

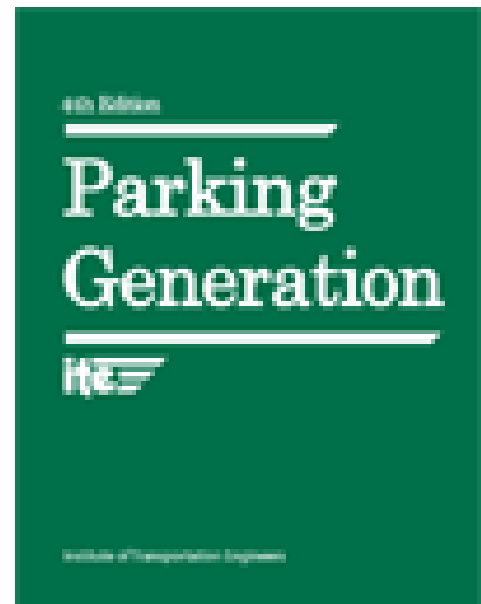
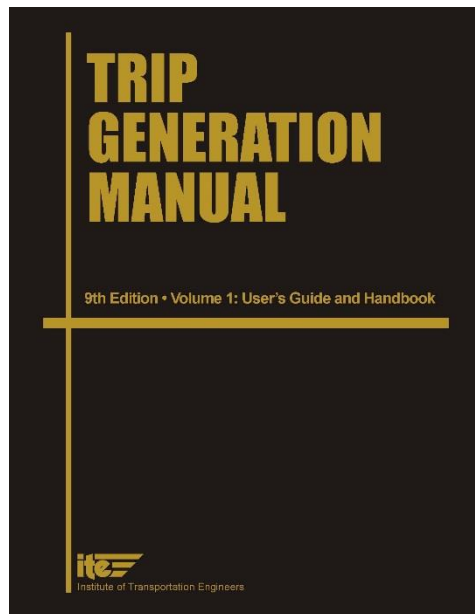
ORENCO STATION TOD VS. STATION PARK TAD – NO CONTEST

Reid Ewing, David Proffitt, and Sadegh Sabouri

**Metropolitan Research Center
Department of City and Metropolitan Planning
University of Utah**

Absent Hard Numbers

- ✓ 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.



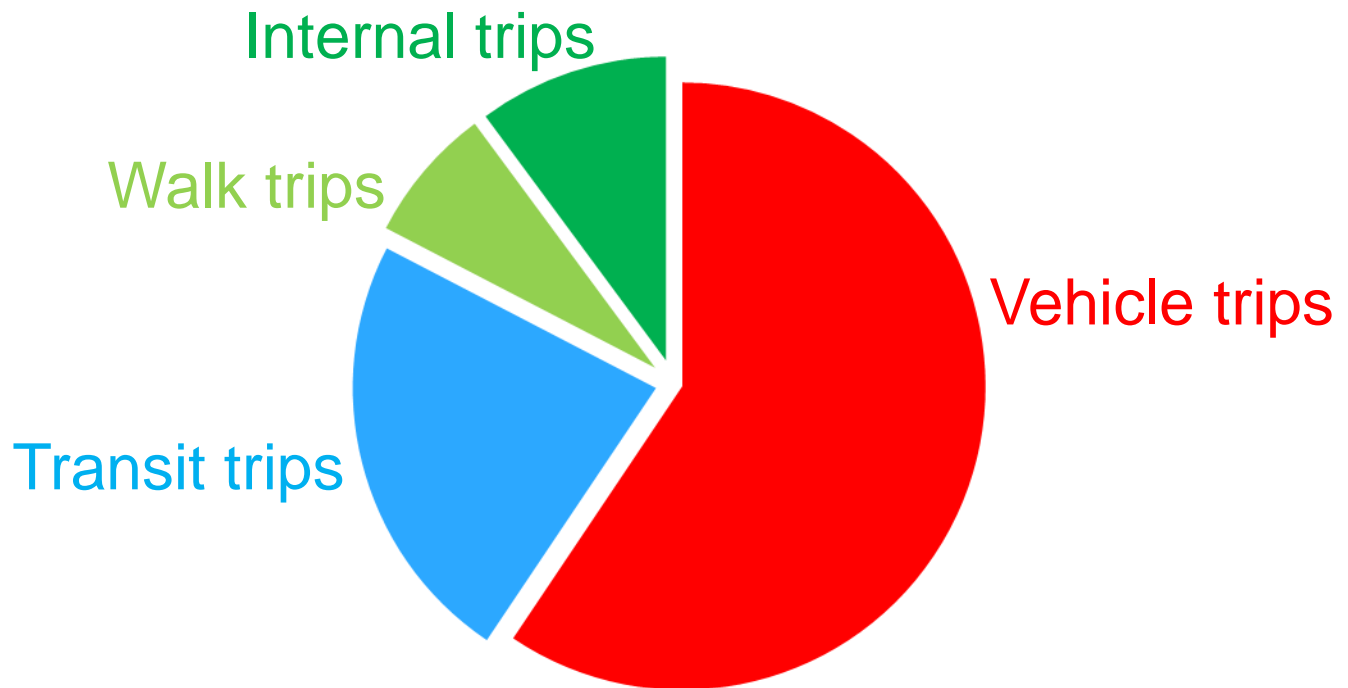
Not Applicable to TODs

- “Data were primarily at **suburban locations** having **little or no transit services**, nearby pedestrian amenities, or travel demand management (TDM) programs” *ITE Trip Generation Manual*
- “Primarily isolated, suburban sites” *ITE Parking Generation*



Research Question

How much of the travel demand is captured internally or satisfied by alternate modes?



Are Suburban TODs Over-Parked?

Robert Cervero, Arlie Adkins, and Cathleen Sullivan
University of California, Berkeley

Abstract

A survey of 31 multi-family housing complexes near rail stations in the San Francisco Bay Area and Portland, Oregon, show peak parking demand is 25-30 percent below supplies and, for most projects, falls below national standards. Peak parking demand is generally less for less expansive projects with short walking distances to rail stations that enjoy frequent peak-period services. Case study experiences suggest that well-designed, short and direct walking paths to rail stops lessen peak parking. A national survey of 80 U.S. cities with rail stations revealed that 75 percent have minimum TOD parking requirements that mandate more parking than suburban design standards and 39 percent grant variances for housing projects near rail stops.

Parking and Transit in the U.S.

Excessive parking could explain why transit-oriented development (TOD) in the United States often has failed to yield hoped-for benefits, such as big ridership gains and less traffic congestion. Critics charge that many large-scale housing projects near urban rail stations are "over-parked"—more parking is provided than is needed (Daisa 2004; Dunphy et al. 2004). This can drive up the cost of housing, consume valuable land near transit, and impose such environmental costs as increased impervious surface area.

Part of the blame for the surfeit of parking in TODs could be the reliance on parking generation figures from the Institute of Transportation Engineers (ITE). Implicitly, ITE standards assume that car ownership levels are no different in rail-served and non-rail-served areas. Outdated parking standards have a way of perpetuating

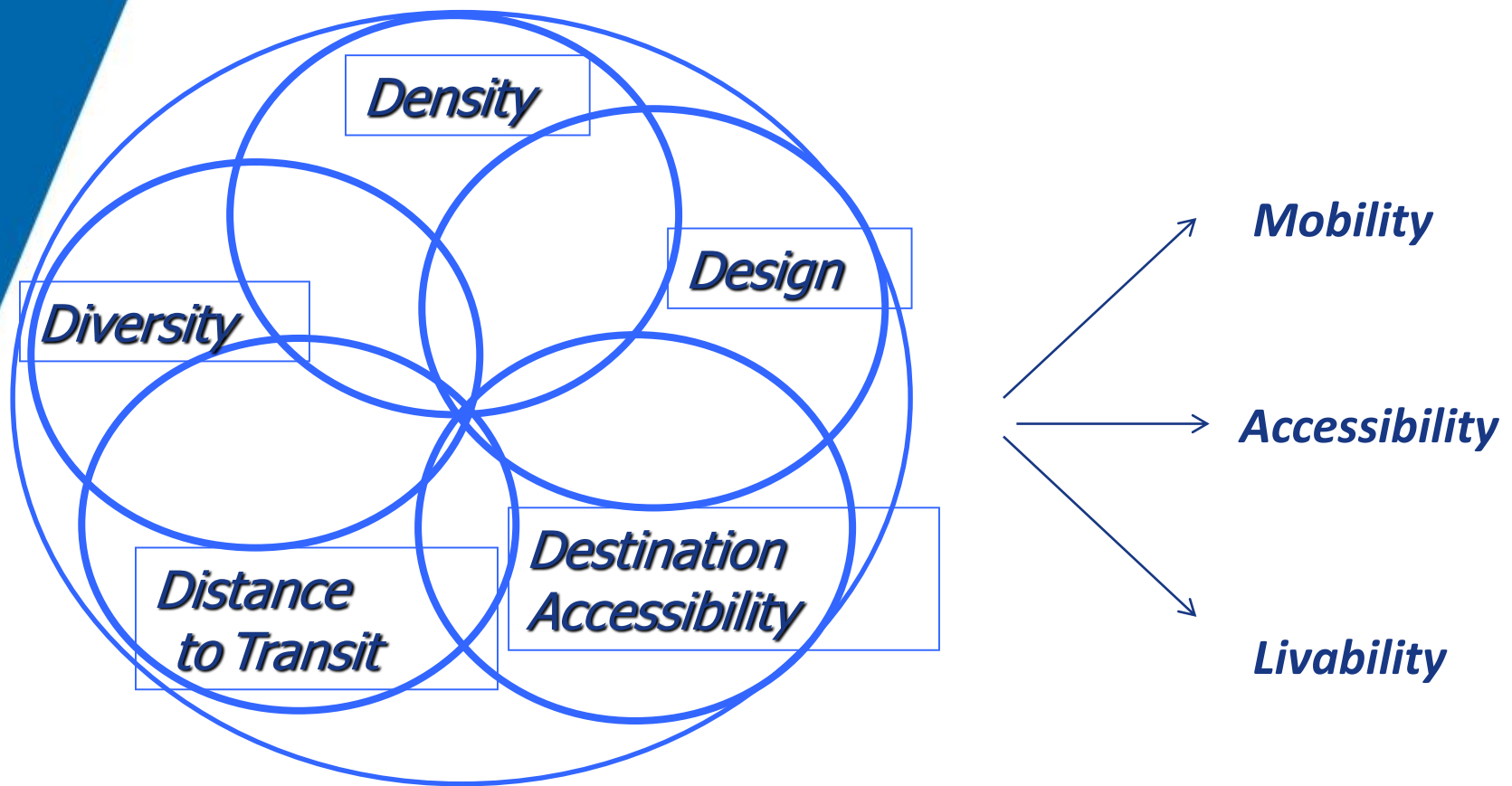
In Literature

The average trip generation rate in areas with TOD is well below the trip generation rate from the ITE report (Arrington & Cervero 2008; Cervero & Arrington 2008; Cervero et al. 2004).

There are a few studies of vehicle trip generation at multifamily developments near transit (Arrington & Cervero, 2008; Cervero & Arrington, 2008; Zamir et al. 2014). 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.

By comparing parking generation rates for housing projects near rail stops with parking supplies and with ITE's parking generation rates (Cervero et al. 2010), found there is an **oversupply** of parking at TODs, sometimes by as much as 25-30 percent.

5Ds of Compact Development



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**



*Redmond TOD,
Seattle*



*Rhode Island Row,
Washington D.C.*



*Wilshire/Vermont,
Los Angeles*



*Englewood TOD,
Denver*

*Fruitvale Village,
San Francisco*





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

Guang Tian¹ · Reid Ewing¹ · Rachel Weinberger² · Kevin Shively² · Preston Stinger³ · Shima Hamidi⁴

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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.

Keywords Transit oriented development · TOD · Trip generation · Parking generation



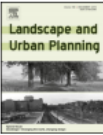
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Research Paper

Trip and parking generation at transit-oriented developments: Five US case studies



Reid Ewing*, Guang Tian, Torrey Lyons, Kathryn Terzano

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HIGHLIGHTS

- Parking demand at the five TODs is generally less than half the US guideline.
- Trip generation at the five TODs is generally less than half the US guideline.
- Automobile mode shares at the five US TODs are as low as one quarter of all trips.
- Results suggest the potential for significant savings in TOD developments.
- Guidelines are provided for using study results in TOD planning.

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ABSTRACT

Guidelines for trip and parking generation in the United States come mainly from the Institute of Transportation Engineers (ITE). However, their trip and parking manuals focus on suburban locations with limited transit and pedestrian access. This study aims to determine how many fewer vehicle trips are generated at transit-oriented developments (TODs), and how much less parking is required at TODs, than ITE guidelines would suggest.

Our sample of TODs is small, which limits our ability to generalize. However, the five cases selected for this study are more or less exemplary of the D variables, at least in comparison with US norms. They are characterized by land-use diversity and pedestrian-friendly designs. They minimize distance to transit, literally abutting transit stations. They have varying measures of destination accessibility to the rest of the region via transit. Three have progressive parking policies, which fall under the heading of demand management. Two have high residential densities, and one has a high intensity of commercial development.

Simply put, our case study TODs create significantly less demand for parking and driving than do conventional suburban developments. With one exception, peak parking demand in these TODs is less than one half the parking supply guideline in the ITE *Parking Generation* manual. Also, with one exception, vehicle trip generation rates are about half or less of what is predicted in the ITE *Trip Generation Manual*. Automobile mode shares are as low as one quarter of all trips, with the remainder being mostly transit and walk trips.

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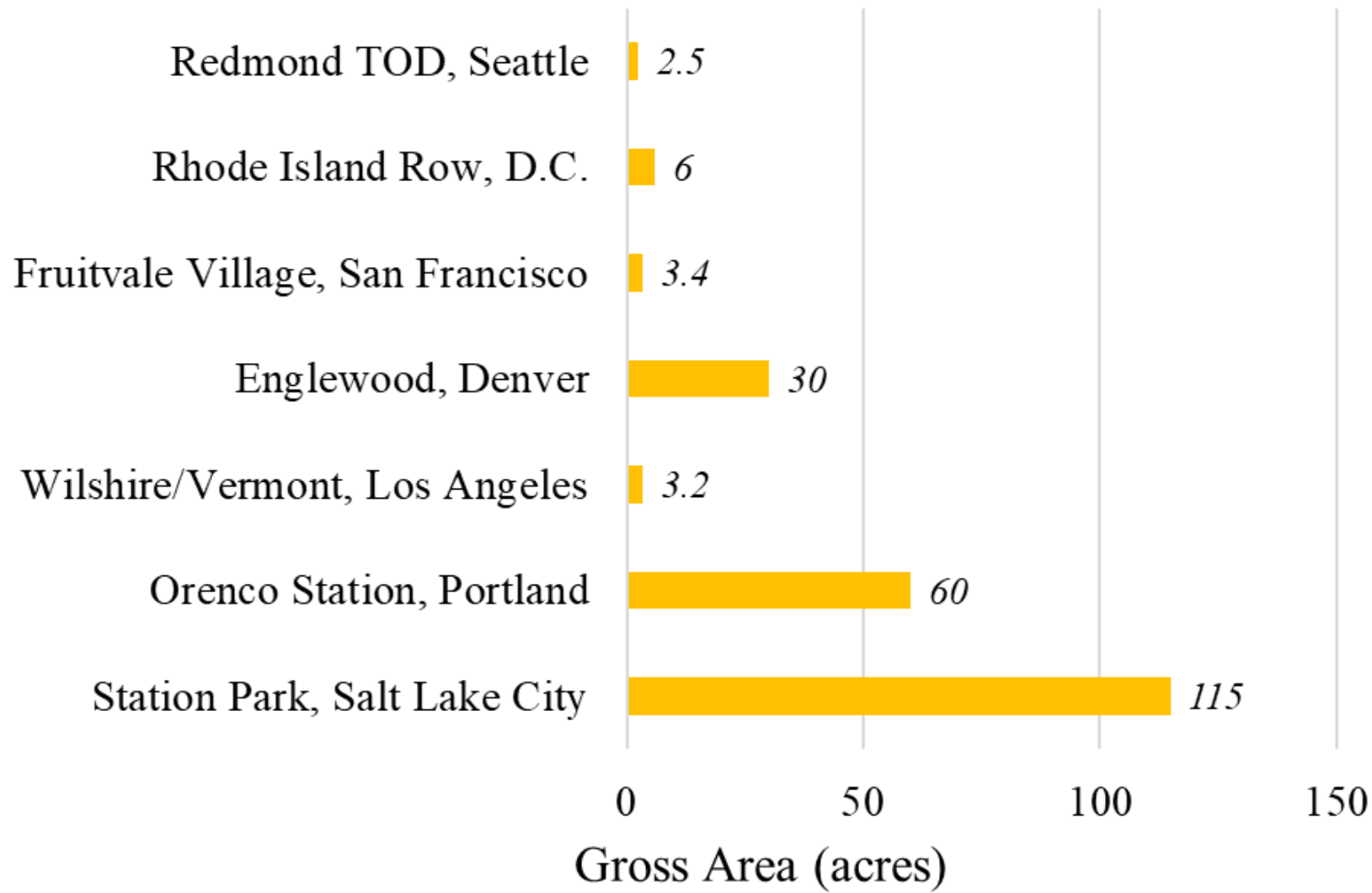
Comparative Case Studies: Trip and Parking Generation at TOD vs. TAD

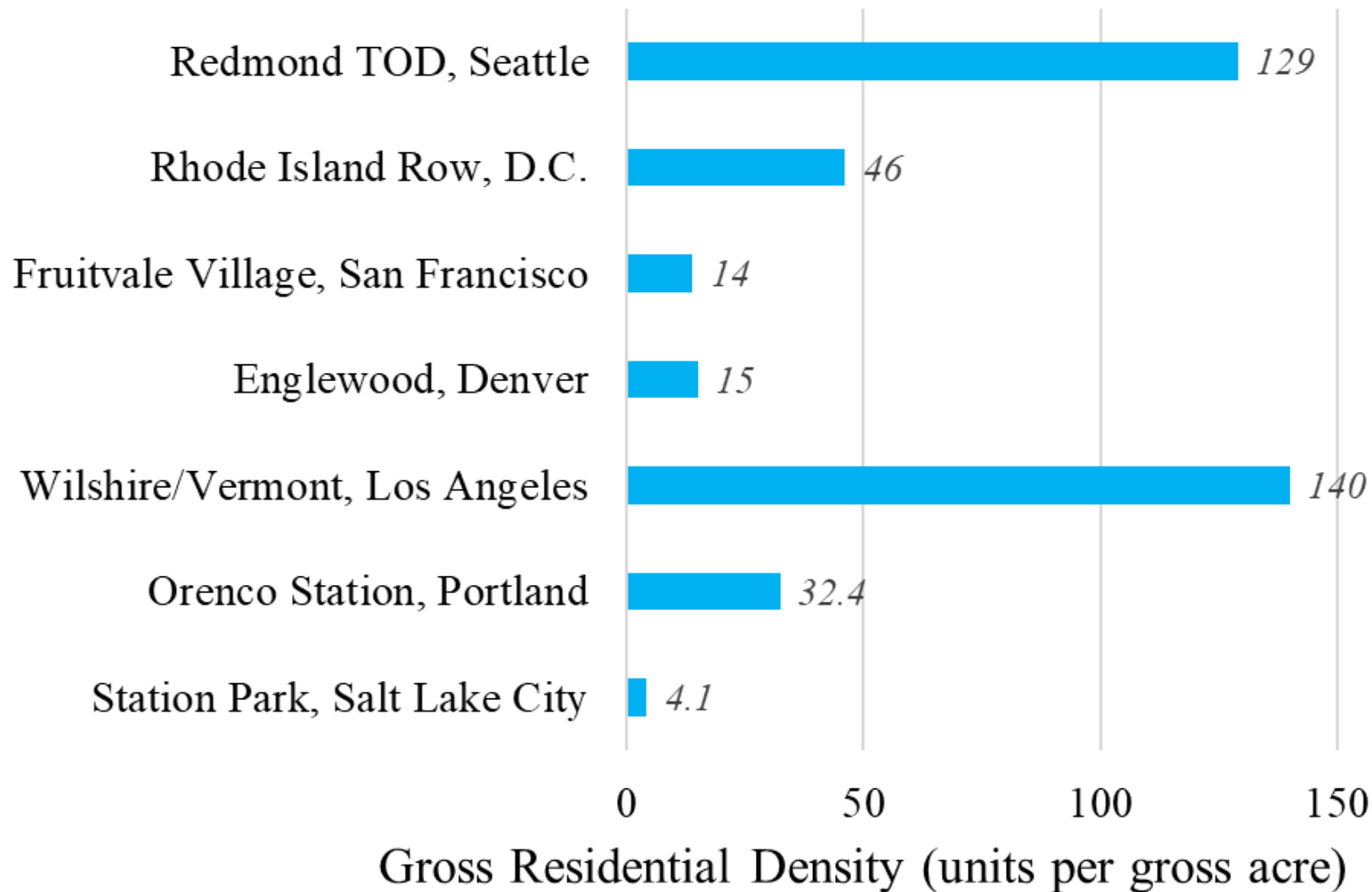
Orenco Station TOD, Portland Region

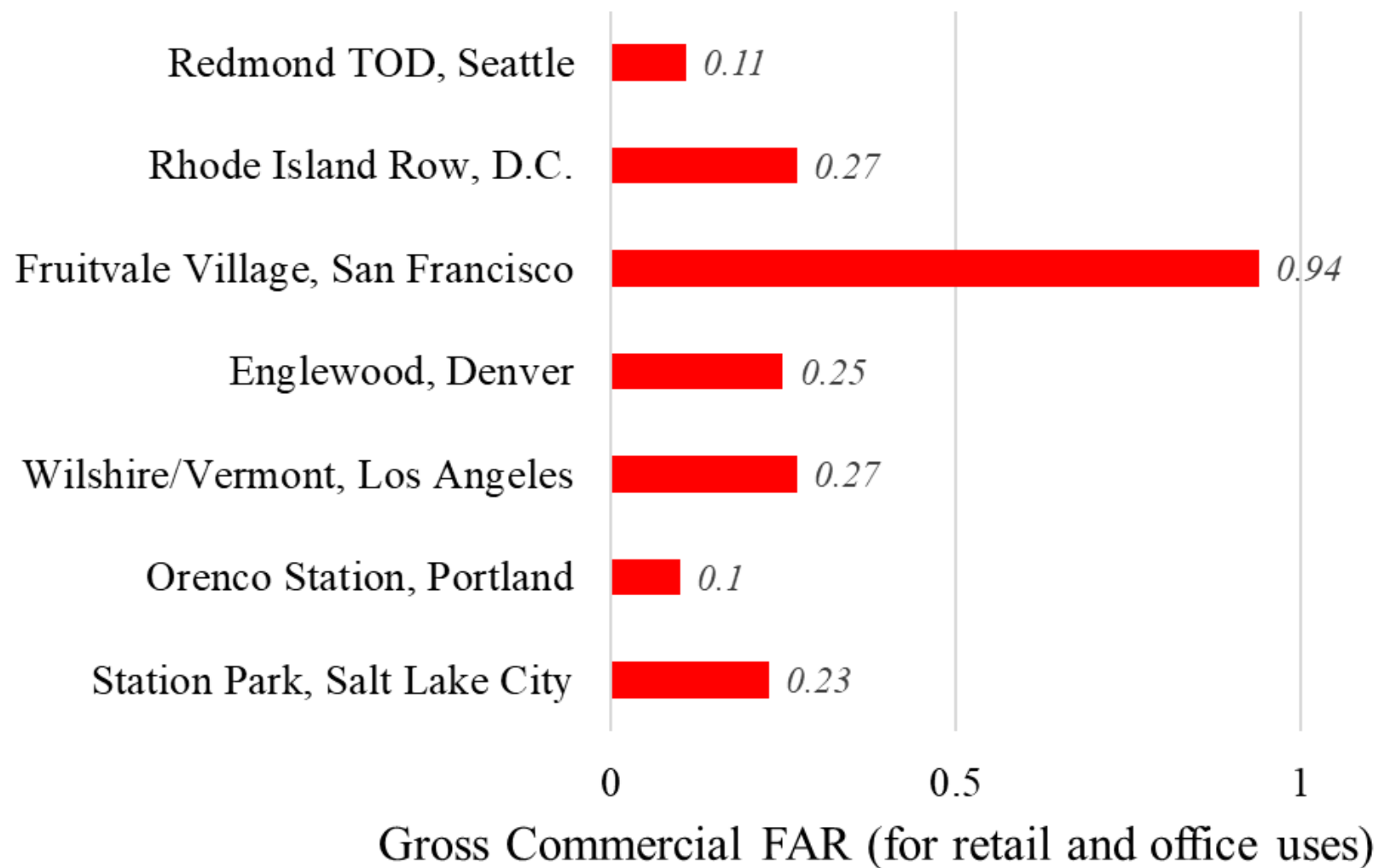


Station Park TAD, Salt Lake City Region







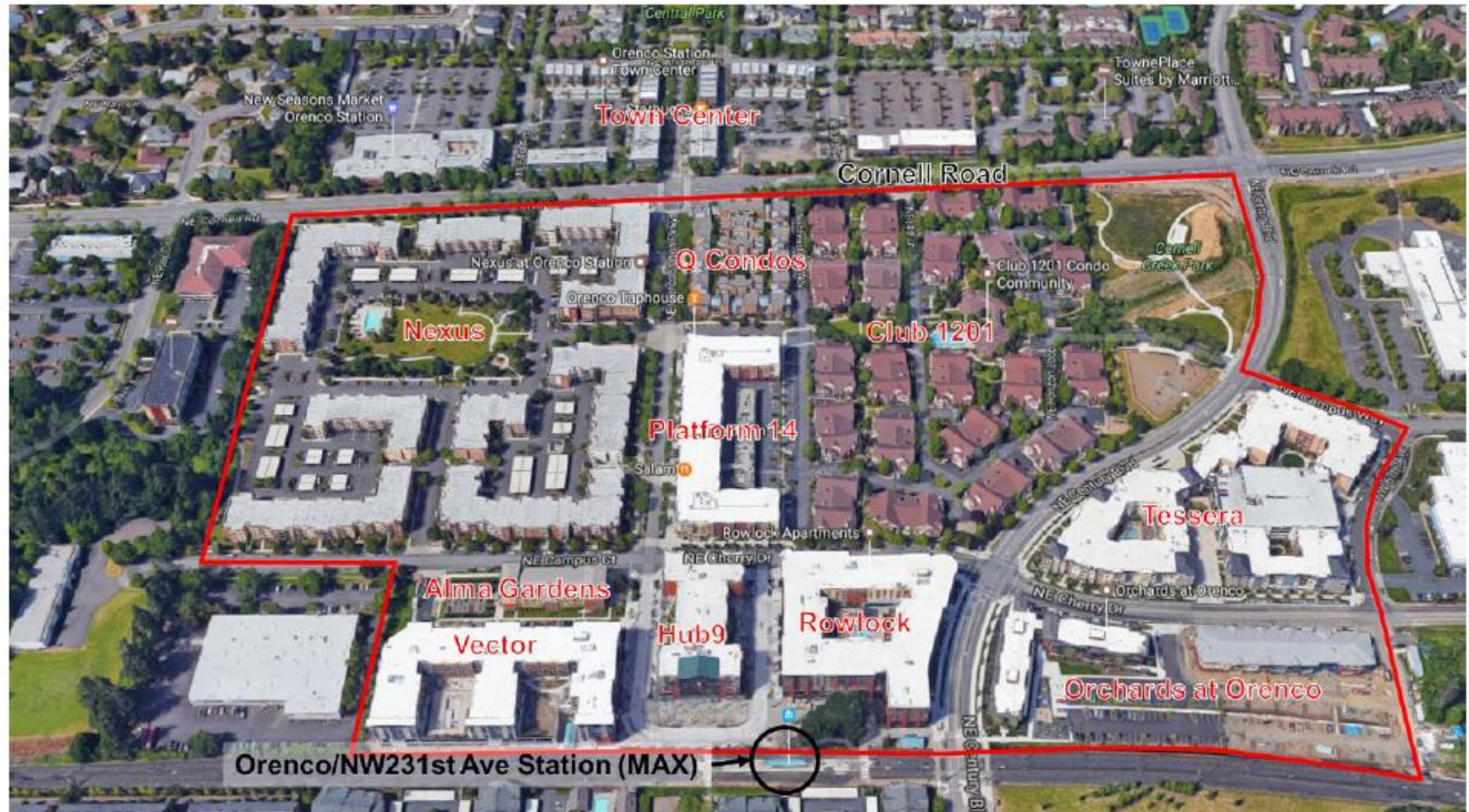


Data Collection

- ✓ **A count of all persons entering and exiting the buildings** – 7:30am to 9:00pm on a weekday in May 2017
- ✓ **Parking Occupancy Counts** – bi-hourly, total of 10 collections
- ✓ **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?
 - How many destinations are you visiting within the Development?



Orenco Station



Orenco History

THE TOWN OF OLD ORENCO

1907: Company Secretary/Treasurer Archibald McGill builds the first house in the town of Orenco. The 5,600-square foot Arts & Crafts-style structure is tucked away on a wooded estate but can be glimpsed from the MAX train. In 1912, company President Malcolm McDonald constructed an even larger home in the same style. This style carried forward into many of the workers' homes in Orenco, evident in the low-pitched roofs, wide eaves, exposed rafters and numerous multi-paned windows.

1908: The nursery company successfully lobbied the Oregon Electric Railway to construct its new connection from Portland to Forest Grove through nursery property instead of a more southerly route. Orenco Station was established just east of where the modern station lies, and served an important role in shipping nursery stock and transporting workers and commuters. Today, the MAX light rail line travels the same route.

1912: McDonald built his nearly 7,700 square foot Arts & Crafts style home on 90 acres at the eastern edge of Orenco (see map description 10).

1912: One hundred and twenty elms were planted, lining the streets of Orenco. The trees can be seen along Birch and Chestnut Streets, and 228th, 229th, and 230th Avenues. In 2013, the Orenco Elms were included in the Oregon Heritage Tree program administered by Oregon Travel Experience, a division of the Oregon Travel Information Council.

1913: Orenco is officially incorporated as a city and McDonald is elected mayor. The population was approximately 300-500 residents, many of whom were immigrants



MCGILL HOME, 1911



ORENCO TRAIN DEPOT, 1908

from Hungary. The city covered 640 acres and had all the amenities of a modern 1913 city, with a general dry goods store, two grocery stores, two churches, a barbershop with billiard tables, a drug store, a hotel, several boarding houses, hardware store, lumber yard, blacksmith shop, livery stable, ice cream parlor and a print shop. The city had no saloon; however the squatter's log house south of Orenco was known as a bootlegger's place. Of the original town, one church, the general store, the drug store and many original homes are still standing.¹

ELMS PLANTED IN ORENCO IN 1912 (BELOW) ARE PART OF THE OREGON HERITAGE TREE PROGRAM (BOTH PHOTOS LOOKING WEST ON BIRCH STREET)



The Orenco Nursery Company developed a highly versatile dessert and cider apple, the "Orenco apple."

Highly desirable for its flavor and high sugar content, the nursery planted one million Orenco apple trees in the 1910s with plans to export the apples to Europe. Onset of World War I derailed that plan, however, and the Oregon Nursery Company suffered severe economic setbacks as a result. The Orenco apple tree is still highly regarded for its resistance to disease, and is available from many heirloom fruit tree growers.



ORENCO'S MAIN (ALDER) STREET WITH DRUG STORE AND MERCANTILE

1914-1915: At its peak, Orenco was referred to as the Garden Spot of Washington County. By 1924, however, the nursery and town were in decline due largely to the depression and World War I.

1927: Oregon Nursery Company closed.

1938: The town of Orenco was officially dissolved.

¹ FROM ORENCO HERITAGE SERIES BOOK ONE, BY LOU HANBERG

Early Development



Platform District



More Recent Development



(a) Main Street Looking South Toward Cornell



(b) Platform 14 on Orenco Station Parkway



(c) Completed Hub 9 Viewed from Platform



(d) Vector on Former Park-and-Ride Lot

More Recent Development



(e) LRT with Rowlock in Background



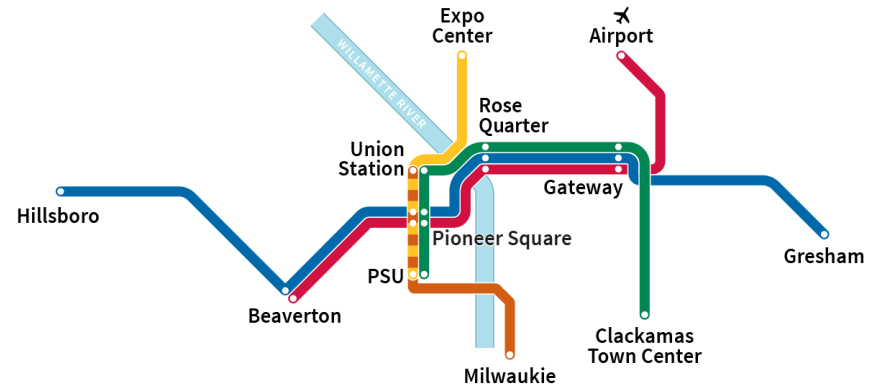
(f) Public Plaza at Edge of Station Platform

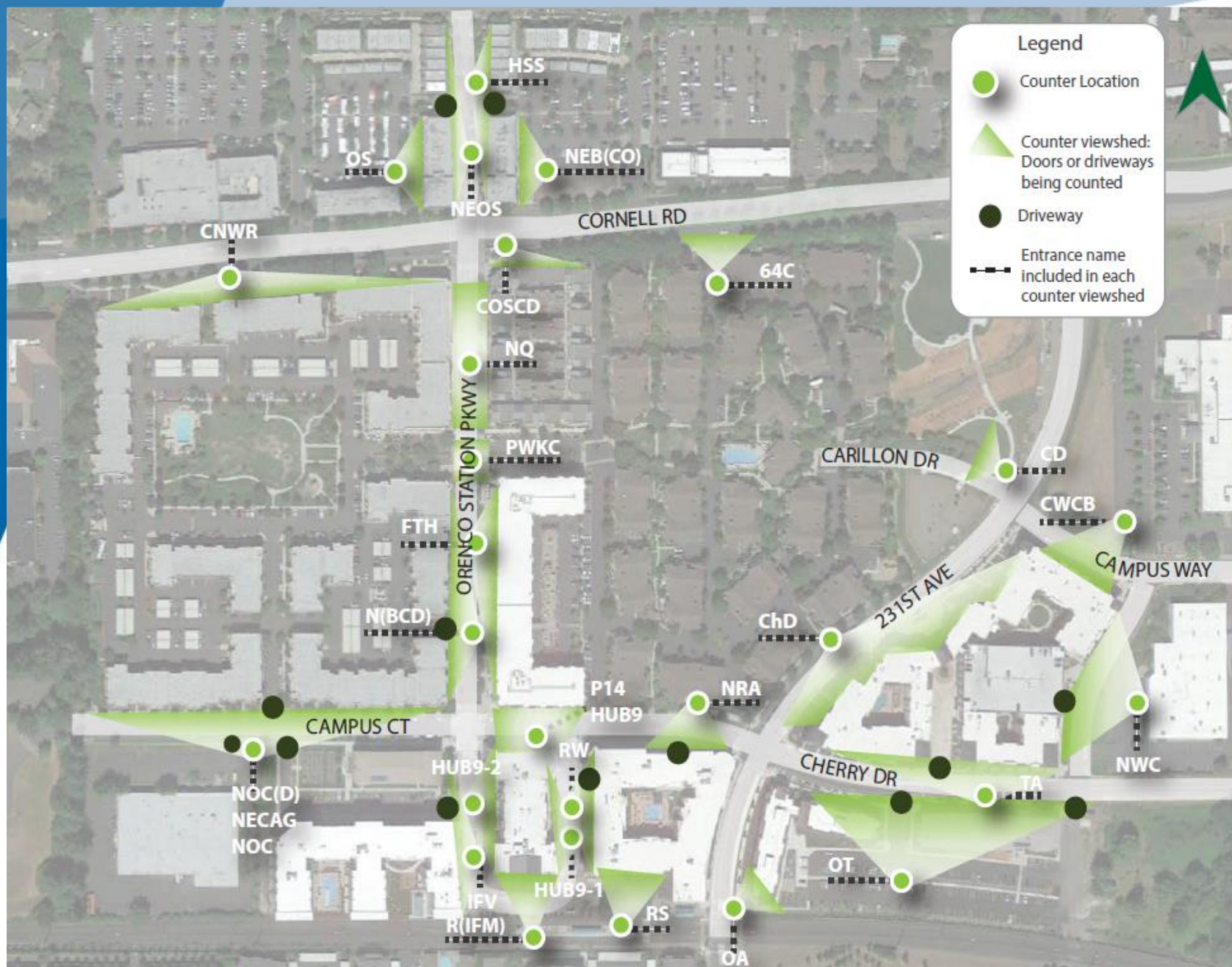


(f) Outdoor Dining at Edge of Plaza

Transit Connections

- Orenco Station is served by TriMet's light rail and a bus route
- 14th stop westbound on the Blue Line from Downtown Portland
- The Blue Line generally runs **every 10 minutes** between **5 am and 1 am**





Three Zones



Mode Shares

Table 2.3. Mode Shares in Orenco Station TOD

<i>Intercept survey</i>							
<i>Entrance</i>	<i>Count</i>	<i>Mode share (%)</i>					
		<i>Walk</i>	<i>Bike</i>	<i>Bus</i>	<i>Rail</i>	<i>Auto</i>	<i>Other</i>
Zone 1	361	43.5	1.7	5.3	21.1	28.0	0.6
Zone 2	247	56.7	2.4	1.6	14.6	24.3	0.4
Zone 3	41	19.5	4.9	7.3	7.3	61.0	0.0
<i>Trip generation counts</i>							
<i>Entrance</i>	<i>Count</i>	<i>Count for modes</i>					
		<i>Walk</i>	<i>Bike</i>	<i>Bus</i>	<i>Rail</i>	<i>Auto</i>	<i>Other</i>
Zone 1	5,998	2,609	100	316	1,263	1,678	33
Zone 2	7,096	4022	172	115	1034	1724	29
Zone 3	2,401	468	117	176	176	1,464	0
Final mode shares	15,495	45.8%	2.5%	3.9%	16.0%	31.4%	0.4%

Vehicle Trip Generation

Table 2.4. The Comparison of Daily Vehicle Trip Generation between ITE Guideline and Orengo Station TOD

	<i>Trip generation rate</i>	<i>Units (sq. ft.)</i>	<i>Total daily trips</i>
ITE guideline	-	-	10,859
<u>Orengo</u> Station TOD	-	-	6,358

*Where only peak hour trip generation rates are available from ITE, and no close analogous land use is available, we assumed a default ratio of daily to peak hour trips of 10.

**Absent guidance from ITE, and assuming that drinking establishments have a lower daily to peak hour ratio than restaurants, we assumed a ratio of 8.0.

LESSONS FOR TRAVEL BEHAVIOR

- Less than 60% of trips predicted by ITE
- High transit mode share near LRT (inverse with auto share)
- High walking share near jobs
- High bicycle share in Platform District

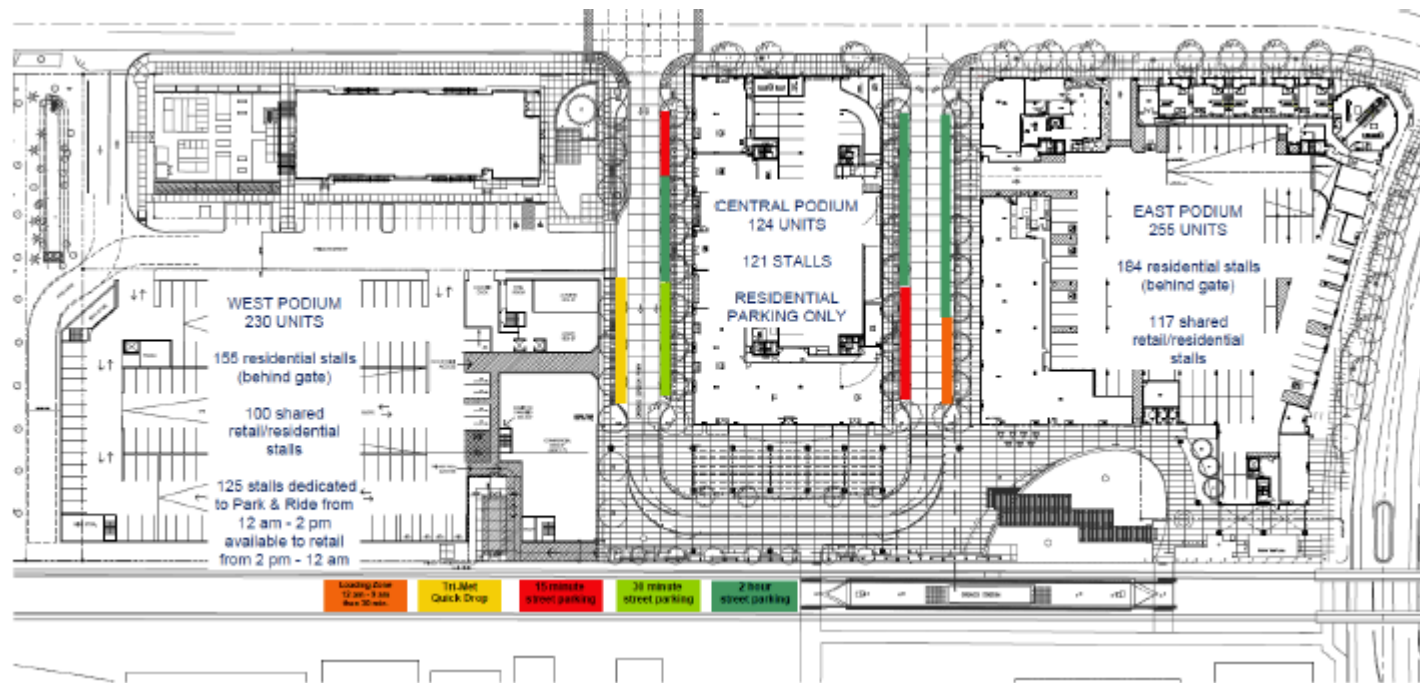


Parking Generation

Table 2.5. Comparison of Residential Parking Supply and Demand between Orenco Station TOD and ITE Guidelines¹

<i>Residential</i>				
	<i>Supply</i>		<i>Peak period demand (occupied unit only)</i>	
	<i>Parking spaces per unit</i>	<i>Total parking spaces</i>	<i>Vehicles per unit</i>	<i>Total parked vehicles</i>
ITE guideline: 221 Low/Mid-Rise Apartment	1.4	1,488	1.20	731
Platform 14	0.60	107	0.46	77
Tessera	1.25	381	0.73	207
Orchards I & II	1.31	151	0.76	86
Nexus	1.27	535	-	-
Alma Gardens	1.22	55	1.09	49
ITE guideline: 222 High- Rise Apartment	2.0	1,218	1.37	749
Hub 9	0.98	121	0.67	77
Rowlock ²	0.72	184	0.51	122
Vector ³	0.67	155	0.40	77
ITE guideline: 230 Condominium	1.4	381	1.38	290
Club 1201	1.39	291	0.79	165
Q Condos	1.90	118	-	-
ITE guideline	1.59	3,087	1.30	1,770
Orenco Station TOD	1.08	2,098	0.63	860

Platform District Parking



Parking Space Occupancy

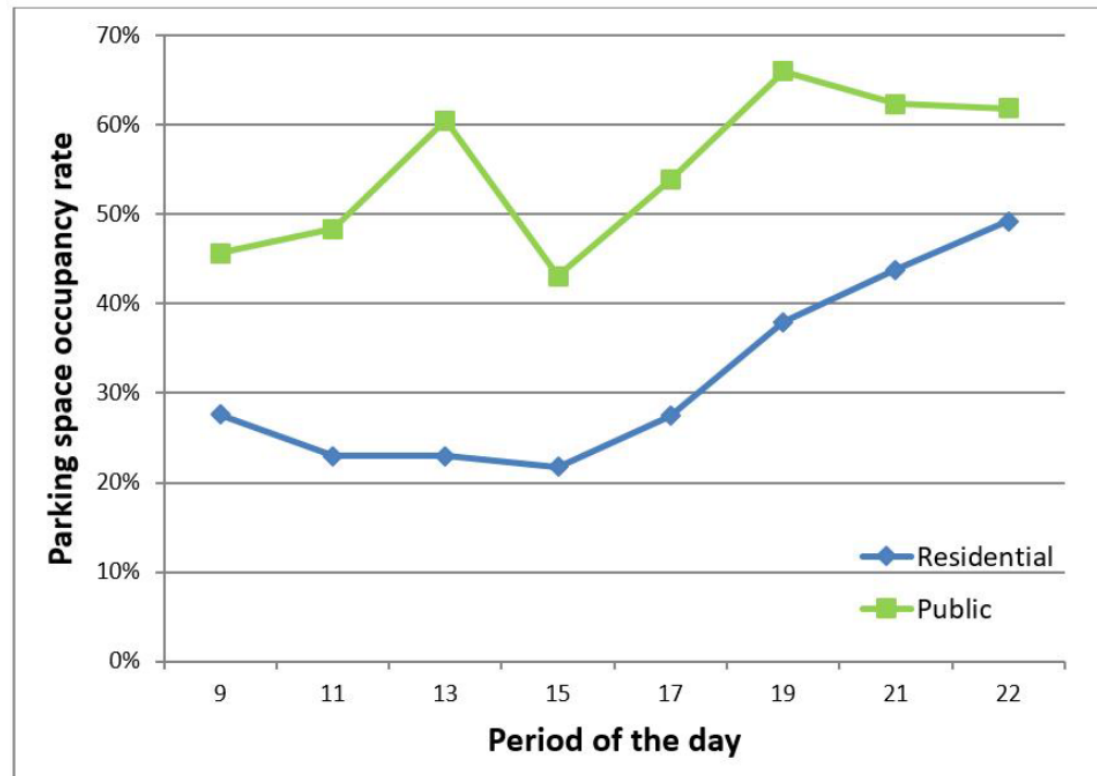


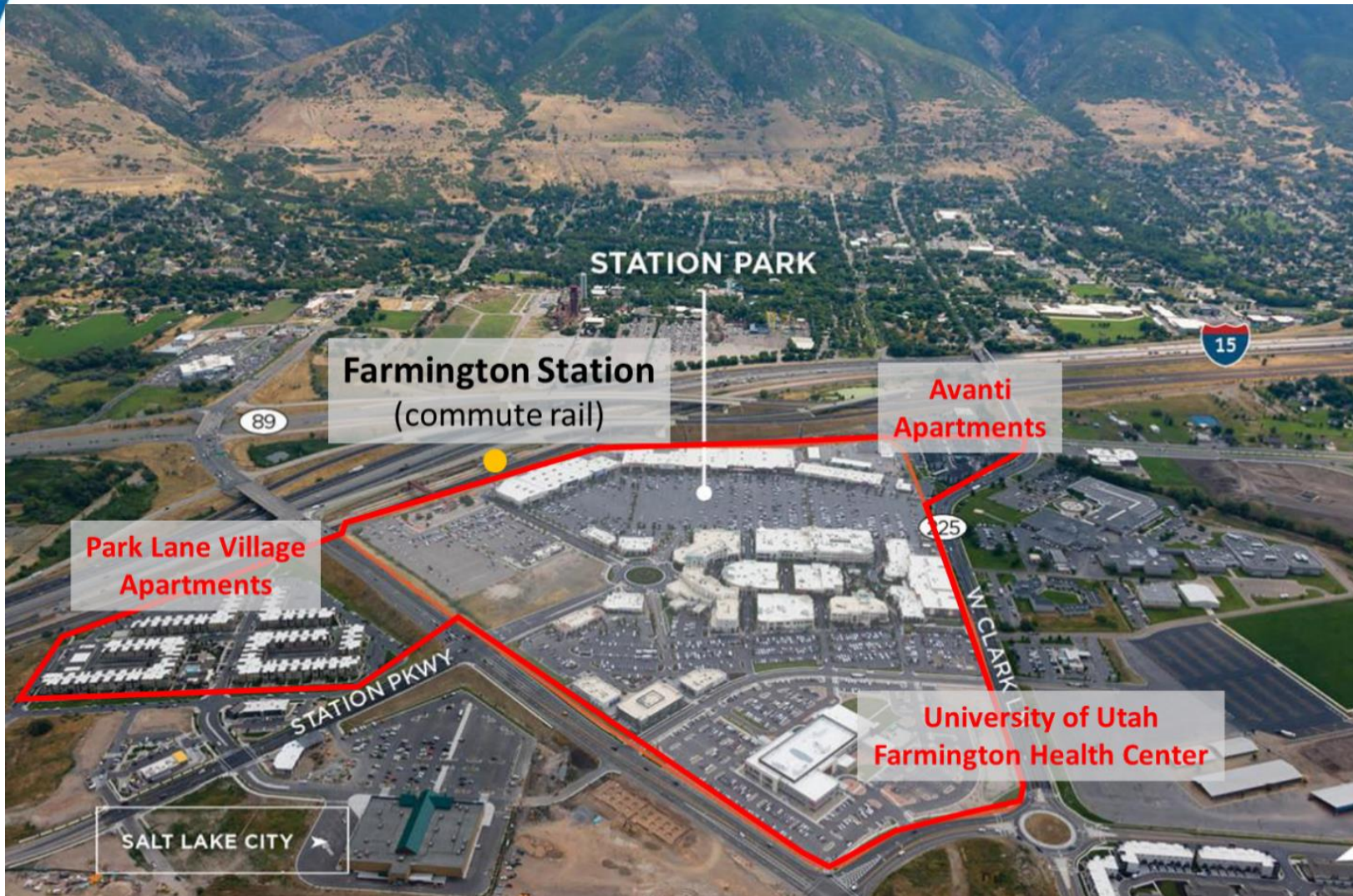
Figure 2.10. Parking Space Occupancy Rate for Different Uses at Orenco Station TOD

LESSONS FOR PARKING

- Parking ratios are low compared to ITE recommendations
- Peak occupancy rates are still only 65% of supply
- **Parking is oversupplied**



Station Park TAD





Big Box Store Turning its Back on the Commuter Rail Station

Station Park Parking Lots



Early History

- Farmington and the original owner's design **was based on a TOD** template from UTA
- **After the recession and under pressure from tenants**, the site plan subsequently morphed into what it is today, the eastern portion consisting of **a big-box power center**



More Recent Development

- Station Park was anchored by a Harmons grocery store and a Cinemark movie theater
- Park Lane Village Apartments (324 units) was completed in 2012
- In August 2016, a 108-room Hyatt Place hotel opened with a 35,000 sq. ft. of commercial space



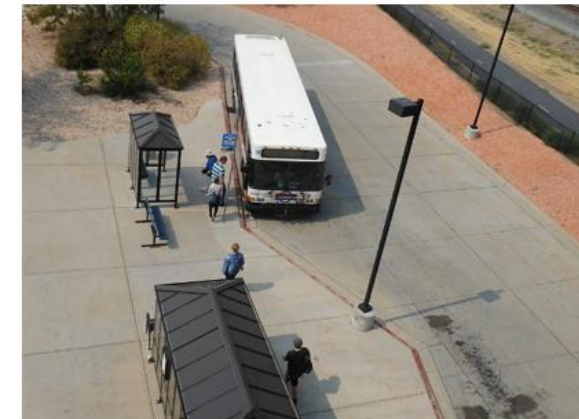
(a) Village Core with Hotel in Background



(b) Fountain Square with Theater in Background



(c) Park-and-Ride with Station in Background



(d) Bus Transfer Area from Rail Overpass

- In October 2016, University of Utah Farmington Health Center opened on the far west side of the development (136,000 sq. ft. facility/ 60 providers & 150 staff)



(e) Big-Box Supermarket as Anchor



(f) New Avanti Apartments in Background

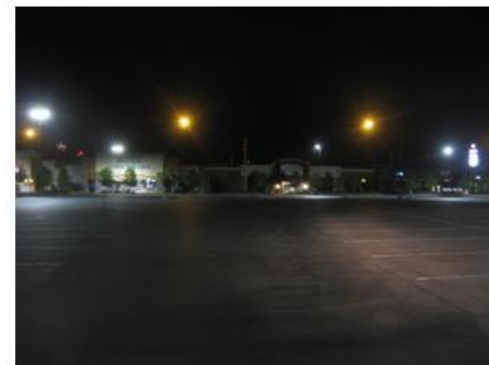


(g) Access from Park Lane Apts to Station



(h) Underutilized Parking at Midday

- Most recently, an apartment development, Avanti at Farmington Station, went up nearly adjacent to Station Park.



(i) Empty Parking at Night

Public Space



Figure 3.3. A Free Concert in Fountain Square (CenterCal)

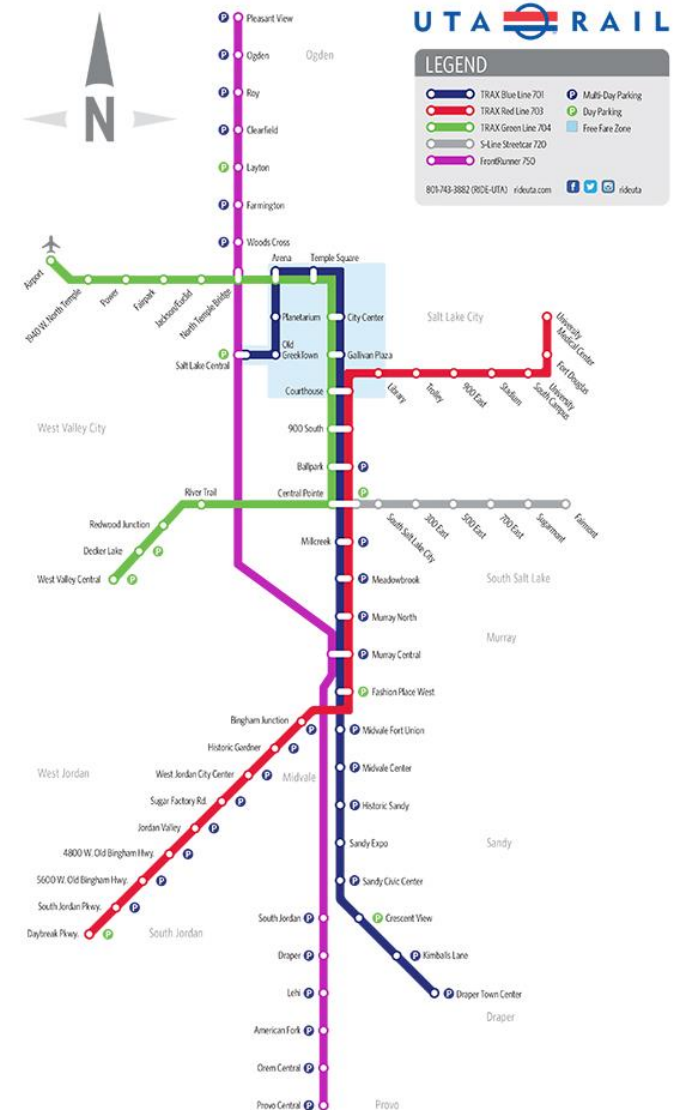
Future Development



Figure 3.6. More Residential, Retail, and Office Development Proposed Northwest of Station Park
(Source: <http://www.parklanecommons.com/>)

Transit Connection

- The site is served by UTA's commuter rail, FrontRunner, and four bus routes. The station has a free park-and-ride lot with about 840 parking spaces available.
- A bus rapid transit (BRT) line is proposed from the suburban community of Bountiful to downtown Farmington and ultimately to Station Park.





Development Summary

<i>Land uses</i>	<i>Description</i>	<i>Square feet / Unit</i>	<i>Occupancy*</i>
<i>Commercial</i>			
Farmington Health Center	University of Utah Health Farmington; Moran Eye Center – Station Park	136,000 sq. ft.	100%
Vista Outdoor	Building X	35,194 sq. ft.	100%
Hyatt Place	Hotel, 108 rooms	80,000 sq. ft.	100%
Offices	Buildings B, C, E, F, and J	146,944 sq. ft.	100%
Retail	Buildings A, B, C, D, E, F, G, H, J, J upper, K, KA, L, OV, S, U, 1005-1080, 1095-1160, 1180, Q, W	752,002 sq. ft.	85%
<i>Residential</i>			
Avanti	built in 2016, four-story apartments	142 units	100%
Park Lane Village	built in 2012, three-story apartments	324 units	95%
<i>Parking</i>	<i>Description</i>	<i>Unit</i>	<i>Occupancy**</i>
Avanti	Garage, surface parking and on-street parking	82	90.2%
Park Lane Village	Surface parking and on-street parking	444	81.5%
Shared parking	Surface parking for all users	4,348	42.5
Park-and-ride	Park-and-ride for transit	840	34.9%

* On May 9, 201

**The peak occupancy on May 9, 2017

Mode Shares

<i>Intercept survey</i>							
<i>Entrance</i>	<i>Count</i>	<i>Mode share (%)</i>					
		<i>Walk</i>	<i>Bike</i>	<i>Bus</i>	<i>Rail</i>	<i>Auto</i>	<i>Other</i>
Circle	143	2.1%	1.4%	0.0%	2.1%	93.7%	0.7%
East Lot / Harmons	141	5.7%	0.7%	1.4%	3.5%	87.2%	1.4%
NW Retail / U health	157	0.0%	1.3%	1.9%	0.6%	96.2%	0.0%
Train Station	145	16.4%	0.9%	9.5%	39.1%	34.1%	0.0%
Avanti	23	12.6%	4.5%	0.0%	0.0%	82.8%	12.6%
Park Lane Village	52	7.2%	1.9%	0.0%	0.6%	90.3%	7.2%
<i>Trip generation counts</i>							
<i>Entrance</i>	<i>Count</i>	<i>Count for modes</i>					
		<i>Walk</i>	<i>Bike</i>	<i>Bus</i>	<i>Rail</i>	<i>Auto</i>	<i>Other</i>
Circle	16,651	349	233	0	349	15,603	116
East Lot / Harmons	10,454	593	74	148	371	9,119	148
NW Retail / U health	10,439	0	133	199	66	10,040	0
Train Station	2,413	395	22	230	943	823	0
Avanti	443	56	20	0	0	367	0
Park Lane Village	1,772	128	34	0	10	1,600	0
Final mode shares	42,172	3.6%	1.2%	1.4%	4.1%	89.0%	0.6%

Vehicle Trip Generation

Table 3.3. The Comparison of Daily Vehicle Trip Generation between ITE Guideline and Station Park TAD

	<i>Trip generation rate</i>	<i>Total units</i>	<i>Total daily trips</i>
<i>Residential</i>			
ITE guideline	-	-	1,939
223 Mid-Rise Apartment	4.31	450	1,939
Station Park TAD	-	-	1,515
<i>Commercial</i>			
ITE guideline	-	-	39,138
630 Clinic	31.45	136,000	4,277
715 Single Tenant Office Building	11.65	35,194	410
310 Hotel	8.17*	108	882
820 Shopping Center	42.70	786,146	33568
Station Park TAD	-	-	29,177

* per room

Parking Generation

Table 3.4. Comparison of Parking Supply and Demand between Station Park TAD and ITE Guidelines

<i>Residential</i>				
	<i>Supply</i>		<i>Peak period demand (occupied space only)</i>	
	<i>Parking spaces per unit</i>	<i>Total parking spaces</i>	<i>Vehicles per unit</i>	<i>Total parked vehicles</i>
ITE guideline: 221 Low/Mid-Rise Apartment	1.4	652	1.20	540
Station Park TAD	1.13	526	0.97	436
<i>Commercial</i>				
	<i>Supply</i>		<i>Peak period demand (occupied space only)</i>	
	<i>Parking spaces per 1,000 sq. ft. GFA</i>	<i>Total parking spaces</i>	<i>Vehicle per unit or 1,000 sq. ft. GFA</i>	<i>Total parked vehicles</i>
ITE guideline	-	5,004	-	2,572
630 Clinic	6.4	870	4.94	672
701 Office Building	4	141	2.84	100
310 Hotel	1.3*	140	0.89	96
820 Shopping Center**	4.9	3,852	2.55	1,704
Station Park TAD	-	4,348	-	1,848

* Per room

**Parking supply ratio for community shopping center is used. Average peak period parking demand on a non-Friday weekday (non-December) is used.

Parking Space Occupancy

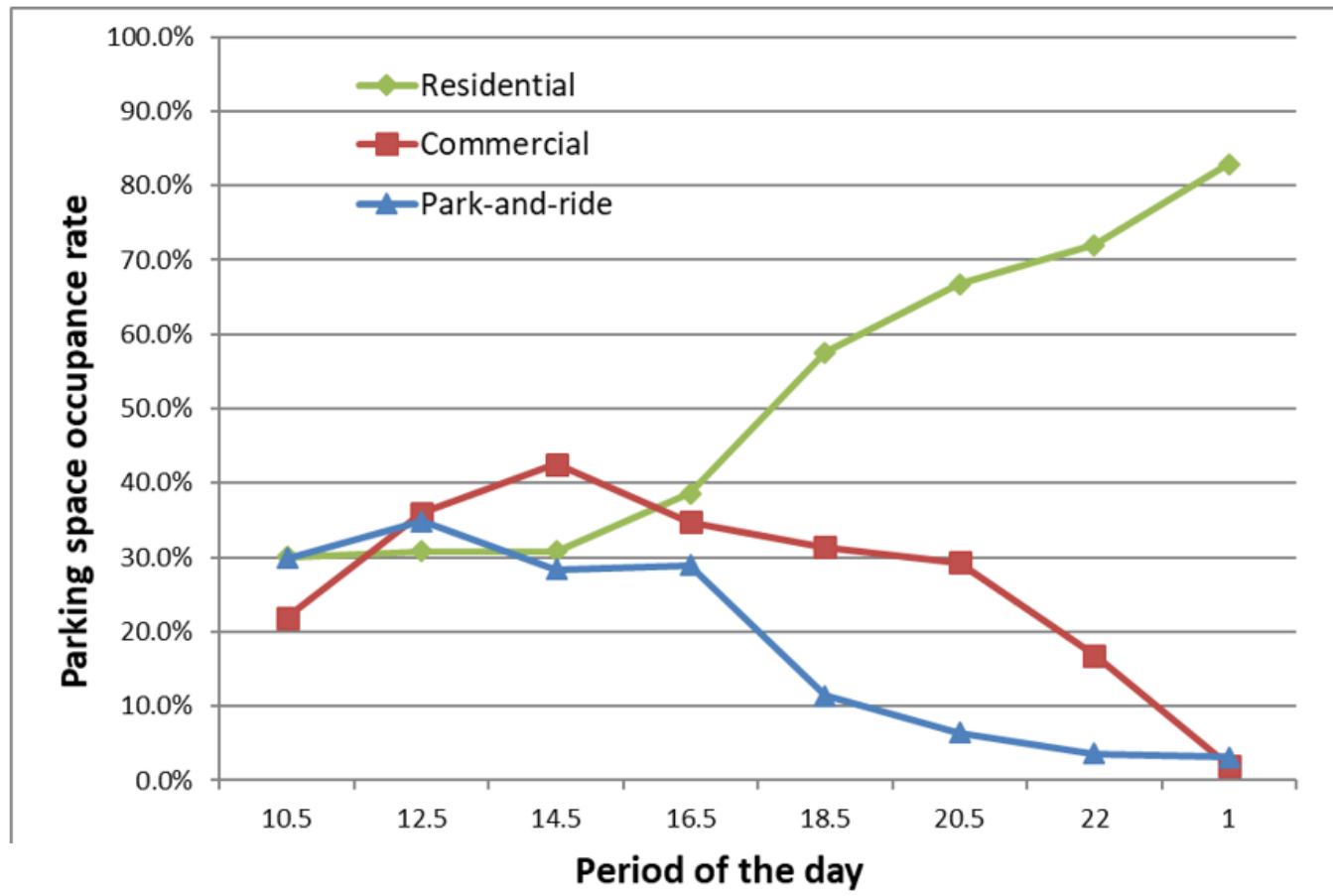


Figure 3.9. Parking Space Occupancy Rate for Different Uses at Station Park TAD

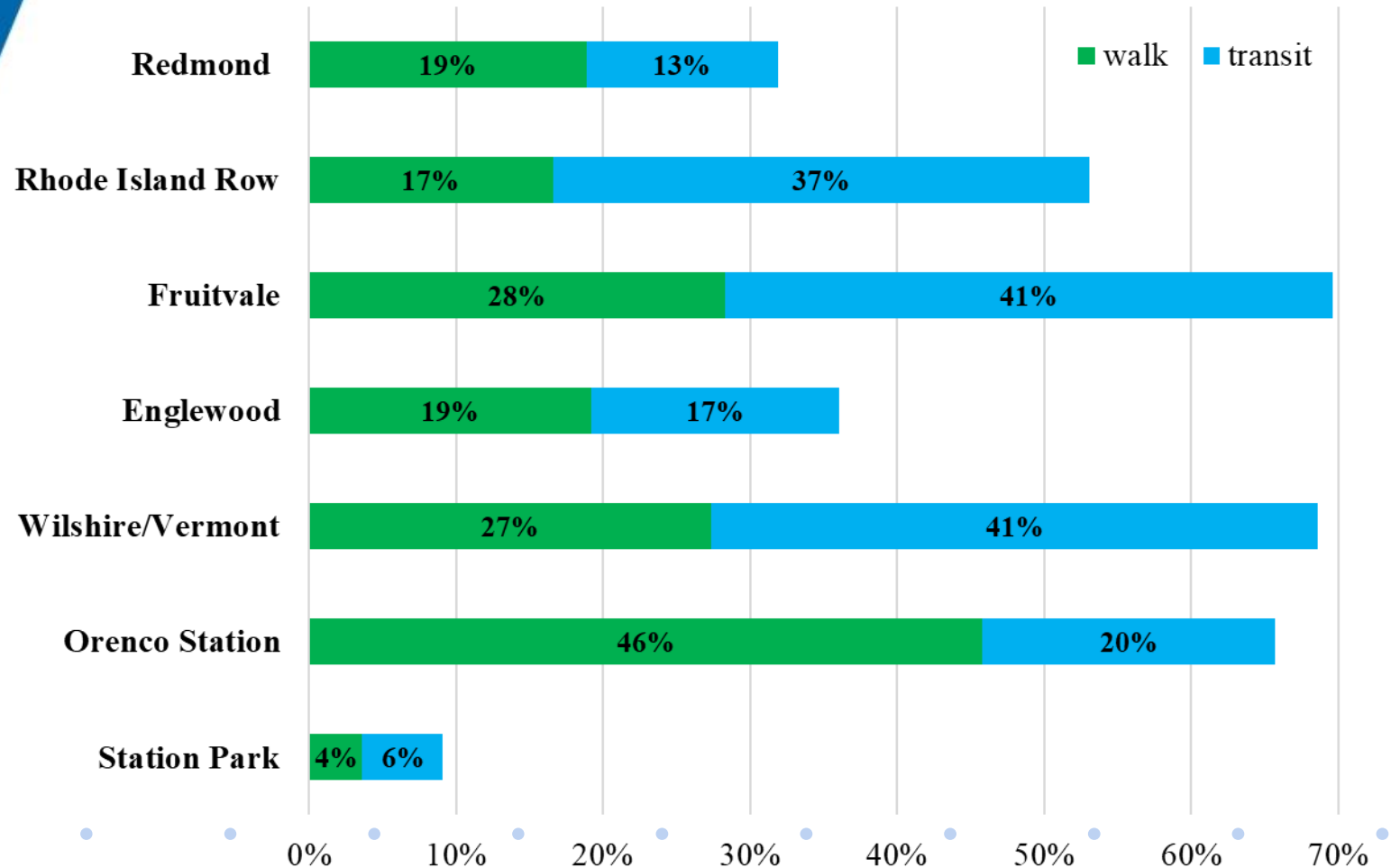
Station Park TAD

- Does not have as deep discounts of vehicle trip and parking generation as the other TODs
- Vehicle trip generation rates are about **three-quarters** what is predicted in the ITE guidelines, due to the mixed-use nature of Station Park
- The results show that **40 percent** of visitors to Station Park have **more than one destination** within the development; the average number of stops is **1.95**, or almost two

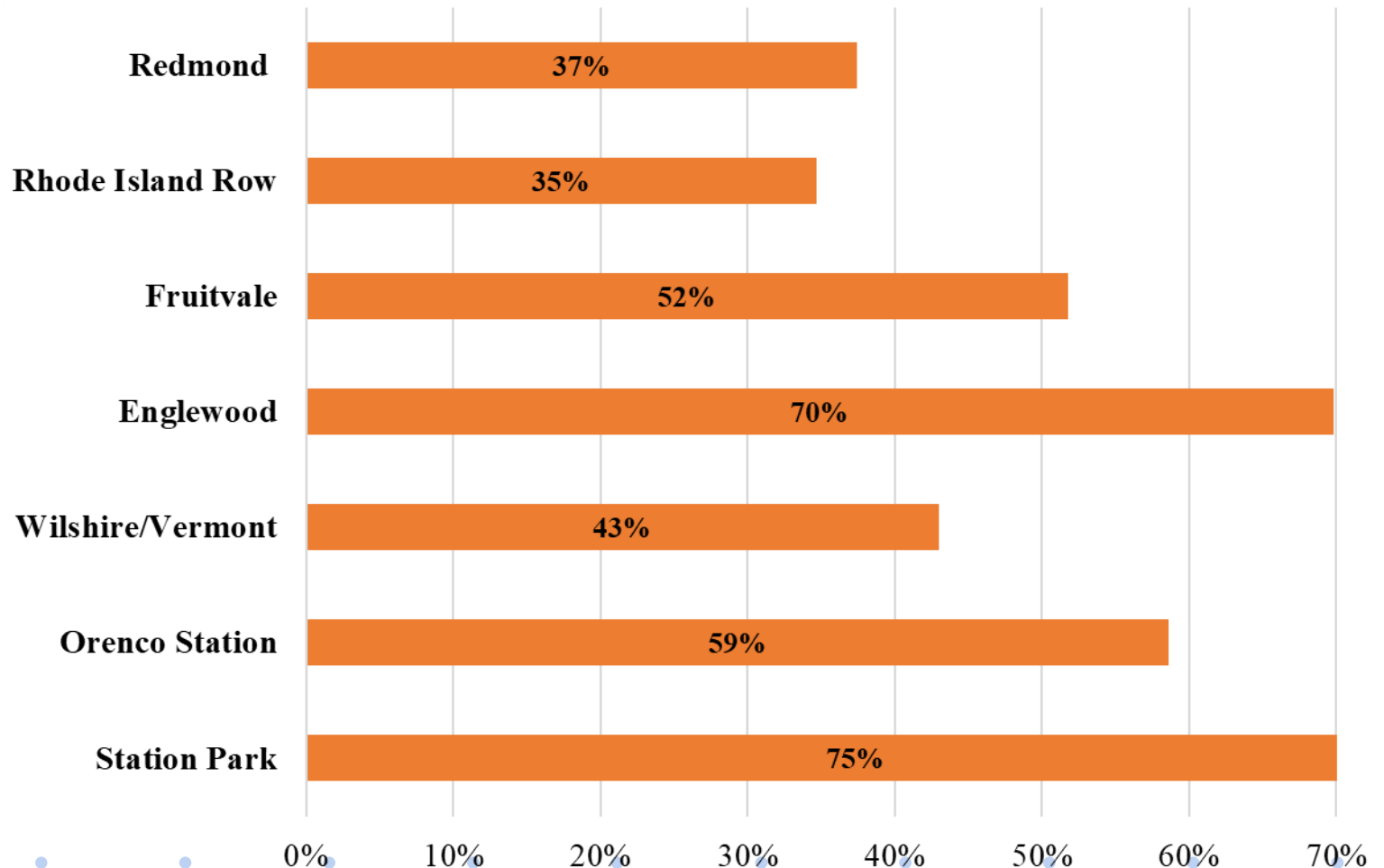


Summary Across Seven Sites

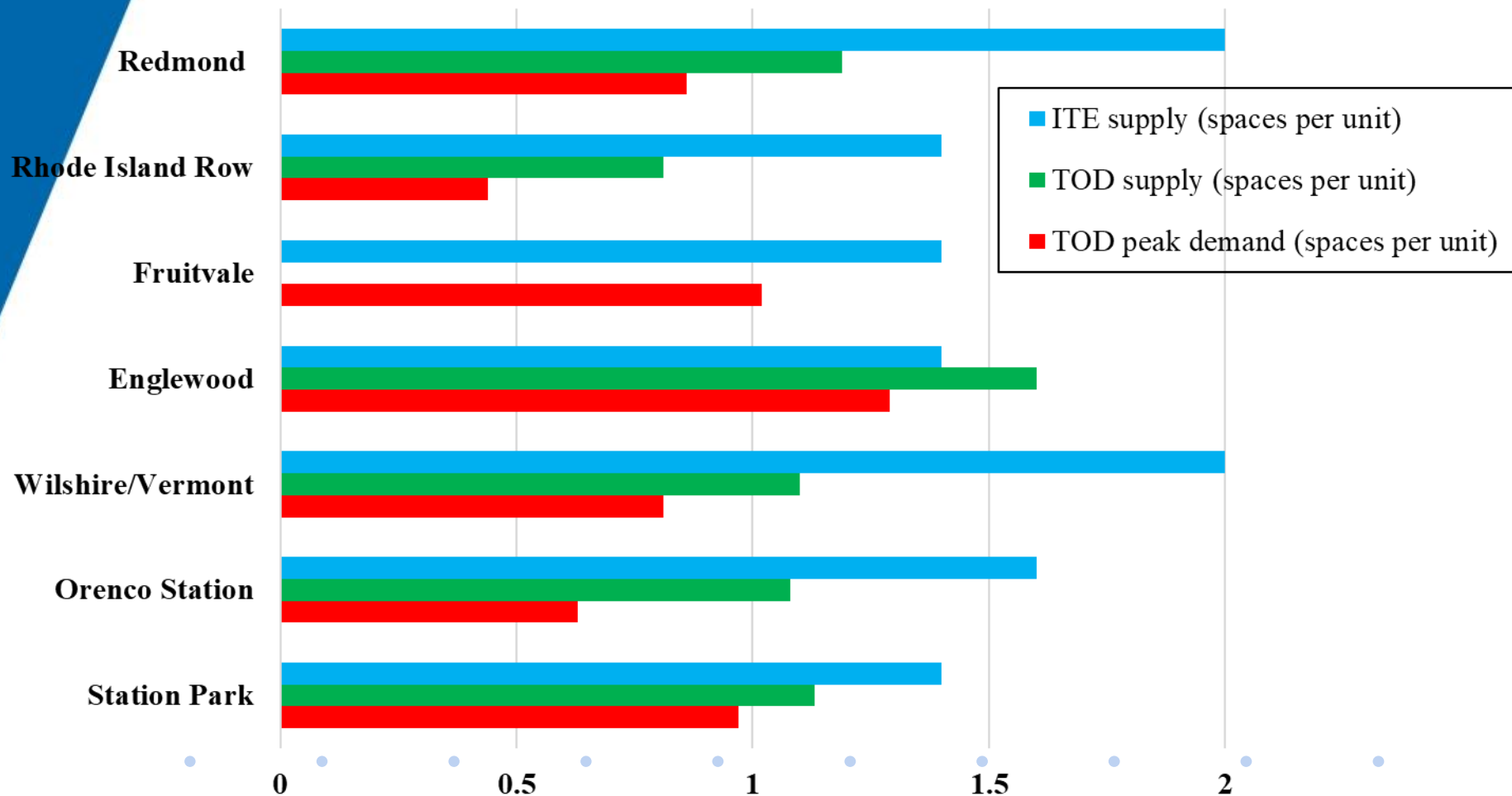
Mode share



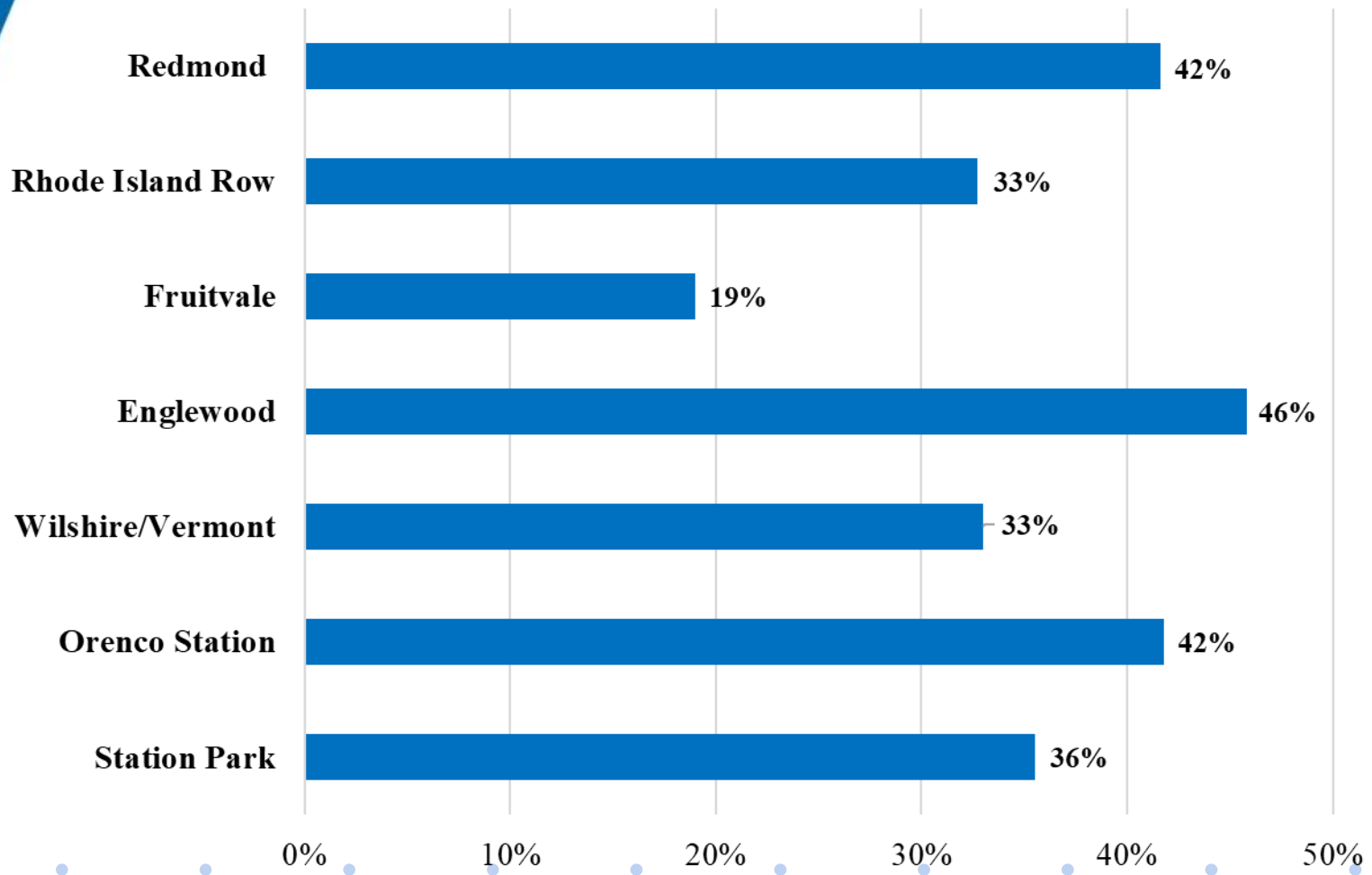
Vehicle Trips as % of ITE Trip Generation



Residential Parking Supplies and Demands



Peak Parking Demand as % of ITE Guideline



Parking Policies

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



Cost of Parking at Redmond TOD

- \$8.0 million as built
- \$2.0 million unused
- \$14 million if built to ITE standards
- \$8 million unused





Thank you !

