APPENDIX B

CORRIDOR PRIORITIZATION

This document provides the approach and methodology used to evaluate and prioritize the candidate corridors. It introduces the evaluation accounts and the relevant criteria.

Pierce Transit Stream

Stream System Expansion Study
Corridor Prioritization Methodology

January 12, 2022

Table of Contents

Overview

- The ***Stream BRT*** System Expansion Study (SSES) will prioritize the next ***Stream BRT*** corridor and set a program for subsequent project development.

- The SSES will prioritize among four candidate BRT corridors identified in the Pierce Transit Long Range Plan – Destination 2040.

DESTINATION
2040

Pierce Transit • Long Range Plan Update

DECEMBER 14, 2020

Study Purpose

- The SSES will use a data-driven approach to evaluating the four candidate BRT corridors identified in Destination 2040 (depicted in the map on the right).

- Prior to application of the prioritization criteria identified in this document, the SSES team will conduct a series of corridor planning activities to better define the characteristics of BRT features and operations for each corridor.

Figure 7–4: Bus Rapid Transit Corridors—Current and Proposed
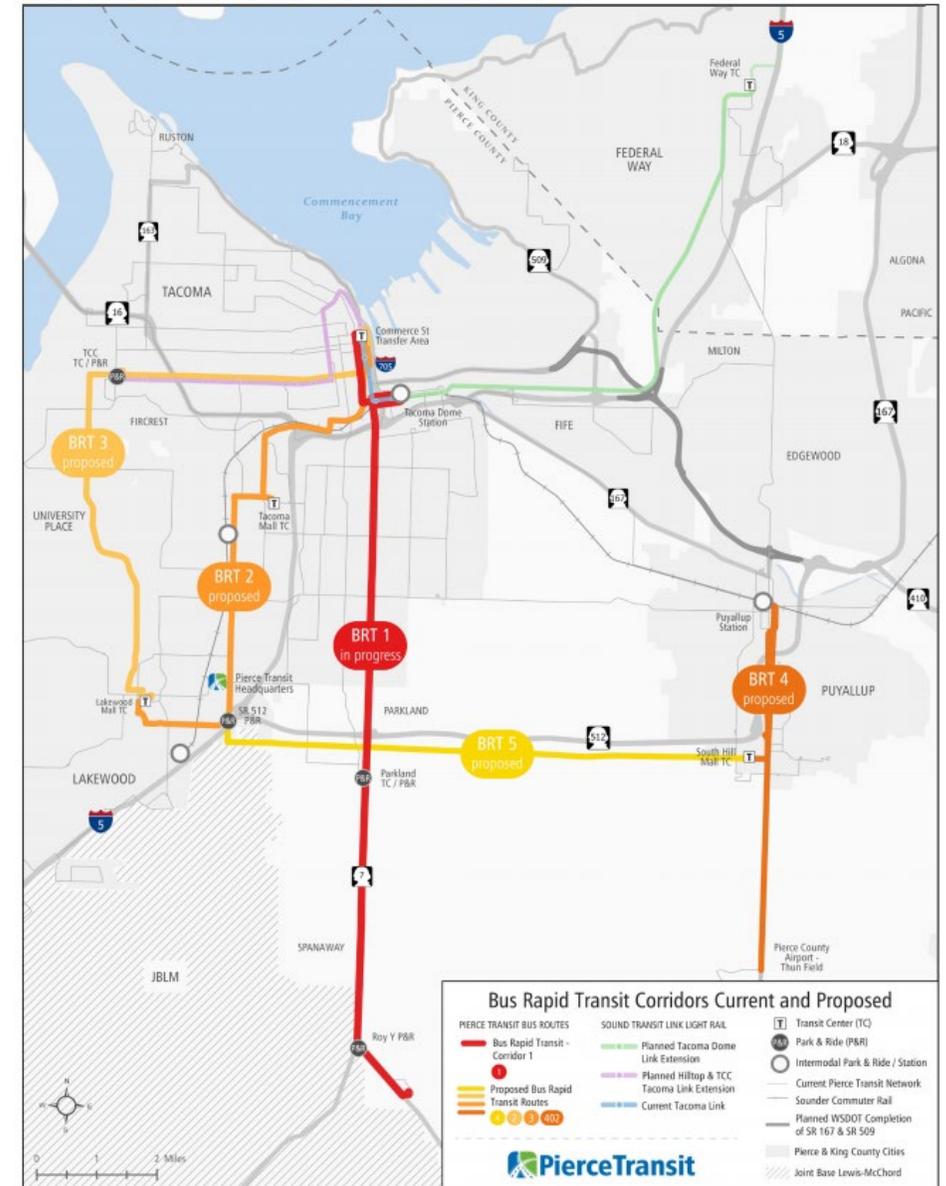
Prioritization Approach

The following are key steps in the approach to prioritizing the candidate Stream BRT corridors.

Prioritization
Methods

Corridor
Definition

Corridor
Evaluation

Weighted
Decision
Making

Prioritization
and Action
Plan
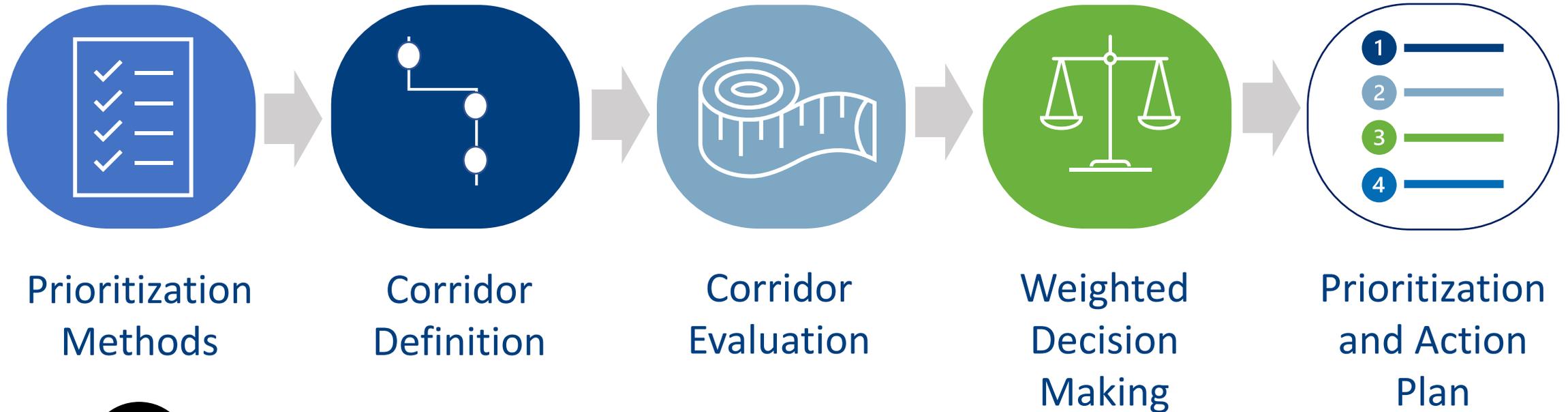
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Prioritization Key Steps

This table provides more detail on the key steps that will be used to prioritize the 4 candidate BRT corridors.

	Prioritization Methods	Develop prioritization criteria, methods for each criterion, and identify data assumptions.
	Corridor Definition	Develop planning level assumptions for each of four candidate BRT corridors to underpin evaluation. This includes running way treatments, station locations, etc.
	Corridor Evaluation	Conduct technical work to evaluate four candidate corridors based on identified prioritization criteria. Includes evaluation potential ridership, cost, etc.
	Weighted Decision Making	Test and determine weighting of prioritization criteria. Determine preferred weighting based on community and Technical Advisory Committee input.
	Prioritization & Action Plan	Finalize prioritization results and develop next steps, actions for corridor project development, including concept designs for the top priority corridor.

Prioritization Approach

- SSES will use both *quantitative* criteria and *qualitative* criteria to evaluate the potential performance of the four candidate corridors.

- SSES prioritization criteria are organized in five "accounts" or related groups of measures. These attempt to reflect goals and priorities identified in Pierce Transit and local community plans.

ENHANCE	Provide BRT service to the highest demand, highest need corridors in the Pierce Transit service area.
CONNECT	Connect residents with jobs, services, and other daily activities.
GROW & PROSPER	Provide BRT services to areas with transit supportive land use, areas of growth, and locations that support local businesses.
SUSTAIN	Reduce emissions and promote sustainable travel.
DELIVER	Develop BRT projects that are fundable, effective, and implementable.

Racially Equitable Outcomes

- Expanding and improving high-frequency, high-quality BRT service to those who rely on transit most is a critical priority for Pierce Transit.

- To ensure **Stream BRT** outcomes are equitable it is proposed that equity be accounted for in each of the five key evaluation areas (accounts).

- Priority populations are defined as communities of color, low-income households, limited-English speaking households, people with disabilities, and foreign-born individuals.

SSES Equity Index

- The SSES Equity Index is an index of Priority Populations that will be used in weighted combination to measure equitable outcomes.

- The Equity Index is applied/used in combination with other measures.

- Weights applied to each Priority Population is influenced by extensive research and analysis conducted by in the Puget Sound region.

| Evaluation Metric |
|---|
| Households (Total) |
| Jobs (Total) |
| Lower Wage Jobs (Total) |
| Priority Populations (Weighted Total) |
| PSRC's 2050 Regional and Local Centers (Area) |
| Key Activity Centers identified by Project Team (Area) |

SSES *Priority Populations* and Weighting

| Priority Population	Weight
Communities of Color (Total)	30%
Low-Income Households (Total)	40%
Limited English Households (Total)	10%
Individuals with a Disability (Total)	10%
Foreign-Born Individual (Total)	10%

Equity Index

- There are four components of the equity index.

- See Appendix A for more detail.
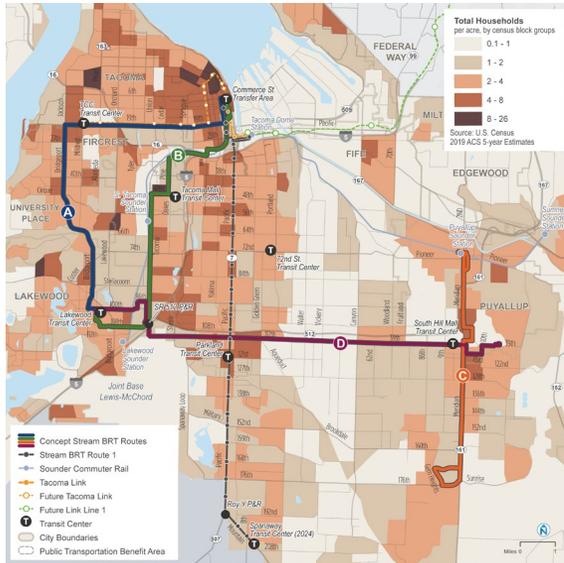
Population
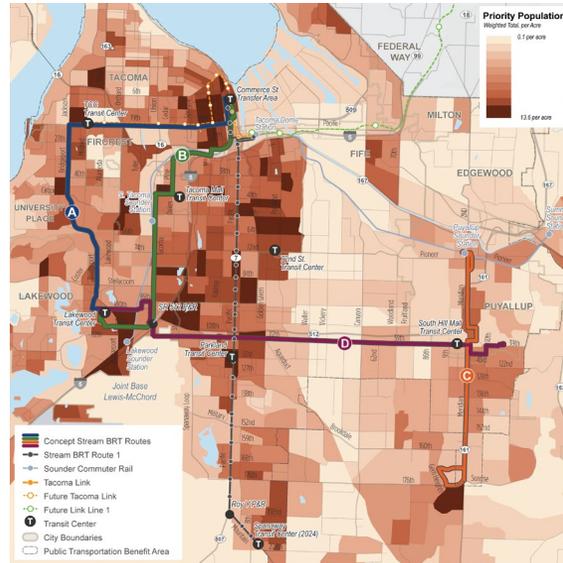
Equity Index

Jobs / Opportunity
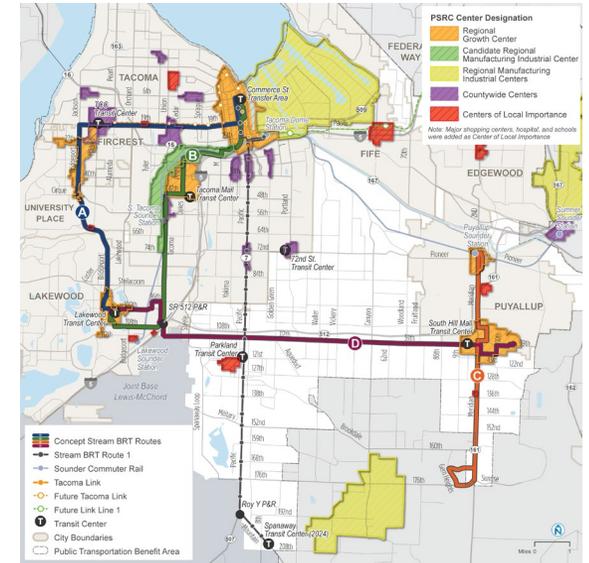
Activity / Life

Equity Index Analysis Results

- Corridors A and B received high scores across all criteria.

- Corridor A would serve more households.

- Corridor B would serve more jobs and activity locations.

- Both Corridors A and B would serve higher concentrations of priority population.

Corridor	Population Score	Equity Index Score	Job Score	Activity Score
A	10	10	8	7
B	6	9	10	10
C	2	1	2	2
D	1	3	1	1

ENHANCE

Provide BRT service to the highest demand, highest need corridors in the Pierce Transit service area.

PRIORITIZATION CRITERIA	DESCRIPTION	APPROACH/METHODS
Future Daily Boardings	Total 2040 weekday transit trips for proposed corridor.	Sound Transit Ridership Forecasting Model used to estimate corridor ridership.
New Transit Trips	Net new 2040 weekday transit trips for proposed corridor.	Sound Transit Ridership Forecasting Model used to net new daily boardings.
Equity Index Weighted Ridership	Total 2040 weekday ridership weighted by equity index score.	Station level ridership (from Sound Transit Ridership Forecasting Model) is multiplied by the Equity Index score based on geographic location of the station.
Ridership Resiliency	Ridership during pandemic identifies most essential trips that were difficult to substitute with other modes.	Pierce Transit existing stop-level boardings from Summer 2020 compared to pre-COVID-19 ridership in Summer 2019.

CONNECT

Connect residents with jobs, services, and other daily activities.

PRIORITIZATION CRITERIA	DESCRIPTION	APPROACH/METHODS
Regional and Local Connectivity (Jobs)	Change in number of jobs accessible in 15-, 30-, and 45-minute travel sheds.	Develop set of representative origins for PT service area and region. Evaluate change in 15-, 30-, and 45-minute travel sheds. 2040 population and employment within each origin's 45-minute travel shed calculated, values from each shed aggregated to produce a total household and employment accessibility value.
Regional and Local Connectivity (Households)	Change in number of households accessible in 15-, 30-, and 45-minute travel sheds.	
Regional Connectivity for Communities of Concern	Change in number of jobs and households accessible for Communities of Concern.	Same analysis as above but focused on origins within identified Priority Populations. PSRC does not forecast the location of Priority Populations; this would be extrapolated from current TAZ data.
Maximize Connectivity with Regional Transit Services	Estimated boarding activity at major transfer locations where important connections to local (PT) and regional service (ST) are available.	Project station level boarding for 2040 at stations that connect with Link Light Rail, Sounder, Pierce Transit ***Stream BRT*** Pacific Avenue/SR 7, or that serve as major hubs/transfer points for Pierce Transit local service.

GROW & PROSPER

Provide *Stream BRT* service to areas with transit supportive land use, areas of future growth, and locations that support local businesses.

PRIORITIZATION CRITERIA	DESCRIPTION	APPROACH/METHODS
Land Use and Affordable Housing Alignment	Potential for BRT to serve transit-supportive development and affordable housing.	Assessment of areas where transit-oriented development and affordable housing is expected based on local and regional plans.
Potential for BRT Supported Redevelopment	Potential for redevelopment along corridor.	Evaluation of zoning regulations and potential buildout development; evaluation of ratio of building value to underlying property value.
Centers of Local Importance Served	# of identified Centers of Local Importance within ½ mile candidate corridor stations.	GIS evaluation of PSRC identified Centers of Local Importance.
Jobs Served	Total jobs served by corridor (2040).	GIS evaluation of total jobs served within ½ mile of proposed corridor stations.
Support Local and BIPOC Businesses	Small businesses served BIPOC-owned businesses served.	Evaluation of total locally owned and BIPOC businesses within ½ mile of proposed corridor stations (if available).

SUSTAIN

Reduce emissions and promote sustainable travel.

PRIORITIZATION CRITERIA	DESCRIPTION	APPROACH/METHODS
Reduce Greenhouse Gas Emissions	Potential reduction greenhouse gas emission based on estimated vehicle miles traveled reduced from new ridership (assumes new Stream BRT routes will use zero emissions vehicles).	Estimated reduction in transit vehicle greenhouse gas emission on candidate corridor + estimated reduction in private vehicle emissions from mode shift to transit.
Pedestrian/Bicycle Safety & Accessibility	Quality of pedestrian and bicycle access to stations (outside station access buffer), opportunity to improve identified deficiencies inside buffer, AND importance measured by historic prevalence of ped/bike involved crashes.	Completeness of sidewalks and bicycle system; note sidewalk deficiencies, noted gaps in bicycle system, high crash locations.
Pedestrian/Bicycle Safety & Accessibility *Priority Populations*	Same as above weighted for Priority Populations served.	Opportunity to improve access to transit in historically underinvested areas with high need.
Increase transit mode share in corridor	Potential increase in transit mode share in BRT candidate corridor.	Estimated new transit riders from Sound Transit Ridership Model * regional estimate of new trips shifted from private vehicle travel.

DELIVER

Develop BRT projects that are fundable, effective, and implementable.

PRIORITIZATION CRITERIA	DESCRIPTION	APPROACH/METHODS
Cost Effectiveness	Annualized Capital and Annual Operating Cost per Net New Rider.	Net new annual operating cost to reach BRT service levels + annualized project capital cost (20-year annualization) / Net New Riders from project (ridership forecast).
Reliability	Reliability of bus arrival and travel time for corridor transit users.	Estimated benefit from transit priority treatments; % of corridor with transit priority.
Passenger Weighted Travel Time Reduction	Potential reduction in person delay.	Passenger weighted delay reduction based on planning level estimate of travel time reduction from transit lanes, signal priority and other treatments x project ridership.
Funding Potential	Estimated score for Small Starts Project Justification.	Calculate score for 6 non-financial Small Starts Project Justification Criteria (mobility improvements, environmental benefits, congestion relief, economic development, land use, cost-effectiveness).
Implementation Feasibility	Assessment of political support and corridor readiness.	Demonstrated political support for BRT investments; ability to take advantage of other planned projects.

Evaluation Precedent

- The High-Capacity Transit Feasibility Study for Pacific Avenue/SR 7 conducted a similar evaluation. The Purpose and Need and criteria from that study are an instructive resource.

- These are illustrated in the table to the right.

Figure 1–1: Results of Modal Evaluation

PURPOSE AND NEED GOALS		NO BUILD (CURRENT SERVICE)	ENHANCED BUS	BUS RAPID TRANSIT	STREETCAR	LIGHT RAIL TRANSIT
1	The project will increase transit ridership by reducing transit travel time, improving trip reliability, increasing service frequency, and enhancing transit's comfort, convenience and image.	○	◑	◕	◕	◕
2	The project will provide cost-effective transit service in the Study Corridor.	◔	◔	◔	◔	○
3	The project will increase transit capacity to meet current and projected transit travel demand.	○	◑	◕	●	●
4	The transit service will be accessible to all populations, including minorities, people with low income levels, and those that are transit dependent.	●	◕	◕	◕	◑
5	The project will promote environmental stewardship and sustainability by reducing greenhouse gas emissions and supporting smart growth.	○	◑	◕	●	◕
6	The project will improve access to the Study Corridor transit service for pedestrians and bicyclists.	○	◑	◕	◕	◑
7	The project will provide improved connections with other local or regional travel modes.	○	◑	●	●	◕
8	The project will have a high likelihood of funding through identified grant programs and new funding sources.	○	◔	◕	◑	◔
9	Enhance safety and security for transit patrons and public health overall.	○	◑	◕	◕	◕
10	The project will support planned local and regional growth and corridor revitalization efforts	◔	◑	◕	◕	●
11	The project will be consistent with adopted local and regional transportation plans.	○	◔	●	○	○
12	The project will minimize adverse impacts to other travel modes and adjacent property.	●	●	◑	◔	◔
Total Score		**24**	**41**	**49**	**42**	**40**
Average Score by Goal		**2.1**	**3.4**	**4.1**	**3.5**	**3.3**

Average score calculated by assigning numerical values as follows: ○ = 1   ◔ = 2   ◑ = 3   ◕ = 4   ● = 5

← Less Effective   More Effective →

Decision Making

- Initial evaluation using prioritization criteria will be conducted without weighting.

- Evaluation measures results will be normalized using a 5- or 7-point scale.

- Quantitative prioritization measures will be normalized using a "natural breaks" method.

- Qualitative prioritization measures will use the same scale and methods and will be established to determine scoring.

Example of Normalized Scoring in Multi-criteria Prioritization Study

ID	Description and Representative Extent/Alignment	Mode	Profile	Criterion 2 Transit Mode Share;-VMT and GHG Reduction Citywide Score	Criterion 4 Job Accessibility within 45 min Citywide Score	Regional Job Accessibility within 75 min Regional Score
	2050 Baseline Transit System			-	-	-
1D	16th Subway (Church – 3rd)	LRT	Subway	4.3	3.0	2.0
3A	Oakdale/Palou-Bayshore-24th BRT (Hunters Point - 24th & Mission BART)	BRT	At-Grade	1.3	2.0	2.0
4B	Geary (Salesforce TC - 48th)	LRT	At-Grade / Subway	5.0	5.0	5.0
6B	N-Judah with Sunset Tunnel Extensions (Church & Duboce–9th)	LRT	At-Grade / Subway	2.3	3.0	1.0
8	Muni Metro System Optimization (all lines except T-Third)	LRT	At-Grade / Subway	1.7	1.0	2.0
8E	Muni Metro M-Line Subway Extension, West Portal-Parkmerced	LRT	Subway	1.7	3.0	1.0
8DT1	Muni Metro Downtown Subway, Division-Howard (Church-Salesforce TC)	LRT	Subway	3.3	3.0	3.0
8DT2	Muni Metro Downtown Subway, Division-King (Church – 4th/King)	LRT	Subway	1.3	1.0	3.0
9A	San Bruno-Bayshore-Potrero via 9th/10th-Market (Visitacion Valley-Downtown)	BRT	At-Grade	1.0	1.0	4.0
10A	Central Subway Extension, T-Third Phase 3 (Chinatown-North Beach-Van Ness)	LRT	Subway	3.0	3.0	2.0
11A	19th/Park Presidio (Daly City BART-Golden Gate Toll Plaza/Presidio TC)	BRT	At-Grade	3.0	2.0	2.0
12A	3rd, T-Third Subway Extension and Surface Optimization (Bayshore-4th & King)	LRT	At-Grade / Subway	2.7	4.0	4.0

Multiple criteria normalized using 0 to 5 scoring system

Weighting with Community Priority

- It is likely that community members, stakeholders, and elected officials value certain outcomes (measures) over others.

- Weighting allows the SSES team to place value on measures that align with community values and priorities.

- We propose to survey the public, the Technical Advisory Committee, and possibly others as a tool to set criteria weighting.

Weighting with Community Priority

▪ The following is an example of an account-based prioritization scheme where key stakeholders and staff were surveyed to determine the weighting of "accounts" and individual criterion.

Results of Survey Based Weighting: San Francisco MTA Corridor Prioritization Study

Criterion	A. Unweighted	B. Equity	C. Sustainability	D. Economy & Transit	E. Outreach-Informed
1: Equity Rating (based on outreach)	10%	10%	5%	9%	7%
2: Change in Access to High-Capacity Transit (VMT, GhG Reduction)	15%	8%	26%	8%	15%
3: Population and Job Density (Growth)	0%	0%	0%	0%	0%
4a: Concept-Level Job Access within 45-min Access	10%	5%	5%	26%	10%
4b: ... for Communities of Concern	2%	5%	1%	1%	3%
4c: ... for Low Income Households	2%	5%	1%	1%	3%
5a: Provide equitable access to significant activity centers and services	8%	4%	14%	4%	8%
5b: ... for Communities of Concern	2%	5%	1%	1%	3%
5c: ... for Low Income Households	2%	5%	1%	1%	3%
6a: Maximize cost-effectiveness	12%	6%	6%	12%	6%
6b: ... for Communities of Concern	2%	5%	1%	1%	3%
6c: ... for Low Income Households	2%	5%	1%	1%	3%
7a: Maximize ridership	10%	5%	15%	10%	10%
7b: ... for Communities of Concern	2%	5%	1%	1%	3%
7c: ... for Low Income Households	2%	5%	1%	1%	3%
8: Align Transit Capacity and Demand	5%	3%	6%	8%	5%
9: Maximize System/Network Connectivity/Integration	5%	3%	6%	8%	5%
10a: Minimize Travel Time	5%	3%	6%	8%	5%
10b: ... for Communities of Concern	2%	5%	1%	1%	3%
10c: ... for Low Income Households	2%	5%	1%	1%	3%
11: Maximize Reliability	0%	0%	0%	0%	0%
Total	100%	100%	100%	100%	100%

Summary

- The SSES will identify a **top priority corridor** that would qualify for USDOT or other discretionary funding, up to and including the FTA Small Starts CIG program.

- The SSES will rank the remaining candidate Stream BRT.

- **Corridor preparedness actions** will be identified for candidate corridors ranked second priority or lower. These will identify opportunities for Pierce Transit and local jurisdictions to ready those corridors for future BRT Project Development and implementation, as well as potential funding opportunities.

Appendix A: Equity Analysis Methods

Inputs

1. Population

Population **Score** based on:

- Number of Households.

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Purpose of Analysis:

Identify places where vulnerable populations live, work, and conduct life activities and create an index to this data to be used as a factor in corridor prioritization.

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2. Equity Index

- Equity Index Score at block group level. Higher score indicates higher concentrations of Priority Populations.

- Weights are applied to each Priority Population based on extensive research and analysis conducted by King County Metro.

Priority Population	Weight
Non-white or Hispanic	40%
Low-income households (below 200% of federal poverty line)	30%
Foreign-born population	10%
Limited-English speaking households	10%
Populating living with disabilities, aged 20 to 64	10%

Analysis Inputs

3. Jobs and Opportunities

Opportunity Score based on:

- Total jobs.
- Low-income jobs (earning <$3,333 per month).

Access to Opportunities:

The jobs score includes all jobs then amplifies this information by adding low-income jobs. This tells us where existing low-income earners work but also where they might access future higher-paying jobs.

4. Activity (Life, other than employment)

Activity Score based on:

- PSRC's 2050 regional and local centers and destinations.

- Identifies key activity centers such as schools, hospitals, retail, and grocery stores, Centers are arrayed in hierarchy based on level of activity. Also are places of emphasis to accommodate growth.

Interim Regional Centers, Countywide Centers, and Centers of Local Importance for 2020 Funding Competition
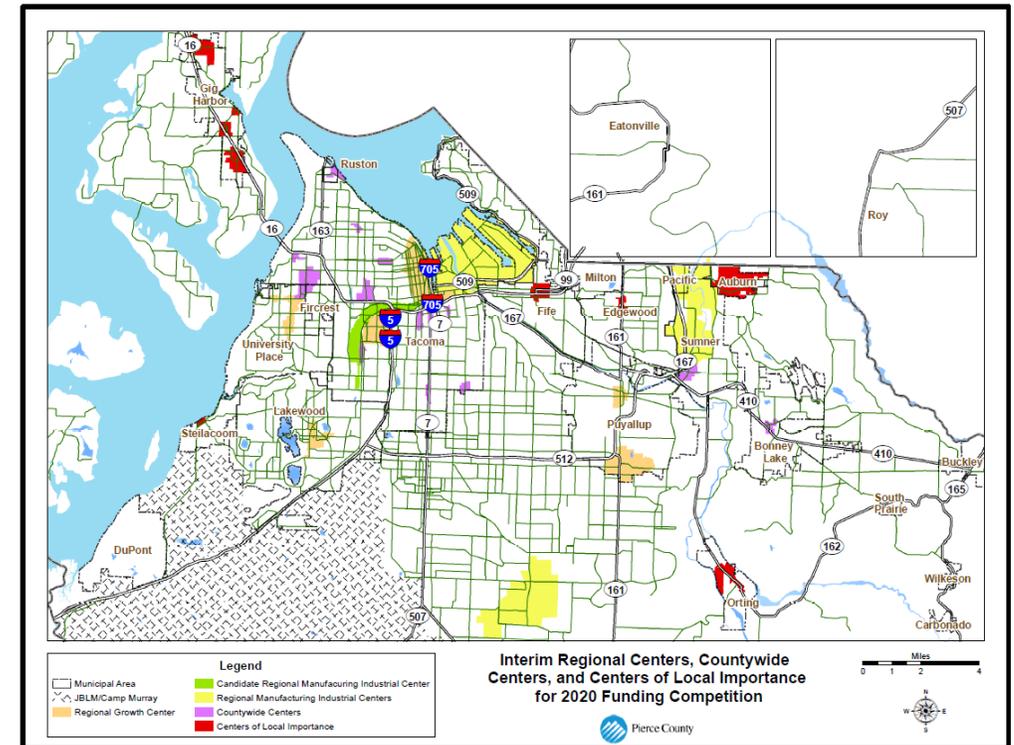
Scoring

- Developed 10-scale score system for each criterion:
  - Identified the data range (from the lowest to the highest value)
  - Used equal interval to develop 10-scale system
  - Corridor with the lowest value gets a score of 1
  - Corridor with the highest value gets a score of 10.

- Total score equals to the sum of all individual scores.

Score

Highest Value

```
10 ----- ⑩ -----
 9 --------------- ┐
 8 ----- ⑧ -----  ├ Equal interval
 7 --------------- ┘
 6 ---------------
 5 ---------------
 4 ---------------
 3 ---------------
 2 ----- ② -----
 1 ----- ① -----
```

Lowest Value
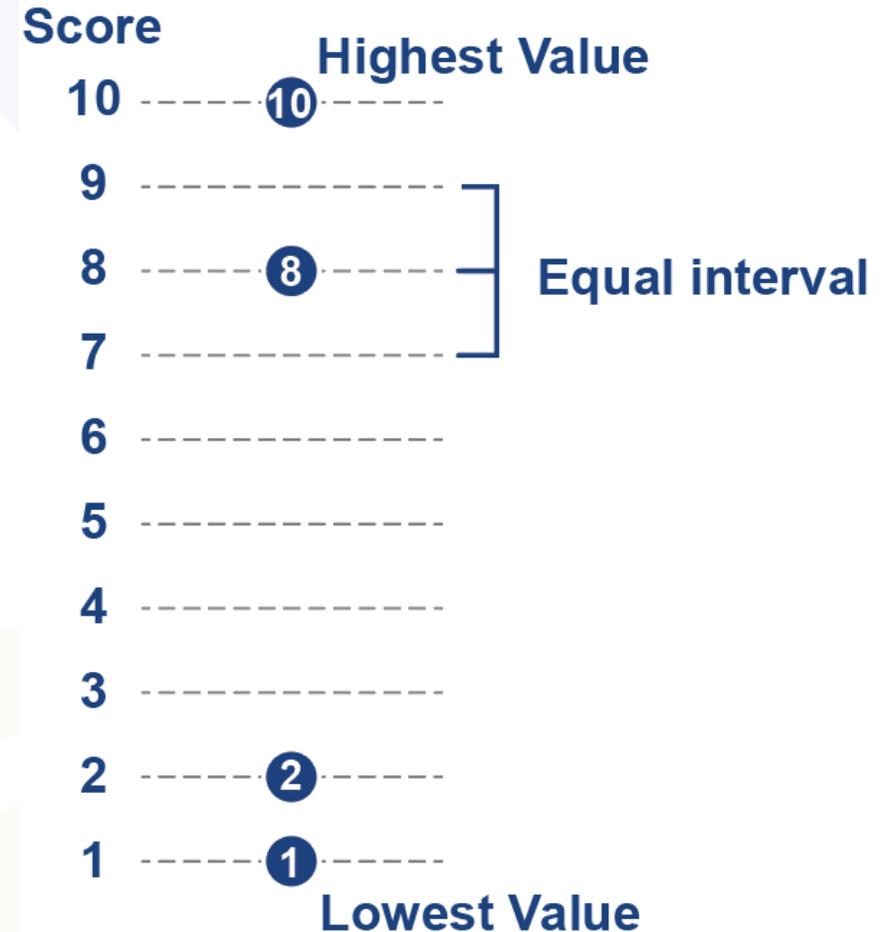
Equity Analysis Geography

Analysis Buffers

- Half-mile walksheds around proposed stops.

- Stop buffers were merged for each corridor.
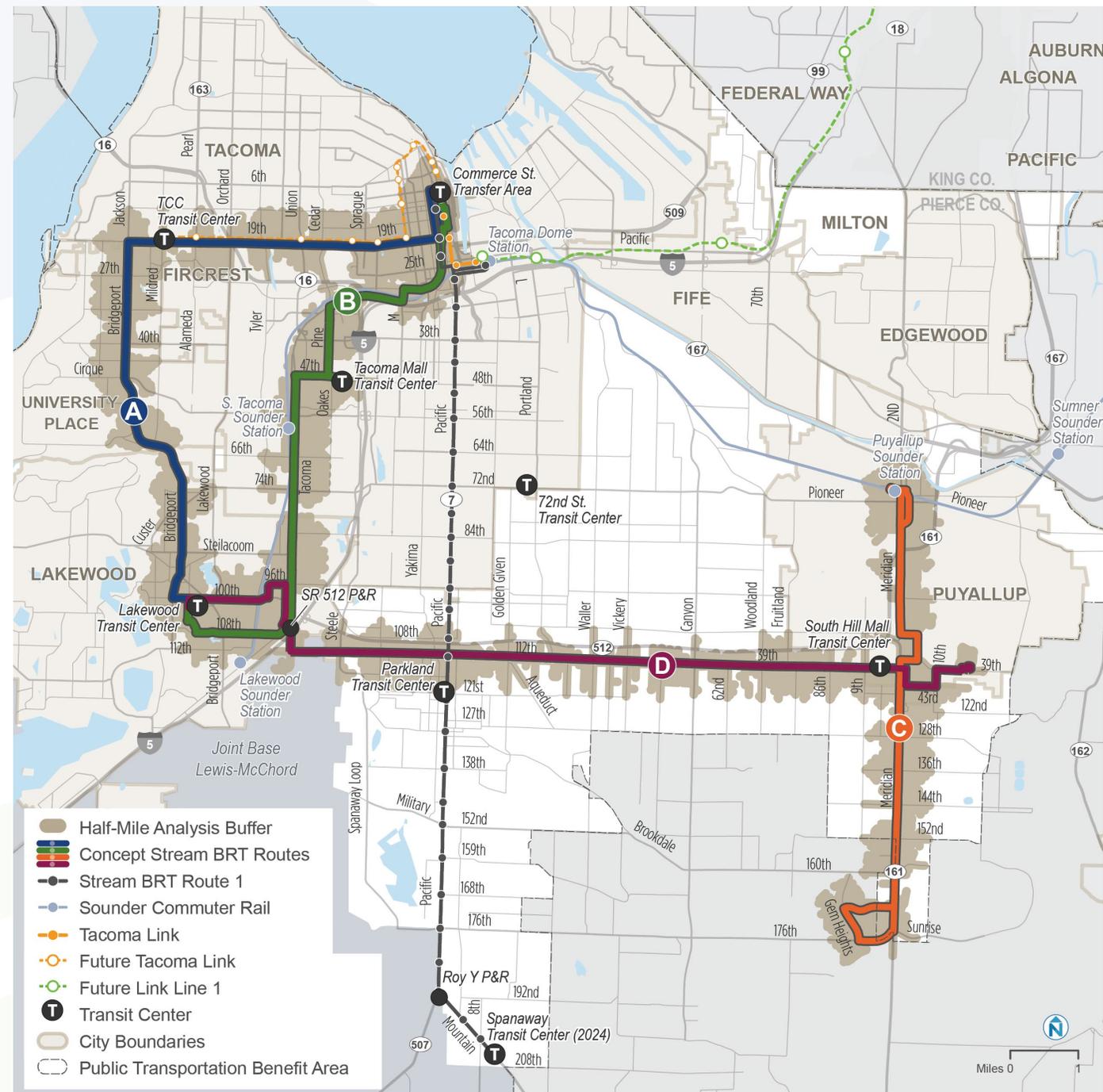
Equity Analysis Outcomes

1. Population

Serving population

Population Score, calculated based on:

| Total households |

(within ½ mile analysis buffer, per corridor mile)

Outcome

Corridor	Households per corridor mile	Population Score
A	1,524	10
B	1,198	6
C	884	2
D	764	1

Total Households
per acre, by census block groups

- 0.1 – 1
- 1 – 2
- 2 – 4
- 4 – 8
- 8 – 26

Source: U.S. Census
2019 ACS 5-year Estimates

Legend:
- Concept Stream BRT Routes
- Stream BRT Route 1
- Sounder Commuter Rail
- Tacoma Link
- Future Tacoma Link
- Future Link Line 1
- Transit Center
- City Boundaries
- Public Transportation Benefit Area
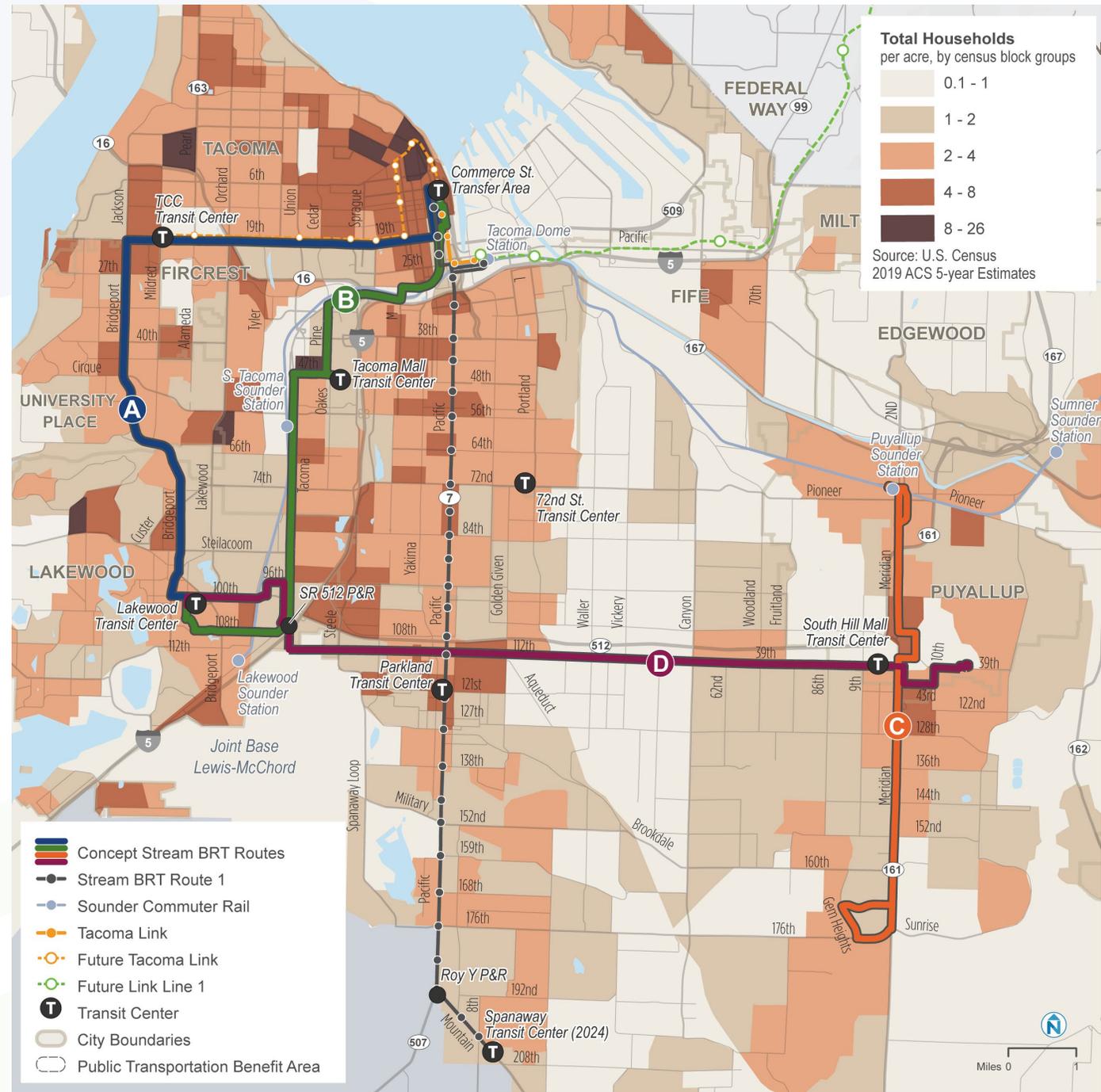
2. Equity Index

Serving Priority Populations

Equity Index Score, calculated based on the weighted sum of priority population:

- Non-white or Hispanic (Wight - 40%)

- Low-income households (30%)

- Foreign born population (10%)

- Limited English-speaking households (10%)

- People with disabilities (10%) .

(within ½ mile analysis buffer, per corridor mile)

Outcome

| Corridor	Weighted Sum of Priority Pop. per Corridor Mile	Equity Index Score
A	1,037	10
B	1,016	9
C	482	1
D	625	3
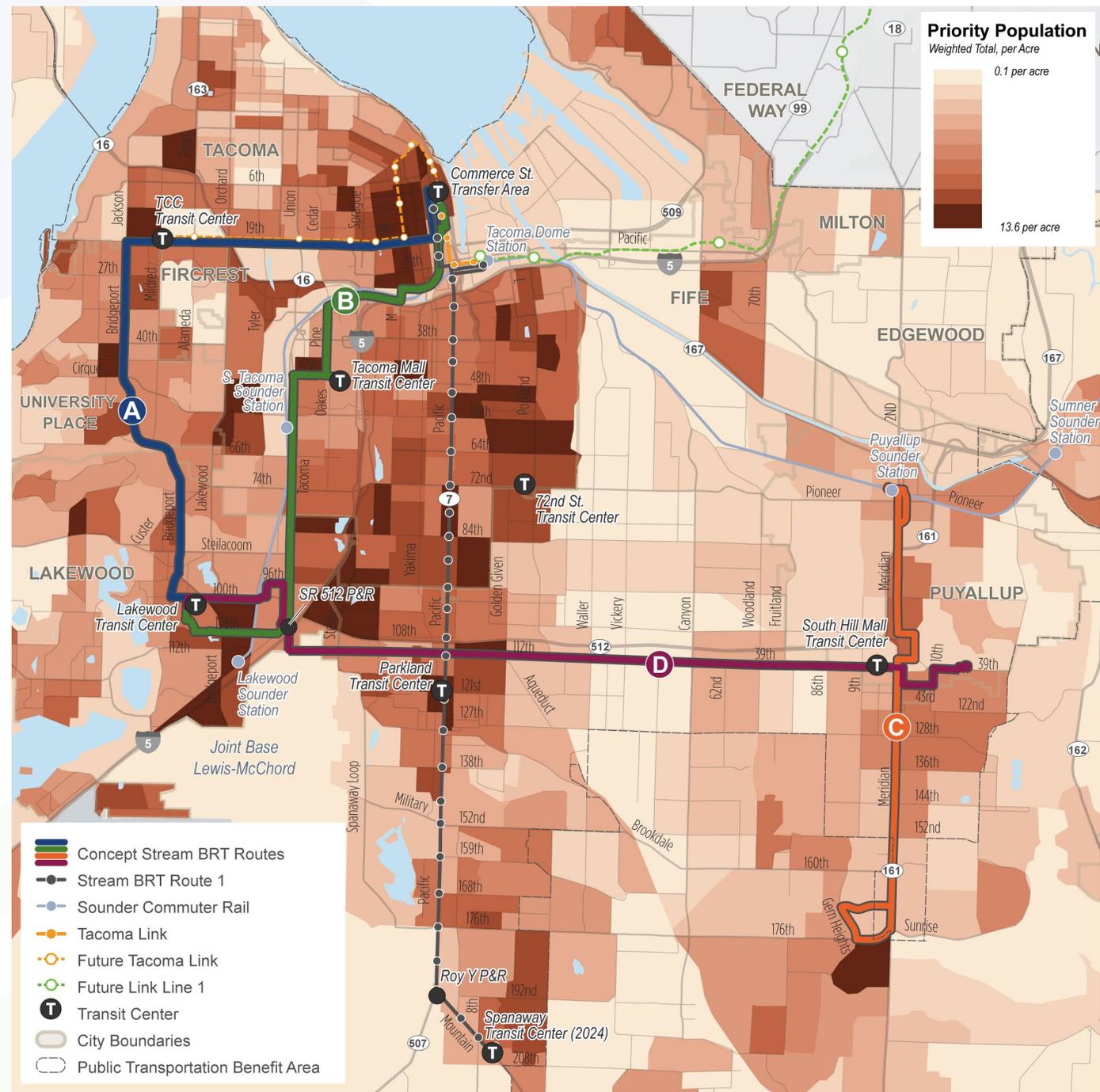
3. Jobs/Opportunity

Serving Job Locations

Job Score, calculated based on:

Total jobs	+	Low-income jobs (earning <$3,333 per month)

(within ½ mile analysis buffer, per corridor mile)

Outcome

Corridor	Total Jobs + Low income jobs per corridor mile	Job Score
A	6,051	8
B	6,860	10
C	2,310	2
D	1,606	1

Sum of Total Jobs and Low-income* Jobs
Jobs per acre, by census block groups

- 0 - 2.5
- 2.6 - 5.0
- 5.1 - 15.0
- 15.1 - 30.0
- 30.1 - 152.1

Source: 2019 LEHD
* Making less than $3,333 per month

Legend:
- Concept Stream BRT Routes
- Stream BRT Route 1
- Sounder Commuter Rail
- Tacoma Link
- Future Tacoma Link
- Future Link Line 1
- T Transit Center
- City Boundaries
- Public Transportation Benefit Area
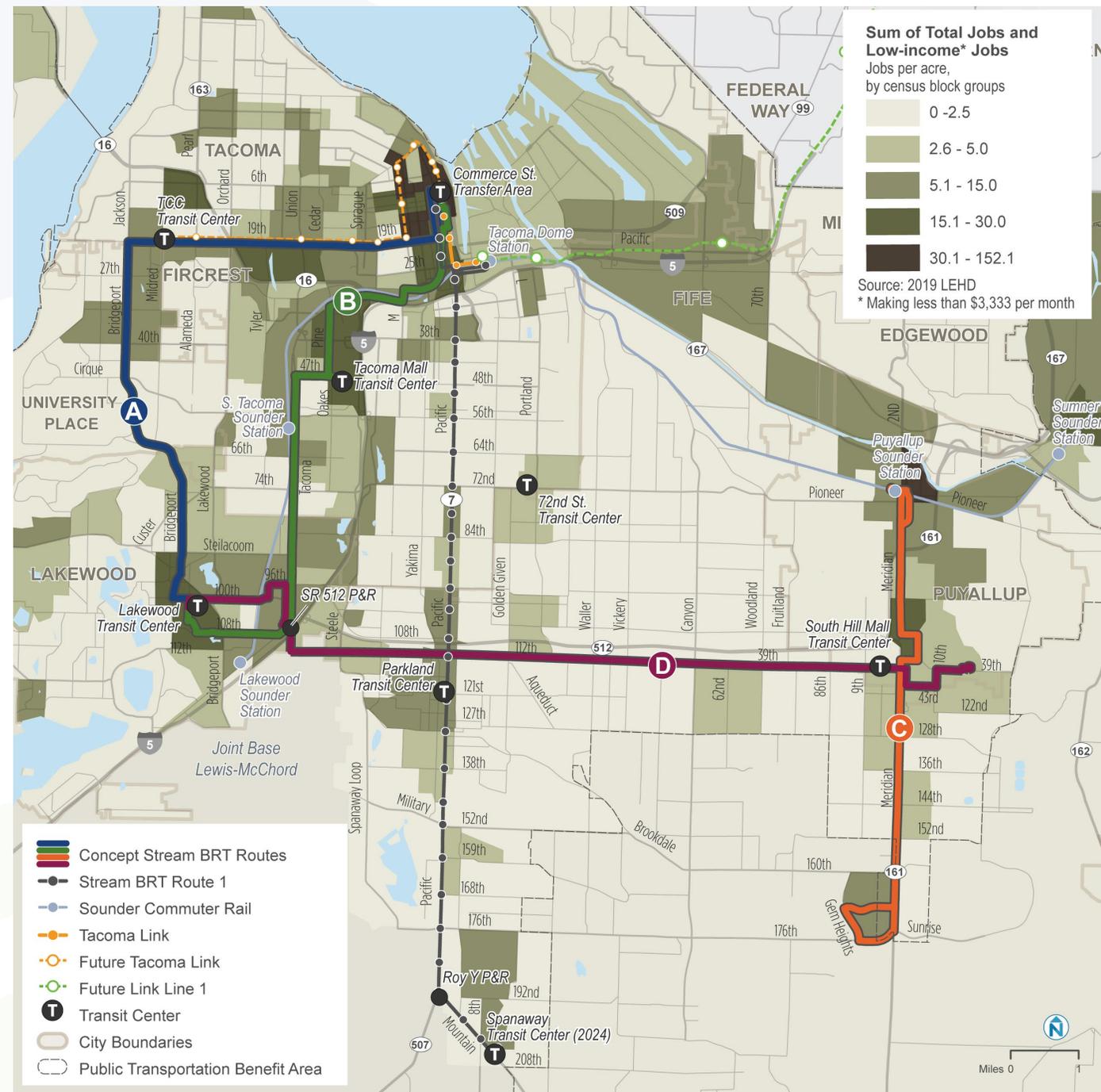
Equity Analysis Outcomes

4. Activity (Life)

Serving Activity Centers

Activity Score, calculated based on:

Total area of PSRC Center Designation	+	Total area of key local destinations

(within ½ mile analysis buffer, per corridor mile)

Outcome

Corridor	Total area (in acre) per corridor mile	Activity Score
A	152	7
B	198	10
C	67	2
D	50	1
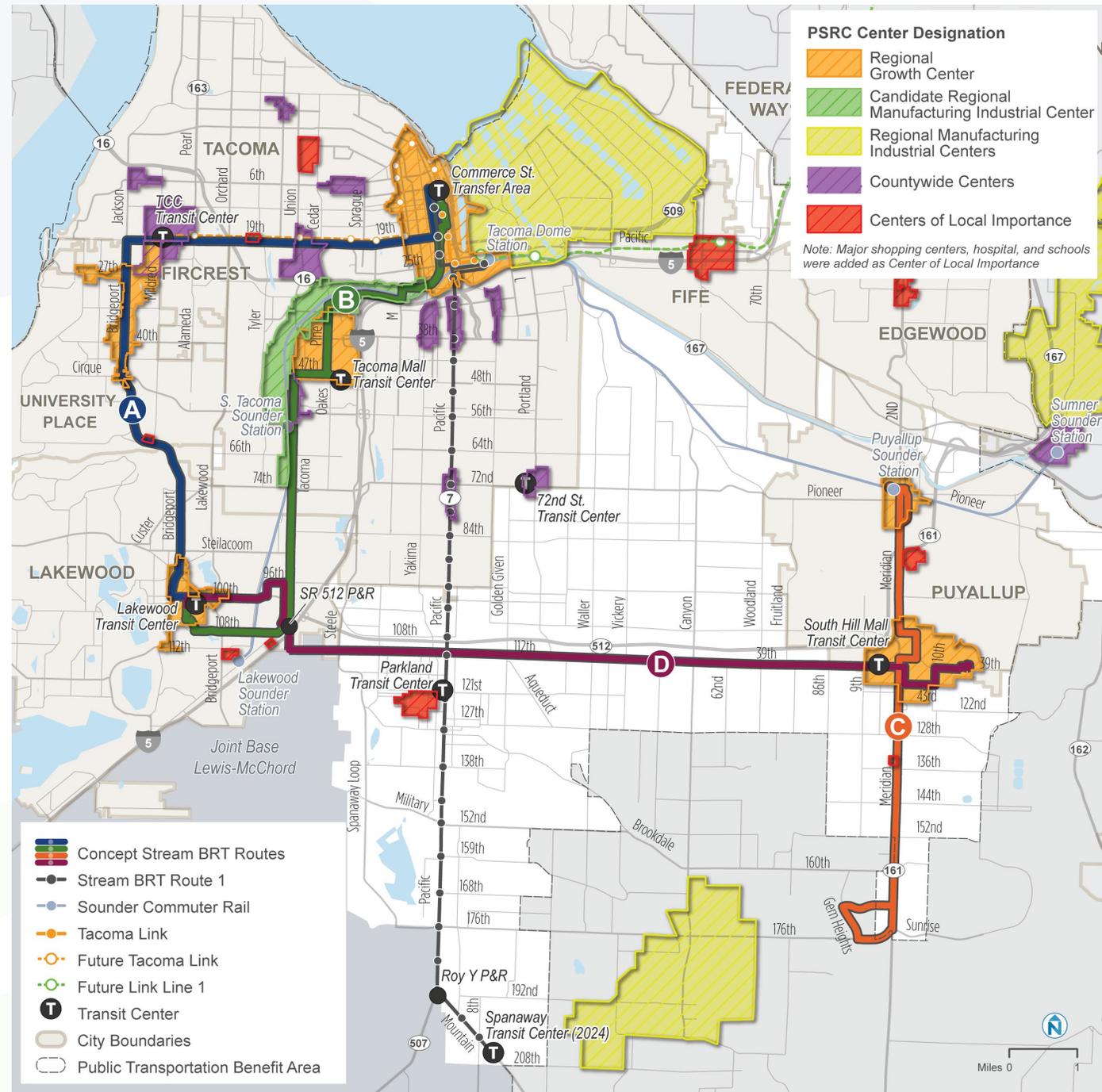
Equity Analysis Results

Results

- Corridors A and B received high scores across all criteria.

- Corridor A would serve more households.

- Corridor B would serve more jobs and activity locations.

- Both Corridors A and B would serve higher concentrations of priority population.

Corridor	Population Score	Equity Index Score	Job Score	Activity Score
A	10	10	8	7
B	6	9	10	10
C	2	1	2	2
D	1	3	1	1