

MEP in BIM

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A-C-I-D Managing Director

HKIBIM Vice-Chairman

HKUSPACE, Lecturer

B

= Building

建築

I

= Information

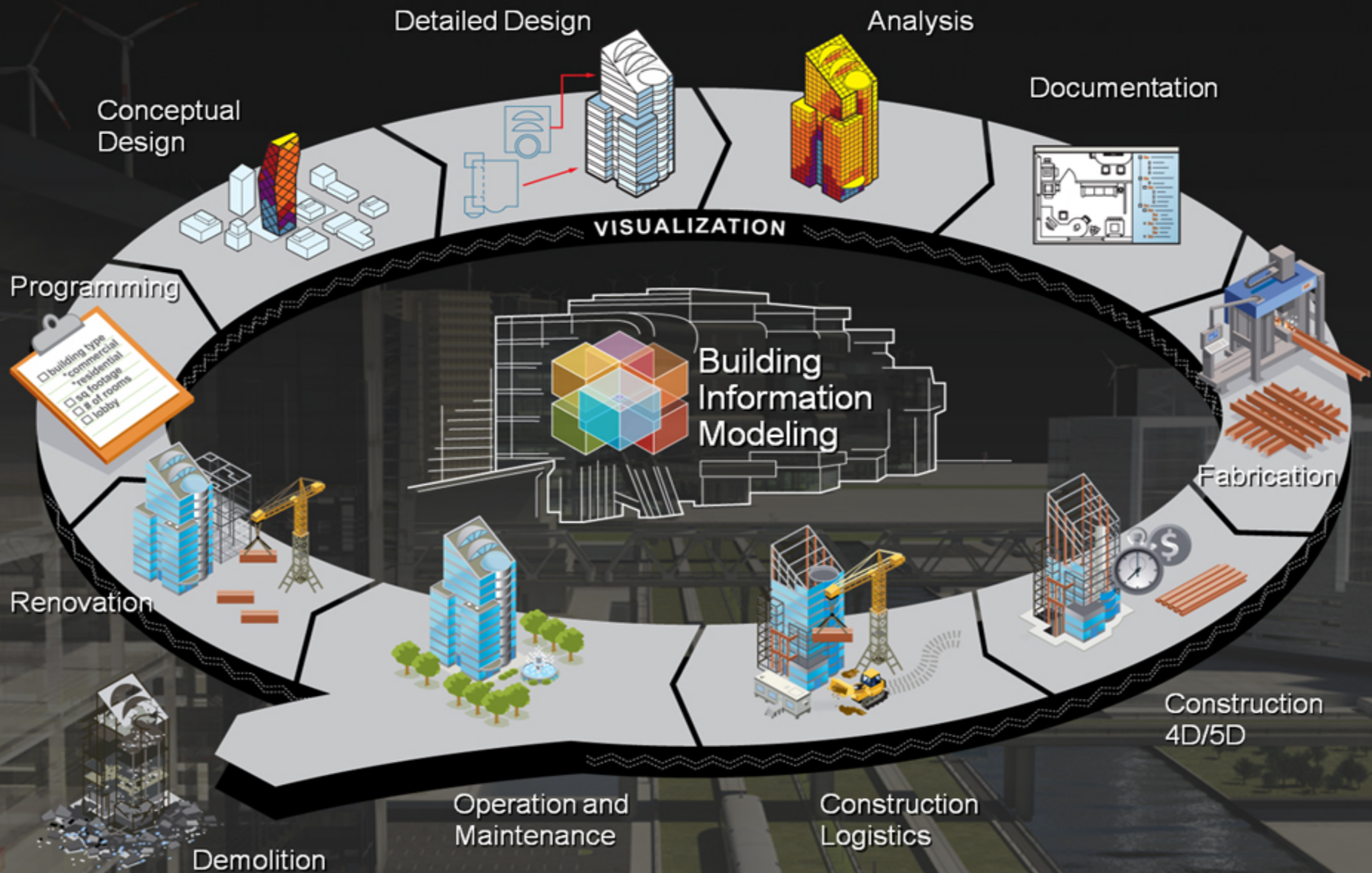
資訊

M

= Modelling

模型/ 模擬

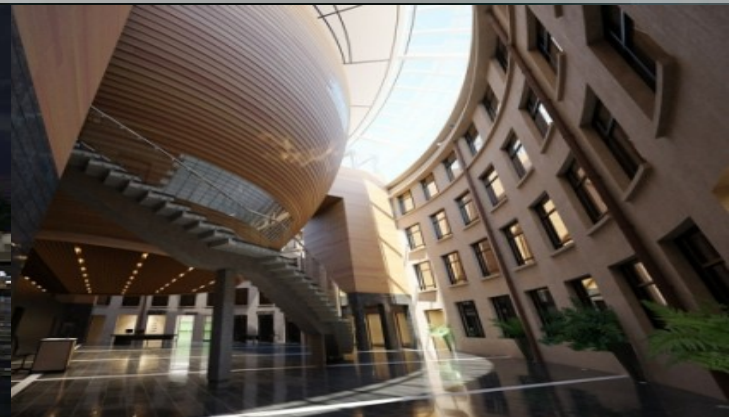
Use of Building Information Modeling (BIM)



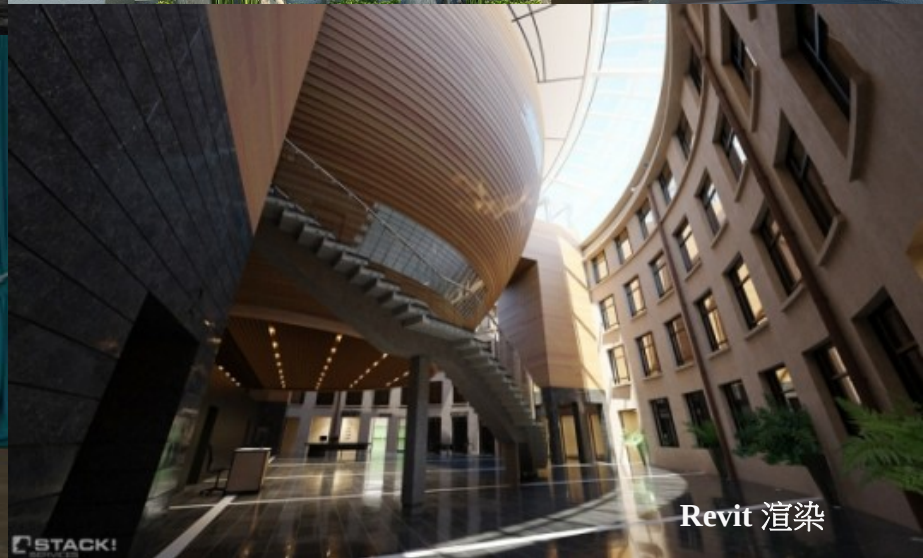
Fake BIM

M + ?

JUST 3D MODEL – NOT BIM



Fake BIM



Fake BIM

- Rendering
- CG (Computer Graphic)
- Animations
- Interactive Gaming

**Use BIM tools not
necessarily means
BIM!**

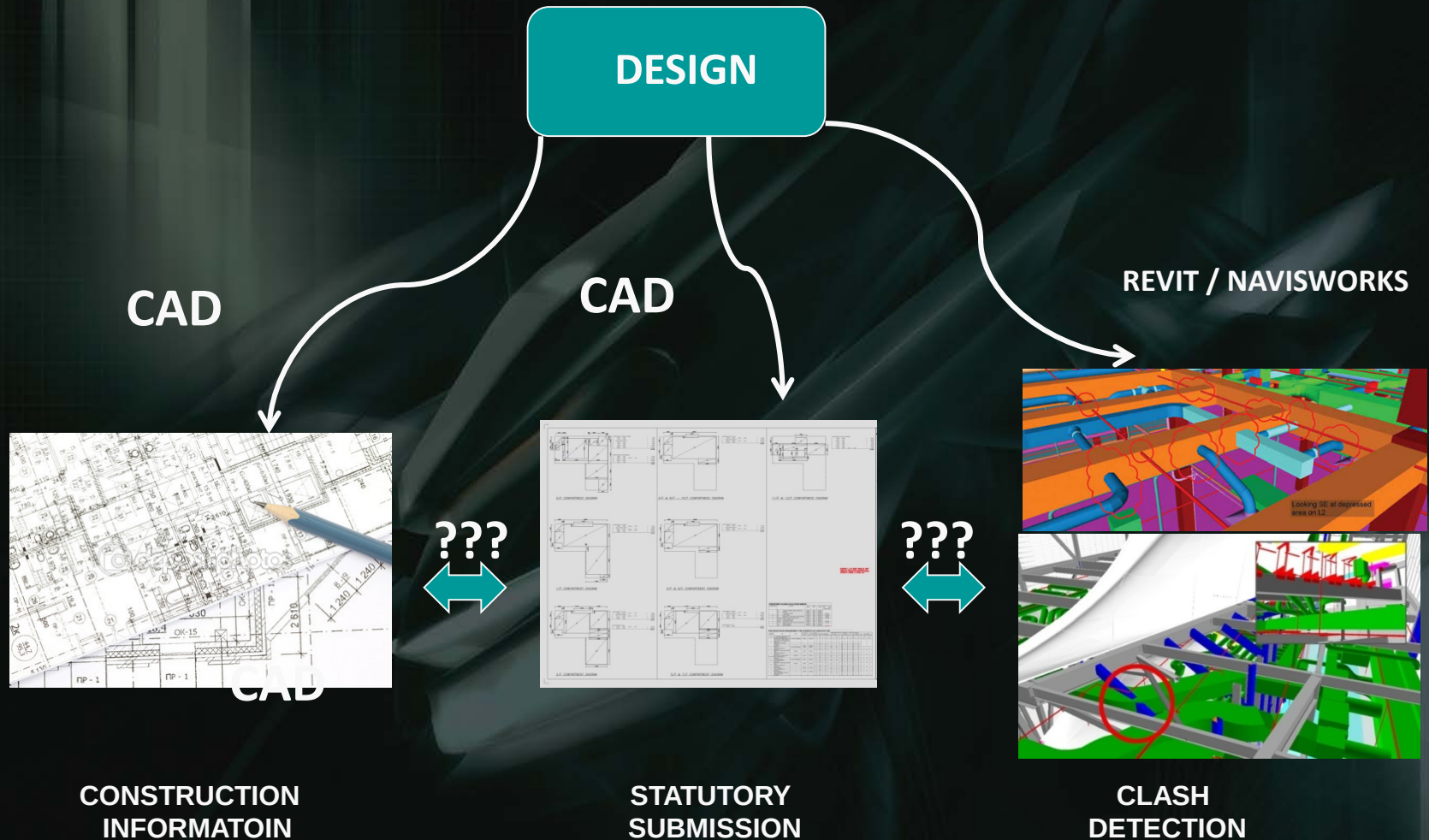


HALF-BIM

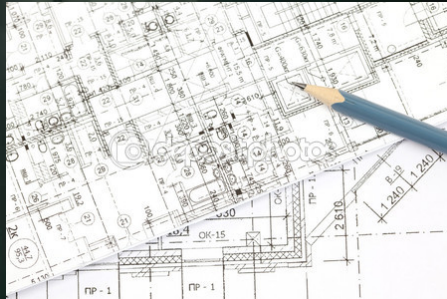
I <> M

3D MODEL >> QTO , CLASH ANALYSIS

HALF BIM

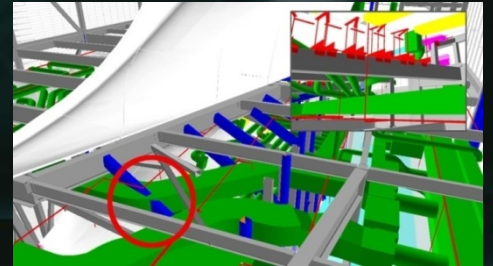
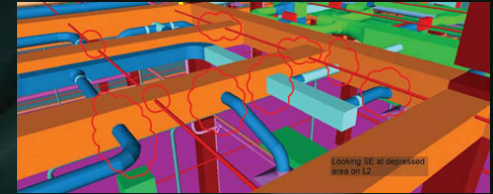


REAL BIM

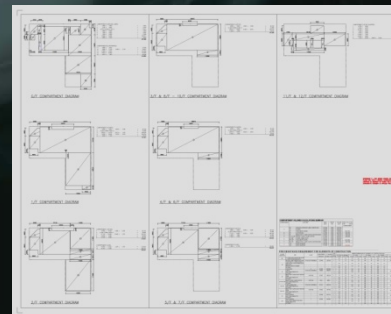


CONSTRUCTION
INFORMATOIN

DESIGN
in
BIM



CLASH
DETECTION



STATUTORY
SUBMISSION

REAL BIM

I = M

I > M

INFORMATION FROM MODEL,
INFORMATION MORE IMPORTANT

B I M



Modelling

Information

Business

REAL BIM

$$M + I = B$$

BIM is a process, Business is the objective

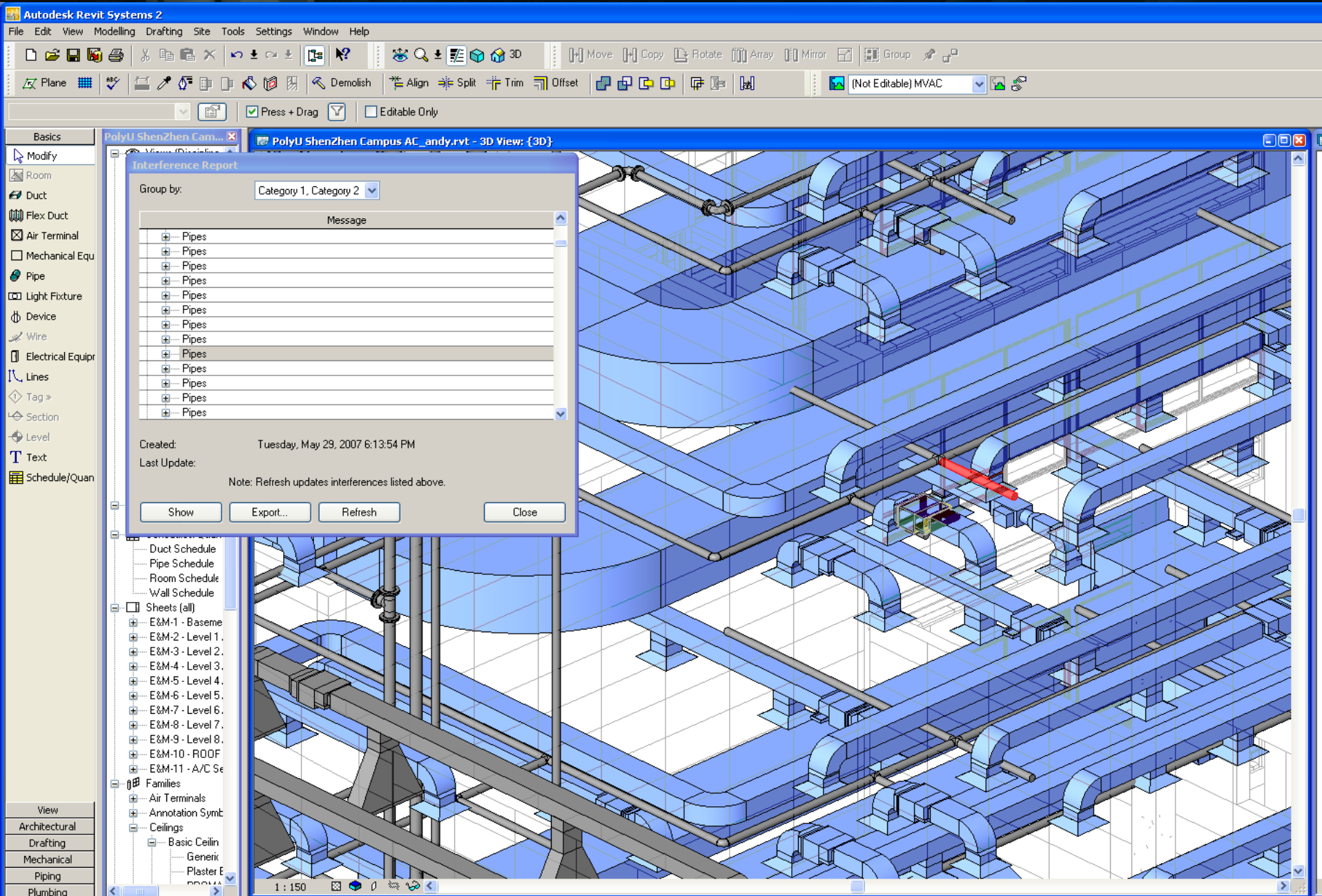
Case 1

Real BIM (Construction)

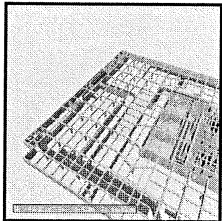
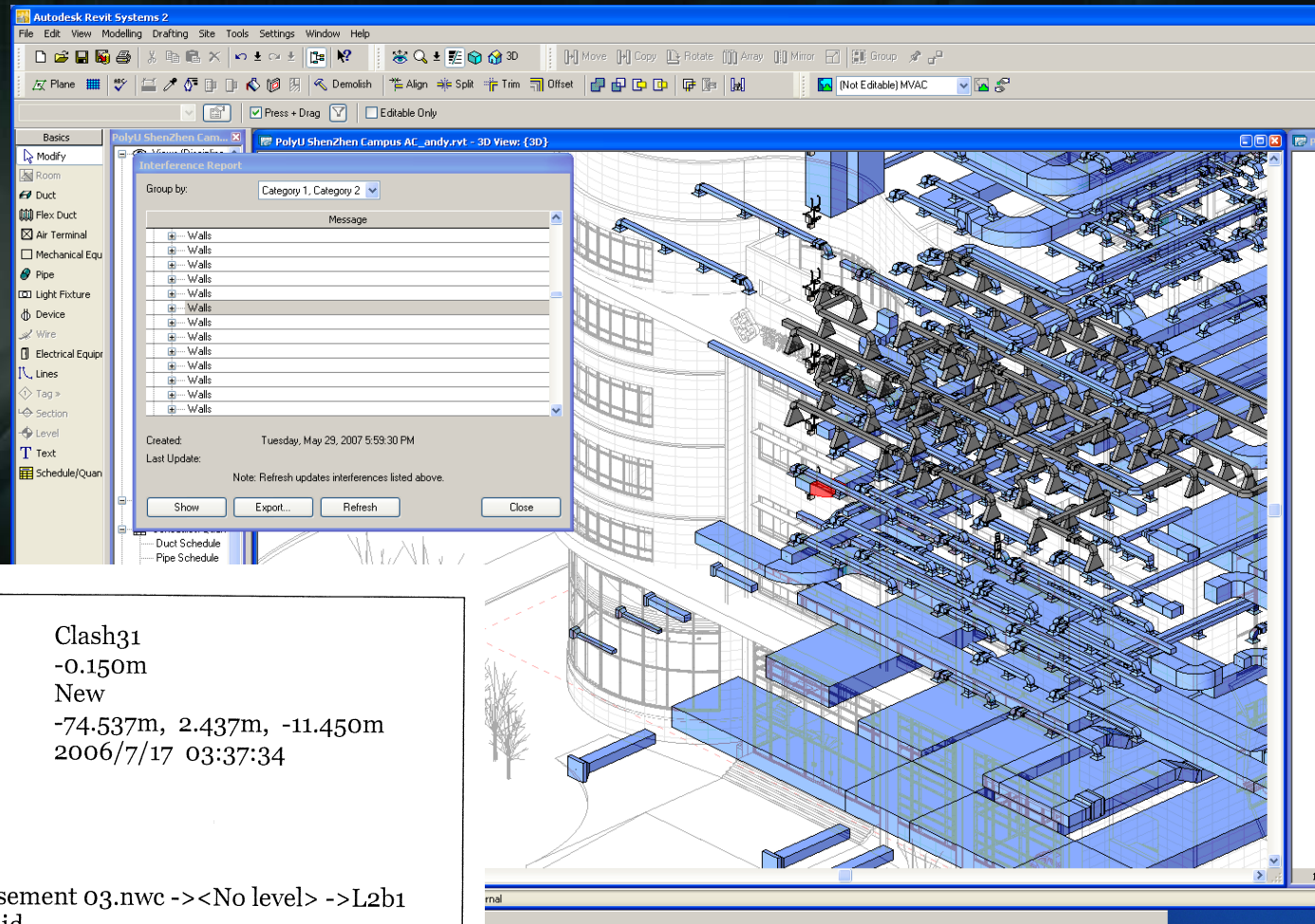
$$M + I = B \text{ (Drawing Production)}$$



CLASH ANALYSIS



CLASH ANALYSIS REPORT



Name Clash31
 Distance -0.150m
 Status New
 Clash Point -74.537m, 2.437m, -11.450m
 Date Created 2006/7/17 03:37:34
 Approved By

Item 1

Path File ->File ->Basement 03.nwc -><No level> ->L2b1
 500 x 700 ->L2b1 500 x 700 ->Solid

Item 2

Entity Handle 2AD6
 Path File ->File ->B3HVAC_Duct.nwd ->H-Ductwork-G -
 >Duct

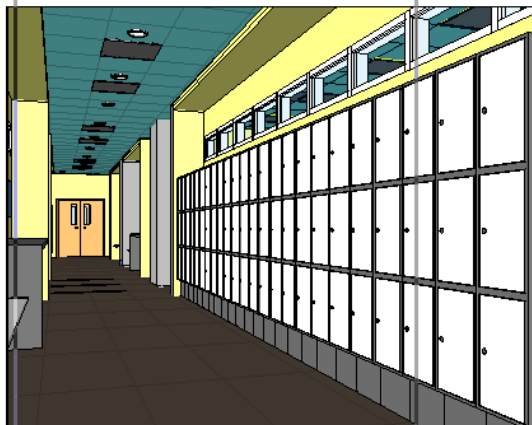
A 3D perspective view of a classroom layout. The room features a blue floor, yellow walls, and a whiteboard. There are several rows of blue desks and black chairs. A teacher's desk is positioned at the front, and a blackboard is visible on the left wall. The room is enclosed by a white border.

A 3D perspective rendering of a modern, empty classroom or lecture hall. The room features a grid-patterned ceiling, large windows on the left wall, and a whiteboard at the front. Rows of grey chairs and dark tables are arranged in the space.

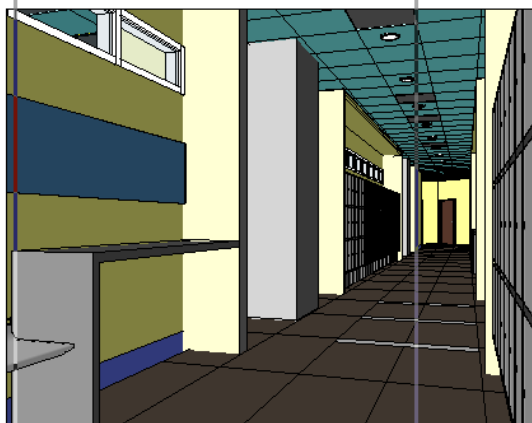
A 3D isometric view of a classroom layout. The room features a blue floor, yellow walls, and a grey ceiling. There are two sets of double doors on the left wall. The seating area consists of several rows of light blue rectangular tables, each with two grey chairs. A teacher's desk, made of brown wood, is positioned at the front of the room with a black office chair. A long grey storage unit or counter runs along the right wall. A yellow rectangular area is visible on the back wall.

[illegible]

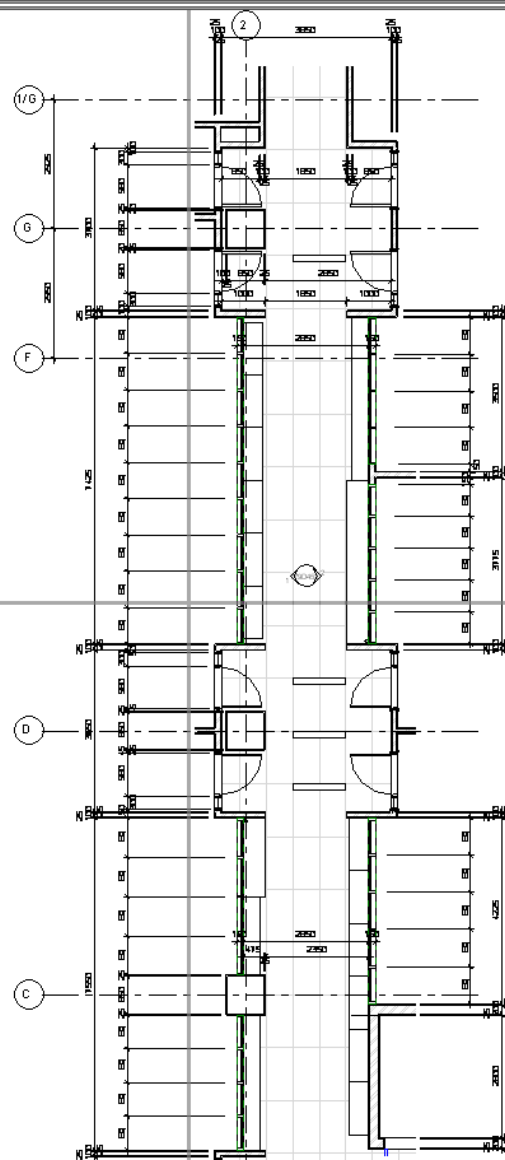
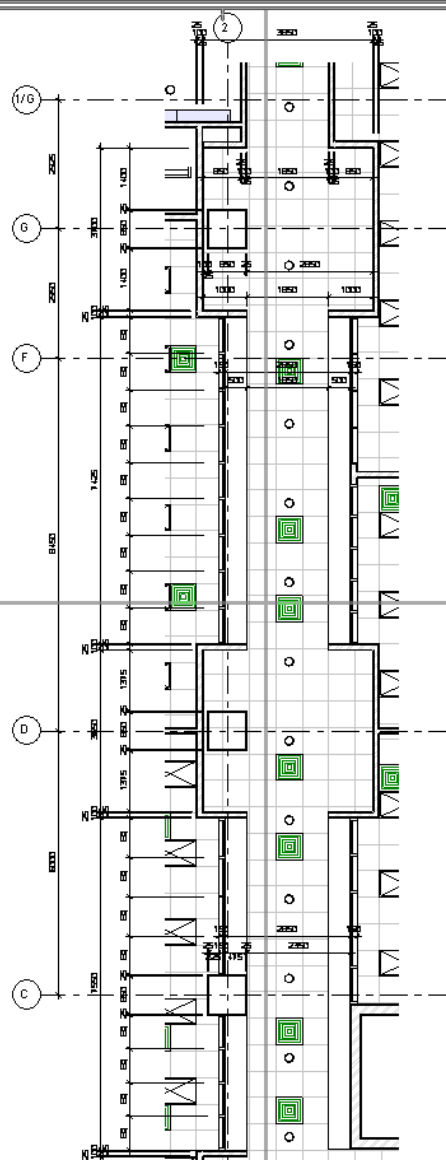
Drawing Type		B.D SUBMISSION	
B-1 Reference No.	GOVERNMENT REFERENCE NO.		
S-01 Submission No.	GOVERNMENT REFERENCE NO.		
Author(s) By			
AUTHORISED PERSON FOR SIGNATURE AREA			
Name			
Name	Description	Drawn Date	Printed
Structural Engineer		benam	
J. ROGER PRENTISS			
E & M			
J. ROGER PRENTISS			
Q.C.			
利比 RLB Rider Levett Bucknall			
香港中環德輔道中168號		香港中環皇后大道中193號	
電話：(852) 2578 1111		傳真：(852) 2578 1111	
電郵：rlb@rlb.com.hk		電郵：rlb@rlb.com.hk	
Aedas Ltd.			
Unit 1001 Two Wings Road Kowloon Hong Kong		T +852 2881 1728 F +852 2222 0478 E hongkong@aedas.com aedas.com	
Client			
THE HONG KONG POLYTECHNIC UNIVERSITY 香港理工大學			
Project 香港理工大学图书馆、学术楼及			
Drawing 行政人员培训中心四座(高层三层) 1			
Contractor's File Contract Name 行政人员培训中心四座(高层三层) Contract Number 00778		Revision 0000007	
Drawing Number FFB DAB8		Date REV.	Issue Status VALID



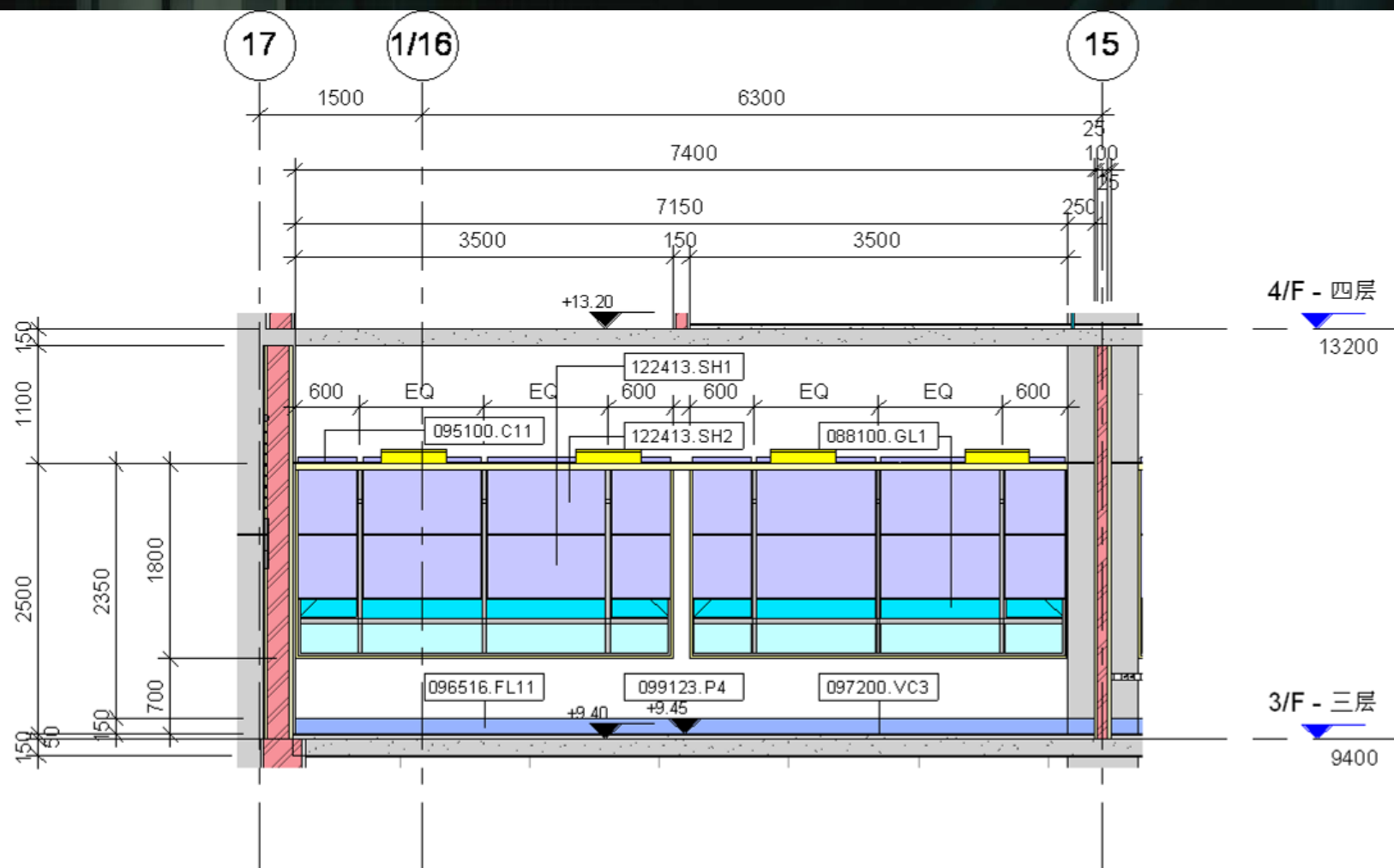
4 走廊立体示意图(低楼三至四层)2



3 走廊立体示意图(低楼三至四层)1



A vertical strip of various logos and brand names, including Aedas, The Hong Kong Polytechnic University, and others.

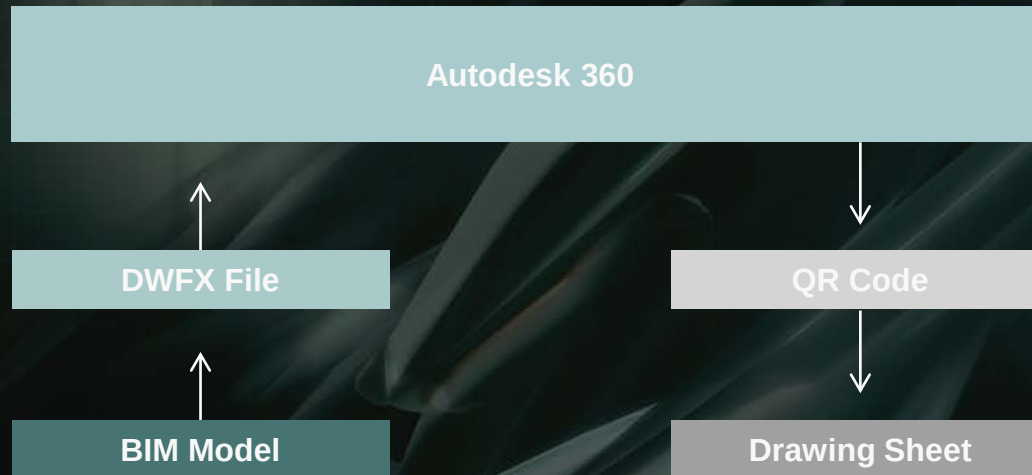


2

行政人员培训室立面图(高楼三层)6

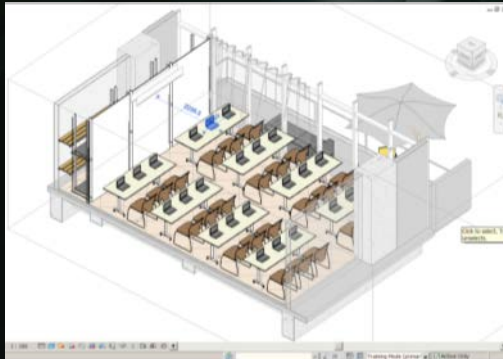
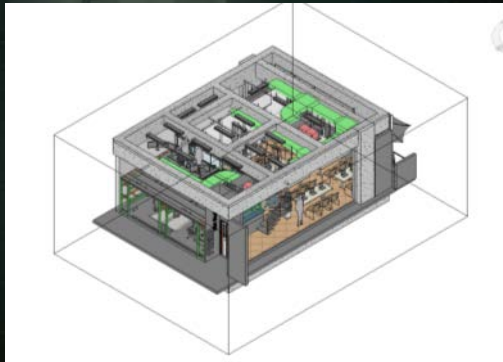
1:50

Linkage between Drawing and BIM model

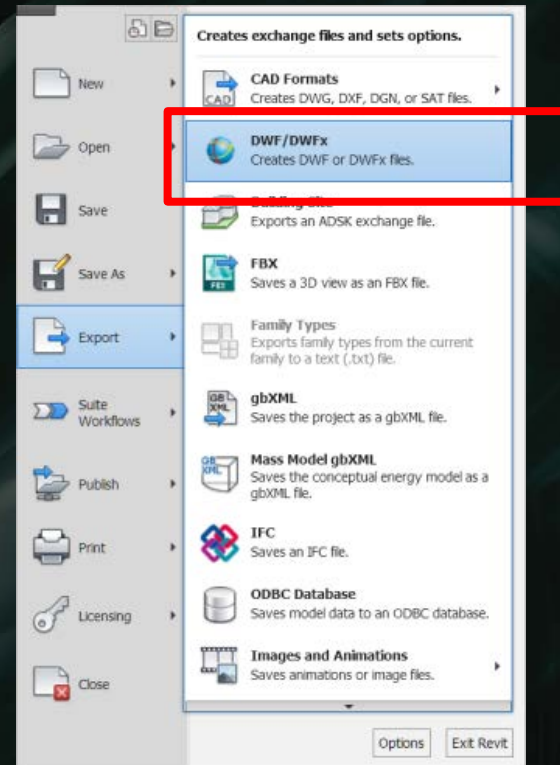


1.0 Linkage between drawing and BIM model

1.2 Prepare the BIM Model

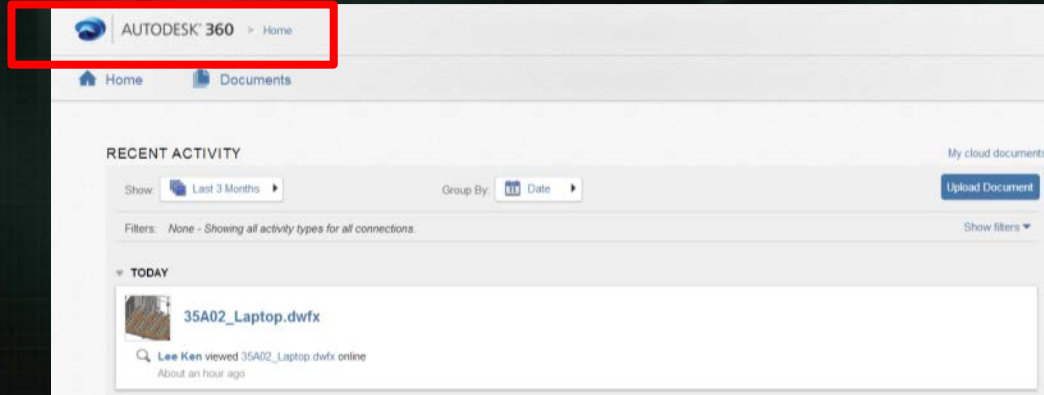


1.3 Export to DWFX format

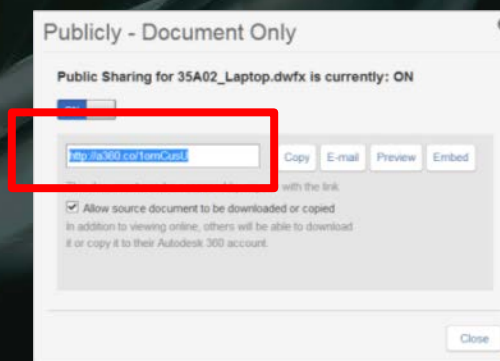
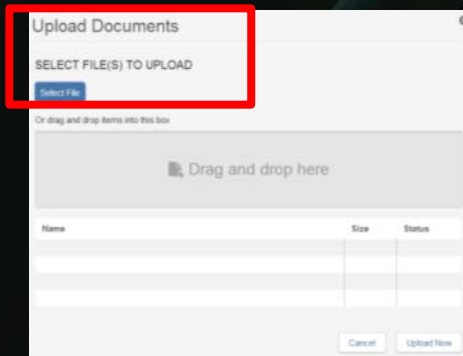


1.0 Linkage between drawing and BIM model

1.4 Access to Autodesk 360

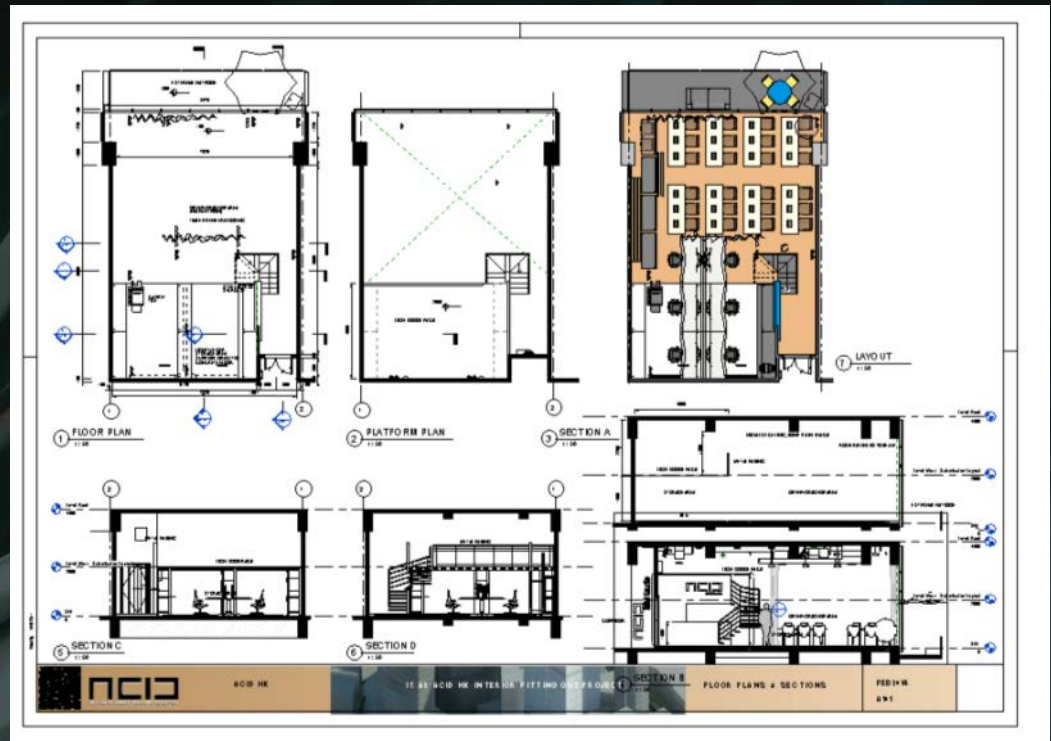
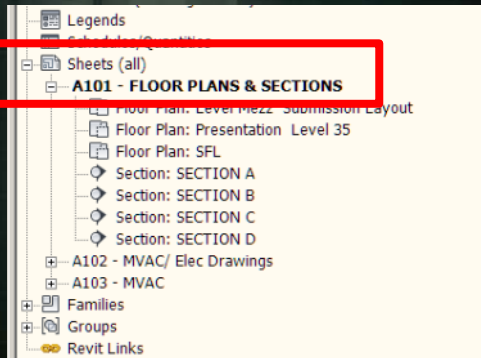


1.5 Upload and share the DWFX file



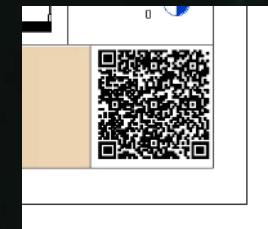
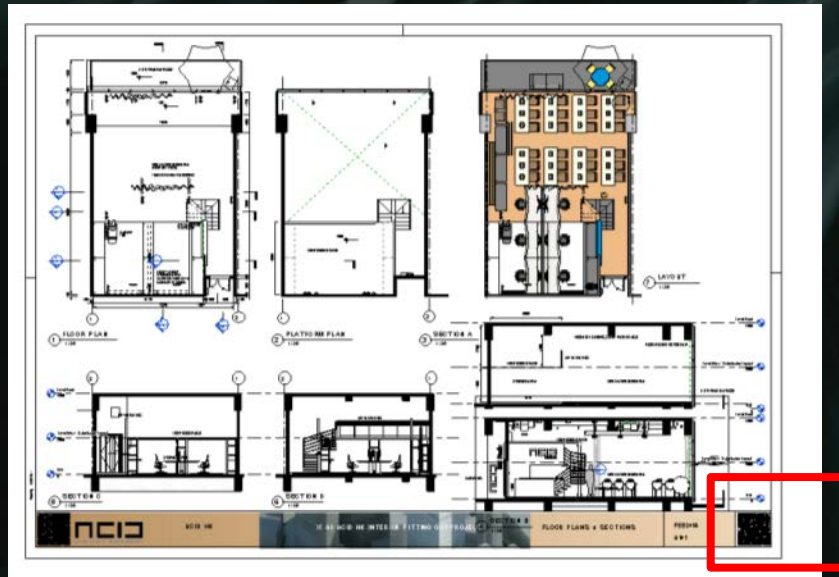
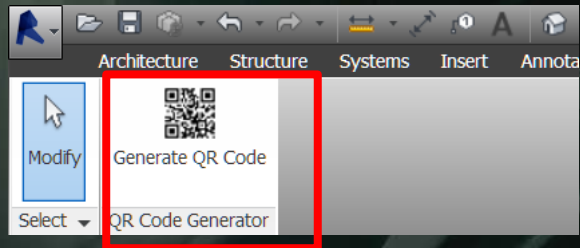
1.0 Linkage between drawing and BIM model

1.6 Prepare the drawing sheet from BIM model



1.0 Linkage between drawing and BIM model

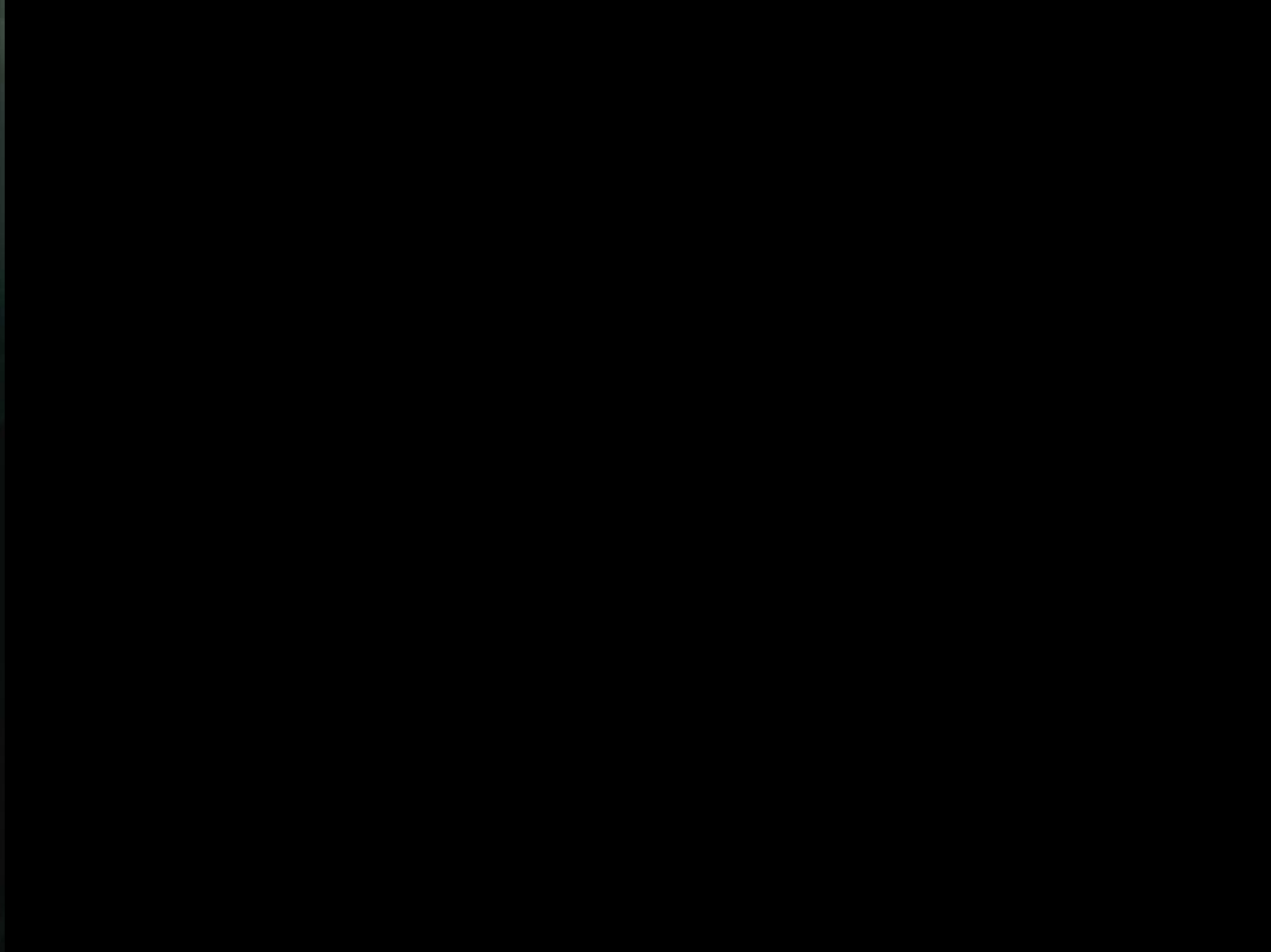
1.7 Generate and add QR Code on the drawing



Interoperability between BIM Model and Reality

1.0 Linkage between drawing and BIM model

1.8 Access to BIM model through mobile device (Video)

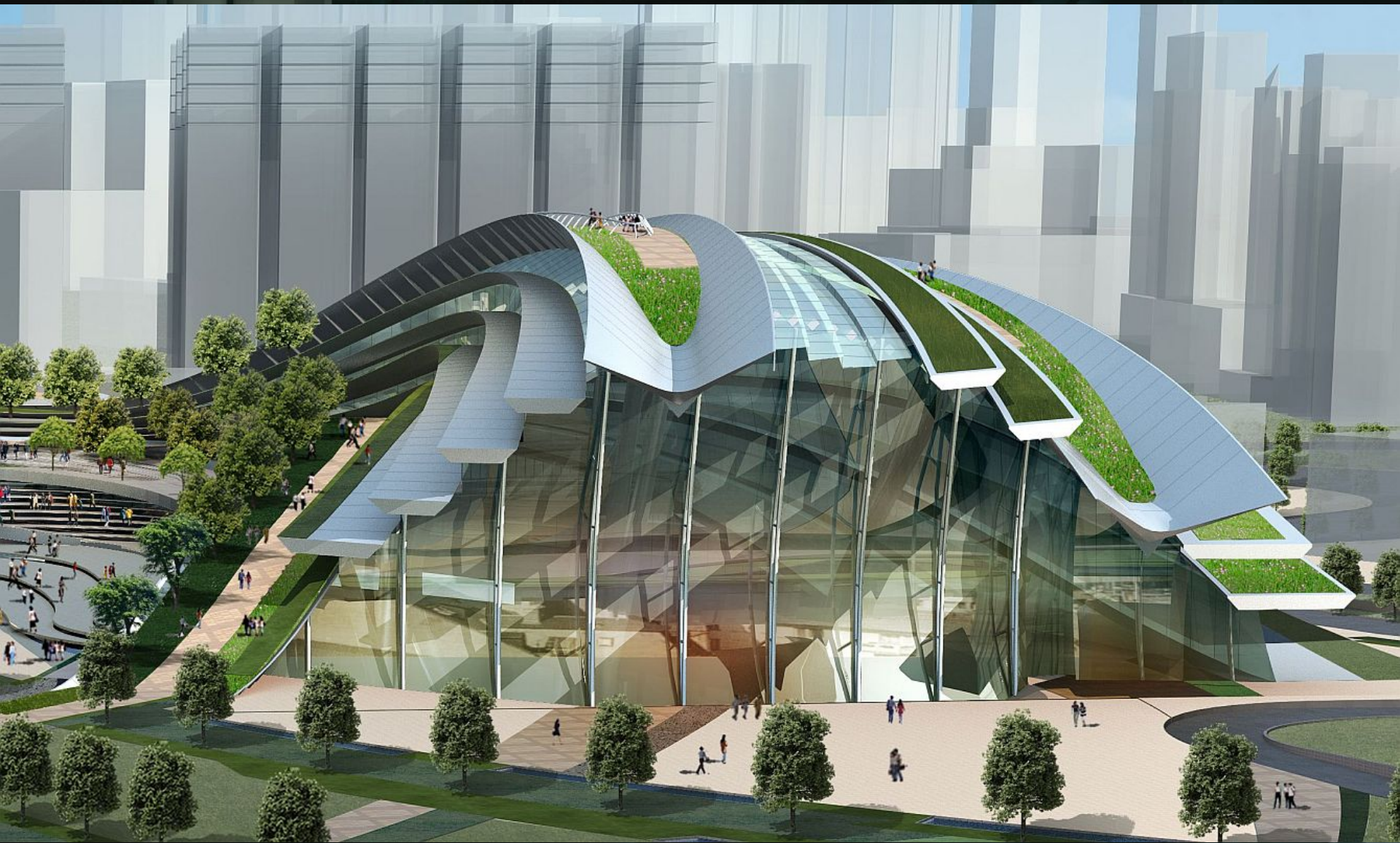


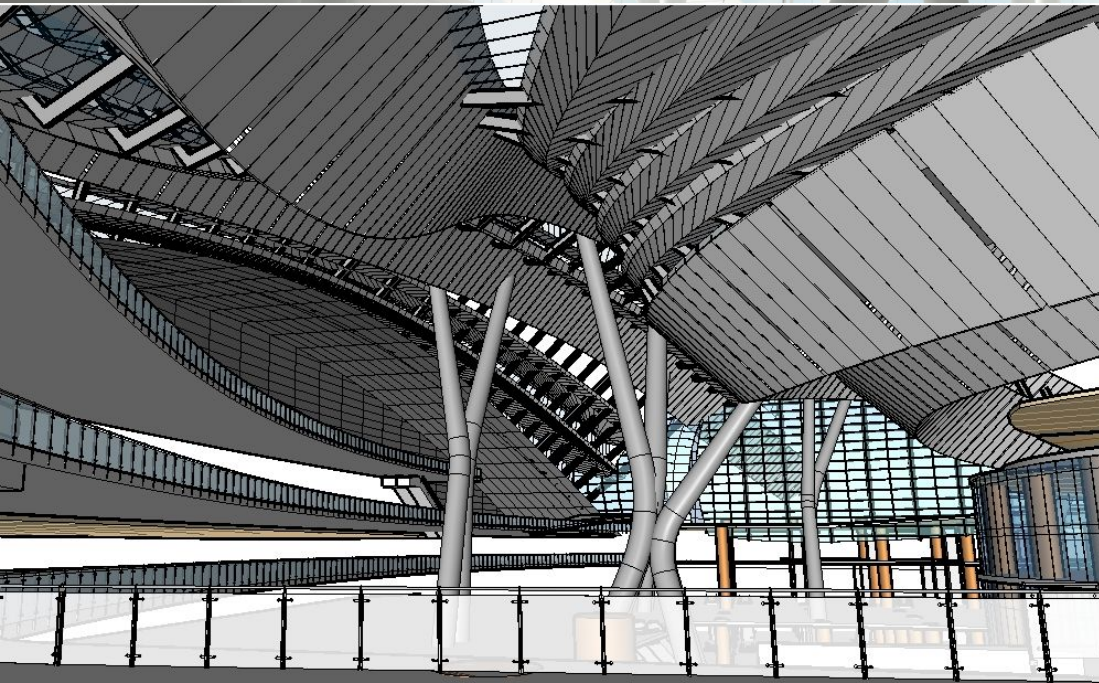
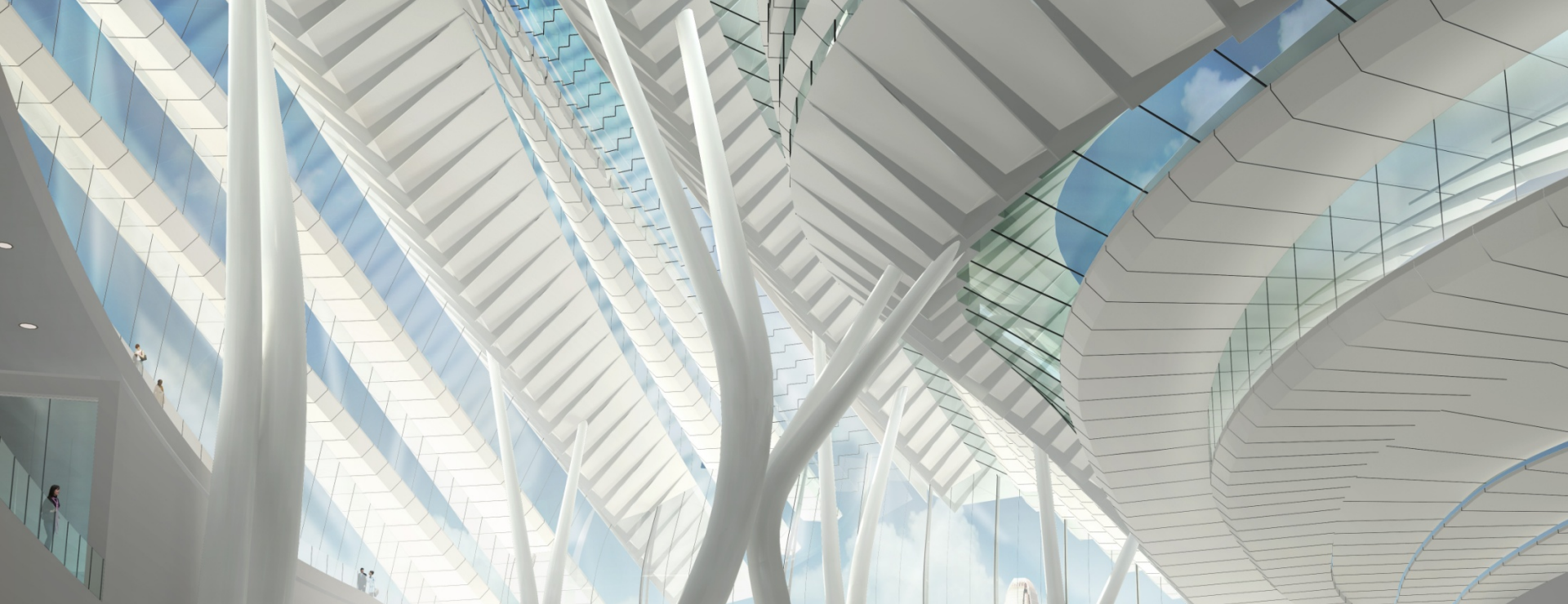
Case 2

Real BIM (Construction)

M + I = B (Fabrication)









DESIGN

RHINO



PANELIZATION

GRASSHOPPER



EXPORT

DATABASE

REVIT API



IMPORT

RATIONALIZATION

REVIT API



BIM RECREATION

REVIT



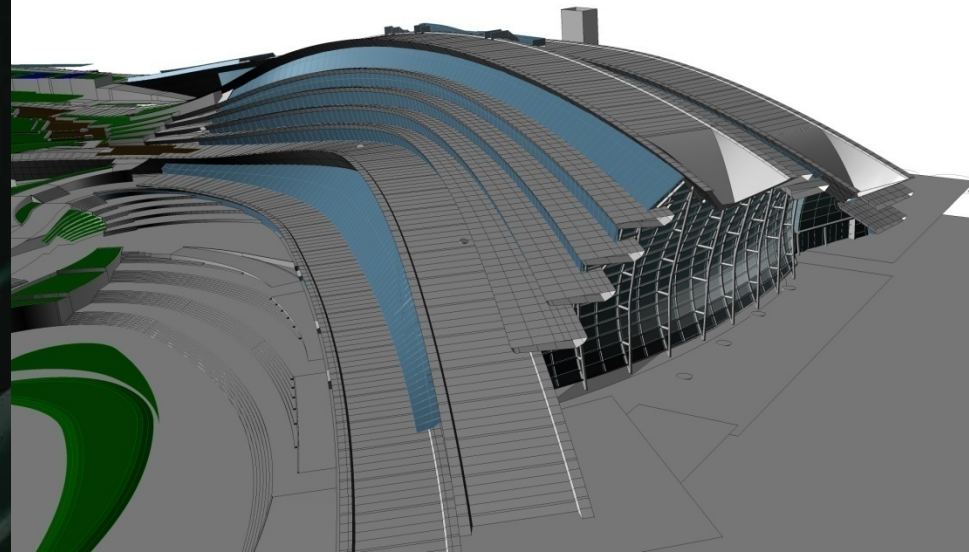
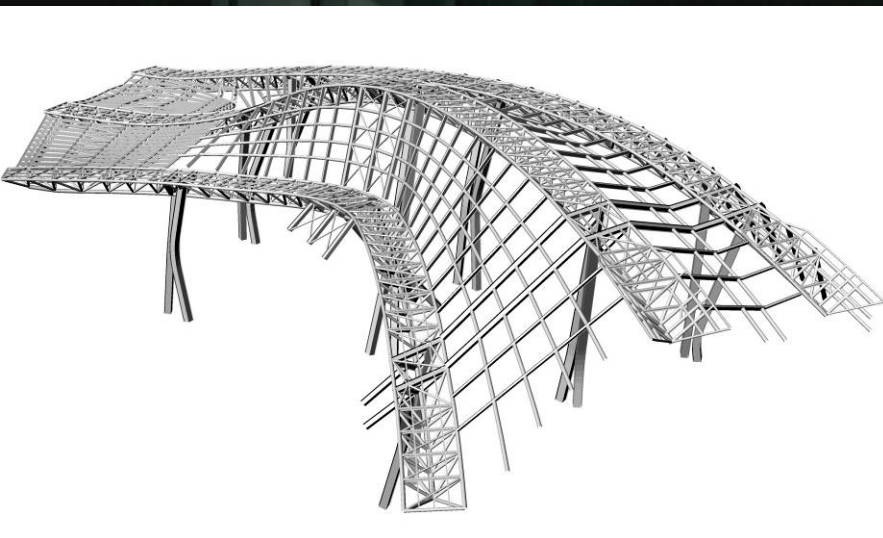
DOCUMENTATION

REVIT



TENDER

MANUF/CONSTRUCTION

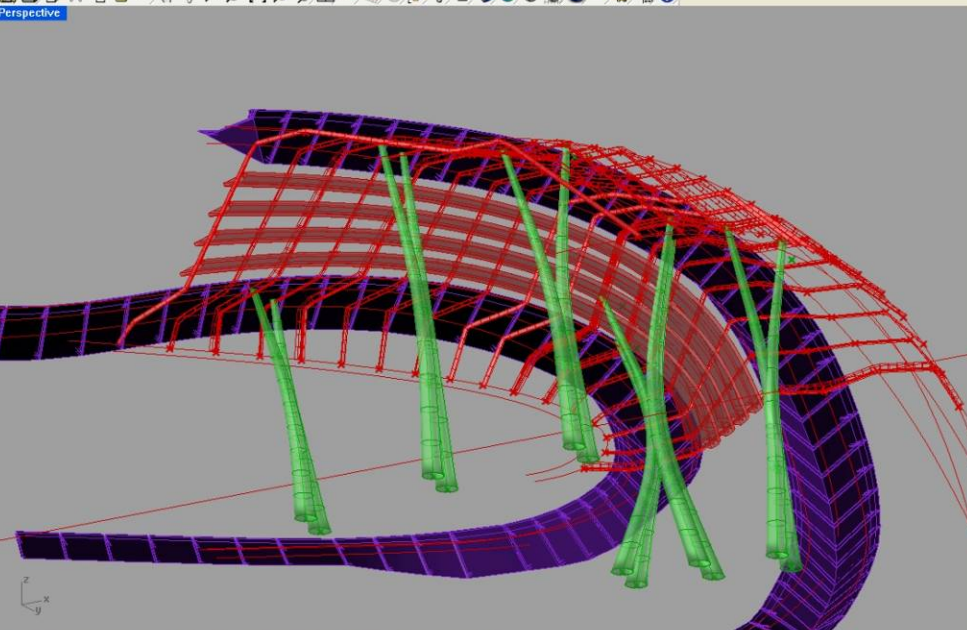


COLUMN HEAD STUDY - Rhinoceros [Commercial] - [Perspective]

File View Curve Surface Solid Mesh Dimension Transform Tools Analyze Render Help
 Hide
 Invert
 Instances, 111 hatches, 452 points, 1924 curves, 117 polysurfaces, 126 surfaces, 36 text added to selection.
 Hide



Perspective



☒ Near ☒ Point ☒ Mid ☐ Cen ☐ Int ☐ Perp ☐ Tan ☐ Quad ☐ Knot ☐ Project ☐ STrack ☐ Disable

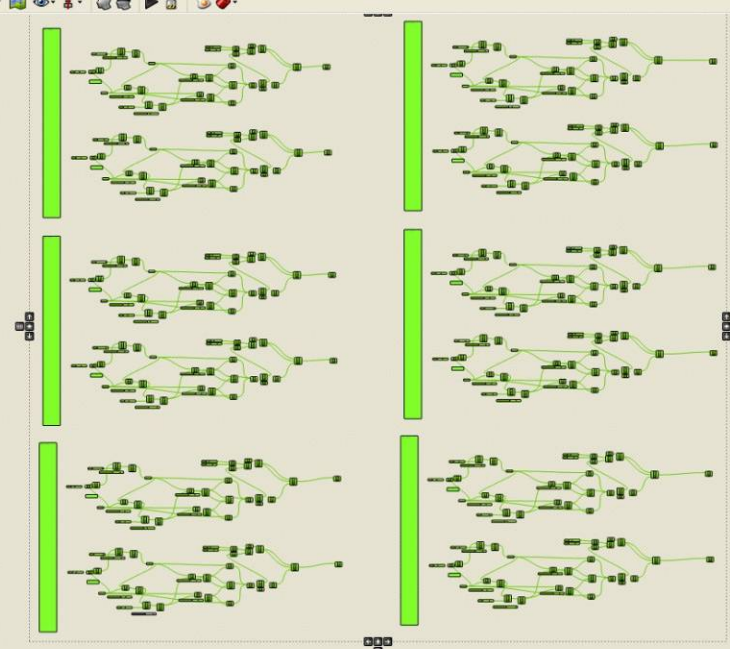
356.991 y 191.236 z 0.000 0.000 Layer 12 Snap Ortho Planar Osnap Record History

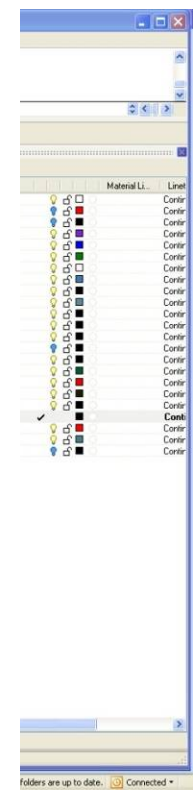
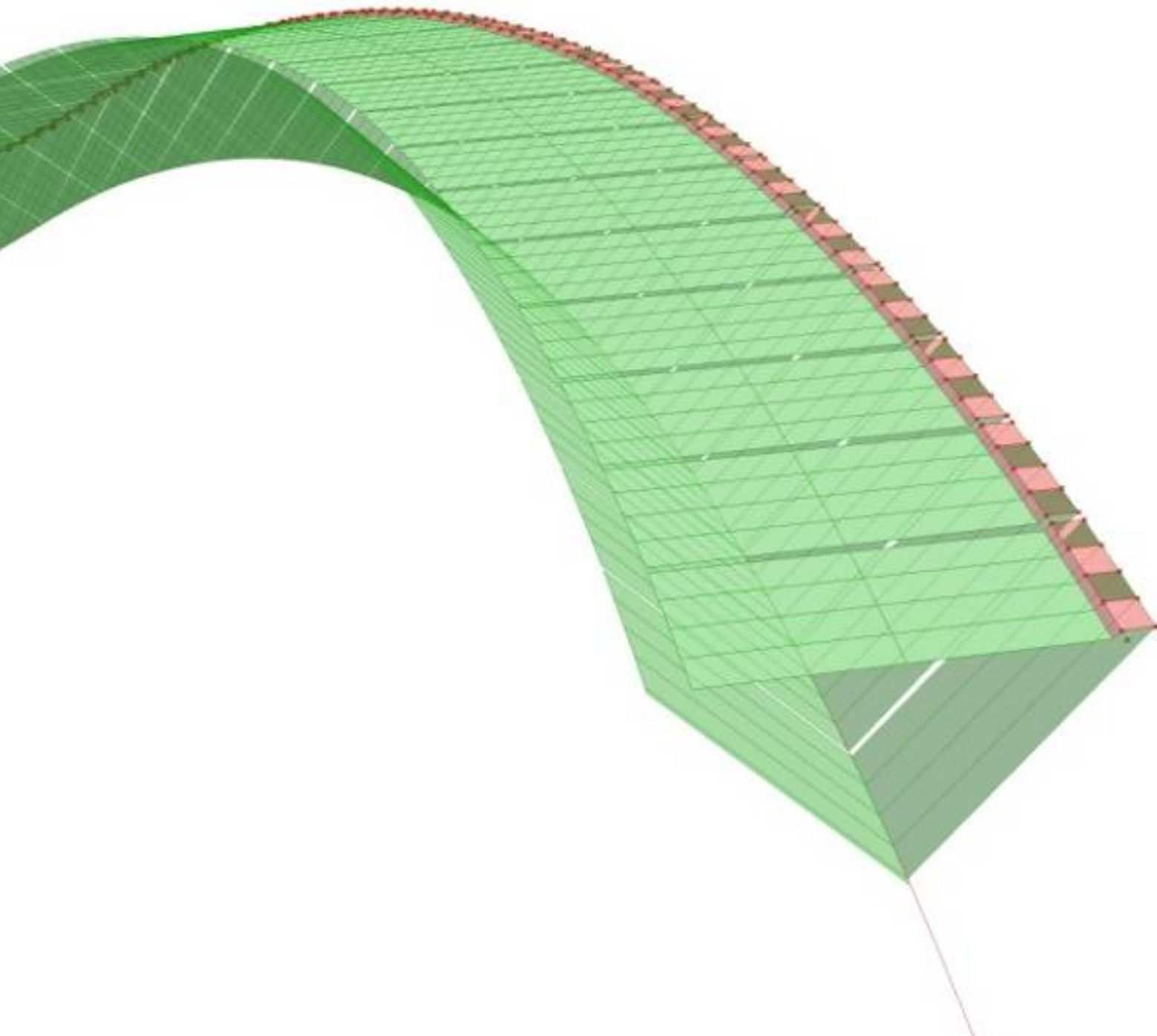
Grasshopper - column head with secondary structure until eastern arch

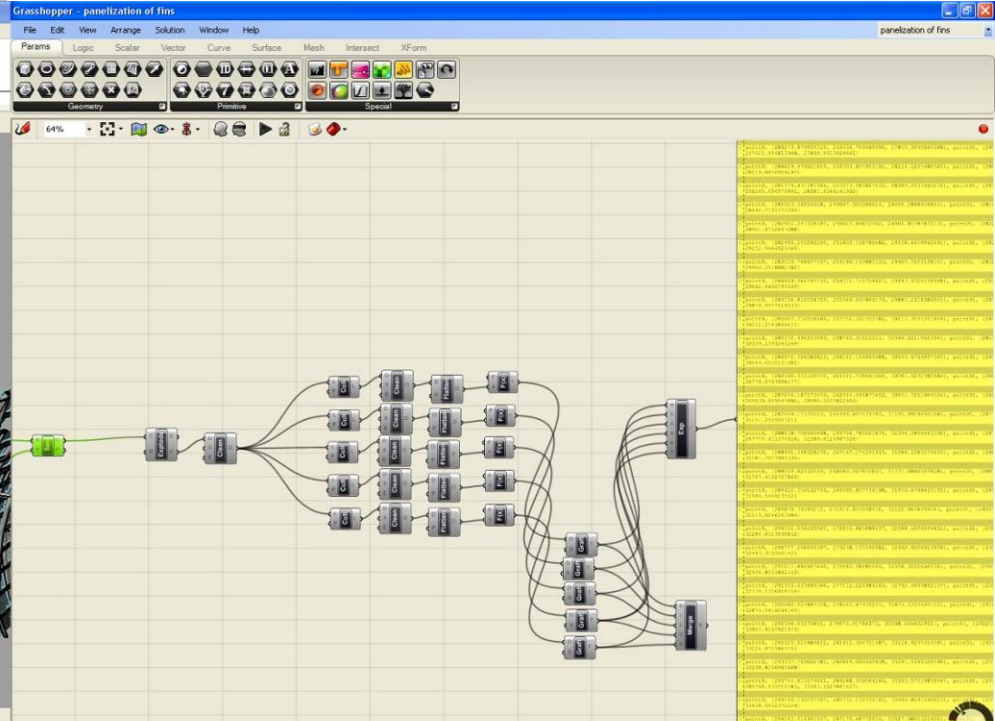
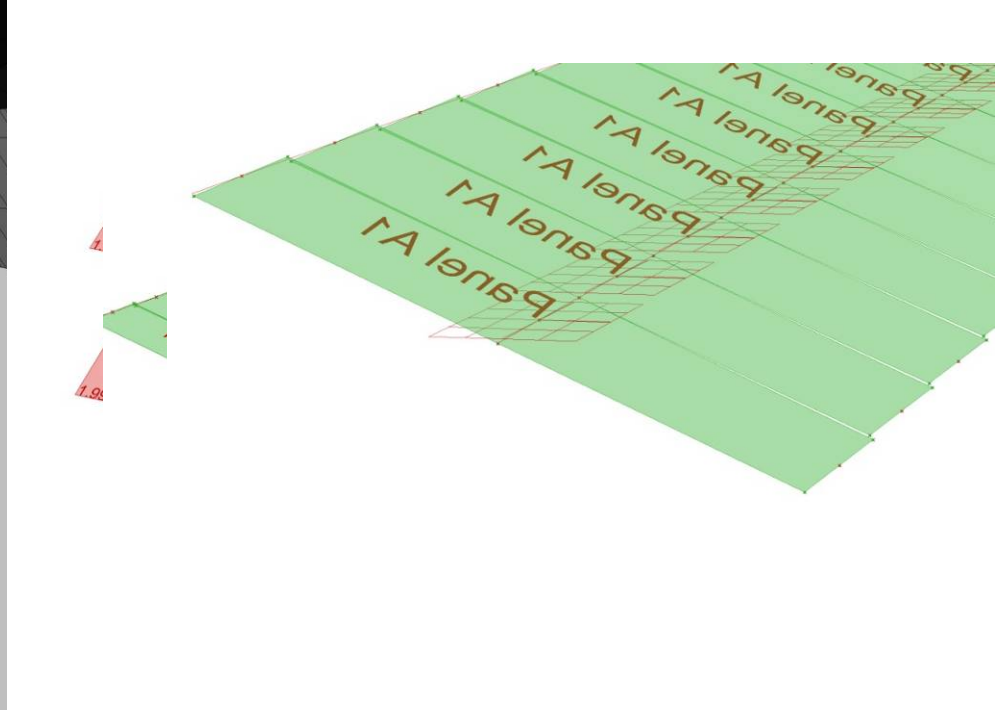
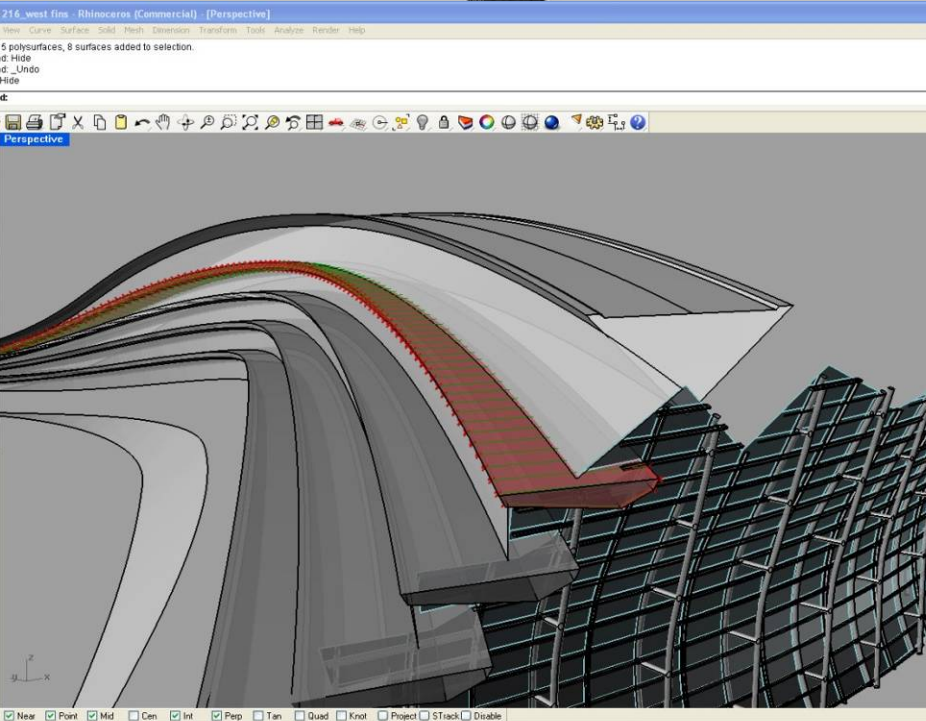
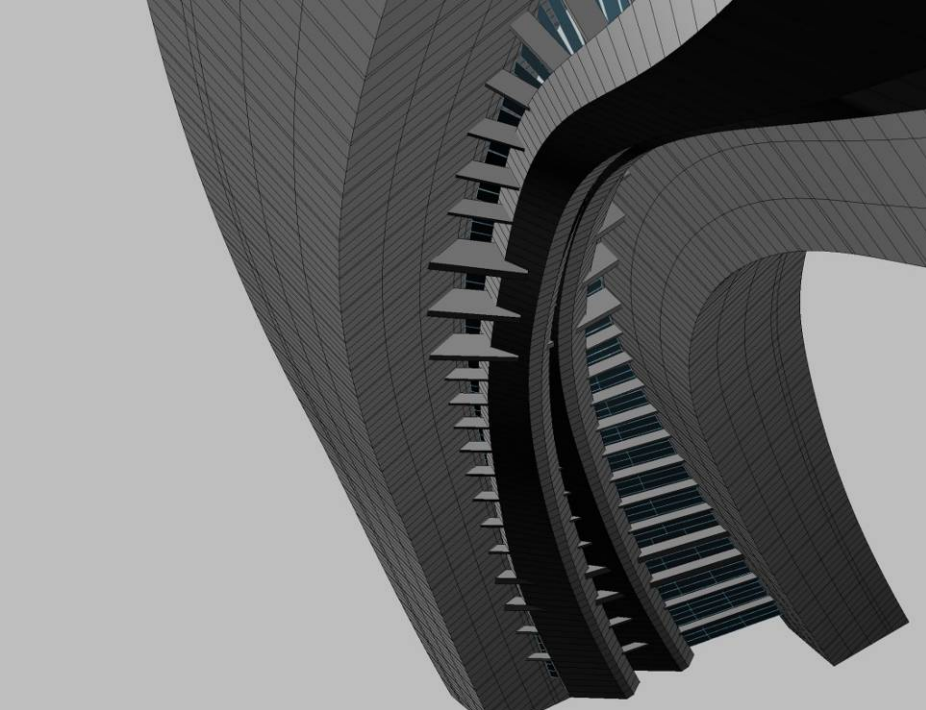
File Edit View Arrange Solution Window Help

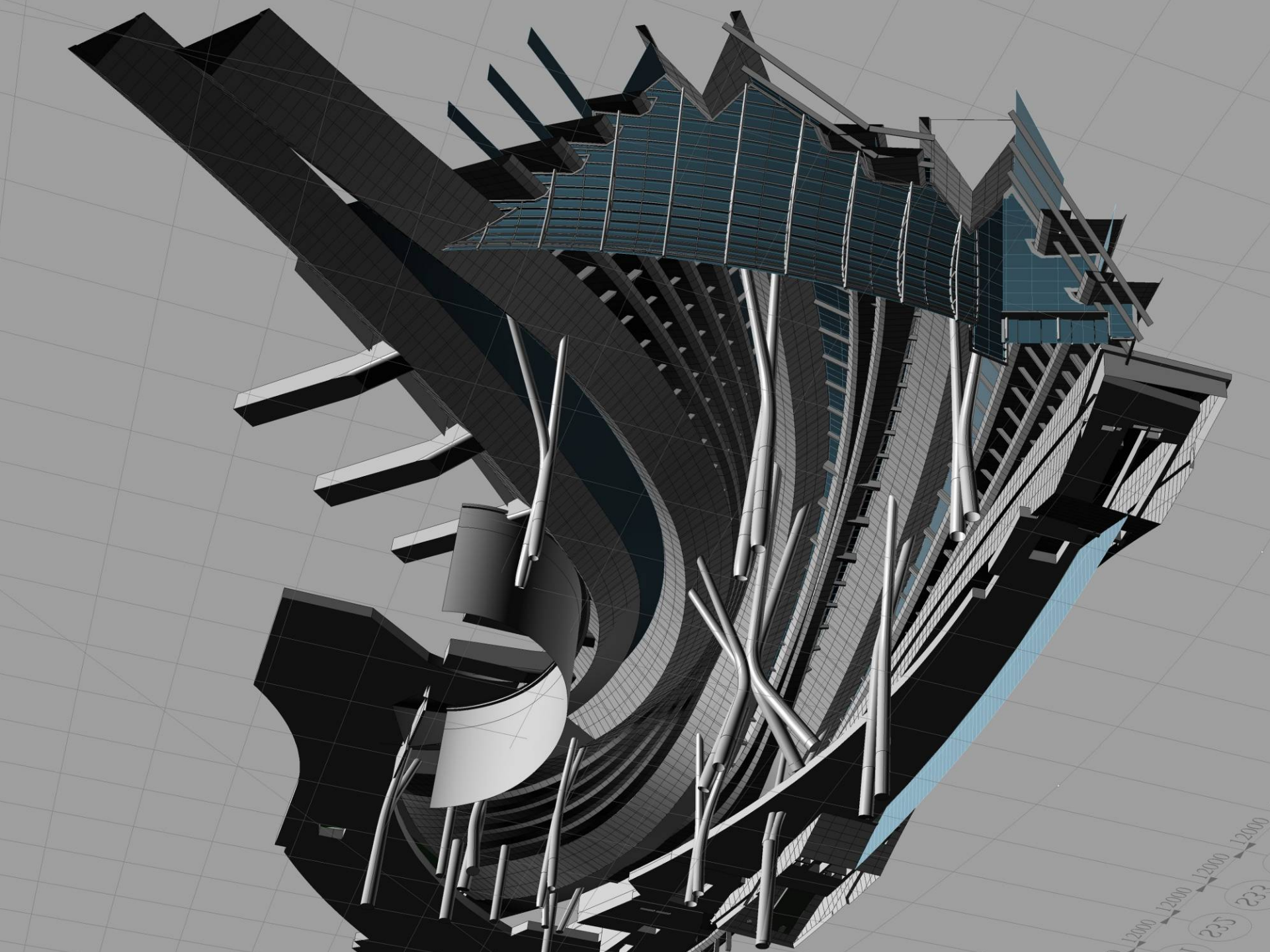


13%

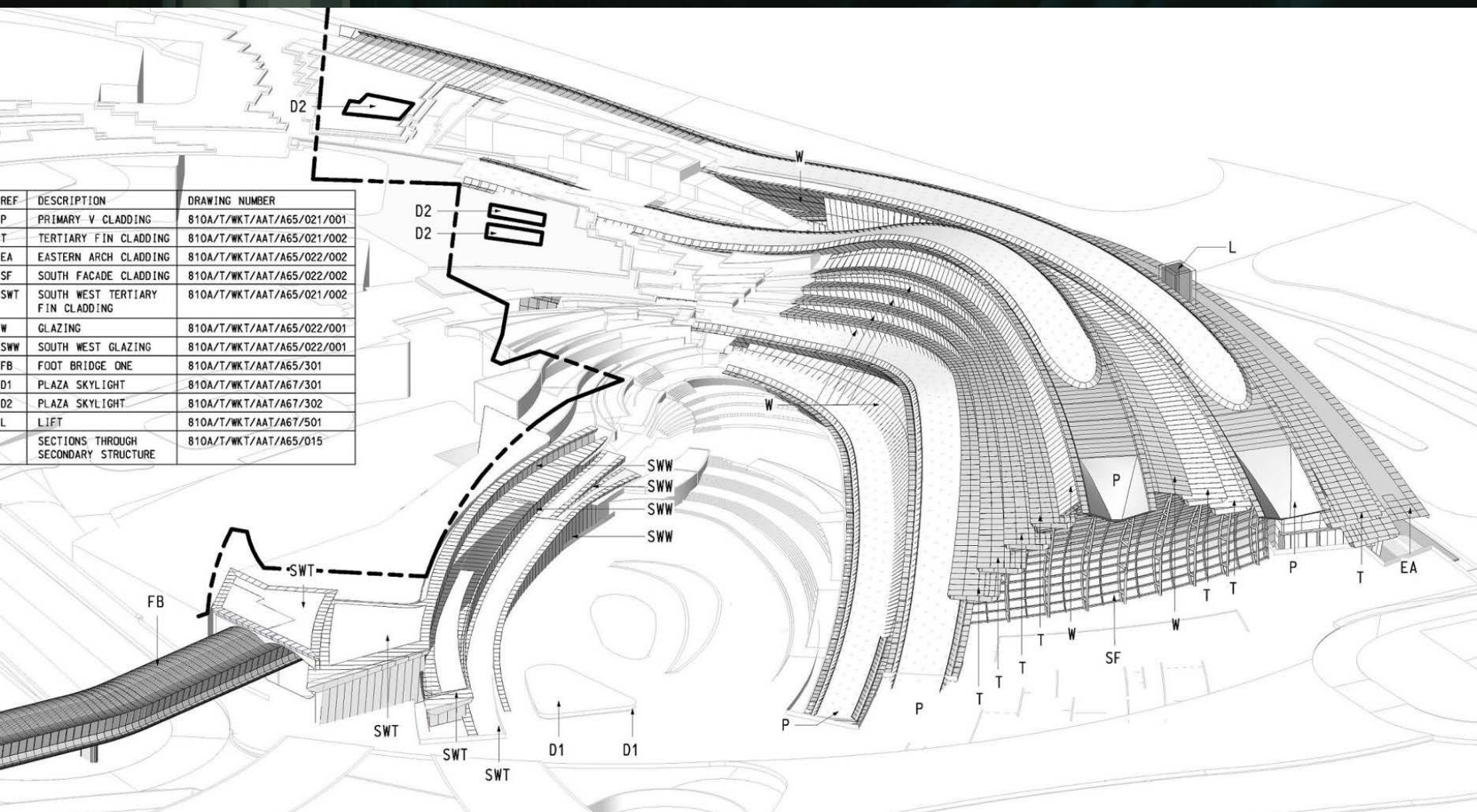


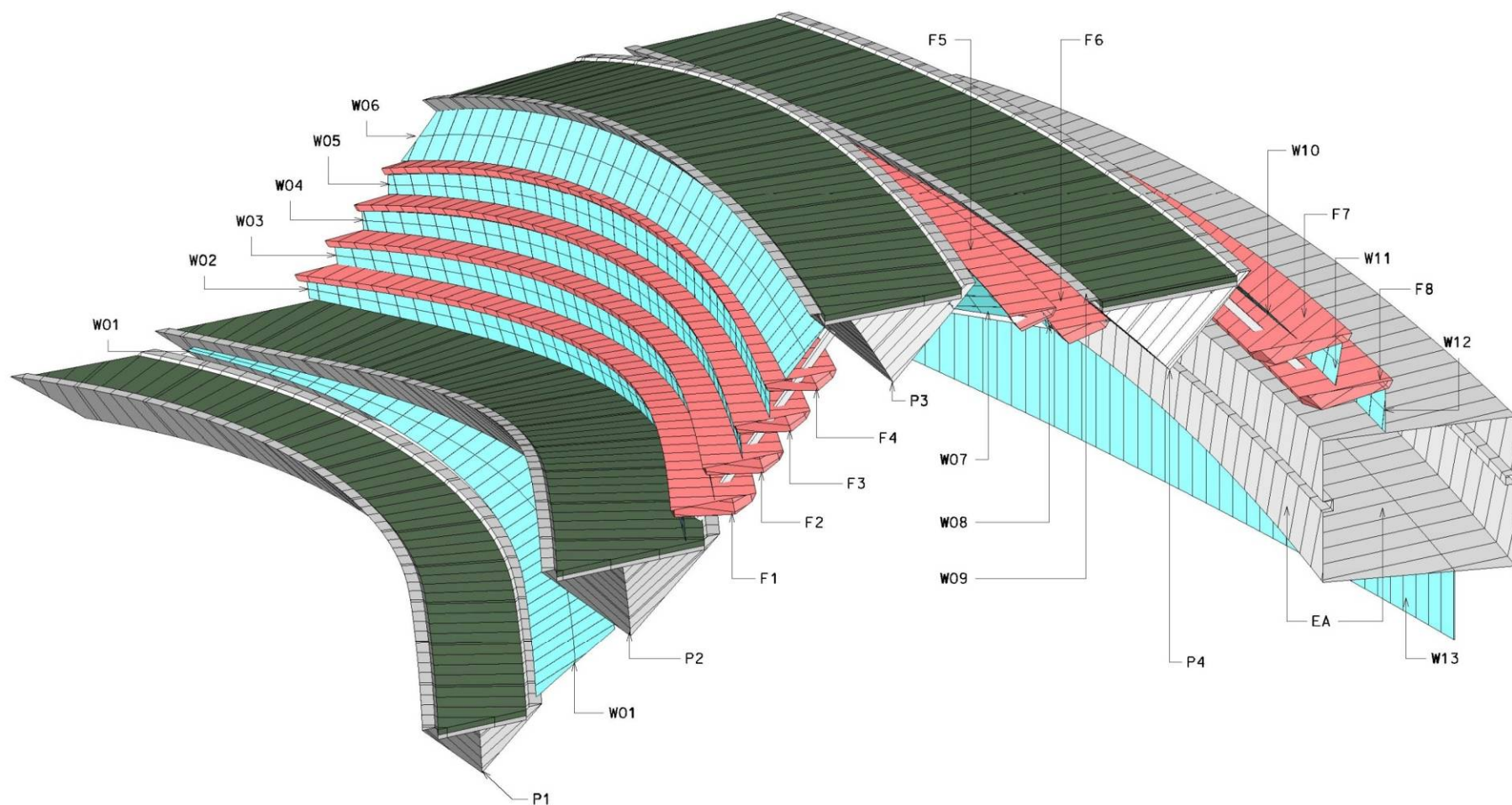


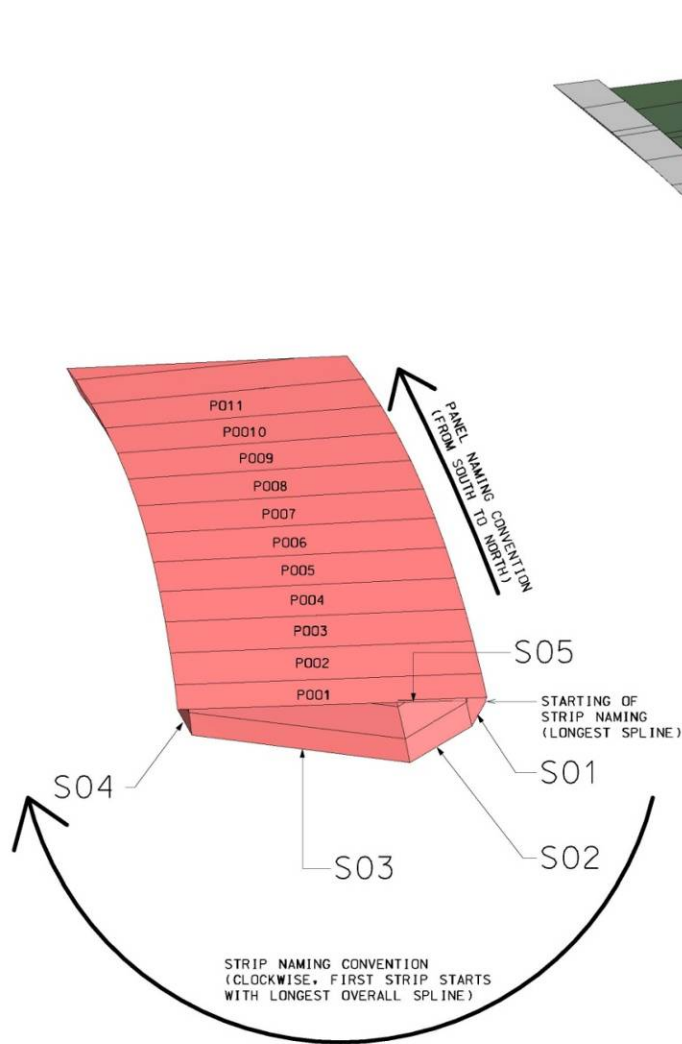




REF	DESCRIPTION	DRAWING NUMBER
P	PRIMARY V CLADDING	810A/T/WKT/AAT/A65/021/001
T	TERTIARY FIN CLADDING	810A/T/WKT/AAT/A65/021/002
EA	EASTERN ARCH CLADDING	810A/T/WKT/AAT/A65/022/002
SF	SOUTH FACADE CLADDING	810A/T/WKT/AAT/A65/022/002
SWT	SOUTH WEST TERTIARY FIN CLADDING	810A/T/WKT/AAT/A65/021/002
W	GLAZING	810A/T/WKT/AAT/A65/022/001
SWW	SOUTH WEST GLAZING	810A/T/WKT/AAT/A65/022/001
FB	FOOT BRIDGE ONE	810A/T/WKT/AAT/A65/301
D1	PLAZA SKYLIGHT	810A/T/WKT/AAT/A67/301
D2	PLAZA SKYLIGHT	810A/T/WKT/AAT/A67/302
L	LIFT	810A/T/WKT/AAT/A67/501
	SECTIONS THROUGH SECONDARY STRUCTURE	810A/T/WKT/AAT/A65/015



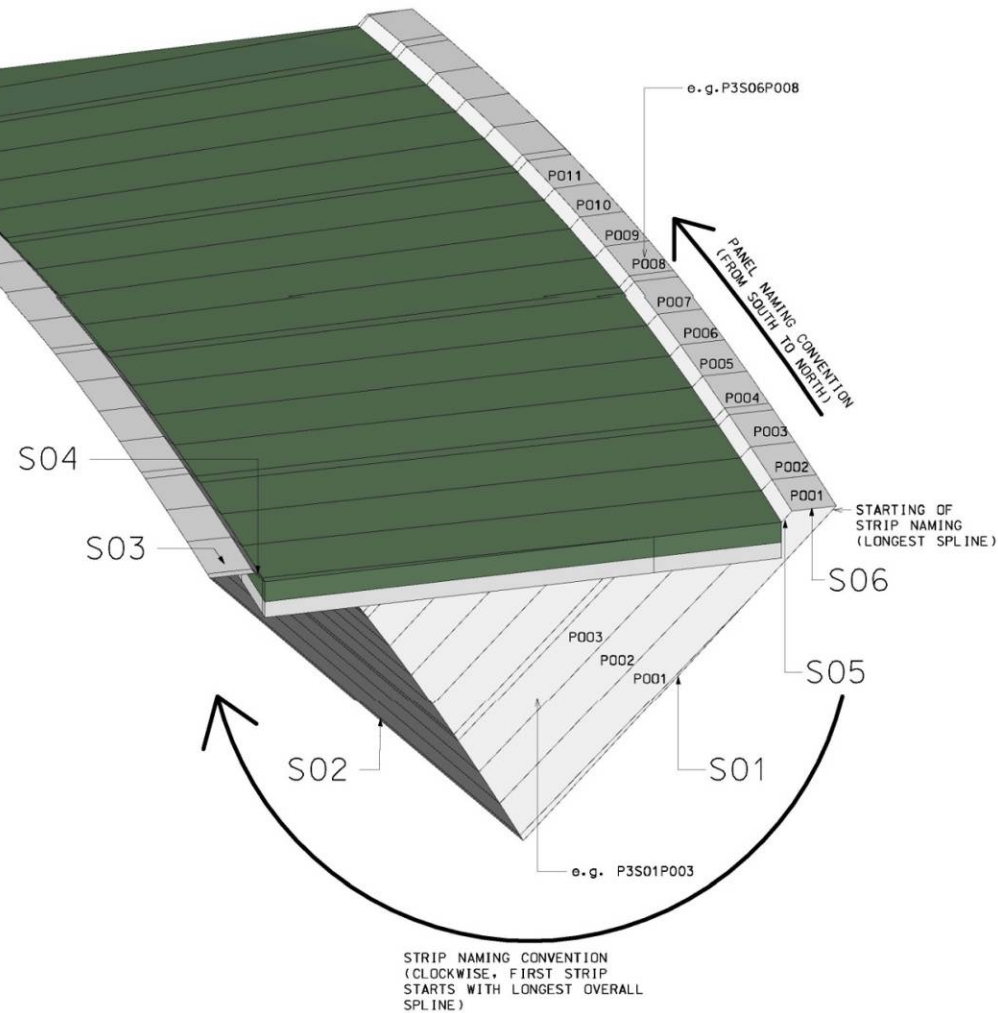




Nomenclature - Fin Cladding

2 e.g. F1

NAMING CONVENTION:
ELEMENT / STRIP(S) / PANEL(P)
E.G. F1 / SXX / PXXX
F1S03P078

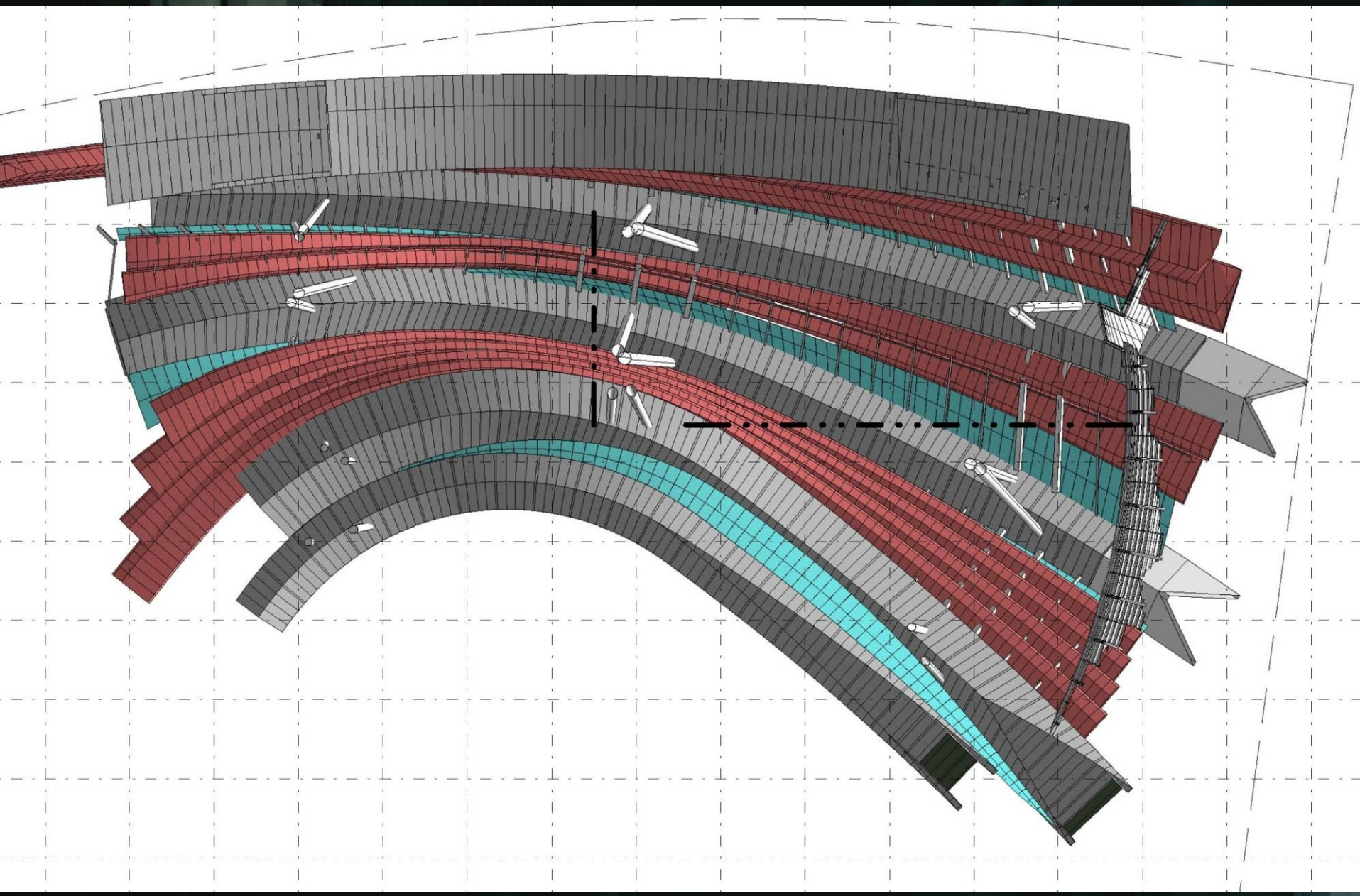


Nomenclature - V Cladding

1 e.g. P3

NAMING CONVENTION:
ELEMENT / STRIP(S) / PANEL(P)
E.G. P3 / SXX / PXXX
P3S17P123





Microsoft Excel - 20100127_V3_S6.xls															EN English (United States)	
File Edit View Insert Format Tools Data Window Help																
100% Arial															\$ % , °00	
R30																
	A	B	C	D	E	F	G	H	I	J	K	L	M	N		
1		P01x### lengt	P01y### lengt	P01z### lengt	P02x### lengt	P02y### lengt	P02z### lengt	P03x### lengt	P03y### lengt	P03z### lengt	P04x### lengt	P04y### lengt	P04z### lengt	Panel Type###totl		
2	P3S06P001	149572.632	43124.1138	30997.4089	150034.096	44497.0923	31201.1007	151479.165	44220.6936	29756.4955	151017.994	42846.0425	29553.4116	P3S06P001		
3	P3S06P002	150034.096	44497.0923	31201.1007	150490.205	45872.5015	31400.2904	151935	45597.7674	29955.086	151479.165	44220.6936	29756.4955	P3S06P002		
4	P3S06P003	150490.205	45872.5015	31400.2904	150940.93	47250.3052	31594.9821	152385.473	46977.2334	30149.1841	151935	45597.7674	29955.086	P3S06P003		
5	P3S06P004	150940.93	47250.3052	31594.9821	151386.267	48630.4698	31785.1616	152830.57	48359.0618	30338.7828	152385.473	46977.2334	30149.1841	P3S06P004		
6	P3S06P005	151386.267	48630.4698	31785.1616	151474.689	48906.7825	31822.6539	152918.944	48635.7079	30376.1616	152830.57	48359.0618	30338.7828	P3S06P005		
7	P3S06P006	151474.689	48906.7825	31822.6539	151913.575	50289.7323	32007.3872	153357.585	50020.3276	30560.3477	152918.944	48635.7079	30376.1616	P3S06P006		
8	P3S06P007	151913.575	50289.7323	32007.3872	152347.08	51674.9657	32187.576	153790.836	51407.2369	30740.0246	153357.585	50020.3276	30560.3477	P3S06P007		
9	P3S06P008	152347.08	51674.9657	32187.576	152775.147	53062.4739	32363.2813	154218.667	52796.4316	30915.2314	153790.836	51407.2369	30740.0246	P3S06P008		
10	P3S06P009	152775.147	53062.4739	32363.2813	153197.744	54452.3272	32534.6167	154641.09	54188.0429	31086.0665	154218.667	52796.4316	30915.2314	P3S06P009		
11	P3S06P010	153197.744	54452.3272	32534.6167	153281.603	54730.5766	32568.3694	154724.924	54466.654	31119.7184	154641.09	54188.0429	31086.0665	P3S06P010		
12	P3S06P011	153281.603	54730.5766	32568.3694	153697.624	56123.188	32734.5715	155140.841	55861.1282	31285.4274	154724.924	54466.654	31119.7184	P3S06P011		
13	P3S06P012	153697.624	56123.188	32734.5715	154108.128	57517.7498	32896.4211	155551.199	57257.4509	31446.8027	155140.841	55861.1282	31285.4274	P3S06P012		
14	P3S06P013	154108.128	57517.7498	32896.4211	154513.02	58914.0007	33053.6684	155955.863	58655.1793	31603.5689	155551.199	57257.4509	31446.8027	P3S06P013		
15	P3S06P014	154513.02	58914.0007	33053.6684	154912.275	60311.9726	33206.0604	156354.833	60054.3601	31755.4605	155955.863	58655.1793	31603.5689	P3S06P014		
16	P3S06P015	154912.275	60311.9726	33206.0604	154991.455	60591.8003	33235.9403	156433.956	60334.4167	31785.2395	156354.833	60054.3601	31755.4605	P3S06P015		
17	P3S06P016	154991.455	60591.8003	33235.9403	155384.039	61992.164	33382.3144	156826.258	61735.9125	31931.1206	156433.956	60334.4167	31785.2395	P3S06P016		
18	P3S06P017	155384.039	61992.164	33382.3144	155771.104	63394.5402	33523.6095	157213.036	63139.4019	32071.9532	156826.258	61735.9125	31931.1206	P3S06P017		
19	P3S06P018	155771.104	63394.5402	33523.6095	156152.641	64799.0536	33659.8994	157594.329	64545.1147	32207.8035	157213.036	63139.4019	32071.9532	P3S06P018		
20	P3S06P019	156152.641	64799.0536	33659.8994	156528.665	66205.8406	33791.3989	157970.193	65953.318	32338.8909	157594.329	64545.1147	32207.8035	P3S06P019		
21	P3S06P020	156528.665	66205.8406	33791.3989	156603.207	66487.4657	33817.1437	158044.711	66235.2527	32364.5566	157970.193	65953.318	32338.8909	P3S06P020		
22	P3S06P021	156603.207	66487.4657	33817.1437	156972.591	67896.8372	33943.1573	158414.002	67646.2548	32490.1972	158044.711	66235.2527	32364.5566	P3S06P021		
23	P3S06P022	156972.591	67896.8372	33943.1573	157336.329	69307.9002	34064.607	158777.619	69058.83	32611.2857	158414.002	67646.2548	32490.1972	P3S06P022		
24	P3S06P023	157336.329	69307.9002	34064.607	157694.338	70720.5482	34181.3772	159135.5	70472.822	32727.6793	158777.619	69058.83	32611.2857	P3S06P023		
25	P3S06P024	157694.338	70720.5482	34181.3772	158046.558	72134.4265	34293.1711	159487.514	71887.6646	32839.0806	159135.5	70472.822	32727.6793	P3S06P024		
26	P3S06P025	158046.558	72134.4265	34293.1711	158116.297	72417.2914	34314.8748	159557.191	72170.6364	32860.703	159487.514	71887.6646	32839.0806	P3S06P025		
27	P3S06P026	158116.297	72417.2914	34314.8748	158461.474	73832.0687	34419.7934	159901.955	73585.5129	32965.2043	159557.191	72170.6364	32860.703	P3S06P026		
28	P3S06P027	158461.474	73832.0687	34419.7934	158800.798	75247.6674	34518.1928	160240.723	75000.5299	33063.172	159901.955	73585.5129	32965.2043	P3S06P027		
29	P3S06P028	158800.798	75247.6674	34518.1928	159134.34	76664.522	34609.6099	160573.676	76416.4942	33154.1589	160240.723	75000.5299	33063.172	P3S06P028		
30	P3S06P029	159134.34	76664.522	34609.6099	159462.105	78082.6818	34693.7628	160900.837	77833.534	33237.8995	160573.676	76416.4942	33154.1589	P3S06P029		
31	P3S06P030	159462.105	78082.6818	34693.7628	159526.964	78366.4655	34709.6976	160965.574	78117.0662	33253.7554	160900.837	77833.534	33237.8995	P3S06P030		
32	P3S06P031	159526.964	78366.4655	34709.6976	159847.917	79786.6698	34784.8936	161285.941	79536.0393	33328.5833	160965.574	78117.0662	33253.7554	P3S06P031		
33	P3S06P032	159847.917	79786.6698	34784.8936	160163.369	81209.1412	34852.7734	161600.864	80957.3769	33396.1369	161285.941	79536.0393	33328.5833	P3S06P032		
34	P3S06P033	160163.369	81209.1412	34852.7734	160473.329	82633.6703	34913.5237	161910.348	82380.8678	33456.5958	161600.864	80957.3769	33396.1369	P3S06P033		
35	P3S06P034	160473.329	82633.6703	34913.5237	160777.356	84058.5399	34967.1102	162213.944	83804.7494	33509.9212	161910.348	82380.8678	33456.5958	P3S06P034		
36	P3S06P035	160777.356	84058.5399	34967.1102	160837.419	84343.4967	34976.9482	162273.925	84089.5132	33519.7114	162213.944	83804.7494	33509.9212	P3S06P035		
37	P3S06P036	160837.419	84343.4967	34976.9482	161133.92	85768.179	35021.638	162570.037	85513.2534	33564.1916	162273.925	84089.5132	33519.7114	P3S06P036		
38	P3S06P037	161133.92	85768.179	35021.638	161424.472	87194.961	35058.7408	162860.157	86938.7178	33601.1181	162570.037	85513.2534	33564.1916	P3S06P037		
39	P3S06P038	161424.472	87194.961	35058.7408	161710.115	88626.5835	35088.1259	163145.242	88368.1089	33630.3397	162860.157	86938.7178	33601.1181	P3S06P038		
40	P3S06P039	161710.115	88626.5835	35088.1259	161991.372	90062.1491	35109.5513	163425.853	89800.6144	33651.6209	163145.242	88368.1089	33630.3397	P3S06P039		
41	P3S06P040	161991.372	90062.1491	35109.5513	162046.965	90348.8387	35112.8371	163481.328	90086.742	33654.8892	163425.853	89800.6144	33651.6209	P3S06P040		
42	P3S06P041	162046.965	90348.8387	35112.8371	162320.456	91777.2531	35124.1735	163754.377	91513.2313	33666.1912	163481.328	90086.742	33654.8892	P3S06P041		
43	P3S06P042	162320.456	91777.2531	35124.1735	162582.475	93187.6147	35126.9896	164016.659	92925.0915	33668.9867	163754.377	91513.2313	33666.1912	P3S06P042		


```

    {
        case 'x':
            p[index].x = System.Convert.ToDouble(para.AsValueString());
            break;
        case 'y':
            p[index].y = System.Convert.ToDouble(para.AsValueString());
            break;
        case 'z':
            p[index].z = System.Convert.ToDouble(para.AsValueString());
            break;
        default:
            MessageBox.Show("Wrong format of parameter name");
            break;
    }
}

CladdingPanel c1 = new CladdingPanel(p, PanelCounter); // new panel created from list of points.
double Area_m2 = c1.PanelArea / 1000000; // division by 1000000 to get area in m2 from mm2

//current family type parameter is updated with value of Area_m2 ;
document.BeginTransaction();
if( symbol.ParametersMap["Area"].Set(Area_m2) == false )
{
    MessageBox.Show("Wrong parameter type");
}
document.EndTransaction();

ArrayOfPanels.Add(c1); // new panel inserted into the array of panels

output += c1.UniqueNumber + " " + Area_m2 + " " + c1.T_edge[0] + " " + c1.T_edge[1] + " " + c1.T_edge[2] + " " + c1.T_edge[3]

// creating panel objects in space
document.BeginTransaction();
FamilyInstance instance = document.Create.NewFamilyInstance(location, symbol, StructuralType.NonStructural);
document.EndTransaction();
}
//MessageBox.Show(output);

```

```

public bool CompareEdgesWith(EdgeGroup otherPanel, double tolerance)
{
    if
    (
        Math.Abs(nextPanel.G_edge[0] - G_edge[0]) <= tolerance
        &&
        Math.Abs(nextPanel.G_edge[1] - G_edge[1]) <= tolerance
        &&
        Math.Abs(nextPanel.G_edge[2] - G_edge[2]) <= tolerance
        &&
        Math.Abs(nextPanel.G_edge[3] - G_edge[3]) <= tolerance
        &&
        Math.Abs(nextPanel.G_diagonal_1 - G_diagonal_1) <= tolerance * Math.Sqrt(2)
    )
    { return true; }
    else
    { return false; }

}

}

#endregion

public class Group
{
    public int GroupNumber;
    public double[] Edge; //array of lengths of groups's edges.
    public double Diagonal; //length of group's diagonal.
    public double Area; //area of a grouped panel;
}

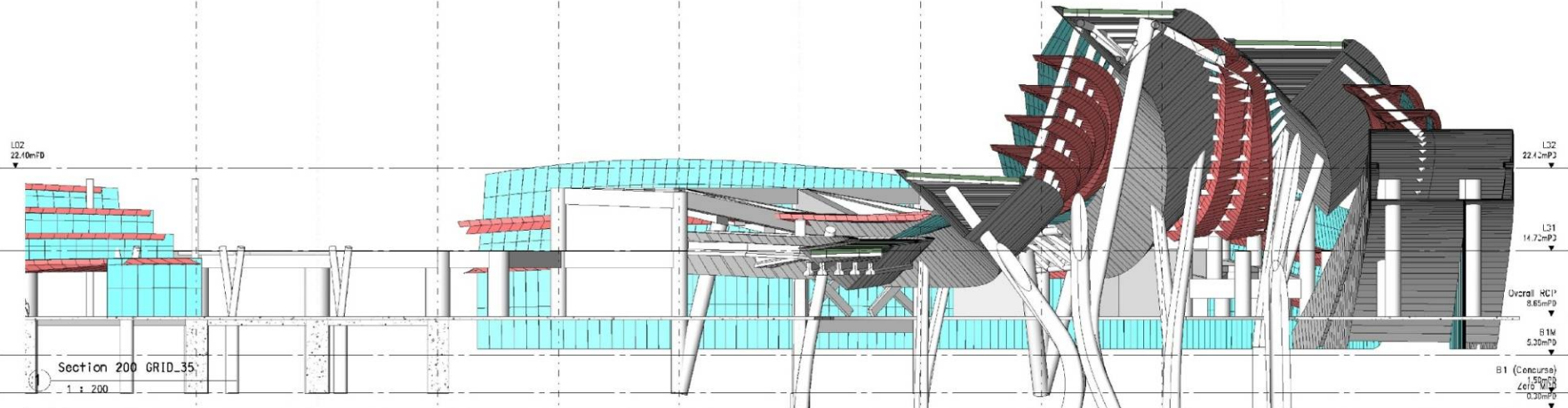
double toFeet(double value) //conversion of linear sizes for family instances
{
    return value * FACTOR_MMtoFT;
}

double toSqFeet(double value) //conversion of areal sizes for family instances
{

```

SK SJ SH SG SF SE SD SC SB SA

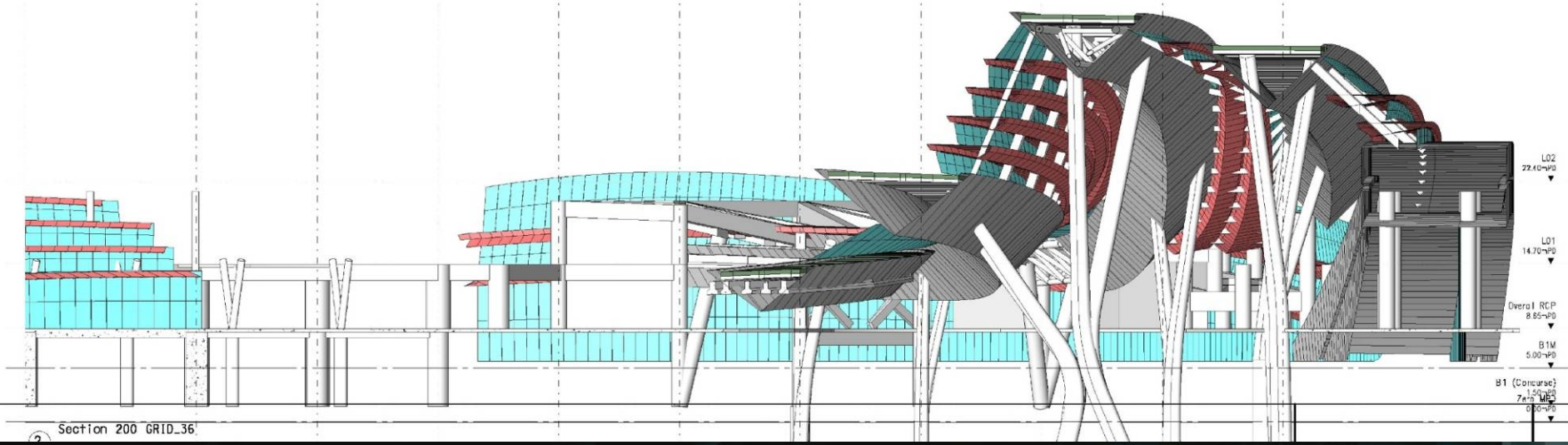
L02
22.10mPD



Section 200 GRID_35
1 : 200

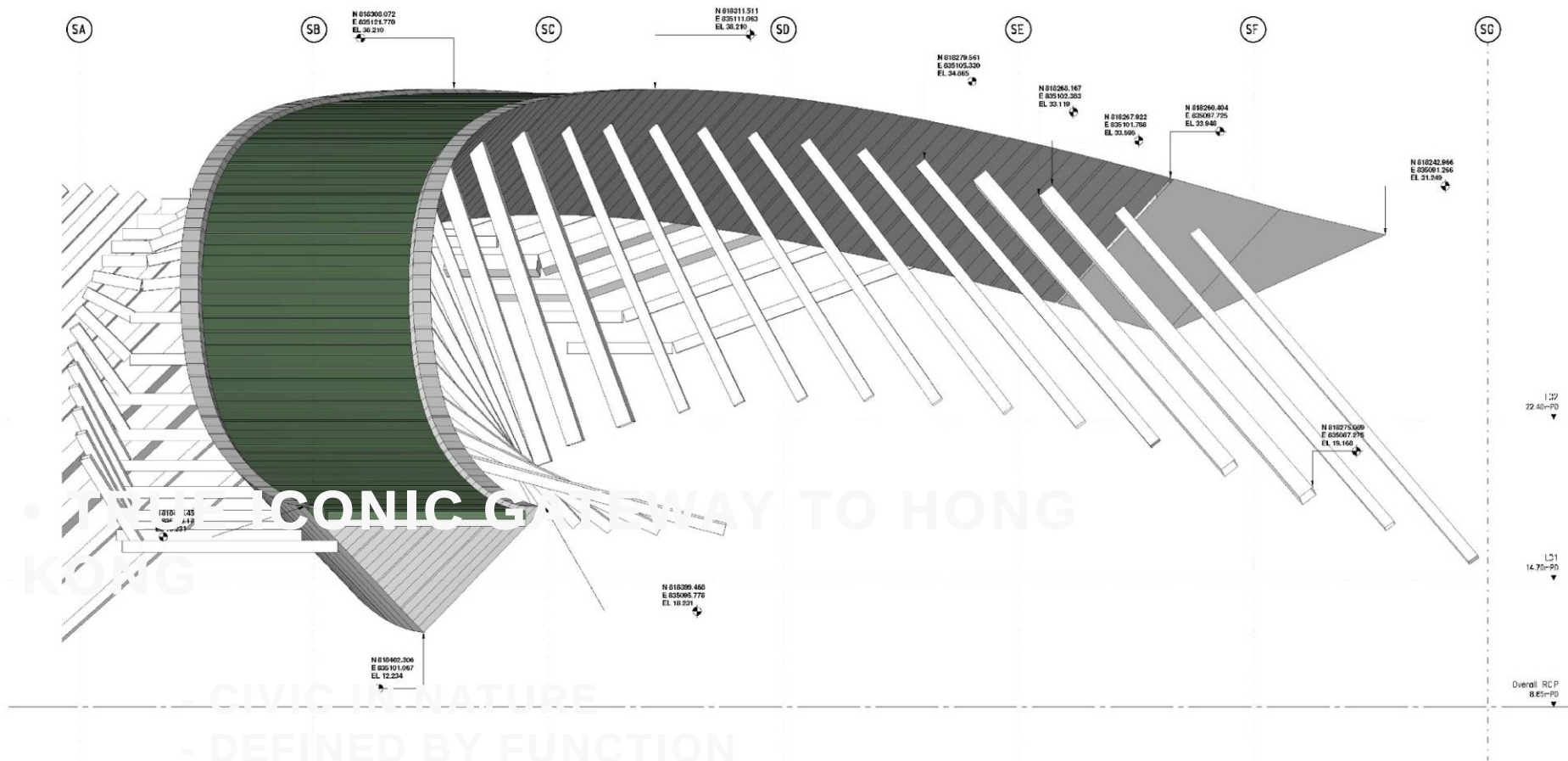
L02
22.12mPD
L01
14.72mPD
Overall RCP
8.85mPD
B1M
5.20mPD
B1 (Concourse)
1.50mPD
2615 WLP
0.25mPD

SL SK SJ SH SG SF SE SD SC SB SA



Section 200 GRID_36

L02
22.10mPD
L01
14.70mPD
Overall RCP
8.85mPD
B1M
5.00mPD
B1 (Concourse)
1.50mPD
2615 WLP
0.25mPD

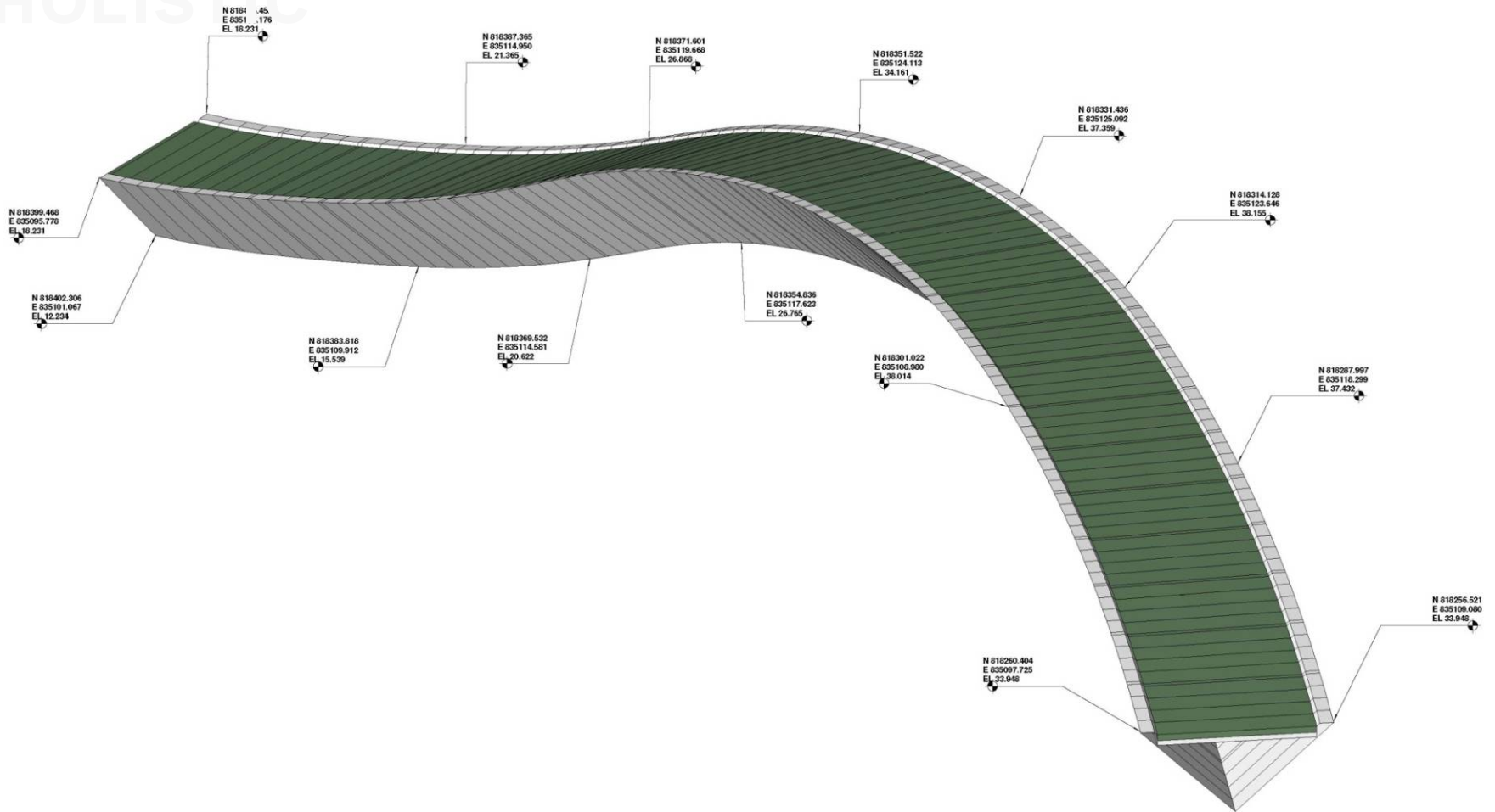


Component Elevation P3 North

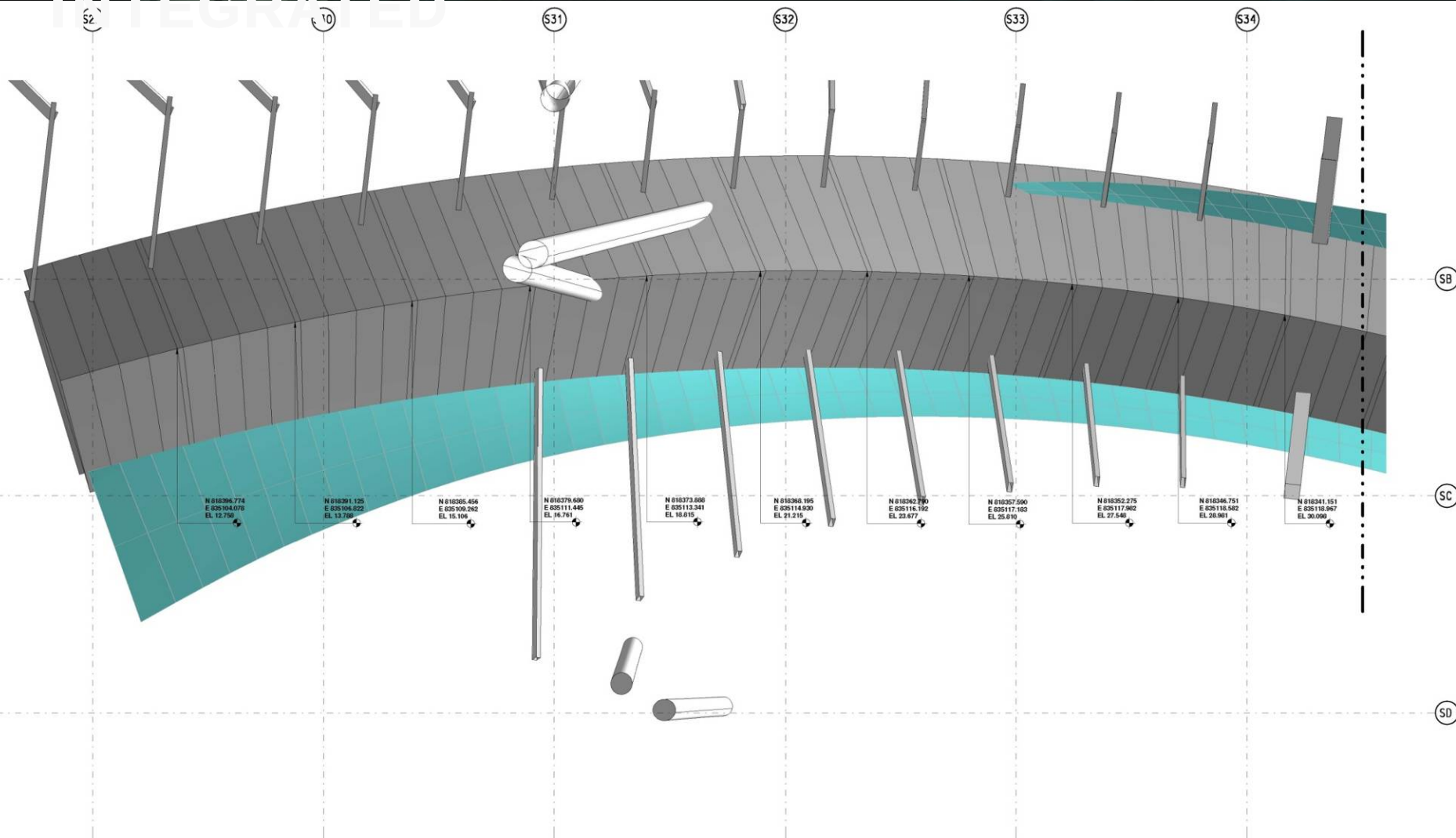
1 : 100

- EXCEEDING EXPECTATIONS

HOLISTIC



INTEGRATED



LEFT_Component RCP P3

1 : 100

Panel P3S03P082

Group AL 36
Edge 1 1391 mm
Edge 2 839 mm
Edge 3 1398 mm
Edge 4 839 mm
Diagonal 1628 mm
Area 1.197 m²

Panel P3S03P081

Group AL 33
Edge 1 1358 mm
Edge 2 839 mm
Edge 3 1366 mm
Edge 4 839 mm
Diagonal 1600 mm
Area 1.169 m²

Panel P3S03P080

Group AL 34
Edge 1 267 mm
Edge 2 824 mm
Edge 3 269 mm
Edge 4 824 mm
Diagonal 867 mm
Area 0.234 m²

Panel P3S03P079

Group AL 33
Edge 1 1358 mm
Edge 2 839 mm
Edge 3 1366 mm
Edge 4 839 mm
Diagonal 1600 mm
Area 1.169 m²

Panel P3S03P078

Group AL 33
Edge 1 1358 mm
Edge 2 839 mm
Edge 3 1366 mm
Edge 4 839 mm
Diagonal 1600 mm
Area 1.169 m²

Panel P3S03P077

Group AL 33
Edge 1 1358 mm
Edge 2 839 mm
Edge 3 1366 mm
Edge 4 839 mm
Diagonal 1600 mm
Area 1.169 m²

Panel P3S04P082

Group AL 43
Edge 1 1378 mm
Edge 2 276 mm
Edge 3 1378 mm
Edge 4 276 mm
Diagonal 1405 mm
Area 0.400 m²

Panel P3S04P081

Group AL 40
Edge 1 1347 mm
Edge 2 276 mm
Edge 3 1354 mm
Edge 4 276 mm
Diagonal 1379 mm
Area 0.392 m²

Panel P3S04P080

Group AL 41
Edge 1 265 mm
Edge 2 271 mm
Edge 3 266 mm
Edge 4 271 mm
Diagonal 381 mm
Area 0.078 m²

Panel P3S04P079

Group AL 40
Edge 1 1347 mm
Edge 2 276 mm
Edge 3 1354 mm
Edge 4 276 mm
Diagonal 1379 mm
Area 0.392 m²

Panel P3S04P078

Group AL 40
Edge 1 1347 mm
Edge 2 276 mm
Edge 3 1354 mm
Edge 4 276 mm
Diagonal 1379 mm
Area 0.392 m²

Panel P3S04P077

Group AL 40
Edge 1 1347 mm
Edge 2 276 mm
Edge 3 1354 mm
Edge 4 276 mm
Diagonal 1379 mm
Area 0.392 m²

Panel P3S02P082

Group AL 30
Edge 1 1412 mm
Edge 2 8443 mm
Edge 3 1400 mm
Edge 4 8443 mm
Diagonal 8559 mm
Area 11.992 m²

Panel P3S02P081

Group AL 29
Edge 1 1400 mm
Edge 2 8443 mm
Edge 3 1367 mm
Edge 4 8443 mm
Diagonal 8551 mm
Area 11.801 m²

Panel P3S02P080

Group AL 23
Edge 1 272 mm
Edge 2 8298 mm
Edge 3 272 mm
Edge 4 8298 mm
Diagonal 8296 mm
Area 2.361 m²

Panel P3S02P079

Group AL 29
Edge 1 1400 mm
Edge 2 8443 mm
Edge 3 1367 mm
Edge 4 8443 mm
Diagonal 8551 mm
Area 11.801 m²

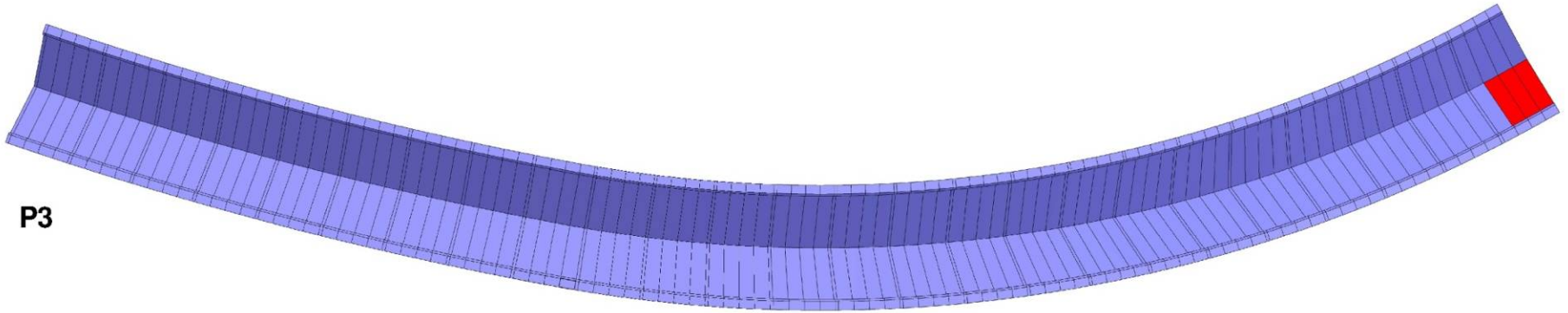
Panel P3S02P078

Group AL 29
Edge 1 1400 mm
Edge 2 8443 mm
Edge 3 1367 mm
Edge 4 8443 mm
Diagonal 8551 mm
Area 11.801 m²

Panel P3S02P077

Group AL 29
Edge 1 1400 mm
Edge 2 8443 mm
Edge 3 1367 mm
Edge 4 8443 mm
Diagonal 8551 mm
Area 11.801 m²

P3



Schedule of panels																									
Panel	Point 1			Point 2			Point 3			Point 4			Center of weight		Edges				Area	Group					
	P01 x	P01 y	P01 z	P02 x	P02 y	P02 z	P03 x	P03 y	P03 z	P04 x	P04 y	P04 z	C x	C y	C z	Edge 1	Edge 2	Edge 3			Edge 4	Diagonal			
P3S01P001	835106129	818405551	18298	835101017	818402394	12231	835106871	818404239	18290	835101802	818401012	12299	835103955	818403297	15262	1493	8446	1583	8446	8565	13.111 m²	AL 1			
P3S01P002	835106871	818404239	18290	835101802	818401012	12299	835107598	818402931	18391	835102588	818399625	12410	835104710	818401952	15347	1493	8446	1583	8446	8565	13.111 m²	AL 1			
P3S01P003	835107598	818402931	18391	835102588	818399625	12410	835108310	818401617	18528	835103312	818398241	12560	835105447	818400664	15472	1493	8446	1583	8446	8565	13.111 m²	AL 1			
AL 1.3																					39.333 m²				
P3S01P004	835108310	818401617	18528	835103312	818398241	12560	835109007	818400300	18696	835104033	818396862	12745	835106166	818399255	15533	1493	8446	1559	8446	8563	13.010 m²	AL 2			
AL 2.1																					13.010 m²				
P3S01P005	835109007	818400300	18696	835104033	818396862	12745	835109144	818400036	18736	835104175	818396588	12786	835106560	818398446	15741	294	8313	305	8313	8318	2.594 m²	AL 3			
P3S01P010	835117656	818394722	19674	835106783	818391211	13770	835111890	818394544	19728	835109506	818390943	13826	835109336	818392833	16760	294	8313	305	8313	8318	2.594 m²	AL 3			
P3S01P015	835114256	818398075	20934	835109228	818385543	15084	835114368	818398805	21001	835109337	818395271	15154	835111797	818397174	18054	294	8313	305	8313	8318	2.594 m²	AL 3			
P3S01P020	835116476	818393092	22499	835111414	818379769	16734	835116575	818383121	22582	835111511	818379492	16822	835113994	818381444	19659	294	8313	305	8313	8318	2.594 m²	AL 3			
P3S01P025	835118417	818377721	24432	835113315	818373975	16781	835118503	818377451	24534	835113398	818373701	16888	835115906	818375712	21659	294	8313	305	8313	8318	2.594 m²	AL 3			
P3S01P030	835120084	818372092	26716	835114909	818368280	21178	835120157	818371825	26832	835114977	818368015	21297	835117532	818370053	24068	294	8313	305	8313	8318	2.594 m²	AL 3			
AL 3.6																					15.564 m²				
P3S01P006	835109144	818400036	18736	835104175	818396588	12786	835108267	818396714	18942	835104583	818395227	13005	835107001	818397641	15867	1493	8448	1534	8448	8561	12.901 m²	AL 4			
P3S01P018	835115454	818396190	21740	835110405	818393231	15899	835116476	818393744	22094	835110918	818391156	16305	835113167	818395362	19002	1493	8448	1534	8448	8561	12.901 m²	AL 4			
P3S01P019	835115974	818396596	22094	835110918	818391156	16305	835116735	818393392	22499	835111414	818379769	16734	835113195	818391395	19362	1493	8448	1534	8448	8561	12.901 m²	AL 4			
P3S01P021	835116575	818393092	22499	835111414	818379769	16734	835117059	818379683	23013	835111597	818378111	17278	835114263	818390623	19254	1493	8448	1534	8448	8561	12.901 m²	AL 4			
P3S01P022	835117059	818379683	23013	835111597	818378111	17278	835117528	818390417	23465	835112447	818376730	17757	835114755	818379257	20378	1493	8448	1534	8448	8561	12.901 m²	AL 4			
P3S01P023	835117528	818390417	23465	835112447	818376730	17757	835117980	818379088	23938	835112890	818375351	17278	835115251	818377981	20855	1493	8448	1534	8448	8561	12.901 m²	AL 4			
P3S01P024	835117980	818379088	23938	835112890	818375351	17278	835118417	818377721	24432	835113315	818373075	16781	835115950	818376529	21353	1493	8448	1534	8448	8561	12.901 m²	AL 4			
P3S01P026	835120084	818372092	26716	835114909	818368280	21178	835120681	818376108	25052	835113302	818372372	16822	835116156	818374988	21983	1493	8448	1534	8448	8561	12.901 m²	AL 4			
AL 4.8																					103.208 m²				
P3S01P007	835109822	818398714	18942	835104583	818395227	13005	835110485	818397388	19174	835105522	818393885	13210	835107673	818396303	16060	1493	8445	1507	8445	8578	12.786 m²	AL 5			
P3S01P031	835110485	818397388	19174	835105522	818393885	13210	835111328	818399052	19474	835109618	818392551	13500	835106325	818394070	10332	1493	8445	1507	8445	8578	12.786 m²	AL 5			
P3S01P039	835112457	818396061	20805	835106783	818391211	13770	835117053	818396277	19514	835109161	818392551	13500	835106325	818394070	10332	1493	8445	1507	8445	8578	12.786 m²	AL 5			
P3S01P041	835113157	818396394	19728	835109803	818390543	13826	835116575	818393392	22499	835107510	818389599	14116	835108702	818392028	16919	1493	8445	1507	8445	8578	12.786 m²	AL 5			
P3S01P012	835112504	818393115	20086	835107510	818395999	14116	835113103	818391771	20300	835108097	818388252	14422	835110304	818390654	17211	1493	8445	1507	8445	8578	12.786 m²	AL 5			
P3S01P013	835113103	818391771	20300	835108097	818388252	14422	835113688	818390425	20609	835108670	818386900	14745	835110280	818399357	17519	1493	8445	1507	8445	8578	12.786 m²	AL 5			
P3S01P014	835113688	818390425	20609	835108670	818386900	14745	835114256	818390075	20934	835109228	818385543	15084	835111450	818387968	17943	1493	8445	1507	8445	8578	12.786 m²	AL 5			
P3S01P016	835114256	818398075	20934	835109228	818385543	15084	835114919	818395075	21514	835114919	818387453	21346	835109678	818389806	15516	635112126	818366359	18254	1493	8445	1507	8445	8578	12.786 m²	AL 5
P3S01P017	835114919	818395075	21514	835114919	818387453	21346	835115304	818394722	19674	835109161	818392551	13500	835106325	818394070	10332	1493	8445	1507	8445	8578	12.786 m²	AL 5			
P3S01P027	835118921	818376108	25052	835113302	818372372	16822	835119324	818373428	26145	835114189	818370671	20002	835116559	818373544	22520	1493	8445	1507	8445	8578	12.786 m²	AL 5			
P3S01P028	835119324	818373428	26145	835114189	818370671	20002	835119711	818374286	26716	835114559	818369618	20585	835116948	818372196	23081	1493	8445	1507	8445	8578	12.786 m²	AL 5			
P3S01P029	835119711	818374286	26716	835114559	818369618	20585	835120964	818372092	26716	835114559	818369618	20585	835116948	818372196	23081	1493	8445	1507	8445	8578	12.786 m²	AL 5			
AL 5.12																					153.433 m²				
P3S01P031	835120157	818371825	26832	835114977	818368015	21297	835120513	818370490	27416	835115304	818366697	21896	835117738	818369257	24360	1493	8445	1477	8445	8574	12.661 m²	AL 6			
AL 6.1																					12.661 m²				

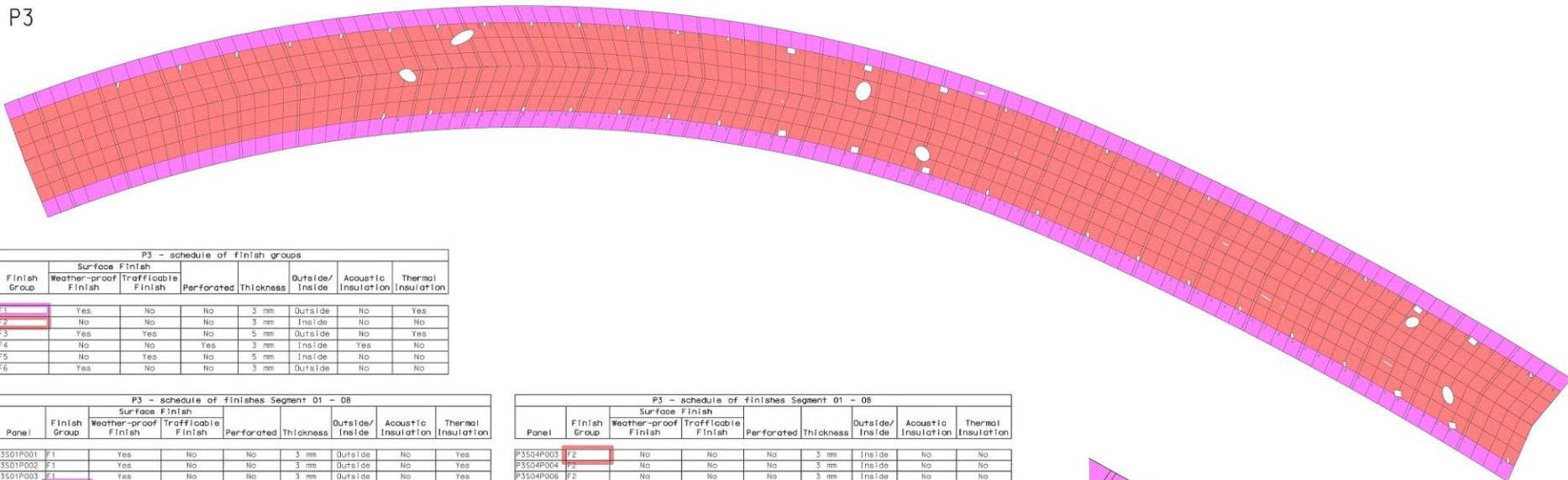
P3

Schedule of panel groups								
Group Name	Number of panels	Edge 1	Edge 2	Edge 3	Edge 4	Diagonal	Panel area	Group Area
AL 1	3	1493	8448	1583	8448	8585	13 111 m²	39 333 m²
AL 2	1	1493	8448	1583	8448	8583	13 010 m²	13 010 m²
AL 3	6	294	8313	305	8313	8318	2 594 m²	15 564 m²
AL 4	8	1493	8448	1534	8448	8581	12 901 m²	103 208 m²
AL 5	12	1483	8445	1507	8445	8578	12 786 m²	153 433 m²
AL 6	1	1493	8445	1477	8445	8574	12 661 m²	12 661 m²
AL 7	32	1493	8444	1452	8444	8572	12 554 m²	401 734 m²

N 818402394
E 835101017
EL 12231

Schedule of panel groups								
Group Name	Number of panels	Edge 1	Edge 2	Edge 3	Edge 4	Diagonal	Panel area	Group Area
AL 1	3	1493	8446	1583	8446	8585	13,111 m ²	39,333 m ²
AL 2	1	1493	8446	1559	8446	8583	13,010 m ²	13,010 m ²
AL 3	6	294	8513	305	8313	8318	2,984 m ²	15,584 m ²
AL 4	8	1493	8446	1534	8446	8581	12,981 m ²	103,206 m ²
AL 5	12	1493	8445	1507	8445	8578	12,798 m ²	153,433 m ²
AL 6	1	1493	8444	1477	8445	8574	12,661 m ²	12,661 m ²
AL 7	32	1493	8444	1452	8444	8572	12,554 m ²	401,734 m ²
AL 8	5	1493	8444	1424	8444	8569	12,439 m ²	62,180 m ²
AL 9	13	1493	8444	1398	8444	8567	12,325 m ²	160,227 m ²
AL 10	23	294	8503	272	8302	8307	2,453 m ²	86,933 m ²
AL 11	25	1493	8443	1369	8443	8564	12,199 m ²	304,979 m ²
AL 12	3	1493	8443	1354	8443	8562	12,139 m ²	36,407 m ²
AL 13	3	1493	8443	1338	8443	8560	12,069 m ²	36,208 m ²
AL 14	3	1583	8445	1387	8445	8568	12,573 m ²	37,718 m ²
AL 15	1	1589	8445	1385	8445	8565	12,479 m ²	12,479 m ²
AL 16	8	1583	8445	1369	8445	8556	12,372 m ²	99,979 m ²
AL 17	3	1513	8445	1374	8445	8547	12,311 m ²	36,932 m ²
AL 18	1	1497	8446	1385	8445	8536	12,290 m ²	12,290 m ²
AL 19	1	1477	8445	1387	8445	8534	12,209 m ²	12,209 m ²
AL 20	1	1452	8446	1387	8445	8531	12,102 m ²	12,102 m ²
AL 21	1	1424	8445	1387	8445	8529	11,984 m ²	11,984 m ²
AL 22	1	1388	8444	1386	8444	8527	11,871 m ²	11,871 m ²
AL 23	11	272	8298	272	8298	8598	2,361 m ²	25,974 m ²
AL 24	6	1369	8444	1385	8444	8524	11,742 m ²	70,452 m ²
AL 25	5	1444	8384	1444	8324	8524	11,614 m ²	57,156 m ²
AL 26	3	1338	8443	1381	8443	8524	11,595 m ²	34,786 m ²
AL 27	8	1362	8442	1389	8442	8539	11,648 m ²	93,185 m ²
AL 28	3	1380	8442	1387	8442	8543	11,714 m ²	35,143 m ²
AL 29	10	1400	8443	1367	8443	8551	11,801 m ²	118,005 m ²
AL 30	1	1412	8444	1400	8443	8559	11,992 m ²	11,992 m ²
AL 31	10	1427	8444	1431	8444	8564	12,187 m ²	121,867 m ²
AL 32	24	1440	8444	1453	8444	8568	12,334 m ²	296,014 m ²
AL 33	52	1358	839	1366	839	1600	1,169 m ²	60,791 m ²
AL 34	16	267	824	269	824	867	0,524 m ²	3,748 m ²
AL 35	13	1372	839	1378	839	1611	1,181 m ²	15,348 m ²
AL 36	1	1391	839	1398	839	1629	1,197 m ²	1,197 m ²
AL 37	31	1422	839	1425	839	1653	1,222 m ²	37,880 m ²
AL 38	3	1444	839	1447	839	1671	1,240 m ²	3,720 m ²
AL 39	34	284	825	285	825	873	0,248 m ²	8,448 m ²
AL 40	54	1347	276	1354	276	1379	0,392 m ²	21,163 m ²
AL 41	24	265	271	268	271	381	0,078 m ²	1,883 m ²
AL 42	11	1361	276	1366	276	1396	0,396 m ²	4,353 m ²
AL 43	1	1378	276	1378	276	1405	0,400 m ²	0,400 m ²
AL 44	32	1406	276	1408	276	1432	0,408 m ²	13,052 m ²
AL 45	10	1456	276	1455	276	1450	0,414 m ²	4,877 m ²
AL 46	26	281	271	281	271	390	0,083 m ²	2,154 m ²
AL 47	100	1456	276	1453	276	1481	0,422 m ²	42,209 m ²
AL 48	100	1456	276	1483	839	1700	1,269 m ²	129,892 m ²
Grand total: 750								2923,908 m ²

P3



P3 - schedule of finish groups							
Finish Group	Surface Finish		Perforated	Thickness	Outside/ Inside	Acoustic Insulation	Thermal Insulation
	Weather-proof Finish	Trafficable Finish					
F1	Yes	No	No	3 mm	Outside	No	Yes
F2	No	No	No	3 mm	Inside	No	No
F3	Yes	Yes	No	5 mm	Outside	No	Yes
F4	No	No	Yes	3 mm	Inside	Yes	No
F5	No	Yes	No	5 mm	Inside	No	No
F6	Yes	No	No	3 mm	Outside	No	No

P3 - schedule of finishes Segment 01 - 08								
Panel	Finish Group	Surface Finish		Perforated	Thickness	Outside/ Inside	Acoustic Insulation	Thermal Insulation
		Weather-proof Finish	Trafficable Finish					

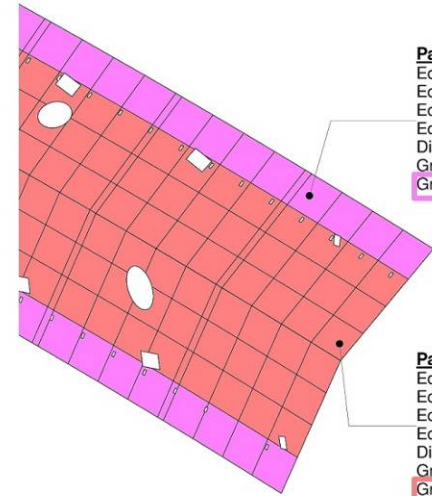
P3501P001	F1	Yes	No	No	3 mm	Outside	No	Yes
P3501P002	F1	Yes	No	No	3 mm	Outside	No	Yes
P3501P003	F1	Yes	No	No	3 mm	Outside	No	Yes
P3501P004	F1	Yes	No	No	3 mm	Outside	No	Yes
P3501P005	F1	Yes	No	No	3 mm	Outside	No	Yes
P3501P006	F1	Yes	No	No	3 mm	Outside	No	Yes
P3501P007	F1	Yes	No	No	3 mm	Outside	No	Yes
P3501P008	F1	Yes	No	No	3 mm	Outside	No	Yes
P3501P009	F1	Yes	No	No	3 mm	Outside	No	Yes
P3508P001	F1	Yes	No	No	3 mm	Outside	No	Yes
P3508P002	F1	Yes	No	No	3 mm	Outside	No	Yes
P3508P003	F1	Yes	No	No	3 mm	Outside	No	Yes
P3508P004	F1	Yes	No	No	3 mm	Outside	No	Yes
P3508P005	F1	Yes	No	No	3 mm	Outside	No	Yes
P3508P006	F1	Yes	No	No	3 mm	Outside	No	Yes
P3508P007	F1	Yes	No	No	3 mm	Outside	No	Yes
P3508P008	F1	Yes	No	No	3 mm	Outside	No	Yes

F 1: 17								
P3502P001	F2	No	No	No	3 mm	Inside	No	No
P3502P002	F2	No	No	No	3 mm	Inside	No	No
P3502P003	F2	No	No	No	3 mm	Inside	No	No
P3502P004	F2	No	No	No	3 mm	Inside	No	No
P3502P005	F2	No	No	No	3 mm	Inside	No	No
P3502P006	F2	No	No	No	3 mm	Inside	No	No
P3502P007	F2	No	No	No	3 mm	Inside	No	No
P3502P008	F2	No	No	No	3 mm	Inside	No	No
P3502P009	F2	No	No	No	3 mm	Inside	No	No
P3503P001	F2	No	No	No	3 mm	Inside	No	No
P3503P002	F2	No	No	No	3 mm	Inside	No	No
P3503P003	F2	No	No	No	3 mm	Inside	No	No
P3503P004	F2	No	No	No	3 mm	Inside	No	No
P3503P005	F2	No	No	No	3 mm	Inside	No	No
P3503P006	F2	No	No	No	3 mm	Inside	No	No
P3503P007	F2	No	No	No	3 mm	Inside	No	No
P3503P008	F2	No	No	No	3 mm	Inside	No	No
P3503P009	F2	No	No	No	3 mm	Inside	No	No
P3504P001	F2	No	No	No	3 mm	Inside	No	No
P3504P002	F2	No	No	No	3 mm	Inside	No	No

P3 - schedule of finishes Segment 01 - 08								
Panel	Finish Group	Surface Finish		Perforated	Thickness	Outside/ Inside	Acoustic Insulation	Thermal Insulation
		Weather-proof Finish	Trafficable Finish					

P3504P003	F2	No	No	No	3 mm	Inside	No	No
P3504P004	F2	No	No	No	3 mm	Inside	No	No
P3504P006	F2	No	No	No	3 mm	Inside	No	No
P3504P007	F2	No	No	No	3 mm	Inside	No	No
P3504P008	F2	No	No	No	3 mm	Inside	No	No
P3504P009	F2	No	No	No	3 mm	Inside	No	No
F 2: 25								
P3503P005	F2	No	No	No	3 mm	Inside	No	No
P3504P005	F2	No	No	No	3 mm	Inside	No	No
P3505P001	F2	No	No	No	3 mm	Inside	No	No
P3505P002	F2	No	No	No	3 mm	Inside	No	No
P3505P003	F2	No	No	No	3 mm	Inside	No	No
P3505P004	F2	No	No	No	3 mm	Inside	No	No
P3505P005	F2	No	No	No	3 mm	Inside	No	No
P3505P006	F2	No	No	No	3 mm	Inside	No	No
P3505P007	F2	No	No	No	3 mm	Inside	No	No
P3505P008	F2	No	No	No	3 mm	Inside	No	No
P3505P009	F2	No	No	No	3 mm	Inside	No	No
P3506P001	F2	No	No	No	3 mm	Inside	No	No
P3506P002	F2	No	No	No	3 mm	Inside	No	No
P3506P003	F2	No	No	No	3 mm	Inside	No	No
P3506P004	F2	No	No	No	3 mm	Inside	No	No
P3506P005	F2	No	No	No	3 mm	Inside	No	No
P3506P006	F2	No	No	No	3 mm	Inside	No	No
P3506P007	F2	No	No	No	3 mm	Inside	No	No
P3506P008	F2	No	No	No	3 mm	Inside	No	No
P3506P009	F2	No	No	No	3 mm	Inside	No	No
P3507P001	F2	No	No	No	3 mm	Inside	No	No
P3507P002	F2	No	No	No	3 mm	Inside	No	No
P3507P003	F2	No	No	No	3 mm	Inside	No	No
P3507P004	F2	No	No	No	3 mm	Inside	No	No
P3507P005	F2	No	No	No	3 mm	Inside	No	No
P3507P006	F2	No	No	No	3 mm	Inside	No	No
P3507P007	F2	No	No	No	3 mm	Inside	No	No
P3507P008	F2	No	No	No	3 mm	Inside	No	No
P3507P009	F2	No	No	No	3 mm	Inside	No	No
F 6: 29								

Remark: An above is a portion extracted for presentation purpose the full schedule of panels included in the BIM model.



Panel P3S01P004

Edge 1 1488 mm
Edge 2 2279 mm
Edge 3 1476 mm
Edge 4 2279 mm
Diagonal 2720 mm
Group(Size) A 1
Group(Finish)... F 1

Panel P3S04P001

Edge 1 1460 mm
Edge 2 2042 mm
Edge 3 1445 mm
Edge 4 2042 mm
Diagonal 2508 mm
Group(Size) A 13
Group(Finish)... F 2

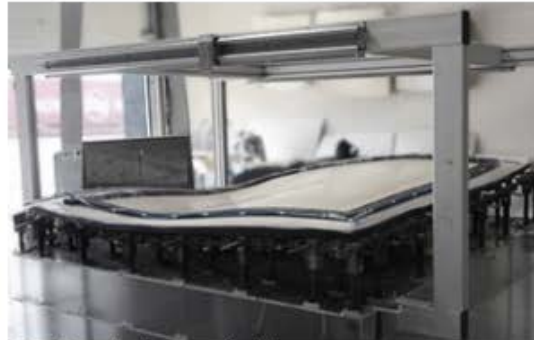


P4S04P073	AL 1011 AF 4	P4S04P073	AL 1011 AF 4	P4S03P070	AL 1005 AF
P4S05P073	AL 1030 AF 5	P4S04P074	AL 1006 AF 4	P4S03P071	AL 1003 AF
P4S05P074	AL 1005 AF 5	P4S04P075	AL 1004 AF 4	P4S03P072	AL 1004 AF
P4S05P075	AL 1004 AF 5	P4S04P076	AL 1008 AF 4	P4S03P073	AL 1005 AF
P4S05P076	AL 1031 AF 5	P4S04P077	AL 1005 AF 4	P4S03P074	AL 1005 AF
P4S05P077	AL 1007 AF 5	P4S04P078	AL 1005 AF 4	P4S03P075	AL 1003 AF
P4S04P078	AL 1005 AF 4	P4S04P079	AL 1006 AF 4	P4S03P076	AL 1004 AF
P4S05P079	AL 1005 AF 5	P4S04P080	AL 1004 AF 4	P4S03P077	AL 1005 AF
P4S05P080	AL 1004 AF 5	P4S04P081	AL 1030 AF 4	P4S03P078	AL 1006 AF
P4S05P081	AL 1031 AF 5	P4S04P082	AL 1005 AF 4	P4S03P079	AL 1003 AF
P4S05P082	AL 1050 AF 5	P4S04P083	AL 1005 AF 4	P4S03P080	AL 1004 AF
P4S05P083	AL 1050 AF 5	P4S04P084	AL 1003 AF 4	P4S03P081	AL 1005 AF
P4S05P084	AL 1005 AF 5	P4S04P085	AL 1004 AF 4	P4S03P082	AL 1003 AF
P4S05P085	AL 1004 AF 5	P4S04P086	AL 1007 AF 4	P4S03P083	AL 1004 AF
P4S05P086	AL 1033 AF 5	P4S04P087	AL 1005 AF 4	P4S03P084	AL 1005 AF
P4S05P087	AL 1011 AF 5	P4S04P088	AL 1005 AF 4	P4S03P085	AL 1003 AF
P4S05P088	AL 1011 AF 5	P4S04P089	AL 1003 AF 4	P4S03P086	AL 1004 AF
P4S05P089	AL 1006 AF 5	P4S04P090	AL 1004 AF 4	P4S03P087	AL 1005 AF
P4S05P090	AL 1004 AF 5	P4S04P091	AL 1007 AF 4	P4S03P088	AL 1003 AF
P4S05P091	AL 1030 AF 5	P4S04P092	AL 1005 AF 4	P4S03P089	AL 1003 AF 5
P4S05P092	AL 1011 AF 5	P4S04P093	AL 1005 AF 4	P4S03P090	AL 1004 AF 5
P4S05P093	AL 1011 AF 5	P4S04P094	AL 1003 AF 4	P4S03P091	AL 1005 AF 5
P4S05P094	AL 1006 AF 5	P4S04P095	AL 1004 AF 4	P4S03P092	AL 1003 AF 5
P4S05P095	AL 1004 AF 5	P4S04P096	AL 1007 AF 4	P4S03P093	AL 1003 AF 5
P4S05P096	AL 1030 AF 5	P4S04P097	AL 1005 AF 4	P4S03P094	AL 1003 AF 5
P4S05P097	AL 1011 AF 5	P4S04P098	AL 1005 AF 4	P4S03P095	AL 1004 AF 5
P4S05P098	AL 1011 AF 5	P4S04P099	AL 1003 AF 4	P4S03P096	AL 1005 AF 5
P4S05P099	AL 1006 AF 5	P4S04P100	AL 1004 AF 4	P4S03P097	AL 1003 AF 5
				P4S03P098	AL 1003 AF 5
				P4S03P099	AL 1003 AF 5

From Construction to Manufacturing



2.1 – Casting sides



2.2 – Panel shape verification



2.3 – Material application



3.1 – Casting verified panel



3.2 – Panel hardening

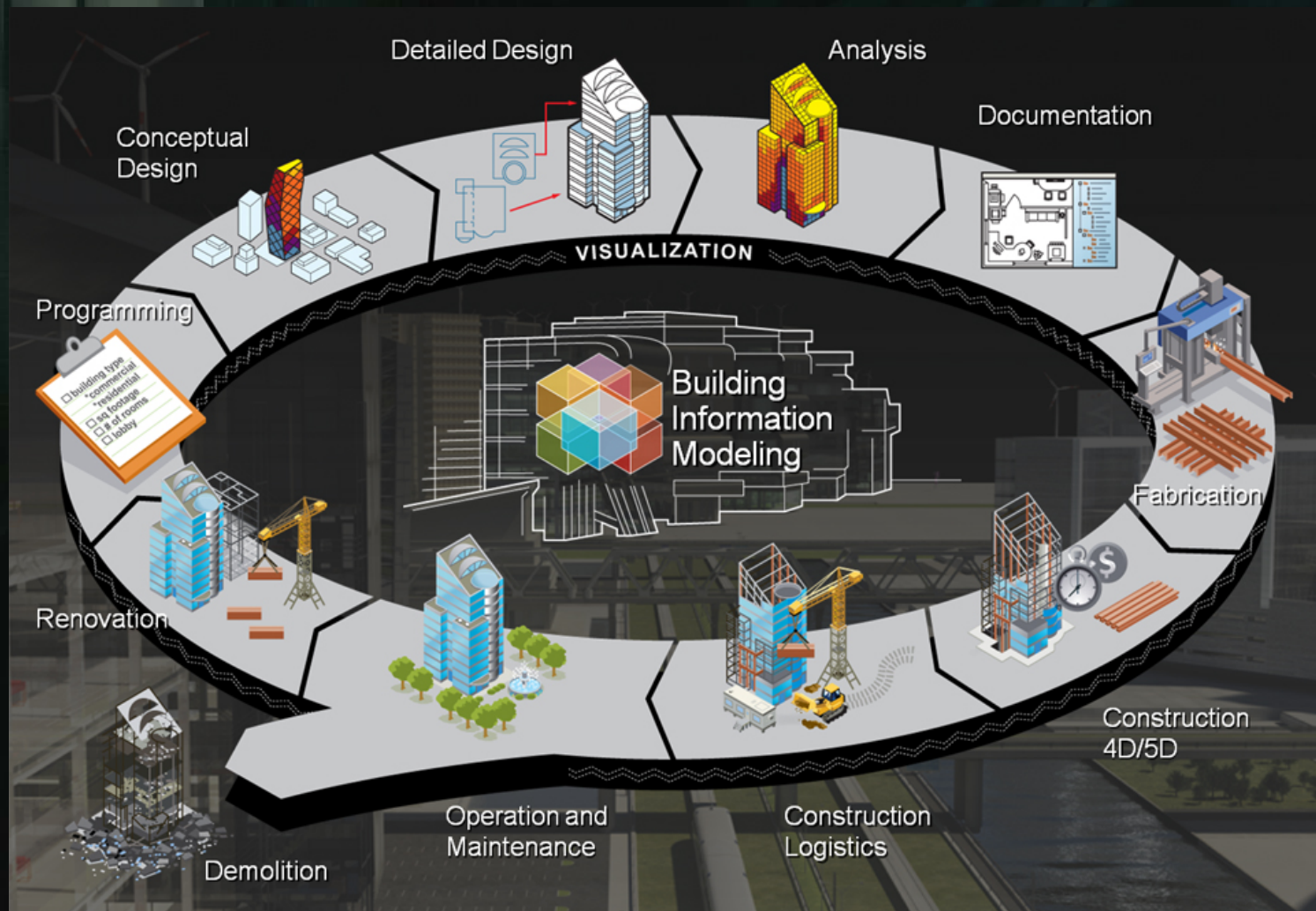


3.3 – Panel release

Case 3

True BIM (Operation Phaes)

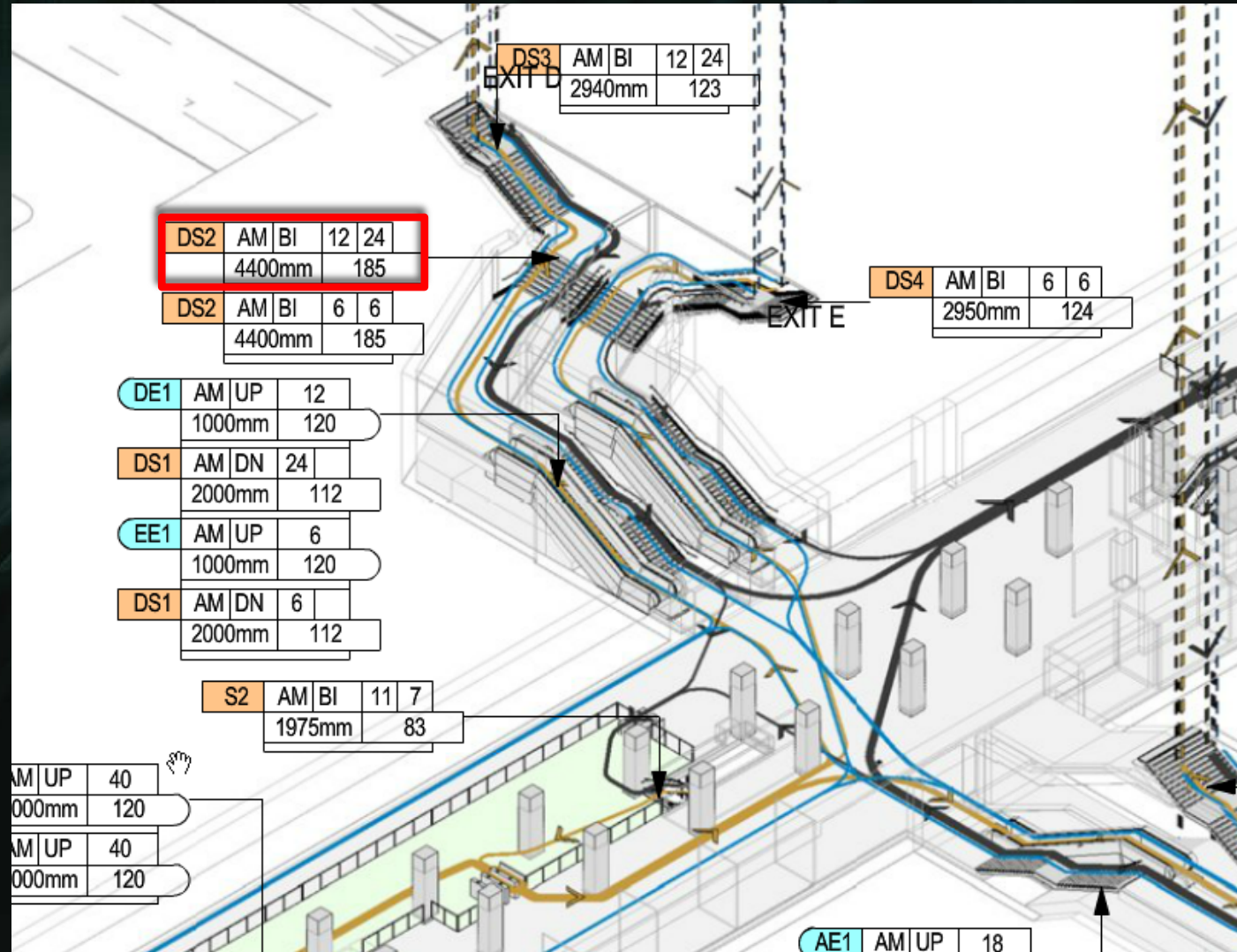
$$M + I = B \text{ (Safety)}$$



True BIM

STAIR SCHEDULE

NAME	STAIR WIDTH (mm)	NORMAL AM PEAK				
		DIR. (UP/DN/BI)	CAL.CAP.			TOTAL CAPACITY (U
			UP	DN	BI	
AS1	2050	DN	103	115	86	115
AS2	4400	BI	220	246	185	185
AS2E	4400	UP	220	246	185	220
BS1	2000	UP	100	112	84	100
BS2	2000	UP	100	112	84	100
BS3	4450	BI	223	249	187	187
BS4	4370	BI	219	245	184	184
BS4E	2630	UP	132	147	110	219
BS5	4370	BI	219	245	184	184
BS5E	4370	DN	219	245	184	245
CS1	4400	BI	220	246	185	185
CS2	2010	DN	101	113	84	113
CS3	2370	BI	119	133	100	100
CS3E	2370	UP	119	133	100	119
CS4	2370	BI	119	133	100	100
CS4E	2370	UP	119	133	100	119
DS1	2000	DN	100	112	84	112
DS1	2000	DN	100	112	84	112
DS2	4400	BI	220	246	185	185
DS2	4400	BI	220	246	185	185
DS3	2940	BI	147	165	123	123



True BIM

Edit Label

Select parameters to add to the label. Parameters will be combined into a single label.

Enter sample values to represent this label in the family environment. ☐ Wrap between parameters only

Category Parameters
Select available fields from:
Stairs

- Actual Number of Risers
- Actual Riser Height
- Actual Tread Depth
- Assembly Code
- Assembly Description
- Assembly Name
- Calculated Capacity_AM
- Calculated Capacity_Evacuation**
- Comments
- Cost
- Description
- Dir_AM (UP/DN/BI)
- Dir_EVA (UP/DN)
- Dir_PM (UP/DN/BI)

Label Parameters

	Parameter Name	Spaces	Prefix	Sample Value	Suffix	Break
1	Calculated Capacity_Evacua			EVA		☐

人流计算

↑E ↓E ↗

OK Cancel Apply

The image shows the 'Parameter Properties' dialog box in Revit, configured for a 'Shared parameter'. The parameter name is 'Calculated Capacity_AM', the discipline is 'Common', and the type is 'Integer'. The parameter is set to be shared across multiple projects and families. A secondary window, 'Add Parameter...', is also visible, showing a list of available fields for the parameter, including 'Calculated Capacity_AM'.

Parameter Properties Dialog:

- Parameter Type:** Shared parameter (Can be shared by multiple projects and families, exported to ODBC, and appear in schedules and tags)
- Parameter Data:**
 - Name: Calculated Capacity_AM
 - Discipline: Common
 - Type of Parameter: Integer
 - Group parameter under: Other
- Categories:**
 - Filter list: <show all>
 - Hide un-checked categories: ☐
 - Categories list: Air Terminals, Analytical Beams, Analytical Braces, Analytical Columns, Analytical Floors, Analytical Foundation S..., Analytical Isolated Founda..., Analytical Links, Analytical Nodes, Analytical Wall Foundat..., Analytical Walls, Areas, Assemblies
- Options:**
 - ☒ Add to all elements in the selected categories

Add Parameter Dialog:

- Assembly Name: Base Level
- Calculated Value: Calculated Capacity_AM
- Include elements in linked files: ☒

True BIM

A	B	C	D	E	F
Esc. No	Stair Name	Type Mark	Width	Actual Number of	Actual Riser
E7		ESC	1000	23	246
E8		ESC	1000	23	246
E9		ESC	1000	23	246
E10		ESC	1000		
E23		ESC	1000		
E11		ESC	1000		
E12		ESC	1000		
E13		ESC	1000		
E26		ESC	1000		
E25		ESC	1000		
E17		ESC	1000		
E18		ESC	1000		
E19		ESC	1000		
E15		ESC	1000		
E16		ESC	1000		
E14		ESC	1000		
E24		ESC	1000		
E1		ESC	1000		
E2		ESC	1000		
E3		ESC	1000		
E4		ESC	1000		
E6		ESC	1000		
E5		ESC	1000		
E20		ESC	1000		
E21		ESC	1000		
E22		ESC	1000		
BE1	BE1	ESC	1000		
BE2	BE2	ESC	1000		
BE3	BE3	ESC	1000		
BE4	BE4	ESC	1000	22	227
BE5	BE5	ESC	1000	22	227
BE6	BE6	ESC	1000	22	227
	ES2	FINISH	1850	17	147
	ES2		1900	17	147
	ES3	FINISH	1850	19	134
	ES3		1900	19	132
	ES5	FINISH	1850	9	173

The screenshot shows the 'Properties' dialog box for a staircase. The 'Schedule' tab is active, displaying a list of scheduled fields. The 'Width' field is highlighted with a red rectangle. The list of fields includes 'Esc. No', 'Stair Name', 'Type mark', 'Width', 'Actual Number of Risers', 'Actual Riser Height', 'Actual Tread Depth', 'Assembly Code', 'Assembly Description', 'Assembly Name', 'Base Level', 'Calculated Capacity_AM', and 'Calculated Capacity_Evacuat'. Buttons for 'Add -->', '<-- Remove', 'Add Parameter...', 'Calculated Value...', 'Edit...', 'Delete', 'Move Up', and 'Move Down' are visible.

J	K	L
Assembly Name	Base Level	Calculated
	BASEMENT (E)	120
	BASEMENT (E)	120
	BASEMENT (E)	120
	BASEMENT (E)	120
	LOWER PLATFORM	120
	LOWER PLATFORM	120
	LOWER PLATFORM	120
	LOWER PLATFORM	120
	LOWER PLATFORM	120
	LOWER PLATFORM	120
	LOWER PLATFORM	120
	LOWER PLATFORM	120
	LOWER PLATFORM	120
	UPPER PLATFORM	120
	UPPER PLATFORM	120
	UPPER PLATFORM	120
	UPPER PLATFORM	120
	UPPER PLATFORM	120
	UPPER PLATFORM	120
	UPPER PLATFORM	120
	UPPER PLATFORM	120
	CONCOURSE (E)	120
	CONCOURSE (E)	120
	CONCOURSE (E)	120
	CONCOURSE (E)	120
	CONCOURSE (E)	120
	CONCOURSE (E)	120
	BASEMENT (E)	93
	CONCOURSE LEV	
	BASEMENT (E)	93
	CONCOURSE LEV	
	CONCOURSE (E)	93

True BIM

Autodesk Revit 2014 - S

Architecture Structure Systems Insert Annotate Analyze Massing & Site Collaborate View Manage Add-Ins Modify Modify Schedule/Quantities

Properties Parameters Columns Rows Titles & Headers Appearance

Modify Schedule/ Schedule Properties

Fields Filter Sorting/Grouping Formatting Appearance

Available fields:

- Actual Number of Risers
- Actual Riser Height
- Actual Tread Depth
- Assembly Code
- Assembly Description
- Assembly Name
- Base Level
- Calculated Capacity_AM
- Calculated Capacity_Evacuation
- Comments
- Cost
- Count
- Critical
- Description
- Dir_AM (UP/DN/BI)
- Dir_EVA (UP/DN)
- Esc. No
- Escalator
- Escalator/Passenger Conveyor
- Family
- Family and Type
- Function
- Keynote
- Landing Type
- Left Support Type
- Machine/Controller Location (MIT/MOT/ MIT/CO)
- Manufacturer
- Mark
- mark test
- Maximum Riser Height

Edit... Delete

Select available fields from:

Stairs

☒ Include elements in linked files

Calculated Value

Name: Capacity Up

☒ Formula ☐ Percentage

Discipline: Common

Type: Integer

Formula: Width / 1000 mm * 50

OK Cancel Help

Scheduled fields (in order):

- Type Mark
- Dir_PM (UP/DN/BI)
- Width
- Capacity Up
- Capacity Down
- Capacity - Bi Direction
- Calculated Capacity_PM
- Stair Name

Add --> <-- Remove

Add Parameter... Calculated Value...

Edit... Delete

Move Up Move Down

确定 取消 帮助

PM_STAIR

Room Schedule

STAIR SCHEDULE

Stair Schedule-mickeymoka2

Stair Schedule_mickeymoka

Structural Column Schedule

Wall Schedule

BI	99	111	83	83
DN	99	111	83	111
BI	99	111	83	83

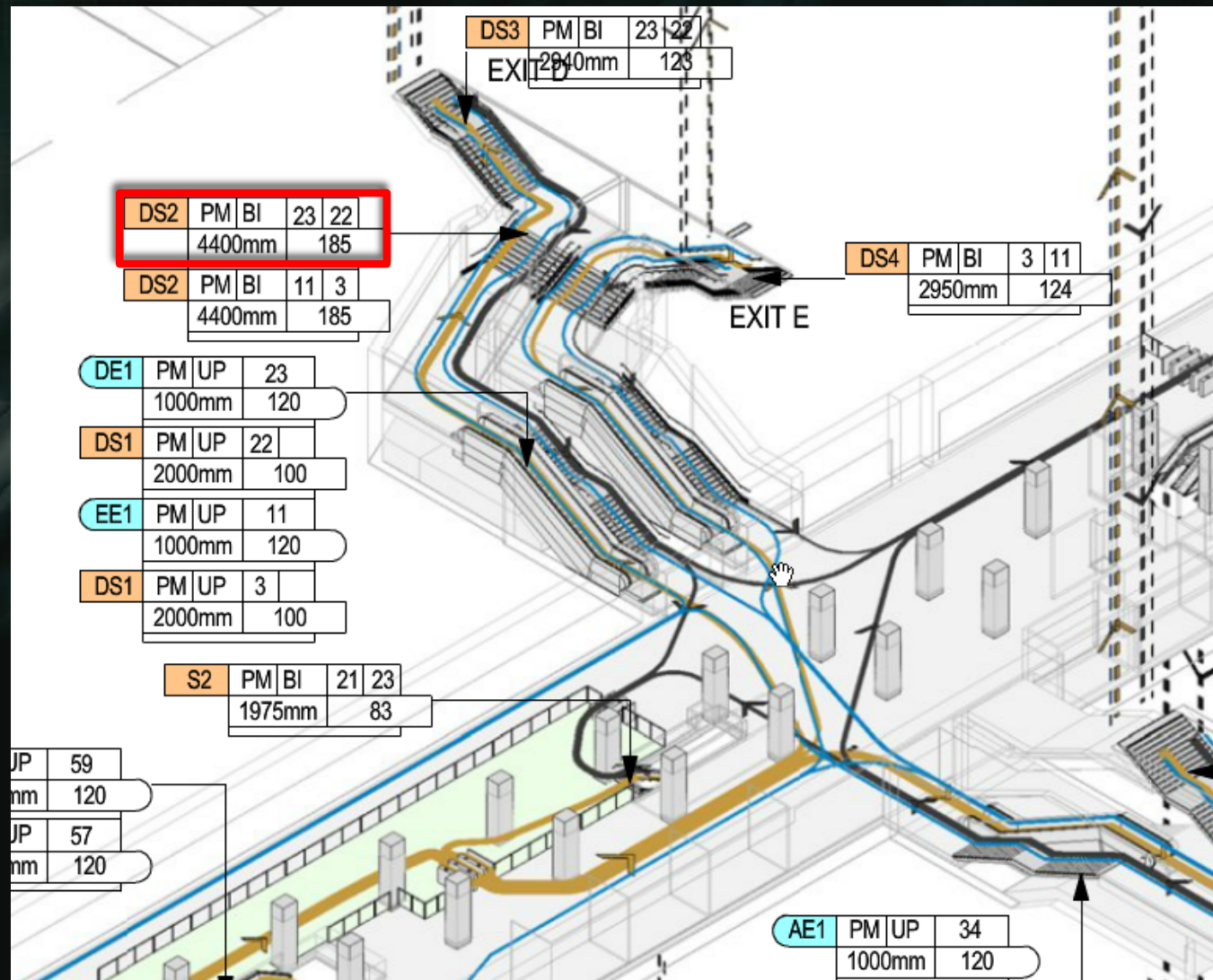
True BIM

$$(23 + 22) / 185$$

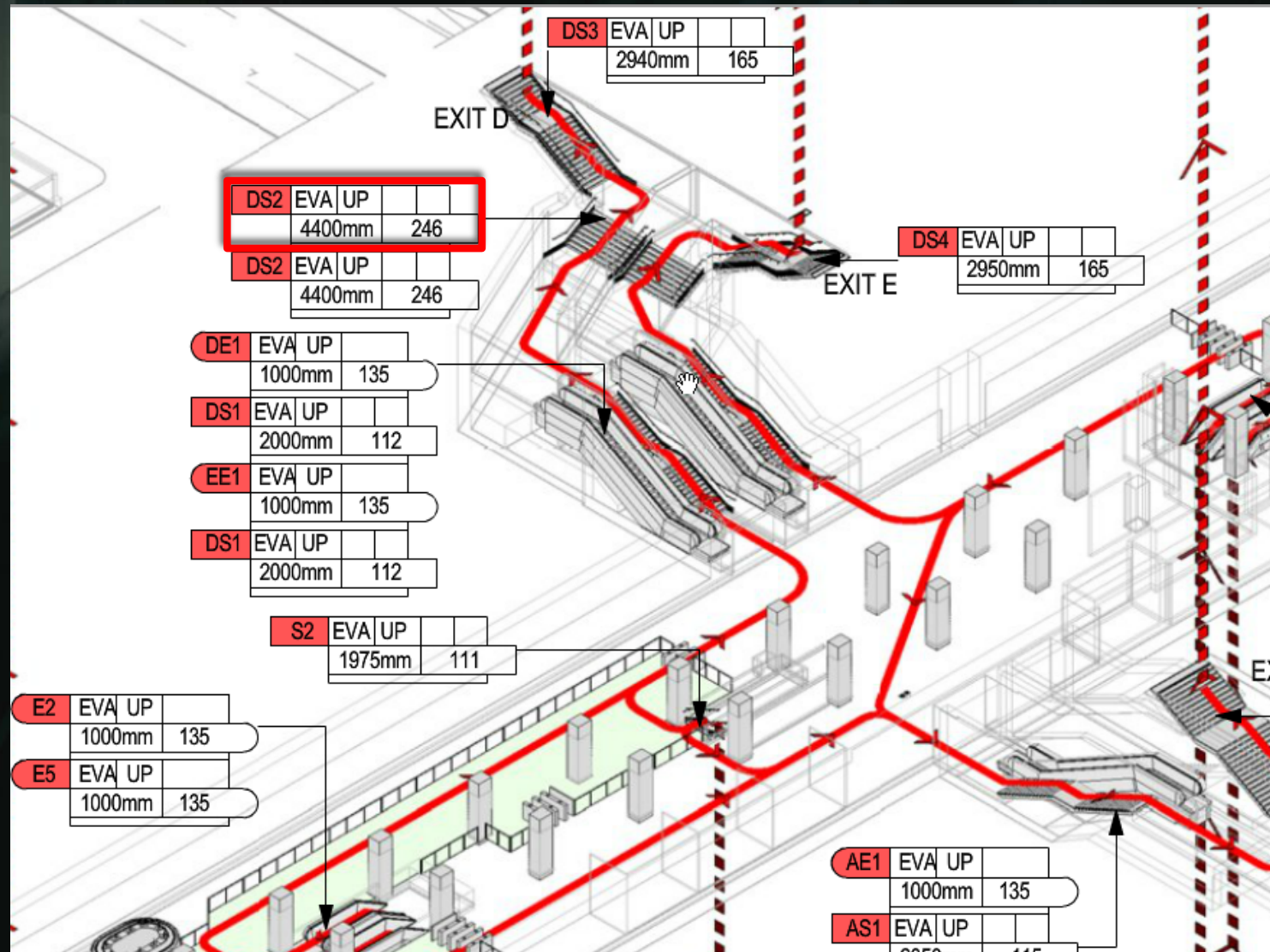
$$= 24.3\%$$

$$= \text{Safe}$$

(Safety factor –
over 80% Potential
Danger)



True BIM



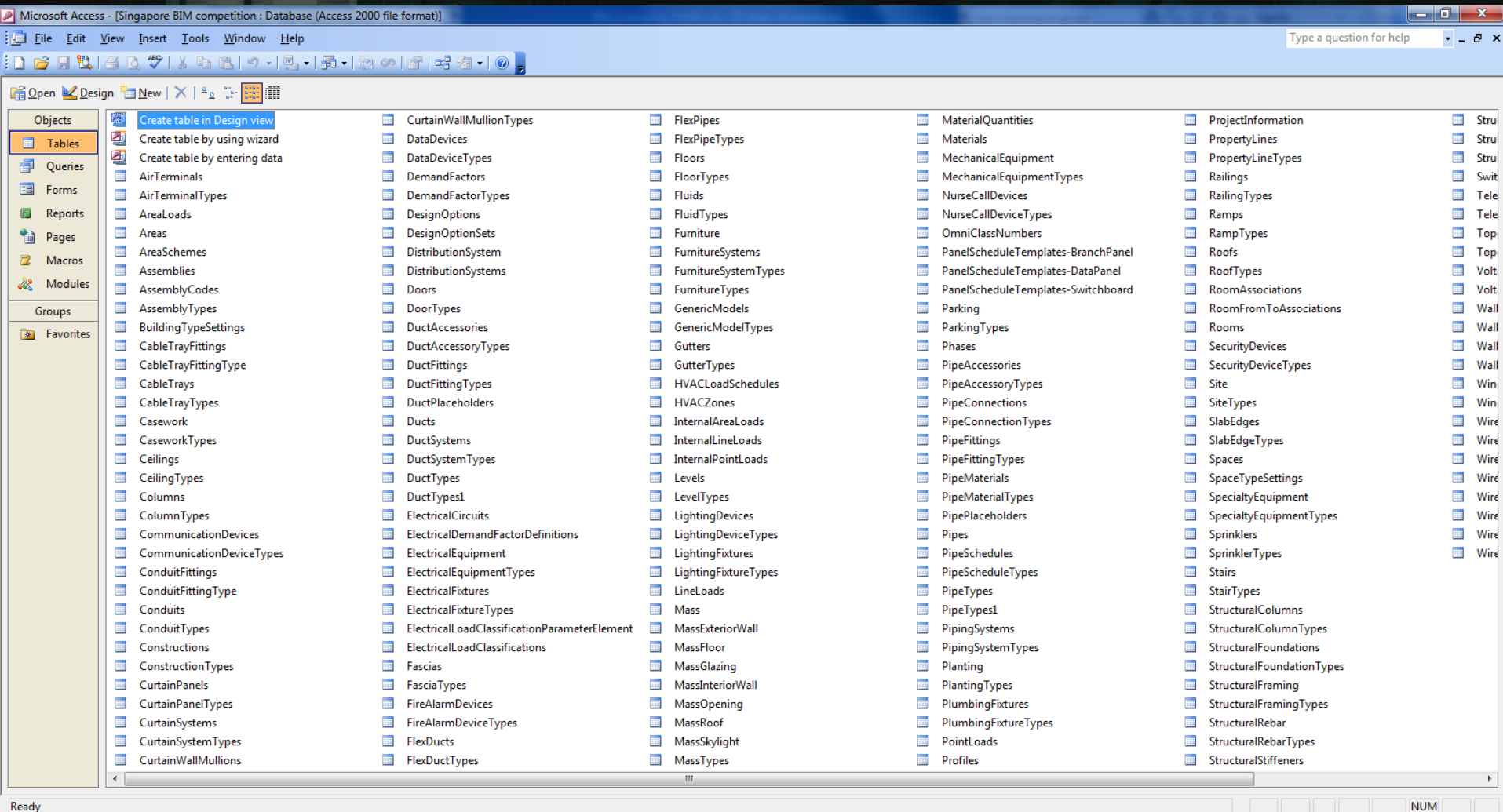
Case 4

True BIM (Operation Phase)

$$M + I = B$$

(Operation & Maintenance)

物业管理 - 维修保养



Sheet: LEGEND, ABBREVI...
Edit Type

Graphics

Visibility/Graphics...

Scale

Text

C&R No.

Figure No. Prefix Z/LRL/PUT/M...

Sheet Name 2nd...

Identity Data

[Properties help](#)

Apply

DRAWING LIST

DRAWING	DRAWING TITLE	REVISION	SHEET IS SU E DATE
A01/010	LEGEND, ABBREVIATION, DRAWING LIST		07/23/10
A01/100	SITE PLAN		07/22/10
A01/101	PLATFORM PLAN SHEET 1 OF 2		07/22/10
A01/102	PLATFORM PLAN SHEET 2 OF 2		07/20/10
A01/103	EAST ELEVATION		08/25/10
A01/104	WEST ELEVATION		07/22/10
A01/105	SOUTH ELEVATION		07/23/10
A01/106	NORTH ELEVATIONS		07/22/10
A01/107	SECTION 01		07/23/10
A01/108	SECTION 02		07/30/10
A01/110	ISOMETRIC & PERSPECTIVES		07/23/10
A01/120	SOLAR STUDY MARCH		07/23/10
A01/121	SOLAR STUDY MARCH		07/23/10
A01/122	SOLAR STUDY MARCH		08/26/10
A01/123	SOLAR STUDY JUNE		08/26/10
A01/124	SOLAR STUDY JUNE		08/26/10
A01/125	SOLAR STUDY JUNE		08/26/10
A01/126	SOLAR STUDY SEPT		08/26/10
A01/127	SOLAR STUDY SPET		08/26/10
A01/128	SOLAR STUDY SPET		08/26/10
A01/129	SOLAR STUDY DEC		08/26/10
A01/130	SOLAR STUDY DEC		08/26/10
A01/131	SOLAR STUDY DEC		08/26/10
A01/132	SECTIONS		10/20/10

Tiling Schedule

Family	Level	Type	Type Mark	Keynote	Count
GEM-MFR_Floor Care Mark Based_DimGray	PLATFORM	GEM-MFR_Floor Care Mark Based_DimGray			12
GEM-MFR_Floor Security Line Based_Yellow	PLATFORM				2
TLG-DRN-MTR-Type_A	PLATFORM	Brick Frame Colour Khaki	A		36
TLG-DRN-MTR-Type_B		Brick Frame Colour Khaki	B		194
TLG-DRN-MTR-Type_C	PLATFORM	Brick Frame Colour Khaki	C		240

Views (all)

Floor Plans

(CONTRACT)_Z_PLATFORM LE

(CONTRACT)_Z_RAIL LEVEL_S

(CONTRACT)_Z_S1000_Site Pl

(CONTRACT)_Z_TRACK LEVEL

(CONTRACT)_Z_TRACK_S100

3D Views

(CONTRACT)_Z_ISO

(CONTRACT)_Z_PER01

(CONTRACT)_Z_PER02

SOLAR DECEMBER 22 0900

SOLAR DECEMBER 22 1200

SOLAR DECEMBER 22 1500

SOLAR JUNE 22 0900

SOLAR JUNE 22 1200

SOLAR JUNE 22 1500

SOLAR MARCH 21 0900

SOLAR MARCH 21 1200

SOLAR MARCH 21 1500

SOLAR SEPTEMBER 21 0900

SOLAR SEPTEMBER 21 1200

SOLAR SEPTEMBER 21 1500

(3D)

Elevations (Building Elevation)

(CONTRACT)_Z_S100 EAST EL

(CONTRACT)_Z_S100 NORTH

(CONTRACT)_Z_S100 SOUTH

(CONTRACT)_Z_S100 WEST EL

Sections (Building Section)

01

02

PLATFORM 1

PLATFORM 2

Legends

Schedules/Quantities

DRAWING LIST

Tiling Schedule

VOICE PCP (All types)

Sheets (all)

A01/010 - LEGEND, ABBREVIAT

A01/100 - SITE PLAN

A01/101 - PLATFORM PLAN SHEET 1 OF 2

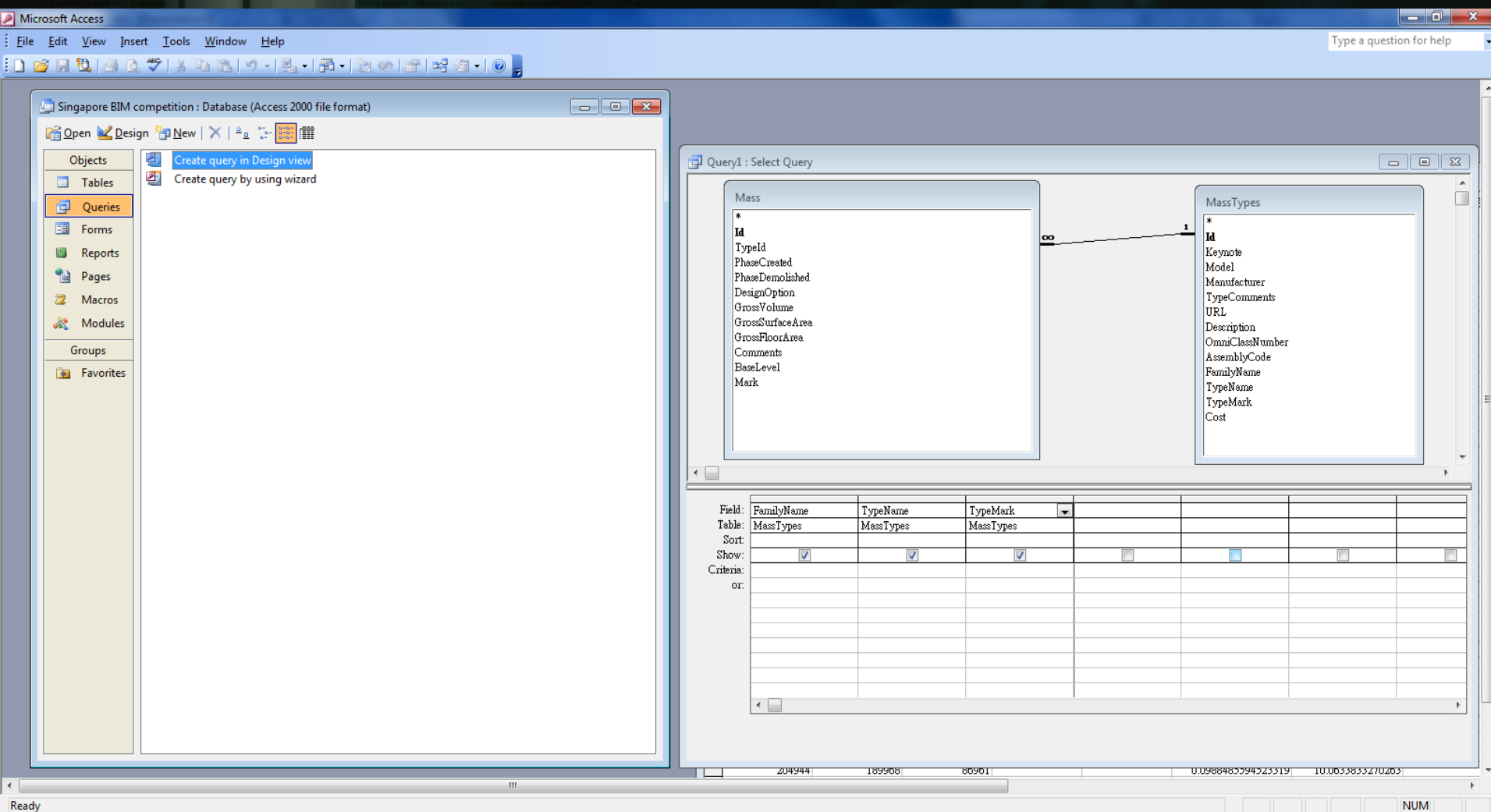
VOICE PCP (All types)

Family	Mark	Type Mark
ELF-ARC-MTR-PCP	xxxx	E
ELF-ARC-MTR-PCP	xxxx	E
ELF-ARC-MTR-PCP	xxxx	E
ELF-ARC-MTR-PCP-Exit_Voice	xxxx	E
ELF-ARC-MTR-PCP-Exit_Voice	xxxx	E
ELF-ARC-MTR-PCP	xxxx	X
ELF-ARC-MTR-PCP	xxxx	X
ELF-ARC-MTR-PCP	xxxx	X
ELF-ARC-MTR-PCP	xxxx	X
ELF-ARC-MTR-PCP	xxxx	X
ELF-ARC-MTR-PCP-Exit_Voice	xxxx	X
ELF-ARC-MTR-PCP-Exit_Voice	xxxx	X
ELF-ARC-MTR-PCP-Exit_Voice	xxxx	X
ELF-ARC-MTR-PCP-Exit_Voice	xxxx	X
ELF-ARC-MTR-PCP-Exit_Voice	xxxx	X

Grand total: 16

A14		1530141	
	A	J	K
1	Id	FamilyName	TypeName
2	7848	Model Text	600mm Arial
3	1148899	Model Text	200mm - wood
4	1148901	Model Text	300mm - black
5	1148904	Model Text	50mm - steel
6	1193027	GEM_MTR_Floor Care Mark Based_DimGray	GEM_MTR_Floor Care Mark Based_DimGray
7	1194842	GEM_MTR_Floor Security Line Based_Yellow	Security Line_MTR_Floor Based_Yellow
8	1206709	GEM_MTR_Floor Security Line Based_Yellow	Security Line_MTR_Floor Based_Yellow W39600mm
9	1282975	GEM_MTR_Floor Security Line Based_Yellow	Security Line_MTR_Floor Based_Yellow W39500mm
10	1528388	TLG-DRN-MTR-Type_A	Brick Frame Colour Khaki
11	1528390	TLG-DRN-MTR-Type_A	Brick Frame Colour DimGray
12	1529333	TLG-DRN-MTR-Type_B	Brick Frame Colour Khaki
13	1529335	TLG-DRN-MTR-Type_B	Brick Frame Colour DimGray
14	1530141	TLG-DRN-MTR-Type_C	Brick Frame Colour Khaki
15	1530143	TLG-DRN-MTR-Type_C	Brick Frame Colour DimGray
16	1532279	TLG-DRN-MTR-Type_C	Brick Frame Colour Khaki W200mm
17	1606926	TRN-TRN-MTR-LRL-Headstock	TRN-TRN-MTR-LRL-Headstock
18	1618524	TRN-TRN-MTR-LRL-Coach	TRN-TRN-MTR-LRL-Coach
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True BIM – Operation & Maintenance



True BIM – Operation & Maintenance

Query1 : Select Query		
FamilyName	Type	Type Name
▶ SAT Tower Mullion		SAT Tower Mullion
SAT Tower Surface Ref		SAT Tower Surface Ref
Tower Panel		S01-P001
Tower Panel		S01-P002
Tower Panel		S01-P003
Tower Panel		S01-P004
Tower Panel		S01-P005
Tower Panel		S01-P006
Tower Panel		S01-P007
Tower Panel		S01-P008
Tower Panel		S01-P009
Tower Panel		S01-P010
Tower Panel		S01-P011
Tower Panel		S01-P012
Tower Panel		S01-P013
Tower Panel		S01-P014
Tower Panel		S01-P015
Tower Panel		S01-P016
Tower Panel		S01-P017
Tower Panel		S01-P018
Tower Panel		S01-P019
Tower Panel		S01-P020
Tower Panel		S01-P021
Tower Panel		S01-P022
Tower Panel		S01-P023
Tower Panel		S01-P024
Tower Panel		S01-P025
Tower Panel		S01-P026
Tower Panel		S01-P027
Tower Panel		S01-P028
Tower Panel		S01-P029
Tower Panel		S01-P030
Tower Panel		S01-P031
Tower Panel		S01-P032
Tower Panel		S01-P033
Tower Panel		S01-P034
Tower Panel		S01-P035
Tower Panel		S01-P036
Tower Panel		S01-P037
Tower Panel		S01-P038
Tower Panel		S01-P039
Tower Panel		S01-P040

Record: 1 of 2503

Room No. 3.3 - Cleaners' Room									
Function	A room for storage of small volume of cleansing materials, tools and short stay of cleaners								
Size	15 - 20 m ²								
Occupants	3-5 persons								
Location	Non-public area								
Fire Rating	# In accordance with Fire Safety Standard for KTL/TWL/ISL Stations - S/ARC/PD/005								
Security Level	Low								
Finish	Floor		Skirting		Wall		Ceiling		
	Vitrified ceramic tiles, 150x150x8, on c/s screed - "Pilkington Dorset, colour Dark Grey" or equal approved; on liquid-applied waterproof membrane - "Lactierete 9235 with fabric reinforcement" or equal approved		Coved ceramic tiles, 150x150x8, on c/s backing - "Pilkington Dorset, colour Dark Grey" or equal approved; on liquid-applied waterproof membrane - "Lactierete 9235 with fabric reinforcement" or equal approved		Glazed ceramic tiles, 150x150x6.5, on c/s backing - "Pilkington Architectural Colours, colour Vellum White" or equal approved; Dural le paint on c/s render above 2100 high - "Alphadecor, colour 9010 White" or equal approved		Durable paint on fairface concrete - "Alpl' adecor, colour 9010 White" or equal approved		
Door Set	Size	Fire Rating	Acting	Frame	Inside Finish	Outside Finish	Air Resistance	Others	
	900 x 2100 mm	# (see above)	Swing In 90°	Painted/ S/S *	Painted/ S/S *	Painted/ S/S *	N/A	Durable kickplate to u/s of push plate	
Ironmongery	Lock Set	Security Level	Access Card		Remote Control	Inside Handle	Outside Handle	Accessories	
	Night Latch	Low	No	No	No	Lever handle on back plate	Pull handle on back plate	Door closer, door stop	
Signage	Door Plate (supply by Ops)								
Environment	Temperature	Ventilation	Humidity			Acoustic		Thermal	
	24 °C A/C	N/A	50% ± 10%			NC 50		---	
Lighting	Normal Illuminance	Emergency Illuminance	Type			Diffusers		Source	
	300 Lux	10 Lux	Fluorescent, surface mounted			---		Direct	
Fire	Detection		Suppression			Extinguisher		Smoke Extraction	
	Smoke Detectors		N/A			Relocate existing		---	
Plumbing & Drainage	Water Supply					Drainage			
	Yes					Yes + Floor drain			
E & M, C & C	Equipment		Socket Type			Socket No. / Location		Communications	
	PABX (no outside call feature)		RJ11 provided by in-house C&C			1 / At 1440mm AFFL		Telephone wire to MTRC distribution box	
	General		Twin 13A			2 / Skirting level		---	
Fixtures & Furniture	Slop sink connect to foul drainage, storage cabinets, lockers, vacuum cleaner, table and chair.								
Others	---								

* Dependent on location - stainless steel door to be used when facing public areas.
- painted doors to be used when facing BofH areas.

Revision D

**ROOM
DATA
SHEET**

True BIM – Operation & Maintenance

The screenshot displays a web application interface for "Work Order Tracking" running in a Windows Internet Explorer browser. The browser address bar shows the URL: `http://localhost:7001/maximo/ui/?event=loadapp&value=wotrack&uisessionid=1253495337442`.

The main application window has a sidebar on the left with a "Toolbox" containing "Report Datasets" and "MAXIMO". The main content area is titled "Reports" and includes a "Select Value" modal window.

The "Reports" section contains a "Select a report from the list, or click Create Report to create an ad hoc report." instruction. Below this, there are tabs for "On Demand Reports" and "Scheduling Status". Under "On Demand Reports", there are links for "Estimated vs Actual Work Order Costs", "Open Work Orders and PM", "SSRS First Report", and "SSRS Work Order by Work Type".

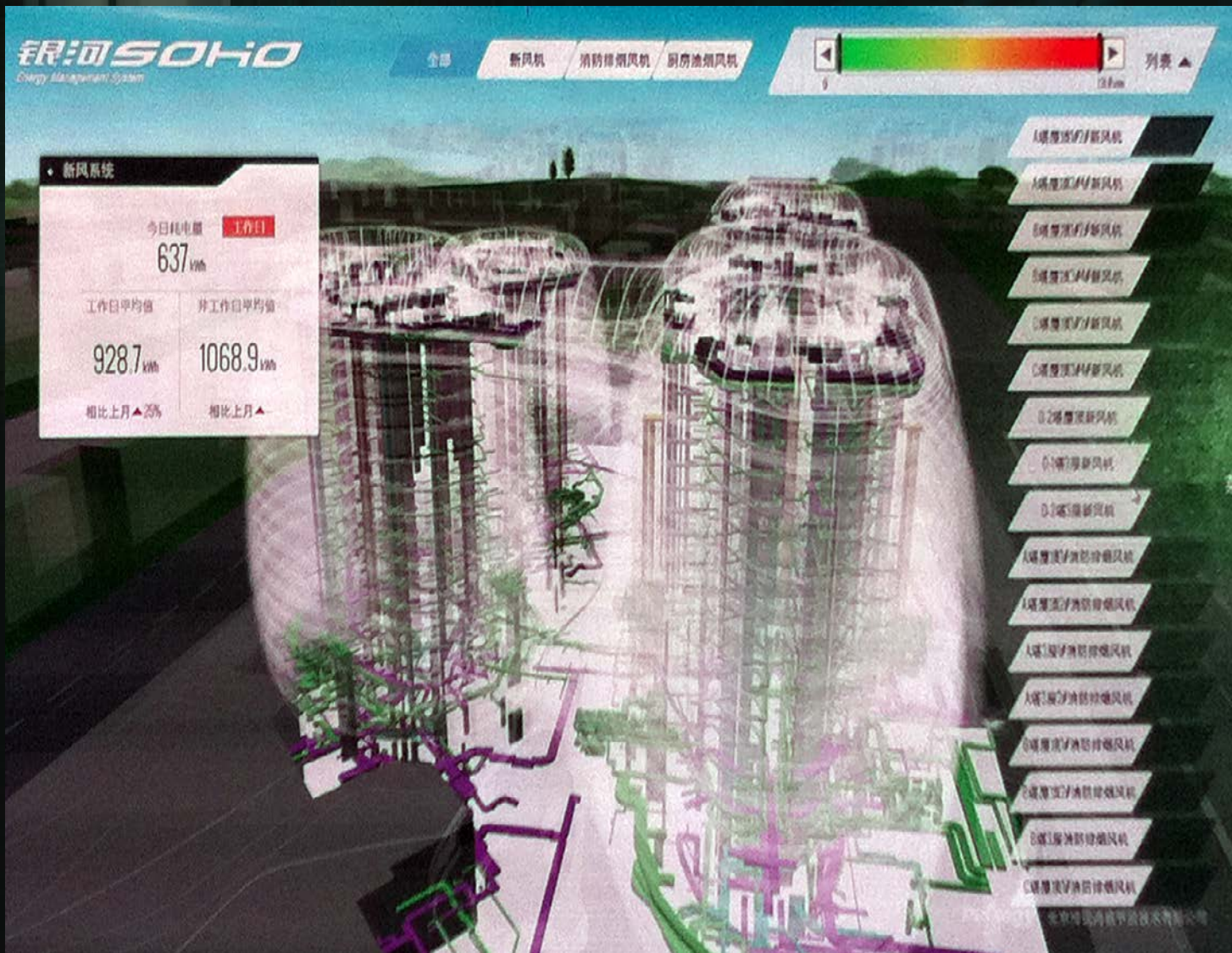
The "Scheduling Status" tab is active, showing a list of reports to run. The list includes a "Filter" button, a "Download" button, and a "1 - 5 of 9" indicator. Below the list, there is a "Parameters" section with a "Search Location Hierarchy" input field and a "Submit" button.

The "Select Value" modal window is open, displaying a table with the following data:

Location	Description	Type	Site
☐ ADDR2001	Address Unit #2001 Oak St. - W560	OPERATING	BEDFORD
☐ ADDR2002	Address Unit #2002 Oak St. - W560	OPERATING	BEDFORD
☐ ADDR2003	Address Unit #2003 Oak St. - W560	OPERATING	BEDFORD
☐ AIR100	Supply Duct Inlet- Conf. Room #100	OPERATING	BEDFORD
☐ AIR101	Supply Duct Inlet- Office #101	OPERATING	BEDFORD
☐ AIR102	Supply Duct Inlet- Office #102	OPERATING	BEDFORD
☐ AIR103	Supply Duct Inlet- Office #103	OPERATING	BEDFORD
☐ AIR104	Supply Duct Inlet- Office #104	OPERATING	BEDFORD
☐ AIR105	Supply Duct Inlet- Office #105	OPERATING	BEDFORD
☐ AIR211	East Wing, First Floor Supply Duct	OPERATING	BEDFORD
☐ AIR212	West Wing, First Floor Supply Duct	OPERATING	BEDFORD
☐ BALL	Allan Ball	LABOR	BEDFORD
☐ BASIN-W1	Main Storm Water Basin - W1	OPERATING	BEDFORD
☐ BLK1000	1000 Block, Oak St. - W560	OPERATING	BEDFORD
☐ BLK2000	2000 Block, Oak St. - W560	OPERATING	BEDFORD
☐ BLK3000	3000 Block, Oak St. - W560	OPERATING	BEDFORD
☐ BOILER	Boiler Room	OPERATING	BEDFORD
☐ BONEY	Joe Boney	LABOR	BEDFORD
☐ BOSTON	City of Boston	OPERATING	BEDFORD
☐ BOW-W1	Harbour Run-off - W1	OPERATING	BEDFORD

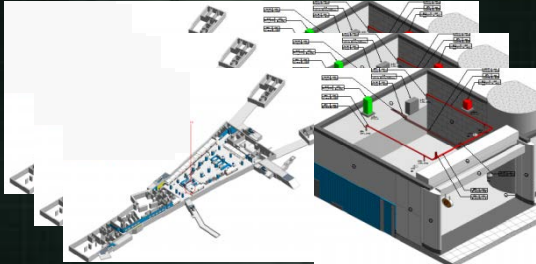
The modal window has "OK" and "Cancel" buttons at the bottom right.

True BIM – Operation & Maintenance

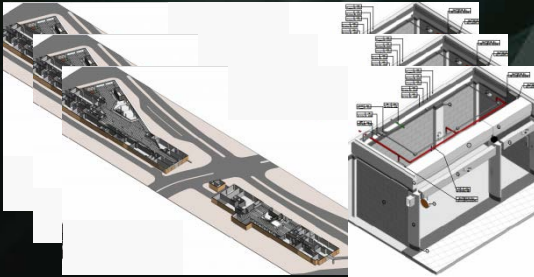


MODELLING + INDIVIDUAL DATABASE

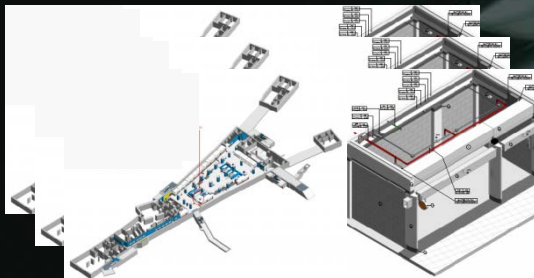
S1



S2



S3



FLEET WIDE DATABASE

MEGA
DATABASE

OTHER
DATABASES

APPLICATIONS

APP 1

E.G. CCTV
MONITORING

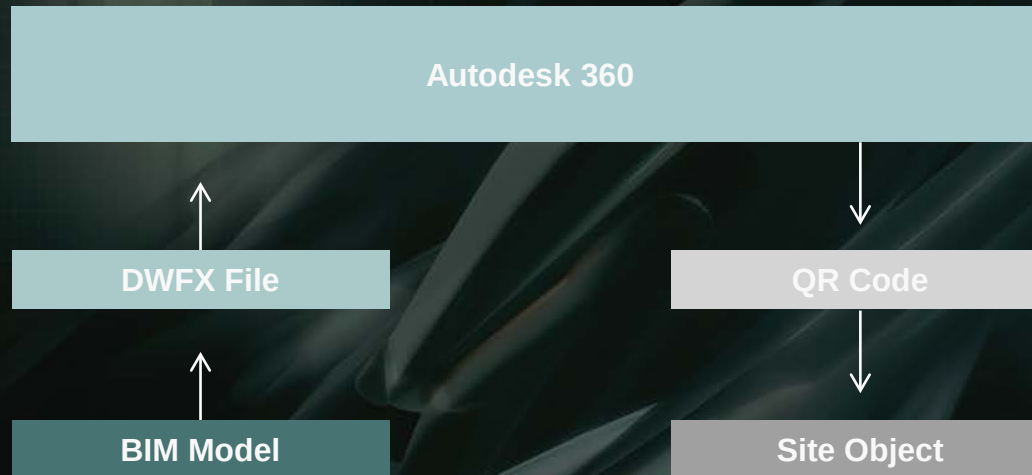
APP 2

E.G. RETAIL

APP 3

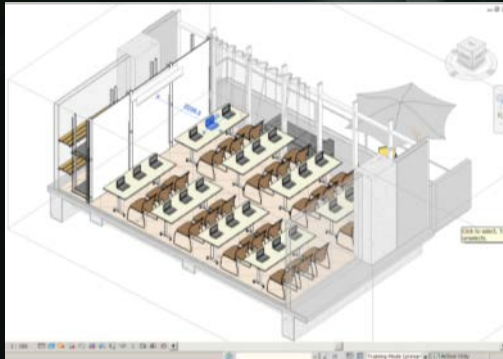
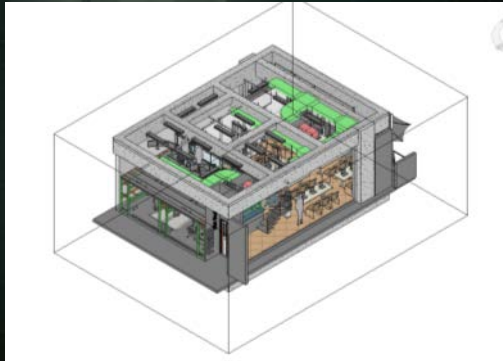


Linkage between object on site and BIM Model

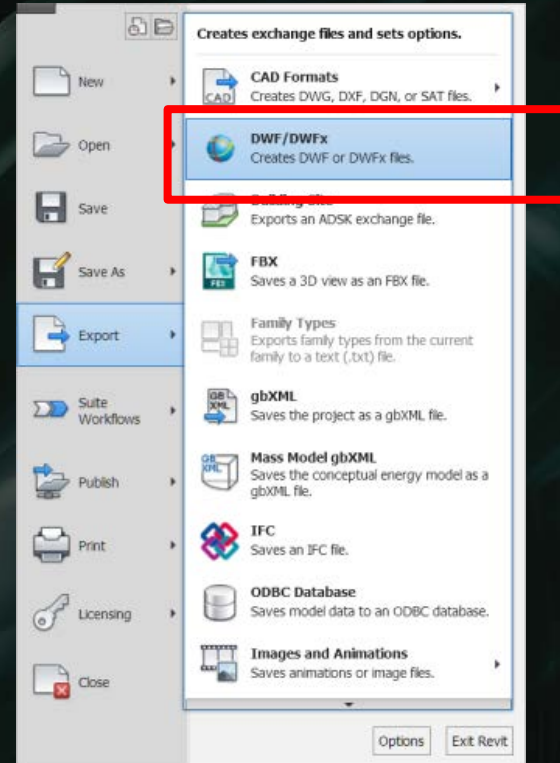


Linkage between object on site and BIM Model

Prepare the BIM Model

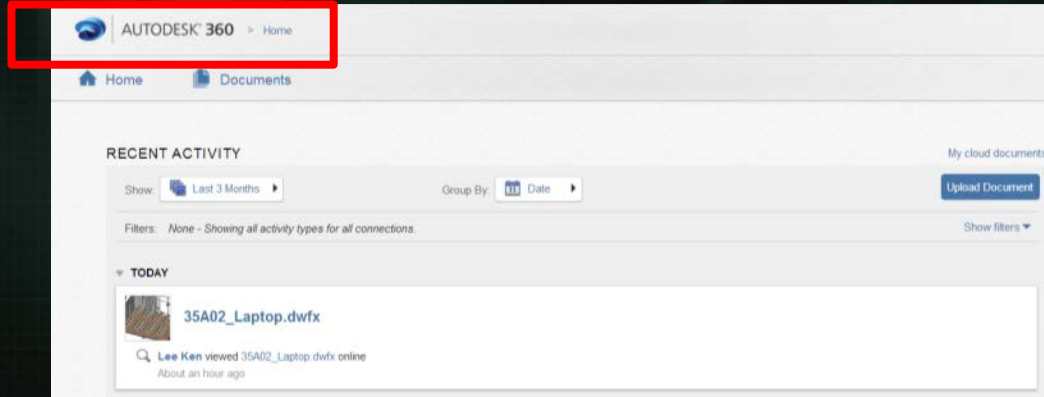


Export to DWFX format

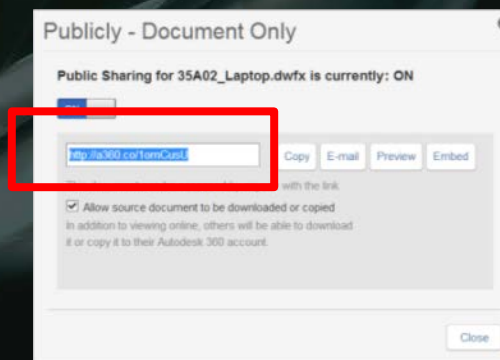
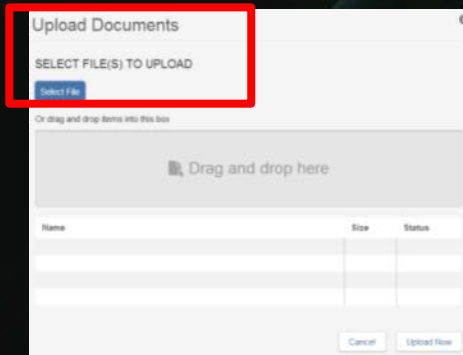


2.0 Linkage between object on site and BIM Model

Access to Autodesk 360



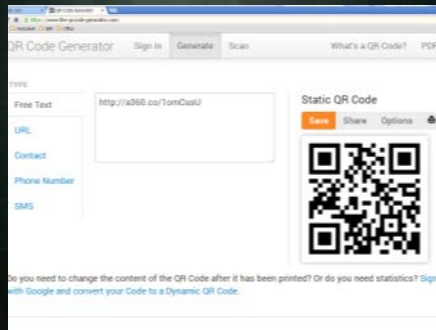
Upload and share the DWFX file



Linkage between object on site and BIM Model

Prepare the QR Code

Generate



Print



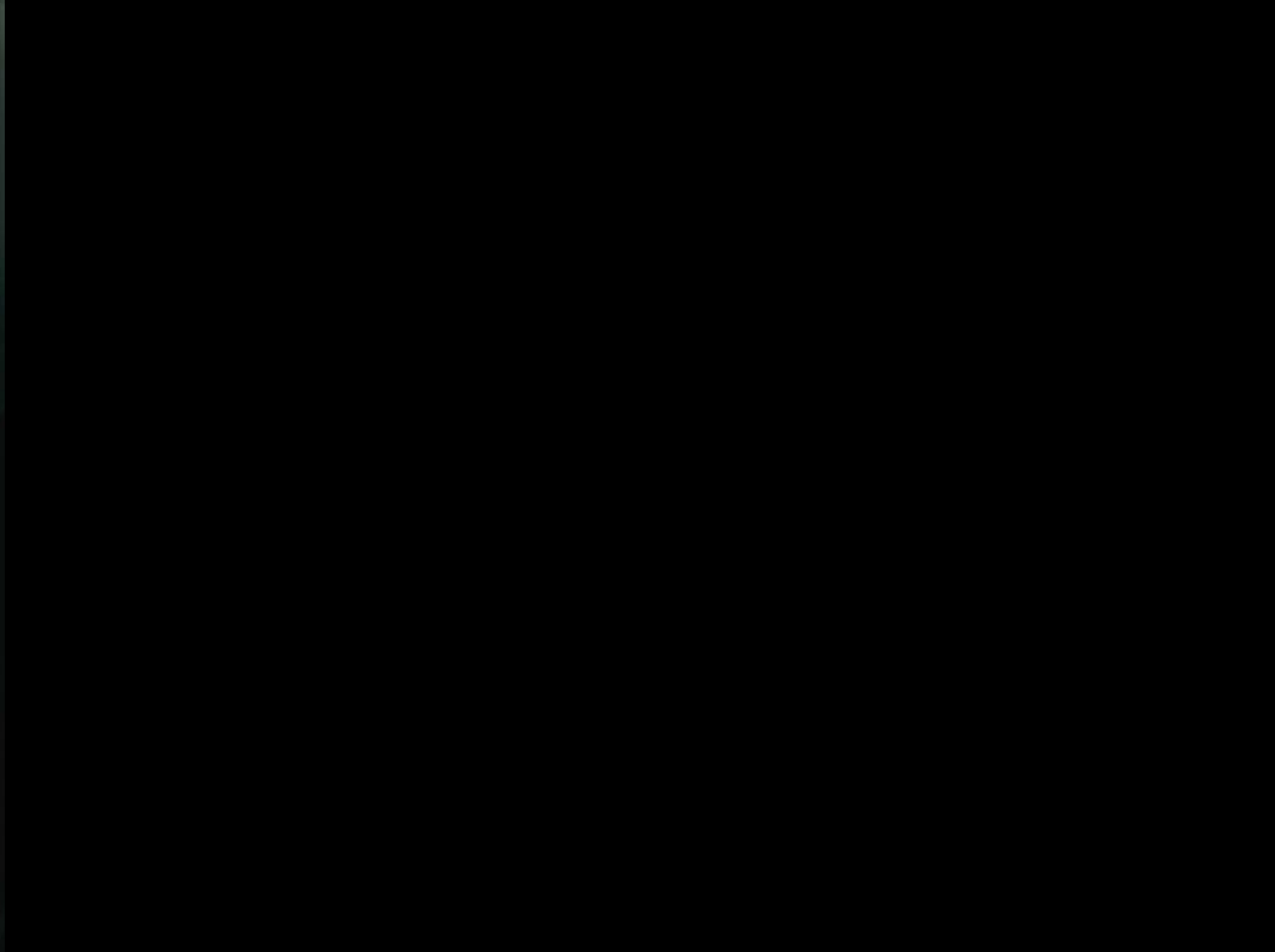
Attached to Object



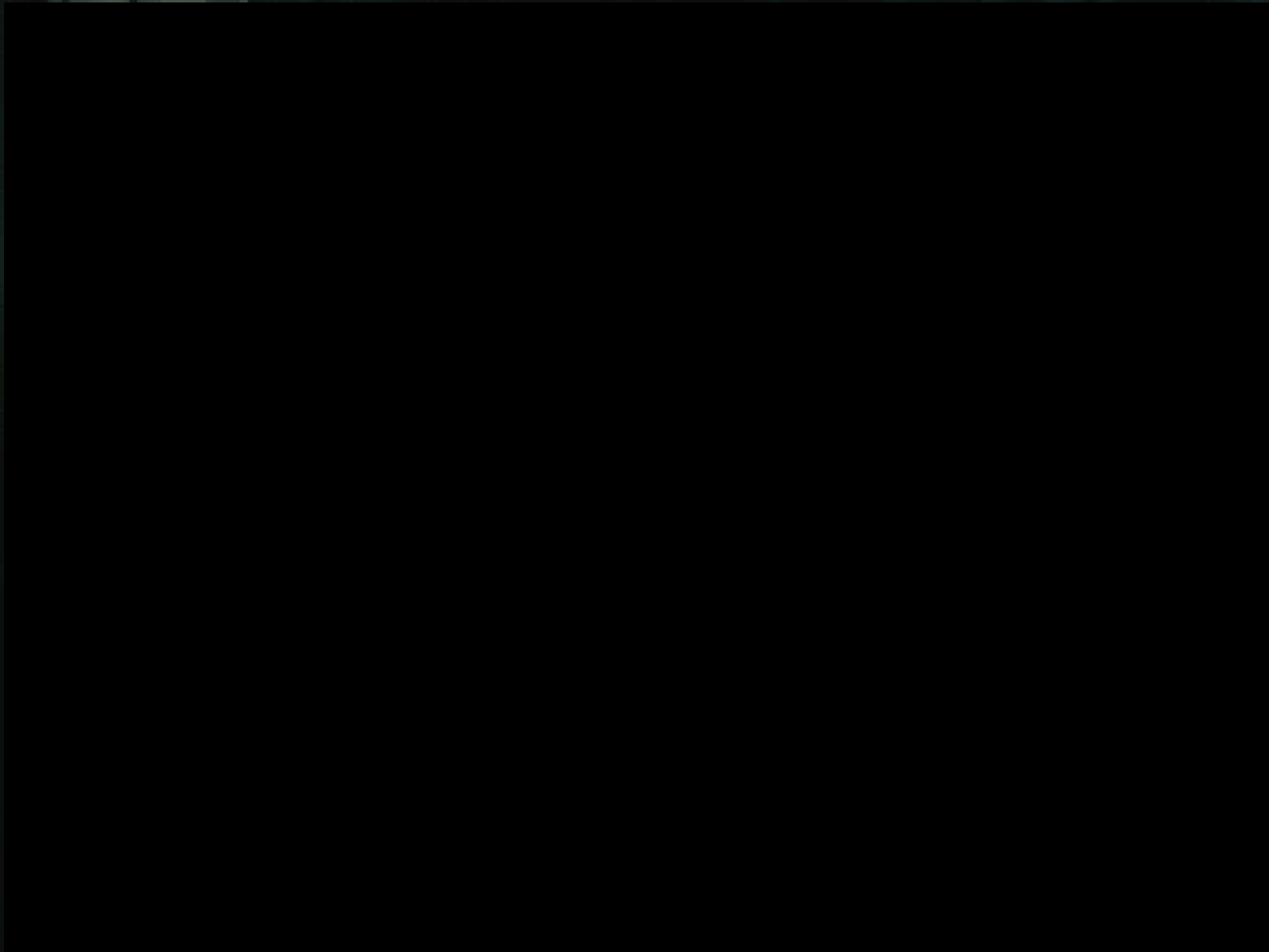
Interoperability between BIM Model and Reality

Linkage between object on site and BIM Model

Access to BIM model through mobile device (Video)



Interoperability between BIM Model and Reality





THANK YOU