090: The How and Why of Analyzing Station Access in Suburban TOD Assessment

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Transit Oriented Development (TOD) is a lot of things to a lot of people. To a transit agency, it might be more riders for less money spent on parking. Cities might see a catalyst for diversity and land use mix. Developers see the potential for density that might not be practical otherwise. To transit riders it could mean more options for places to reach via transit and a better justification to look into the benefits of transit. However, to each of these, planning for TOD is about opportunity. This paper examines access analysis in suburban TOD assessment through the lens of a recent project in the Seattle area.

Introduction

In the Seattle metro area, Sound Transit (the transit district created in 1996 to build and operate a regional high-capacity transit system) is building and studying extensions of its light rail transit (LRT) system that were identified and funded in part by two tax-levy measures—the first in 1996 and the second in 2008. The last of these extensions to be studied under the 2008 measure is the 7.6-mile Federal Way Link Extension (FWLE), which starts about 12 miles south of downtown Seattle and about 2 miles south of SeaTac Airport. A current system planning map is provided in **Figure 1** for context. The FWLE is somewhat different from previous corridors in that after the "Alternatives Analysis and Basic Engineering" phase of the project, no general alignment or set of stations was clearly favored. Instead, four alignment alternatives and more than 20 distinct potential station sites were carried forward to the "Draft Environmental Impact Statement (DEIS) and Conceptual Engineering" phase of project development.

Figure 1
LINK System Planning Map
Source: Sound Transit, 2015

Overall Methodology

To conduct the planning-level analysis of many station options, Sound Transit directed its consultant to develop a TOD assessment consistent with its overall system access policies that would provide useful information about how likely the candidate station locations would be to support TOD. The overall goal was to determine which station site would have the best TOD support within each of 5 general geographic areas being considered for stations. TOD assessment needed to be consistent with the level of design information available for a DEIS, yet simple enough to be

accepted by the public. In the end, TOD support is one piece of information Sound Transit's board of directors will consider, along with project costs, benefits, and impacts, when it identifies the Locally Preferred Alternative to carry into the next phase of the project ("Final EIS and preliminary engineering").

The TOD methodology was founded on the following 4 categories of criteria: Access, Land Use, Plans & Policies, & Utilities; Market Support; and Land Availability. Each category received equal weight in the final evaluation, and consisted of 3 or 4 criteria by which candidate station options were evaluated. Each criterion also received equal weight in determining the "category score" for each station option. This paper focuses just on the Access category and the methods, challenges, and lessons associated with analysis of access to the proposed stations.

The criteria in the Access category were defined by mode: walk, bike, transit, and auto. For each, the team sought to answer, at least in a relative way, "How easy would it be to get to the station?" The station rating for each mode-based access criterion was composed of ratings for three to five criteria specific to that mode. Ratings were assigned on a scale of 1 (worst) to 5 (best) relative to a high-performing station elsewhere in Sound Transit's LRT network.

Land use mix and critical density are what drive the transit ridership benefits of TOD, but those don't happen without easy access to the station platform, whether they are walkers coming from 5-10 minutes away, those on bicycles in the 1- to 3-mile range, bus and paratransit riders, or drivers and chauffeured riders from both within and outside the station area. In the suburbs, where a new transit station could help concentrate development, changes in access infrastructure could be required to handle demand.

Breaking Down Access Analysis by Mode

Walk Access

Walk access is usually considered an important indicator of TOD potential for a transit station area. Good walk access can be a key driver of the compact development that tends to make TOD successful. The method used to evaluate walk access for Sound Transit involved comparing each proposed station location to a model pedestrian-friendly environment served by high capacity transit. The Sound Transit Capitol Hill Link Station, scheduled to open for service in early 2016, was used as the Walk Access model. The Capitol Hill station was selected as the "control" for walk access because it would receive the best ratings when scored against the evaluation criteria used for walk access. Each station received a score for each criterion listed in the table below and was rated on a scale of one (worst performing) to five (best performing) for its relative performance to the Capitol Hill comparison station. The criteria used to evaluate walk access at each station location were:

- Grid density — Density of the public walking network, which is presumed to consist primarily of streets and sidewalks
- Continuity and directness — Lack of broken links in walk routes, and directness of the route between the station platform and walk trip destinations
- Barriers — Lack of barriers and impediments between walk destinations and the station area, such as I-5, major streets, or fences
- Destinations — Presence and variety of major walk access destinations in the station area
- Topography — Topography of the station area for walking

Research shows that under good circumstances, most transit riders are willing to walk up to ¼ of a mile to access transit services, and many are willing to walk up to ½ mile. Circles ½-mile in radius around the station area are often used to assess the station walkshed, which covers a 10 to 15 minute walk. Due to the close proximity of the station options within each of the five station areas, 1/2-mile circles did not provide meaningful differentiation among the alternatives to help identify the TOD support of a particular station option. To correct for this condition, a ¼-mile circle from the station platform was used instead. This corresponds to the distance someone can walk in about five minutes walking at a three mile-per-hour pace.

Transit related pedestrian behavior can be linked to the quality of the walking environment surrounding the station. Willingness to walk to transit correlates with topography, density, urban design features, frontage activity along the walk route, and riders' sense of safety and security. Direct routes with lower delays promote walkability.

Topography ratings for walk access were considered in the same way they were for bicycle access (described in the next section) using the assumption that flatter terrain makes access easier. Ratings were made on a qualitative, 'general station vicinity' basis relative to the control location, rather than on specific quantitative measurements or numerical thresholds for grade.

Presence of sidewalks, signalized crosswalks, lighting, and distance from major arterials contribute to pedestrian safety and security. Urban design at a human scale, such as moderate building setbacks, sidewalk connections, and park features near the station area encourage transit patrons to walk to their destinations, and therefore to consider transit a viable option for the bulk of their overall trip. Development, density, active retail centers, and greater pedestrian traffic contribute to an increased sense of security around transit stations by increasing the overall activity level in the station area.

Bicycle Access

Bicycling is a healthy, low cost alternative to commuting via personal auto. Improved bicycle access increases the transit catchment area of a station, as commuters can travel in the same time spent walking to the station. Transit riders traveling to and from the station by bicycle desire direct and safe routes to their destinations. Integrating safe, convenient, and affordable bicycle parking into light rail station design promotes bicycling as a mode to connect to transit.

The method used to assess bicycle access involves comparing the proposed station location to a model bicycle-friendly environment served by high capacity transit. The Sound Transit University of Washington Link Light Rail Station, which is scheduled to open in early 2016, was used as the model for comparison purposes. The University of Washington station was selected as the "control" for bicycle access because (1) it is the closest station to the busiest and most significant regional bicycle facility in the Sound Transit service area (the Burke-Gilman Trail), (2) it serves major institutional land uses that generate high bicycle ridership demand, and (3) it does not have steep slope constraints in most directions. Each station was scored for each criterion and was rated on a scale of one (lowest performing) to five (best performing) for its relative performance to the University of Washington station. Bicycle access to the proposed station locations was evaluated as follows:

- Facilities — The type or significance of the bicycle route or facility in the station area, scored as: (1) none, (2) shoulder, (3) designated route, (4) on-street bicycle lane, (5) separated path
- Proximity — The proximity of the bicycle route or facility to the station area
- Topography — Topography of the station area for biking

A typical bikeshed radius for a transit station is three miles. Due to the clustering of the station options, the three mile bikeshed did not provide significant differentiation among stations in terms of access potential. Instead, this study examined the presence and quality of connections to bicycle routes and facilities nearby to evaluate bicycle access to and from the station locations. This provided information on how easy or difficult it would be for a bicyclist to connect to the station from the bicycle lanes or routes on nearby streets that take riders to their eventual destinations.

Topography ratings for bicycle access were considered in the same way they were for walk access (section above) using the assumption that flatter terrain makes access easier. Ratings were made on a qualitative general station-vicinity basis relative to the control location, rather than on specific quantitative numerical measurements of grade.

Transit Access

Connecting bus service to LRT stations expands the system's ridershed by providing an alternative to driving for people living beyond the immediate station area, especially for riders without a car, the elderly, and persons with disabilities. In the FWLE project corridor, connecting fixed-route scheduled bus service is provided by Sound Transit, King County Metro, and Pierce Transit. In addition, paratransit service provides access for passengers who are unable to use the bus system due to disability. Conditions that support integrated transit service include minimal wait times between modes, short walk distances to stops, safe and direct routes, coordinated fares, and a secure station environment.

The method used to assess transit access involves comparing the proposed station option to a model transit-friendly environment served by high capacity transit. The future Northgate Link Light Rail Station, which is scheduled to open for service in 2021, was used as the model for comparison purposes. Northgate was selected as the "control" for transit access because it has a high volume and variety of connecting transit and paratransit services. The "RapidRide proximity" criterion was not compared to the Northgate station because that station is not currently served by RapidRide. Each station was scored for each criterion and was rated on a scale of one (worst performing) to five (best performing) for its relative performance to the Northgate comparison station. Transit connections to the proposed light rail station locations were evaluated as follows:

- Proximity to RapidRide — The proximity of the proposed light rail station location to RapidRide bus stops to collect riders along the corridor
- Density of Connecting Service — Density of other connecting local or regional bus service in the station area
- Paratransit — Quality of paratransit transfers, including proximity to the platform, directness, and freedom from barriers

Sound Transit coordinated with King County Metro on the conceptual station layout plans in the early design phase to ensure that future bus needs could be accounted for in each station design. The agencies also discussed future service revisions and other ways to improve connectivity between modes that would promote ridership and multimodal accessibility. This coordination will continue throughout the project planning process and future design efforts.

Auto Access

The FWLE project is located in a suburban corridor. Currently, Sound Transit regional express bus service in the corridor attracts riders from a large area, primarily via auto access at park-and-rides, but also from local connecting bus service from the surrounding communities. While Sound Transit aims to promote the use of non-motorized modes and integrated transit service, personal vehicles will remain a significant mode of transit access for riders in the near and mid-term future in this corridor. Additionally, due to funding constraints, the FWLE project will likely be built in phases. A station at Kent/Des Moines or S. 272nd Street could be an interim terminus. The pattern of auto commuting to access regional transit will is very likely to continue during interim phases. Additionally, the current mix of land uses, the market forces, and the likely timeline for redevelopment to achieve the local jurisdictions' future visions will keep the personal automobile a primary mode of LRT station access. For these reasons, auto access is included in this assessment of transit oriented development potential.

The method used to assess transit access involves comparing the proposed station option to a model environment with good auto access served by high capacity transit. The future Northgate Link Light Rail Station, which is scheduled to open for service in 2021, was used as the model for comparison purposes. The Northgate station was selected as the "control" for auto access because it has good quantity and quality of surrounding streets and because parking and drop-off areas will be reasonably close to the proposed station platform location. The specific criteria used to evaluate auto access in this study were:

- Access Options – Quantity: Quantity of streets connecting the station to the surrounding area (the number of access options)
- Access Options – Quality: Quality of streets connecting to the station in terms of congestion (from DEIS intersection LOS analysis results), complexity, and directness
- Parking Stall to Platform Connection: Qualitative assessment of distance and directness from parking area to station platform
- Pick-up and Drop-off: Qualitative assessment of proximity and access for short-term parking, as well as orientation and line of sight with respect to the platform

The Auto access criterion was treated particularly carefully because several interested stakeholders questioned whether autos should be considered at all in evaluating a TOD scenario. This is where the highly suburban nature of the project area comes into play. The Federal Way corridor has a high proportion of its land dedicated to lower-density uses and most residents do not desire a high degree of added density. Outside of central Seattle and a few planned high-density station areas, many transit system users are still expected to access stations by car. In addition, there is increasing consideration of pick-up/drop-off trips, or "chauffeured" trips, when modeling station access mode. At two of the five station areas in this project corridor, all station options have been designed without any on-site parking, even though a substantial share of riders are expected to desire to get to the station by car.

Key Lesson: The Two Special Challenges of Planning-Level Rating Systems

Subjective vs. Objective Scoring

Subjective or relative scores, as employed here (the 1-to-5 range) are useful at the planning level when there are not enough data or project resources to analyze a large number of stations for a large number of criteria. Subjective scoring is also useful in highlighting differences between stations WITHIN a project, rather than against other stations in other transit systems, because doing so allows the opportunity to normalize scores (to assign a "1" to the worst-performing station and a "5" to the best), if desired.

Relative Importance of Criteria ("Weighting")

Any multi-faceted analysis faces the challenge of whether some criteria should carry more weight in the decision than others. Even the methods of scoring and averaging can result in implicit weighting. Addressing this challenge requires special attention to the transit agency's goals and the constraints and opportunities present in the context of the project. Here, the four access modes were considered equally because the density and quality of development that supports transit not an automatic result of building the transit project. In a sense, the inclusion of bicycling and auto access represents an effort to match the corridor's travel mode split in a somewhat realistic fashion, rather than how an "ideal" TOD would want it to be. Another (and perhaps stronger) reason to avoid weighting is that doing so is a subjective exercise in itself—it can offer more opportunities for opponents to challenge the findings of the analysis.

Big-Picture Results

Four alternatives were selected for analysis in the DEIS: two parallel alternatives ("SR 99" and "I-5") and two alternatives that would use one alignment in the northern part of the corridor and switch to the other in the Kent/Des Moines area ("SR 99 to I-5" and "I-5 to SR 99"). The Access ratings for each station "dot" were combined with TOD Support ratings from the other three categories of criteria to produce an overall rating for each station. These results are shown with the SR 99 and I-5 Alternatives in **Figure 2**.

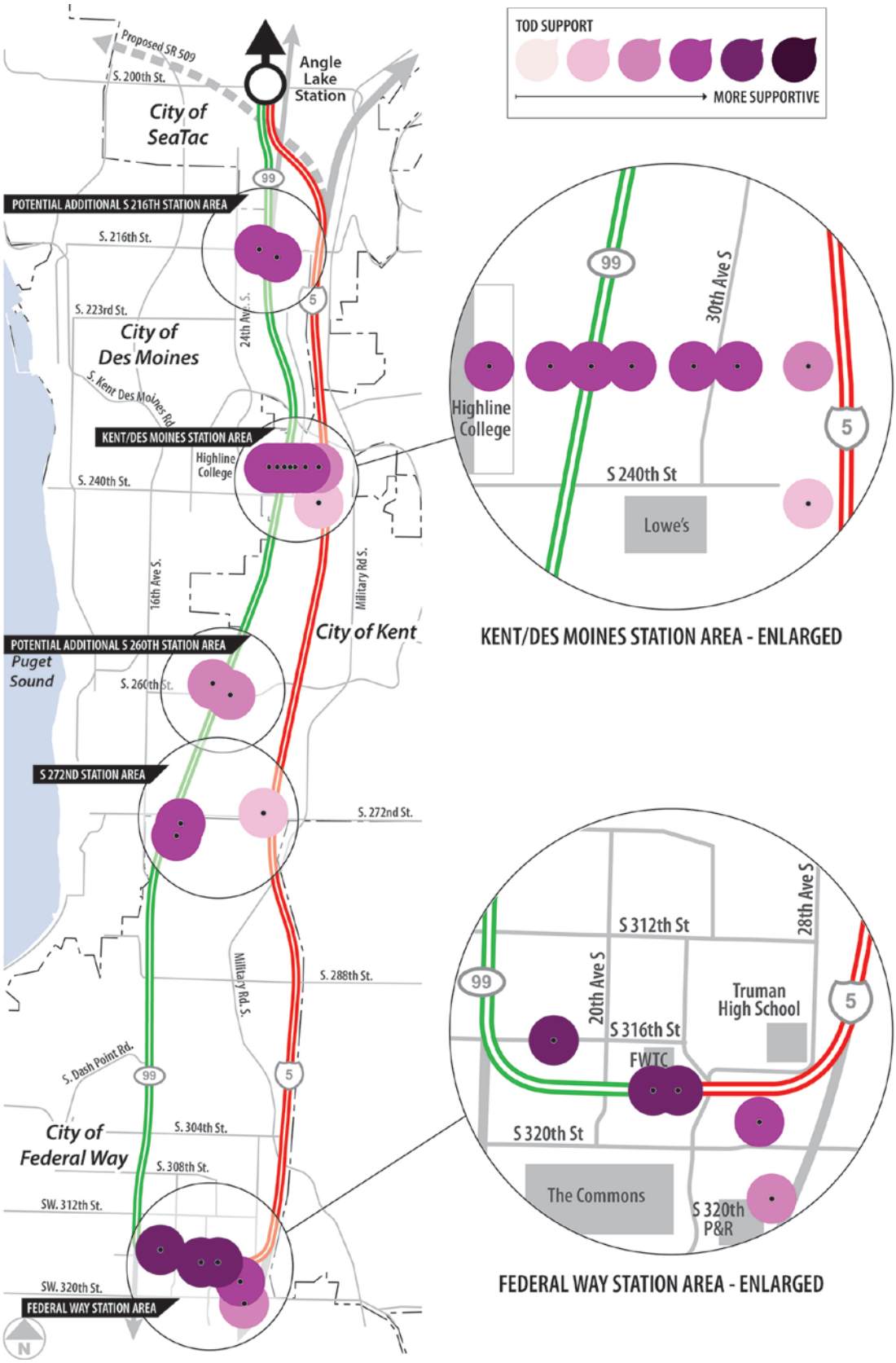

Figure 2
Overall TOD Support Results
Source: Sound Transit, 2015