FINALTECHNICAL MEMORANDUM

Date:	December 22, 2022	**TG:**	1.21322.00
To:	Tim Wilder – Whatcom Transit Authority Chris Comeau, FAICP-CTP – City of Bellingham		
From:	Stefanie Herzstein and Jessica Lambert – Transpo Group		
cc:	John Duesing – Transpo Group		
Subject:	Rapid Transit Study – Existing Conditions		

This technical memorandum summarizes the existing conditions for the Whatcom Transportation Authority High Frequency Transit Study. The study focuses on two (2) Whatcom Transportation Authority (WTA) corridors: (1) Gold Line (route 331) and (2) Blue plus Green Lines (100-series routes and 232) in Bellingham, WA. The evaluation of the Blue Line is focused on the Route 190 alignment with consideration of the 100-series service levels.

This memorandum describes the roadway context (existing and planned), transit service, safety, land use (existing and forecasted) and vehicle ownership, socioeconomic characteristics, ridership, and on-time performance. The memorandum has been summarized at a high level and more detail is available on a GIS database.

Background & Purpose

Figure 1 illustrates the study corridors. The Gold Go Line (route 331) provides service between the Cordata Station at Whatcom Community College (WCC) and the Bellingham Station in downtown Bellingham. Service is primarily provided along Cordata Parkway, Bellis Fair Parkway, Deemer Road, Telegraph Road, James Street, E Sunset Drive, Woburn Street, Alabama Street, and Cornwall Avenue.

The Green plus Blue Go Lines (routes 232 and 100-series following the path of the route 190) provide service between the Cordata Station at WCC, the downtown Bellingham Station, Western Washington University (WWU), and Lincoln Street. The Green Go Line provides service between the Cordata Station, and the downtown Bellingham Station and the Blue Go Line provides service between the downtown Bellingham Station, WWU, and Lincoln Street. The Lines primarily operate along Eliza Avenue, W Bakerview Road, Northwest Drive, Elm Street, Dupont Street, Billy Frank Jr. Street, High Street, Highland Drive, W College Way, Bill McDonald Parkway, and Lincoln Street.

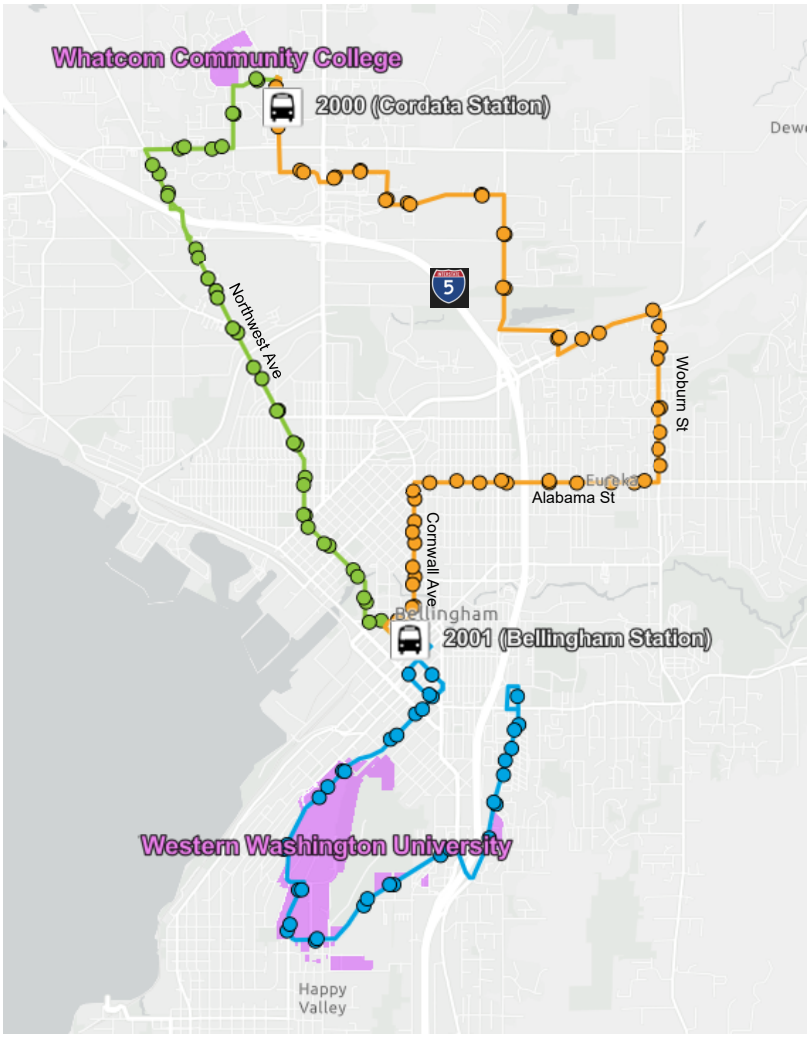


Figure 1 Study Corridors

As shown in Figure 1, all of the routes involve a number of turning maneuvers requiring the buses to make left and right-turns which can slow down drivetimes. There are also numerous closely spaced locations along Woburn Street, Cornwall Avenue, and Northwestern Avenue.

The routes identified for this analysis currently have scheduled headways of 15-minutes; however, growth and resulting congestion are causing delays. This memorandum reviews and analyzes data for the existing conditions of the Gold, Green, and Blue Go Lines as well as the roadways the routes operate along.

The purpose of this study is to assess speed and reliability improvements and the potential for bus rapid transit (BRT) in each corridor, while also considering changes in land use plans to better support more frequent transit service. Specifically, the Rapid Transit Study will:

- Identify and analyze the feasibility of transit infrastructure improvements to improve the speed and reliability of transit along key high frequency corridors
- Assess alternatives and opportunities, including land use initiatives along corridors, to identify a Locally Preferred Alternative for potential bus rapid transit system

- Prepare work and documentation that would enable WTA to obtain local, state and federal funding, including entering into the FTA's Project Development phase for a possible Capital Investment Grant

This technical memorandum provides the foundation for determining the corridor conditions and needs to determine a preferred alternative and identify transit improvements for rapid transit corridors. Much of the analysis focuses on areas within ¼ and ½ mile walking distance of the transit lines. The distances are measured based on sidewalk and trail connectivity to/from the transit routes.

Transit Service

The study routes and each of the stops along the routes are provided in Attachment A.

The Gold Go Line (Route 331) currently operates between Cordata Station and Bellingham Station. Service is offered Monday through Friday from 6:40 a.m. to 10:40 p.m., Saturdays from 7:55 a.m. to 10:40 p.m. and Sundays from 8:10 a.m. to 8:10 p.m. Service is offered with 15-minute headways with the exception of service before 7:10 a.m. and service after 5:40 p.m. Service is offered with 30-minute headways before 7:10 a.m. and between 5:40 and 8:40 p.m. and the headways are 60 minutes after 8:40 p.m. Headways on the weekend service are 15 to 30 minutes. The scheduled run time is 30 minutes in each direction.

The Blue Go Line (Route 105, 107, 108, 190, 196 and 197) currently operates Monday through Saturday and the combination of the routes offers 15-minute headways. Service is provided on weekdays from 6:40 a.m. to 11 p.m. Saturdays from 8:25 a.m. to 11:00 p.m. Service on Sundays is provided from 8:25 a.m. to approximately 10 p.m. and operated with 30-minute headways during peak periods.

The Green Go Line (Route 232) currently operates Monday through Friday from 6:40 a.m. to 10:31 p.m. and Saturdays from 8:10 a.m. to 10:31 p.m. with 30-minute headways. Similar to the Gold Go Line service is offered with 15-minute headways with the exception of service before 7:10 a.m. and service after 5:40 p.m. Service is offered with 30-minute headways before 7:10 a.m. and between 5:40 and 8:40 p.m. and the headways are 60 minutes after 8:40 p.m. Headways on the weekend service are 15 to 30 minutes. Sundays, route 232 runs from 8:10 a.m. to 8:01 p.m. with a 30-minute headway.

Bus fare is collected using cash, WTA's Umo Card or Western Washington University (WWU)/Whatcom Community College (WCC) bus passes. The Umo Card can be loaded with any pass option. An Umo Card can be purchases and loaded online on the WTA website, or in person at several retailers. Bus pass options include a Whatcom County Day or monthly pass, Skagit-Whatcom County Connector day or monthly pass, a pack of 11 passes, or a 92-day pass. The pass options and fees are shown on Figure 2. The bus passes account for approximately 40 percent of the ridership and cash is also a large portion of the fare collected.

General	
Day Pass	$3
Skagit-Whatcom Day Pass	$6
11 Ride Ticket	$10
31-Day Pass	$30
County Connector 31-Day Pass	$50
92-Day Pass	$90
Gold Card	Free

Figure 2 Bus Fare Costs

An inventory of the transit stops was conducted for each route. The inventory reviewed the stop for amenities including a bench, shelter, ADA accessibility, pedestrian pad, signage and ability to connect to power. ADA accessibility was determined by assessing nearby curb-ramps and sidewalk condition. Stops that had a nearby curb-ramp and sidewalk were determined to be ADA accessible. The review of accessibility did not verify if the curb ramps and amenities meet current ADA guidelines. The City of Bellingham has an adopted ADA Transition Plan and is working to implement recommended changes for pedestrian facilities within the public right of way to remove barriers and provide access for individuals with disabilities.

Most transit stops are ADA accessible, have a sign designating the location and provide a bench and/or a shelter. In addition, power is available for approximately 40 to 45 percent of the transit stops providing the ability to have electronic messages and information for passengers. Solar power could be a consideration for locations without connections to power.

The non-accessible stops were observed to have no sidewalks making the stop difficult to access. There are also areas with narrow sidewalks and frequent interruptions by driveways as well as stops located adjacent to driveways with limited space for waiting. These factors cause barriers for individuals to access. Widened sidewalks, ADA compliant curb ramps and a designated waiting area outside of the sidewalk would improve ADA accessibility.

Along the Gold Go Line the majority of non-accessible bus stops were along Telegraph Road and the James Street at McLeod Road stops. Telegraph Road will be reconstructed in 2023 and all bus stops will be ADA-compliant and aligned with flashing crosswalks. While the City may be able to work with WTA to make some temporary/interim improvements to bus stops along James Street between Telegraph/James and Birchwood/James/Orchard, the permanent improvement is a paved multiuse pathway along the west side of James Street between Telegraph and Birchwood, which is estimated to cost $10 million and is not currently funded.

Study Area

The Gold Line study area encompasses approximately seven miles between Bellingham Station and Cordata Station via James Street, E Sunset Drive, Woburn Street and Alabama Street. Key intersections for the Gold Line include:

- Cornwall Avenue/York Street
- Cornwall Avenue/Ohio Street

- Cornwall Avenue/Kentucky Street
- Cornwall Avenue/Virginia Street
- Cornwall Avenue/Texas Street
- Alabama Street/Dean Avenue
- Alabama Street/Humboldt Street
- Alabama Street/James Street
- Alabama Street/Nevada Street
- Alabama Street/Queen Street
- Alabama Street/St Paul Street
- Alabama Street/Undine St
- Woburn Street/North Street
- Woburn Street/Maryland Street
- Woburn Street/Barkley Boulevard
- Woburn Street/Rimland Drive
- Sunset Drive/Woburn Street
- Sunset Drive/Racine Street
- James Street/McLeod Road
- Telegraph Road/James Street
- Telegraph Road/Primrose Lane
- Deemer Road/Telegraph Road

Green plus Blue Line study area encompasses approximately ten miles between Cordata Station, Bellingham Station, and Lincoln Street via West Bakerview Road, Northwest Avenue, Elm Street, Dupont Street, High Street, Billy McDonald Parkway and Lincoln Street. Key intersections in the study area for the Green/Blue Line include:

- Magnolia Street/High Street
- Billy Frank Junior Street/Holly Street
- Billy Frank Junior S/Chestnut Street
- Billy Frank Junior Street/Laurel Street
- Bill McDonald Parkway/Ferry Ave
- Bill McDonald Parkway/Samish Way
- Lincoln Steet/Maple Street
- Lincoln Street/Lakeview Drive
- Champion Street/Unity Street
- Champion Street/Grand Avenue
- Prospect Street/Flora Street
- Dupont Street/C Street
- Dupont Street/G Street
- Elm Street/Broadway
- Elm Street/Jefferson Street
- Northwest Avenue/Connecticut Street
- Northwest Avenue/Illinois Street
- Northwest Avenue/Lynn Street
- Northwest Avenue/McLeod Road
- Northwest Avenue/Sterling Drive
- Northwest Avenue/Bakerview Road
- Bakerview Road/Palisade Way
- Bakerview Road/Eliza Avenue
- Eliza Avenue/ Darby Drive

The route maps and stops locations are summarized in Attachment A.

Roadway Context

This section describes the vehicle, pedestrian and biking facilities as well as transit signals along the study corridors. Table 1 summarizes the key characteristics of the study corridors.

Table 1. Existing Street Network Summary

Roadway	Transit Route	Classification[1]	Speed Limit[2]	# Lanes	Pedestrian Facilities	Bicycle Facilities	On-Street Parking
James Street	Gold (331)	Secondary Arterial	25 mph	2 to 3	Yes	No	Yes
Woburn Street	Gold (331)	Principal Arterial	35 mph	2 to 5[1]	Yes	Yes[2]	Intermittent
Alabama Street	Gold (331)	Secondary Arterial	30 mph	3 to 5[3]	Yes	Yes[3]	No
Cornwall Avenue	Gold (331)	Secondary Arterial	25 mph	3	Yes	Yes	Yes[4]
Billy Frank Jr. Street	Blue (190)	Collector Arterial	25 mph	2	Yes	Yes[5]	Yes[5]
High Street	Blue (190)	Collector Arterial	25 mph	2	Yes	No	Yes
Billy McDonald Parkway	Blue (190)	Secondary Arterial	25 to 35 mph	2	Yes	Yes	No
Lincoln Street	Blue (190)	Secondary Arterial	25 to 35 mph	2 to 5	Yes	Yes	No
Northwest Avenue	Green (232)	Principal Arterial	25 mph	2 to 3	Yes	Yes	Yes[6]
Sunset Drive	Gold (331)	Principal Arterial	35 mph	5	Yes	Yes	No
Telegraph Road	Gold (331)	Collector Arterial	25 mph	2 to 3	Intermittent	No	No
Dupont Street	Green (232)	Principal Arterial	25 mph	2	Yes	Yes	Yes
Lakeway Drive	Blue (190)	Principal Arterial	25 mph	5	Yes	No	No
Cordata Parkway	Green (232)/ Gold (331)	Secondary Arterial	35 mph	2 to 3	Yes	Intermittent	No

Source: Transpo Group, August 2022
1. Roadway narrows south of Newmarket Street.
2. Bicycle facilities provided south of Texas Street.
3. Roadway narrows west of James Street where bike lanes are also provided.
4. Along the east side of the roadway.
5. On-street parking with sharrow bike facilities is provided northeast of E Chestnut Street. A bike lane is provided along the northwest side with on-street parking along the southeast side southwest of E Chestnut Street.
6. Parking allowed along the east side south of Alderwood Avenue.

As shown in Table 1, the roadways along the study corridors are 2 to 5-lane facilities. Sidewalks are provided along all of the primary roadways on at least one side of the roadway, with pedestrian crosswalks present at each signalized intersection. Designated bike lanes are present along many of the corridors.

Some signalized intersections along the routes have transit signal priority (TSP) or signal preemption technologies to try to expedite buses movements through the intersection. TSP locations are depicted on the GIS database. The majority of intersections are running low priority signal preemption rather than TSP. The preemption system is the same system used for emergency vehicles; however, the bus emits a different pulse (low pulse) than the emergency vehicles.

As defined by the Manual on Uniform Traffic Control Devices (MUTCD), traffic signal preemption is “the transfer of normal operations of a traffic control signal to a special control mode of operation”. The preemption control is designed and operated to give certain vehicles the right of way through the signal by interrupting the normal signal operations and transferring right of way to the direction of certain vehicles. Preemption also allows for the shortening or omission of pedestrian walk intervals and/or changes to the pedestrian interval permission. Signal preemption can have impacts to traffic/corridor operations because it replaces the normal timing and logic with preemptive timing and logic to serve specific vehicle types. Following alterations to the green time

for the preempted vehicle, the traffic signal goes through a recovery or transition period back to normal operations.[1]

Transit signal priority (TSP) operations work differently than preemption systems. TSP modifies signal operations process to better accommodate transit vehicles while preemption interrupts the normal signal operations for special events such as an approaching fire engine. TSP aims to reduce delay experienced by transit vehicles at intersections and involves communication between the bus and traffic signals so that the signal can alter its timing to give priority to transit. Priority at signals can be granted in a number of methods including extension of the greens on specific phases, altering the phase sequencing, and including special phases without interrupting coordination between signals at adjacent intersection.[1] The intent of TSP is to not have major disruptions in corridor operations but rather to work within parameters to improve efficiency of transit operations while maintaining progress of traffic along the corridor. Comparatively, signal preemption disrupts corridor operations and while it serves to improve efficiency for the transit vehicle as it passes through the intersection it can make corridor/intersection operations worse for a period of time, which could make operations less efficient for transit vehicle coming after.

The Gold Go Line also has a queue jump lane with a bus activated signal for the westbound through movement where the bus can utilize the right-turn lane to through the intersection, avoiding westbound through vehicle queuing. The queue jump lane is at the James Street/Alabama Street intersection. Observations at this intersection indicate that buses may not be utilizing the queue jump and may instead be waiting and getting into traffic with the through movement. WTA has indicated that drivers only use the queue jump when they are behind schedule.

Planned Improvements

There are several projects planned in the study area along Route 331,190 and 232 corridors by the City of Bellingham. In 2023, Telegraph Road between Deemer Road and James Street in the area that Route 331 serves will be reconstructed and will have sidewalks, bike lanes, a center turn-lane and flashing pedestrian crossings will be added to ensure users safety. The flashing pedestrian crossings will be added at locations where there are existing WTA stops. The City of Bellingham also has planned improvements to add a full traffic signal at the Lincoln Street/E Maple Street intersection. In addition, Lincoln Street north of E Maple Street to the south Fred Meyer driveway will be rechanneled from 5- to 3-lanes and buffered bike lanes will be provided. A flashing crosswalk will be installed at Lincoln/Viking Circle and an ADA-compliant transit island will be constructed at the southwest corner.

Safety

Collision data were obtained from WSDOT and reviewed along the study corridors for the five-year period between 2017 and 2021. Collison data is summarized in Table 2 for key intersections along the Gold Go Line and Table 3 summarizes collision along key intersections for the Green & Blue Go Line routes.

[1] U.S. Department of Transportation Federal Highway Administration, Chapter 9, Advanced Signal Timing Topics.

Table 2. Five-Year Collision Summary – Gold Go Line

Intersection	Traffic Control	Number of Collisions					Total	Annual Average
		2017	2018	2019	2020	2021		
Cornwall Avenue/York Street	Signal	1	2	1	0	1	5	1
Cornwall Avenue/Ohio Street	Signal	2	1	0	0	3	6	1
Cornwall Avenue/Kentucky Street	Stop Controlled	1	0	1	1	0	3	1
Cornwall Avenue/Virginia Street	Stop Controlled	0	0	0	0	1	1	0
Cornwall Avenue/Texas Street	Stop Controlled	0	0	1	0	1	2	0
Alabama Street/Dean Avenue	Stop Controlled	0	0	0	0	0	0	0
Alabama Street/Humboldt Street	Stop Controlled	0	0	1	0	0	1	0
Alabama Street/James Street	Signal	1	3	5	4	3	16	3
Alabama Street/Nevada Street	Stop Controlled	0	1	0	0	0	1	0
Alabama Street/Queen Street	Stop Controlled	0	0	1	0	0	1	0
Alabama Street/St Paul Street	HAWK Signal	1	2	0	1	0	4	1
Alabama Street/Undine St	Stop Controlled	1	0	1	0	1	3	1
Woburn Street/North Street	Stop Controlled	0	1	0	0	0	1	0
Woburn Street/Maryland Street	Stop Controlled	0	0	1	0	0	1	0
Woburn Street/Barkley Blvd	Signal	6	2	5	1	2	16	3
Woburn Street/Rimland Drive	Signal	0	0	0	0	0	0	0
Sunset Drive/Woburn Street	Signal	0	0	0	0	0	0	0
Sunset Drive/Racine Street	Signal	0	0	0	0	0	0	0
James Street/McLeod Road	Stop Controlled	0	1	0	0	1	2	0
Telegraph Road/James Street	Stop Controlled	0	2	0	3	3	8	2
Telegraph Road/Primrose Lane	Stop Controlled	0	0	0	0	0	0	0
Deemer Road/Telegraph Road	Stop Controlled	2	1	1	0	0	4	1

Source: WSDOT, Transpo Group 2022

Note: Under 23 U.S. Code § 409 and 23 U.S. Code § 148, safety data, reports, surveys, schedules, lists compiled or collected for the purpose of identifying, evaluating, or planning the safety enhancement of potential crash sites, hazardous roadway conditions, or railway-highway crossings are not subject to discovery or admitted into evidence in a Federal or State court proceeding or considered for other purposes in any action for damages arising from any occurrence at a location mentioned or addressed in such reports, surveys, schedules, lists, or data.

As shown in Table 2, collisions along the Gold Go Line route are relatively low with many locations having on average no collisions. The highest number of collisions were at the Alabama Street/James Street and the Woburn Street/Barkley Boulevard intersections, which each had an annual average of 3 collisions per year so still a low number of collisions. The Telegraph Road intersections with James Street and Primrose Lane will be signalized in 2023. Overall, no specific safety issues are identified along the Gold Go Line route.

Table 3. Five-Year Collision Summary – Green & Blue Go Line

Intersection	Traffic Control	Number of Collisions					Total	Annual Average
		2017	2018	2019	2020	2021		
Magnolia Street/High Street	Stop Controlled	0	0	0	0	0	0	0
Billy Frank Junior Street/Holly Street	Signal	0	1	2	3	2	8	2
Billy Frank Junior S/Chestnut Street	Signal	1	1	0	2	8	12	2
Billy Frank Junior Street/Laurel Street	Stop Controlled	0	0	0	0	0	0	0
Bill McDonald Parkway/Ferry Ave	Stop Controlled / OH Flashing Crosswalk	3	3	2	1	0	9	2
Bill McDonald Parkway/Samish Way	Signal	1	3	0	4	2	10	2
Lincoln Steet/E Maple Street	Stop Controlled	3	1	0	2	0	6	1
Lincoln Street/Lakeview Drive	Signal	0	0	0	0	0	0	0
Champion Street/Unity Street	Stop Controlled	0	0	0	0	0	0	0
Champion Street/Grand Avenue	Signal	1	0	1	0	0	2	0
Prospect Street/Flora Street	Stop Controlled	0	0	0	0	0	0	0
Dupont Street/C Street	Stop Controlled	0	1	1	0	0	2	0
Dupont Street/G Street	Stop Controlled	0	2	0	0	0	2	0
Elm Street/Broadway	Signal	2	1	2	0	3	8	2
Elm Street/Jefferson Street	Stop Controlled	0	0	0	0	0	0	0
Northwest Avenue/Connecticut Street	Stop Controlled RRFB	0	0	0	1	0	1	0
Northwest Avenue/Illinois Street	Signal	0	2	0	0	0	2	0
Northwest Avenue/Lynn Street	Signal	0	1	1	0	0	2	0
Northwest Avenue/McLeod Road	Roundabout	1	0	0	3	0	4	1
Northwest Avenue/Sterling Drive	Stop Controlled	0	0	0	2	0	2	0
Northwest Avenue/Bakerview Road	Signal	9	8	9	12	10	48	10
Bakerview Road/Palisade Way	Stop Controlled	1	0	0	0	0	1	0
Bakerview Road/Eliza Avenue	Signal	3	6	2	1	3	15	3
Eliza Avenue/ Darby Drive	Stop Controlled	0	0	0	0	0	0	0

Source: WSDOT, Transpo Group 2022
Note: Under 23 U.S. Code § 409 and 23 U.S. Code § 148, safety data, reports, surveys, schedules, lists compiled or collected for the purpose of identifying, evaluating, or planning the safety enhancement of potential crash sites, hazardous roadway conditions, or railway-highway crossings are not subject to discovery or admitted into evidence in a Federal or State court proceeding or considered for other purposes in any action for damages arising from any occurrence at a location mentioned or addressed in such reports, surveys, schedules, lists, or data.
OH = overhead flashing crosswalk; RRFB = rectangular rapid flashing beacon

As shown in Table 3, collisions along the Green and Blue Go Line route are relatively low with many locations having on average no collisions except at the Northwest Avenue/Bakerview Road intersection. The Northwest Avenue/Bakerview Road intersection has an annual average of 10 collisions per year and the 5-year review shows a slight increase in collisions in 2020 and 2021. The most frequently reported collision at the Northwest Avenue/Bakerview Road intersection was an approach turn followed by rear-end. Rear-end collisions are common at signalized intersections where there is stop-and-go traffic. Approach turn collisions occur when vehicles are approaching from the same or opposite directions and one turns while the other does not yield. The Northwest Avenue and Bakerview Road approaches have protected permitted left-turn signal timing, which means during the permitted phase yielding would need to occur for vehicles to make turns. The Green Go Line transit vehicles do turn left heading westbound from Bakerview Road onto Northwest Avenue to head south; there were not reported transit collisions at this intersection (see more detail in the following section).

The City will install a traffic signal at Lincoln Street/E Maple Street in 2023. In addition, the 2022 Pedestrian Master Plan Update identified the potential for a HAWK signal to facilitate pedestrian crossings at the Bakerview Road/Palisade Way intersection.

The WSDOT data only reflects two reported collisions with transit buses in the five-year period, collisions along the corridor can also delay transit service. The transit related collisions were reported in 2019 and 2020 and involved property damage only. Transit related collisions were reported at the Humboldt Street/Alabama and Alabama Street/St Paul Street intersection.

In addition to the WSDOT data, specific collision data from WTA was reviewed. The data includes the collisions reported in the WSDOT as well as additional collisions that may not have occurred at intersections or were not reported. Data provided by WTA indicated in the five-year period between 2019 and 2021 that 14 collisions occurred involving buses. The specific collisions are summarized in Table 4.

Table 4. Five-Year Transit Collision Summary

Location	Collision Type	Route	Collision Year
1200 block of Chestnut Street	Other Vehicle	Blue (190)	2019
Prospect Street and Flora Avenue	Fixed Object	Green (232)	2021
Prospect St. and Central Avenue	Fixed Object	Green (232)	2019
Cornwall Avenue and Magnolia Avenue (Intersection)	Other Vehicle	Green (232)	2018
Railroad Avenue and Magnolia Avenue	Transit Vehicle	Green (232)	2018
Northwest Avenue and Illinois Street	Other Vehicle	Green (232)	2017
Cornwall Avenue and Alabama Street	Other Vehicle	Gold (331)	2021
James Street and Telegraph Road (Intersection)	Other Vehicle	Gold (331)	2021
Cornwall Avenue and Champion Street	Other Vehicle	Gold (331)	2021
Alabama Street and Undine Street (Bus stop)	Other Vehicle	Gold (331)	2020
Alabama Street and Toledo Street	Other Vehicle	Gold (331)	2020
Alabama Street and Pacific Street	Bicycle	Gold (331)	2019
Alabama Street and Humboldt Street	Other Vehicle	Gold (331)	2019
Alabama Street and Cornwall Avenue	Other Vehicle	Gold (331)	2019

Source: WTA, Transpo Group 2022

As shown in Table 4, the majority of the collisions involved other vehicles with one reported collision with a bicycle. Of the 14 reported collisions over the last 5-years, 6 were reported along the Green/Blue Go Line and 8 were reported along the Gold Go Line. The highest number of collisions were reported along Alabama Street. There is no distinct pattern to the collisions or specific location with more collisions. No specific safety issues related to transit have been identified for the study area.

Land Use and Population Characteristics

This section summarizes the land use and key population characteristics relative to transit. Table 5 provides an overview of the existing land use and population within x-miles of the study corridors. The ridership for transit service is influenced by population (housing) and employment (jobs) densities as well as population characteristics such as vehicle ownership, zero car households and income. Higher household/employment densities support a transit system and allow for more households to not be auto dependent. Having higher housing and employment densities allows for the population to have shorter travel distances reducing auto needs for most daily trips. Providing

transit within a 5 to 15-minute walk (1/4 to 1/2 mile) of uses coupled with higher frequencies, such that riders have reduced wait times, further reduces the dependence on personal autos and makes transit a more attractive and viable mode of transportation for more people.

Table 5. Existing Population and Land Use within 1/4-Mile of the Study Routes

Route	Population	Households	Employment
Gold Go Line (331)	9,670 people	5,300 houses	14,785 jobs
Green Go Line (232)	8,375 people	5,260 houses	7,795 jobs
Blue Go Line (190)	10,465 people	4,415 houses	12,875 jobs

Source: WTA and Transpo Group, September 2022
1. Percent of stops along that route that have the amenity.

Land Use

The current and future land use densities surrounding the study routes were evaluated based on data from the Whatcom County of Governments (WCOG) travel demand model.

Gold Go Line

Figure 3 and Figure 4 shows the existing housing and employment density, respectively, overlayed with the Go Lines and approximately a ¼-mile walking distance from the lines.

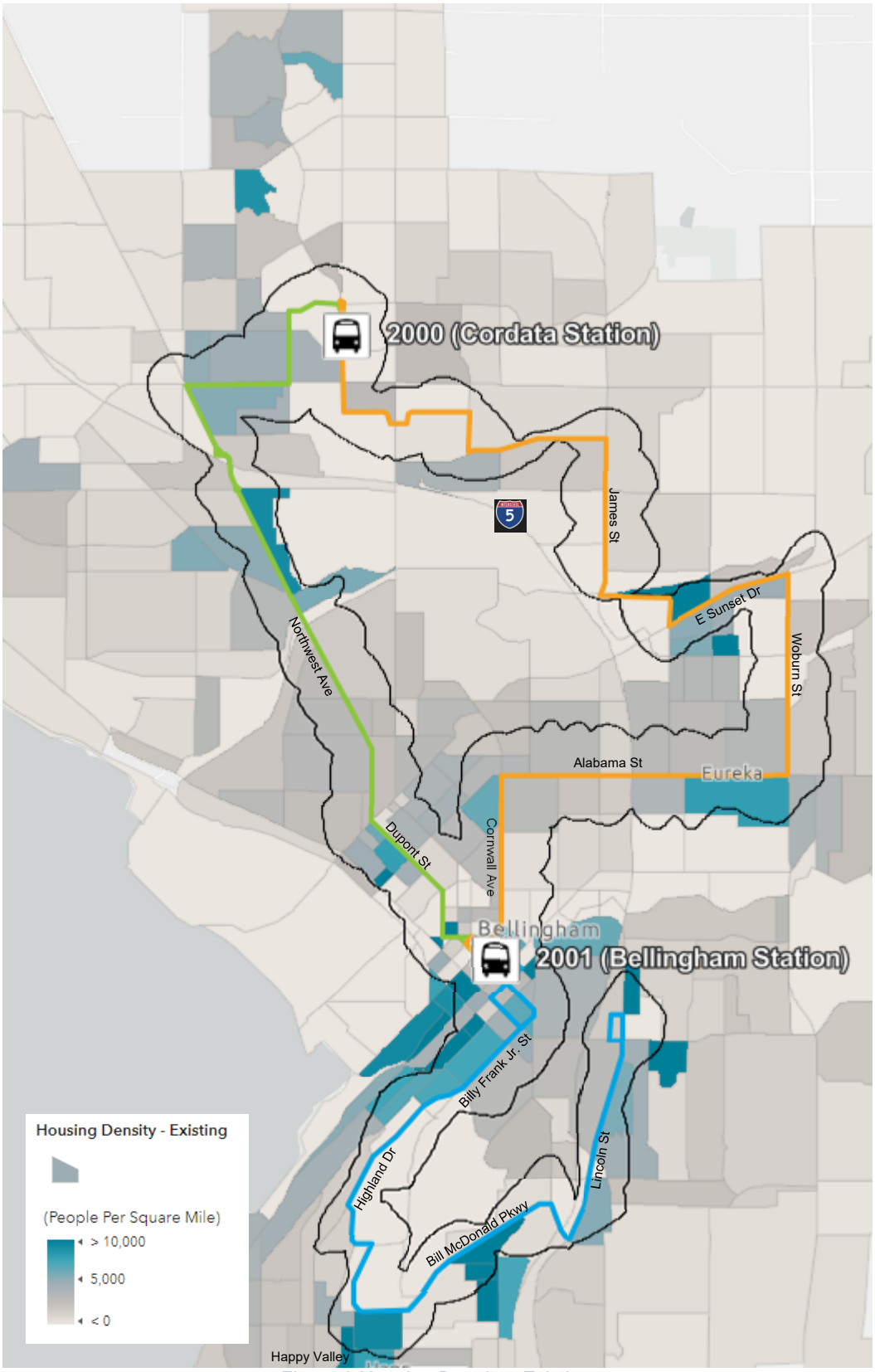


Figure 3 Housing Density - Existing

As shown on Figure 3, the highest housing densities are along the transit routes including north of E Sunset Drive, South of Alabama Street, Cornwall Avenue, Northwest Avenue, Billy Frank Jr. Street, Bill McDonald Parkway, Lincoln Street, and Downtown Bellingham and Western Washington University. Overall, the current route alignment serves the denser housing areas. High density areas not currently served by transit include the Happy Valley area (south and east of Bill McDonald Parkway) and areas north of the Cordata Station.

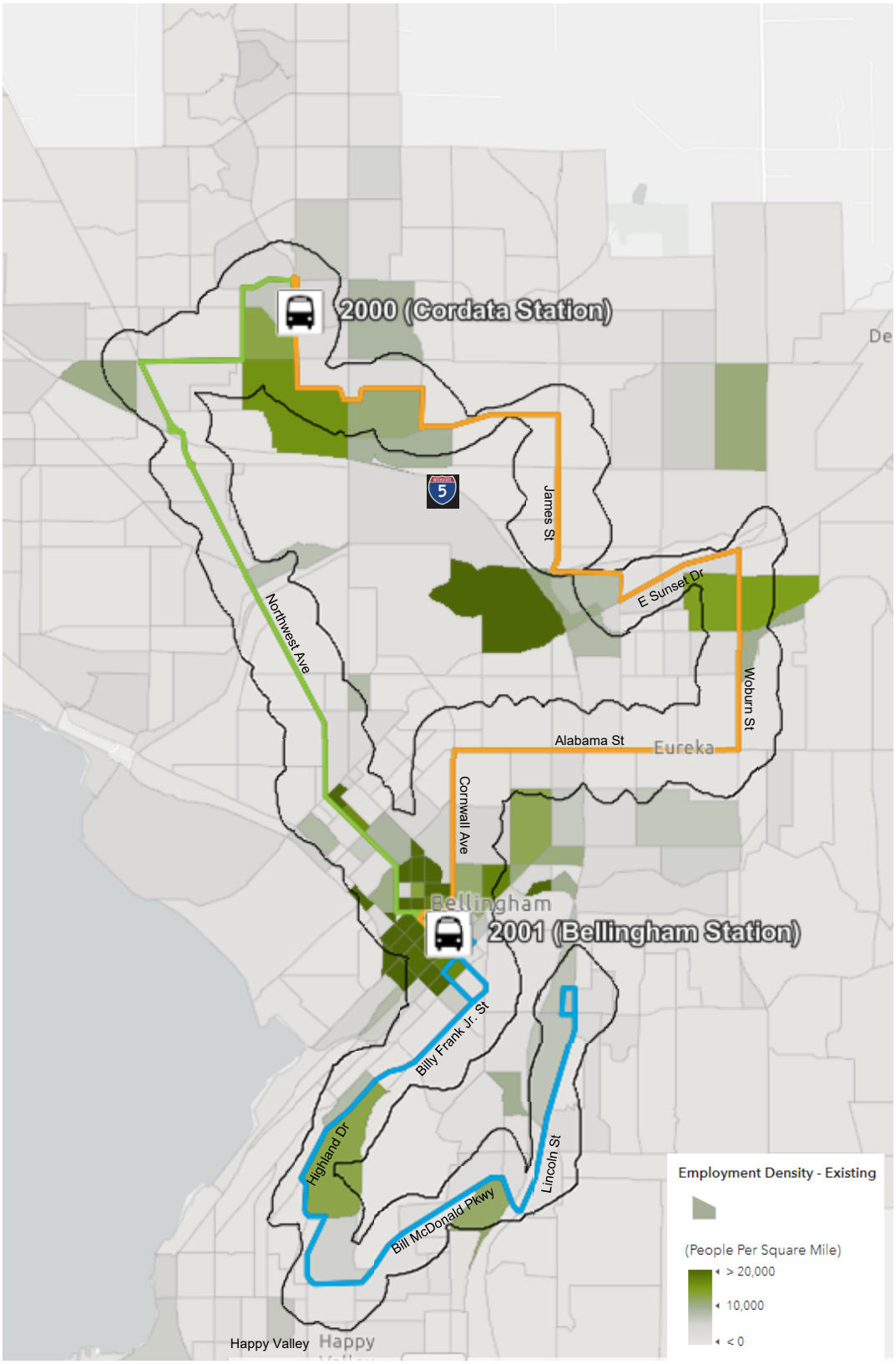


Figure 4 Gold Go Line Employment Density - Existing

As shown on Figure 4, some of the highest employment density is near WCC, Woburn Street and Barkley Boulevard, southeast of Highland Drive, South of Bill McDonald, WWU and in Downtown Bellingham. Similar to the housing, the route alignment is near the higher density areas of employment. The only area not served is located south of I-5, PeaceHealth Hospital area, and east of the Cordata Station.

Future 2045 housing densities are shown on Figure 5 and the forecast increase between existing and 2045 is shown on Figure 6.

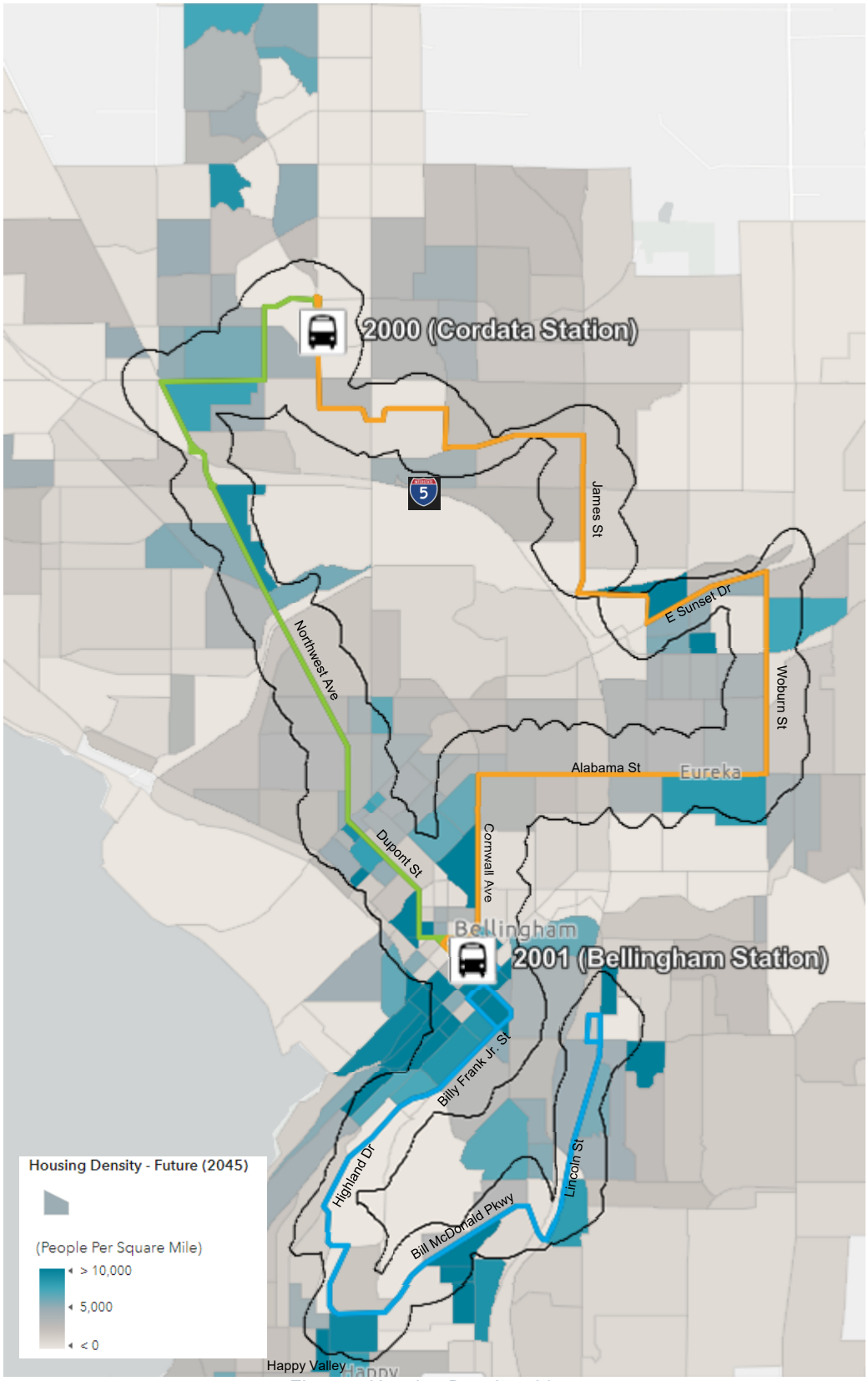


Figure 5 Housing Density - 2045

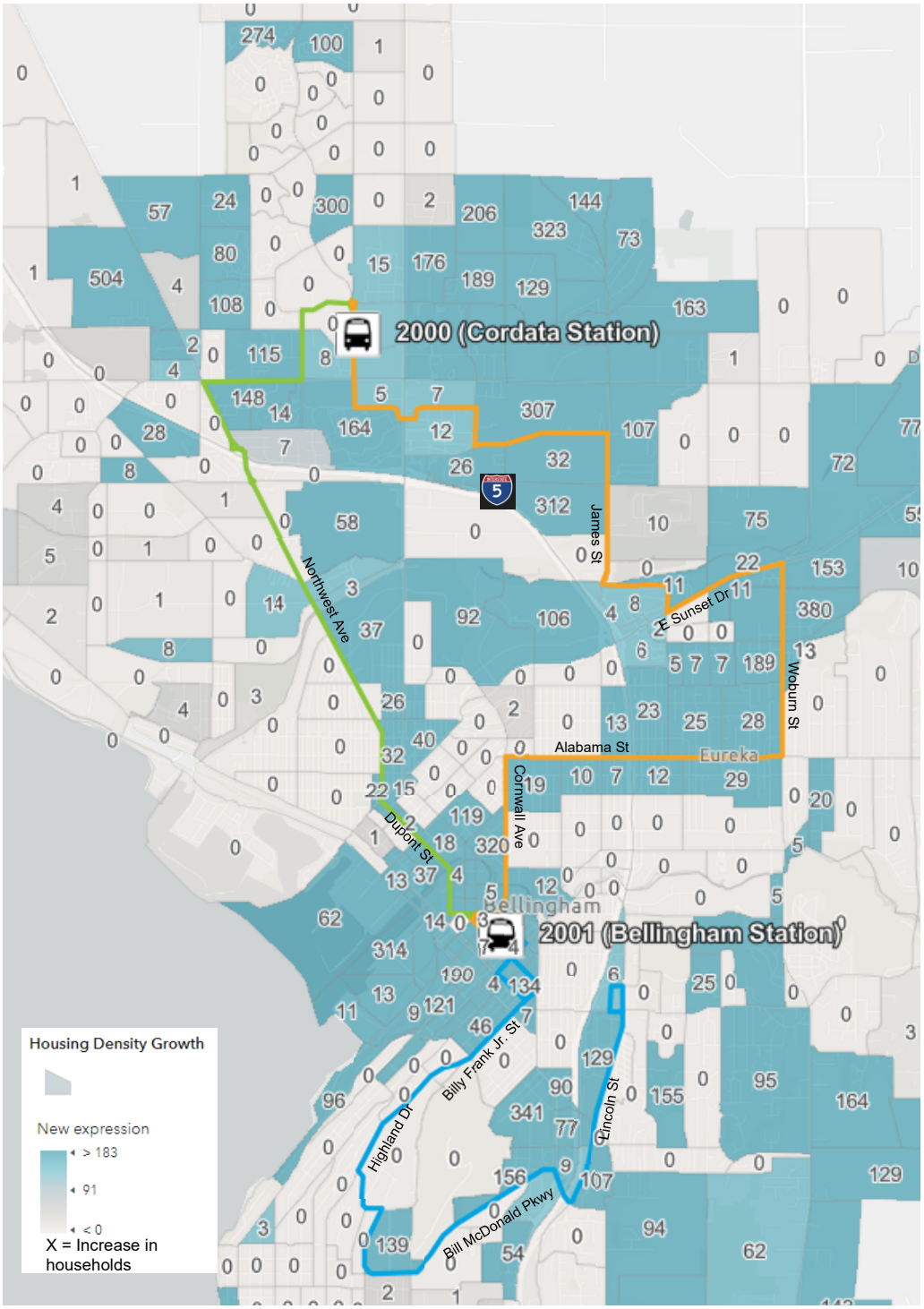


Figure 6 Growth in Households

As shown on Figure 6, some of the highest anticipated growth areas not currently served by transit are areas north and east of Cordata Station, west of I-5, and in parts of Downtown closer to the waterfront. the highest housing densities are along the transit routes include along Telegraph Road, Woburn Street, west of Cornwall Avenue, east of Northwest Avenue, Billy Frank Jr. Street, Bill McDonald Parkway, and Lincoln Street. Overall, the current route alignment serves some of

the anticipated higher density housing areas. Opportunities include the areas north and east of the Cordata Station and west of I-5. Areas along Northwest Drive north of Bakerview Road are currently served by Route 27.

Future 2045 employment densities are shown on Figure 7 and the forecast increase between existing and 2045 employment is shown on Figure 8.

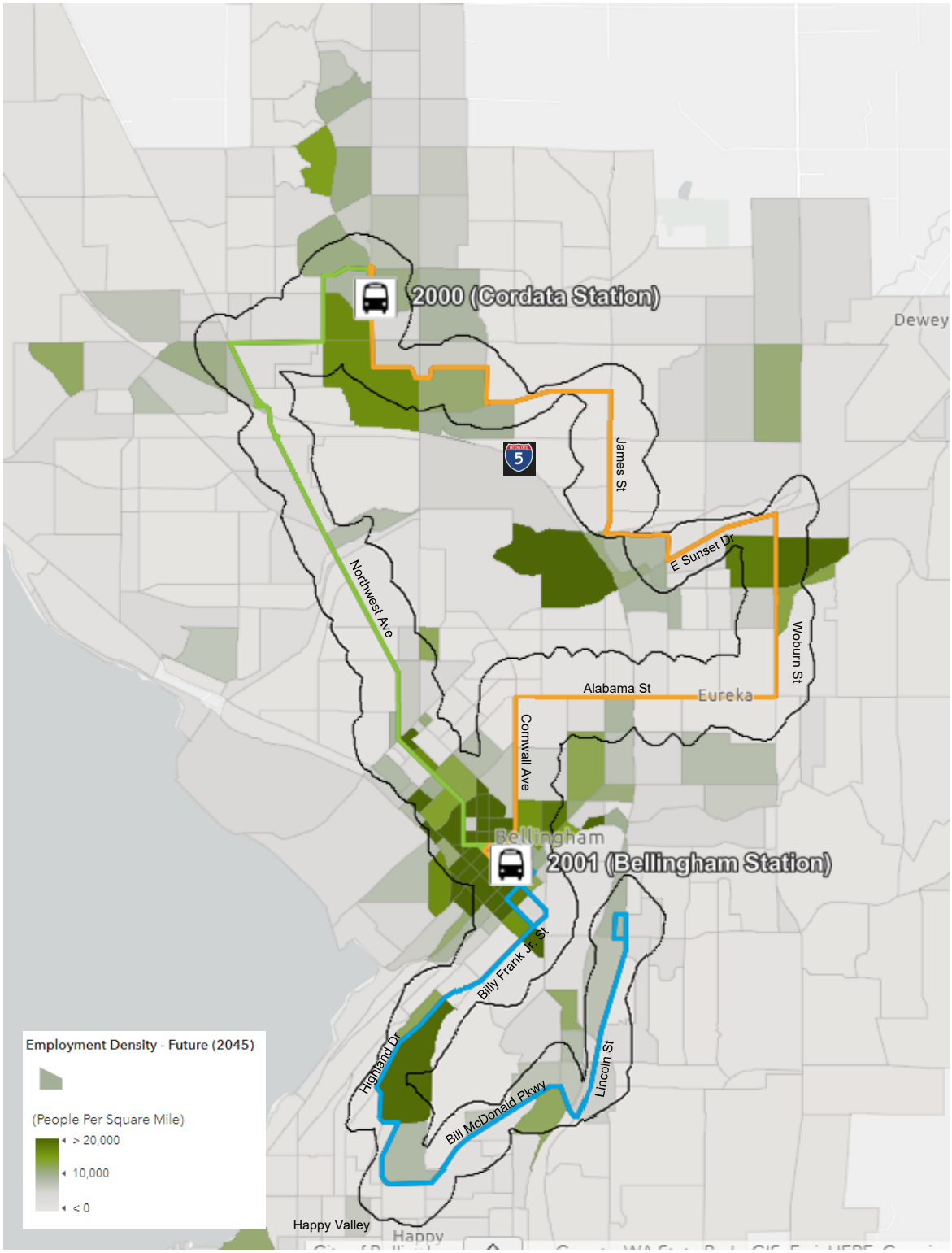


Figure 7 Employment Density - 2045

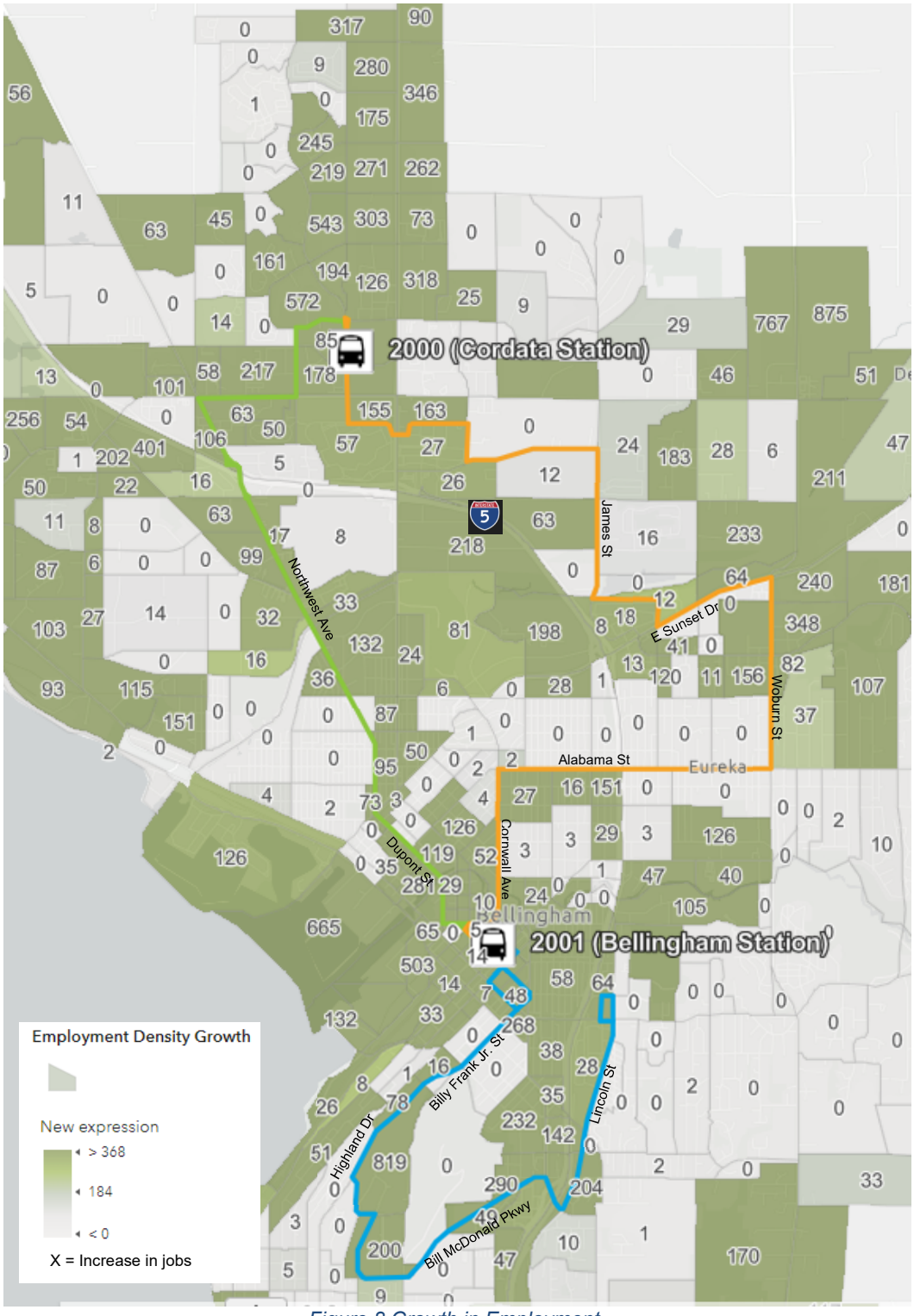


Figure 8 Growth in Employment

As shown in Figure 8, the largest growth areas currently not served by the subject routes are north of the Cordata Station, west of I-5, and areas of Downtown near the waterfront. Areas currently

served by the transit are near WWU along Highland Drive, Bill McDonald Parkway and Lincoln Street and along Woburn Street.

The City of Bellingham currently has a significant amount of housing, retail/commercial, and mixed-use developments in-process. Figure 9 shows the buildable lands proximate to the Go lines where areas could develop or redevelop (i.e., vacant/developable land). The buildable lands show that there are areas in the future that could be developed near the Green, Blue and Gold Lines. Along with developable land, the City also tracks work in progress. The City's dashboard indicates that approximately 1,500 units are under construction and 450 are in application review. A large majority of the applications and permitting are within close proximately of Downtown.

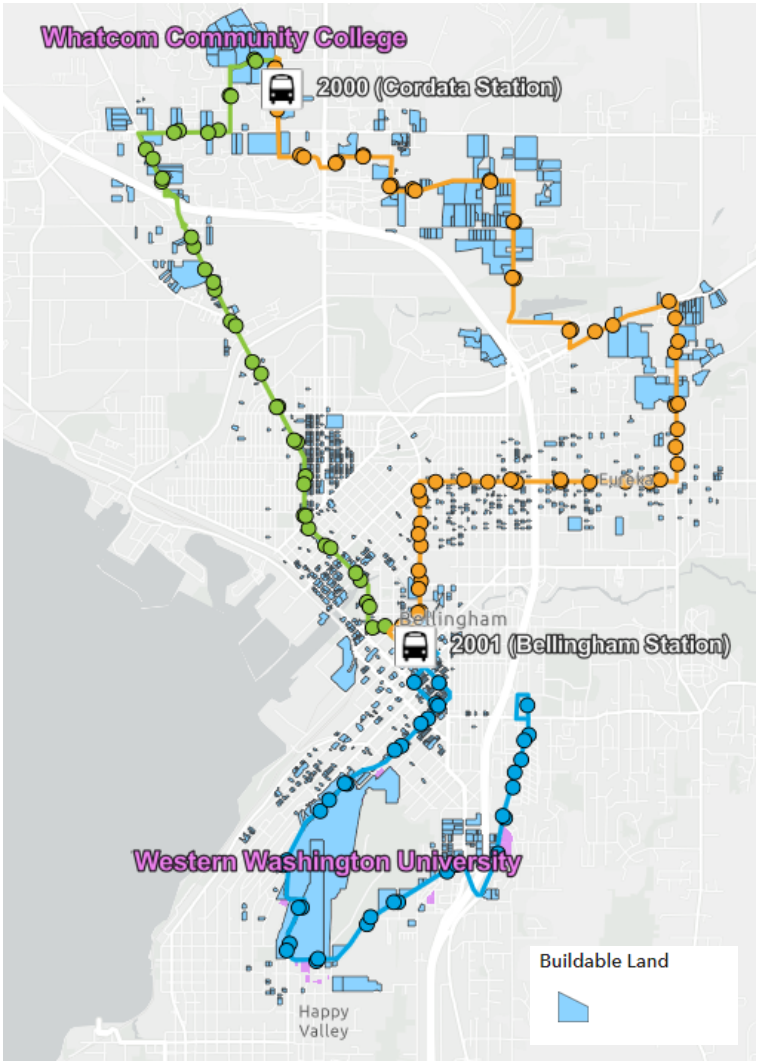


Figure 9 Buildable Lands Proximate to the Go Lines

The evaluation presented in the existing conditions study for land use provides a high-level understanding of patterns around the corridors. Further detail review and input on land use will be conducted as part of the recommended alternative including providing input on whether future/existing land use supports Rapid Transit and what changes/policies should be considered by the City to provide transit supportive land use.

Population Travel Characteristics

The 2020 US Census data for the City of Bellingham were reviewed to understand where workers live and work, how they commute to work, and vehicle ownership. The census data was based on:

- **OnTheMap** data showing where people who live in Bellingham work and where people who work in Bellingham live
- **2020 American Community Survey Estimates** for Journey to Work (i.e., commuting) and Vehicle Ownership

Table 6 provides a summary of where workers live who are employed in Bellingham and where workers are employed who live in Bellingham.

Table 6. Live/Work Census Data for Bellingham

City	Where Workers Live Who are Employed in Bellingham	Where Workers are Employed Who Live in Bellingham
Bellingham	53%	59%
Ferndale	7%	6%
Lynden	5%	3%
Blaine	3%	2%
Sedro Woolley	2%	1%
Everson	2%	1%
Everett	0%	2%
Mount Vernon	2%	3%
Other[1]	26%	23%

Source: OnTheMap, Transpo Group 2022
1. Made up of multiple areas with very low percentages to/from each City.

As shown in Table 6, the majority of people live and work in Bellingham with the next largest share either commuting to or from Bellingham living or working in Ferndale, approximately 9 miles northwest of Bellingham. Having a large portion of population living and working within Bellingham means there is opportunity for transit to serve these trips especially since the review of land use shows that the study routes are located along the corridors with the densest housing and employment. In addition, Ferndale is accessible via Route 27 to Cordata Station and providing Rapid Transit could reduce transfer times to/from Ferndale.

The current modes used to travel to work were reviewed for the whole City as well as by tenure (i.e., owner occupied versus renter occupied housing units).

Figure 10 shows the journey to work modes for the City of Bellingham.

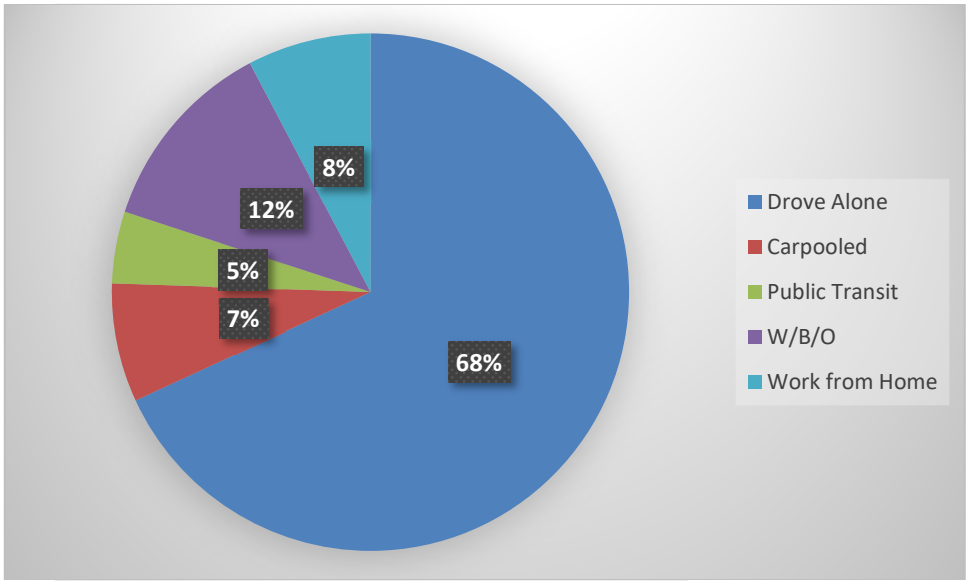


Figure 10 City of Bellingham Journey to Work Modes

As shown on Figure 10, the majority of residents (approximately 76 percent) commuted via vehicle with 68 percent driving alone and 7 percent carpooling. Approximately 5 percent of people use public transit as their primary means of commuting to work. Figure 11 and Figure 12 provide the journey to work breakdown for the owner occupied and renter occupied units, respectively.

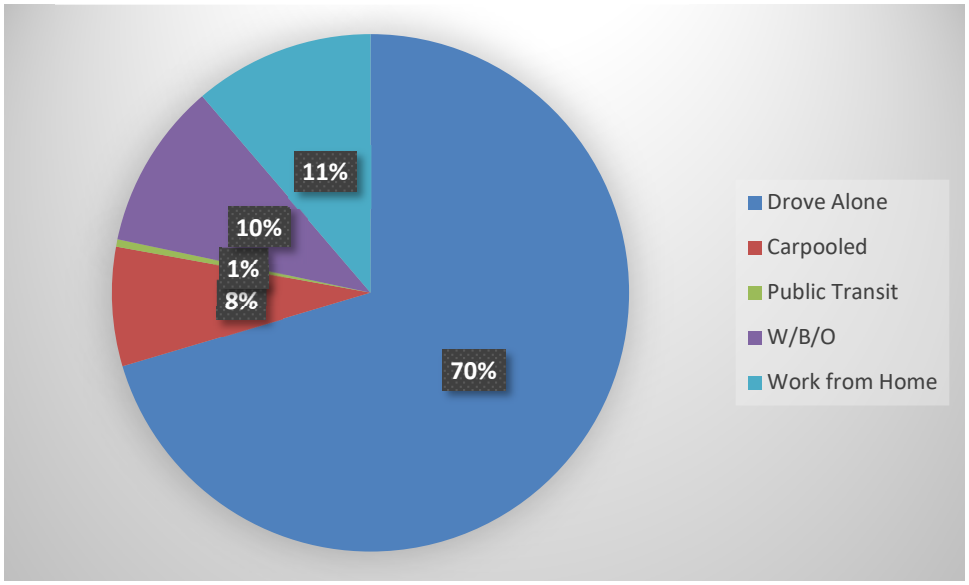


Figure 11 Journey to Work Modes for Owner Occupied Units

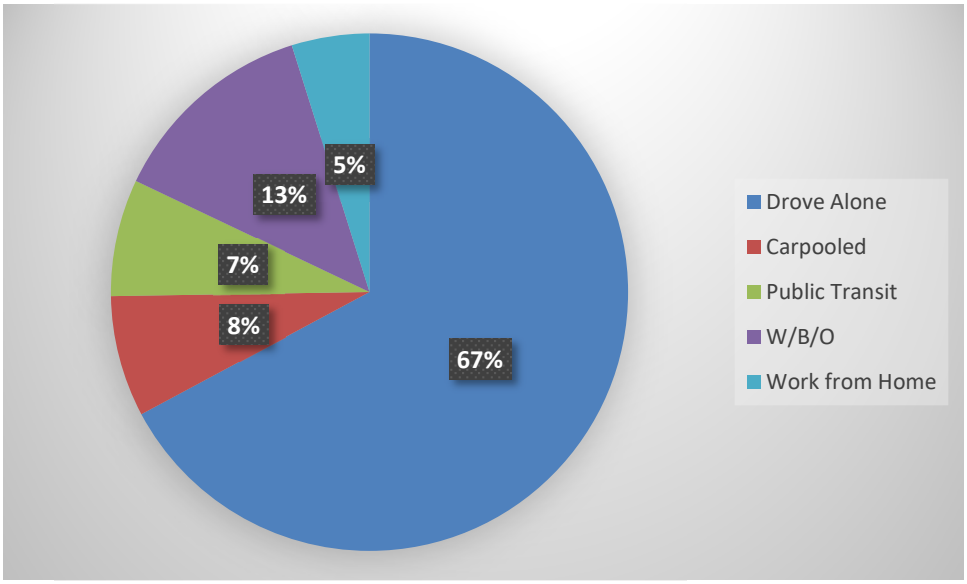


Figure 12 Journey to Work Modes for Renter Occupied Units

As shown on Figure 11 and Figure 12, both owner and renter occupied units have similar drive alone, carpooling, and walk/bike/other trends. The two differ on transit and work from home trends with renter occupied units using transit more and owner-occupied workers tending to work from home more. When considering changes to stops and routing, the journey to work data would support changes and service near multi-family/renter housing units.

Vehicle ownership also plays a role in transit use. Households without access to vehicles or with fewer vehicles than necessary to satisfy the transportation needs of all household members, represent a potential transit-dependent population. Figure 13 summarizes the households by vehicles available for owner and renter occupied units.

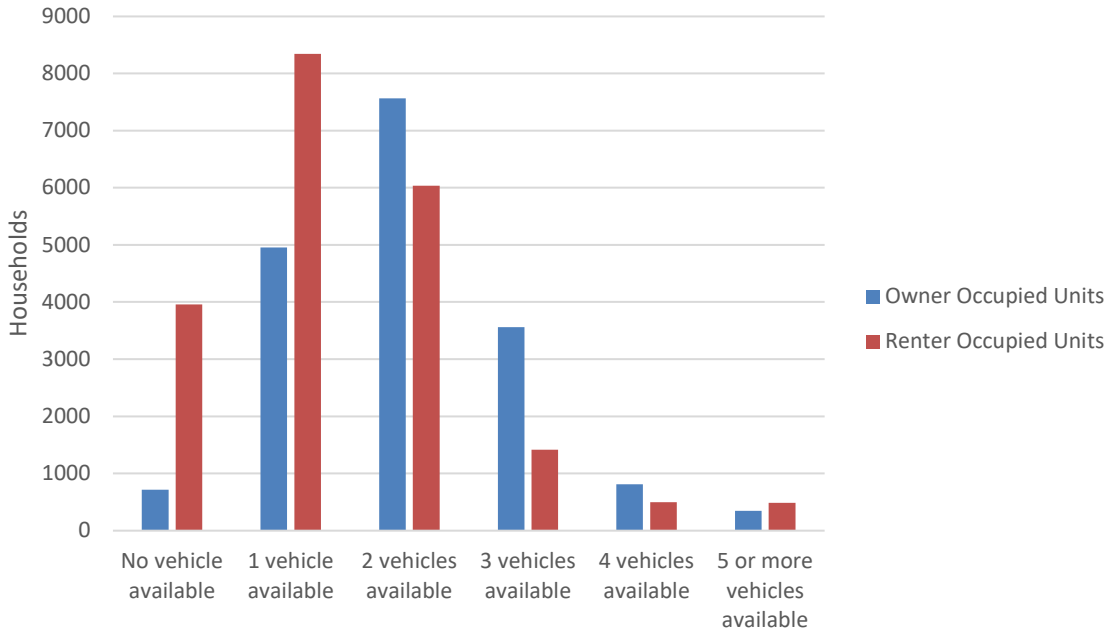


Figure 13 Tenure by Vehicles Available

As shown on Figure 13, for owner occupied units, the majority of households have two vehicles available where renter occupied units have one vehicle available. Additionally, the renter occupied units are far more likely not to own any vehicle at. The vehicle ownership further reinforces that any changes to routes should consider multi-family/renter occupied residential areas which tend to be higher in density and/or the City could consider zoning/rezoning that encourages higher density multifamily development. These multi-family facilities show up as the higher density areas on the existing and forecast land use like along Northwest Avenue south of I-5, north of E Sunset Drive and in Downtown.

Zero vehicle households were also reviewed relative to the Go lines. Ownership data were reviewed within approximately a 10-minute walking distance from the lines. The percent of households with no vehicles relative to the Gold and Green Go Line is shown on Figure 14 and Figure 15 for the Blue Go Line.

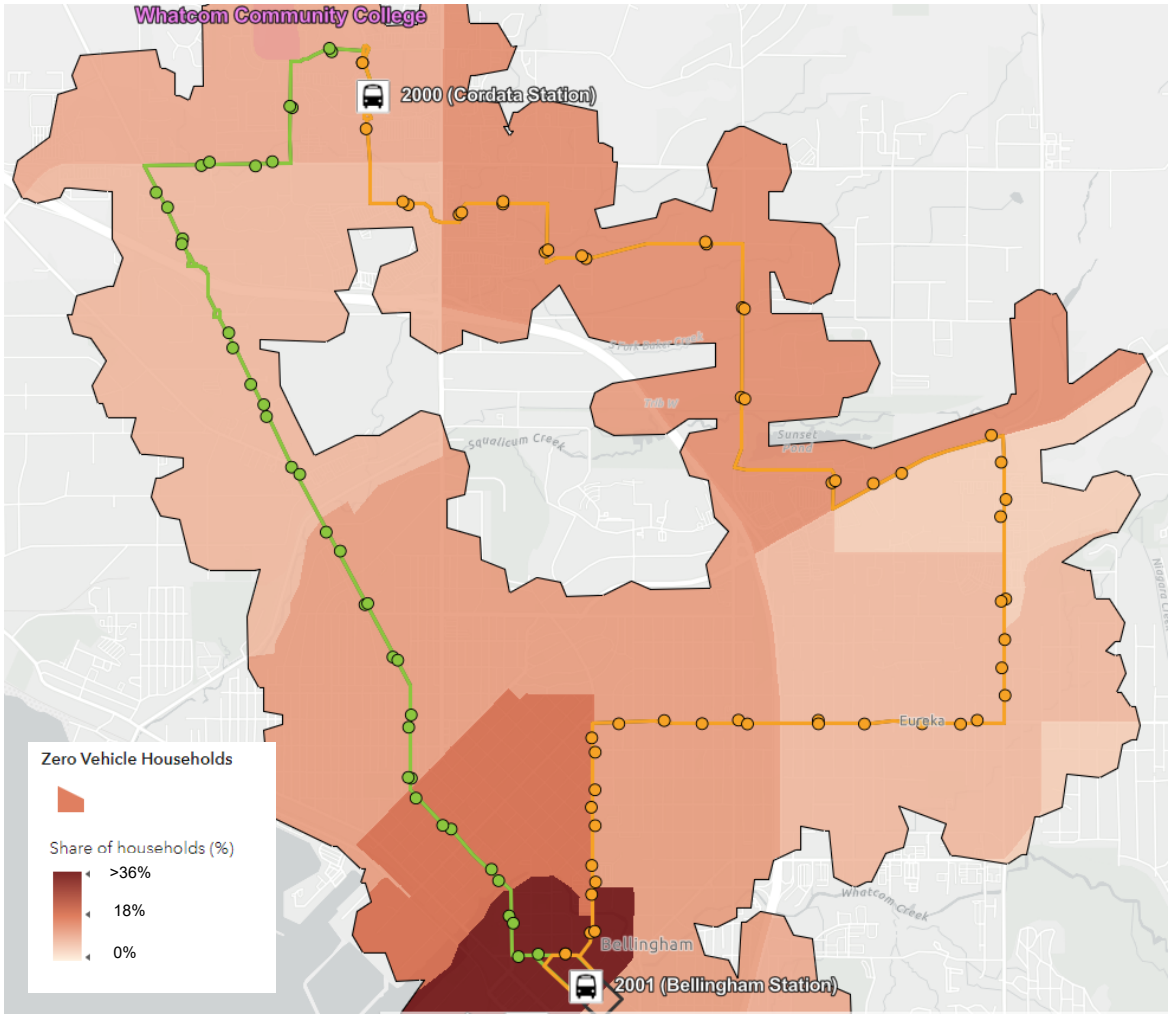


Figure 14 Zero Vehicle Households Proximate to the Gold & Green Go Line (331 & 232)

As shown in Figure 14, the highest percentage of zero vehicle households is in Downtown where it is easiest for residents to walk or access transit to make daily trips.

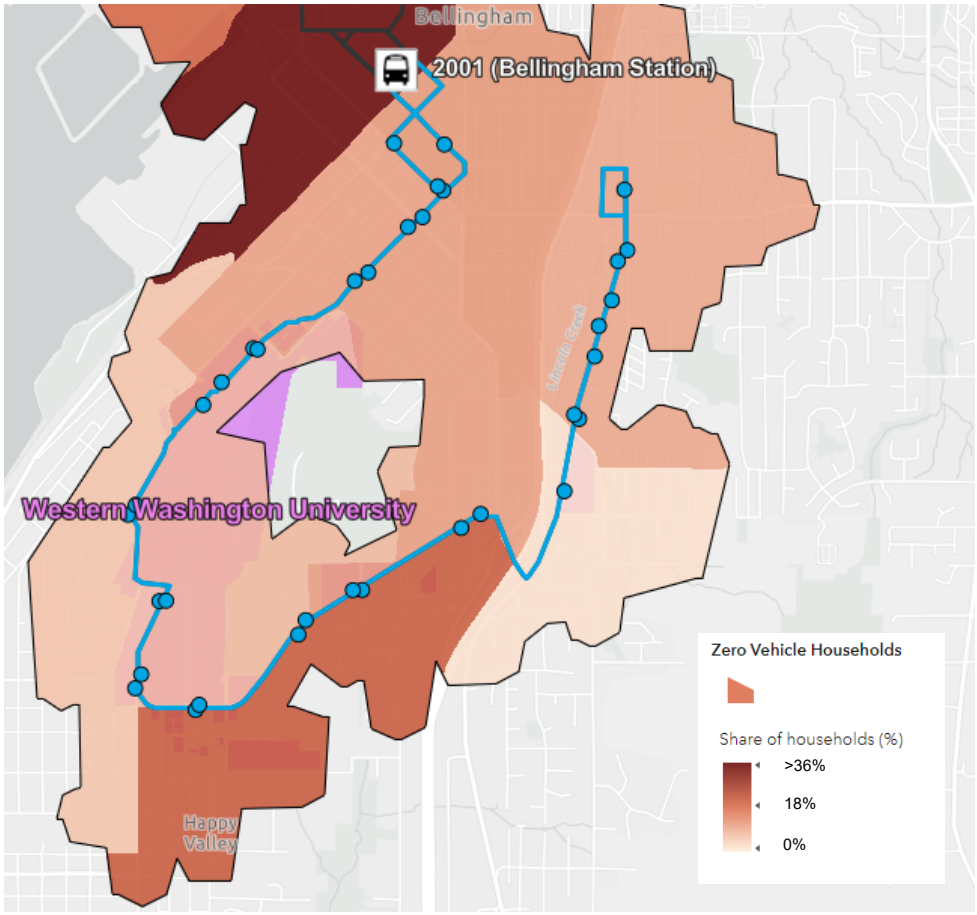


Figure 15 Zero Vehicle Households Proximate to the Blue Go Line (190)

Similar to the Gold and Green Go Lines, the highest zero vehicle households are located in Downtown. For the Blue Go Line, another area with higher zero vehicle households is located at southeast of Western Washington University near higher density housing.

Socioeconomic Characteristics

The following summarize the socioeconomic characteristics along the different routes completed by WTA. The maps highlight areas within ¼-mile of the routes with above average shares of minority, limited English proficiency (LEP), and low-income households, summarized at the Title VI Index. The index compares the share of minorities, LEP, and low-income households within each census block to the service area average.[2] In the following figures a 3 (dark blue) represents a higher share of total Title VI households and white represents areas where the Title VI share is lower than the service area average for the census block. Transit can be a mode of transportation to serve lower income population, which often have limited or no access to vehicles.

Title VI characteristics for the Gold Go Line (331) is summarized in Figure 16, Figure 17 summarizes the characteristics for the Green Go Line (232), and Figure 18 summarizes the Blue Go Line (190).

[2] Each category (minority, LEP, low-income) is scored a 0 or a 1 based on the share of each factor in the census tract with 1 representing a greater share of that population. A score of 3 indicates a census tract with a higher portion of each of the categories.

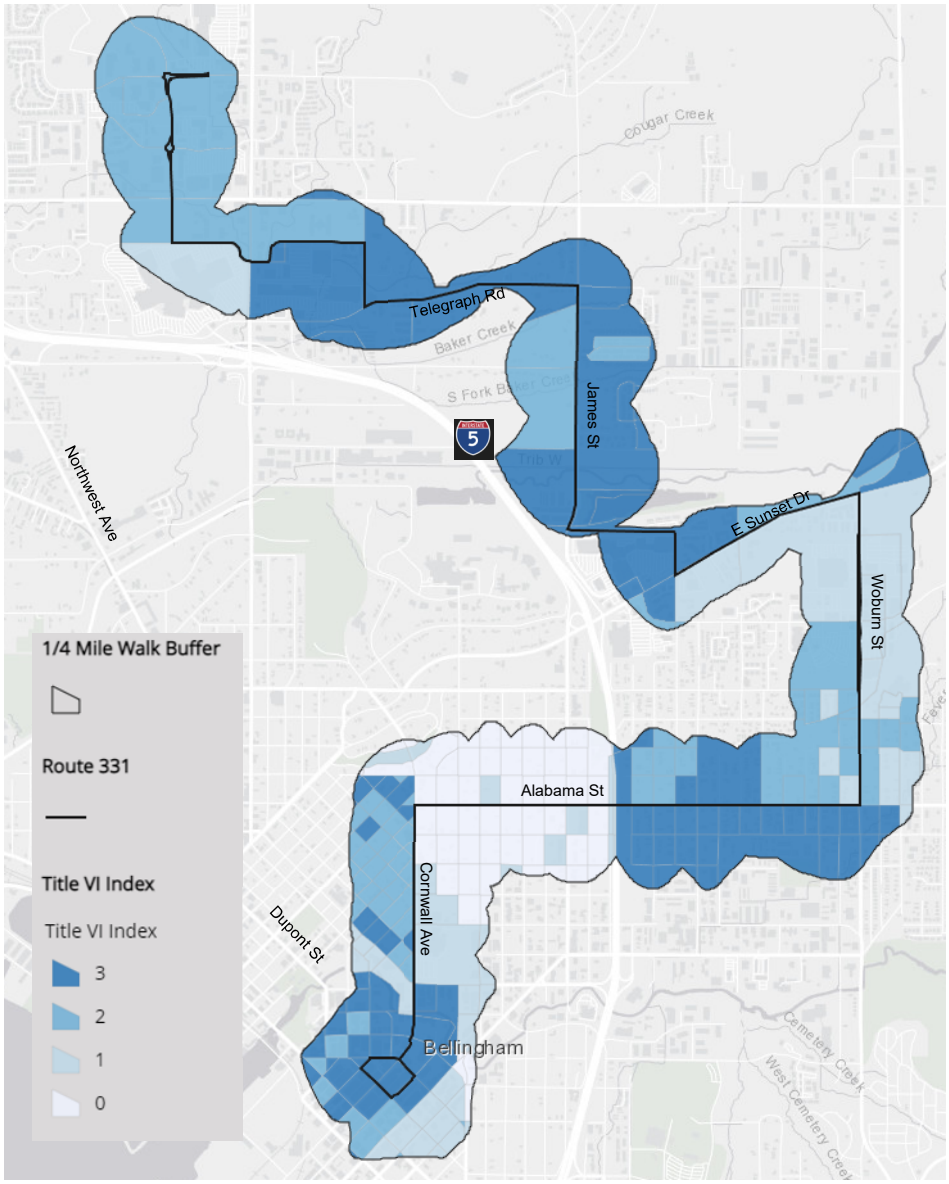


Figure 16 Title VI Census Blocks - Gold Go Line (331)

As shown in Figure 16, the highest concentration of Title IV residents is near Telegraph Road, East of James Street, south of Alabama Street east of I-5, and in Downtown.

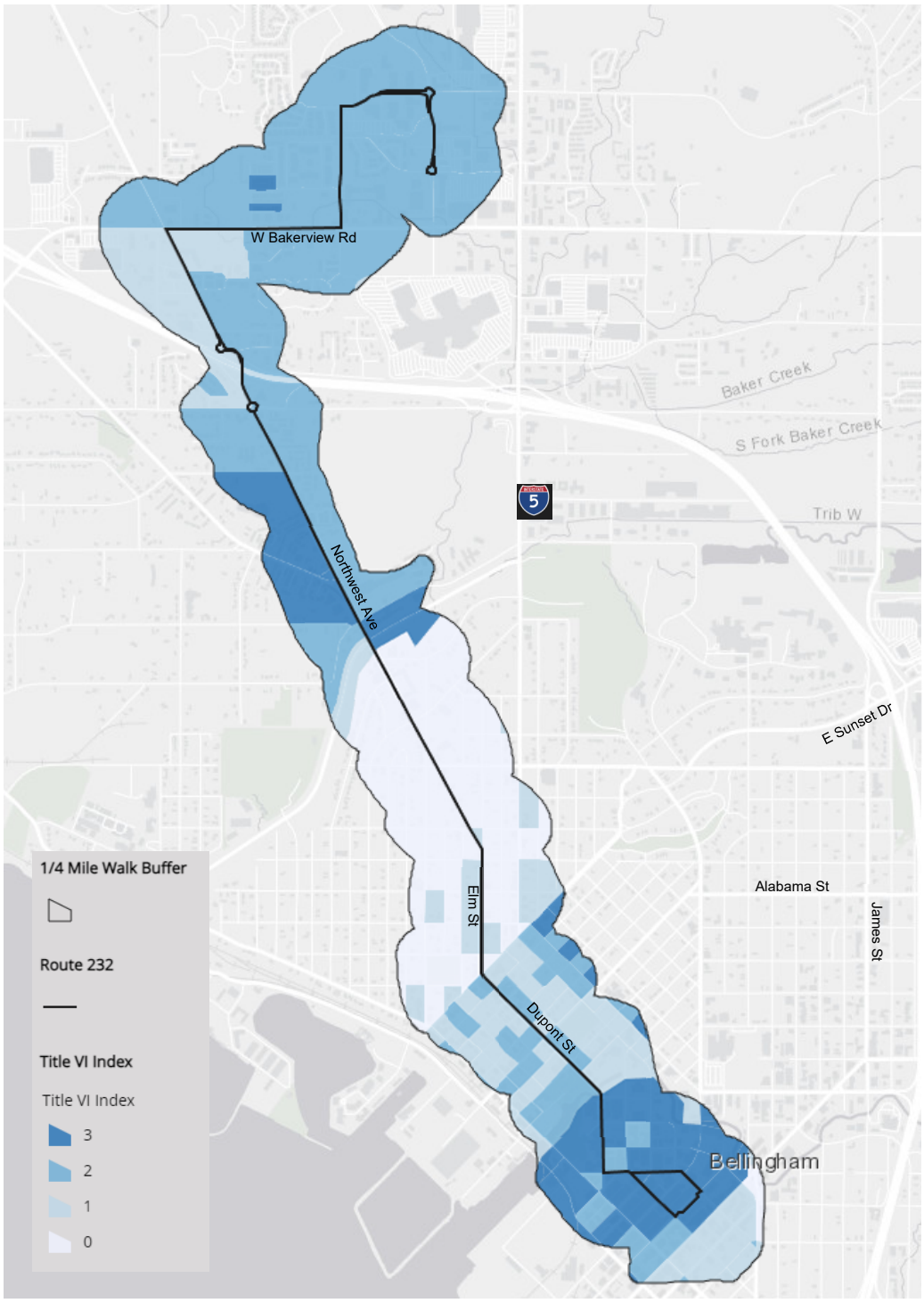


Figure 17 Title VI Census Blocks - Green Go Line (232)

As shown in Figure 17, along the Green Go Line the highest Title VI concentrations are west of Northwest Avenue and in Downtown Bellingham.

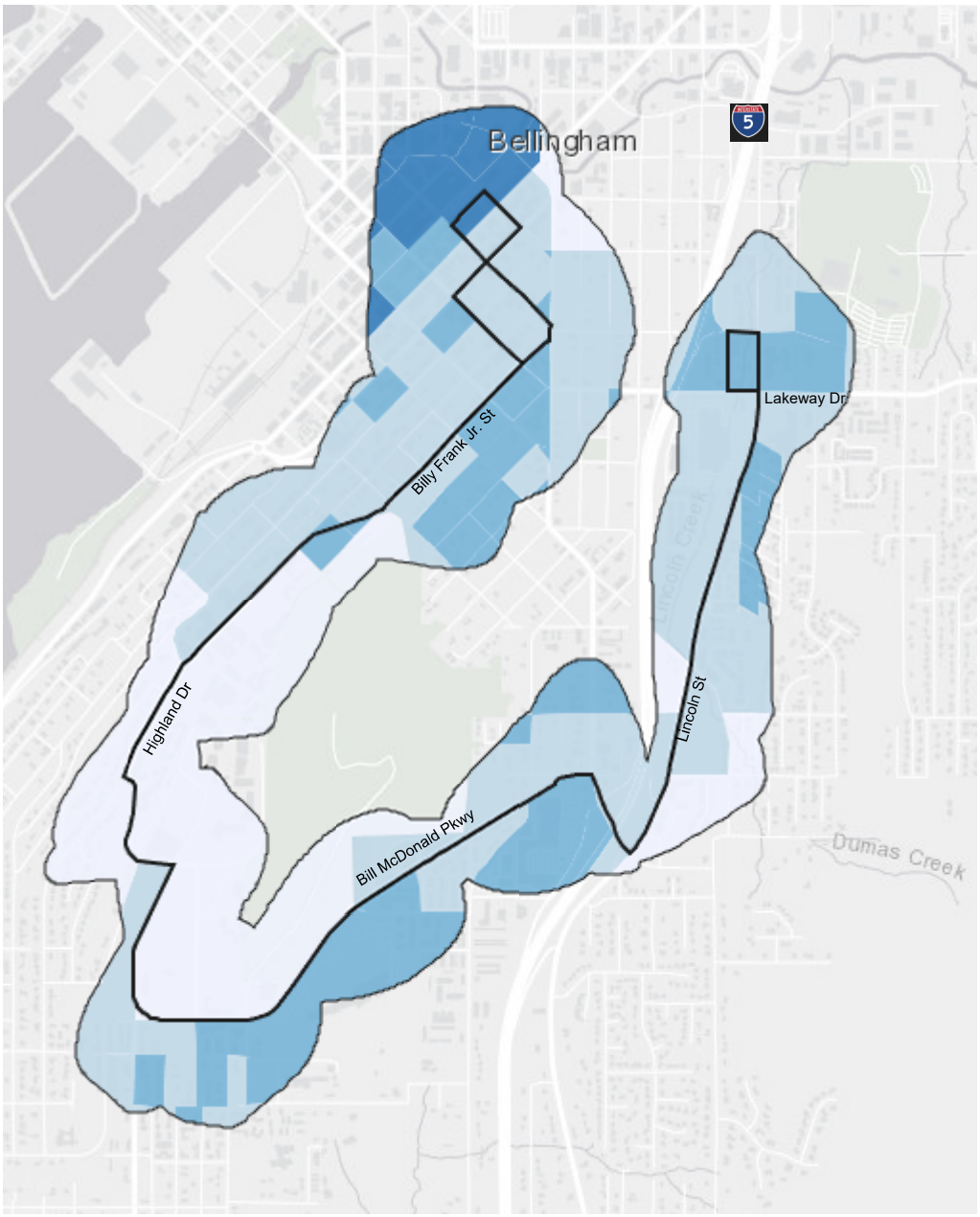


Figure 18 Title VI Census Blocks - Blue Go Line (190)

As shown in Figure 18, the highest Title VI areas are in Downtown with medium concentrations north of Lakeway Drive and south of Bill McDonald Parkway.

Ridership

Existing Gold, Green, and Blue Go Line ridership data were obtained from WTA. The data was reviewed for 2018, 2019 and 2022 conditions. Ridership is approximately 55 percent on average of what it was pre-pandemic across the three Go Lines; however, it is continuing to increase and it is anticipated that ridership will return to the level seen in previous years. Therefore, the 2018 and 2019 ridership levels represent the ridership without the influence of the pandemic.

WTA captures alightings by conducting periodic surveys while boardings are recorded as passengers enter the transit vehicles. Prior to 2020, boardings were only collected at the aggregated level and not by stops unless a survey was conducted. Therefore, only monthly data was available for 2019 while both boardings and alightings were available for 2018 when a survey was conducted. Boardings data is available for 2022 as a survey has not been conducted for alightings.

Transpo reviewed the monthly data from 2019 (before the COVID-19 pandemic) and for the first 5 months of 2022. Figure 19 provides a summary of the monthly boardings for 2019 and 2022 for the Gold Go Line and Figure 20 provides a summary for the Blue and Green Go Lines.

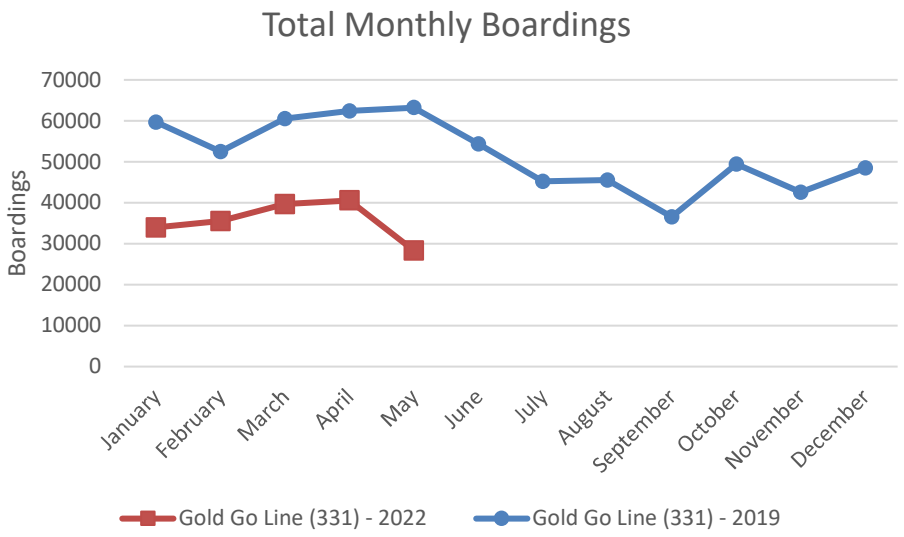


Figure 19 Monthly Ridership – Gold Go Line (331)

As shown on Figure 19, overall ridership was lower in 2022 as compared to 2019 due to the COVID-19 pandemic. The average monthly boardings for the first part of 2022 was over 35,500 boardings for the Gold Go Line. February 2022 represents the median ridership for the first 5 months of the year with February and June representing the median ridership in 2019. The review of 2019 data shows there is a decrease in ridership in the summer, which is due to the colleges and universities enrollment being less during this period.

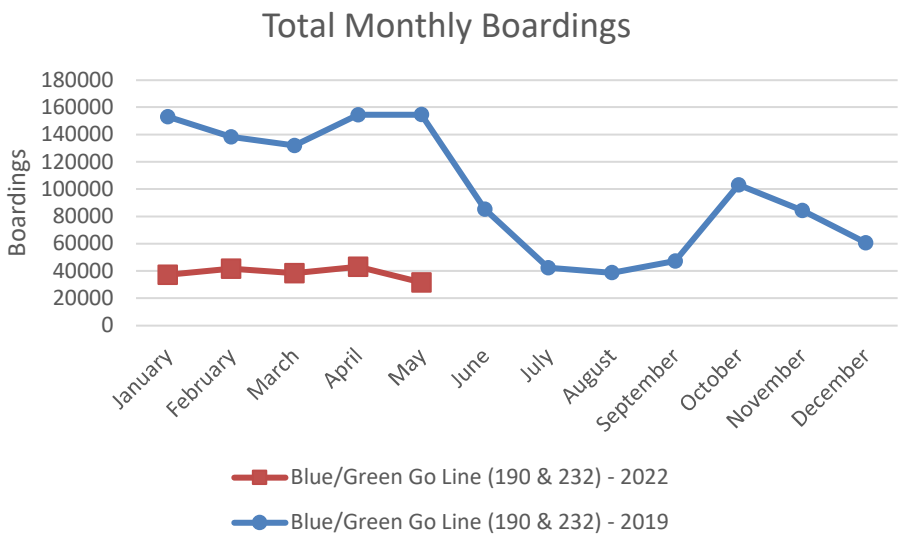


Figure 20 Monthly Ridership – Blue & Green Go Lines (232 & 190)

As shown on Figure 20, similar to the Gold Go Line, the 2022 ridership is down compared to the 2019 data. March 2022 represents the median ridership while in 2019 June represents the median. Similar to the Gold Go Line, ridership decreases in the summer consistent with the lower enrollment at the colleges and universities. The change is ridership is more pronounced for the Blue/Green Go Lines varying from a high of 154,625 to 38,850 boardings since it serves both WWU and WCC and WWU has a higher enrollment change. It is noted that the review of ridership focused on Route 190, which is the alignment that is being considered. The other 100-series routes that also serve these stops result in approximately 35,000 additional boardings in March.

It is noted based on a review of October 2022 data that WTA ridership is increasing and has recovered to around 70 percent.

Monthly Gold Go Line (331)

ridership by stop was reviewed for the median month for 2022. As discussed above, 2022 ridership is down due to the COVID-19 pandemic, but this information is considered to provide a benchmark of existing conditions. The total boardings for February was 35,564 boardings. Not all data recorded with the stop number; however, this represented only 1,300 boardings or less than 4 percent. Figure 21 provides a summary of total monthly boardings at each stop along the Gold Go Line.

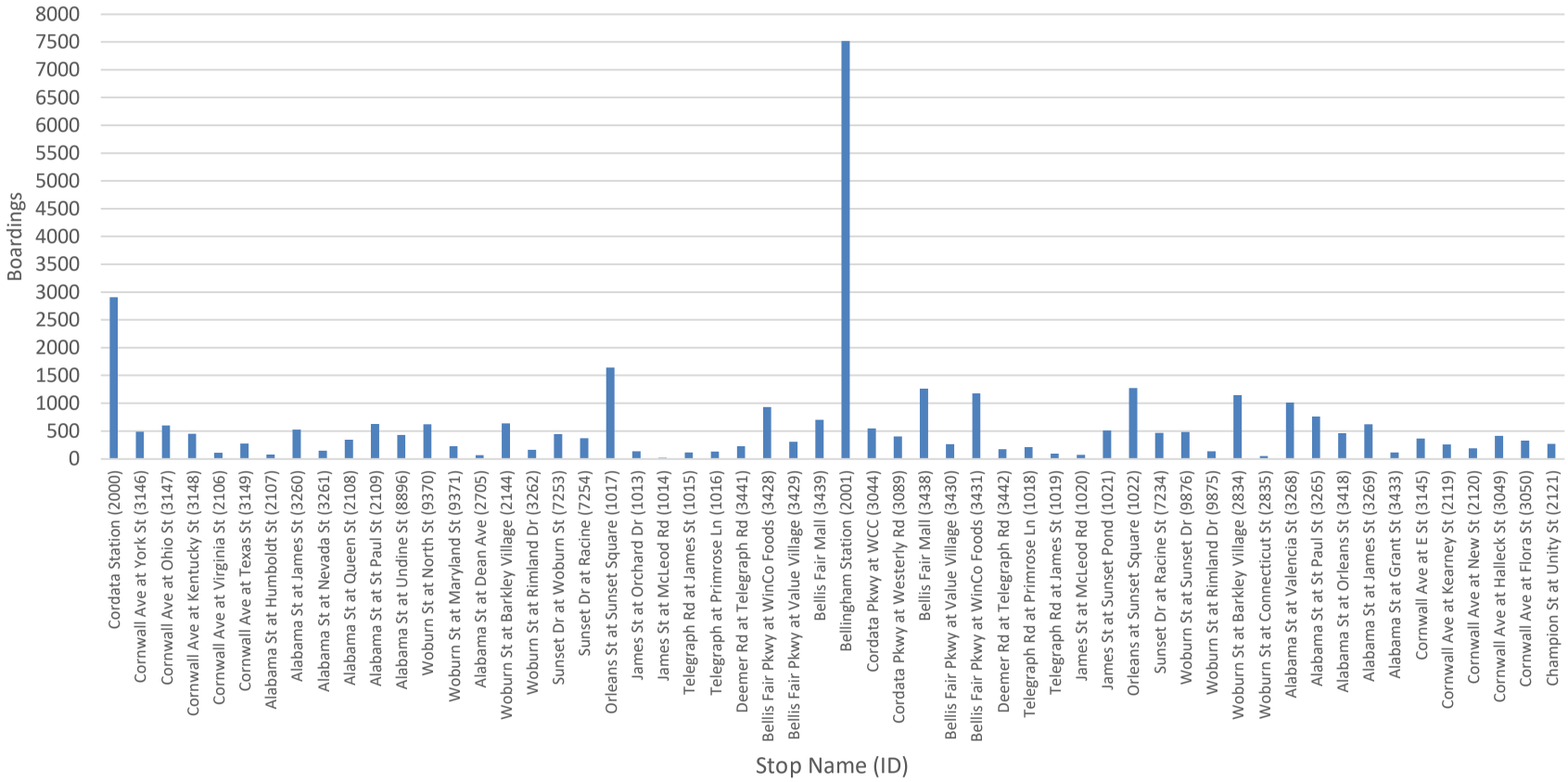


Figure 21 Total Boardings by Stop – February 2022 – Gold Go Line (331)

As shown on Figure 21 the highest number of monthly boardings were at the Cordata and Bellingham Stations. Other stops at over 1,000 total monthly boardings included:

- Alabama Street at Valencia Street (3268)
- Woburn Street at Barkley Village (2834)
- Bellis Fair Parkway at WinCo Foods (3431)
- Bellis Fair Mall (3438)
- Orleans Street at Sunset Square (1017 & 1022)

Stops with less than 100 boardings during the month included:

- James St at McLeod Rd (1014 & 1020)
- Woburn St at Connecticut St (2835)
- Alabama St at Dean Ave (2705)
- Alabama St at Humboldt St (2107)
- Telegraph Rd at James St (1019)

Daily ridership was also reviewed for the route for a typical day in February 2022 and April 2018. April 2018 is when WTA conducted a ridership survey, and the data reflects both boardings and alightings. The 2018 daily ridership is summarized on Figure 22 and Figure 23 shows the 2022 typical day ridership by stop. The review of a typical day ridership helps to understand if stops serve little to no riders and could be considered for elimination or consolidation. Consolidating or eliminating stops with little to no riders can help improve transit speed by minimizing stops that generally do not get used.

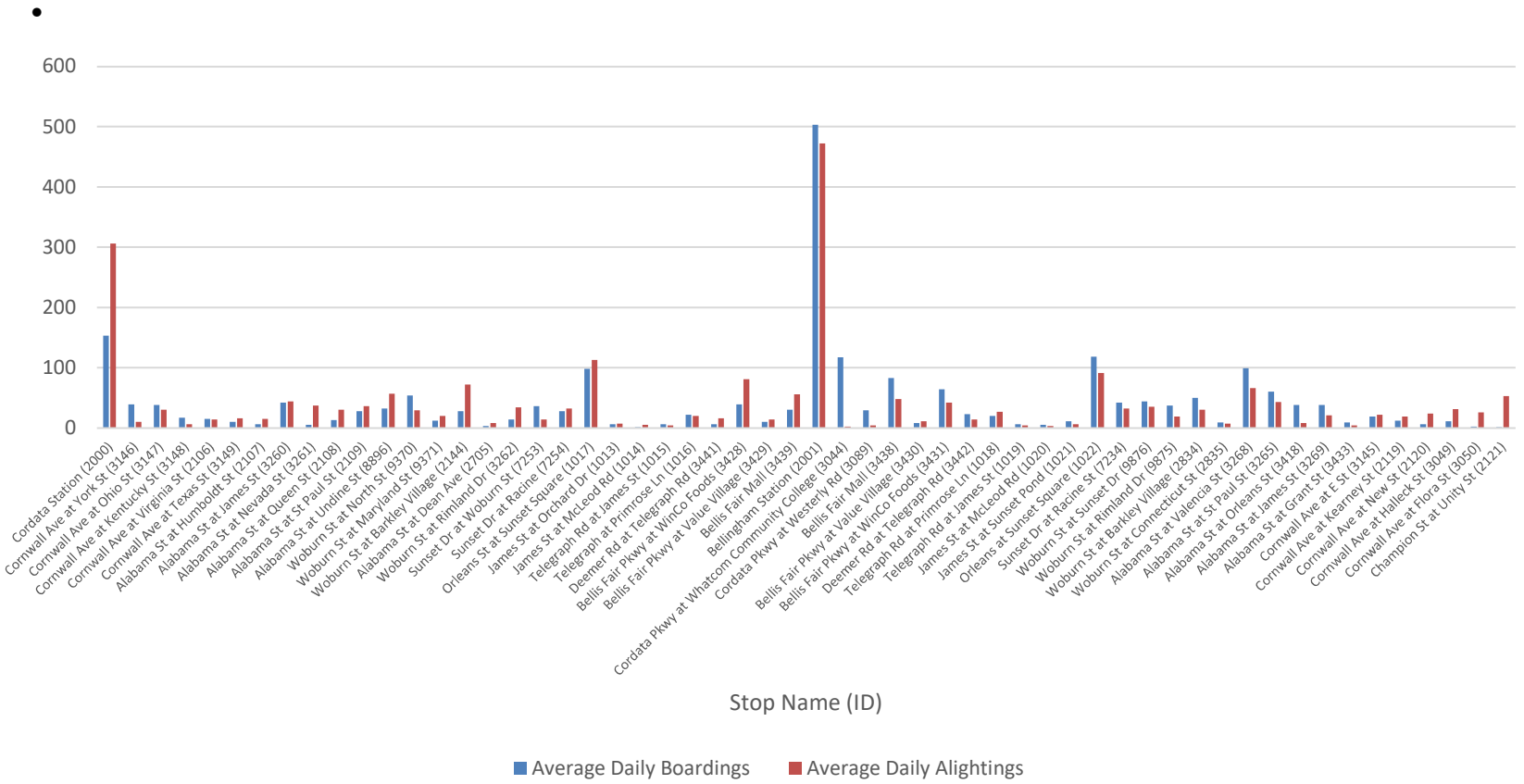


Figure 22 April 2018 Average Weekday Daily Boarding & Alighting Survey Results – Gold Go Line (331)

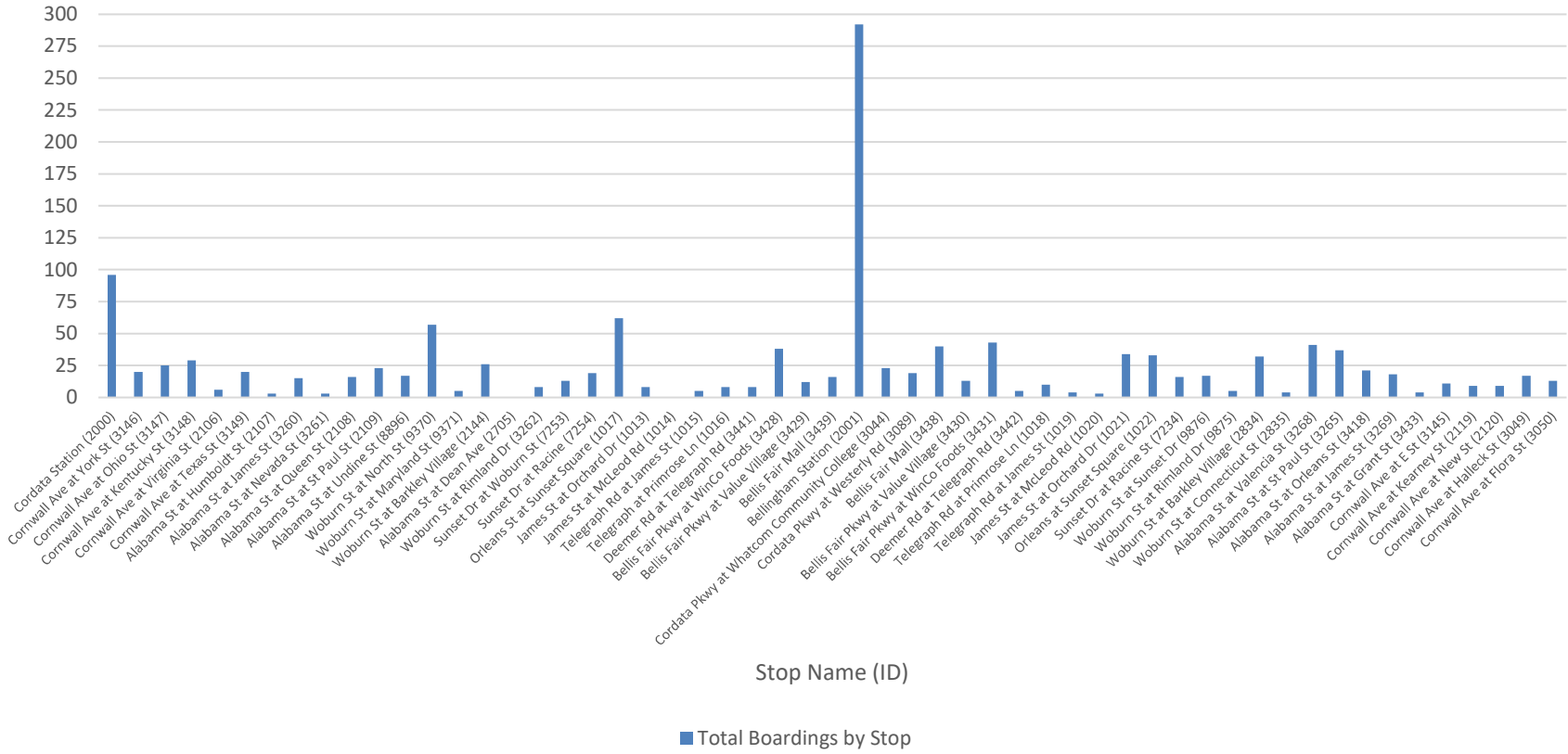


Figure 23 Total Boardings by Stop - Typical Day February 2022 - Gold Go Line (331)

As shown in Figure 22 and Figure 23, consistent with the total monthly boardings the stops representing the highest ridership are the Bellingham and Cordata Stations, as well as Orleans Street at Sunset Square and Woburn Street at North Street.

Some stops had little or no boardings over the course of a day and very low boardings over the month. These stops include:

- James St at McLeod Rd – towards Cordata (1014) – 0 boardings on a typical day and 15 in the month of February. It is noted that there is a lack of sidewalks in this area.
- James St at McLeod Rd towards Downtown (1020) – 3 daily boardings, 68 monthly
- Alabama St at Dean Ave (2705) – 0 boardings on a typical day and 67 in the month of February.
- Woburn St at Connecticut St (2835) – 4 daily boardings, 48 monthly

Additionally, the 2018 boarding and alighting survey showed lower levels of alightings at the intersections listed above with a maximum of 8 alightings. It is important to note that James Street lacks any kind of pedestrian facilities, which severely limits access to existing bus stops. The City has targeted James Street for future pedestrian improvements, which may increase ridership at these stops.

Cornwall also has a series of stops spaced less than 1/8-mile apart, making consolidation in the segment between Ohio and Alabama a feasible option to improve transit speeds. Segments along Alabama and Woburn may likewise benefit from stop consolidation.

Green and Blue Go Line (232 & 190)

For the Green and Blue Go Lines March 2022 represented the median ridership. The total boardings for March was 38,458 boardings. Not all data recorded with the stop number; however, only 552 boardings or less than 2 percent of the boardings is not represented in the data. The data also indicated that occasionally the bus makes stops at locations that are not part of the route. Figure 24 provides a summary of total monthly boardings at each stop along the Green Go Line and Figure 25 summarizes the total monthly boardings by stop for the Blue Go Line.

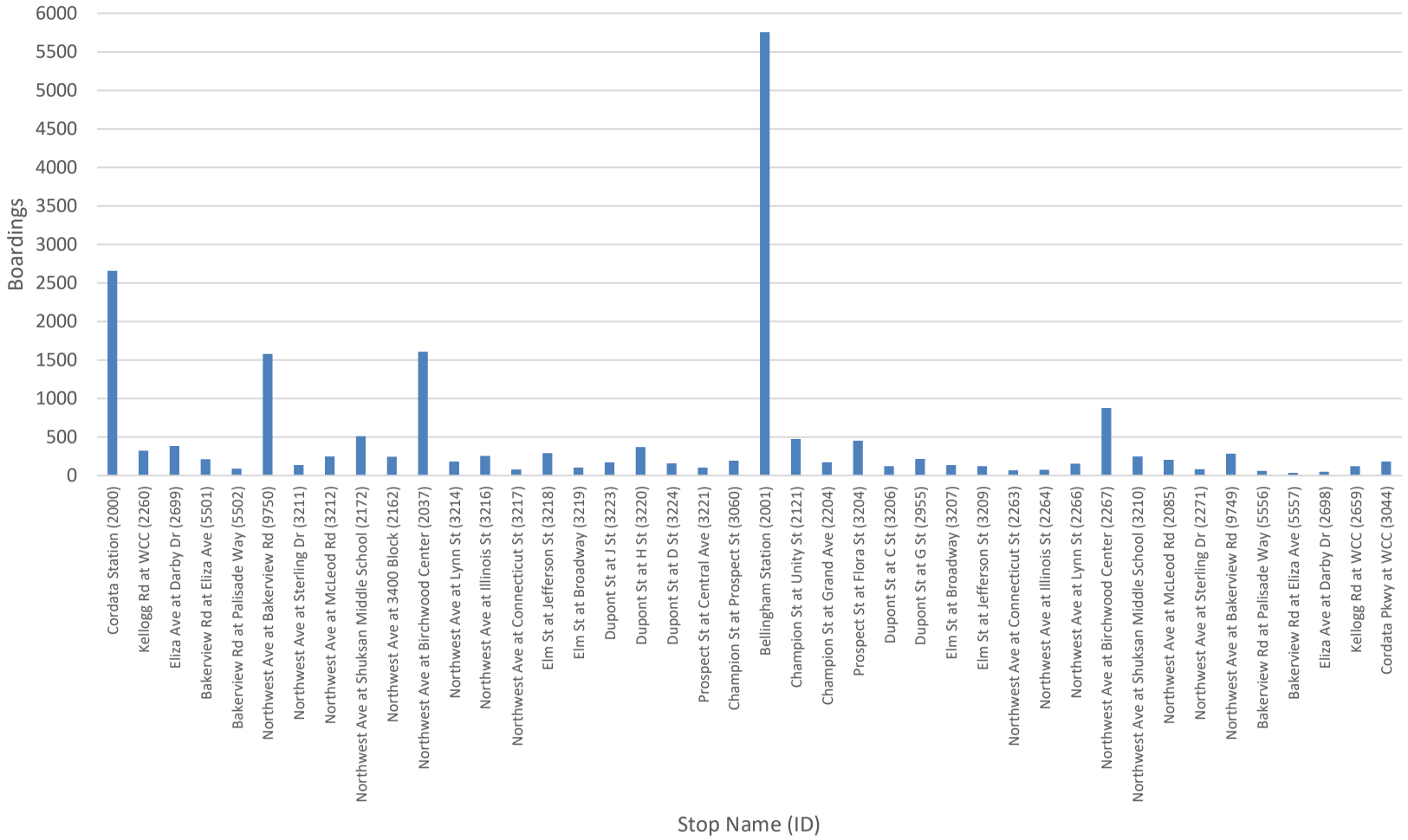


Figure 24 Total Boardings by Stop – March 2022 – Green Go Line (232)

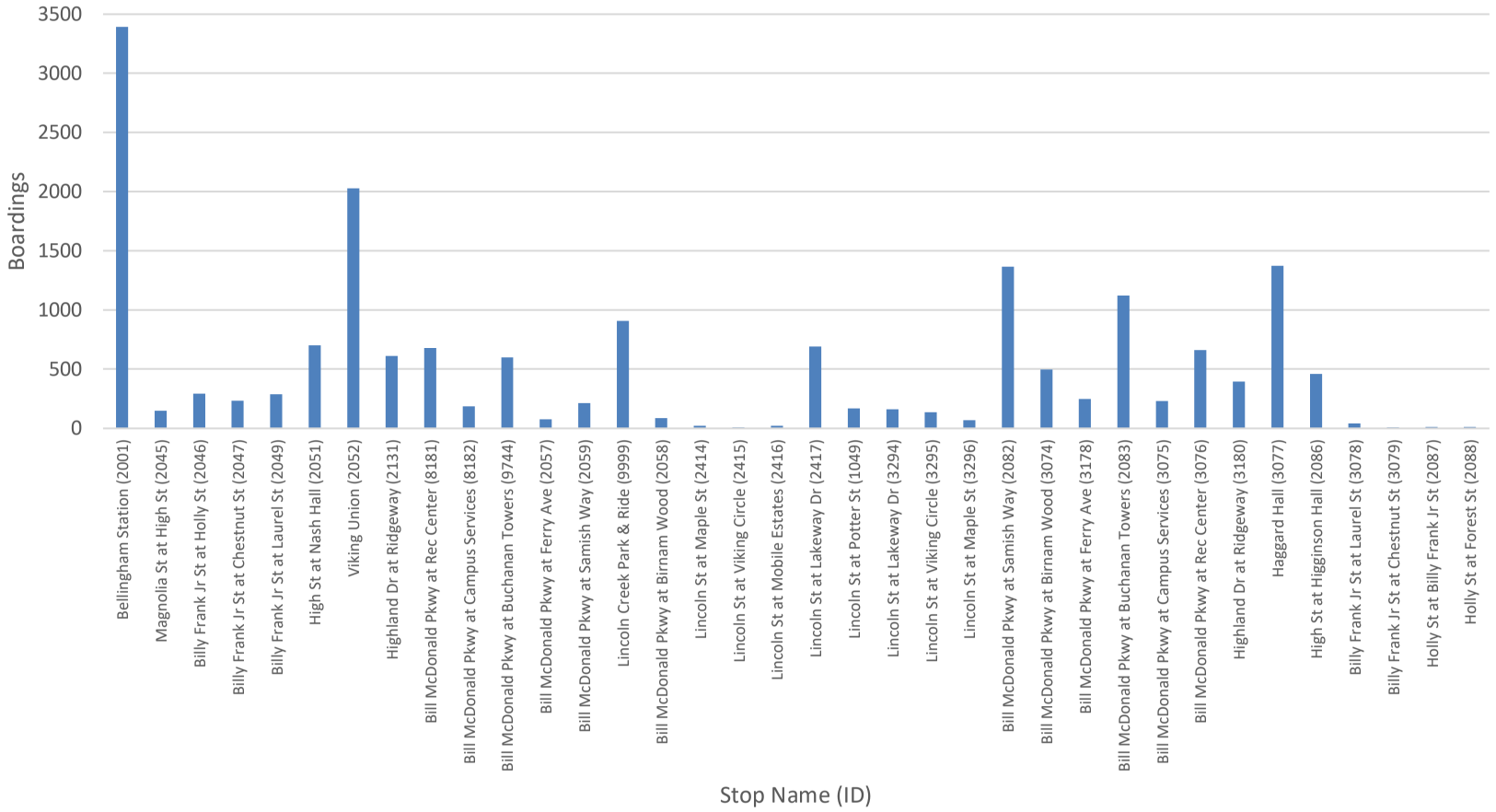


Figure 25 Total Boardings by Stop – March 2022 – Blue Go Line (190)

As shown in Figure 24, the stops with the most total monthly boardings included the Bellingham Station, Cordata Station, Northwest Avenue/Bakerview Road, and Northwest Avenue/Birchwood Center stations. Stops with less than 100 boardings during the month include the following:

- Bakerview Rd at Palisade Way (5502 & 5556)) – There is a potential for a future HAWK signal at this location, which could increase boardings.
- Northwest Ave at Connecticut St (2263 & 3217)
- Northwest Ave at Illinois St (2264)
- Northwest Ave at Sterling Dr (2271)
- Bakerview Rd at Eliza Ave (5557)
- Eliza Ave at Darby Dr (2698)

The stop with the lowest total monthly boardings was the Bakerview Road/Eliza Avenue stop with 36 boardings for the month.

For the Blue Go Line, shown on Figure 25, again the Bellingham Station had the most boardings. The next stations with more than 1,000 total monthly boardings include the following:

- Viking Union (2052)
- Bill McDonald Pkwy at Samish Way (2082)
- Bill McDonald Pkwy at Buchanan Towers (2083)
- Haggard Hall (3077)

Stops with lower boardings during the month of March include:

- Bill McDonald Pkwy at Ferry Ave (2057)
- Bill McDonald Pkwy at Birnam Wood (2058)
- Billy Frank Jr St at Laurel St (3078)
- Billy Frank Jr St at Chestnut St (3079)
- Holly St at Billy Frank Jr St (2087)
- Holly St at Forest St (2088)

Daily ridership was also reviewed for the routes for a typical day in March 2022 and April 2018. For the Green Go Line, the 2018 daily ridership is summarized on Figure 26 and the 2022 typical day ridership by stop is summarized on Figure 27. For the Blue Go Line, the 2018 daily ridership is summarized on Figure 28 and the 2022 typical day ridership by stop is summarized on Figure 29.

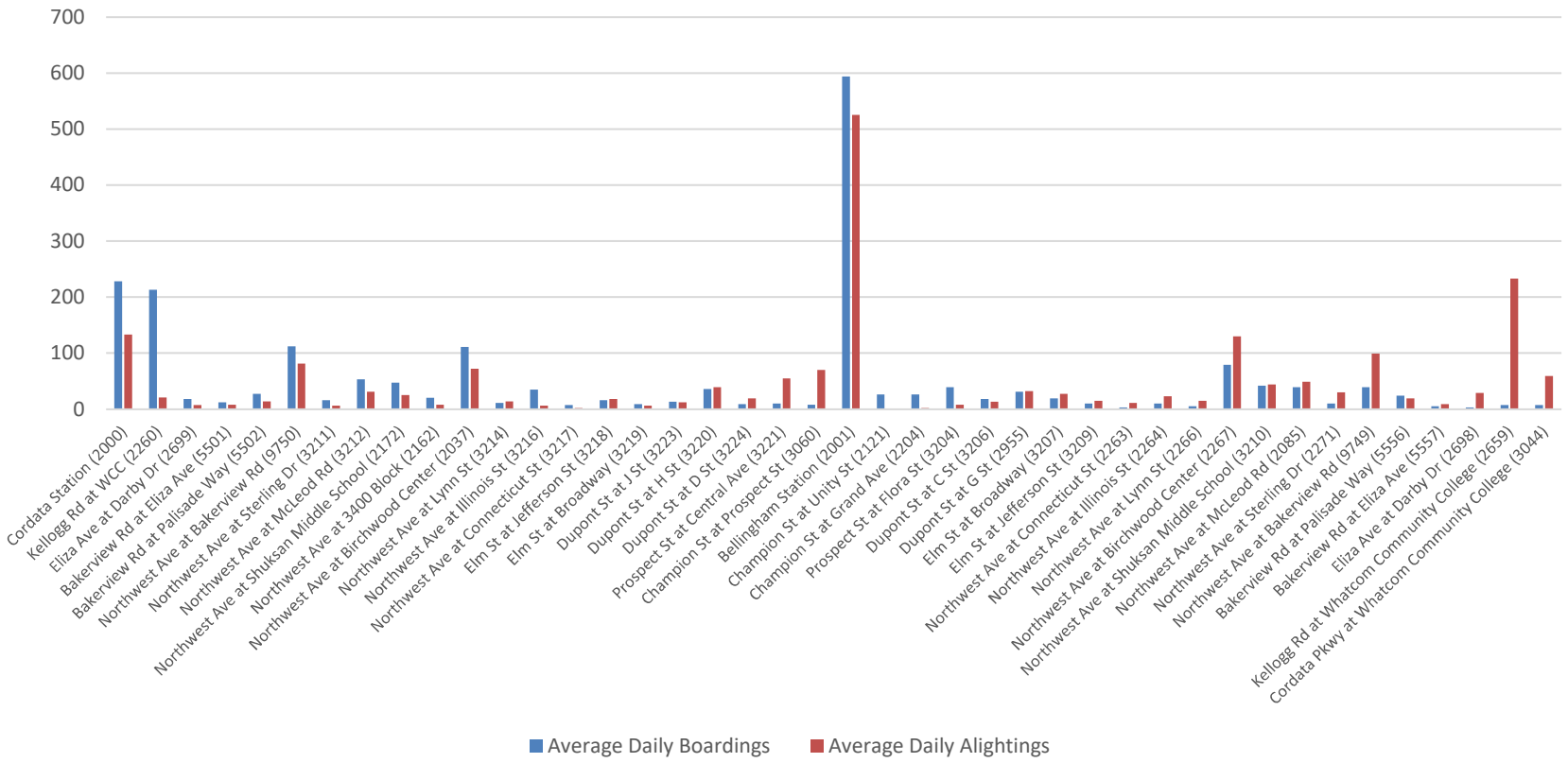


Figure 26 April 2018 Average Weekday Daily Boarding & Alighting Survey Results – Green Go Line (232)

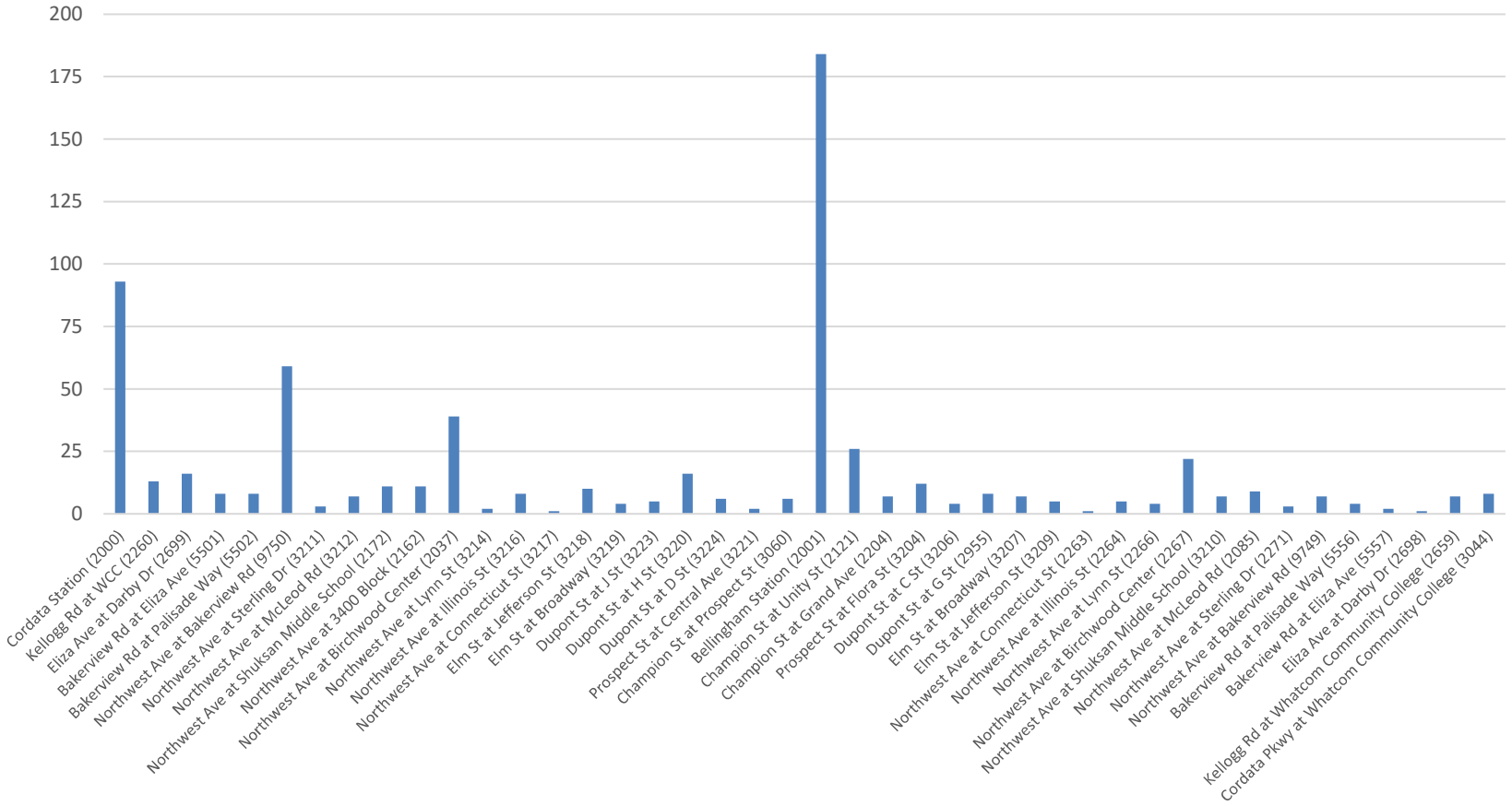


Figure 27 Total Boardings by Stop - Typical Day March 2022 - Green Go Line (232)

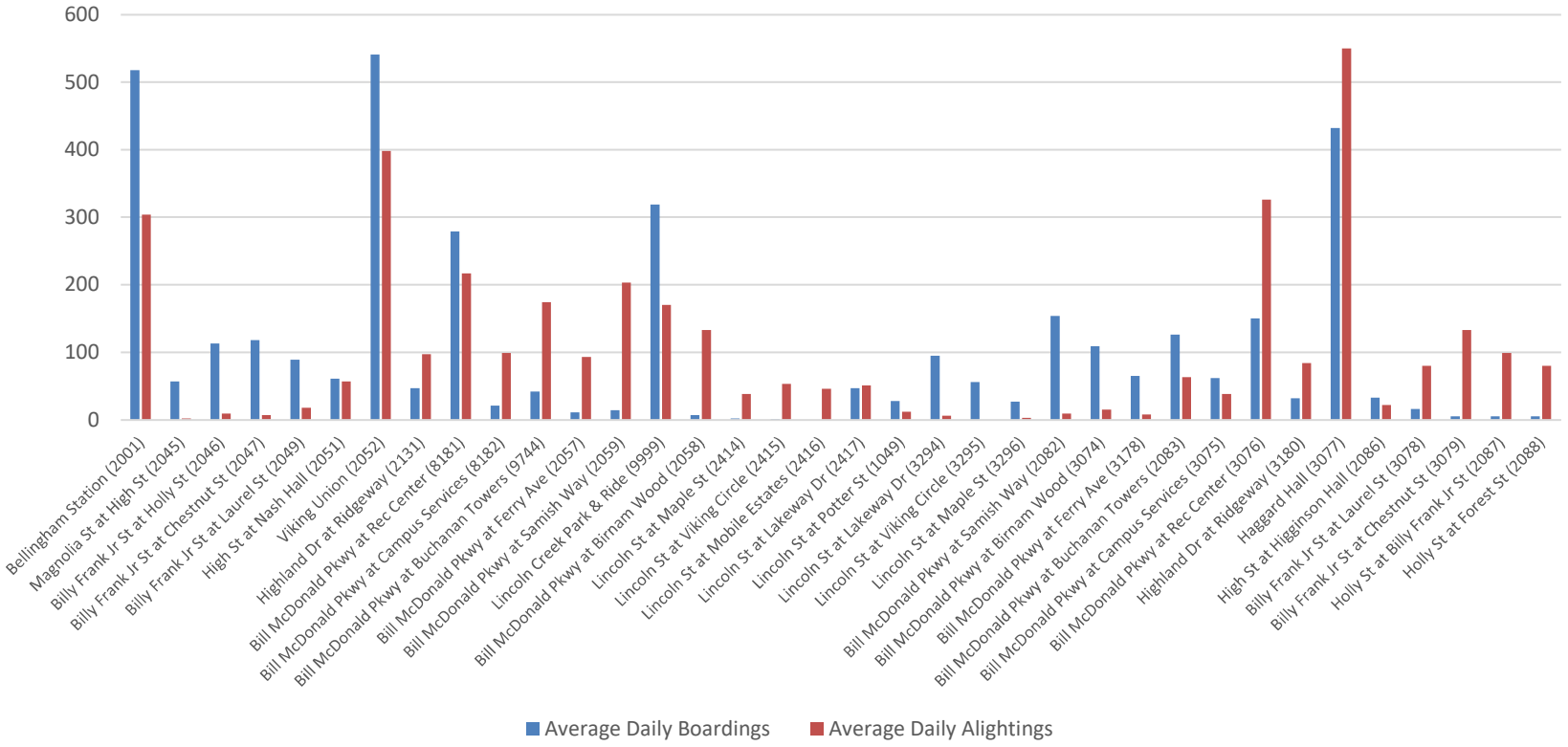


Figure 28 April 2018 Average Weekday Daily Boarding & Alighting Survey Results – Blue Go Line (190)

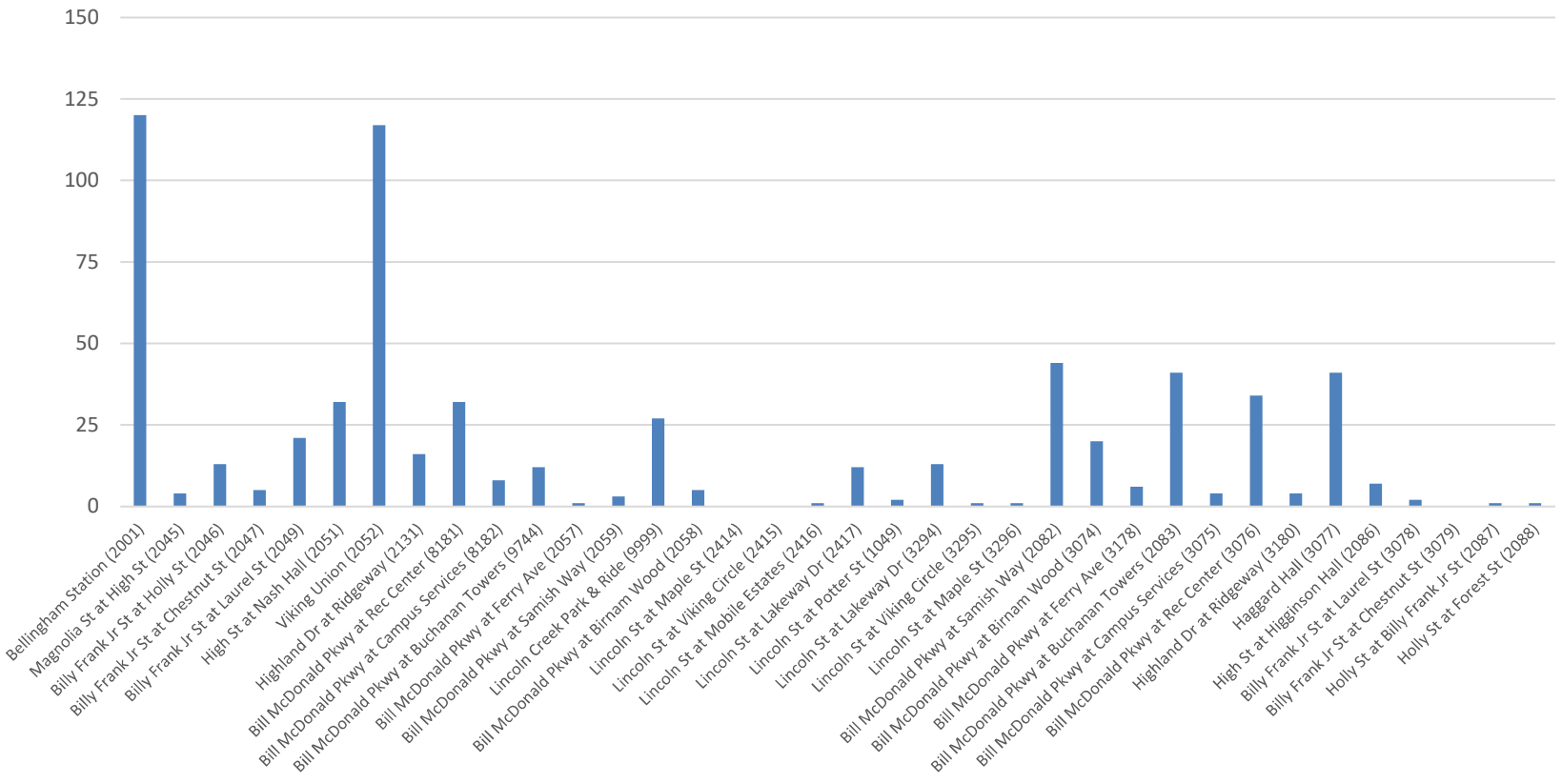


Figure 29 Total Boardings by Stop - Typical Day March 2022 - Blue Go Line (190)

For the Green Go Line, the Cordata and Bellingham stations had the most boardings. Other stops with higher boardings in both years are the Northwest Avenue at Bakerview Road and Northwest Avenue at Birchwood Center stops. From the 2018 data, the Kellogg Road at WCC stop also represents a stop with a high number of alightings. Similar to the Gold Go Line, ridership is down from 2018.

Similar to the other Go Lines, the Bellingham Stations represents the highest ridership for the Blue Go Line. Other stops with higher ridership were the Viking Union and Haggard Hall. The ridership in 2022 is much lower than in 2018, likely representing impacts of the pandemic and utilization of remote learning/working practices. It is noted that as of October 2022 ridership has recovered to around 70 percent.

Along the Green Go Line there were no stops that had zero boardings. Several had low average daily ridership but higher monthly ridership. The four stops with the lowest ridership were:

- Bakerview Rd at Eliza Ave (5557) – 2 daily and 36 monthly boardings
- Eliza Ave at Darby Dr (2698) – 1 daily and 51 monthly boardings
- Bakerview Rd at Palisade Way (5556) – 4 daily and 60 monthly boardings (City has identified potentially installing a HAWK at this location, which could increase pedestrian accessibility and potentially riders.)
- Northwest Ave at Connecticut St (2263) – 1 daily and 68 monthly boardings

The 2018 survey data showed that the stops above had between 9 and 29 alightings.

Some stops along the Blue Go Line had little or no ridership over the course of a day and very low ridership over the month. These stops include:

- Billy Frank Jr St at Chestnut St (3079)
- Holly St at Billy Frank Jr St (2087)
- Holly St at Forest St (2088)

The 2018 boarding and alighting survey showed most of the stops listed above had a higher number of alightings.

It is noted that this review generally focuses on the Route 190 ridership, which is the alignment that is being considered. The other 100-series routes result in an additional 35,000 boardings based on a review of March data.

On-Time Performance

WTA also collects data related to the on-time performance of the buses. WTA considers a bus to be on-time if it arrives at timepoint locations within 5 minutes of scheduled service. The current routes have headways of 15 minutes or more; with Rapid Transit's higher frequency of 10-minutes or less on-time consideration will need to be given to changing the on-time performance standards. Arrival would need to be better than 5 minutes otherwise the transit vehicles may begin to bunch. Based on the current service standard, WTA aims for the AM and Mid-Day time periods to be on time 95 percent or more of the time and during the PM periods for the service to be on-time 90 percent of the time or more.

The on-time performance for the analysis from February for the Gold Go Line is shown on Figure 30. The Green Go Line and Blue Go Line are summarized on Figure 31 and Figure 32, respectively.

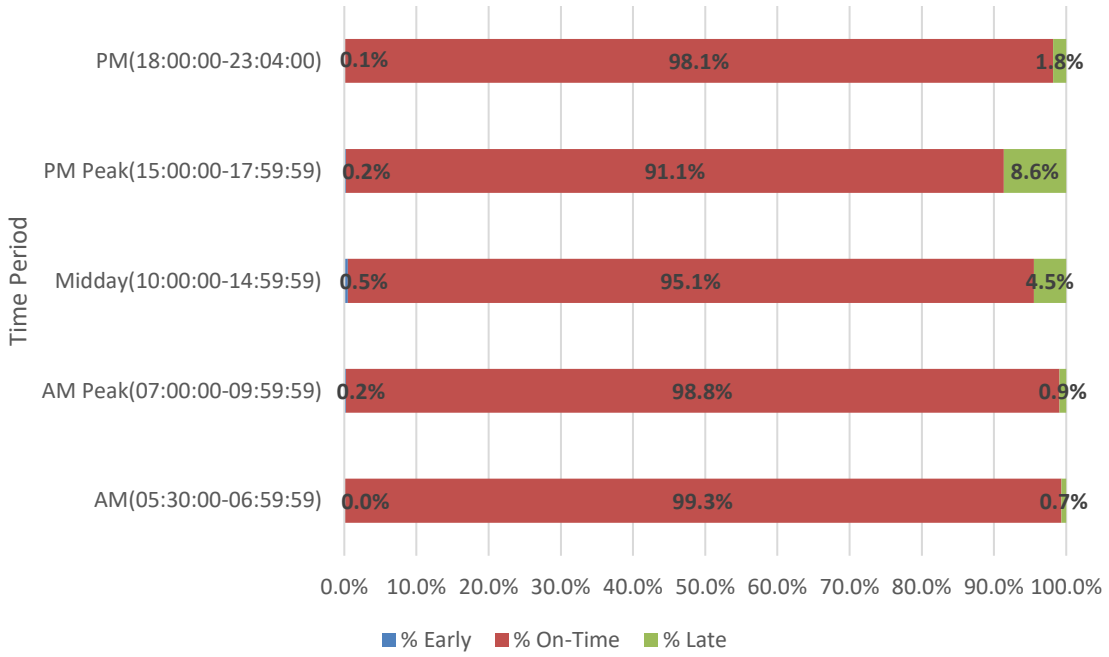


Figure 30 On-Time Performance - Gold Go Line - February 2022

As shown on Figure 30, generally service is on time for the Gold Go Route based on the February 2022. The largest on-time difficulties during the PM commute period between 3 and 6 PM with approximately 9 percent of buses running late, which is also the period with the highest traffic volumes/congestion. The average schedule deviation was 6.3 minutes during the 3 to 6 PM peak period.

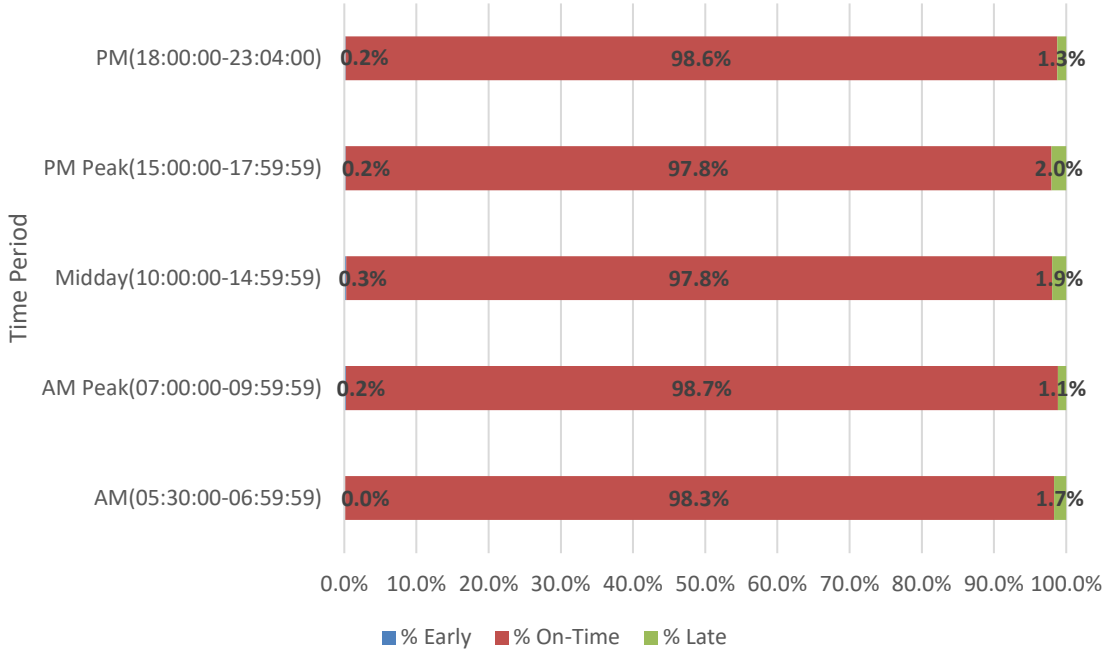


Figure 31 On-Time Performance - Green Go Line - March 2022

As shown on Figure 31, buses along the Green Go Line are on-time over 97 percent of the time. The largest instance of buses running late is during the PM peak period between 3 and 6 PM. All time periods meet the on-time standards.

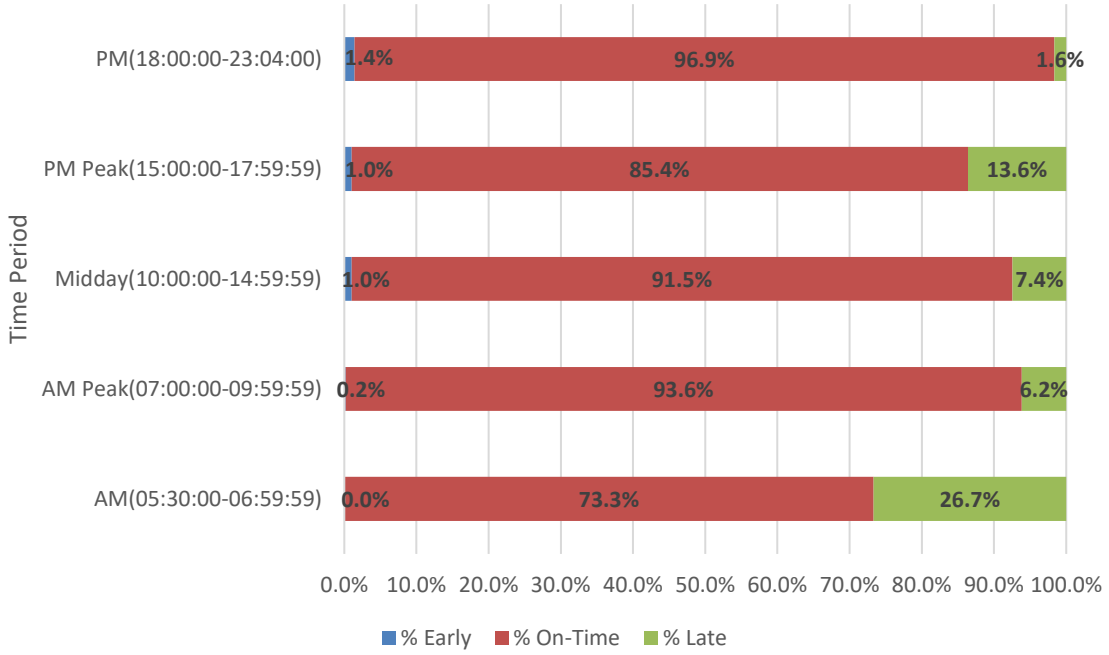


Figure 32 On-Time Performance - Blue Go Line - February 2022

As shown on Figure 32, the Blue Go Line has the largest instances of running late with approximately 27 percent of vehicles late during the AM peak period. . Currently, the only time period meeting the on-time standards is during the PM period between 6 and 11 PM.

A review of on-time performance for October 2022 shows that as traffic is increasing performance for buses is worsening. The percent of buses late has increased since February 2022.

During the AM peak period, the buses ran an average of 6.65 minutes late. Additionally, the majority of delays occurred at the Haggard Hall timepoint. During the 3 to 6 PM peak period, the bus was an average of approximately 6.7 minutes late and occurred at 6 different stop locations. The most frequent timepoint location with late buses was the Lincoln at Lakeway Stop followed by the Haggard Hall stop. Both of these stops are along corridors that experience congestion during the peak commuter periods. Of the late buses, approximately 75 percent were headed toward Downtown. It should be noted that there is a bus signal at the Lincoln Street/Lakeway Drive intersection; however, it is only in the westbound direction. Buses for the Blue Go Line make northbound left-turning (to Lakeway) and southbound through (to WWU) movements at the intersection.

Buses at the Haggard Hall stop could be delayed due to the gate utilized to restrict traffic which results in a one lane road to service buses and service vehicles. The stop is also located between numerous crosswalks. Depending on the time of day and level of pedestrian activity could delay bus movements. The gate and crosswalk locations are shown on Figure 33.

Figure 33 Roadway Leading Up to Haggard Hall Stop

Additionally, as discussed further, there are a number of maneuvers the bus has to make at the turnaround point near the Lincoln Street/Lakeway Drive intersection.

Dwell time at the stops was also reviewed to understand potential issues associated with on-time performance. Bus travel times are impacted to the amount of time spent at a stop or dwell time and delays related to traffic congestion within the corridors. There are a few stops where dwell time was not available and those stops were skipped as part of the analysis. The average weekday peak hour dwell time by stop is summarized on Figure 34 for the Gold Go Line, Figure 35 for the Green Go Line, and Figure 36 for the Blue Go Line.

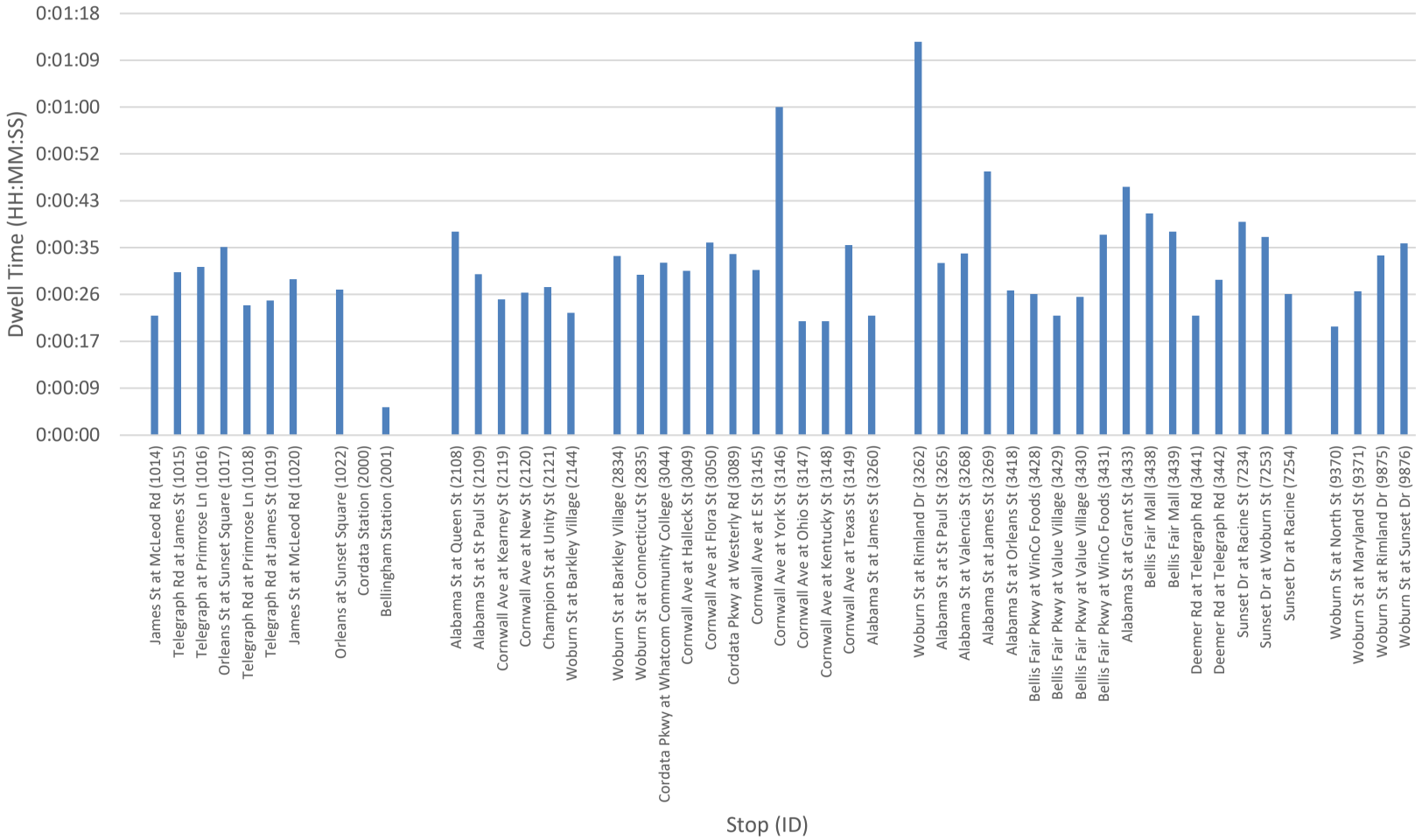


Figure 34 Average Dwell Time - February 2022 - Gold Go Line

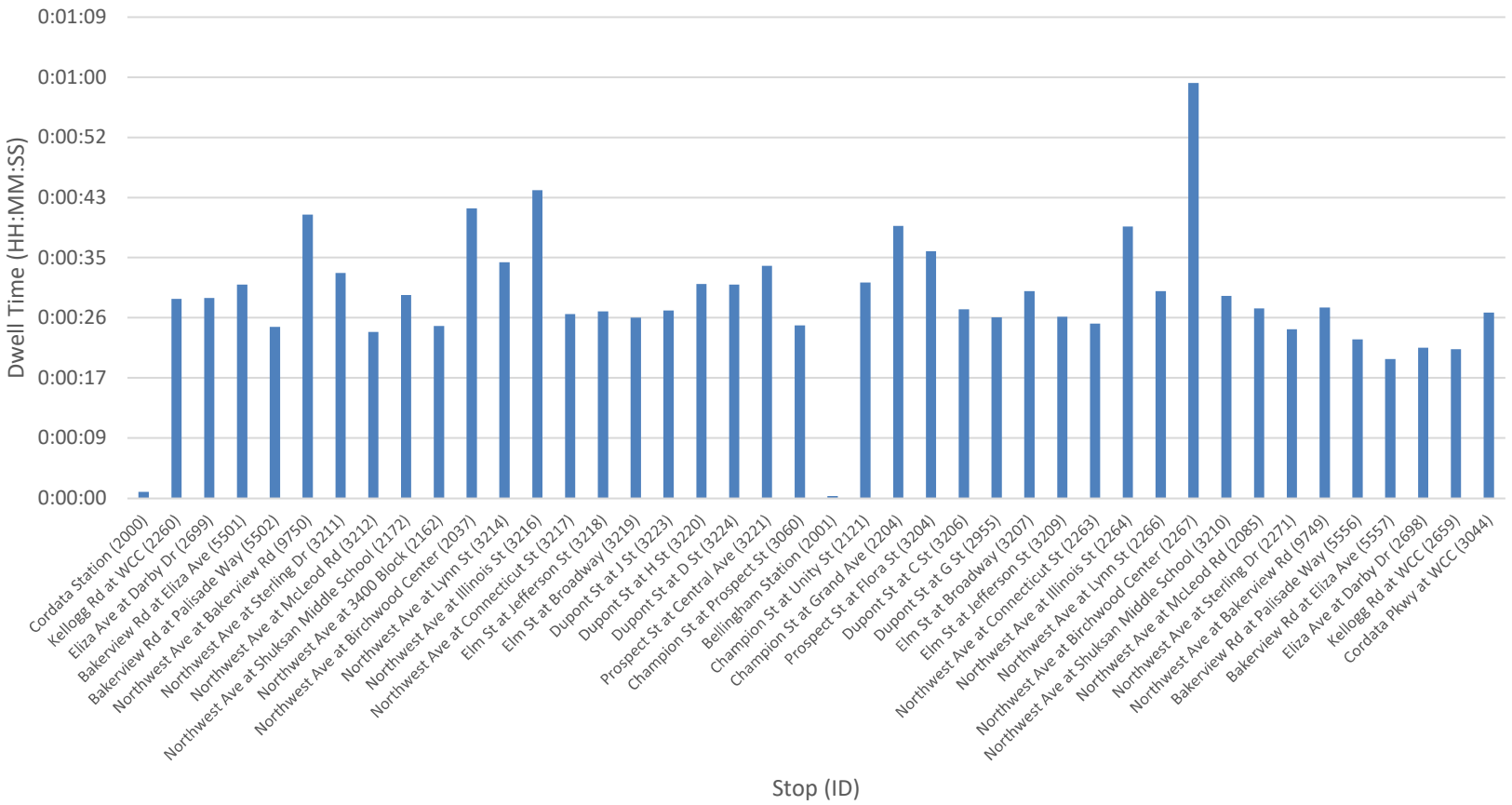


Figure 35 Average Dwell Time - March 2022 - Green Go Line

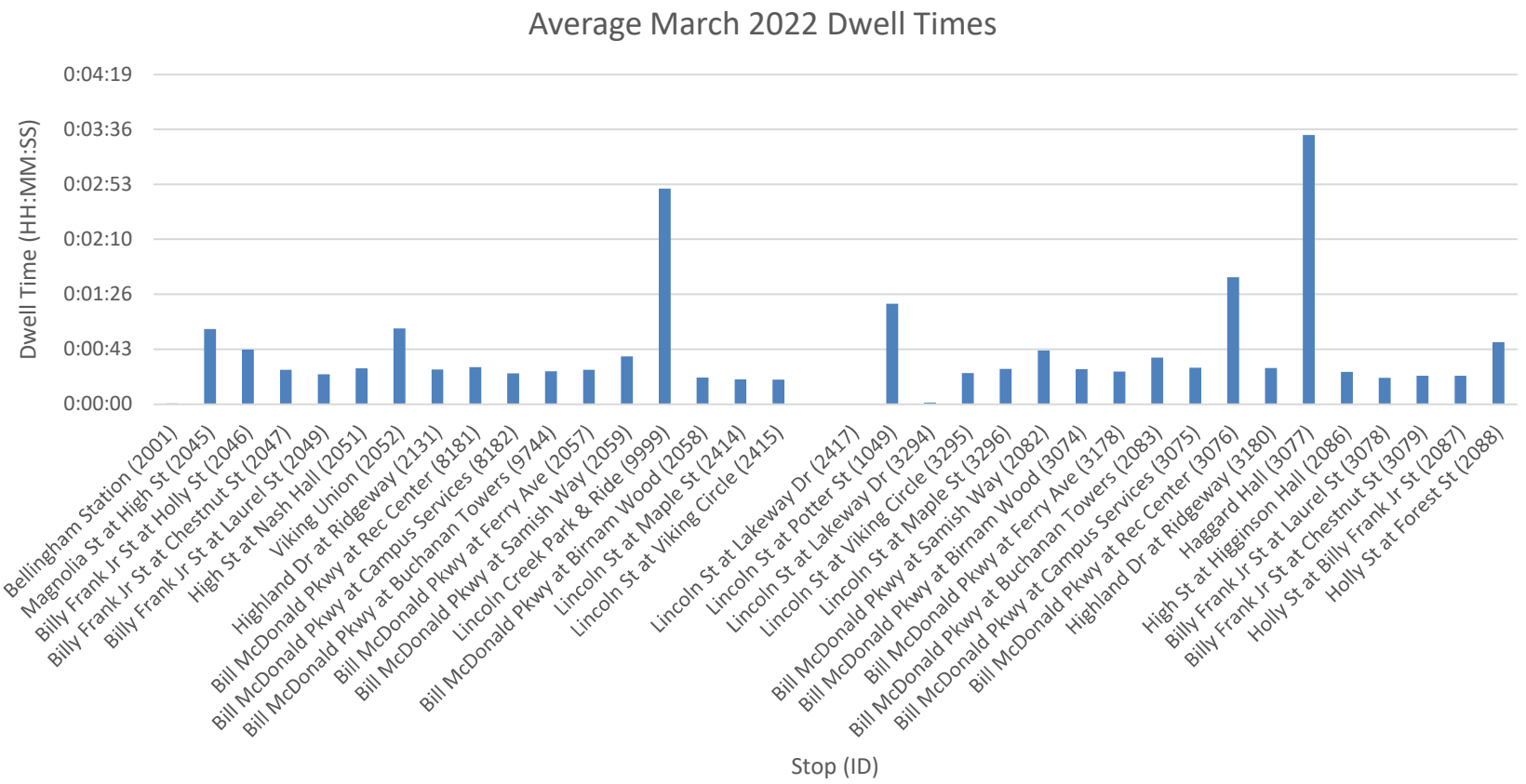


Figure 36 Average Dwell Time - March 2022 - Blue Go Line

On average dwell times at stops are short at 30 seconds or less for the Gold and Green Go Line. Average dwell times for the Blue Go Line were longer at 40 seconds. As shown on Figure 34, the longest dwell times along the Gold Go Line are at the Cornwall Avenue at York Street and Woburn Street at Rimland Drive with average dwell times at or over 1 minute. The Cornwall/ York stop has slightly more than the median monthly ridership and the Woburn/Rimland stop has less than the median monthly ridership. Additional stops with dwell times over 30 seconds include the following stops:

- Telegraph at Primrose Ln (1016)
- Orleans St at Sunset Square (1017)
- Alabama St at Queen St (2108)
- Woburn St at Barkley Village (2834)
- Cordata Pkwy at Whatcom Community College (3044)
- Cornwall Ave at Flora St (3050)
- Cordata Pkwy at Westerly Rd (3089)
- Cornwall Ave at Texas St (3149)
- Woburn St at Rimland Dr (3262)
- Alabama St at St Paul St (3265)
- Alabama St at Valencia St (3268)
- Alabama St at James St (3269)
- Bellis Fair Pkwy at WinCo Foods (3431)
- Alabama St at Grant St (3433)
- Bellis Fair Mall (3438)
- Bellis Fair Mall (3439)
- Sunset Dr at Racine St (7234)
- Sunset Dr at Woburn St (7253)
- Woburn St at Sunset Dr (9876)

As shown on Figure 35, the longest average dwell time for the Green Go Line was at the Northwest Avenue at Birchwood Center Stop at approximately 1 minute and does represent some of the higher ridership for the line. Additional stops with dwell times over 30 seconds include the following stops:

- Bakerview Rd at Eliza Ave (5501)
- Northwest Ave at Bakerview Rd (9750)
- Northwest Ave at Sterling Dr (3211)
- Northwest Ave at Lynn St (3214)
- Northwest Ave at Illinois St (3216)
- Dupont St at H St (3220)
- Dupont St at D St (3224)
- Prospect St at Central Ave (3221)
- Champion St at Unity St (2121)
- Champion St at Grand Ave (2204)
- Prospect St at Flora St (3204)
- Northwest Ave at Illinois St (2264)

As shown in Figure 36, the longest dwell times along the Blue Go Line include the Lincoln Creek Park and Ride and Haggard Hall. Average dwell time at these two stops were over two minutes and three minutes, respectively. Both of these stops have some of the highest ridership along the lines. Some of the higher dwell times are related to riders having to sometimes move off the bus to allow fpassengers to get on or off. Additional stops with dwell times over 30 seconds include the following stops:

- Magnolia St at High St (2045)
- Billy Frank Jr St at Holly St (2046)
- Viking Union (2052)
- Bill McDonald Pkwy at Samish Way (2059)
- Lincoln St at Potter St (1049)
- Bill McDonald Pkwy at Samish Way (2082)
- Bill McDonald Pkwy at Buchanan Towers (2083)
- Bill McDonald Pkwy at Rec Center (3076)
- Holly St at Forest St (2088)

Based on field observations, performance analysis, and coordination with WTA staff, buses experience delays and difficulties maneuvering at several locations along the routes. These operational issues can impact travel time. Key locations include:

Woburn Street/Alabama Street Southbound Direction. The southbound right-turn lane has limited storage and the southbound through-lane backs up beyond the start of the right-turn pocket. The intersection currently operations at LOS D during the weekday AM and PM peak hours. During the AM peak hour, the average southbound queue is approximately 350 feet with a 95th percentile queue length of approximately 450 feet. During the PM peak hour, the average queue length is approximately 375 feet with a 95th percentile queue of approximately 525 feet. The distance between the southbound through stop bar at Alabama and the next adjacent intersection (Woburn Street/E North Street) is approximately 415 feet indicating that during the peak commute periods the vehicles are queueing close to or past the next intersection. The queuing for the southbound through movement can result in delays for the bus wishing to make a right-turn.

Lincoln Street/Lakeway Drive. The evaluation of the on-time performance shows that Lincoln Street Lakeway Drive stands out as a potential problem area for the buses. The Lincoln Street area was also identified as an on-time performance issue area in the Lincoln-Lakeway Multimodal Transportation Study.[3] For the Blue Go Line (190) the routing requires a number of maneuvers for the bus as shown on Figure 37 including short merging segments and turns. During the PM peak hour, the Lincoln Street/Lakeway Drive intersection operates at LOS D. However, many of the maneuvers for the bus routing at Lakeway Drive experience longer delays and may experience peak period queuing issues. Table 7 provides a summary of the intersection operations and queueing following the bus route near the Lincoln Street/Lakeway Drive intersection.

Figure 37 Lincoln Street/Lakeway Drive Bus Routing

[3] *Lincoln-Lakeway Multimodal Transportation Study,* Transpo Group, October 2021

Table 7. Existing Weekday PM Peak Hour LOS and Queuing Summary – Lincoln St/Lakeway Dr				
	Intersection Operations		Queue Lengths[3]	
Intersection & Movement	LOS[1]	Delay[2]	Average	95th Percentile
Lincoln Street/Lakeway Drive	D	44	-	-
Northbound Left-Turn	E	69	175	350
Northbound Through	F	81	225	450
Southbound Through-Right	F	105	**250**	500
King Street/Lakeway Drive	C	34	-	-
Westbound Through-Right	C	23	125	150
Lincoln Street/Potter Street	D	27	-	-
Eastbound	D	27	-	50

Notes: queue lengths in **bold**, volume exceeds capacity, queue is theoretically infinite. Queue lengths in red, 95th percentile volume exceeds capacity, queue may be longer. Queue lengths in gray, volume for 95th percentile queue is metered by an upstream signal.
1. Level of Service (A – F) as defined by the *Highway Capacity Manual* (TRB, 2016)
2. Average delay per vehicle in seconds
3. Queue length in feet rounded to the nearest 25 feet

As shown in Table 7, there are several movements where the bus could experience delays over 1 minute. The current routing through this intersection is resulting in on-time performance issues for the Blue Go Line.

Existing and future LOS was also reviewed at approximately 70 locations to understand where other key congestion points may be for the Gold, Green and Blue Lines. The following intersections current operate at LOS E or F during the weekday PM peak hour:

- Lincoln Street/E Maple Street – A traffic signal is planned at this location for 2023 such that this should not be a congestion point for transit.
- Lincoln Street/Bryon Avenue
- Nevada Street/Lakeway Drive
- Orleans Street/Lakeway Drive
- Lincoln Street/Fraser Street
- King Street/Potter Street/I-5 NB Ramps
- James Street/E Sunset Drive
- I-5 NB Ramps/E Sunset Drive
- Woburn Street/E Illinois Street

Without improvements, the intersection above will continue to operate at LOS E or F given projected increases in traffic. Along with the intersections above, the following additional intersections are anticipated to operate at LOS E or F during the weekday PM peak hour under 2040 conditions:

- N Samish Way/Abbott Street
- S Samish Way/I-5 NB Off-Ramp
- Lincoln Street/Lakeway Drive
- I-5 SB Ramps/Lakeway Drive
- James Street/Meador Avenue
- Lincoln Street/Potter Street

- Ellis Street/N Forest Street/York Street
- 36th Street/I-5 SB On-Ramp/Fielding Avenue
- King Street/Lakeway Drive
- Woburn Street/Yew Street/Lakeway Drive
- Northwest Drive/W Bakerview Road

These locations currently are or will be congestion points for WTA without additonal improvements. Based on coordination with WTA, some other key congestion areas are Bellis Fair Parkway at Meridian and Sunset at Orleans for the Gold Line and High Street between Oak and Campus Way and Bill McDonald and Lincoln Street for the Blue Line.

Key Findings

The following provides a summary of the key findings for consideration in development of alternatives for the Rapid Transit Study.

- **Gold Go Line Roadway Characteristics.** Route 331 travels primarily on James Street, Woburn Street, Alabama Street and Cornwall Avenue. In addition, the route travels along a number of other roadways and makes numerous turns between the Cordata and Bellingham Stations, which could impact on-time performance and transit safety. The route provides service to 58 stops. The Woburn Street/Alabama Street intersection as well as along Bellis Fair Parkway and E Sunset are a key problem area for this route.
- **Green and Blue Go Line Roadway Characteristics.** Route 190 provides service primarily along Billy Frank Jr. Street, High Street, Billy McDonald Parkway and Lincoln Street. Route 232 travels along primarily Northwest Avenue, Elm Street and Dupont Street. The Blue and Green Go Lines combined provide service to 64 stops. Along with the Woburn Street/Alabama Street intersection, the Lincoln Street/Lakeway Drive intersection, High Street between Oak and Campus Way, and the road segments from Bill McDonald to Lincoln Street are a key problem areas for this study route.
- **Traffic Signals.** Transit signal priority (TSP) should be considered overuse of signal preemption.
- **Bus Stops.** The majority of stops are ADA accessible and have signage available noting the stop location. Over half of the stops have a bench, shelter, and concrete pad. Less than half of the stops have a power connection.
- **Land Use and Population Characteristics.** A review of the job/housing balance along the routes shows connections between dense housing and employment areas. To serve these areas, the routing is circuitous and makes frequent turning maneuvers. The land use patterns for the future are similar to existing conditions with increases in housing and employment densities. A review of the census data indicates that between 67 and 70 percent of people commute to work driving alone. The data also indicate that renter occupied housing is more likely to utilize transit and to not own a vehicle. The highest rates of no vehicle homes are in Downtown.
- **Ridership.** There are a number of closely spaced stops with little to no ridership that should be considered for elimination or consolidation.
- **On-Time Performance.** Based on current on-time performance metrics the Gold and Green Go Lines meet on-time performance criteria. The Blue Go Line does not meet all on-time performance criteria. With frequent transit and the decrease in headways of the service, consideration should be given to the measure of the on-time performance and when a bus is

considered late or early. There are a number of intersections where congestion and queuing can contribute to bus delays.

Next Steps

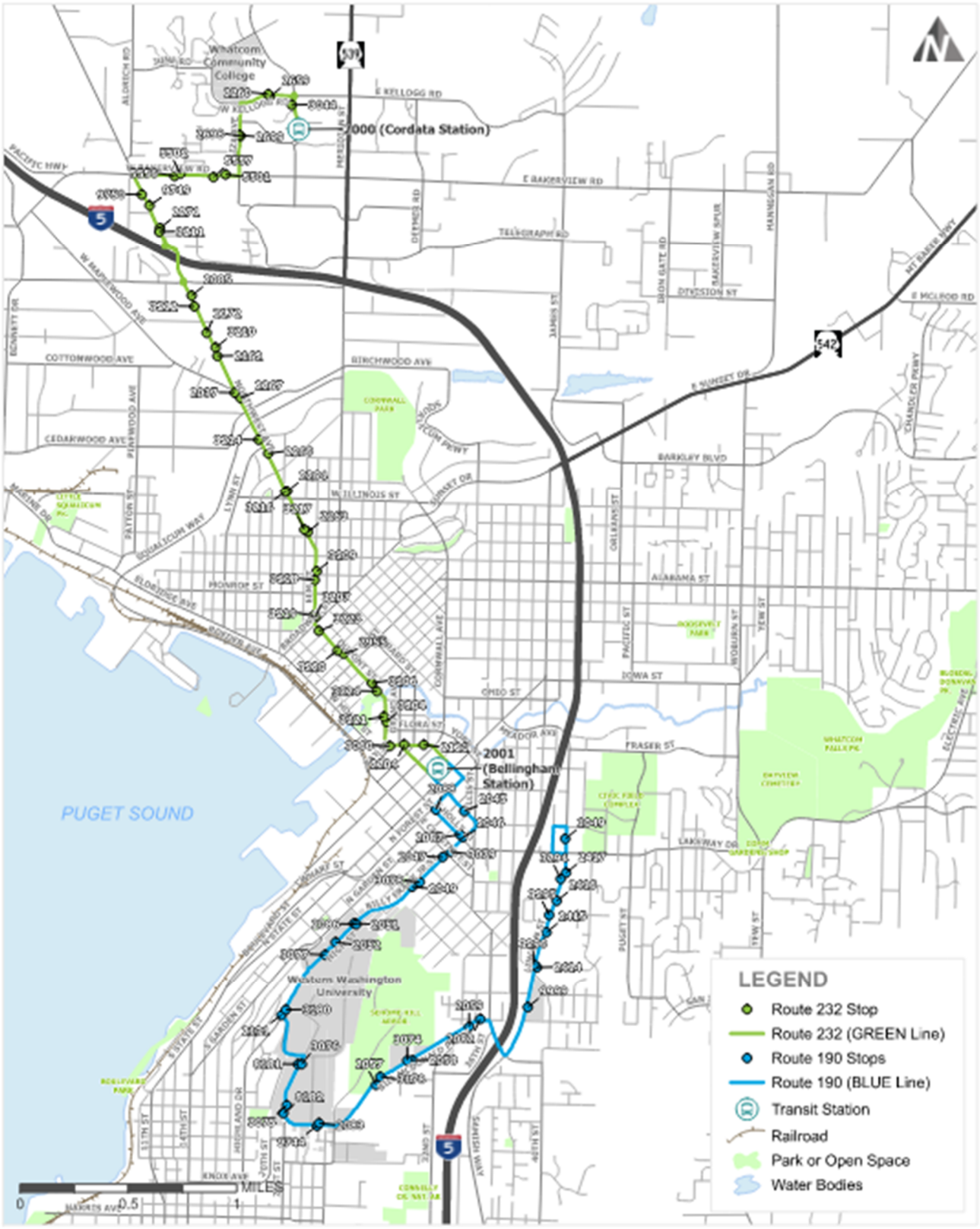
The findings of the existing conditions review are used to develop alternatives and a set of guiding principles, objectives, measures to evaluate alternatives for the Rapid Transit study. This study provides an understanding of key elements that should be considered in developing the alternatives including bus stop amenities and access, stop consolidation, improvements to address on-time performance and considering connectivity to key land uses that generate ridership. The affected environment study in conjunction with the alternatives analysis also provides context in determining the type, stop locations, and routing of bus that should be provided along the existing or amended service for the Gold, Green, and Blue Go Lines.

Attachment A – Route & Stop Maps

Gold Line


2000 (Cordata Station)
2001 (Bellingham Station)
PUGET SOUND
Whatcom Community College
Western Washington University
LEGEND
Route 331 Stops
Route 331 (GOLD Line)
Transit Station
Railroad
Park or Open Space
Water Bodies
MILES
0
0.5
1

Green and Blue Line



Attachment B – Stop Amenities

Stop Amenity Matrix.xlsx