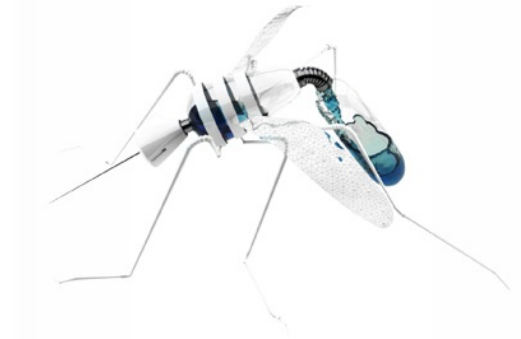


Mosquito

for Grasshopper

by Carson Smuts

Architect, Programmer and Industrial Designer - StudioSmuts.com
Research Scientist - MIT
Adj. Assistant Professor - GSAPP Columbia University



Mosquito is a plugin suite developed for Rhino3D and Grasshopper (Rhino3D is a CAD program and Grasshopper a plugin for Rhino that allows you to build parametric models).

The plugin allows us to tap into social, financial and popular media data sources. Extracting geo-locations, transportation routes, user profiles and images from flicker, as well as geo-located messages from Twitter. In addition, as of version 0.4c, Mosquito has its own built in maps.

As architects part of our responsibility is the consideration of the public realm. Today however , people tend to hang in the digital equivalent, namely, social media space. While this space becomes ever more permanent, the physical realm is fleeting, an evanescent space.

With mobile tech at our disposal, we can overlay the digital and physical in the same space. They intersect, and at this point new potential exists. Whether you agree or not with nature of social media, it is important to remain critical from either side.

We are utilizing the tools in this component suite to bridge the gap between geometrics and information. Driving geometry with data and vice-versa. The ability to extract user Geo-coordinates, language, thoughts, profile and image enables architects to paint a picture over time. It is this 4-dimensional picture, which we refer to as “spatial condition”, that allows us to explore what happened yesterday, now and hypothesize about tomorrow. True 4-dimensional modeling.

Primer Content

The Mosquito parcel has reached a point where a software primer (manual) is necessary in order to speed up the learning process for its users. I would encourage you to review this primer when updates to the software take place.

1. Components Overview

2. VectorMaps Tutorial

- Specifying the area your would like to download.
- Extracted additional information such as buildings and roads.
- Scaling from Lat/Lon to Metric units (Meters)
- Centering the data to Rhino's world zero point.
- Extruding buildings

Components

This is the current toolbar for Mosquito and contains the following components.



VectorMaps

This component extracts geometry and information regarding roads, buildings, amenities and more. The information can then be used to create an underlay for your geo-located data or simply to create a drawing.



ProjectPoints: to be used with VectorMaps

VectorMaps has the ability to create undistorted maps, center them to your Rhino viewport and scale the drawing to meters. This component will allow you to overlay Lat/Lon, or in conjunction with the Geo-Project plugin below, GIS state plane data.



Geo-Project

GIS information is plotted using projections. These projections are place specific. Meaning that you cannot use the same projection to plot information from Cape Town, South Africa and New York, United States. This component will allow you to use custom projections to plot to a state plane or back to Lat/Lon.



Directions and Routing

Extract transit, driving, walking and cycling route information from a start and end point in a city.



Route Info: to be used with Directions and Routing

Extracts additional direction and time information per step in a journey.



Location

A very handy component, feed it a street address or city and it will return the geo-coordinate for you to use on your maps.



Places

This plugin is a work in progress and attempts to extract information and location regarding places and amenities from Google Maps. Requires some knowledge about APIs.

Experimental plugins:



GoogleMaps

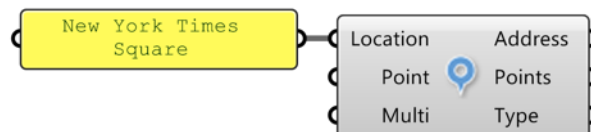
This plugin is experimental, and will most likely be removed in the near future. It aims to extract Google Map tiles and draw these to your viewport.

Vector Maps tutorial

To start with the "Vector Maps" component we first need a location that we want to map. This can be done by using the "Location" component. Use a panel to input the location. The component will return the full address and geographic points in latitude and longitude.

*NOTE: Latitude and Longitude often represented by **Lat,Lon** is the equivalent of saying **Y,X**. Therefore the component swaps these around in order to create Points in Rhino. Points in Rhino represent **Lon/Lat (X,Y)**. For this tutorial you do not need to worry about this.*

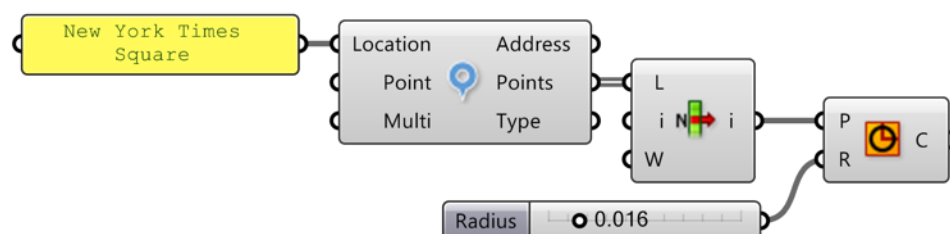
Important: This component requires an internet connection.



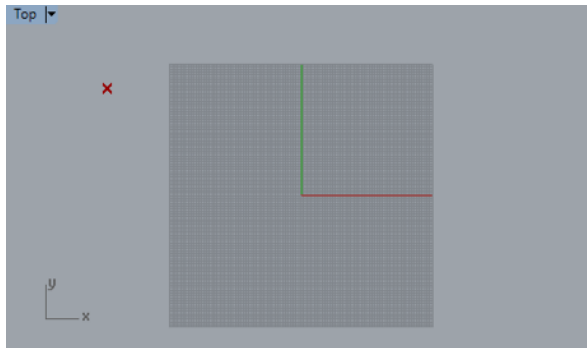
The "Vector Maps" component extracts a portion of the city based on bounds. In other words, it takes a shape that you have drawn and downloads all the city information within that shapes boundary.

In this example we will use a "circle component" to draw a boundary. The "Location" component may return more than one point if your description was too vague. We use the "List Item" component to extract only a single point and then use this point to draw our circle.

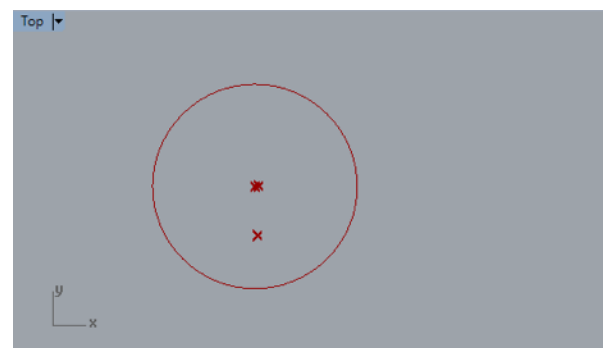
*IMPORTANT: The Radius - It is vital that you start small, if your circle is too big and your internet is too slow your request to download the map will be rejected, lets start with a radius of **0.016**.*



You should now see a small red point in your Rhino Viewport. Lat/Lon units are incredibly tiny and so we need to zoom in to see our circle.



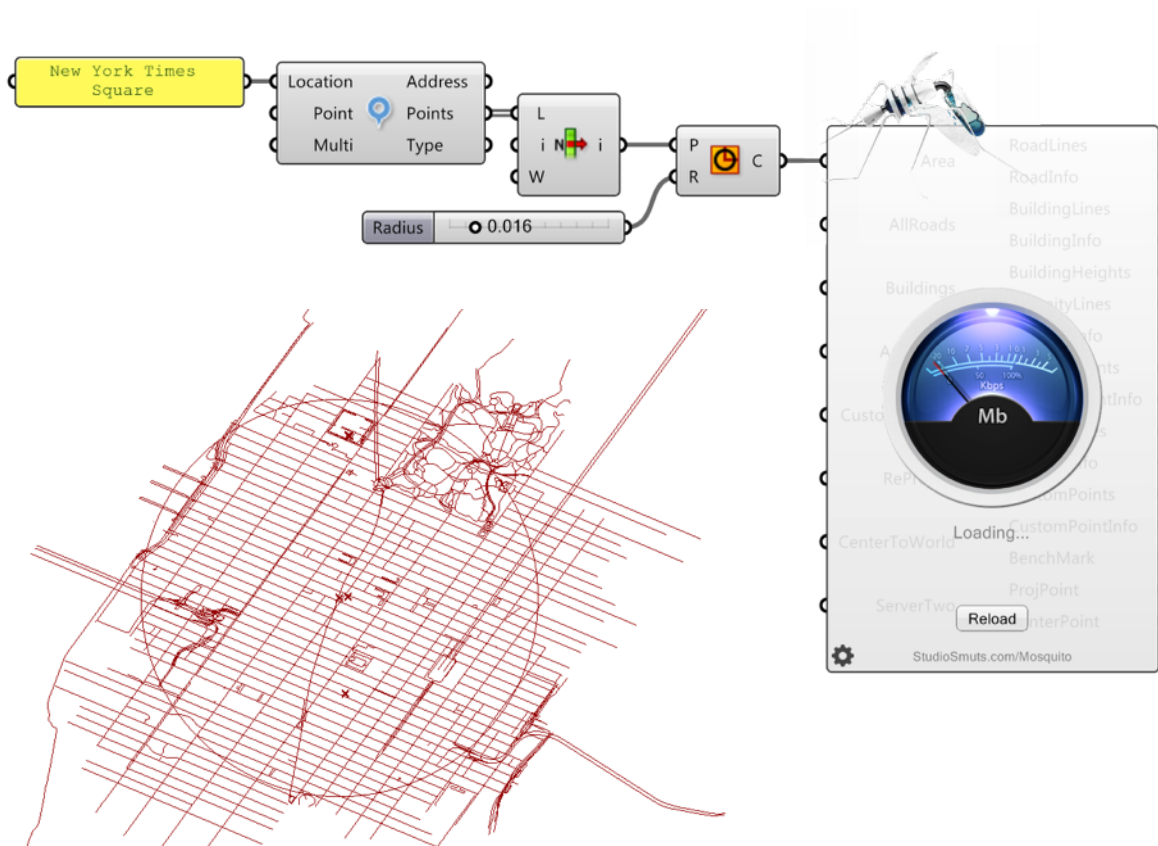
Zoomed Out



Zoomed In

Now that we have our circle representing the area we would like to extract we can go ahead and create a **"Vector Maps"** component. Connect the circles output to "Vector Maps Area".

- Click the **"Reload"** button on the component.
- You should now see "Loading..." and then "Downloading" until the plugin has finished.
- You should now see basic roads in your Rhino viewport.



Extracting Additional information

By default, Vector Maps extracts only basic primary roads. This is done on purpose so that we can assess the initial bounds and determine if we would like to download more detailed information.

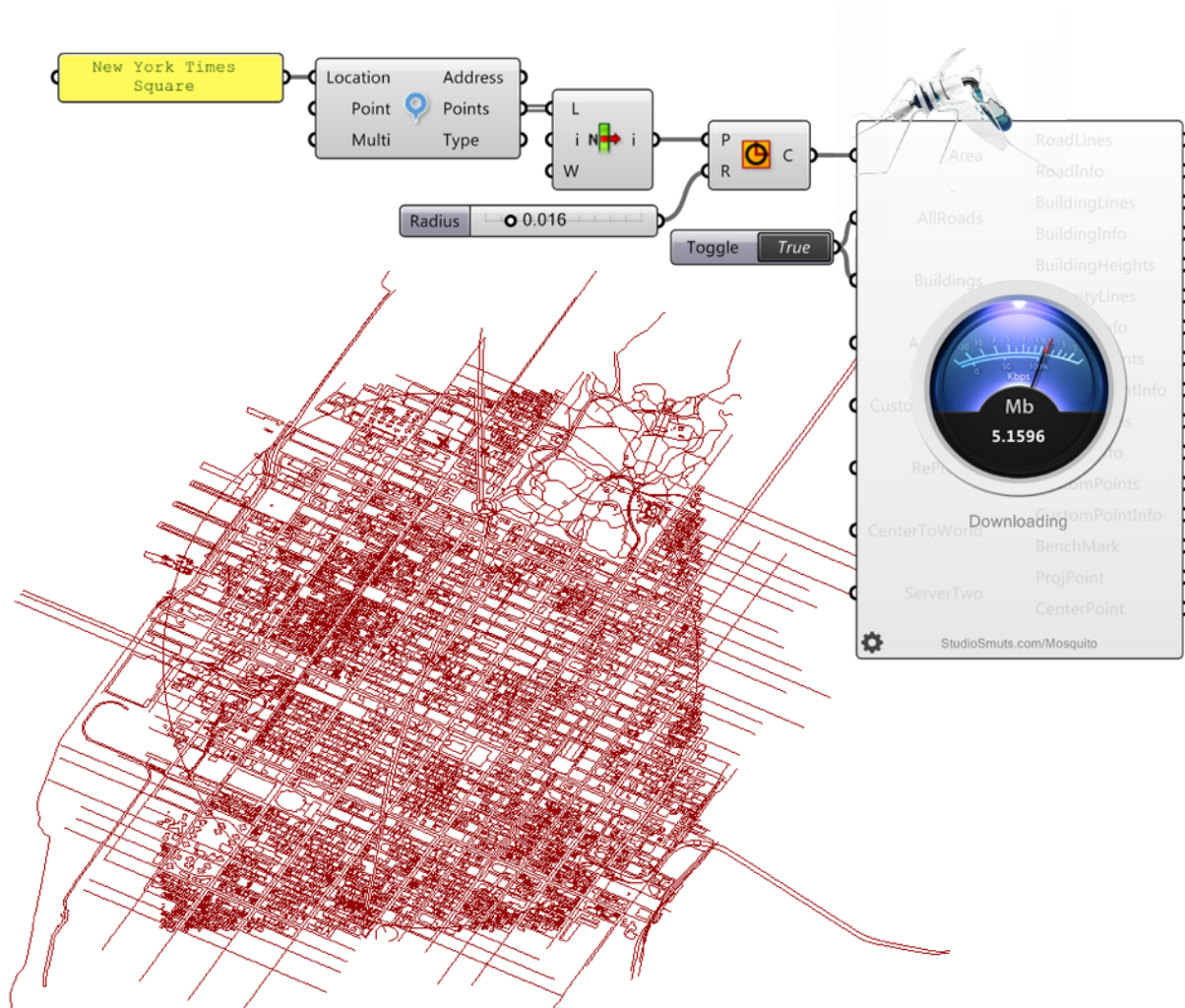
NOTE: Maps contain a lot of geographic information and depending on the bounds and the level of detail we request, downloads can take a couple minutes.

Additional road data:

-Go ahead and plug in a "Boolean Toggle" component into the "All Roads" and "Buildings" input.

-Hit "Reload"

You should now see all the possible roads and buildings in your viewport.



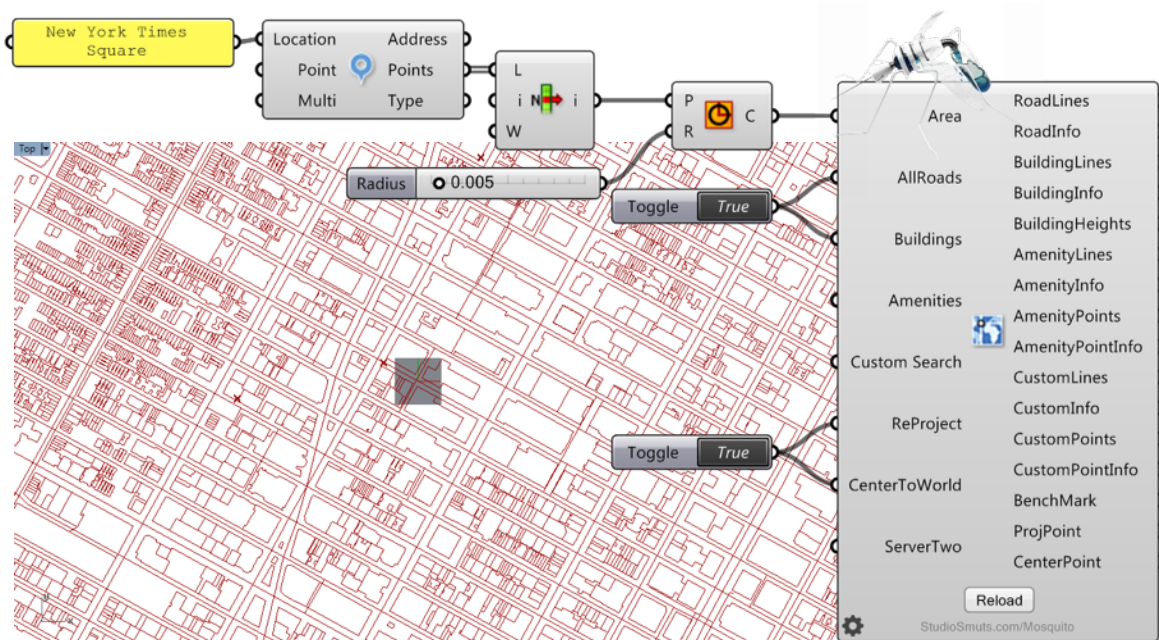
Projecting the plan to Meters

You will notice that the map looks a bit skew or distorted. This is because the data is mapped to Lat/Lon coordinates. Lat/Lon mappings are not a true representation of scale either.

Mosquito Maps has a built in function that will both rescale the information to meters and center the map to your Rhino viewport.

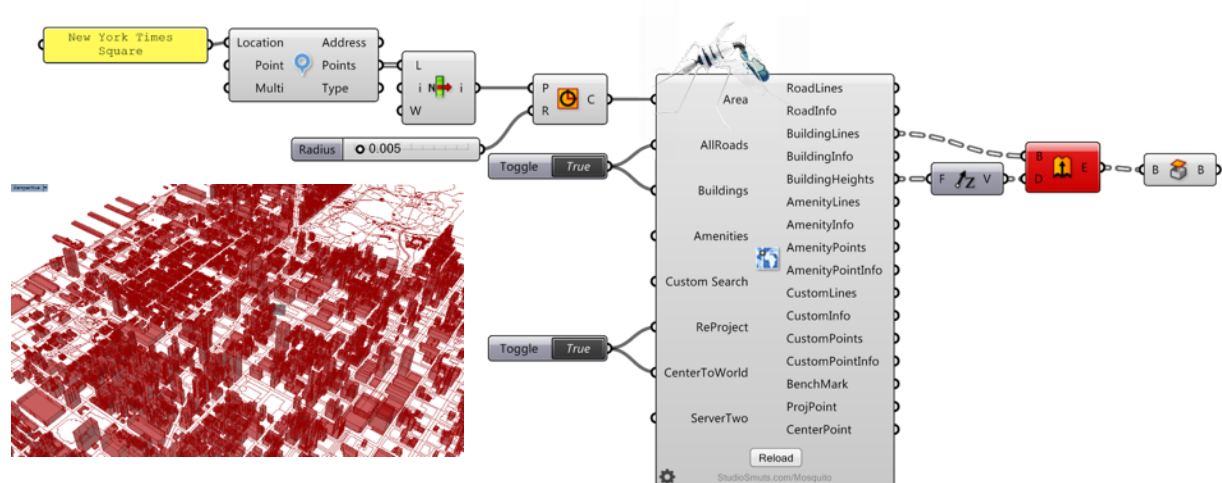
-Attach a "Boolean Toggle" component to the "ReProject". This will rescale the map to meters.

-Attach another or the same "Boolean Toggle" component to the "CenterToWorld". This will reposition the map so that it is centered in the Rhino viewport.



Quick 3D buildings

If you are lucky, buildings will contain height information. Cities such as New York contain almost every height in the building data.



Once baked you should have something similar to the image below.

