

# Data-Driven Styling, 3D Polygons and Vector Tiles with Mapbox GL

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**Hyatt Regency Columbus**  
Columbus, Ohio

**Ohio GIS Conference**

*September 25 – 27, 2017*





**OVRDC**

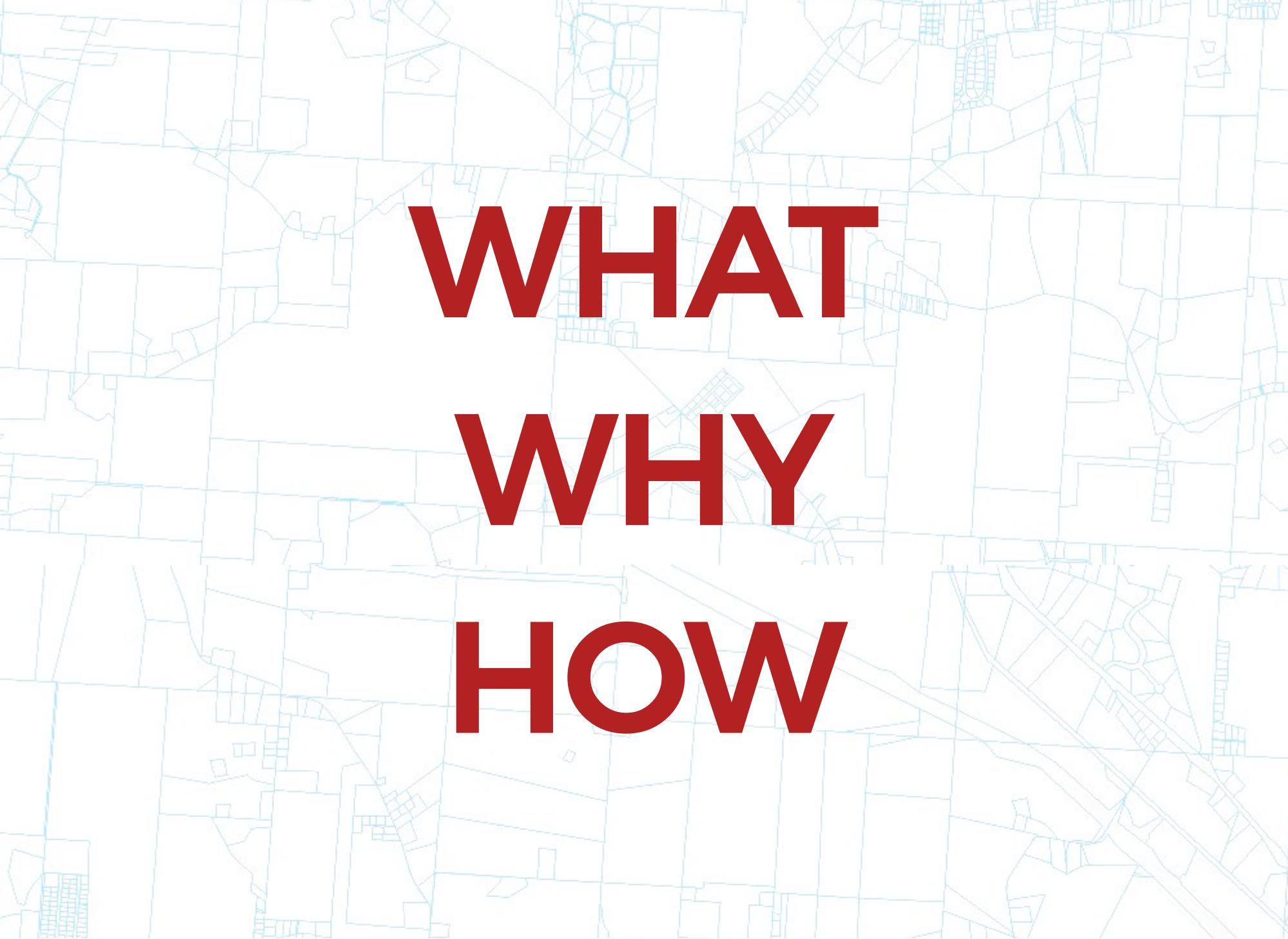
[www.ovrdc.org](http://www.ovrdc.org)

**MAP EXAMPLES**

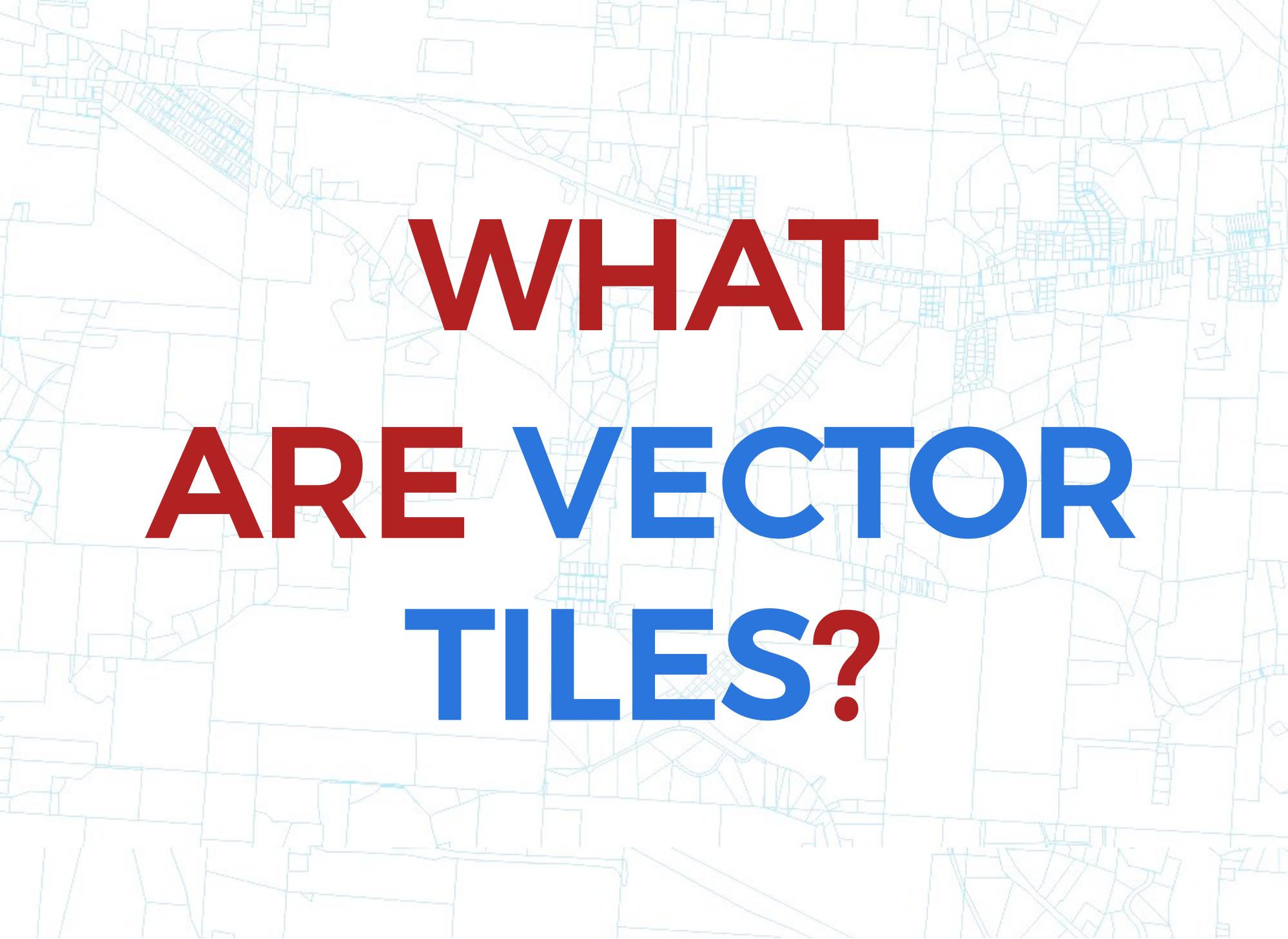
[ovrdc.github.io/gis-tutorials](https://ovrdc.github.io/gis-tutorials)

**THIS PRESENTATION**

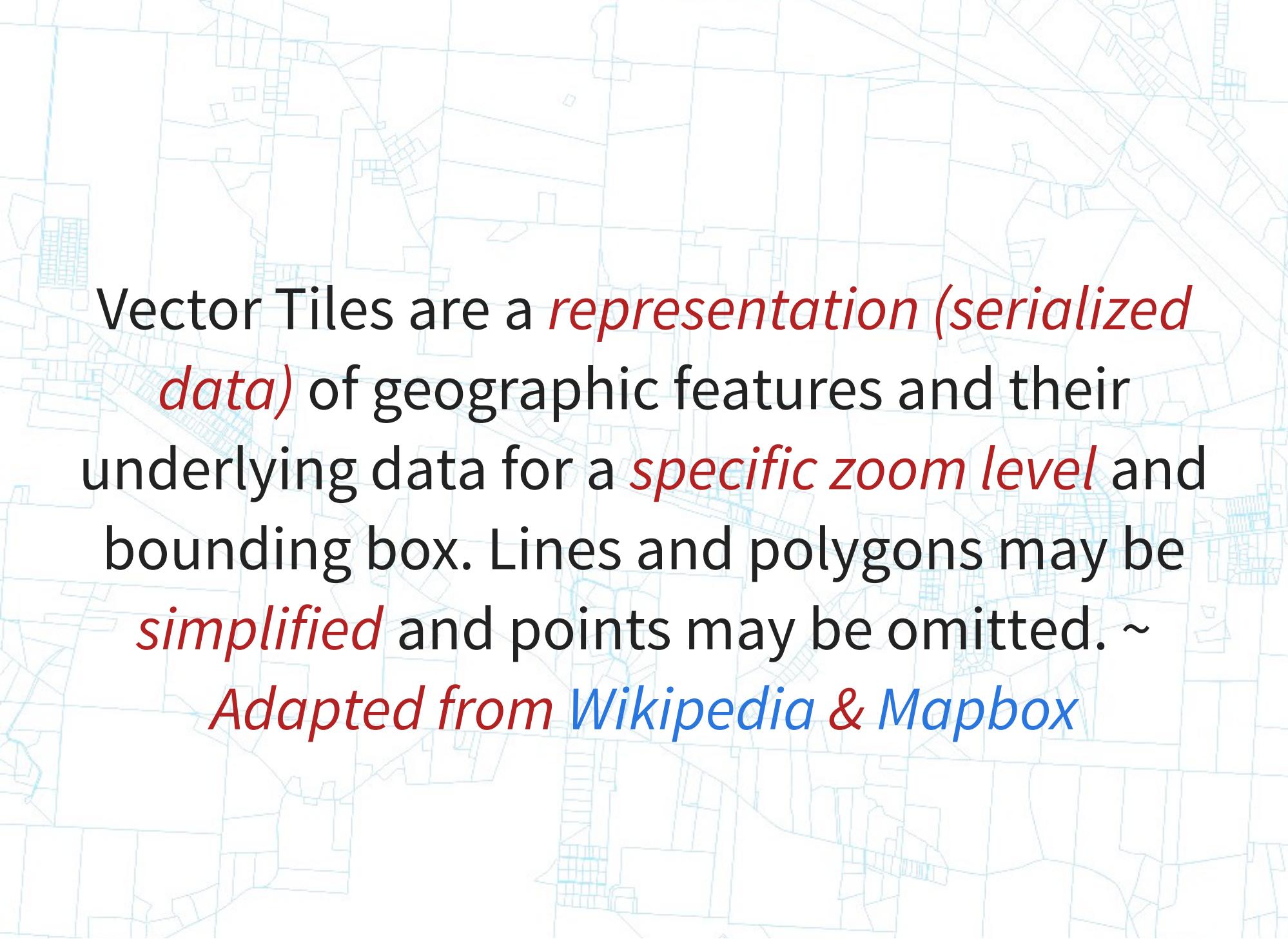
[www.ovrdc.org/gis/presentations](http://www.ovrdc.org/gis/presentations)



**WHAT**  
**WHY**  
**HOW**



**WHAT  
ARE VECTOR  
TILES?**



Vector Tiles are a *representation (serialized data)* of geographic features and their underlying data for a *specific zoom level* and bounding box. Lines and polygons may be *simplified* and points may be omitted. ~

*Adapted from Wikipedia & Mapbox*

# WEB MAP TILES



*img source: [leafletjs.com/examples/zoom-levels](http://leafletjs.com/examples/zoom-levels)*

# MAPBOX VECTOR TILES (MVT)

MVT is slowly becoming an industry standard.



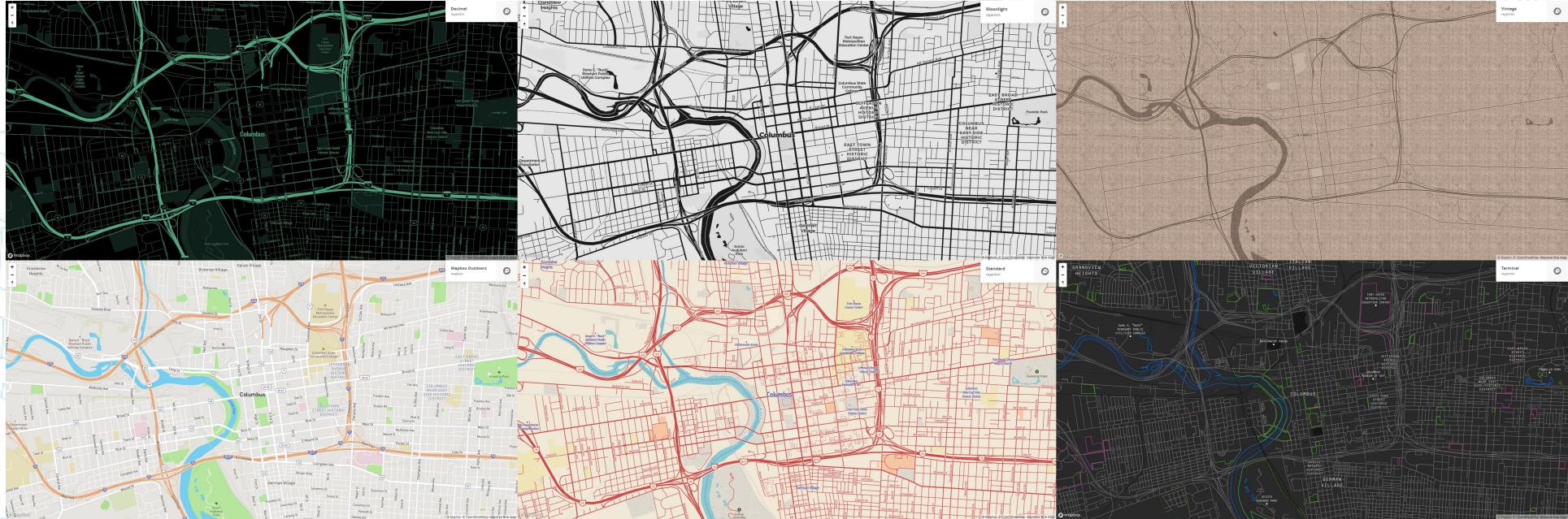


**WHY USE  
VECTOR TILES?**



**CLIENT-SIDE  
RENDERING =  
POTENTIAL SAVINGS  
SERVER-SIDE**

# UNLIMITED



# BASEMAPS

# **ACCESS TO ATTRIBUTE DATA**

# PERFORMANCE

AGOL Raster Basemap

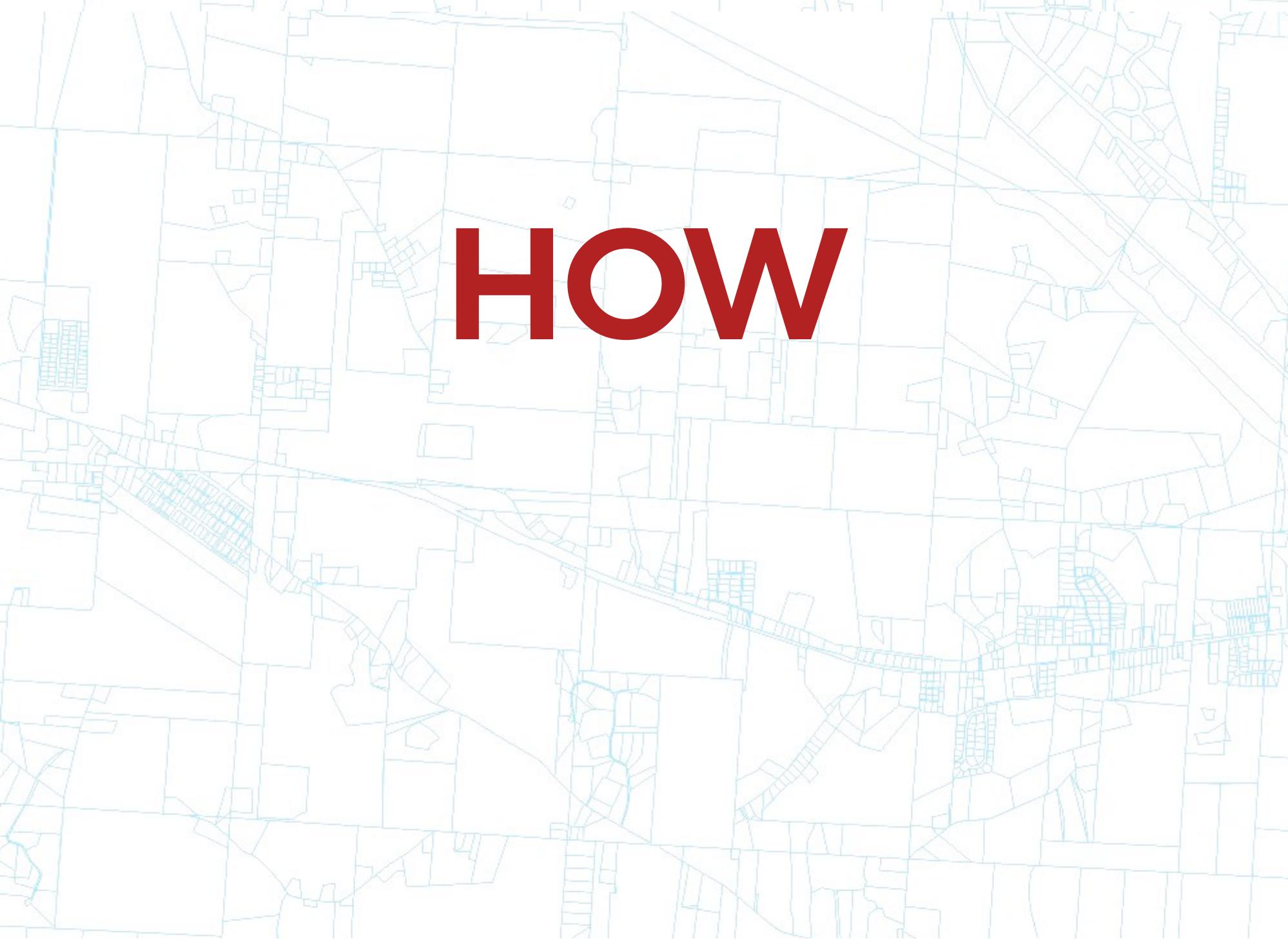
~70 Image Requests, 1100kb OpenStreetMap Raster

~45 Image Requests, 749kb Vector Tile Basemap

~20 Vector Tile requests, 759kb

*This includes feature data!!*





**HOW**



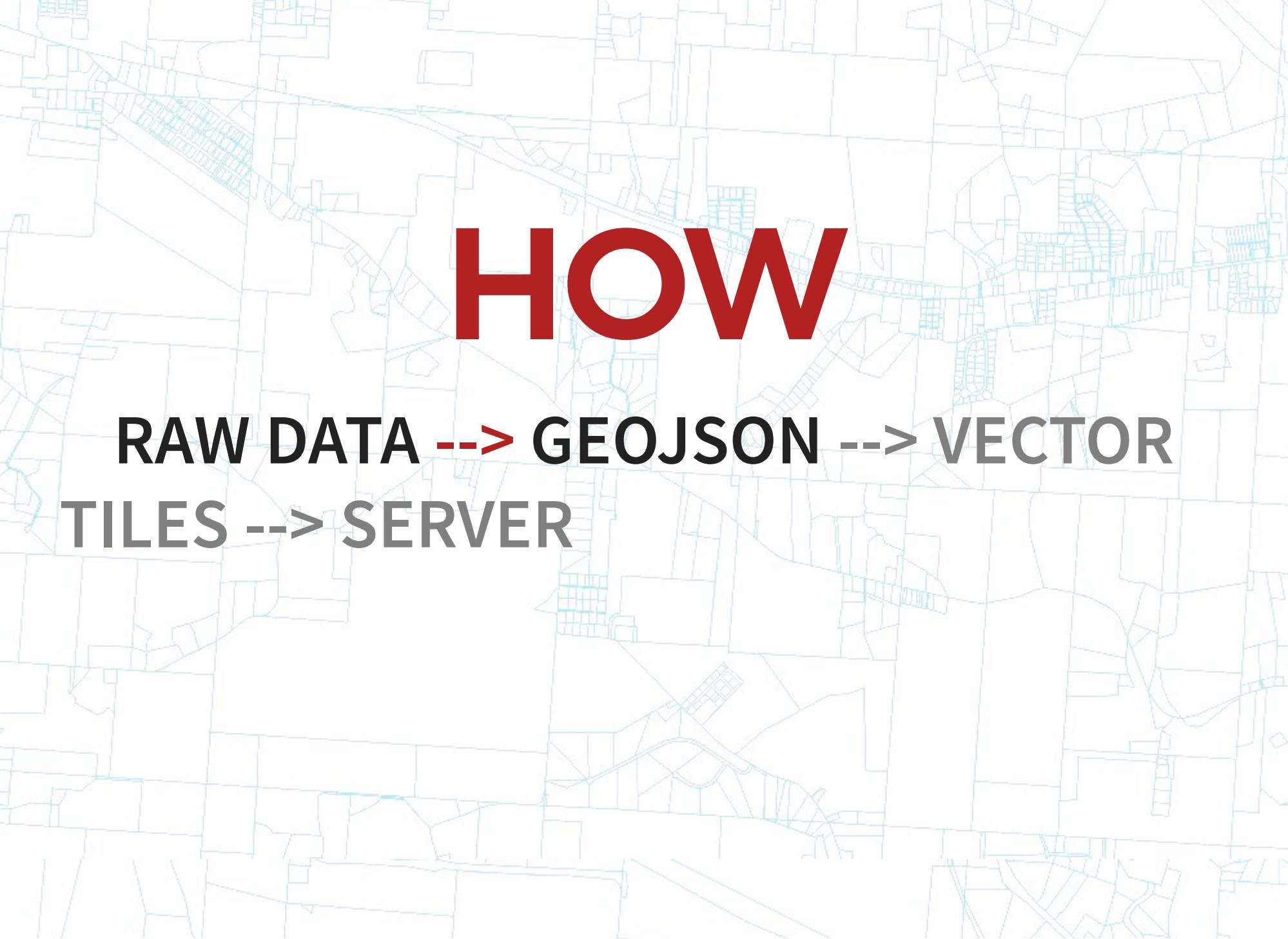
**RAW DATA**

**HOW**



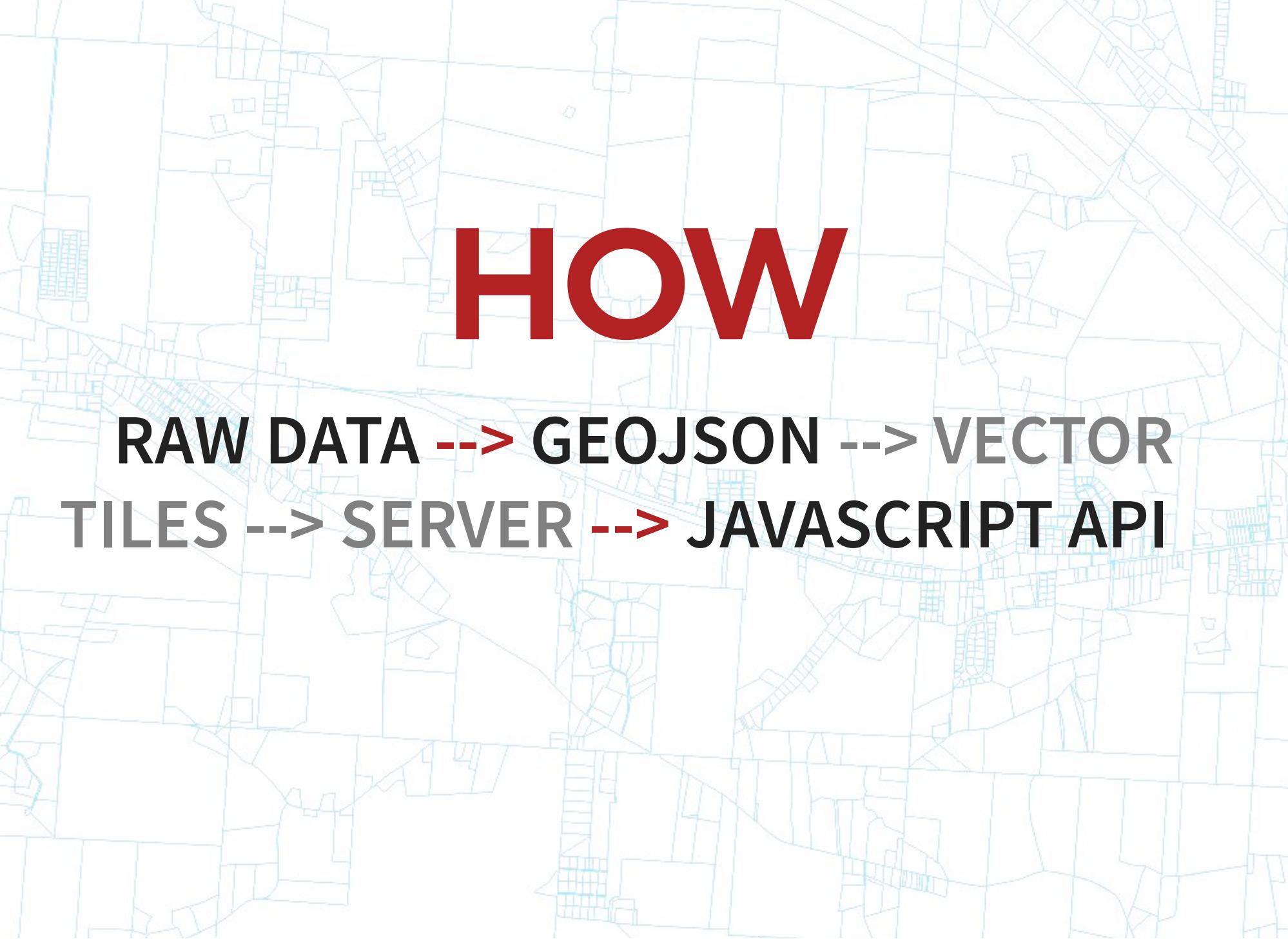
# **HOW**

## **RAW DATA --> GEOJSON**



# **HOW**

**RAW DATA --> GEOJSON --> VECTOR  
TILES --> SERVER**



# HOW

RAW DATA --> GEOJSON --> VECTOR  
TILES --> SERVER --> JAVASCRIPT API



# **HOW**

**RAW DATA --> GEOJSON --> VECTOR  
TILES --> SERVER --> JAVASCRIPT API --> BROWSER**

# HOW

RAW DATA --> GEOJSON --> VECTOR  
TILES --> SERVER --> JAVASCRIPT API --  
> BROWSER

*or just use Mapbox and Mapbox Studio*

# MAPBOX STUDIO

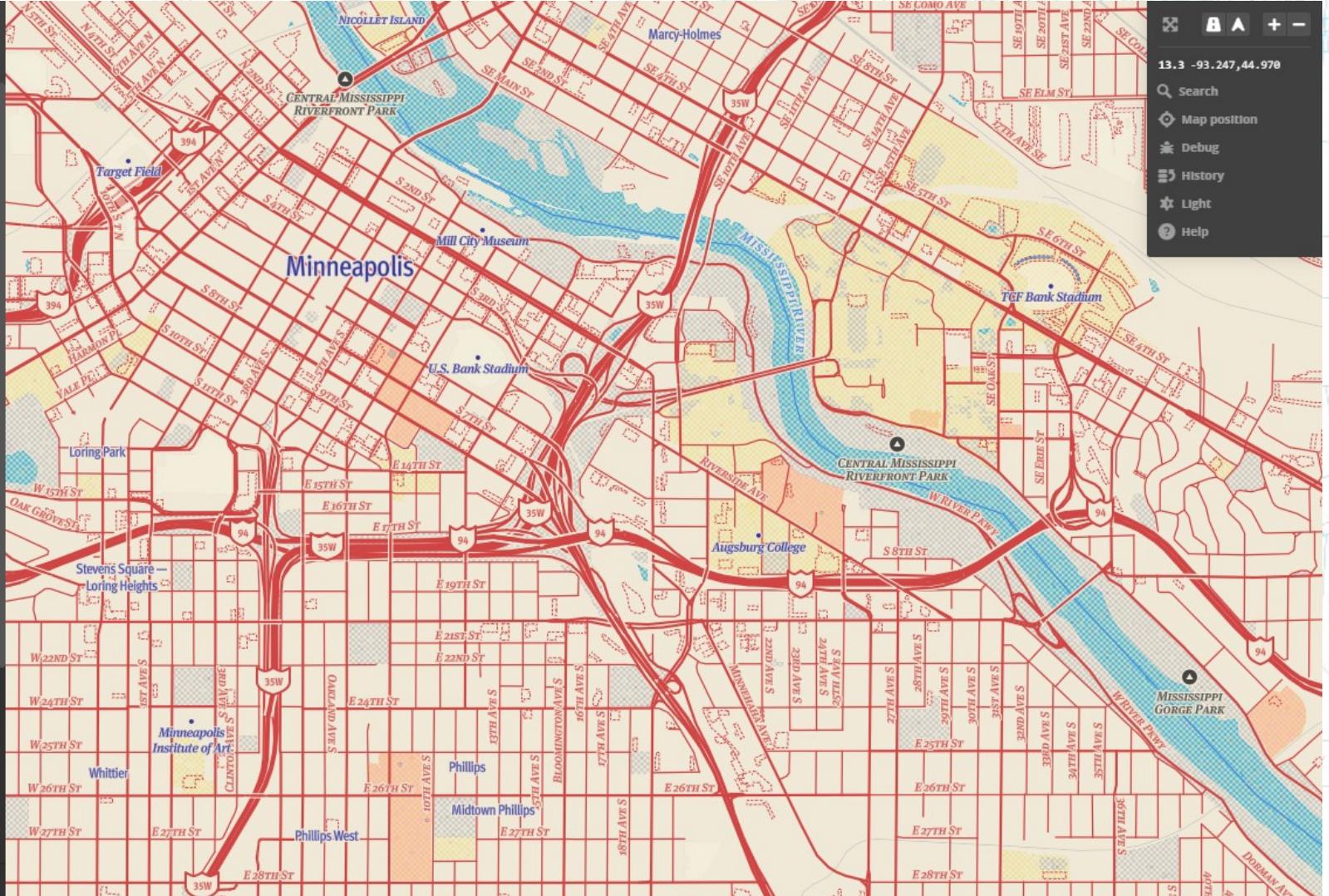
Standard Publish

- + New layer
- country labels 3 layers
- city label major
- highway labels 6 layers
- city labels 2 layers
- place labels 3 layers
- point of interest labels 5 layers
- marine labels 3 layers
- other labels 2 layers
- road label
- waterway label
- buildings 2 layers
- 3d buildings
- building
- bridges 10 layers
- admin boundaries 5 layers
- roads 11 layers
- motorway
- motorway case
- motorway link
- primary
- motorway link case
- secondary
- service
- street
- rail-tracks
- rail
- street limitors

Properties

13.3 -93.247,44.970

Search Map position Debug History Light Help



# MAPBOX STUDIO

The screenshot shows a map editing application with a dark-themed interface. On the left, a sidebar lists various map layers: country labels, city label major, highway labels, city labels, place labels, point of interest labels, marine labels, other labels, road label, waterway label, buildings, 3d buildings, building, bridges, admin boundaries, roads, motorway, motorway case, motorway link, primary, motorway link case, secondary, service, street, rail-tracks, rail, street limited, and Properties. The 'motorway' layer is currently selected and highlighted in blue.

The main area is divided into two sections: 'Style' and 'Select data'. The 'Style' section contains the following controls:

- Color:** A color picker set to #00FF00 (green). A color calibration chart is visible next to it.
- Pattern:** Set to 'none'.
- Opacity:** Set to 1.
- Width:** Set to 3.96 px.
- Cap:** Set to 'c' (square).
- Join:** Set to 'r' (miter).
- Round limit:** Set to 1.05.
- Miter limit:** Set to 2.

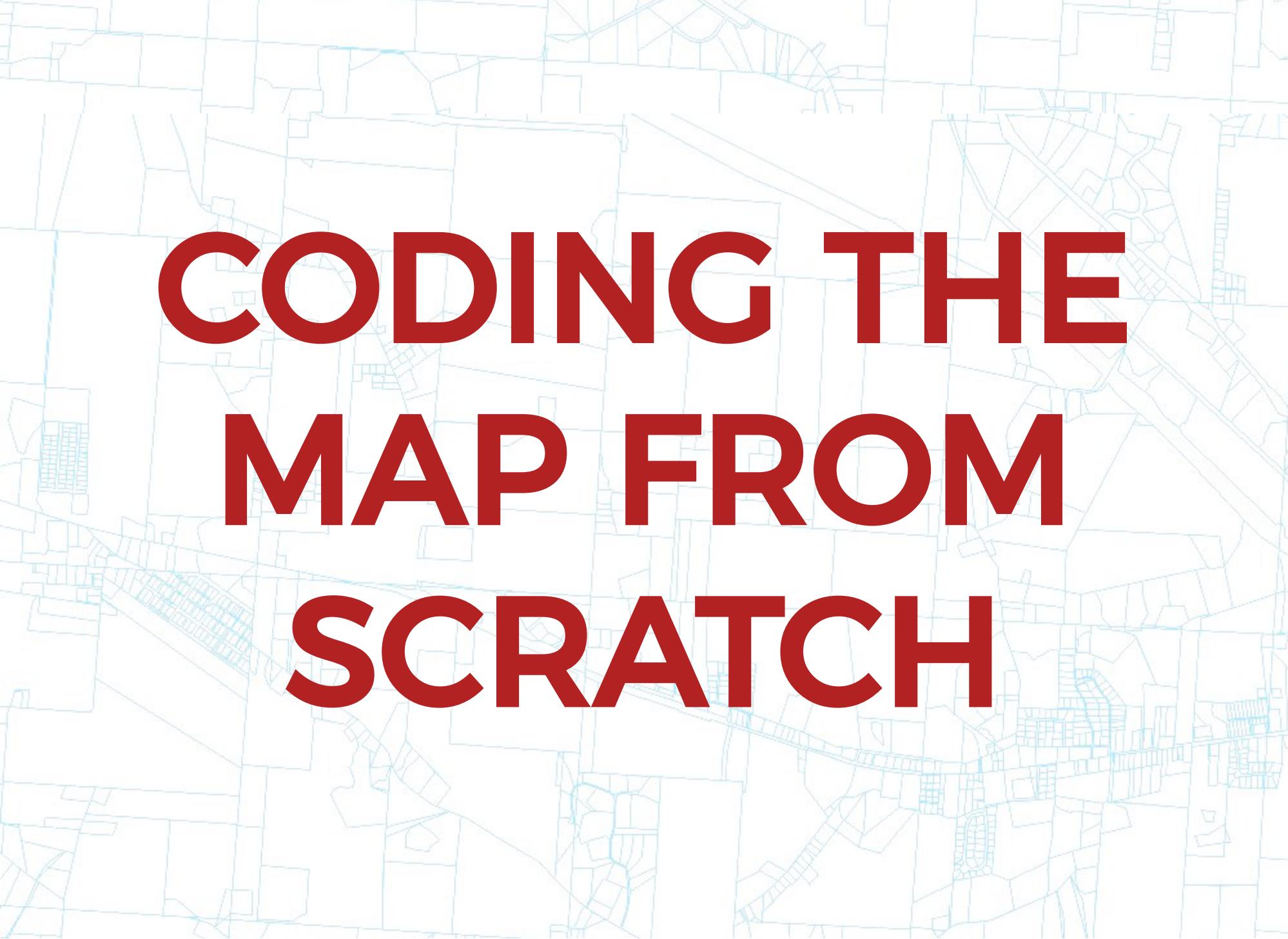
**Options** section:

- Dash array:** A button labeled '+ Add dash pattern'.
- Gap width:** Set to 0 px.
- Blur:** Set to 0 px.
- Offset:** Set to 0 px.
- Translate:** Set to 0 px (X) and 0 px (Y).
- Translate anchor:** Buttons for 'Top Left' and 'Top Center'.

A modal window titled 'Edit Values' is open over the map, showing the current color settings in RGB and HSV modes. The HSV values are H 123, S 100, V 100, with an alpha value of 100.

The map itself displays a detailed urban area with a green motorway highlighted. The green line follows the path of Interstate 35W and Interstate 94. The map includes labels for 'NICOLLET ISLAND', 'CENTRAL MISSISSIPPI RIVERFRONT PARK', 'Marcy-Holmes', 'TCF Bank Stadium', 'Augsburg College', 'Phillips', 'Midtown Phillips', 'Phillips West', and numerous street names like 'SE 1ST ST', 'SE 2ND ST', 'SE 3RD ST', etc. The river 'MISSISSIPPI RIVER' is also visible.

On the right side of the interface, there is a vertical toolbar with icons for search, map position, debug, history, light, and help. Above the toolbar, the coordinates '13.3 -93.247,44.970' are displayed.



**CODING THE  
MAP FROM  
SCRATCH**

# TOOLS

ATOM/NOTE PAD++

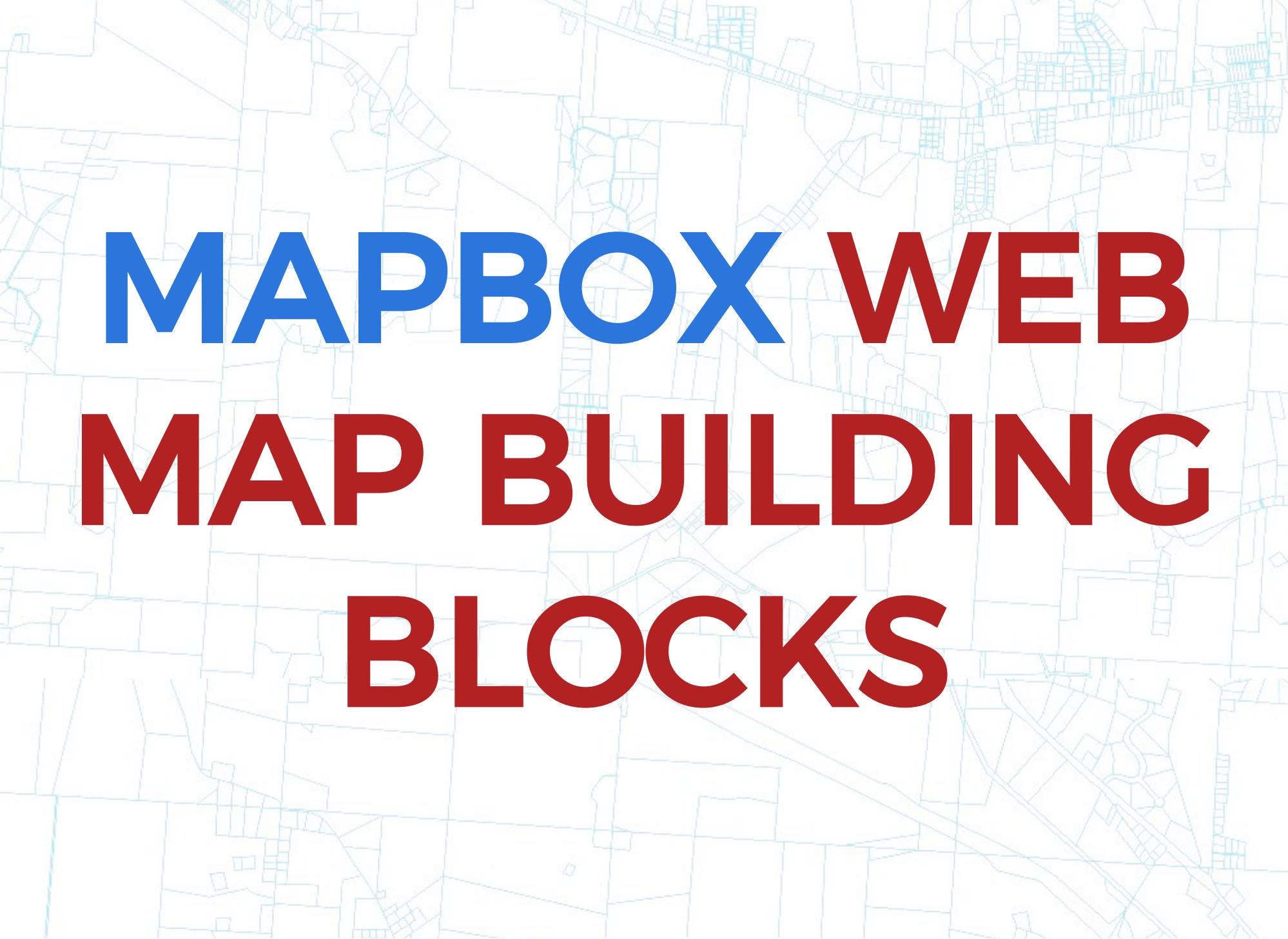
OPENMAPTILES - BASEMAP TILES

ESRI2OPEN/MAPSHAPER - GEOJSON

TIPPECANOE - VECTOR TILES

NODE JS & NGINX - TILE SERVER

LEAFLET/MAPBOX/OPENLAYERS

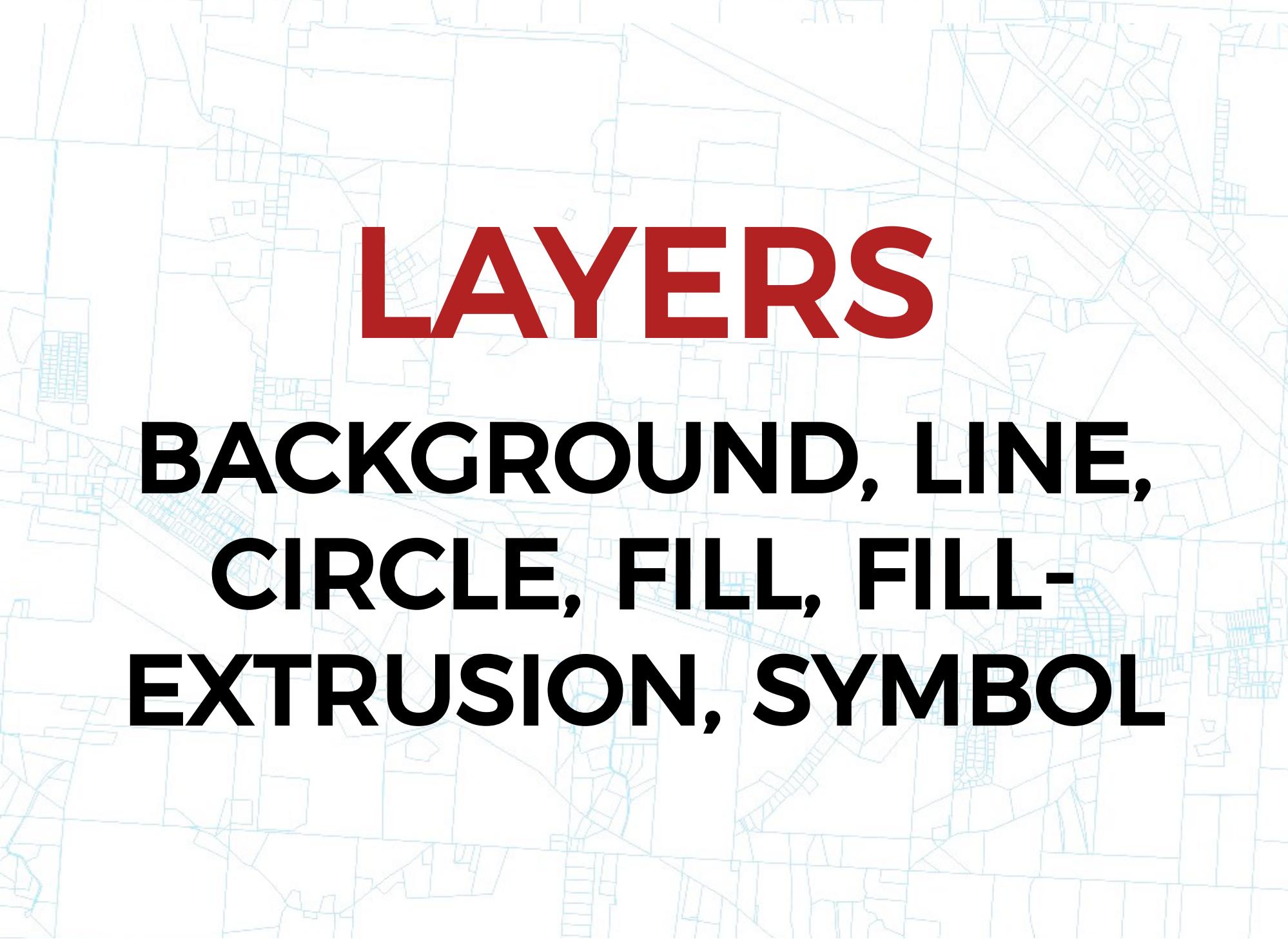


# **MAPBOX WEB MAP BUILDING BLOCKS**



**SOURCES**

**GEOJSON, VECTOR  
TILES, RASTER TILES,  
IMAGES, VIDEOS**



**LAYERS**

**BACKGROUND, LINE,**

**CIRCLE, FILL, FILL-**

**EXTRUSION, SYMBOL**



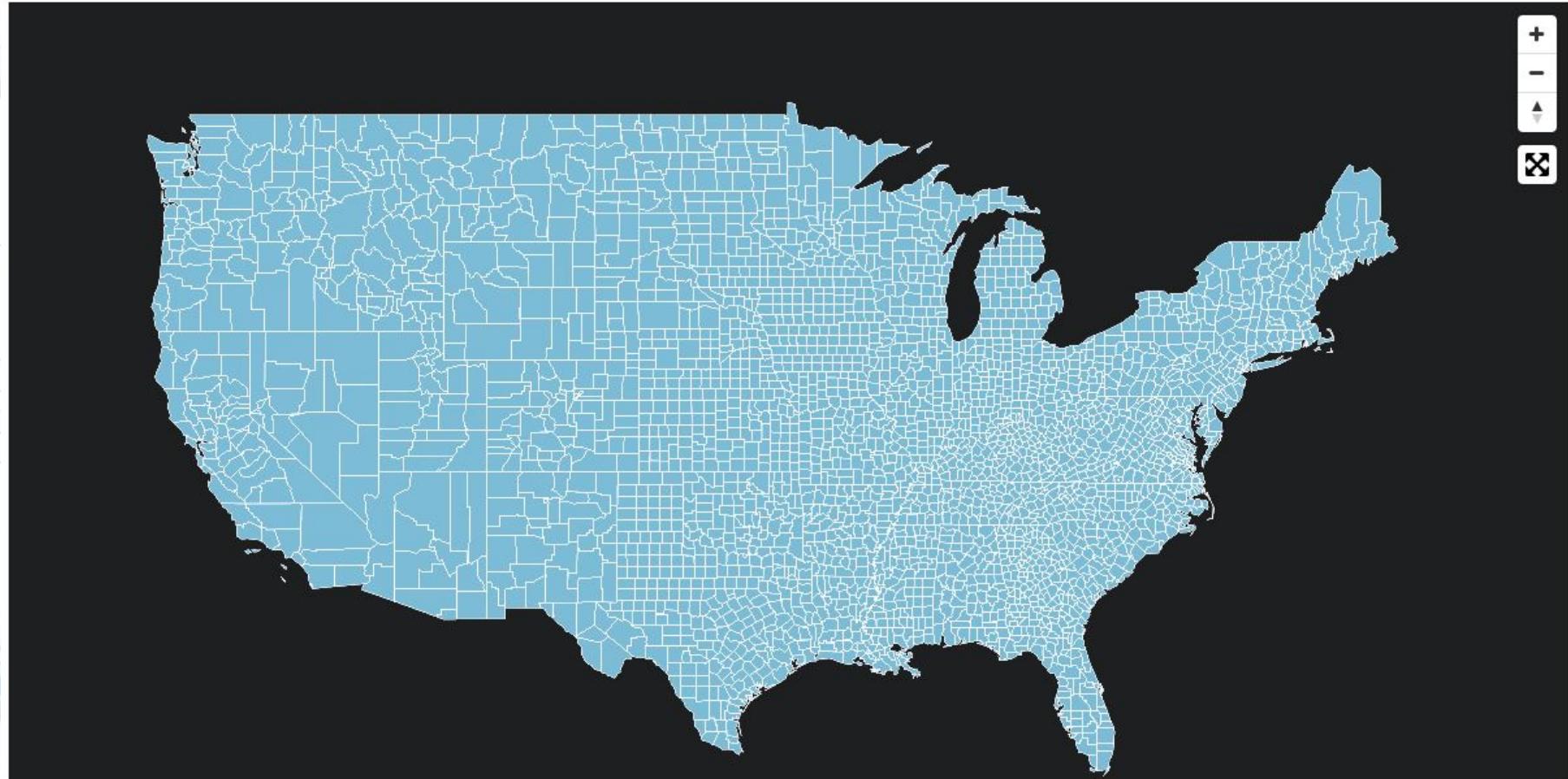
**PROPERTIES**

**BEARING, PITCH, LIGHT,**

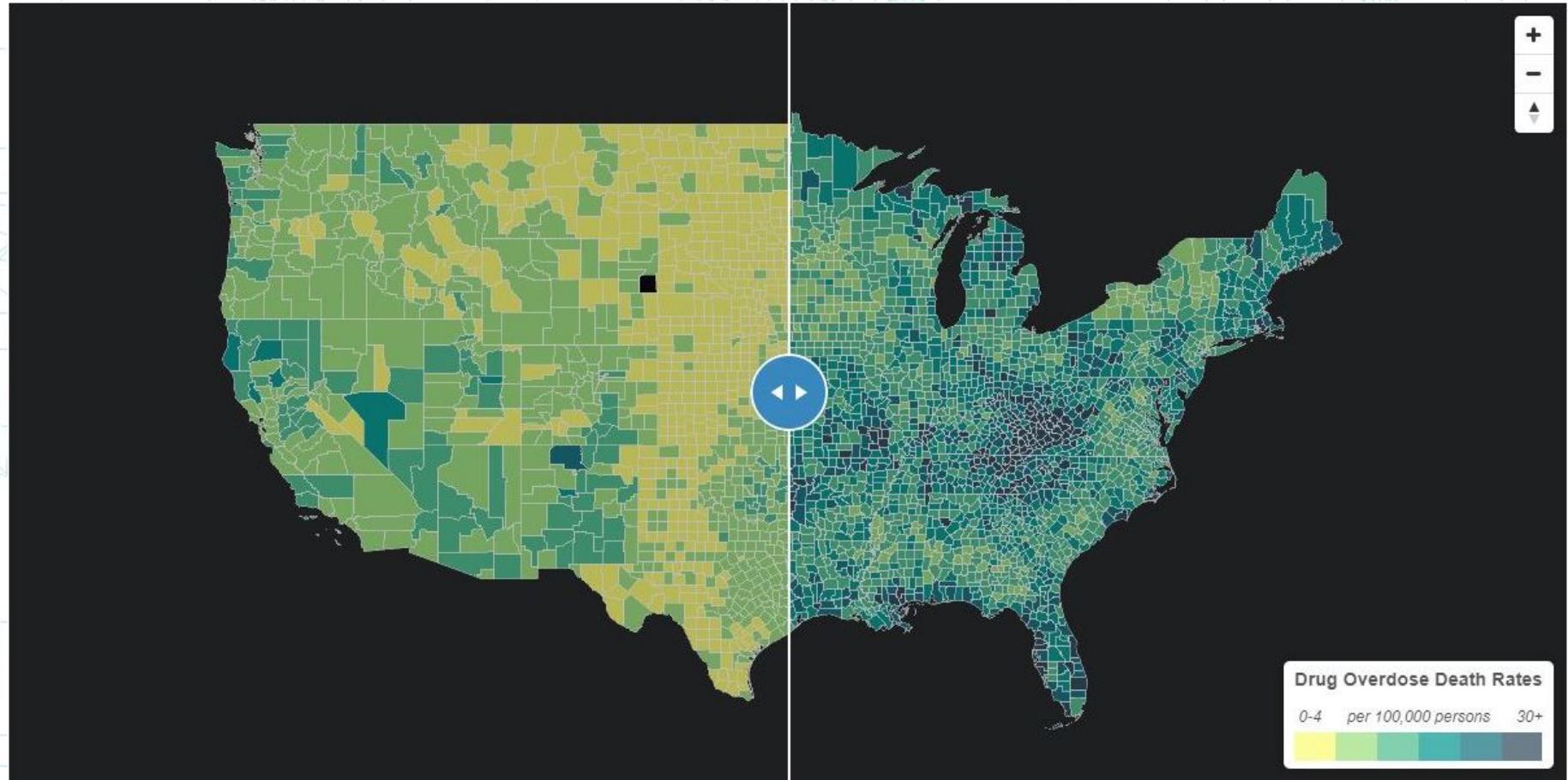
**SPRITES, GLYPHS,**

**TRANSITION**

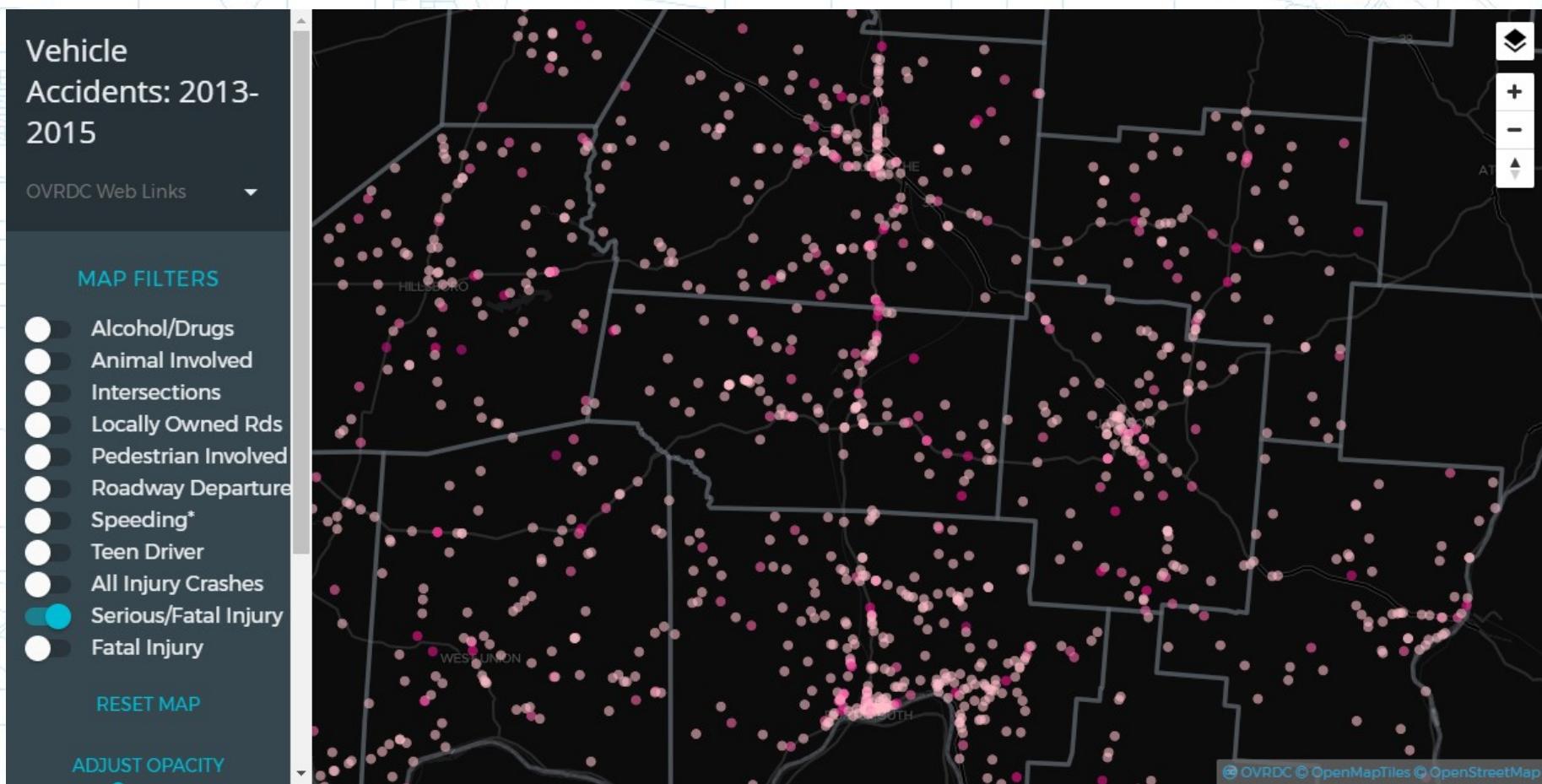
# FILL & QUERY



# FILL WITH DATA-DRIVEN STYLES



# FILTERING



# FILL-EXTRUSION & PITCH

## Block Group Explorer

OVRDC Web Links

### DEMOGRAPHICS (% OF TOTAL)

- Age (65 & Older)
- Food Stamps
- Population Density
- Poverty
- Renter Occupied
- Minority
- Uninsured
- Vacancy
- Veterans

RESET MAP

ADJUST OPACITY

Toggle 3D



# PARCEL VIEWER & JSON SEARCH

Mapbox Parcel Viewer

OVRDC Web Links

**PARCEL SEARCH**

**JOHNSON FAMILY TRUST**  
Parcel ID: P250311000

**JOHNSON**  
CHRISTOPHER L &  
CINDY A J/S  
Parcel ID: PI72242000

**JOHNSON**  
CHRISTOPHER L &  
CINDY A J/S  
Parcel ID: PI72241000

JOHNSON FAMILY TRUST  
W 1/2 NE 75.39A RTS 19-3-5 MAP 5

© OVRDC © OpenMapTiles © OpenStreetMap



A faint, light blue map of a city's street network serves as the background for the text. The map shows a dense grid of roads and some major highways, with buildings represented by small squares.

**THANKS!**

**MALCOLM MEYER**

**@getBounds**

# SLIDE SOURCES

<https://stackoverflow.com/questions/36426428/mapbox-gl-js-3d-elevation-profile> <http://scottsfarley.com/cartography/coding/2017/02/11/DC-Mapbox-Plugin.html>  
<https://blog.mapbox.com/shading-and-lighting-3d-features-in-mapbox-gl-js-e544695cd64> <https://blog.mapbox.com/introducing-data-driven-styling-in-mapbox-gl-js-f273121143c3> [https://blog.mapbox.com/dive-into-large-datasets-with-3d-shapes-in-mapbox-gl-c89023ef291](https://blog.mapbox.com/introducing-data-driven-styling-in-mapbox-gl-js-f273121143c3)