

FLUID TRANSLATION

FLEXIBILITÄT VON BIM IM ENTWURF



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11. BIM-Anwendertag | 21.05.2014 | Königstein im Taunus



FLUID TRANSLATION – FLEXIBILITÄT VON BIM IM ENTWURF

Mit der Olaya Metro Station von Gerber Architekten entsteht einer der modernsten Hauptbahnhöfe in Riad (Saudi Arabien), als Teil des derzeit weltgrößten Metroprojekts.

Aus der Wettbewerbsphase entwickelte sich in der weiteren Bearbeitung die Anforderung zur Integration in eine komplexe, multidisziplinäre BIM Struktur im internationalen Kontext.

Neben den Vorteilen von BIM in späteren Leistungsphasen, gibt es immer noch Bedenken BIM bereits im Entwurfs- und Wettbewerbsstadium einzusetzen. Dies wird oft mit der eingeschränkten Flexibilität im Modellieren komplexer Geometrien begründet.

Die Kombination unterschiedlicher BIM Anwendungen kann hierfür einen Lösungsansatz darstellen.

Anhand eines aktuellen Projekts, der Olaya Metro Station, sollen die entwickelten Strategien veranschaulicht werden.

INHALT

- Olaya Metro Station
- Vom Wettbewerb in die Ausarbeitung
- Konkrete Anwendung der Arbeitsmethode BIM - Komponenten/Prozess

- Parametrik im BIM-Modell
- Kollaboration mit Fachbereichsmodellen
- Projekt-Output
- Gebäudeanalyse
- Ausführungsplanung

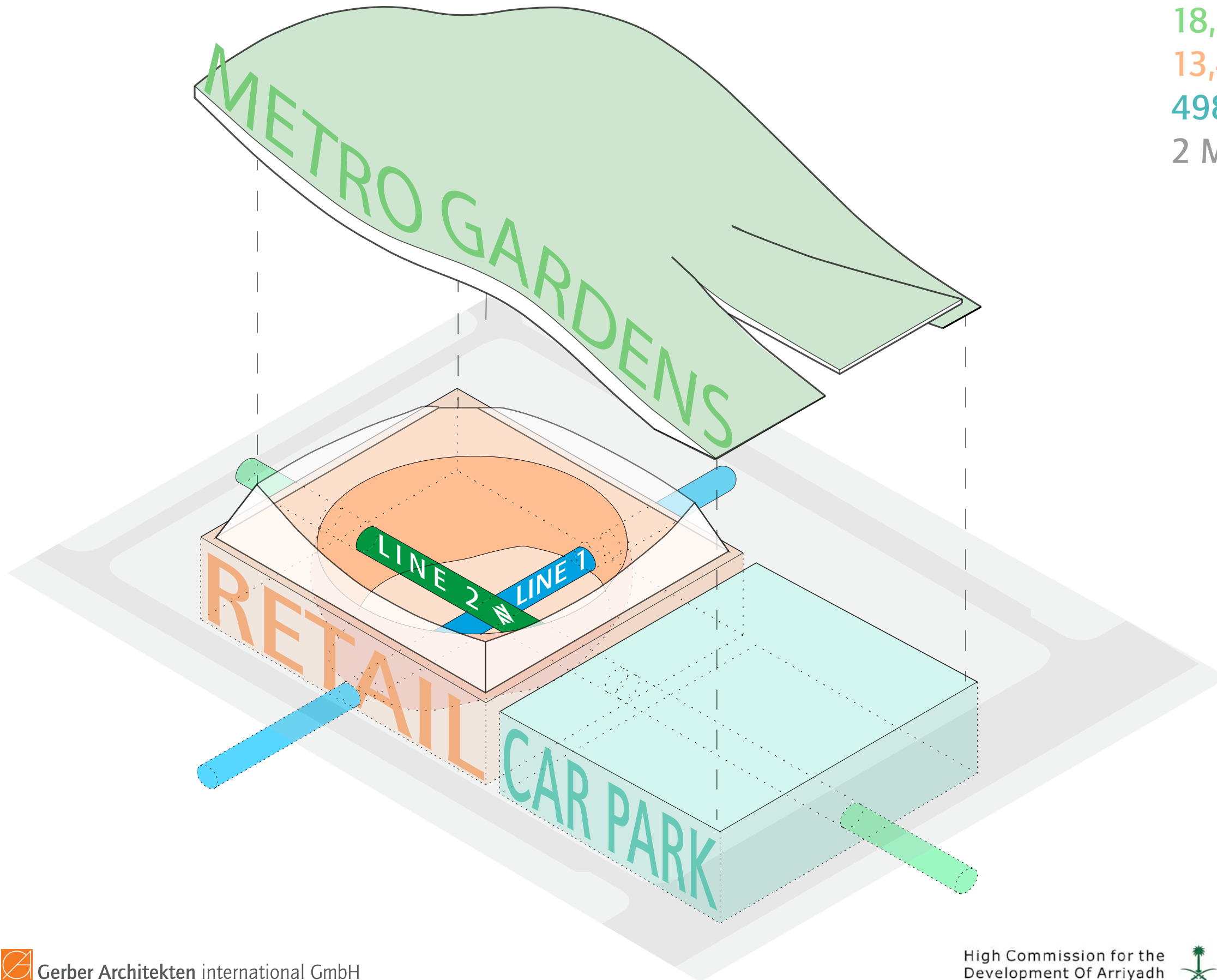
- GA BIM Projekte/ Wettbewerbe





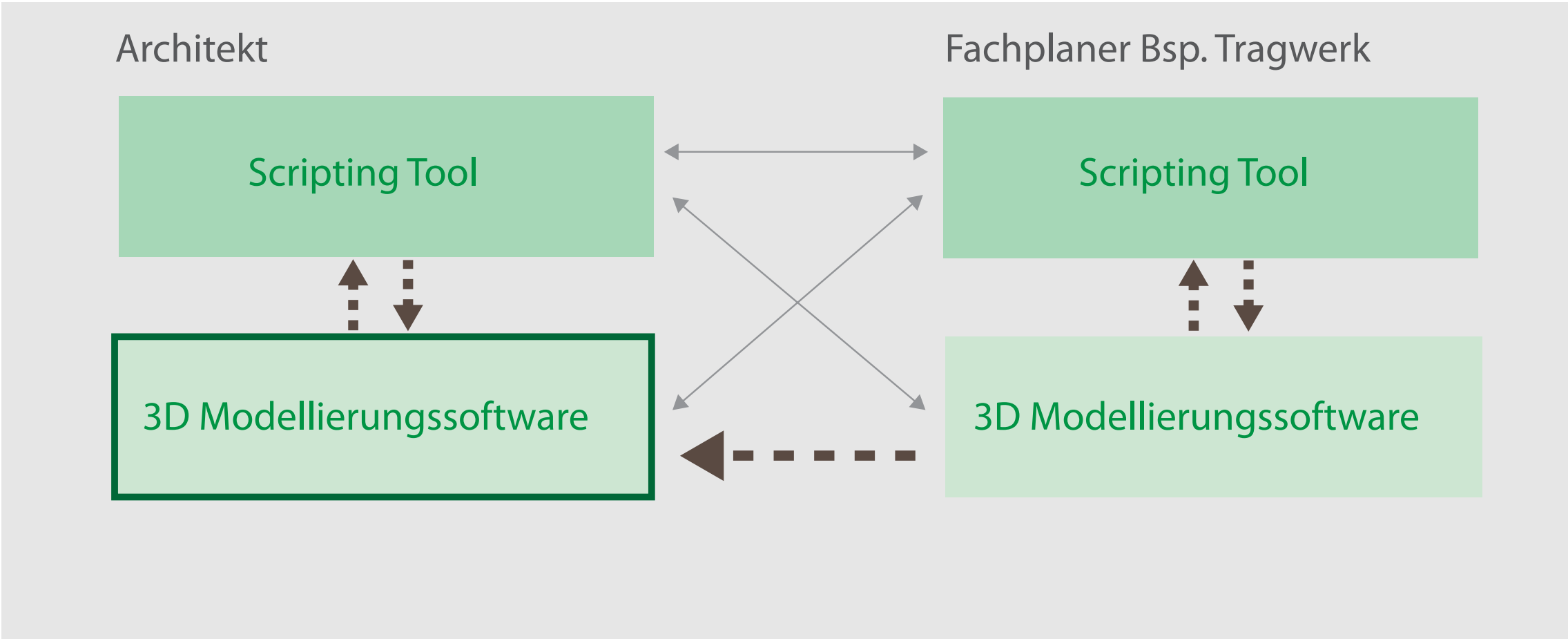
In the Name of GOD, Most Merciful, Most Gracious



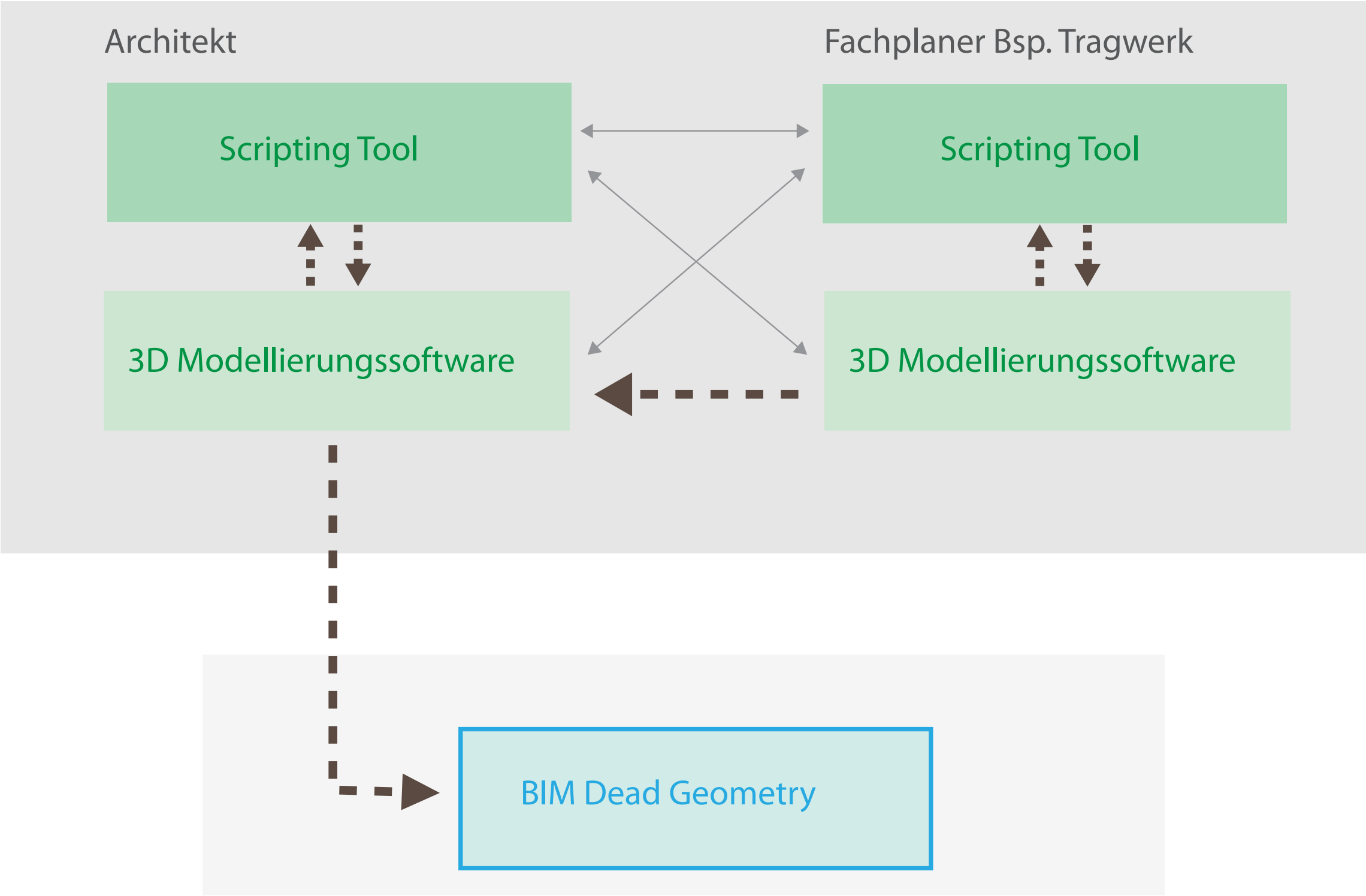


18,562 sqm Rooftop Park
 13,445 sqm of Retail Space
 498 Car Parking Spaces
 2 Metro Lines ⇄

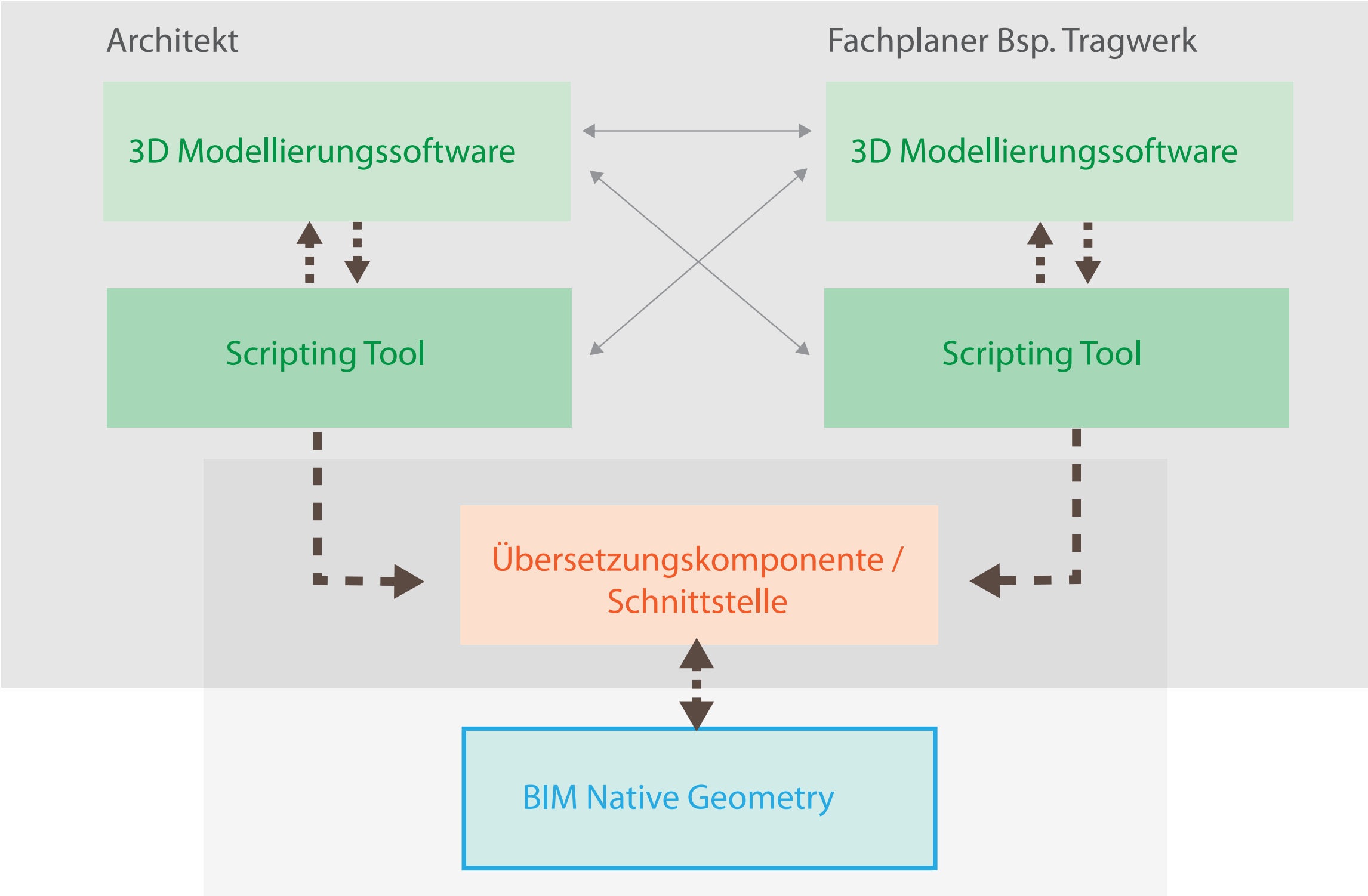
WETTBEWERB



PROJEKTSTART / PHASE 1

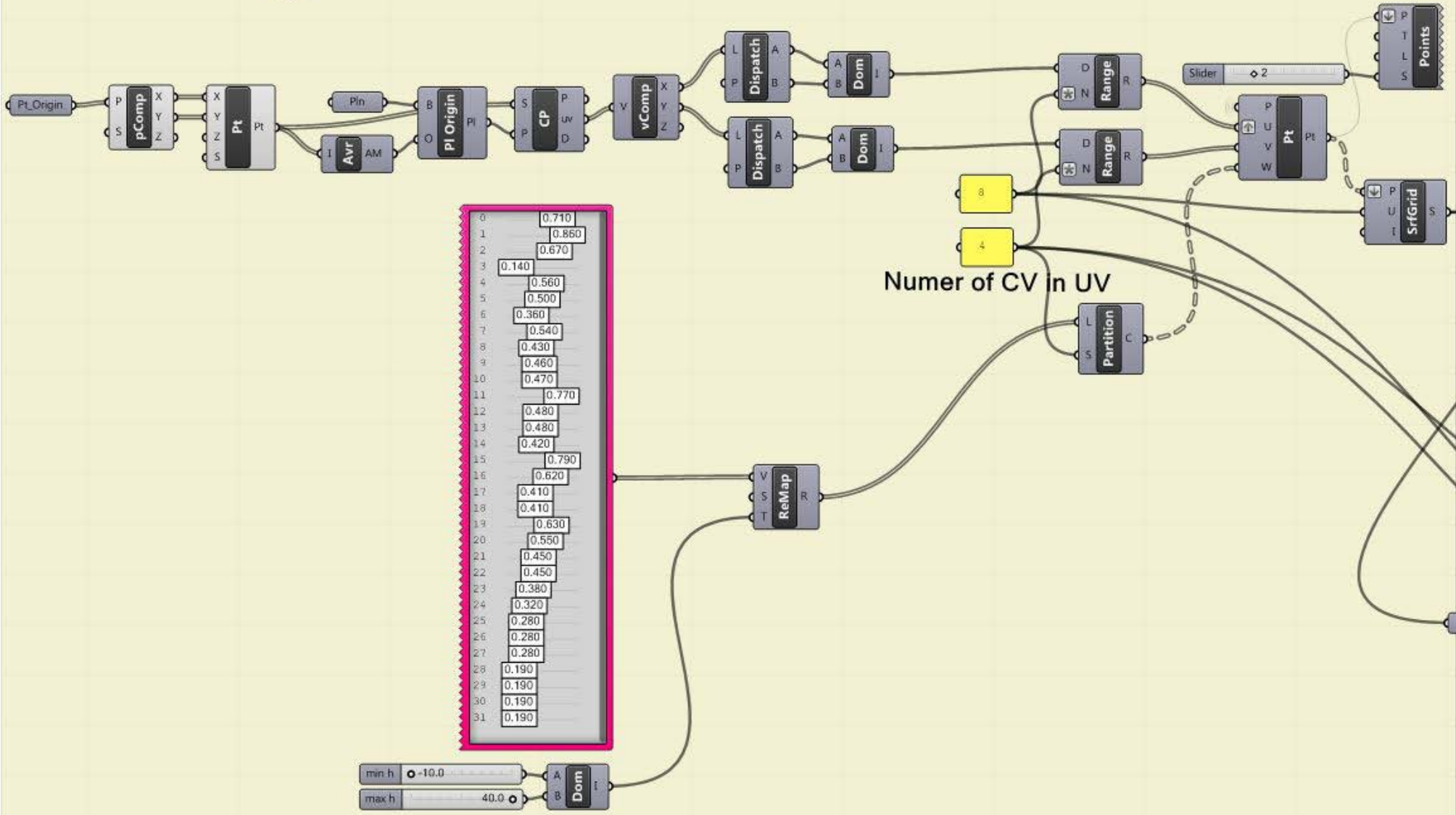


OPTIMIERUNG IM PROJEKTVERLAUF



SCRIPTING TOOL - BEISPIEL GENERIERUNG DER DACHFLÄCHE

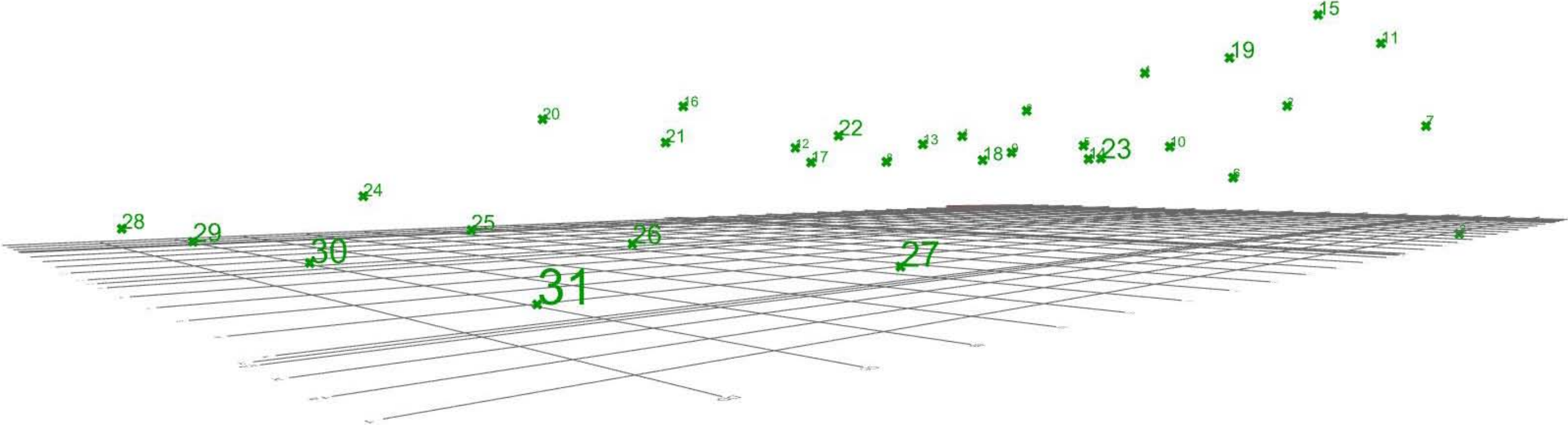
Design Surface



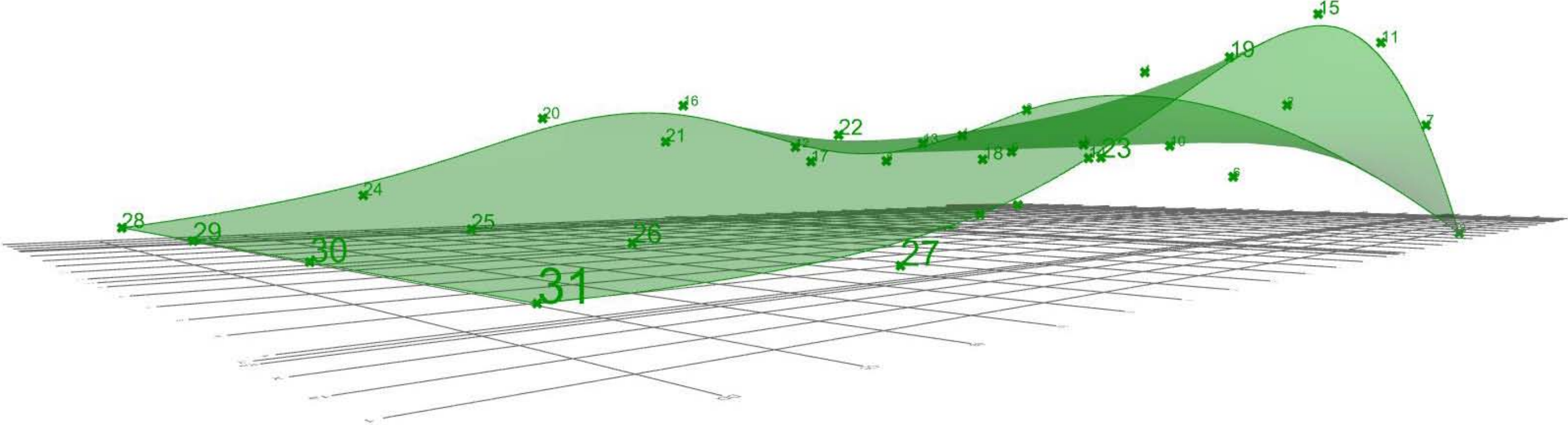
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1	0.860
2	0.670
3	0.140
4	0.560
5	0.500
6	0.360
7	0.540
8	0.430
9	0.460
10	0.470
11	0.770
12	0.480
13	0.480
14	0.420
15	0.790
16	0.620
17	0.410
18	0.410
19	0.630
20	0.550
21	0.450
22	0.450
23	0.380
24	0.320
25	0.280
26	0.280
27	0.280
28	0.190
29	0.190
30	0.190
31	0.190

0	0.710
1	0.860
2	0.670
3	0.140
4	0.560
5	0.500
6	0.360
7	0.540
8	0.430
9	0.460
10	0.470
11	0.770
12	0.480
13	0.480
14	0.420
15	0.790
16	0.620
17	0.410
18	0.410
19	0.630
20	0.550
21	0.450
22	0.450
23	0.380
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31	0.190

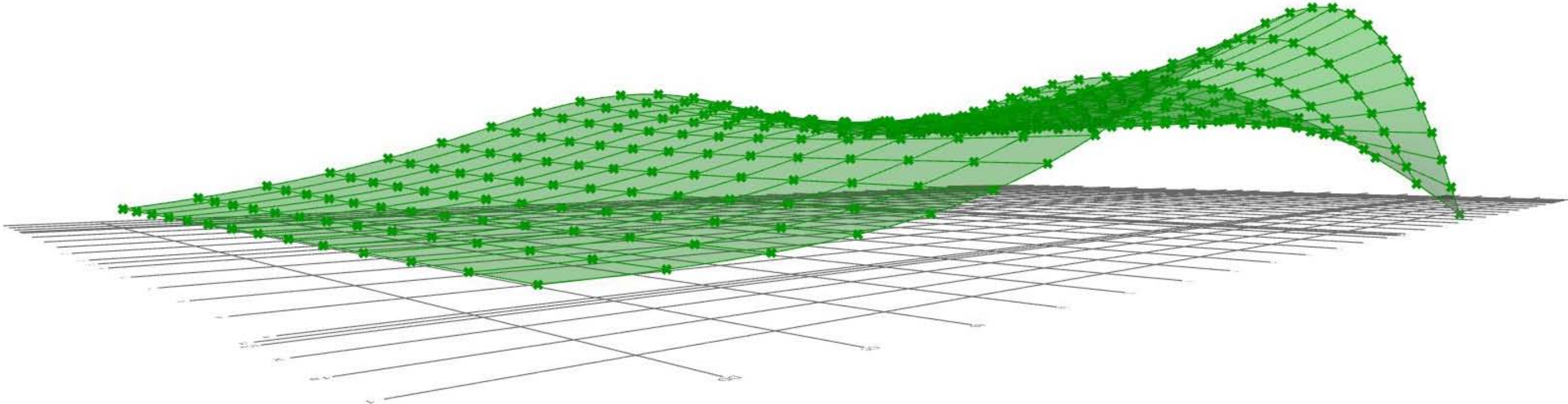
Modifizierungspunkte für Oberfläche generieren



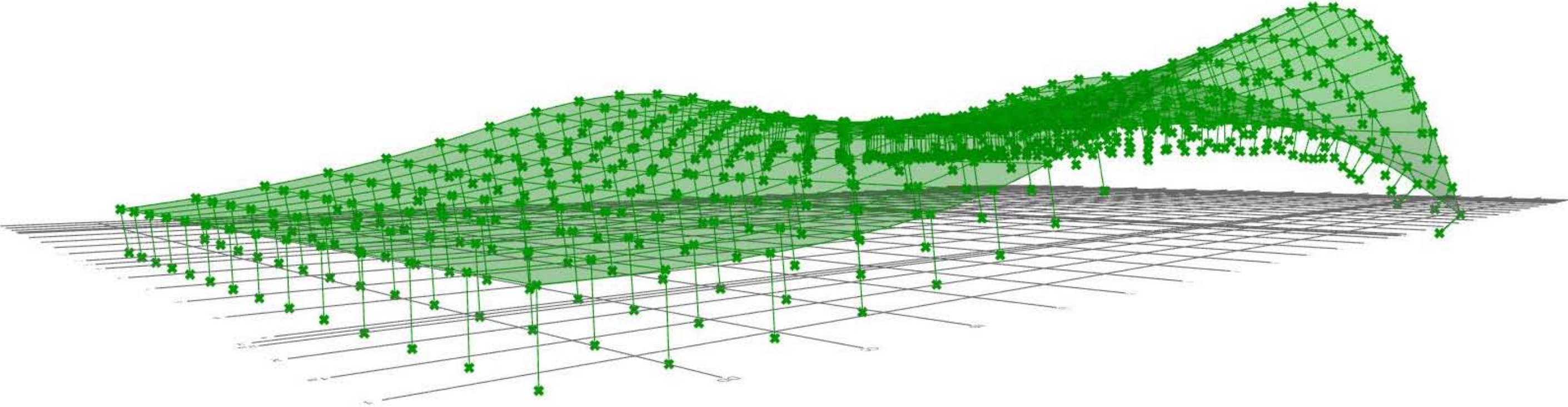
Generieren der Oberfläche



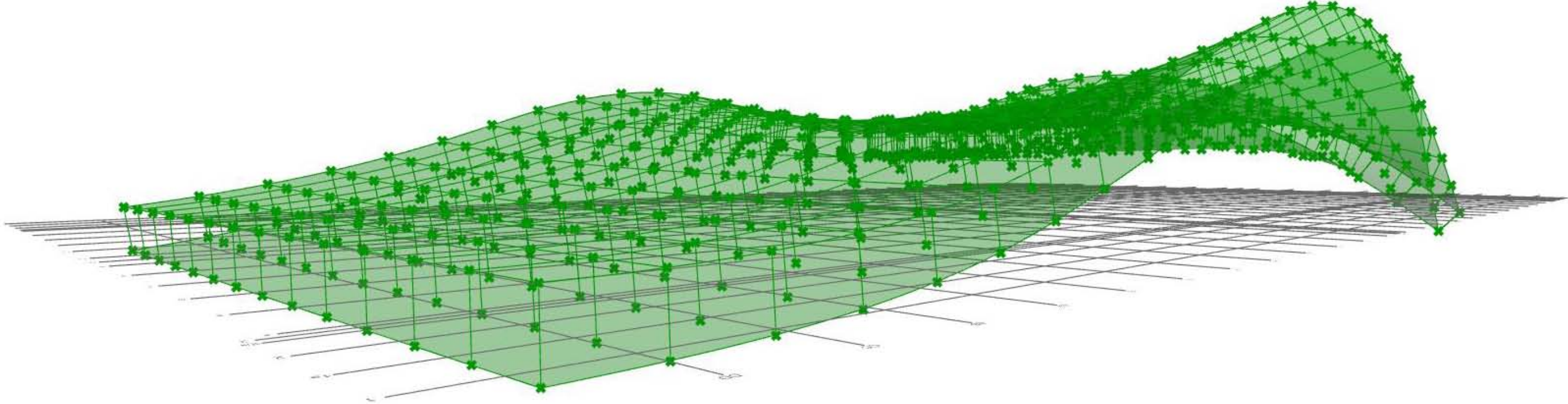
Raster für Oberfläche erstellen



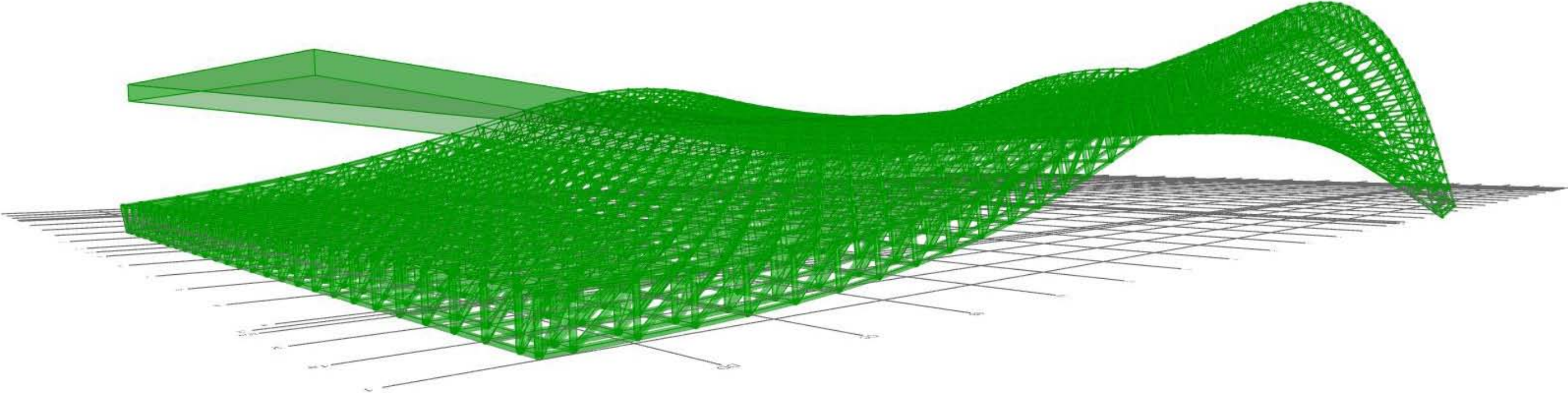
Dachunterseite in Abhängigkeit von benötigter Tragwerkshöhe



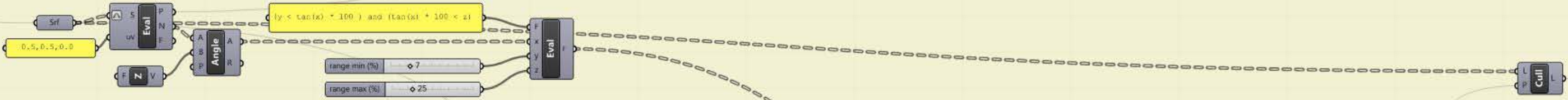
Dachunterseite in Abhängigkeit von benötigter Tragwerkshöhe



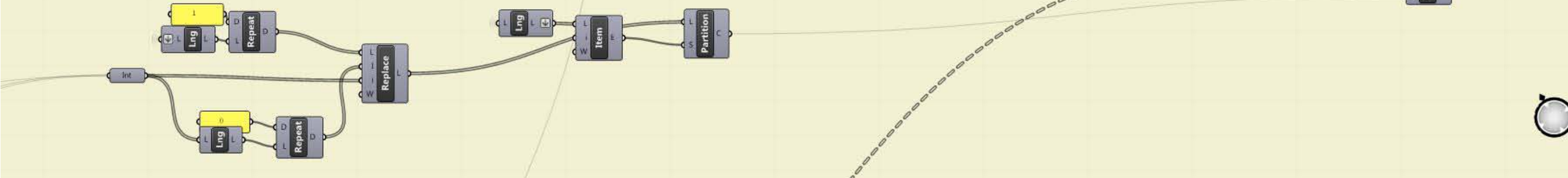
Script als Basis für Tragwerksanalyse



Evaluate by inclination



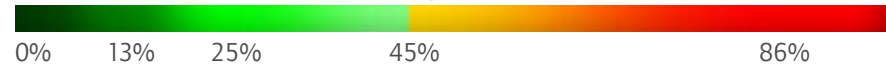
Remove Items from selection (Steps)



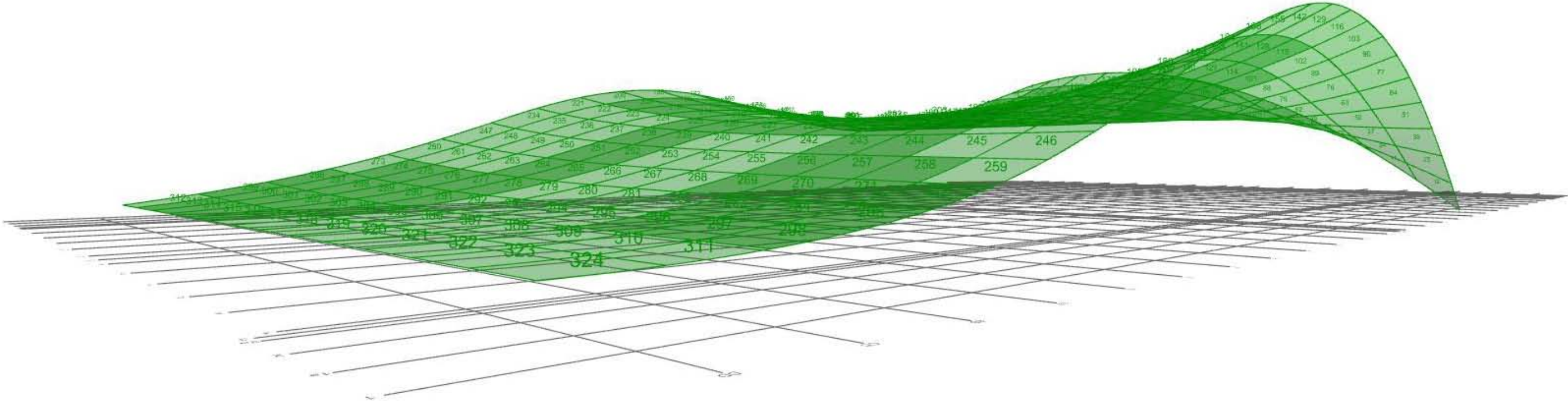
Steigungsanalyse Dachfläche Wettbewerbsstand



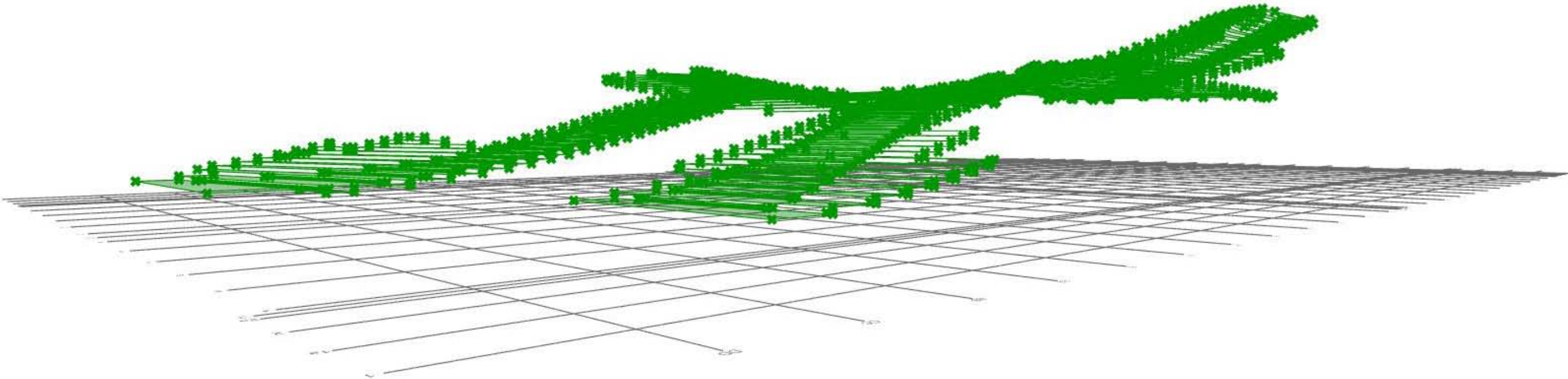
Number Code Based on Line of Greatest Slope
 Colour Code Based on Average Patch Inclination



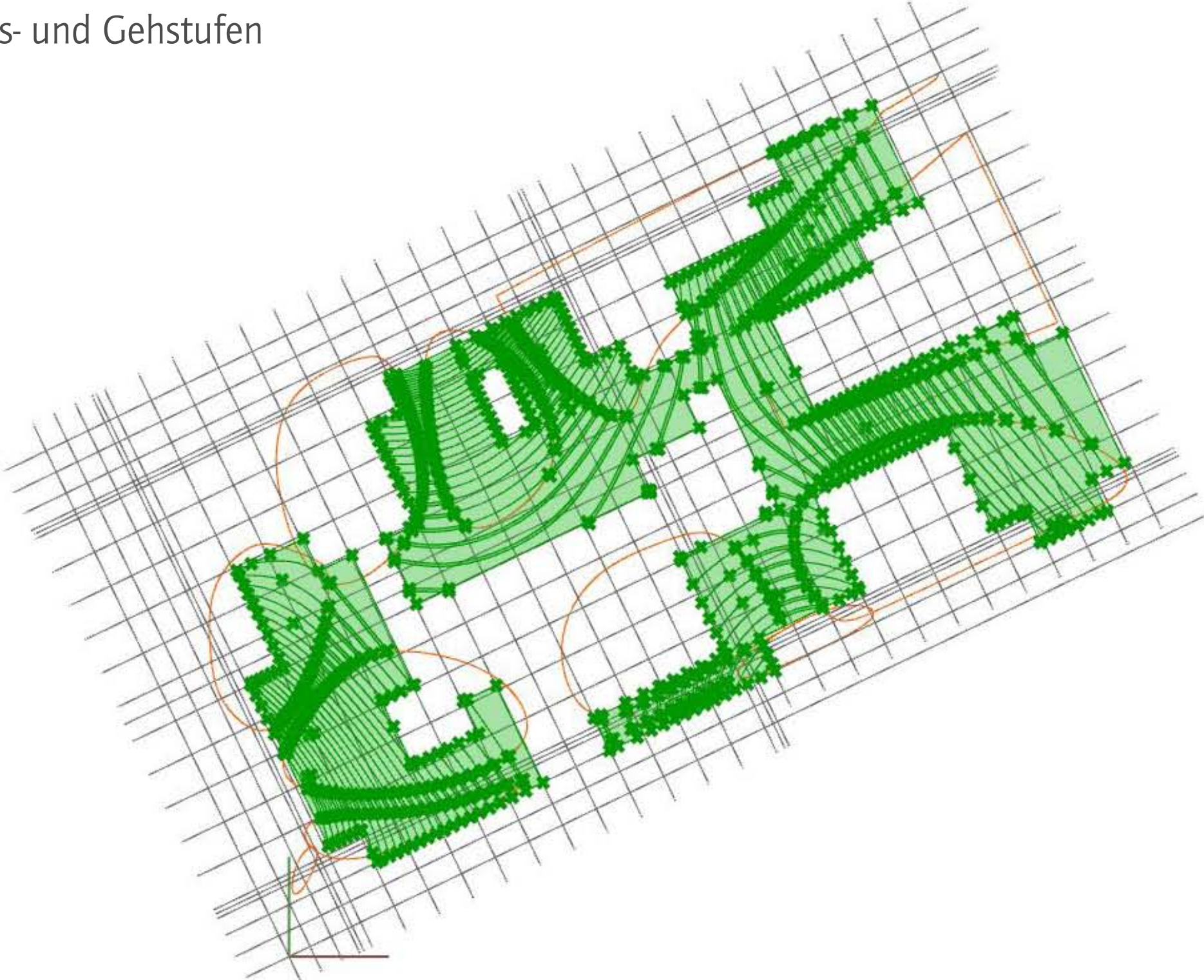
Parametrische und manuelle Auswahl der Stufenfelder



Generierung der Landschafts- und Gehstufen

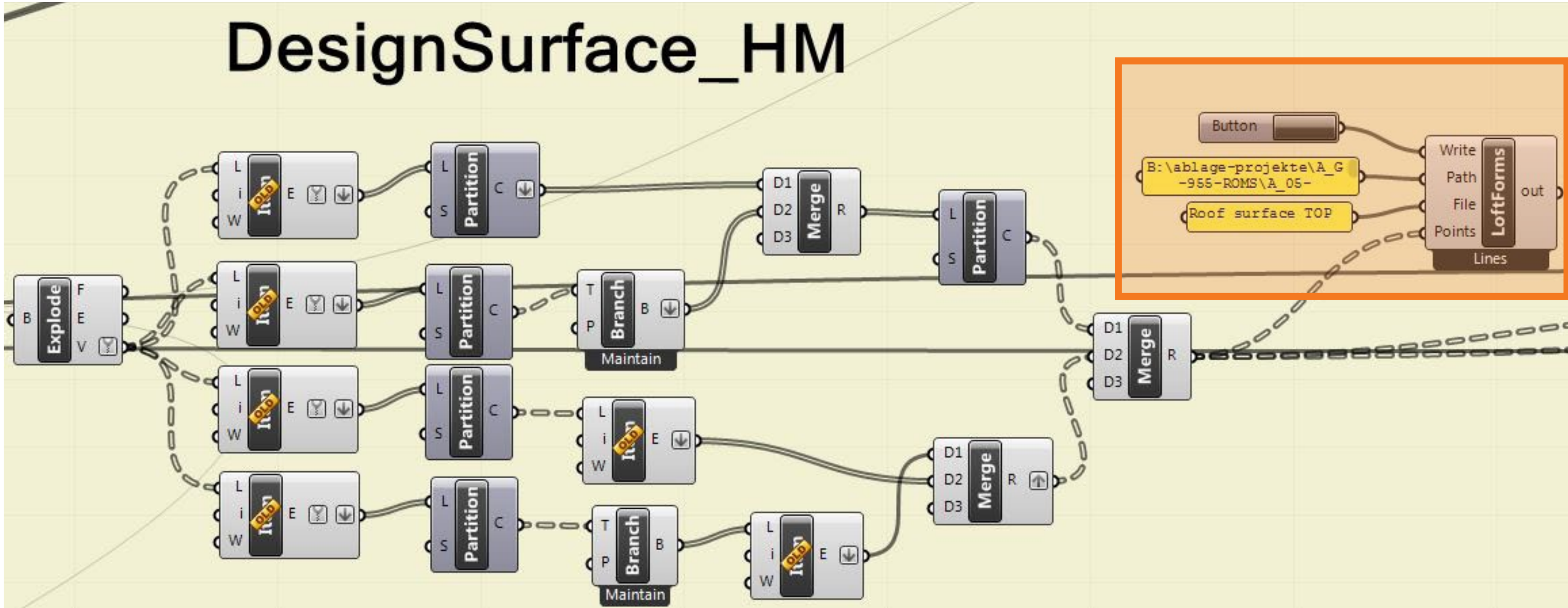


Generierung der Landschafts- und Gehstufen



ÜBERSETZUNGSKOMPONENTE/SCHNITTSTELLE

- Grasshopper Definition wird in CSV-Code übersetzt



CSV - CODE

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RowId,ElementId,Action,Object,Value01,Value02,Value03,Value04
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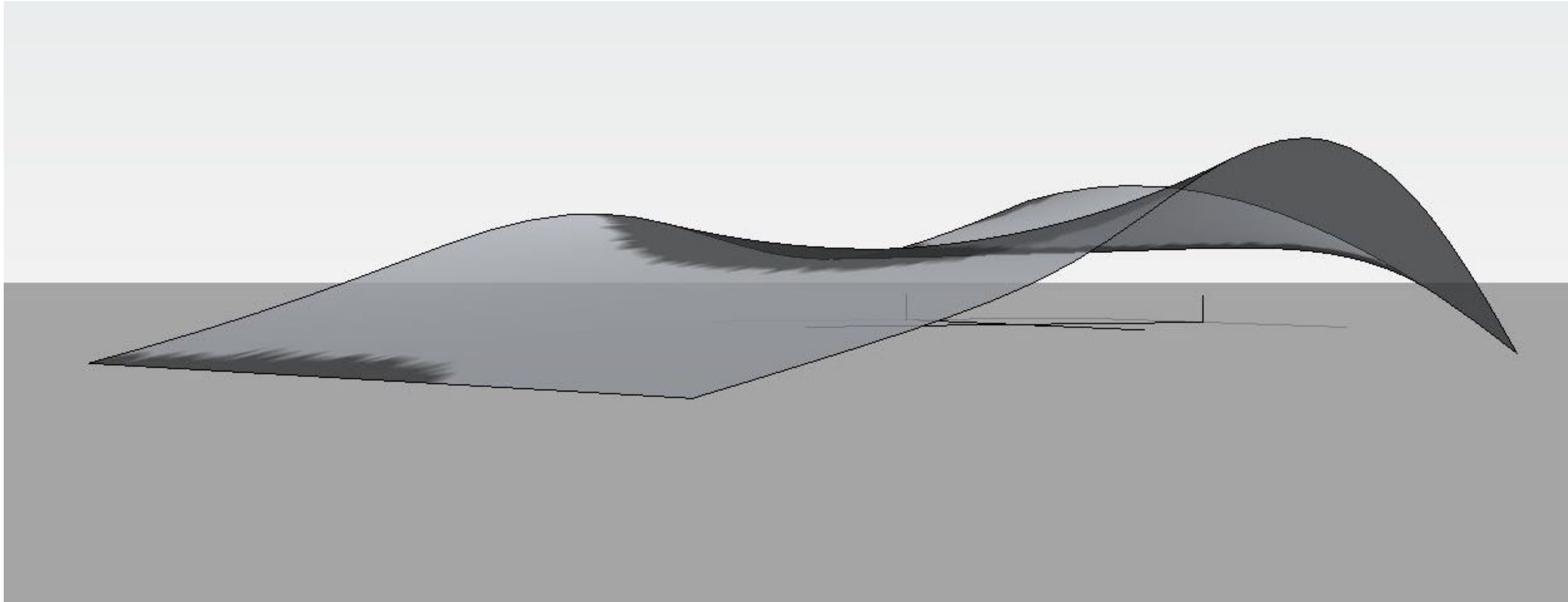
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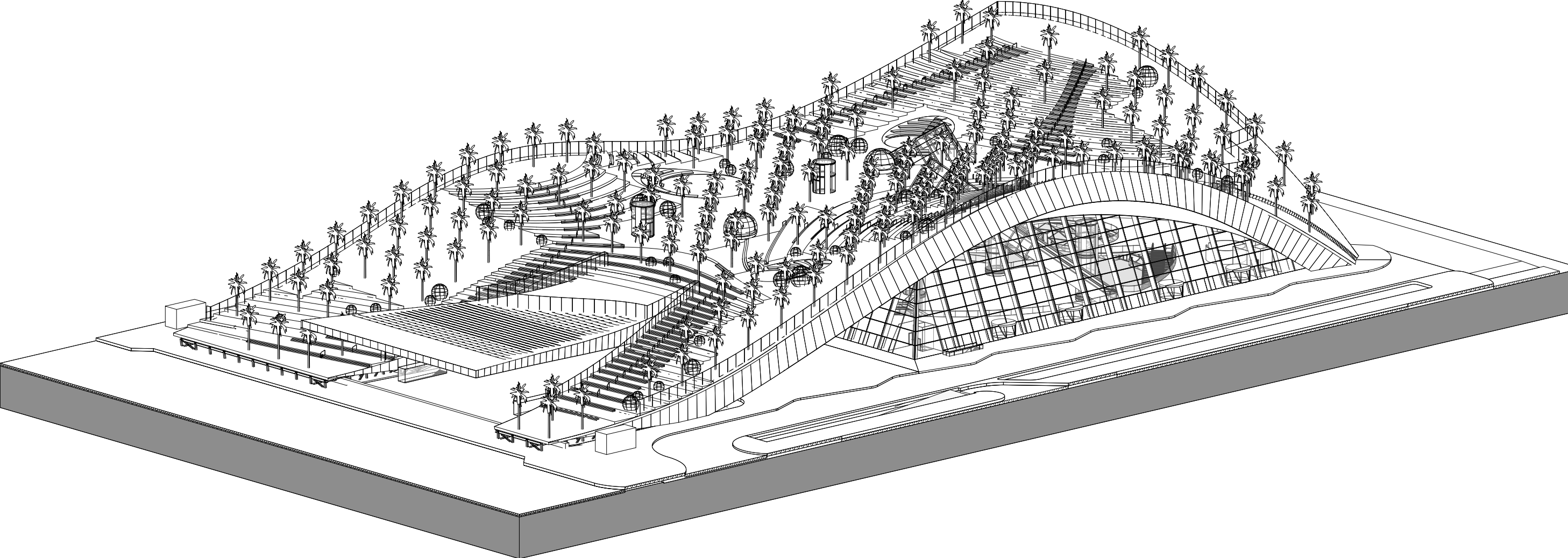
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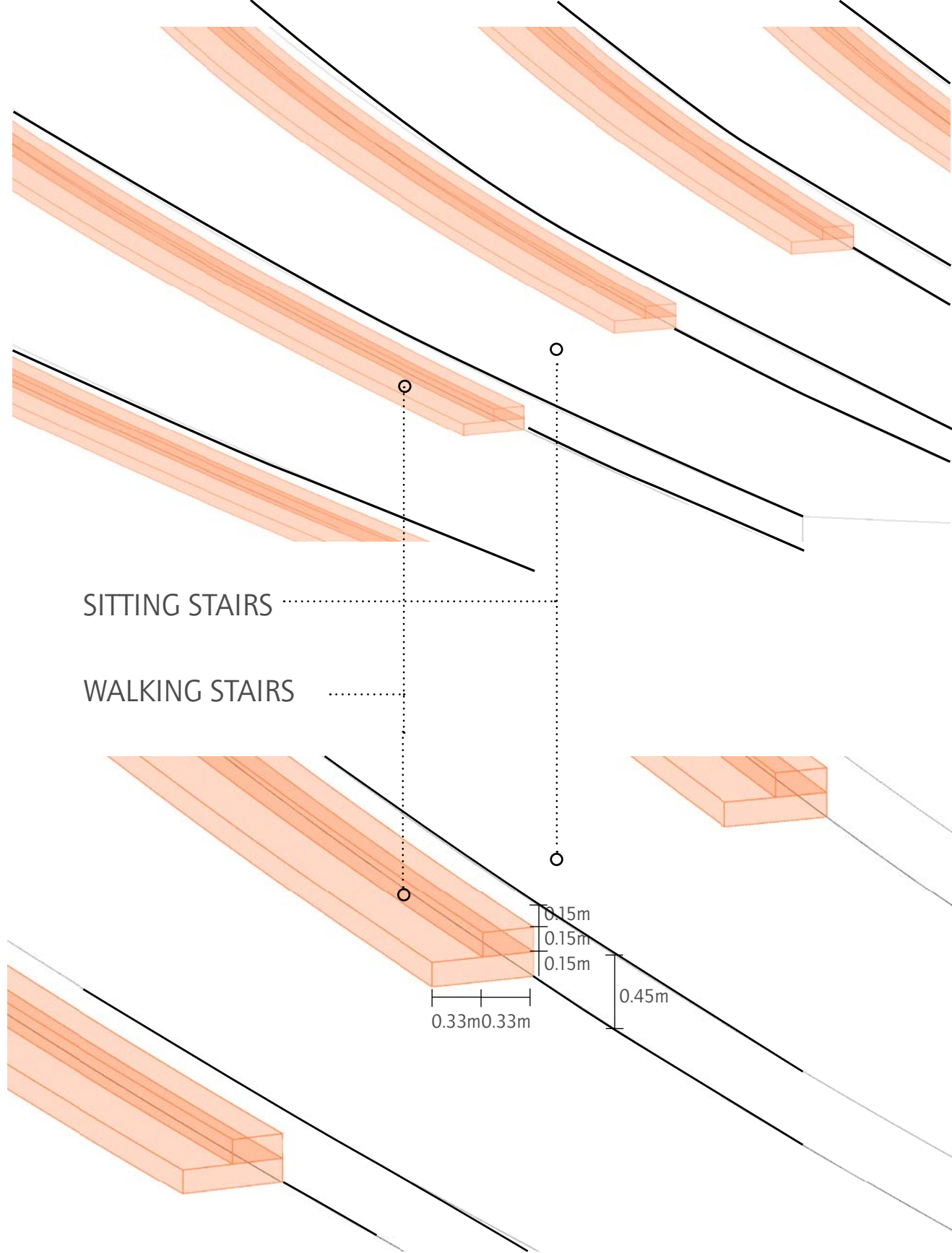
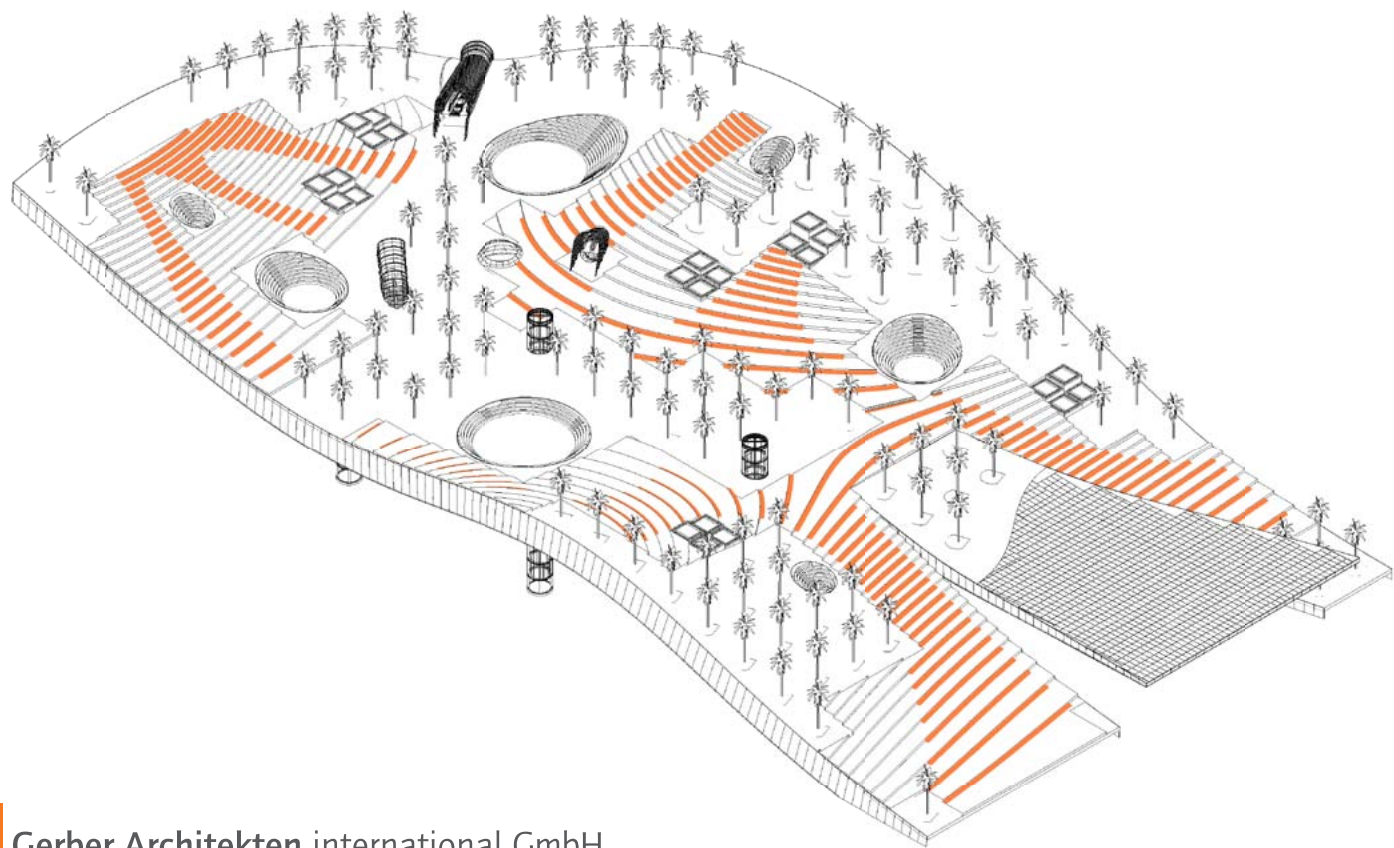
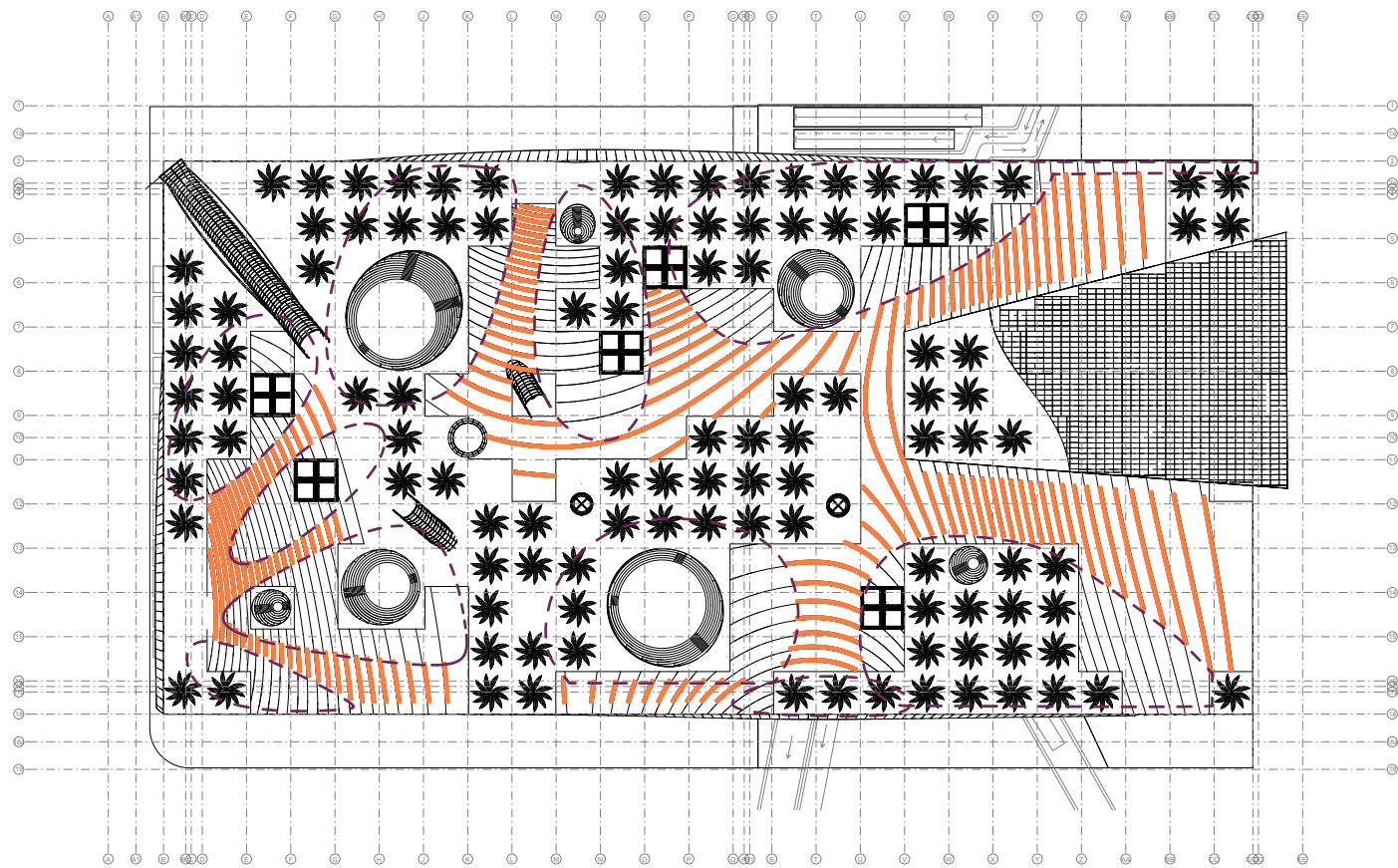

BIM NATIVE GEOMETRY

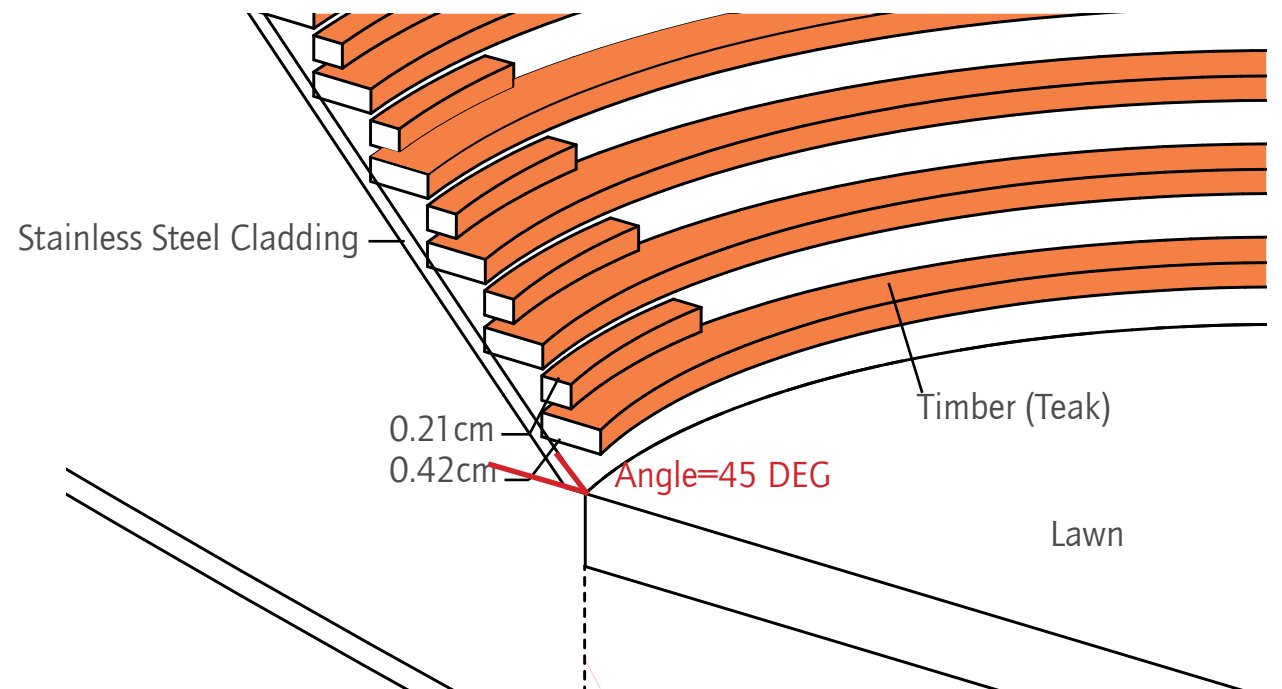
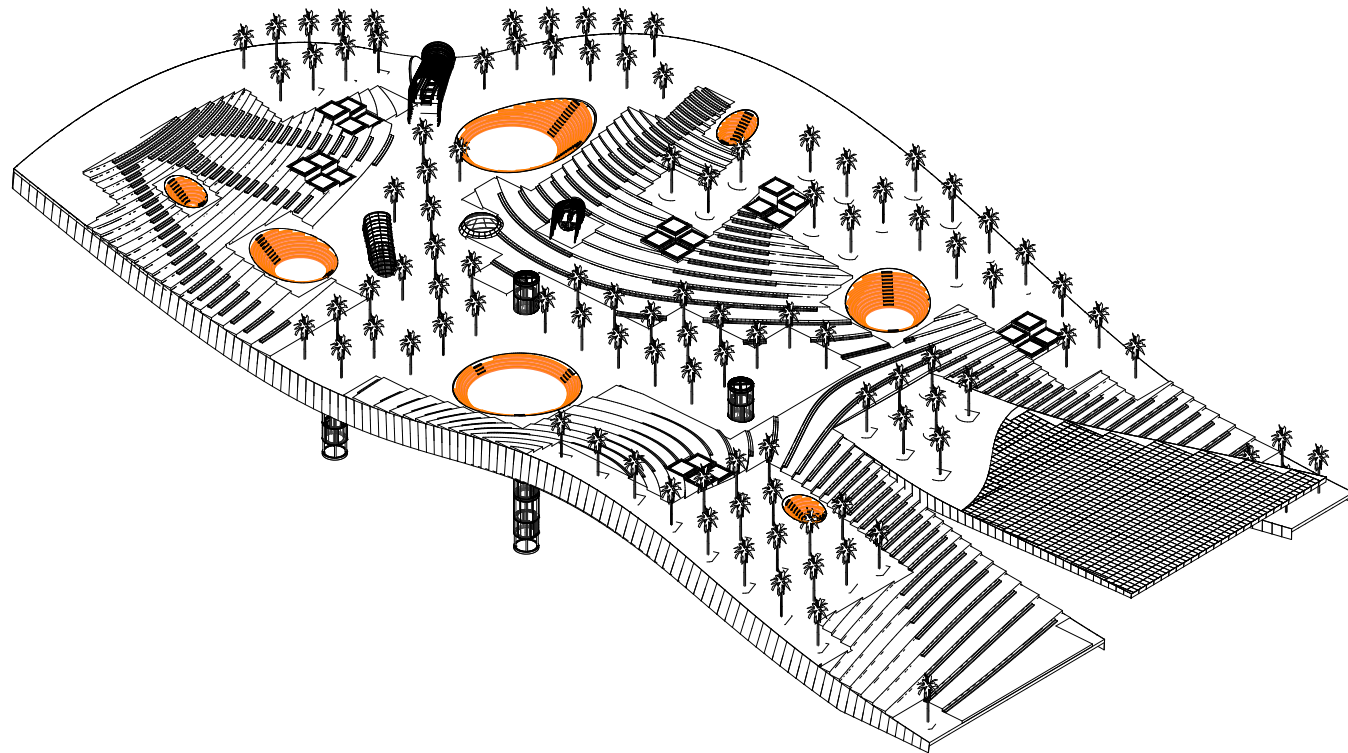
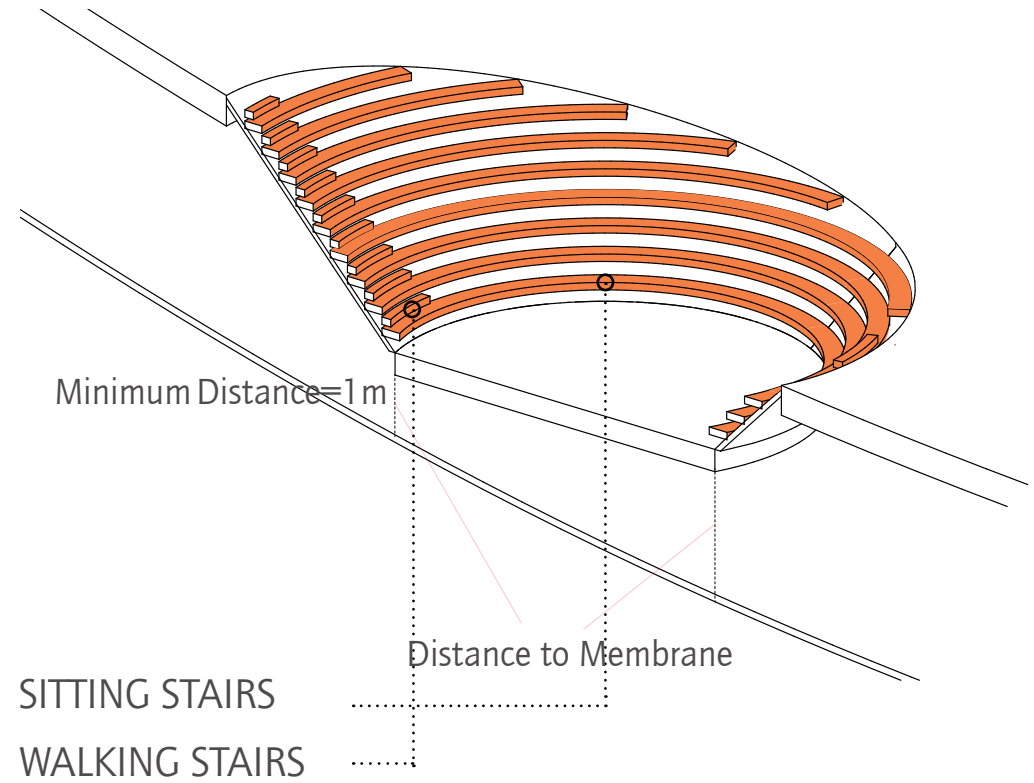
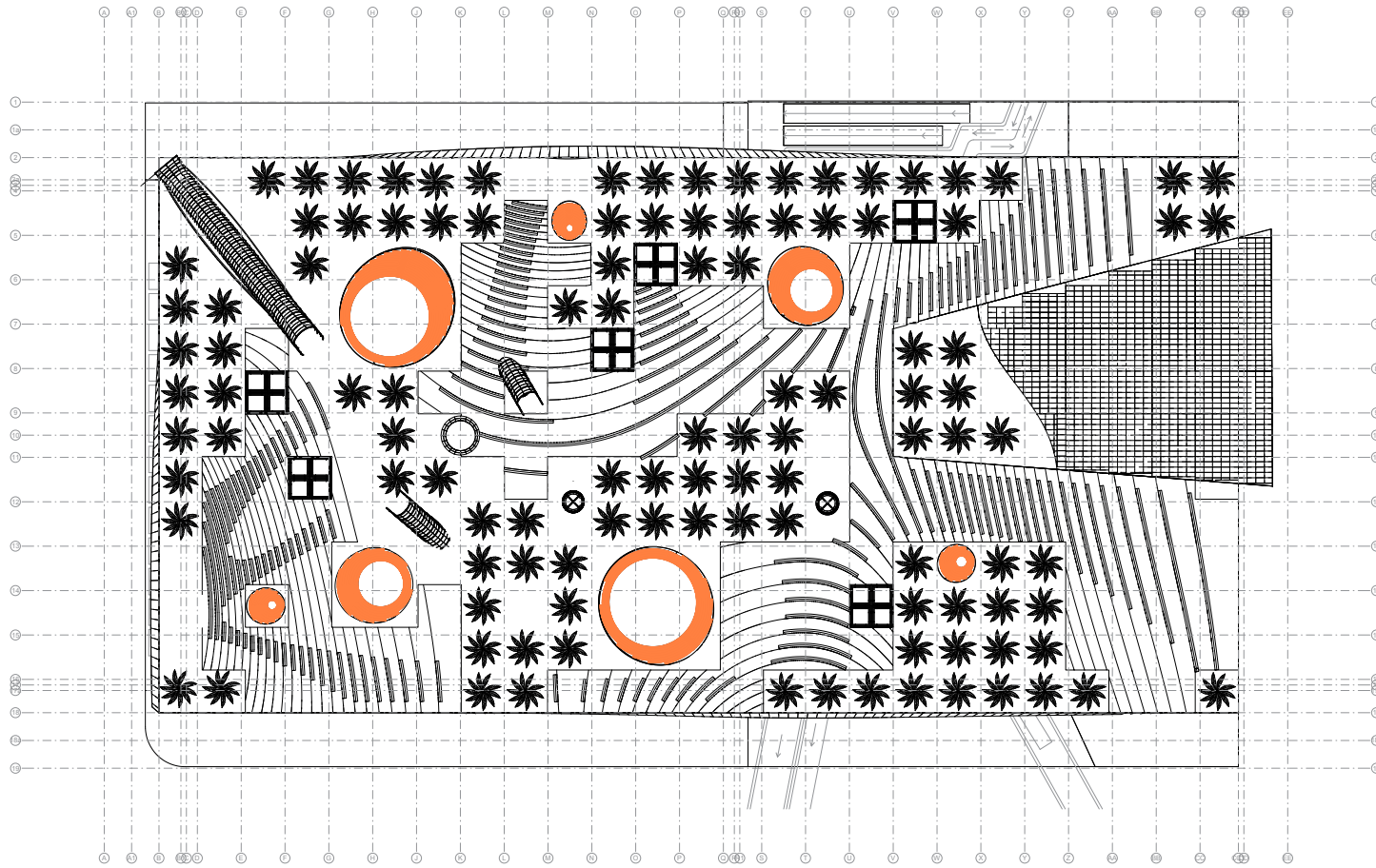
- CSV-Code kann in Revit als "Native Geometry" eingelesen werden



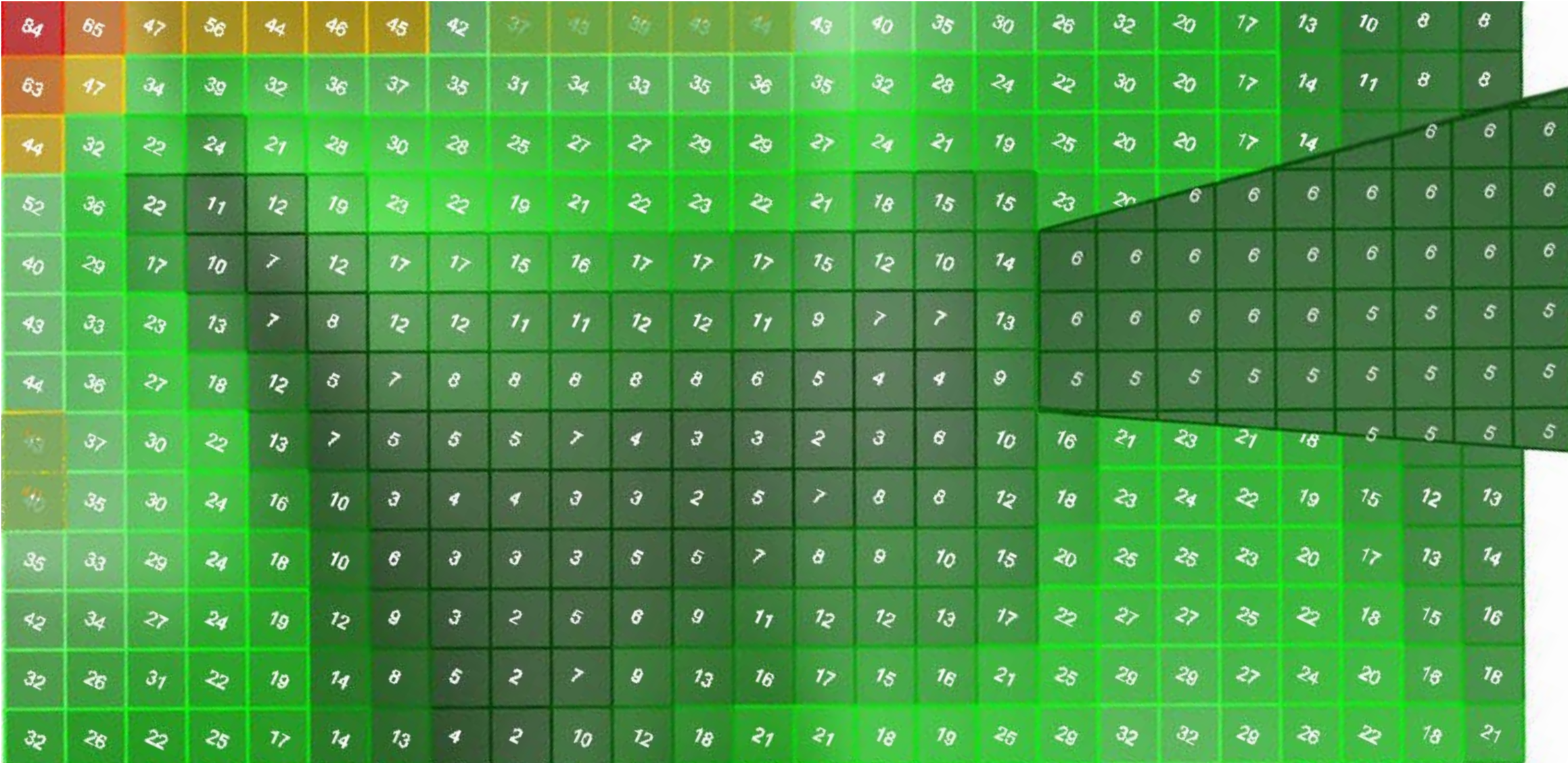
BIM - NATIVE GEOMETRIE INTEGRIERT IN HAUPTMODELL



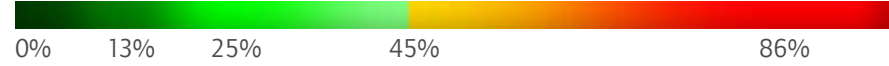




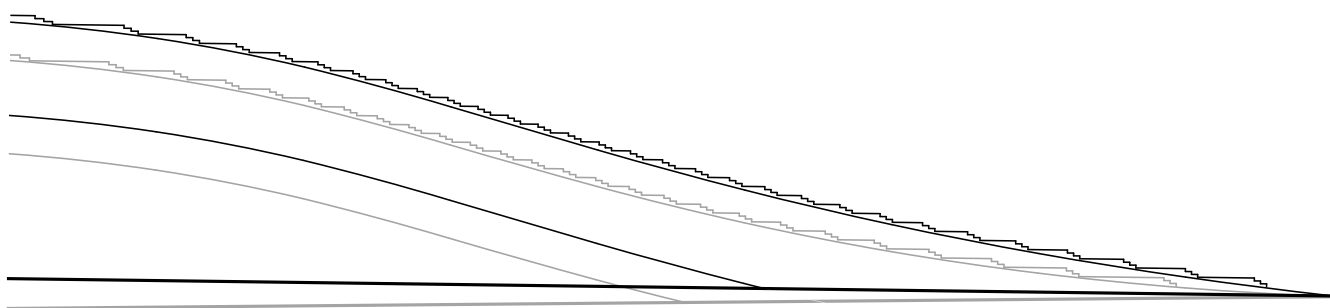
Anpassung der Dachfläche in erster Ausarbeitungsphase



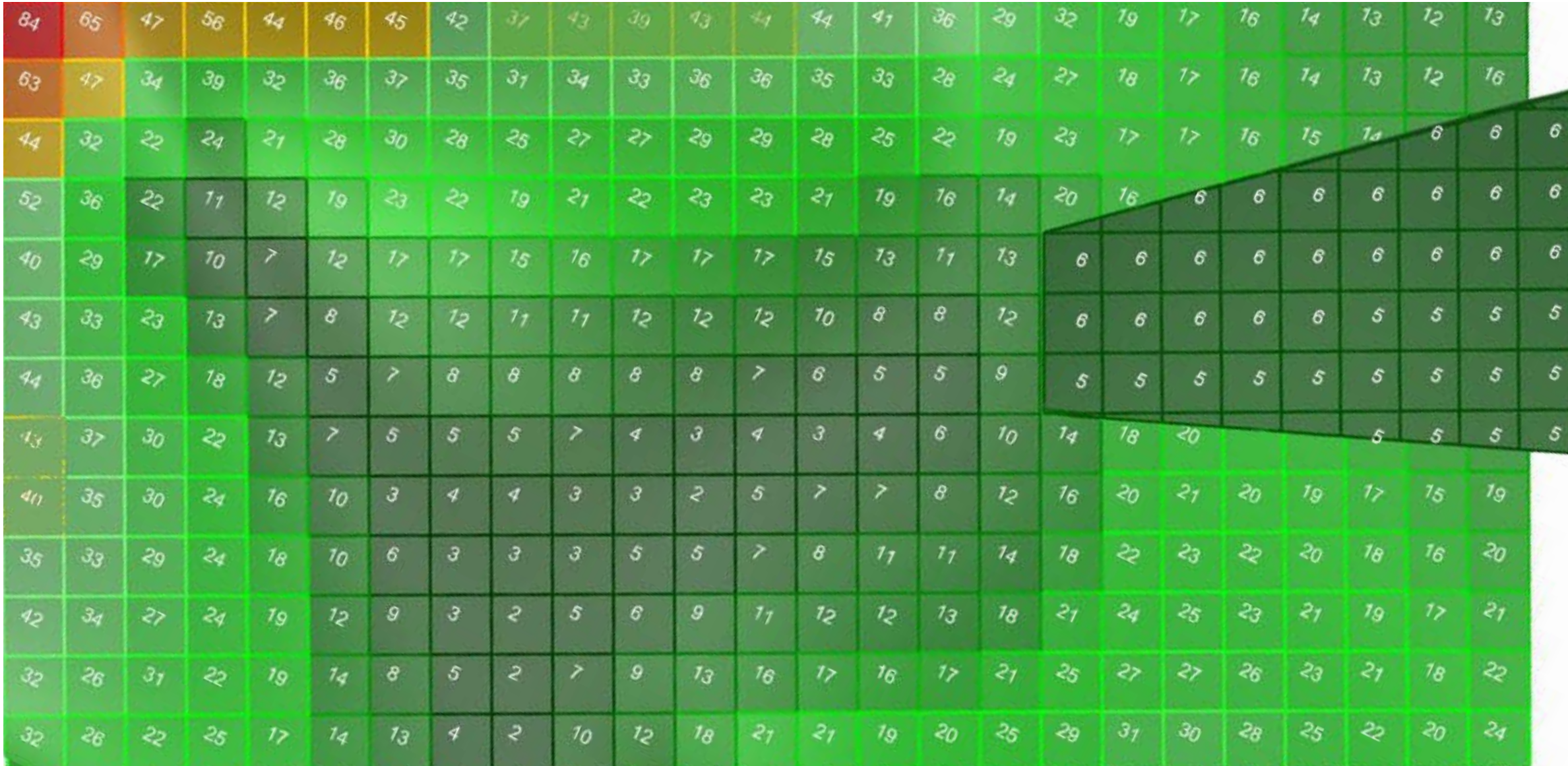
Number Code Based on Line of Greatest Slope
 Colour Code Based on Average Patch Inclination



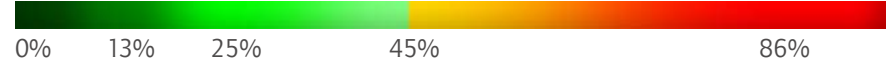
Adjusted Roof
 Phase 1 Roof



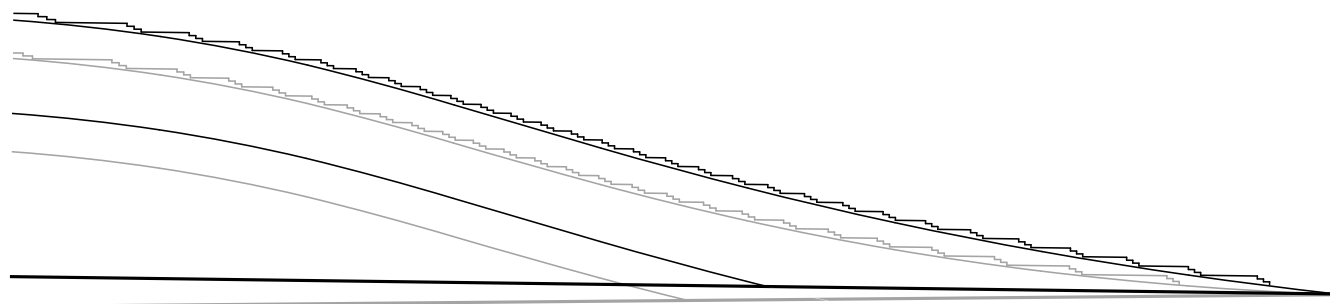
Erneute Anpassung der Dachfläche Aufgrund von erweiterten Auflagen zum Hochwasserschutz

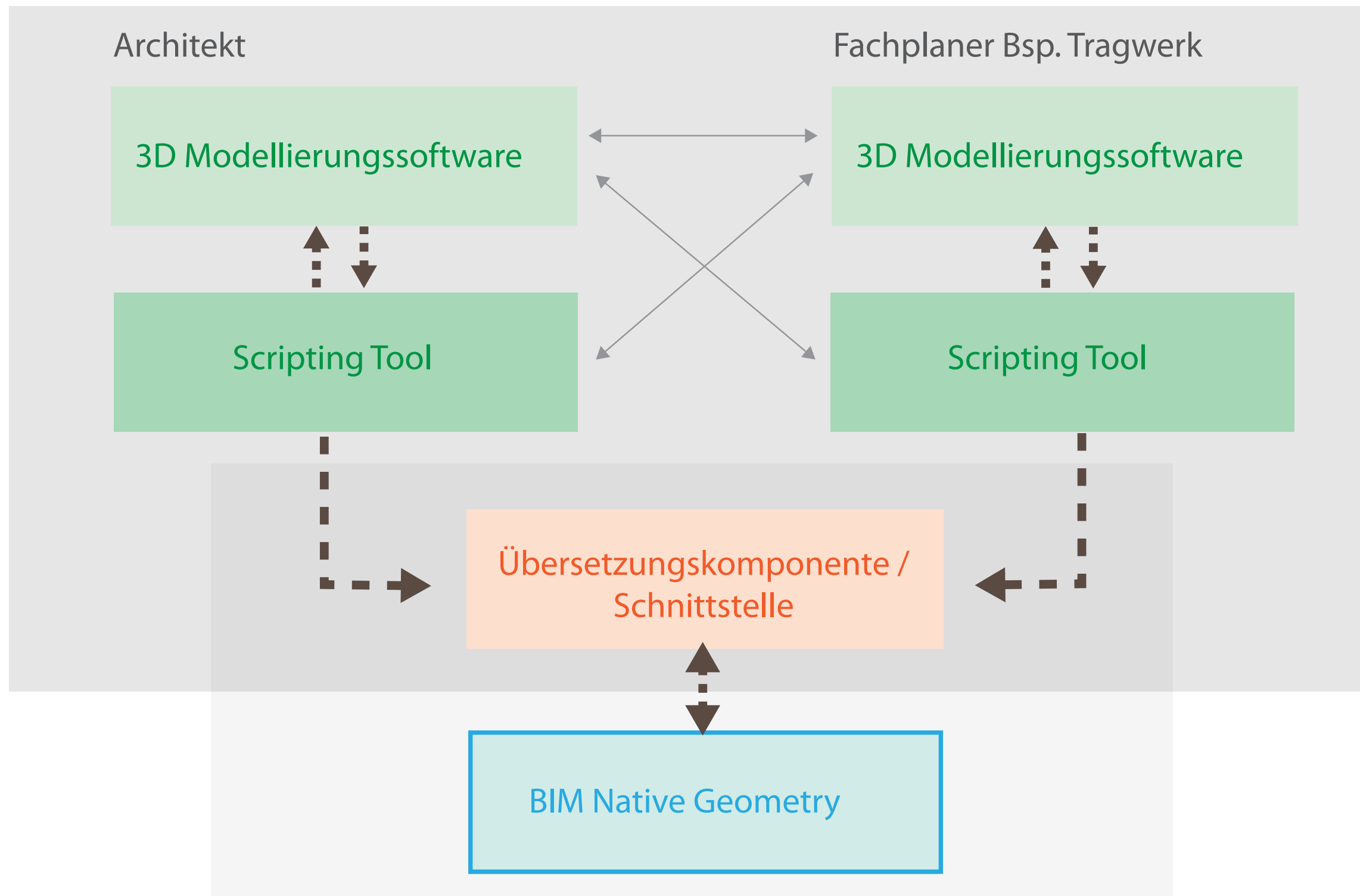


Number Code Based on Line of Greatest Slope
 Colour Code Based on Average Patch Inclination

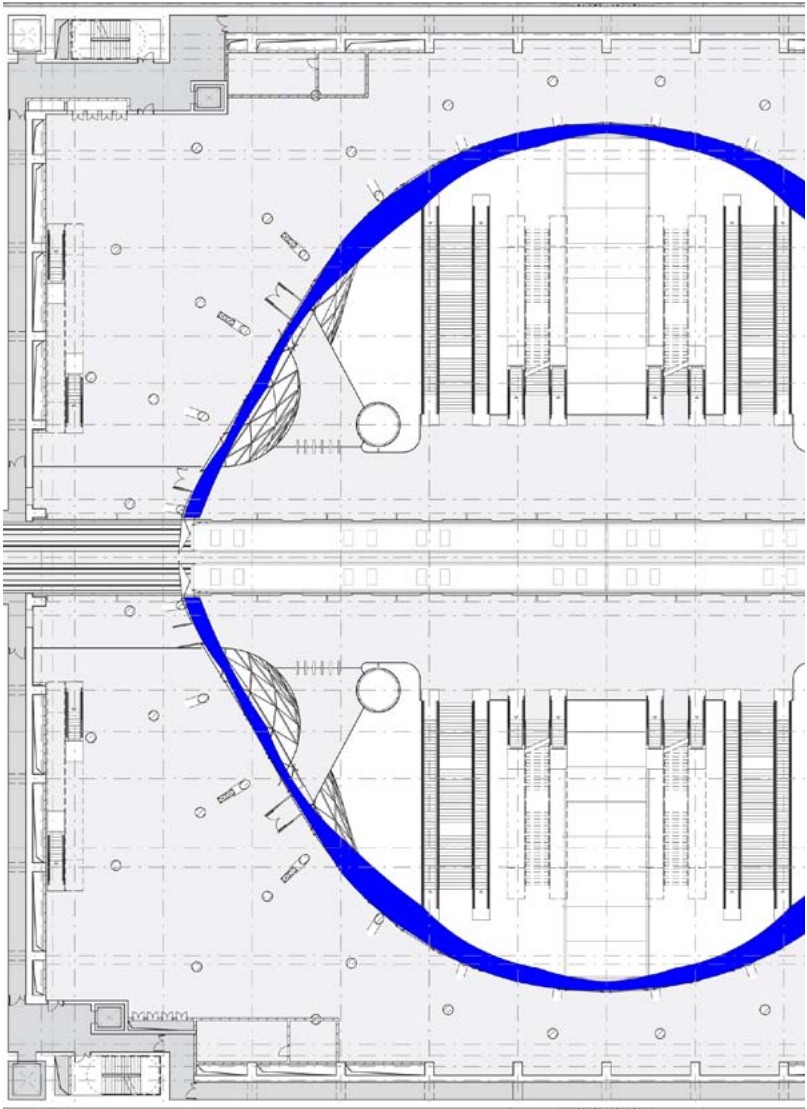
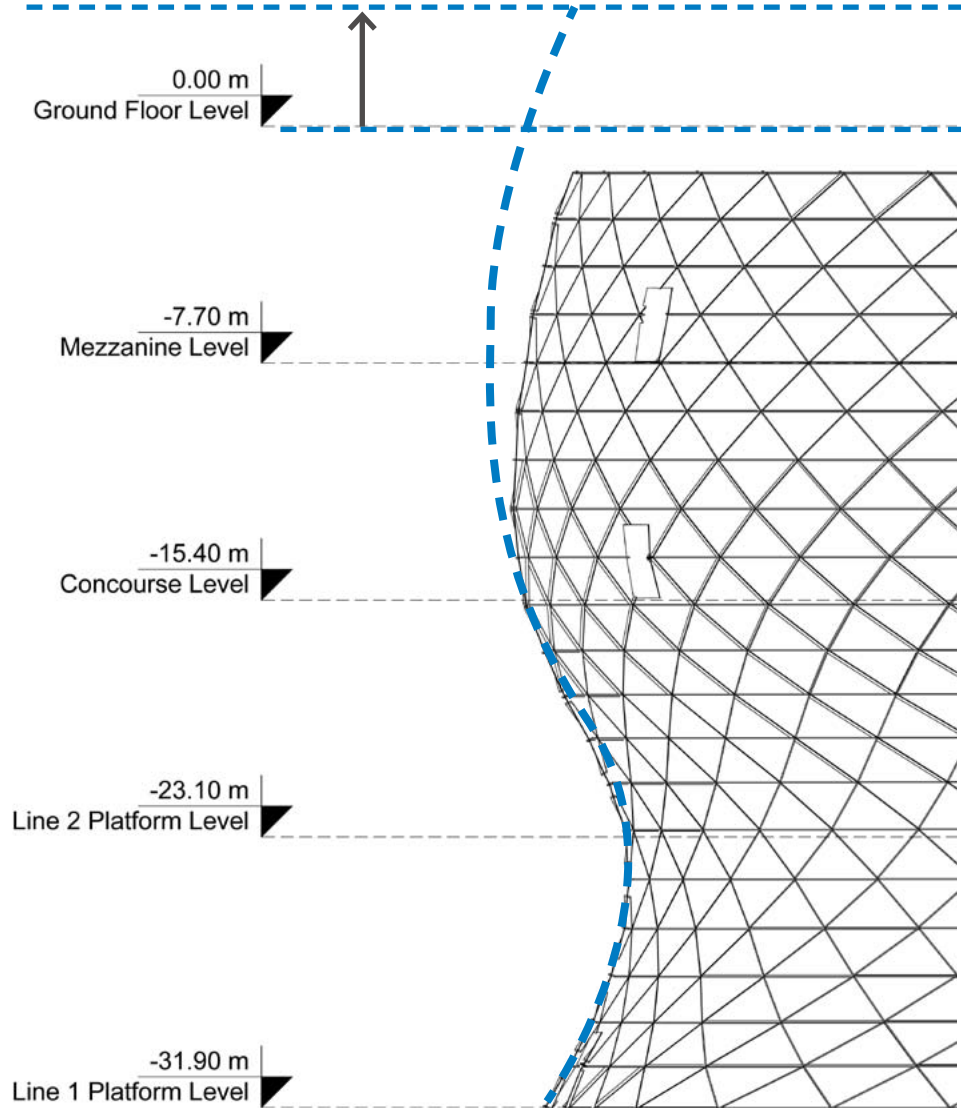
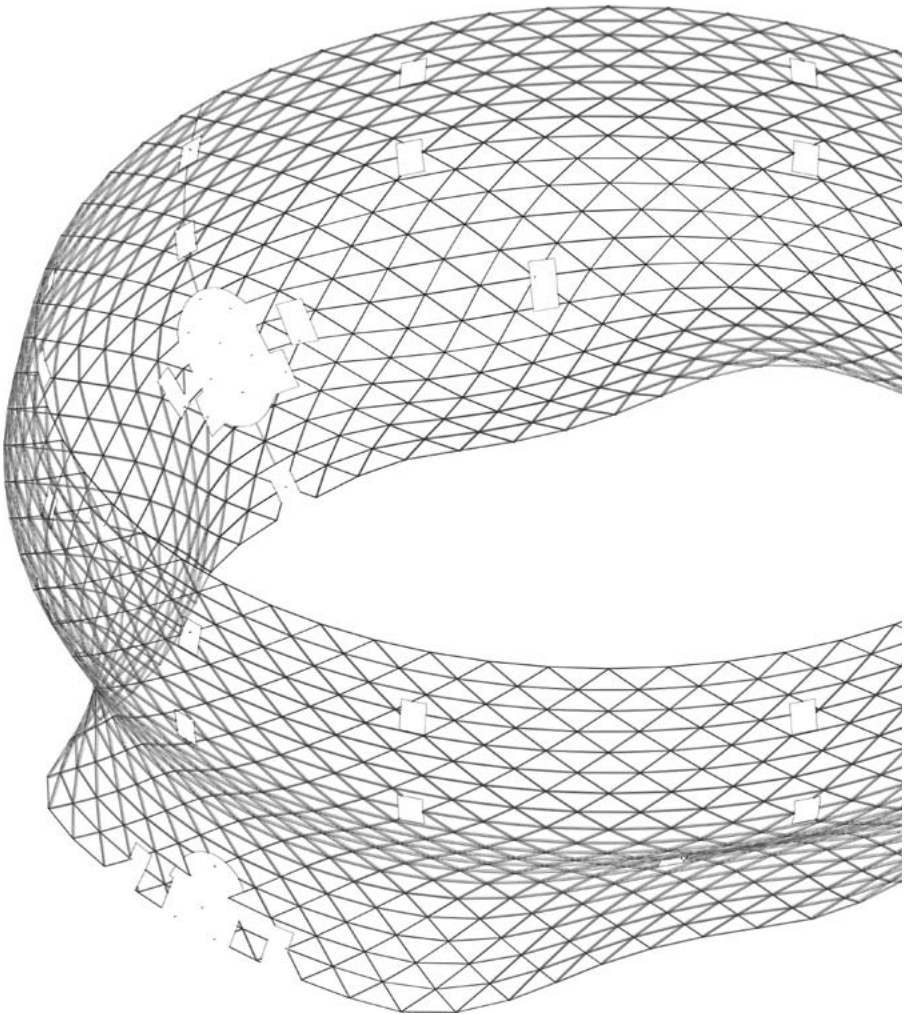


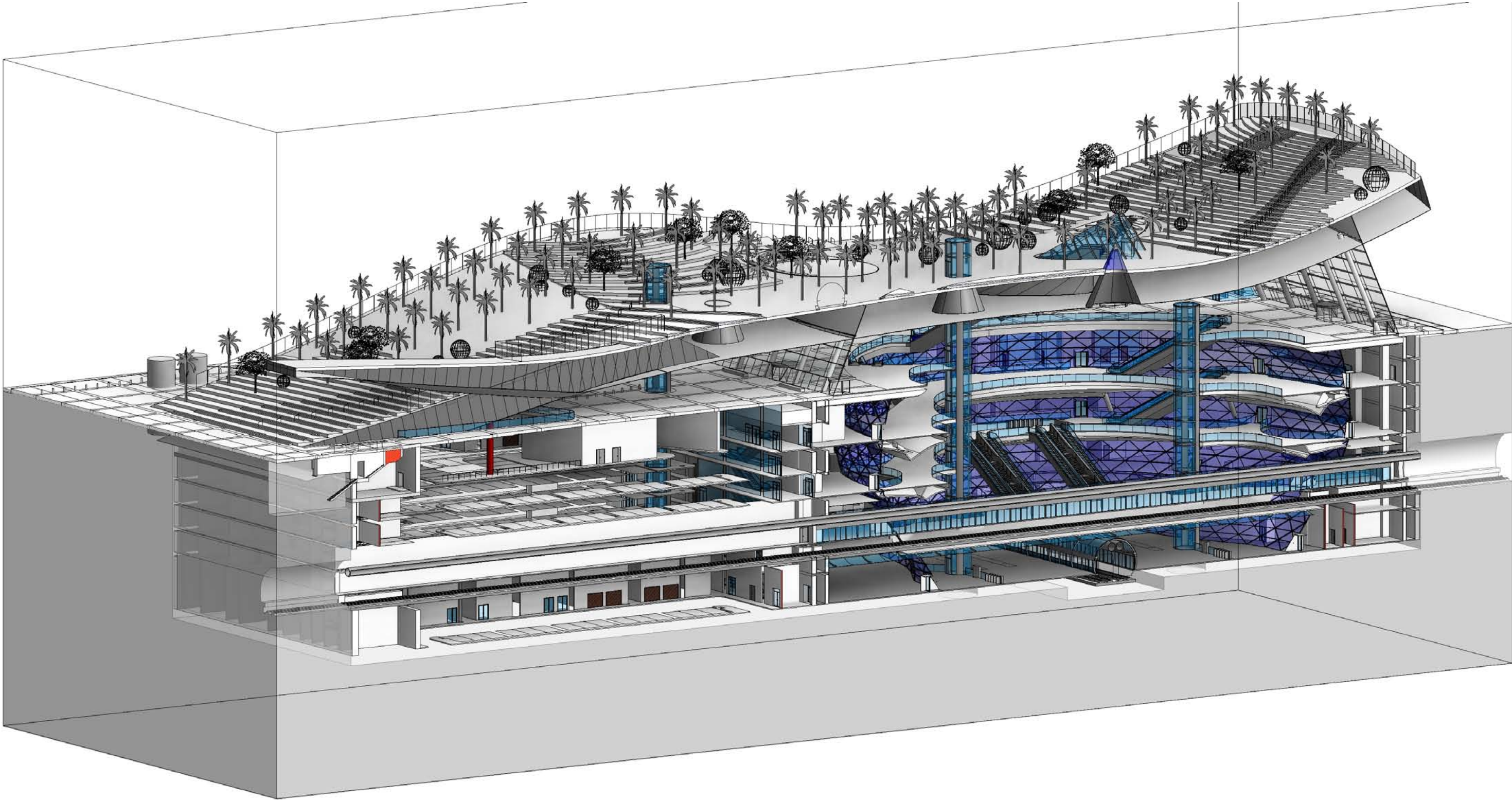
Adjusted Roof
 Phase 1 Roof



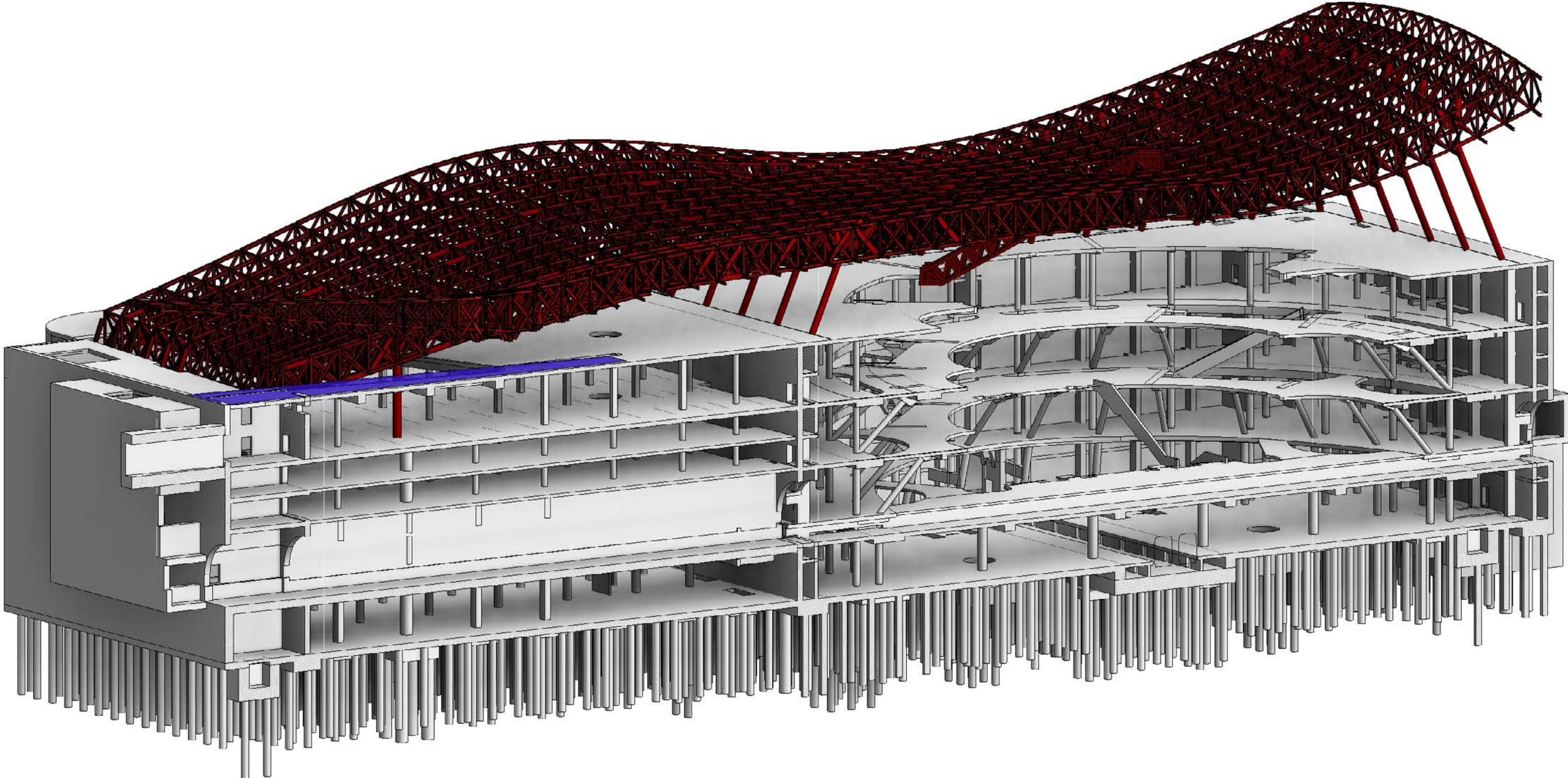


PARAMETRIK IM BIM-MODELL

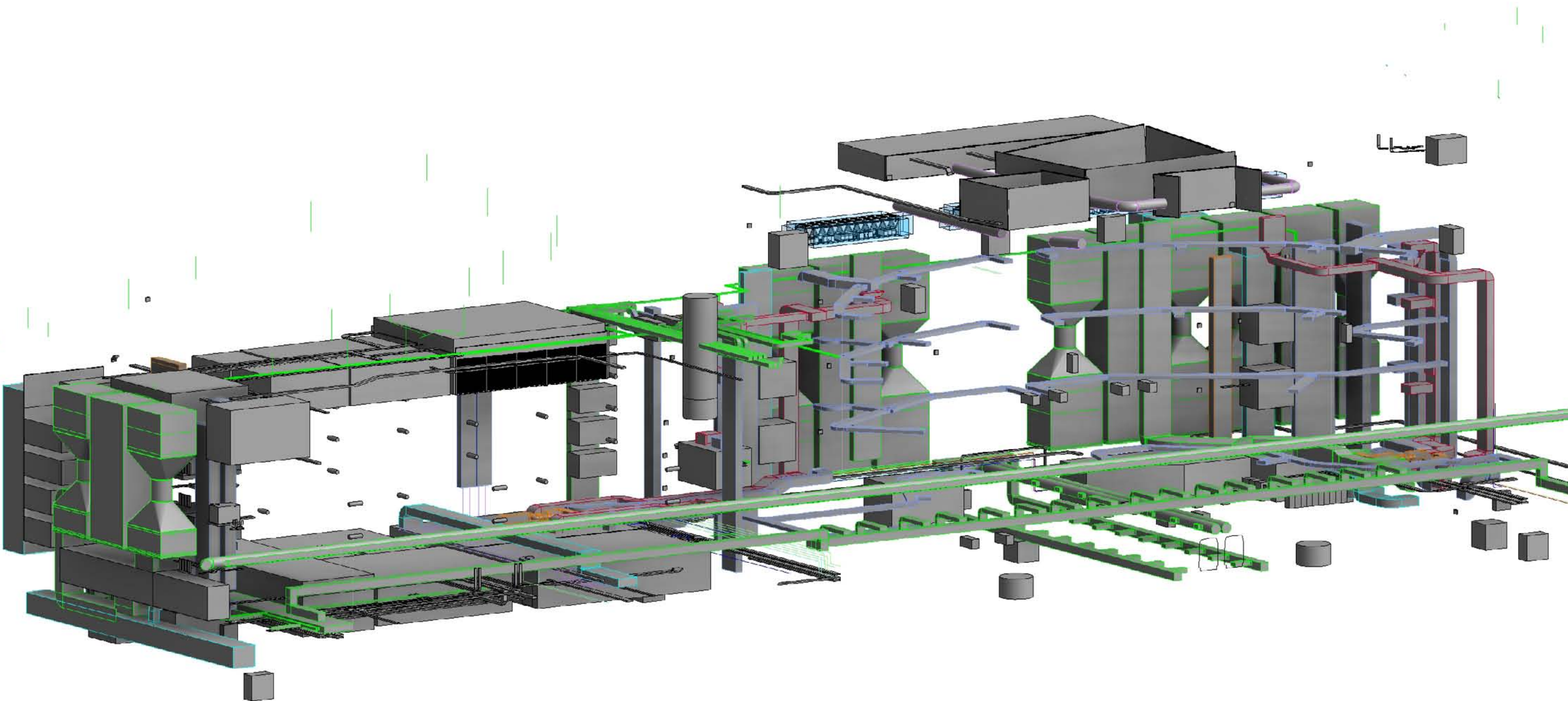




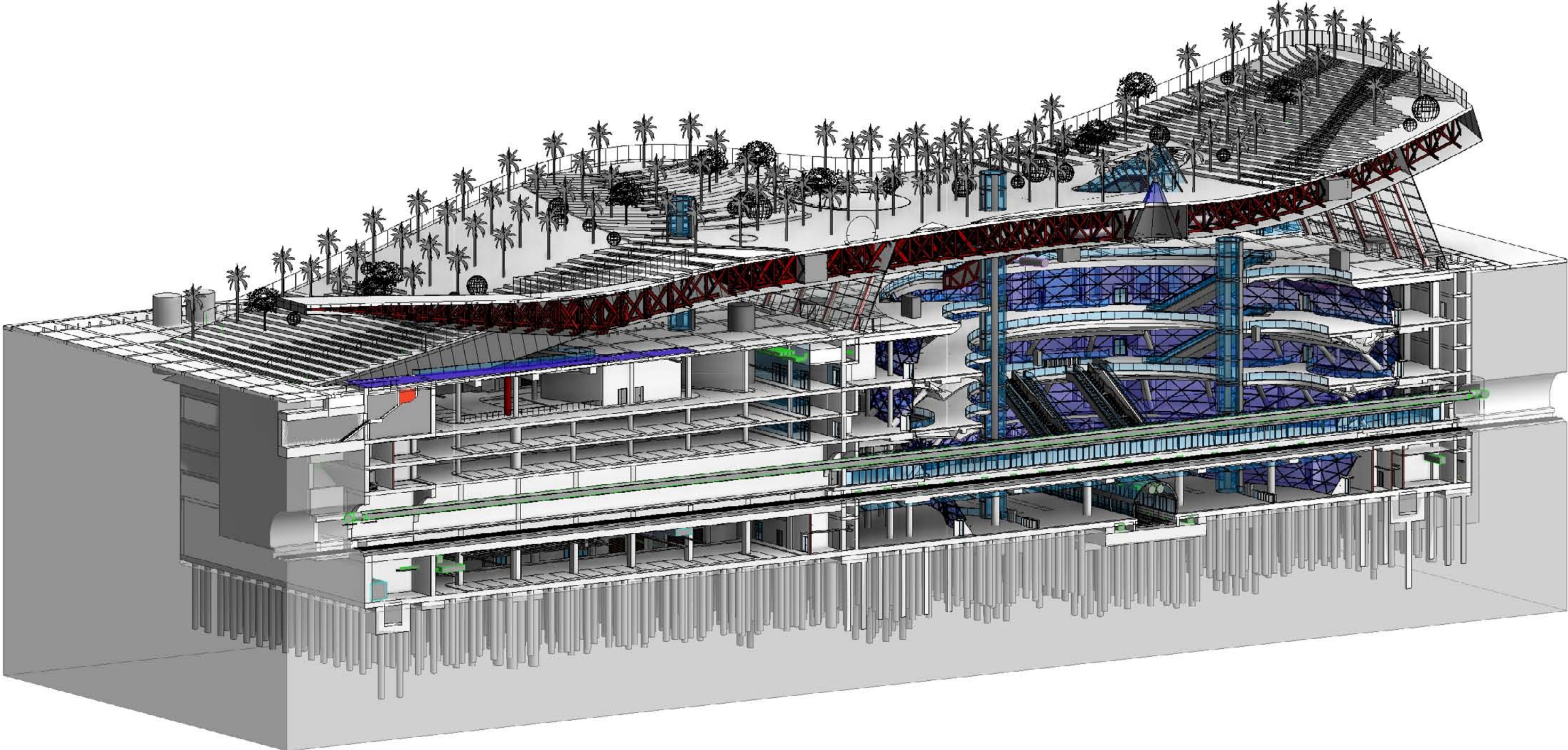
Tragwerk

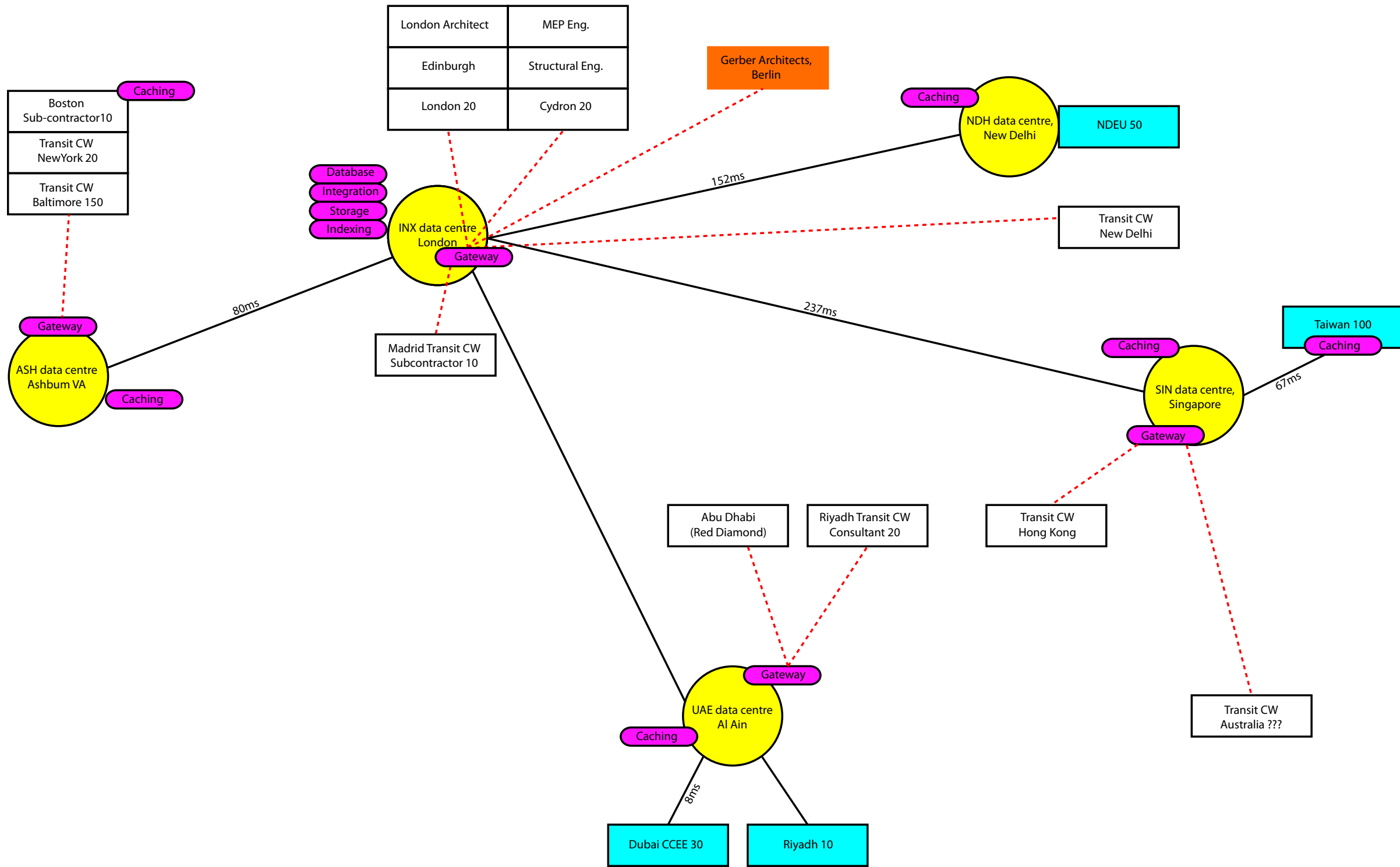


Technische Gebäudeausrüstung

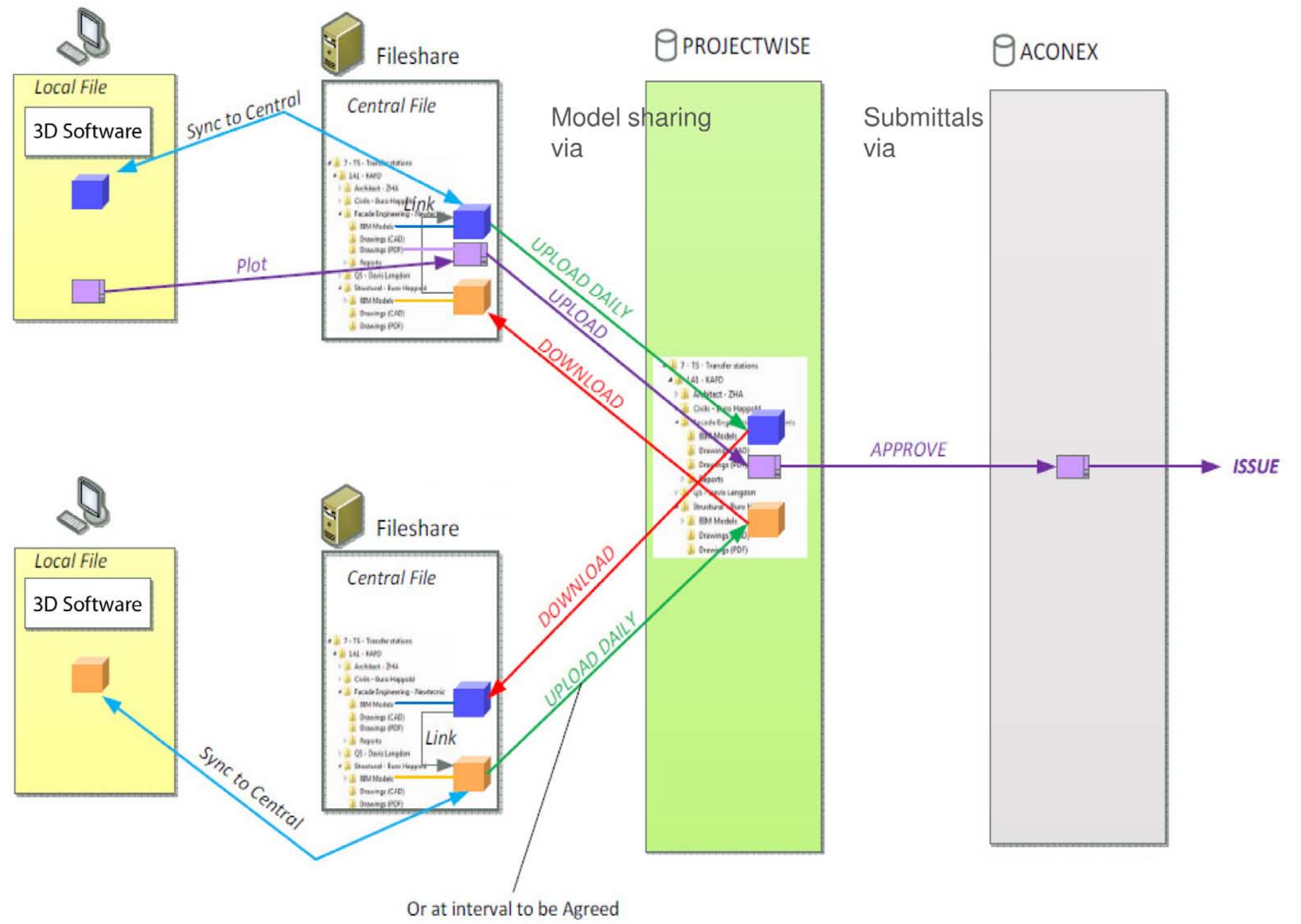


Koordinationsmodell





CDE - Common Data Environment

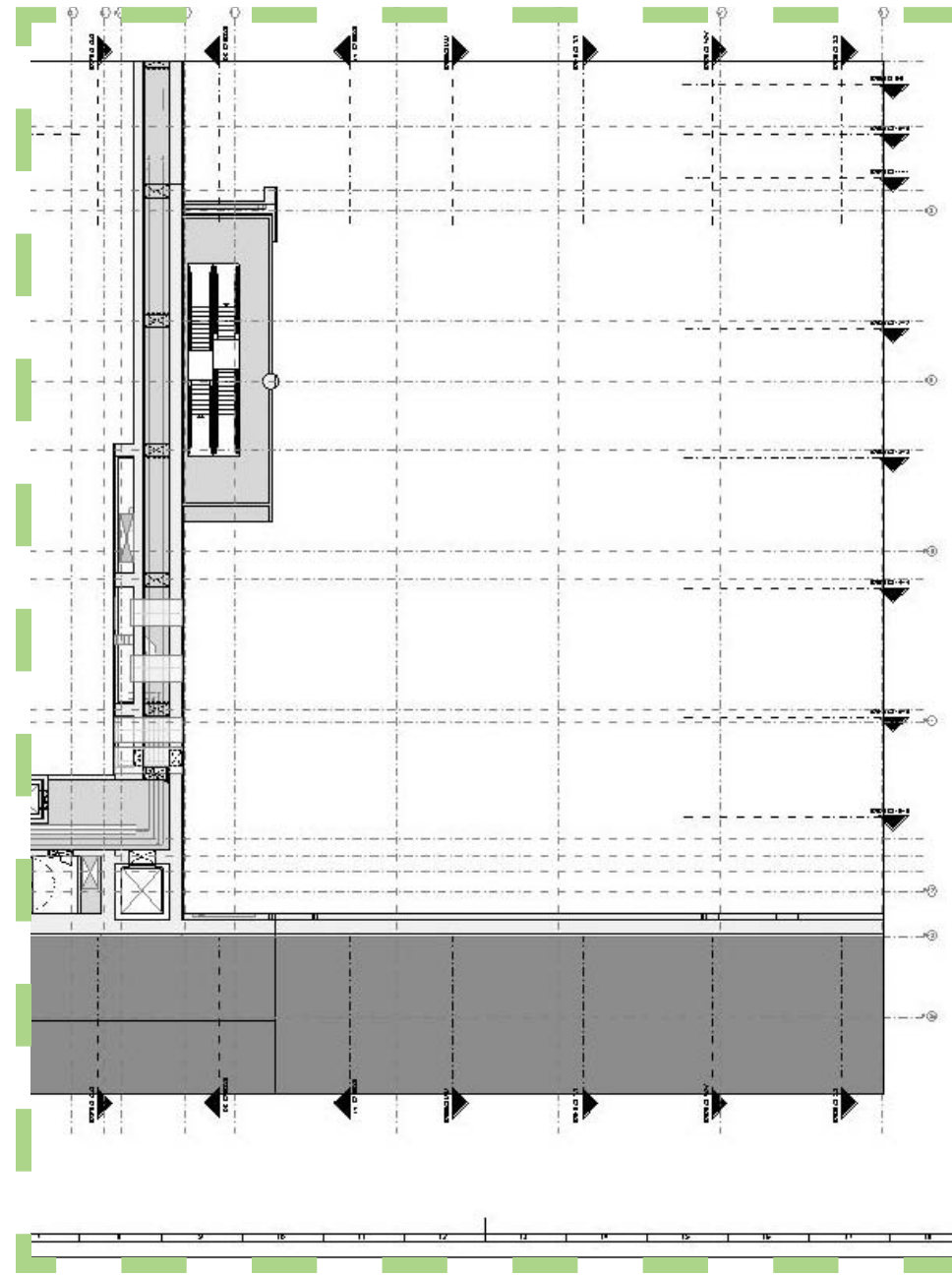


Project Browser - M-BGR-1B3TS0-CA00-BIM-100001-ARCHPRINTING_SCS.rvt

- Views (GAI Working / Printing / Coordination)
- Printing
 - Floor Plans
 - Ceiling Plans
 - 3D Views
 - Elevations
 - Sections
 - Drafting Views
 - Area Plans
- Working
- Legends
- Schedules/Quantities
- Sheets (by Deliverables)
 - 00000 Sketch Drawings
 - 00010-00499 Project Organisation
 - 00500-00999 Master Plans
 - 01000-01999 General Arrangement Plans
 - 02000-02499 General Arrangement Elevations
 - 02500-02999 General Arrangement Sections
 - 03000-03999 Life Safety Plans
 - 04000-04499 Scope Drawings NFA Areas
 - 04500-04999 Scope Drawings GFA Areas
 - 06000-06999 Scope Drawings Flooring Systems, Finishes
 - 07000-07999 Scope Drawings Reflected Ceiling Plans
 - 08000-08499 Scope Drawings Operation and Maintenance, Sanitary
 - 08500-08999 Scope Drawings Signage and Wayfinding
 - 09000-09999 Scope Drawings Space Proofing Plans
 - 10000-12999 Detail Arrangement Plans**
 - 13000-14000 Detail Arrangement Sections
 - 15000-19999 Detail Arrangement Sections
 - 16000-16999 Scope Drawings
 - 17000-17999 Study Areas
 - 20000-29999 Detailed Drawings External Cladding Systems
 - 25000-25999 - Detailed Drawings - Shell
 - 26000-26999 Detailed Drawings - Interior
 - 30000-39999 Detailed Drawings Roofing Systems
 - 50000-59999 Detailed Drawings Staircases and Ramps
 - 60000-69999 Detailed Drawings Interior Construction Details
 - 70000-79999 Detailed Drawings Fixed Furniture and Fittings
 - 80000-89999 Detailed Drawings Specialist Equipment
 - 90000-99999 Detailed Drawings External Works
- Project Org
- Families
- Groups
- Revit Links

Project Browser - M-BGR-1B3TS0-CA00-BIM-100001-ARCHPRINTING_SCS.rvt

- 02000-02499 General Arrangement Elevations
- 02500-02999 General Arrangement Sections
- 03000-03999 Life Safety Plans
- 04000-04499 Scope Drawings NFA Areas
- 04500-04999 Scope Drawings GFA Areas
- 06000-06999 Scope Drawings Flooring Systems, Finishes
- 07000-07999 Scope Drawings Reflected Ceiling Plans
- 08000-08499 Scope Drawings Operation and Maintenance, Sanitary
- 08500-08999 Scope Drawings Signage and Wayfinding
- 09000-09999 Scope Drawings Space Proofing Plans
- 10000-12999 Detail Arrangement Plans
 - M-BGR-1B3TS0-CA00-EDR-10000 - Line-1 Level Part Plan A
 - M-BGR-1B3TS0-CA00-EDR-10010 - Line-1 Level Part Plan B
 - M-BGR-1B3TS0-CA00-EDR-10020 - Line-1 Level Part Plan C
 - M-BGR-1B3TS0-CA00-EDR-10030 - Line-1 Level Part Plan D
 - M-BGR-1B3TS0-CA00-EDR-10050 - Technical Level Part Plan A
 - M-BGR-1B3TS0-CA00-EDR-10060 - Technical Level Part Plan B
 - M-BGR-1B3TS0-CA00-EDR-10070 - Technical Level Part Plan C
 - M-BGR-1B3TS0-CA00-EDR-10080 - Technical Level Part Plan D
 - M-BGR-1B3TS0-CA00-EDR-10200 - Intermediate Line-1 Level Part P
 - M-BGR-1B3TS0-CA00-EDR-10210 - Intermediate Line-1 Level Part P
 - M-BGR-1B3TS0-CA00-EDR-10220 - Intermediate Line-1 Level Part P
 - M-BGR-1B3TS0-CA00-EDR-10230 - Intermediate Line-1 Level Part P
 - M-BGR-1B3TS0-CA00-EDR-10250 - Intermediate Technical Level Pa
 - M-BGR-1B3TS0-CA00-EDR-10260 - Intermediate Technical Level Pa
 - M-BGR-1B3TS0-CA00-EDR-10270 - Intermediate Technical Level Pa**
 - M-BGR-1B3TS0-CA00-EDR-10280 - Intermediate Technical Level Pa
- M-BGR-1B3TS0-CA00-EDR-10500 - Line-2 Level Part Plan A
- M-BGR-1B3TS0-CA00-EDR-10510 - Line-2 Level Part Plan B
- M-BGR-1B3TS0-CA00-EDR-10520 - Line-2 Level Part Plan C
- M-BGR-1B3TS0-CA00-EDR-10530 - Line-2 Level Part Plan D
- M-BGR-1B3TS0-CA00-EDR-10550 - Parking-5 Level Part Plan A
- M-BGR-1B3TS0-CA00-EDR-10560 - Parking-5 Level Part Plan B
- M-BGR-1B3TS0-CA00-EDR-10570 - Parking-5 Level Part Plan C
- M-BGR-1B3TS0-CA00-EDR-10580 - Parking-5 Level Part Plan D
- M-BGR-1B3TS0-CA00-EDR-10700 - Intermediate Line-2 Level Part P
- M-BGR-1B3TS0-CA00-EDR-10710 - Intermediate Line-2 Level Part P
- M-BGR-1B3TS0-CA00-EDR-10720 - Intermediate Line-2 Level Part P
- M-BGR-1B3TS0-CA00-EDR-10730 - Intermediate Line-2 Level Part P
- M-BGR-1B3TS0-CA00-EDR-10750 - Parking-4 Level Part Plan A
- M-BGR-1B3TS0-CA00-EDR-10760 - Parking-4 Level Part Plan B
- M-BGR-1B3TS0-CA00-EDR-10770 - Parking-4 Level Part Plan C
- M-BGR-1B3TS0-CA00-EDR-10780 - Parking-4 Level Part Plan D
- M-BGR-1B3TS0-CA00-EDR-11000 - Concourse Level Part Plan A
- M-BGR-1B3TS0-CA00-EDR-11010 - Concourse Level Part Plan B
- M-BGR-1B3TS0-CA00-EDR-11020 - Concourse Level Part Plan C
- M-BGR-1B3TS0-CA00-EDR-11030 - Concourse Level Part Plan D
- M-BGR-1B3TS0-CA00-EDR-11050 - Parking-3 Level Part Plan A
- M-BGR-1B3TS0-CA00-EDR-11060 - Parking-3 Level Part Plan B
- M-BGR-1B3TS0-CA00-EDR-11070 - Parking-3 Level Part Plan C



UPDATED PRELIMINARY DESIGN

PROJECT TITLE

PROJECT NO. : 422.51

OLAYA METRO STATION

High Commission for the Development of Arriyadh

BACS

CONTRACTOR

DESIGNER

INTERMEDIATE TECHNICAL LEVEL PART PLAN C

NO.	DATE	DESCRIPTION	BY	CHECKED	APPROVED

PROJ. NO. : 422.51

SCALE: 1 : 100

DATE: 11/01/2024

M-BGR-1B3TS0-CA00-EDR-10270

Plangverwaltung

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GAI-AS	100%				
GAI-AS	100%				
GAI-AS	100%				
Author	100%				
Author	100%				

Properties

RMP-BACS-Drawing Border-A0-Gerber

Title Blocks (1) Edit Type

Graphics

RM_North Arrow

Scale 1:100

Identity Data

Sheet Name Intermediate Technical Level Part Plan C

Sheet Number M-BGR-1B3T50-CA00-EDR-10270

Sheet Issue Date 01/07/14

Checked By Checker

Designed By Designer

Approved By Approver

Sheet Width 1189.0

Sheet Height 841.0

Workset View "Sheet: M-BGR-1B3T50-CA00-EDR-10270..."

Edited by

Other

Date/Time Stamp 01/07/14

File Path

Drawn By Author

Intermediate Technical Level Part Plan C

PROJ. NO. 555

SCALE 1:100

SHEET NO. A0

DATE 01/07/14

DESIGNED BY

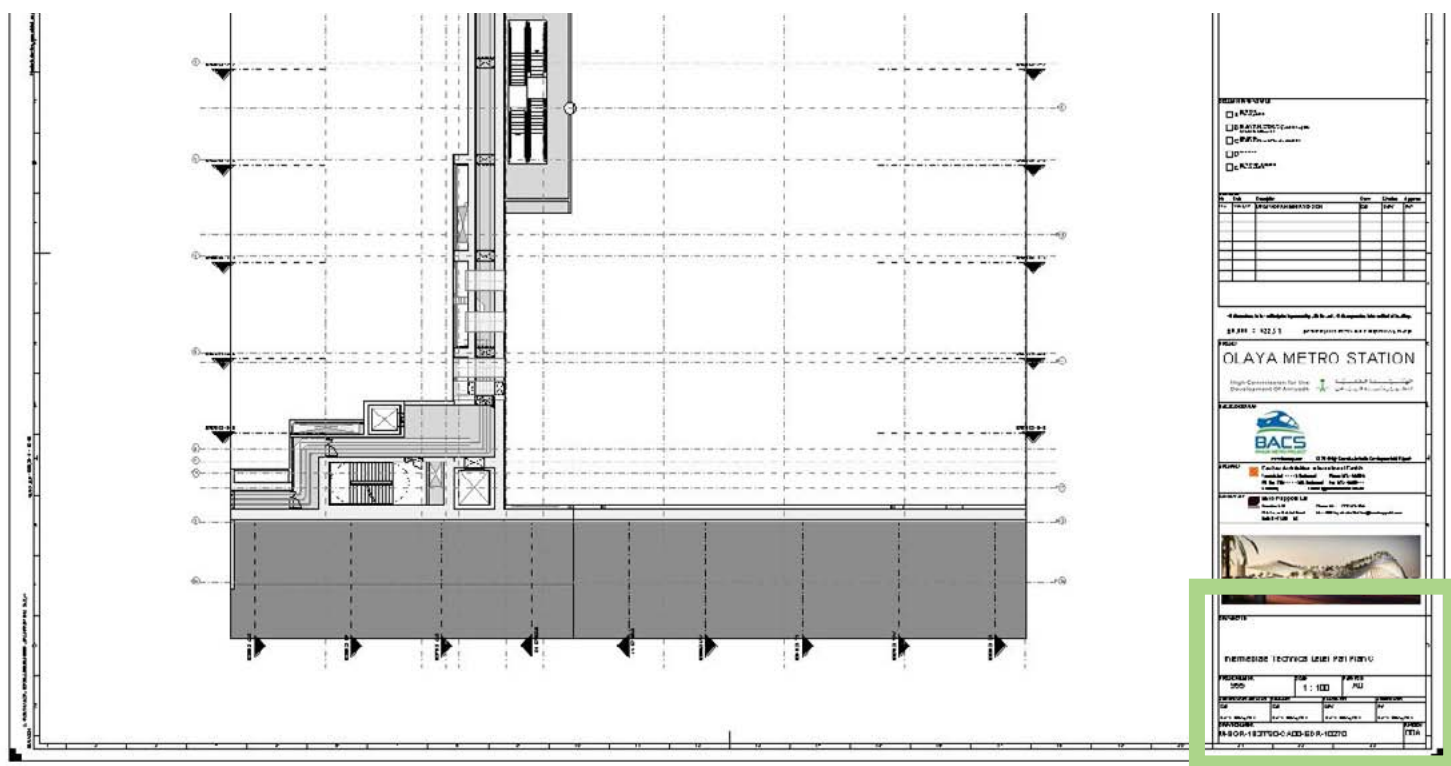
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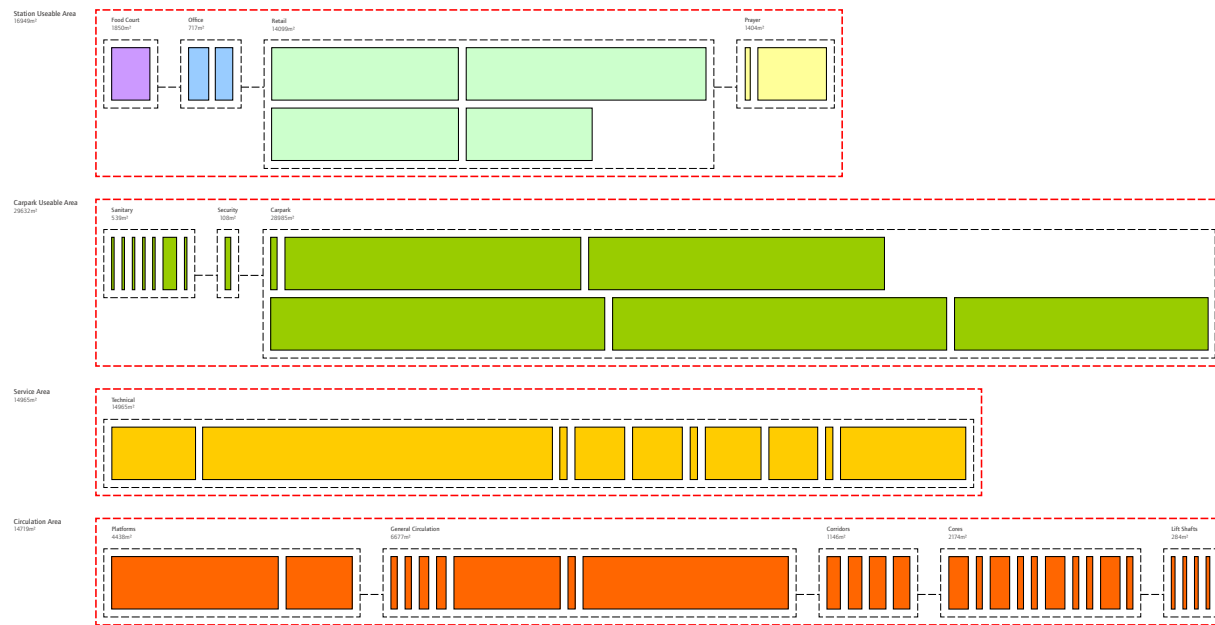
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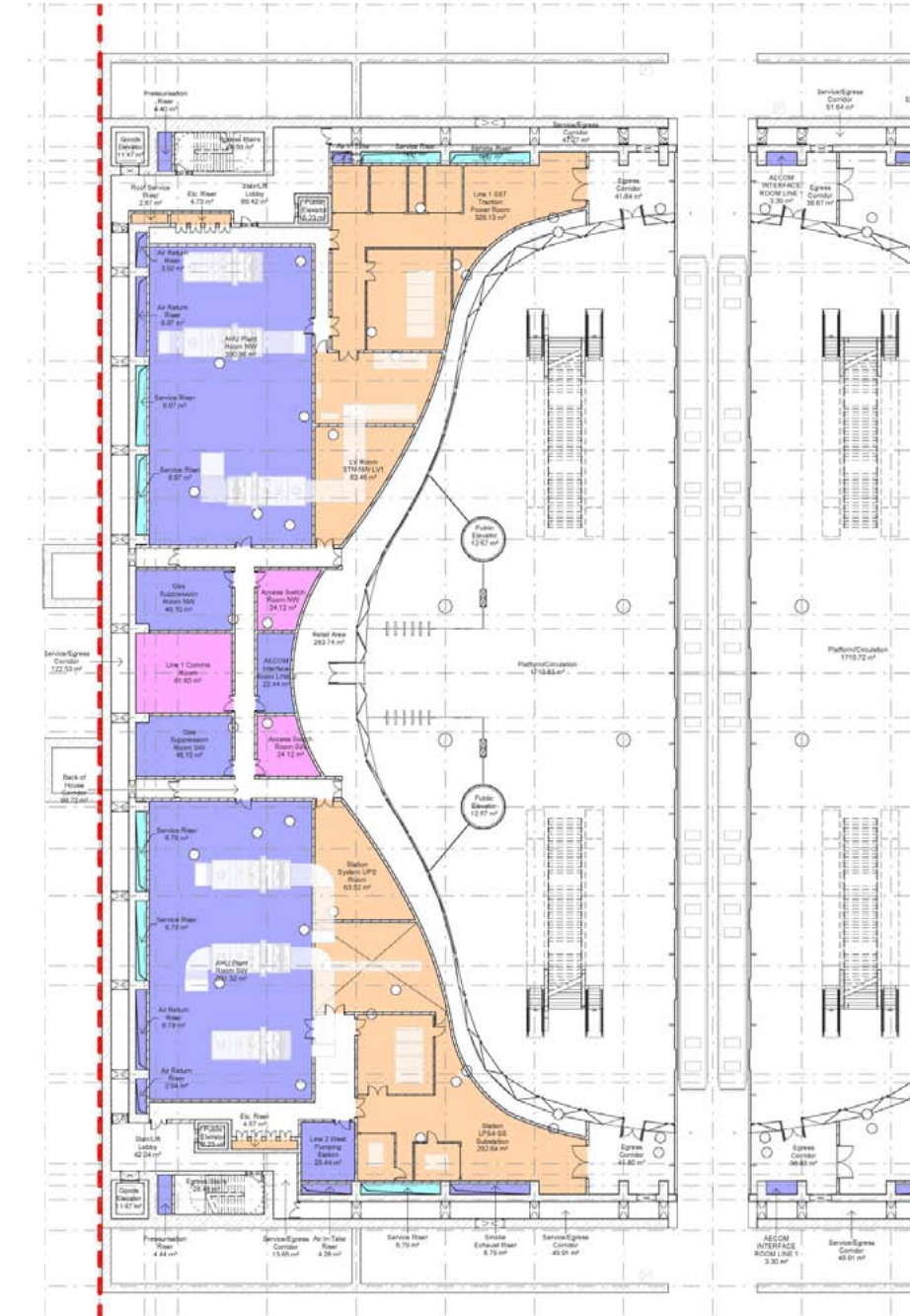


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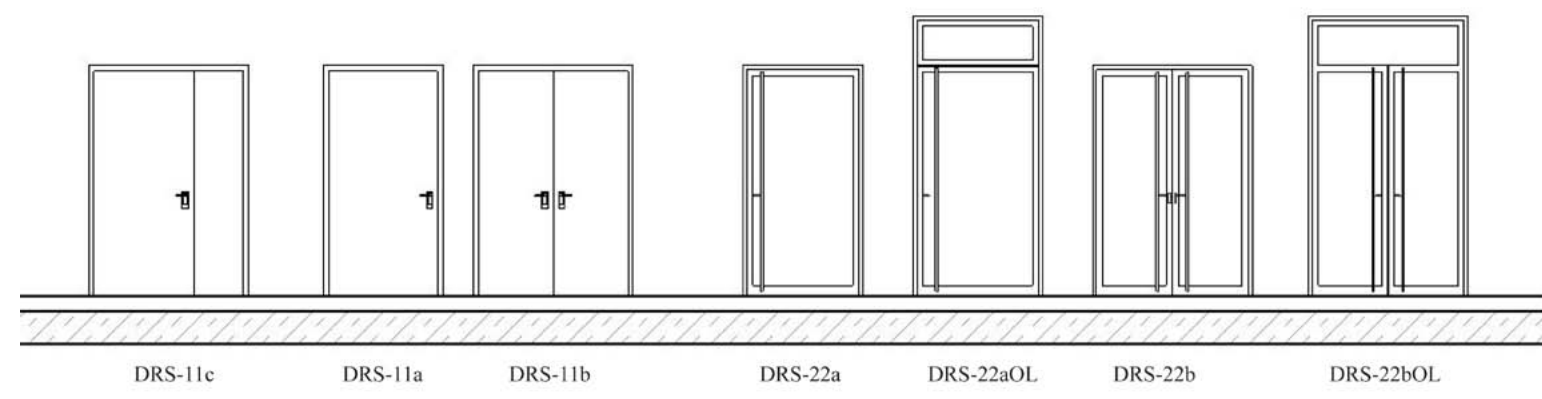
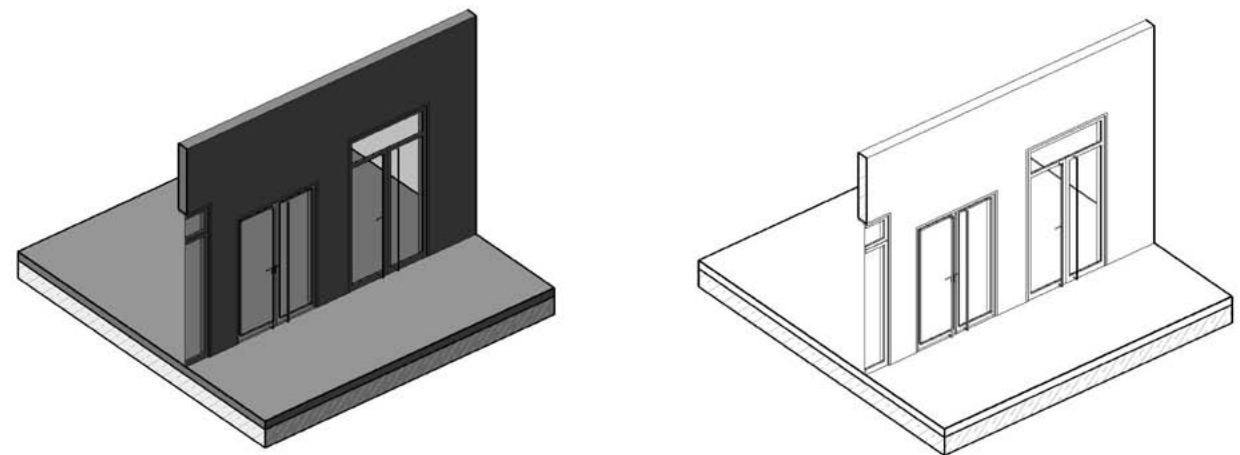


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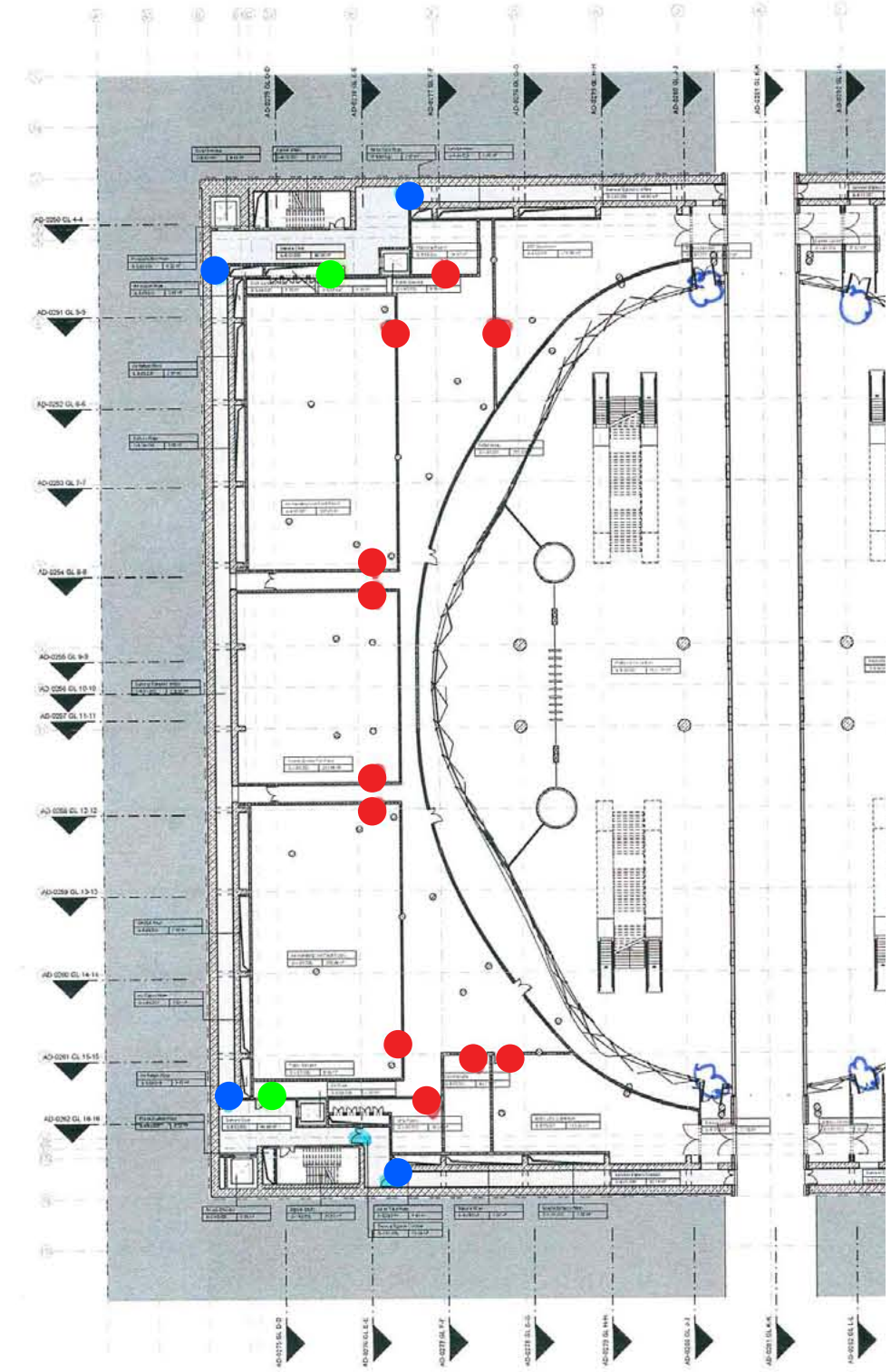
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		Name	Room Category	Required Area	Area	Height	Required Height	Height Control			
Electrical											
S-6.80.007	Line-1 Level (S-6)	Station LPS4-SS Substation	Electrical	160.00 m ²	292.64 m ²	8150			FL-08		
S-6.80.001	Line-1 Level (S-6)	Line 1 SST Traction Power Room	Electrical	170.00 m ²	326.13 m ²	8150			FL-08		
S-6.89.024	Line-1 Level (S-6)	Elc. Riser	Electrical		5.16 m ²	8150			FL-08		
S-6.89.025	Line-1 Level (S-6)	Elc. Riser	Electrical		5.16 m ²	8150			FL-08		
S-6.89.026	Line-1 Level (S-6)	Elc. Riser	Electrical		4.57 m ²	8150			FL-08		
S-6.89.027	Line-1 Level (S-6)	Elc. Riser	Electrical		4.73 m ²	8150			FL-08		
S-6.89.028	Line-1 Level (S-6)	Roof Service Riser	Electrical		2.87 m ²	8150			FL-08		
S-6.80.011	Line-1 Level (S-6)	LV Room STN-NW-LV1	Electrical	44.00 m ²	63.46 m ²	8150			FL-08		
S-6.80.008	Line-1 Level (S-6)	Station System UPS Room	Electrical	30.00 m ²	63.52 m ²	4400	3000	1400	FL-91		
ICT											
S-6.77.001	Line-1 Level (S-6)	Retail Control Room	ICT	0.00 m ²	25.79 m ²	8150	0	8150	FL-05		Siemens required Room added as per BACS RFI-06
S-6.80.018	Line-1 Level (S-6)	Line 1 Comms Room	ICT	65.00 m ²	61.65 m ²	4950	3000	1950	RAF-01		
S-6.80.019	Line-1 Level (S-6)	Access Switch Room SW	ICT	6.00 m ²	24.12 m ²	8150			RAF-01		
S-6.80.023	Line-1 Level (S-6)	Access Switch Room NW	ICT	6.00 m ²	24.12 m ²	8150			FL-91		
S-6.80.024	Line-1 Level (S-6)	Access Switch Room SE	ICT	6.00 m ²	17.36 m ²	8150			FL-91		
S-6.80.025	Line-1 Level (S-6)	Access Switch Room NE	ICT	6.00 m ²	17.36 m ²	8150			FL-91		
Mechanical											
S-6.80.003	Line-1 Level (S-6)	AHU Plant Room SW	Mechanical	390.00 m ²	391.32 m ²	8150	7500	650	FL-08		Make Smaller
S-6.80.002	Line-1 Level (S-6)	AHU Plant Room NW	Mechanical	390.00 m ²	390.96 m ²	8150	6500	1650	FL-08		
S-6.89.005	Line-1 Level (S-6)	Air Return Riser	Mechanical		6.79 m ²	8150			FL-08		
S-6.89.004	Line-1 Level (S-6)	Air Return Riser	Mechanical		2.94 m ²	8150			FL-08		
S-6.89.001	Line-1 Level (S-6)	Smoke Exhaust Riser	Mechanical		6.79 m ²	8150			FL-08		



Türlisten



Doorname		Door Schedule															
Specification Code	Door Number	Level	Number	From Room:	Wall Finish	Number	To Room:	Wall Finish	Width	Height	No. of Leaves	Frame Material	Door Leaf Material	Acoustic Rating	Security Rating	Door Handle	Door Lock
	00 - Line 1 Platform Le	S-6.80.015	Back of House Corridor	S-6.89.027	Elc. Riser				1000	2260							
	00 - Line 1 Platform Le	S-6.80.015	Back of House Corridor	S-6.89.027	Elc. Riser				1000	2260							
	00 - Line 1 Platform Le	S-6.80.015	Back of House Corridor	S-6.40.001	Retail Area				1510	2260							
	00 - Line 1 Platform Le	S-6.80.015	Back of House Corridor	S-6.40.001	Retail Area				1510	2260							
	00 - Line 1 Platform Le	S-6.40.002	Retail Area	S-6.40.002	Retail Area				1800	2400							
	00 - Line 1 Platform Le	S-6.40.002	Retail Area	S-6.40.002	Retail Area				1800	2400							
	00 - Line 1 Platform Le	S-6.91.018	Egress Corridor	S-6.91.018	Egress Corridor				1800	2400							
	00 - Line 1 Platform Le	S-6.91.011	Egress Corridor	S-6.91.011	Egress Corridor				1800	2400							
	00 - Line 1 Platform Le	S-6.91.014	Egress Corridor	S-6.91.014	Egress Corridor				1800	2400							
	00 - Line 1 Platform Le	S-6.80.015	Back of House Corridor	S-6.40.001	Retail Area				1510	2260							
	00 - Line 1 Platform Le	P-6.91.001	Entrance Parking	S-6.40.002	Retail Area				1950	2260							
	00 - Line 1 Platform Le	P-6.91.002	Entrance Parking	S-6.40.002	Retail Area				1950	2260							
	00 - Line 1 Platform Le	S-6.71.001	Sanitary Men	S-6.71.001	Sanitary Men				750	2200							
	00 - Line 1 Platform Le	S-6.91.006	Service/ Egress Corridor	S-6.92.004	Service Core				1510	2260							
	00 - Line 1 Platform Le	S-6.40.002	Retail Area	S-6.89.025	Elc. Riser				1000	2260							
	00 - Line 1 Platform Le	S-6.40.002	Retail Area	S-6.89.025	Elc. Riser				1000	2260							
	00 - Line 1 Platform Le	S-6.40.002	Retail Area	S-6.92.004	Service Core				1510	2260							
	00 - Line 1 Platform Le	S-6.92.003	Egress Stairs	S-6.92.004	Service Core				1510	2260							
	00 - Line 1 Platform Le	S-6.92.006	Service Core	S-6.92.005	Egress Stairs				1510	2260							
	00 - Line 1 Platform Le	S-6.92.008	Service Core	S-6.91.009	Service/ Egress Corridor				1510	2260							
	00 - Line 1 Platform Le	S-6.89.026	Elc. Riser	S-6.80.013	IIPS Room				1000	2260							



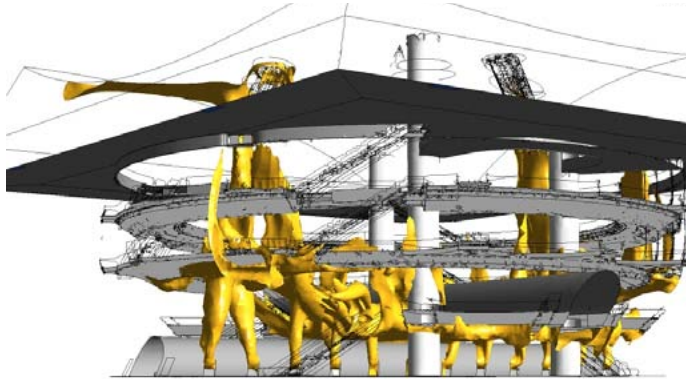
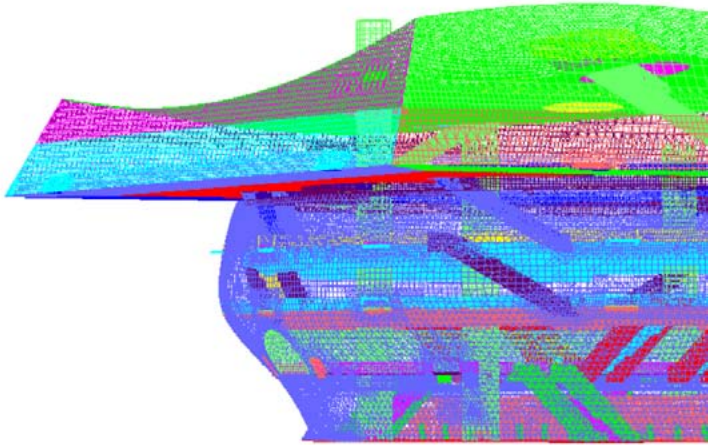
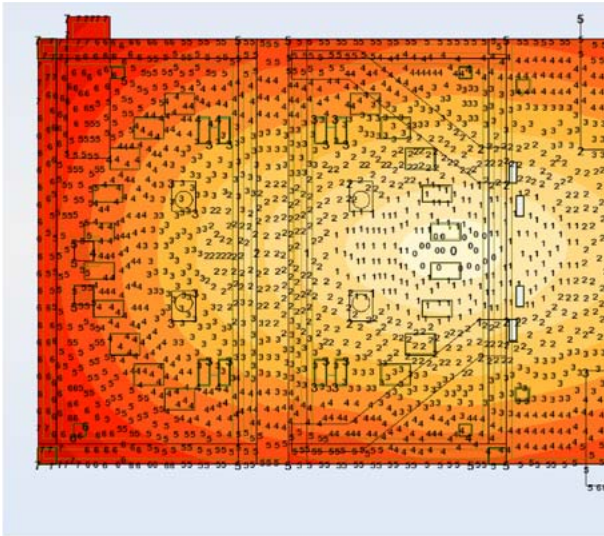
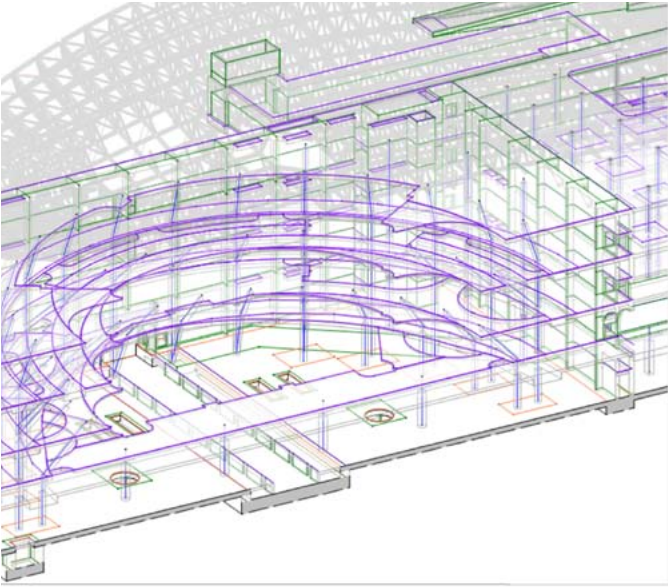
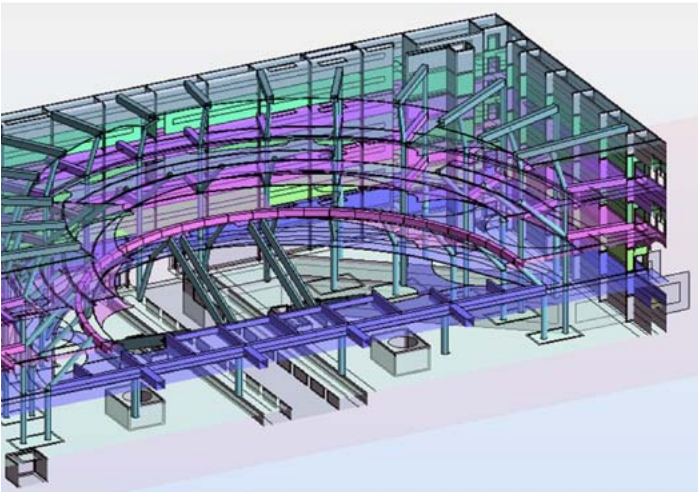
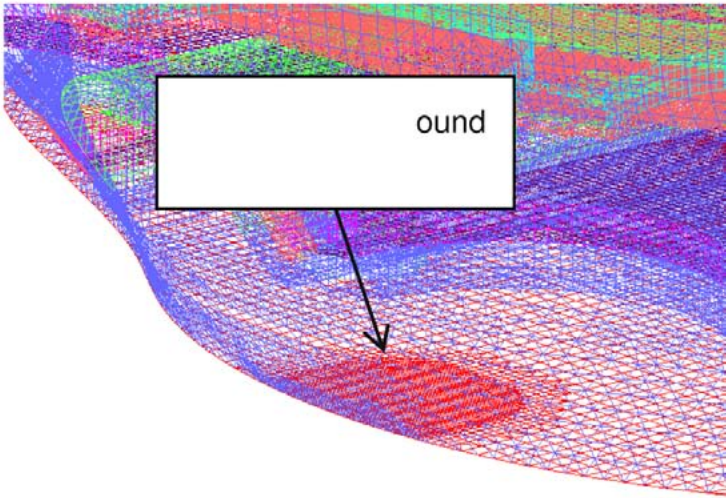
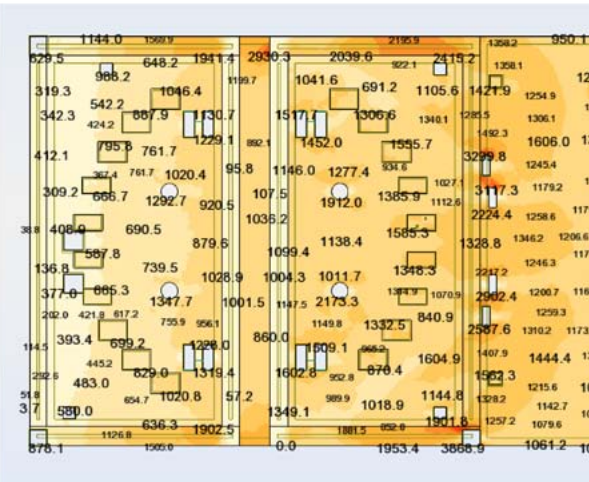


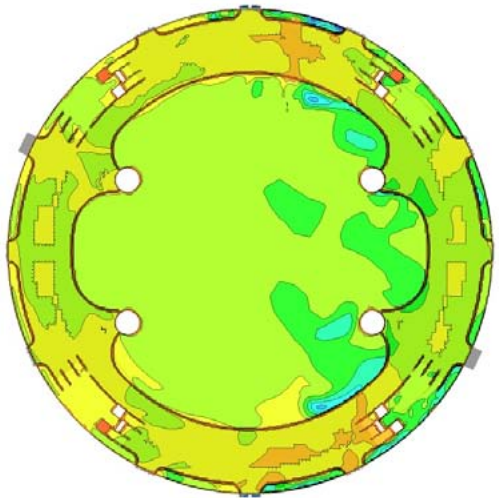
Figure 8—42 Computational mesh - Overview

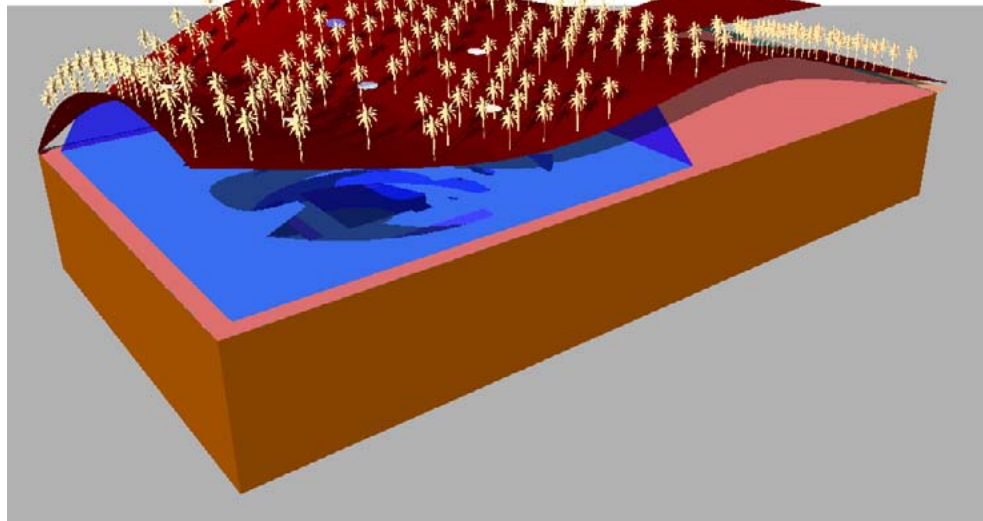
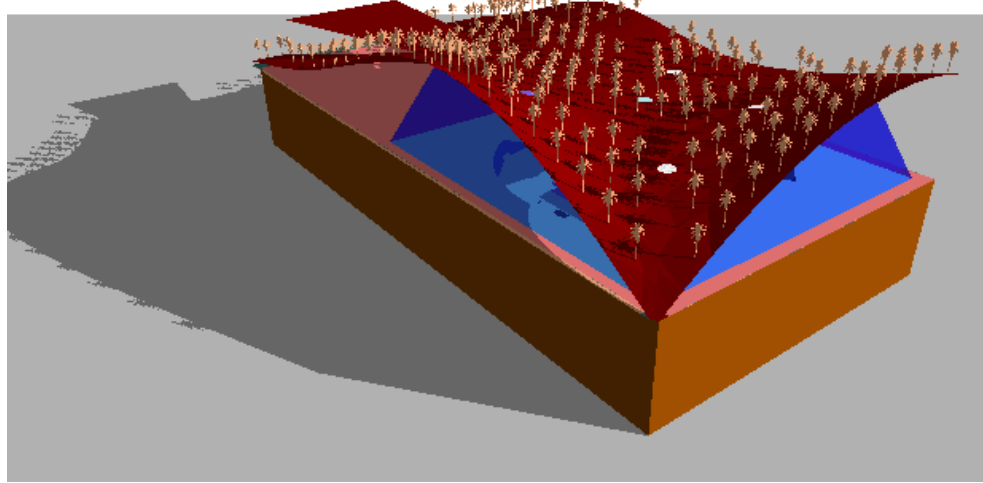


Axial Forces in X-direction

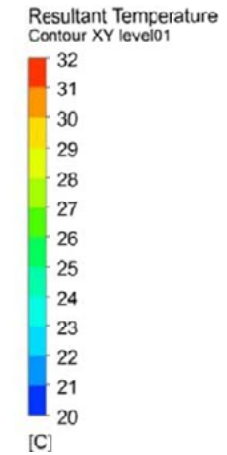
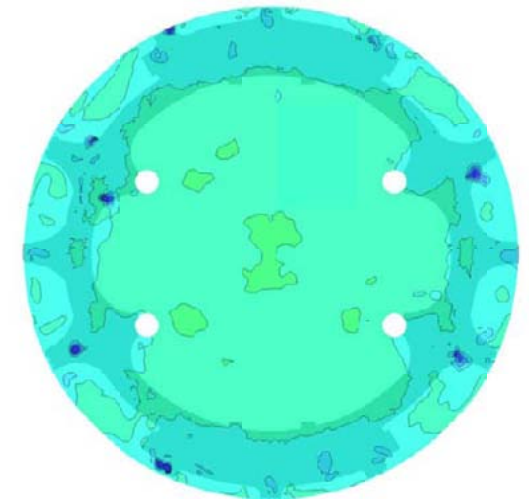


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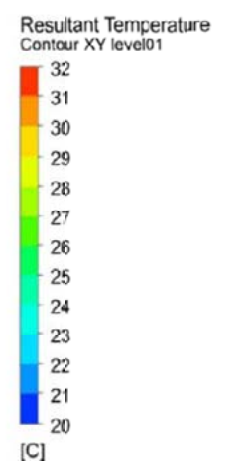
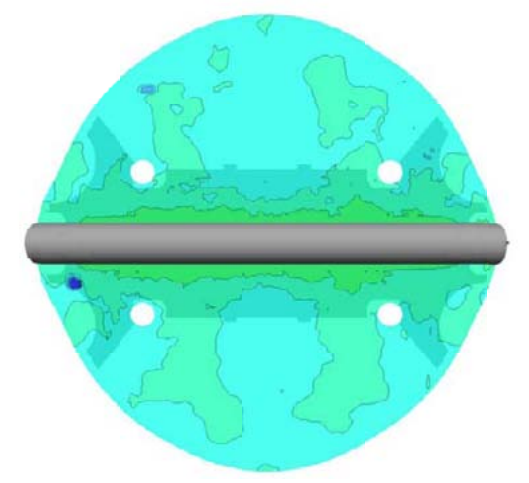




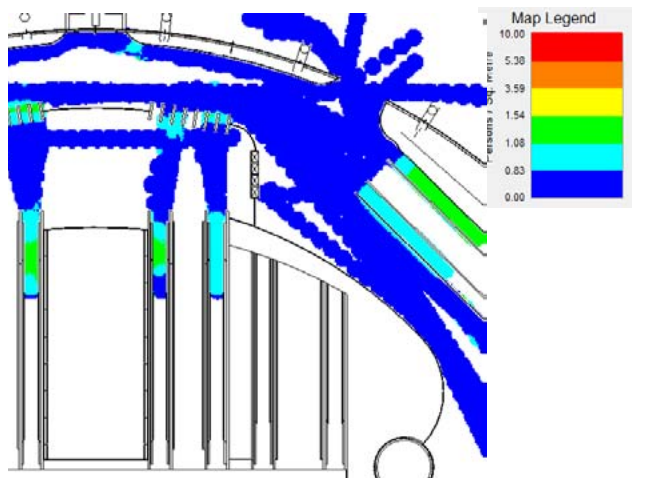
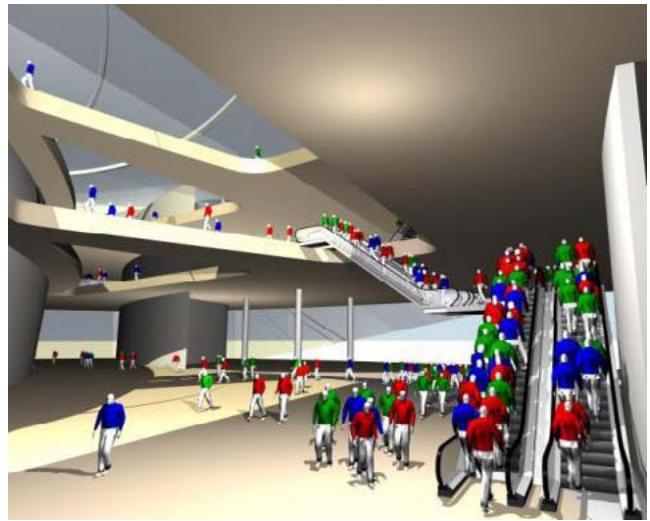
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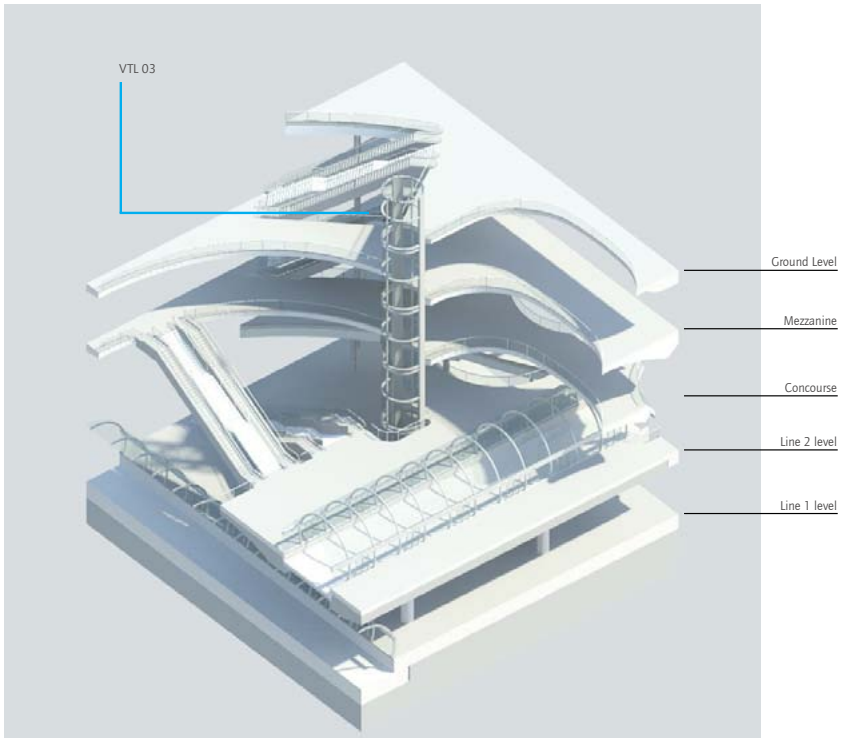
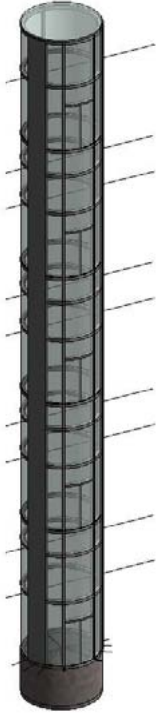
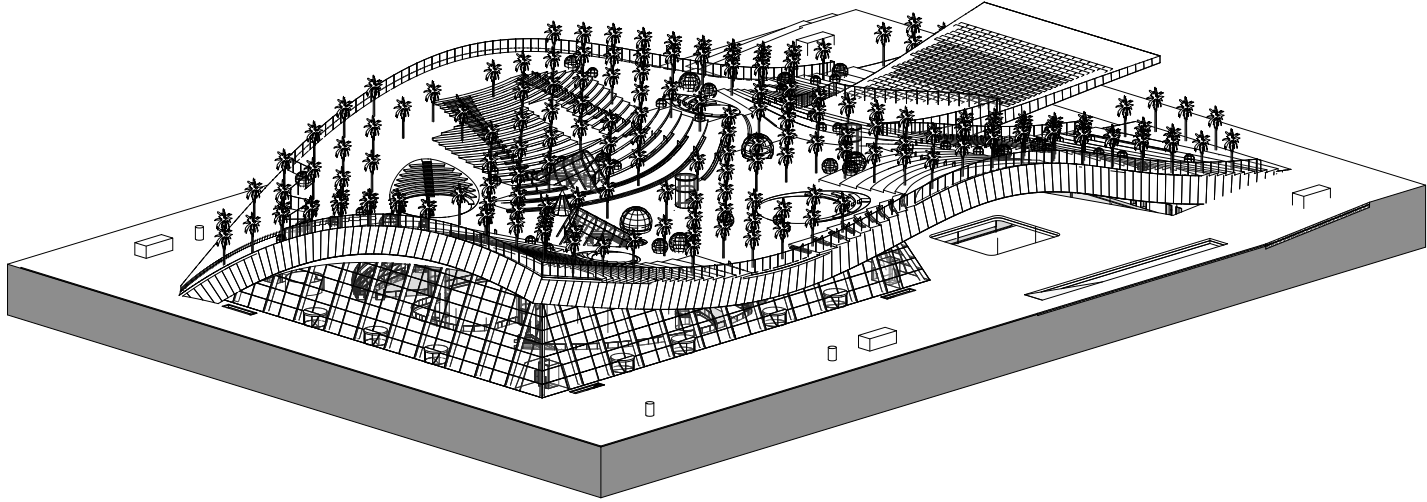
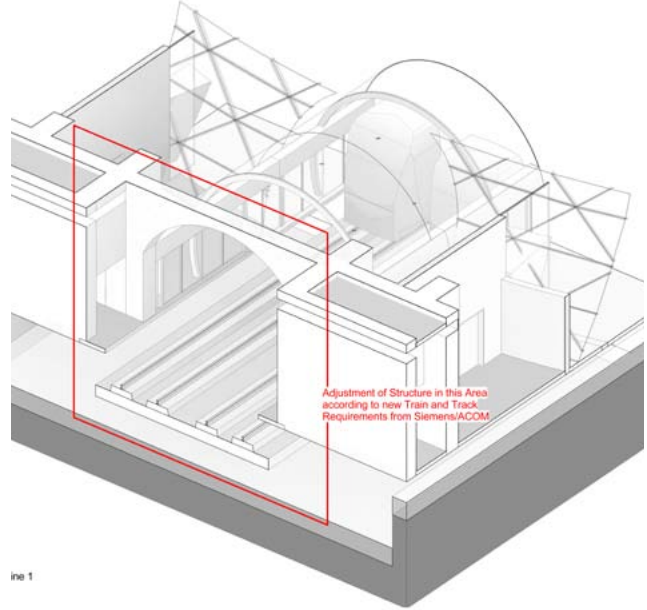
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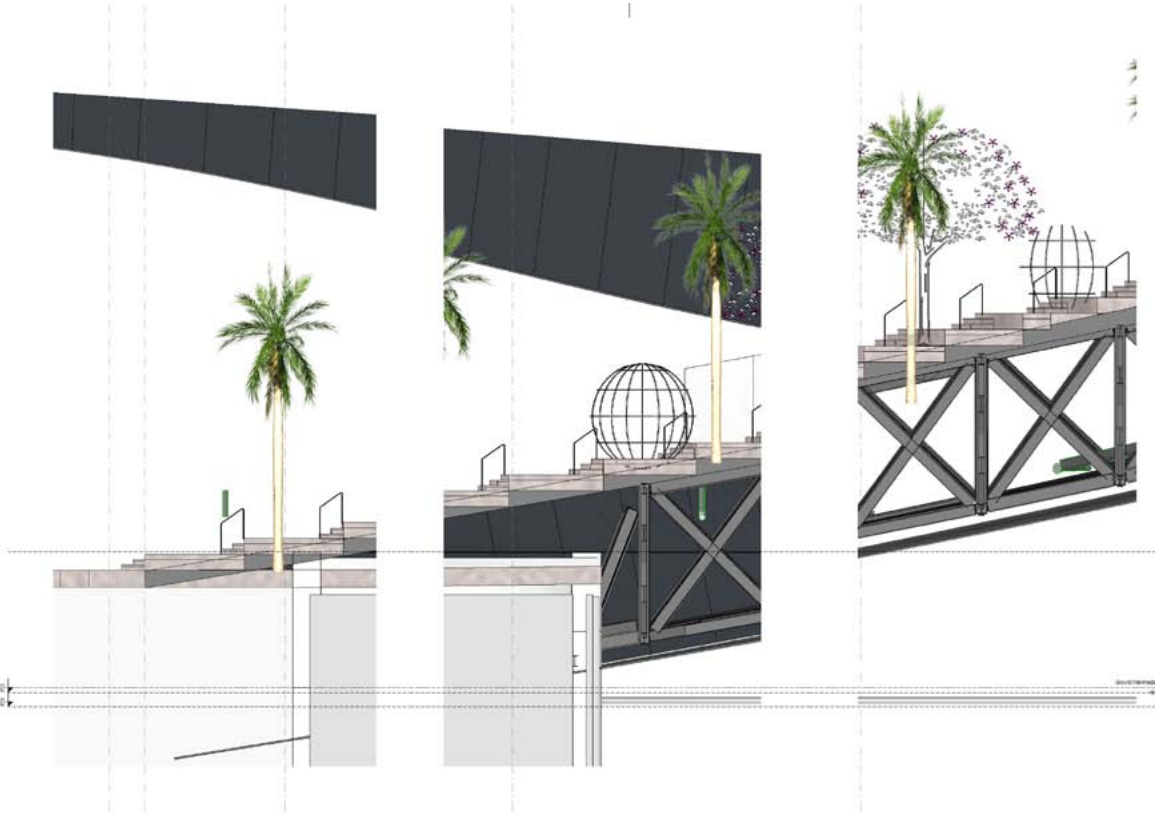
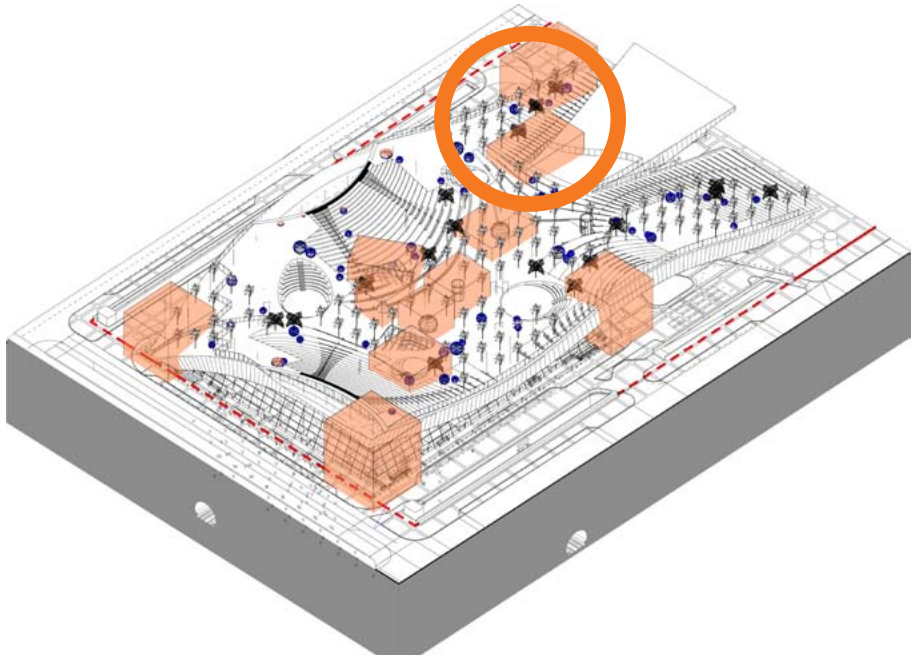
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VISUALISIERUNG



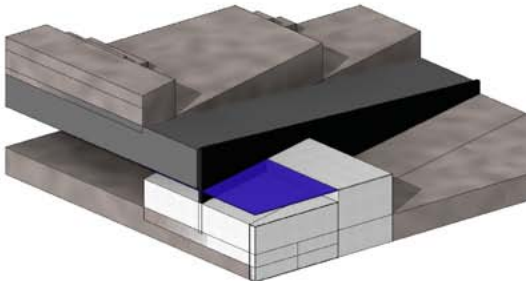
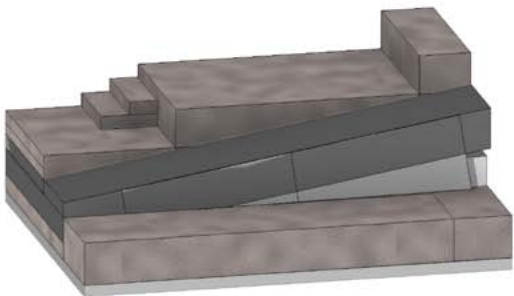
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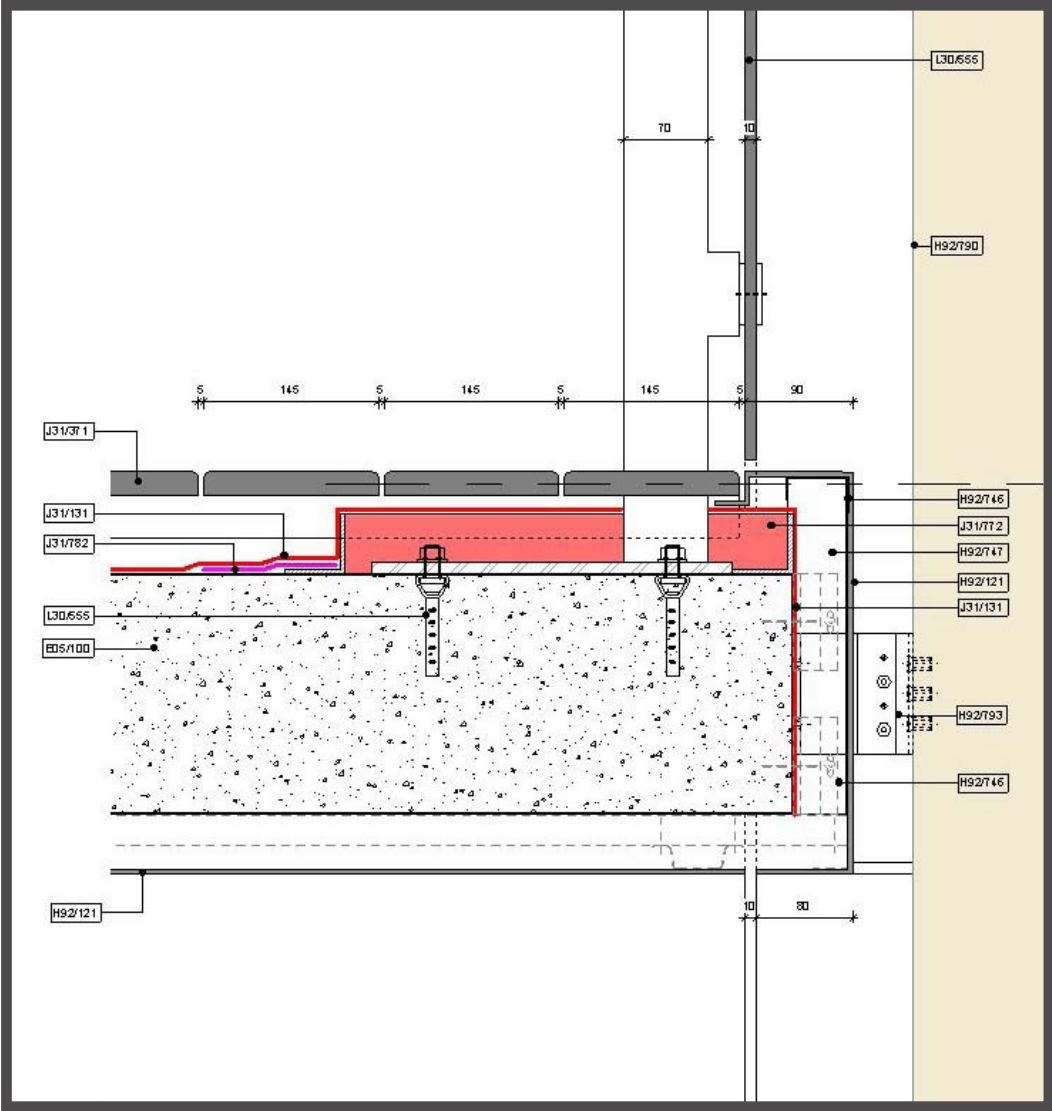
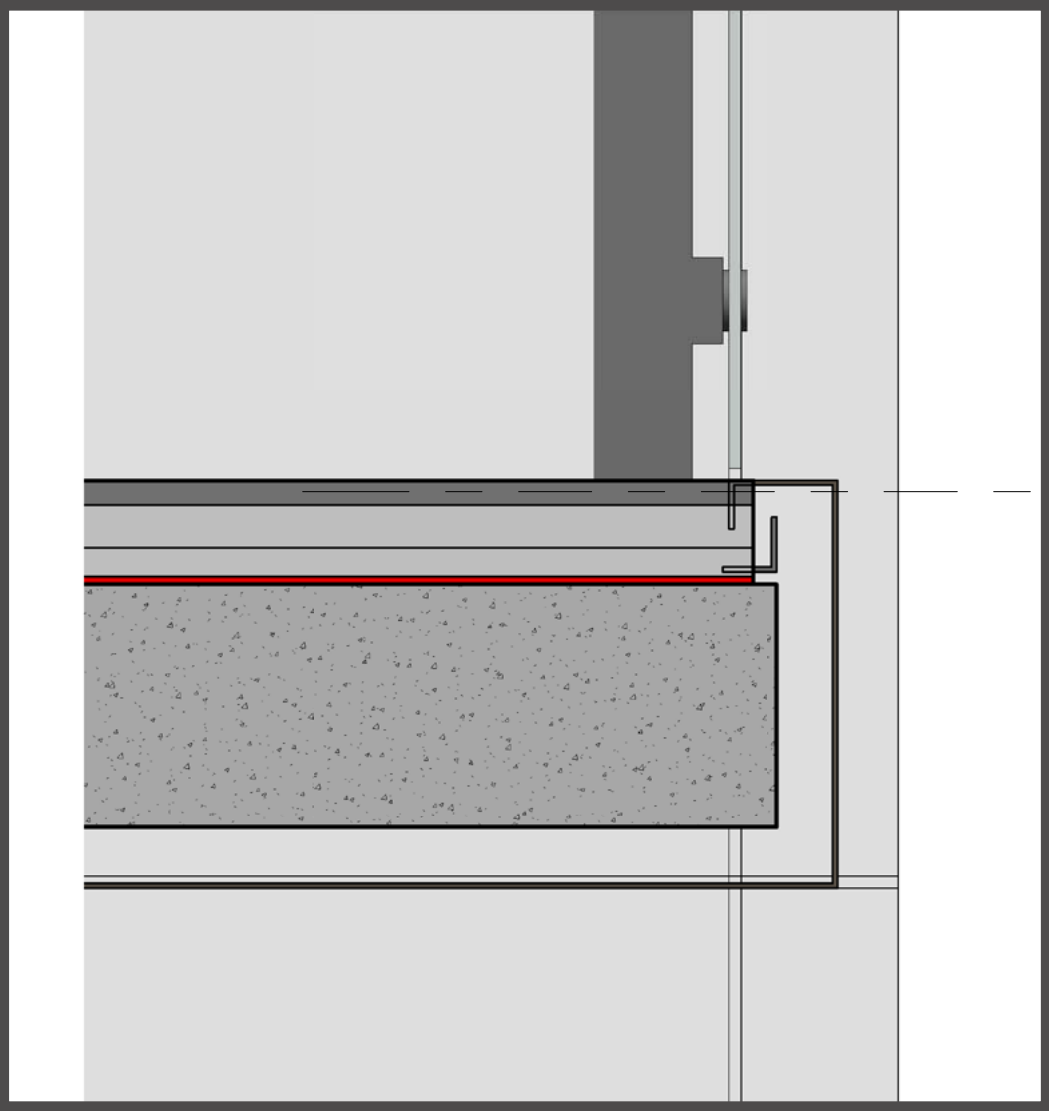


1 Study Area 1 - 50_1



1 Study Area 1 - 100_2





ED5/100	CONCRETE SLAB TO STRUCTURAL ENGINEER'S DETAIL AND DESIGN REFER TO STRUCTURAL ENGINEER'S DETAILS FOR WALL THICKNESS AND SPECIFICATION
H92/121	ALUMINIUM COMPOSITE MATERIAL (ACM) RAINSCREEN FACADE, SOFFIT AND BALCONY FASCIA CLADDING. FINISH MATERIAL TO BE FOLDED INTO WINDOW, DOOR & CURTAIN WALL JAMBS & HEADS AS PER DETAILS. SUBFRAME, BRACKETS AND FIXINGS TO SPECIALIST SUB-CONTRACTOR'S DETAILS - REFER TO EXTERNAL ELEVATIONS FOR COLOUR, FINISH AND JOINT SETOUT OF ALL ACM PANELS
H92/746	ACM CLADDING BRACKET TO SPECIALIST CLADDING SUB-CONTRACTOR'S DETAILS
H92/747	ACM CLADDING VERTICAL SUPPORT RAIL TO SPECIALIST CLADDING SUB-CONTRACTOR'S DETAILS
H92/790	GOLD ALUMINIUM PRESSED VERTICAL FIN EXTRUSION FIXED BETWEEN BALCONIES AND RESTRAINED AT INTERMEDIATE LEVELS. COLOUR OF FIN TO BE PPC RAL 9016 GOLD PEARL (INTERPOL D2525). THE HEAD AND BASE OF THE FIN EXTRUSIONS ARE TO BE SUPPORTED BY SPIGOTTED PLATES
H92/791	SPIGOTTED BASE PLATE AND BRACKET FIXED TO SLAB AND CONCEALED WITHIN CLADDING ZONE. SLOTTED VOIDS EQUAL TO THE SIZE OF PROTRUDING SPIGOT ARE TO BE FORMED IN THE ACM CLADDING TO PROVIDE A NEAT PENETRATION. SIZE, CENTRES AND FIXING OF PLATES TO BE DETERMINED
H92/792	SPIGOTTED HEAD PLATE AND BRACKET WITH SLOTTED CONNECTIONS FIXED TO SLAB AND CONCEALED WITHIN CLADDING ZONE TO ALLOW FOR VERTICAL DEFLECTION AND MOVEMENT. SLOTTED VOIDS EQUAL TO THE SIZE OF PROTRUDING SPIGOT ARE TO BE FORMED IN THE ACM CLADDING TO PROVIDE A
H92/793	INTERMEDIATE FIXING BRACKET FIXED TO SLAB AND CONCEALED WITHIN CLADDING ZONE. SLOTTED VOIDS EQUAL TO THE SIZE OF PROTRUDING SPIGOT ARE TO BE FORMED IN THE ACM CLADDING TO PROVIDE A NEAT PENETRATION. BRACKETS ARE TO BE PPC RAL 8019 (BRONZE)
J31/131	100 PERMATEC ECOWRAP HOT MELT WATERPROOFING TO SPECIALIST SUB-CONTRACTOR'S DETAILS - SYSTEM TO INCLUDE PRIMER LAYER, REINFORCEMENT AND VAPOUR PERMEABLE MEMBRANE IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATION AND DETAILS
J31/371	20MM X 145MM ECO DECKING BOARDS TO ROOF TERRACE AND BALCONIES
J31/772	PITCH POCKET DETAIL. GALVANISED STEEL PITCH POCKET FORMER ANGLE SECURED BY STRAPS OF PERMAFLASH-D 150 BONDED IN 2 COATS OF PERMATEC ECOWRAP INCORPORATING PERMAFLASH-R REINFORCEMENT. A MINIMUM 20MM MARG IN BETWEEN STEEL PITCH POCKET FORMER AND PENETRATION
J31/782	PERMATEC PERMAFLASH-D 150 DETAILING SHEET BONDED IN PERMATEC ECOWRAP. MINIMUM WIDTH OF DETAILING SHEET 150MM TO BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S DETAILS
L30/655	GALVANISED AND POLYESTER POWDER COATED (PPC) LASER CUT 70MM X 100MM METAL BALUSTRADE FLATS. SIZE AND CENTRES TO BE DETERMINED BY SPECIALIST SUB-CONTRACTOR AND STRUCTURAL ENGINEER - 10MM TOUGHENED AND LAMINATED OBSUCRED GLASS IN FILL PANELS SECURE BY GLAZING CLAMPS AND NEOPRENE GASKETS. 42MM BRUSHED STAINLESS STEEL TOP RAIL SECURED TO BALUSTRADE UPRIGHTS IN ACCORDANCE STRUCTURAL ENGINEER'S REQUIREMENTS TO SPECIALIST SUB-CONTRACTOR'S DESIGN
R10/481	75MM VERTICAL OVERFLOW PIPE. POSITION OF OVERFLOW PIPE TO ALIGN WITH SOFFIT CLADDING JOINT

BIM MODEL ALS GRUNDLAGE FÜR MODELLBAU



AKTUELLE BIM PROJEKTE





PRINCE SALMAN SCIENCE OASIS





















