

Introduction to Tableau

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Criminology 4949

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Northeastern University

NULab for Texts, Maps, and Networks

*Feel free to ask questions at any point
during the presentation!*

Introduction

This presentation will help you:

- Learn about the Boston Area Research Initiative Data Portal
- Learn to interact with the BARI research map
- Learn about Tableau
- Understand how to import and modify data in the Tableau environment
- Filter data in a variety of ways to produce custom visualizations

To follow along, visit: <https://bit.ly/sp23-drakulich-tableau>



Our Roadmap for Today

1. Look at BARI and explore the Boston Area Research Map
2. Learn the basics of Tableau
3. After this, we will leave the slides and go to a live demo examining how to graph Boston 911 call data in Tableau.
4. These slides also contain a comprehensive mapping tutorial featuring more BARI data—Boston Building Permits. Please refer to that tutorial for more information on how to interact with geocoded datasets.



Boston Area Research Initiative: Data Portal

The screenshot shows the Boston Area Research Initiative Data Portal website. At the top left is the BARI logo, a stylized red tree. To its right is the text "Boston Area Research Initiative". Further right is a search bar with the word "Search" and a magnifying glass icon. Below the header is a dark red navigation bar with the text "Boston Area Research Initiative" and an "EMAIL SIGN UP" button. Underneath is a red navigation menu with links: Home, About, News & Events, Annual Conference, Projects, Boston Data Portal, Grants, and BARI Community. The main content area has the heading "Boston Data Portal" and the subheading "The Boston Data Library and BostonMap". Below this are four content blocks. The first block on the left describes the portal's purpose and contact information. The second block, highlighted with a red border, lists three datasets: Massachusetts Census Indicators, Geographical Infrastructure, and City of Boston Administrative Data, each with a brief description and date. The third block features a map of Boston and describes the "Boston Research Map" as an interactive tool. The fourth block on the right shows a group of people in a meeting and describes "Boston Data Portal Training and the Data Consultant" services.

Boston Area Research Initiative

Search

EMAIL SIGN UP

Home About News & Events Annual Conference Projects Boston Data Portal Grants BARI Community

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 training, please email us at bari@northeastern.edu.

Massachusetts Census Indicators Dataservice (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 Dataservice (Harvard University, Northeastern Univ)
Feb 6, 2016 Geographical Infrastructure for the City of Boston Dataservice
Geographical Infrastructure for the city of Boston, as of 2010

City of Boston Administrative Data Dataservice (Harvard University, Northeastern Univ)
Feb 6, 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 Dataservice 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 Area Research Map...Let's Explore!

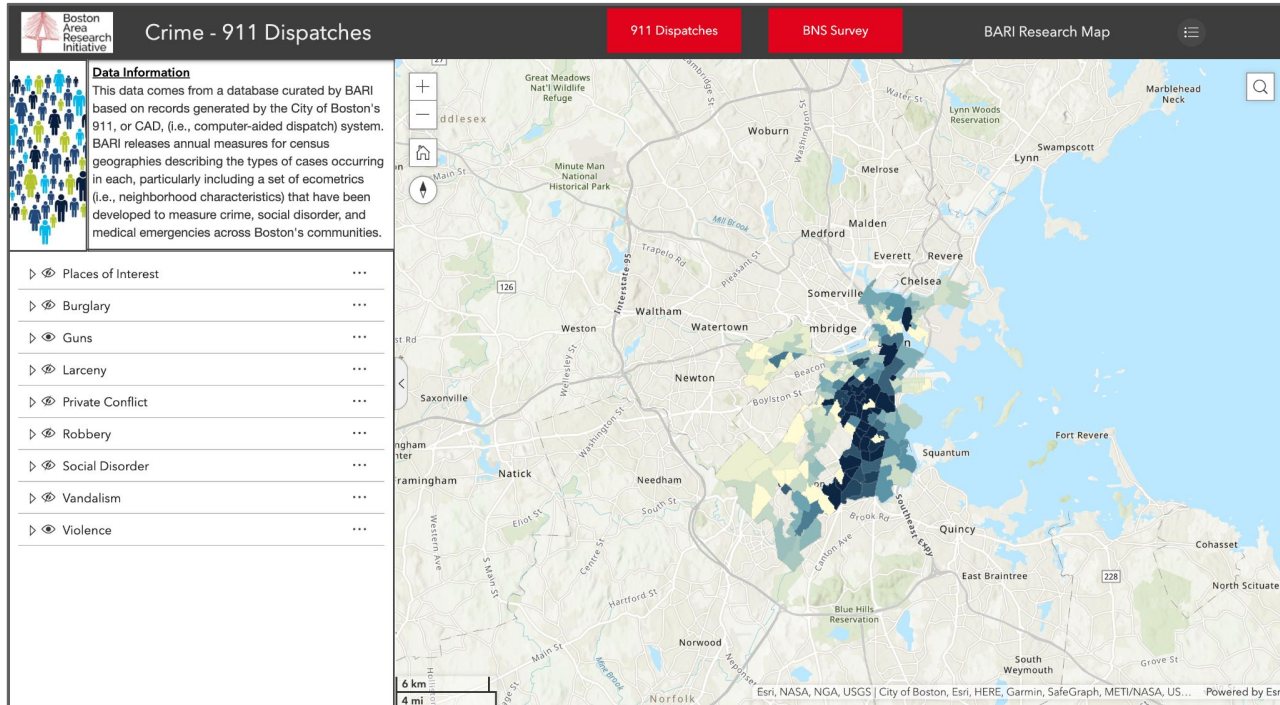


Tableau Basics



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Tableau Basics

- Tableau is a powerful visualization tool. It can produce a variety of charts and graphs that look much nicer than basic Excel visualizations.
- We will be focusing today on Tableau's graphing functions.
 - However, this presentation will also include information on mapping, another prominent Tableau feature, for your reference as you begin to plan your own research.



Tableau: 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.



Tableau: 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.



In Short, Tableau...

- Tableau is very powerful at creating a variety of charts and graphs.
- Tableau is also a powerful tool for quickly mapping coordinate points onto a simple map.
- Now, we'll leave the slides and work through a demo on graphing. Remember that this slide deck does also contain a comprehensive mapping tutorial for your future reference.



Tableau Mapping Walkthrough



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Our BARI Data for the Mapping Walkthrough

The screenshot shows the Harvard Dataverse website. On the left, there are filters for Datasets (25), Files (263), and various categories like Publication Year and Subject. The main area displays search results for '1 to 10 of 34 Results'. The first result is 'Geographical Infrastructure for the City of Boston v. 2', which is highlighted with a red box. Below it, the 'Building Permits' dataset is listed, also highlighted with a red box. The 'Building Permits' dataset is described as containing various files detailing the City of Boston's building permits applications from September 26, 2006 to the present. The raw data were originally gathered and released by the Inspectional Service Department (ISD) of the City of Boston. It details various... The 'Permits.Records.Geocoded.2018.csv' dataset is highlighted with a red box, and a red arrow points to its 'Download' button. The 'Property Assessment' dataset is also visible below it.

Harvard Dataverse

Add Data Search About User Guide Support Sign Up Log In

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, Justin; Sheini, Saina, 2019, "Geographical Infrastructure for the City of Boston v. 2018", <https://doi.org/10.7910/DVN/N4BL71>, Harvard Dataverse, V3, UNF:6:MoA2dRjgIDfFBW9B5KUNsA== [fileUNF]
The Boston Area Research Initiative's Geographical Infrastructure for the City of Boston, MA across various geographic levels—

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/N4BL71>, Harvard Dataverse, V3, UNF:6:MoA2dRjgIDfFBW9B5KUNsA== [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:d6pzPv2A31t6mUdw4gGY1w== [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:uXC4EvnoDNRyzMB8o04Vw==
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:vKb9zFyJlueY3pJgLGfA==
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
MD5: eb86c8b751de719834e71476ad43cf20
Data

To access the data in a CSV file, download the Geocoded Permit Records from 2018.



Our Mapping 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.
- As the dataset covers several years, it can help us see change over time in the city as a whole and in specific neighborhoods.

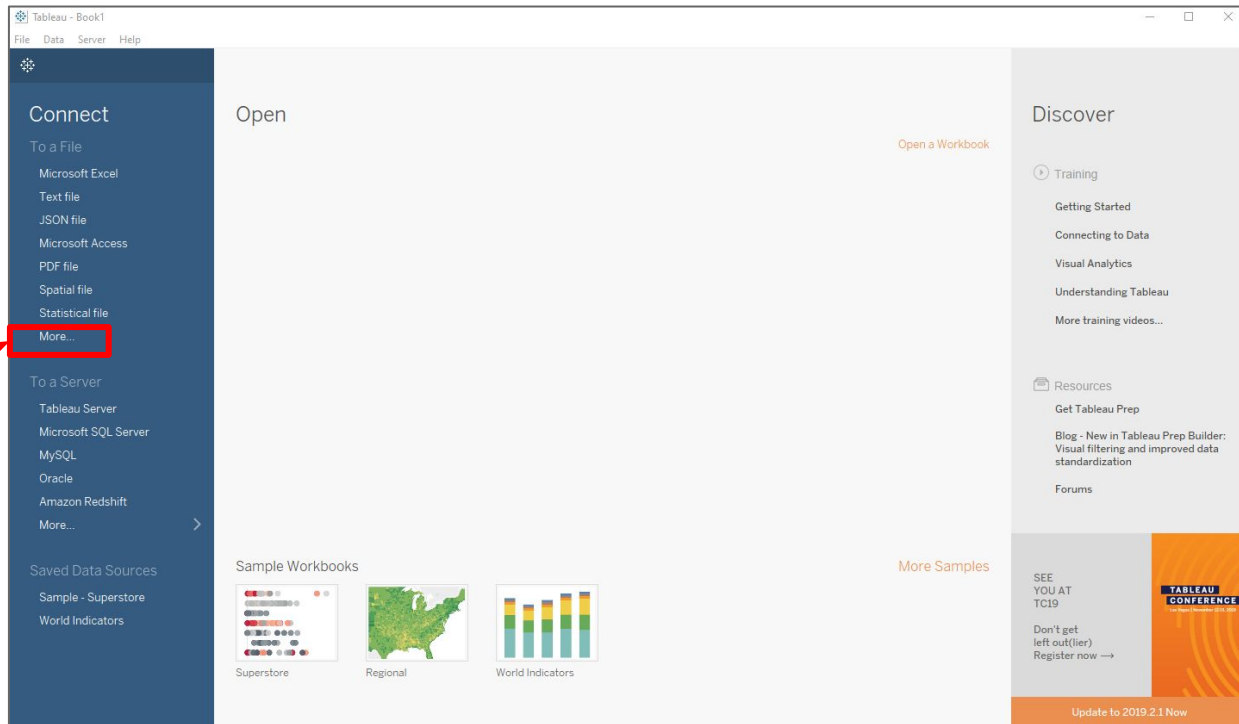


Step One: Connecting to data

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

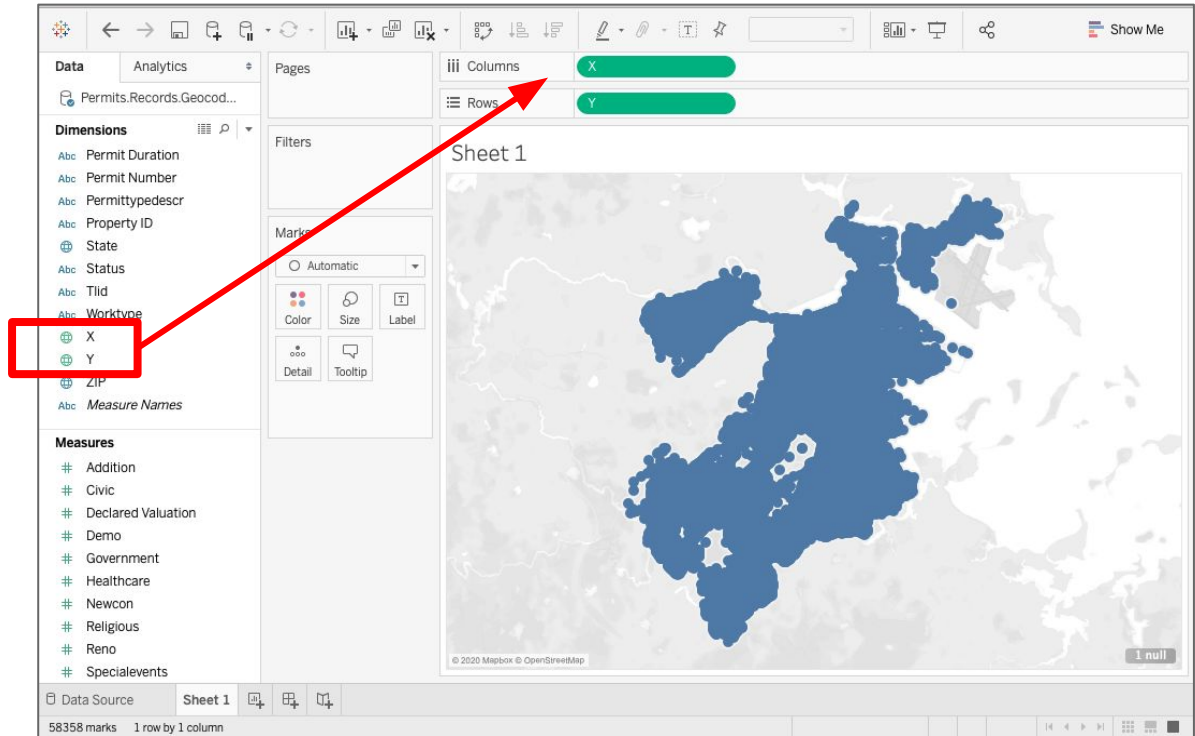
The screenshot shows the Tableau interface with the 'Permits.Records.Geocoded.2018' data source. The 'Columns' shelf contains 'State', 'ZIP', 'Location', 'Property ID', and 'Parcel Num'. The 'Rows' shelf contains 'Parcel ID'. The 'Marks' shelf is set to 'Geographic Role'. A red box highlights the 'Geographic Role' dropdown menu, which is open, showing options like 'Latitude' and 'Longitude'. Another red box highlights the 'Number (decimal)' data type selection for the 'Parcel Num' field.



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.

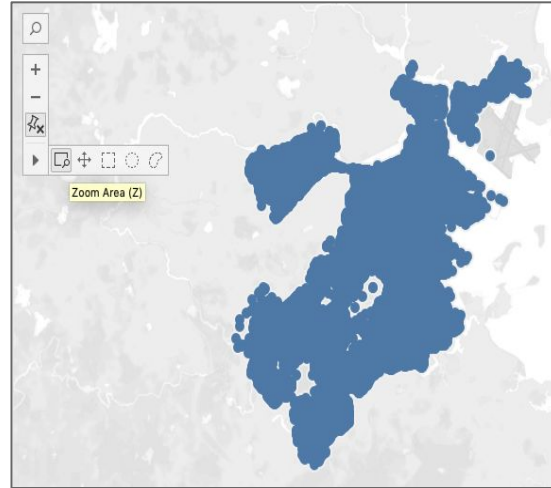
Tableau will automatically plot points based upon those X/Y coordinates.



Step Four: Zoom controls

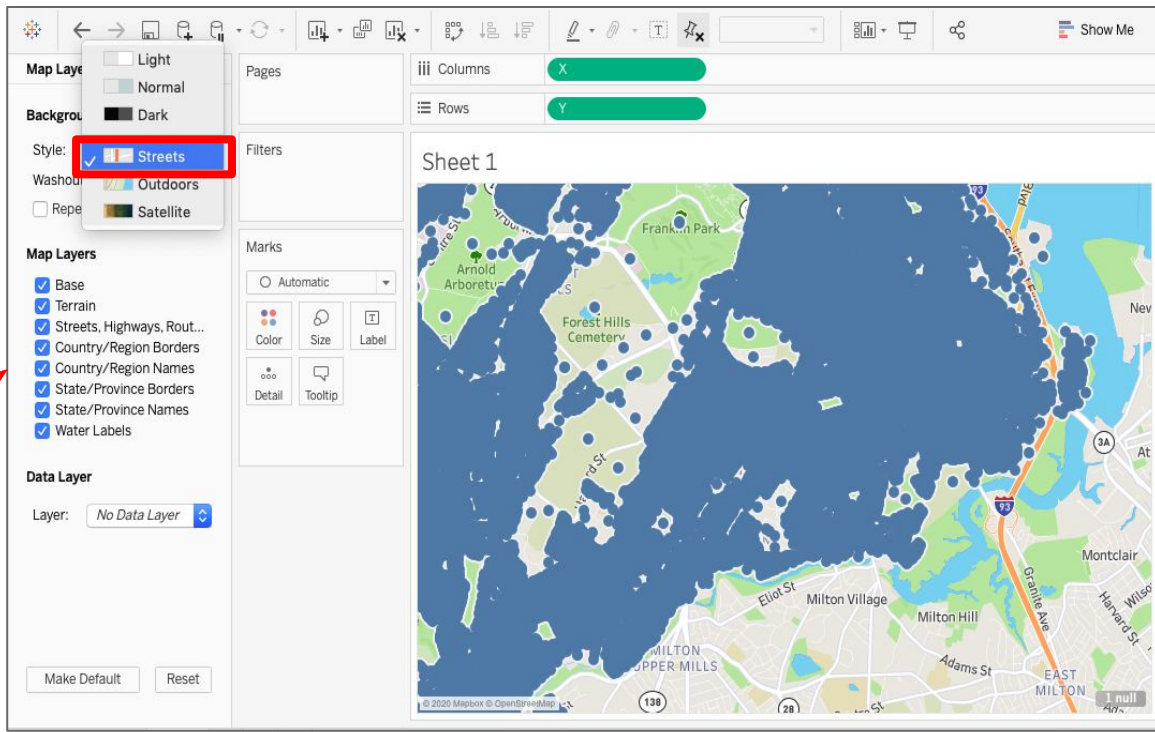
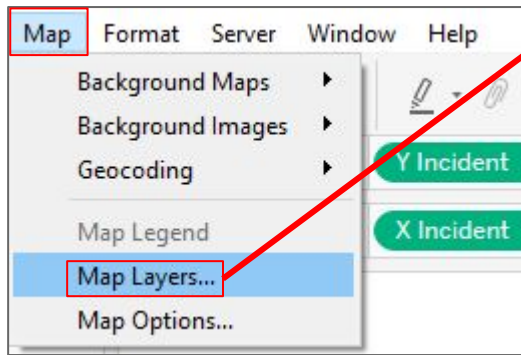
The navigation and zoom controls are in the top left of the plot area.

We have zoomed into the Downtown Boston, Fenway/Kenmore, Jamaica Plain, Roxbury areas.



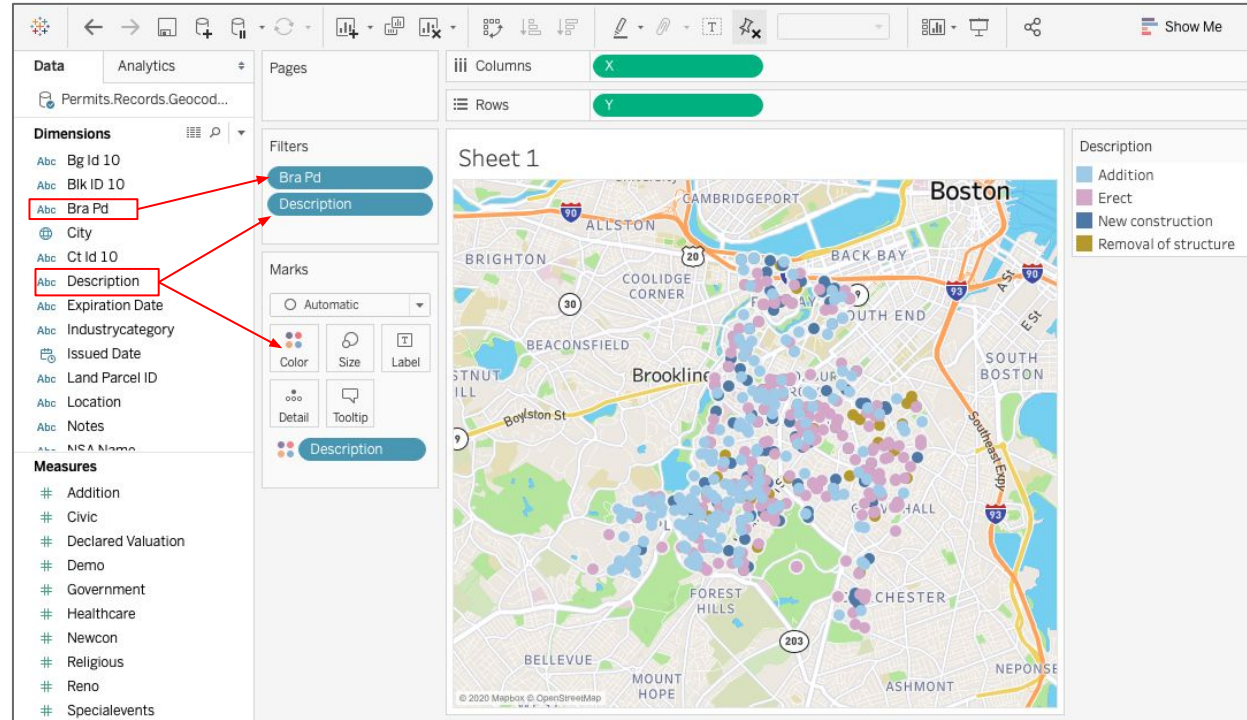
Step Five: Modifying the basemap

- 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.



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.**

The image displays two side-by-side screenshots of the 'Filter' dialog boxes in a software application.

Left Window: Filter [Bra Pd]

- Buttons: General (selected), Wildcard, Condition, Top
- Radio buttons: ☒ Select from list, ☐ Custom value list, ☐ Use all
- Search box: Enter search text
- List of neighborhoods:
 - ☐ Charlestown
 - ☐ East Boston
 - ☒ Fenway/Kenmore
 - ☐ Hyde Park
 - ☒ Jamaica Plain
 - ☐ Mattapan
 - ☐ NA
 - ☐ North Dorchester
 - ☐ Roslindale
 - ☒ Roxbury
 - ☐ South Boston
- Buttons: All, None, ☐ Exclude
- Summary:
 - Field: [Bra Pd]
 - Selection: Selected 3 of 17 values
 - Wildcard: All
 - Condition: None
 - Limit: None
- Buttons: Reset, Apply, Cancel, OK

Right Window: Filter [Description]

- Buttons: General (selected), Wildcard, Condition, Top
- Radio buttons: ☒ Select from list, ☐ Custom value list, ☐ Use all
- Search box: Enter search text
- List of permit types:
 - ☐ Null
 - ☒ Addition
 - ☐ Annual Maintenance
 - ☐ Application to Correct a Vi
 - ☐ Awning
 - ☐ Awning Renewal
 - ☐ Canopy
 - ☐ Canopy Renewal
 - ☐ Capital Improvement
 - ☐ Cellular Tower
 - ☐ Change Occupancy
- Buttons: All, None, ☐ Exclude
- Summary:
 - Field: [Description]
 - Selection: Selected 4 of 69 values
 - Wildcard: All
 - Condition: None
 - Limit: None
- Buttons: Reset, Apply, Cancel, OK



Step Seven: Creating filters results

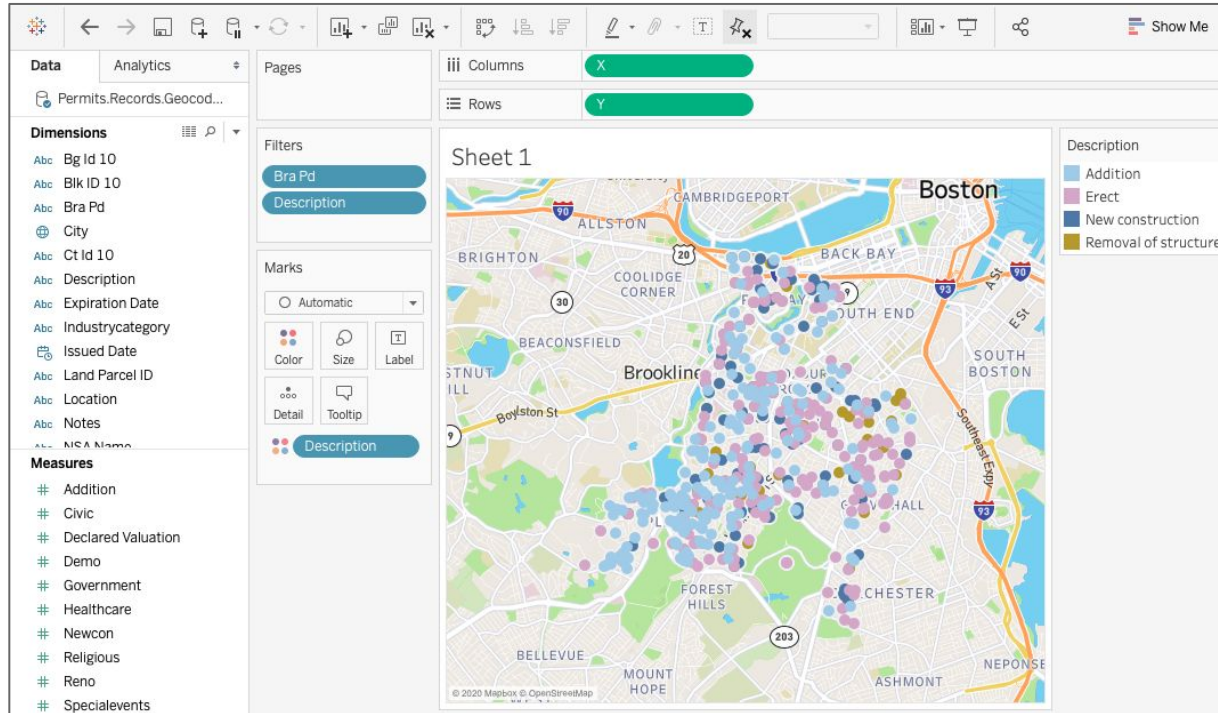


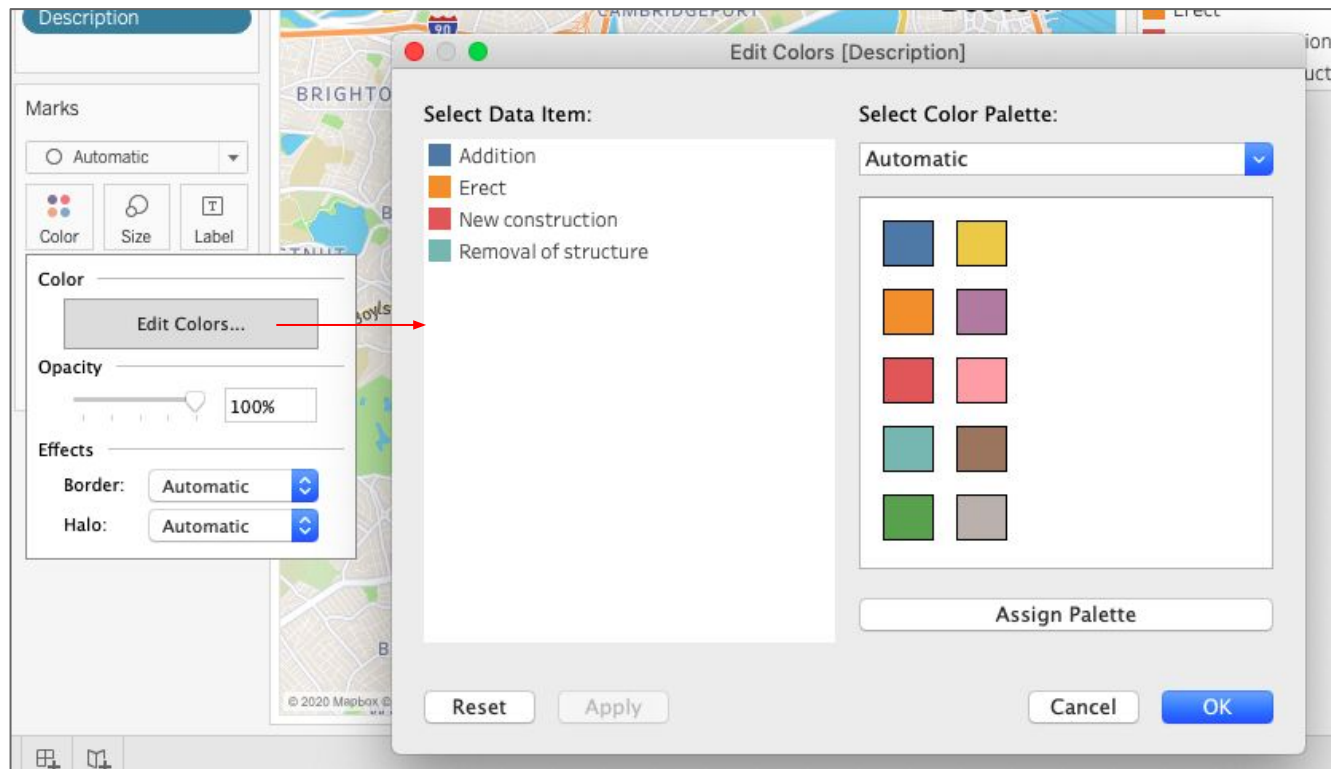
Tableau and Accessibility

- 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.

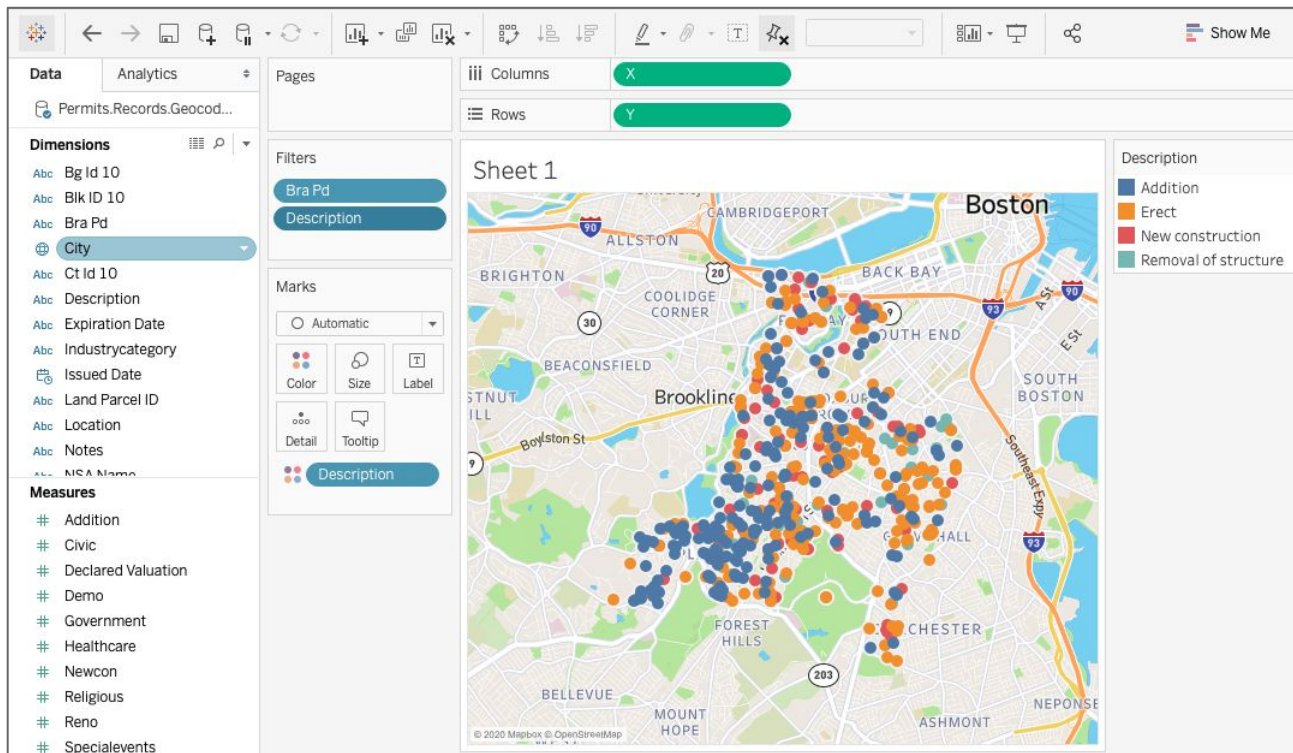


Step Eight: Modifying colors

- 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.



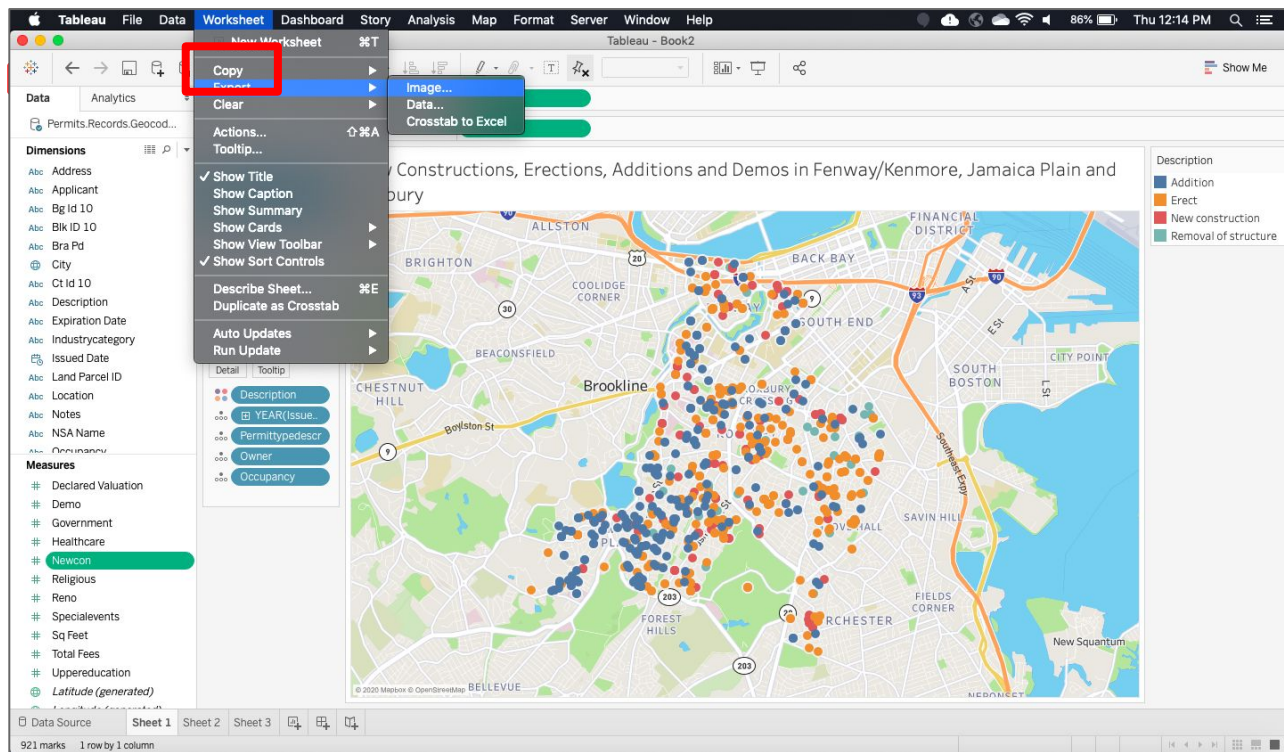
Step Eight: Modifying colors results



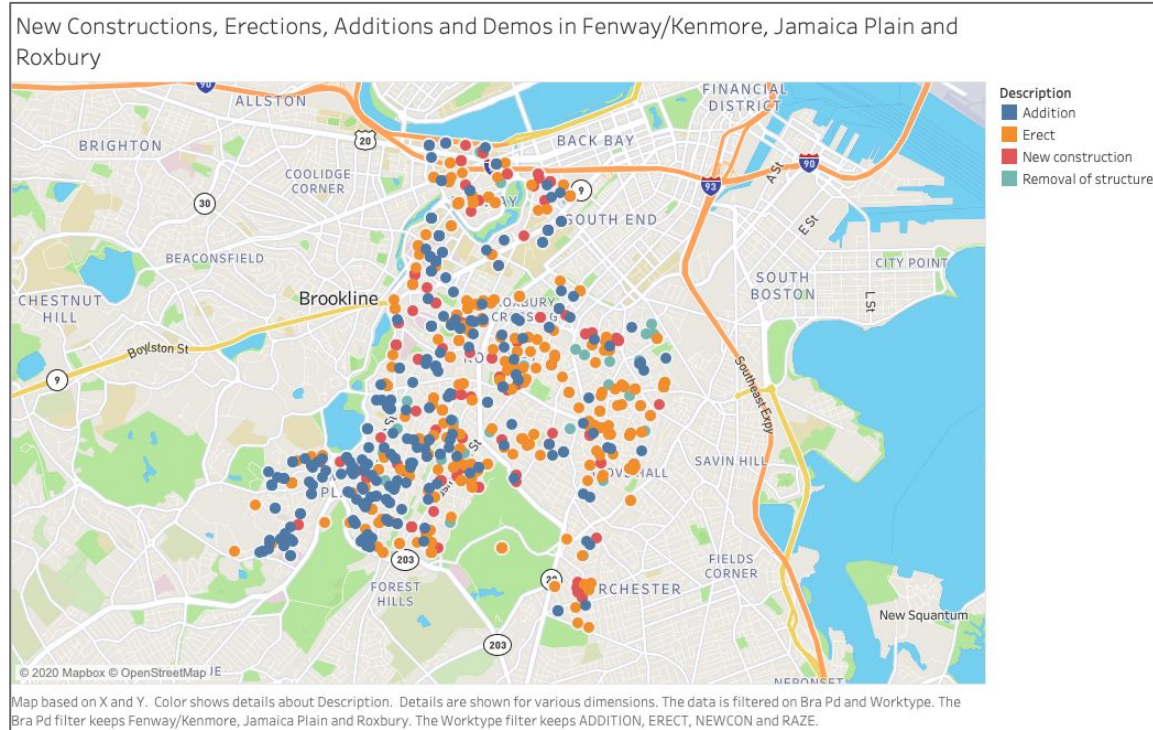
Step Nine: Exporting images

From the **Worksheet** drop-down menu, select **Export**, then click on **Image....**

You can select the type of export then click **Save**.



Exported image



Graphing in Tableau

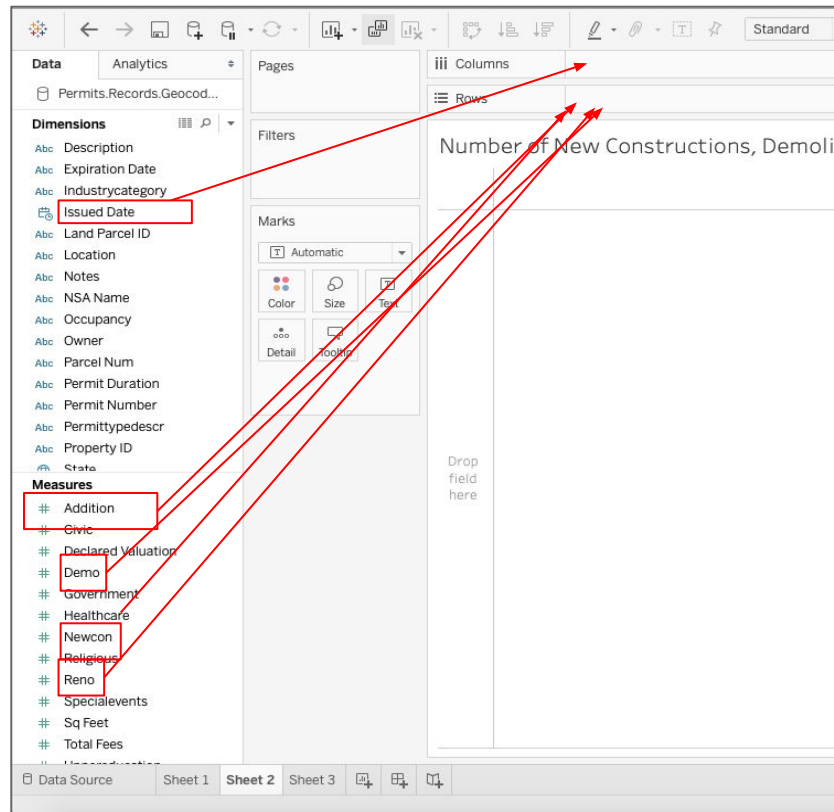


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Graphs with Tableau: Drag & drop

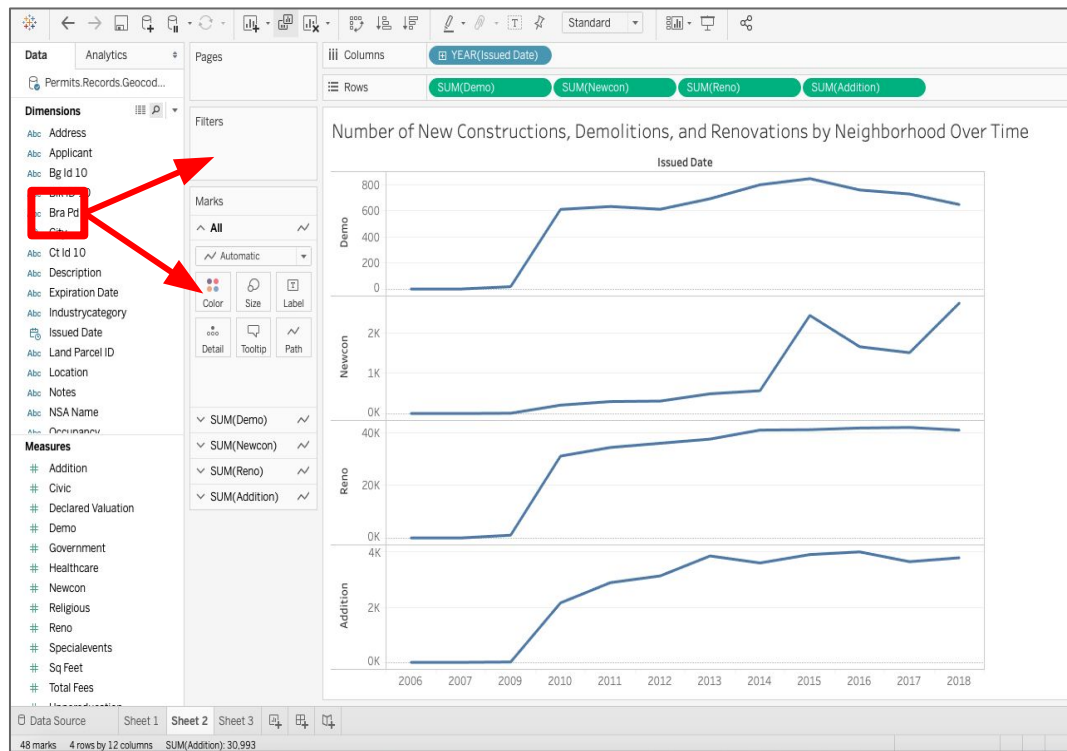
- As with mapping, creating a graph can be accomplished by dragging and dropping our dimensions and measures.
- To map the number of records over time according to permit type, first create a new sheet (click the + sign next to **Sheet 1** at the bottom).
- Next, drag and drop the **Issued Date** dimension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



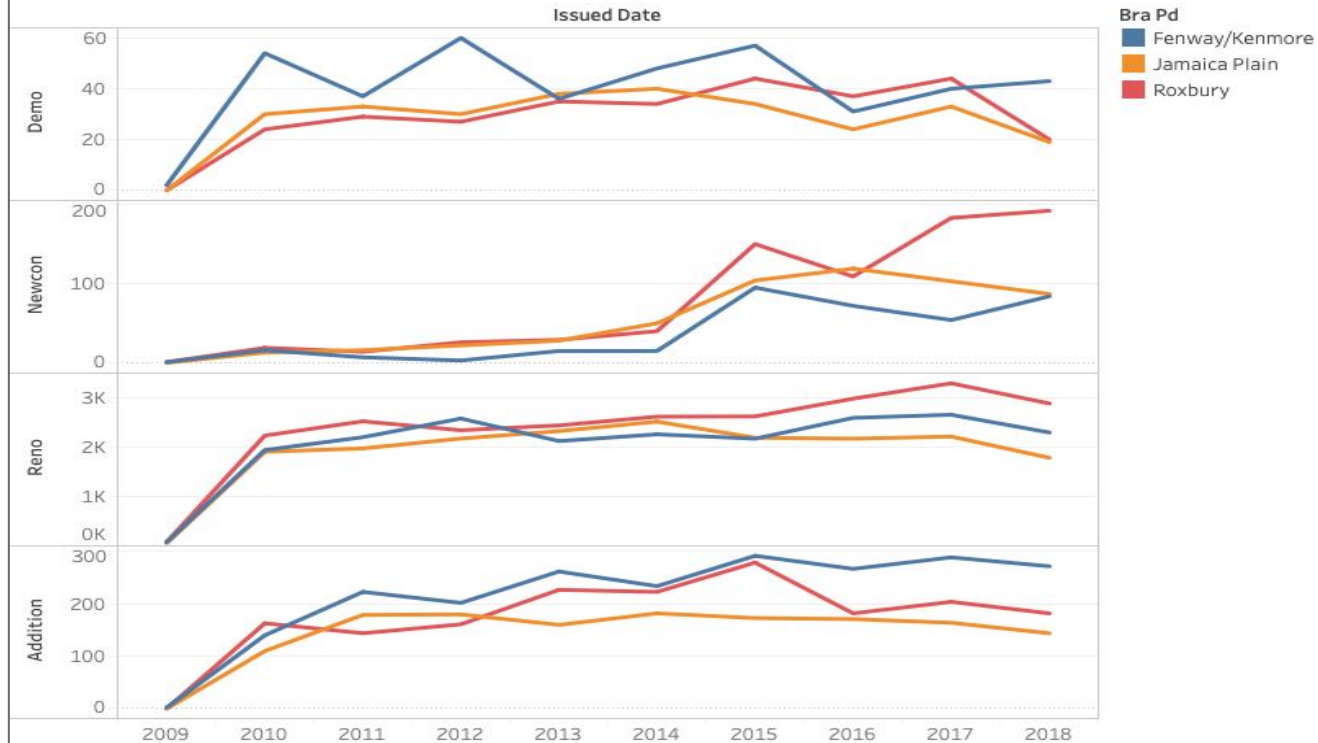
Graphs with Tableau: Drag & drop

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.

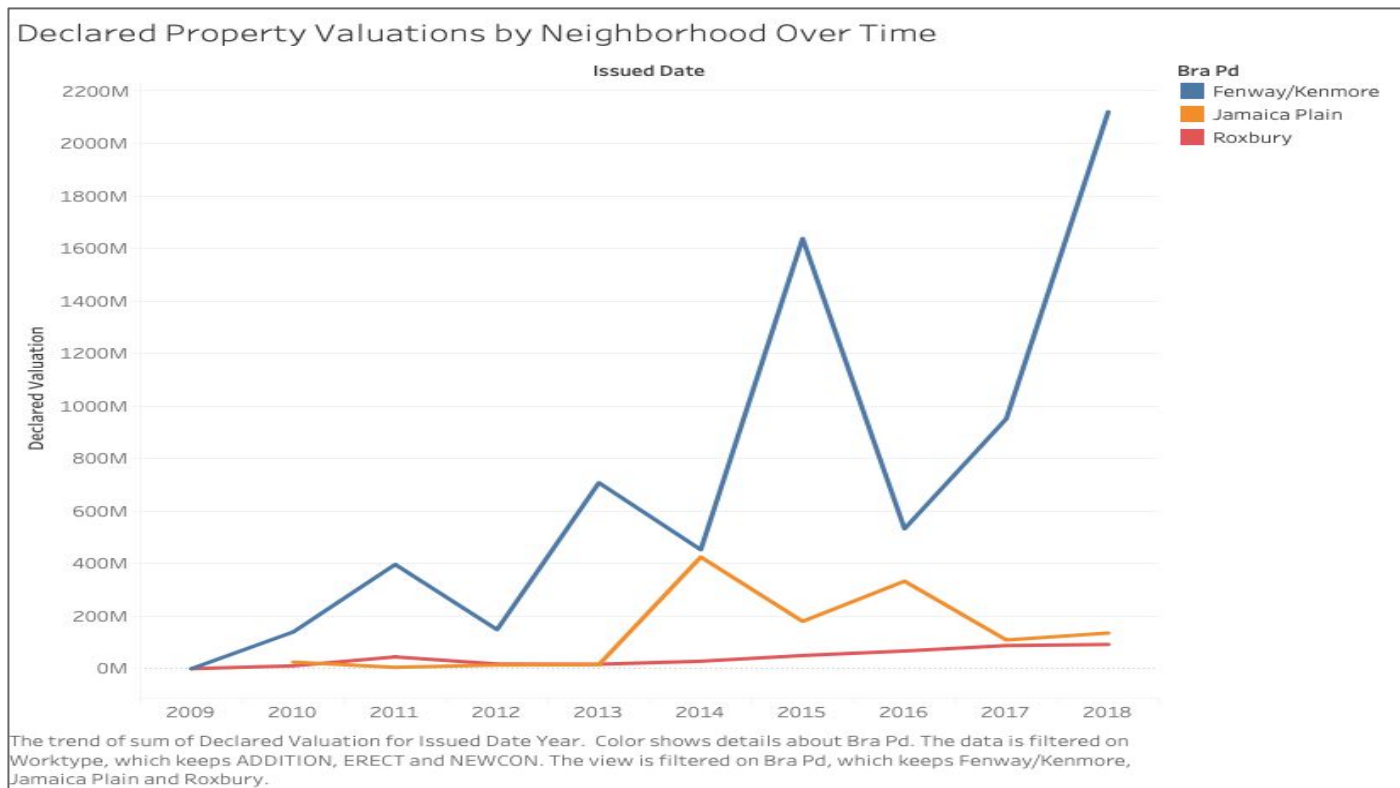


Example research questions

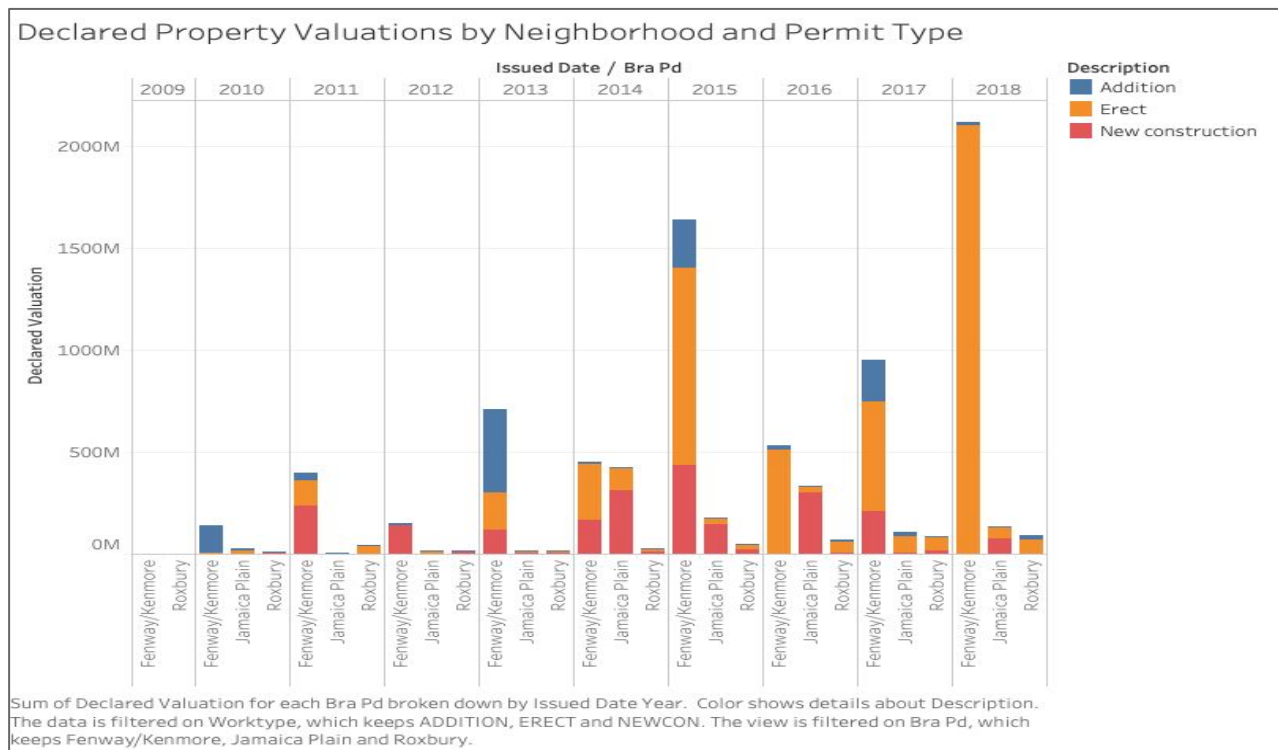
- How much value are new constructions and renovations adding to their neighborhood over time?
- How much value does each type of construction add to each neighborhood's overall valuation?
- What different types of industry are building in these neighborhoods?



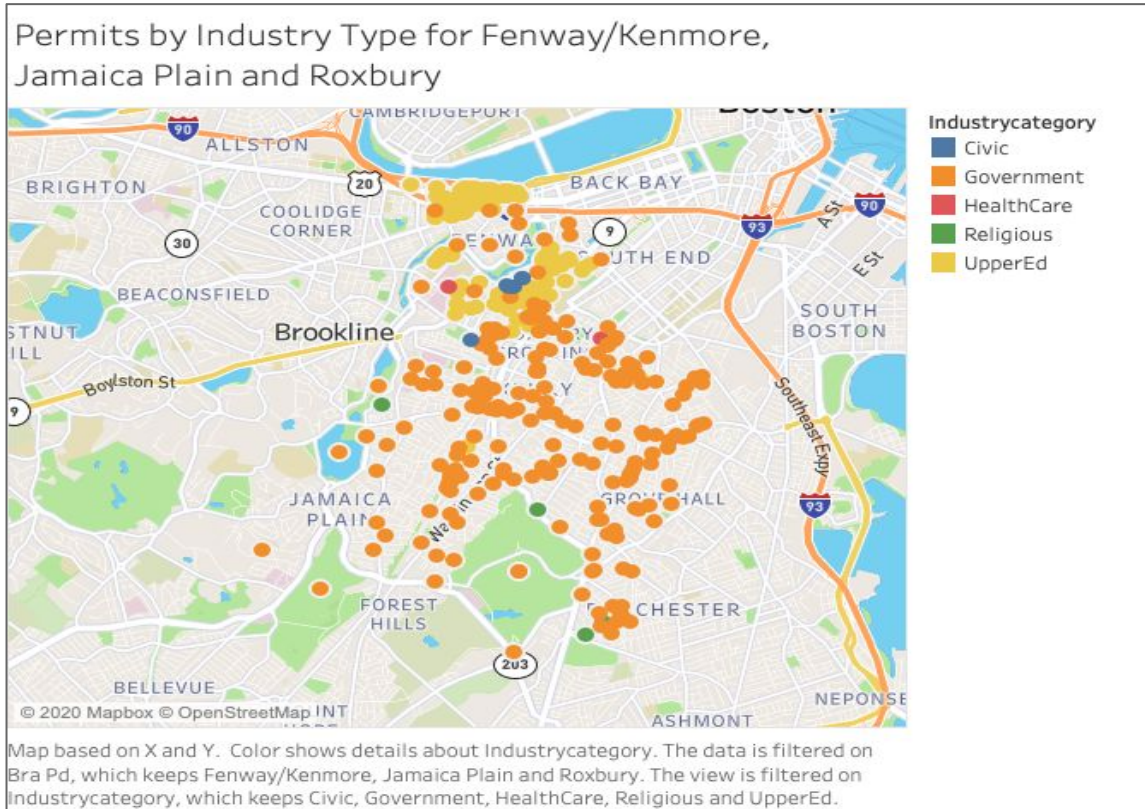
How much value are new constructions and renovations adding to their neighborhoods over time?



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?



Conclusion

Tableau is a powerful tool for quickly mapping coordinate points onto a simple map. Experiment with the many different options available for filtering and displaying data in different ways.

Tableau is also very powerful at creating a variety of charts and graphs, this can easily be done 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

For more powerful mapping software, see ArcGIS, QGIS, or CartoDB.



Thank you!

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Research Fellow

- Slides developed by Jeff Sternberg, Ana Abraham and Juniper Johnson
- If you have any questions, contact us at nulab.info@gmail.com
- Schedule an appointment with us! <https://calendly.com/diti-nu>
- Link to Online Materials:
<https://bit.ly/sp23-drakulich-tableau>
- We'd love your feedback! Please fill out a short survey here:
<https://bit.ly/diti-feedback>



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