Evaluation of Sound Transit Train Stations and Transit Oriented Development Areas for

COMMON CARRIER LOCKER SYSTEMS:

Phase 1 Research Project

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Cover photo: Manali Sheth

INTRODUCTION

This report provides a literature review of the parcel locker landscape in Europe and the U.S.; reports on a survey of rider interest in parcel lockers at the three Link Light Rail stations under consideration; documents the process for developing site evaluation criteria and applying the criteria; and analyzes and explains the key features of five viable pilot locker sites.

Of course, no common carrier locker system will be an economically sustainable strategy unless both parcel locker users and delivery carriers see it as a valued benefit. This report documents strong interest among both groups: potential locker users in the form of Link Light Rail riders and the two Urban Freight Lab (UFL) carrier members, USPS and UPS. (Due to the pilot nature of the proposal being considered, just the two UFL carrier members were involved in this research.)

King County Metro Transit, the Seattle Department of Transportation (SDOT), and Sound Transit are fulfilling their missions by adding amenities that attract and support ridership and create vibrant public spaces in and around the transportation system. Engaging in a common carrier locker pilot test will provide insights that may lead to vital long-term transportation system enhancements.

There is no one-size-fits-all approach to solving for failed first deliveries. But parcel lockers are a promising solution that aligns with city, industry, and agency needs in Seattle.

This report maps five viable pilot locker sites for consideration at three Link Light Rail stations: one at the University of Washington Station; three at the Capitol Hill Station; and one at the Westlake Station. These sites were collaboratively evaluated by the research team, public agency representatives, and UFL members. The five sites were identified within the scope of this research project, but do not represent an exhaustive list of all potentially viable sites.

King County Metro Transit, the Seattle Department of Transportation (SDOT), and Sound Transit are national leaders in exploring the feasibility of providing public right of way for common carrier parcel lockers at commuter train stations and/or in the Transit Oriented Development (TOD) areas near them. This research project supports the agencies' mobility goals, as smart locker systems in cities may:

- Reduce the number of truck trips caused by the rapid growth of e-commerce, and
- Make urban truck parking spaces more productive.

Lockers do this by creating delivery density, so trucks can deliver many packages at one stop rather than driving, parking, and/or pulling handcarts to multiple locations.

Parcel lockers also support the three agencies' mobility hub policies, which call for rider amenities that create lively public spaces. Mobility hubs are part of the people-centered approach to public spaces known as placemaking. Mobility hubs aim to create a one-stop-shop of sorts for multiple modes of transportation, from bicycles and ride shares to trains and buses. They seek to make transit options other than single-occupant vehicles easier to use and more appealing by embedding these options into well-designed, well-connected public spaces loaded with ample community amenities—all of which fosters vibrant street life and improves livability.

Common carrier lockers are consistent with the mobility hub concept and are a potential tool for mitigating the challenges of Final 50 Feet delivery—most urgently, the need to reduce both dwell time (the time a truck is parked in a load/unload space in the city) and the number of failed first delivery attempts.

Research in the Urban Freight Lab in the Supply Chain Transportation and Logistics Center at the University of Washington has shown that dense, mini-distribution nodes are likely to be an effective strategy for mitigating these Final 50 Feet challenges. (1) Creating ways to receive goods in these dense mini-distribution nodes can help eliminate the time-consuming process inherent in a traditional system where deliveries are made one-by-one, door-to-door to individual consumers. Seattle's first Freight Master Plan, for its part, echoes the notion of dense, mini-distribution nodes, calling for the city to study the feasibility of creating "urban consolidation centers, joint distribution centers, or local building logistics centers." (2)

A common carrier locker system is a potential low-cost, high-value strategy for operationalizing this mini-node concept. A secure, automated, self-service system designed to accommodate a range of parcel sizes, common carrier lockers allow multiple carriers (delivery firms) to use them. Although branded parcel lockers have been installed in myriad publicly accessible locations in the U.S. and Europe, the research team found no existing common carrier locker systems on public property. (See Literature Review for details).

Seattle is now the fourth most-congested city in the U.S., according to the 2016 TOMTOM Traffic Index. (3) The e-commerce explosion has transformed urban goods delivery systems and increased the challenges associated with the Final 50 Feet delivery in increasingly crowded cities like Seattle, with a density around 8,350 residents per square mile. The Final 50 Feet is shorthand for the end segment of the supply chain. It begins when trucks pull into a parking space and stop moving—in public load/unload spaces at the curb or in an alley, or in a building's loading dock or internal freight bay. It tracks the delivery process inside buildings and ends where the customer takes receipt of the goods. (3)

Delivery firms are trying to move more goods, more quickly in a congested urban environment while online shoppers' expectations for fast, reliable service are rising. Retailers need a more efficient, reliable, safe and cost-effective way to deliver goods to these urban residents. Cities like Seattle share the desire to minimize traffic congestion, both to sustain quality of life for urban residents and to ensure the smooth flow of goods and services to support the economy.

According to Urban Freight Lab members, the failed first delivery rate is up to 15 percent in some areas of major U.S. cities. Reducing failed first deliveries will:

- Improve an amenity that adds value at Sound Transit stations and the TOD's near stations —the ability to ensure that riders can shop online and get their order when they expect it in a secure and convenient location;
- Lower traffic congestion in cities, as delivery trucks could make up to 15% fewer trips while still completing the same number of deliveries;
- Cut crime and provide a safer environment for residents and workers;
- Improve urban online shoppers' experiences and protect retailers' brands;
- Ensure that all city neighborhoods can receive online orders, not just a few;

- Make the City of Seattle a more inviting place to live and work, thereby attracting more business development, and;
- Cut business costs for the retail sector and logistics firms.

The UFL analyzed the Final 50 Feet of the urban goods delivery system in 2017; developed the common carrier locker strategy based on that analysis; and is pilot-testing a common carrier locker system in the Seattle Municipal Tower in spring 2018. Results from that pilot test will be published in 2018.

Current UFL members are retail and goods delivery company executives; membership is also open to building developers and managers and technology firms supporting delivery systems. The Lab partners with SDOT to solve urban delivery issues that are important to both the private and public sectors. The Lab is a structured work group in which members set priority goals and provide business insights and data for chosen projects. The UFL university research team gathers and analyzes multiple data sets, then develops and implements pilot tests for promising solutions in the public right of way and in buildings. This approach provides public agencies with evidence of the new strategies' effectiveness in reaching both public and private sector goals before they decide to widely adopt them throughout the city. Both UFL members and the three agencies involved in this project have shown a high level of interest in a common carrier locker solution and have helped guide this research project. Current UFL members are Charlie's Produce, Nordstrom, UPS, and USPS.

Publicly accessible parcel lockers in the U.S. currently are owned, branded, and managed by individual companies. For example, Amazon has placed its branded parcel lockers at convenience stores in the U.S. and at locations within its Seattle campus. Amazon is also signing contracts with some of the nation's largest apartment owners and management firms to install lockers for building residents that officially accept packages from all carriers— not just for Amazon purchases. (4) But other retailers are wary of Amazon's lockers, as they fear that the online giant would gain access to their information. Amazon recently expressed interest in installing their branded lockers on King County Metro Transit and Sound Transit property; this was one impetus for this research study.

King County Metro Transit, SDOT, and Sound Transit are stewards of public facilities, which precludes them from advantaging a single firm by giving them the right to place parcel locker systems in public spaces, unless other companies also have access to this public good. This report will help the agencies understand the key considerations, benefits, and tradeoffs of potential public-private partnerships to implement a common carrier locker system open to multiple retailers and delivery companies.

The research team did not find any other U.S. or European city that has a common carrier locker system on public property. The UFL pilot test of common carrier lockers in the Seattle Municipal Tower from March 23 to April 13, 2018 is the only known pilot test underway in the country.

Photo owned by Parcel Pending.

SECTION 1

LITERATURE REVIEW OF PARCEL LOCKERS IN EUROPE AND THE U.S.

A parcel locker is a self-service technology that has helped reshape the urban goods delivery system in both the U.S. and Europe. Some of the first parcel lockers were introduced in the U.S. in 2011 and in Europe in 2002. (5) & (6) As noted in the introduction, the e-commerce explosion has transformed urban goods delivery and ratcheted up the challenges in the Final 50 Feet of the supply chain. Parcel lockers and other new technologies may help respond to these challenges by reducing commercial vehicle dwell time and cutting the number of failed first delivery attempts. (1)

For this literature review, the research team examined previous reports, online articles, and information from parcel locker companies to better understand parcel lockers' role and impact and to identify existing common carrier locker systems in the U.S. and Europe.

The research team found references to single carrier *publicly accessible* lockers in the U.S. and Europe. Although the research team found references to lockers sited in and around train stations in Europe and references to common carrier lockers on private property in the U.S., the team found no record of an existing *common carrier* locker system on *public property* in the U.S. or Europe.

Key findings from the literature review follow below.

Scope of the failed first delivery rate and parcel theft challenges in the U.S.:

Urban Freight Lab members report the rate of failed first deliveries has reached 15 percent in some areas of major U.S. cities. The research team could find no public data sets that reveal how many failed first deliveries or parcel thefts occur at the zip code or census tract level. As to porch piracy, a 2016 nationwide survey captured 2,000 peoples' attitudes. The survey found (7):

- Nearly 45% of Americans have had a package stolen or know someone who has.
- 75% of Americans are concerned about porch piracy with urban residents the most concerned.
- Porch piracy has influenced how two-thirds of Americans manage their deliveries;
  - 49% have adjusted their schedules to be home for a delivery.
  - 46% have changed the way they receive packages.
  - 31% have reduced their online shopping.

HOW THE PARCEL LOCKER WORKS

As a self-service technology, parcel lockers allow customers to independently access their packages 24/7 (locker system location permitting). Typically, the system includes lockers with a range of dimensions to fit small, medium, and large parcels. Customers are alerted via text message or email that their package is ready for pick up. Once customers enter their one-time access code into a screen embedded in the locker, the locker holding the package automatically unlocks for parcel retrieval. Parcel lockers can be installed on residential, commercial, public, or publicly accessible property, such as inside a convenience store. Figure 1-1 shows a customer using a UPS Access Point locker. Some parcel locker systems also have built-in label printing capacity. By making it possible for customers to print return labels at the locker itself, the system facilitates returns, which provides customers an amenity and consolidates carrier company trips.

Figure 1-1. Example of Self-Service Parcel Locker Design and Utility (8)

CURRENT PARCEL LOCKER LANDSCAPE IN THE U.S.

In the U.S., Amazon first piloted parcel lockers in 2011, in the Seattle market. The Amazon Lockers started in 7-Eleven convenience stores as an alternative to home delivery for Amazon customers. (5) The lockers offer Amazon customers parcel pick up at a convenient place with flexible pick up time at no additional cost. (9) Packages are held in the locker for three days before being sent back to the Amazon warehouse (the customer is then refunded.) Seattle currently has 17 self-service Amazon Lockers, 14 of which are publicly accessible. (The remaining three are in private buildings that require a key or other security access). (10) Each locker has its own hours of operations. Some are accessible from 6 AM; others are accessible 24/7. (10) Today, more than 50 major U.S. metropolitan areas have a total of 2,000+ Amazon Lockers at convenience stores, banks, and other centrally located sites. (5)

In July 2017, Amazon launched Amazon Hub, a common carrier locker system for installation on private property, designed to exclusively serve occupants of residential or office buildings. (11) While this approach echoes the common carrier locker concept explored in this research project, it departs radically in that it is not designed to serve the public at large and it is not sited in a publicly accessible area. Third-party locker vendors such as Luxer One have expressed concern that Amazon, as a retail giant, will "gather personal data (demographics, order frequency, store preferences, package size, etc.)" and potentially breach personal security and privacy concerns with the data. (12) Many stakeholders in this proposed pilot project have expressed that having a neutral third-party locker vendor manage common carrier lockers is important. Any security and privacy concerns could be addressed when the vendor and delivery companies negotiate contract terms.

The rise of Amazon Lockers has spurred a competitive marketplace for parcel lockers in the U.S. FedEx, UPS, and USPS have added parcel lockers to their delivery system to help combat failed first deliveries, missed deliveries, and theft. To date, these function as single-carrier lockers.

FedEx currently has indoor and outdoor, publicly accessible self-service lockers in Texas and Tennessee. These lockers, with return label printing capacity, operate 24/7 and accept FedEx packages only. Packages are held in the locker for five days before being returned to the shipper. (13)

UPS has collaborated with retailers such as 7-Eleven to install some 300, 24/7 UPS Access Point lockers nationwide. (14)

USPS, the largest postal delivery service in the U.S., first piloted parcel lockers in 2012. (15) To use the lockers, customers must register and receive a special card. They have 15 days to pick up their parcel before it is returned to the shipper. (16) A 2013 USPS report on the pilot gopost program says the agency could have improved it by: simplifying the registration process; partnering with other delivery companies to consolidate delivery points; implementing a penalty charge for 15-day parcel hold breach; picking better site locations; and adding languages other than English to the gopost interface. (17) USPS estimated that the 13 pilot gopost locations would save them between $147,000 and $634,000 in annual labor costs. (17) The pilot has since grown to a network of 27 goposts operating across the country in or around USPS stores, grocery stores, and banks to provide customers 24/7 access. (18) & (19)

PARCEL LOCKER CASE STUDIES IN THE U.S.

A U.S. Department of Transportation-supported study included a pilot test of parcel lockers and three other off-hour (7 PM – 6 AM) delivery alternatives in New York City's Manhattan borough. Thirty-three retail companies participated in the off-hour delivery program for one month. The participating companies were provided lockers, designed to enable off-hour deliveries to the companies without requiring staff to receive them. Unlike lockers designed for consumer use—such as those being considered for pilot-testing in Seattle—these lockers were placed in individual company locations and used exclusively by those companies. The study found off-hour deliveries decreased total delivery time and increased delivery productivity, efficiency, and reliability, suggesting lockers might improve urban freight delivery systems. (20)

CURRENT PARCEL LOCKER LANDSCAPE IN EUROPE

Europe has examples of parcel lockers in and around train stations, but the research team found no reference for common carrier lockers on public property. DHL and other single-carrier parcel lockers are sited in publicly accessible areas, such as around grocery stores, residential neighborhood blocks, convenience stores, and train stations.

In Europe, DHL lockers, or Packstations, date to 2002 and are the earliest delivery locker venture. Germany alone has nearly 3,400 Packstations; 90% of the German population has a Packstation within a ten-minute walk. (21) Customers must register and receive a special card to use Packstations (which accepts only DHL parcels) at no additional charge. (22) These lockers also provide label printing.

In addition to DHL Packstations, Europe hosts many other single-carrier lockers owned and operated by delivery companies, such as Bring Express, BPost, Itella, Post Danmark, and InPost.

In March 2017, a government controlled train company partnered with a grocery chain to install refrigerated parcel lockers in two cities' main train stations (Stuttgart's main station and Berlin's Ostbahnhof). (23) Although this is not a common carrier locker as defined in this report, this locker system is a relatively straightforward public-private partnership designed to create public amenities in and around transit. (While Deutsche Bahn is legally referred to as a private railway company, the German government is the sole shareholder.) The pilot may expand to accept deliveries beyond the grocery chain, Edeka, such as from pharmacies, dry cleaners, and other food delivery services. (24) & (25) For now, the refrigerated parcel lockers at select platforms enable riders to use their wait time to pick up groceries to and from their work commute. This service costs 2.95 Euros with no minimum purchase required. (26) Customers can pay for their items when they place their order online or at pick-up from the locker. (27) There is a four-hour lead time between submitting an order and being able to retrieve the delivery. (28)

PARCEL LOCKER CASE STUDIES IN EUROPE

Two qualitative studies in Europe explored how customers valued parcel lockers and why they chose to use them.

A 2017 study in Sweden sought to understand how customers value parcel lockers, assessing four values: functionality, emotional experience, social interactions, and financial impacts. The study included 26 participants between 20-59 years old who received or returned a parcel at a locker at least once. Research participants confirmed that these four elements did create customer value. Different combinations of these factors led customers to either continue using parcel lockers or stop using them. (29)

A second qualitative study, from 2014 in Poland, explores whether environmental concerns motivate Millennials to use parcel lockers since "the last mile is currently regarded as one of the most expensive, least efficient and most polluting sections of the entire logistics chain." (30) The study analyzed interviews of 234 participants who have used a parcel locker at least once. They found environmental considerations were *not* a major factor for Millennials' parcel locker use: Instead, the convenience of 24/7 service was the most common reason given. (31)

Efficiency study: In 2015, another study in Poland found that installing lockers in prime locations can increase delivery efficiency. Compared with delivering to each recipient location, the data from a single day on one locker system studied showed this: Total miles travelled in one day fell by more than half, from 150 km (93 miles) to 70 km (43 miles); the number of parcels delivered in one day by one truck grew from 60 to 600 parcels, which also significantly reduces CO2 emissions and fuel consumption. (32) This research suggests that strategically sited parcel lockers can allow delivery companies to increase the number of packages delivered in a day while cutting travel time and mileage.

Environmental study: A 2012 Politecnico di Milano study models and compares the environmental impact (in KgCO2e, a standard unit for measuring carbon footprints) and operational costs (in euros) of parcels delivered to a locker rather than to homes in both an urban and extra-urban scenario. In both urban and extra-urban scenarios, environmental impact and operational costs can significantly decrease

with locker delivery. This study quantifies parcel locker benefits and acknowledges how the distance between an end customer's home and the closest parcel locker affects both environmental impact and operational costs. (33)

Growth of alternative delivery methods study: A focused study on alternative delivery methods explored parcel lockers in Germany and Pick-up Points in France. The authors attribute Germany's success with parcel lockers to high access to the Internet, high rates of e-commerce, and consumer comfort with returning items purchased online. DHL Packstations, for example, are expected to grow in Germany. France, until recently, prohibited unattended parcels in lockers. This explains the predominance of staffed Pick-Up Points, convenient locations with extended hours such as a pharmacy, rather than lockers. Both parcel lockers and Pick-up Stations are expected to grow and thrive as alternative delivery methods in Germany and France. (34)

PARCEL LOCKERS ARE POSITIONED TO CONTINUE TO GROW IN URBAN DELIVERY SYSTEMS

As e-commerce grows so do failed delivery attempts due to: a requirement that someone sign for the delivery but no one is home, misaddressed parcels, and package thefts. Delivery companies and parcel vendors recognize parcel lockers as a potential marketplace solution. TZ, Bell and Howell, Parcel Pending, Cleveron, and Bringme are just some of the companies bringing parcel locker technology to the mass market in the U.S. and Europe.

The literature review surfaced key considerations around parcel locker systems and revealed their benefits, as well as design and operational considerations.

Benefits:

- offer reliable parcel storage
- facilitate deliveries and returns
- facilitate off-peak-hour deliveries
- offer consolidated deliveries
- offer flexible hours of operation
- offer label printing stations on-site, for returns

Design and operational considerations:

- may be limited to use by just one delivery company (single carrier)
- have design limitations around locker number and sizes (fixed capacity)
- require maintenance

To date, parcel lockers have provided a viable alternative approach to managing urban deliveries. These systems are positioned to continue to grow as part of a dynamic urban delivery system in both the U.S. and Europe.

Photo: Manali Sheth

SECTION 2

MARKET RESEARCH:

Measuring Rider Behavior and Rider Interest in Parcel Lockers at the Three Link Light Rail Stations

As noted at outset of this report, a common carrier parcel locker system ultimately will not be an economically viable strategy unless both delivery carriers and riders see the system as a valued asset. Research team survey interviews of 185 Link Light Rail riders show strong rider interest at all three stations under consideration for the pilot parcel locker system.

LINK LIGHT RIDER DATA COLLECTION PLAN

Over five days in fall 2017, researchers surveyed riders between 7-9:30 AM and 5-7:30 PM on one weekday at each of the three Seattle stations. Researchers stood at the approved entrance and exit points and approached riders by saying: "Hello, did you just get on/are you about to get on to Light Rail? I am working with Sound Transit and am exploring the idea of putting a common carrier locker for online deliveries at the station. Do you have a few minutes?"

If a respondent said that he/she does not use the Link Light Rail or does not shop online, researchers did not continue surveying the respondent. (These terminated interviews are not included in the final survey results shared below.)

Researchers interviewed riders at both street level around the stations (at stations with street-level train schedule monitors) and on the station platforms, as researchers found riders were more inclined to participate in the survey if they could maintain a clear view of the train schedule monitor. Researchers asked riders seven multiple-choice questions about their commute pattern, online shopping and parcel delivery behavior, and interest in using a common carrier locker. The complete survey is included in Appendix D.

LINK LIGHT RAIL RIDER SURVEY RESULTS

Rider survey results summarized and shown here use clean data. (The data cleaning process is included in Appendix C.) The research team completed 185 interviews, far surpassing the initial goal of 30 interviews. Survey participants broken down by station are shown in Figure 2-1.

Figure 2-1. Number of People Surveyed at Each Station

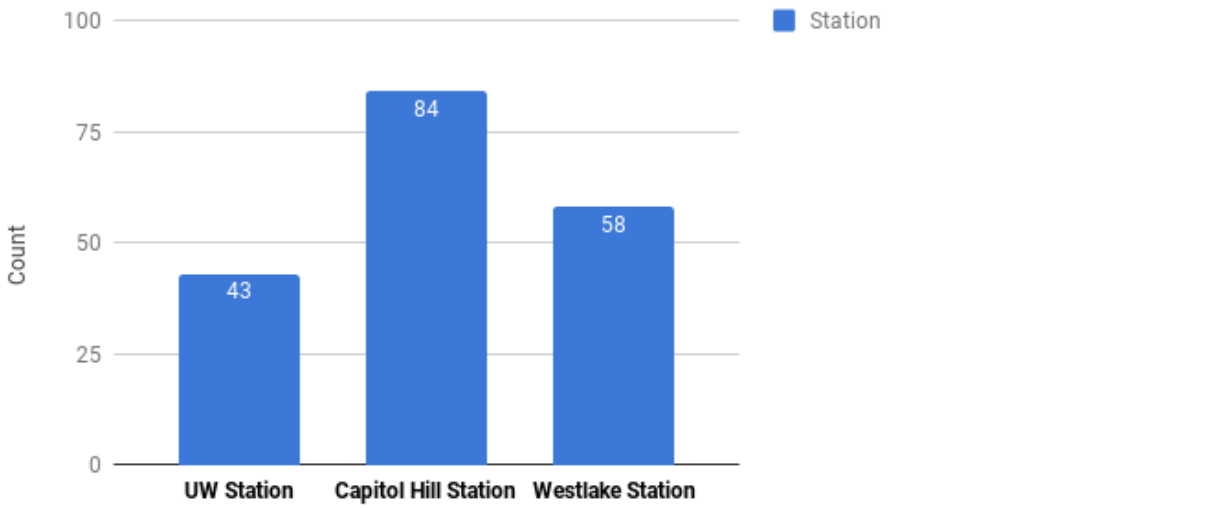
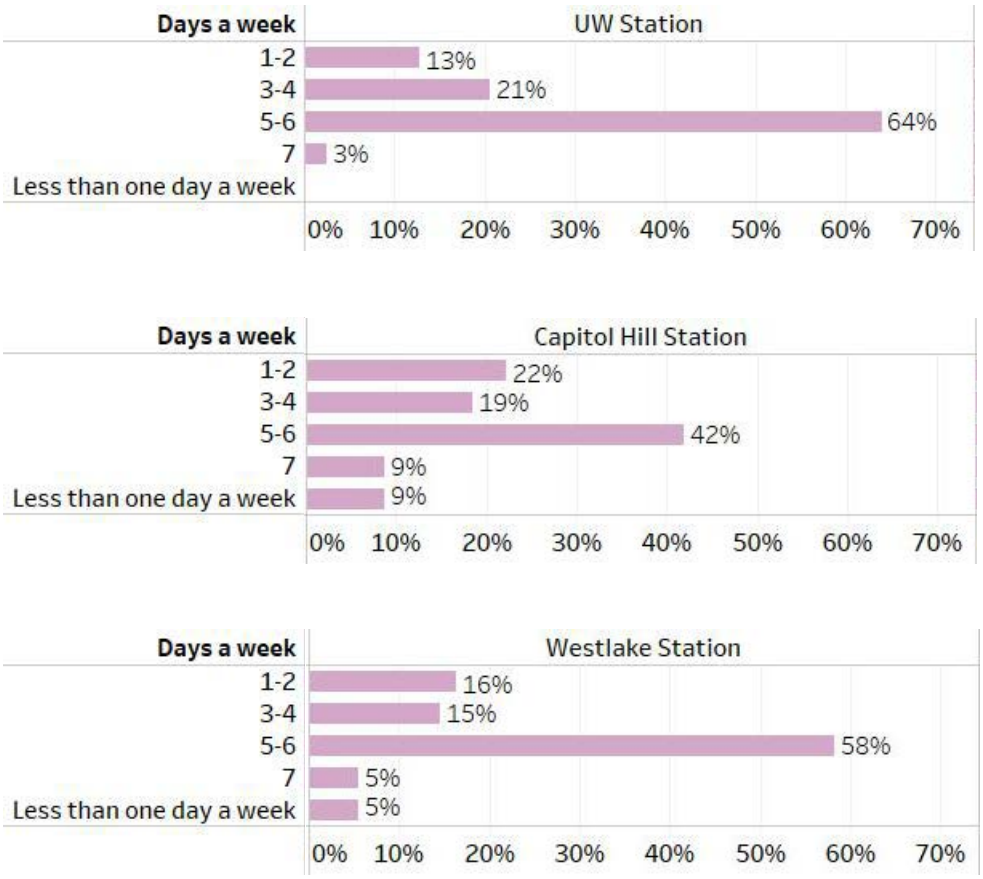
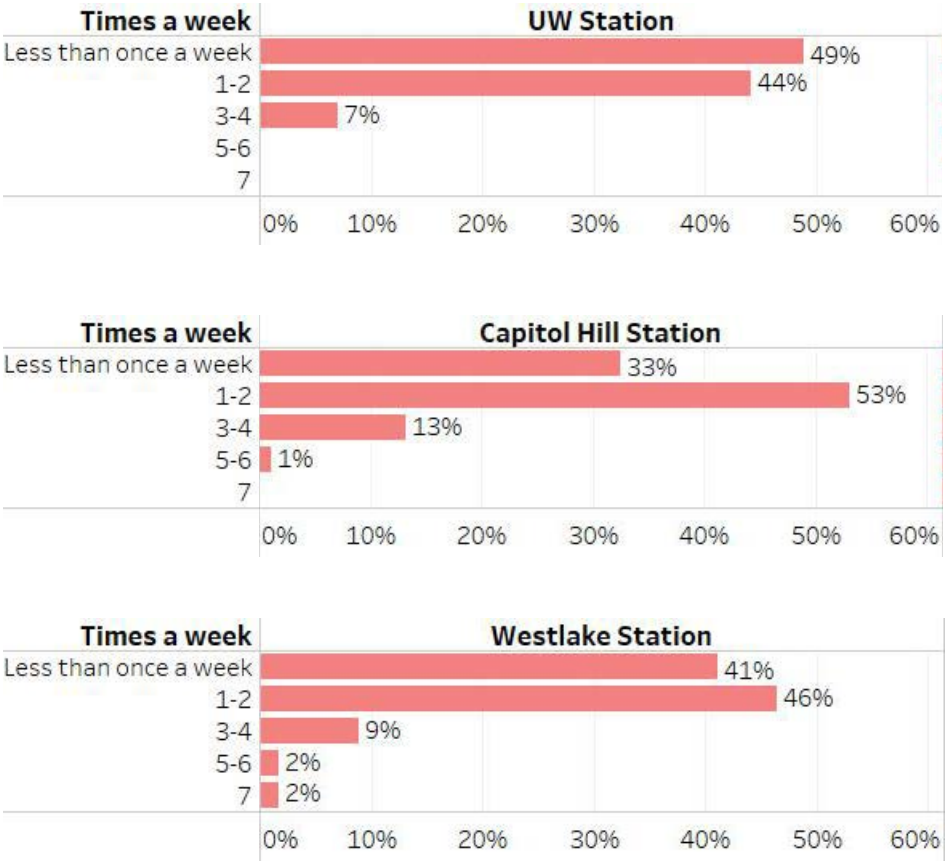


Figure 2-2. Survey Question #1:
How Many Days a Week Are You at This Train Station?



As shown above, most survey participants at all three stations were weekday commuters who reported being at the station 5-6 days each week.

Figure 2-3. Survey Question #2:
How Many Times a Week Do You Receive Online Deliveries?



At all three stations, most survey participants reported receiving online deliveries 1-2 times a week or less than once a week. The “less than once a week” category includes actual rider responses such as “once every two weeks,” “once a month,” or “a few times a year.”

Figure 2-4. Survey Question #3:
What Are Your Top Two Locations for Receiving Your Online Order?

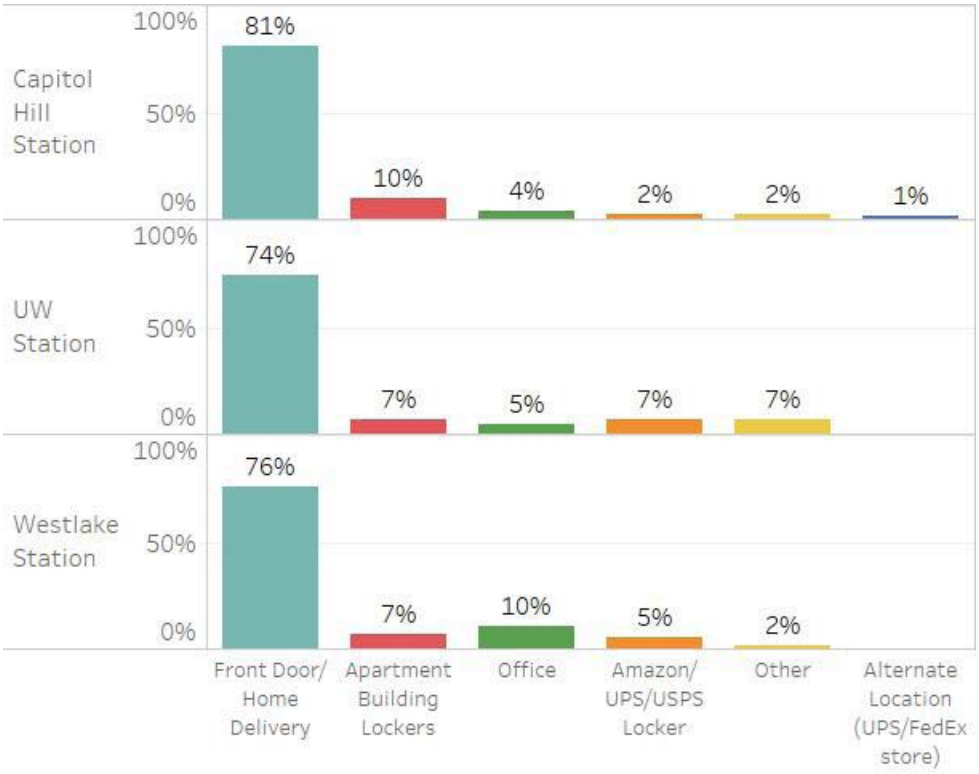
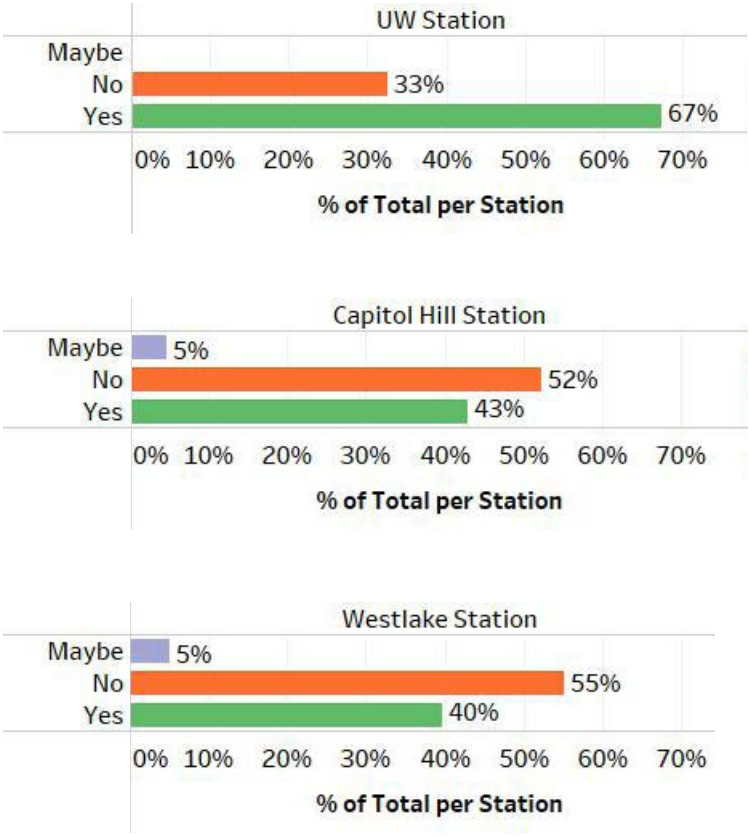


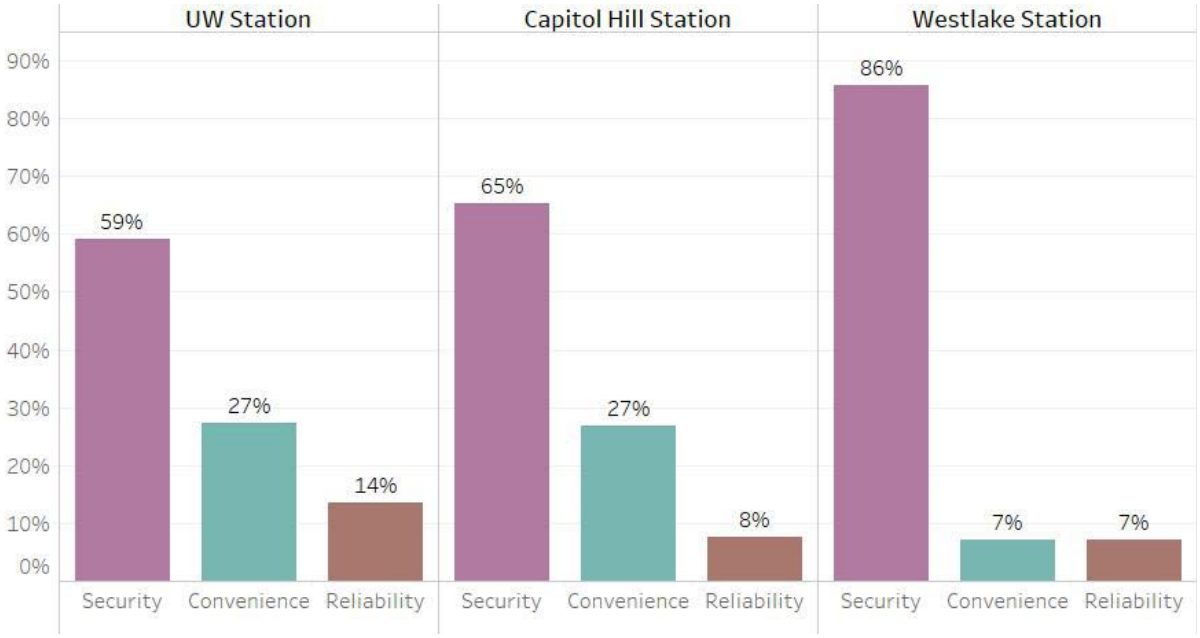
Figure 2-4 gives a sense of how riders currently manage their online deliveries. At all three stations, riders overwhelmingly reported front door or home delivery as their top two locations for receiving their online orders. The "other" category includes residential building lobby or other building locations offered by building management.

Figure 2-5. Survey Question #4:
Would You Use a Common Carrier Locker to Pick Up Your Online Orders at This Station?



As shown above, a full 67% of UW Station survey participants responded "yes" that they would use a common carrier locker. This was the highest "yes" rate of the three stations, with riders at the Capitol Hill and Westlake stations also reporting high interest (with "yes" figures of 43% and 40%, respectively.)

Figure 2-6. Survey Question #5:
Why Would You Pick Up Your Packages from a Locker at This Station?



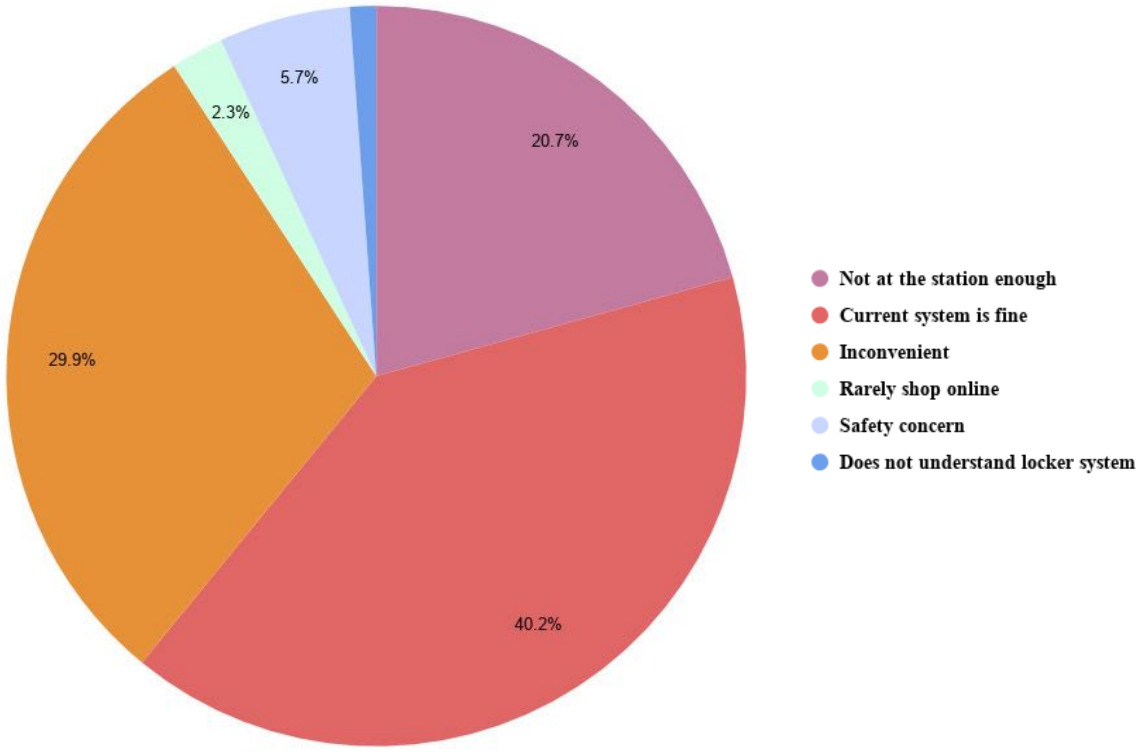
Those that answered "yes" to using a common carrier locker in the Link Light Rail station were then asked *why* they would pick up a package from a locker at the station. At all three stations, the overwhelming majority of riders ranked **security** of the package as the main reason they would use a common carrier locker.

At the UW and Capitol Hill stations the second most frequent reason riders gave was convenience, followed by reliability third. At the Westlake Station, riders rated convenience and reliability as equal runner-up reasons behind security.

Researchers offered these examples to riders to help them understand category definitions:

- **Security:** No theft from your doorstep, good lighting, presence of people, presence of security personnel.
- **Convenience:** You are at this train station most days of the week and prefer getting the item yourself; more flexible pick-up hours assuming lockers have same hours of operations as Light Rail.
- **Reliability:** The parcel will always be delivered to this locker, not to an alternate location communicated to you via a delivery company note left on your front door.

Figure 2-7. Survey Question #4:
Why Would You NOT Use a Common Carrier Locker at This Station?



Those answering "No" to using a common carrier locker were then asked in an open-ended question to explain the reason why. Researchers categorized rider responses as shown in Figure 2-7 above. (For example, responses such as "It is too much work to carry a parcel" or "I live too far from the station" are categorized as "Inconvenient" in Figure 2-7 above.)

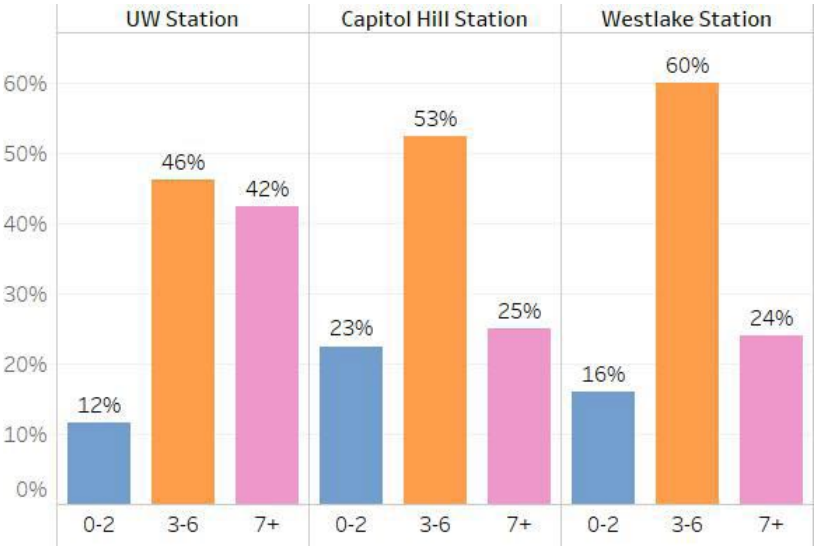
In rank order, the top three reasons these riders gave for not wanting to use a common carrier locker were:

They believe their **current delivery system is fine.**

They believe using a common carrier locker is **inconvenient.**

They believe they are **not at the station often enough.**

Figure 2-8. Survey Question #7:
How Many Blocks Are You Willing to Carry a Package?



Number of Blocks

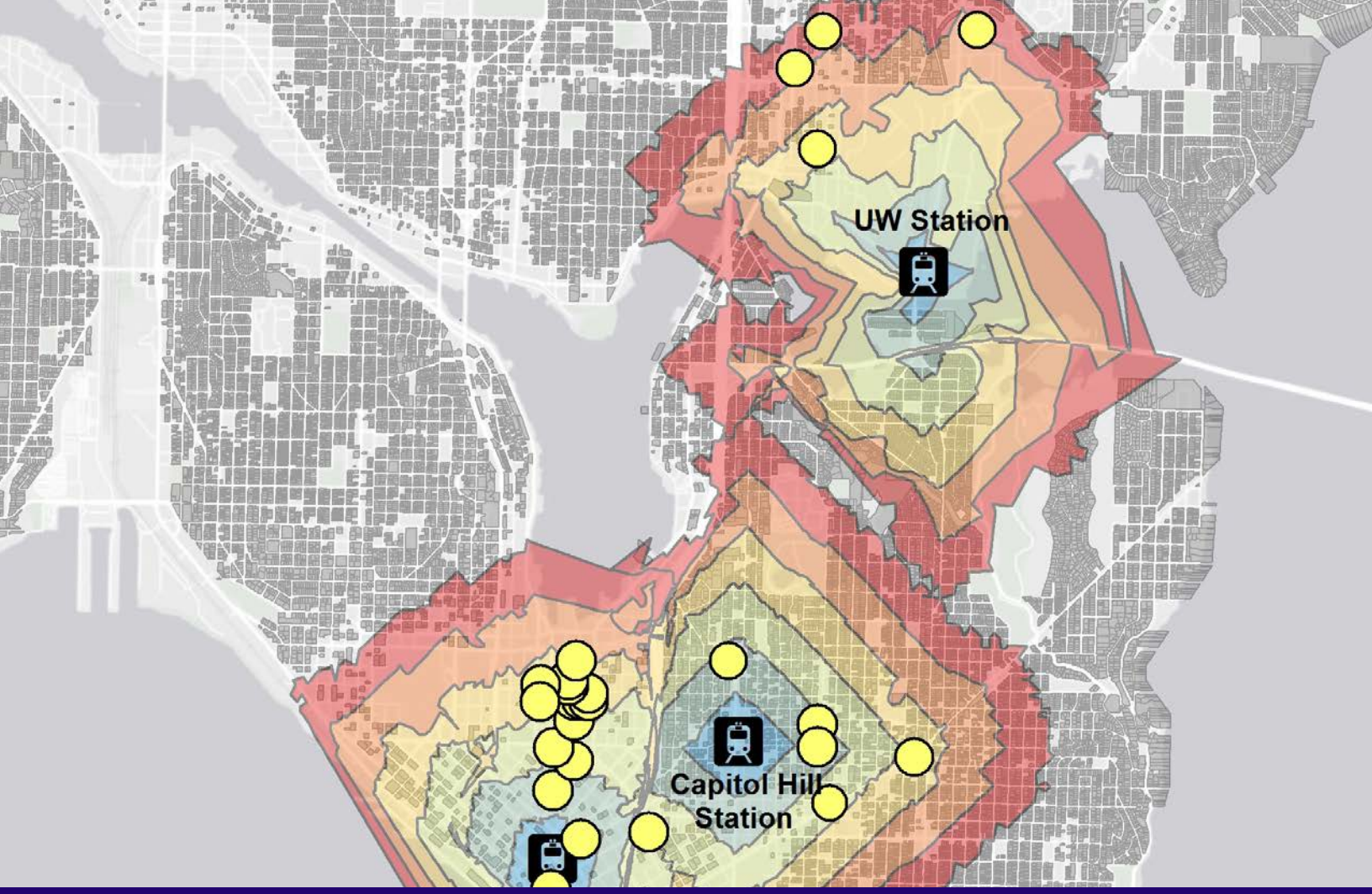
All riders were asked how far they would be willing to walk with a parcel. Between 3-6 blocks (a substantial distance) was the most common answer at all three stations. A relatively high proportion of riders—42%, 25%, and 24%—at each station reported their willingness to walk even farther (7 or more blocks). As shown in Figure 2-8, a larger share of riders expressed willingness to walk 7 or more blocks than the share who reported only being willing to walk 2 blocks or fewer.

LINK LIGHT RAIL RIDER SURVEY SUMMARY

The results from Link Light Rail rider interviews at the three stations under consideration for a pilot common carrier locker show strong rider interest in a parcel locker system.

Main findings are:

- 67% of riders at the UW Station, 43% at the Capitol Hill Station, and 40% at the Westlake Station said "yes" they would use a parcel locker at the station.
- Most riders said they would walk 3-6 blocks with a parcel.
- Security of the package was the reason most "yes" riders gave for using a locker.
- Most riders who said "no" to using a parcel locker at the system gave as the reason the belief that their current delivery system is fine.
- Most survey participants were weekday commuters who reported being at the station 5-6 days a week.
- Most survey participants reported receiving online deliveries 1-2 times a week or less than once a week.
- Riders overwhelmingly reported front door or home delivery as their current top two locations for receiving their online orders.



SECTION 3

STATION-BY-STATION OVERVIEWS WITH WALKING SHED ANALYSIS

Here, the research team presents station-by-station data snapshots and station-by-station maps showing how long it would take a parcel locker user to walk from a given station to the majority of nearby residential buildings. The team also maps locations of existing Amazon Lockers within the maximum 30-minute walk time from each station being considered for the common carrier locker pilot.

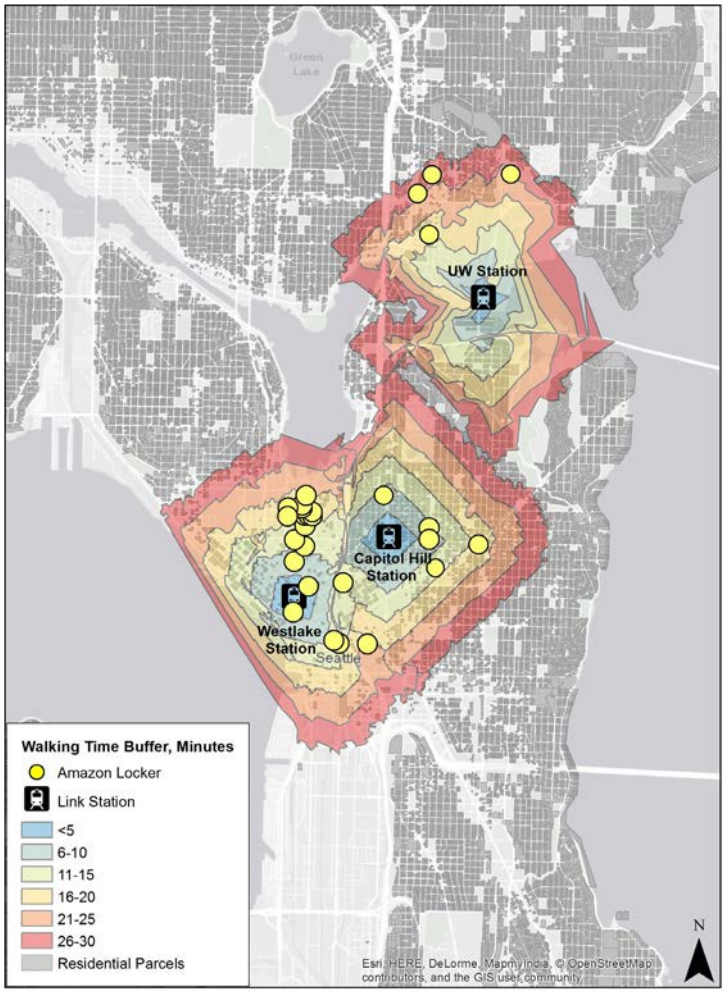
The three stations under evaluation for a pilot locker system are outlined below in green on the map of the full Sound Transit Link Light Rail system. Sound Transit operates all the train stations; King County Metro Transit currently owns the Westlake Station tunnel; and SDOT owns one of the viable sites in the Capital Hill Station TOD.

Figure 3-1. Active Line of Sound Transit Link Light Rail as of February 2018 *(35)*

2017 represents the first year of full service at all the stations in Figure 3-1. Overall, the Link Light Rail system has experienced a 22% growth in ridership since 2016. (36) In the fourth quarter from October 1 – December 31, 2017, average weekday boardings were 71,058, an 8.3% increase compared to the fourth quarter of 2016. (37)

The research team created a walking shed map with an overview of all three stations to visually depict the walking distance for common carrier locker users. The Figure 3-2 map captures a 0-30-minute walking distance between each station and surrounding residential buildings. The rings start with the blue buffer at 5 minutes or less and extend to the red buffer of 26 to 30 minutes. Dark gray represents residential parcels. Yellow dots show current Amazon Locker locations (which, presumably, could compete with Link Light Rail common carrier lockers). Each station map was drawn to radiate 1.5 miles from the respective station. This represents the estimated distance a walker could cover in 30 minutes.

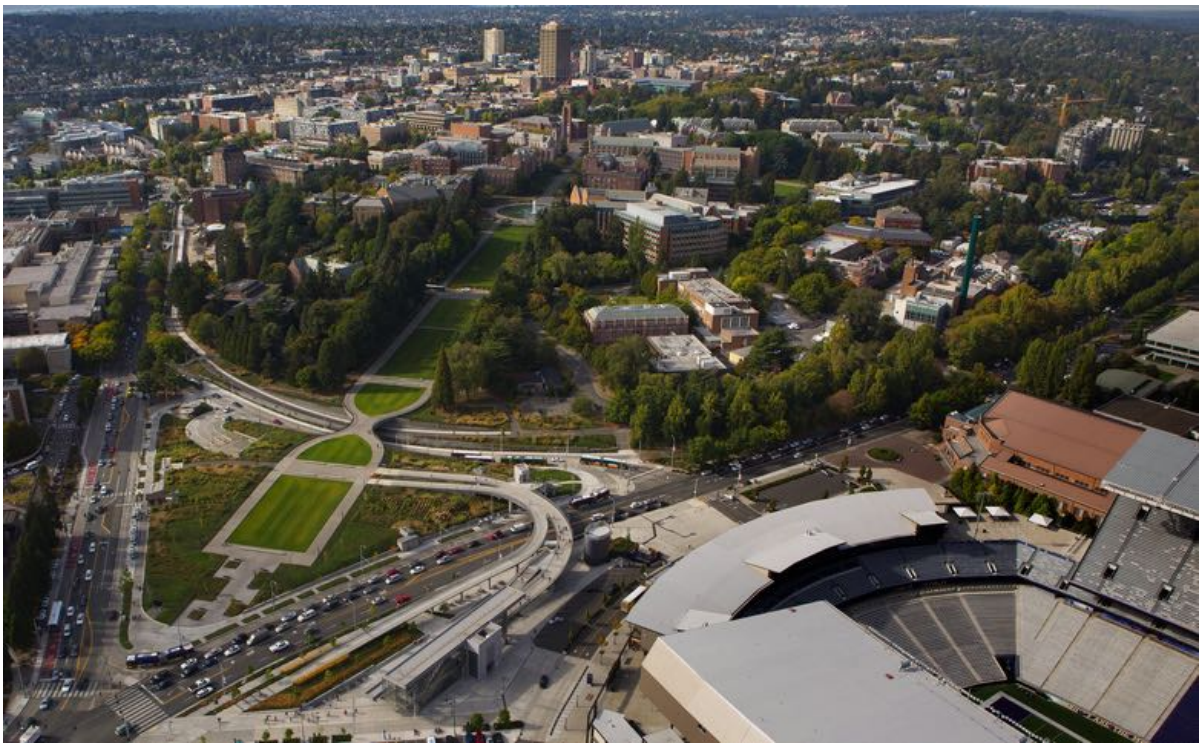
Figure 3-2. Walking Shed Map All Stations



Please note that researchers requested data from public and private delivery companies about their rate of failed first deliveries in Q1-Q4 2016 and Q1-Q3 2017 for zip codes surrounding the UW, Capitol Hill, and Westlake stations. Appendix A includes a map of the relevant zip codes. The research team also requested ORCA data to better understand rider behavior, as well as crime data to gauge station safety. None of the requested data was made available to the research team at the time of this study.

UNIVERSITY OF WASHINGTON STATION

Figure 3-3. Aerial View of Built Environment NW of University of Washington (UW) Station *(38)*



GPS: *47.649870, -122.303799*

Station # entrance/exits: 3

Neighborhood zoning: In February 2017 the area around the UW Station was rezoned to Seattle Mixed Use and Neighborhood Commercial, allowing taller buildings and higher density.

Major impacts & key features: Bicycle and pedestrian infrastructure directly connects the station to the main UW campus, with roughly 4,350 faculty and 46,000 students (39). The station is a major transit hub for public bus and shuttle services (such as Seattle Children's Hospital.) Two other major UW facilities are adjacent: the 5,483-employee University of Washington Medical Center and the 70,138-seat Husky Football Stadium. (40)

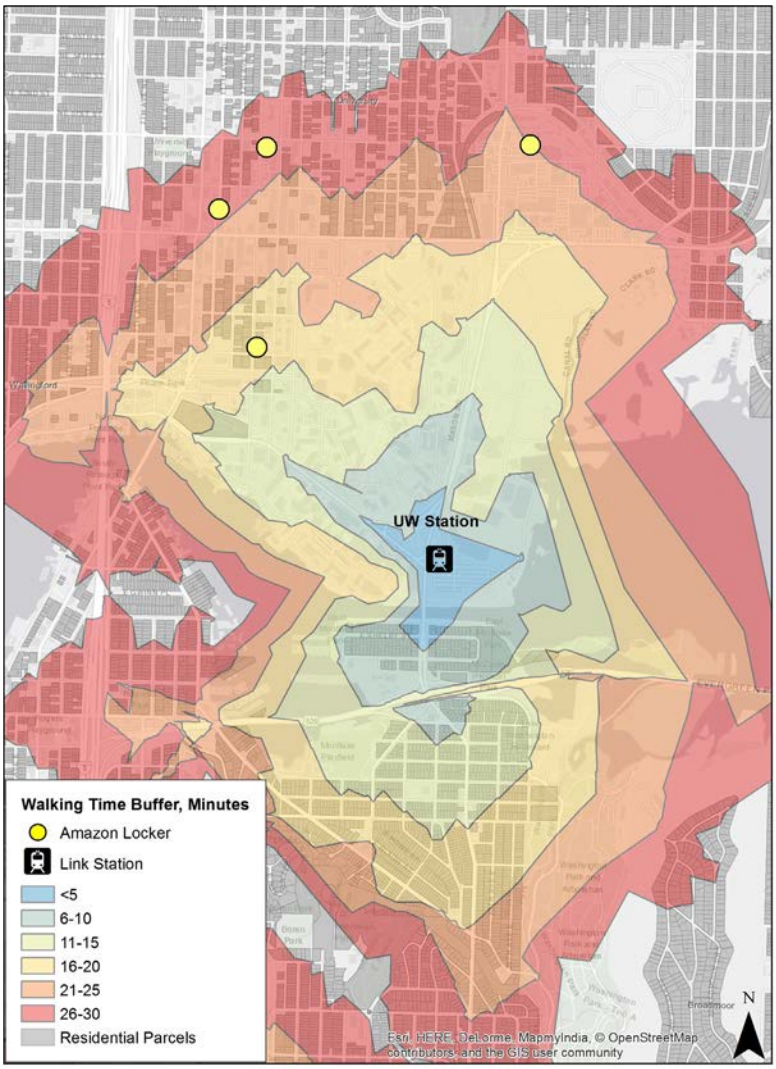
Parking: Yes. Paid parking station next to the UW Station, operated and maintained by the UW Tyee Club, the fundraising arm of the UW Department of Intercollegiate Athletics.

Ridership: In Q4 2017, the station had 9,792 average weekday boardings, a 5.8% increase from Q4 2016. (41) UW faculty, staff, and students receive a U-PASS, offering low-cost transit options, including Link Light Rail.

Figure 3-4. Figure 3-4. One of Three Entry/Exit Points at UW Station *(42)*

Figure 3-5. Adjacent Tyee Club Parking to UW Station

Figure 3-6. Walking Time in Minutes from UW Station to Residential Buildings



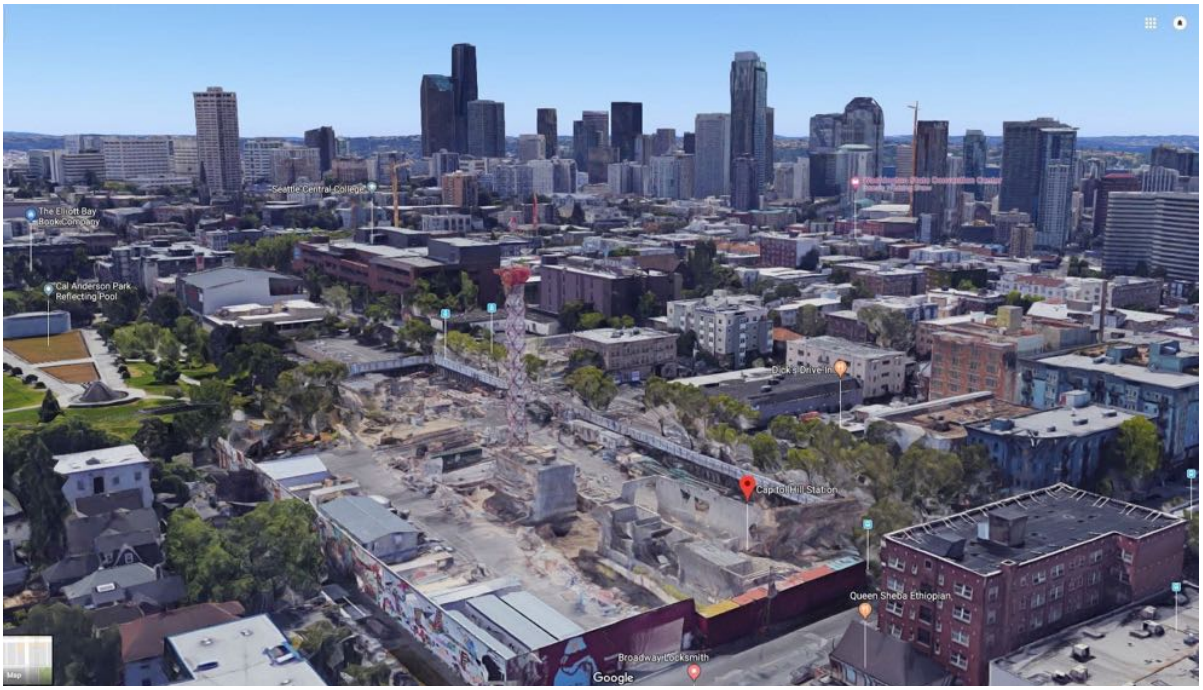
Map population: Approximately 42,609 people. (43)

Shortest walk time to residential buildings: The majority of residential parcels are a 26-30-minute walk from the station.

Number of Amazon Lockers: 4. (44)

CAPITOL HILL STATION

Figure 3-7. Aerial View of the Built Environment SW of the Capitol Hill Station *(45)*



GPS: 47.619654, -122.320316

Station # entrance/exits: 3.

Neighborhood zoning: As of February 2018, the city is reviewing a proposal to up-zone and otherwise change zoning to meet the city's Mandatory Housing Affordability policy. The area around the Capitol Hill Station is zoned as Low-Rise Residential, Mid-Rise Residential, and Neighborhood Commercial. (46)

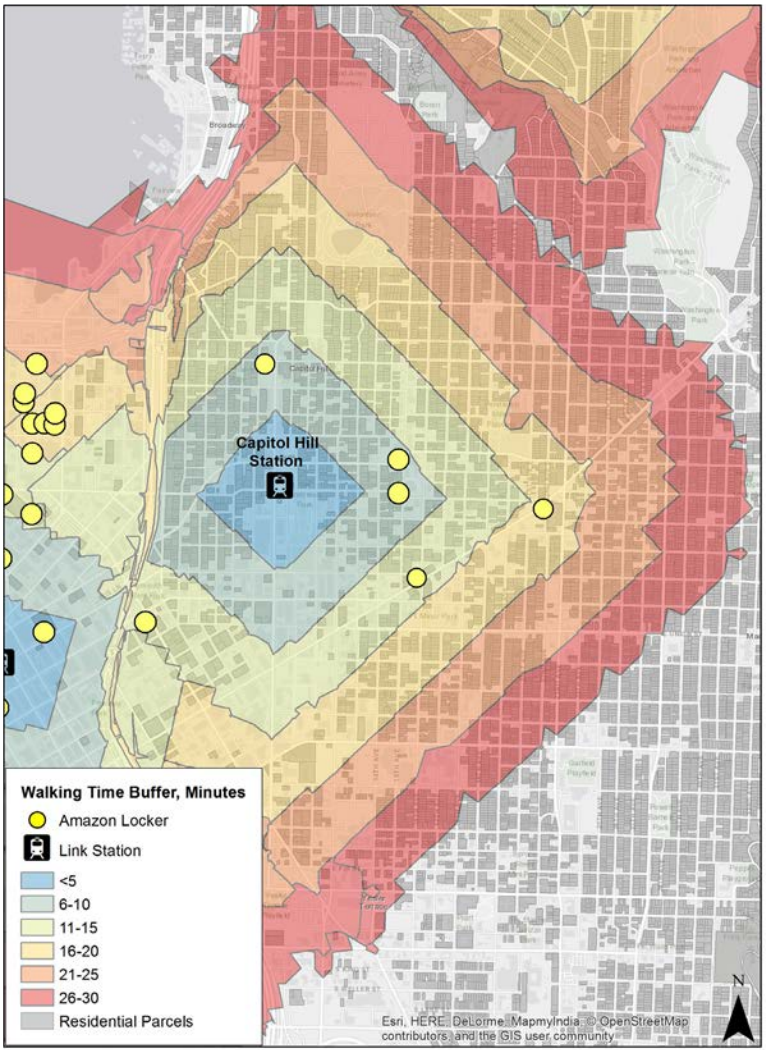
Major impacts & key features: Next to downtown and surrounded by commercial activity and residential neighborhoods, the station is a major transit hub for public buses and the streetcar. The roughly 16,000-student Seattle Central College is directly across from one of the station entrances/exits. These students can qualify for discounted ORCA transit passes. (47) & (48)

Parking: No paid parking adjacent.

Ridership: In Q4 2017, the station had 7,695 average weekday boardings, a 14% increase from Q4 2016. (41)

Figure 3-8. One of Three Entry/Exit Points at Capitol Hill Station

Figure 3-9. Walking Time in Minutes from Capitol Hill Station to Residential Buildings



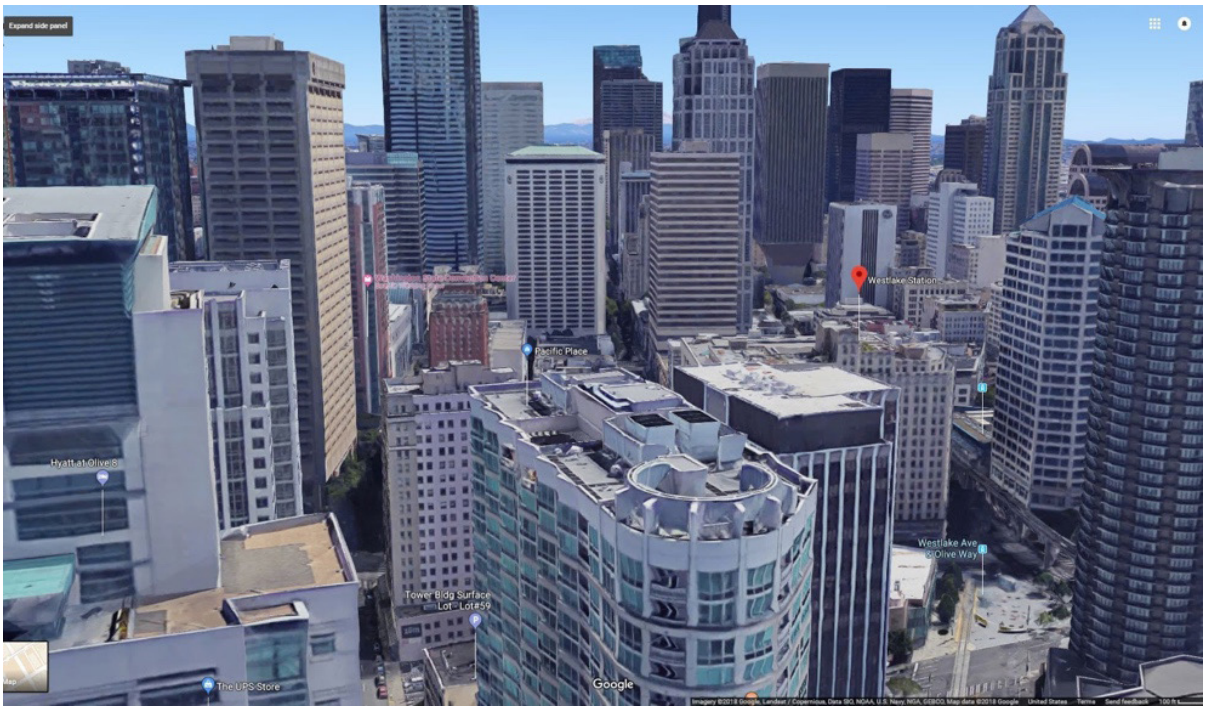
Map population: Approximately 57,467 people. (43)

Shortest walk time to residential buildings: As shown above, the Capitol Hill Station is located closer to residential parcels than the other two stations. The majority of residential buildings are within an 11-15 minute walk.

Number of Amazon Lockers: 5. (10)

WESTLAKE STATION

Figure 3-10. Aerial View of the Built Environment SW of Westlake Station *(49)*



GPS: 47.612012, -122.335893

Station # entrance/exits: 3.

Neighborhood zoning: Both residential and commercial and part of the Downtown Retail Core (DRC).

Major impacts & key features: The station is in Seattle's central business district, providing access to Pike Place Market, shopping, restaurants, and entertainment. Westlake is a major transit hub for public buses. King County Metro Transit manages and operates this station.

Parking: No paid parking adjacent.

Ridership: In Q4 2017, the station had 11,417 average weekday boardings, a 12.5% increase from Q4 2016. (41)

Figure 3-11. One of Three Entry/Exit Points at Westlake Station

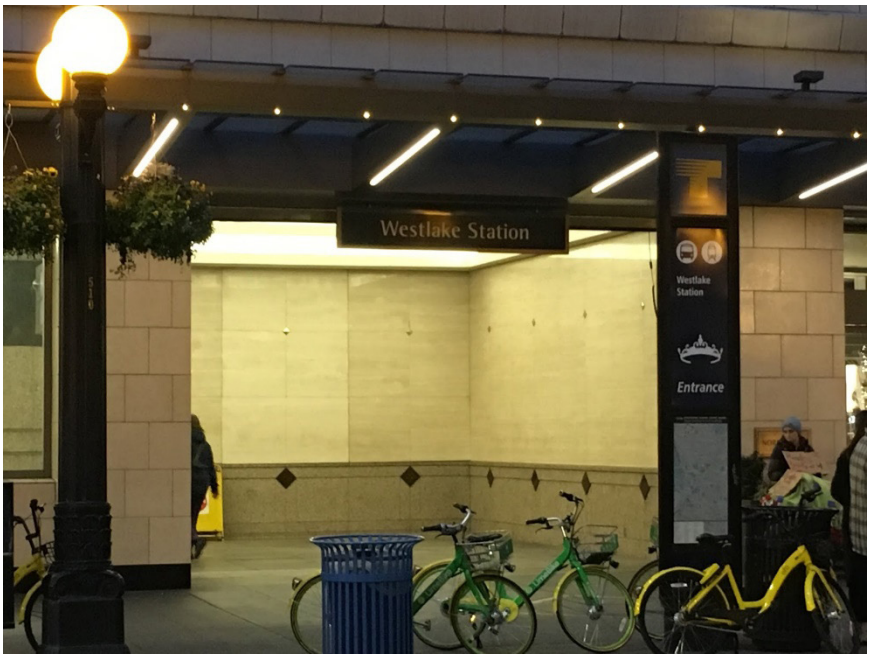
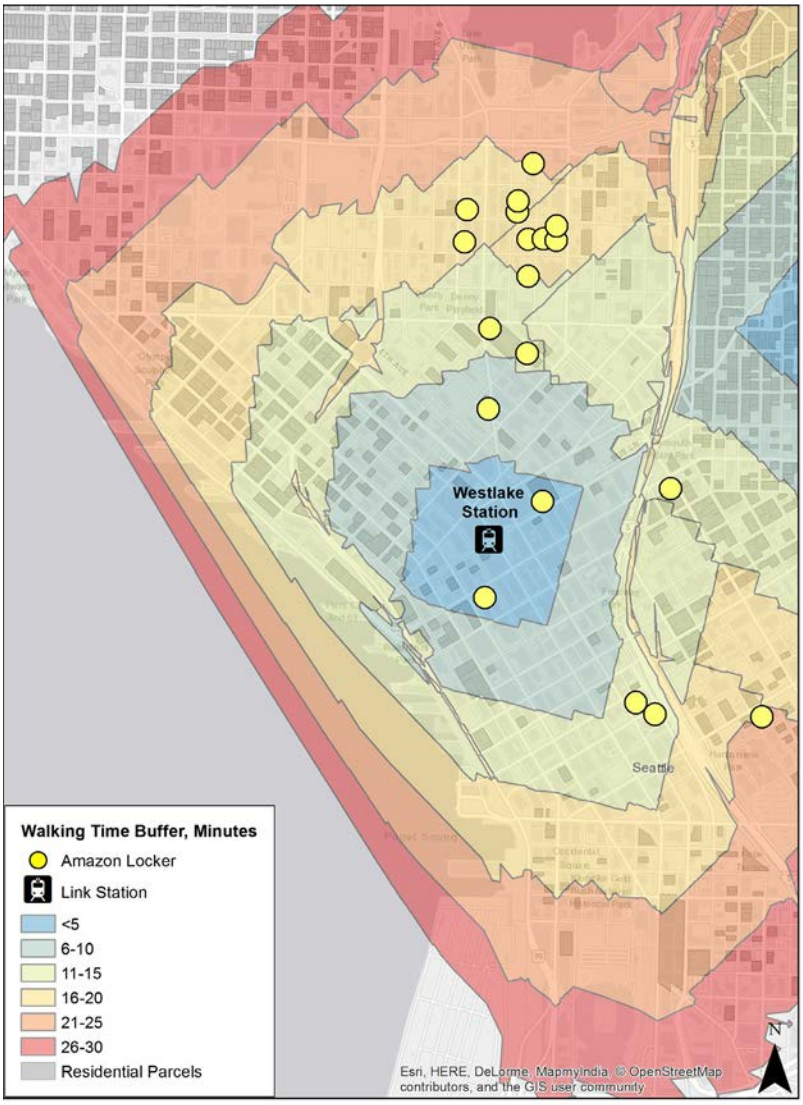


Figure 3-12. Walking Time in Minutes from Westlake Station to Residential Buildings



Map population: Approximately 36,860 people. (43)

Shortest walk time to residential buildings: Westlake is unique as it is a mobility hub. Many riders in this station are traveling through Westlake on route to their destination. Residential multi-story towers near Westlake Station are within an 11-15-minute walk, with additional residential parcels within a 16-20-minute walk.

Number of Amazon Lockers: 20 (10)

As this section shows, each of the three stations has some residential parcels within a five-minute walk or less, with Capitol Hill station showing the highest number of parcels close to the station. As discussed in the earlier Market Research section of this report, Link Light Rail riders surveyed at the three stations most commonly said they would be willing to walk between 3-6 blocks with a parcel. A relatively high proportion of riders—42% at UW, 25% at Capitol Hill, and 24% at Westlake station—reported their willingness to walk even farther, at 7 or more blocks.

Photo owned by Parcel Pending.

SECTION 4

DEVELOPING FINAL EVALUATION CRITERIA FOR LOCKER SITE SELECTION

The research team drew on the deep expertise of the Supply Chain Transportation and Logistics Center to develop draft criteria for evaluating both the feasibility of a station for a common carrier locker and the functionality of a locker location within a chosen station or an adjacent Transit Oriented Development area (TOD). The draft criteria were built around four central categories: Location & Logistics, Market Demand, Operations, and Legal Considerations, as shown in Table 4-1. The draft criteria reflected important elements to consider in the design, installation, and potential impact of a locker installed at a given Link Light Rail station.

To generate final evaluation criteria, researchers facilitated an in-person workshop of Urban Freight Lab members and partnering agencies to discuss the draft criteria. Participants then determined which of the subcategories within the draft criteria were Essential, Of Interest, or Irrelevant. (A note to other researchers: The research team tried to prepare for the in-person facilitated meeting by pre-screening certain questions online with all the interested parties. But the response rate was extremely low, which meant the online effort costs in time far outweighed the benefits.)

The final criteria are the result of intensive collaboration and debate among all participating parties. The criteria were developed with perspectives from the business community (in the form of delivery firms and retailers); from agency stewards of the public right of way; and from expert academic researchers. Table 4-1 documents the result of all the parties' collaboration and discussion, ultimately surfacing final criteria.

The percentages shown in Table 4-1 refer to the percentage of workshop participants who deemed each subcategory Essential, Of Interest, or Irrelevant. When more than 50% of participants defined a subcategory as Essential, that automatically became part of the final criteria.

The research team included in the final evaluation criteria some subcategories despite their not being rated Essential by 50% of workshop participants. The research team did this because from a functional design and logistics perspective, the station and site selected must have both commercial vehicle access and parking to efficiently deliver parcels to the locker system.

In addition, the research team added "Live Ethernet/Strong Cellular" to the final criteria after the team learned that having a strong Ethernet or cellular connection point is essential for the parcel locker to function and communicate operations with locker users. The team added the subcategory after consultation via conference call with Parcel Pending, a parcel locker company, and two Urban Freight Lab members, UPS and USPS, to discuss parcel locker systems' technical needs. Further details about the criteria development process are available in Appendix E.

Figure 4-1. Stakeholder Feedback for **Final** Common Carrier Locker Evaluation Criteria for SiteSelection

	FINAL EVALUATION CRITERIA	ESSENTIAL	OF INTEREST	IRRELEVANT
Location & Logistics	Lighting	100%	0%	0%
	Vehicle Traffic Flow Management	78%	22%	0%
	Pedestrian Traffic Flow Management	78%	22%	0%
	Electricity	70%	30%	0%
	Visibility	67%	22%	11%
	ADA Standards	67%	33%	0%
	Commercial Vehicle Access	44%	56%	0%
	Commercial Vehicle Parking	44%	56%	0%
	Live Ethernet/Strong Cellular	-	-	-
Market Demand	Ridership Density	91%	9%	0%
	Safety at the Station	70%	30%	0%
	Failed First Delivery	58%	42%	0%
Operations	Graffiti	82%	18%	0%
	Parcel Management	80%	20%	0%
	Hours of Operation	64%	36%	0%
Legal	Right of Way	100%	0%	0%
	Liability	82%	18%	0%

In the final evaluation form, shown in Appendix F, the subcategories above were made into true and false statements. The final evaluation form is a tool designed to call attention to important elements for optimal common carrier locker site consideration and location placement.

Photo: Kevin Scott. Sound Transit U Link University of Washington Station. Seattle : 2016.

SECTION 5

APPLYING FINAL EVALUATION CRITERIA AT LINK LIGHT RAIL STATIONS:

Research Team and Stakeholders Identify Five Viable Pilot Sites

To test the efficacy and reliability of the final evaluation criteria form in Appendix F, the research team field-tested it at the University of Washington, Capitol Hill, and Westlake stations to identify potential pilot locker sites for stakeholder review. In this trial-run, on-site analysis, the research team found the final evaluation form to be clear and easy to use and apply at the sites.

Through this field-testing process, the research team generated five locker site options: two at the University of Washington Station, two at the Capitol Hill Station, and one at the Westlake Station. Appendix G details this field-testing process.

Next, the research team ran a three-hour walk-through of the stations with key stakeholders to review researcher-identified locations, discuss alternatives, and agree on optimal common carrier site locations using the final evaluation form. Walk-through participants included representatives from Sound Transit and UPS. Although participants inspected and discussed many locations at each station, ultimately only those that substantially meet the Location & Logistics requirements in the final evaluation form are being put forth in this report as potential pilot sites. After the walk-through, SDOT reviewed the vetted proposed sites. The invaluable Urban Freight Lab member and public-sector partner input allowed for quick elimination of some initial proposed sites.

This collaborative process surfaced five viable pilot locations, with at least one suitable location at each station: One at the UW Station, three at the Capitol Hill Station, and one at the Westlake Station. All five sites recommended for pilot consideration are at street level to facilitate delivery truck access.

In the walk-throughs, platforms were ruled out as viable sites for piloting common carrier parcel lockers because:

- Lockers could become a safety hazard by becoming an obstacle for riders running to catch their trains or exiting the platform.
- Some stations have impermeable platform sides that make locker access challenging. Some stations have transit tracks between platforms, which could force locker users to go up one floor and back down to the opposite platform to retrieve their parcel.

Similarly, mezzanines were ruled out because they offer delivery companies poor accessibility. Elevator reliability, size, and frequency may work against efficient delivery times. Compared to street level, station platform and mezzanine levels are much harder to access.

The five proposed pilot site locations have access to electricity and cellular connection; in some cases, Ethernet cables and additional electrical cables could be installed as needed.

Below, Table 5-1 shows an overview analysis of the five proposed pilot locker sites. All five pilot options appear to be ADA accessible. Note particularly that the typical smart locker system allows users to choose a lower-level locker (under 4 feet), which should enable wheelchair users to access the locker system.

While the final evaluation criteria developed in this report cover legal, operational, and market demand factors as well as location and logistics, pilot sites were rated only against the physical Location & Logistics criteria. All five proposed pilot locations appear to meet most of the nine Location & Logistics subcategories shown below.

Figure 5-1. The Five Proposed Pilot Locations Rated Against Location & Logistics Final Evaluation Criteria

SITE LOCATION	RATING AGAINST EVALUATION CRITERIA								
	Lighting	Vehicle Traffic Flow Management	Pedestrian Traffic Flow Management	Electricity	Visibility	ADA Standards	Commercial Vehicle Access	Commercial Vehicle Parking	Live Ethernet/Strong Cellular
Site #1 Husky Train (UW station) on ST ROW	●	○	●	●	●	●	●	○	●
Site #2 Capitol Hill Bikes Under Cover	◉	●	●	●	●	●	●	●	●
Site #3 Capitol Hill Streetscape	◉	●	●	●	●	●	●	●	●
Site #4 Capitol Hill Mural Interior	●	●	●	●	●	●	●	●	●
Site #5 Westlake Retail Hub near Nordstrom entry	●	●	●	●	●	●	●	●	●

KEY: SITE LOCATION MEETS EVALUATION CRITERIA

- ● Completely
- ◉ Partially
- ○ No, Not Yet

The following section highlights key features and considerations at each of these five viable pilot sites.

UNIVERSITY OF WASHINGTON STATION

Figure 5-1. 'Husky Train' Proposed Site #1. UW Station on Sound Transit Right of Way (50)

Figure 5-2. Stakeholder Walk-Through at Proposed Site #1 'Husky Train' UW Station on Sound Transit Right of Way

PROPOSED SITE #1: 'Husky Train' UW Station on Sound Transit Right of Way (ROW). Meets 7 of the 9 defined essential evaluation criteria.

KEY POINTS: Many unrestricted public parking spaces are nearby. Sound Transit may be able to negotiate with the UW Tyee Club, which owns the adjacent lot, to designate 1-2 spaces as a commercial vehicle load zone. Such a load zone does not currently exist.

GPS: 47.649670, -122.303817

CAPITOL HILL STATION

Figure 5-3. 'Capitol Hill Bikes Under Cover' Proposed Site #2.
Capitol Hill Station on Sound Transit ROW Near Bike Racks (51)

Figure 5-4. 'Capitol Hill Bikes Under Cover' Proposed Site #2.
Capitol Hill Station on Sound Transit ROW Near Bike Racks (52)

Figure 5-5. 'Capitol Hill Bikes Under Cover' Proposed Site #2
Capitol Hill Station on Sound Transit ROW Near Bike Racks

PROPOSED SITE #2: 'Capitol Hill Streetscape' Capitol Hill Station Sound Transit ROW near bike racks. Meets 8 of the 9 defined essential evaluation criteria.

KEY POINTS: Offers superb amenities for a mobility hub. Both buses and streetcar stop at the station. The site is adjacent to bike racks and the station's entry/exit. While remaining fully accessible, it offers a strong perception of security, being largely well-lit and well-maintained and fenced on one side.

GPS: 47.618367, -122.321243

Figure 5-6. 'Capitol Hill Streetscape' Proposed Site #3. Capitol Hill in Transit Oriented Development Area on Seattle Department of Transportation (SDOT) ROW (53)

Figure 5-7. 'Capitol Hill Streetscape' Proposed Site #3. Capitol Hill in Transit Oriented Development Area on Seattle Department of Transportation (SDOT) ROW

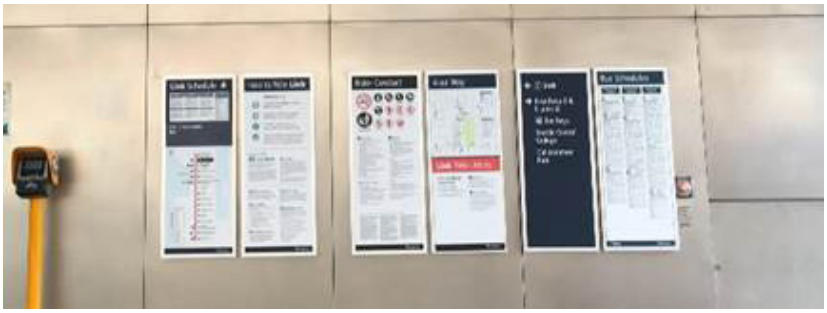
PROPOSED SITE #3: 'Capitol Hill Streetscape' Capitol Hill Transit Oriented Development area on Seattle Department of Transportation (SDOT) ROW. Meets 8 of the 9 defined essential evaluation criteria.

KEY POINTS: The 15-foot-wide sidewalk offers a huge advantage with ample space for locker site and pedestrian flow. A commercial vehicle load zone is immediately adjacent. And the site makes for a desirable mobility hub, being located within a TOD area.

GPS: 47.618652, -122.321109

Figure 5-8. 'Capitol Hill Mural' Proposed Site #4 in Capitol Hill Sound Transit Station

Figure 5-9. 'Capitol Hill Mural' Proposed Site #4 in Capitol Hill Sound Transit Station



PROPOSED SITE #4: 'Capitol Hill Mural' Inside Capitol Hill Sound Transit Station. Meets 9 of the 9 defined essential evaluation criteria.

KEY BENEFITS: This is the only potential Capitol Hill site identified as clearly well covered and secure behind a locked door (the station gate). As such, the locker site would be open during Sound Transit business hours.

GPS: 47.619722, -122.320584

WESTLAKE STATION

Figure 5-10. 'Westlake Retail Hub' Proposed Site #5. Inside Westlake Sound Transit Station Near Nordstrom Entry (54)

Figure 5-11. 'Westlake Retail Hub' Proposed Site #5. Showing Alley for Delivery Vehicle Access (55)

Figure 5-11. 'Westlake Retail Hub' Proposed Site #5. Showing Alley for Delivery Vehicle Access (55)

Figure 5-12. Figure 5-12. 'Westlake Retail Hub' Proposed Site #5 Showing Large Available Space

PROPOSED SITE #5: 'Westlake Retail Hub' Inside Sound Transit Westlake Station on Pine Street next to Nordstrom. Meets 9 of the 9 defined essential evaluation criteria.

KEY BENEFITS: This site offers a rare and virtually priceless asset in downtown Seattle—ample space. An alley for delivery vehicles is right across from the site. Lockers would complement the Transit Oriented Development along Pine Street. The site offers high security since it is behind a locked door when the station closes.

GPS: 47.612035, -122.335889

CONCLUSION AND NEXT STEPS

This report presents five viable options for piloting a common carrier locker system at Sound Transit stations and/or in the Transit Oriented Development (TOD) near them. **These five options include one at the University of Washington Station; three at the Capitol Hill Station; and one at the Westlake Station.**

These options were selected through a highly collaborative process. The business community (in the form of delivery firms and retailers); agency stewards of the public right of way; and expert academic researchers all contributed to the criteria for evaluating the sites and gave valuable feedback on each site.

A pilot test ultimately may be run at one or all five viable sites. Of course, any pilot test must have sufficient locker capacity to meet demand for locker use at a site. Anticipated demand must be carefully assessed and built into any pilot to make the test valid and worthwhile. The pilot test plan should include an evaluation of conditions before and after a locker system is introduced to track what changes. A well-designed pilot test provides a critical opportunity to learn from and improve on an approach before investing in more widespread implementation.

Common carrier lockers squarely align with King County Metro Transit, Seattle Department of Transportation (SDOT), and Sound Transit missions to reduce traffic congestion, create mobility hubs and support a more livable and economically viable city and region. (2) Prior research in the Urban Freight Lab has underscored the need for dense, mini-distribution nodes for more efficient urban delivery: Lockers can be part of meeting that need. (1) Clearly, no single solution is likely to be a panacea for the myriad challenges involved in the Final 50 Feet urban goods delivery system. But this report documents strong interest in lockers among both potential locker users (in the form of Link Light Rail riders) and carriers (in the form of Urban Freight Lab carrier members, USPS and UPS.)

King County Metro Transit, SDOT, and Sound Transit have demonstrated national leadership in evaluating the feasibility of providing public right of way for common carrier lockers at transit stations and in nearby TOD's. These agencies, charged with stewarding that public right of way, now have five good options to make the pilot test(s) a reality.

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APPENDIX A –
FAILED FIRST DELIVERY DATA MAP (REQUESTED)

This map shows the Light Rail Stations and surrounding zip codes. The research team requested data on the rate of failed first delivery attempts in 2016 and within the first three quarters of 2017. Relevant sources were asked to express this as a percent of total delivery attempts to this zip code area or as a total number of failed first deliveries out of attempted deliveries. Unfortunately, data was not made available to the research team for this report.

Light Rail Survey Location

- UW Station
- Capitol Hill Station
- Westlake Station

98195 -UW Station

- 98195

98105 -UW Station

- 98105

98102 -Capitol Hill Station

- 98102

98122 -Capitol Hill Station

- 98122

98112 -Capitol Hill Station

- 98112

98101 -Westlake Station

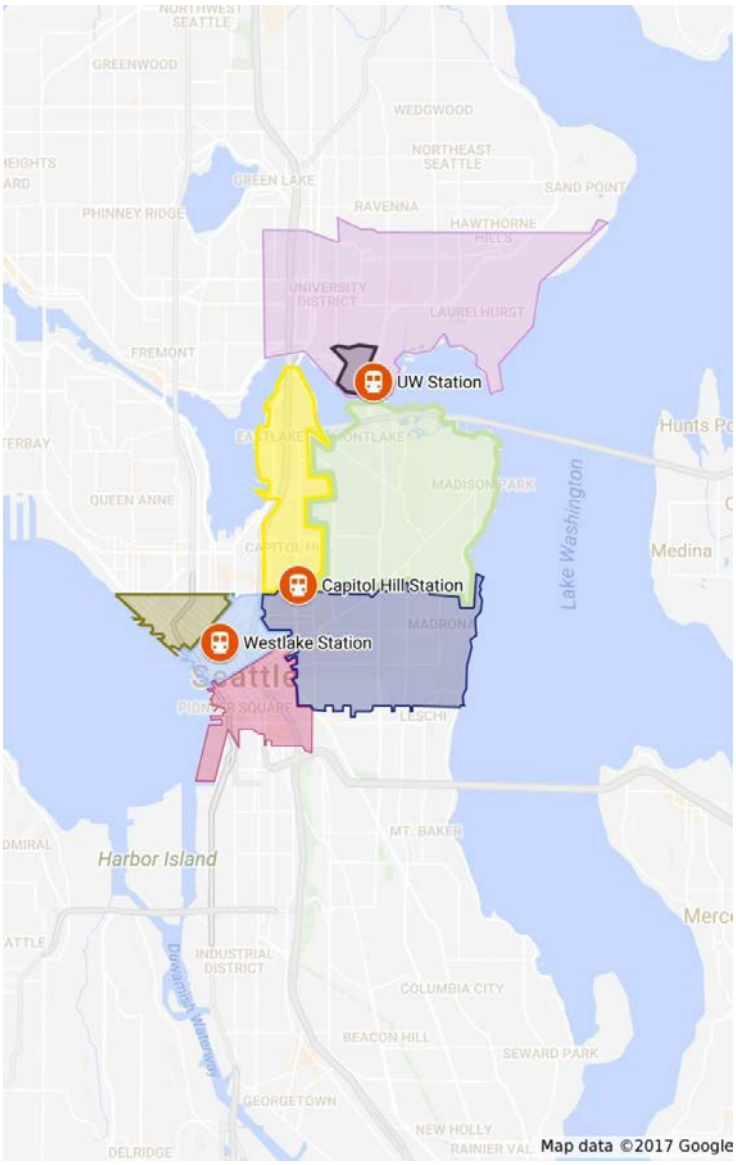
- 98101

98104 -Westlake Station

- 98104

98121 -Westlake Station

- 98121



APPENDIX B –
LETTERS OF APPROVAL

SOUNDTRANSIT

October 2017

Subject: Common Carrier Locker System Research Project

This letter is to inform all Sound Transit or security personnel that members from the University of Washington's Supply Chain Transportation and Logistics (SCTL) Center in cooperation with Sound Transit (ST), Seattle Department of Transportation (SDOT), and King County Metro are surveying commuters in the University of Washington, Capitol Hill, and Westlake Light Rail stations about their transportation mode and online shopping behavior. The purpose of this study is to better understand goods delivery in Seattle and the potential of a common carrier locker at these stations.

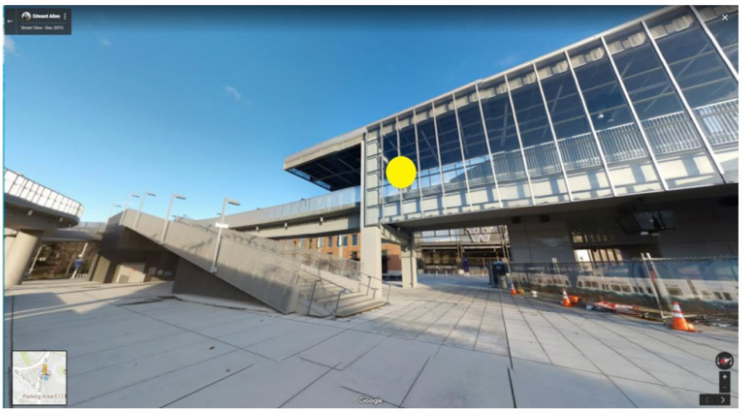
With the cooperation of ST; UW, King County Metro, and SDOT can use the gathered information to improve delivery and pick-up options of goods by installing central common carrier lockers in or next to these train stations.

In the month of October 2017, two University of Washington students will conduct about 10 surveys at each station during peak commuting hours (7-9:30AM., 5-7:30 PM) during a weekday. Yellow dots in the images below indicate the area we plan to stand and conduct interviews. Interviews will not be conducted at any of the station platforms.

Students surveying transit riders will be wearing orange vests and will have their ID and this letter with them at all times.

Central Puget Sound Regional Transit Authority • Union Station
401 S. Jackson St., Seattle, WA 98104-2826 • Reception: (206) 398-5000 • FAX: (206) 398-5499
www.soundtransit.org

University of Washington Station



Central Puget Sound Regional Transit Authority • Union Station
401 S. Jackson St., Seattle, WA 98104-2826 • Reception: (206) 398-5000 • FAX: (206) 398-5499
www.soundtransit.org

Capitol Hill Station

If you have any questions or concerns, please feel free to contact the following Sound Transit staff for more information.

Janine Sawyer
Business Development Coordinator
W (206) 398-5108
C (206) 331-8175
janine.sawyer@soundtransit.org

Brian Brooke
Senior Manager, Innovation and Performance
(206) 398-5229
brian.brooke@soundtransit.org

Thank you,

Sound Transit

Central Puget Sound Regional Transit Authority • Union Station
401 S. Jackson St., Seattle, WA 98104-2826 • Reception: (206) 398-5000 • FAX: (206) 398-5499
www.soundtransit.org

King County

Department of Transportation
Metro Transit Division
Design and Construction Section
201 S. Jackson Street
KSC-TR-0435
Seattle, WA 98104-3856

Date: October 23, 2017

Re: Common Carrier Locker System Research Project

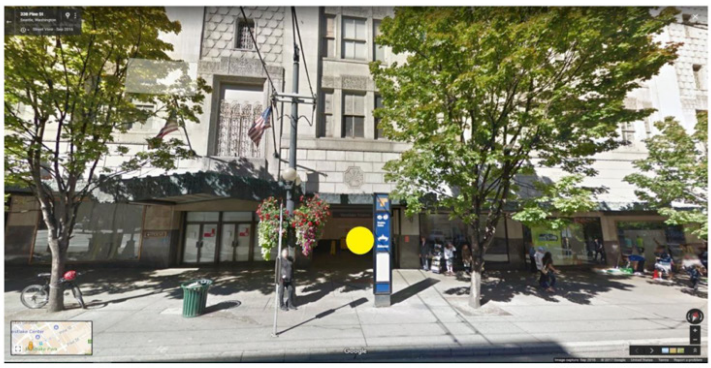
This letter is to inform all King County Metro or security personnel that members from the University of Washington's Supply Chain Transportation and Logistics (SCTL) Center in cooperation with Sound Transit (ST), Seattle Department of Transportation (SDOT), and King County Metro are surveying commuters in the University of Washington, Capitol Hill, and Westlake Light Rail stations about their transportation mode and online shopping behavior. The purpose of this study is to better understand goods delivery in Seattle and the potential of a common carrier locker at these stations.

With the cooperation of King County Metro; UW, ST, and SDOT can use the gathered information to improve delivery and pick-up options of goods by installing central common carrier lockers in or next to these train stations.

In the month of October 2017, two University of Washington students will conduct about 10 surveys at each station during peak commuting hours (7-9:30AM., 5-7:30 PM) during a weekday. The yellow dot in the image below indicates the area we plan to stand and conduct interviews. This location may shift to further down the station corridor depending on survey participant behavior. Interviews will not be conducted at any of the station platforms.

Students surveying transit riders will be wearing orange vests and will have their ID and this letter with them at all times.

Westlake Station



If you have any questions or concerns, please feel free to contact the following King County Metro staff for more information.

Jennifer Altschuler, Supervisor
King County DOT/Transit Division
D&C - Real Estate, Land Use, Environmental Planning
W (206) 477-5925
Jennifer.Altschuler@kingcounty.gov

Jean Paul Velez
King County DOT/Transit Division
SD - Market Development
W (206) 477-7694
JeanPaul.Velez@kingcounty.gov

Thank you,

King County Metro

APPENDIX C –
DATA COLLECTION PLAN FOR LINK LIGHT RAIL RIDER SURVEYS

The research team followed these steps to better understand rider interest in common carrier lockers at the three Link Light Rail stations being considered for a pilot locker system.

Step 1 – *UW Institutional Review Board (IRB) Exemption*: Seek and receive IRB exemption status for conducting interviews at the three Link Light Rail stations.

Step 2 – *Obtain Permission from Sound Transit and King County Metro Transit:* Design a letter of permission for Sound Transit and King County Metro Transit. These letters included information about the research project and the dates and times the research team planned to survey riders at each station. Sound Transit and King County Metro Transit each approved the letter. Researchers had these letters with them at the stations while conducting interviews. The Sound Transit and King County Metro Transit letters can be found in Appendix B.

Step 3 – *Survey Link Light Rail Transit Users:* Over five days in fall 2017, the research team surveyed riders at the University of Washington, Capitol Hill, and Westlake stations during two time slots on one weekday at each station, between 7-9:30 AM and 5-7:30 PM. Researchers stood at the approved entrance and exit points and approached riders by saying: "Hello, did you just get on/are you about to get on to Light Rail? I am working with Sound Transit and am exploring the idea of putting a common carrier locker for online deliveries at the station. Do you have a few minutes?"

Seven multiple choice questions were asked regarding peoples' commute pattern, online shopping and parcel delivery behavior, and interest in using a common carrier locker. The complete survey is included in Appendix D.

Step 4 – *Determine Unqualified Survey Participants:* Researchers terminated the survey if the participant said that they do not use the Link Light Rail or do not shop online. Final survey results do not include terminated interviews.

Step 5 – *Digitize Raw Data:* The 185 rider responses were electronically transcribed using Google Sheets (see Figure C-1 below). Each column represented the interview date, time slot, station name, each of the seven interview questions, and rider comments. Survey Question #5 asked riders to rank from 1-4 their reasons for why they would use a common carrier locker, with '1' being the most beneficial of the four options given (security of package, convenience, reliability, or "other.")

Figure C-1. Example of Raw Data Organized in Google Sheets

Date	Time	Station	1. How many days of the week are you at this train station?	2.How many times a week do you receive online deliver-ies?	3.What are your top two locations for receiving your online order?		4.Would you use a common carrier locker to pick up your online orders at this station?	5.Why would you pick up your packages from a locker at this station? Please rank your reasons (1- most beneficial) Security, Convenience, Reliability, Other				6.How likely are you to pick up your package from a locker at this station on the same day of its delivery?	7.How many blocks are you willing to carry a package?	Comments
10/11/2017	7-9 AM	UW Station	5-6	1-2	Front Door/ Home Delivery	N/A	N/A	1	3	2	N/A	100%	6	

For the data sheet, researchers created a numeric code for responses to this question. 1 = Security, 2 = Convenience, 3 = Reliability, 4 = Other. Comments included additional qualitative information from rider responses to Survey Questions #1-7, their online shopping behavior, transportation choices, or any other relevant information riders offered in the interview.

Step 6 – *Clean Data:* The clean data includes response bins the researchers created to consolidate similar responses that did not perfectly match the survey's defined options for responses. For example, for Survey Question #2, "Less than once a week" was created to categorize responses such as "once a month," "twice a month," or "once in a couple months." Survey Question #4 did not provide the response of "maybe," but researchers created a response bin since riders at times answered the question as such. For Survey Question #7, some respondents chose the number of blocks provided as survey response options; others gave exact block numbers not included in the survey or a range of blocks. Some participants responded with responses such as an "indefinite" number of blocks. To consolidate these responses, researchers created the following bins: "0-2 blocks, 3-6 blocks, and 7+ blocks."

Researchers also organized the raw data to capture participants' open-ended explanations of why they would not use a common carrier locker. Researchers categorized responses under one of the following: "Current System is Fine; Inconvenient; Not at the Station Enough; Rarely Shop Online; Safety Concerns; Does not Understand Locker System." For example, "it is too much work to carry a parcel" or "I live too far from the station" would be categorized as "Inconvenient" in the clean data.

APPENDIX D –
RIDER SURVEY INSTRUMENT

Below is the survey instrument researchers used to interview Sound Transit Light Rail users. Riders were first approached with the explanatory text below. If they met the requirements, the research team went forward with the survey.

Figure D-1. Survey Instrument Used to Interview Sound Transit Light Rail riders

Explanatory text: *Hello, did you just get on/are you about to get on to Light Rail? I am working with Sound Transit and exploring the idea of putting a common carrier locker for online deliveries at the station. Do you have a few minutes?*

1. **How many days of the week are you at this train station?**
   a. 1-2
   b. 3-4
   c. 5-6
   d. 7
   e. Other _____

2. **How many times a week do you receive online deliveries?**
   a. 1-2
   b. 3-4
   c. 5-6
   d. 7
   e. Other _____

3. **What are your top two locations for receiving your online order?**

   ___ Front Door/Home Delivery

   ___ Apartment Building Lockers

   ___ Office

   ___ Alternate Location (UPS/FedEx store)

   ___ Amazon/UPS/FedEx/USPS Locker

   ___ Other _____

4. **Would you use a common carrier locker to pick up your online orders at this station? ****

   Yes

   No; Explanation _____

5 **Why would you pick up your package from a locker at this station?**
Please rank your reasons (1 - most beneficial).

   ___ Security of your package (ex. no theft from your doorstep, good lighting, presence of people, presence of security personnel)

   ___ Convenience (ex. You are at this train station most days of the week and prefer getting the item yourself; more flexible pick-up hours assuming lockers have same hours of operations as Light Rail)

   ___ Reliability (ex. it will always be delivered to this locker, not to an alternate location notified to you by a note from a delivery company on your front door)

   ___ Other _____

6. **How likely are you to pick up your package from a locker at this station on the same day of its delivery?**

   100%

   75%

   50%

   25%

   Other _____

7. **How many blocks are you willing to carry a package?**

   2

   4

   6

   Other _____

   ***If a respondent answered "no" to question 4, the research team moved to question 7 (skipping questions 5 and 6.)*

APPENDIX E –
CONSIDERATIONS AND PROCESS FOR DEVELOPING COMMON CARRIER LOCKER EVALUATION CRITERIA

Step 1 – *Develop Draft for Stakeholder Feedback:* The Supply Chain Transportation and Logistics Center created four main categories around which locker site evaluation criteria could be built:

1. Locker Location & Logistics
2. Locker Operations
3. Market Demand
4. Legal/Regulations

Each of the four main categories has multiple subcategories, refined over multiple drafts. Rather than request stakeholders to rank each subcategory under these four main categories, the research team decided that input on the relative importance of each would be more efficiently delivered via one of three response categories: Essential, Of Interest, and Irrelevant.

Step 2 – *Stakeholder Meeting Feedback:* The research team attempted to solicit initial stakeholder feedback to an evaluation criteria form online in advance of a scheduled in-person facilitated meeting. But the response rate was low. At the in-person facilitated meeting to solicit stakeholder feedback, each stakeholder was given three different index cards: Pink (Essential), Green (Of Interest), and Yellow (Irrelevant). Individuals who had participated in the online feedback were asked not to participate in this interactive session. The research team reviewed each subcategory and asked each stakeholder to hold up the index card that represented their response. Each response was counted. Stakeholders considered the subcategories in Table E-1 below for final evaluation criteria, but ultimately these subcategories were not included because less than 50% of participants defined them as Essential.

The final criteria are in Appendix F.

Figure E-1. Considered But Not Included in Final Evaluation Criteria Due to Low Stakeholder Rating of "Essential"

	NOT INCLUDED IN FINAL EVALUATION CRITERIA	ESSENTIAL	OF INTEREST	IRRELEVANT
LOCATION & LOGISTICS	**Inside/Outside of Light Rail Station**	38%	63%	0%
	Surveillance Camera	36%	55%	9%
MARKET DEMAND	**Consumer Age Density**	33%	67%	0%
	Residential Density	18%	73%	9%
	Walkability	11%	56%	33%
	Density of Other Locker Alternative	8%	75%	17%
	Land Use Surrounding Station	8%	67%	25%
	Income Density	0%	100%	0%
	Building Age Density	0%	55%	45%
OPERATIONS	**Perishable Goods**	36%	55%	9%
	Number of Locker Units	18%	18%	64%
LEGAL	**Locker Management/Ownership**	45%	55%	0%

APPENDIX F –
FINAL COMMON CARRIER LOCKER EVALUATION FORM FOR SITE SELECTION

COMMON CARRIER LOCKER EVALUATION FORM

Location & Logistics

Electricity (there is a reliable source of electricity available for locker)

- ☐ True
- ☐ False

Live Ethernet/Strong Cellular Signal (there is reliable cellular connection/signal)

- ☐ True
- ☐ False

ADA Standards (locker location and installation meets 2010 ADA Standards for Accessible Design)

- ☐ True
- ☐ False

Commercial Vehicle Access to Lockers (locker location is at street level)

- ☐ True
- ☐ False

Commercial Vehicle Parking (Commercial Vehicle Load Zone is present)

- ☐ True
- ☐ False

Lighting (locker location is well-lit 24/7)

- ☐ True
- ☐ False

Visibility (there is little to no obstructions to view the locker)

- ☐ True
- ☐ False

Vehicle Traffic Flow Management (locker location does not impede current vehicle traffic flow or points of congestion)

- ☐ True
- ☐ False

Pedestrian Traffic Flow Management (locker location does not impede current pedestrian traffic flow or points of congestion)

- ☐ True
- ☐ False

Market Demand

Safety at the Station (Number of crimes and types of crime reported at this station has been reviewed and compared with other stations)

- ☐ True
- ☐ False

Ridership Density (the number of riders who get on and get off at the station has been reviewed and compared with other stations)

- ☐ True
- ☐ False

Failed First Delivery (number of FFD within 1 mile of the station has been recorded and compared with other stations)

- ☐ True
- ☐ False

Common Carrier Locker Operations

Hours of Operation (locker hours of operation match station hours)

- ☐ True
- ☐ False

Parcel Management (there is clear signage about parcel management in the case of full lockers or parcels that are left in lockers for more than 3 days)

- ☐ True
- ☐ False

Graffiti (the locker is designed to repel paint, markers, etc.)

- ☐ True
- ☐ False

Legal/Regulations

Right of Way (All stakeholders have agreed to common carrier locker location and its consequences on pedestrian and vehicle traffic flow in and around the station)

- ☐ True
- ☐ False

Common Carrier Locker Liability (the party responsible for the liability affiliated with locker is a third-party vendor that is unaffiliated with any of the stakeholders)

- ☐ True
- ☐ False

APPENDIX G –
FIELD-TESTING FINAL EVALUATION FORM AT STATIONS AND USING FORM TO IDENTIFY PRELIMINARY LOCKER SITES FOR STAKEHOLDER CONSIDERATION

The research team in its on-site analysis of the three stations used only the Location & Logistics from the final evaluation form in Appendix F. This category has nine subcategories: Lighting, Vehicle Traffic Flow Management, Pedestrian Traffic Flow Management, Electricity, Visibility, ADA Standards, Commercial Vehicle Access, Commercial Vehicle Parking, and Live Ethernet/Strong Cellular.

Step 1 – *Research Team Walk-through:* The research team visited the three stations for a walk-through using the final evaluation criteria form to identify potential locations for stakeholder review and discussion. The research team found the final evaluation criteria form to be clear and easy to use and apply at the sites.

Step 2 – *Review & Discuss Site Selections:* The research team identified five initial sites for consideration: two options at the University of Washington Station, two at the Capitol Hill Station, and one at the Westlake Station. As detailed in the report, the research team and stakeholders then did a joint walk-through of the three stations under consideration and discussed and reviewed the research team-identified options as well as several others.

Of the five researcher-identified options for consideration, three ultimately became proposed sites for pilot testing through the collaborative process between researchers and stakeholders detailed in the report.

Below are the five options researchers initially identified for stakeholder consideration.

University of Washington Station

Research team Option 1: *GPS:* 47.649798, -122.303872: Outdoor location, well-lit, wide, visible, and spacious. Presumed underground wiring for electricity and the Ethernet because Sound Transit Link Light Rail ticket vending machines were installed next to this location. An outlet was found next to the south elevator and can be seen in Figure G-2. *This site was ultimately decided against because it is a designated busking area.*

Figure G-1. Research Team Location Option 1 UW Station

Figure G-2. Research Team Location Option 1 UW Station, Electricity Source

Research team Option 2: *GPS*: 47.649670, -122.303817: *This became the proposed pilot site #1 following joint researcher and stakeholder review as discussed in the report.*

Figure G-3. Research Team Location Option 2 UW Station; Proposed Pilot Site #1

Capitol Hill Station

Research team Option 1: *GPS:* 47.619722, -122.320584: *This became the proposed pilot site #4 following joint researcher and stakeholder review as discussed in the report.*

Figure G-4. Research Team Location Option 1 Capitol Hill Station; Proposed Pilot Site #4

Research team Option 2: *GPS:* 47.618458, -122.321064: While this option substantially met many of the criteria, including good visibility from the street, good vehicle and pedestrian flow, and nearby commercial vehicle load zones, way-finding to the locker could be challenging due to poor visibility from within the station and lighting quality was unclear. *This site was ultimately decided against due to concerns about the locker potentially obstructing the drain and water pipe for run-off as shown in Figure G-5.*

Figure G-5. Figure G-5. Research Team Location Option 2 Capitol Hill Station

Westlake Station

Research team Option 1: *GPS:* 47.612035, -122.335889: *This became the proposed pilot site #5 following joint researcher and stakeholder review as discussed in the report.*

Figure G-5. Research Team Location Option 1 Westlake Station; Proposed Pilot Site #5 *(54)*