Sustainable Design
In Tan Mei Elementary School

represents a balanced interaction between the human-built and natural worlds

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競圖 /
深圳寶安中心區整體規劃案國際競圖首獎
臺南水產試驗所新建工程(二期/三期)競圖首獎
臺北花卉批發市場新建工程競圖首獎
臺北市內湖區潭美國小遷校工程競圖首獎 Tanmei Elementary School
臺北市成功市場改建工程競圖首獎
臺北市中山區基督長老教會競圖首獎 The missions Center of Presbyterian church Of Zhongsha
臺北市中山區錦州街公共住宅競圖首獎
臺北市南港區中南段公共住宅競圖首獎
臺北市南港區經貿段公共住宅競圖首獎

得獎 / 展覽
臺北市內湖區潭美國小遷校工程 公共工程類金石獎與金石首獎
宜蘭衛禾居入圍台灣住宅獎
臺北花卉批發市場新建工程入圍臺北市都市景觀大獎
Architizer +A Award mixed use 全球前五名
臺北花卉批發市場新建工程登錄Archidaily最佳文化類獎
2012年實構築展覽 2012 Tectonic Becoming Exhibition

Intro

12
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內湖區
Neihu District
06
04
01
07
05
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09
08

Sun Yat-Sen Fwy
Minquan Bridge
Xingzhong Road
Xinghu 2nd Road
Section 1, Jiuzong Road
Xingshan Road
Original Site
Section 1, Tiding Boulevard
SITE
Huandong Boulevard
Keelung River

Site

12
11
內湖區
Neihu District
06
04
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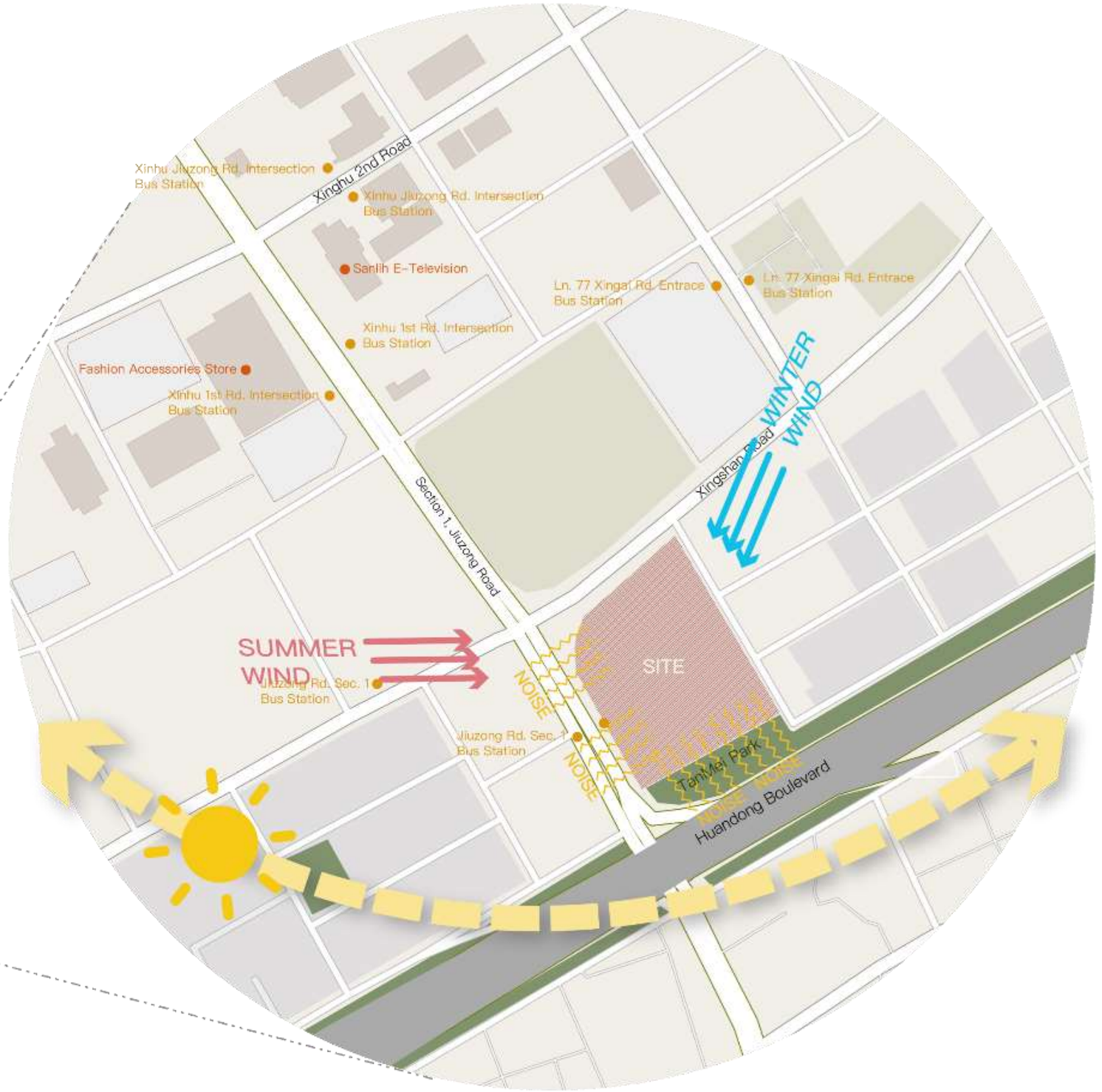
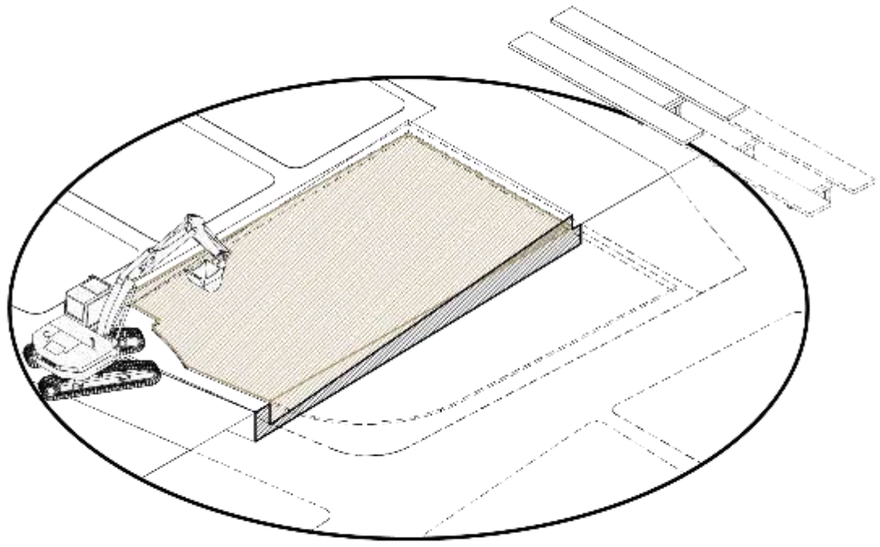
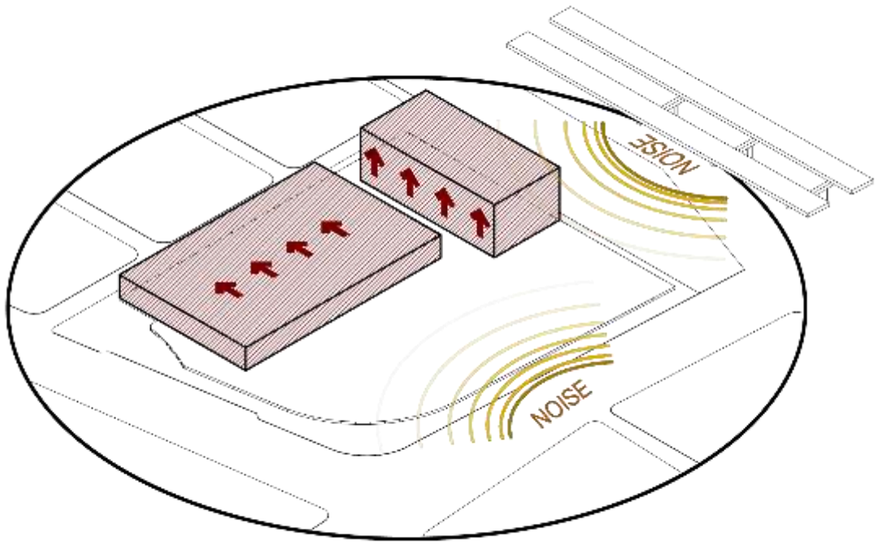
08


Xinhu Jiuzong Rd. Intersection
Bus Station
Xinghu 2nd Road
Xinhu Jiuzong Rd. Intersection
Bus Station
Sanlih E-Television
Ln. 77 Xingai Rd. Entrace
Bus Station
Ln. 77 Xingai Rd. Entrace
Bus Station
Xinhu 1st Rd. Intersection
Bus Station
Fashion Accessories Store
Xinhu 1st Rd. Intersection
Bus Station
WINTER
WIND
Xingshan Road
Section 1, Jiuzong Road
SUMMER
WIND
Jiuzong Rd. Sec. 1
Bus Station
NOISE
SITE
Jiuzong Rd. Sec. 1
Bus Station
NOISE
TanMei Park
NOISE
NOISE
Huandong Boulevard

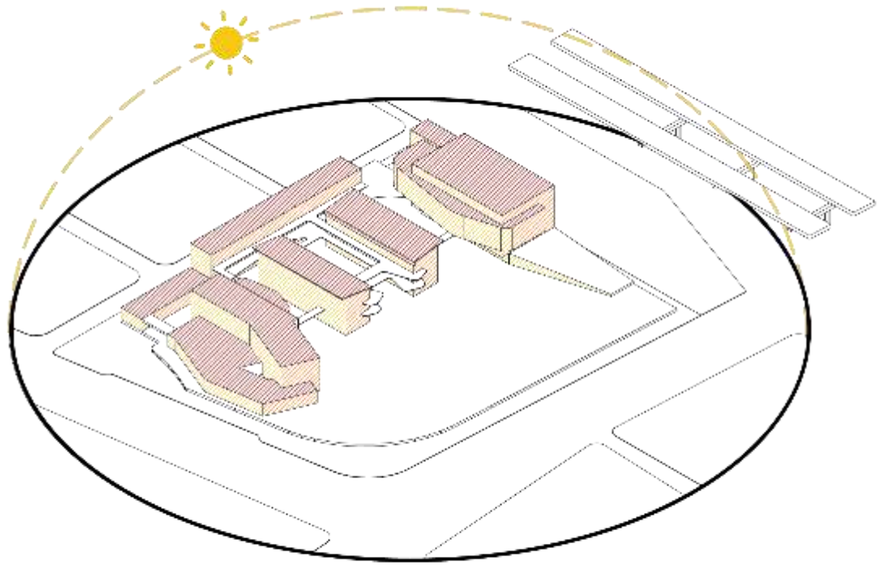
Strategy



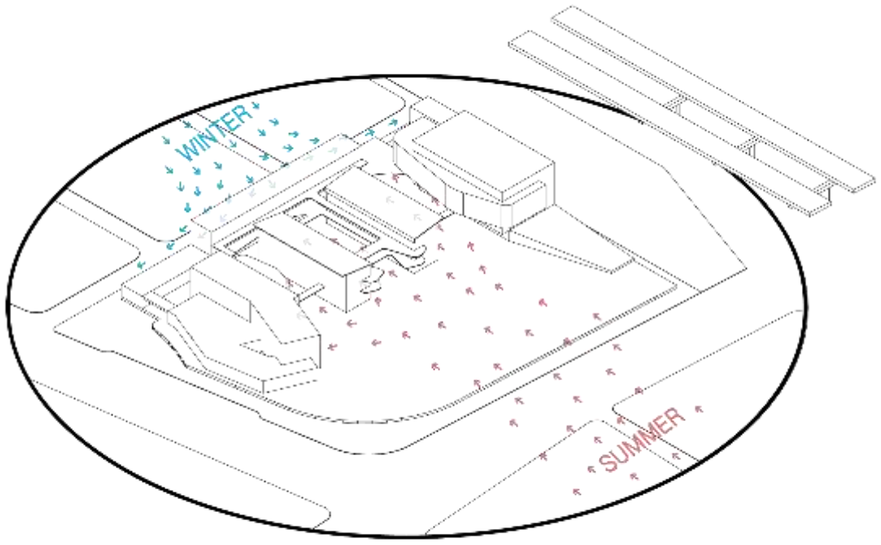
Earthworks Balance



Noise Resistance



North and South Oriented Volume



Wind Comfort

Programme

Education Space 教學空間

類別	空間名稱	面積 (m2)	數量
	普通教室	68	24
	專科教室		(9)
	自然教室	102	2
	美勞教室	102	2
	音樂教室	136	2
	英語教室	102	2
	電腦教室	102	1
	本土語言教室	68	1
	特色課程教室		
	十鼓擊鼓練習教室		
	多功能活動教室	204	1
	特殊教育資源班		
	特教班教室*2	68	2
	資源班教室*1	102	1
	知動教室	136	1
	生活訓練教室	68	1
	幼稚園教室	272	1
	活動室與寢室	90	4
	室內遊戲室		
	圖書室	180	1

Administration Space 行政空間

類別	空間名稱	面積 (m2)	數量
	校長室	68	1
	校史室	68	1
	教務處	68	1
	訓導處	68	1
	總務處	68	1
	人事室	34	1
	會計室	34	1
	輔導室	136	1
	教師辦公室	68	4
	特教班辦公室	34	1
	幼稚園辦公室	68	1
	幼稚園教保準備室	102	
	會議暨教學研討室	30-50人	1
	小會議室	34	1
	教師會辦公室	34	1
	家長會辦公室	34	1
	校友會辦公室		
	印刷室	22.7	1
	檔案室	102	1
	警衛執勤室	22.7	1
	體育器材室	68	1
	體育教學準備室	34	1

Public Service Space 公共服務空間

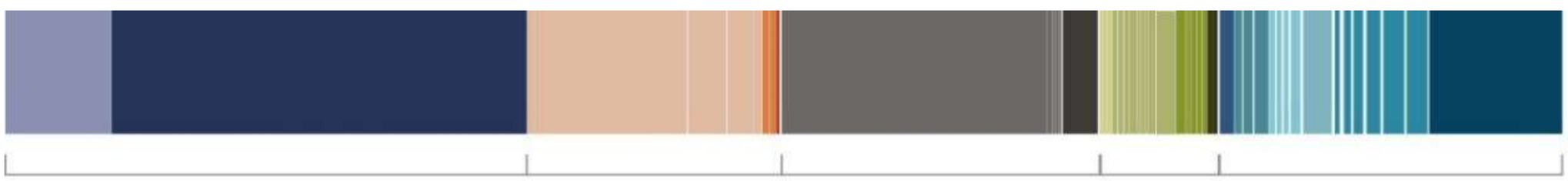
類別	空間名稱	面積 (m2)	數量
	廁所空間		
	幼稚園廁所		
	儲藏室	34	4
	衛生安全器材室	34	1
	哺乳室	22.7	1
	資源回收室	68	1
	公共設施空間	依相關法規於方案配置	
	地下停車空間	依法規設置	

Educational Support Space 服務教學空間

類別	空間名稱	面積 (m2)	數量
	廚房		
	幼稚園備餐室	34	1
	健康中心	102	1
	教具室	102	1
	資訊影音主控室	102	1
	多功能活動中心		
	室內泳池	25M、6道	
	多功能展演中心	250人	1
	多功能體育場	標準籃球場；總數；觀眾席；	
	室內體能教室	附屬空間+舞台空間	
	地板韻律教室	102	1

Outdoor Space 戶外空間

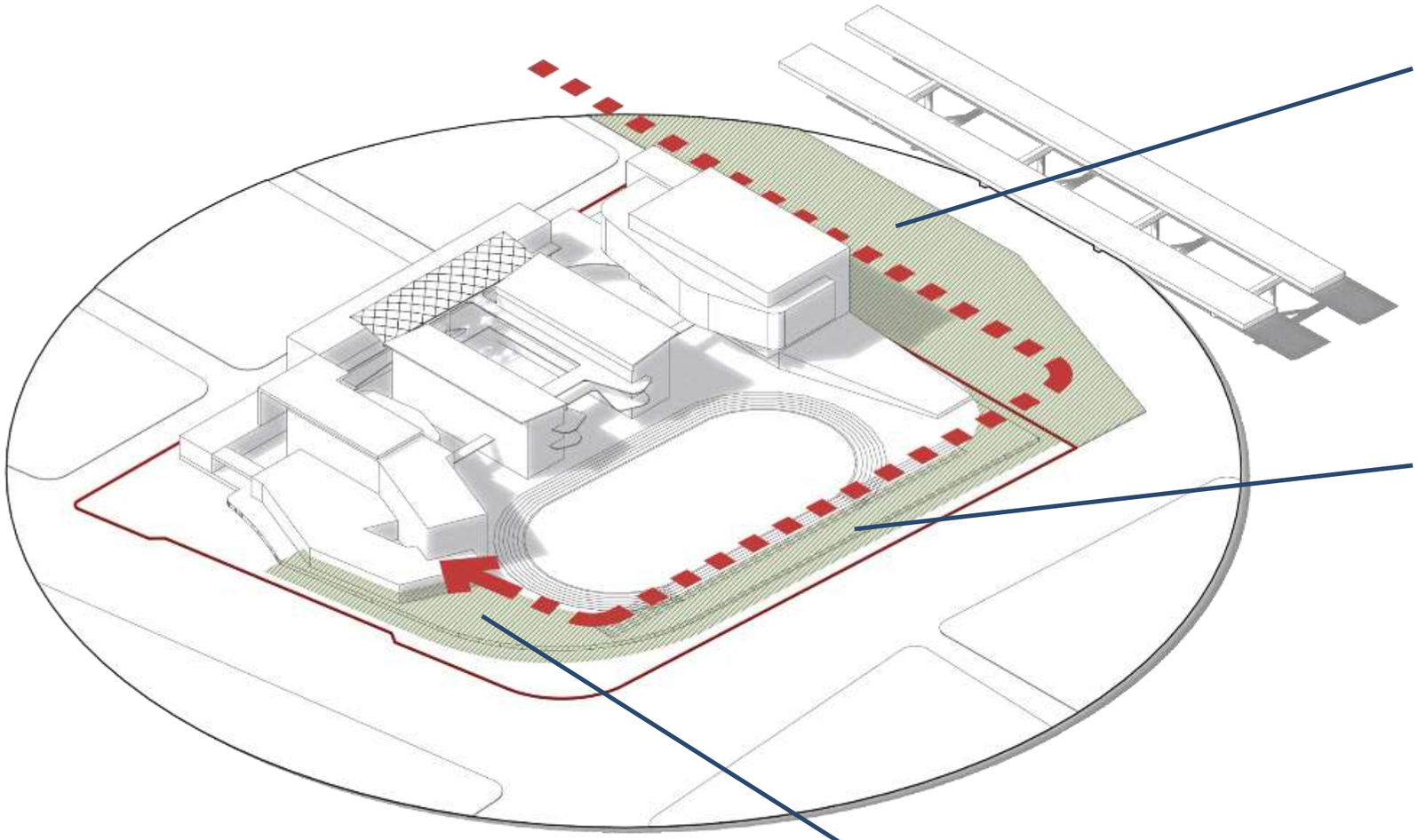
類別	空間名稱	面積 (m2)	數量
	運動場	100M 直線跑道；一圈200M；6 跑道。	
	風雨操場		
	戶外運動設施	依方案配置	
	戶外遊戲場	依相關法規於方案	
	資源回收空間	配置	
	家長接送區	依方案配置	
	主要廣場空間	依方案配置	
	其他空間	配合細部計畫。	
		依方案配置	



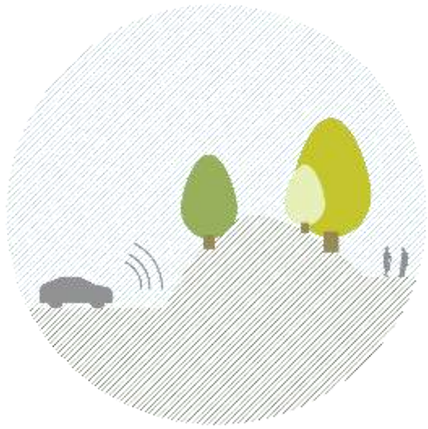
Outdoor Space	Educational Support Space	Public Service Space	Administration Space	Education Space
33.4%	15.7%	23.3%	6.8%	20.8%

Strategy

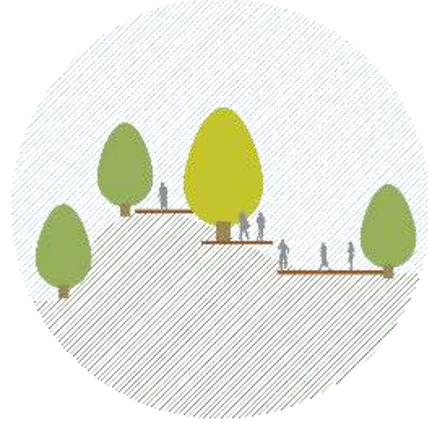
extending the landscape elements to create ecological landscape boundary



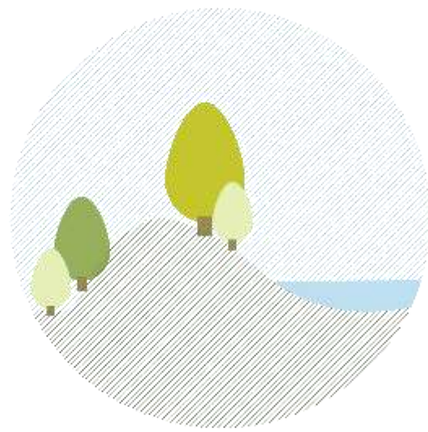
Reduce Noise



Extend Activities

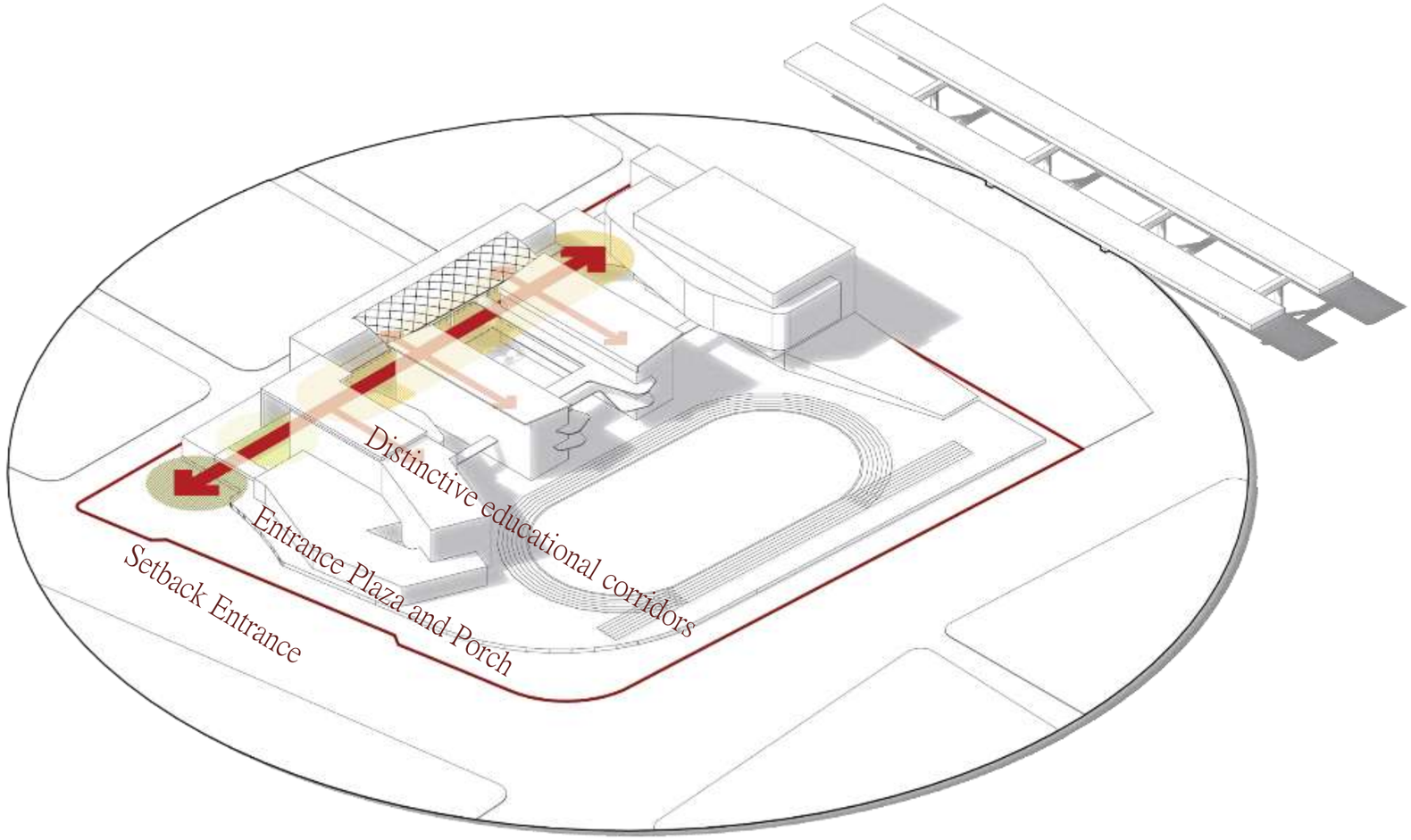


Integrat Ecology



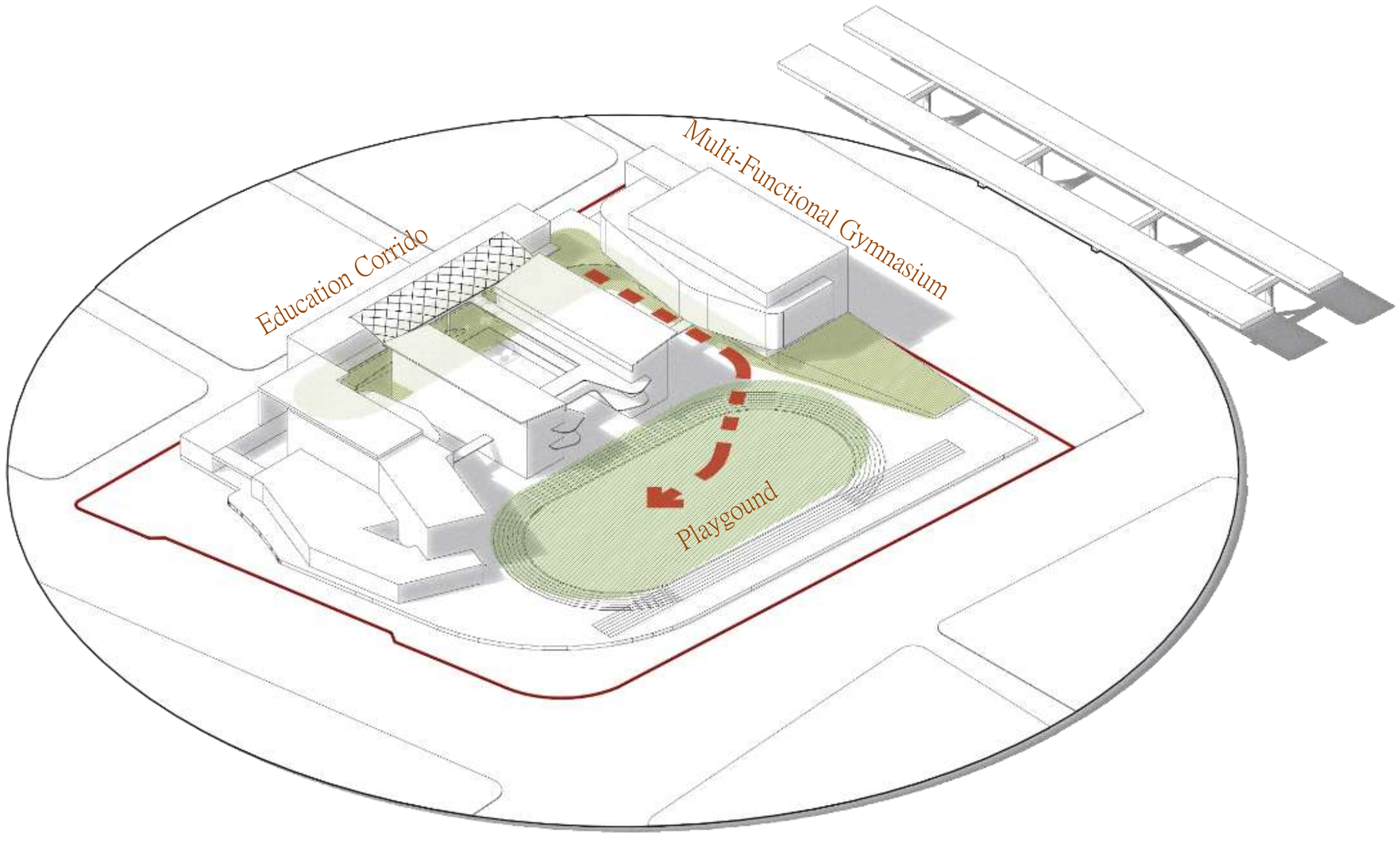
Strategy

setback school gate and create a distinctive educational corridor



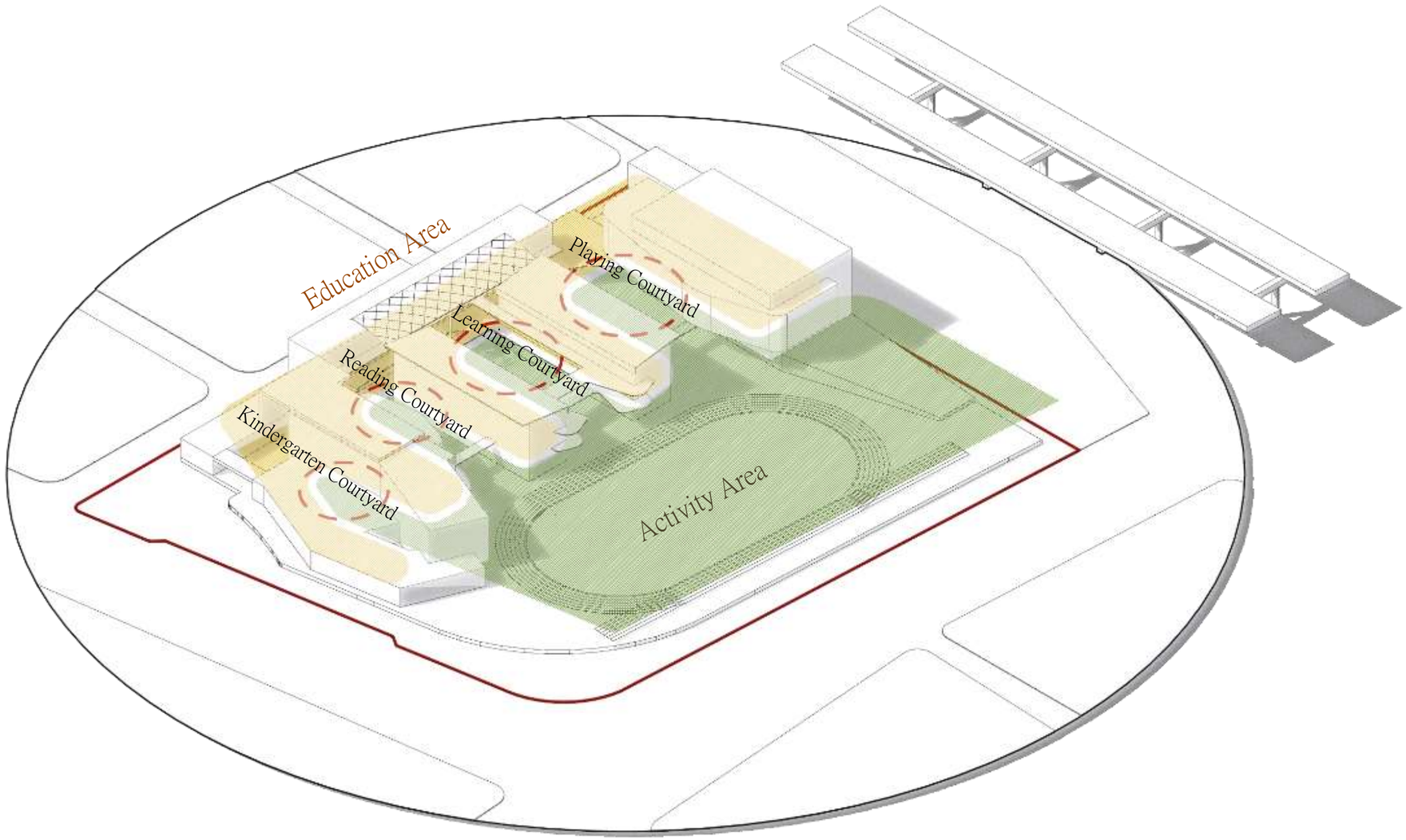
Strategy

using continuous activity platforms to create flowing space



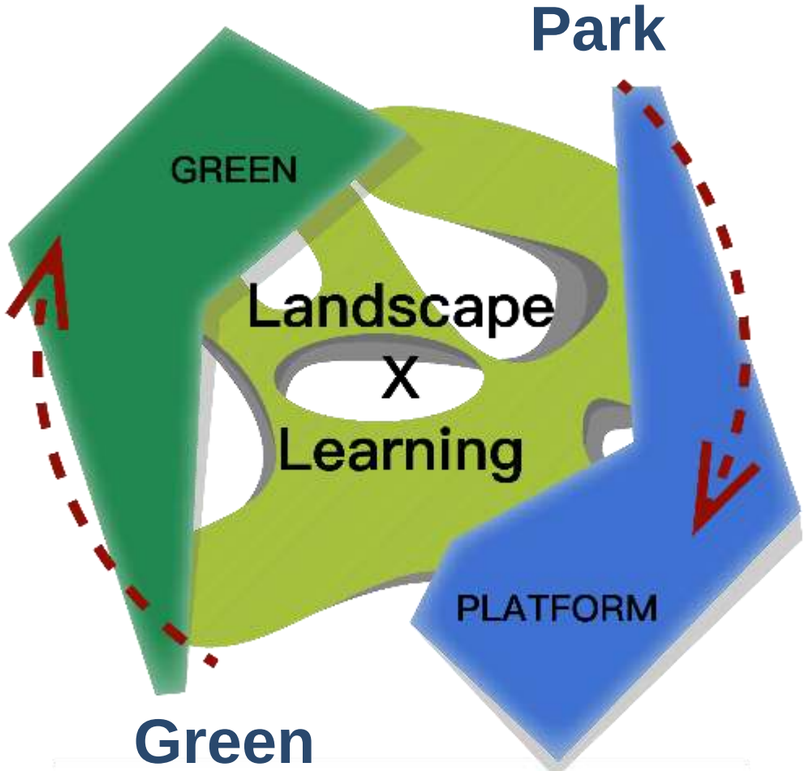
Strategy

palm shaped building volumes create diversity courtyards for increasing interaction between educational area and activity area .



Strategy

Neihu Technology Park



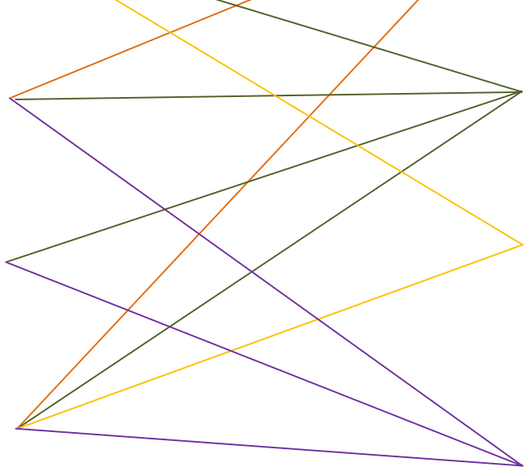
Green Corridor

Technology

Ecology

Humanity

Security



extending the landscape elements to create ecological landscape boundary

setback school gate and create a distinctive educational corridor

using continuous activity platforms to create flowing space

palm shaped building volumes create diversity courtyards for increasing interaction between educational area and activity area

Green Architecture Strategy

Green Building Labeling

01. Roof greeney
02. Digital weather station
03. Landfilled earth mound
04. Roof Garden
05. Ecological Pond
06. Ecological filtration channel
07. Water powered generator
08. Underground rainwater tank
09. Solar Panel
10. Urban farm
11. Tensile Canopy
12. Porous Pavement
13. North side curtain wall
14. Recycle Drop-off station

14. Recycle Drop-off station

生態 Ecology	1.生物多樣性指標 2.綠化量指標 3.基地保水指標	1. 覆土丘陵 2.層層退縮的綠化屋頂 3.綠草坡 4.生態廣場(生態水池/水道/濕地) 4.屋頂教學苗圃 5 .地下礫石滲透 6.覆層綠化	1. 創造生態跳島/採用複層植栽(原生植栽) 2. 以水循環結合生態棲地 3.土壤開挖採表土保護方式 4.燈源適當的配置
節能 Energy Saving	1.日常節能指標	1. 室內照明節能(詳件後述) 2.室外照明節能(詳件後述) 3.空調節能(行政棟採一對多變頻,教室為分離式,體育棟為熱泵)	1. 教室屋頂採雙層屋頂,部分屋頂以植栽土包作為博層綠地 2. 直接受熱之西曬牆面採攀藤性植栽 3.採用反射率之玻璃 4.燈具以工作照明與一般照明分區
減碳 CO2 Reduction	1.CO2減量指標 2.廢棄物減量指標	1. 土方平衡(覆土丘陵/草坡/草階/彩虹操場) 2.可回收性建材(鋪面/鋼構/輕量化)	1. 配合地形,藉由土方平衡的機制,調整地貌 2.陽台與廁所,與戶外透水磚均採用再生綠建材 3.透過營建管理減少營建廢棄物外運
健康 Health	1.室內環境指標 2.水資源指標 3.污水垃圾改善指標	1. 綠建材(45%) 2.雨撲滿/雨水回收池/滴灌/地下儲留 3.資源回收示範站	1. 所有走道空間均可採光通風 2.減少複雜的室內裝修,內部牆面均採用環保漆 3.利用屋面收集水至雨撲滿與雨水回收池 4.透過生態過濾水道,處理為再利用水源使用　5.均採省水標章浴廁
再生能源 Resource Energy	1.水循環 2.光電 3.體驗教學		1.將水/光電/綠系統與教學空間整合 2.結合相關互動性裝置

Landscape

Paving Plan

- 透水磚/透水混凝土 / 無細骨材混凝土：
  設置於入口廣場、中庭及周邊人行道，基礎以乾式工法施作
- 鐵木：設置於生態池畔及各中庭部分平台鋪面
- 瀝青 + 合成橡膠：運動場中央的籃球場及跑道以瀝青為基礎，表層合成橡膠處理
- 地墊：以瀝青為基礎，結合合成橡膠與彈性基層

圖例		名稱	規格尺寸
透水鋪面		透水磚/ 透水混凝土/ 無細骨材混凝土	TH=6cm/-
		鐵木	14x4cm
		綠地	-
不透水鋪面		瀝青+PU	-
		人工草跑道	TH=2.5-3cm
		彈性地墊	-
		AC/車道磚	-

Landscape

Plantation (tree species)

1 麵包樹x3

2 光蠟樹x11

3 鳳凰木x1

4 黃花風鈴木x3

5 台灣櫸木x4

6 楓香x55

7 厚皮香x5

8 竹柏x3

9 烏心石x9

10 青楓x1

11 樟樹x47

12 鵝掌柴x5

13 小葉欖仁x2

14 茄苳x3

15 苦楝x4

16 穗花棋盤腳x1

17 落羽松x2

18 緬梔x1

19 小葉桑x1

Landscape

Plantation (shrubs and lawns)

S1鵝掌藤

S2金毛杜鵑

S3海桐

S6野牡丹

S7杜虹花

S8楦梧

S12山黃梔

S13白水木

H1山蘇

S4車桑子

S5雙花金絲桃

S9月橘

S10田代式石斑木

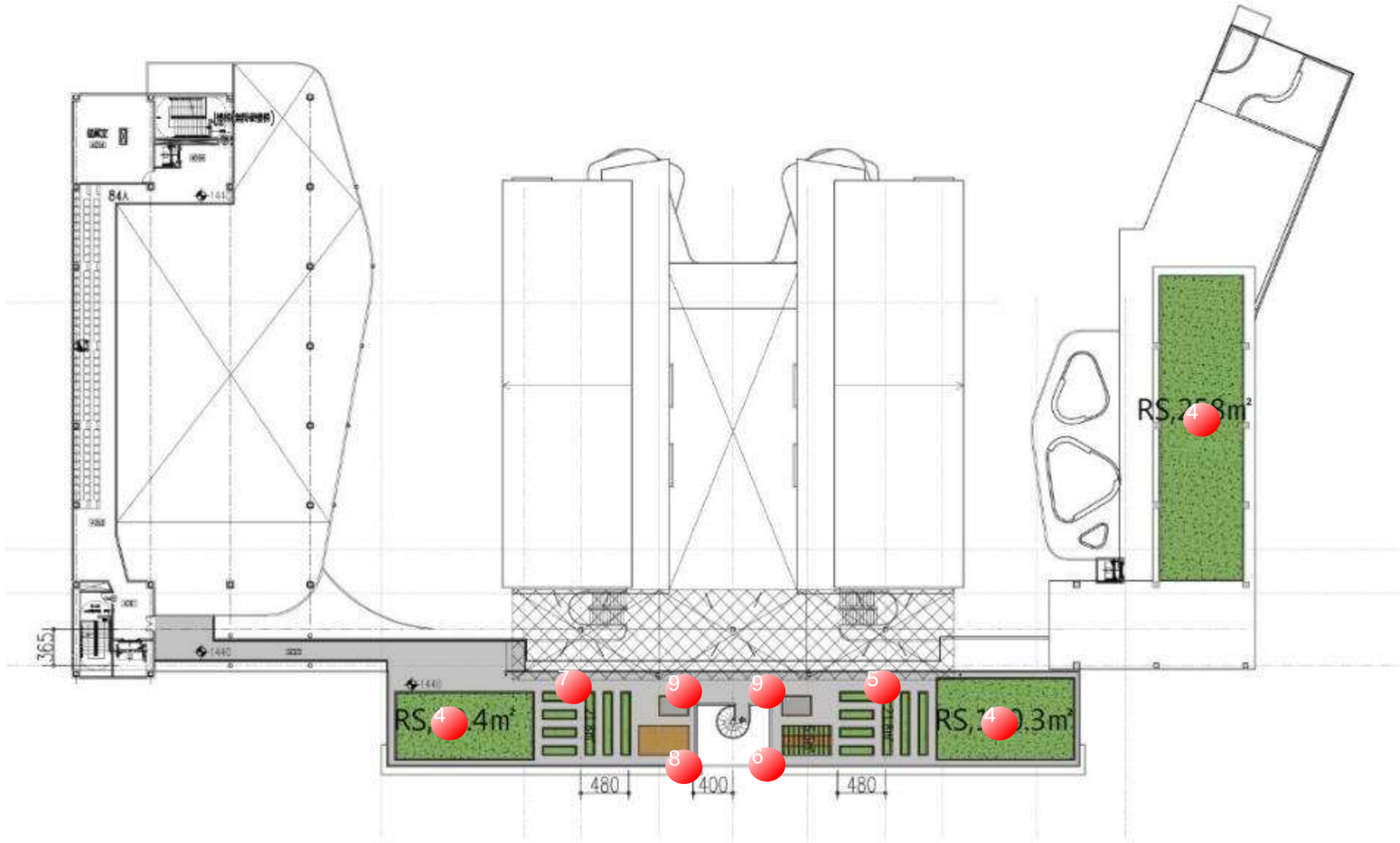
H2十大功勞

H3龍船花

Landscape

Plantation (other green areas)

1. 露台綠化
2. 綠化斜坡
3. 圖書館屋頂綠化平台
4. 屋頂薄層綠化
5. 實驗菜圃
6. 實驗菜圃(棚架)
7. 陶藝花園
8. 陶藝工作區
9. 工具儲藏室
10. 樹林草坡



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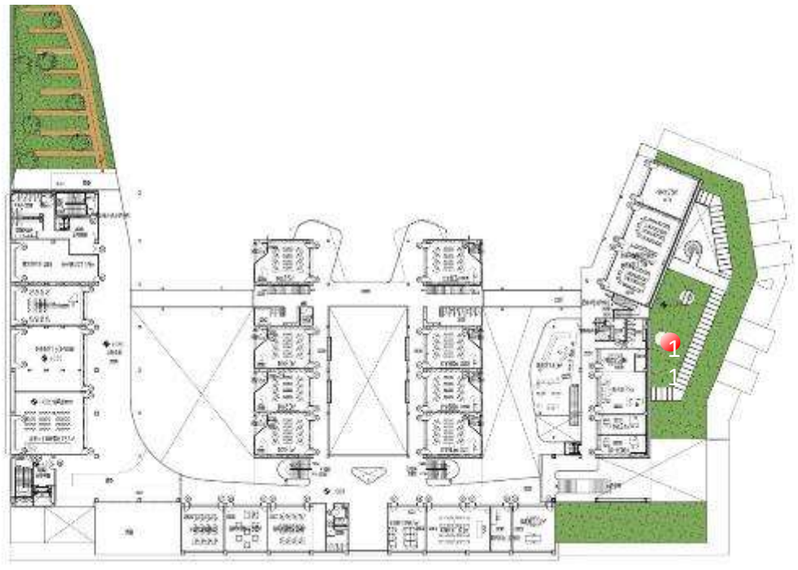

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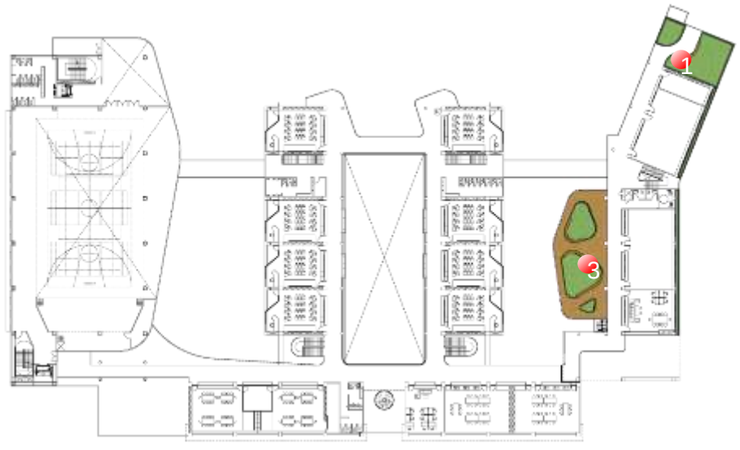

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Landscape

Plantation (other green areas)

Shrubs and lawns

●灌木類考量耐旱耐風及易維管，選用田代式石斑木、白水木等植物。

地被配置計畫

●以耐陽耐旱植物，如台北草。

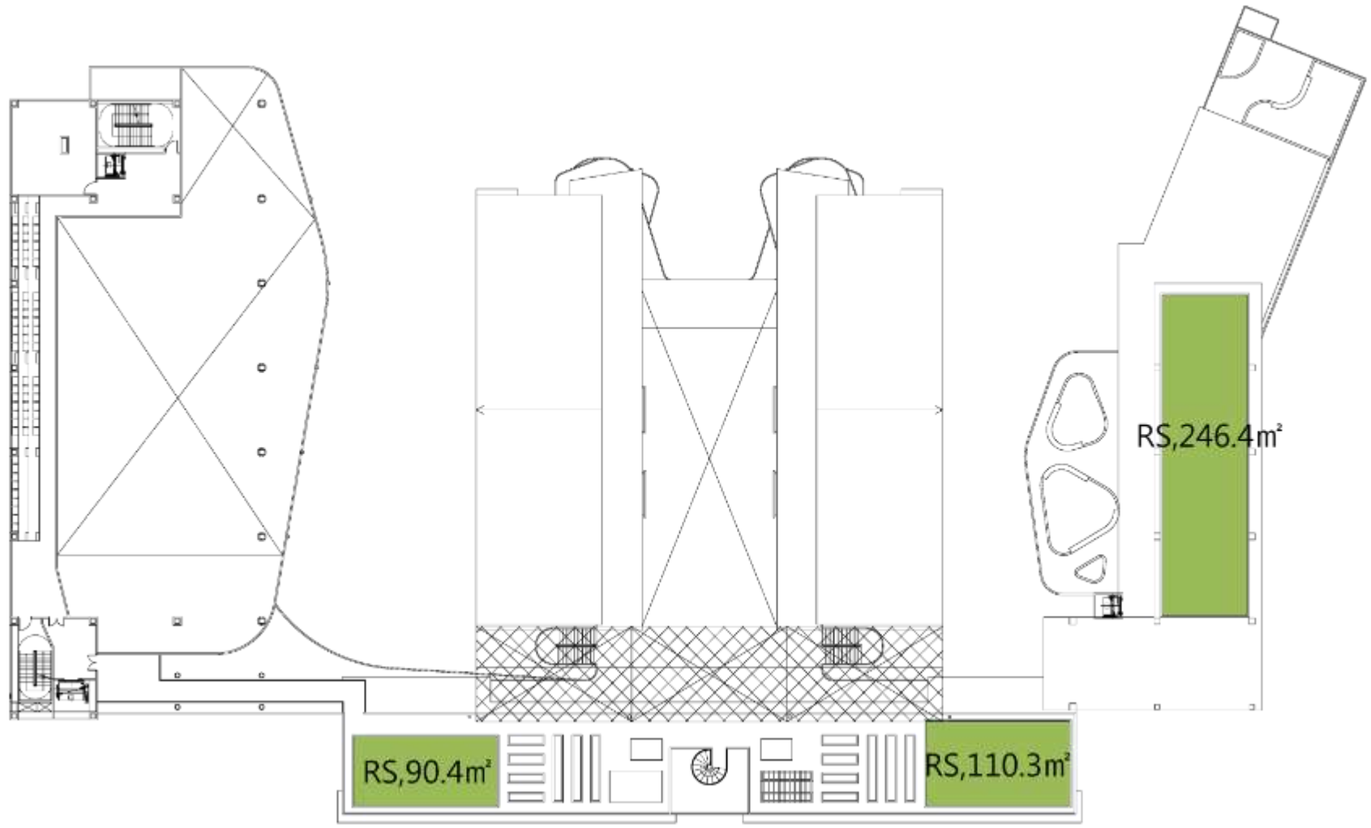
■ S10田代式石斑木 ■ S13白水木 ■ G3台北草

屋頂薄層綠化

●植栽選用生長強健、適應淺介質、強風、烈日、乾旱並且根系不會造成屋頂破壞為主之景天科與馬齒莧科植栽。

選用玫瑰景天(春天開花)、馬齒莧(夏天開花)、小蚌蘭(葉色變化)、龍舌蘭(觀葉灌叢)等植物。

■ RS3小蚌蘭 ■ RS1玫瑰景天 ■ RS2馬齒莧



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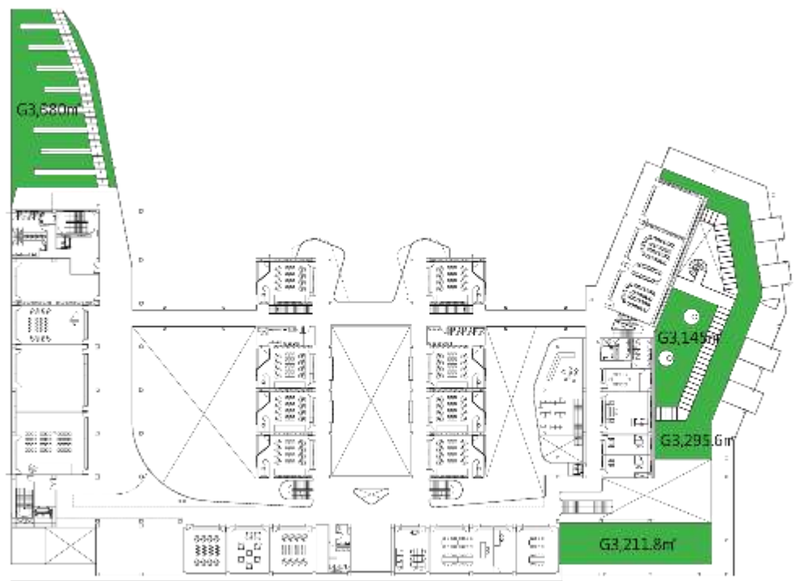

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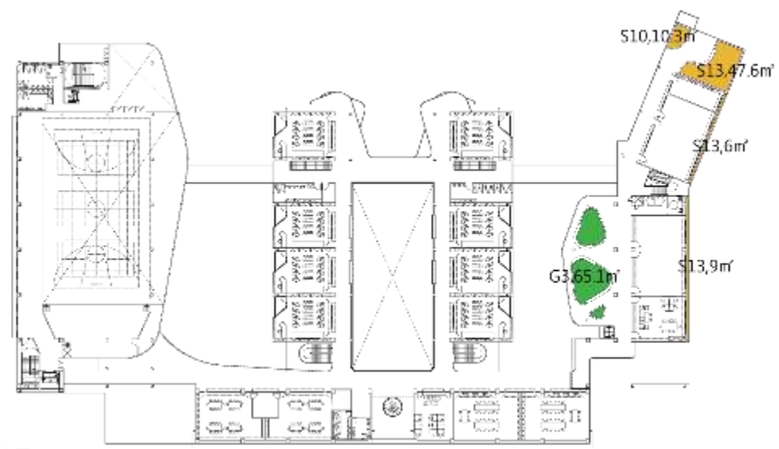


3F

Landscape

Plantation (Aquatic Plants)

W1小蒼菜

W2台灣萍蓬草

W3野慈姑

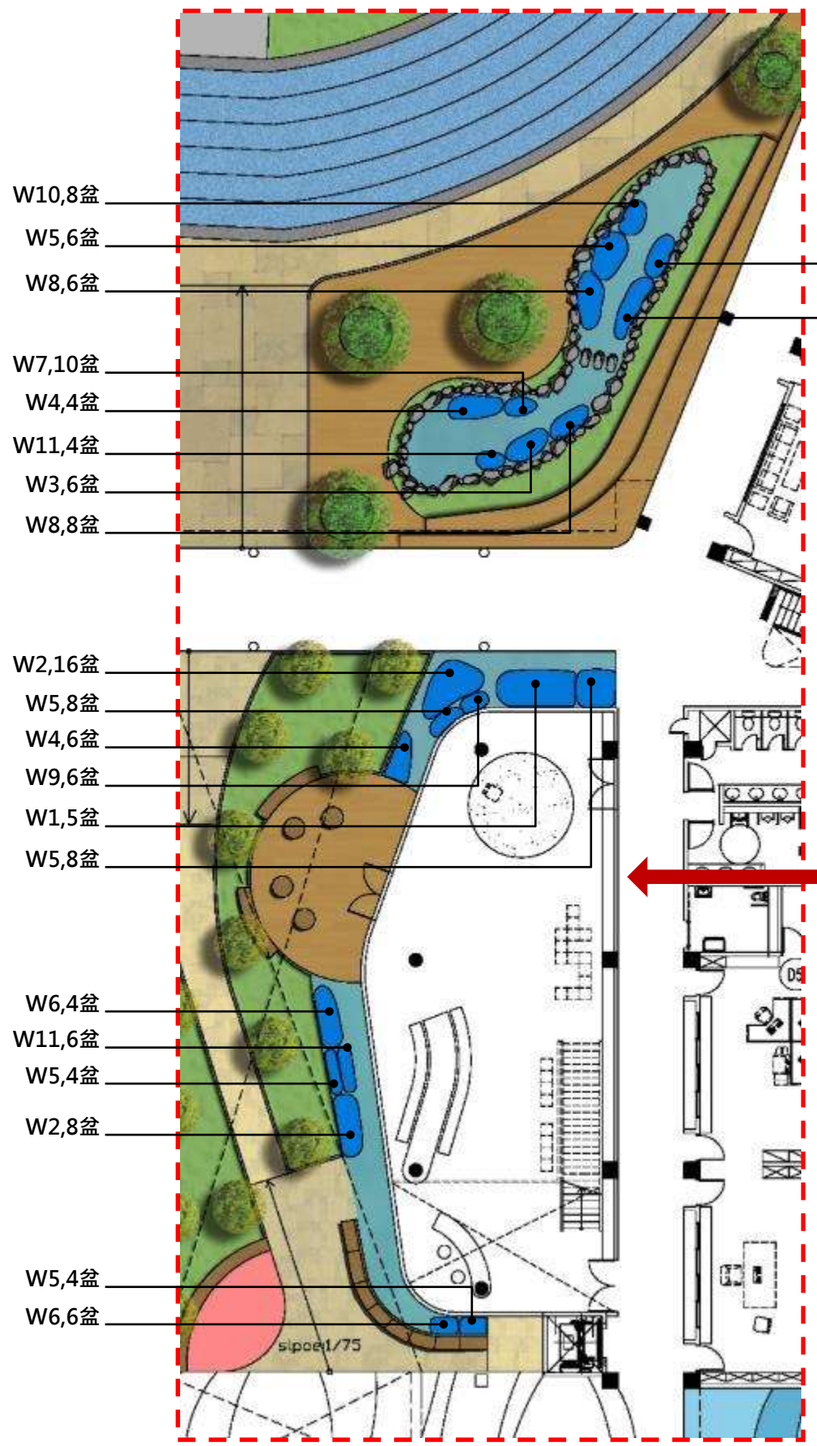
W5水燭

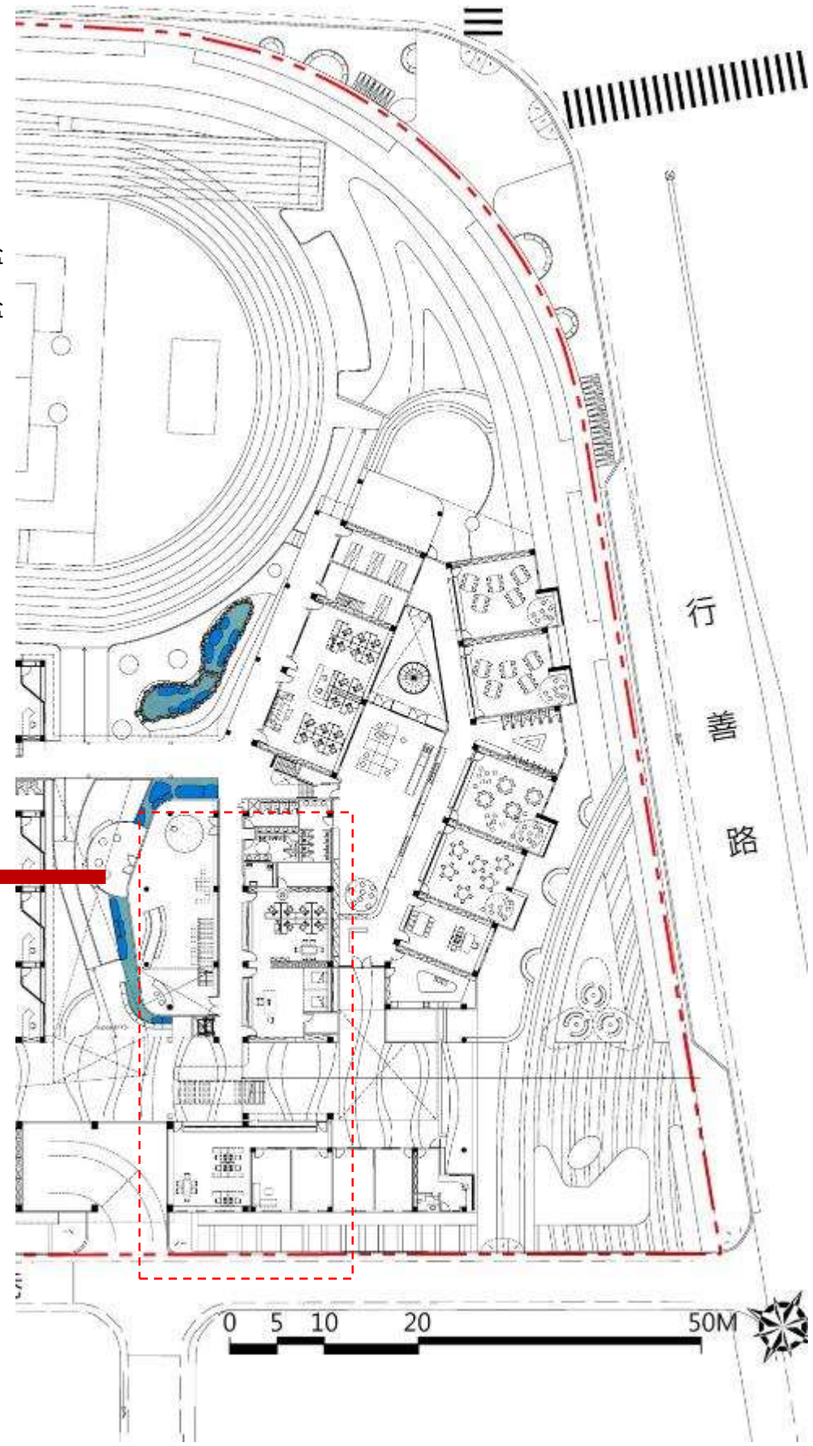
W6燈心草

W7水芹菜

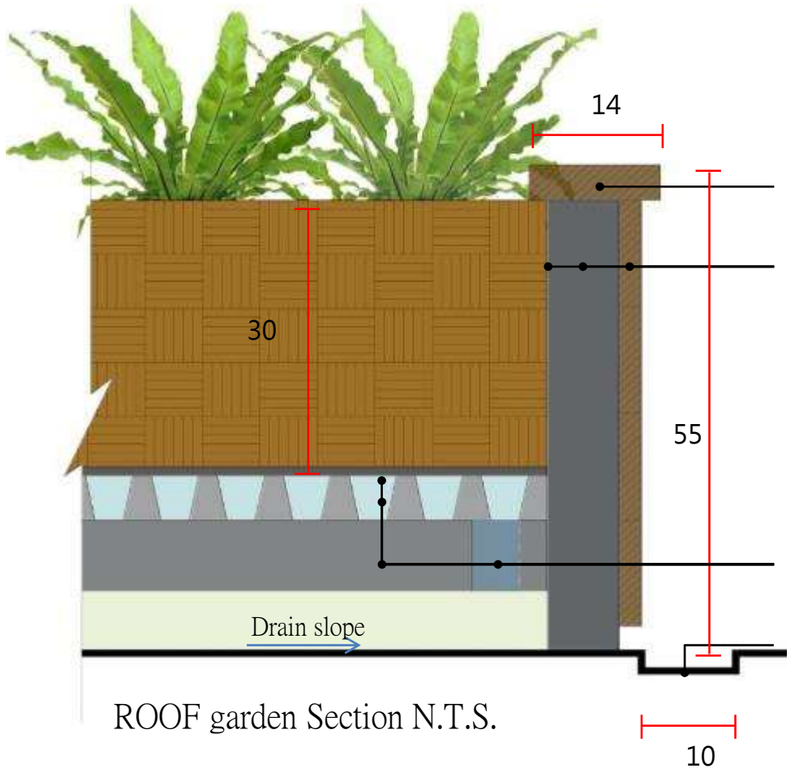
W9石菖浦

W10圓葉節節菜

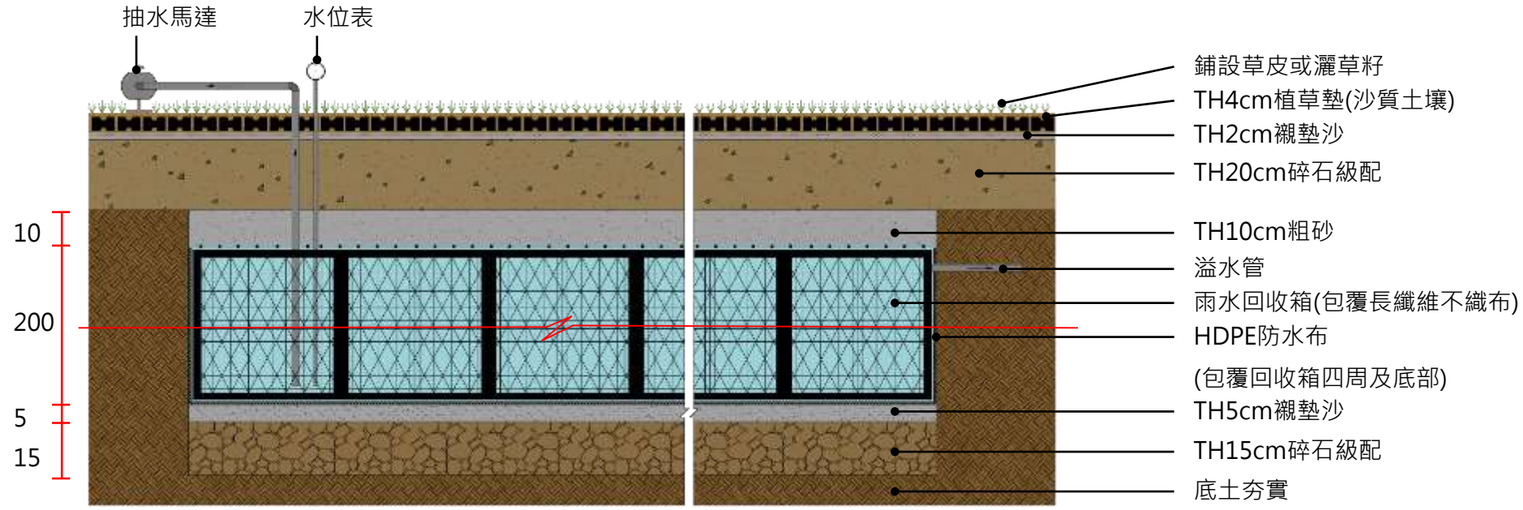




Landscape



ROOF garden Section N.T.S.



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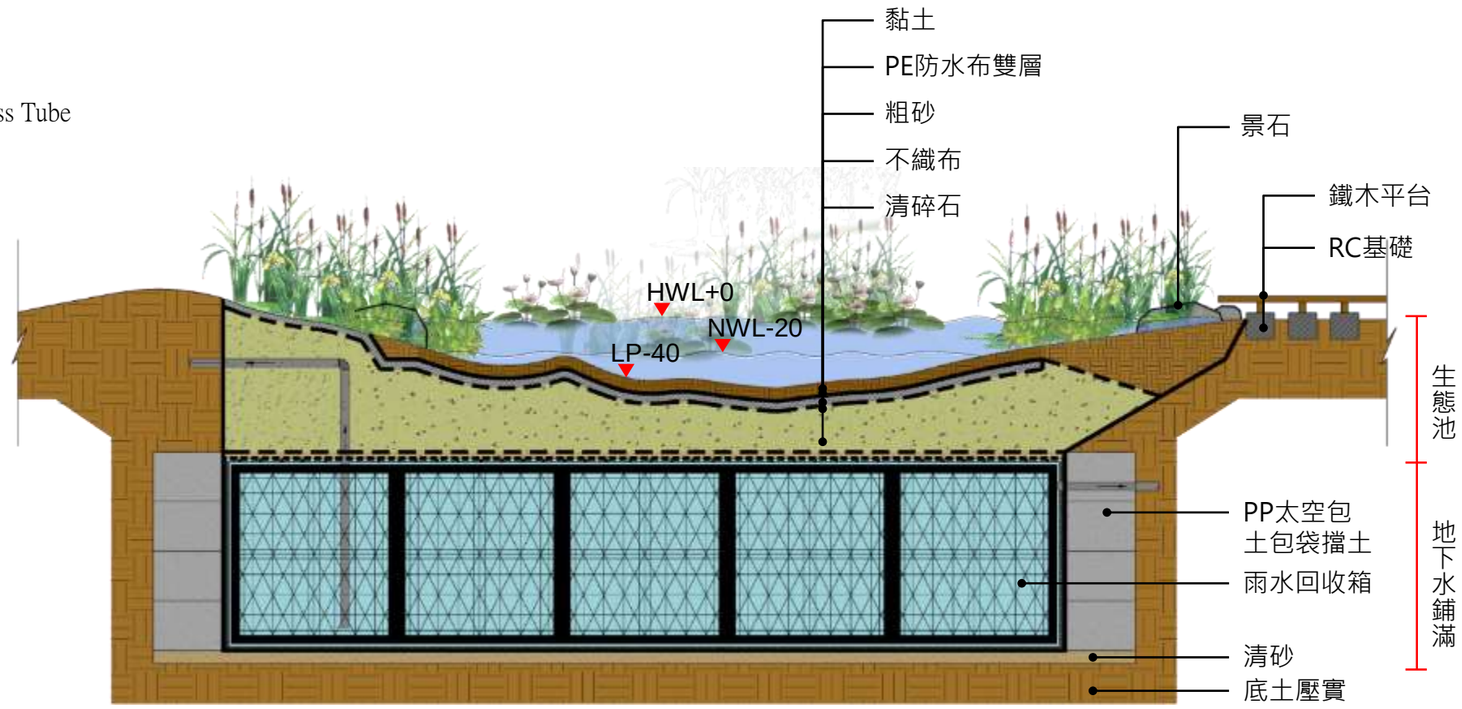
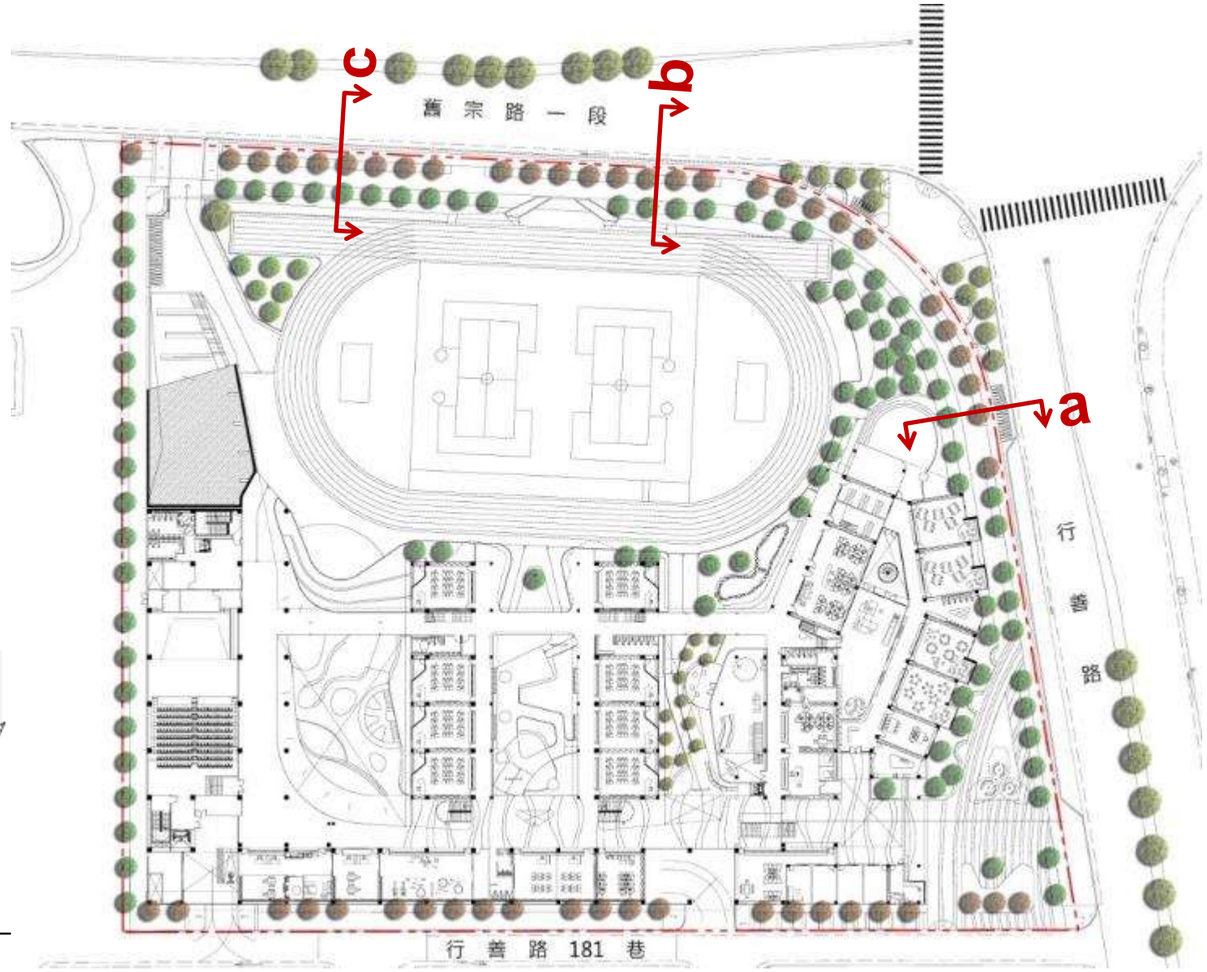


行政樓旁生態池剖面詳圖 N.T.S.

Sidewalk System



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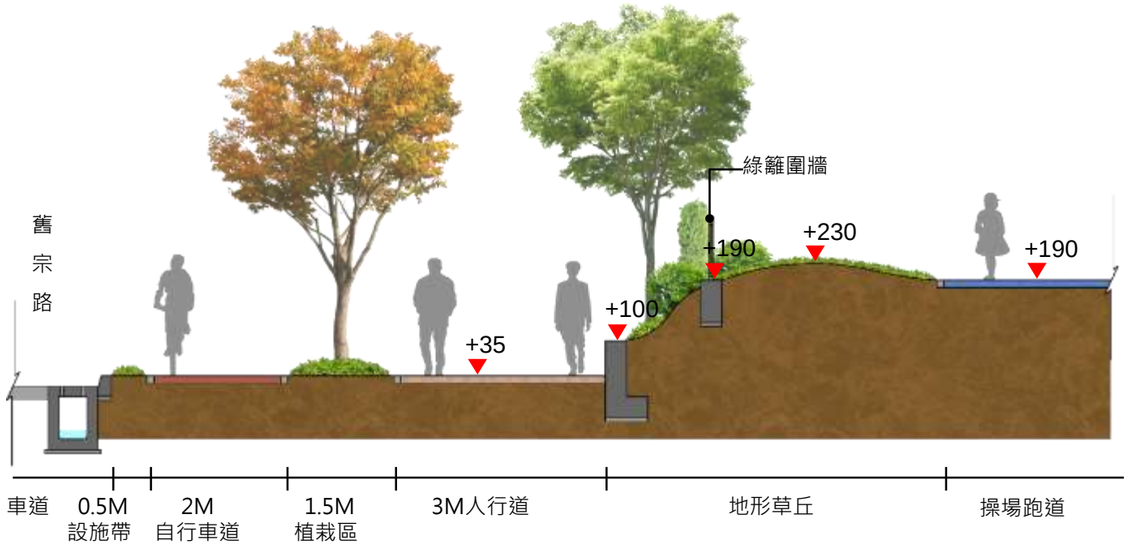

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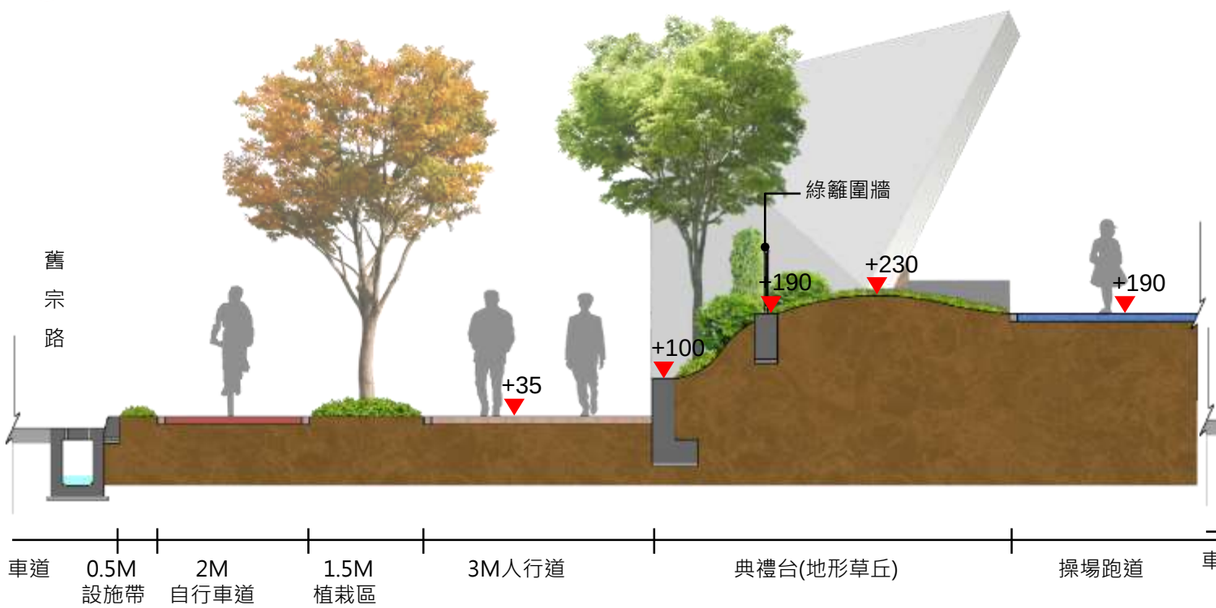

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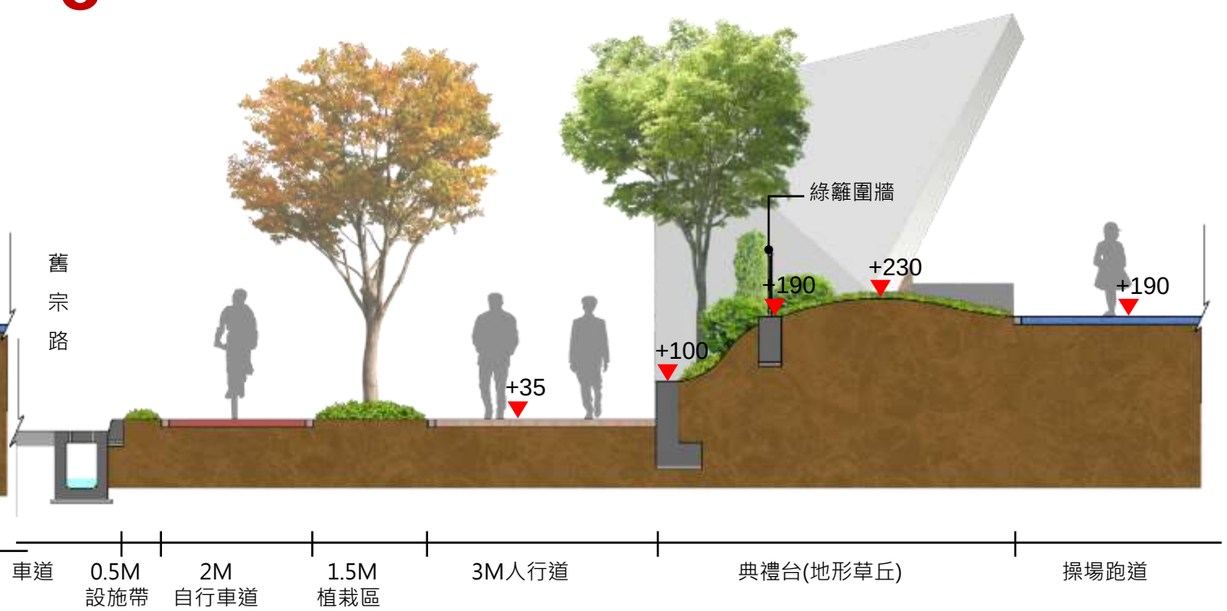
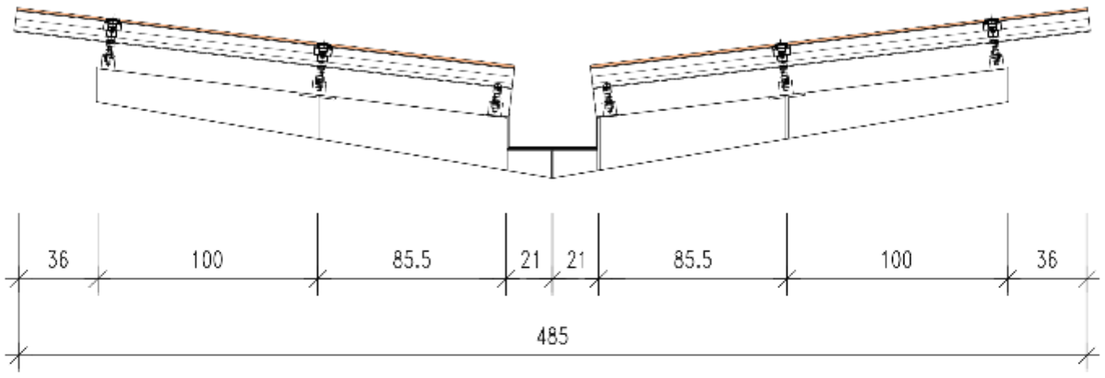
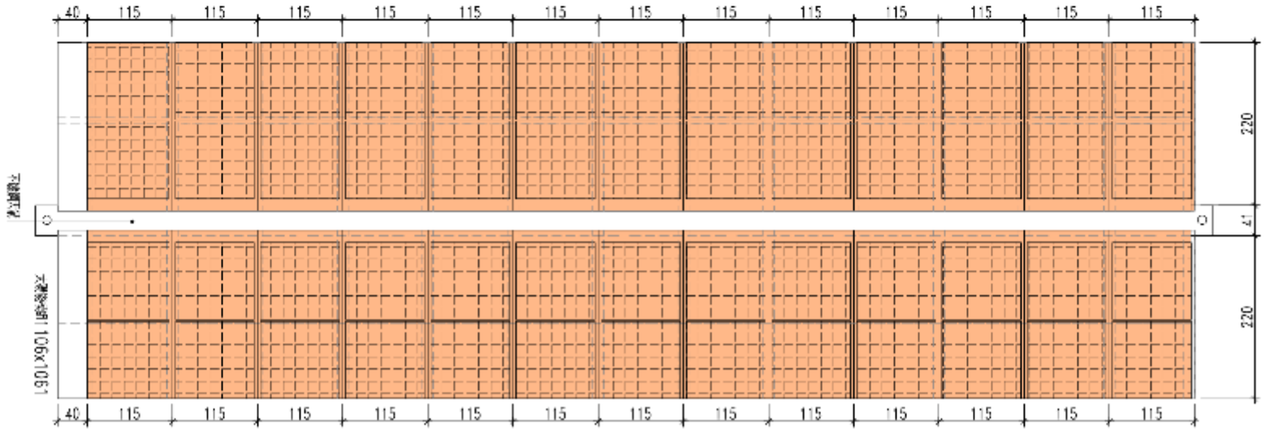


Renewable Energy

Solar Panel System

125W Solar Panel 1106 X 1061
6 + 6 mm Agglutination glass





Renewable Energy

Hydro Generator System (1.5kw)

It can generate water level from the campus's altitude. The energy can be used to not only the irrigation system, but also the Lecture Demonstrations.

斜擊式水力發電機

型號	功率(kW)	水頭(M)	流量(m^3/s)	重量(Kg)	輸出電壓
FS-WB-500	0.5	6-15	0.007	30	220V
FS-WB-1000	11	10-20	0.012	44	220V
FS-WB-3000	3	15-30	0.025	72	220V
FS-WB-5000	5	20-50	0.035	150	220V
FS-WB-8000	8	25-60	0.045	160	3相220V
FS-WB-10000	10	30-60	0.055	190	3相220V

斜擊式5kw

水頭高度: 20m-120m
建議水流量:0.035-0.006 m ³/sec
建議搭配管徑:150mm-200mm
轉速 :1500 rpm/min
發電機:激磁式發電機或永磁式發電機
(輸出為主單相220V)

斜擊式3kw

水頭高度: 15m-60m
建議水流量:0.028-0.007 m ³/sec
建議搭配管徑:120mm-200mm
轉速 :1500 rpm/分
發電機:永磁式發電機(輸出為主單相220V)

斜擊式水力發電機
安裝示意圖

Green Architecture Indicator

生物多樣性指標 / Biodiversity Indicator
綠化量指標 / Greenery Indicator
基地保水指標 / Water Retention Indicator
日常節能指標/ Energy Saving Indicator
二氧化碳減量指標 / CO2 Reduction Indicator
廢棄物減量指標 / Waste Reduction Indicator
室內環境指標 / Interior Indicator
水資源指標 / Water Resources Indicator
污水垃圾改善指標 / Waste Reduction Indicator

綠建築標章評估總表－基本型（2012 年版）

一、建築名稱：臺北市內湖區潭美國民小學遷校工程

二、建物概要：地下 1 層，地上 3 層鋼筋混凝土構造、鋼骨鋼筋混凝土構造學校類及大型空間類建築

三、評估結果：

申請指標項目		設計值	系統得分	
□	生物多樣性指標	BD= BDc=	RS1=18.75×【(BD-BDc)/BDc】+1.5=	_
■	綠化量指標	TCO2=4187977.39 TCO2c=3648892.50	RS2=6.81×【(TCO2- TCO2c)/TCO2c】+1.5=	2.51
■	基地保水指標	λ=1.89 λc=0.30	RS3=4.0×【(λ-λc)/λc)】+1.5=	9.00
■	日常節能指標	EEV=0.75 EEVc=0.80	$RS4_1$=a×【(0.80-EEV)/0.80】+2.0=	3.94
		EEV≦EEVc	■合格 □不合格	
		EAC=0.63 EACc=0.80	$RS4_2$=18.6×【(0.80-EAC)/0.80】+1.5=	5.45
		EAC≦EACc	■合格 □不合格	
		EL=0.45 ELc=0.70	$RS4_3$=10.5×【(0.70-EL)/0.70】+1.5=	5.25
		EL≦ELc	■合格 □不合格	
■	二氧化碳減量指標	CCO_2=0.51 CCO_{2c}=0.82	RS5=19.40×【(0.82-CCO_2)/0.82】+1.5=	8.00
■	廢棄物減量指標	PI=2.61 PIc=3.30	RS6=13.13×【(3.30-PI)/3.30】+1.5=	4.25
■	室內環境指標	IE=79.64 IEc=60.00	RS7=18.67×【(IE-60.0)/60.0】+1.5=	7.61
■	水資源指標	WI=8.00 WIc=2.00	RS8=2.50×(WI-2.0)/2.0+1.5=	8.00
		WI≧WIc	■合格 □不合格	
■	污水垃圾改善指標	Gi=14.00 Gic=10.00	RS9=5.15×【(GI-10.0)/10.0】+1.5=	3.56
系統總得分 RS=ΣRSi=57.57				

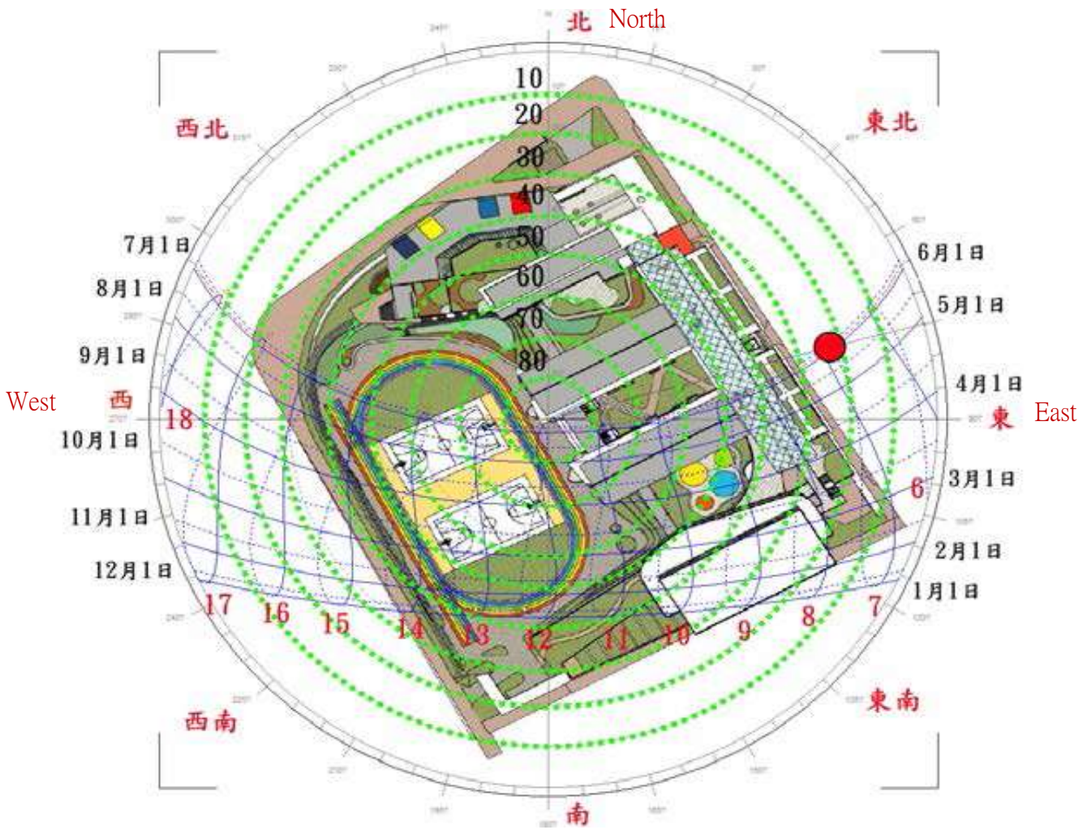
四、綠建築標章分級評估級：

綠建築標章等級		合格級	銅級	銀級	黃金級	鑽石級
■	九大指標全評估總得分	20≦RS＜37	37≦RS＜45	45≦RS＜53	53≦RS＜64	64≦RS
□	免評估生物多樣性指標	18≦RS＜34	34≦RS＜41	41≦RS＜48	48≦RS＜58	58≦RS
綠建築標章等級判定		□	□	□	■	□

五、填表人簽章：

Ecotech

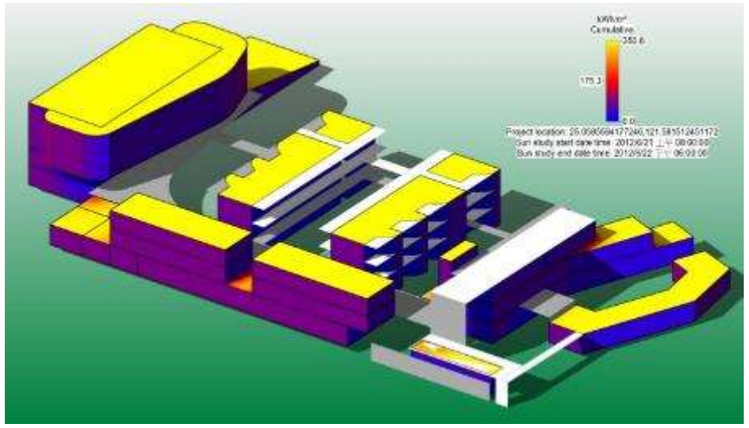
Solar Path & Louver System



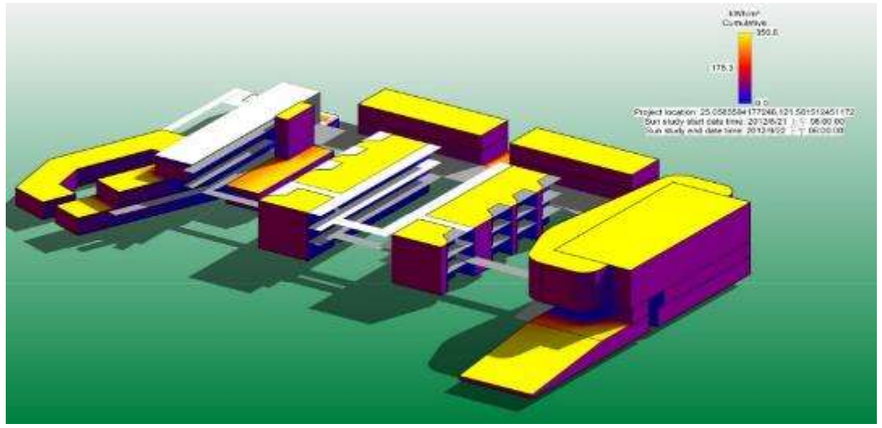
Ecotech

Solar Path & Louver System

Measurement of Solar Radiation on Building Envelop

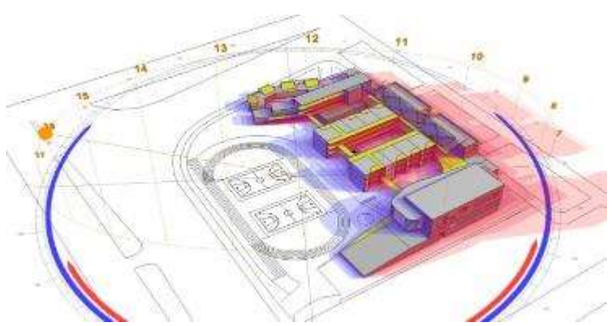


North

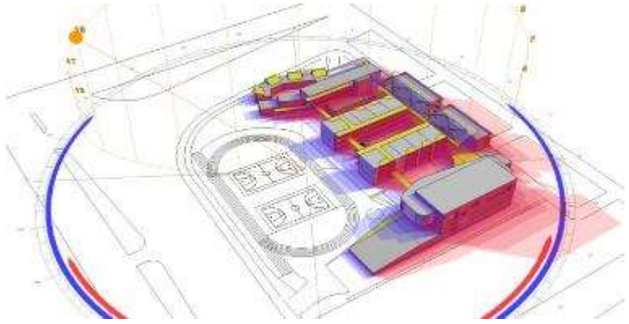


South

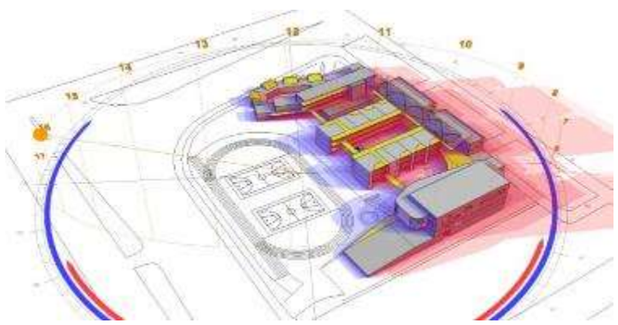
Analysis of Shadow Effects of Sunshine



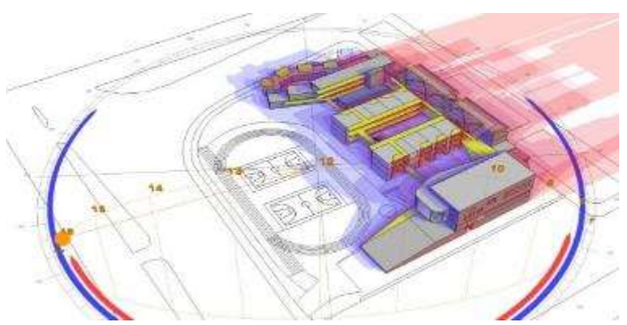
Spring Solstice



Summer Solstice



Autumn Solstice



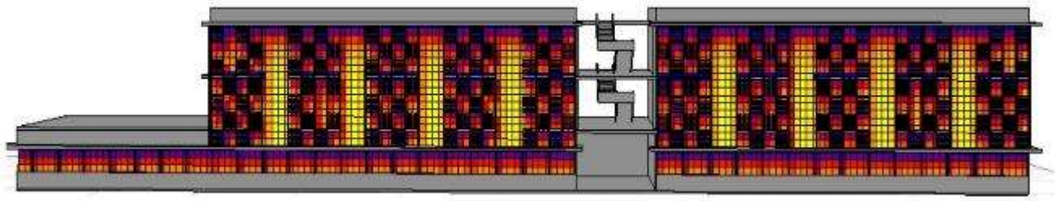
Winter Solstice

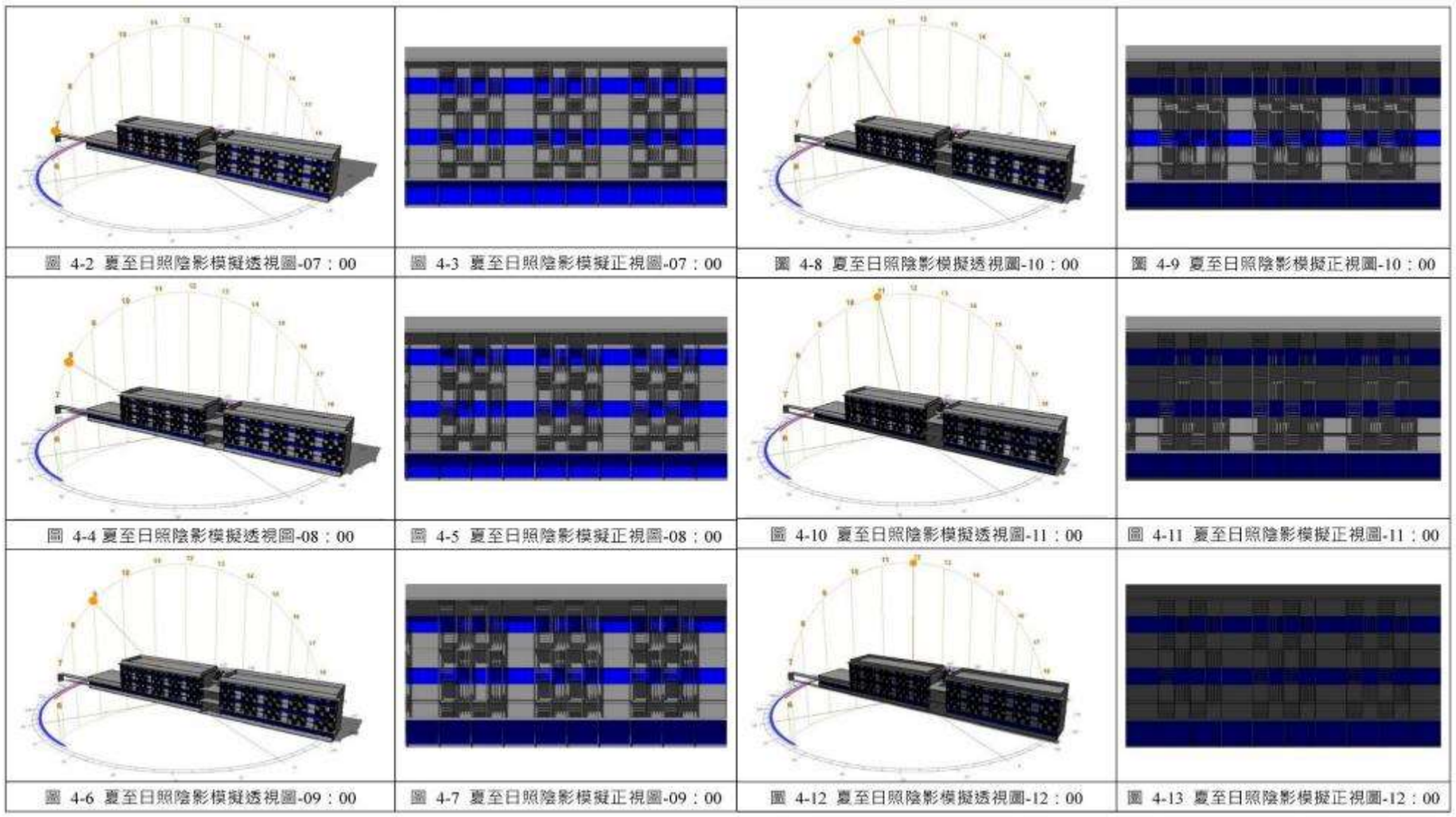
Ecotech

Solar Path & Louver System

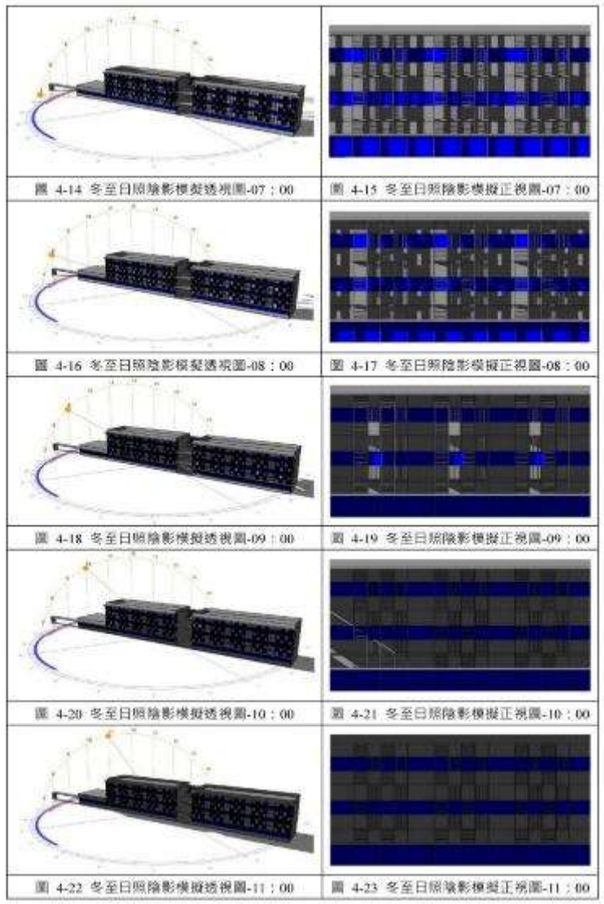
After Adding Egg crate Shading Device, the building reduce 325.06-138.81=186.25 kWh / m² heat, the decrease of insolation is 57.3% 。

The Insolation of East Elevation





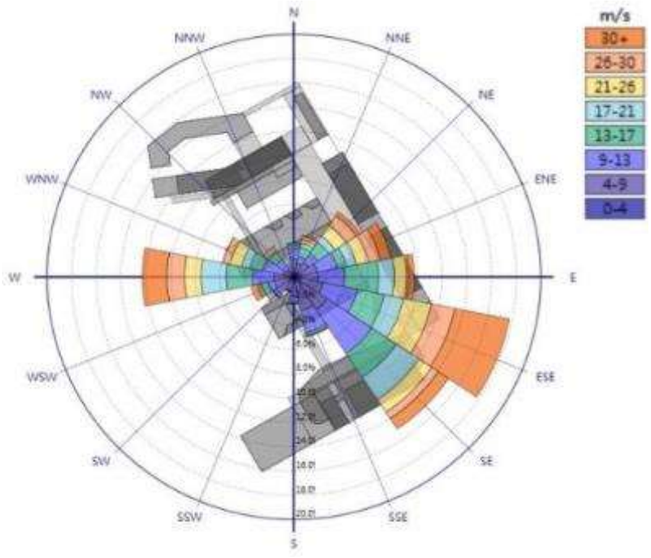
Summer daylight 7am-12am



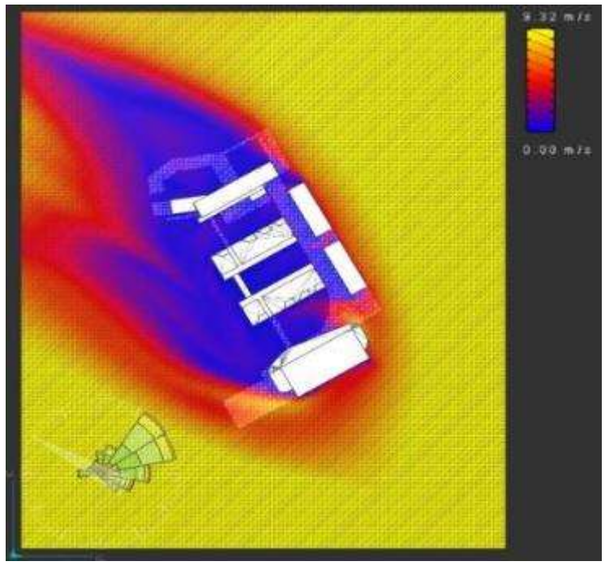
Winer daylight 7am-12am

Ecotech

Wind Environment Simulation (summer)



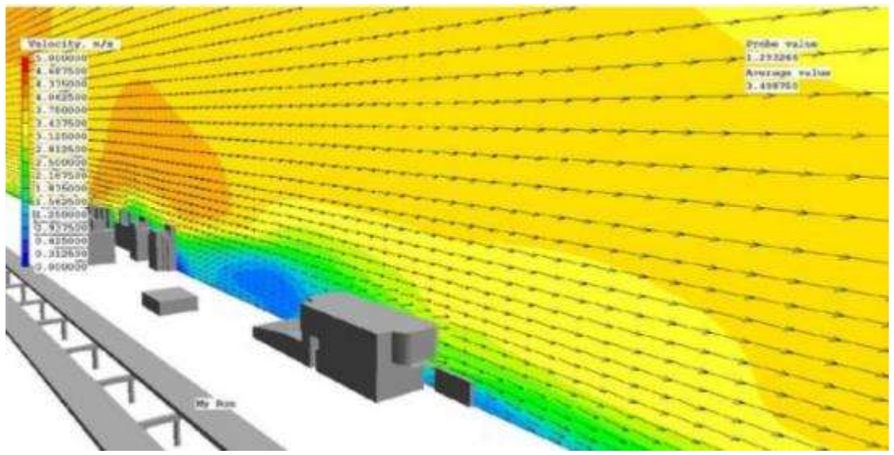
Summer / Average Wind direction and speed



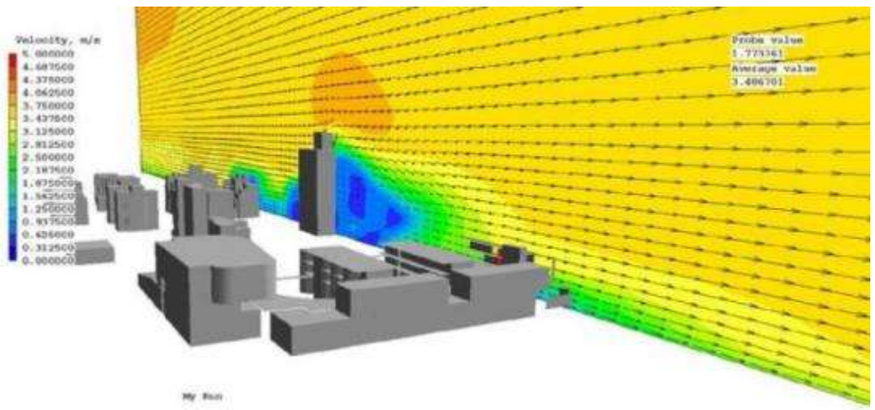
Summer Main Prevailing Wind Direction

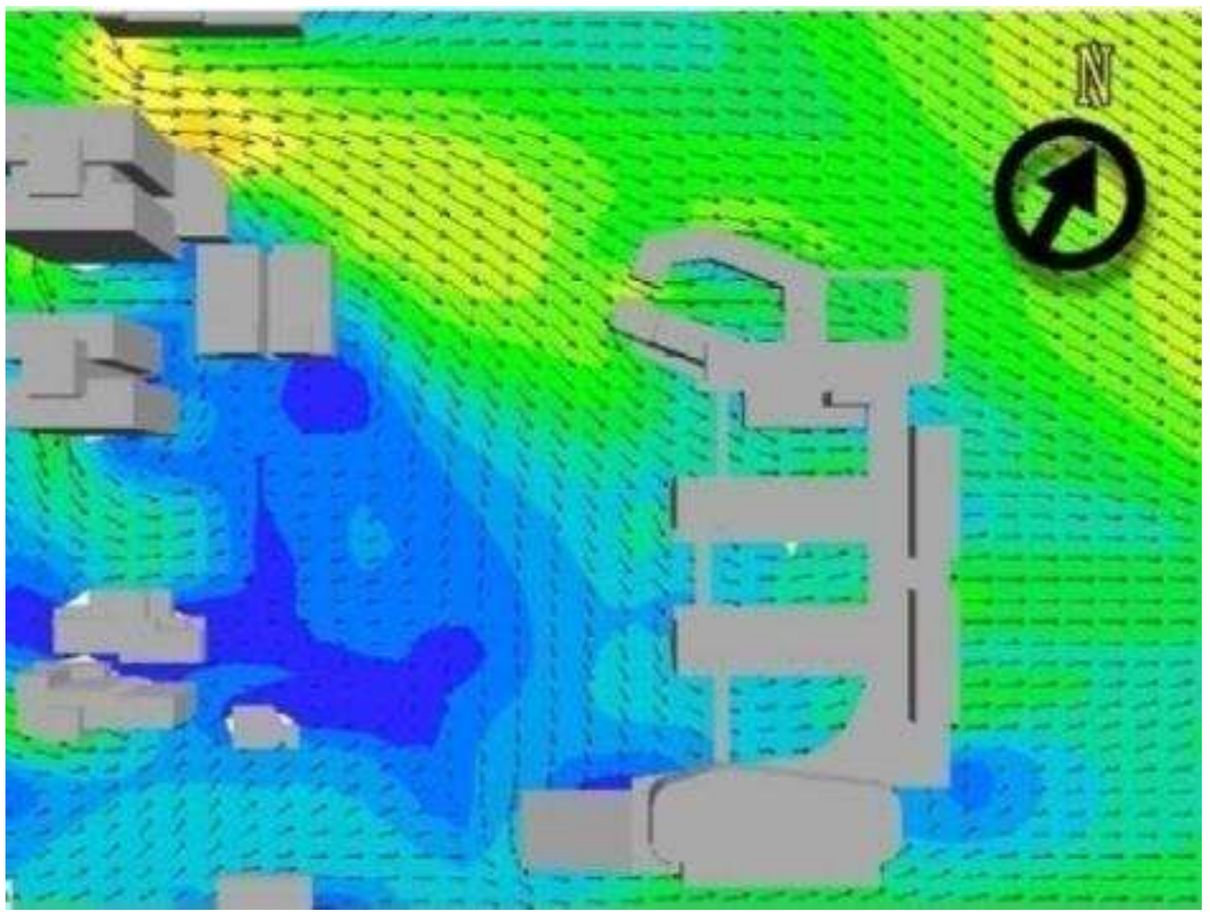
Summer wind direction and speed

A Elevation



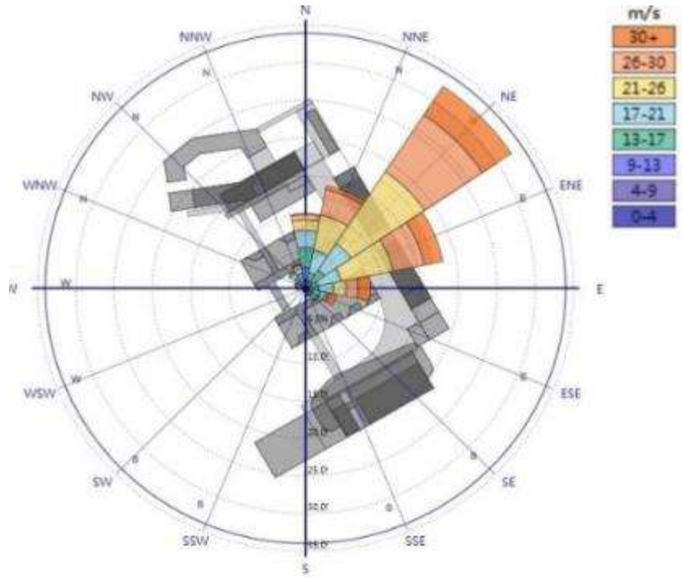
B Elevation



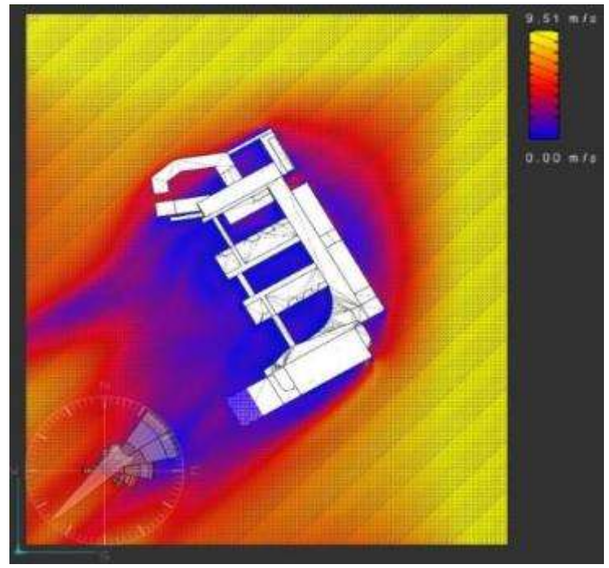


Ecotech

Wind Environment Simulation (winter)



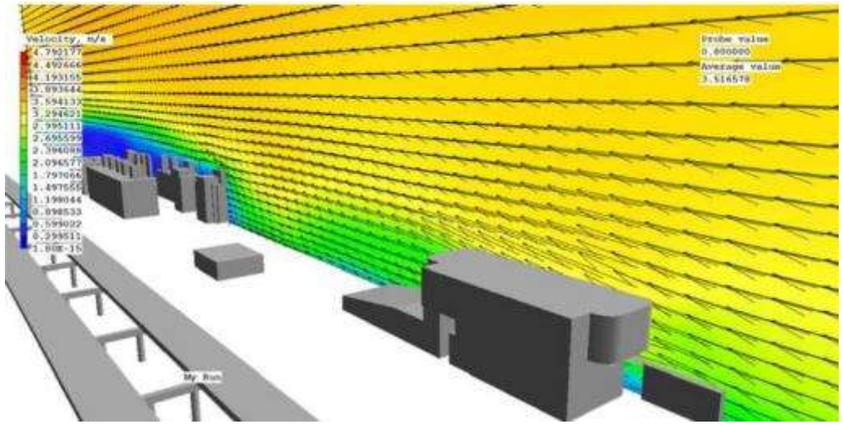
Winter / Average Wind direction and speed



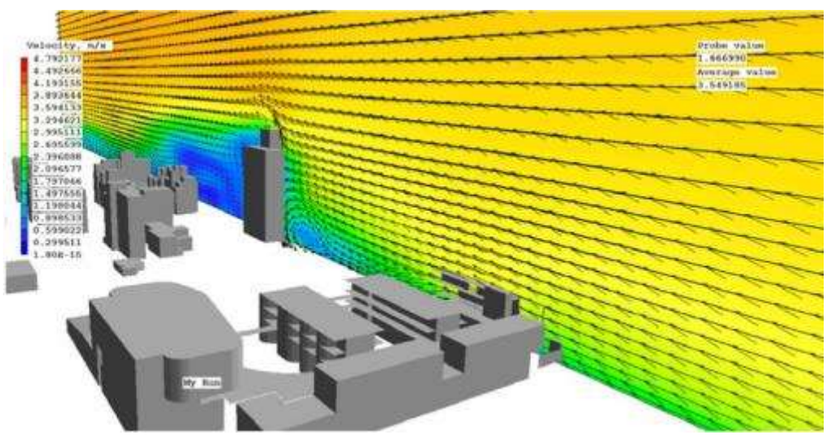
Winter Main Prevailing Wind Direction

Winter wind direction and speed

A Elevation



B Elevation



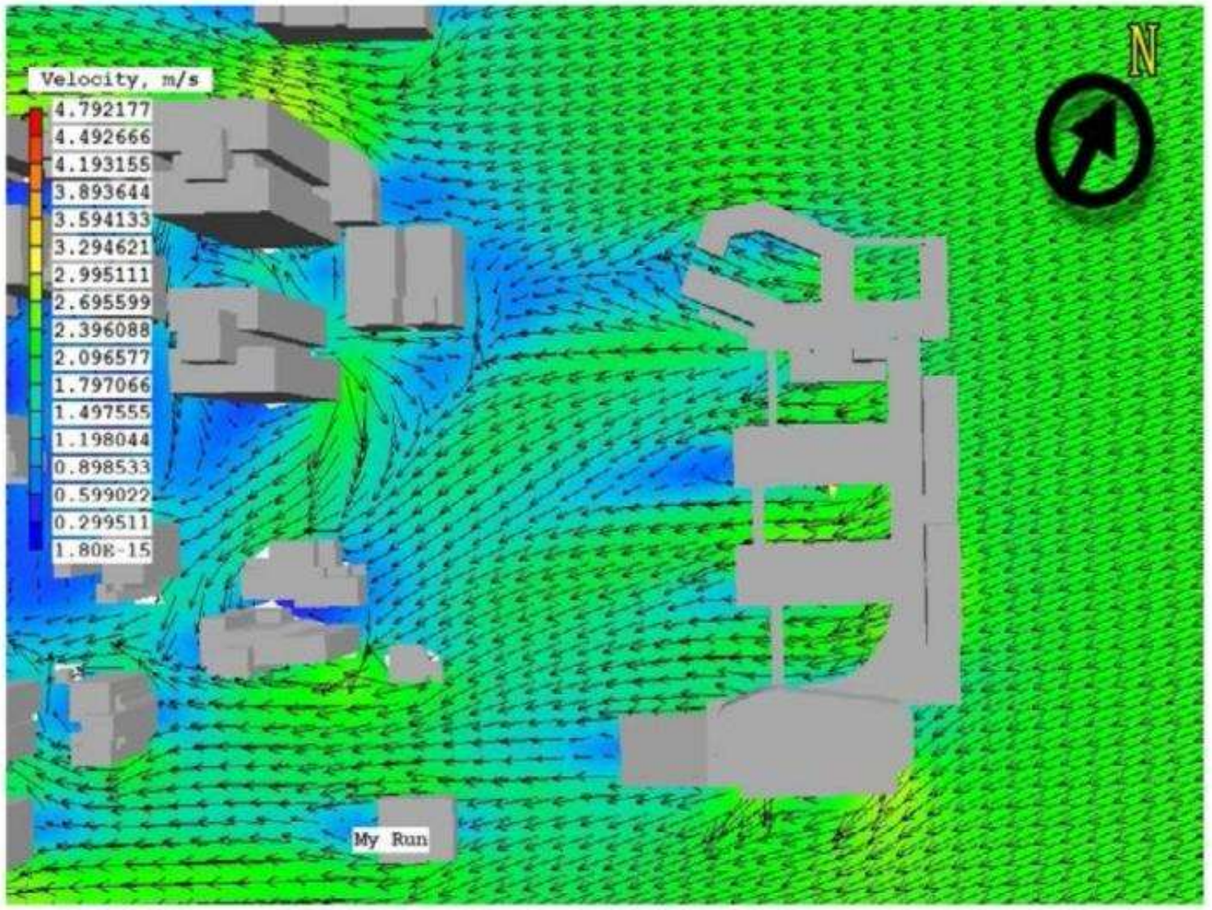
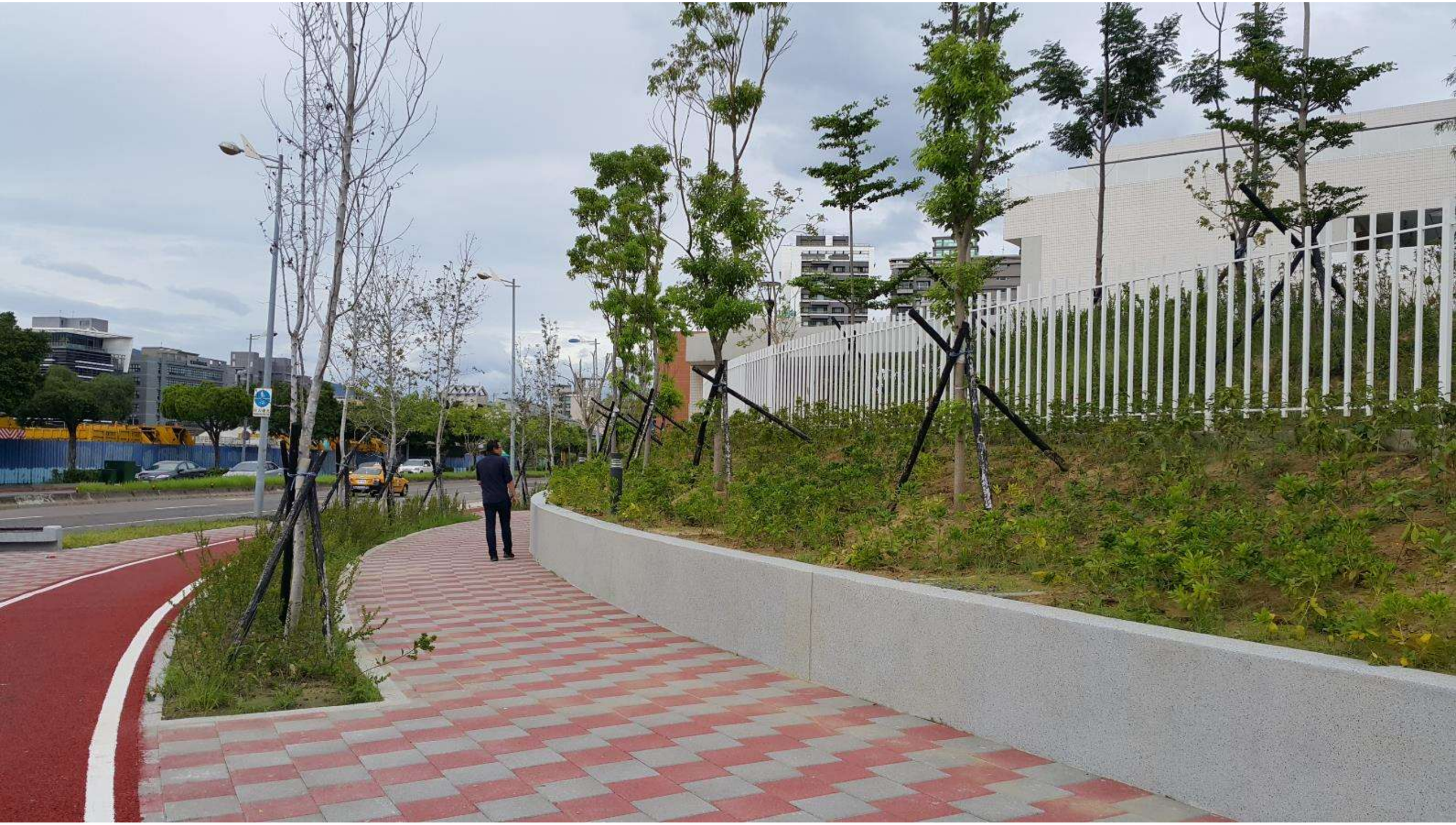
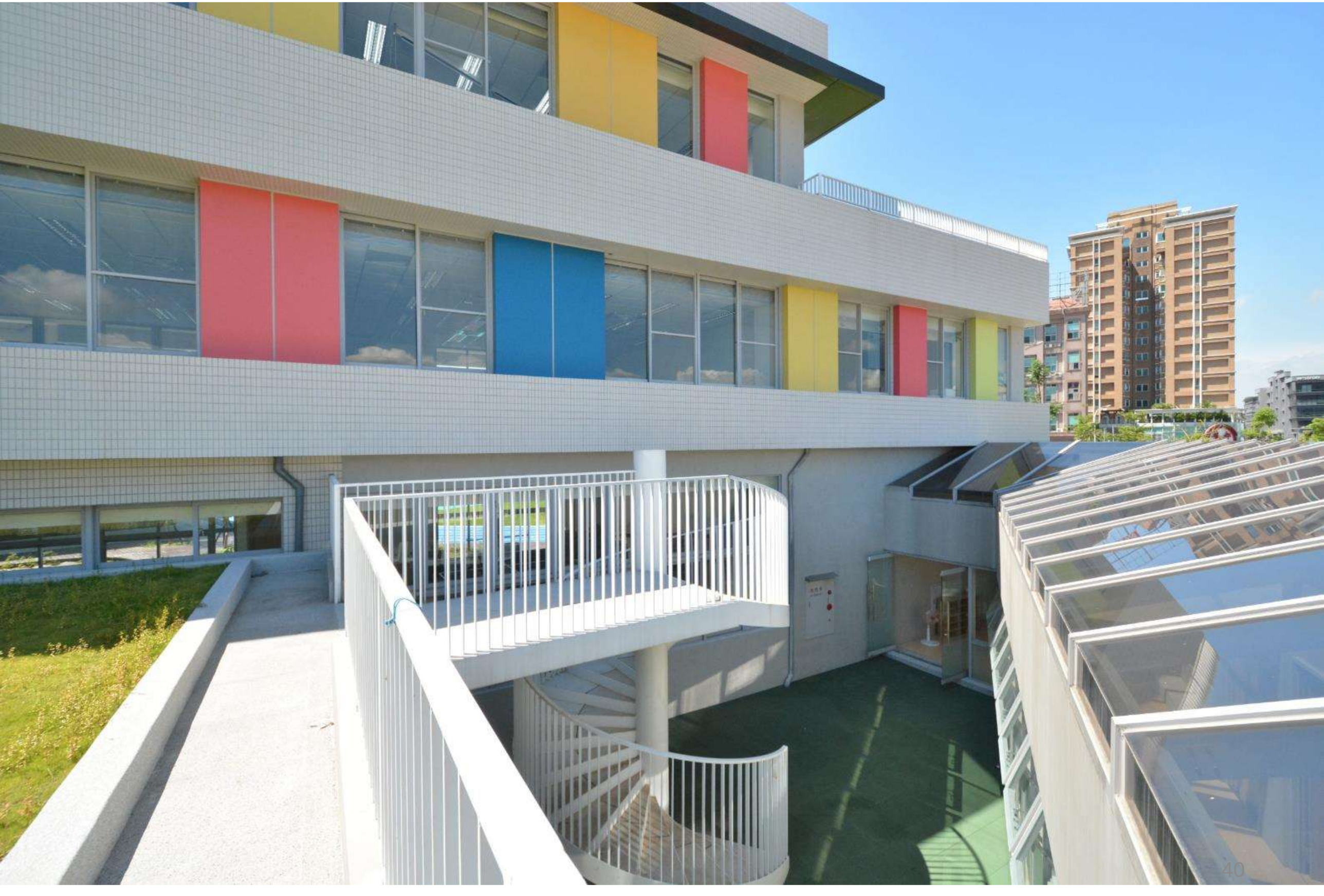
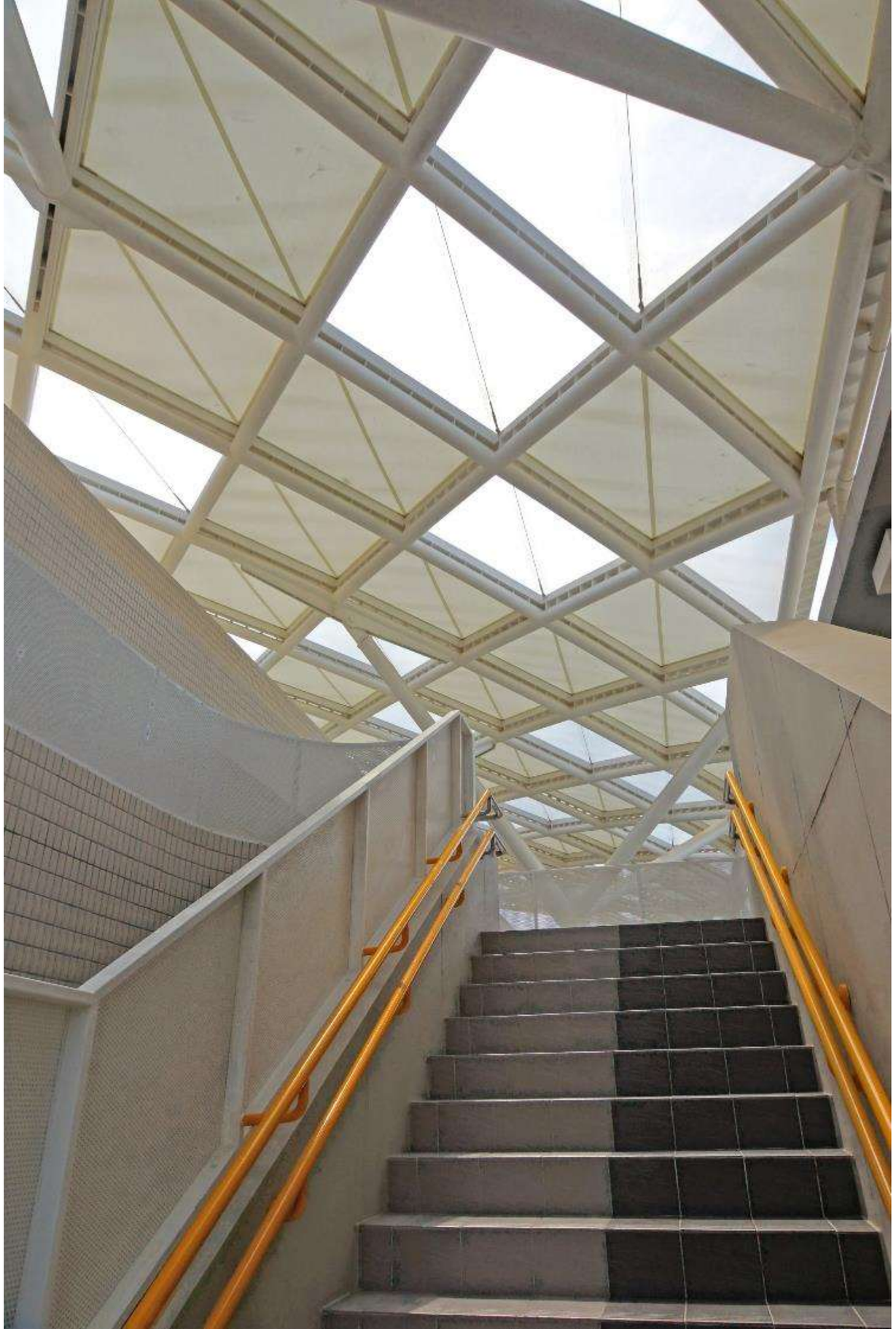


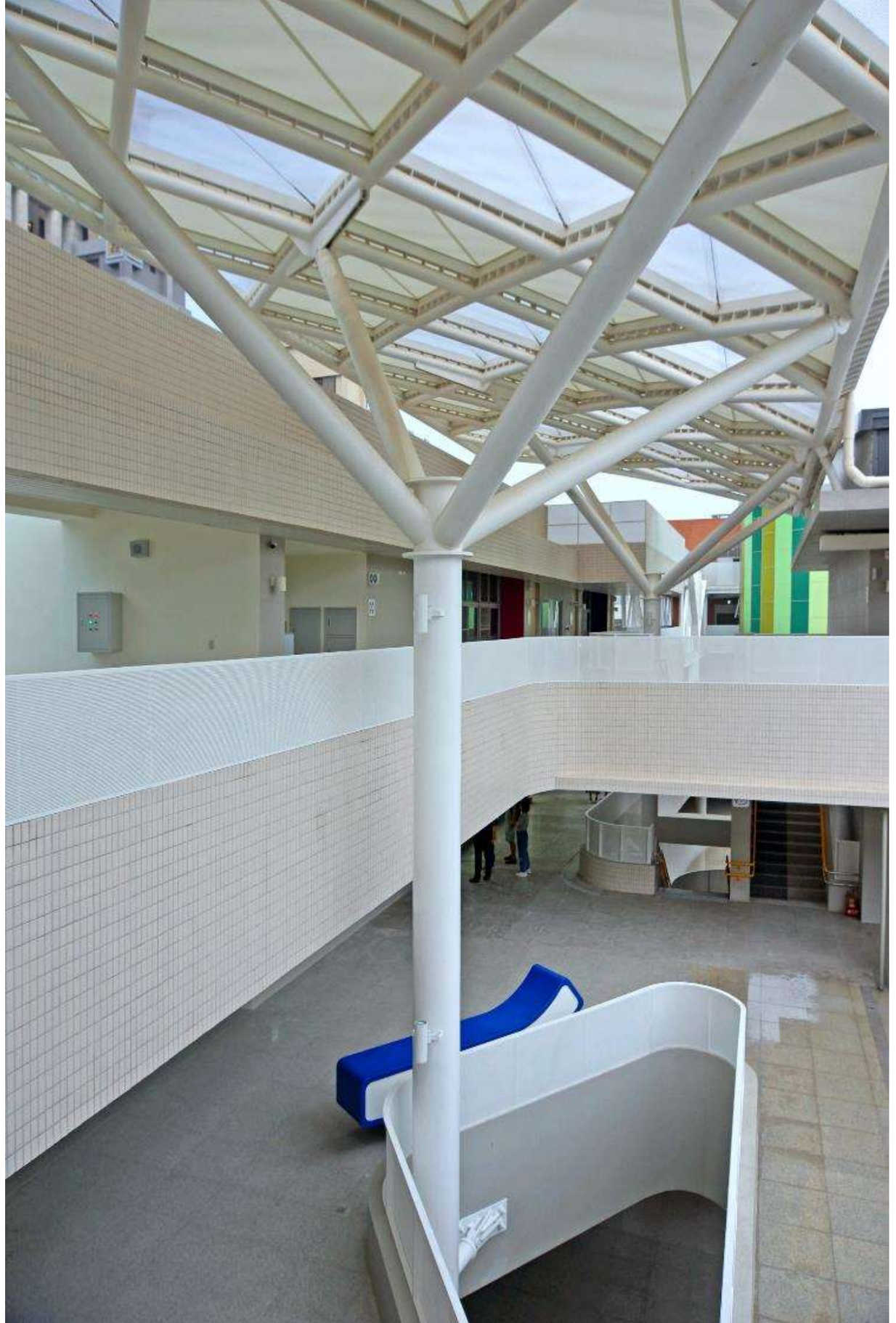
Photo Gallery

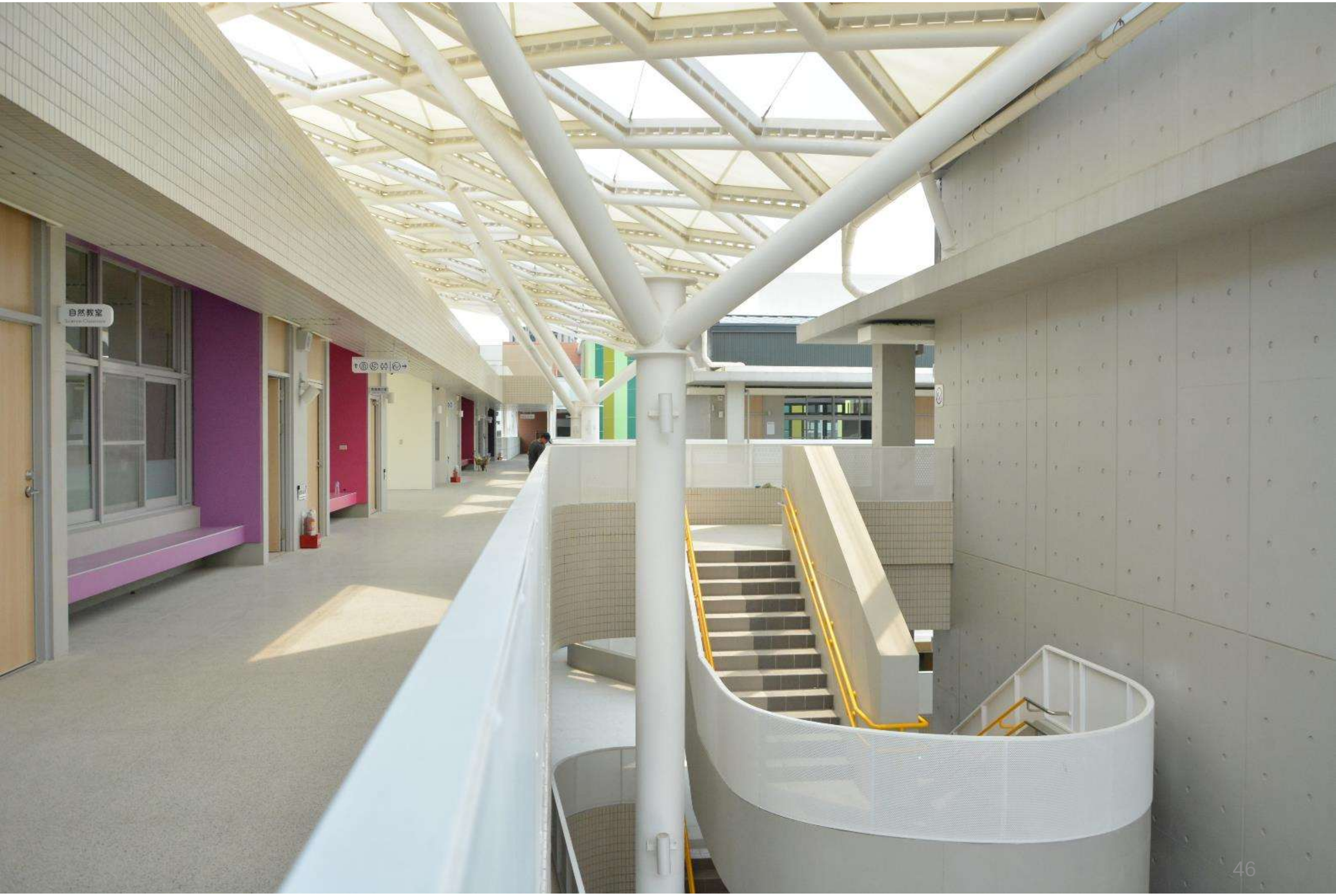
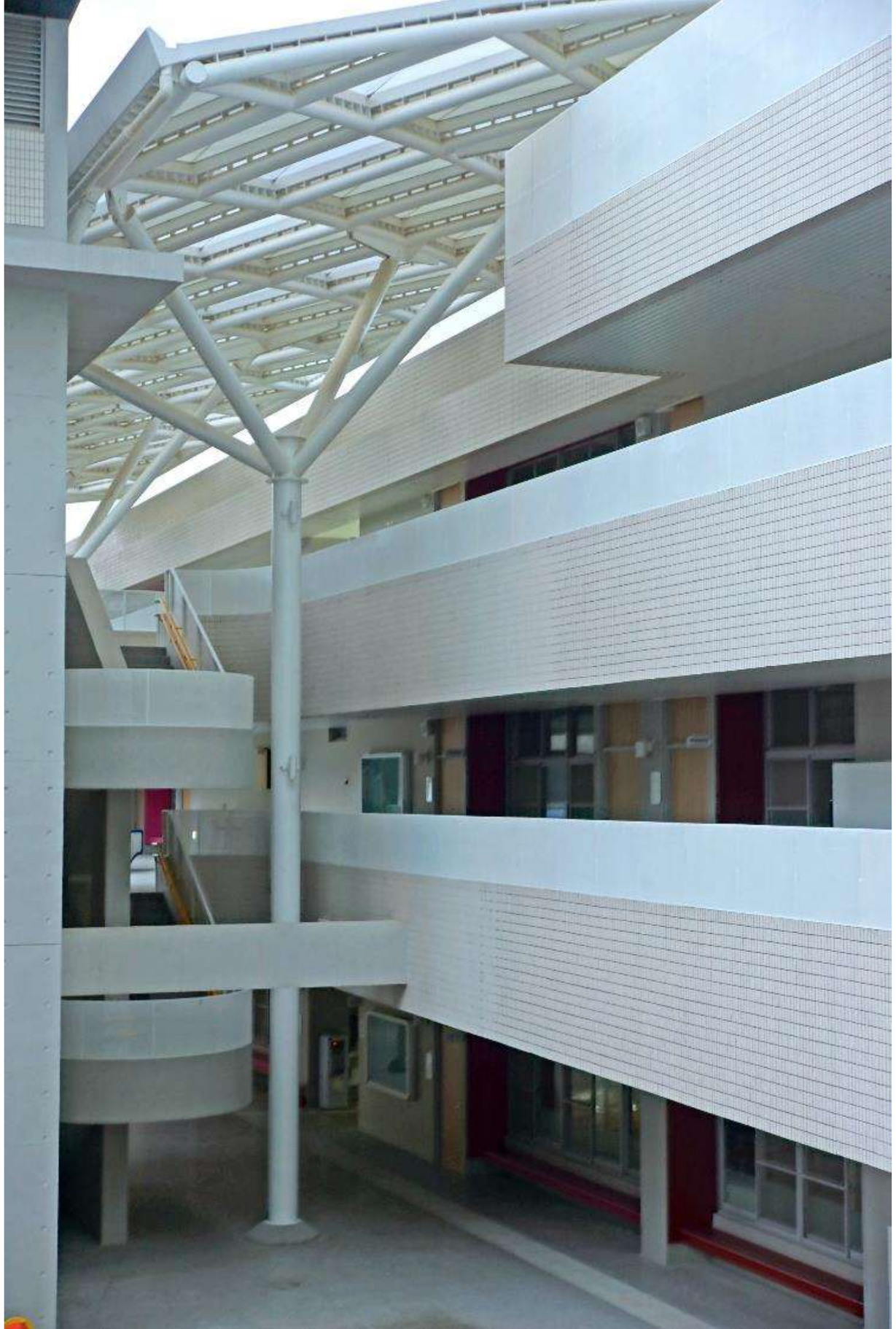
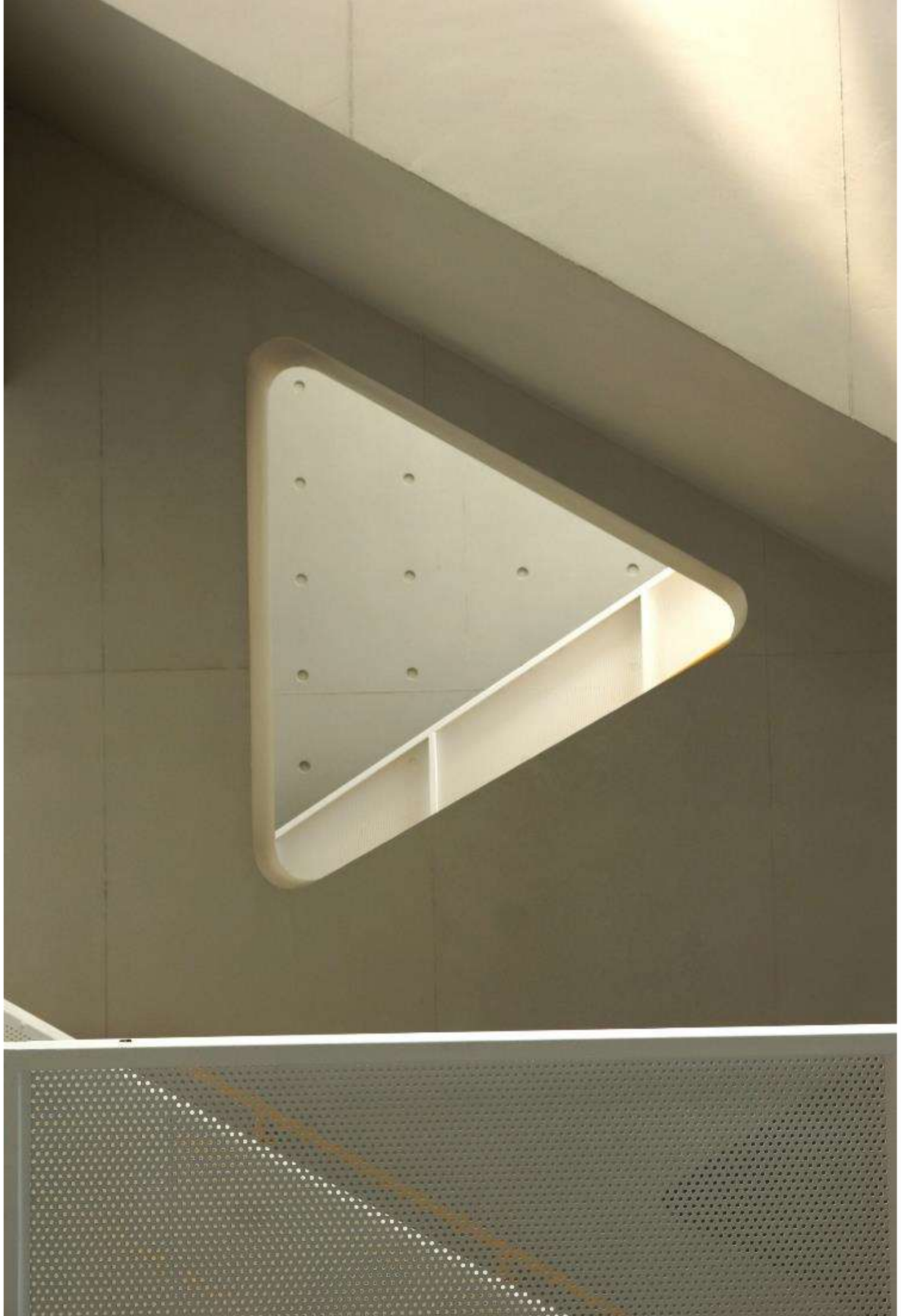
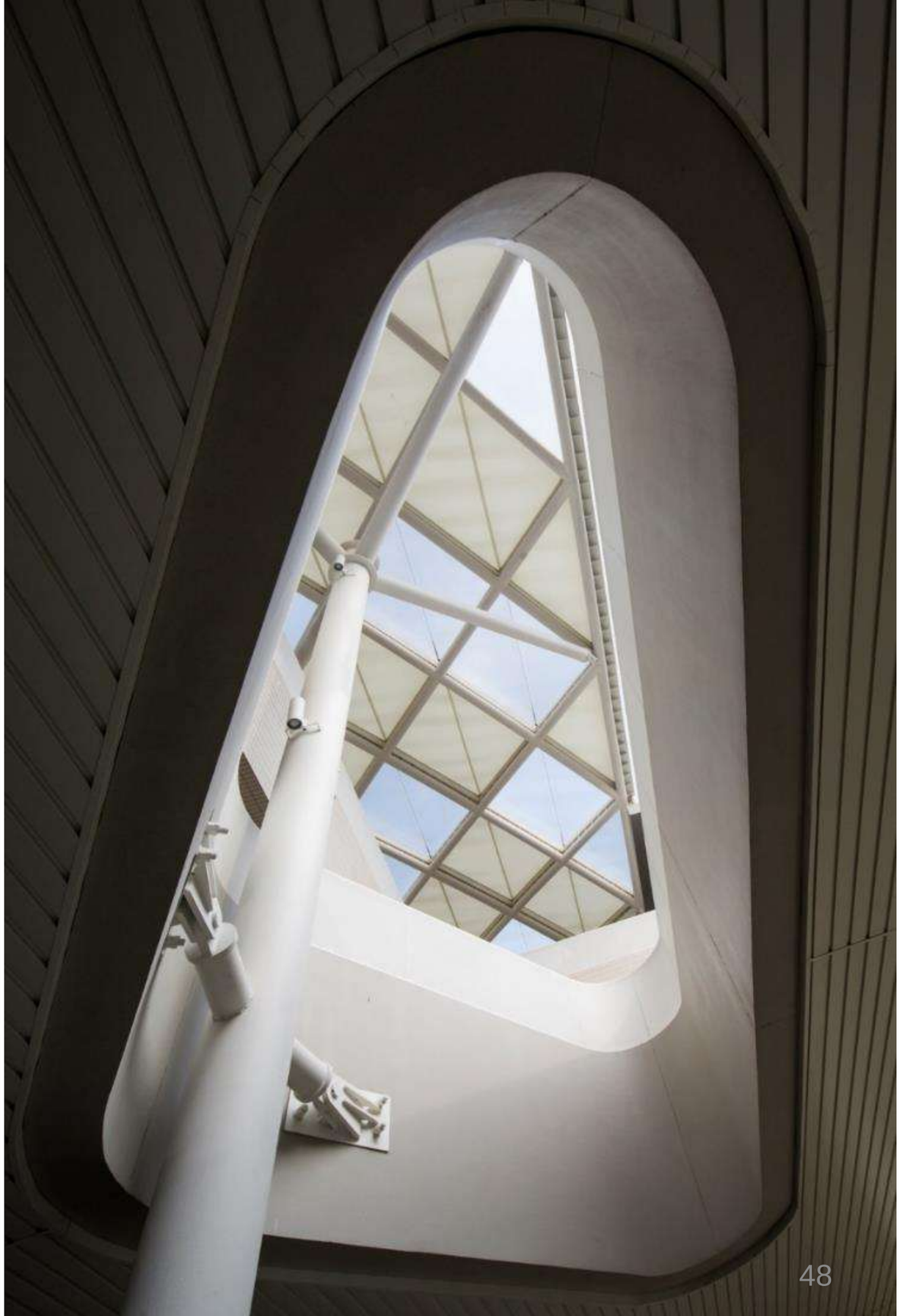
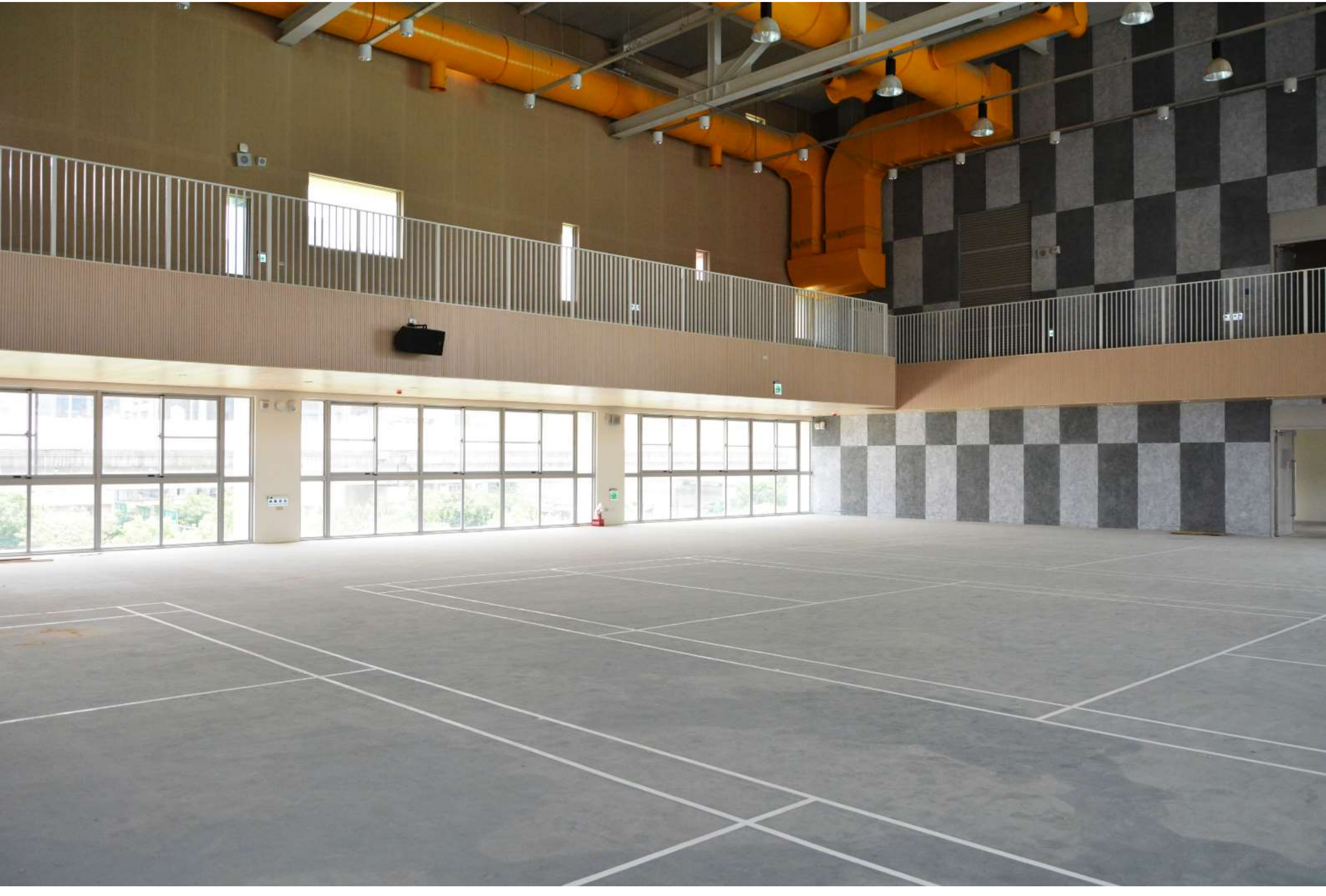
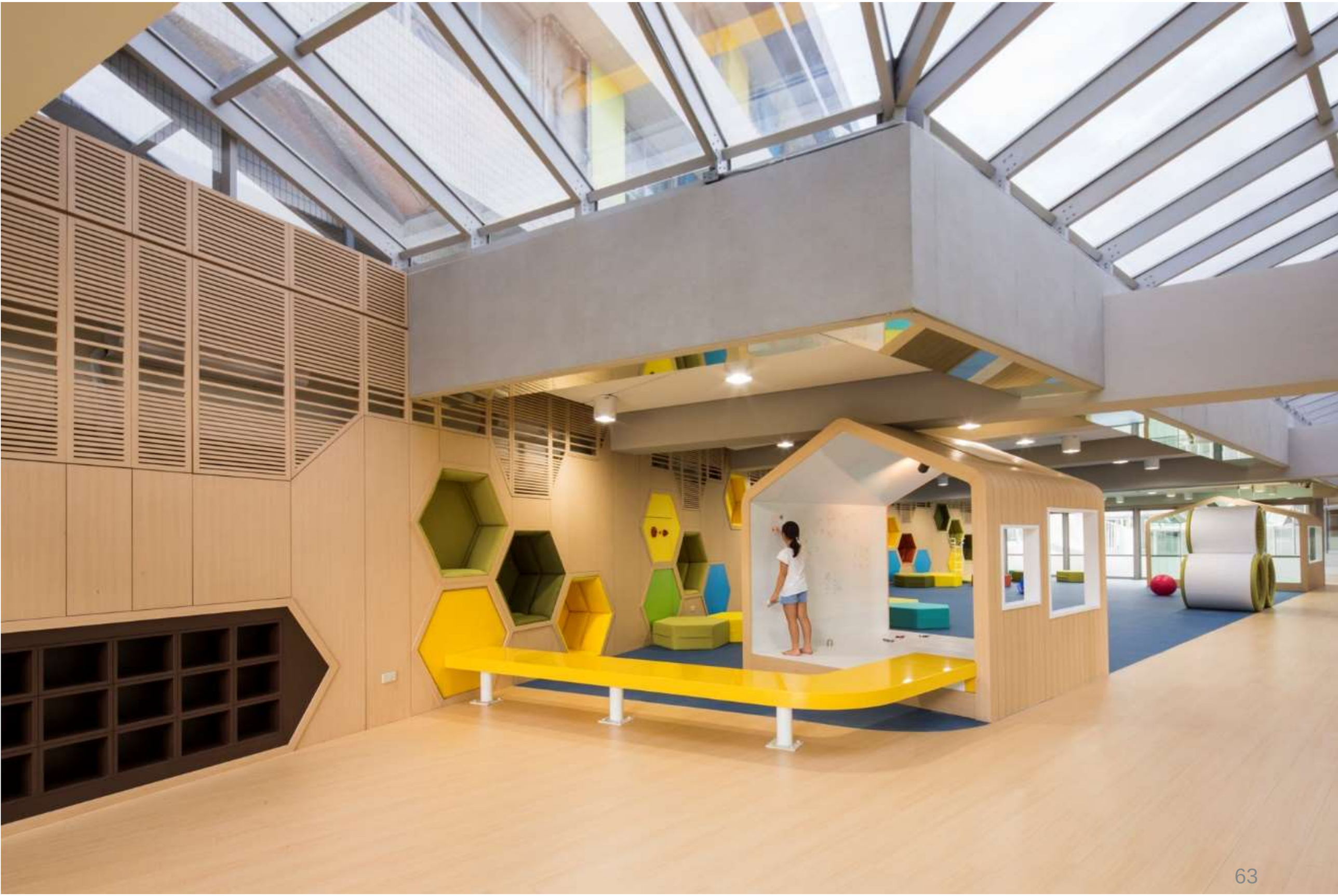
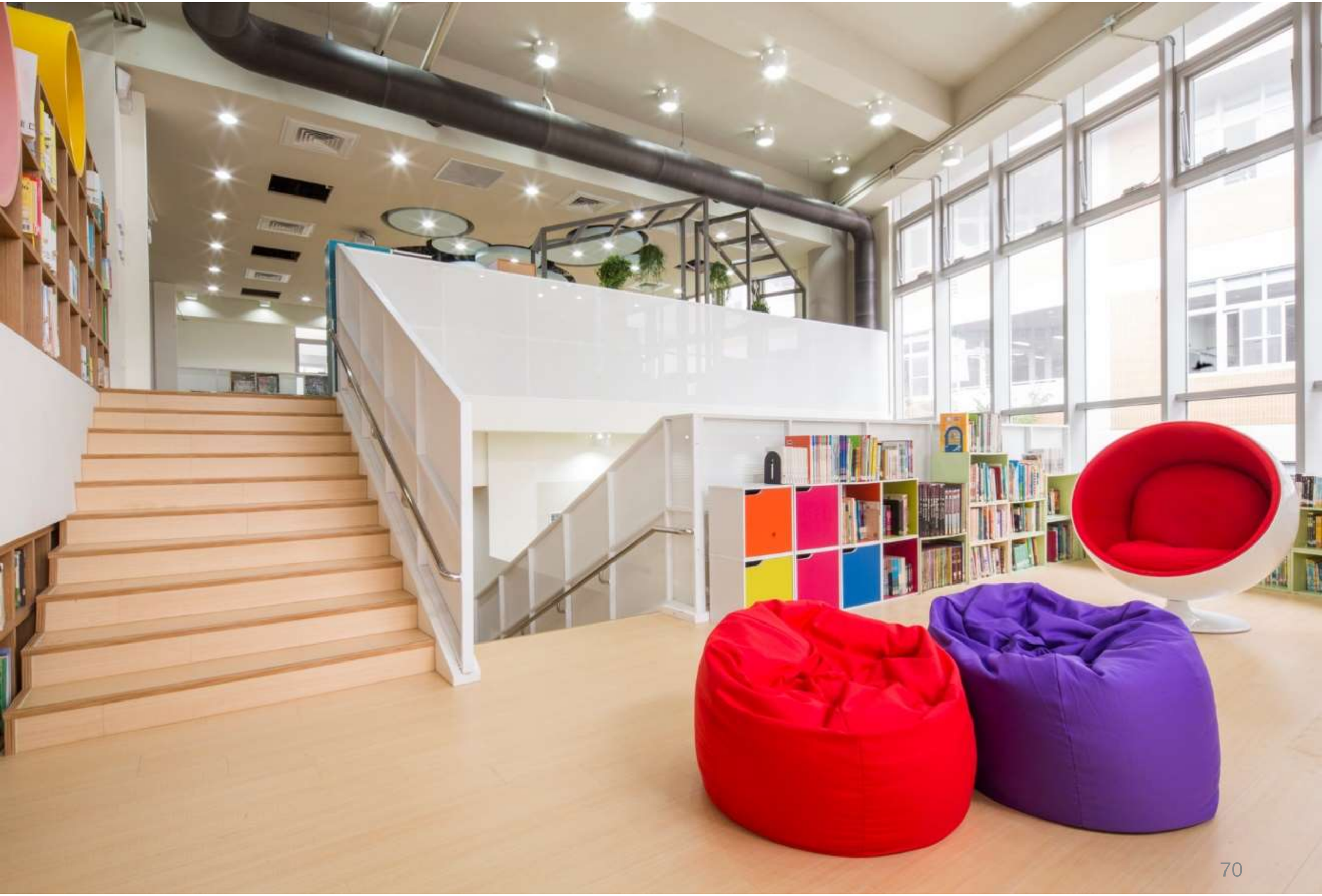
臺北市內湖區潭美國民小學
Tanmei Elementary School










自然教室