VIRTUAL TRAINING GUIDE

Intermediate Tableau Training

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Contents

Exercise #1

Exercise #1.1: Data Prep

In this exercise, we'll follow the following five steps to prepare our dataset for analysis.

Step 1) In Tableau, connect to Intermediate_Tableau_dataset.xlsx

Step 2) Rename the fields in the dataset so that they are more concise and understandable.

Step 3) Check that the data types are correct for each data field.

Step 4) Choose the appropriate data connection type.

Step 5) Click on "Sheet 1" and save the extract file.

Like in the Fundamentals training, we will use a static Excel file containing 311 DC service request data available from the Open Data DC website (http://opendata.dc.gov).

Step 1) Connect to the intermediate dataset
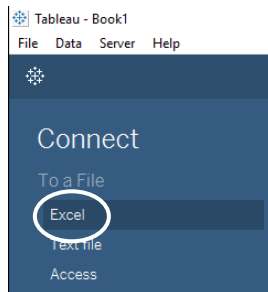
- In the Connect pane, click on "Excel"
- Navigate to the folder where the Excel file for the training is saved.
- Double click on the Excel file for the training to load the data into Tableau.

Step 2) Rename the fields in the dataset so that they are more concise and understandable.

- **Double click** on the field "Servicecodedescription" and **rename** it "Services"
- **Click** the "Tab" key to move over to the next field and rename each as shown below:

Old Name		New Name
Servicecodedescription	→	Service
Servicecallcount	→	Requests
Organizationacronym	→	Agency
Adddate	→	Date Added
Resolutiondate	→	Date Resolved

Abc	#	Abc	Abc	Abc
dataset!2!intm	dataset!2!intm	dataset!2!intm	dataset!2!intm	dataset!2!intm
Services	**Requests**	**Agency**	**Date Add**	**Date Resolved**
Rodent Inspection and Treat...	1	DOH	2015-12-06T08:00:11...	2015-12-24T07:53:36...

Step 3) Check that the data types are correct for each data field. Below is a table that show the Tableau icons that go with each associated Data Type.

Icon	Data type
Abc	Text (string) values
📅	Date values
📅🕐	Date & Time values
#	Numerical values
T|F	Boolean values (relational only)
⊕	Geographic values (used with maps)

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| #	Abc	#	Abc	📅🕐	📅🕐	Abc	⊕	⊕	#
dataset!2!...	dataset!2!intm	dataset!2!intm	dataset!2!intm	dataset!2!intm	dataset!2!intm	dataset!2!intm	dataset!2!intm	dataset!2!intm	dataset!2!intm
F1	**Services**	**Requests**	**Agency**	**Date Add**	**Date Resolved**	**Servicerequestid**	**Latitude**	**Longitude**	**Ward**
1	Rodent Inspection and Treat...	1	DOH	12/6/2015 8:00:11 AM	12/24/2015 7:53:36 AM	15-00331005	38.900399	-76.990936	6

Step 4) Choose the appropriate data connection type.

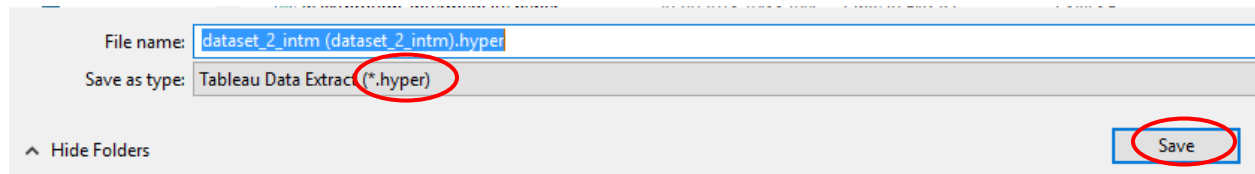- For today's training we'll use an extract connection since we are working from a flat file.

Connection
○ Live   ◉ Extract   Edit   Refresh
Extract will include all data.

Step 6) Save Extract file

- Click on "Sheet 1" in the bottom left corner
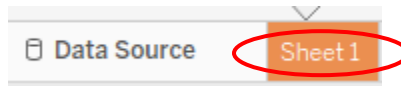
- Save the extract file (.hyper) to your computer

Exercise #1.2: Simple Visualizations

Asking Questions to Understand the Data

1. **How many agencies are in our dataset? And which agency has received the most requests?**

   - In the Data Window on the left side of the screen, double click on "Agency" in the list of dimensions.

   - Double click on "Requests" in the list of measures.

   - In the toolbar, click on the "Show Mark Labels" icon to show the total requests per agency in the bar chart.
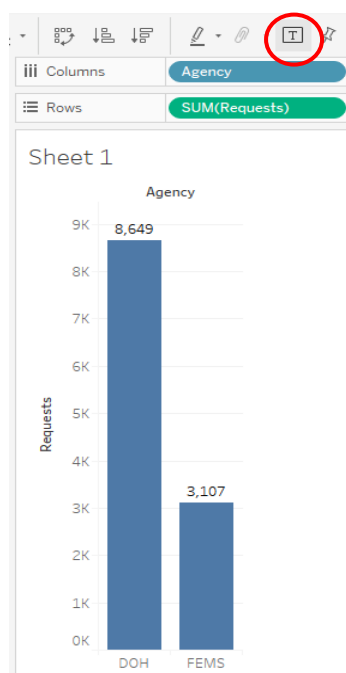
2. What are the most requested services by agency?

- Drag the "Services" from the list of dimensions to the columns shelf
- In the toolbar, click on the "Sort Descending" icon to display the services for each agency from greatest to least.
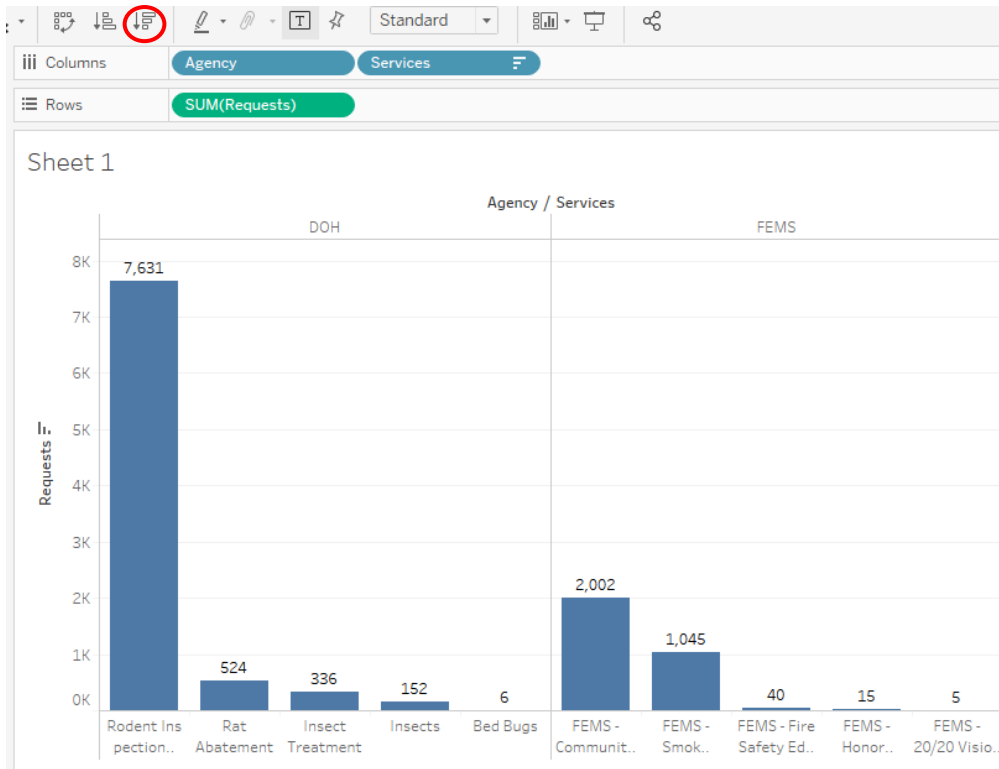

3. How many years of data are in the dataset?

- Remove the "Agency" and "Services" pills from the view since the question does not ask about either of these fields.
- Double click on "Date Add" to bring in a date field into the view.
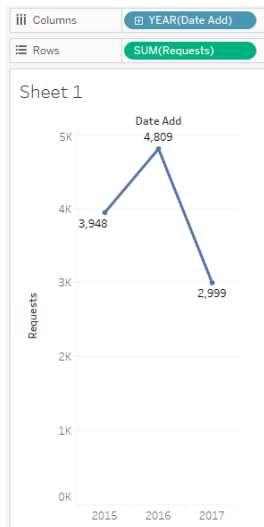
4. **How many years of complete data are in the dataset?**

- Drill down from "Years" to "Months" to see the number of requests for each date part. Notice that there is just one month of data for the third quarter of 2017.
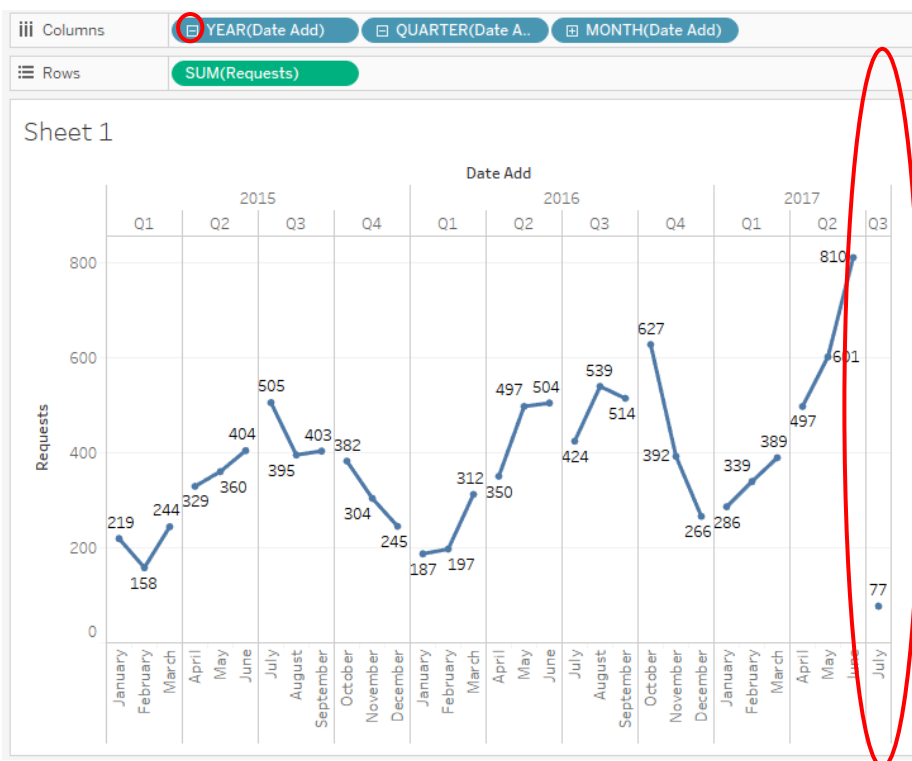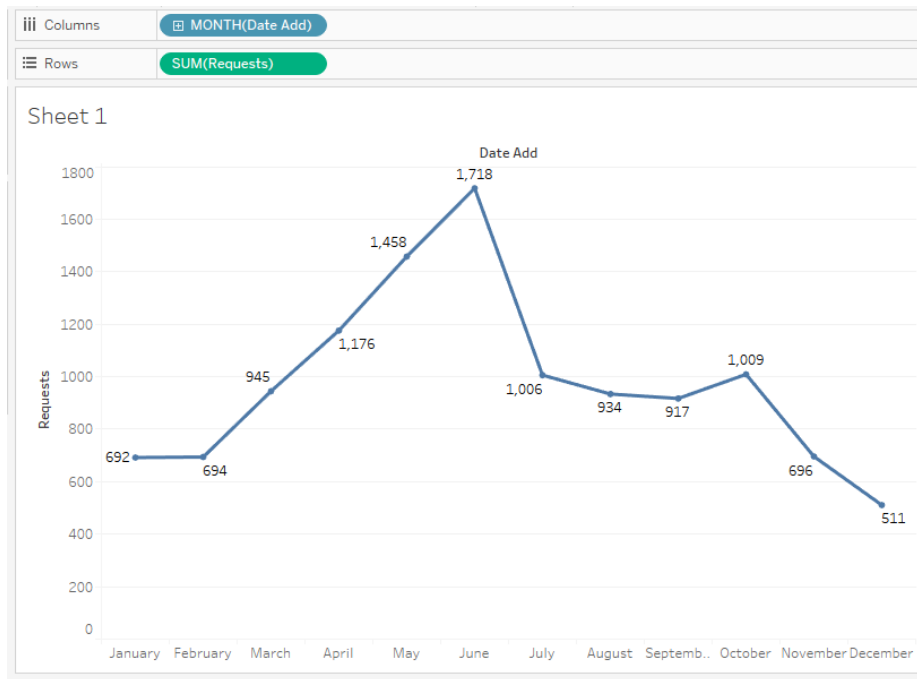

Exercise #1.3: Quick Data Analysis

Quick Data Analysis – step-by-step instructions

Question 1: What **patterns** emerge when we look at *all* service requests in the dataset by month? Which month has the **most** requests? Which month has the **least** requests?
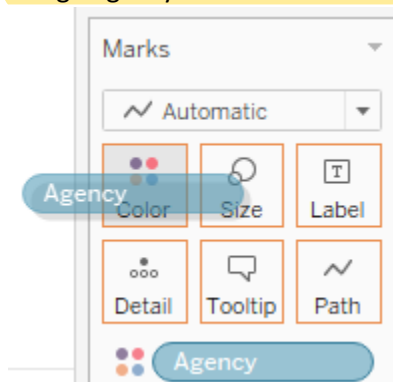
Step 1: Using the above visualization, drag off the "Year" and "Quarterly" pills from the columns shelf.

Question 2: How many requests did **DC Health** receive in **June 2017**?

Step 1: Starting from the visualization in the above step, follow these steps:

- o Bring "Agency" to the "Marks Card" and place it on color

- o Bring "Date Add" to the filter pane.
- o Select "Years" in the dialog box that opens.
- o Place a check mark next to each year.

Filter [Year of Date Add]

General | Condition | Top
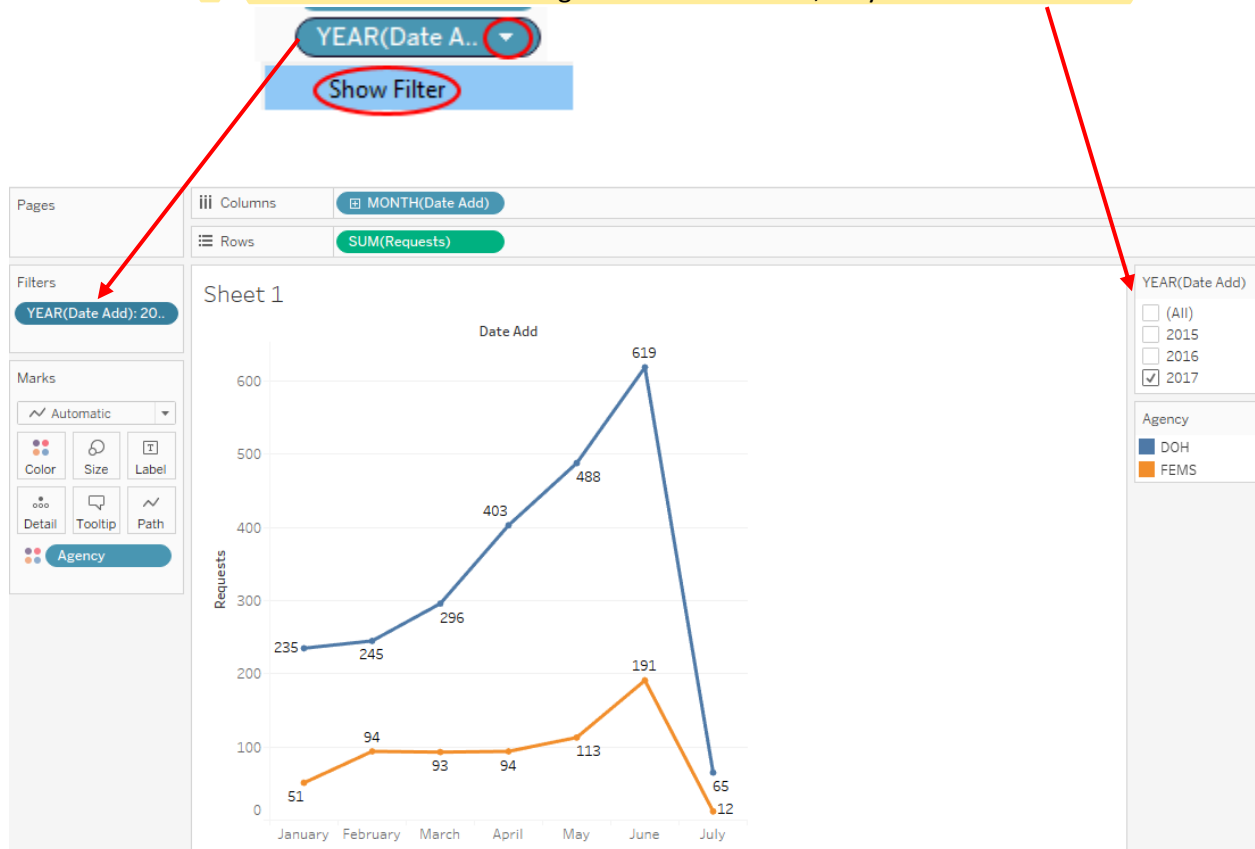
◉ Select from list ○ Custom valu

Enter search text

☑ 2015
☑ 2016
☑ 2017

○ Click "OK" to close the filter dialog box.

○ In the filters shelf, click on the "Year" pill and select "Show Filter"
○ In the YEAR filter on the right side of the screen, only select data for 2017.
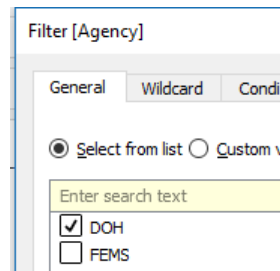
YEAR(Date A..) ▼

Show Filter

The viz now makes it possible to answer question #2: How many requests has DOH received in June 2017?

Question 3: During **which month** in **2017** did **DC Health** experience the **largest increase** in requests?
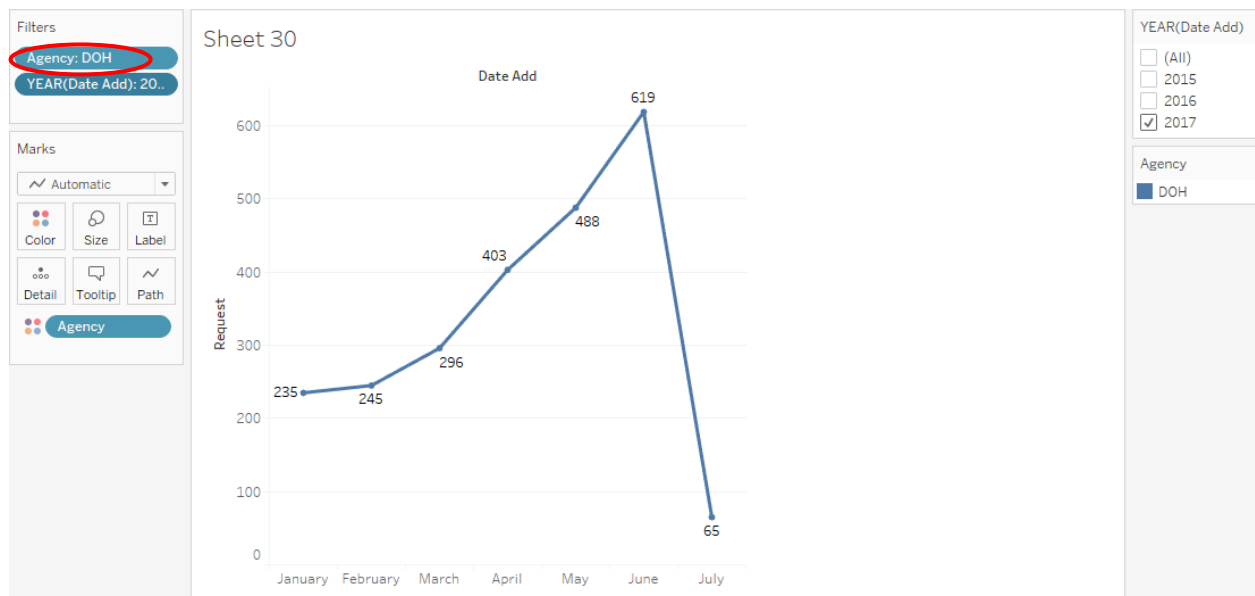
Step 1: Starting from the visualization in the last step, create a view that shows the monthly requests just for DOH.

- Bring "Agency" to the filter shelf and create a quick filter for DOH

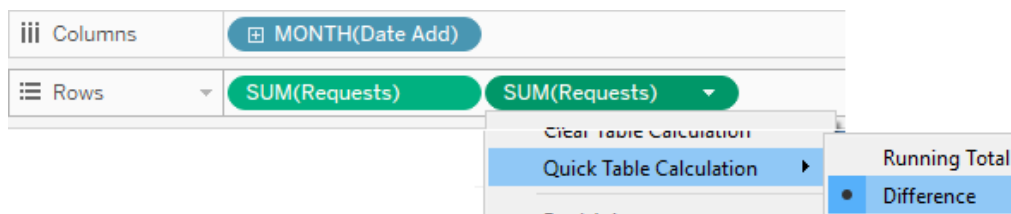- Click "OK" to close the filter window.

Now we can see the monthly number of requests DC Health has received each month in 2017.
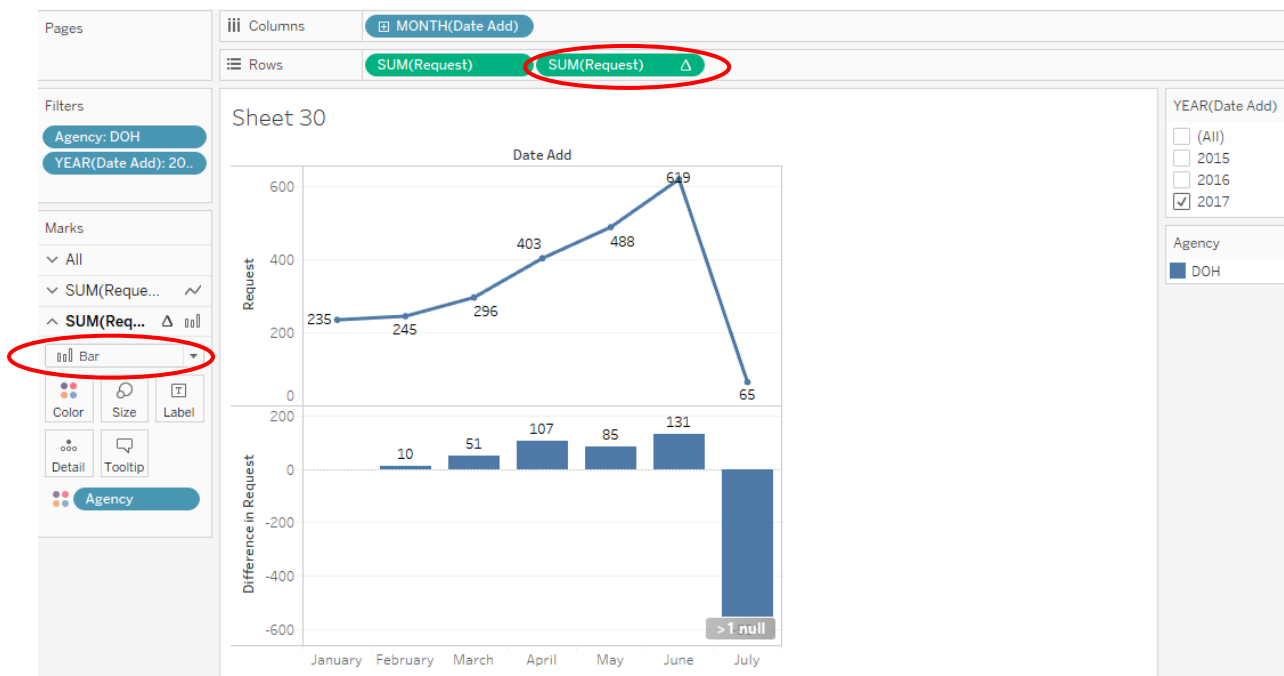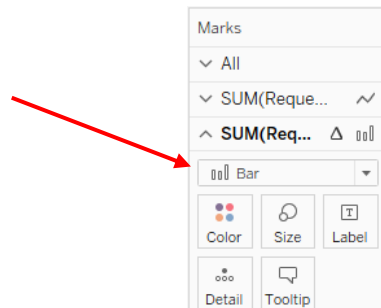

- Double click on "Requests"

Now there are two "Requests" pills in the rows shelf.

- In the second "Requests" pill in the rows shelf, click on the dropdown arrow, select "Quick Table Calculation" and then "Difference"

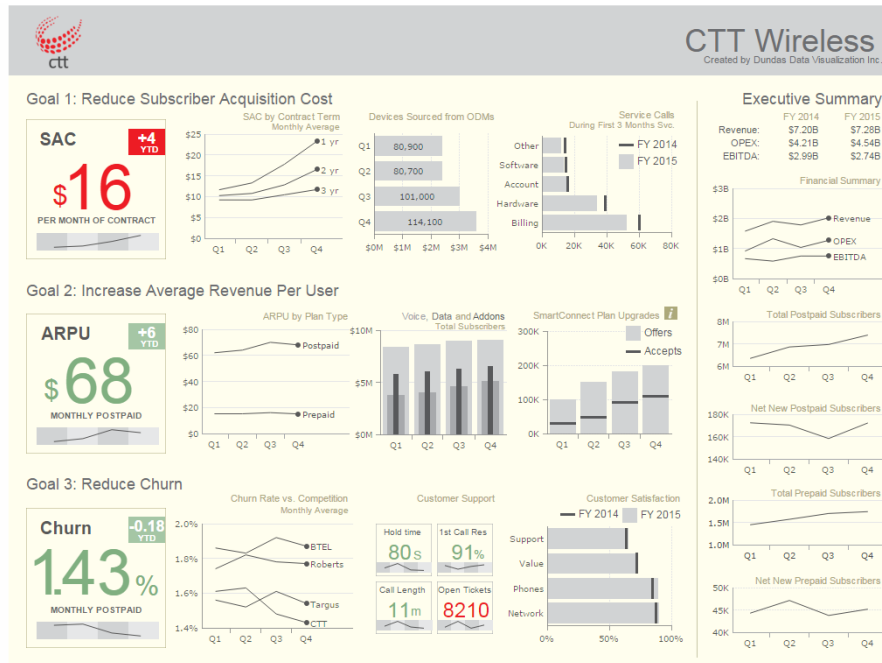- In the bottom layer of the marks card, change the chart format from "automatic" to "Bar"

The viz now makes it possible to answer question #3: During **which month** in **2017** did **DC Health** experience the **largest increase** in requests?

*****STOP*****

Module A: Identify the Audience

- Lecture on effective dashboards
- Model dashboard

Module B: Using Layout Containers to Draft an Executive Dashboard

Layout containers help organize content in dashboards.

Step 1: Identify Audience -- DC Health Leadership

Step 2: Format Dashboard

Looking at our model dashboard, there are three rows of information; dashboard title and two goals.

- Use four horizontal containers to create the four rows in the layout and give us control over the width of the supporting visualizations for each goal.
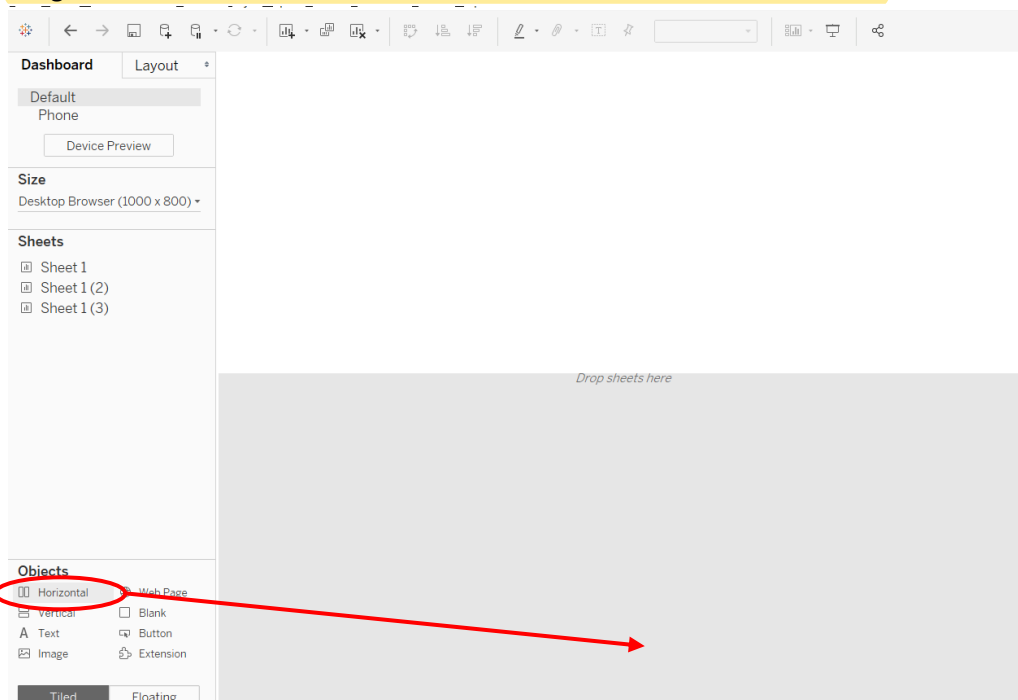
Row 1	**Title**
Row 2	**Goal 1**
Row 3	**Goal 2**

- Click on the "New Dashboard" icon
- Name the new dashboard "Executive Dashboard"

- **First**, drag a "Horizontal" container into the center of the blank page from the "Objects" menu.
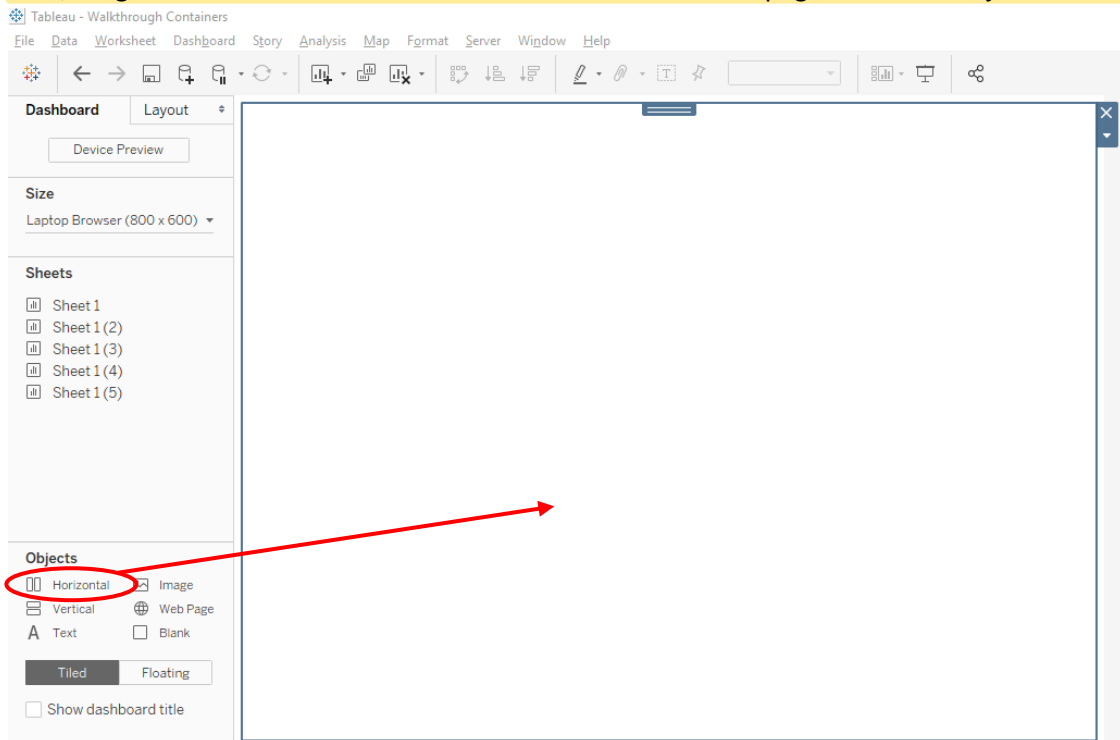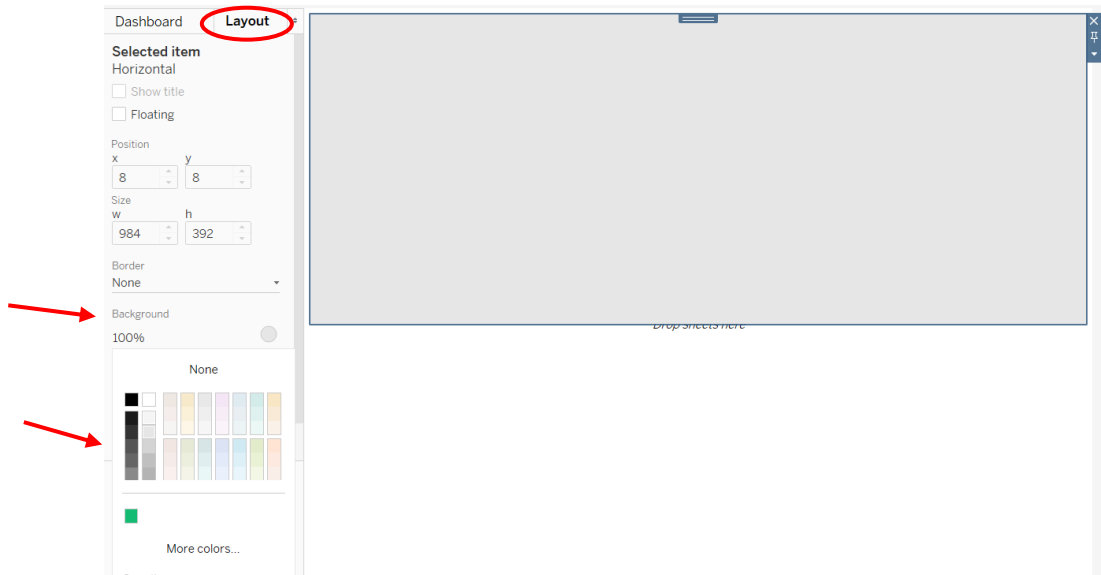

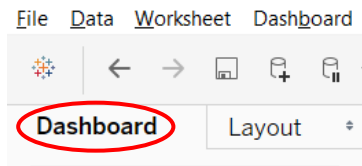- Drag one additional horizontal container to the bottom of the dashboard`

- Change the shading of each container
    - Click on the "Layout" tab
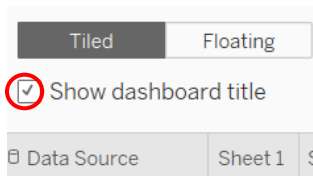   - Click on a container to select it
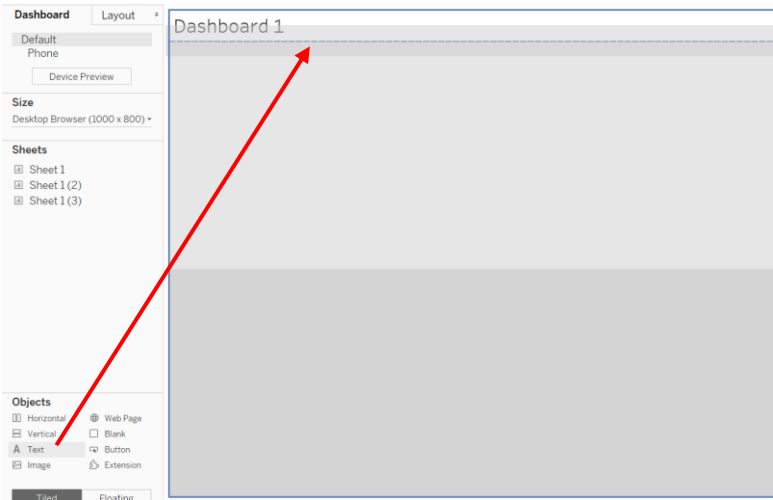
o Add a background color

- Click back on the Dashboard tab in the upper-right corner of your screen.
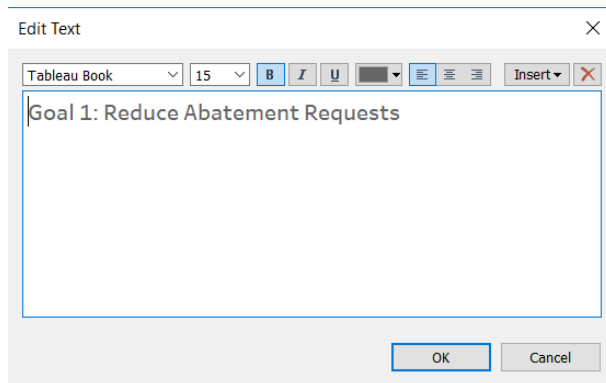

- Select "Show dashboard title" in the bottom-left corner of your screen. This creates a placeholder title.

- Go back to the "Dashboard" tab
- Add in Text objects above each of the containers. In the text box, we can write in DC Health's goals.
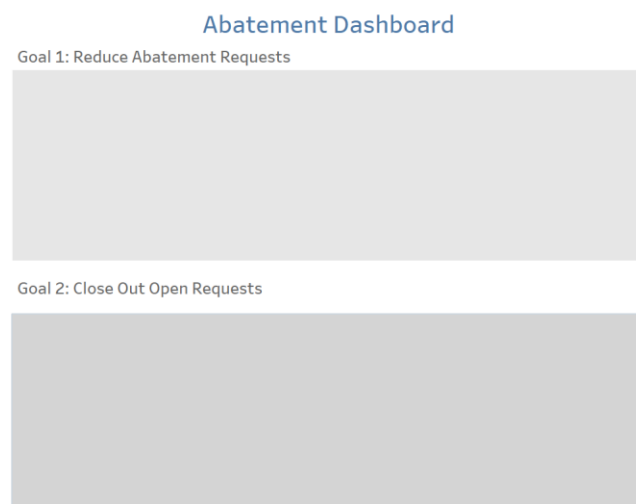
- In the text box, type in DC Health's first goal like in the image below.
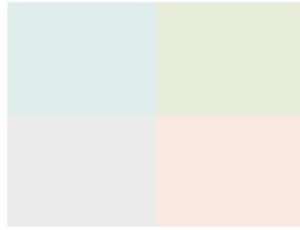- Increase the font size and make the text bold.

- Add a title to your dashboard

Your dashboard should look like this:

Exercise #3: Layout Containers

In a new dashboard, create a layout in Tableau like the one in the below image.

1) Click on the "New Dashboard" icon
2) Rename "Dashboard 2" as "Practice Layout"
3) In the "Size" dropdown, change the size of the layout to "Laptop Browser (800 X 600)"
4) Create a grid layout with **four vertical containers**
5) Click on the layout container tab.
6) Give each container a different background color to create a layout like the one above
7) Add a title to your dashboard
   a. Click back on the dashboard tab in the top left of your screen

   Dashboard   Layout   ⬍

   b. Select "Show dashboard title" in the bottom left

   ☑ Show dashboard title

Challenge:

1. Replicate the layout that DC Metro uses in their executive dashboard by following these steps:

   a. In a browser, search for "Tableau Public", click on in the top right corner, and search for "DC Metro scorecard." Alternatively, open the dashboard by clicking here.

   b. Download the Tableau Workbook.

   c. Open the file in the bottom-left corner.

   d. In the dashboard, click on the "Layout" tab

   e. Review the dashboard's layout in the "Item Hierarchy"

   Item hierarchy
   ScoreCard
       🖼 doingdata.png
       ⅈ Title

   f. In Tableau Desktop, try to replicate the layout of the dashboard using layout containers. Do this in a new dashboard called "Layout Practice."

Module C: Aggregation and Big Numbers

Now that we have determined who are audience is and what they want to know, we need to filter out unrelated data.

- Click on Data Source tab in bottom-left of your screen.
- In Data Source page, click on filter in top-right of screen
- Filter out agencies that are not DC Health.

Now we can begin creating metrics in our DC Health Executive Dashboard

Year-to-date company metric.
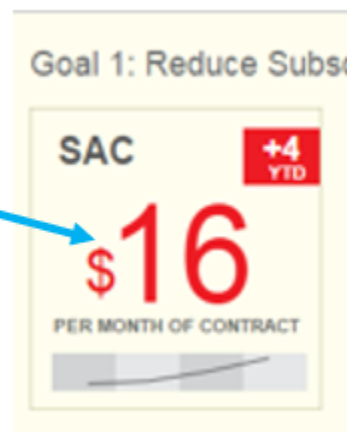
Step 1: Click on the new sheet icon in the bottom right corner.

Step 2: Double click on the new sheet and name it "Requests YTD".

Step 3: In the "Requests YTD" sheet, double click on "Date Add" and "Requests" in the data pane.

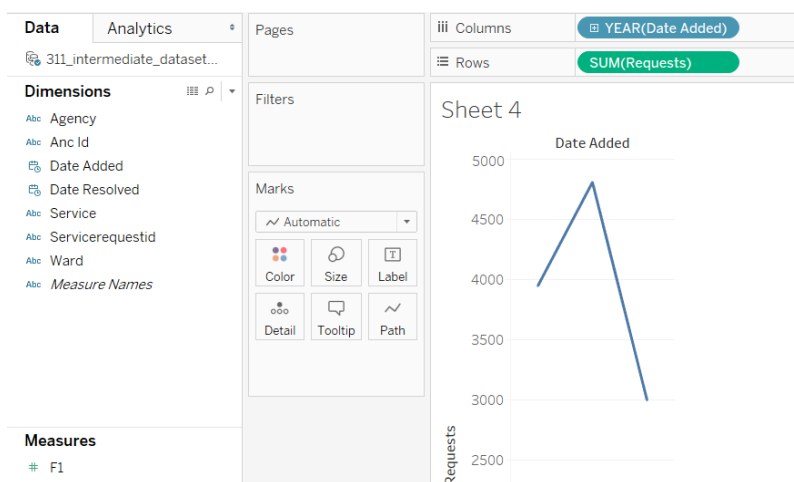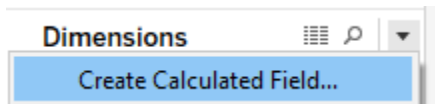*Isolate the number of requests for the most recent year in the dataset, with a calculated field. Looking at our line chart, we know that 2017 is the most recent year.*

Step 4: Click on the dropdown arrow to the right of the "dimensions" header and select "Create Calculated Field…"

Step 5: Name the new variable "Current Year"

One way to write the calculation is to hard code the year we want, in this case 2017.

IF YEAR([Date Added]) == 2017 THEN [Request] END

Problem: *This calculation tells Tableau to only return results for the year 2017. This is problematic if data from more recent years are added to the dataset. It would require the dashboard owner to update the calculation each year.*

Solution: *Instead, the calculation can be automated. By using the below calculation, we can tell Tableau to identify the most recent year in the dataset and aggregate the number of requests for that year (Syntax #2 from Word document).*

SUM(IF DATEDIFF('year', DATETRUNC('year',[Date Added]),{MAX(DATETRUNC('year',[Date Added]))})=0
THEN [Request]
END)

Step 6: Add the automated syntax for the current year into the calculated field dialog box

Step 7: Click OK

In another calculated field, create the metric called "Previous Year" using the below syntax (Syntax #3 from Word document). We will want to be able to compare the current and previous years to each other.

**Step 8:** Follow the same steps you took to create the "Current Year" metric

> **SUM(IF DATEDIFF('year', DATETRUNC('year',[Date Added]),{MAX(DATETRUNC('year',[Date Added]))})=1**
> **THEN [Requests]**
> **END)**

Big Number Metric Formatting

Use Show Me to format your metric

Step 1: In Tableau, click on the new sheet ⬚ icon in the bottom right corner.

ests YTD **Current YTD**

Measures

Step 2: Double click on the new sheet and name it "Current YTD"
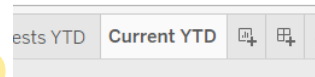
≠# Current Year

Step 3: From the data pane, double click on "Current Year"
- o   This will produce a bar chart

Step 4: Change the format of the viz from a bar chart to a number
- Click on ⬛ Show Me in the upper-right corner and select the text table option

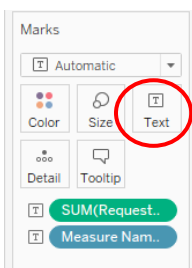*Now your visualization should look like the following:*
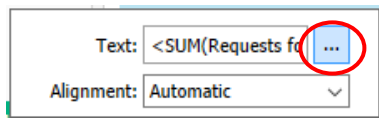
Current YTD

2,351

Font Size

Use the marks card to increase font size

Step 1: Clicking on "Text" in the Marks Card
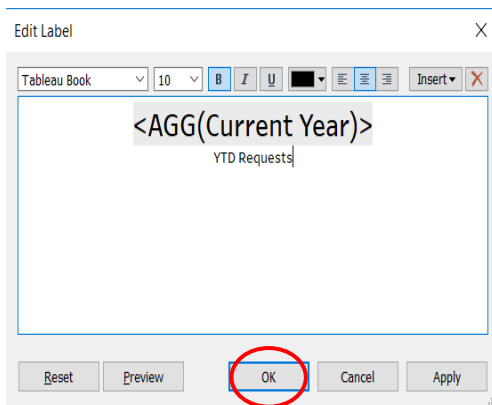
Step 2: Clicking on the "…" icon

In the new dialog box, we now have the option to change the format of the metric and give it a descriptive name.

Step 3: Increase the font *size to 20* for <SUM(Current Year)> ; use **BOLD** font.

Step 4: Click "Enter" on the keyboard and type in a descriptive name for the metric like "YTD Requests"

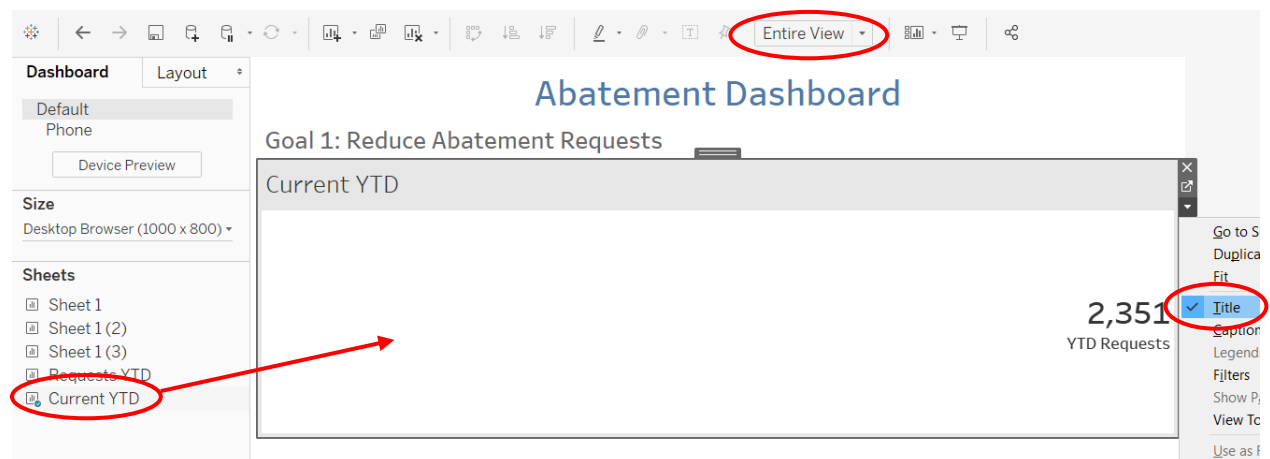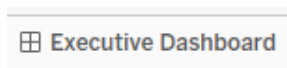**Step 5:** Decrease the font *size to 10* for the "YTD Requests".

Add Big Number Metric to Dashboard

Now add the BIG number viz into your Executive Dashboard in the Goal #1 container.

Step 1: Click back on the "Executive Dashboard" tab

Step 2: Drag the **Current Year** sheet into the horizontal container underneath **Goal 1.**

Step 3: Change the fit size to "Entire View"

Step 4: Click on the dropdown arrow and unselect "Title"

Module D: Change from Current YTD vs. Previous YTD

Learning takeaway: Quick table calculations are not correct if an incomplete time period is compared to a complete time period. To find year-to-date changes, data in the viz first needs to be filtered so that there are comparable time periods before applying a table calculation to find the rate of change.

Following our model dashboard, the next visualization needs to show the year-to-date percentage change in the number of requests DC Health has received. In addition, the visualization needs to show whether the year-to-date trend is making positive or negative progress toward the organization's goal. Color is an effective way to communicate the direction of the trend.

Direction of year-to-date change.
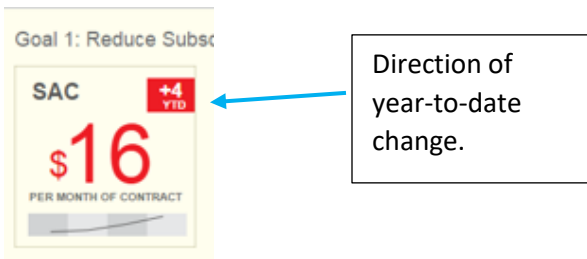
Show the number of requests for the most recent and prior year by year and month

Step 1: Create a new sheet

Step 2: Name the sheet "YTD Change"

Step 3: Double click on **Date Added**

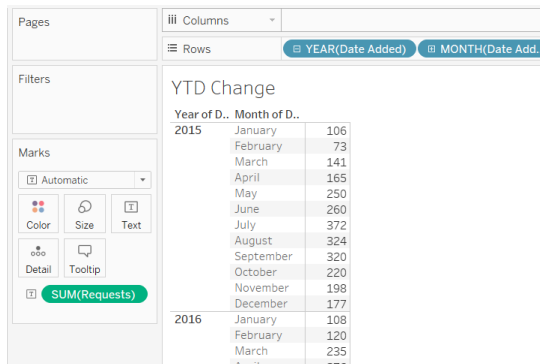- Drill down from Years to Months

- Remove the Quarter pill by clicking and dragging it off

Step 4: Double click on **Requests**

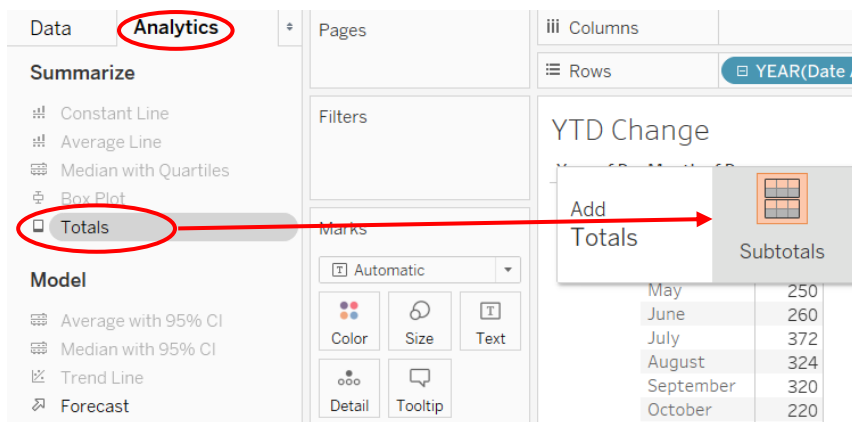**Step 5:** Transpose the rows and columns by clicking on the [icon] icon in the toolbar at the top of the page.

Step 6: Add in subtotals to the table of data to see the total requests each year.

- Click on the Analytics tab
- Drag "Totals" on top of "Subtotals"

Problem: We could use a quick table calculation in Tableau to calculate the change in requests from one year to the next, but Table calculations evaluate all the data present in the visualization. Since 2017 is an incomplete year – with data only through July 6, 2017 -- we cannot compare all of 2016 to part of 2017.

2016	January	108
	February	120
	March	235
	April	276
	May	384
	June	400
	July	322
	August	434
	September	414
	October	463
	November	318
	December	218
	Total	3,692

2016: complete year

2017	January	235
	February	245
	March	296
	April	403
	May	488
	June	619
	July	65
	Total	2,351

2017: incomplete year

Solution: *Apply a filter so that the same period of time is being compared in 2016 and 2017 before calculating the percentage change.*

Create a dynamic year-to-date calculation

Step 1: Create the YTD metric

- **Calculation 1:** Create a calculated field called **Max Date** to find the maximum date in the dataset.

$$\{MAX([Date\ Added])\}$$

The MAX function returns the maximum or highest value across all records.

- **Calculation 2:** Create a second calculated field called **YTD**

(MONTH([Date Added]) < MONTH([Max Date]) OR (MONTH([Date Added]) = MONTH([Max Date])

AND DAY([Date Added]) <= DAY([Max Date]))) AND YEAR([Date Added]) >= YEAR([Max Date])-1

Interpreting the syntax: Take all values where the year the request was made is less than or equal to the maximum year in the dataset, where the month is less than or equal to the maximum month, and where the day is less than or equal to the maximum day. Do this for the most recent year and the year before it.[1]

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[1] Month To Date syntax: (YEAR([Date Add]) <= YEAR([Max Date]) AND DAY([Date Add]) <= DAY([Max Date])) AND YEAR([Date Add]) = YEAR([Max Date])AND MONTH([Date Add]) >= MONTH([Max Date])-1

Step 2: Bring the YTD metric to the filter pane to exclude any dates with missing data from the viz.

- Drag the "YTD" metric to the filter pane
- From the filter selections, only select options that are "TRUE" to indicate that you only want to account for cases that meet the criteria in the YTD syntax.

Filter [YTD]

General | Condition | Top

◉ Select from list ○ Custom value list

Enter search text

☐ Null
☐ False
☑ True
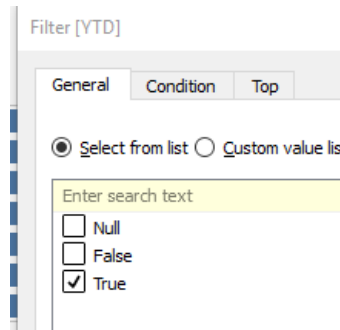
- Success! Notice that the same time periods are being evaluated in 2016 and 2017. If you drill down to the daily level, you will see that the last day is July 6 for both years. If additional data are added for 2017, Tableau will automatically update the comparison period.

Year of D..	Month of..	
2016	January	108
	February	120
	March	235
	April	276
	May	384
	June	400
	July	57
	Total	1,580
2017	January	235
	February	245
	March	296
	April	403
	May	488
	June	619
	July	65
	Total	2,351

The YTD filter returns the same time periods from January 1 through July 6.

Month on month syntax: https://interworks.com/blog/estam/2017/04/05/compare-incomplete-month-same-days-previous-month-tableau/

Quick Table Calculation: YTD Percent Change

Use a quick table calculation to find the year-to-date change in the number of requests.

Percent Change from Current YTD vs. Previous YTD
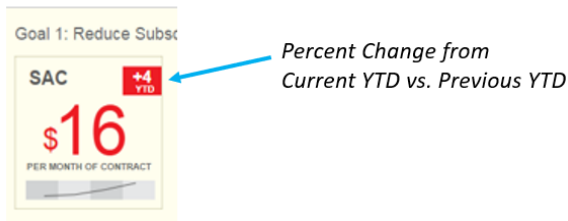
Step 1: Apply the "Percent Difference" quick table calculation to the filtered YTD data
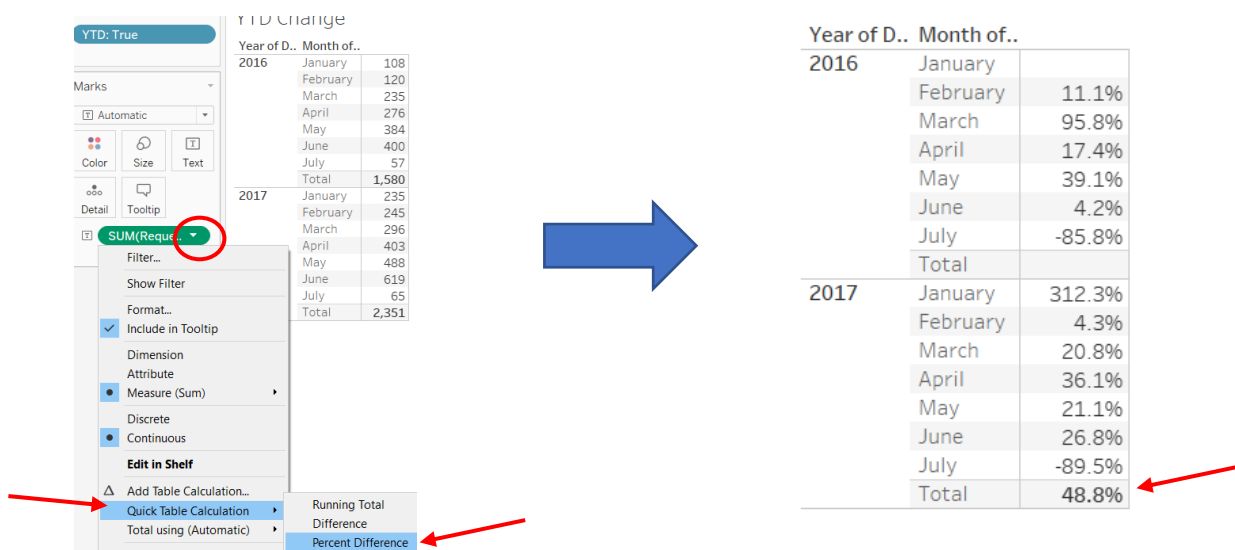
The resulting table shows there has been a 48.8% increase in abatement requests YTD. The next step is to isolate the number 48.8% such that only the value appears and there are no headers.

Step 2: Remove the month pill

Step 3: Right-click on the "Year of Date Added" field and select **Hide Field Labels for Rows**

Step 4: Right-click on "2016" and select "Hide"

**Step 5:** Right-click on "2017" and unselect "Show Header"

Great work! The YTD change value is now isolated.

Module E: Thresholds and Conditional Color Coding

Use color to communicate whether the YTD percentage change suggests DC Health is making progress towards its goal.
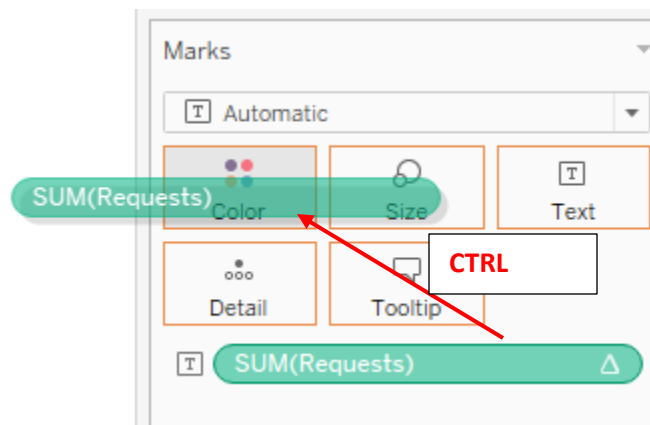
To create a similar visualization like our model dashboard, we need to:

- Place a filled box behind our YTD value
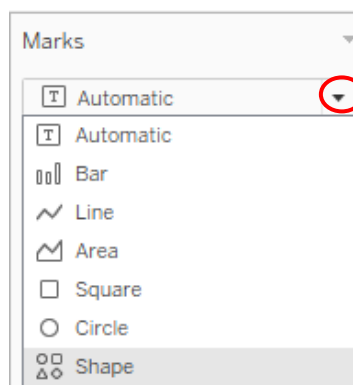- Program Tableau to change the color of the box based on the YTD value.

Percent Change from Current YTD vs. Previous YTD
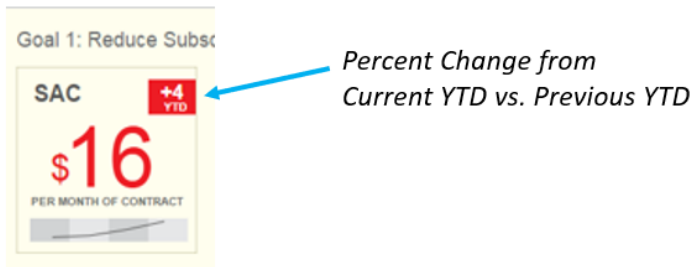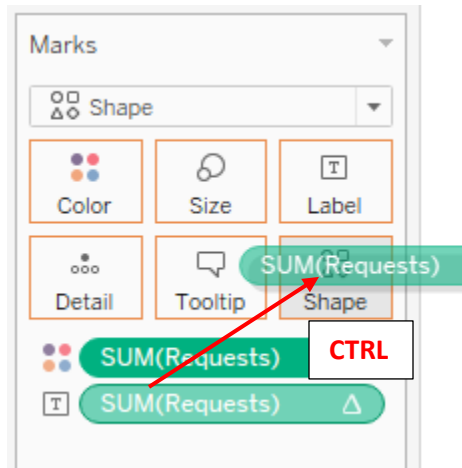
Place a filled box behind the YTD value

Step 1: Hold down the CTRL key and drag the "Requests" pill in the marks card to "Color."

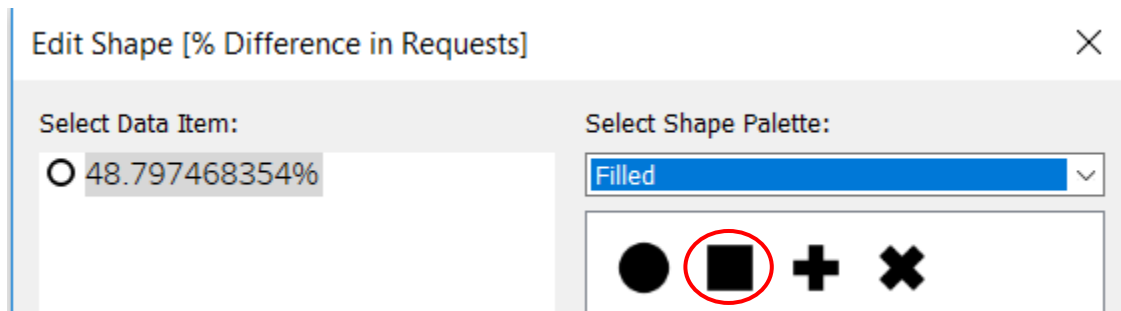**Step 2:** Change the Marks Card chart type from "Automatic" to "Shapes."

Step 3: Hold down the CTRL key and drag the "Requests" pill in the marks card to "Shapes."

There is now a color legend and shape legend on the right side of the screen.

Change the shape to a filled box

Step 4: Double clicking on the shape legend and choosing a filled box


Change the color scheme

Step 5: Edit the color legend and choose the red-blue diverging color

- o **Red** represents the wrong direction for YTD change
- o **Blue** represents the right direction for YTD change
- Select "Reversed" because positive values are moving in the wrong direction as DC Health's goal to reduce abatement requests.
- Define what values are red and which values are blue
    - o Click on "Advanced" button
    - o Set start value to -1 (-100%)
    - o Set end value to 1 (100%)
    - o Set center value to 0 (0%)
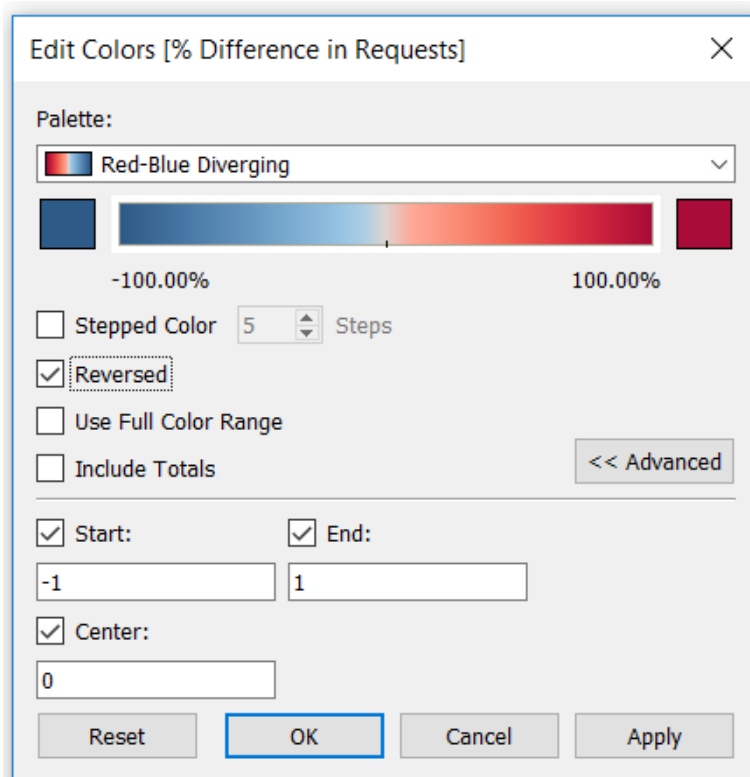
**Bring the YTD change threshold viz into the Executive Dashboard so that it looks like the following:**

Step 6: Use the Text card in the marks card to format the text and alignment.
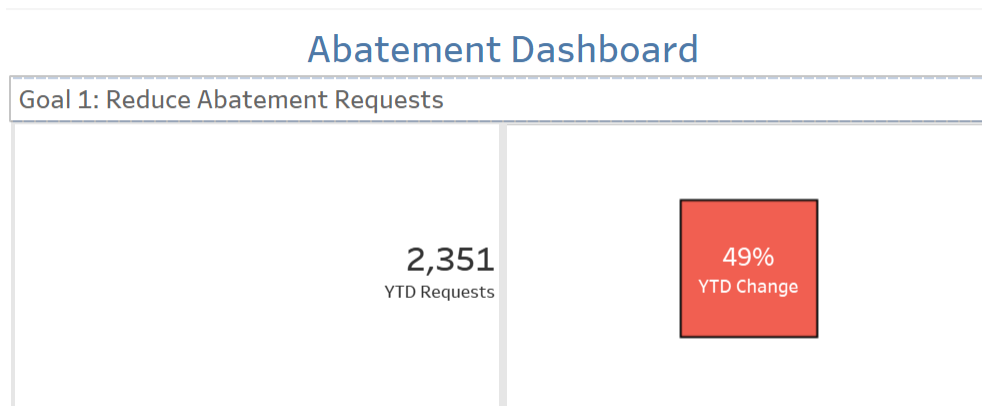
## Module F: Benchmark Visualizations

Benchmark visualizations allows users to immediately see a historical average alongside current data and answer questions about performance from the current to previous period.

Now that we have created visualizations for the entire city, like those in the blue rectangle of the model dashboard, we need to create views at a granular level like those in the green rectangle of the model dashboard. By creating supporting visualizations using the same metric for each DC Ward, these more granular level views will help us understand why the citywide metric is trending in a particular direction.
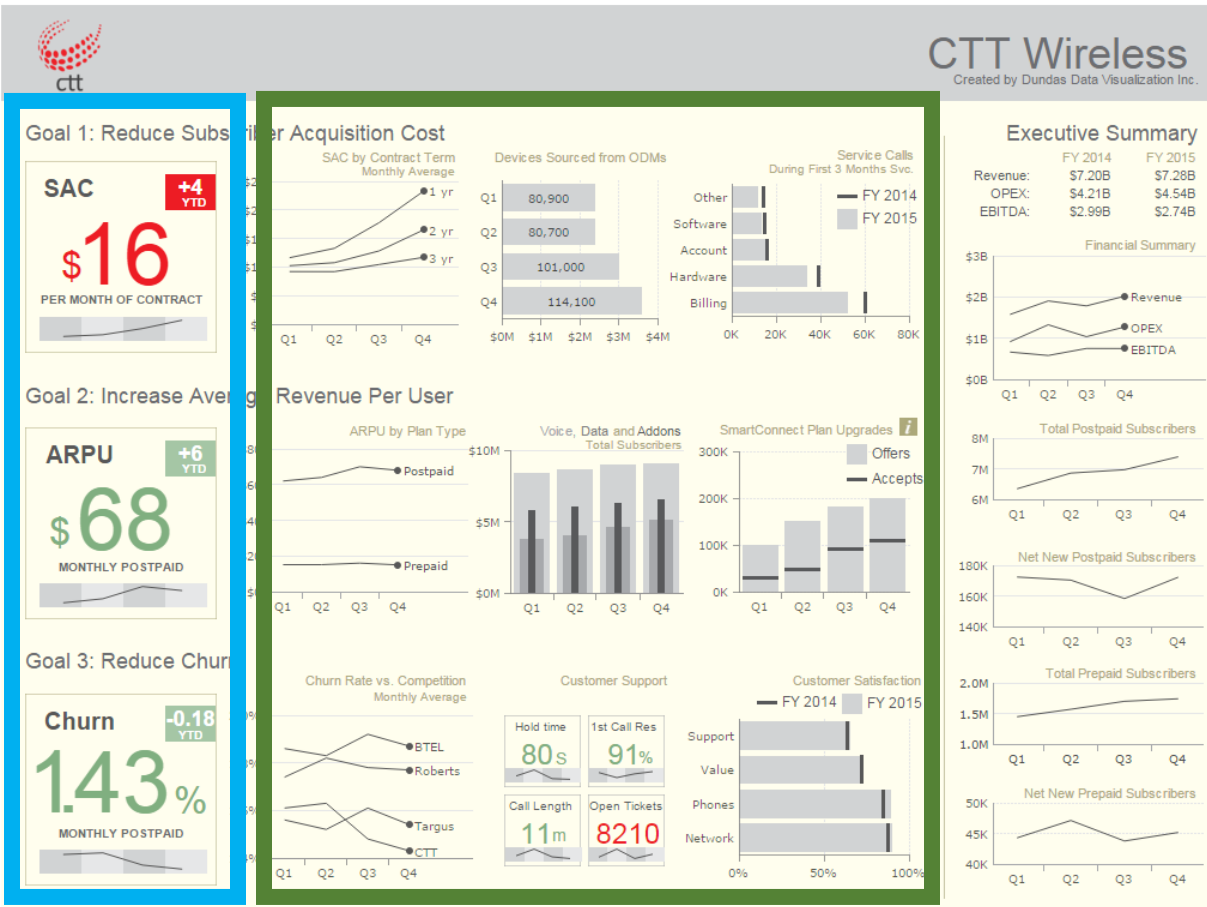
Dual Axis Bar Chart

Create this visualization, which will show number of YTD requests for current year and the previous year.
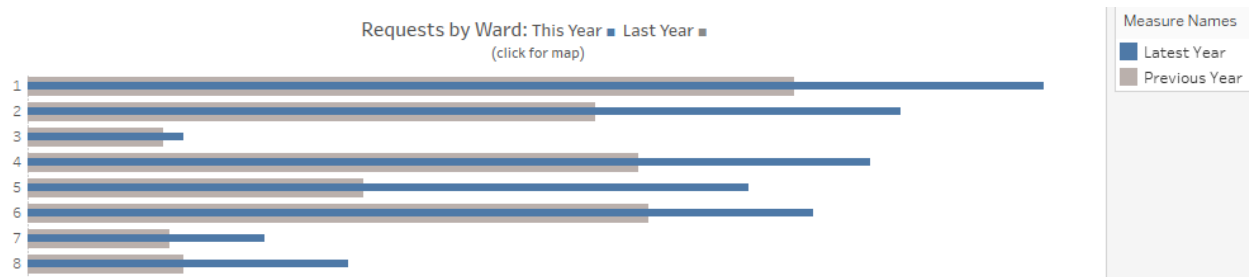

- Open a new sheet and name it "Dual Axis Bar Chart".

Create a **dual axis** using the **Current Year** and **Previous Year** calculated fields.

- From the measures list, drag **Previous Year** to the columns shelf
- Drag **Current Year** to the columns shelf and place it after Previous Year pill.
- Click on the dropdown arrow for the **Current Year** pill and select **Dual Axis**.
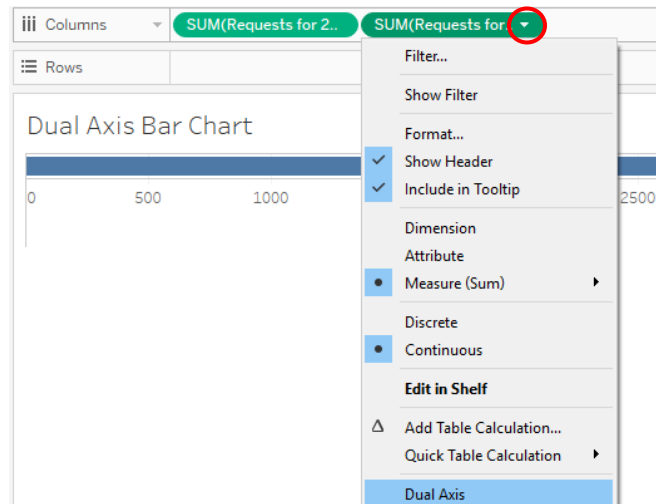
- Change the chart type to a bar chart in the Marks Card.
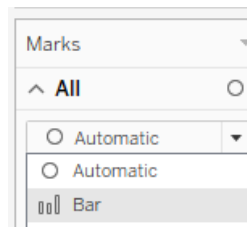
- Synchronize the axes by right-clicking on either axis and selecting "Synchronize Axis".
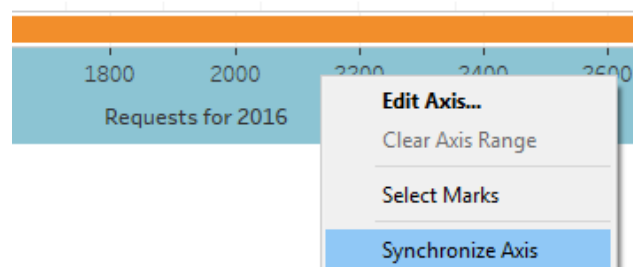
Reduce the thickness of the bar chart for **Current Year** so that it's possible to see both years.

- Click on the third level of the marks card
- Click on the size card
- Drag the scroll bar to the left to reduce the thickness of the **Current Year** bar chart
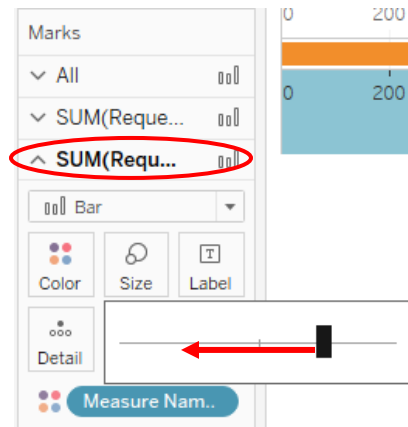
Now our bar chart is showing the number of requests year-over-year (for all of 2016 – the previous year -- and the number of requests in the partial year of 2017 – the current year). To be consistent with the metrics in our dashboard, change the metric from year-over-year to a year-to-date metric to create comparable periods for both years.

- Drag the YTD measure from the dimensions list to the filters shelf
- Select "True" in the dialog box to select dates that fall within out YTD parameters
- Click "OK"

Now we have a bar chart that shows the number of requests for the entire city YTD (through July 6) for both years.
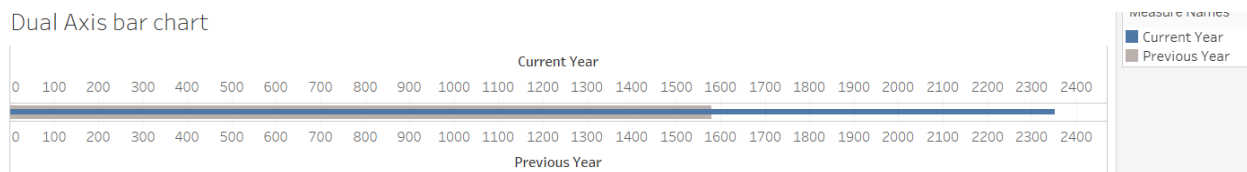

Break down the number of YTD requests by ward.

- Drag "Ward" from the dimensions list to the rows shelf in the view.

Success! Now we have a **compact visualization comparing the number of requests** by Ward for the same for the current and previous year to date. We can quickly see that certain wards are contributing much more to the increase in service requests than others.

Last, **give the viz a descriptive title**

- Double click on the title of the viz
- In the dialog box, change the title to "Requests by Ward: This Year vs. Last Year"
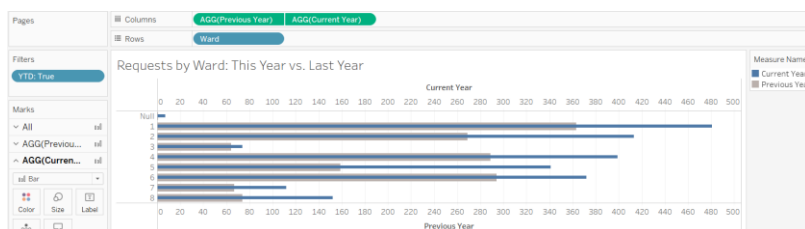
Exercise #6: Sparkline Chart

Sparkline charts are an effective way of showing trends in a compact visualization. These charts help someone quickly understand the magnitude of changes and whether there are patterns in the elements being compared.

Create a Sparkline Chart like the one below that shows the daily requests by ward over most recent 60 days. Highlight on which days the most requests were made.

Requests by Ward (60-day trend)
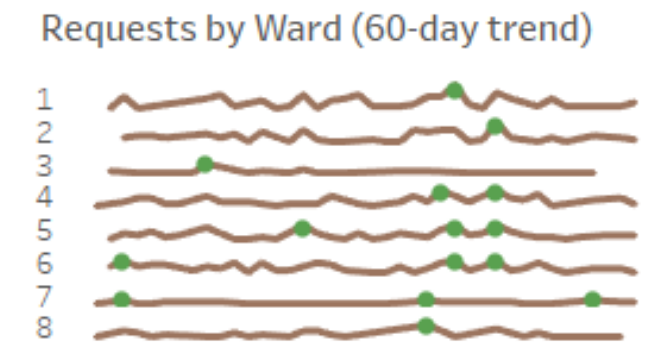
- Open a new worksheet [icon] and name it "Sparklines"
- Double click on the following metrics:
  - Ward – from the dimensions list
  - Date Add – from the dimensions list
  - Requests – from the measures list
- In the columns shelf, drill down to the "Day" level

iii Columns | ⊟ YEAR(Date Add) | ⊟ QUARTER(Date A.. | ⊟ MONTH(Date Add) | ⊞ DAY(Date Add)

- To evaluate the data at the daily level, **remove** all pills except the "Day" pill in the columns shelf.

Now our view shows the total number of requests by ward for each day of the month.

Ward	1	2	3	4	5	6
Null				1		1
1	46	62	58	62	64	78
2	54	62	52	35	56	57
3	12	13	17	7	11	10
4	46	52	55	35	55	59
5	42	36	46	47	36	42
6	67	46	40	35	37	45
7	11	12	15	11	7	15
8	11	15	13	9	19	10

Columns: ⊞ DAY(Date Add)
Rows: Ward
Marks: Automatic — Color, Size, Text, Detail, Tooltip — SUM(Requests)

From this point, there are four additional steps to finalize the Sparkline Chart:

1. Change the format of our map to a line chart
2. Limit the data to the past 60 days
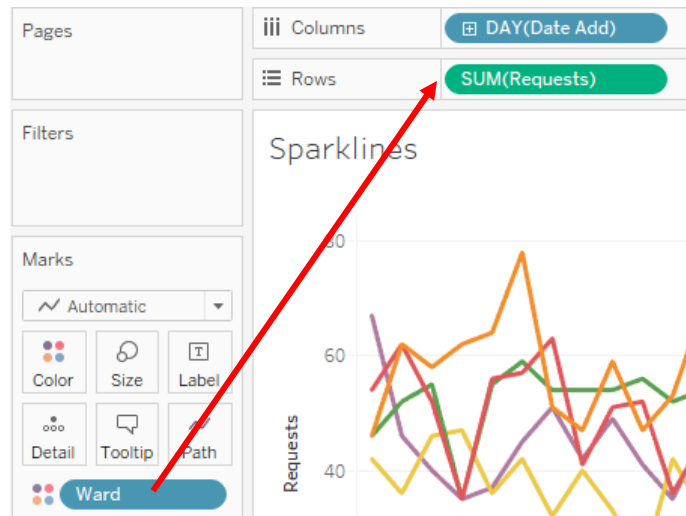3. Highlight days with the highest single-day request rates
4. Format the chart

Step 1: Change the chart type to a line chart.

- Click on "Show Me" in the top-right corner
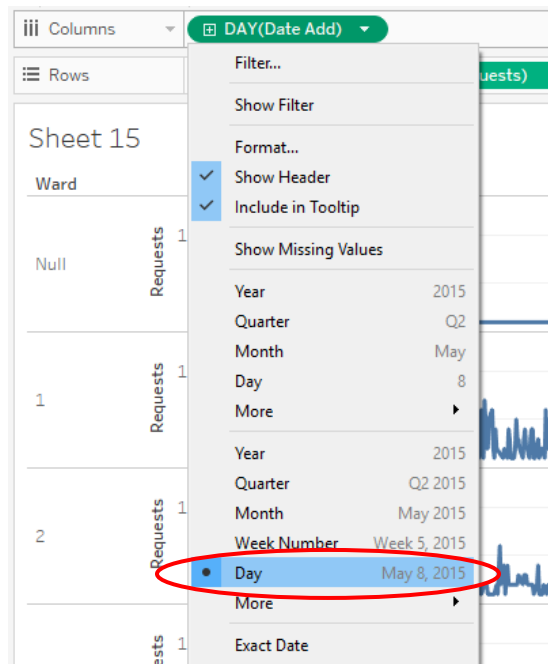- Select the line chart option circled below.
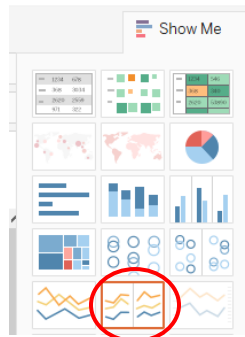
Change the Y-axis from "Requests" to "Ward".

- Move the "Ward" pill from the Marks card to the rows shelf in the viz.

Change the date field from discrete to continuous data type.

- In the columns shelf, click on the "Day(Date Add)" pill and select "Day" option just above "Exact Date".

Step 2: Restrict the date range to the past 60 days from the last date in our dataset (July 6, 2017).

- Drag "Date Add" from the dimensions list to the filter shelf
- Double click on "Relative Date" in the dialog box
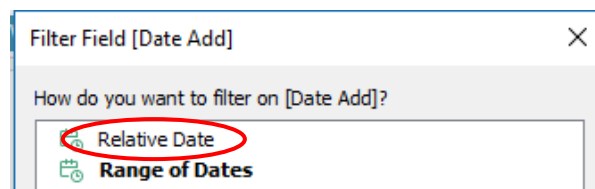
In the Relative Date dialog box, we can set/anchor the most recent date to 7/6/2016 to tell Tableau that today is not the most recent date. Once we've anchored our date, we can have Tableau limit the period in the view to the past 60 days.

Follow these steps:

1. Set the anchor date to 7/6/2017
2. Click on the "Days" icon
3. Click on the "Last" radio button and enter in 60 days
4. Click "OK"

Step 3: Highlight which day(s) DC Health received the most requests within the past 60 days.

- Create a calculated field called "High Point" and use the following syntax. The syntax looks for the most requests in the view within each ward and indicates where the highest value is on the trends chart with a circle.

Syntax 5:

IF SUM([Requests]) = WINDOW_MAX(SUM([Requests])) THEN SUM([Requests]) END
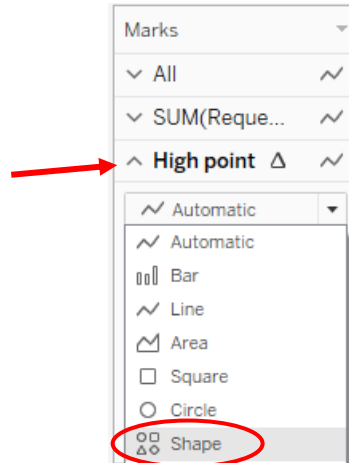
- Drag the "High Point" metric to the Rows shelf

- Click on the "High Point" pill in the Rows shelf and select "Dual Axis" in the dropdown option.
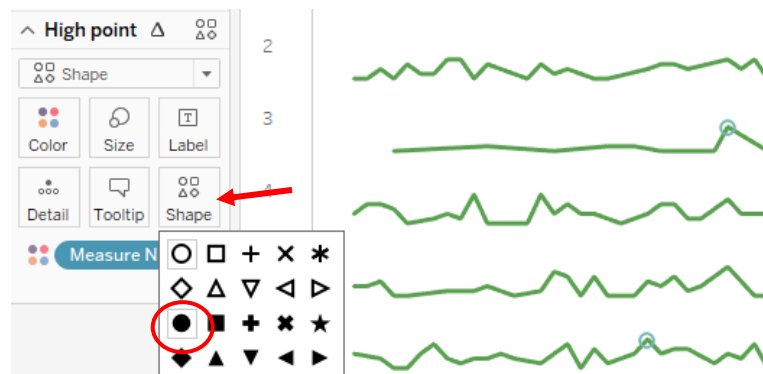
Next, change the "High Point" marker in the viz to a shape, so that it's easier to see.

- In the Marks Card, click on the "High Point" level
- Change the chart type to "Shape"

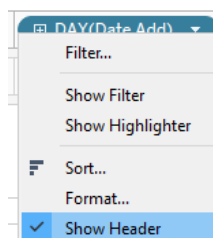- Click on the Shape Card, then select the filled circle option
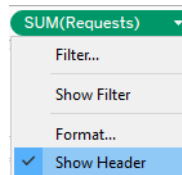

Step 4: Format Sparkline Chart

a. Remove unnecessary column headers
b. Remove unnecessary borders and grid lines
c. Give the viz a descriptive title

Step 4.a: Remove unnecessary headers

- In the Columns shelf, click on the DAY(Date Add) pill dropdown and unselect "Show Header"
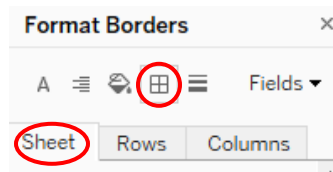
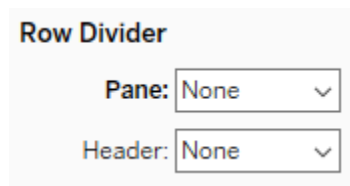- In the Rows shelf, click on the SUM(Requests) pill dropdown and unselect "Show Header"

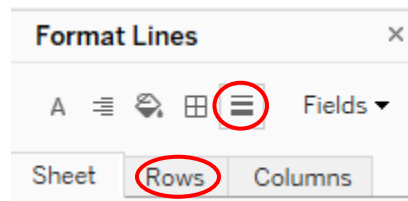**Step 4.b:** Remove unnecessary borders and grid lines

- Right-click on the anywhere on the viz and select "Format"
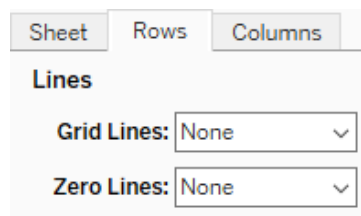- In the format pane on the left side of the screen, select the borders icon and select the "Sheet" tab.

- Change the "Row Divider" options to "None"

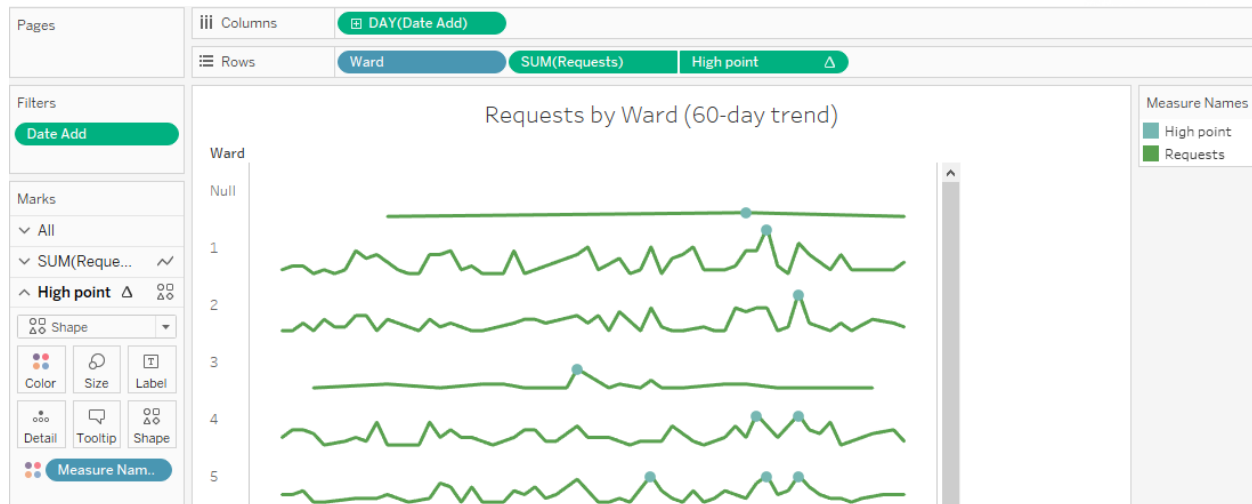- Next, select the "Format Lines" icon and select the "Rows" tab.

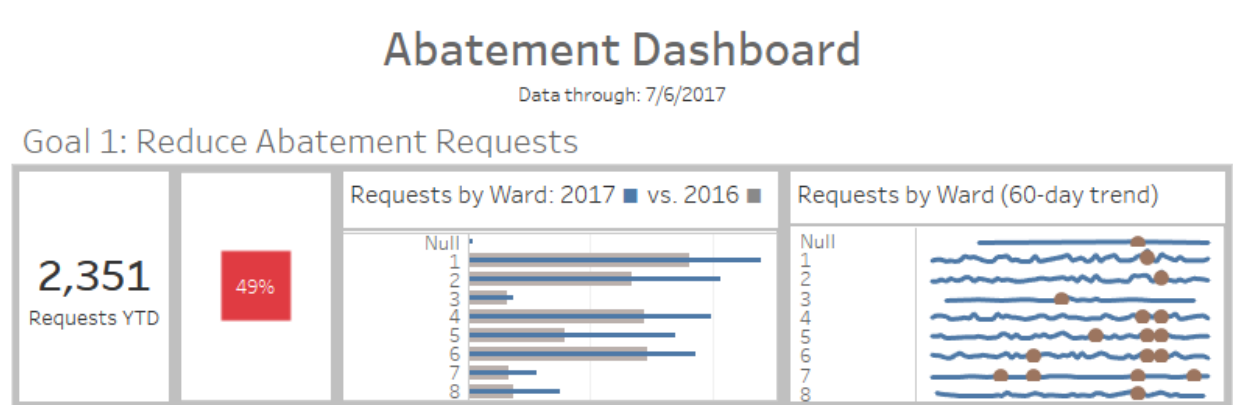- Change both the "Grid Lines" and "Zero Lines" to "None"

Step 4.c: Give the Sparkline chart a descriptive title

- Double click on the title of the viz
- In the dialog box, change the title to "Requests by Ward (60-day trend)"

Module G: Dashboard Organization

Our objective is to format our dashboard so that it looks like this:
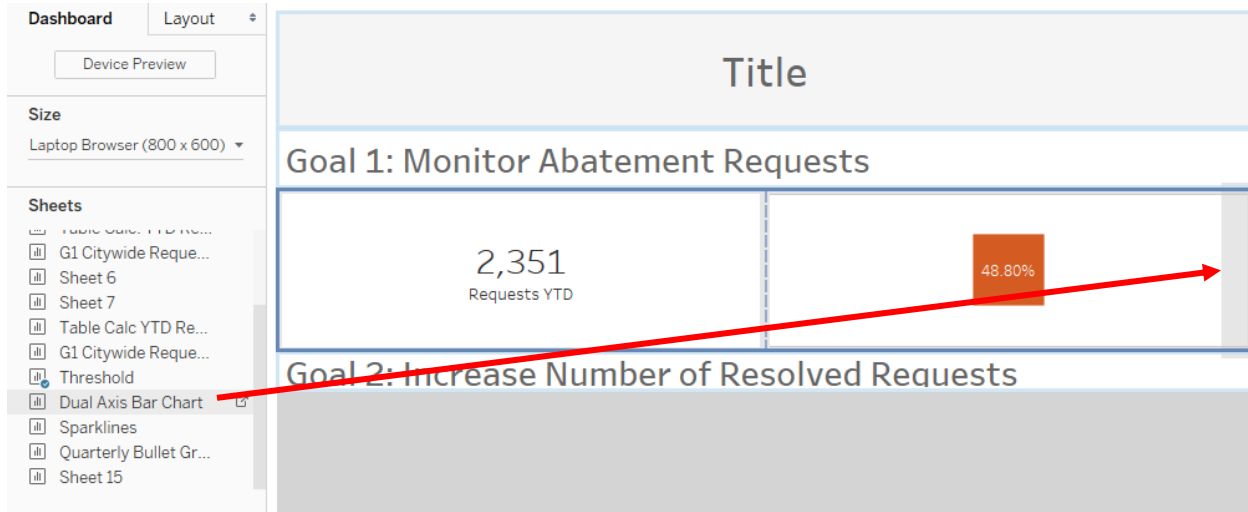

Now that we have several ward-level visualizations to support Goal 1 for DC Health, add two of them into the dashboard.

Creating a polished dashboard that is easy to understand, usually involves the following steps:
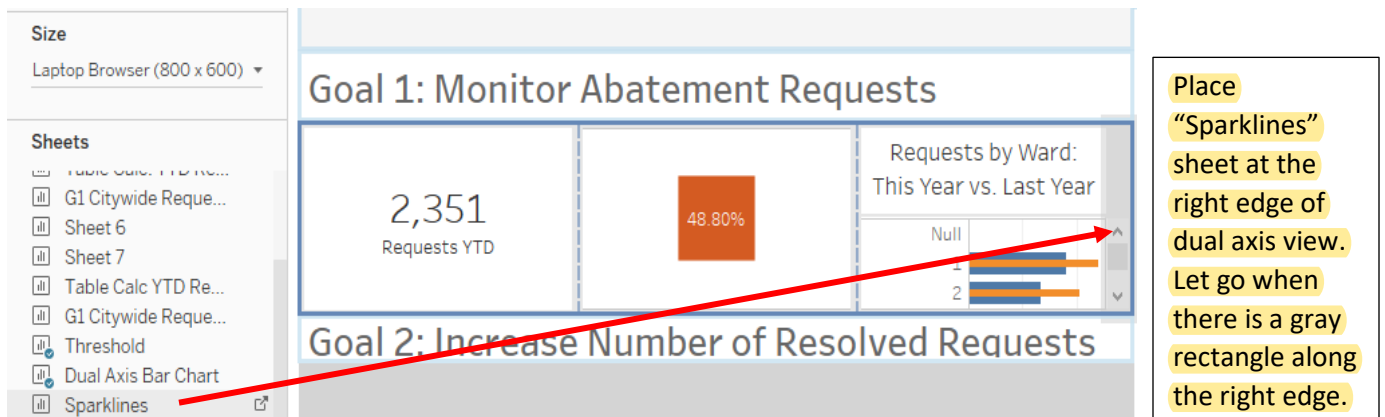
1. Scale
2. Removing unnecessary axis and legends
3. Sheet dimensions
4. Font/title size
5. Use of color
6. Appropriate labeling
7. Data freshness date

Navigate to the Executive Dashboard and add a couple visualizations to the layout container for Goal 1.

- Click on the "Executive Dashboard" sheet
- Drag the "Dual Axis Bar Chart" sheet into the dashboard container for Goal 1.

- Drag the "Sparklines" sheet into the dashboard container for Goal 1.

Place "Sparklines" sheet at the right edge of dual axis view. Let go when there is a gray rectangle along the right edge.
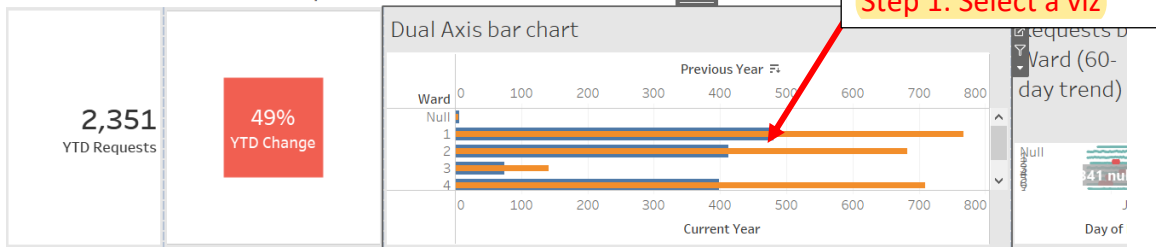
Scale

Change the fit type to "Entire View" for each visualization you added to the Goal 1 container. This will cause the selected visualization to expand within its container.

- Select a viz in the dashboard
- Change fit size to "Entire View"

Abatement Dashboard

Goal 1: Reduce Abatement Requests

Step 1: Select a viz

- Select "Entire View" from the drop-down in the toolbar
- Repeat for each of the views in the Goal 1 container

Removing unnecessary axis and legends

At this point, our visualizations are squished together. We can create more space in our dashboard for the visualizations if we remove the legends. However, after deleting them to create space, we will need to add our legends back into the dashboard later in another step.

**Remove the container the legends appear in.**

- Select the vertical container
- Click the "X" in the upper right corner

- Click "Delete" when warned that we are deleting the container and objects within it.

Hide the axis labels in the dual axis bar chart. The axes are unnecessary since the number of requests can be seen in the tooltip when the user hovers over each bar.

- **Remove each of the legends with a red circle around them in the below image.**
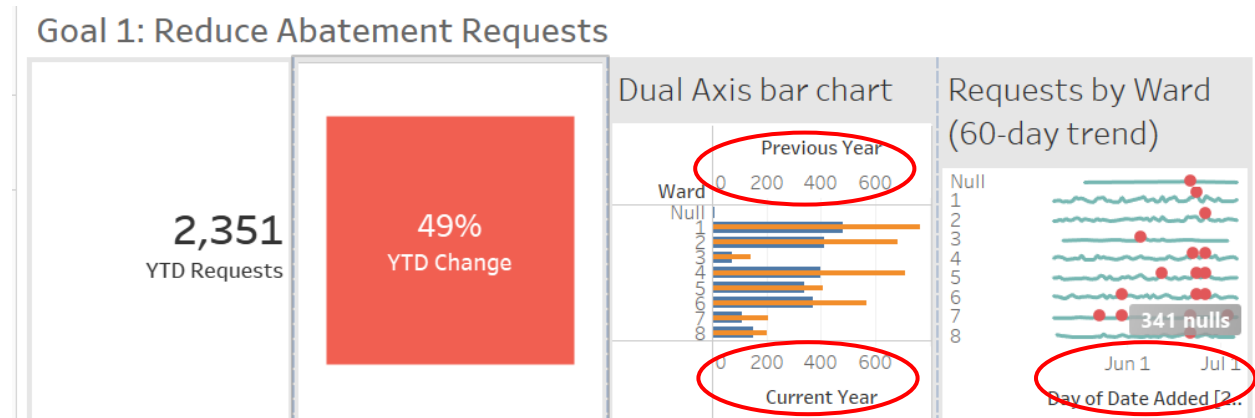
- From the dashboard, click on the dual axis bar chart
- Right-click on the axis of the report, then select "Show Header" to remove the axes.
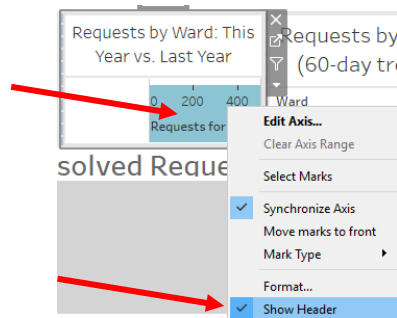

Sheet Dimensions

What size should each of the visualizations be? Following the layout of our model dashboard, reduce the width of the first two visualizations to create more space for our two benchmark visualizations.

**Make your dashboard look like the one below by adjusting the width of each viz.**

- Change the width by clicking and dragging the borders of the visualizations (like you would in Excel when a column needs to be wider).
 - Make the first two vizzes the same size and the last two the same size.
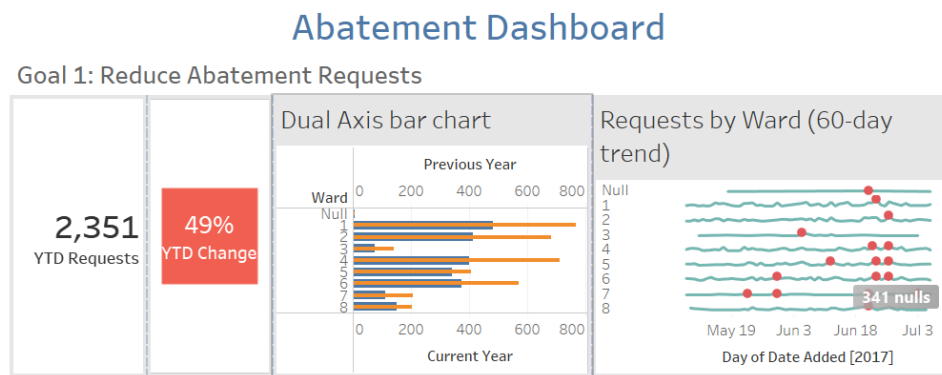
Font size

The **font size in dashboards should have a distinct hierarchy**. The dashboard title should have the largest font, the subtitles should have the second-largest font, and so on.

- Double click on the container labeled "Title"
- Give the dashboard an appropriate title like "Rodent and Insect Abatement"
- Change **dashboard title font size to 22**
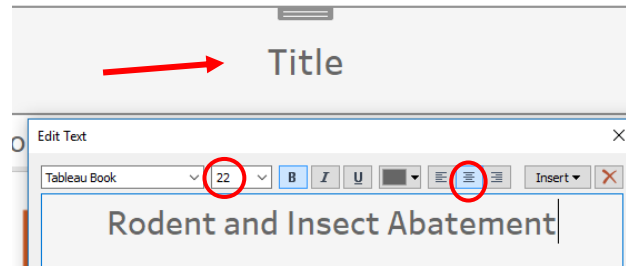
- **Change the font size to 16 for each goal**. This will create a distinct font size hierarchy between the dashboard title and sub-titles for each of the three goals.
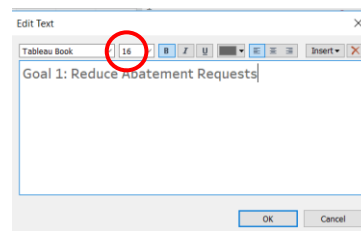
Change the font size to 11 for the titles within each visualization.

- Double click on the title to open the dialog box for editing.
- Change the font size to 11 (eleven) for each of the ward-level views (but not so small that the audience can't read the dashboard).

Now our dashboard looks like this:
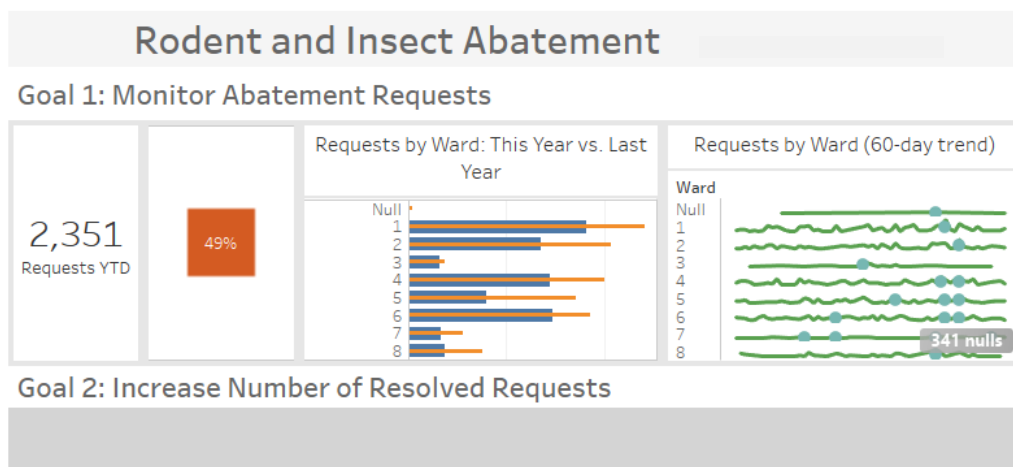
Use of color

Looking at our dashboard, there are six different colors. This is too many colors and distracts the eye from the conditional color scheme (where blue means "good" and red means "challenges") we previously created for the change in YTD requests.

Two guidelines for using color in dashboards are:

1. **Use as few colors in your dashboard as possible**
2. **Use the same colors when dashboard items are related** (same metric or same year). For example, in a dashboard with multiple charts showing year-over-year data, the most recent year should be the same color. The previous year should use a lighter color so that most recent year stands out.

Applying these two guidelines, do the following:

In the **dual axis bar chart**, change the color of the most recent year from orange to blue, and the previous year from blue to gray.

- Toggle back to the worksheet where we created the dual axis bar chart by **selecting the view** in the dashboard and then choose the "**Go to sheet**" option.
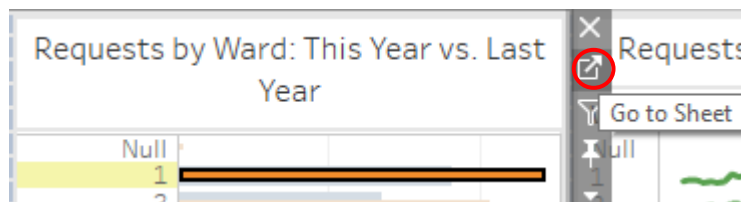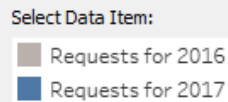

- In the worksheet, double click on either color in the legend.

- In the new dialog box, click on "Previous Year" blue box.
- Select the gray box in the color palette
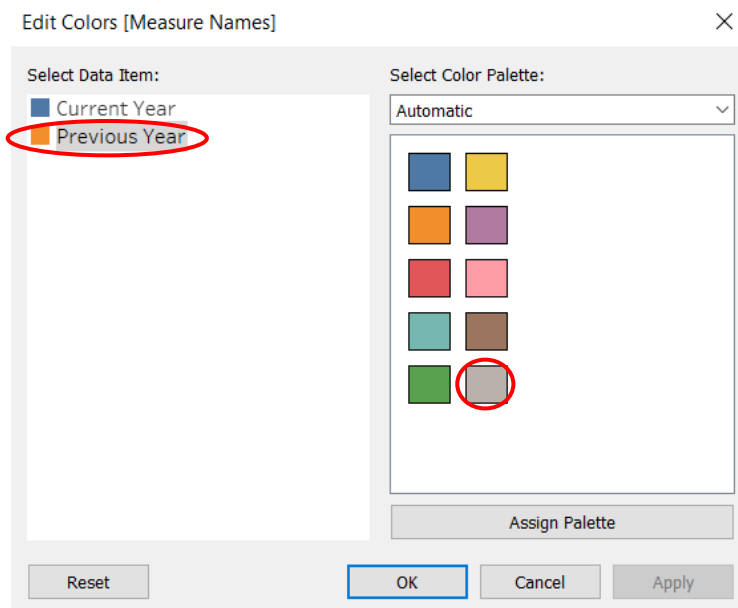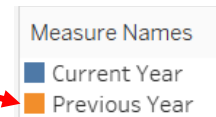
Follow the same steps for "Current Year," but choose blue as the color.

Select Data Item:
■ Requests for 2016
■ Requests for 2017

- Click "OK" to apply the changes.

Sparkline chart colors:

The colors for the Sparkline chart refer to the requests in the current year. Therefore, we should use the same color **blue** as the dual axis visualization.

- Change the color of the requests trendline to **blue**.
  - ○ Remember, editing colors has be done in original sheet and not in the dashboard.
- Change the color of the "high points" to a muted color that is not gray.

Requests by Ward (60-day trend)
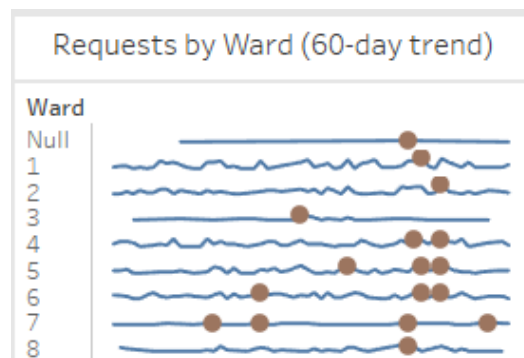
Appropriate Labeling

Users need to be able to **quickly understand** what each view means. For example, it's unclear in the chart below which is "This Year" and which is "Last Year."

Additionally, we can be even clearer about what "This Year" and "Last Year" mean by substituting in **dynamic date values**.

Requests by Ward: This Year vs. Last Year
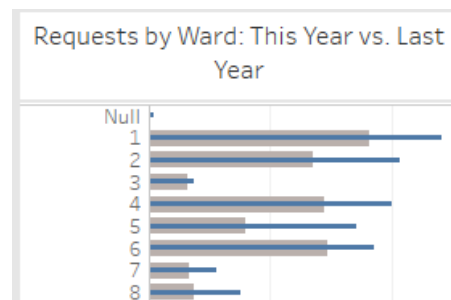
Step 1: Embedding color legends in viz titles

Adding the legend within the chart title is one way to make the chart more understandable. This is achieved by using Unicode objects.
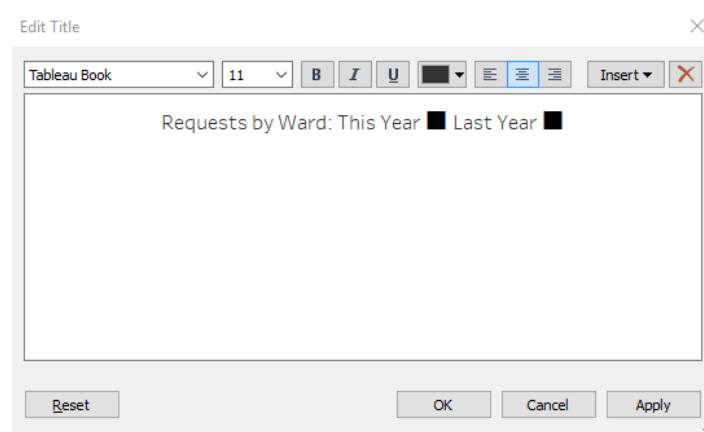
- Go to the website https://en.wikipedia.org/wiki/Geometric_Shapes


- Double click on the filled square to select it

- Copy it (CTRL + C)
- In Tableau, double click on the title of the dual axis bar chart to open the title dialog editor.
- Paste (CTRL + V) the filled square in the title as shown below for both "This Year" and "Last Year"

Change the color of each square to match what's in the chart.

- Double click on the square for "This Year"
- In the color dropdown in the dialog box, choose a dark **blue**
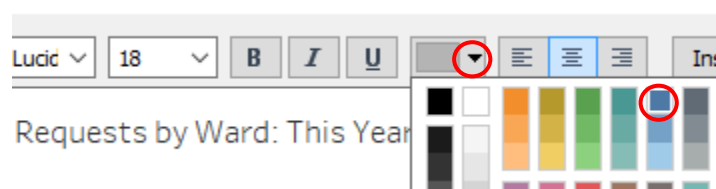
- Repeat these two steps but change the color to gray for "Last Year"

Step 2: Dynamic dates in viz titles

Instead of using text like "this year" and "last year", dynamic dates values make it easier for users to interpret the data.

We have already created a MAX(DATE) calculated field that returns the greatest year in the dataset. We also need to create a metric that returns one year less than the MAX(DATE). To create this metric, follow these steps:

- Create a calculated field called **Previous Year Title**
- Use the syntax **YEAR([Max Date])-1**
- Click Ok to create the metric
- Drag both **Max Date** and **Previous Year Title** from dimensions to the details card
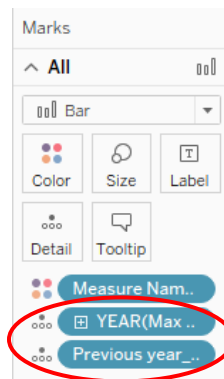
Add these dynamic date metrics to the viz title, following these steps:

- Double click on the title of the "Requests by Ward" viz
- Highlight the text "This Year" and replace it with the dynamic metric for the most recent year by clicking on **Insert** and selecting **YEAR(Max Date)**.
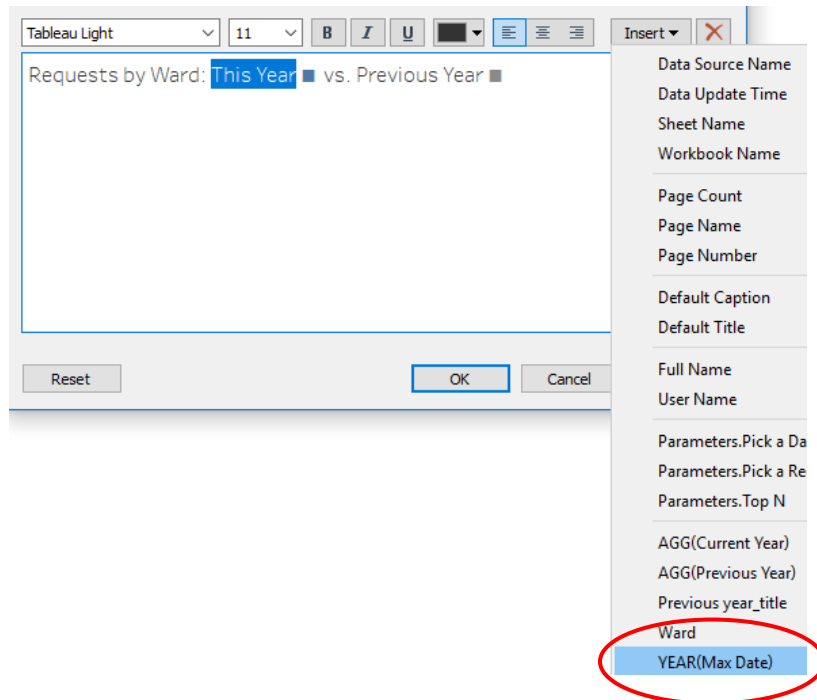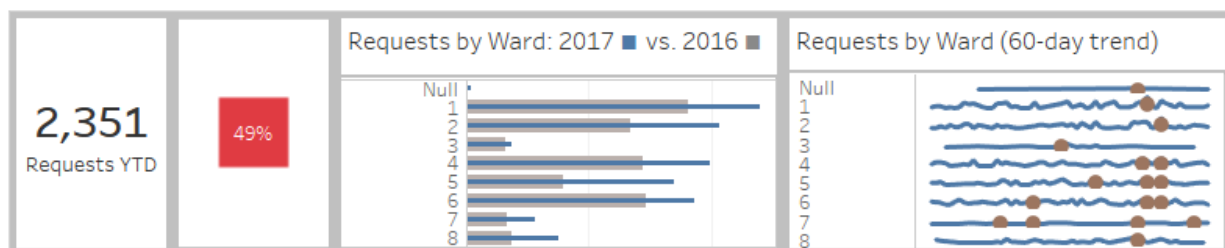
- Change "Previous Year" to a dynamic date by clicking on **Insert** and selecting **Previous Year Title**

Now the dashboard is easy to understand and offers lots of quick insights about YTD requests at both the city and ward levels as well as trends for past 60 days. Each of the visualizations will update automatically with any changes to the data.

Data freshness date

In every dashboard, it's very important to let users know how recent the data are. Providing information about when the dashboard was last updated will help users determine how to react to the information. If the data are current, then the data will typically be much more useful and actionable than an out-of-date dashboard.

Let's add a dynamic field that returns the maximum date in the dataset and place it under the dashboard title. This will allow users to easily see whether the data are fresh or stale.
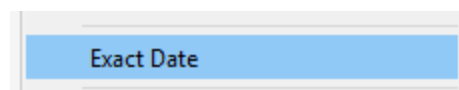
Rodent and Insect Abatement
Data through: 7/6/2017

- Click on a new sheet and name it "Max Date"
- Drag "Max Date" from the dimensions list the Text marks card.
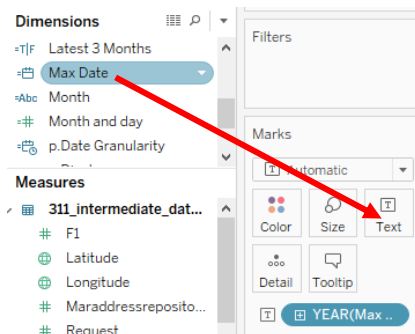
- Click on the pill **⊞ YEAR(Max Date)** in the marks card and select Exact Date in the dropdown list.

Exact Date

Now our view shows that the maximum date in our dataset is 7/6/2017. Let's add some information about what this date means before placing it into the dashboard. We want to communicate that the data are through this maximum date.
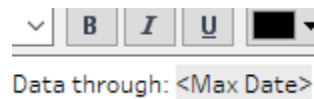
- Click on "Text" in the marks card
- Change the Alignment to "Center" so that the date will be centered under the dashboard title
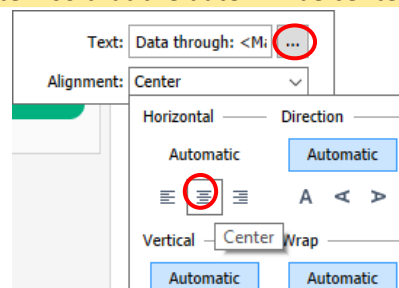
- Next, click on "…" next to the "Text:" option
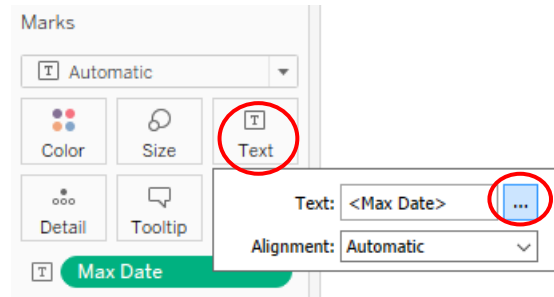
- In the new dialog window, add in the language "Data through:" before the dynamic Max Date metric.

Data through: <Max Date>

- Click "OK"

Now add the "Max Date" sheet into our dashboard under the main title.

- Click on the ⊞ Executive Dashboard sheet to navigate to the main dashboard
- Drag the "Max Date" sheet from the left side and underneath the dashboard title as shown below.
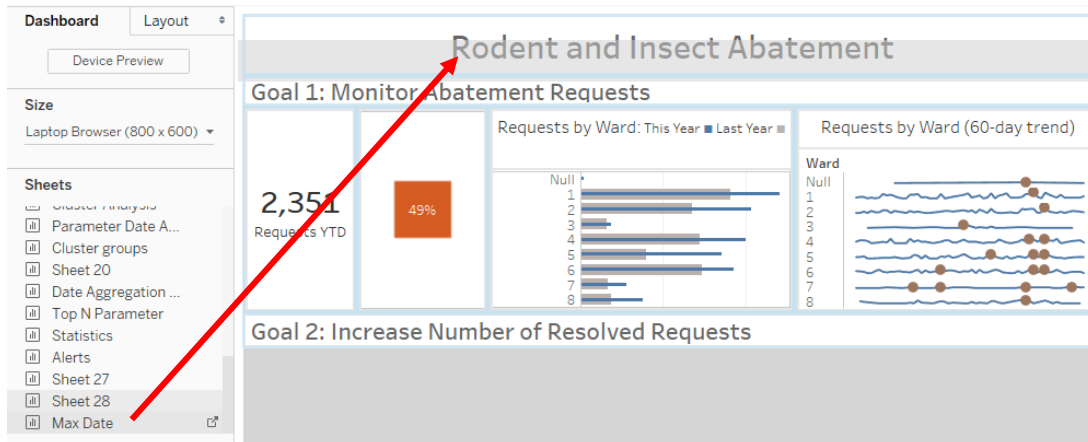
- Hide the title of the "Max Date" sheet by clicking on the dropdown arrow and unselecting "Title"
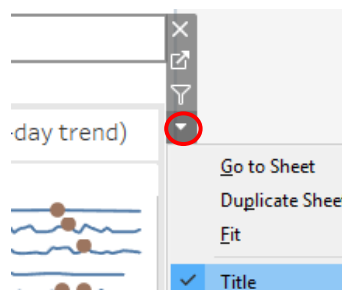
- Last, change the extent of the "Max Date" sheet to "Entire View".

Entire View ▾
  Standard
  Fit Width
  Fit Height
  Entire View

# Module H: Parameters

Parameters add interactivity to dashboards and allow end users to choose how to view the data.

A Parameter is like a variable in an equation whose value can be controlled by the end user. Unlike filters that trim data, parameters allow the user to control the value of a variable. Parameters allow users to look at different scenarios in the dataset. For example, a parameter that allows a user to set different thresholds can make it easy to see how many data points are above or below their chosen threshold.

Reference Line
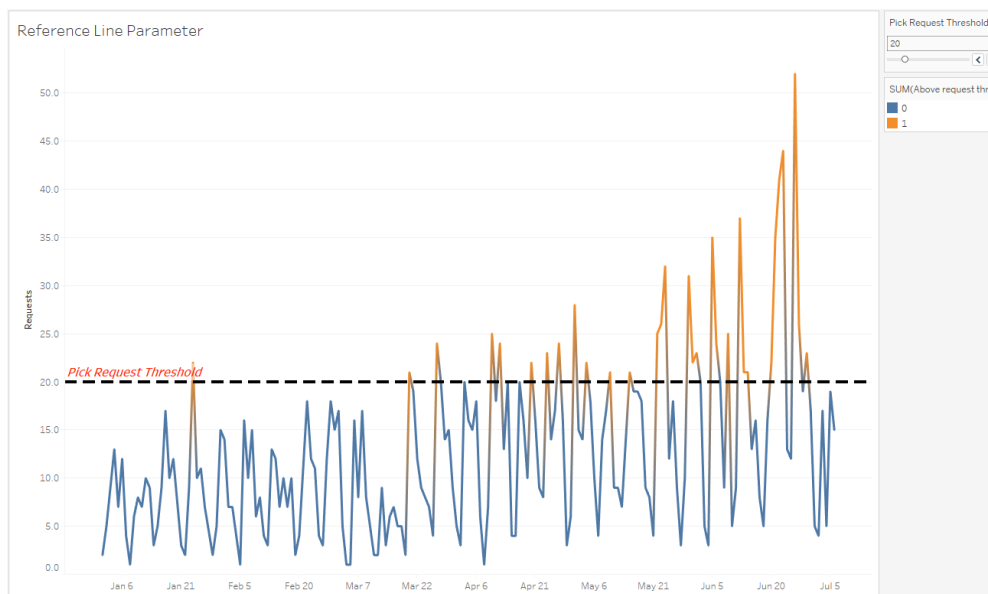
Question 1: How many days were there 20 or more requests in 2017 across the city?

Four prerequisites for parameters to work:
1. Create the parameter
2. Show the parameter control for the user
3. Use the parameter in a calculation
4. Use the calculated field for the parameter in your visualization

To create the above visualization, follow these steps:

- Create a new worksheet and call it "Parameters Reference Line"
- Bring "Date Add" to the columns shelf
- Click on the dropdown arrow in the "Date Add" pill and change the date part to "Day" and make the pill continuous.
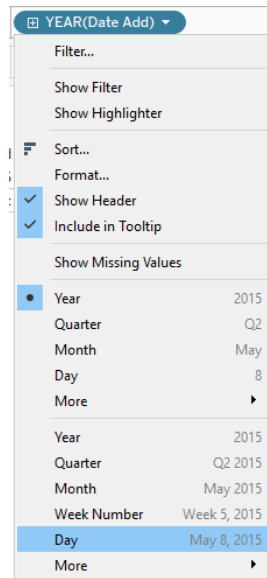
The pill is now green since it is now a continuous measure. *(Discrete dates aggregate to their selected date part.)*
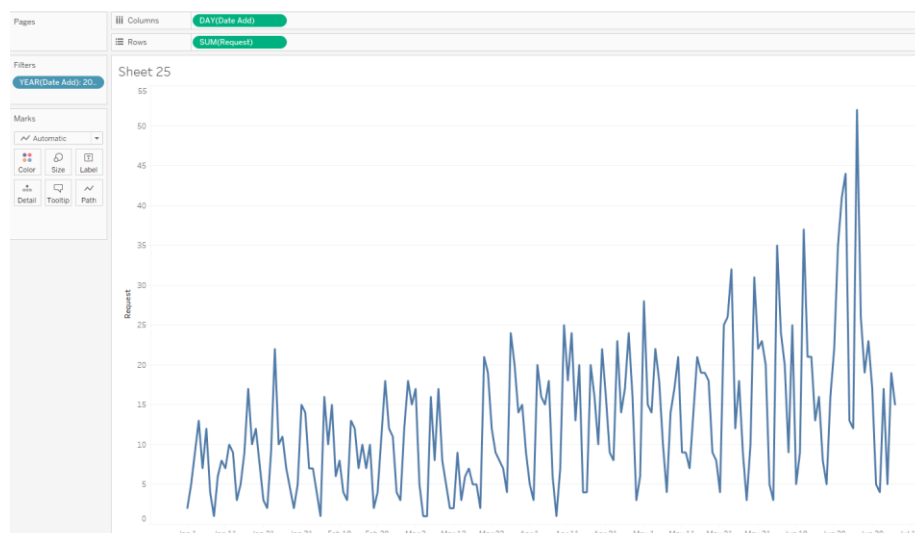

- Double click on "Requests" in the measures list

Limit the data to just 2017 by using a filter.

- Drag **Date Add** from the Dimensions list to the filters shelf
- Select **Years** in the dialog box
- Put a check mark next to **2017**
- Click Okay

The visualization should look like the one below, with requests on the Y-axis and date at daily level for 2017 on the X-axis.

Add a reference line for the number of requests:

- **Right-click on the Y-Axis**, the one for requests, and select "Add reference line"
- In the new dialog box, choose "**Create a New Parameter**..." from the "Value" dropdown field
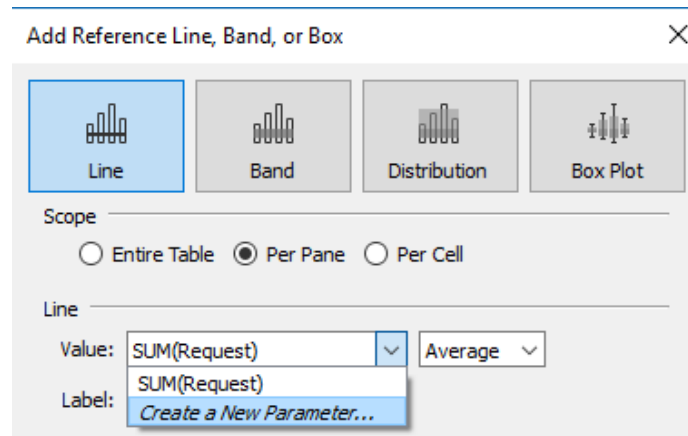

In the new dialog box, follow these steps:

- **Name** the parameter "**Pick a Request Threshold**"
- Select "**Range**" as the "Allowable values"

Now let's set a range of values from which the user can pick from. Set the **minimum value to 0**, the **maximum value to 3000**, and have the reference line move **(step size) in increments of 10** requests at a time.

Implement these parameters by copying the selections in the dialog box below.

- Then select "OK" twice
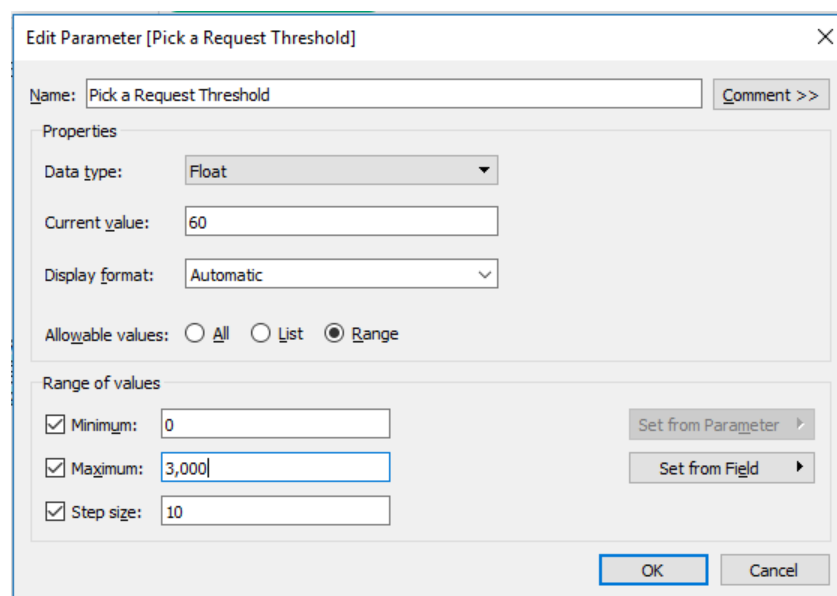
In the upper-right corner, we've created a parameter. When we change the threshold value, the reference line also changes.
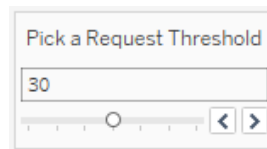

Now use conditional coloring to add contrast to values above and below the reference line. If the number of daily requests is greater than the threshold chosen by the user, make them one color, and all the other values below the threshold another color.

Create a calculated field called "Above or Below"

- Click and drag "Pick a Request Threshold" from the parameters list into the calculated field
- Make the sum of requests less than or equal to "Pick a Request Threshold"
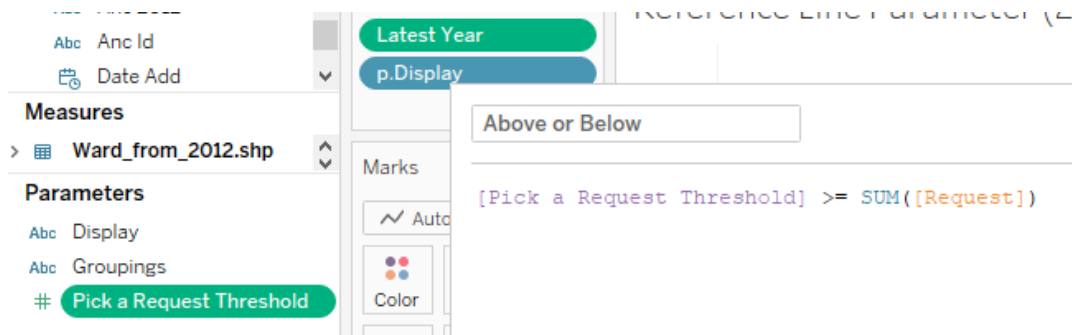
- Drag the new metric "**Above or Below**" from the measures list on the left side of the screen **to the color card.**
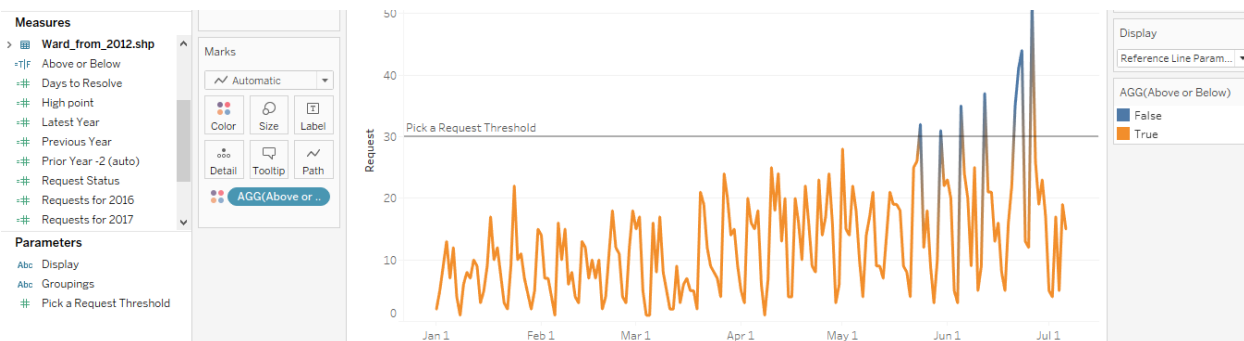
Now if we change the threshold, we see that days where the number of requests is above the threshold are blue, and those below it are orange.

Date Aggregation

Question 2: How can we use different date aggregations (day, week, month…) to view request trends in the same view?

Solution: Create a parameter with the different date granularity options for end users (day, week, month…), and create a calculated field that will aggregate your dates based on what's selected in the parameter.

- **Duplicate** the **Parameters Reference Line** sheet and rename it **Parameters Date Aggregation**

Step 1: Create a string parameter with each level of date aggregation
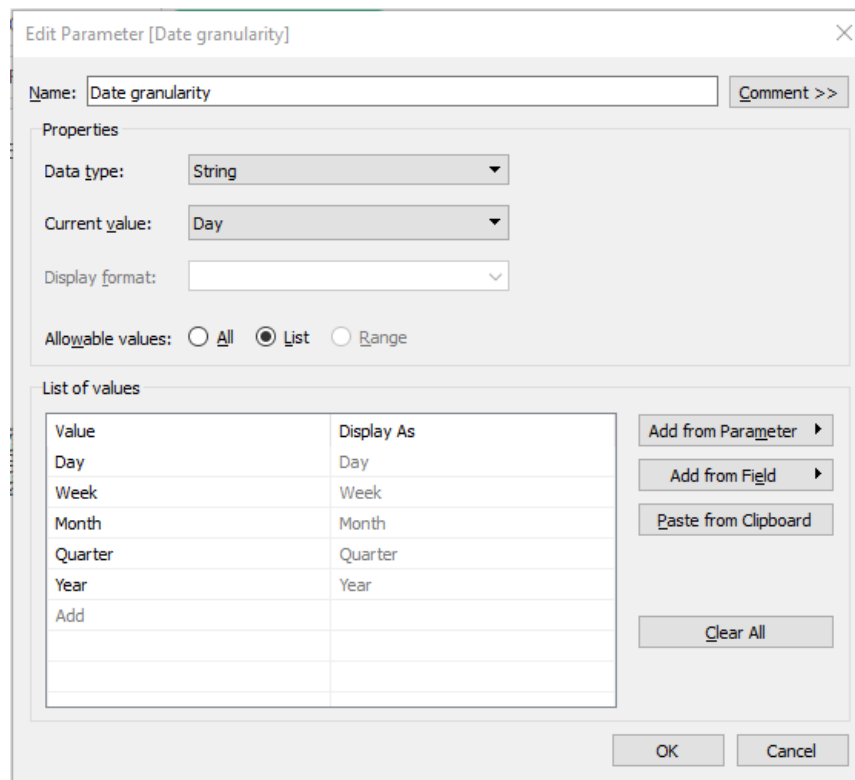
- Create a parameter

Dimensions

Create Calculated Field...

Create Parameter...
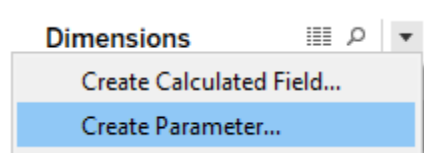
- Make the following selections in the parameter dialog box:

Step 1: Name your Parameter	Edit Parameter [Date granularity] ✕
	Name: Date granularity Comment >>
	Properties
Step 2: Pick the "String" as data type	Data type: String
	Current value: Day
	Display format:
	Allowable values: ○ All ● List ○ Range
	List of values
Step 3: Type in each date value for the end user to choose from. Press the down arrow on your keyboard to type in the next value.	Value / Display As — Day/Day, Week/Week, Month/Month, Quarter/Quarter, Year/Year, Add. Add from Parameter ▸ Add from Field ▸ Paste from Clipboard Clear All
	OK Cancel
	Step 4: Click "OK" to add the parameter.

Step 2: Create a calculated field that uses the list of values or inputs in the parameter control we just created. The calculated field will connect the values in the dataset to each input in our parameter control. Use the DATETRUNC function to truncate the date field to the specified date part that is associated with the parameter control.

- Create a calculated field
- Name the metric "p.Date Granularity" (putting a "p." before the name is a reminder the calculated field is associate with a parameter).
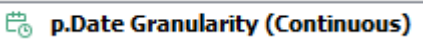
p.Date Granularity   ✕

```
CASE [Date granularity]
WHEN "Day" THEN DATETRUNC('day',[Date Add])
WHEN "Week" THEN DATETRUNC('week', [Date Add])
WHEN "Month" THEN DATETRUNC('month',[Date Add])
WHEN "Quarter" THEN DATETRUNC('quarter', [Date Add])
WHEN "Year" THEN DATETRUNC('year', [Date Add])
END
```

The calculation is valid.   1 Dependency ▾   Apply   OK

Parameter calculated field syntax:

Syntax 6:

CASE [Date granularity]
WHEN "Day" THEN DATETRUNC('day',[Date Added])
WHEN "Week" THEN DATETRUNC('week', [Date Added])
WHEN "Month" THEN DATETRUNC('month',[Date Added])
WHEN "Quarter" THEN DATETRUNC('quarter', [Date Added])
WHEN "Year" THEN DATETRUNC('year', [Date Added])
END

Step 3: Instead of using DATE ADDED in the columns shelf of the viz, replace it with the new p.Date Granularity metric.

- In the viz, click and drag off ⊞ DAY(Date Add) from the columns shelf.
- **Right-click and drag** the new "p.Date Granularity" metric from the dimensions list to the columns shelf
- Choose the first option – 📅 **p.Date Granularity (Continuous)**

Step 4: Show your "Date Granularity" parameter in the viz so that users can select from the different date options.

- In the parameters list (bottom left corner) right-click on the "Date Granularity" parameter
- Select "show parameter" – the parameter will appear on the right side of the viz.

Step 5: Test the Date Aggregation parameter controls to change the date aggregation along the X-Axis. Also test whether the reference line continues to work. The final viz should look like the one below.

- Select different Date Granularity options
- Change the value to 100 for the "Pick a Request Threshold" parameter
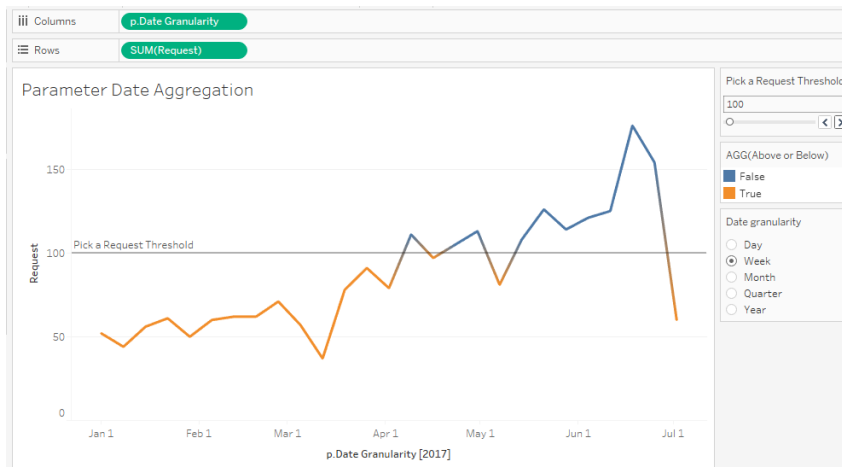
Challenge #1:

In a new sheet, create a parameter to **toggle between dimensions** in the same viz. Using a **CASE statement**, allow the end-user to look at the number of requests by **Ward** and **Service**. Sort in descending order. Below is an example of what the parameter may look like:

Slicing the data by Ward
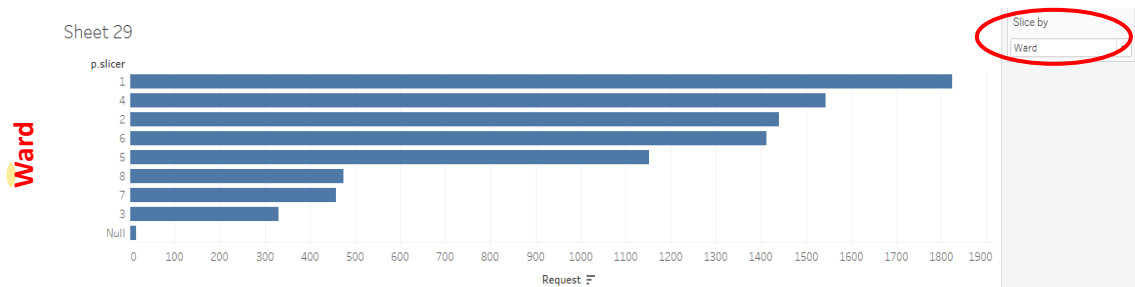
Slicing the data by Service
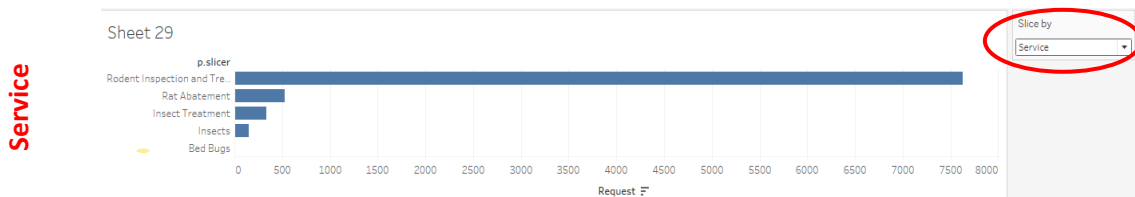
Challenge #3: Read how to create dynamic parameters when the data in your workbook updated (version 2020.1):

https://playfairdata.com/3-essential-ways-to-use-dynamic-parameters-in-tableau/

Module I: Choropleth Maps, ESRI ArcGIS Connection, Data Relationships (version 2020.2)

Choropleth Maps display divided geographical areas or regions that use color shading in relation to a data variable. This provides a way to visualize variations in values across geographic areas.

Ward Map

Below is a Choropleth Map that shows the number of requests and by ward.
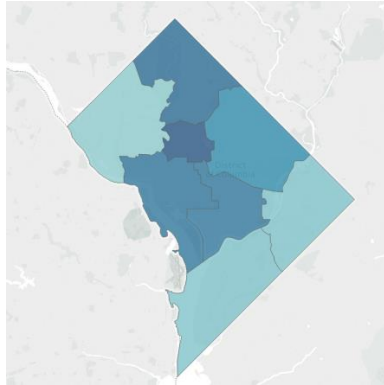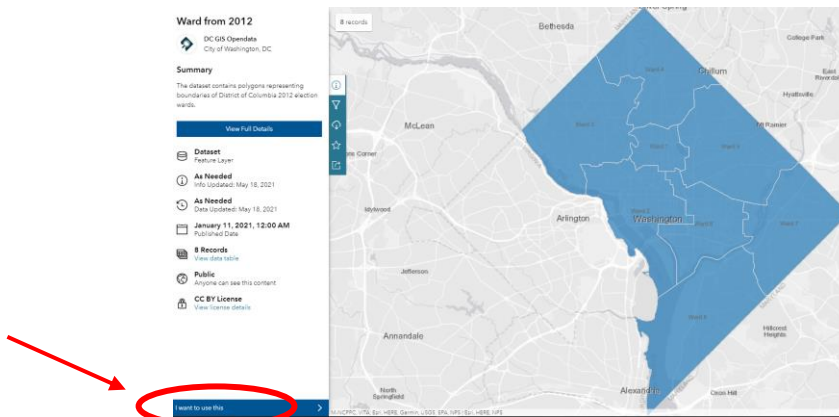

Mapping for versions of Tableau 2020.2 and above:

Create a relationship between the 311 dataset and DC Ward feature layer.

Step 1: Go to the Open Data DC website https://opendata.dc.gov/

Step 2: Search for "Ward from 2012" so that we can pull in the Ward boundaries into Tableau.

Step 3: Click on **I want to use this**

Step 4: Select **View API Resources**
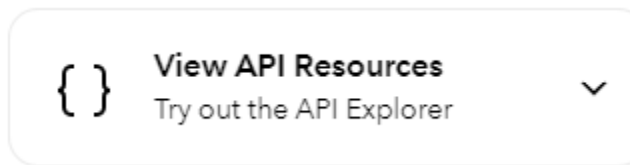
Step 5: Copy (CTR + C) the **GeoService** link from the API Resources drop down
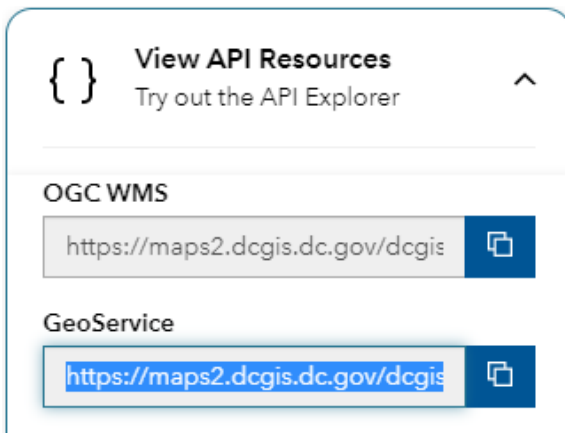
Step 6: Click on the **Data Source** tab in your Tableau Workbook (bottom-left corner)
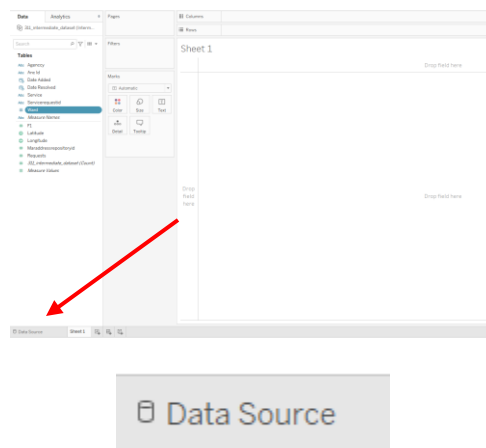
Relationships

To combine the Ward feature service with the 311 data, we need to establish a relationship between the datasets. Tableau's Relationship feature allows users to combine data from multiple tables for analysis

Some benefits of relationships are:

- **Less data preparation**: you do not need to aggregate your datasets to the same level of detail, nor do you need to use join clauses (eg: left, inner, outer).
- **Reduce the number of data sources in your workbook**: Relationships allow you to use the same data source for different levels of detail.

- **Unmatched values are accounted for**: all unmatched data are included, and unmatched measure values are represented with a zero (0).

Step 7: Add the Ward from 2012 feature service via Tableau's ESRI ArcGIS connection *(version 2020.2)*

The ESRI ArcGIS connection (version 2020.2) allows you to avoid having to download and save the shape file from Open Data onto your personal machine or Tableau Server.

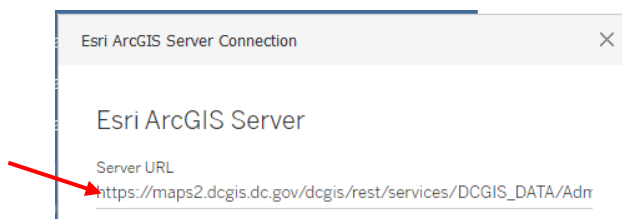- Click on the **Add** icon in the Connections data pane (top-left of screen).
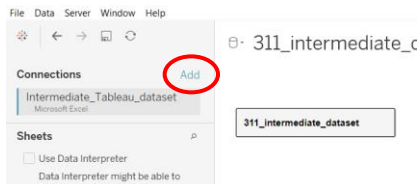
- Choose the ESRI ArcGIS Server connection
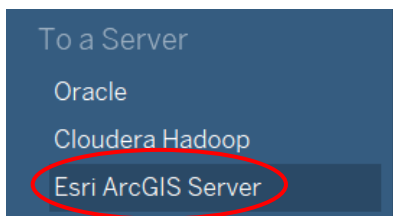
Step 8: Paste in the GeoService URL from the Open Data website into the dialog box

Note: The

- Click **Connect** or press **Enter**

Step 9: Drag in the Ward from 2012 table
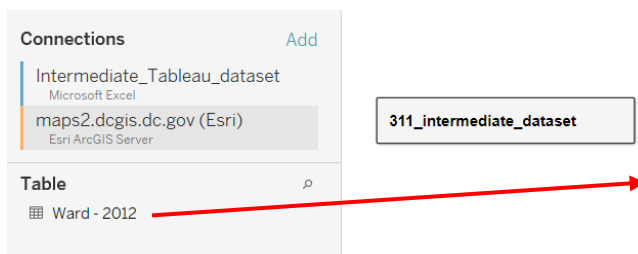
A relationship is created between the 311 and Ward tables. The line between the two tables is called a "noodle."

311_intermediate_dataset ———————— Ward - 2012

Step 10: Decide how you want the two tables to relate to each other by identifying one or more fields that the tables have in common.

- In our case, Tableau automatically identifies that both tables have a ward field.
- Close the relationship dialog box by clicking the X in the top-right corner.

Edit Relationship   ×

How do relationships differ from joins? **Learn more**

311_intermediate_dataset		Ward - 2012
# Ward	=	# WARD (Ward - 2012)
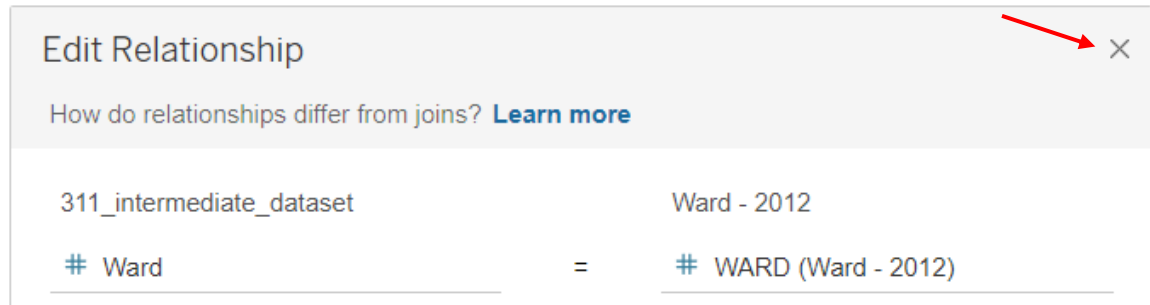
Now create your map in a new sheet.

Step 11: Open a new sheet and name it "Choropleth Map"

Choropleth Map
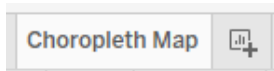
- Search for the "Shape" field in the Data Pane
  The search option narrows down the list of fields available in the data pane

  Data   Analytics
  📑 311_intermediate_dataset...
  shape   × ▽ ▦ ▾
 **Tables**
  ∨ ▦ **Ward - 2012**
     ⊕ Shape
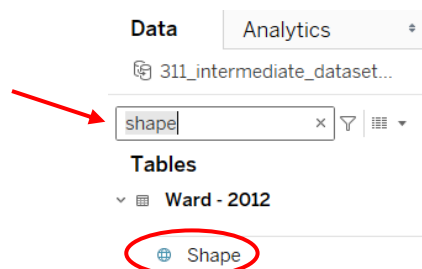
- Under the Ward – 2012 table, double click on ⊕ Shape

  The shape field brings in the ward polygon boundaries into the visualization.

- Search for and double click on **Requests** in the measures list for "311_intermediate_dataset"
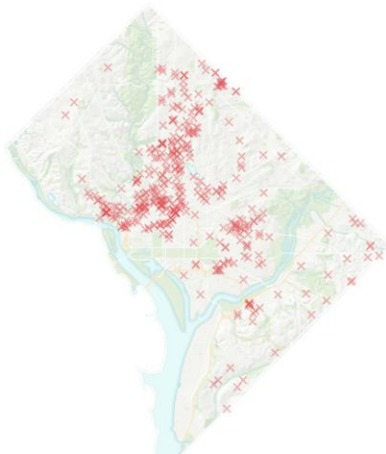 *Requests is the measure we are aggregating by.*
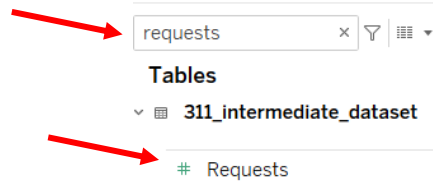
- Search for and double click on "Ward" in the dimensions list for "311_intermediate_dataset"
  Ward is the dimension we are grouping the number of requests by.
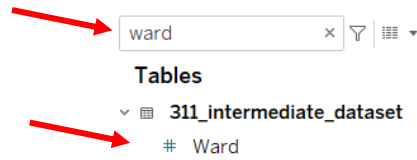
Exercise #8: Advisory Neighborhood Commission Point Map

Create a point map like the one below showing where requests have *not* been resolved at the ANC level
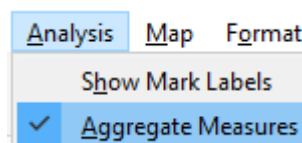

Recreate this map by following these steps:

- Open a new sheet and name it "ANC Point Map"

In the measures list for the "311_intermediate_dataset.csv" data file, follow these steps:

- Double click on **Latitude**
- Double click on **Longitude**

Disaggregate the data points:

- In the toolbar, click on "Analysis" and "Aggregate Measures"

Reduce the size of the points in the map:

- Click on "Size" in the Marks Card and move the slide bar to the left
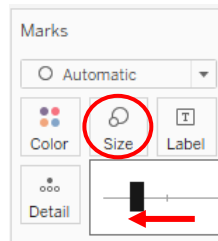
Create the metric "Request Status" to differentiate between resolved and unresolved requests. Unresolved requests will not have a Resolution Date.

- Create a calculated field
- Name the metric "Request Status"

Use the following syntax to determine whether a request has a resolution date or not.
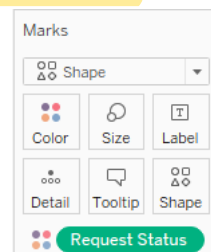
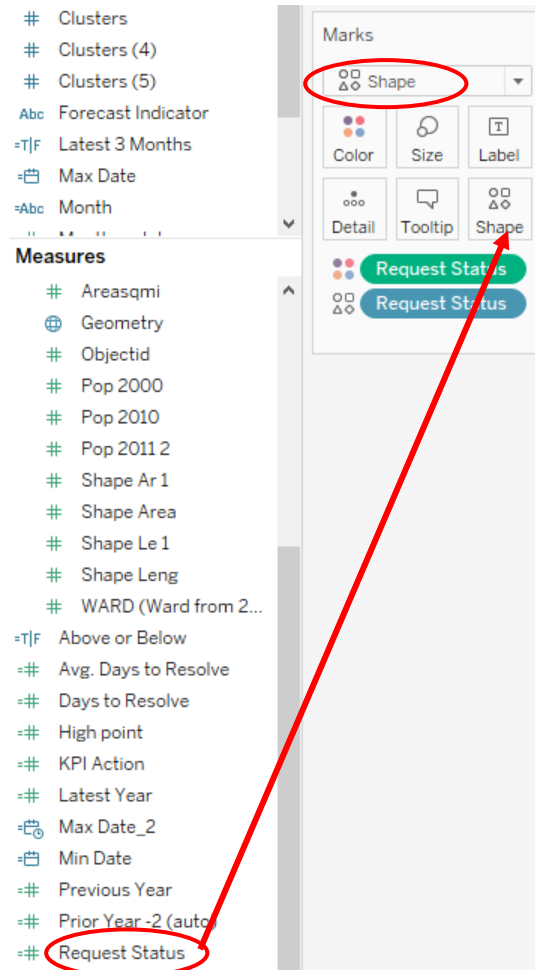*Syntax 7:*

```
IF ISNULL([Date Resolved])
THEN 0
ELSE 1
END
```
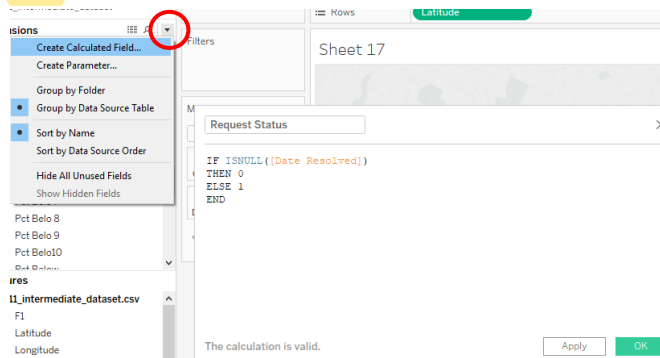

Add the "Request Status" field to the map and differentiate open and closed requests with color and shapes.

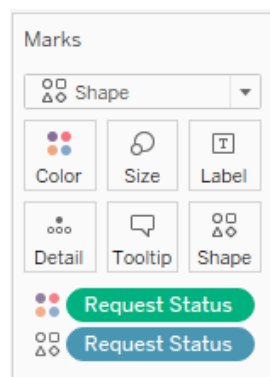Scroll to the bottom of the measures list, and follow these steps:
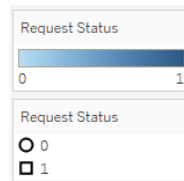- Drag "Request Status" to the color marks card

- Change the marks card chart type to "Shape"
- Drag "Request Status" to the Shape card

Make sure your Marks Card looks like this:

Now we have two legends with colors and shapes. We know that the marks with a value of 0 (zero) are unresolved cases and marks with a value of 1 are resolved.
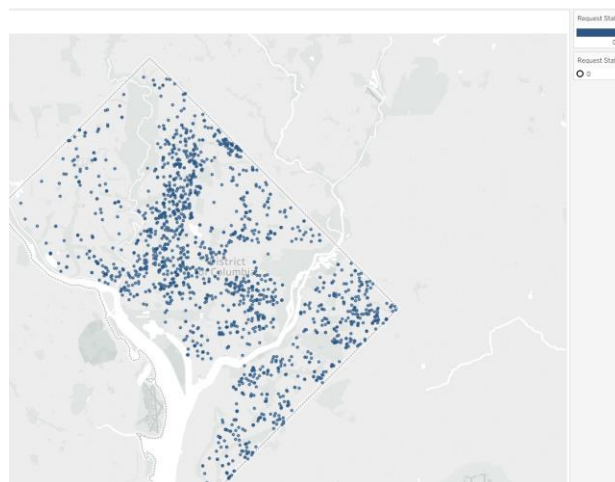
Since we just want the map to show unresolved cases, hide all the marks that are resolved and have a value of 1 (one).

- In the legend with the shapes (second from the top), right click on the value 1 (resolved requests)
- In the dropdown menu, click on "Hide" so that the resolved requests are not shown on the map
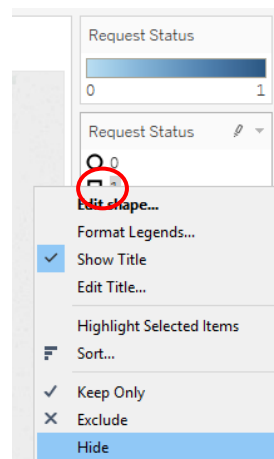
Now the map shows the location of all the unresolved requests since 2015.

Challenge #1: Add the ANC boundaries to the map by downloading the most recent ANC shape file from opendata.dc.gov and joining it to the requests dataset. The resulting visualization showing where unresolved requests exist for each ANC may look something like this:

Request Status

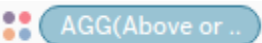☐ Unresolved
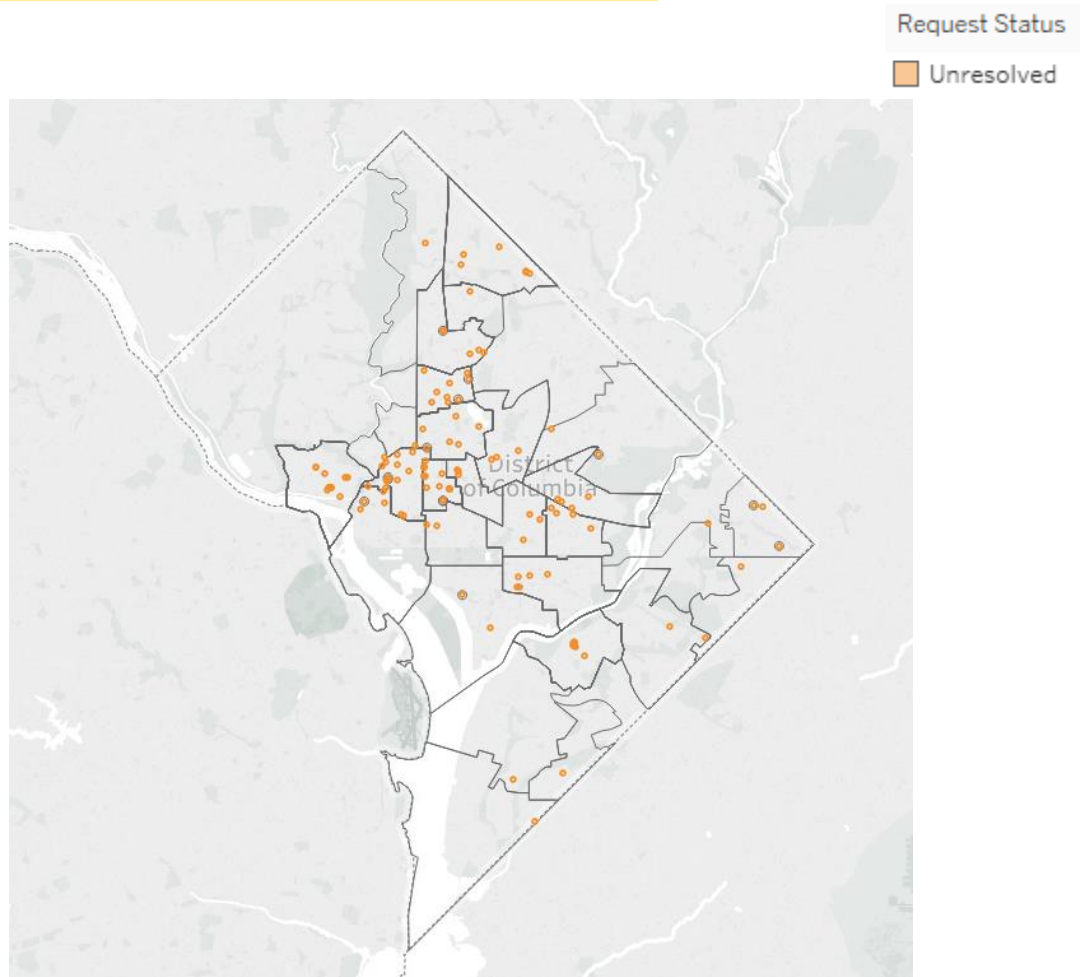
Module J: Statistics

Question 1: How can we group the number of requests each day into categories of low, medium, and high? Is there a way Tableau can do this with a statistics test?

Solution: Tableau's "Cluster Analysis" feature allows us to group similar values together by way of a statistical test called K-Segments[2]. Let's use Tableau's cluster feature to group the number of daily requests into three groups as shown below.

Cluster Analysis
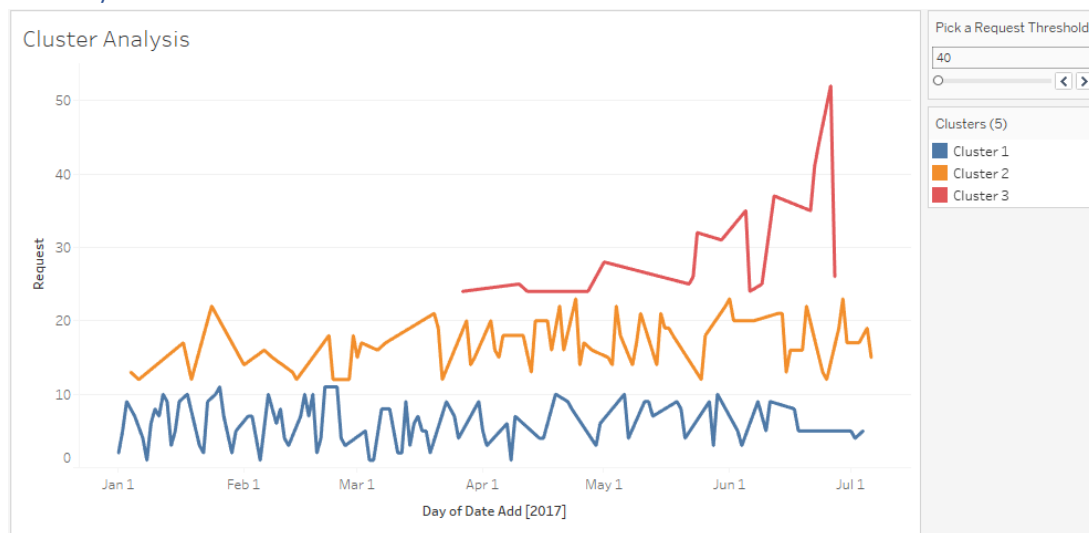
Note: Cluster analyses are best used in cases where each case has at least two measures and the data values are variable. In these scenarios, a scatter plot can effectively show how data can be grouped.

- Duplicate the "Reference Line Parameter" sheet and rename it "Cluster Analysis"
- Drag off the pill from the marks card

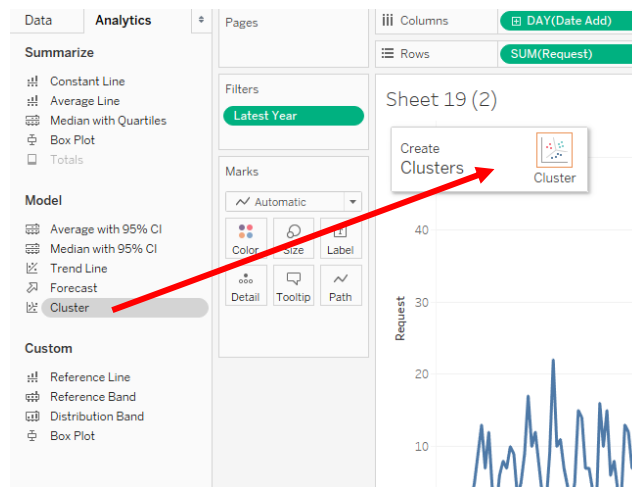Remove the reference line in the viz.

- Right click on the reference line and select "Remove."

---

[2] K-means procedure splits the data into K segments. Each segment has a centroid that corresponds to the mean value for the members in that segment. The objective of the algorithm is to place the centroids such that the total of the sum of distances between centroids and members in respective segments is as small as possible. https://boraberan.wordpress.com/2016/07/19/understanding-clustering-in-tableau-10/

- Click on the "Analytics" tab in the top-left corner.
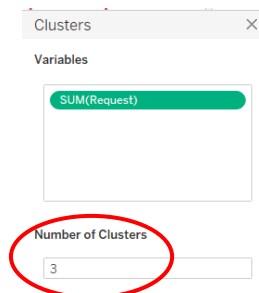- Drag "Cluster" onto the viz

Based on the values, Tableau has statistically identified four different groupings or "Clusters."
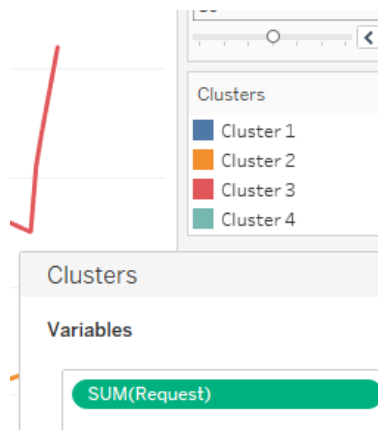
Since we want to group the data into High, Medium, and Low, **only three groups** are needed, not four.

- Go to the Marks Card and find the "Clusters" pill
- Click on the "Clusters" pill in the marks card and select "Edit Clusters"
- Change the number of clusters from "automatic" to "3" in the clusters dialog box.

Now Tableau has grouped our data into three groups or clusters. To understand how each cluster is grouped, follow these steps:

- Select "Describe Clusters" from the dropdown option for the Cluster pill
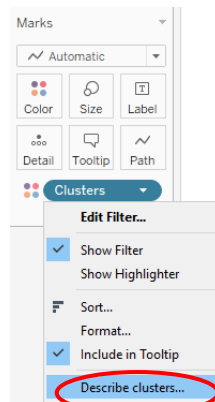
The "Describe clusters…" dialog box shows the inputs used to create the clusters and summary statistics about each of the clusters.

Exercise #10: Analytics Tab

- Duplicate the "Cluster Analysis" sheet.
- Remove the "Clusters" pill from the color card.
- Using the Analytics Tab, answer the following questions about daily requests in 2017:
    - What is the mean, and median?
    - Perform a least squares regression analysis. What is the correlation coefficient?
    - What does Tableau's forecast tell us about the data trend? Is there any way to make the forecast more accurate?
    - Shade the area in the viz between the average and maximum number of requests a different color. (Hint: Use one of the options from the "Custom" list of features in the analytics tab.)
    - In a new sheet, create a viz that shows the number of days to resolve requests by ANC. Next, group the number of days into three levels using Tableau's Cluster analysis.

Challenge #1: How does weather affect rodent and insect service requests? Using the **Weather Data.xlsx** file and **service request file**, answer the following question:

What can be said about the relationship between daily temperatures and the number of requests?

Appendix

Exercise #5: Table Calculations

1. Create the following visualization to show the sum of all requests (running total) for each ward across all the years in the dataset.
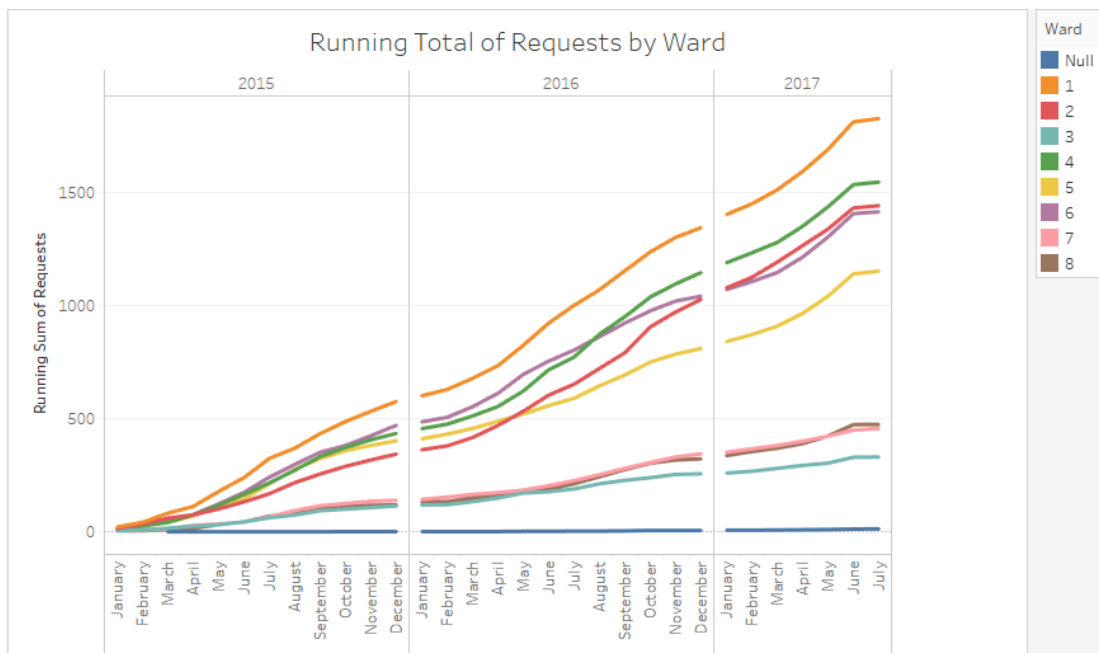

- Open a new worksheet and name it "Running Total of Requests by Ward"
- Bring "Ward" to the columns shelf
- Bring "Date Add" to the Rows shelf and drill down to the monthly level
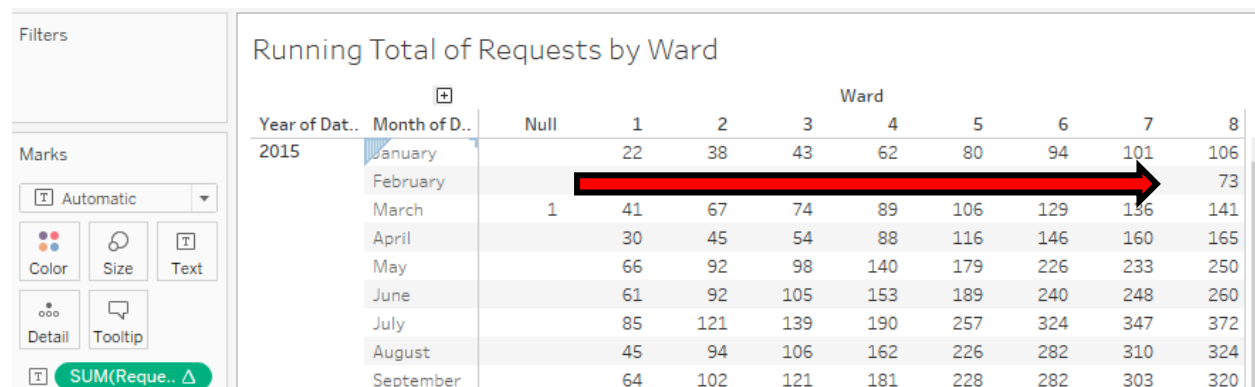- Drag off the Quarterly pill
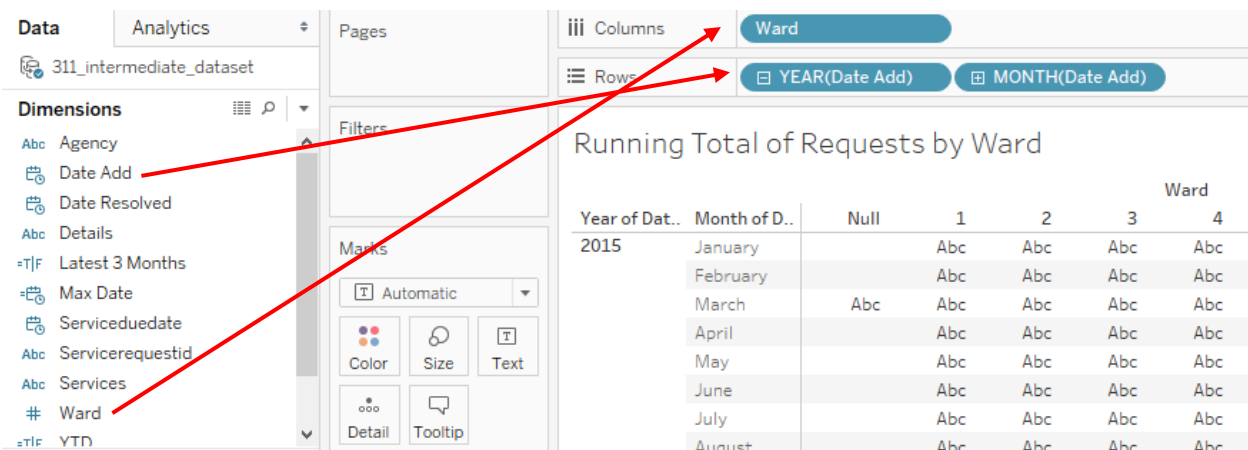
- Double click on "Requests" in the measures list

Now add the "Running Total" table calculation to find how many requests have been made within each Ward since January 2015.

- Click on the Requests pill in the marks card and add a "Running Total" Table Calculation
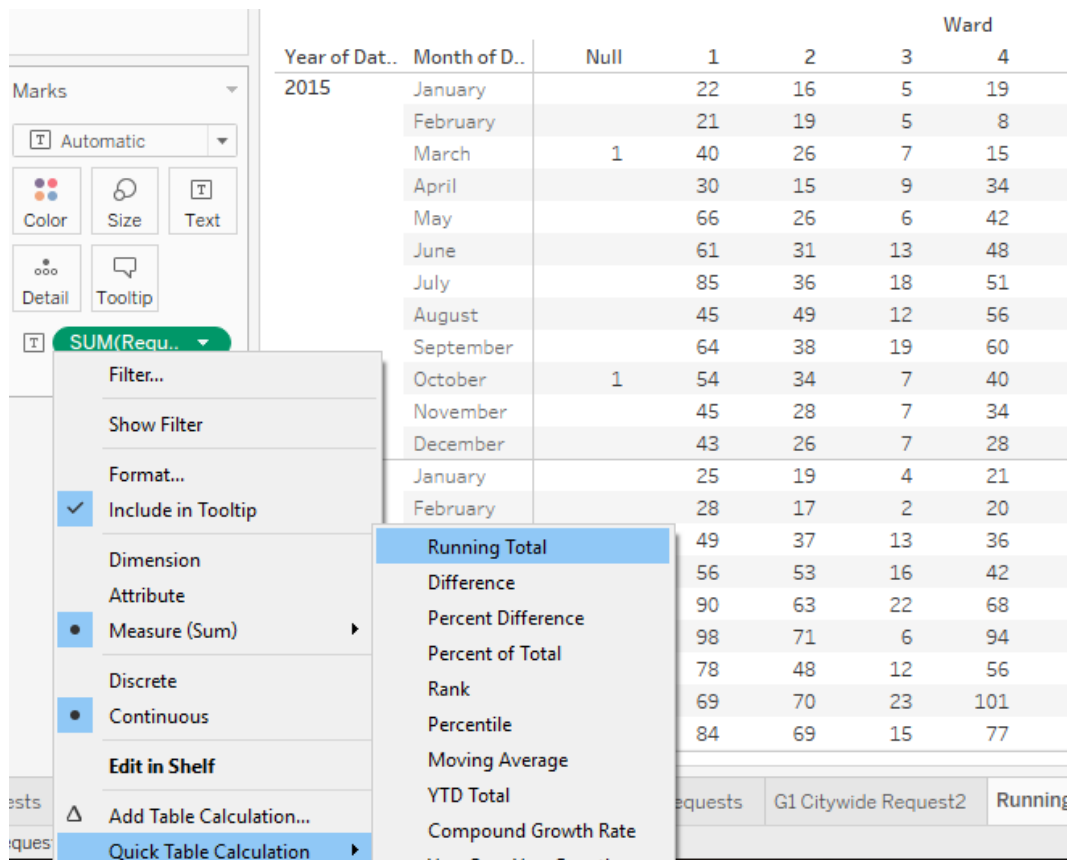
Below is what the table looks like after adding the table calculation. Notice that Tableau is adding the requests **across** the table (or across each of the wards). This is the default setting (direction of the red arrow). We want to sum the requests **down** the table so that requests are totaled within each ward.

Running Total of Requests by Ward

Year of Dat..	Month of D..	Null	1	2	3	4	5	6	7	8
2015	January		22	38	43	62	80	94	101	106
	February									73
	March	1	41	67	74	89	106	129	136	141
	April		30	45	54	88	116	146	160	165
	May		66	92	98	140	179	226	233	250
	June		61	92	105	153	189	240	248	260
	July		85	121	139	190	257	324	347	372
	August		45	94	106	162	226	282	310	324
	September		64	102	121	181	228	282	303	320

To change the orientation for how the table calculation is being calculated from across to down, follow these steps:
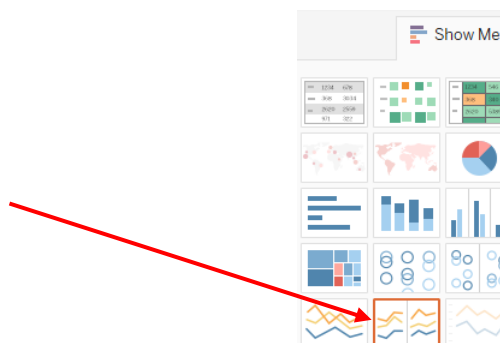
- Click on the Requests pill again, select "compute using," and then "Table (down)"
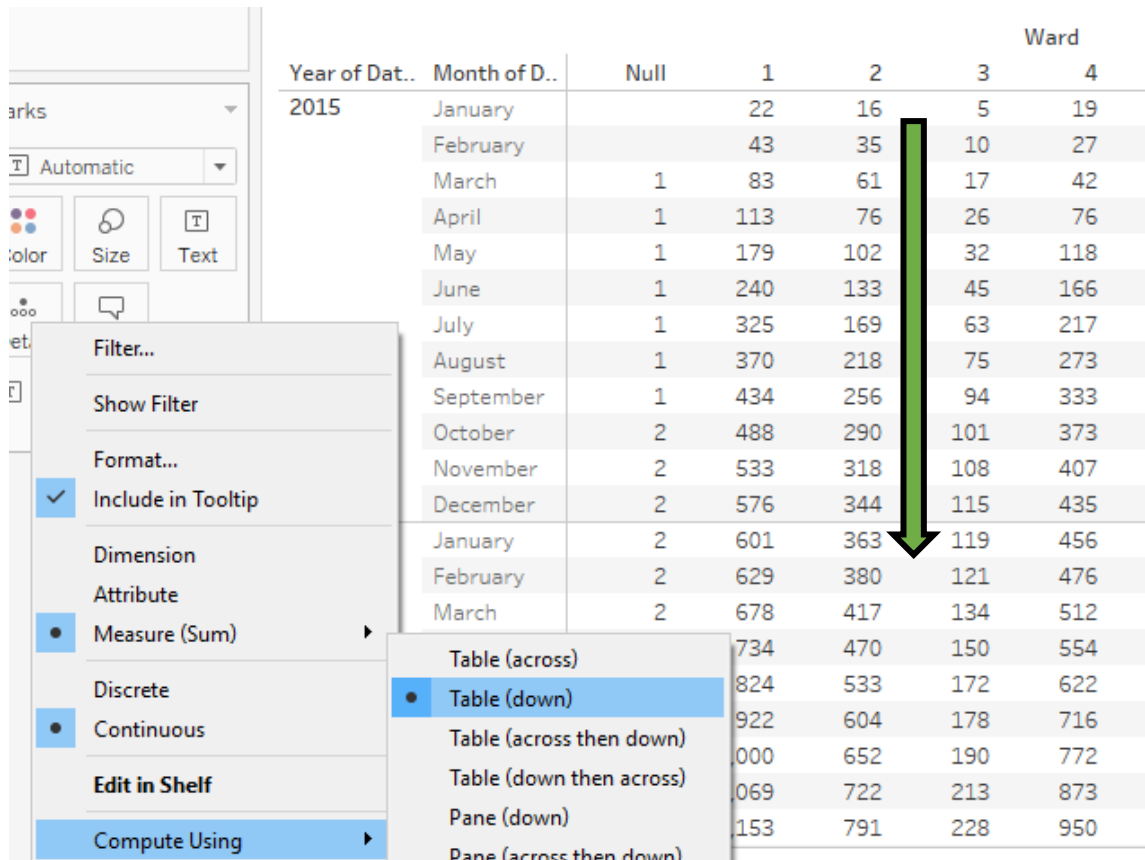
Notice how the number of requests is now being summed going down the table (within each ward across time) in the direction of the green arrow.

As a last step, use "Show Me" in the top right corner, to select a recommended visualization.

- Select "Show Me" and choose the recommended chart

- Time permitting, try using other Table Calculations. Note: You will need start over if you change the measures or dimensions in the viz.

2. In a new sheet, use the same data visualization but have the **running total restart at the beginning of each year.**
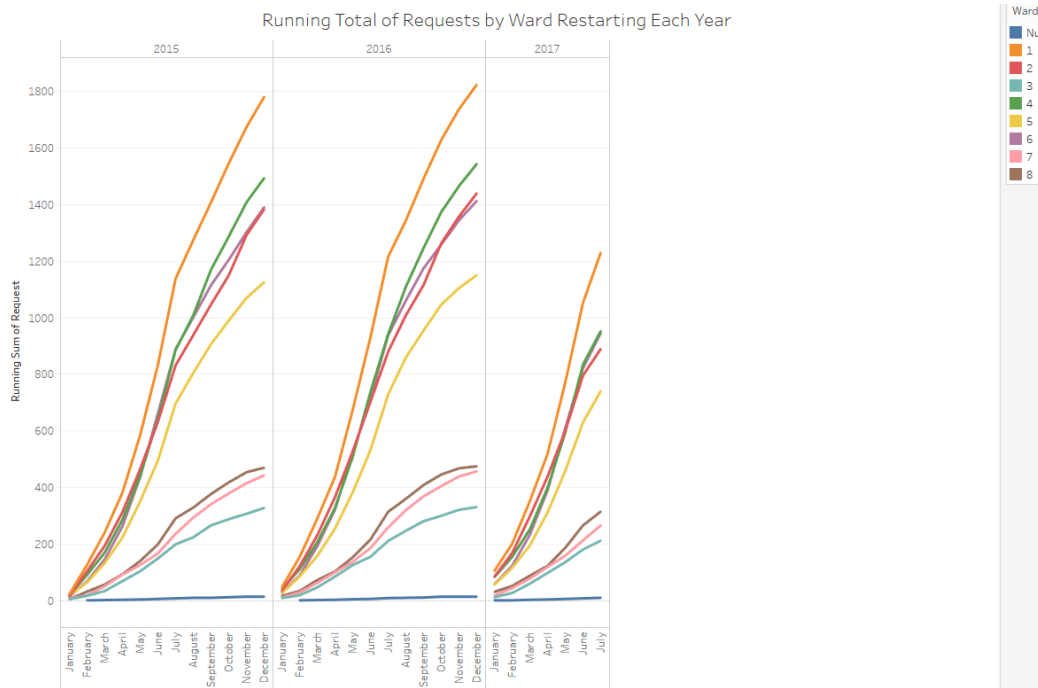
Exercise #6: Bullet Graph

A **Bullet Graph** is another way of showing data from the most recent and prior years and is like the Dual Axis viz.

Create a Bullet Graph like the one below to show the number of requests on a quarterly basis for 2016 and 2017.
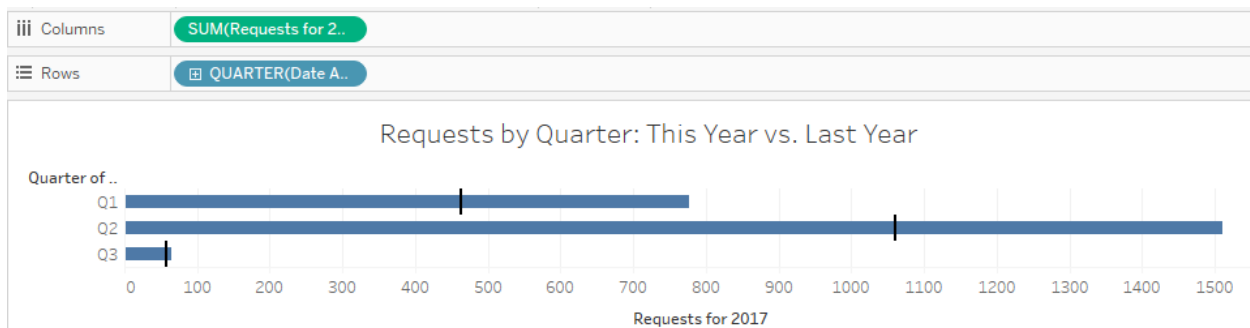

- Open a new worksheet and name it "Quarterly Bullet Graph"
- Holding down the CTRL key on your keyboard, select the following metrics:
  - o **Previous Year** – from the measures list
  - o **Current Year** – from the measures list

o **Date Added** – from the dimensions list
- Click on "Show Me" in the top right of the screen and select the Bullet Graph option.
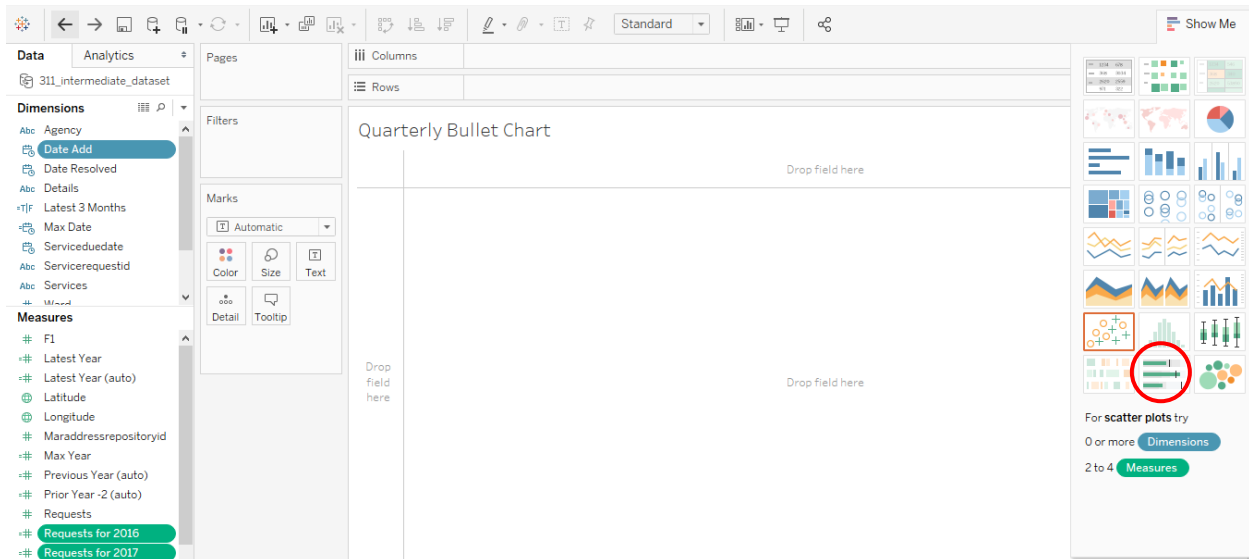
- Swap the rows and columns by clicking on the icon in the toolbar.
- Drill down from the Year level to Quarterly level in the rows shelf.
- Drag off the "Year" pill to evaluate the data at the quarterly level.
- Add in the YTD filter and select for "True" cases.
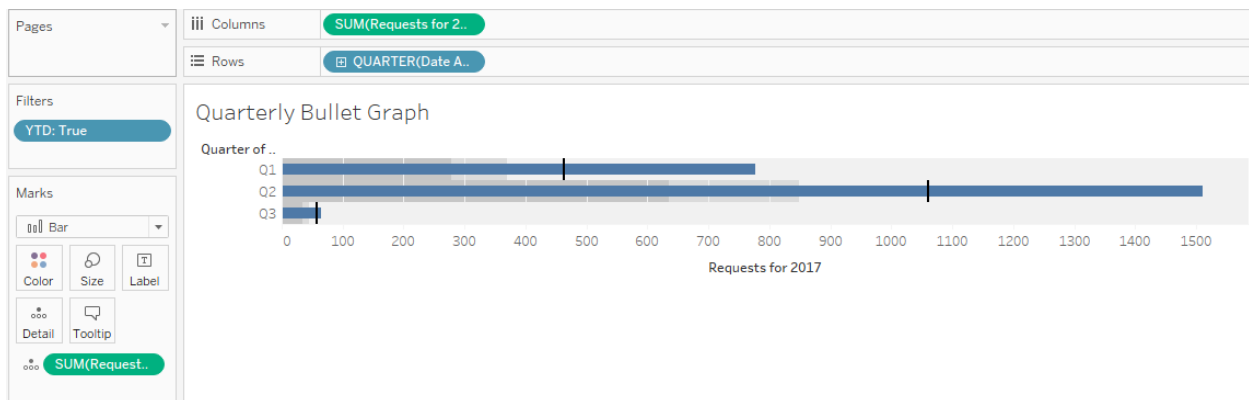
To remove background formatting so the chart just shows the blue bar chart (most recent year) and the black reference line (previous year), follow these steps.

- Right-click on the axis
- Select "Remove Reference Line" and then select "60%, 80% of Average Requests for 2016"

Quarterly Bullet Graph
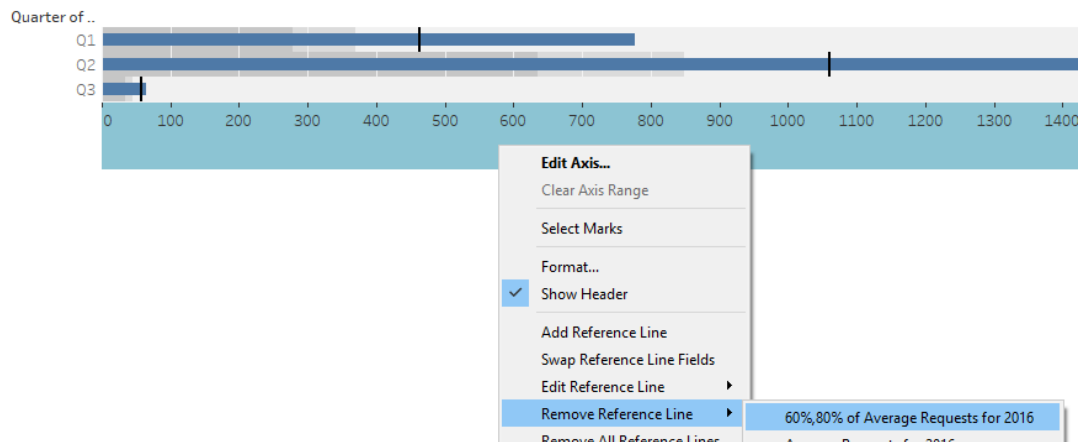
Provide a descriptive title.

- Double click on the title of the viz
- In the dialog box, change the title to "Requests by Quarter: This Year vs. Last Year"
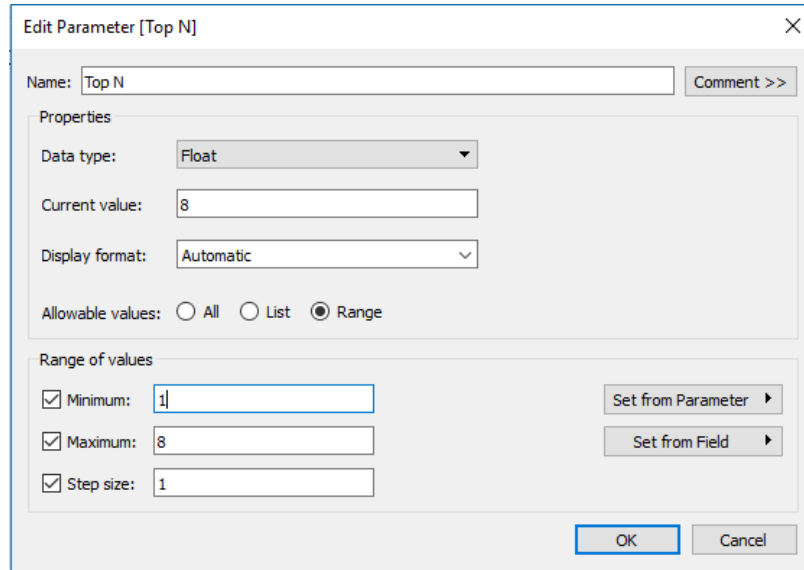
Exercise #7.2: Top N Parameter

Question 3: The user wants to focus on the Wards with the most requests. How can a user quickly select the top 3 or 5 wards with the most requests?

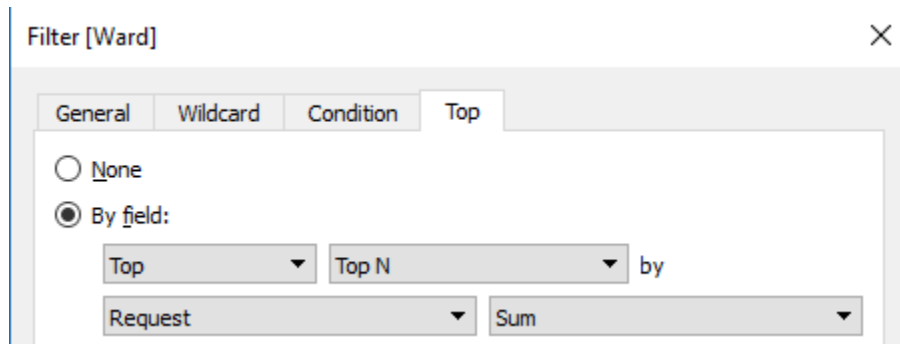**Solution: Create a Top N parameter** that allows the user to select the wards with the most requests in order of greatest to least.
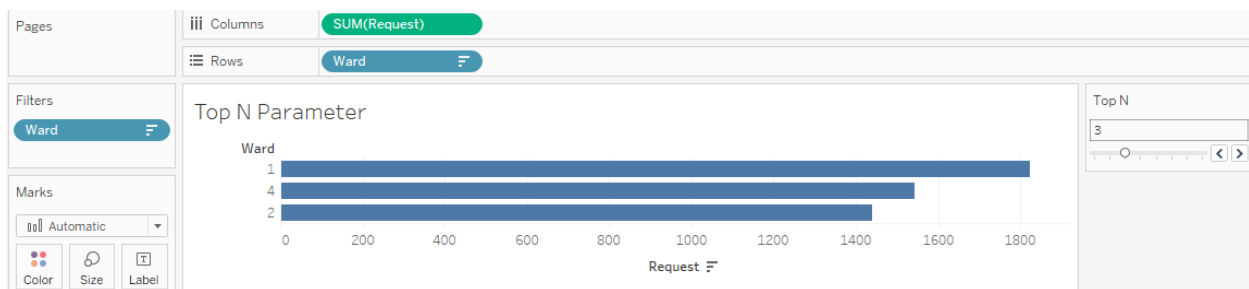
- Create a new sheet and name it "Top N Parameter".
- Drag "Requests" to the Rows shelf.
- Drag "Ward" to the Columns shelf.

- Transpose the bar chart by clicking on in the toolbar.
- In the Data pane, click the drop down to the right of Dimensions and select Create Parameter.
- Name the Parameter "Top N."
- Select "Range" as the Allowable values option.

- Under Range of values, specify the Minimum, Maximum, and Step size desired. In this case, our range is the number of Wards in our dataset. Set the Minimum to 1, the Maximum to 8, and the Step Size to 1.

- Click OK
- Right click on "Ward" in the Rows shelf and select **Show Filter**
- Click on "Ward" pill in the filter shelf and select **Edit Filter**
- Select the "Top" tab in the filter window
- Select **By field:**
- In the second drop down field to the left of "by", select **Top N**
- Make sure that the field to filter by (usually a measure) is specified, in case "Request" as "Sum".
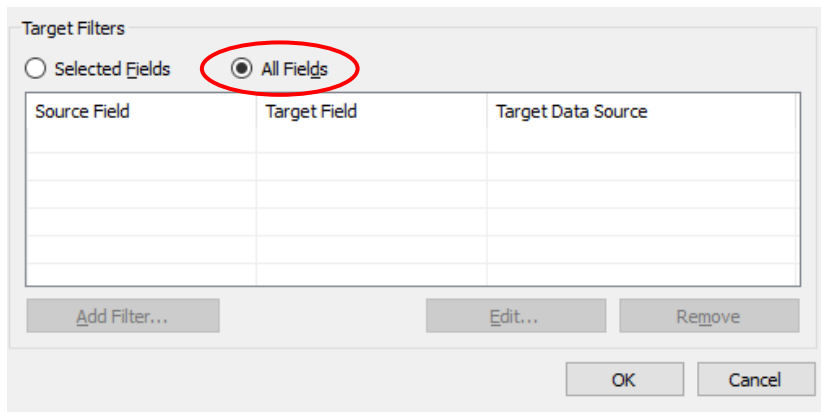
- Click OK.
- In the Data pane, under Parameters, right click on "Top N" and select Show Parameter Control.
- In the toolbar at the top of the screen, click on the Descending button icon ⬇, which will sort SUM(Requests).
- Lastly, in the upper right corner of the view, there is now a "Top N" slider and number field. Changing this field by moving the slider, will change what is shown in the view.

Below is what the viz will look like when the top 3 wards are selected.

Exercise #9: Filter Actions

Create a filter action that drills down from the **Ward Map** dashboard **to the ANC Map** dashboard.

- Click on the Ward Map dashboard ⊞ Ward Map
- In the toolbar, select "Dashboard" → "Actions" → Filter
- Set the "Ward Map" dashboard as the **source sheet** and the "ANC Map" dashboard as the **target sheet**. Use steps 1 through 5 on the previous page as a reference.
- Edit the filter action to just show the unresolved requests within the ward that was selected on the Ward Map.
    - o Do this by changing the Target Filters from "Selected Fields" to "All Fields."

URL Actions:

URL actions make it possible to bring in webpages into your dashboard. For additional interaction, URL actions can also be used to build a relationship between the data in your dashboard and the internet.

Some examples include:
- Clicking on an agency's logo in a Tableau dashboard and accessing the agency's website within the dashboard.
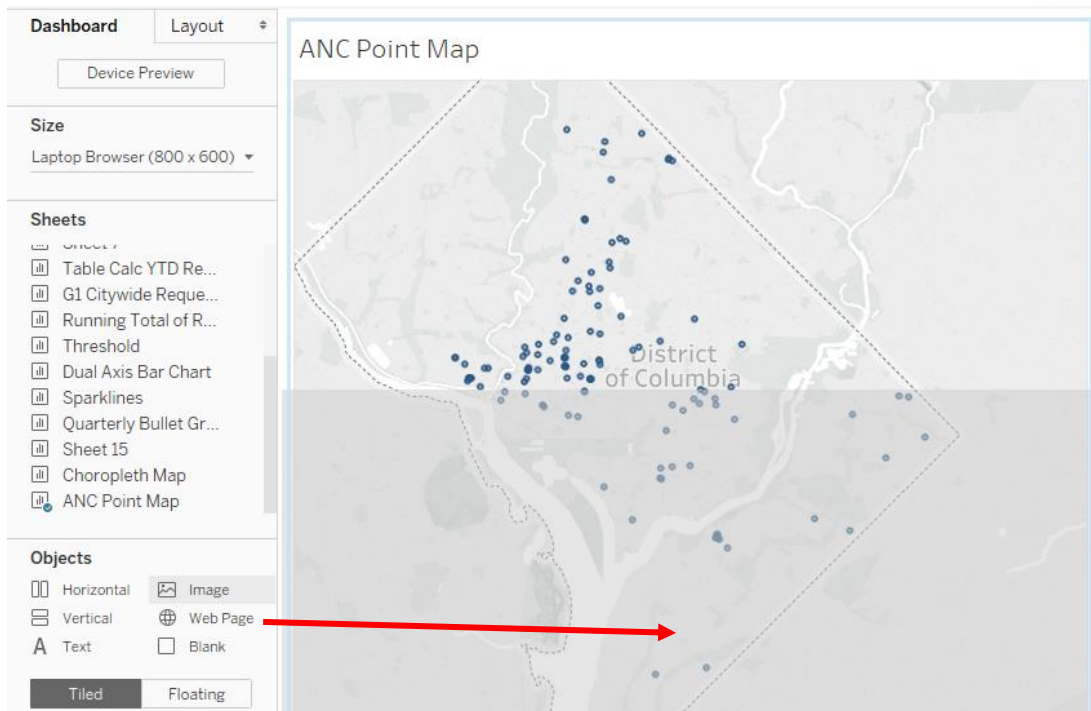- Linking the coordinates of the points in Tableau to Google Maps. Below is an example.
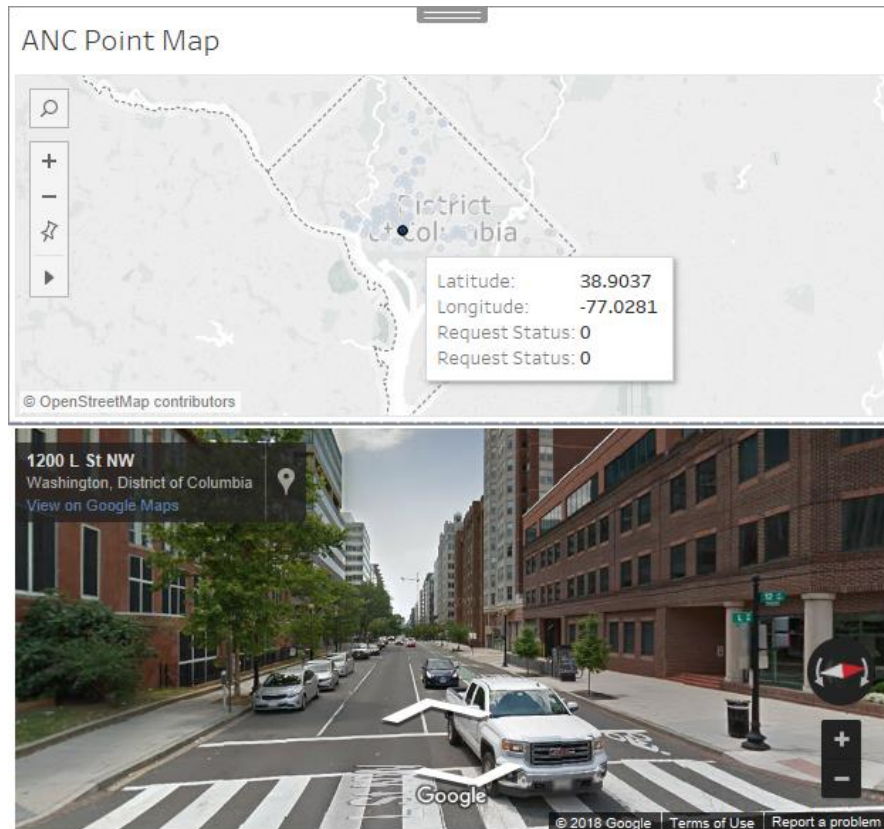
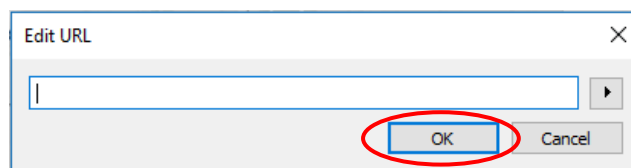Here is the process for linking coordinates in Tableau to Google Map images:

- In Tableau, click on the "ANC Map" dashboard

Add in a web page into the dashboard.

- From the "Objects" list on the left side of the dashboard, click and drag the "Web Page" object below the ANC Requests map.
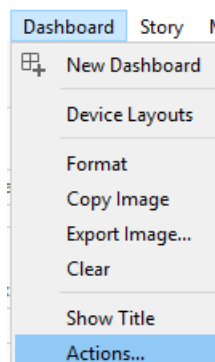
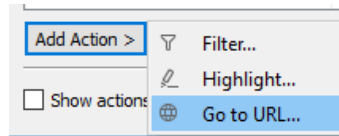- Click "OK" in the "Edit URL" dialog box

Now add in the URL action

- In the toolbar at the top of the page, select "Dashboard" and then "Actions…"

- Select "Add Action" → Go to URL…

- In the URL Action dialog box, follow these three steps as pictured below:
  1. Provide the URL action with a descriptive name
  2. Choose "Select" for the action to run on
  3. Enter in the URL (see below)

Syntax 8:

https://www.dataplusscience.com/iframe.html?url=https://maps.google.com/maps?q=<AVG(Latitude)>,<AVG(Longitude)>&layer=c&z=17&sll=<AVG(Latitude)>,<AVG(Longitude)>&cbp=13,276.3,0,0,0&cbll=<AVG(Latitude)>,<AVG(Longitude)>&hl=en&ved=0CAoQ2wU&sa=X&iwloc=near&output=svembed&layer=c

- Additional information about this code can be found here:
  https://www.dataplusscience.com/EmbedGoogleMaps.html

Choropleth Map for versions 2020.1 and below
Ward Map

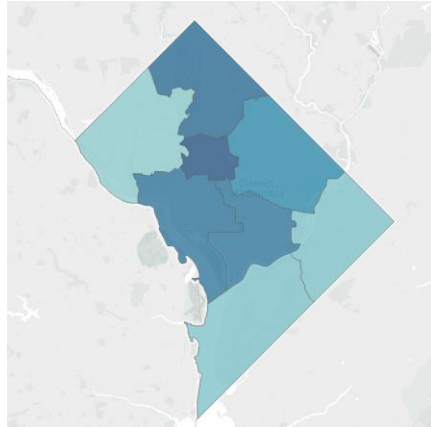Below is a Choropleth Map that shows the number of requests and by ward.

Tableau Desktop versions before 2020.2 do not include the relationship feature. If your version of Tableau Desktop is earlier than 2020.2, then follow these steps to create the choropleth map:
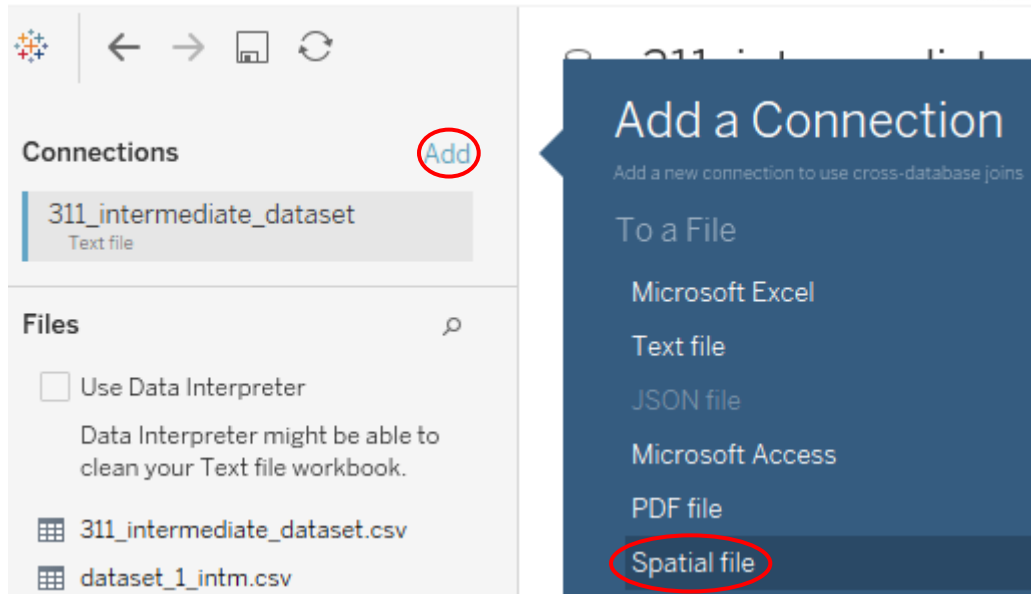
Source files:

1. **311_intermediate** CSV file from training
2. **Ward from 2012** shape file from opendata.dc.gov
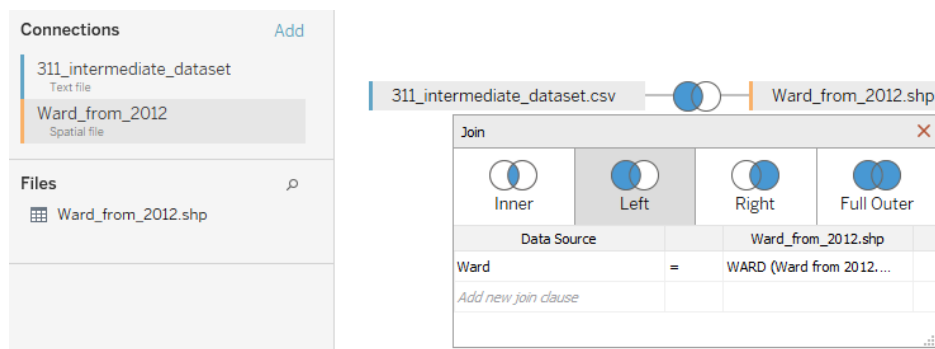   a. Click download and select "shapefile"
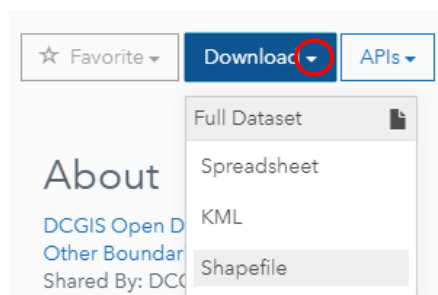
The process:

- Open a new sheet and name it "Choropleth Map"
- In the Data Source page, add both files to Tableau
   o Click "add" and open the Ward_from_2012.shp file to Tableau

- Join the two files together
  - Click the "Left" join icon to merge the Ward shape file onto the 311_intermediate file
  - Join on "Ward" – 311_intermediate; "WARD(Ward from 2012.shp)"

- Click back to your "Choropleth Map" worksheet (click "save" if prompted to re-save the extract)
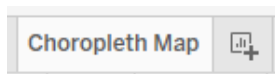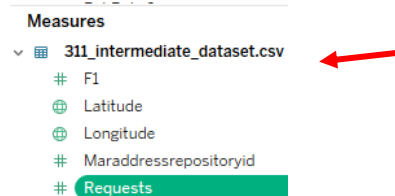

- In the measures list, scroll down to the "Ward_from_2012.shp" data file
  - Double click on *Latitude (generated)*
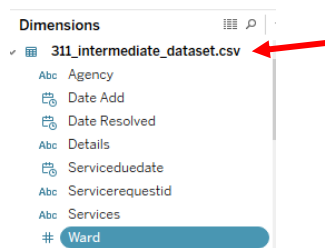 - Double click on *Longitude (generated)*
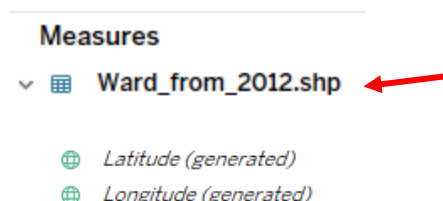
- Double click on "Geometry" in the measures list for "Ward_from_2012.shp"

- Double click on "Requests" in the measures list for "311_intermediate_dataset.csv"

- Double click on "Ward" in the dimensions list for "311_intermediate_dataset.csv"

Switching from a static file to a database in Tableau Desktop

Process for switching data sources:

1. Install database drivers
2. Connect to database in Tableau
3. Drag in database table to use in Tableau
4. Reduce size of database tables by applying filters in Tableau Desktop's Data Source UI
5. Change the data source of existing visualizations to database table
6. Reconcile any differences in field names or data types between static file and database table

**Step 1:** Install the Oracle driver that has been authenticated by OCTO by following these instructions: https://octo.in.dc.gov/sites/default/files/dc/sites/OCTO/publication/attachments/DCGIS_Oracle_12c_64bit_Runtime_Connection_Win10_0.pdf

Notes:

1. These instructions are for version 12c of Oracle but also work for more recent versions of Oracle (E.g.: 19c).
2. Oracle Runtime is installed successfully when you see the Finish menu.
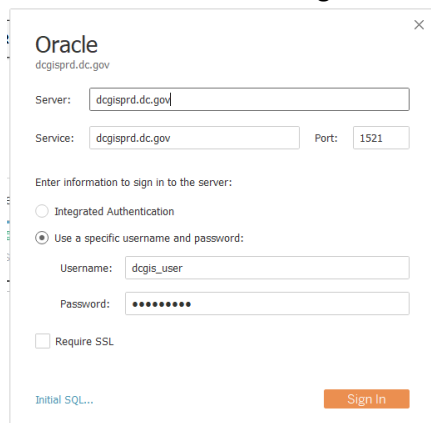
Step 2: In Tableau Desktop, connect to Oracle

      a.   Navigate back to your Tableau workbook

      b.   Click on any sheet in your workbook (not a dashboard)

      c.   In the top menu bar, select "Data" then "New data source"
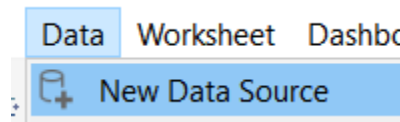
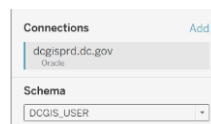   d.   Select "Oracle" as your new data source
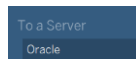
      e.   Enter the following connection details

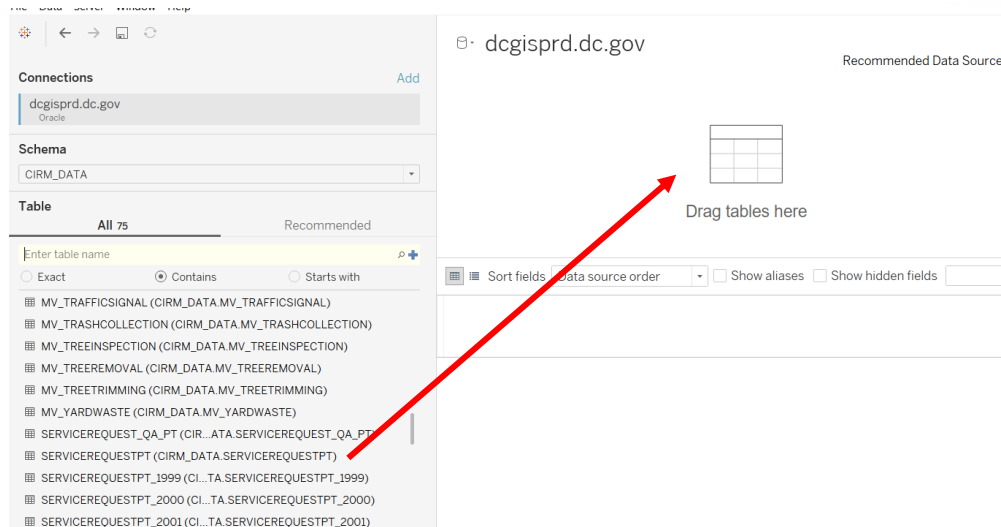   Password: dcgisuser

Step 3: Once you have connected to Oracle, pick the database/schema and table that contains the data that you want to use.

      a.   Under Schema, choose "CIRM_DATA" in the drop-down menu

      b.   Under Table, scroll down to "SERVICEREQUESTPT"

   c.   Drag "SERVICEREQUESTPT" into the Tableau Data Source interface.

Step 4: Use the filter in the data source (top-left corner) to reduce the amount of available data

    a. Filter "Addate" to the most recent year

    b. Filter "OranizationAcronymn" (or Agency) to "DOH"

Step 5: Switch the data source from the static file to the Oracle data connection.
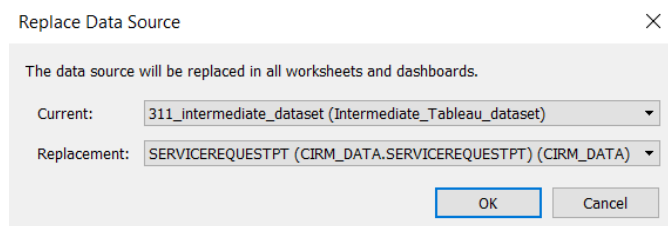
    a. Click on one of the sheets in the workbook

    b. Right-click on the static data source in the connection pane (top-left corner)
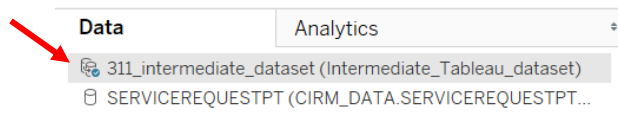
    c. Select "Replace Data Source" from the drop-down options
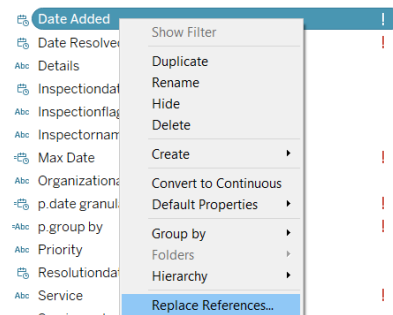

    d. In the Replace Data Source dialog box, select the Current data source and the Replacement data source.

    e. When finished, click OK

Step 6: Reconcile any differences between the two data sources. This applies to data field names, calculated fields, groups, and sets.

    a.   If there are differences between the data sources, right click on the fields in the data pane with a red exclamation mark next to them (**!**)

    b.   Select **Replace References** in the drop down

    c.   In the dialog box, select the field name that is associated with the new data source.