

**Analysis of Changing Transit Travel Behavior
As a Result of the Opening of the
U-District, Roosevelt, and Northgate Link Stations**

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Executive Summary

On October 2, 2021, Sound Transit (ST) started Link light rail service to three new stations on the 1 Line. These stations serve the University District, Roosevelt, and Northgate. In coordination with the station openings, Sound Transit, King County Metro (Metro) and Community Transit (CT) restructured many of their routes that had previously provided express service to downtown Seattle and the University District. This report examines the changes in travel behavior that occurred as a result of those changes in transit service. Comparisons are made primarily between September/October 2019 (the last pre-COVID-19 year), and September/October 2021.

The results are based on an analysis of ORCA farecard boarding data. The analysis does not reflect Link and bus transit boardings paid for by methods other than ORCA. Therefore, some bias is likely present in the analysis, but key trends should be correctly identified. However, substantial financial incentive exists for riders to use ORCA when transferring to and from light rail, so it is assumed that the majority of transfer activity is captured in this report.

IMPACT ON BUS ROUTES SERVING THE NEW STATIONS

The report examines, in aggregate, multiple sets of routes affected by the new stations. The first set included routes from Snohomish County that had previously served either downtown Seattle or the U-District and that were altered to terminate at the Northgate Link station. This provided excellent access to Link but resulted in a two-seat ride for many riders. This group included Sound Transit routes 511, 512, and 513, which had previously served downtown Seattle, and Community Transit routes 810, 821, 860, 871, and 880, which had served the University District.

The second set of routes continued to serve downtown Seattle from Snohomish County with one-seat rides, but travel time reliability remained affected by congestion on I-5. These included Community Transit routes 402, 405, 410, 412, 413, 415, 416, 417, 421, 422, 424, 425, 435, and Sound Transit Route 510.

The third set of routes included King County Metro routes (345, 346, 347, and 348), which had previously served the Northgate Transit Center and remained essentially unchanged after Link opened. The fourth group included north end Metro routes 301 and 304, which had previously served downtown Seattle but were changed to terminate at Northgate.

The next two groups of routes were essentially control groups, as they served the north end and downtown Seattle or the University District but were not significantly altered when the new Link stations opened. These included the downtown-serving KCM routes 40, 49, 62, 64, and 70, and the University District-serving routes 31, 32¹, 44, 45, 48, 65, 67, 73, 75, 372.

Finally, this Executive Summary includes a brief discussion about how riders of Sound Transit Route 522 in September 2021 adjusted their transit use when that route was shortened to end at the Roosevelt station instead of continuing to downtown Seattle.

Use of Snohomish County Bus Routes Now Serving the Northgate Station

When the Link stations opened in 2021, ORCA boardings for routes 511, 512, and 513 lost 2 percent of their total ORCA boardings in contrast to growing by 4 percent during the same time period in 2019. As expected, in 2021 these routes experienced a major jump in transfers, which now accounted for 65 to 90 percent of the total boardings (depending on the specific route). These transfers all took place at the Northgate station. The same pattern was evident in Link to bus (northbound) transfers as in bus to Link (southbound). Riders heading to or from downtown Seattle or the University of Washington (UW) on these revised routes now had a two-seat bus/Link ride.

For the 8xx series buses that had previously headed to the University District, ridership grew by 36 percent in 2021 in comparison to 53 percent from September to October in 2019. This growth was primarily associated with the start of classes at the UW. The lower ridership growth on the 8xx series routes in 2021 in comparison to 2019 was similar in pattern to the lower bus boarding growth rates observed systemwide from September to October. That is, ORCA-paid bus ridership growth did occur on the routes re-oriented to Northgate, but that growth was lower than in a “typical” pre-COVID year.

Use of Snohomish County Bus Routes Still Directly Serving Downtown Seattle

Unlike the newly truncated routes, ridership on routes that continued to operate one-seat rides to downtown Seattle increased by about 20 percent from September to October 2021 in comparison to a 6 percent increase in 2019. A large portion of this increase was from the growth

¹ Routes 31 and 32 did experience minor route changes when passing through the University District, but the majority of the two routes serving Seattle Center, Magnolia, Seattle Pacific University, Fremont, and passing through the University District to reach Children’s Hospital were similar in both 2019 and 2021. They were therefore not expected to carry substantially different ridership.

of ridership on the 510, which was a weekday, peak-period only, express route to/from downtown Seattle. Much of this growth came from riders who had previously used one of the routes now terminating at Northgate, allowing them to retain their one-seat ride to and from downtown Seattle.

In looking at the combined ridership of these routes, as well as the size of the bus-to-Link transfer activity, it can be said that slightly more than half (52 percent) of the riders who were apparently headed downtown from Snohomish County now had two-seat rides where they used to have a one-seat ride. The remaining 48 percent selected bus routes that directly served downtown. The total number of riders on the routes that now served Northgate increased about 10 percent, from just under 48,000 boardings to just over 53,000 boardings.

Analysis of October trip making by riders who rode 8xx² routes in September 2021 showed that many of them used a combination of both 5xx³ and 8xx routes to get to and from Northgate before riding Link to the University District. Using a combination of the routes that provided access to Northgate gave these riders a much better choice of bus headways, providing both shorter transfer times between bus and Link and more flexibility in their travel schedule. This use of multiple routes in place of a changed previous route can also be seen in the distribution of routes used to access Link at Northgate for September 2021 riders of the discontinued U-District Route 855 shown in Table E-1.

Table E-1. Number of Transfers to/from Link at Northgate by Route for Previous Route 855 Users

Route	October Transfers to Link	October Transfers from Link
511	1298	1072
512	928	965
513	560	439
810	59	129
821	759	737
860	202	296
871	464	349
880	294	289

The shift of riders who had previously used the 8xx series (including the discontinued Route 855) to the 5xx series helps explain the very low drop in 511, 512, and 513 ridership, given the 20 percent increase in the ridership of the 510 and 4xx routes headed directly to and from

² 8xx = a combination of all 800 series routes, such as the 810, 855, and 880.

³ 5xx = a combination of routes 511, 512, or 513.

downtown Seattle. As some of the ridership lost to the 510 and 4xx routes has been made up by riders shifting from the 8xx routes.

Aggregation of ridership for all routes discussed above showed that ORCA bus boardings on these routes increased by 8 percent in October 2021. In 2019, these routes increased by 11 percent, with the Covid pandemic limiting the some of the growth in ridership that might otherwise have occurred due to the new rail stations.

Use of North End King County Metro Routes Serving the New Link Stations

Another set of routes that experienced large ridership increases as a result of the new route structure were the 345, 346, 347, and 348, the routes that had already served Northgate before the opening of the new Link stations. These routes experienced an increase of 16,000 boardings (46 percent) in October 2021. This was roughly twice the growth in ridership of the 4xx and 510 routes traveling to/from downtown Seattle. In the northbound direction for these routes, the increase in Link-to-bus transfers was nearly identical to the increase in bus boardings, meaning that the growth in ridership was likely due to new passengers taking these routes to catch Link at the Northgate station, and the base ridership that had previously taken these routes was not affected by the service changes.

Use of North End King County Metro Routes Serving Downtown Seattle

Routes 301 and 304 that had previously ended downtown were rerouted to terminate at Northgate in October 2021. The majority (74 percent) of frequent users of the 301/304 routes in September 2021 did continue to use those routes in October; however, most of these riders supplemented the use of those routes with other alternative routes to access Link. The number of boardings on these routes decreased by about 2,000 (40 percent) from September to October for both the southbound and northbound directions combined.

After the 301/304 route had been altered to end at Northgate, over 70 percent of the northbound boardings came from transfers at the Northgate station. It is worth noting that these routes now shared some of the same Shoreline-to-Northgate passengers as the 345, 346, 347, and 348, which captured an additional 2,600 boardings from these riders in October over their previous September use of these routes.

Interestingly, individuals who had previously ridden the 301 and 304 made 1,500 trips on routes 302 and 303 in October. These two routes both continued to allow one-seat rides to downtown Seattle for trips from northern Seattle, although they also allowed transfers to Link at

Northgate. Roughly 550 of these trips involved a transfer either to or from Link, suggesting that about 15 percent of previous trips on routes 301 and 304 shifted to routes that allowed maintenance of a one-seat ride to downtown Seattle.

Northern Routes That Also Serve Downtown

These routes (e.g., KCM 40, 62, 64, etc.) did not change significantly and still ended in downtown Seattle but served a variety of markets other than downtown. These routes should not have been heavily affected by the new stations, and in fact were not heavily affected, achieving a 1 percent increase in ORCA boardings in October 2021, which is a lower growth in ridership than the observed systemwide increase during that time.

Northern Routes That Also Serve the U-District

The structure of these routes (e.g., 31, 44, 67, etc.) did not change significantly in October 2021. They did experience a 50 percent increase in ridership, which is assumed to have been directly caused by the start of classes at the UW. While these routes did allow easy transfers to Link at the new stations, only 5 percent of trips associated with these routes involved a transfer to or from Link in October.

Sound Transit Route 522

Route 522 previously ran from Woodinville through Bothell and Kenmore along SR 522 and ended in downtown Seattle. The October 2021 service revisions changed the route so that it ended at the Roosevelt Link station. While the trip to downtown now required a two-seat ride, the new 522 route did allow riders improved access to the UW, since Link served the U-District and UW Stadium stations as well as downtown from Roosevelt.

Less than half of the individual ORCA cards that were observed riding the 522 in September 2021 rode the 522 in October. However, most of the “lost” riders were infrequent users of the route, and a large fraction of those losses were made up by new riders taking the route in October who did not use the route in September. Of the ORCA cards observed in both September and October, roughly half transferred from the 522 to Link at the Roosevelt station. Slightly more (60 percent) transferred from Link to the 522 at Roosevelt. Of the riders observed on Route 522 in September, 20 percent were observed boarding Link at either Roosevelt or Northgate, without transferring from a bus, suggesting they drove to and parked near these stations.

A substantial number of September Route 522 riders also shifted to other transit routes. For example, 16 percent of previous Route 522 riders took either Route 320 or 322, with most of those riders making one-seat rides to downtown. October trips on these routes by these individuals were equal to 15 percent of the September use of the 522. Another 1,600 previous users of Route 522 (25 percent) used Route 372 in October, making almost 4,000 more Route 372 trips in October than in September (10 percent of September trip making), with most of these trips traveling directly to or from the UW.

GENERAL LINK STATISTICS

Overall Link Ridership

Figure E-1 shows the number of Link boardings in September and October for 2019, 2020, and 2021. While there had historically been a small increase in boardings from September to October, as shown in the 2019 data (the 8 percent increase was most likely due to the start of classes at the UW), there was a much larger increase (130 percent) in 2021, when ORCA boardings more than doubled from 415,900 in September to 960,800 in October. Almost one third of the total Link system ORCA boardings in October occurred at the new Northgate, Roosevelt, and U-District stations.

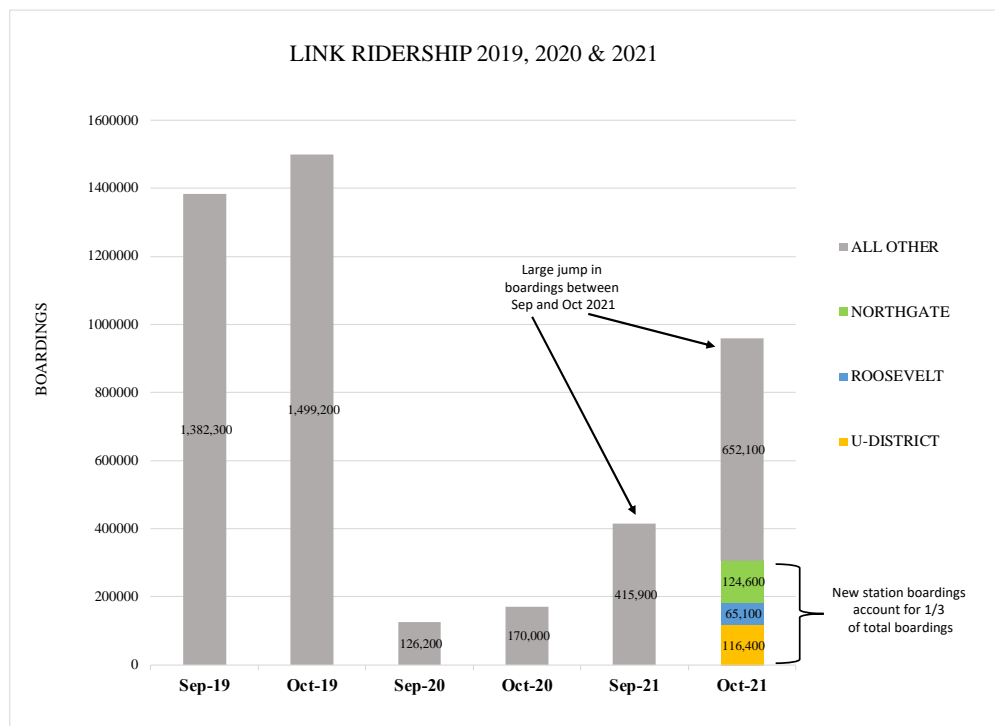


Figure E-1. Link Boardings in September and October 2019 and 2021

Transfer Activity at Link Stations

The changes in bus routes described previously were intended to assist in bringing Link riders to the new stations via bus transit. Table E-2 shows both the number of ORCA Link boardings that occurred at the four northern stations, as well as the fraction of those boardings that transferred from buses to Link. Non-transfer boardings occurred as a result of some combination of walking and vehicle access.

Table E-2. Transfer Activity of Link Riders by Station

Station	Percentage Transferring from Bus	Percentage Not Transferring	Reported Link to Link Transfers	October Link Boardings
Northgate	38.5%	61%	6.3%	125,496
Roosevelt	21.5%	79%	9.1%	65,996
U-District	9.9%	90%	9.5%	117,281
UW Stadium (2021)	12.9%	87%	4.9%	112,548
Total Link System (2021)	17.9%	82%	6.9%	964,239
UW Stadium (2019)	32.1%	67.8%	2.3%	192,942

Not surprisingly, with the new stations and route structure, riders changed where and how often they transferred from buses operating from the north, taking advantage of the three new stations (U-District, Roosevelt, and Northgate) while decreasing their use of the UW Stadium station. A large drop in bus transfers to Link occurred at the UW Stadium station. However, the sum of transfers that occurred at the four stations was more than twice the number of transfers that occurred at the UW Stadium station during September. A shift away from transfers at the UW Stadium station toward transfers at the new stations can clearly be seen, as riders took advantage of transfer opportunities closer to their origin to board Link earlier in their trip, rather than riding all the way to the UW Stadium.

Table E-3 summarizes the routes that provided the largest number of bus to Link transfer boardings to each of the four stations.

Table E-3. Largest Bus-to-Link Transfers by Station and Route for October 2021

Northgate		Roosevelt		U-District		University of Washington	
Route	Number of Transfers	Route	Number of Transfers	Route	Number of Transfers	Route	Number of Transfers
512	13644	522	7061	44	2615	255	2831
75	3573	62	2824	32	1503	372	2261
511	3383	45	1378	31	1408	65	1707
347	2918	67	809	45	956	271	1670
348	2640	79	691	372	938	542	1110
860	2546	322	579	79	763	67	1034
20	2341	73	390	67	585	75	867
880	2152	64	200	70	576	45	820
40	2121	65	35	20	365	48	732
346	1833	20	33	73	303	44	652
513	1798	372	30	271	287	73	97
871	1658	75	15	49	239	32	62
821	1377	21	12	75	180	43	61
810	1143	44	11	48	169	31	50
345	1134			542	144	556	37
67	887			255	120	373	28
301	836			65	106	444	24
320	639			512	36	70	21
304	282			62	25	120	19
510	201			132	14	49	17
302	194						
532	180						
303	178						
45	107						
331	55						

SUMMARY OF BEHAVIOR CHANGES

While the analysis in the main body of this report includes a variety of facts about the use of the new Link services and the altered bus routes that serve those stations, the authors suggest the following takeaways from those facts.

- The three new Link stations are heavily used.
- The altered bus route structure has, in general, done well at bringing riders to Link, as transfer rates at all three stations are high.
- A simple rule of thumb appears to be that 15 to 20 percent of riders headed to downtown elected to switch to other routes that allowed them to maintain a one-seat ride, rather than take revised bus routes and transfer to Link.

- Riders willing to transfer to Link often take advantage of multiple alternative routes to reach Link, rather than remaining on their previous route or selecting a single new route.
- A substantial number of previous bus riders appear to drive to Link, at least occasionally, using both the Northgate and Roosevelt stations in this manner.

Analysis of Changing Transit Travel Behavior as a Result of the Opening of the U-District, Roosevelt, and Northgate Link Stations

INTRODUCTION

On October 2, 2021, Sound Transit (ST) started Link light rail service to three new stations on the 1 Line. These stations serve the University District, Roosevelt, and Northgate. In October 2021, these three stations ranked first (Northgate), second (U-District), and sixth (Roosevelt) in total ORCA boardings among all Link stations. At the time these stations opened, Sound Transit, King County Metro (Metro) and Community Transit (CT) restructured many of their routes that had previously provided express service to downtown Seattle and the University District. This combination of changes was designed to both maximize access to the new stations while removing duplicate bus service and reducing Metro and CT operational costs.

Provision of high quality access to Link is intended to increase overall ridership as a result of the greater reliability of the Link service and, in many instances, faster travel times because of the need for transit buses to negotiate both congested I-5 and city of Seattle arterials. The downside of the shift in route structure to focus on light rail is that many riders who used to have one-seat rides to their destinations in downtown Seattle and the U-District must now transfer from bus to rail inbound and from rail to bus outbound. All three transit agencies are interested in how this change in the nature of transit service to these two major transit destinations has changed ridership. Understanding the changes in travel behavior that resulted from these service changes should assist planners in improving their modeling of the impacts of future light rail station openings.

Consequently, this report examines the changes in travel behavior that occurred as a result of those changes in transit service. These results are based on an analysis of ORCA farecard boarding data. The analysis does not reflect Link and bus transit boardings paid for by methods other than ORCA. While a large percentage of riders pay for their transit trips with ORCA, the results described in this paper do not include those paying with cash. Consequently, there is some bias in these results. However, given that ORCA use is required for free transfers between transit and light rail services and that there is substantial financial incentive for riders to use ORCA when they transfer to and from light rail, it is assumed that the majority of transfer activity is captured in this report.

Report Organization

After this introductory section, which includes a short discussion of the time periods selected for analysis, a second section looks at the broader changes in travel patterns for Sound Transit, Metro, and CT routes as a result of the start of the new light rail service and the corresponding changes to some bus routes in the north end of the metropolitan region.

The third section describes, at the summary level, how transit ridership changed for routes that had previously served either downtown or the University District from the north end of King County or Snohomish County. The section's subsections deal with specific sets of King County and Snohomish County bus routes. The Snohomish County buses include both CT and ST branded routes.

The fourth section looks at how travel patterns of individual riders changed when those riders had previously used the routes that changed as a result of the new stations opening. It examines the degree to which riders who had previously used routes that were affected by the opening of the new stations used the new Link stations and which bus routes, if any, they used to reach Link. It also examines whether those riders still used those changed routes or used new routes to reach downtown and University District destinations via one-seat bus rides. This section also describes the number of new riders observed in the system who used the revised bus routes to access Link.

The fifth major section examines Link ridership in detail, with emphasis on how riders used the three new stations. This includes weekday/weekend patterns and the impact that the three new stations had on the UW Stadium station, which had previously been the northern-most Link station.

The sixth section describes how frequently riders used the three new Link stations. This section describes not ORCA boardings but the number of unique individuals who used the three new stations and how often they used them. This allows Sound Transit to understand the fraction of trips made by high frequency transit users versus the number of transit trips made by individuals who used Link only infrequently. These patterns are compared across years to examine how those patterns have changed over time.

Finally, the last two sections examine the distribution of ORCA users by passenger type (Adult, Senior, Disability, Low Income, Youth card), and the types of ORCA payment mechanisms used (e-Purse versus various pass types). The use of the three new Link stations is

examined and compared to bus use in the north end of the metropolitan area as well as to historical patterns.

Analysis Periods

For this analysis, the UW team worked with Sound Transit staff to identify appropriate time spans for the before and after periods. The time periods for this analysis were as follows:

- October 2, 2021 – October 31, 2021 (After period)
- September 1, 2021 – October 1, 2021 (Before period 1)
- September 1, 2020 – October 31, 2020 (Before period 2)
- September 1, 2019 – Oct 31, 2019 (Before period 3).

Note that Before period 2 and Before period 3 can be split into periods 2A/2B (September/October) and 3A/3B (September/October) for comparison with the Before period 1 and the After period as needed.

The Before period 1 was the month immediately before the start of the new Link service. The effect of Covid on trip behavior during that time period was hardly different from that in the After period, which was the first month in which the new Link service operated. Both periods also occurred after school started in the fall for elementary through high school classes. Therefore, travel to downtown would have similar patterns, at least for the period after the Labor Day holiday. Unfortunately, travel to the University of Washington (UW) fluctuates beginning in September. In-person classes at the UW typically start near the end of September, but many UW employees return to work on-campus in mid-September to prepare for students returning to campus. In addition, graduate students start work officially on the first Monday after the 15th of the month. In 2021, the first day of in-person classes was September 29th.

This combination of changing activity levels created a slowly growing ridership pattern to the UW and U-District during September. Travel activity levels then jumped on September 29th when classes started. September 2021 travel to campus remained low relative to pre-pandemic (2019) levels. This variation in travel activity during September means that the Before 1 and After periods were not as directly comparable as we would like. However, travel demand to and from downtown from northern Seattle and Snohomish County should have been similar during September 2021 and October 2021. Differences due to pandemic-related changes in demand were present when monthly patterns were compared between 2019 and 2020.

The Before 2 and 3 time periods were selected to obtain travel pattern data before and during the COVID impacts. The dates September 1 to October 31 were selected to match the time period for which data were available for the combined Before 1 and After study periods. The Before 2 and 3 data were split to compare pre-COVID to COVID conditions before and after the start of the new Link service. An important difference between the 2020 period and both 2019 and 2021 was the absence of in-person learning and operations at the University of Washington.

SYSTEMWIDE BACKGROUND CHANGES IN TRANSIT PATTERNS⁴

Systemwide Ridership Changes by Mode Between 2019, 2020, and 2021

Because of external factors and changing pandemic conditions, ridership levels on all modes varied significantly between 2019, 2020, and 2021. This complicated distinguishing the changes in travel behavior due to the new station openings from changes that occurred as a result of the slow recovery from the pandemic. It was therefore necessary to examine overall changes in ridership that occurred systemwide to be able to distinguish the ridership changes due to the new Link stations from those that occurred as a result of both overall regional travel patterns as the region slowly recovered from the pandemic and seasonal changes such as those caused by the start of classes at the UW.

Despite changing background conditions, important trends can be seen occurring as a result of the opening of the three new Link stations. Comparing the September to October travel patterns from 2019 and 2020 to those in 2021 helped reveal the changes in rider behavior that occurred when the three new Link stations opened by isolating other causal factors, while also isolating the impacts of the COVID pandemic.

After the new stations opened, significant differences in ridership occurred in bus and light rail use. Figure 2 shows the systemwide number of boardings broken down by mode (bus, bus rapid transit (BRT), and Link) for each period. It is important to note that the 2020 bus boardings shown in this graph do not accurately reflect the true number of ORCA boardings because some

⁴ Unless otherwise indicated, “bus ridership” or “bus boardings” includes all bus services using the ORCA payment system. In many cases, this report will talk about specific agencies, services, or geographic areas. Where those restrictions are not mentioned, all agencies’ data are included.

buses did not require payment during September 2020.⁵ The effect of classes beginning at the UW at the end of September was factored in by comparing ridership for September versus October of each year.

Comparing 2019 versus 2021, systemwide bus ORCA bus boardings (combined on-board and off-board payments) grew by 15 percent from September 2019 to October 2019. ORCA bus boardings grew by 9 percent in 2021. In contrast, ORCA Link boardings grew by 9 percent in the same period in 2019 but by 131 percent in 2021.

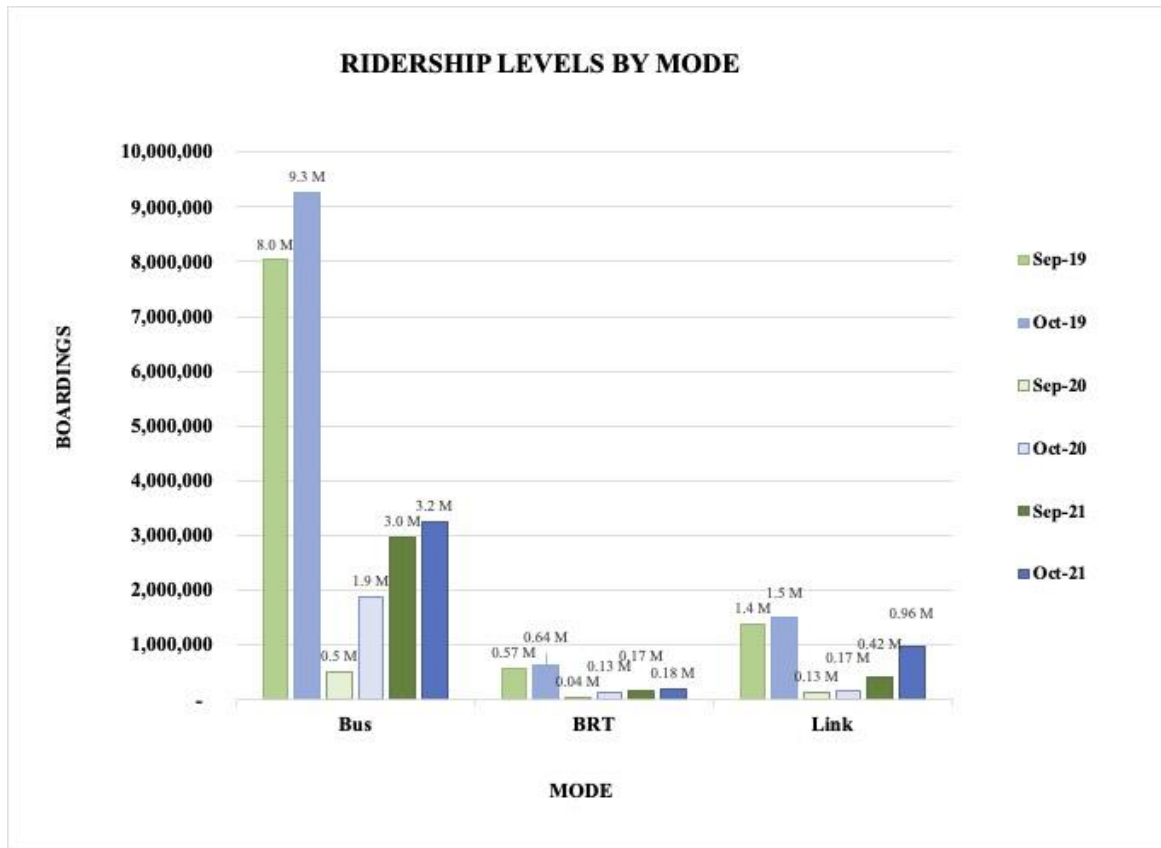


Figure 2. Number of Boardings by Analysis Time Period for Each Mode

Because of the slow recovery from the COVID-19 pandemic, bus ridership in September 2021 was 37 percent of what it was in September 2019. Despite growing slightly in absolute terms in October of 2021, bus ridership dropped to 35 percent of 2019 levels.

⁵ For example, King County Metro did not return to requiring payment until October 21, 2020. www.king5.com/article/traffic/traffic-news/fares-resume-king-county-metro/281-aaeb4b71-8705-4bb2-b4f6-4da8bce22ed3 Therefore, many riders carrying ORCA cards did not tap them to pay during those periods.

In contrast, systemwide ridership for Link in September 2021 was at 30 percent of 2019 levels but jumped significantly to 64 percent of 2019 levels in October when the new stations opened.

Changes in Bus Usage Patterns and Transit Access to New Stations

Given the overall ridership patterns presented above (i.e., a large increase in Link ridership but a more limited change in bus ridership), the key interest of this study was to examine the changing ridership patterns of transit riders directly affected by the opening of the three new Link stations and the ridership of the bus routes designed to provide convenient access to those stations.

As part of the opening of the new light rail stations, bus routes were restructured to provide both better access to the new Link stations and to limit the duplication of service now being provided by light rail. The revised bus routes improved access to the new stations, lowering the need for parking at those stations, but caused many riders who had previously had a one-seat ride to their destinations to now need to transfer between buses and light rail to reach those same destinations.

shows the percentage of riders that boarded at the four northern-most Link stations that transferred from buses for those Link trips. The UW Stadium station was previously the northern terminus of the light rail and was a major transfer point between bus to rail before October 2021. With the opening of the new stations, many bus routes that had previously terminated at the UW Stadium were changed to terminate at one of the new stations. Others still served the UW Stadium but also stopped at one or more of the three new stations, causing riders to transfer at those stations instead of the UW Stadium to shorten their overall travel time.

Table 1. Transfer Activity of Link Riders by Station

Station	Percentage Transferring from Bus	Percentage Not Transferring	Reported Link to Link Transfers	October Link Boardings
Northgate	38.5%	61%	6.3%	125,496
Roosevelt	21.5%	79%	9.1%	65,996
U-District	9.9%	90%	9.5%	117,281
UW Stadium (2021)	12.9%	87%	4.9%	112,548
Total Link System (2021)	17.9%	82%	6.9%	964,239
UW Stadium (2019)	32.1%	67.8%	2.3%	192,942

Not surprisingly, because of the redesign of northern bus routes that had previously served downtown and the U-District that now terminated at Northgate, a far larger fraction of riders reached that station via bus (39 percent) than reached the other northern stations. Within the entire Link system, only the SODO station (43 percent) had a larger percentage of riders boarding Link after transferring, and SODO had only 12 percent of the ridership of Northgate. (SODO had 15,750 ORCA boardings in October 2021 versus Northgate’s 125,500.) The transfer rate at Northgate was high despite the fact that Northgate had a large park and ride. Angle Lake, another Link station with a large park and ride, had a 7 percent transfer rate.

Table 2 shows the transfer rates from all ORCA transit modes to Link at each of the Link stations in October 2021.

Table 2: Transfer Rates to Light Rail at Link Stations in October 2021

Station	Total Number of ORCA Boardings	Percentage of Boardings That Are Transfers from Bus	Percentage of All Boardings That Are Transfers (including Link-to-Link transfers⁶)
UW Stadium	112,548	13%	18%
Cap Hill	98,135	8%	17%
Angle Lake	22,024	5%	7%
Westlake	100,458	18%	26%
University St	48,069	20%	25%
Pioneer Sq	22,465	13%	19%
ID	57,917	14%	26%
Stadium	14,692	11%	16%
SODO	15,751	43%	49%
Beacon Hill	24,532	30%	35%
Mt. Baker	20,653	22%	26%
Columbia City	21,251	8%	12%
Othello	22,202	12%	18%
Rainier Beach	15,872	20%	22%
Tukwila	24,008	20%	21%
SeaTac	31,478	8%	12%
Northgate	125,496	39%	45%
Roosevelt	65,996	21%	31%
U-District	117,281	10%	19%
Total for All Link Stations	960,828	18%	25%

The change in bus route structure, and the addition of the U-District station, also resulted in substantial changes in both how many riders used the UW Stadium station and how the UW Stadium riders reached the station. Before October 2021, travelers coming from the U-District would often ride buses to the UW Stadium to board Link and travel south. After October 2021, many of those individuals walked to the U-District station. This decreased both the total number of boardings at the UW Stadium station, as well as the percentage of those boardings that arrived at the station riding on buses.

⁶ A Link-to-Link transfer typically occurs when a rider exits a Link trip at a station, performs a short activity, and re-boards Link. If the “entry tap” for the second Link trip occurs within two hours of the tap for the initial Link boarding, then the boarding tap for the second trip is recorded as a Link-to-Link transfer.

In addition, other riders who had previously boarded Link at the UW Stadium station rode buses from the north of the University District to the stadium to board Link. Many of those riders used routes that took them to one of the three new stations. For example, riders of KCM Route 73 primarily transferred at the Roosevelt (63 percent) and U-District (28 percent) stations, even though that route still served the UW Stadium station. Similarly, the interlined KCM Route 65/67 served all three of the new Link stations as well as the UW Stadium. After October 2021 only 29 percent of the transfers to Link from this route occurred at the UW Stadium station, with the remainder split among the three new stations. The overall result is that transfers from buses to Link at the UW Stadium station dropped from one of the highest percentages of transfer activity in the Link system (~32 percent depending on the year) to being in the middle of the distribution (13 percent) for all Link stations.

IMPACT ON BUS ROUTES SERVING THE NEW STATIONS

This section of the report examines how transit ridership changed for routes that had previously served either downtown or the University District from either the north end of King County or Snohomish County. The section is broken into subsections dealing with specific sets of King County Metro and Snohomish County bus routes. The Snohomish County buses include both CT and ST branded routes.

Use of Snohomish County Bus Routes Now Serving the Northgate Station

This analysis examined the changes in ridership that occurred on Community Transit-operated bus routes that were altered concurrently with the addition of the new Link stations. This included routes 511, 512, 513, 810, 821, 860, 871, and 880. The southern terminus of these routes had previously been in either downtown Seattle or the University District and changed to the Northgate station. Bus/Link transfers were divided by month and labeled as either southbound (bus to Link transfer) or northbound (Link to bus transfer).

In September 2021 (before the opening of the new stations), about 4 percent of the southbound boardings of routes 511, 512, and 513 transferred to Link. These transfers occurred mostly at the Westlake and International District stations. The other routes in this group had little or no transfer activity to Link. This pattern held true for transfers from Link to northbound buses as well, with limited transfer activity from Link to the 511/512/513, and essentially no transfer activity from Link to the other routes in this group. This shows that the vast majority of bus trips

from Snohomish County to downtown ended downtown, and only a modest number transferred to Link to reach destinations farther south or on Capitol Hill. Almost no travelers transferred to or from Link and the buses bound to the U-District.

When the Link stations opened in October and the new bus routes took effect, as expected, rider transfer behavior changed dramatically. Figure 3 shows the shift in bus to Link (southbound) transfers by ORCA users between September and October on these routes. Transfers for riders on the 511, 512, 513, 810, 821, 860, 871, and 880 jumped to account for 65 to 90 percent of total boardings. These transfers all occurred at the Northgate station. The same pattern was also evident in the Link to bus (northbound) transfers. Riders heading to or from downtown Seattle or the UW on these revised routes now had a two-seat bus/Link ride, but ORCA ridership on these routes remained steady or increased even when they made the switch to ending at Northgate.

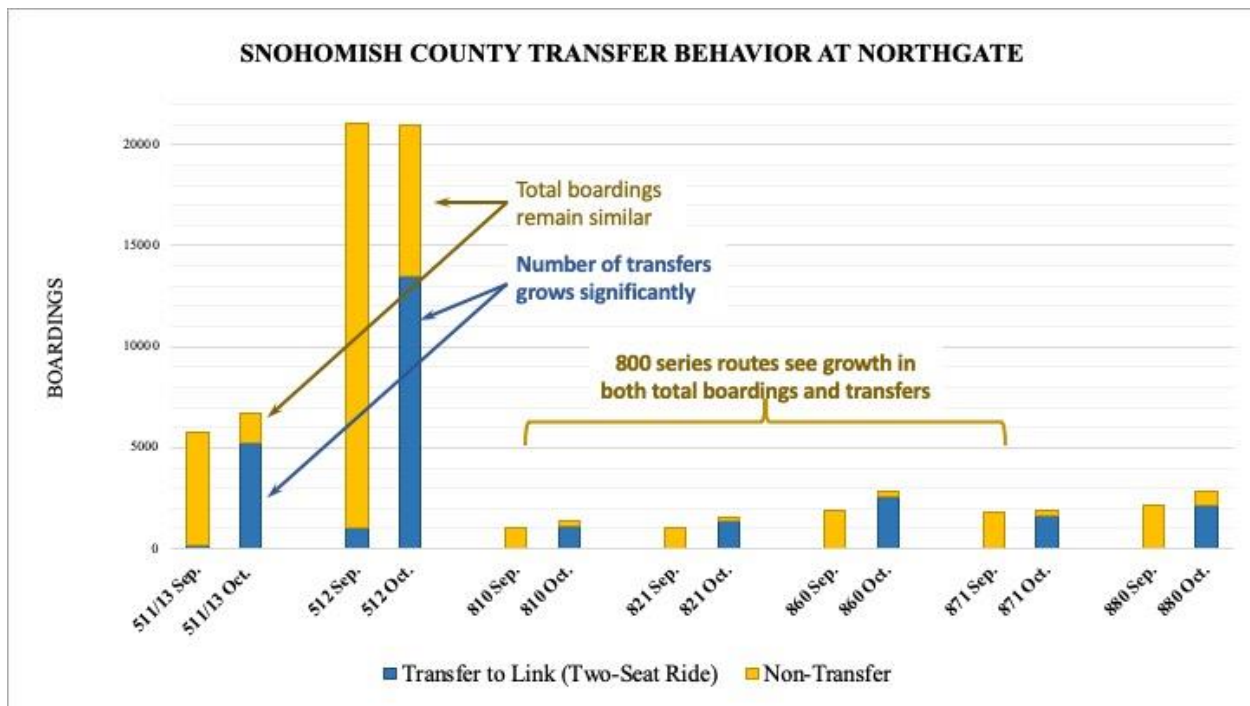


Figure 3. 2021 Bus to Link Transfer Patterns by Route and Month at the Northgate Station

If total ORCA boardings are examined for these routes, the combined ORCA boardings for routes 511, 512, and 513 grew by 4 percent from September to October in 2019. In 2021 these routes lost 2 percent of their total ORCA boardings. For the 800 series buses previously headed to the University District, ridership grew by 53 percent from September to October in 2019. In 2021, this growth was 36 percent. Thus, month-to-month ridership growth in 2021 was lower than that

observed in 2019. These changes compare to the systemwide bus boarding growth rates from September to October of 15 percent in 2019 and 9 percent in 2021. Thus, ORCA bus ridership growth was slightly lower than a “typical” pre-COVID year, but the changes observed were essentially aligned with the slow overall post-COVID transit recovery. That is, the slower growth on routes affected by the new stations appears to reflect the same post-COVID trends that affected systemwide bus ridership.

Usage Patterns of Snohomish County Bus Routes Serving Downtown Seattle

Not all Snohomish County buses changed routes to terminate at the Northgate Link station. A number of Community Transit routes and one peak-period Sound Transit route continued to operate directly to downtown Seattle. This section examines how the ridership on these routes changed with the availability of the two-seat Link trips via Northgate.

Table 3 and Figure 4 show the number of boardings on different clusters of CT-operated bus routes. Comparing these groups helps show the differences between ridership on routes that remained the same when the new Link stations opened and routes that were altered to end at Northgate. The first group shown in

Table 3 is that of ‘To Seattle (route unchanged).’ These are the routes that ended in downtown Seattle both before and after the new Link stations opened (routes 402, 405, 410, 412, 413, 415, 416, 417, 421, 422, 424, 425, 435, and 510). Ridership on these routes increased by about 20 percent from September to October 2021, which was higher than the 6 percent increase observed in 2019 for these routes. It was also larger than the systemwide ORCA bus ridership growth of 9 percent. A large portion of this increase was from the growth of ridership on the 510, which remained a weekday only, peak period only, express route to/from downtown Seattle. Some of that growth was due to people choosing these routes to retain their one-seat ride to and from downtown Seattle rather than taking two-seat rides by transferring at Northgate.

Table 3. Boardings on Select CT Routes in September and October 2021

Southbound	September	October	Change	Percentage Change
To Seattle (route unchanged)	21,197	25,326	4,129	19%
To Northgate (was to Seattle)	26,773	27,678	905	3%
To Northgate (was to UW)	7,955	10,546	2,591	33%
Northbound				
From Seattle (route unchanged)	21,680	26,134	4,454	21%
From Northgate (was from Seattle)	27,114	25,352	-1,762	-6%
From Northgate (was from UW)	8,100	11,350	3,250	40%

The second group of routes examined in this section are routes that were re-routed to the Northgate Transit Center to allow for connections to Link. These are labeled ‘To Northgate (was to Seattle)’ and the ‘From Northgate (was from Seattle)’, and they include the southbound and northbound routes (511, 512, and 513) that had previously ended/begun in downtown and after October 2021 ended/began at Northgate. After October riders on these revised routes had a two-seat bus/Link ride.

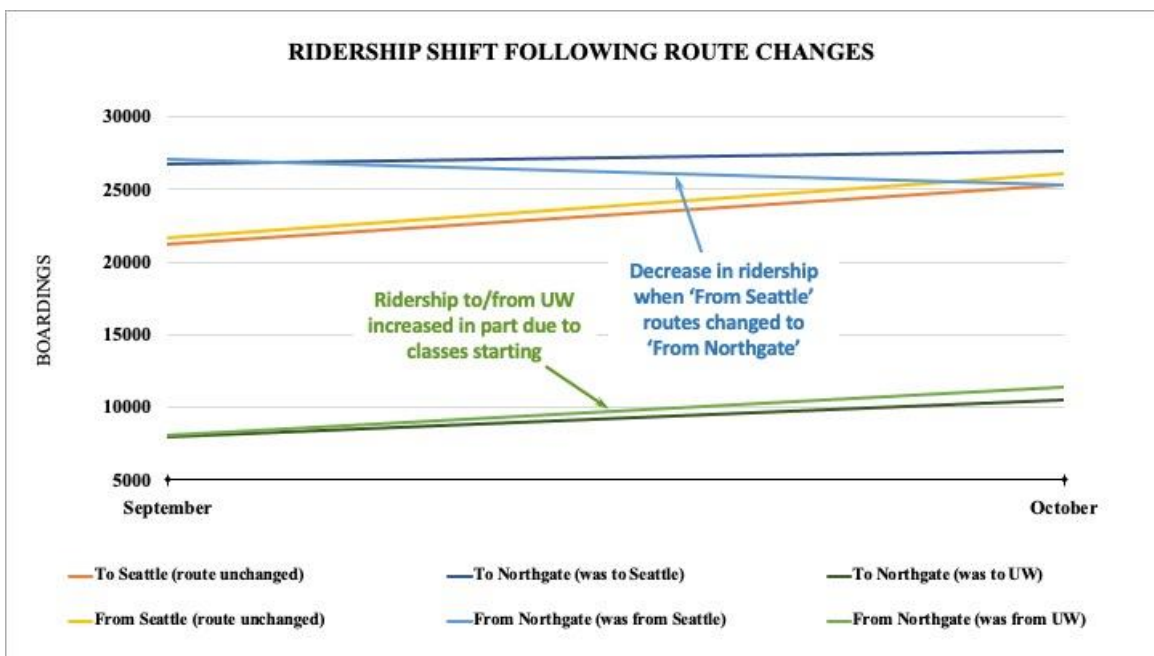


Figure 4. Shift in Ridership Between September and October on Select CT Routes

The number of boardings for riders heading southbound on these altered routes remained about the same from September to October of 2021, but there was a small decrease in the number of riders heading northbound. Total ridership for both directions on these three routes was thus down roughly 2 percent from September to October 2021, while these routes had a 4 percent increase during the same time period in 2019. This indicates that some riders switched from these routes to the 4xx series buses and the 510 to maintain their one-seat rides to downtown.

With these combined results, it can be said that slightly more than half (52 percent) of the riders apparently headed downtown from Snohomish County now had two-seat rides where they used to have a one-seat ride. The remaining 48 percent continued to select bus routes that directly served downtown.

The final group in

Table 3 is ‘To Northgate (was to UW)’ and ‘From Northgate (was from UW)’, which includes the 800 series routes (810, 821, 860, 871, and 880) that had previously ended/begun at the UW and now ended/began at Northgate. This group had a 36 percent increase in ORCA boardings, with much of that increase likely due to the start of classes at the UW on September 29th. While large, this increase was lower than the 53 percent increase that these routes experienced in 2019.

The project team did not analyze ridership specifically for UW-supplied Business Passports or analyze specific hashed ORCA cards to determine whether riders who had previously used the 400 or 500 series buses began using the 800 series buses to reach Northgate before continuing downtown. However, the discussion later in this document of observed changes in rider behavior for previous users of the 855 when it was terminated indicates that many previous users of 8xx series routes began to use a combination of bus routes, including the 511, 512, and 513 to reach Northgate. This helped limit the loss of ridership from these routes, even as some previous users of these routes shifted to the 4xx and 510 routes to preserve their one-seat rides.

If ridership for all three groups of routes discussed above is aggregated, it can be seen that ORCA bus boardings on these routes increased by 8 percent in October 2021. In 2019, these routes increased by 11 percent from September to October.

Use of King County Metro Bus Routes Serving the New Link Stations

This subsection examines King County Metro bus routes of interest operating in northern Seattle and King County.

Table 4 shows the number of ORCA bus boardings on different groups of KCM routes. The first group shown in the table is ‘To Northgate (route unchanged).’ These are the routes that began in the Shoreline area and ended at Northgate both before and after the new stations opened and include routes 345, 346, 347, and 348. Ridership on these routes increased by about 8,000 (40 to 50 percent) from September to October of 2021. In the northbound direction, the increase in Link-to-bus transfers was nearly identical to the increase in bus boardings, meaning that the growth in ridership was likely due to new passengers taking these routes to catch Link at the Northgate station, and the base ridership that had previously taken these routes was not affected by this change.

Table 4. Boardings on Select Groups of KCM Routes in September and October 2021

Southbound Route Group	September	October	Change	Percentage Change
To Northgate (route unchanged)	17,468	24,801	7,333	42%
To Seattle (route unchanged)	116,624	127,276	10,652	9%
To U-District (route unchanged)	173,231	262,001	88,770	51%
To Northgate (previously to Seattle)	2,493	1,514	-979	-39%

Northbound Route Group	September	October	Change	Percentage Change
From Northgate (route unchanged)	17,210	25,802	8,592	50%
From Seattle (route unchanged)	133,042	125,717	-7,325	-6%
From U-District (route unchanged)	197,066	297,382	100,316	51%
From Northgate (previously from Seattle)	2,813	1,685	-1,128	-40%

The second group is ‘To Seattle (route unchanged),’ which includes routes 40, 49, 62, 64, and 70. These routes did not change significantly and still ended in downtown Seattle but served a variety of markets other than downtown. (For example, the 62 and 40 serve South Lake Union via Fremont and Ballard, while the 64 is heavily used for commuting from several North Seattle neighborhoods to South Lake Union. Before the pandemic, the 64 also served the medical facilities on First Hill, but this leg of the routes was dropped.) These routes should not have been heavily affected by the new stations, and in fact they were not heavily affected. In the southbound direction, boardings grew by about 10,000 from September to October 2021, which matched the increase in total ORCA bus ridership increase of 9 percent. In the northbound direction, however, boardings dropped by about 7,000. It is not clear why this difference occurred.

The third group is ‘To U-District (route essentially unchanged).’ This includes routes 31, 32⁷, 44, 45, 48, 65, 67, 73, 75, 372. These routes ended in, or passed through, the U-District both

⁷ Routes 31 and 32 did experience minor route changes when passing through the University District, but the majority of the two routes serving Seattle Center, Magnolia, Seattle Pacific University, Fremont, and passing through the University District to reach Children’s Hospital were similar in 2019 and 2021. They were thus not expected to carry substantially different ridership.

before and after the new stations opened. This group had the highest number of boardings and experienced a large increase from September to October (upwards of 100,000 additional boardings northbound); much of this increase was likely due to the start of classes at the UW on September 29th. It is important to note that some individuals headed downtown may also have taken these routes to and from the U-District or UW Stadium stations to take Link to their destination, but transfers to/from Link remained a low percentage of the overall boardings of these routes.

The final group is the 'To Northgate (was to Seattle),' which includes routes 301 and 304 that had previously ended in downtown and now ended at Northgate. The number of boardings on these routes decreased by about 1,000 (40 percent) from September to October 2021 in both the southbound and northbound directions, and the share of riders who transferred to/from Link changed significantly as well. In September, only about 2 percent of the northbound riders transferred from Link (at a downtown station), but after the route was altered to end at Northgate, over 70 percent of the boardings came from transfers at the Northgate station. It is worth noting that these routes began to share some of the same Shoreline-to-Northgate passengers as the 345, 346, 347, and 348, which may be partially responsible for the drop in ridership. (Together, the 34x routes each gained an average of about 2,000 boardings from September to October, or twice what was lost by routes 301 and 304.) Riders on these routes who were still going to or coming from downtown now had a two-seat bus/Link ride.

Changes in Transfer Activity for KCM Routes that Operate between Northern Seattle and the U-District and Downtown

This subsection looks at transfer activity for King County Metro bus routes that served both existing and new Link stations in the north end. Not surprisingly, riders changed where and how often they transferred from these routes, taking advantage of the three new stations (U-District, Roosevelt, and Northgate) but continuing to use the UW Stadium station, although less frequently.

After the new stations opened, there was a large drop in bus transfers to Link at the UW Stadium station. However, the sum of transfers at the four northern stations (the UW Stadium plus the three new stations) in October 2021 was more than twice the number of transfers that occurred at the UW Stadium station during September. A shift away from transfers at the UW Stadium station toward transfers at the new stations can clearly be seen in the data, as riders took advantage

of transfer opportunities closer to their origin to board Link earlier in their trip, rather than riding all the way to the UW stadium.

Table 5 summarizes the number of bus-to-Link transfer boardings for six King County Metro routes (31/32, 44, 45, 67, 73, and 75) that took place at the UW Stadium (UW), U-District, Roosevelt, and Northgate stations. For comparison, before September 2021, all of the transfers to Link from these routes occurred at the UW Stadium station. Routes with less than 1 percent of the transfers to the UW Stadium station are not shown, as most of these transfers were considered to be the result of “financial transfers”⁸ and should not be used as indications of direct bus-to-rail transfer as part of a continuous trip. Table 5 gives the total number of transfers from each of these bus routes to Link in October 2021.

Table 5. Number of Metro Bus-to-Link Transfers by Station for October 2021

Station	Bus Route						Total
	31/32	44	45	67	73	75	
UW Stadium	49	481	637	754	81	726	2,728
U-District	2,411	2,142	847	466	292	126	6,284
Roosevelt		0	1,150	648	652		2,450
Northgate		0	35	727	2	3161	3,925
Total	2,460	2,623	2,669	2,595	1,027	4,013	15,387

⁸ The ORCA system records a boarding as a "transfer" whenever a boarding takes place within two hours of a previous boarding that required payment. For the purpose of coordinating transit services, the expectation is that "transfers" occur when a rider exits one transit vehicle, walks a relatively short distance, and boards another vehicle. A "Financial Transfer" occurs when the ORCA financial system records a boarding as a transfer, but the rider has either obviously taken another mode of travel before making the transfer boarding or has performed an economic activity. One example of a Financial Transfer is when a rider boards an inbound bus (e.g., Route 44) and transfers to an outbound bus of the same route (another Route 44). In this case, we can assume that some activity took place before the rider boarded the second bus. A second example is when a rider travels a long distance between the first service used and the second service boarded. For example, a rider boards a local Community Transit local bus (e.g., Route 101) but then transfers to Link at the UW Stadium. As long as their Link trip segment that starts at the UW Stadium occurs within two hours of their payment on the CT 101 bus, ORCA records this as a "transfer" to Link. In reality, they did not transfer directly from Route 101 to Link, as Route 101 never comes within 11 miles of the UW stadium. They used an unknown mode of travel to move between routes. Thus, this Link boarding is a legal "Financial Transfer" but is not a transfer of interest to this study.

Figure 5 shows the bus-to-Link transfer boardings for the same routes by week. Riders of these routes transferred frequently at both the UW Stadium station and the three new stations, although transfers at the UW Stadium station decreased markedly after the opening of the three new stations. The transfer boardings were summarized by week, with Saturdays not included to account for the uneven jump in boardings during UW Husky home football games. The bus-to-Link transfers at the UW Stadium station for each of the routes are shown for September and October 2021, and transfers to the new stations were summed together and are shown for the weeks they were open. As shown in Table 5, some of the routes served more than one of the new stations, while others primarily served one. The new station transfers are added together in this graph for clarity and visual comparison with the previous transfer activity at the UW Stadium station.

Total transfer activity from bus to Link increased significantly with the opening of the new stations, indicating that additional riders used these routes to reach downtown and other destinations that could be more conveniently reached via Link.

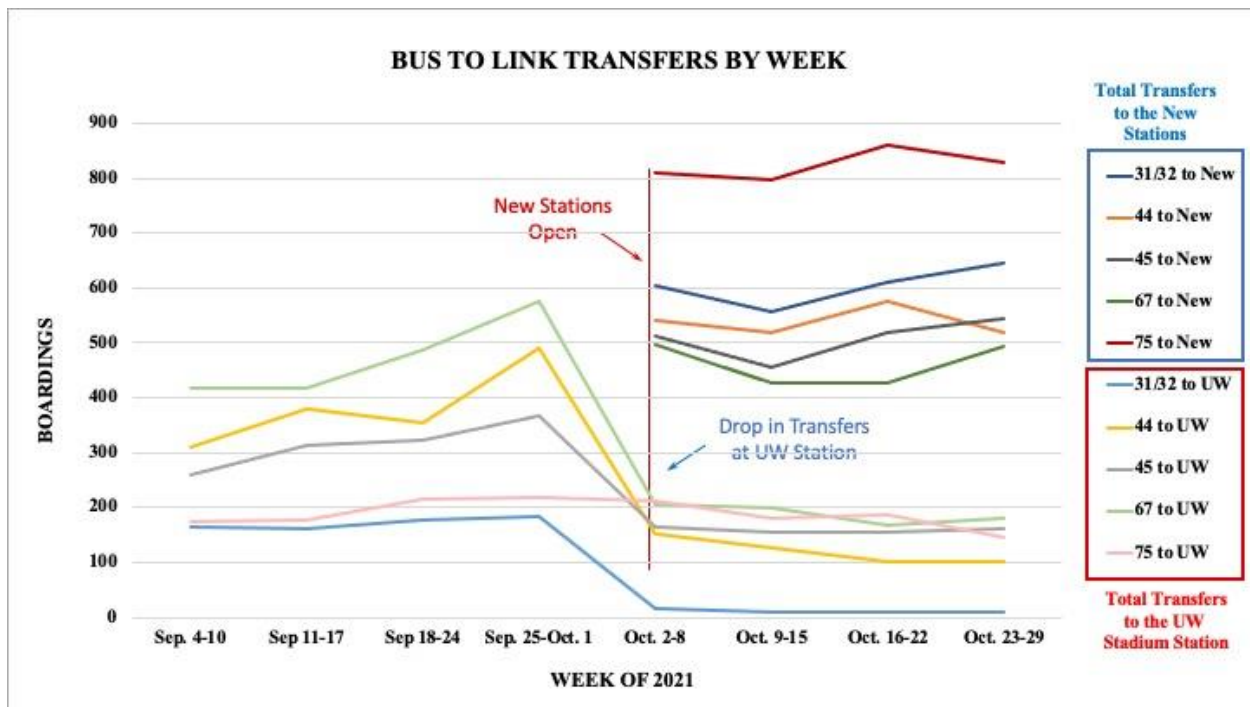


Figure 5. Bus-to-Link Transfers by Route and Week for 2021

ANALYSIS OF BEHAVIOR CHANGES DUE TO SPECIFIC ROUTE CHANGES

This subsection examines how the behaviors of riders of specific routes changed when those routes were altered in response to the opening of the new Link stations. Some of the routes examined were eliminated altogether, while others were truncated at one of the new Link stations.

Four routes are examined:

- 1) the 309, which had previously run from the Kenmore Park & Ride down Lake City Way (SR 522) to downtown Seattle and was terminated in October
- 2) the 855, which had run from Lynnwood to the University District and the University of Washington and was terminated in October
- 3) the 522, which had run from Woodinville to downtown Seattle via SR 522 and I-5 and which was truncated at the Roosevelt station
- 4) the 301/304, which had previously run to downtown and was terminated at Northgate.

Route 309: Terminated in October

Route 309 Analysis

King County Metro Route 309 was a peak period commuter route from the Kenmore P&R down Lake City Way (SR 522) to downtown Seattle. It operated southbound in the morning peak period and northbound in the afternoon peak. The route was terminated when the three new Link stations opened. Riders who had previously used the route had the option to switch to one of three new routes: the 20, the 320, or the 322. They could also use the existing 372 or 522. Riders of the 322 could choose to either transfer at the Roosevelt Link station or travel to downtown or First Hill on a one-seat ride. Riders of the 20 could transfer to Link at Northgate or continue to the University District. Riders of the 320 could transfer at Northgate or keep a one-seat ride to downtown and South Lake Union. The 372 takes riders to the UW Stadium station and University District. The 522 takes riders to the Roosevelt Link station.

Table 6 summarizes how individuals who used Route 309 in September 2021 used transit in October of that year.

A total of 450 riders used KCM Route 309 in September 2021. Only 161 rode that route five or more times during September. Of the 450, 205 (46 percent) boarded a Link train at either

Roosevelt, Northgate, or the UW Stadium⁹ in October. Of those individuals, 88 used more than one of these train stations, and 76 became frequent users of Link in October.¹⁰ Only 18 of those new frequent Link users were frequent users of Route 309 in September. Of the September riders of the 309, 34 percent did not ride any of the five obvious alternative bus routes (20, 320, 322, 372, or 522) during October.

⁹ The UW Stadium is used here because the 372 is an alternative route to the 309, and its logical Link station transfer is at the UW Stadium station. Only 11 transfers from the 372 occurred at the U-District station for previous users of Route 309, although other 372 riders did transfer to Link at the U-District more often.

¹⁰ Note that in this case, “frequent user” is based only on boardings at these three stations and does not include possible alightings from Link at these stations.

Table 6: How September Users of Route 309 Travelled in October

	Used Route 309 in Sept.	Used Route 20 in Oct.	Used Route 320 in Oct.	Used Route 322 in Oct.	Used Route 372 in Oct.	Used Route 522 in Oct.	Boarded at Roosevelt in Oct. ¹¹	Boarded at Northgate in Oct. ⁶	Boarded at UW Stadium in Oct. ⁶
Total Number of Unique Riders	450	89	128	168	152	183	128	116	49
Subset of Riders w/ 5+ Trips	161	30	62	91	63	86	45	29	2
Total Trips	2,732	513	1,070	1,611	1,233	1,458	597	409	81
Increase in Previous Trip Making on This Route		513	1,070	1,611	-116	-1,287	597	409	81
Percentage of 309 Sept. Riders Observed in October		20%	28%	37%	34%	41%	28%	26%	1%
Percentage of 309 Sept. Trips increased in Oct.		19%	39%	59%	13%	13%	22%	15%	3%

¹¹ In this table “use” is defined entirely based on boardings at the three Link stations. If alightings are assumed to be equal to boardings at the stations, then the number of trips using the stations is double what is shown for the use of these stations.

Table 6 shows only boardings of Link at the three stations. Boardings at these stations were primarily related to southbound travel, while the bus boardings reported in Table 6 include travel in both directions. Therefore, if the Link boardings are doubled to estimate use of light rail in both directions of travel (i.e., boardings and alightings), then Link travel in October by previous users of Route 309 represented roughly 80 percent of their travel on Route 309 in September. Not transferring from another ORCA transit service were 177 of the Link boardings at Northgate (43 percent) and 160 of the Link boardings at Roosevelt (27 percent), meaning that roughly one-third of the time these individuals used Link, they most likely drove to these stations. When transferring from a bus to Link at the Roosevelt station, 301 of the 437 transfers to Link came from Route 522. When riding the bus to Northgate to catch Link, the most common route used was Route 20 (86 transfers).

From a transit route choice perspective, the major shift in transit route use was to routes 320 and 322, with Route 20 being a distant third option. On both the 320 and 322, about one-third of the previous Route 309 riders took at least one trip. The 322 captured 1,611 trips and the 320 captured 1,070. Importantly, only 41 trips on the 320 resulted in a transfer to Link at Northgate (roughly 8 percent of southbound trips on the 320), while only 54 trips (roughly 7 percent of southbound trips) resulted in a transfer from the 322 to Link at Roosevelt. This suggests that the majority of these trips were one-seat rides either to or from downtown. Of the Route 20 boardings, 86 (roughly 33 percent of southbound trips) were transfers from Link.

Many users of Route 309 also used routes 372 and 522 in September. While many of them continued to use these routes in October, their use of both routes declined in October. These declines in ridership on the 372 and 522 partially offset the new ridership on routes 320 and 322 in terms of the total bus ridership observed in October by previous users of Route 309.

If all ORCA boardings of Route 322 are examined (not just previous users of Route 309), then a total of 5,213 boardings of the new Route 322 occurred in October 2021. Of these, 714 were transfers from Link at the Roosevelt station. Another 579 transferred to Link from the 322 at Roosevelt. If directional travel is assumed to be roughly equal on the 322, then between 22 and 27 percent of trips on the 322 transferred to or from Link at the Roosevelt station. This indicates that while previous users of Route 309 were not frequently using the 322 to access Link, many other riders used the new route for that purpose.

Route 309 Analysis Conclusion

Routes 320 and 322 were the most common replacement for previous users of Route 309. The use of these routes in October by previous riders of Route 309 was almost equal to the use of Route 309 by those individuals. While both of these routes provided for transfers to Link, the vast majority of the trips made on these routes by previous users of Route 309 did not transfer to Link. The conclusion is that these riders chose to keep their one-seat ride to downtown destinations over trips that provided better route frequency and reliability via Link but that added the inconvenience and potential for delays as a result of the need for transferring.

Despite riders not transferring to Link from the routes being used in place of the terminated Route 309, the use of Link was fairly strong by previous users of that route. For previous users of Route 309, much of the increased ridership of Link appears to have come at the expense of their use of Route 522, which declined substantially in October. Two-thirds of this group's Link trips at the new stations were preceded by a bus transit ride, but one-third appears to have involved drive access.

Route 855: Terminated in October

Route 855 Analysis

Route 855 was a Community Transit route that had run from the Lynnwood Transit Center to the University District and UW campus. The route had run only southbound in the morning and only northbound in the afternoon. This route was terminated in October 2021. Possible alternatives for riders of the 855 were identified as routes that stopped at the Lynnwood Transit Center and continued to the Northgate station, as the Lynnwood Transit Center was the only pick-up point for the 855. The ways that riders of the 855 in September travelled to the UW in October can be seen in Table 7 and Figure 5.

Table 7. How September Users of Route 855 in September Traveled in October

	855 Sep	511 / 512 / 513 & Link – Oct	821 Oct	Link Boardings in Oct. at Northgate	Boarded Link at Northgate in Oct. w/out Transfer	Transferred to Bus from Link at Northgate
Total Number of Unique Riders	684	370	259	475	239	444
Subset of Riders w/ 5+ Trips	176	242	42	368	42	335
Total Trips	3,388	3,731	1,703	5,400	710	4,356
Percentage of 855 Sept. Riders Observed in October	--	54%	38%	69%	35%	65%
Percentage of 855 Sept. Trips Made in October	--	110%	50%	138%	21%	

An examination of Link usage at Northgate for individuals who rode the 855 in September showed that these individuals boarded Link 5,400 times in October. All but 710 of those boardings (87 percent) involved a transfer from another ORCA transit service. While it is not possible to accurately identify the number of Link trips that ended at Northgate and did not transfer to another ORCA service, it is possible to determine that 4,356 transfers from Link to bus by these same individuals took place in October at Northgate. If the same ratio of transfers existed for trips exiting Link at Northgate as boarding Link at Northgate, then roughly 5,000 Link trips to Northgate (~4,360 transferring to buses and an estimated 640 using a car or a non-motorized mode to leave Northgate) were taken in October by previous users of the 855 in September. An examination of the number of boardings by these individuals at the U-District and UW Stadium stations showed that boardings at these two stations by these individuals exceeded the number of boardings at Northgate. Thus, the majority of these new Northgate trips are assumed to have had destinations in the University District, including the University itself. This means that these individuals increased their trip making to the overall University District by a factor of 3 from September to October. This was consistent with the start of classes but also greatly exceeded the overall September to October growth rate of trips to the University District discussed earlier in this report.

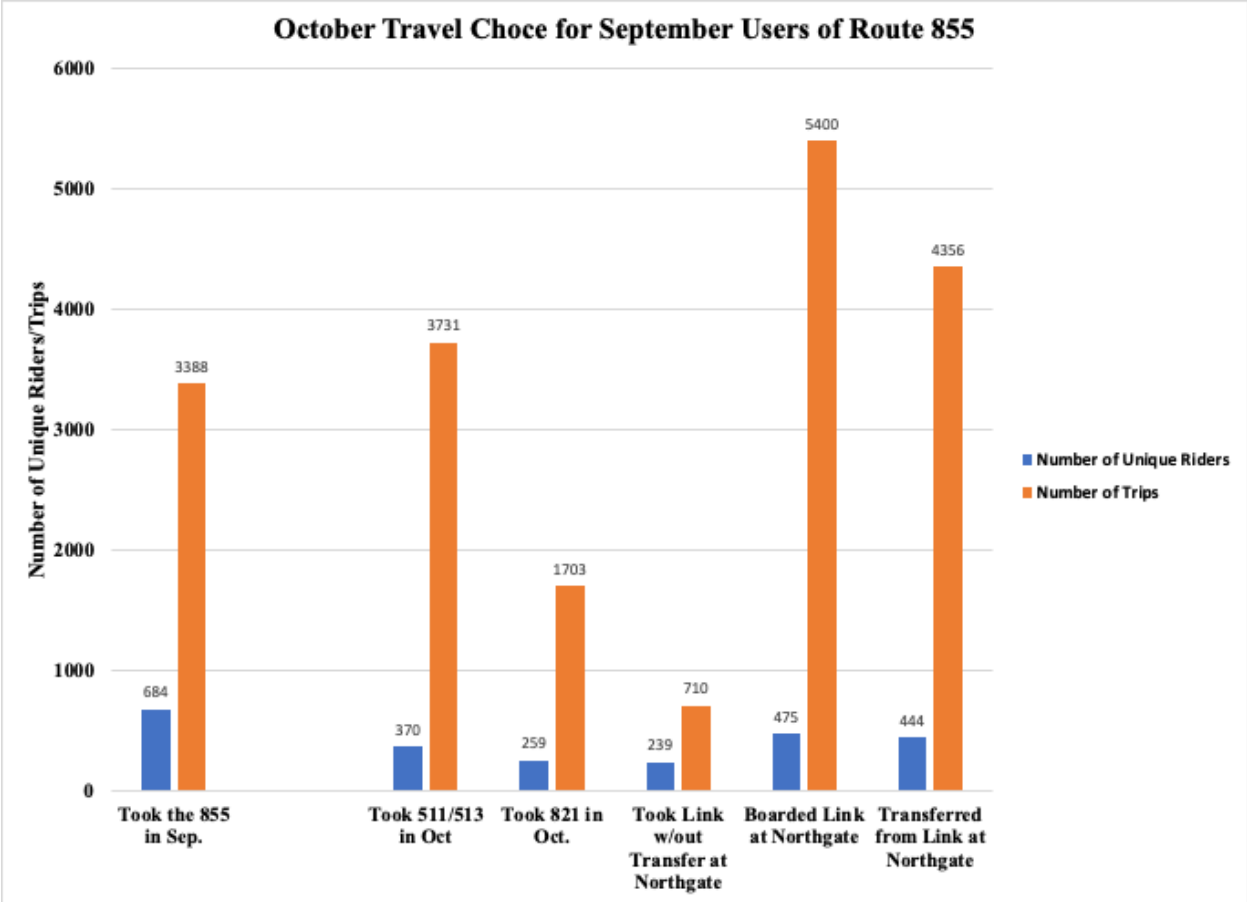


Figure 6. How Users of Route 855 in September Traveled in October

Riders of the 855 boarded Link 695 times in September. These previous Route 855 riders boarded Link 10,400 times in October. If the assumptions described above regarding trips ending at Northgate are correct, then the vast majority of these trips were either to or from Northgate. This was more than 3 times the number of trips (3,388) they made in September on the 855. In 2019, Route 855 ridership increased by only 49 percent between September and October. Total 8xx series ridership grew by only 6,300 trips during this period in 2019. This was roughly equal to the growth in trip making from just the September users of the 855 in 2021.

Table 8 shows which transit routes these individuals commonly used to access Link at Northgate in October.

Table 8: Number of Transfers to/from Link at Northgate by Route for Previous Route 855 Users

Route	October Transfers to Link	October Transfers from Link
511	1298	1072
512	928	965
513	560	439
810	59	129
821	759	737
860	202	296
871	464	349
880	294	289

The largest share of previous Route 855 users, 385 individuals, took the 511, 512, or 513 route in October. These users made over 5,200 transfers to/from Link in October and these three routes. Other heavily used routes for ex-Route 855 customers were CT routes 821, 860, 871, and 880. The 821 could be used interchangeably with the 511/512/513 for those traveling from the Lynnwood Transit Center to Northgate station but ran less frequently than the 5xx routes. The other 8xx series buses (860, 871, and 880) did not serve the Lynnwood Park and Ride, indicating that a significant number of previous Route 855 users chose places other than the Lynnwood Park and Ride to board CT transit services to access Link at Northgate. The improved geographic access and improved headway appear to have more than offset the shift from a one-seat to a two-seat transit ride.

Although a number of the 400 series Community Transit buses stopped at the Lynnwood Transit Center, most of the riders who took the 855 in September did not take these routes in October. This makes sense, as these routes ended in downtown Seattle, and the 855 had previously ended at the University of Washington, so the ridership between these routes was unlikely to have much overlap. In total, only 29 riders rode the 855 in September and then rode one of the 4xx series routes in October.

Route 855 Analysis Conclusion

The majority of riders who took the 855 in September switched to one of the multiple transit options for reaching the Northgate Link station in October. These options included the 511/512/513 and 821, which all served both the Lynnwood Park and Ride and the Northgate Transit Center. The vast majority of these October trips were headed to the University of Washington or the University District in general, given that a large number of the northbound trips made by these individuals began at these two Link stations and then transferred to these bus routes

at Northgate. These riders now had a two-seat ride and had to get off at one of two Link stations rather than at one of the stops previously made by the 855.

While the two-seat ride and longer walk between the transit station and their destination within the University District was a disadvantage for many travelers of the Link service, the availability of a far wider set of routes that could be used to access the Northgate station and then reach the University District via Link increased overall access on the northern end of this trip, decreased the headway between vehicles in both directions of the trip in comparison to the previous one-seat ride, and provided more reliable travel via Link than buses on I-5, making other aspects of the two-seat trip more convenient to riders. The result was a substantial increase in transit use for this specific market.

Routes 301 and 304: Changed from Ending in Downtown to Ending in Northgate

Routes 301 and 304 Analysis

This analysis determined how passengers who rode the 301 and 304 in September 2021 changed their behavior in October 2021. Results are discussed for all directions of travel, as well as by direction.

When routes 301 and 304 changed from ending in downtown to ending at Northgate, riders from Shoreline to downtown could reach downtown by continuing to take these routes, only now transferring to Link at Northgate. Alternatively, to maintain a one-seat ride, they could switch to Route 303, the new Route 302, or the E-Line, which traveled on SR 99 from the Shoreline area to downtown. Riders could also drive to the Northgate station to take Link. Southbound riders of Routes 302 and 303 could transfer at Northgate or stay on these routes for a one-seat ride to downtown. The results of the analysis are shown below in Table 9 and Figure 7.

Table 9. Changes to Route 301 and 304 Ridership

	301/304 Sep	Total Users of 301/304 Oct (includes non-Sept users)	Users of 301/4 in both Sept & Oct	Transfer to or from Link at Northgate in Oct. & Used 301/4 in Sept.	Used 302/303 in Oct & 301/4 in Sept.	Used Link at Northgate w/out Transfer in Oct. & 301/4 in Sept.	Used E- Line or BRT in Oct. & 301/4 in Sept.	Used 345, 346, 347, or 348 in Oct. & 301/4 in Sept .	Used 302 in Oct. & 301/4 in Sept .
Total Number of Unique Passengers	911	982	389	311	170	345	434	497	229
Number of Passengers with 5+ Trips	351	245	163	158	90	71	214	231	109
Total Trips	6,352	4,215	2,646	2,608	1,516	1,173	4,394	4,224 (2,574 increase)	2,174
Percentage of 301/304 Sept (Passengers)	--	108%	43%	34%	19%	38%	48%	55%	25%
Percentage of 301/304 Sept (Trips)	--	66%	42%	41%	24%	18%	69%	66%	34%

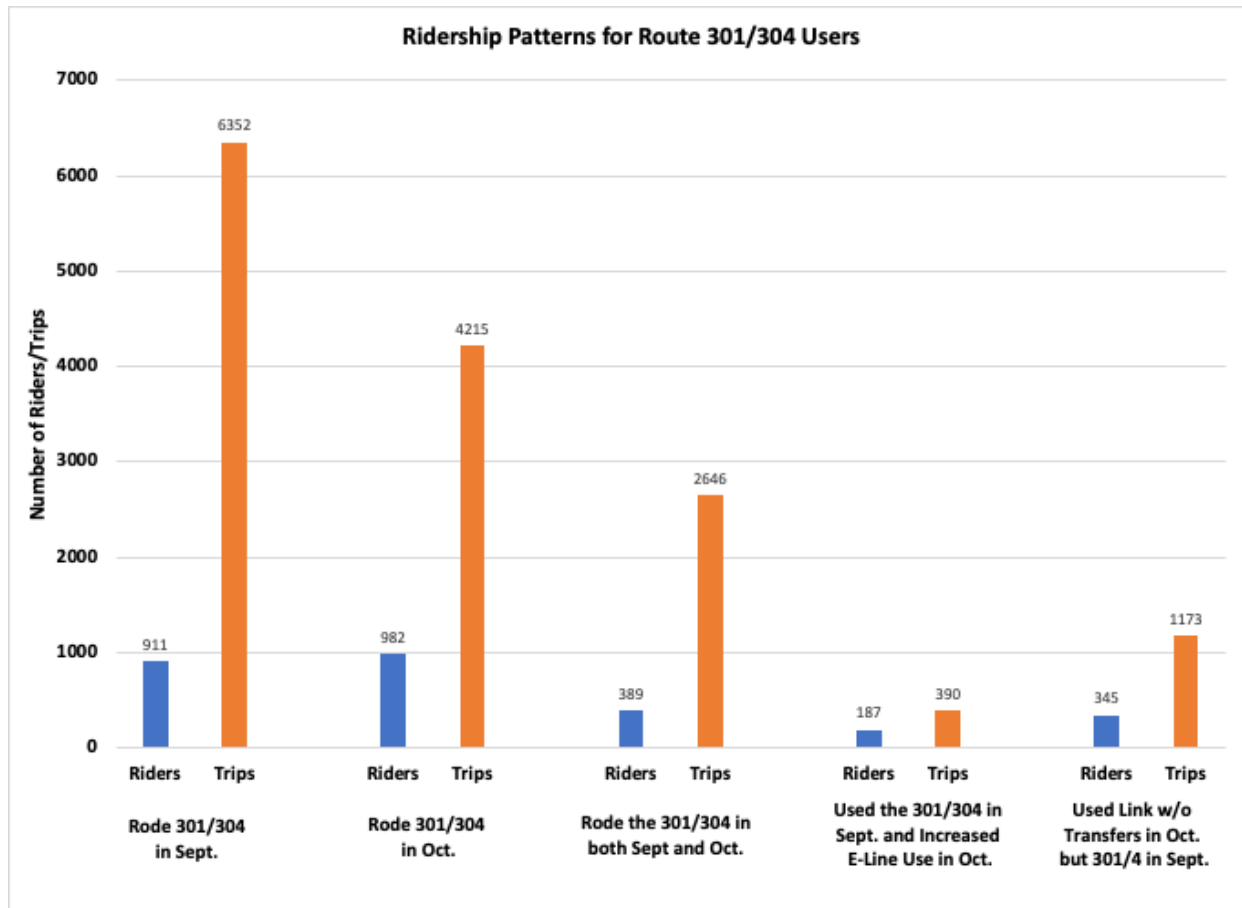


Figure 7. Ridership Patterns for Routes 301 and 304 in September and October

Table 9 shows that 911 unique ORCA cards (assumed to be unique travelers) rode either the 301 or the 304 in September. Of the 911, 389 (43 percent) individuals who rode the 301/304 in September continued to ride that route in October after the route was truncated at Northgate. Of these riders, 311 either transferred to Link to continue downtown or transferred from Link to routes 301 or 304 going northbound. The other 78 users did not transfer to or from Link from these routes in October. Interestingly, 359 (39 percent) of the unique ORCA cards that used the 301/304 in September boarded these combined routes only once in September. Many of these ORCA cards were not observed on these routes in October.

However, while many of the September riders of the 301/304 did not continue riding the route in October, many new riders did choose to use the route. The number of unique ORCA cards using these two routes increased to 981 in October. However, similar to what was observed in September, many (479 or 49 percent) of these riders used these routes only once in October.

Of the September riders of the 301/304, 130 started riding Route 302 in October. Those individuals made 847 trips on that route. An additional 252 trips were made by individuals who used the 301/304 in October but not in September. Of the 1,099 trips made by these combined groups, 118 transferred to Link at Northgate, and 91 transferred from Link to the 302, so 19 percent of trips made by previous and current users of Route 302 transferred to or from Link in October. The majority of the remaining 81 percent are assumed to have been one-seat rides to or from downtown. Some riders also shifted to Route 303, although this route had an October decrease in ridership by September users of the 301/304, from 1,208 boardings to 1,007 boardings.

The other major shift in route choice for the previous users of the 301/304 was to King County Metro routes 345, 346, 347, and 348 (the “34x series”). Of the September users of routes 301/304, 229 used the 34x series buses in October, taking 2,174 trips on these routes. Of these riders, 109 rode those buses more than five times in October. A total of 496 unique riders used both the 301/304 routes and the 34x series routes in September and October, making 4,224 trips on the 34x series in October. This was an increase of 1,981 boardings for these four routes by riders of the 301/304, with Route 346 gaining 822 trips in October and 348 gaining 607 trips.

Of the 351 riders who made five or more trips in September, 163 continued to be frequent riders of the 301/304 in October, and 158 of them transferred to/from Link at Northgate at least five times. Another 71 boarded Link at Northgate at least five times without having arrived at

Northgate via bus. Yet another 88 of them used the 302, with 40 of them being frequent users of the 302, and 11 of them used the 34x series buses, with 57 being frequent users.

While the total number of unique riders on the 301/304 increased slightly in October, the total number of ORCA boardings declined on the combined routes from 6,352 ORCA boardings in September to 4,215 ORCA boardings in October. Thus, while more people rode these routes, total trip making on these routes declined after the Northgate Link station opened.

To further examine how traveler behavior changed for previous users of the combined routes, it is useful to look at the behavior of individuals who rode these routes frequently. For simplicity, a “frequent rider” is defined as someone who made at least five trips during September on a combination of routes 301 and 304. In September, 351 individuals made at least five boardings (trips) on the combination of routes 301 and 304.

Of the 351 frequent users of the 301/304 in September, the following behaviors took place:

- 258 still used the 301/304 route (74 percent), of those 258,
 - 138 were still frequent users, having made five or more trips on the 301/304 in October
 - 113 also used either the 302 or 303 in October
 - 111 used at least one of the 345, 346, 347, or 348, typically connecting to/from Link
 - 213 reduced the number of 301 and 304 boardings they made
 - 30 increased their use of the 301/304 over their September behavior
 - 15 made the same number of 301/304 trips in October as in September
- 93 did not use Route 301 or 304 in October. Of those 93,
 - 22 used the 302/303 in October but did NOT use the 301/304
 - 22 did not use any of the 301, 302, 303, or 304 routes but did board Link at Northgate
 - 17 used at least one of the 345, 346, 347, or 348 routes
 - 10 used the E-Line but not Link at Northgate or the 301, 302, 303, or 304
 - 39 did not use any of the 301, 302, 303, or 304 route buses, the E-Line, or board Link at Northgate
- 187 boarded Link at Northgate
- 108 boarded Link at Northgate without transferring from a bus

- 183 transferred between Link and a bus (any route) at Northgate
- 110 transferred to Link from the 301 or 304 route bus
- 157 transferred from Link at Northgate to a bus (any route).

An examination of the overall transit travel behavior of these high frequency riders showed both a modest increase in overall transit trip making and an increase in transfer activity. An examination of the total trip making of riders who used the 301 and 304 in either September or October showed that in September travelers who used the 301 and 304 made 28,622 transit trips, which included 18,292 transfers (39 percent of their total ORCA boardings). In October, transit trip making grew to 31,758 trips (an 11 percent increase), which required 23,227 transfer boardings (42 percent of all transit trips required transfers).

Thus, while trip making on the 301/304 did decline, total transit use associated with Route 301/304 patrons increased. As expected from their growing use of Link and the frequent use of buses to reach Link stations, the number and percentage of transfers required for their transit trips increased. Thus, the need to transfer does not appear to have been a deterrent to transit use.

As noted above, if riders wished to continue one-seat rides to downtown, routes 302 and 303 could be used in place of the old Route 301/304. Both the 302 and 303 allowed riders to transfer to Link at Northgate but also continue downtown via I-5 to a stop at 5th and James. This allowed a one-stop ride to at least the edge of downtown Seattle before each of these routes turned east to travel to First Hill. A total of 170 of the 911 September riders of the 301 and 304 rode the 302 or the 303 in October, making 1,516 trips on those two routes. These were modest increases over September, when 128 of these same individuals made 913 trips via routes 302 and 303. The increase of 603 trips was 10 percent of September use of the 301/304 by these individuals.

The E-Line¹² was another choice for using transit for a one-seat ride to downtown. Previous riders of the 301 and 304 slightly increased their use of the E-Line, from 4,249 rides in September to 4,394 rides in October. Thus, while 57 percent of previous Route 301/304 riders did use the E-

¹² Unfortunately, it is currently difficult to identify all E-line boardings because off-board ORCA card taps are not always associated with the E-Line. For the analysis, E-line boardings discussed only include on-board ORCA taps and those off-board BRT taps that occurred north of Northgate, where off-board readers only serve the E-Line.

Line in October, relatively few riders of the 301/304 chose to switch their route choice to the E-Line. Riders of this route were already users of the service.

Routes 301/304 Analysis Conclusion

While trip making on the 301/304 did decline, total transit use associated with Route 301/304 patrons increased in October. The majority (74 percent) of frequent users of the 301/304 routes in September continued to use those routes in October; however, most supplemented the use of those routes with other alternative routes to access Link. Of the frequent users, 40 switched to being frequent users of Route 302, allowing them to take one-seat trips to downtown. While some also used the 303 for a one-seat trip, ridership on the 303 declined in October for this group of users. Instead, these individuals chose to use a number of other routes to reach Northgate to board Link, including the 302 and 303, as well as the 345, 346, 347, and 348.

Link usage by these individuals was strong, with September users of the 301/304 making 2,608 transfers to or from Link at Northgate in October and boarding link an additional 1,173 times without transferring from a bus. Combined, this implies¹³ around 4,950 trips on Link in October. In contrast, roughly 600 trips switched to the remaining one-seat ride options to downtown.

Route 522: Changed from Running Downtown to Terminating at Roosevelt

522 Analysis

Route 522 is a Sound Transit route that had previously run from Woodinville through Bothell and Kenmore along SR 522 and ended in downtown. The October 2021 service revisions changed the route so that it ended at the Roosevelt Link station. Route 522 continued to run all day during both weekdays and weekends. While the trip to downtown changed to require a two-seat ride, the new 522 route did give riders improved access to the UW because Link serves the U-District and UW Stadium stations as well as downtown from Roosevelt. As with the other routes examined above, previous users of route 522 gained multiple ways to either reach the new stations or maintain their one-seat ride to destinations that were no longer served directly by the 522, and they used many of those options.

If previous riders of the 522 to downtown wished to continue traveling from the Bothell/Kenmore area to downtown by bus via a one-seat ride, they could take either the 322, a

¹³ This value assumes the same number of alightings as boardings at Northgate in order to estimate the number of Link trips that exited at Northgate but did not transfer to a bus.

new King County Metro (KCM) route that began service in October and ran from Kenmore to downtown during the weekday peak periods, or the KCM Route 311, which ran during the weekday peak periods from multiple park and rides near Woodinville to downtown. Otherwise, riders could transfer from the 522 or the 322 to Link at the Roosevelt station and ride Link to downtown. They could also take KCM Route 20 or KCM Route 320 to Northgate, or they could travel to Northgate or Roosevelt via other (non-bus) means and ride Link from there.

The results from the analysis of changes in travel by previous Route 522 riders are illustrated in Figure 8 and summarized in Table 10.

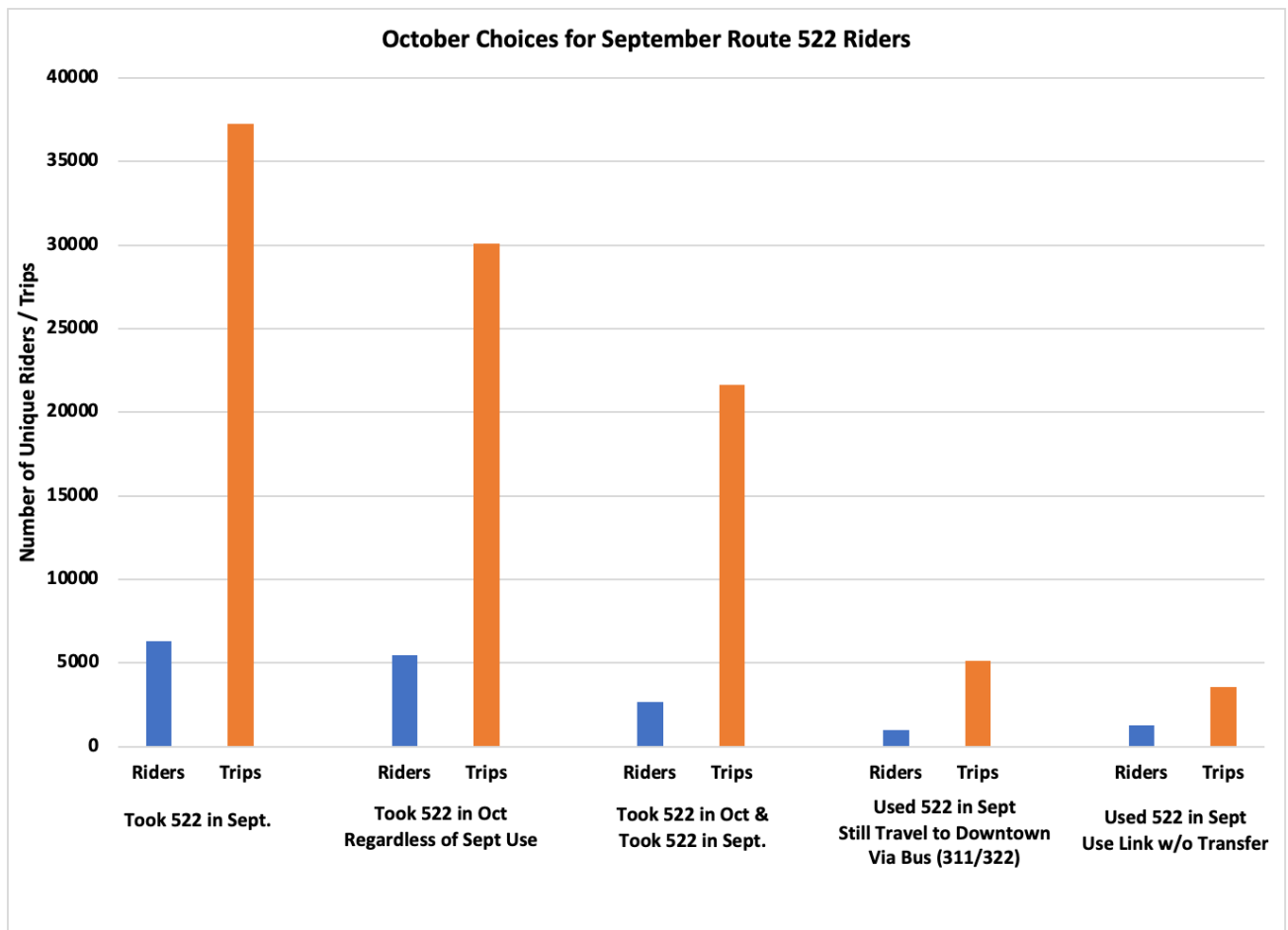


Figure 8. How Users of Route 522 in September Traveled in October

Table 10. How Users of Route 522 in September Traveled in October

	522 Sep.	Rode 522 in Sept & Rode 522 in Oct.	Total 522 Ridership in Oct. Regardless of Sept. Use	522/Link Transfer at Roosevelt Oct.	322 Oct.	320 Oct.	Total 372 in Oct. of Sept Users	20 Oct.	Rode 522 in Sept & Boarded Link at Roosevelt in Oct.	Link Northgate, (w/w.o. bus transfer) Oct.	Oct. Link at Roos. or North. w/o Bus Transfer
Total Number of Unique Riders	6332	2655	5475	1337	851	544	1421	1365	1576	1413	1254
Subset of Riders with 5+ Trips	1864	1218	1630	396	239	110	1132	390	495	357	196
Total Trips	37,241	21,625	30,083	5,697	4,108	2,084	3,892 (increase)	6,604	7196	5413	3579
Percentage of 522 September Riders Observed in October	--	42%		21%	13%	9%	2%	22%	25%	22%	20%
Percentage of 522 September Trips Made in October	--	58%		15%	11%	2%	3%	18%	19%	15%	10%

Both the number of unique riders and the ridership of the 522 decreased from September to October 2021. In October, 5,475 unique ORCA cards were used for 30,083 boardings. These were 13.5 percent and 19.2 percent decreases, respectively, from September 2021 when 6,331 unique ORCA cards were used to board Route 522 a total of 37,241 times. This occurred despite the shift in riders coming from the terminated Route 309, as discussed earlier.

Of the 6,331 unique ORCA cards that used the 522 in September, just under 42 percent (2,655) continued to use the 522 in October. These individuals reduced their use of the route in October by 5,211 boardings, from 26,836 to 21,625. However, these riders were still the most “productive” riders of Route 522, as they made 10.1 trips per rider in September and 8.2 trips per rider in October. There were 3,677 riders observed in September that were not observed in October. These riders contributed 10,405 trips, or 2.8 trips per unique rider, so the riders that stopped using the route, like the new riders on the route, were typically less frequent users of Route 522.

In addition to the continuing riders, 2,820 riders were new to the route in October (that is, ORCA cards observed in October, but not September). However, these new riders used the route much less frequently than the continuing riders, as they contributed just under 8,500 trips, or three trips per new rider.

The primary routes that September Route 522 riders shifted to include the 20, 320, 322, and 372. In October, 1,365 riders who had previously used Route 522 used Route 20. They made over 6,600 trips and transferred to or from that route and Link at a rate of around 30 percent of those boardings.

In October, 544 previous Route 522 riders chose to use the new KCM 320 route. They made 2,084 trips on that route, transferring to or from Link on about 40 percent of their trips. Even more previous Route 522 riders (851) chose to use KCM Route 322. They made 4,108 trips on that route in October, transferring to and from Link about 24 percent of the time. Finally, a large number of riders shifted some trips to KCM Route 372. The 372 was a route already used by many Route 522 riders, but the number of riders who used both routes increase by 1,421 in October. Riders who used both routes increased their use of Route 372 by 3,892 trips in October.

In addition to the alternative routes for reaching the Roosevelt and Northgate stations, riders could access Link by driving to the stations and parking (although parking was limited, especially at Roosevelt). In October, this resulted in 1,254 unique ORCA cards that had previously used Route 522 making 5,379 Link boardings at Roosevelt and Northgate without arriving at the

station via another ORCA transit mode. Because the majority of Route 522 was not within walking distance of these stations, it is assumed that the majority of these non-transfer boardings at Northgate and Roosevelt involved auto access to the station.

Other routes also served this corridor and previous users of the 522. For example, September users of the 522 also rode KCM Route 75 (1,093 transfers to Link at Northgate), and KCM 347 and 348 (595 transfers combined for the two routes combined). These routes experienced smaller increases in ridership among those who had previously used Route 522. Route 75 crossed route 522 in Lake City, and portions of Routes 347 and 348 ran parallel to sections Route 522, providing useful alternatives to the 522 for some individuals in the Victory Heights neighborhood.

Travelers who either had previously used the 522 or currently used the 522 in fact transferred to and from Link as expected. Users of Route 522, whether they had used the route in September or October, made over 10,100 boardings of Link at the Roosevelt station in October. This was slightly over 15 percent of the entire number of ORCA boardings that took place at Roosevelt. Slightly over 6,200 of these boardings were transfers from Route 522. This was just over 9 percent of all ORCA boardings at Roosevelt. Another 508 Link boardings at Roosevelt were transfers from Route 322, showing that a substantial number of riders of the 322 were not using that route as a one-seat ride to downtown but as a more convenient access mode to Link for at least some trips. These routes were the primary sources of transfer boardings at the Roosevelt station, with KCM Route 62 contributing 183 transfer boardings in October and KCM Route 73 contributing another 169.

In addition to the boardings at Roosevelt, previous users of Route 522 also shifted some trips to Northgate. Of the September 522 riders, 1,413 (22 percent) took Link at least once in October from the Northgate station. These historical riders of Route 522 boarded Link at Northgate over 5,400 times in October. Of these riders, 919 transferred to Link at Northgate from a bus at least once, with transfers to Link making up 46 percent of the Northgate boardings by previous Route 522 patrons. For the remaining 54 percent of Northgate boardings, the station was reached by a non-transit mode, most likely by driving to the station, given the distance the station is from Route 522's nearest stop.

In addition to the previous users of Route 522, new users of Route 522 also traveled to Northgate. More than 670 additional ORCA users who rode Route 522 at least once in October,

but did not ride the route in September, also boarded Link at Northgate, slightly more than 1750 times.

In terms of the interaction between Link and the northbound Route 522, the Bay 3 transit stop at Roosevelt station was by far the highest volume transit stop for Route 522 in October. At the Bay 3 stop, 5,984 boardings of the northbound Route 522 took place. Of those boardings, 4,968 (83 percent) were recorded as transfers, with 4,339 of them (87 percent) coming from Link. Route 522 also experienced transfers from a number of bus routes that served the Roosevelt station, including King County Metro routes 45, 62, 64, 67, and 73, which provided a total of 368 transfers to Route 522 at Roosevelt in October.

In October, 1,576 (25 percent) of the September 522 riders used the Roosevelt station. Of these individuals, 602 used both the Roosevelt and Northgate stations. In October, 2,387 (38 percent) of the 6,332 unique riders of Route 522 in September used Link at either Roosevelt or Northgate in October. For the 1,864 individuals who rode the 522 frequently (five or more trips in a month) in September, 446 frequently took Link at Northgate and 650 Link frequently took at Roosevelt in October.

Of those who rode the 522 in September, about 42 percent, or 2,655 riders, continued riding the 522 in October. Riders who continued to ride the 522 were more likely to be frequent riders than those who no longer rode the 522. In October, 1,337 riders (21 percent) of September 522 riders took a bus to the Roosevelt station and transferred to Link at least once. Also in October, 396 transferred to Link at Roosevelt more than five times.

Route 522 Analysis Conclusion

As with most of the other changed routes examined in this report, less than half of the individual ORCA cards that were observed riding the 522 in September rode the 522 in October. However, most of the “lost” riders were infrequent users of the route, and a large fraction of those losses were made up for by new riders taking the route in October who had not used the route in September.

Of the cards observed in both September and October, roughly half transferred from the 522 to Link at the Roosevelt station. Slightly more (60 percent) transferred from Link to the 522 at Roosevelt. Thus, the majority of individuals who rode the 522 in September and continued to take it in October did transfer; the rest made trips along the corridor. The riders who continued to use the 522 in October had been the most frequent users of the route in September. The 60 percent

of September riders who chose not to use the 522 in October had been mostly infrequent riders on the route. However, the loss of these riders was partially made up for by the attraction of new riders to the 522.

Also, as observed in other changed routes, a substantial number of previous Route 522 riders shifted to other routes, either to maintain a one-seat ride to downtown or to use other KCM routes that apparently provided more convenient access to Link. For those riders who still wished to travel downtown by bus with a one-seat ride, routes 320 and 322 both provided attractive alternatives.

Finally, a significant fraction (almost 20 percent) of previous Route 522 riders chose to use Link from either Northgate or Roosevelt in October, without accessing those stations via another ORCA transit mode. Northgate has a limited number of park and ride spaces, as well as a large number of paid parking spaces. There is also some free parking near Roosevelt on weekends and at night. Thus, auto access was a reasonable alternative to both stations, especially on weekends and evenings, and it appears to have drawn many of the previous Route 522 riders on many occasions.

CHANGES IN LINK BOARDINGS ASSOCIATED WITH THE NEW STATION

OPENINGS

To provide additional background for the observed changes to north end ridership, this section describes overall ridership trends. It then summarizes changes to ridership patterns that occurred as a result of the three new Link stations and the bus route changes made to support those new rail stations.

Overall Link Ridership

Figure 9 shows the number of Link boardings in September and October for 2019, 2020, and 2021. While there has historically been a small increase in boardings from September to October, as shown in the 2019 data (the 8 percent increase was most likely due to the start of classes at the UW), there was a much larger increase (130 percent) in 2021, when ORCA boardings more than doubled from 415,900 in September to 960,800 in October. Almost one third of the total Link system ORCA boardings in October occurred at the Northgate, Roosevelt, and U-District stations. If the number of ORCA trips ending their Link travel at these stations was roughly equal

to the number of trips starting at them, then more than half of all October Link trips either started or ended at one of the three new stations.

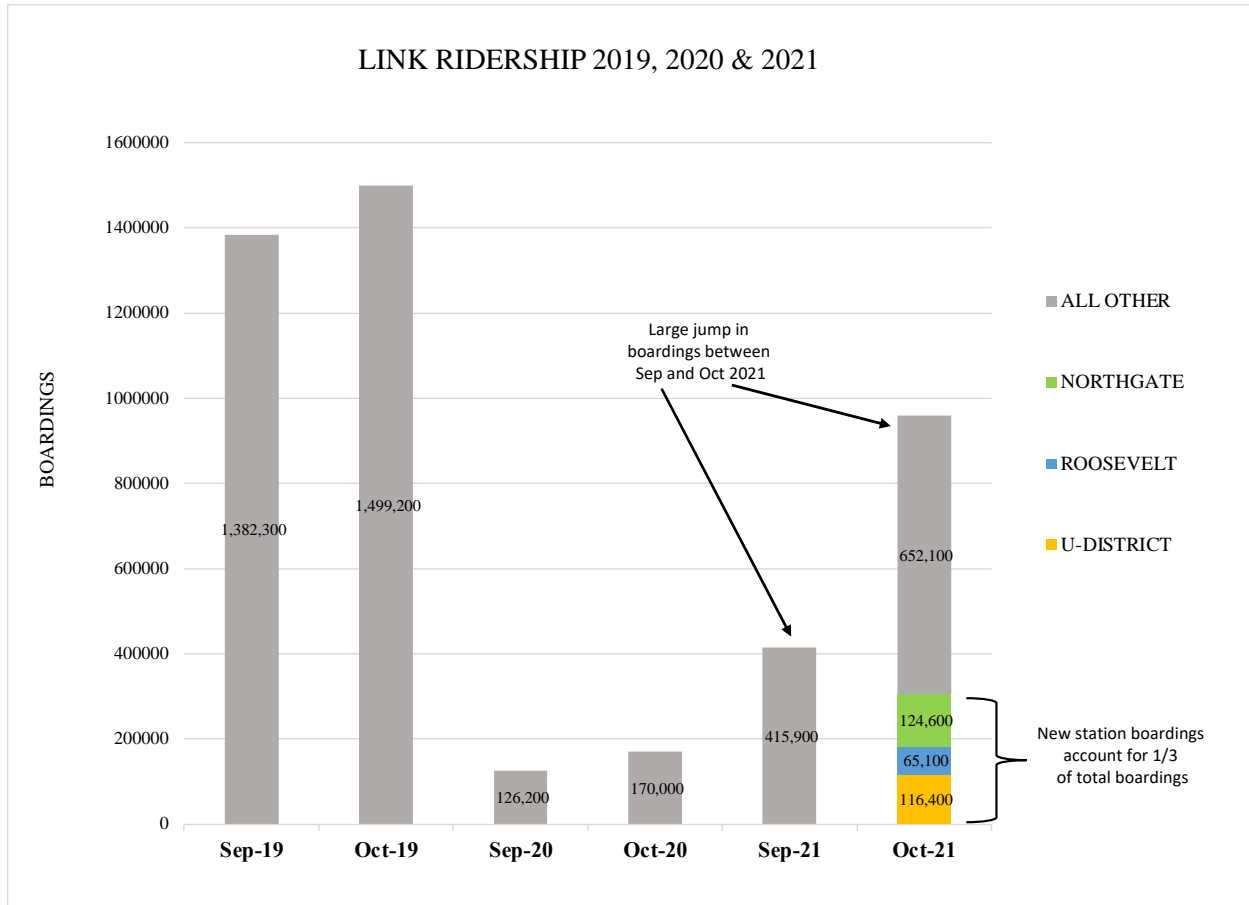


Figure 9. Link Boardings in September and October 2019 and 2021

Impact of Weekends on Link Ridership

While some of the increased October ridership can be explained by the surge associated with local communities taking rides to explore the new stations, a breakdown of ridership by week showed that ridership experienced only a small drop during the second week after the station openings and then flattened. Thus, the doubling in ridership reported above holds even after the exploratory rides are accounted for. Figure 10 shows the average weekday and average weekend number of Link boardings at the UW Stadium, U-District, Roosevelt, and Northgate stations by week for September and October of 2021. The graph highlights the Saturdays when the University of Washington football team had home games at Husky Stadium, which led to modest increases

in weekend boardings at the UW Stadium station. The start of classes at the university also led to an increase in boardings, but the growth related to the start of classes occurred the week before the new stations opened.

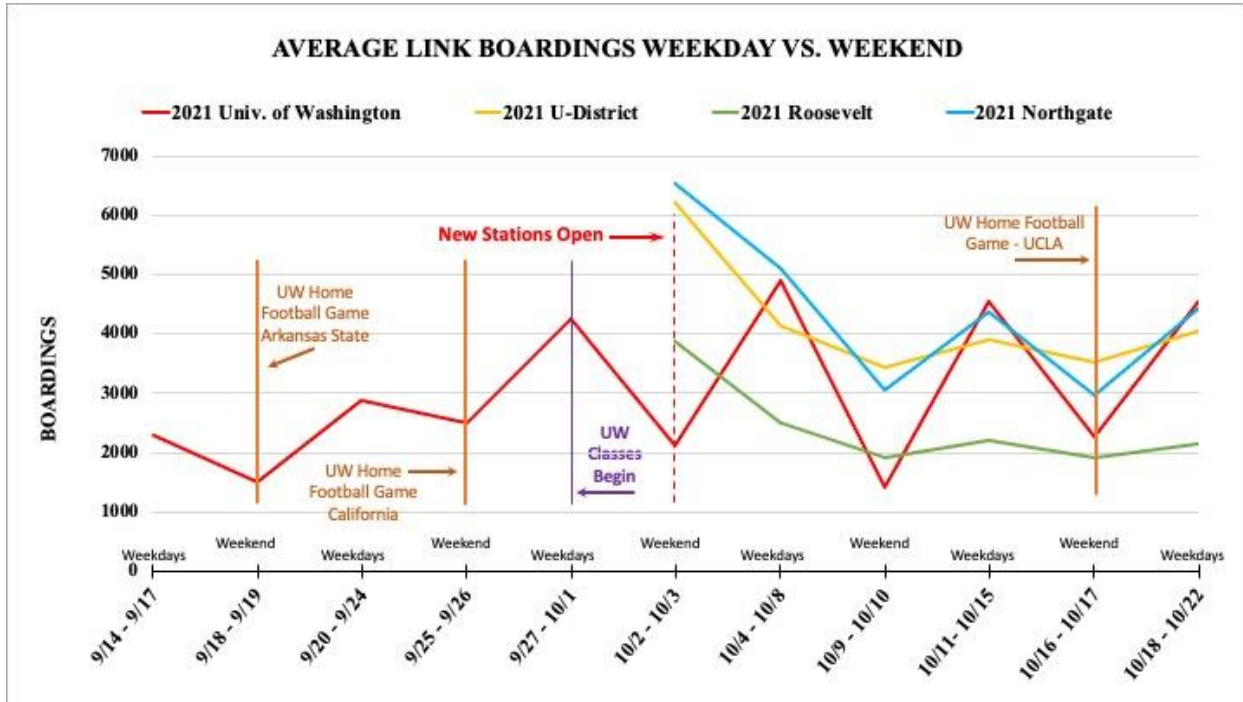


Figure 10. Boardings at the UW and Three New Stations by Average Weekday versus Average Weekend Day during 2021

The average weekday ridership at all stations was consistently higher than the average weekend ridership. The proportionality between the weekday and weekend travel provides some insight into the purposes of the trips being made at each station. The high proportion of weekday boardings in comparison to weekend boardings at the UW Stadium and Northgate stations suggests that many of these riders made utilitarian trips during the week for work or school.

An analysis of when unique ORCA cards were observed resulted in the data shown in tables 11 through 13, which show the trip making behavior of people who used the new stations. This analysis examined individual hashed ORCA card behavior¹⁴ and determined whether those individuals traveled on weekdays, weekends, or both. It then examined how many trips they made.

¹⁴ Transit users who do not have ORCA cards may exhibit different weekday/weekend ridership patterns.

Table 11. Weekday/Weekend Use of Link by Specific Individuals at Northgate

	Total Number of Boardings	Number of Unique ORCA Users at This Station	Percentage of ORCA Users at This Station	Boardings Per Person	Boardings Per Person Per Day
Only Used the Station on Weekdays	58,534	22,019	48%	2.66	0.53
Only Used the Station on Weekends	19,562	5,453	12%	3.59	1.79
Used the Station on Both	47,400	18,547	40%	2.56	0.37

In a comparison of the user behavior at the three new stations, the U-District had a much larger percentage of individuals who used Link exclusively on weekends (34 percent) than either Northgate or Roosevelt (12 percent and 15 percent, respectively). The majority of individuals who used these two stations rode Link exclusively on weekdays (48 percent and 43 percent) or used it on both weekdays and weekends. The U-District station had a percentage of people who used the station only on weekdays that was similar to the those at other two stations, but it had a much smaller percentage in the “both” category.

Table 12. Weekday/Weekend Use of Link by Specific Individuals at Roosevelt

	Total Number of Boardings	Number of Unique ORCA Users at This Station	Percentage of ORCA Users at This Station	Boardings Per Person	Boardings Per Person Per Day
Only Used the Station on Weekdays	22,217	10,093	42%	2.20	0.44
Only Used the Station on Weekends	10,277	3,639	15%	2.82	1.41
Used the Station on Both	33,502	10,238	43%	3.27	0.47

One possible explanation for this was that a significant number of individuals living in the University District did not need to take Link to work/school but did take full advantage of the rail system on weekends for recreation or shopping purposes. Interestingly, this conclusion also offers an explanation as to why the U-District, unlike the other stations, had the highest daily ridership

on Fridays. These patterns are even more evident in Figure 11, which further breaks down the boardings at each of these stations to show the day-to-day changes and weekly patterns in ridership.

Table 13. Weekday/Weekend Use of Link by Specific Individuals at U-District

	Total Number of Boardings	Number of Unique ORCA Users at This Station	Percentage of ORCA Users at This Station	Boardings Per Person	Boardings Per Person Per Day
Only Used the Station on Weekdays	47,681	18,860	43%	2.53	0.51
Only Used the Station on Weekends	18,228	14,779	34%	1.23	0.62
Used the Station on Both	51,372	9,942	23%	5.17	0.74

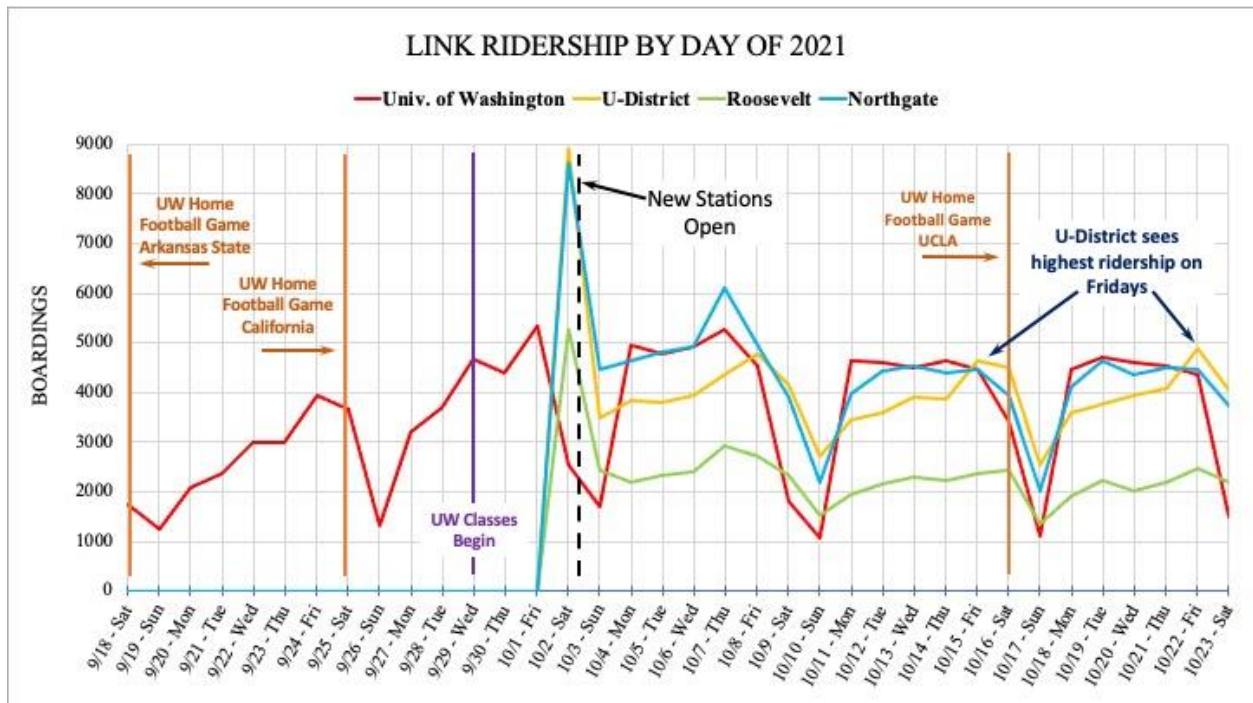


Figure 11. Boardings at the UW and Three New Stations by Day of 2021

Link Ridership by Time of Day

When overall Link ridership was examined by summary time of day and weekday/weekend combinations (i.e., AM peak, weekday midday, PM peak, weekday night, weekend day, and

weekend night), it was found that October 2021 experienced large growth across all of these time periods. The biggest growth was seen in boardings during the weekend daytime period, when Link boardings in October 2021 actually surpassed the boarding count from that same period in 2019, whereas the other periods remained at about 50 to 70 percent of the 2019 levels. This shift can also be seen in the changes from September to October. In 2019, October weekend daytime ridership was 71 percent of that in September of the same year, whereas in 2021 October weekend daytime ridership was 280 percent of that in September of that year. For comparison, bus ridership in both years remained roughly the same from month to month. A portion of this large weekend October growth can be attributed to the large initial weekend ridership experienced by Link as riders explored the new stations.

Further disaggregating the Link boardings by origin (boarding) station revealed that boardings at the UW Stadium station actually decreased from September to October during the AM peak period (-21 percent), even while experiencing 58 percent in growth for all times combined. In contrast, the new stations brought in a large number of boardings during the AM peak, with riders making up about 37 percent of the total Link ridership at these stations during that period in October 2021. Northgate alone accounted for almost a quarter of the total AM peak weekday boardings. It appears that many people boarded at the Northgate, Roosevelt, and Capitol Hill stations in the morning (high percentage of total AM peak) to go to work or school near the U-District, UW Stadium, and Westlake stations. These each had a high percentage of the overall PM peak travel, which is when the corresponding return trip would have taken place.

INDIVIDUAL TRANSIT TRIP MAKING FREQUENCY

The following analysis examines individual trip making activity associated with the three new Link stations. The analysis measured “trips”—not “boardings”—to account for the fact that what had been one-seat rides for a number of trips became two-seat rides, thereby doubling the number of ORCA boardings, while not actually increasing travel activity using transit.

Trip making behavior for those routes that served the north end (north Seattle and Snohomish County) was examined on routes that served downtown, as well as those serving the University District, as well as for those routes serving both downtown and the University District. In this latter category, it was not possible to differentiate between potential origins and destinations. If one or more transfers were made, then the designation of whether that trip used a downtown- or University District-bound route was determined on the basis of all routes used for

that trip. Thus, in the tables and discussions below, if a “trip” started on a University District-bound bus and transferred to a downtown-bound bus, then that trip is counted in both categories of trips. However, the “total trips of interest” category only counts that trip once. Therefore, the “total trips of interest” value is NOT the simple sum of the three other categories.

Number of Unique Users Observed

In 2019, the total number of unique ORCA card holders who used routes serving the north end was just under 146,700 in September and grew by only 300 unique riders in October. The number of individuals making trips on routes that served downtown from the north end decreased slightly (-1.8 percent) from September to October, from just under 132,000 unique ORCA cards to just over 129,000. The number of ORCA users of buses on routes serving the University District remained essentially unchanged from September to October (~114,000), while the number taking riders on routes that served both downtown and the University District (e.g., the Metro Route 70) increased by 6 percent in October. The total number of card serial numbers (CSNs) observed grew very slightly (+0.2 percent or +300 CSNs).

This analysis could not be performed for 2020 because ORCA data were not collected on most King County Metro bus trips during September 2020. However, in October 2020, only 30,700 unique CSNs were observed.

In October 2021, the number of unique CSNs was more than double (71,000) what was observed in 2020. However, in October 2021, the UW was holding classes in person, whereas in 2020 all classes were offered remotely. The number of observed ORCA cards in 2021 was still roughly half of the number observed in 2019. Unlike 2019, the number of observed ORCA cards increased almost 10 percent between September and October in 2021. However, only trips on routes headed to the University District experienced this increase. This likely reflected the opening of the University of Washington to in-person learning and the start of Fall quarter classes at the end of September. These statistics show that the number of transit users increased in 2021 after having crashed during the early part of the COVID pandemic, but the number of transit users was still well below the ridership levels experienced in pre-COVID conditions.

Distribution of Riders by Frequency of Riding

Looking at whether riders of these bus routes were frequent or infrequent bus users revealed some significant but unsurprising differences between 2019 and 2021.

2019 Patterns

Figure 12 presents the percentage of users who took routes that served downtown, the University District, routes that served both destinations, and all of these trips of interest in 2019. (The last category removed double counting of individuals who transferred from one route to another.)

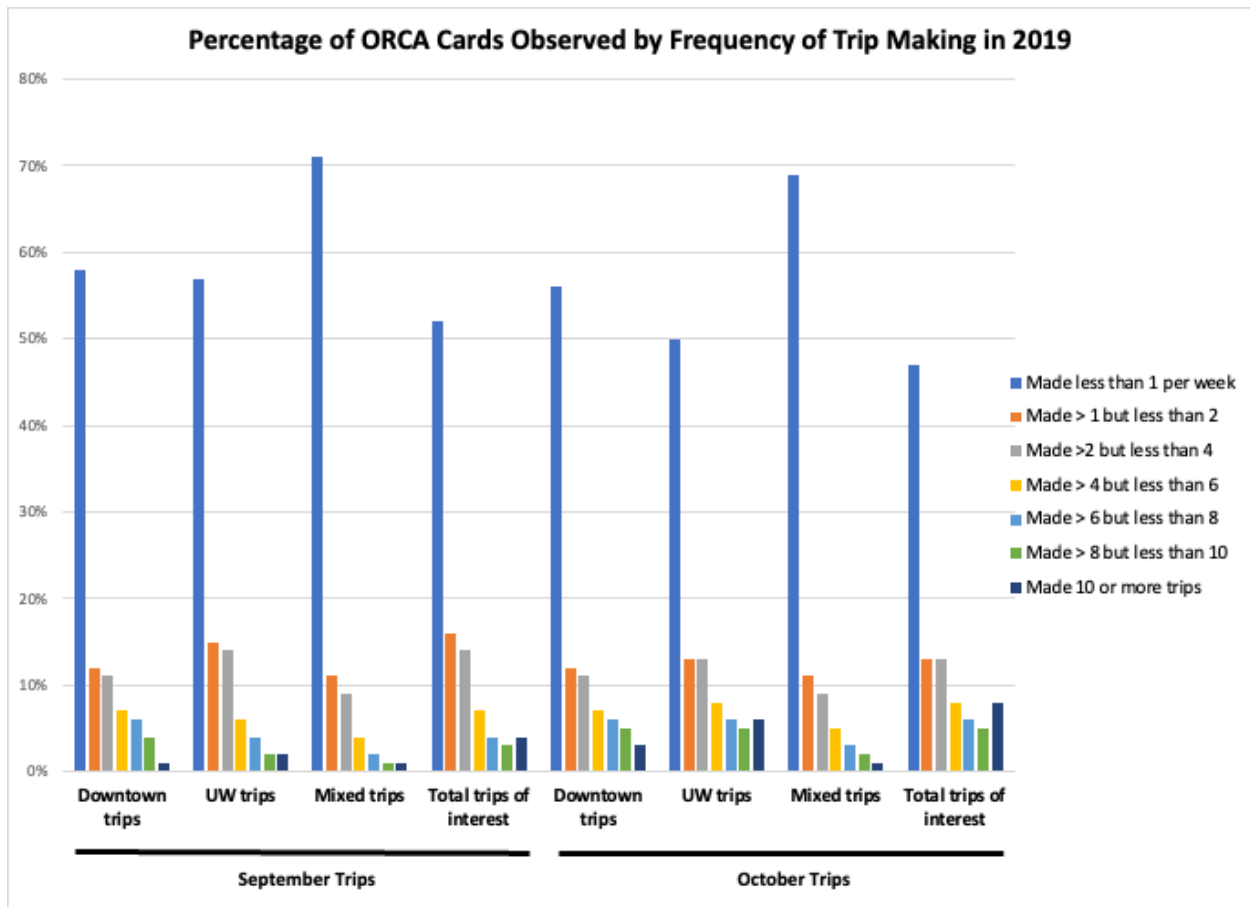


Figure 12: Percentage of ORCA Cards Observed by Frequency of Trip Making in 2019

Infrequent Users in 2019. In 2019, 58 percent of CSNs observed on downtown oriented buses used the routes less than once per week in September. This percentage declined slightly to 56 percent in October. If “infrequent user” was defined as less than two trips per week (e.g., one inbound and one outbound), then the fraction of infrequent users rose to 70 percent.

Using this two-trip definition, on University District-oriented routes 72 percent of riders took trips to the University District infrequently in September, declining to 63 percent in October.

When all trip making behavior to and from the north end was examined (Total Trips of Interest), the percentage of bus users who were infrequent riders declined from 68 percent in September to 60 percent in October.

Frequent Users in 2019. Conversely, in 2019, 5 percent of ORCA card users on downtown-oriented routes made more than eight trips per week in September, with the percentage of frequent bus users increasing to 8 percent in October.

Only 4 percent of users of University District-bound routes were frequent bus route users in September, but this jumped to 11 percent once classes started in October.

When all trip making behavior to and from the north end was examined, the percentage of frequent users increased from 7 percent in September to 13 percent in October.

2019 Conclusion. The conclusion is that pre-pandemic, the opening of the UW resulted in a measurable increase in the fraction of bus transit riders in the north end considered “frequent” users, with a commensurate decrease in the fraction of infrequent users.

2021 Patterns

Figure 13 presents the individual transit use patterns by frequency of use in 2021. The patterns observed in 2019 before the pandemic were still observable in 2021, although the bus routes included in the definition of “downtown oriented” or “University District-oriented” now frequently traveled to one of the three new Link stations. In 2021, the UW started in-person classes on September 29th, and Link service started at the three new stations on Saturday, October 2nd.

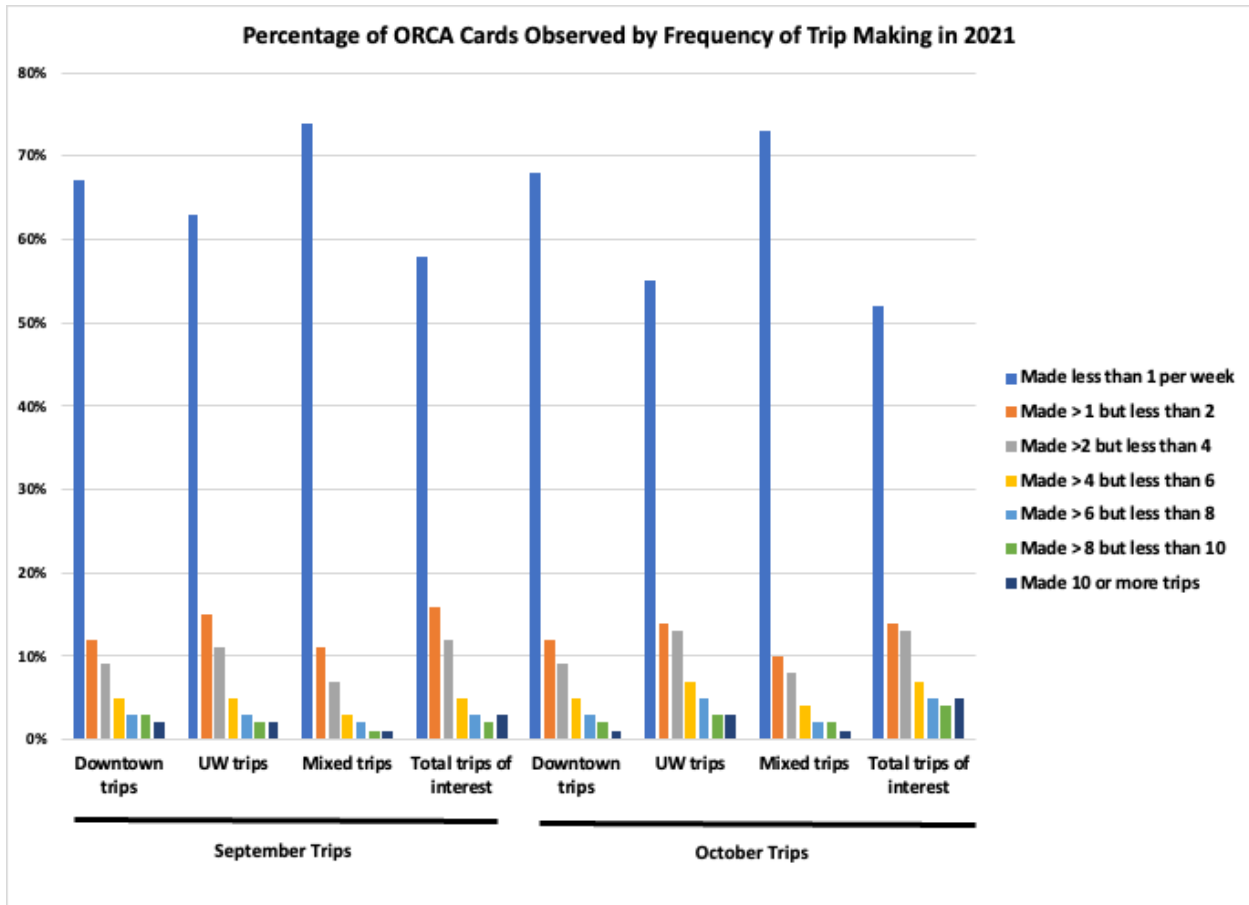


Figure 13: Percentage of ORCA Cards Observed by Frequency of Trip Making in 2021

Infrequent Riders 2021. Not surprisingly, given the overall decrease in commuting due the growth of telecommuting and the consequent decrease in transit use during the pandemic, a larger fraction of trip makers used the bus infrequently than in 2019. In September 2021, 67 percent of observed CSNs on the downtown-oriented routes used these bus routes less than once per week. This stayed roughly the same (68 percent) in October 2021. These figures are about 10 percent higher than in 2019, indicating that **infrequent users were more common in 2021 than in 2019**. This relationship stayed the same if “infrequent use” was defined as less than two trips per week.

For routes headed to and from the UW, the September values were similar to those of the downtown oriented routes (63 percent) in September, but the percentage of infrequent users decreased in October to 55 percent with the start of the Link services and the start of UW classes. For all bus routes of interest in the north end, infrequent users dropped from 74 percent of the users in September to 66 percent in October.

Frequent Riders 2021. Conversely, frequent users of the buses grew as a fraction of total users. For all north end bus routes of interest, frequent users changed from 5 percent of the rider population in September 2021 to 9 percent in October. Interestingly, frequent users of downtown routes dropped from 5 percent of unique users in September to 3 percent in October. In comparison, frequent users of the UW routes increased from 4 percent in September to 6 percent in October.

This suggests that the start of the UW (which began in-person classes at the end of September) resulted in many riders using the bus system more often in October, even as many of those routes now stopped at Link stations and required a transfer to Link.

Figures 11 and 12 examine the number of unique ORCA users. Looking at the actual number of trips that occurred makes the importance of frequent users clear. Figure 14 and Figure 15 show the percentage of trips made by individuals within each category of trip making frequency.

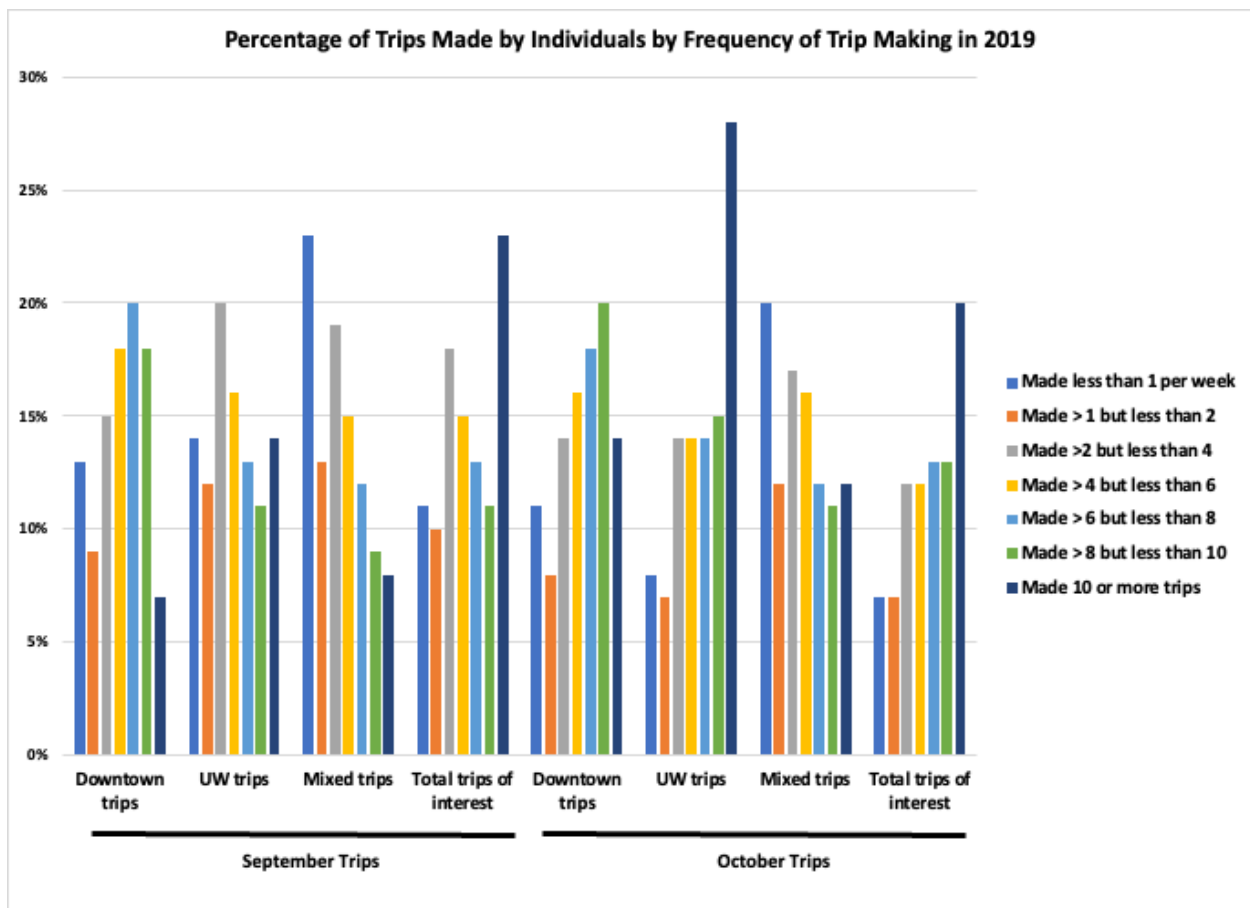


Figure 14: Percentage of Trips Made by Individuals by Frequency of Trip Making in 2019

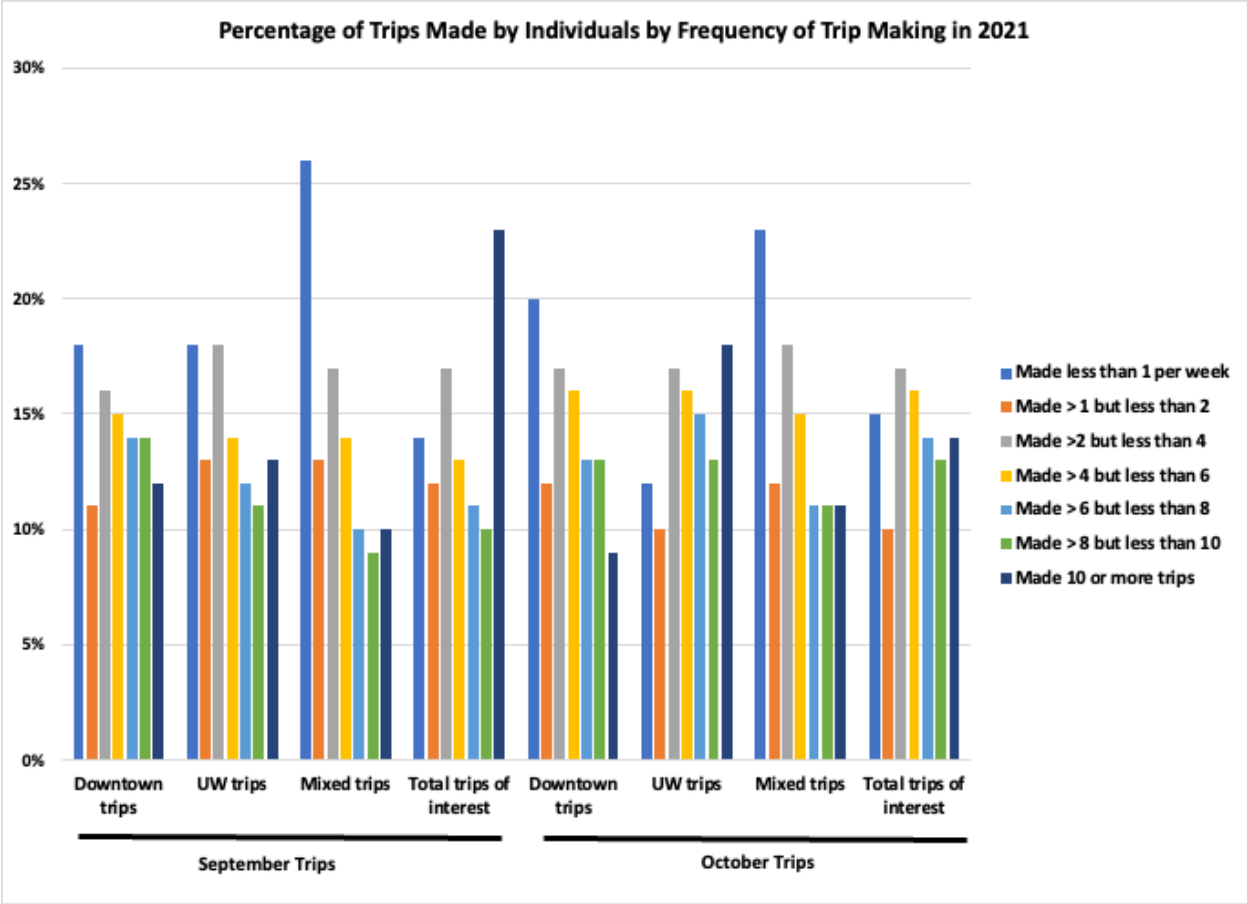


Figure 15: Percentage of Trips Made by Individuals by Frequency of Trip Making in 2021

A comparison of Figure 12 and Figure 14 it shows that in 2019, roughly 70 percent of ORCA card holders who used routes connected to downtown used the system reasonably infrequently (less than two trips per week, meaning less than one round-trip per week). However, this large fraction of users made only about 20 percent of the trips, and only modest changes in this pattern occurred from September to October. For University District-oriented routes, this basic pattern was also present, but with a larger share of September trips made by infrequent users, and with a larger shift to frequent riders in October. The fraction of trips made on these routes by infrequent riders dropped commensurately from 26 percent to 15 percent.

For all routes of interest in the north end, only 21 percent of trips were made by infrequent users of ORCA in September 2019, dropping to 14 percent in 2021. In 2021, infrequent users made up a slightly higher fraction of trips (26 percent in September, 25 percent in October). At the same time, total trip making increased by 400,000 trips. This suggests that a large fraction of the trips that took place when Link first opened were not made by riders who continued to use buses

frequently, thus cancelling out some of the seasonal shift caused by consistent trip making to the UW.

Weekday Versus Weekend Rider Behavior for the New Stations

Looking at individual ORCA rider behavior for weekday versus weekend use showed that riders had similar behavior at the Northgate and Roosevelt stations, but more than double the riders took only weekend trips at the U-District station. Table 14 shows the percentage of individuals (not the number of trips made) who used Link only on weekdays versus using Link only on weekends, versus using it on both weekdays and weekends, by station. Table 14 suggests that a significant fraction of University District residents used Link only on the weekends. This is most likely because they could walk to their “work” (i.e., school) destination without the need for transit. but took advantage of the new Link station to increase their travel to weekend recreation and shopping activities.

Table 14. Percent of Unique ORCA Cards That Used Link Stations on Weekdays vs Weekends

Station	Used Link Station Only on Weekdays (Percent)	Used Link Station Only on Weekends (Percent)	Used Link Station on Both Weekdays and Weekends
Northgate	48%	12%	40%
Roosevelt	42%	15%	43%
U-District	43%	34%	23%

In contrast, individuals who used the Northgate and Roosevelt stations were similar in their general weekday/weekend behavior, with more than 86 percent of them using the station on weekdays, and just over half using them on the weekends. The difference in these stations’ users was that Roosevelt station users did not use the station as frequently on weekdays as did Northgate users. In this pattern Roosevelt was more like the U-District station.

RIDERSHIP BY ORCA PASSENGER TYPE

This section examines Link ridership at the three new stations and compares the characteristics of the riders, including both the percentage of each of the five passenger types (Adult, Youth, Senior, Disabled, Low-Income) of the three stations versus the characteristics found

at other Link stations and the frequency with which ORCA cards associated with business IDs were used.

Table 15 shows the percentage of boardings by passenger type for each of the three new stations, the UW Stadium station, and Link ridership as a whole for October 2021. It also shows the total Link system values for 2019, the 2020 pandemic year, and the September 2021 UW Stadium rider characteristics. Several interesting facts can be seen in this table.

All three new stations had a below average fraction of Link boardings by low-income riders. This was particularly true of the U-District station, which also had below average use by the other three special rider categories. This mimicked the pattern seen at the UW Stadium station, which had even lower use by these categories of riders. This pattern was likely driven by the very large fraction of riders that were UW U-Pass (Business Passport) holders, which were treated as “Adult” riders. This assumption was partly confirmed by the September 2021 pattern at the UW stadium, where the fraction of Adult riders was 4.5 percent lower than that in October after classes were in full swing. More analysis on the impact of ORCA cards provided by businesses is discussed later in this section.

Table 15. Passenger Ridership Type for the New Stations

	Adult	Youth	Senior	Disabled	Low Income
Northgate	86.5%	2.5%	5.2%	2.2%	3.5%
Roosevelt	86.1%	4.6%	4.4%	1.7%	3.1%
U-District	92.9%	1.6%	2.3%	0.9%	2.2%
UW Stadium	94.6%	1.4%	1.9%	0.7%	1.3%
Total Link System 2021	85%	5%	3.7%	2.1%	4.3%
Total Link System 2020	85%	1%	3.6%	4.1%	6.5%
Total Link System 2019	85%	5%	3.1%	2.2%	5.1%
UW Stadium Sept 2021	90.0%	2.4%	3.5%	1.3%	2.9%

The Roosevelt station had a large fraction of Youth riders (4.6 percent versus the systemwide value of 2.4 percent). This was the result of the station being located across the street

from Roosevelt High School. While high in comparison to the systemwide ridership pattern, this level of youth ridership was still low in comparison to the Mt. Baker station (34 percent), which also served a large high school (Franklin High School), as well as the Rainier Valley stations of Columbia City, Othello and Rainier Beach (9 percent, 14 percent, 18 percent respectively), which served students attending both Franklin and Rainier Beach high schools.

The Roosevelt station October youth ridership (3,056) was about half the Youth ridership at Mt. Baker. But the total Roosevelt ridership (56,851) was much larger than the Mt. Baker (10,855) ridership. Roosevelt Youth ridership was similar to the Youth ridership at Othello (3,027) and Rainier Beach (2,792) and larger than that at Columbia City (1,897). The total Link ridership at the Rainier Valley stations was much lower than that at Roosevelt, making the Youth ridership a higher percentage of total boardings at these stations. (Total October 2021 ridership: Columbia City 16,910, Othello 16,310, Rainier Beach 11,080.)

Both Northgate and Roosevelt had slightly higher than average Senior ridership percentages, whereas the U-District and the UW Stadium stations had lower than average Senior use.

Northgate was roughly average in terms of the percentage of riders who used disability ORCA cards, whereas the other stations were well below average.

All three new stations, as well as the UW Stadium station, had below average use by Low-Income ORCA card users.

Again, these trends may well have been driven by the high percentage of riders who used university-issued Business Passport (U-Pass) ORCA cards. This is explored in the next section.

CHANGES IN PAYMENT USING PASSES VERSUS E-PURSES

To examine the impact of business-based ORCA cards on ridership characteristics, an analysis was performed to examine the fraction of ORCA boardings made at Link stations with cards associated with businesses versus those not associated with an ORCA business ID.

Table 16 shows the percentage of ORCA payments made with ORCA cards associated with business IDs. The table shows the averages for the system by year, as well as the UW Stadium use for each of those years and compares September patterns with October patterns. Historically, use of Business ORCA cards on Link increased systemwide in October in comparison to September. This was not true during the pandemic year of 2020, when a large fraction of the local workforce did not routinely commute to the office. The other interesting, but not surprising,

pandemic-related pattern observed is that the percentage of overall boardings that used business-related ORCA cards declined from pre-COVID conditions from between 2 percent (October) and 4 percent (September).

Table 16. Percentage of Use of Business-Supplied ORCA Cards on Link by Year

	September	October
Link System Average 2019	57%	61%
UW Stadium 2019	65%	74%
Link System Average 2020	55%	52%
UW Stadium 2020	70%	66%
Link System Average 2021	53%	59%
UW Stadium 2021	63%	82%

Because of the heavy use of ORCA cards associated with the UW’s U-Pass program, the percentage of ORCA Business cards at the UW Stadium station was considerably higher than the percentage of Business card use across the entire Link system. This remained true in 2020, even though the UW campus largely operated remotely in 2020. Of course, while the UW campus operated remotely, the UW Hospital was still operational, and a large amount of the Link use at the UW Stadium station in 2020 may well have been related to the UW Hospital and its associated facilities. Also of interest in 2020 is the fact that the percentage of Business ORCA users declined slightly at the UW Stadium station in October in comparison to September. This was the opposite of the usual pattern, in which Business card use increased as students returned to campus and used their U-Passes.

Interestingly, in 2021 with UW classes back in session and the three new stations open, the percentage of Link boardings paid with Business cards in October increased to over 80 percent of all ORCA payments. This suggests that the fraction of Link users at the UW Stadium that were associated with the UW increased with the opening of the three new stations (all while the total number of individuals boarding at that station declined).

It is assumed that many individuals not associated with the UW campus and medical complex, either as employees or students, shifted to accessing Link at one of the three new stations rather than traveling to the UW Stadium. This behavior can also be seen in the patterns of transfers to Link from buses discussed elsewhere in this report. This change in behavior would both decrease

the percentage of non-UW users at the UW Stadium station and increase the percentage of UW-affiliated riders.

Table 17 presents the percentages of ORCA boardings made at the three new Link stations in October 2021 by individuals with ORCA Business cards. The table shows that, like the UW Stadium station, the U-District station was heavily dominated by individuals who used ORCA cards associated with business IDs. In contrast, both Northgate and Roosevelt had slightly lower than average use by individuals with cards associated with businesses.

Table 17. Percentage of Use of Business-Supplied ORCA Cards at the Three New Stations

Station	October 2021
Northgate	54%
Roosevelt	53%
U-District	72%
October 2021 Link System Average	59%

ORCA CARD PAYMENT TYPES AT THE NEW STATIONS

This section examines the types of payments made with ORCA cards at the three new stations and compares those usage rates to that at the UW Stadium station in both September and October of 2021 and to Link systemwide averages for September and October of both 2019 and 2020, as well as October 2021.

Riders can use their ORCA cards to pay for transit with a large number of payment types. The payment types are

- an e-purse –the cost of the trip is deducted from an account balance
- a Business Passport – a specific type of transit pass sold to employers that then provide those passes to their employees, typically at a discount
- a range of different monthly passes
- a variety of day passes
- a variety of passes for individuals with disabilities
- a series of other pass types.

To simplify this analysis, these pass types were aggregated into the following categories: e-purse, PugetPass (regardless of value), Business Passport, Adult Day Passes, Disability Passes, and Other. (Note that ferry passes also exist, but they are not useful for Link trips and therefore do not appear in this analysis.)

Table 18 shows the fraction of Link ORCA payments made with each of these summary payment types. One statistic that stands out is the very high use of Business Passports at the U-District and UW Stadium stations, which is how the system records UW U-Pass ORCA cards. The very high usage of these cards at these two stations both increased the percentage of Business Passports at these stations and reduced the percentage of the use of the other types of ORCA cards.

Table 18. ORCA Card Payment Types at the New Link Stations

	Purse	PugetPass	Business Passport	Adult All Day Pass	Other	Disability Pass
Northgate	39%	9%	51%	0.3%	0.8%	0.0%
Roosevelt	41%	8%	50%	0.3%	0.6%	0.0%
U-District	23%	5%	71%	0.3%	0.4%	0.0%
UW Stadium	15%	3%	81%	0.1%	0.3%	0.0%
Total Link System 2021	35%	9%	54%	0.5%	1.1%	0.0%
Total Link System 2020	35%	15%	50%	0.4%	0.3%	0.0%
Total Link System 2019	30%	16%	55%	0.3%	0.1%	0.0%
UW Stadium Sept 2021	31%	6%	61%	0.3%	0.6%	0.0%

At the Roosevelt and Northgate stations, Business Passport use was slightly lower than the overall system average for September and October of 2021. E-Purse payments were modestly higher than the 2021 systemwide average. Use of the other ORCA payment types was similar to that found systemwide.

It is clear that the pandemic resulted in a relative reduction in the use of PugetPass, across all stations in the system.

SUMMARY OF BEHAVIOR CHANGES

While the analysis in this report includes a variety of facts about the use of the new Link services and the altered bus routes that serve those stations, the authors suggest the following takeaways from those facts.

- The three new Link stations are heavily used.
- The altered bus route structure has, in general, done well at bringing riders to Link, as transfer rates at all three stations are high.
- A simple rule of thumb appears to be that 15 to 20 percent of riders headed to downtown elected to switch to other routes that allowed them to maintain a one-seat ride, rather than take revised bus routes and transfer to Link.
- Riders willing to transfer to Link often take advantage of multiple alternative routes to reach Link, rather than remaining on their previous route or selecting a single new route.
- A substantial number of previous bus riders appear to drive to Link, at least occasionally, using both the Northgate and Roosevelt stations in this manner.