How To Map Your Own Bike Lanes

A Philly Bike Action Production

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Introduction

Introduction

 So, you want to design your own bike lanes? You are in the right place. This a comprehensive guide to show you how to do just that. We believe that streets are best designed by communities that use them the most. While we value the skillsets of professional planners and engineers, we do not think that one needs to be a professional to share their vision of community spaces. This guide aims to democratize and decentralize this process specifically for the addition or improvement of bike lanes. Onward!

Introduction

- This guide is intended to demonstrate a method of creating maps showing public infrastructure, including existing and proposed conditions for the proposition of changes to public infrastructure. The method described uses **Geographic Information Systems (GIS)** software to create the maps. In order to maximize the potential user base and minimize barriers to entry, QGIS will be used as it is a **free** and **open source** GIS software suite. QGIS may be downloaded from the QGIS website, located here: <u>https://qgis.org/en/site/</u>.
- Similar maps could be created using other GIS software suites, such as ArcGIS or CAD software, but those approaches will not be treated explicitly by this guide.

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Setting Up A New QGIS Project

Setting Up A New QGIS Project

• After installing QGIS, launch the program and start a **new project**. You will be greeted with a blank screen like this:

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- In order to efficiently work through a project, you need all necessary tools quickly at your disposal
- Right click the top toolbar and add the panels and toolbars shown here

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	Debugging/Development Tools Panel	V Web Toolbar
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	Statistics Panel	
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<u>Selecting a Coordinate Reference System</u>

- Before doing anything else, first select a coordinate reference system (CRS) for your project. There are many CRS that geographic data can use and QGIS is able to convert between them on the fly, but fewer conversions will be necessary if a coordinate system common to available data is chosen. This is especially useful for base maps and image layers, as base maps may become deformed by the conversions.
- For the southern latitudes in Pennsylvania, NAD83 / PA South (ft), EPSG:2272, is commonly used. This guide assumes that much of your data will use this coordinate system, but if you find that other coordinate systems are a better fit for your project, select that CRS instead. This can also be changed later.

Selecting a Coordinate Reference System

• Select Project / Properties to raise the properties dialog:



Selecting a Coordinate Reference System

 Next, click the CRS tab and enter 2272 into the filter. Select Projected Coordinate Systems, Lambert Conformal Conic, NAD83 / Pennsylvania South (ftUS), EPSG:2272 from the list of Predefined Coordinate Reference Systems and click Apply.

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		OK Cancel Apply	Help

Establishing a Project Directory Structure

GIS project files take a different approach to saving data than other programs you may be familiar with. When working on your project, you will only be establishing links to data sources (files, databases, web APIs, etc) and these data will not be included in the project directly. If your data is contained in local files on your computer, then it is a good idea to save your project file in a location near the GIS data and maintain that directory structure when transmitting the project file and data. For example, you could save your project files in a directory (for me, this is E:\gis) and then create subdirectories for data sources by data type.

	7/5/2023 5:05 PM	File folder	
qgis	7/4/2023 7:05 PM	File folder	
	7/5/2023 3:46 PM	File folder	
shapes	7/5/2023 4:15 PM	File folder	
💽 spruce-pine.qgs	8/12/2023 12:29 PM	QGIS Project	602 KB

Establishing a Project Directory Structure

 Next, make sure the project is configured to save data source paths as relative paths. This way, it won't matter if the files are moved from one location to another as long the established directory structure is maintained. Open Project / Properties and click the General tab. Ensure the Save paths setting is set to **Relative**.



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Adding Data To Your Project

Adding Data To Your Project

- After the preliminary set up, you will still only have a blank project. QGIS itself does not provide data, it only provides a system for organizing, presenting, analyzing and manipulating geographic data. You will need to provide your own GIS data for QGIS to work with. Thankfully, there is a world of freely available GIS data, especially where it concerns public infrastructure, which is the domain with which we are presently concerned. A few sources of GIS data worth mentioning:
 - 1. Pennsylvania Spatial Data Access (PASDA) This is a huge repository of GIS data operated by Penn State University (PSU)
 - a. PASDA <u>https://www.pasda.psu.edu/</u>
 - b. PASDA Imagery Navigator <u>https://maps.psiee.psu.edu/ImageryNavigator/</u>
 - 2. Open Data Philly <u>https://opendataphilly.org/</u>

<u>Adding A Basemap</u>

• It is often useful to have a basemap to work with, even if that basemap will not be a part of the finished product. Basemaps can be street maps (like what you would see on the default view of google maps) or aerial/satellite photography. There are better sources for high quality basemaps, but the fastest way to get something on the screen so that you're no longer looking at a blank map is to add a publicly available basemap through a plugin like QuickMapServices.

Installing and Using QuickMapServices

 Click Plugins / Manage and Install Plugins to raise the Plugin dialog. Then, enter QuickMapServices into the search bar and select QuickMapServices from the list. In the bottom right of the right pane, click Install Plugin.

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Upgrade All Uninstal Plugin Reinstal Plugin		kettings		Easy to use list of services and search for finding datasets and basemaps. Please contribute new via https://nextgis.com/contact Tags service, internet, tms, wms, qms, wfs, geojson, openstreetmap, os basemap More info homepage bug tracker code repository Author NextGIS Installed version 0.19.33 Available version (stable) 0.19.33 Vuplate link to contrib package 0.19.33 Update link to contrib package 0.19.33 Fix add new services link 0.19.31 Fix add new services link 0.19.32 Fix add new services link 0.19.33 Bug fixes 0.19.32 Fix add new services link 0.19.33 Bug fixes 0.19.32 Fix add new services link 0.19.24 Bug fixes 0.19.25 Added request timeout 0.19.24 Fixed locale initialization 0.19.26 Fixed locale initialization 0.19.	n,

Installing and Using QuickMapServices

 After QuickMapServices is installed, you can use the plugin to add a wide array of base maps to the project. Click Web
 / QuickMapServices / Search QMS:



Installing and Using QuickMapServices

• This will open a pane on the right of the project where you can search for basemaps to add. Some useful, well known basemaps include various offerings from Google Maps and Bing Maps, but the plugin offers a very large variety to select from. To add a default Google Maps layer to the project, enter **Google Maps** into the **Search QMS** search bar and then click the **Add** button next to the **Google Maps** search result. A Google Maps entry will appear in the project layers and there the google maps layer will be visible in the main project pane. You can now scroll around and zoom in and out on the project map pane.



• As mentioned above, PASDA is a good resource for imagery specific to Pennsylvania. Google Maps and Bing Maps are good sources for an overview, but at smaller scales, the imagery can leave something to be desired. PASDA has an Imagery Navigator, where you can navigate to the area of interest, click on the map and see what image datasets are available for that location

(<u>https://maps.psiee.psu.edu/ImageryNavigator/</u>)



 From the image navigator, zoom and scroll to the location of interest, then right click on the map. This will raise a dialog where you can find data sets organized into tabs by year. The map tiles (images) will have to be downloaded individually and in addition to age, they will vary by quality and size of extent of each tile. Feel free to click around looking for one that suits your needs, but I have personally found that the 2018 Philadelphia 3in Color dataset is a good balance of being high quality and is recent enough for most purposes.

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24002690PAS PEMA	PEMA Orthoimagery Color (1/2ft)	View	download	download	download			

• Each tile will have to be downloaded individually. Right clicking on the map will show only the tile containing the point clicked. You can show the extent of that tile by clicking on the **Show Tile Extent** link to see where you would need to click to download adjacent tiles. Alternatively, you may click on Advanced Download Options at the bottom of the main map and click List tiles in the current map extent. This will list all tiles in the current map extent, and you may then click through showing each tile extent and downloading only those of interest.

 As mentioned above in the section regarding Project Directory Structure, before adding the imagery to the project, it should first be saved to a location in the established project directory structure, in my case, this is E:\gis\raster\philly\2018:

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		26981E233974N.zip	7/6/2023 8:32 PM	Compressed (zipp	276,271 KB	
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 Next, you may want to create a layer group so that these individual images may be grouped together and toggled on and off all at once. In QGIS, in the layer window, right click and select Add Group. Name this group, Imagery.



• Next, you can **drag the files from a file manager** (like File Explorer on Windows) into the newly created group. If the CRS of the image data is different from CRS of the project, you may get a warning message regarding transformations. You can probably just click OK through these notifications; however, if many of your data layers require transformations, you may consider changing the base project CRS instead.

<u>Adding Street Data</u>

 Street centerlines are generally freely available. PASDA is a good resource for this data. You can just search for, "[political boundary] street centerlines" in PASDA and scroll through the results. One such dataset at the time of the writing of this guide is the City of Philadelphia 2022 Street Centerlines and may be found here: <u>https://www.pasda.psu.edu/uci/DataSummary.aspx?dataset=7102</u>

Philadelphia Streets - Street Centerline

2022 - City of Philadelphia

Metadata | Download | Preview | KMZ | Spreadsheet | GeoJSON | Add to ArcMap: Image or Feature | Add to ArcGIS Pro

API

REST: https://mapservices.pasda.psu.edu/server/rest/services/pasda/CityPhillyStreets/MapServer **WMS:** https://mapservices.pasda.psu.edu/server/services/pasda/CityPhillyStreets/MapServer/WMSServer?request=GetCapabilities&service=WMS

ADDITIONAL RESOURCES

Web Application: https://metadata.phila.gov/ Data Archive: Download historic versions of this dataset

ABSTRACT

Used citywide as base layer for many purposes/applications. The street centerline is available for reference purposes only and does not represent exact engineering specifications. The Philadelphia Streets Department makes no guarantees as to the accuracy of the layer.

Adding Street Data

• Download the street centerline dataset and save it in the shapes folder of project directory structure, then add the data to the map by dragging and dropping into the layers window. Lines with default symbology will appear on the map:



Adding Street Data

Again, for the purposes of this guide, I am assuming the NAD83 PA South (ft) CRS. The above dataset uses another CRS. To use a common CRS and to allow for the use of feet as a map unit instead of degrees, it is a good idea to reexport this data layer using the project's CRS. Right click on the layer in the Layers window and click Export, Save Features As. Name the file PhiladelphiaStreetCenterlines. For Format. select ESRI Shapefile. For CRS, select **Project CRS**. Then click OK. The layer will be exported and a new layer will be added to the Layers window. We can remove the old street layer to reduce Layer clutter. Right click on the Layer in the Layer window and click **Remove Layer** for the old street layer, leaving only the new street layer we just exported with the project CRS.

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File name	E: \gis \shapes \philly \exam	ple\philly_streets_	nad83.shp	
Layer name				
CRS	Project CRS: EPSG:2272	- NAD83 / Pennsyl	vania South (ftUS)	•
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- In addition to spatial information, GIS data carries tabular data. To see the table for a data layer, right click on the layer in the layer window and click, **Open Attribute Table**. For the street centerline table, we can see that the street name is included. This would be useful for creating street labels for our map.
- Right click on the data layer in the layers window and click on **Properties**.



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• Click **Apply** and now the street centerlines should be labeled with the street name from the attribute data, but the default label style will likely be hard to read:



<u>Adding Street Name Labels</u>

• To make the labels more legible, I like to add a buffer. Reopen the **StreetCenterlines** layer **properties** and click on the **labels** tab. From here, select **text** and set the text color to your preference and then click on **buffer** and set the buffer color to something that will contrast well with your text color and with the background. **Black text with a white background** tends to work well with aerial imagery:

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• Next, because the purpose of this layer will be to label the streets and we will have aerial imagery to show the streets themselves, we don't really need symbols to show the street centerlines, so we can disable the line symbology. Click on the symbology tab and select **No Symbols**:

Q	Layer Properties — PhiladelphiaStreetCenterlin	nes2022 — PhiladelphiaStreetCenterlines2022.shp — Symbology	×
Q		No Symbols	•
i	Information		
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• And finally, since we no longer need to worry about overlapping the symbols, it may make more sense to have our labels placed over the street centerline rather than above it. Click on the **Labels** tab, **Placement** and then select only the **On Line** allowed position:

🔍 Layer Properties — PhiladelphiaStreetCenterlines	2022 — PhiladelphiaSl	eetCenterlines2022.shp — Labels			×
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• The street labels should now be more visible over the aerial imagery:



<u>Adding Street Name Labels</u>

• You may notice a problem, though. Some labels appear many times. This is because the underlying data exists as many line features and each feature will be labeled. A quick and dirty way to solve this problem can be to use geoprocessing to dissolve the line features by street name to create a new data layer where no street names are repeated. Click **Vector, Geoprocessing Tools, Dissolve**.



 Select the street centerline layer as the input layer, then click the ... next to the dissolve field selection to raise the list of fields. Check the STNAME field and then click the blue back arrow in the upper left. From there, click on the ... next to the Dissolved selection and select Save to file. Save a shapefile (example_street_names) in the project directory structure and click run.

Q Dissolve	×	Q Dissolve	
Parameters Log Input layer ✓ ✓ PhiladelphiaStreetCenterlines2022 Philadelphia ✓ Selected features only Dissolve field(s) [optional] … STNAME … … ▶ Advanced Parameters … Dissolved … … [Create temporary layer] … … ✓ Open output file after running algorithm …	Dissolve This algorithm takes a vector layer and combines their features into new features. One or more attributes can be specified to dissolve features belonging to the same class (having the same value for the specified attributes), alternatively all features can be dissolved in a single one. All output geometries will be converted to multi geometries. In case the input is a polygon layer, comon boundaries of adjacent polygons being dissolved will get erased. If enabled, the optional 'Keep disjoint features separate's estimg will cause features and parts that do not overlap or touch to be exported as separate features (instead of parts of a single multipart feature).	Parameters Log Issolve field(s) PRE_DIR ST_NAME ST_VPE SUP_EDIR ZIP_LEFT ZIP_RIGHT OK OK OK OK OK ST_CODE L,HNDRED SG_D ONEWAY CLASS RESPONSIBL UPDATE_ MUNT_REP STREETLABE STAME	Dissolve This algorithm takes a vector layer and combines their features into new features. One or more attributes can be specified to dissolve features belonging to the same class (having the same value for the specified attributes), alternatively all features can be dissolved in a single one. All output geometries will be converted to multi geometries. In case the input is a polygon layer, common boundaries of adjacent polygons being dissolved will get erased. If enabled, the optional "keep disjoint features separate" setting will cause features and parts that do not overlap or touch to be exported as separate features (instead of parts of a single multipart feature).
0%	Cancel	Advanced Run as Batch Process	Cancel Run Close Help
Advanced * Run as Batch Process	Kun Close Help		

- After running this, a new layer will be added to the Layers window where all line features with the same STNAME value will have been combined into a single feature, meaning labels will not be duplicated.
- We can copy the existing layer style (including symbology and labels) from the existing street centerline layer to the new dissolved layer. Right click on the **StreetCenterlines** layer in the Layers window and click **Styles**, **Copy Style**, **All Style Categories**.



 Then, right click on the new dissolved layer (example_street_names), styles, paste style, all style categories.



• Then, uncheck the original street centerline layer. Now, street labels should not be repeated multiple times:



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Generating New Features

<u>Using the Street Centerlines to</u> <u>Generate Road Shoulder Polygons</u>

- If we're interested in showing bicycle lanes on the map, but we don't already have data for those lanes, we'll have to create it ourselves. We could do that from scratch, but that would be a lot of work. Instead, we can use the street centerlines and some geoprocessing to generate a rough estimate.
- Many streets have a fairly uniform width, so long as the centerline is fairly accurate, we can generate lines parallel to the centerline, offset by a certain amount, then create a buffer of the lane width from those lines. The result won't be perfect, but it will be faster to edit the generated polygons than it would be to create them from scratch.

Filtering the Street Data by Name

- First, we should pare down the roads we're going to work on. Right now, we have all roads in Philadelphia. For any given project, we probably only care about a small subset of those roads. If we want to work on a specific road for its entire length, we could temporarily filter the road layer by street name.
- This can be done by right clicking on the street layer (example_street_names) in the Layer window and clicking, Filter. Then, you can write a SQL expression in the Filter Expression. If we wanted to filter the streets to only those containing, "SPRUCE" and "PINE", we could write: "STNAME" like '%SPRUCE%' or "STNAME" like '%PINE%'

				Values			
OBJECTID				Q. Search			
FNODE_							
TNODE_							
LPOLY_							
RPOLY_							
LENGIH							
SICL2_							
SICL2_ID				-			
PRE_DIR							
			_				
				Si	ample][All
			Ŧ	Use unfilte	red layer		
-	<	>	LIKE	%	IN	NOT IN	
<=	>=	!=	ILIKE	AND	OR	NOT	
vider Specific I 'STNAME" li	ilter Expressio	n E%' or "ST	NAME" like	'%PINE%'			

Filtering the Street Data by Name

• Click OK. Now, only roads containing SPRUCE or PINE should be displayed:



 Next, we want to create lines parallel to the streets of interest. We'll have to do some calculations first. For the road of interest, measure the road width. Then, determine the desired width of the bicycle lane (or other polygon being generated). The offset from the road centerline should then be (road width - desired polygon width) / 2.

- We can use the measurement tool in QGIS to take some of these measurements. Click the dropdown next to the measurement tool (ruler icon) and select measure line to raise the measure line tool. Then click on one side of the street and then the opposite side of the street, doing your best to draw a straight line across the street that intersects with the curb at right angles. Switch the unit to feet if it's not already in feet and then record the result. For spruce street, it appears that it's roughly 26 feet from curb to curb:
- Repeat the measurement steps with the shoulder area. In the pictured section of Spruce, we have parked cars and a painted bike lane to use as a guide. This appears to be roughly 7 ft across. That gives us an offset of (26 - 7) / 2, or 9.5 ft.



• Next, open the processing toolbox (Processing / Toolbox) and begin entering "offset lines" into the search bar:

			-	ð
Mesh	Processing Help			
(11)	Toolbox	Ctrl+Alt+T	🕒 • 🔂 • 🔂 🚳 🔊 🖸 🔚 • 🚃 • 💭 🚳 •	
~ ~	🏘 Graphical Modeler	Ctrl+Alt+G		
- 74	(<u>H</u> istory	Ctrl+Alt+H	ang	
10.00	Results Viewer	Ctrl+Alt+R		
1 %	Edit Features In-Place			
			A	
ØX			Processing Toolbox	6
			🧤 🔍 🕑 🖹 I 🤜 🔧	
-			Q. offset	
			▼ ③ Recently used	
			🌞 Offset lines	
			Array of offset (parallel) lines	
			Coverage of a set of the set of a	
			* Array of translated features	
			▼ Q Vector geometry	
			* Offset lines	
			CDAL	
			vector geoprocessing a Offset curve	
			vue.	

- From the results, select Offset lines. Make sure the example_street_names is selected as the input layer. Set the distance to the calculated offset (9.5 ft for our example values) and the segments to 1. Click run. This will create a temporary layer named Offset. Rename it something descriptive (positive_offset) in order to keep track of these intermediate products until we're done with them.
- Repeat the Offset line generation for the negative offset. Open the Offset lines tool again and enter all the same values, except flip the offset to a negative value with the same magnitude. BE SURE THAT "example_street_names" is selected as the input layer. Otherwise your line will not be properly placed.

 The result should now be two temporary layers, each offset from the street centerlines by the same amount on either side. Next, we can merge these separate layers into a single layer using the Merge vector layers tool. Enter, "Merge vector layers" into the processing toolbox search bar and select the Merge **vector** layers tool.

Parameters Log Input layers	Merge vector layers This algorithm combines multiple vector layers of the same geometry type into a single one. The attribute table of the resulting layer will contain the fields from all input layers. If fields with the same name but different types are found then the exported field will be automatically converted into a string type field. New fields storing the original layer name and source are also added. If any input layers contain Z or M values, then the output layer will also contain these values. Smilarly, if any of the input layers are multi-part, the output layer will also be a multi-part layer. Optionally, the destination coordinate reference system (CRS) for the merged layer can be set. If it is not set, the CRS will be taken from the first input layers will all be reprojected to match this CRS.	Processing Toolbox

- Click the ... next to Input layers and select the layers to merge (the two temporary layers we just created).
- Then click run. A new temporary layer will be added to the layers window named, Merged.



 Next, we can generate a buffer from these merged lines. Click Vector, Geoprocessing Tools, Buffer to raise the buffer tool dialog.



 Select the Merged layer we just generated as the input and a distance of bicycle lane width / 2. For the example values we've been using, that would be 3.5 ft. Set segments to 1 and end cap style to flat. Click run.

• A temporary layer will now be added to the map with polygons that should be an approximation of the road shoulder areas we want to classify:



• If we zoom out a bit on our map, we can see that our filter may have captured some streets in error and we may have also captured stretches of street we don't really care about for the purposes of the project. Now is a good time to clean up this layer.

• The method described above to generate the buffers may have resulted in noncontiguous geometries, so first click Vector, Geometry Tools, Multipart to Singleparts. Select the buffered layer as the input and click run.

Q Multipart to Singleparts	
Parameters Log	Multipart to singleparts
Input layer	This algorithm takes a vector layer with multipart
Buffered [EPSG:2272]	geometries and generates a new one in which all geometries contain a single part. Features with
Selected features only	multipart geometries are divided in as many different features as parts the geometry contain,
Single parts	and the same attributes are used for each of them.
[Create temporary layer]	
100	

Coordinate 2688924.233862 🕷 Scale 1:2444 💌 🖴 Magnifier 100

 Next, we want to delete those features we don't care about. We can either select features to delete, either all together or individually and delete them, or if it's easier to select the features we do want to include, we can instead select the features to keep, then invert the selection. In this case, our project only involves the stretches of Spruce and Pine in center city, so we can just select the features in that area. Click the selection tool, then select the desired features.



Single parts — Features Total: 24, Filtered: 24, Selected: 4

• Next, open the attribute table for the layer and click the invert selection button:

(OBJECTID	FNODE_	TNODE_	LPOLY_	RPOLY_	LENGTH	STCL2_	STCL2_ID	PRE_DIR	ST_NAME
	39586	717	735	NULL	NULL	241.9045055400	NULL	NULL	NULL	PINE HILL
	40958	133	28856	NULL	NULL	408.6476299999	NULL	NULL	NULL	PINEWOOD
	40900	141	133	NULL	NULL	300.8401101700	NULL	NULL	NULL	PINEWOOD
	38107	29295	29762	NULL	NULL	456.2090948599	NULL	NULL	NULL	PINE VALLEY
	40454	889	849	NULL	NULL	450.5583888400	NULL	NULL	NULL	CALPINE
	38813	1108	1090	NULL	NULL	566.6016777099	NULL	NULL	NULL	PINE
	37975	1620	1527	NULL	NULL	1318.391494010	NULL	NULL	NULL	PINE
	2178	20892	20873	NULL	NULL	560.2914533099	NULL	NULL	NULL	PINE
	2178	20892	20873	NULL	NULL	560.2914533099	NULL	NULL	NULL	PINE
)	31236	5847	5746	NULL	NULL	264.0431693699	NULL	NULL	NULL	PINE RIDGE
	5914	26975	21743	NULL	NULL	39.05857489000	NULL	NULL	NULL	SPRUCE
2	5914	26975	21743	NULL	NULL	39.05857489000	NULL	NULL	NULL	SPRUCE
	39586	717	735	NULL	NULL	241.9045055400	NULL	NULL	NULL	PINE HILL
	40958	133	28856	NULL	NULL	408.6476299999	NULL	NULL	NULL	PINEWOOD
5	40900	141	133	NULL	NULL	300.8401101700	NULL	NULL	NULL	PINEWOOD
5	38107	29295	29762	NULL	NULL	456.2090948599	NULL	NULL	NULL	PINE VALLEY
7	40454	889	849	NULL	NULL	450.5583888400	NULL	NULL	NULL	CALPINE
	38813	1108	1090	NULL	NULL	566.6016777099	NULL	NULL	NULL	PINE
	37975	1620	1527	NULL	NULL	1318.391494010	NULL	NULL	NULL	PINE
	2178	20892	20873	NULL	NULL	560.2914533099	NULL	NULL	NULL	PINE
	2178	20892	20873	NULL	NULL	560.2914533099	NULL	NULL	NULL	PINE
	31236	5847	5746	NULL	NULL	264.0431693699	NULL	NULL	NULL	PINE RIDGE
	5914	26975	21743	NULL	NULL	39.05857489000	NULL	NULL	NULL	SPRUCE
	5914	26975	21743	NULL	NULL	39.05857489000	NULL	NULL	NULL	SPRUCE

 Next, begin an edit session by clicking the pencil icon and then click on the delete selected features button.

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123	OBJE = E	123										
	OBJECTID	FNODE_	TNODE_	LPOLY_	RPOLY_	LENGTH	STCL2_	STCL2_ID	PRE_DIR	ST_NAME	ST_TYPE	SUF_DIR
1	39586		735	NULL	NULL	241.9045055400	NULL	NULL	NULL	PINE HILL	RD	NULL
2	40958	133	28856	NULL	NULL	408.6476299999	NULL	NULL	NULL	PINEWOOD	PL	NULL
3	40900	141	133	NULL	NULL	300.8401101700	NULL	NULL	NULL	PINEWOOD	RD	NULL
4	38107	29295	29762	NULL	NULL	456.2090948599	NULL	NULL	NULL	PINE VALLEY	BLVD	NULL
5	40454	889	849	NULL	NULL	450.5583888400	NULL	NULL	NULL	CALPINE	RD	NULL
6	38813	1108	1090	NULL	NULL	566.6016777099	NULL	NULL	NULL	PINE	PL	w
7	37975	1620	1527	NULL	NULL	1318.391494010	NULL	NULL	NULL	PINE	RD	NULL
8	2178	20892	20873	NULL	NULL	560.2914533099	NULL	NULL	NULL	PINE	ST	NULL
9	2178	20892	20873	NULL	NULL	560.2914533099	NULL	NULL	NULL	PINE	ST	NULL
10	31236	5847	5746	NULL	NULL	264.0431693699	NULL	NULL	NULL	PINE RIDGE	RD	NULL
11	5914	26975	21743	NULL	NULL	39.05857489000	NULL	NULL	NULL	SPRUCE	ST	NULL
12	5914	26975	21743	NULL	NULL	39.05857489000	NULL	NULL	NULL	SPRUCE	ST	NULL
13	39586		735	NULL	NULL	241.9045055400	NULL	NULL	NULL	PINE HILL	RD	NULL
14	40958	133	28856	NULL	NULL	408.6476299999	NULL	NULL	NULL	PINEWOOD	PL	NULL
15	40900		133	NULL	NULL	300.8401101700	NULL	NULL	NULL	PINEWOOD	RD	NULL
16	38107	29295	29762	NULL	NULL	456.2090948599	NULL	NULL	NULL	PINE VALLEY	BLVD	NULL
17	40454	889	849	NULL	NULL	450.5583888400	NULL	NULL	NULL	CALPINE	RD	NULL
18	38813	1108	1090	NULL	NULL	566.6016777099	NULL	NULL	NULL	PINE	PL	w
19	37975	1620	1527	NULL	NULL	1318.391494010	NULL	NULL	NULL	PINE	RD	NULL
20	2178	20892	20873	NULL	NULL	560.2914533099	NULL	NULL	NULL	PINE	ST	NULL
21	2178	20892	20873	NULL	NULL	560.2914533099	NULL	NULL	NULL	PINE	ST	NULL
22	31236	5847	5746	NULL	NULL	264.0431693699	NULL	NULL	NULL	PINE RIDGE	RD	NULL
23	5914	26975	21743	NULL	NULL	39.05857489000	NULL	NULL	NULL	SPRUCE	ST	NULL
24	5914	26975	21743	NULL	NULL	39.05857489000	NULL	NULL	NULL	SPRUCE	ST	NULL

 A confirmation dialog will pop up. Confirm the deletion, then click the save button and end the edit session by clicking the pencil icon again. We should now only be left with the buffers generated in the area of interest:



 This would be a good point to export the temporary layer to a file. Right click on the Single Parts layer from the Layers window and click Export/ Save features as. Select ESRI Shapefile as the format and save the shapefile (road_shoulder_area) to the project directory structure. We can now remove all the temporary layers that were created up to this point, as they were only intermediate products being used to achieve the now exported shapefile

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Editing Generated Features

Adjusting the Road Shoulder Geometry

- Since the generation of the road shoulder area was based on a buffer of a line offset from a centerline, there's a lot of room for error. The shoulder may not be as properly aligned to the curb as we want. To correct this, we can edit the geometry of the generated road shoulder area polygons.
- Select the road shoulder areas polygon layer and click the pencil icon to enable edit mode.



Adjusting the Road Shoulder Geometry

• Then, starting at one end of the street, pan along the length of the shoulder area polygon until you notice the shoulder area is misaligned with the road curb. Click the **vertex tool** from the toolbar and then hover over the polygon. The available vertices should appear as red dots. It's possible to add and remove vertices, but for the purpose of realigning the polygons, it is probably better to drag existing vertices in pairs. **Find a pair to drag** and then select them.



Adjusting the Road Shoulder Geometry

• With the pair of vertices selected, left click on either vertex and then drag the pair to their new location. A faint highlight of the adjusted polygon should show as you're moving the pair. You can use this highlight to align the polygon to the curb. When you're satisfied with the new alignment, left click again.



<u>Cutting the Road Shoulder Polygons</u>

Ultimately, the goal will be to show different classifications for the road shoulder area, so the polygons will have to be cut into segments so that each segment can be given a classification (bike lane, permit parking, loading zone, etc.) This can be done using the Split Features tool. (split features is under the advanced digitizing toolbar) Select the road shoulder area layer and begin an edit session by clicking on the pencil icon. Then, at any breakpoint between areas that should have separate classifications, use the Split Features tool. Click on the Split Features tool icon, then click on the map to begin drawing a line. A faint outline of the line being drawn will appear as you move the mouse to select a second point. You can continue drawing line segments, but when the last line segment has been drawn for the cut, right click to end the cut. The polygon will then be cut into separate polygons by the line(s) drawn.

<u>Preparing Template Atlas for Field</u> <u>Work</u>

- Now that our polygons are cut appropriately, we need to change them to a shade appropriate for marking.
- Open properties on the street shoulder layer, click symbology, simple fill
- Choose a white fill and set the opacity to about 65%. This best balances the need to make visible marks and the need to see underlying street features



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Creating Features for Atlas Generation
- Large projects, including long linear projects like bike lanes, cover too much area to fit on a single map page at a sensible scale. We can automate the generation of multiple pages by creating another layer which will contain data for each map page to be generated.
- Click on create new shapefile layer:



- Give the new shapefile layer a name (ATLAS). Set the geometry to LineString. Set the CRS to the Project CRS and then add several fields:
 - Order, Integer Type
 - StreetName, Text, Length 255
 - FromSt, Text, Length 255
 - ToSt, Text, Length 255
- Click OK
- Then, make sure the original street centerline layer is enabled in the **Layer window**. We're going to be creating new lines along the same alignment as the street centerlines. We're also going to leverage the angle of the line to automatically orient each map page, so it's important that the lines follow the street orientation and snapping to existing street centerlines is a good way to achieve that.

 Ensure snapping is enabled and snapping settings are set so that we can snap to the street centerlines. Click the magnet icon to enable snapping:



• Then enable snapping to all layers:



And enable snapping to vertices



 We're going to be creating new lines and tracing the original street centerlines at their vertices. One block segments seems like a sensible scale for map pages and conveniently, the original street centerline layer has vertices at intersections that we can use to trace.

One last bit of set up: since we have a street name field, but will be populating only a small set
of streets that will be repeated often, we can add some value mapping that will make this
entry easier. Right click on the ATLAS layer and open the properties. Open the Attributes
Form tab and click StreetName. Change the Widget Type to Value Map. In this example,
we're only dealing with Spruce Street and Pine Street, so add these values, duplicated in the
Value and Description fields. Apply the changes and close the properties.

Available Widgets	- Connel
▼ Fields	Verieral
123 id	Alias
123 Order	
abc StreetName	Comment
abc FromSt	Editable Reuse last entered value Label on top
abc ToSt	
Relations	▼ Widget Type
Actions	
Other Widgets	Value Map 👻
UML Widget HTML Widget	Combo box with predefined items. Value is stored in the attribute, description is shown in the combo box.
	Load Data from Layer Load Data from CSV File
	Value Description
	1 Spruce St Spruce St
	2 Pine St Pine St
	3
	Additional and Descent Changed
	Add NULL Value Remove Selected
	▼ Constraints
	Not null Enforce not null constraint
	Unique Enforce unique constraint
	Expression * E
	Expression description
	Enforce expression constraint

• Now, we're ready to begin creating the atlas data features. We're eventually going to be leveraging the line angle to orient pages, so it is imperative that we draw them going in a consistent direction (East to West or West to East) so that we can use the same calculation for all features later. Pick a direction and stick with it. For this example, I am going to draw the lines going West to East.

• Start an edit session on the ATLAS data layer and then click add line feature:



 Now hover the mouse near the west intersection of the first block we want to create. When you near the vertex at that intersection from the street centerline layer, it will be highlighted for you to snap to. Left click here:



 Then repeat this for the vertex at the East intersection for this block:



 The line defined by these two points will be displayed. Because the geometry type for this layer can be a line string of many line segments, we need to right click to end the line string with only a single segment in the feature.



 Creating the feature will raise an attribute form. Enter an order number, select the street, and enter the cross streets and click OK.

SERIES						Search Search	
	🔇 atlas-data	- Feature Attributes		×			
	id	NULL			+		
	Order	1	4		The loss		ļ
	StreetName	Spruce St		-	1	HST	Ŕ
	FromSt	25th St			1 /man		0
1 Stand	ToSt	24th St				The P. M	J.
Selection of the select			OK Can	ncel		S24THS	

• **Repeat** this process for every block, creating one line string feature with one line segment each for every block to include in the map atlas. When you're done creating the line features, save your edits and end the edit session.

• Then, open the ATLAS attribute table and click on the field calculator icon.

id	Order	StreetName	FromSt	ToSt	
1	1	Spruce St	25th St	24th St	
2	2	Spruce St	24th St	23rd St	

• In the field calculator dialog, select create new field, create virtual field, give the new field a name (line_angle) and select a decimal data type. In the expression field, enter, "angle_at_vertex(@geometry, 0)". This will take the angle at the first vertex for each feature, which we can later use to orient each map page.

• Click OK. The attribute table should now have a virtual field with the angle for each line:



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Creating a Layout

• Open the layout manager.



<u>Creating a Layout</u>

• Under new from template, click **Create**

Search			
Show	Duplicate	Remove	Rename
New from Ten	nplate		
Empty Layout		•	Create
		Defeute	

<u>Creating a Layout</u>

• Give the layout a title:



Creating a Layout

• This will open the layout window where you can start defining the map layout.



 In the lower right, click on the Atlas tab. (may need to click atlas and the atlas settings tab) Check
 Generate an atlas. Select the ATLAS layer as the Coverage layer. For the page name, select the Order field. Check sort by. In sort by, also select the Order field.

tlas				0
✓ Generate an a	tlas			
Configuration	n			
Coverage layer	√° atlas	data		•
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Page name	123 Order		•	3
Filter with				3
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▼ Output				
Output filename	expression	i		
'output_' @atl	as_feature	number		3
✓ Single file ex	port when	possible		
Image export fo	ormat png			•

• Add a label for the map title (click button on left pane) :



- In the Item Properties tab for the new label, change the label font (Arial Black).
- Use 18pt font

out	Item Properties	Guides	Atlas		
our	rtem Froper des				
Prop	erties				
el					
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- nc	nder as HIML				
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Ins	ert/Edit Expression.		Dyr	namic Text	•
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Appo Fo	earance earance ntal margin al margin otal alignment		Dyr 00 mm 00 mm	namic Text	• •
Ins Appe Fo Iorizon /ertica Iorizon	earance at margin al margin al margin al alignment a Contor		Dyr 00 mm 00 mm	namic Text	• •
Appe Fo lorizor /ertica lorizor	earance earance ntal margin ntal alignment ft Center 		Dyr 00 mm 00 mm) Justify	namic Text	• •
Ins Appe forizor /ertica lorizor) Le /ertica	earance earance ntal margin ntal alignment ft Center C al alignment		Dyr 00 mm 00 mm) Justify	namic Text	• •

• Then, in the main properties section, change the text to an appropriate title. Each map page has access to the data stored in the atlas data feature, with each page getting a different row from that data table, so we'll populate some of the title data dynamically. Something like below:

Spruce Pine Bike Lane Current vs Proposed Conditions [%"StreetName"%] from [%"FromSt"%] to [%"ToSt"%]

 The variables wrapped in square brackets can be easily added while typing out the static components of the label by clicking on the Dynamic Text dropdown, then selecting Field and the appropriate data field from the atlas data layer:



• Next, add a map view.



 Under item properties for the new map, check "Controlled by Atlas"

tem Prop	erties	
lap 1		
2		
E Fo	llow map theme (none)	•
Lo	ck layers	ی ا
Lo	ck styles for layers	
▼ Exte	ents	
X min	2687832.274	
Y min	234460.041	
X max	2690309.343	
Y max	234948.040	
	Composed Dance	
▼ V (Controlled by Atlas	
	argin around feature 10%	<
Ma		
Ma	edefined scale (best fit)	
Ma Pr Fb	edefined scale (best fit) red scale	
Ma Pr Fib Fib Grid	edefined scale (best fit) xed scale s	
Ma Pro Fix Grid Over	edefined scale (best fit) xed scale s rviews	
Ma Pri Fib Grid Over Posi	edefined scale (best fit) xed scale s rviews tion and Size	
 Ma Pro Fib Grid Over Posi Rota 	edefined scale (best fit) xed scale s rviews tion and Size stion	

• Next, set the map rotation under main properties. Click the box to the right of Map rotation and click Edit... in the dropdown

Main P	roperties				
Scale	379.43	2			
Map rotat	tion 0.00 °				
CRS	Use Pro	Data defined override (expression)			
V Draw	map canvas	Deactivate Description			
/ Layers	6	Attribute Field			
Follow map theme		Field type: int, double, string			
Lock	ayers	Variable			
Lock s	styles for lay	✓ Current: 90-"line_angle"			
		Edit			
Extent	s	Сору			
X min 2	688614.817	Paste			
		Clear			
Y min 2	34705.097	Assistant			

Q Expression String Builder

- Enter the expression 90-"line_angle" into the expression box
- Click OK

Expression Function Editor		
00701	Q. Search	Show Help
0-"line_angle"	feature geometry id Aggregates Arrays Color Conditionals Conversions Date and Time Fields and Values Files and Paths Files and Paths Fuzzy Matching General Geometry Layout Map Layers Maps	
	Maps Math	

• Be sure the Current: 90-"line_angle" box is checked in the dropdown

rialii r	roperue		1
Scale	379.	432	
Map rota	tion 0.00	• 🗘 🗘	
CRS	Use	Data defined override (expression)	
		Deactivate	
V Draw	map canv	Description	
/ Layers	5	Attribute Field	
		Field type: int, double, string	1
Follo	w map the	Expression	
Lock	layers	Variable	0
Lock	styles for	ay 🗸 Current: 90-"line_angle"	
		Edit	
Extent	s	Сору	
X min	688614.8	7 Paste	
		Clear	
Y min	234705.09	Assistant	

• At this point, we can begin to see our data driven atlas if we would like. Click on Atlas, Preview Atlas:



• QGIS will generate the atlas pages. This may take a moment. When it's done, we should now have one page per atlas data feature. You can click through the generated atlas pages with the left and right arrows in the menu bar, or you can select any individual page with the dropdown.



• Next, copy/paste the map pane to create a second map pane below the first and add some labels to distinguish them.

3RD Street Bike Lane Current vs Proposed Conditions 3RD St from South to Lombard

Current Condition



Proposed Condition:



 Make sure to save your atlas layout when you have finished your changes. The layout is saved independently of the main project. Finally, when you are ready to export your field work atlas, you may do so under the Atlas menu item:



You will be prompted for a file name and location as well as some rendering options. After entering this information, QGIS should export the atlas as a pdf to your selected location. Look at the pdf file and verify its what you want. Then print the file (grayscale or color is fine). Hole punch and secure in a binder.


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Field Work!

Field Work

 This is the fun part! With binder and pencil in hand, make your way to the street of interest.



Field Work

- Look at the signs and use the blank white space to mark what each area is used for. Use the edges of streets and buildings to help guide you.
- Zones you want to mark
 - No stopping
 - Bike lanes
 - Residential Parking
 - Metered parking
 - Bus zones
 - Handicap zones
 - Loading zones
 - And others!
- You may choose to write in your proposed changes while in the field or wait until after you have mapped everything in GIS



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Adding Classifications to Road Shoulder Areas

 To classify areas we marked during our field work, we will need to add a new data column to the attribute table and then populate that with data identifying the classification. To make this population easier, we can first modify the attribute form in the layer properties.

• First, open the road_shoulder_area polygon layer attribute table, begin an edit session and then create a new attribute.

1	1821	1 6 × 6 6	§ 🗧 🔁 🚺	🔩 🍸 🔳	🏶 🔎 🖪 🖪	💋 🔛 😸 🍳	a		
123 C	BJE = E	123						▼ Update	All Update Selected
	OBJECTID	FNODE_	TNODE_	LPOLY_	RPOLY_	LENGTH	STCL2_	STCL2_ID	PRE_DIR
1	2178	20892	20873	NULL	NULL	560.2914533099	NULL	NULL	NULL
2	5914	26975	21743	NULL	NULL	39.05857489000	NULL	NULL	NULL
3	2178	20892	20873	NULL	NULL	560.2914533099	NULL	NULL	NULL
4	5914	26975	21743	NULL	NULL	39.05857489000	NULL	NULL	NULL
5	5914	26975	21743	NULL	NULL	39.05857489000	NULL	NULL	NULL
5	5914	26975	21743	NULL	NULL	39.05857 <mark>48</mark> 9000	NULL	NULL	NULL
7	5914	26975	21743	NULL	NULL	39.05857489000	NULL	NULL	NULL
3	5914	26975	21743	NULL	NULL	39.05857489000	NULL	NULL	NULL

 For our example, we will create a field named,
 SH_CLASS of type Text and a length of 255. Click
 OK, save the edits and end the edit session.

21743	NULL	LL NULL 39.0585		000	NULL
21743	NL 📿 Add Field		×	00	NULL
	N <u>a</u> me Comment Type Provider type	SH_CLASS abc Text (string) string			
	Length	255 OK	Cancel		

 Next, we want to create a definition of the classifications we're using and map the populated values to display values.
 Click on new shapefile layer.



 Next, give the file a name (RoadShoulderClass) and set the geometry to No Geometry. Then add two fields: ClassName, Display, both with a length of 255. Click OK.

ile name		RoadShoulder	Class.dbf	⊠			
File encoding Geometry type Additional dimensions		UTF-8		*			
		No Geom	No Geometry				
		None	O Z (+ M values) O M values				
		Project CRS:	EPSG:2272 - NAD83 / Pennsylvania South (ftUS)	- 🌚			
New Field							
Name							
Type abc Te	xt (string)			*			
Length 255	Precis	ion					
		Add to Fie	lds List				
Fields List							
icids cisc		P. C.					
Name	Туре	Length	Precision				
Id	Integer	10		_			
Display	String	255					
Display	String	233					

• Next, open the attribute table for the newly created RoadShoulderClass layer and click Edit



 Click the Add features button. The ClassName field will be a coded value stored in the new data layer while the Display Value will be displayed to the user during entry.



Adding classifications to road shoulder

areas

 Add the classifications for your project. The table here is a suggestion although your project may involve more or less. It is vital that the ClassName field is kept unique and that there are no duplicate values. When done, save the edits and end the edit session. 🔇 RoadShoulderClass — Features Total: 14, Filtered: 14, Selected: 0

/		18 10 10 10	🗴 🗧 🖸 😼 🕇 🖀 🗞
	id 🔺	ClassName	Display
1	1	NULL	NULL
2	2	RPP	Residential Permit Parking
3	3	MP	Metered Parking
4	4	LZ	Loading Zone
5	5	NS	No Stopping
6	6	BLNP	Bike Lane (No Parking)
7	7	BLNS	Bike Lane (No Stopping)
8	8	MPM	Motorcycle Parking (Metered)
9	9	HP	Handicap Parking
10	10	HPM	Handicap Parking (Metered)
11	11	BS	Bus Stop
12	12	СР	Consul Parking
13	13	V	Valet
14	14	NP	No Parking

Adding classifications to road shoulder

<u>areas</u>

 Next, open the road_shoulder_area layer properties, click on the attributes form tab and select the SH_CLASS field we just created. Change the widget type to Value Relation, set the Layer to the classification layer we just created, the key column to ClassName and the Value column to Display. Check allow NULL value. Click Apply and OK.

	Autogenerate	Show Form on Add Feature (global sett)
Information	Available Widgets	▲ General
Source	123 OBJECTID 123 FNODE_	Alias
Symbology	123 TNODE_ abc_LPOLY_	Comment Image: Comment
Labels	abc RPOLY_ 1-2 LENGTH	▼ Widget Type
Masks	abc STCL2_ abc STCL2_ID	Value Relation
3D View	abc PRE_DIR abc ST_NAME	Select layer, key column and value column
Diagrams	abc ST_TYPE abc SUF_DIR	Layer RoadShoulderClass
ields	123 ZIP_LEFT 123 ZIP_RIGHT	Value column abc Disolav *
Attributes Form	123 L_F_ADD 123 L_T_ADD	Description column
loins	123 R_F_ADD 123 R_T_ADD	✓ Allow NULL value
Auxiliary Storage	123 ST_CODE 123 L_HUNDRED	Order by value Allow multiple selections
Actions	123 R_HUNDRED 123 SEG_ID	Number of columns 1
Display	abc ONEWAY 123 CLASS	Use completer
Rendering	ebc RESPONSIBL	Fitter expression G
Temporal	III NEWSEGDATE	
Variables	abc STREETLABE abc STNAME	
Elevation	1.2 Shape_Len abc layer	▼ Constraints
Metadata	abc path SH_CLASS	Not null Enforce not null constraint

 Now, for every road shoulder polygon segment, we can select from user friendly values in a dropdown in the attribute table to update each to the correct classification:



• Classify all polygons so that the current conditions are accurately modeled for the purposes of the project.

Classifying Polygons

• To classify, first select the **road_shoulder_area** layer



• Next, click the edit tool



 Use the split feature tool to cut the polygons to match your field work





– o ×

Classifying Polygons

- Once the polygons are split appropriately, open the Attributes table of the road_shoulder_area layer
- With the attribute table open, use the select tool to select the polygon of interest. This will highlight the entry in the attribute table and allow you to classify it.
- Repeat until all polygons are classified
- It may be easier to finish the "Setting Map Symbology" portion of this guide before classifying so that you can see your progress as you classify

5	SH_CLASS	path		layer	Shape_Len	STNAME	STREETLABE	MULTI_REP	NEWSEGDATE	UPDATE_
	NULL	ultiLineString	Mu	Offset	179.737883249	S 89TH ST	S 89TH ST	C	12/16/1999	12/16/1999
	NULL	ultiLineString	Mu	Offset	62.0648356681	N 9TH ST	N 9TH ST	(NULL	9/29/1998
	NULL	ultiLineString	Mu	positive_offset	179.737883249	S 89TH ST	5 89TH ST	C	12/16/1999	12/16/1999
	NULL	ultiLineString	Mu	positive_offset	62.0648356681	N 9TH ST	N 9TH ST	C	NULL	9/29/1998
		(no selection)	М	Offset	182.868539937	S 9TH ST	S 9TH ST	(NULL	8/25/1998
			м	positive_offset	182.868539937	S 9TH ST	S 9TH ST	C	NULL	8/25/1998
	Stopping)	Ambulance Bike Lane (No	м	Offset	182.868539937	S 9TH ST	S 9TH ST	C	NULL	8/25/1998
	stopping	Bus Stop	М	positive_offset	182.868539937	S 9TH ST	S 9TH ST	(NULL	8/25/1998
	ing (Metered)	Handicap Park	М	Offset	182.868539937	S 9TH ST	S 9TH ST	C	NULL	8/25/1998
		Loading Zone	м	positive_offset	182.868539937	S 9TH ST	S 9TH ST	c	NULL	8/25/1998
d	/ Metered Park	Loading Zone	м	Offset	182.868539937	S 9TH ST	S 9TH ST	C	NULL	8/25/1998
	iig	No Parking	М	positive_offset	182.868539937	S 9TH ST	S 9TH ST	(NULL	8/25/1998
		No Stopping	м	Offset	182.868539937	S 9TH ST	S 9TH ST	C	NULL	8/25/1998
	rmit Parking	Residential Per	М	positive_offset	182.868539937	S 9TH ST	S 9TH ST	C	NULL	8/25/1998
	atered Parking	Residential/Me	м	Offset	182.868539937	S 9TH ST	S 9TH ST	C	NULL	8/25/1998
	NULL	ultiLineString	Mu	positive_offset	182.868539937	S 9TH ST	S 9TH ST	C	NULL	8/25/1998
	NULL	ultiLineString	Mu	Offset	182.868539937	S 9TH ST	S 9TH ST	C	NULL	8/25/1998
	NULL	ultiLineString	Mu	positive_offset	182.868539937	S 9TH ST	S 9TH ST	(NULL	8/25/1998
	NULL	ultiLineString	Mu	Offset	182.868539937	S 9TH ST	S 9TH ST	c	NULL	8/25/1998
	NULL	ultiLineString	Mu	positive_offset	182.868539937	S 9TH ST	S 9TH ST	C	NULL	8/25/1998
	NULL	ultiLineString	Mu	Offset	62.0648356681	N 9TH ST	N 9TH ST	C	NULL	9/29/1998
	NULL	ultiLineString	Mu	positive_offset	62.0648356681	N 9TH ST	N 9TH ST	(NULL	9/29/1998
	NUUL	ultil ineString	Mu	Offset	62.0648356681	N 9TH ST	N 9TH ST	(NULL	9/29/1998

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<u>Color Coding Standards</u>

- Loading zone, Bike Lane (no parking): rgb (8, 250, 7)
- No stopping, Bike Lane (no stopping): rgb (255, 1, 36)
- Residential Parking Permit, Motorcycle Parking (metered), Metered parking: rgb (247, 253, 2)
- Handicap Parking, Handicap Parking (metered): rgb (1, 233, 243)
- Bus stop: rgb (4, 0, 255)
- No parking: __rgb (252, 164, 5)
- Valet: (125, 0, 143)

 Next, we want to be sure that our map symbology is set how we want it for the map output. Right click on the road_shoulder_area polygon layer. Click properties. Click the symbology tab. Set the type to categorized, the value to SH_CLASS and then click the Classify button. This will add a symbol for each unique value of SH_CLASS.

• If there are values of SH_CLASS that do not exist in the existing conditions layer but may exist in the proposed conditions layer, then these values may need to be added manually. We're going to copy the symbology from this layer to the proposed layer when we create it, so ideally, we only want to set the symbols once and then copy/paste them without having to manually recreate them, so add those now if necessary. Press the plus button to add a new entry and then manually set the Value to the value of SH_CLASS that the symbol will correspond to.

Q Layer Properties — road_shoulder_areas_p	roposed — Sym	bology		Х
٩	📑 Catego	orized		•
 Information 	Value	abc SH_CLASS		3
Source	Symbol			·
🥳 Symbology	Color ramp		Random colors	•
	Symbol	▼ Value	Legend	
(abc Labels	V 🗌	LZ	Loading Zone	
	V 🗌	all other values		
abc Masks	✓ 🗌	RPP	Residential Permit Parking	
	V	SomeNewValue		
SD View	Image: A marked block in the second secon	all other values		
Magrams				
Fields				

• Double click on each symbol and set its symbology. In the symbol selector, you can compose many different symbol components, such as outlines, fills, images, etc. Press the **Plus button** to add a new symbol component. Highlight a symbol component and click the minus icon to remove it.

Q Layer Properties — road_shoulder_areas_prop	iosed — Sym	bology		X
Q	atego	vrized		¥
(i) Information	Value	abc SH_CLASS	V	3
🇞 Source	Symbol			ŀ
Sumbalany	Color ramp		Random colors	
Symbology	Symbol *	Value	Legend	
(abc) Labels	V 🗌	LZ	Loading Zone	1
m	V	all other values	Devidential Dermit Darlinn	
Masks	V	SomeNewValue	nesidenilar remiil rahmig	
🕎 3D View	V	all other values		
🐪 Diagrams				
Fields				

Adding a Centroid Fill

- In many cases, you may wish to add markers within your symbology
- Do this by adding a centroid fill layer over the color layer
- Add an SVG or font marker and choose the appropriate color and size





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Layer Duplication for Proposed Conditions

Layer Duplication for Proposed Conditions

• In addition to the existing conditions, we are also going to want to show proposed conditions. Now that the existing conditions have been modeled, we can use that layer as a starting point for the proposed conditions. Begin by duplicating the layer. **Right click on the road shoulder areas layer** and rename it as "Current Conditions". Then, in the Layers window and click Export, Save Features As.



Layer Duplication for Proposed Conditions

 In the Save Vector Layer dialog, select ESRI Shapefile and designate a path and filename in the project directory structure. Name it "Proposed Conditions".

	ESRI Shapefile				•			
ile name	E:\gis\shapes\philly\example\road_shoulder_areas_proposed.shp							
ayer name								
CRS	EPSG:2272 - NAD83 / Pennsylvania South (ftUS)							
Encoding		UTF-8	N.		-			
Save or	nly selected features							
Select	t fields to export and t	heir export options						
✔ Persist	layer metadata							
▼ Geom	etry							
Geometr	y type	Au	tomatic		•			
Eoro	e multi-tune							
Force	e multi-type de z-dimension							
Force	e multi-type ide z-dimension							
Force	e multi-type de z-dimension ttent (current: none)							
Force Force Indu Ex	e multi-type ide z-dimension ttent (current: none) Options							
Force	e multi-type de z-dimension tent (current: none) Options NO				•			
Force	e multi-type de z-dimension ttent (current: none) Options NO				• •			
Force Force Indu Layer RESIZE SHPT	e multi-type de z-dimension tent (current: none) Options NO				• •			
Force Indu Karleyer RESIZE SHPT Custo	e multi-type de z-dimension tent (current: none) Options NO m Options				• •			
 Force Indu Ex Layer RESIZE SHPT Custo 	e multi-type de z-dimension tent (current: none) Options NO m Options				• •			

Layer Duplication for Proposed Conditions

 Copy all symbology to the new layer (Proposed conditions) as well as the relationship to the classification table, so you can now go through the proposed conditions layer and reassign classifications as necessary.





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- Right now, both map panes are synced to the layers in the main QGIS window, but they can be locked at any time. We're going to take advantage of that fact by first selecting only the existing conditions, locking the existing conditions map pane, then disabling the existing conditions layer and instead enabling the proposed conditions layer and locking the second pane.
- First, enable the current conditions layer and disable the proposed conditions layer:



 Then, go into the layout window and select the existing conditions map pane. Under layers, click lock layers.

Item Properties		C
Map 1		
2 🗎 🖻	🚼 🛃 🖳 🔣 🛲 🇊	
▼ Main Prop	erties	
Scale	379.432	€,
Map rotation	0.00 °	3
CRS	Use Project CRS	- 🚳 🖶
V Draw map	o canvas items	
▼ Layers		
Follow ma	p theme (none)	•
V Lock layer	rs	۹.
Lock style	es for layers	

 Then, go back to the main QGIS window and deselect the current conditions layer and select the proposed conditions layer.



• Then, in the layout window, for the proposed conditions map pane, check lock layers. Now the top pane should display the existing conditions layer and the bottom pane should display the proposed conditions layer and any changes between existing and proposed within the same area boundaries should be clear.


Adding A Legend	Layout Edit Yiew Items Add Item Atlas Settings
 Next, we'll add a legend. Click the button here to do so 	
 Under item properties for the legend, deselect the layers we don't care to differentiate in the map. This will include all of our images/basemaps, the data layers, etc. Since our existing and proposed layers share symbology, we can leave only one copy, either the existing or the proposed. Uncheck auto-update, then click through the legend items, removing unwanted items by clicking the minus icon. 	Existing conditions Existing conditions Proposed conditions Proposed conditions RoadShoulderClass road_shoulder_areas_proposed Loading Zone Loading Zone Loading Zone Loading Zone

<u>Adding a Compass</u>

- A compass is helpful for orientation
- To add a compass, click the compass tool
- Drag a box over the area you want your compass
- Under Item Properties, change the fill color to black so the North orientation is visible

Parking d Parking	
SVG Parameters	
Fill color Stroke color Stroke width 0.20 mm	

Adding final touches

- Very last!
- Add a PBA logo
- You can use the image in this presentation



Export File

- Export the file as a pdf
- Double check your labels in the field for correctness.
- You are all done. Reach out to Caleb if you would like your design added to the website