

## 4. Characteristics

During the course of our research, we compiled a list of more than 100 different “characteristics” that could potentially affect the performance of mixed-use districts. These include:

- Census data (population, housing, income, and demographics)
- Individual parcel data from the LA County Assessor
- Information about local businesses and economies from InfoUSA
- Traffic volumes provided by the individual cities.
- Pedestrian counts and bus ridership figures from a variety of sources

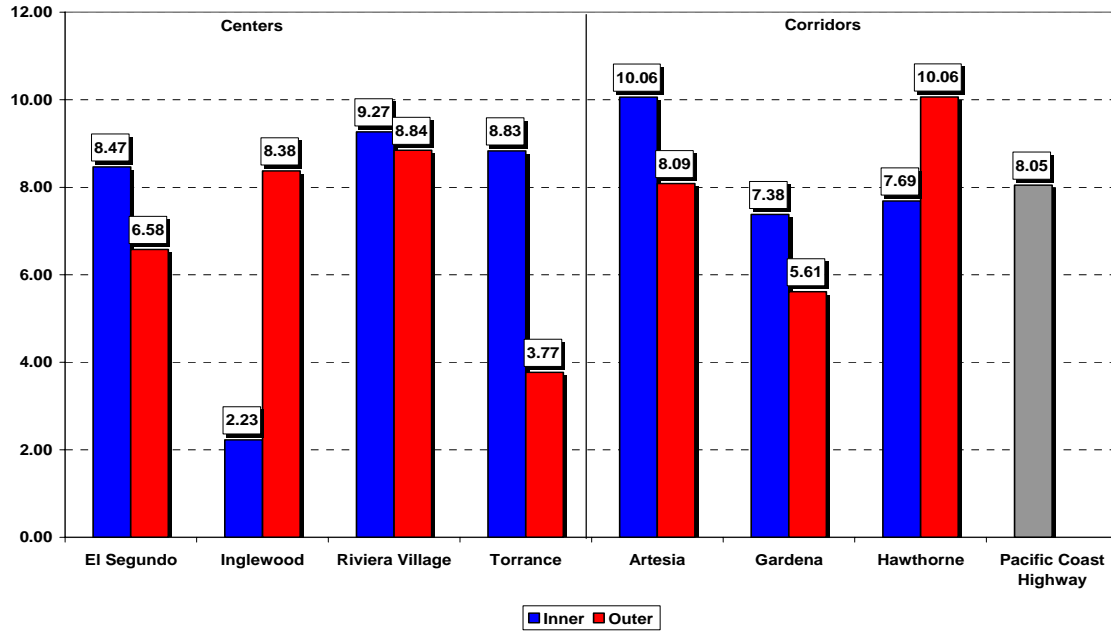
A complete list of these characteristics is contained in the “base table” in Appendix X.

Though this database includes a huge number of characteristics, throughout our three-year study, we had gradually begun to zero in on a few factors, including the following:

### ***Housing Density***

Housing density is considered especially important given the fact that future growth in the South Bay is likely to occur in high-density mixed-use areas. A simple question is, Do higher densities influence either trip capture or mode split? In this case, seeking consistent data, we measured housing density as the number of residential units (from the Census) divided by the total amount of land in the study area (from the Assessor). In general, housing densities were fairly consistent across study areas, even between centers and corridors, ranging from 8 to 10 units per acre, with a couple of exceptions. (Figure 4-1.)

Figure 4-1: Housing Density (Units Per Acre)



We attempted to calculate housing density on residential land only, but it can be difficult to derive, from the Assessor data, both the numerator (number of housing units) and the denominator (amount of land devoted to residential use). We did seek to calculate this measure based on housing units from the Census and residential land from the Assessor, but we believe there are some data problems and we are not confident enough of the results to publish them. In general, however, we believe net residential densities in the study areas to range between 15 and 30 units per acre. We will use this general knowledge to inform our discussion below.

### Physical Form of Study Area

We divided study areas into two types – centers and corridors – based largely on the physical form of those study areas. This was partly a qualitative grouping, but it can be measured by certain objective criteria such as traffic volume at key intersections in the study area. In general, traffic volumes in corridors are higher than traffic volumes in centers, as corridors by definition lie on either side of a busy arterial street.

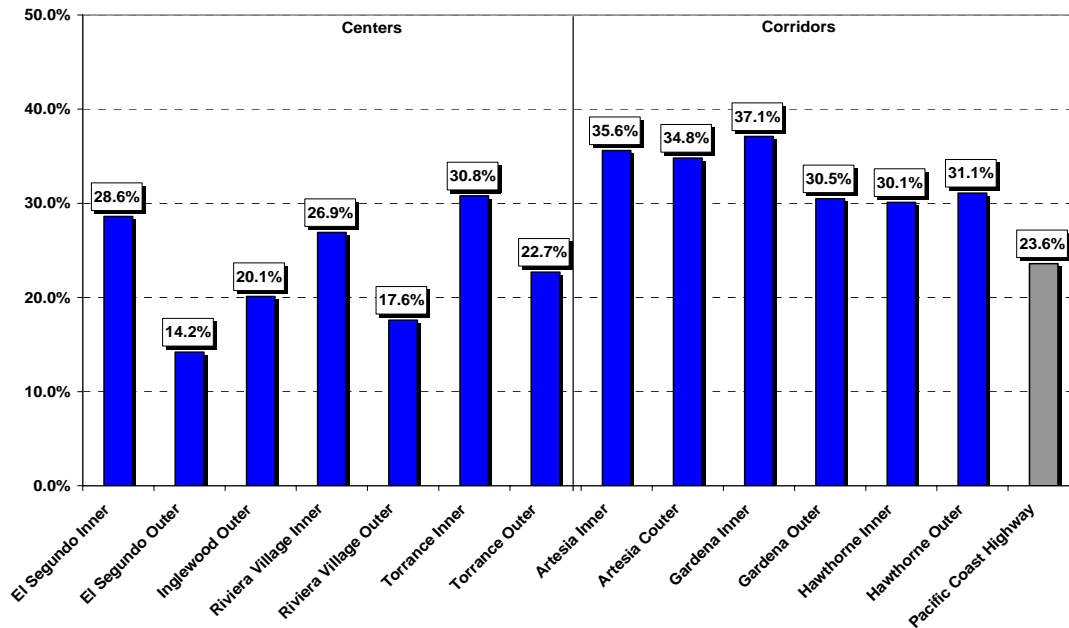
### Retail Business and Other Available Services

A working hypothesis of this study has been that retail businesses and other functions and services available in the study areas might be just as important as density or form in influencing the performance of the study areas. In other, similar studies we have conducted, including studies of other cities in the South Bay, we have found that the pulse of a commercial district near a residential area often lies in its base of retail businesses, professional services businesses, and personal care businesses.

In this study, we have examined a variety of such factors, including the following:

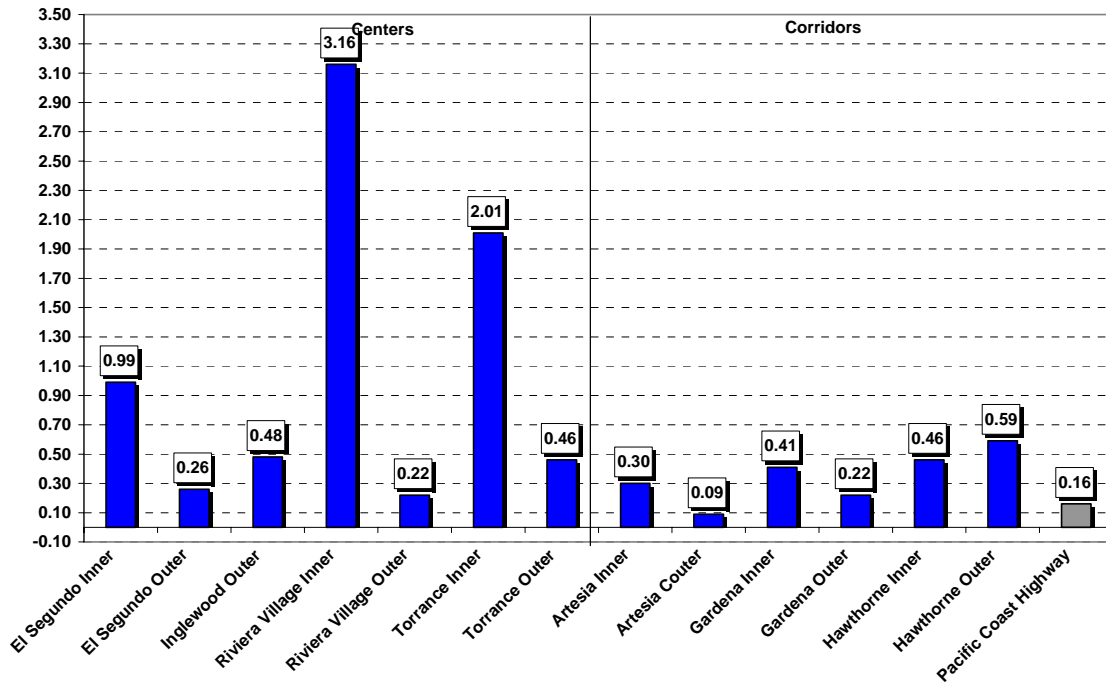
1. The percentage of all businesses in the study area that are defined, according to our taxonomy, as “retail businesses”. (Figure 4-2)

Figure 4-2: Retail Businesses As a Percentage of All Businesses in Study Area



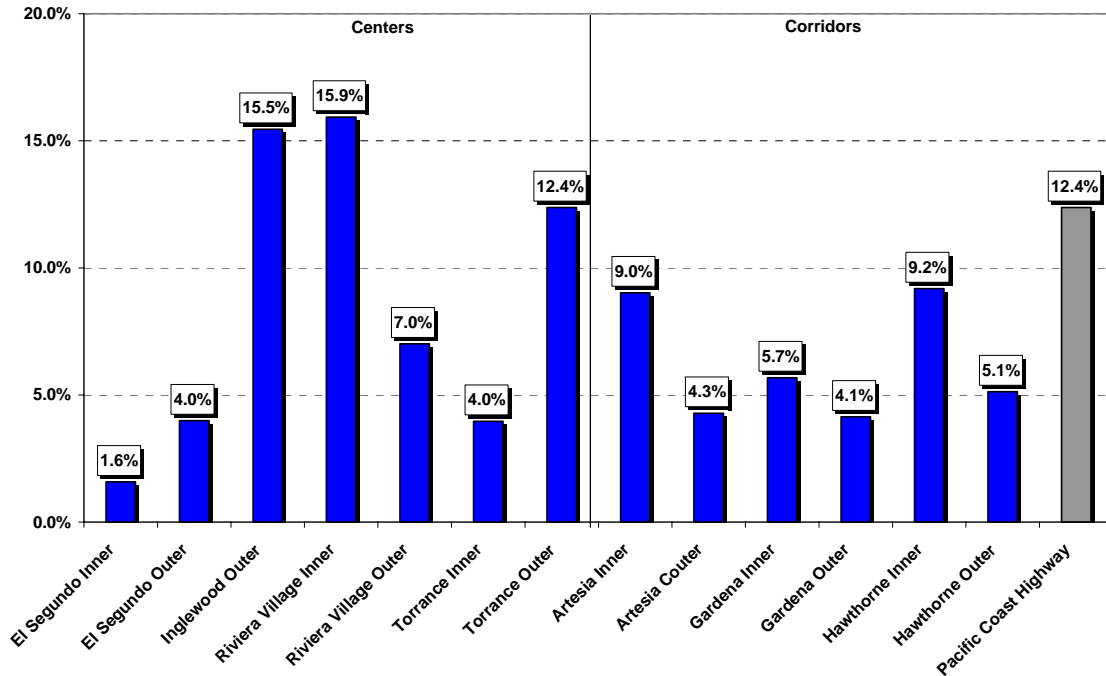
- The density of businesses we defined as “neighborhood businesses” (that is, neighborhood businesses per acre), especially in the *inner* area. Our definition of neighborhood businesses, which was explained in detail in Appendix B of our Year 1 report, includes retail businesses such as drug stores and food markets and other service-oriented businesses such as banks, dry cleaners, medical and dental offices, coffee shops, video rental stores, and health clubs. (Most retail businesses were located in the inner study areas and in general these were the retail “cores” of the study areas.) (Figure 4-3)

Figure 4-3: Density of Neighborhood Businesses (Per Acre)



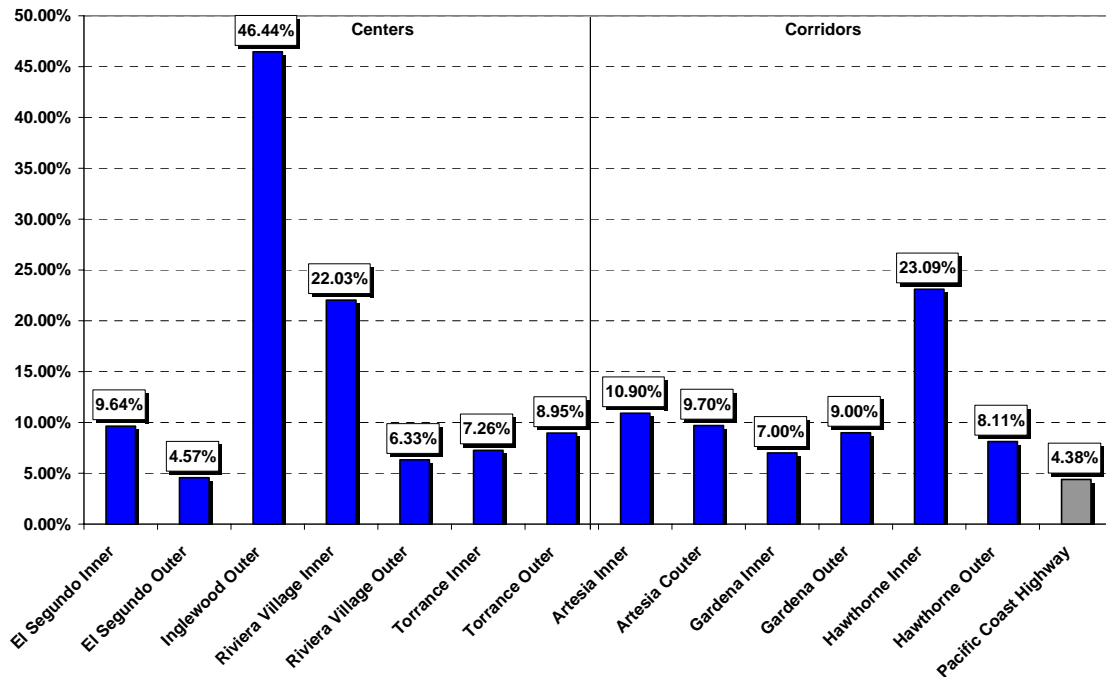
- The percentage of businesses we define as “personal care” businesses (hair salons, nail salons, etc.), especially in the *inner* area. (Figure 4-4.)

Figure 4-4: Personal Care Businesses As a Percentage Of All Businesses



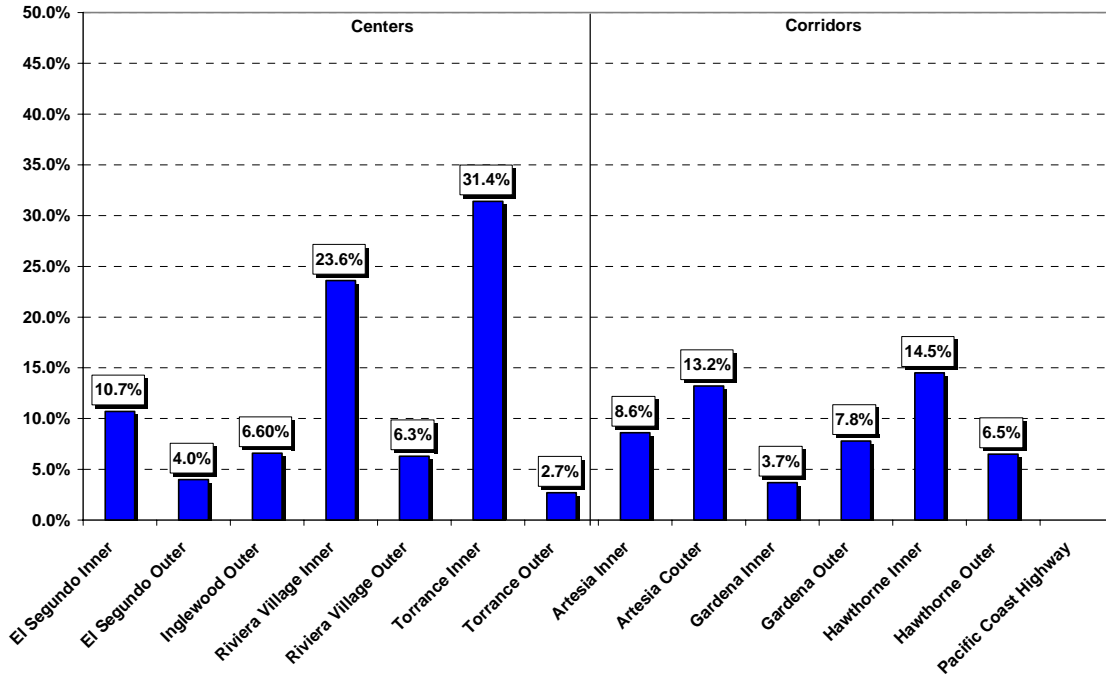
- The percentage of businesses we define as “professional services” businesses, especially in the *inner* area. (Figure 4-5.)

Figure 4-5: Professional Services Businesses As a Percentage Of All Businesses



5. The percentage of total *land* in the study area devoted to retail uses. (Figure 4-6)

Figure 4-6: Land Devoted to Retail Use As Percentage of All Land



## 5. Results

Figures 5-1 and 5-2 show the correlation coefficients for the 14 study areas and, in the case of some Census data, the 8 combined study areas. Figures 5-3 and 5-11 show the performance of each center according to each of our two measurements, trip capture and mode split.

**Figure 5-1: Correlation Coefficients**

Name	Trip Capture Correlation	Mode Split Correlation
<b>City</b>		
<b>Trip Capture</b>		<b>0.593</b>
<b>Mode Split</b>	<b>0.593</b>	
Census Block Groups in Study Area		
Census Blocks in Study Area	-0.382	-0.693
Acres	-0.227	-0.699
Square Miles	-0.090	-0.627
<b>Socioeconomics</b>		
Total Population (Blocks)	-0.320	-0.684
Population Per Acre	-0.206	-0.286
Persons/Square Mile	-0.209	-0.286
Sum of WHITE	-0.143	-0.554
% White	<b>0.472</b>	<b>0.574</b>
Sum of BLACK	-0.145	-0.296
% Black	0.028	-0.153
Sum of ASIAN	-0.547	-0.648
% Asian	-0.433	-0.305
Sum of HISPANIC	-0.300	-0.553
% Hispanic	-0.033	-0.433
Males	-0.255	-0.637
% Males	0.186	-0.047
Females	-0.182	-0.588
% Females	0.117	0.191
Households	-0.285	-0.661
Household Units/Acre	0.181	0.179
Vacancies	-0.145	-0.579
Percent Vacancies	<b>0.476</b>	<b>-0.075</b>
Owner Tenure	-0.318	-0.700
Percentage Owner Tenure	0.057	-0.598
Renter Tenure	-0.218	-0.530
Percentage Renter Tenure	<b>0.320</b>	<b>0.387</b>
Median Age	<b>0.351</b>	<b>0.232</b>

Household Size		-0.121	-0.366
Sum of FAMILIES		-0.319	-0.679
% Families		-0.154	-0.230
<b>Housing</b>			
Housing Units		-0.281	-0.661
Housing Units Per Acre		0.149	0.211
Sum of VACANT		-0.145	-0.579
Vacancy Rate 2000 Census		0.476	-0.075
<b>Business</b>			
Frequency			
Construction		0.057	-0.256
Percent Construction		0.205	-0.024
Manufacturing		-0.283	-0.188
Percent Manufacturing		0.021	-0.057
Transportation and Shipping		-0.045	-0.266
Percent Transportation and Shipping		0.214	-0.103
Wholesale		0.511	0.164
Percent Wholesale		0.579	-0.046
Retail		-0.146	-0.284
Percent Retail		-0.360	-0.310
Technology		0.377	0.183
Percent Technology		0.317	0.504
Services-Retail		0.089	-0.091
Percent Services-Retail		0.072	0.191
Services-Professional		0.178	0.167
Percent Services-Professional		0.360	0.542
Government/Education/Institutional		-0.258	-0.386
Percent Government/Education/Institutional		0.135	-0.007
Uncategorized		-0.063	-0.017
Percent Uncategorized		0.154	0.090
<b>Employees</b>			
Construction		-0.181	-0.010
Percent Construction		-0.319	0.177
Manufacturing		0.417	0.006
Percent Manufacturing		0.376	-0.038
Transportation and Shipping		-0.030	-0.081
Percent Transportation and Shipping		0.155	0.133
Wholesale		0.005	-0.036
Percent Wholesale		0.199	0.114
Retail		-0.052	-0.283
Percent Retail		-0.163	0.118
Technology		0.445	0.131
Percent Technology		0.505	0.091
Services-Retail		0.105	-0.145
Percent Services-Retail		0.000	0.090
Services-Professional		-0.005	-0.041
Percent Services-Professional		0.212	0.213
Government/Education/Institutional		-0.318	-0.517
Percent Government/Education/Institutional		-0.189	-0.221



Uncategorized		0.044	-0.159
Percent Uncategorized		-0.242	0.065
<b>Sales</b>			
Construction		-0.052	0.085
Percent Construction		-0.040	0.190
Manufacturing		-0.453	-0.395
Percent Manufacturing		-0.595	-0.122
Transportation and Shipping		-0.180	-0.295
Percent Transportation and Shipping		0.130	-0.294
Wholesale		-0.008	0.028
Percent Wholesale		0.271	0.253
Retail		-0.294	-0.437
Percent Retail		-0.346	-0.316
Technology		0.388	0.147
Percent Technology		0.473	0.046
Services-Retail		-0.080	-0.243
Percent Services-Retail		-0.063	0.060
Services-Professional		0.018	-0.073
Percent Services-Professional		0.442	0.088
Government/Education/Institutional		-0.037	-0.097
Percent Government/Education/Institutional		0.241	0.121
Uncategorized		0.369	0.082
Percent Uncategorized		-0.127	-0.091
<b>Age of Structure</b>			
No Data		0.004	-0.416
		0.437	0.045
1946 and Earlier		-0.130	-0.411
		0.342	0.138
1947-1969		-0.388	-0.698
		-0.101	0.102
1970-1989		-0.318	-0.545
		-0.142	-0.138
1990-2005		-0.229	-0.429
		0.168	-0.003
Total		-0.365	-0.697
<b>Land Use</b>			
		-0.415	-0.749
Low Density		-0.395	-0.719
Medium Density		-0.431	-0.701
High Density		-0.044	-0.169
Mod/Mob		-0.636	-0.586
		-0.163	-0.554
Commercial (Retail)		-0.246	-0.574
Office		0.172	-0.034
Hotel / Lodging		0.128	-0.277
Auto (Commercial)		-0.314	-0.557
		-0.307	-0.610
Gov't / Hospital / Education		0.292	-0.143
Utilities		-0.499	-0.638
		0.182	-0.252

Industrial		0.298	-0.087
Mixed-Use		-0.234	-0.193
Parking Lot		0.077	-0.227
Recreation		-0.418	-0.445
Vacant		-0.579	-0.487
No Data		-0.111	-0.371
<b>Building Square Feet</b>			
<b>Res, Low Density</b>			
Count		-0.446	-0.736
Mean		0.052	0.089
Median		0.033	0.085
<b>Res, Medium Density</b>			
Count		-0.387	-0.666
Mean		0.081	0.156
Median		0.107	0.188
<b>Res, High Density</b>			
Count		-0.283	-0.453
Mean		0.225	0.238
Median		0.149	0.139
<b>Res Mod/Mob</b>			
Count		-0.620	-0.909
Mean		0.755	0.375
Median			
<b>Commercial (Retail)</b>			
Count		-0.073	-0.051
Mean		-0.235	-0.488
Median		0.111	-0.007
<b>Office</b>			
Count		0.055	0.136
Mean		0.534	0.155
Median		0.244	0.243
<b>Hotel / Lodging</b>			
Count		-0.065	-0.431
Mean		0.273	0.371
Median		-0.102	-0.249
<b>Auto (Commercial)</b>			
Count		-0.190	-0.350
Mean		0.272	0.504
Median		-0.048	0.267
<b>Industrial</b>			
Count		0.397	0.075
Mean		-0.152	-0.369
Median		-0.181	-0.526
<b>Gov't / Hospital / Education</b>			
Count		-0.130	-0.137
Mean		-0.102	-0.038
Median		0.253	0.497
<b>Mixed-Use</b>			

Count		0.046	-0.201
Mean		0.804	0.538
Median		0.829	0.648
Count		-0.409	-0.700
Mean		0.064	0.149
Median		0.028	0.164
<b>Neighborhood Businesses</b>			
Count		0.010	0.055
<b>Neighborhood Dynamics</b>			
Total Businesses		0.009	-0.149
Neighborhood Businesses Per Acre		0.418	0.762
Housing Units Per Nhood Biz		-0.201	-0.524
Percentage Commercial (Retail) Land		-0.022	0.273
Businesses Per Acre		0.467	0.810
Jobs		0.188	-0.223
Jobs Per Acre		0.620	0.724
Mixed Use As % of Building Square Footage		0.272	0.107

**Figure 5-2**

**Correlation Coefficients, Census SF-3 (Sample) Data (Block Group Level)**

	Trip Capture Correlation	Mode Split Correlation
Trip Capture -- Full Area	0.479	
Mode Split -- Full Area		0.479
Median Income	0.450	0.259
Median Owner-Occupied Home Value, 2000 Census	0.529	0.643
Contract Rent, 2000 Census	0.497	0.276
Total Population (Block Groups)	-0.296	-0.689
Households (Block Groups)	-0.268	-0.644
Household Size (Block Groups)	0.226	-0.065
Housing Units (Block Groups)	-0.272	-0.646
Sum of Vacant (Block Groups)	-0.328	-0.654
Owner Tenure (Block Groups)	-0.238	-0.667
Reter Tenure (Block Groups)	-0.279	-0.579
Name		
Census Block Groups in Study Area	-0.632	-0.841
Vehicles	-0.253	-0.645
Vehicles Per Household	0.392	0.074
Ratio of Vehicles to Household Size	0.477	0.297
Homeowner Households		

Vehicles (Homeowners)	-0.210	-0.634
Vehicles Per Homeowner Household	0.408	0.135
Ratio of Vehicles to Household Size	0.351	0.676
Renter Households		
Vehicles (Renter)	-0.274	-0.600
Vehicles Per Renter Household	0.387	0.142
Ratio of Vehicles to Household Size	0.265	0.593
Resident Work Force	-0.262	-0.634
Name		
City		
Census Block Groups in Study Area	-0.632	-0.841
Work at home	0.031	-0.442
Percent Work at home	0.447	-0.182
Less than 10 Minutes	-0.370	-0.614
Percent Less than 10 Minutes	0.305	0.168
10 to 20 Minutes	-0.297	-0.645
Percent 10 to 20 Minutes	0.262	-0.273
20 to 30 Minutes	-0.237	-0.638
Percent 20 to 30 Minutes	-0.353	0.165
30 Minutes or More	-0.232	-0.613
Percent 30 Minutes or More	0.463	0.231
Aggregate Travel Time (minutes)	-0.242	-0.618
Mean Travel Time	0.454	0.243
Public Transit Riders	0.006	-0.184
Others	0.488	0.247
Name		
City		
Census Block Groups in Study Area	-0.632	-0.841
Acres	-0.100	-0.613
Drive Alone	0.421	0.128
Carpool	0.250	0.121
Public Transit	0.299	0.160
Walk	-0.366	0.211
Bicycle	-0.370	0.209
Other	-0.368	-0.148
Work at Home	-0.323	-0.172
Drive Alone	0.462	0.173
Carpool	0.264	0.099
Public Transit	0.303	0.157
Walk	-0.375	-0.161
Bicycle	-0.352	0.265
Other	-0.365	-0.146

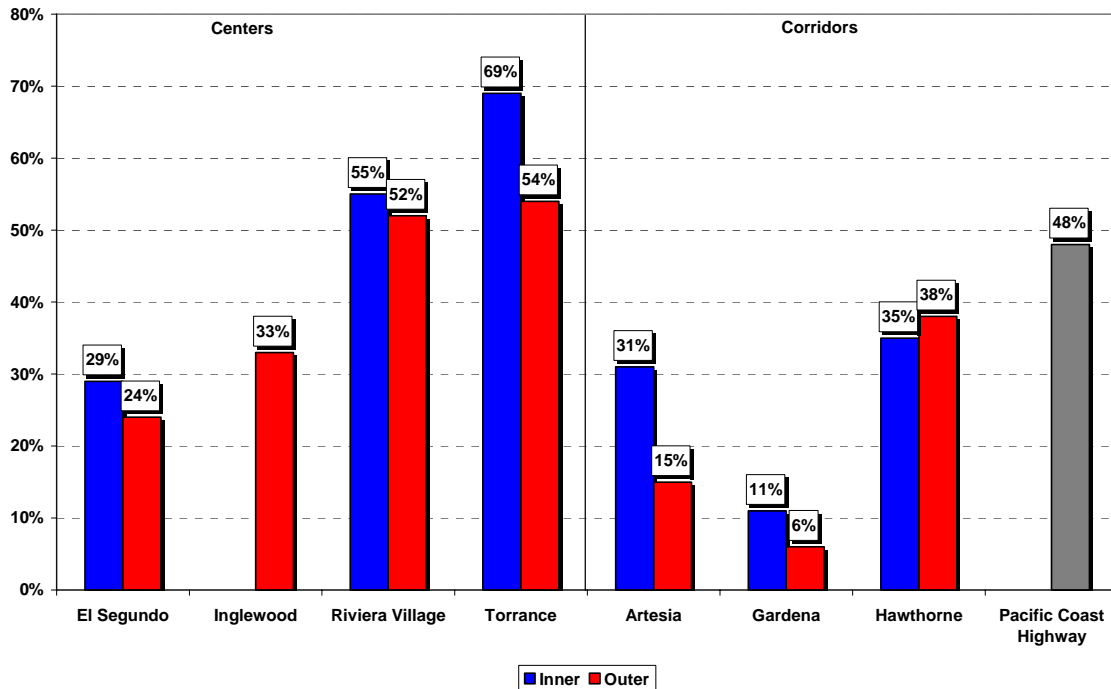
Works at Home/Public Transit/Walk/Bike	0.384	0.184
Works at Home/Commute 10 min or less	0.007	0.019
Housing units: Total	-0.272	-0.646
Housing units: 1; detached units in structure	-0.159	-0.655
Housing units: 1; attached units in structure	-0.361	-0.624
Housing units: 2 units in structure	-0.417	-0.470
Housing units: 3 or 4 units in structure	-0.422	-0.657
Housing units: 5 to 9 units in structure	-0.355	-0.377
Housing units: 10 to 19 units in structure	-0.266	-0.377
Housing units: 20 to 49 units in structure	0.031	-0.312
Housing units: 50 or more units in structure	0.408	-0.269
Housing units: Mobile home	-0.620	-0.598
Housing units: Boat; RV; van; etc.	-0.148	-0.616
Percent Single-Family Detached	-0.024	-0.131
Percent Single-Family Attached	0.077	0.080
Percent Duplexes	-0.362	0.337
Percent Triplexes & Fourplexes	0.100	-0.187
Percent 5-9 Units	0.283	0.398
Percent 10 or more units	0.507	0.288
Percent Other	-0.604	-0.554

We will now examine each group of characteristics, using both the correlation coefficients and side-by-side charts.

### ***Performance of Each Study Area***

As Figure 5-3 shows, Torrance and Riviera Village produced the best performance on trip capture for both the inner and outer areas. In each case, respondents said that they take more than half of all trips to the study area, with Inner Torrance capturing 69%. Pacific Coast Highway, which was not divided into inner and outer, also showed one of the higher percentages (48%) while Gardena and Artesia were the worst trip capture performers.

Figure 5-3: Percentage of All Trips by Nearby Residents Directed To Study Area



As Figure 5-11 shows, the mode split performance was slightly different. Again Riviera Village and Torrance attracted the most walkers, joined in this case by El Segundo. Artesia, Gardena, and Hawthorne attracted the most drivers, with Pacific Coast Highway and Inglewood in between.

Torrance and Riviera Village are both strong centers revolving around commercial areas and protected from through traffic. As we will explain below, Riviera Village has a very strong retail base while Torrance’s retail base is relatively weak. Torrance, however, has strong neighborhood loyalty and a large employment base nearby.

El Segundo was something of a surprise. Though its physical characteristics are similar to Torrance and Riviera Village and it attracted many walkers, its trip capture was much lower. This suggests that some critical businesses and services could be missing from El Segundo.

The Pacific Coast Highway area and the Hawthorne Boulevard corridor both scored well in terms of trip capture, suggesting that, in contrast to El Segundo, these areas contain many of the critical businesses and services required for daily life. As they are auto-oriented, they did not draw many walkers.

The Artesia Boulevard study area had a fairly high trip capture from immediate residents but not more distant residents. (It should be noted that this study area is very close to Riviera Village, which has a very strong and concentrated retail base.) The Gardena Boulevard study area did poorly in terms of both trip capture and mode split, suggesting that despite its small-town feel something is missing in the business or services mix.

### ***Performance of Centers v. Corridors***

Again referring to Figure 5-3, Riviera Village and Torrance performed far better than any other study area on trip capture. Beyond that distinction, however, the results were mixed. Pacific Coast Highway performed well. Inner El Segundo, Outer Inglewood, Inner Artesia, and Inner and Outer Hawthorne all registered trip capture of between 29% and 38%.

These statistics suggest that trip capture is not always related to whether the study area was a center or a corridor. Rather, it would appear to be a more complicated combination of factors, most especially the businesses and services available in the study area.

On mode split, Figure 5-11 clearly shows that centers perform much better on mode split than corridors. Walkers accounted for between 59% and 71% of all travelers in inner center areas and between 27% and 43% in outer center areas. Pacific Coast Highway registered a 24% walker rate – somewhat surprising considering how auto-oriented the area is. All the other corridors showed very low walker rates.

### ***Performance of Inner v. Outer Study Areas***

As with the center/corridor analysis, the performance of inner study areas versus outer study areas was somewhat mixed with regard to trip capture but much clearer with regard to mode split.

Once again referring to Figure 5-3, it can be seen that of the six inner-outer pairs analyzed, inner areas outperformed outer areas in five cases. However, outer-area trip capture was within 5% of inner-area trip capture in three of those five cases – El Segundo, Riviera Village, and Gardena. The inner study area showed significantly more trip capture than the outer study area only in Torrance and Artesia. In the sixth study area, Hawthorne, the outer area outperformed the inner area by a few percentage points. (The outer study area for Hawthorne also included additional commercial areas along El Segundo and Rosecrans Boulevards and Hawthorne Boulevard itself.)

As with the preceding discussion, these results suggest that trip capture is not driven purely by the distance between residents and the core portion of the study area. In all likelihood, the mix of businesses and services in that study area also plays a role.

### ***Trip Capture***

Trip capture varied widely across the study areas, ranging from 69% in Inner Torrance to 6% in Outer Gardena (Figure 5-3). Like mode split (see below), trip capture is related to the form of the study area – that is, whether it is a center or a corridor. Centers performed

better than corridors in terms of trip capture. But trip capture is also related to a variety of other factors, including the particular mix of businesses in the study area. The specific business mix of each area is discussed in more detail in the case studies report.

### Purpose of Trip

As Figure 5-4 shows, the average trips per week varied dramatically by purpose and this variation was in some cases different between centers and corridors. The most frequent trip purposes are meals, groceries, personal shopping and “just walking around”. The correlations between all these purposes and trip capture was very high. The single highest correlation was between trip capture and “just walking around” (+0.859). As is frequently the case in this analysis, Hawthorne (and, to a lesser extent, Artesia) are anomalies.

**Figure 5-4: Mean Trips Per Week, by Purpose**

Study Area	Trip Capture	Mode Split	Meal	Groceries	Personal Shopping	Personal Services	Entertainment / Rec	School	Medical / Dental	Community Meeting	Just Walk Around
El Segundo Inner	30%	69%	2.08	1.86	1.24	0.73	0.91	0.86	0.21	0.21	1.94
El Segundo Outer	25%	33%	1.80	1.46	1.18	0.60	0.99	1.15	0.13	0.25	1.28
Inglewood Outer	28%	27%	1.18	1.80	1.41		0.52	0.96	0.43		1.66
Riviera Village Inner	42%	71%	1.78	2.70	1.37		1.50	0.92	0.27		2.28
Riviera Village Outer	41%	32%	1.85	2.29	1.59		1.56	0.18	0.21		2.46
Torrance Inner	52%	59%	1.93	1.63	1.49		1.16	0.55	0.20		2.57
Torrance Outer	51%	32%	1.66	1.54	1.22		0.82	1.13	0.25		2.22
Artesia Inner	25%	13%	1.50	1.79	1.45	0.37	0.48	0.49	0.06	0.04	0.59
Artesia Outer	24%	4%	1.38	1.49	1.36	0.40	0.46	0.58	0.08	0.06	0.52
Gardena Inner	12%	15%	0.83	0.84	0.46	0.10	0.09	0.33	0.03	0.03	0.41
Gardena Outer	14%	4%	0.75	0.79	0.47	0.19	0.15	0.44	0.12	0.06	0.54
Hawthorne Inner	31%	18%	1.40	1.39	1.46	0.39	0.48	0.49	0.21	0.46	0.97
Hawthorne Outer	32%	8%	1.37	1.31	1.21	0.59	0.72	1.07	0.31	0.54	0.76
Pacific Coast Highway	39%	24%	1.99	1.71	1.70		1.42	1.61	0.35		2.22
<b>Correlations</b>											
Trip Capture			0.726	0.595	0.674	0.830	0.754	0.313	0.509	0.755	0.859
Mode Split			0.692	0.663	0.308	0.665	0.645	0.173	0.276	0.098	0.763

We have no basis for drawing conclusions as to whether and why “just walking around” would influence overall trip capture. It is possible – though this is purely speculation – that recreational walking has informational value for the walkers, giving them both a greater comfort level with and more knowledge about the businesses and services available in close proximity to their homes.

### Demographic Factors

According to the correlation coefficients, older, affluent white people were more likely to frequent their nearby centers and corridors, especially if the median home value in the area was high. In part, this relationship is a result of the fact that the “center” study areas – especially Riviera Village – bore these characteristics.

Trip capture was also associated with a number of other demographic factors, including contract rent, the percentage of the labor force that works at home, the percentage of the



labor force that commutes 20 to 30 minutes to work, and the percentage of the labor force that drives to work alone. These factors are all correlated with income, so it may be that the real lesson is that trip capture is associated with income. (The correlation coefficient between working at home and income, for example, is +0.680.) A few demographic factors not associated with income – for example, commuting to work via bicycle – are also strongly correlated with trip capture.

## **Housing Density and Mixed Use**

The overall number of housing units per acre was positively, though mildly, related to higher trip capture. This is counter-intuitive, but we believe it is partly because of the way we measured housing density. We were unable to isolate the amount of residential land and devise a measure of density per *net* residential acre. Our attempts to do so did reveal that the correlation is probably higher, and we believe that increasing housing density is associated with trip capture.

In any case, however, the relevant point is that housing density in and of itself does not guarantee trip capture.

Interestingly, we found a negative correlation between the amount of land in a study area devoted to mixed use and trip capture. But mixed-use projects are typically very high-density, so it is important to measure not just land area devoted to mixed use but also *building square footage* devoted to mixed use. Although we had some missing data here (PCH and El Segundo), we found a fairly strong correlation (+0.315) between the *percentage* of building square footage in a study area and trip capture. But the *single strongest correlation in our entire analysis* (+0.828) was between *the median amount of building square footage in a study area devoted to mixed use* and trip capture. In other words, the more mixed-use square footage you have, the higher your trip capture seems to be.

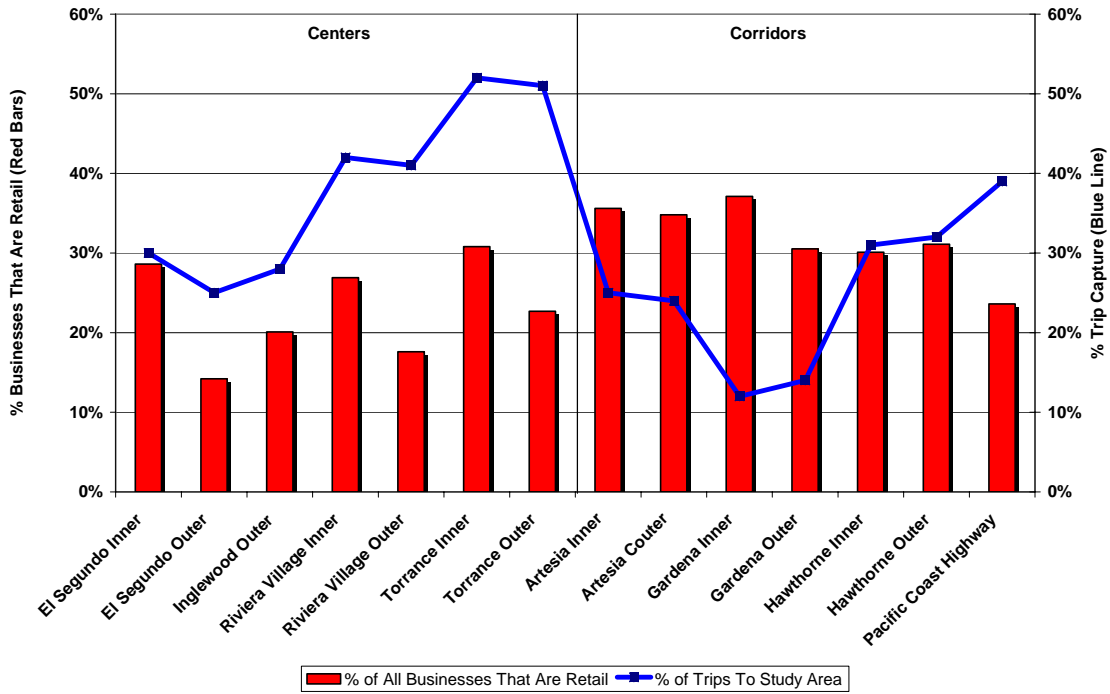
## **Physical Form**

In general, trip capture did seem to be related to whether the study area is a center or a corridor, with centers performing much better.

## **Retail and Business Functions**

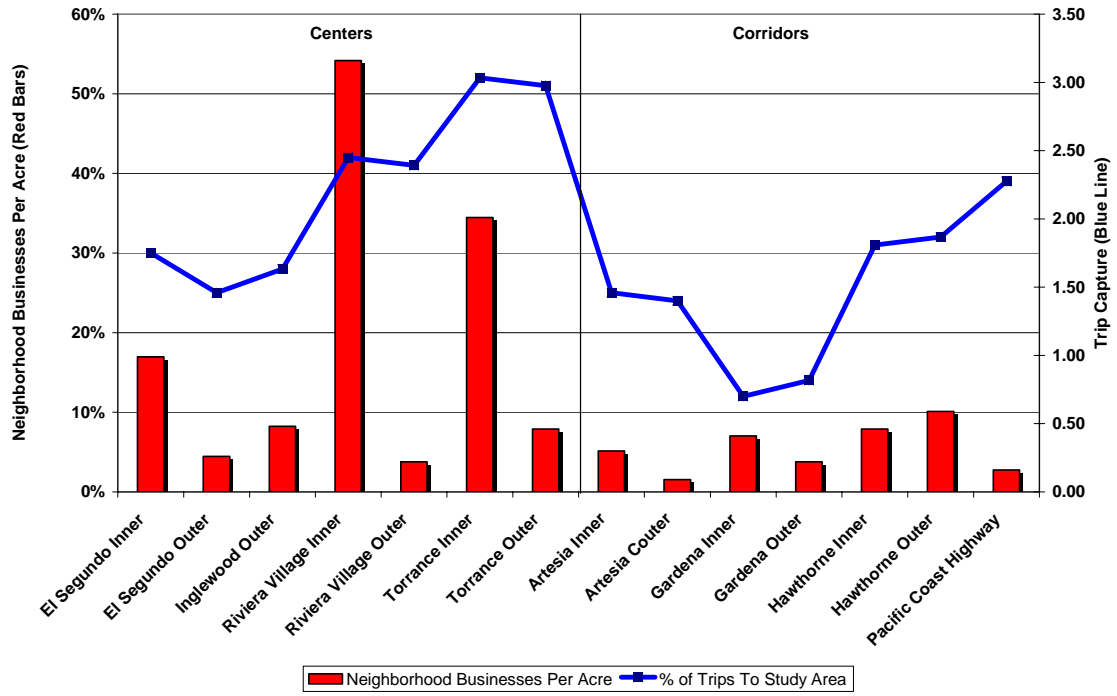
We actually found a negative correlation between trip capture and *the percentage of all businesses that are retail businesses*. As Figure 5-5 shows, this is because the percentage of businesses that are retail is generally *higher* in the corridors while trip capture is *lower*.

Figure 5-5: % of All Businesses That Are Retail and Trip Capture



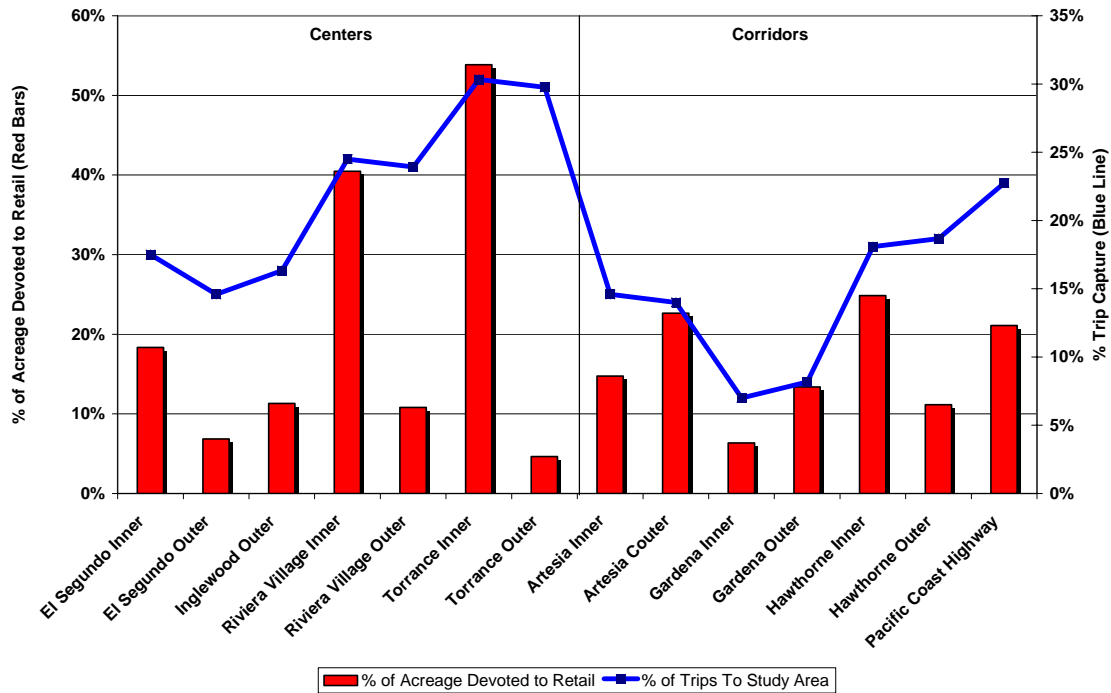
However, we found a positive correlation (+0.438) between trip capture and *the per-acre density of neighborhood businesses* as we defined them for this study. Our side-by-side chart (Figure 5-6) doesn't appear to reveal this relationship. However, the chart does seem to suggest that there is a relationship between *neighborhood business density in the inner area* and *trip capture overall in both the inner and outer area*.

Figure 5-6: Neighborhood Business Density and Trip Capture



There is a medium correlation (+0.463), however, between trip capture and *the percentage of land in the study area devoted to retail uses as defined by the Assessor*. As Figure 5-7 shows, this relationship appears even stronger if one takes into account only the percentage of retail land in the *inner* study area, where most retail businesses are typically located.

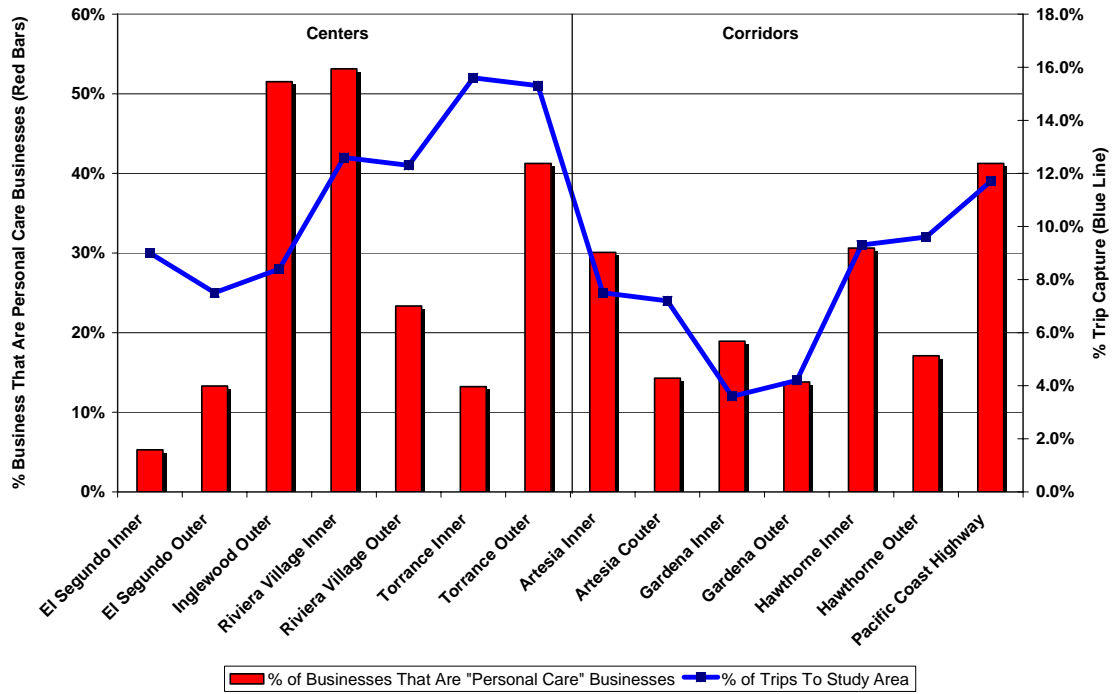
Figure 5-7: Percentage of All Land in Study Area Devoted to Retail and Trip Capture



We also paid particular attention to two other business sectors typically associated with an area that has many services – the percentage of businesses devoted to *personal care* (hair and nail salons and other related businesses as we defined it and the percentage of businesses devoted to *professional services* (lawyers, accountants, and so forth).

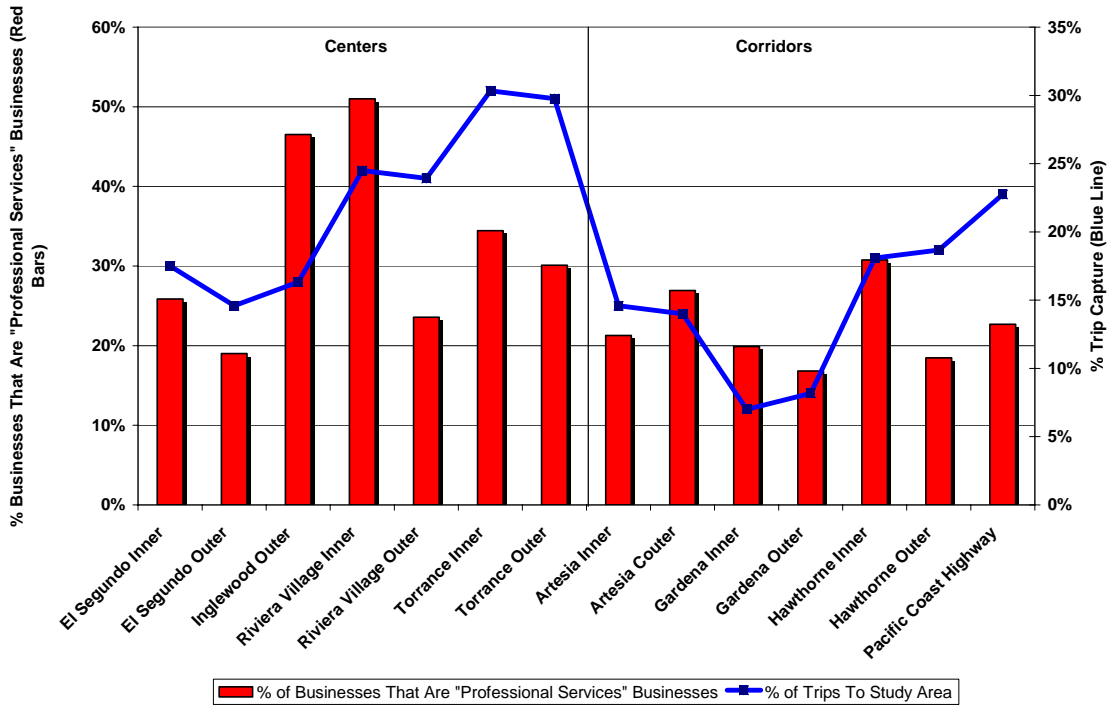
We found a medium positive correlation (+0.359) between trip capture and personal care. As Figure 5-8 shows, this relationship is not constant across all study areas (Riviera Village and El Segundo are notable exceptions) but once again the relationship holds better if one looks at trip capture from both inner and outer areas and personal care businesses only in the inner area.

Figure 5-8: Percentage of All Businesses That Area "Personal Care" and Trip Capture



We also found a medium correlation between professional services and trip capture (+0.452). Figure 5-9 reveals some outliers – including Torrance, Hawthorne, and PCH – but in general this relationship holds.

Figure 5-9: Percentage of All Businesses That Area "Professional Services" and Trip Capture

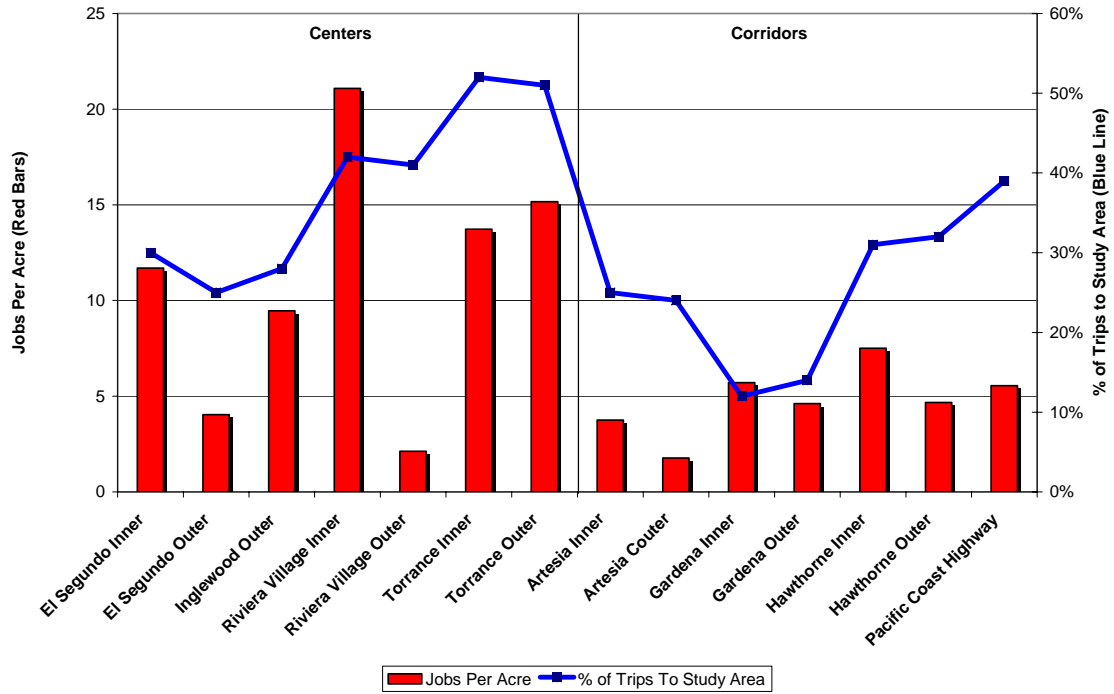


### Other Jobs and Business Factors

The correlation analysis found a strong relationship between a variety of other business factors and trip capture from nearby residents. These included technology businesses and, oddly, in some cases warehousing and manufacturing businesses. Perhaps the most important point to note here, however, is the relationship between general business activity and trip capture.

We found a medium correlation between the overall number of businesses per acre and trip capture (+0.455) and a strong correlation especially job density and trip capture (+0.593). Figure 5-10 charts job density against trip capture. In general, a greater concentration of business activity of all kinds – and especially the greater concentration of jobs – the more likely a study area is to capture trips from surrounding residents.

Figure 5-10: Job Density and Trip Capture

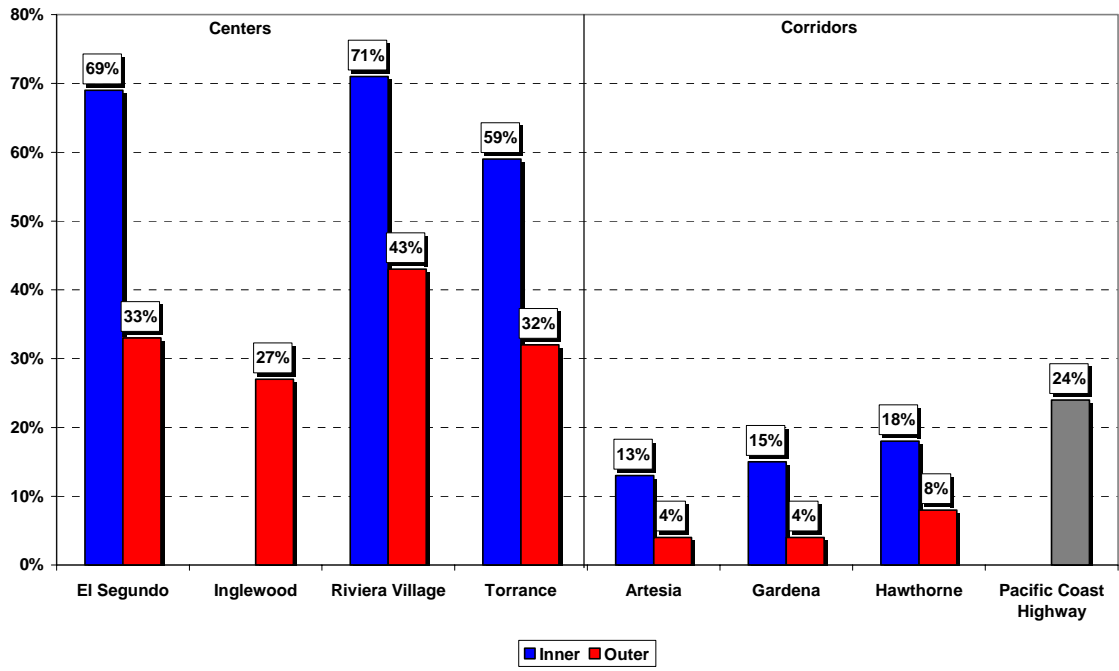


**Mode Split**

Mode split varied widely as well, with walking preference ranging from 71% in Inner Riviera Village to only 4% in Outer Artesia and Gardena Boulevards (Figure 5-11). Because of the high correlation between mode split and trip capture, many of the same factors are at work. However, there are some important differences. As we stated above, one clear factor is distance. Inner study areas performed much better on mode split than outer study areas.



Figure 5-11: Percentage of Nearby Residents Who Travel to Study Area by Walking



## Purpose of Trip

As was stated above, the most frequently stated purposes of trips to the study areas by surrounding residents were for meals, grocery shopping, personal shopping, and just to walk around. The correlation coefficients between mode split (percentage of walkers) was high for meals, just to walk around and – surprisingly – grocery shopping.

Figure 5-12 shows the relationship between mode split and just walking around. Figure 5-13 shows the relationship between mode split and meals. These were the two highest correlation coefficients in the trip purposes/mode split analysis.

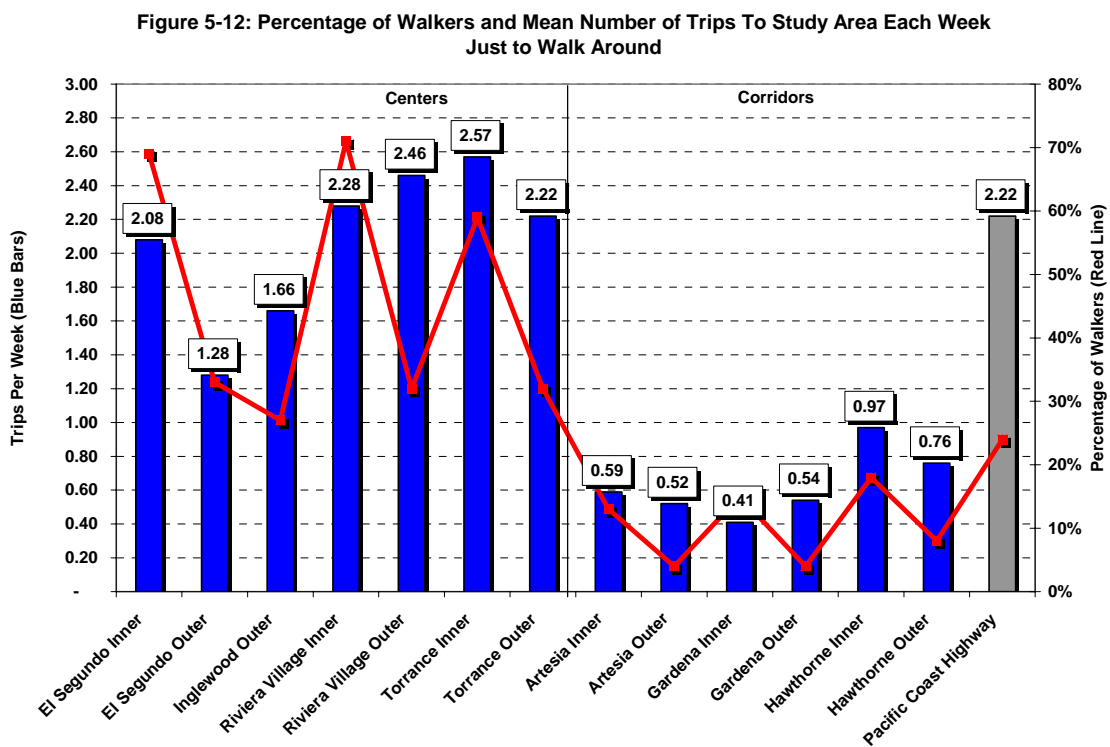


Figure 5-13: Percentage of Walkers and Mean Number of Trips To Study Area Each Week To Eat A Meal

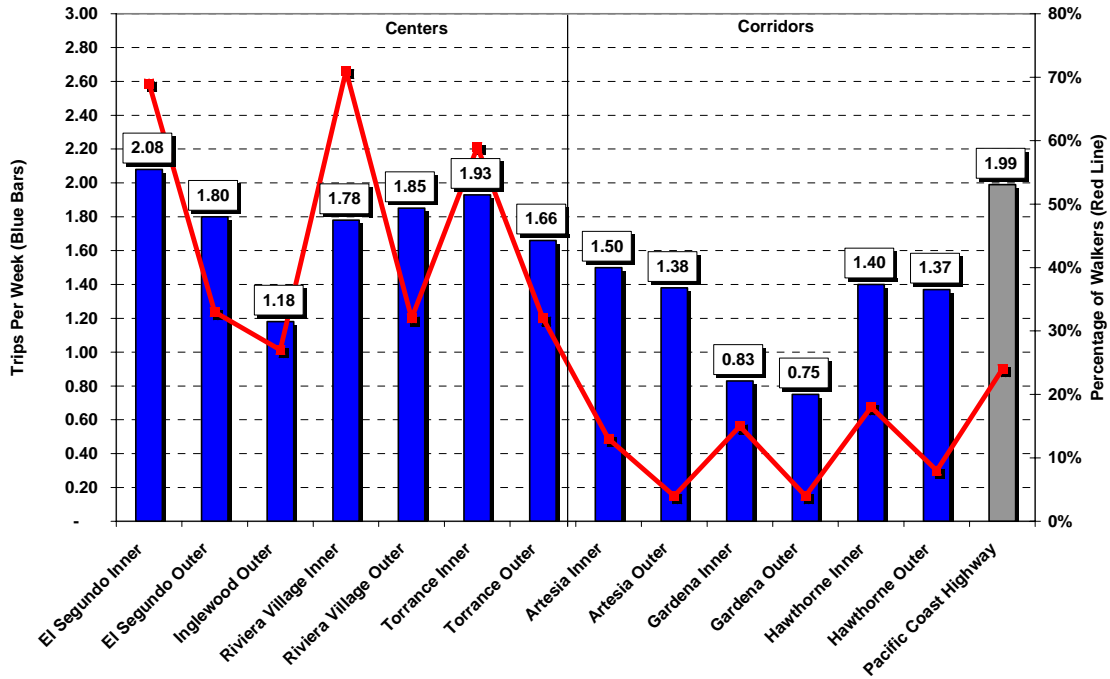
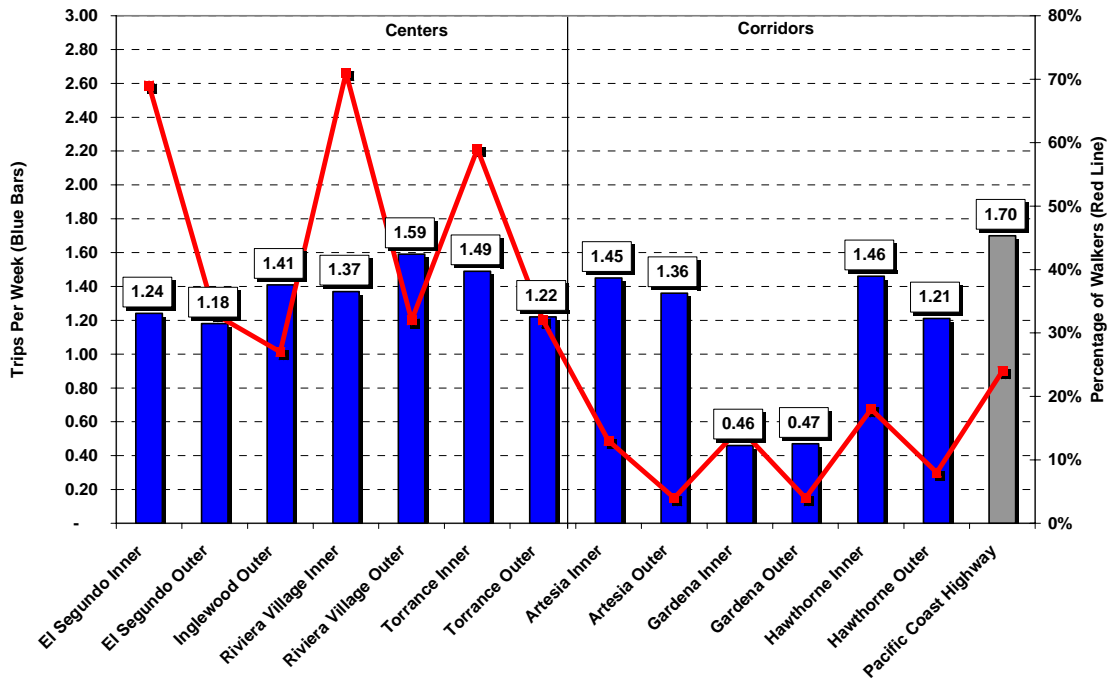


Figure 5-14 shows the relationship between mode split and personal shopping. This was the area in which there was the greatest difference in the correlation coefficient between trip capture and mode split. With the exception of Gardena, the mean number of personal shopping trips is remarkably consistent across all study areas – about 1.3 to 1.5 per week. But mode split varies greatly.

Figure 5-14: Percentage of Walkers and Mean Number of Trips To Study Area Each Week For Personal Shopping



## Demographic Factors

In general, the same demographic factors that are related to trip capture are also related to mode split, including race, age, and home value or rent level. Income is not as important a factor, nor – surprisingly – is working at home, though both showed positive correlation coefficients.

Not surprisingly, walking shows a much stronger correlation than trip capture among those who walk to work (a small number, admittedly) but also among those who drive alone to work. Correlation to a resident’s access to vehicles is much higher as well – oddly, the higher the ratio of vehicles to people in the household, the more likely people are to walk. Access to vehicles is highly correlated to income, but this relationship is much stronger than the relationship to income.

One additional demographic twist on mode split is that there is a strong correlation between renters and walking (+0.625) and also between renters who have access to vehicles and walking. We cannot speculate as to why this might be.

## Housing Density

Again, we found a correlation between housing density and mode split, although we believe a more precise measurement would find a stronger correlation. Our crude analysis of the relationships with housing density when measured differently (using assessor data) suggested that this is the case.

It is also worth noting that, as with trip capture, mixed-use square footage as a percentage of all square footage shows a medium positive correlation with mode split (+0.404). As with trip capture, the correlation between median square footage of mixed-use space in a study area and mode split was strong (+0.686).

## **Physical Form**

Figure 5-11 shows a clear relationship between whether a study area is a corridor or a center (a qualitative judgment we made ahead of time) and propensity for walking. Generally speaking, respondents in the centers are much more likely to walk to their study area than respondents in corridors. Again, this may be a matter of distance – but also it may be that in a center more businesses and services are located closer to more residences than in a corridor.

In our qualitative judgments, we generally assigned “center” status to areas where office and retail districts were several blocks deep and also where design was characterized by “village” or “oasis” design with little through traffic. We generally assigned “corridor” status to areas characterized by strip commercial that backed up to residential as well as heavy through traffic on an arterial. (There were exceptions, including Inglewood – a deep commercial district with heavy through traffic – and Gardena – a commercial strip with little through traffic.)

## **Retail and Business Functions**

Again we found a negative correlation between mode split and the percentage of all businesses that are retail businesses. As with trip capture, this is primarily because walking is much higher in the centers, yet the percentage of businesses is generally higher in the corridors.

However, the connection to our two other retail business measurements were even stronger for mode split than for trip capture. The correlation coefficient between mode split and neighborhood businesses per acre was +0.759 – one of the highest correlations in our entire analysis. The correlation between mode split and percentage of land devoted to retail was +0.554. Figures 5-15 and 5-16 show these comparisons. In the case of both measures, inner Riviera Village and inner Torrance – the two study areas with the highest walking percentage – also stand out in these measures. Hawthorne and especially El Segundo once again appear as outliers.

Figure 5-15: Neighborhood Business Density and Mode Split

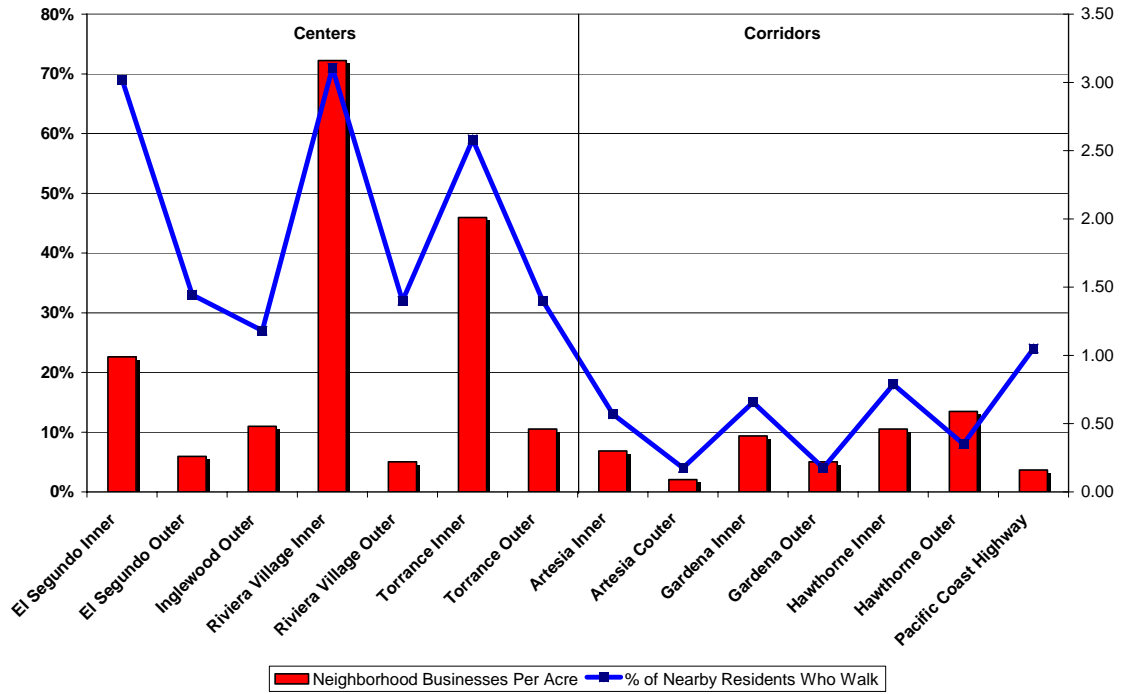
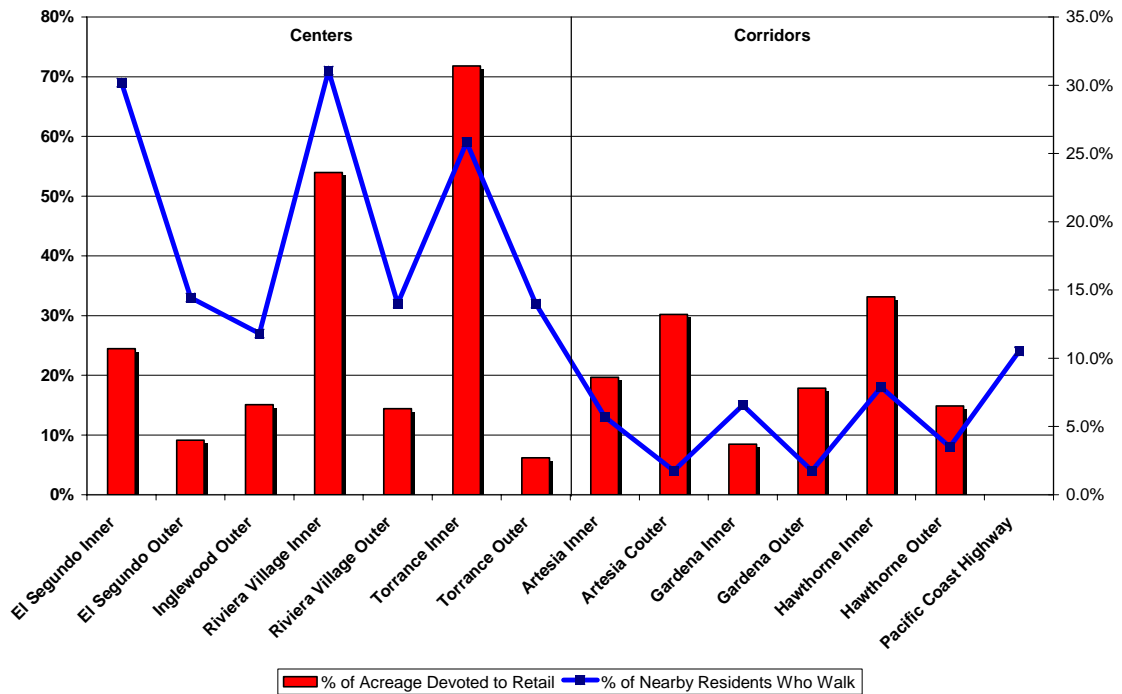
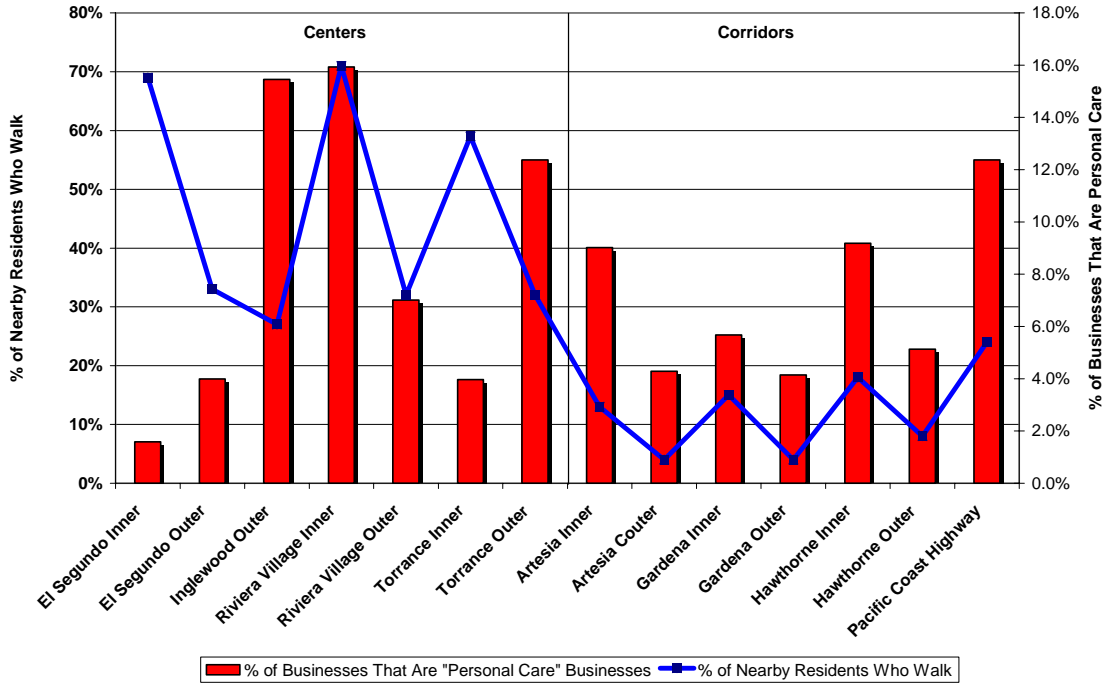


Figure 5-16: Percentage of All Land in Study Area Devoted to Retail and Mode Split



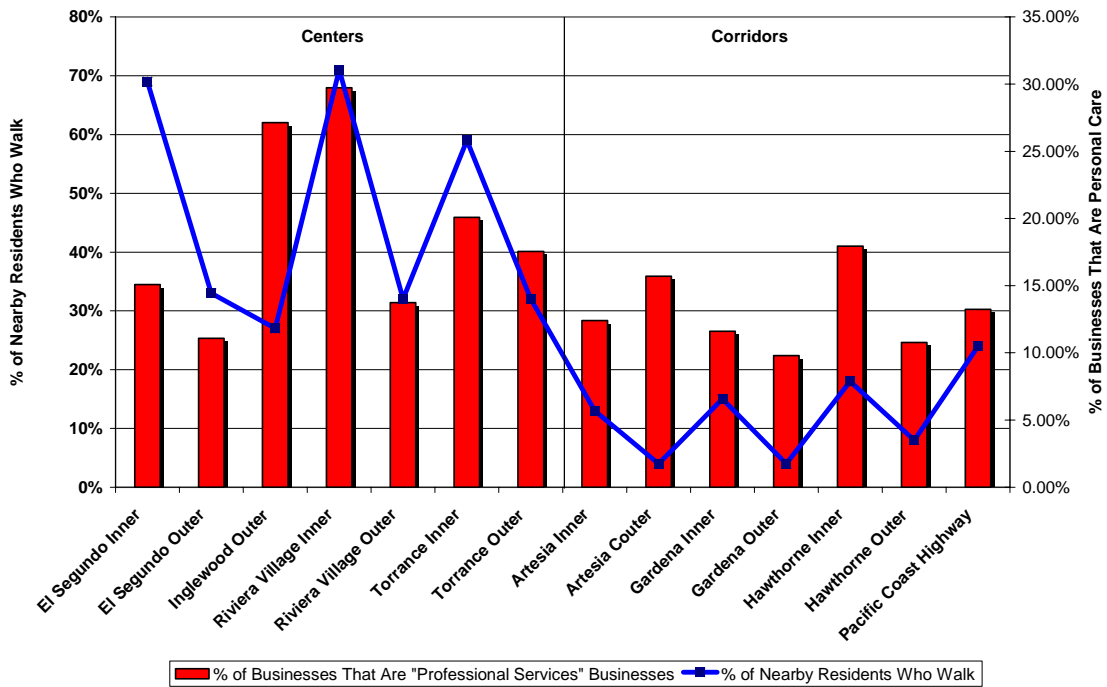
Regarding personal care and professional services businesses, we found similar results as with trip capture. The correlation coefficient between mode split and personal care businesses was similar (+0.348). As Figure 5-17 shows, El Segundo, Torrance, and Hawthorne are the outliers.

Figure 5-17: Percentage of Businesses That Are Personal Care and Mode Split



In professional services, the correlation coefficient is stronger for mode split (+0.547) than for trip capture. As Figure 5-18 shows, this is largely because professional services are somewhat more likely to be concentrated in centers than along corridors.

Figure 5-18: Percentage of Businesses That Are Personal Care and Mode Split

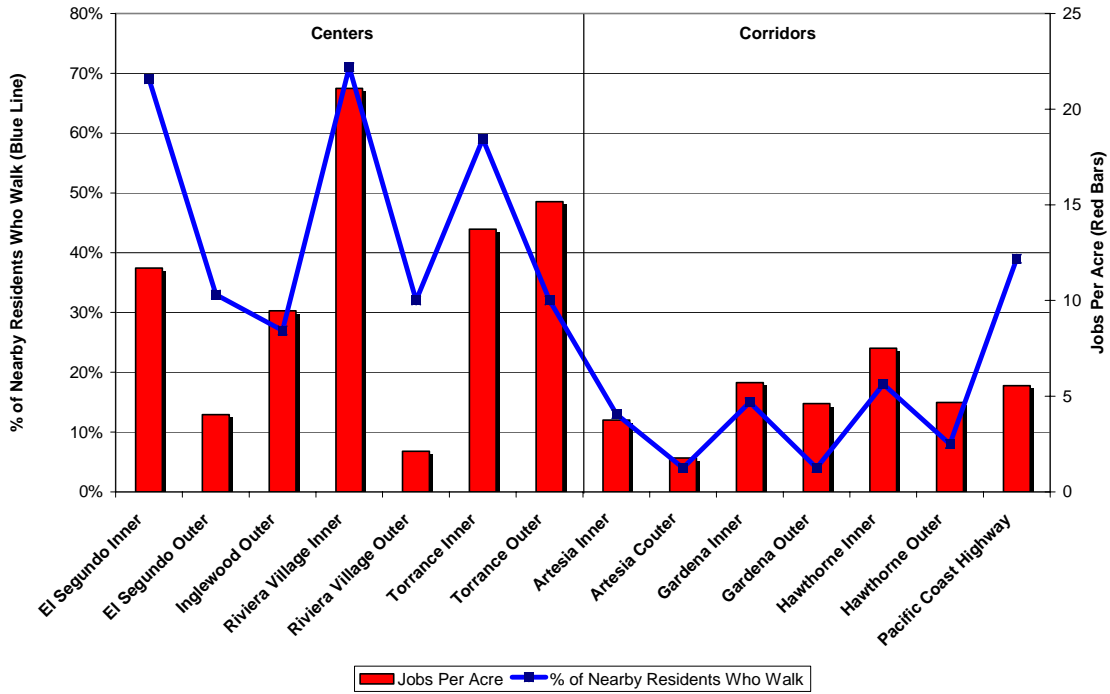


### Other Jobs and Business Factors

The relationship between other types of businesses was sometimes present but typically not as strong as with trip capture. However, the correlations were very strong between the overall number of businesses per acre and mode split (+0.812) and between job density and mode split (+0.736). Figure 5-19 shows the relationship between job density and walking. Here, El Segundo and Pacific Coast Highway are outliers, as is Hawthorne to a lesser extent.



Figure 5-19: Job Density and Mode Split



As our analysis in the case studies shows, job density appears to play an important role in improving the attractiveness of the study areas both in terms of trip capture and mode split. We can only speculate as to why. A strong hypothesis would be that employees provide a strong daytime market that allows businesses to thrive that might struggle if they had to depend only on local residents.

## 6. Conclusions

The intent of this report is to provide some rough statistical analysis and some rough qualitative analysis to create a baseline about what study area characteristics seem to drive the transportation performance of those study areas. As we stated above, the performance measures are trip capture and mode split.

Centers perform better than corridors on mode split, but the evidence on trip capture is more mixed.

### ***Demographic Factors***

In general, we found that both trip capture and especially propensity for walking was associated with a population that is white, older, and affluent. This association may be influenced by the fact that three of the four *centers* – El Segundo, Riviera Village, and Torrance – have populations of this type. (Although the Torrance study area’s median income in 2000 was just slightly higher than the county average.)

### ***Housing Density***

Housing density as we measured it in this report appears to be mildly correlated to both trip capture and mode split. We believe that an accurate measurement of net housing density would find the correlation to be stronger.

However, our conclusion is that while housing density might be *one* factor in improving performance, it is not the *only* factor. It is our view that factors of form, business mix, and business concentration must also be present to maximize performance.

### ***Form***

Propensity for walking was associated with centers as opposed to corridors. Some centers performed better than some corridors on trip capture but the evidence was not overwhelming. The form and design of centers, as opposed to corridors, is characterized by a commercial district several blocks deep (as opposed to a strip) and an “oasis” or “village” setting that has relatively little through traffic.

This may not be entirely because of form, but it is fair to assume that form plays a role. The significant difference between centers and corridors in the propensity to “just walk around” suggests that the presence of a more pleasant walking environment, especially without through traffic, is an important factor.

### ***Retail Businesses and Other Services***

Clearly, the presence or absence of retail businesses and services plays a role in a study area's performance. But the role played by retail businesses and other services is not related just to the volume of businesses. Rather, performance appears to be affected by the *mix* of retailers and services and the *concentration* of these businesses.

Nearby residents do not automatically patronize businesses in nearby study areas and they especially do not automatically walk to those businesses. However, in our survey, we found that they do tend to patronize nearby restaurants, food markets, and other local stores. They are more likely to walk to restaurants and food markets than other stores. Clearly, the presence of both restaurants and food markets is a major factor in performance.

We also found, as we expected we would, strong correlations between trip capture and both personal care businesses and professional services businesses. We believe that the presence of both types of businesses – hair salons and nail salons, as well as lawyers and accountants – is an important factor in the success of a mixed-use district. These businesses are not likely to draw their patrons *only* from the surrounding neighborhood. But if they are present, surrounding residents are very likely to use them.

It is not just the *mix* of businesses that is important, however. It is also the *concentration*. We found several indicators that concentration of retail businesses and services is very important:

- The mere presence of a large number of retail businesses was not correlated with better performance, even for trip capture.
- The percentage of land devoted to retail use (as defined by the Assessor) was *strongly* related to better performance. This relationship becomes even stronger if one compares trip capture and mode split for the entire study area to retail land only in the inner study area, where businesses tend to be more concentrated.
- The density of neighborhood businesses is also strongly related to better performance. This measure does not include just retail businesses but also businesses we identified as serving a neighborhood clientele. And again the significance does not lie in the number of these businesses, but rather their concentration.

Throughout our analysis of trip capture, we continually found Hawthorne Boulevard to be the anomaly of the group. Hawthorne Boulevard is the classic corridor – divided by a very wide street with a high volume of fast-moving traffic – and neighbors are not likely to walk there. But they are likely to *go* there. Trip capture was unaccountably high. What businesses and services are available along Hawthorne Boulevard that draws people?

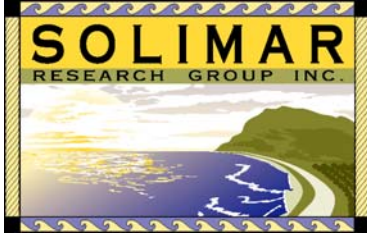
For insight into this question, we re-examined the business functions analysis for Hawthorne Boulevard contained in the Year 2 report. We found several interesting patterns:

- The *outer* study area along Hawthorne Boulevard – which contains portions of the east-west arterial streets of Rosecrans and El Segundo Boulevards – contains just as rich a mix of businesses and services as the *inner* study area. For example, 30% of businesses in the outer area are retailers, compared with 33% in the inner area. This is unusual among our study areas. It means that there is an unusually rich mix of retail businesses close to the outer study area residents, especially along east-west arterials that were included in the outer study area.
- The study area’s retail mix is heavily tilted toward certain types of retail businesses. Almost one-quarter of all retail businesses in the inner Hawthorne study area (essentially, Hawthorne Boulevard itself) are restaurants. These restaurants are not high end, but they clearly serve a local clientele – and restaurants are typically a major draw to surrounding residents. In the outer study area, more than a third of all retail businesses are auto related. This would help explain why trip capture is high but propensity to walk is low.
- The inner study area’s personal services business mix is heavily tilted toward personal care, fire and insurance, and real estate agents. (Almost 80% of personal services businesses in the area fall into these three categories.) All these businesses apparently cater to a local clientele and serve as major draws

### ***Jobs and Overall Business Activity***

One factor that would be easy to overlook is the apparently indirect impact of overall business activity, not just retail and neighborhood businesses. Somewhat to our surprise, we found the performance of our study areas – which were related to the habits of nearby residents – to be strongly correlated to the *density* of both businesses and jobs. We believe there are two explanations for this.

1. Retail and neighborhood businesses account for a significant portion of local businesses and local jobs and therefore these indicators are in part a measurement of the density of local businesses and local jobs.
2. The presence of a dense concentration of businesses and jobs overall enhances the market for local retail and services, thus creating a mix of retail and service businesses that is both denser and more attractive to surrounding residents.



## **Technical Background Report Section 7**

Mixed-Use District Case Studies

Prepared for South Bay Cities Council of Governments

July 1, 2007

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## Introduction

The purpose of this document is to summarize findings on each study area to provide background and greater insight into each study area and the contribution that study area makes to this report's conclusions.

Over the course of the three-year project, eight study areas were selected. These were:

### Centers

- Downtown El Segundo
- Downtown Inglewood
- Riviera Village in Redondo Beach
- Downtown Torrance

### Corridors

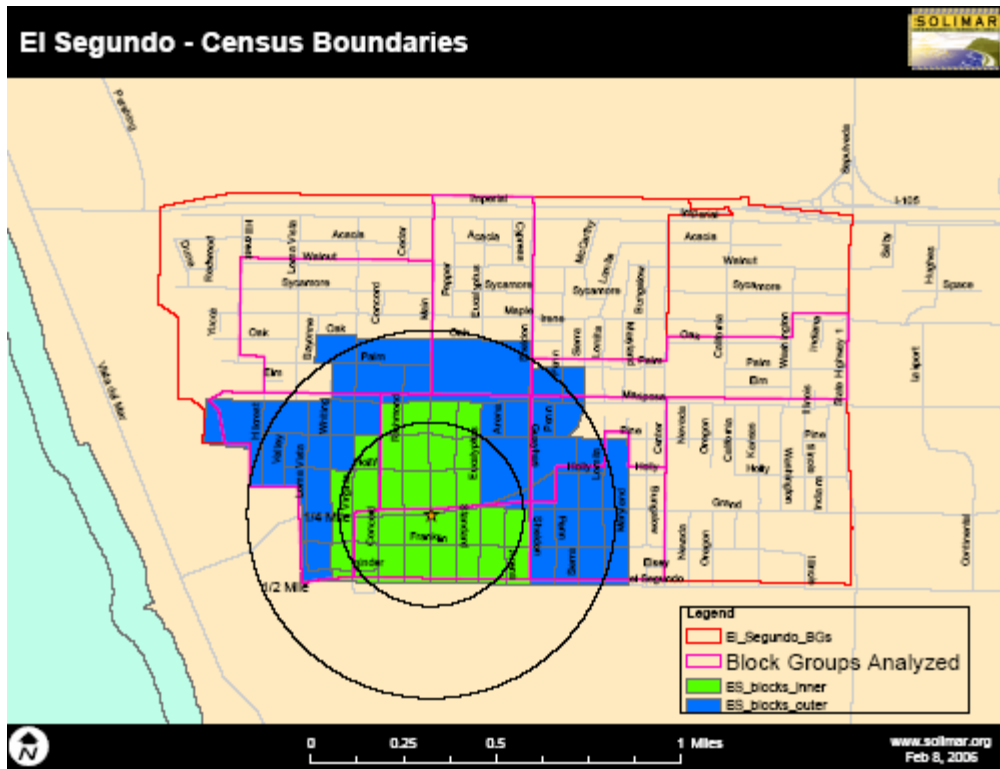
- Artesia Boulevard in Redondo Beach
- Gardena Boulevard in Gardena
- Hawthorne Boulevard in Hawthorne
- Pacific Coast Highway/Hawthorne Boulevard in Torrance

Each study area was divided into an “inner” (within 1/4 –mile of a centerpoint) and “outer” (between 1/4 and 1/2 mile of a centerpoint). Not all data is analyzed for Downtown Inglewood because few survey results were gathered, nor for Pacific Coast Highway, which was never divided into inner and outer because it began as a control area in Year 1.

## Downtown El Segundo

The El Segundo study area consists of approximately 379 acres radiating from the intersection of Main St. and E. Grand Ave., which is generally regarded as the center of the downtown area. The “inner” study area – a radius of approximately one-quarter mile from the intersection of Main and Grand – stretches from Virginia St. on the west to Sheldon St. on the east, and from Pine Ave. on the north to just below El Segundo Blvd. on the South and includes 137 acres. The “outer” area – a radius of approximately one-half mile from the intersection of Main and Grand – stretches from Hillcrest on the West to Maryland on the East, and from Oak on the to well within the Chevron refinery property on the south and increase 242 acres.

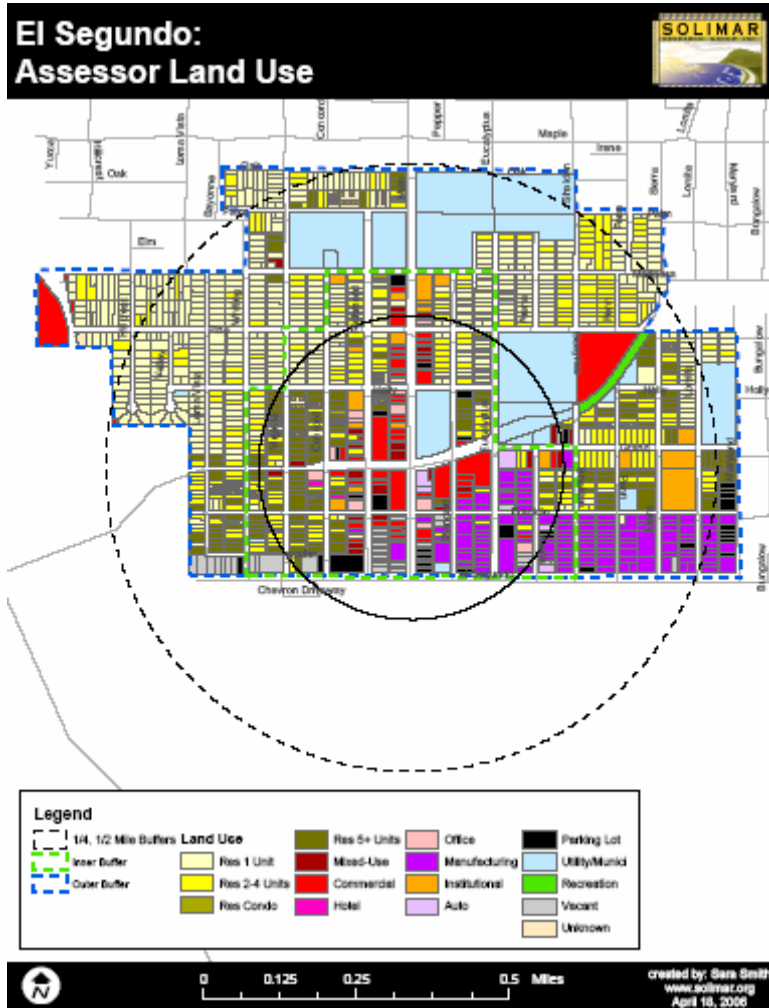
Though this is the historic center of Downtown El Segundo, it is located approximately 1.5 miles of the city’s major employment centers and its Green Line rail stations, which are located in between Sepulveda Boulevard and the 405 Freeway.



Because of its history as a planned industrial suburb, Downtown El Segundo has an unusual diversity of land uses. Retail and commercial land uses are clustered toward the center of downtown. But industrial land is significant (even though the accompanying maps and charts do not include the Chevron refinery). Civic and institutional uses such as



City Hall and schools are strongly in evidence, and a variety of housing types exists in the immediate vicinity.

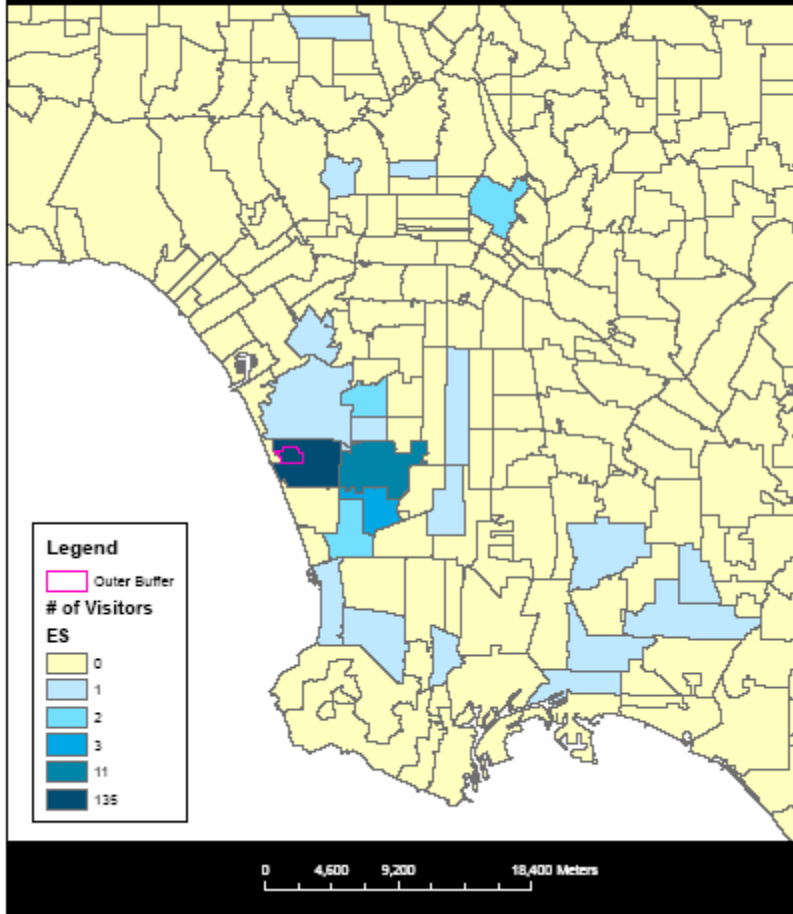


The Downtown El Segundo study area contains 626 different businesses. Of these 390 are located in the inner (one-quarter-mile) area, while 236 are located in the outer area (from one-quarter to one-half mile, which is geographically larger). These businesses employ about 2,500 persons – 1,500 in the inner area and 1,000 in the outer area – and they produce about \$650 million a year in sales – about \$300 million in the inner area and about \$350 million in the outer area.

Overall, 28% of these businesses are retail businesses – a fairly typical number – whereas 26% are personal services and 16% are professional services. Some 17% of the businesses are in construction or manufacturing – a large number attesting to the strength of the industrial area along El Segundo Boulevard.

A zip code analysis of the visitors who responded to the intercept survey found that they were overwhelming local residents, with some visitors coming from the area immediately to the east of El Segundo.

## El Segundo: Origin of Visitors by Zip Code



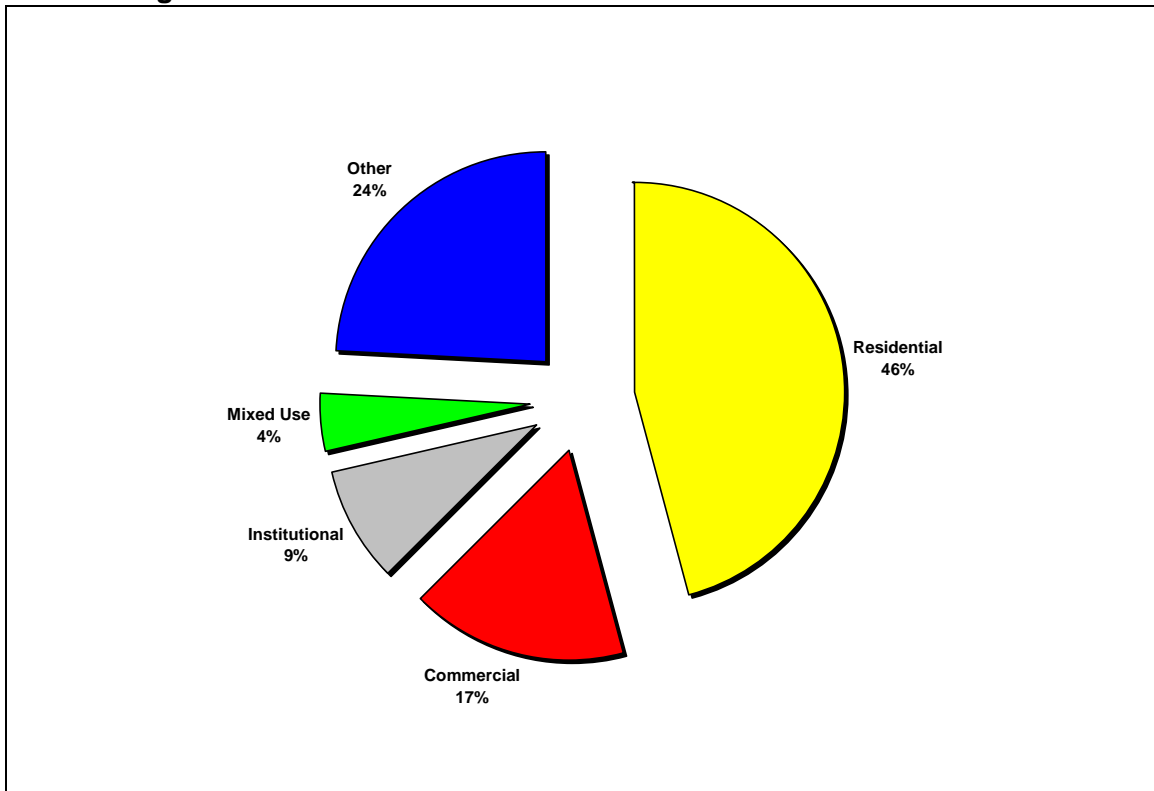
### ***Inner Area***

Inner El Segundo's trip capture rate was 29%, far less than the comparable centers of Riviera Village and Downtown Torrance.

However, inner El Segundo's mode split measurement (% of walkers) was 69%, comparable to Riviera Village and higher than Torrance.

The land use breakdown in the inner area reveals that only 48% of the study area is devoted to residential uses.

### **Inner El Segundo Land Use Breakdown**



Job density here (7,457 per square mile) is higher than the median (4,785). Densities for retail uses are also above their medians. The density of apparel stores is 14.4 per square mile (the median is 7.9), while the density of specialty stores is 61.9 per square mile (the median is 31.5). Personal care services occur at more than three times the median density (133 versus 40). Medical and dental offices are about 1.5 times as dense as the median (76 versus 50). However the largest difference is in restaurants, which are more than 5 times as dense in El Segundo-Inner than in the median case (157 versus 30).

While restaurants here are clustered more tightly than anywhere else in the study area, they are not surrounded by a similar proportion of shops. This may account for the low trip capture rate, at least in part.

The ratio of restaurants to neighborhood function businesses is .2374, while the median is .1541 and ratios in the areas with the highest trip capture rates average 0.1240. In Riviera Village-Inner it is .1069. Reflective of this is the ratio of apparel and specialty shops to neighborhood function businesses, which is 0.1151 for El Segundo-Inner (the median is 0.1878).

As noted above, job density is above the median. Jobs per resident are higher than the median (0.7 versus 0.33), but well below those of the top three trip capture centers (Torrance-Inner, 1.07; Torrance-Outer, 1.71, Riviera Village-Inner, 1.45). On most other population-based measures El Segundo-Inner is above the medians. The total neighborhood function businesses-per-1000 population figure is 62.1 (versus the median 14.8). The number of restaurants per 1000 population is 1.47, more than 5 times the median. Personal care services number 12.5 per 1000 residents or about 4.6 times the median rate, while the rate of 7.1 medical and dental offices per 1000 persons is 1.25 times the median. The high density and per-resident numbers seem to be reflected in the high mode-split figure, but the shops-to-restaurants balance and the lower than average proportion of clothing and specialty shops may depress the trip capture rate.

El Segundo—Inner has both a grocery (local) and a pharmacy (Rite Aid). It also has 2 video rental stores and 2 coffee shops, both of which are local. There are 8 churches and 5 auto related businesses. The ratio of barbers to beauty salons is 3-to-16, second behind Hawthorne-Outer.

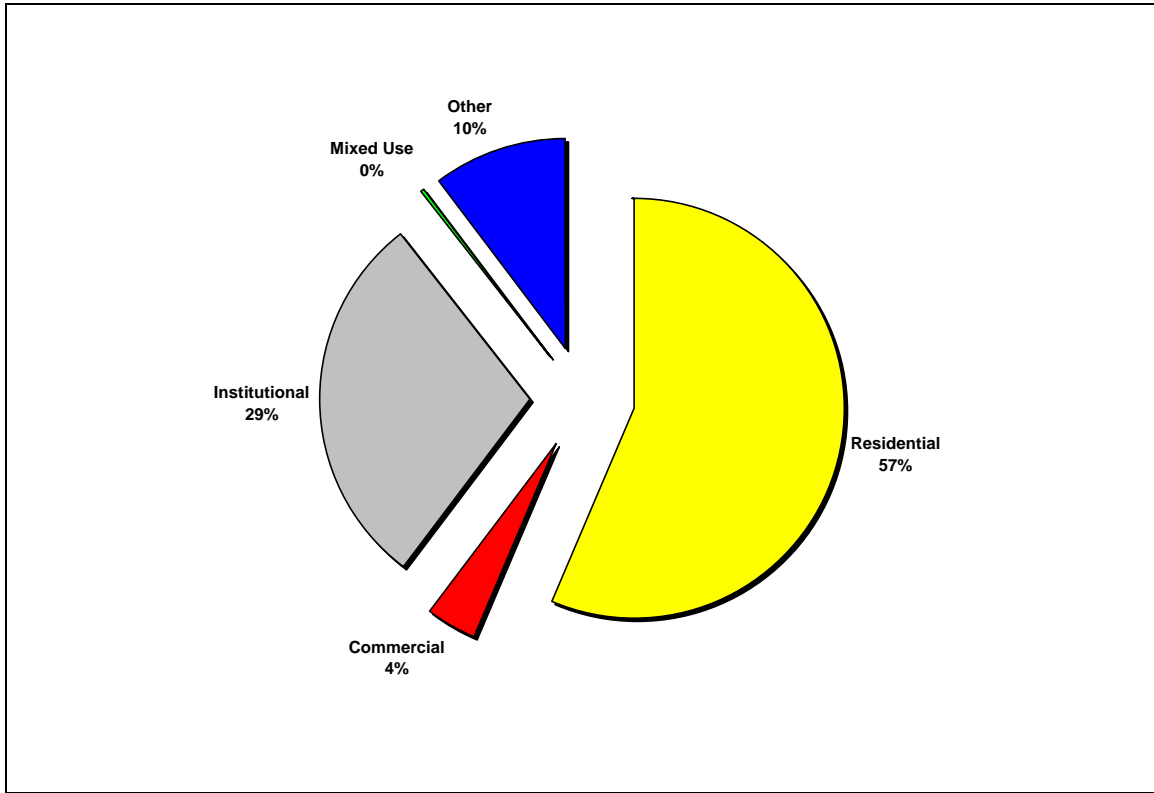
### ***El Segundo Outer***

El Segundo Outer's trip capture rate was 24%, lower than the outer area of all other centers.

El Segundo Outer's walker rate was 33%, comparable to the walker rate of the other centers and much better than any corridor.

The land use breakdown in the inner area reveals that 57% of the study area is devoted to residential uses.

## Outer El Segundo Land Use Breakdown



El Segundo-Outer also ranks below median on population density (9,278 residents per square mile versus 12,493 per square mile) and job density (2,608 jobs per square mile versus 4,785).

The retail environment in the Outer area is quite different from that in the Inner area. The neighborhood function business density here is 127 outlets per square mile, which is below the median figure of 188.7 and only about 19 percent of that found in the Inner area (661.9). Of the retail and services density measures, there are few in which El Segundo-Outer matches or exceeds the median: medical and dental offices (51 per square mile), antique and used goods shops (5.4 per square mile), and specialty shops (32.4 per square mile). The density figure for restaurants is 13.5 per square mile; the Inner area restaurant density is nearly 12 times as high.

The ratio of business services to all businesses is also lower than the median (0.11 versus 0.164). The percentage of apparel and specialty shops relative to neighborhood function businesses is higher than the median (27.7 percent versus 18.8 percent) and 2.4 times that of the Inner area. The restaurant to neighborhood function businesses ratio is the lowest of any study area at 0.1064 (that for Riviera Village-Inner is 0.1069). The comparable rate in the Inner area is .1151.

Viewed on a population basis, El Segundo-Outer is near the median on many counts. There are 0.28 jobs per resident, which is only about 40 percent of the rate for El Segundo-Inner but is close to the median of 0.33. The most divergent measure is restaurants per 1000 pop, which for El Segundo-Outer is 1.5, while the median is 2.7 and the measure for the Inner area is an astounding 14.7. The rate for personal care services per 1000 population is only 0.9, less than a third the median for this measure (2.8).

Though the clothing and specialty shops occur and a relatively high rate compared to other retail outlets and the ratio of shops-to-restaurants is high, it appears there may not be enough shops, restaurants and personal care services or a high enough proportion of jobs-per-residents to produce a high trip capture. Middling jobs-per-resident figure and the proportion of apparel and specialty stores may contribute to the .33 mode-split, which is higher than that in many study areas, but is less than half that recorded for El Segundo-Inner.

El Segundo-Outer has two churches, no video stores, no coffee shops, or pharmacies. It is the only one among our study areas to have no barbers or beauty salons. There is one grocery here; it is not affiliated with a major chain. There are 8 automobile-related businesses located in this area.

## Downtown Inglewood

For the purposes of this analysis, Downtown Inglewood was defined rather expansively to include 99 acres in the inner boundary and 582 acres in the outer boundary – a total of 680 acres, or slightly more than one square mile. (Figures 3.1.1 and 3.1.2.) The inner boundary was bounded principally by Florence on the north, Fir on the west, Locust on the east, and Hillcrest on the south. The outer boundary was bounded principally by Hazel on the north, Inglewood on the west, Prairie on the east, and Buckhorne on the south. The study team and the Working Group debated at length whether to include the area north of Florence in the outer boundary, as it is cut off from downtown by Florence and the railroad tracks. However, we decided to include the area because of its extremely close proximity to the inner boundary.



Virtually all of the land inside the inner boundary is either office, commercial, or governmental. Retail commercial uses are clustered along Market Street, which is still Inglewood's main shopping street. Office uses are gathered one block to the west along La Brea. Government uses are clustered further west, between Manchester and Florence, where both city and county operations are located.

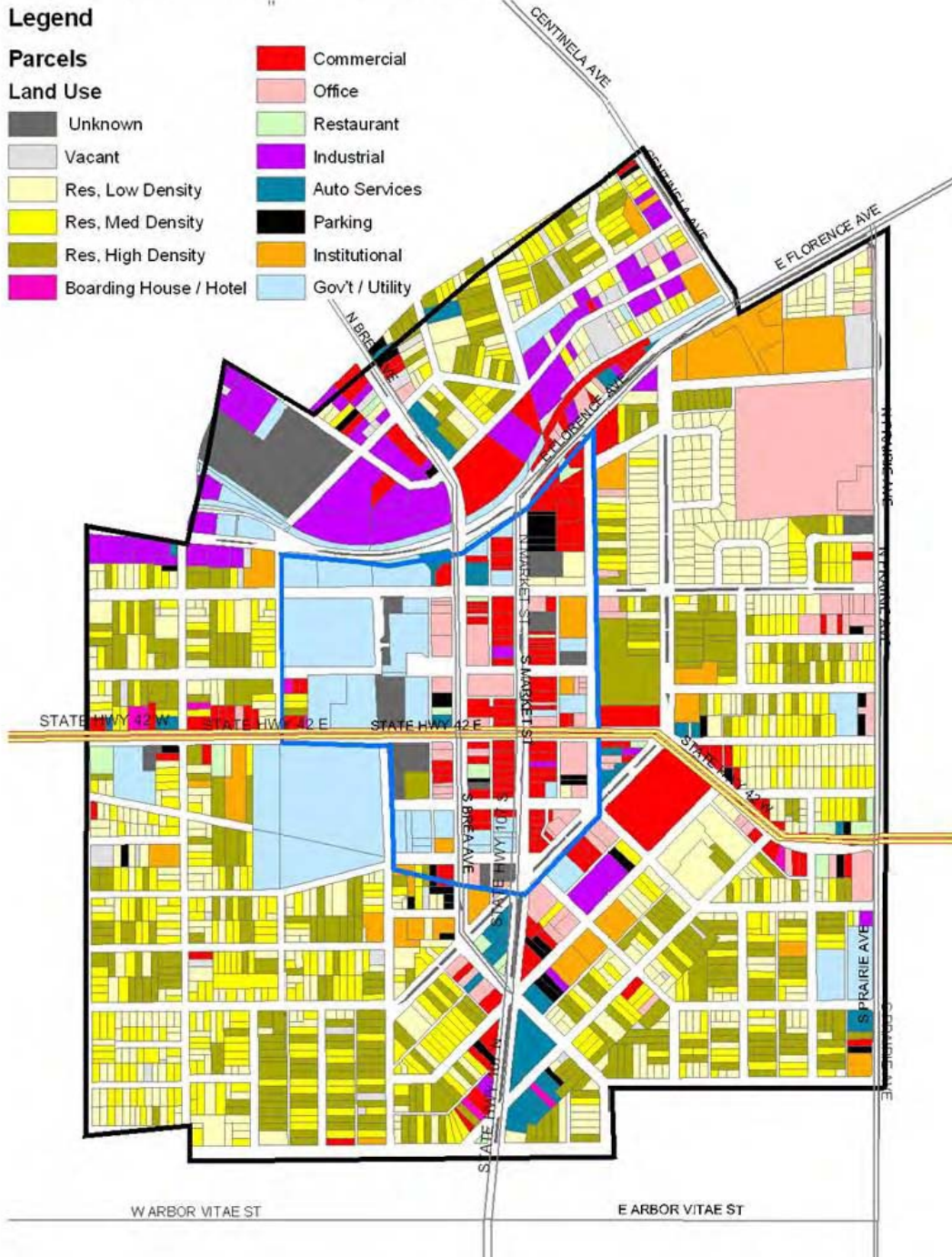
# Inglewood - Parcel Land Use

## Legend

### Parcels

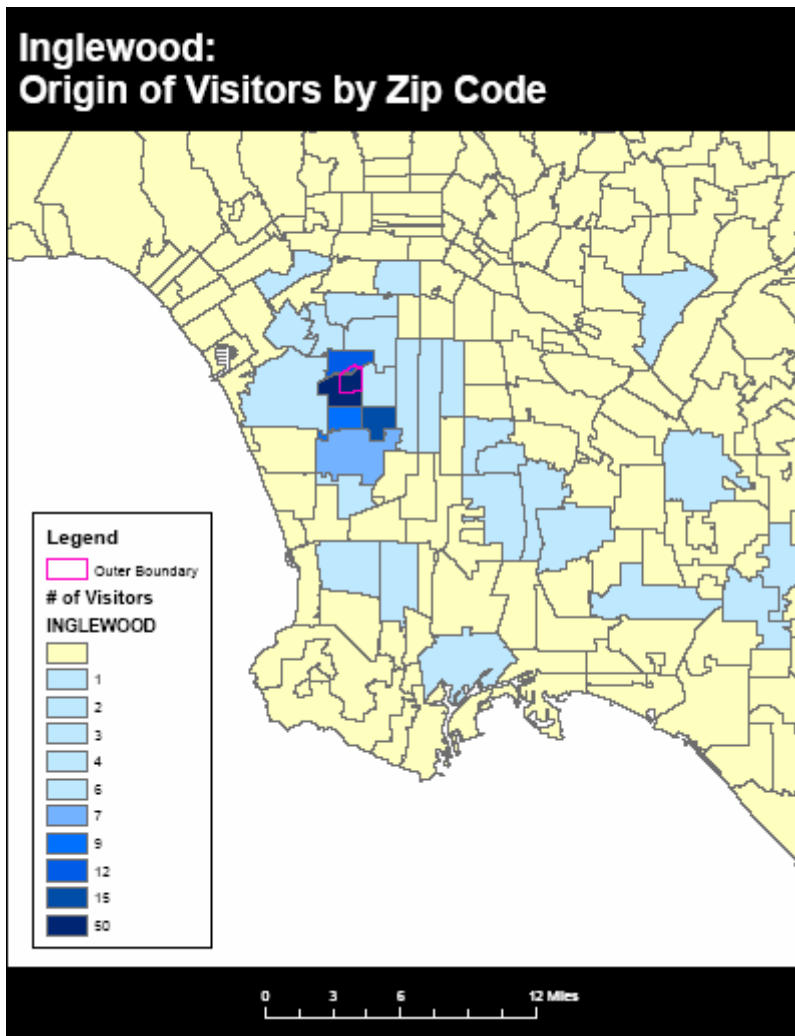
### Land Use

	Unknown		Commercial
	Vacant		Office
	Res, Low Density		Restaurant
	Res, Med Density		Industrial
	Res, High Density		Auto Services
	Boarding House / Hotel		Parking
			Institutional
			Gov't / Utility





Our visitor intercept survey found that most visitors came from zip codes in Inglewood, though the overall catchment area stretched well to the east into other traditionally African American communities.



### *Inglewood Inner*

Because Inglewood Inner has few residents, only a few surveys were returned. Therefore, Inglewood Inner was not part of the final analysis.

However, it is worth noting that the inner study area, which could be a destination for residents for the outer area, is largely devoted to commercial uses and to institutional uses, mostly government offices.

