

Project Proposal  
DATA 601 – L02-3  
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Alister Salmon  
Anne Pratoomtong  
Danica Bauer  
Poonam Phagura  
Rozita Ghasemi

## **Glossary of Terms:**

**New Start:** measure of new residential construction

**Building Permit:** refers to the final authorization to start work on a building project. Issued by, in this project, the City of Calgary.

**Residential:** Designed for people to live in

**Non-residential:** for commercial purposes (not for persons living space)

**Employment rate:** The percentage of the labour force that is employed (has jobs)

**Unemployment rate:** measures the share of workers in the labour force who do not currently have a job but are actively looking for work

**Inflation:** A general increase in prices and the fall of purchasing value of money

**CER:** Calgary Economic Region

## **Introduction**

Calgary is currently experiencing a housing crisis both in access and affordability. In 2021, construction values (residential and non-residential) increased by 68% from 2020 (Babych, 2021). The recent Housing Needs Assessment published by the city of Calgary stated that 1 in 5 Calgary households are unable to afford where they currently live (The City of Calgary, 2023). That is 80,000 households who are spending more than 30% of their income on housing. Low vacancy rates, higher than normal rent increases, and escalating home prices are putting Calgary's competitive advantage as one of the world's most livable cities at risk (City of Calgary, 2023).

Our domain is investigating if there is a relationship between monthly economic indicators and Residential and non-residential building permit values between 2000 -2023. There are several economic factors to be explored including employment and unemployment rates, inflation, migration, and immigration.

## **Dataset**

All datasets are from Calgary Open Data, and licensing to use the data for the purposes of the course project is laid out in the *Open Calgary Terms of Use*: The data free to use, re-use and redistribute without any legal, technological or social restriction (The City of Calgary, 2023). There are two primary datasets, *Monthly Economic Indicators* and *Building Permits*, both found on Open Calgary (The City of Calgary, 2023). Each data set contains structured data in a tabular format.

**Monthly Economic Indicators** (The City of Calgary, 2023) contains numerical data about economic indicators, such as employment and inflation rate, collected on a month-by-month basis. The data ranges from January 1972 and was last updated in July 2023. The data between 1972 and 2000 is not complete in each column (for reasons unknown) so this project will be focusing on the data between the year 2000 and 2023. This dataset contains 14 columns and 619 rows of numerical data. The columns include unemployment rates (Canada, Alberta, Calgary), Calgary total employment per 1000 persons, Calgary total employment change per 1000 persons (month-over-month and year-over-year), inflation rate and Calgary average hourly wage. Columns related to building permit values are both residential and non-residential building permit values, measured in dollars. Total housing is measured month-over-month and counts the number of residential housing projects started; there are two columns for total housing for projects within Calgary and projects in the Calgary Metropolitan Area (CMA).

**Building Permits** (The City of Calgary, 2023) contains data about the permit type, permit class, type of work, applicant information, estimated project cost, total square feet, and location data. The data has 30 columns and 424,000 rows with data beginning in 1999 and last updated on September 4, 2023. There is also meta-data about the permits such as the permit number, status, application date, issued date, and completion date. Each permit class has an associated code (ie. 1106 is Single Family House). Type of work includes whether the building permit is for new development (ie. new homes) or alterations (ie. building a deck). There is a variety of location data such as latitude and longitude, community name, and street address.

### **Guiding questions**

#### **1.) How has the ratio between building permit types changed through the decades?**

This project is focusing on the following permit types:

- Residential Improvement Project
- Commercial/Multi Family Project
- Single Construction Permit
- Demolition

This project will explore trends in the number of residential versus non-residential permits issued in Calgary and their relationship to the local economy. Building permit types and values can be used to gauge the state of Calgary's non-residential and residential real estate market and the economy. As a leading economic indicator, the Building Permit types predict the current demand in the real estate market and estimate the future performance of the construction industry. It is designed to gauge the strength of the national housing market and the state of the economy in general. If consumers not only feel secure but also believe they're doing well financially, they might lean towards buying Single Construction houses, which are typically pricier than Multi Family homes.

#### **2.) What is the relationship between residential building permit value and different communities?**

This project will explore the relationship between the number and the value of residential building permits and the communities they are built in. Focusing on three types of residential building permits (commercial/multi-family, single construction, and residential improvement) to see if the value and number of these permits will reflect the housing trend (large apartment complex VS single family home) in each community and how the trends change over time. Since there are over 300 small communities around Calgary, we will divide those communities into eight zones (center, north, south, east, west, northwest, northeast, and southeast)

### **3.) How did COVID affect building permit types and work class in Calgary?**

COVID impacted the world both socially and economically. Industry halted, employees were furloughed, and remote working became the norm. This project will delve into the effects on building permit types. Was there an increase in residential permits or non-residential permits? Were the work class types different? Demolition, residential improvement or new start? This project will investigate the unique effects of a COVID related world shut down on the microcosm of construction in Calgary.

### **4.) What is the relationship between unemployment rate and Calgary residential and non-residential building permit values?**

This project will investigate correlations between unemployment rates and residential and non-residential building permit values. Does the unemployment rate impact the value of the residential and non-residential permits, and in what way? Unemployment rates went up in 2020-2021 to a high number. Looking at the trends on how the unemployment rates are impacting the building permit values over the years and what kind of trends were around covid as the building permit values were all-time high in 2020. During a recession, unemployment goes up fast and takes a while to come back down. This can have expensive and lasting effects on the economy. This project will investigate the impact of these crises on the permit value.

### **5.) What is the impact of 2008 financial crises on building permits values and type?**

We will investigate the impact of the 2008 financial crisis on building permits values and types in Calgary. In 2008, due to global financial crisis and the Bank of Canada's low interest rate policy caused an unprecedented bull market in Canadian Real Estate (Hynes 2023). This project will analyze the pattern in current building permit values and types to see if there are similarities between the current housing market and the previous housing market in 2008. Specifically, looking at the unemployment and Inflation rates in 2008 in correlation with building permits and types against current trends.

## **Tasks**

### **Data Wrangling Tasks**

- Determine what columns will be needed to answer guiding questions and remove any rows that have missing data.
- Export wrangled data as CSV to avoid wasted time re-wrangling.
- Export sub-datasets as CSV for increased team efficiency.

### **Visualization Tasks**

- Explore building permit codes that exist and define terms to help group codes.
- Create various plots of different visualization techniques to help answer guiding questions.

### **Tools**

- *Pandas* for handling, wrangling, and organizing tabular data
- *NumPy* may be used when dealing with and wrangling numeric data
- *Matplotlib* for scatter plots, graphs, and bar charts.
- Scatter plots are useful for visualizing possible trends between numeric values. Graphs are useful for visualizing how numeric data has changed over time. Bar charts are useful for visualizing categorical data.
- *Pandas* may be used to explore permit types throughout the city of Calgary on a map, if time permits.

## **References**

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