City of Boston: Remodeling and Unit Loss - Team C Early Insights
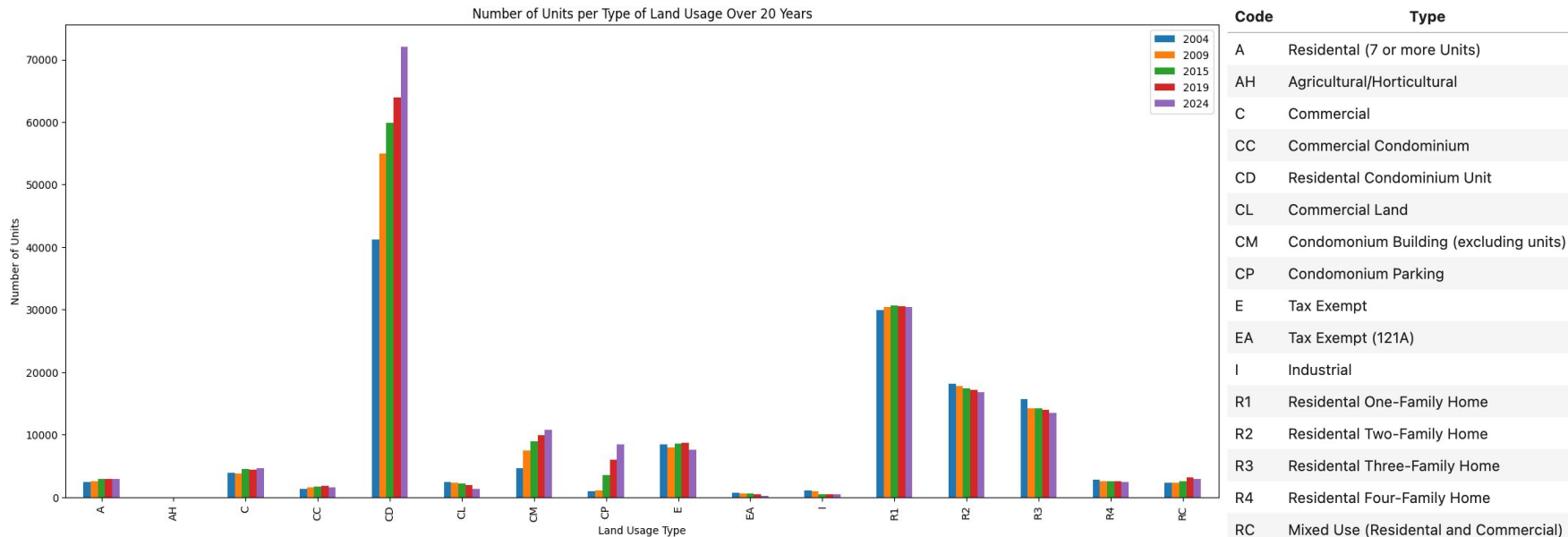
02/29/24

AGENDA

- First looks at the Property Assessment Data Analysis
  - Land Usage Over Time
  - Average Total Value
  - Average Bedrooms
  - Average Living Area
  - Combinations of these properties

- First looks at the Building Permits Data Analysis
  - Insight on Total Fees and Declared Valuation
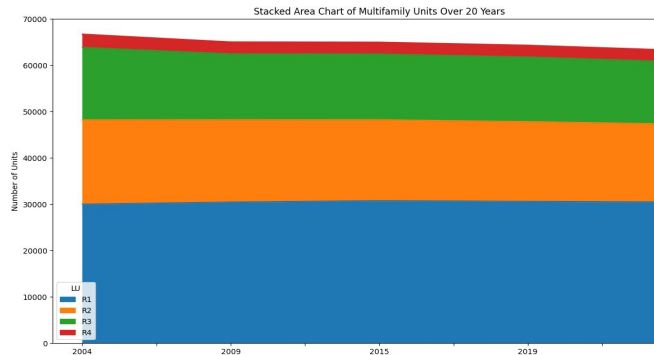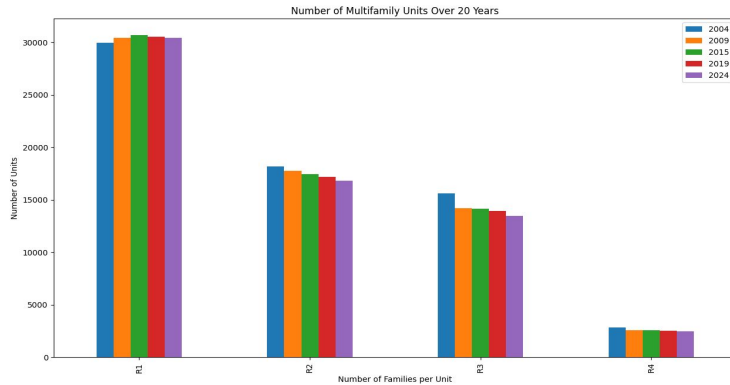 - Number of permits based on occupancy types

Property Assessment Data - Early Insights

Property Assessment - Early Insights - Land Usage Analysis

Number of Units per Type of Land Usage Over 20 Years

| Code	Type
A	Residental (7 or more Units)
AH	Agricultural/Horticultural
C	Commercial
CC	Commercial Condominium
CD	Residental Condominium Unit
CL	Commercial Land
CM	Condomonium Building (excluding units)
CP	Condomonium Parking
E	Tax Exempt
EA	Tax Exempt (121A)
I	Industrial
R1	Residental One-Family Home
R2	Residental Two-Family Home
R3	Residental Three-Family Home
R4	Residental Four-Family Home
RC	Mixed Use (Residental and Commercial)

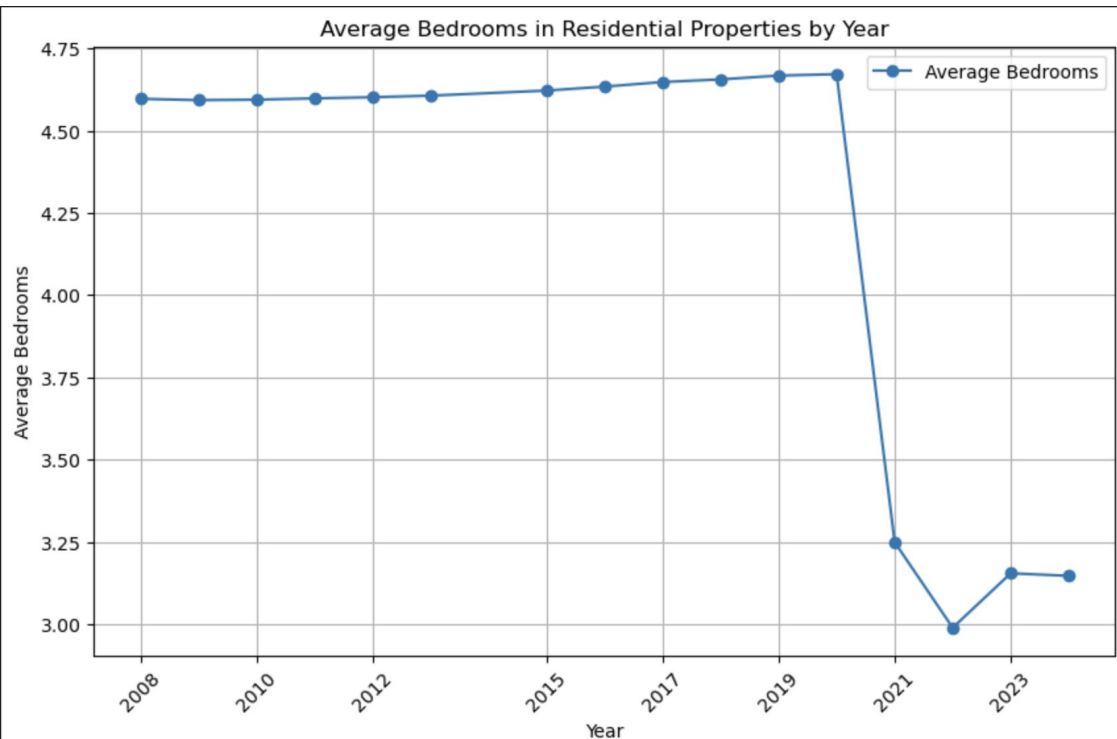# Property Assessment - Early Insights - Land Usage Analysis

- The number of multi-family homes is decreasing
- The number of single family homes is relatively stagnant

- The number of single family homes and multi-family homes together is decreasing
- What is the cause of this decrease?
    - Demolition?
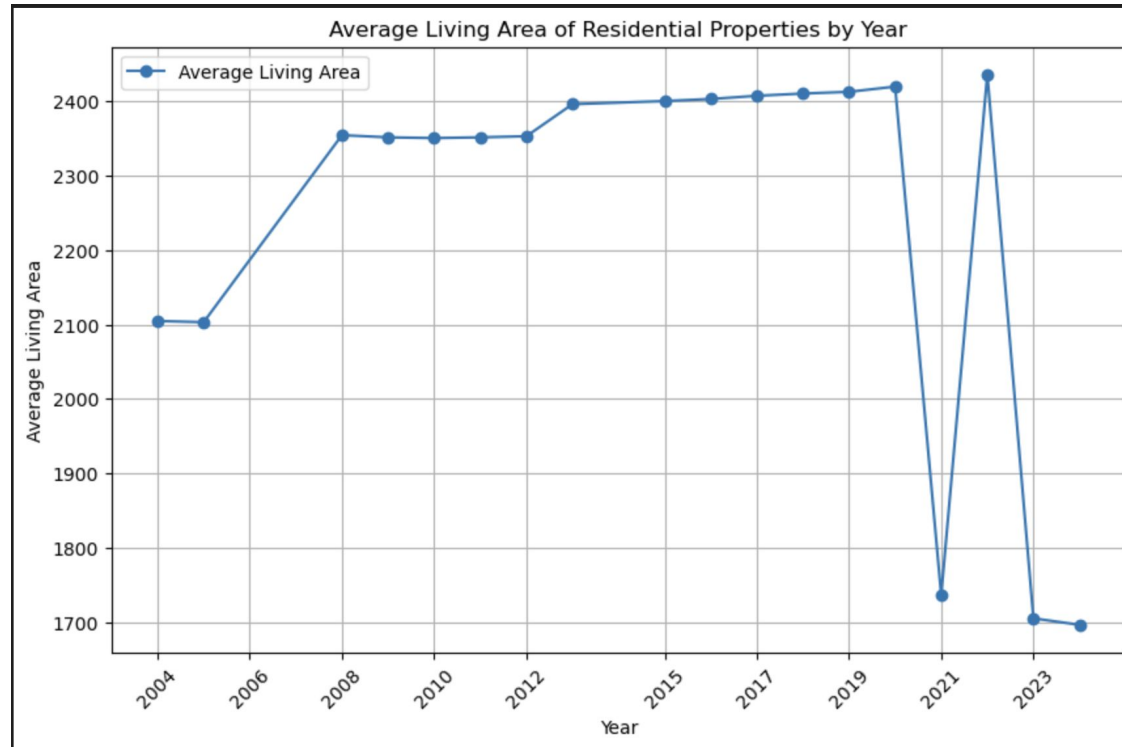   - Conversion to non-residential buildings?

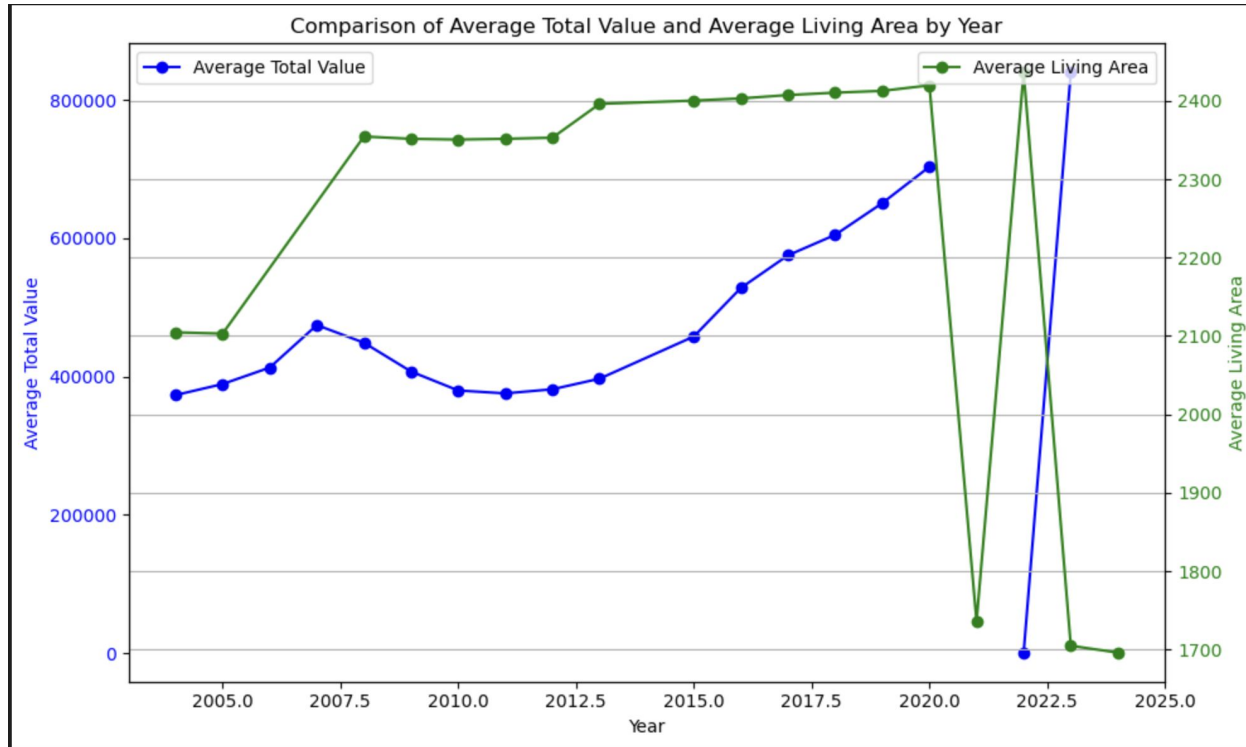# Property Assessment - Early Insights - Average Total Value

Average Total Value of Residential Properties by Year
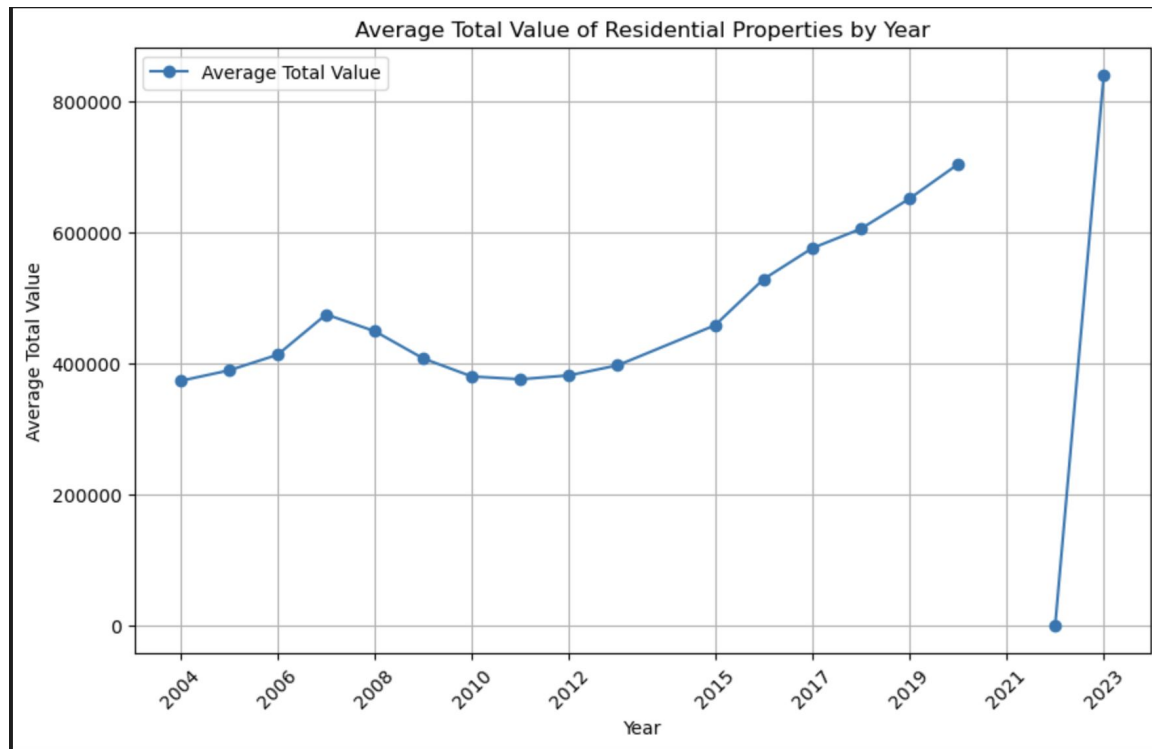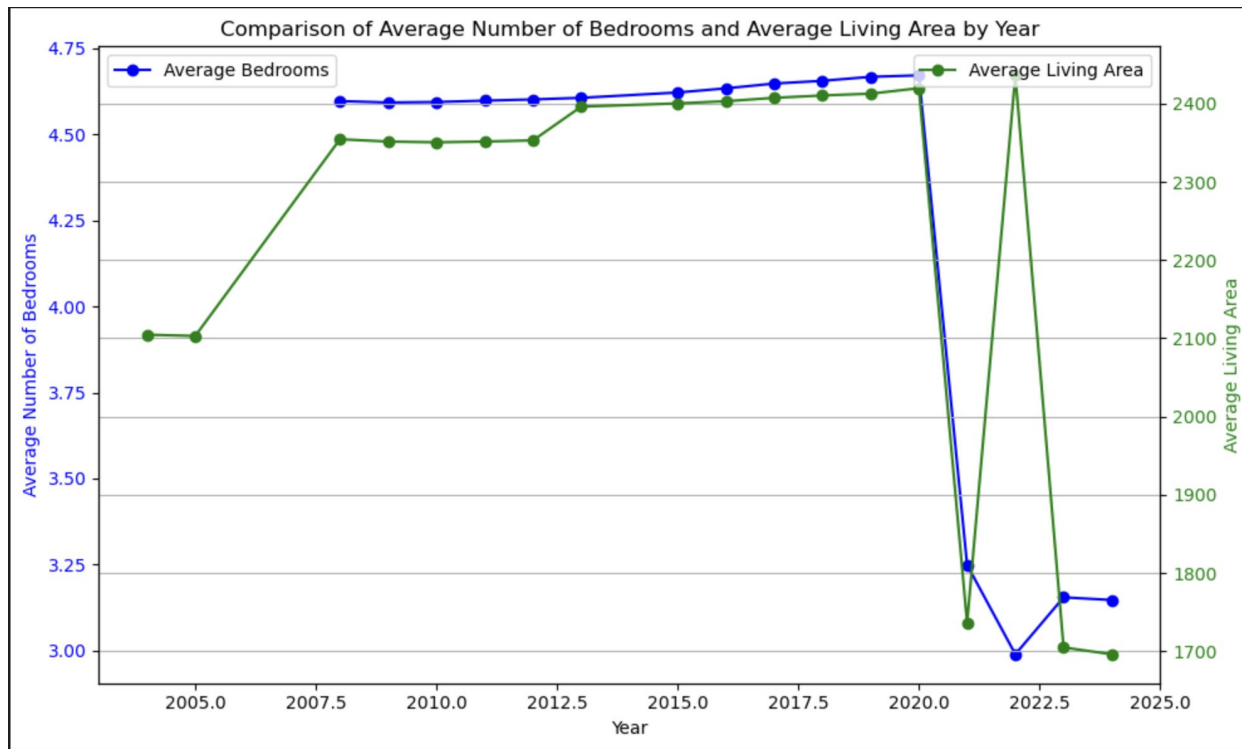
Property Assessment - Early Insights - Average Bedrooms

Property Assessment - Early Insights - Average Living Area

Property Assessment - Early Insights - Average Total Value X Living Area

Comparison of Average Total Value and Average Living Area by Year

Property Assessment - Early Insights - Average Number of Bedrooms X Living Area

Approved Building Permits Data - Early Insights

Insight on Total Fees and Declared Valuation

Total Fees

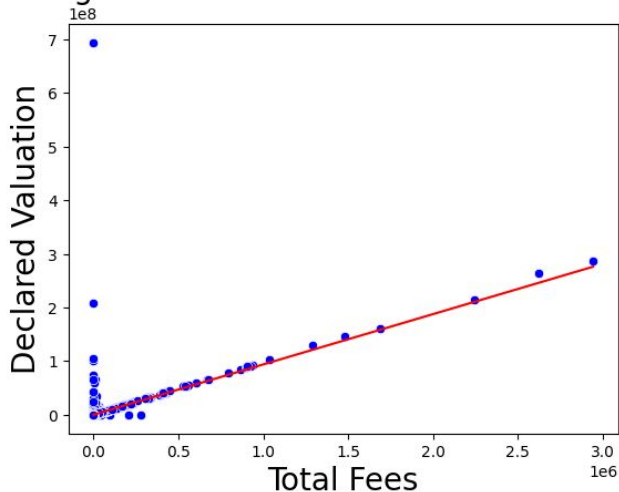Count: 555,815
Mean: $ 916
Std: 26,022
Min: $ 0
25%:   32
50%:   70
75%:   190
Max: $ 13,080,420

Declared Valuation

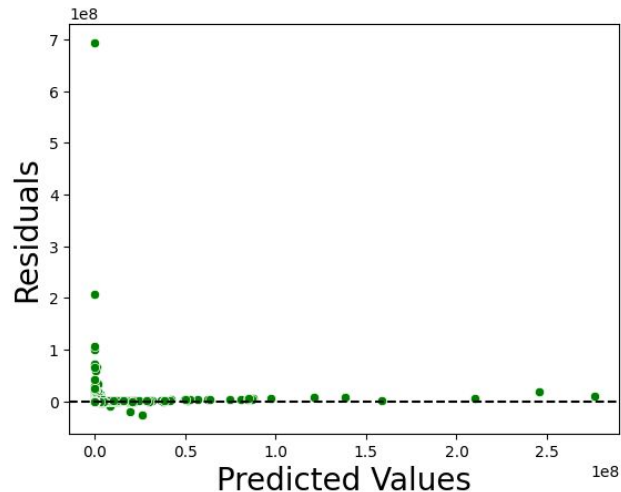Count: 555,815
Mean: $ 116,650
Std: 4,040,626
Min: $ -1,000,000
25%:   1,500
50%:   5,500
75%:   20,000
Max: $ 2,100,000,000

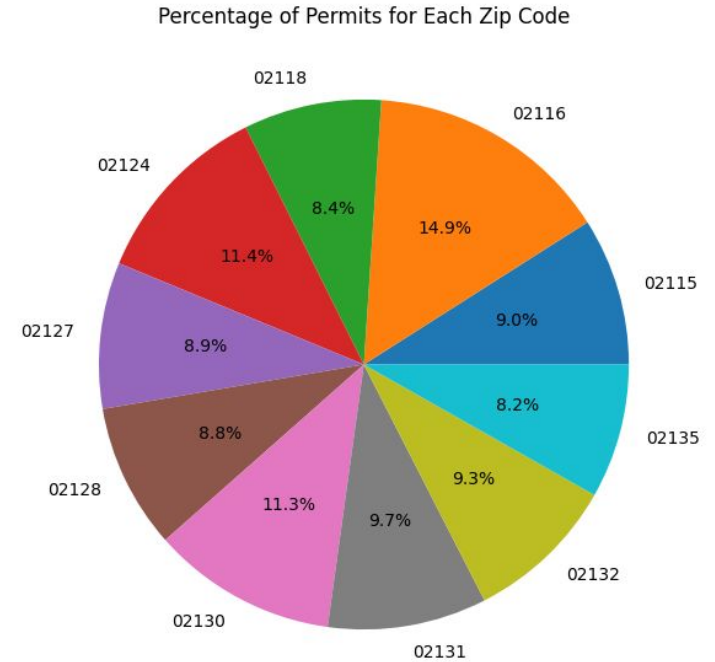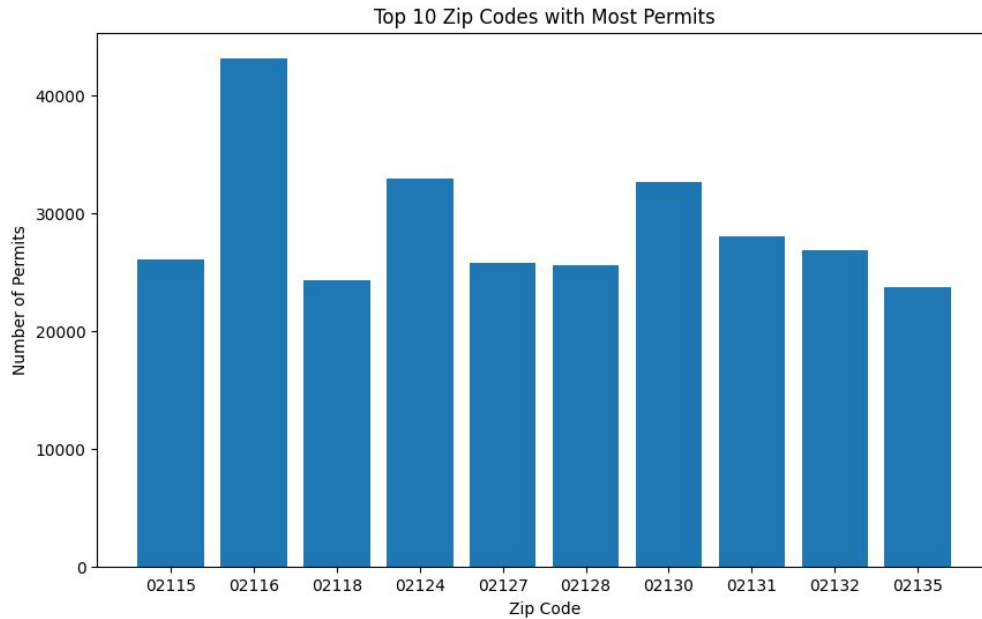# Relation between Total Fees and Declared Valuation

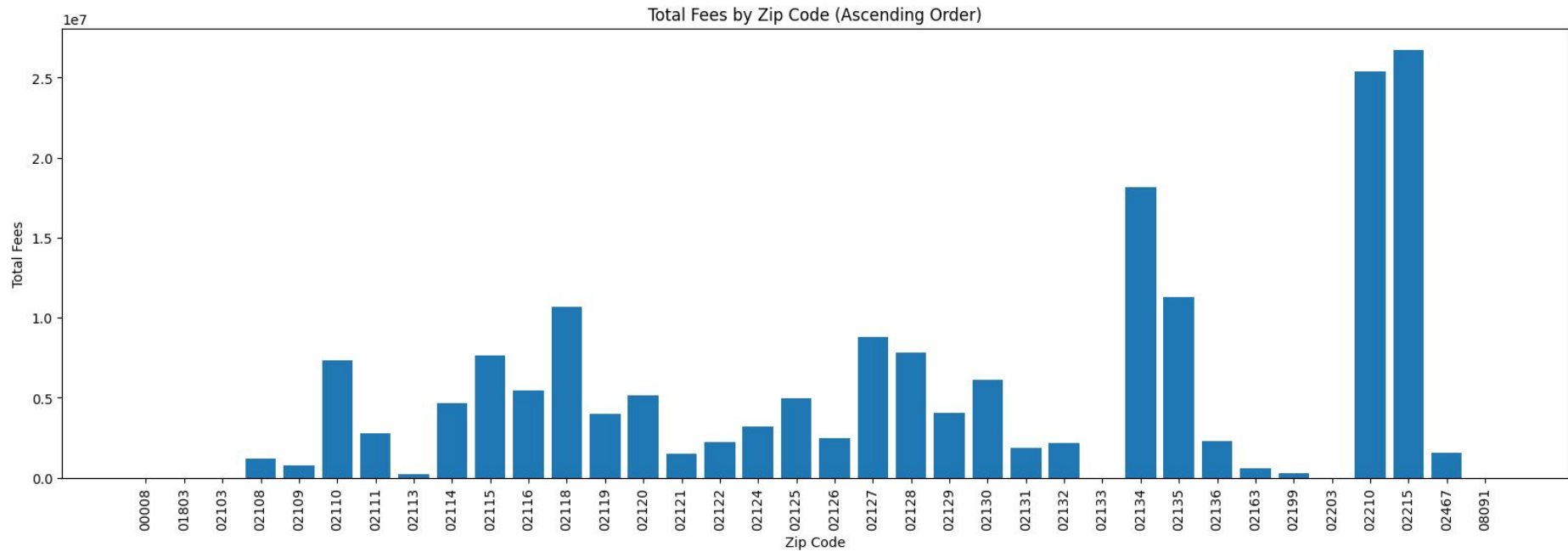Linear Regression of Total Fees vs. Declared Valuation

Residual Plot of Total Fees vs. Declared Valuation
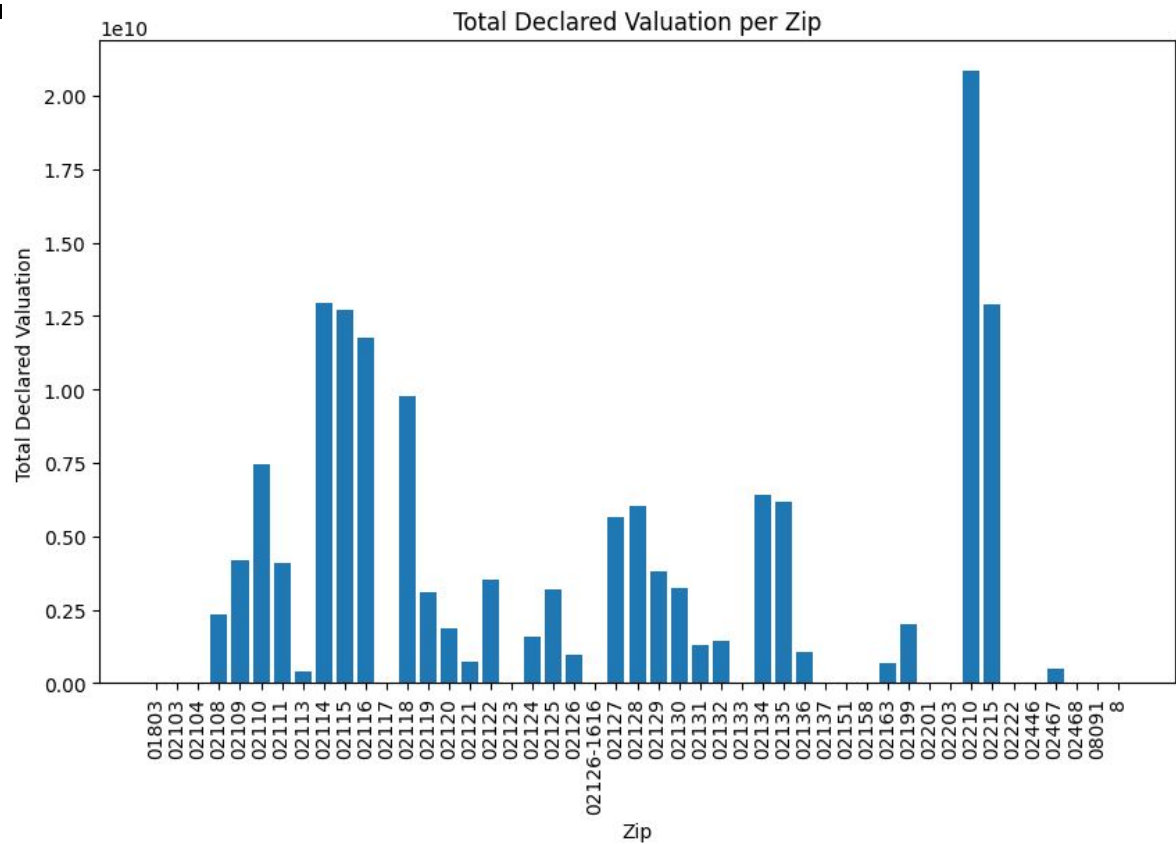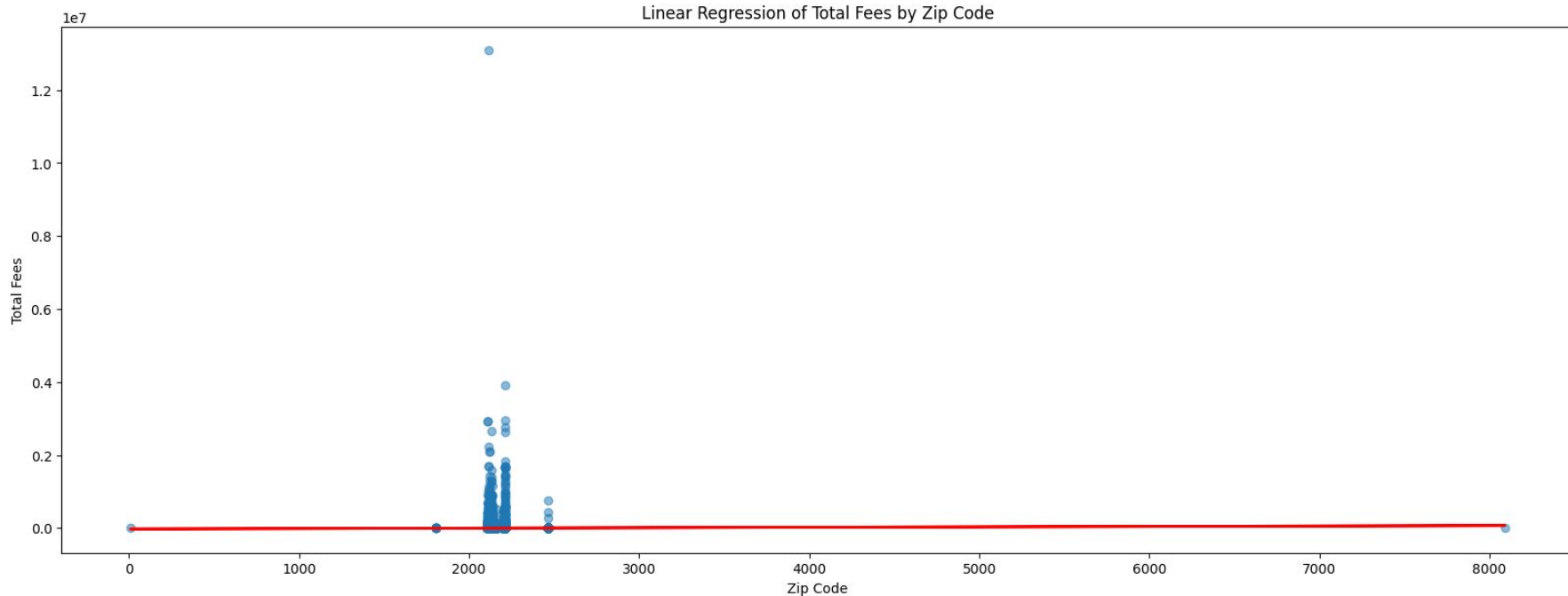
The RMSE value of 2305872.84 indicates that, on average, the model's predictions deviate from the actual values by about $190,658.13.

Top 10 Zip Codes with Most Permits

Percentage of Permits for Each Zip Code

These are the top 10 zip codes from 75 entries

Total Fees by Zip Code (Ascending Order)

Total Declared Valuation per Zip

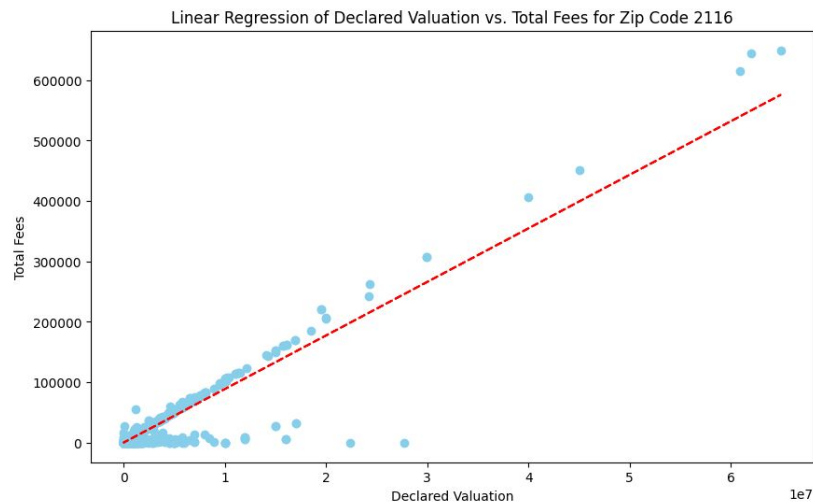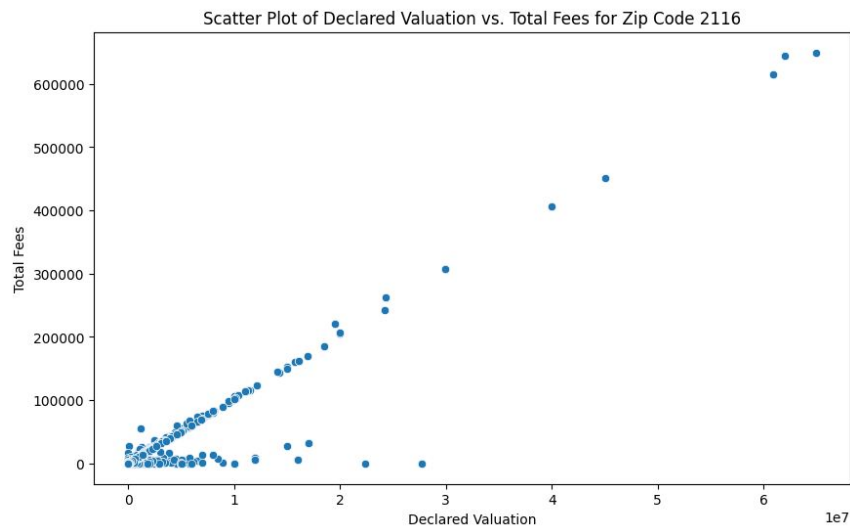Linear Regression of Total Fees by Zip Code

Linear Regression of Total Fees by Zip Code

Correlation between zip code and total fees: 0.013502869660220495
Mean squared error: 677070053.16897

Insight on ZIP Code 2116

Scatter Plot of Declared Valuation vs. Total Fees for Zip Code 2116

Linear Regression of Declared Valuation vs. Total Fees for Zip Code 2116

Correlation coefficient between declared valuation and total fees for zip code 2116: 0.9323180081064679

Number of Permits for Top 6 Occupancy Types
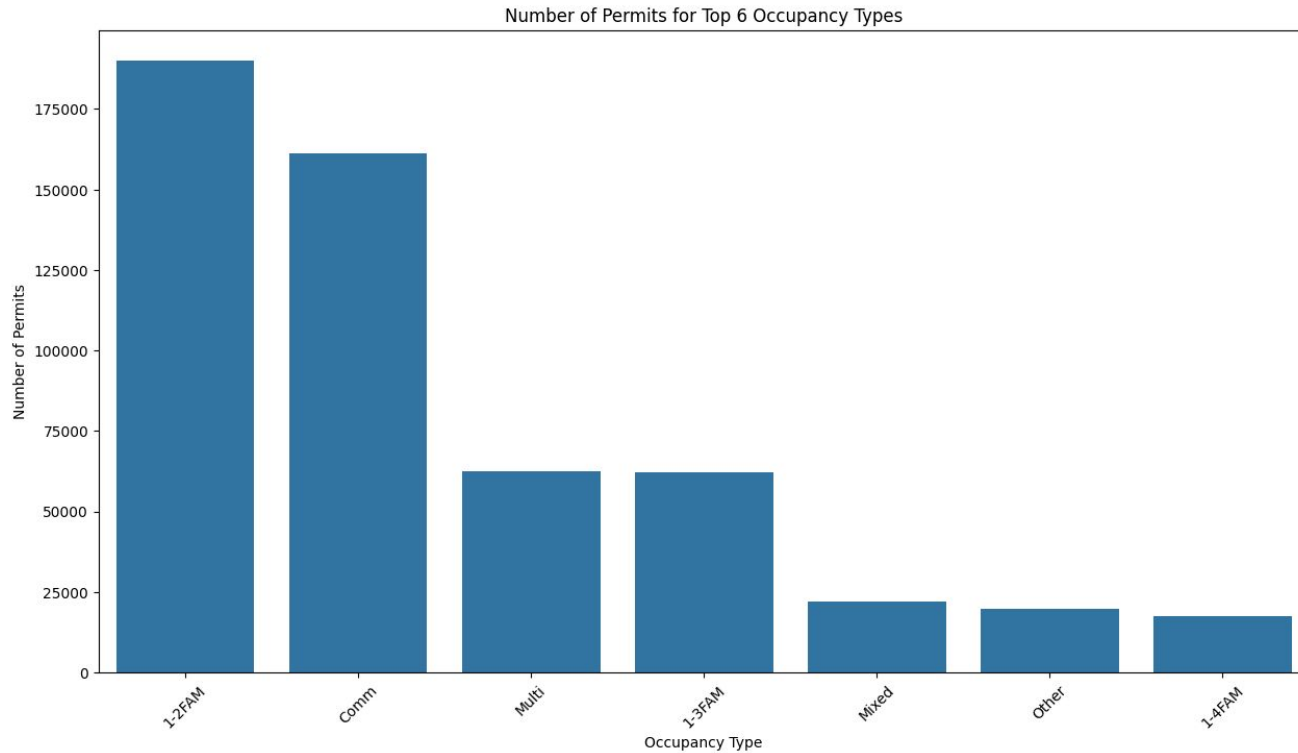
Number of permits based on occupancy types

1-2FAM	189951
Comm	161103
Multi	62631
1-3FAM	62102
Mixed	21898
Other	19781
1-4FAM	17442
1Unit	6854
VacLd	4884
7More	4478
1-7FAM	2230
3unit	752
2unit	613
4unit	414
5unit	310
6unit	304
7unit	67
COMM	1

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Potential Next Steps

- Look into increase of residential condominium units to see what areas and communities are developing most
- Look into decrease of multifamily home units to find potential cause
- Look into average total value increase in relation to inflation
- Look into decrease of the number of bedrooms in relation to potential renovations