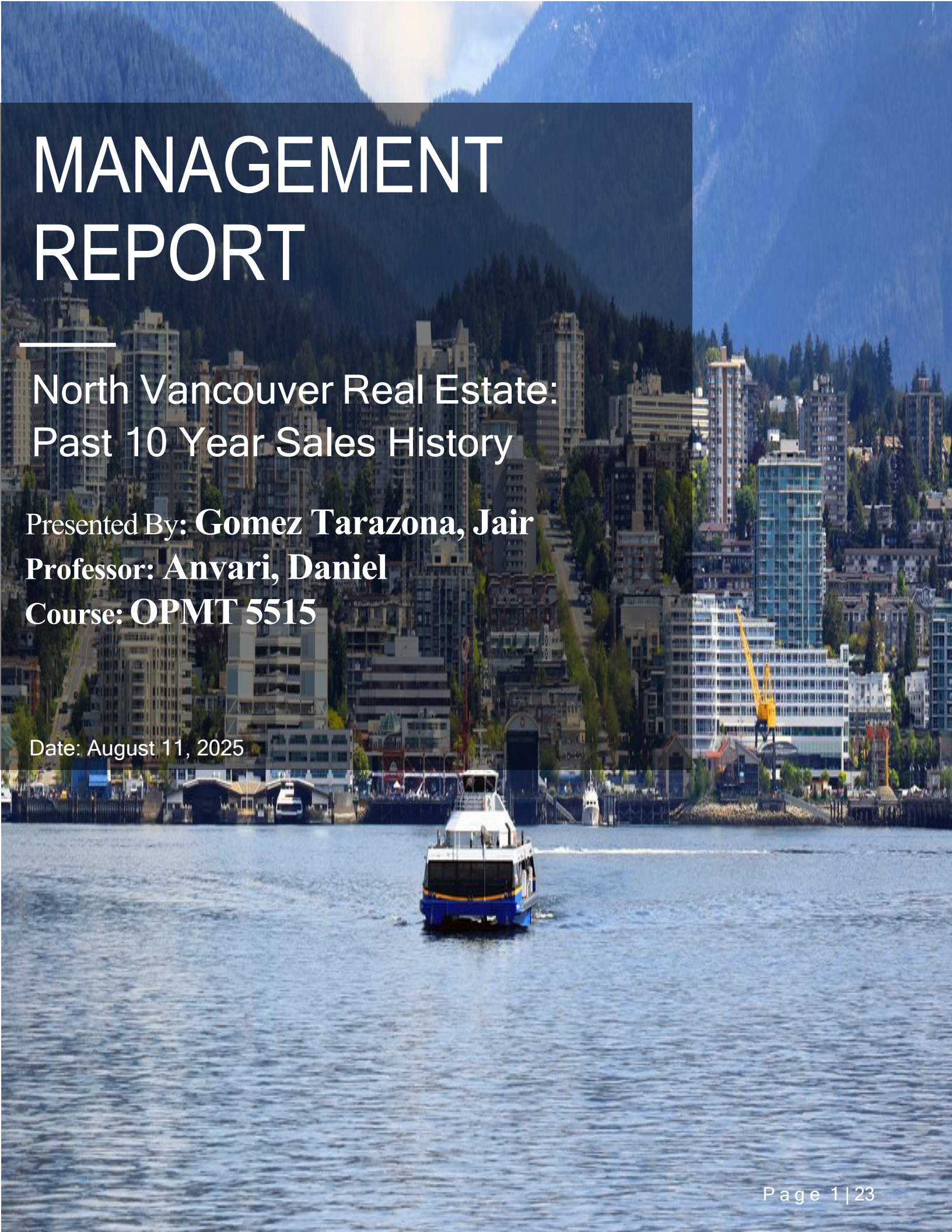

MANAGEMENT REPORT

North Vancouver Real Estate: Past 10 Year Sales History

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Course: OPMT 5515

Date: August 11, 2025

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Abstract

This real estate management report is designed for prospective clients who wish to gain insights into the North Vancouver real estate market through the application of descriptive and inferential statistics. The report includes the following sections:

- Introduction
- Problem
- Objective
- Methodology
- Analysis and Results
- Conclusion

Introduction

Real estate statistics, along with the data used to generate them, are among the most valuable tools available to prospective home buyers and sellers. The decision-making process can become significantly simpler when supported by precise and reliable statistics.

It is important, however, to carefully consider how these figures are produced to ensure they are not presented in a way that could be misleading. High-quality statistical data and thorough analysis enable real estate professionals and buyers to make well-informed choices, narrowing their search and making competitive, appropriate offers.

In addition, focusing on the most relevant key indicators helps ensure that buyers find the type of property they are looking for while paying a fair market value. By relying on a combination of these key indicators that align directly with their needs and preferences, buyers can feel confident in securing the home of their dreams.

Problem

The Vancouver housing market has long been known for its high prices, largely due to the city's desirability compared to many other places around the globe.

Our firm is working with a potential client relocating from Ottawa to North Vancouver who is concerned about these higher costs and requires additional information before finalizing his decision to move. While he is eager to enjoy living close to both the ocean and the mountains, he is unfamiliar with the factors that influence Vancouver's housing market. He is seeking a property that meets his needs and budget.

Listed below are the key indicators from our firm's data set that will assist him in making an informed final decision:

- Year Sold
- Property Type
- Age
- Building Size
- Lot Size
- Neighborhood
- Number of Bedrooms
- Number of Bathrooms
- Special Features
- Pool (Yes/No)
- Price Sold

Objective

We are conducting research and analyzing data from the North Vancouver housing market to identify the key factors that are associated with home prices. Our dataset consists of 100 properties sold over the past 10 years, which will serve as the sample for this report.

The primary objective of this statistical analysis is to apply both inferential and descriptive statistical methods, utilizing qualitative and quantitative data, to uncover correlations between housing prices and the main influencing factors. The ultimate aim is to gather sufficient, relevant insights to assist potential home buyers in selecting a property that aligns with their specific needs and preferences.

Methodology

The sample used in our firm's research consists of 100 distinct properties sold at various times over the past 10 years.

Within this dataset, three outliers identified as property ID numbers 16, 57, and 95 were detected by examining the Z-Scores associated with their sale prices. These outliers have been included in the report and analysis unless otherwise specified.

In certain cases, they were excluded to provide a clearer representation of average prices, particularly when comparing homes with and without pools or other unique features. The three outliers, along with their corresponding ID numbers, are shown below.

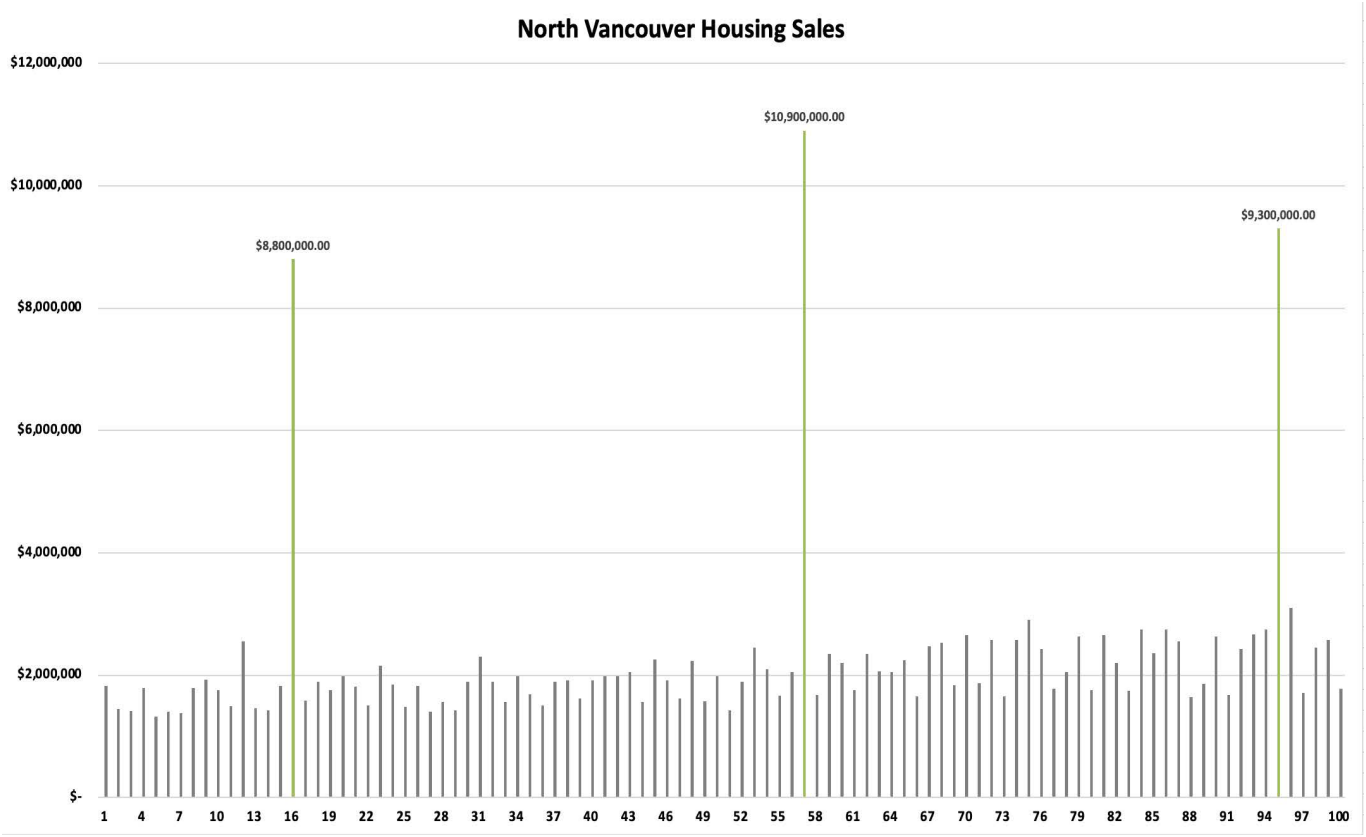

Figure 1 – Appendix A

In this report, we utilized seven key indicators from our firm's dataset. The quantitative indicators include the year sold, the age of the house, the building size, and the sale price. The qualitative indicators consist of the neighborhood in which the property is located, whether it has special features, and whether it includes a pool.

Indicators excluded from this analysis were property type and lot size. We determined that property type had minimal or no significant influence on the sale price, while lot size was omitted due to the lack of available data for the majority of the properties in the sample.

Throughout this report, you will find a variety of charts, histograms, and scatterplots designed to help interpret the real estate data for properties in North Vancouver.

The table below presents the base descriptive statistics for the quantitative data compiled by our firm. These figures provide a foundational understanding of the average price, age, building size, number of bedrooms, and number of bathrooms in homes within our sample. The mode row highlights the most frequently occurring values, while the median row displays the middle values for each category.

Additionally, the table includes maximum and minimum values to offer further insight into the range and distribution of our dataset.

	Price	Age	Building Size	Number of Bedrooms	Number of Bathrooms
Mean	$ 2,212,330	30.74	2644.85	3.82	2.41
Median	$ 1,890,000	28	2855	4	2
Mode	$ 1,890,000	28	3200	3	2
Minimum	$ 1,325,000	1	730	1	1
Maximum	$ 10,900,000	92	6780	8	5
Range	$ 9,575,000	91	6050	7	4
Sample Variance	1.92976E+12	320.3761616	935921.947	1.179393939	0.486767677
Standard Deviation	$ 1,389,157	17.89905477	967.4305903	1.085999051	0.697687378
Coefficient of Variation	62.79%	58.23%	36.58%	28.43%	28.95%
Skewness	4.954640937	0.723425883	0.400284208	0.415511261	1.239310655
Kurtosis	26.05030209	0.759096208	2.262143821	1.18423046	1.554188339
Standard Error	$ 138,915	1.79	96.74	0.11	0.07
Count	100	100	100	100	100

Figure 2 – Appendix A

Analysis and Results

1. Has the mean price varied over the years?

The table below shows the average sale price of homes for each respective year. Each yearly group includes at least 7 samples.

Years Sold	Average Price
2010	$1,548,500
2011	$2,404,545
2012	$1,759,286
2013	$1,830,556
2014	$1,887,143
2015	$2,850,000
2016	$2,115,000
2017	$2,311,000
2018	$2,265,556
2019	$2,910,833

Figure 3 - Appendix B

The graph below provides a visual representation of the data shown in the table above. The average home price has fluctuated over the years, with the lowest mean occurring in 2010 and the highest in 2019. Please note that outliers were recorded in 2011 ($8,800,000), 2015 ($10,900,000), and 2019 ($9,300,000), which should be taken into consideration.

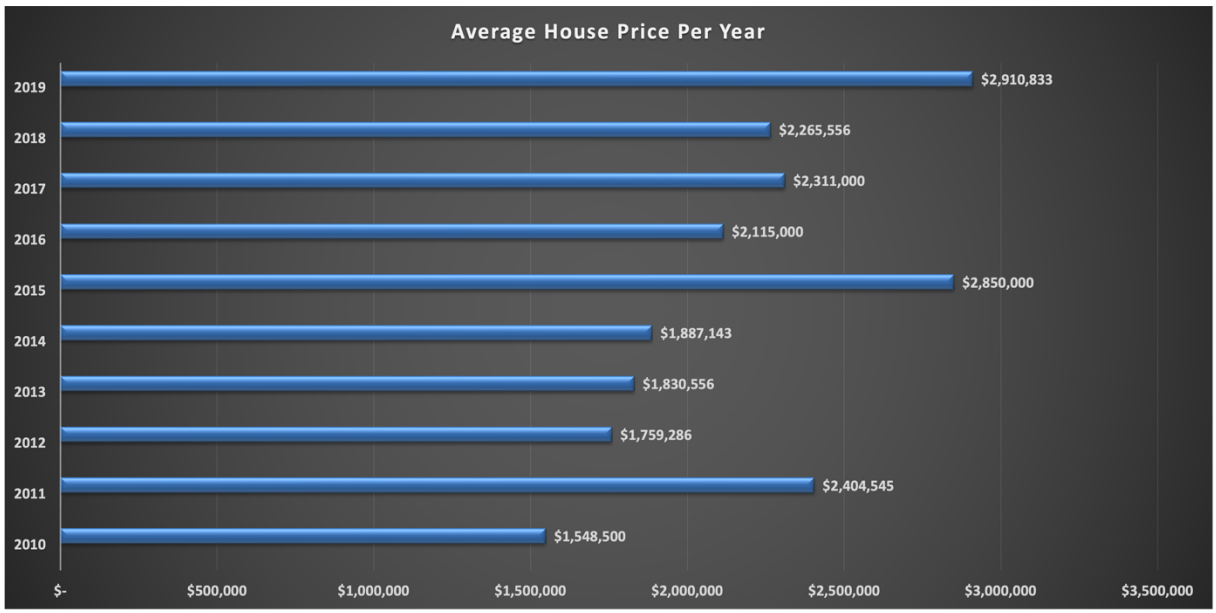

Figure 4 – Appendix B

2. Use appropriate charts to describe individually the relationship between the key response variable (price sold) and the following key explanatory variables (neighborhood, special feature, pool)

Below is a bar graph illustrating the average home sale prices by neighborhood. A second graph, excluding the outliers, is provided beneath it to offer a less skewed view of the averages. The Lions Gate and Upper Capilano neighborhoods include only 1 and 2 samples, respectively, making them an unreliable representation of the true average home price in that area. After removing the outliers, Upper Lonsdale emerges as the most expensive neighborhood on average, while Lions Gate and Seymour are the least expensive neighborhoods to live in.

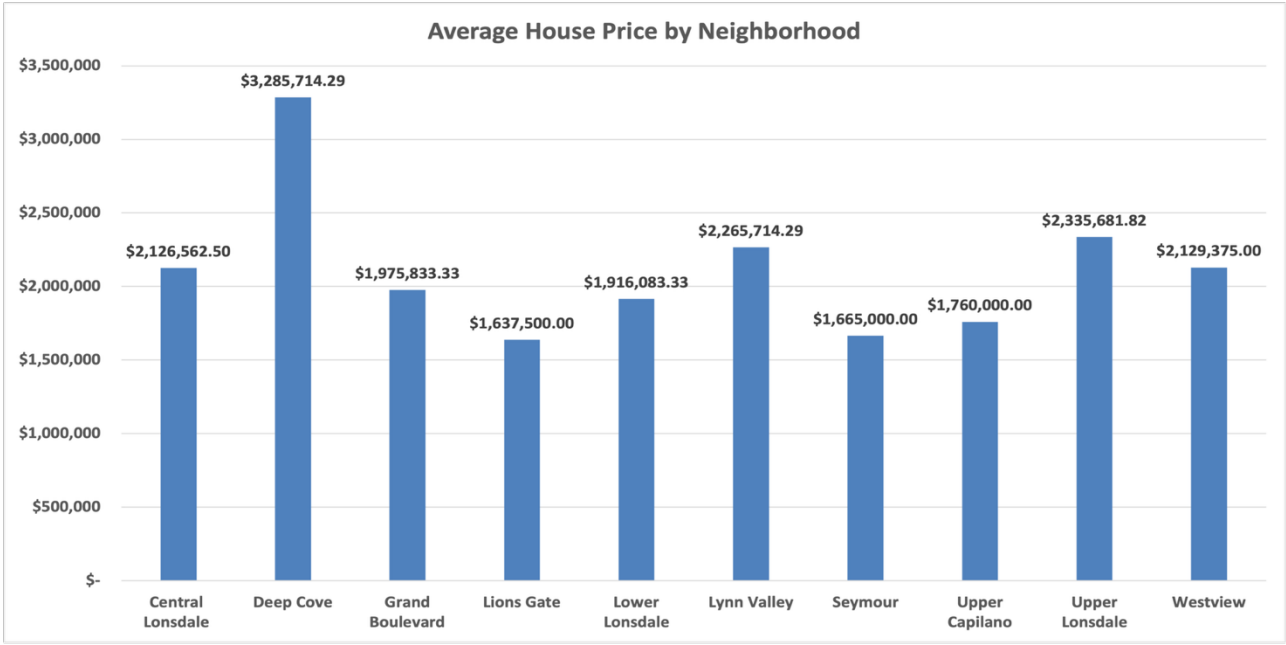

Figure 5 – Appendix C

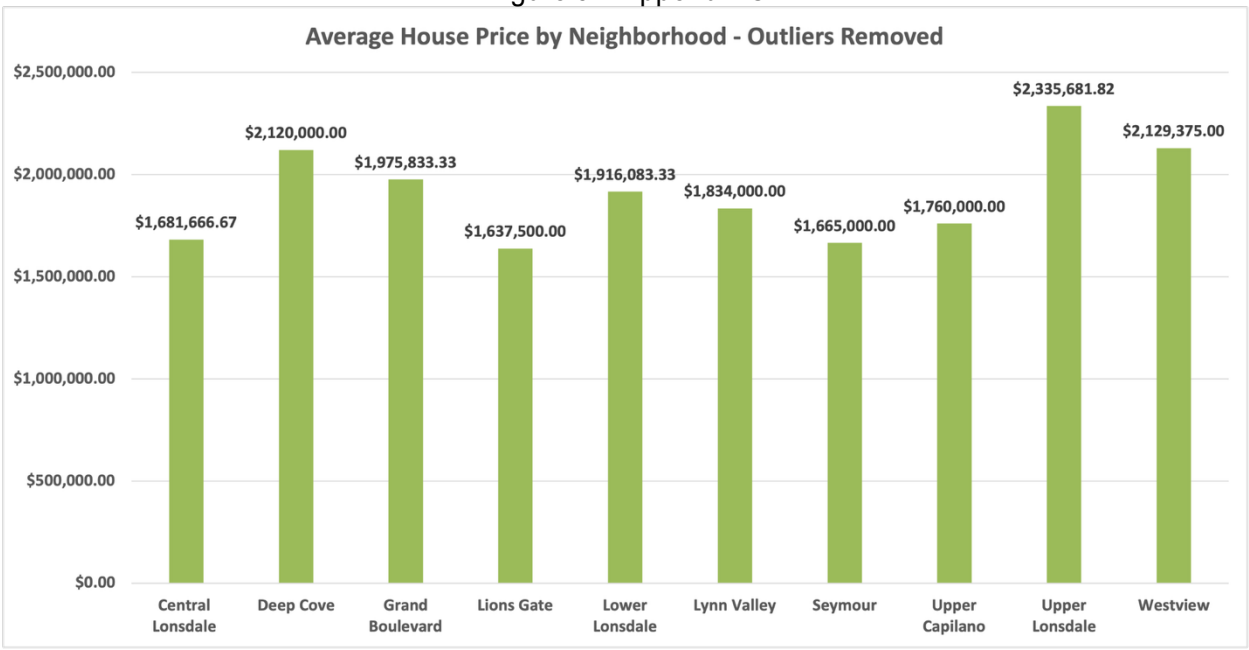

Figure 6 – Appendix C

The bar graph below displays the average sales prices for homes with and without pools. Houses featuring a pool sold for an average of $2,673,158, while those without a pool sold for an average of $2,104,235

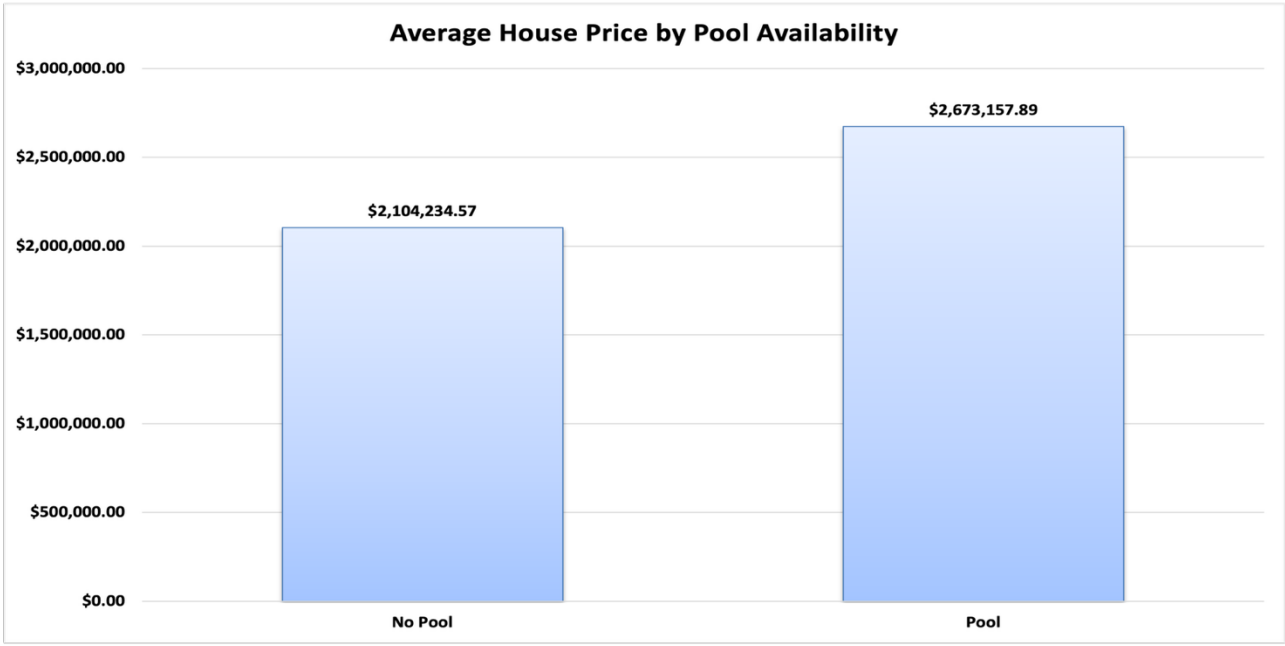

Figure 7 – Appendix C

The average sales price related to properties with special features is shown below. In our sample, the two notable special features are waterfront and water view properties. It's important to highlight that the only waterfront properties are located in Deep Cove, with just two samples included in our data. This small sample size, combined with one of the values being an outlier, means the average price shown may not accurately represent the true average cost of waterfront properties in North Vancouver.

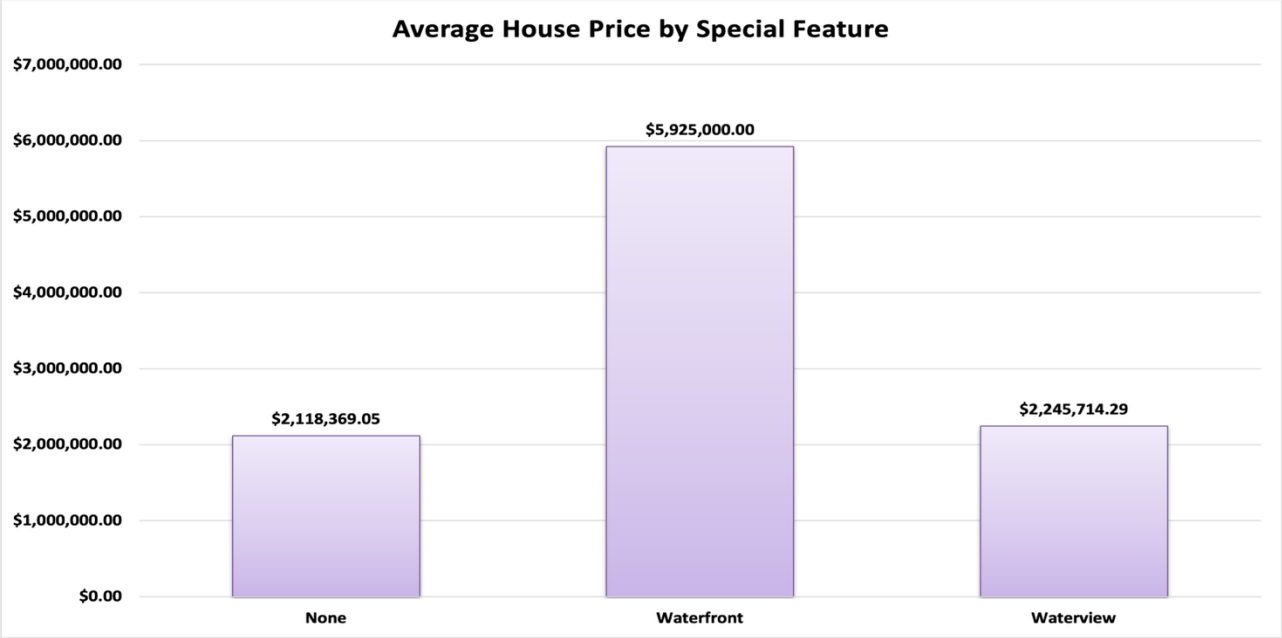

Figure 8 – Appendix C

3. Construct a pivot table to group the following variables: Neighborhood vs. special Feature. Use various statistics tools to describe the relationship between variables. Comment on the result.

The pivot table and the graph below illustrate the relationship between various neighborhoods and the average home prices when factoring in special features. The two special features considered are either water view or waterfront. It's important to note that our sample includes only two waterfront properties, both of which are located in the Deep Cove neighborhood of North Vancouver.

Special Features by N	Average of Sold Price
None	**$2,118,369.05**
Central Lonsdale	$2,126,562.50
Deep Cove	$2,100,000.00
Grand Boulevard	$2,012,000.00
Lions Gate	$1,637,500.00
Lower Lonsdale	$1,916,083.33
Lynn Valley	$2,265,714.29
Seymour	$1,665,000.00
Upper Capilano	$1,760,000.00
Upper Lonsdale	$2,360,714.29
Westview	$2,110,714.29
Waterfront	**$5,925,000.00**
Deep Cove	$5,925,000.00
Waterview	**$2,245,714.29**
Deep Cove	$2,262,500.00
Grand Boulevard	$1,795,000.00
Upper Lonsdale	$2,291,875.00
Westview	$2,260,000.00
Grand Total	**$2,212,330.00**

Figure 9 – Appendix D

Apart from the waterfront area, there is no significant difference in the average home prices between properties with or without a water view feature. More samples from the waterfront neighborhood would be necessary to draw definitive conclusions about price variations related to the presence of a water feature.

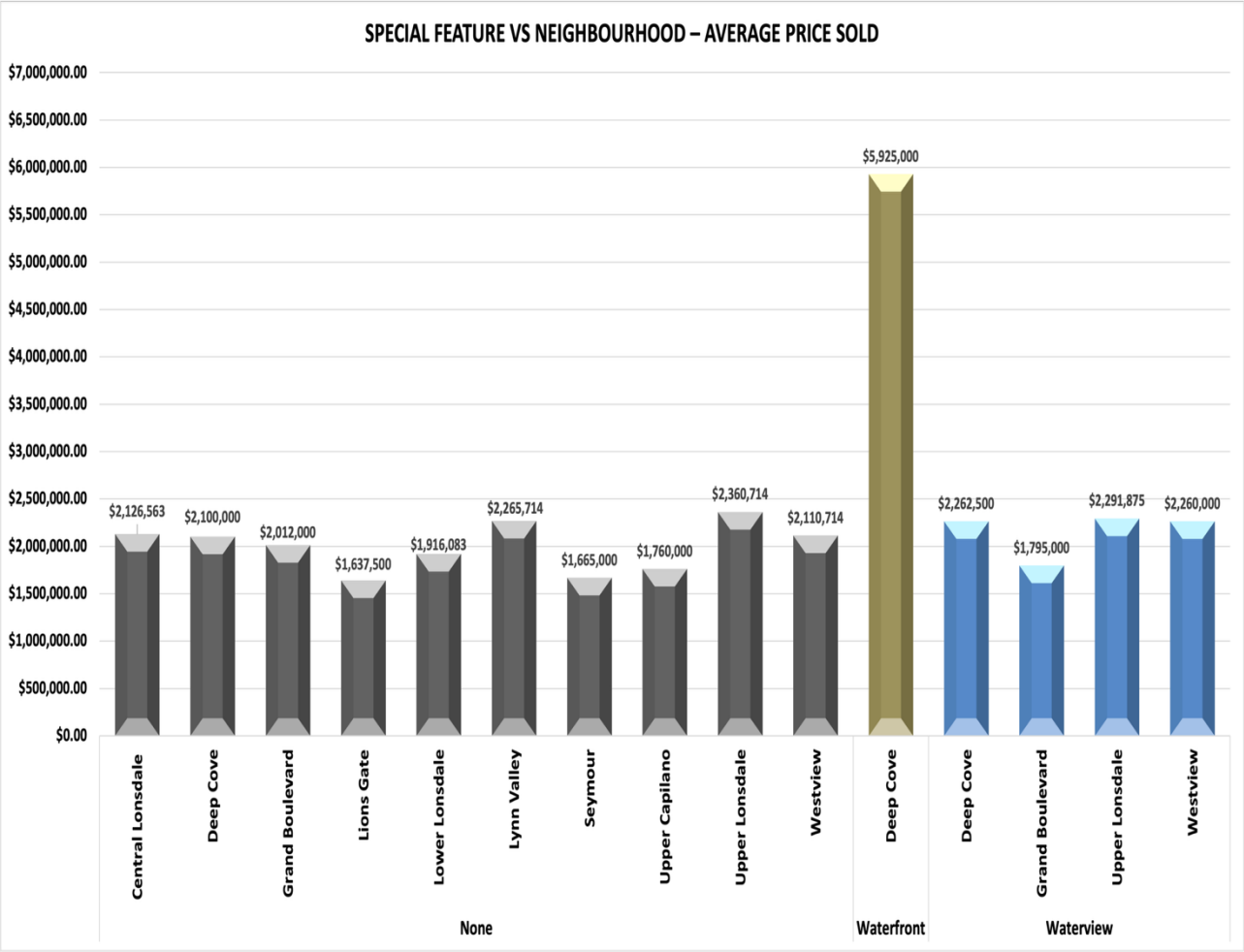

Figure 10 – Appendix D

4. Which of the variables (year sold, age, building size) is the most and least highly correlated with price?

Below is the data analysis showing the relationship between building size, year sold, and property age with the average price, ranked from the strongest to the weakest correlation.

1. Year Sold and Price Sold
2. Building size and Price Sold
3. Age and Price Sold

The regression summary output for the year sold and price is listed below. The coefficient of determination shows that 41% of the variation in price can be explained by the year the house was sold.

Regression Statistics	
Multiple R	**0.204455382**
R Square	**0.41802003**
Adjusted R Square	**0.32024472**
Standard Error	**1366732.661**
Observations	**100**

Figure 11 Appendix E

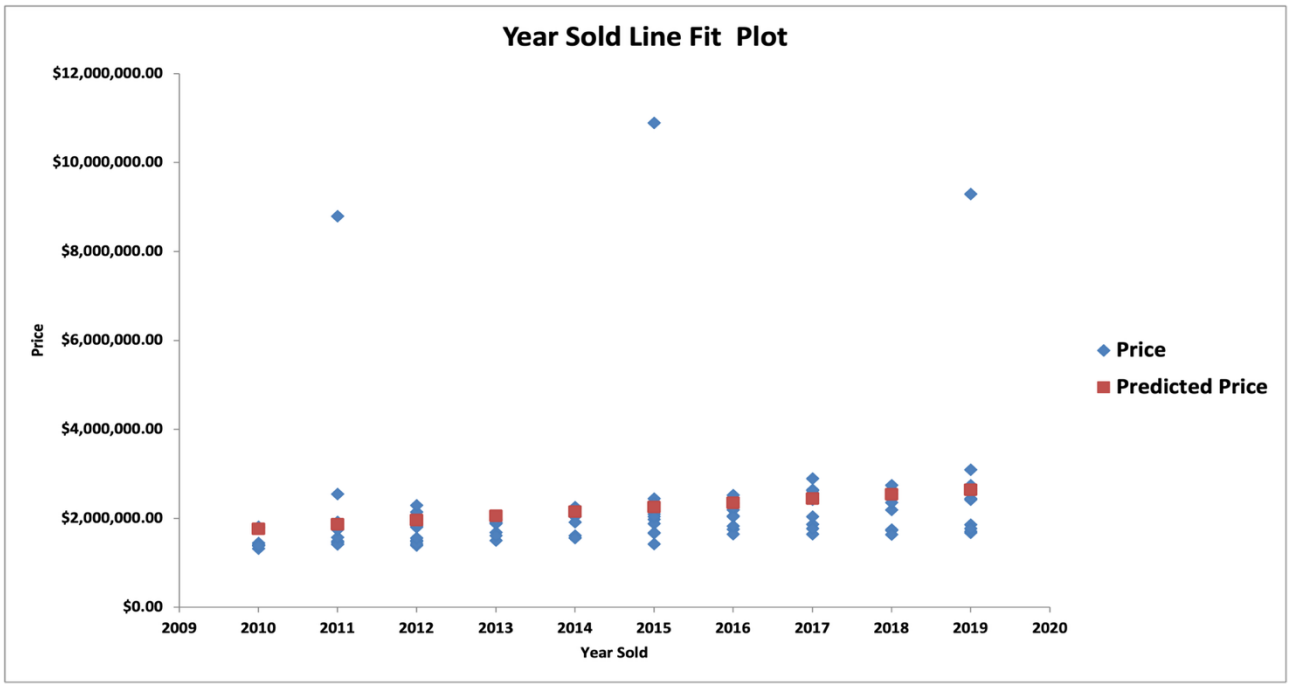

Figure 12 – Appendix E

Building size exhibits a relatively weak correlation with the sale price, as indicated by its coefficient of determination of 18.77%. This suggests that approximately 18% of the variation in home prices within the sample can be explained by differences in building size. While building size does have some influence on price, other factors likely play a more significant role in determining a property's value.

Regression Statistics	
Multiple R	**0.433342738**
R Square	**0.187785929**
Adjusted R Square	**0.17949803**
Standard Error	**1258320.286**
Observations	**100**

Figure 13 – Appendix E

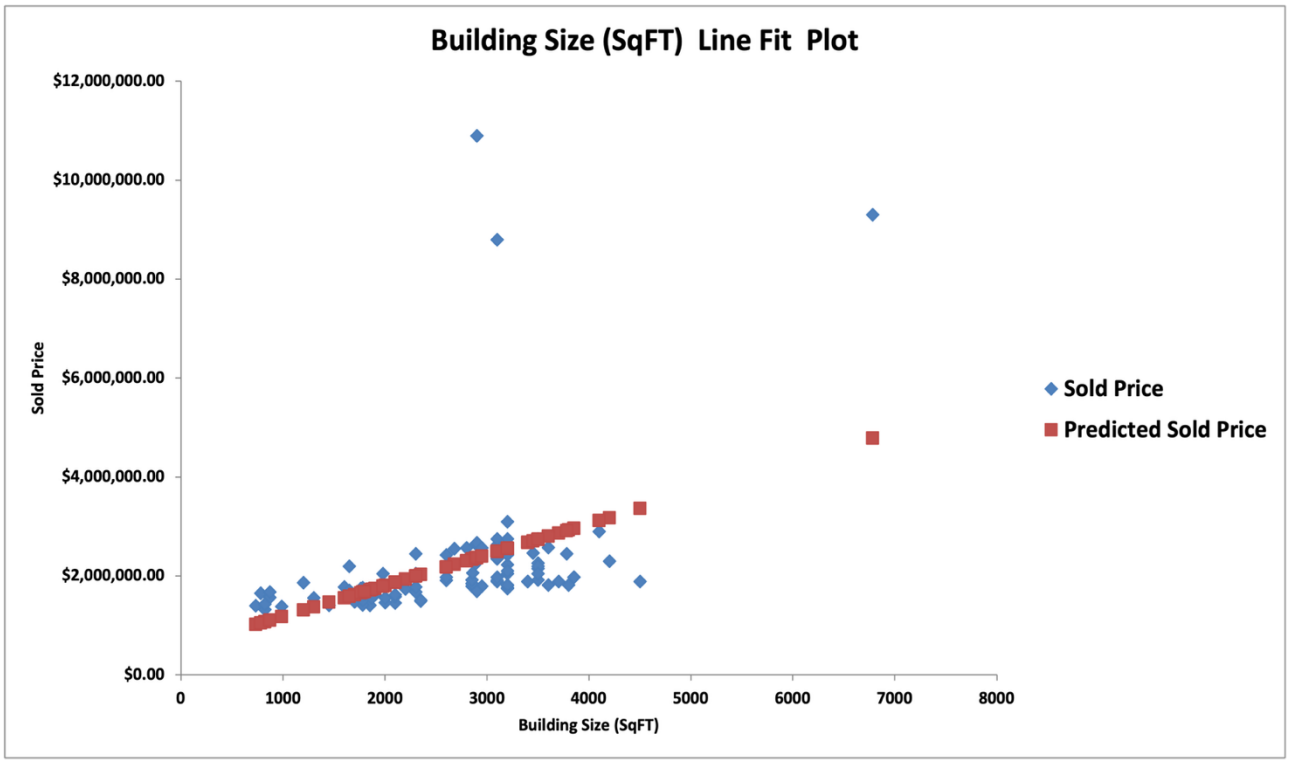

Figure 14 - Appendix E

The age of a property shows virtually no correlation with its sale price, as reflected by an R-squared value of 0.00034. This means that less than 0.04% of the price variation can be explained by the property's age. The negligible relationship suggests that, within our sample, age is not a meaningful factor in determining home value, and other variables are likely to have a much greater influence on pricing.

Regression Statistics	
Multiple R	**0.018540179**
R Square	**0.000343738**
Adjusted R Square	**-0.009856836**
Standard Error	**1395986.727**
Observations	**100**

Figure 15 – Appendix E

5. How strongly is age related to price sold?

According to the regression analysis noted above, age has little to no relationship with the price at which a property was sold. The R-squared, or coefficient of determination, indicates that only 0.34% of the variation in price can be attributed to the property's age. This suggests that age is not a significant factor in determining sale price.

Figure 16 – Appendix E

6. Is there a relationship between the # of bathrooms and price sold?

The coefficient of determination between the number of bathrooms and sale price is 0.1264, meaning that 12.64% of the variation in price can be explained by the number of bathrooms in a property. With a p-value of 0.000283, the slope is statistically significant at the 5% level, indicating that the regression model is significant at this confidence level.

Regression Statistics	
Multiple R	**0.355542223**
R Square	**0.126410273**
Adjusted R Square	**0.117496092**
Standard Error	**1304997.57**
Observations	**100**

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	**1**	**2.41502E+13**	**2.41502E+13**	**14.1808063**	**0.000283328**
Residual	**98**	**1.66896E+14**	**1.70302E+12**		
Total	**99**	**1.91046E+14**			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*
Intercept	**506252.542**	**471472.713**	**1.073768488**	**0.285563273**	**-429369.7125**
# of bathrooms	**707915.9577**	**187988.4815**	**3.765741135**	**0.000283328**	**334858.9344**

Figure 17 - Appendix F

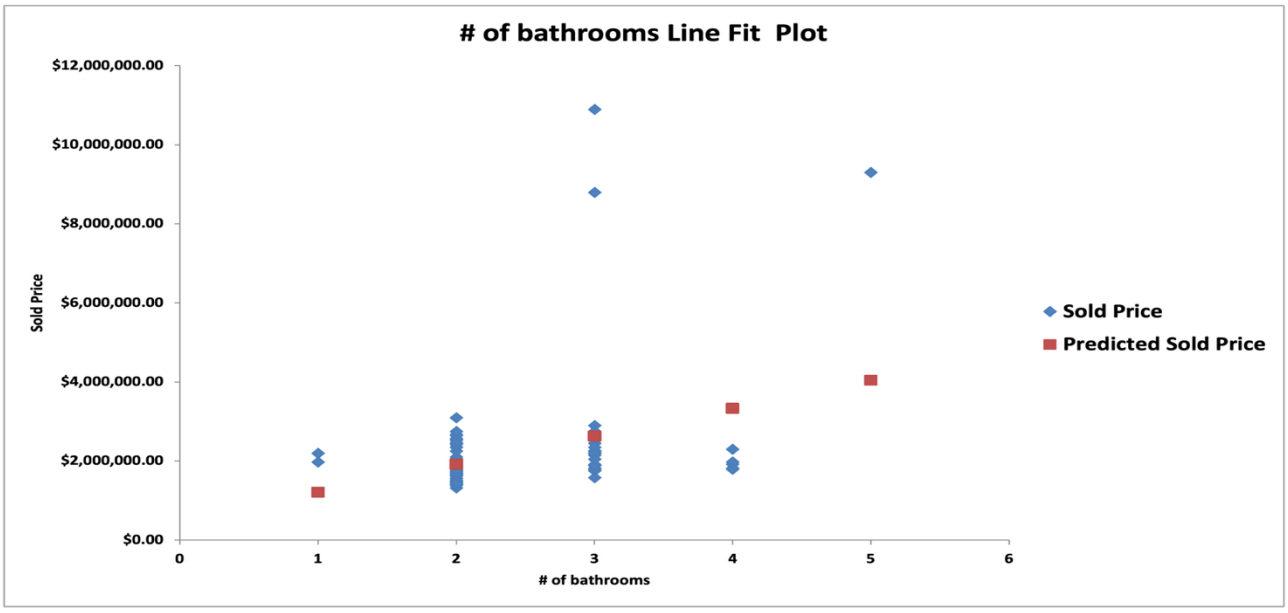

Figure 18 – Appendix F

7. Does having a pool matter? Is there a difference in the mean and distribution of price between the two groups (pool versus no pool)?

The average price for a property with a pool is $2,305,000, whereas a home without a pool is $1,908,139

	No Pool	Pool
Minimum	$1,325,000.00	$1,795,000.00
Q1	$1,620,000.00	$1,980,000.00
Median	$1,820,000.00	$2,265,000.00
Q3	$2,175,000.00	$2,605,000.00
Maximum	$2,750,000.00	$3,100,000.00
Mean	$1,908,139.24	$2,305,000.00
Lower Whisker	$295,000.00	$185,000.00
Upper Whisker	$575,000.00	$495,000.00
NOTE: Outliers are not noted on the box plot		

Figure 19 - Appendix G

The box plot below displays the average price for homes with a pool at the top and for homes without a pool at the bottom. The section to the left of the beige box represents the lowest 25% of property sale prices. The beige box itself covers the 25th to 50th percentile, while the blue box represents the 50th to 75th percentile of prices. The section to the right of the blue box reflects the highest 25% of prices for homes with and without a pool.

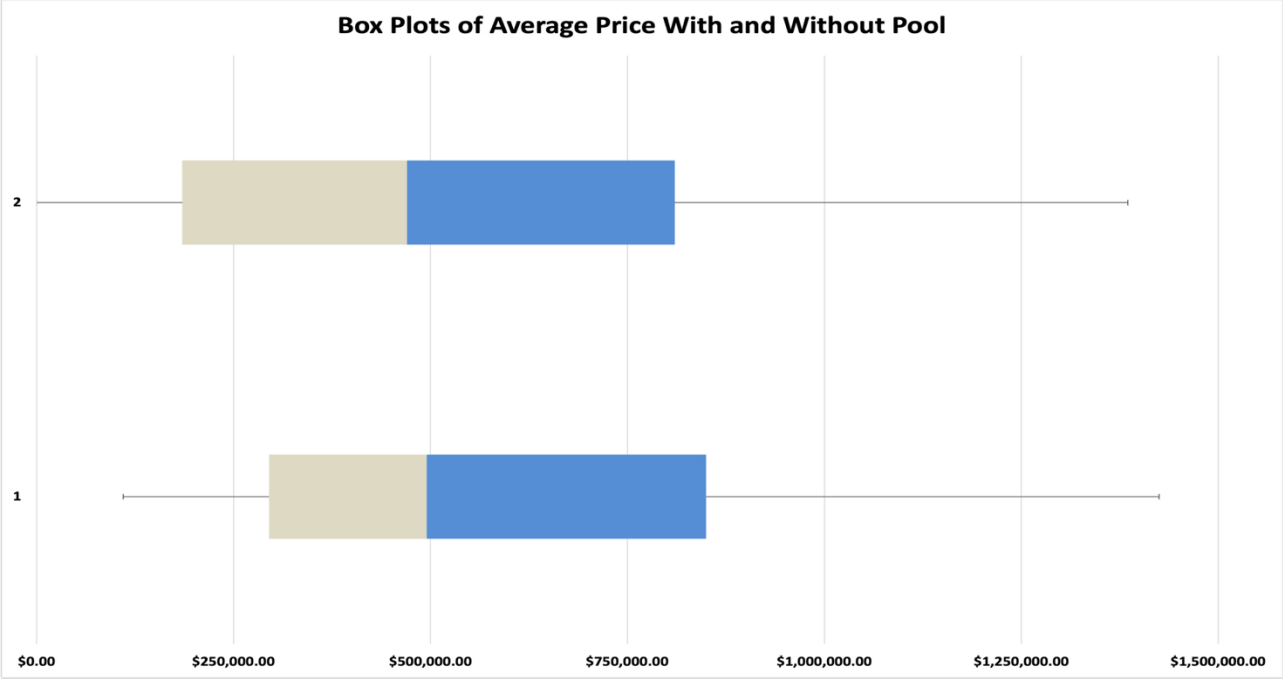

Figure 20 – Appendix G

8. Does having a special feature matter? Is there a difference in the mean and distribution of price between the two groups (special feature versus no special feature)?

The average price for a property with a special feature is $2,266,000, whereas a home without a special feature is $1,929,793

	No Special Feature	Special Feature
Minimum	**$1,325,000.00**	**$1,795,000.00**
Q1	**$1,625,000.00**	**$1,980,000.00**
Median	**$1,840,000.00**	**$2,150,000.00**
Q3	**$2,222,500.00**	**$2,500,000.00**
Maximum	**$2,750,000.00**	**$3,100,000.00**
Mean	**$1,929,792.68**	**$2,266,000.00**
Lower Whisker	**$300,000.00**	**$185,000.00**
Upper Whisker	**$527,500.00**	**$600,000.00**
NOTE: Outliers are not noted on the box plot		

Figure 21 – Appendix H

The top box plot represents the prices of properties with a special feature, while the bottom box plot shows prices for properties without a special feature. The section to the left of the beige box represents the lowest 25% of property prices, the beige box covers the 25th to 50th percentile, the blue box represents the 50th to 75th percentile, and the area to the right of the blue box reflects the top 25% of prices, Outliers have been excluded from these box plots to provide a clearer view of the overall price distribution.

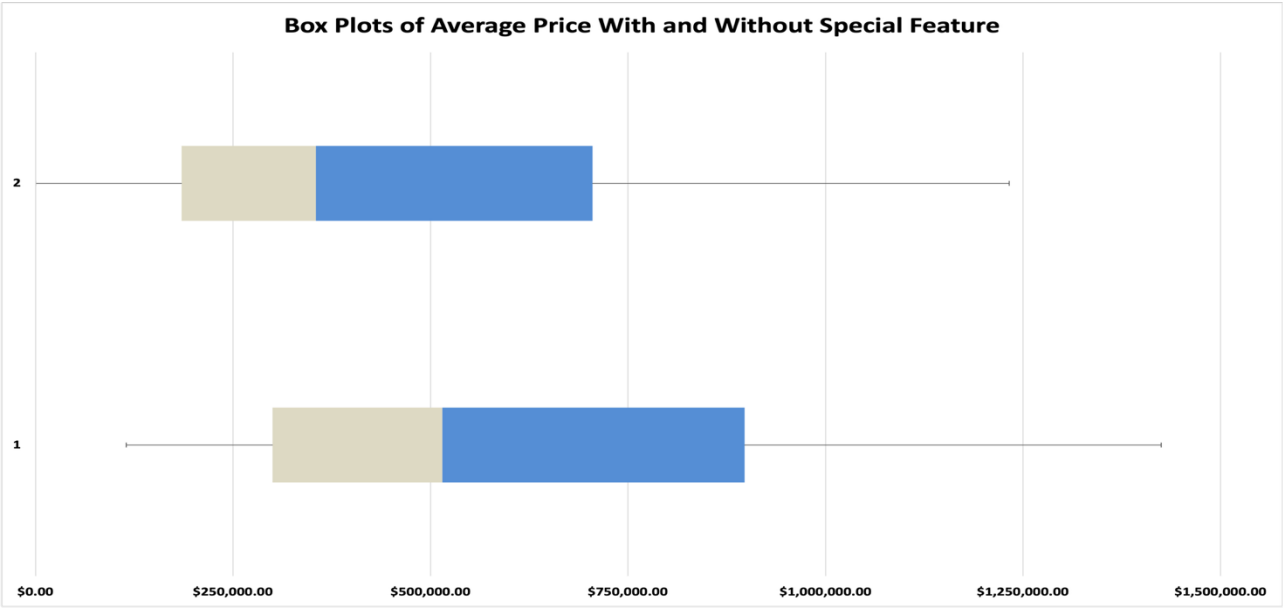

Figure 22 – Appendix H

9. Is there a difference in price for the different neighborhoods? Compare the means for the different neighborhoods.

The bar graph below displays the average home prices by neighborhood, excluding the three previously identified outliers. Neighborhoods with average property prices below $1,700,000 include Lions Gate, Seymour, and Central Lonsdale. Those with averages ranging from $1,750,000 to $2,000,000 are Upper Capilano, Lynn Valley, Lower Lonsdale, and Grand Boulevard. Deep Cove, Upper Lonsdale, and Westview have average prices between $2,1,000,000 and $2,400,000

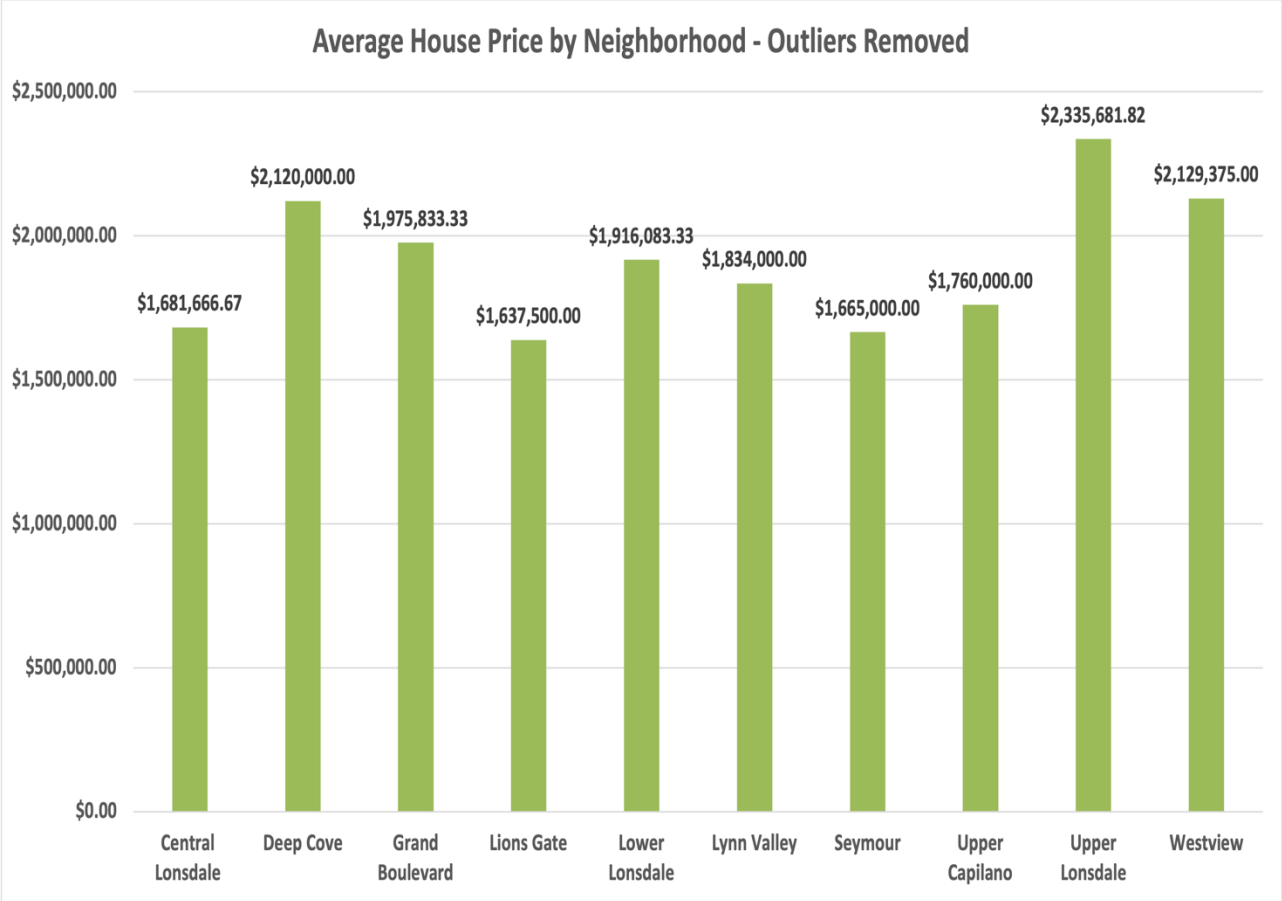

Figure 23 - Appendix C

10. Create the best multiple regression model you can to predict price.

The regression statistics illustrate the relationship between the independent variables (year sold and building size) and the sales price of a property. Among the quantitative indicators available to our firm, these two variables show the strongest correlation with price. The coefficient of determination of 0.75 indicates that 75% of the variation in sale price can be explained by the combination of building size and the year the property was sold. The low p-values (less than 0.05) confirm that the regression is statistically significant at the 5% level. Outliers were excluded from this analysis to provide a more accurate representation of property values within our sample.

Regression Statistics	
Multiple R	**0.86606549**
R Square	**0.750069433**
Adjusted R Square	**0.744751761**
Standard Error	**211237.2336**
Observations	**97**

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	**2**	**1.25878E+13**	**6.29392E+12**	**141.0522281**	**4.98323E-29**
Residual	**94**	**4.19439E+12**	**44621168861**		
Total	**96**	**1.67822E+13**			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*
Intercept	**-173602291**	**14916032.94**	**-11.63863688**	**6.44993E-20**	**-203218424.1**
Year Sold	**86776.02866**	**7403.730168**	**11.72058229**	**4.35292E-20**	**72075.74886**
Building Size	**297.3252164**	**24.38701459**	**12.19194811**	**4.58448E-21**	**248.9042273**

Figure 24 Appendix I

Conclusion

This report shows that two main factors, when a home was sold and how big it is, play a very important role in determining its price in North Vancouver. Homes sold more recently tend to have higher prices, reflecting the overall rise in the housing market over the past 10 years. Also, larger homes generally sell for more, with each extra square foot adding a noticeable amount to the price.

Together, these two factors explain about 75% of the differences in home prices, which means the model does a good job predicting how much a home might sell for. This information can be very useful for buyers who want to understand market trends, sellers looking to price their homes fairly, and real estate professionals advising clients. Overall, the analysis gives a clear and reliable picture of what affects home prices in North Vancouver.

Appendices

Please refer to the raw Excel file, which contains multiple worksheets directly related to the questions and appendices mentioned in this report. The appendices could not be attached directly to the PDF document.

Appendix A – Methodology

Appendix B – Question 1

Appendix C – Question 2 & 9

Appendix D – Question 3

Appendix E – Question 4 & 5

Appendix F – Question 6

Appendix G – Question 7

Appendix H – Question 8

Appendix I – Question 10

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