

**SIZE MATTERS: Using Census
Block, Block-Group and Tract
polygons in Transit Planning.**

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Abstract

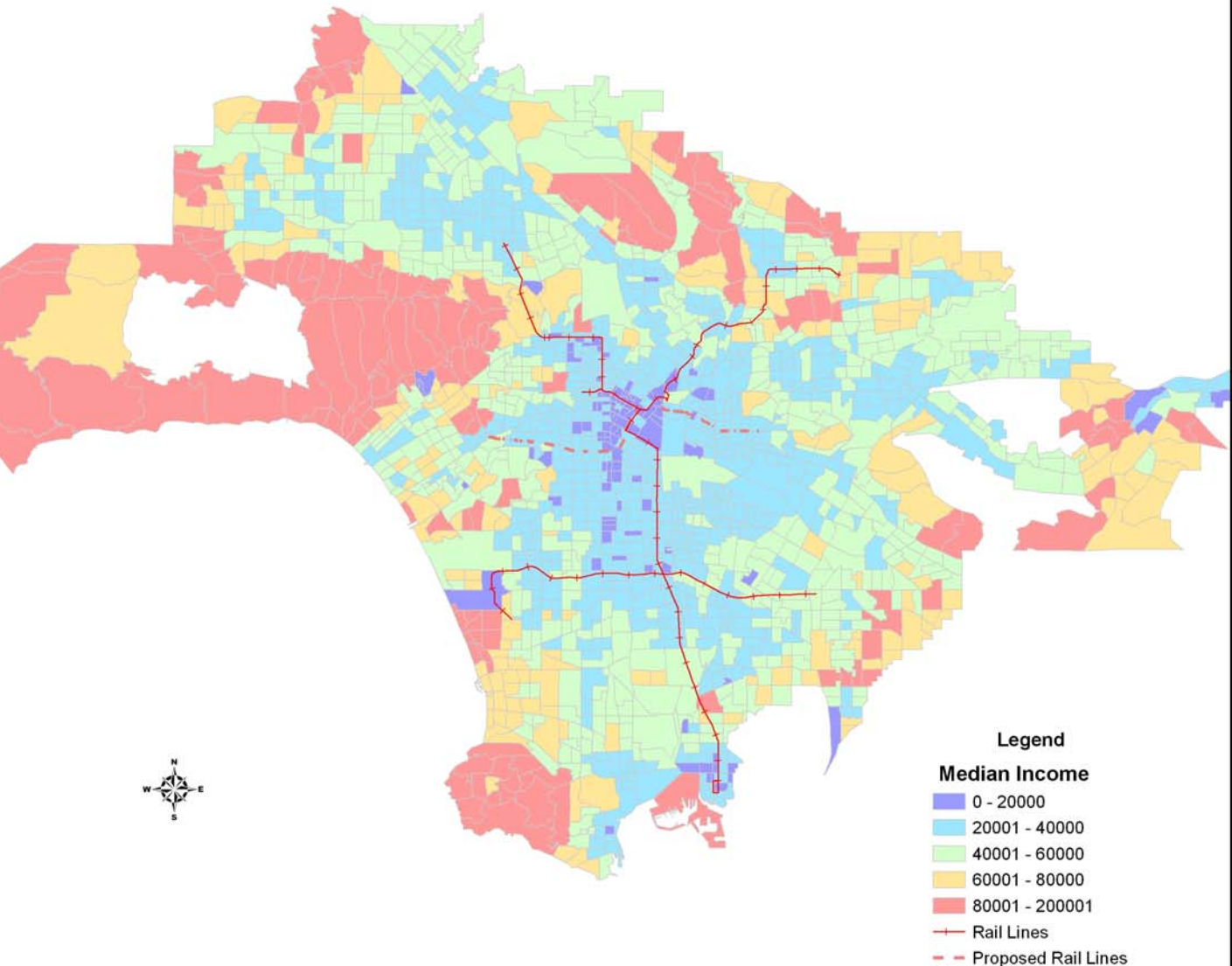
The Census divides urban areas into different sized polygons: Census Tracts, Block-Groups and Blocks, where Block-Groups can be mapped as subsets of Tracts and Blocks as subsets of Block-Groups. In Los Angeles County, Tracts have an average radius of .7 miles, which is too long for transit walk distances. Tracts can be used to address global planning issues, such as transit accessibility of rail corridors to lower income communities. Block-groups have an average radius of .4 miles, which is between bus and rail walk distances. Block-Groups have been used to evaluate siting of transit centers. Metro's Title 6 submittal (accessibility by ethnic status) uses tracts but will substitute block-groups when service only touches a single boundary area of a tract. Blocks are generally the size of city blocks. Metro uses them to analyze accessibility for populations with limited mobility, such as wheelchair users. The paper provides illustrations of each type of analysis.

Using Census Tracts

- Low Income Areas Served by Metro Rail
- Title 6 Submittal: Equitable Service by Ethnicity

Areas Served By Metro Rail

Rail Overlay of Los Angeles Census Tracts with Metro Transit Service



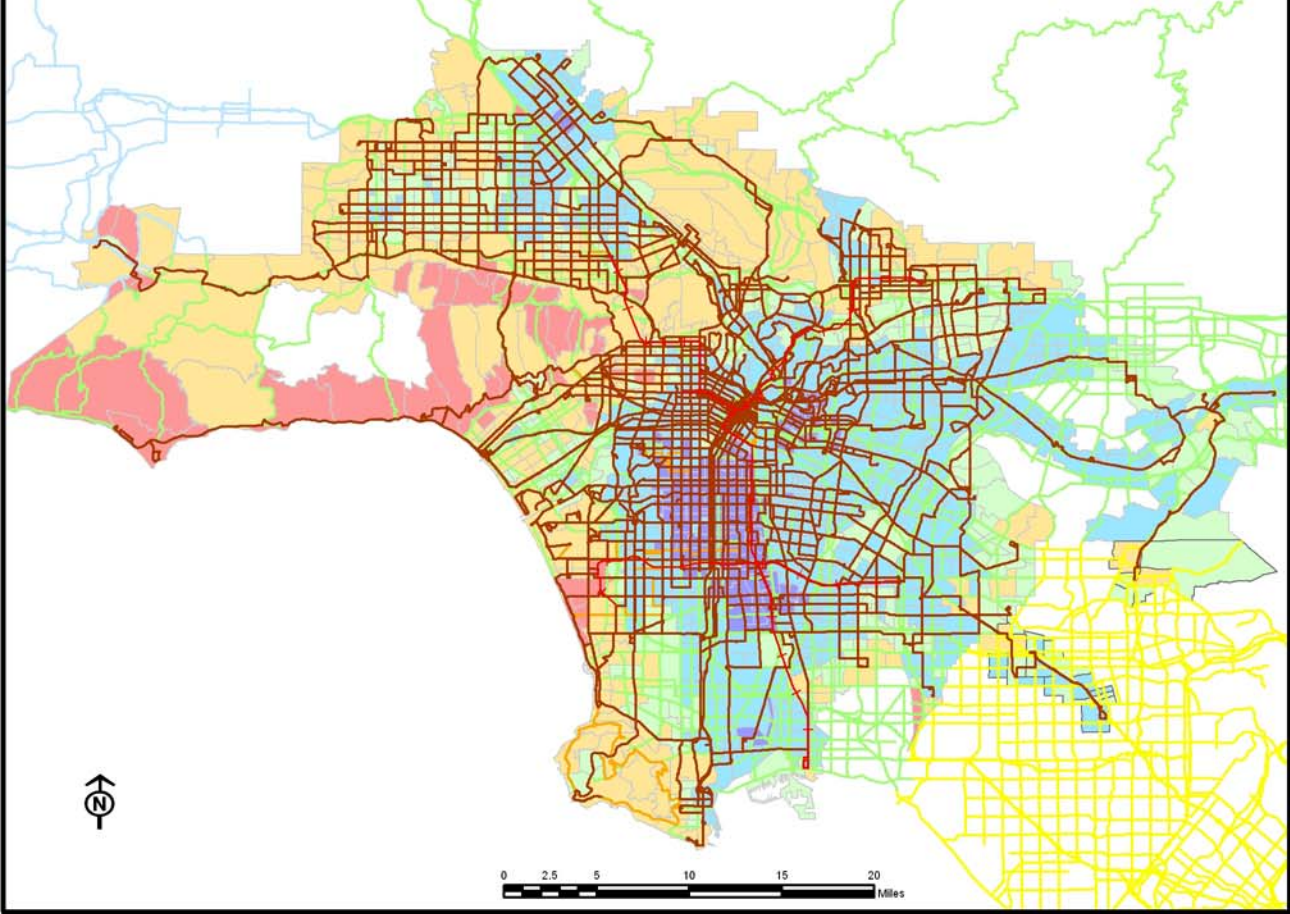
Key Points for Areas Served by Metro Rail

- Issue Addressed. Disparity of patrons' median income by mode:
 - Rail Patron income is 83% higher than Bus Patron Income.
- Myth: Rail Service is in higher income areas.
- Reality: The Rail patron income distribution is bimodal. It represents current bus and new choice riders.
 - Rail lines are placed in corridors with existing high demand.
 - Choice riders will go longer distances to ride rail.
- Map reflects reality:
 - Rail Lines tend to be in lower income areas.

Conclusion: Like the Girl Scout song¹ rail attracts both old and new friends, high and low income riders.

¹ "Make new friends but keep the old, one is silver but the other is gold"

**Overview of MTA Service Area:
Transit System & % Minority per Census Tract**



Legend

- Major Activity Center
- MTA Facility
- Red Line Station
- Hospital
- ⋮ Elementary School
- ⋮ Middle/Jr. High School
- ⋮ High School
- ⋮ College
- Major LA Road
- Major Ventura Road
- Major Orange Road

- Rail Line
- Bus Line: All Day
- Bus Line: Peak Only

Line Number	Service Type
001-229:	Local
300-399:	Limited
400-599:	Express
600-699:	Community circulator
700-799:	Rapid
exception:	Lines 418 and 426 are limiteds

Line numbers reference the trunk line. Trunks with branches have buses with one or more other numbers on their headsigns.

Census Tract

Percent Minority in Tract



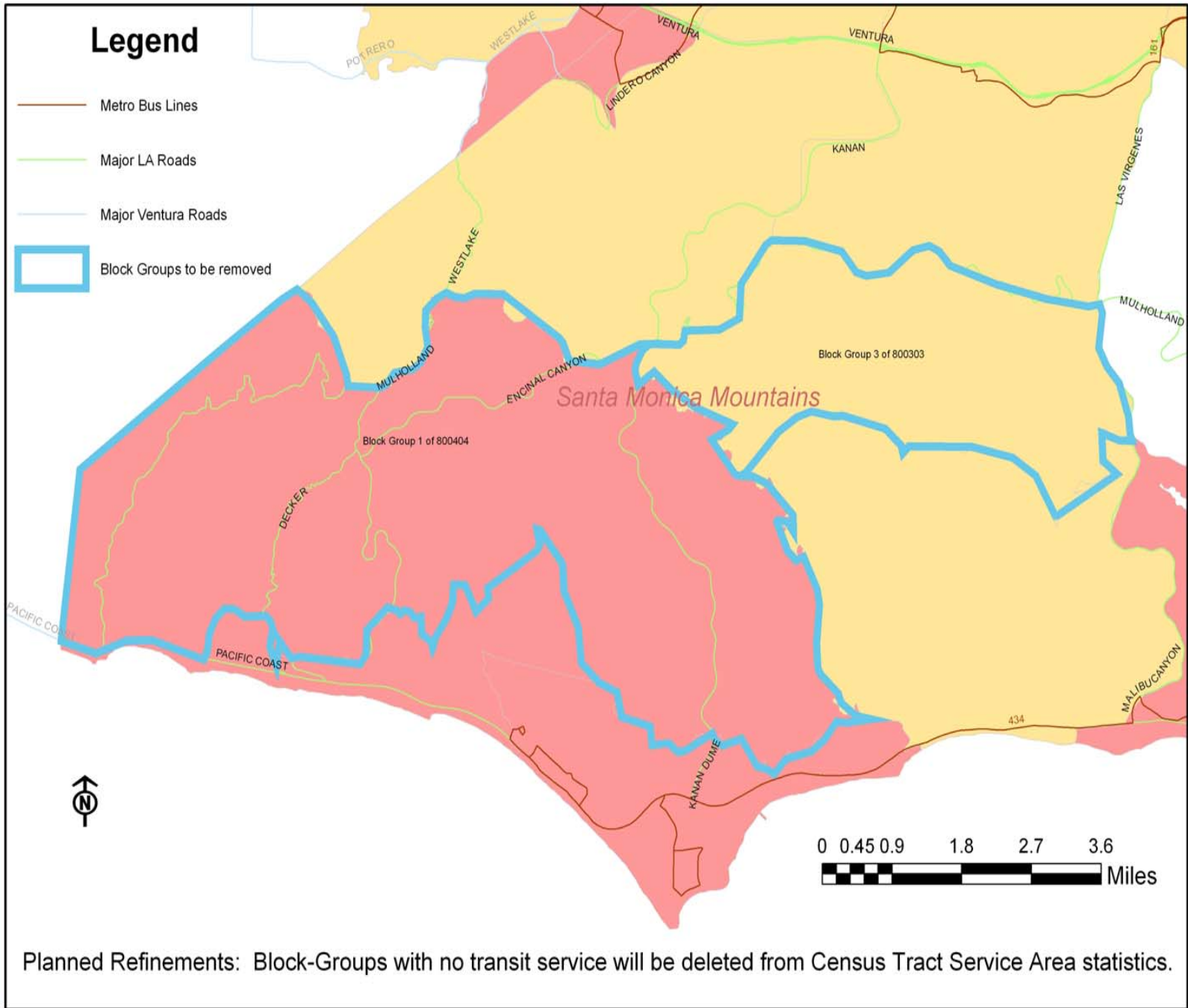
Key Points for Title 6 Submittal

- Issue Addressed. Submitting a Title 6 Report (Service to Minority Areas) via GIS Software not only meets federal requirements but also advances goals.
- Transit System overlaid on Census Tracts.
 - Census Tracts Color Ramped to show degree of Minority Representation:
 - Colors stepped by standard deviations from mean.
69.5% is mean minority population in service area.
- Problem: Title 6 requires too many details to be mapped in overview.
 - Requires variety of service details, exact percentage of minorities reported, road system, activity centers, and cultural features.
 - Resolved by scaling (“zooming in”) capabilities of ArcReader software: as user zooms down to a community level more and, sometimes, different detail is displayed
- Conclusion: Better Overview with no loss of Detail.

Using Census Block-Groups

- Future Title 6: Eliminate sparsely populated portions of Tracts.
- Transit Center Analysis

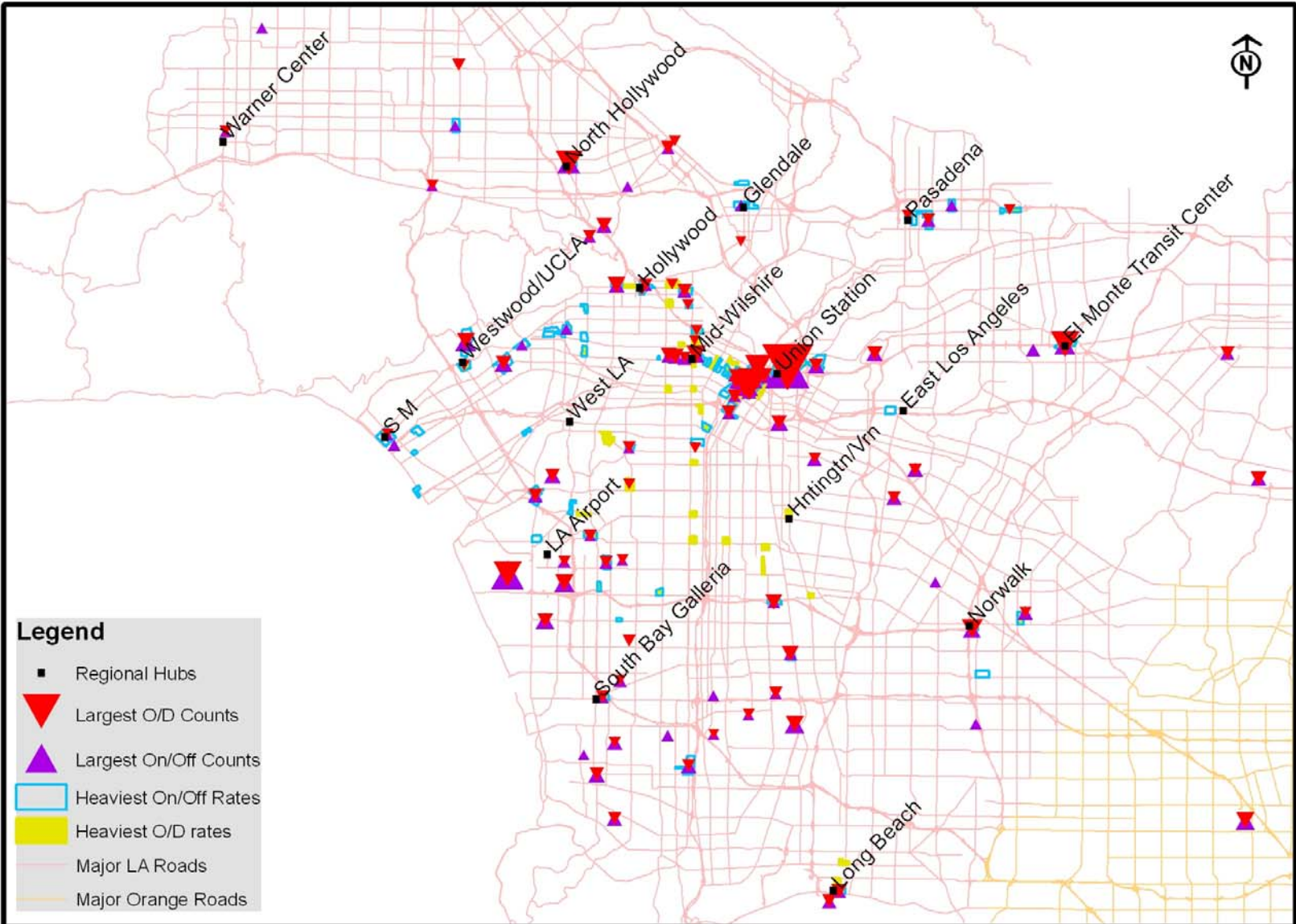
Block-Groups to be Dropped From Service Area Map



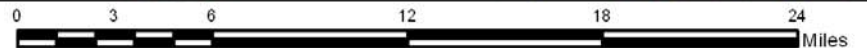
Key Points for Transit Center Analysis

- Issue Addressed. Are Proposed Transit Centers In Current Activity Centers?
- Analysis based on Customer Information Calls
 - Origins and Destinations accumulated to Block-Groups
 - Ons/Offs also accumulated based on trip itinerary:
 - Counts every link boarding plus final link alighting
- Problem with using Block-Groups:
 - Size of BGs varies by residential density.
 - Resolution: In addition to plotting absolute numbers, plotting of rates per BG area
- Resulting Plots:
 - Proposed Regional Transit Centers
 - BGs with high absolute O/D
 - BGs with high rates of O/D
 - BGs with high absolute ons/offs
 - BGs with high rates of ons/offs
- Conclusion: The proposed Transit Centers are in high activity centers
 - Two exceptions: East and West LA Centers at stations at the end of proposed rail lines.
 - These tend to become high activity centers

Present and Proposed Activity Centers



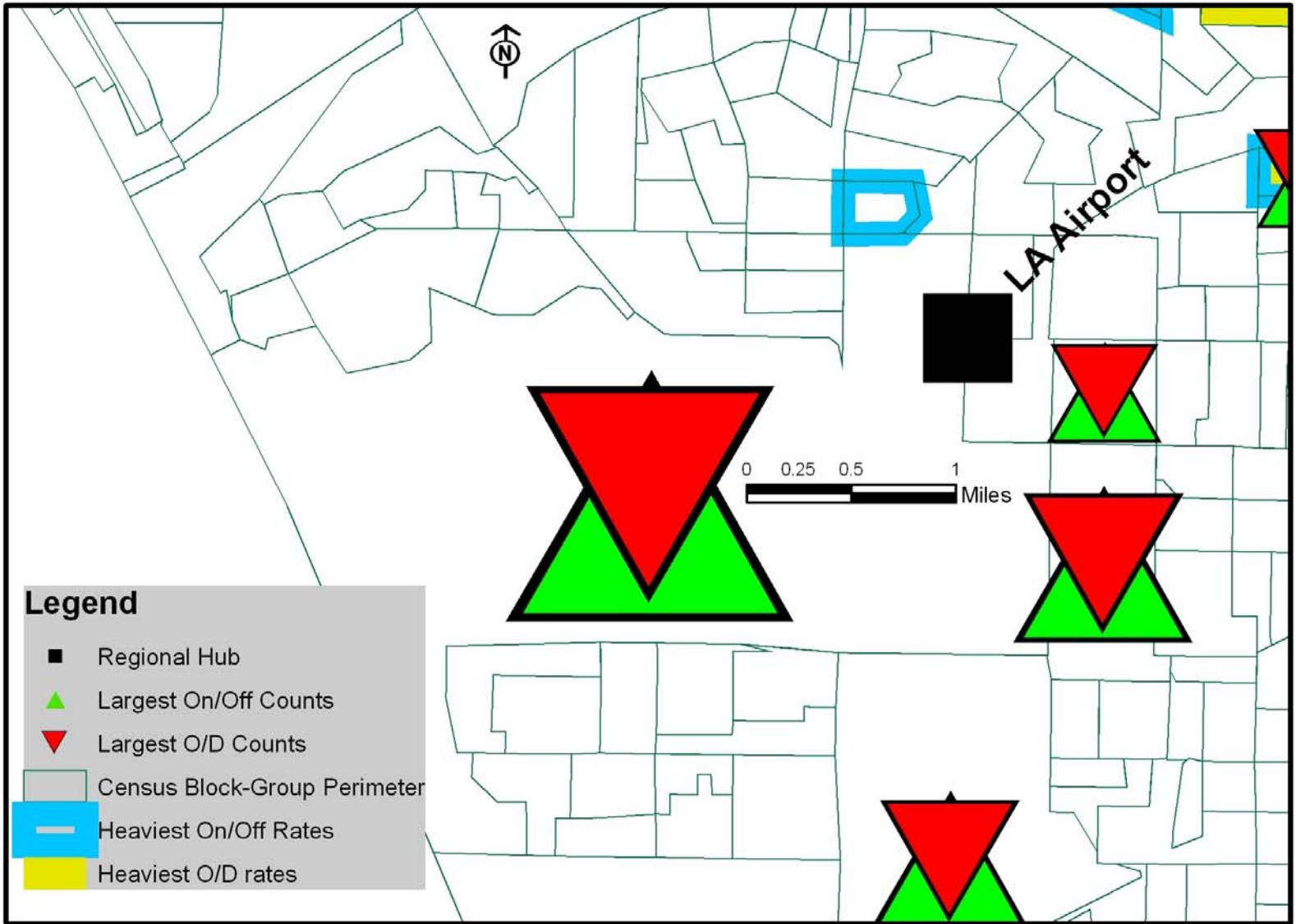
Data based on September 2004 calls to CCIS about weekday trips.



Using Customer Information Calls

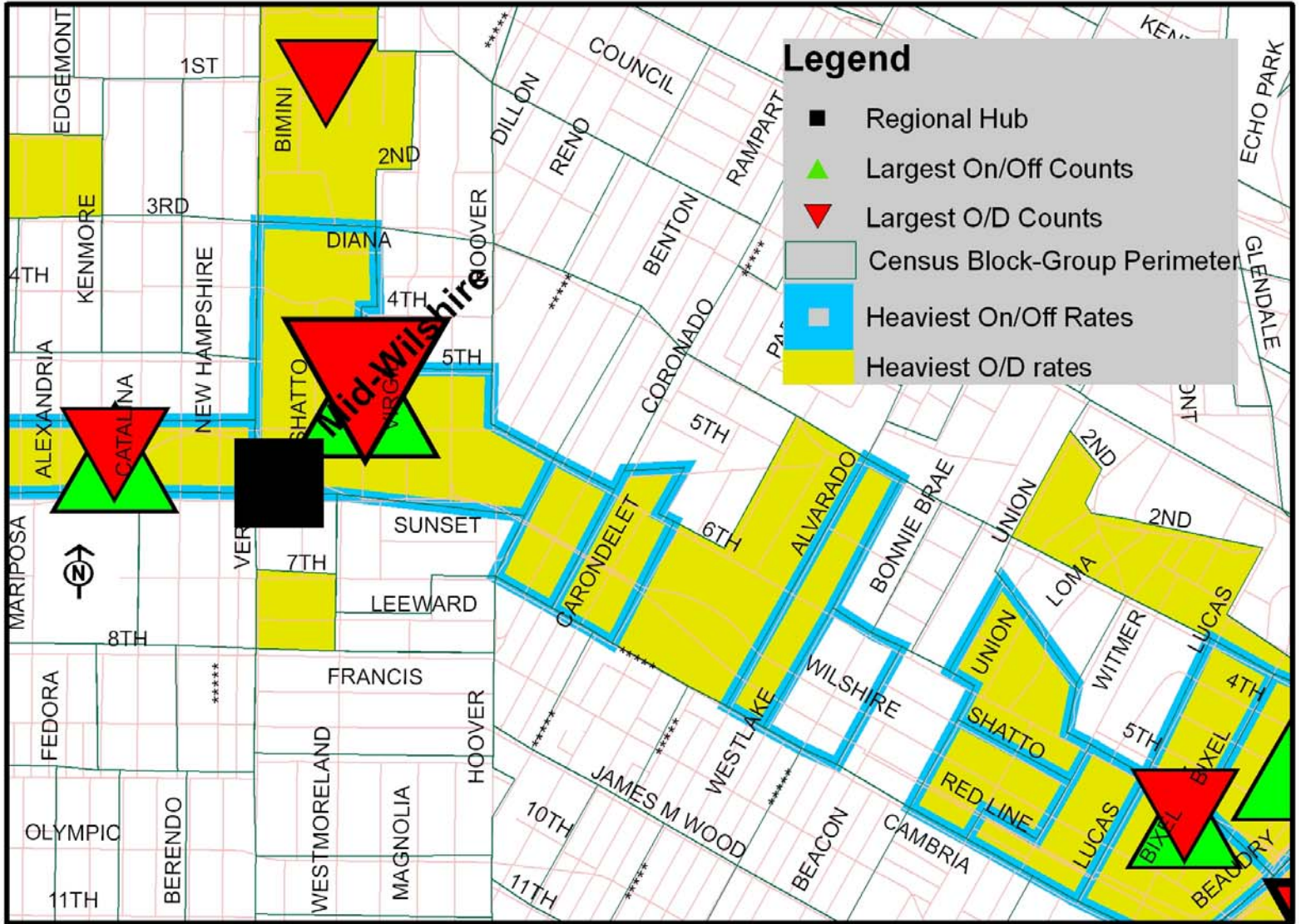
- Large amounts of free data involving no extra coding and data cleaning expense
- Over 280,000 weekday calls per month
- Valid Origins and Destinations
 - Required to complete suggested trip itineraries
- Transfer Points listed in trip itineraries
- But commonly seen as unrepresentative
 - Presumes calls not by users making normal trips
- Empirical Evidence: O/Ds no different from people answering on-board surveys
 - Basis: Wilcoxon Matched Pairs Signed Ranks Test
 - 5000 person samples of callers and respondents
 - Caveat: O/D matrix had to be collapsed to the 151 Community Service Areas of LA County
 - A large enough sample could not be drawn for the O/D matrix of the 6352 block-groups in LA County

Regional Hub: Los Angeles Airport

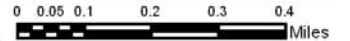


O/D and On/Off data based on September 2004 calls to CCIS about weekday trips. Red and green triangles represent absolute numbers. Yellow areas and Blue outlines represent usage rates. O/D red triangles and yellow areas show where callers say they are coming & going. On/Off green triangles and blue outlined areas show where CCIS itineraries have them get on and off buses & trains.

Regional Hub: Mid-Wilshire



O/D and On/Off data based on September 2004 calls to CCIS about weekday trips. Red and green triangles represent absolute numbers. Yellow areas and Blue outlines represent usage rates. O/D red triangles and yellow areas show where callers say they are coming & going. On/Off green triangles and blue outlined areas show where CCIS itineraries have them get on and off buses & trains.



Using Census Blocks

- Wheelchair Boardings and Alightings

Key Points for Wheelchair Stops

- Issue Addressed. Schedule adjustment for Bus Lines with high wheelchair patronage.
 - Average time per Boarding: 6 seconds
 - Average time per Wheelchair Boarding: 3 minutes
 - Average time per Wheelchair Alighting: 2 minutes
- Example: Wheelchair stops per Census Block in the San Fernando Valley
 - Map Identifies Van Nuys corridor as having over half the heavily used blocks in the Valley
 - Most frequented Blocks are color coded by daily rate of use.
 - ArcReader function allows Schedule Makers to click on a Block to find total wheelchair ons and offs for the month.
- Schedule Makers, using ArcReader, can then select stops from the identified corridor.
 - Selected Stops provide information for each wheelchair transaction:
 - The Line, Route, Bus Run, direction, date and arrival time of the bus. Also, the operator ID and bus vehicle number. The type of transaction (boarding or alighting) is also recorded.

Conclusion: Running time is added to appropriate Bus Runs.

Pop-up tables using ArcReader

Table from Wheelchair Census Block Map:

Identify Features on the Map

Identify from: <Top-most layer>

Count_per_Block
113

Location: -118.26 / 34.05 Decimal Degrees

Field	Value
Count for Month	113
FID	2097
Shape	Polygon

Identified 1 feature

Table from disaggregated Wheelchair activity at Bus Stops Map:

Identify Features on the Map

Identify from: <Top-most layer>

WC_Geo_positions_m
7:10
9:21
9:26
16:15
9:22
9:29
19:34
14:52
9:24

Location: -118.29 / 34.06 Decimal Degrees

Field	Value
BUSRUN	5
DATE	3/9/2005
DIRECTION	5
DIVISION	2
DRIVER	28333
FID	17263
LINE	105
On or Off	Boarding
ROUTE	18
Shape	Point
TIME	9:26
VEHICLE	7437

Identified 9 features