Draft Process: Estimate the Number of Residents within One Half Mile

ESSB 5689 requires that WSDOT calculate the number of people living within a ½ mile walk of frequent transit. The process consists of the following steps.

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 block group 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 block group 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 block group 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 elsewhere.

Detailed process

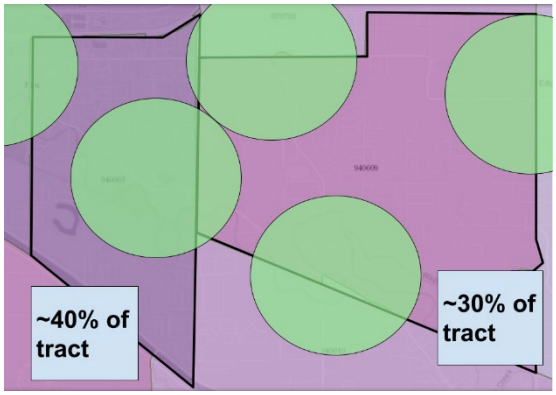
The steps listed above are further detailed in this section.

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

	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

- Publish this .csv with the report and on the WSDOT Geospatial Data Portal.
- Gather Census population data at block group level.
    - Collect American Community Survey five-year total population data for each census block group in the state.
- 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”.
    - If two buffers overlap, they will be ‘flattened’ so the area is only counted once.
    - Any area that is a body of water will be trimmed from the frequency layer.



- Calculate what percent of each census block group is inside each frequency layer
    - Overlay each frequency layer on top of the map of census block groups.
    - For each census block group, calculate the percent of the block group that is covered by the frequency access layer
- Calculate statewide totals by frequency category. Assume the population with access is approximately equal to the percent of the census block group inside the frequency layer.
    - The percent of the population within the frequency access layer is assumed to equal the percent of the census block group that is covered by a frequency access layer.
    - The percent of population in the frequency access layer in each block group multiplied by the corresponding block group population equals the statewide estimate of the number of residents within a half mile walk of that frequent transit category.

Open issues

- 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 block groups 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 block group is zoned for any type of residential’.
    - Instead of percent of census block group covered by the frequency layer, this could be the percent of residential land within the census block group covered by the frequency layer would be considered instead.