BIM in
Construction Productivity

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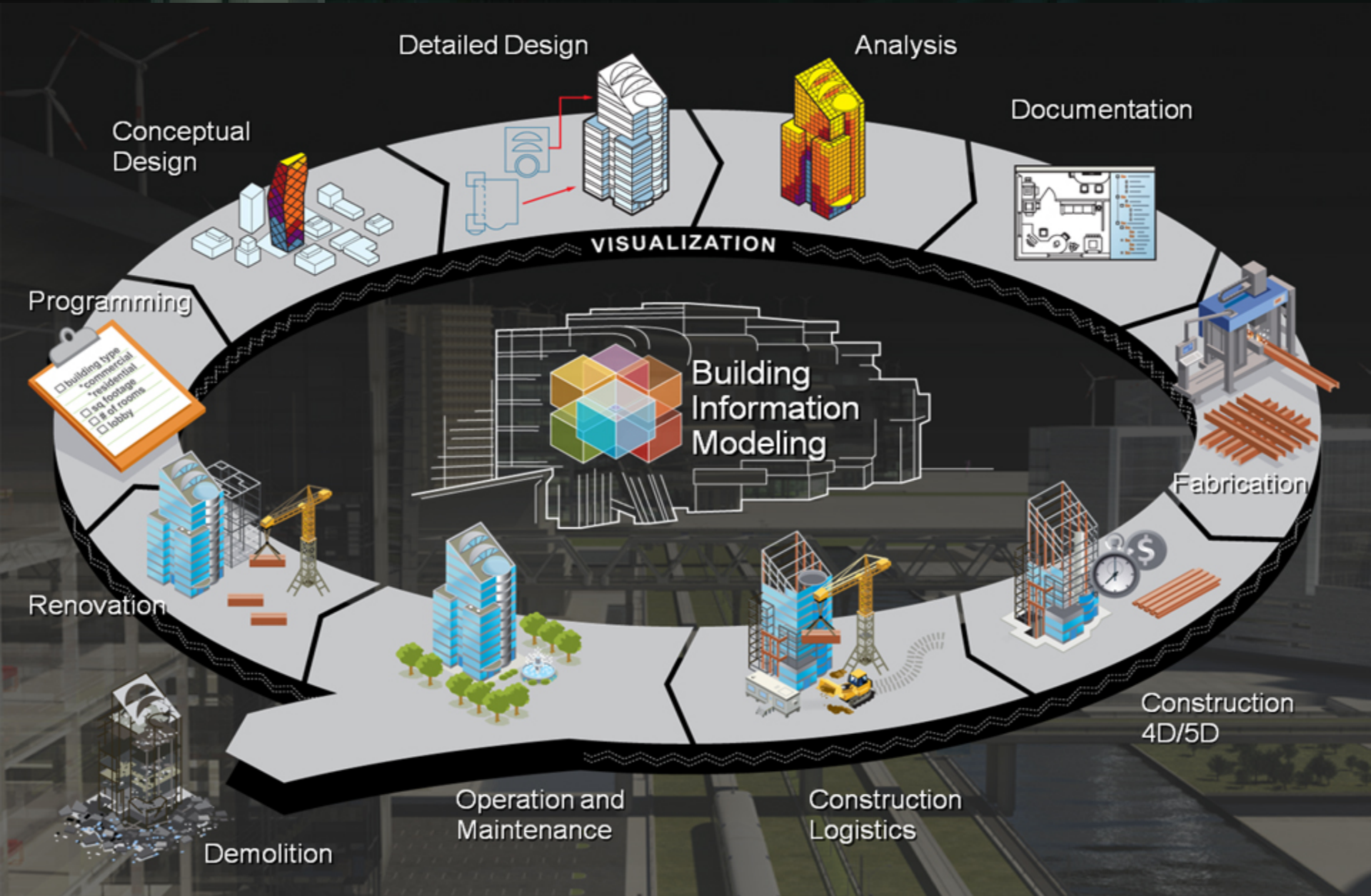
HKIBIM Vice-Chairman
HKUSPACE, Lecturer

B = Building 建築

I = Information 資訊

M = Modelling 模型/ 模擬

Use of Building Information Modeling (BIM)

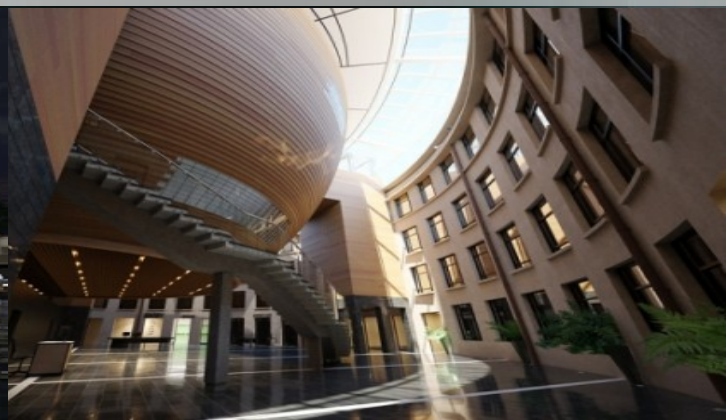


Fake BIM

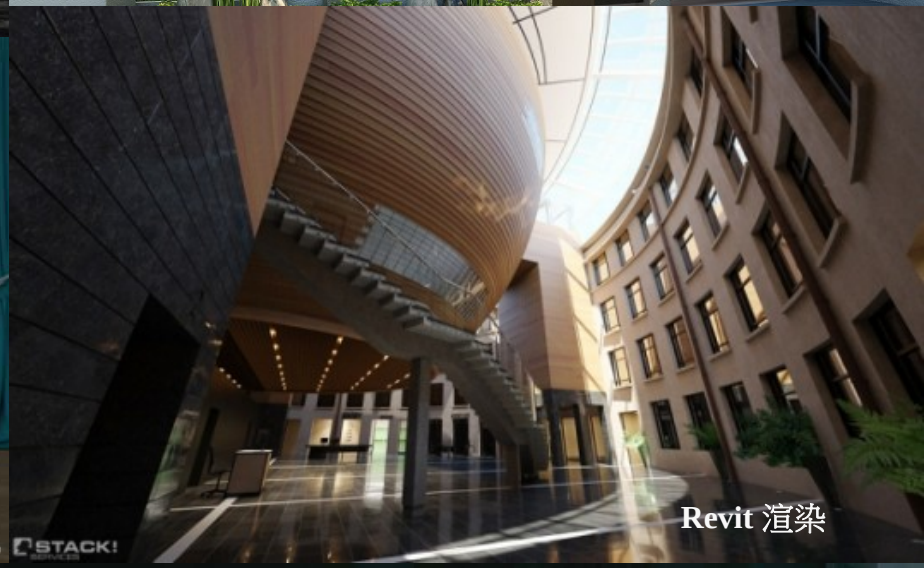
M + ?

JUST 3D MODEL – NOT BIM





Fake BIM



Fake BIM

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

Use BIM tools not necessarily means BIM!

Movie

互動展示

HALF-BIM

I <> M

3D MODEL >> QTO , CLASH ANALYSIS

HALF BIM

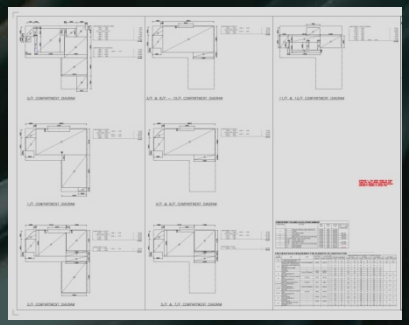
DESIGN

CAD

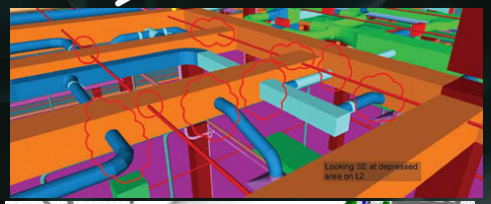
CAD

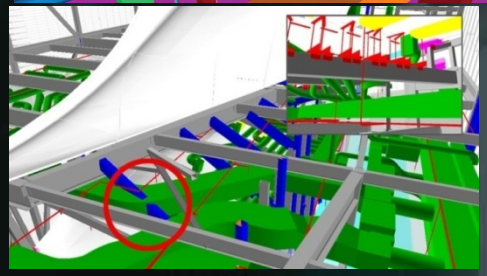
REVIT / NAVISWORKS

???



???





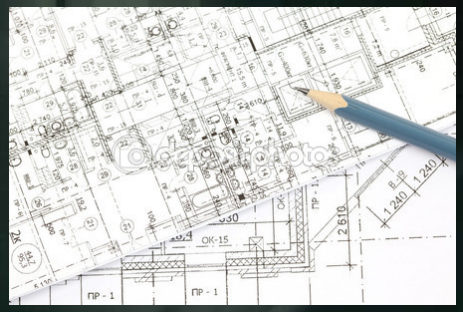
CAD

CONSTRUCTION INFORMATOIN

STATUTORY SUBMISSION

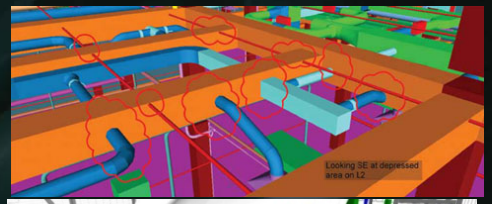
CLASH DETECTION

REAL BIM

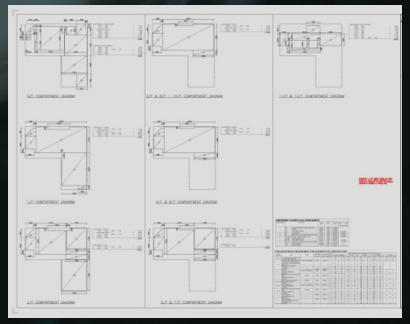


CONSTRUCTION
INFORMATOIN

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

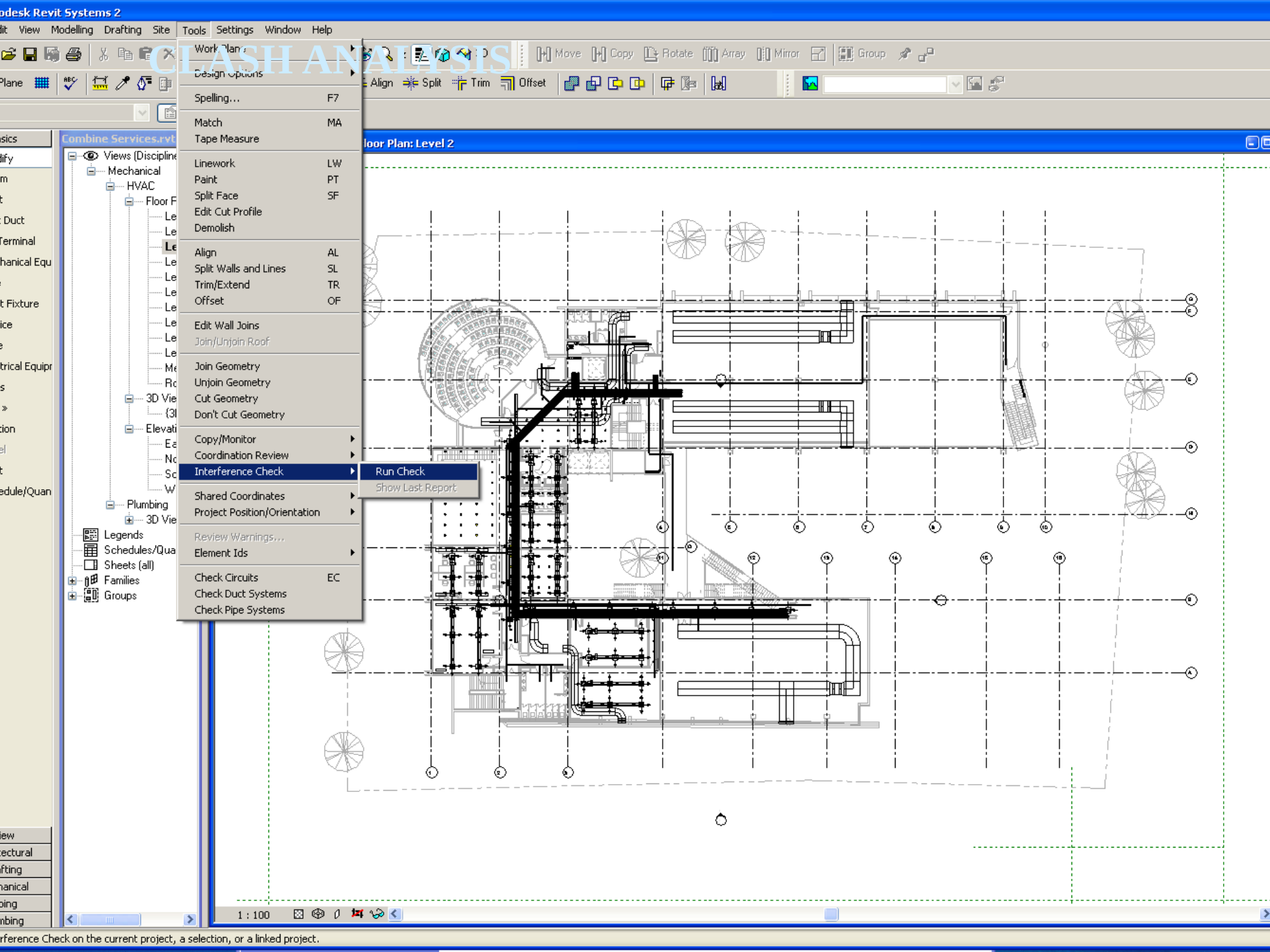
M + I = B

BIM is a process, Business is the objective

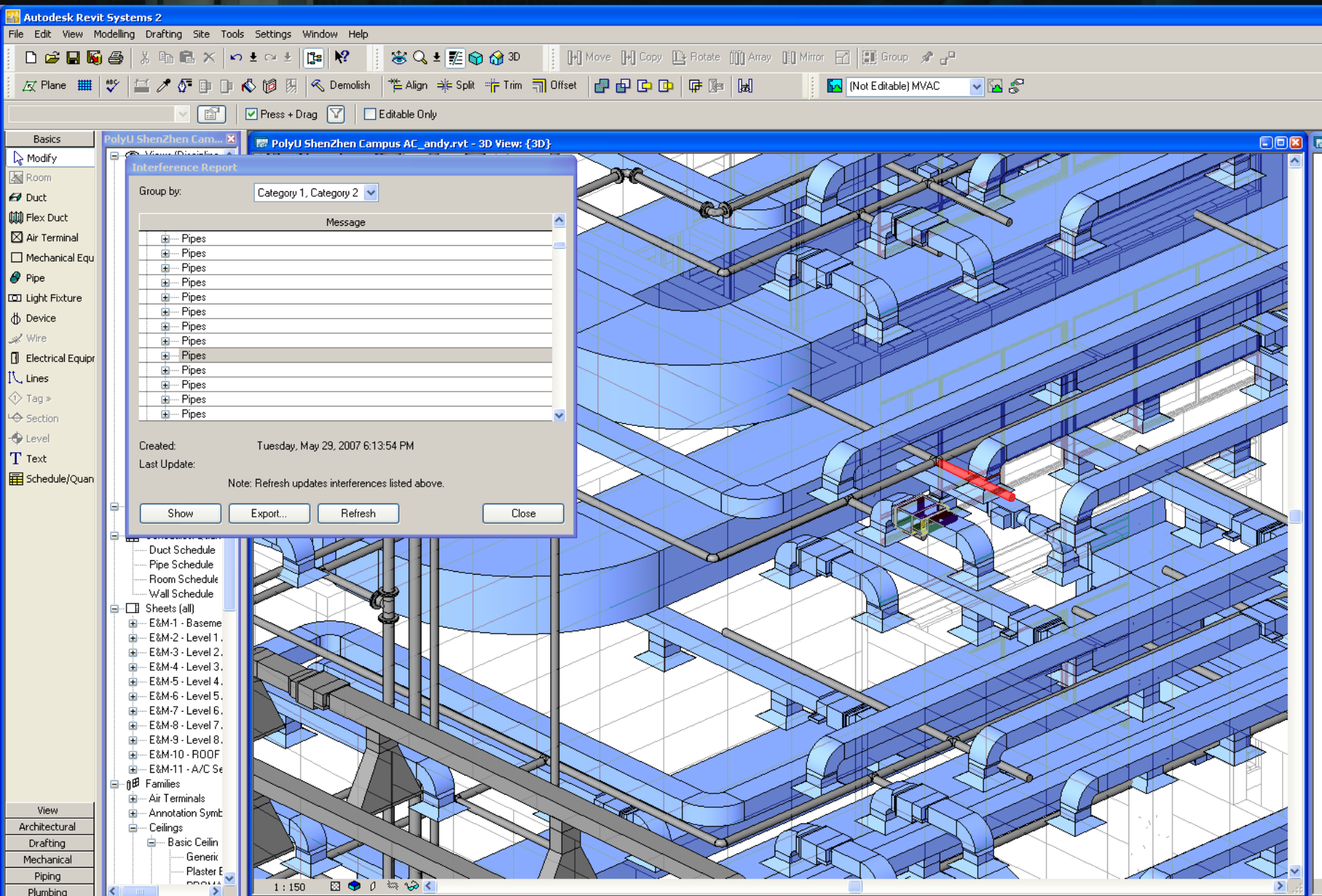
Case 1

Real BIM (Construction)

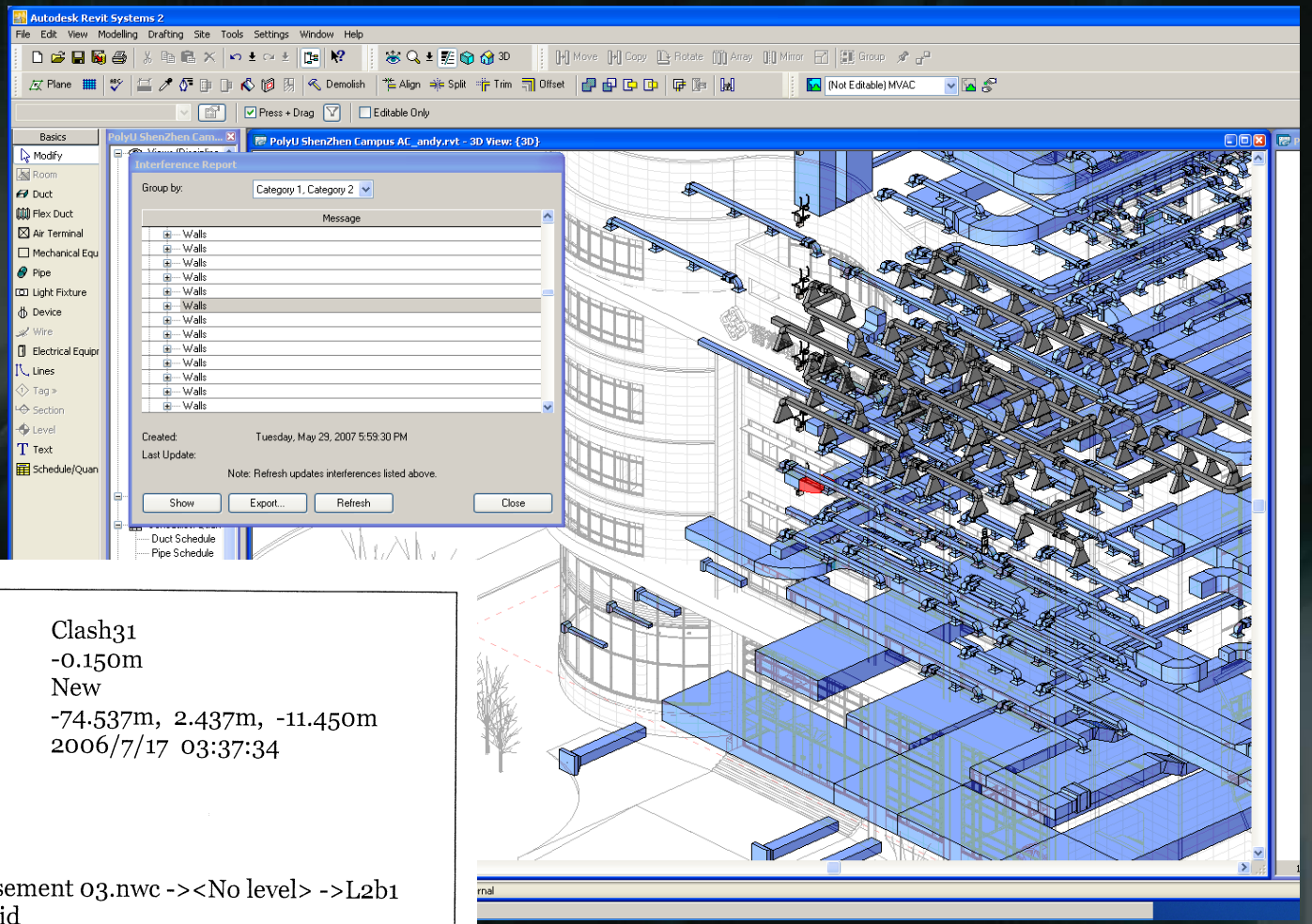
M + I = B (Drawing Prodcution)

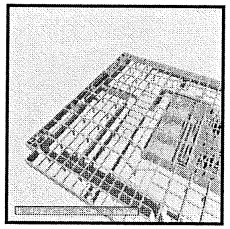

CLASH ANALYSIS
Autodesk Revit Systems 2
File View Modelling Drafting Site Tools Settings Window Help
Work Planes
Design Options
Spelling... F7
Match MA
Tape Measure
Linework LW
Paint PT
Split Face SF
Edit Cut Profile
Demolish
Align AL
Split Walls and Lines SL
Trim/Extend TR
Offset OF
Edit Wall Joins
Join/Unjoin Roof
Join Geometry
Unjoin Geometry
Cut Geometry
Don't Cut Geometry
Copy/Monitor
Coordination Review
Interference Check
Run Check
Show Last Report
Shared Coordinates
Project Position/Orientation
Review Warnings...
Element Ids
Check Circuits EC
Check Duct Systems
Check Pipe Systems
Move Copy Rotate Array Mirror Group
Align Split Trim Offset
Combine Services.rvt
Views (Discipline
Mechanical
HVAC
Plumbing
Legends
Schedules/Qua
Sheets (all)
Families
Groups
Floor Plan: Level 2
1 : 100
Interference Check on the current project, a selection, or a linked project.

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	

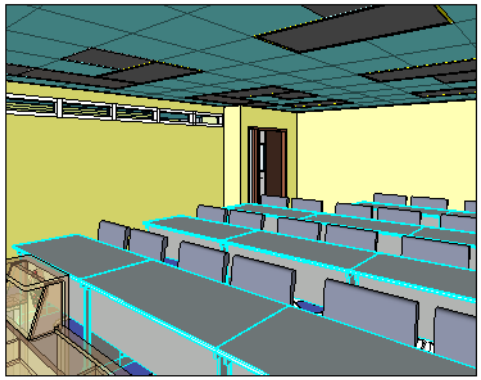
Item 1

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

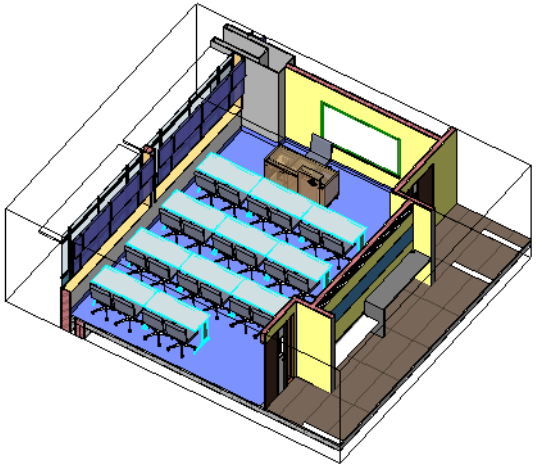
Item 2

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

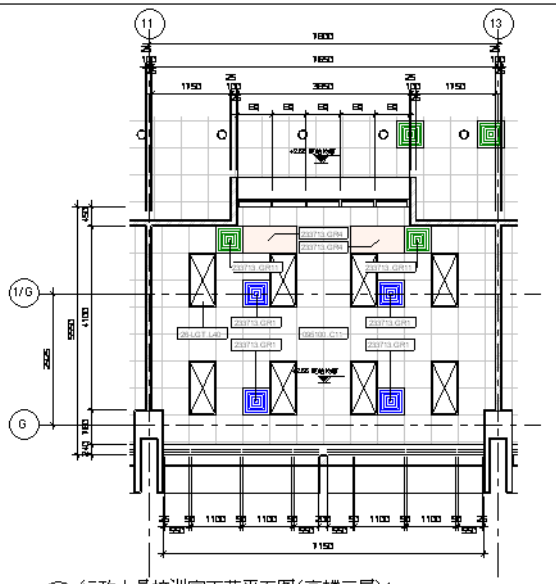
PRODUCTION OF CONSTRUCTION DRAWINGS



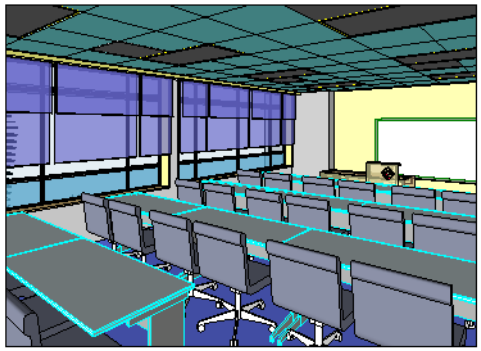
6 行政人员培訓室立体示意图2



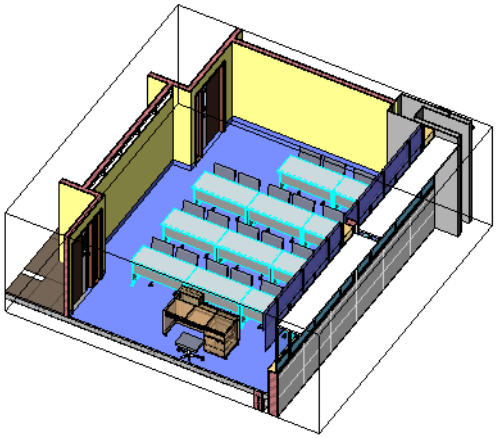
4 行政人员培训室立体剖面示意图2



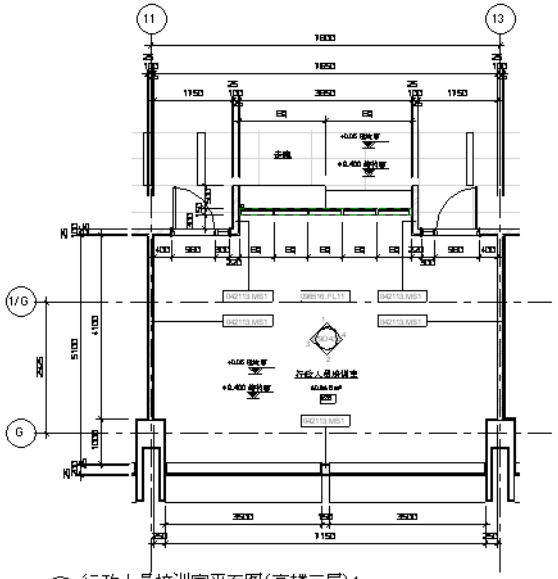
2 行政人员培训室天花平面图(高楼三层)1
1 : 50



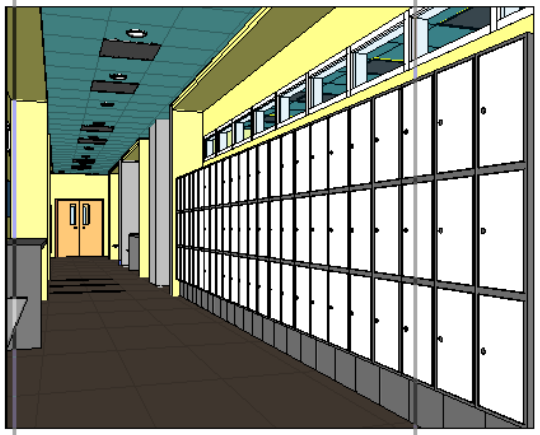
5 行政人员培訓室立体示意图1



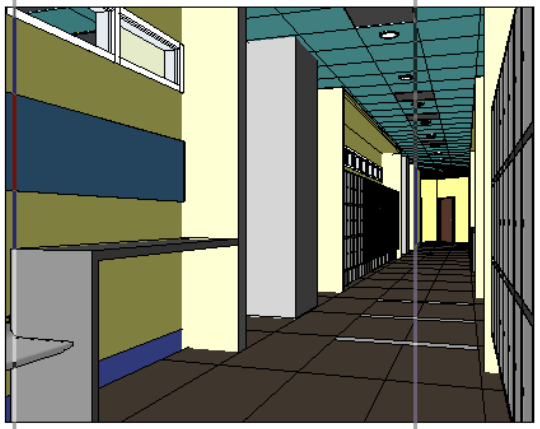
3 行政人员培训室立体剖面示意图1



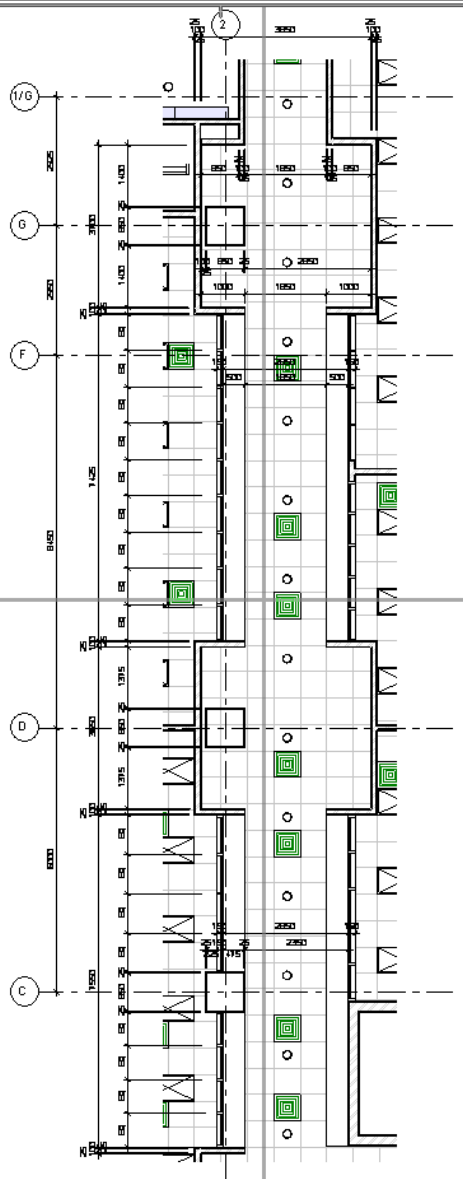
1 行政人员培训室平面图(高楼三层)1
1 : 50



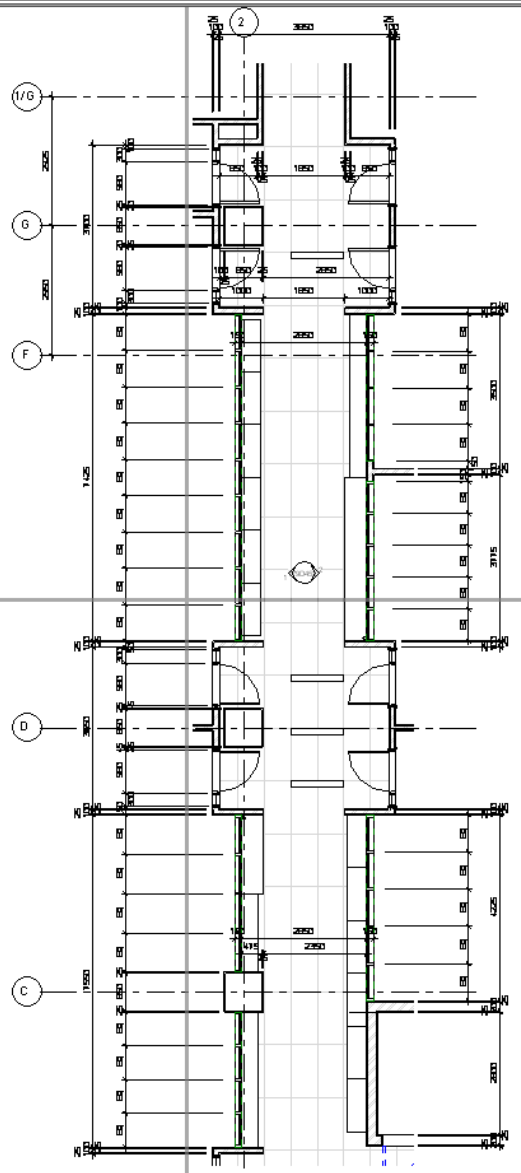
4 走廊立体示意图(低楼三至四层)2



3 走廊立体示意图(低楼三至四层)1



2 走廊天花平面图(低楼三至四层)
1 : 50



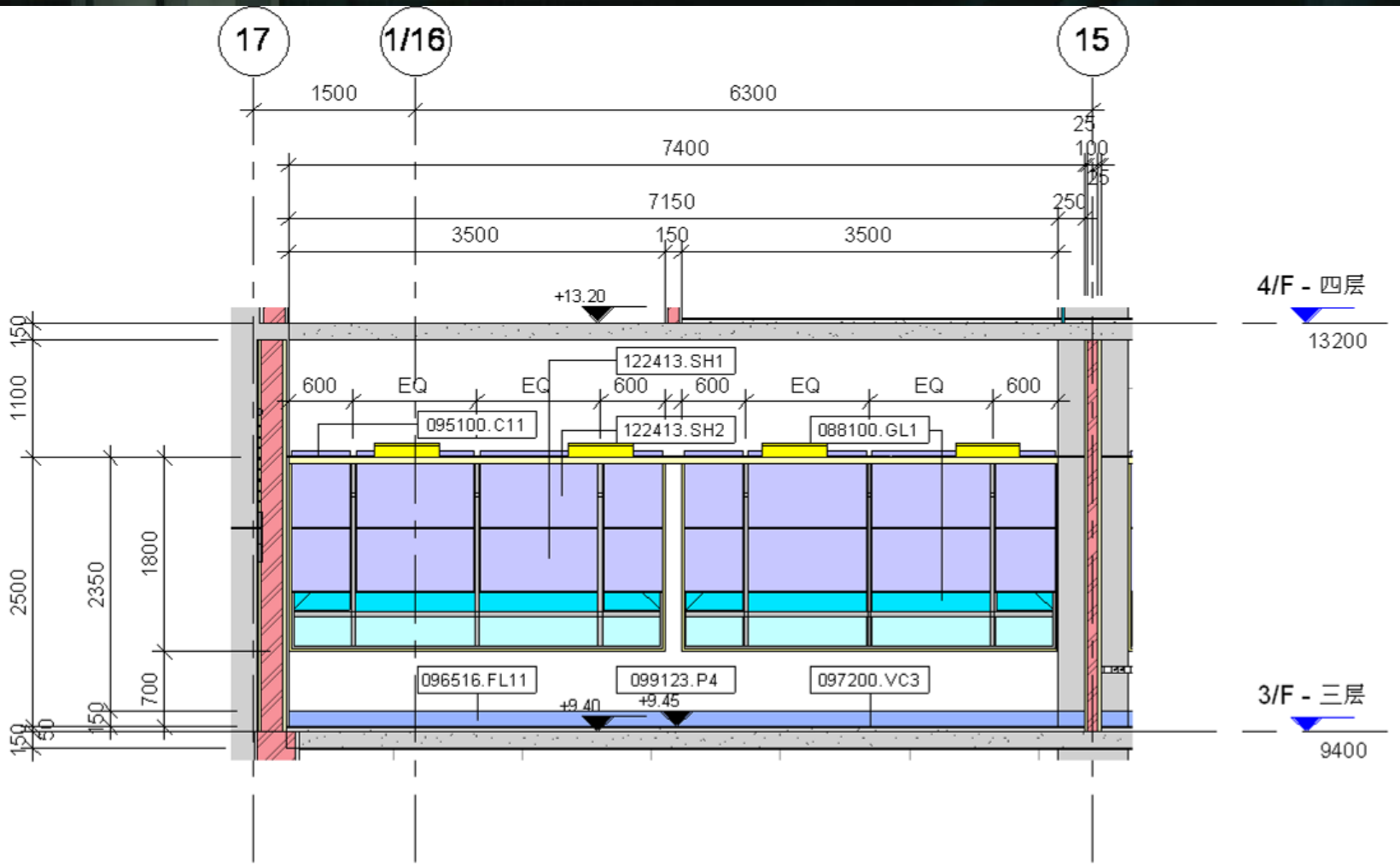
1 走廊平面图(低楼三至四层)
1 : 50

benaim

利比 RLB Rider Levett Bucknall

Aedas

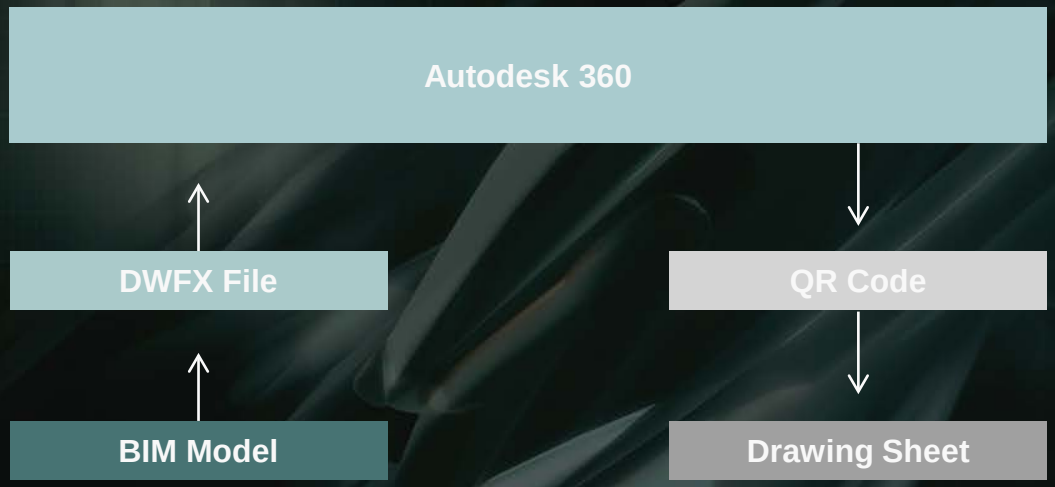
THE HONG KONG POLYTECHNIC UNIVERSITY 香港理工大學



2 行政人员培训室立面图(高楼三层)6

1 : 50

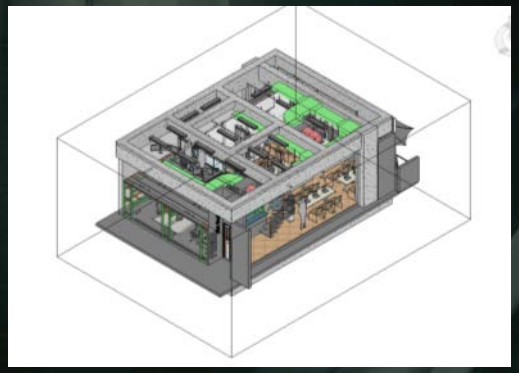
Linkage between Drawing and BIM model

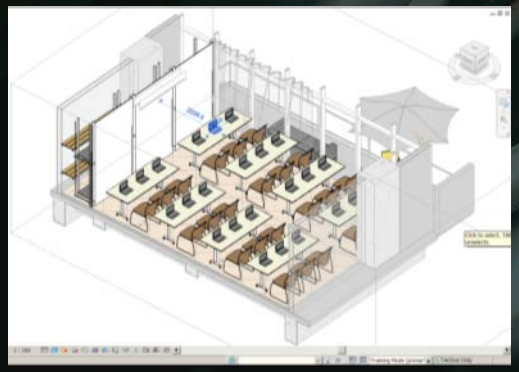


Interoperability between BIM Model and Reality

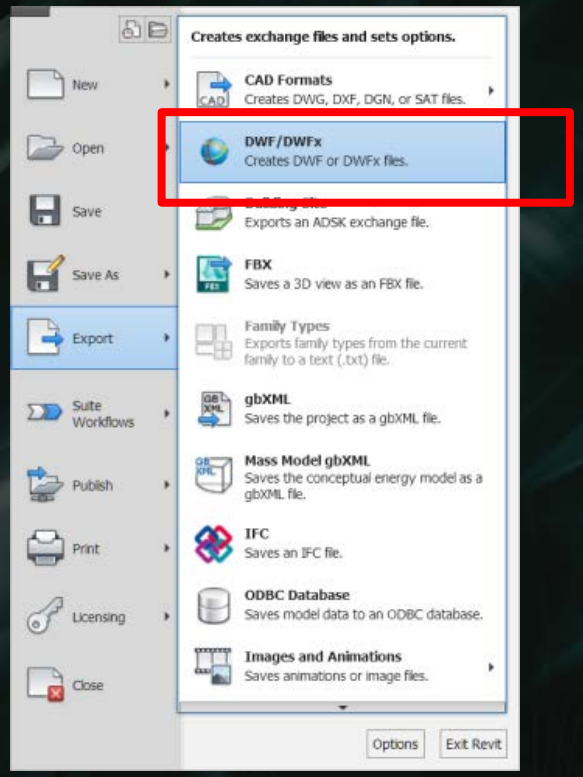
1.0 Linkage between drawing and BIM model

1.2 Prepare the BIM Model



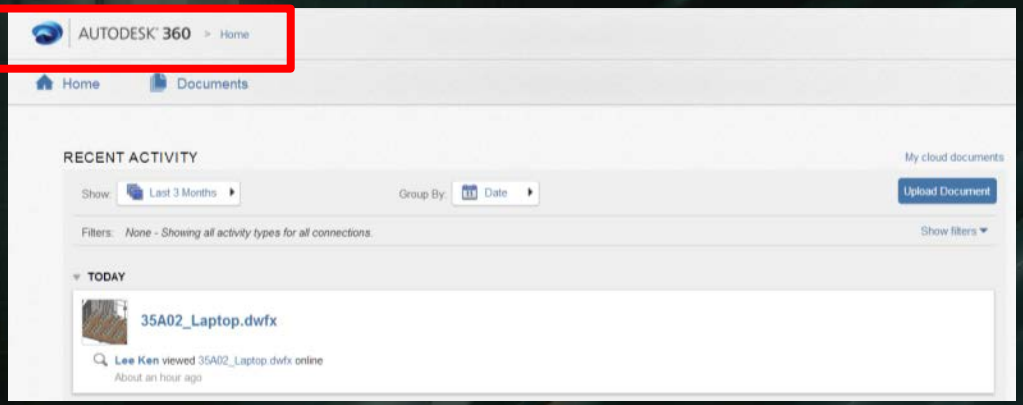


1.3 Export to DWFX format

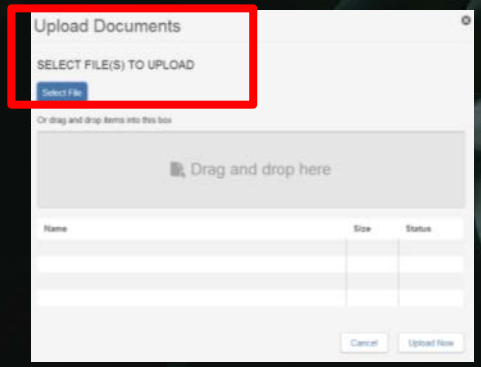


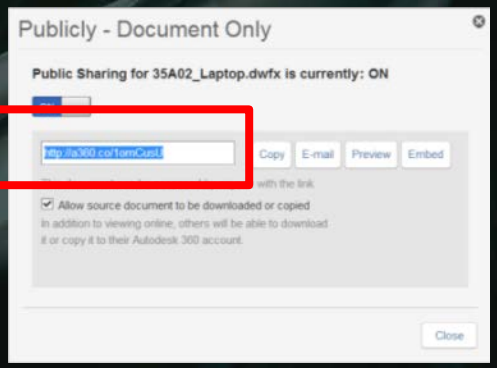
1.0 Linkage between drawing and BIM model

1.4 Access to Autodesk 360



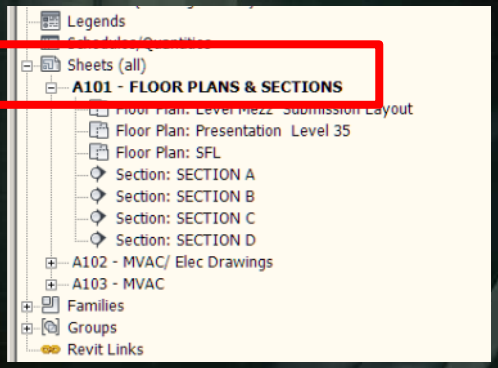
1.5 Upload and share the DWFX file

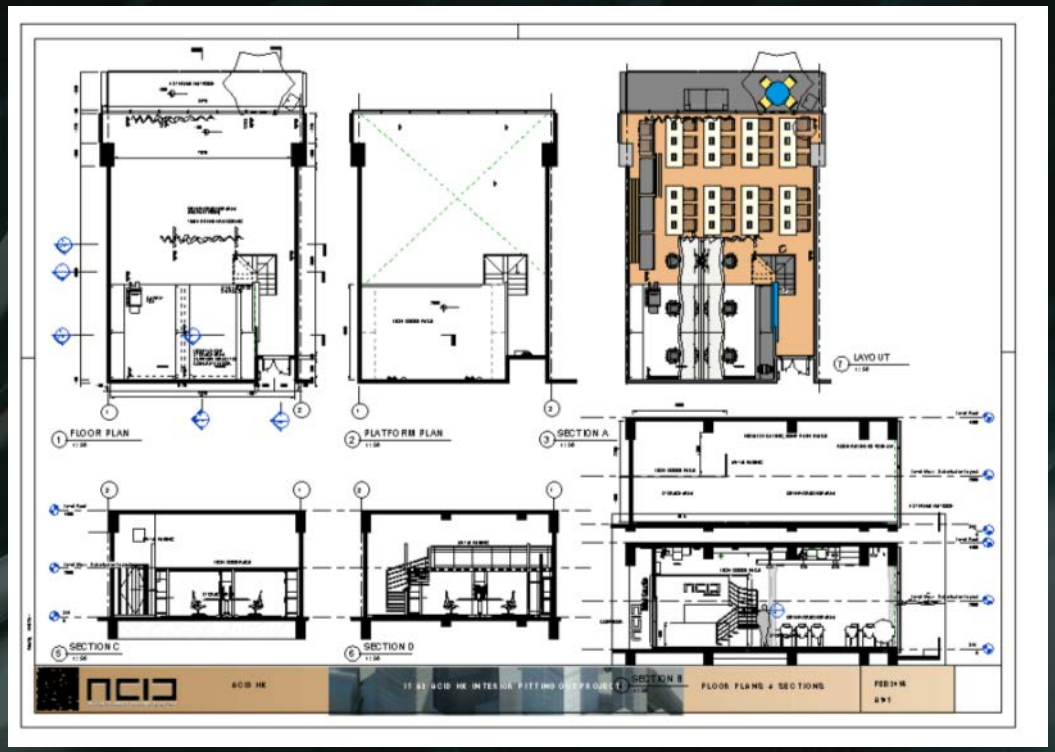




1.0 Linkage between drawing and BIM model

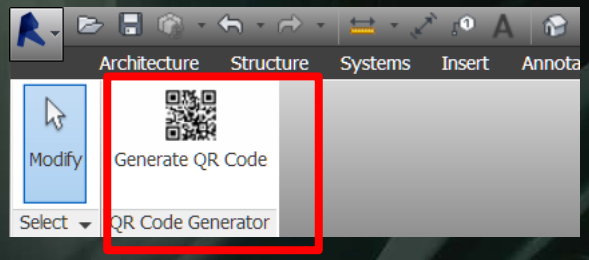
1.6 Prepare the drawing sheet from BIM model

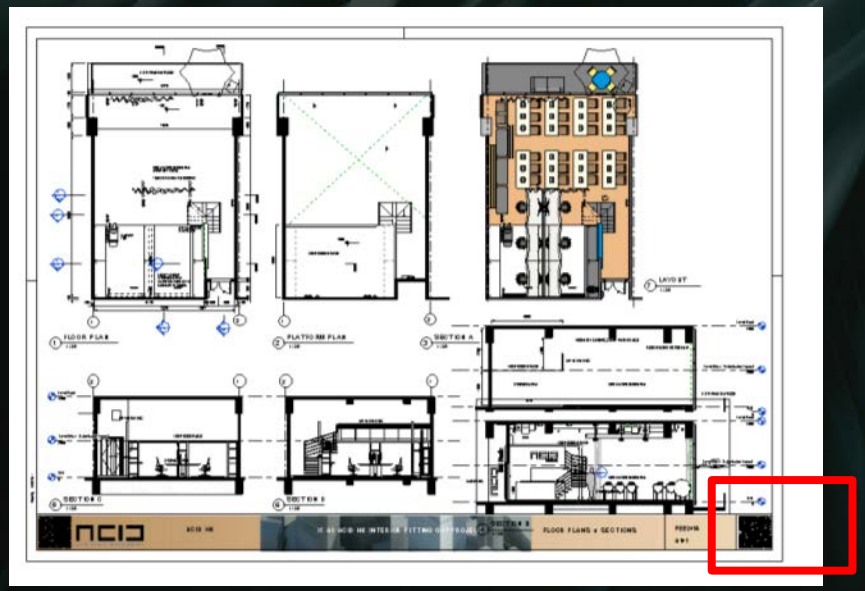


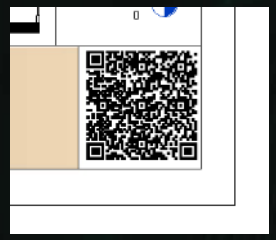


1.0 Linkage between drawing and BIM model

1.7 Generate and add QR Code on the drawing







1.0 Linkage between drawing and BIM model

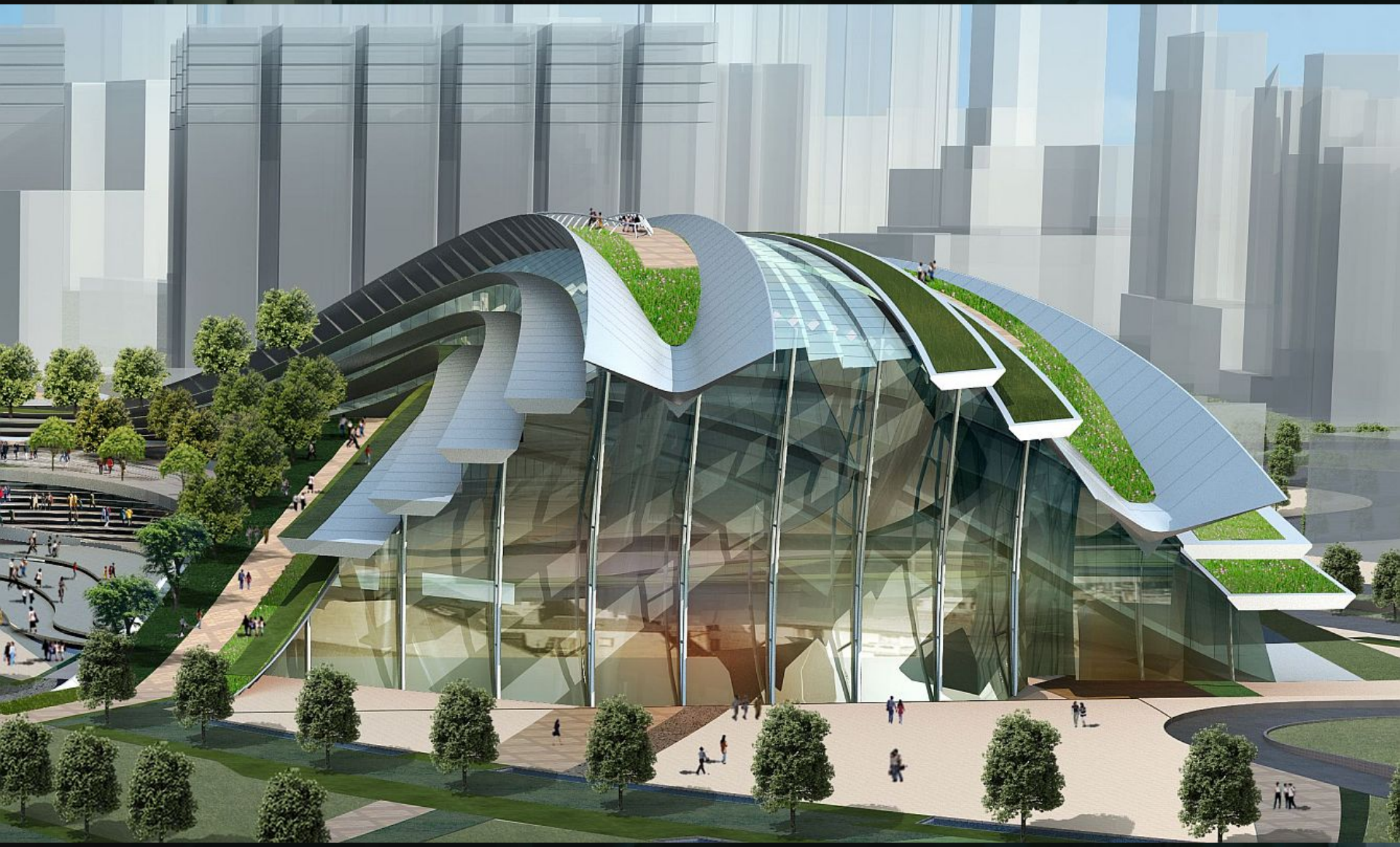
1.8 Access to BIM model through mobile device (Video)

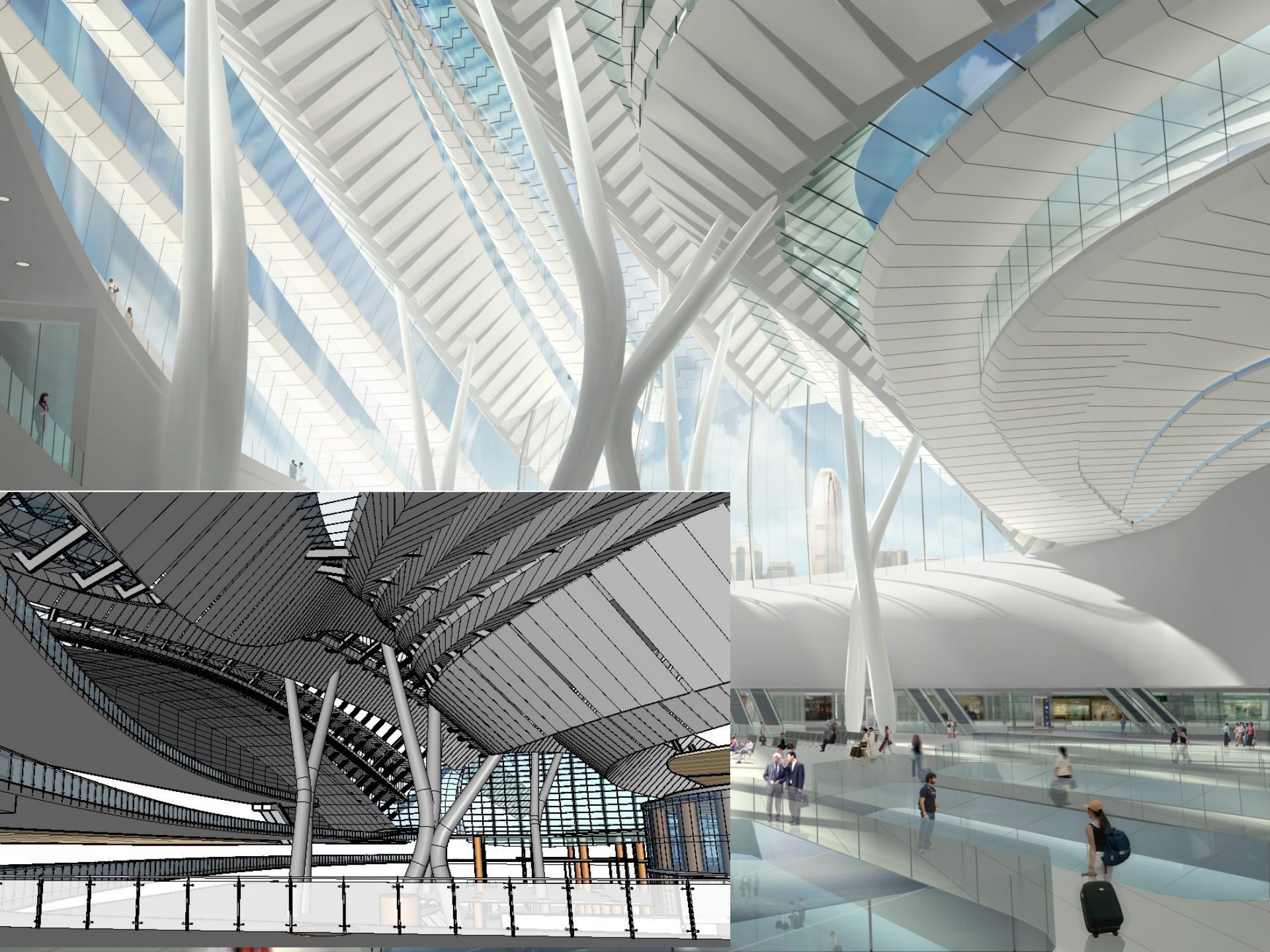
Interoperability between BIM Model and Reality

Case 2

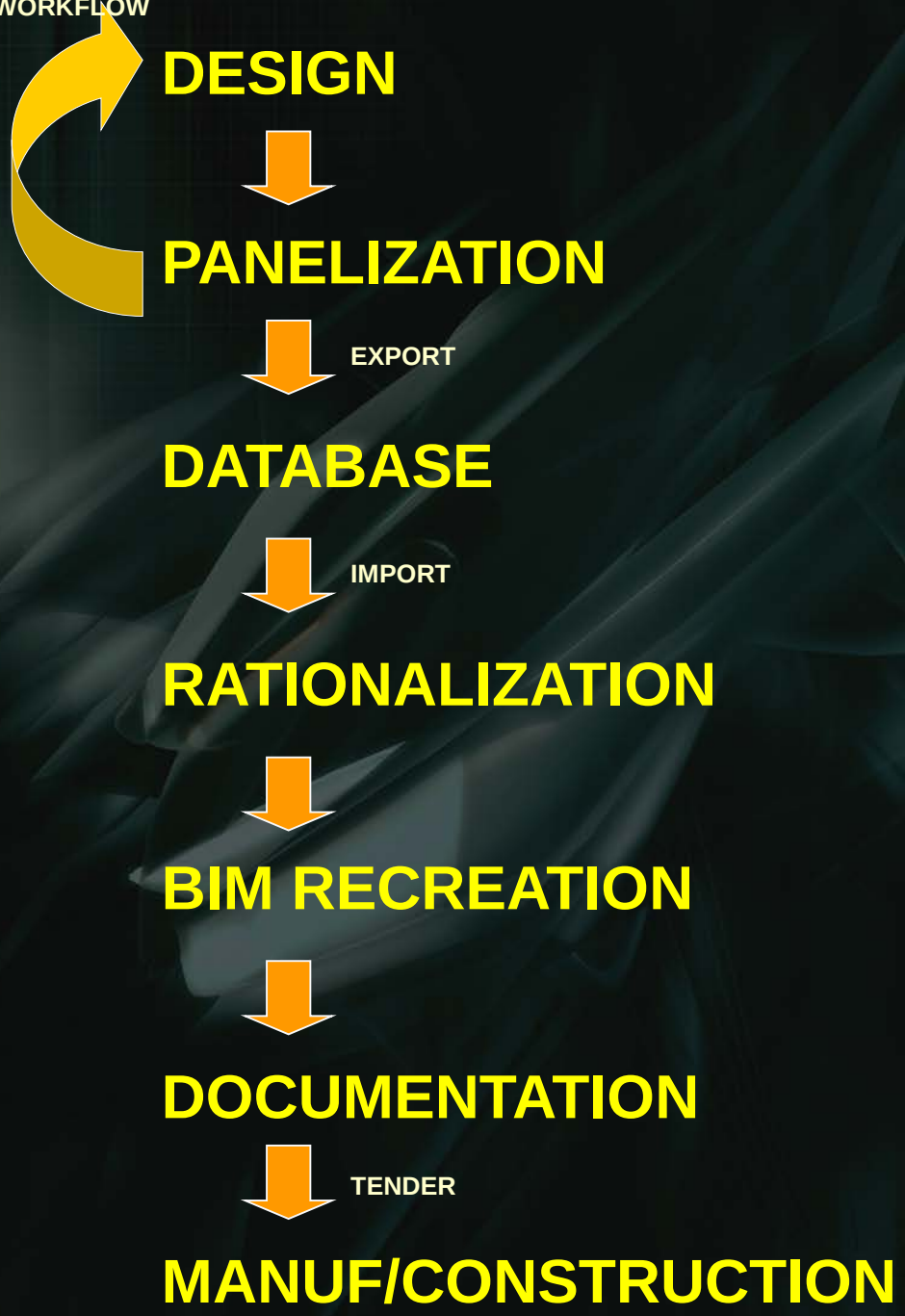
Real BIM (Construction)

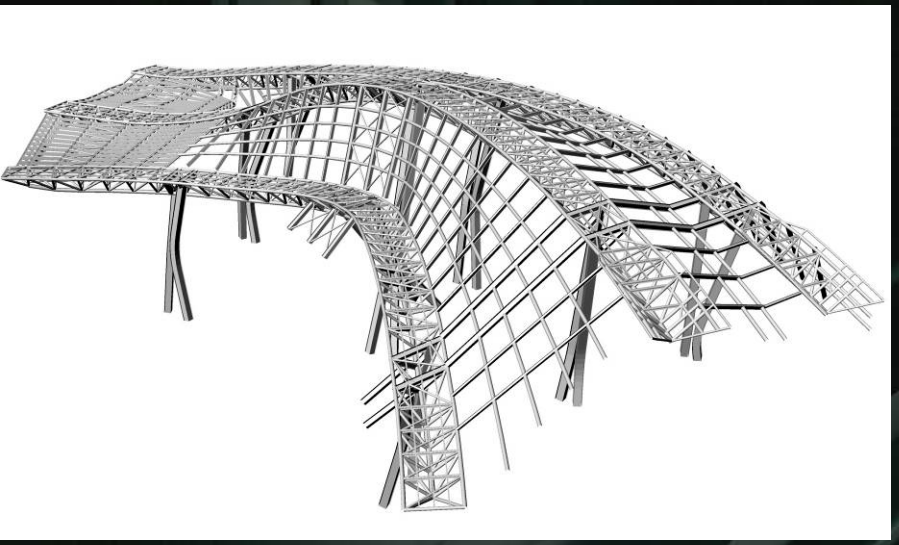
M + I = B (Fabrication)

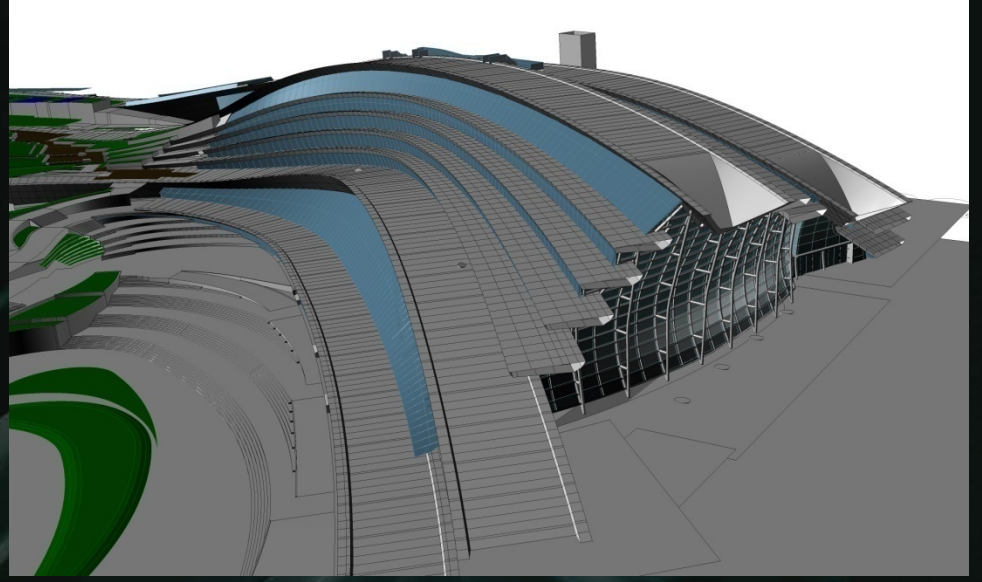


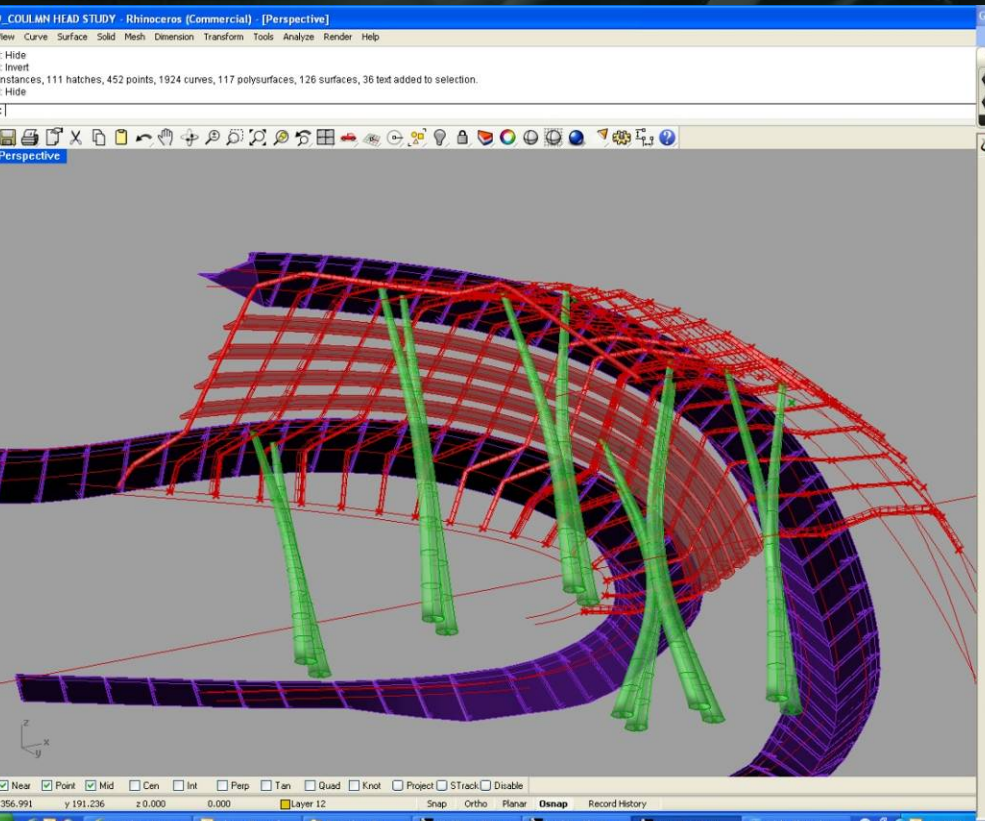


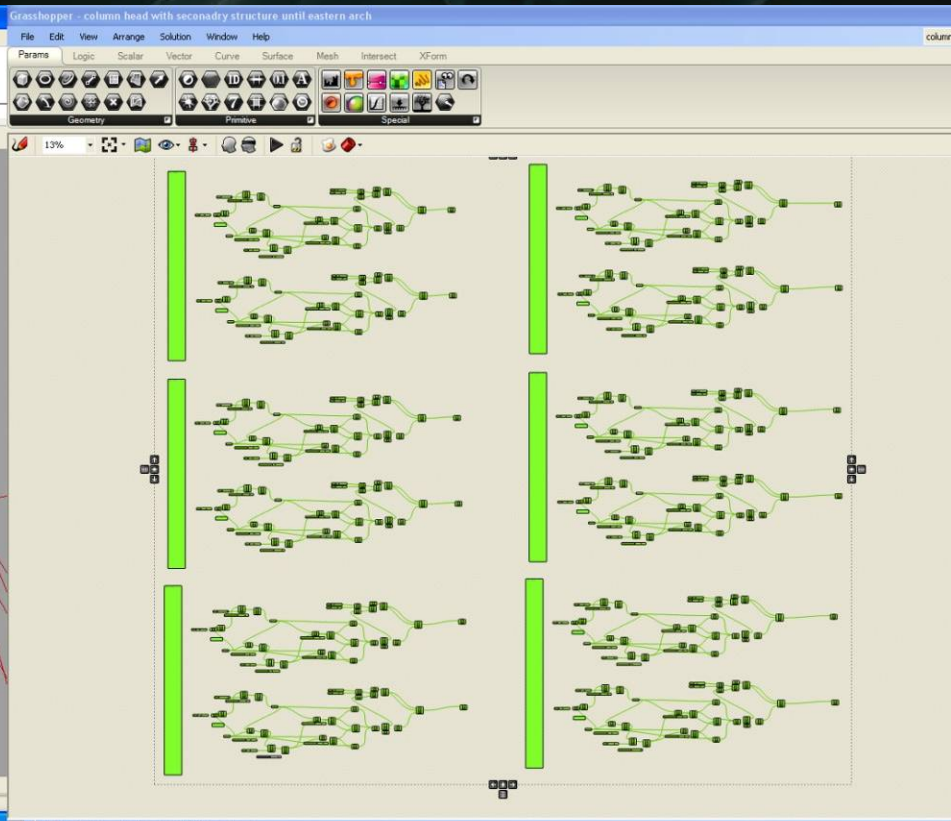
WKT DESIGN/ DOCUMENTATION WORKFLOW

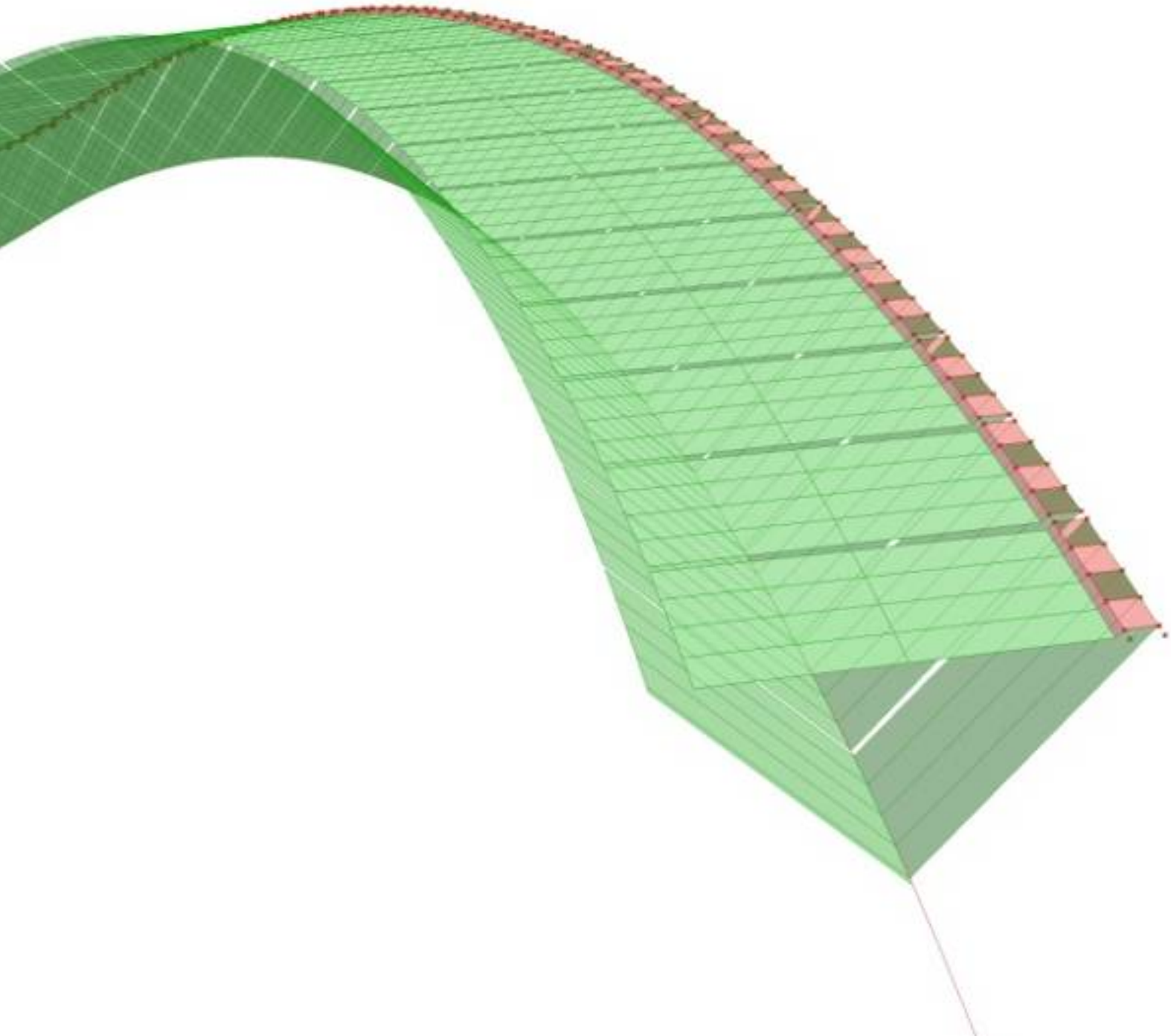


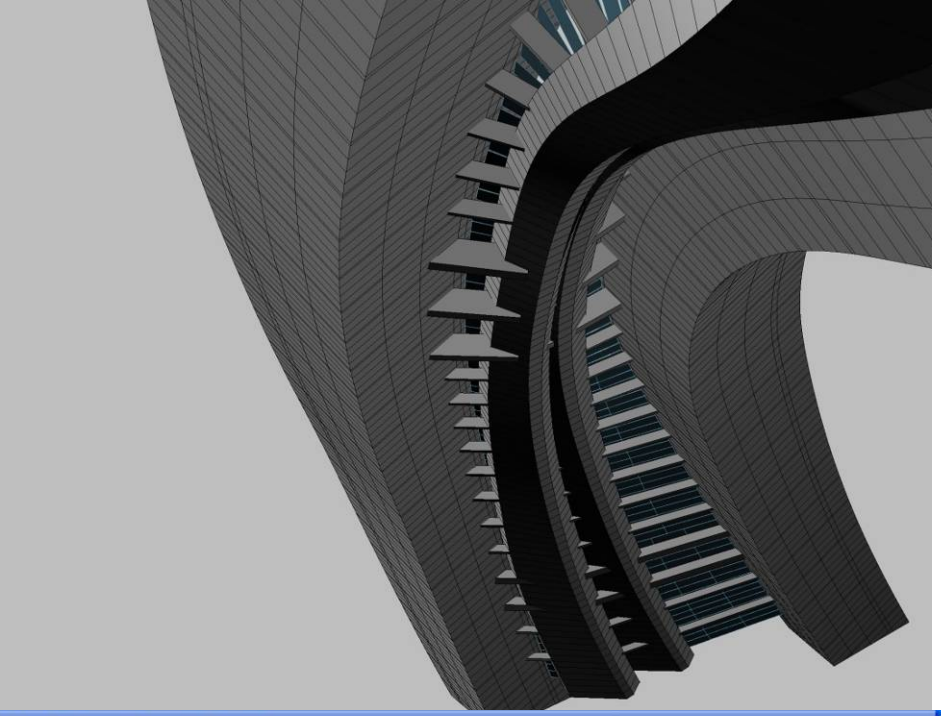


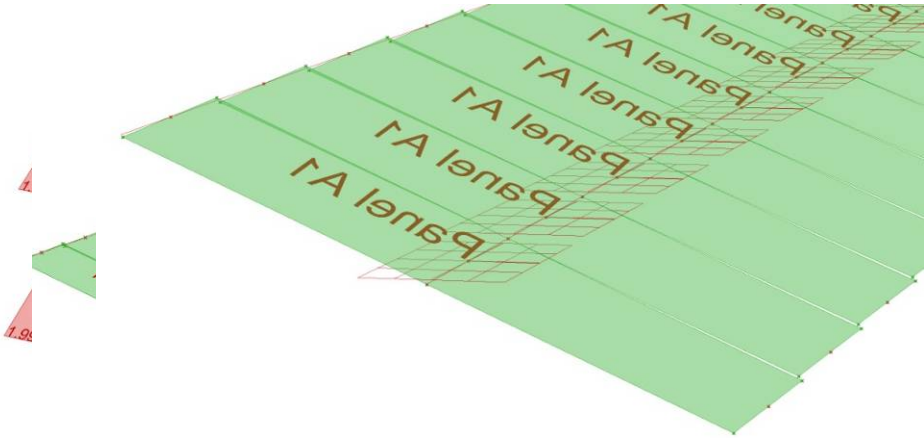



_COULMN HEAD STUDY - Rhinoceros (Commercial) - [Perspective]
iew Curve Surface Solid Mesh Dimension Transform Tools Analyze Render Help
: Hide
: Invert
nstances, 111 hatches, 452 points, 1924 curves, 117 polysurfaces, 126 surfaces, 36 text added to selection.
: Hide
Perspective
Near Point Mid Cen Int 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 secondry structure until eastern arch
File Edit View Arrange Solution Window Help
Params Logic Scalar Vector Curve Surface Mesh Intersect XForm
Geometry Primitive Special
13%



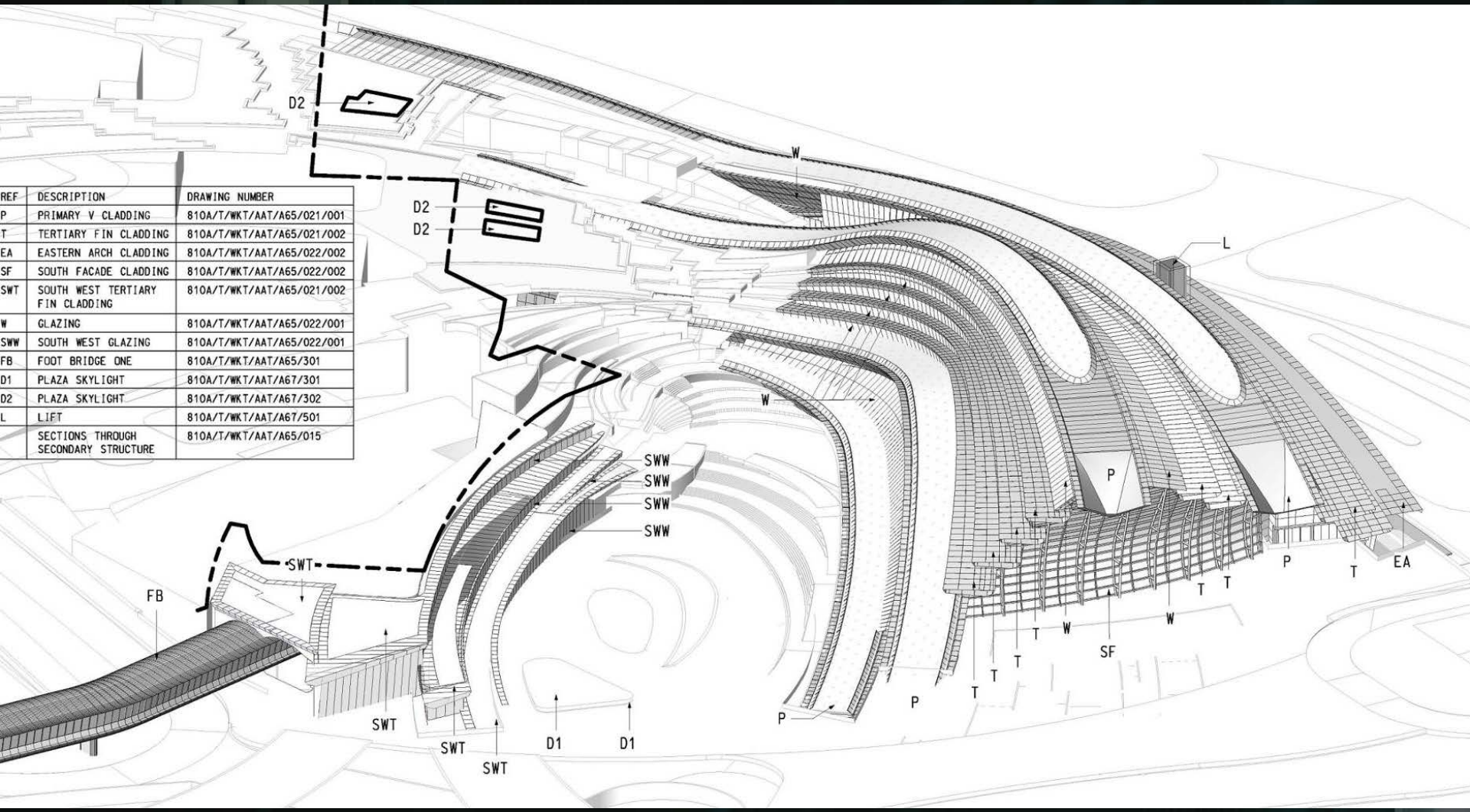




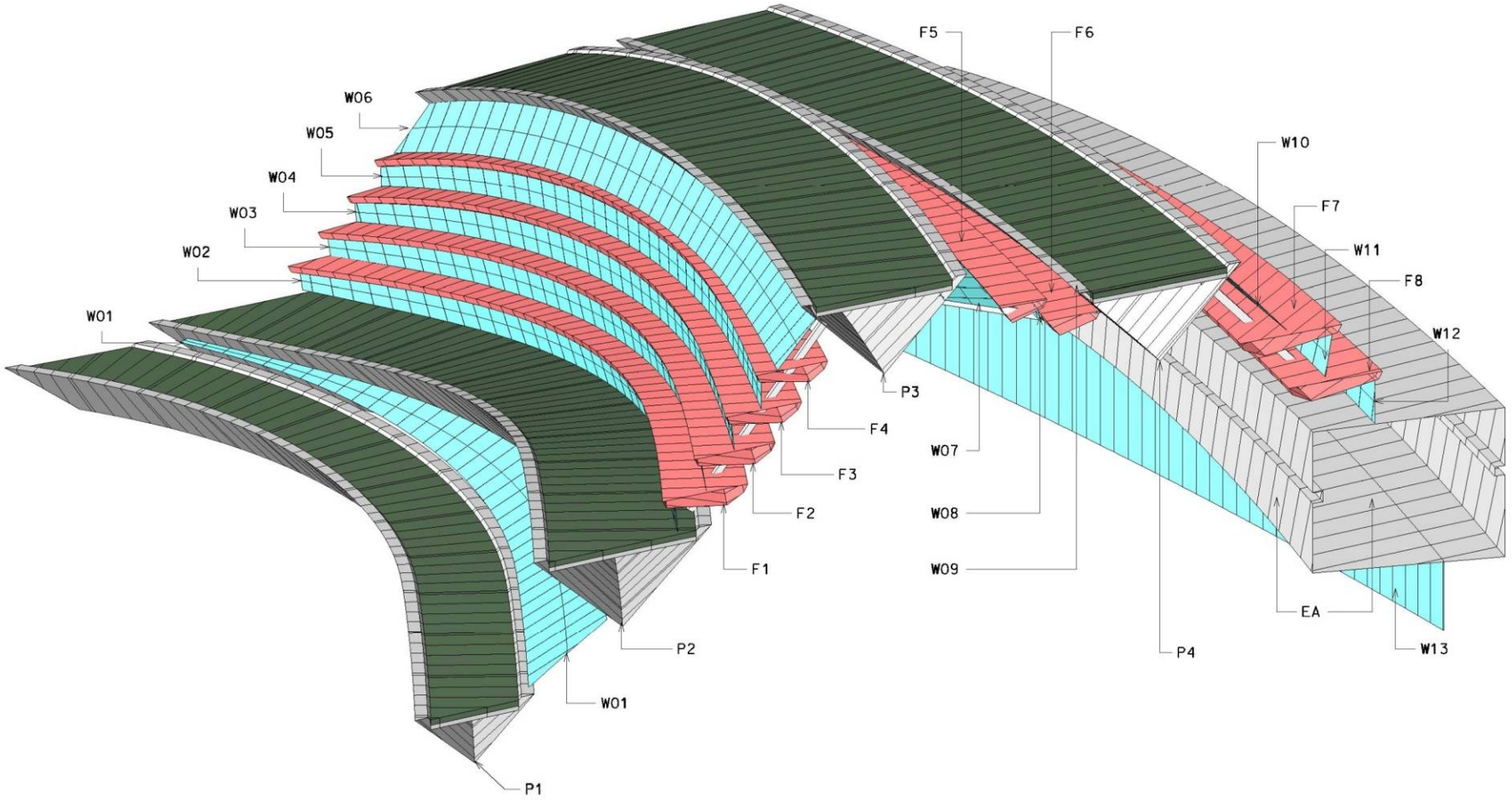
216_west fins - Rhinoceros (Commercial) - [Perspective]
View Curve Surface Solid Mesh Dimension Transform Tools Analyze Render Help
5 polysurfaces, 8 surfaces added to selection.
d: Hide
d: _Undo
Hide
d:
Perspective
Near Point Mid Cen Int Perp Tan Quad Knot Project STrack Disable

Grasshopper - panelization of fins
File Edit View Arrange Solution Window Help
panelization of fins
Params Logic Scalar Vector Curve Surface Mesh Intersect XForm
Geometry Primitive Special
64%

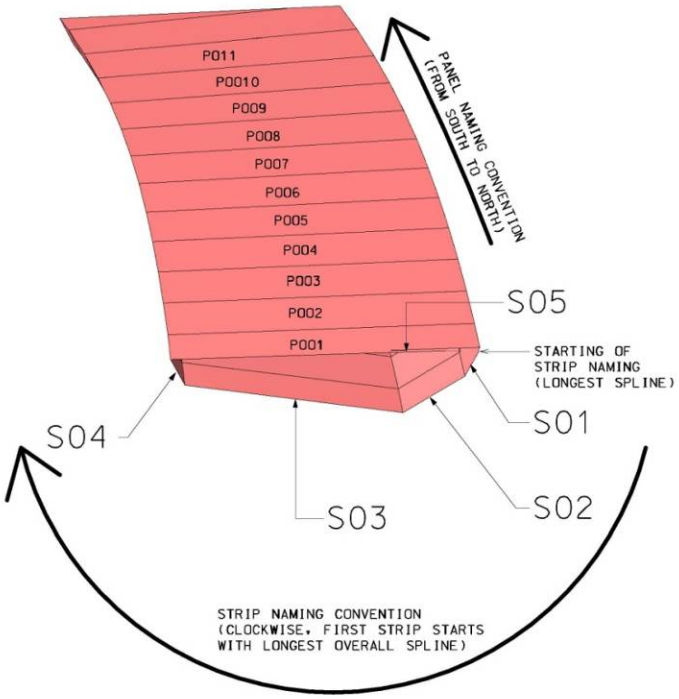
12000
12000
12000
12000
235

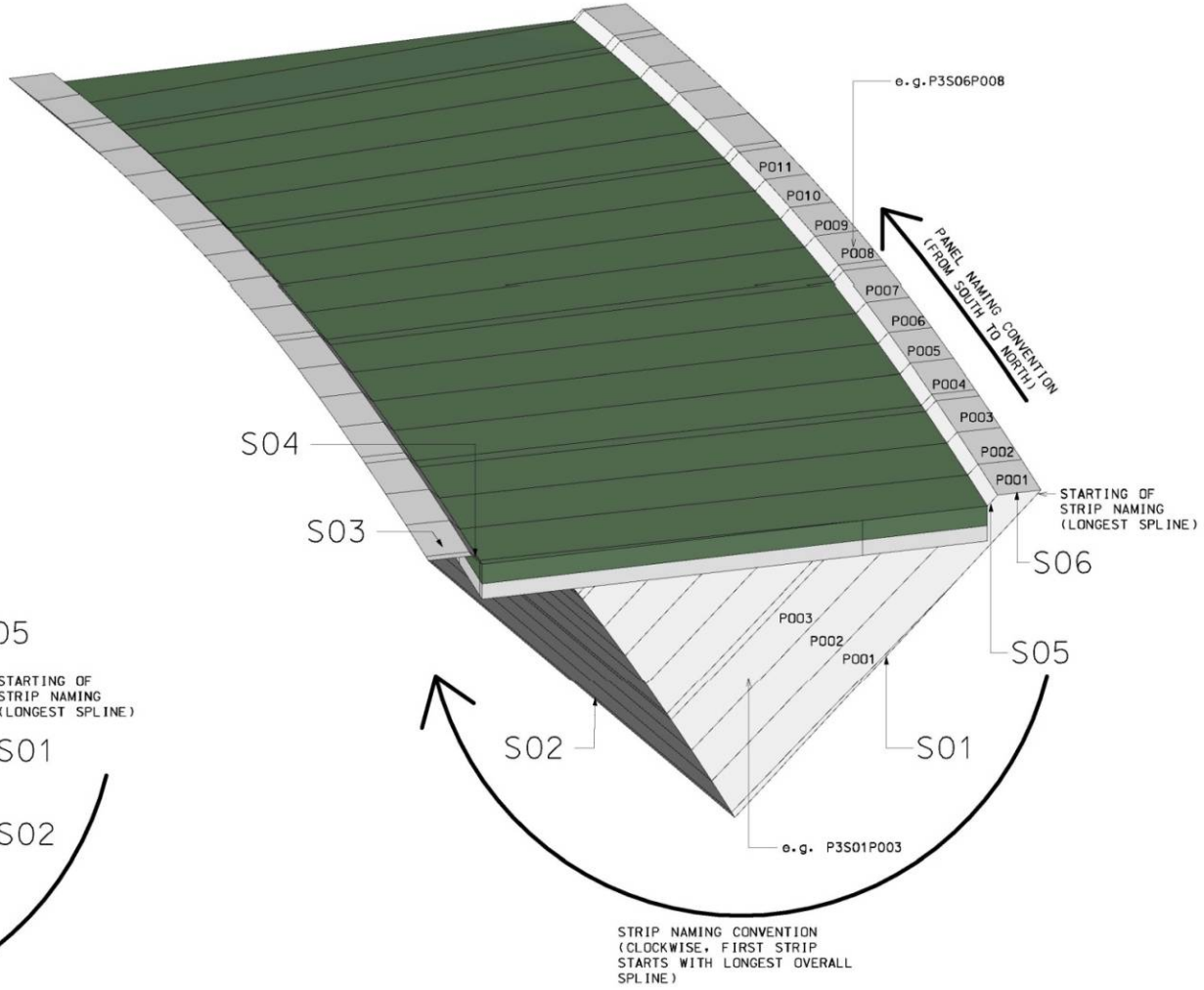


REF	DESCRIPTION	DRAWING NUMBER
P	PRIMARY V CLADDING	810A/T/WKT/AAT/A65/021/001
T	TERTIARY FIN CLADDING	810A/T/WKT/AAT/A65/021/002
EA	EASTERN ARCH CLADDING	810A/T/WKT/AAT/A65/022/002
SF	SOUTH FACADE CLADDING	810A/T/WKT/AAT/A65/022/002
SWT	SOUTH WEST TERTIARY FIN CLADDING	810A/T/WKT/AAT/A65/021/002
W	GLAZING	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


F5
F6
W06
W05
W04
W03
W02
W01
W10
F7
W11
F8
W12
P3
F4
F3
F2
F1
W07
W08
W09
P2
W01
P1
P4
EA
W13

CONTEXT





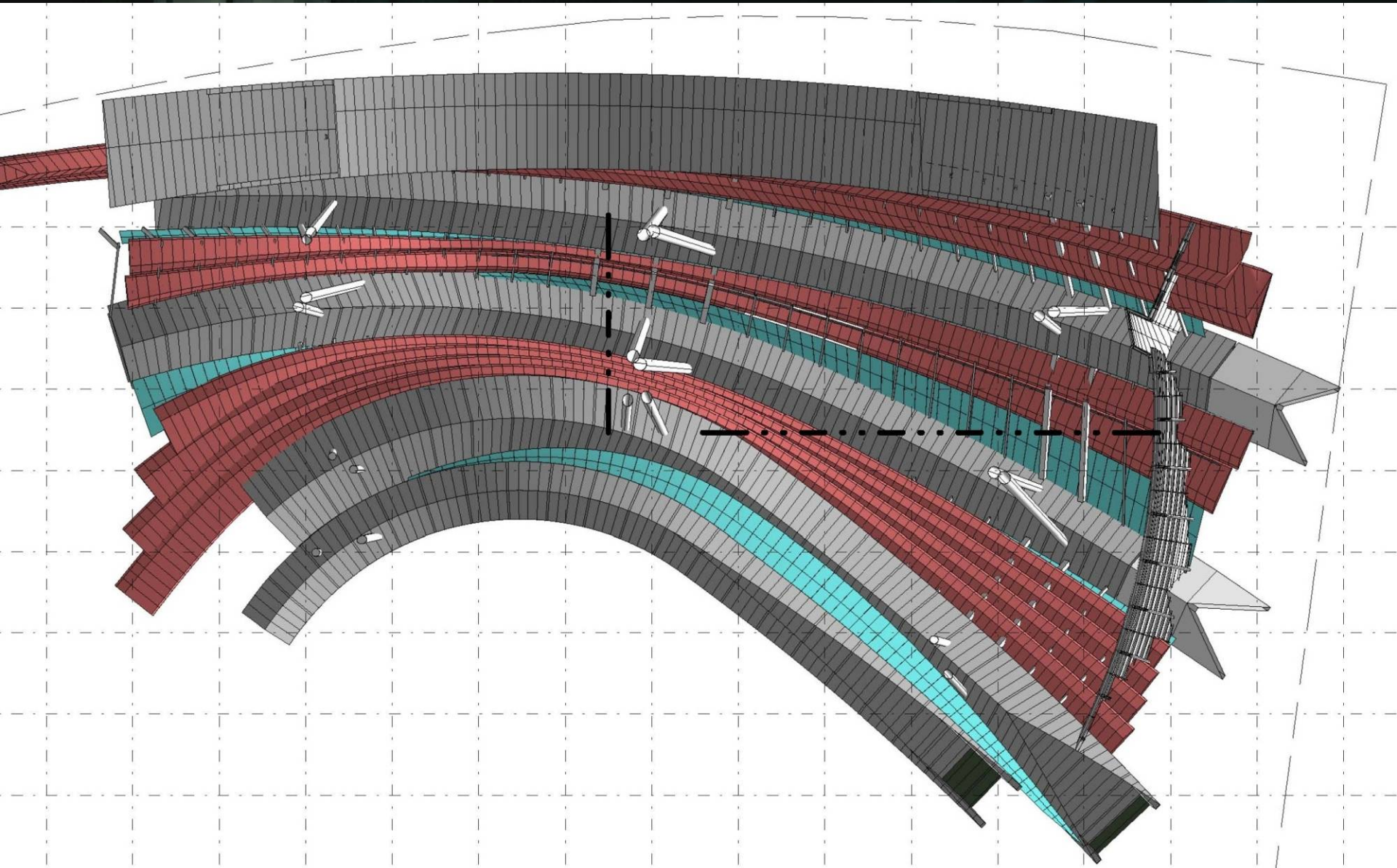
2 Nomenclature - Fin Cladding
e.g. F1

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

1 Nomenclature - V Cladding
e.g. P3

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

N



Microsoft Excel - 20100127_V3_S6.xls

EN English (United States)

File Edit View Insert Format Tools Data Window Help

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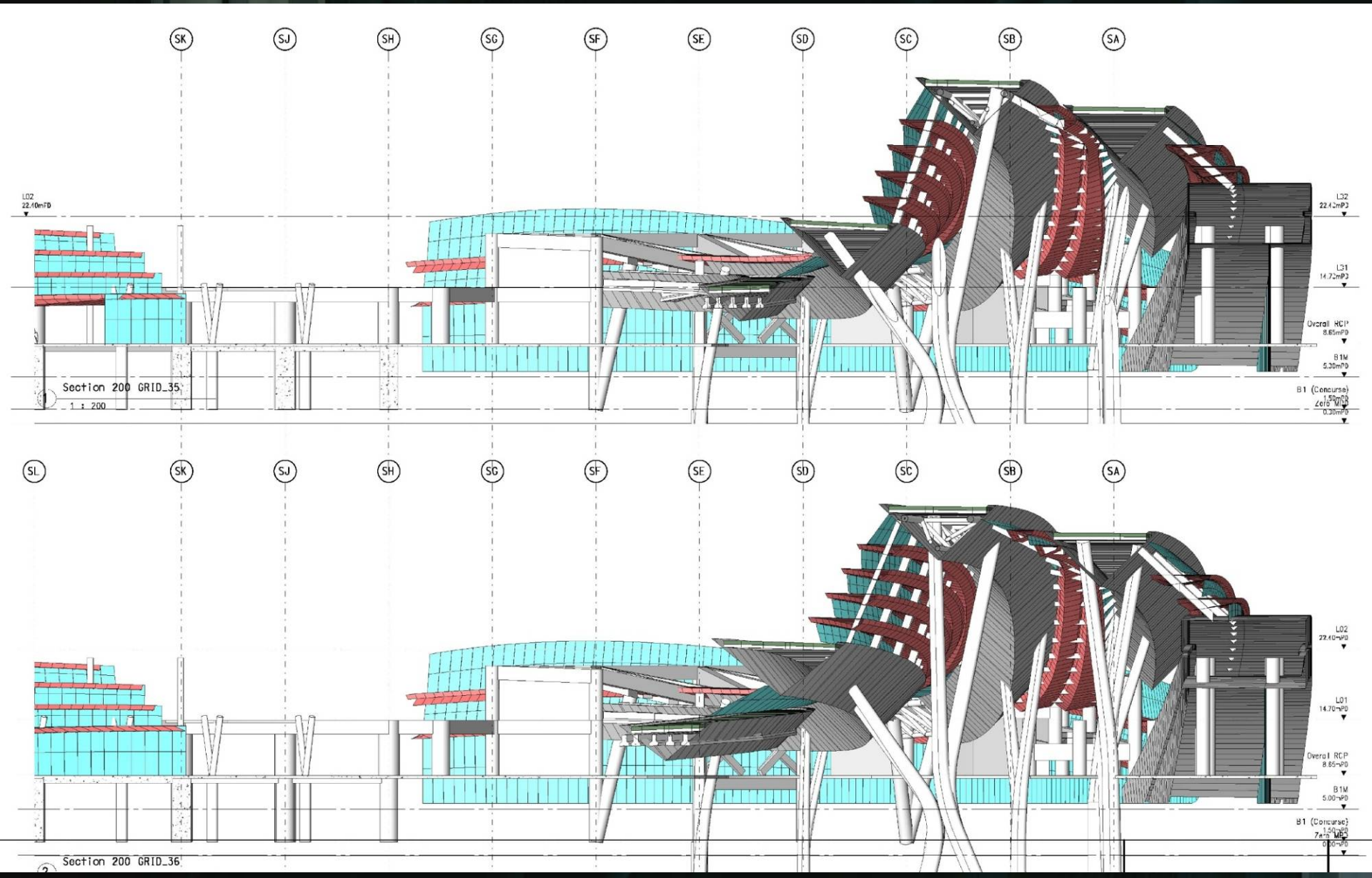
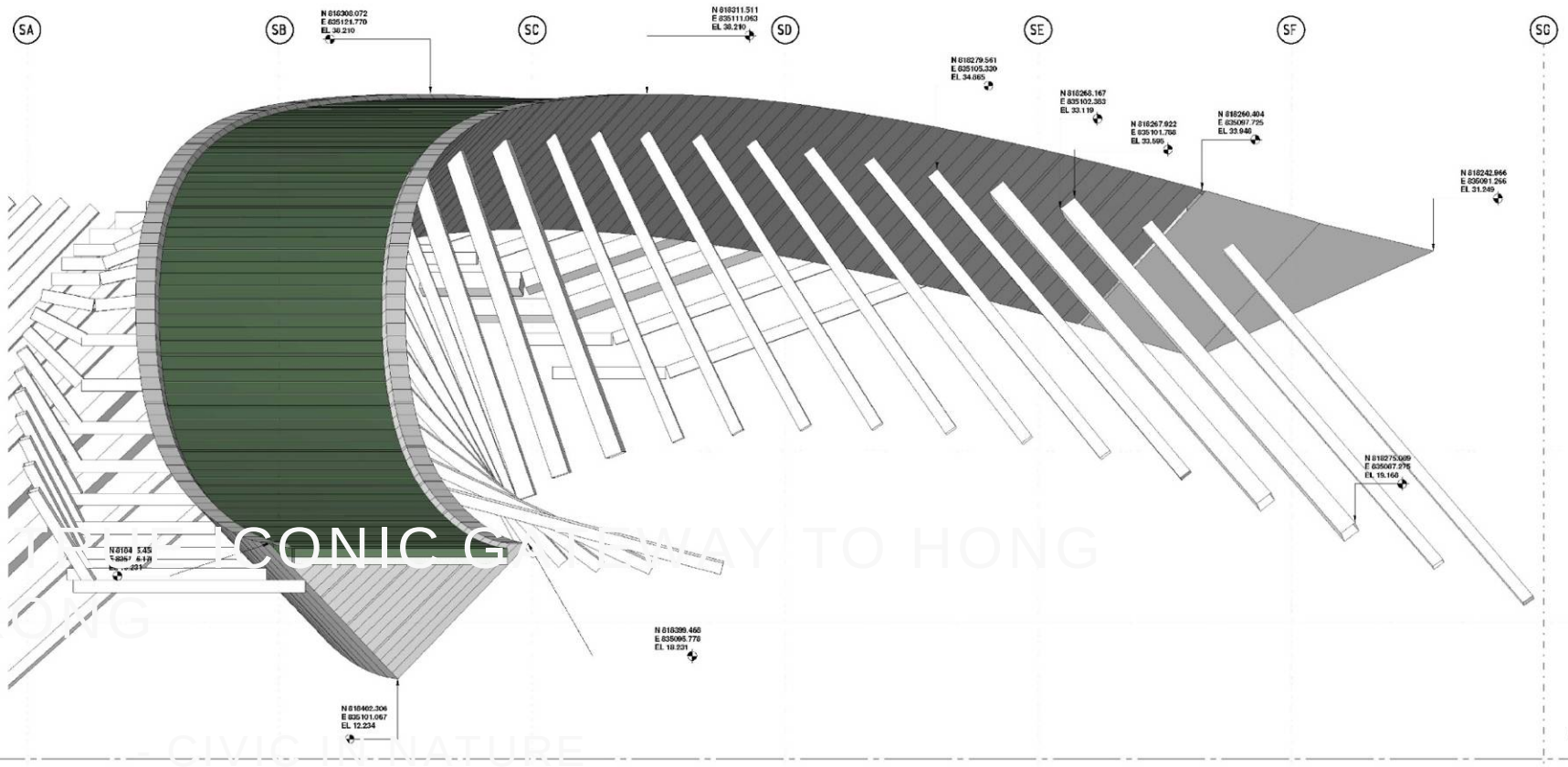
R30

	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##ot
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 cl = new CladdingPanel(p, PanelCounter); // new panel created from list of points.
    double Area_m2 = cl.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(cl); // new panel inserted into the array of panels

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

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

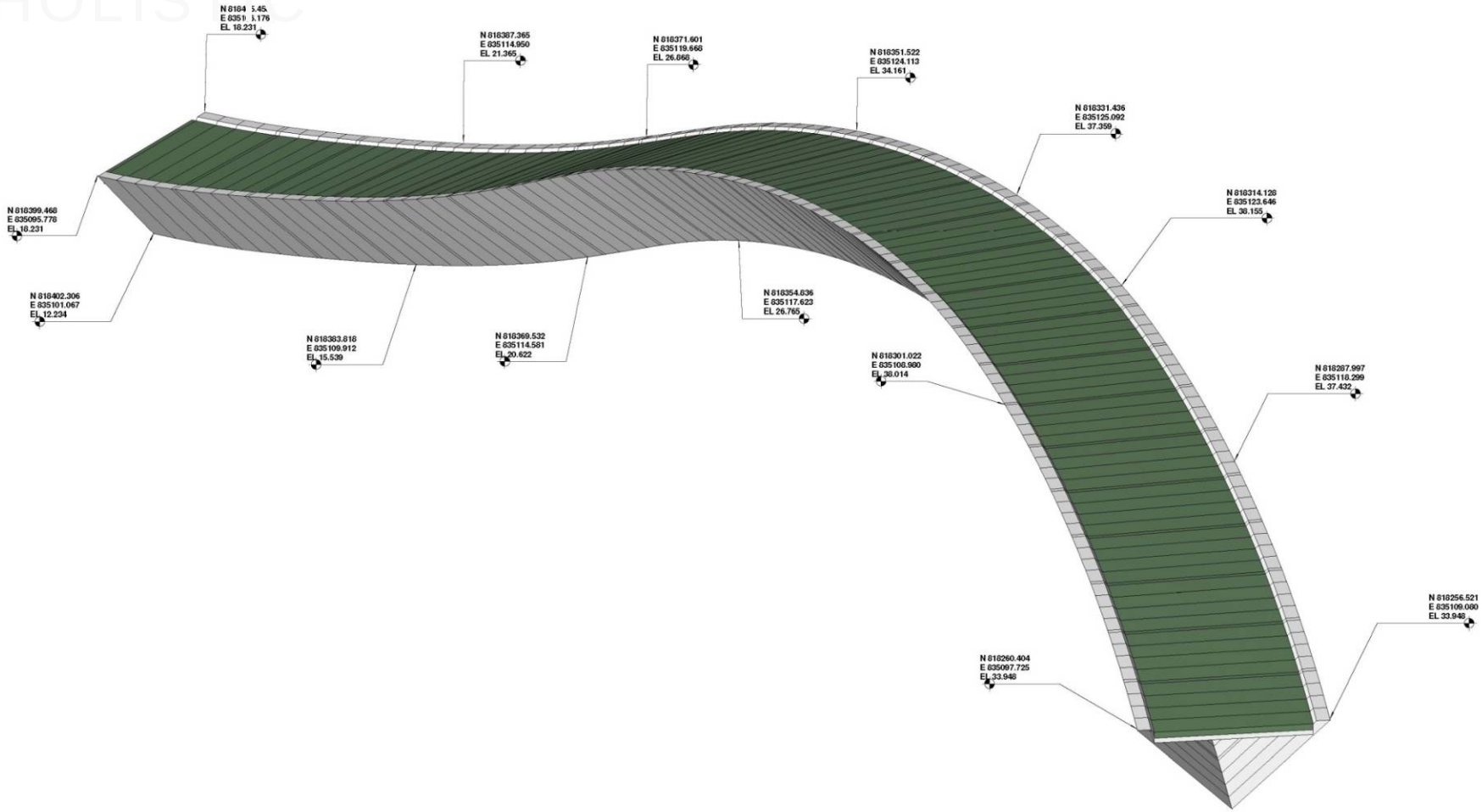
```
        public bool CanBeGroupedWith(CladdingPanel nextPanel, double tolerance)
        {
            if
            (
                Math.Abs(nextPanel.G_edge[0] - G_edge[0]) <= tolerance
                &&
                Math.Abs(nextPanel.G_edge[1] - G_edge[1]) <= tolerance
                &&
                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 groupped panel;
    }

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

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


SK
SJ
SH
SG
SF
SE
SD
SC
SB
SA
L02
22.40mFD
L32
22.40mFD
L31
14.70mFD
Overall RCP
8.65mFD
B1M
5.00mFD
B1 (Concourse)
1.50mFD
Zero MFD
0.00mFD
Section 200 GRID_35
1 : 200
SL
SK
SJ
SH
SG
SF
SE
SD
SC
SB
SA
L02
22.40mFD
L01
14.70mFD
Overall RCP
8.65mFD
B1M
5.00mFD
B1 (Concourse)
Section 200 GRID_36



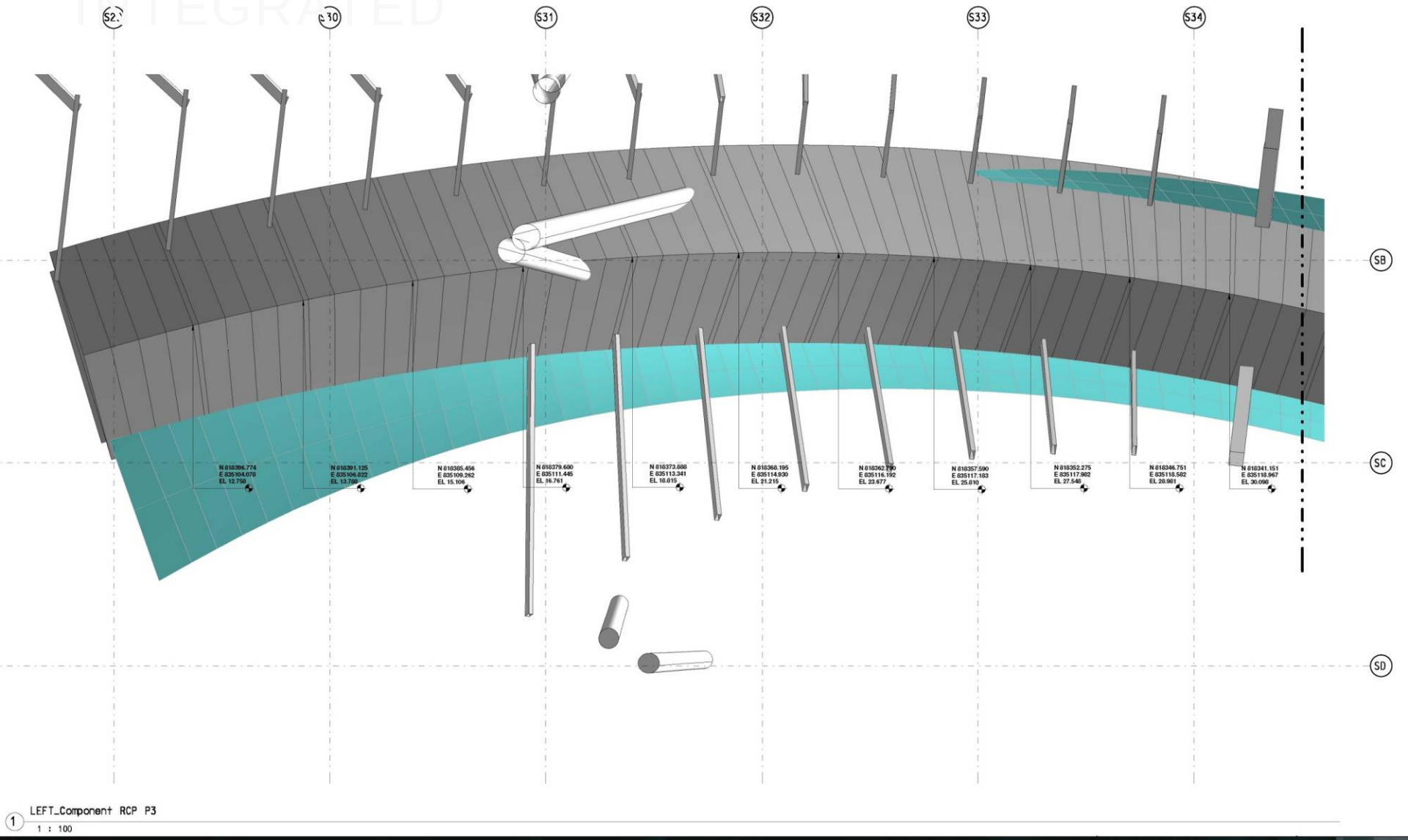
1 Component Elevation P3 North
1 : 100

- EXCEEDING EXPECTATIONS


N 8184 5.45
E 8351 3.176
EL 16.231
N 818387.365
E 835114.950
EL 21.365
N 818371.601
E 835119.668
EL 26.068
N 818351.522
E 835124.113
EL 34.161
N 818331.436
E 835125.092
EL 37.359
N 818314.128
E 835123.646
EL 36.155
N 818399.468
E 835095.778
EL 16.231
N 818402.306
E 835101.067
EL 12.234
N 818383.816
E 835109.912
EL 15.539
N 818369.532
E 835114.581
EL 20.622
N 818354.636
E 835117.623
EL 26.765
N 818301.022
E 835100.960
EL 38.014
N 818287.997
E 835116.299
EL 37.432
N 818256.521
E 835109.080
EL 33.948
N 818260.404
E 835097.725
EL 33.948

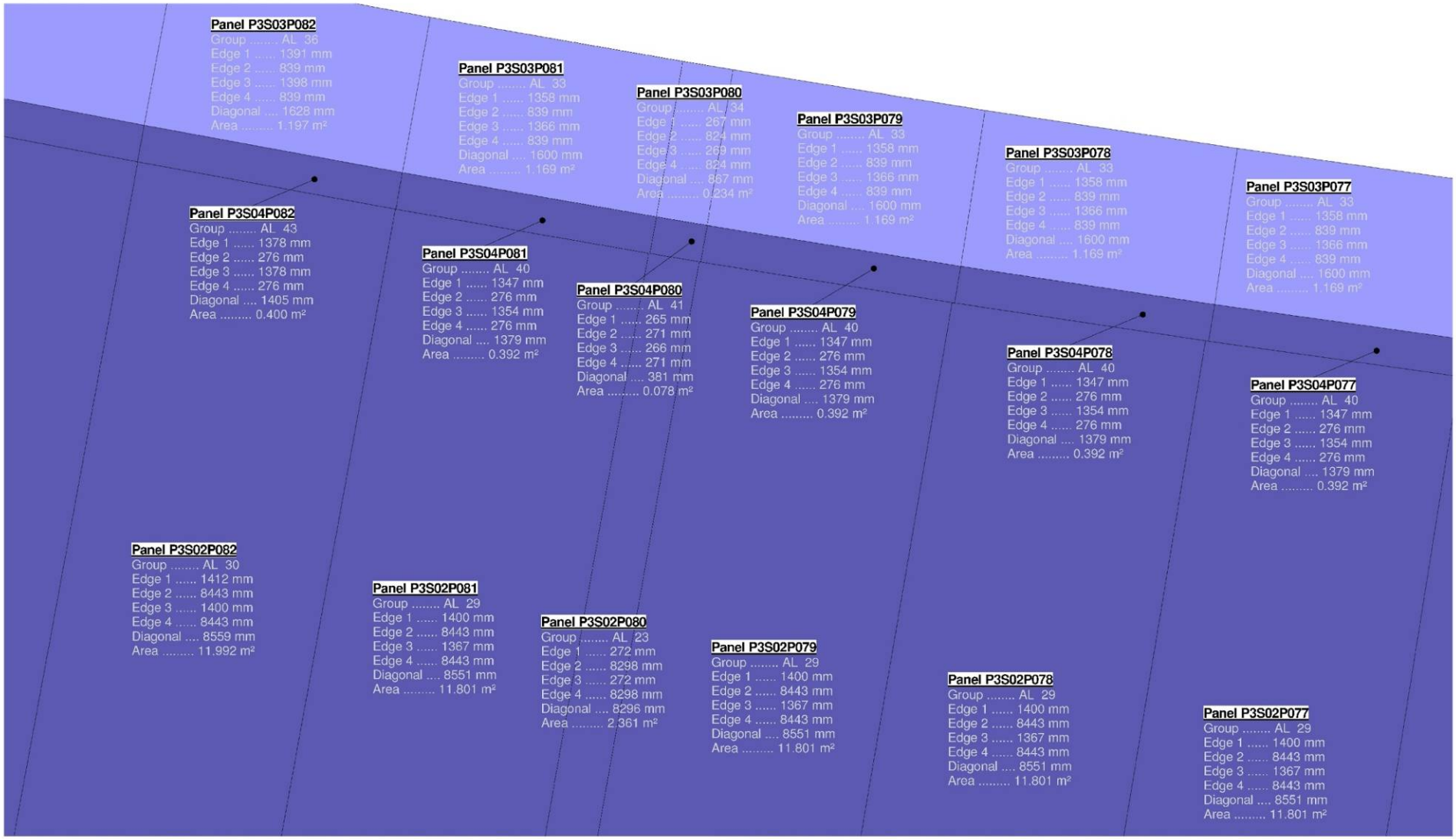
1 ISO - P3

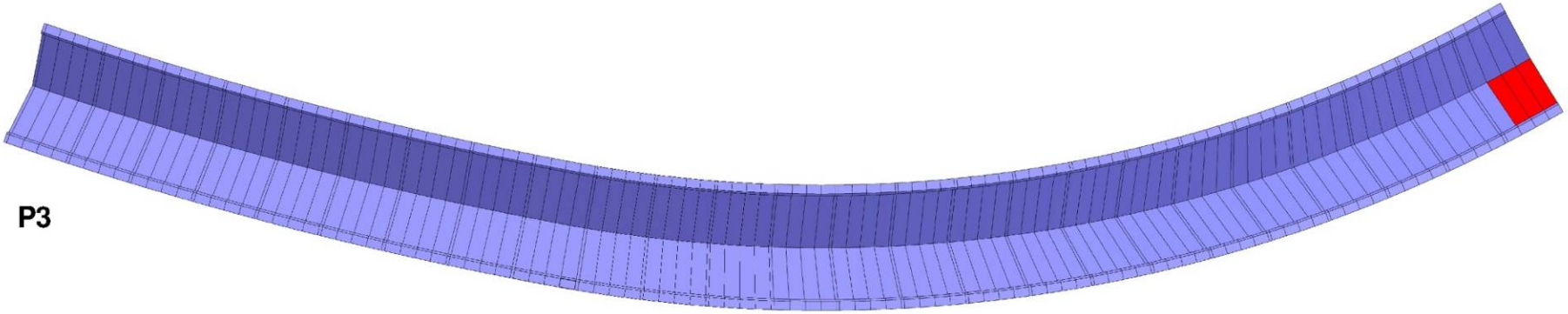
INTEGRATED



1 LEFT_Component RCP P3

1 : 100

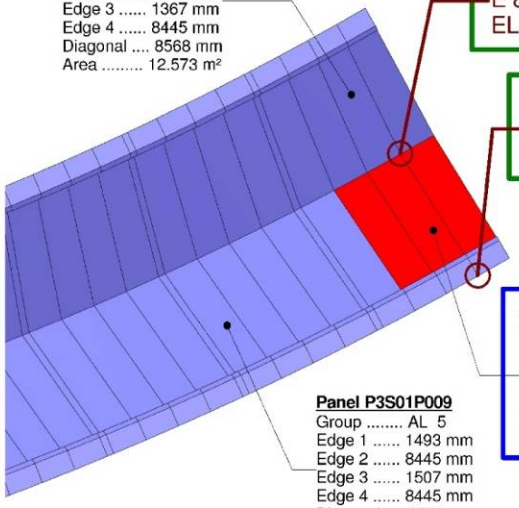

Panel P3S03P082
Group ..... AL 36
Edge 1 ..... 1391 mm
Edge 2 ..... 839 mm
Edge 3 ..... 1398 mm
Edge 4 ..... 839 mm
Diagonal .... 1628 mm
Area ..... 1.197 m²
Panel P3S03P081
Group ..... AL 33
Edge 1 ..... 1358 mm
Edge 2 ..... 839 mm
Edge 3 ..... 1366 mm
Edge 4 ..... 839 mm
Diagonal .... 1600 mm
Area ..... 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



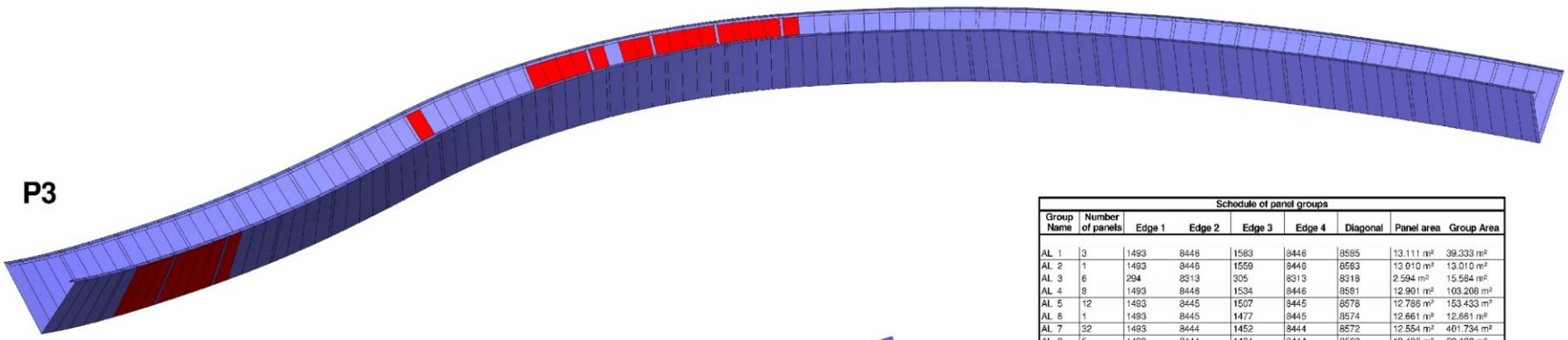
Schedule of panels

Panel	Point 1			Point 2			Point 3			Point 4			Center of weight			Edges				Diagonal	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			
P3S01P001	835106129	818405541	18226	835101017	818402394	12231	835106871	818404239	18290	835101802	818401012	12299	835103955	818403297	15262	1493	8446	1583	8446	8585	13.111 m²	AL 1
P3S01P002	835106871	818404239	18290	835101802	818401012	12299	835107598	818402931	18391	835102568	818399625	12410	835104710	818401952	15347	1493	8446	1583	8446	8585	13.111 m²	AL 1
P3S01P003	835107598	818402931	18391	835102568	818399625	12410	835108310	818401617	18528	835103312	818398241	12560	835105447	818400604	15472	1493	8446	1583	8446	8585	13.111 m²	AL 1
AL 1:3																					39.333 m²	
P3S01P004	835108310	818401617	18528	835103312	818398241	12560	835109007	818400300	18698	835104033	818396862	12745	835106166	818399255	15633	1493	8446	1559	8446	8583	13.010 m²	AL 2
AL 2:1																					13.010 m²	
P3S01P005	835109007	818400300	18698	835104033	818396862	12745	835109144	818400036	18736	835104175	818396588	12786	835106590	818398446	15741	294	8313	305	8313	8318	2.594 m²	AL 3
P3S01P010	835111765	818394722	19674	835106783	818391211	13770	835111890	818394454	19728	835106906	818390943	13826	835109336	818392833	16750	294	8313	305	8313	8318	2.594 m²	AL 3
P3S01P015	835114256	818389075	20934	835109228	818385543	15084	835114368	818388805	21001	835109337	818385271	15154	835111797	818387174	18043	294	8313	305	8313	8318	2.594 m²	AL 3
P3S01P020	835116476	818383392	22499	835111414	818379769	16734	835116575	818383121	22582	835111511	818379492	16822	835113954	818381444	19859	294	8313	305	8313	8318	2.594 m²	AL 3
P3S01P025	835118417	818377721	24432	835113315	818373975	18781	835118503	818377451	24534	835113398	818373701	18888	835115908	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	24006	294	8313	305	8313	8318	2.594 m²	AL 3
AL 3:6																					15.564 m²	
P3S01P006	835109144	818400036	18736	835104175	818396588	12786	835109822	818398714	18942	835104863	818395227	13005	835107001	818397641	15867	1493	8446	1534	8446	8581	12.901 m²	AL 4
P3S01P018	835115454	818386100	21710	835110405	818382531	15899	835115973	818384746	22094	835110918	818381150	16305	835113167	818383632	19002	1493	8446	1534	8446	8581	12.901 m²	AL 4
P3S01P019	835115973	818384746	22094	835110918	818381150	16305	835116476	818383392	22499	835111414	818379769	16734	835113955	818382264	19408	1493	8446	1534	8446	8581	12.901 m²	AL 4
P3S01P021	835116575	818383121	22582	835111511	818379492	16822	835117059	818381769	23013	835111987	818378111	17278	835114263	818380623	19924	1493	8446	1534	8446	8581	12.901 m²	AL 4
P3S01P022	835117059	818381769	23013	835111987	818378111	17278	835117528	818380417	23465	835112447	818376730	17757	835114755	818379257	20378	1493	8446	1534	8446	8581	12.901 m²	AL 4
P3S01P023	835117528	818380417	23465	835112447	818376730	17757	835117980	818379068	23938	835112890	818375351	18258	835115211	818377891	20855	1493	8446	1534	8446	8581	12.901 m²	AL 4
P3S01P024	835117980	818379068	23938	835112890	818375351	18258	835118417	818377721	24432	835113315	818373975	18781	835115650	818376529	21363	1493	8446	1534	8446	8581	12.901 m²	AL 4
P3S01P026	835118503	818377451	24534	835113398	818373701	18888	835118921	818376108	25052	835113802	818372332	19436	835116156	818374898	21978	1493	8446	1534	8446	8581	12.901 m²	AL 4
AL 4:8																					103.208 m²	
P3S01P007	835109822	818398714	18942	835104863	818395227	13005	835110485	818397388	19170	835105522	818393885	13245	835107673	818396303	16090	1493	8445	1507	8445	8578	12.786 m²	AL 5
P3S01P008	835110485	818397388	19170	835105522	818393885	13245	835111132	818396057	19414	835106161	818392551	13500	835108325	818394970	16332	1493	8445	1507	8445	8578	12.786 m²	AL 5
P3S01P009	835111132	818396057	19414	835106161	818392551	13500	835111765	818394722	19674	835106783	818391211	13770	835108960	818395635	16590	1493	8445	1507	8445	8578	12.786 m²	AL 5
P3S01P011	835111890	818394454	19728	835106906	818390943	13826	835112504	818393115	20006	835107510	818389599	14116	835109702	818392028	16919	1493	8445	1507	8445	8578	12.786 m²	AL 5
P3S01P012	835112504	818393115	20006	835107510	818389599	14116	835113103	818391771	20300	835108097	818388252	14422	835110304	818390684	17211	1493	8445	1507	8445	8578	12.786 m²	AL 5
P3S01P013	835113103	818391771	20300	835108097	818388252	14422	835113688	818390425	20609	835108670	818386900	14745	835110890	818389337	17519	1493	8445	1507	8445	8578	12.786 m²	AL 5
P3S01P014	835113688	818390425	20609	835108670	818386900	14745	835114256	818389075	20934	835109228	818385543	15084	835111460	818387966	17843	1493	8445	1507	8445	8578	12.786 m²	AL 5
P3S01P016	835114368	818388805	21001	835109337	818385271	15154	835114919	818387453	21346	835109878	818383906	15516	835112126	818386359	18254	1493	8445	1507	8445	8578	12.786 m²	AL 5
P3S01P017	835114919	818387453	21346	835109878	818383906	15516	835115454	818386100	21710	835110405	818382531	15899	835112864	818384998	18618	1493	8445	1507	8445	8578	12.786 m²	AL 5
P3S01P027	835118921	818376108	25052	835113802	818372332	19436	835119324	818374766	25590	835114189	818370971	20002	835116559	818373544	22520	1493	8445	1507	8445	8578	12.786 m²	AL 5
P3S01P028	835119324	818374766	25590	835114189	818370971	20002	835119711	818373428	26145	835114559	818369618	20585	835116948	818372196	23081	1493	8445	1507	8445	8578	12.786 m²	AL 5
P3S01P029	835119711	818373428	26145	835114559	818369618	20585	835120084	818372092	26716	835114909	818368280	21178	835117316	818370855	23656	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	

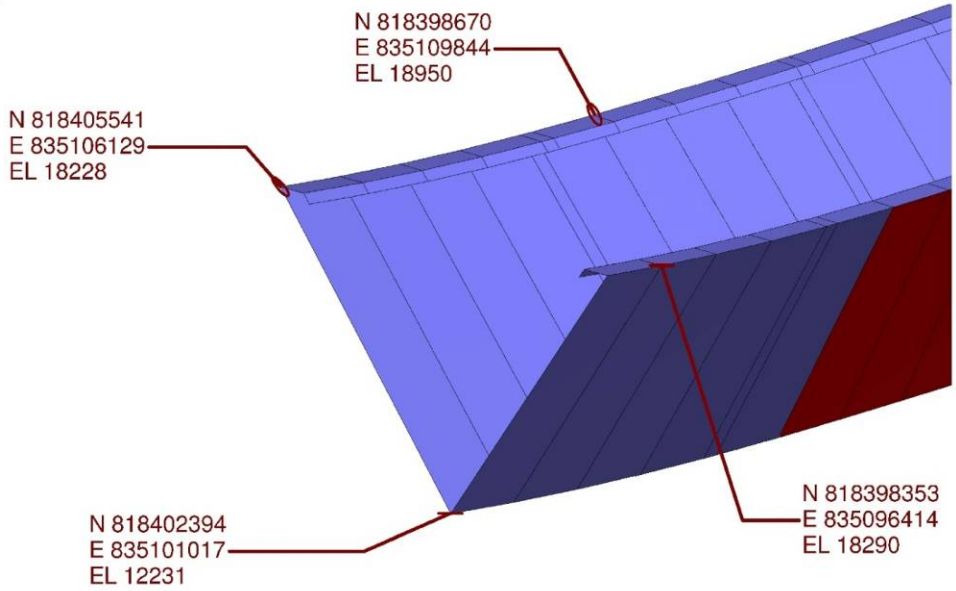
Panel P3S02P002
Group ..... AL 14
Edge 1 ..... 1583 mm
Edge 2 ..... 8445 mm
Edge 3 ..... 1367 mm
Edge 4 ..... 8445 mm
Diagonal .... 8568 mm
Area ..... 12.573 m²



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



P3

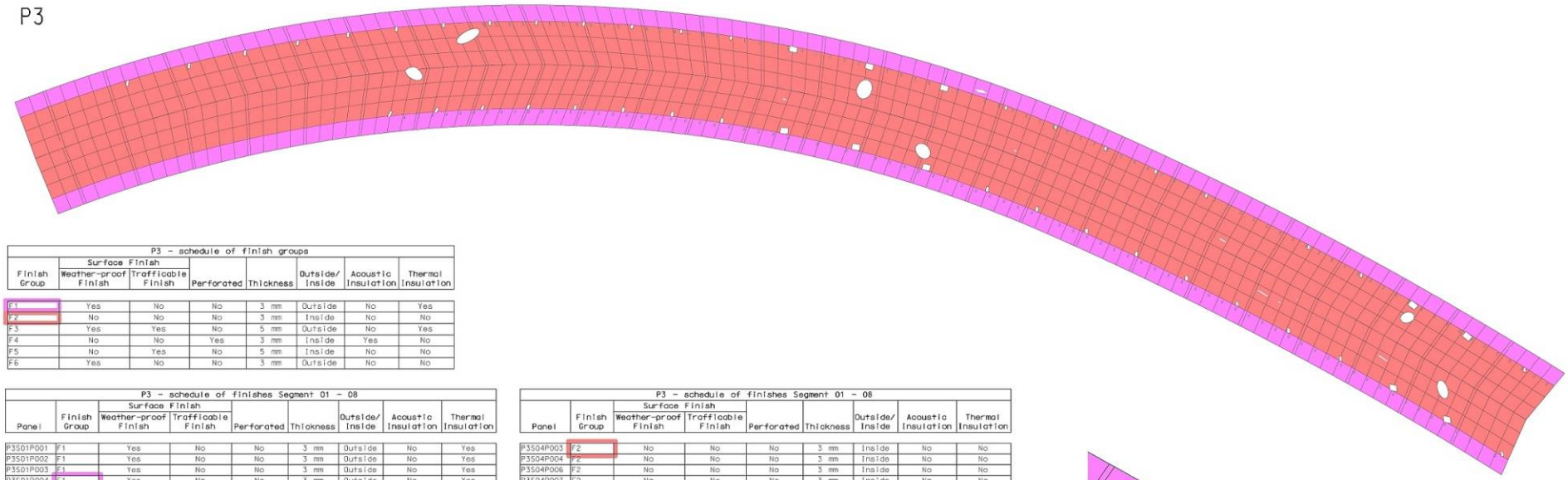


Schedule of panel groups

Group Name	Number of panels	Edge 1	Edge 2	Edge 3	Edge 4	Diagonal	Panel area	Group Area
AL 1	3	1493	8446	1583	8446	8595	13.111 m²	39.333 m²
AL 2	1	1493	8446	1559	8446	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	8446	1534	8446	8581	12.901 m²	103.208 m²
AL 5	12	1493	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
AL 8	5	1493	8444	1424	8444	8569	12.436 m²	62.180 m²
AL 9	13	1493	8444	1398	8444	8567	12.325 m²	160.227 m²
AL 10	33	294	8303	272	8302	8307	2.453 m²	80.933 m²
AL 11	25	1493	8443	1369	8443	8564	12.199 m²	304.979 m²
AL 12	3	1493	8443	1354	8443	8562	12.135 m²	36.076 m²
AL 13	3	1493	8443	1338	8443	8560	12.069 m²	36.208 m²
AL 14	3	1583	8445	1367	8445	8568	12.573 m²	37.718 m²
AL 15	1	1559	8445	1368	8445	8560	12.479 m²	12.479 m²
AL 16	8	1533	8445	1369	8445	8556	12.372 m²	98.979 m²
AL 17	3	1513	8445	1374	8445	8547	12.311 m²	36.932 m²
AL 18	1	1497	8446	1385	8445	8536	12.290 m²	12.290 m²
AL 19	1	1477	8445	1387	8445	8534	12.209 m²	12.209 m²
AL 20	1	1452	8445	1387	8445	8531	12.102 m²	12.102 m²
AL 21	1	1424	8445	1387	8445	8529	11.984 m²	11.984 m²
AL 22	1	1398	8444	1386	8444	8527	11.871 m²	11.871 m²
AL 23	11	272	8298	272	8298	8296	2.361 m²	25.974 m²
AL 24	6	1369	8444	1385	8444	8524	11.742 m²	70.452 m²
AL 25	7	1354	8444	1384	8444	8524	11.674 m²	81.718 m²
AL 26	3	1338	8443	1381	8443	8524	11.595 m²	34.788 m²
AL 27	8	1362	8442	1389	8442	8539	11.648 m²	93.185 m²
AL 28	3	1380	8442	1367	8442	8543	11.714 m²	35.143 m²
AL 29	10	1400	8443	1367	8443	8551	11.801 m²	118.005 m²
AL 30	1	1412	8443	1400	8443	8559	11.992 m²	11.992 m²
AL 31	10	1427	8444	1431	8444	8564	12.187 m²	121.867 m²
AL 32	24	1440	8444	1453	8444	8568	12.334 m²	296.014 m²
AL 33	52	1358	839	1366	839	1600	1.169 m²	60.791 m²
AL 34	16	267	824	269	824	867	0.234 m²	3.748 m²
AL 35	13	1372	839	1379	839	1611	1.181 m²	15.348 m²
AL 36	1	1391	839	1398	839	1628	1.197 m²	1.197 m²
AL 37	31	1422	839	1425	839	1653	1.222 m²	37.880 m²
AL 38	3	1444	839	1447	839	1671	1.240 m²	3.720 m²
AL 39	34	284	825	285	825	873	0.248 m²	8.446 m²
AL 40	54	1347	276	1354	276	1379	0.392 m²	21.163 m²
AL 41	24	265	271	266	271	381	0.078 m²	1.883 m²
AL 42	11	1361	276	1366	276	1396	0.396 m²	4.353 m²
AL 43	1	1378	276	1378	276	1405	0.400 m²	0.400 m²
AL 44	32	1406	276	1406	276	1432	0.408 m²	13.052 m²
AL 45	2	1426	276	1425	276	1452	0.414 m²	0.827 m²
AL 46	26	281	271	281	271	390	0.083 m²	2.154 m²
AL 47	100	1456	276	1453	276	1481	0.422 m²	42.209 m²
AL 48	100	1474	839	1483	839	1700	1.269 m²	126.892 m²
Grand total: 750								2923.908 m²

CONTEXT

P3



P3 - schedule of finish groups

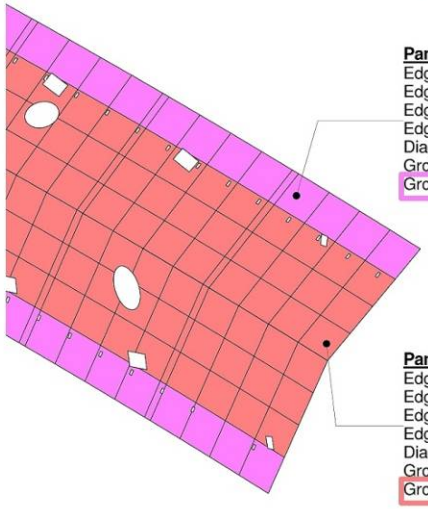
Finish Group	Surface Finish: Weather-proof Finish	Surface Finish: Trafficable Finish	Perforated	Thickness	Outside/ Inside	Acoustic Insulation	Thermal Insulation
F1	Yes	No	No	3 mm	Outside	No	Yes
F2	No	No	No	3 mm	Inside	No	No
F3	Yes	Yes	No	5 mm	Outside	No	Yes
F4	No	No	Yes	3 mm	Inside	Yes	No
F5	No	Yes	No	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: Weather-proof Finish	Surface Finish: Trafficable Finish	Perforated	Thickness	Outside/ Inside	Acoustic Insulation	Thermal Insulation
P3S01P001	F1	Yes	No	No	3 mm	Outside	No	Yes
P3S01P002	F1	Yes	No	No	3 mm	Outside	No	Yes
P3S01P003	F1	Yes	No	No	3 mm	Outside	No	Yes
P3S01P004	F1	Yes	No	No	3 mm	Outside	No	Yes
P3S01P005	F1	Yes	No	No	3 mm	Outside	No	Yes
P3S01P006	F1	Yes	No	No	3 mm	Outside	No	Yes
P3S01P007	F1	Yes	No	No	3 mm	Outside	No	Yes
P3S01P008	F1	Yes	No	No	3 mm	Outside	No	Yes
P3S01P009	F1	Yes	No	No	3 mm	Outside	No	Yes
P3S08P001	F1	Yes	No	No	3 mm	Outside	No	Yes
P3S08P002	F1	Yes	No	No	3 mm	Outside	No	Yes
P3S08P003	F1	Yes	No	No	3 mm	Outside	No	Yes
P3S08P004	F1	Yes	No	No	3 mm	Outside	No	Yes
P3S08P005	F1	Yes	No	No	3 mm	Outside	No	Yes
P3S08P006	F1	Yes	No	No	3 mm	Outside	No	Yes
P3S08P007	F1	Yes	No	No	3 mm	Outside	No	Yes
P3S08P008	F1	Yes	No	No	3 mm	Outside	No	Yes
F 1: 17								
P3S02P001	F2	No	No	No	3 mm	Inside	No	No
P3S02P002	F2	No	No	No	3 mm	Inside	No	No
P3S02P003	F2	No	No	No	3 mm	Inside	No	No
P3S02P004	F2	No	No	No	3 mm	Inside	No	No
P3S02P005	F2	No	No	No	3 mm	Inside	No	No
P3S02P006	F2	No	No	No	3 mm	Inside	No	No
P3S02P007	F2	No	No	No	3 mm	Inside	No	No
P3S02P008	F2	No	No	No	3 mm	Inside	No	No
P3S02P009	F2	No	No	No	3 mm	Inside	No	No
P3S03P001	F2	No	No	No	3 mm	Inside	No	No
P3S03P002	F2	No	No	No	3 mm	Inside	No	No
P3S03P003	F2	No	No	No	3 mm	Inside	No	No
P3S03P004	F2	No	No	No	3 mm	Inside	No	No
P3S03P006	F2	No	No	No	3 mm	Inside	No	No
P3S03P007	F2	No	No	No	3 mm	Inside	No	No
P3S03P008	F2	No	No	No	3 mm	Inside	No	No
P3S03P009	F2	No	No	No	3 mm	Inside	No	No
P3S04P001	F2	No	No	No	3 mm	Inside	No	No
P3S04P002	F2	No	No	No	3 mm	Inside	No	No

P3 - schedule of finishes Segment 01 - 08

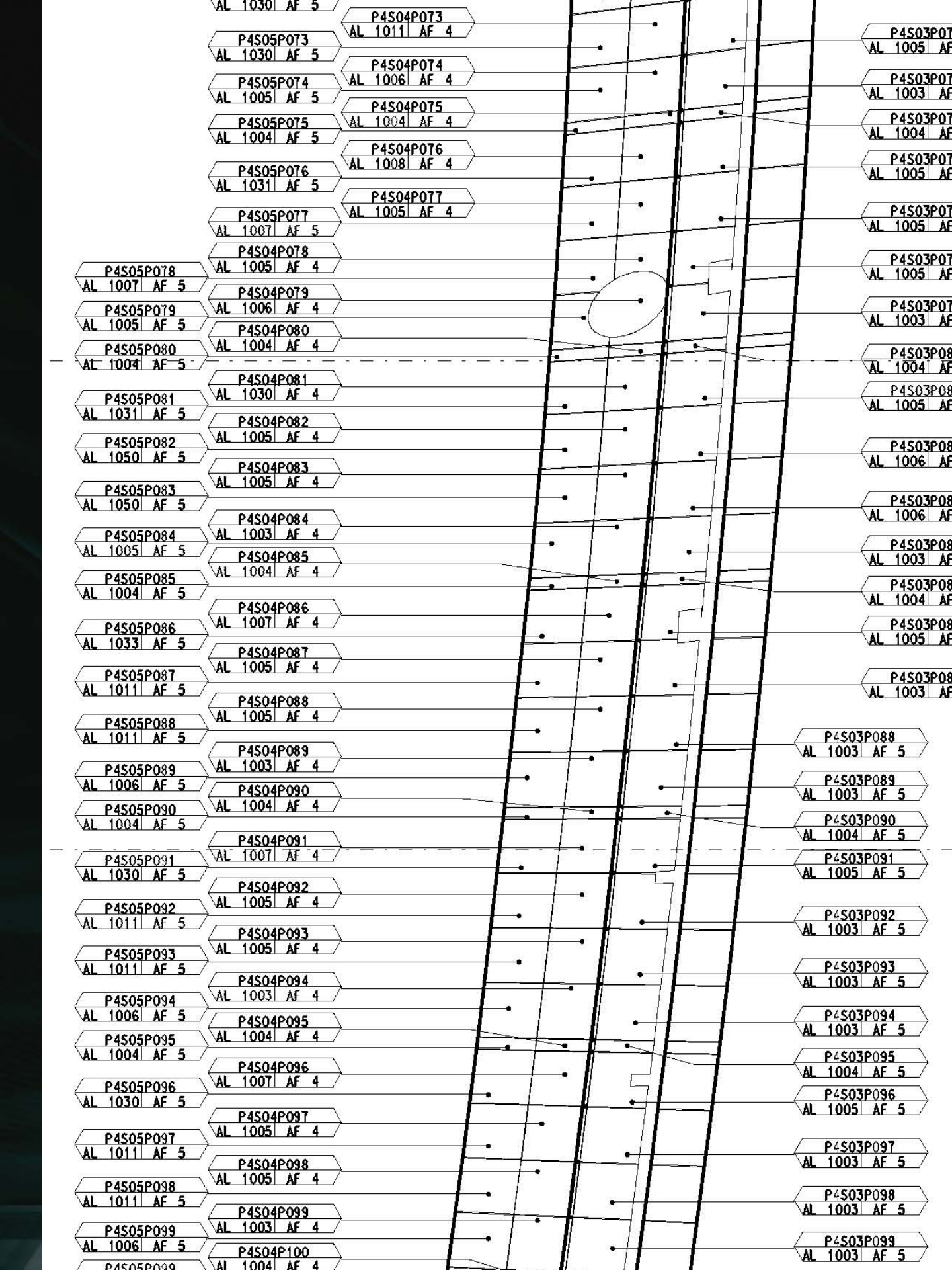
Panel	Finish Group	Surface Finish: Weather-proof Finish	Surface Finish: Trafficable Finish	Perforated	Thickness	Outside/ Inside	Acoustic Insulation	Thermal Insulation
P3S04P003	F2	No	No	No	3 mm	Inside	No	No
P3S04P004	F2	No	No	No	3 mm	Inside	No	No
P3S04P006	F2	No	No	No	3 mm	Inside	No	No
P3S04P007	F2	No	No	No	3 mm	Inside	No	No
P3S04P008	F2	No	No	No	3 mm	Inside	No	No
P3S04P009	F2	No	No	No	3 mm	Inside	No	No
F 2: 25								
P3S03P005	F2	No	No	No	3 mm	Inside	No	No
P3S04P005	F2	No	No	No	3 mm	Inside	No	No
P3S05P001	F2	No	No	No	3 mm	Inside	No	No
P3S05P002	F2	No	No	No	3 mm	Inside	No	No
P3S05P003	F2	No	No	No	3 mm	Inside	No	No
P3S05P004	F2	No	No	No	3 mm	Inside	No	No
P3S05P005	F2	No	No	No	3 mm	Inside	No	No
P3S05P006	F2	No	No	No	3 mm	Inside	No	No
P3S05P007	F2	No	No	No	3 mm	Inside	No	No
P3S05P008	F2	No	No	No	3 mm	Inside	No	No
P3S05P009	F2	No	No	No	3 mm	Inside	No	No
P3S06P001	F2	No	No	No	3 mm	Inside	No	No
P3S06P002	F2	No	No	No	3 mm	Inside	No	No
P3S06P003	F2	No	No	No	3 mm	Inside	No	No
P3S06P004	F2	No	No	No	3 mm	Inside	No	No
P3S06P005	F2	No	No	No	3 mm	Inside	No	No
P3S06P006	F2	No	No	No	3 mm	Inside	No	No
P3S06P007	F2	No	No	No	3 mm	Inside	No	No
P3S06P008	F2	No	No	No	3 mm	Inside	No	No
P3S06P009	F2	No	No	No	3 mm	Inside	No	No
P3S07P001	F2	No	No	No	3 mm	Inside	No	No
P3S07P002	F2	No	No	No	3 mm	Inside	No	No
P3S07P003	F2	No	No	No	3 mm	Inside	No	No
P3S07P004	F2	No	No	No	3 mm	Inside	No	No
P3S07P005	F2	No	No	No	3 mm	Inside	No	No
P3S07P006	F2	No	No	No	3 mm	Inside	No	No
P3S07P007	F2	No	No	No	3 mm	Inside	No	No
P3S07P008	F2	No	No	No	3 mm	Inside	No	No
P3S07P009	F2	No	No	No	3 mm	Inside	No	No
F 6: 29								



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

Remark: An above is a portion extracted for presentation purpose the full schedule of panels included in the BIM model.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P4S05P074 AL 1005 AF 5
P4S04P075 AL 1004 AF 4
P4S05P075 AL 1004 AF 5
P4S04P076 AL 1008 AF 4
P4S05P076 AL 1031 AF 5
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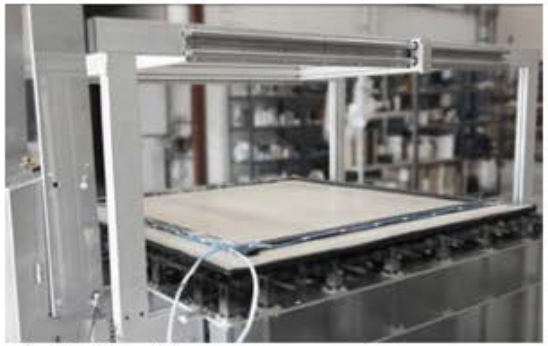
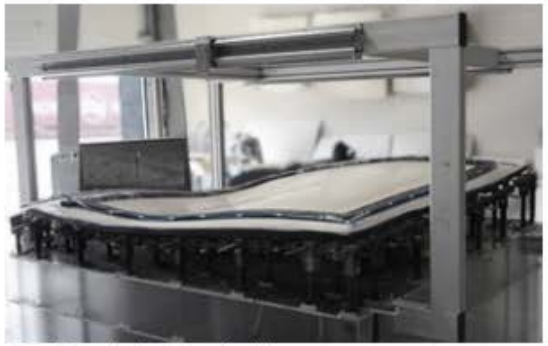
P4S04P086 AL 1007 AF 4
P4S05P086 AL 1033 AF 5
P4S04P087 AL 1005 AF 4
P4S05P087 AL 1011 AF 5
P4S04P088 AL 1005 AF 4
P4S05P088 AL 1011 AF 5
P4S04P089 AL 1003 AF 4
P4S05P089 AL 1006 AF 5
P4S04P090 AL 1004 AF 4
P4S05P090 AL 1004 AF 5
P4S04P091 AL 1007 AF 4
P4S05P091 AL 1030 AF 5
P4S04P092 AL 1005 AF 4
P4S05P092 AL 1011 AF 5
P4S04P093 AL 1005 AF 4
P4S05P093 AL 1011 AF 5
P4S04P094 AL 1003 AF 4
P4S05P094 AL 1006 AF 5
P4S04P095 AL 1004 AF 4
P4S05P095 AL 1004 AF 5
P4S04P096 AL 1007 AF 4
P4S05P096 AL 1030 AF 5
P4S04P097 AL 1005 AF 4
P4S05P097 AL 1011 AF 5
P4S04P098 AL 1005 AF 4
P4S05P098 AL 1011 AF 5
P4S04P099 AL 1003 AF 4
P4S05P099 AL 1006 AF 5
P4S04P100 AL 1004 AF 4
P4S03P088 AL 1003 AF 5
P4S03P089 AL 1003 AF 5
P4S03P090 AL 1004 AF 5
P4S03P091 AL 1005 AF 5
P4S03P092 AL 1003 AF 5
P4S03P093 AL 1003 AF 5
P4S03P094 AL 1003 AF 5
P4S03P095 AL 1004 AF 5
P4S03P096 AL 1005 AF 5
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

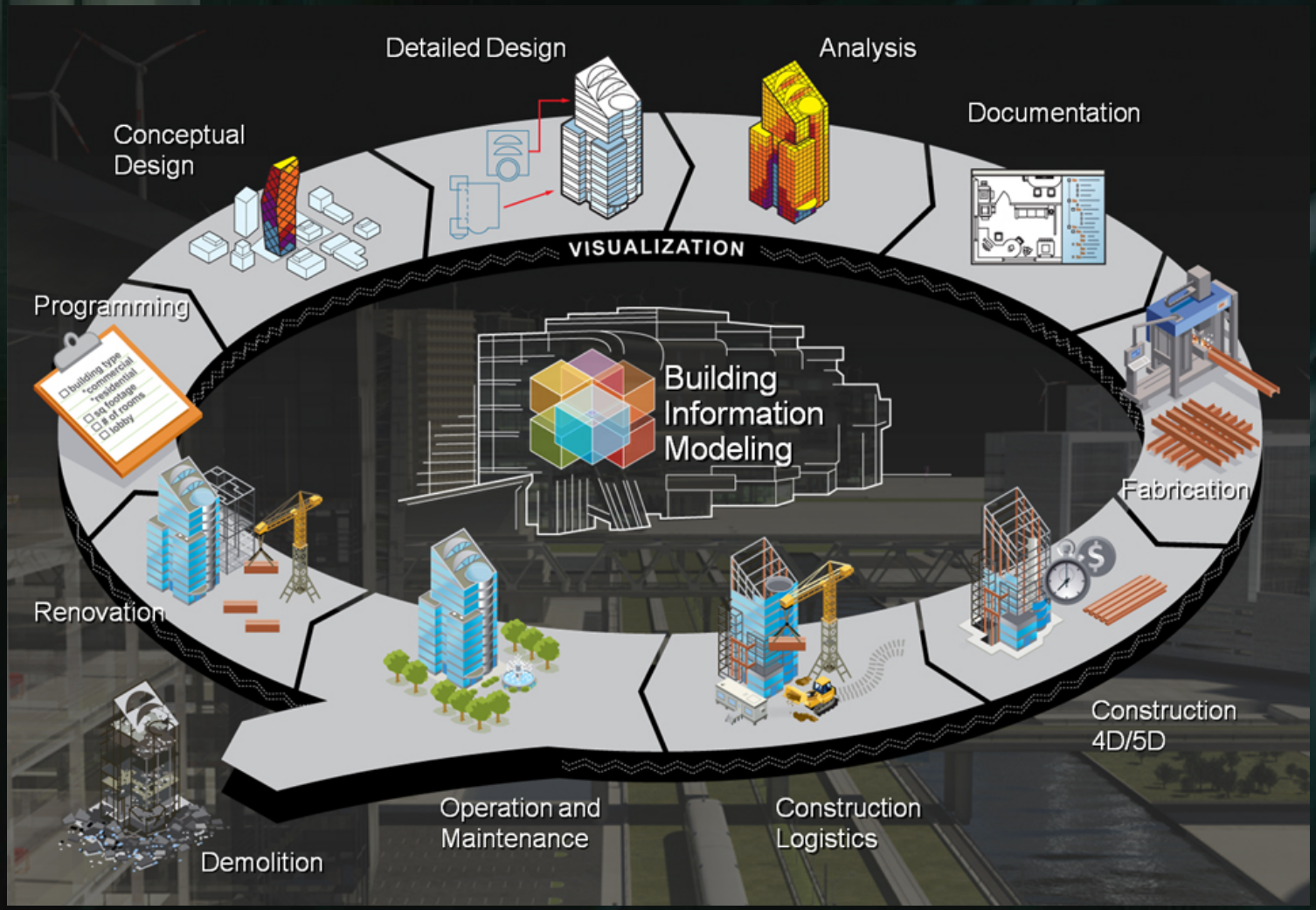
3.3 – Panel release

http://adapa.dk/

Case 3

True BIM (Operation Phaes)

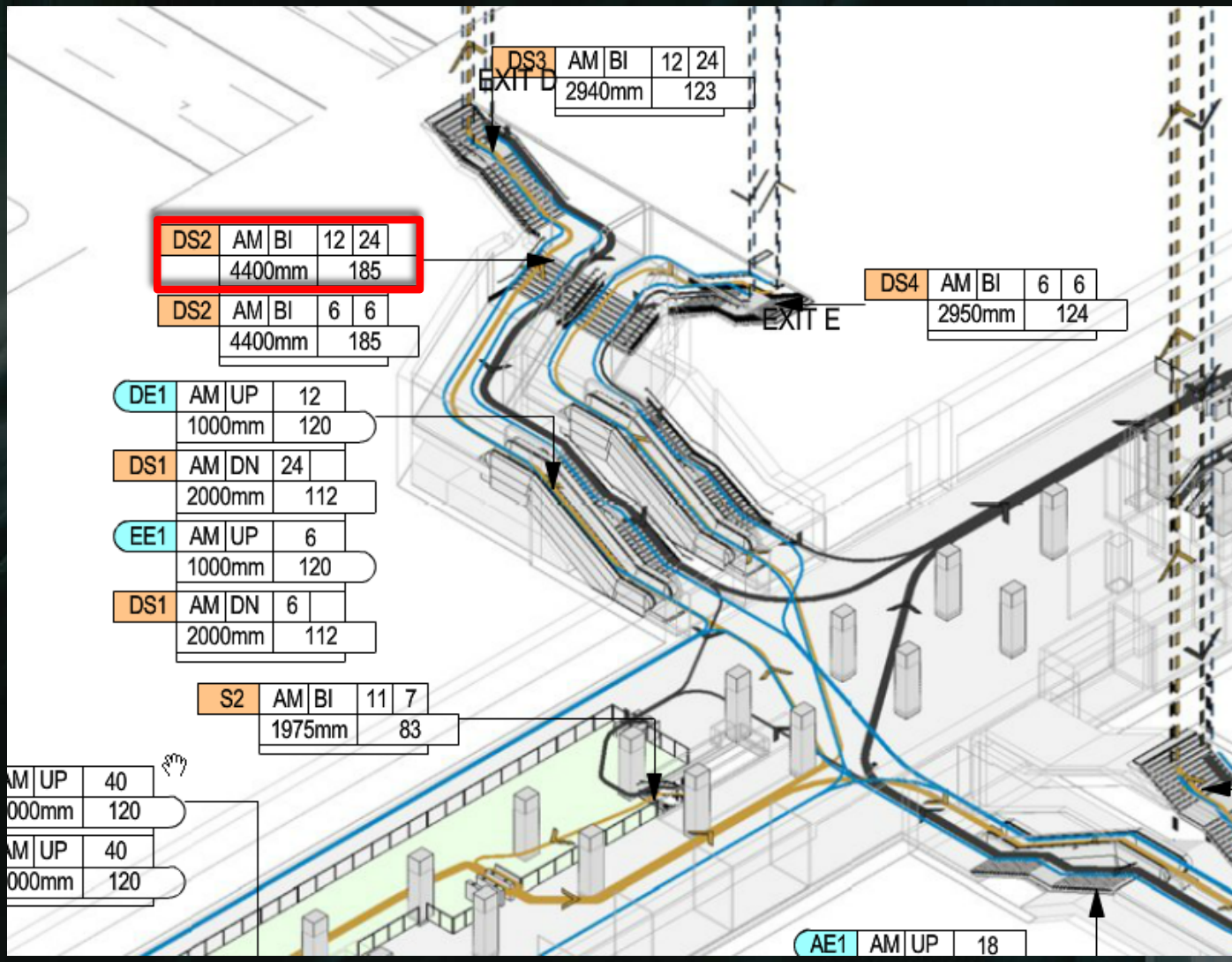
M + I = B (Safety)


Detailed Design
Analysis
Documentation
Conceptual Design
VISUALIZATION
Programming
Building Information Modeling
Fabrication
Renovation
Construction 4D/5D
Operation and Maintenance
Construction Logistics
Demolition

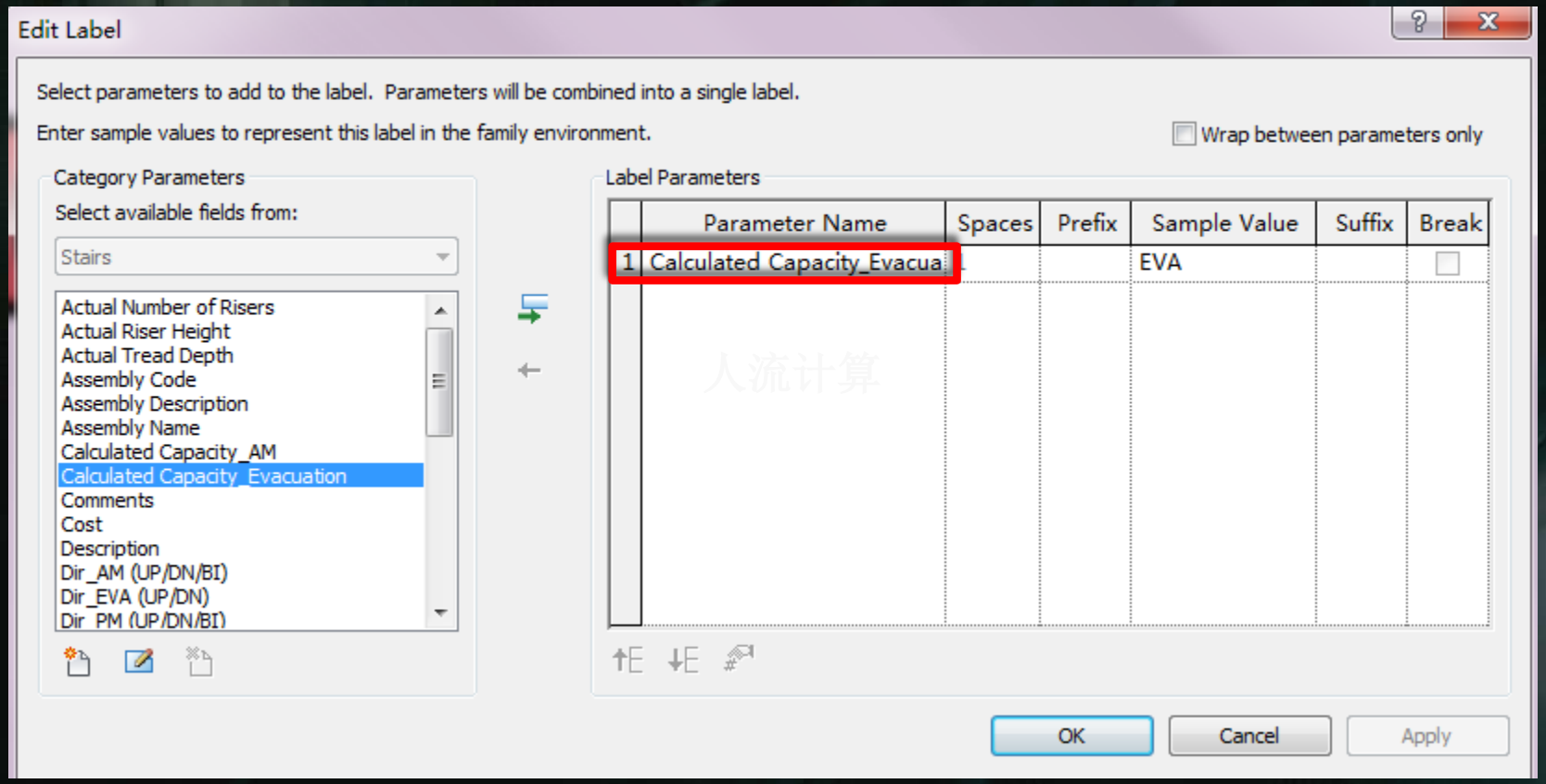
True BIM

STAIR SCHEDULE

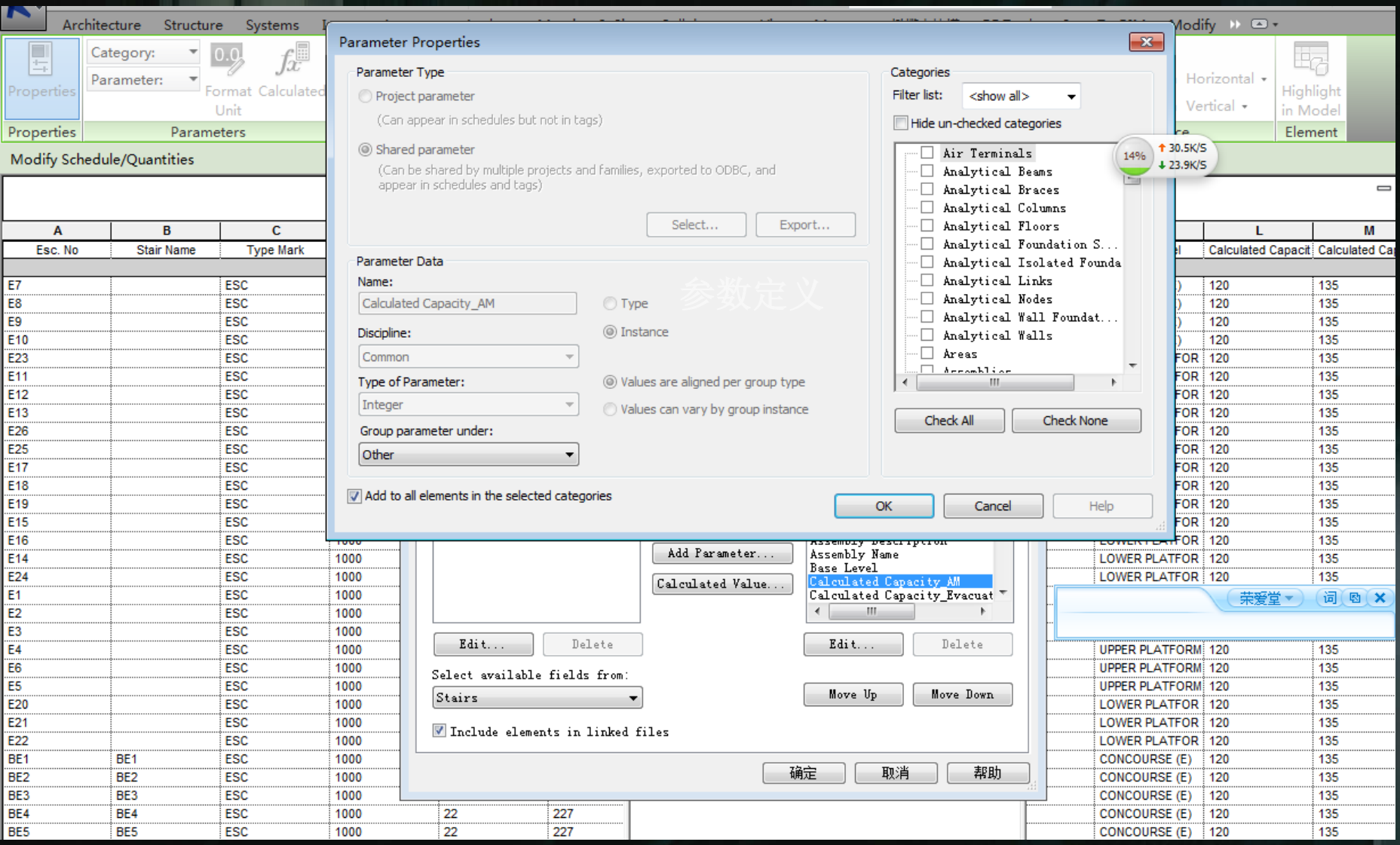
NAME	STAIR WIDTH (mm)	NORMAL AM PEAK				
		DIR. (UP/DN/BI)	CAL.CAP. UP	CAL.CAP. DN	CAL.CAP. BI	TOTAL CAPACITY
AS1	2050	DN	103	115	86	115
AS2	4400	BI	220	246	185	185
AS2E	4400	UP	220	246	185	220
BS1	2000	UP	100	112	84	100
BS2	2000	UP	100	112	84	100
BS3	4450	BI	223	249	187	187
BS4	4370	BI	219	245	184	184
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



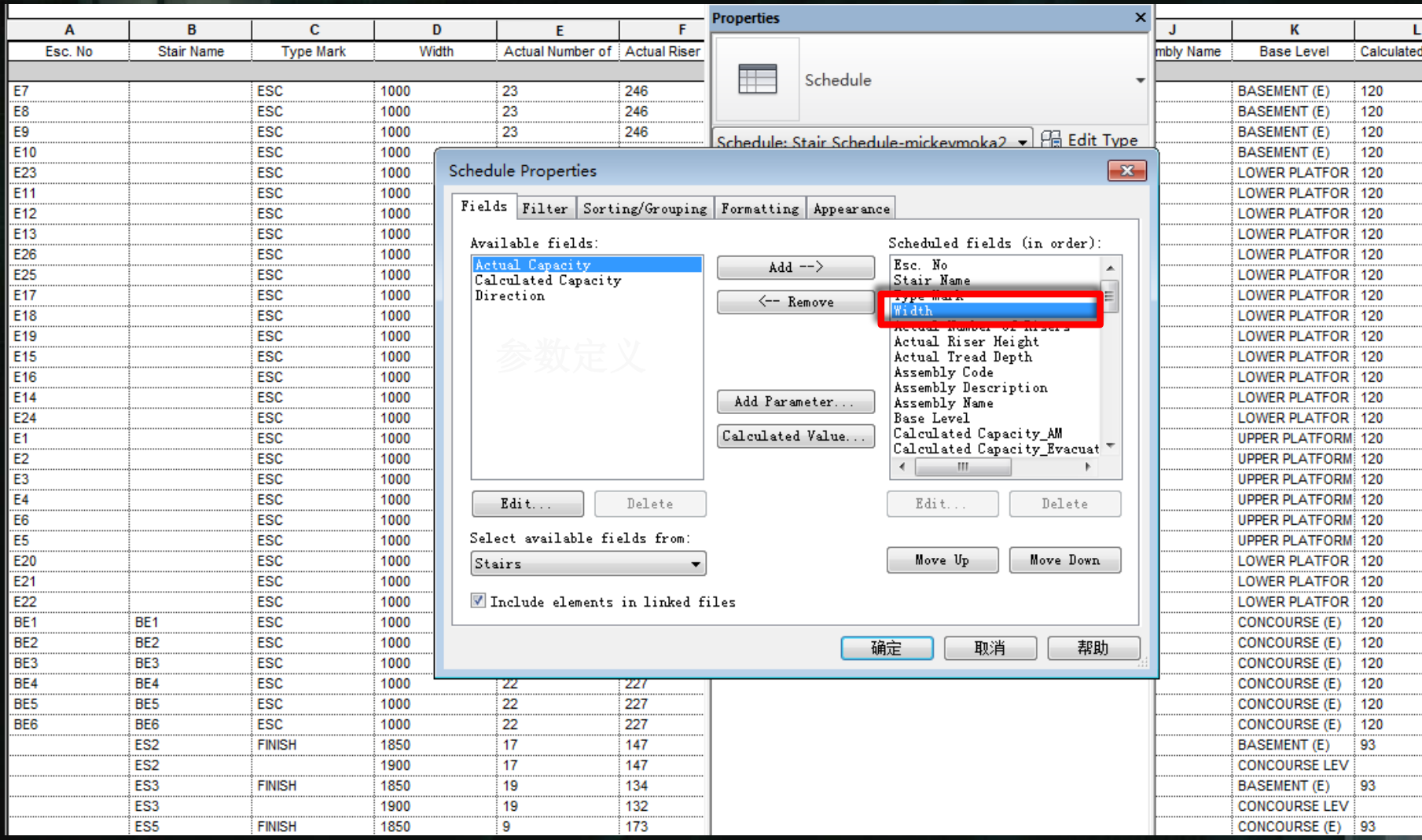
True BIM


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
OK
Cancel
Apply

True BIM

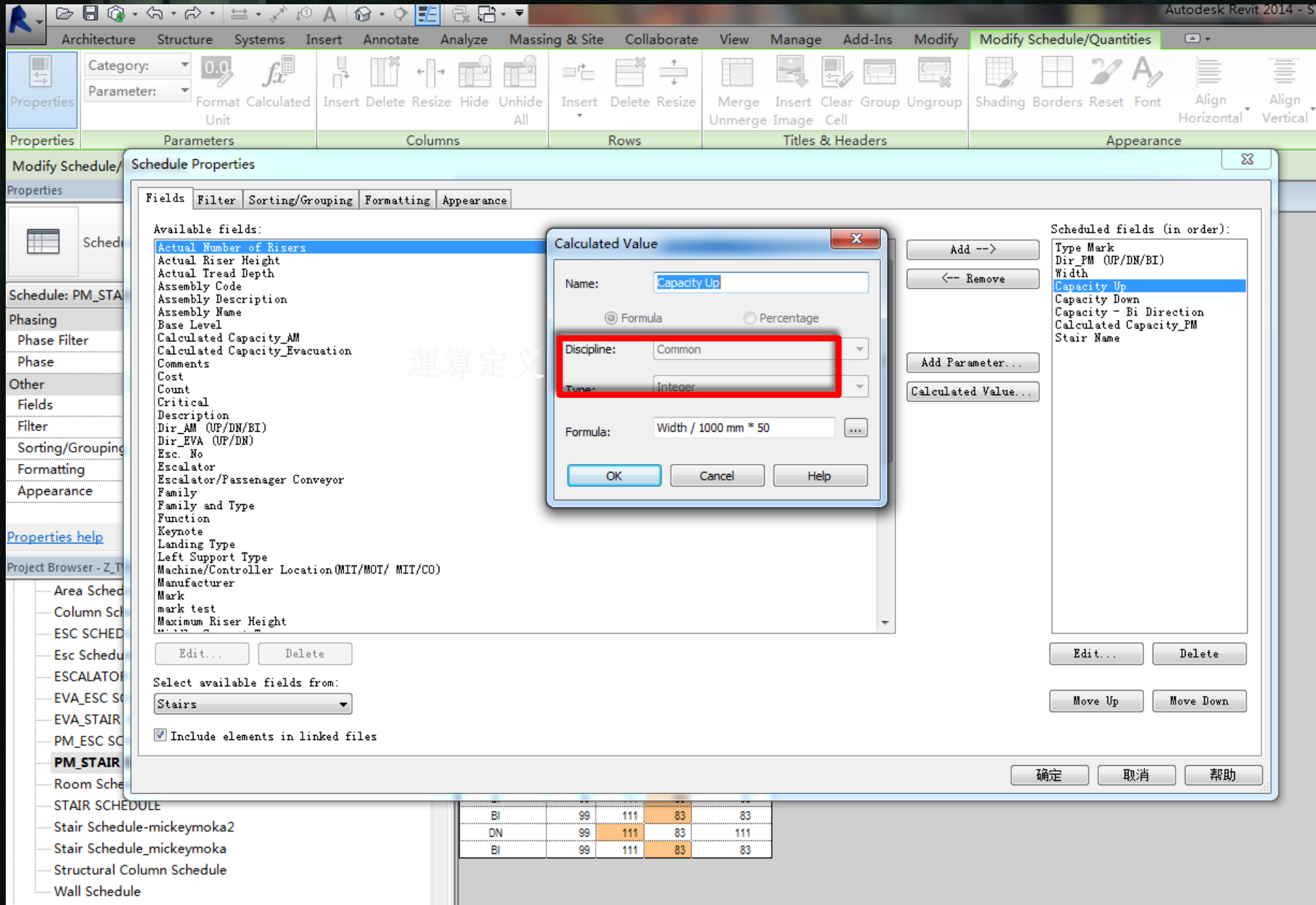

Architecture
Structure
Systems
Modify
Properties
Category:
Parameter:
Format
Unit
Calculated
Properties
Parameters
Horizontal
Vertical
Highlight in Model
Element
Modify Schedule/Quantities
Parameter Properties
Parameter Type
Project parameter
(Can appear in schedules but not in tags)
Shared parameter
(Can be shared by multiple projects and families, exported to ODBC, and appear in schedules and tags)
Select...
Export...
Parameter Data
Name:
Calculated Capacity_AM
Discipline:
Common
Type of Parameter:
Integer
Group parameter under:
Other
Type
Instance
Values are aligned per group type
Values can vary by group instance
Add to all elements in the selected categories
Categories
Filter list:
<show all>
Hide un-checked categories
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
Check All
Check None
OK
Cancel
Help
14%
30.5K/S
23.9K/S
Add Parameter...
Calculated Value...
Assembly Name
Base Level
Calculated Capacity_AM
Calculated Capacity_Evacuat
Edit...
Delete
Select available fields from:
Stairs
Include elements in linked files
Move Up
Move Down
确定
取消
帮助
荣爱堂
词
A
B
C
L
M
Esc. No
Stair Name
Type Mark
Calculated Capacit
Calculated Ca

True BIM



A	B	C	D	E	F	J	K	L
Esc. No	Stair Name	Type Mark	Width	Actual Number of	Actual Riser	mbly Name	Base Level	Calculated
E7		ESC	1000	23	246		BASEMENT (E)	120
E8		ESC	1000	23	246		BASEMENT (E)	120
E9		ESC	1000	23	246		BASEMENT (E)	120
E10		ESC	1000				BASEMENT (E)	120
E23		ESC	1000				LOWER PLATFOR	120
E11		ESC	1000				LOWER PLATFOR	120
E12		ESC	1000				LOWER PLATFOR	120
E13		ESC	1000				LOWER PLATFOR	120
E26		ESC	1000				LOWER PLATFOR	120
E25		ESC	1000				LOWER PLATFOR	120
E17		ESC	1000				LOWER PLATFOR	120
E18		ESC	1000				LOWER PLATFOR	120
E19		ESC	1000				LOWER PLATFOR	120
E15		ESC	1000				LOWER PLATFOR	120
E16		ESC	1000				LOWER PLATFOR	120
E14		ESC	1000				LOWER PLATFOR	120
E24		ESC	1000				LOWER PLATFOR	120
E1		ESC	1000				UPPER PLATFORM	120
E2		ESC	1000				UPPER PLATFORM	120
E3		ESC	1000				UPPER PLATFORM	120
E4		ESC	1000				UPPER PLATFORM	120
E6		ESC	1000				UPPER PLATFORM	120
E5		ESC	1000				UPPER PLATFORM	120
E20		ESC	1000				LOWER PLATFOR	120
E21		ESC	1000				LOWER PLATFOR	120
E22		ESC	1000				LOWER PLATFOR	120
BE1	BE1	ESC	1000				CONCOURSE (E)	120
BE2	BE2	ESC	1000				CONCOURSE (E)	120
BE3	BE3	ESC	1000				CONCOURSE (E)	120
BE4	BE4	ESC	1000	22	227		CONCOURSE (E)	120
BE5	BE5	ESC	1000	22	227		CONCOURSE (E)	120
BE6	BE6	ESC	1000	22	227		CONCOURSE (E)	120
	ES2	FINISH	1850	17	147		BASEMENT (E)	93
	ES2		1900	17	147		CONCOURSE LEV	
	ES3	FINISH	1850	19	134		BASEMENT (E)	93
	ES3		1900	19	132		CONCOURSE LEV	
	ES5	FINISH	1850	9	173		CONCOURSE (E)	93

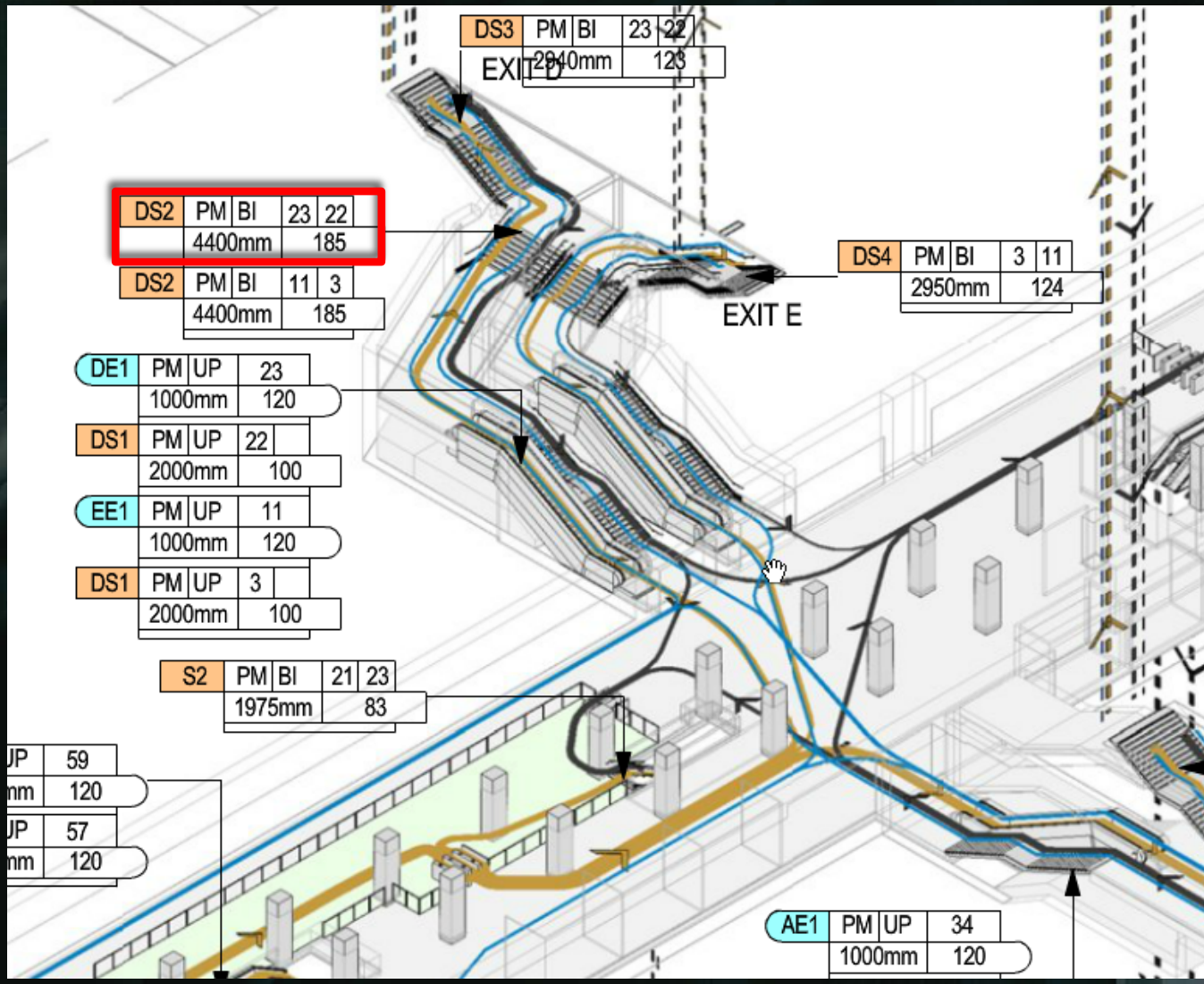
True BIM


Autodesk Revit 2014 - S
Architecture
Structure
Systems
Insert
Annotate
Analyze
Massing & Site
Collaborate
View
Manage
Add-Ins
Modify
Modify Schedule/Quantities
Properties
Category:
Parameter:
Format
Calculated
Unit
Insert
Delete
Resize
Hide
Unhide
All
Insert
Delete
Resize
Merge
Unmerge
Insert
Image
Clear
Cell
Group
Ungroup
Shading
Borders
Reset
Font
Align
Horizontal
Align
Vertical
Properties
Parameters
Columns
Rows
Titles & Headers
Appearance
Modify Schedule/
Properties
Schedule: PM_STA
Phasing
Phase Filter
Phase
Other
Fields
Filter
Sorting/Grouping
Formatting
Appearance
Properties help
Project Browser - Z_T
Area Sched
Column Sch
ESC SCHED
Esc Schedu
ESCALATOR
EVA_ESC SC
EVA_STAIR
PM_ESC SC
PM_STAIR
Room Sche
STAIR SCHEDULE
Stair Schedule-mickeymoka2
Stair Schedule_mickeymoka
Structural Column Schedule
Wall 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/Passenager 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
Add -->
<-- Remove
Add Parameter...
Calculated Value...
Scheduled fields (in order):
Type Mark
Dir_PM (UP/DN/BI)
Width
Capacity Up
Capacity Down
Capacity - Bi Direction
Calculated Capacity_PM
Stair Name
Edit...
Delete
Move Up
Move Down
確定
取消
帮助
BI 99 111 83 83
DN 99 111 83 111
BI 99 111 83 83

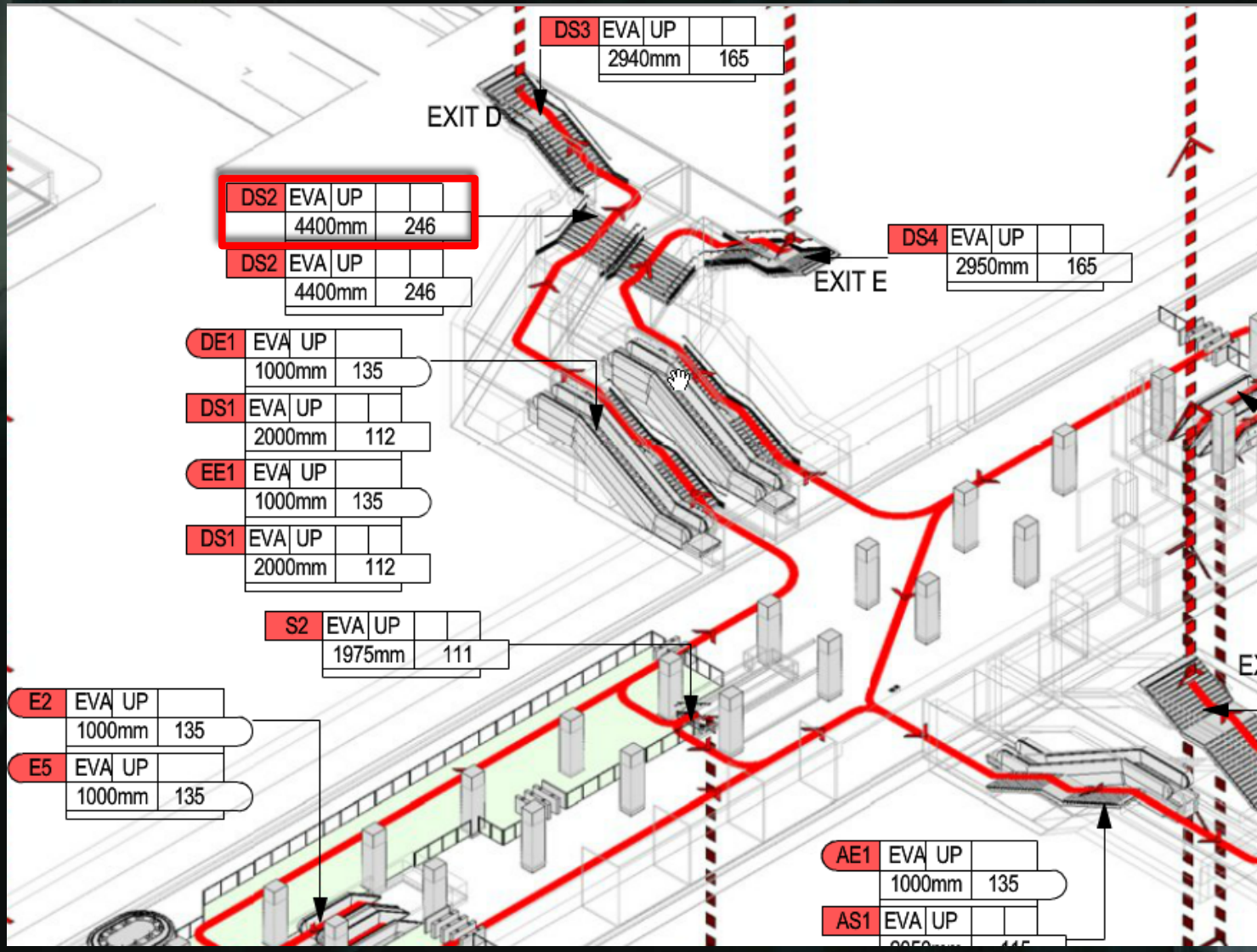
True BIM

(23 + 22) / 185
= 24.3%
= Safe

(Safety factor – over 80% Potential Danger)



True BIM


DS3 EVA UP
2940mm 165
EXIT D
DS2 EVA UP
4400mm 246
DS2 EVA UP
4400mm 246
DS4 EVA UP
2950mm 165
EXIT E
DE1 EVA UP
1000mm 135
DS1 EVA UP
2000mm 112
EE1 EVA UP
1000mm 135
DS1 EVA UP
2000mm 112
S2 EVA UP
1975mm 111
E2 EVA UP
1000mm 135
E5 EVA UP
1000mm 135
AE1 EVA UP
1000mm 135
AS1 EVA UP

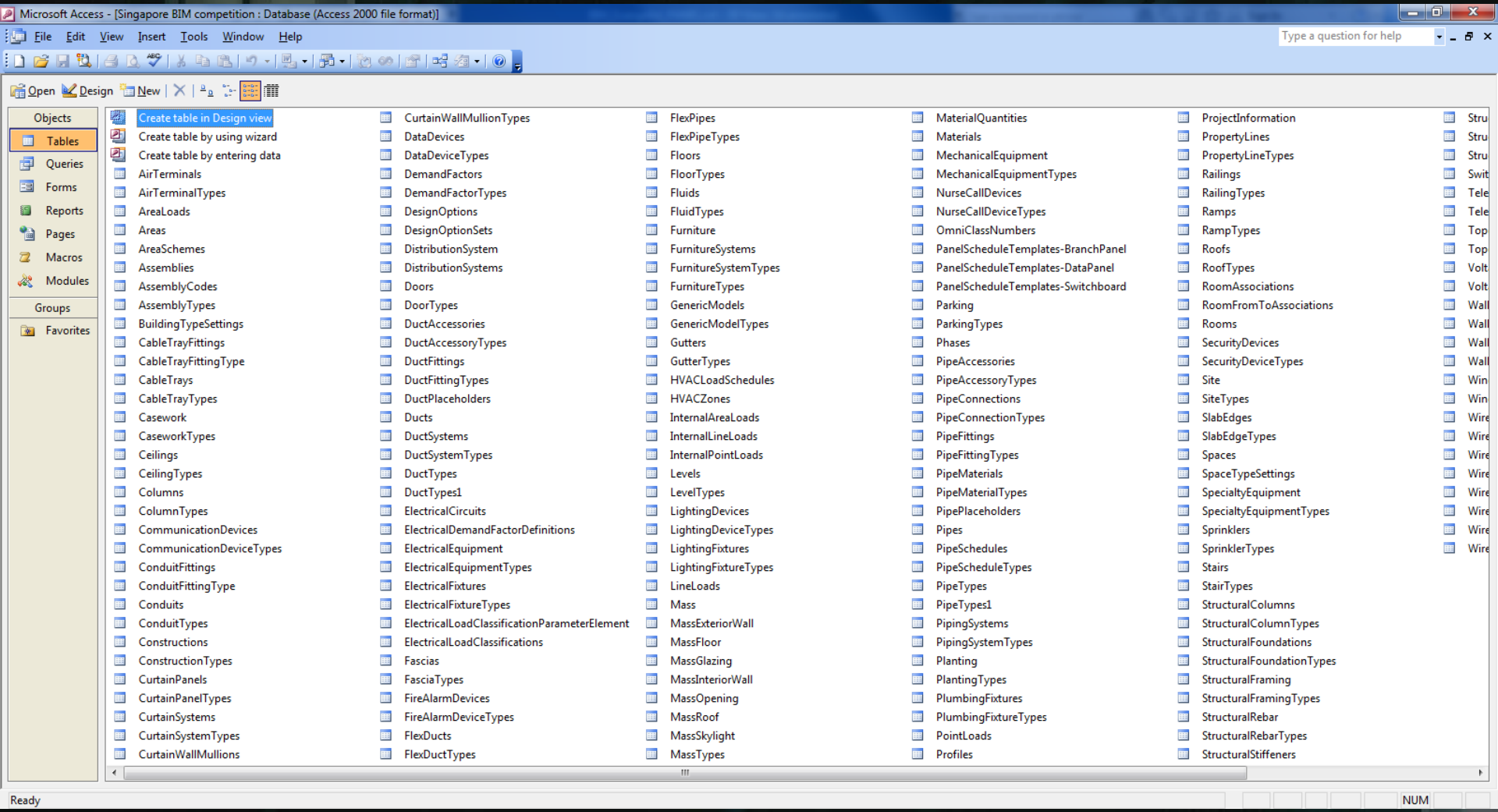
Case 4

True BIM (Operation Phase)

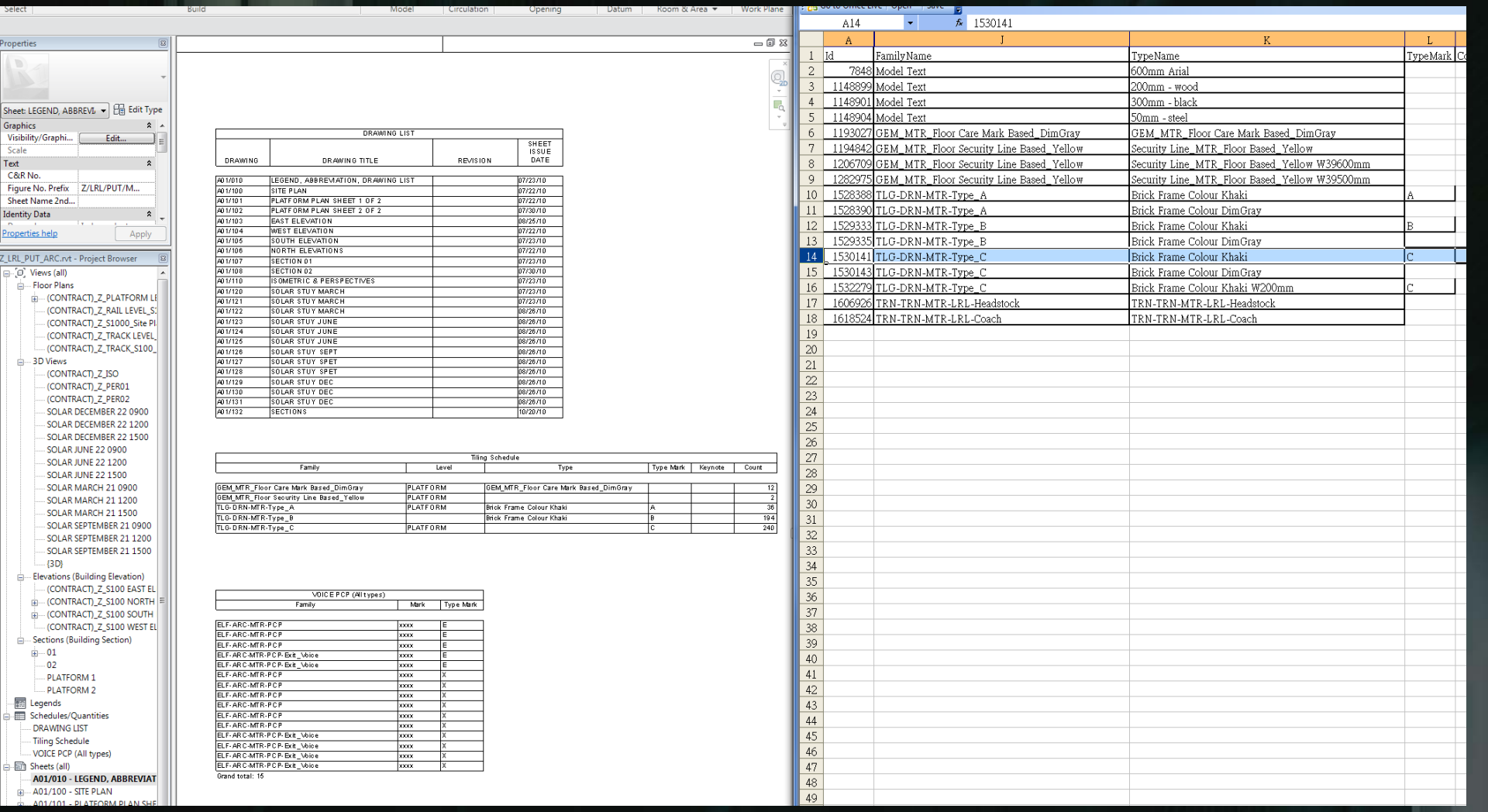
M + I = B

(Operation & Maintenance)

物业管理 - 维修保护


Microsoft Access - [Singapore BIM competition : Database (Access 2000 file format)]
File Edit View Insert Tools Window Help
Type a question for help
Open Design New
Objects
Tables
Queries
Forms
Reports
Pages
Macros
Modules
Groups
Favorites
Create table in Design view
Create table by using wizard
Create table by entering data
AirTerminals
AirTerminalTypes
AreaLoads
Areas
AreaSchemes
Assemblies
AssemblyCodes
AssemblyTypes
BuildingTypeSettings
CableTrayFittings
CableTrayFittingType
CableTrays
CableTrayTypes
Casework
CaseworkTypes
Ceilings
CeilingTypes
Columns
ColumnTypes
CommunicationDevices
CommunicationDeviceTypes
ConduitFittings
ConduitFittingType
Conduits
ConduitTypes
Constructions
ConstructionTypes
CurtainPanels
CurtainPanelTypes
CurtainSystems
CurtainSystemTypes
CurtainWallMullions
CurtainWallMullionTypes
DataDevices
DataDeviceTypes
DemandFactors
DemandFactorTypes
DesignOptions
DesignOptionSets
DistributionSystem
DistributionSystems
Doors
DoorTypes
DuctAccessories
DuctAccessoryTypes
DuctFittings
DuctFittingTypes
DuctPlaceholders
Ducts
DuctSystems
DuctSystemTypes
DuctTypes
DuctTypes1
ElectricalCircuits
ElectricalDemandFactorDefinitions
ElectricalEquipment
ElectricalEquipmentTypes
ElectricalFixtures
ElectricalFixtureTypes
ElectricalLoadClassificationParameterElement
ElectricalLoadClassifications
Fascias
FasciaTypes
FireAlarmDevices
FireAlarmDeviceTypes
FlexDucts
FlexDuctTypes
FlexPipes
FlexPipeTypes
Floors
FloorTypes
Fluids
FluidTypes
Furniture
FurnitureSystems
FurnitureSystemTypes
FurnitureTypes
GenericModels
GenericModelTypes
Gutters
GutterTypes
HVACLoadSchedules
HVACZones
InternalAreaLoads
InternalLineLoads
InternalPointLoads
Levels
LevelTypes
LightingDevices
LightingDeviceTypes
LightingFixtures
LightingFixtureTypes
LineLoads
Mass
MassExteriorWall
MassFloor
MassGlazing
MassInteriorWall
MassOpening
MassRoof
MassSkylight
MassTypes
MaterialQuantities
Materials
MechanicalEquipment
MechanicalEquipmentTypes
NurseCallDevices
NurseCallDeviceTypes
OmniClassNumbers
PanelScheduleTemplates-BranchPanel
PanelScheduleTemplates-DataPanel
PanelScheduleTemplates-Switchboard
Parking
ParkingTypes
Phases
PipeAccessories
PipeAccessoryTypes
PipeConnections
PipeConnectionTypes
PipeFittings
PipeFittingTypes
PipeMaterials
PipeMaterialTypes
PipePlaceholders
Pipes
PipeSchedules
PipeScheduleTypes
PipeTypes
PipeTypes1
PipingSystems
PipingSystemTypes
Planting
PlantingTypes
PlumbingFixtures
PlumbingFixtureTypes
PointLoads
Profiles
ProjectInformation
PropertyLines
PropertyLineTypes
Railings
RailingTypes
Ramps
RampTypes
Roofs
RoofTypes
RoomAssociations
RoomFromToAssociations
Rooms
SecurityDevices
SecurityDeviceTypes
Site
SiteTypes
SlabEdges
SlabEdgeTypes
Spaces
SpaceTypeSettings
SpecialtyEquipment
SpecialtyEquipmentTypes
Sprinklers
SprinklerTypes
Stairs
StairTypes
StructuralColumns
StructuralColumnTypes
StructuralFoundations
StructuralFoundationTypes
StructuralFraming
StructuralFramingTypes
StructuralRebar
StructuralRebarTypes
StructuralStiffeners
Ready
NUM

True BIM – Operation & Maintenance



DRAWING LIST

DRAWING	DRAWING TITLE	REVISION	SHEET ISSUE 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		07/30/10
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 STUY MARCH		07/23/10
A01/121	SOLAR STUY MARCH		07/23/10
A01/122	SOLAR STUY MARCH		08/26/10
A01/123	SOLAR STUY JUNE		08/26/10
A01/124	SOLAR STUY JUNE		08/26/10
A01/125	SOLAR STUY JUNE		08/26/10
A01/126	SOLAR STUY SEPT		08/26/10
A01/127	SOLAR STUY SPET		08/26/10
A01/128	SOLAR STUY SPET		08/26/10
A01/129	SOLAR STUY DEC		08/26/10
A01/130	SOLAR STUY DEC		08/26/10
A01/131	SOLAR STUY DEC		08/26/10
A01/132	SECTIONS		10/20/10

Tiling Schedule

Family	Level	Type	Type Mark	Keynote	Count
GEM_MTR_Floor Care Mark Based_DimGray	PLATFORM	GEM_MTR_Floor Care Mark Based_DimGray			12
GEM_MTR_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		C		240

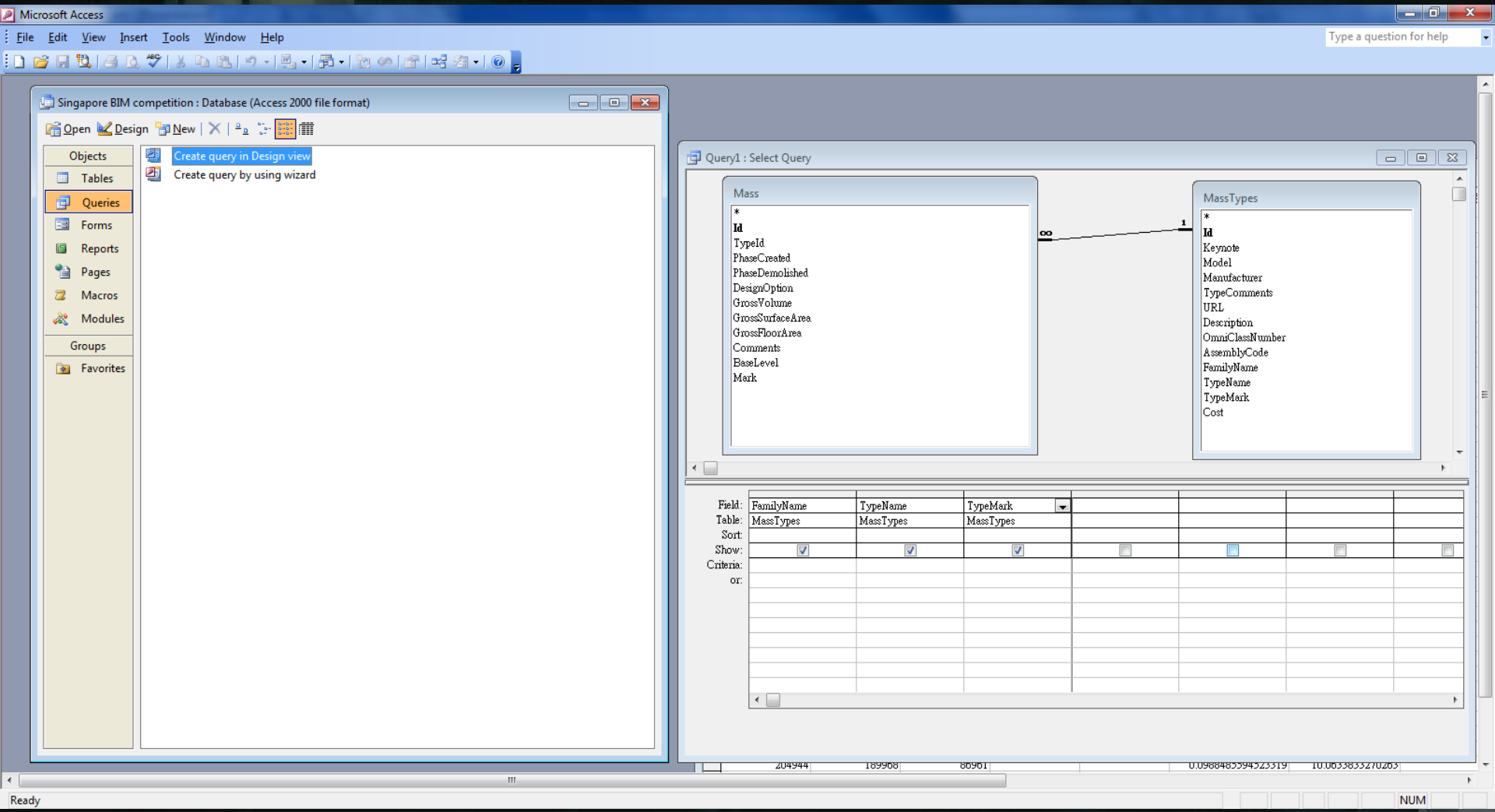
VOICE PCP (All types)

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	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

	A	J	K	L
1	Id	FamilyName	TypeName	TypeMark
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	A
11	1528390	TLG-DRN-MTR-Type_A	Brick Frame Colour DimGray	
12	1529333	TLG-DRN-MTR-Type_B	Brick Frame Colour Khaki	B
13	1529335	TLG-DRN-MTR-Type_B	Brick Frame Colour DimGray	
14	1530141	TLG-DRN-MTR-Type_C	Brick Frame Colour Khaki	C
15	1530143	TLG-DRN-MTR-Type_C	Brick Frame Colour DimGray	
16	1532279	TLG-DRN-MTR-Type_C	Brick Frame Colour Khaki W200mm	C
17	1606926	TRN-TRN-MTR-LRL-Headstock	TRN-TRN-MTR-LRL-Headstock	
18	1618524	TRN-TRN-MTR-LRL-Coach	TRN-TRN-MTR-LRL-Coach	

True BIM – Operation & Maintenance



True BIM – Operation & Maintenance

Query1 : Select Query

FamilyName	TypeName
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

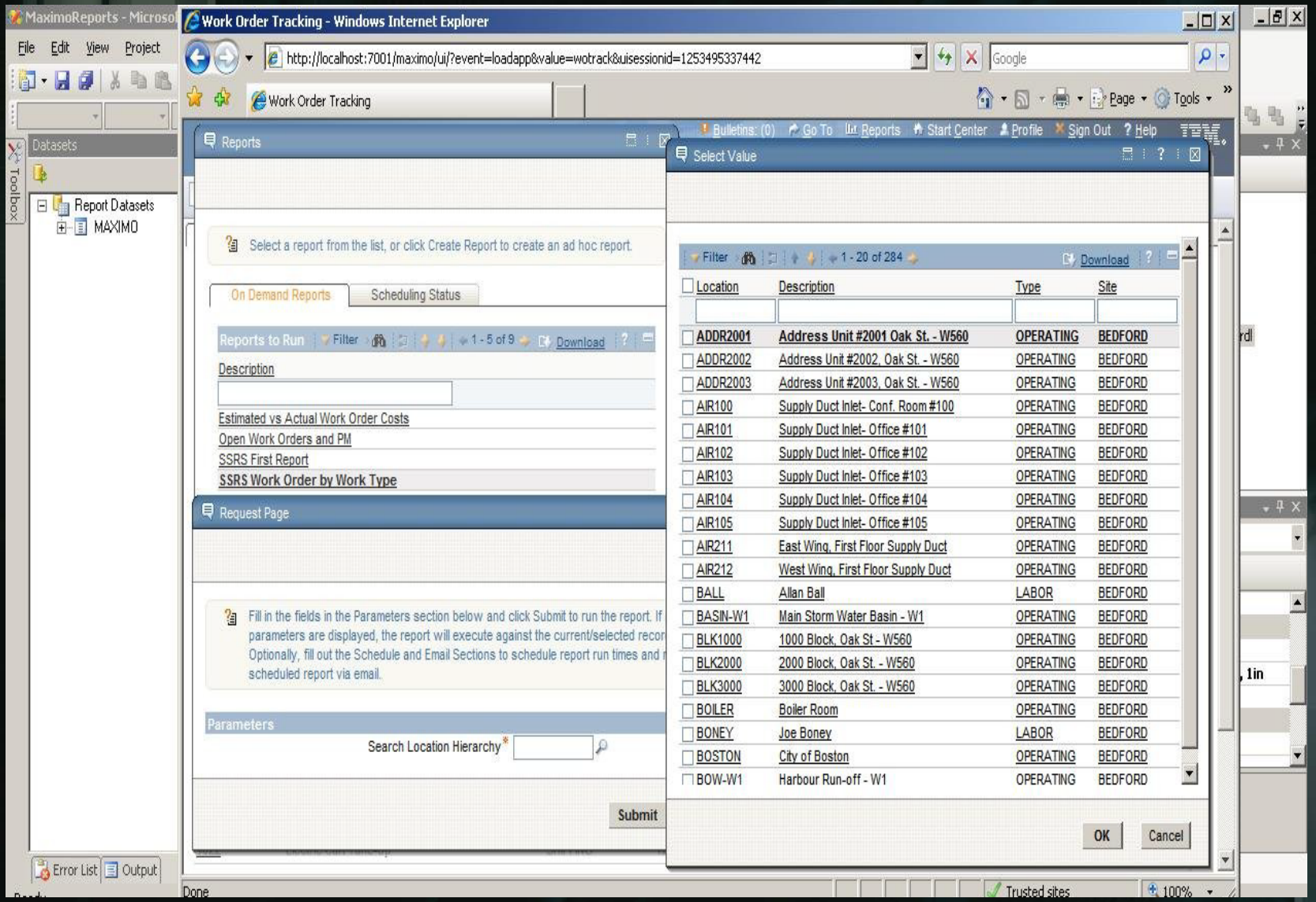
Function	A room for storage of small volume of cleansing materials, tools and short stay of cleaners							
Size	15 - 20 m^2							
Occupants	3-5 persons							
Location	Non-public area							
Fire Rating	# In accordance with Fire Safety Standard for KTL/TWL/ISL Stations - S/ARC/PD/005							
Security 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 - "Laticrete 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 - "Laticrete 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; Durable paint on c/s render above 2100 high - "Alphadecor, colour 9010 White" or equal approved		Durable paint on fairface concrete - "Alphadecor, 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: Inside	Access Card: Outside	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	---							

Revision D

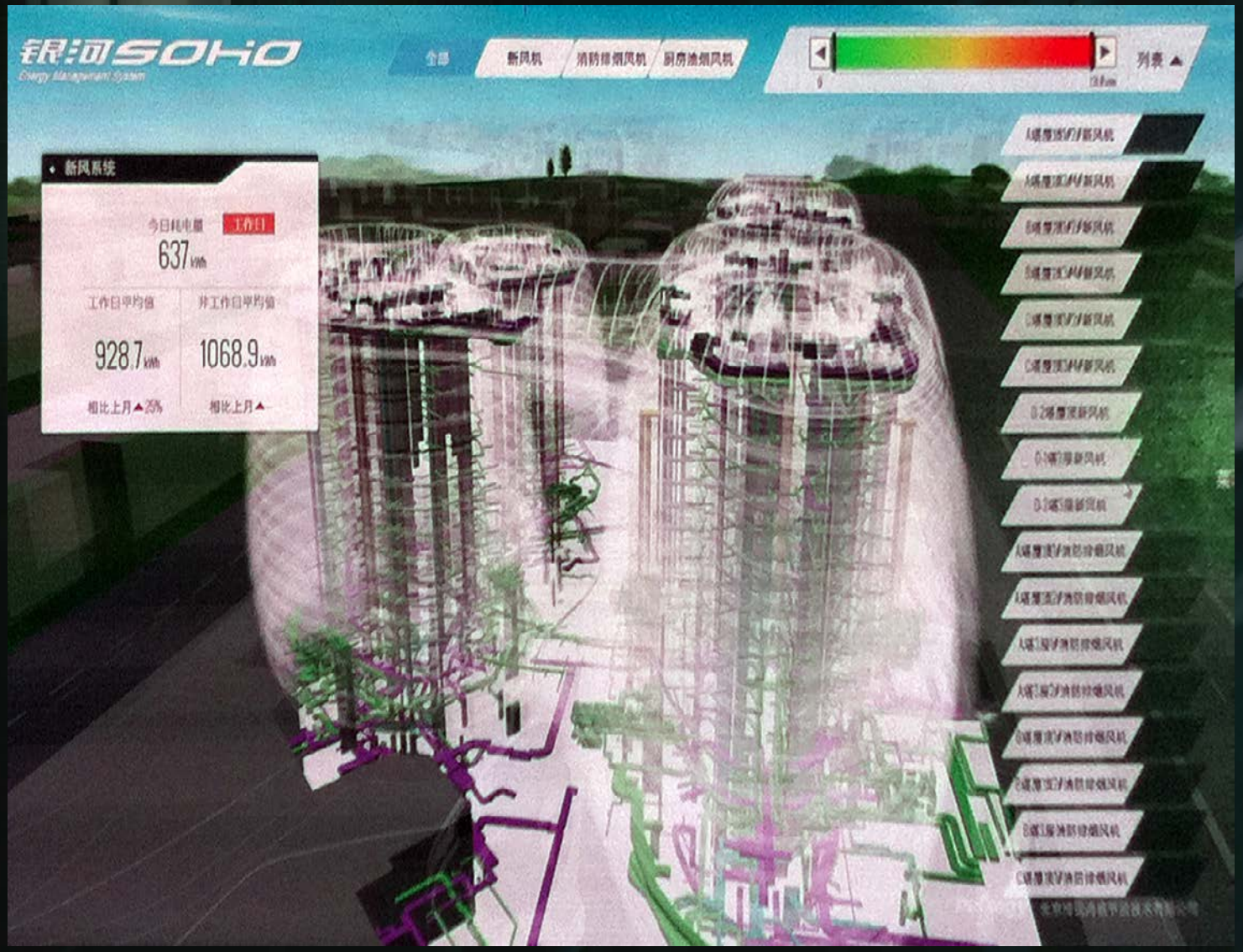
* Dependent on location - stainless steel door to be used when facing public areas.
- painted doors to be used when facing BofH areas.

ROOM DATA SHEET

True BIM – Operation & Maintenance

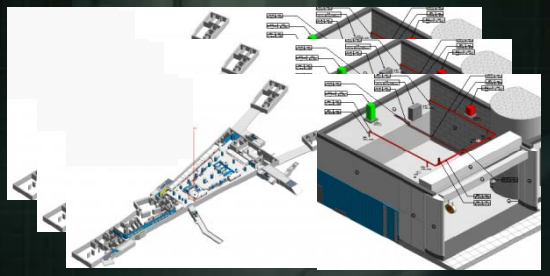


True BIM – Operation & Maintenance

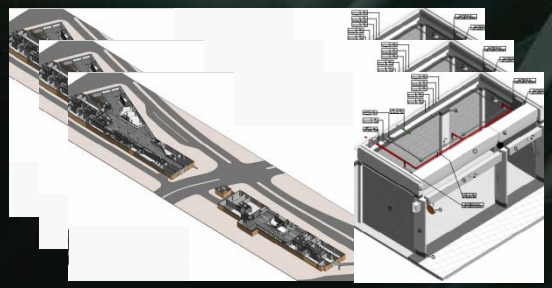


MODELLING + INDIVIDUAL DATABASE

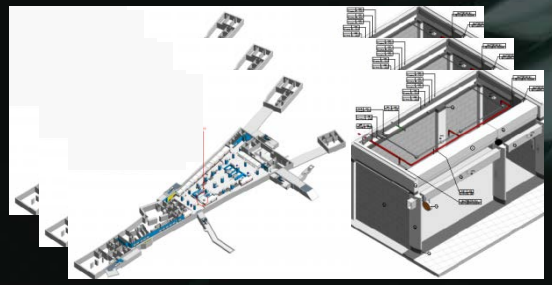
S1



S2



S3



FLEET WIDE DATABASE

MEGA DATABASE

OTHER DATABASES

APPLICATIONS

APP 1

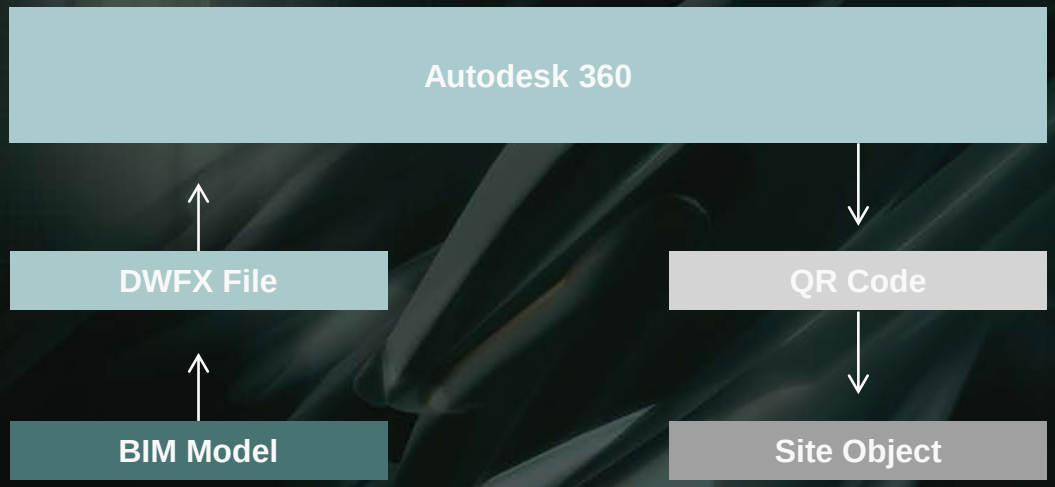
E.G. CCTV MONITORING

APP 2

E.G. RETAIL

APP 3

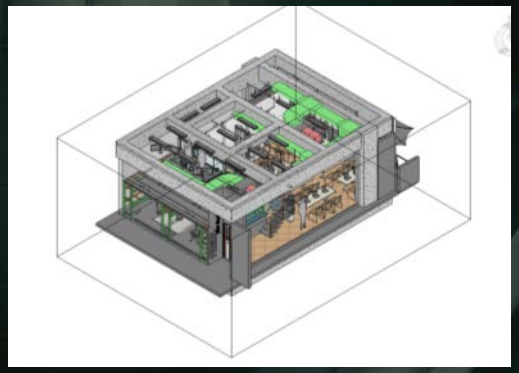
Linkage between object on site and BIM Model

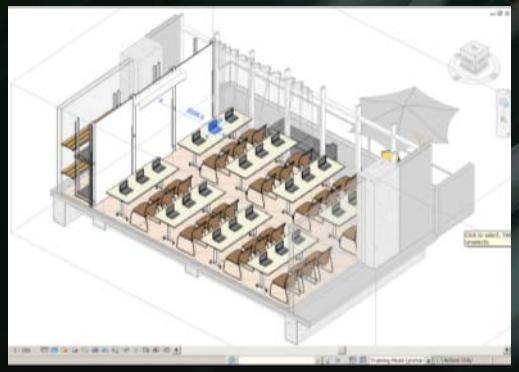


Interoperability between BIM Model and Reality

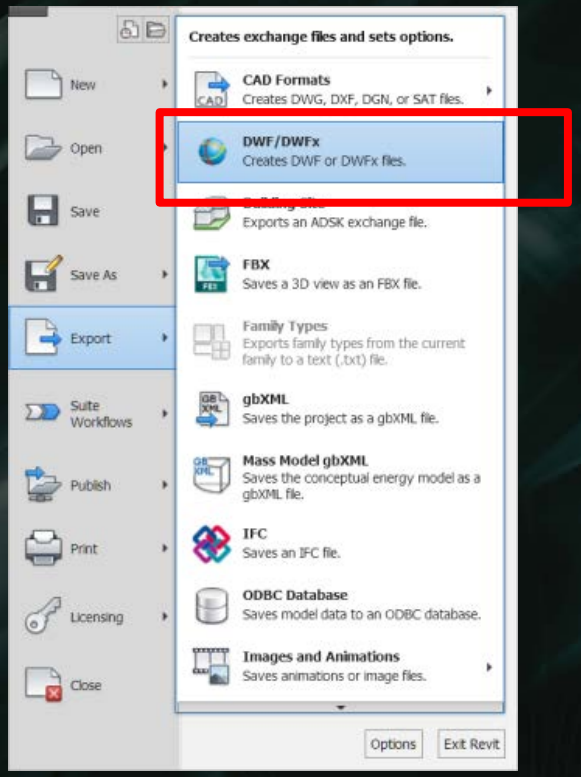
Linkage between object on site and BIM Model

Prepare the BIM Model





Export to DWFX format

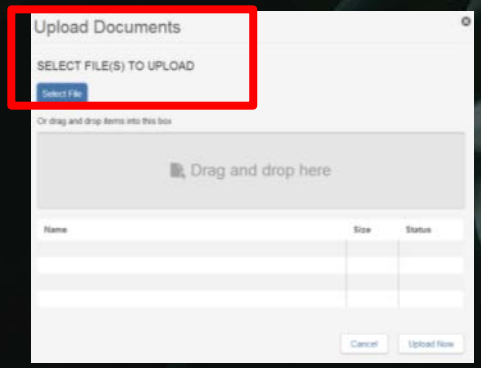


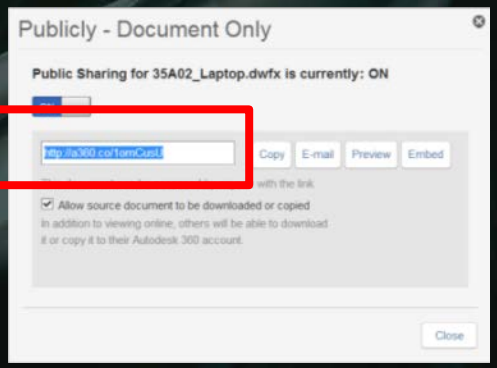
Interoperability between BIM Model and Reality

2.0 Linkage between object on site and BIM Model

Access to Autodesk 360

Upload and share the DWFX file

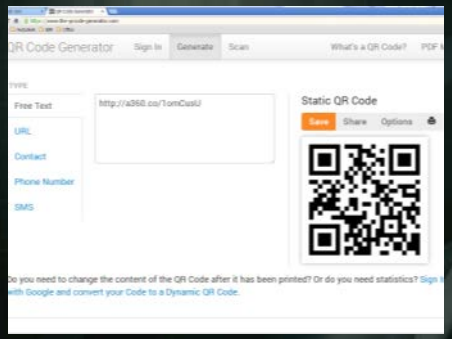




Linkage between object on site and BIM Model

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