

Self-Driving City & Parking Management



Challenges of Self-driving Cars

1. 誰會擁有自駕車？ **私有** / 私人車隊 / 公有

2. 如何使用自駕車？ **自用** / 租借 / 共享

3. 如何影響交通量？ 道路暢通 / 道路阻塞

4. 如何行駛和存放？ 規律移動 / 隨機載客 / **停車選擇**

5. 如何影響都市空間？ 道路規劃 / **停靠空間設置** / 停車場設計



Outline

**Data
Visualization**

**Data
Analysis**

Proposal

Self-Driving Car



Tesla Model X

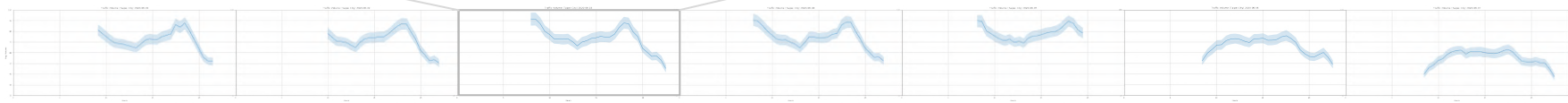
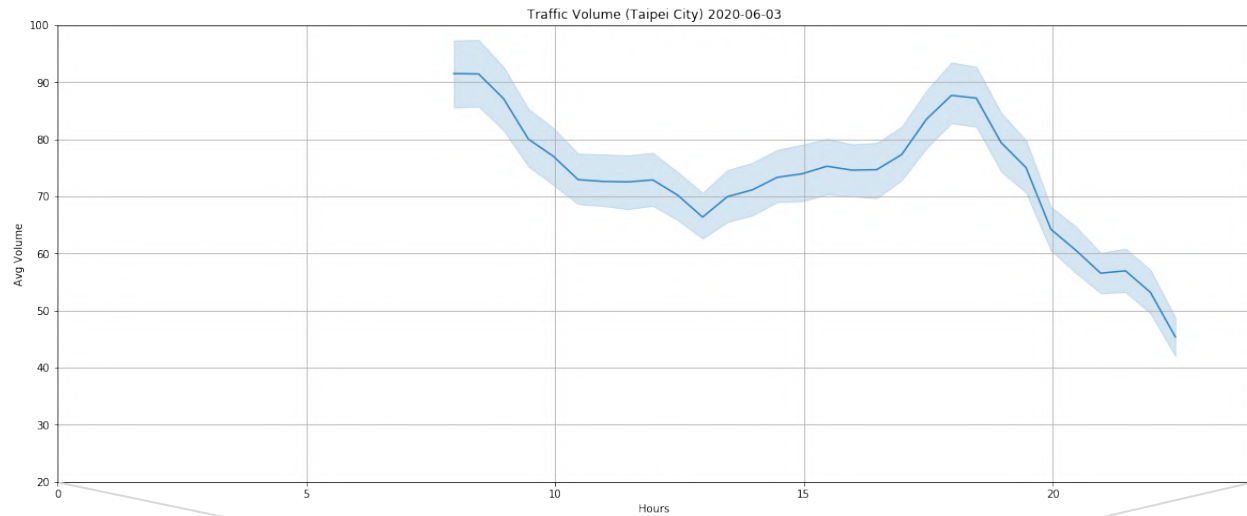
Self-Driving Car



Toyota E-palette

Traffic Volume

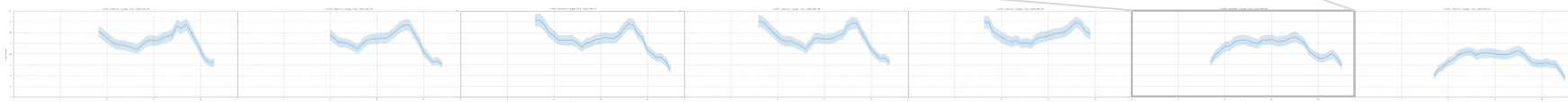
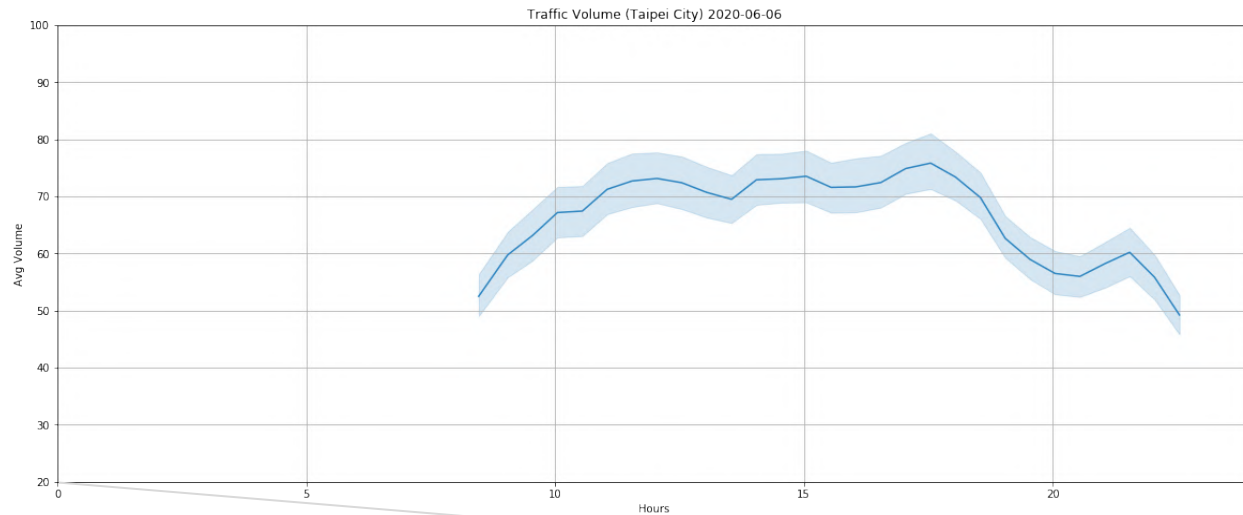
Weekdays of Taipei City



Wed.

Traffic Volume

Weekend of Taipei City

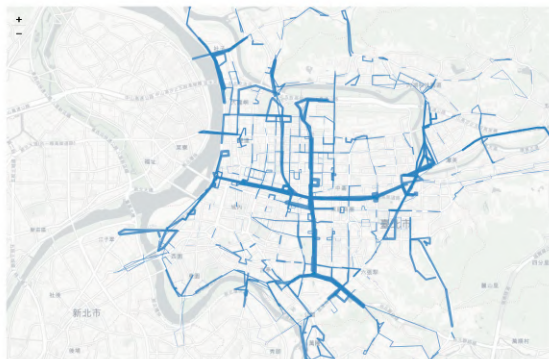


Sat .

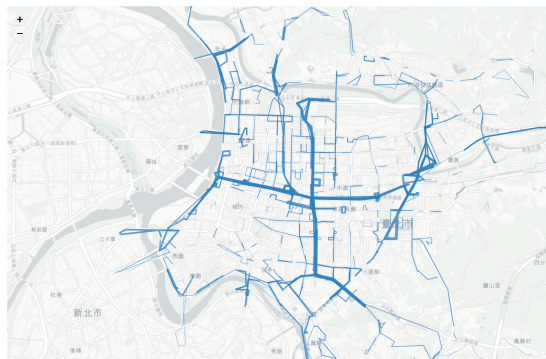
Traffic Volume

Mapping of the Traffic

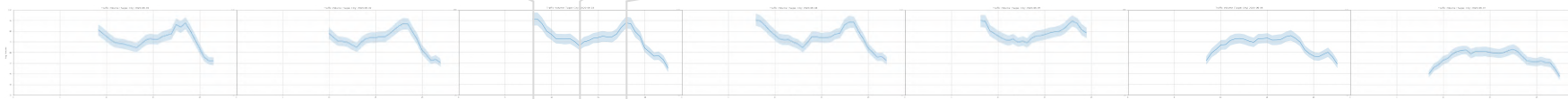
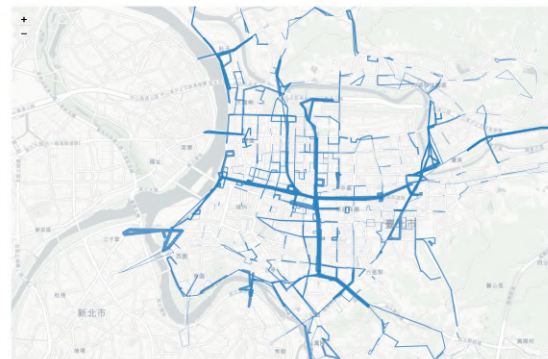
2020-06-03 08:00



2020-06-03 13:00



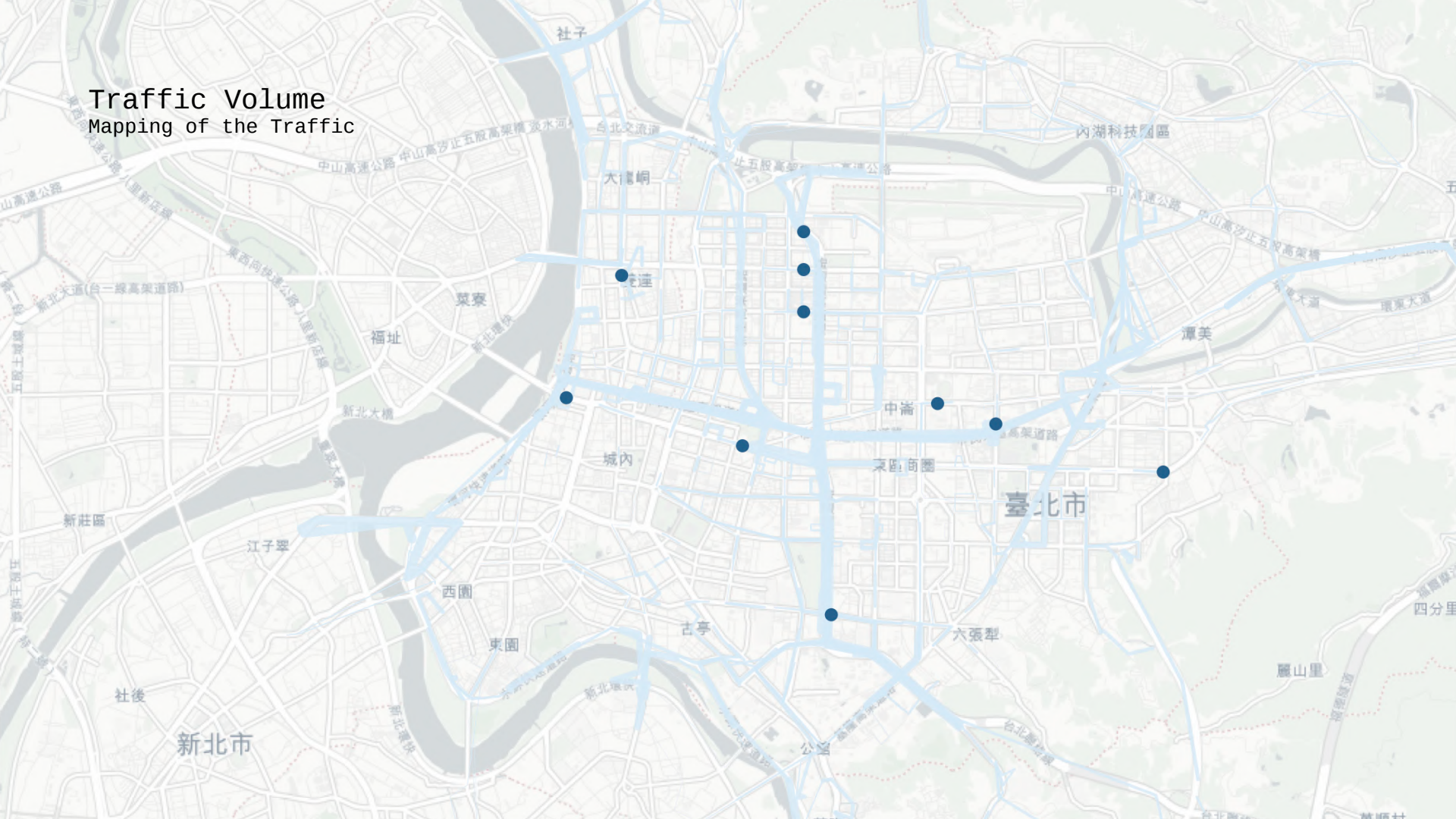
2020-06-03 18:00



Wed.

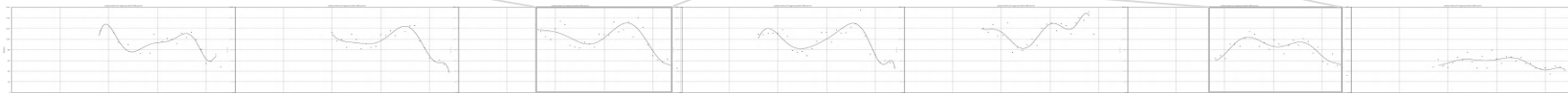
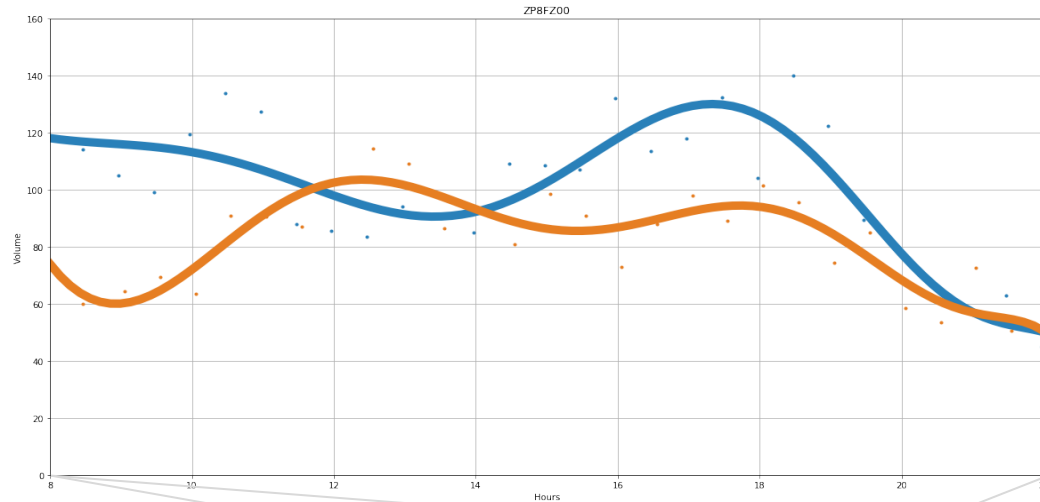
Traffic Volume

Mapping of the Traffic



Traffic Volume

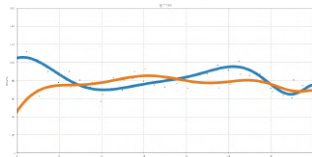
Comparison of Weekdays and Weekend



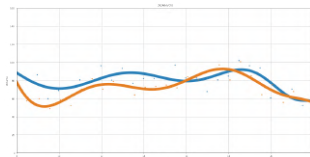
Traffic Volume

Comparison of Weekdays and Weekend

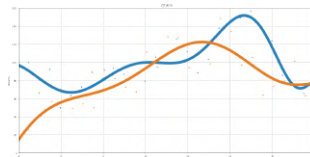
忠孝東路 松山路-松信路



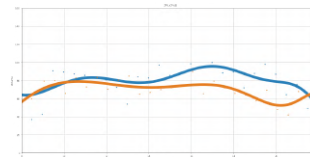
八德路 敦化南路-光復南路



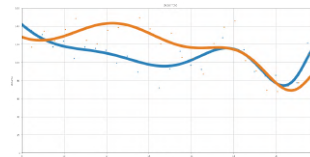
忠孝東路 杭州北路-中山北路



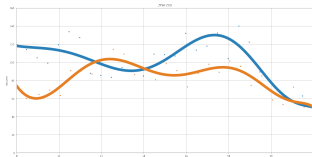
建國北路 民權東路-民族東路



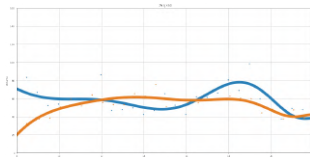
忠孝西路 環河北路-塔城街



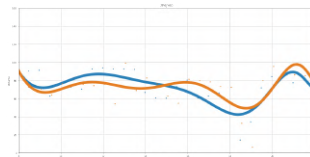
重慶北路 南京西路-民權西路



民生東路 建國北路-松江路



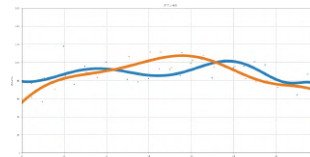
民權東路 建國北路-松江路



光復南路 市民大道-八德路



和平東路 復興南路-新生南路



Parking Lot Distribution



Parking Space & Parking Rates

Rate

0

200

Total Space

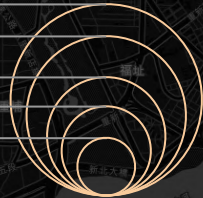
2000

1100

544

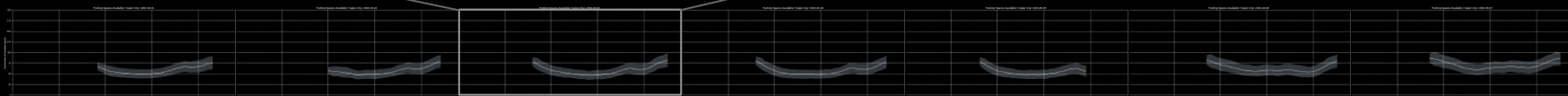
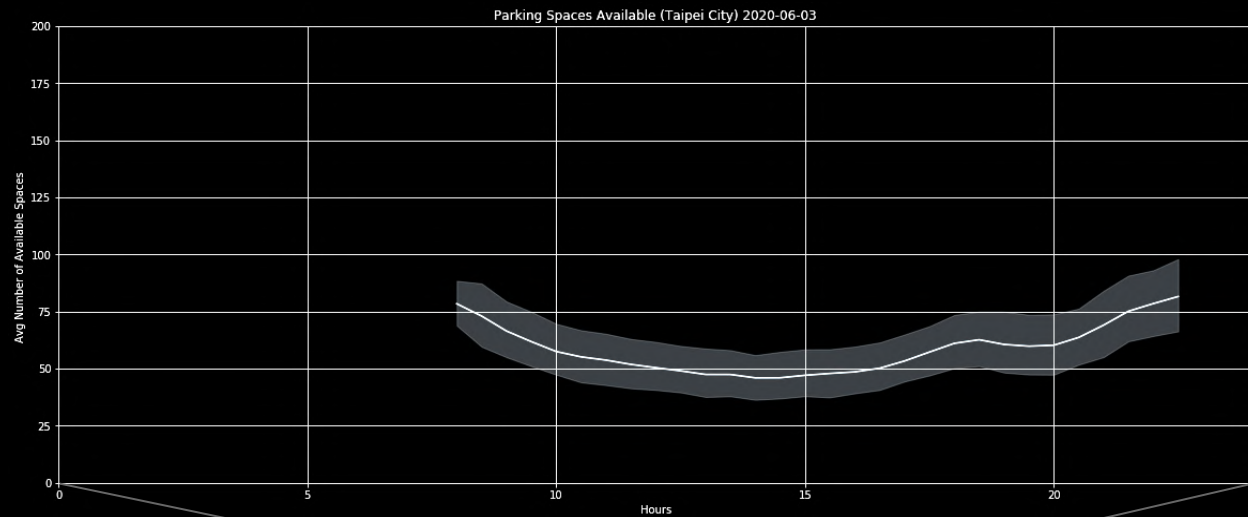
256

88



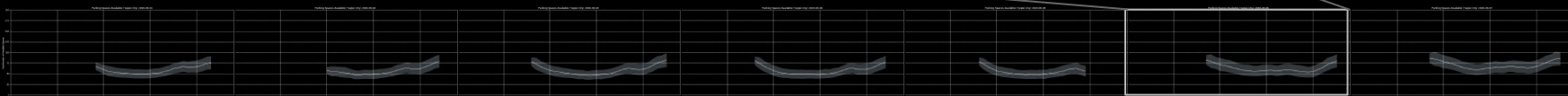
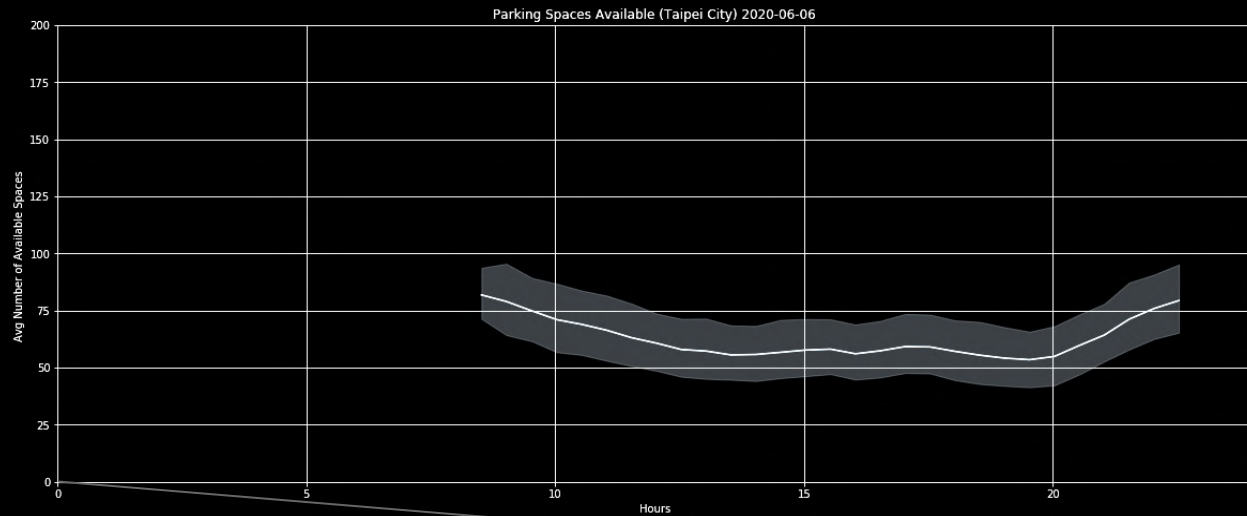
Available Space

Weekdays of Taipei City



Available Space

Weekend of Taipei City

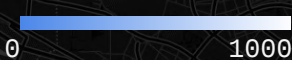


Available Space

Mapping of the Parking Lot

2020-06-03 08:00

Available



Total Space

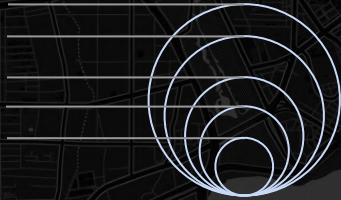
2000

1100

544

256

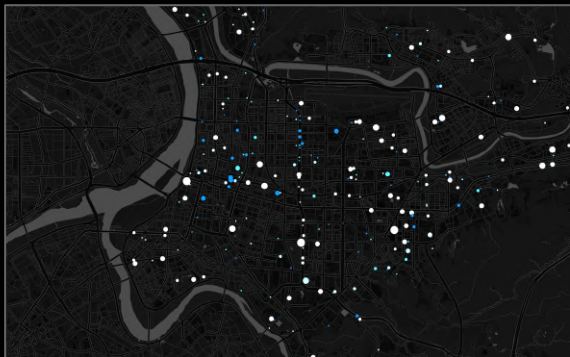
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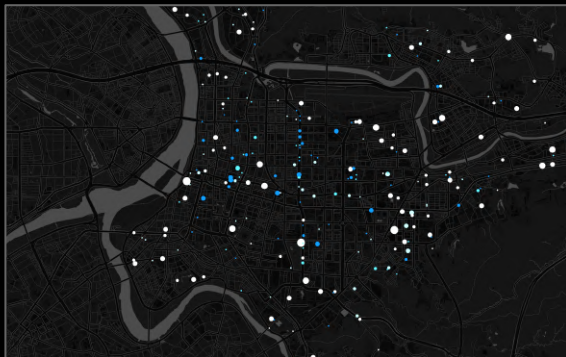
Available Space

Mapping of the Parking Lot

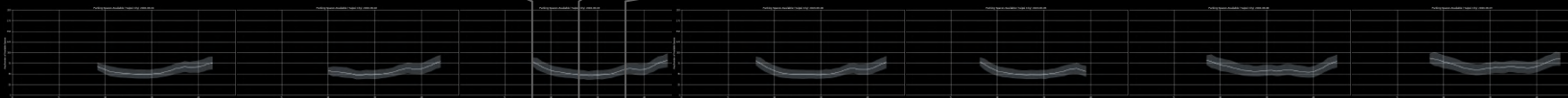
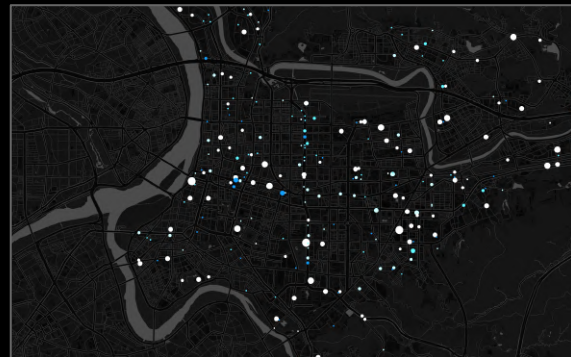
2020-06-03 08:00



2020-06-03 13:00



2020-06-03 18:00



Wed.

Increase & Decrease
in quantity of Available Space
2020-06-03 11:00-to-13:00

Delta

-180

80

Increase or Decrease Amount

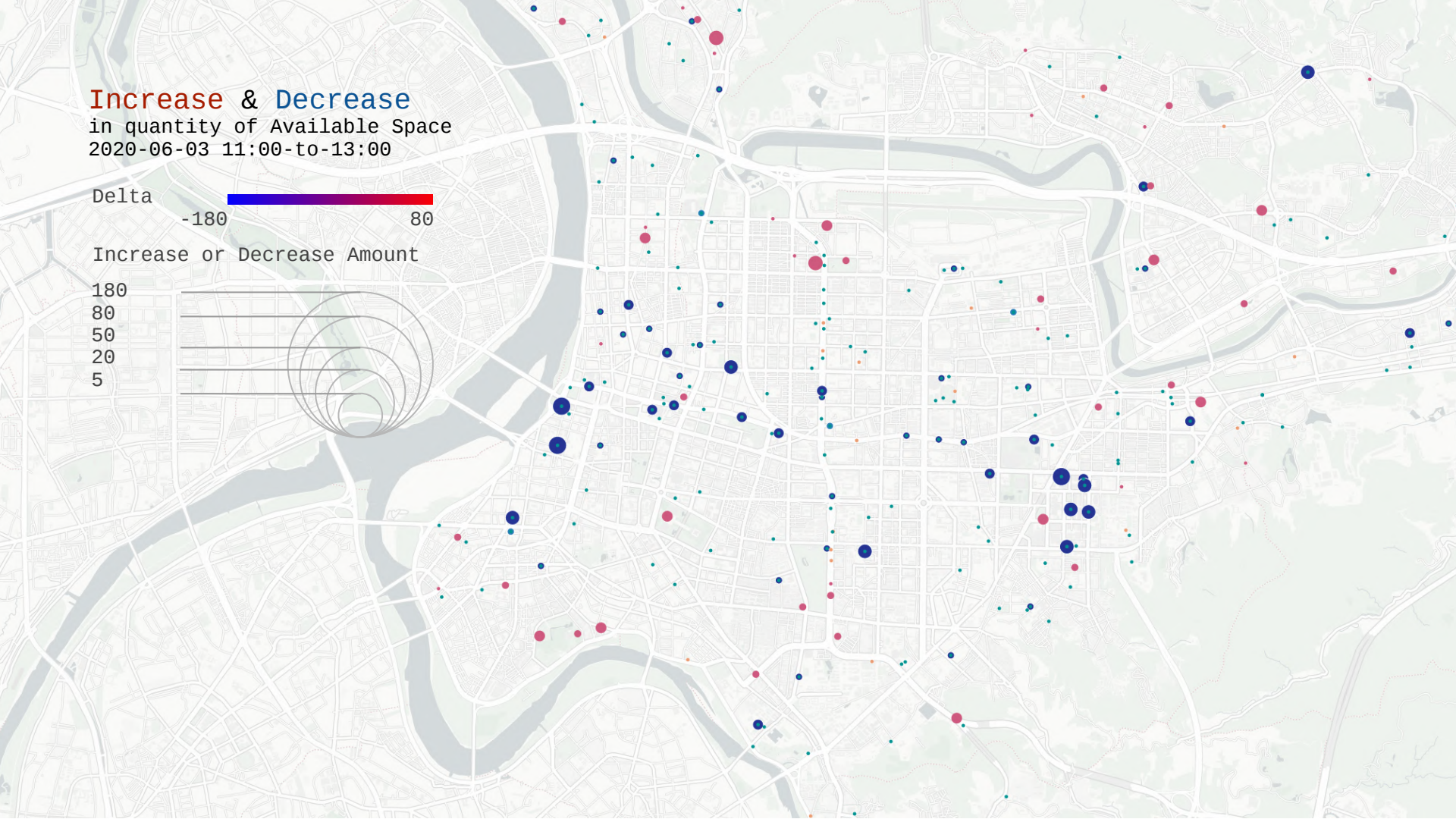
180

80

50

20

5



Increase & Decrease
in quantity of Available Space
2020-06-03 13:00-to-17:00

Delta

-150

300

Increase or Decrease Amount

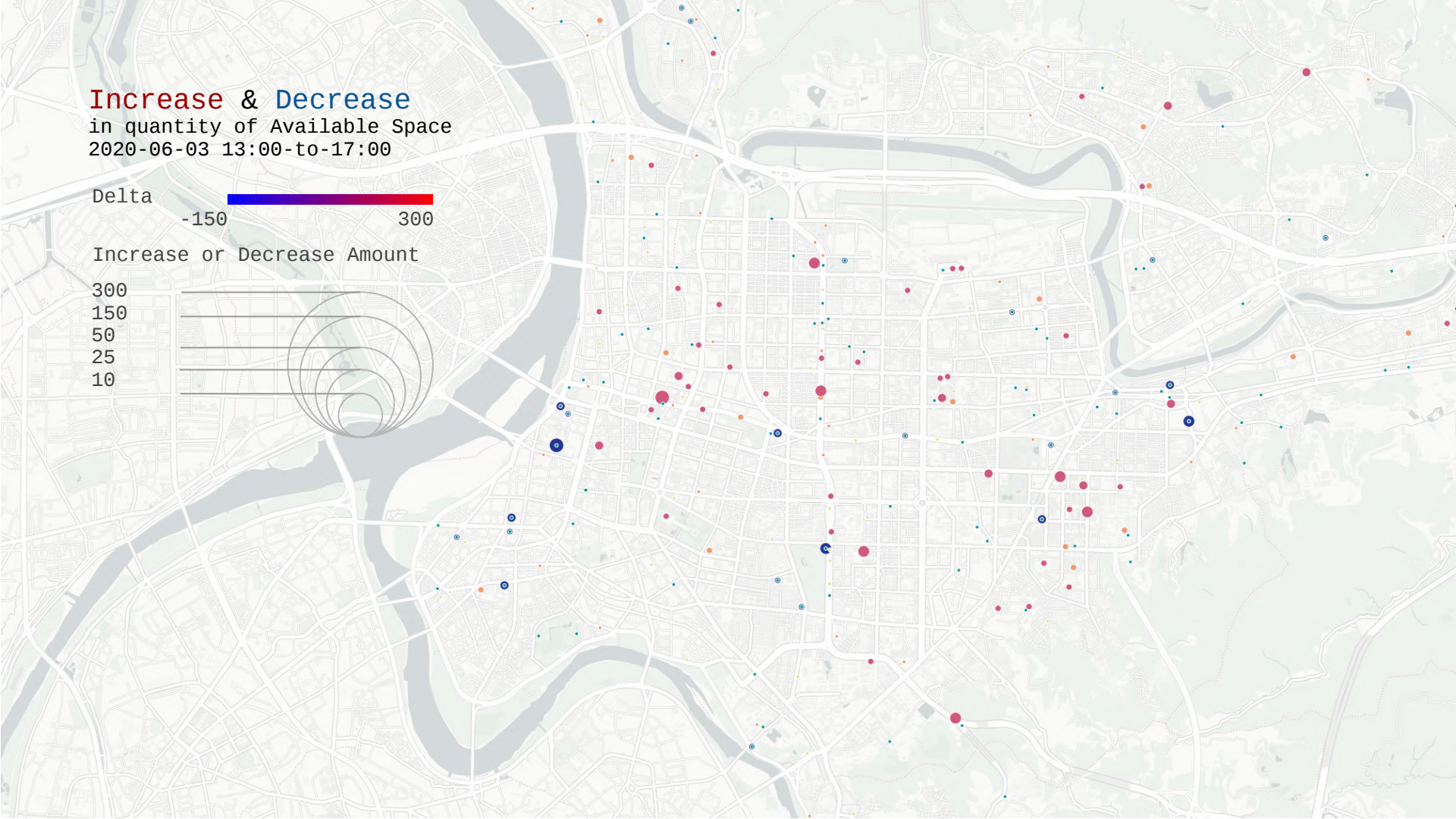
300

150

50

25

10



Increase & Decrease
in quantity of Available Space
2020-06-03 17:00-to-19:00

Delta

-350

700

Increase or Decrease Amount

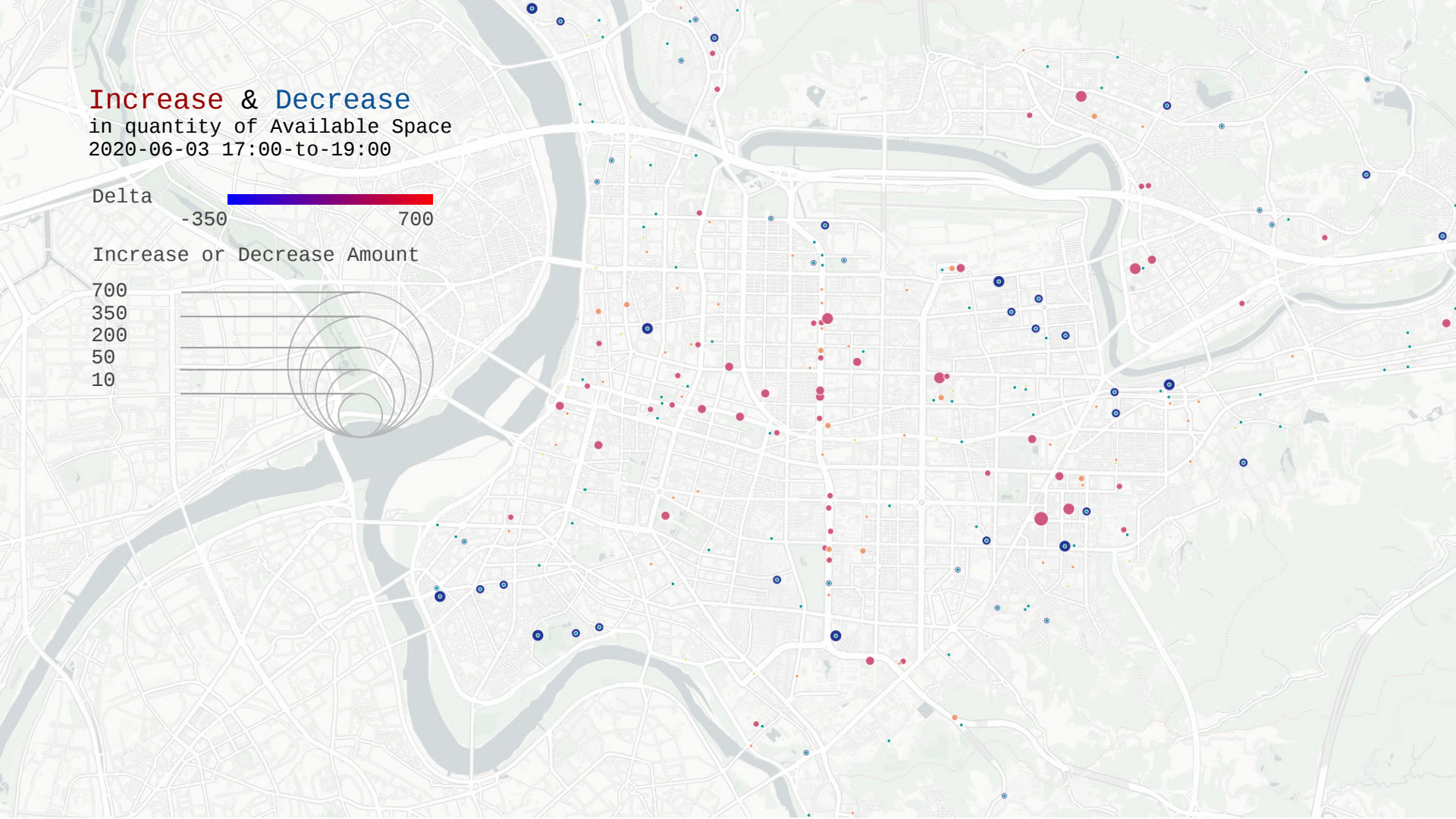
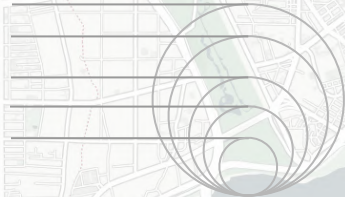
700

350

200

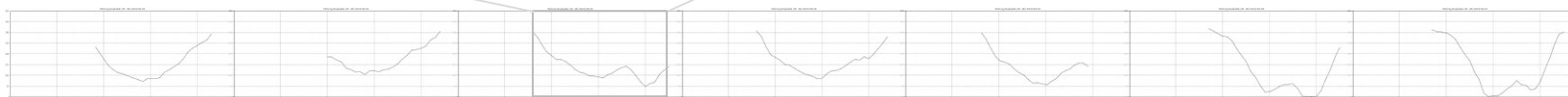
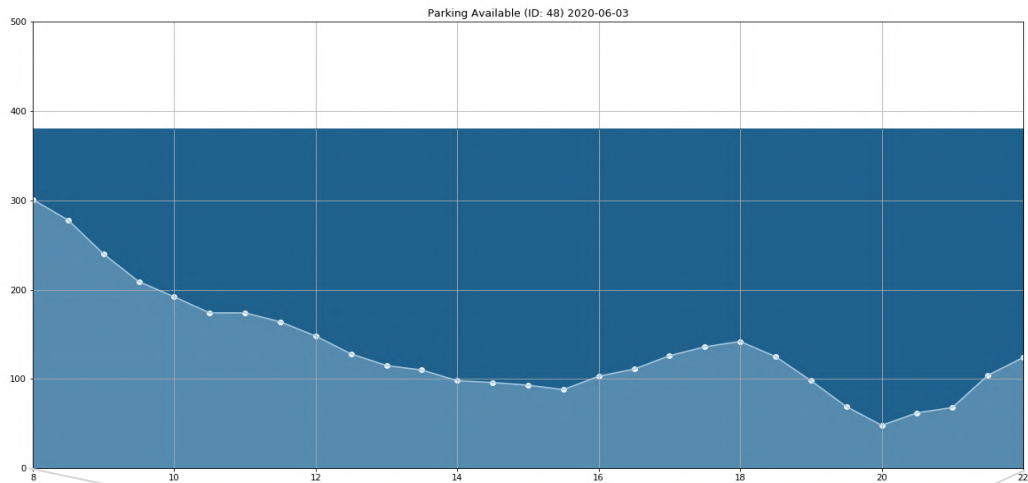
50

10



Available Space

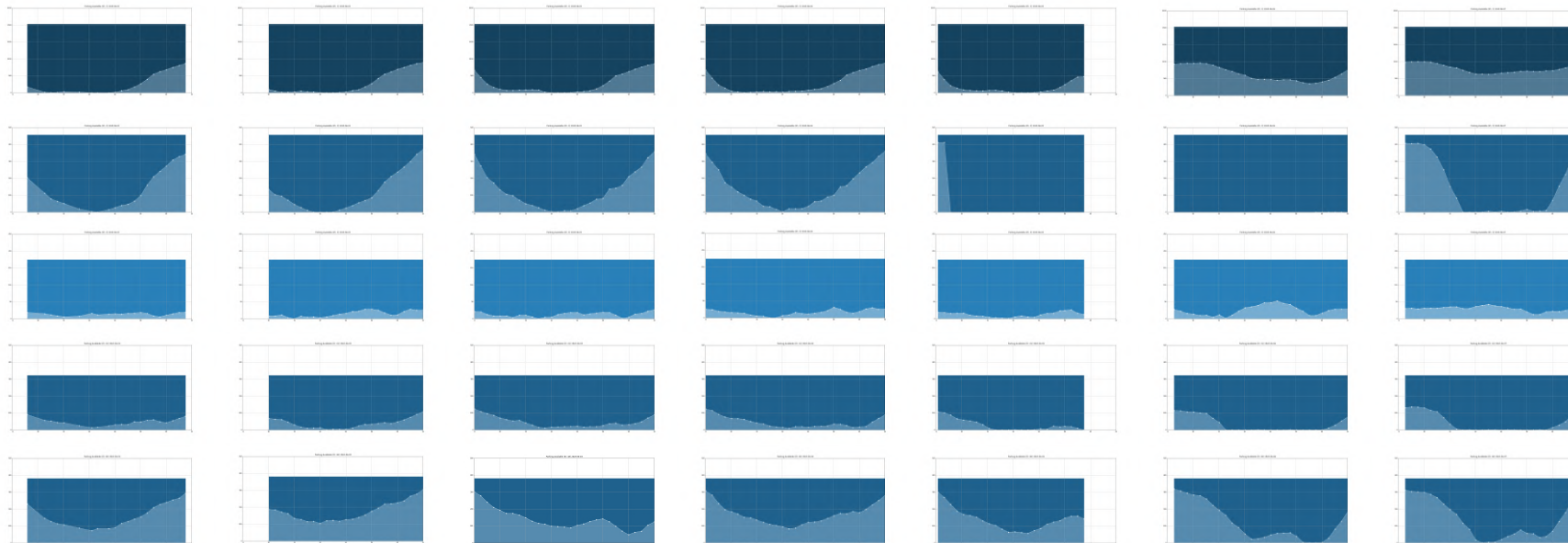
Service in weekdays & weekend



Wed.

Available Space

Service in weekdays & weekend

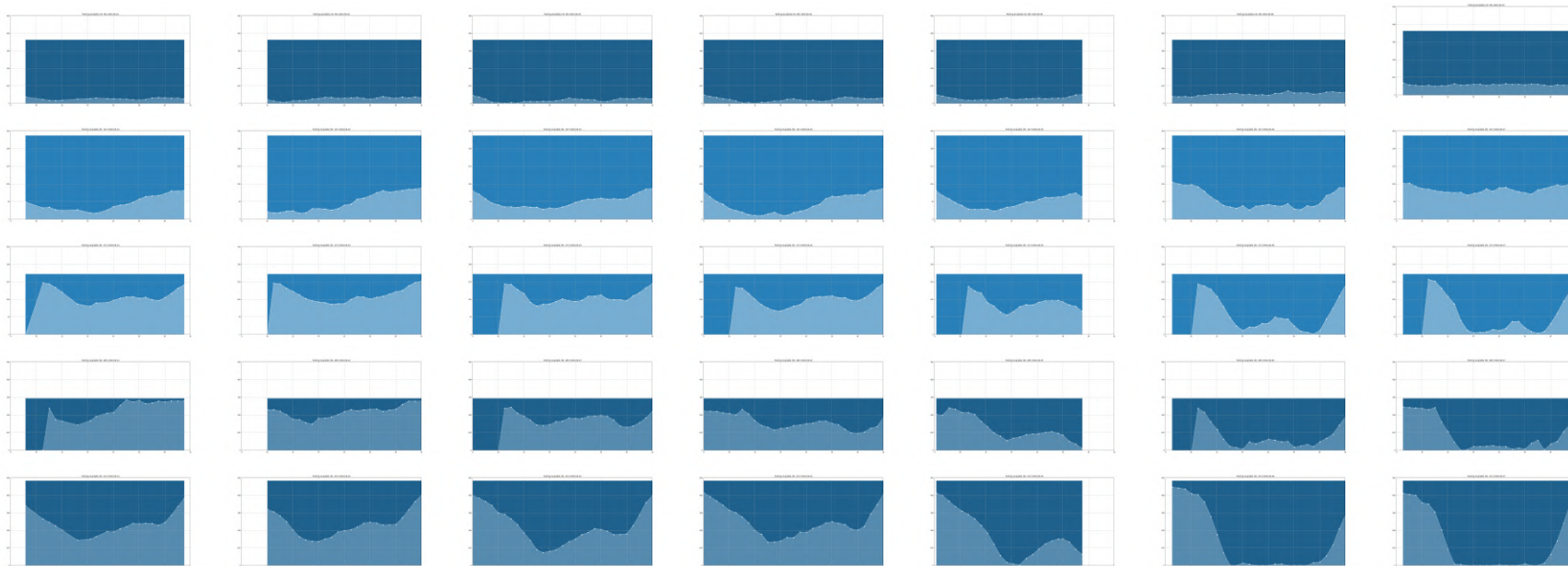


weekdays

weekend

Available Space

Service in weekdays & weekend



weekdays

weekend

Self-Parking Problem

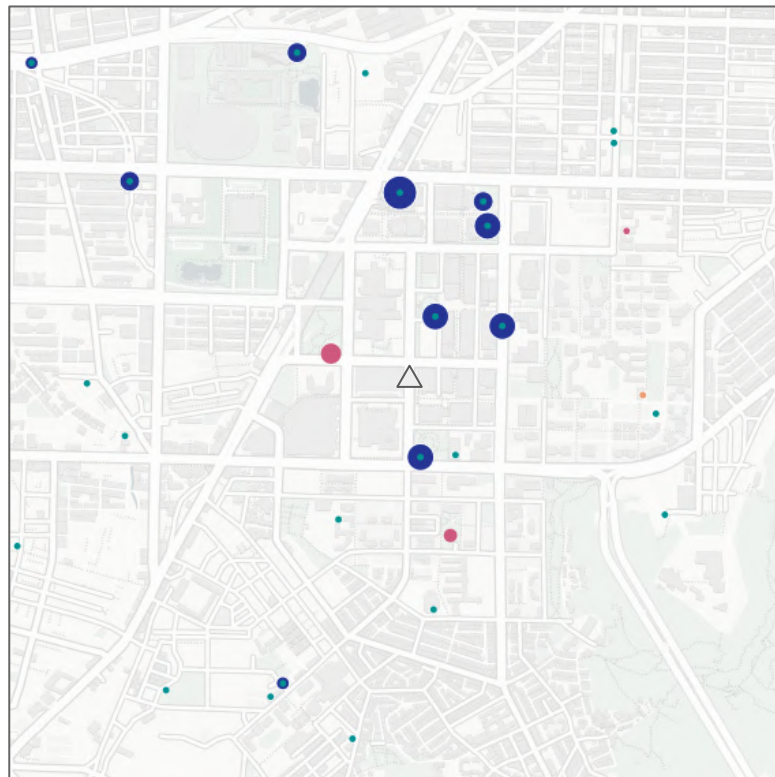
Instant Data

即時數據

鄰近停車場(位置)與(費率)
[(12156.3, 2503.6)]

即時停車位預測
[0, 0, 0, 0, 0, 0, 0, 0, 0, 660, 252, 97, 65,
82, 78, 0, 0, 26, 56, 206, 495, 620, 758,
851, 0]

即時交通流量預測
[True, False]



Self-Parking Problem

Parameter

輸入變數

起始時間

currenttime = 9 #0'clock

停車時間

empty_hours = 2 #hr

初始速度

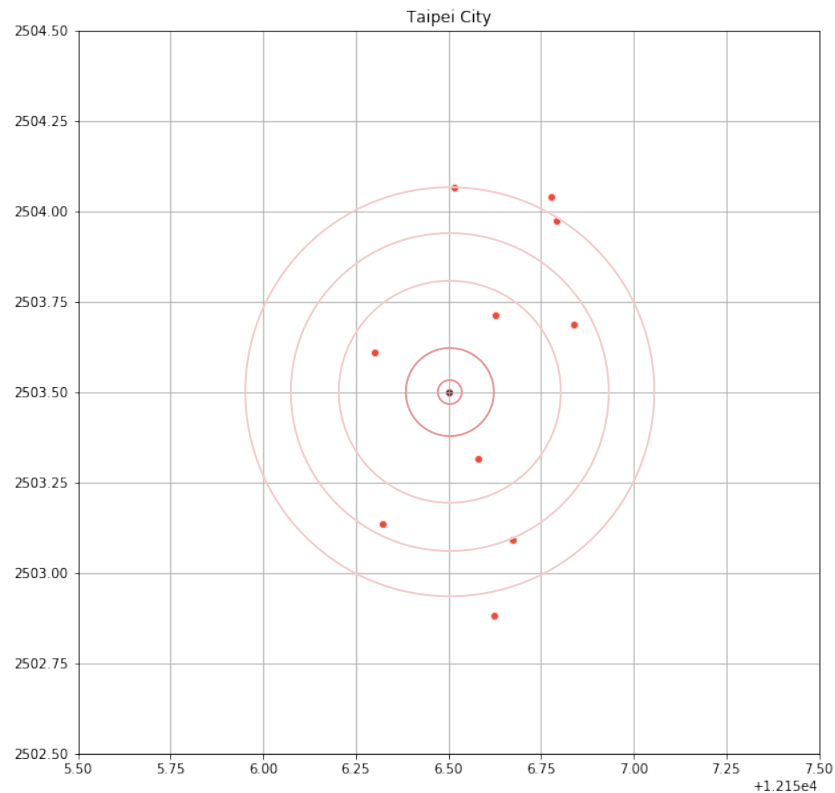
speed = 30 #km/hr

起始點

point_start = (12156.5, 2503.5)

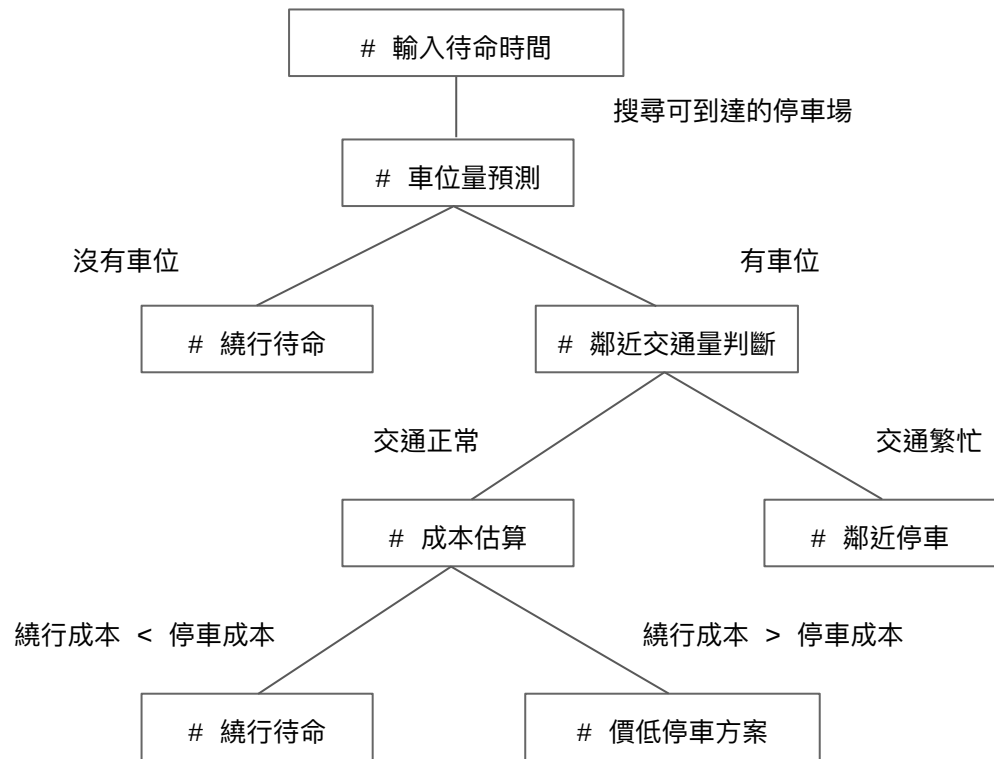
電價/公里

fuelcost = 1.8 #NTD/km



Self-Parking Problem

Algorithm



Self-Parking Decision

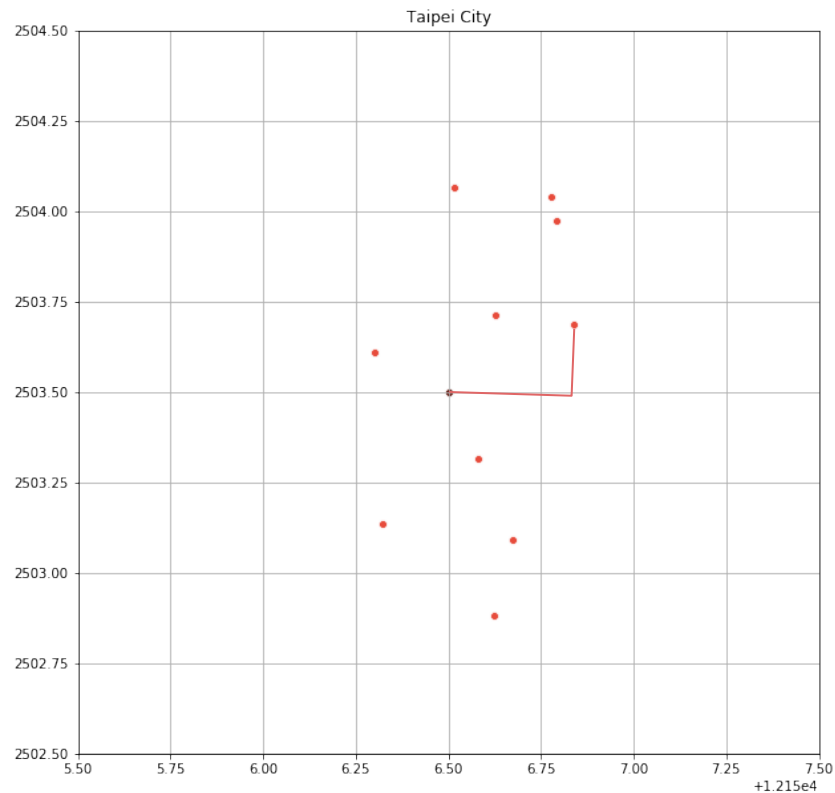
Cost & Distance

成本估算

行駛距離 X 電價

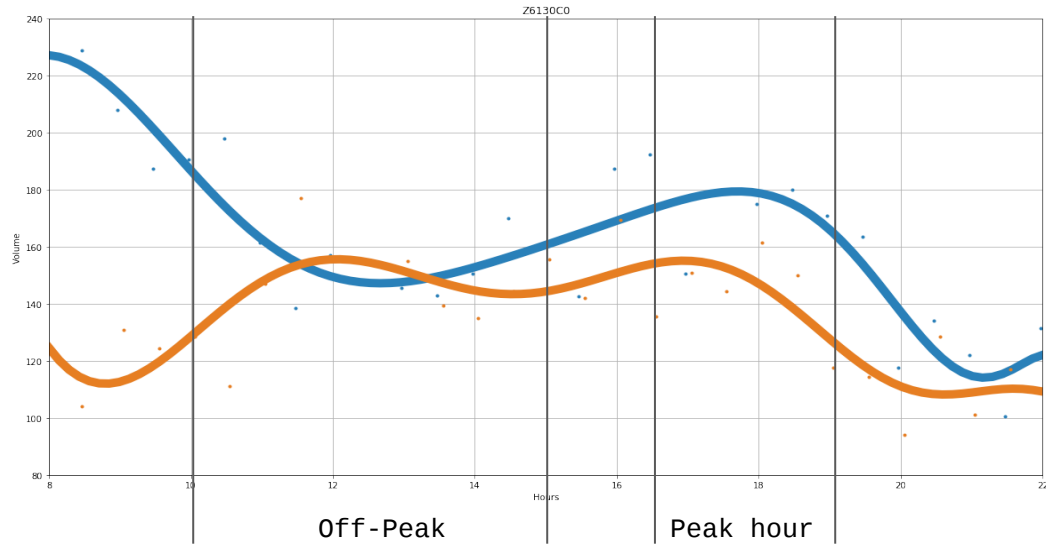
停車費率 X 停靠時間

	id	location	rate	cost
0	1	(12156.299732925112, 2503.608871399772)	30.0	60.364715
1	2	(12156.628035534453, 2503.7146696000364)	30.0	60.399924
2	3	(12156.62260284535, 2502.8806331929663)	30.0	61.010216
3	41	(12156.778319103674, 2504.0419316888965)	40.0	80.568607
4	48	(12156.581163492996, 2503.3146073617418)	40.0	80.188889
5	88	(12156.67488676518, 2503.0915461015984)	30.0	60.710911
6	107	(12156.322742598948, 2503.137022943796)	40.0	80.377016
7	177	(12156.791712976386, 2503.9730235834463)	120.0	237.554741
8	405	(12156.839193996428, 2503.687998053841)	20.0	40.879034
9	472	(12156.5163622336, 2504.066791522695)	50.0	100.151207
10	-1	(inf, inf)	0.0	108.000000



Pick-Up and Drop-Off

Space Management

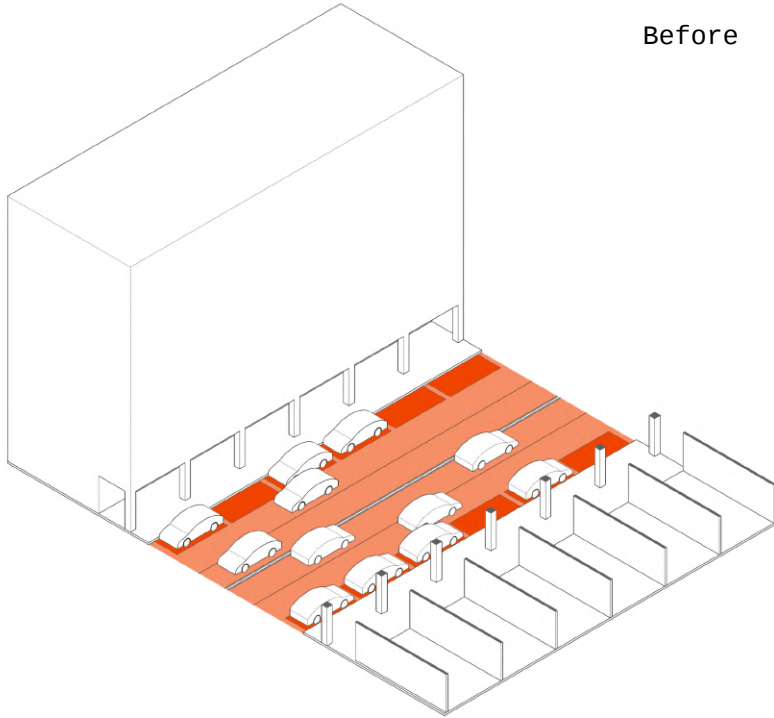


八德路四段

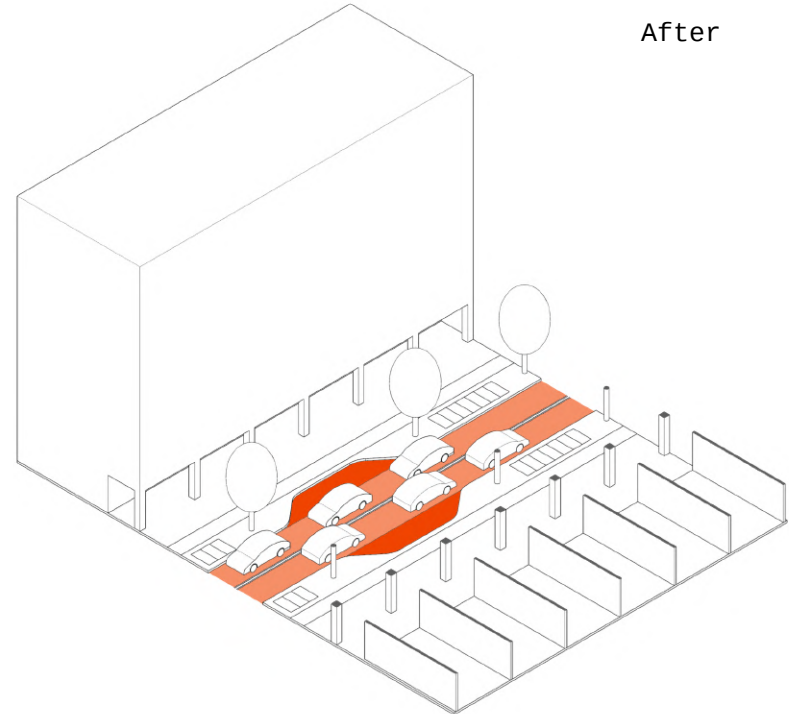
Pick-Up and Drop-Off

Space Management

Before

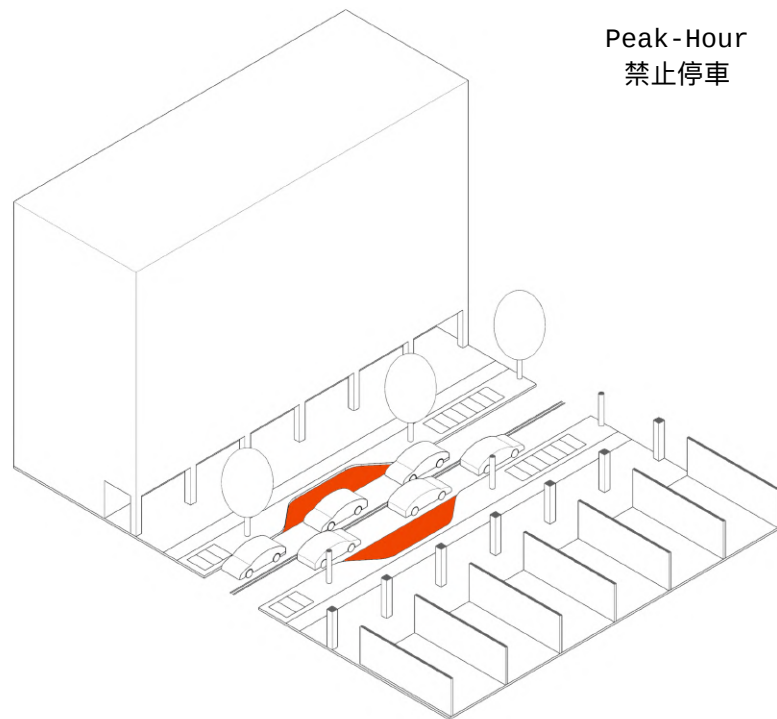
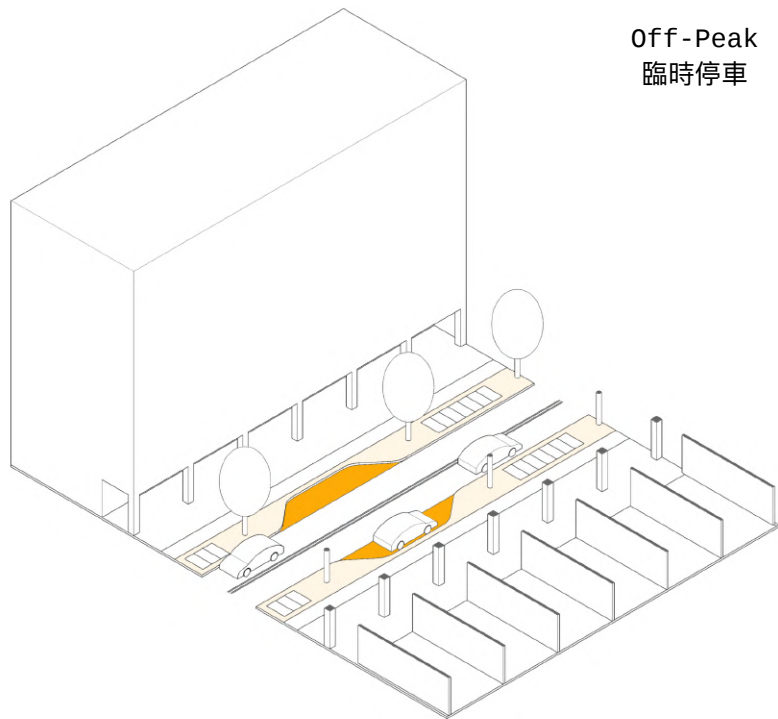


After

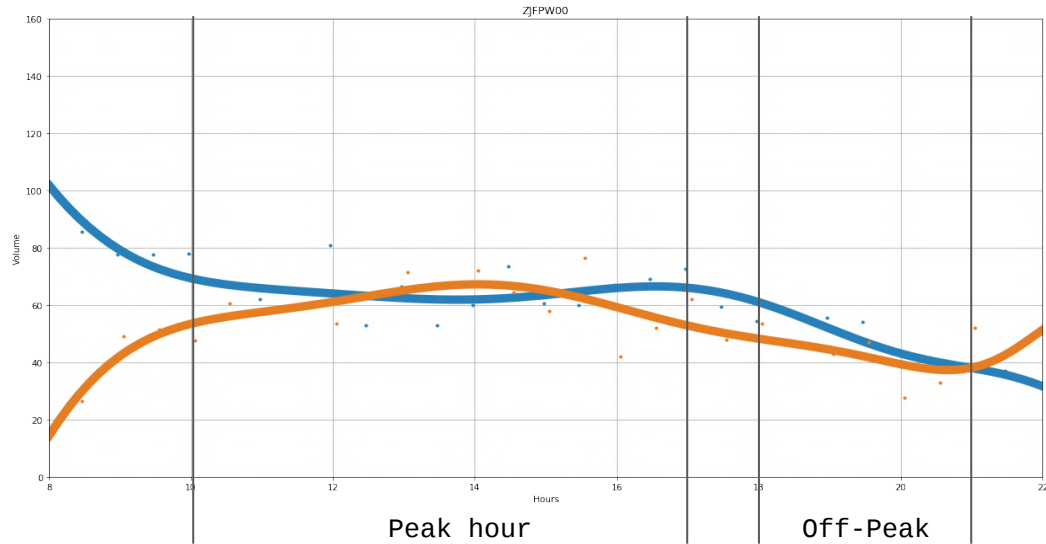


Pick-Up and Drop-Off

Space Management



Pick-Up and Drop-Off Space Management

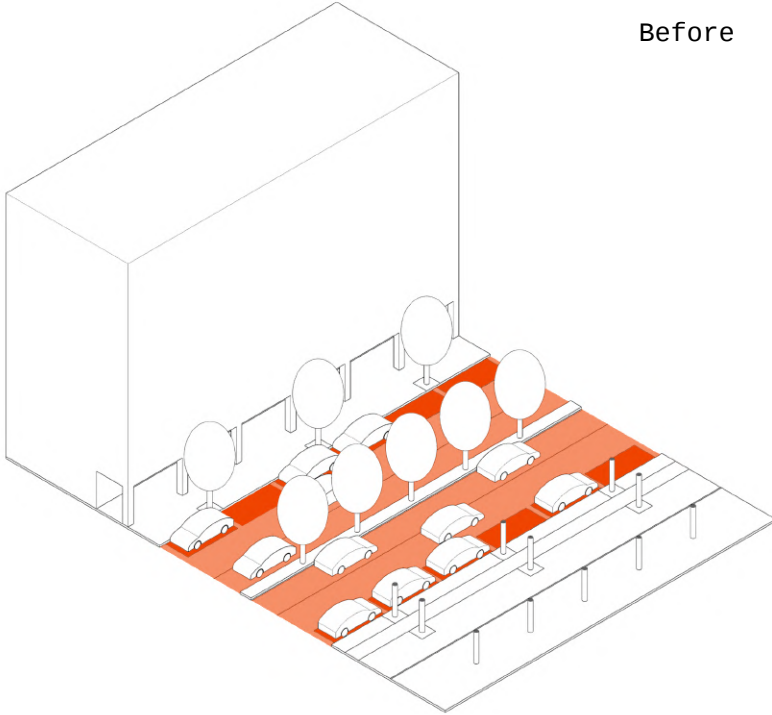


光復南路

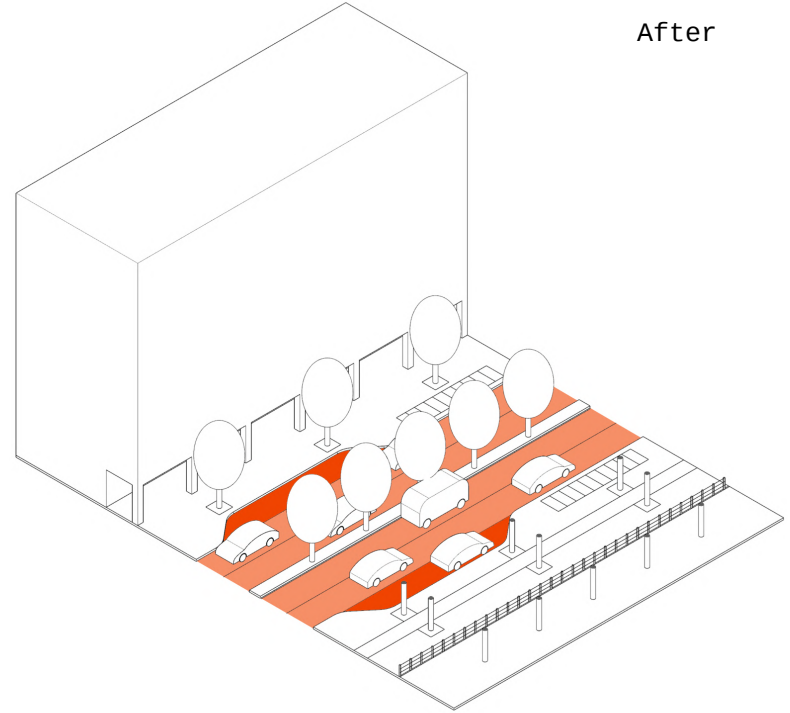
Pick-Up and Drop-Off

Space Management

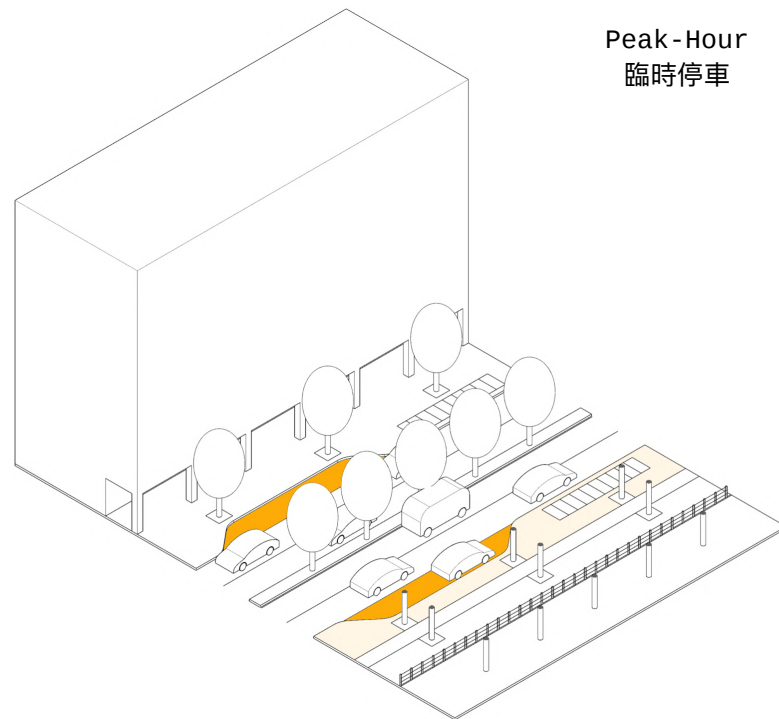
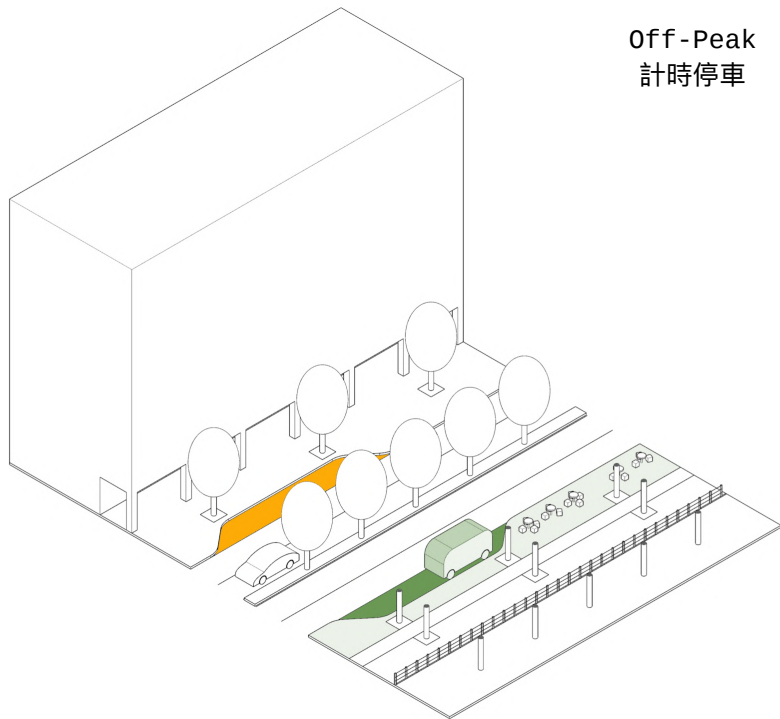
Before

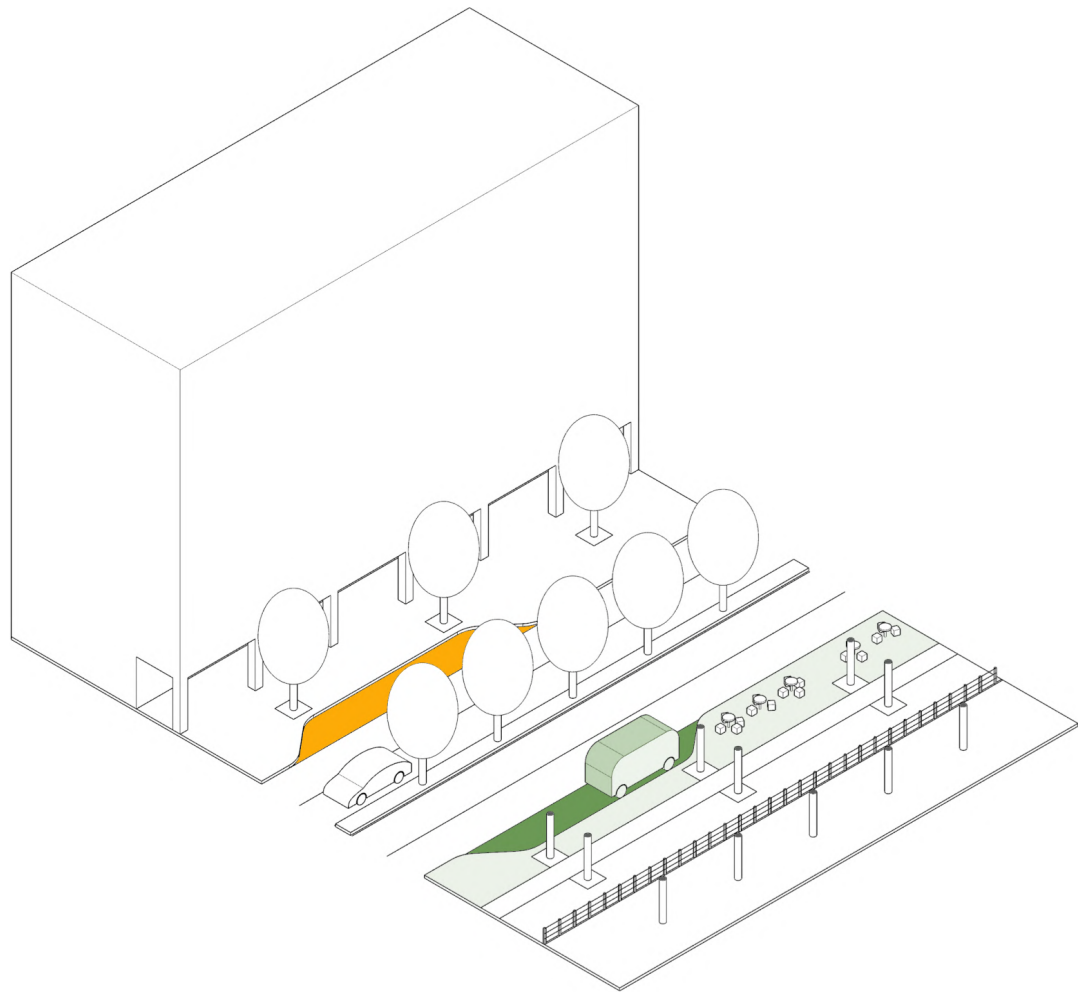


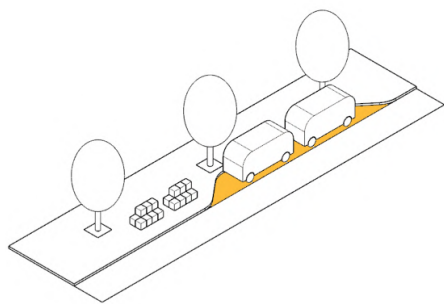
After



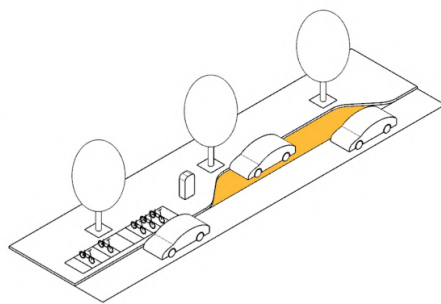
Pick-Up and Drop-Off Space Management



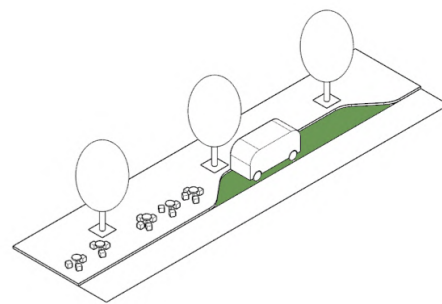




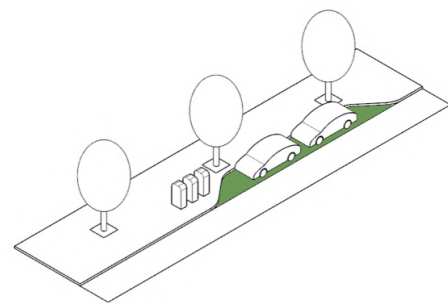
7:00
上下貨物



12:00
臨時停車



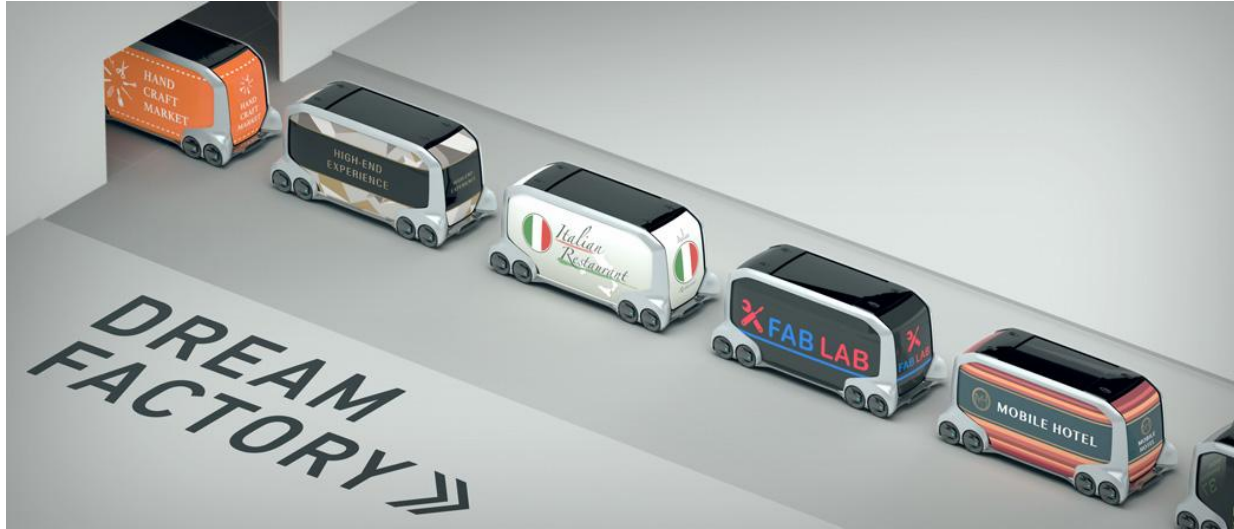
19:00
商業活動



23:00
計時停車

Future of Mobility

Reshaping Urban Space



Toyota E-palette

