

AS323688

## **Optimizing Parametric Parking Lots and Site Layouts with Dynamo and Project Refinery**

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*Axoscape*

### **Learning Objectives**

- Learn to combine Dynamo and Project Refinery to augment your design process.
- Learn about geometry relationships in a parametric system.
- Learn how to use Dynamo points, curves, polygons, surfaces, and solids to represent design components.
- Get ideas on how to approach the site planning and design algorithmically.

### **Description**

Learn how to use parametric models to assist your site planning and design process. This instructional demo is designed to show the audience how to use Dynamo's geometry tools to model site components, such as property lines, parking spots, driving lanes, building footprints, and more. We'll define relationships between components and we'll integrate them into one parametric model, bringing to life a basic site-layout generator. Whether you're looking to improve your design process, think algorithmic, or learn and create or improve your own tool, this session will serve as a foundation to start using parametric models as your design assistant. Also, get ready to stop manually quantifying parking spaces or building areas. Finally, we'll launch Project Refinery to optimize output values that reflect on design, such as parking-space count, building area, or average walking distance from parking space to building.

### **Speaker(s)**

Xavier is a civil engineer interested in applying proven technologies to help the AEC industry. His experience covers mapping and photogrammetry projects, transportation and geotechnical engineering for roadways, and BIM consulting. His passion for technology began from shaping wings on foam and eventually led up to establishing a company in Ecuador to primarily fly UAVs for cadastral projects. In 2015, Xavier joined a Construction Management graduate program at the University of Houston. Currently, he is collaborating with Axoscape, a BIM consulting company where they work to make the AEC industry a better place. Xavier is always eager to learn and share.

## Introduction

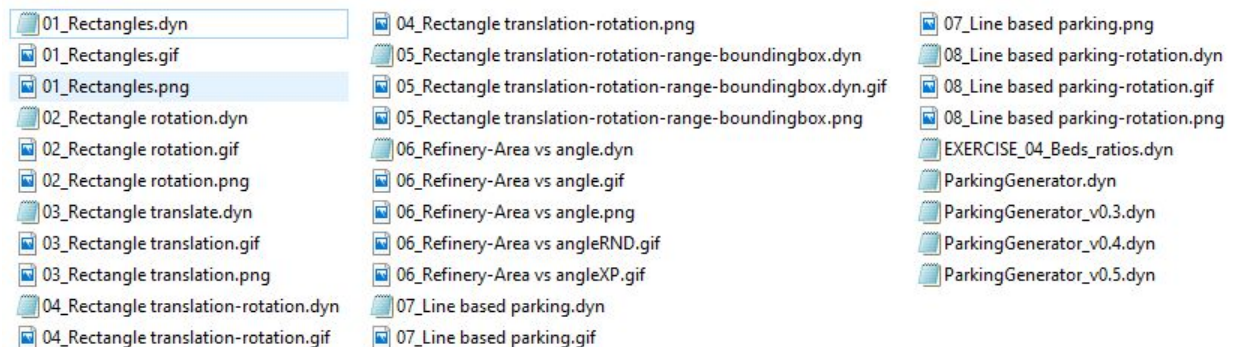
On this educational session, we have selected site analysis as a challenge to create parametric concepts of a preliminary design. Perhaps, we have oversimplify the design considerations to show how to use DynamoBIM and Project Refinery to develop a simple site layout generator.

## Packages Required

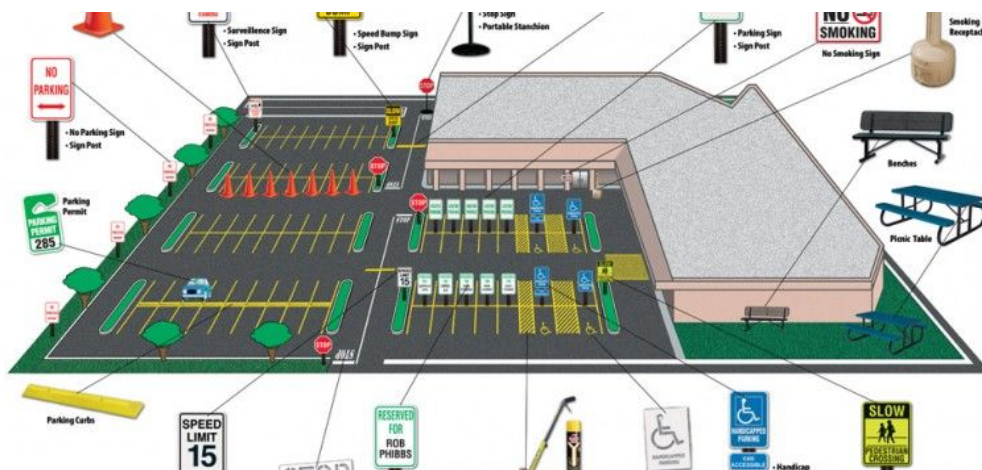
- Refinery
- SpaceAnalysis

## Sample Files

### [DOWNLOAD](#)

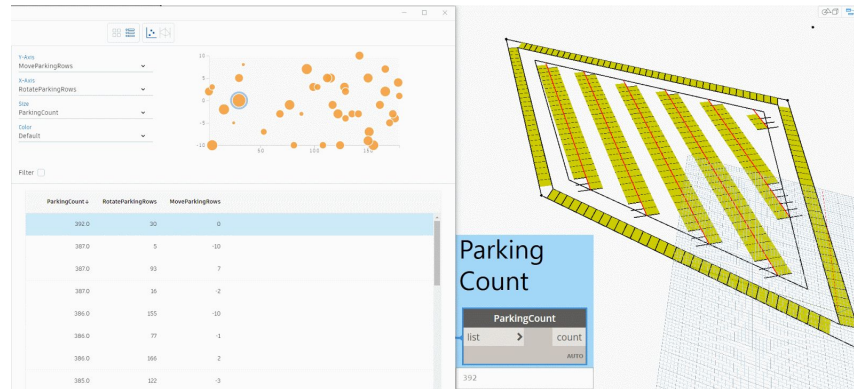


## Site Components



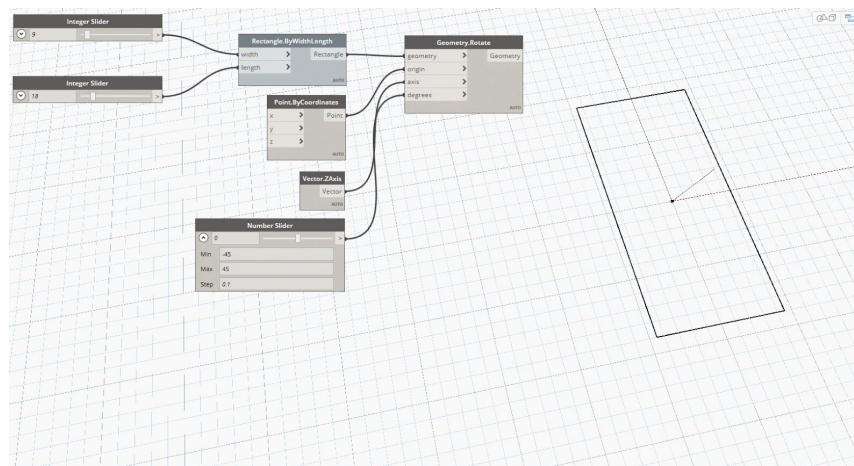
The list of components that we can find in a site is very extensive. For the purpose of this demo, we will use a few of them. We are going to start with a property line as our boundary where we are going to fit the rest of our components including parking stalls, buildings, and circulation elements for pedestrians and vehicles.

## Property Line



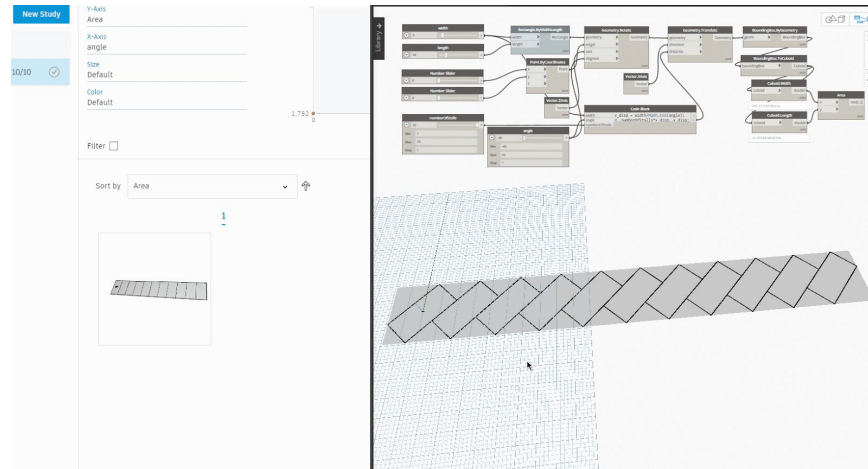
This component depends on the location of the points that represents the vertices of a polygon. We can create this element using an actual property line in Revit or defining the points or a polygon in a form of a Dynamo Geometry.

## Single Parking Stalls

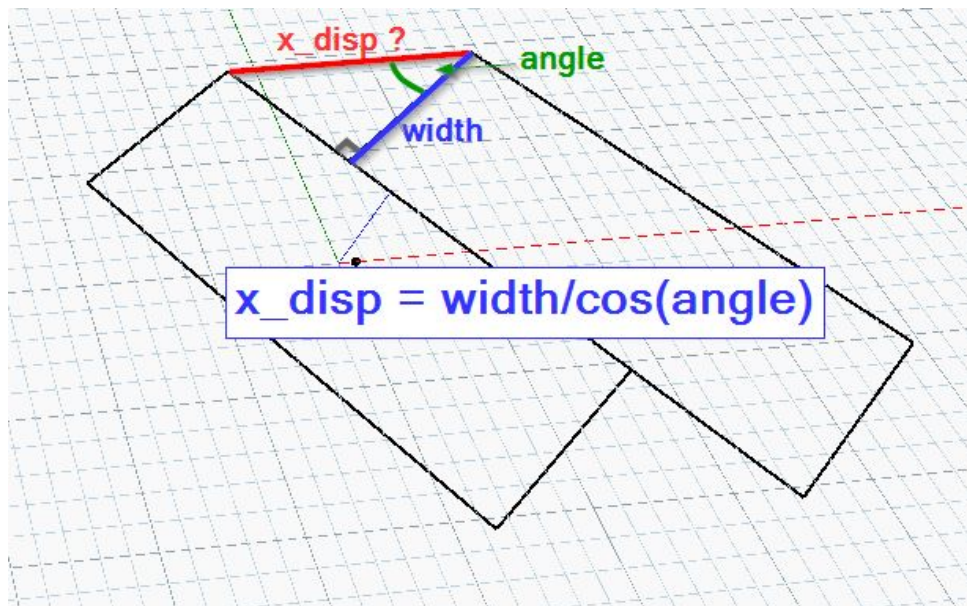


This could be the simplest element in our list. It can be represented as a rectangle based on width and length.

## Parking Strip (Single Sided)

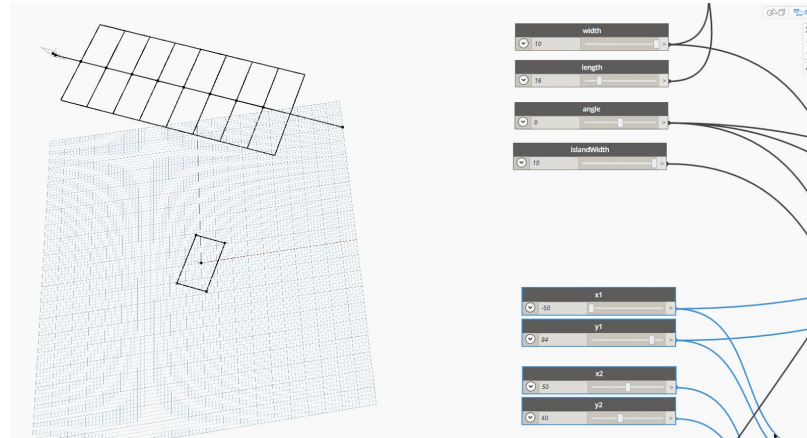


The parking strip has as a base the consecutive single parking stalls that follow a path with a direction and rotation. To calculate the separation of the stalls based on their rotation width and length we have followed this geometry analysis.





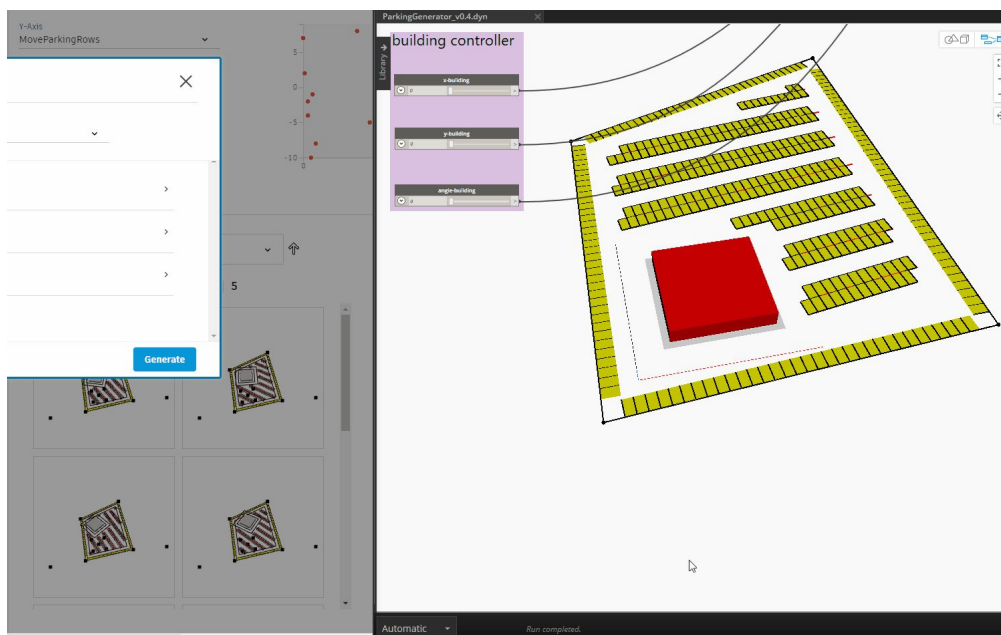
## Parking Strip (Double Sided)



This is a representation in which the parking stalls are mirrored based on the path of the strip. A similar analysis than in the single sided parking strip is calculated to offset the parking stalls from the centerline of the path in the double sided parking strip.

### The Goal

Once we have set up our parametric system, we use Refinery to explore options. For example, we could optimize for an output that gives us the maximum parking capacity.



**Bonus: Testing on a web application**

