




Working With Data and Selections

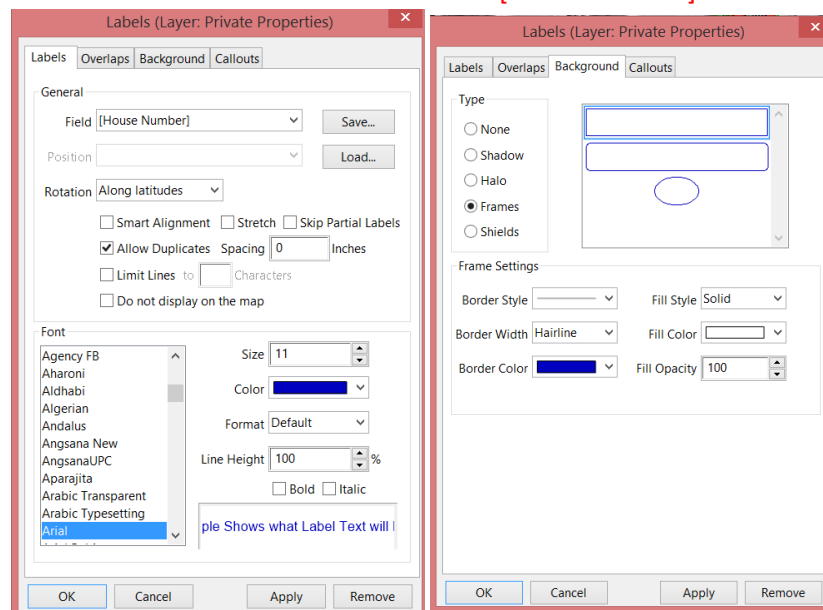
Task 1: Build your base map.


The objective is to build a base map with the four layers given in the above table.

- [a] Define a proper style for all **cdf**-files in the map and show the aerial **GOOGLE** image.
- [b] Label each property by its house number (Note: for subsequent mapping tasks remove the labels again).
- [c] Add the legend to the map and set the map units to feet.
- [d] Show your properly formatted base map.

Steps:

1. Open → Choose “Geographic File (*.cdf, *.dbd)” from the file type list → Choose all four layers → Uncheck “Add to map” and “Open for exclusive access”.
2. Map → Layers... or click  → Add Layer → Choose “JPEG (*.jpg)” file type to import the aerial GOOGLE image “CrownGoogle.jpg”.
3. Click  in  → Choose [House Number] to label each property.



4. Set your preferred style for each mapping layer.
5. Edit → Preferences → System → Set Map Unites as “Feet”.
6. Click  to add a legend.



Task 2: Link an attribute table to a layer and format it

[a] Link the file **CrownAppraisal.xlsx** to the layer of the private homes by the house numbers.

1. Open → Choose "Excel Worksheet" as the file type → Import CrownAppraisal.xlsx.
2. Choose "Private Properties" from the dropdown list as the current working layer → Dataview → Join → Choose [House Number] as the join field.

Join

Settings Options

Create Joined View

Name: PropertyTax

Joining from (left side of join)

Table: Private Properties

Field: [House Number]

Examples: 12, 31, 30, 29, 13, 14, 15, 16, 42, 43

To (right side of join)

Table: CrownTaxAppraisal

Field: [House #]

Examples: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10

OK Cancel

[b] Calculate for 2013 and 2014 the *improvement value per square foot living space* and use-format these new fields by **\$123.89/sqft**.

1. → Calculate the *improvement value per square foot living space* for 2013 and 2014 separately.

Formula (Dataview: PropertyTax)

Improve13 / [SQF Living]

OK Cancel Delete Clear Verify Sum Fields...

Formula Builder

Field List... Operator List... Function List... Values...

Formula Fields

Improve per srt 2013 Save... Load...

Previous Formulas

Improve13 / [SQF Living]

Formula (Dataview: PropertyTax)

Improve14 / [SQF Living]

OK Cancel Delete Clear Verify Sum Fields...

Formula Builder

Field List... Operator List... Function List... Values...

Formula Fields

Improve per sqft 2014 Save... Load...

Previous Formulas

Improve13 / [SQF Living]

2. Dataview → Formats... → Define the new format as **\$123.89/sqft**.

Custom Field Formats

Format

Format: New Format Delete

Edit

Text Before Number: \$

Text After Number: /sqft

Comma Symbol: ,

Decimal Places: 2

Significant Digits: 0

Scientific Notation: None

☐ Convert to %

Sample: \$12,345.00/sqft

Defaults OK Cancel Apply

3. Dativew → Column Settings → Choose the new defined format for the calculated improvement value field.

Land13	Improve13	Land14	Improve14	[Improve per sarr 2013]	[Improve per sarr 2014]
47500	183347	51300	197287	\$74.77/sqft	\$80.46/sqft
52500	216185	56700	232669	\$72.45/sqft	\$77.97/sqft
52500	210157	56700	226136	\$73.17/sqft	\$78.74/sqft
71500	215840	77220	232282	\$71.71/sqft	\$77.17/sqft
47500	150422	51300	161858	\$75.74/sqft	\$81.50/sqft
47500	179888	51300	193566	\$74.92/sqft	\$80.62/sqft
47500	137076	51300	147101	\$63.23/sqft	\$67.85/sqft
47500	175048	51300	237509	\$64.14/sqft	\$87.03/sqft
52500	190713	56700	202194	\$66.82/sqft	\$70.85/sqft
71500	201570	77220	216896	\$71.61/sqft	\$77.05/sqft
71500	141082	77220	149577	\$74.73/sqft	\$79.23/sqft
65000	162500	70200	174854	\$78.01/sqft	\$83.94/sqft
65000	149440	70200	158436	\$72.23/sqft	\$76.58/sqft
47500	189936	51300	204529	\$81.38/sqft	\$87.63/sqft
47500	145154	51300	190227	\$73.68/sqft	\$96.56/sqft
47500	164159	51300	241212	\$59.91/sqft	\$88.03/sqft
50000	148419	54000	174718	\$63.37/sqft	\$74.60/sqft
50000	129652	54000	139135	\$64.31/sqft	\$69.02/sqft
50000	129866	54000	139365	\$64.93/sqft	\$69.68/sqft
65000	138780	70200	147134	\$74.57/sqft	\$79.06/sqft
65000	175839	70200	189210	\$72.90/sqft	\$78.45/sqft
47500	123433	51300	132461	\$66.33/sqft	\$71.18/sqft
47500	172087	51300	185309	\$77.13/sqft	\$83.06/sqft

[c] Calculate the percentage change in the square foot value from 2013 to 2014 using the equation $\frac{\$/ft^2 \text{ in 2014} - \$/ft^2 \text{ in 2013}}{\$/ft^2 \text{ in 2013}}$ and assign the %12.34 format to the new field.

1.  → Calculate the percentage change by using the equation $\frac{\$/ft^2 \text{ in 2014} - \$/ft^2 \text{ in 2013}}{\$/ft^2 \text{ in 2013}}$.

Formula (Dativew: PropertyTax)

Formula: $([Improve \text{ per sarr } 2014] - [Improve \text{ per sarr } 2013]) / [Improve \text{ per sarr } 2013]$

Formula Fields: Improve percent

Previous Formulas: Improve14 / [SQF Living]

Buttons: OK, Cancel, Delete, Clear, Verify, Sum Fields..., Save..., Load...

2. Dativew → Formats... → Define the new format as %12.34.

Custom Field Formats

Format: New Format

Edit

Text Before Number: %

Text After Number:

Comma Symbol: None

Decimal Places: 2

Significant Digits: 0

Scientific Notation: None

☐ Convert to %

Sample: %12345.00

Buttons: Delete, Defaults, OK, Cancel, Apply

3. Datiview → Column Settings → Choose the new defined format for the calculated percentage change field.

Land14	Improve14	[Improve per srt 2013]	[Improve per sqrt 2014]	[Improve percent]
51300	197287	\$74.77/sqft	\$80.46/sqft	%0.08
56700	232669	\$72.45/sqft	\$77.97/sqft	%0.08
56700	226136	\$73.17/sqft	\$78.74/sqft	%0.08
77220	232282	\$71.71/sqft	\$77.17/sqft	%0.08
51300	161858	\$75.74/sqft	\$81.50/sqft	%0.08
51300	193566	\$74.92/sqft	\$80.62/sqft	%0.08
51300	147101	\$63.23/sqft	\$67.85/sqft	%0.07
51300	237509	\$64.14/sqft	\$87.03/sqft	%0.36
56700	202194	\$66.82/sqft	\$70.85/sqft	%0.06
77220	216896	\$71.61/sqft	\$77.05/sqft	%0.08
77220	149577	\$74.73/sqft	\$79.23/sqft	%0.06
70200	174854	\$78.01/sqft	\$83.94/sqft	%0.08
70200	158436	\$72.23/sqft	\$76.58/sqft	%0.06
51300	204529	\$81.38/sqft	\$87.63/sqft	%0.08
51300	190227	\$73.68/sqft	\$96.56/sqft	%0.31
51300	241212	\$59.91/sqft	\$88.03/sqft	%0.47
54000	174718	\$63.37/sqft	\$74.60/sqft	%0.18
54000	139135	\$64.31/sqft	\$69.02/sqft	%0.07
54000	139365	\$64.93/sqft	\$69.68/sqft	%0.07
70200	147134	\$74.57/sqft	\$79.06/sqft	%0.06
70200	189210	\$72.90/sqft	\$78.45/sqft	%0.08
51300	132461	\$66.33/sqft	\$71.18/sqft	%0.07
51300	185309	\$77.13/sqft	\$83.06/sqft	%0.08

[d] Provide a screenshot showing a few records of the linked dataview displaying the all fields of the private homes layer and the house numbers from the EXCEL file as well as the three newly created and formatted fields. You may hide the other fields in the joint dataview.

ID	AREA	DATA[House Number]	[House #]	[SQF Living]	[SQF Garage]	Location	Land13	Improve13	Land14	Improve14	[Improve per sqft 2013]	[Improve per sqft 2014]	[Improve percent]
6871	4315.68	29	29	3010	570	INTERIOR	71500	215840	77220	232282	\$71.71/sqft	\$77.17/sqft	%0.08
6888	4438.72	13	13	1986	517	NORTH	47500	150422	51300	161858	\$75.74/sqft	\$81.50/sqft	%0.08
6906	4291.45	14	14	2401	484	NORTH	47500	179088	51300	193566	\$74.92/sqft	\$80.62/sqft	%0.08
6923	4351.99	15	15	2168	462	NORTH	47500	137076	51300	147101	\$63.23/sqft	\$67.85/sqft	%0.07
6941	4412.44	16	16	2729	556	NORTH	47500	175048	51300	237509	\$64.14/sqft	\$87.83/sqft	%0.36
6958	4294.16	42	42	2854	506	INTERIOR	52500	190713	56700	202194	\$66.82/sqft	\$70.85/sqft	%0.06
6976	4321.23	44	43	2815	484	INTERIOR	71500	201570	77220	216896	\$71.61/sqft	\$77.05/sqft	%0.08
6993	4683.81	45	28	1888	562	INTERIOR	71500	141082	77220	149577	\$74.73/sqft	\$79.23/sqft	%0.06
7010	4425.57	27	27	2083	473	INTERIOR	65000	162500	70200	174854	\$78.01/sqft	\$83.94/sqft	%0.08
7027	4530.25	26	26	2069	508	INTERIOR	65000	149440	70200	158436	\$72.23/sqft	\$76.58/sqft	%0.06
7045	4342.76	17	17	2334	528	NORTH	47500	189936	51300	204529	\$81.38/sqft	\$87.63/sqft	%0.08
7062	4410.99	18	18	1970	554	NORTH	47500	145154	51300	190227	\$73.68/sqft	\$96.56/sqft	%0.31
7080	4422.14	19	19	2740	506	NORTH	47500	164159	51300	241212	\$59.91/sqft	\$88.83/sqft	%0.47
7097	4044.67	51	49	2342	462	EAST	50000	148419	54000	174718	\$63.37/sqft	\$74.60/sqft	%0.18
7115	4300.25	50	48	2016	484	EAST	50000	129652	54000	139135	\$64.31/sqft	\$69.02/sqft	%0.07
7132	4356.66	49	47	2000	484	EAST	50000	129866	54000	139365	\$64.93/sqft	\$69.68/sqft	%0.07
7150	4443.99	25	25	1861	524	INTERIOR	65000	138780	70200	147134	\$74.57/sqft	\$79.06/sqft	%0.06
7167	4521.77	24	24	2412	510	INTERIOR	65000	175839	70200	189210	\$72.90/sqft	\$78.45/sqft	%0.08
7185	4424.07	20	20	1861	524	NORTH	47500	123433	51300	132461	\$66.33/sqft	\$71.18/sqft	%0.07
7202	4325.44	21	21	2231	441	NORTH	47500	172087	51300	185309	\$77.13/sqft	\$83.06/sqft	%0.08
7220	4610.62	23	23	2562	517	INTERIOR	71500	156529	77220	167979	\$61.10/sqft	\$65.57/sqft	%0.07
7236	4157.65	48	46	2226	484	EAST	50000	156374	54000	165789	\$70.25/sqft	\$74.48/sqft	%0.06
7254	4317.99	47	45	3031	484	EAST	50000	190617	54000	202091	\$62.89/sqft	\$66.67/sqft	%0.06
7271	4109.06	46	44	2416	517	EAST	45000	188619	48600	194151	\$78.76/sqft	\$88.84/sqft	%0.08

[e] Why does it make more sense to compare improvement values in a year based on the *relative* improvement value per square foot living space values rather than on just their *absolute* improvement values?

Comment: Properties differ in their living areas. Usually larger properties are more expensive. To control for the varying property sizes one needs to normalize the property values by their sizes. Expressing the property values in terms of dollars per square foot makes the values directly comparable. One can expect that modernized homes, better located home etc. have a higher square foot value.

Task 3: Choropleth mapping

[a] Compare side-by-side the improvement value per square foot living space in 2013 to its value 2014 in two choropleth maps. To facilitate this comparison a common color ramp must be used. Define 8 equal sized class intervals with common interval break points in both scales and use a common color ramp with light intensities for low valued home and dark intensities for higher valued homes.

Show both choropleth maps with their attached legends side-by-side and discuss any changes.

1. Color Theme Map Wizard → Choose the improvement value per square foot living space in 2013 → Click Customize → Define 8 equal sized class intervals to cover the ranges of improvement values in both 2013 and 2014 → Save the classification settings → Choose a color ramp with gradual gradient → Add legend.

Manual Theme (Layer: Private Properties)

Settings Styles

Values (Column: Improve per srt 2013)

From 54.256897 to 81.377892 Save...

Avg 69.254874 Load...

Classes

Method Low & High Values # of Classes 8

From	Inclusive	To	Inclusive	Count
52	<input checked="" type="checkbox"/>	58	<input type="checkbox"/>	1
58	<input checked="" type="checkbox"/>	64	<input type="checkbox"/>	2
64	<input checked="" type="checkbox"/>	70	<input type="checkbox"/>	11
70	<input checked="" type="checkbox"/>	76	<input type="checkbox"/>	10
76	<input checked="" type="checkbox"/>	82	<input type="checkbox"/>	12
82	<input checked="" type="checkbox"/>	88	<input type="checkbox"/>	18

OK Cancel Apply Remove

2. Map → Duplicate Map → Arrange two maps side-by-side → Remove the color theme for the second map.
3. Make the second map active → Color Theme Map Wizard → Choose the improvement value per square foot living space in 2014 → Click Customize → Load the previous classification settings.

Manual Theme (Layer: Private Properties)

Settings Styles

Values (Column: Improve per sqrt 2014)

From 60.111207 to 96.561929 Save...

Avg 75.318878 Load...

Load Area Manual Color Theme (Layer: Private Pro...)

Choose Theme

☒ From Workspace ☐ From Settings File

Title	Map	Layer
Improve per sqrt...	CommonArea...	Private Properties

OK Cancel

OK Cancel Apply Remove



Comment: Most houses have higher per square foot improvement values in 2014 compared to 2013. Some home values at the northern perimeter increased dramatically in value. Using a common classification in the legend makes these changes apparent.

[b] For the second task generate a choropleth map for the newly created field percentage change. Use natural breaks.

Can you explain based on the last sold field why three homes increased by over 30%?

7080	4422.14	19	19	19	1978	2740	506 NORTH	2013	\$59.91/sqft	\$88.03/sqft	%0.47
7062	4410.99	18	18	18	1978	1970	554 NORTH	2013	\$73.68/sqft	\$96.56/sqft	%0.31
6941	4412.44	16	16	16	1978	2729	556 NORTH	2013	\$64.14/sqft	\$87.03/sqft	%0.36

Comment: The three houses (No. 16, No. 18, No. 19) were last sold in 2013. Apparently, the value of the homes were under-estimated by the appraisal district prior to the sale. After the appraisal district got information about the true sales prize of these homes their value was adjusted upwards for the 2014 appraisal leading to a change in the home values ranging from 31% to 47 %.



[c] Why does the percentage change map communicate the information more efficiently than the side-by-side map comparison of the two years of relative home values?

Comment: The improvement values of each property are different in 2013. So it's difficult to observe the change pattern based on different base values. However, the percentage change map includes the differences, which are standardized based on the reference values in 2013. Therefore, the percentage change map has more efficiently to display the relative changes. Note that 21 homes experienced an appraisal increase by less than 7%, and 33 homes between 7% and 10%. Thus the majority of the homes experienced a moderate increase in the appraised home values.

[d] Map the 2014 land value in a choropleth map and explain the observed pattern based on the location of the properties. Do not forget to format the land value properly before you generate your map.



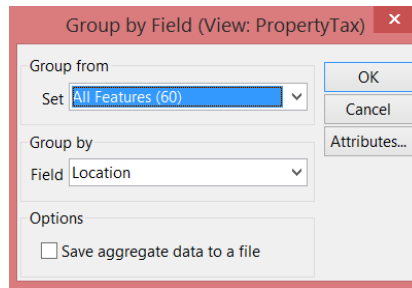
Comment: Lots located in the interior (No. 23 – No. 34) have the highest land values in 2014 because they are not affected by noise intrusions etc. coming from the perimeter. Lots adjacent to common green spaces, in particular those corner lots, have had a higher value than their neighboring lots. Lots at the western perimeter wall exhibited the lowest values, perhaps due to the parking lot at the opposite side. Lots with easements (No. 22, 44, and 50) have had a lower value.

Task 4: Calculations based on selection sets

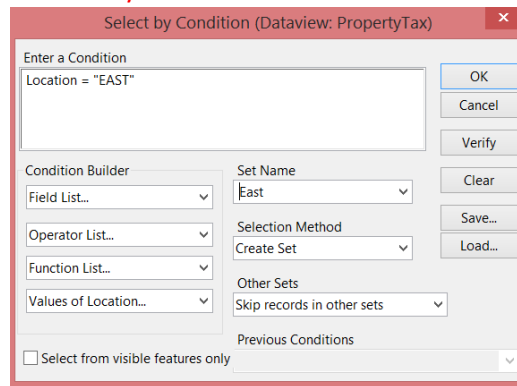
[a] Based on the location (north, east, west and interior) in The Crown calculate the average 2014 improvement values per square foot and report the results in a table. Which selection option did you use to generate these sets?

Do the home values dependent of the location of the homes?

1. You can use Dataview → Group By...



2. Or You can use Selection → Select by Condition → Calculate the average value for each subsets.

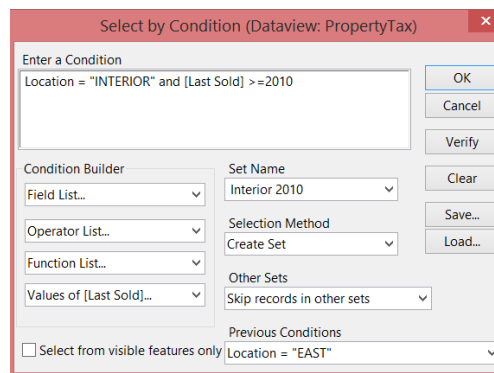


[GroupedBy(Location)]	[Avg Improve per sqrt 2013]	[Avg Improve per sqrt 2014]	[Avg Improve percent]
EAST	69.015705	74.383657	0.078055
INTERIOR	69.609564	74.543927	0.071212
NORTH	71.085083	80.895055	0.144130
WEST	66.235394	70.839144	0.069606

Comment: Due to the high values of recent sales in 2013, homes in the northern part exhibited the highest per square foot value (~ \$81) in 2014, whereas western homes on averages have had the lowest value (~\$71). Interior and eastern homes have had an intermediate square foot value of approximately \$74.

[b] For the properties in the interior of The Crown select all those properties that were sold since 2010. Show the map highlighting the selected properties. Which selection option did you use to generate this set?

1. Selection → Select by Condition



Dataview18 - PropertyTax													
			[Last Sold]	Land06	Improve06	Land07	Improve07	Land08	Improve08	Land09	Improve09	Land10	Improve10
			2013	65000	189004	65000	191846	65000	193188	65000	202078	65000	196962
			2011	65000	171567	65000	175086	65000	173943	65000	182083	65000	179917



[c] Generate a selection set of the private properties that are *contained or touch* a common area. Show the map highlighting the selected properties. Which selection option did you use to generate this set?

1. Selection → Select by Location

Select by Location (Layer: Private Properties)

Select Based on Features in

Layer: Common Areas

Selection Set: All Features

Select Private Properties features

that are: touching or contained

Place selected Private Properties features in

Selection Set: Selection

Selection Method: Create Set

OK Cancel

