Evaluating Tradeoffs in Warehousing and Drayage Costs in the Greater Los Angeles Region

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The Los Angeles region has a complex network of warehouses and distribution centers for handling both domestic and foreign trade. Los Angeles' freight system has two primary markets and freight functions. The first is to serve the massive local market of 19 million consumers. The second function is as a waypoint for distributing goods around the country that arrive in Los Angeles via air or maritime ports. This dual role complicates the traditional rent gradient model for warehousing in which warehouses further from the city center are always less preferable and hence cheaper than more centrally located facilities.

The warehousing needs of individual shippers vary significantly based upon their supply chain, customer base and product type. For this reason, the question of the optimal warehouse location has no easy answer and depends and these and other variables. This study focuses on shippers whose primary decision factor is accessibility to the ports of Los Angeles and Long Beach. For the purpose of simplicity, we will assume that all cargo moves directly from the ports to these shippers' warehouses. We make no assumptions regarding the end customer for the deliveries.

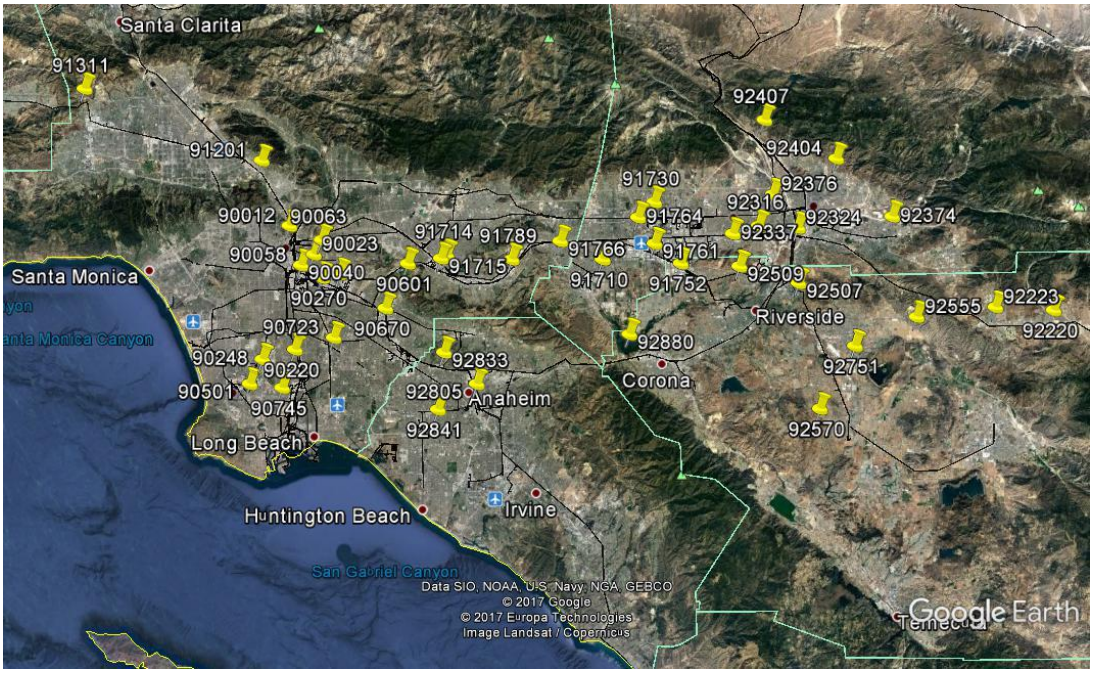
Zip Code Selection

We selected 50 representative zip codes that host warehousing and distribution activity around the Greater Los Angeles metropolitan area. While not exhaustive, these zip codes are intended to represent the major submarkets for warehousing and distribution. These include clusters near the Ports of Los Angeles and Long Beach, in the downtown area that are largely focused on serving the intermodal rail terminals and downtown customers. Thus, these zip codes represent both the geographic scope of the southern California drayage market as well as the different functions the dray industry serves

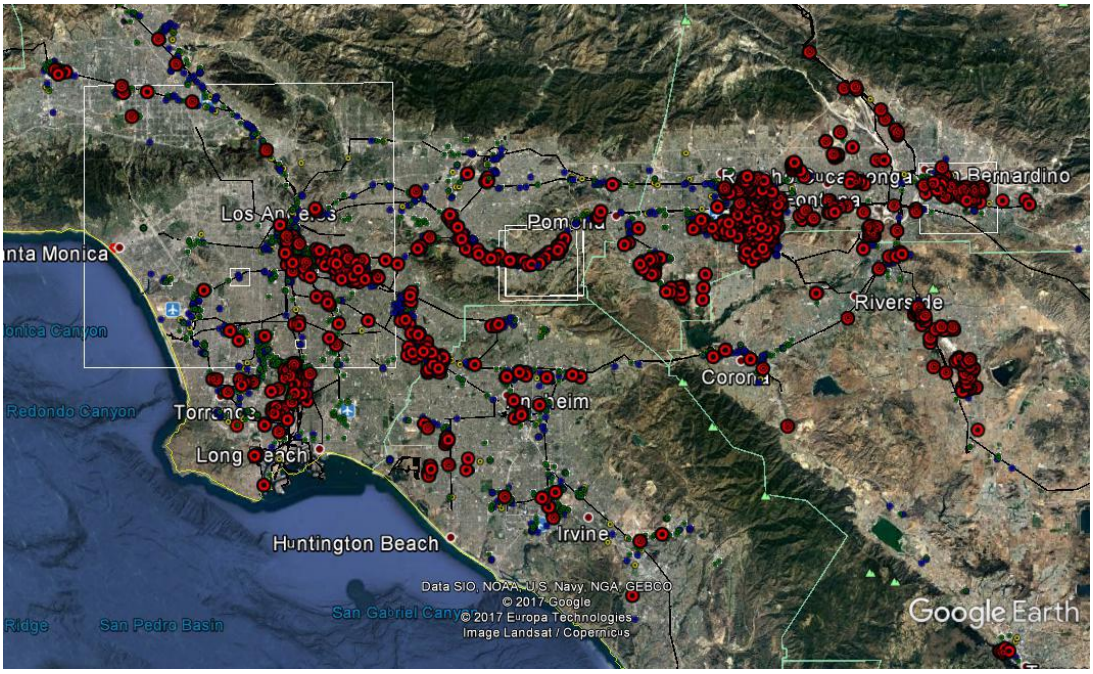
Map 1 shows the location of the zip codes selected for inclusion within the study. **Map 2** shows the concentrations of warehouse clusters within the Los Angeles urban Area.

The researchers used a single point of origin, the APM Maersk terminal as the default point of origin for all shipments due to the fact that it is the largest terminal at the Port of Los Angeles in terms of total acreage. The Port of Los Angeles and Long Beach currently handles 15.6 million TEU's per year (2016) through more than 1200 registered drayage operators.

Map 1: Location of Surveyed Zip Codes



Map 2: Clusters of Warehousing and Distribution Centers in the LA Metro Area (Source: COSTAR)



As can be seen, the zip codes sampled are intended to roughly approximate the distribution of warehousing clusters within the Los Angeles region. Almost without exception, drayage operators do not differentiate between destinations within the same zip code. For this reason, the zip code was the smallest practical unit of analysis.

The research team surveyed drayage operators who service these markets and asked for quotes of base dray rate plus fuel surcharge for each zip code destination from the APM Terminal (the largest terminal at the Port of Los Angeles). Fuel surcharge is typically calculated as a percentage of base rate based on a weekly index.

Data Collection: Drayage Price Bids

The principal mechanism of gathering data was through phone requests. Respondents were requested to provide as many price bids for individual zip codes as practical. They were also asked to separate out base rate from fuel surcharge and to specify any other ancillary charges. The lists of potential participant firms were provided by the Ports of Los Angeles and Long Beach. The researchers also reached out to the Harbor Truckers Association (HTA) which sent an email to their membership encouraging participation in the study.

Warehouse Rental Rates: COSTAR

The physical location and rental rates of the warehouses were retrieved from the COSTAR database. COSTAR provides information such as vacancy rates, year of construction/renovation, square footage and lease price per square foot that are essential for fully understanding the greater Los Angeles warehousing market. USC METRANS currently has a academic subscription to COSTAR.

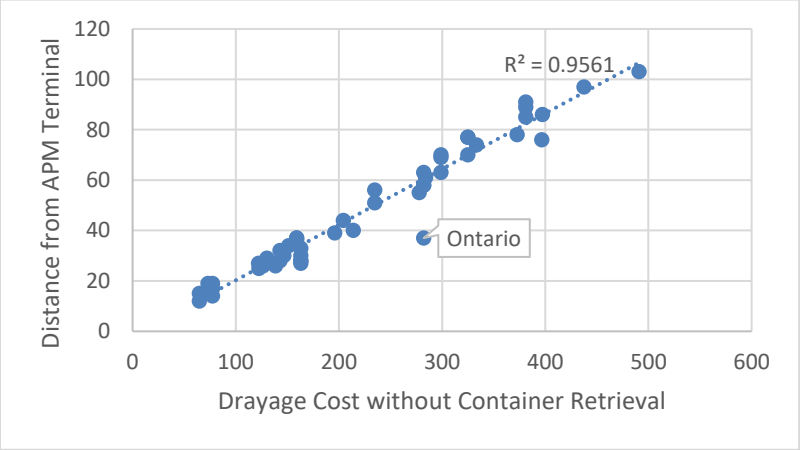
Results

The average distance from the APM terminal to all dray destinations is 48.5 miles whereas the average dray cost of $481. The least costly dray, to zip code 90810 in Long Beach is $315 which is only 12 miles from the port terminal. Clearly the trucking cost for this shipment is not $26 per mile.[1] Instead most of this amount is a fixed cost that the driver charges for picking up the container from the terminal – a process that often includes waiting in line outside the terminal gates. For near port deliveries, the vast majority of the drayage cost is actually a container retrieval cost. From the evidence of near port deliveries, it appears that if this cost were disaggregated from the bundled rate, it would be at least $250. To illustrate the effect of this factor, we compared the drayage cost with an assumed fixed cost of $250 removed as this cost will be a constant regardless of warehouse location. If the container retrieval cost is retained as part of the drayage side of the ledger, it may bias us in favor of reducing trucking costs.

Figure 1 shows how dray cost varies with distance from the port. It is unsurprising that dray cost is directly correlated with dray distance. Nevertheless, the precise nature of the relationship is somewhat surprising given that some regions of Los Angeles area suffer from more crippling bottlenecks than others. Yet, despite these discrepancies, dray companies consistently quote rates that are linearly proportional to driving distance. Only one outlier, Ontario, was found to significantly deviate.

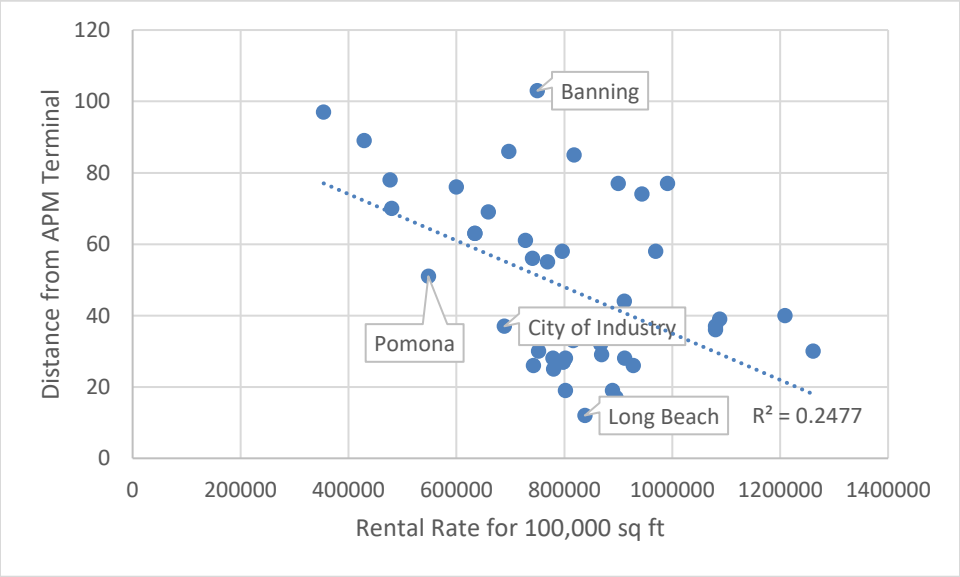
[1] https://www.dat.com/resources/trendlines/van/national-rates

Figure 1: Correlation of Dray Cost w/out Container Retrieval



The next step was to test the admittedly simplistic hypothesis that drayage rental rates directly correlate with distance from the port. We would not predict that this hypothesis would hold true given the fact that the Port of Los Angeles is not in the downtown and does not occupy the most costly real estate in the region. In addition, given that many shippers who use warehouses do not ship through the port, access to the port can be assumed to be only one of many factors driving rental rates. Figure 2 confirms the weak correlation between warehouse rental rates and distance from the port. If a shipper were only concerned with warehouse rental and dray cost, she would likely first target those markets that are cheaper on a per sq footage basis than their proximity to the port would suggest. For example in Figure 2 we see that Long Beach rental rates are higher than those in the in Inland Empire however, shippers that seek to save drayage costs may choose to locate in these near port markets despite slightly higher warehouse rental rates.

Figure 2: Correlation Between Dray Distance and Warehouse Rental Rate for a 100,000 sq foot facility



The next step in the analysis was to determine whether or not the avoidance of higher drayage cost is sufficient to outweigh potentially lower rental rates in the exurban locations. To do so, we examined the comparative magnitude of these two factors. The key missing variable is how many trucks the average warehouse or distribution center generates per day as this will show how much each facility would benefit from lower per unit trucking costs. The statistic used in this report .38 trucks per day per 1000 gross sq feet which comes from a survey from Fontana, California.[2] By this logic, the average 100,000 sq ft warehouse would generate 1,140 truck trips per month. In reality there would be significant variation in the rate of truck trip generation depending on the type of warehousing activity. Higher rates of generation will push the needle toward a closer location whereas less intensive truck generation would favor a more distant location. Table 1 shows the ranking of warehouse zip codes in terms of total warehousing and drayage cost from least to most.

We can conclude that there is no single warehousing cluster in the Los Angeles area that is, under all circumstances, the superior choice for locating a business that is fully reliant on port deliveries. The top ranked choices include some very distant locations like Beaumont and some close-in locations like Compton. Nevertheless, there do seem to be significant differences in which location is chosen for port dependent shippers. For example, locating in Pomona would save a shipper $638 thousand per month than the equivalent building in Glendale due to the significantly lower rental rate per sq foot. Other locations such as Compton, which have somewhat higher rental rates per sq foot, are nonetheless highly attractive due to their lower dray costs. Other factors to be considered would include travel time reliability, which would be lower for the more distant destinations, as well as the end point for the deliveries after they reach the warehouse. Clearly, if cargo needs to move back to the Los Angeles area after being picked up from a warehouse, locating in a distant location such as Beaumont is more difficult to justify. Finally, this analysis does not take into account the externalities associated with very long dray deliveries such as emissions, traffic congestion and safety impacts. In situations where the shipper is truly indifferent to locating distribution near to the port as opposed to an exurban location, there is the potential for policy incentives to encourage shippers to choose a more sustainable location.

[2] Monthly Truck Trip Generation for a 100000 sq foot warehouse TABLE C-1D
WEEKDAY DAILY TRUCK TRIP GENERATION RATES (Fontana, CA)
http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_syn_298.pdf

Table 1: Ranking of Zip Codes for Total Cost Considering Warehouse Rental and Average Truck Trip Generation for a 100,000 square foot building

Rank	Destination Zip Code	City	Distance from APM Terminal (miles)	Combined Warehouse and Dray Cost	Average Warehouse Rental Rate	Drayage trucking cost for 100,000 sq foot warehouse
1	91766	Pomona	51	$815,634	$548,000	$267,634
2	92316	Bloomington	70	$850,538	$480,000	$370,538
3	92223	Beaumont	97	$852,636	$354,000	$498,636
4	92551	Moreno Valley	89	$863,530	$429,000	$434,530
5	90220	Compton	19	$885,334	$802,000	$83,334
6	90040	Commerce	26	$887,020	$743,000	$144,020
7	92407	San Bernardino	78	$902,030	$477,000	$425,030
8	90810	Long Beach	12	$911,834	$838,000	$73,834
9	92833	Fullerton	30	$918,972	$752,000	$166,972
10	90270	Maywood	25	$919,536	$780,000	$139,536
11	92805	Anaheim	34	$932,254	$760,000	$172,254
12	90058	Vernon	27	$937,004	$798,000	$139,004
13	91752	Mira Loma	63	$955,594	$634,000	$321,594
14	90063	Los Angeles	28	$964,706	$779,000	$185,706
15	90638	La Mirada	28	$964,754	$802,000	$162,754
16	91752	Jurupa Valley	63	$974,594	$634,000	$340,594
17	90723	Paramount	19	$977,084	$889,000	$88,084
18	90058	Los Angeles	27	$983,706	$798,000	$185,706
19	90248	Gardena	17	$984,084	$896,000	$88,084
20	92337	Fontana	69	$999,594	$659,000	$340,594
21	90012	Los Angeles	33	$1,001,706	$816,000	$185,706
22	91710	Chino	56	$1,008,634	$741,000	$267,634

23	91761	Ontario	37	$1,010,594	$689,000	$321,594
24	92841	Garden Grove	29	$1,017,504	$869,000	$148,504
25	90601	Whittier	32	$1,029,754	$867,000	$162,754
26	91730	Rancho Cucamonga	61	$1,051,836	$728,000	$323,836
27	92570	Perris	76	$1,051,934	$600,000	$451,934
28	90745	Carson	15	$1,055,834	$982,000	$73,834
29	92880	Corona	55	$1,085,578	$769,000	$316,578
30	90670	Santa Fe Springs	26	$1,086,004	$928,000	$158,004
31	90023	Los Angeles	28	$1,097,706	$912,000	$185,706
32	90501	Torrance	14	$1,103,084	$1,015,000	$88,084
33	91764	Ontario	58	$1,117,594	$796,000	$321,594
34	91789	Walnut	44	$1,143,940	$911,000	$232,940
35	93030	Oxnard	86	$1,149,732	$697,000	$452,732
36	92374	Redlands	85	$1,252,530	$818,000	$434,530
37	91714	City of Industry	37	$1,261,222	$1,080,000	$181,222
38	91715	City of Industry	36	$1,261,222	$1,080,000	$181,222
39	92507	Riverside	77	$1,270,538	$900,000	$370,538
40	91311	Chatsworth	58	$1,290,594	$969,000	$321,594
41	92220	Banning	103	$1,309,436	$750,000	$559,436
42	92606	Irvine	39	$1,311,440	$1,088,000	$223,440
43	92376	Rialto	74	$1,324,038	$944,000	$380,038
44	92324	Colton	77	$1,361,538	$991,000	$370,538
45	90021	Los Angeles	30	$1,446,706	$1,261,000	$185,706
46	91201	Glendale	40	$1,452,884	$1,209,000	$243,884

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