Regional Centers, MXDs, TODs, and Streets

Reid Ewing

Professor & Chair
City and Metropolitan Planning
University of Utah
ewing@arch.utah.edu

MRC Research at 5 Geographic Scales (cover 4 today)

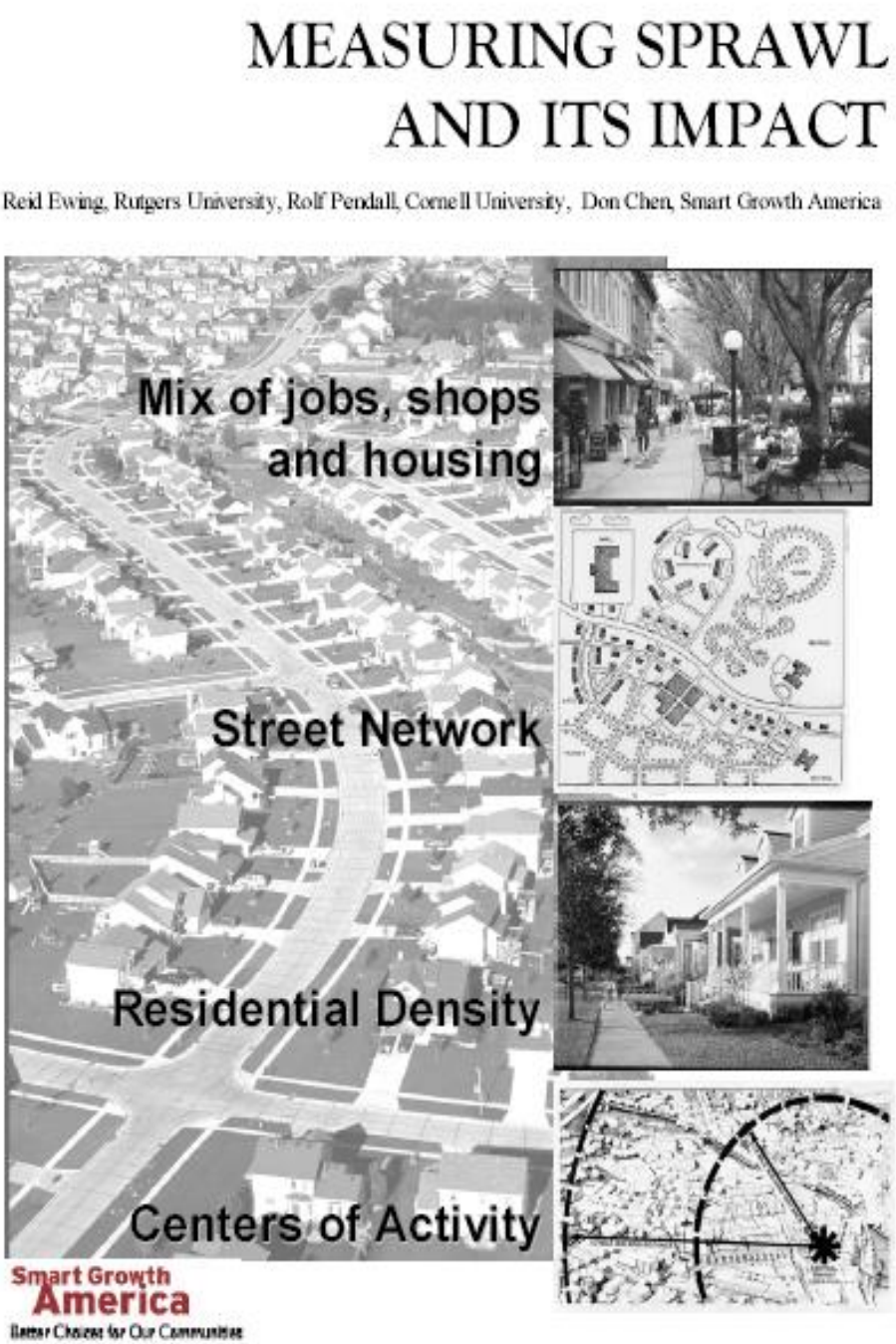
- **Region/County**
- Neighborhood
- **MXD**
- **TOD**
- **Street**

REGIONAL/COUNTY SCALE

Measuring Sprawl and Its Impacts

- Low Density
- Segregation of Uses
- Lack of Strong Centers
- Sparse Street Network

Released October 2002



The Washington Post

MD VA

Friday, August 29, 2003

The Washington Post NATIONAL NEWS DC MD VA R Friday, August 29,

Suburbia USA: Fat of the Land?

Report Links Sprawl, Weight Gain

By Rob Stein
Washington Post Staff Writer

Suburban sprawl appears to be contributing to the nation's obesity epidemic, making people less likely to walk and more likely to be overweight, researchers reported yesterday.

In the first comprehensive examination of whether suburbs spreading across the U.S. landscape are affecting Americans' health, the researchers studied more than 200,000 people in 448 counties, producing the first concrete evidence supporting suspicions that sprawl is aggravating the nation's growing weight crisis.

People who live in the most spread-out areas spend fewer minutes each month walking and weigh about six pounds more on average than those who live in the most densely populated places. Probably as a result, they are almost as prone to high blood pressure as cigarette smokers, the researchers found.

"There are lots of other reasons why we should work to contain sprawl," said Reid Ewing of the University of Maryland's National Center for Smart Growth, who led the

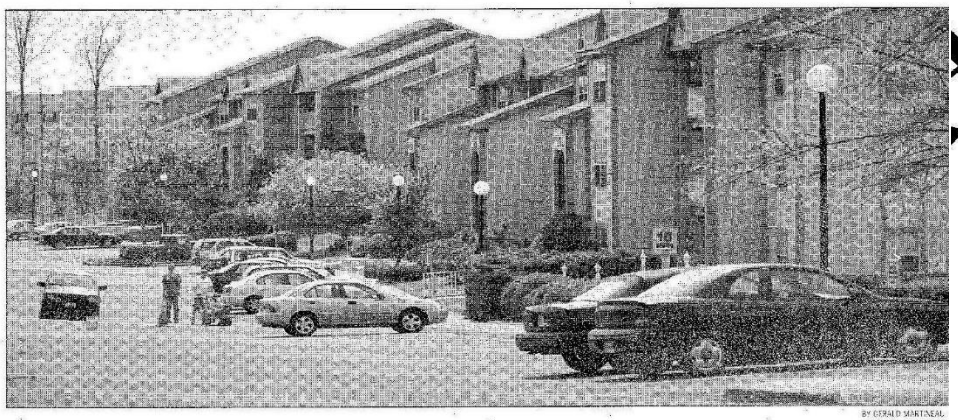
dence and no national data. The new findings are likely to be used by advocates of tightly controlled growth around the country, including locally.

"There is a lot of circumstantial evidence that sprawl is related to health," Ewing said in a telephone interview. "This is certainly the first national study to make the direct connection between the built environment and health."

Ewing and his colleagues analyzed data collected about 206,992 U.S. adults between 1998 and 2000 by the Behavioral Risk Factor Surveillance System, an ongoing federal survey. Using data from the Census Bureau and other federal sources about population density, block size, street patterns and other factors, the researchers calculated a "sprawl index" for 448 counties in the largest metropolitan areas nationwide, where two-thirds of the population reside, including the Washington region.

The index ranged from a low of 63 for the most sprawling county—Geauga, Ohio, just outside Cleveland—to a high of 352 for the densest—New York City.

Frederick County in Maryland,



BY GERALD MARTINEAU

People who live in the most spread-out areas were found to weigh about six pounds more on average than those in the most densely populated pl

25 densest counties.

People in more sprawling counties are also likely to have a higher body mass index (BMI), a standard measure of weight. A 50-point increase in the degree of sprawl was associated with an average weight gain of a little more than one pound per person, researchers found.

While researchers found no association between sprawl and diabetes or heart disease, they did find that people who live in the least sprawling areas had a 29 percent lower risk of developing high blood pressure than those in the most sprawling areas.

Sprawl and Obesity

New research links suburban sprawl to obesity. You are more likely to be overweigh live in an area with low population density and a more expansive street grid.

STATE/COUNTY	SPRAWL INDEX SCORE (The lower the sprawl index score, the greater the amount of sprawl.)	EXPECTED BMI* (More sprawl means you are more likely to have a higher body mass index, . . .)	EXPECTED WEIGHT** (. . . the more pounds you are likely to weigh, . . .)	PERCENT DIFFERENCE FROM AVERAGE RISK (. . . the higher your risk of high blood pressure . . .)	. . . a high risk bein
Maryland					
Anne Arundel	107.75	26.07	166.47	-0.92%	-1
Calvert	90.84	26.13	166.84	1.10	1
Charles	89.72	26.14	166.87		2

Pickens County, S.C. (83.8)		3.5%
Geauga County, Ohio (63.1)	4.5%	8.1%

Source: Smart Growth America Surface Transportation Policy Project

at the University of Maryland.

The study also looked at heart disease and diabetes, but didn't find any statistically relevant relationship between sprawl and these diseases.

The study did find that the

on weight, obesity, hypertension and other health factors were gleaned from a continuing phone survey of more than 200,000 adults by the CDC.

The study found that for every 50-point increase in sprawl

Connections to Outcomes

Physical activity, obesity (Ewing et al, 2003; Kelly-Schwartz et al, 2004; Sturm and Cohen, 2004; Doyle et al, 2006; Fan and Song, 2009; Plantinga and Bernell, 2007; Lee et al, 2009)

Traffic fatalities (Ewing et al, 2003)

Air quality (Kahn, 2006; Stone et al, 2010; Schweitzer and Zhou, 2010)

Residential energy use (Ewing and Rong, 2008)

Emergency response times (Trowbridge et al, 2009)

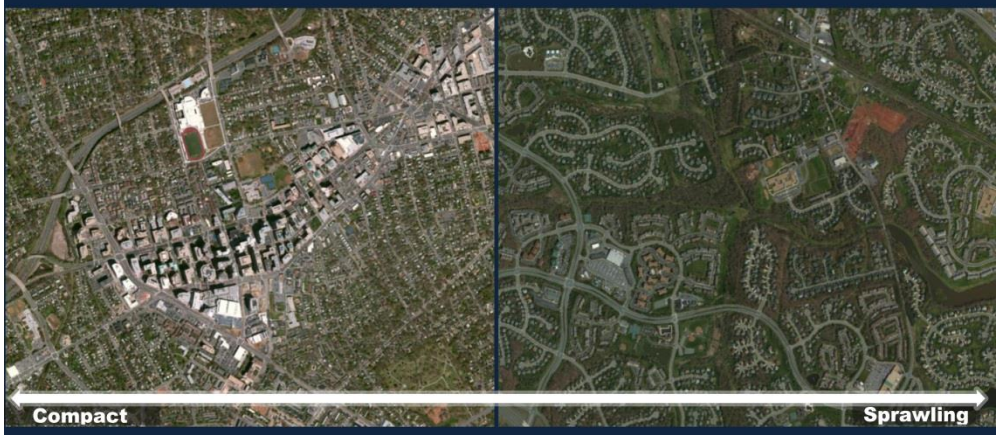
Teenage driving (Trowbridge and McDonald, 2008; McDonald and Trowbridge, 2009)

Social capital (Kim et al, 2006; Nguyen, 2010)

Private-vehicle commute distances and times (Ewing et al, 2003; Zolnik, 2011; Holcombe and Williams, 2012)

Update and Refinement

- National Institutes of Health
- Ford Foundation
- Smart Growth America

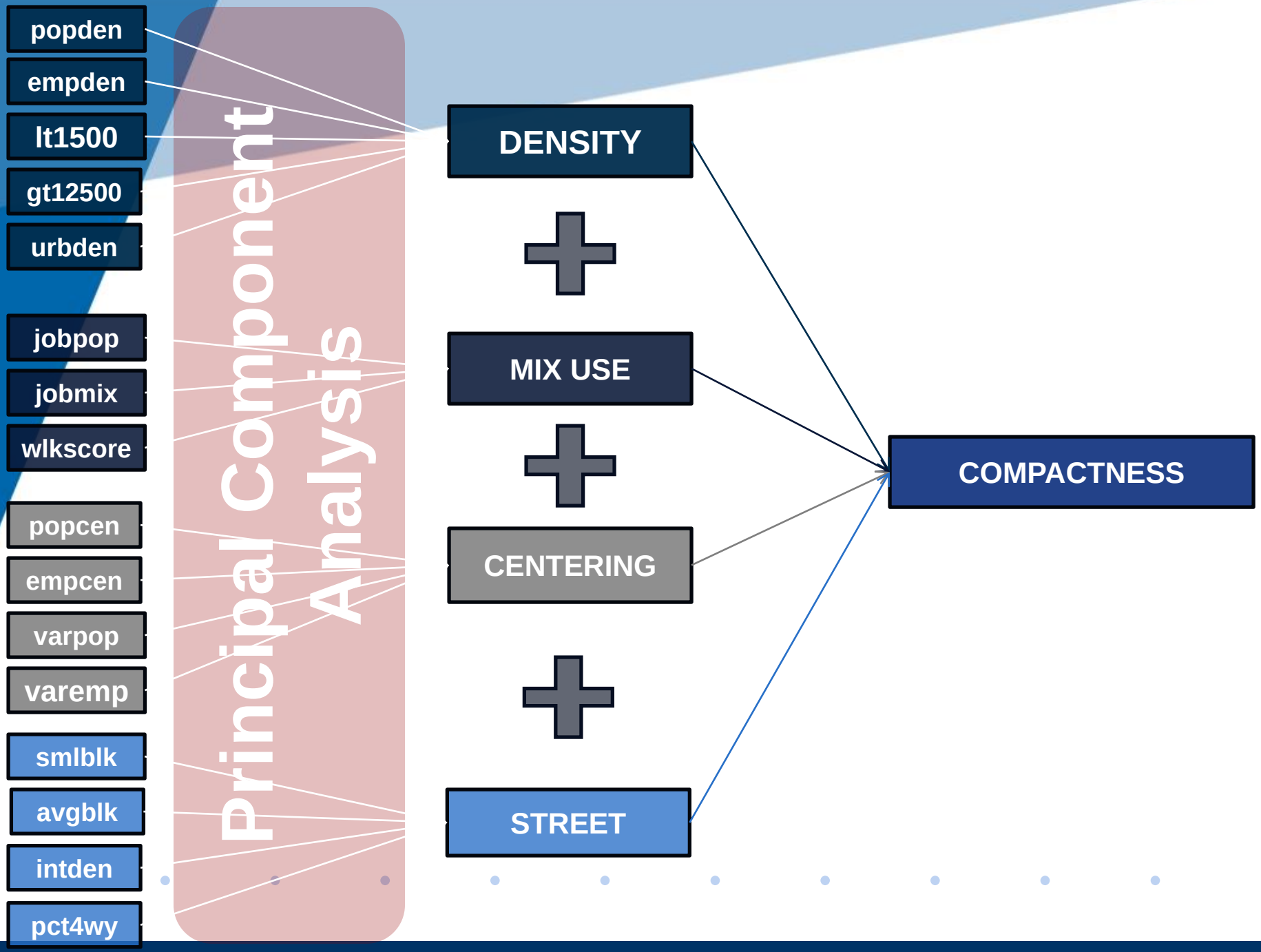


MEASURING URBAN SPRAWL AND VALIDATING SPRAWL MEASURES

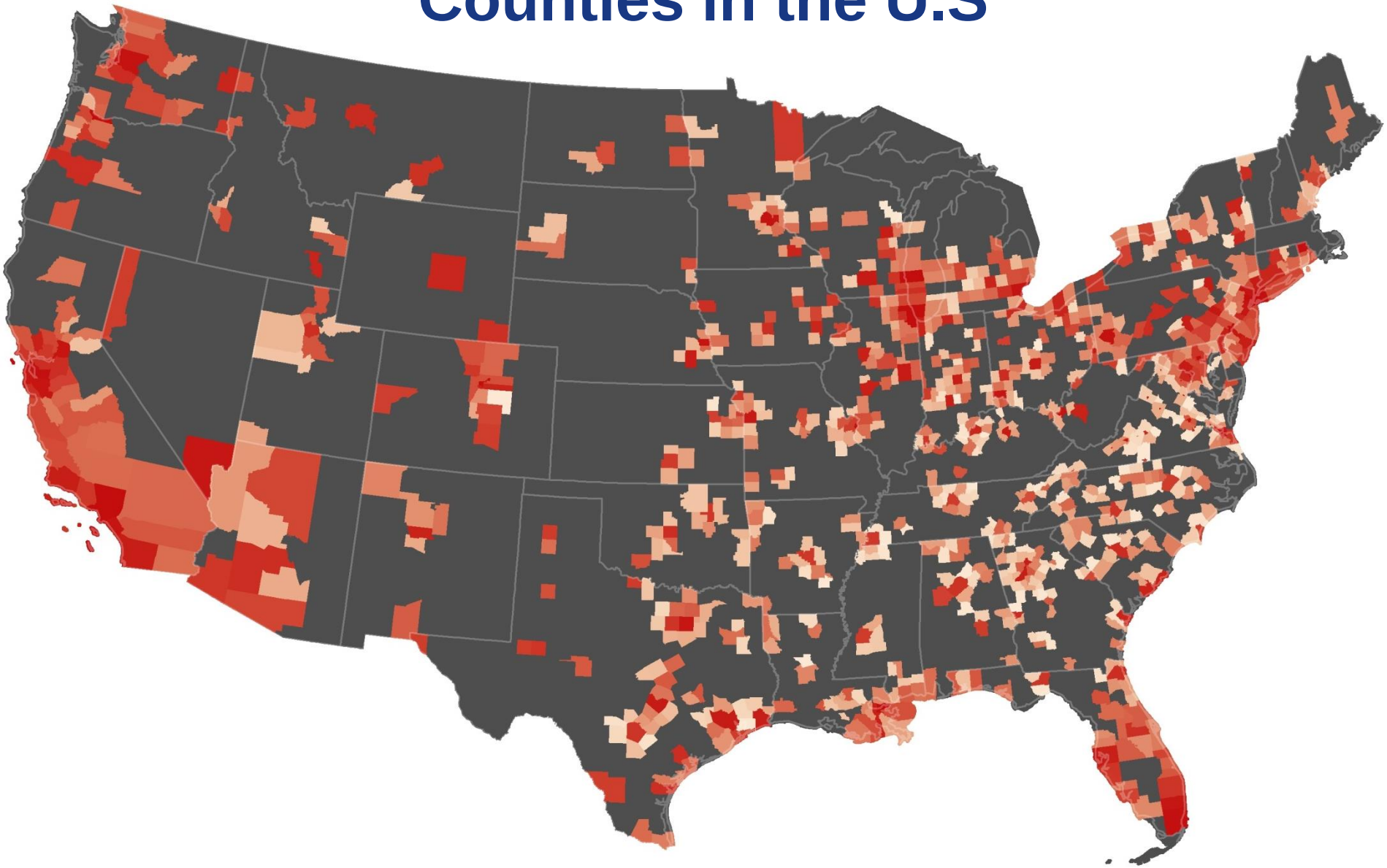
Reid Ewing and Shima Hamidi

Prepared for:

National Cancer Institute, National Institutes of Health
Ford Foundation
Smart Growth America


popden
empden
lt1500
gt12500
urbden
jobpop
jobmix
wlkscore
popcen
empcen
varpop
varemp
smlblk
avgblk
intden
pct4wy
Principal Component Analysis
DENSITY
MIX USE
CENTERING
STREET
COMPACTNESS

Compactness Scores for 994 Metropolitan Counties in the U.S



Compactness Scores for Counties in Utah

Compactness Ranking	County	Metropolitan Area	Compactness Score
133	Salt Lake County, UT	Salt Lake City, UT	120.12
261	Weber County, UT	Ogden-Clearfield, UT	111.17
275	Cache County, UT	Logan, UT-ID	110.14
279	Utah County, UT	Provo-Orem, UT	109.98
385	Davis County, UT	Ogden-Clearfield, UT	104.52
612	Washington County, UT	St. George, UT	90.67
714	Tooele County, UT	Salt Lake City, UT	85.94
751	Summit County, UT	Salt Lake City, UT	83.61
775	Juab County, UT	Provo-Orem, UT	82.2

Article

Measuring Sprawl and Its Impacts: An Update

Journal of Planning Education and Research
2015, Vol. 35(1) 35–50
© The Author(s) 2015
Reprints and permissions:
sagepub.com/journalsPermissions.nav
DOI: 10.1177/0739456X14565247
jpe.sagepub.com
SAGE

Shima Hamidi[1], Reid Ewing[1], Ilana Preuss[2], and Alex Dodds[2]

Abstract

Across the nation, the debate over metropolitan sprawl and its impacts continues decade after decade. To elevate the debate, a decade ago, researchers developed compactness/sprawl indices for metropolitan areas and counties that have been widely used in health and other research. In this study, we develop refined compactness/sprawl indices based on definitions and procedures in earlier studies by Ewing and colleagues and validate them against transportation outcomes. The indices are being made available to researchers who wish to study the causes, costs and benefits, and solutions to sprawl and to practitioners who wish to check their community's success in containing sprawl.

Keywords

growth management, transportation, urban form, urban sprawl

Health & Place 26 (2014) 118–126

Contents lists available at ScienceDirect

Health & Place

journal homepage: www.elsevier.com/locate/healthplace

Relationship between urban sprawl and physical activity, obesity, and morbidity – Update and refinement ☆

Reid Ewing *, Gail Meakins [1], Shima Hamidi [2], Arthur C. Nelson [3]

Department of City and Metropolitan Planning, College of Architecture and Planning, 375 S 1530 E RM 235, Salt Lake City, UT 84112, USA

ARTICLE INFO

Article history:
Received 11 April 2013
Received in revised form
10 December 2013
Accepted 15 December 2013
Available online 21 December 2013

Keywords:
Obesity
Compactness
Sprawl
Physical activity
Built environment

ABSTRACT

Aims: This study aims to model multiple health outcomes and behaviors in terms of the updated, refined, and validated county compactness/sprawl measures.
Methods: Multiple health outcomes and behaviors are modeled using multi-level analysis.
Results: After controlling for observed confounding influences, both original and new compactness measures are negatively related to BMI, obesity, heart disease, high blood pressure, and diabetes. Indices are not significantly related to physical activity, perhaps because physical activity is not defined broadly to include active travel to work, shopping, and other destinations.
Conclusions: Developing urban and suburban areas in a more compact manner may have some salutary effect on obesity and chronic disease trends.

© 2013 The authors. Published by Elsevier Ltd. All rights reserved.

Article

Urban Studies

Urban Studies
2016, Vol. 53(2) 247–266
© Urban Studies Journal Limited 2014
Reprints and permissions:
sagepub.co.uk/journalsPermissions.nav
DOI: 10.1177/0042098014562331
usj.sagepub.com
SAGE

Urban sprawl as a risk factor in motor vehicle crashes

Reid Ewing
University of Utah, USA

Shima Hamidi
University of Utah, USA

James B Grace
US Geological Survey, USA

Abstract

A decade ago, compactness/sprawl indices were developed for metropolitan areas and counties which have been widely used in health and other research. In this study, we first update the original county index to 2010, then develop a refined index that accounts for more relevant factors, and finally seek to test the relationship between sprawl and traffic crash rates using structural equation modelling. Controlling for covariates, we find that sprawl is associated with significantly higher direct and indirect effects on fatal crash rates. The direct effect is likely due to the higher traffic speeds in sprawling areas, and the indirect effect is due to greater vehicle miles driven in such areas. Conversely, sprawl has negative direct relationships with total crashes and non-fatal injury crashes, and these offset (and sometimes overwhelm) the positive indirect effects of sprawl on both types of crashes through the mediating effect of increased vehicle miles driven. The most likely explanation is the greater prevalence of fender benders and other minor accidents in the low speed, high conflict traffic environments of compact areas, negating the lower vehicle miles travelled per capita in such areas.

Is Sprawl Affordable for Americans?

Exploring the Association Between Housing and Transportation Affordability and Urban Sprawl

Shima Hamidi and Reid Ewing

Housing affordability has been one of the most persistent national concerns in the United States, mainly because housing costs are the biggest item in most household budgets. Urban sprawl has been proved by previous studies to be a driver of housing affordability. Previous studies, however, were structurally flawed because they considered only costs directly related to housing and ignored the transportation costs associated with a remote location. This study sought to determine whether, after transportation costs were taken into account, urban sprawl was still affordable for Americans. Multilevel modeling and the recently released location affordability indexes (LAIs) and metropolitan compactness indexes tested the relationship between sprawl and housing affordability. By controlling for covariates, this study found that in compact areas, the portion of household income spent on housing was greater but the portion of income spent on transportation was lower. Each 10% increase in a compactness score was associated with a 1.1% increase in housing costs and a 3.5% decrease in transportation costs relative to income. The combined cost of housing and transportation declined as the compactness score rose. As metropolitan compactness increased, transportation costs decreased faster than housing costs increased, creating a net decline in household costs. This is a novel finding, conditioned only on the quality of the data on which the LAI is based.

One result was the mortgage crisis and ensuing wave of foreclosures that swept the United States in the late 2000s and directly helped precipitate the global financial crisis (the Great Recession). Under traditional metrics of affordability, lenders granted loans to families who were unable to maintain mortgage payments, in many cases because of the crushing costs of transportation in an environment with record high prices for motor vehicle fuel. Foreclosures were centered in the Sunbelt states of Arizona and Nevada, where rapid suburban and exurban development occurred in automobile-dependent areas with virtually no transit access and no ability to walk to anything.

The recent foreclosure crisis raises the question of whether, after transportation costs are taken into account, urban sprawl is still affordable for Americans. This study seeks to answer this question and test the relationship between metropolitan sprawl and housing affordability by using the recently released location affordability indexes (LAIs) (funded by the U.S. Departments of Transportation and of Housing and Urban Development) and compactness indexes funded by the National Institutes of Health and the Ford Foundation. LAIs consider both housing and transportation costs, accounting for locational advantages and disadvantages usually ignored in housing affordability studies.

Landscape and Urban Planning 148 (2016) 80–88

Contents lists available at ScienceDirect

Landscape and Urban Planning

journal homepage: www.elsevier.com/locate/landurbplan

Research Paper

Does urban sprawl hold down upward mobility?

Reid Ewing[a,*], Shima Hamidi[b], James B. Grace[c], Yehua Dennis Wei[d]

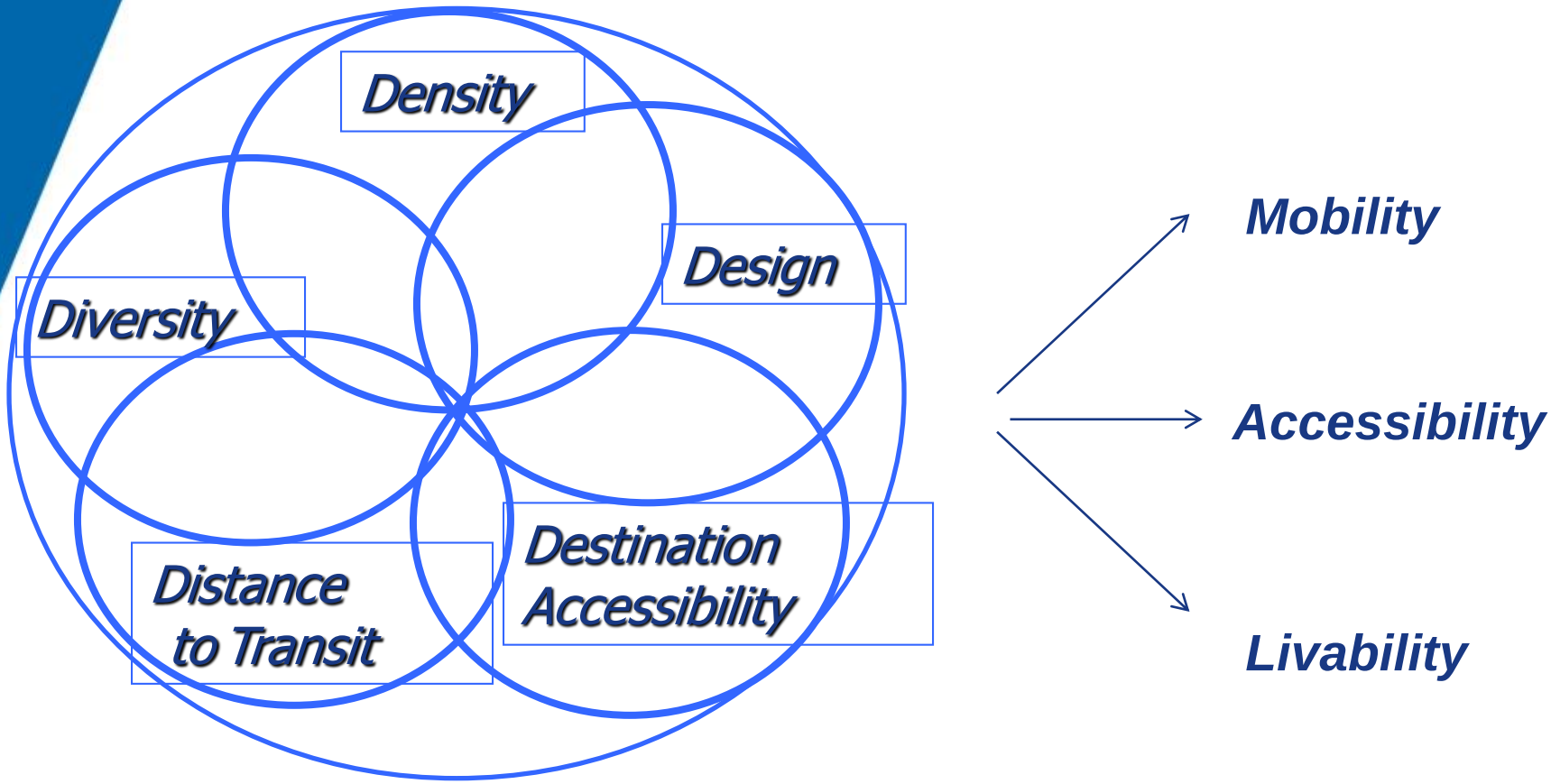
[a] College of Architecture+Planning, 220 AAC, University of Utah, 375 S 1530 E, Salt Lake City, UT 84112, United States
[b] College of Architecture, Planning and Public Affairs, University of Texas at Arlington, Arlington, TX 76019, United States
[c] U.S. Geological Survey, Lafayette, LA, United States
[d] Department of Geography, University of Utah, Salt Lake City, UT 84112, United States

HIGHLIGHTS

- Upward mobility is significantly higher in compact areas than sprawling areas.
- The direct effect of compactness is attributed to better job accessibility in more compact areas.
- As compactness doubles, the likelihood of upward mobility increases by about 41%.
- Among indirect effects of compactness, only poverty segregation is significant and negative.

MXD SCALE

5Ds of Compact Development



Traffic Generated by Mixed-Use Developments—Six-Region Study Using Consistent Built Environmental Measures

Reid Ewing[1]; Michael Greenwald[2]; Ming Zhang[3]; Jerry Walters[4]; Mark Feldman[5]; Robert Cervero[6]; Lawrence Frank[7]; and John Thomas[8]

Abstract: Current methods of traffic impact analysis, which rely on rates and adjustments from the Institute of Transportation Engineers, are believed to understate the traffic benefits of mixed-use developments (MXDs), leading to higher exactions and development fees than necessary and discouraging otherwise desirable developments. The purpose of this study is to create new methodology for more accurately predicting the traffic impacts of MXDs. Standard protocols were used to identify and generate data sets for MXDs in six large and diverse metropolitan regions. Data from household travel surveys and geographic information system (GIS) databases were pooled for these MXDs, and travel and built environmental variables were consistently defined across regions. Hierarchical modeling was used to estimate models for internal capture of trips within MXDs, walking and transit use on external trips, and trip length for external automobile trips. MXDs with diverse activities on-site are shown to capture a large share of trips internally, reducing their traffic impacts relative to conventional suburban developments. Smaller MXDs in walkable areas with good transit access generate significant shares of walk and transit trips, thus also mitigating traffic impacts. Centrally located MXDs, small and large, generate shorter vehicle trips, which reduces their impacts relative to outlying developments. **DOI: 10.1061/(ASCE)UP.1943-5444.0000068.** *© 2011 American Society of Civil Engineers.*

CE Database subject headings: Traffic management; Assessment; Environmental issues.

Author keywords: Mixed-use development; Trip generation; Internal capture; Traffic impact assessment.

Traffic Generated by Mixed-Use Developments

Thirteen-Region Study Using Consistent Measures of Built Environment

Guang Tian, Reid Ewing, Alex White, Shima Hamidi, Jerry Walters, J. P. Goates, and Alex Joyce

Current methods of traffic impact analysis, which rely on rates and adjustments from ITE, are believed to understate the traffic benefits of mixed-use developments (MXDs) and therefore to lead to higher exactions and development fees than necessary and to discourage otherwise desirable developments. The purpose of this study was to improve methodology for predicting the traffic impacts of MXDs. Standard protocols were used to identify and generate data sets for MXDs in 13 large and diverse metropolitan regions. Data from household travel surveys and geographic information system databases were pooled for these MXDs, and travel and built-environment variables were consistently defined across regions. Hierarchical modeling was used to estimate models for internal capture of trips within MXDs and for walking, biking, and transit use on external trips. MXDs with diverse activities on site were shown to capture a large share of trips internally, so that the traffic impacts of the MXDs were reduced relative to conventional suburban developments. Smaller MXDs in walkable areas with good transit access generated significant shares of walk, bike, and transit trips and thus also mitigated traffic impacts.

In addition to getting internal-capture estimates right, accurate assessments of MXD projects depend on estimating the share of external trips served by alternative modes (e.g., transit, biking, and walking). These must also be subtracted from nominal trip generation rates to estimate the net impacts of MXDs on traffic and vehicle miles traveled.

CONVENTIONAL ANALYSIS OF TRAFFIC IMPACT

Virtually all analyses of traffic impact rely on the ITE *Trip Generation* report (*2*). The ITE rates are largely representative of individual, single-use suburban developments whose trips are by private vehicle and whose origins or destinations lie outside the development. As the report says, "Data were primarily collected at suburban localities with little or no transit service, nearby pedestrian amenities, or travel demand management (TDM) programs" (*2*). Recognizing but not resolving this limitation, *Trip Generation*

Sample selection

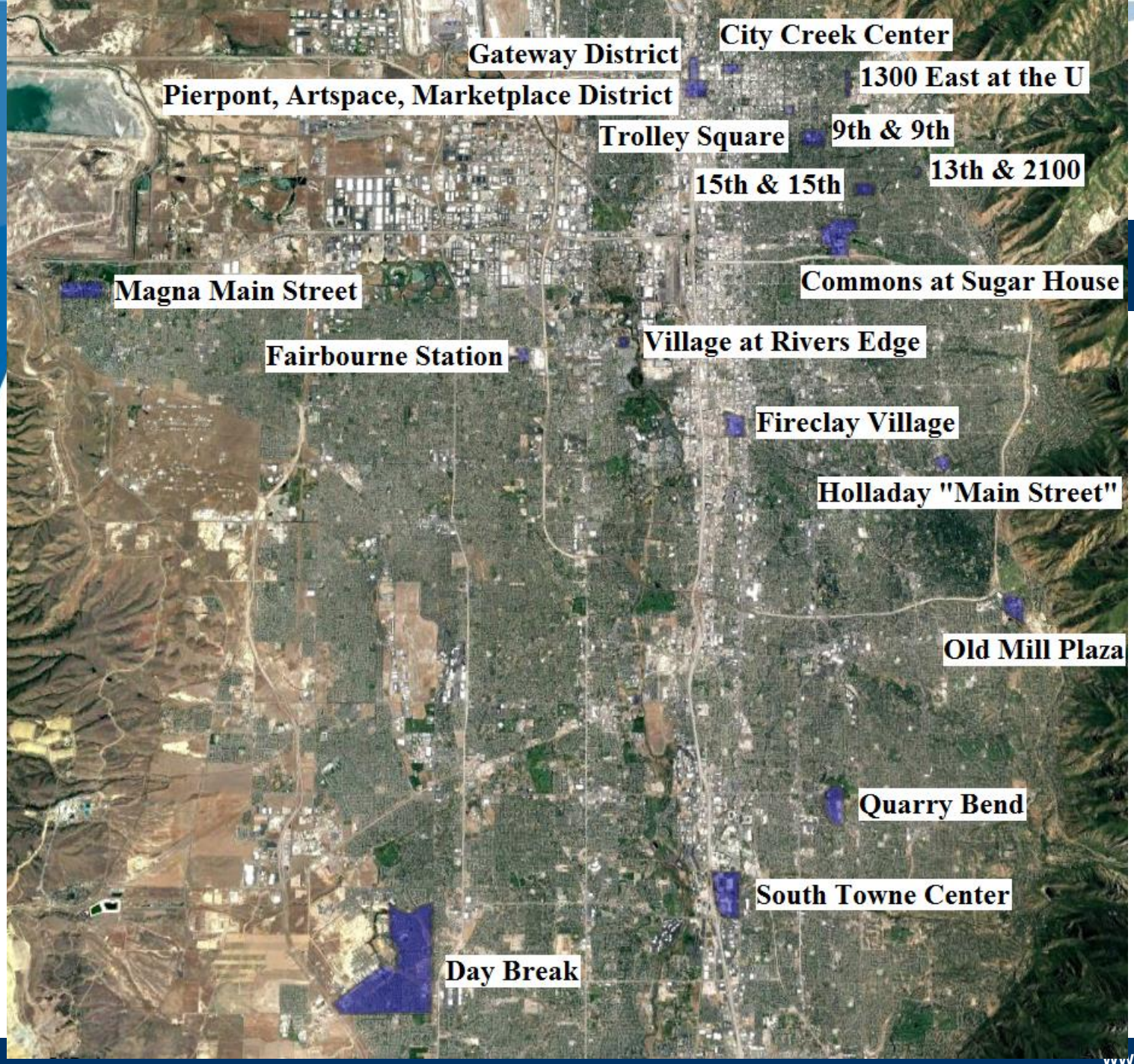
Household travel survey

- Regional household survey with XY coordinates;
- Parcel level land-use data;

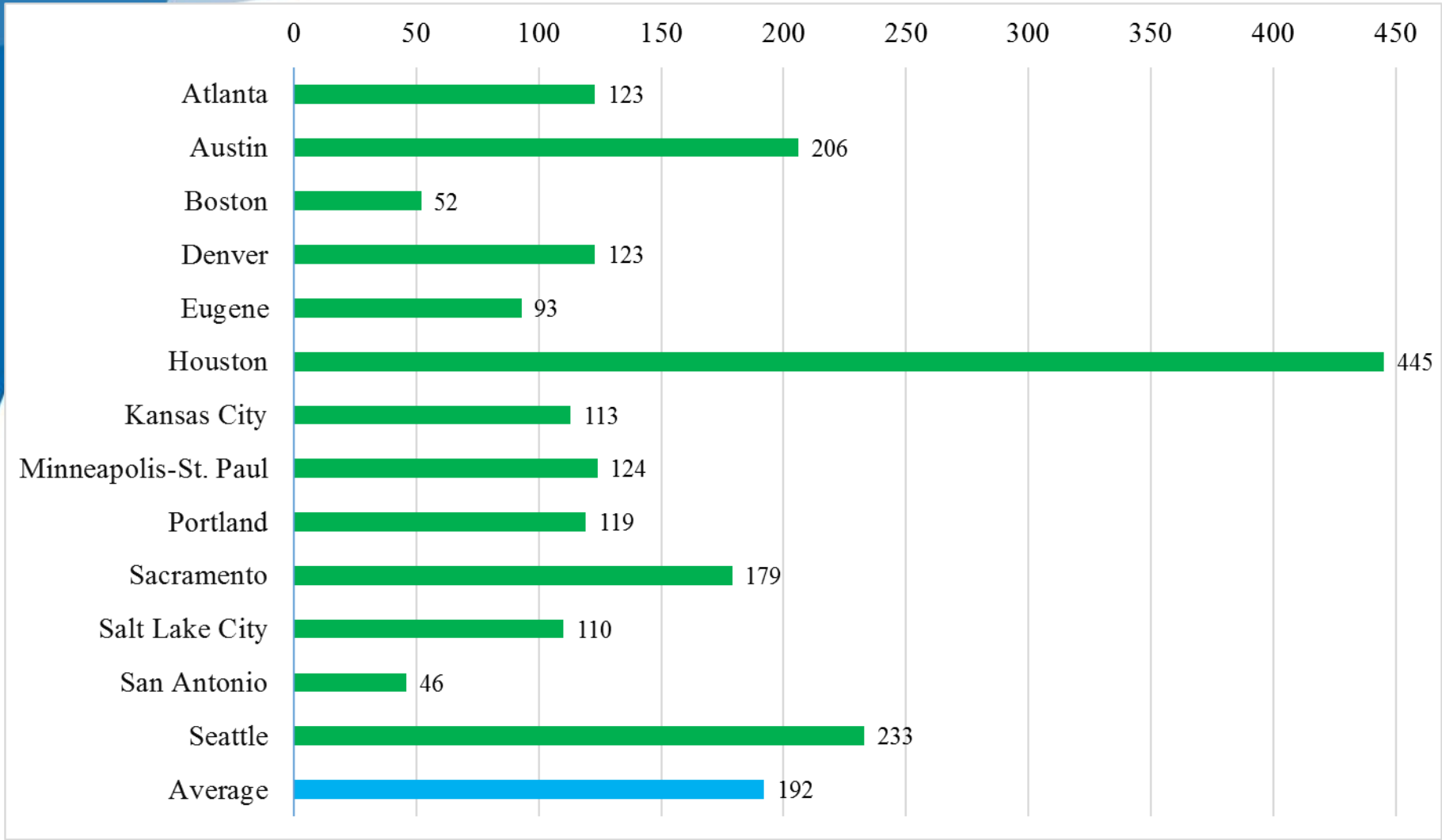
MXDs selection

- A mixed-use development or district consists of two or more land uses between which trips can be made using local streets, without having to use major streets. The uses may include residential, retail, office, and/or entertainment. There may be walk trips between the uses.
- Expert-based process

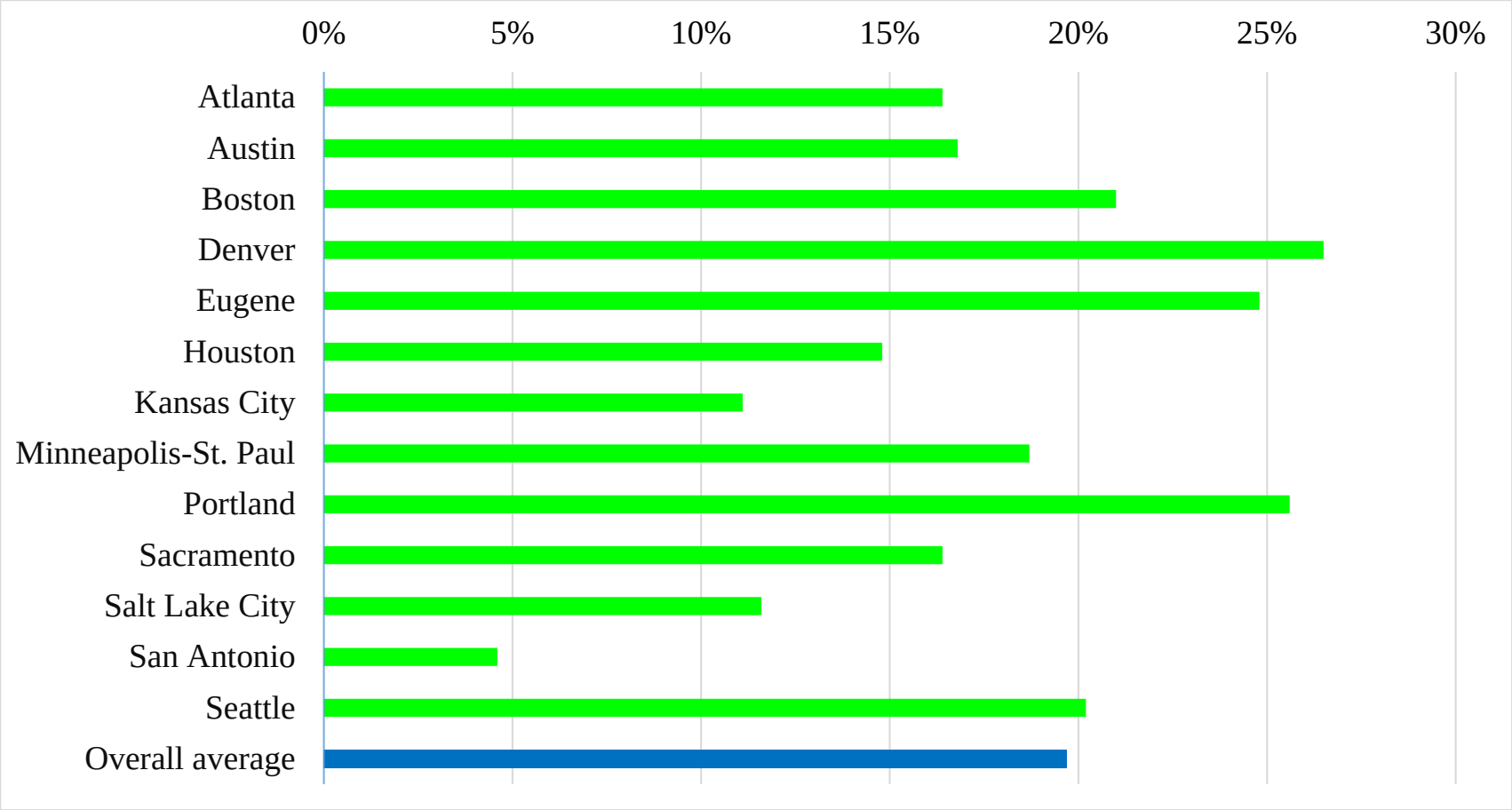
Gateway district, Salt Lake City: dining, entertainment, retail, residential, office


City Creek Center
Gateway District
1300 East at the U
Pierpont, Artspace, Marketplace District
Trolley Square
9th & 9th
13th & 2100
15th & 15th
Commons at Sugar House
Magna Main Street
Village at Rivers Edge
Fairbourne Station
Fireclay Village
Holladay "Main Street"
Old Mill Plaza
Quarry Bend
South Towne Center
Day Break

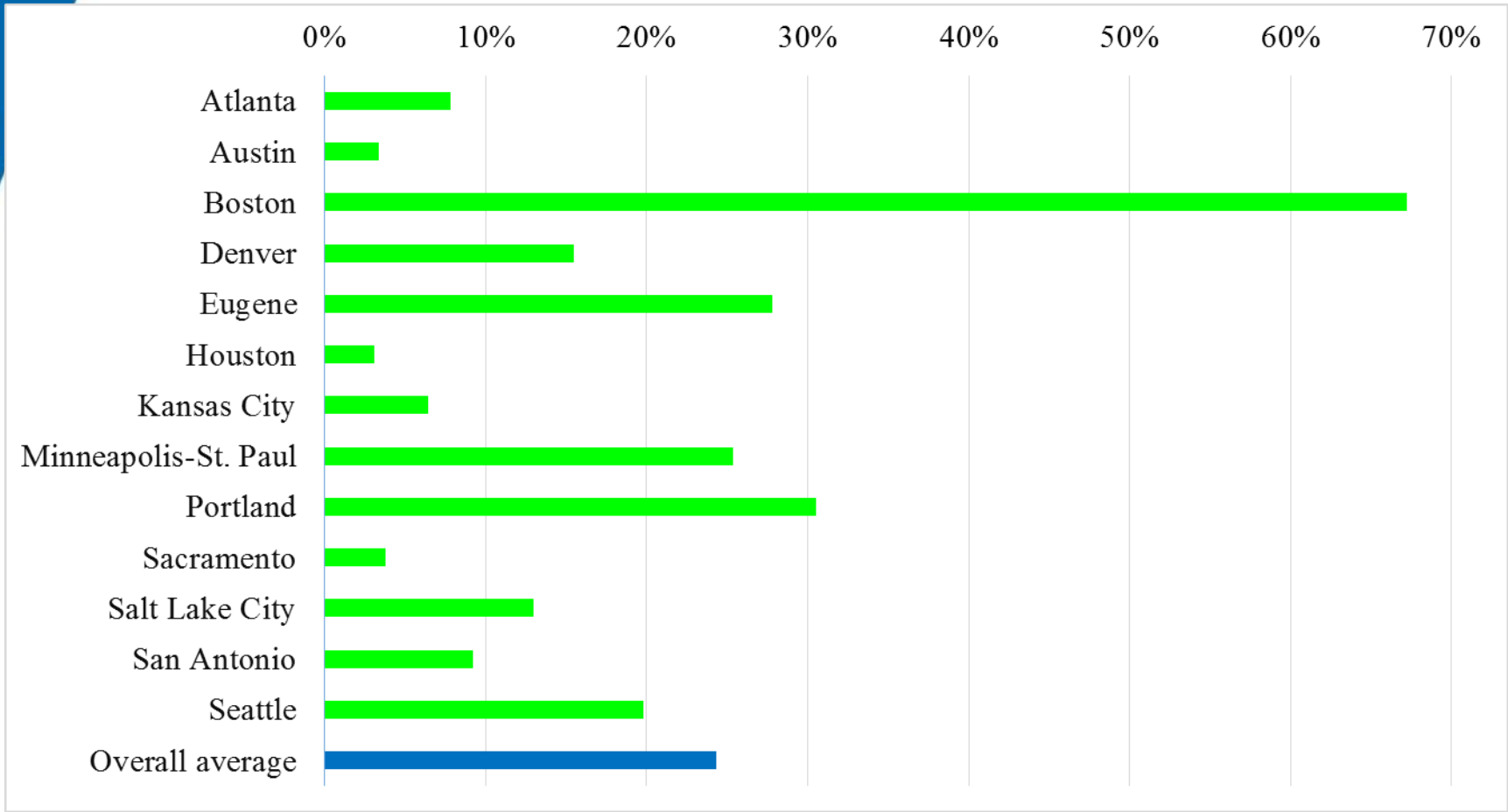
Average acreage for MXDs



Internal capture rates of trips by MXDs



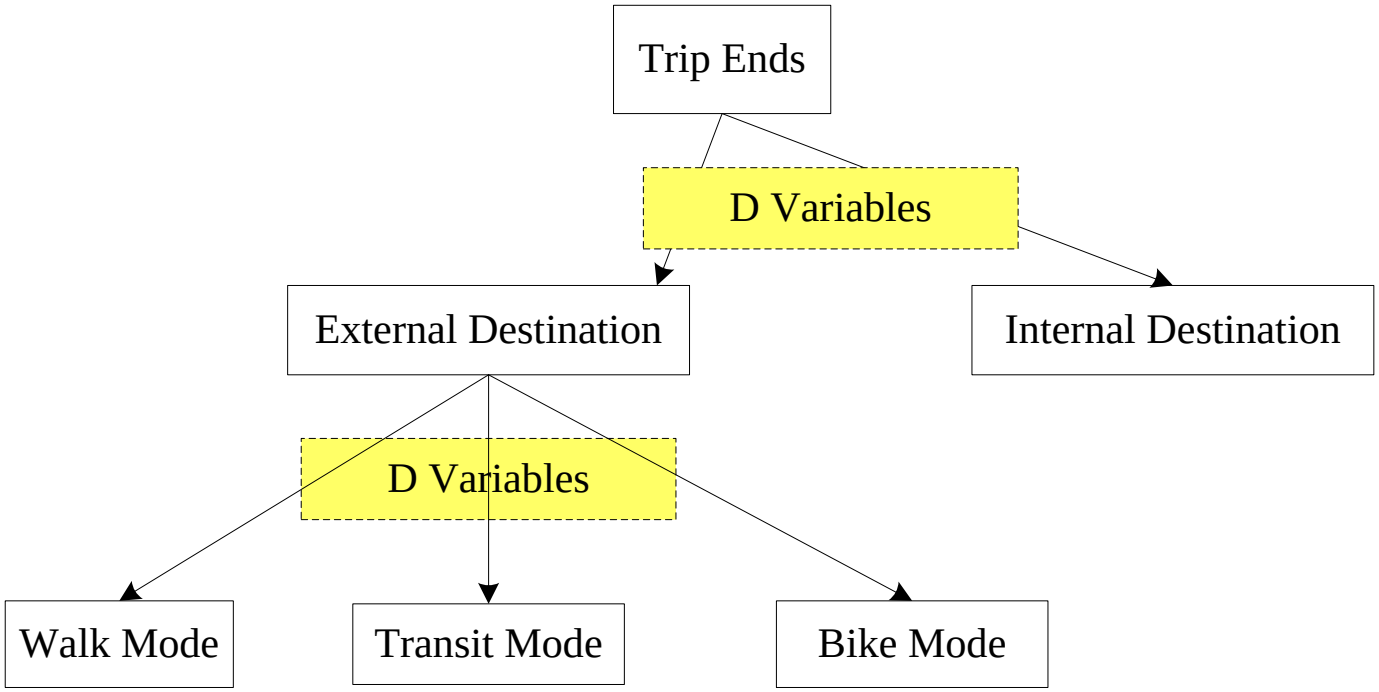
Total share of walk, bike and transit for external trips to/from MXDs



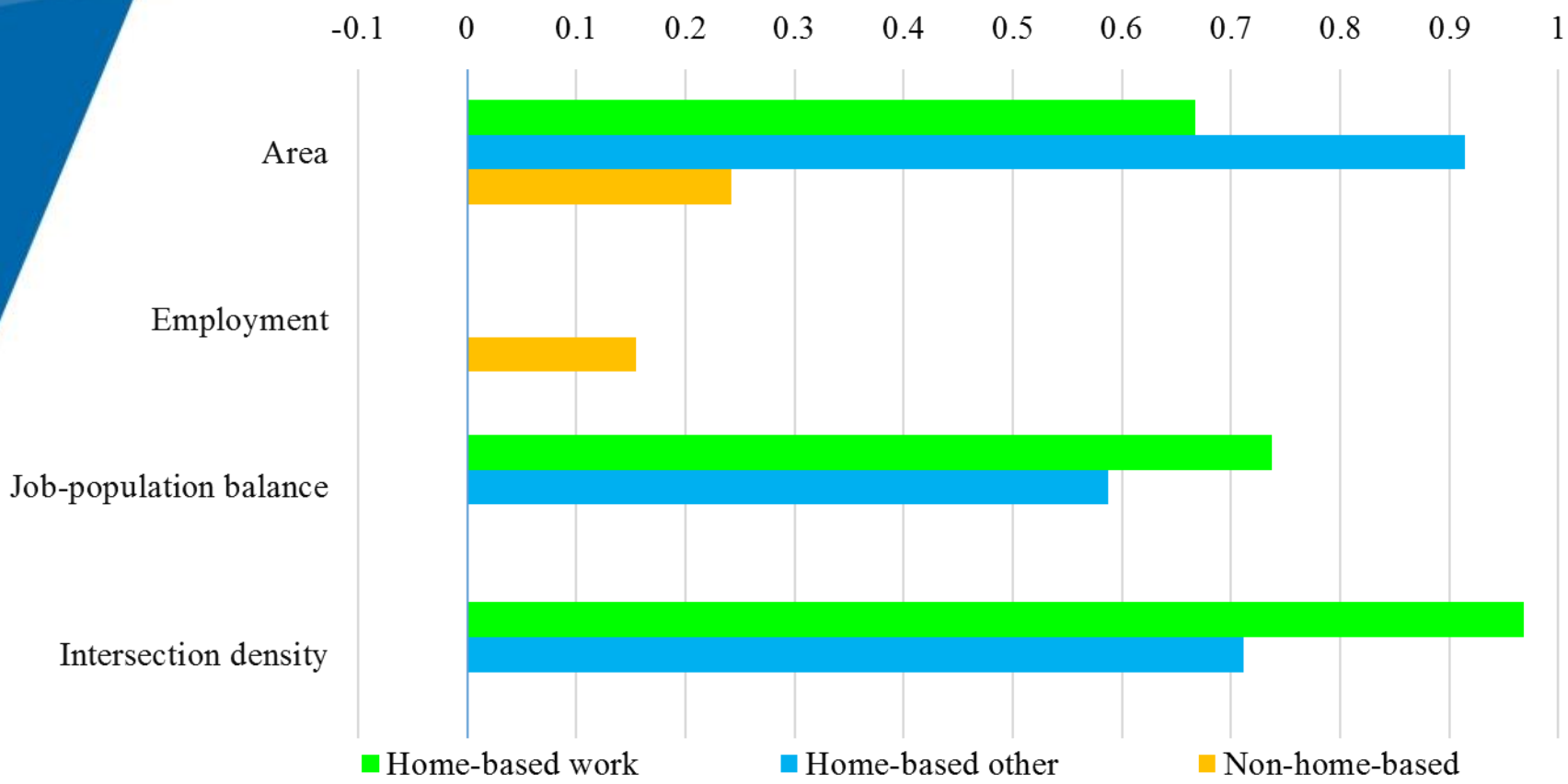
RiverPlace (Portland)

Internal capture - 36%
Walking – 14%
Transit – 9%
Auto Trips – 7.7 miles

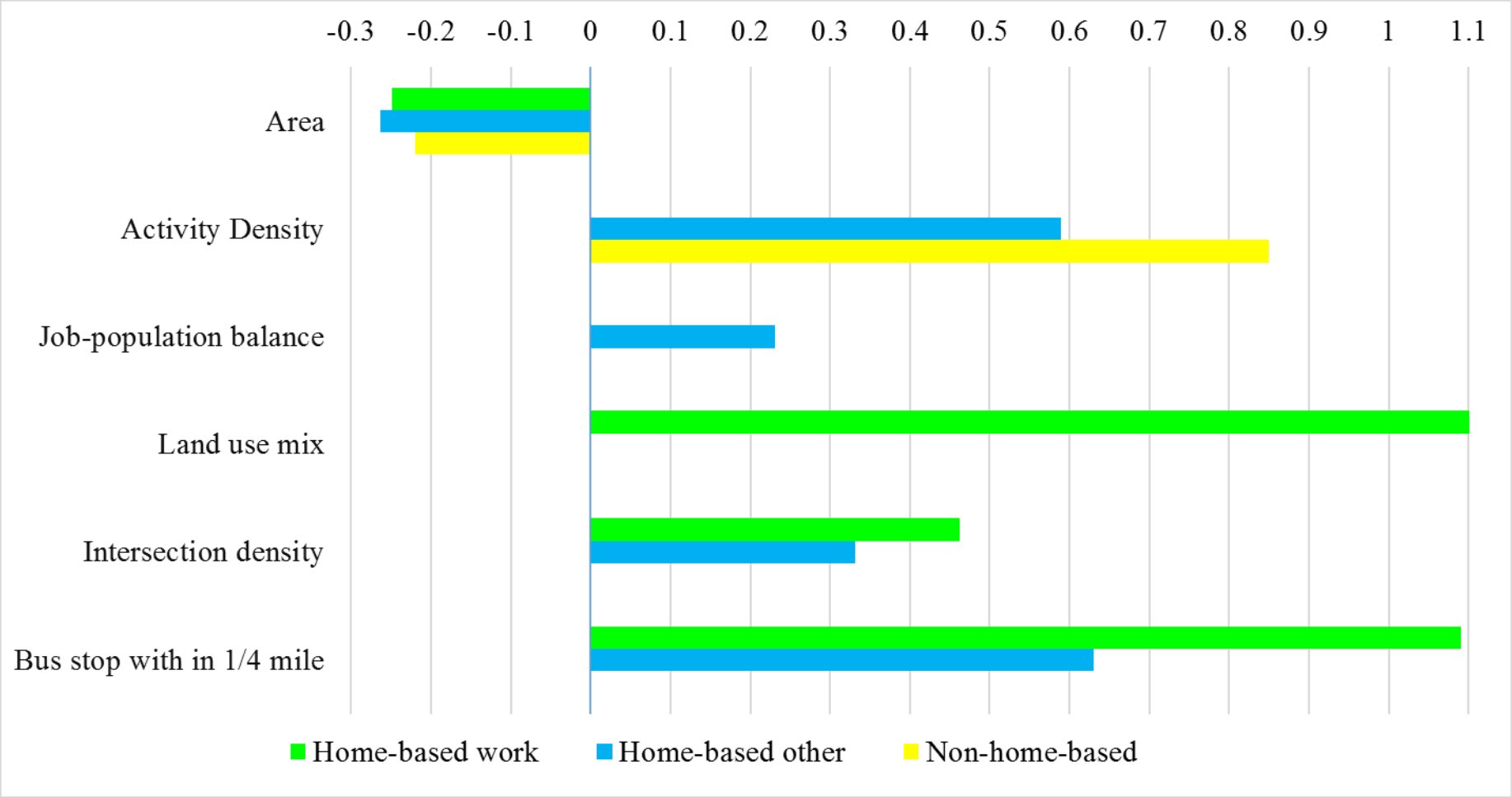
Conceptual framework



Internal Capture

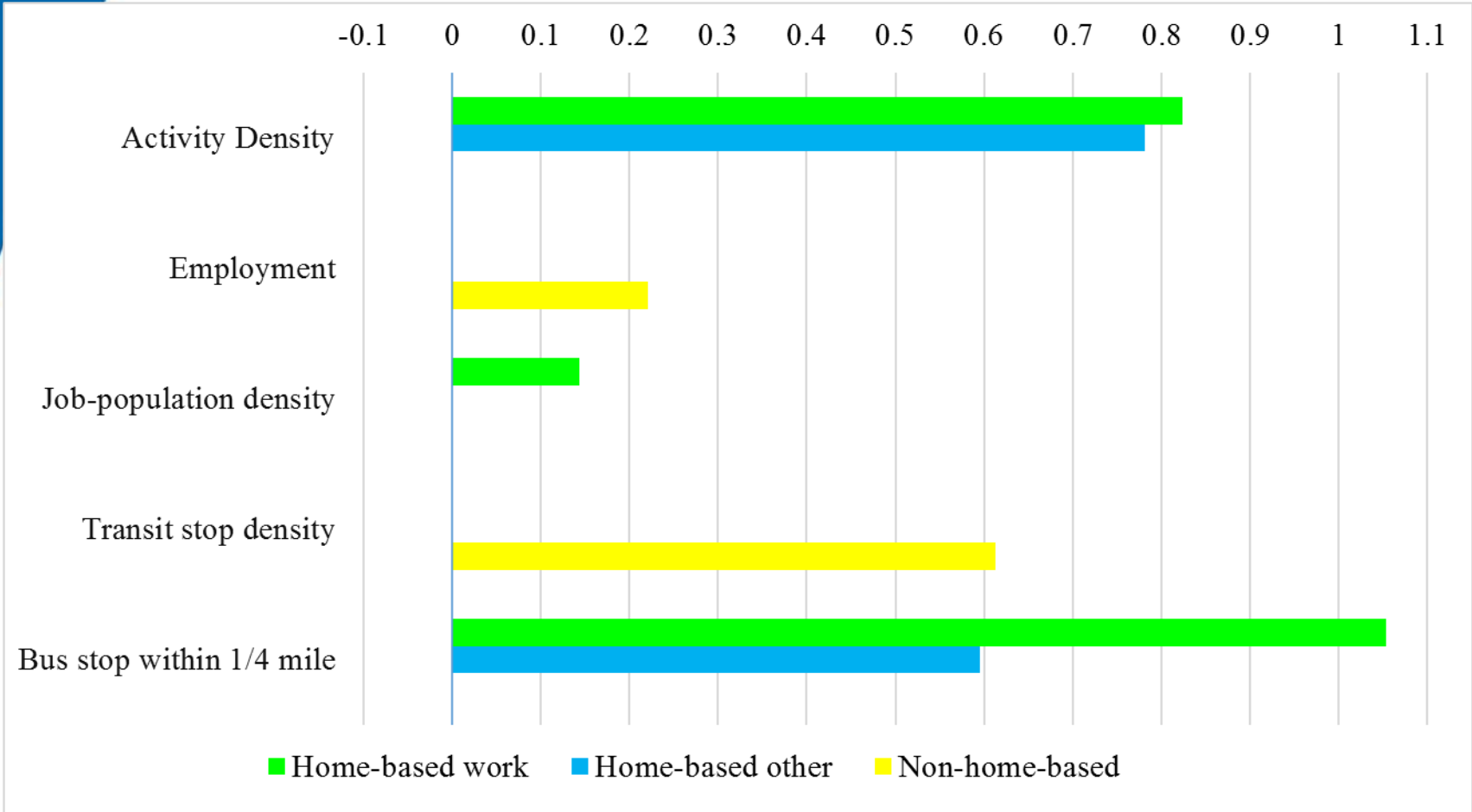


External Walking



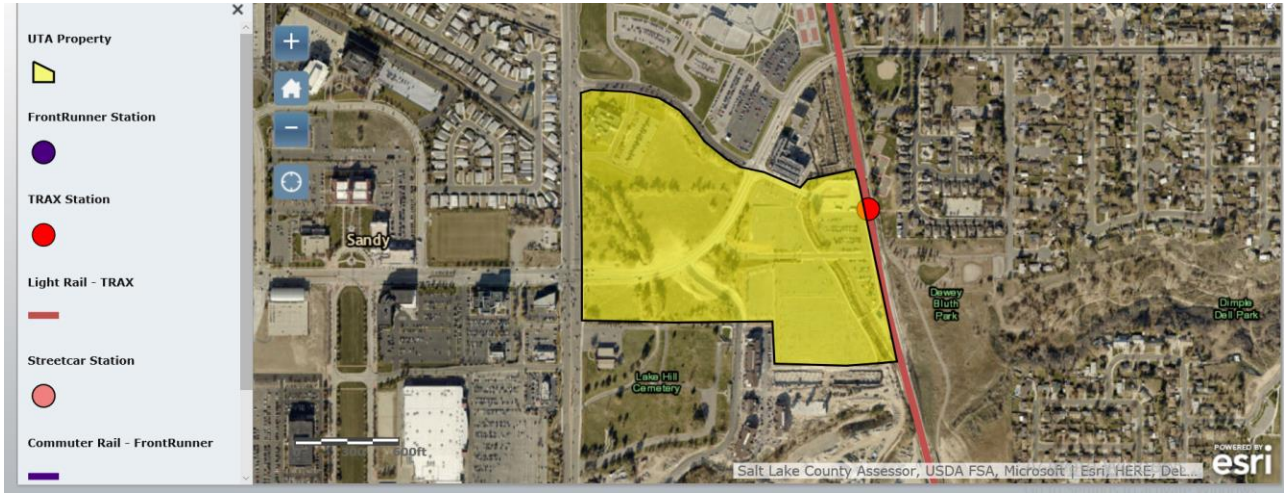
External Biking

External Transit



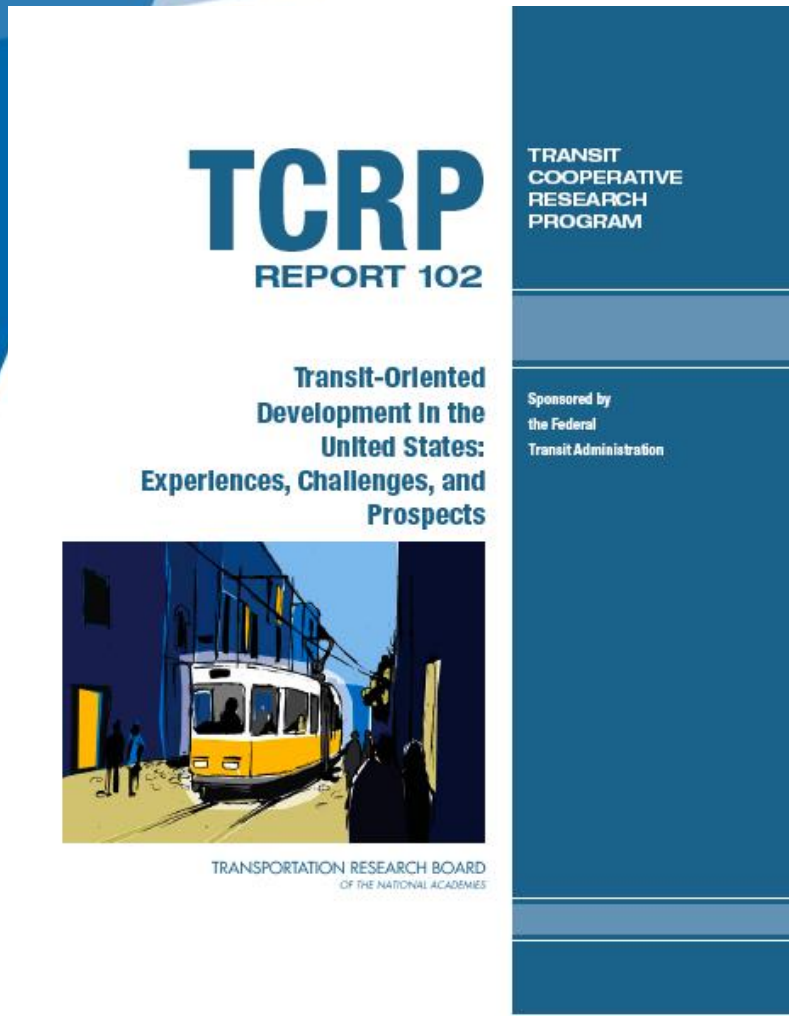
Local Use of MXD Models

- Hales Engineering
- Fehr & Peers



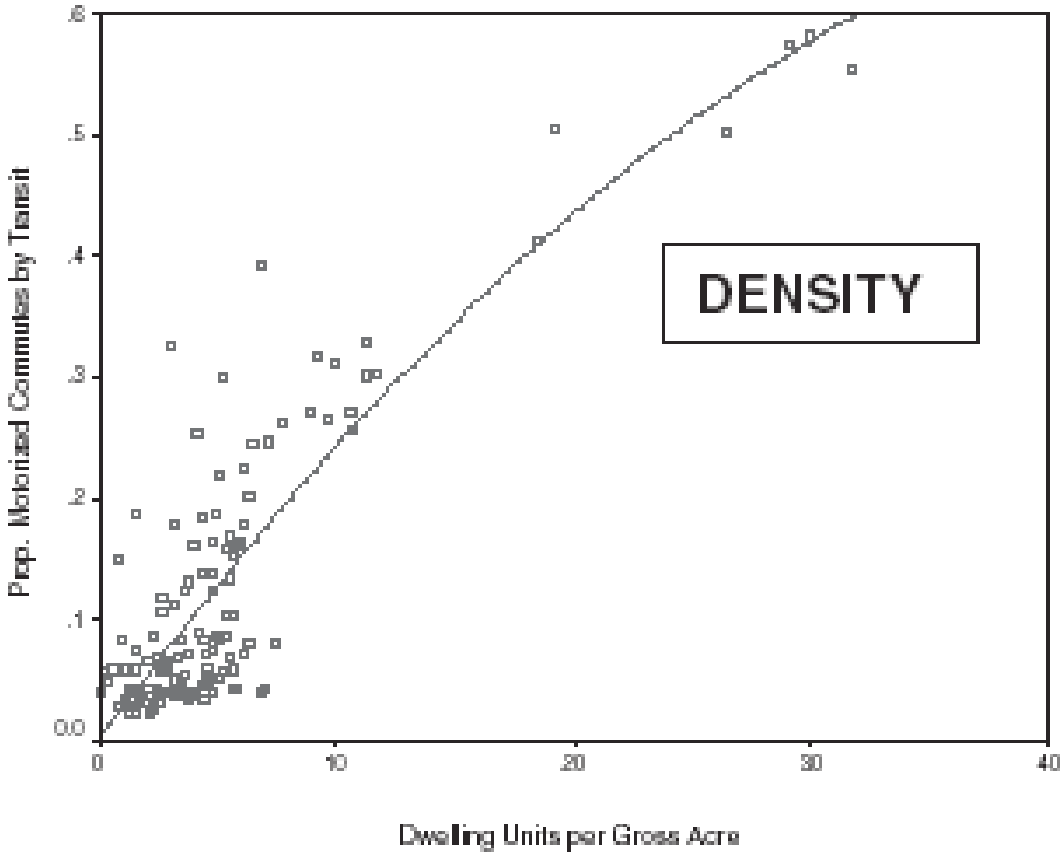
TOD SCALE

What is TOD?

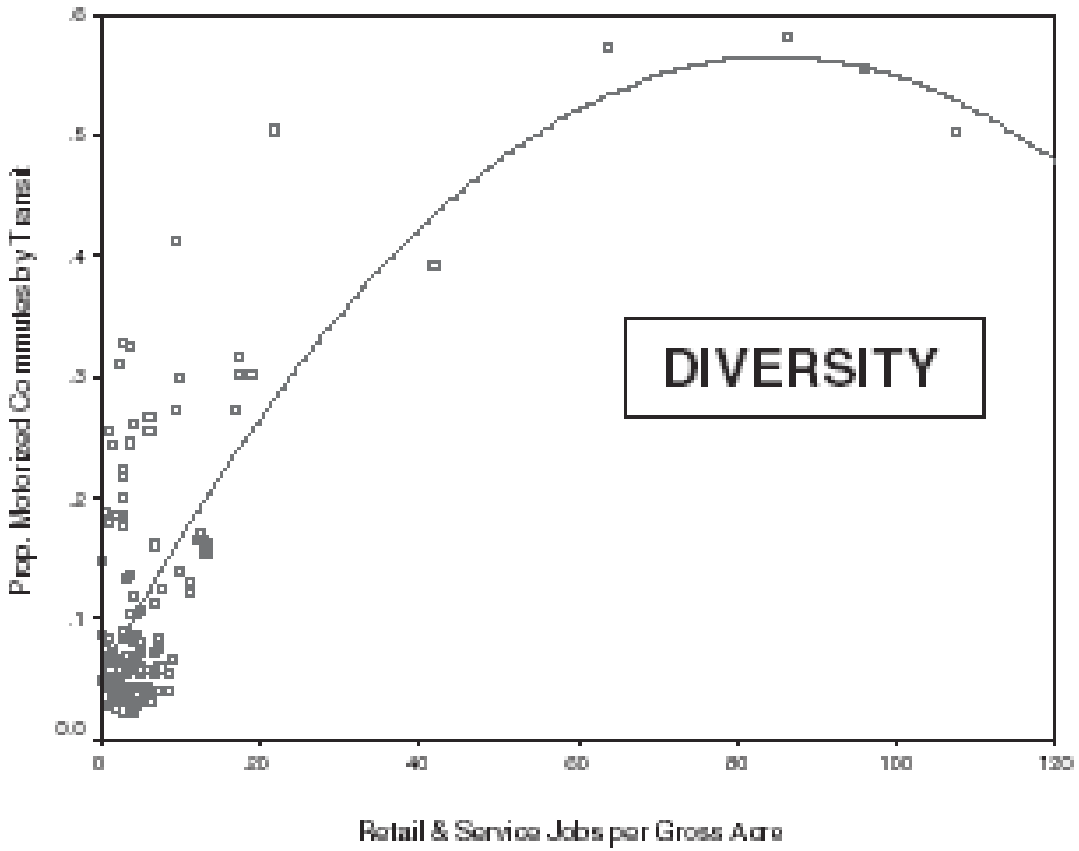


TOD is widely defined as compact, mixed-use development near transit facilities with high-quality walking environments, not necessarily at the expense of automobile access.

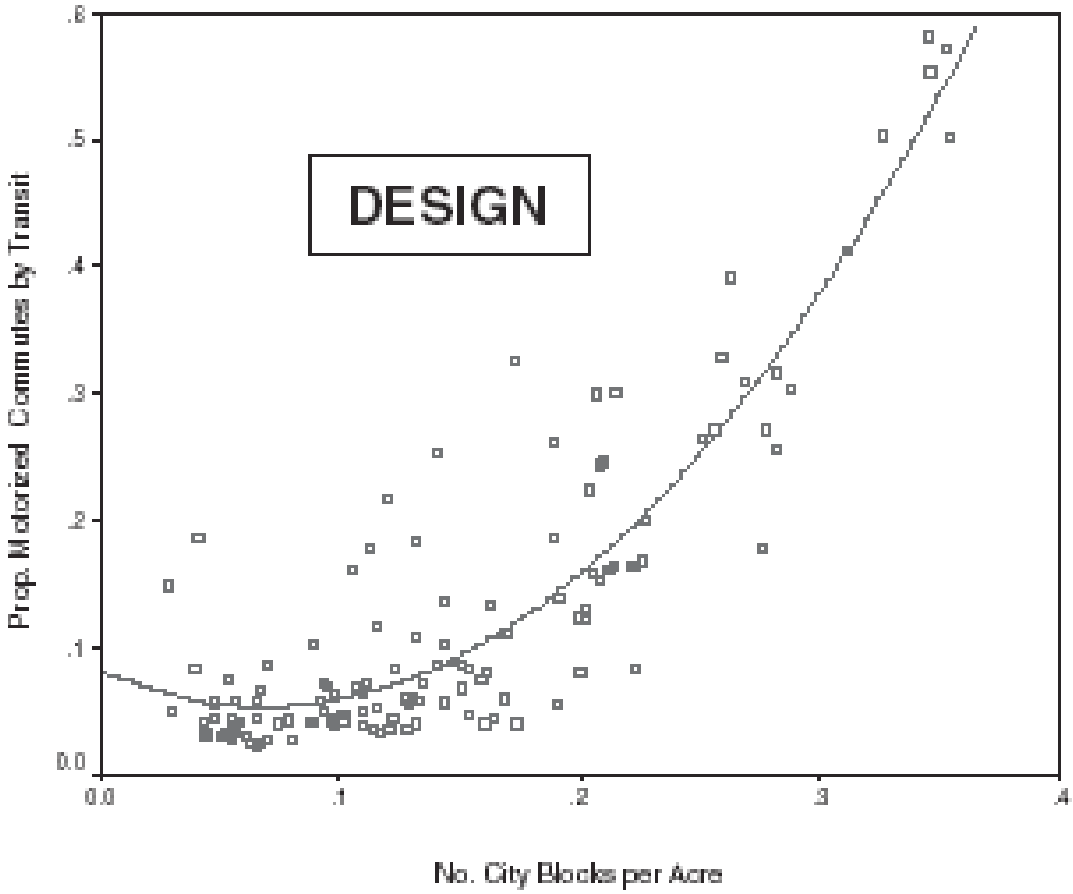
Effect of Density – Bay Area Rail



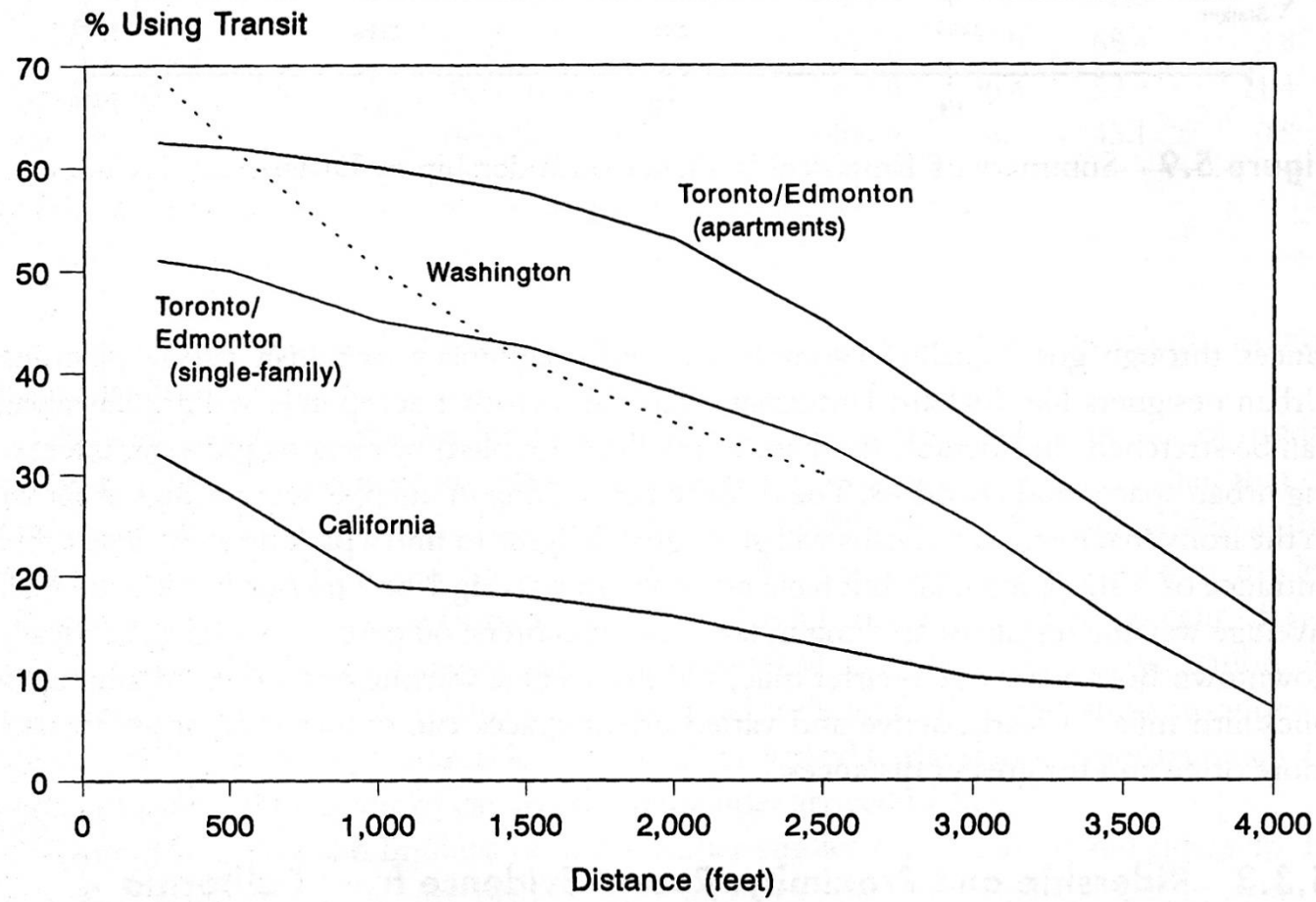
Effect of Diversity



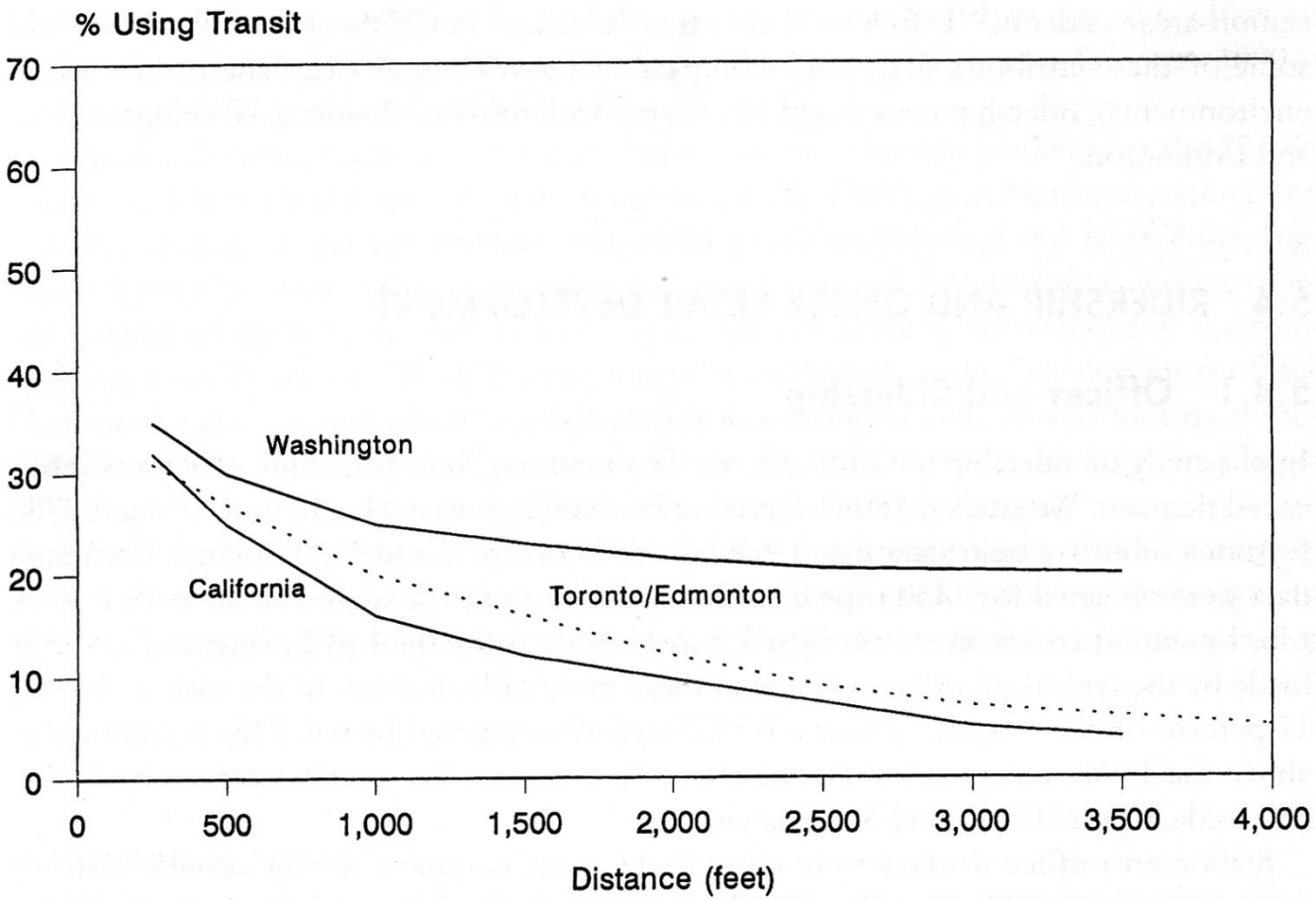
Effect of Design



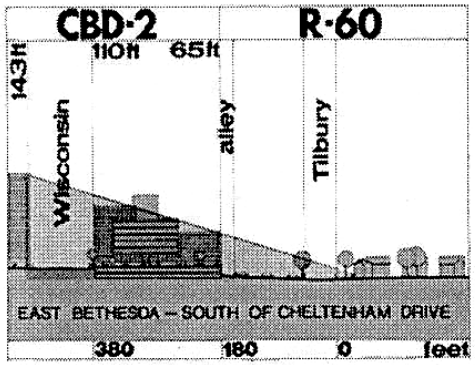
Mode Share vs. Distance to Station (Residential)



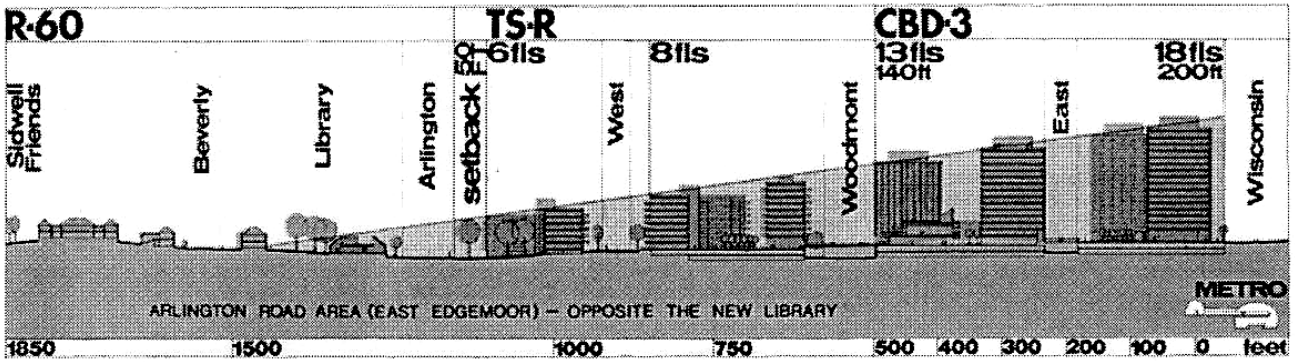
Mode Share vs. Distance to Station (Office)



Classic Density Gradient



Profile A



Profile B

Transportation
DOI 10.1007/s11116-016-9702-x

Trip and parking generation at transit-oriented developments: a case study of Redmond TOD, Seattle region

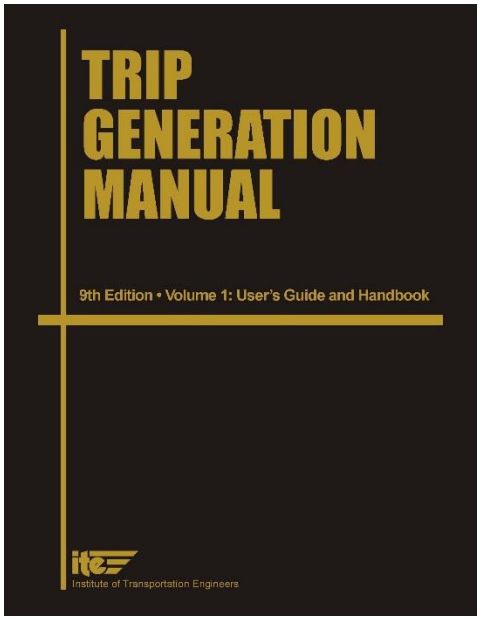
Guang Tian[1] · Reid Ewing[1] · Rachel Weinberger[2] · Kevin Shively[2] · Preston Stinger[3] · Shima Hamidi[4]

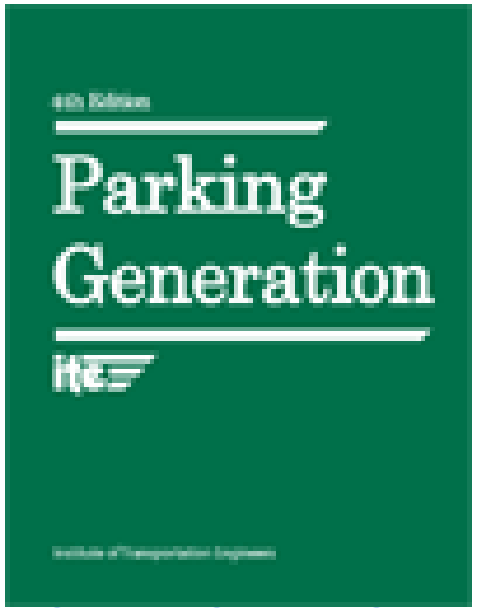
© Springer Science+Business Media New York 2016

Abstract The decision on how best to allocate land around transit stations is a debated topic, with transit officials often opting for park-and-ride lots over active uses such as multifamily housing, office, and retail organized into transit-oriented developments (TODs). In this study, we identify the ten best self-contained TODs in ten regions across United States based on seven criteria: dense, mixed-use, pedestrian-friendly, adjacent to transit, built after transit, fully developed, and with self-contained parking. We measure trip and parking generation at one of these TODs, the Redmond TOD in the Seattle region, as a pilot study, using an onsite count and intercept survey. The results show that the Redmond TOD has 1.7 times more trips made by walking and 3 times more trips made by transit than Seattle's regional average. The actual vehicle trips we observed are only 37 % of the Institute of Transportation Engineers' (ITE) expected value. The actual residential peak period parking demand is only 65 % of the ITE's peak demand, and the actual commercial peak period parking demand is only 27 % of the ITE's peak demand. Additionally, the peak period of transit parking was daytime, while the peak periods of commercial and residential were evening and nighttime. There is a real opportunity for sharing parking spaces among these different uses, something which is not realized at present.

In practice

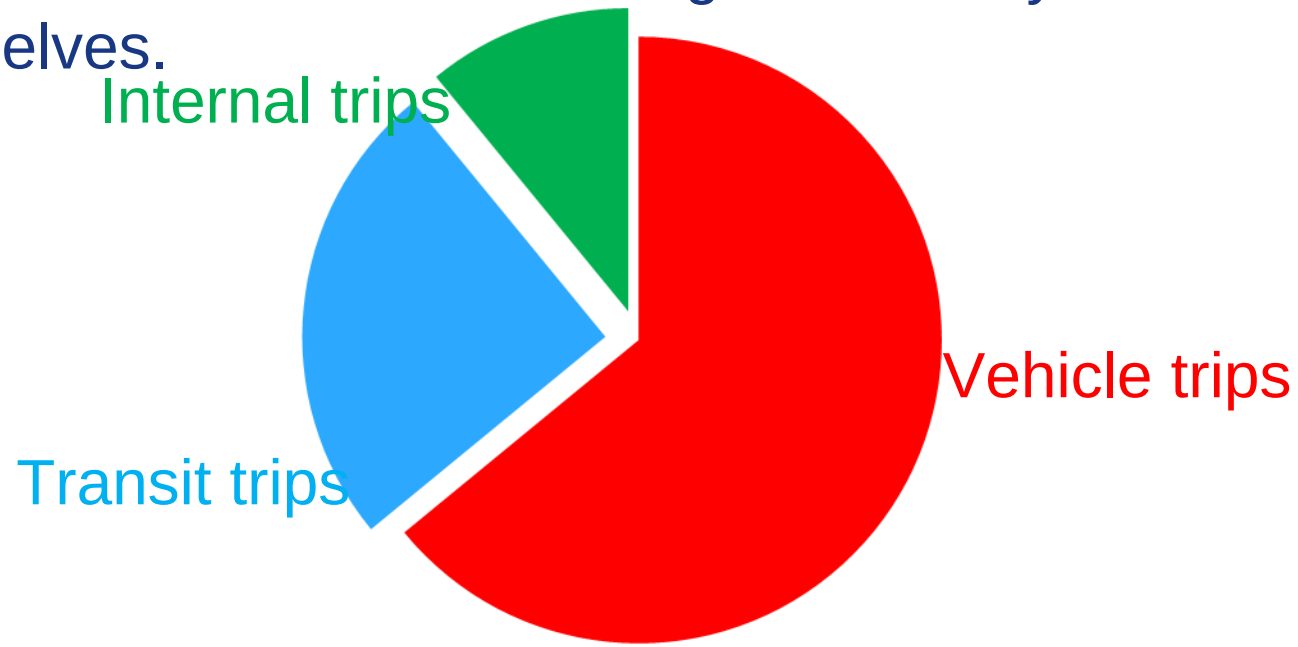
- Officials usually assume that TODs require the same number of parking spaces as conventional development and that transit stations require the same number of park-and-ride spaces as non-TOD stations.





Research Question

Much of the travel demand is captured internally and much of the transit demand is generated by TODs themselves.



There are a few studies of vehicle trip generation (*Arrington & Cervero, 2008; Cervero & Arrington, 2008; Zamir et al. 2014*) at multifamily developments near transit. There is only one study of vehicle trip generation at TODs (defined as mixed-use developments – Handy et al. 2013). The question of how much vehicle trip reduction occurs with TOD is largely unexplored in the literature.

TOD Definition

TODs are widely defined as compact, mixed-use developments with high-quality walking environments near transit facilities (*ITE 2004, pp. 5-7; Jacobson & Forsyth 2008; Renne 2009*).

For our purposes, TODs are developed by a single developer under a master development plan, and can also include a clustering of development projects near transit facilities that are developed by one or more developers pursuant to a master development plan.

Dense

Mixed use

Pedestrian-friendly

Adjacent to transit

Built after transit

Fully developed or nearly so

Self-contained parking

Lindbergh City Center
Atlanta

City Creek Center
Salt Lake City

Station Landing
Boston

Redmond TOD
Seattle

Englewood Denver

City College San Diego

Del Mar
Los Angeles

Fruitvale Village
San Francisco

Orenco Station
Portland

Rhode Island Row
Washington, D.C.

Redmond TOD, Seattle

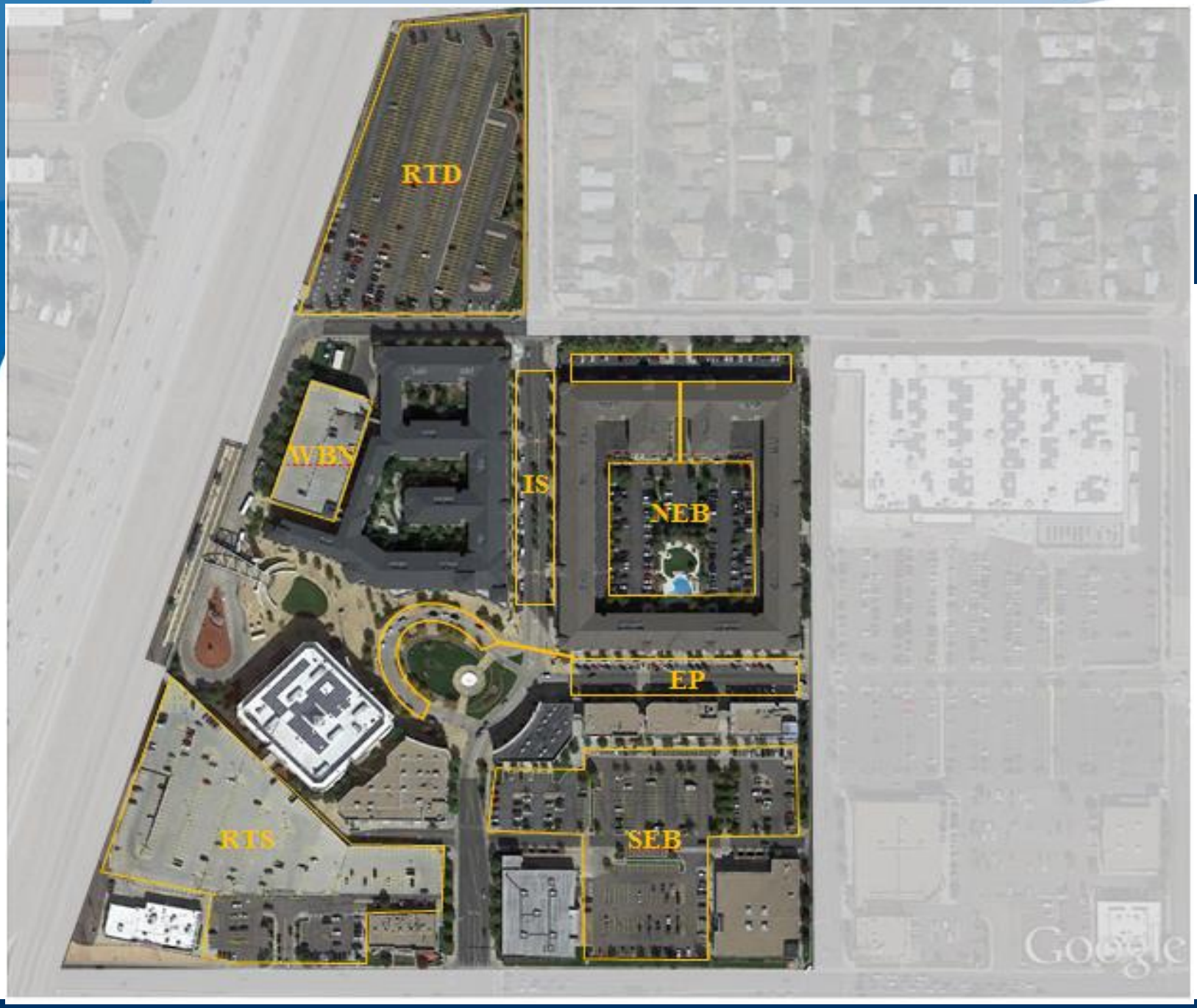
Rhode Island Row, Washington D.C.

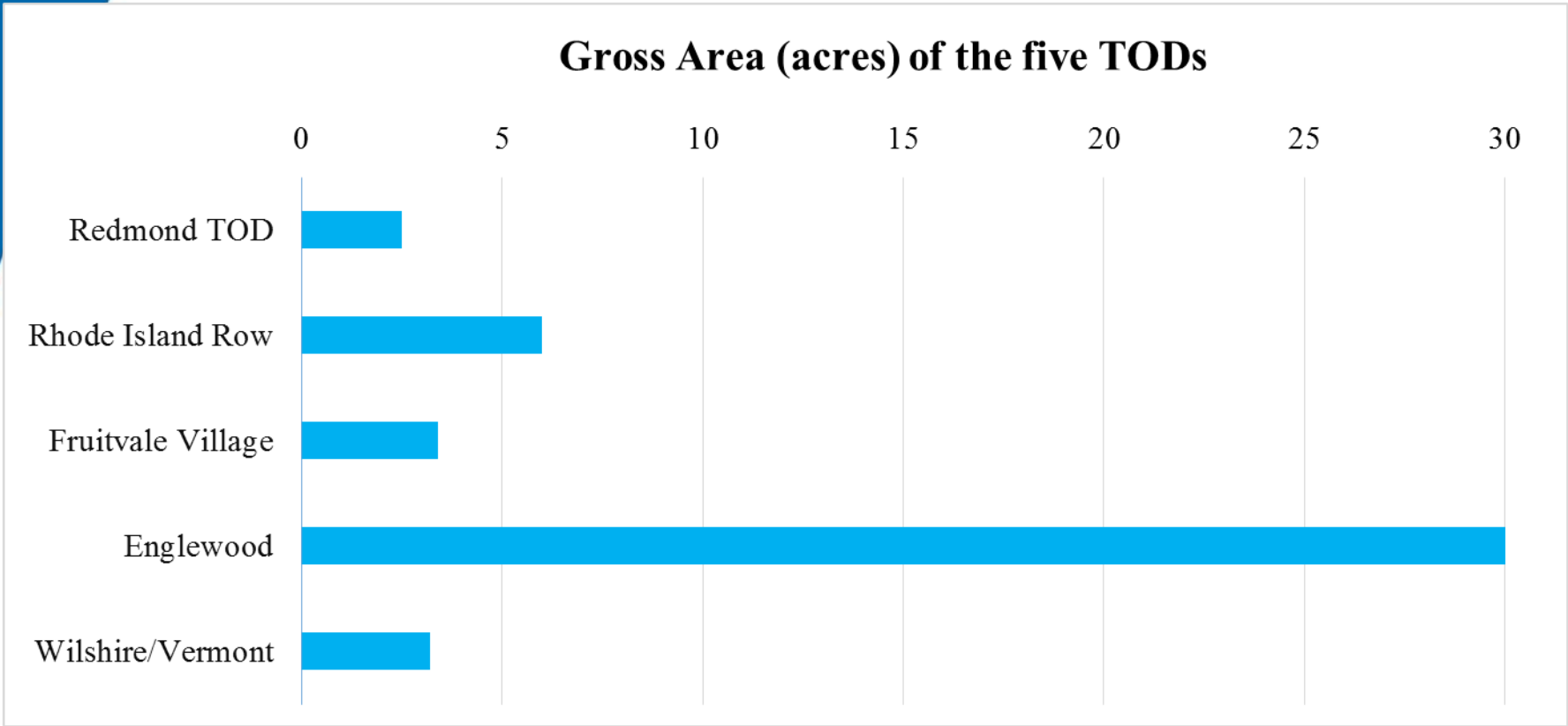
Wilshire/Vermont, Los Angeles

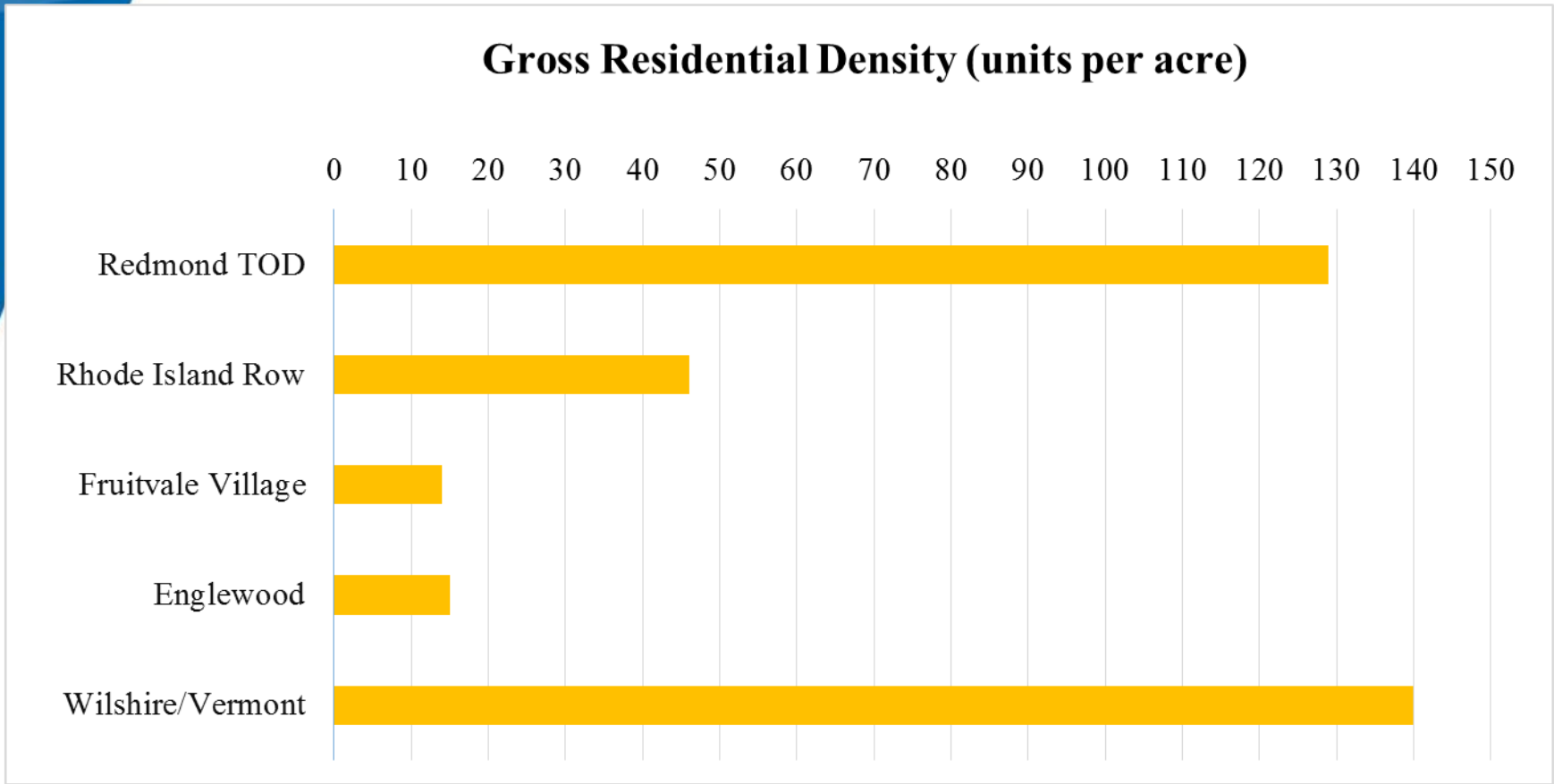
Fruitvale Village, San Francisco

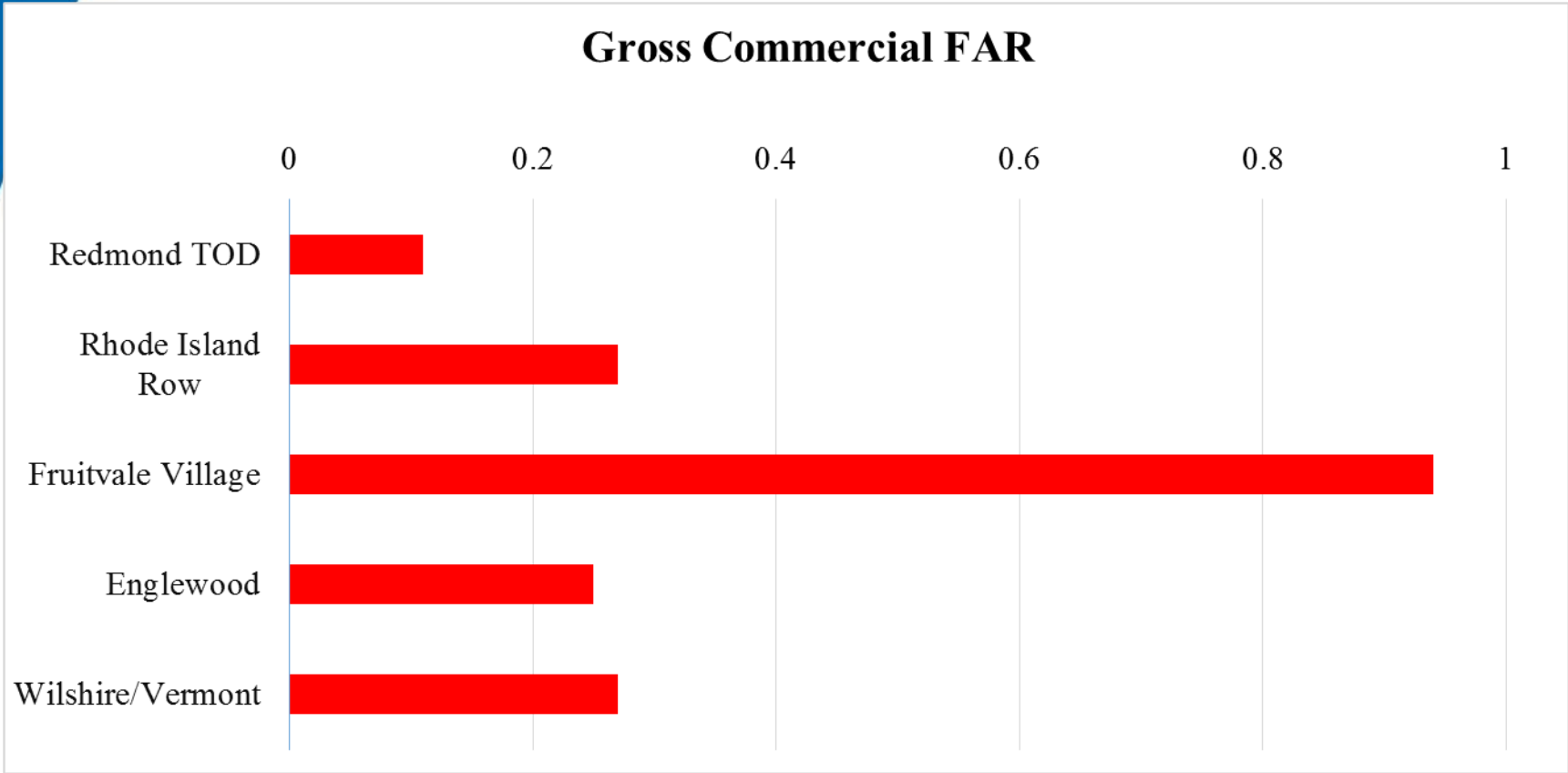
Englewood TOD, Denver

Pylon #2
Rhode Island Avenue 34,800 CPD
Pylon #1
RHODE ISLAND AVENUE/ BRENTWOOD
Parking Exit
168 PUBLIC PARKING SPACES
Elevator
Garage 2
Ramp
Service Corridor
CVS
101 N
2,594 SF
106 N
3,003 SF
105 N
Phenix Salon Suites
104 N
TKO Burger
103 N
THE CAROLINA kitchen
102 N
Proposed Entry
Washington Place
DC DMV
112 N
1,089 SF
111 N
2,111 SF
110 N
109 N
1,793 SF
108 N
1,744 SF
107 N
NORTH BUILDING RESIDENTIAL LOBBY
Parking Entrance
MAIN STREET: 42 ON-STREET PARKING SPACES
2,286 SF
112 S
2,113 SF
111 S
1,059 SF
110 S
Arte Nail & Spa
109 S
T-Mobile
108 S
Sprint
107 S
Sala Thai
106 S
1,707 SF
105 S
1,479 SF
104 S
2,224 SF
103 S
Jersey Mike's Subs
102 S
CHIPOTLE MEXICAN GRILL
101 S
Fitness Center
Elevator
Washington Place


RTD
WBN
IS
NEB
EP
RTS
SEB
Google


Gross Area (acres) of the five TODs
0
5
10
15
20
25
30
Redmond TOD
Rhode Island Row
Fruitvale Village
Englewood
Wilshire/Vermont

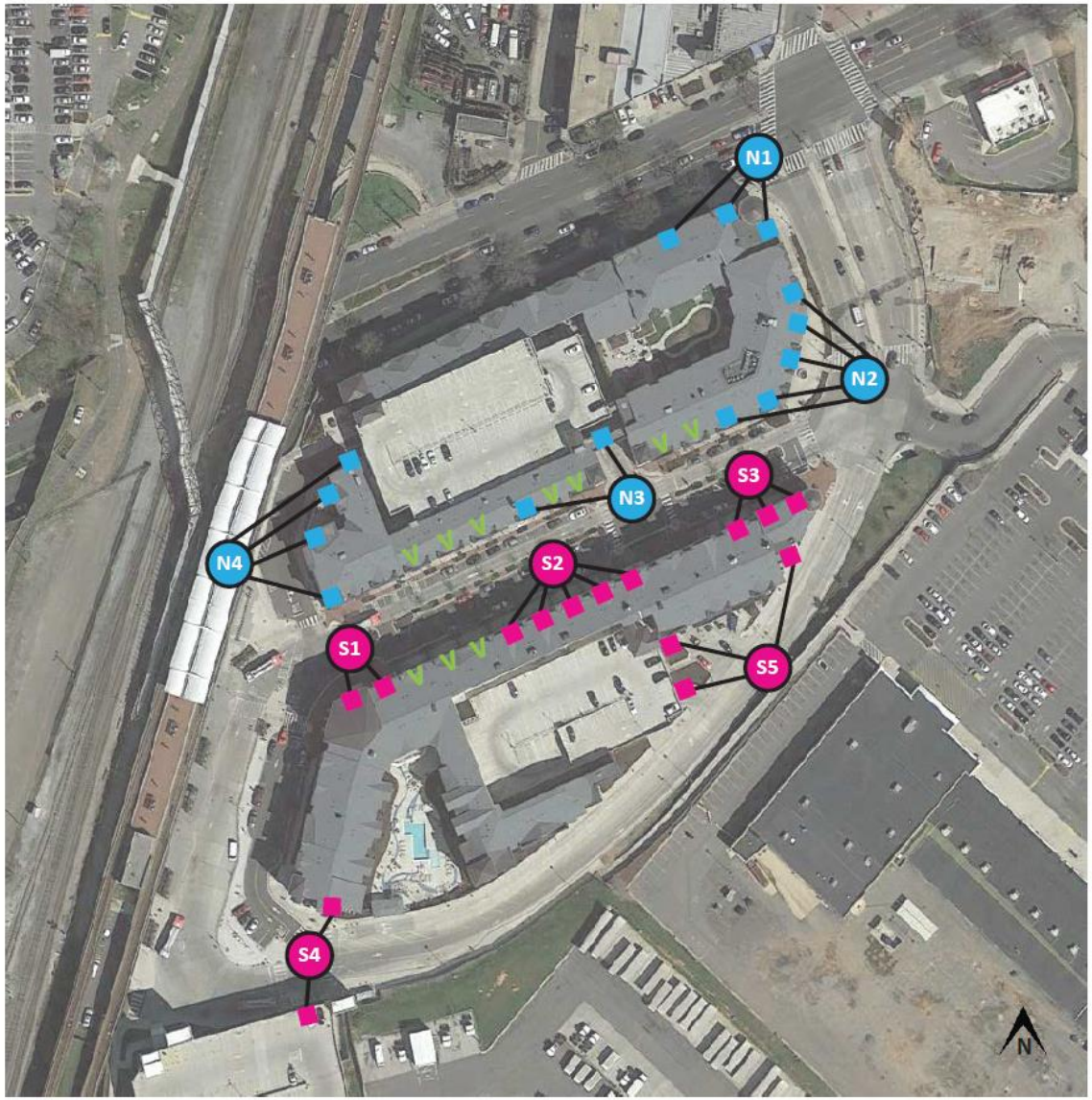

Gross Residential Density (units per acre)
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
Redmond TOD
Rhode Island Row
Fruitvale Village
Englewood
Wilshire/Vermont


Gross Commercial FAR
0
0.2
0.4
0.6
0.8
1
Redmond TOD
Rhode Island Row
Fruitvale Village
Englewood
Wilshire/Vermont

Data Collection

- ✓ **A full count of all persons entering and exiting the building**
- ✓ **A brief intercept survey of a sample of individuals entering and exiting the building**
  - "How did you get here?" (e.g., by what mode of travel?), and
  - What is the purpose of your trip?

7:30 a.m. and 9:00 p.m. on a workday in spring or fall 2015



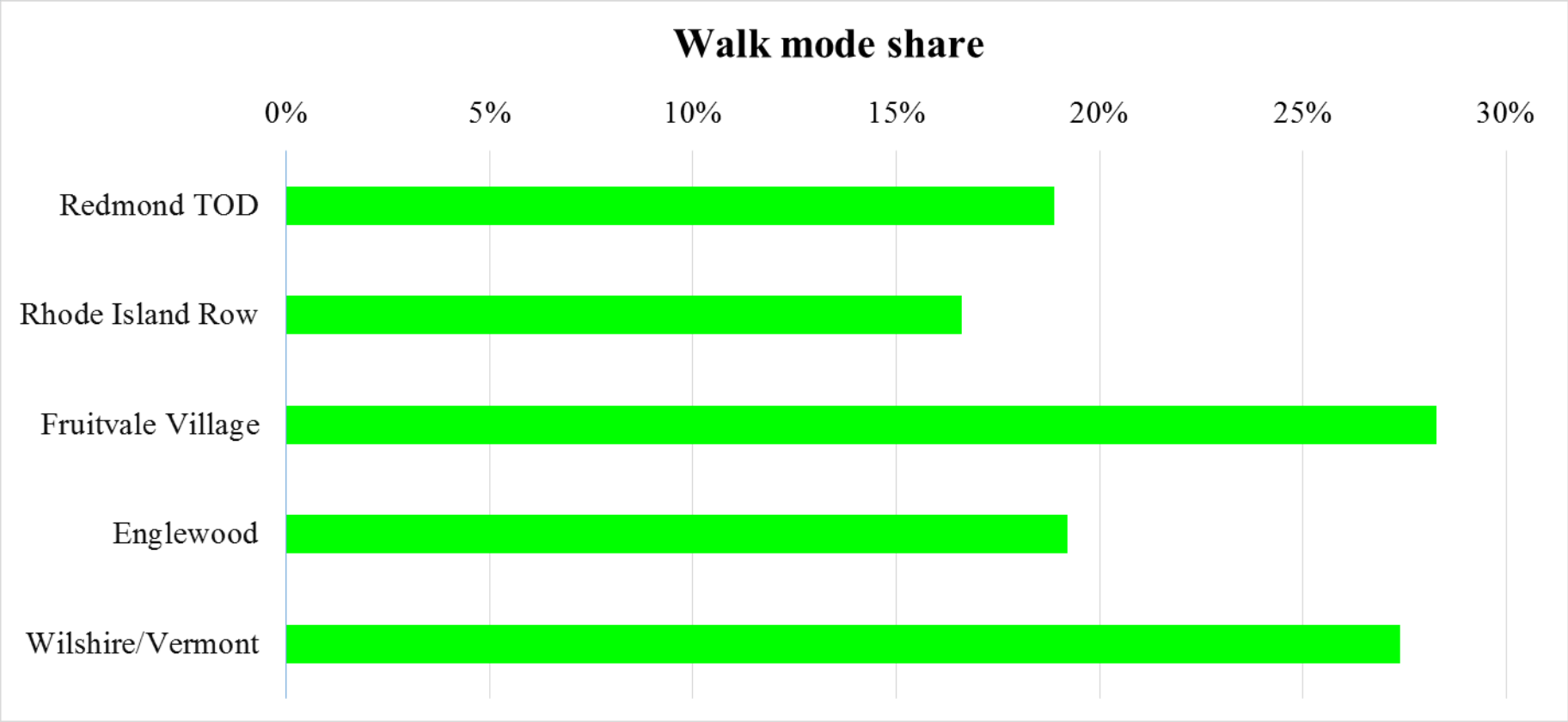
V Vacant

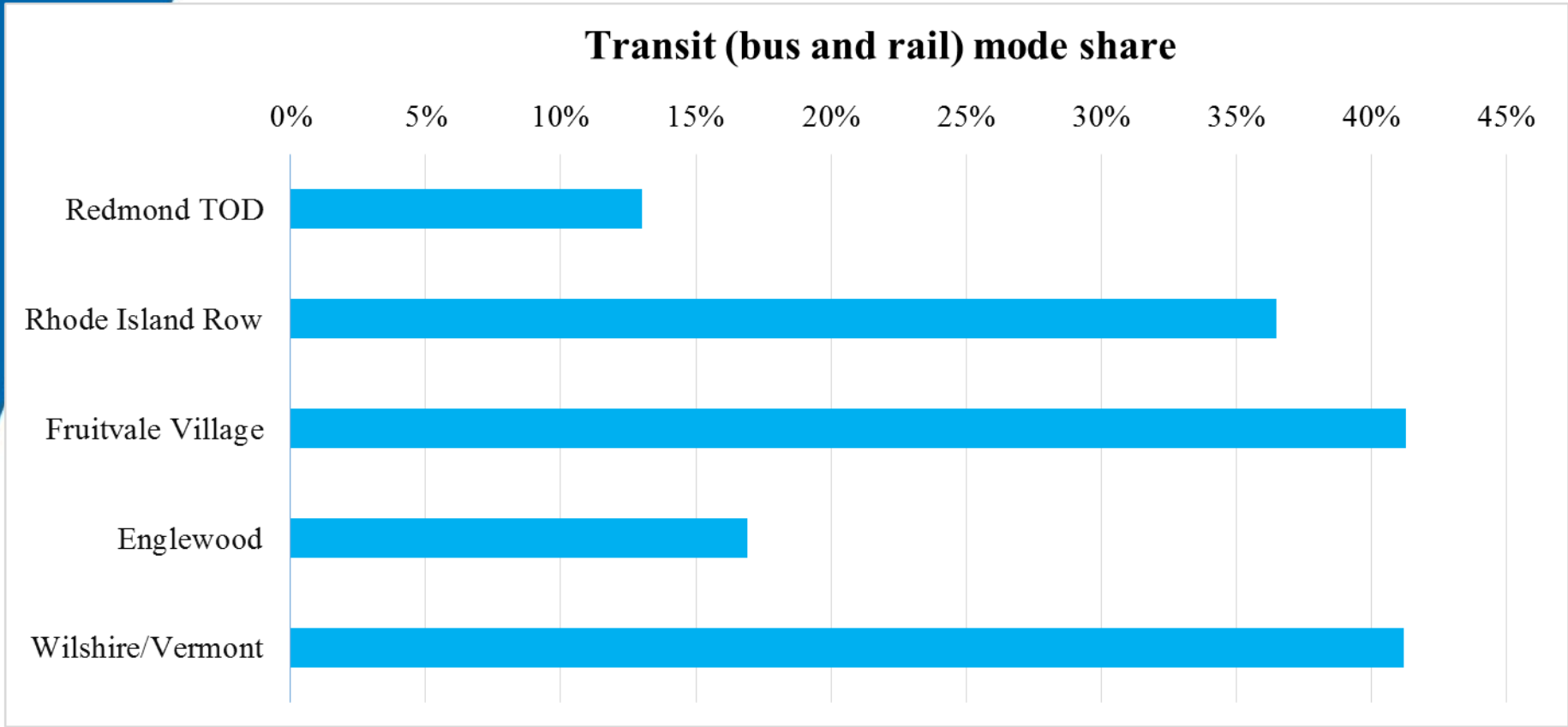
3X Counter Location

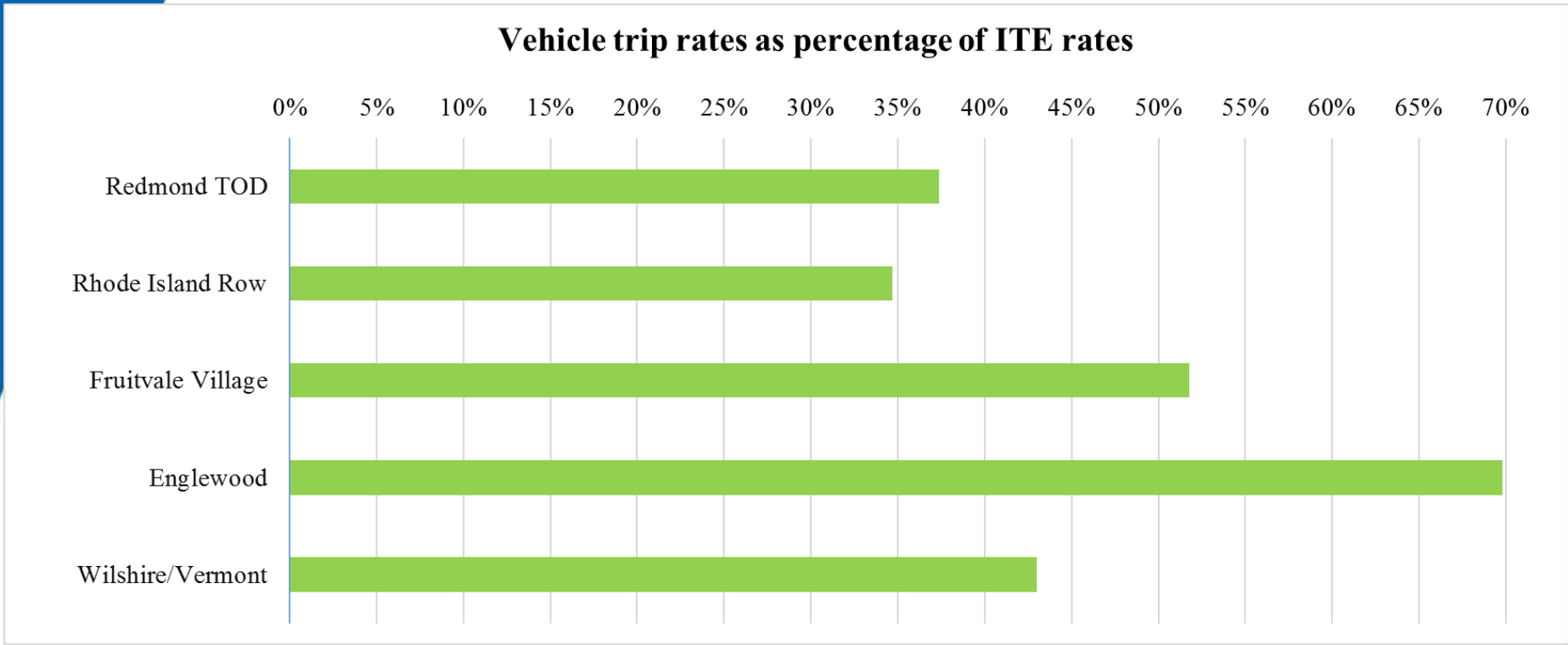
Door to be Observed

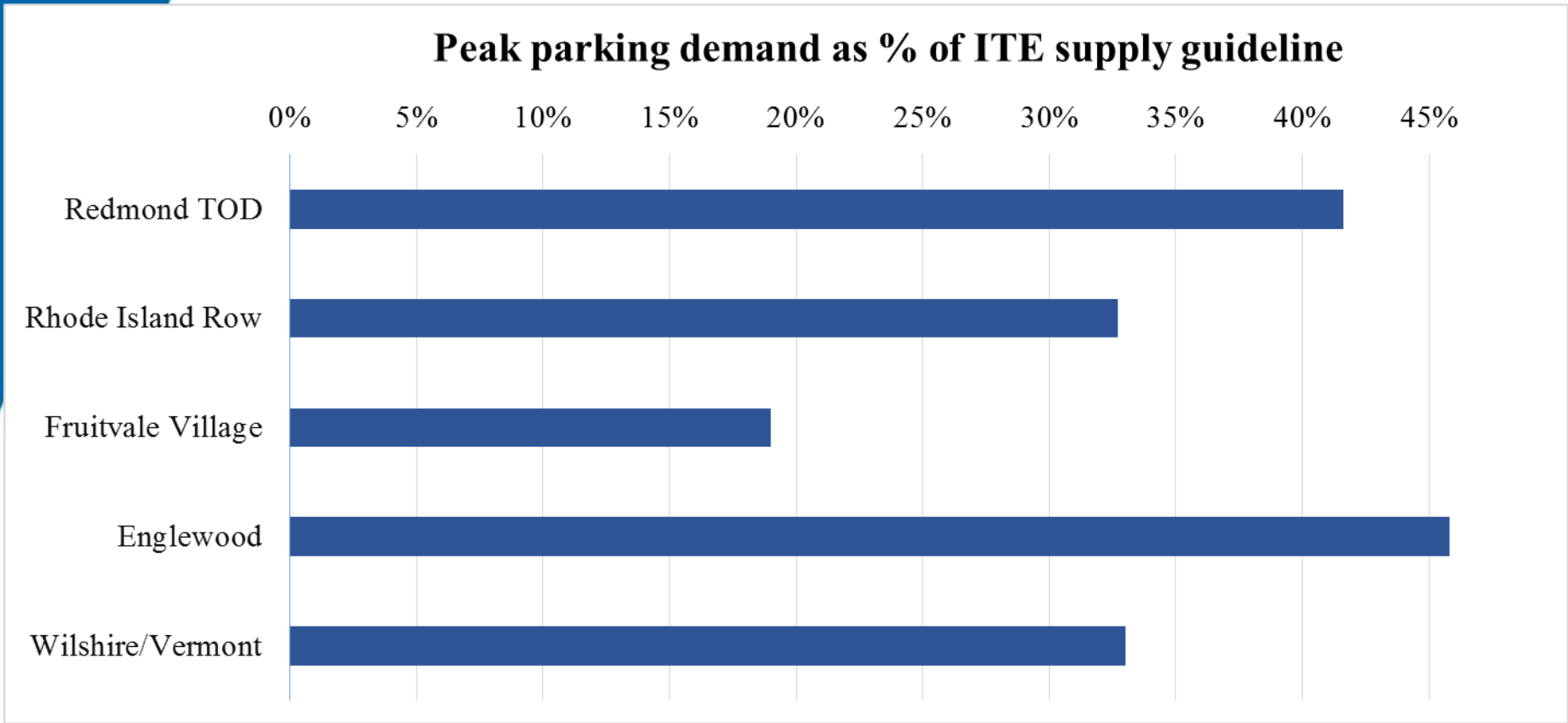
North Building

South Building


Walk mode share
0%
5%
10%
15%
20%
25%
30%
Redmond TOD
Rhode Island Row
Fruitvale Village
Englewood
Wilshire/Vermont


Transit (bus and rail) mode share
0%
5%
10%
15%
20%
25%
30%
35%
40%
45%
Redmond TOD
Rhode Island Row
Fruitvale Village
Englewood
Wilshire/Vermont


Vehicle trip rates as percentage of ITE rates
0%
5%
10%
15%
20%
25%
30%
35%
40%
45%
50%
55%
60%
65%
70%
Redmond TOD
Rhode Island Row
Fruitvale Village
Englewood
Wilshire/Vermont


Peak parking demand as % of ITE supply guideline
0%
5%
10%
15%
20%
25%
30%
35%
40%
45%
Redmond TOD
Rhode Island Row
Fruitvale Village
Englewood
Wilshire/Vermont

Parking Policies

- Lowest Parking Demand at Fruitvale Village, Rhode Island Row, and Wilshire/Vermont
  1. Shared Parking (FV, RIR)
  2. Unbundled Residential Parking (FV, RIR)
  3. Paid Commercial Parking (FV, RIR, W/V)

STREET SCALE

Measuring Urban Design

Salt Lake City Study

Table 1. Summary of models

Urban design quality	Significant physical features	Coefficient	*p*-value
Imageability	People (#)[a]	0.0239	<0.001
	Proportion of historic buildings	0.970	<0.001
	Courtyards/plazas/parks (#)	0.414	<0.001
	Outdoor dining (yes/no)	0.644	<0.001
	Buildings with non-rectangular silhouettes (#)	0.0795	0.036
	Noise level (rating)[b]	−0.183	0.045
	Major landscape features (#)	0.722	0.049
	Buildings with identifiers (#)	0.111	0.083
Enclosure	Proportion street wall—same side	0.716	0.001
	Proportion street wall—opposite side	0.940	0.002
	Proportion sky across	−2.193	0.021
	Long sight lines (#)	−0.308	0.035
	Proportion sky ahead	−1.418	0.055
Human scale	Long sight lines (#)	−0.744	<0.001
	All street furniture and other street items (#)	0.0364	<0.001
	Proportion first floor with windows	1.099	<0.001
	Building height—same side	−0.00304	0.033
	Small planters (#)	0.0496	0.047
	Urban designer (yes/no)	0.382	0.066
Transparency	Proportion of first floor with windows	1.219	0.002
	Proportion of active uses	0.533	0.004
	Proportion of street wall—same side	0.666	0.011
Complexity	People (#)1	0.0268	<0.001
	Buildings (#)	0.0510	0.008
	Dominant building colours (#)	0.177	0.031
	Accent colours (#)	0.108	0.043
	Outdoor dining (yes/no)	0.367	0.045
	Public art (#)	0.272	0.066

Field Manual

Focuses on Urban Design Qualities that Meet Performance Criteria

- Imageability
- Enclosure
- Transparency
- Human scale
- Complexity

Qualitative Introduction to Urban Design Quality

imageability

Imageability is the quality of a place that makes it distinct, recognizable, and memorable. A place has high imageability when specific physical elements and their arrangement capture attention, evoke feelings, and create a lasting impression.

What do the experts say?

"generic places with no character have no imageability"

"really imageable places are recognizable and memorable"

"distinct views can make an otherwise ordinary place very imageable"

"architecture that suggests importance, presence of historical buildings, and landmarks"

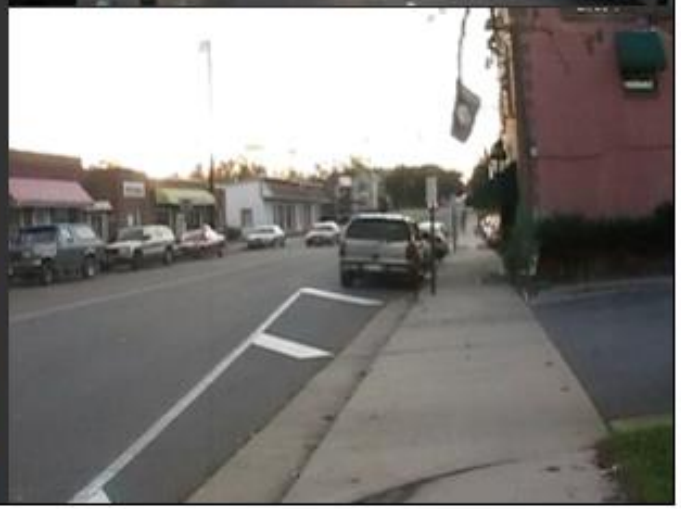
"is the place unique?"

Streets filled with people, many signs to draw pedestrians, and strong landmarks make Times Square in New York City a very imageable place.

HIGH IMAGEABILITY

Few pedestrians, no street activity like outdoor dining, and no features that serve as landmarks make this street hardly distinguishable from others and thus not that imageable.

LOW IMAGEABILITY



Detailed Illustrated Steps

measuring imageability

5. count buildings with non-rectangular shapes

Step 1
Walk entire length of study area (1 block or approximately... feet?

Step 2
As you walk, note buildings whose shape is not a simple rectangular box. on either side of the street.

Note:
Consider a non-rectangular building to be any building that from any angle is not a simple rectangle. Buildings with a basically rectangular shape but have a pitched roof or ornamental trim will be considered as non-rectangular. Use the figures to familiarize yourself with the concept.

Step 3
Record the number of buildings that have a non-rectangular shape.

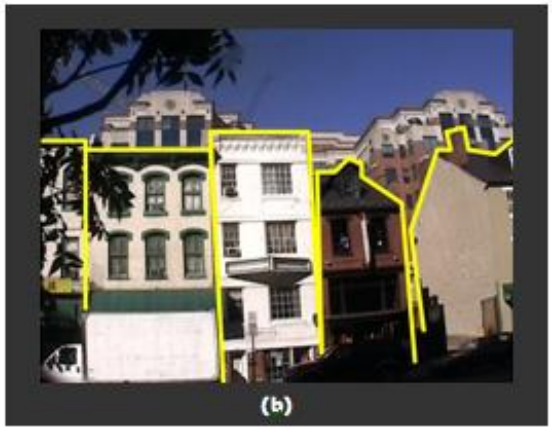
(a) 1 non-rectangular building
The building trim on the left most building does enough to deviate the otherwise rectangular building to non-rectangular.

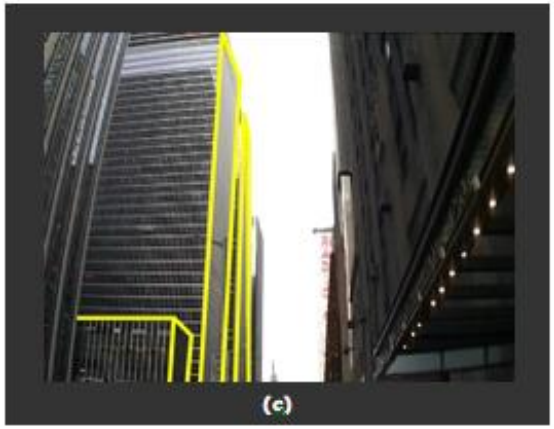
(b) 2 non-rectangular buildings
The pitched roofs and chimneys make the two left most buildings non-rectangular.

(c) 3 rectangular buildings
These modern skyscrapers all have simple rectangular shapes.

(d) 1 non-rectangular building
While the office park building shown does not have any curved edges and is comprised of all right angles, it does not have a simple box shape.

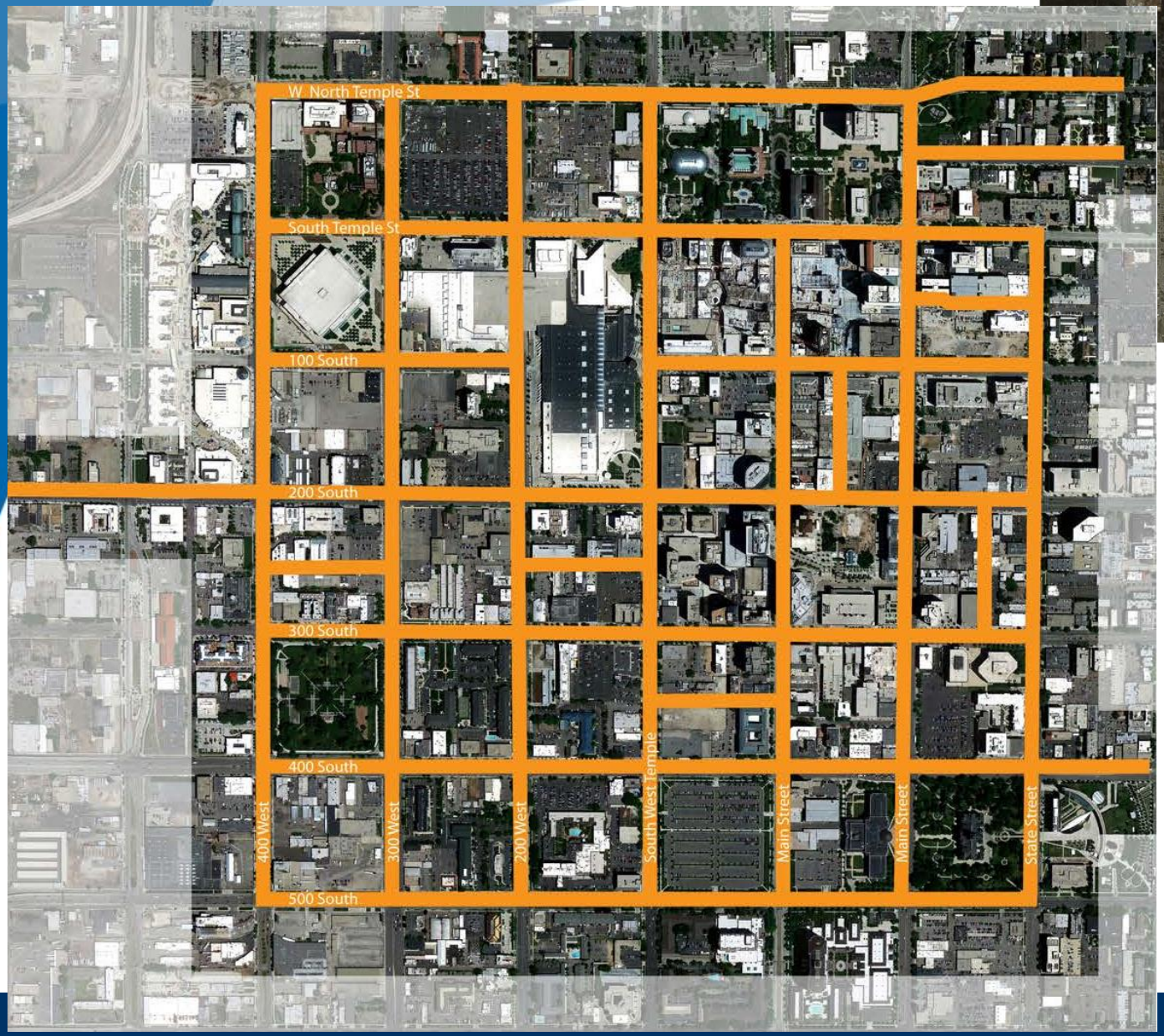
(a)


(b)


(c)

(d)

Study Area



Downtown 'Free Fare Zone' (FFZ) Salt Lake City, UT

179 block faces

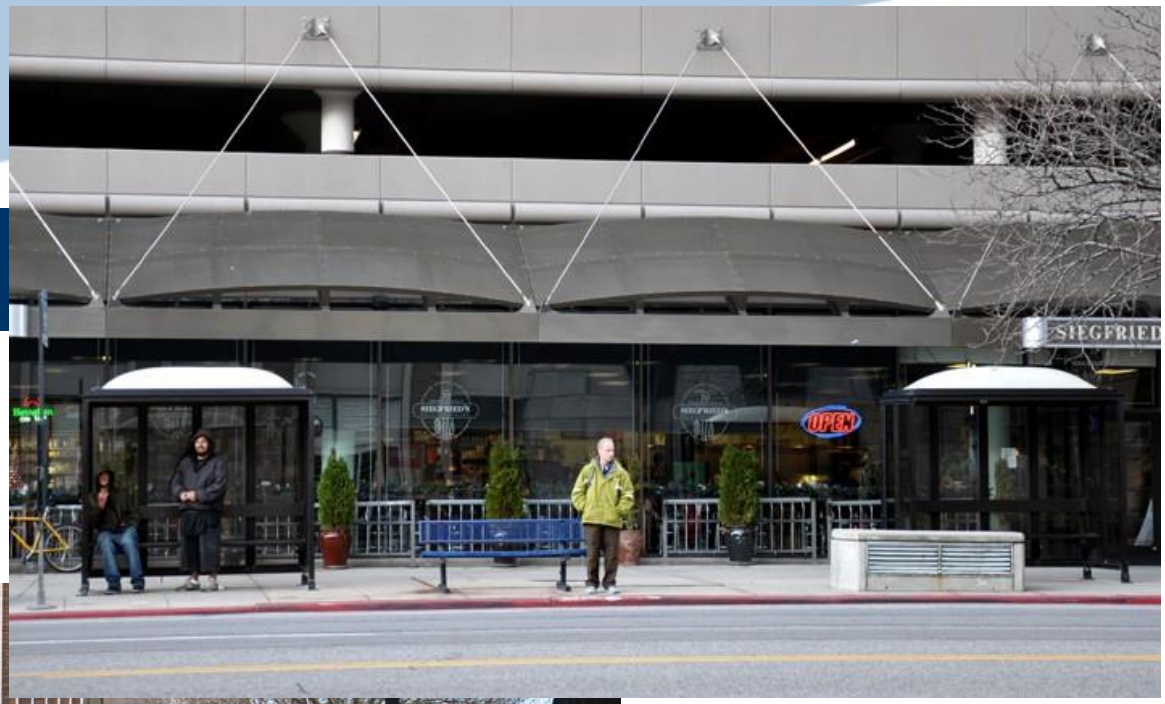
Outcome variable: Pedestrian activity

The number of people encountered over a 30 minutes time period for a given block face during peak hours for a ‘typical’ weekday (September and October of 2012)

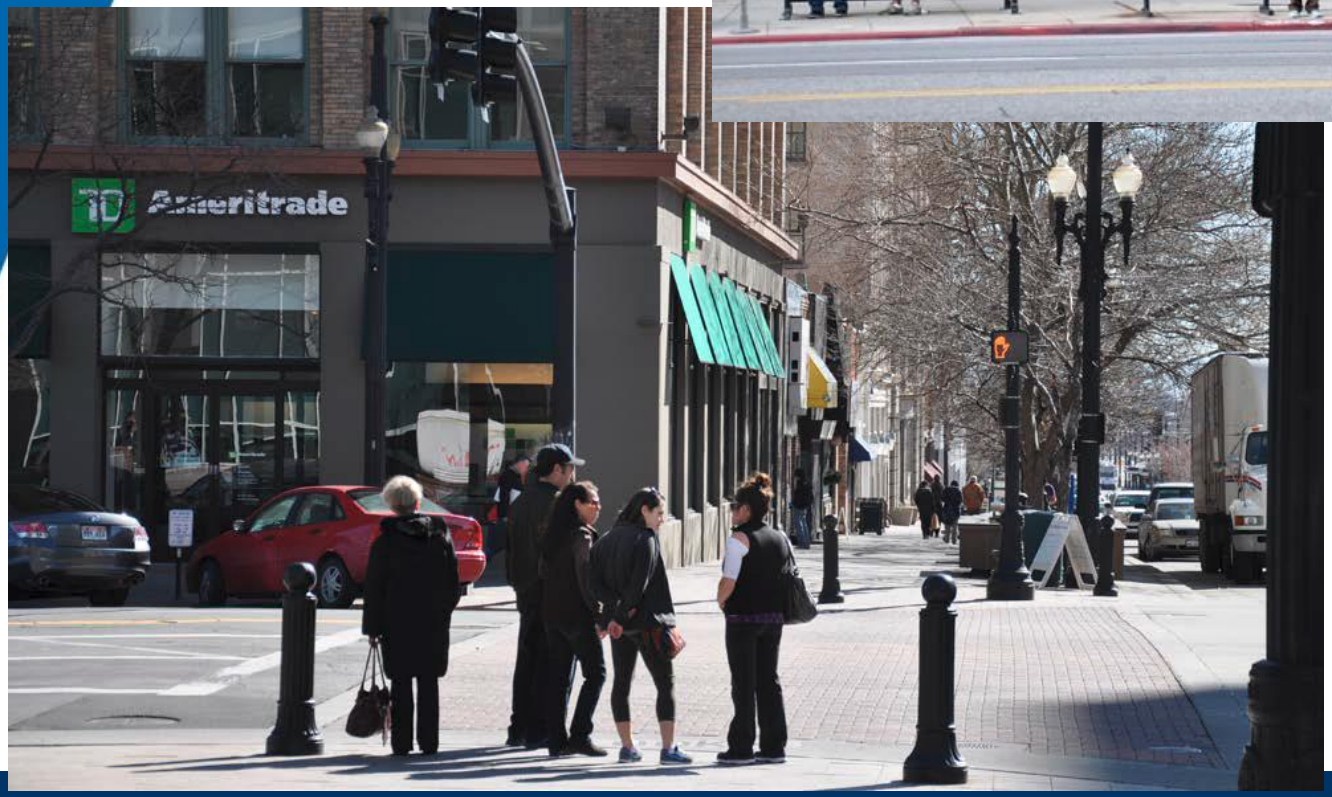
Imageability

262 S Main St

Human Scale

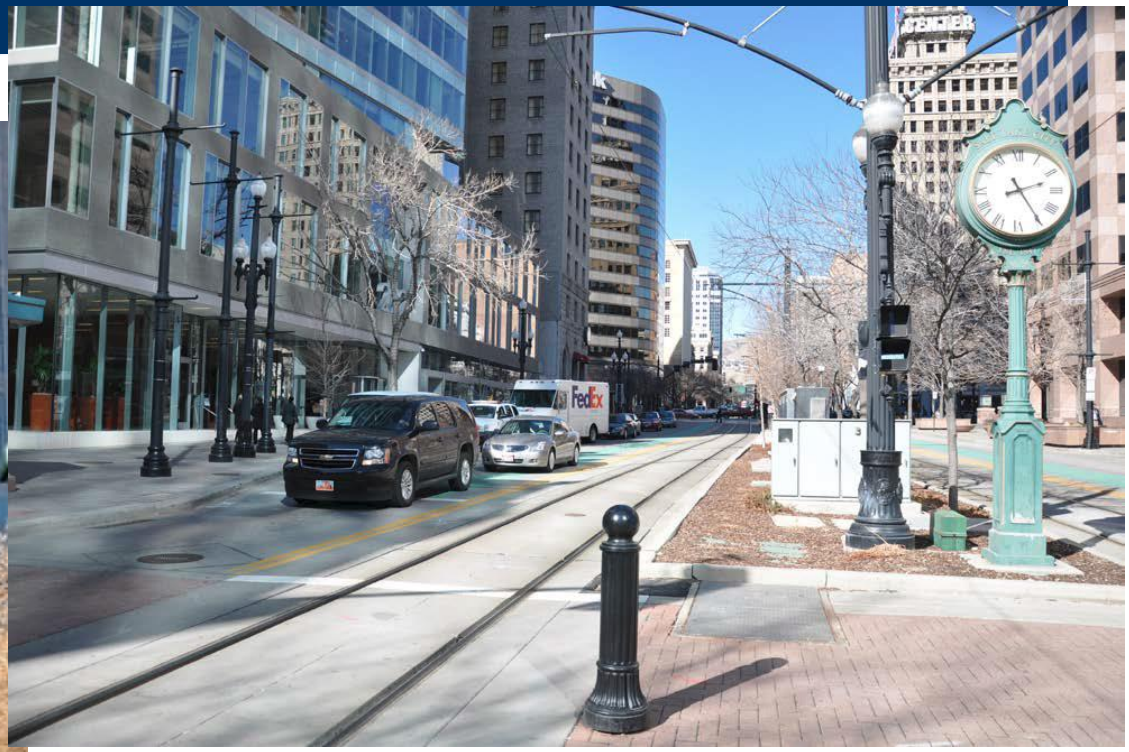


32 W 200 S



2 E Broadway

Enclosure



245 S Main St

311 S Main St

Transparency

254 S Main St

Complexity

262 S Main St

High Value of All 5 Qualities

169 S Main St

Low Value of All 5 Qualities

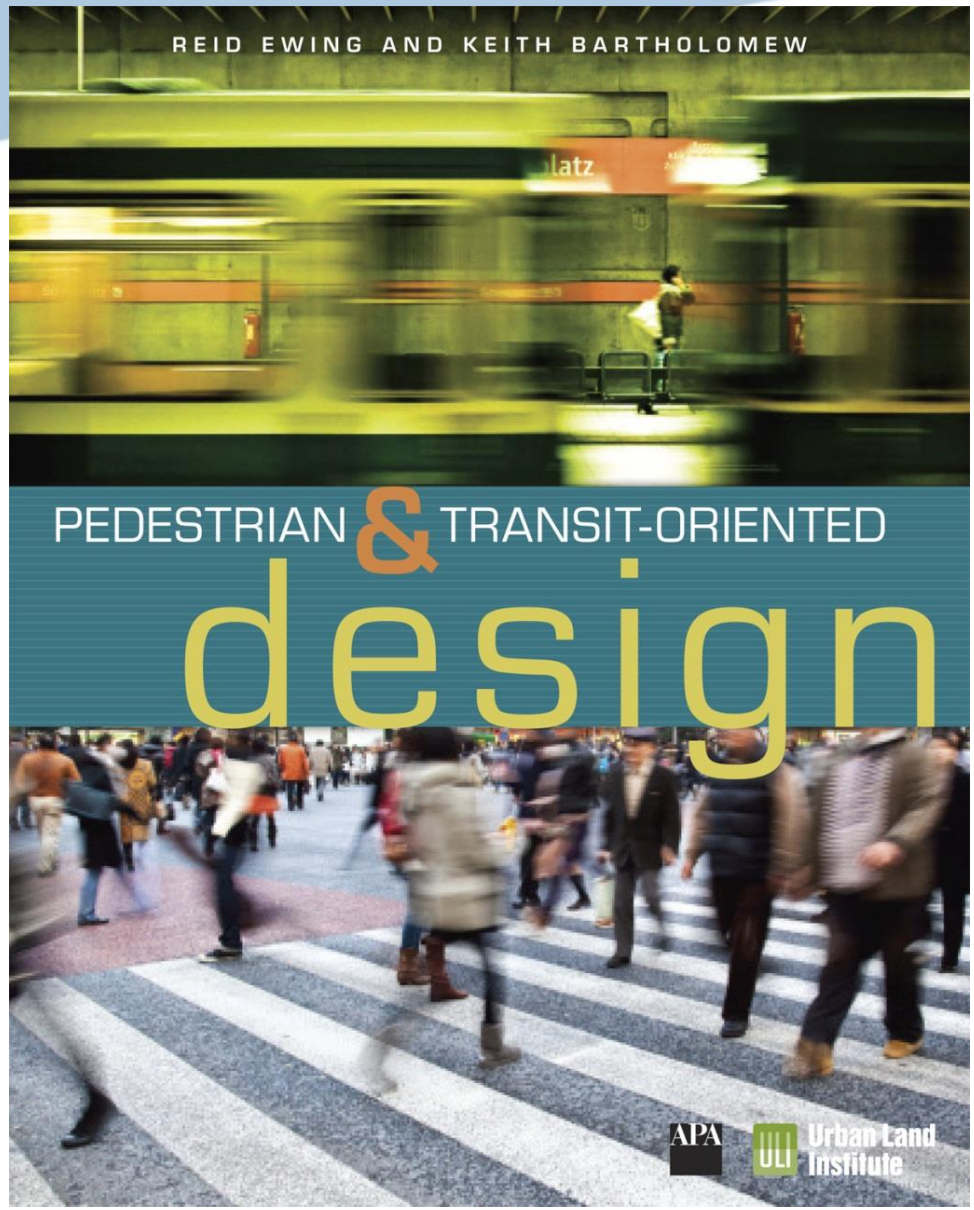
230 W N Temple St

D Variables

- Density – Floor Area Ratio
- Diversity – Entropy based on floor area
- Design – Intersection Density
- Destination Accessibility – Walk Score
- Distance to Transit – Miles to Nearest Transit Line
- Demographics – Per Capita Income

While the D variables are included as controls, the primary focus of this study is the five urban design qualities, both individually and as a whole.

- *Two of the five measures of urban design qualities found in Model 2, 'transparency' and 'imageability', are highly significant.*
- *'Enclosure' and 'complexity' have no individual relationship to pedestrian activity.*
- *As a whole, however, the five urban design qualities improved the fit of the model.*


REID EWING AND KEITH BARTHOLOMEW
PEDESTRIAN & TRANSIT-ORIENTED
design
APA
Urban Land Institute

Orenco Station

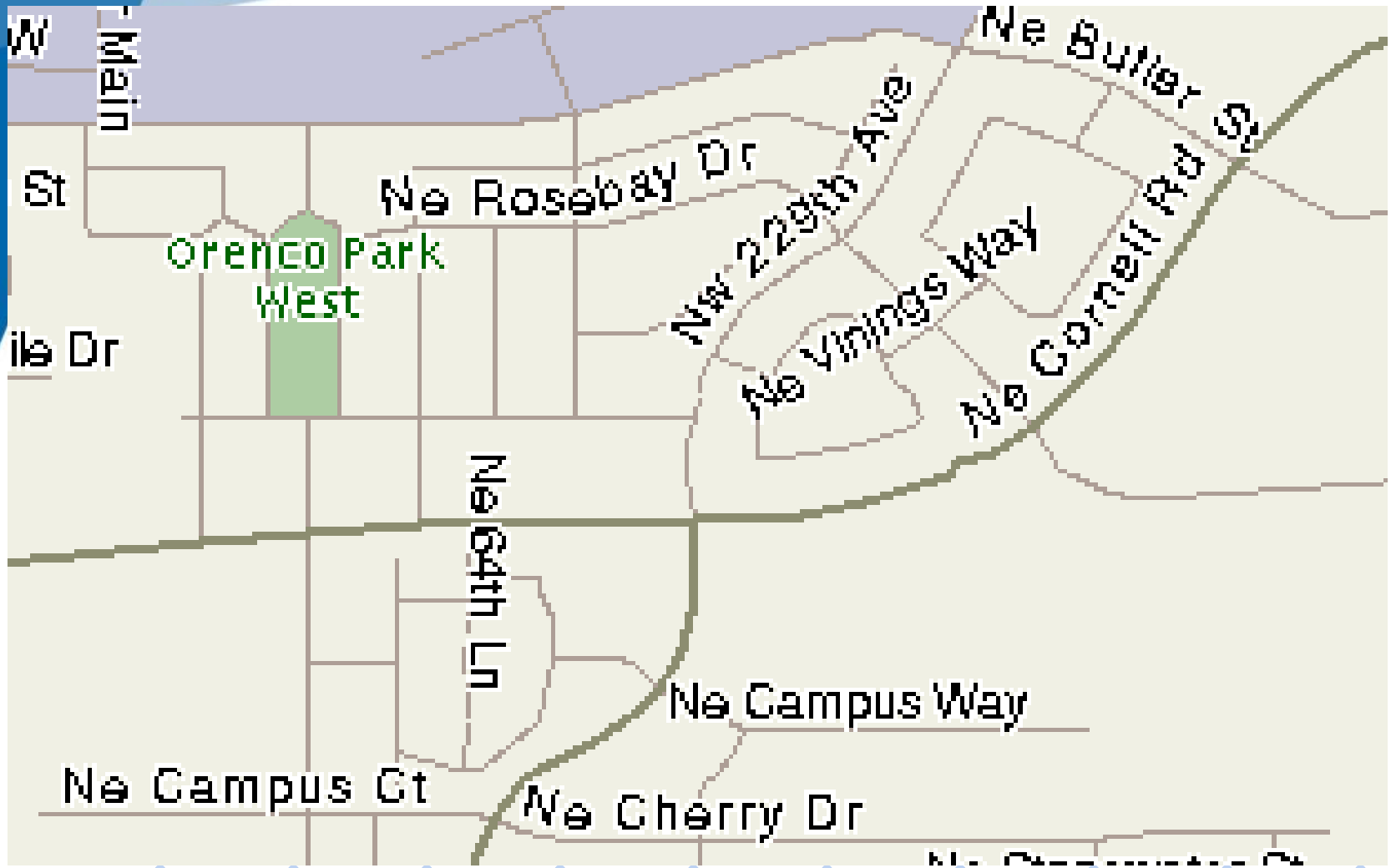
ORENCO STATION

ILLUSTRATIVE OVERALL SITE PLAN

MASTER DEVELOPER PAC-TRUST

Orenco Station

Orenco Station – Index of 1.53



TRIMET
MAX

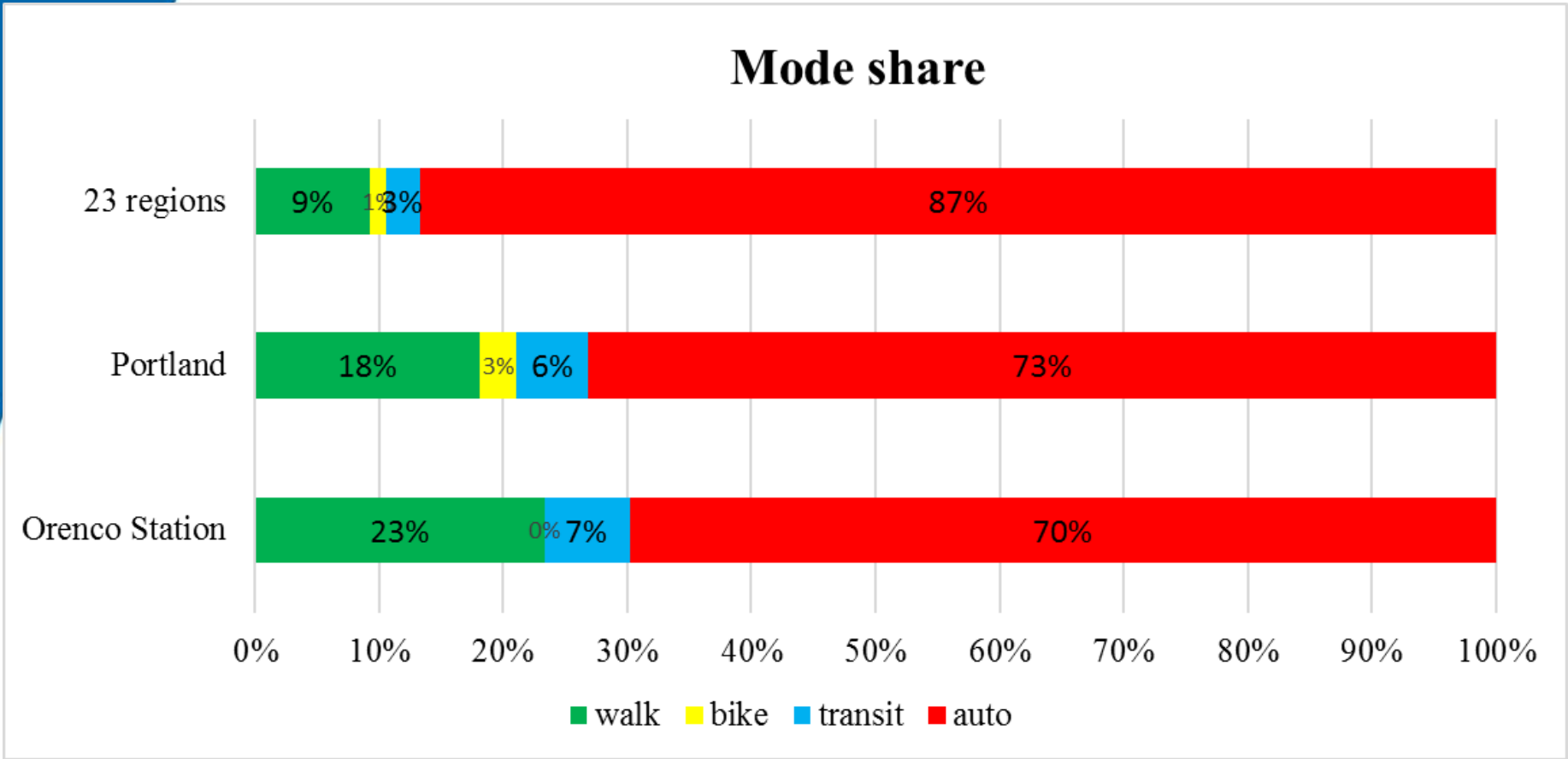
NOW LEASING
Be Alert
• Report suspicious objects or behaviors to operator or other Tri-Met personnel
• Buses and MAX trains are equipped with 2-way radios
• 9-1-1 calls are free at all MAX stations and transit center pay phones
TRIMET

NOW LEASING
FOR LEASE
The Platform District
25,000 SF Divisible
Restaurant & Retail Space
Delivery 2014
Contact: Michelle Rozakis,
Nick Diamond or Ian Biggi
503.222.1655
REAL ESTATE
NOTICE!
PROPERTY PROTECTED WITH
VIDEO SURVEILLANCE. ENTER THIS
SITE AFTER HOURS AND YOU WILL
6380
NE CHERRY DR.
HILLSBORO, OR
LEASING

SALON 14
Mens Hair Cut $8. & Up
Kids Hair Cut $5. & Up
Pedicure $20.
Eyebrows Wax $10.
503.693-9331

NE CORNELL RD
LEFT TURN YIELD TO ONCOMING TRAFFIC
STARBUCK

WARNING


Mode share
23 regions
9%
1%
3%
87%
Portland
18%
3%
6%
73%
Orenco Station
23%
0%
7%
70%
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
walk
bike
transit
auto

Redmond TOD

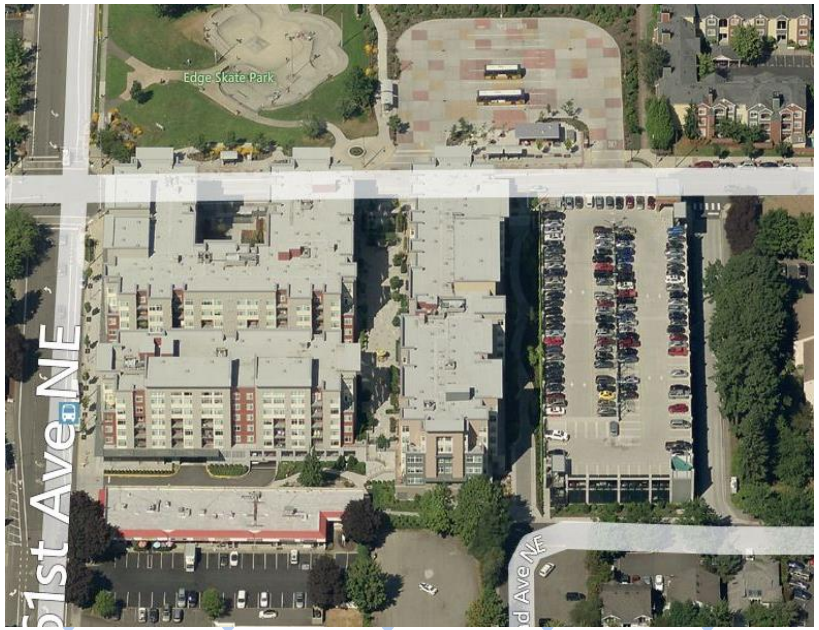
US Post Office
Edgar State Park
Transit Layover
N. E. 83rd Street
N. E. 81st Street
161st Avenue N. E.
102nd Avenue N.E.

How best to allocate land around transit stations?

large park-and-ride lots

vs.

active uses such as multifamily housing, office, and retail



Redmond TOD, Seattle

(a) Apartment Building and Park-and-Ride Garage

(b) Apartment Building with Ground Floor Retail

(c) Apartment Building with Underground Parking

(d) Park-and-Ride Garage

(e) Redmond Transit Center

(f) Transit Users

(g) Redmond Edge Skate Park

(h) Unleased Space

(i) Spillover bike parking at the apartment garage

Mode Choice and Trip Generation

- Redmond TOD has 1.7 times more trips made by walking and 3 times more trips made by transit than the Seattle regional average.

TABLE 3 Mode share in Redmond TOD

Intercept survey						
Entrance	*Count*	*Mode share (%)*				
		Walk	*Bike*	*Transit*	*Auto*	*Other*
Parking Garage	115	2.61	1.74	0.87	93.04	1.74
Residential North	90	21.11	2.22	65.56	10	1.11
Residential West	124	54.03	0.81	9.68	34.68	0.81
Commercial (West)	99	18.18	2.02	13.13	64.65	2.02
Trip generation counts						
Entrance	*Count*	*Count for modes*				
		Walk	*Bike*	*Transit*	*Auto*	*Other*
Parking Garage	852	22	15	7	793	15
Residential South	173	65	3	65	39	2
Residential North	145	31	3	95	15	2
Residential West	324	175	3	31	112	3
Commercial (West)	446	81	9	59	288	9
Parking Garage Street Exit	41	1	1	0	38	1
Final mode share	**1981**	**18.93%**	**1.67%**	**13.01%**	**64.85%**	**1.54%**

- Based on the ITE's trip generation rates, the Redmond TOD would be expected to generate 1,773 daily vehicle trips (Table 4). The actual vehicle trips we observed on the survey day was 661, which is only 37.3 percent of the ITE's expected value.

TABLE 4 The Comparison of Daily Vehicle Trip Generation between ITE Guideline and Redmond TOD

	Trip generation rate	*Total units*	*Total daily trips*
ITE guideline	-	-	1,773
223 Mid-Rise Apartment	4.31	312	1,344.72
715 Single Tenant Office Building	11.65	1,905	22.19
932 High-turnover (sit-down) restaurant	127.15	2,682	341.02
640 Animal Hospital/Veterinary Clinic	31.45	2,081	65.45
Redmond TOD	-	-	661

Parking Generation

TABLE 5 The Comparison of Parking Supply and Demand Between Redmond TOD Residential and ITE Guideline

Residential				
	Supply		*Peak period demand*	
	Parking spaces per unit	*Total parking spaces*	*Vehicle per unit*	*Total parked vehicles*
ITE guideline: 222 high-rise apartment	2.0	644	1.37	441
Redmond TOD residential	1.19	379	0.86	278
Commercial (occupied space only)				
	Supply		*Peak period demand*	
	Parking spaces per 1,000 sq. ft. GFA	*Total parking spaces*	*Vehicle per 1,000 sq. ft. GFA*	*Total parked vehicles*
ITE guideline	-	51	-	37
932 High-turnover (sit-down) restaurant	14.3	-	10.6	-
701 office building	4		2.84	
640 animal hospital/veterinary clinic	2.3		1.6	
Redmond TOD commercial	3.14	14	1.8	12

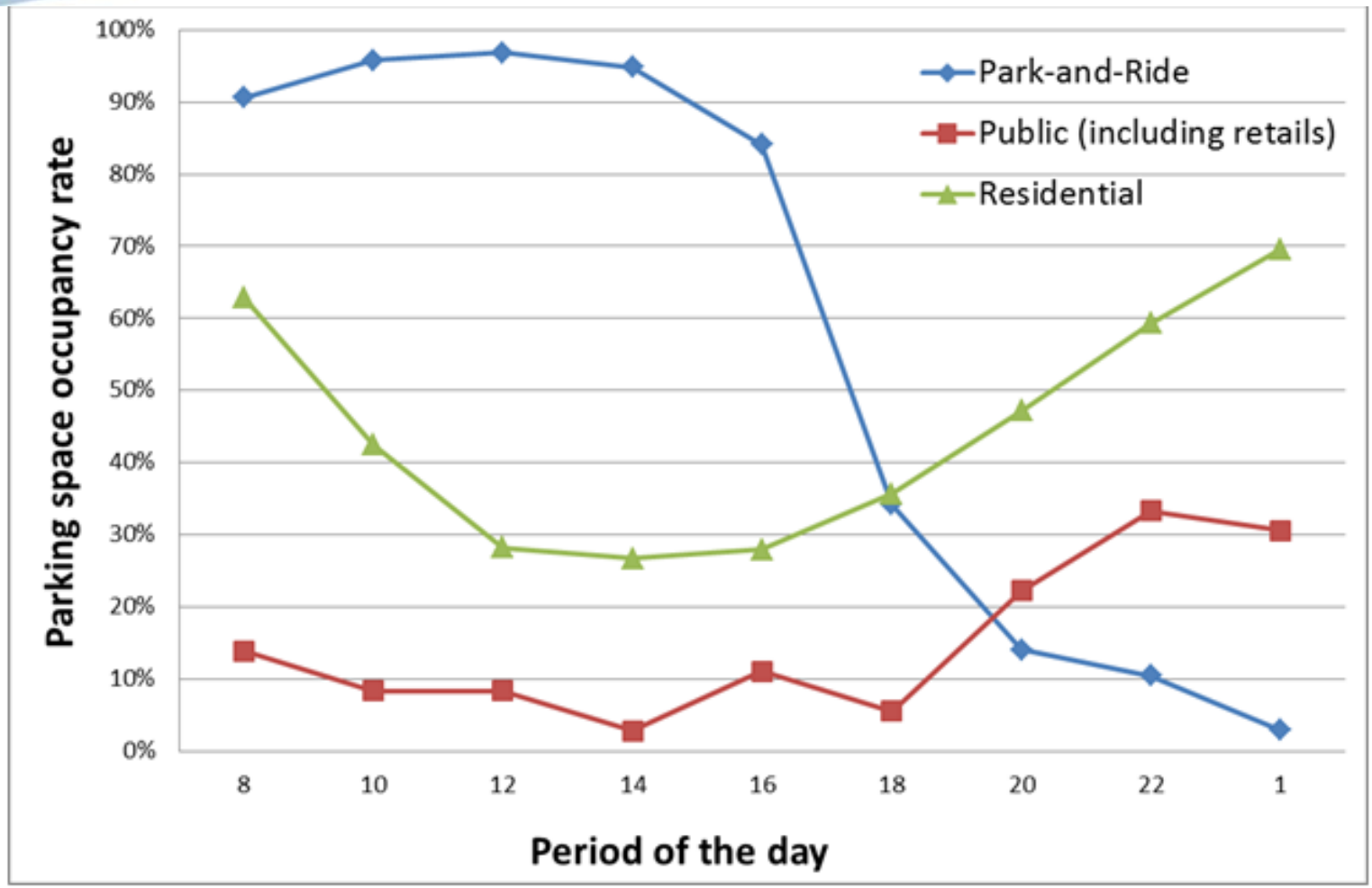


FIGURE 4 Parking Space Occupancy Rate for Different Uses at Redmond TOD