

MAX Station Optimization

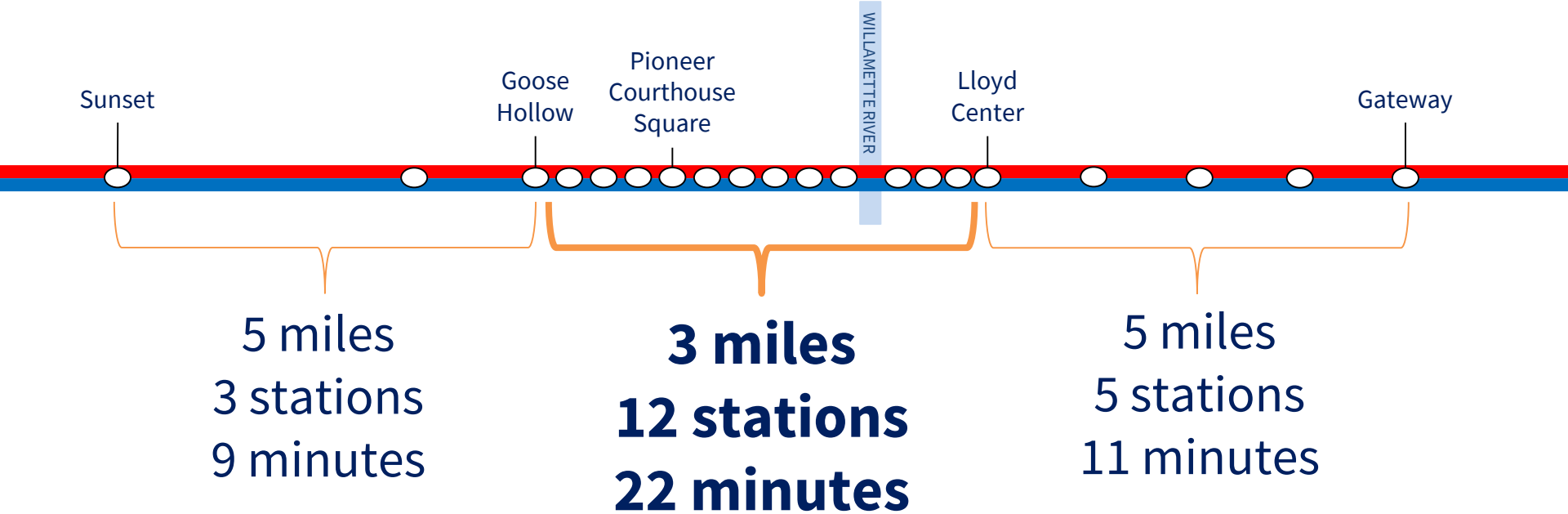
May 31, 2019

Long a critique of MAX

“Has there been any discussion about reducing the number of stops on the route? I find the 4 stops within 6 blocks downtown perplexing as I often get off and walk to the Orange Line and beat the train I just got off...”

- Rider submission to Service Improvement Process (SIP #530975)

Rail Segment Comparisons



A focus on speed and on-time performance

Similar initiatives to support a growing region:

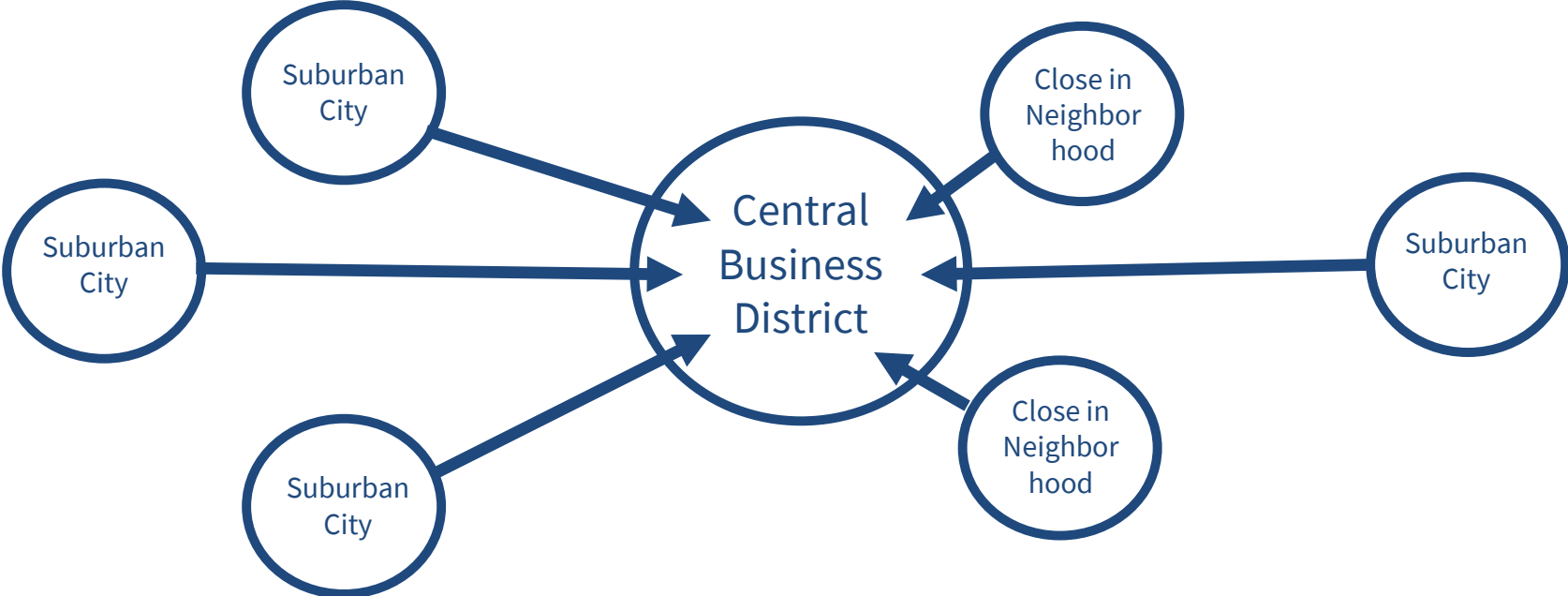
Investments to date:

- Major on time performance (OTP) focus, bringing average OTP on MAX from 84% to 92%
- Improvements to Steel Bridge to speed travel times
- Changes to emergency response plans that ensure quick clearing of tracks blocked by fallen trees or cars in the right of way
- Changes to the overhead power system to reduce slow orders during hot weather
- Changes to tracks to reduce slow orders during hot weather
- Changes to police procedure to reduce the delays caused by police activity

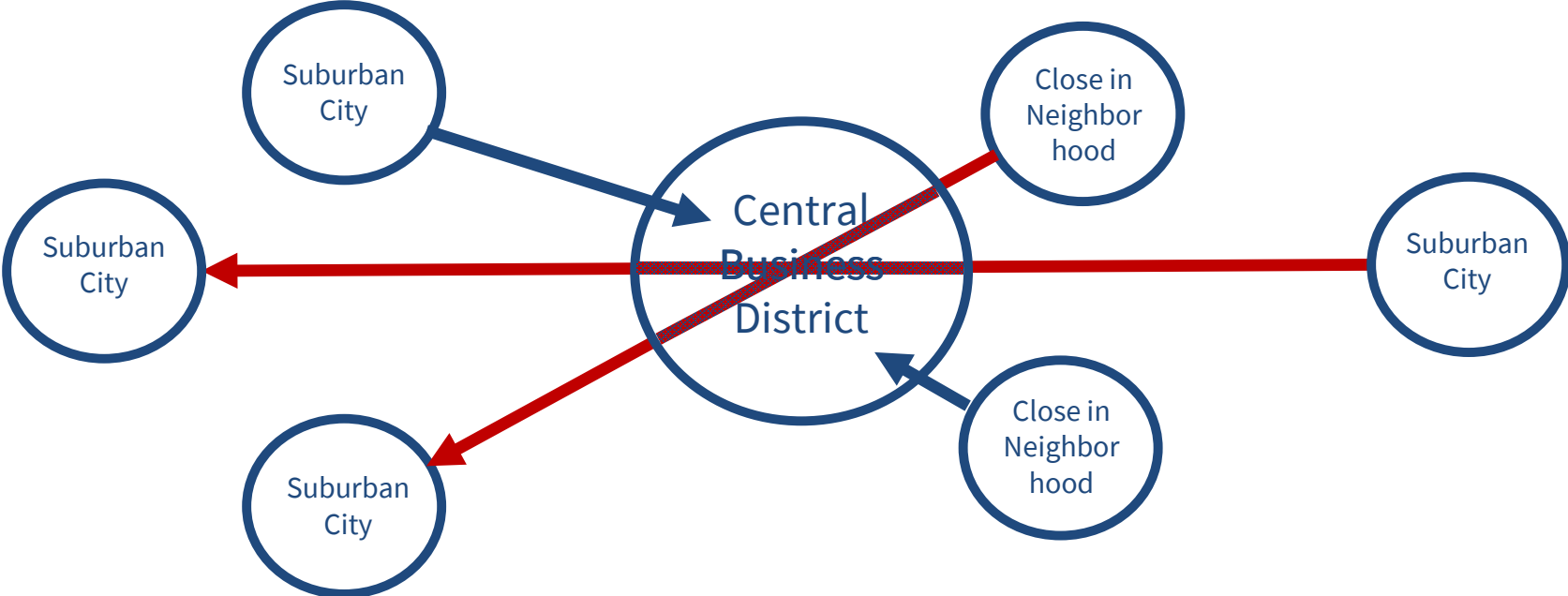
Investments planned:

- Red Line investments to improve on time performance
- Further investments in Steel Bridge
- Study of dwell time at platform and adjustments to optimize performance

Light Rail Design Circa 1970



Light Rail Design Circa 2000



Equity & Gentrification

Distances between people and jobs are growing, particularly for communities of concern.

“The number of jobs near the typical Hispanic (-17 percent) and black (-14 percent) resident in major metro areas declined much more steeply than for white (-6 percent) residents, a pattern repeated for the typical poor (-17 percent) versus non-poor (-6 percent) resident.”

“As people and jobs continued to suburbanize and spread out in the 2000s, the number of jobs near the typical resident fell.”

The growing distance between people and jobs in metropolitan America

Elizabeth Kleebone and Natalie Holmes

Findings

Proximity to employment can influence a range of economic and social outcomes, from local fiscal health to the employment prospects of residents, particularly low-income and minority workers. An analysis of private-sector employment and demographic data at the census tract level reveals that:

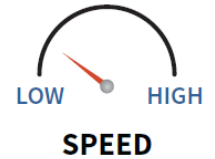
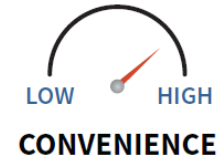
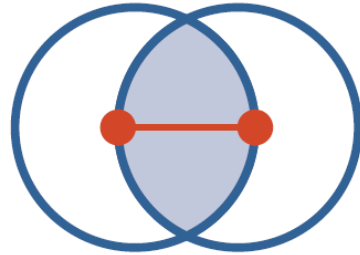
- Between 2000 and 2012, the number of jobs within the typical commute distance for residents in a major metro area fell by 7 percent. Of the nation's 96 largest metro areas, in only 29—many in the South and West, including McAllen, Texas, Bakersfield, Calif., Raleigh, N.C., and Baton Rouge, La.—did the number of jobs within a typical commute distance for the average resident increase. Each of these 29 metro areas also experienced net job gains between 2000 and 2012.
- As employment suburbanized, the number of jobs near both the typical city and suburban resident fell. Suburban residents saw the number of jobs within a typical commute distance drop by 7 percent, more than twice the decline experienced by the typical city resident (3 percent). In all, 32.7 million city residents lived in neighborhoods with declining proximity to jobs compared to 59.4 million suburban residents.
- As poor and minority residents shifted toward suburbs in the 2000s, their proximity to jobs fell more than for non-poor and white residents. The number of jobs near the typical Hispanic (-17 percent) and black (-14 percent) resident in major metro areas declined much more steeply than for white (-6 percent) residents, a pattern repeated for the typical poor (-17 percent) versus non-poor (-6 percent) resident.
- Residents of high-poverty and majority-minority neighborhoods experienced particularly pronounced declines in job proximity. Overall, 64 percent of high-poverty tracts (with poverty rates above 20 percent) and 55 percent of majority-minority neighborhoods experienced declines in job proximity between 2000 and 2012. A growing number of these tracts are in suburbs, where nearby jobs for the residents of these neighborhoods dropped at a much faster pace than for the typical suburban resident (17 and 16 percent, respectively, versus 7 percent).

For local and regional leaders working to grow their economies in ways that promote opportunity and upward mobility for all residents, these findings underscore the importance of understanding how regional economic and demographic trends intersect at the local level to shape access to employment opportunities, particularly for disadvantaged populations and neighborhoods. And they point to the need for more integrated and collaborative regional strategies around economic development, housing, transportation, and workforce decisions that take job proximity into account.

Best Practices – Stop Spacing

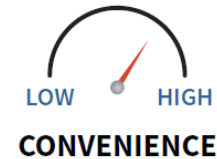
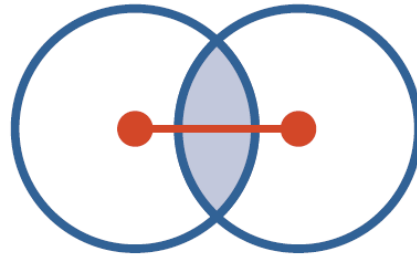
1/4-mile stop spacing

Stops every 1320 feet or about 5 Portland blocks, with duplicate access (shaded area)



1/3-mile stop spacing

Stops every 1760 feet or about 7 Portland blocks, with duplicate access (shaded area)



Within range
of industry
Best practices

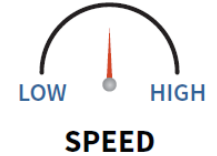
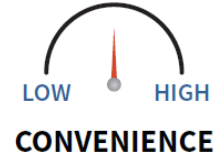
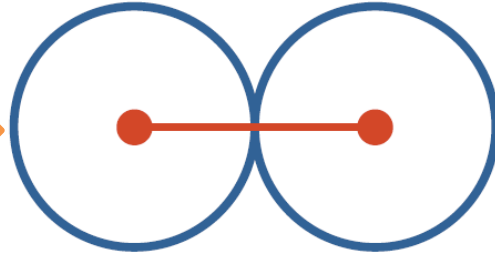


Best Practices – Stop Spacing

1/2-mile stop spacing

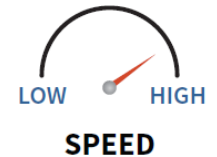
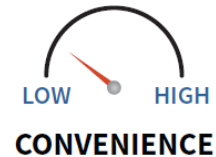
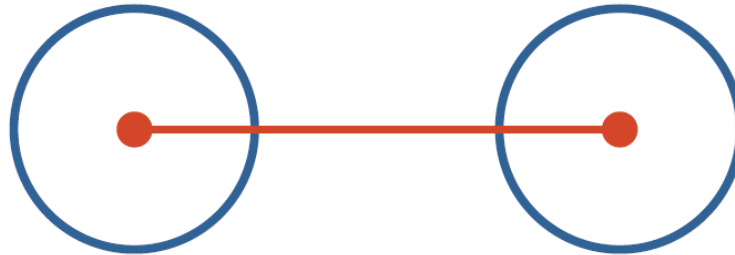
Stops every 2640 feet or about 10 Portland blocks, with no duplicate access

Within range
of industry
Best practices

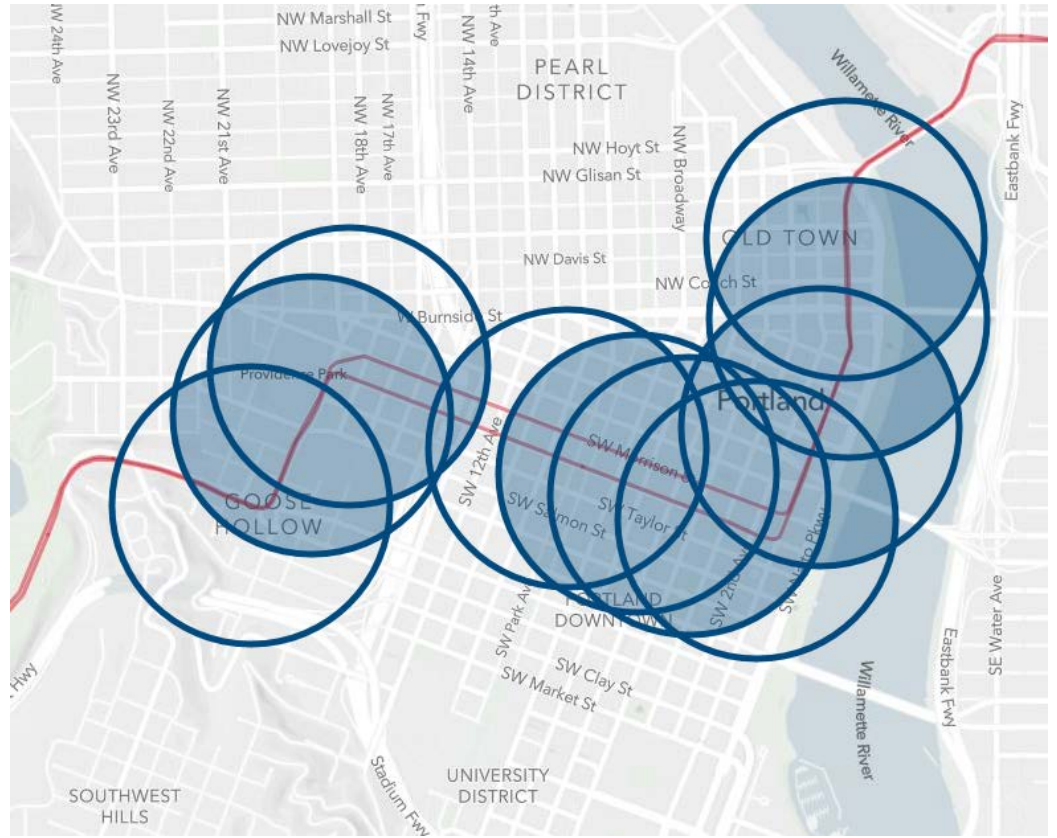


1-mile stop spacing

Stops every 5280 feet or about 20 Portland blocks, with no duplicate access

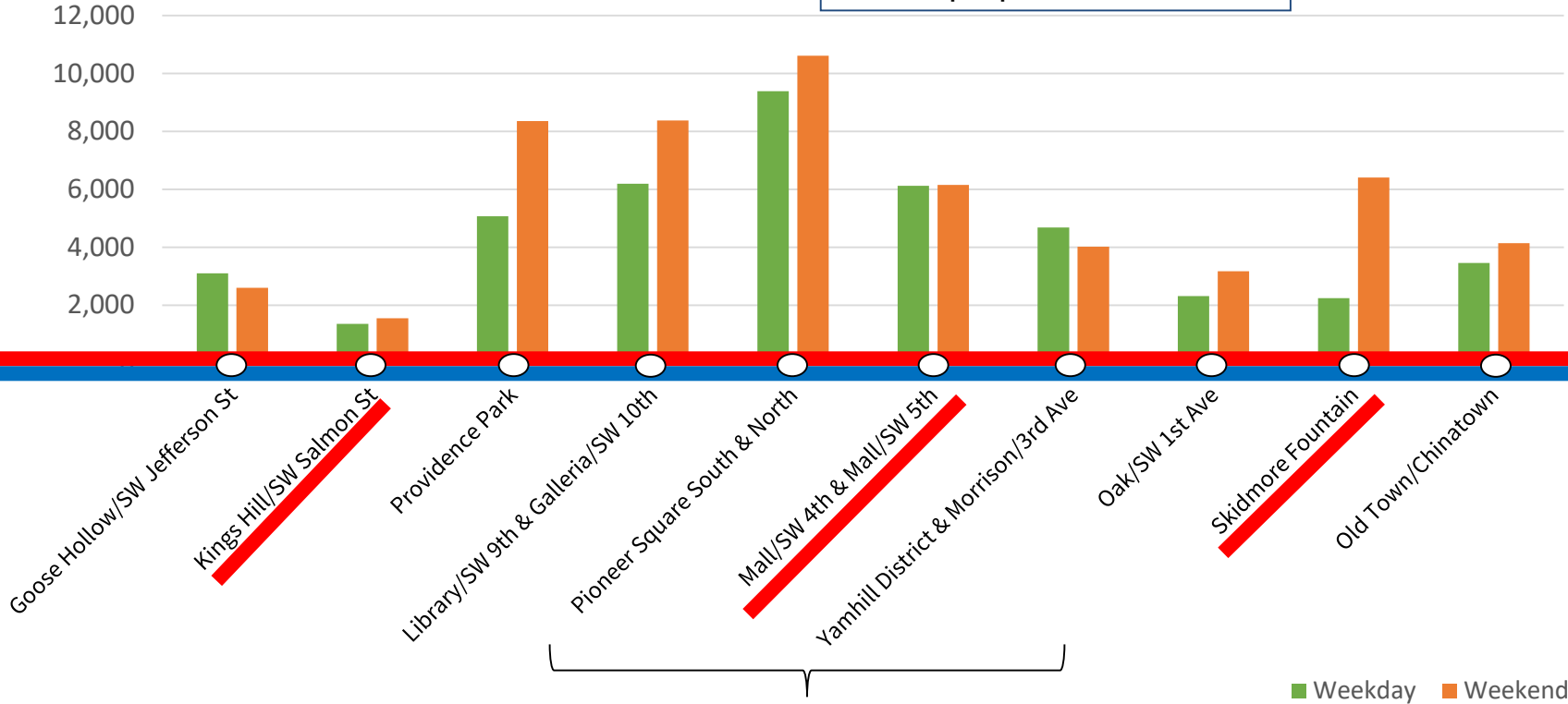


Duplication in coverage area of existing stations



Ridership

Approximately **10,000** riders passing through each station proposed for closure.



Note that single direction stations along Morrison & Yamhill have been combined with their pair stations to allow comparison to the other bi-directional stations.

■ Weekday ■ Weekend

Source: Spring 2018 Census

**King's Hill/
SW Salmon St.
Station**

Kings Hill/SW Salmon St. MAX Station

350'

450'

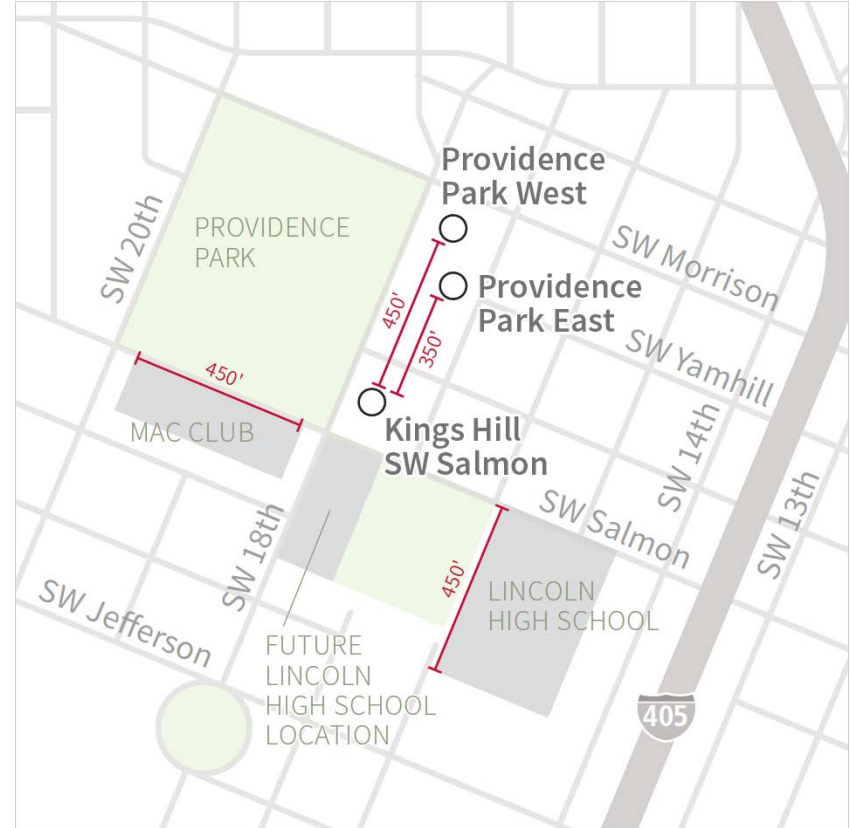
Providence
Park
Stations

© 2018 Google

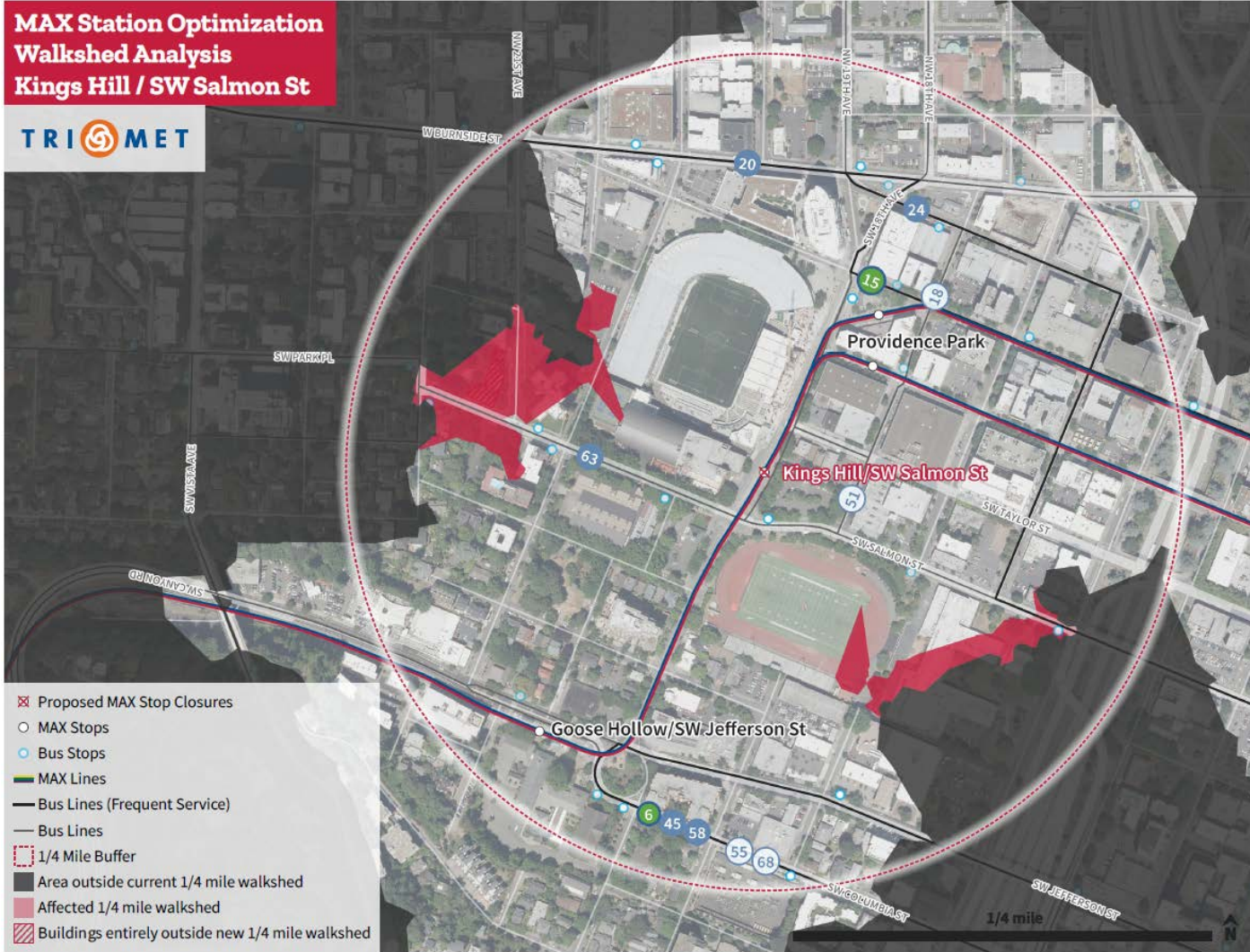
Google Earth

Kings Hill/ SW Salmon St

Contextual Distances



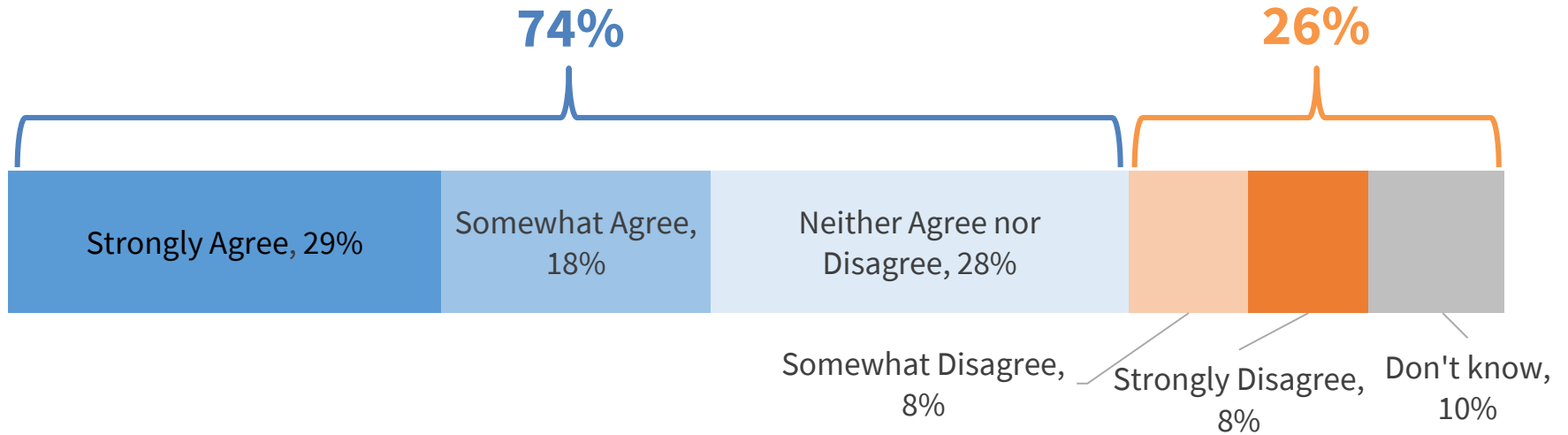
**MAX Station Optimization
Walkshed Analysis
Kings Hill / SW Salmon St**



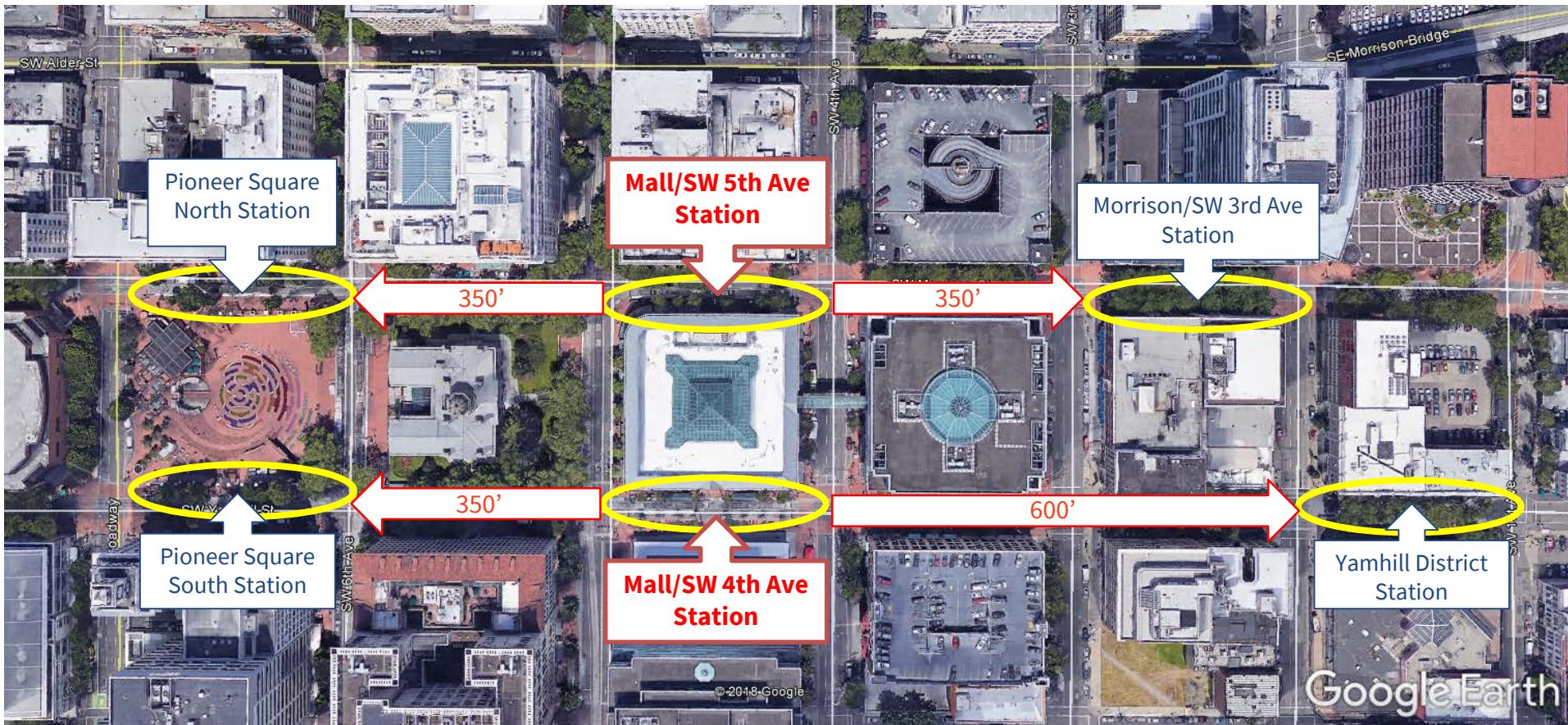
- ✘ Proposed MAX Stop Closures
- MAX Stops
- Bus Stops
- MAX Lines
- Bus Lines (Frequent Service)
- Bus Lines
- ⋯ 1/4 Mile Buffer
- Area outside current 1/4 mile walkshed
- Affected 1/4 mile walkshed
- ▨ Buildings entirely outside new 1/4 mile walkshed

"How do you feel about closing the Kings Hill/SW Salmon station?"

Onboard Survey of Affected Riders, N=516

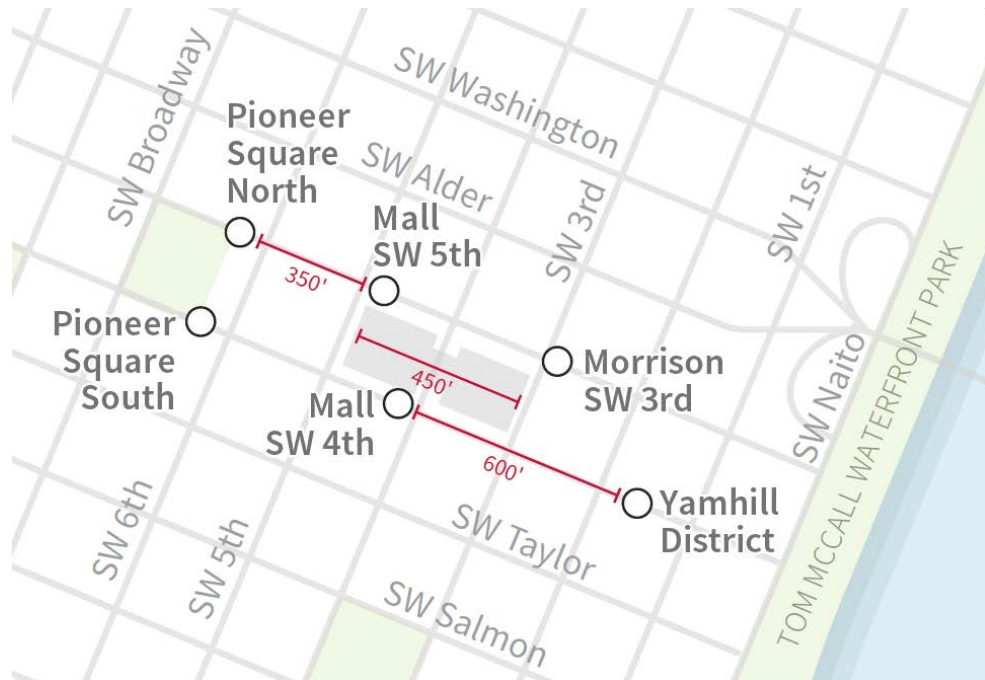


Cells may not add to 100% due to rounding

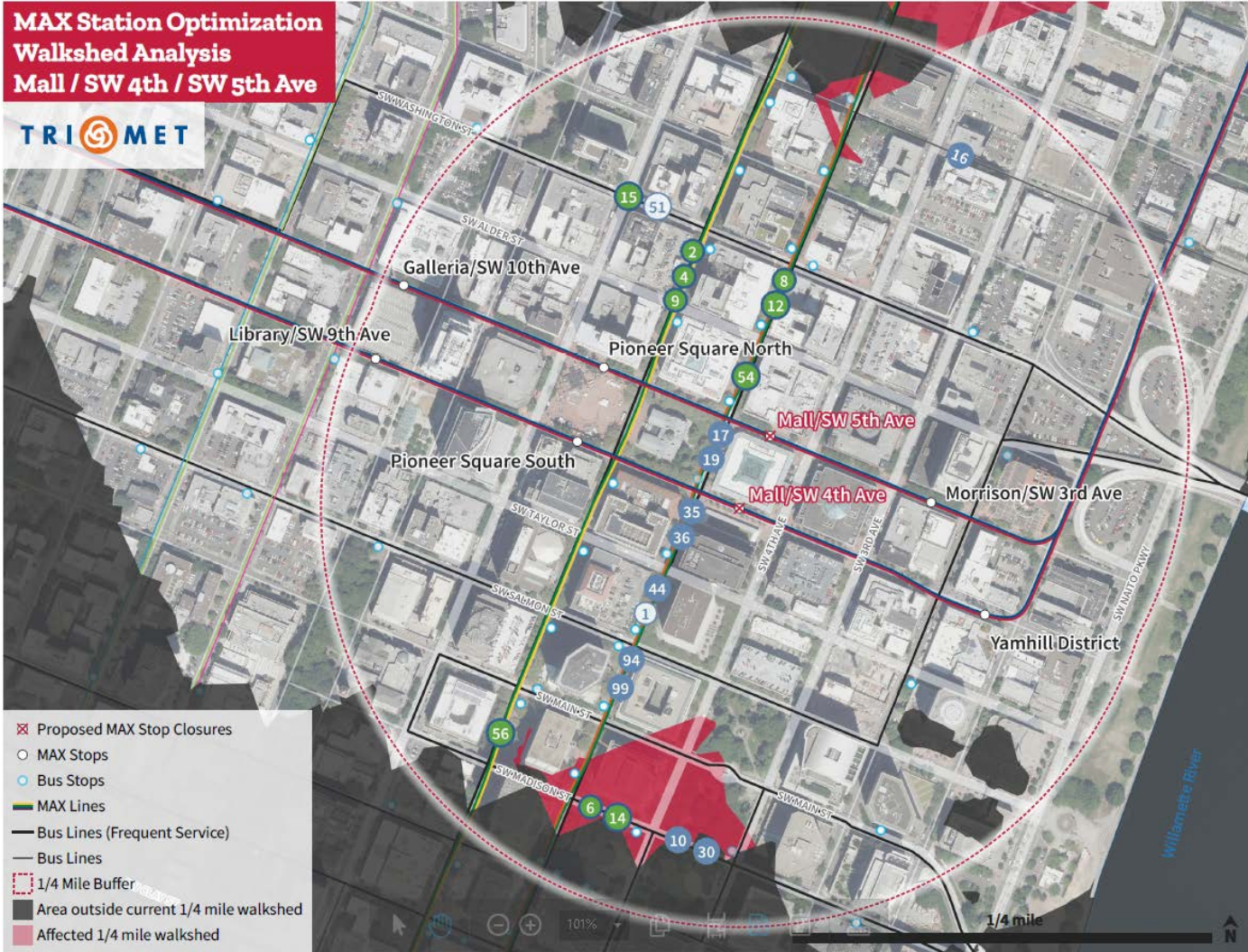


Mall/SW 4th Ave & Mall/SW 5th Ave

Distances in context of Pioneer Place Mall



**MAX Station Optimization
Walkshed Analysis
Mall / SW 4th / SW 5th Ave**

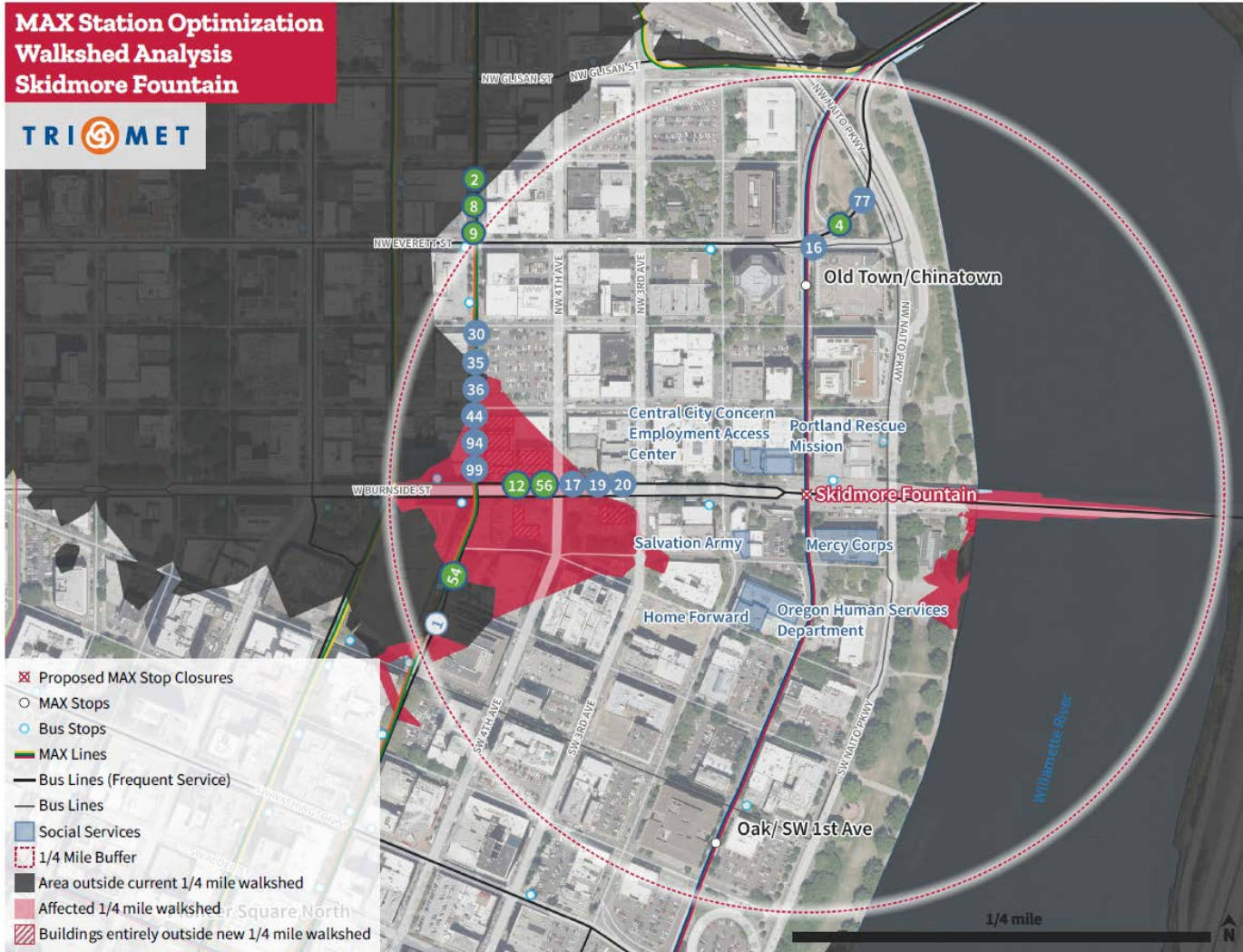


- ✘ Proposed MAX Stop Closures
- MAX Stops
- Bus Stops
- MAX Lines
- Bus Lines (Frequent Service)
- Bus Lines
- ⋯ 1/4 Mile Buffer
- Area outside current 1/4 mile walkshed
- Affected 1/4 mile walkshed

Skidmore Fountain



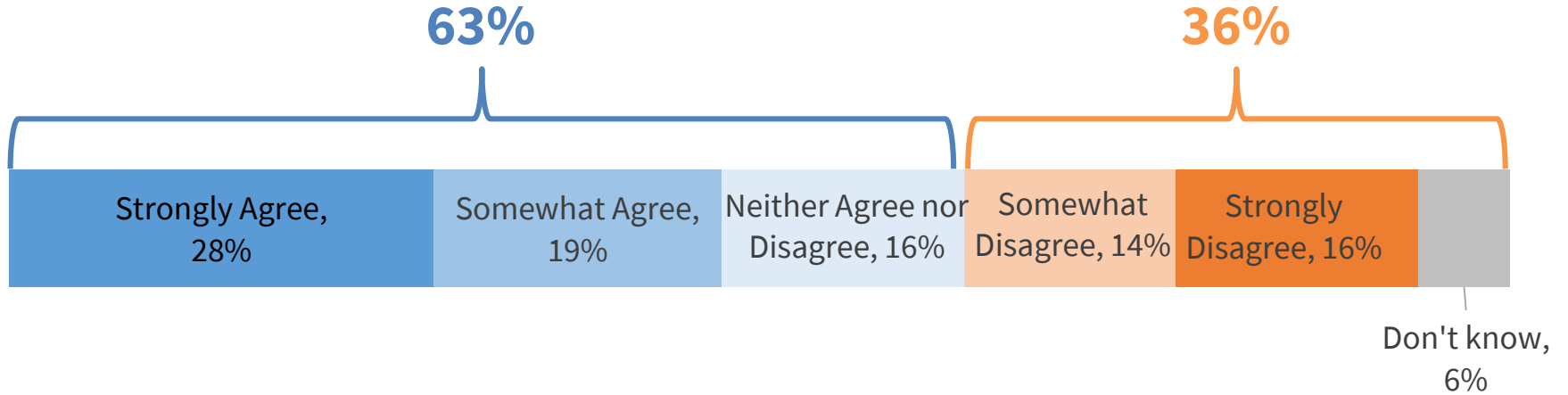
MAX Station Optimization Walkshed Analysis Skidmore Fountain



- ✘ Proposed MAX Stop Closures
- MAX Stops
- Bus Stops
- MAX Lines
- Bus Lines (Frequent Service)
- Bus Lines
- Social Services
- ⬜ 1/4 Mile Buffer
- ⬜ Area outside current 1/4 mile walkshed
- ⬜ Affected 1/4 mile walkshed
- ⬜ Buildings entirely outside new 1/4 mile walkshed

"How do you feel about closing the Skidmore Fountain station?"







Onboard Survey of Affected Riders, N=511



Cells may not add to 100% due to rounding

What if all riders at the Mall Stations shifted to Pioneer Square?

Fruin's Level of Service Standards

Waiting Area LOS		
LOS A		≥ 13 ft ² per person
LOS B		10-13 ft ² per person
LOS C		7-10 ft ² per person
LOS D		3-7 ft ² per person
LOS E		2-3 ft ² per person
LOS F		< 2 ft ² per person

What if all riders at the Mall Stations shifted to Pioneer Square?

Space Available:
(feet)

Furnishing Zone:	6
Accessory Zone:	3
Length:	190
Appurtenances:	-10%

1540 square feet



What if all riders at the Mall Stations shifted to Pioneer Square?

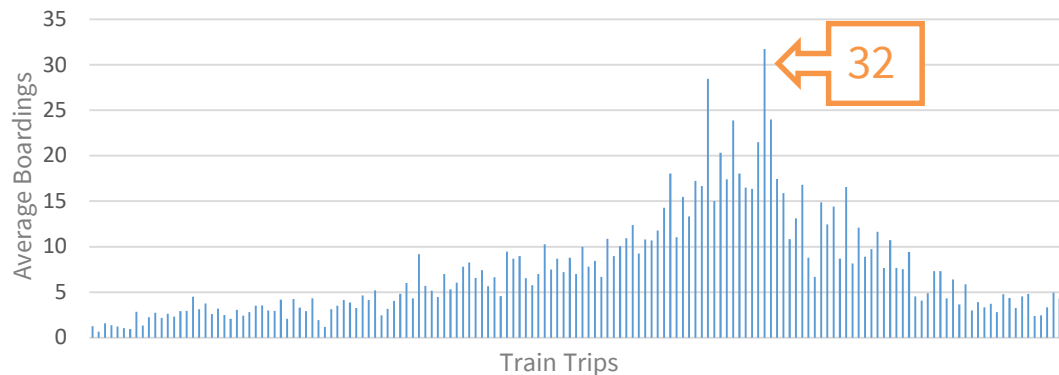
Busiest trips combined:

$$32 + 39 = 71$$

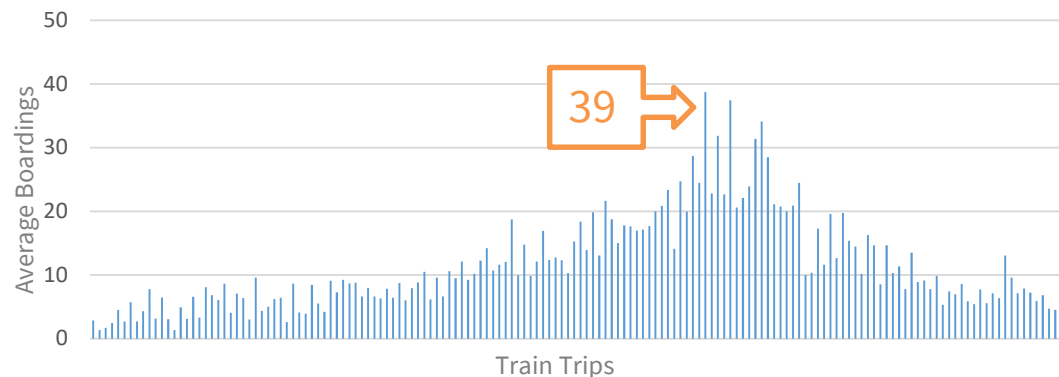


Person Capacity	
A	>=118
B	118 - 154
C	154 - 220
D	220 - 513
E	513 - 770
F	<770

Mall/SW 4th Ave



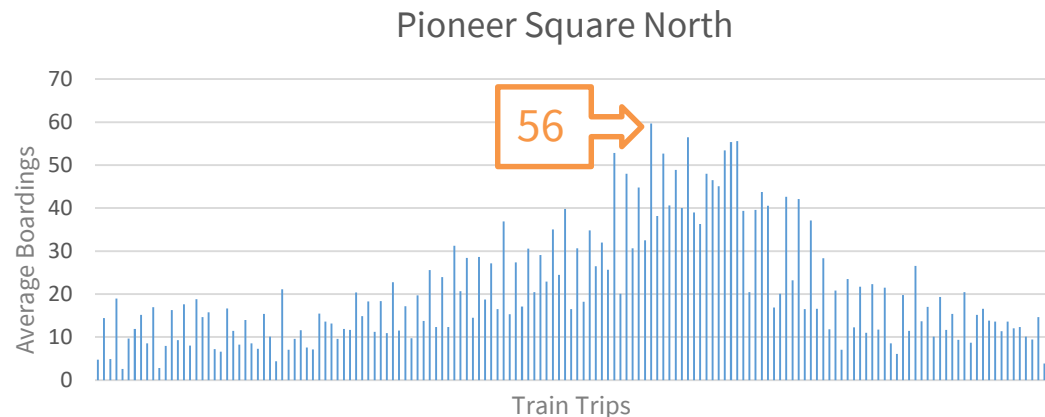
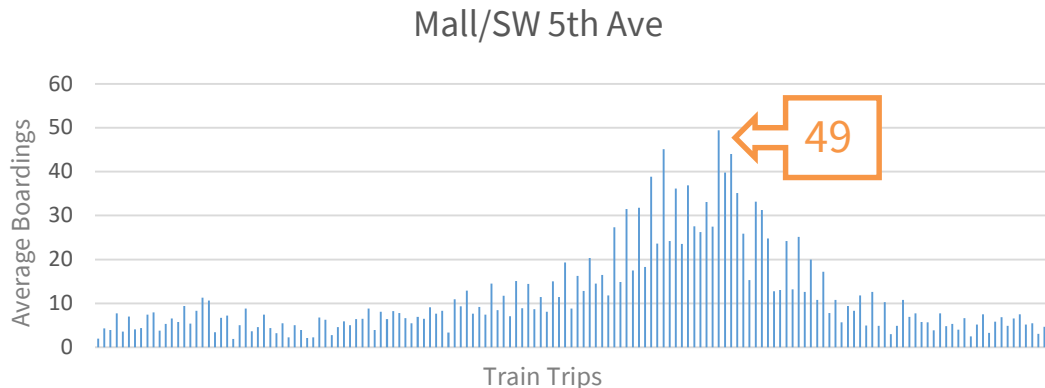
Pioneer Square South



What if all riders at the Mall Stations shifted to Pioneer Square?

Busiest trips combined:

$$49 + 56 = \mathbf{105}$$



Person Capacity	
A	>=118
B	118 - 154
C	154 - 220
D	220 - 513
E	513 - 770
F	<770

Impact to dwell times:

MAX Stations have little variation in the dwell times thanks to All-Door Boarding and Off-Board Fare Payment.

Additional riders at alternate stations will have minimal impact on the dwell times of those stations.



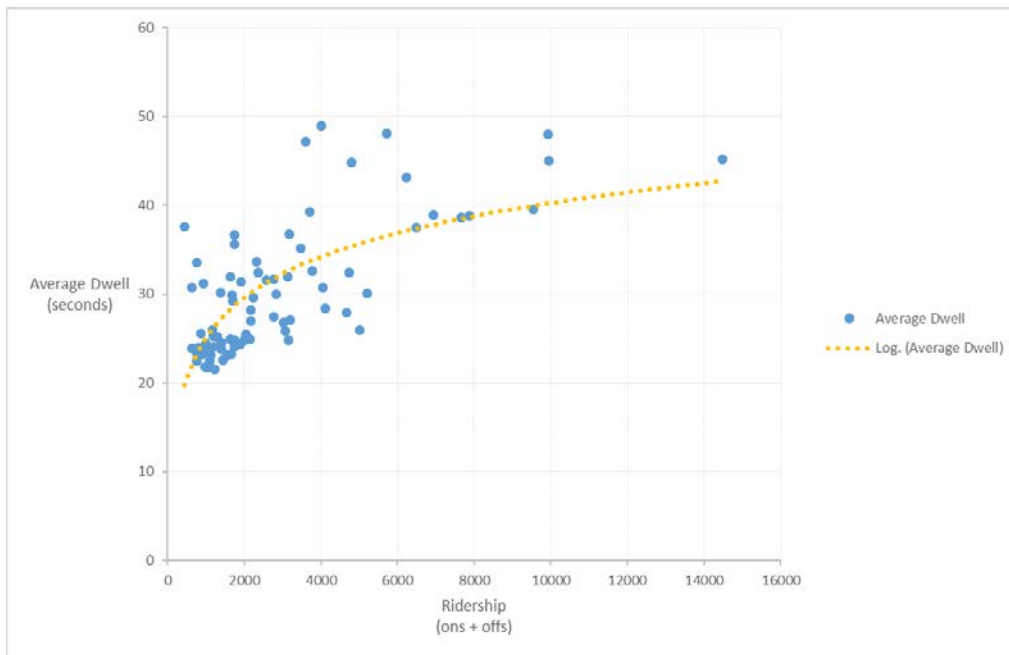
Impact to dwell times:

A model was built using average dwell times and ridership at other MAX stations. For this exercise we looked at the unlikely, worst case scenario of all riders shifting exclusively to one alternate station.

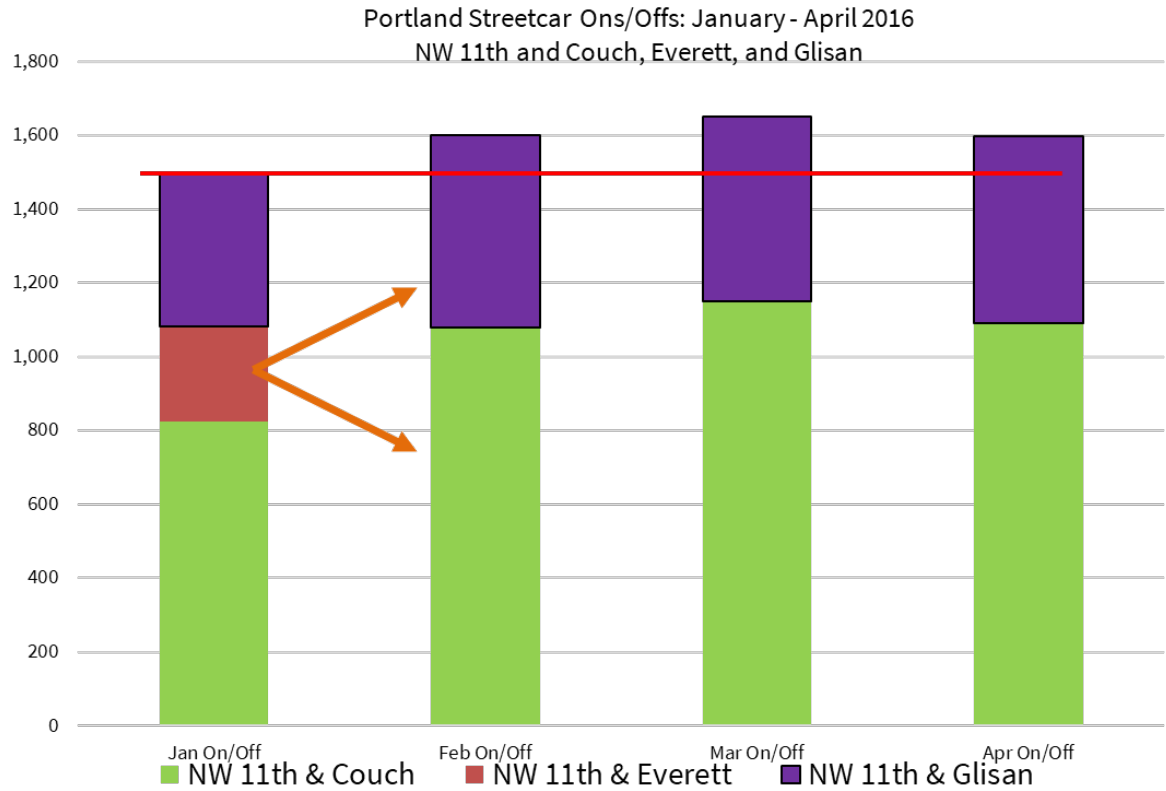
Kings Hill to Providence Park
+1357 daily riders, +3 seconds

Mall to Pioneer Square
+6149 daily riders, +1-2 seconds

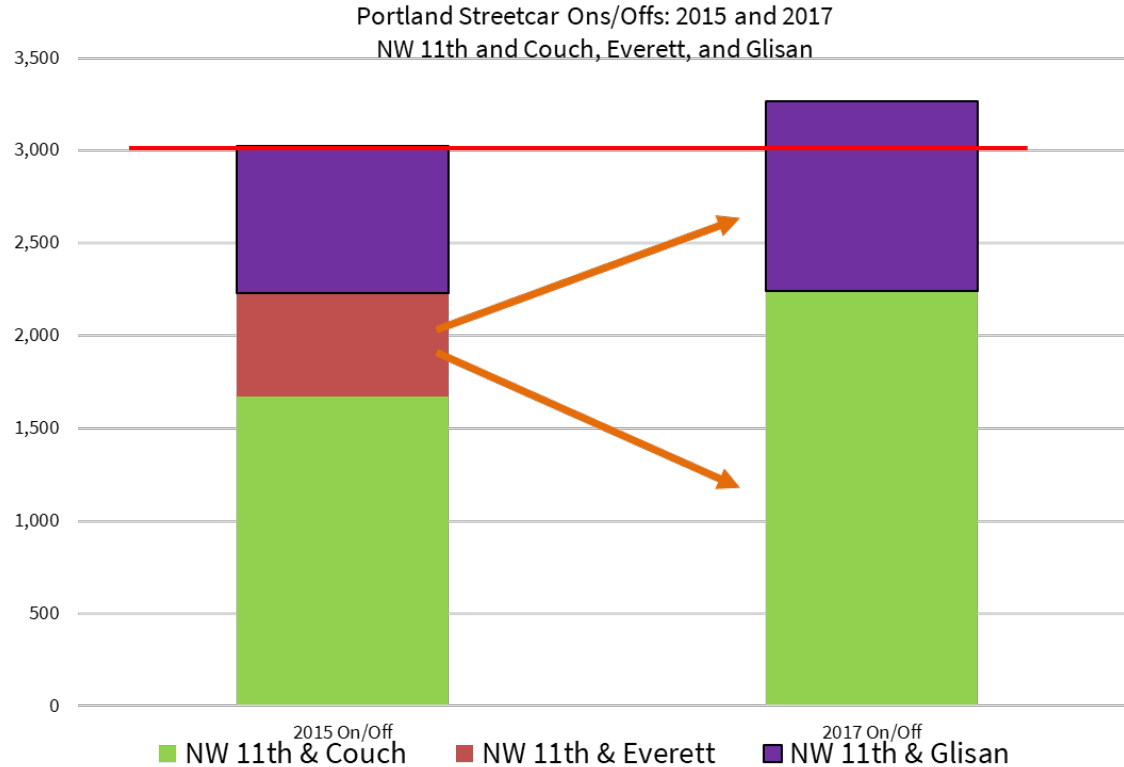
Skidmore to Old Town/Chinatown
+2245 daily riders, +3 seconds



NW 11th/Everett Streetcar Station Closure and Ridership



NW 11th/Everett Streetcar Station Closure and Ridership



Travel Time Savings:

Westbound	Dwell Time Saved (average in seconds)	Acceleration / Deceleration Time Saved (seconds)	Time Saved (seconds)	Total Time Saved (minutes)
Skidmore Fountain	33	10	43	
Mall/SW 5 th Ave	52	10	62	
Kings Hill/SW Salmon	27	10	37	
TOTAL:	112	30	142	2.37
Eastbound				
Kings Hill/SW Salmon	33	10	43	
Mall/SW 4 th Ave	26	10	36	
Skidmore Fountain	30	10	40	
TOTAL:	89	30	119	1.98

Anticipated 2 – 2:30 minutes each way improvement on travel time or 14% of travel time from Old Town/Chinatown to Goose Hollow

Outreach & Engagement:

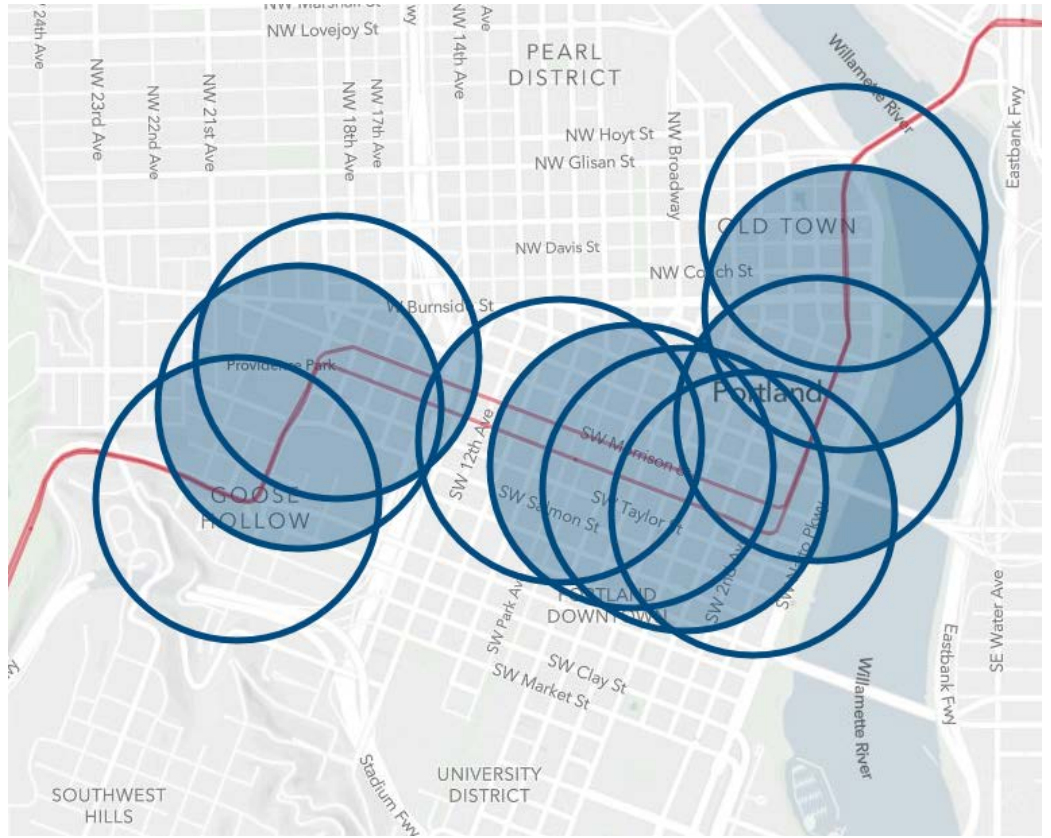
- Website
- Nine Open Houses
- Multiple Surveys (including Spanish)
- Postings at stations

Meetings or Presentations with:

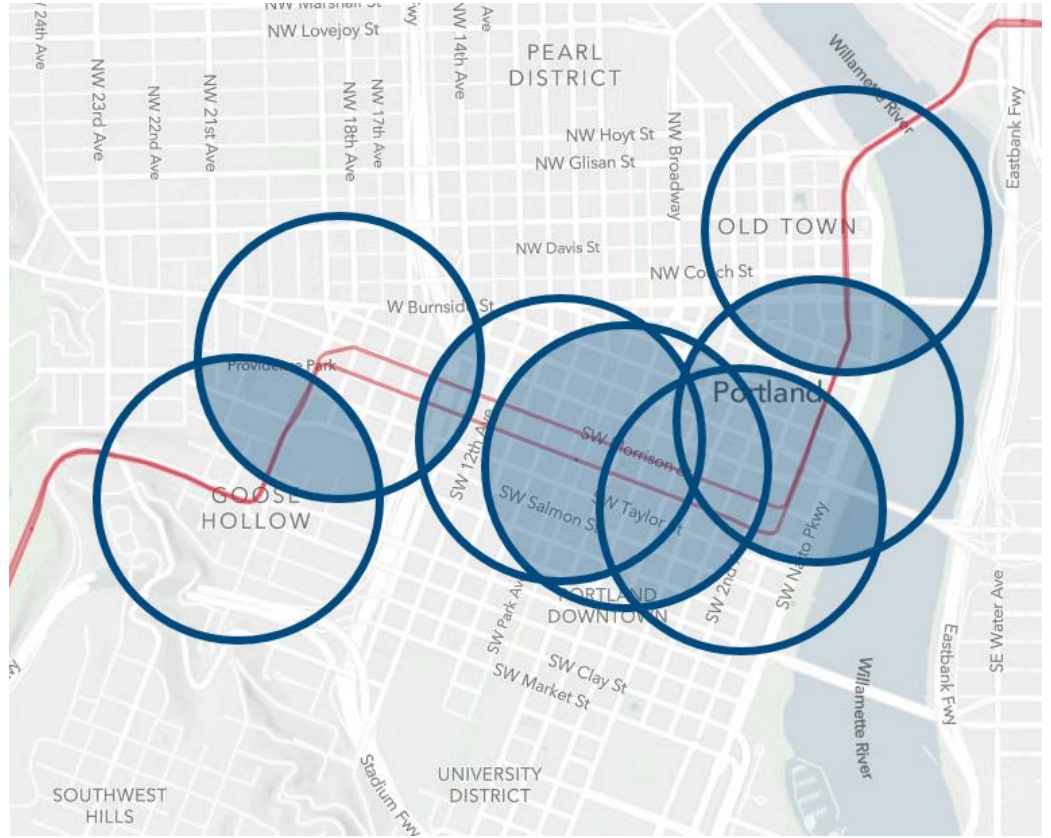
City of Portland, Bureau of Transportation
Committee on Accessible Transportation (CAT)
Portland Saturday Market
Mercy Corp
The Nines Hotel
Portland Rescue Mission
Pioneer Place
Pioneer Courthouse Square
Apple Store – Management
Niketown - Management
Lincoln High School
MAC
Goose Hollow Foothills League
University of Oregon
Stadium District Business Association
Old Town/Chinatown Community Association
PBA Transportation Committee
Downtown Public Safety Committee
Go Lloyd Board
NWDA Board
Lan Su Chinese Garden
Westside Transportation Alliance

Transportation Equity Advisory Committee (TEAC)
Multnomah County Commissioners
Westside Economic Alliance
Washington County Coordinating Committee
Central City Concern

Duplication in coverage area of existing stations



Quarter mile coverage area of remaining stations



Conclusions

- Downtown stations have significant duplication.
- Stations can be trimmed – increasing speed without reducing convenience, impacting dwell time or station crowding.
- Travel time savings are significant at the system level.
- Improvements to speed and on time performance will benefit low income and minority communities.
- System riders support consolidations at all stations, but with some differences.
- Each area has unique characteristics.

Recommendation

Retain Skidmore station with review in three years

- Ridership
- Development
- Security
- Burnside Bridge

Permanent closure of 4th & Mall and 5th & Mall stations

Trial closure of Kings Hill station with review in one year

- Ridership
- Operational improvements
- Security

Benefits:

- **3 minutes every day adds up to 13 hours each year not spent in transit for 10,000 people.**
- **1.5 minutes out of 356 trips adds up to 9 operational hours per day to reinvest in service reliability.**

Questions?

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