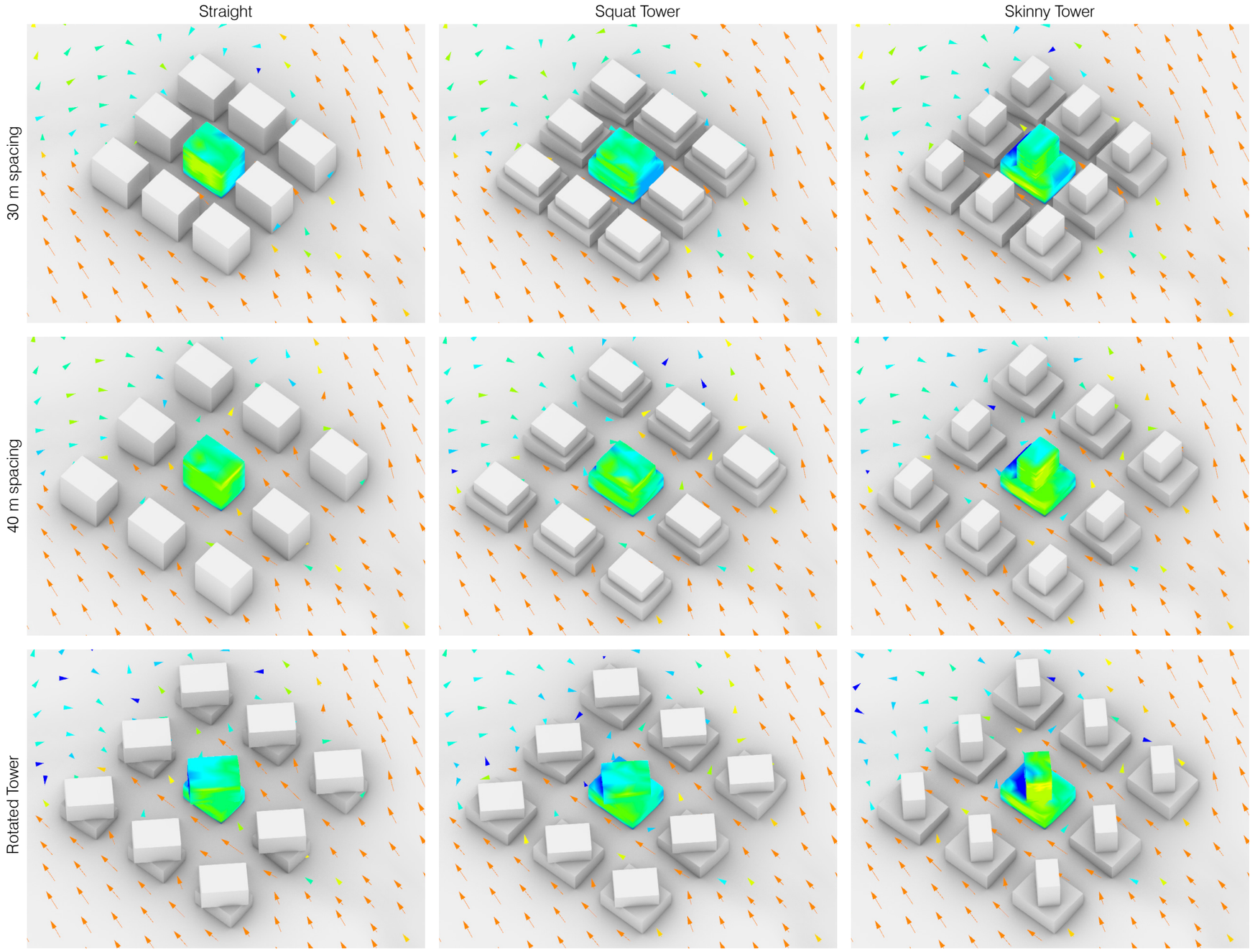


TROPICAL DISTRICT MASTERPLAN

Flat Site

Introduction

Given the site's tropical hot, humid climate, the district must rely on natural ventilation to conserve building energy and reduce urban heat island. Therefore, mutilple variations of a cluster of nine prototypical buildings were tested to understand the best block and building configurations for the larger district.

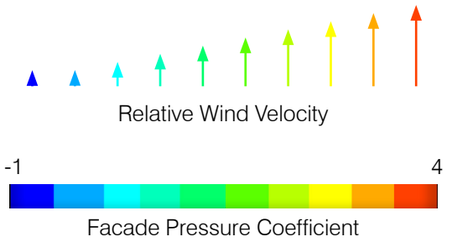
Variables:

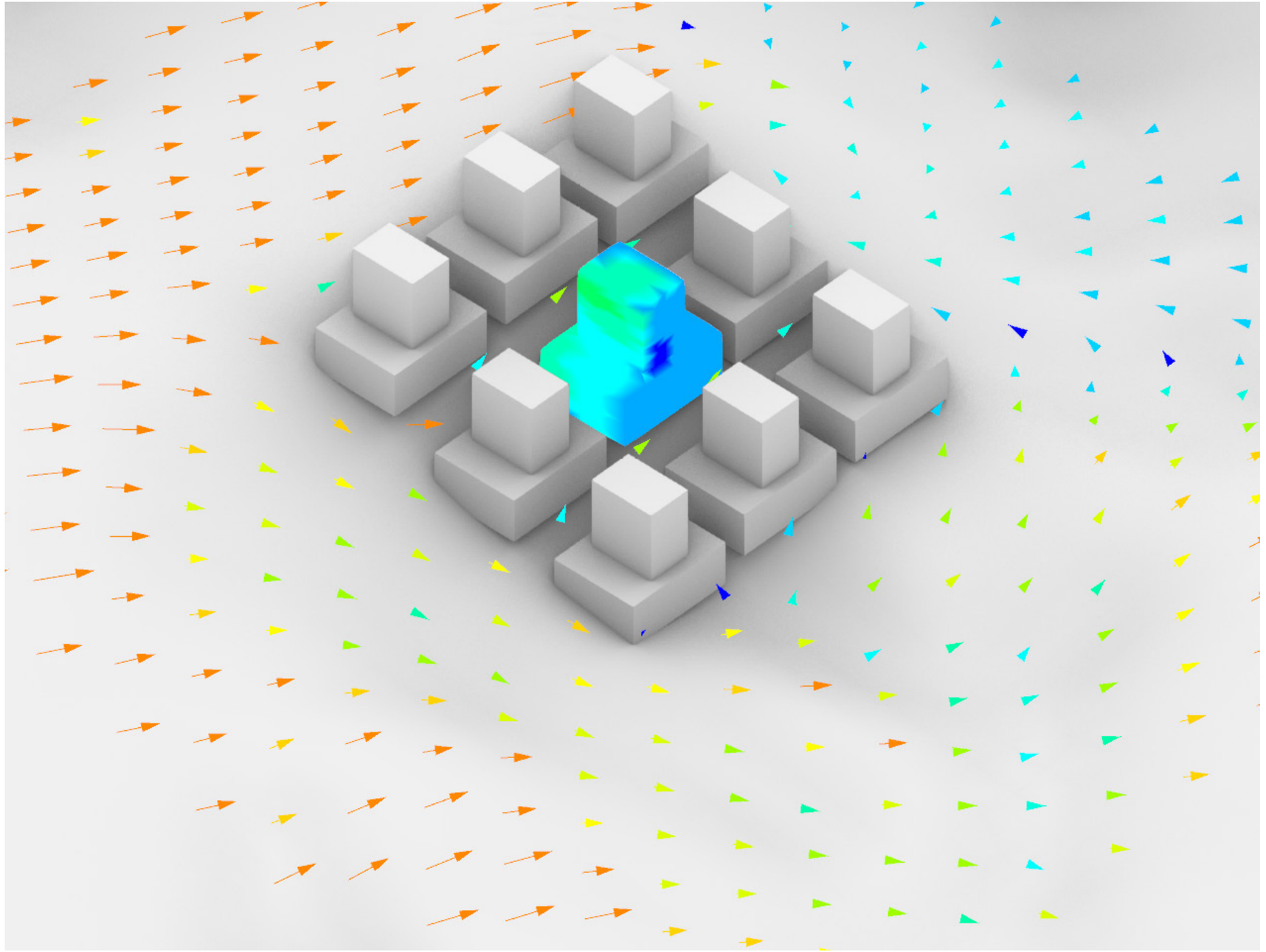
- Tower Profile
- Tower Spacing
- Tower Rotation
- Site Topography

Results

Larger 40 m spacing increases ground wind velocities and facade pressures, the skinny tower profile produces the highest facade pressure deltas at the upper stories, a rotated tower has little effect on facade pressures but slows ground velocities.

Legend





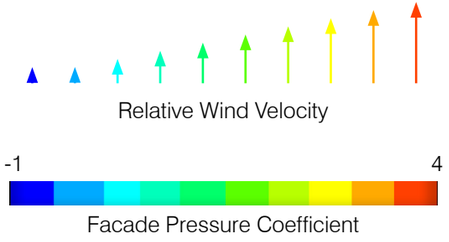
TROPICAL DISTRICT MASTERPLAN

Leeward Site

Results

A leeward (wind-protected) hill site produces inadequate ground wind velocities and facade pressure deltas for natural ventilation in this climate.

Legend

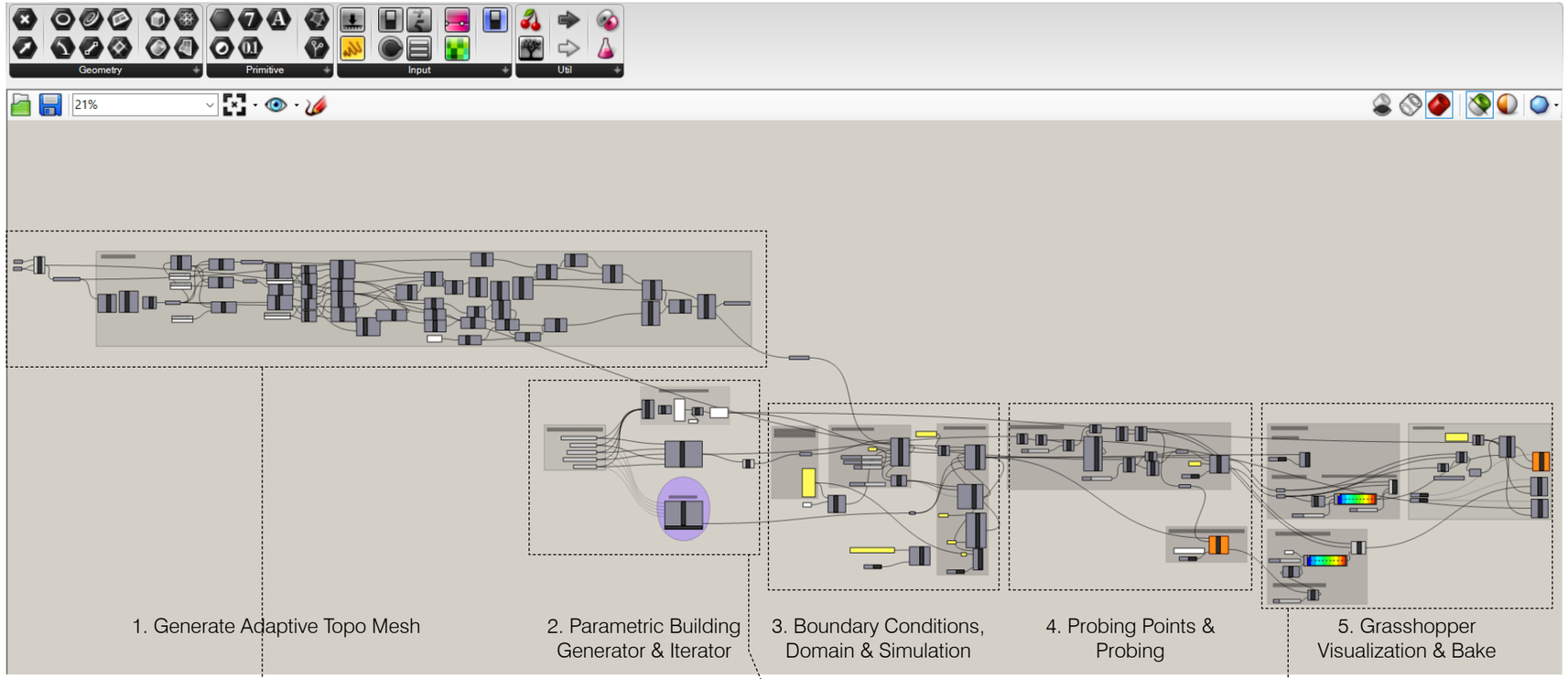


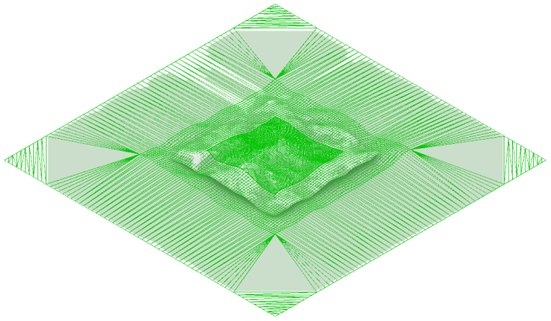
TROPICAL DISTRICT MASTERPLAN

Workflow

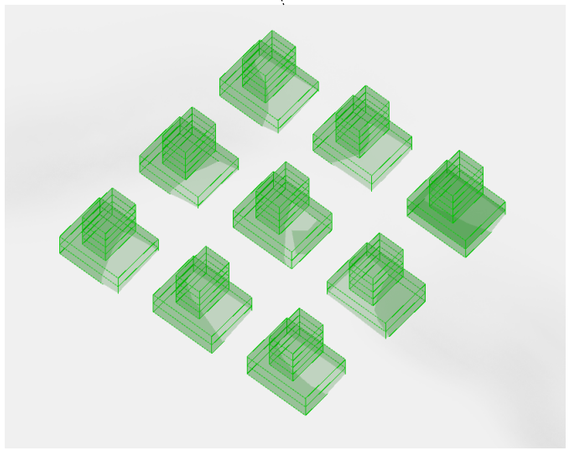
To efficiently simulate several iterations of a cluster of buildings, a special Grasshopper workflow was developed. Notably, this workflow:

1. Generates an adaptive mesh for the site's topography to speed up simulation times,
2. Parametrically generates the building geometries and utilizes the Colibri Iterator (TT Toolbox component) to sequentially generate and simulate every iteration,
3. Uses a modified Eddy Annual Wind Analysis template,
4. Probes points near the ground surface and along the center building massing facade
5. Visualizes wind vectors and facade pressures in Grasshopper and bakes the results.

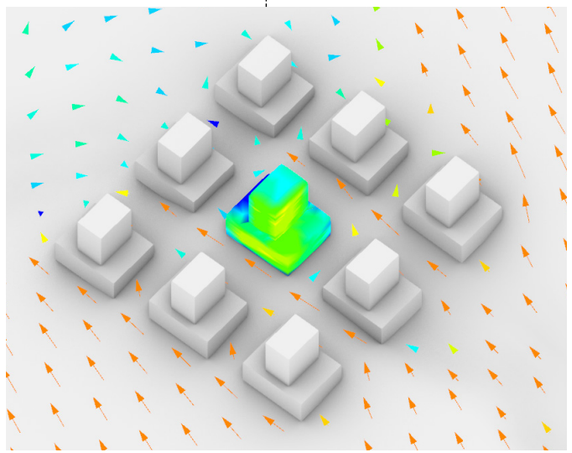




Adaptive Topo Mesh



Parametrically Generated Massings



Baked Results