

# Process: Estimate the Number of Residents within One Half Mile (draft)

ESSB 5689 requires that WSDOT calculate the number of people living within a half mile walk of frequent transit. The process consists of the following steps, which are detailed below.

1. Collect transit stop locations.
2. Sort stops into frequency categories (based on definition of frequent transit developed for the Frequent Transit Service Study).
3. Gather U.S. Census population data at tract level.
4. Draw half-mile circles around stops. Each group of circles corresponding to a frequency category is a frequency layer.
5. Calculate what percent of each census tract is inside each frequency layer.
6. Calculate statewide totals by frequency category. Assume the population with access is approximately equal to the percent of the census tract inside the frequency layer.

## Data limitations

Internal research and stakeholder feedback has established that it is not possible to precisely and accurately calculate the number requested. This is because suitable lot-level population data and detailed walkway data including accessibility information do not exist. This process has thus been designed to prioritize accuracy and simplicity and deprioritize precision. A technical process that achieves precision is feasible but requires extensive data investments that will be described later this fall.

## Detailed steps

1. Collect transit stop locations.  
We will use General Transit Feed Specification (GTFS) data sets collected from transit agencies in the state and a software utility published by Puget Sound Regional Council to create a combined transit service feed for the entire state.
2. Sort stops into frequency categories (based on definition of frequent transit developed for the Frequent Transit Service Study).
  - We will select an additional software utility to identify the frequency of service at different stops, likely the utility published by PSRC.
  - Export stops data as a .csv file with columns stop\_id, lat, lon, freq1, freq2, freq3, ...
    - stop\_id is a unique identifier for the stop
    - lat and lon are decimal numbers indicating the coordinates of the stop
    - freq1, freq2, ... are binary columns indicating whether that stop meets the qualification parameters for the first, second, third, etc. frequency categories
  - Publish this .csv with the report and on the WSDOT Geospatial Data Portal.

	A	B	C	D	E	F
1	stop_id	lat	lon	freq1	freq2	freq3
2	101	47.127035	-119.281443	1	1	1
3	102	47.12724	-119.281583	1	1	0
4	103	47.141106	-119.278208	1	1	0
5	104	47.141094	-119.278503	1	0	0
6	105	47.145422	-119.278206	1	0	0
7	106	47.14954	-119.293673	1	0	0

Figure 1: Example database of transit stops meeting definition of frequent

3. Gather U.S. Census population data at tract level.  
Collect American Community Survey five-year total population data for each census tract in the state.
4. Draw half-mile circles around stops. Each group of circles corresponding to a frequency category is called a frequency layer.
  - Import stops data into ArcGIS, which will be used for the remainder of the process.
  - For each frequency category, draw a ½ mile circular buffer around each transit stop assigned to the category.
  - The resulting set of circular buffers for each frequency category is the corresponding frequency layer.
5. Calculate what percent of each census tract is inside each frequency layer
  - Overlay each frequency layer on top of the map of census tracts.
  - For each census tract, calculate the percent of the census tract that is covered by the frequency access layer
6. Calculate statewide totals by frequency category. Assume the population with access is approximately equal to the percent of the census tract inside the frequency layer.
  - The percent of the population within the frequency access layer is assumed to equal the percent of the census tract that is covered by a frequency access layer.
  - The percent of population in the frequency access layer in each tract multiplied by tract populations equals the statewide estimate of the number of residents within a half mile walk of that frequent transit category.

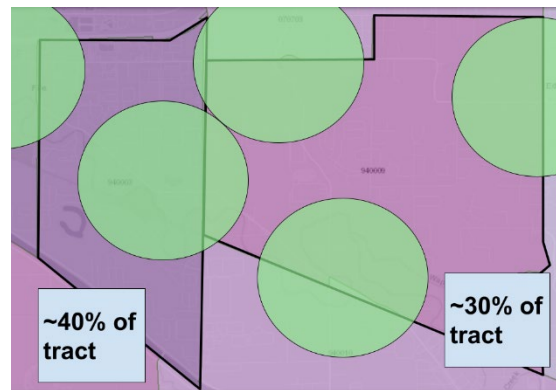


Figure 2: Illustration of frequency layer overlay on top of the map of census tracts, and percent coverage calculation

## Open issues

- A. Potential improvement, based on research and data availability: Collect basic zoning layer for state and use to increase accuracy of analysis.
  - For at least all census tracts in which a frequency access layer is present, zoning data would be collected. The only data point considered would be 'what part of this census tract is zoned for any type of residential'.
  - Instead of percent of census tract covered by the frequency layer, this could be the percent of residential land within the census tract covered by the frequency layer would be considered instead.
- B. Option, based on research and advisory group guidance: Use block group or block instead of tract for this analysis.
  - The primary issue with this would be that block and block group data will not be available for some demographic data used in the final report. We may want to use tracts consistently throughout the study.