

2021 International Smart Cities e-Forum

# 智慧城市國際線上論壇



## Automating the Generation of Indoor Network for Human Way-Finding Using 3D-GIS

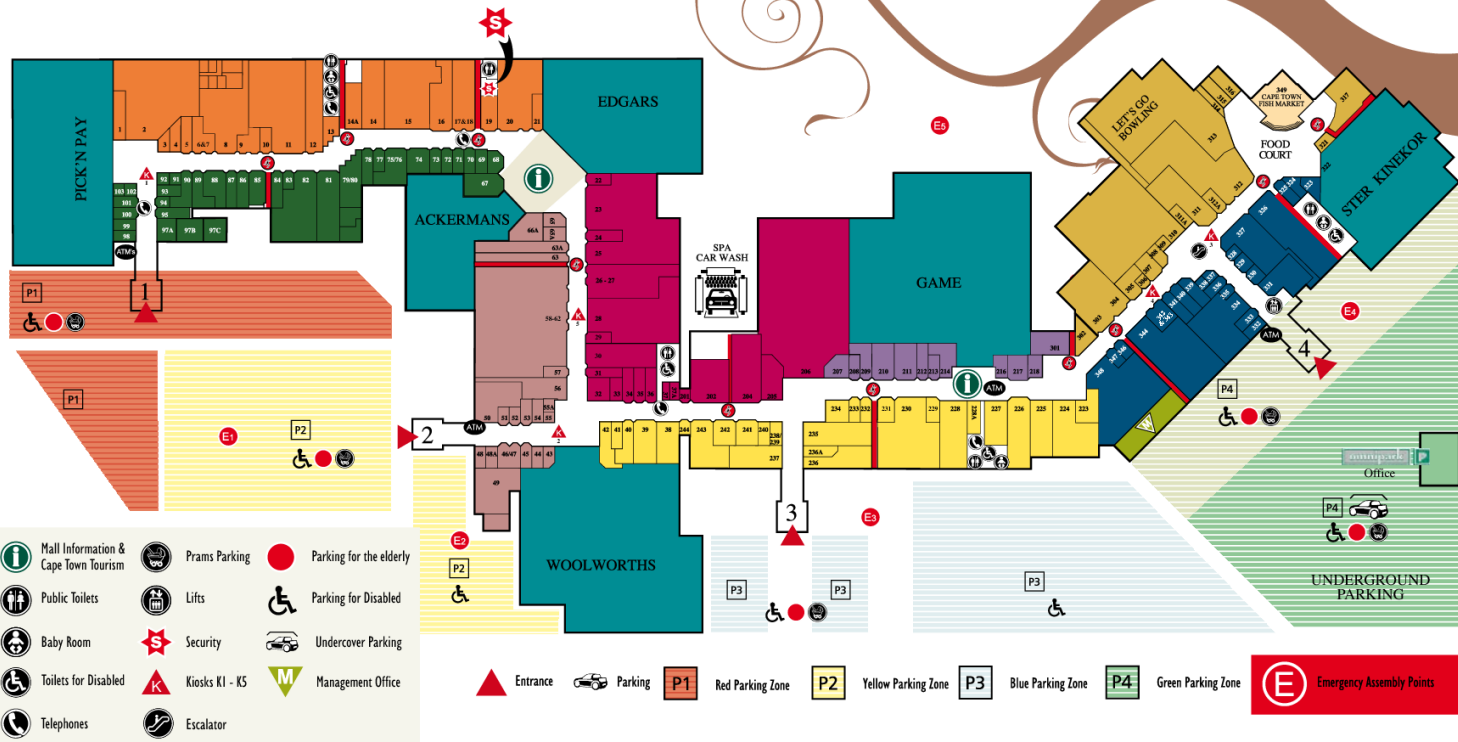
Wei-Yen (William) Lin  
Dept. of Civil Engineering  
Feng Chia University





# Current Indoor Wayfinding

## Floor Plan Somerset Mall



Trading Hours: Monday - Saturday: 09h00 - 18h00 | Sunday & Public Holidays: 09h00 - 16h00

### ANCHOR TENANTS

- Ackermans 021 851 0680
- Dion Wired 021 840 4000
- Edgars 021 851 2970
- Game 021 850 4720
- Pick'n Pay 021 852 7210
- Woolworths 021 850 1600

### BANKS & BUREAUX DE CHANGE

- 50 ABSA Bank 021 852 7226
- 3 American Express 021 851 5801
- 484 Bidvest Bank 021 852 7316
- 225 First National Bank 021 850 1040
- 96 Imral: Foreign Exchange 021 851 4561
- 226 Netbank 021 850 1500
- 333 Rennie's/Bidvest 021 852 5959
- ATM's ABSA, Standard Bank
- ATM's Standard Bank, FNB, Netbank

### JEWELLERY & ACCESSORIES

- 201 Accessories 021 851 0179
- 63A African Diamonds 021 852 4828
- 65 American Swiss 021 850 1938
- 328 Attitude 021 851 0277
- 340 Bliss 021 851 0268
- 242 Bosman Jewellers 021 851 4466
- 55 Extravaganza 021 852 1545
- 68 Galaxy 021 852 1511
- 57 Marina 021 850 1985
- 337 Ockhai Sunglasses 021 852 1149
- 306 Sass Diva 021 852 7127
- 22 Stems 021 850 1944
- 37 Strictly Diamonds 021 852 0952
- 43 Sunglass Hut 021 852 1599
- 309 Swish Silver 021 851 0256
- 29 Time Watch Specialists 021 851 5291
- 42 Van Der Jij Jewellers 021 852 7017
- 55A Wolf Bros. 021 852 1132

### STATIONERY, BOOKS, NOVELTY & GIFTS

- 302 Birthdays 021 851 2885
- 342-343 Build-A-Bear 021 852 2338
- 229 Cards 021 852 0712
- 15 CMC 021 852 7340
- 216 Com Books 021 852 5534
- 327 Exclusive Books 021 851 0250
- 71 Paper Paradise 021 851 3510
- 81 Paperweight Platinum 021 851 4802
- 311 PMA Colours 021 852 0994
- 235 Woolworth Books 021 852 5516

### TRAVEL & SERVICES

- 40 AA Travel Experience 021 851 0827
- 103 Barkale 021 851 3916
- 98 Harvey World Travel 021 852 9847
- 330 PenTravel 021 850 5740
- Outside Spa Car Wash 021 851 3705
- 228A Telkom 021 851 0384
- 85 Tots Taxi's 082 477 4376
- 83 Yale Security Point 021 852 5482

### HEALTH & BEAUTY

- 332 Amique 021 851 0066
- 209 Authentics 021 851 6667
- 2 Clicks 021 852 7330
- 310 Di+chen 021 850 5940
- 236A Dream Nails & Body 021 851 3004
- Kiosk 5 Fragrance Boutique Kiosk 021 851 6901
- 207 Mellins Optical Eyes 021 852 7516
- 101 Optical Eyes 021 851 2566
- 37A Partners for Men 021 851 3686
- 41 Partners Hair (Woolworths) 021 852 1342
- 95 Partners Hair (Pick'n Pay) 021 852 1350
- 347 Rain 021 852 3833
- 307 Halo Cosmetics 021 852 2783
- 232 Sasha International 021 851 2545
- 35 The Body Shop 021 852 4658
- 93 The Health Kick 021 852 3733

### SPECIALTY SHOPS

- 9 Ancur 021 852 2273
- 5 About Cats and Dogs 021 852 0925
- 97B Aroma Liqueur 021 852 7114
- Kiosk 1 Bitlong Kiosk 082 821 0974
- Kiosk 2 Bitlong Kiosk 082 821 0974
- Kiosk 4 Bread Kiosk 082 576 2356
- 74 Cellina 021 851 1437
- 78 Curiosity Hut 021 851 1095
- 85 Dad's 021 852 7200
- 87 Elina 021 851 7021
- 100 Flower Emporium 021 851 0007
- 210 Frazer's Luggage 021 851 1720
- 86 Glomail 021 852 1888
- 99 Homemark 021 851 5033
- Kiosk 3 Ily Coffee Pod 083 651 6455
- 77 Scain 021 852 3358
- 10 Verimark Direct 021 851 1397

### RESTAURANTS & CONVENIENCE FOODS

- 33 Cafe Ole 021 851 4845
- 234 Caffe Rossini 021 851 2653
- 51 Cake For Africa 021 852 8705
- 349 Cape Town Fish Market 021 850 4778
- 91 Crumbs 021 851 3923
- 317 Dodge City 021 851 0275
- 89 Fresh Stop 021 852 0973
- 16 House of Coffees 021 851 0833
- 97A iFC 021 852 9586
- 1 King Pie 021 851 2821
- 102 Marcel's Frozen Yoghurt 021 852 2513
- 236 Mugg & Bean 021 851 2318
- 316 Nando's 021 851 0255
- 223 Nino's 021 851 3590
- 227 Ocean Basket 021 851 2555
- 331 Panarotti's 021 851 3807
- 315 Scovones 021 852 0023
- 314 Simply Asia Somerset Mall 021 850 0224
- 321 Subway 021 850 0219
- 324 Sweet Star 021 851 6904
- 312 Tallahassee Spur 021 851 3868
- 40 Tamaret 021 852 7507
- 92 Tea & Coffee Beanery 021 851 5448
- 52 Vida e Cafe 021 852 0705
- 14 Wimpy 021 852 7233

### SPORTS & OUTDOOR

- 205 Billabong Surf Shop 021 851 3905
- 63 Cape Storm 021 850 0188
- 82 Cape Union Mart 021 852 7120
- 238 Dur South 021 850 0973
- 39 Sport Scene 021 850 1954
- 6-7 Sports Unlimited 021 851 1477
- 21 Total Sports 021 850 1959

### CELLULAR & ELECTRONICS

- 73 BT Games 021 851 0368
- 84 Cell C 021 851 3816
- 329 Cellcity 021 851 0240
- 144 Computer Mania 021 852 1080
- 325 Computer Zone 021 851 0020
- 334 Incredible Connection 021 850 9600
- 4 MTN 021 852 3929
- 312a Virgin Mobile 021 851 0150
- 218 Vodacom 021 851 2740
- 88 Wodapop 021 852 9598

### PHOTOGRAPHIC & MUSIC

- 46 & 47 Kodak Superfoto 021 852 6737
- 79 Musica 021 851 6635
- 326 Music Moods 021 851 0102

### ENTERTAINMENT

- 313 Let's Go Bowling 021 850 0254
- 322 Star Kinekor 082 16789

### FURNITURE & DÉCOR

- 214 @Home 021 850 1918
- 336 Bazaar Oriental Carpets 021 851 0845
- 11 Boardmans 021 852 7030
- 8 Concraft 021 852 0786
- Frames & Things 021 851 6609
- 227 Pallucci Home Depot 021 851 3497
- 301 Kitchen World Exclusive 021 851 0371
- 45 Le Creuset 021 851 0661
- 12 Sheet Street 021 850 2110
- 55 Spillhaus 021 852 3599
- 344 Wetherleys 021 851 7887

### SHOES

- 67 Chic Shoetique 021 851 3799
- 311A Shoe Lovers 021 851 3799
- 90 Green Cross 021 852 9802
- 70 Limited Edition 021 852 7607
- 241 Lullia 021 850 1934
- 36 Step High 021 852 5197
- 208 Zoom Shoes 021 852 2931

### FASHION

- 244 Avenue 021 852 0874
- 72 Boogloos 021 851 2074
- 65A C'Neque 021 851 1992
- 34 Cressiano 021 852 7114
- 20 Donna Claire 021 850 1922
- 53 Earth Addict 021 852 1998

- 308 Enigma 021 852 2308
- 54 Escape 021 851 3718
- 240 Evora 021 852 5560
- 204 Exact 021 850 1949
- 58-62 Fochini 021 850 1900
- 66A Hang Ten 021 851 6761
- 17-18 Identity 021 852 0244
- 13 Jay Jay's 021 852 7114
- 28 JET 021 852 7020
- 239 J&K Clothing 021 851 2344
- 31 Laundry Clothing 021 850 0681
- 56 Markham 021 852 1556
- 38 Martin Delport 021 850 1927
- 230 Midy's 021 851 3572
- 348 Mr Price Clothing 021 852 7916
- 305 Naarjie 021 851 3007
- 346 Occasions 021 851 1787
- 224 Old Khaki 021 850 0223
- 69 Out of the Blue 021 852 4355
- 303 Pick'n Pay Clothing 021 852 7505
- 26-27 Poetry 021 850 0187
- 202 Queenspark 021 852 7114
- 30 Rene Taylor 021 851 2366
- 343 Scarlett 021 851 1023
- 338 Sharon's Boutique 021 851 1714
- 25 The Sock Spot 021 850 2118
- 32 Traversiti LTD 021 852 5470
- 243 YDE 021 851 1167
- 243 YDE 021 852 0761

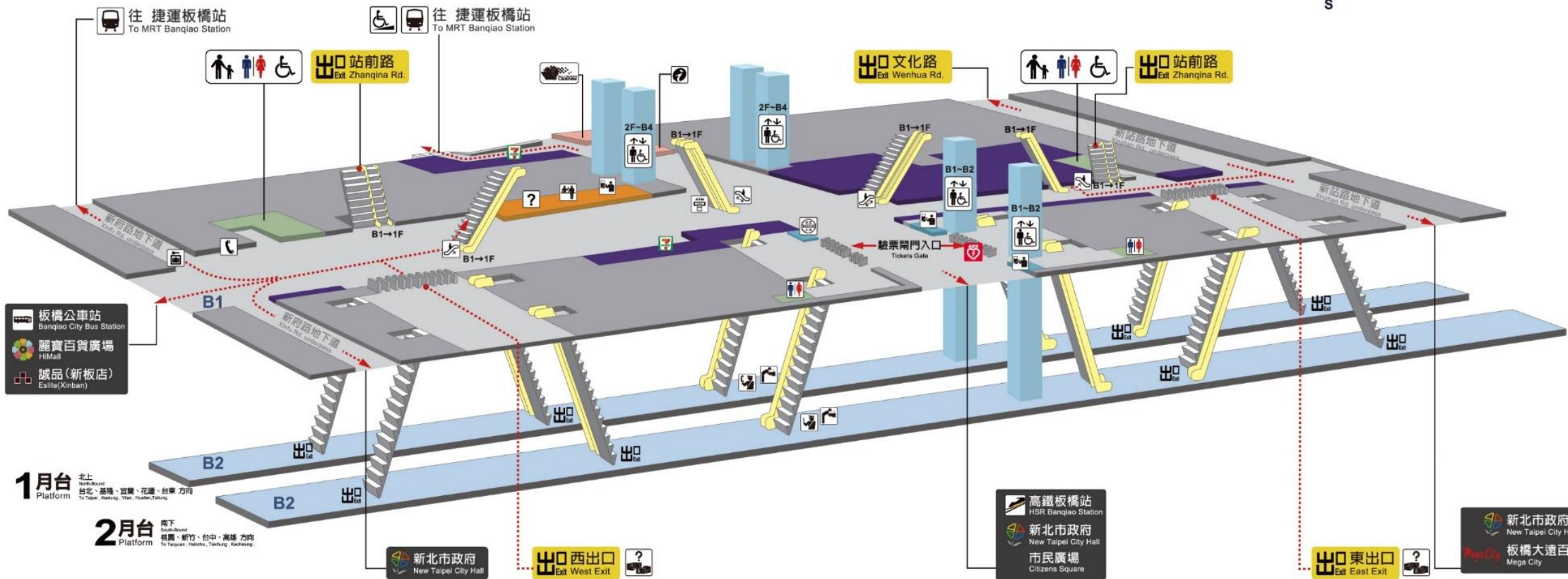
T. 021 852 7114  
F. 021 852 1249

Somerset Mall  
Property Management  
Company (Pty) Ltd

Somerset Mall,  
Intersection of N2 & R44,  
Centenary Drive,  
Somerset West, 7130

Tourism Bureau  
021 840 1400

# B2



**1月台** 北上  
Platform North-bound  
台北、基隆、宜蘭、花蓮、台東 方向  
To Taipei, Keelung, Yilan, Hualien, Taichung

**2月台** 南下  
Platform South-bound  
桃園、新竹、台中、高雄 方向  
To Taoyuan, Hsinchu, Taichung, Kaohsiung

新北市政府  
New Taipei City Hall

西出口  
Exit West Exit

高鐵板橋站  
HSR Banqiao Station

新北市政府  
New Taipei City Hall

市民廣場  
Citizens Square

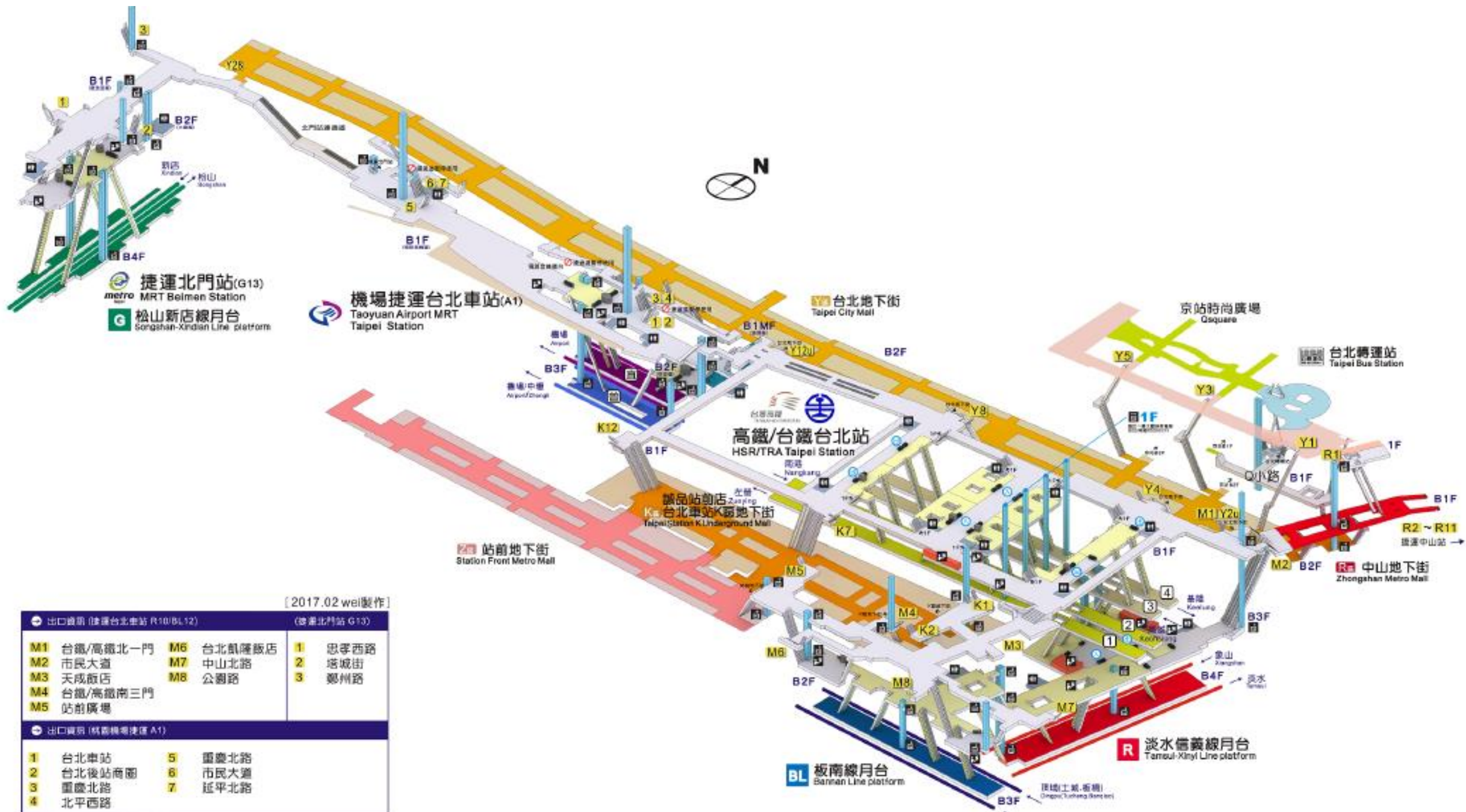
東出口  
Exit East Exit

新北市政府  
New Taipei City Hall

板橋大遠百  
Mega City

圖例 LEGEND	管制區	台鐵服務區	高鐵服務區	廁所	旅遊服務中心 Visitor Information	電扶梯 Escalator	台鐵 TRA	板橋客運站 Banqiao Intercity Bus Station	捷運 MRT	自動售票機 Tickets Vending Machine	補票處 Fare Adjustment	行李室 Train Control Room	親子廁所 Parents with Infants Toilets	提款機 ATM	公共電話 Public Telephone	智慧圖書館 Self-service Library
	電梯	商店區	旅遊服務中心 智慧圖書館	服務台(高鐵) Service Counter(HSR)	電梯 Elevator	樓梯 Stairs	高鐵路 HSR	板橋公車站 Banqiao City Bus Station	停車場 Parking Lot	台鐵售票處 TRA Tickets	聯絡室 Contact Room	無障礙坡道 Wheelchair Ramp	廁所 Toilets	儲物櫃 Lockers	飲水機 Water Dispenser	自動體外心臟電擊去顫器 AED

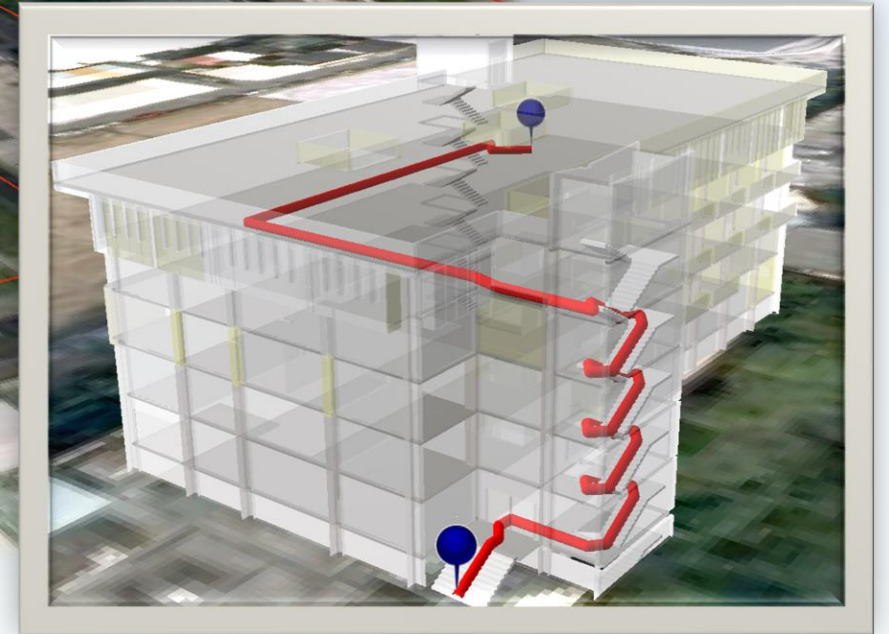
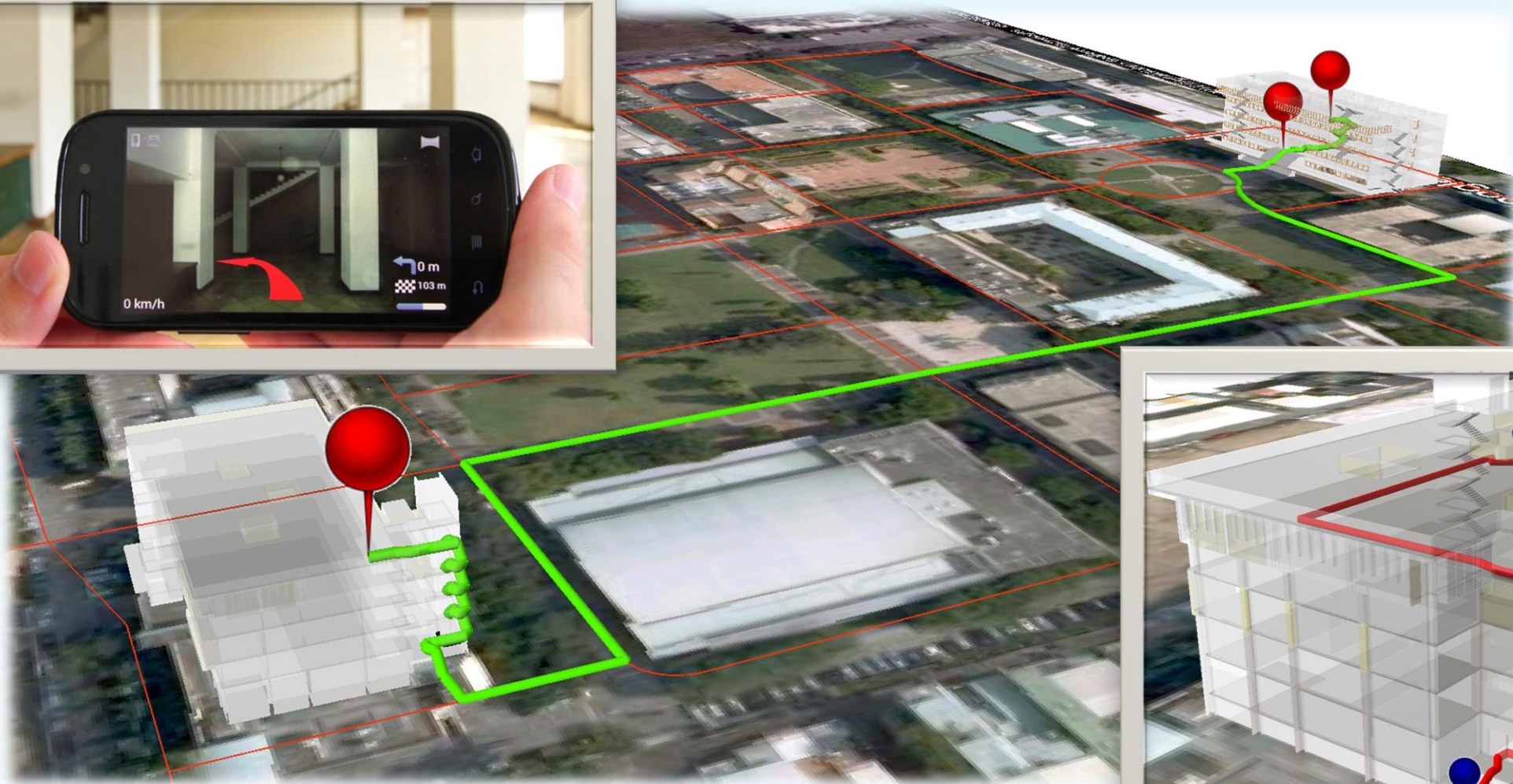




[2017.02 wei製作]

出口資訊 (捷運台北車站 R10/B112) (松山北門站 G13)		
M1 台鐵/高鐵北一門	M6 台北凱薩飯店	1 忠孝西路
M2 市民大道	M7 中山北路	2 塔城街
M3 天成飯店	M8 公園路	3 鄭州路
M4 台鐵/高鐵南三門		
M5 站前廣場		
出口資訊 (機場機場捷運 A1)		
1 台北車站	5 重慶北路	
2 台北後站商園	6 市民大道	
3 重慶北路	7 延平北路	
4 北平西路		

# What If We Have...



GIS Tutorials.mxd - ArcMap

File Edit View Bookmarks Insert Selection Geoprocessing Customize Windows Help

1:12,500

Network Analyst Xitun\_ND

3D Analyst

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- 路網分析
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    - Restriction
    - Added Cost
  - Routes
    - Routes
  - Line Barriers
    - Restriction
    - Scaled Cost
  - Polygon Barriers
    - Restriction
    - Scaled Cost
- 台中市政府
- 台中市西屯區淹水區域
- 台中市西屯區公園
- 台中市警察局
- 台中市大專院校
- XitunRoads
- 台中市西屯區區界
- Xitun\_ND\_Junctions

逢甲大學

台中市政府

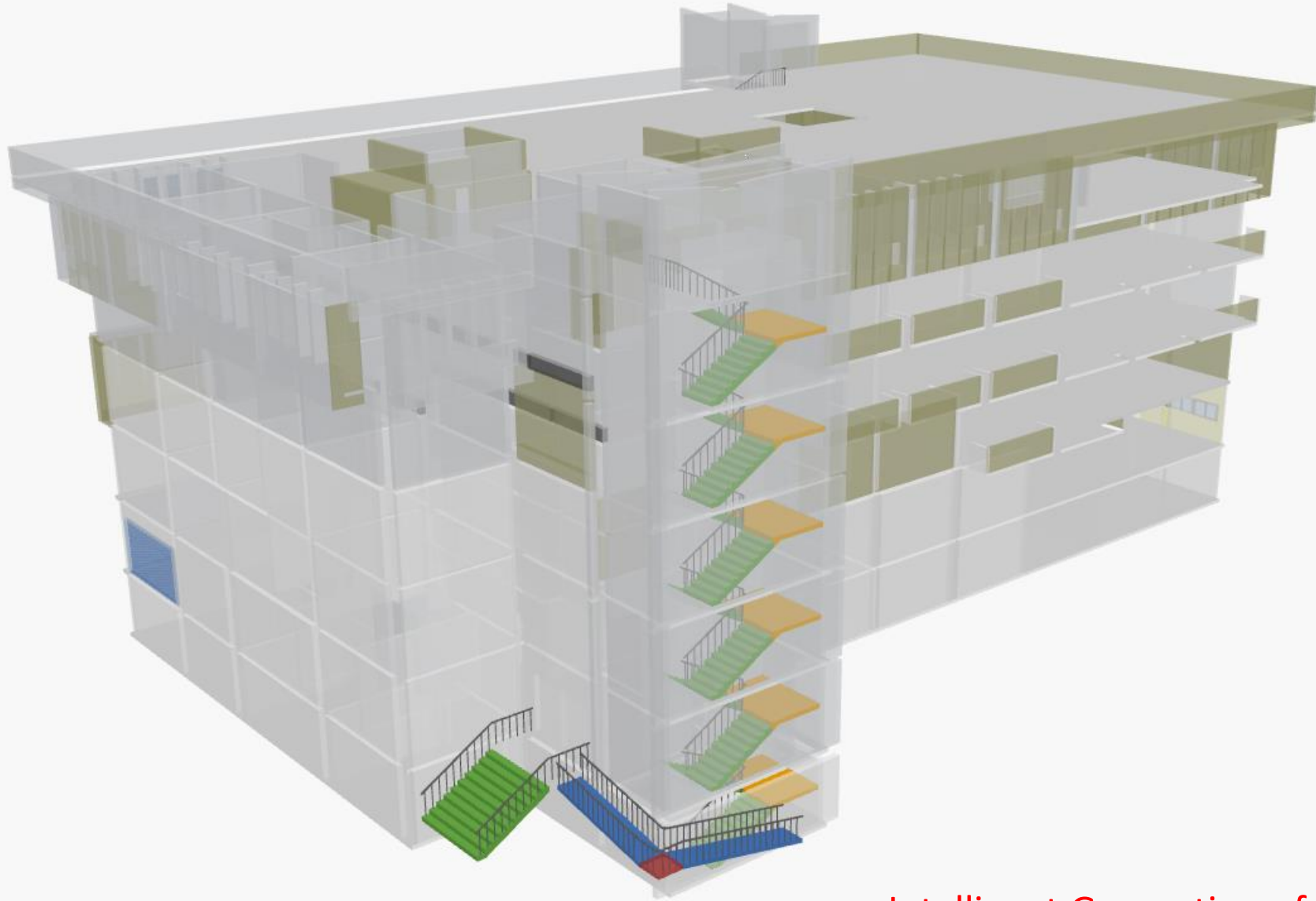
What About Indoor?

(Route)

Graphic Pick 1 - Graphic Pick 2	Distance	Map
Graphic Pick 1 - Graphic Pick 2	2176.6 m	<a href="#">Map</a>
Start at Graphic Pick 1		<a href="#">Map</a>
Turn right on 逢大路 toward 河南路二段	339.7 m	<a href="#">Map</a>
Continue on 河南路二段	139.6 m	<a href="#">Map</a>
Turn left on 無路名道路 and immediately turn right on 福上巷	70.9 m	<a href="#">Map</a>
Turn right on 福上巷255弄	95.5 m	<a href="#">Map</a>
Continue on 弘孝路251巷	84.0 m	<a href="#">Map</a>
Turn right on 弘孝路	503.3 m	<a href="#">Map</a>
Turn left on 西屯路二段	147.5 m	<a href="#">Map</a>
Turn right on 惠中路	561.0 m	<a href="#">Map</a>
Turn left on 台12 (臺灣大道三段)	235.1 m	<a href="#">Map</a>
Finish at Graphic Pick 2, on the right		<a href="#">Map</a>
Driving distance: 2176.6 m		

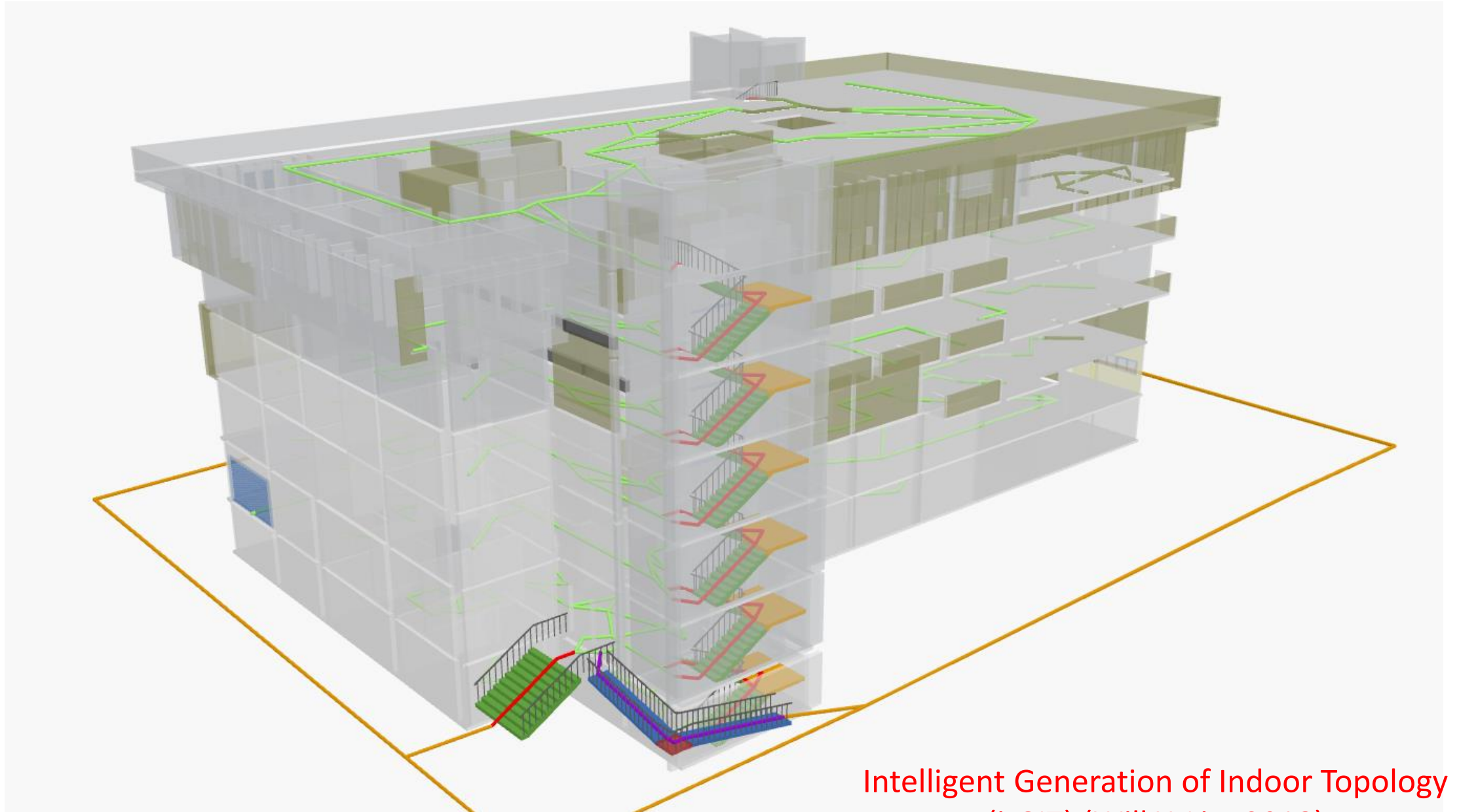
Options... Print Preview... Save As... Print Close

212873.27 2673831.326 Meters

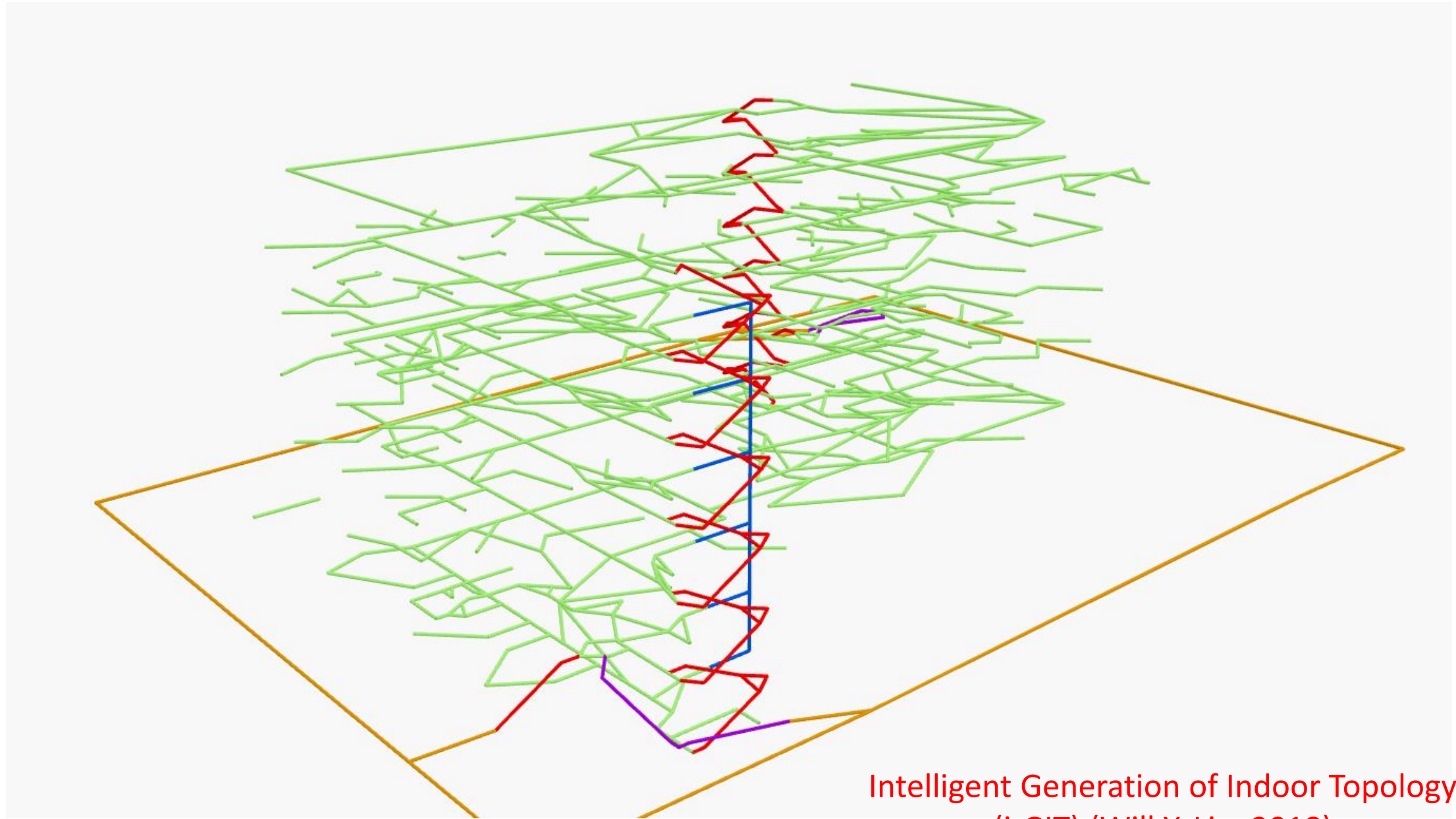


Intelligent Generation of Indoor Topology  
(i-GIT) (Will Y. Lin, 2018)



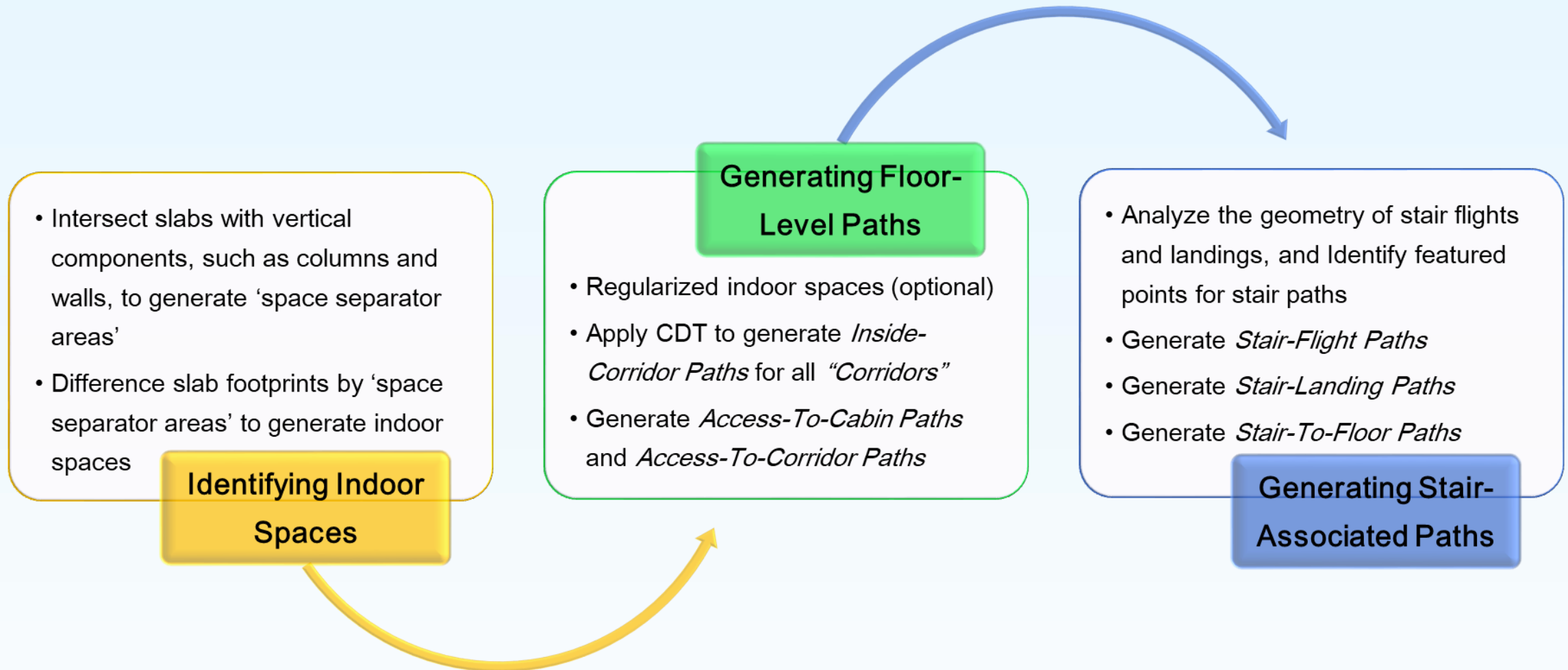


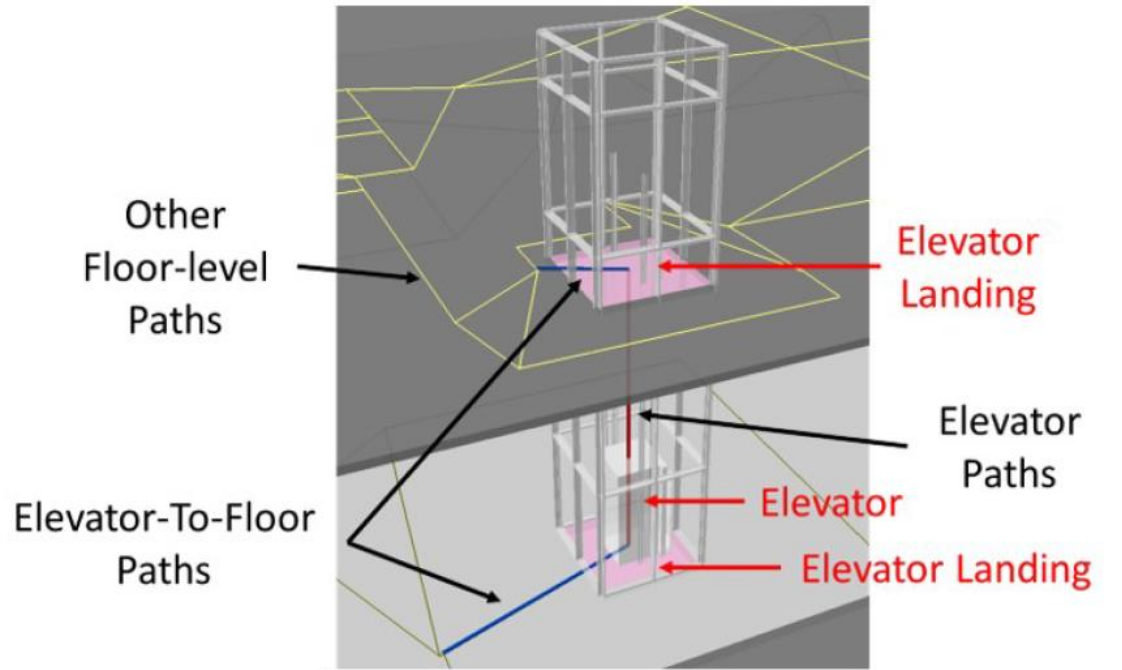
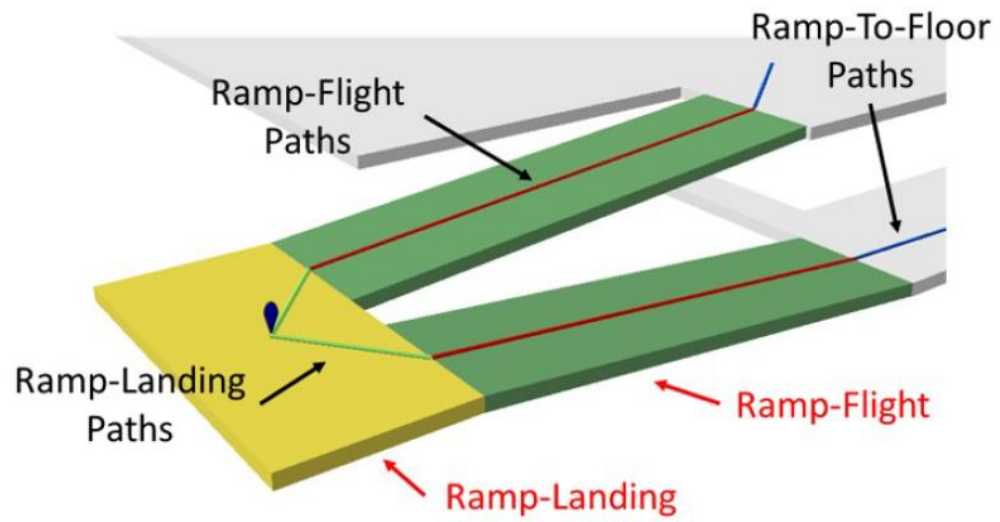
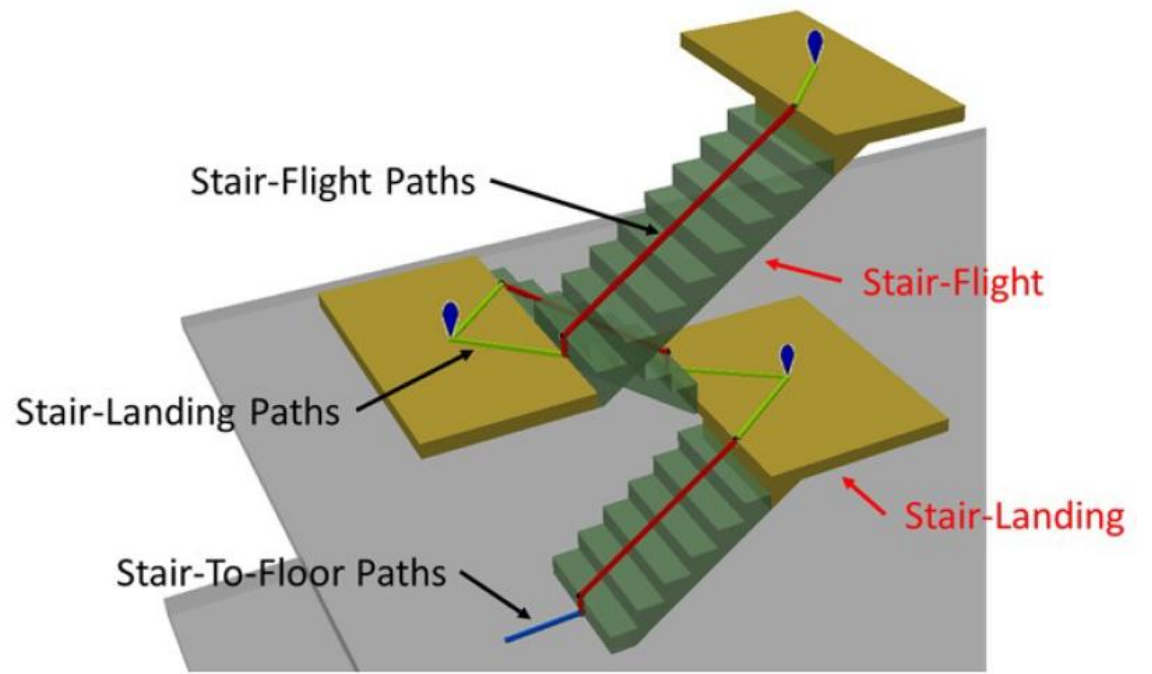
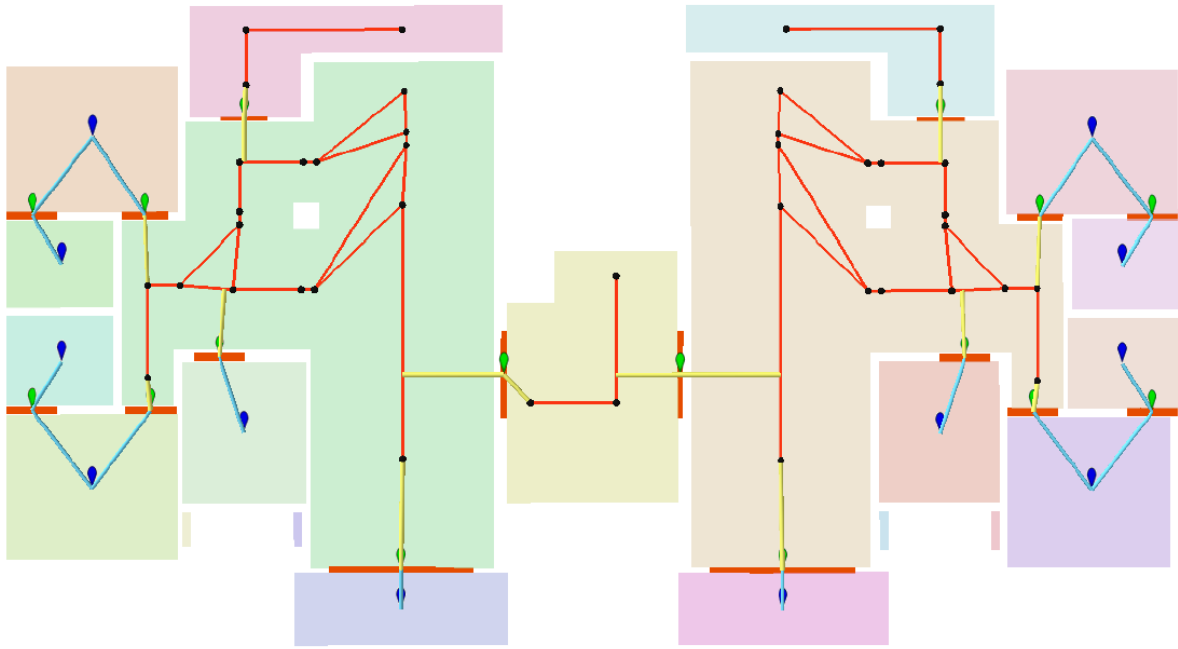
Intelligent Generation of Indoor Topology  
(i-GIT) (Will Y. Lin, 2018)



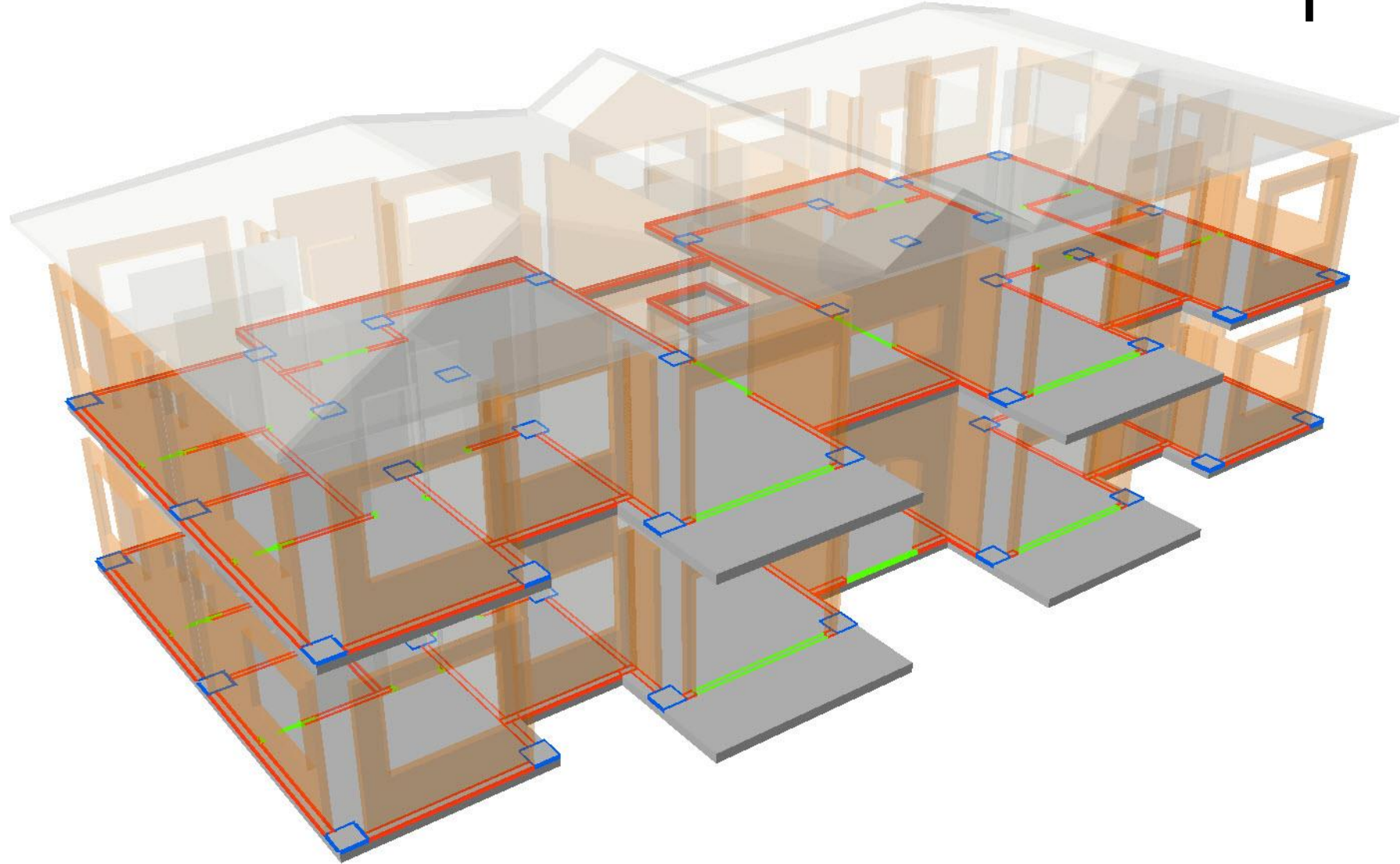
Intelligent Generation of Indoor Topology  
(i-GIT) (Will Y. Lin, 2018)

# Geoprocessing Workflow

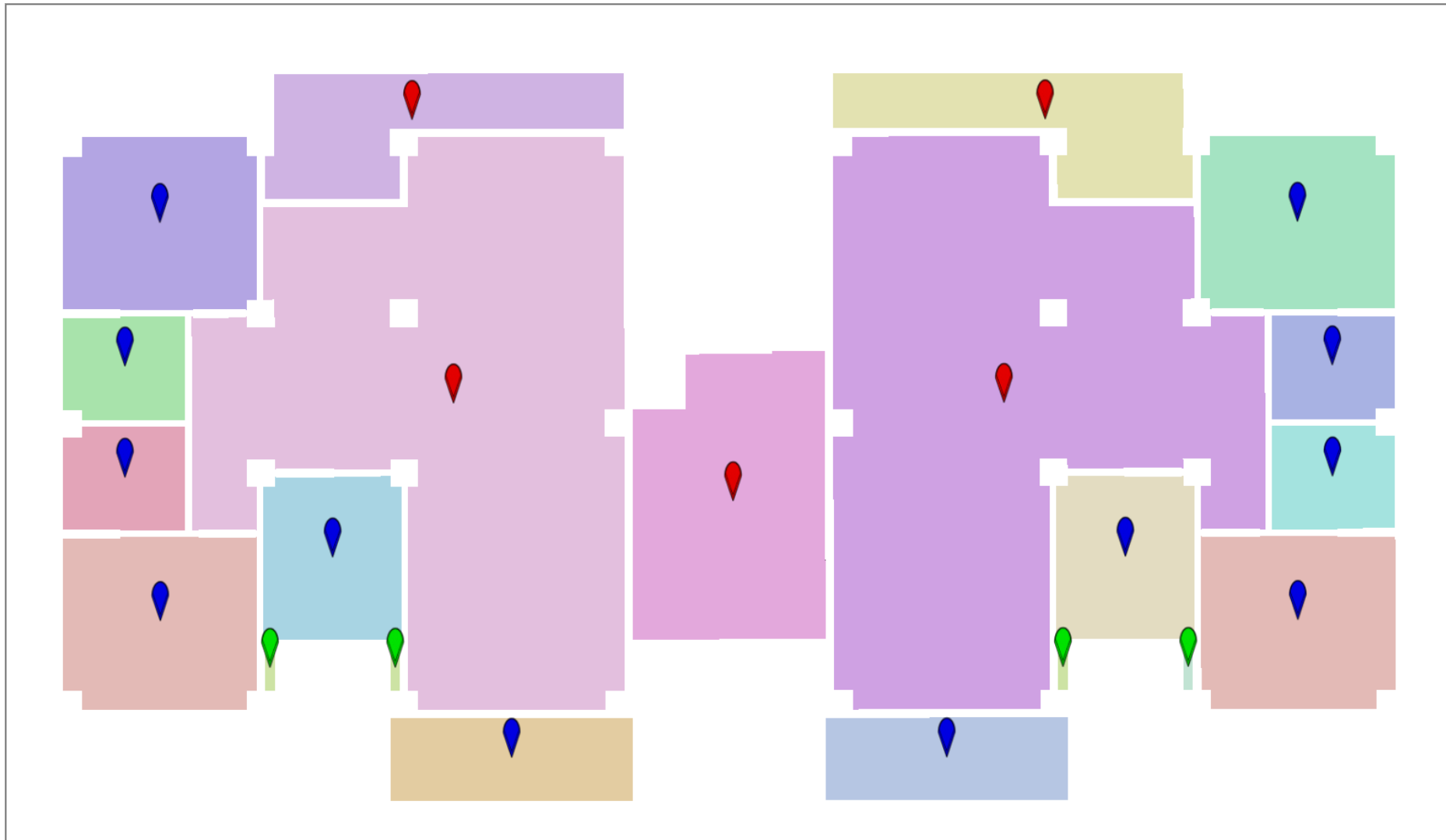




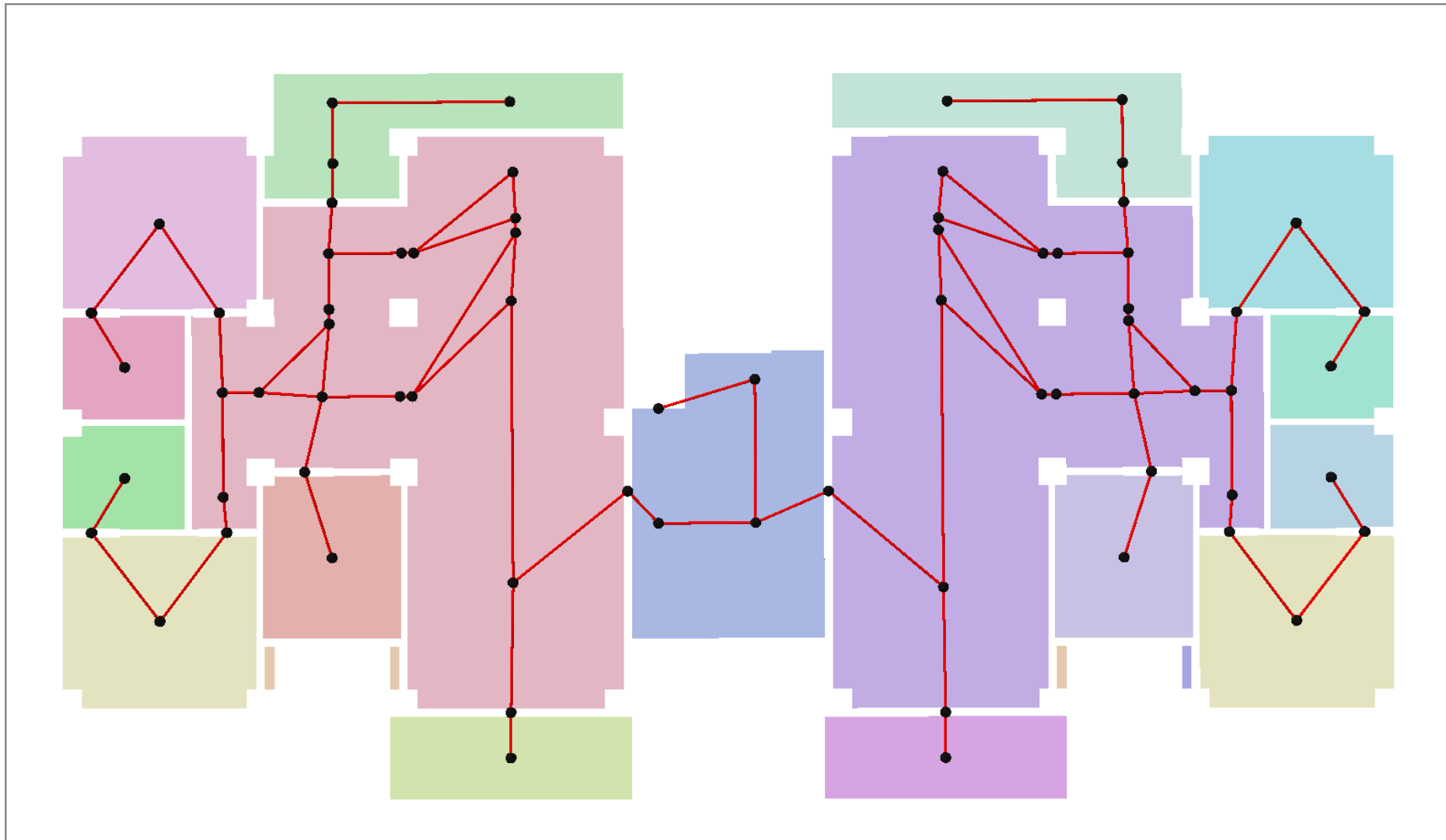
# Phase 1: Identification of Indoor Spaces



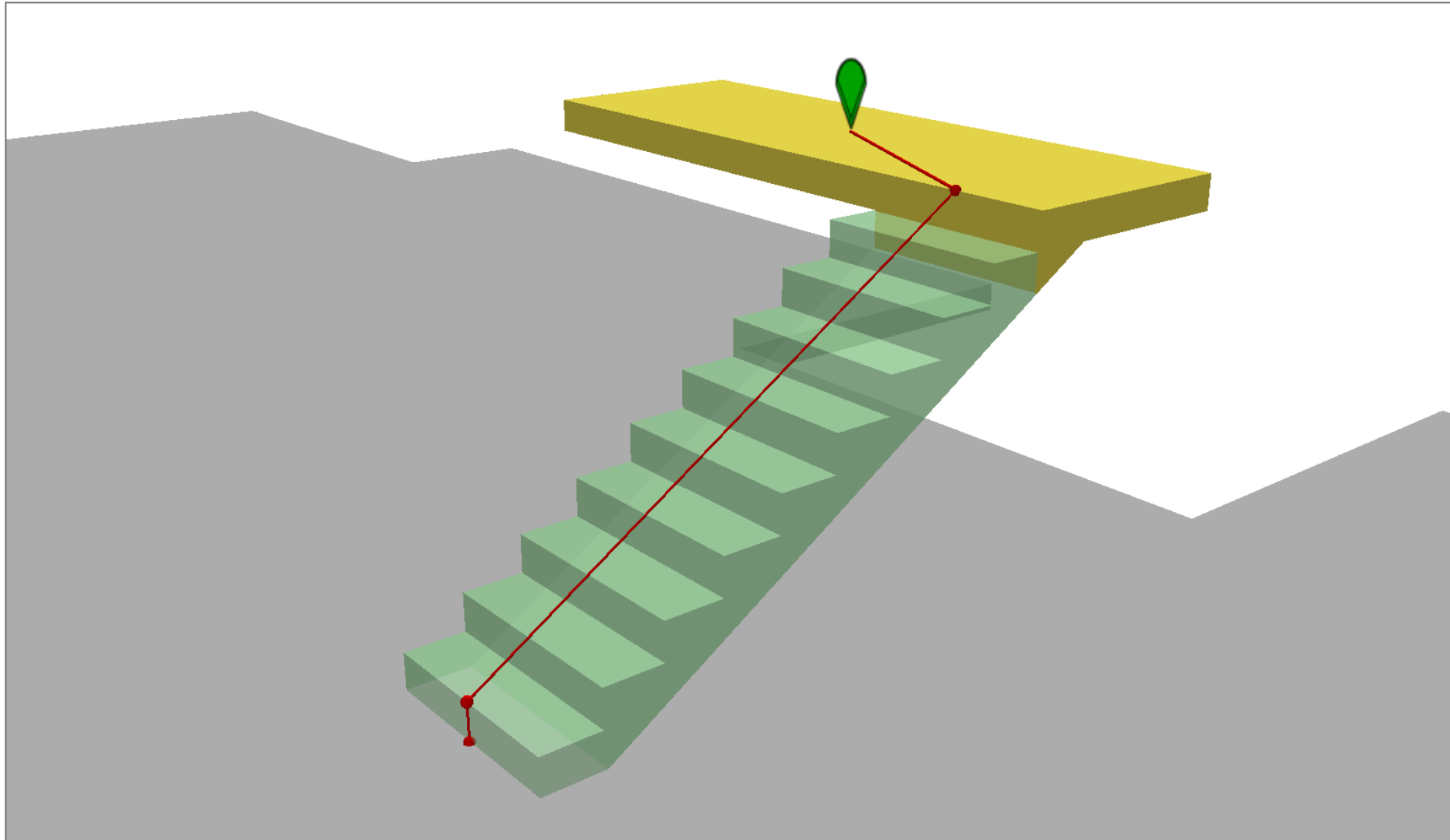
# Phase 1: Identification of Indoor Spaces



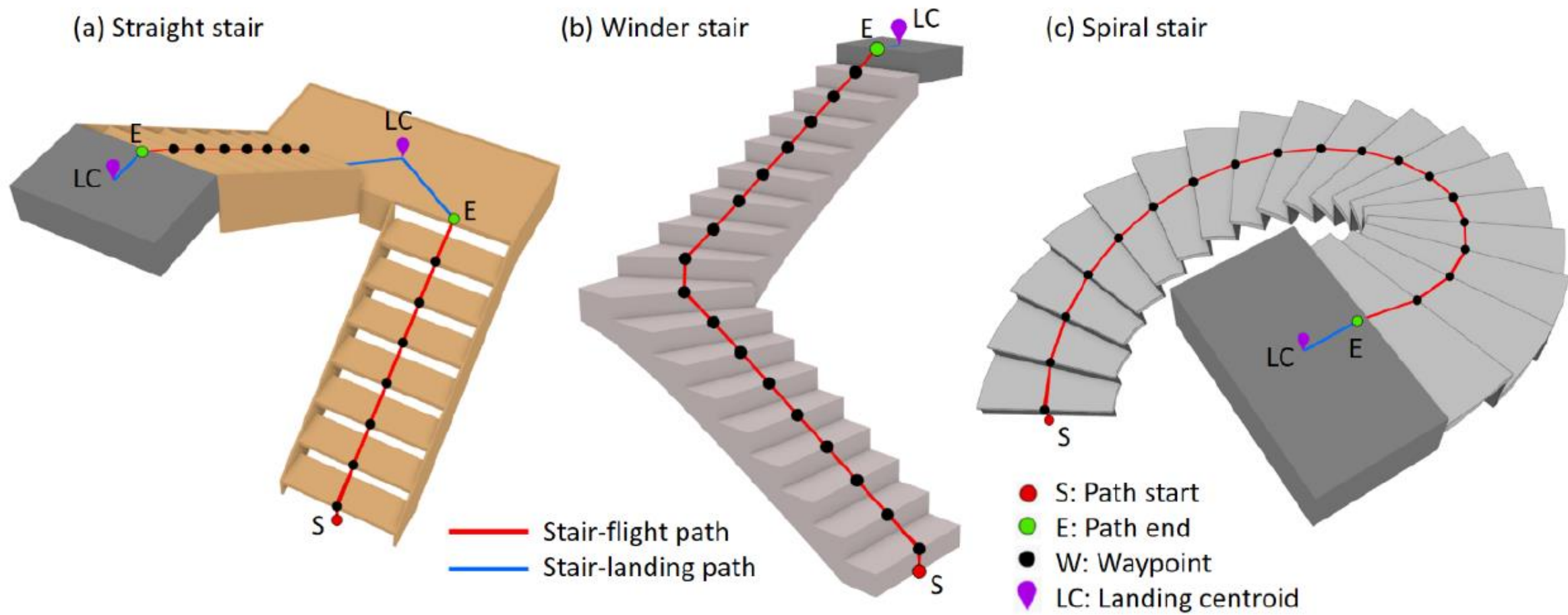
# Phase 2: Generation of Level Paths



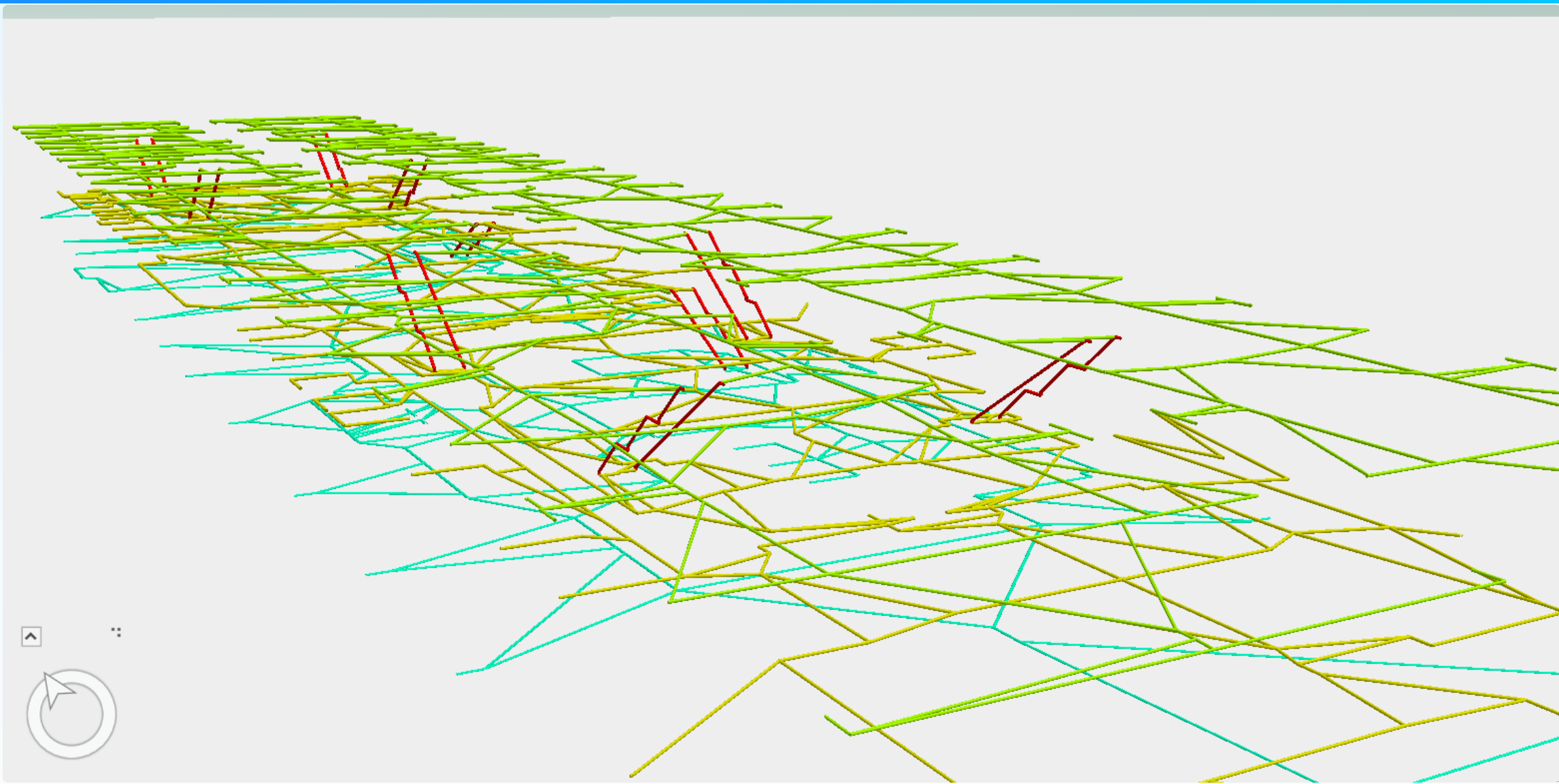
# Phase 3: Generation of Stair Paths







# Applications



# 愛搭網 i-Take

我尋其乘



選擇搭乘日期: 11-03-2017



選擇起點: 台北車站

選擇目的地: 台中歌劇院

出發時刻: 9 : 0

乘客人數: 1

搜尋路線

費率說明



會員服務



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啟用 Windo

# 逢甲大學3D智慧校園導引系統



依地標 依活動



Front View



土木水利館



圖書館



福慶男宿



# 逢甲大學3D智慧校園導引系統



依地標 依活動

輸入地標:

加入

禁用電梯

禁用樓梯

路徑清單:

大門(西門·逢甲路與文華·  
建設學院院辦公室[572])

上移

下移

清除

顯示路徑



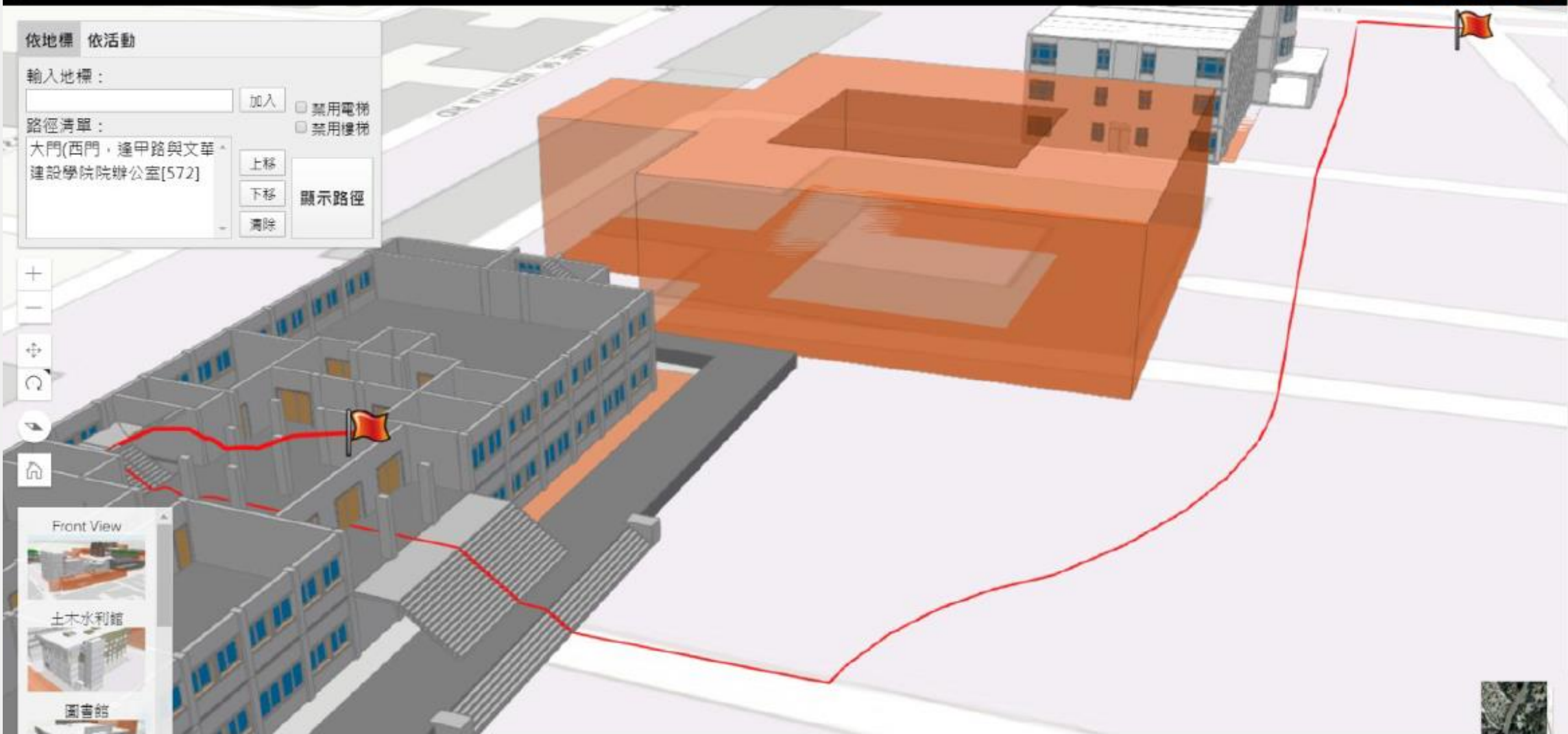
Front View



土木水利館



圖書館





逢甲大學

Feng Chia University

Thank you for listening

Q & A

3DGIS-BIM Research Center

[weiylin@mail.fcu.edu.tw](mailto:weiylin@mail.fcu.edu.tw)