Early Insights Report

City of Boston : Remodeling and Unit Loss (Team A)

The City of Boston, renowned for its rich history, vibrant communities, and dynamic urban landscape, faces many challenges and opportunities as it navigates the complexities of urban development and housing availability. At the heart of these challenges is the intricate balance between accommodating the city's growing population and the accessibility of housing for all its residents. Our team began work on analyzing the housing data in Boston to gain some understanding of the initial situation and specifically analyzing the housing unit trends across communities in Boston.

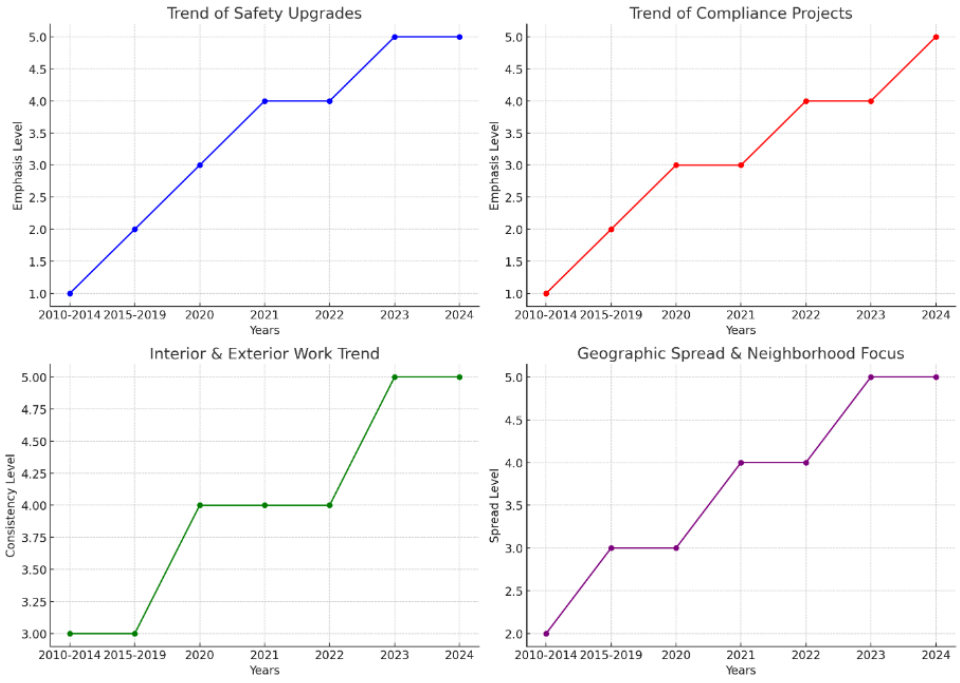
We used data on property assessments from the past 20 years from 2004 to 2024. Some cleaning was necessary since the data did not exactly match from year to year. For example, 2020 and 2021 included variables that changed slightly from other datasets, so we had to adjust to that. In addition, we analyzed data on approved building permits in Boston. In our analysis, we also wanted to understand various scopes of how communities in Boston were being affected. So, we not only filtered data by zip code but also by each neighborhood(ex. Roxbury, South Boston, etc.). As we move forward with analysis we want to understand what levels of grouping ‘communities’ create the most useful insights.

The property assessment data included a total of 1914941 observations across all the years ranging from 164091 to 182242 per year. Each observation represents a different property. For this initial analysis, we used observations per data each year as a metric to determine how

housing units changed over time. Important variables in this dataset include the city, mail city, gross area, zip code, LU(Land Use), and a combination of a few others which helped us understand how the number of housing units changed over time.

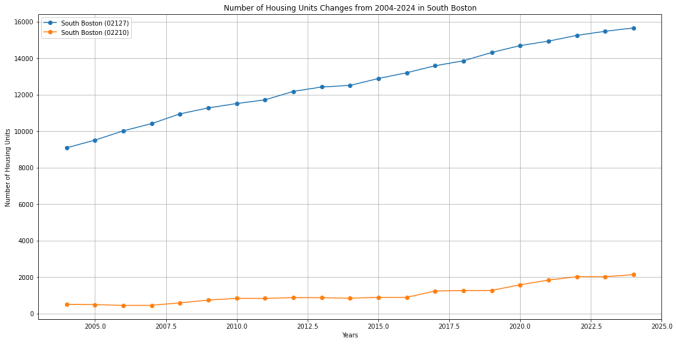
Before looking at the change in the housing units per community, we wanted to understand the trends in the permits as it would explain the impact of remodeling in Boston. It was clear to us that there was a clear trend towards prioritizing safety improvements, particularly through the installation of fire alarms and sprinkler systems(*Figure 1*). Renovations often align with regulatory requirements, indicating a proactive approach to compliance with building codes and standards. We also discovered that there was an interesting balance of renovation efforts between improving the interior living spaces and enhancing the exterior appeal and structural integrity of buildings. Also looking at specific areas we found that certain neighborhoods, such as Roxbury, Dorchester, South Boston, and East Boston, consistently see significant renovation activities.

Figure 1. **Renovation Trends**



We created the Emphasis Level (on safety and compliance), Consistency Level (in interior/exterior work), and Spread Level (geographic distribution) to understand the permit data. The Emphasis Level is a calculation of the percentage of projects focusing on safety and compliance out of the total renovation projects each year. This metric indicates the priority given to safety and compliance in renovation efforts. The Consistency Level is a ratio of interior to exterior projects annually and measures the variance or stability of these ratios over the years. A lower variance signifies a higher consistency in focus between interior and exterior renovations. Lastly, the Spread Level evaluates the diversity of neighborhoods undergoing renovation projects. This is done by counting the number of different neighborhoods each year by considering both the variety of neighborhoods and how evenly projects are distributed among them.

Figure 2. South Boston Housing Unit



In looking at the property assessment data, we noticed significant increases in the number of units being renovated with specifically large increases in areas like South Boston(02127) with an increase of 6571 as shown in *Figure 2*, and the South End(02118) with an increase of 3774 since 2004 as shown in *Figure 3*. From our initial research, most neighborhoods had an increase in units ranging from 113 to 4872.

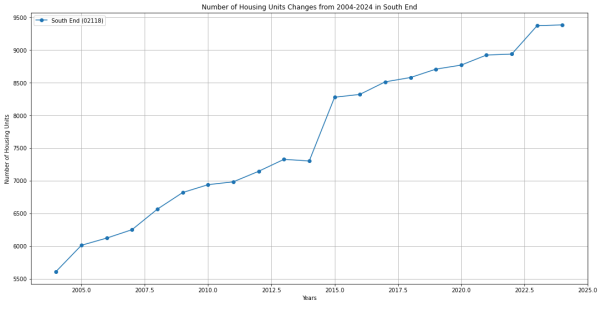
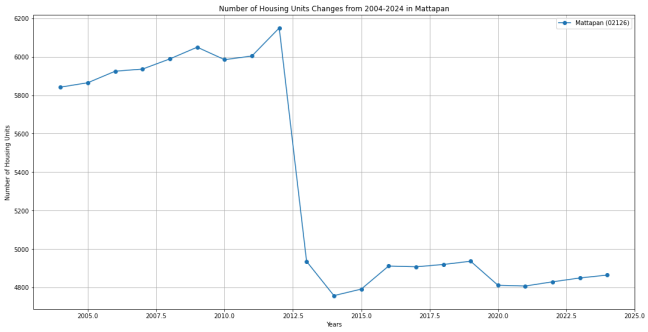


Figure 3. South End Housing unit

Figure 4. Mattapan Housing Unit



However, there was a clear outlier with Mattapan(02126) where there has been a large decrease of 978 units from 2004 to 2024 with the biggest decrease in 2013 as shown in *Figure 4*. Other notable changes have been increases in Jamaica Plain(3038 units) and Hyde Park(1896 units) as shown in *Figure 5 and 6.*

Figure 5. Jamaica Plain Housing Unit

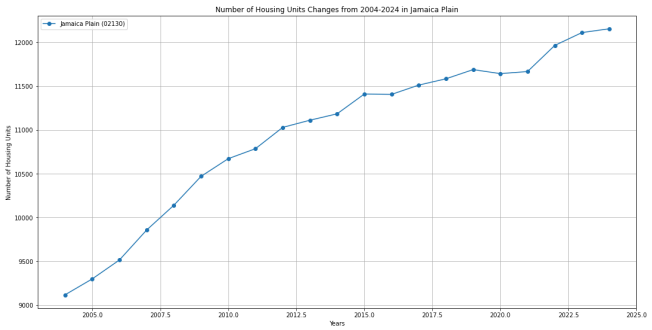
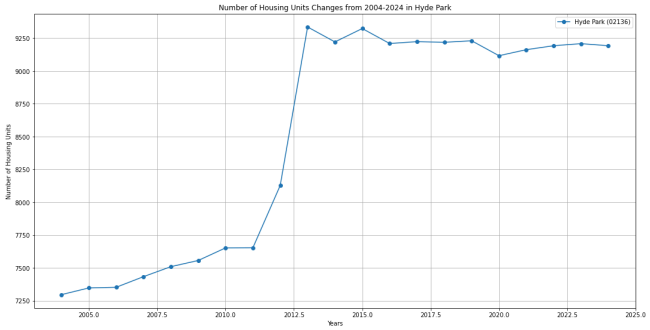


Figure 6. Hyde Park Housing Unit.



Furthering this, data on the changes year over year showed a few communities with more volatile environments in terms of the properties. We noticed in particular, that there were consistently large changes each year in downtown Boston, and significantly large changes in Hyde Park in 2013 and the South End in 2015 of 14.85% and 13.35% respectively*(Figure 7)*. This is interesting when compared with the changes in Boston overall with the city having the largest percentage increases in 2008, 2012, and 2015 and the largest decrease in units of -0.85% in 2014 (*Figure 8)*.

Figure 7. Percent Change by Neighborhood

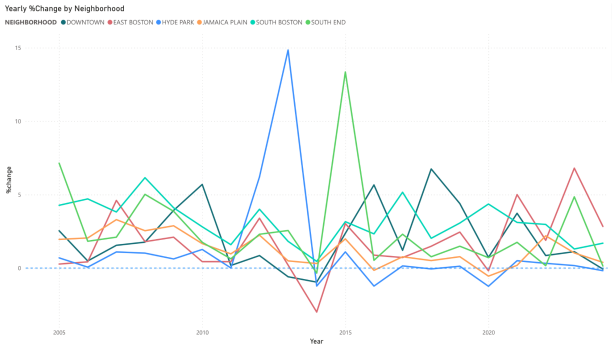
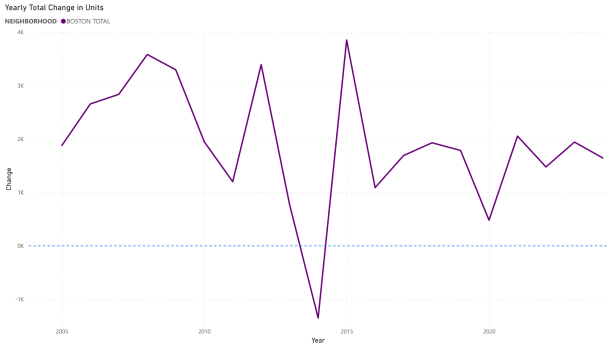
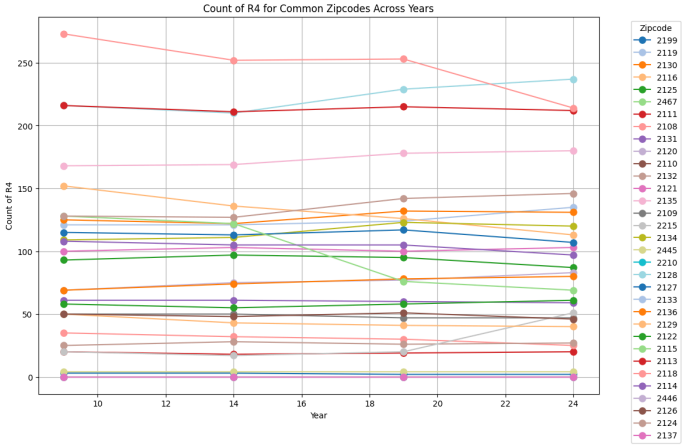


Figure 8. Total Change



Lastly, we wanted to understand trends within types of properties. Specifically residential properties with 4-6 units(R4), and residential units with 1 unit(R1). To do this we filtered by the LU and LU_DESC variables. We noticed large changes in residential units specifically for zip codes 02108, 02115, and 02116(*Figure 9)*.

Figure 9. R4 Count per Zip Code



What is even more interesting is within these specific communities, as the number of R4 units decreased, there was an increase in R1 units. This is an interesting trend we would like to understand further. This might be explained by renovations of multi-family homes being

converted into single-family homes, but it is something we want to look into further(*Figure 10,11,12)*.

Figure 10. R1 and R4 Trend for 02108

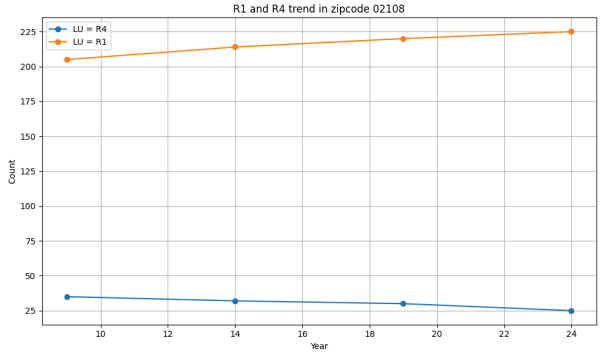


Figure 11. R1 and R4 Trend for 02215

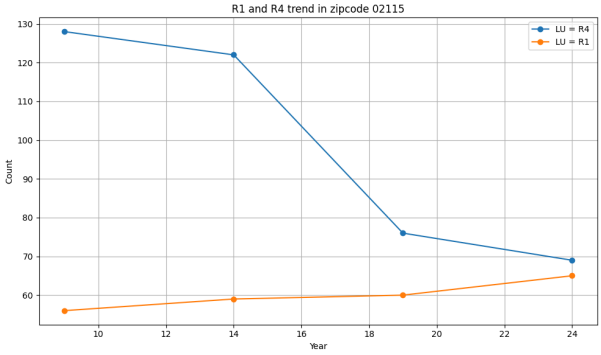


Figure 12. R1 and R4 Trend for 02116

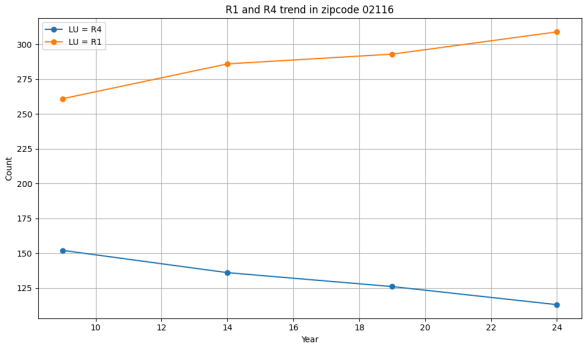
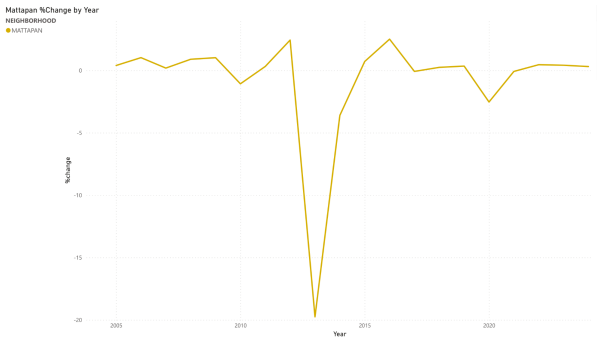


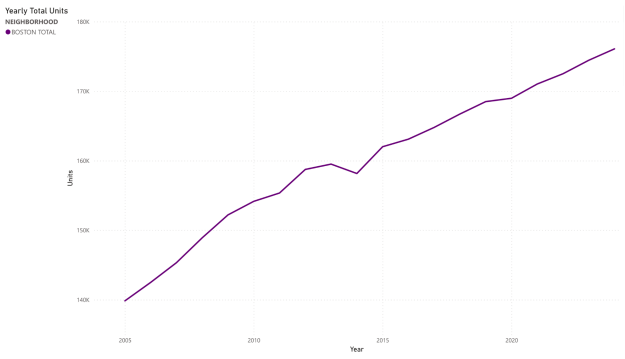
Figure 13. Mattapan % Change by Year



Our initial analysis suggests that renovation in the city of Boston is a topic that should be under watch. Large increases in certain neighborhoods like South Boston while large overall decreases in areas like Mattapan suggest a larger trend at play. We also would like to further understand the specific large changes in various neighborhoods like the significant decrease in Mattapan during 2013(*Figure 13)*.

This is something that our group will be trying to understand as we dive deeper into the data that we have. We determined that communities in South Boston are having the largest increases, and Mattapan as well as the city as a whole in 2014 having large single year decreases in properties overall*(Figure 14)*. We would like to further research the decrease in Mattapan, but upon initial research, it might be explained by borders within the Mattapan zip code changing in 2013.

Figure 14. Yearly Total Units by Neighborhood



Specifically, we also noted decreases in the number of multi-family homes with increases in single families in Beacon Hill(02108), Kenmore Square(02215), and Back Bay(02216). With this information, we would like to understand the reasoning behind these underlying trends and the connection between these communities being affected. While we answered two of the initial questions the city of Boston initially set out to understand, it brings up many new questions to understand the reasoning behind these trends. For example, understanding the large changes in Hyde Park in 2013, and South End in 2015 while also determining the relationship between single-family and multi-family properties. In our future reports, we would also like to discover the connections between the types of permits being accepted, renovations, and the amount of housing in the various communities being affected to help answer these questions.