Characterizing Travel Behavior Zones in Los Angeles

Karina Macias, City of Los Angeles Department of Transportation

Transportation Impact Analysis Reform

The City of Los Angeles is in the process of adopting project impact assessment methods based on vehicle miles traveled (VMT). The City aims to encourage reductions in greenhouse gas emissions, support multimodal transportation, and promote diverse infill development by reducing VMT.

Projects estimated to generate VMT exceeding the City's thresholds of significance will be required to implement Transportation Demand Management (TDM) to reduce vehicle trips generated by the project, and thus, mitigate its impacts on the environment.

Objective

TDM effectiveness depends on a project site's built environment and demographic context. Los Angeles comprises 469 square miles and is made up of diverse neighborhood typologies, from low density rural to high density urban communities. The City of Los Angeles developed a Travel Behavior Zone (TBZ) categorization method to help estimate the VMT and single-occupant vehicle trip reductions of TDM measures.

This poster describes data inputs and methods used to assign TBZ designations to U.S. Census Tracts within the City of Los Angeles.

Methods

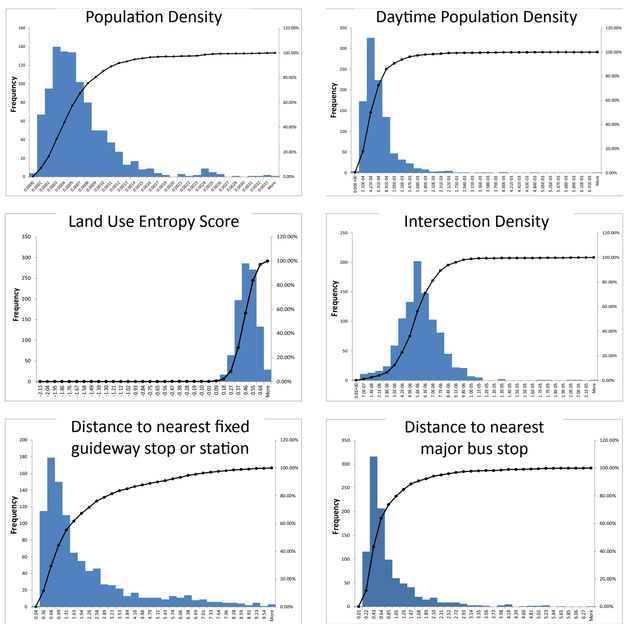
- Built environment and demographic variables demonstrated to influence residents, employees, and visitors' propensity to use transit were calculated for 1,003 U.S. Census Tracts within the City using ArcGIS software. See Table 1 for data definitions and sources[1].
- To compare each variable within the City, the z-score for each variable was calculated using the sample mean and standard deviation.
- Finally, a Travel Behavior Zone Index Value was calculated for each Census Tract using the z-score value of each factored variable and a function that assigns weights to the standard score (z-score) for each variable:

Travel Behavior Zone Index = (0.25 * z-population density) + (0.25 * z-daytime population density) + (0.24 * z-land use diversity score) + (0.23 * z-intersection density) + (-0.29 * z-distance to nearest fixed guideway station) + (-0.1 * z-distance to nearest major bus stop)

Table 1. Data Definitions and Sources

Variable	Definition	Data Source
Population Density	Total population divided by land area in square feet	2015 American Community Survey 5-Year Estimate
Daytime Population Density	Total population present during average weekday daytime hours divided by land area in square feet	Derived from Census Transportation Planning Products and 2013 ACS population estimates
Land Use Entropy Score[2]	Measure of five land use mix represented in the area: residential, retail (excluding region-serving or "big box" uses of 300,000 square feet or larger), entertainment (including restaurants), office, and institutional (including schools and community institutions)	Los Angeles County Assessor's Tax Roll, 2015
Intersection Density	Total street intersections divided by land area in square feet	City of Los Angeles Bureau of Engineering Street Centerline
Distance to nearest fixed guideway station	Geodesic distance (in miles) between Census Tract centroid and nearest fixed guideway bus stop or rail station	Los Angeles County Metropolitan Transportation Authority (Metro)
Distance to nearest major bus stop	Geodesic distance (in miles) between Census Tract centroid and nearest major bus stop, as defined by Metro's bus ridership analyses	Los Angeles County Metropolitan Transportation Authority (Metro)

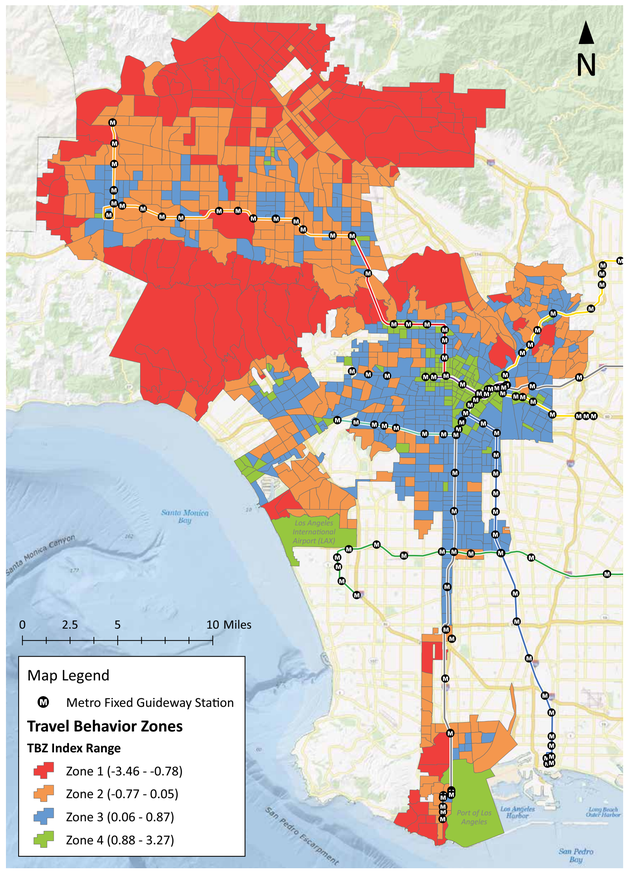
Variable Frequency Distribution



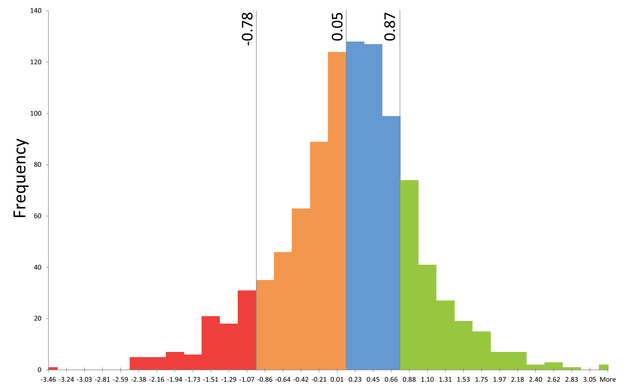
Results

- The average Travel Behavior Zone (TBZ) Index value is 0.045 and values follow a somewhat normal distribution with a standard deviation of 0.827.
- Designations range from Zone 1, equivalent to a neighborhood context with low employment and population densities, homogenous land use mix, low intersection density, and underserved by transit service, to Zone 4, which describes an urban built environment with high population and employment densities, high street network connectivity, and access to transit.
- Areas where large employers own and/or occupied the majority of the land area with no residential population were manually assigned a Zone 4 designation because TDM can effectively influence commuter trips at campus-style contexts.

Map of Travel Behavior Zones within the City of Los Angeles



Travel Behavior Zone Frequency Distribution



How effective would TDM be in different TBZs?

Zone 1

Projects in this context must implement comprehensive packages of TDM measures to support non-single occupancy vehicle travel and may have to help expand mobility services in the area to encourage transit use

Zone 2

Projects in this context must administer TDM measures that disincentivize non-single occupancy vehicle travel and encourage transit trips. Developer may have to help expand mobility services to transit to ensure project-level VMT reductions.

Zone 3

Projects in this context must administer TDM measures that disincentivize non-single occupancy vehicle travel and encourage transit trips. Developer may help expand emerging shared mobility services in this context to ensure project-level VMT reductions.

Zone 4

Pojects in this neighborhood context can implement traditional TDM measures to encourage alternative modes of travel using exisiting multi-modal transportation infrastructure and reduce project-level VMT. Developers can help expand emerging shared mobility services in this context.

References

1. Ewing, Reid, and Robert Cervero. "Travel and the built environment: a meta-analysis." Journal of the American planning association 76.3 (2010): 265-294.

2. Brown, Barbara B., et al. "Mixed land use and walkability: Variations in land use measures and relationships with BMI, overweight, and obesity." Health & place 15.4 (2009): 1130-1141.

Contact

Karina Macias <karina.macias@lacity.org>