

# Mapping with Tableau

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**Taught by: Ana Abraham and Chris McNulty**  
SOCL 2358: Current Issues in Cities and Suburbs  
Prof. Gordana Rabrenovic  
Spring 2023



**Northeastern University**  
*NULab for Texts, Maps, and Networks*

# Workshop agenda

- Learn about the Boston Area Research Initiative (BARI) Data Portal
- Learn about Tableau
- Understand how to import and modify data in Tableau
- Filter data in a variety of ways to produce custom visualizations
- Brainstorm sociological research questions BARI and Tableau could help answer

All materials are available here:

<http://bit.ly/diti-spring2023-rabrenovic-tableau>



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# Datasets and Maps



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# Boston Area Research Initiative Data Portal



Boston Area Research Initiative

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## Boston Data Portal

### The Boston Data Library and BostonMap

The Boston Data Portal makes publicly available the data products from BARI projects. The Data Portal is a key part of BARI's efforts to collect and disseminate information that foster policy/research collaborations.

The Data Portal has two components: the Data Library and the Research Map.

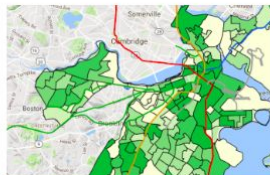
BARI offers Data Portal trainings for community organizations. If you or your organization would like to attend or host a training, please email us at [bari@northeastern.edu](mailto:bari@northeastern.edu).

Massachusetts Census Indicators Database (Harvard University)  
May 12, 2016  
This database contains a curated set of indicators accessed or derived from the US indicators are for all census tracts and block groups in Massachusetts and include in the decennial census.

Geographical infrastructure v. 2010 Database (Harvard University, Northeastern University)  
Feb 8, 2016  
Geographical infrastructure for the city of Boston, as of 2010.

City of Boston Administrative Data Database (Harvard University, Northeastern University)  
Feb 8, 2016  
Administrative data, including requests for city services, from the city of Boston.

**Boston Data Library:** Download data and documentation describing Boston from various sources. (Powered by the Dataverse at the Institute for Quantitative Social Science at Harvard University)



**Boston Research Map:** Visualize BARI data in our interactive map (powered by the Center for Geographic Analysis at Harvard University)



**Boston Data Portal Training and the Data Consultant:** View tutorials, attend a community training, or get in touch with the Data Consultant



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# Boston Research Map

**Boston Research Map**  
Powered by WorldMap

Add Layers Copy Identify Link Print Gazetteer About Notes

**Overlays**

**Society & Demographics**

**Place Locations**

- ☐ Colleges 2018
- ☐ Community Centers 2018
- ☐ Community Health Centers 2018
- ☐ Fire Stations 2018
- ☐ Hospitals 2018
- ☐ Police Stations 2018
- ☐ Public Libraries 2018
- ☐ Public Schools 2018
- ☐ Subsidized Housing 2018
- ☐ Supermarkets 2018

**Parcels**

**Transportation**

**Investment & Growth (Building Permits)**

- ☐ Alterations to Existing Structures (2018)
- ☐ New Construction (2018)

**Assessed Value (Tax Assessments)**

- ☐ Annual Changes in Assessed Value
- ☐ Building Age
- ☒ Neighborhood Effects on Property Value
  - ☐ Negative Effect on Value
  - ☐ Neutral Effect on Value
  - ☐ Positive Effect on Value

**Medical Emergencies (911 Reports)**

- ☐ Major Medical Emergencies
- ☐ Youth Health Emergencies

**Social Disorder and Crime (911 Reports)**

Enter search... Search Reset Data CC-BY-SA by OpenStreetMap

**Boston Research Map**

**The Boston Research Map**

Boston Research Map is an open source web mapping system that is an ongoing project of the Boston Area Research Initiative (BARI) in conjunction with the WorldMap team. It is intended to help faculty and their students, policymakers and practitioners, and community members to explore the neighborhoods of Boston from their computer. Visitors to BostonMap can:

1. Interact with the best available public data for the Boston region, while also uploading their own data.
2. See the whole Boston area but also zoom in to particular places.
3. Accumulate both contemporary and historical data supplied by researchers and make it permanently accessible online.
4. Work collaboratively across disciplines and organizations with spatial information in an online environment.

 **Boston Area Research Initiative**

**Sign in | Create Map | View Map | Help**

Street View Measure Jump to... Share Map

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Quincy

Milton

Dedham

Needham

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Waltham

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# Boston Area Research Initiative Dataverse



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**Dataverse Category**  
[Research Project \(7\)](#)

**Publication Year**  
[2019 \(9\)](#)  
[2018 \(7\)](#)  
[2016 \(6\)](#)  
[2017 \(6\)](#)  
[2012 \(3\)](#)  
[More...](#)

**Subject**  
[Social Sciences \(26\)](#)  
[Earth and Environmental Sciences \(3\)](#)  
[Other \(1\)](#)

**Author Name**  
[O'Brien, Daniel T. \(7\)](#)  
[de Benedictis-Kessner, Justin \(6\)](#)  
[O'Brien, Dan \(4\)](#)  
[Sheini, Saina \(4\)](#)  
[Shields, Michael \(3\)](#)  
[More...](#)

**Author Affiliation**  
[Northeastern University / Harvard University \(14\)](#)  
[Harvard University \(6\)](#)

**1 to 10 of 34 Results**

[Geographical Infrastructure for the City of Boston v. 2](#)  
Dec 5, 2019  
O'Brien, Daniel T.; Phillips, Nolan; de Benedictis for the City of Boston v. 2018\*, <https://doi.org/10.7910/DVN/N4BL71> [fileUNF]  
The Boston Area Research Initiative's Geographical Infrastructure of Boston, MA across various geographic levels — is

[Geographical Infrastructure for the City of Boston v. 2](#)  
Dec 4, 2019  
O'Brien, Daniel T.; Phillips, Nolan Edward; Sheini, Saina, 2019, "Geographical Infrastructure for the City of Boston", <https://doi.org/10.7910/DVN/N4BL71>, Harvard Dataverse, V3, UNF:6:MoA2dRjgDfFBW9B5KUNsA== [fileUNF]  
The Boston Area Research Initiative's Geographical Infrastructure of Boston, MA across 17 levels, including land parcels, streets, census geographies, and other administrative regions. The levels are organized...

**Building Permits**  
Nov 25, 2019  
O'Brien, Daniel T.; Barrett W. Montgomery; de Benedictis-Kessner, Justin; Sheini, Saina, 2019, "Building Permits", <https://doi.org/10.7910/DVN/YVKZIG>, Harvard Dataverse, V1, UNF:6:d6pzPv2A3116mUdw4gGY1w== [fileUNF]  
This dataset contains various files detailing the City of Boston's building permits applications from September 26, 2006 to the recent present. The raw data were originally gathered and released by the Inspectional Service Department (ISD) of the City of Boston. It details various...

**Property Assessment**  
Aug 26, 2019  
Shields, Michael; Sheini, Saina; de Benedictis-Kessner, Justin; O'Brien, Daniel T., 2019, "Property Assessment", <https://doi.org/10.7910/DVN/YVKZIG>, Harvard Dataverse, V1, UNF:6:d6pzPv2A3116mUdw4gGY1w== [fileUNF]  
This dataset details the various cross-sectional and longitudinal data files of the City of Boston's property assessment data. These data were curated and added to by the Boston Area Research Initiative. The corresponding documentation details information about the various

**21 to 23 of 23 Files**

[Permits.Ecometrics.CT.Longitudinal.tab](#)  
Tabular Data - 343.9 KB - Nov 25, 2019 - 2 Downloads  
173 Variables, 181 Observations - UNF:6:uXC4EvnofDNryzMB8o04Vw==  
Building permits by Census tract for all years  
[Geospatial](#) [Data](#)

[Permits.Ecometrics.LP.Longitudinal.tab](#)  
Tabular Data - 11.9 MB - Nov 25, 2019 - 0 Downloads  
73 Variables, 98436 Observations - UNF:6:uKb9zFyfjluoeY3pjgLGfA==  
Building permits by land parcels for all years  
[Geospatial](#) [Data](#)

[Permits.Records.Geocoded.2018.csv](#)  
Comma Separated Values - 186.2 MB - Nov 25, 2019 - 4 Downloads  
MDS: eb86c8b751de7f9834e7476ad43cf20  
[Data](#)

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# Our dataset

- Boston's 2018 Permit and Record Spreadsheet, which tracks construction permits.
- Includes information such as
  - Type of permit (addition, renovation, etc.).
  - Address of permit (including geographic coordinates) and neighborhood name.
  - Permit holder and fee information.





# Key terminology

- **X/Y Coordinates:** Numerical values that allow every location on earth to be pinpointed.
- **Latitude:** The north/south coordinate of a location based upon its distance from the equator.
- **Longitude:** The west/east coordinate of a location based upon its distance from the standard meridian.





# Key terminology continued

- **Dimension:** Qualitative values (such as names, dates, or geographical data). You can use dimensions to categorize or segment your data.
- **Measure:** Numeric, quantitative values that you can measure. Measures can be aggregated. When you drag a measure into the view, Tableau applies an aggregation to that measure (by default).
- **Basemap:** The type of map that your coordinates are plotted on. Options include streets and satellite images, just like Google Maps. We will learn how to toggle between these options soon.



# Tableau



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# Tableau basics

Tableau is a powerful tool for different types of data visualizations. Tableau can also do basic mapping!

A Tableau license is available for free to students with a .edu email address. You can use the key on two different devices.

Link to Tableau for students:

<https://www.tableau.com/academic/students>



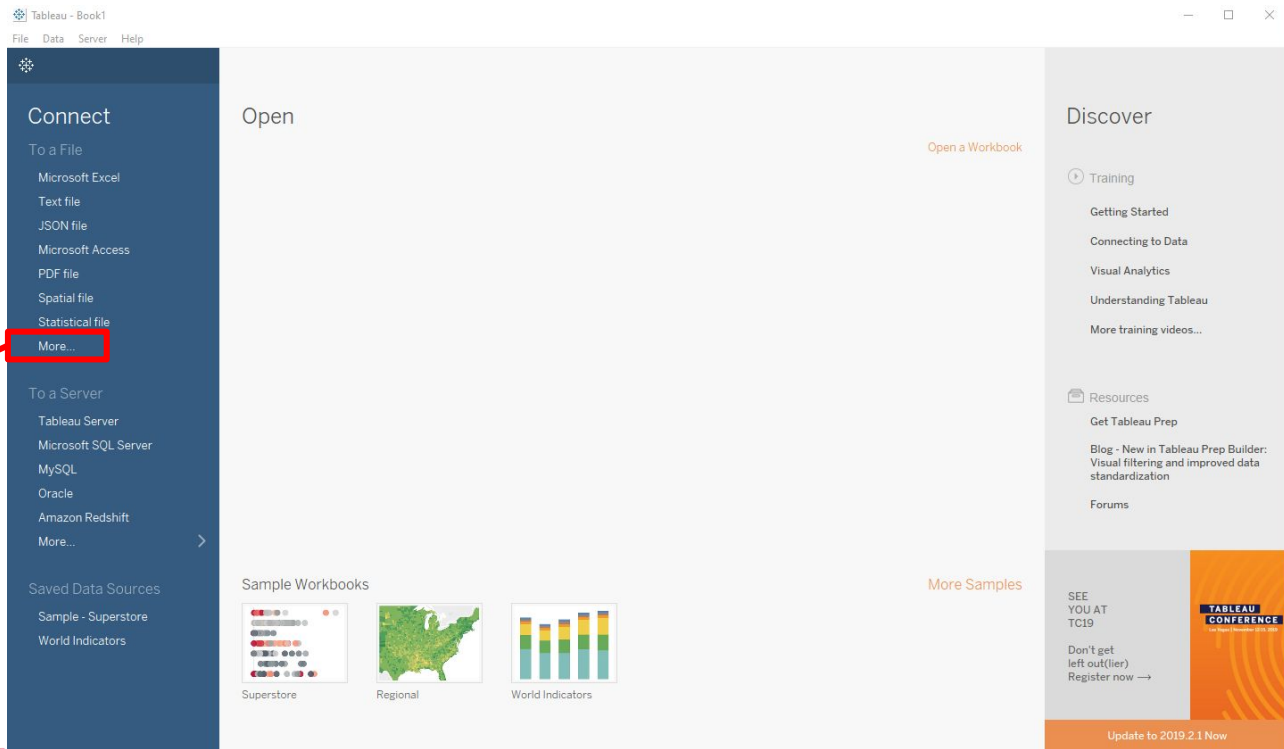
# Tableau Walkthrough



Northeastern University  
*NULab for Texts, Maps, and Networks*

# Step One: Connecting to data

- First, we need to connect to our data.
- We will be using building permit data for the City of Boston in .csv format.
- Select **More...** and navigate to the data file that was sent via email.



# Step Two: Convert coordinate column to geo data

- To map our data, we have to first convert the X/Y data into coordinates.
- Click on the **Abc**, and change the data type from **String** to **Number (decimal)**.
- Click on the **#** and select over **Geographic role**, and then select **Latitude** or **Longitude**. Convert:

X -> Longitude  
Y -> Latitude

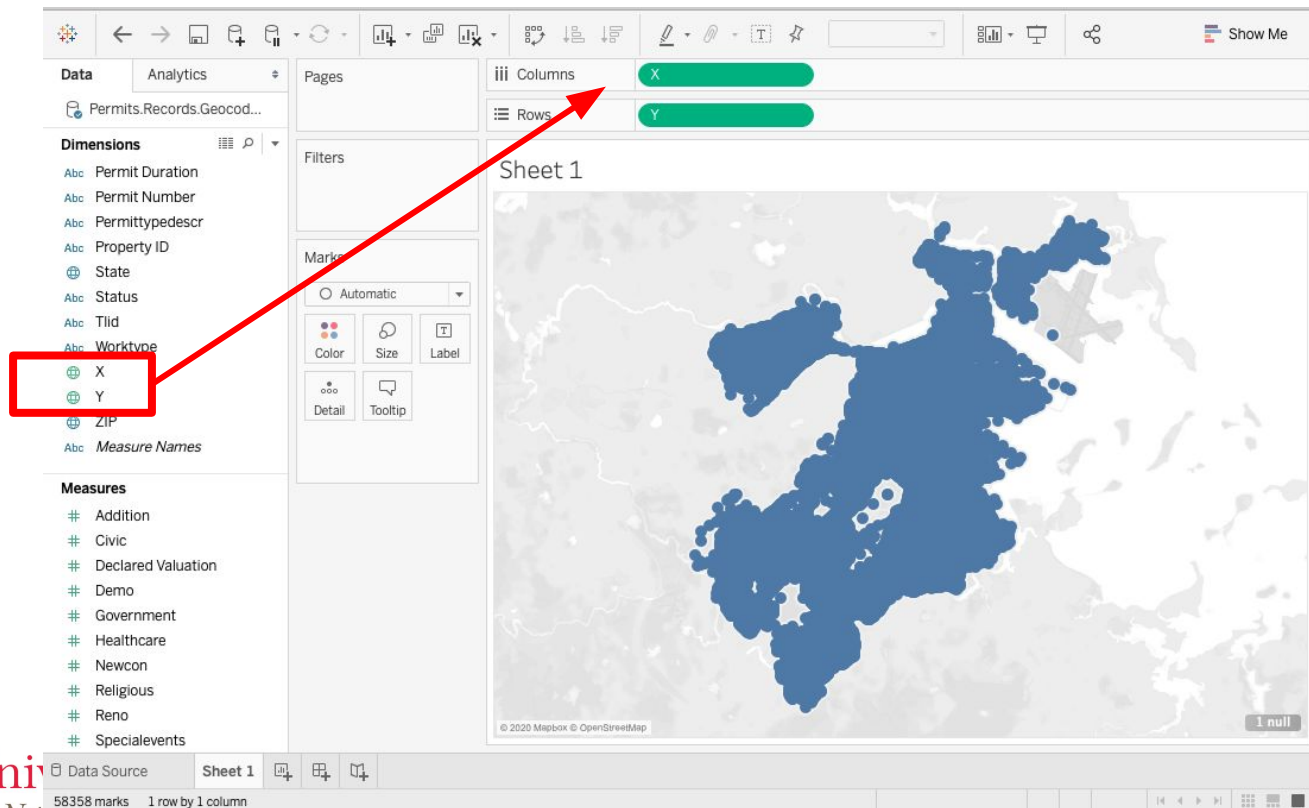
The screenshot displays the Tableau interface for a data source named 'Permits.Records.Geocoded.2018'. The left sidebar shows the 'Connections' and 'Files' panels. The main view is a table with columns: State, ZIP, Location, Property ID, Parcel Num, and Parcel ID. The 'Parcel Num' column is selected, and a context menu is open, showing options to change the data type to 'Number (decimal)' and the role to 'Geographic Role'. The 'Geographic Role' sub-menu is also open, showing options to select 'Latitude' or 'Longitude'. The 'Longitude' option is highlighted.

State	ZIP	Location	Property ID	Parcel Num	Parcel ID
MA	02116	null	NA	NA	NA
MA	02210	null	NA	NA	NA
MA	02128	null	NA	NA	NA
MA	02118	null	NA	801720000	801720000
MA	02118	null	NA	801720000	801720000
MA	02126	null	NA	1804116000	1804116000
MA	02129	null	NA	203517600	203517600
MA	02124	null	NA	1701902000	1701902000
MA	02124	null	NA	1701902000	1701902000
MA	02135	null	NA	2205126010	2205126010
MA	02135	null	NA	2205126010	2205126010



# Step Three: Plotting points

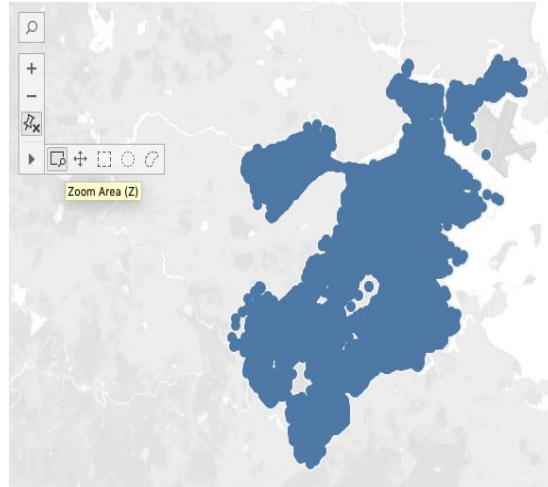
- To map the data points, drag the Y data into the **Columns** area, and the X data into the **Rows** area.
- Tableau will automatically plot points based upon those X/Y coordinates.





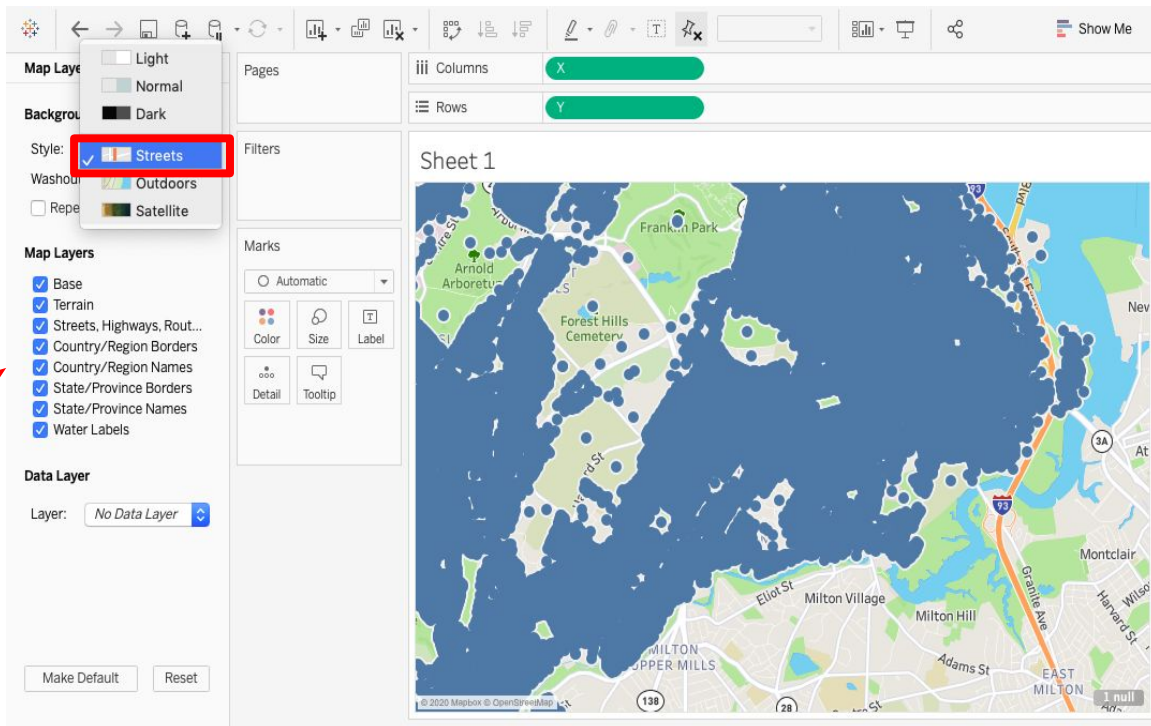
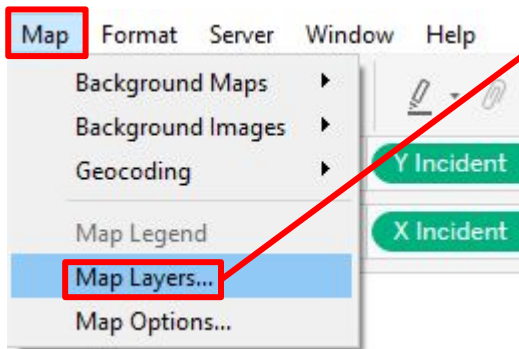
# Step Four: Zoom controls

- The navigation and zoom controls are in the top left of the plot area.
- We have zoomed into the Downtown Boston, Fenway/Kenmore, Jamaica Plain, Roxbury areas.



# Step Five: Modifying the basemap

- Select **Map** on the toolbar and go to **Map Layers...** to modify the basemap.
- Select a new style, e.g. **Streets**.
- When you are happy, click the **X** at the top of the map layers sidebar.



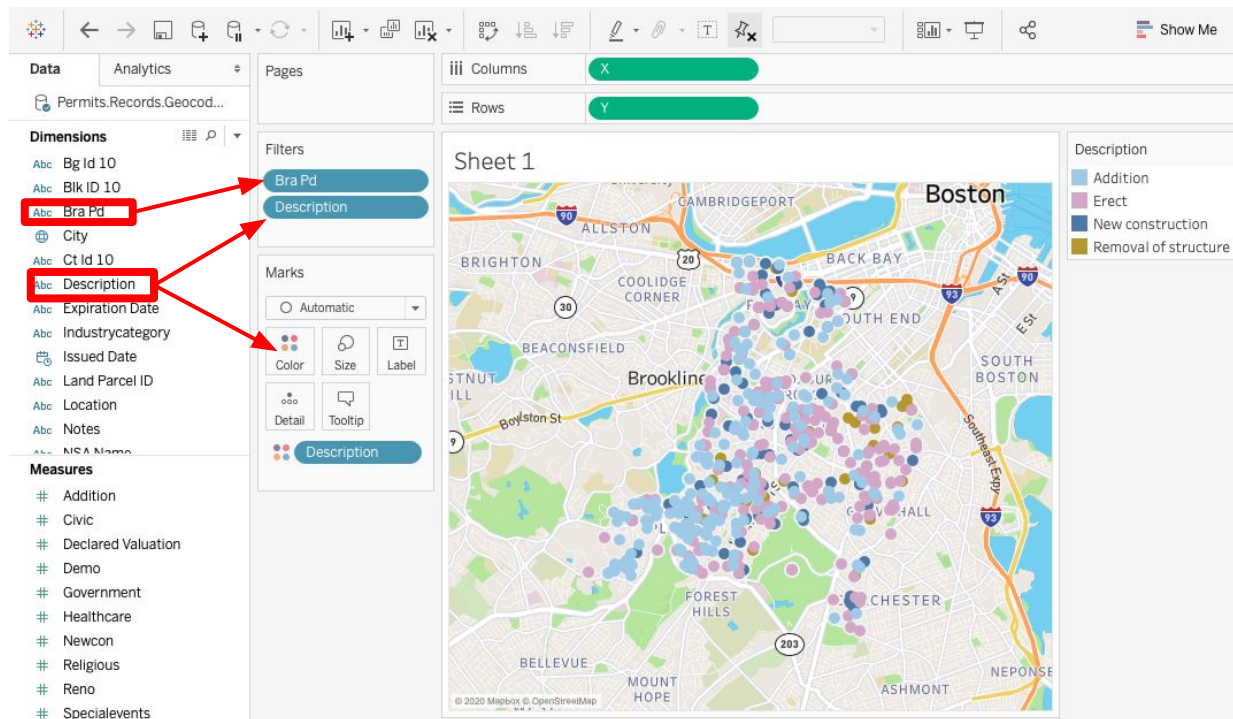
**Hypothesis:** Gentrification will look different in each neighborhood of study.

**Operationalization:** Gentrification can be tracked by filtering out **Addition, Erection, New Construction, and Removal of Structure** building permits.



# Step Six: Creating filters

- To create different filters and visualization parameters, drag a dimension or measure into the **Marks** box. Change marks to **Map**.
- To specify a type of visualization, drag the parameter of choice onto **Color, Size, etc.**
- We have mapped **Description of Permit Type** as a color, and filtered by neighborhood and description of permit type (which will appear as a tooltip).



# Step Seven: Creating filters continued

- We want to filter our neighborhood data parameter to only display Fenway/Kenmore, Jamaica Plain and Roxbury.
- Click on **Filter...** to bring up the filter box.
- Deselect all and then check the boxes for Fenway/Kenmore, Jamaica Plain and Roxbury.
- Do the same thing for permit description type, selecting the boxes for **Addition, Erect, New Construction, and Removal of Structure.**

Filter [Bra Pd]

General Wildcard Condition Top

☒ Select from list ☐ Custom value list ☐ Use all

Enter search text

- ☐ Charlestown
- ☐ East Boston
- ☒ Fenway/Kenmore
- ☐ Hyde Park
- ☒ Jamaica Plain
- ☐ Mattapan
- ☐ NA
- ☐ North Dorchester
- ☐ Roslindale
- ☒ Roxbury
- ☐ South Boston

All None Exclude

Summary

Field: [Bra Pd]  
Selection: Selected 3 of 17 values  
Wildcard: All  
Condition: None  
Limit: None

Reset Apply Cancel OK

Filter [Description]

General Wildcard Condition Top

☒ Select from list ☐ Custom value list ☐ Use all

Enter search text

- ☐ Null
- ☒ Addition
- ☐ Annual Maintenance
- ☐ Application to Correct a Vi
- ☐ Awning
- ☐ Awning Renewal
- ☐ Canopy
- ☐ Canopy Renewal
- ☐ Capital Improvement
- ☐ Cellular Tower
- ☐ Change Occupancy

All None Exclude

Summary

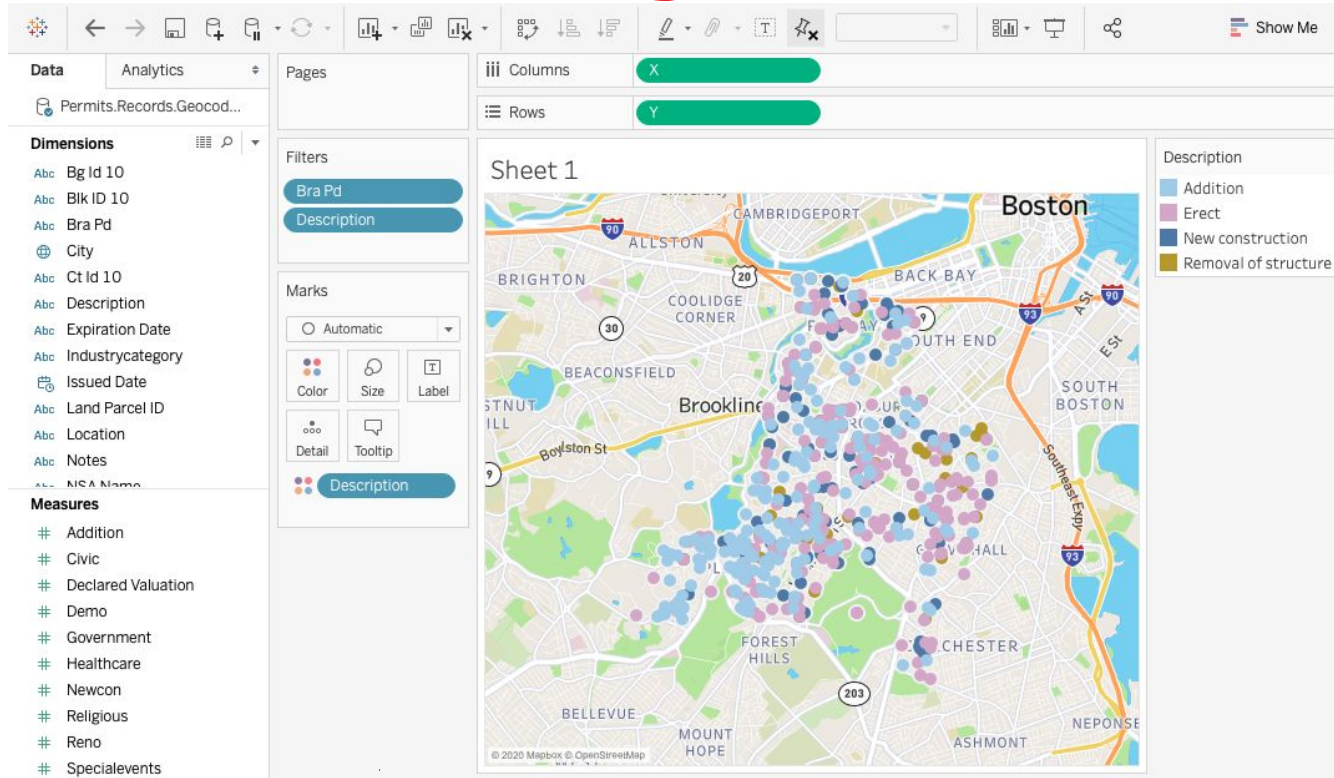
Field: [Description]  
Selection: Selected 4 of 69 values  
Wildcard: All  
Condition: None  
Limit: None

Reset Apply Cancel OK





# Step Seven: Creating filters results



# Tableau and Accessibility

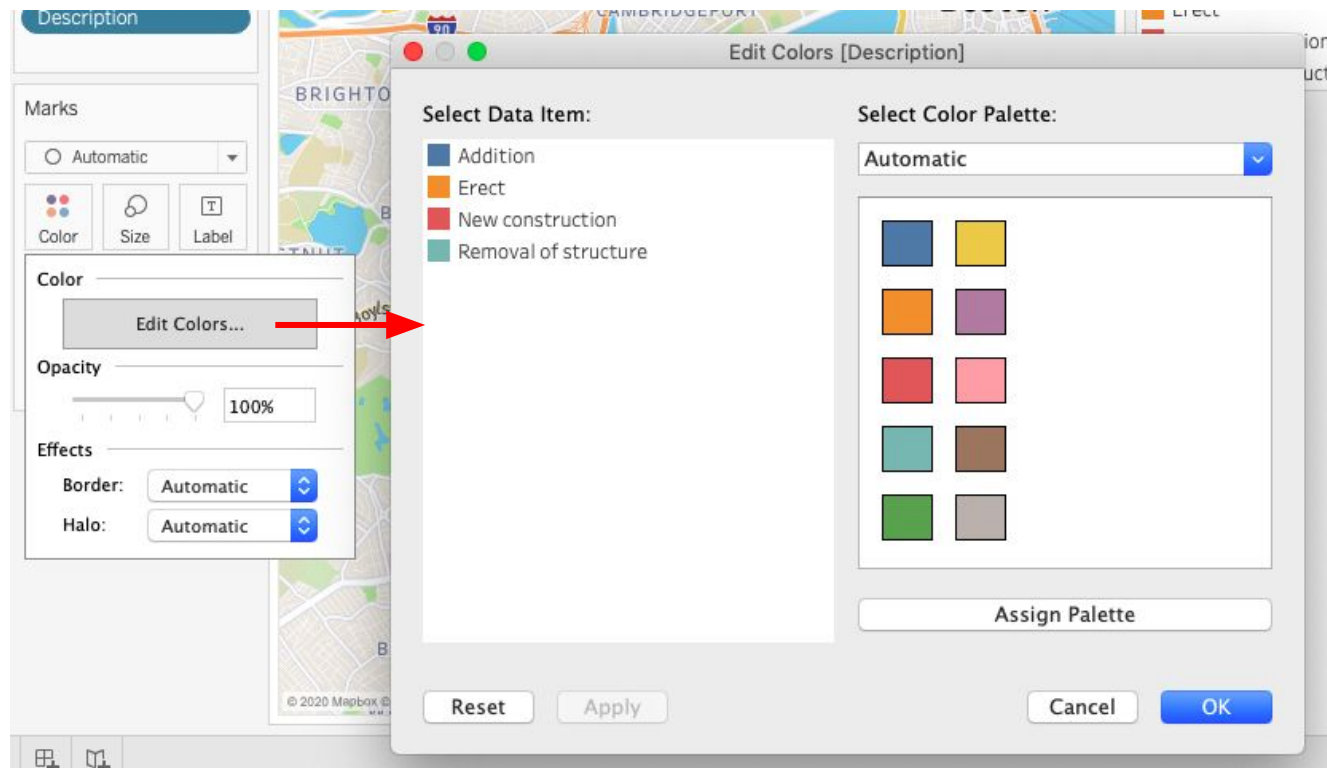
- Tableau lets you *modify* and *customize* how your maps and graphs look.
- Keep accessibility concerns in mind when choosing fonts and colors.
  - Colors with higher contrast from the background are easier to distinguish.
  - Larger, bolder fonts stand out and designate importance.
  - Overcrowding text makes the information harder to read.



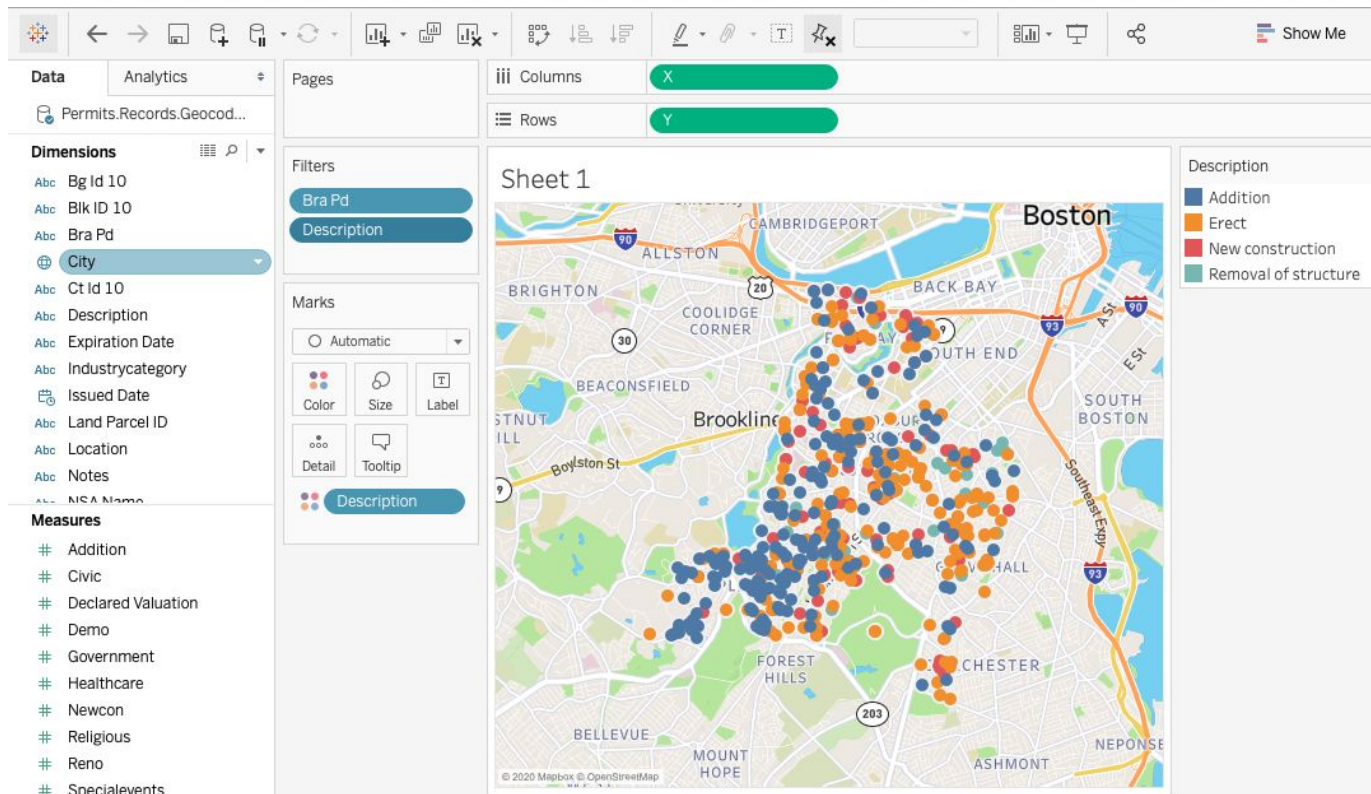


# Step Eight: Modifying colors

- The standard map colors don't contrast very well.
- On the **Bra Pd (neighborhoods)** sidebar, click the dropdown arrow, then click on **Edit Colors....**
- We can now change our colors and improve the contrast.

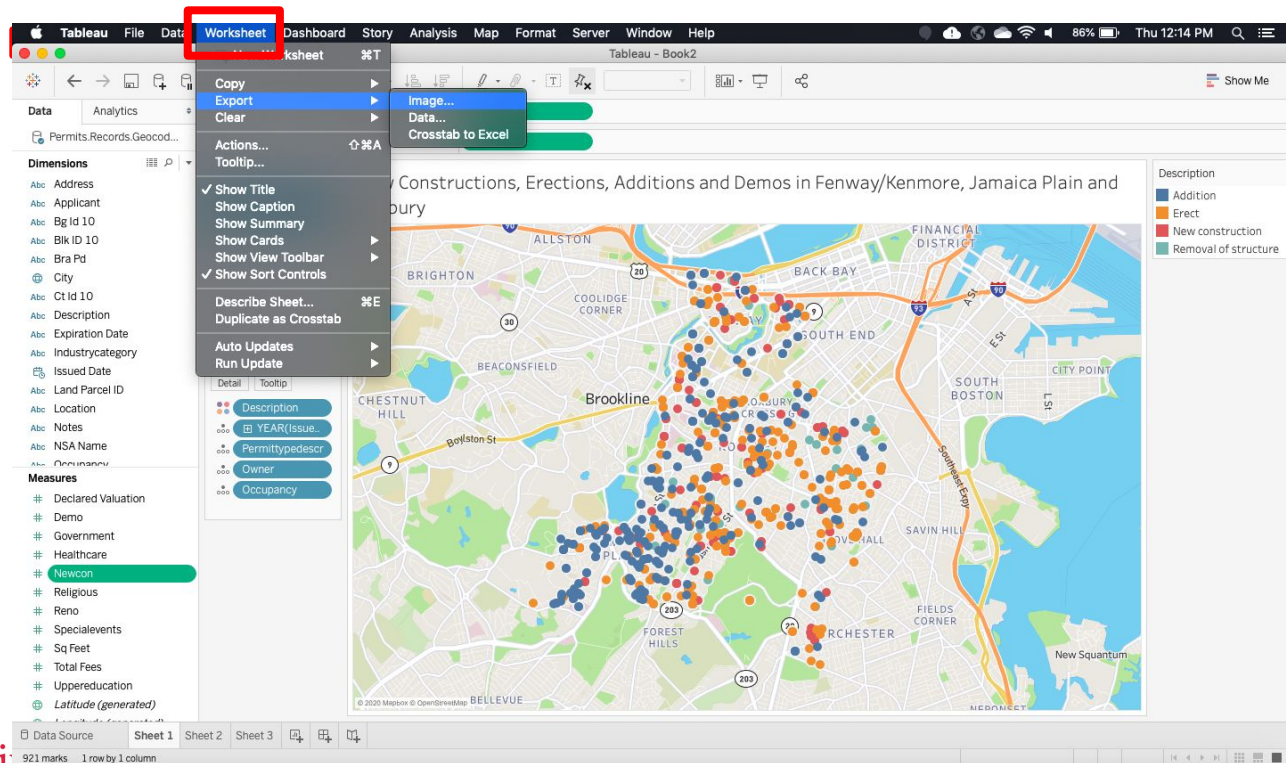


# Step Eight: Modifying colors results



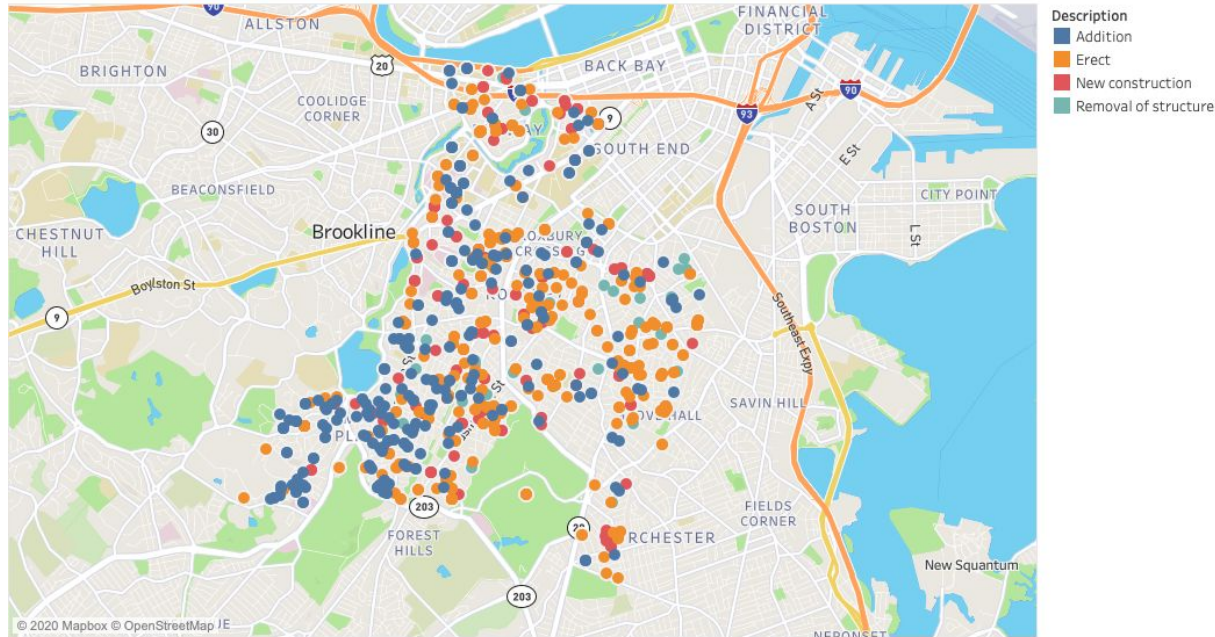
# Step Nine: Exporting images

- From the **Worksheet** drop-down menu, select **Export**, then click on **Image...**
- You can select the type of export then click **Save**.



# Step Nine: Exported image

New Constructions, Erections, Additions and Demos in Fenway/Kenmore, Jamaica Plain and Roxbury



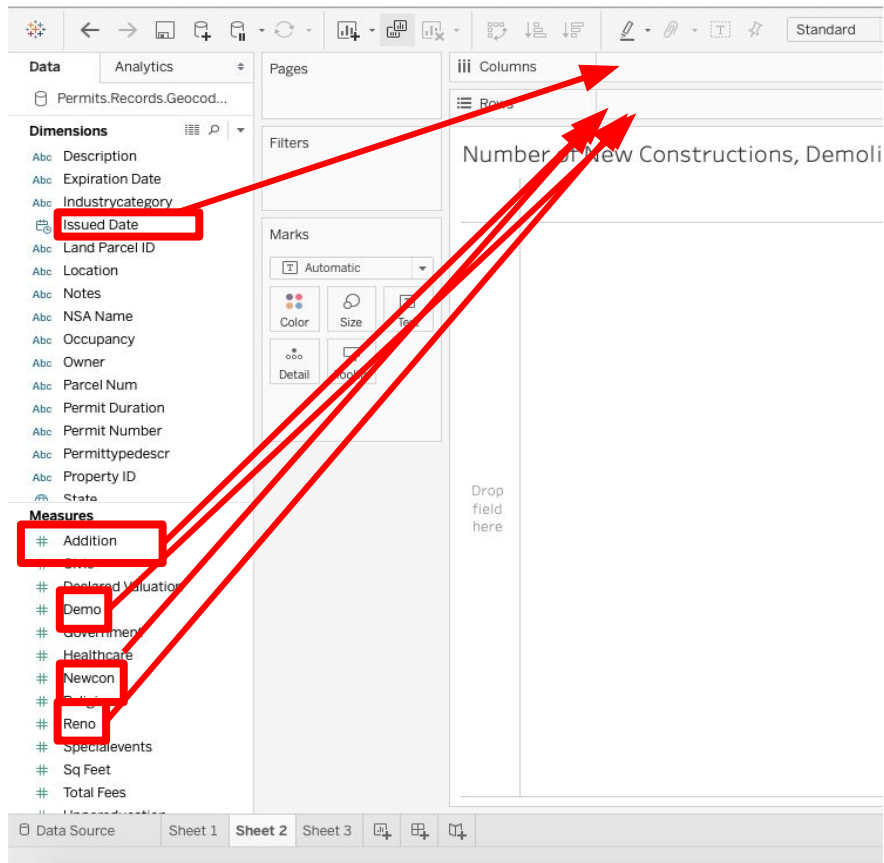
Map based on X and Y. Color shows details about Description. Details are shown for various dimensions. The data is filtered on Bra Pd and Worktype. The Bra Pd filter keeps Fenway/Kenmore, Jamaica Plain and Roxbury. The Worktype filter keeps ADDITION, ERECT, NEWCON and RAZE.





# Graphs with Tableau: Drag & drop

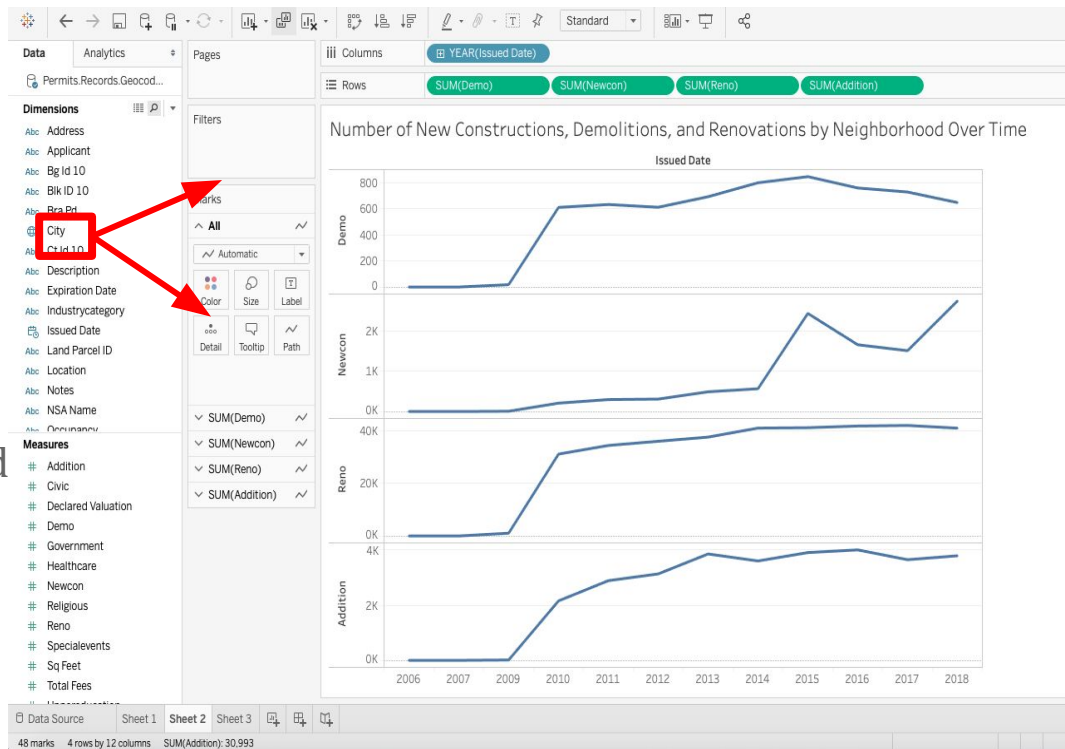
- As with mapping, creating a graph can be accomplished by dragging and dropping our dimensions and measures.
- To map the number of records over time according to permit type, first create a new sheet (click the + sign next to **Sheet 1** at the bottom).
- Next, drag and drop the **Issued Date** dimension to the columns, and the **Addition, Demo, Newcon** and **Reno** measures to the rows.



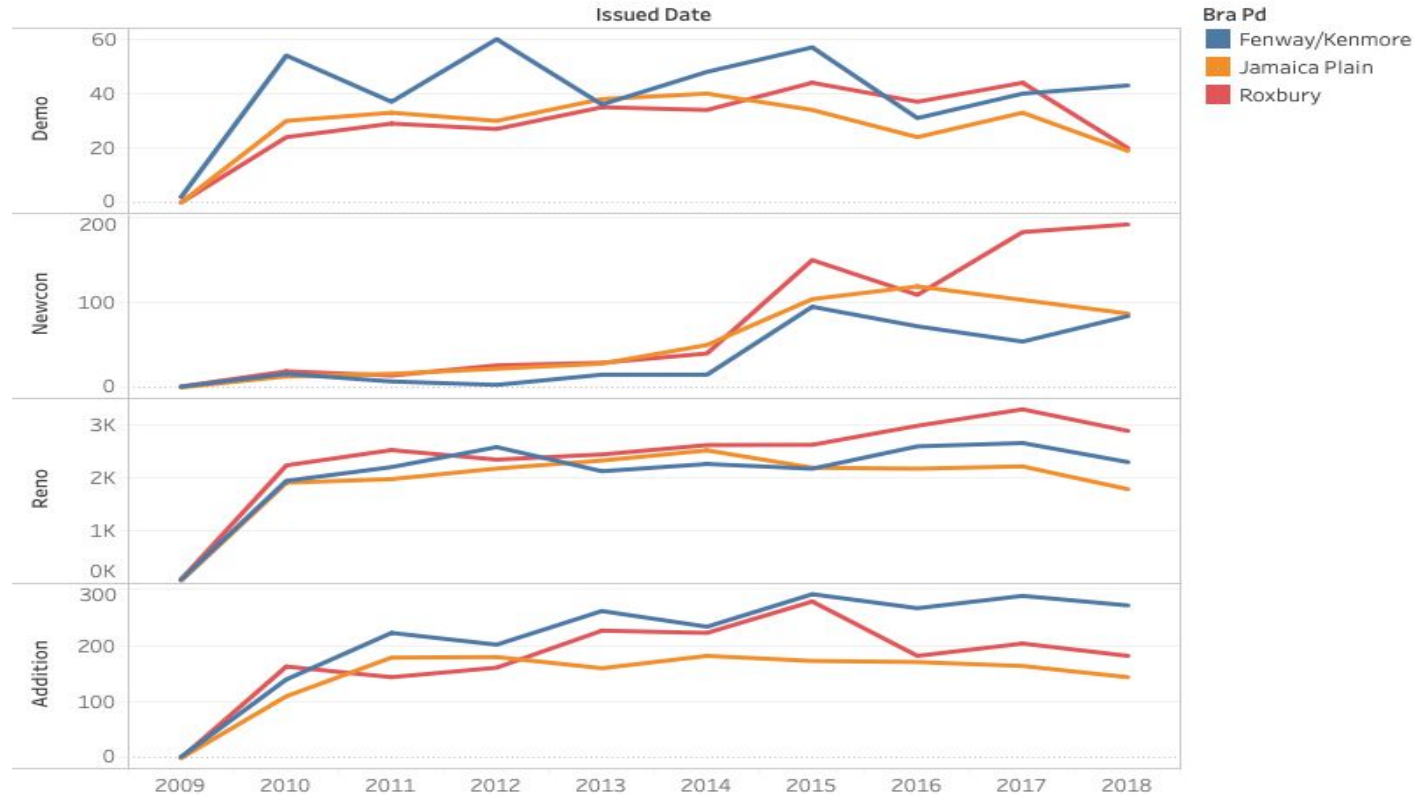
# Graphs with Tableau: Drag & drop

We now have a graph of different building permit records over time. To see specific neighborhoods:

- Drag and drop the **Bra Pd** measure onto both the filter box and the colors in the marks box to the left of our new graph. Filter your neighborhoods to include only Fenway/Kenmore, Jamaica Plain and Roxbury.
- Tableau will automatically set each neighborhood to a different color and redraw our graph.



## Number of New Constructions, Demolitions, and Renovations by Neighborhood Over Time



The trends of sum of Demo, sum of Newcon, sum of Reno and sum of Addition for Issued Date Year. Color shows details about Bra Pd. The view is filtered on Bra Pd, which keeps Fenway/Kenmore, Jamaica Plain and Roxbury.





# How can Tableau help us to answer sociological questions?



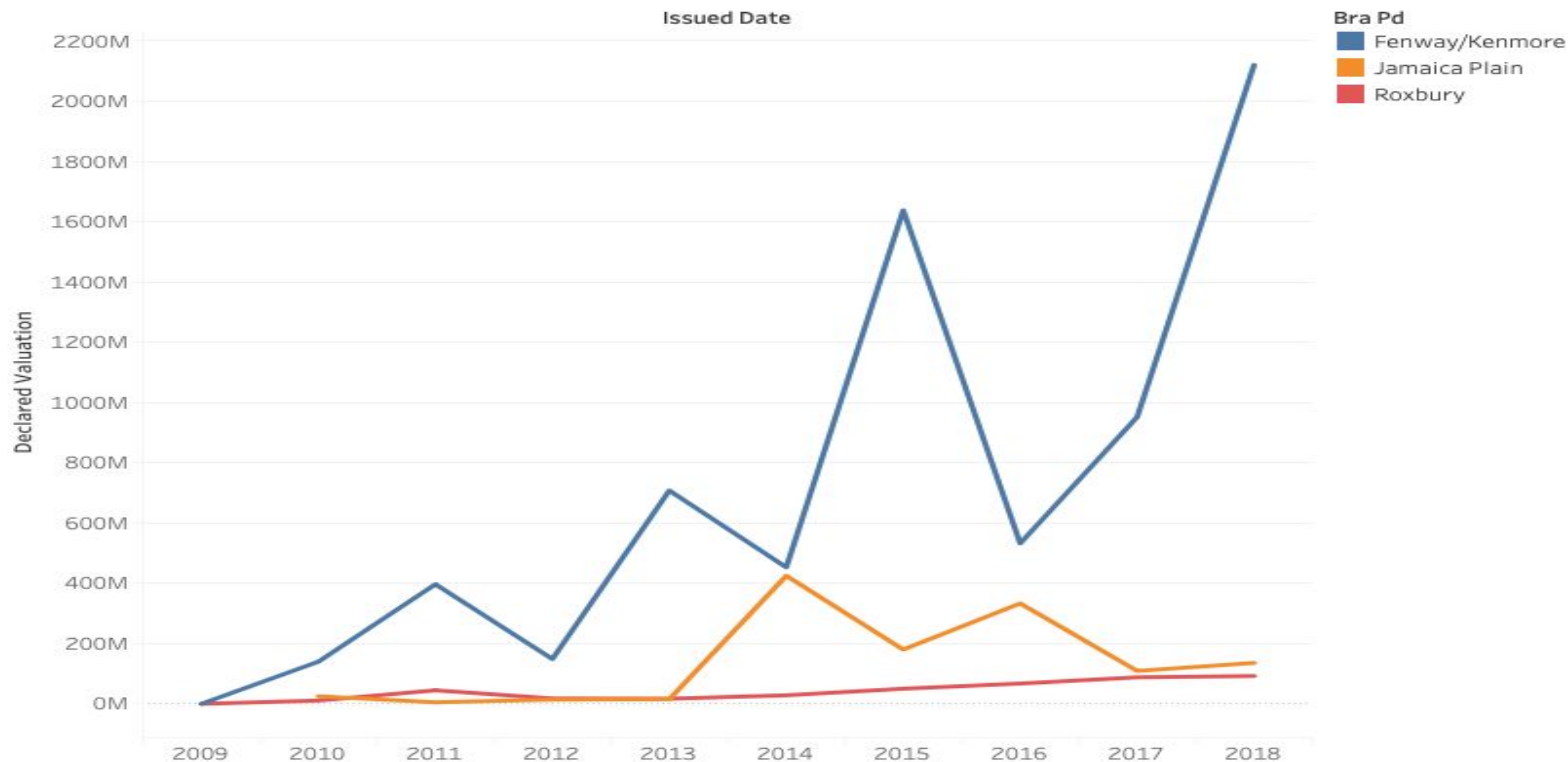
# Example research questions

- How much value are new constructions and renovations adding to their neighborhood over time?
- How much value does each type of construction add to each neighborhood's overall valuation?
- What different types of industry are building in these neighborhoods?



# How much value are new constructions and renovations adding to their neighborhoods over time?

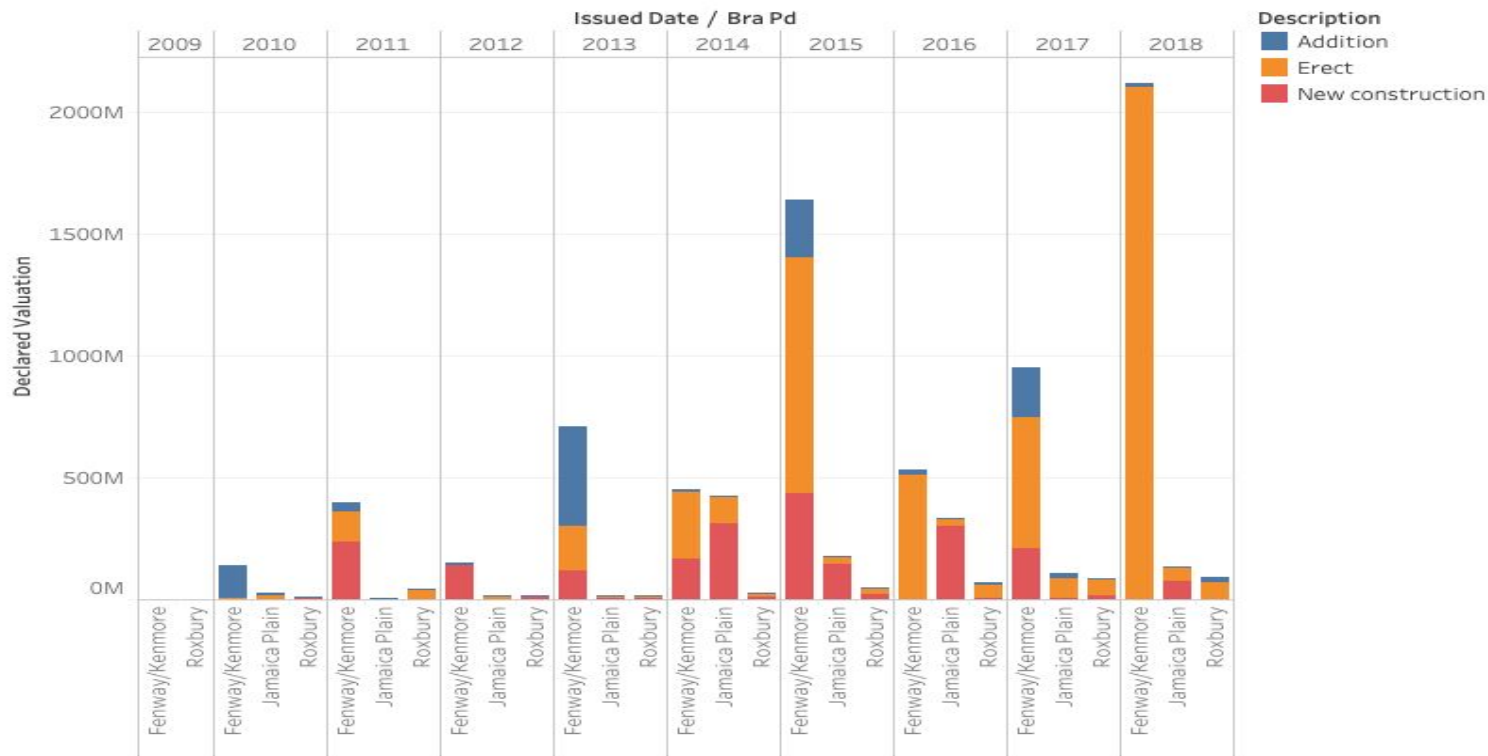
Declared Property Valuations by Neighborhood Over Time



The trend of sum of Declared Valuation for Issued Date Year. Color shows details about Bra Pd. The data is filtered on Worktype, which keeps ADDITION, ERECT and NEWCON. The view is filtered on Bra Pd, which keeps Fenway/Kenmore, Jamaica Plain and Roxbury.

# How much value does each type of construction add to each neighborhood's overall valuation?

Declared Property Valuations by Neighborhood and Permit Type

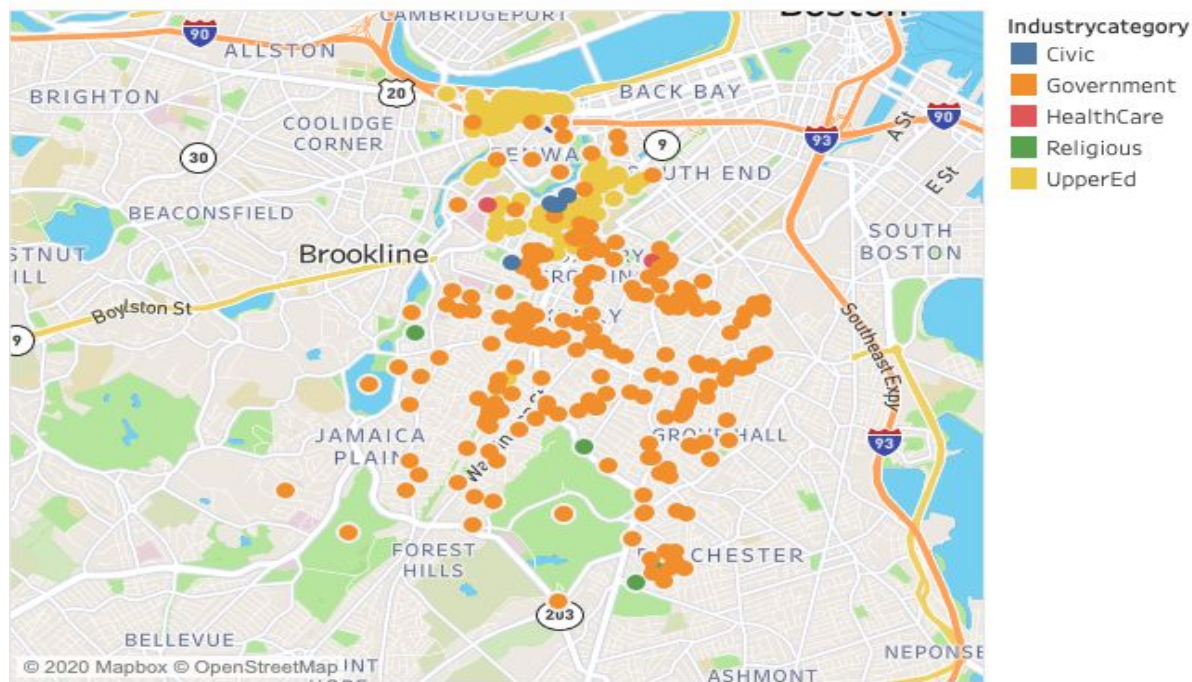


Sum of Declared Valuation for each Bra Pd broken down by Issued Date Year. Color shows details about Description. The data is filtered on Worktype, which keeps ADDITION, ERECT and NEWCON. The view is filtered on Bra Pd, which keeps Fenway/Kenmore, Jamaica Plain and Roxbury.



# What different types of industry are building in these neighborhoods?

Permits by Industry Type for Fenway/Kenmore, Jamaica Plain and Roxbury



Map based on X and Y. Color shows details about Industrycategory. The data is filtered on Bra Pd, which keeps Fenway/Kenmore, Jamaica Plain and Roxbury. The view is filtered on Industrycategory, which keeps Civic, Government, HealthCare, Religious and UpperEd.



# Conclusion

- Tableau is a powerful tool for mapping coordinate points onto maps.
- Tableau is also very powerful at creating a variety of charts and graphs by dragging non-coordinates to the 'column' and 'row' areas.
- Research questions can include a number of different dimensions and measures—do not be afraid of experimenting with different visualizations!



# Thank you!

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- If you have any questions, contact us at [nulab.info@gmail.com](mailto:nulab.info@gmail.com)
- Have questions? Schedule an appointment with us!

<https://calendly.com/diti-nu>

- Link to Online Materials:

<http://bit.ly/diti-spring2023-rabrenovic-tableau>

- We'd love your feedback! Please fill out a short survey here:

<https://bit.ly/diti-feedback>



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