Building Trends within the Greater Los Angeles Area

Statistics 141SL

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Group Members:

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Executive Summary:

The goal of this project was to assess 2013 through 2018 building permit data for the Los Angeles Department of Building and Safety, and produce visualizations to further the department's understanding of building trends within the greater Los Angeles area. The primary objective was to identify what areas of Los Angeles are constructing new buildings and which are more likely to rehabilitate the buildings that already stand.

The data necessary to complete this task was easy to attain through data.lacity.org, which was fully cleaned and ready for analysis. The data is a single .csv file that details every permit issued from the start of 2013 through January of 2018. The .csv was transferred into R for analysis. Using the PCIS permit number as our unique identifier we were then able to parse data as needed in order to create choropleth maps for rehabilitation and new construction of housing throughout the Los Angeles area. In order to place latitude and longitude correctly for each permit, third party assessor parcels data was required as well as an API for Google Maps and geocoder from the Census Bureau. This allowed for the correct placement of each permit within each of the two maps.

The maps created are subsetted and based off of building type and permit type. New building and altered/repaired building permit types were used in our analysis, and we examined permit sub-types of apartments and 1 or 2 family dwellings. Through our analyses, we were able to see that overall new building has been focused along major highways within Los Angeles, with the largest number of new buildings coming from council district 5, which is Paul Koretz. In terms of rehabilitation, we can see that most of Los Angeles is undergoing significant rehabilitation work, with council district 12, which is Mitchell Englander, having the most rehabilitation work done.

Intro:

One of the purposes of the Department of Building and Safety is to enhance the quality of life, housing and economic prosperity for the Los Angeles population. Thus, the Department of Building and Safety advise the construction, remodeling and repair of buildings and structures. However, in order for any assembly to take place, a permit must be issued by the department. These permits are categorized into building permits, electrical permits and mechanical permits and depending on intricacy, can be issued the same day or required to be reviewed. Thus, a thorough understanding of building trends would be an advantage for the department in providing efficient housing and permit types in the South California Region. In our research project, we are primarily focused on the locations of new construction of housing, rehabilitation work and types of permits. We attempted this project to assist the Department of Building and Safety in tackling these queries to improve the department’s understanding of the building trends in the City of Los Angeles.

Research Questions:

1. Where has new housing in LA been built?
2. How many new units have been built?
3. Where is housing being rehabilitated rather than new constructions?
4. What type of permits are being issued?

Data:

2 datasets were used for this project. Specifications of the data are given below:

1. Building and Safety Permit Information

   The Department of Building and Safety issues permits for the construction, remodeling, and repair of buildings and structures in the City of Los Angeles. Permits are categorized into building permits, electrical permits, and mechanical permits (which include plumbing, HVAC systems, fire sprinklers, elevators, and pressure vessels).

2. Assessor Parcels Data 2017

   Valuation and property description for parcels on the Assessor's annual secured assessment rolls 2006 thru 2017. The default sort is by AssessorID and ascending RollYear within AssessorID.

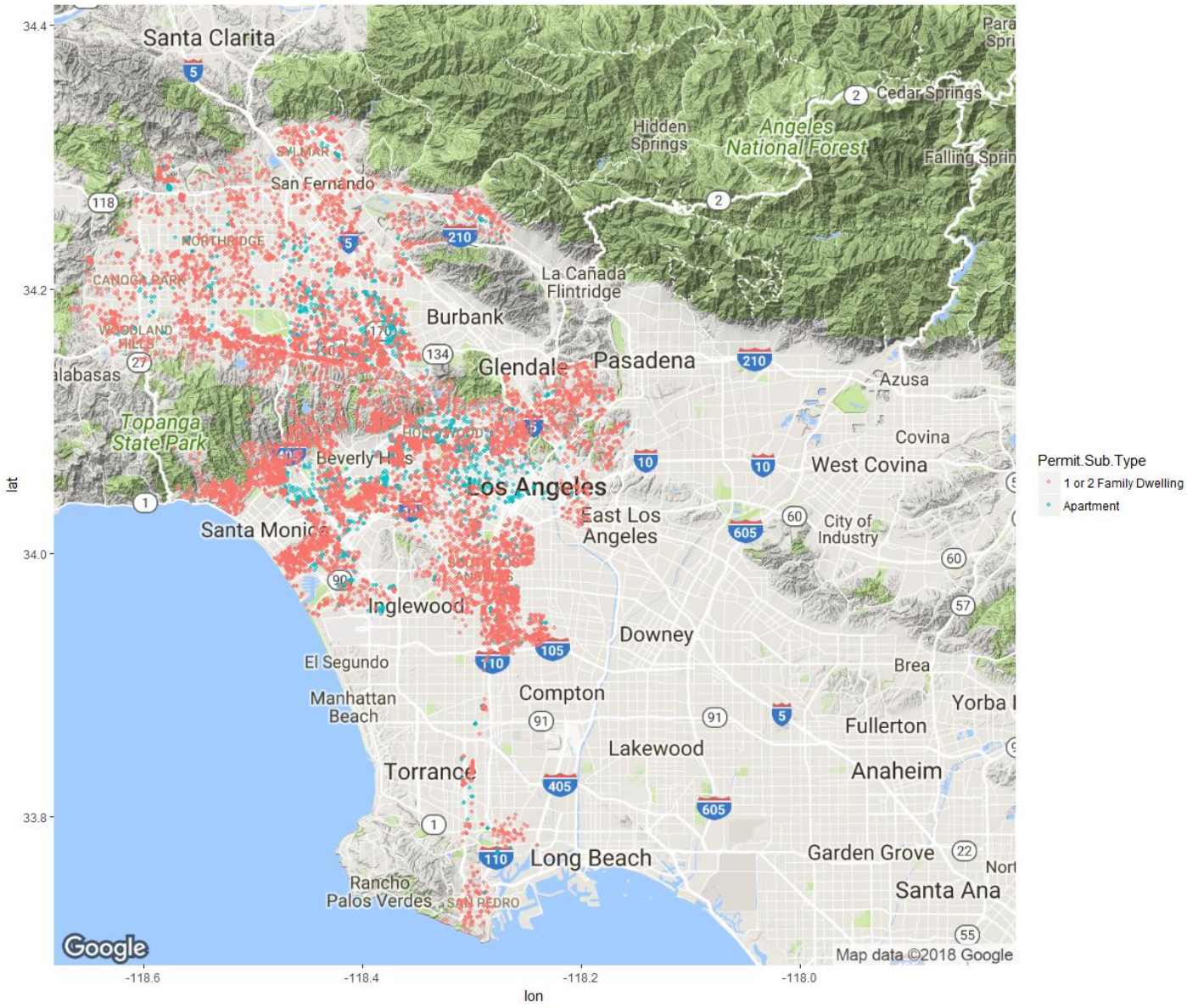
In order for us to create the maps required we focused on three primary variables outside of our unique identifier. The first of the three is *Permit Type* which allowed for the parsing between whether or not the work being done was for a new building (Bldg-New) or if it was actually rehabilitation work (Bldg-Alter/Repair). This allowed us to keep the heat map and clustered map separate. Secondly, our group focused on the *Permit Sub-Type,* which added an extra level of granularity to our maps. The three primary levels of Permit Sub-Type are Commercial, 1-2 family dwelling and Apartment. Through this variable we were able to visually see trends in whether or not new building or rehabilitation was more common in a specific building type. Finally, without having the latitude and longitude of every permit it would've been near impossible to create such detailed mappings. Thus, our group relied heavily on these variables to create accurate mappings.

Methods Used:

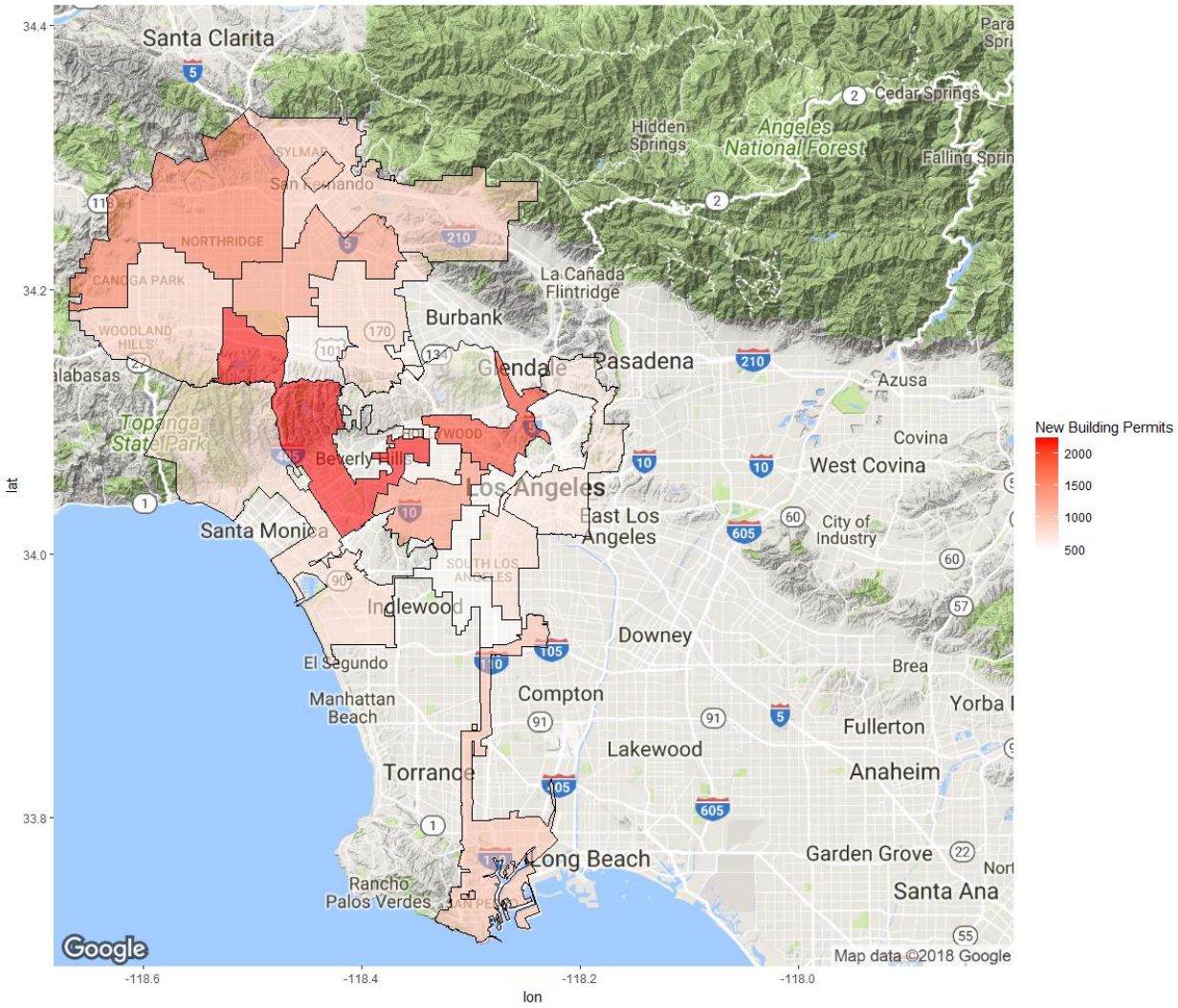
The methods used for the analysis were the evaluation of choropleth maps and shapefiles using ggmap, ggplot2, rgeos, rgdal, maptools, and sp. In addition, retrieval of several thousand missing latitude and longitude pairs were conducted through a combination of merging with the assessors parcels data from lacity.gov, use of a geocoder from the Census Bureau, and querying with a Google Maps API with the RSJONIO package. Given that the research questions primary stressed for location of new housing construction and location of housing rehabilitation, we felt that plotting the data on maps would provide the best analysis and visualization of our predictions and findings. We also focused on filtering specific variables and creating subsets before providing simple table functions to identify the housing units and rank the permit types.

Results:

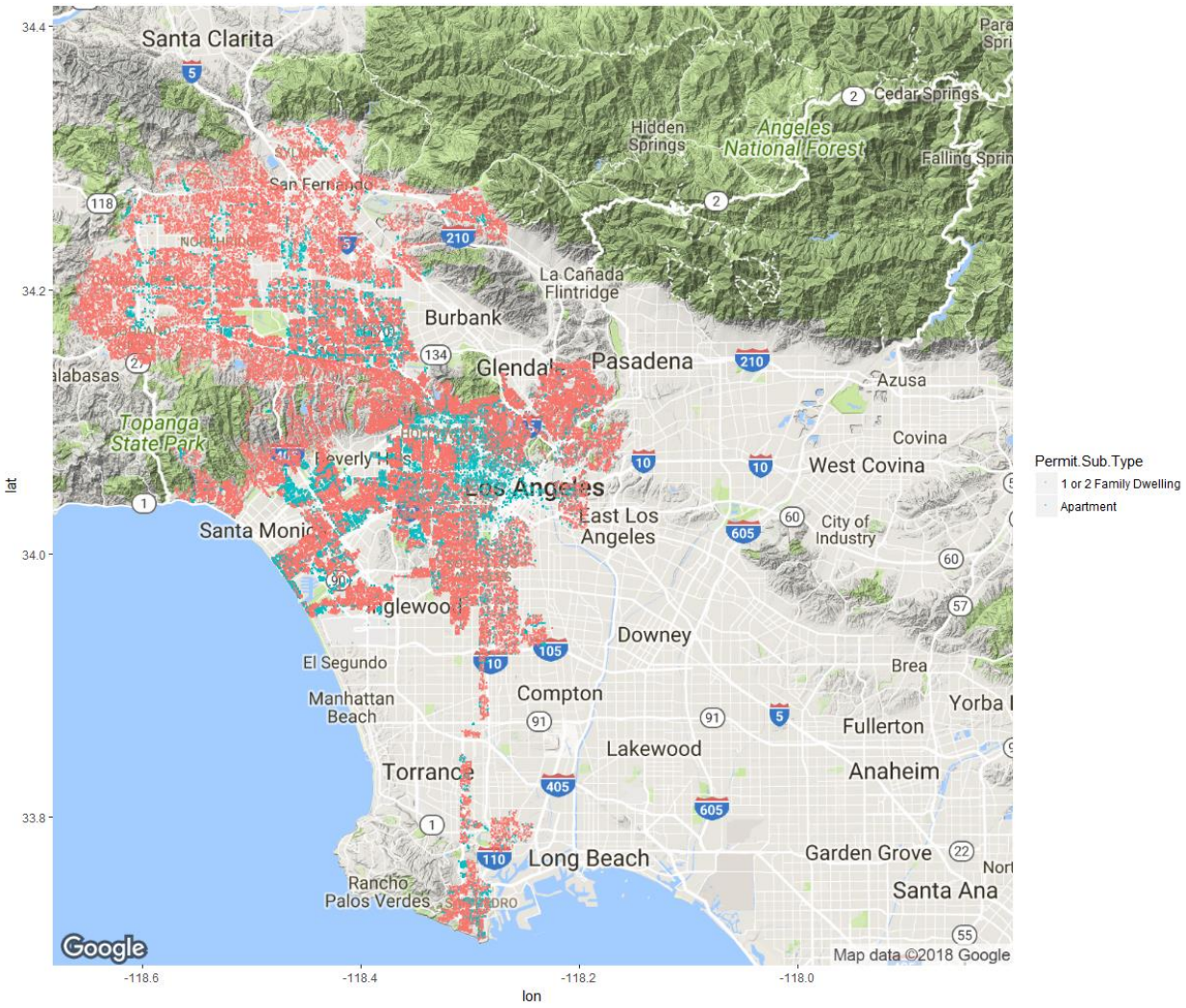
New Housing by Permit type



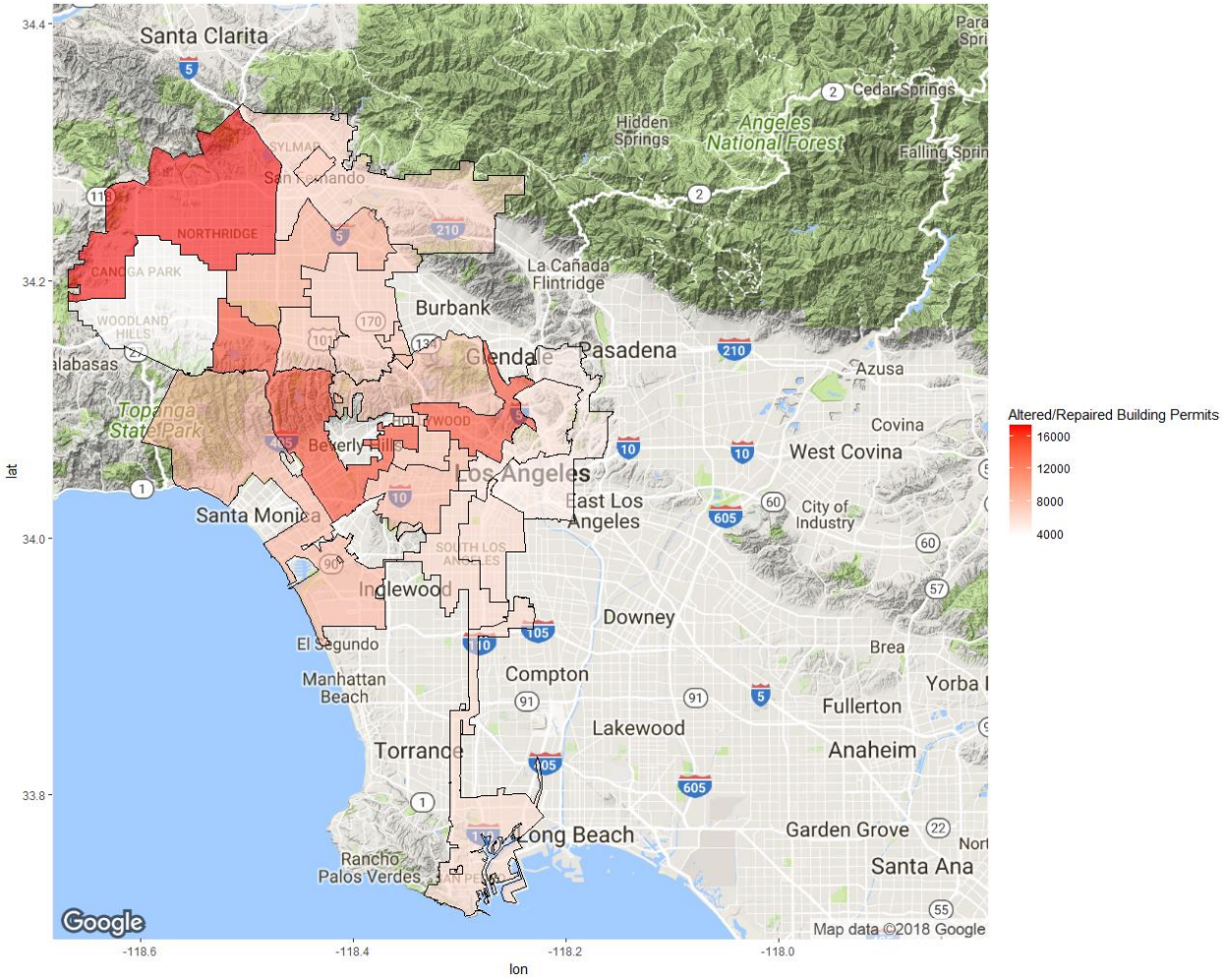
New Housing Choropleth



New Housing by Permit Type



Housing Rehabilitation Choropleth



Analysis:

Where has new housing in LA been built?

The maps used for analysis consist of the New Housing by Permit Type and New Housing Choropleth. Corresponding to the New Housing Choropleth, the areas in darker red symbolize a high concentration of new houses while lighter colors represent areas with less new housing construction. The map identifies council district 5 to contain the greatest levels of new housing concentration. Following, districts 12 and 13 which include: Northridge, West Los Angeles, some areas in Long Beach, and south of Northridge, are popular locations for new housing as well. Possible reasons may include that these areas may be in greater demand due to location, community and environment, thus resulting in the increase of quantity for new housing permits. In contrast, it is interesting to note that patches of South Los Angeles and Hollywood do not display any levels of new dwellings, specifically the districts 1,4, and 8. Furthermore, a pattern can be distinctly seen in the New Housing by Permit Type map. The map identifies clusters of new housing to be primarily located around areas close to major highways. These major highways consist of the 101, 170, 405, 10 and 5

How many new units have been built?

Our process consisted of carefully cleaning the dataset by filtering out only new buildings and separating them by permit subtypes. Following, we chose to focus on the variable called "# of Residential Dwelling Units" and concluded that there were 12,025 new single or two family homes and 39,381 new apartments. Our final analysis suggests that there is a total of 51,406 new units built within the Los Angeles area.

Where is housing being rehabilitated rather than new constructions?

The maps used to perform the necessary analysis for the above questions consist of the Housing Rehabilitation Choropleth. It is interesting to note that the overall trends are similar but not identical to those of new housing. In the Housing Rehabilitation Choropleth, the rehabilitation housing levels in the Los Angeles region retain the same structure as the new housing Choropleth, with increased concentration in every council district in general. The highest concentration of housing rehabilitation lies in district 12 and Northridge area, with districts 5 and 13 also having high concentrations. Furthermore, there is very low concentration in district 3, which is the Canoga Park and Woodland Hills area. Our analysis of both maps showcase that rehabilitation is preferred over new housing which can be seen by the greater spread of color in the second Heatmap.

What types of permits are being issued?

From the analysis of the New Housing by Permit Type and Housing Rehabilitation by Permit Type, we predominately see that there is a greater amount of permit types in Housings that require rehabilitation in comparison to new houses. More so, 1 or 2 Family dwellings typically have more requests for these permits because there are obviously greater clusters of latitude and longitude data points in the Housing Rehabilitation by Permit Type than New housing by Permit Type.

However, to answer the question specifically in regards to what types of permits have been issued within Los Angeles from 2013-2018, we considered the "Permit Type" variable within our data set. After running a simple table function it became clear that out of the 765,166 permits that have been issued the most common is electrical. Over this time period there have been 216,157 electrical permits issued. The second and third most common permit types are building alter/repair and plumbing with 171,314 and 148,153 permits respectively. A full table is provided below:

Permit Type	Number Issued
Building Addition	27,430
Building Alter/Repair	171,314
Building Demolition	10,108
Building New	18,068
Building Relocation	6
Electrical	216,157
Elevator	9,935
Fire Sprinkler	30,254
Grading	15,717
HVAC	77,493
Non-Building Addition	160
Non-Building Alter/Repair	3,987
Non-Building Demolition	53
Non-Building New	13,884
Plumbing	148,153
Pressure Vessel	1,387
Sign	10,585
Swimming Pool/Spa	10,475

Conclusion:

In conclusion both rehabilitation and new building construction have been very popular over the last fifteen years. Just over fifty thousand new units have been built in this time frame, most of which have been near major freeways such as the 405,10 and 101. This number specifically breaks down to just over twelve thousand new single or two family homes and thirty nine thousand new apartments. The most popular areas for this new construction have been council districts 5 and 13, which are Beverly Hills and Hollywood, with on average more 1 or 2 family homes being built in the San Fernando Valley and more new apartment construction taking place within Los Angeles City itself. The areas around South Los Angeles and council district 4 have seen very little new construction in comparison to the rest of the greater Los Angeles area.

While council districts 5 and 13 have focused more so on new construction over the last fifteen years, council districts 5, 12, and 13 have been the primary areas for rehabilitation work. We see that district 3, which is Canoga Park and Woodland hills, have not had much work done within this time period.

Lastly, although the permit types ranged vastly there were three in particular that made up the majority of the over seven hundred and fifty thousand that have been issued in the last fifteen years. The most common was electrical permits followed by building alterations/repairs and plumbing.

Overall there has been a lot of change and construction for the Los Angeles area from 2013 to the start of 2018 and there are no signs for this rate of construction to slow down.