

South Bay Transportation Performance Study

**Technical Report 3
Case Studies/Performance**

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Technical Report 3

Case Studies/Performance Report

This is the third of three reports that supplement the updated “guidelines” – The Sustainable South Bay Strategy. Technical Report 2 described the findings of the regression analysis. Regression looks at patterns over many variables in order to identify statistically significant relationships. This report compares the study areas and their rankings along several dimensions as another way to gain insights into their transportation performance, although not statistically significant.

This research project has focused on the underlying travel dynamics that generate the VMT in a neighborhood rather than on large area aggregate travel data. This approach makes it possible to analyze and evaluate the various ways in which the built environment actually affects VMT, and to identify other sources of significant influence on VMT. The work, in other words, is attempting to shed light directly on the *transportation performance* of the *built environment*.

Comparative Analysis of Study Area Transportation Performance

This begins with a description of 6 ways of measuring performance in the context of comparing centers with corridors and contrasting the inner core with the outer ring. Density is of course the next most important consideration. Conventional wisdom suggests that centers will outperform corridors, inner locations will outperform outer areas, and the most dense study areas will outperform the least dense areas.

Six Performance Measures Defined

The research developed the data collected into seven measures of performance.

1. Center trip capture rate

One way for trips to be as short as possible is for the nearest commercial centers to serve as the primary destination for many residents most of the time. In other words, successful reduction of VMT will occur when each commercial center captures a high percentage of the trips taken by adjacent residents.

By measuring the trip capture rates we will be able to tell the extent to which that is happening in the South Bay study areas. Some areas will do better than others so the next question is whether we will be able to identify the factors that create high capture rates. (Regression analysis was used to identify which center characteristics have a significant impact on center capture rate.)

Trip capture rate is measured in this study with two metrics;

- Average capture rate per center
- Threshold capture rates-- at 20, 50 and 80 per center (plus graphs)

2. Mode to Center

Walk-able neighborhoods are considered by planners to be the best places to live. However, the idea of walk-able obscures the difference between walking from home to center and walking around the center after arrival. Mode to center measures the extent to which residents walk, drive cycle or take transit to their nearby commercial center.

To the extent that proximity is a factor, walking distances up to ½ mile to the center should result in a high rate of walking for those trips in which the local center is the destination. This allows an analysis of the places where walk-able distances are actually walked. .

3. Census travel data

If density is a significant factor in reducing VMT/person, then relatively dense mixed-use centers should cause secondary travel measurements to be relatively low compared to less dense centers.

- Vehicles per HH – (not correlated with income)
- Time to work (Census) – (correlated with income)
- Mode to work (drive SOV, public transit) – (correlated with income)

4. Travel destinations: frequency, distance and mode

The survey asked residents to estimate the frequency of travel, distance traveled (In categories) and mode of travel for 7 types of destination, e.g., food shopping, eating at a restaurant, etc. Good transportation performance would mean the most frequent trips are either walked or driven for a very short distance.

5. Employee travel behavior

The study also collected data on the residential location and travel behavior of the employees from a few selected employers in each study area. . Ideally, employees will live close to their workplace and walk rather than drive to work. This is not a statistically significant sample of employees so the results are anecdotal. Nevertheless, it is interesting to see whether the best performing centers in the other dimensions also compare well in this one. We looked at two dimensions – distance and mode – and then compared the number of responses to the total number of employees in that study center.

- Estimated distance to work
- Estimated travel mode to work in the center
- Total number of employees for magnitude (from InfoUSA)

6. Visitor travel behavior

Visitors were randomly approached on the streets in each study center and asked a few questions such as where do you live, how did you get here and why are you visiting. Good performance would be having a nearby residential origin and a non-automotive mode of access. As with the employee survey, the visitor survey is anecdotal and not statistically significant.

- Estimated distance from home
- Estimated travel mode to the center

Technical Report #2, the Regression Report, contains a number of detailed, nuanced findings. In summary, regression found that:

Centers performed better than corridors in that there were significantly more walking trips per household per day, but not fewer driving trips.

Centers have shorter trips for six of the seven trip types surveyed, the journey to school being the exception. Shorter trip lengths tend to induce more trips and more walking trips.

The density of business establishments is the most effective predictor of walking trips per household per day and of trip capture rate by the commercial district in each study area.

Housing density, block size, and residential street pattern were not significantly linked to any transportation performance measures.

Center Capture Rate

One of the basic research questions is whether or not mixed-use centers have better transportation performance than mixed-use corridors.

Average capture rate per center

Is there a difference between the average capture rate of the centers VS the corridors?

1) All Study Areas

As expected, compact centers generally have a higher capture rate than suburban arterials. However, this is not a clear superiority where all centers would be higher than all corridors.

El Segundo is the center with the 3rd lowest average capture rate and PCH intersection has the 3rd highest where the expectation would be that their ranking would be reversed from what it is.

Unexpected patterns like that will be tracked through all the performance measures and the characteristics in order to find insights into the transportation performance of the South Bay urban form.

2) All study areas with corridors in terms of intersections

By breaking the arterial corridors into three intersections each and re-ranking with the centers, nothing changes at the top or the bottom of the list. Hawthorne's 3 intersections are remarkably similar, meaning that the average capture rate is relatively homogeneous along the length of the 1 mile corridor.

In contrast, the average capture rate of both Artesia and Gardena vary significantly along the one mile corridors.

3) All Study Areas – Inner Core and Outer Ring

If proximity is an important factor in visiting a commercial area, then average capture rates should be higher among inner core than outer ring residents. This would be most dramatically observed in the Inglewood study area except that the inner core sample size was quite low and is considered somewhat unreliable.

The next highest inner core trip capture rates belong to Old Torrance and Riviera Village where, in both cases, but there is virtually no difference between the inner core and outer ring.

The next two, Hawthorne and El Segundo, have slight differences between inner and outer with the oddity that outer-Hawthorne actually has a slightly higher average capture rate than its inner core.

However, the most interesting comparison occurs at the lower end where there is a substantially higher capture rate in the inner areas over the corresponding outer areas.

This suggests where the draw of the center is great (whatever factors determine that), the propensity to visit there does not diminish much with distance, at least from between $\frac{1}{4}$ to $\frac{1}{2}$ mile. But where average capture rates are lowest (the draw of the center is not that strong), proximity even over the short distance between $\frac{1}{4}$ and $\frac{1}{2}$ mile, makes a significant difference.

In other words, when those qualities that attract business are present, they attract uniformly throughout the neighborhood and do not decay with distance from the core to the half mile edge. When the attraction is much less to begin with, distance proves to be quite discouraging.

Breaking each of the three arterials into three centers or neighborhoods reveals quite a difference in performance. Hawthorne which appeared homogeneous when considering capture rate for the entire corridor actually has a crazy quilt pattern when each neighborhood is broken into inner and outer.

Rosecrans inner is much higher than the average for the neighborhood as the outer is slightly below the average. The middle neighborhood is actually the opposite with the inner dropping and the outer raising. The north intersection does not vary much between the inner and the outer as each are close to the average for the whole.

Regression analysis found that the variations along Gardena and Artesia were due to the uneven distribution of commercial activity. Hawthorne has pretty uniform commercial density along its length leaving the distribution of functionality as a candidate for the cause of the variation in performance.

Table 1. Area Totals Question 9 (Center's Trip Capture Rate)		
Area	Type	Weighted Average of Area Capture Rate (Using Midpoint)
Old Torrance Total	Center	46%
Riviera Village Total	Center	46%
PCH	Intersection	44%
Inglewood Total	Center	36%
Hawthorne Total	Arterial	29%
El Segundo Total	Center	26%
Artesia Total	Arterial	22%
Gardena Total	Arterial	12%

Table 2. Area and Intersection Totals Question 9 (Center's Trip Capture Rate)	
Area	Weighted Average of Area Capture Rate (Using Midpoint)
Old Torrance Total	46%
Riviera Village Total	46%
PCH	44%
Inglewood Total	36%
Hawthorne @ Rosecrans Total	31%
Hawthorne @ 135 Total	29%
Hawthorne @ El Segundo Total	29%
Artesia @ Rindge Total	26%
El Segundo Total	26%
Artesia @ Inglewood Total	23%
Artesia @ Aviation Total	22%
Gardena @ Vermont Total	19%
Gardena @ Normandie Total	13%
Gardena @ Western Total	9%

Table 3. Inner Inner Areas Question 9 (Center's Trip Capture Rate)	
Area	Weighted Average of Area Capture Rate (Using Midpoint)
Inglewood Inner	58%
Old Torrance Inner	47%
Riviera Village Inner	46%
Hawthorne Inner	28%
El Segundo Inner	27%
Artesia Inner	26%
Gardena Inner	15%

Table 4. Outer Outer Areas Question 9 (Center's Trip Capture Rate)	
Area	Weighted Average of Area Capture Rate (Using Midpoint)
Riviera Village Outer	46%
Old Torrance Outer	46%
Inglewood Outer	33%
Hawthorne Outer	30%
El Segundo Outer	25%
Artesia Outer	19%
Gardena Outer	10%

Table 5. Inner Areas and Inner Intersections Question 9 (Center's Trip Capture Rate)	
Area	Weighted Average of Area Capture Rate (Using Midpoint)
Inglewood Inner	58%
Old Torrance Inner	47%
Riviera Village Inner	46%
Hawthorne @ Rosecrans Inner	42%
Hawthorne @ El Segundo Inner	27%
El Segundo Inner	27%
Artesia @ Rindge Inner	27%
Artesia @ Aviation Inner	24%
Gardena @ Vermont Inner	24%
Artesia @ Inglewood Inner	23%
Hawthorne @ 135 Inner	22%
Gardena @ Normandie Inner	20%
Gardena @ Western Inner	5%

Table 6. Outer Areas and Outer Intersections Question 9 (Center's Trip Capture Rate)	
Area	Weighted Average of Area Capture Rate (Using Midpoint)
Riviera Village Outer	46%
Old Torrance Outer	46%
Inglewood Outer	33%
Hawthorne @135 Outer	32%
Hawthorne @ El Segundo Outer	29%
Hawthorne @ Rosecrans Outer	26%
Artesia @ Rindge Outer	26%
El Segundo Outer	25%
Artesia @ Inglewood Outer	23%
Artesia @ Aviation Outer	22%
Gardena @ Vermont Outer	17%
Gardena @ Normandie Outer	11%
Gardena @ Western Outer	10%

Threshold capture rates -- percent of trips of at 20, 50 and 80 per study area

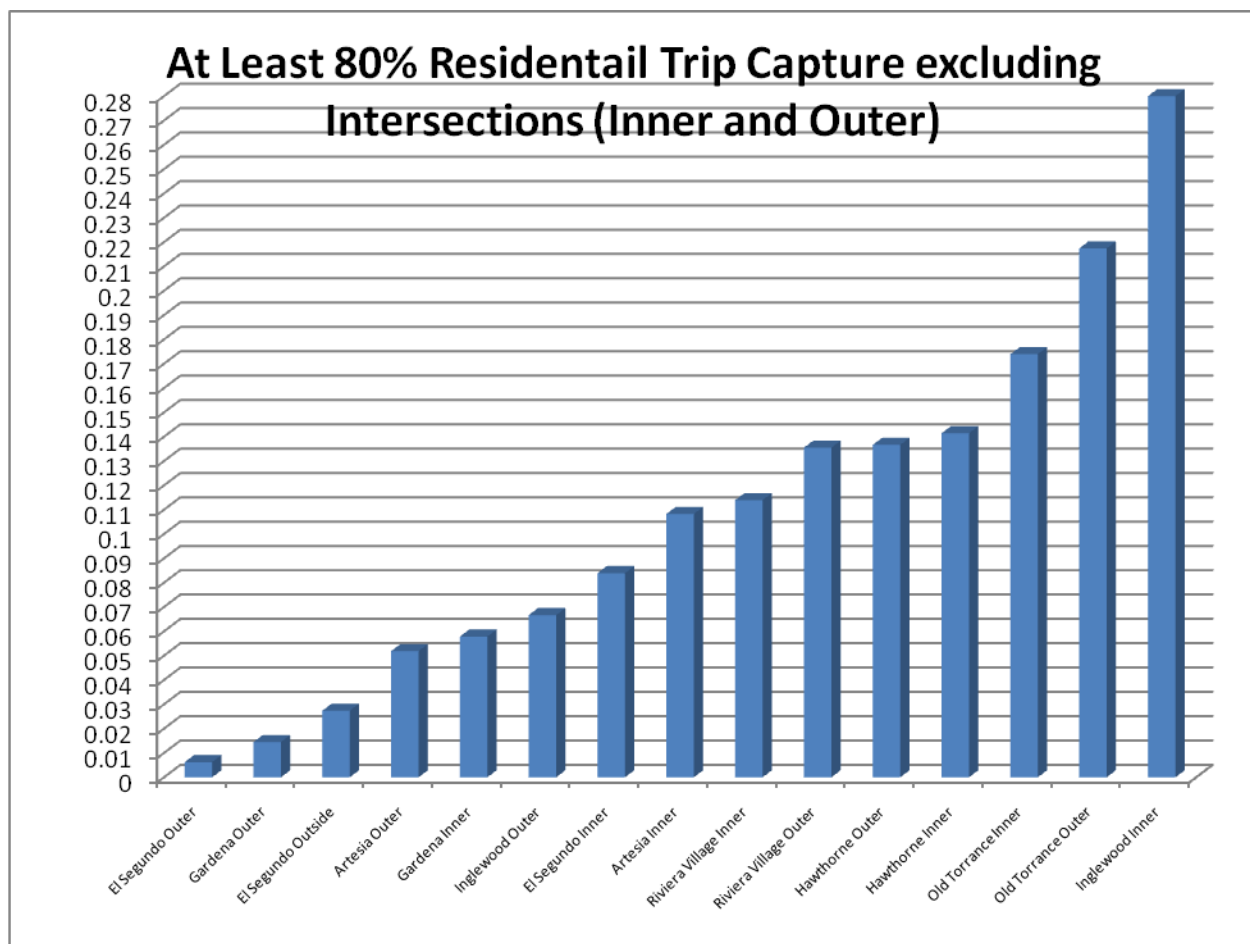
The Capture Rate Section above identified OT and RV as the study centers with the highest average capture rate. Both were centers. The greatest VMT savings will be captured when a high percentage of trips taken have the center as their destination.

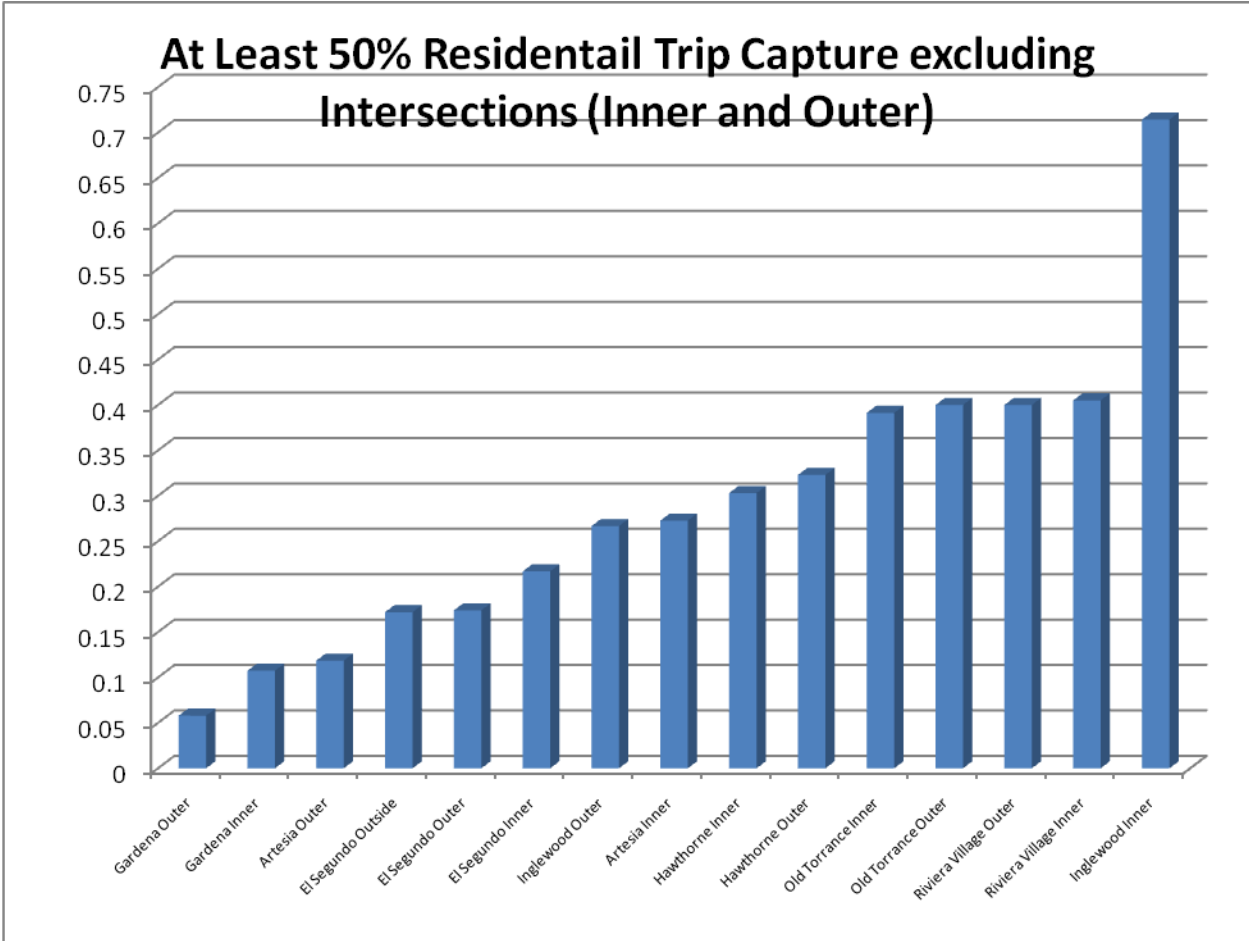
Among the centers, ES had the lowest average capture rate (26%), but when examining the thresholds, ES appears at the bottom of the top group for once in a while visits. ES then drops to the second group at the 50% threshold, and into the third group at the 80% or visits frequently.

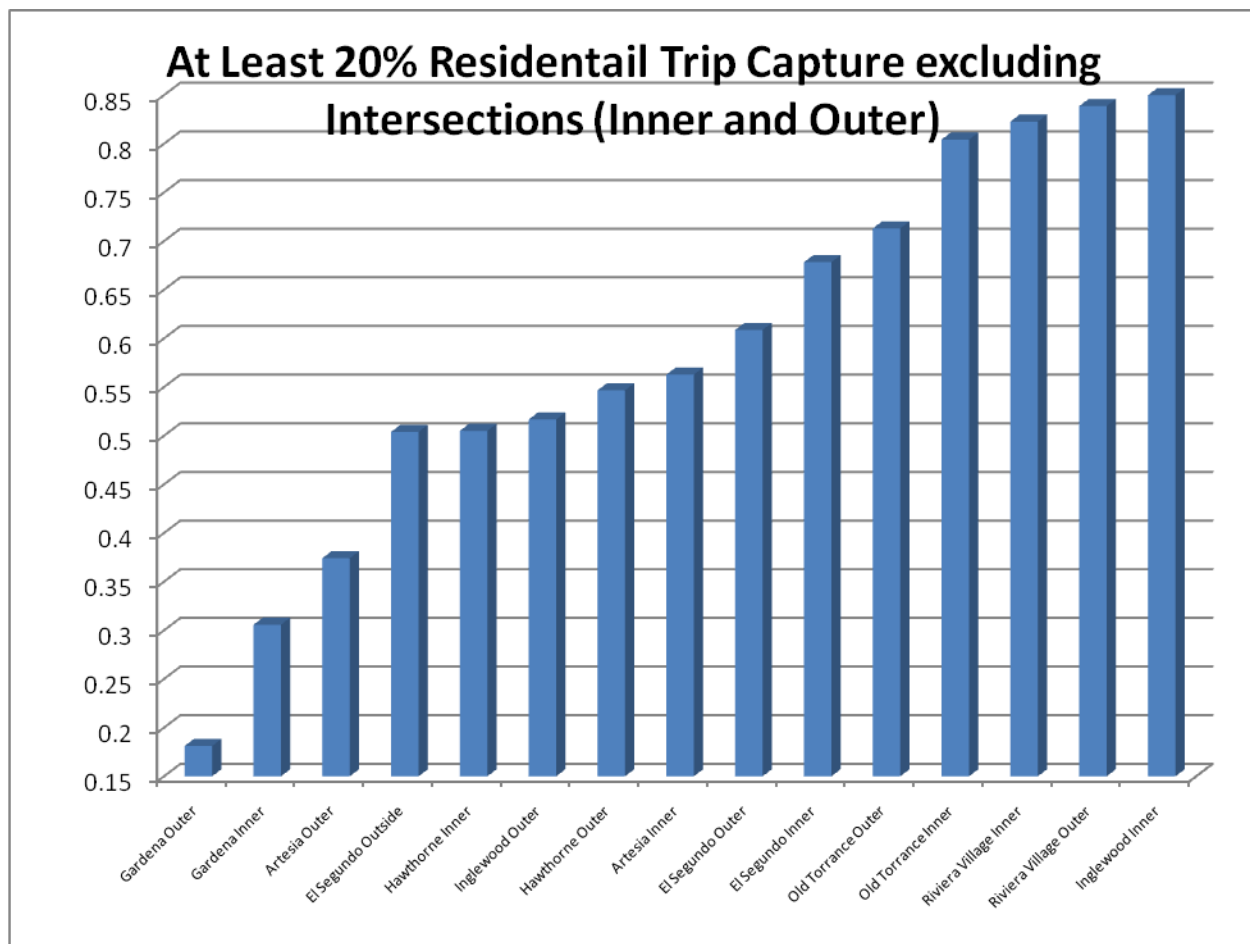
Consistent with its low average capture rate, Gardena had the lowest rate at each of the 3 thresholds.

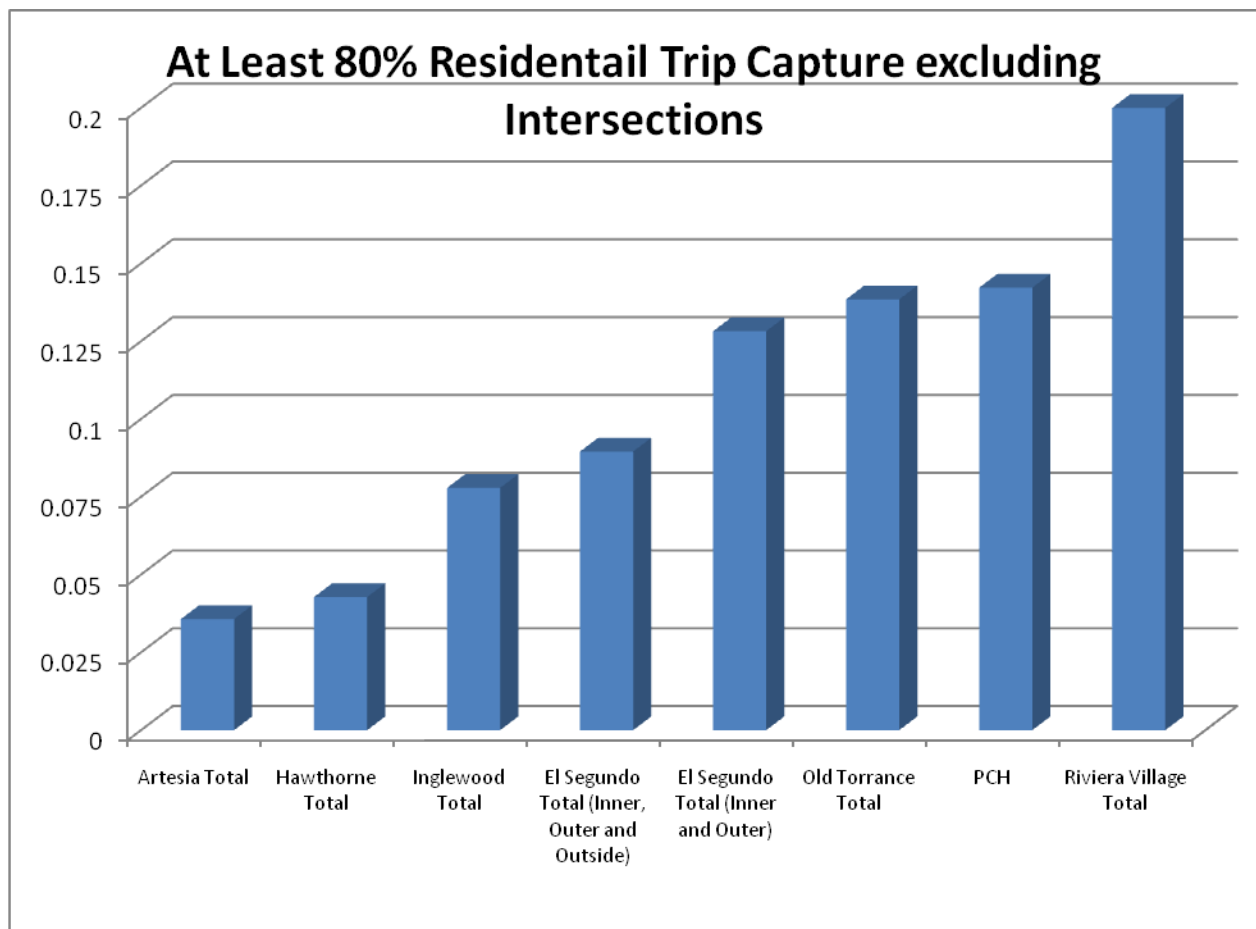
For respondents who estimated they took at least half of their total trips to the center, the study areas fell into 4 groups:

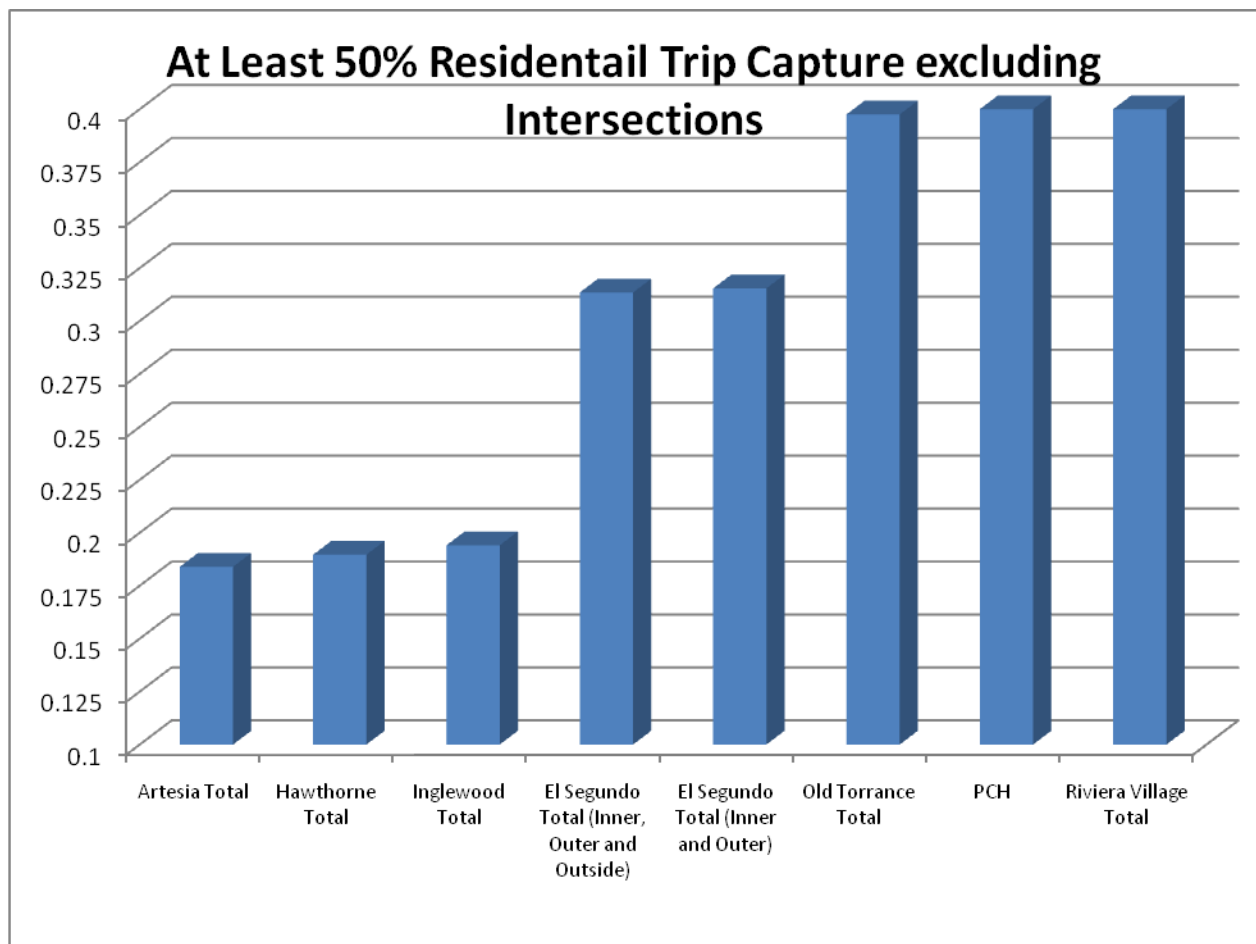
Table 7. Frequency of Trips to Study Areas					
Once in a while (20%)		Commonly (50%)		Frequently (80%)	
<u>Most</u>	-	<u>Most</u>	-	<u>Most</u>	
PCH	75%	Riviera Village	40%	Old Torrance	20%
Old Torrance	74%	PCH	40%		
Riviera Village	73%	Old Torrance	40%	<u>Second</u>	
El Segundo	67%			Hawthorne	14%
		<u>Second</u>		PCH	14%
<u>Second</u>		Hawthorne	32%	Riviera Village	13%
Inglewood	56%	Inglewood	31%		
Hawthorne	53%			<u>Third</u>	
Artesia	46%	<u>Third</u>		Inglewood	9%
		El Segundo	19%	Artesia	8%
<u>Least</u>		Artesia	19%		
Gardena	24%			<u>Least</u>	
		<u>Least</u>		El Segundo	
		Gardena	8%	Gardena	4%
					3%

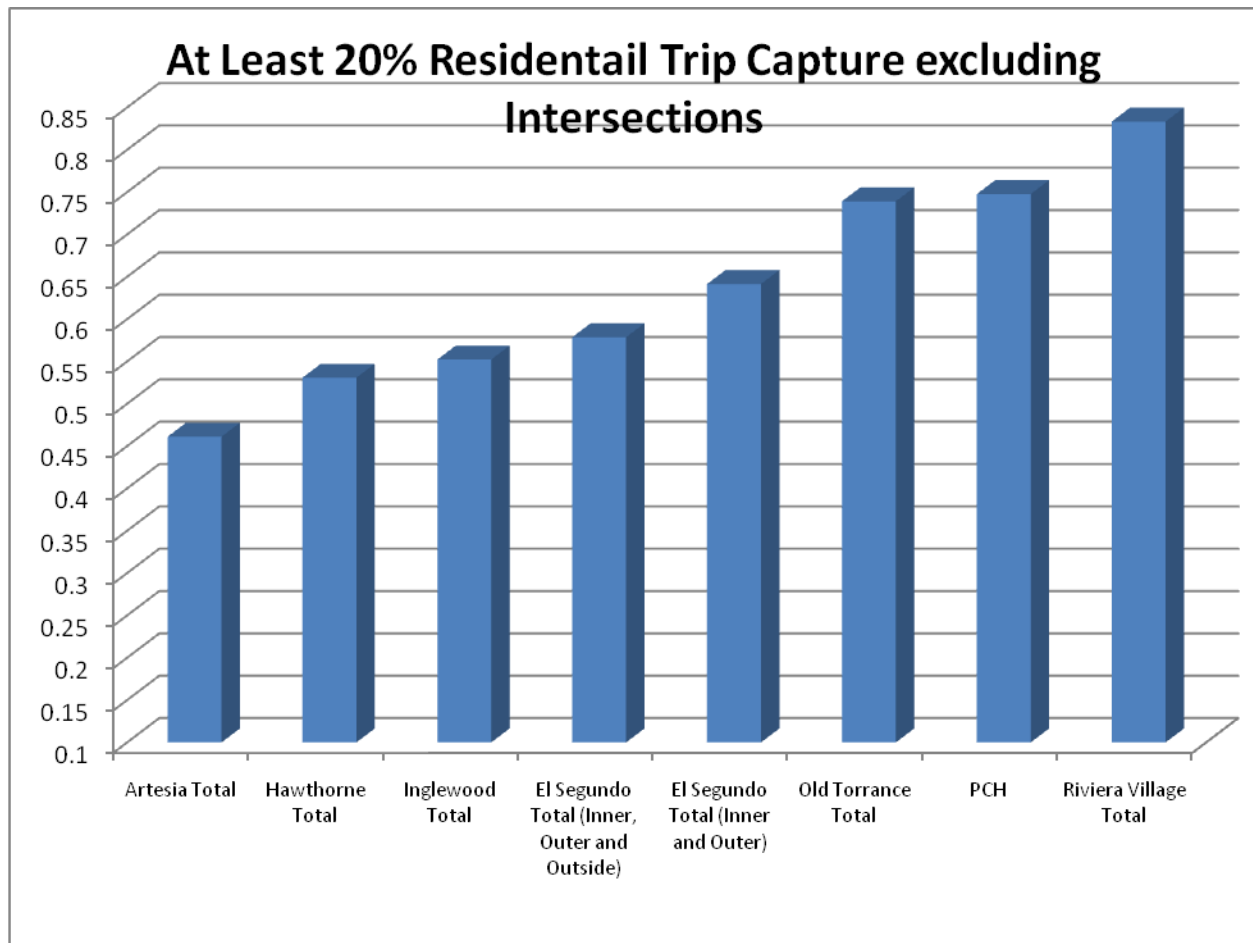












Observations

Centers tend to have a high percentage of visits at least once in a while.

Corridors tend to have a lower percentage that visit at least once in a while

One of the centers, ES, performs poorly at the common and frequent thresholds.

One corridor, Haw, consistently performs in the second tier at all levels.

The most dense, Ing, is in the second tier but drops to 3rd for frequent capture.

As the frequency of use increased, all centers had a relative drop except for OT. OT is in the second tier of housing density (around 20DU/A) and in the 3rd tier of FAR.

Do the centers have substantially better performance than the typically suburban corridors? No, the centers and corridors overlap. PCH and Hawthorne are high performing corridors and El Segundo is a poor performing center

Mode to Center

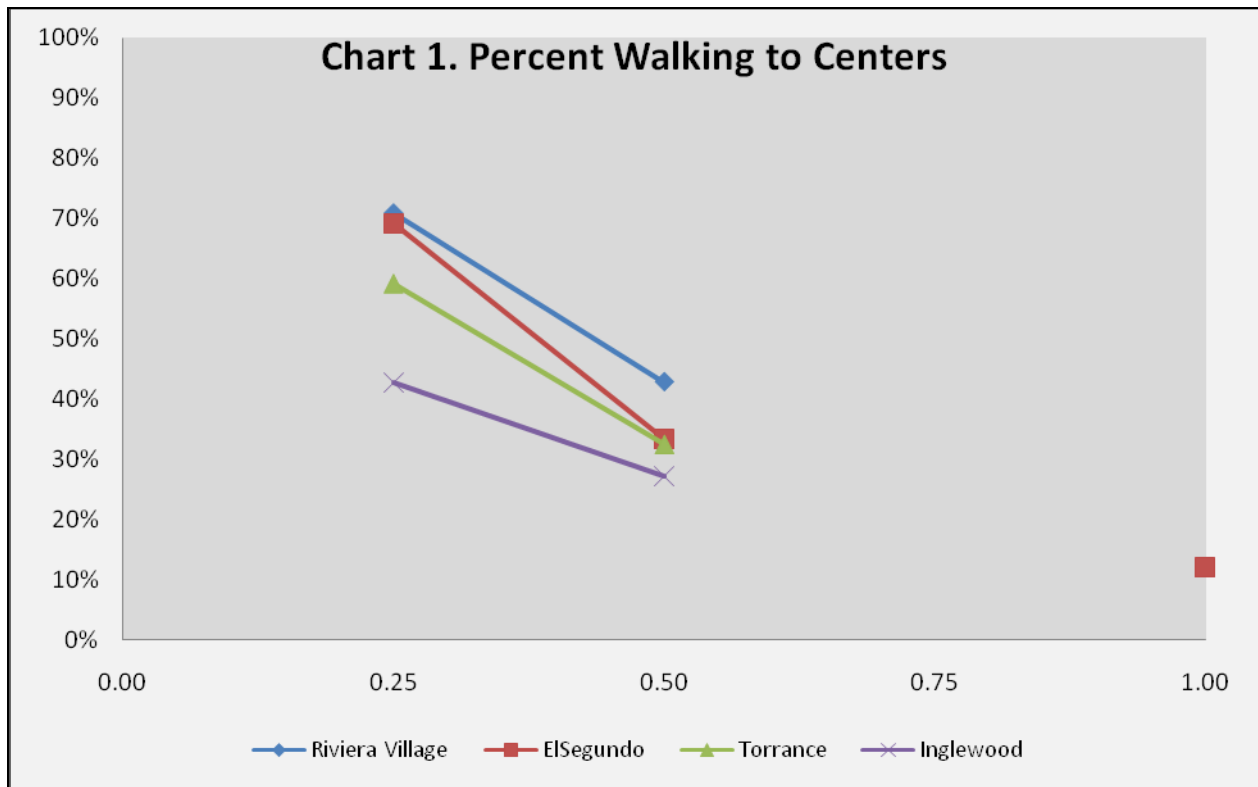
Effect of distance is almost identical in the 4 centers, that is the slopes of the lines formed by connecting the two data points are reasonably similar.

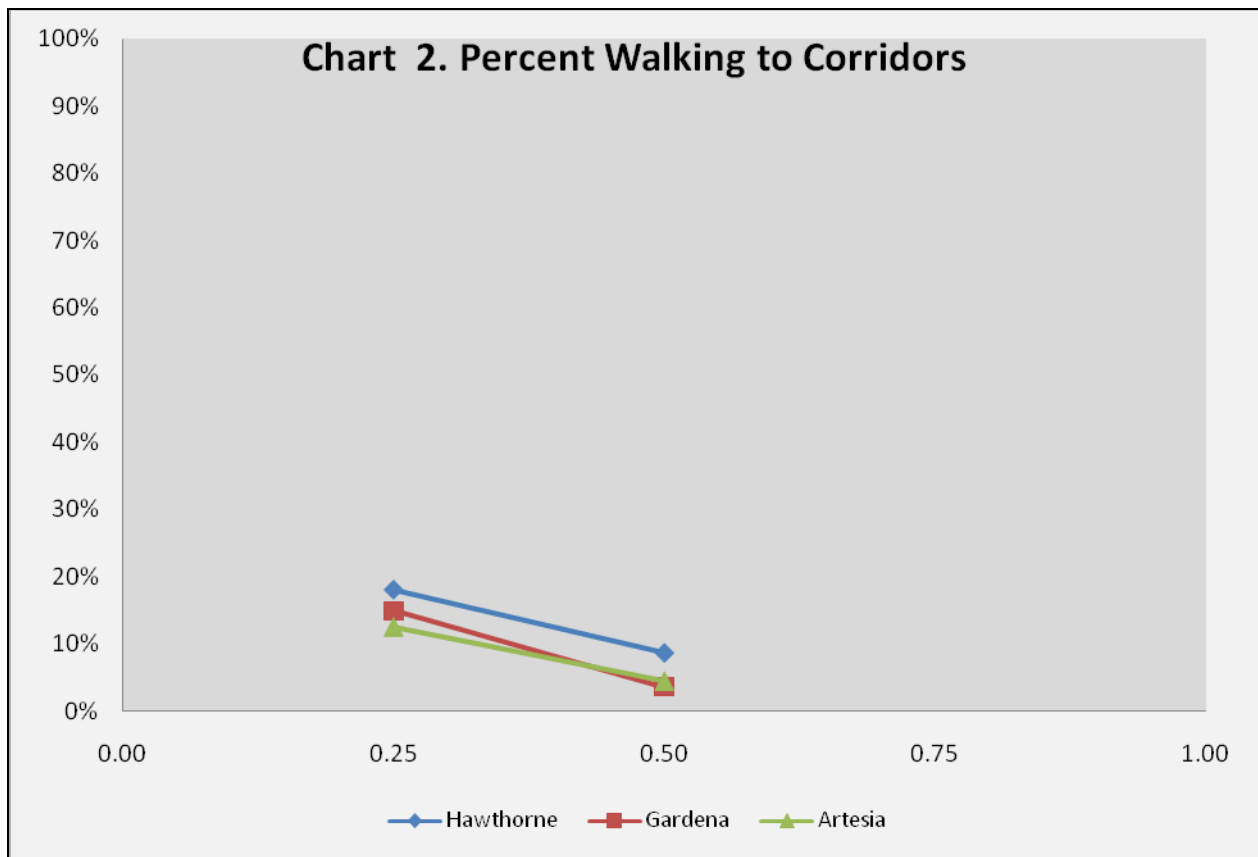
What differs is the propensity to drive – highest in RV and OT and lowest in ES and Ing. This propensity may be influenced by income.

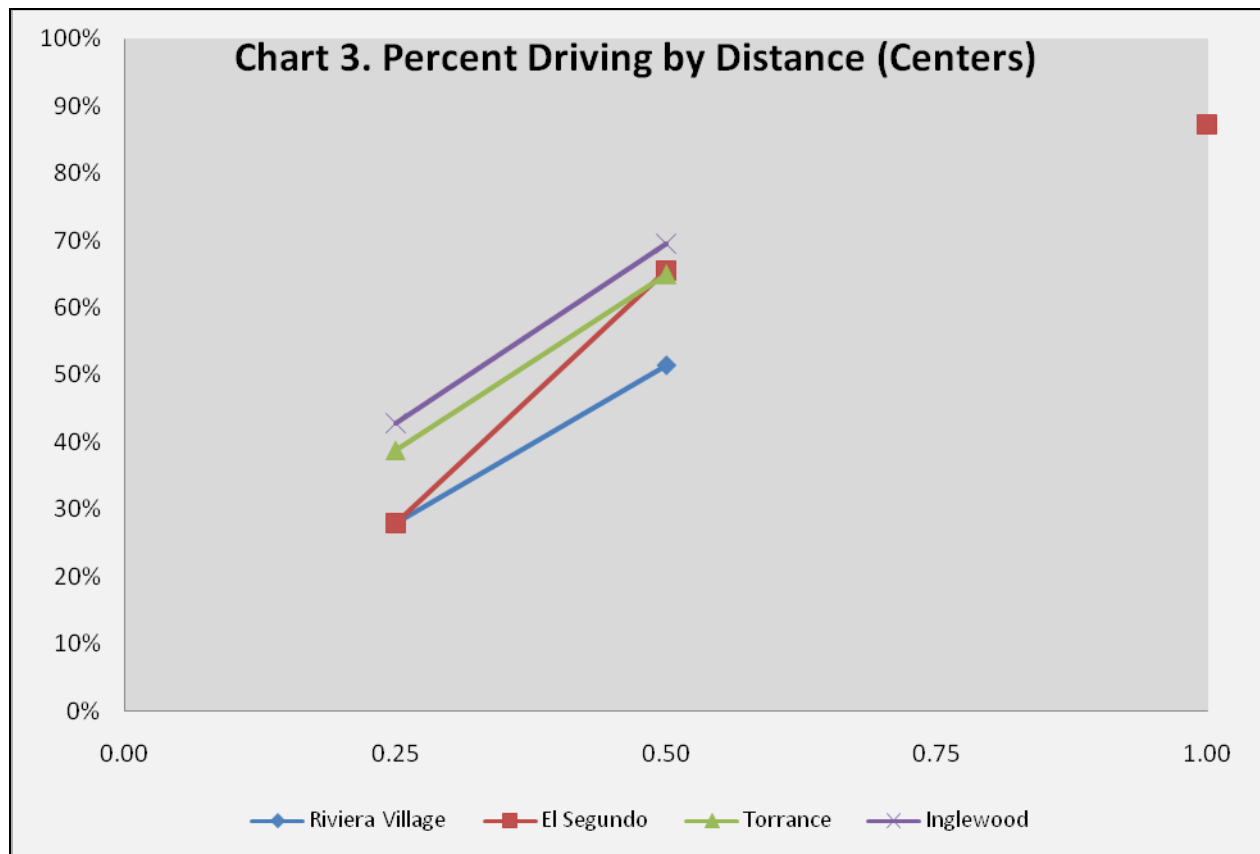
The line slope in corridors is different than centers. This is influenced by the fact that the rate of walking is much lower along the corridors than in the centers. The lowest center rate is 40% and the highest corridor rate is 20%. Given the exceedingly low rate of walking by corridor residents, it would be possible for the same steep decline to occur as in the centers or the half-mile rate would be negative. The rates of walking at the half mile distance in centers are all greater than the rates of walking in corridors at the quarter mile distance.

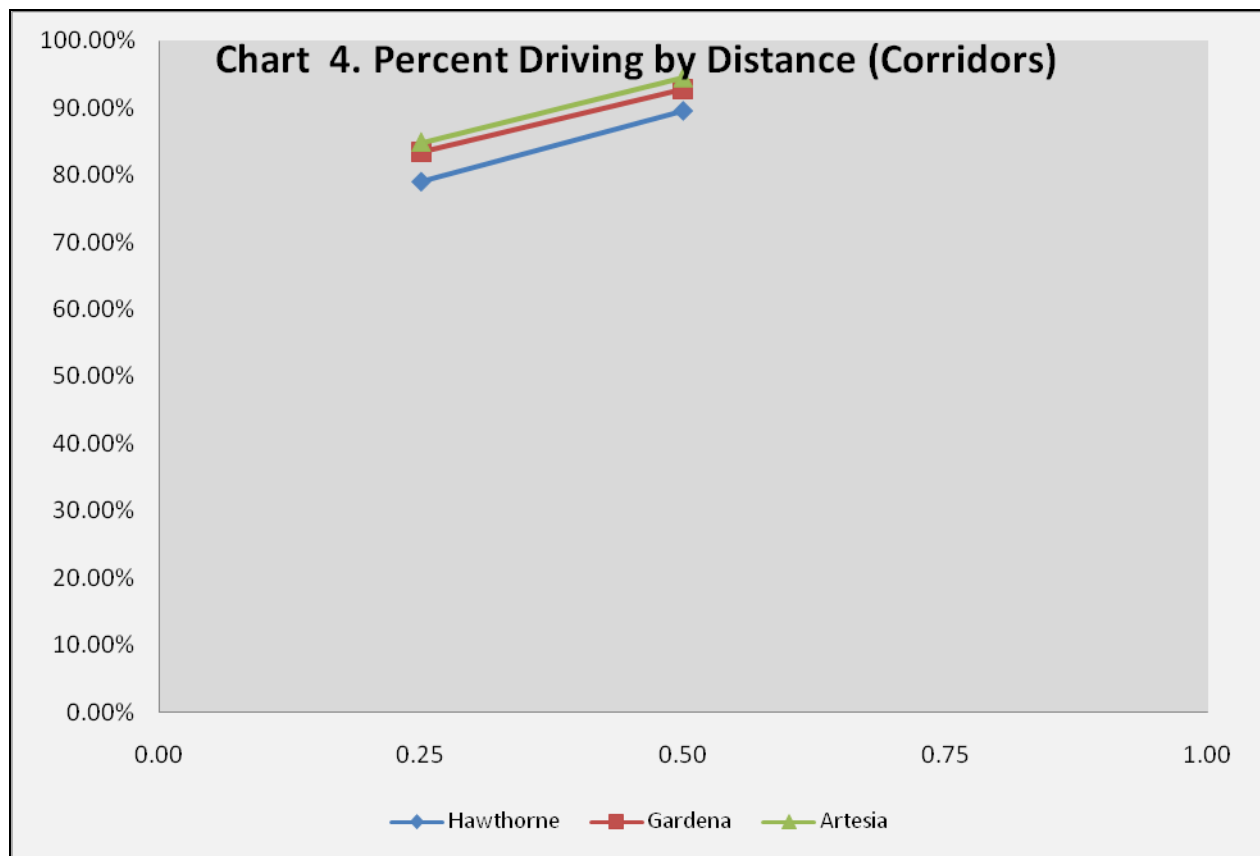
Conclusion: Friction of distance is universal, walkable design appears to have only a marginal effect on mode choice. Income may be on factor but so is the density of commercial opportunities. Corridors simply do not provide access to the same number of commercial opportunities once a resident gets there as does a center.

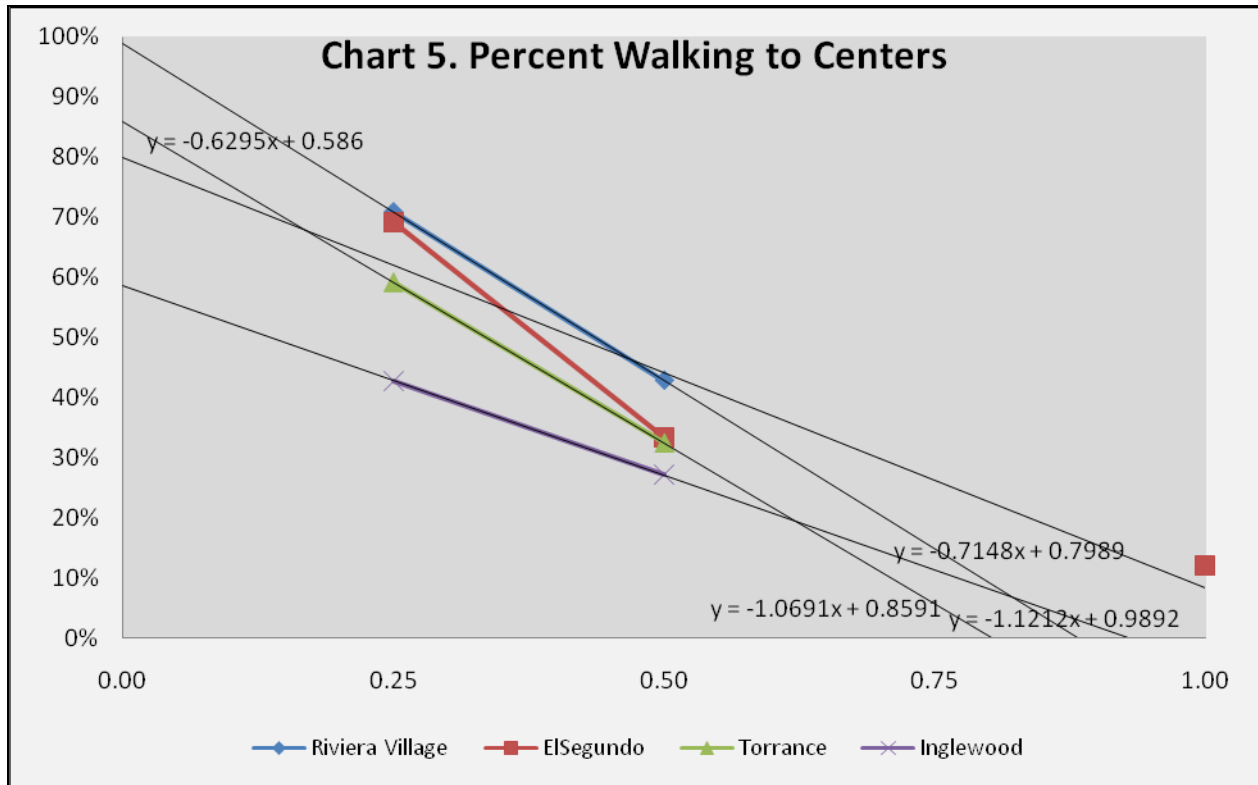
Response: Reduce the auto mode choice, not by walkable design, but by introducing a new mode, the NEV, which might also improve the capture rate of the centers due to convenience factor. Also, increase the commercial density.

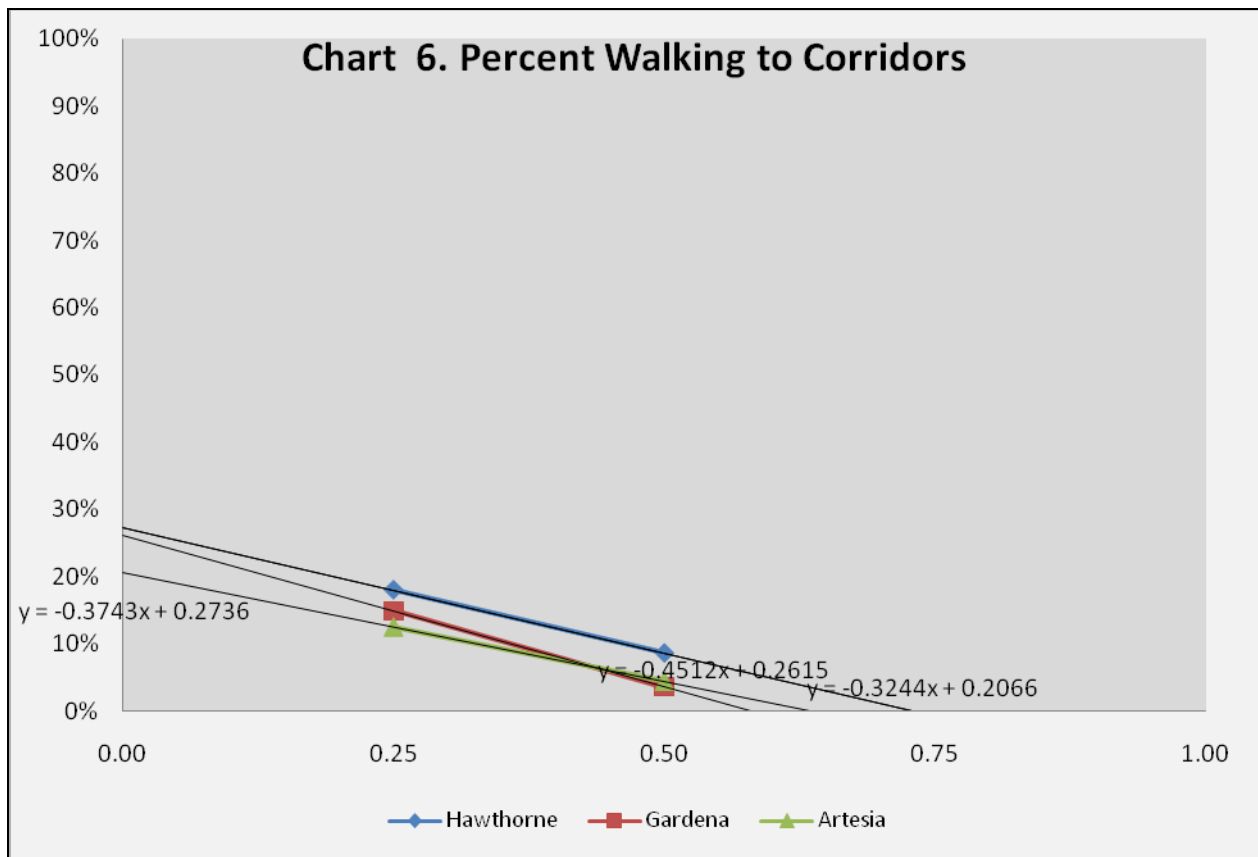












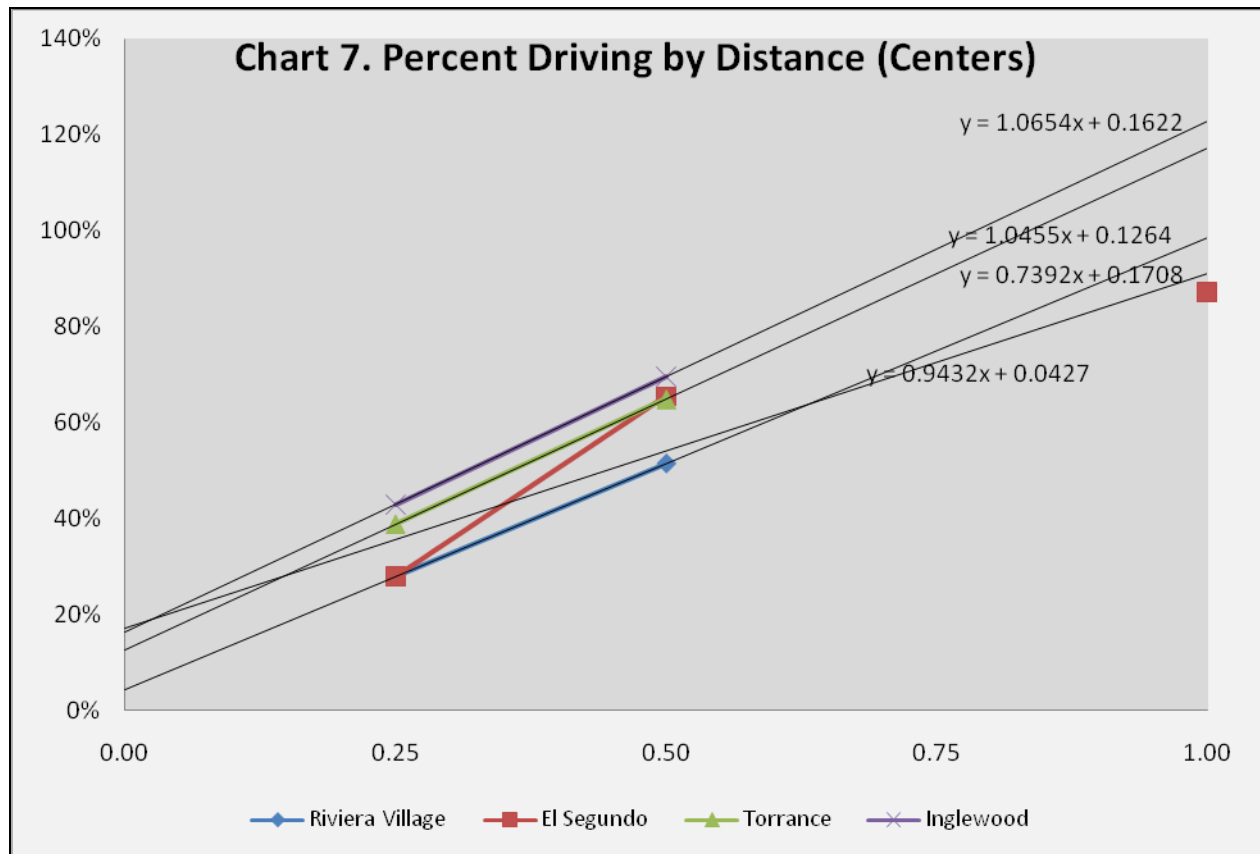
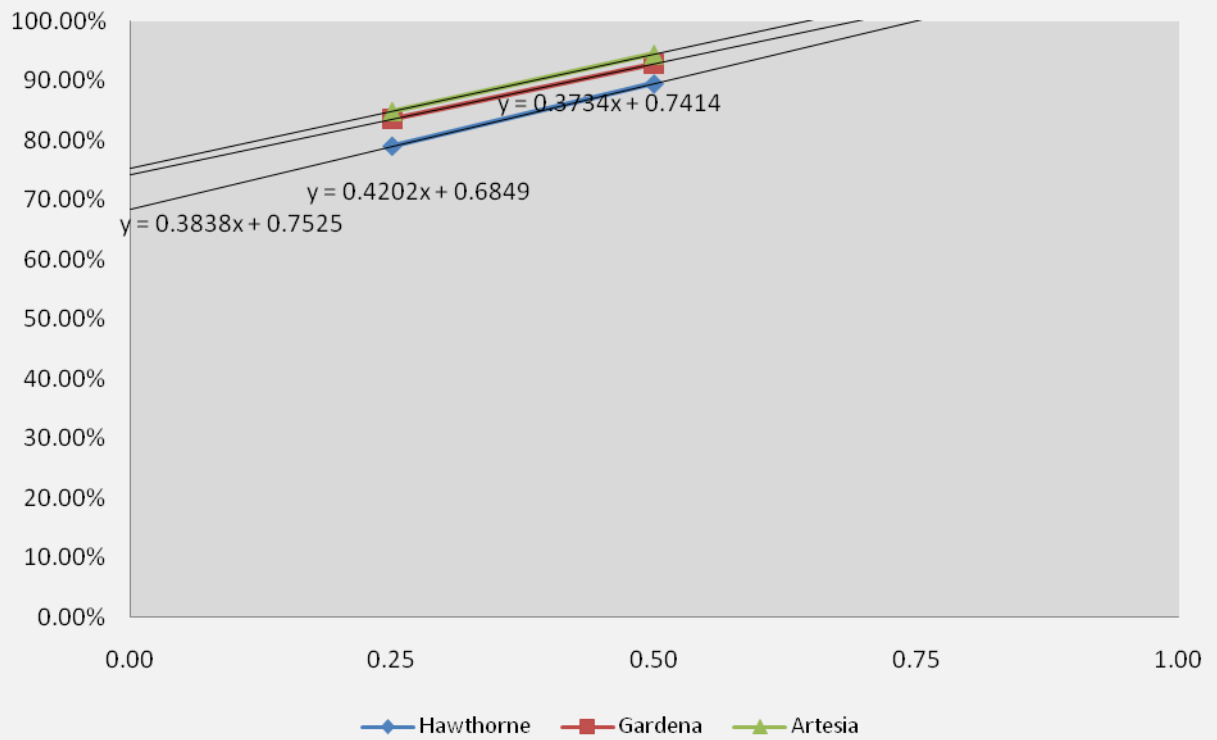


Chart 8. Percent Driving by Distance (Corridors)



Census Travel Data

In addition to center capture rate and mode to center, other metrics related to the transportation behavior of neighborhood residents can also reflect comparatively better or worse transportation performance. The ones examined in this section are drawn from the 2000 U.S. Census.

Vehicles per HH

Neighborhoods with better transportation performance will tend to have fewer automobiles per household.

The bar chart with centers and corridors shows no particular pattern based on performance. Old Torrance, with one of the highest capture rates does in fact have relatively low Vehicles per HH. Riviera Village, with the highest capture rate has the third highest vehicles per HH. Hawthorne, the best performing corridor has the highest vehicles per HH. There are overlaps with no strong trend.

However, the inner-out distinction does show a trend toward slightly fewer vehicles per HH in the outer ring compared to the inner core. The willingness to walk to the commercial district from close in, so pronounced in the centers but also present in the corridors translates into fewer vehicles per household in every case. Hawthorne Blvd is the lone exception where the inner has greater vehicles per HH than the outer – but that is also the only study area where the outer ring had a higher capture rate than the inner core.

Chart 9. Average Vehicles per Household Inner vs. Outer

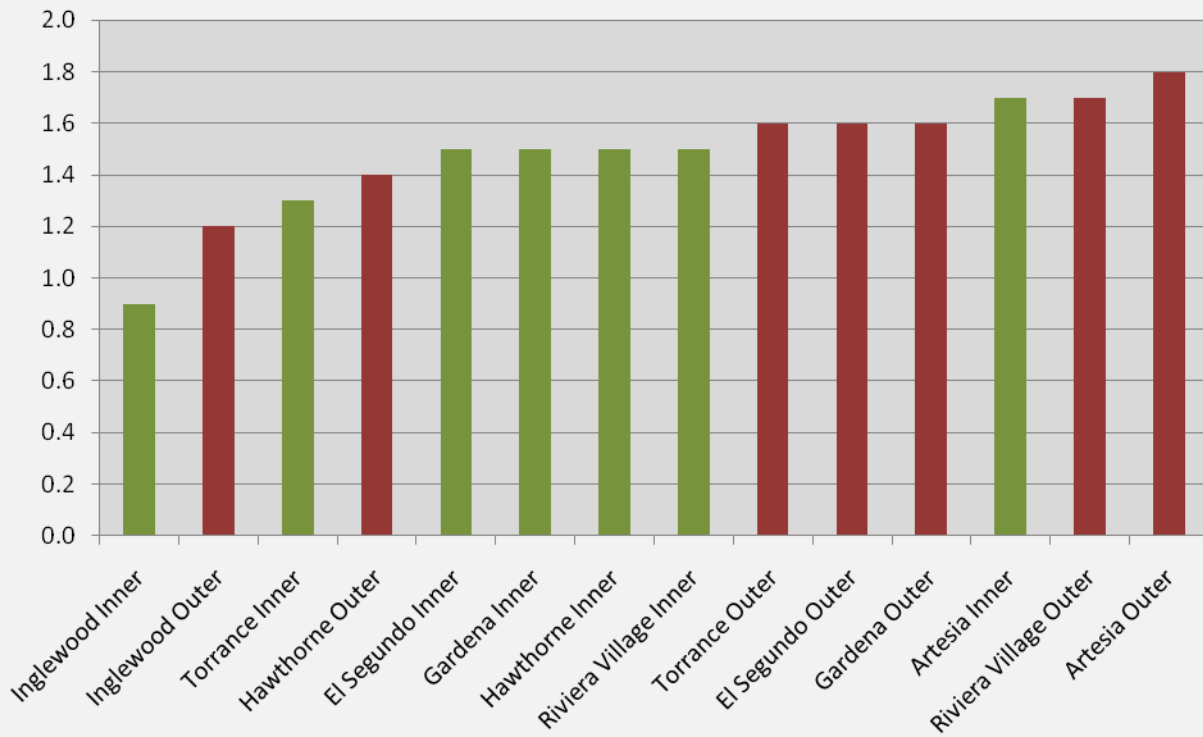


Chart 10. Average Vehicles per Household Centers vs. Corridors

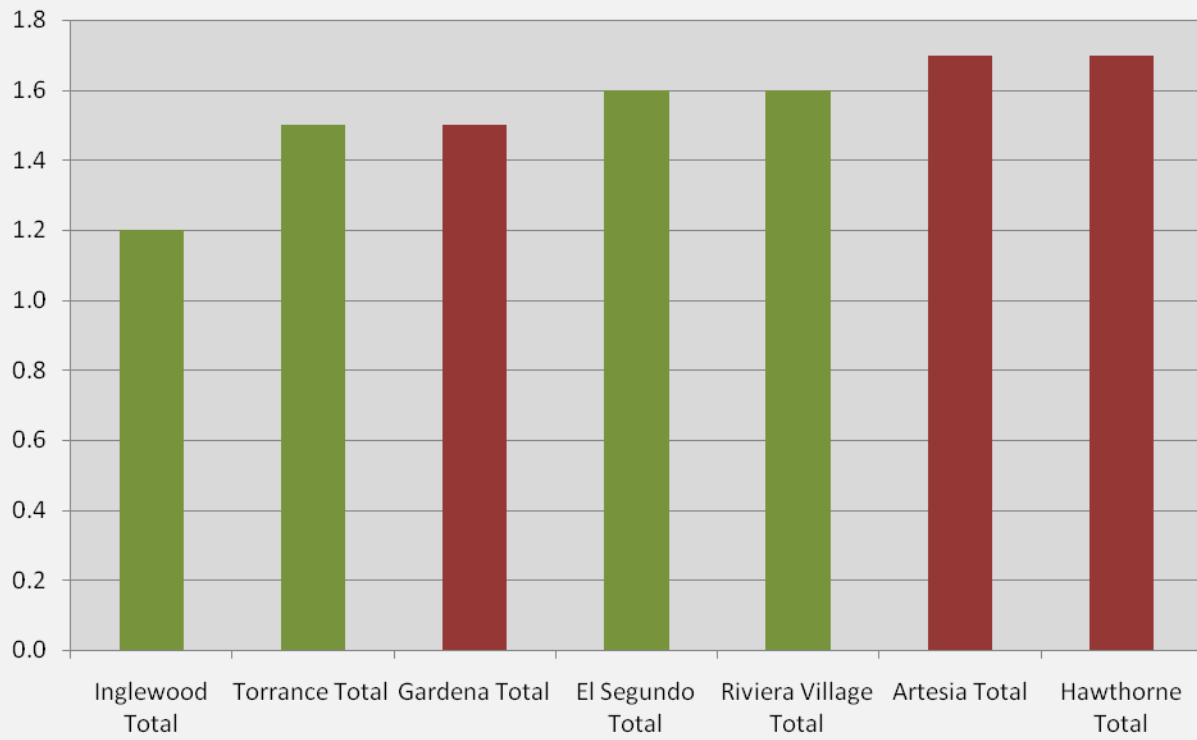
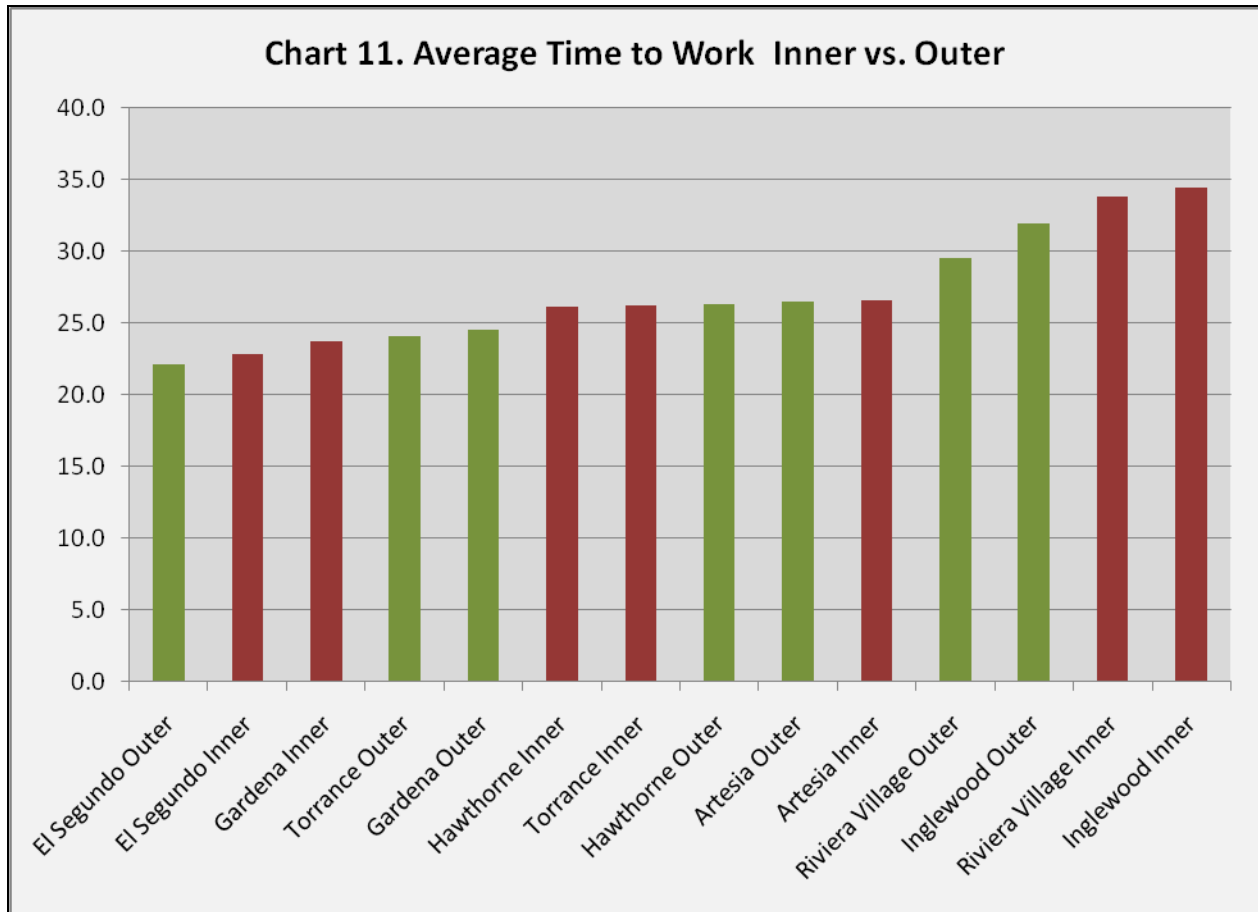


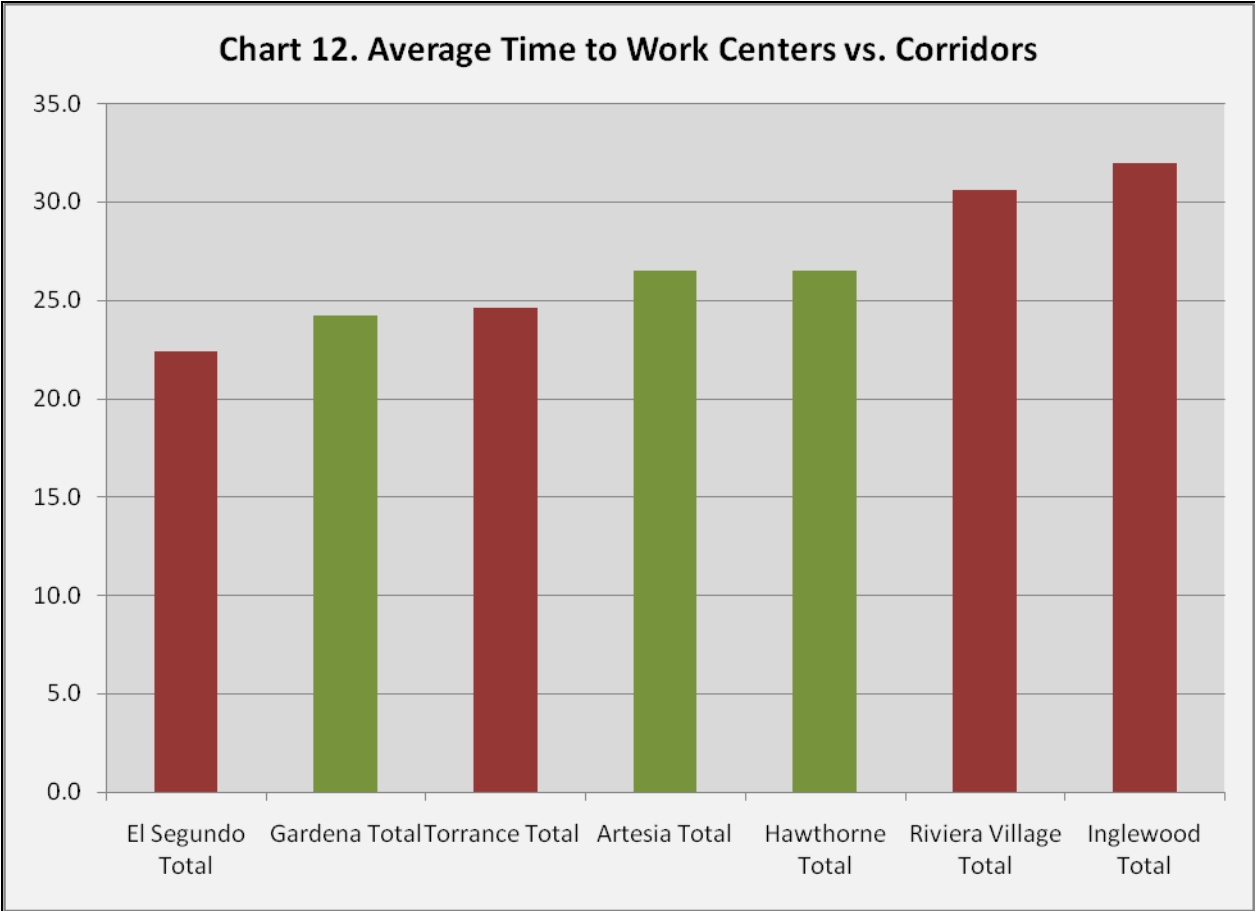
Table 8. Average Number of Vehicles Available per Household 2000

Los Angeles	1.6				
Combined		Inner		Outer	
Artesia Outer	1.8	Artesia Inner	1.7	Artesia Outer	1.8
Artesia Inner	1.7	Downtown El Segundo Inner	1.5	Riviera Village Outer	1.7
Riviera Village Outer	1.7	Gardena Inner	1.5	Downtown Torrance Outer	1.6
Downtown Torrance Outer	1.6	Hawthorne Inner	1.5	Downtown El Segundo Outer	1.6
Downtown El Segundo Outer	1.6	Riviera Village Inner	1.5	Gardena Outer	1.6
Gardena Outer	1.6	Downtown Torrance Inner	1.3	Hawthorne Outer	1.4
Downtown El Segundo Inner	1.5	Inglewood Inner	0.9	Inglewood Outer	1.2
Gardena Inner	1.5				
Hawthorne Inner	1.5				
Riviera Village Inner	1.5				
Hawthorne Outer	1.4				
Downtown Torrance Inner	1.3				
Inglewood Outer	1.2				
Inglewood Inner	0.9				

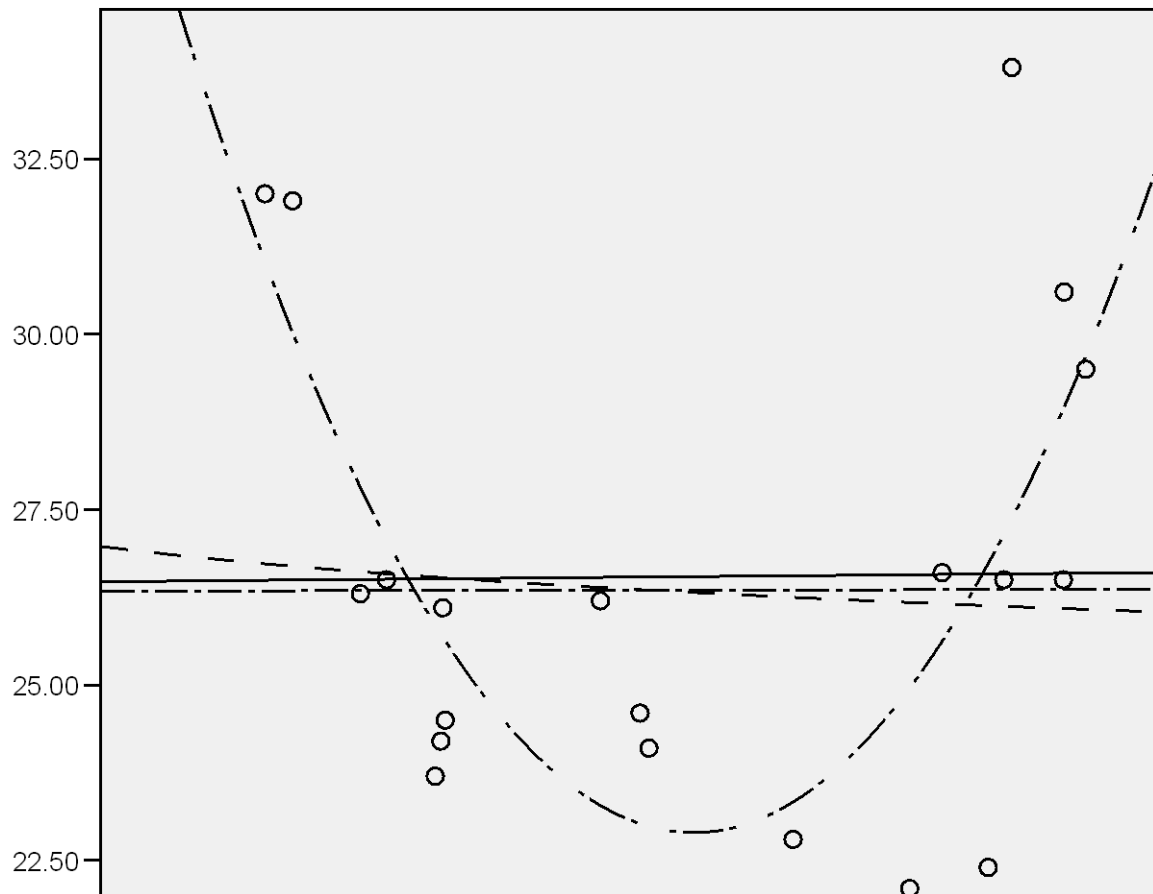
Time to Work

Good capture rate does not appear to be related to the journey to work, suggesting that not many residents are employed in their local commercial district. We found a strong quadratic relationship between time to work and income, graphed below. One interpretation is that low income people take longer to get to work because they tend to take public transit, which takes longer than driving; and that people with higher incomes simply must go further in order to find jobs that pay more, probably in some professional specialization.





TravelTime



Model Summary and Parameter Estimates

Dependent Variable: TravelTime

Equation	Model Summary					Parameter Estimates		
	R Square	F	df1	df2	Sig.	Constant	b1	b2
Linear	.000	.002	1	18	.964	26.420	1.95E-006	
Quadratic	.506	8.697	2	17	.003	68.501	-.001	1.11E-008
Power	.005	.087	1	18	.771	35.920	-.028	
Exponential	.000	.000	1	18	.993	26.328	1.42E-008	

The independent variable is Income.

Mode to Work

Mode to work is highly correlated with household income. About 80% of the variation in Drive Alone can be explained by variation in income. Not as correlated but still significant is income and public transit to work. The following is a graph of that relationship.

Model Summary and Parameter Estimates

Dependent Variable: PubTransit

Equation	Model Summary					Parameter Estimates		
	R Square	F	df1	df2	Sig.	Constant	b1	b2
Linear	.656	34.339	1	18	.000	.112	-1.23E-006	
Quadratic	.870	56.642	2	17	.000	.342	-9.02E-006	6.07E-011
Power	.713	44.798	1	18	.000	69961010 213.107	-2.608	
Exponential	.684	38.956	1	18	.000	.327	-4.17E-005	

The independent variable is Income.

PubTransit

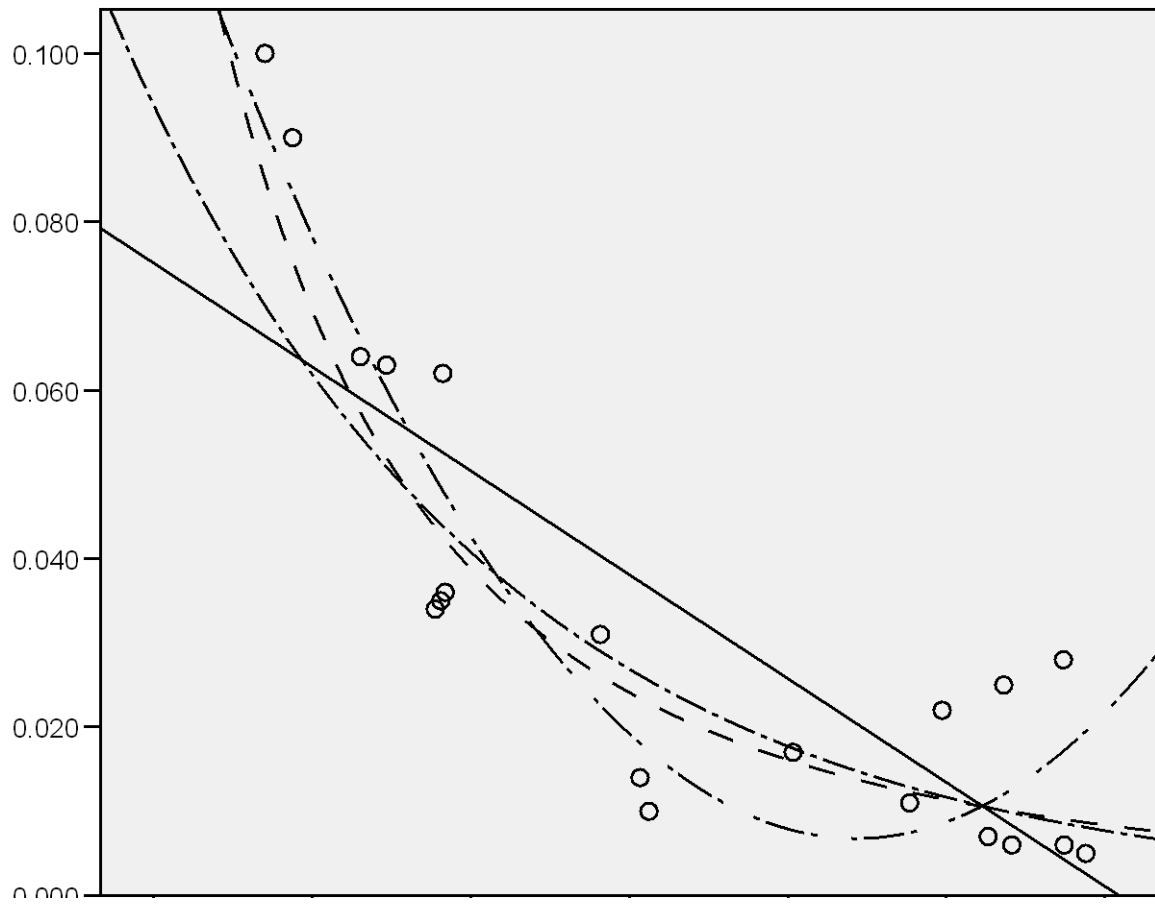


Table 9. Regression Results

With Totals (excluding Inglewood Inner)				
	R	R²	F	Sig.
Income v. Drive Alone	0.921	0.849	101.303	0
Income v. Travel Time	0.011	0	0.002	0.964
Income v. Number of Vehicles	0.655	0.429	13.5	0.002
Income v. Public Transit	0.81	0.656	34.339	0
Without Totals (excluding Inglewood Inner)				
	R	R²	F	Sig.
Income v. Drive Alone	0.898	0.806	45.809	0
Income v. Travel Time	0.109	0.012	0.133	0.722
Income v. Number of Vehicles	0.703	0.494	10.731	0.007
Income v. Public Transit	0.805	0.647	20.181	0.001

Table 10. Descriptive Statistics

	Mean	Median	St. Deviation
Drive Alone	78.70%	81.00%	5.57%
Income	64,507	61,239	18,429

Table 11. Regression Model

R	0.896		
R Squared	0.802		
F= Explained Variance/ Unexplained Variance	44.683	About 80% of the variation in Drive Alone can be explained by variation in income	
Significance	0.00	There is a significant linear relationship between Income and Drive Alone	

Table 12. Regression Model (Excluding Inglewood Inner)

	R	R Squared	F= Explained Variance/ Unexplained variance	Significance	
Income v. Drive Alone	0.896	0.802	44.683	0	
Income v. Aggregate Travel Time	0.063	0.004	0.044	0.84	not significant
Income v. Drive Alone + Carpool	0.736	0.541	12.99	0	
Income v. Carpool	0.717	0.515	11.658	0.01	
Age v. Drive Alone	0.851	0.723	28.771	0	
White v. Drive Alone	0.897	0.805	45.484	0	
White v. Income	0.886	0.785	40.262	0	
African American v. Drive Alone	0.683	0.466	9.618	0.01	
Asian v. Drive Alone	0.218	0.048	0.55	0.47	not significant
Hispanic (Any Race) v. Drive Alone	0.935	0.875	76.98	0	
Total Units v. Drive Alone	0.379	0.143	1.841	0.2	not significant
Twenty Plus Units v. Drive Alone	0.042	0.002	0.02	0.89	not significant

Employee Travel Behavior

A request for employee home zip codes was made to a sampling of employers in each study area except PCH. The data collected are not statistically valid but can provide an impression of the extent of the draw of each labor concentration.

Distance to work

The following values were calculated as the distance between the center of each study area and the centroid of the zip codes of employee residence, inflated by 20% to translate direct distances into street distances.

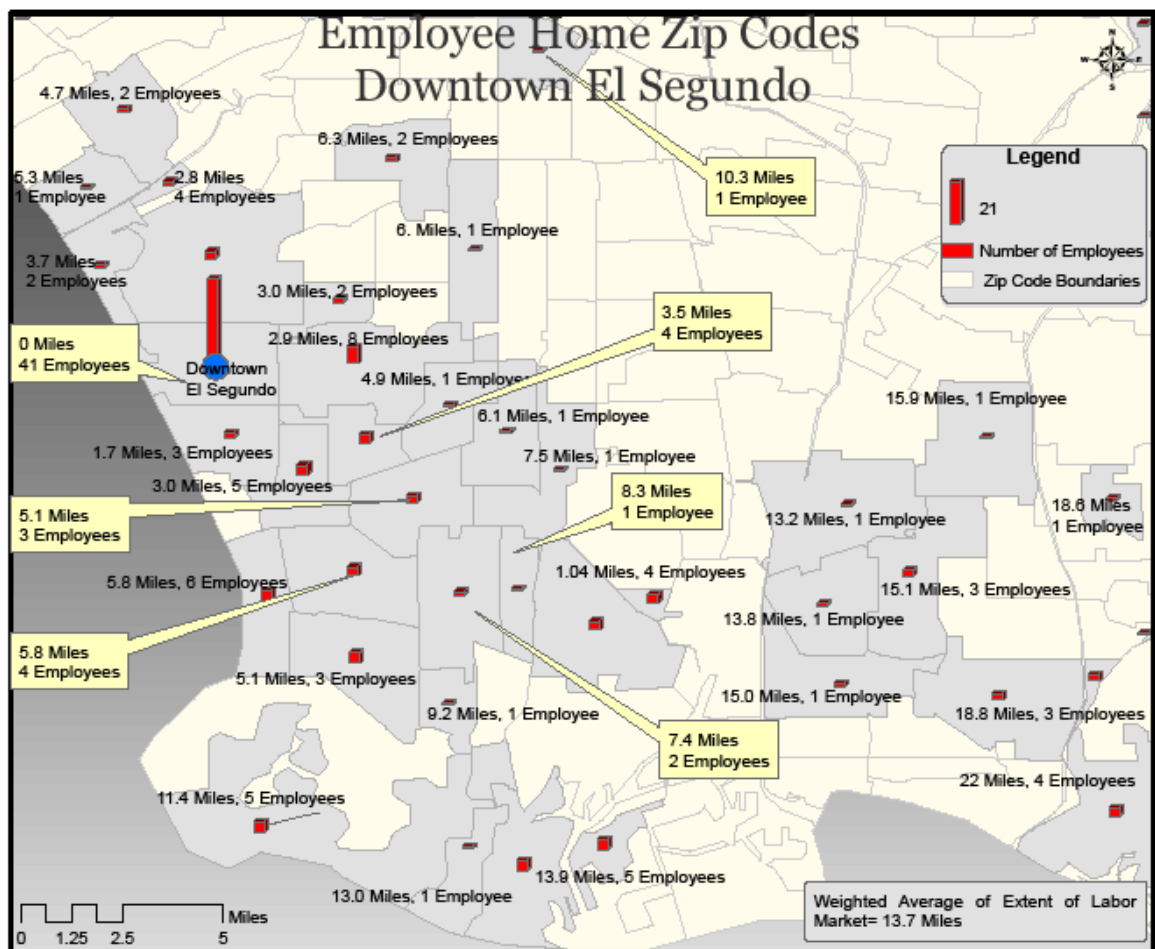
Table 13. Average Distance to Work		
	Miles	Employees
Centers		
Riviera Village	5.3	3,670
Inglewood	9.9	7,660
Old Torrance	11.3	7,410
El Segundo	16.5	3,420
Corridors		
Artesia	5.4	3,080
Gardena	10.6	8,550
Hawthorne	11.7	7,000

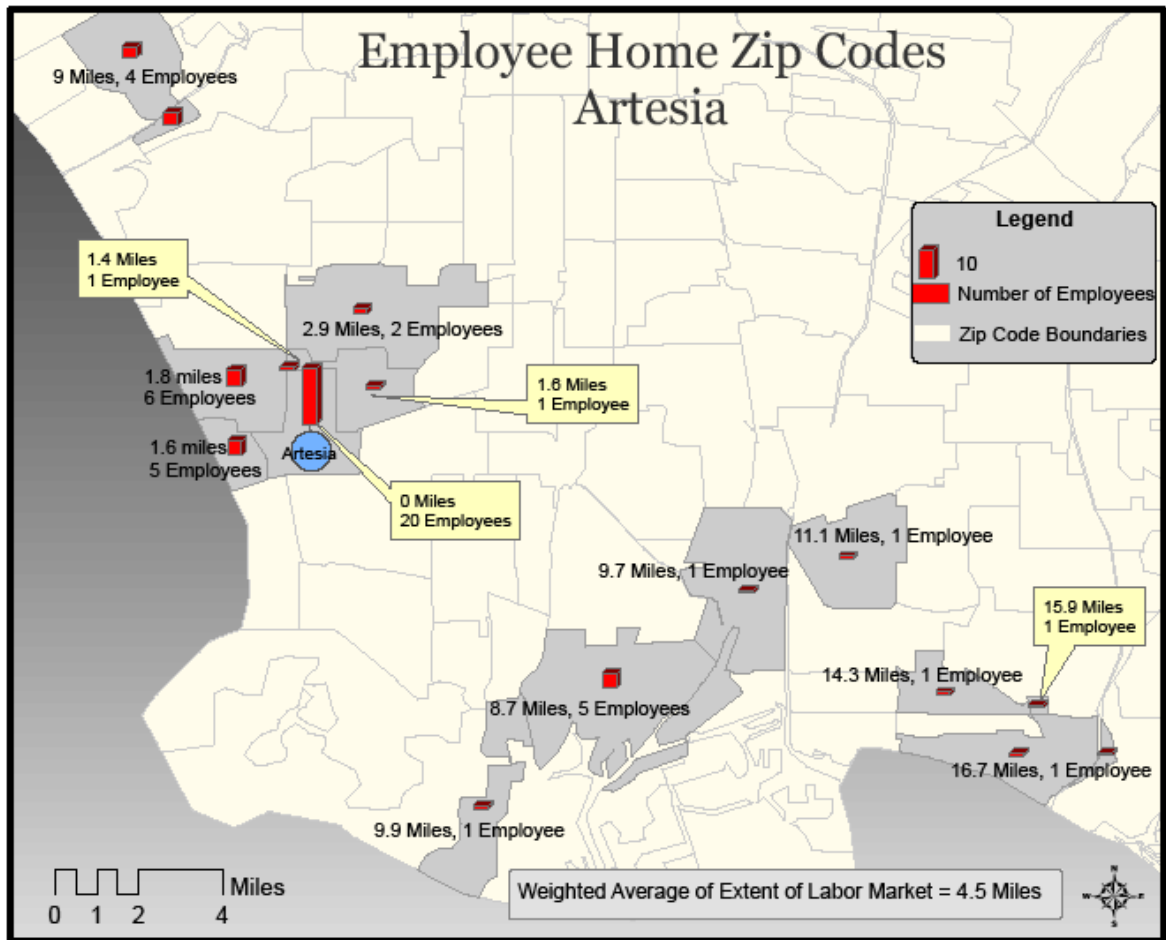
Table 14. Employee Travel Distances		
	Percent of Employees that travel more than 2 miles	Percent of Employees Who live Within 1/2 Mile
Redondo	29%	26%
Torrance	52%	8%
Inglewood	59%	13%
El Segundo	76%	8%
Hawthorne	80%	5%
Gardena	73%	12%
Artesia	59%	18%

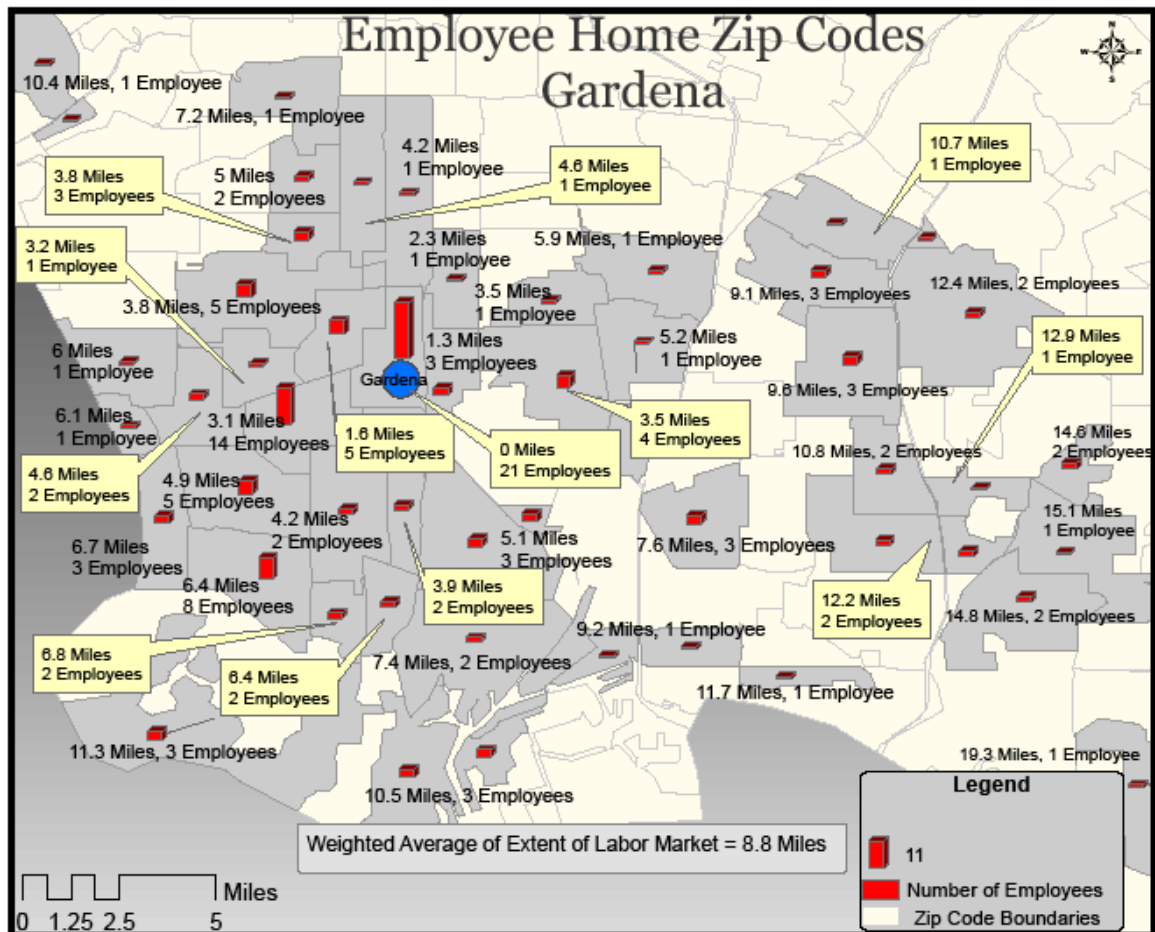
If the distance figures are accurate to an order of magnitude, then each study center is likely generating about 20 million VMT per year in autos for the journey to work. Substantially less in Riviera Village and Artesia due to the relatively small work force and short distances; a little more in Gardena and Old Torrance.

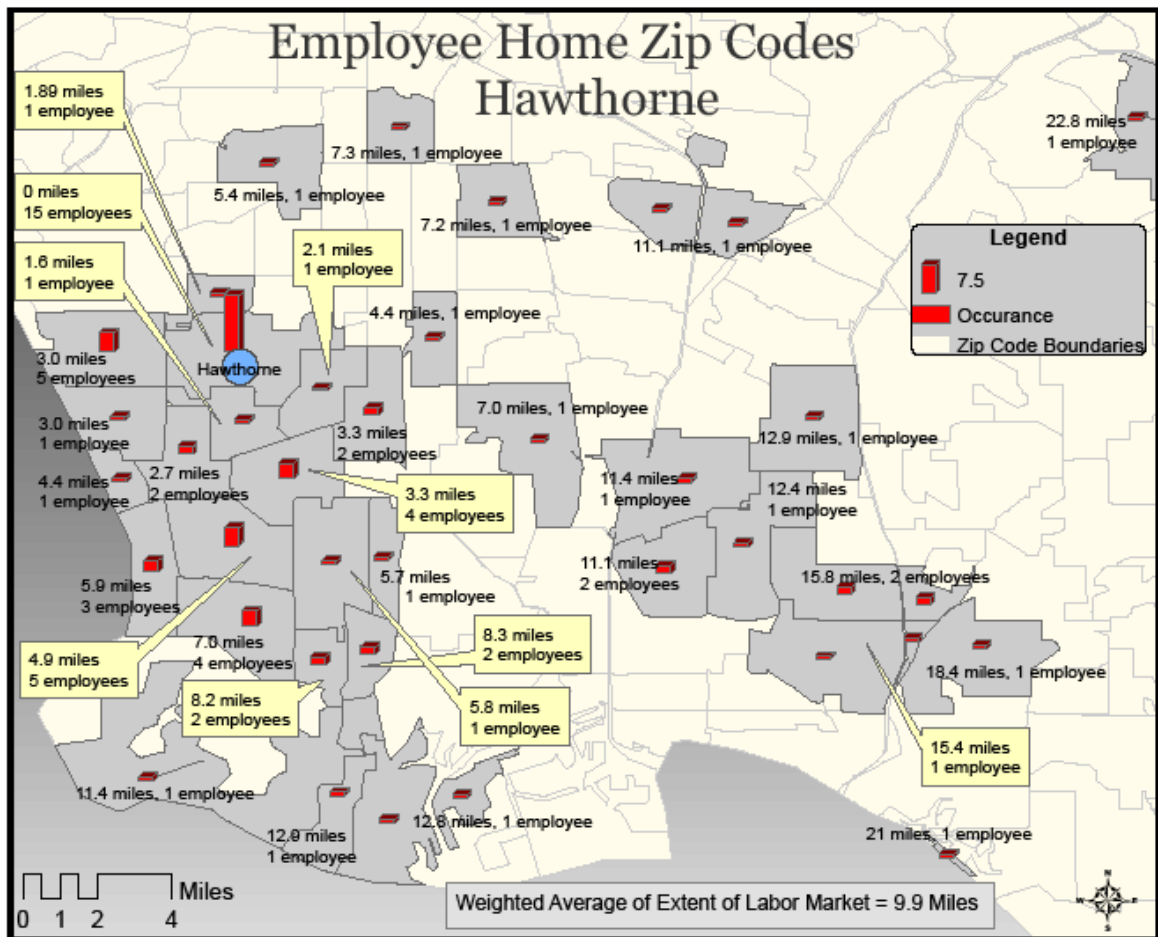
Employees of course are an important component of the economic success of each commercial area. They provide one source of demand for center goods and services from outside the residents. In the ideal smart growth center, many employees would live and work in the center. On average, employees tend to live too far away to walk, two centers are on the edge of neighborhood vehicle distance, and 5 are beyond neighborhood vehicle distance. However, the next table breaks the data into travel distances less than .5 miles and more than 2 miles. From that, over 10% of the employees of 5 of the study areas live within walking distance of .5 mile. Between 20% in Hawthorne and a very substantial 71% in Riviera Village live within 2 miles, a distance well suited to neighborhood vehicle use. In other words, assuming the employee data are even remotely accurate, neighborhood vehicles could substantially reduce the VMT generated by the journey to work with no changes to land use.

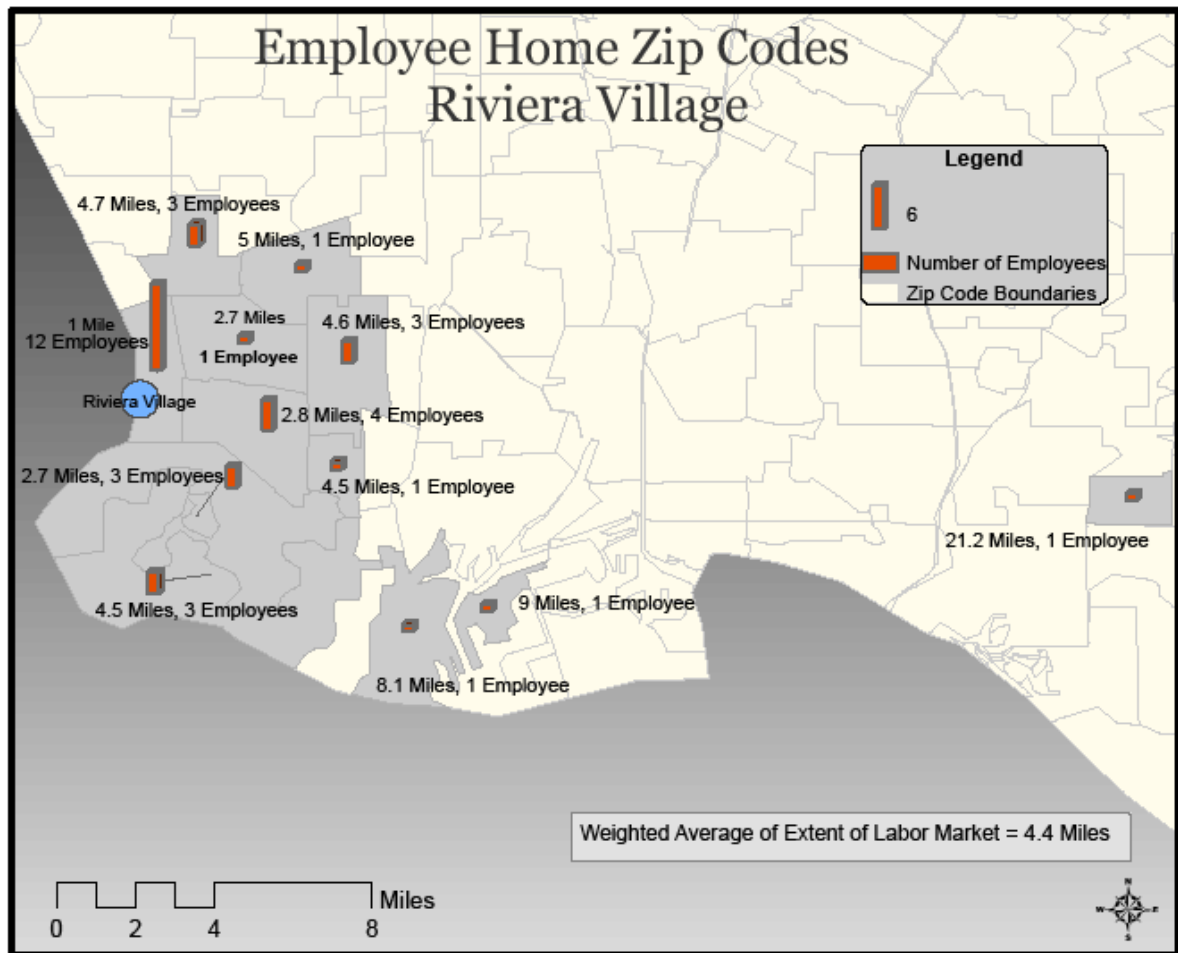
On average, employees tend to live too far away to walk, two centers are on the edge of NEV distance, and 5 are beyond NEV distance.

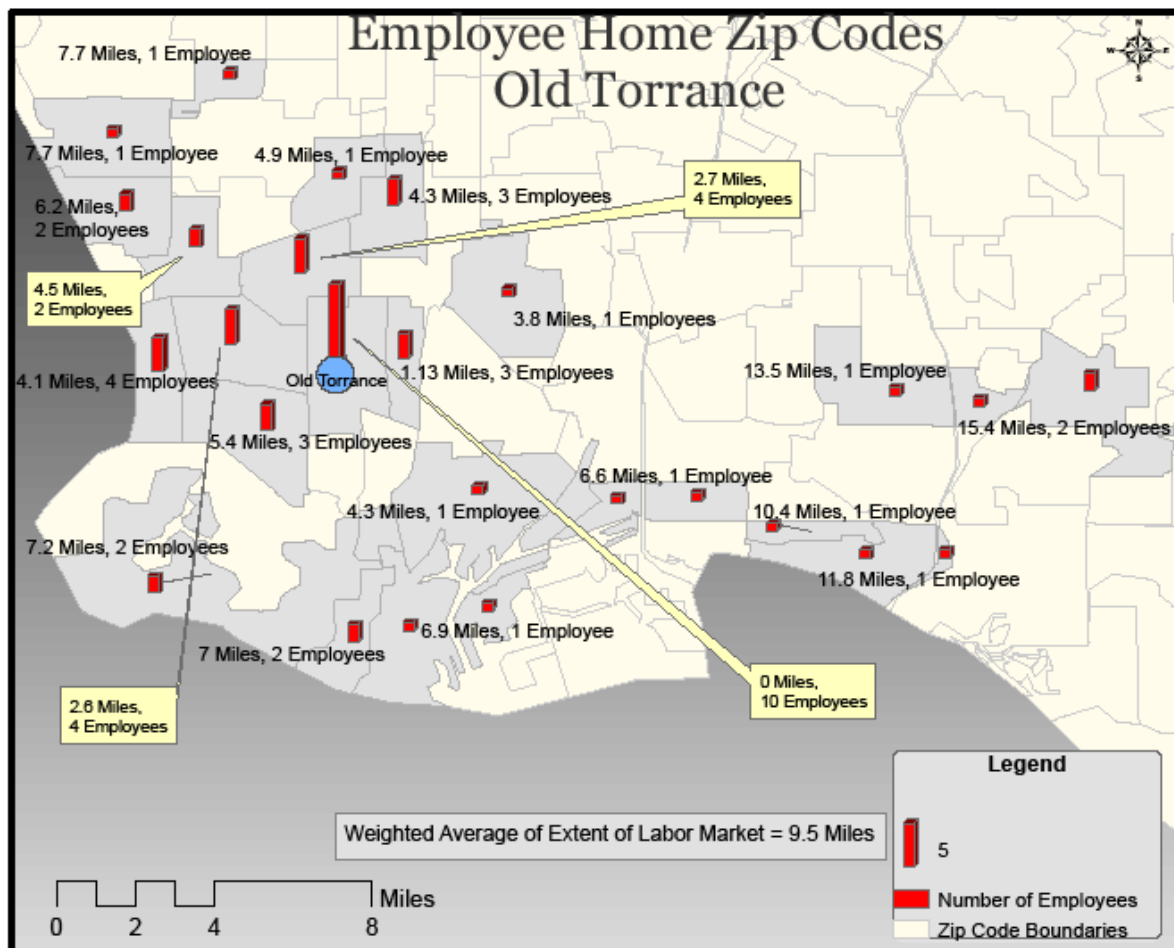












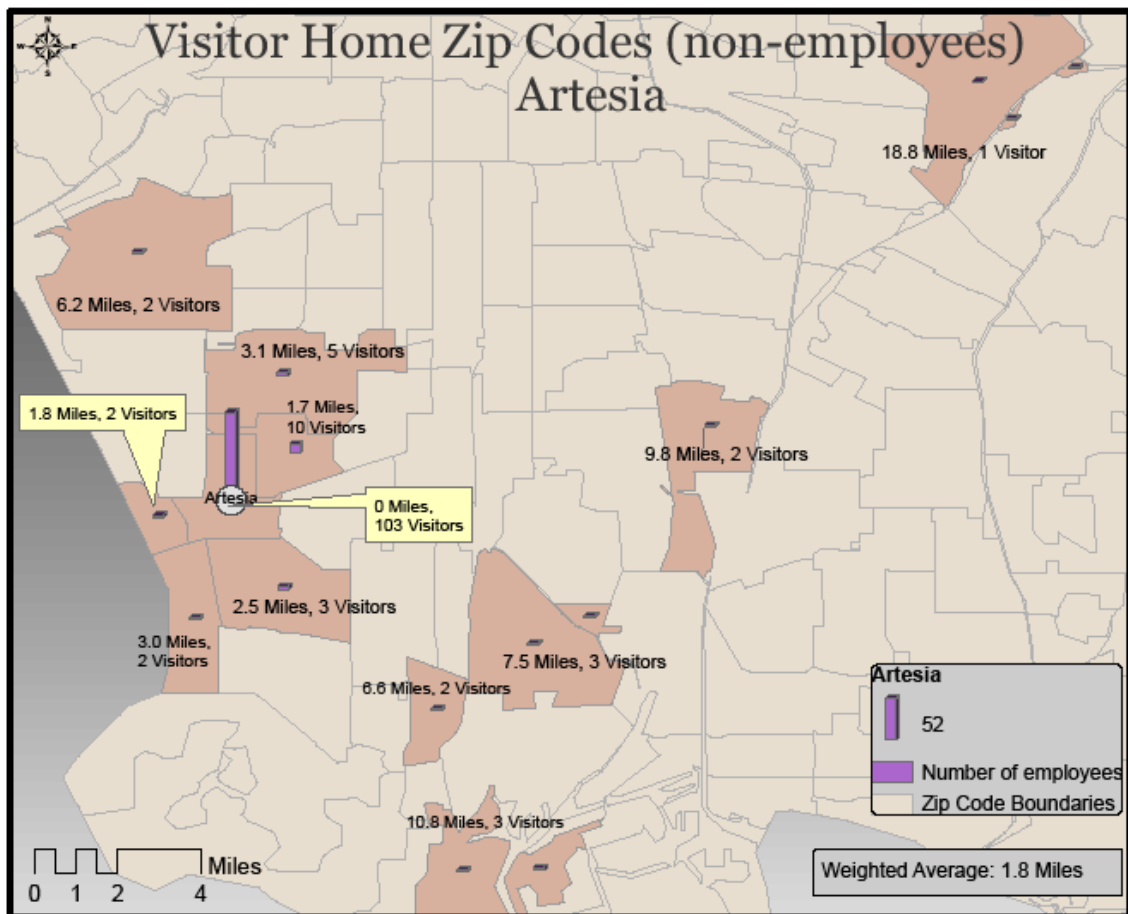
Visitor Travel Behavior

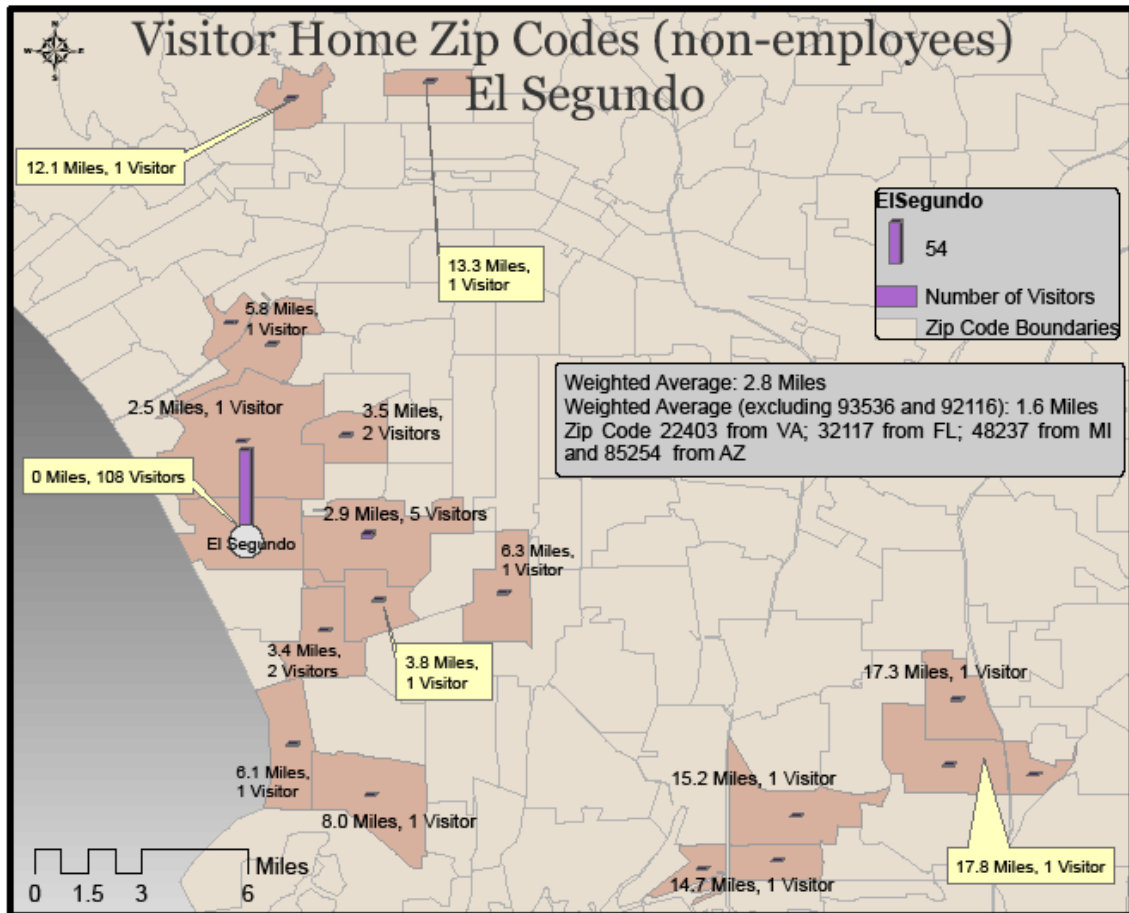
People walking around each center on the same days of the week and at the same times across study areas were stopped by interviewers and asked questions about where they live, purpose of the visit and mode of travel. The data collected are not statistically valid but can provide an impression of the extent of the draw of each commercial district. As with distances to the centroid of the employee's zip codes, the figures have been inflated by 20% to account for driving distances. These figures have had the employees removed since employees were addressed through the employer cooperation and we did not want to double count.

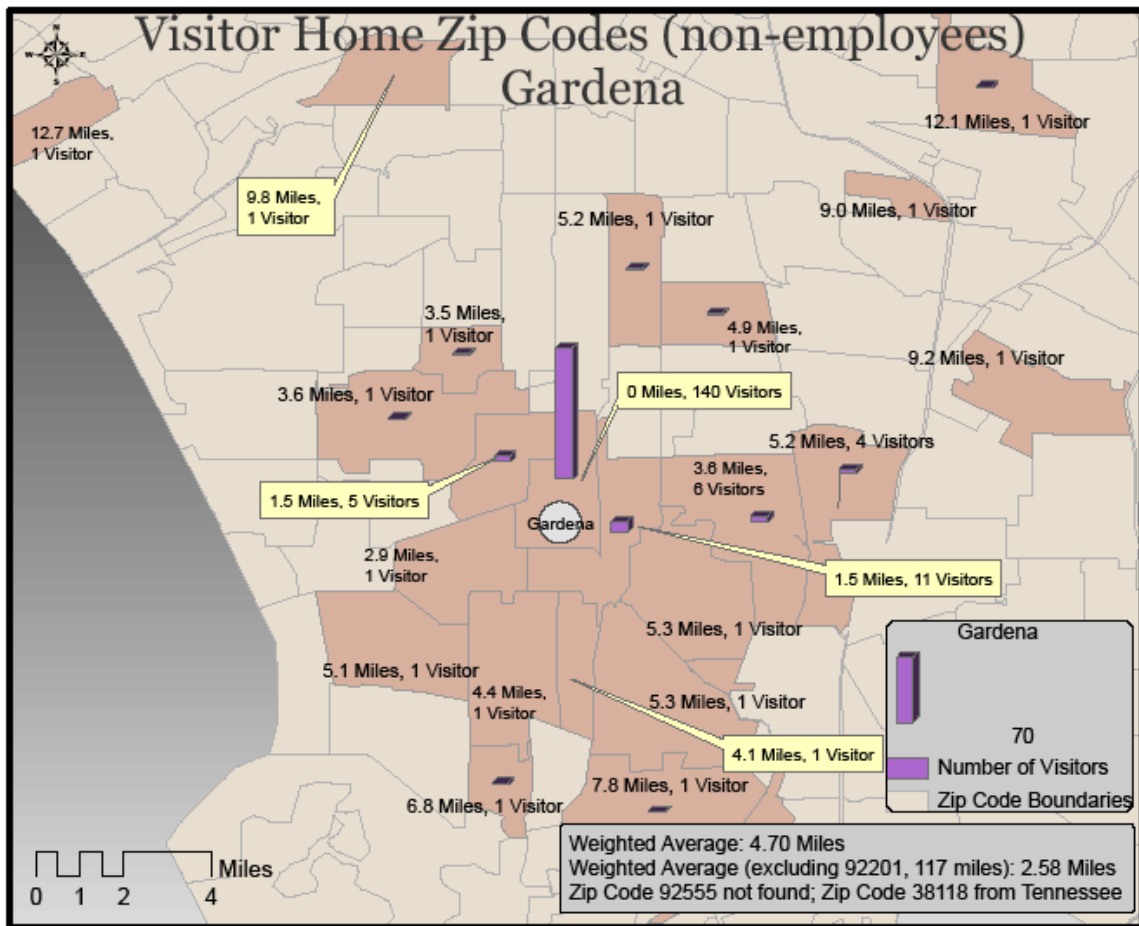
Table 15. Weighted Average of Visitor Miles Traveled to District	
El Segundo	2.0
Artesia	2.2
Riviera Village	2.2
Inglewood	2.9
Gardena	3.2
Hawthorne	5.0
Torrance	5.0
PCH	5.7

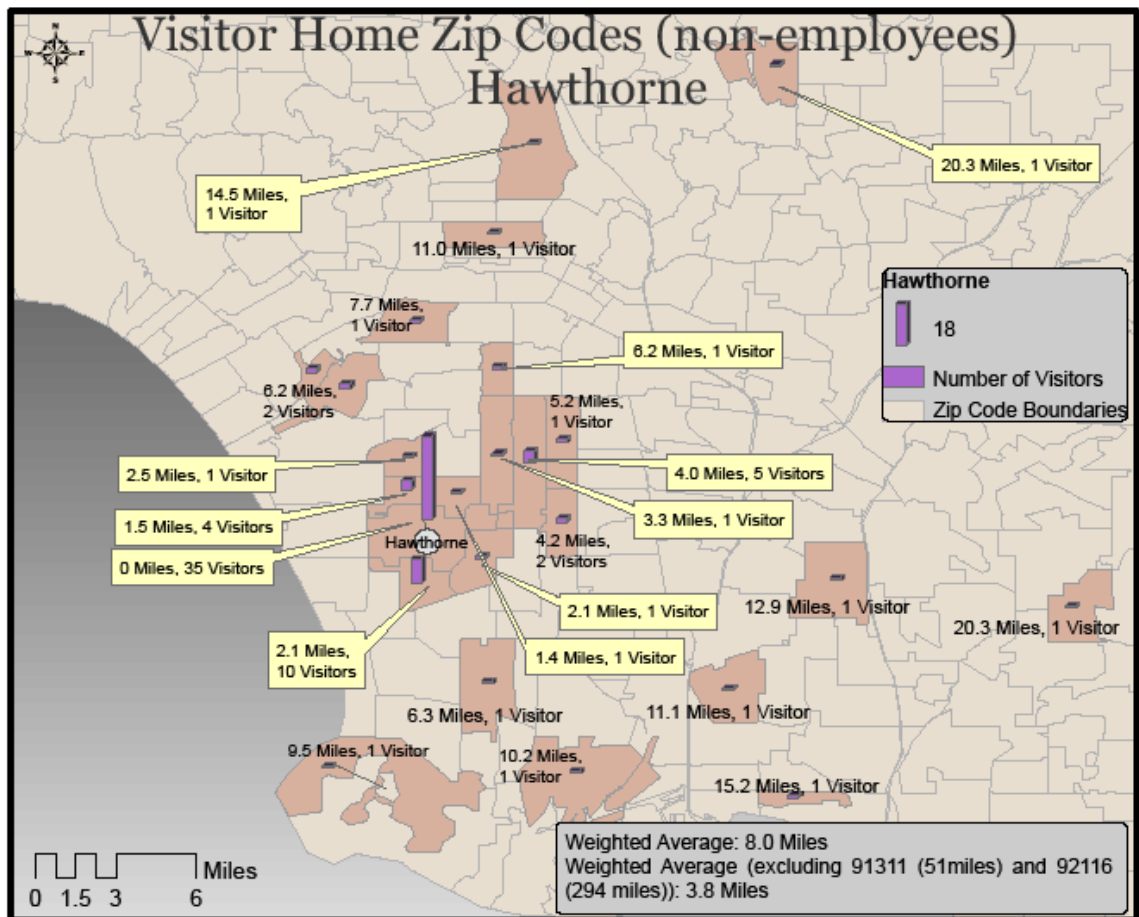
Virtually every center could be accessed by a neighborhood vehicle. The following table makes that point even more effectively. Somewhere between 2/3 and 90% of the non-employee visitors interviewed lived within 5 miles of commercial district in every study area.. In every case, between 1/3 and ¾ lived within one half mile.

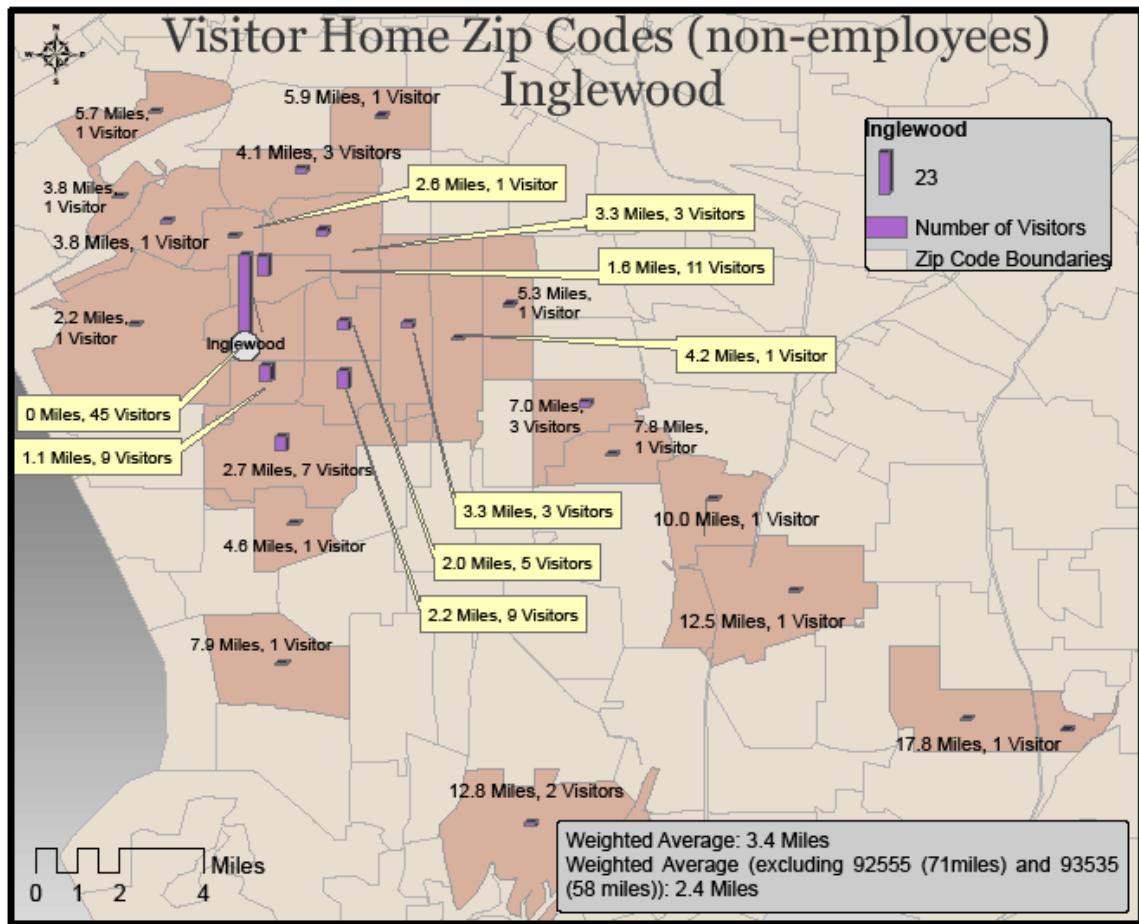
Table 16. Visitor Distances- Percent					
	Approximate Miles				
	0-.5	.5-2	5-Feb	<5	>5
Centers					
El Segundo	73.8	0	11.5	85.3	14.7
Old Torrance	38.9	5.2	19.6	66.3	33.7
Riviera Village	31.7	0	50	81.7	18.3
Inglewood	35.2	13.4	22.5	71.8	28.2
Corridors					
Artesia	67.4	6.48	8.5	82.1	17.9
Gardena	74.4	7.1	9.4	92.1	7.9
Hawthorne	42.5	6.7	23.9	75.4	24.6
PCH	14.2	4.5	42.6	63.1	36.9

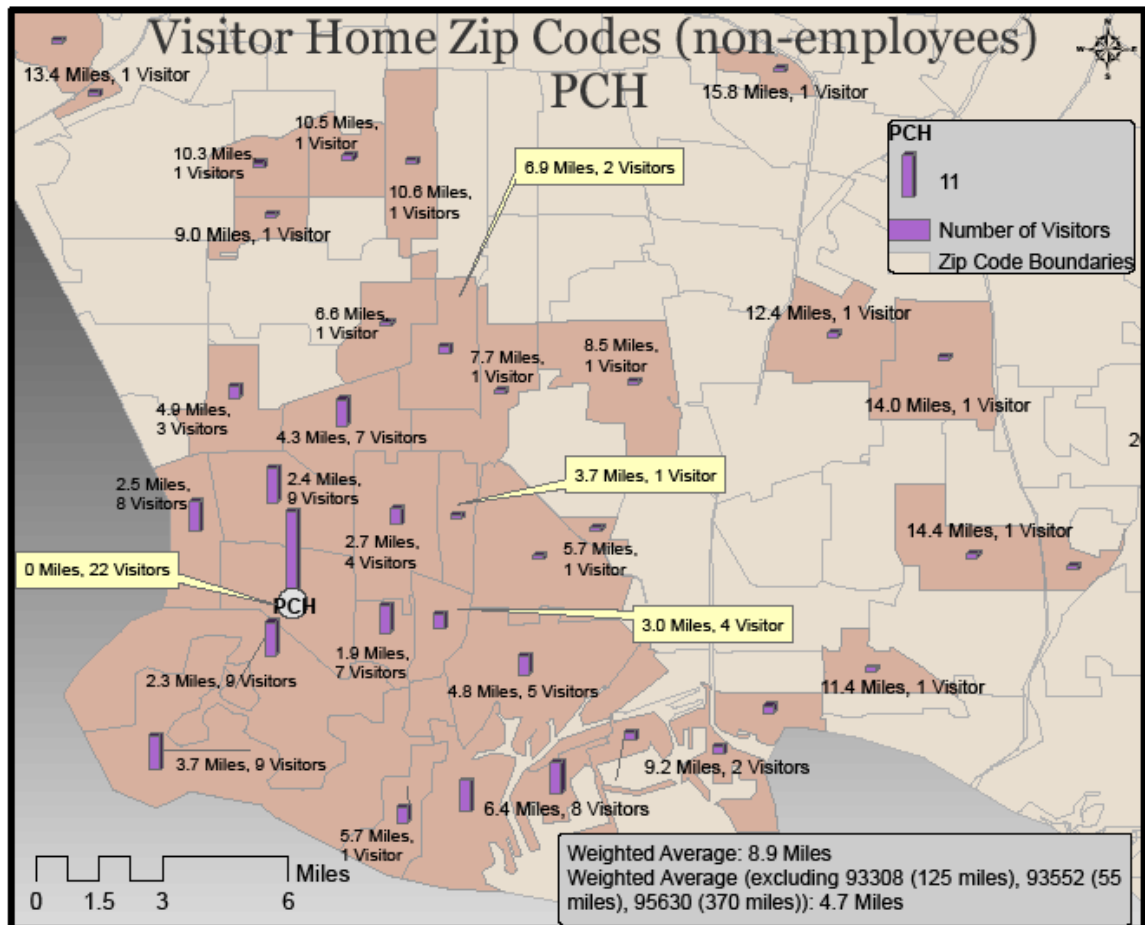


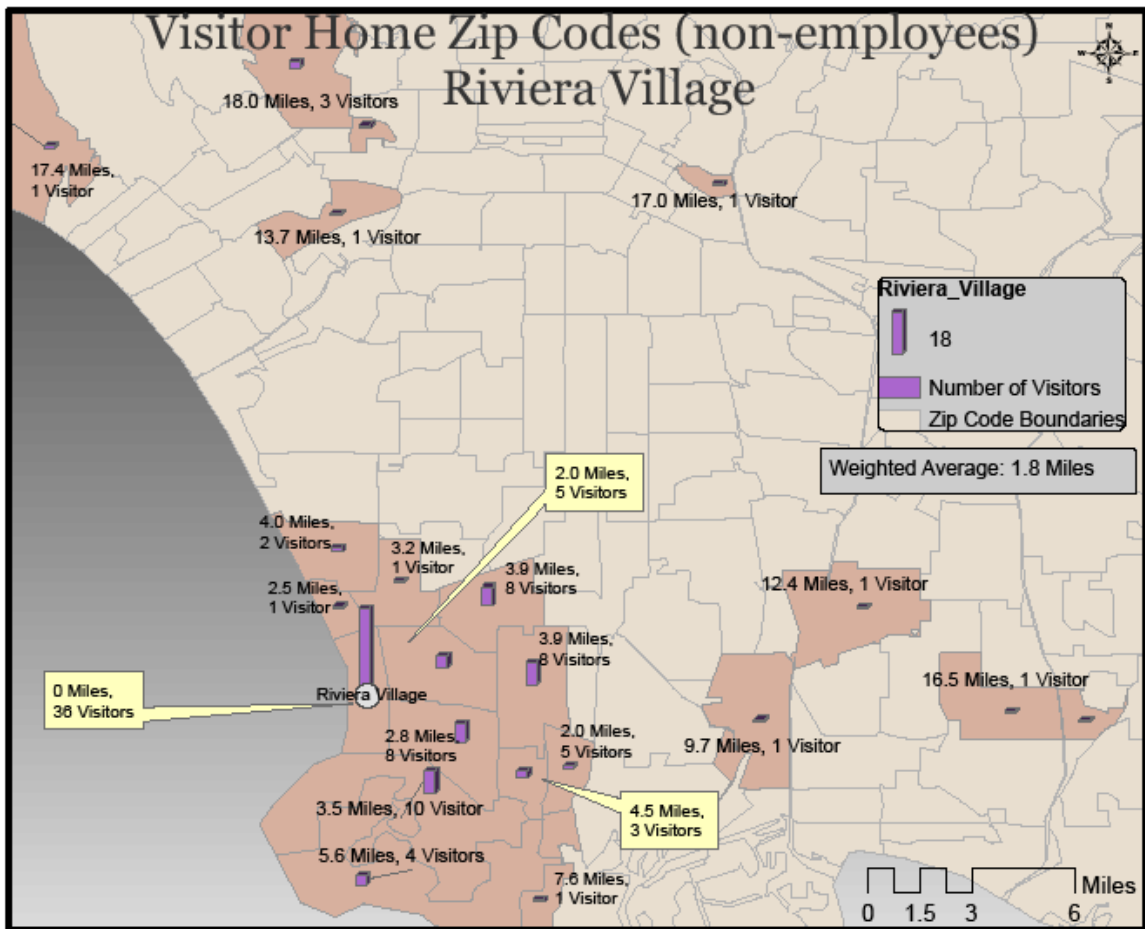


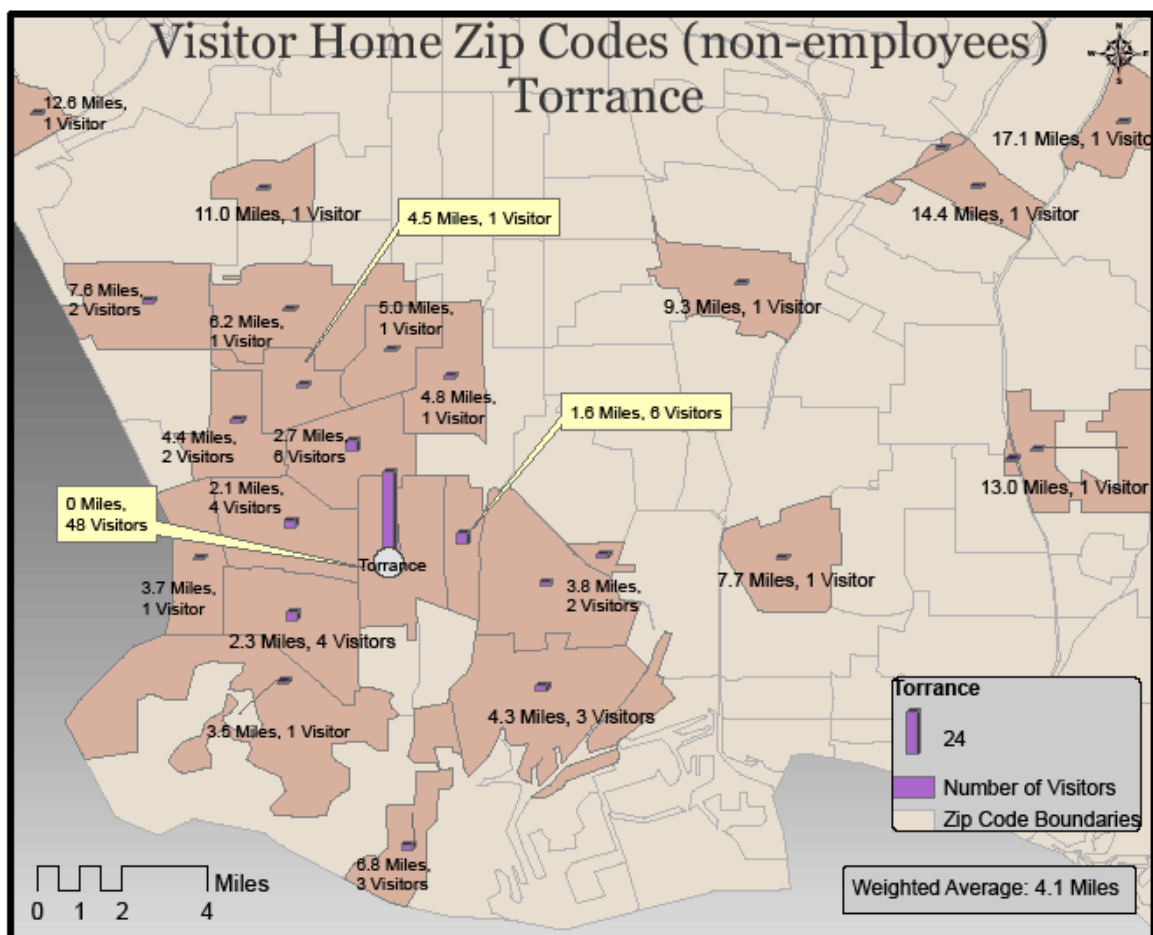












Distance by Trip Type

The residential survey asked for the frequency, mode and distance (in categories) for different types of trips: eating a meal out, grocery shopping, personal shopping, and personal services are the most significant.

Although there are overlaps, the residents of centers stayed within their neighborhoods for the 4 trip purposes more of the time than did corridor residents. According to the regression analysis, this is because of the functional concentration of centers.

Center residents stayed closer to home than did corridor residents even when leaving their neighborhoods when traveling for personal services and to eat out. But when buying groceries and personal shopping both center and corridor residents traveled over two miles roughly the same percentage of time. Assuming personal shopping translates into visiting a mall, it would make sense that residential origin would not make a significant difference.

Even in the high capture neighborhoods of Riviera Village and Old Torrance, residents traveled over 2 miles most often for personal shopping (about 1/3 of the time) and eating out (25%-40% of the time).

The leakage of demand out does not appear as significant a VMT generator as the trips into the study areas, but is still a factor. This is true because of the heavy reliance on the automobile, especially in the corridor neighborhoods.

Table 17. Trips for Personal Services							
Stayed in the Neighborhood < .5 Miles				Left Village > 2 Miles			
Centers		Corridors		Centers		Corridors	
RV	52%	PCH	25%	RV	13%	PCH	22%
OT	45	Haw	28	OT	18	Haw	35
Ing	54	Gard	25	Ing	23	Gard	34
ES	32	Art	19	ES	28	Art	32

Table 18. Shop for Groceries							
Stayed in the Neighborhood < .5 Miles				Left Village > 2 Miles			
Centers		Corridors		Centers		Corridors	
RV	55%	PCH	18%	RV	8%	PCH	24%
OT	27	Haw	26	OT	30	Haw	23
Ing	52	Gard	32	Ing	22	Gard	16
ES	23	Art	25	ES	26	Art	321

Table 19. Trips for Personal Shopping							
Stayed in the Neighborhood < .5 Miles				Left Village > 2 Miles			
Centers		Corridors		Centers		Corridors	
RV	36%	PCH	11%	RV	31%	PCH	34%
OT	18	Haw	20	OT	34	Haw	41
Ing	40	Gard	14	Ing	36	Gard	56
ES	16	Art	13	ES	60	Art	43

Table 20. Trips to Eat a Meal Out							
Stayed in the Neighborhood < .5 Miles				Left Village > 2 Miles			
Centers		Corridors		Centers		Corridors	
RV	36%	PCH	14%	RV	23%	PCH	37%
OT	17	Haw	21	OT	39	Haw	35
Ing	38	Gard	14	Ing	33	Gard	43
ES	27	Art	14	ES	29	Art	34

Table 21. Trips for Personal Services (Mode)							
Walking				Driving			
Centers		Corridors		Centers		Corridors	
RV	25%	PCH	7%	RV	74%	PCH	92%
OT	20	Haw	8	OT	78	Haw	91
Ing	20	Gard	1	Ing	78	Gard	97
ES	15	Art	5	ES	82	Art	94

Table 22. Trips to Shop for Groceries (Mode)							
Walking				Driving			
Centers		Corridors		Centers		Corridors	
RV	19%	PCH	1%	RV	80%	PCH	99%
OT	4	Haw	3	OT	94	Haw	97
Ing	15	Gard	2	Ing	85	Gard	96
ES	3	Art	4	ES	96	Art	95

Table 23. Trips for Personal Shopping (Mode)							
Walking				Driving			
Centers		Corridors		Centers		Corridors	
RV	7%	PCH	2%	RV	91%	PCH	97%
OT	3	Haw	1	OT	95	Haw	98
Ing	17	Gard	1	Ing	83	Gard	98
ES	7	Art	1	ES	91	Art	99

Table 24. Trips to Eat a Meal Out (Mode)							
Walking				Driving			
Centers		Corridors		Centers		Corridors	
RV	31%	PCH	5%	RV	68%	PCH	95%
OT	13	Haw	5	OT	84	Haw	93
Ing	20	Gard	2	Ing	80	Gard	97
ES	8	Art	5	ES	91	Art	94

Comparative Analysis of Study Area Characteristics

Density and Transportation Performance

The smart growth model is supposed to work by creating enough density to support both walking to many destinations and public transit service to reach the rest, at least a high percentage of the time.

According to “Creating Great Neighborhoods: Density in Your Community” (Local Government Commission in cooperation with the U.S. EPA, September, 2003), “studies indicate that the average resident in a compact neighborhood will drive 20-30% less than residents of a neighborhood half as dense.”

Studies indicate that suburban residents drive more than those in urban cores, and that a disproportionate share of the growth in aggregate vehicle miles traveled has been due to continued suburbanization. Josh Stephens, Transportation Planning Warms Up to Climate Change, Intransition, Winter, 2008 (www.intransitionmag.org)

“Note that density has been shown to have a nonlinear relationship with vehicle travel, with a threshold value of 20-30 units per acre below which the travel impacts of increased density are particularly large. [Research] found that the best single variable equations to predict household vehicle travel relied on Households per Residential Acre.”

URBEMIS Windows Users Guide
D-14, 11/07

Measuring Density: Net and Gross Density

One problem analyzing density is that density can be measured in a variety of ways, often producing different results.

Density is typically measured in terms of housing units per acre although population per acre population per square mile are sometimes used. There is also a commercial density in areas with a mix of land uses. This can be measured as square foot of commercial buildings per acre; employees per acre are often also discussed.

In this research, HU per Acre have been calculated in two ways: Housing Units divided by the total acreage of the study area and Housing Units divided by just those acres used for housing. Call them gross and net residential densities. Mixed use areas should actually be discussed in some form of residential plus non-residential density.

Areas with more land used for non-residential purposes will tend to have lower gross densities. In this study, the gross and net densities of the centers lead to the centers being ranked quite differently.

The three centers with the least residential land are so because they are also employment centers with functionally specialized districts within them. They are Inglewood which includes the civic center, County court complex and a couple of medical centers; Old Torrance which includes a high school, modest industrial area and the Honda Motors Headquarters facility; and El Segundo which includes its civic center, high school, small industrial area and an oil refinery.

So the centers, including RV which has a good number of employees (interspersed throughout the center rather than concentrated in specialized districts), have the highest net residential densities although not relatively high gross residential densities (except for Riviera Village which has the highest gross and second highest net figures). They are more of a compact mix of origins and destinations (for residents, employees, and visitors).

Scale

An important dimension of density is its scale. A high density of 30 HU per acre would function and be experienced quite differently if there was one acre of it VS 1,000 acres.

Table 25. Residential Density vs. Acres			
	Net Density	Residential Acres	
Inglewood	25.4	171	Employment center in districts
Riviera Village	20.2	222	Employment center dispersed
Hawthorne S.	20.1	271	
Old Torrance	20.0	129	Employment center in districts
El Segundo	18.6	141	Employment center in districts
Hawthorne N.	18.2	260	
Artesia E.	16.9	246	Galleria district
Artesia W.	14.9	326	
Gardena	14.7	594	

Observations:

Centers VS Corridors:

Centers tend to be more dense than corridors. Net residential densities in centers range from El Segundo (18.6 DU/A) to Inglewood (25.4 DU/Acre). These net residential densities reflect the fact that all suburbs are in some state of re-development.

Density Dynamics: Over time, the market place drives density within the constraints of public policy. Initially, developers absorb the available vacant land. As vacant land disappears and land value appreciates over time, buildings depreciate through age and obsolescence. At some point, maintenance is no longer a viable option and the best economic case is for replacement. When developers pay a high acquisition cost for the land and also face demolition costs, an economic case can be made only for a bigger building.

Political opposition holds density down by delaying re-development of properties where higher density has been proposed, especially at scales of re-development that would affect quality of life factors such as traffic congestion.

Resistance to increasing density – and hence to building replacement – becomes more strident over time as the average densities creep upward a project at a time. Also whatever VMT benefits result from density diminish as density increases and the density increment decreases.

Mature suburbs will be best served by a different strategy.

General – high residential density is generally found where there is a low amount of residential land. Conversely low residential density goes with high amounts residential land.

Of the 9 study areas, the 5 with the greatest residential densities (including the median ES) the 4 that also include employment have the lowest amount of residential land.

The area with the lowest residential density, Gardena, has the most residential land.

Structure of Residential Density

An important dimension of density is the way in which the density is created. In order to understand that underlying structure, we looked at the distribution of housing units by units in a building.

Here are tables of net residential densities and the acreage on which it is located.

Table 26. Housing Density Statistics Riviera Village

Densest of the Study Areas with 17 units per acre						
Least amount of acres next to El Segundo						
Bulk of its housing is in the range of 3 unit housing to 49 unit housing						
Comparatively it ranks in the middle as far as SF Detached	Single-Family Detached	Single-Family Attached	Duplexes	Triplexes & Fourplexes	5-9 Units	10 or more units
36% of its housing consists of buildings of 10 or more units. This ranks second of the study areas	32.54%	3.70%	1.90%	7.58%	18.32%	450
3rd Largest proportion of housing with 5-9 and 20 to 49 units						
Visually the denser housing seems to lie near the center						
The bulk of the single family housing is farther away on the north and south east edges						

Table 27. Housing Density Statistics Downtown Inglewood Total

2nd Highest Density. 3rd largest amount of acres and households						
Ranks as one of the highest in number of housing units 5-49 and Housing units 50+						
Lowest in SF detached	Single-Family Detached	Single-Family Attached	Duplexes	Triplexes & Fourplexes	5-9 Units	10 or more units
Highest portion of housing stock is in housing of 19 or more units at 40% and housing of units 5-9 at 26%. This is the highest ranking in these terms in the study areas.	14.27%	8.02%	2.67%	8.88%	26.46%	39.70%
Seems to be relatively dense with housing around the center. The multi family seems to be nestled around the perimeter with a little amount of single-family						

Table 28. Housing Density Statistics El Segundo

Least amount of acres, second least amount of households yet ranks as the third densest area						
31% percent of its housing stock is of buildings of 5 to 9 units. This ranks as the first in proportion of housing 5-9 units.	Single-Family Detached	Single-Family Attached	Duplexes	Triplexes & Fourplexes	5-9 Units	10 or more units
	28.96%	7.81%	7.81%	12.69%	30.75%	14.52%
Seems to be a lot of multi-family around the perimeter and to the south of the center. Single family residences are much more visible to the north away from the refinery.						

Table 29. Housing Density Statistics Hawthorne Total

Ranks in the middle as far as density. 2nd largest amount of acres and households						
Some of the highest ranking numbers of all categories	Single-Family Detached	Single-Family Attached	Duplexes	Triplexes & Fourplexes	5-9 Units	10 or more units
Highest proportion is in Housing of 10 or more units and SF detached	26.93%	10.67%	4.00%	11.60%	16.47%	29.24%
Seems to be a lot of both single family and multi-family around the corridor						
Visually it looks like one of the densest areas. Hard to visually differentiate between single and multi family. It seems to share a more balanced percentage of each housing category than do the other areas. Single family detached and attached account for around 38% of its housing stock						

Table 30. Housing Density Statistics Artesia

Ranks as third least dense. Largest amount of acres and households						
Highest proportion is in Housing of 10 or more units and SF detached						
Ranks amongst the highest in Single Family homes and housing with units of 3 to 4	Single-Family Detached	Single-Family Attached	Duplexes	Triplexes & Fourplexes	5-9 Units	10 or more units
Stays in the middle from Housing units of 5 to 50+	39.72%	19.94%	2.21%	16.77%	11.78%	9.46%
Highest proportions of SF						
Single family homes dominate the housing mix and percentages of Housing with 5 to 10 or more units only account for around 20% of the housing mix.						
Artesia also looks very dense housing wise like Hawthorne. SF homes detached and attached account for 60% of its housing stock						

Table 31. Housing Density Statistics Downtown Torrance

Second least dense. Slightly larger in acres than Riviera and El Segundo. Smallest number of Households						
Lowest amounts of all types of housing						
Largest proportion of Duplexes	Single-Family Detached	Single-Family Attached	Duplexes	Triplexes & Fourplexes	5-9 Units	10 or more units
Single family residences substantially dominate the housing mix. Housing of 10 or more units follows	47.63%	8.08%	10.38%	11.14%	6.41%	16.36%
Has 110 less Housing of Units of 50+ than Riviera Village						
Less visually dense than Artesia and Hawthorne. To the east and north of the center are rather large areas that are not filled with housing. SF detached and attached account for 56% of housing stock						

Table 32. Housing Density Statistics Gardena

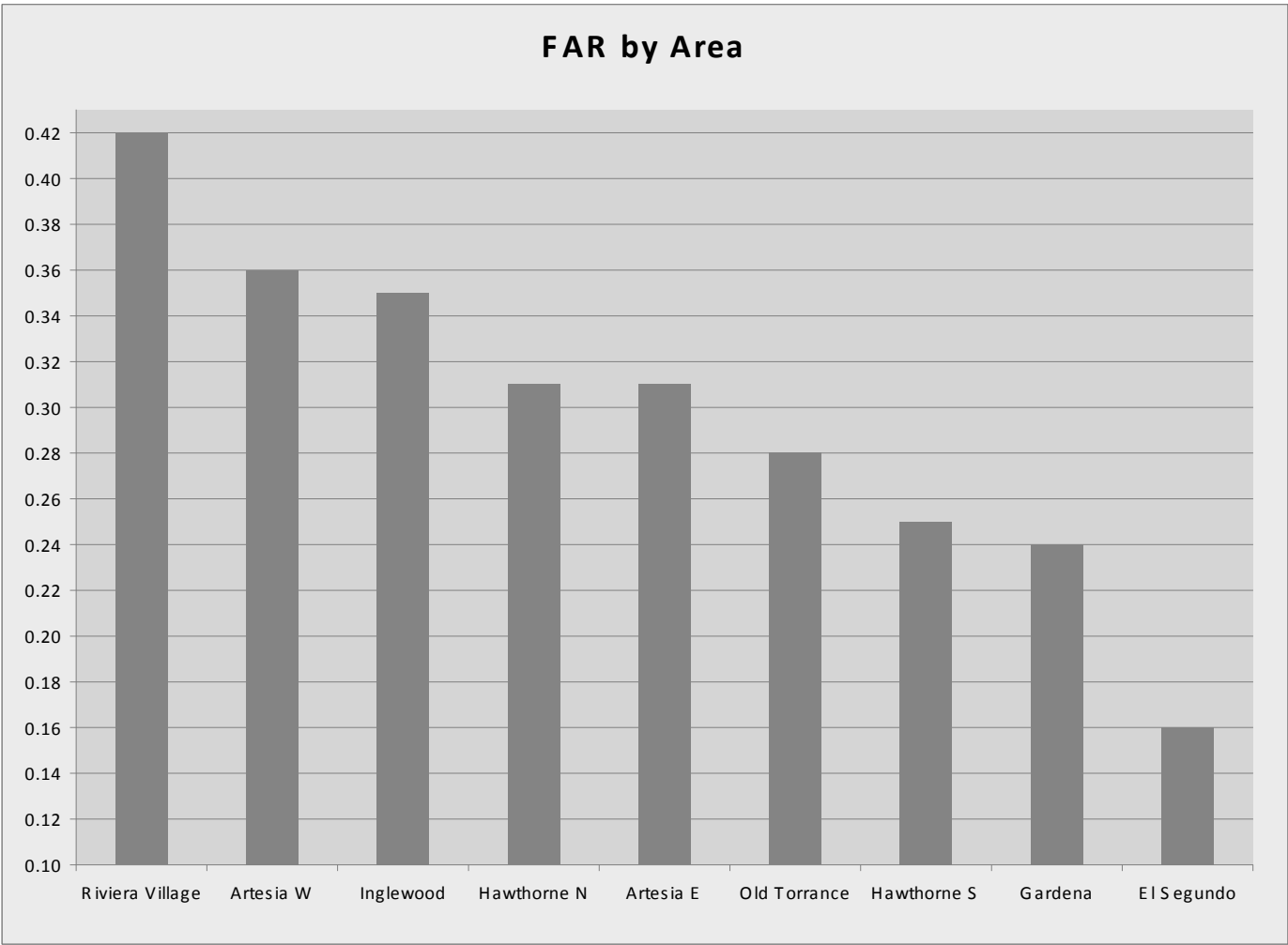
Least Dense. Third largest amount of acres and households						
Lies around the middle for amounts of all types of housing						
Ranks in the middle for proportions as well	Single-Family Detached	Single-Family Attached	Duplexes	Triplexes & Fourplexes	5-9 Units	10 or more units
It differs greatly from the other areas as far as acres yet does not rise in proportion with households. For example RV and Gardena have a 600 acre difference and around a 2,500 difference in households. RV and El Segundo have only a 60 acre difference and around a 2,000 difference in households.	37.32%	9.83%	5.51%	14.75%	12.46%	16.40%
Also less visually dense than Artesia and Hawthorne. Large swaths with no housing. SF detached and attached account for 47% of housing stock which is less than DT's proportion. Yet DT and Gardena share a 500 acre difference while only a 2,500 number household difference						
Gardena's low density rankings seem to be caused by its acreage definitions						

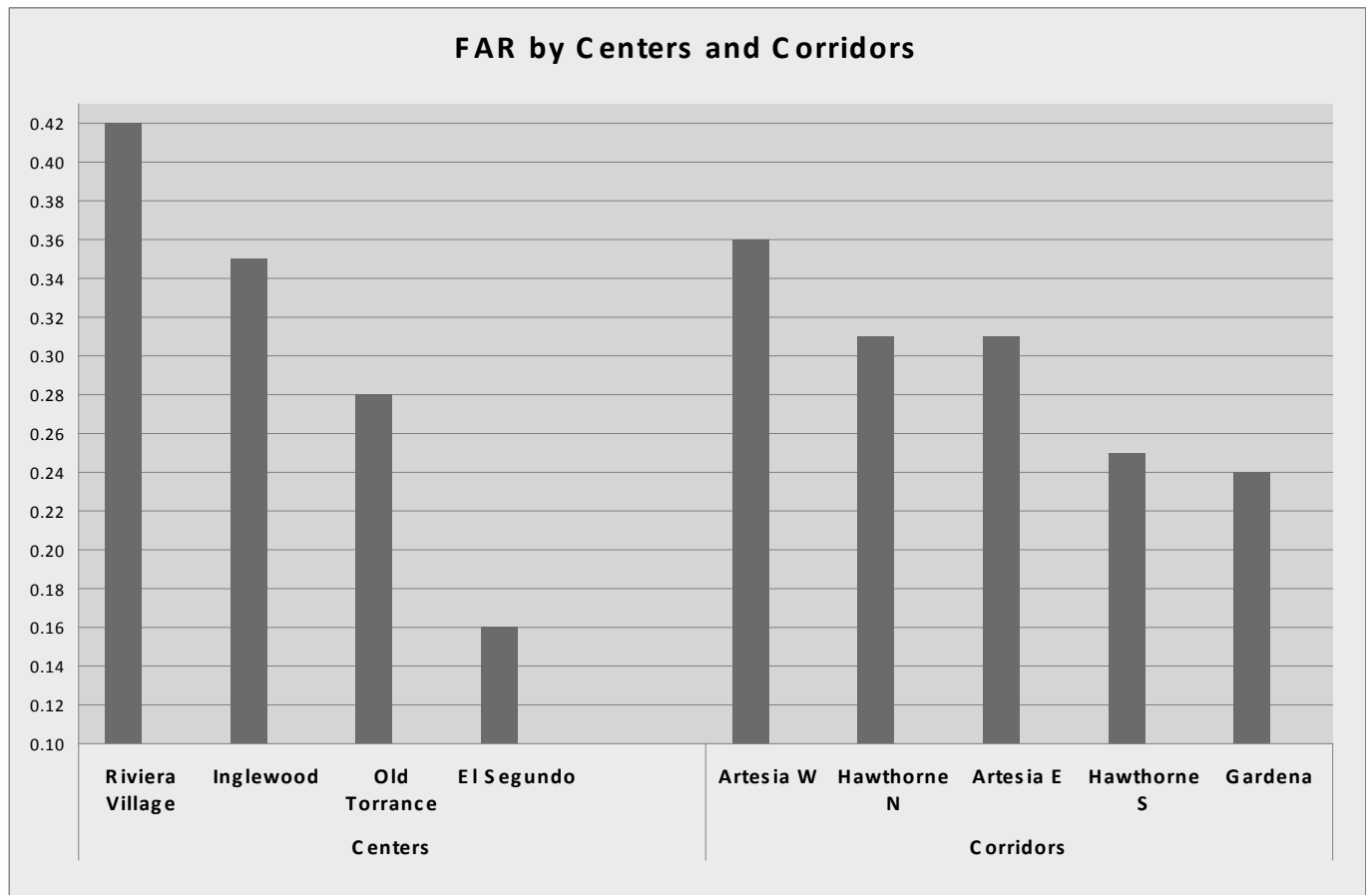
Table 33. Residential Densities

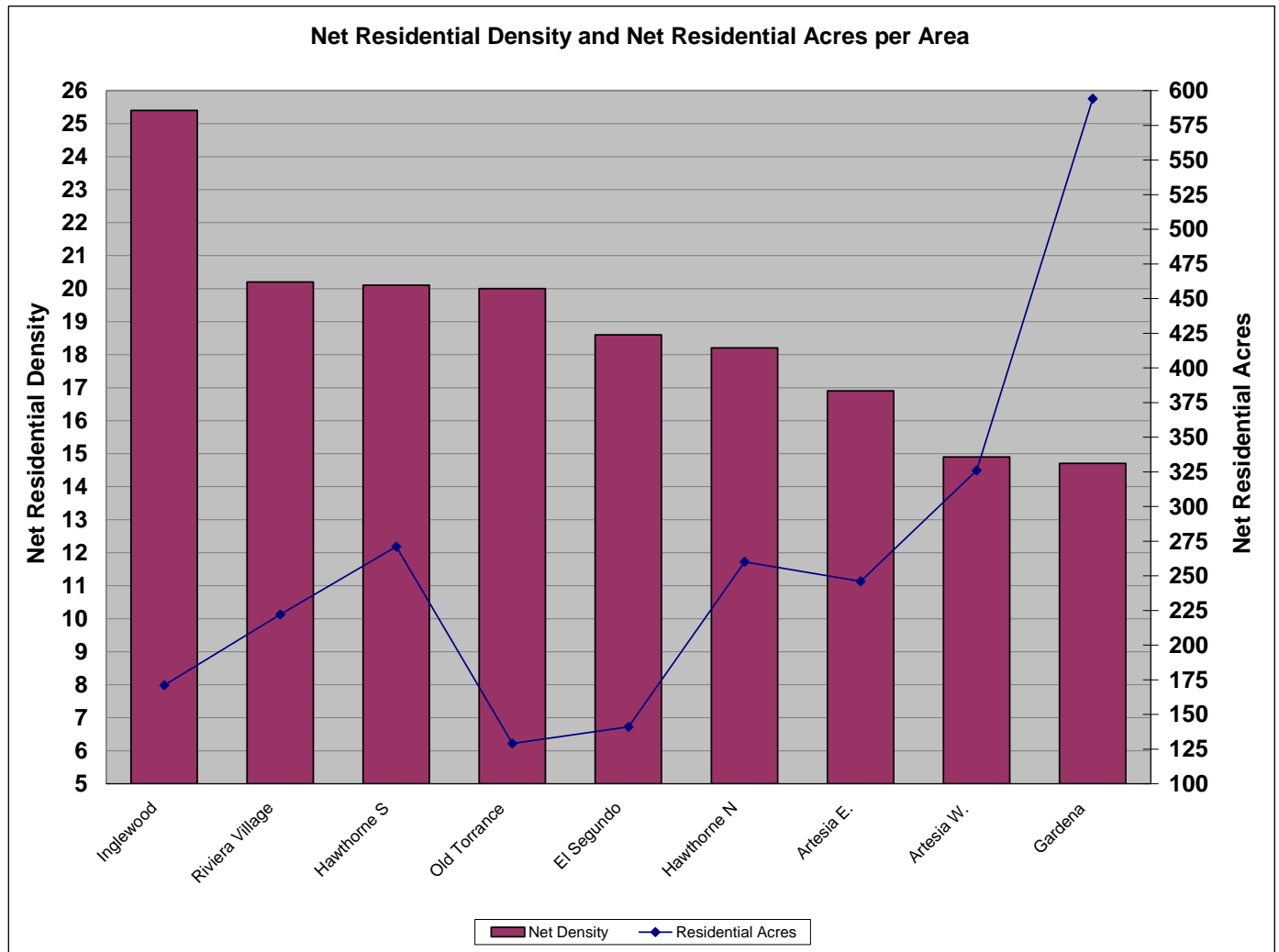
	Net Residential Density	Gross Residential Density	Population
Inglewood	25.4	12.4	10,589
Riviera Village	20.2	15.0	8,154
Hawthorne S.	20.1	13.0	
Old Torrance	20.0	9.2	5,436
El Segundo	18.6	5.8	5,377
Hawthorne N.	18.2	13.6	
Artesia E.	16.9	10.6	
Artesia W.	14.9	11.6	
Gardena	14.7	10.0	24,477
PCH		8.1	10,530

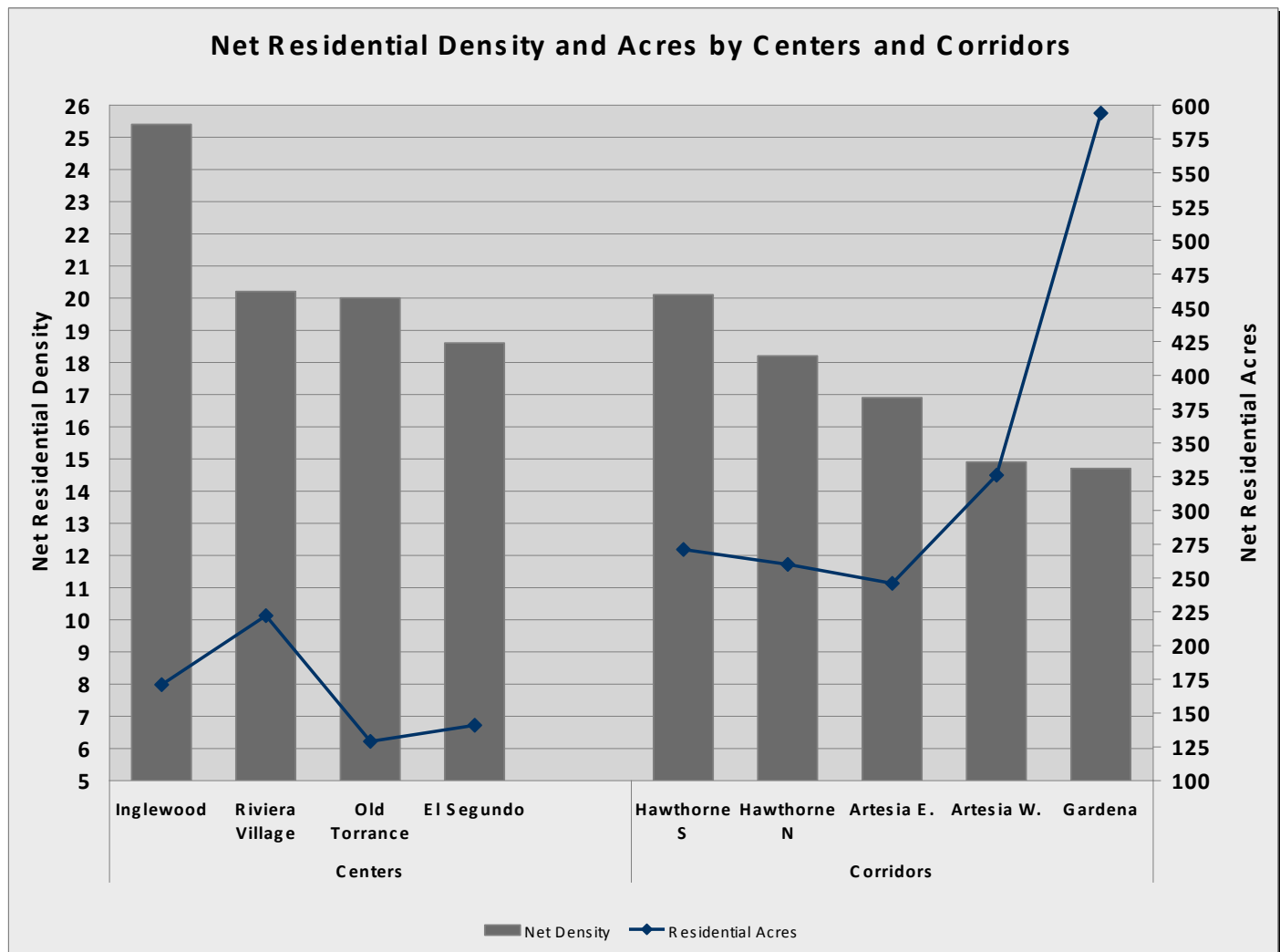
Table 34. Housing Unit Densities

	Net Density DU/Acre	Residential Acres	Population	Net Population Density
Inglewood	25.4	171	10,589	61.9 p/a
Riviera Village	20.2	222	8,154	36.7
Hawthorne S.	20.1	271	13,887	51.2
Old Torrance	20.0	129	5,436	42.1
El Segundo	18.6	141	5,377	38.1
Hawthorne N.	18.2	260	14,983	57.6
Artesia E.	16.9	246	10,281	41.8
Artesia W.	14.9	326	11,140	34.1
Gardena	14.7	594	24,477	41.2









Conclusions

Density is supposed to support transit service with the assumption that the capture rate will be high enough to economically support transit. The problem with this is that transit use is most related to income. As soon as anyone can afford it, they acquire an auto. Consequently, excellent transit in an affluent neighborhood will potentially capture few residents and be used almost exclusively by the few service workers who are employed by the affluent residents. While this is not an insignificant contribution to regional mobility, it ultimately has little to do with the density at the affluent end.

FAR is high in a good performing center (Riviera Village) and low in a poor performing center (El Segundo), but in general there is significant overlapping not correlated with performance. This suggests the building envelope may not be a good tool for improving transportation performance.

Functional Analysis

One of the most significant characteristics of a neighborhood is likely to be the functions (or businesses or activities) that are located there. The following is an analysis of the pattern of functionality in each study area, beginning with the issue of how functionality in centers and corridors differs from that in retail malls.

The North American Industrial Classification system was used to organize data from InfoUSA commercial data base. The highest level of NAIC codes are two-digit and they go down to six-digits. This analysis focused on the two-digit level but touches a little on both three and four-digit code level.

Functional Analysis

Two Digit NAIC Code

Source: Bar Charts, Source Tables

There are 20 two digit NAICs

11	Agriculture, Forestry, Fishing and Hunting
21	Mining, Quarrying, and Oil and Gas Extraction
31-33	Manufacturing
42	Wholesale Trade
44-45	Retail Trade
48-49	Transportation and Warehousing
51	Information
52	Finance and Insurance
53	Real Estate and Rental and Leasing
54	Professional, Scientific, and Technical Services
55	Management of Companies and Enterprises
56	Administrative and Support and Waste Management and Remediation Services
61	Educational Services
62	Health Care and Social Assistance
71	Arts, Entertainment, and Recreation
72	Accommodation and Food Services
81	Other Services (except Public Administration)
92	Public Administration
22	Utilities
23	Construction

23 counting the double codes

All of the 20 are businesses with employees and generate demand for VMT for the journey to work. Four of them substantially generate VMT by customers -- 44/45, 61, 62, and 72. Three more, 71, 81, and 92, include subcategories that generate VMT by customers.

Malls

We looked at 9 malls in the South Bay.

All malls are of course dominated by retail (44/45). But the degree of that domination and the combination with other categories differentiates malls from one another. Based on these functional profiles, there are two main categories of malls, and each of those has two sub-categories.

South Bay Galleria

Retail (70) + food = 84%
10 or half the categories are absent
8 categories have very small presence which total 16%

South Bay Pavilion at Carson

Retail (68) + food = 84%
9 categories are absent
9 categories have a small presence which total 19% Error

Marketplace at Hollywood Park

Retail (62) + Food = 81%
14 categories are absent
4 categories = 20%

Del Amo Fashion Center

Retail (66) + food = 84%
8 are absent
10 others total 19% Error

Promenade on the Peninsula

Reatil (62) + food = 79%
10 are absent
8 total 21% (other services at 6%)

The Plaza

Retail (88%) + food = 100%

Group 2

Manhattan Village

Retail (60%) + food = 76%

14 are absent

4 others = 21% (health care at 110%, Finance (probably banks at 7%)

Lifestyle

Retail (64%) + food = 73%

15 are absent

3 others = 27% (9 each for services, arts/entertainment, information)

Torrance Crossroads

Retail (50) + food = 71%

Services – 14%

14 absent

3 others = 15%

Group 3

Peninsula Center

Retail and food = 55%

Services = 12

10 absent

7 = 33%

The most geographically isolated has the greatest mix, but least variety – verify at 4 digit level.

Study Areas

Old Torrance

Retail (15%) + food = 23%

4 absent

14 others with a presence

Larges are retail at 15, professional/technical at 15 and services at 14

Retail + service = 29%

Riviera Village

Food + retail = 27%

6 absent

14 present, 5>10%

Retail 18, services 17, professional/technical 14, health care 13%

Retail + services = 35%

Inglewood

Retail + food = 24%

4 absent

Retail – 20, services 17, health care 14, pro/tech 8

Retail + services = 37%

El Segundo

Retail 11 = food 6 = 17%

4 absent

Pro/tech 13, Services 12, Retail 11, construction 8

Retail + services = 23%

Worst capture rate has the smallest retail and food cluster and worst retail/services cluster.

Corridors

Gardena

Retail (17) + food = 25%

4 absent

Retail 17, services 17 = 35

PCH

Retail 14 + food = 23%

6 absent

Services 20, retail 14, health care 13

(check 4 digit within retail as this is mostly home improvement)

Retail + services = 34%

Artesia

Retail 17 + food = 24%

5 missing

Retail 17, services 15, pro/tech 11, construction 10

Retail + services = 32%

Artesia at Aviation

Retail 16 + food = 22%

5 absent

Retail 16, services 14, pro/tech 12, construction 11

Retail + services = 30%

Artesia at Inglewood

Retail 21 + food = 30%

5 absent

Retail 21, services 18, pro/tech 10, health care 10

Retail + service = 39%

Hawthorne

Retail 15 + food = 22%

4 absent

Services 18, retail 16, health care 9

Service + retail = 34%

Hawthorne at El Segundo

Retail 17 + food = 26%

4 absent

Retail 17, service 16, health care 14

Retail + service = 33%

Hawthorne at Rosecrans

Retail 15 + food = 23%

5 absent

Services 17, Retail 15, real estate 10

Retail + service = 32%

Malls are in 3 groups

Retail and food dominate VS slightly more mixed, VS very mixed in most geographically isolated.

Centers and Corridors are equally structured around retail and services but at around 1/3 with a much greater mix. Centers tend to a slight more pro/tech meaning they are more job centers.

Observations

Malls

Malls are classic well designed and landscaped walking environments. Consumers drive once, park in the ample lots (either surface or structured), and walk everywhere from there. Their main problems from a transportation perspective are that

- the shopping functionality tends to be concentrated on an island surrounded by a sea of parking, usually surface but sometimes a combination of surface and structures, This physical form makes walking from surrounding neighborhoods difficult, the parking lots add distance and/or form physical barriers to access. This would not be a problem for NEVs however.
- second, their functionality is narrowly constrained, generally dominated by retail and food services, thereby eliminating the possibility of trip chaining. and finally
- there are relatively few businesses in a retail mall, generally between 50 and 100 although some are much small and a couple as large as 175 to 191, and the density of business is relatively low, around 1 or 2 per acre VS 5 to 15 an acre for centers and arterials.

The two-digit functional analysis shows that SB malls can be organized into three types based on the breadth of their functional content. Type I is the largest category and can be considered “typical” – retail businesses make up between 70% to 88% of all businesses with most in the low 80%’s. Retail plus food ranges between 79% and 100%. Overall, an additional zero to 10 other two digit categories are represented by very few businesses.

The second type has fewer retail and food businesses as well as fewer overall categories with a small presence. So these malls are less concentrated in retail and food but more concentrated in 2 or 3 other business types including health care, finance (banks), services, and entertainment. Retail ranges from 50% to 64% and food plus retail range from 71% to 76%. In these cases, all functionally is found in 5 or 6 2-digit categories rather than 8 to 12 as in the first type

The third type – only one is found in the SB – has a low retail-food presence like type 2 (55%), but a large services segment (12%) and 7 other categories that make up one third of the total. This example has the widest mix with variety within the mix – reflecting that it is the most geographically isolated of all the malls. It is on the Peninsula. So the most geographically isolated has the greatest mix with variety. [verify with the charts]

Interpretation of malls:

The dominant mall type is highly concentrated in retail and food functions, where there will be a great deal of variety within those two categories; while the rest of the functionality is spread in small amounts in many categories.

A smaller number of malls, while having a concentration in retail and food, do not have it to the same dominant extent. Instead it has a second tier of concentrations with much less functional breadth. So this is more specialized than category 1, i.e. there is variety within a larger number of categories but a smaller mix overall.

Finally, there is a single mall that is physically isolated and offers the broadest mix of functions,. The broadest mix seems to have the smallest market area, which it also shares with other malls and centers. It seems that this mall tries to offer something for everyone but without much variation within the mix.

One conclusion is that variety within the mix requires a larger market area. So one approach is to create the mix everywhere but distribute the variety out among many different centers so that no one center has much variety but taken together they offer a great deal of it.

Malls are small compared to our study areas -- so one strategy would be to dramatically increase the total number of businesses, mostly expanding the mix but not so much the variety beyond a couple of categories.

Broad mix within a mall seems to be related to little commercial competition nearby. This strategy tried to offer something for everyone. Most malls offer extensive variety within a very narrow mix. This strategy will capture comparison shoppers of certain high volume goods.

Study Areas

Percent retail and percent retail plus food are both much lower in the study areas than in the malls.

In general, more categories are present, usually 14 to 16 2-digit categories. That is, the mix is much broader than in the malls.

However, two categories dominate study areas, although a different two and to a much less extent than retail plus food in the malls. The two dominant categories are retail plus services.

Percent retail in corridors is relatively consistent in the range from 14% to 17%. Except for PH at 14%, the other three corridors are either 16% or 17%.

Retail in Centers varies in a broader range – 11% in ES to 20% in Inglewood. Ironically, ES and Inglewood are the worst performing centers suggesting that neither high nor low retail composition is a link to good transportation performance.

Retail plus food in corridors are 23%, 23%, 24% and 25%. Retail plus services are 32%, 34%, 34% and 35% -- an uncanny consistency across quite varied study areas.

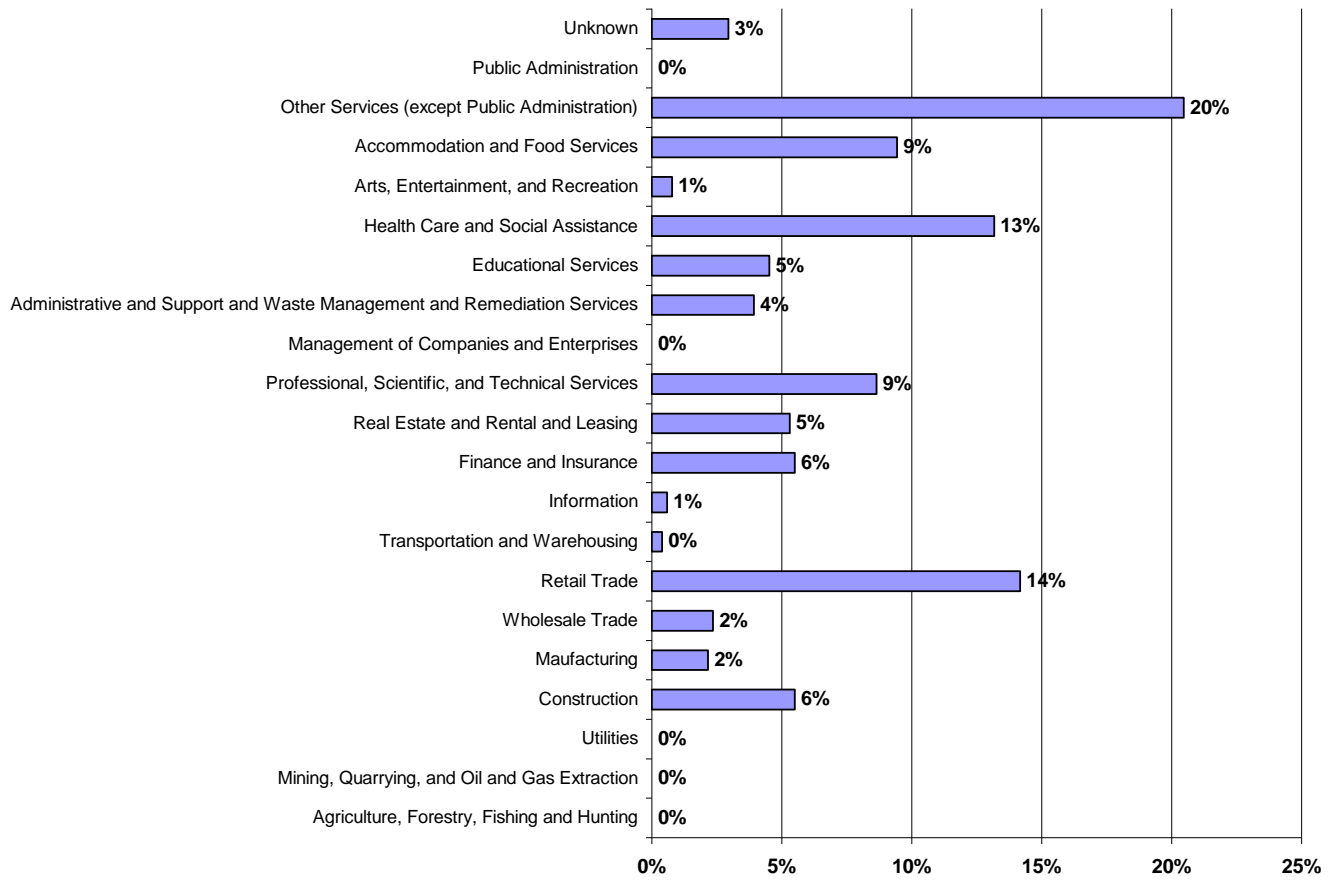
Retail plus food in centers were consistent at 23%, 24% and 27% outside of El Segundo which, due to its quite low relative retail presence was only 17%. Retail plus services was similar to the corridors at 32%, 35% but more varied with OT at 29% and ES at only 23%, thanks again to its relatively low retail.

Corridors of course have many more businesses than centers due to their linear geography. Both centers and corridors have many more businesses than malls. In just the quarter mile inner core, corridor businesses range from 513 to 549. Center inner cores range from 347 to 556 in Inglewood, Riviera Village is relatively large with 506 businesses. Corridors and centers are remarkably similar at the two-digit level.

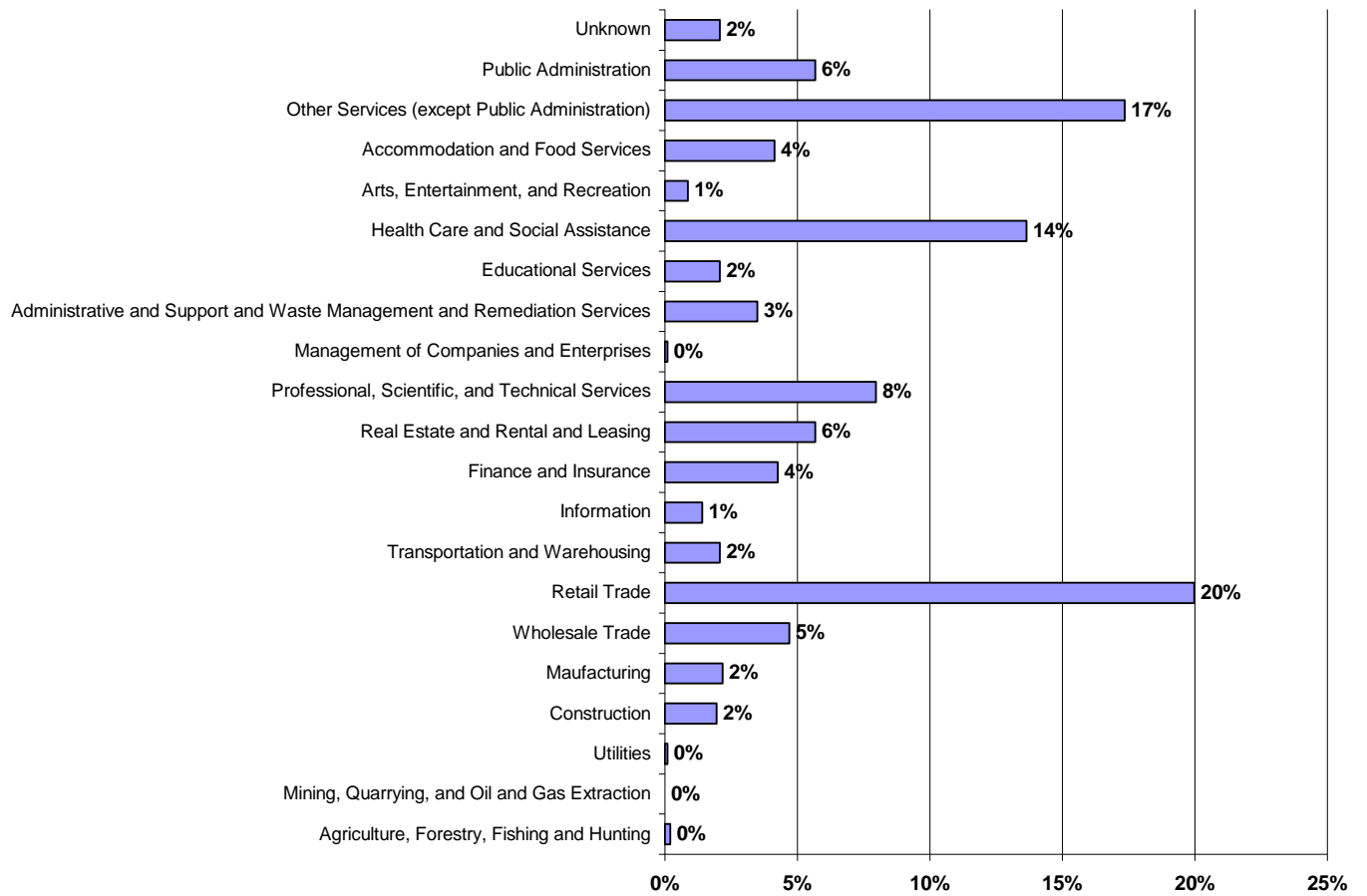
Study areas tend to have two to ten times as many businesses as malls.

Conclusions; Malls, despite being walkable, are too small and specialized, and tend to be physically isolated due to parking lots in order to have good transportation performance.

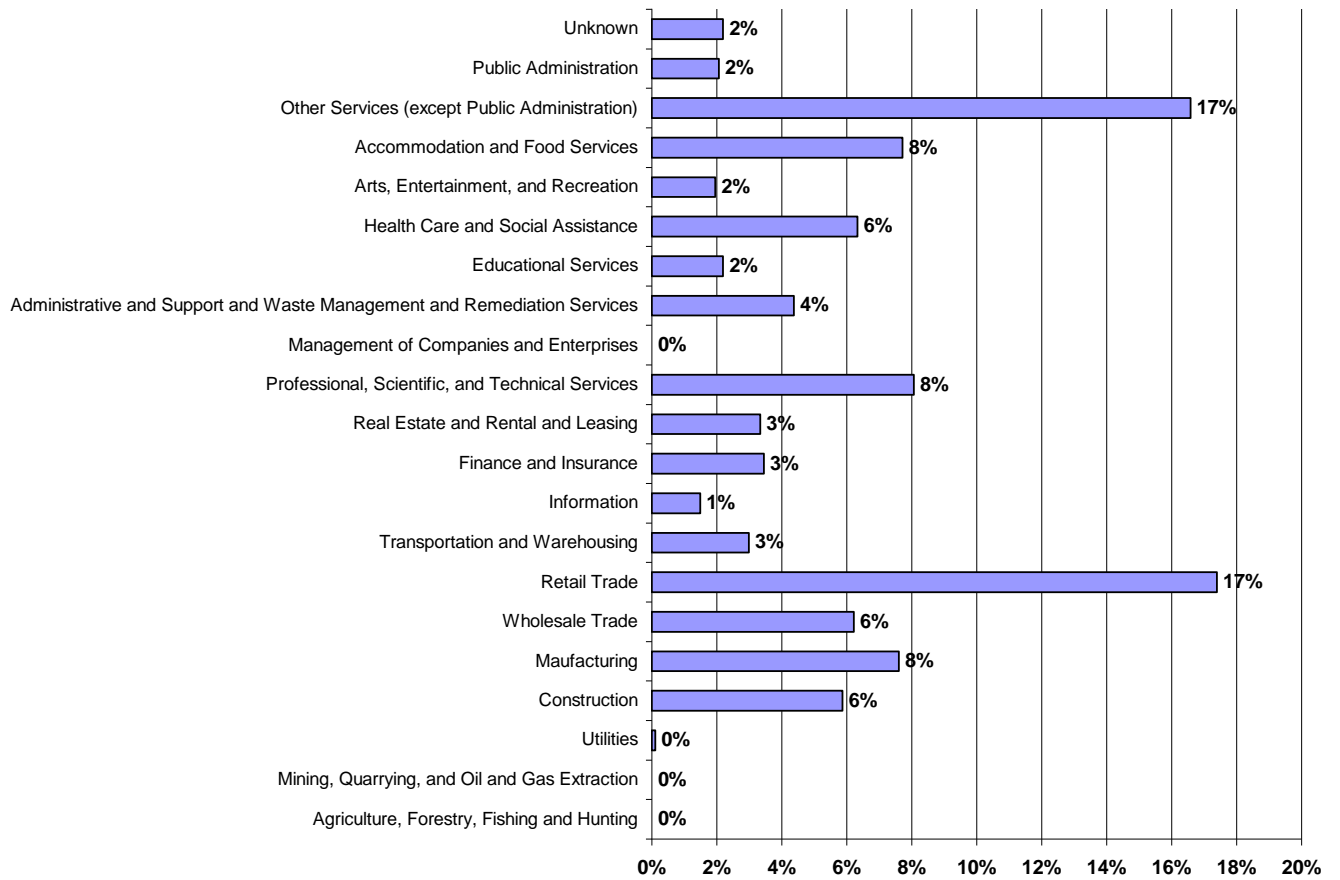
PCH 2-Digit NAIC Composition



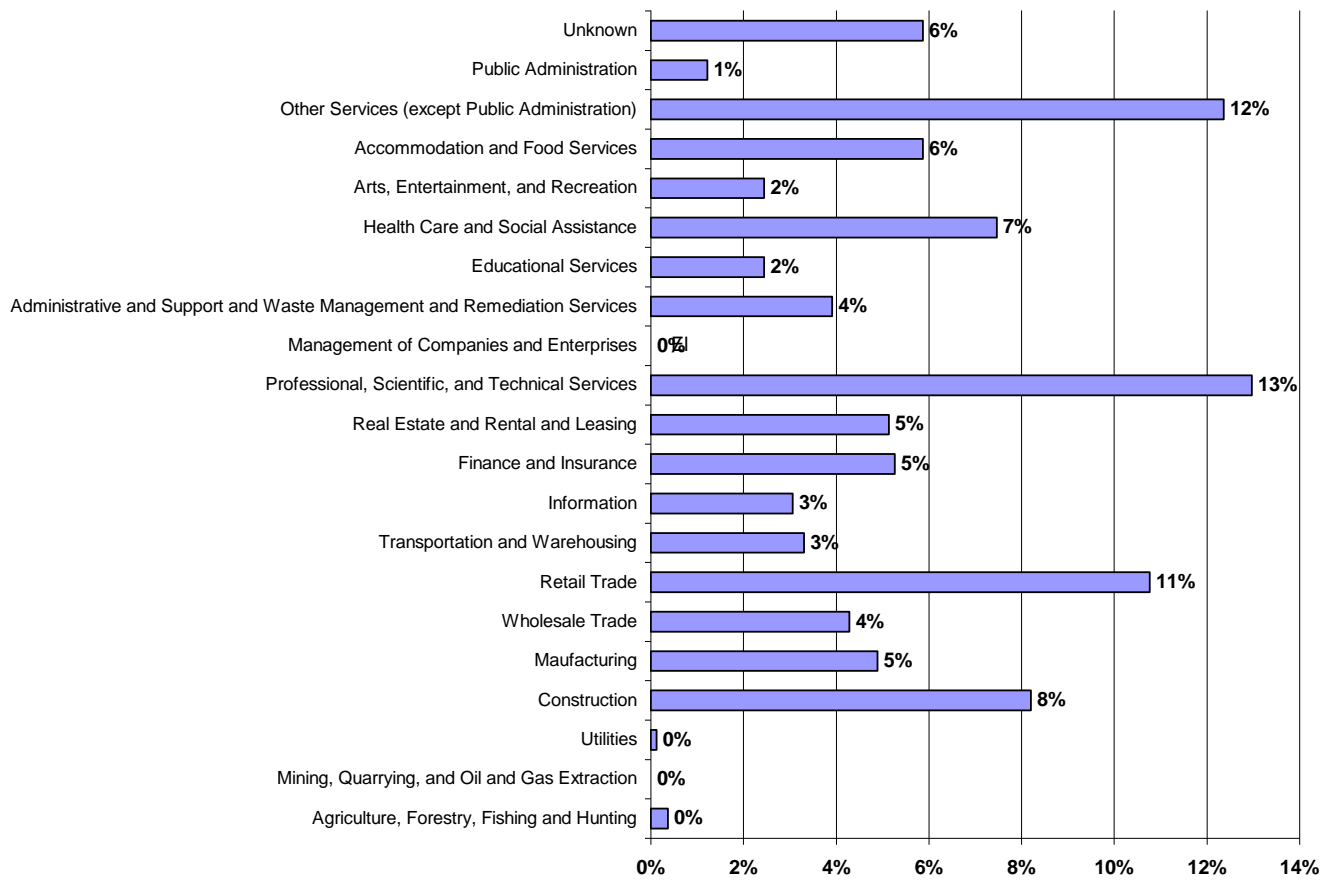
Inglewood Total 2-Digit NAIC Composition



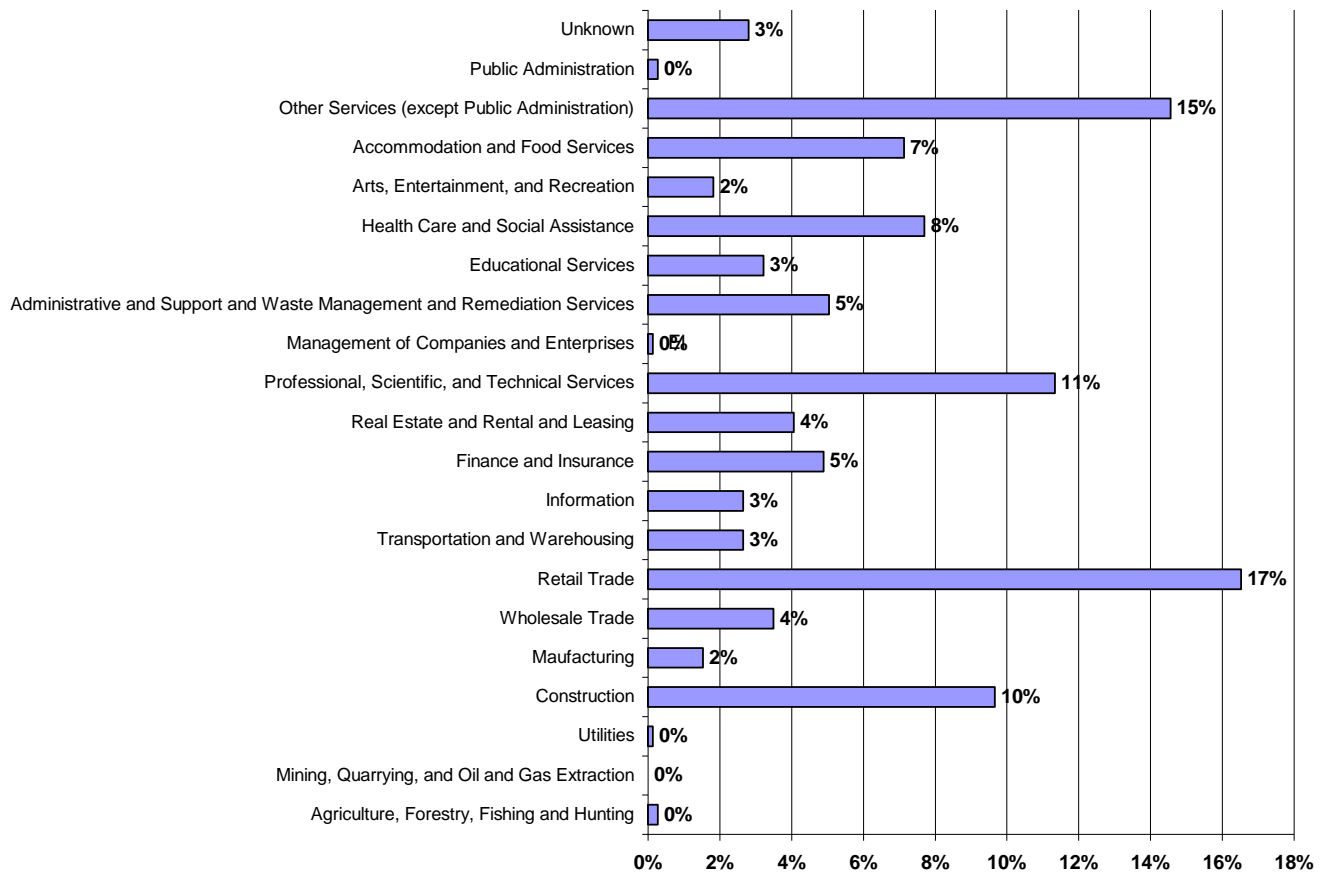
Gardena Total 2-Digit NAIC Composition



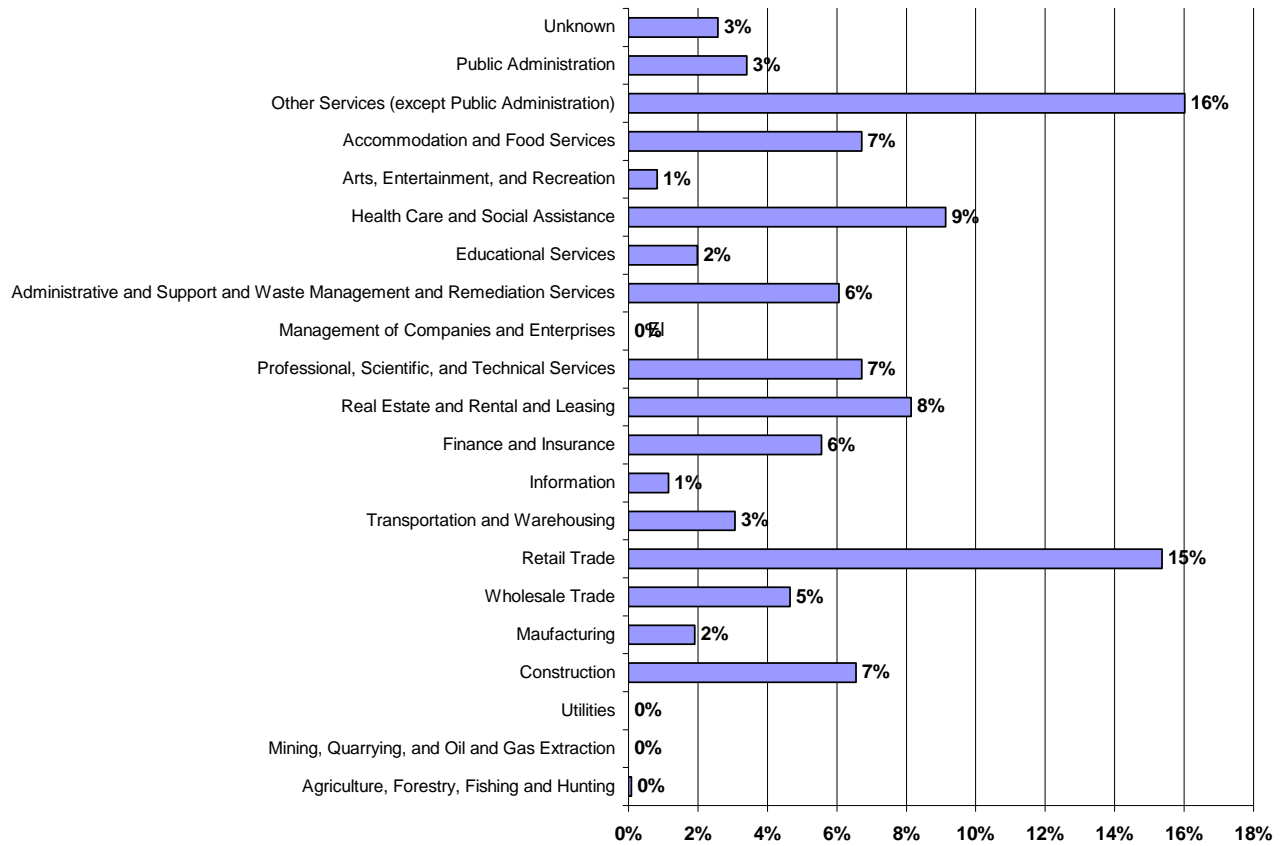
El Segundo Total 2-Digit NAIC Composition



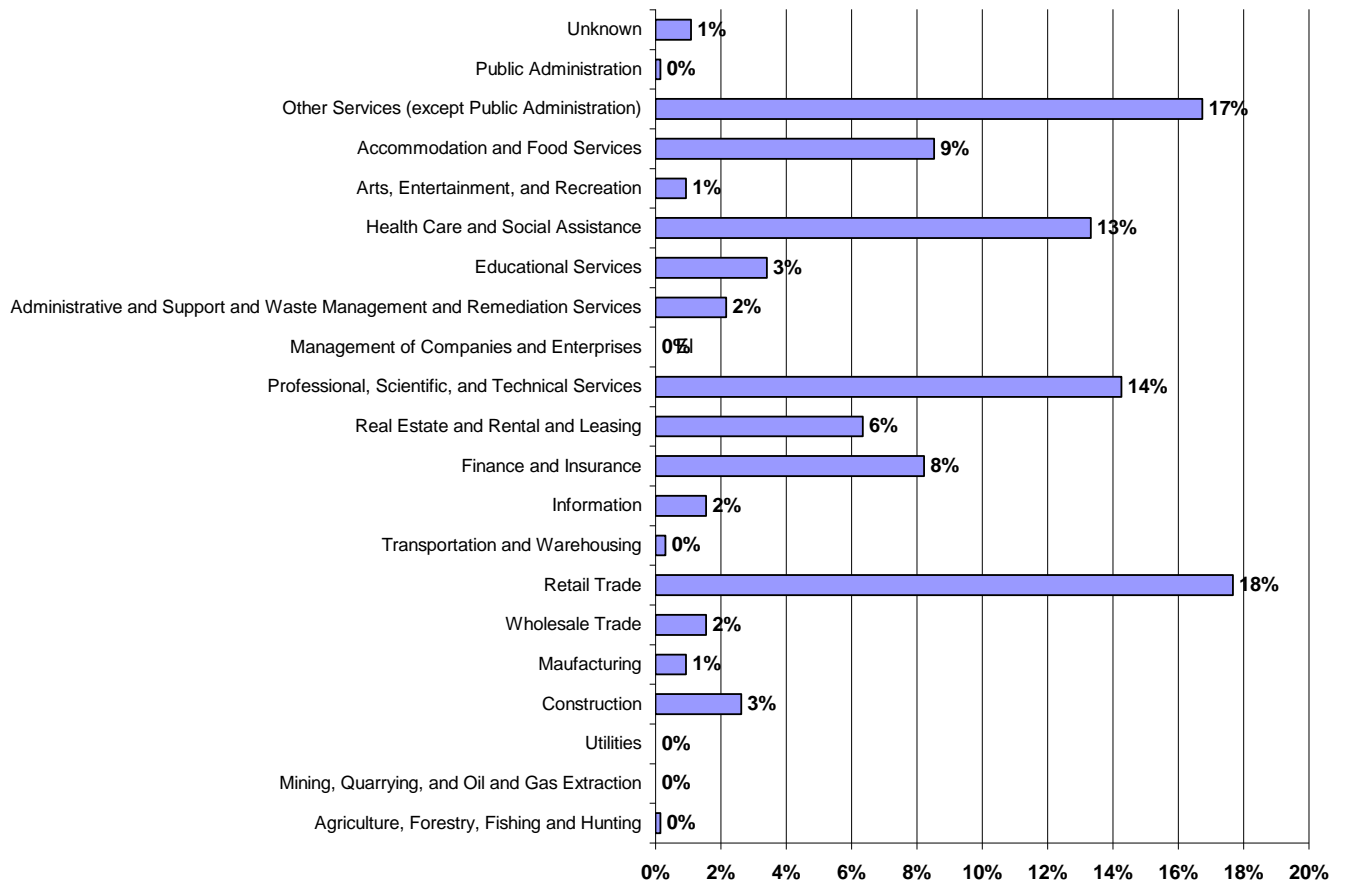
Artesia Total 2-Digit NAIC Composition



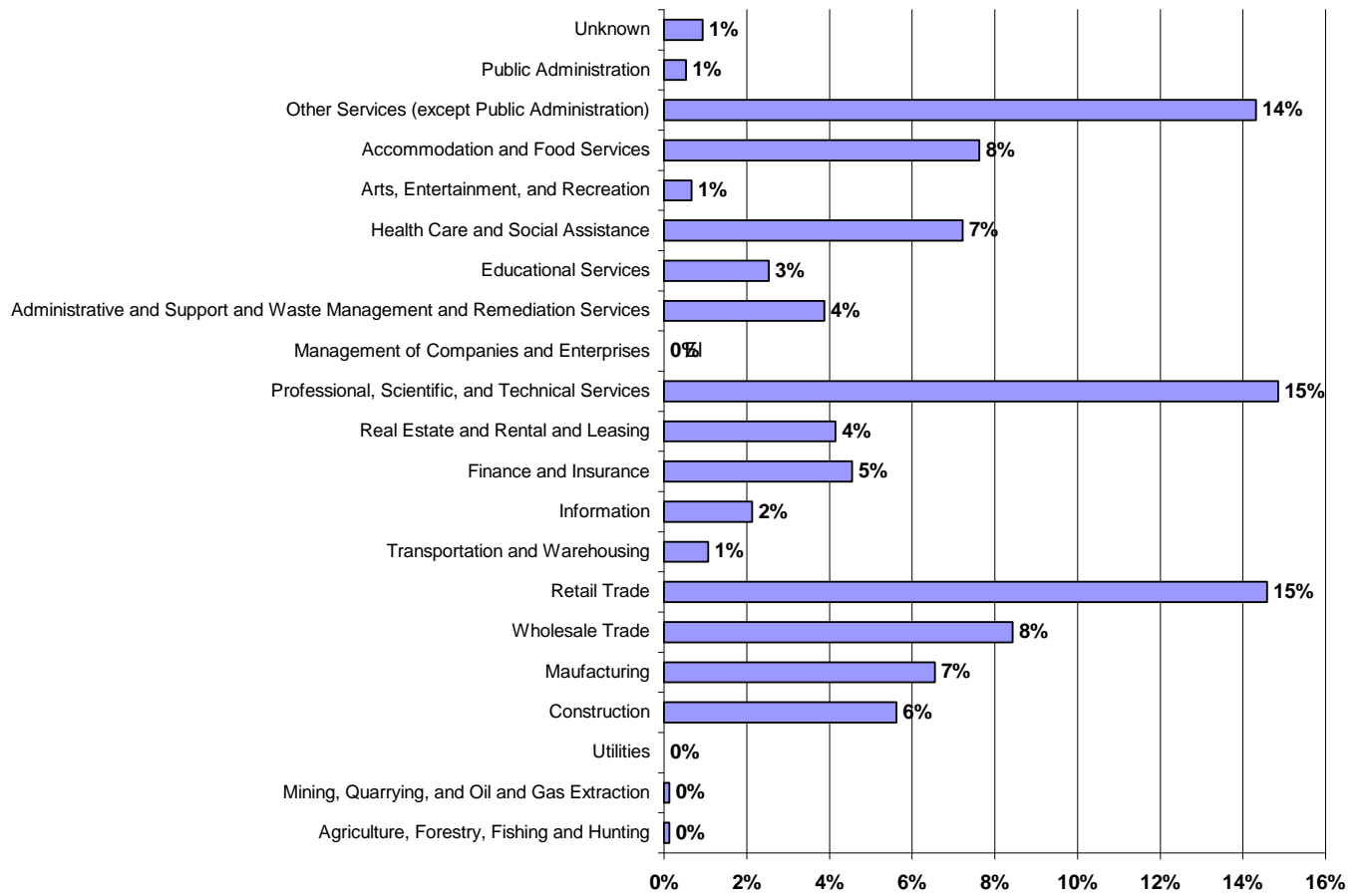
Hawthorne Total 2-Digit NAIC Composition



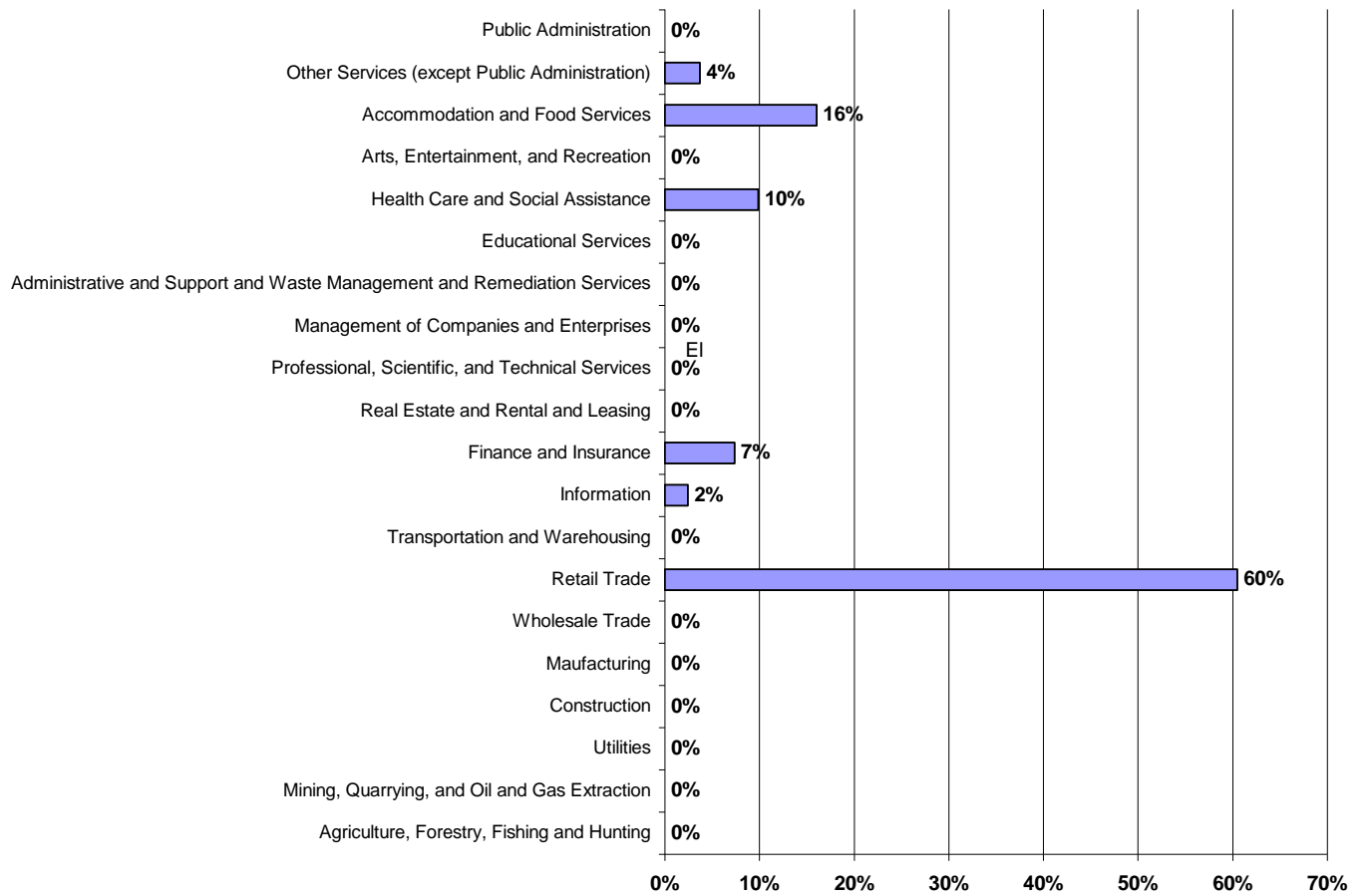
Riviera Village Total 2-Digit NAIC Composition



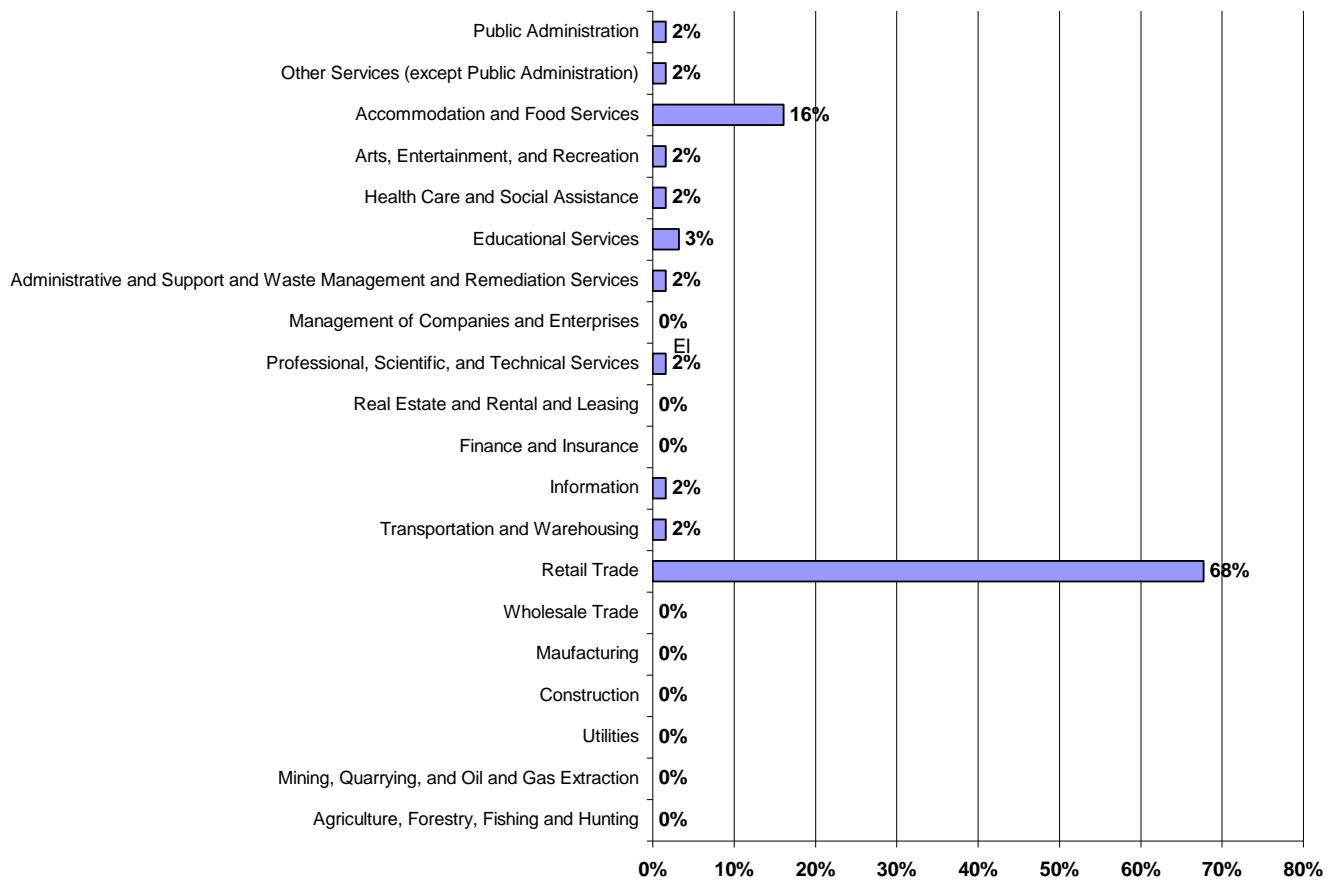
Old Torrance Total 2-Digit NAIC Composition



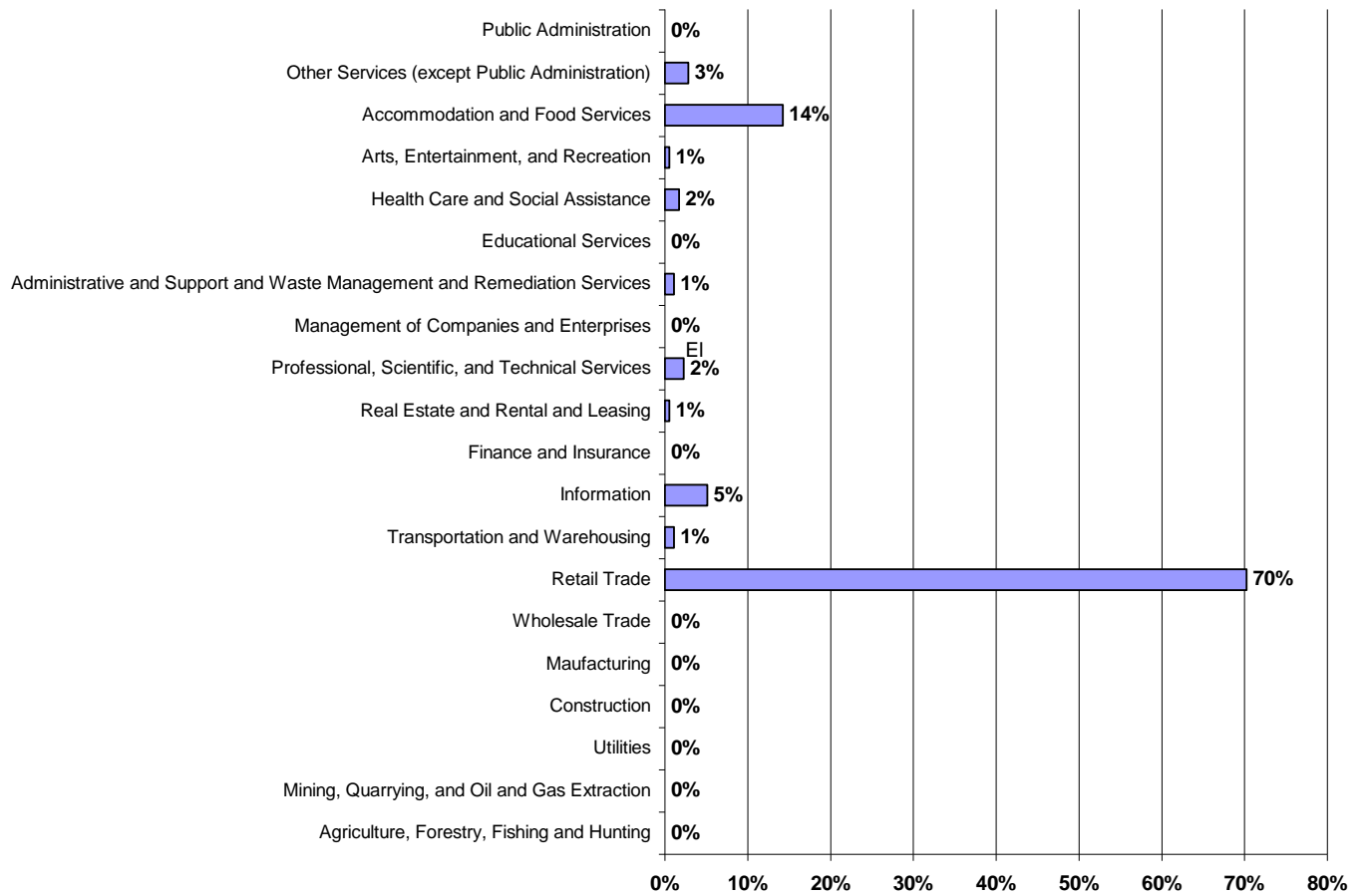
Manhattan Village 2-Digit NAIC Composition



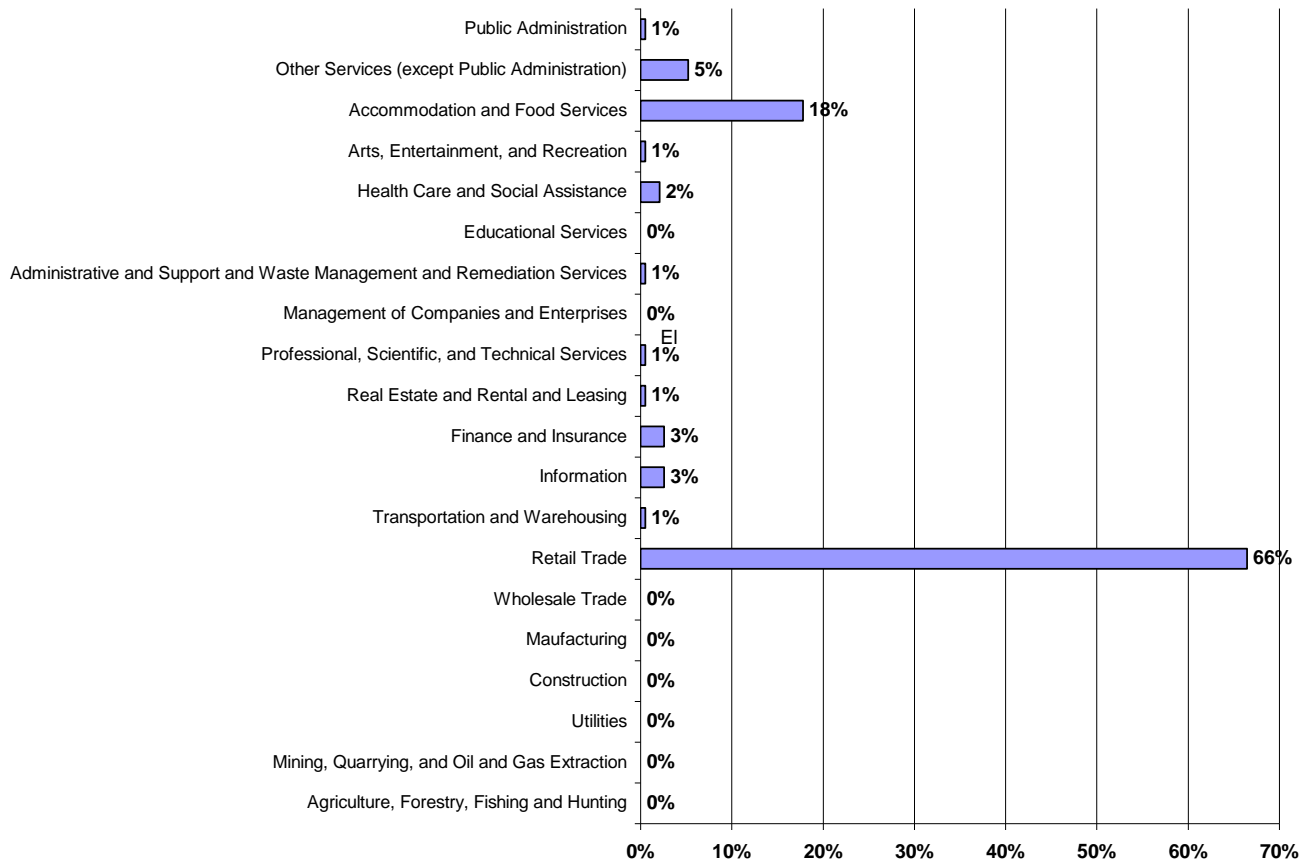
South Bay Pavillion at Carson 2-Digit NAIC Composition



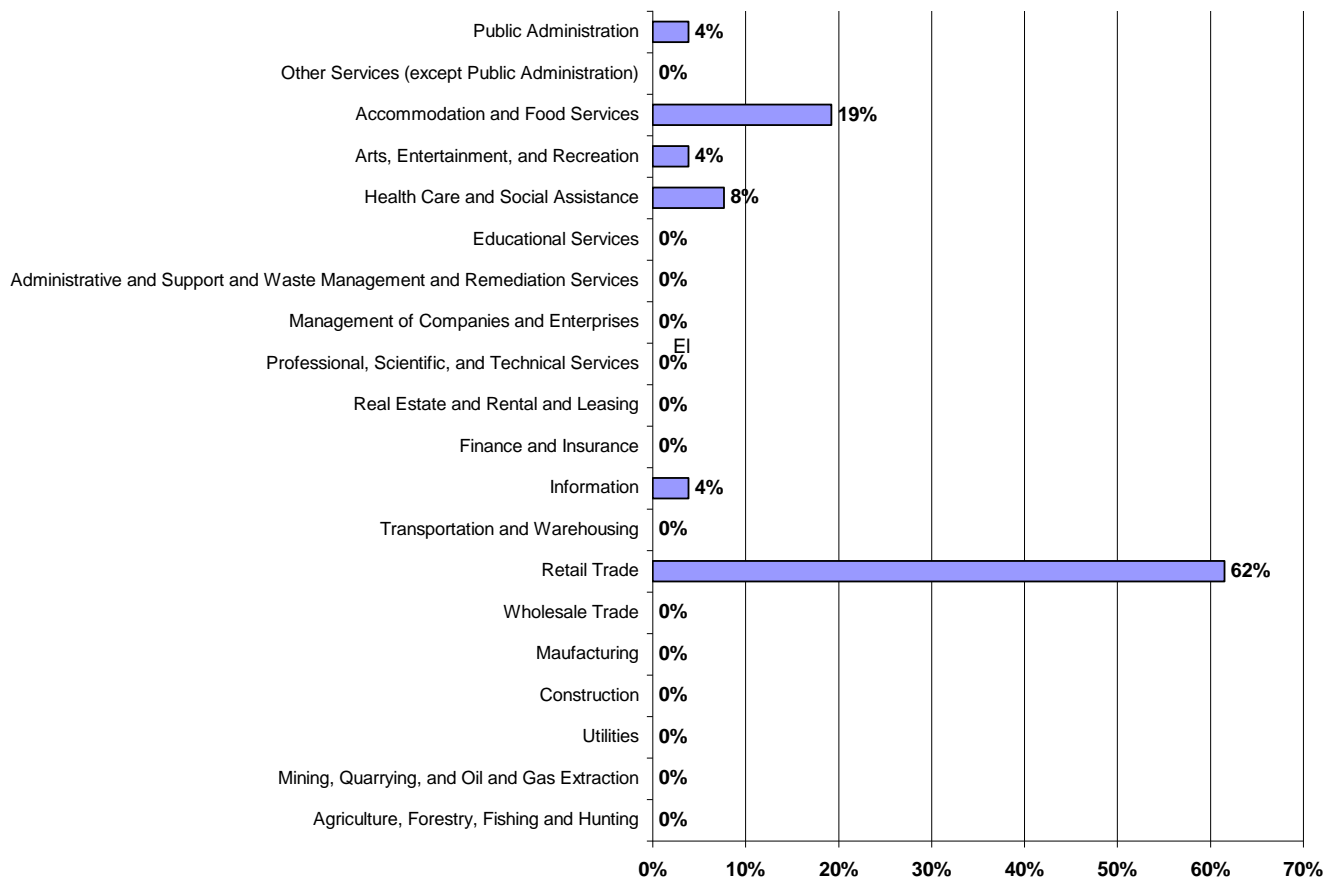
South Bay Galleria 2-Digit NAIC Composition



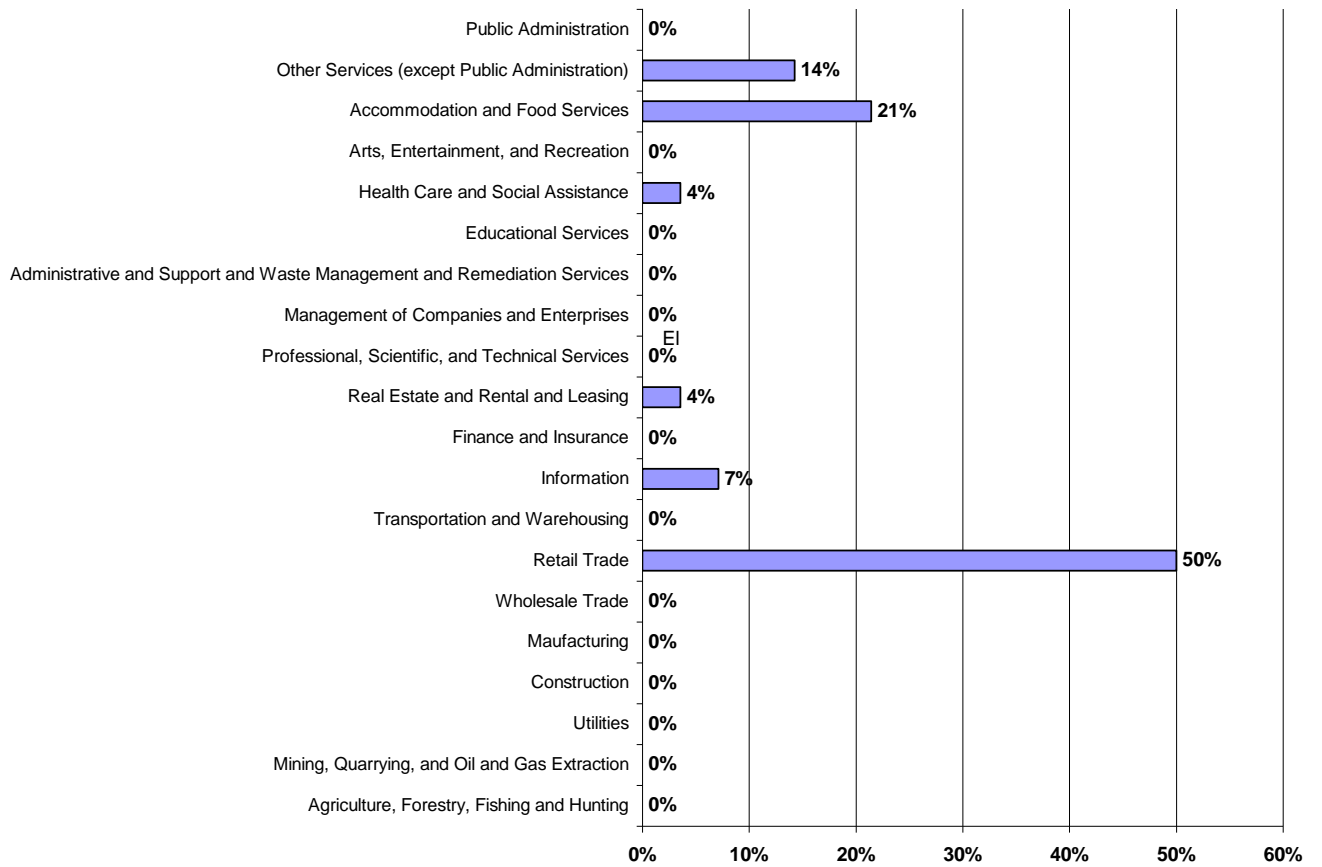
Del Amo Fashion Center 2-Digit NAIC Composition



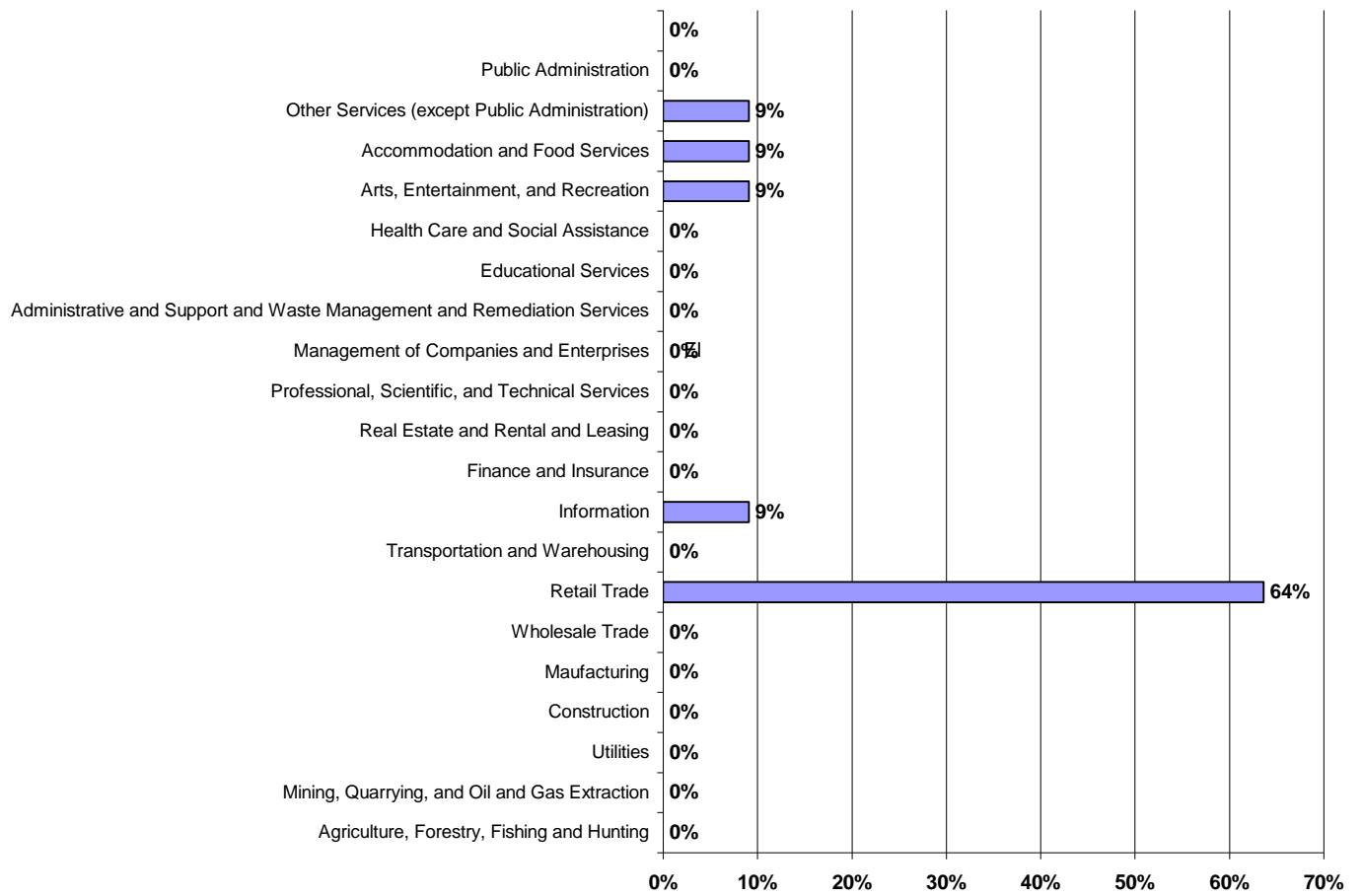
The Marketplace at Hollywood Park 2-Digit NAIC Composition



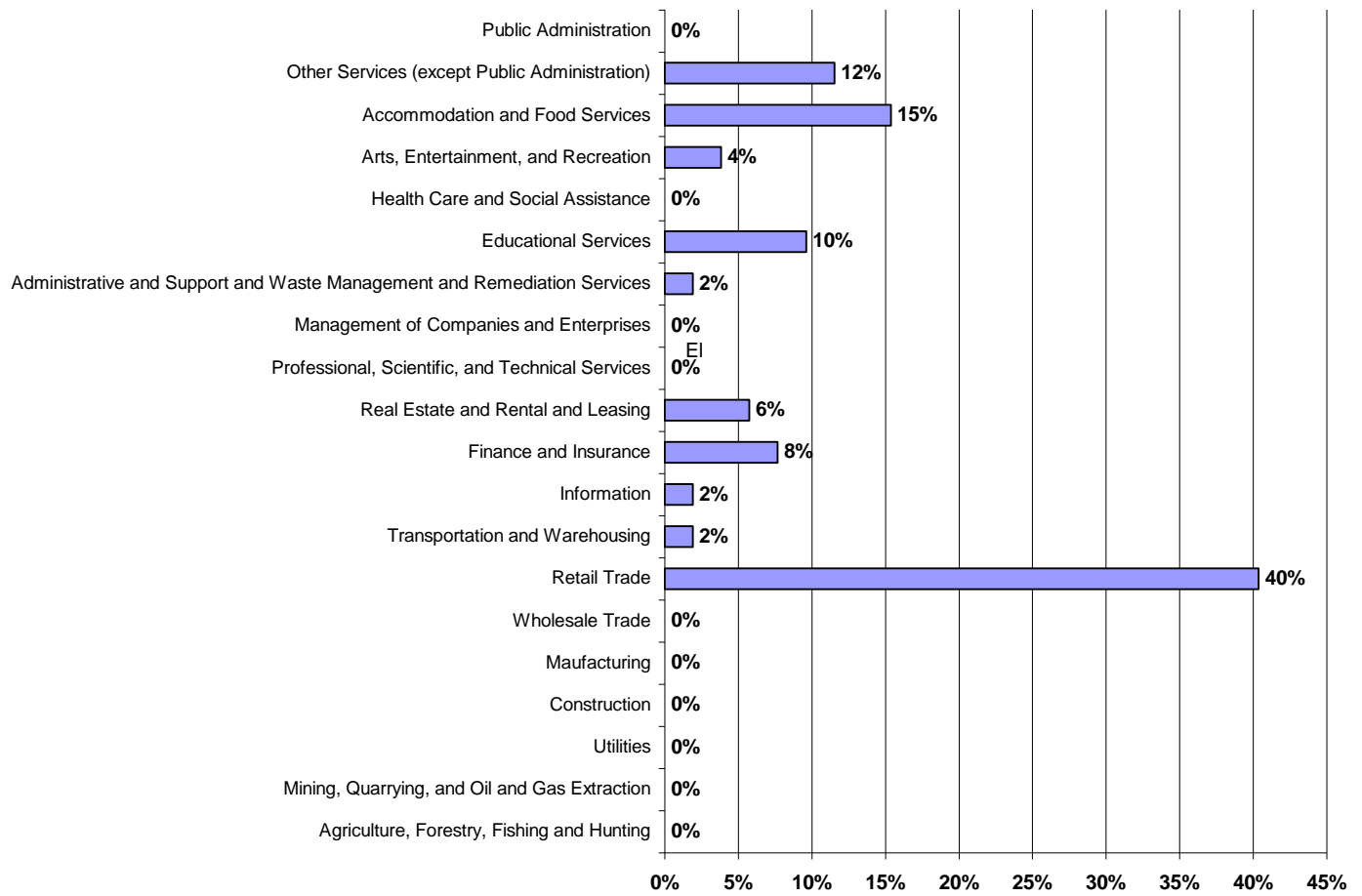
Torrance Crossroads 2-Digit NAIC Composition



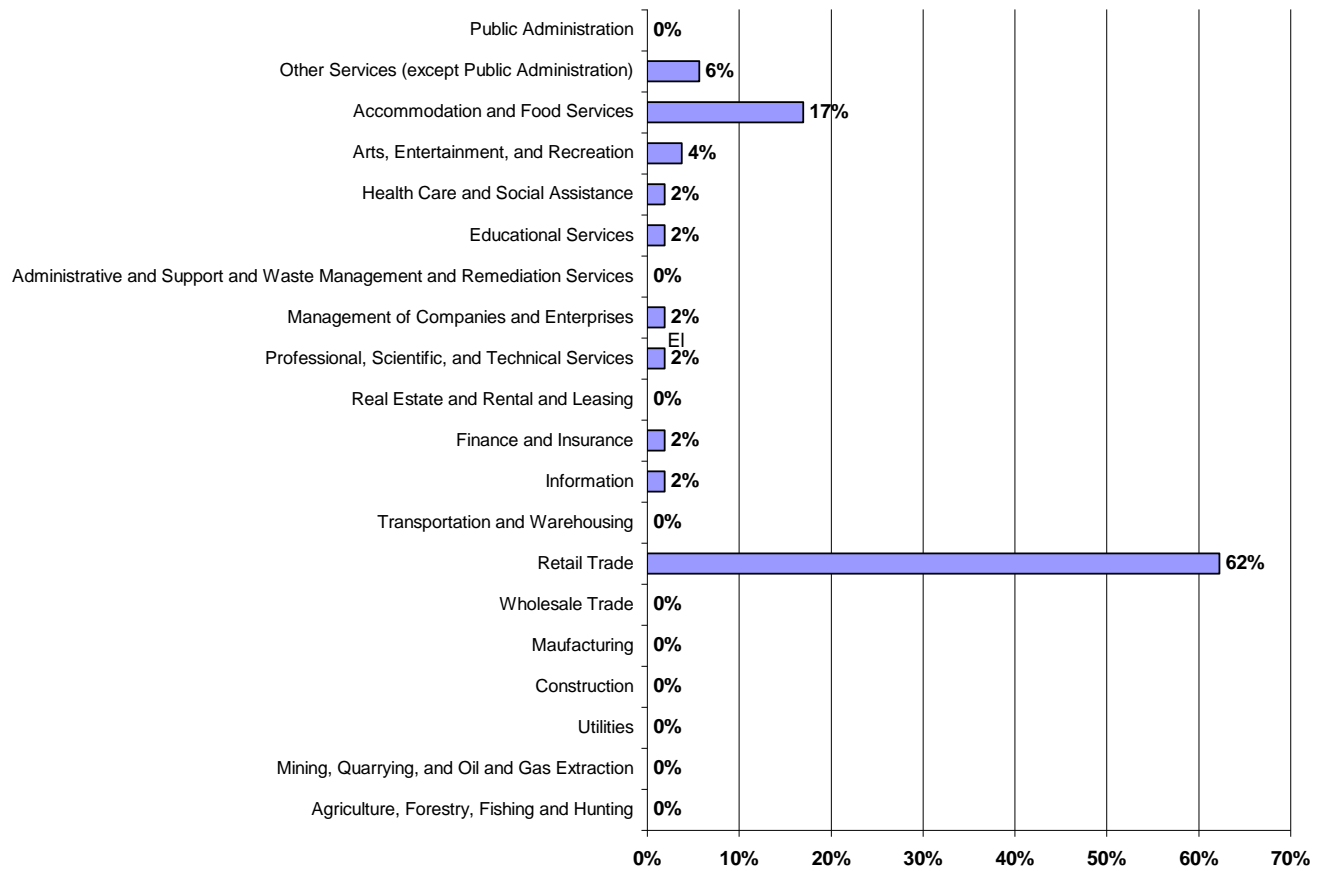
Lifestyle Wing 2-Digit NAIC Composition



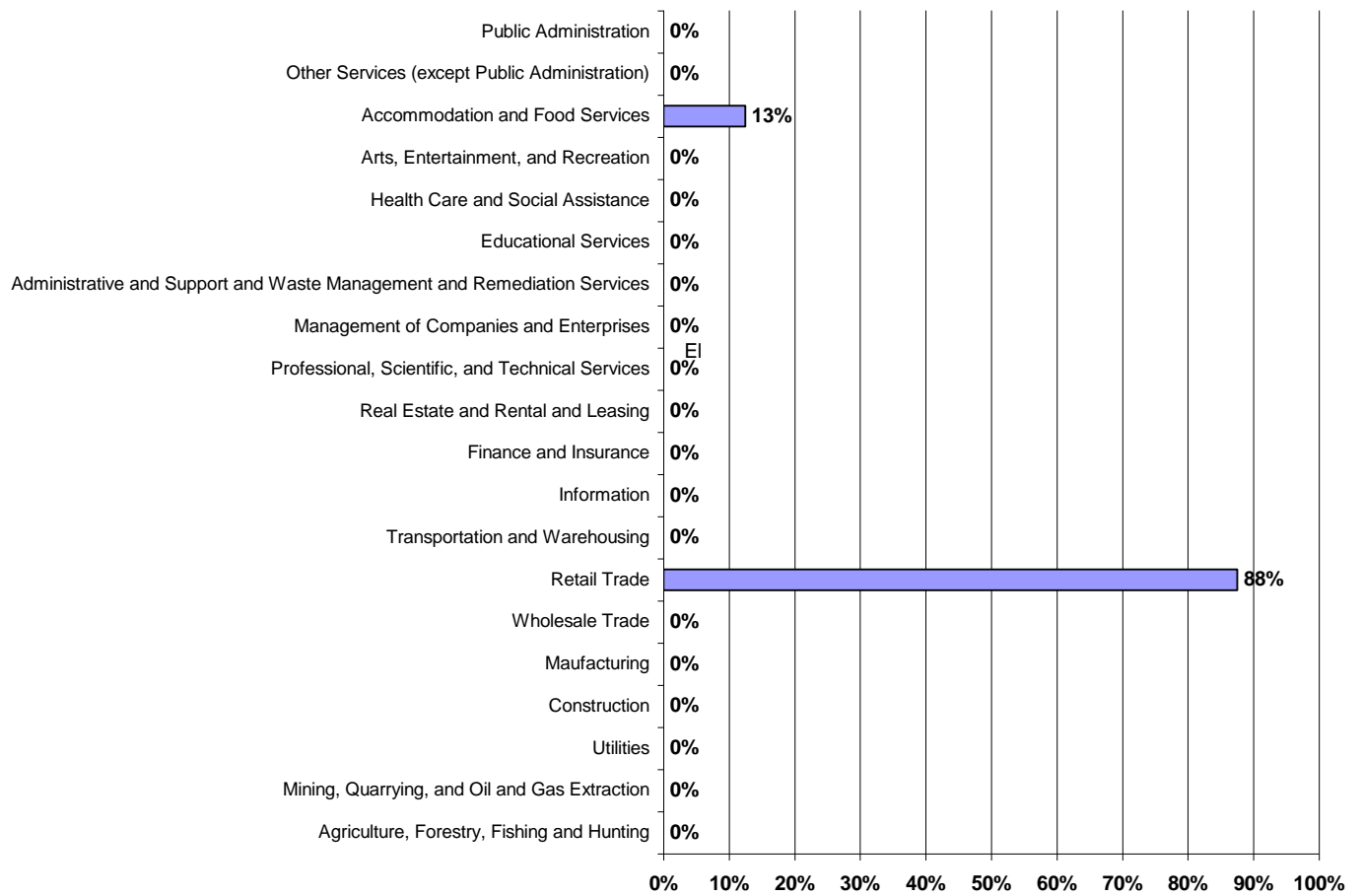
Peninsula Shopping Center 2-Digit NAIC Composition

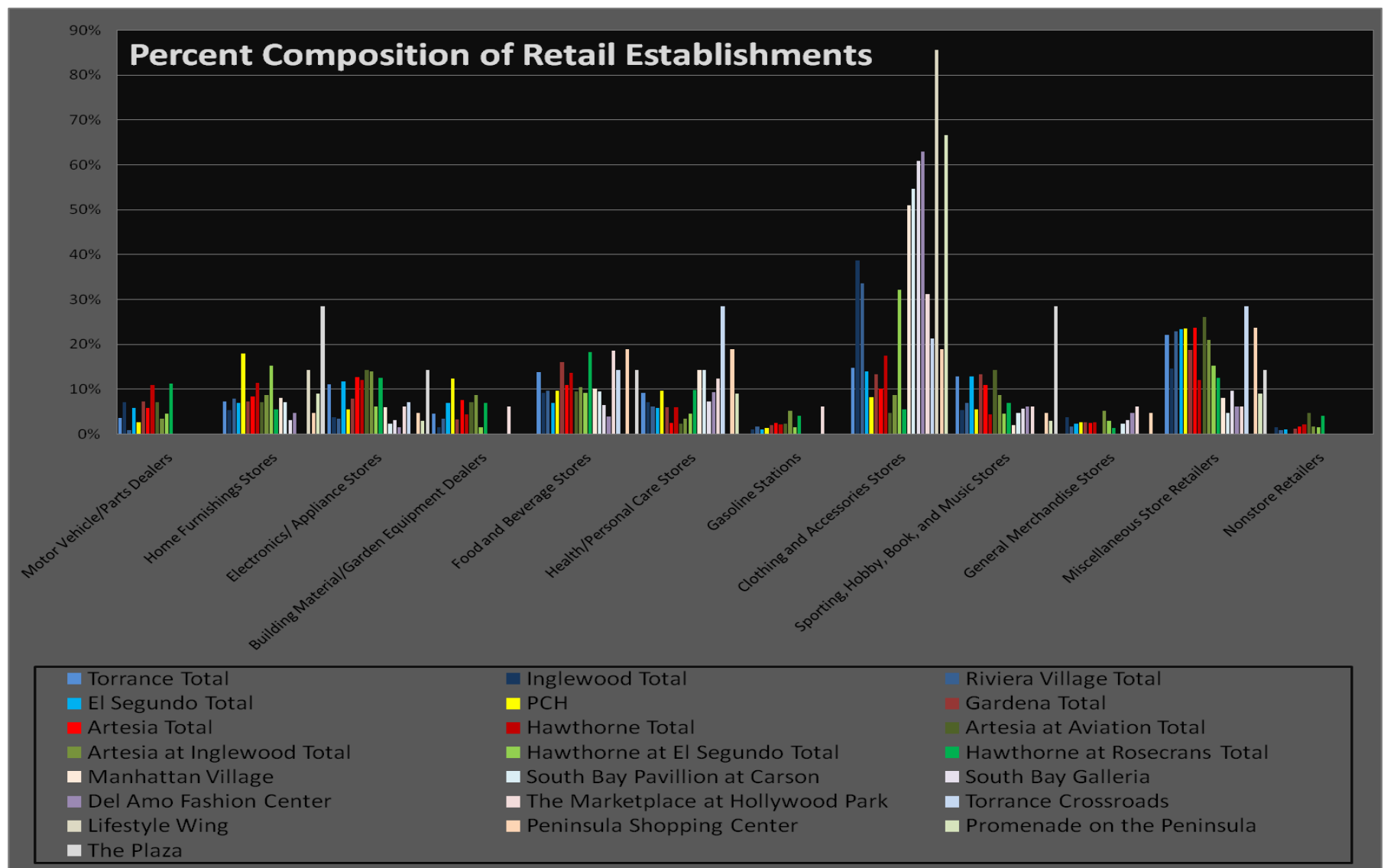


Promenade on the Peninsula 2-Digit NAIC Composition

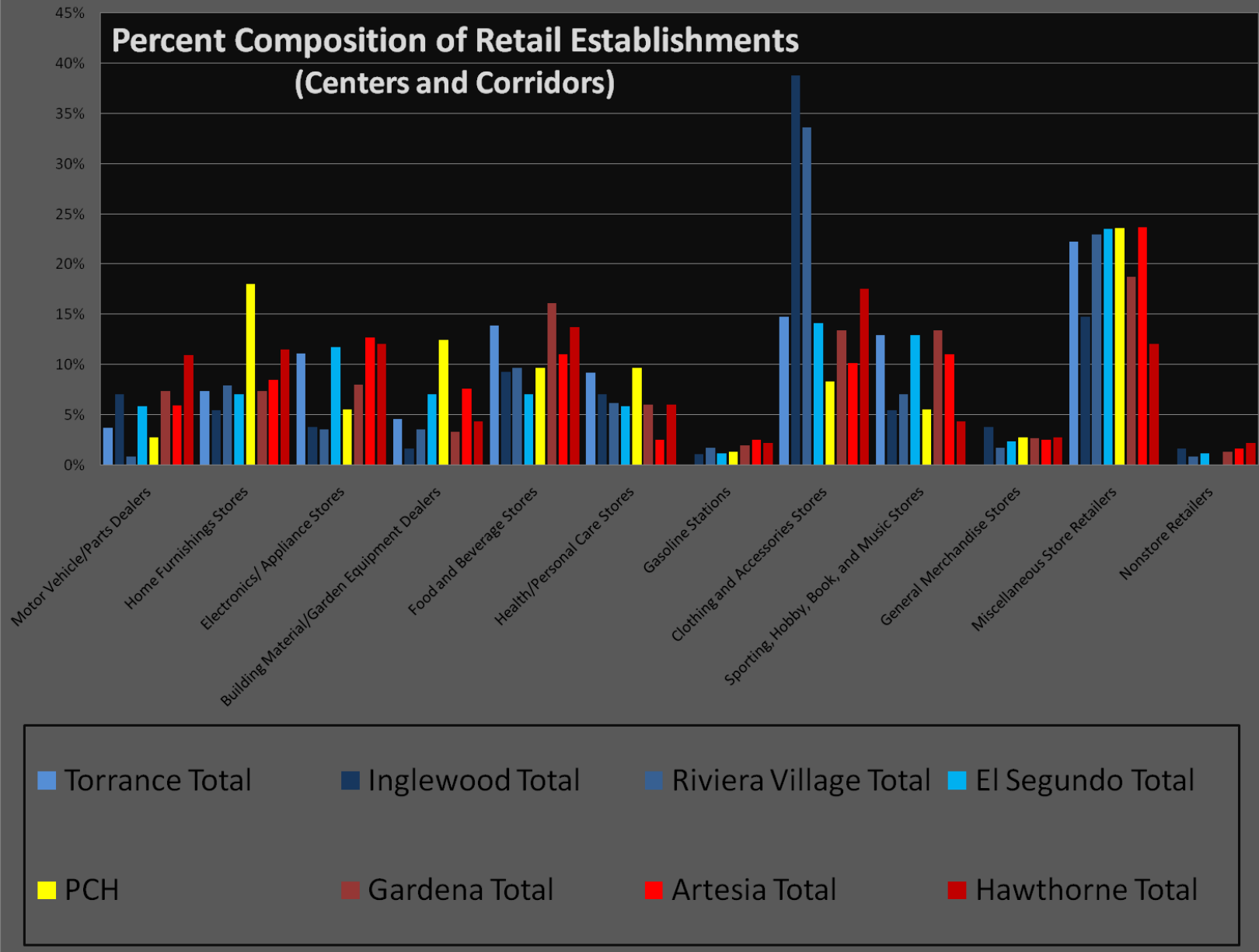


The Plaza 2-Digit NAIC Composition

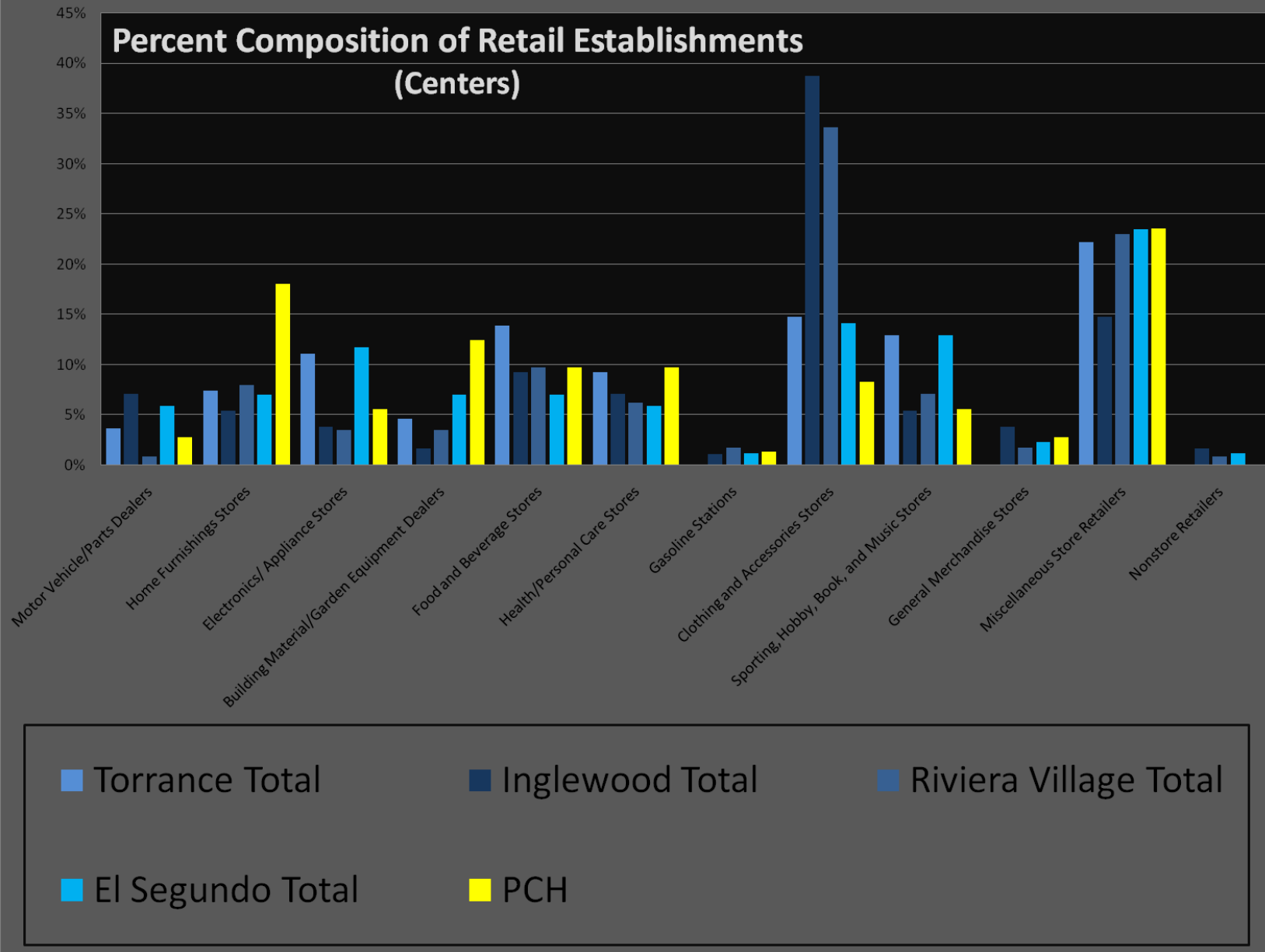


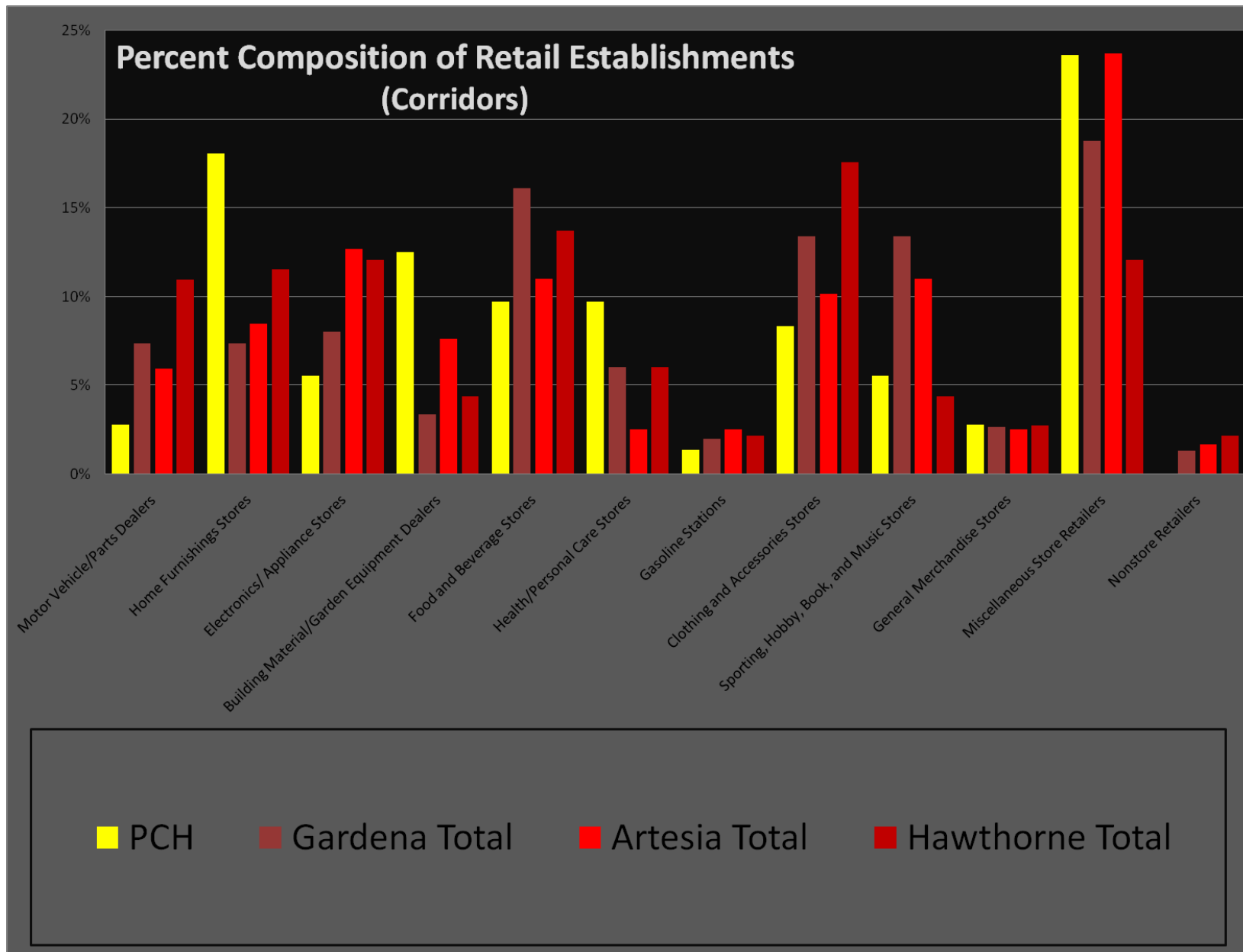


Percent Composition of Retail Establishments (Centers and Corridors)

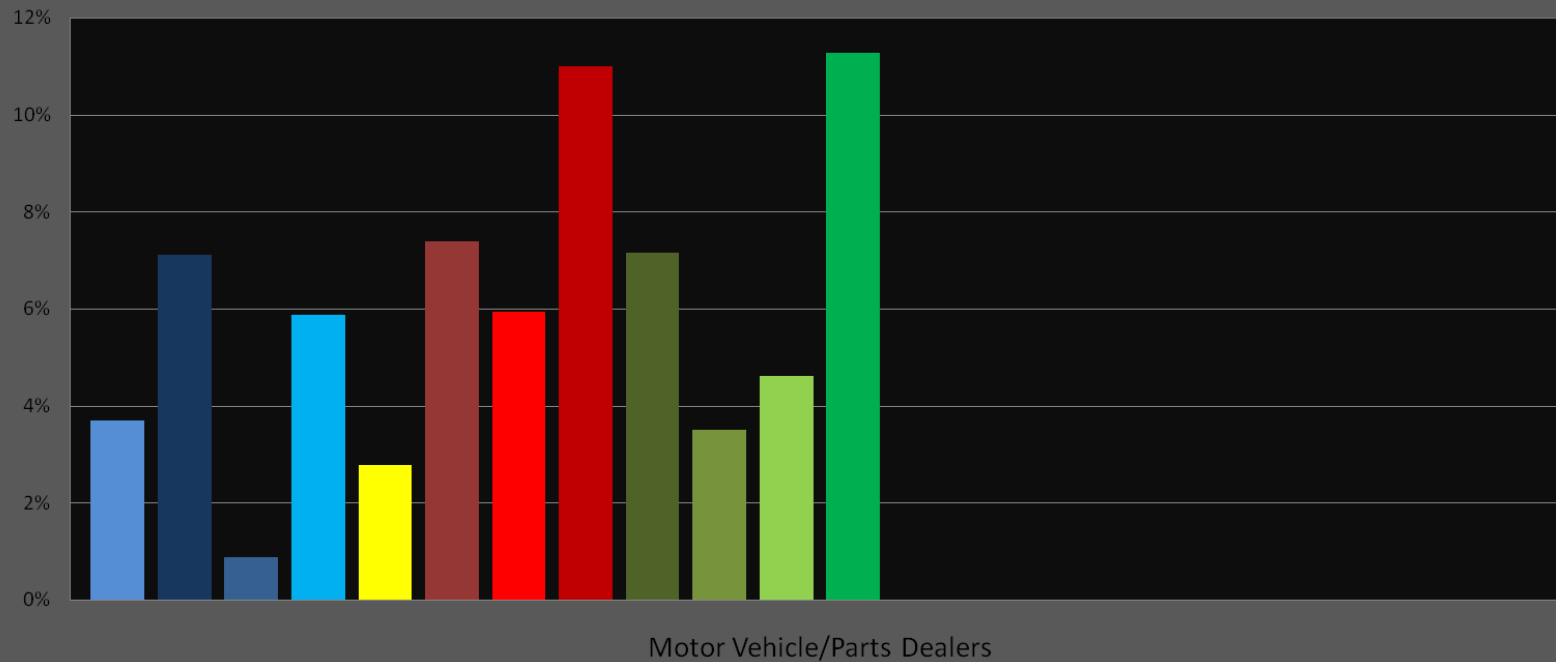


Percent Composition of Retail Establishments (Centers)



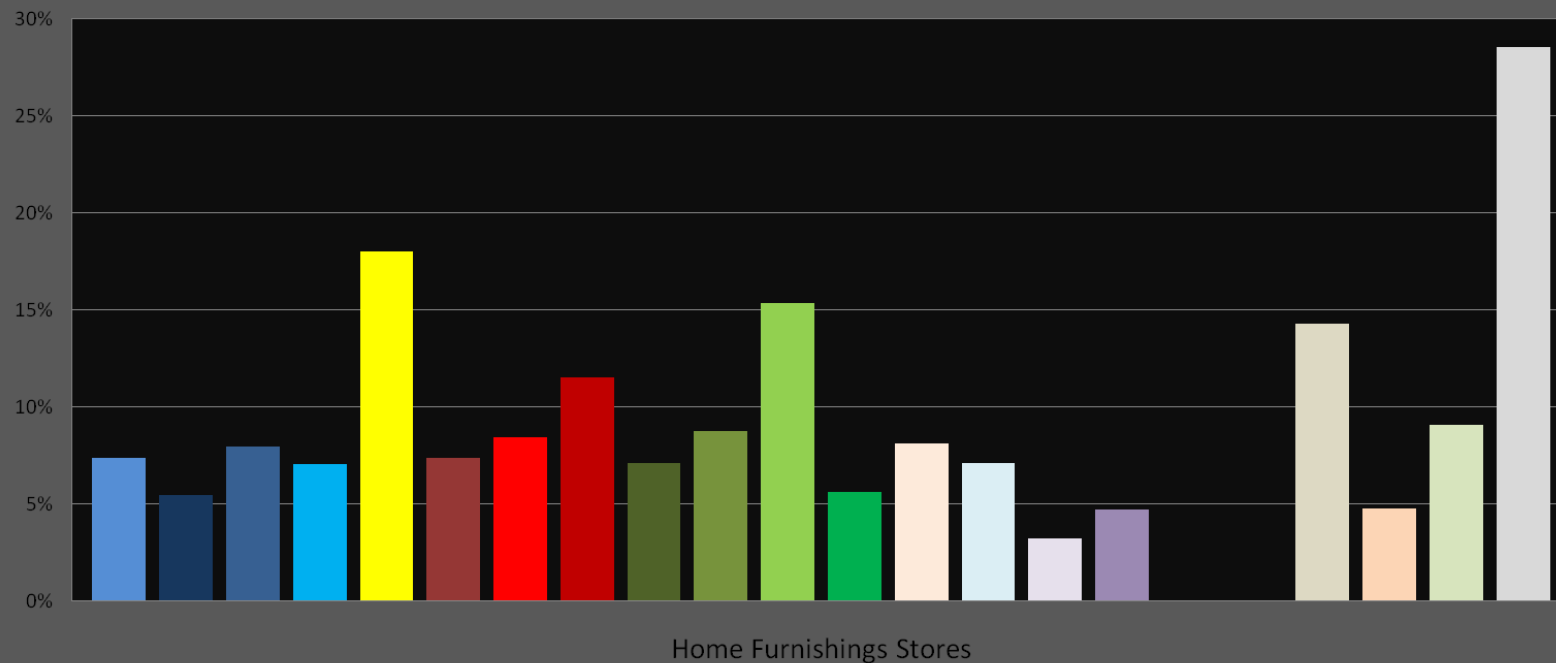


Percent Composition of Motor Vehicle/Parts Dealers



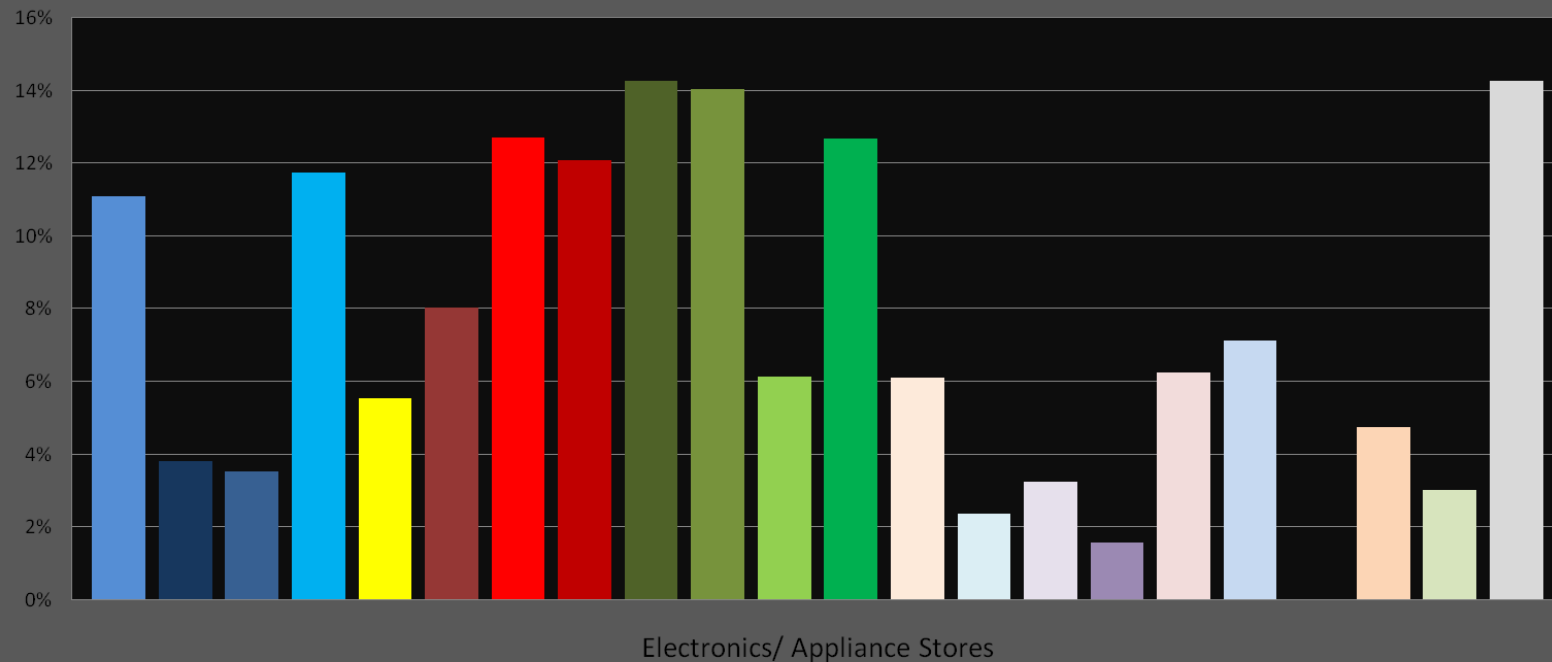
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| ■ Riviera Village Total | ■ El Segundo Total |
| ■ PCH | ■ Gardena Total |
| ■ Artesia Total | ■ Hawthorne Total |
| ■ Artesia at Aviation Total | ■ Artesia at Inglewood Total |
| ■ Hawthorne at El Segundo Total | ■ Hawthorne at Rosecrans Total |
| ■ Manhattan Village | ■ South Bay Pavillion at Carson |
| ■ South Bay Galleria | ■ Del Amo Fashion Center |
| ■ The Marketplace at Hollywood Park | ■ Torrance Crossroads |
| ■ Lifestyle Wing | ■ Peninsula Shopping Center |
| ■ Promenade on the Peninsula | ■ The Plaza |

Percent Composition of Home Furnishing Stores



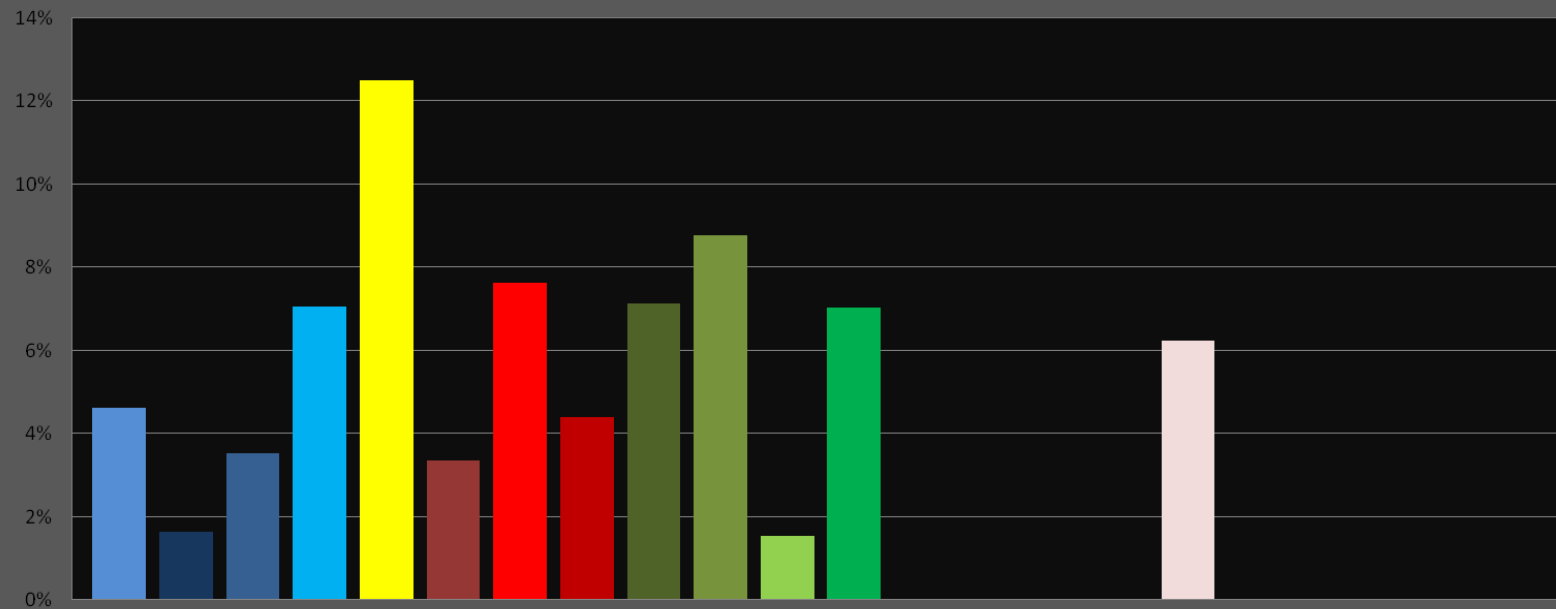
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| ■ South Bay Galleria | ■ Del Amo Fashion Center |
| ■ The Marketplace at Hollywood Park | ■ Torrance Crossroads |
| ■ Lifestyle Wing | ■ Peninsula Shopping Center |
| ■ Promenade on the Peninsula | ■ The Plaza |

Percent Composition of Electronics/Appliance Stores



- Torrance Total
- Inglewood Total
- Riviera Village Total
- El Segundo Total
- PCH
- Gardena Total
- Hawthorne Total
- Artesia at Aviation Total
- Artesia at Inglewood Total
- Hawthorne at El Segundo Total
- Hawthorne at Rosecrans Total
- Manhattan Village
- South Bay Pavillion at Carson
- Del Amo Fashion Center
- Torrance Crossroads
- Peninsula Shopping Center
- The Plaza
- The Marketplace at Hollywood Park
- Lifestyle Wing
- Promenade on the Peninsula
- South Bay Galleria

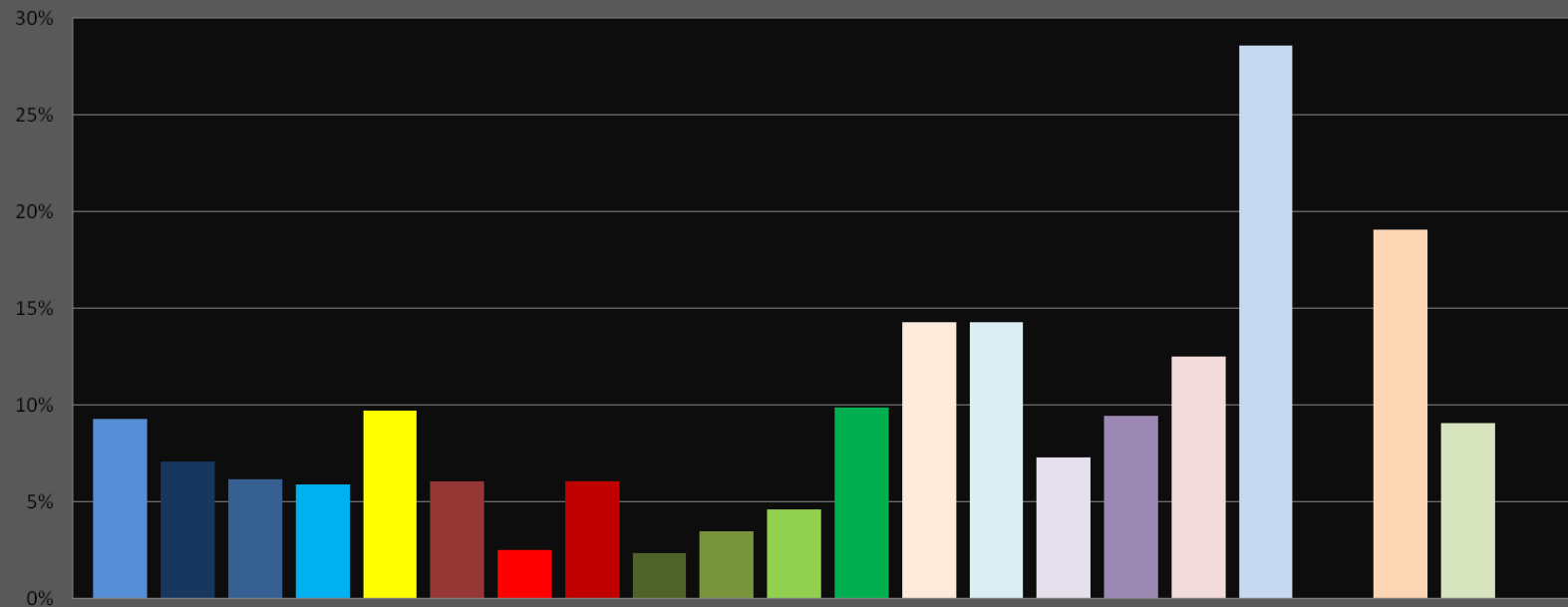
Building Material/Garden Dealers



Building Material/Garden Equipment Dealers

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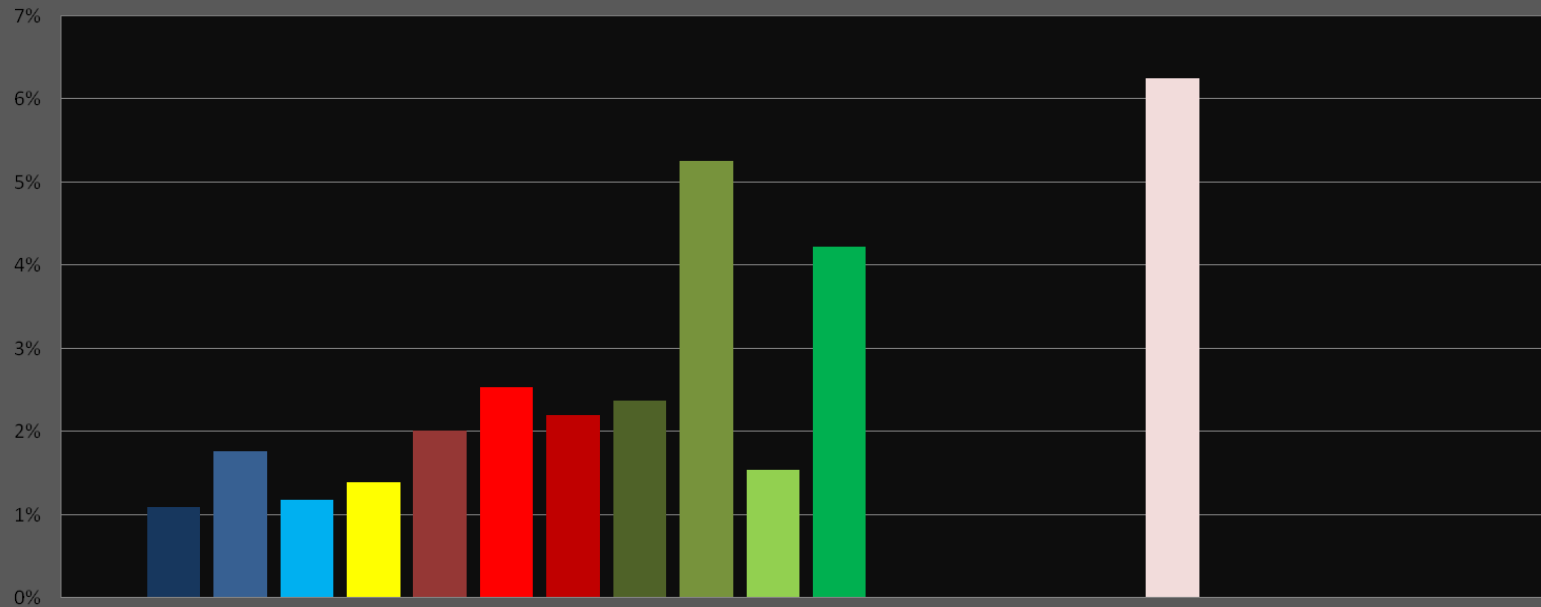
Health/Personal Care Stores



Health/Personal Care Stores

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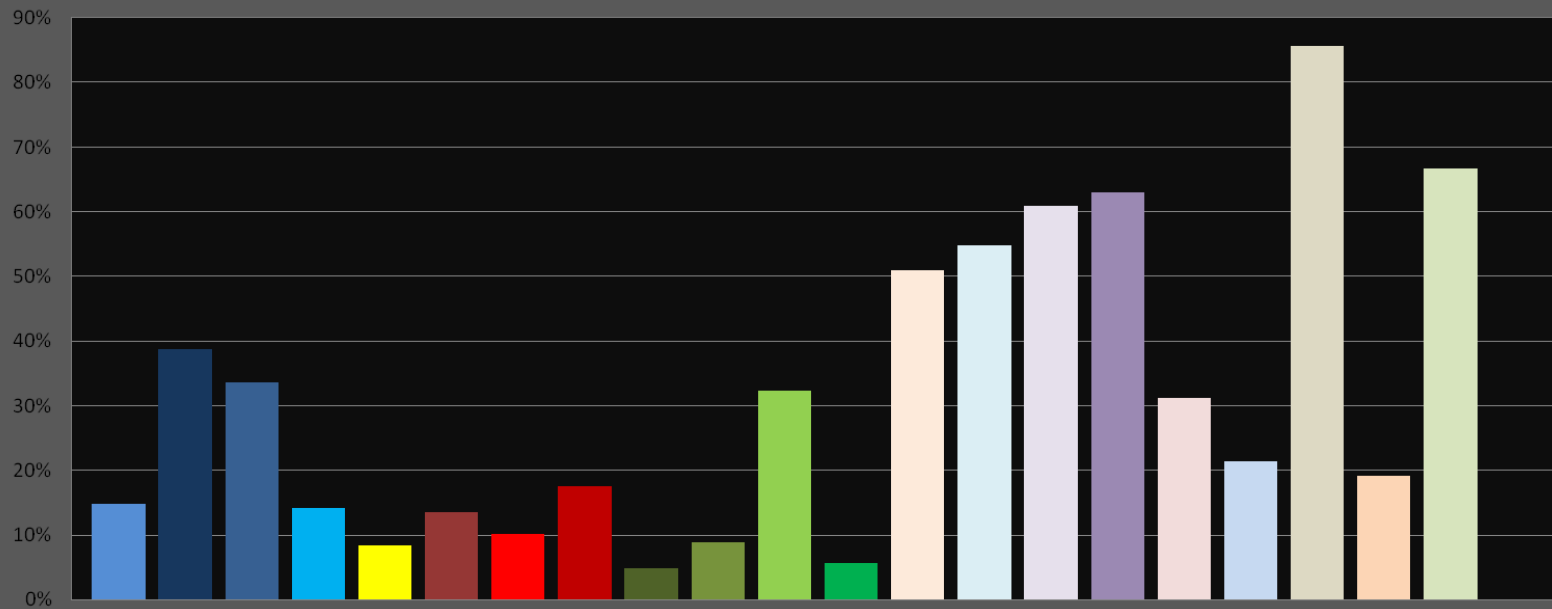
Gasoline Stations



Gasoline Stations

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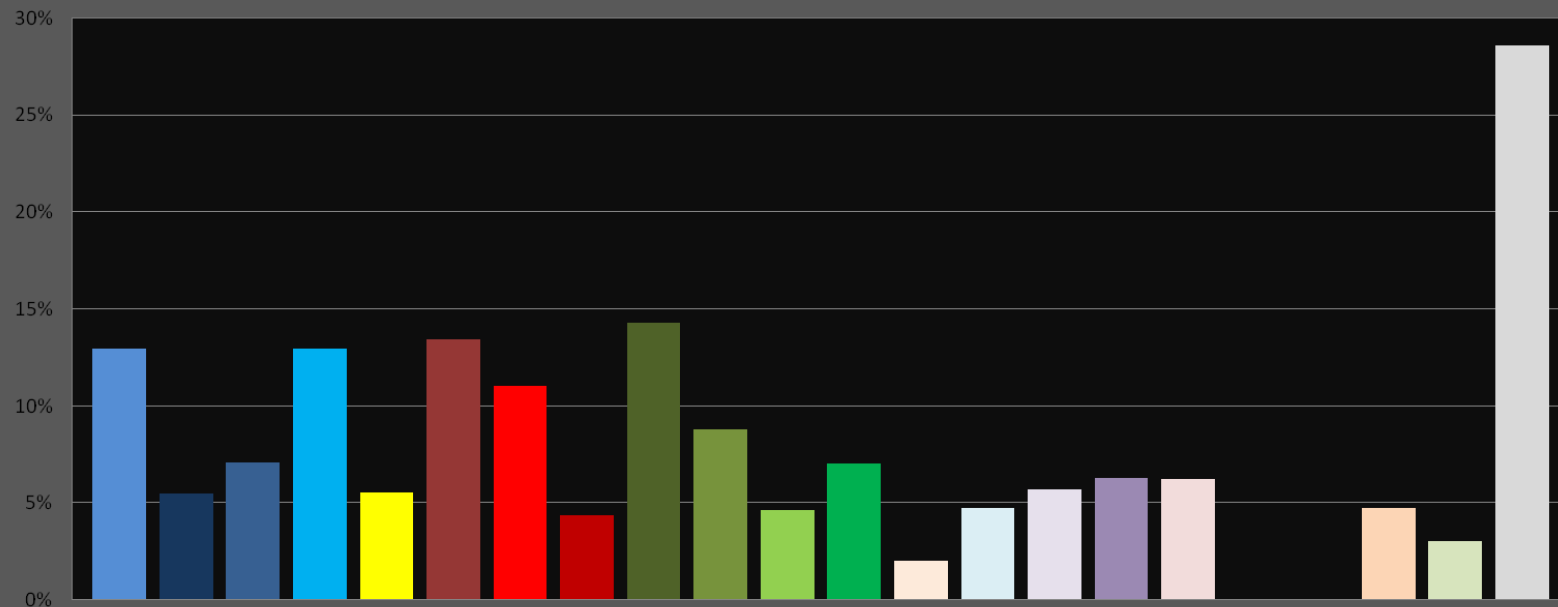
Clothing and Accessories



Clothing and Accessories Stores

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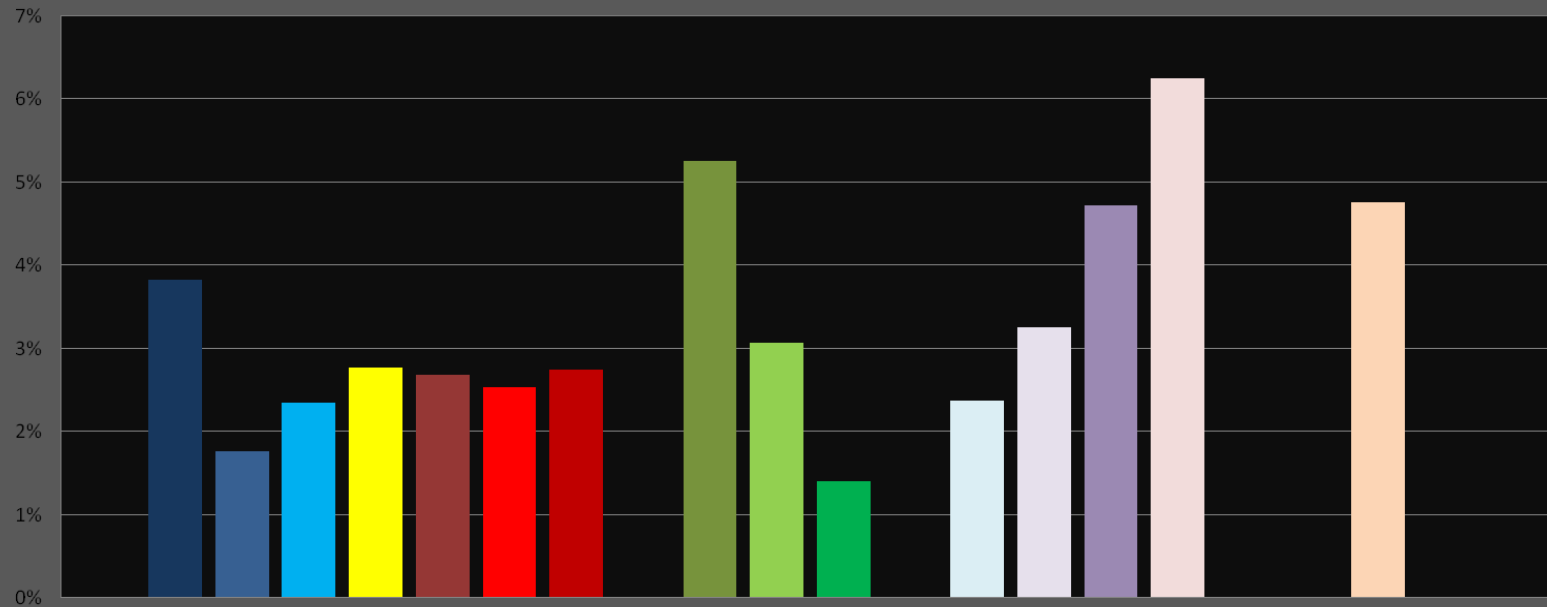
Sporting, Hobby, Book and Music Stores



Sporting, Hobby, Book, and Music Stores

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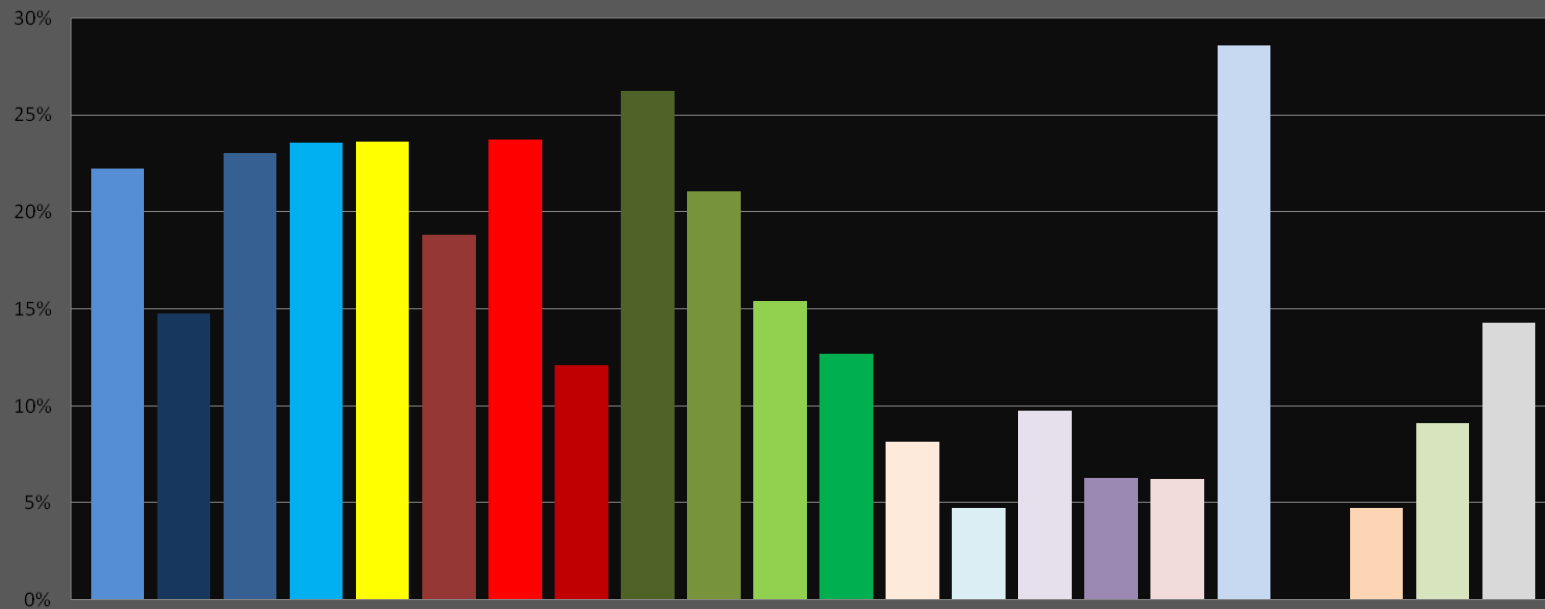
General Merchandise Stores



General Merchandise Stores

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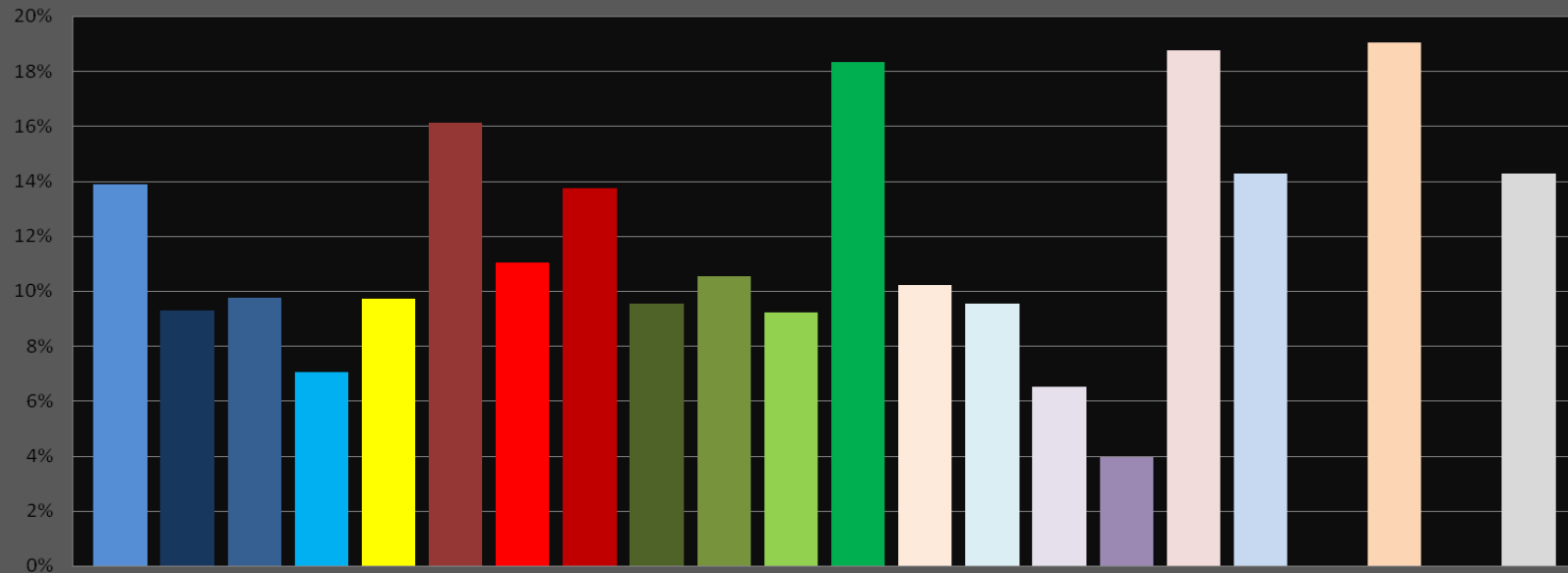
Miscellaneous Store Retailers



Miscellaneous Store Retailers

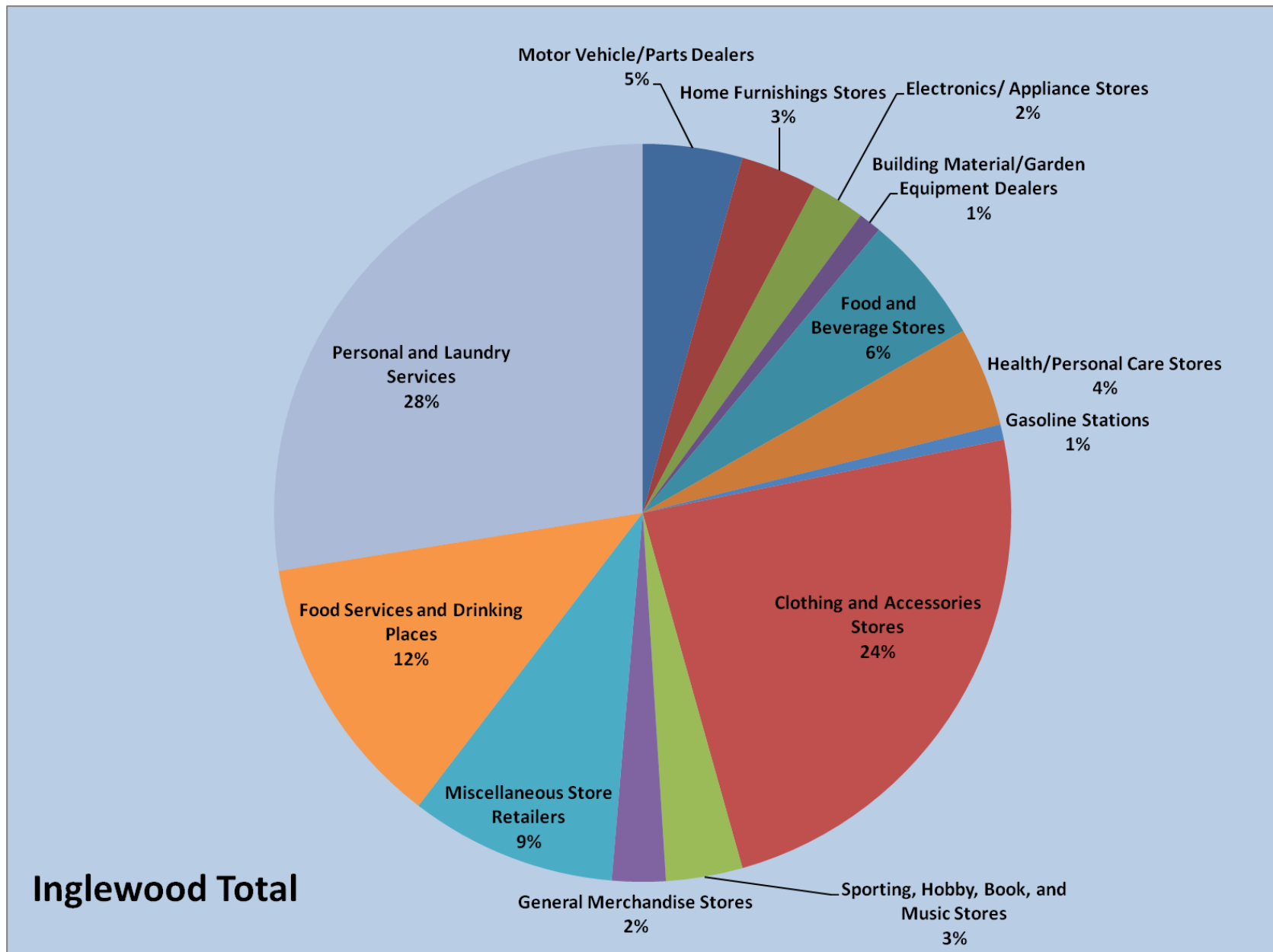
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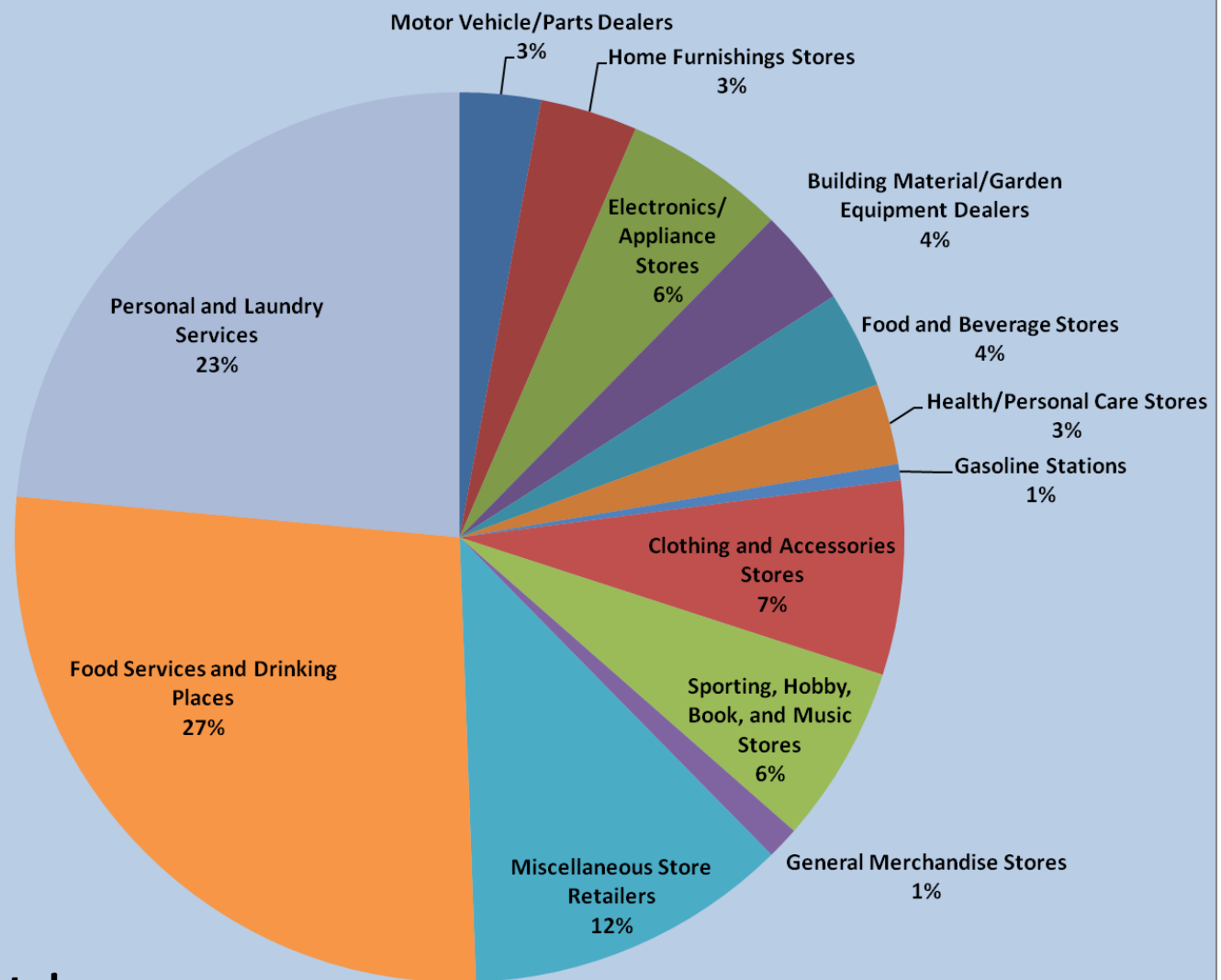
Food and Beverage Stores



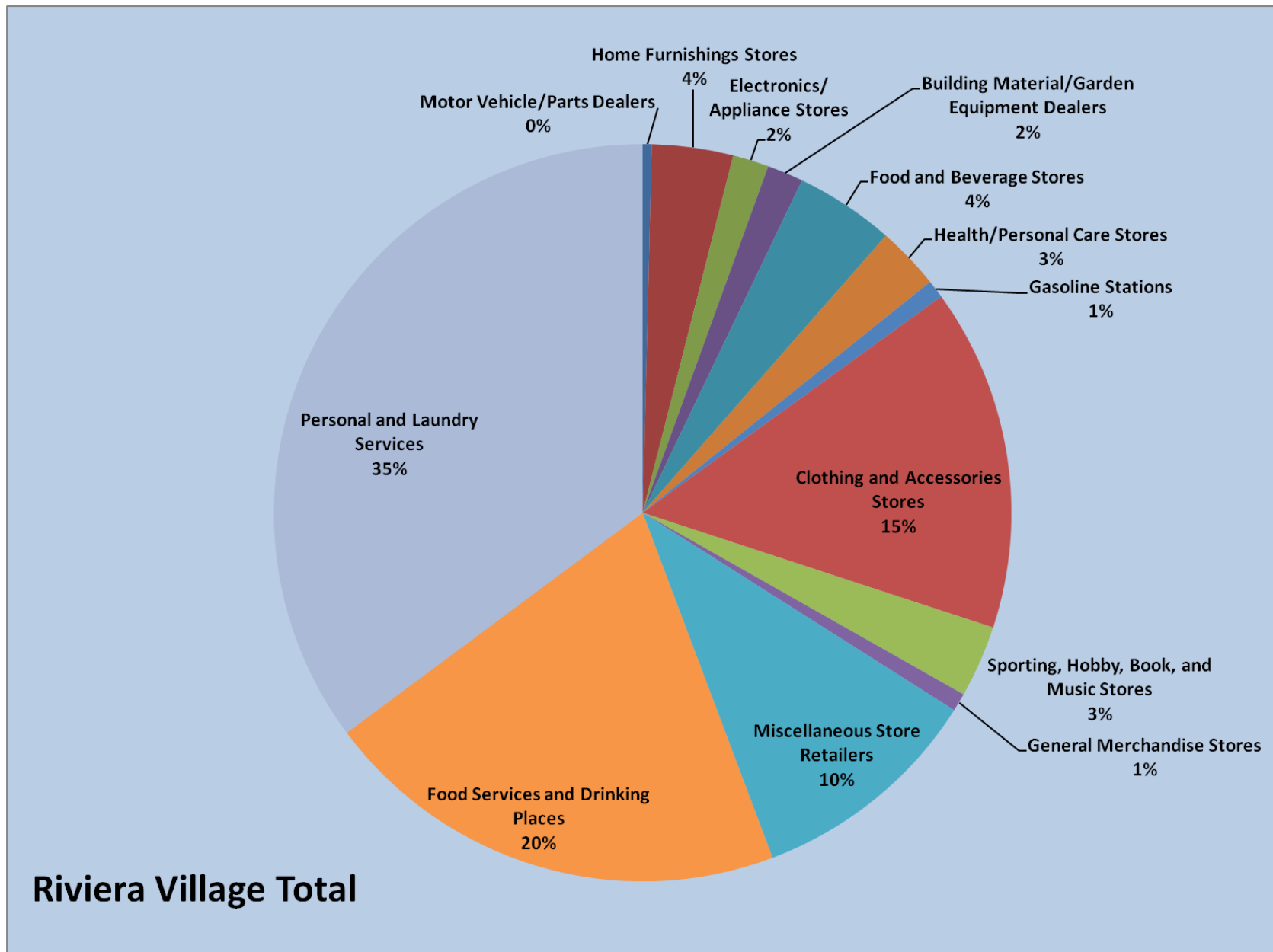
Food and Beverage Stores

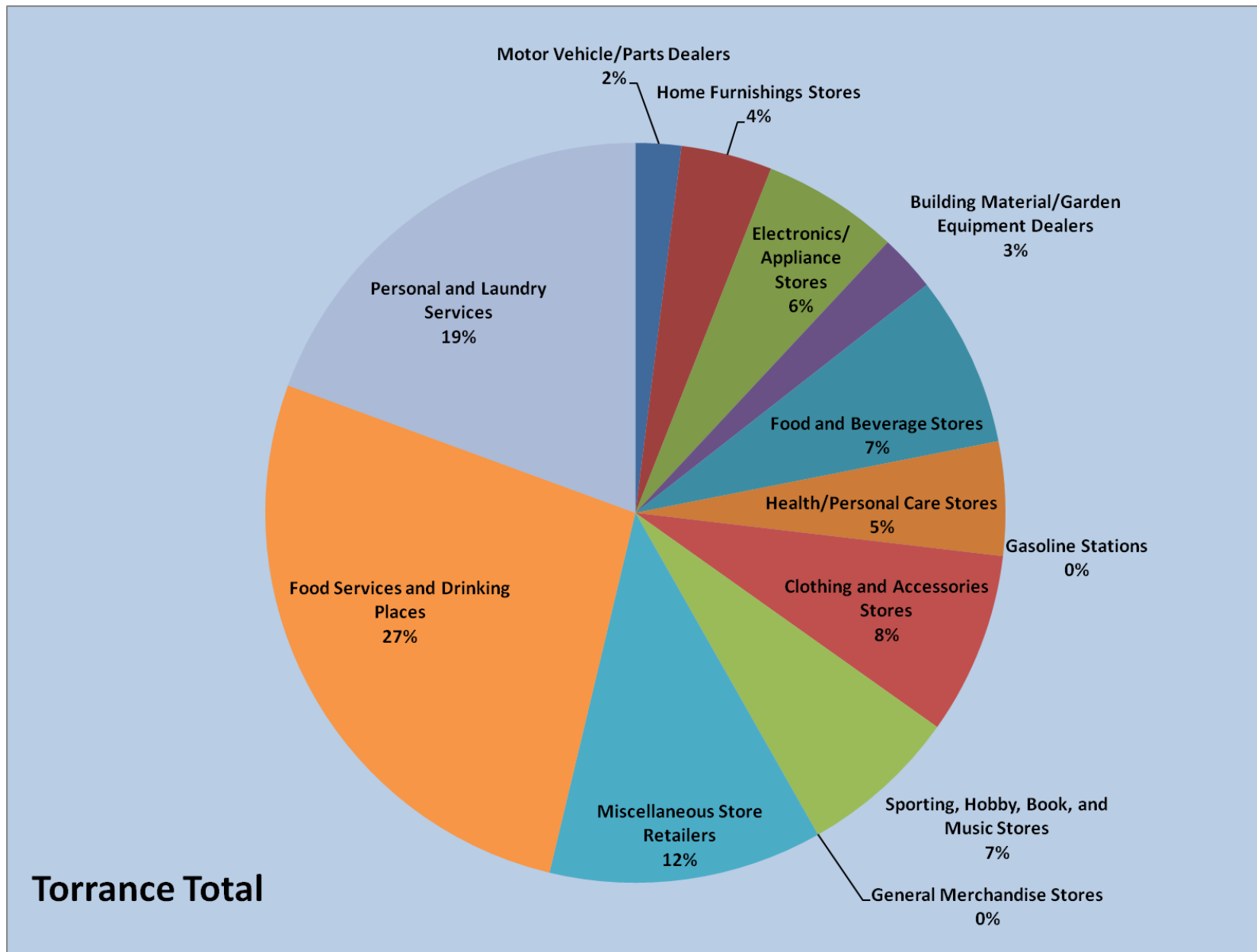
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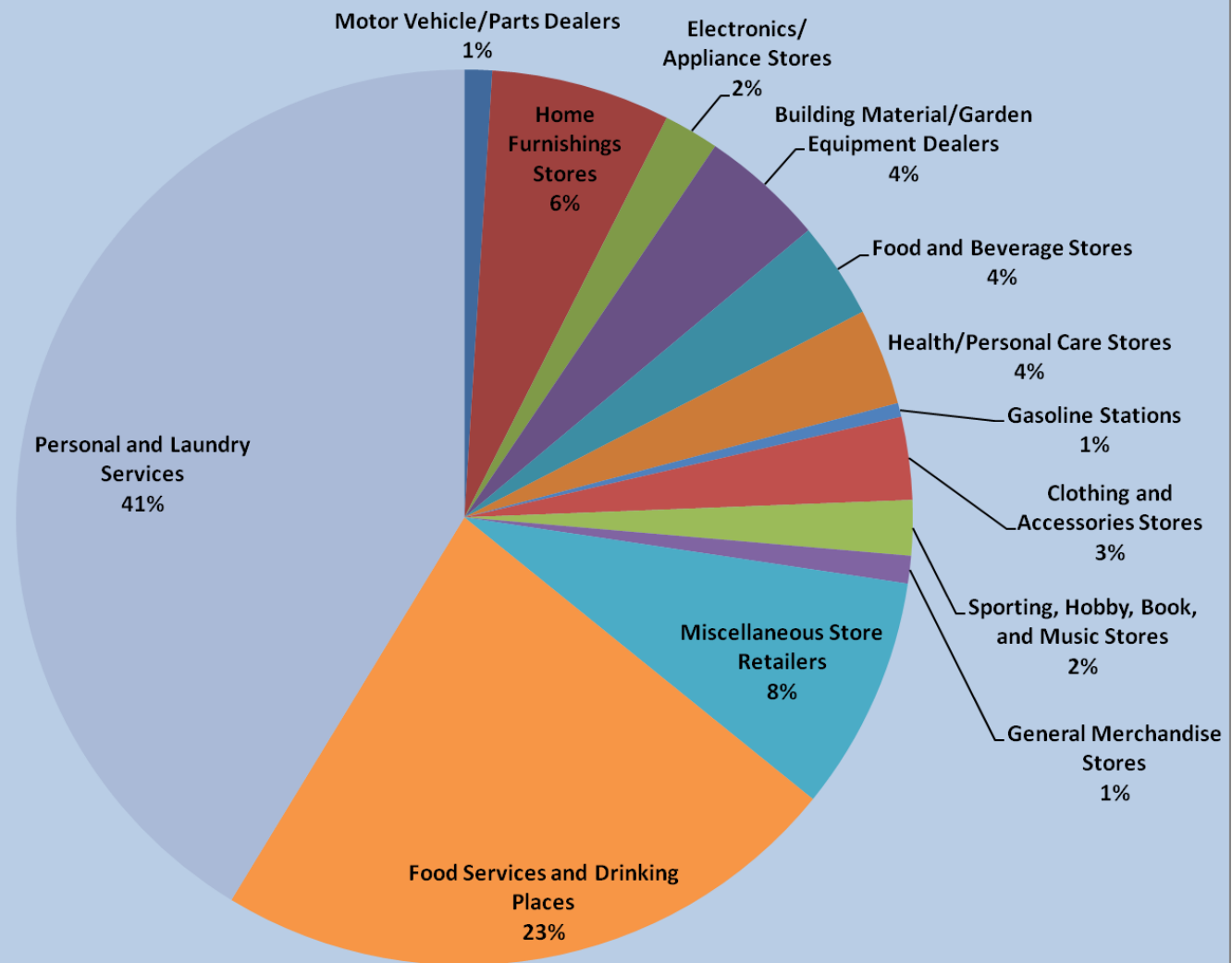




El Segundo Total

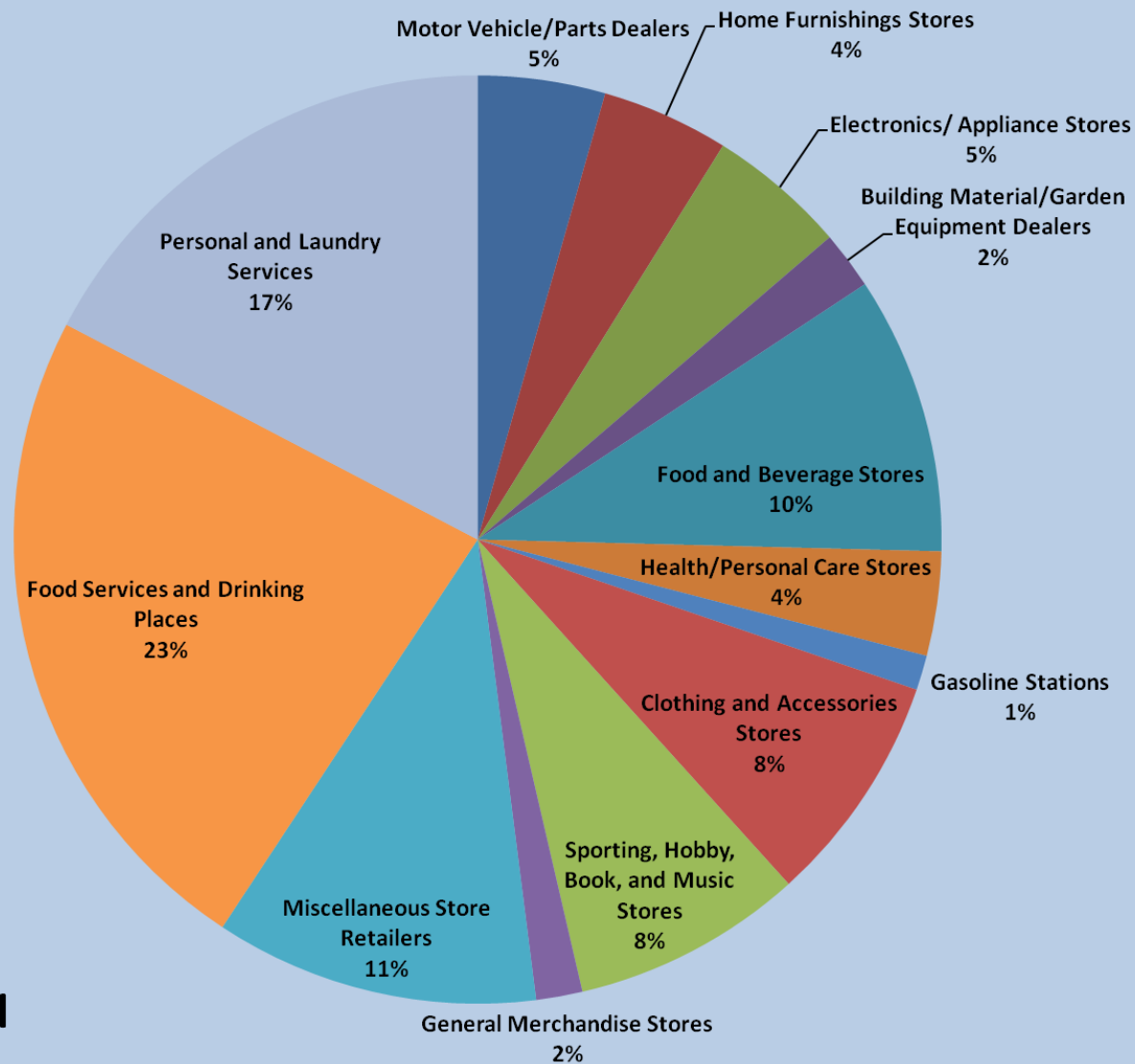


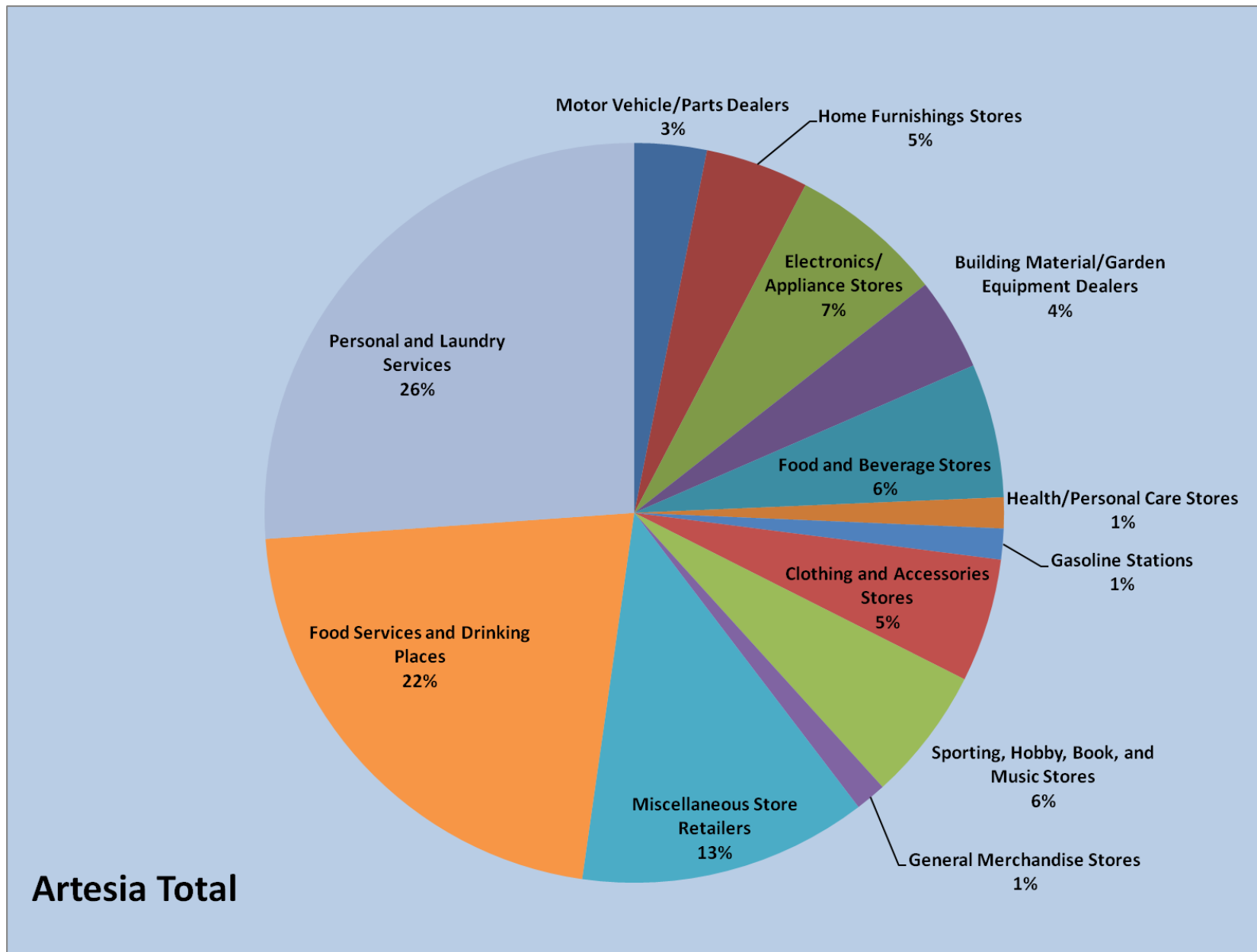




PCH

Gardena Total





Three Digit NAIC Analysis

74 3-digit codes appear somewhere among the 8 study areas.

16 (22%) of the 74 have a significant presence, defined as at least 1% of the total businesses in the study area are of that 3 digit code. This means that 78% of the 3-digit NAICs present have a relatively minor presence in most study areas.

Including the retail businesses means that around 40% plus or minus a few percentages of the 3 digit codes are present in every study area. And that 58 codes in relatively small numbers make up the remaining 60% of the businesses. This implies that a lot of the uniqueness of each place comes from trace presence of a large number of different kinds of businesses.

Code 541 (Professional, Scientific and Technical Services) has the next highest presence beyond retail with a range of 7% to 15% in the study areas.

The 16 3-digit NAICs with a significant presence and the range of presence are:

Table 35. 3-digit NAICs	
Building construction (236)	0.9% in Ing to 3.5% in ES
Specialty trade contractors (238)	1.0% in Ing to 7.2% in Art
Merchant wholesalers – durable goods (423)	2.0% in PCH to 6.4% in OT
Credit intermediation and related (522)	1.8 % in PCH & ES) to 2.7 in Haw
Securities, other financial, etc. (523)	0.3 in OT to 1.7 in RV
Insurance carriers and related (524)	0.7 in Ing to 4.4 in RV
Real estate (531)	3.0 in Gard to 7.6 in Hawthorne
Prof, scientific, & technical services (541)	7.0 in Haw to 15.1 in OT
Administrative and support services (561)	2.2 in RV to 5.8 in Haw
Educational services (611)	2.1 in Haw to 4.7 in PCH
Ambulatory health care services (621)	4.9 in Gard to 11.2 in RV
Social assistance (624)	1.0 in OT to 3.2 in Ing
Food services and drinking places (722)	4.0 in Ing to 6.0 in ES
Repair and maintenance (811)	1.1 in RV to 6.2 in Haw
Personal and laundry services (812)	5.1 in Gard to 16.8 in PCH
Religious, civic, prof assoc, etc. (813)	1.0 in PCH to 5.8 in Haw

There are 9 that have a significant presence and seem to vary substantially between centers.

Ratio refers to the highest percent over the lowest in that category. Spread refers to the difference between the highest and lowest. So, for example, 524 has a ratio of 6.3 to 1 and a spread of 3.7 while 811 has a ratio of 5.6 to 1 and a spread of 5.1.

Three of the 16 have a large ratio between as well as a wide spread. They are highlighted in red. Those are likely specializations for those centers in which they are high.

Two have a high ratio but a relatively low spread – 523 has a ratio of 5.6 to 1 but a spread of only 1.4. This means the amounts are pretty small in either case.

Four have a normal ratio but a wide spread – 541 has a ratio of 2.2 to 1 but a large spread of 8.1. This implies that every center has some substantial amount but that with the most are highly concentrated in that function.

522 has a 1.5 to 1 ratio and only a 0.9 spread, meaning that every center has about the same amount of this function. 722 is also evenly distributed among the study areas. All the rest confirm the thought that uniqueness of a commercial area comes to a certain extent from the variety within functions that are pretty much everywhere, as much or more than having a completely unique functional profile. That uniqueness tends to come from very small amounts of seldom found functions.

One interesting corridor-center comparison, for 531 Real Estate – centers average 4.9%, corridors 4.8%.

Four Digit NAIC Analysis

64 4-digit codes appear in each of the 8 study centers out of a total 221 4 digit codes present in the study areas. In other words, 29% of the business types are common to all study areas whether corridor or center. 21 are in 7 of the areas (9.5%), and 19 are in 6 (8.6%) for a total 47% of all business types are in almost every study area. In other words, the study areas share a common base of functionality.

In the retail category, only 2 of the 27 retail codes are relatively rare with a presence in only one study area (4541; mail order house) in Inglewood and 4412 used car lots in only two areas – El Segundo and Hawthorne. All other retail categories are present in at least 4 areas. And there is only one category in 4 – 4543 Direct Selling Establishments and it is in 3 corridors (not PCH) and one center (Inglewood). There are, in other words, no dramatic differences between the retail mix in each study area. This reinforces an earlier observation made at 2-digit code level that retail malls have an extraordinarily narrow range of functionality compared to centers and corridors. And that the uniqueness of study areas tend to reflect the variety (the number of businesses within each category) within functions more than the overall functional profile.

It is also unlikely that there is some universal mix and variety that will work everywhere. The issue is the relationship of the mix and variety to the needs and interests of the neighborhood residents, subject to influence by the employees and visitors who originate outside of the

neighborhood. However, it does appear that one of the primary reasons for the poor performance of El Segundo is its extraordinarily low rate of retail and of retail plus services.

Each common category can appear relatively more or less across the areas. This frequency of appearance breaks out nicely into 5 categories:

Lowest 22-35 businesses among the 8 areas

Non retail	13
Retail	5
Total	18

2nd Lowest 39-55

Non-retail	11
Retail	6
Total	24

Medium 61-87

Non-retail	11
Retail	4
Total	15

High 100-153

Non-retail	10
Retail	1

Ultra High 214-408

Non-retail	3
Retail	0
Total	3

Lowest (from 22 to 35 businesses across the 8 study areas

Six non-retail codes and five retail codes are in this lowest category of variety.

3231` `Printing and Related Support Activities: Commercial lithographs (the dominant subcategory), screen printing and other.

There are 35 of these in the 8 areas (average 4.4) with 13 in Gardena, by far the most of any other area. ES 1, and 2 each in Artesia and RV.

4236 Electrical and Electronic Goods Wholesalers

There are 31 of these in the 8 areas (average 3.9) with 7 in Hawthorne and 5 each in Gardena and El Segundo.

4238 Machinery, Equipment and Supplies Merchant Wholesalers

33 in the 8 areas (average 4.1) with 9 in Gardena and 7 each in Inglewood and Hawthorne

Retail Sub-Category

4452 Specialty Food Stores: Meat markets, fish and seafood markets, fruit and vegetable markets, baked goods stores, confectionary and nut store, and other specialty.

29 in 8 areas (average 3.6) with Gardena 8 and Hawthorne 6. At the low end, RV 1, 2 each in Inglewood and ES, 32, and 3 each in PCH and Artesia.

Second Lowest 39-55

2361 Residential building construction: SF builders, operative builders, and remodelers, where remodelers is the dominant sub-category.

There are 39 of these businesses in the 8 areas (average of 4.9 per), with 8 in El Segundo being the most in any one area.

2389 Other Specialty Trade Contractors. Site preparation contractors and other specialty trades.

There are 43 of these in the study areas for an average of 5.4 per area. Artesia has 14, Hawthorne 11 with RV 1, OT, PCH and Gardena 2 each, and 3 in Inglewood.

Retail Sub-Category

4421 Furniture Stores;

40 in the 8 study areas, 5 per study area. Hawthorne with 11, Inglewood 7, lowest with ES w 1 and PCH with 2.

4422 Home Furnishings Stores

39 total., 4.9 average. 11 in PCH, Gardena 7

Medium 61-87

4239 Miscellaneous Durable Goods Merchant Wholesalers: Sporting and recreation goods, toys and hobbies, recyclable machines, jewelry, watch and precious metals.

62 in the 8 areas (average 7.8) with 21 in Gardena and 17 in Old Torrance

Observations: While these codes appear everywhere, they are not particularly businesses that will attract visitation by residents. They are probably located because of the rent structure, convenience to the owner, or for proximity to related businesses. The areas with the greatest variety among them did not have high capture rates. So they are taking up space in the area without attracting customer trips from within the neighborhood.

It is surprising to find 3 wholesale categories appear in all 8 study areas.

2362 Non residential building construction; industrial, commercial and institutional. There are 72 for an average of 9 per area. ES 19, OT 13, Artesia 12, and Gardena 11. R\$V has 4.

High 100-153

2382 Building Equipment Contractors – category includes electrical contractors and plumbing, heating and air conditioning contractors.

There are 100 of these businesses in the 8 study areas so the average per area is 12.5. Hawthorne had the greatest number with 35, then Artesia with 21 and 15 in El Segundo. Lowest totals are in Gardena 1, RV 4, PCH 4, and Inglewood 6.

5242 Agencies, brokerages and other insurance related activities – these are essentially insurance brokers

There are 115 among the 8 study areas for an average of 14.4 per area. RV had 28, Hawthorne 18, and Artesia 16.

5411 Legal Services

There are 114 among the 8 study areas for an average of 14.3 per area. Inglewood and RV were high with 29 probably reflecting, respectively, the County court complex in Inglewood and the residential location of many attorneys in South Redondo Beach. OT was third with 23.

5412 Accounting, tax preparation, bookkeeping and payroll services

There are 120 among the 8 study areas for an average of 15 each. Hawthorne and Gardena have 23 each followed by OT with 17.

5416 Managerial, scientific and technical consulting services

There are 102 among the 8 study areas for an average of 12.8 per area. ED with 25 was followed by Artesia with 18 and OT with 14.

6212 Office of dentists

There are 137 among the 8 study areas for an average of 17.1 led by Hawthorne with 35 and RV with 25.

6213 Offices of other healthpractitioners

There are 152 among the 8 study areas for an average of 19.1 led by RV with 27, PCH 23, and ES and Art with 21 each.

8111 Automotive repair and maintenance includes exhaust, transmissions, body, glass, oil change

There are 148 in the 8 areas for an average of 18.5 led by Haw with 45, Ing 29, and OT 26. This component of center functionality will be reduced or replaced by other vehicle services as the fuel base for automobiles changes.

8112 Electronic and precision equipment repair and maintenance

There are 148 among the 8 study areas for an average of 18.5 led by Hawthorne with 45, Ing with 29 and OT with 26.

8131 Religious organizations

There are 136 among the areas for an average of 17, led by Gardena with 35, Hawthorne 29 and Inglewood 23.

Retail Sub-Category

4481 – Clothing Stores – category includes mostly women’s clothing, but some men, family and children.

There are 159 of these stores in the 8 study areas for an average of almost 20 in each. Inglewood leads with 57 followed by RV with 29 and Hawthorne with 23. Given the spread of the capture rates in those areas, it seems clear there is no “magic bullet” in functional profile or even in variety.

Ultra High 214-408

7221 Full and limited service restaurants

There are 305 in the 8 study areas for an average 38.1 led by Hawthorne with 58 and Gardena with 53.

8121 Personal care services

There are 408 among the 8 areas for an average of 51 each, led by RV with 78, Ing 66, haw 65 and PCH 71. RV and PCH totals most likely reflect proximity to a customer base on the relatively isolated Palos Verdes Peninsula.

5312 Office of Real Estate Agents

There are 214 in the 8 areas for an average of 26.8, led by Haw with 64, Ing 33, ES 27, and RV 26.

So the most ubiquitous functionality in our study areas were restaurants, personal care services and real estate agents. Malls in contrast have a lot of restaurants but few personal services and no real estate agents. All three of those functions draw in visitors as well as employees, although realtors surely generate less volume.