



Parametric design and Optimization

Assignment 5
Phuong Quan Trinh

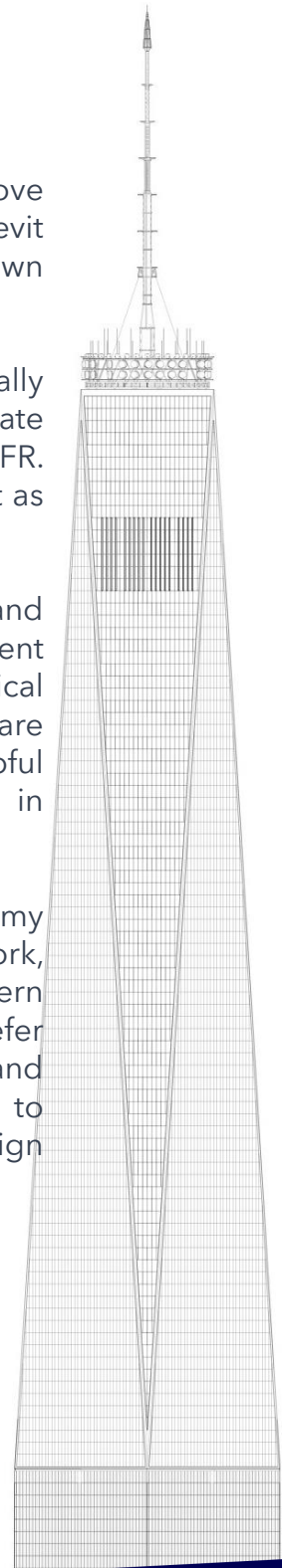
Background

This was an interesting and effective method that will prove useful for future work. In my opinion, an advantage of Revit over Rhino is its BIM platform that comes with its own parametric design tools.

The massing study often takes a lot of time, especially when we need to regenerate several options and create schedules to calculate GFD, volume, façade area, and GFR. Actually, I don't like the massing tool in Revit as it is not as intuitive as Sketchup.

However, with this power tool from Dynamo, I understand why the Revit massing tool takes a completely different approach to generating massing, due to its radical parametric design. All parameters and information are controlled and can be altered later, which is super helpful compared to line and polygon-based modelling in Sketchup.

In this assignment, I tried to recreate the massing of my favorite building, the One World Trade Center in New York, design by SOM, with its simple yet beautiful and modern design. The export tool is new to me, and I needed to refer to several examples and watch video clips to understand how it works. I think I need more time practicing this to remember all the formulas and plugins used in the design development.

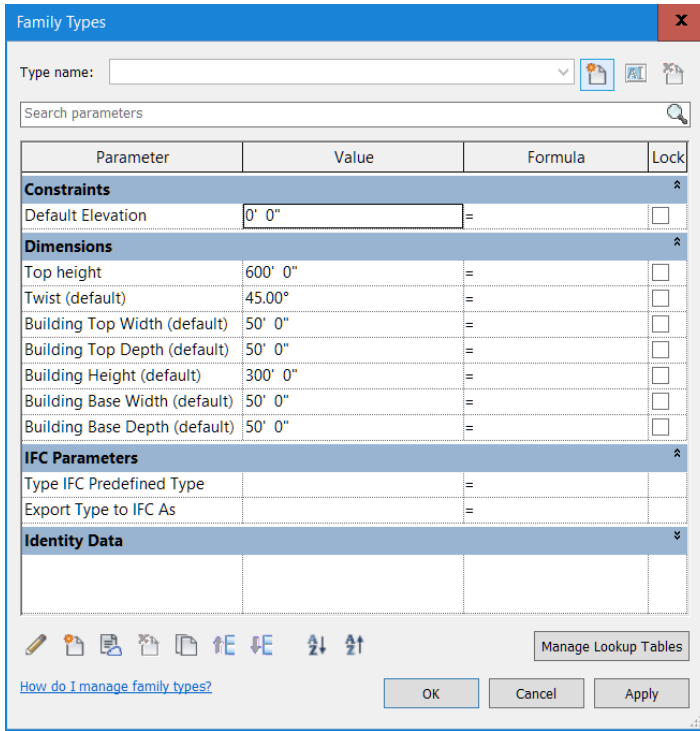


An aerial, high-angle photograph of a dense urban skyline, likely New York City. The image shows a variety of skyscrapers and buildings of different heights and architectural styles. A prominent red rectangular box is overlaid on the left side of the image, containing the text "Site location" in white. The background shows a mix of concrete, glass, and brick buildings, with some greenery visible in the lower right quadrant. The lighting suggests a bright, sunny day.

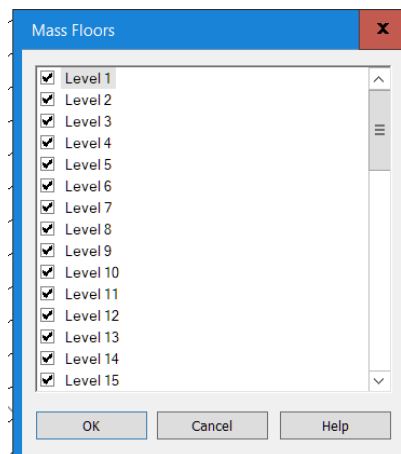
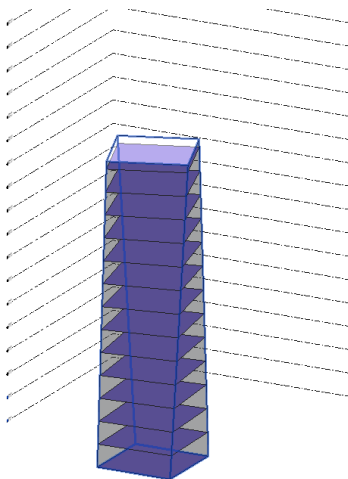
Site location

Part 1

Following the instruction, I chose the Twisting Rectangular Mass and added more 50 floors into the Revit file. Top height parameter is added to control the building mass height

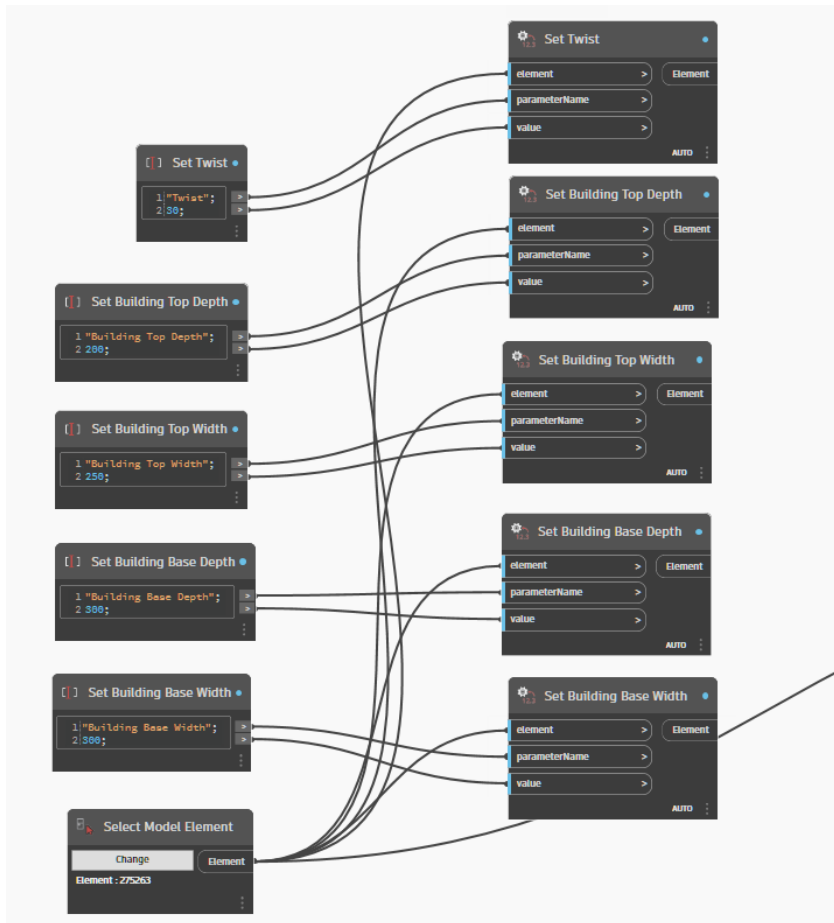


Each floor height is 15' and I used the array tool to copy it, and regenerate the Mass floor to create 50 floors

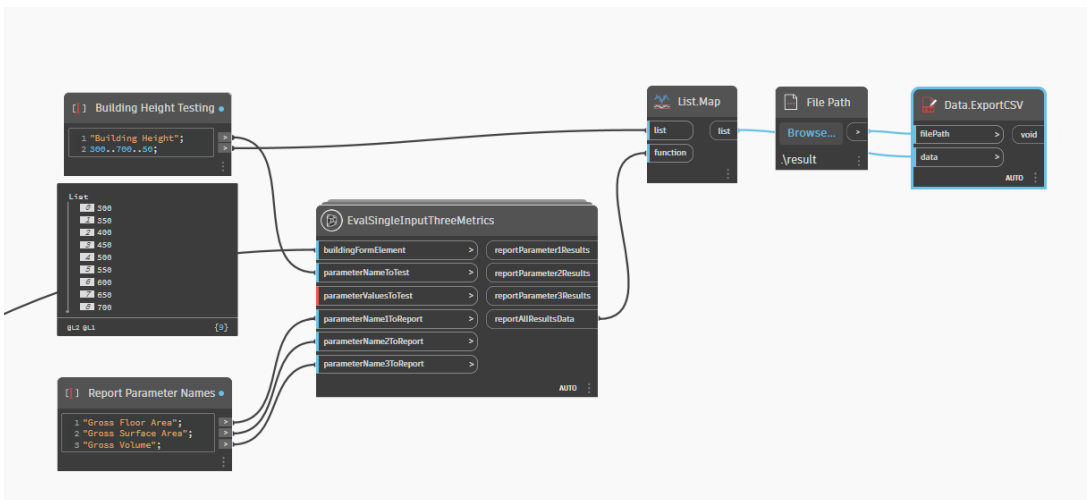


Part 1

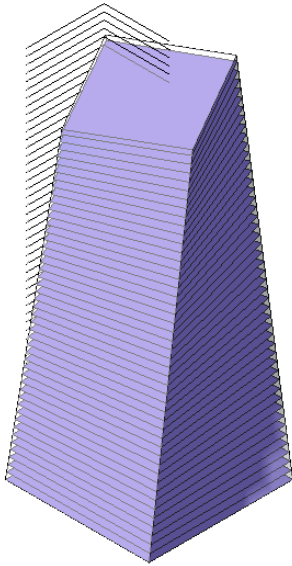
Variable to control the building mass (Base Width, Base Depth, Top Width, Top Depth) and Twist angle



Several building height testing from 300ft - 700 ft, step 100 ft



Part 1



The CSV file is exported with 7 options as below, following these parameter extracted from the model which include "Building Height", "Gross Floor Area"; "Gross Surface Area"; "Gross Volume". Unit in Ft and Ft2

See also [CSV to HTML Table](#) and [HTML Table to CSV](#)

Step 1: Select your input

Option 1 - Choose a CSV/Excel file result Encoding

Option 2 - Enter an URL

Option 3 - paste into Grid below

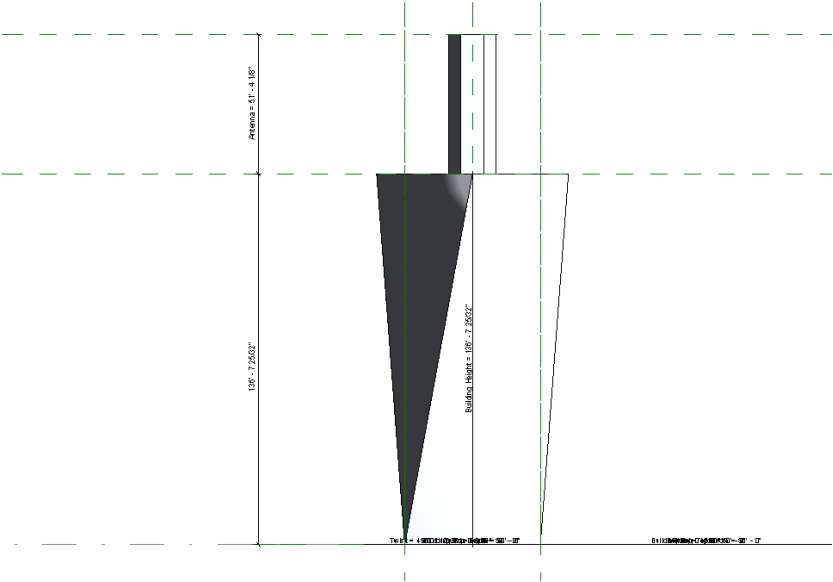
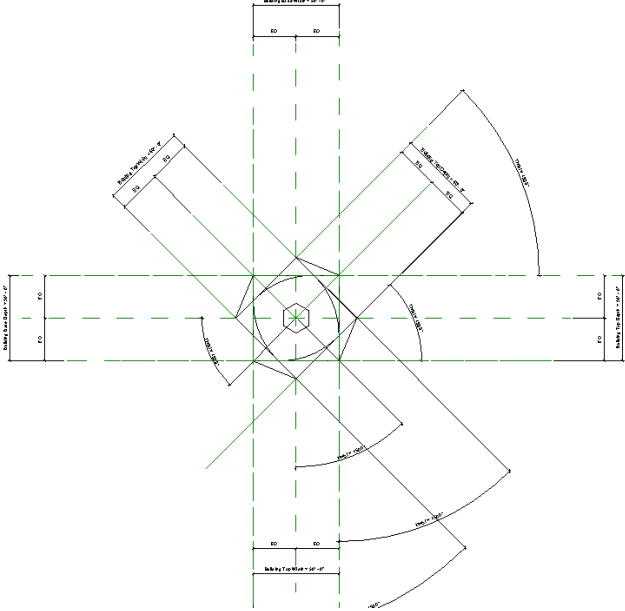
Step 2: Choose input options (optional) ▾

Save Your result: .csv or .xlsx EOL: Include Header

	A	B	C	D
1	300	1343237.15312371	453364.530213976	19845671.4755449
2	350	1597130.47991949	503955.926706308	23153283.3881358
3	400	1800941.51787878	554726.145356511	26460895.3007266
4	450	2004695.40627939	605618.015303231	29768507.2133174
5	500	2258579.49616054	656596.24044982	33076119.1259082
6	550	2462405.13967127	707637.904456945	36383731.0384991
7	600	2666185.72411632	758727.50462179	39691342.9510899
8	650	2920062.33472972	809854.189672688	42998954.8636807
9	700	3123893.97140204	861010.142789671	46306566.7762715
10				

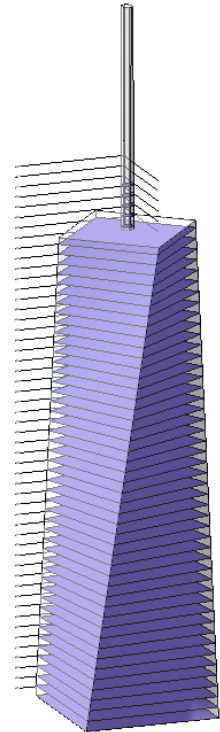
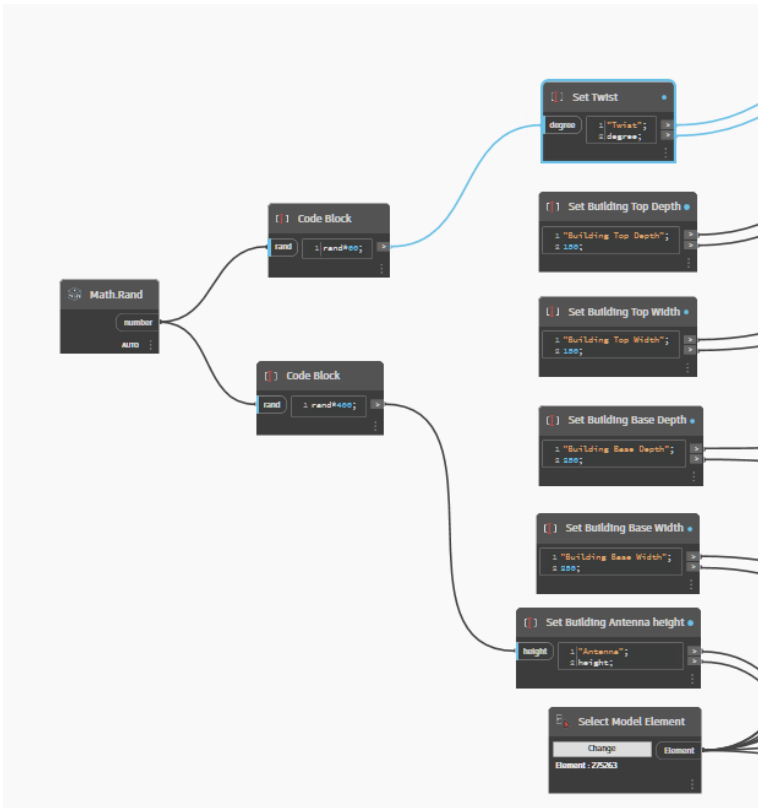
Part 2

In this part, I edited the massing family, added another level and set it as Antenna height. This will help to control another Antenna extrusion from the top of the Architectural part.

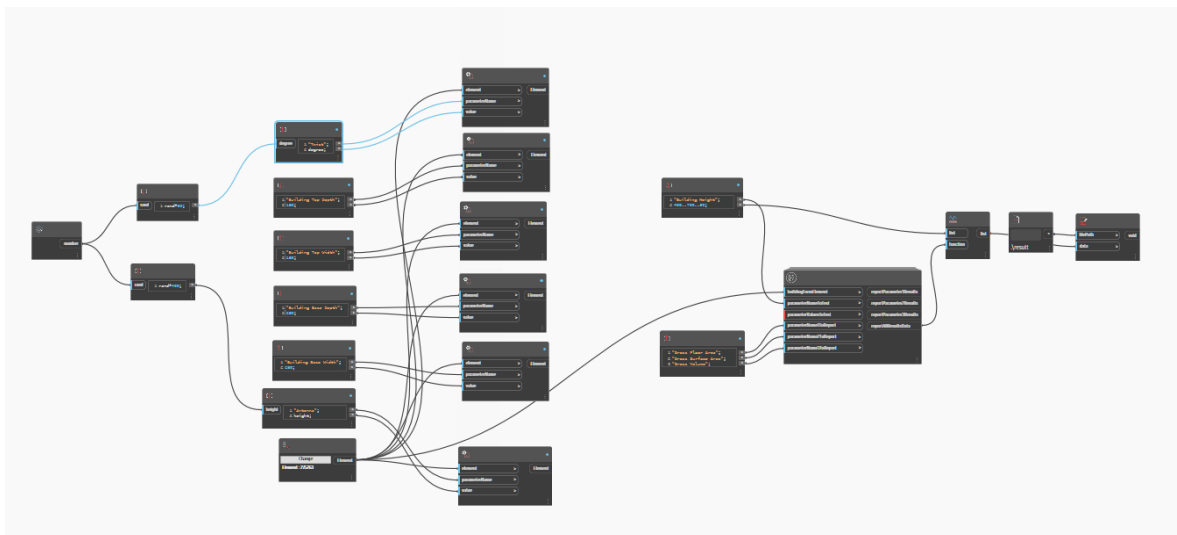


Part 2

I drew inspiration from the One World Trade Center, aiming to create a structure with a comparable building mass and impressive antenna. To add some variability, I incorporated a randomizing element to determine the building's height and antenna size, ensuring proportionality and randomness.



Overall Dynamo script



Step 1: Select your input

Option 1 - Choose a CSV/Excel file result1 Encoding

Option 2 - Enter an URL

Option 3 - paste into Grid below

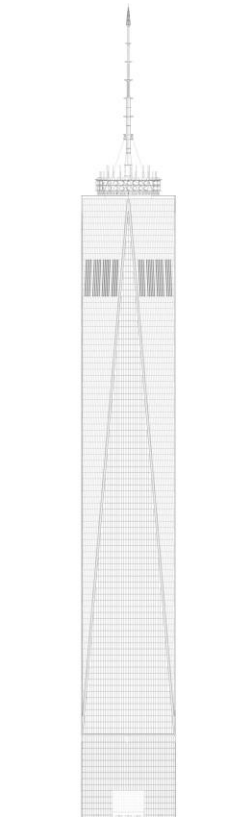
Step 2: Choose input options (optional) ▾

Save Your result: .csv or .xlsx EOL: Include Header

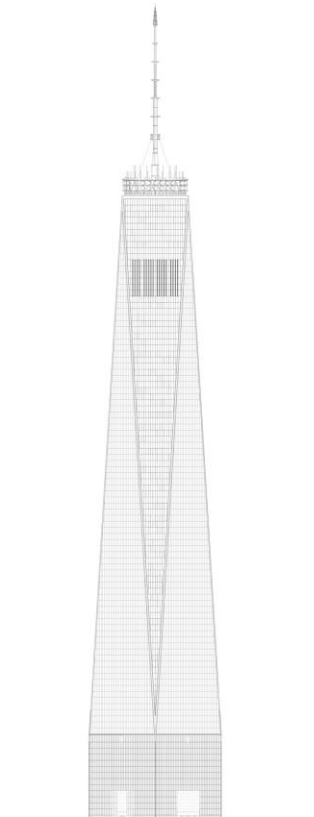
	A	B	C	D
1	200	526743.558029625	262062.791260124	7368383.36023087
2	250	640896.099546795	298115.164907516	9194558.50509012
3	300	755052.15086596	334890.989600439	11020733.6499494
4	350	891773.373039337	371560.220817825	12846908.7948086
5	400	1005985.33360959	408643.518006169	14673083.9396678
6	450	1120187.57155276	445866.592403392	16499259.0845271
7	500	1256146.89970712	483189.366990289	18325434.2293863
8	550	1369791.11117624	520585.640776692	20151609.3742456
9	600	1483425.87361687	558037.59841424	21977784.5191048
10	650	1619391.14742916	595532.721617224	23803959.6639641
11	700	1733042.09682226	633061.965685284	25630134.8088233
12				

One World Trade Center

"QUAN" World Trade Center



SOUTH ELEVATION



SOUTHWEST ELEVATION

