Environmental Assessment of the Emerald Express Franklin Boulevard Corridor

Spring 2020
LTD

Marie Haefliger • Bethany Hays-Alsin • Yizhao Yang

PPPM 408/508 - Advanced GIS

UNIVERSITY OF OREGON

LTD

SCI Sustainable Cities Institute

SCYP Sustainable City Year Program

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Environmental Assessment of the Emerald Express Franklin Boulevard Corridor

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Thomas Schwetz, Director of Planning and Development
Jennifer Zankowski, Senior Development Planner
Andrew Martin, Development Planner

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About SCI

The Sustainable Cities Institute (SCI) is an applied think tank focusing on sustainability and cities through applied research, teaching, and community partnerships. We work across disciplines that match the complexity of cities to address sustainability challenges, from regional planning to building design and from enhancing engagement of diverse communities to understanding the impacts on municipal budgets from disruptive technologies and many issues in between.

SCI focuses on sustainability-based research and teaching opportunities through two primary efforts:

1. Our Sustainable City Year Program (SCYP), a massively scaled university-community partnership program that matches the resources of the University with one Oregon community each year to help advance that community's sustainability goals; and

2. Our Urbanism Next Center, which focuses on how autonomous vehicles, e-commerce, and the sharing economy will impact the form and function of cities.

In all cases, we share our expertise and experiences with scholars, policymakers, community leaders, and project partners. We further extend our impact via an annual Expert-in-Residence Program, SCI China visiting scholars program, study abroad course on redesigning cities for people on bicycle, and through our co-leadership of the Educational Partnerships for Innovation in Communities Network (EPIC-N), which is transferring SCYP to universities and communities across the globe. Our work connects student passion, faculty experience, and community needs to produce innovative, tangible solutions for the creation of a sustainable society.

About SCYP

The Sustainable City Year Program (SCYP) is a year-long partnership between SCI and a partner in Oregon, in which students and faculty in courses from across the university collaborate with a public entity on sustainability and livability projects. SCYP faculty and students work in collaboration with staff from the partner agency through a variety of studio projects and service-learning courses to provide students with real-world projects to investigate. Students bring energy, enthusiasm, and innovative approaches to difficult, persistent problems. SCYP's primary value derives from collaborations that result in on-the-ground impact and expanded conversations for a community ready to transition to a more sustainable and livable future.

About Lane Transit District

LTD provides more than 10 million trips per year on its buses and EmX Bus Rapid Transit line in Lane County, Oregon. Of Lane County's approximately 4,700 square miles, LTD's service area is about 480 square miles and includes the Eugene-Springfield metropolitan area, and the surrounding cities of Coburg, Cottage Grove, Creswell, Lowell, Junction City and Veneta as well as communities in the McKenzie River valley.

LTD is a special district of the state of Oregon and led by a seven-member board of directors appointed by Oregon's Governor. LTD also operates RideSource, a paratransit service for people with disabilities, and numerous transportation options programs to promote sustainable travel county wide, and Point2Point, an initiative that provides community members with the necessary information and resources to assist them in identifying opportunities to drive less by discovering transportation choices that meet their individual lifestyles. LTD continually explores opportunities to enhance regional mobility through its projects and partnerships with other agencies.

Course Participants

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Executive Summary

This technical report describes a multi-scale environmental study of Emerald Express (EmX) in the Franklin Boulevard Corridor. This study is a collaboration between Advanced GIS students at the University of Oregon, Lane Transit District (LTD), and the Sustainable City Year Program. The EmX is a Bus Rapid Transit (BRT) system that connects downtown Springfield to downtown and west Eugene. The study area contains stops with the highest daily average ridership on the EmX line. This study seeks to explain what makes these stops successful and how ridership, accessibility, and safety can be improved along the Franklin Corridor. This study includes an equity and demographic analysis, a network connectivity analysis, and a land use analysis. Some of the trends that affect ridership included in this study are population density, proximity to facilities, concentration of commercial parcels, and bike share stations. Students surveyed the 13 outbound stations included in the study area. This report includes station highlights and recommendations. The report also addresses specific recommendations for improving facilities and their safety.

Introduction

This report summarizes student work from the Spring 2020 PPPM Advanced Urban GIS class. For this class's SCYP project, students collaborated with LTD to conduct a multi-level analysis of the Franklin Boulevard Corridor of LTD's EmX system.

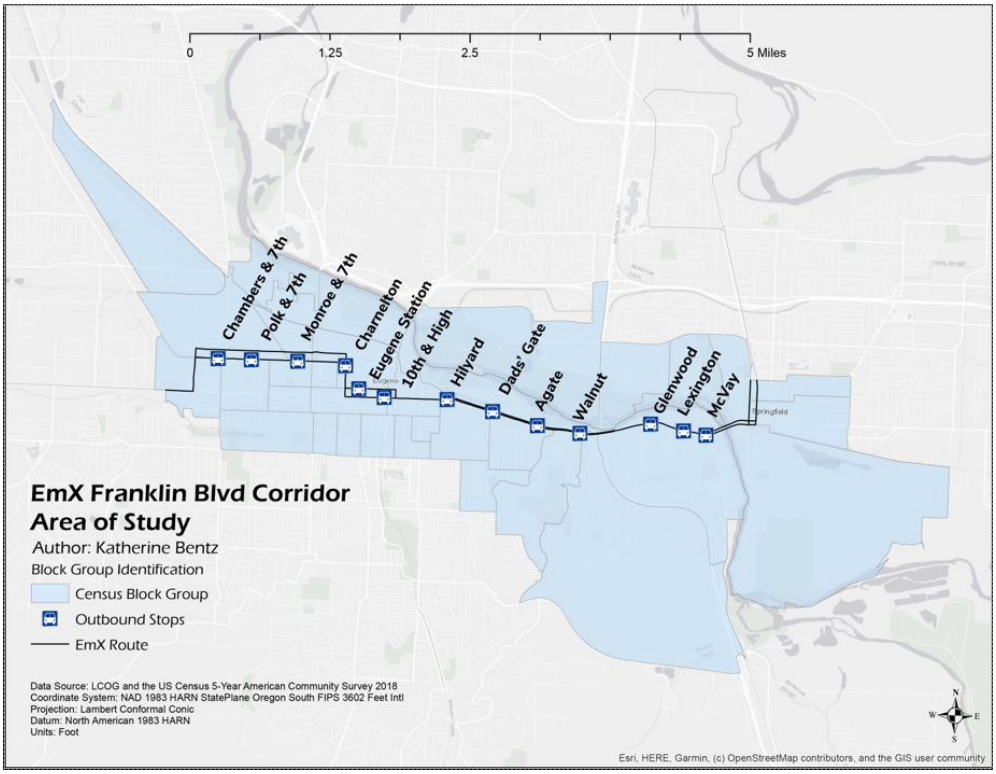
The environmental study had three primary goals:

1. Analyze the environment surrounding the study stations that span the Franklin Boulevard Corridor (from McVay Station to the Chambers/6th Station). This includes sociodemographic, land use, and street connectivity analyses.
2. Conduct environmental assessments of each station and provide recommendations to LTD.
3. Analyze ridership counts at the various stations to examine relationships between environmental factors and ridership.

Overview: Emerald Express (EmX) Franklin Boulevard Corridor

The Emerald Express (EmX) is a BRT system that serves the Eugene-Springfield area. The study area spans 10.7 miles of Franklin Boulevard from the McVay Station to the Chambers/6th Avenue Station. This route connects Downtown Eugene to University of Oregon campus and Downtown Springfield. The Franklin Corridor includes 13 outbound stations. These stops have the highest daily ridership among the entire EmX line. The census block groups included in the study area span 8,860 acres or approximately 14 square miles. The census block groups were selected in this study area because they were within a half-mile buffer of the EmX stops.

FIG. 1
Map of study area



Methodology

For this report, students used a mix of data collection and analysis methods. Students used ArcGIS's ArcMap software extensively to create maps and perform spatial analyses. Students also conducted a literature review to study elements of walkability, safety, and accessibility in planning. These ideas were incorporated into the analysis.

DATA SOURCES

The data used in this report include GIS shapefiles from the Lane Council of Governments (LCOG). Students used demographic data from the 2018 US Census American Community Survey to analyze population characteristics within the study area. Lane Metropolitan Planning Organization provided ridership information from October 2019. Students collected field data from Google Street View and in-person visits.

STATIONS AND VICINITY

The study area comprises 34 census block groups that total 8,860 acres or 13.8 square miles. Using ArcMap, students selected census block groups along a 0.5-mile buffer from the EmX Franklin Corridor bus route. Students numbered census block groups from one to 34 for simplicity. The full census block group names are provided in Table 1 in the Appendix. Within the study area, students identified 13 outbound stations. These stations are listed in Table 2 in the Appendix.

SERVICE AREA STREET CONNECTIVITY AND ACCESSIBILITY ANALYSIS

This section provides an accessibility and connectivity analysis of potential destinations such as amenities, facilities, and businesses located within the service zones of the Franklin EmX Corridor. Students conducted analysis for this report using ArcGIS's ArcMap and ArcCatalog. The ArcGIS Network Analyst extension created service areas within the EmX Franklin Corridor. These service areas, also referred to as walksheds and service zones, relied on EmX station data and were calculated around each outbound EmX Franklin Corridor station at a half-mile distance. This method accounts for network connectivity in the area and is therefore more precise than a buffer analysis. Using the calculate geometry attribute, students calculated the area of the walksheds. From there, students determined Pedestrian Catchment Ratio (PCR) for each station's outbound service area at a half-mile. The PCR for each station service area was calculated using the following equation:

$$PCR = \frac{area}{\pi r^2}$$

FIG. 2
Pedestrian Catchment Ratio (PCR) equation

where "area" is the area of each service zone. Next, the clip tool was used to create selections showing the facilities, other LTD bus stops, non-residential buildings, and bike-share hubs within the service areas. Students used the

spatial join tool to create attribute tables for each destination by service station name. Finally, the data were summarized from the various attribute tables and edited in Microsoft Excel.

SERVICE AREA LAND USE MIX ANALYSIS

This section assesses various indicators of land use types and mixture for the service zones. Students conducted analysis for this section using ArcGIS's ArcMap and Microsoft Excel. Students used the spatial join tool to join land use type data to the service zones. Students used the summarize attribute tool to create a table of total land use composition by area and field, a count of each land use type, and a sum of the total area of the five land use types in each service station area. The text file was imported to Microsoft Excel to clean the data and calculate land use mix entropy of each service area. Land mix use entropy was calculated using the following formula:

FIG. 3
Land use entropy formula

$$H_1 = \frac{-\sum_{i=1}^{s} (p_i) \ln(p_i)}{\ln(s)}$$

where, "p_i" is the percentage of area for land use category "i" within a service area, "ln" is the natural log of "p_i" and "s" is the number of land use categories considered, which in this case is five. A land use mix entropy score of one reflects an equal distribution of land use types or more mixed-use development in an area (Knaap, 2007; Zagorskas, 2016). Lastly, the table was brought back into ArcMap and joined to the service areas. The table and maps in this report are drawn from the findings of this analysis.

ENVIRONMENTAL AUDITS

Students conducted audits of each station by comparing residential and environmental variables with ridership data. The analysis for this section was conducted using ArcMap and GeoDa. ArcMap was used to join the ridership table to the Franklin Corridor station layer containing important variables. Next, the layer was brought into GeoDa to create several scatter plots. Finally, the scatter plots were brought to ArcMap and added to a map showing relationships between ridership data and important environmental factors. Field data collected by in-person visits and Google Street view were also used to evaluate the stations.

Equity and Demographic Analysis

PART A: POPULATION DENSITY

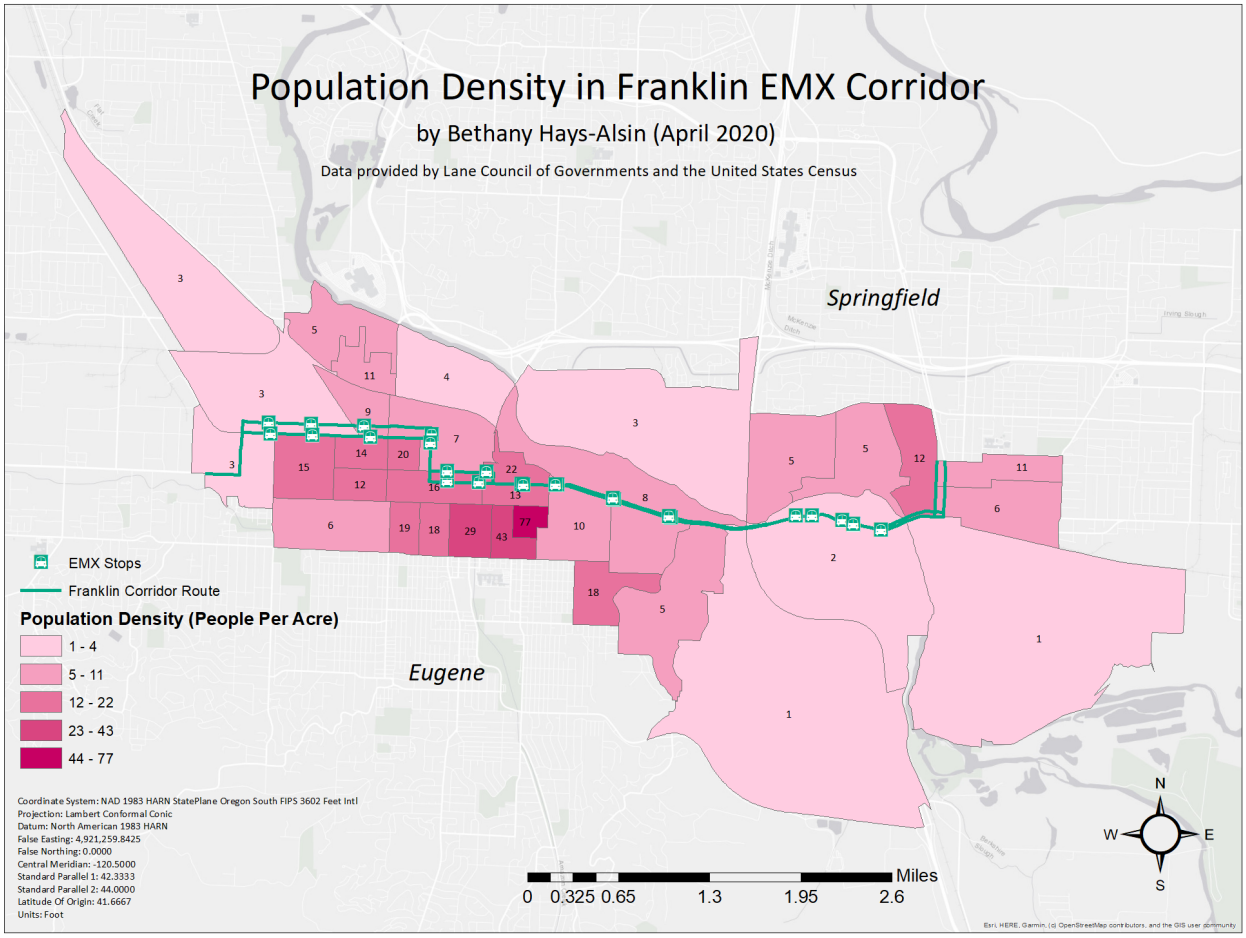


FIG. 4

Map of Population Density

The population of the study area includes 45,077 people. The Glenwood neighborhood (Southeast Eugene/Springfield) as well as the River Road/Bethel neighborhood (Northwest Eugene) are more sparsely populated, while the more central areas closer to downtown and the University of Oregon tend to be very densely populated. The EmX line runs through these very densely populated areas. The part of the line that runs through the lightly populated area in Glenwood serves as a connector to the EmX's Springfield (Gateway) Corridor. This line connects to the Gateway Mall and Riverbend Hospital, which are major transit destinations.

PART B: HOUSING DENSITY

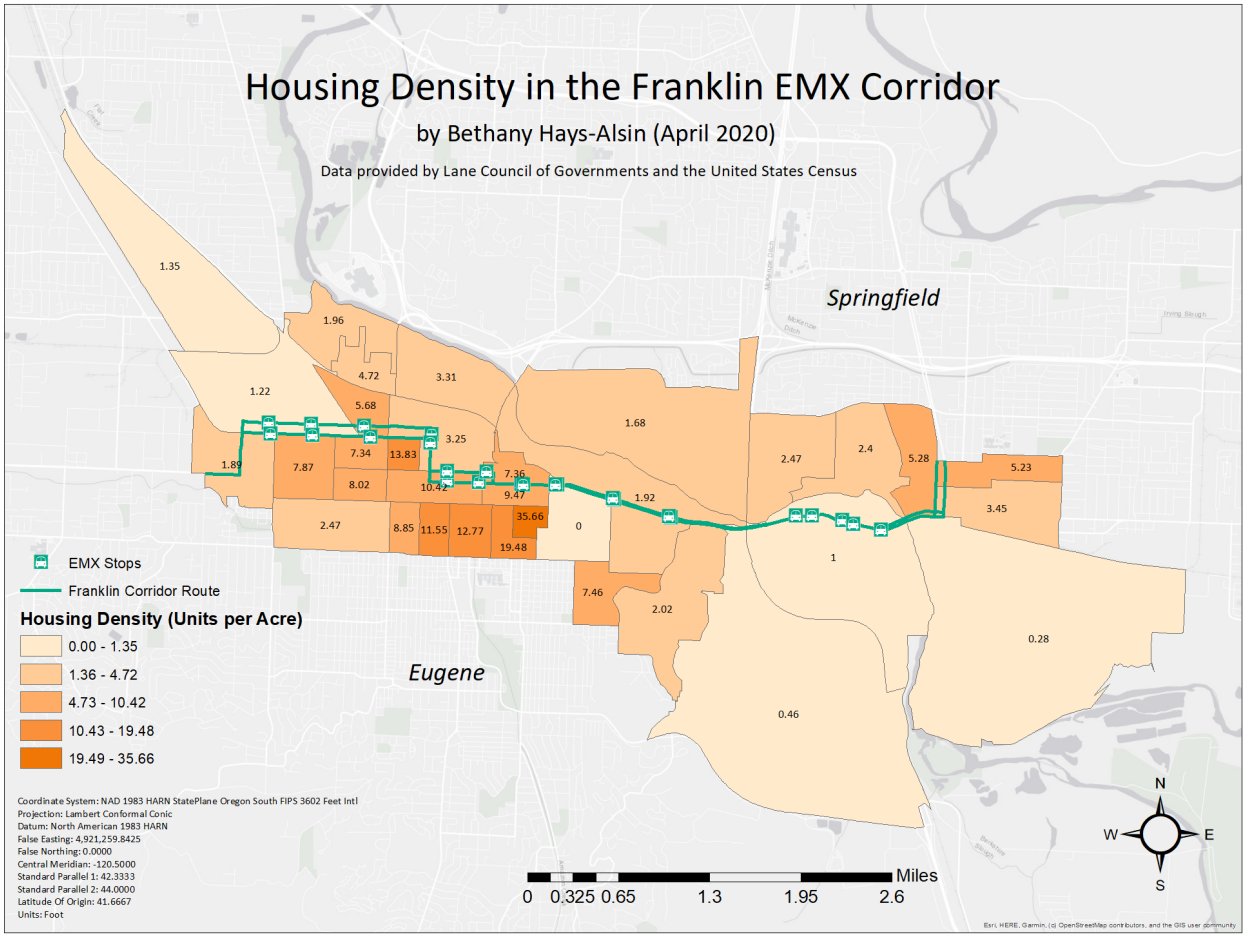


FIG. 5

Map of Housing Density

There are 21,094 housing units in the study area. The areas that are closer to central Eugene, downtown Eugene, and the University of Oregon have a higher housing density (units per acre) than the River Road (Northeast Eugene) and the Glenwood (Southeast Eugene and Springfield) areas.

PART C: PEOPLE OF COLOR IN THE COMMUNITY

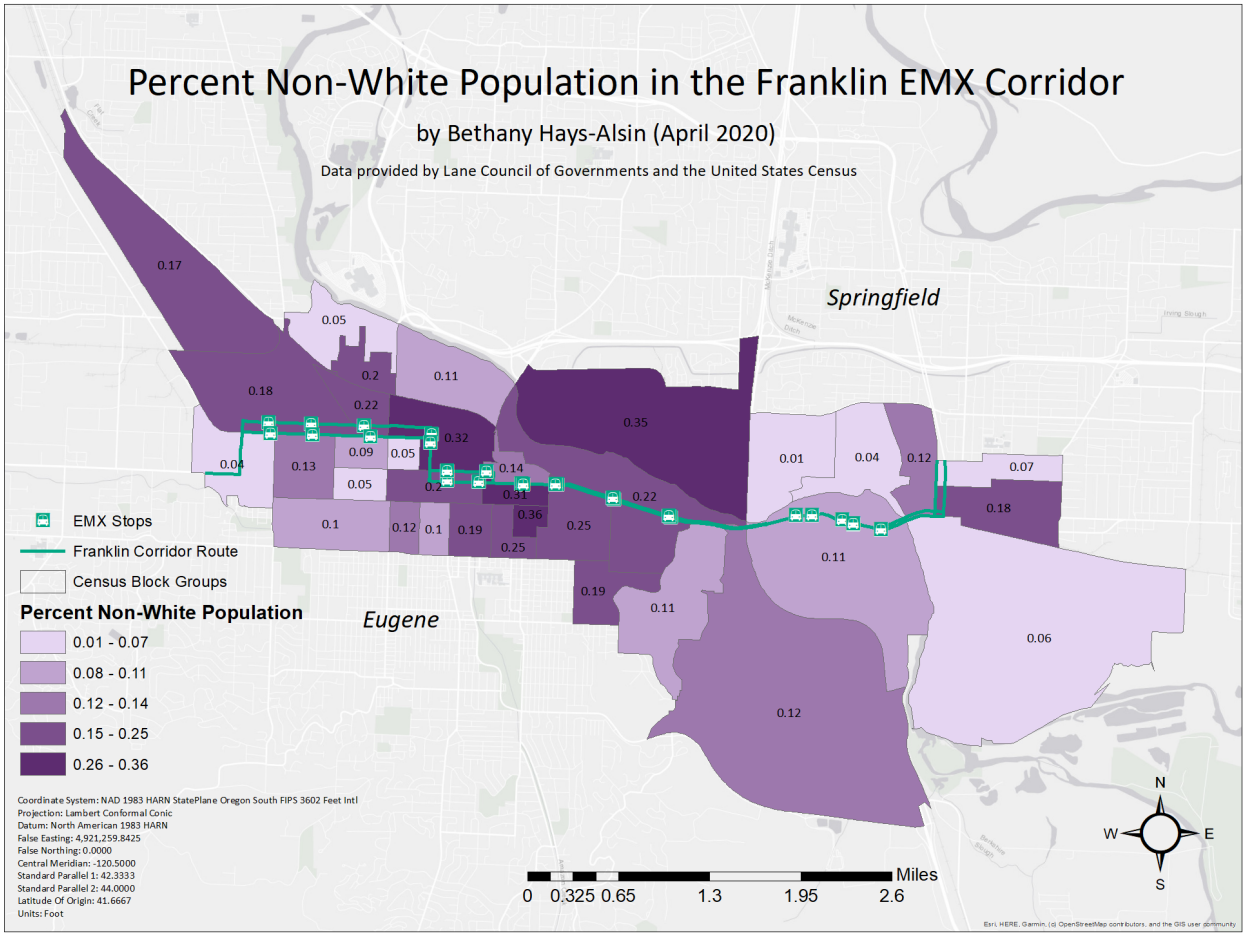


FIG. 6

Map of non-white population

In the study area, about 15% of the population identifies as a race other than white. This includes 6,907 people in the Franklin Corridor. Students included racial demographics in the analysis to indicate how equitably the EmX serves people of color. The areas with the most people of color are Cal Young/Harlow at 35%, downtown Eugene at 31-35%, and the Whitaker at 32%.

PART D: HOUSEHOLD SIZE DISTRIBUTION

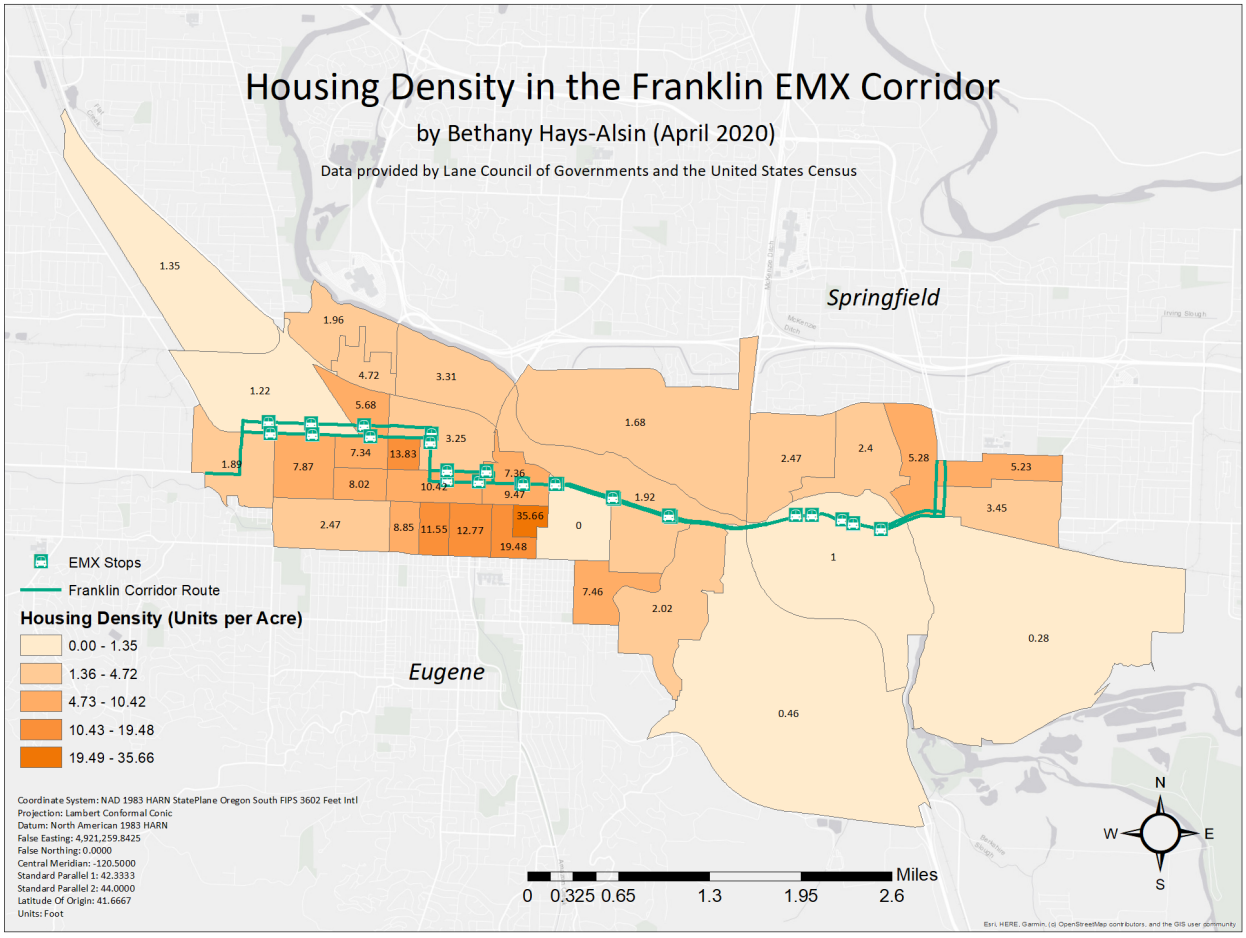


FIG. 7

Map of Household Size Distribution

There are 19,442 households in the service area. About 2,916 households, or 15%, of these total households are two-person households. Very few of the central downtown and university area households are two-person households. Many of South Eugene households have two people.

PART E: AGE DISTRIBUTION

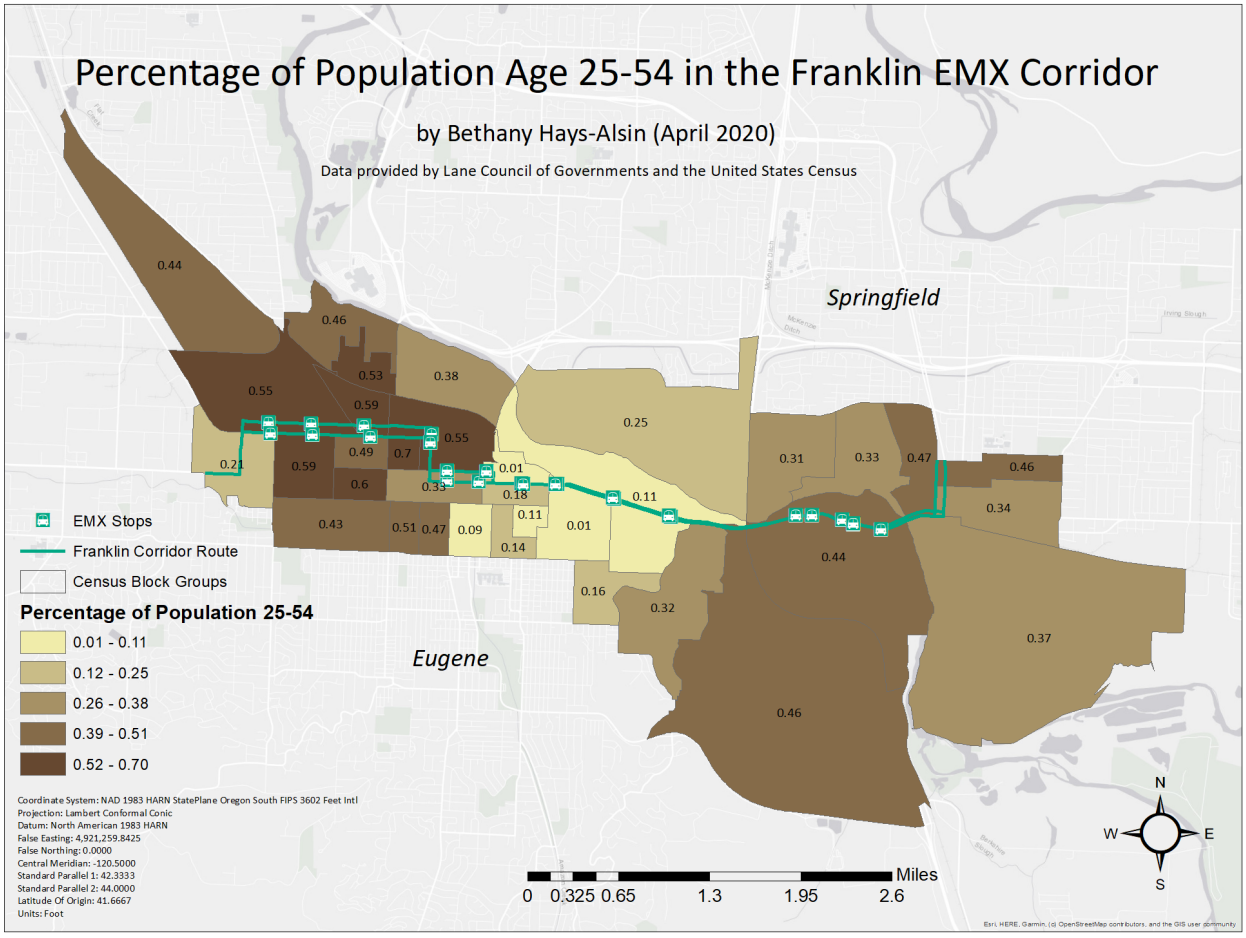


FIG. 8

Map of age distribution

There are 14,545 people who are within the 25-54 age range in the study area. The majority of residents in the West Eugene area are within this age range, as indicated by the darker areas in the map. Very few people in the central Eugene and university areas are in this age range. Many of these residents are likely younger than 25 as they are probably young college students.

PART F: HOUSEHOLD INCOME DISTRIBUTION

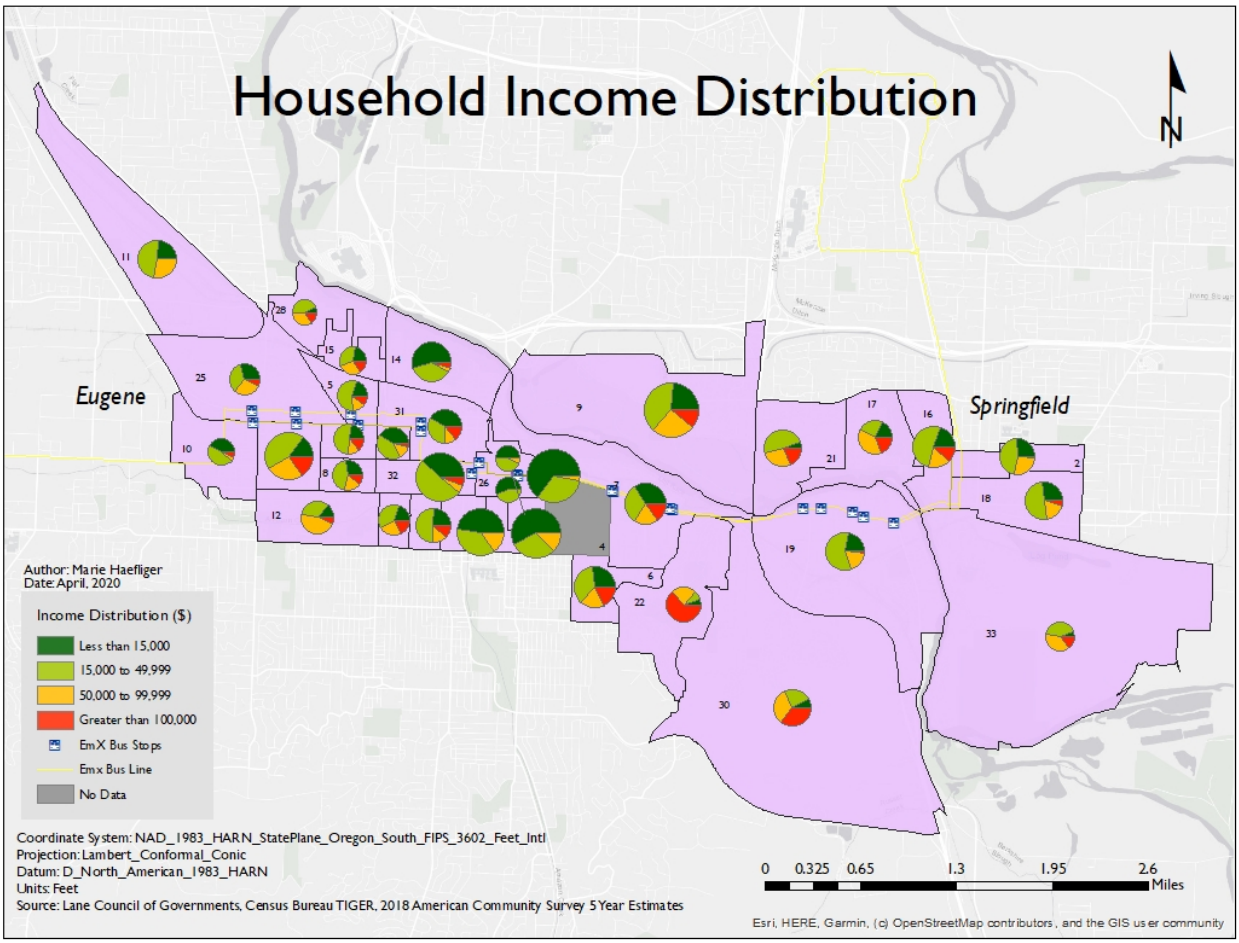


FIG. 9

Map of household income distribution

This map shows the income distribution in the study area. The South Eugene area tends to be wealthier and includes more people earning $100,000 or more. The downtown and university areas include more people that earn under $14,999. The rest of the map includes primarily middle earners who earn $50,000-$100,000 annually.

PART G: POVERTY DISTRIBUTION

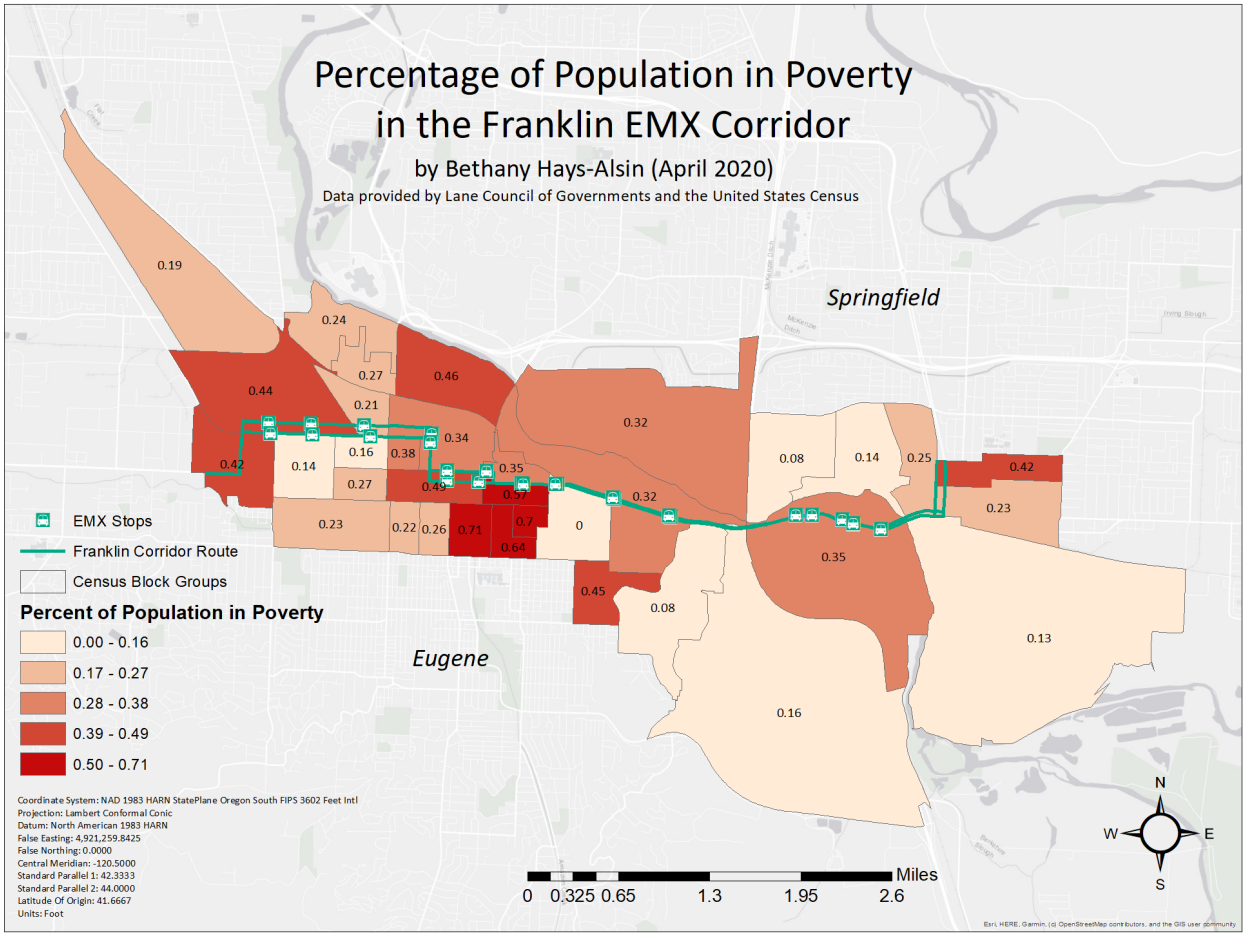


FIG. 10

Map of poverty distribution

The average percentage of the population in poverty for the study area is 31%. This measure of poverty is based on the federal poverty line (FPL). The US Census designates a household to be in poverty if their income was under the FPL for the preceding 12 months. The downtown and university areas have higher poverty levels and parts of the River Road and Bethel neighborhoods do as well.

PART H: VEHICLE OWNERSHIP

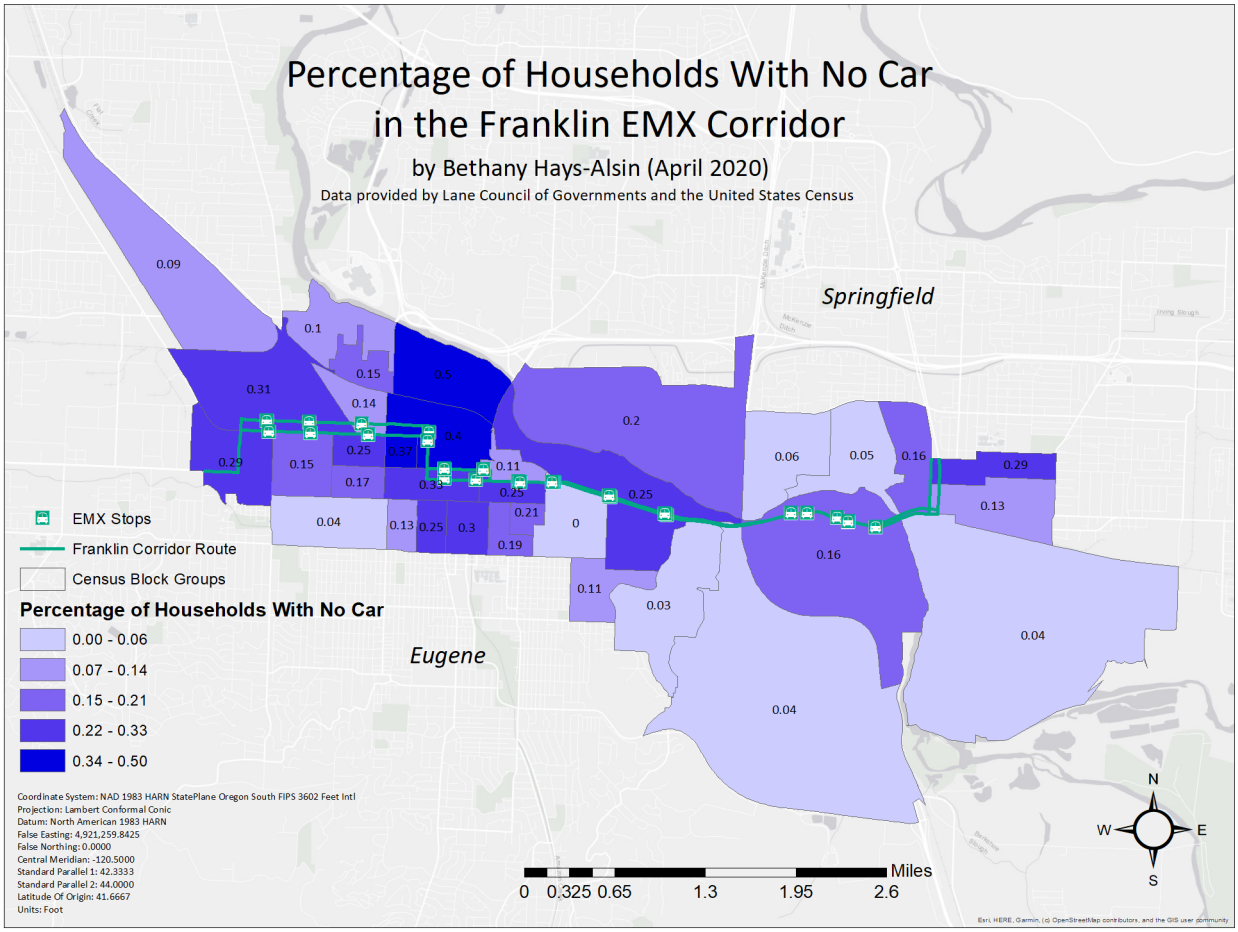


FIG. 11

Map of vehicle ownership

The average number of vehicles per household in the study area is 1.86. This is slightly higher than the average for the whole county (1.8). This map displays the percentage of households with no car per each block group. The downtown area, as well as parts of Northwest Eugene and a part of North Springfield, tend to have low car ownership rates. These areas are all relatively close to the EmX line.

PART I: FEMALE POPULATION

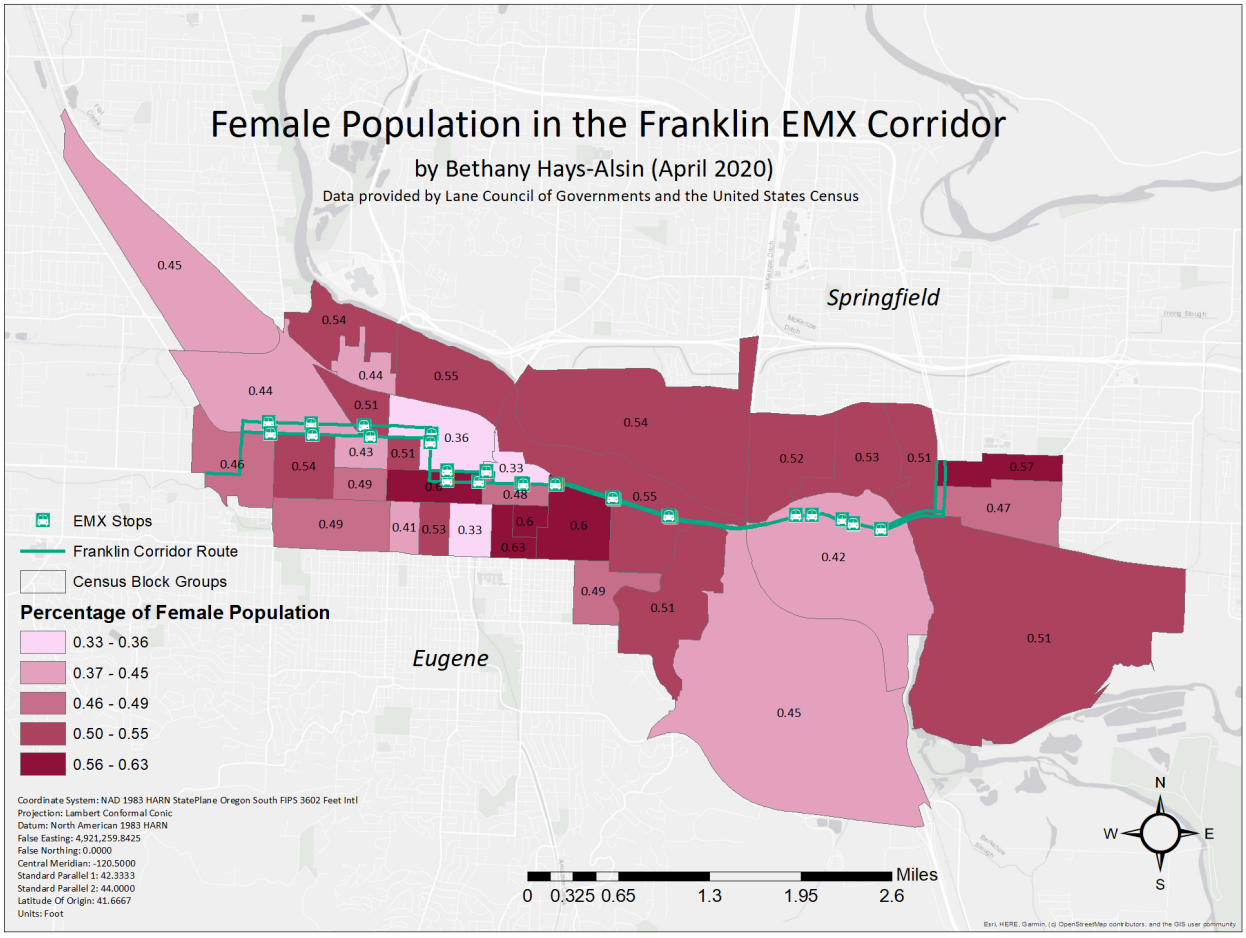


FIG. 12

Map of female population

This map displays the percentage of female populations in the study area. Parts of the university and downtown areas have relatively high female populations, but some areas nearby have relatively low female populations.

Network Connectivity

PART A: SERVICE ZONES

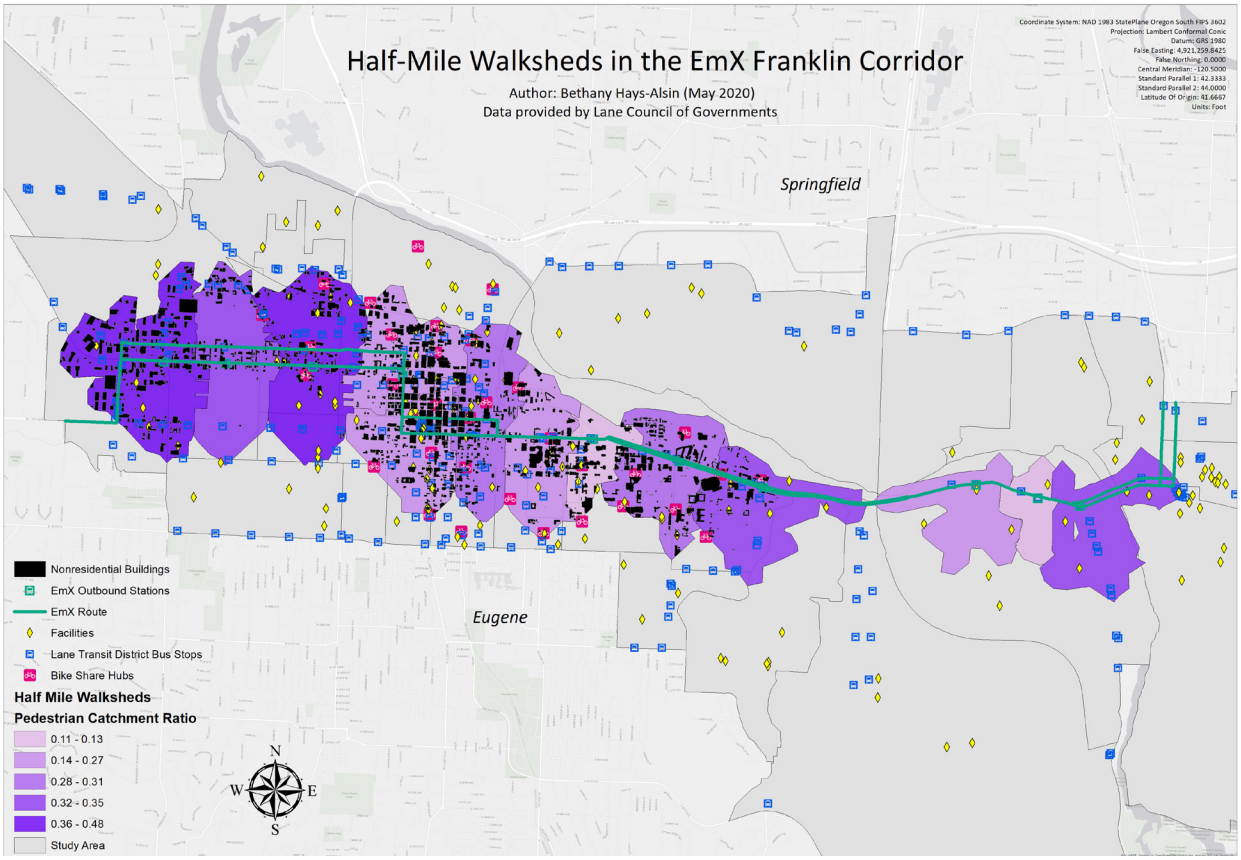


FIG. 13

Map of half mile walksheds

This analysis shows the network connectivity of the Franklin EmX corridor. Half-mile walksheds were created using the Network Analyst feature of ArcMap. These walksheds illuminate the Franklin Corridor's accessibility and the connections that EmX riders can make from various stations. As shown in Table 1, there are a total of 148 bus stops that are within the half-mile walksheds, indicating many connections to nearby buses for EmX riders. There are 86 facilities within a half-mile walk of the EmX stations (Table 2). There are also 28 "social bike stations," or bike-sharing stations, in the half-mile walkshed region, which allows riders to connect to the EmX via bike-sharing (Table 3). Several stations do not have a bike-sharing station within a half-mile walk, including Chambers/7th Avenue Station, Glenwood Station, Lexington Station, McVay Station, and Polk/7th Avenue Station (Table 3). There

are 5,758 nonresidential buildings in the half-mile walksheds. The Dads' Gate station has the least amount of nonresidential buildings at only 73 (Table 4).

A higher pedestrian catchment ratio (PCR) indicates higher connectivity in the half-mile walksheds. Two walksheds in West Eugene have particularly high PCRs (as indicated by the darker purple color in Figure 13). One is the Monroe/7th Avenue Station with a PCR of 0.42 and the other is the Chambers/7th Avenue Station with a PCR of 0.48. Some of the lowest PCRs include the Dads' Gate Station in Central Eugene (just west of UO Campus) with a PCR of 0.13 and the Lexington Station (in Springfield, just east of Glenwood) with a PCR of 0.11.

Table 1: Bus Stops near the EmX Stations

EmX Stations	Bus Stops
Chambers/7th Station Outbound	19
Charnelton Station Outbound	15
EmX Agate Station Outbound	4
EmX Dads' Gates Station Outbound	6
EmX Glenwood Station outbound	2
EmX High Street Station outbound	15
EmX Hilyard Station Outbound	8
EmX Lexington Station Outbound	3
EmX McVay Station Outbound	10
EmX Walnut Station Outbound	9
Eugene Station, Bay T	31
Monroe/7th Station Outbound	18
Polk/7th Station Outbound	8
Grand Total	**148**

FIG. 14
Table 1
Bus Stops near the EmX Stations

FIG. 15
Table 2
Facilities near the EmX Stations

Table 2: Facilities near the EmX Stations

EmX Stations	Facilities
Chambers/7th Station Outbound	5
Charnelton Station Outbound	12
EmX Agate Station Outbound	5
EmX Dads' Gates Station Outbound	2
EmX Glenwood Station Outbound	2
EmX High Street Station Outbound	11
EmX Hilyard Station Outbound	7
EmX Lexington Station Outbound	1
EmX McVay Station Outbound	4
EmX Walnut Station Outbound	5
Eugene Station, Bay T	20
Monroe/7th Station Outbound	11
Polk/7th Station Outbound	1
Grand Total	**86**

FIG. 16
Table 3
Social Bike Stations near the EmX Stations

Table 3: Social Bike Stations near the EmX Stations

EmX Stations	Social Bike Stations
Chambers/7th Station Outbound	0
Charnelton Station Outbound	4
EmX Agate Station Outbound	5
EmX Dads' Gates Station Outbound	1
EmX Glenwood Station Outbound	0
EmX High Street Station Outbound	5
EmX Hilyard Station Outbound	3
EmX Lexington Station Outbound	0
EmX McVay Station Outbound	0
EmX Walnut Station Outbound	1
Eugene Station, Bay T	5
Monroe/7th Station Outbound	4
Polk/7th Station Outbound	0
Grand Total	**28**

Table 4: Nonresidential Buildings near the EmX Stations

EmX Stations	Nonresidential Buildings
Chambers/7th Station Outbound	573
Charnelton Station Outbound	277
EmX Agate Station Outbound	208
EmX Dads' Gates Station Outbound	73
EmX Glenwood Station outbound	220
EmX High Street Station outbound	350
EmX Hilyard Station Outbound	360
EmX Lexington Station outbound	359
EmX McVay Station Outbound	581
EmX Walnut Station Outbound	485
Eugene Station, Bay T	414
Monroe/7th Station Outbound	926
Polk/7th Station Outbound	932
Grand Total	**5,758**

FIG. 17
Table 4
Nonresidential Buildings near the EmX Stations

PART B: LAND USE MIX AND LAND USE ENTROPY

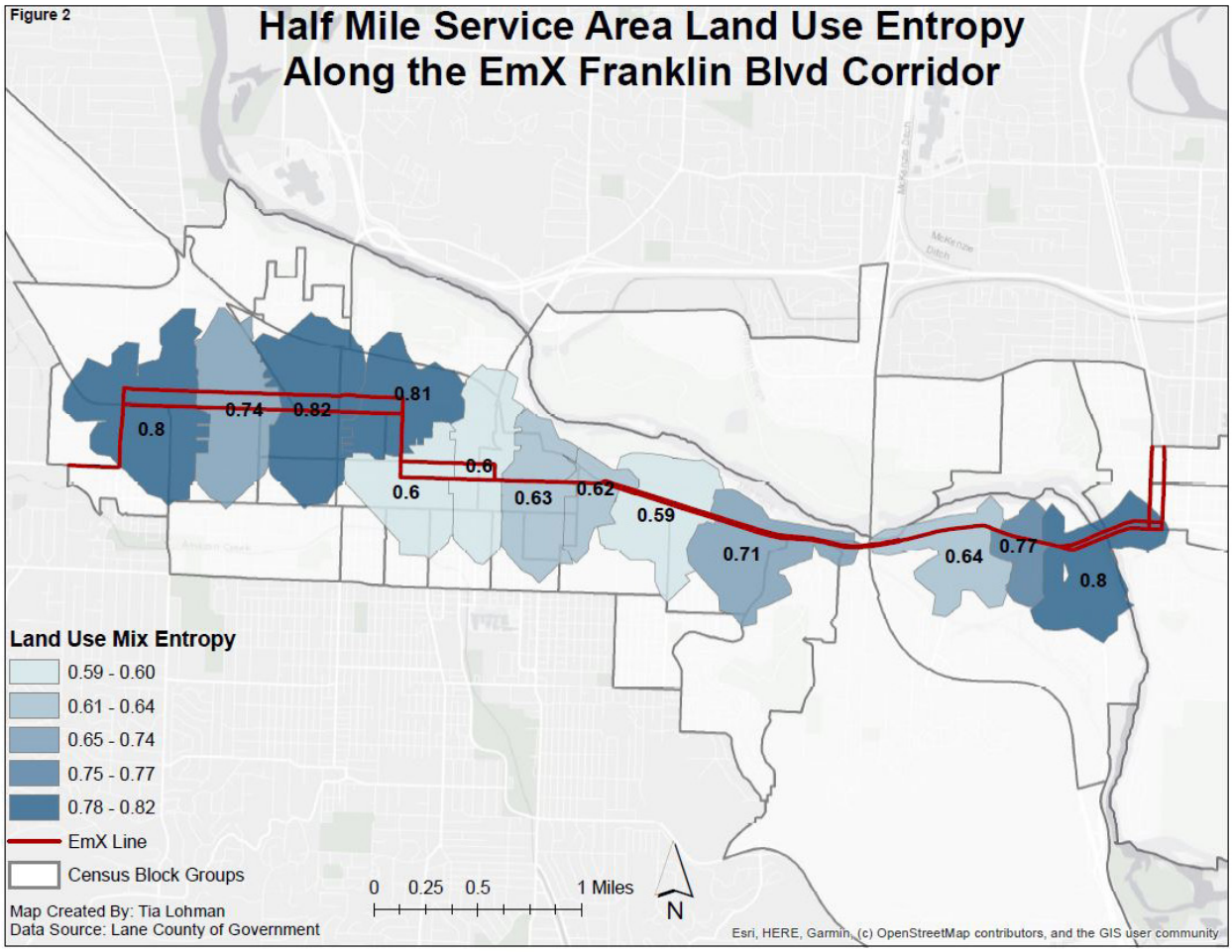


FIG. 18

Map of land use entropy

Overall, the land use mix entropy ratios are closer to one than zero. The service zones within the study area have an average land use mix entropy ratio of 0.7. The Monroe/7th Station has the highest land use mix entropy at 0.82 and Agate Station has the lowest land use entropy score at 0.52.

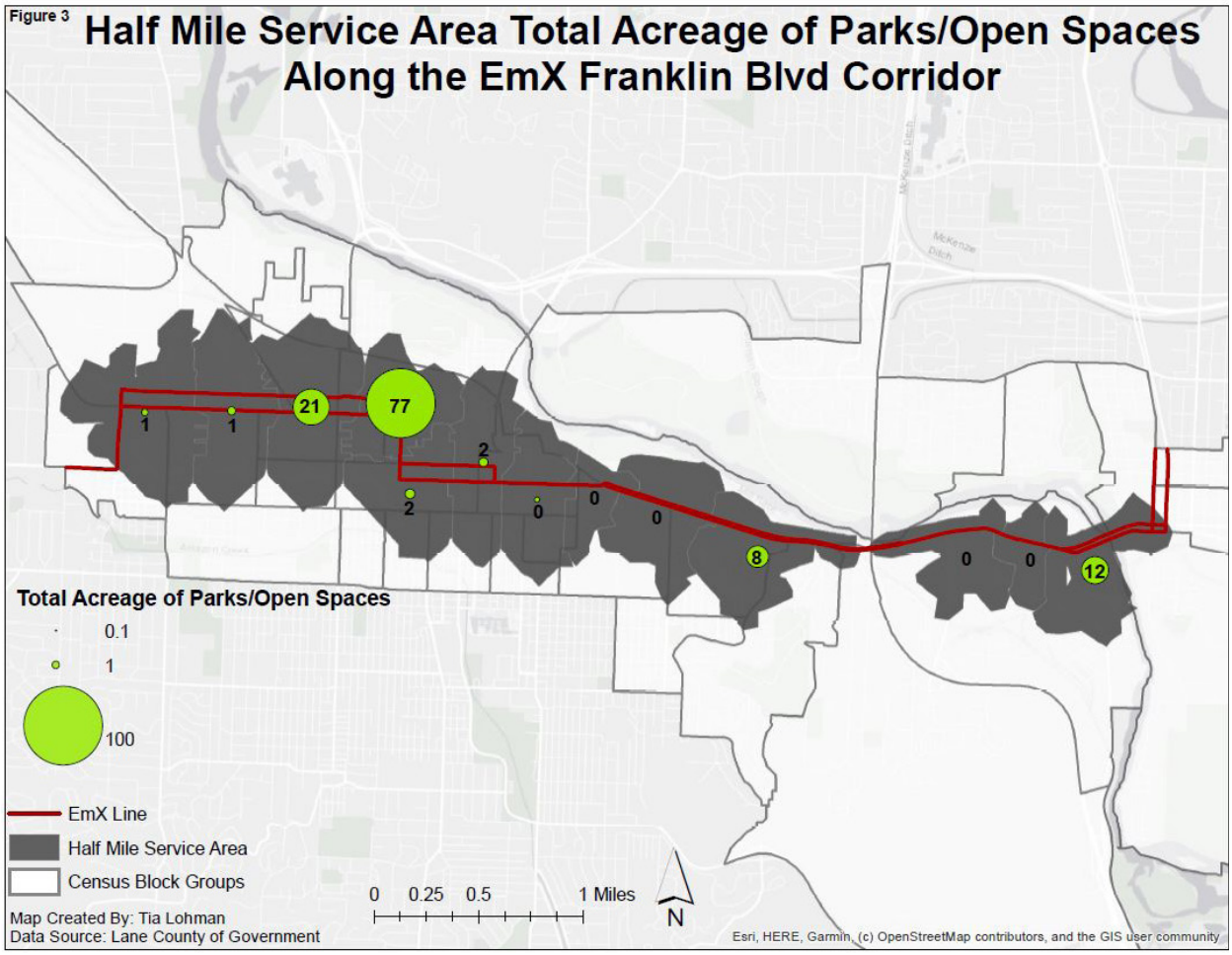


FIG. 19

Map of park land use

The distribution of parks and open spaces in the study area varies dramatically. The Charnelton Station service area has the greatest acreage of parks and open spaces at 77 acres. There are four service zones that do not have any parks or open spaces, including Dads' Gate, Agate, Glenwood, and Lexington stations.

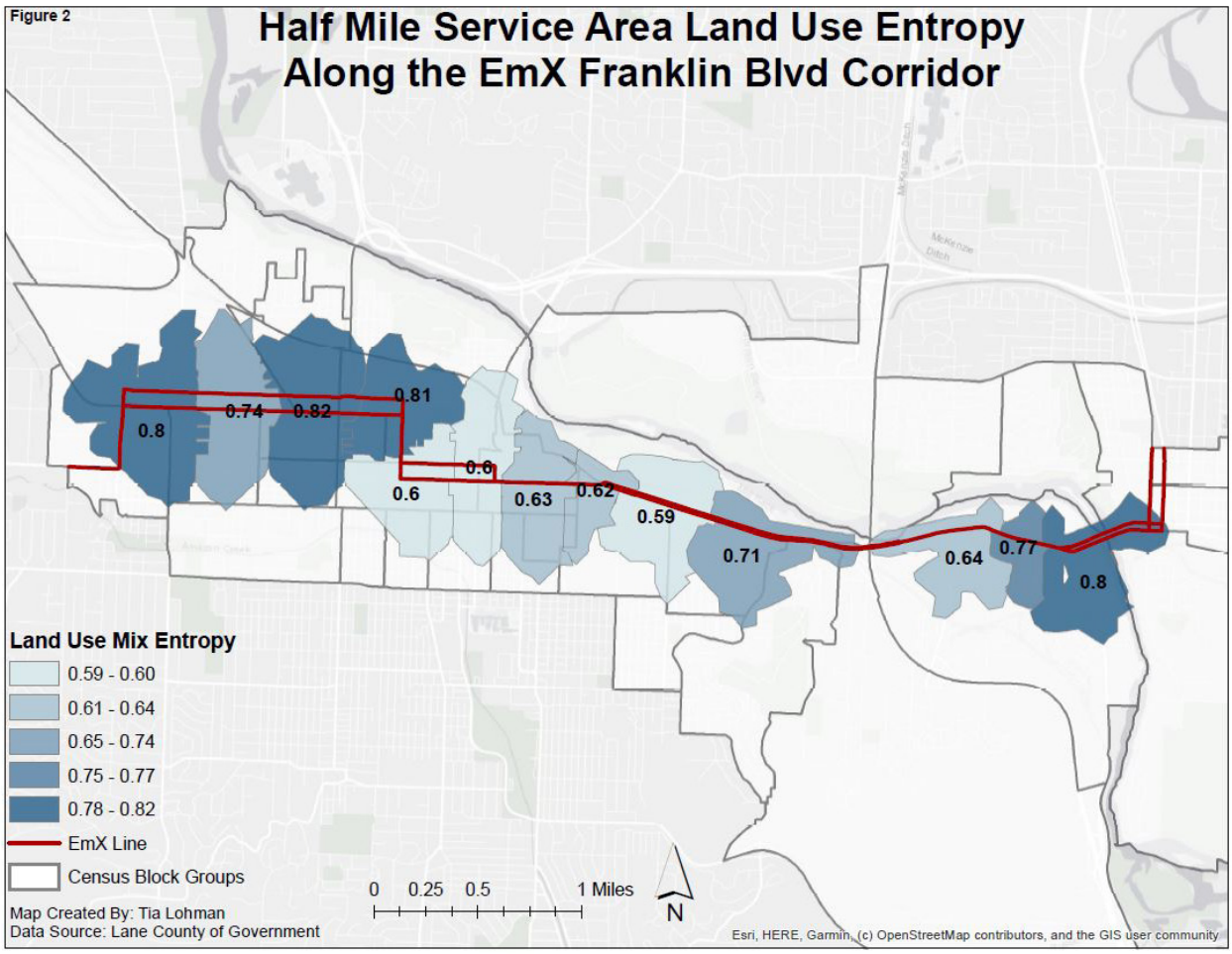


FIG. 20

Map of commercial parcels

High concentrations of commercial parcels tend to be clustered around downtown Eugene. Eugene Station has the greatest number of commercial parcels at 279 parcels in the service area, while Agate Station has the greatest acreage of commercial parcels at 204 acres. The Glenwood and Lexington stations have the fewest commercial parcels compared to the rest of the study area.

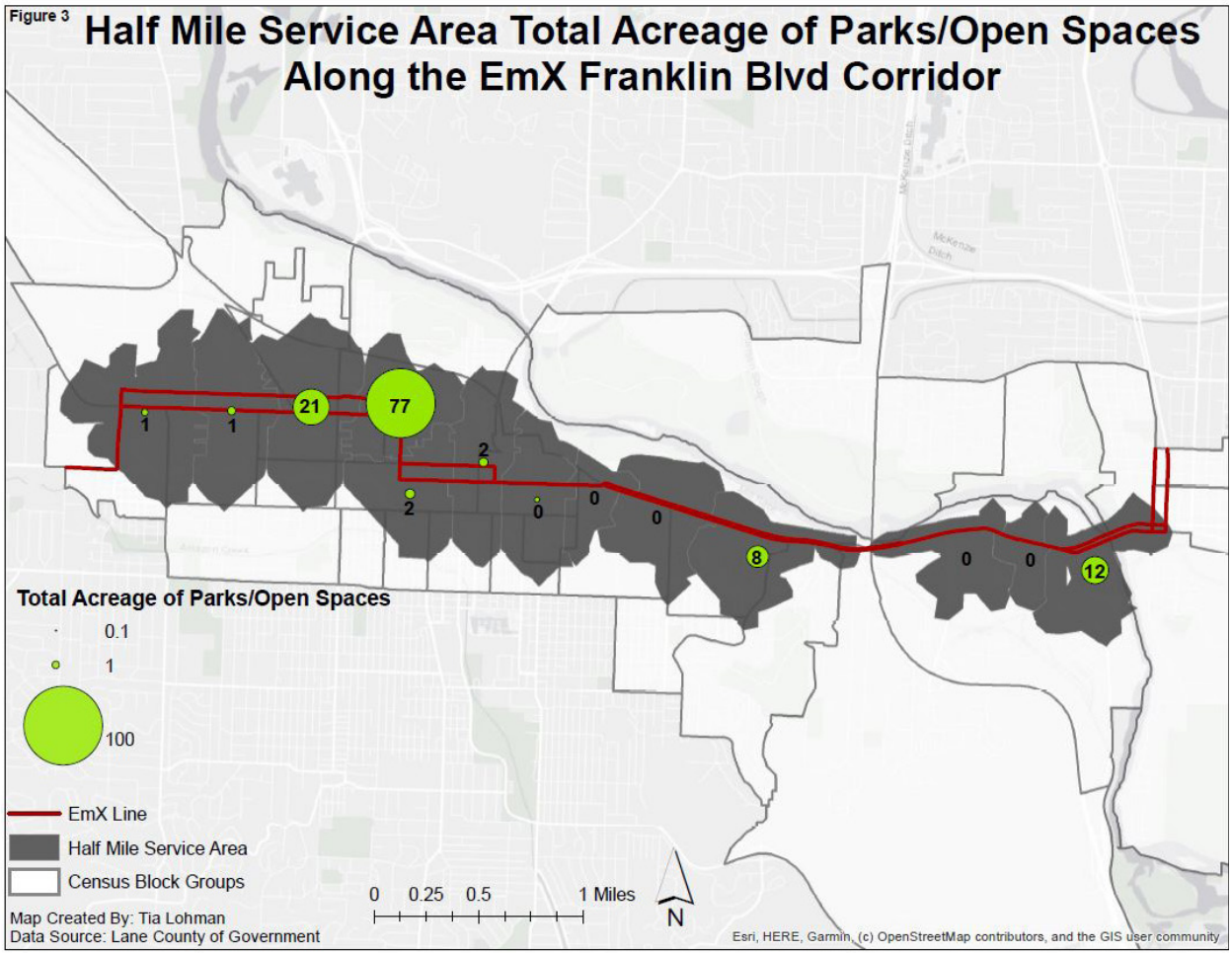


FIG. 21

Map of land use composition

Among the stations with the most varied land use policies are Glenwood and McVay stations. These stations both have a high percentage of “other” land use, with Glenwood comprising primarily industrial land use parcels. The Eugene Station service area has the greatest number of residential parcels, while the Polk/7th Station service zone has the largest acreage of residential parcels. This indicates that there may be smaller homes near Eugene Station and that homes may be fewer and larger near the Polk/7th Station. Overall, residential parcels are the most common land use type in the study area, with commercial as the second-most common land use.

FIG. 22

Table of land use entropy

Station Name	Land Use Mix Entropy	Parks and Open Spaces		Residential Parcels		Commercial Parcels		Industrial Parcels		Other Parcels	
		Total Number	Total Acreage	Total Number	Total Acreage	Total Number	Total Acreage	Total Number	Total Acreage	Total Number	Total Acreage
Chambers/7th Station Outbound	0.80	3	0.8	284	43.5	175	74.9	82	83.3	81	161.0
Charnelton Station Outbound	0.81	6	77.3	232	21.0	266	84.2	3	3.0	147	112.9
EmX Agate Station Outbound	0.59	0	0	14	56.0	53	204.2	0	0	24	90.2
EmX Dads' Gates Station Outbound	0.62	0	0	14	57.5	37	140.1	0	0	11	60.0
EmX Glenwood Station Outbound	0.64	0	0	18	30.9	11	10.0	28	94.7	28	167.1
EmX High Street Station Outbound	0.60	5	1.5	179	24.7	266	84.5	0	0	131	131.4
EmX Hilyard Station Outbound	0.63	3	0.4	324	52.4	141	161.2	0	0	55	93.8
EmX Lexington Station Outbound	0.77	0	0	105	37.5	18	9.7	12	16.8	19	42.1
EmX McVay Station Outbound	0.80	21	12.2	65	51.9	64	45.6	42	40.7	88	174.0
EmX Walnut Station Outbound	0.71	11	7.7	358	77.8	80	59.2	0	0	36	127.5
Eugene Station, Bay T	0.60	5	1.6	1813	33.3	279	67.7	1	0.2	440	148.2
Monroe/7th Station Outbound	0.82	39	21.3	688	88.0	161	86.2	23	9.7	188	151.6
Polk/7th Station Outbound	0.74	2	1.2	571	92.6	95	27.7	38	19.0	43	113.5

Ridership Analysis

Students analyzed ridership data from October 2019. Only 12 of the 13 study area stations were included in this data set (McVay Station was not operational at this time). The following sections explore four variables that may have a statistically significant impact on ridership and affiliated trends. The four variables include population density, proximity to facilities, concentration of commercial parcels, and proximity to social bike stations.

PART A: TOTAL RIDERSHIP AND POPULATION DENSITY

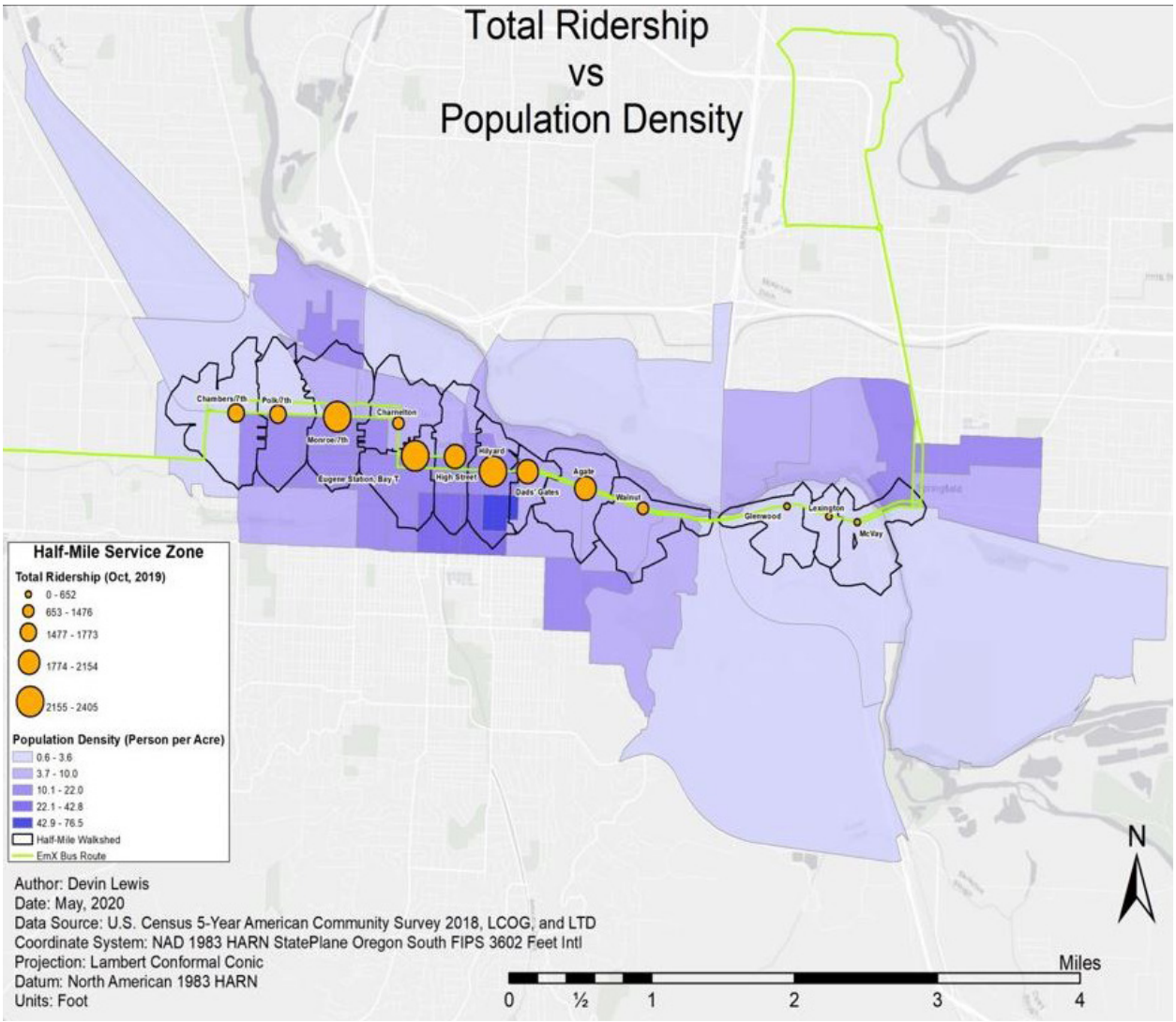
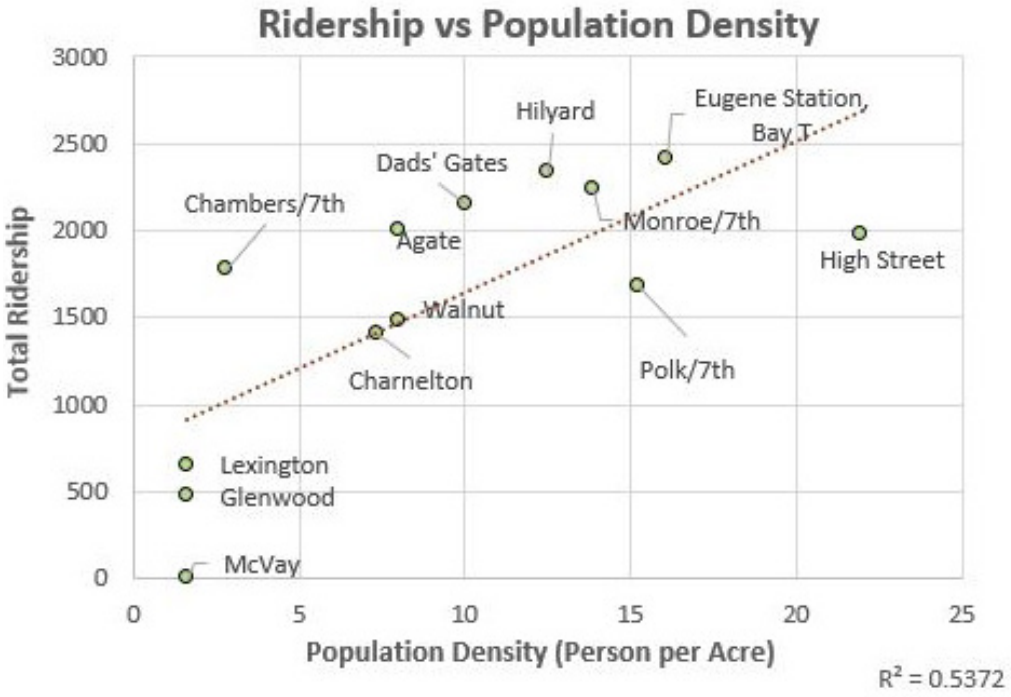


FIG. 23

Map of total ridership vs population density

FIG. 24
Graph of total ridership vs population density



There is a positive relationship between population density and ridership counts for these stations. Some underperforming stations based on this metric include Glenwood, Lexington, Polk/7th and High Street stations. Chambers/7th Station is overperforming based on this variable and has a low population density but high ridership.

PART B: TOTAL RIDERSHIP AND FACILITIES

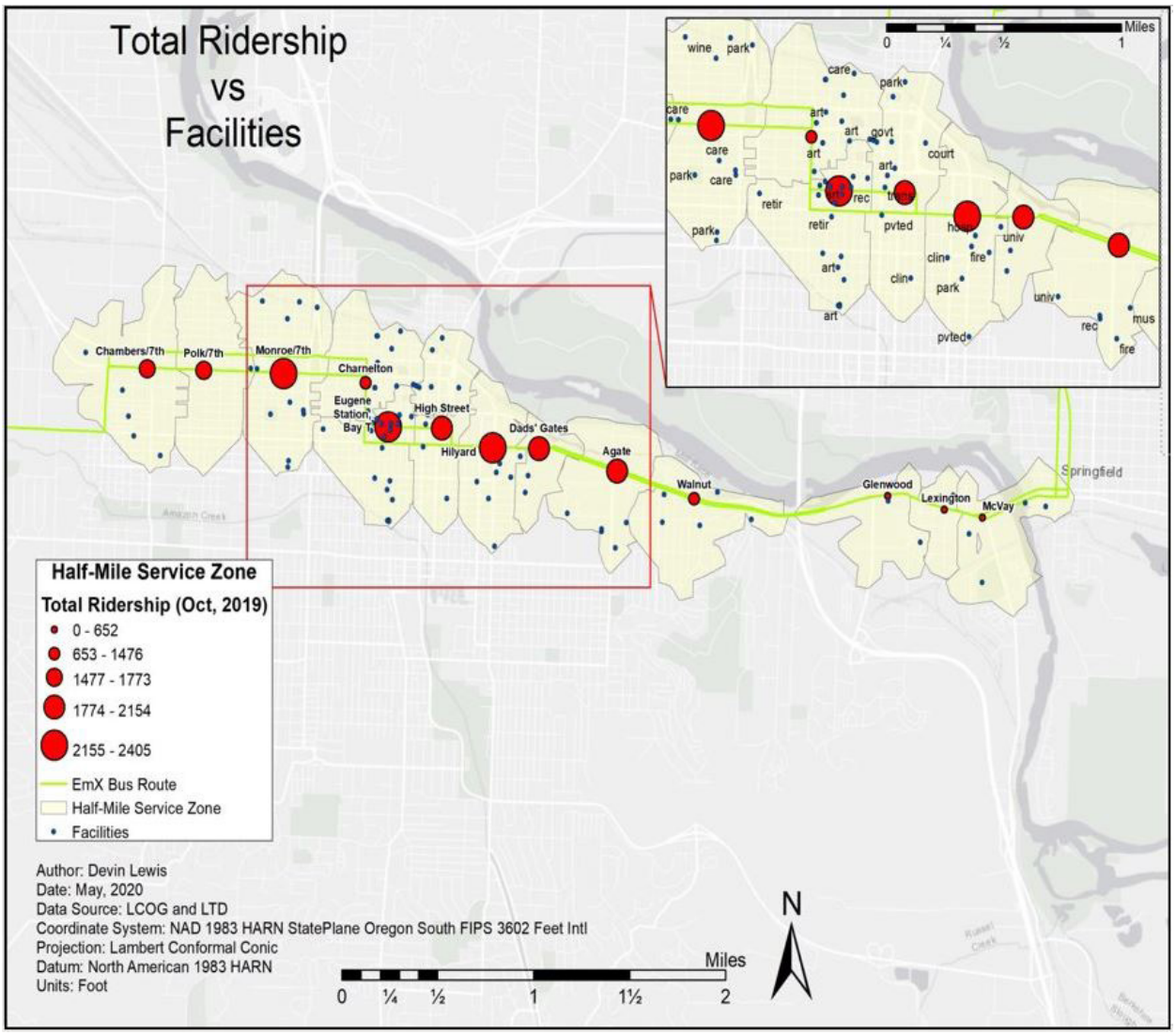
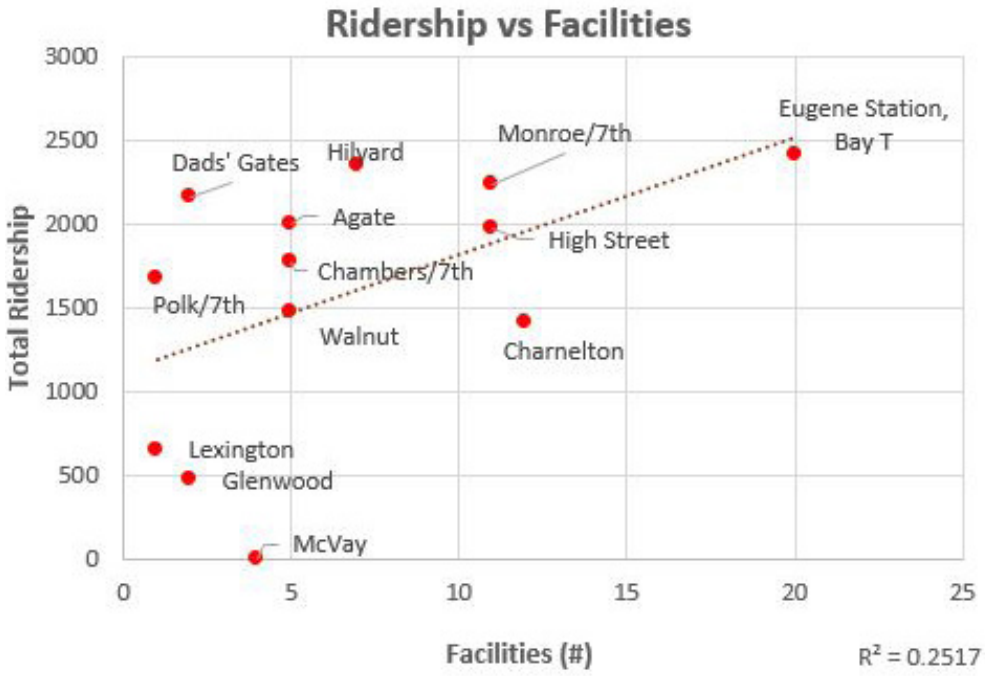


FIG. 25

Map of total ridership vs facilities

FIG. 26
Graph of total ridership vs facilities



There is also a positive relationship between ridership and the number of facilities in a service area: as facilities increase, ridership increases. Eugene Station has both the highest total ridership and total facilities. Charnelton Station has the second highest concentration of nearby facilities but underperforms in ridership. Hilyard, Dads' Gate, and Agate stations perform relatively well in ridership despite a lower number of facilities, likely due to these stations' proximity to the University of Oregon.

PART C: TOTAL RIDERSHIP AND COMMERCIAL PARCELS

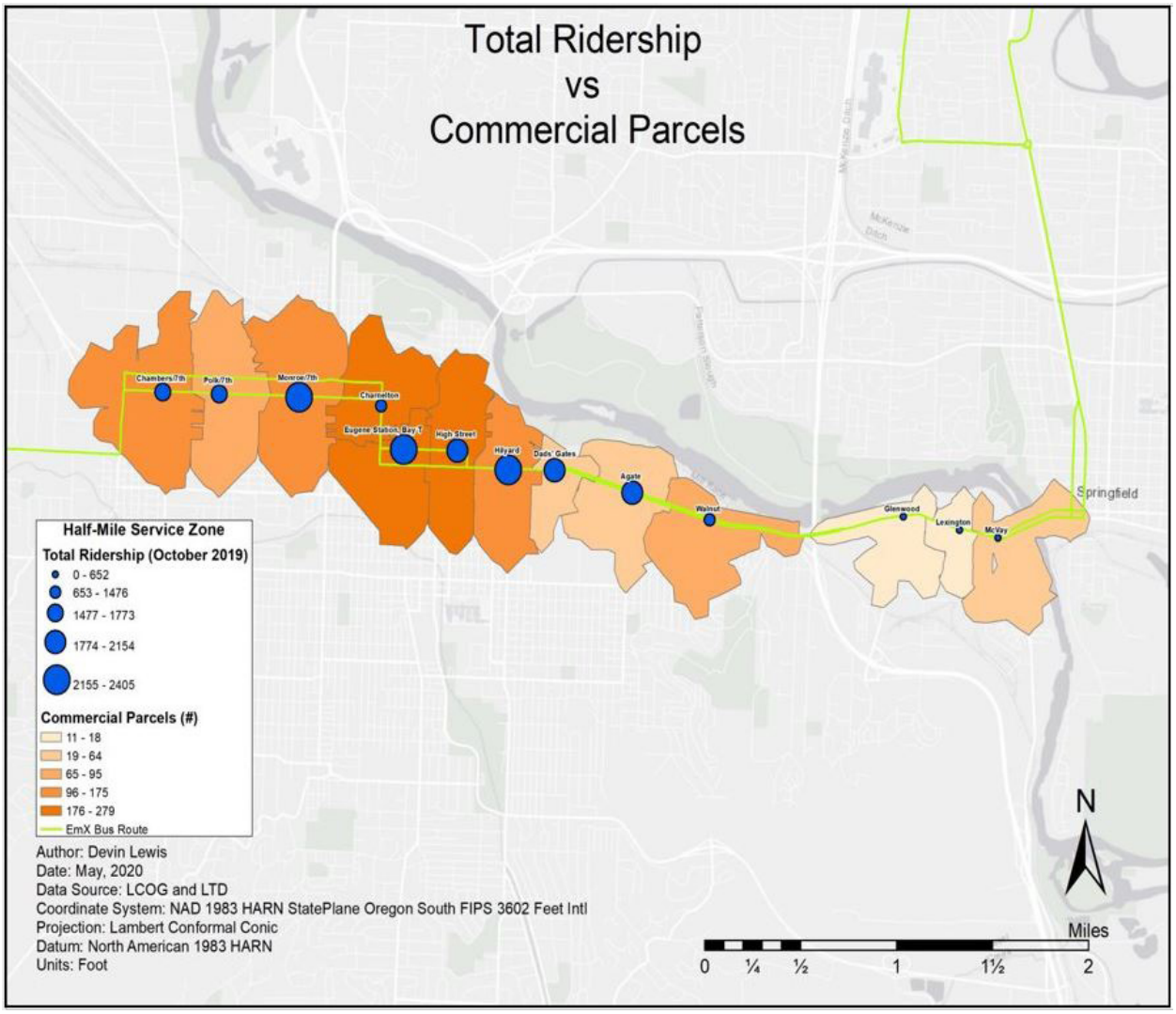
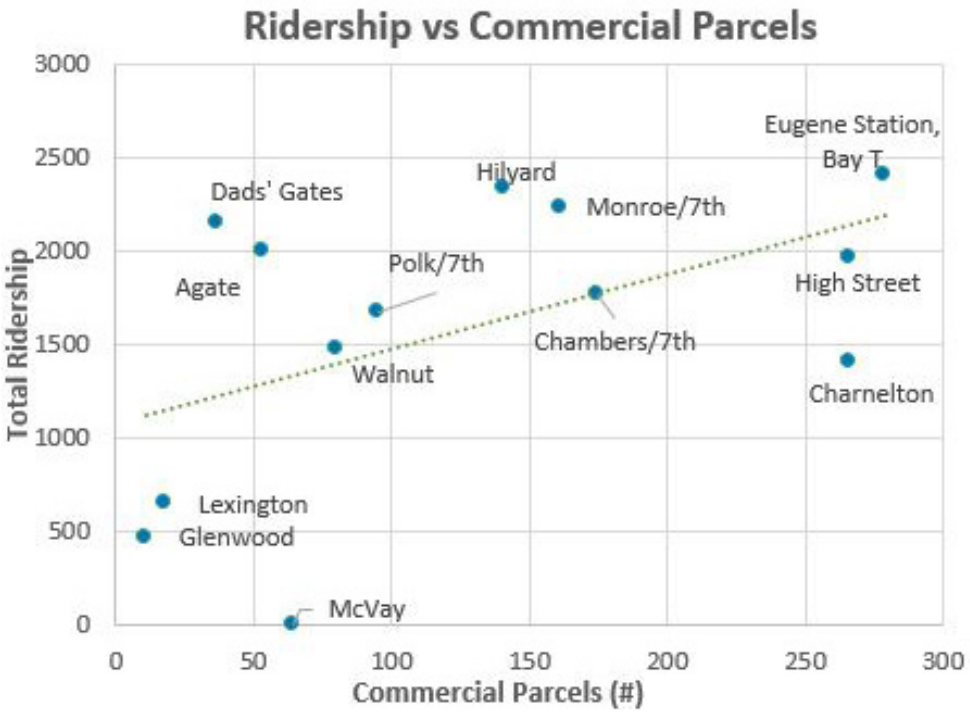


FIG. 27

Map of total ridership vs commercial parcels

FIG. 28

Graph of total ridership vs commercial parcels



Proximity to commercial parcels appears to have a positive relationship to ridership. Eugene Station has both the highest total ridership and number of commercial parcels nearby. Charnelton Station has a relatively high number of commercial parcels and is underperforming in ridership based on this metric. Hilyard Station has a relatively high ridership despite having a mid-range number of commercial parcels nearby.

PART D: TOTAL RIDERSHIP AND SOCIAL BIKE SHARE STATIONS

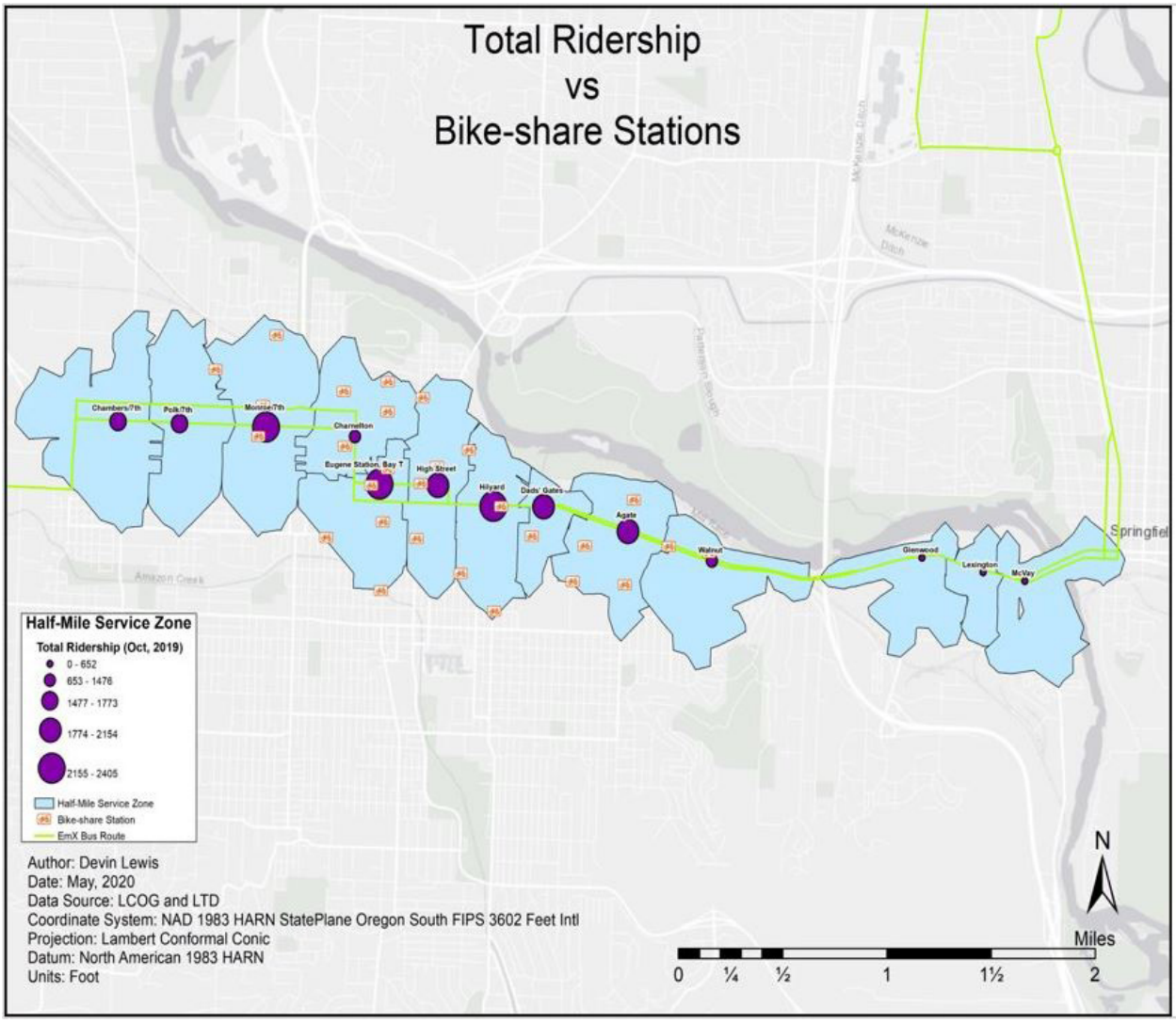
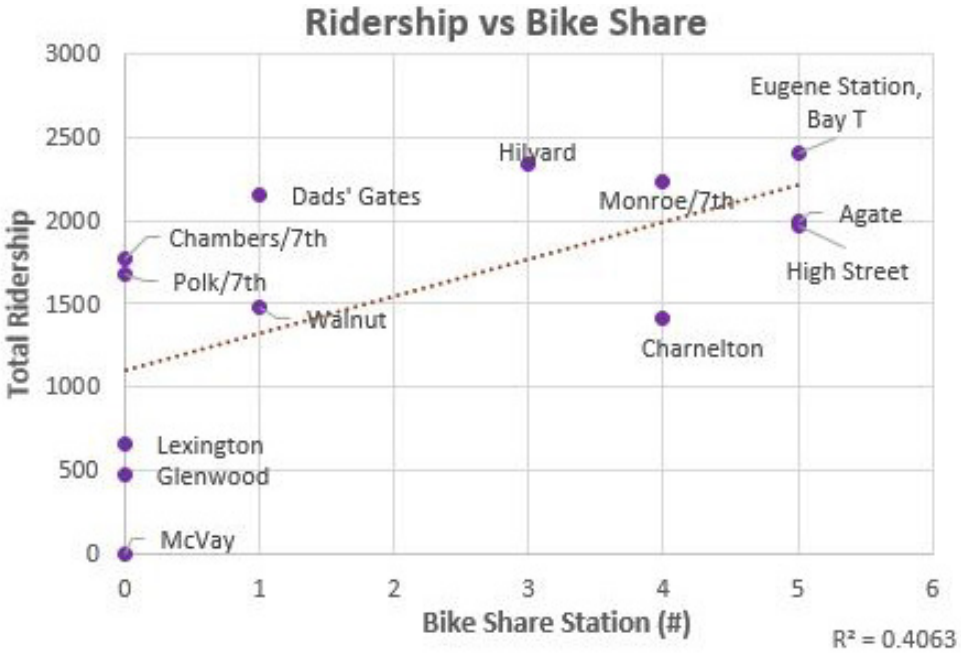


FIG. 29

Map of total ridership vs bike share stations

FIG. 30

Graph of total ridership vs bike share stations



There is a positive relationship between total ridership and the concentration of social bike share stations in a service zone. Eugene, Agate, and High Street stations have five bike share stations in each zone and maintain relatively high ridership counts. Based on this metric, Charnelton Station is underperforming in ridership despite having four bike share stations in its service zone.

Study Area Stations and Recommendations

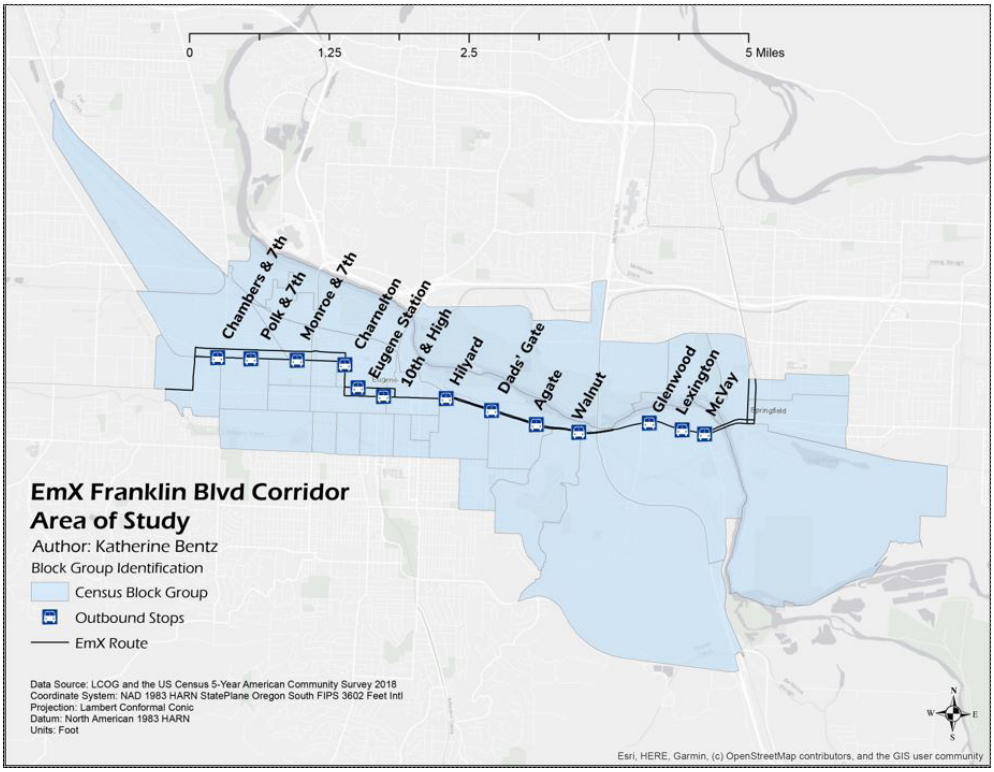


FIG. 31
Map of study area stations

MCVAY STATION

McVay Station is located at the intersection of Franklin Boulevard and Brooklyn Street. Within the half-mile service zone there are two care facilities and two parks. Land use around the station is primarily industrial and commercial. The station is located near recreational facilities such as a boat ramp. Walking and biking infrastructure around the station is present but disconnected. The station is located along McVay Highway, making it a high-speed area that lacks tree coverage and greenery. McVay Station became operational after October 2019, thus ridership data is limited.

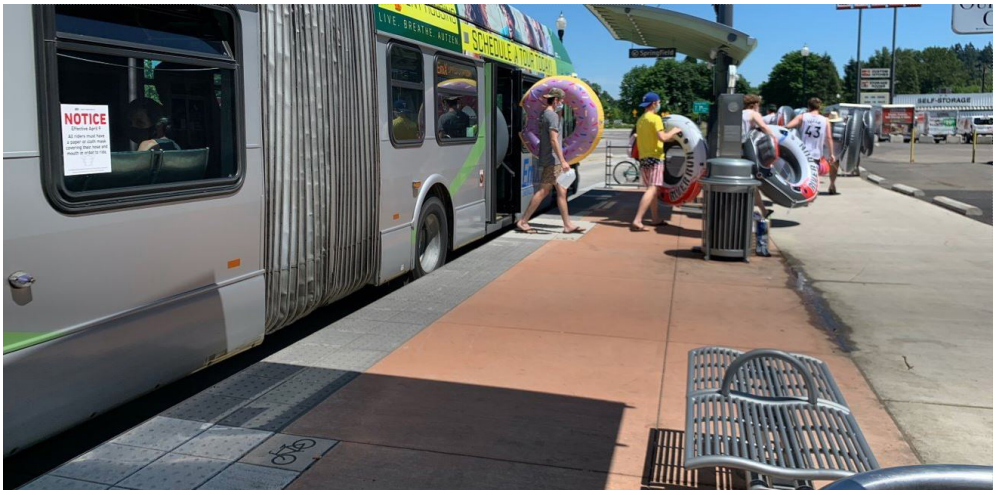


FIG. 32
Photo of McVay Station

Recommendations:

- Collaborate with Springfield and Eugene to create more recreation wayfinding signage
- Develop a program to educate bus drivers on destination directions near EmX stations so that drivers can better assist riders who seek navigation assistance
- Promote multi-modal connectivity by leveraging pedestrian and biking infrastructure improvements at McVay station.

LEXINGTON STATION

Lexington Station is located at the intersection of Franklin Boulevard and Mississippi Avenue. There is one destination (an adventure park) within the half-mile service zone. Compared to the other stations in the study, it is located around the fewest facilities. There are no bike-share stations within the service area. The station's service zone also has the lowest population density.

FIG. 33
Photo of Lexington Station

Recommendations:

- Improve walkshed safety by installing additional lighting at the station.
- Collaborate with the City of Springfield to develop a crosswalk at the station. Adding a crosswalk at this station would assist riders in crossing the street safely and improve street connectivity.
- Promote multi-modal connectivity by leveraging the expansion of sidewalks in this area.

GLENWOOD STATION

Glenwood Station is located in the Glenwood neighborhood. Within the half-mile service zone, there is a clinic, a care facility, several auto dealerships, and multiple hotels. There are limited facilities in the area and no bike share hubs. The surrounding area is primarily zoned for industrial and other uses. The service area has average walkability: sidewalks are not ADA compliant, there are no bike paths on the outbound side, and there is limited crosswalk access.

FIG. 34
Photo of Glenwood Station

Recommendations:

- Collaborate with the City of Springfield to make sidewalks around the station service area ADA accessible.
- Promote street connectivity by developing a crosswalk system between the station and Henderson Avenue.
- Improve bike infrastructure by adding bike paths and racks. Bicycle storage at the station would allow riders who commute to the station to safely store their bikes.
- Work in partnership with the cities of Springfield and Eugene to encourage non-residential facility development.

WALNUT STATION

The EmX Walnut Station Outbound is located at the intersection of Walnut Street and Franklin Boulevard. The station is at the middle of the crosswalk along the median that separates highways 126 and 99. Within the half-mile service zone there are nine other LTD bus stops, one bike share station, and five facilities. Outside the station service zone, there are three additional facilities and two bike share stations within walking distance. Destinations include three parks, a post office, the Maude Kerns Art Center, a Dutch Brothers Coffee, a Holiday Inn Express, and a 76 gas station. The most common land use type is residential parcels followed by commercial parcels. The station is equipped with several covers to protect riders from rain, an accessibility ramp, two trash units, and a bike rack. The Walnut Station service area has limited walkability, and most destinations around the station are optimized for car travel.

FIG. 35
Photo of Walnut Station

Recommendations:

- Increase safety warnings due to the station's proximity to highways.
- Collaborate with the City of Eugene to improve street connectivity around the station by developing additional crosswalks.
- With more destinations and crosswalks, the speed limit along Franklin Boulevard should be reduced to a speed that is ideal for pedestrian activity.

AGATE STATION

Agate Station is located at the intersection of Franklin Boulevard and Agate Street. Within the half-mile service zone there are two facilities and five bike share hubs. The land use mix in the service zone is mostly commercial. Pedestrian and biking infrastructure is present around the station; however, it is disconnected. It is in a high-speed area that has various recreational uses.

FIG. 36
Photo of Agate Station

Recommendations:

- Work with the City of Eugene to develop a bike lane on Franklin Boulevard by this station.
- Improve traffic light timing to make walking and biking to the station more immediate and aligned with the EmX bus schedule.
- Educate bus drivers on directions to destinations nearby the EmX station.

DADS' GATE STATION

Dads' Gate Station is located along 11th Avenue and Old Campus Lane. Within the half-mile service zone there are two care facilities and one bike share hub. The station serves the University of Oregon. The land use type is mostly commercial. The station accumulates more ridership than other stations with similar PCR and land use entropy. The majority of the bikeways around the walkshed are connected except those directly serving the station.

FIG. 37
Photo of Dads' Gate Station

Recommendations:

- Connect bikeways directly to the EmX station.
- Incorporate more station art that coincides with the University of Oregon.
- Add a vegetation barrier between sidewalk and the street to prevent non-crosswalk crossings.

HILYARD STATION

Hilyard Station is located on Hilyard Street between the University of Oregon and downtown Eugene. This station incorporates a guardrail surrounding the station that prevents pedestrians from cutting across the street illegally. Nearby amenities include three social bike stations, two police stations, and the PeaceHealth hospital.

FIG. 38
Photo of Hilyard Station

Recommendations:

- Add an accessible pedestrian signal (a verbal voice message prompting pedestrian crossing).
- Add specific signage at the station indicating the nearby transfers to other bus lines and to the bike share stations.
- Work to publicize “park and ride” options for bus riders and bike share users.

HIGH STREET STATION

High Street Station is located near the "entrance" of downtown Eugene. This station has the highest land use entropy (0.60) and highest population density (22 people per acre) in the Franklin Corridor. It also has relatively high housing density (7 units per acre). There is a great variety of nearby amenities including five bike share stations, city hall, a park, a shopping center, government offices, and a police station. However, despite these metrics that would imply high ridership, ridership is in the medium range and is well below what would be expected for this station. This station underperforms, possibly due to surrounding parking lots.

FIG. 39

Photo of High Street Station

Recommendations:

- Add an accessible pedestrian signa prompting pedestrian crossing for the High Street intersection.
- To improve ridership, coordinate with the City of Eugene to change parking requirements for this area.

EUGENE STATION, BAY T

The Eugene Station is located in the heart of Downtown Eugene and has 17 different terminals that connect 28 bus lines. Because of this station's interconnectedness, it maintains very high ridership counts. Other amenities that add to the station's high ridership include high levels of non-car owning households in this area and five social bike stations within a half-mile walk from this station. There is a great variety of nearby facilities including the public library, many restaurants, the Downtown Athletic Club, Chase Bank, and the Kiva grocery store.

FIG. 40
Photo of Eugene Station

Recommendations:

- Enhance the green space around the station by adding concrete planters and/or additional trees.

CHARNELTON STATION

The Charnelton Station sits between downtown and West Eugene. Charnelton Station is underperforming despite having four nearby bike stations and a variety of nearby facilities including five arts centers, a health clinic, a care center, and the Lane County Courthouse. There is a high commercial acreage in the walkshed which correlates with high ridership for this station. Some of the drawbacks of this station include the lack of direct access to landmarks in the street design, the uninviting surroundings of the station, and that the commercial acreage is concentrated in services rather than shopping. This station could be performing better with a few improvements.

FIG. 41

Photo of Charnelton Station

Recommendations:

- Add natural and artistic elements to the station design to make the station stand out against street design and elevate waiting experiences for bus riders.
- Add specific signage at the station indicating the nearby transfers to EmGo (a sustainable electric ride share service) and to the bike share stations.
- Work with nearby businesses to increase awareness of shopping and experiences near the station.

MONROE/7TH STATION

The Monroe and 7th Avenue Station is located in West Eugene. This is a side-boarding BRT station with a designated bus lane. The Monroe/7th Station walkshed is mostly commercial and residential. There is noise pollution from the four lanes of traffic on 7th Avenue. The station lacks seating options and could use some greenery or art to enhance the appeal for EmX riders. This station's ridership is relatively high. There are two nearby bike share stations and a variety of nearby facilities including a park, a care facility, a private school, a school district facility, and a winery.

FIG. 42
Photo of Monroe/7th Station

Recommendations:

- Connect more bikeways directly to the EmX station.
- Incorporate side-boarding island with a protected bike lane along 7th Avenue.
- Add a vegetation barrier between sidewalk and street.
- Improve bikeway connectivity from the station to the three nearby parks in the walkshed.

POLK/7TH

Polk/7th Station is located between Polk Street and 7th Avenue. Within the service zone, there is a care facility and one bike hub. Pedestrian infrastructure is lacking at the station, and it can be difficult for riders to cross from the adjacent street. Land use around the station is mostly commercial and industrial. There is a covering to protect from rain, a ramp, and a trash can. Public art and appropriate shelter make the station a pleasant waiting area.

FIG. 43
Photo of Polk/7th Station

Recommendations:

- Improve walking infrastructure to better protect pedestrians as they cross 7th Avenue or Polk Street.
- Increase the number of bikeshare hubs around the station.

CHAMBERS/7TH STATION

Chambers and 7th is the farthest station in West Eugene and this station connects riders to the River Road and Bethel-Danebo neighborhoods. Like the Monroe/7th Avenue station, it is very busy due to the four lanes of traffic on 7th Avenue. Some drawbacks include a lack of a bike lane so it would be challenging for riders to utilize active transportation. Some of this station's highlights include primarily industrial and commercial land use and appropriate shelter, seating, and public art.

FIG. 44
Photo of Chambers/7th Station

Recommendations:

- Improve walking infrastructure to better protect pedestrians as they cross 7th Avenue or Chambers Street.

Key Findings

This section presents a summary of findings. It is organized into four sections: Neighborhood Characteristics, Accessibility and Connectivity, Land Use Mix, and Station Ridership.

NEIGHBORHOOD CHARACTERISTICS

- The majority of residents in the study area are outside of the 25 – 54 age range. In 2018, 36% of residents in the study area reported being between the ages of 25 and 54.
- There is a more significant percentage of households living below poverty in the study area than in Lane County as a whole. In 2018, there was an average of 25% of households living below the poverty level. Lane County has an overall poverty rate of 18.1% (U.S Census Bureau, 2019).
- Vehicle ownership is high along the Franklin Boulevard Corridor. In 2018, an average of 8% of households in the study area reported not having a vehicle accessible.

ACCESSIBILITY AND CONNECTIVITY

- All service areas have pedestrian catchment ratios that are below the optimal range of 0.50 (Schlossberg).
- The highest PCRs are located in West Eugene.
- Overall, there are numerous destinations within the service zones.
- Several walksheds have one bike share hub or none.
- Bike share hubs are clustered around downtown Eugene and the UO campus.
- The Glenwood area is lacking in bike stations, bus stations, and facilities.
- Eugene Station has the most nearby facilities, buildings, bus stations, and bike stations.

LAND USE MIX

- Areas in west and central Eugene are highly residential.
- Parts of downtown Eugene and Glenwood are highly commercial.
- Overall, parks and open spaces are lacking in the study area.
- We see higher land use entropy ratios in the UO campus area, part of the Glenwood neighborhood, and in downtown Eugene.

STATION RIDERSHIP

Highest performing stations
Dads' Gate
Hilyard
Chambers/7th
Agate
Polk/7th
Eugene Station

Lowest performing stations
High Street
Charnelton
Lexington
Glenwood
McVay

Recommendations

This section provides recommendations informed by neighborhood characteristics for LTD to consider as they re-evaluate the EmX Franklin Corridor route and stops. The recommendations are organized into two categories: Safety Improvements and Facility Improvements.

SAFETY IMPROVEMENTS

- Invest in audio, communication, light, and advanced sensor technologies at stations, such as intelligent transportation systems (ITS) or connected/automated vehicle technologies (C/AV). Implementation of these technologies can increase safety for pedestrians by making all parties on the road more aware of their surroundings (U.S Department of Transportation, 2016; Smith; 1998).
- Consider developing additional lighting infrastructure to increase visibility at stations. Greater visibility can create more secure stations by protecting vulnerable riders from potential crime or self-inflicted accidents (National Center For Transit Research, 2003). Evaluate the current lighting at all stops, especially in stations located near block groups that have larger female populations.
- Coordinate with the cities of Eugene and Springfield to improve the sidewalk connectivity, marking, and signage. Various stops lead into areas that lack sidewalks and are not ADA compliant.

FACILITIES IMPROVEMENTS

- Develop additional bike facilities, such as bicycle storage, instructions for on-bus storage, and additional bike share hubs in Walnut Station, Glenwood Station, Lexington Station, and McVay Station.
- Re-evaluate the viability of underperforming stations that may be located near destinations and infrastructure that is optimized for automobile transportation.
- Advocate for the development of mixed land use types in service zones located in Springfield. Walksheds within Springfield have lower entropy ratios. By creating more destinations and facilities, ridership may improve in this section of the study area.
- Improve the quality of station art by ensuring that design themes are meaningful to Eugene and Springfield residents.

Conclusion

In this report, students analyzed each of Lane Transit District's EmX Franklin Boulevard Corridor's 13 stations, their half-mile service areas, street segments, and surrounding neighborhoods. For each unit of analysis, walkability, safety, accessibility, and public use and public life were analyzed. The report provides recommendations to improve ridership and quality of the stations.

References

Smith, S., Transcore, A., & Federal Highway Administration, W. (1998). Integrating Intelligent Transportation Systems within the Transportation Planning Process: An Interim Handbook.

https://www.nctr.usf.edu/pdf/473-13.pdf

Appendix

Table 1

1- Block Group 3, Census Tract 45.02, Lane County, Oregon
2- Block Group 2, Census Tract 33.02, Lane County, Oregon
3- Block Group 4, Census Tract 38, Lane County, Oregon
4- Block Group 2, Census Tract 37, Lane County, Oregon*
5- Block Group 3, Census Tract 42, Lane County, Oregon
6- Block Group 2, Census Tract 49, Lane County, Oregon
7- Block Group 1, Census Tract 37, Lane County, Oregon
8- Block Group 2, Census Tract 45.02, Lane County, Oregon
9- Block Group 4, Census Tract 31.02, Lane County, Oregon
10- Block Group 3, Census Tract 44.03, Lane County, Oregon
11- Block Group 1, Census Tract 42, Lane County, Oregon
12- Block Group 3, Census Tract 45.01, Lane County, Oregon
13- Block Group 1, Census Tract 45.01, Lane County, Oregon
14- Block Group 1, Census Tract 40, Lane County, Oregon
15- Block Group 2, Census Tract 40, Lane County, Oregon
16- Block Group 3, Census Tract 32.02, Lane County, Oregon
17- Block Group 2, Census Tract 32.02, Lane County, Oregon
18- Block Group 3, Census Tract 33.02, Lane County, Oregon
19- Block Group 1, Census Tract 36, Lane County, Oregon
20- Block Group 3, Census Tract 38, Lane County, Oregon
21- Block Group 1, Census Tract 32.02, Lane County, Oregon
22- Block Group 1, Census Tract 49, Lane County, Oregon
23- Block Group 2, Census Tract 45.01, Lane County, Oregon
24- Block Group 5, Census Tract 38, Lane County, Oregon
25- Block Group 2, Census Tract 42, Lane County, Oregon
26- Block Group 2, Census Tract 38, Lane County, Oregon
27- Block Group 1, Census Tract 38, Lane County, Oregon
28- Block Group 3, Census Tract 40, Lane County, Oregon
29- Block Group 3, Census Tract 39, Lane County, Oregon
30- Block Group 3, Census Tract 36, Lane County, Oregon
31- Block Group 1, Census Tract 39, Lane County, Oregon
32- Block Group 2, Census Tract 39, Lane County, Oregon
33- Block Group 1, Census Tract 35, Lane County, Oregon
34- Block Group 1, Census Tract 45.02, Lane County, Oregon

Table 2

EmX Agate Station Outbound
EmX Glenwood Station outbound
EmX Lexington Station outbound
Eugene Station, Bay T
Monroe/7th Station Outbound
EmX Dads' Gates Station Outbound
Polk/7th Station Outbound
EmX McVay Station Outbound
EmX Walnut Station Outbound
Charnelton Station Outbound
Chambers/7th Station Outbound
EmX High Street Station outbound
EmX Hilyard Station Outbound

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