oscillare

Future Building Category
Advancing Net ZERO Ideas Competition

DESIGN STATEMENT

In Hong Kong, high population result in dense building development and traffic congestion affecting millions of citizens daily life. Similar cases are found around the globe including China, Asia region countries and EU countries. Local government including planning departments proposed green building with minimal carbon footprint to promote the idea of sustainable living. We proposed an idea of green energy generate based on Hong Kong local climate and the building typology found in general site context. We apply the idea in the site of the competition.

We use passive building design, building response to climate in order to minimize the energy consumption. The high-rise in Hong Kong is a challenge to promote green building and net zero concept. The challenge came from the overlapped floors for efficiency which increase the heat gain in day time especially in hot summer season in local tropical climate and the heat lose in chilling season in the winter. We propose a façade that gather the natural energy (wind) to minimize the energy consumption in the commercial tower.

Building Seperation lower district air quality

Hong Kong is suffering from the Urban Heat Island effect. Our urban areas are significantly warmer than the rural surroundings. As a result, the number of very hot days has increased dramatically. This leads to uncomfortable urban living, heat stress and related health problems, and increase in energy consumption. All in all, this has resulted in poorer living quality.

A Vision of HK Island East

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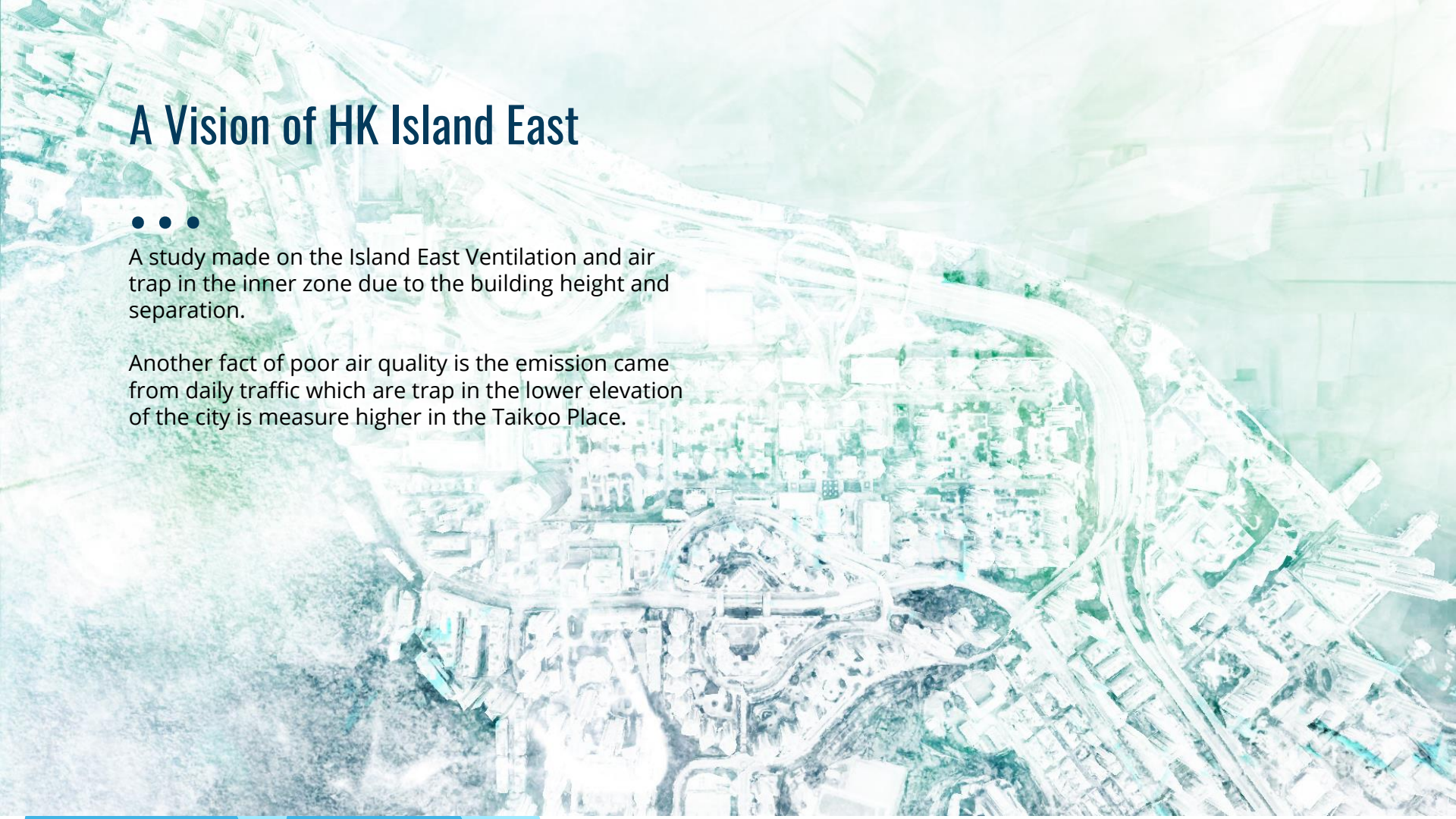
A study made on the Island East Ventilation and air trap in the inner zone due to the building height and separation.

Another fact of poor air quality is the emission came from daily traffic which are trap in the lower elevation of the city is measure higher in the Taikoo Place.



A Vision of HK Island East

Data measured 107-269 tonne of SO2 record in Hong Kong Island East district (Highest) fig.1. Data suggest the density and congestion happen in average of daily Hong Kong.

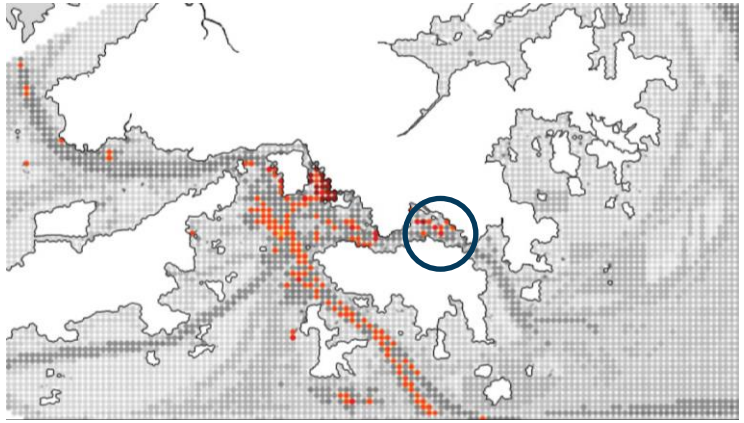


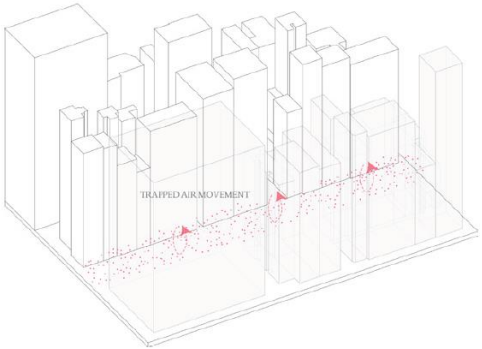
Fig.1 – SO2 emission in Hong Kon. Source: S. Ng, et. al. (2012)

		2016	2017	2018	2019	2020	Compare to 2019
PM2.5	General	22	22	20	19	15	-21%
	Roadside	26	26	25	25	19	-24%
PM10	General	34	35	33	32	27	-16%
	Roadside	38	39	39	38	32	-16%
NO2	General	47	40	39	38	33	-13%
	Roadside	82	86	82	80	70	-13%
O3	General	39	51	52	60	52	-13%
	Roadside	19	23	24	32	32	0%

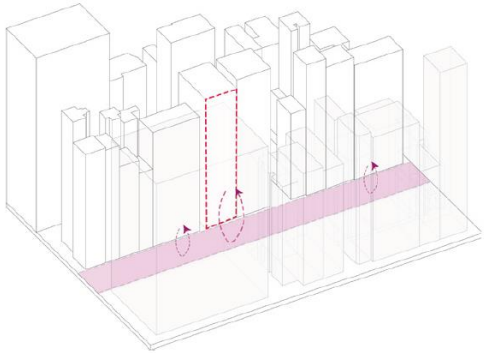
Fig.2 – NO2 and Ozone at High Level despite of improved Air Quality
Source: Hongkongcan.com

A Vision of HK Island East

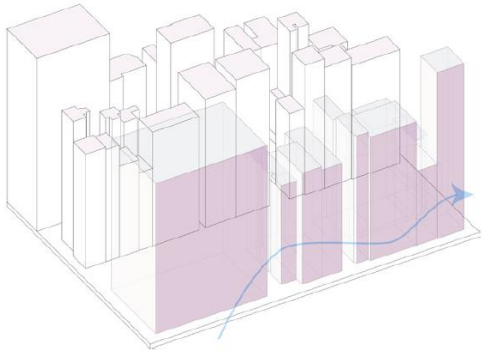
Below are the diagrams indicate possible consequences due to inadequate building separation.



Trapped air movement from traffic congestion



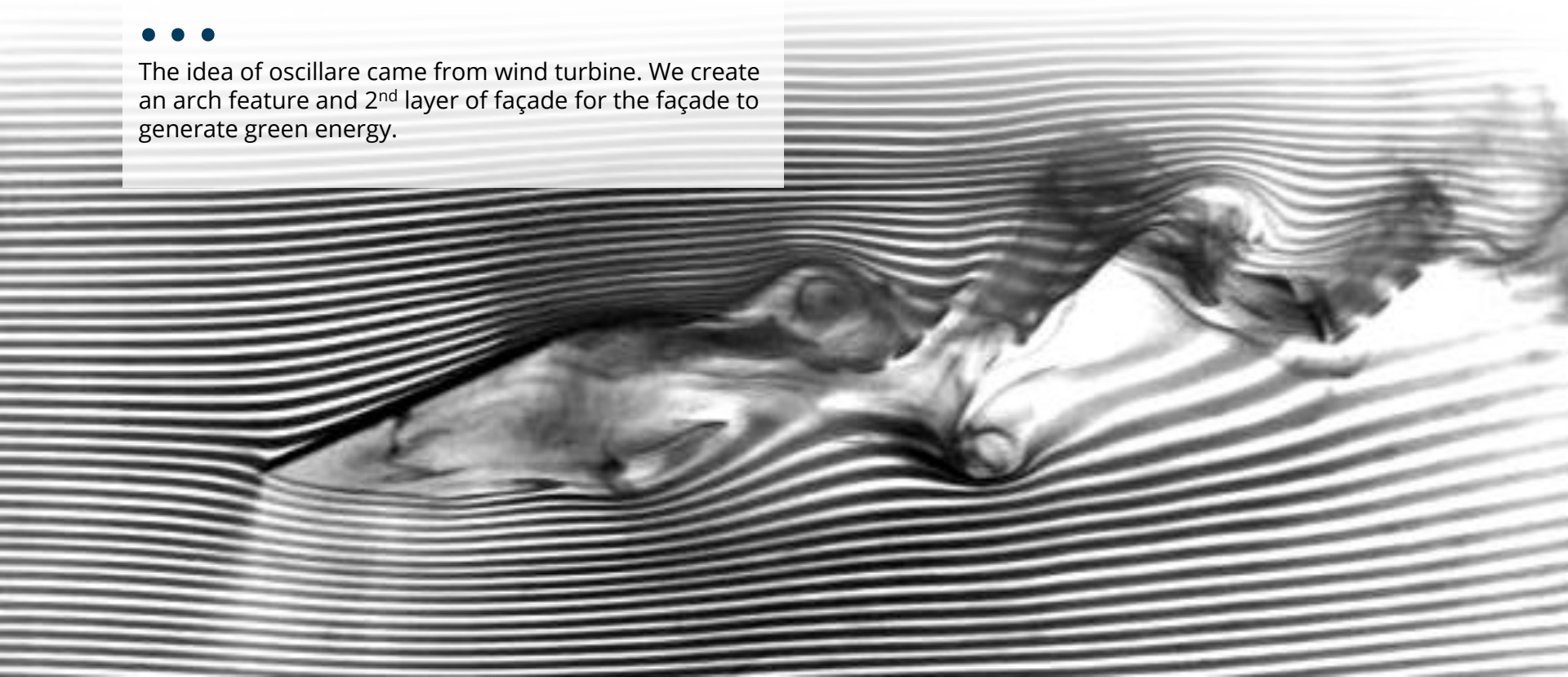
Lack of building set back from the site boundary causing canyon effect.



Uniform building height causing urban screening effect.

01. concept

The idea of oscillare came from wind turbine. We create an arch feature and 2nd layer of façade for the façade to generate green energy.



TRADITIONAL WIND FARM

Wind turbines are manufactured in a wide range of sizes, with either horizontal or vertical axes. It is estimated that hundreds of thousands of large turbines, in installations known as wind farms, now generate over 650 gigawatts of power. They are an increasingly important source of intermittent renewable energy, and are used in many countries to lower energy costs and reduce reliance on fossil fuels.

Types of existing wind turbine

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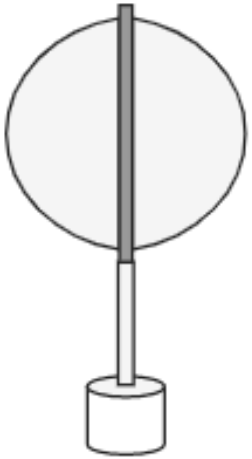
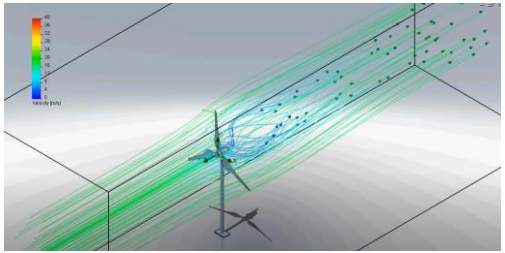


Darrieus

Savonius

* Hawt

H-Rotor



* Hawt type traditional wind turbine CFD Analysis

Oscillation

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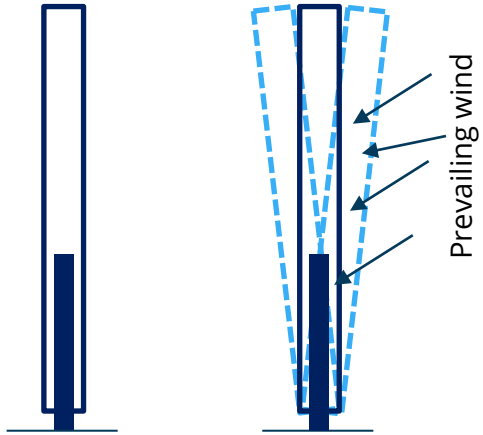
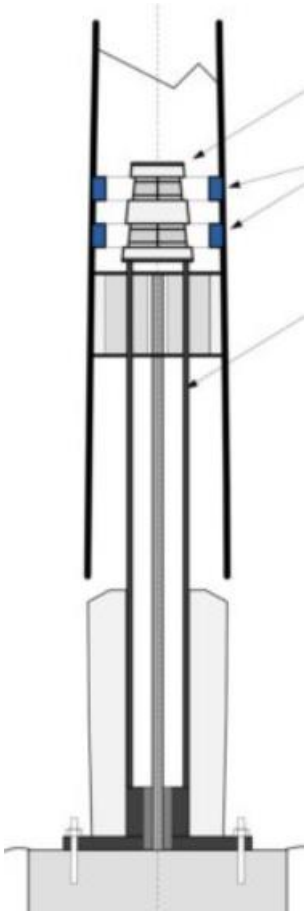
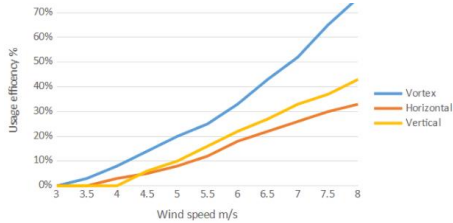


wind rod

electricity through oscillation



Detail
(Source: Vortex Bladeless)



Low/zero carbon technologies

An unconventional wind turbine which deliberately maximize shedding, converting wind energy to fluttering of light-weight vertical pole, then captures that energy with a generator at the bottom of the pole.

The unusual shape comes with a fiberglass and carbon fiber mast oscillates in the wind taking advantage of the shedding effect. A carbon fiber rod sits at the bottom of the mast and its movement inside a linear alternator generates the electricity.

The device look similar to a reed gently swaying in the wind, the new technology wind-driven generator can produces electricity with vert few moving parts, which maximize the efficiency and lower the maintenance. The device is deliberately designed to have no parts in contact at all.

Oscillare

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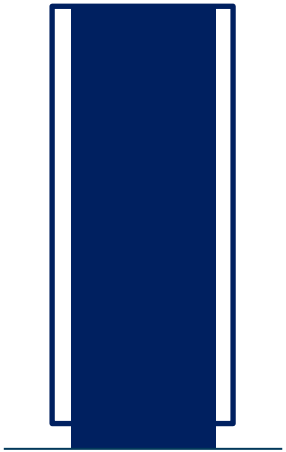
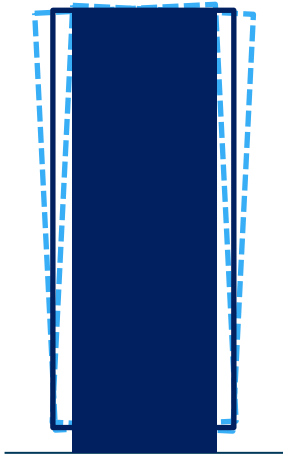
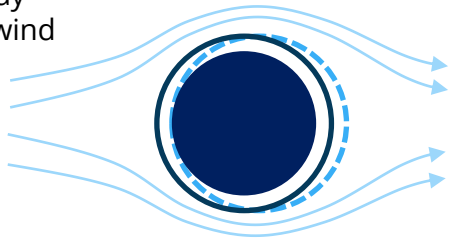


2nd layer facade

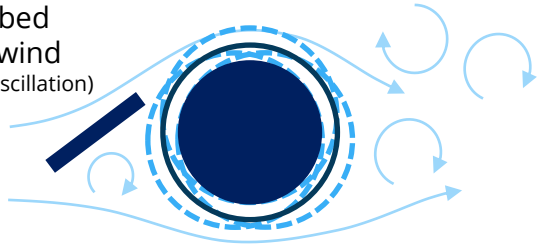


Detached façade
act as wind turbine

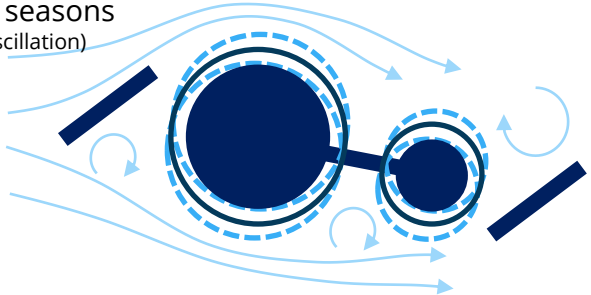
01 – one way
prevailing wind
(No oscillation)



02 – disturbed
prevailing wind
(inconsistent oscillation)



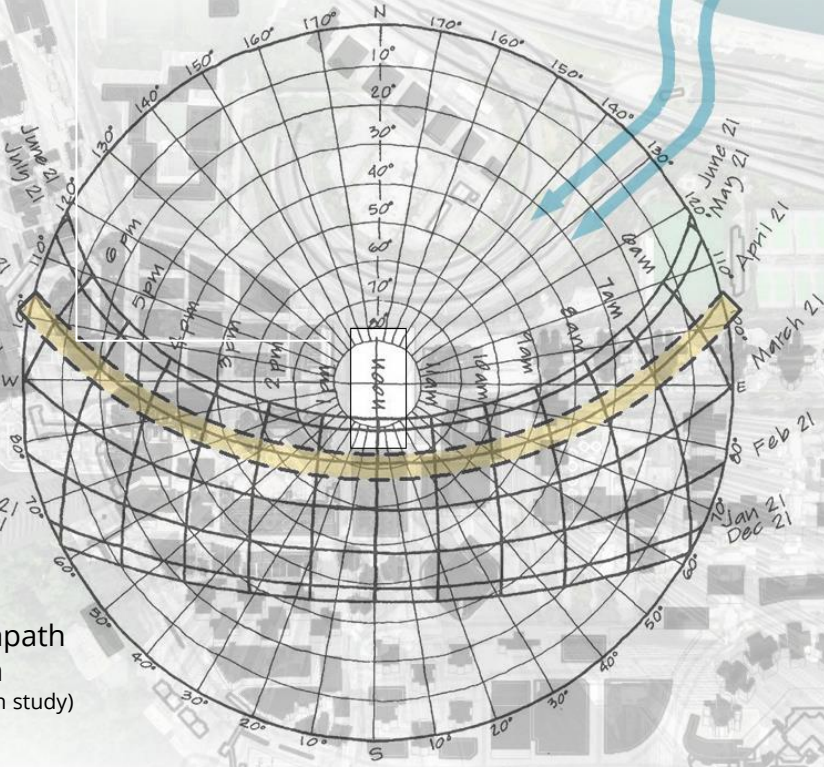
03 – dual direction to
cater vary seasons
(Consistent oscillation)



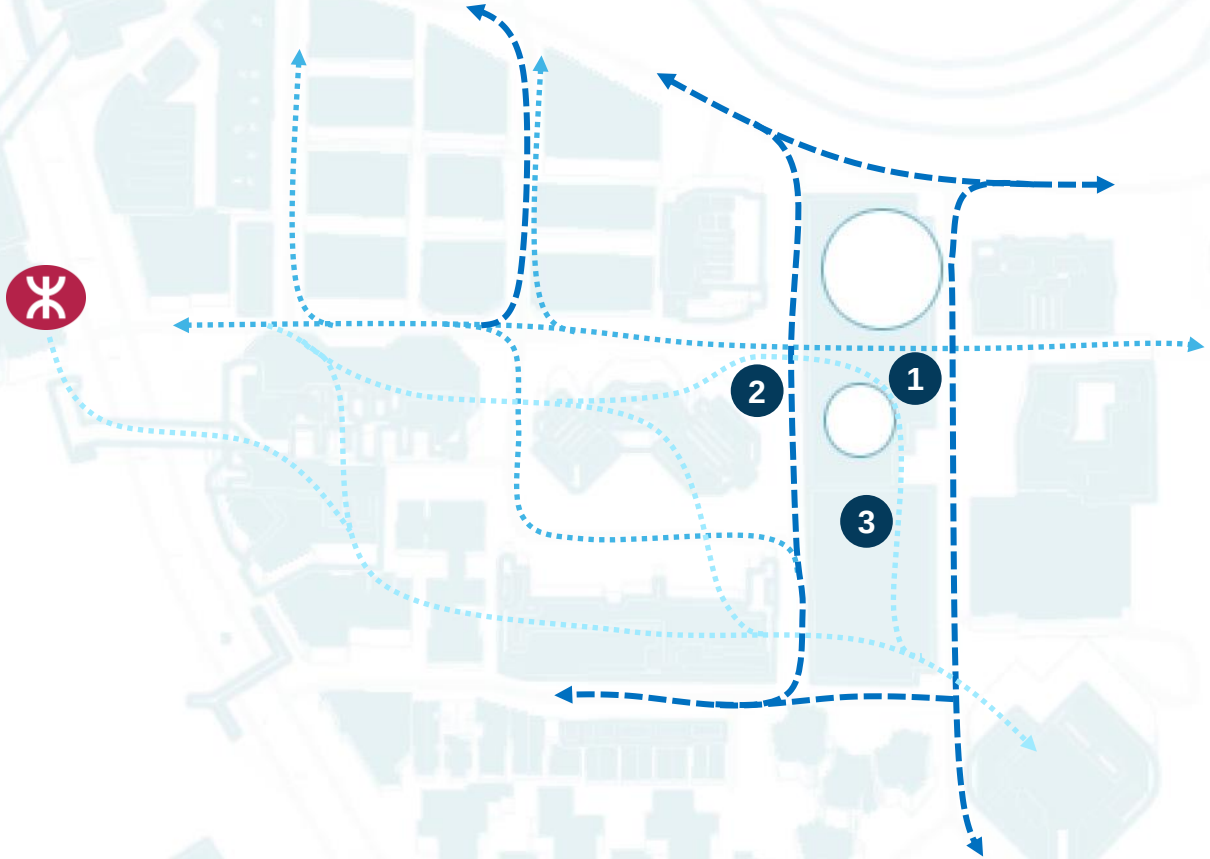
02. Site plan

1 : 1500

01 – summer prevailing wind



02 – sunpath diagram
(orientation study)



Legend:

- Pedestrian Walkway
- Elevated Walkway
- Vehicle Driveway

1. Proposed circulation on Ground level through site, hence dual oscillation towers.
2. Open Piazza facing the main pedestrian walk path.
3. Proposed elevated walkway to connect existing Dorset House and Taikoo Place.

Elevation

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OIE

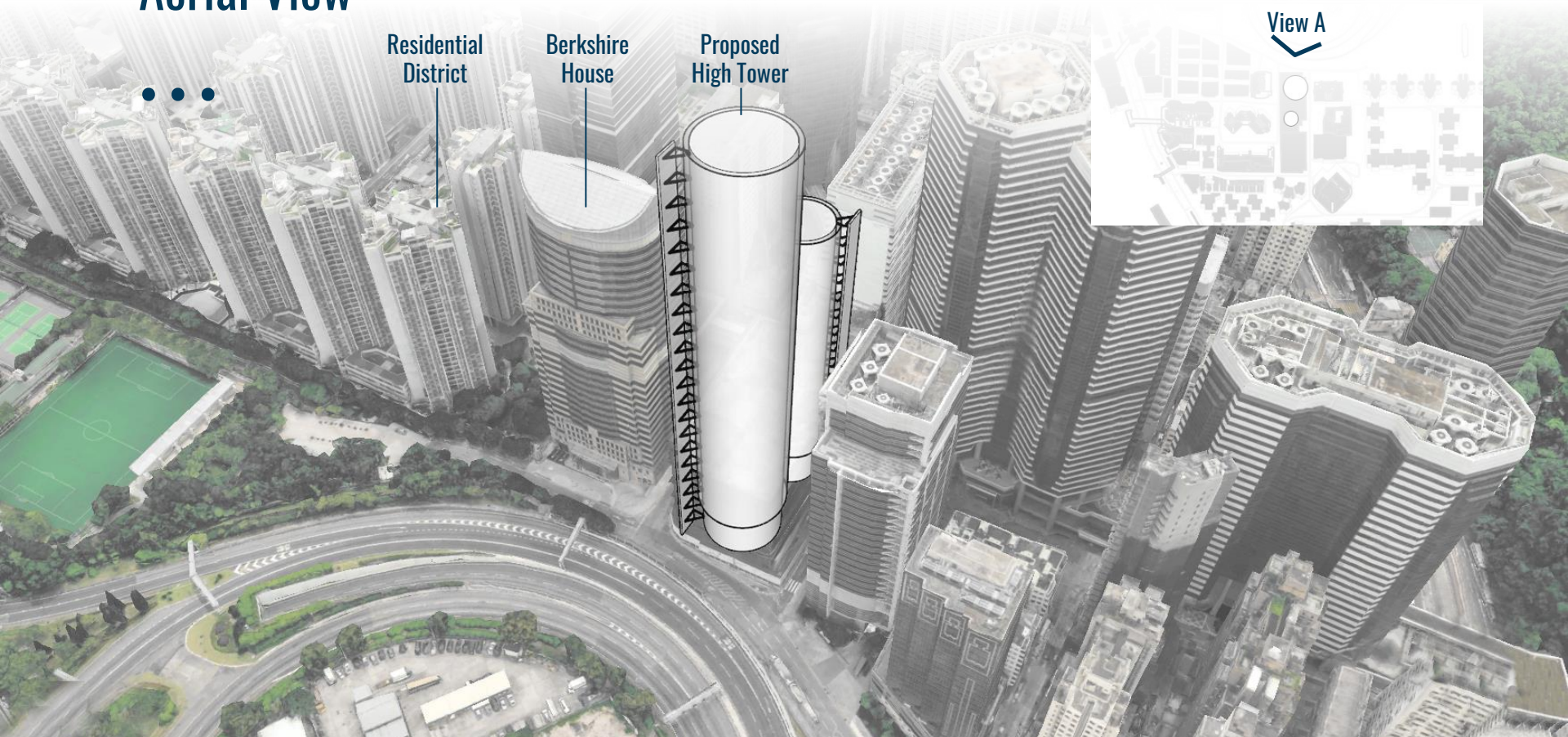
Residential District

Proposed High Tower

MTR (Quarry Bay Station)

Siu Ma Mountain

Aerial View

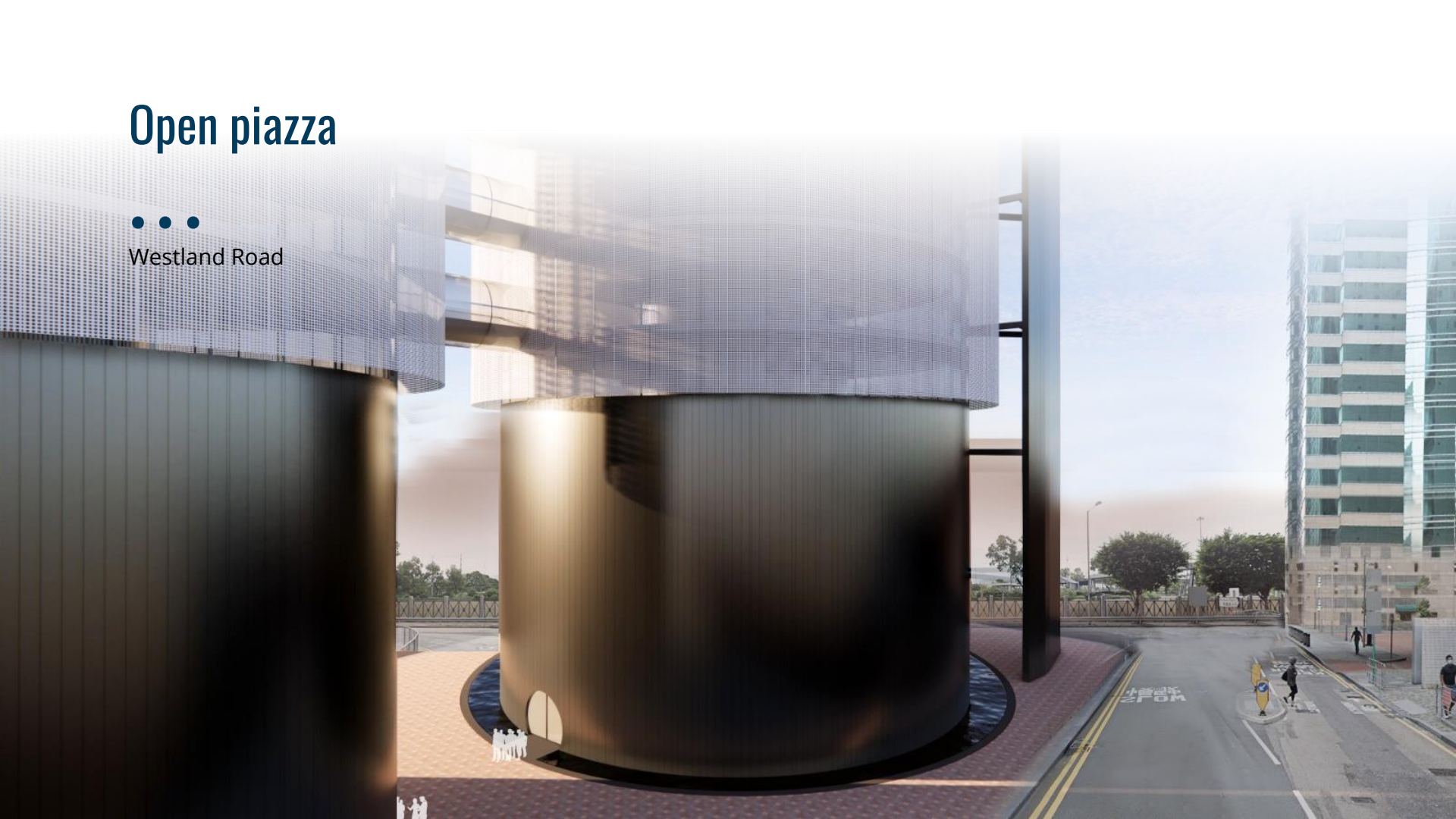

Residential District
Berkshire House
Proposed High Tower
View A

Street View

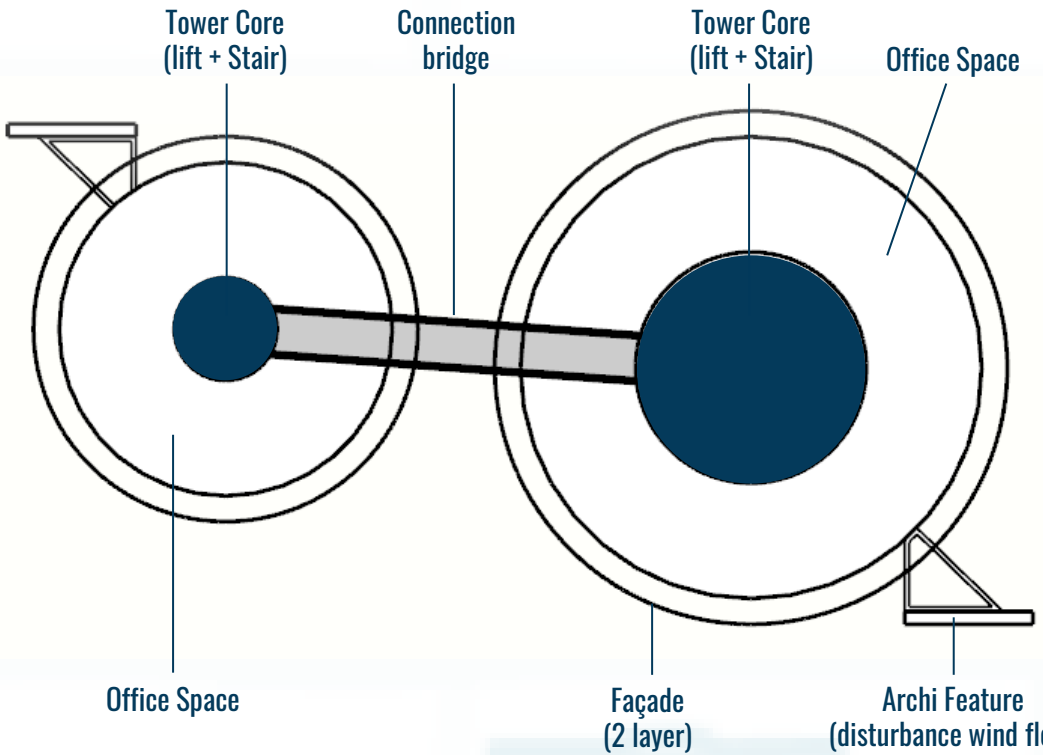
Westland Road & Hoi Tat Street

Open piazza

Westland Road



Layout Plan


Tower Core
(lift + Stair)
Connection
bridge
Tower Core
(lift + Stair)
Office Space
HOI TAT STREET
WESTLAND ROAD
Office Space
Façade
(2 layer)
Archi Feature
(disturbance wind flow)

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THANKS!