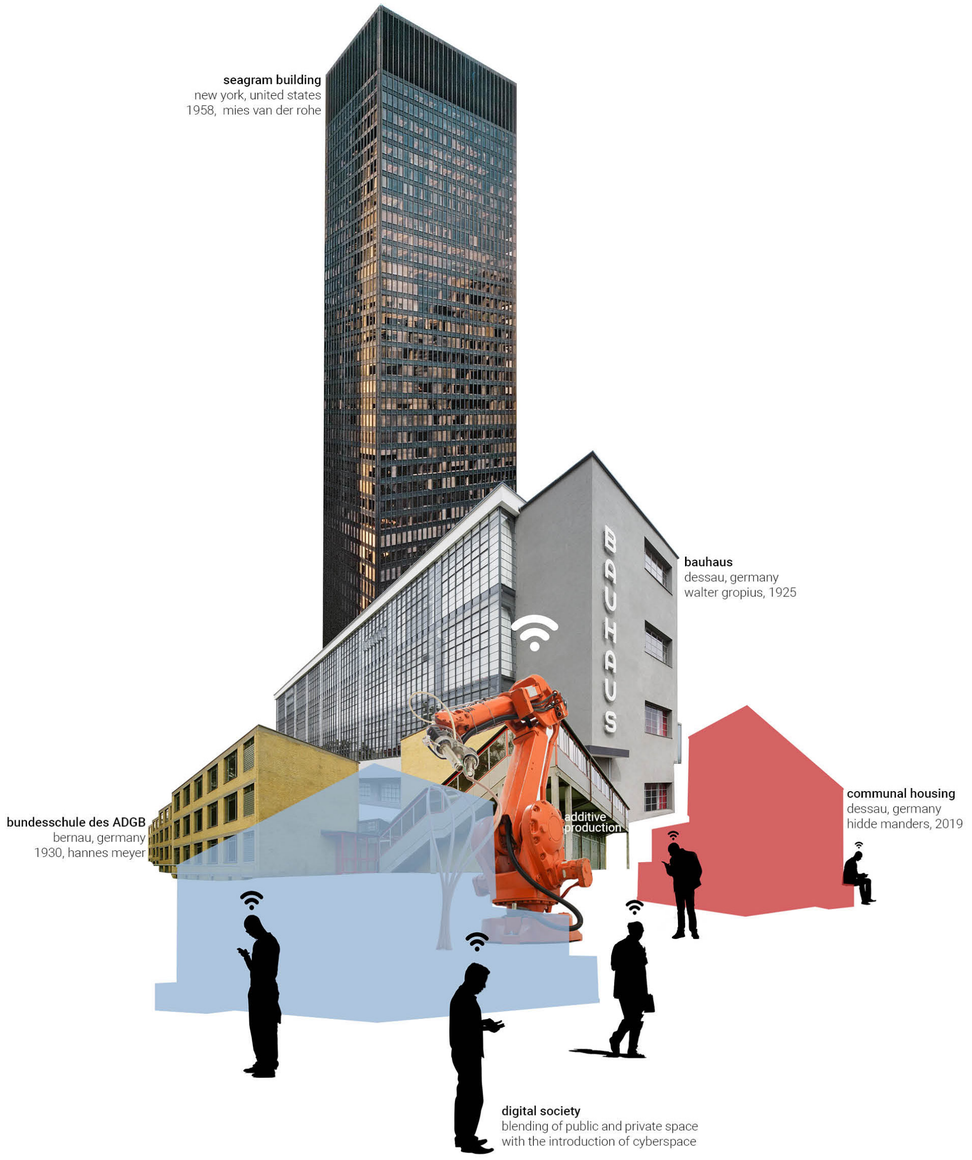


rethinking the role of the bauhaus master

#1 Bauhaus Research
#2 Site
#3 Functions
#4 Design Simulation
#5 Design Experiments
#6 Design
#7 Materiality
#8 Algorithm
#9 Construction
#10 Conclusion
#11 Reflection

#1 Bauhaus Research

Research Question: Theory

Who is the new Bauhaus master?

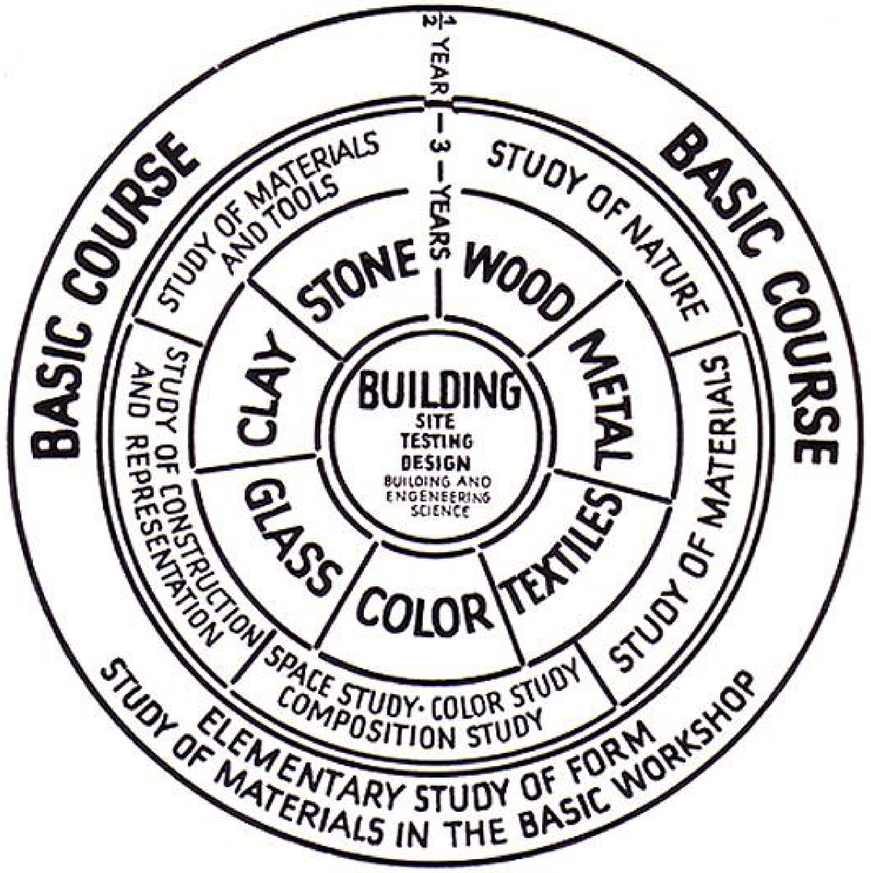
bauhaus reuniting arts

theatre workshop

plastic arts workshop

metal workshop

the educational system



apprentice

young master

journeyman

master

new method of production

handcraft

robotcraft

new kind of architect

Research Question: **Process**
How can the user be involved in the design process?

new kind of student

new kind of master

young teaching old

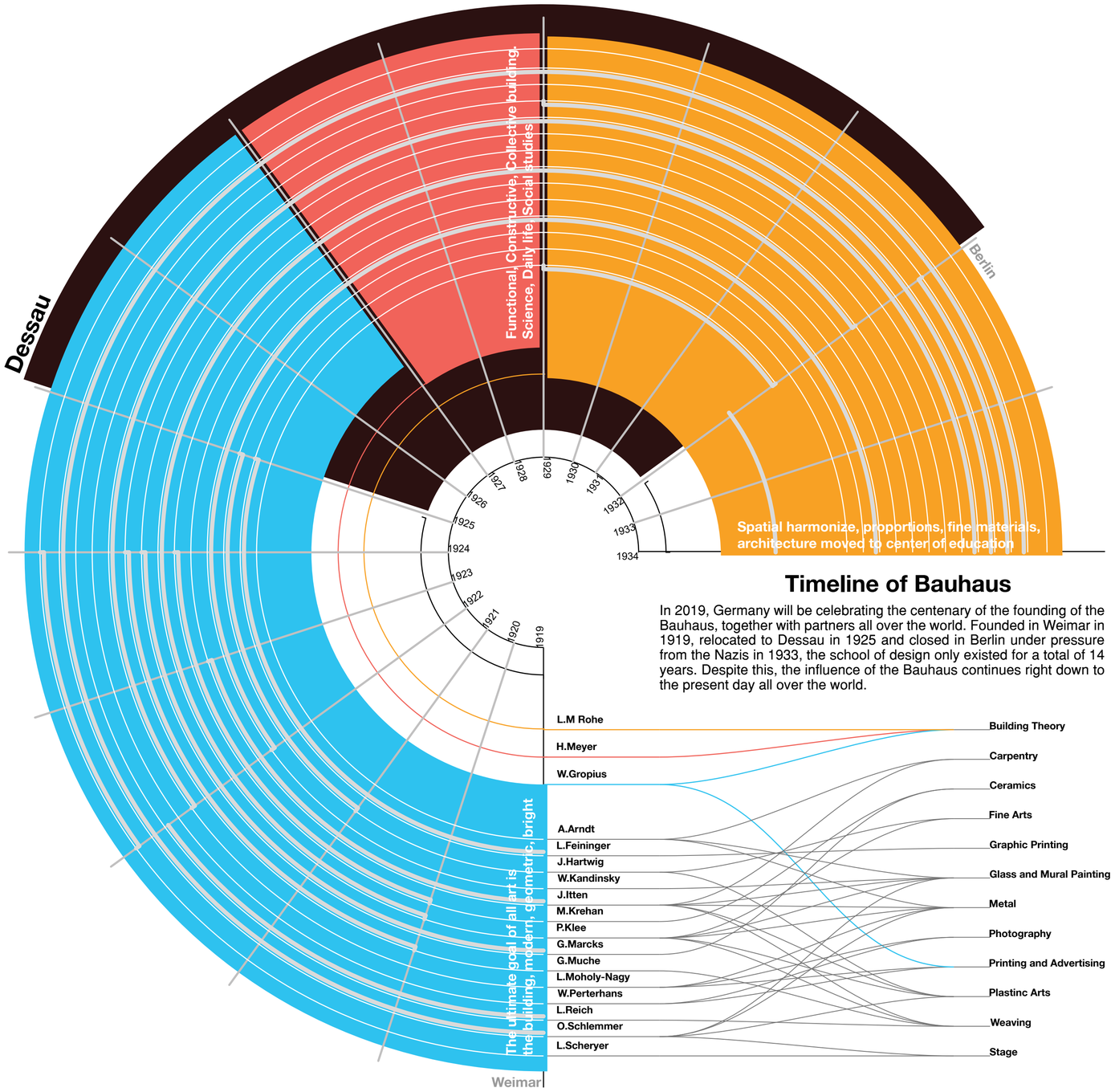
old teaching young

CONCLUSION

dynamic realtionship student and master
new bauhaus university building

#2 Site

Bauhaus timeline



Timeline of Bauhaus

In 2019, Germany will be celebrating the centenary of the founding of the Bauhaus, together with partners all over the world. Founded in Weimar in 1919, relocated to Dessau in 1925 and closed in Berlin under pressure from the Nazis in 1933, the school of design only existed for a total of 14 years. Despite this, the influence of the Bauhaus continues right down to the present day all over the world.

Germany

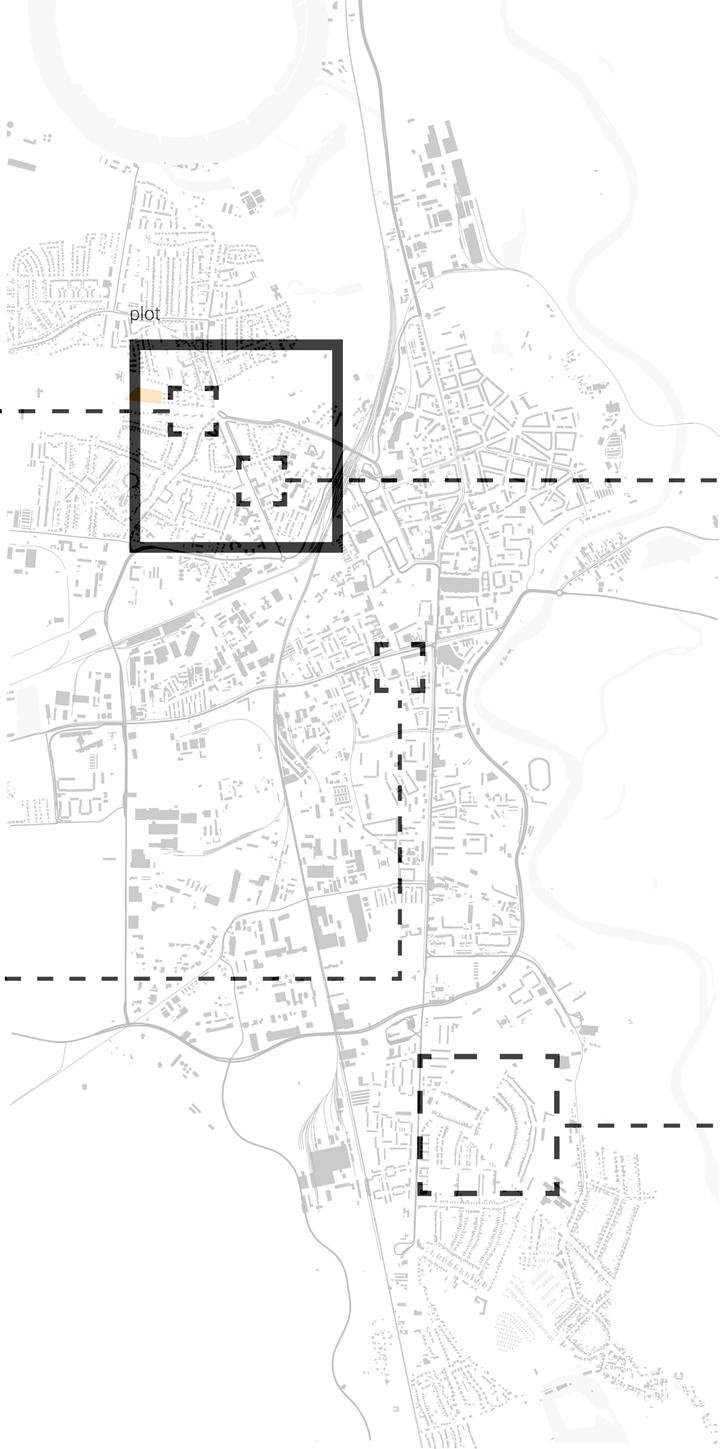
map of germany

Dessau

dessau map

dessau - bauhaus buildings

bauhaus master house - walter gropius

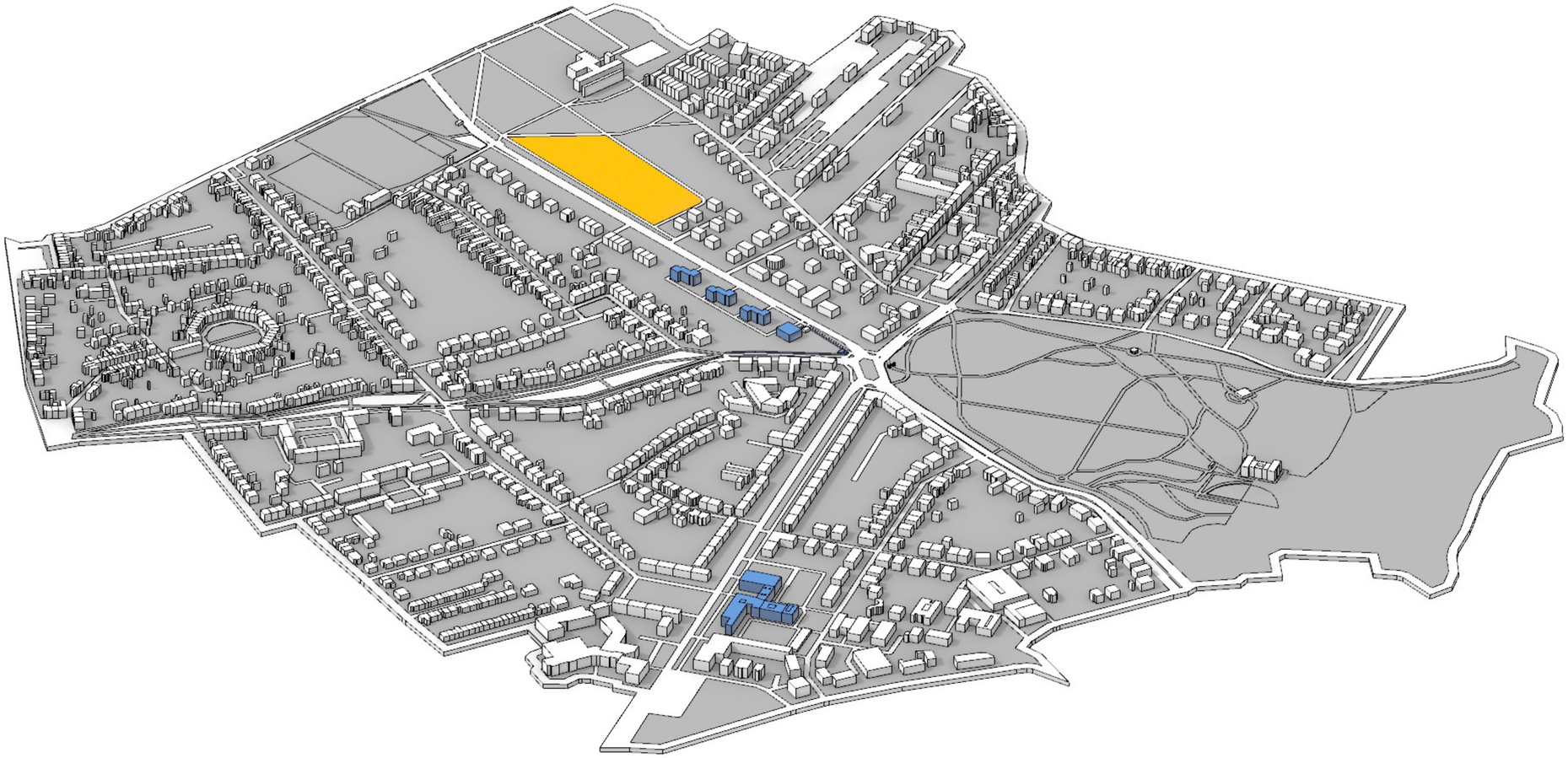


bauhaus university building - walter gropius

employment office - walter gropius

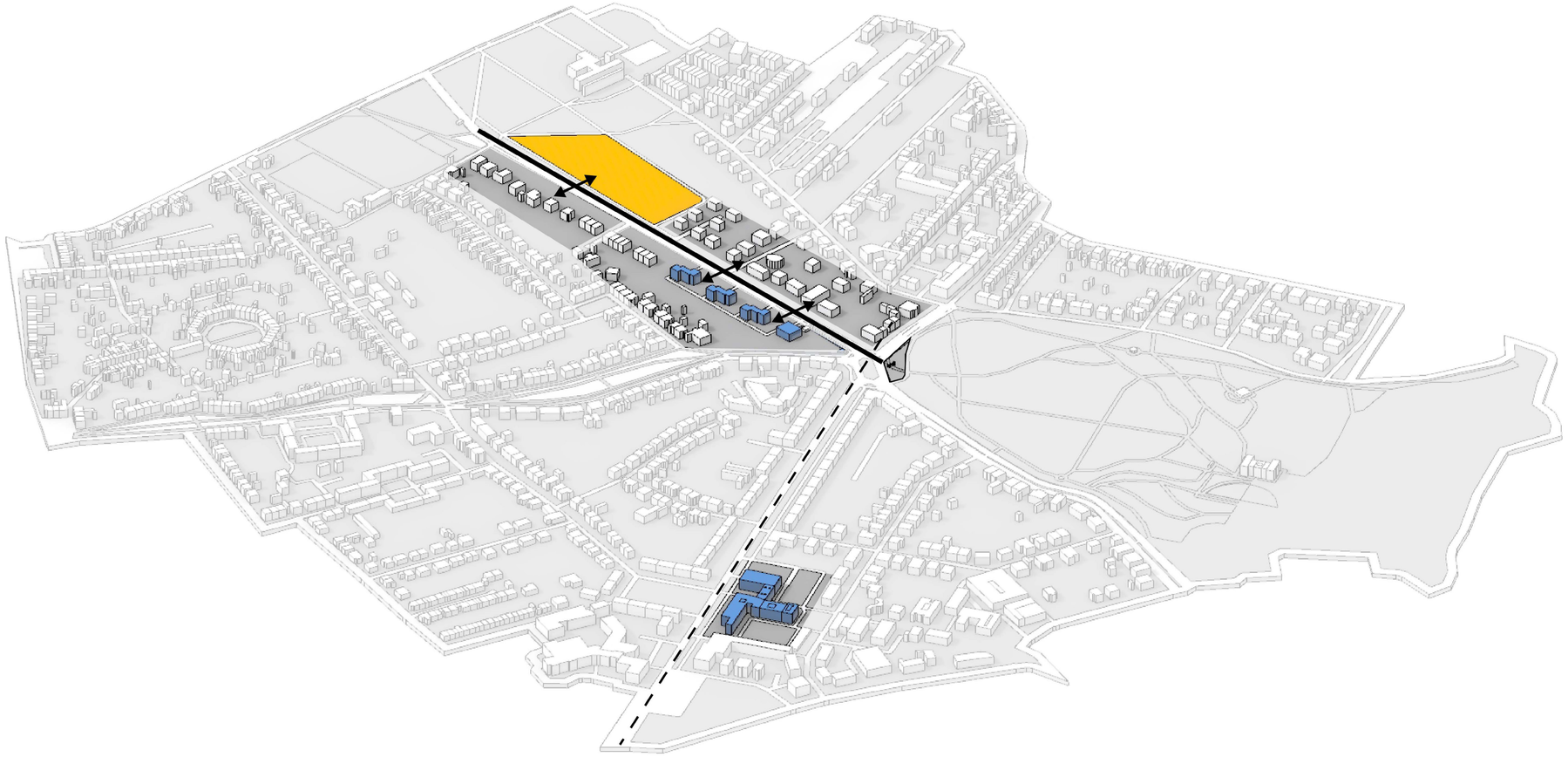
dessau-törten housing estate - walter gropius

plot



project context + bauhaus houses and university

plot - axis , contrast



context axis + contrasting buildings

roman ruins

contemporary master houses

banal housing

original master houses

banal housing

banal housing

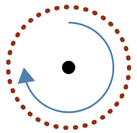
context

CONCLUSION

Dessau context
Contemporary langugage contrast

#3 Functions

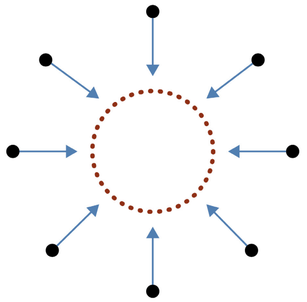
4 distinctive parts of developing



staying

First element of the development is that of self-awareness. Schools offer a lot of tutoring, guidance and knowledge. However it is the students themself that has to understand this, not just by following what the teacher is saying but being able to understand this.

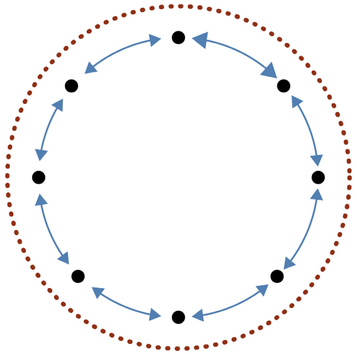
This element is represented in the building with residencies. Similar to the studios in the Bauhaus, there will be 25 studios/bedrooms for students/teachers to stay. This can be 1 day, 10 days or 1 year. Depending on what courses they are following.



learning

Second element in the development is that of learning. Simply learning from an other, may it be a teacher, a book in the library or a tutorial that is shown on the internet. From the perspective of hierachy there is still a division within these functions, a division between the teacher teaching and the student learning.

Within learning there are the lecture and class rooms. Offices for personnel of the school or mentors of the students. Shops where students and the public is able to buy materials, books, print posters, or buy furniture made in the school. Finally there is the library that houses two methods of learning, books and the internet.

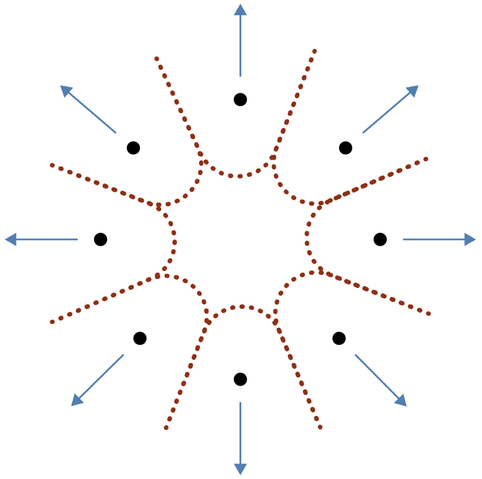


collaborating

Third element in developing is that of collaboration. As discussed before, the students needs to be able to collaborate and learn from each other. Introducing the horizontal hierachy, in which all the students are equal.

The goal of collaborating is the workshop, similar to that of the Bauhaus system. Achieving perspective and aspects through different workshops. However with the introduction of robotics, this is being defined as the final goal of the workshop. Where Bauhaus envisioned their products to be mass-produced, the current products should be mass-customized.

The workshop rooms are multifunctional however, depending on the courses of a given year, the spaces are able to adapt. However there are fixed rooms with the method/tools to be used within the workshops. Such as woodworking, machines, and robotic lab.

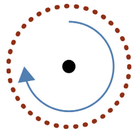


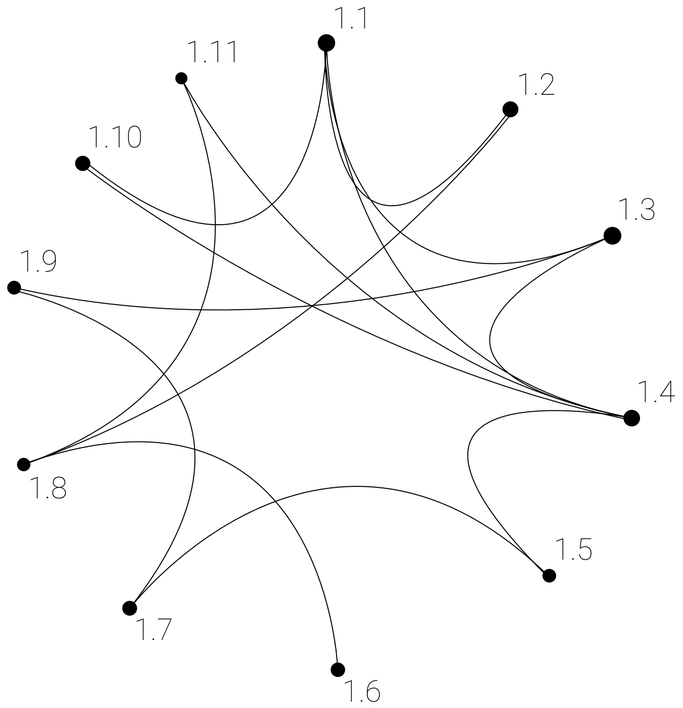
sharing

Last element in the development is that of sharing. Inviting the public within the design process. Where the Bauhaus had their exhibitions, theatre plays or parties, the school will have similar elements.

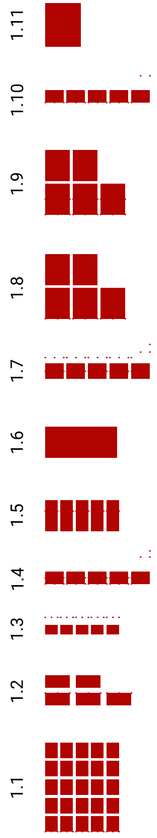
The collaboration that happened between the students, will here take place between student and public. Teaching the student to become the choral architectur, the 'middle-man'. Defining the question, where the public will bring the response.

staying

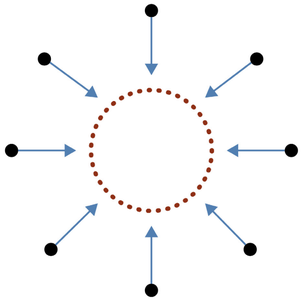


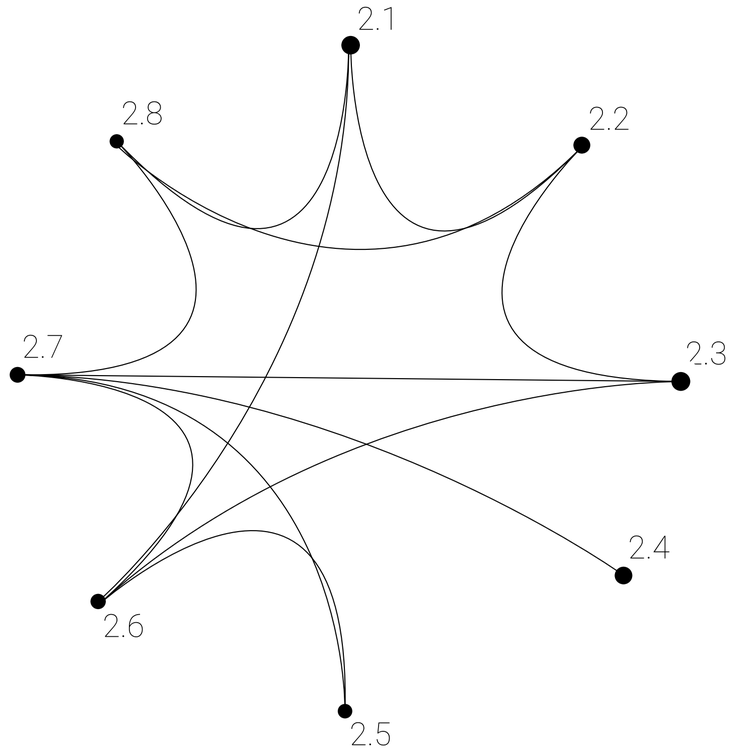


room		area	undirected adjacency matrix
1.1	bedroom	[50 m²]	[1.2, 1.3, 1.4, 1.8]
1.2	study	[40 m²]	[1.1, 1.8]
1.3	toilet	[15 m²]	[1.4, 1.8, 1.9]
1.4	bathroom	[35 m²]	[1.1, 1.3]
1.5	storage	[50 m²]	[1.10, 1.11, 2.8]
1.6	garden/balcony	[..... m²]	[1.7, 1.8, 1.11]
1.7	kitchen	[35 m²]	[1.3, 1.6, 1.8, 1.9]
1.8	iving room	[100 m²]	[1.1, 1.2, 1.3, 1.6, 1.7, 1.9, 1.11]
1.9	dining room	[100 m²]	[1.3, 1.7, 1.8]
1.10	laundry	[30 m²]	[1.4, 1.5, 1.11]
1.11	hall	[... m²]	[1.5, 1.6, 1.8, 1.10]

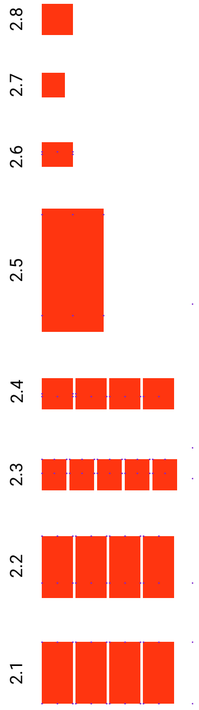


learning

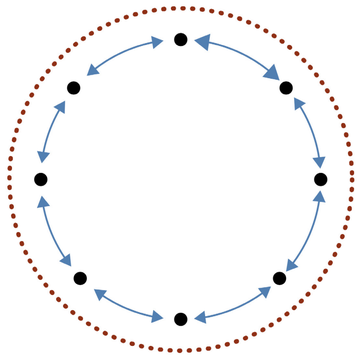


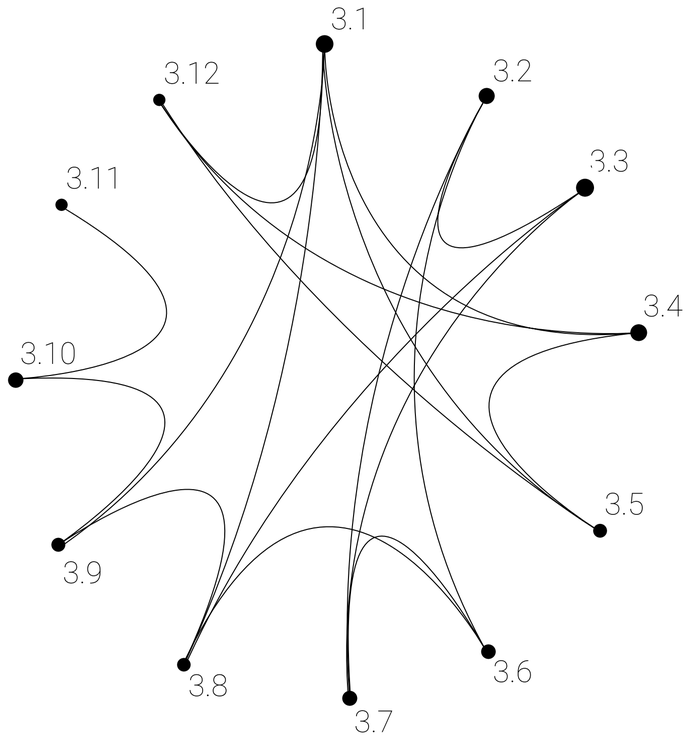


room		area	adjacency matrix undirected
2.1	lecture room	[200 m²]	[2.2, 2.7, 2.8]
2.2	class room	[200 m²]	[2.1, 2.3, 2.7]
2.3	office	[100 m²]	[2.2, 2.7
2.4	shops	[100 m²]	[2.7]
2.5	library	[200 m²]	[2.6, 2.7]
2.6	toilets	[20 m²]	[2.5, 2.7]
2.7	reception	[.... m²]	[2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.8]
2.8	lockers	[25 m²]	[2.1, 2.7]

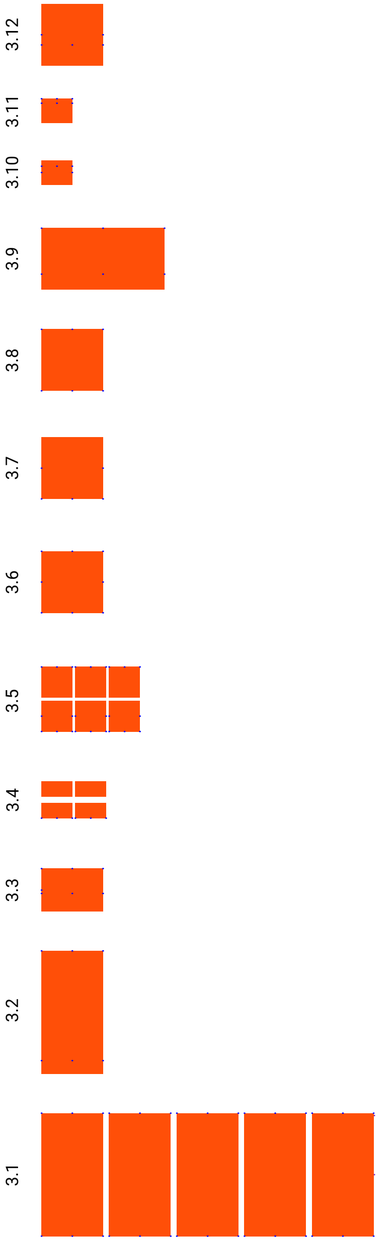


collaborating

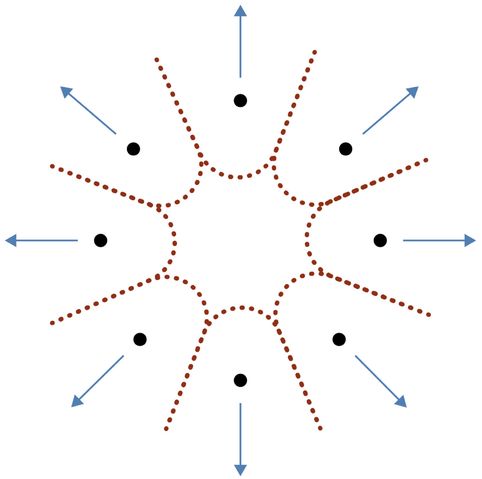


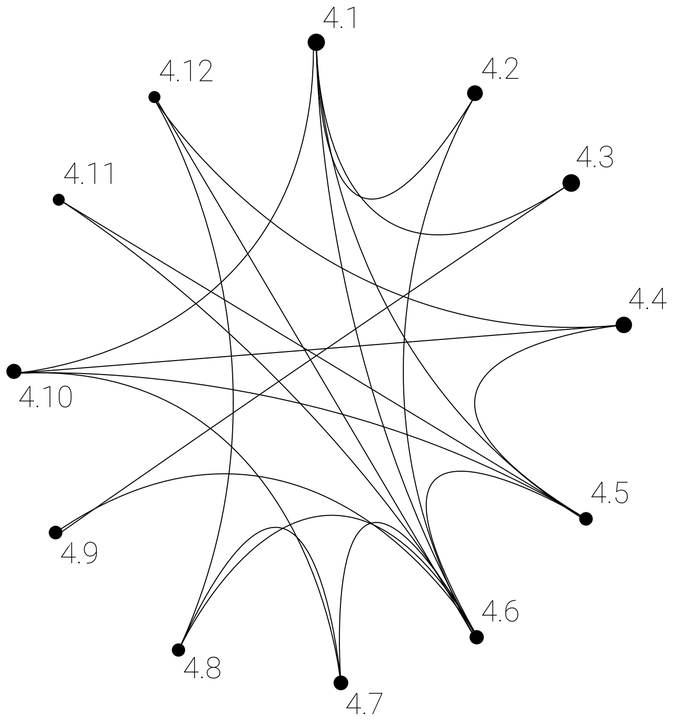


room		area	adjacency matrix undirected
3.1	workshop	[1000m²]	[3.4, 3.5, 3.8, 3.9, 3.12]
3.2	materials/storage	[200m²]	[3.3, 3.6, 3.7]
3.3	laboratory/painting	[70m²]	[3.2, 3.7, 3.8]
3.4	conference	[50m²]	[3.1, 3.12]
3.5	meeting	[150m²]	[3.1, 3.4, 3.12]
3.6	woodworking	[100m²]	[3.2, 3.7, 3.8]
3.7	machines	[100m²]	[3.2, 3.3]
3.8	robotic lab	[100m²]	[3.1, 3.6, 3.9]
3.9	stage/theatre	[200m²]	[3.1, 3.8, 3.10]
3.10	film room	[20m²]	[3.9, 3.11]
3.11	radio room	[20m²]	[3.10]
3.12	lobby	[.....m²]	[3.1, 3.4, 3.5, 3.11]

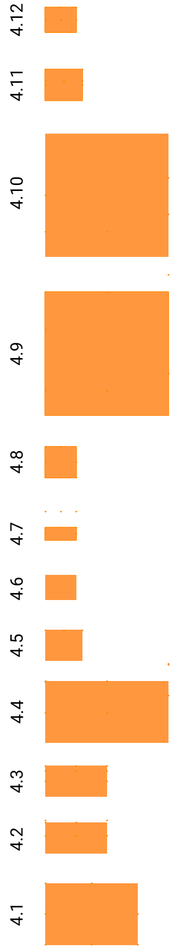


sharing

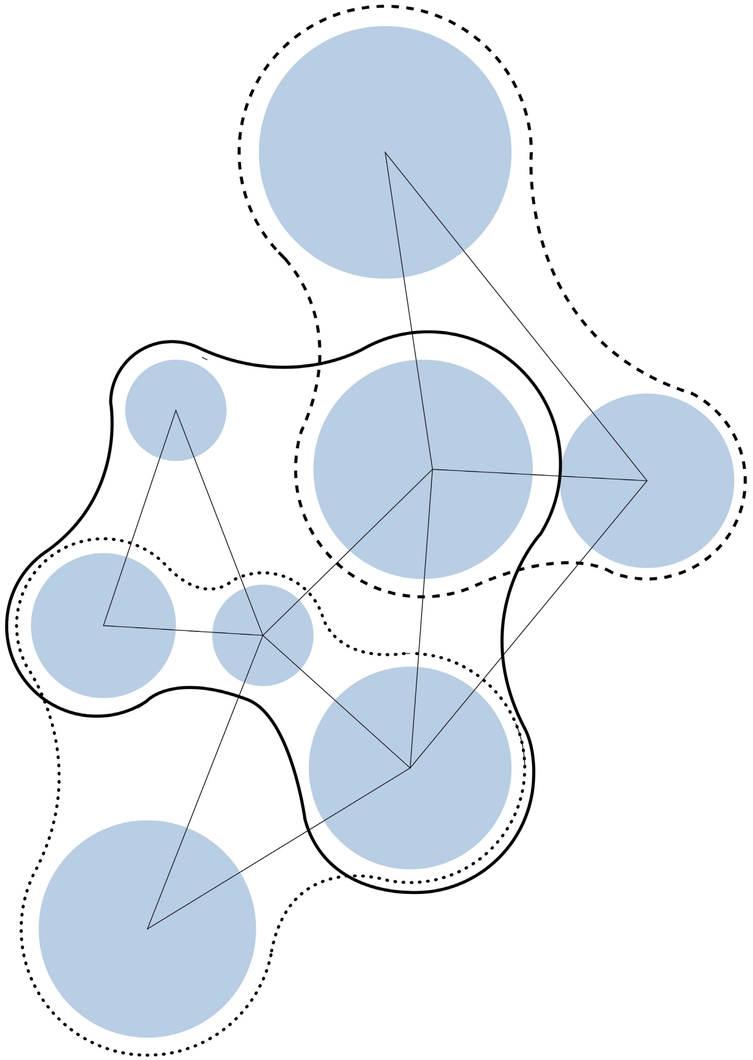




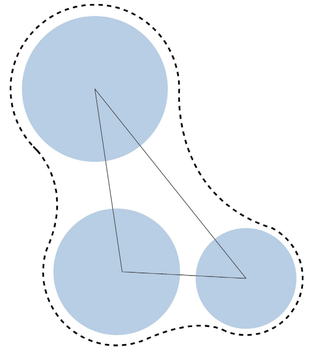
room		area	adjacency matrix undirected
4.1	canteen	[150m²]	[4.2, 4.3, 4.5, 4.6, 4.10]
4.2	cafe	[50m²]	[4.1, 4.6]
4.3	gym	[50m²]	[4.1, 4.9]
4.4	auditorium	[200m²]	[4.5, 4.10]
4.5	exhibition	[30m²]	[4.1, 4.4, 4.6, 4.10, 4.11
4.6	lobby	[.... m²]	[4.1, 4.3, 4.7, 4.8, 4.9, 4.11, 4.12]
4.7	reception	[10m²]	[4.6, 4.8, 4.10]
4.8	lockers	[25m²]	[4.6, 4.7]
4.9	playground	[.... m²]	[4.3, 4.7]
4.10	sculptures	[.... m²]	[4.1, 4.4, 4.5, 4.7]
4.11	display	[30m²]	[4.5, 4.6]
4.12	toilets	[20m²]	[4.4, 4.6, 4.8]



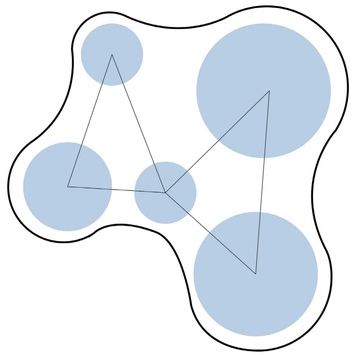
dynamic network



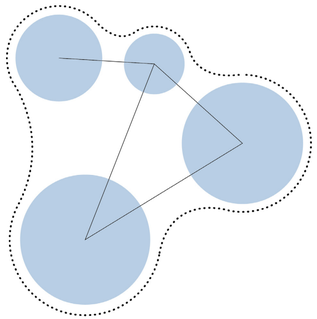
dynamic network



network 1

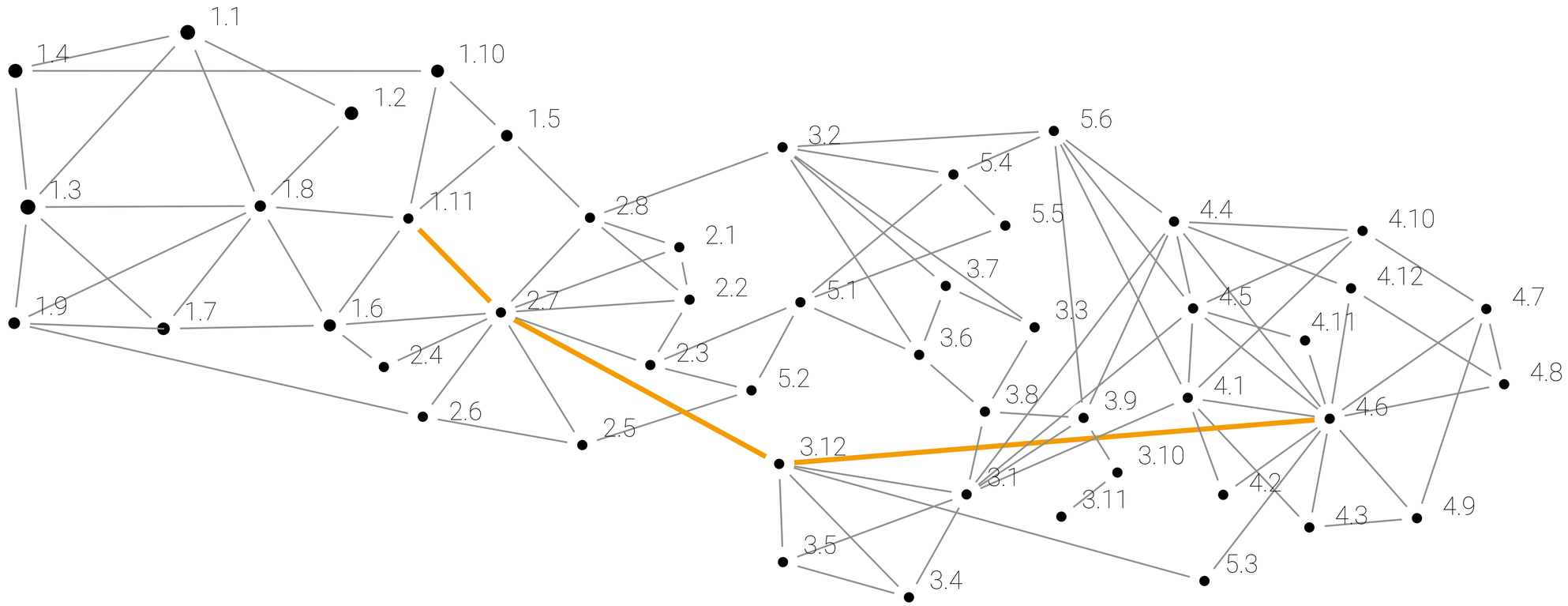


network 2



network 3

adjecency scheme



CONCLUSION

4 distinctive parts of development
Dynamic Network
Continuous Space

#4 Macro Design Simulation

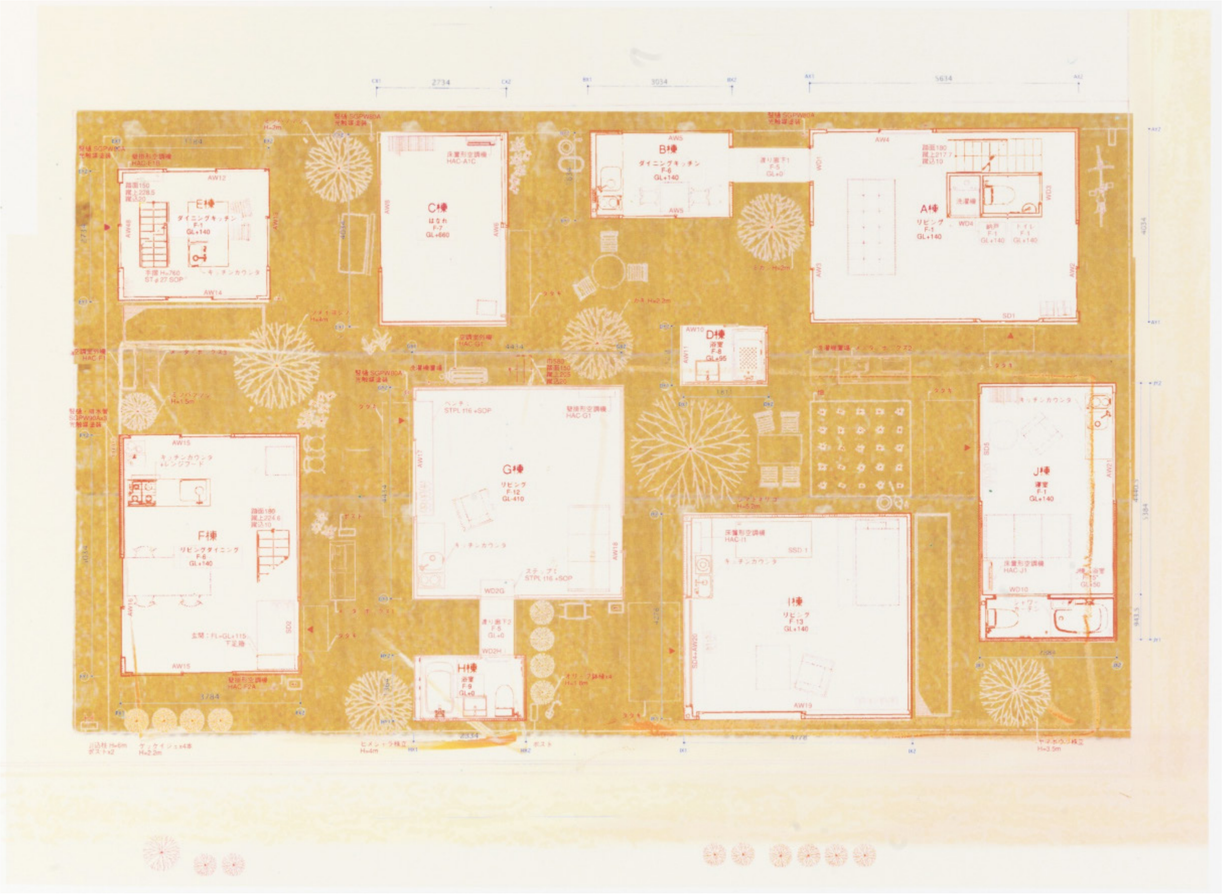
design reference
Ryue Nishizawa - Moriyama house

moriyama house - Ryue Nishizawa

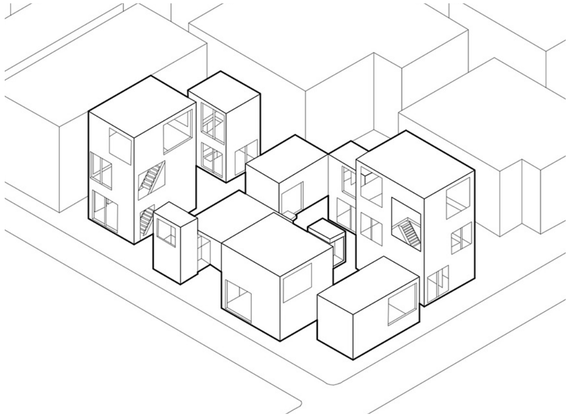
changing functions changes circulation

internal pocket gardens

public edge graduadlly towards private garden



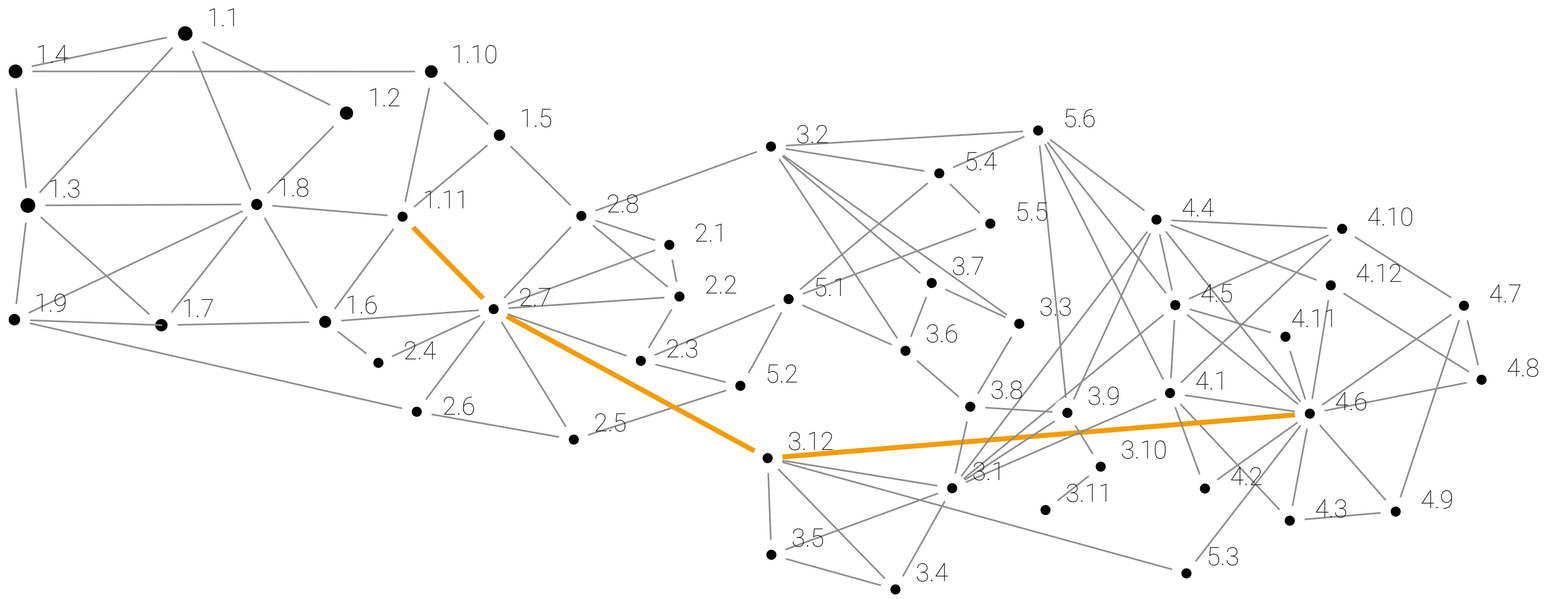
moriyama house - plan



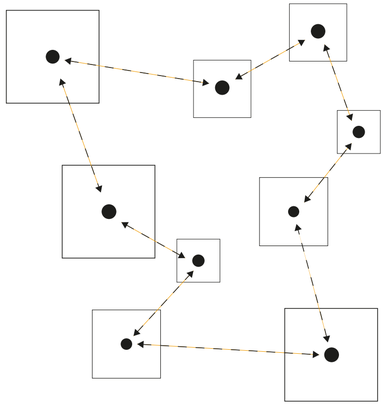
moriyama house - axonometric view

moriyama house photo

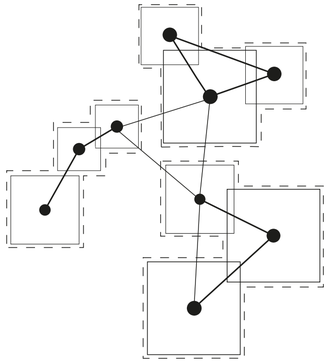
algorithm design



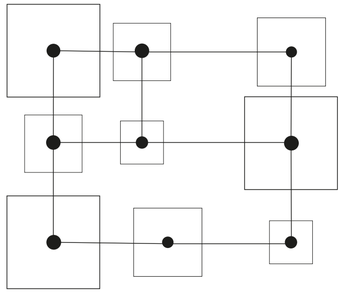
adjecency scheme



distance algorithm

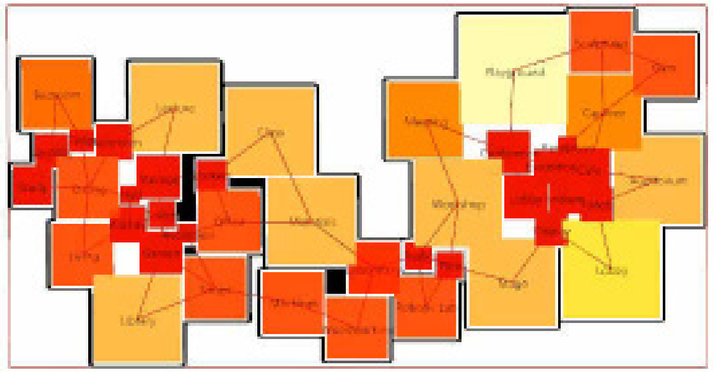


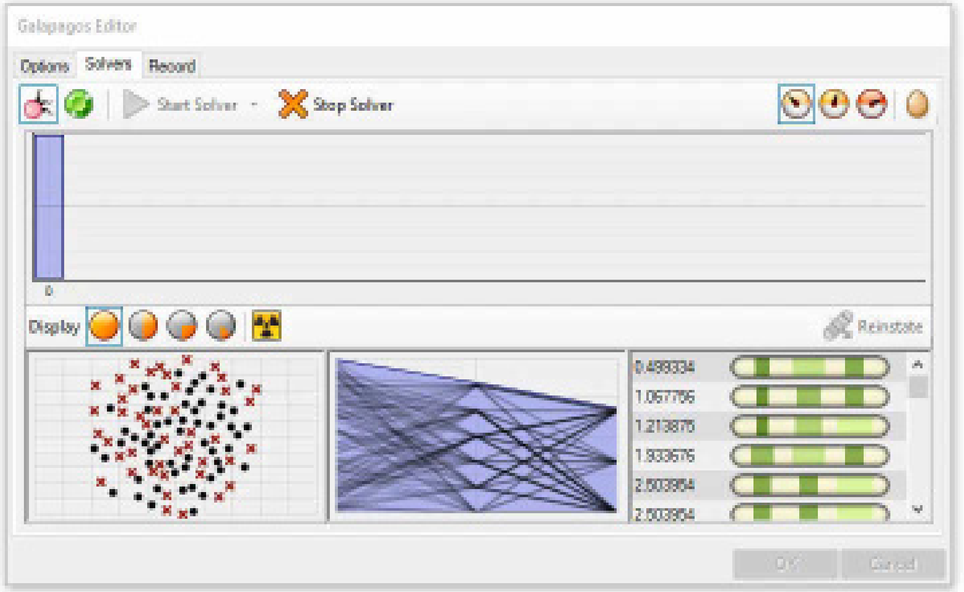
clustering algorithm

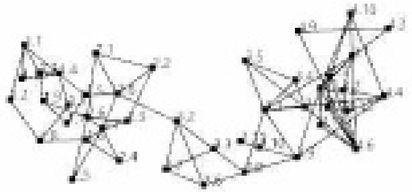


distribution algorithm

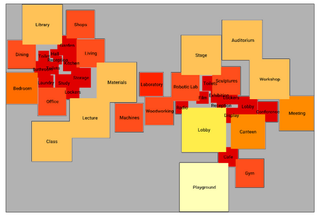
clustering algorithm







simulation results



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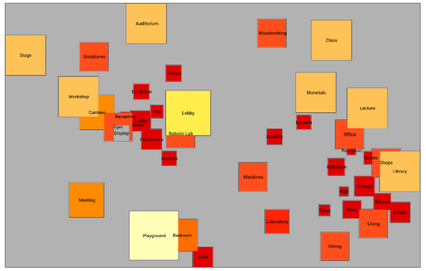
simulation type:	clustering
attraction:	1.40
repulsion:	0.06
area:	0.20

simulation_ID:	**2**
simulation type:	distance
attraction:	1.32
repulsion:	0.03
area:	0.20



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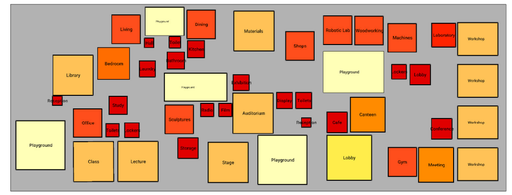
area:	0.30



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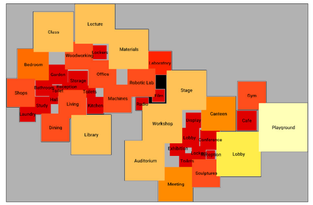
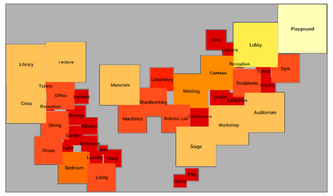
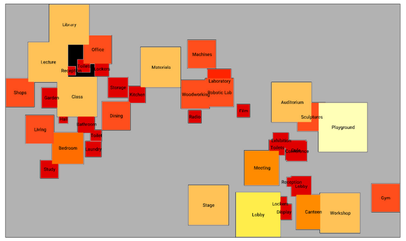
attraction:	1.34
repulsion:	0.04
area:	0.30



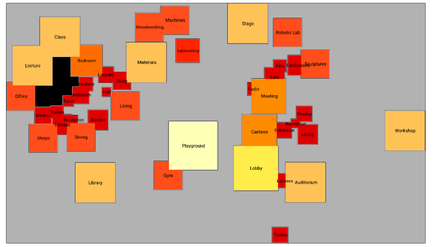
simulation_ID:	**5**
simulation type:	clustering
attraction:	1.20
repulsion:	0.01
area:	0.30



simulation_ID:	**6**
simulation type:	clustering
attraction:	1.09
repulsion:	0.03
area:	0.30



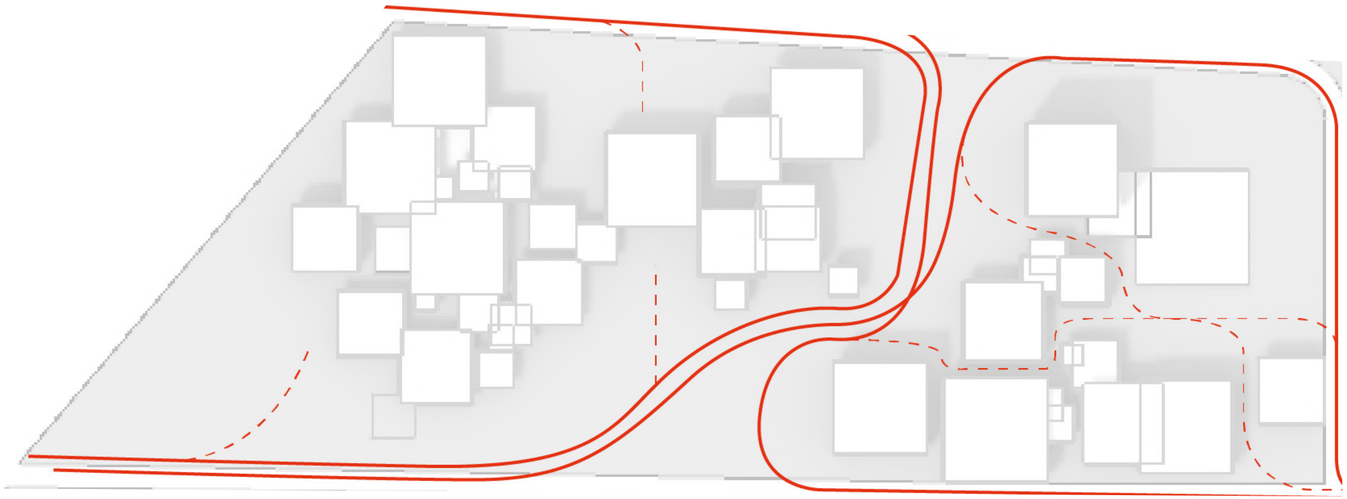
simulation_ID:	**7**
simulation type:	distance
attraction:	1.47
repulsion:	0.06
area:	0.20



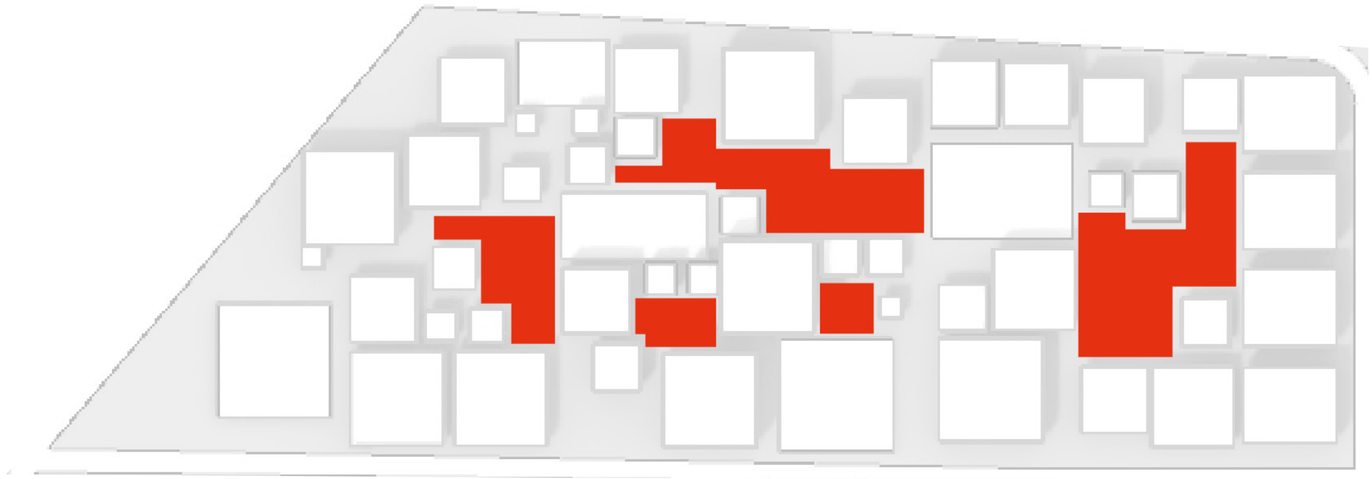
simulation_ID:	**8**
simulation type:	distribution
attraction:	1.19
repulsion:	0.04
area:	0.30

border

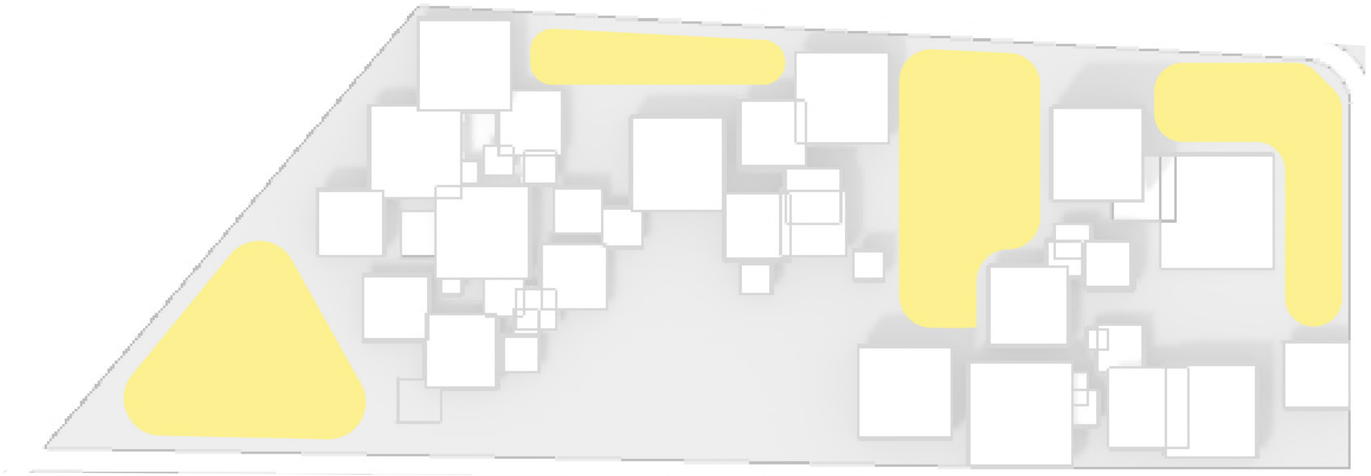
circulation



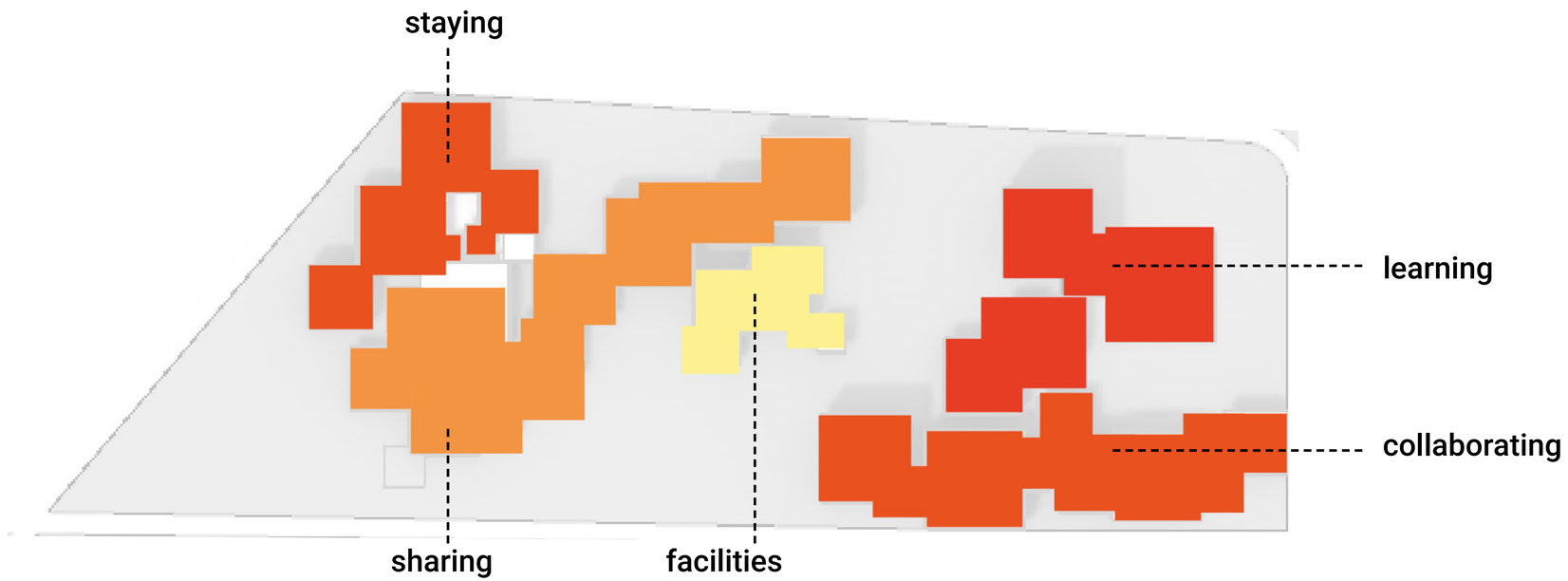
pocket parks



landscape



functional distribution

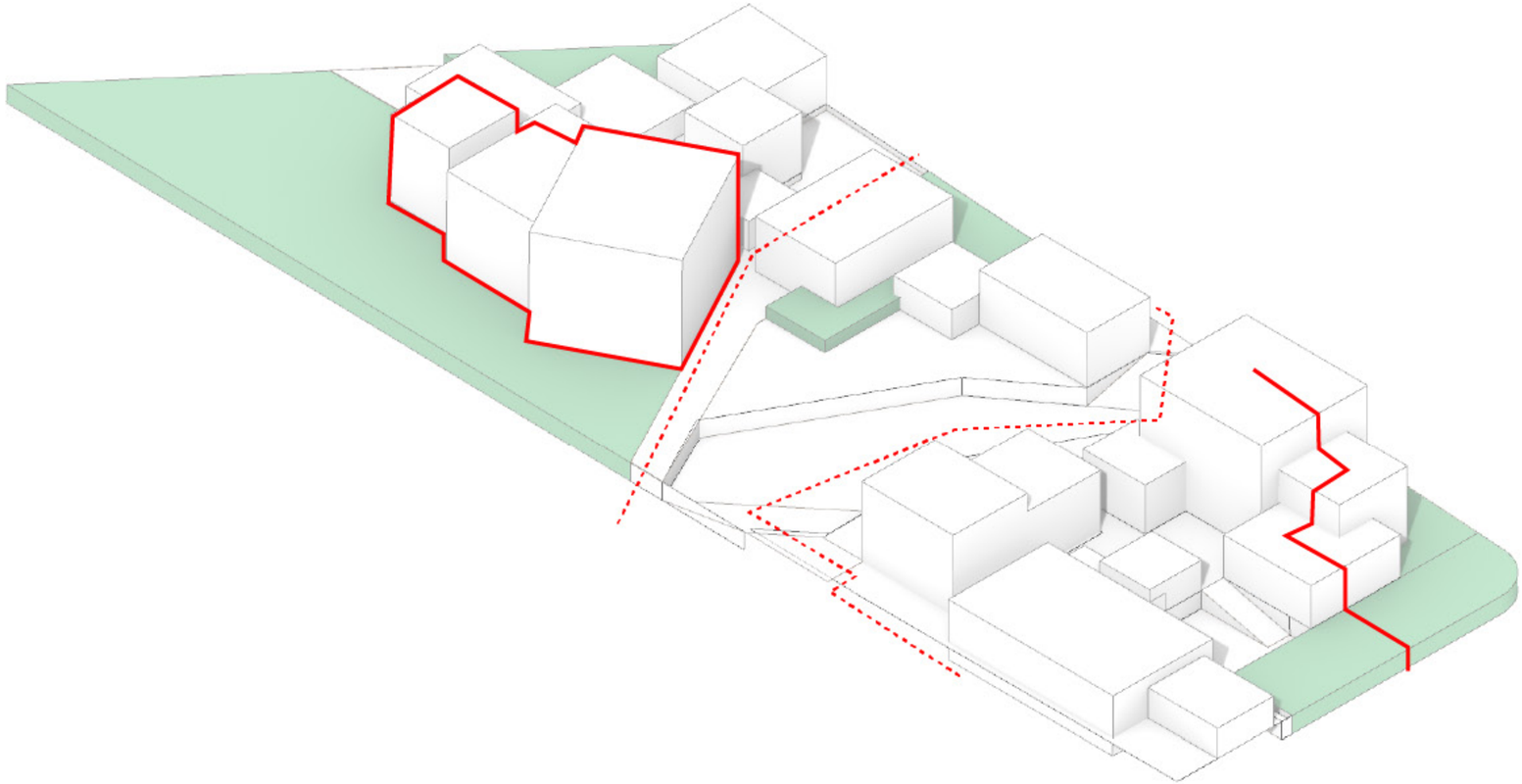


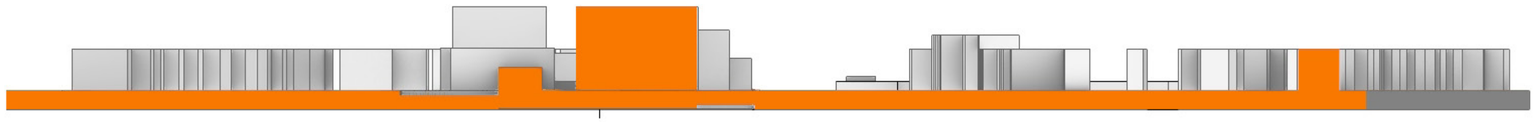
CONCLUSION

Functional Distribution
Macro Design concepts

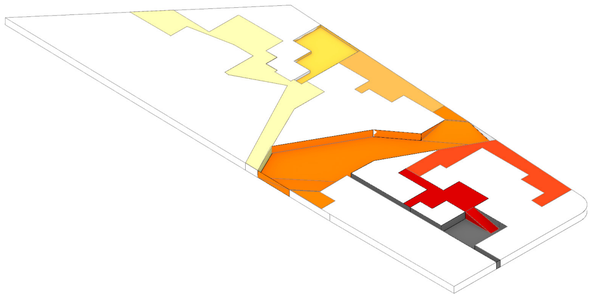
#5 Macro Design Development

Kazuyo Sejima - Nishinoyama House

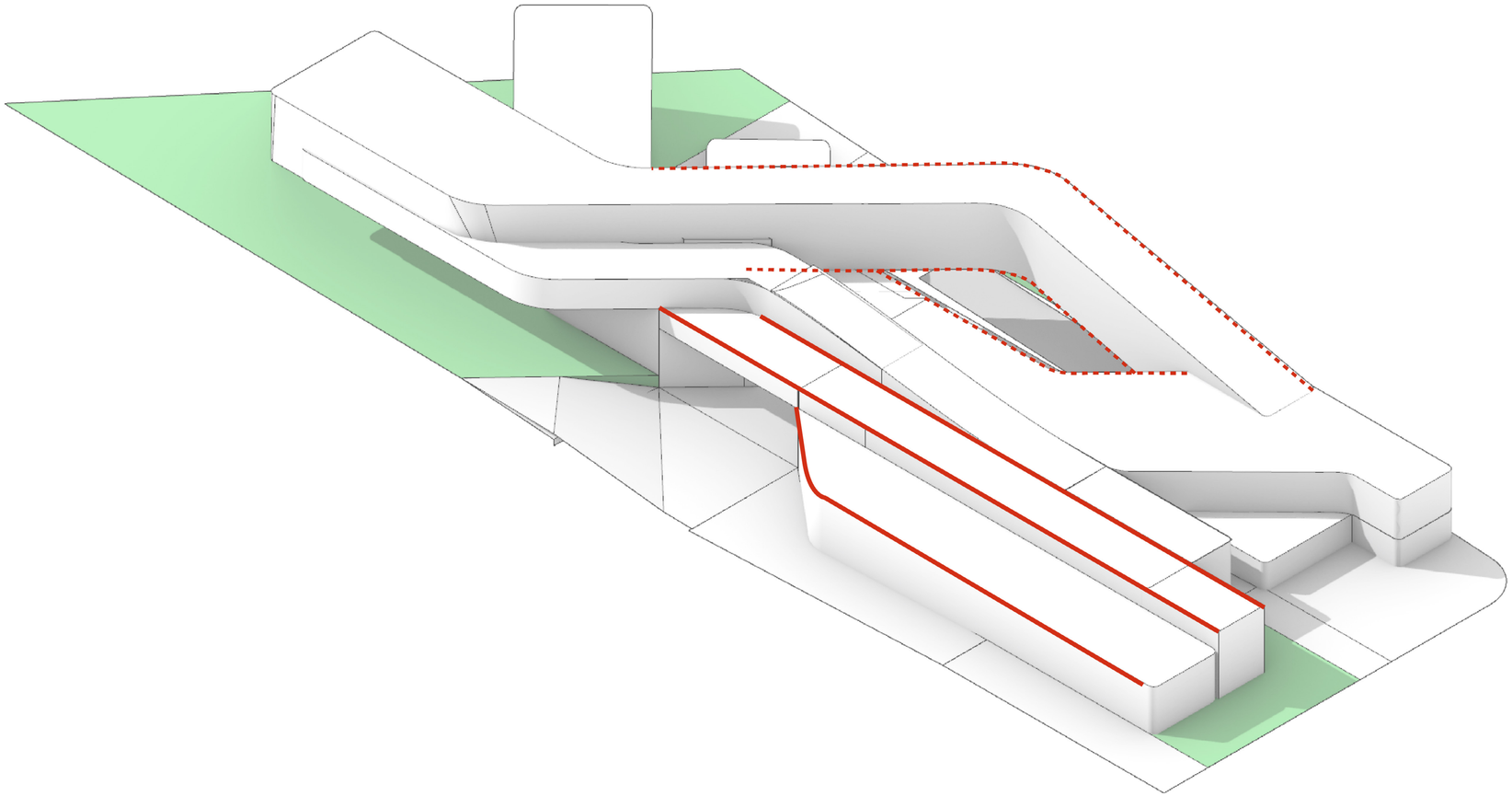




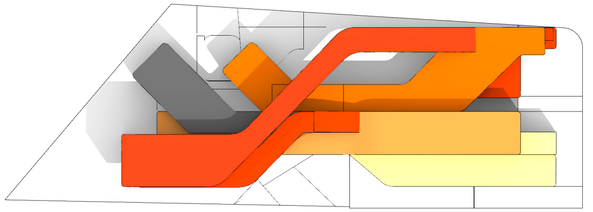
pros:
- well-defined landscape fragments
- dynamic circulation

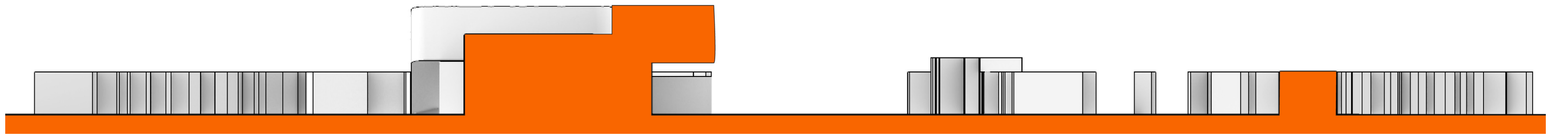


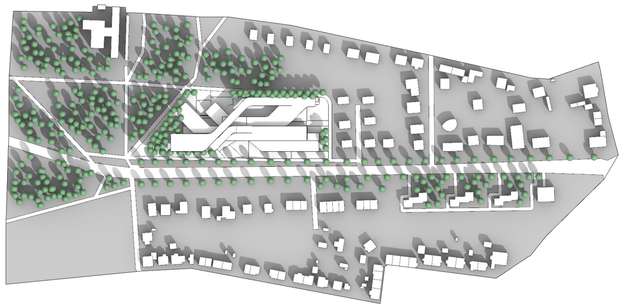
Steven Holl - Institute for Contemporary Art



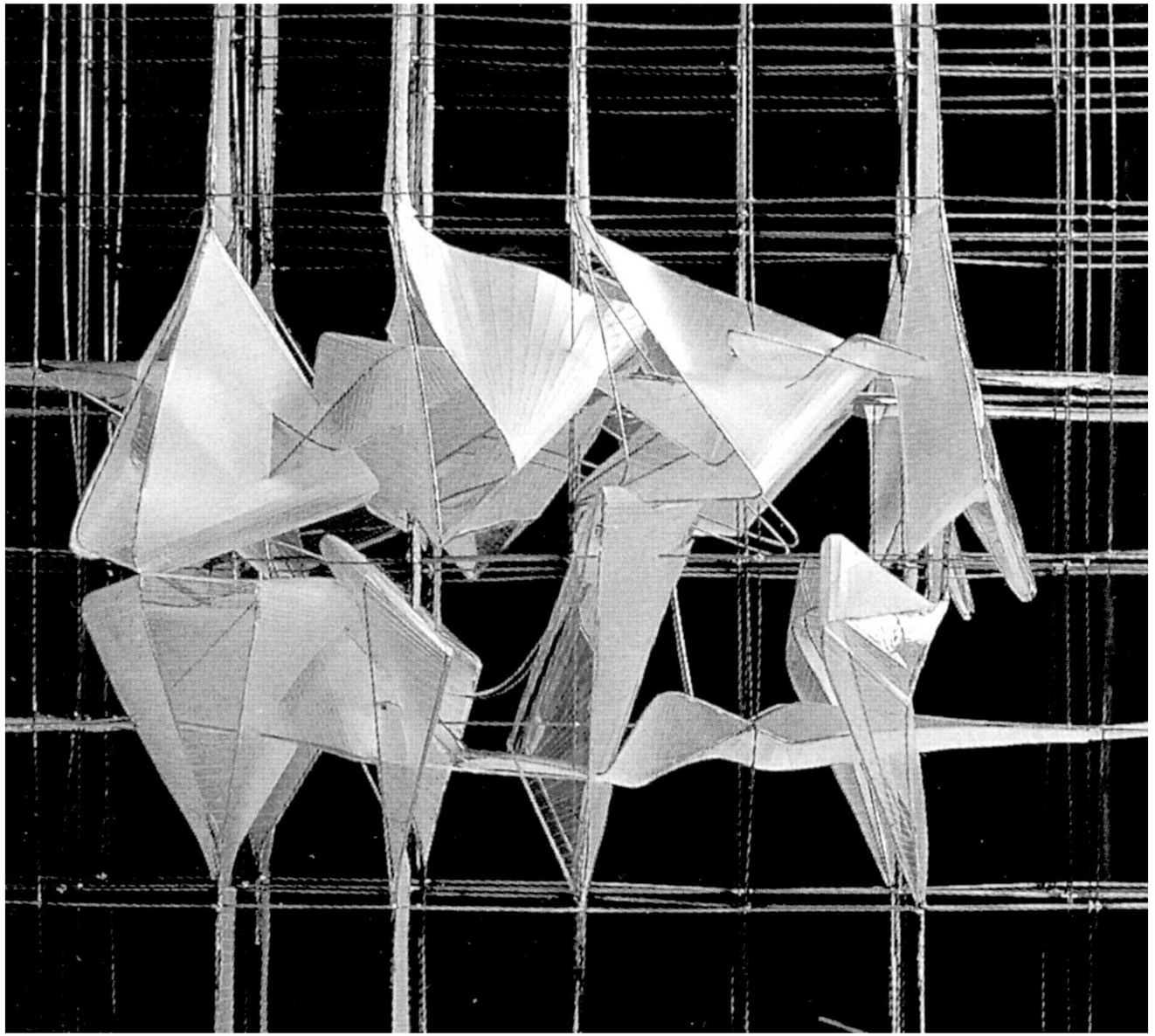
pros:
- branching of geometry
- flow from context



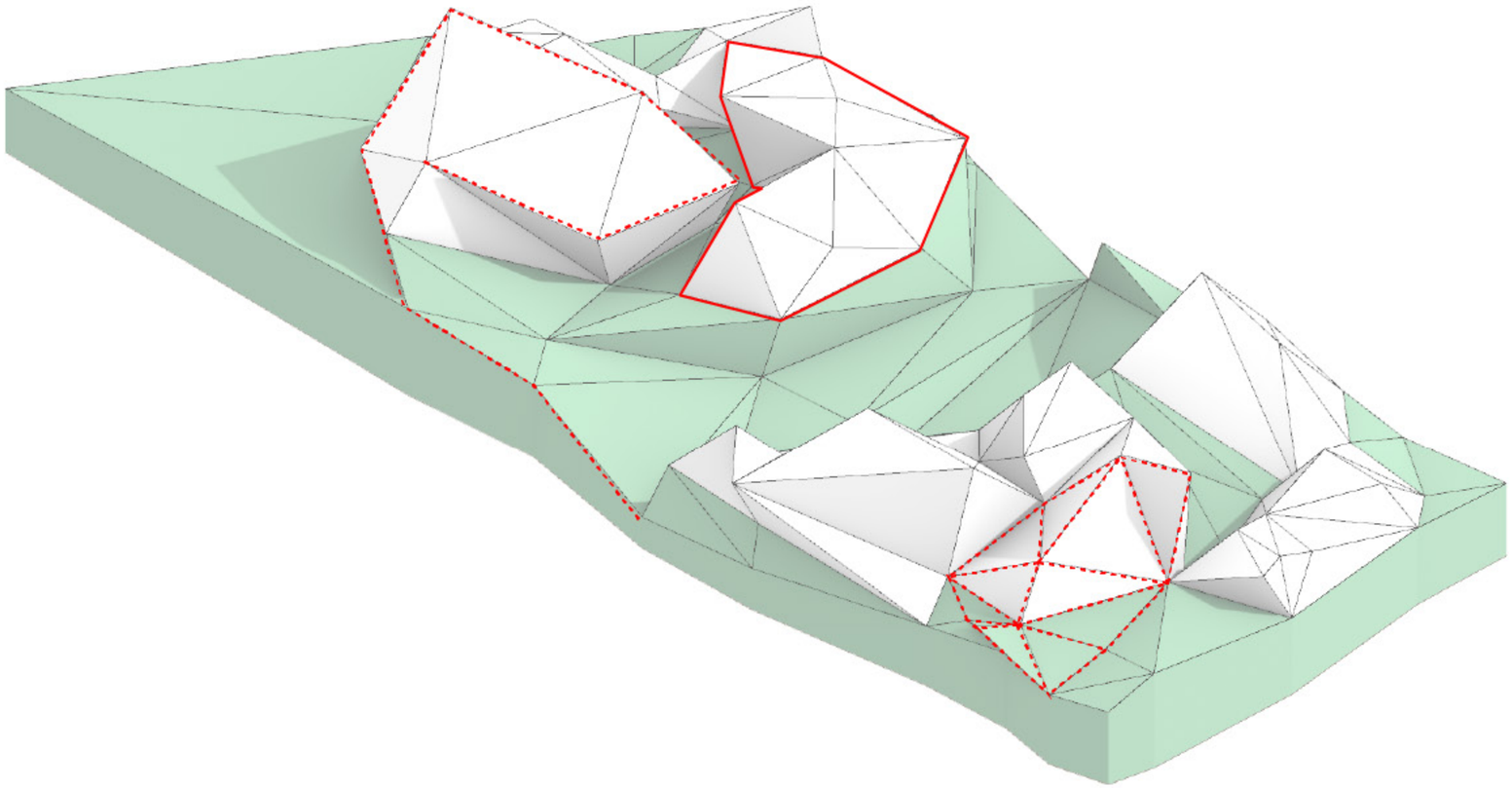


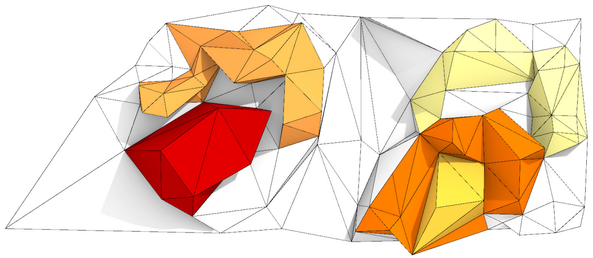


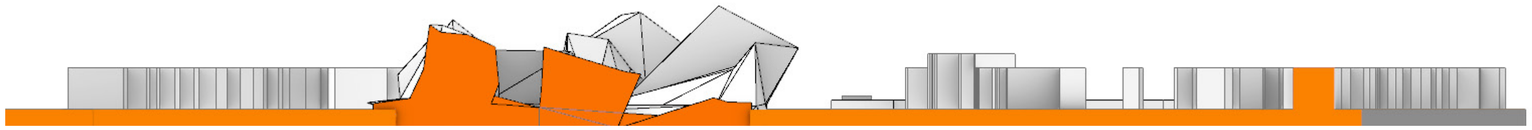
Peter Eisenman - Virtual House

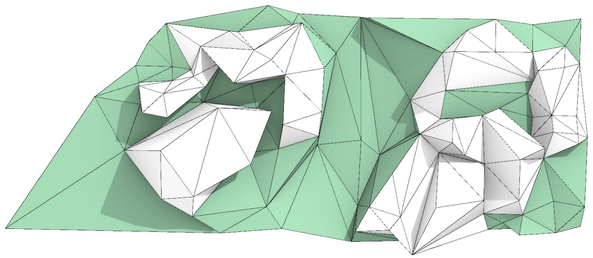


pros:
- flow from landscape to building
- clustering of spaces
- fragmented facades



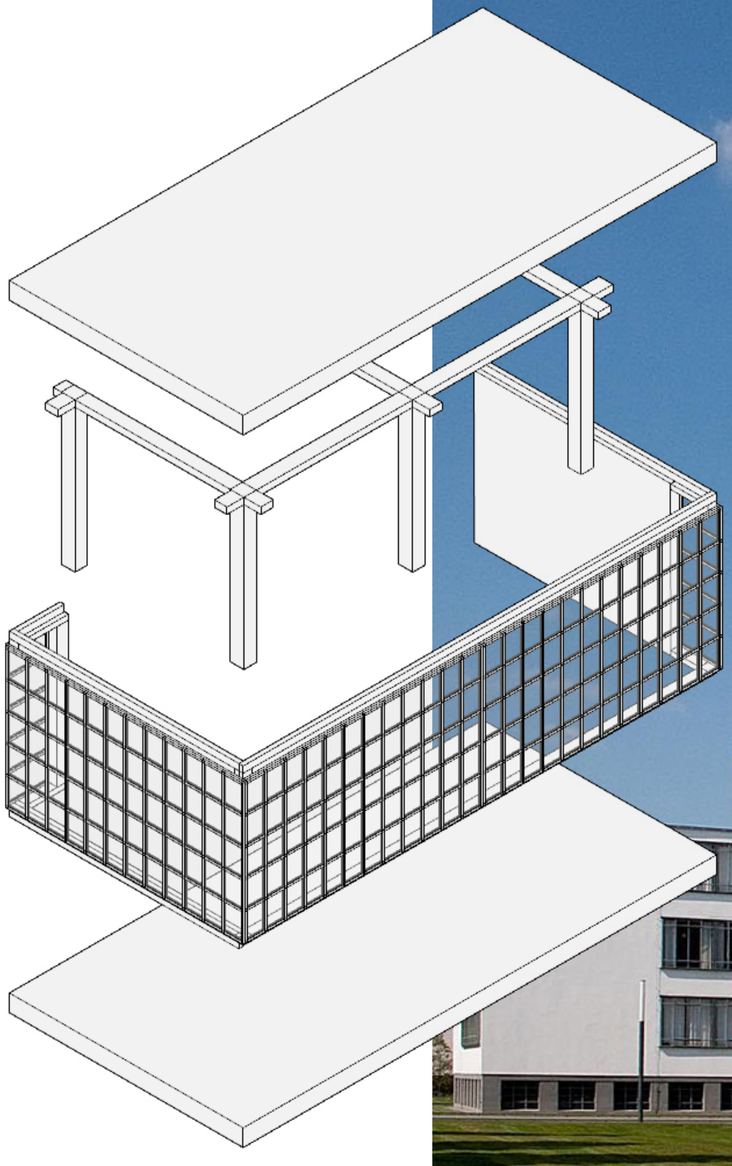




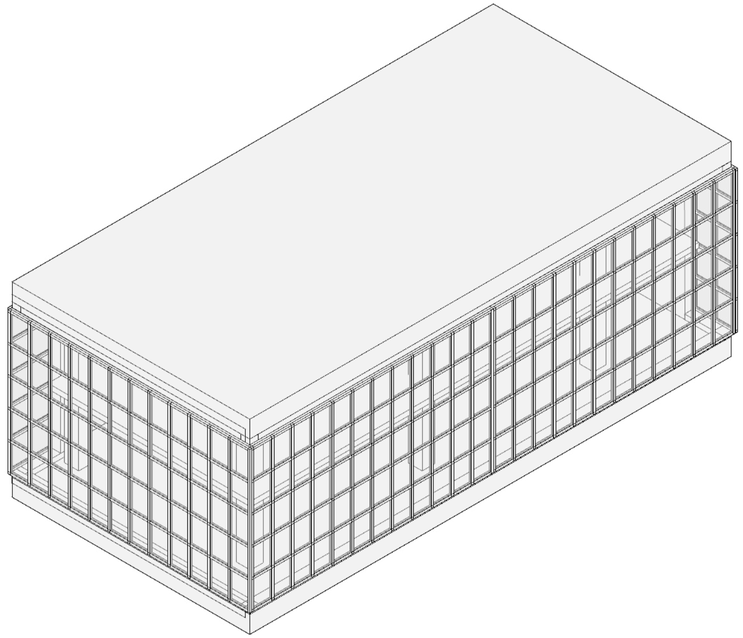


#6 Macro Design

liberation



GOAL



MASS PRODUCTION

ORTHOGONAL

UNIFORM

LIBERATION OF PLAN

MASS CUSTOMIZATION

CURVILINEAR

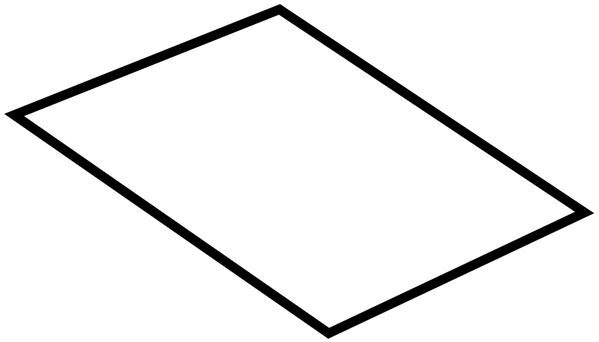
LOCALLY INFORMED

INTEGRATION OF PLAN

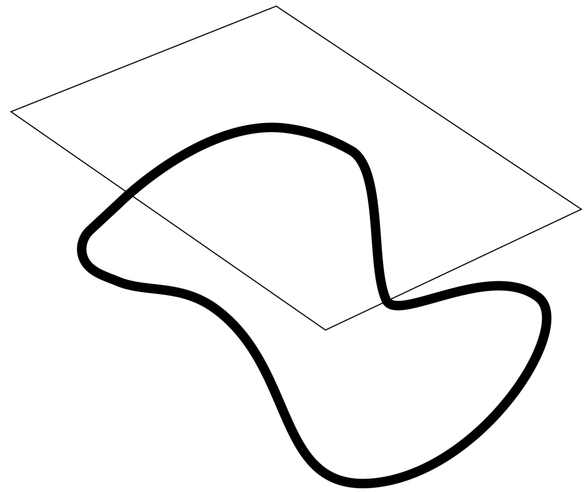
Research Question: Design

How to design a topological transformation from orthogonal to freeform?

orthogonal > freeform

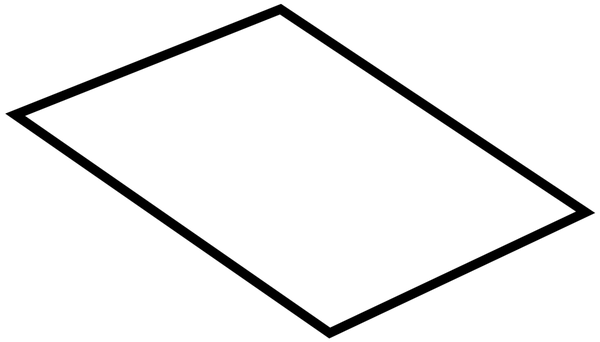


orthogonal

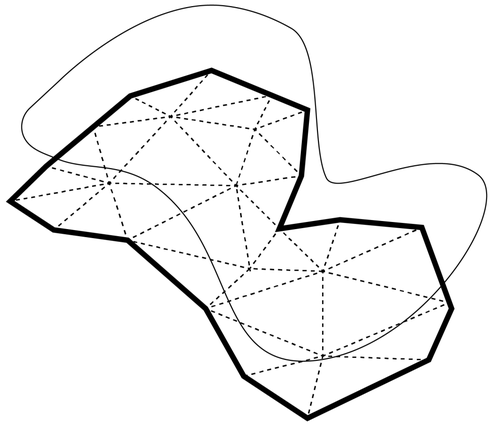


freeform

surface triangulation

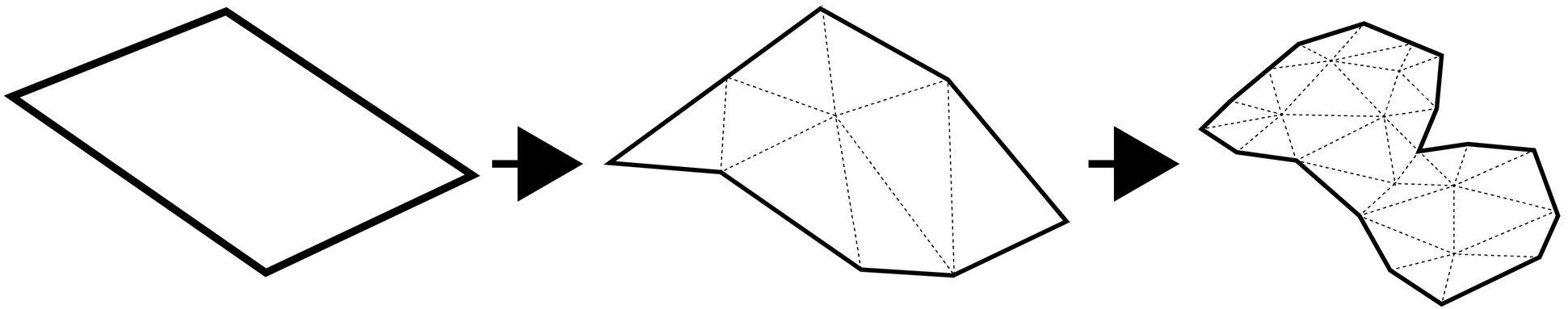


orthogonal



freeform

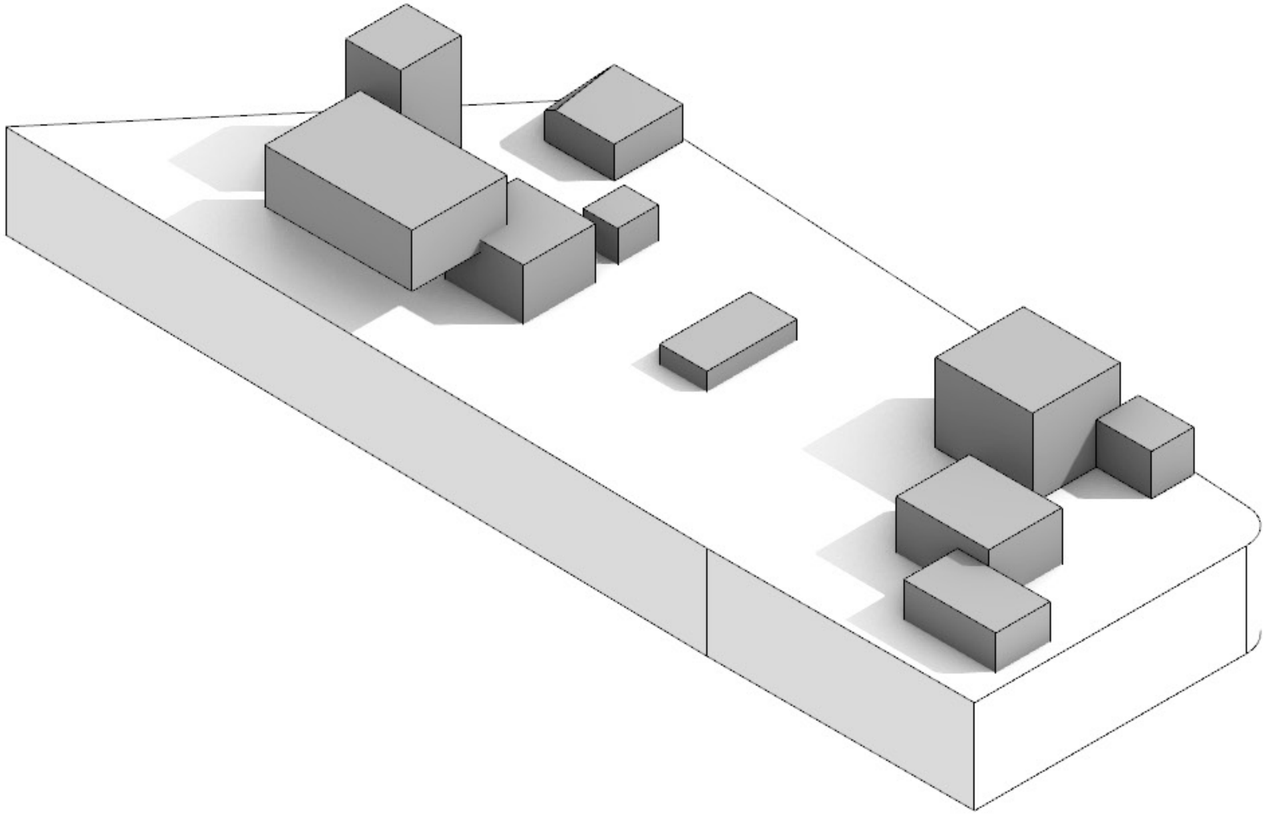
gradient



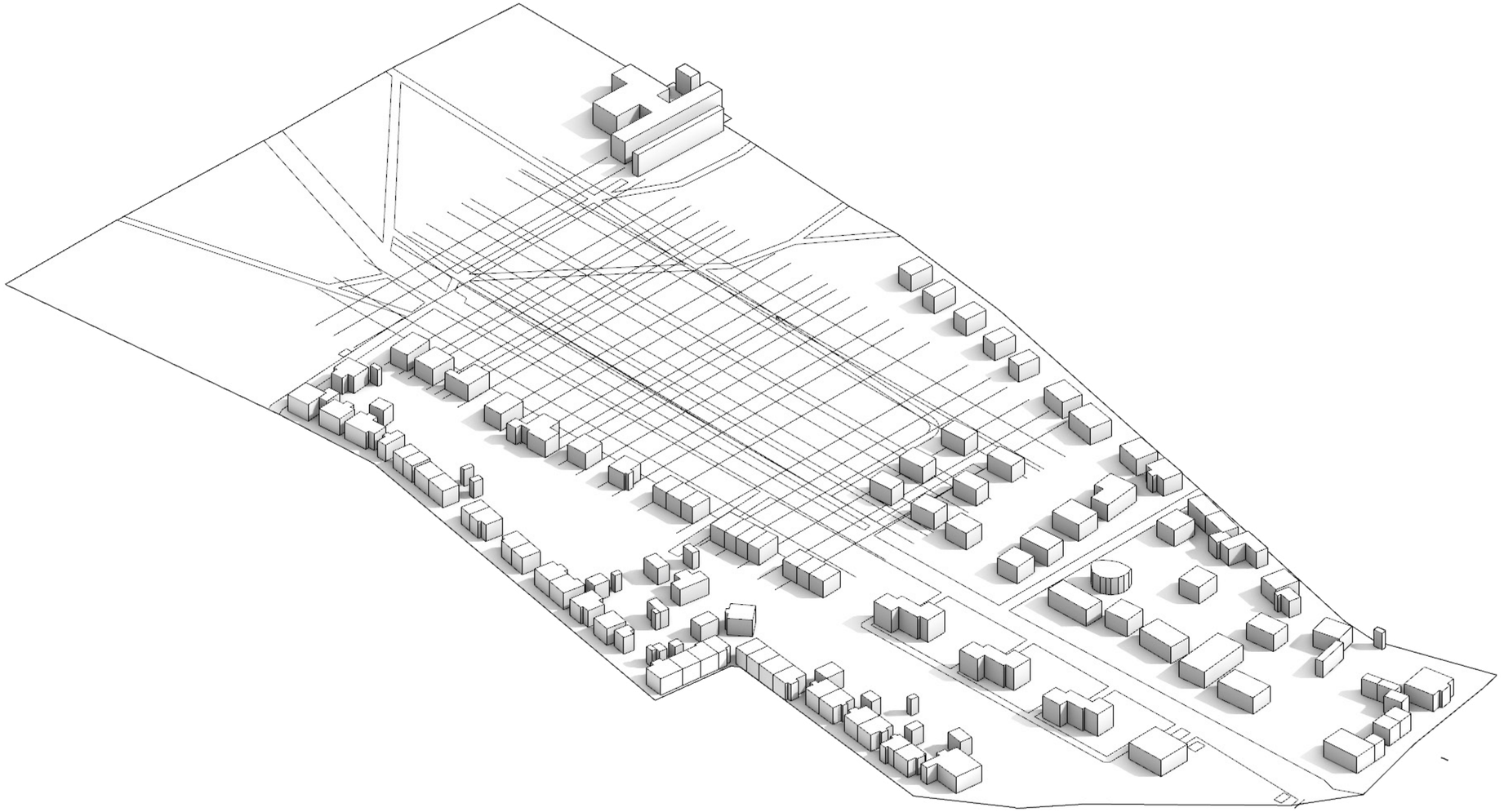
orthogonal

freeform

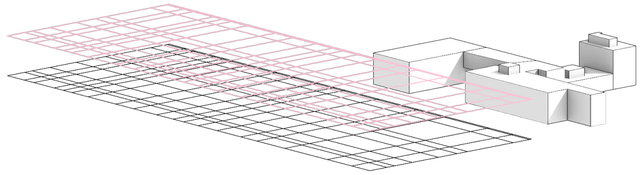
anchor points
-functional distribution
-moriyama house reference

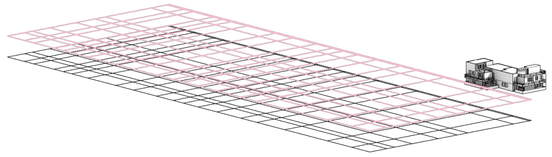


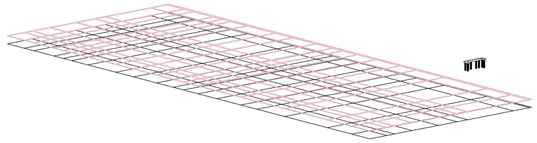
context grid

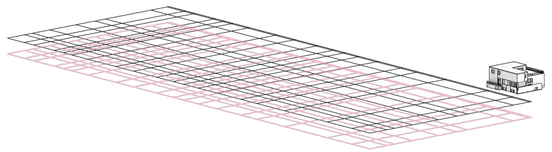


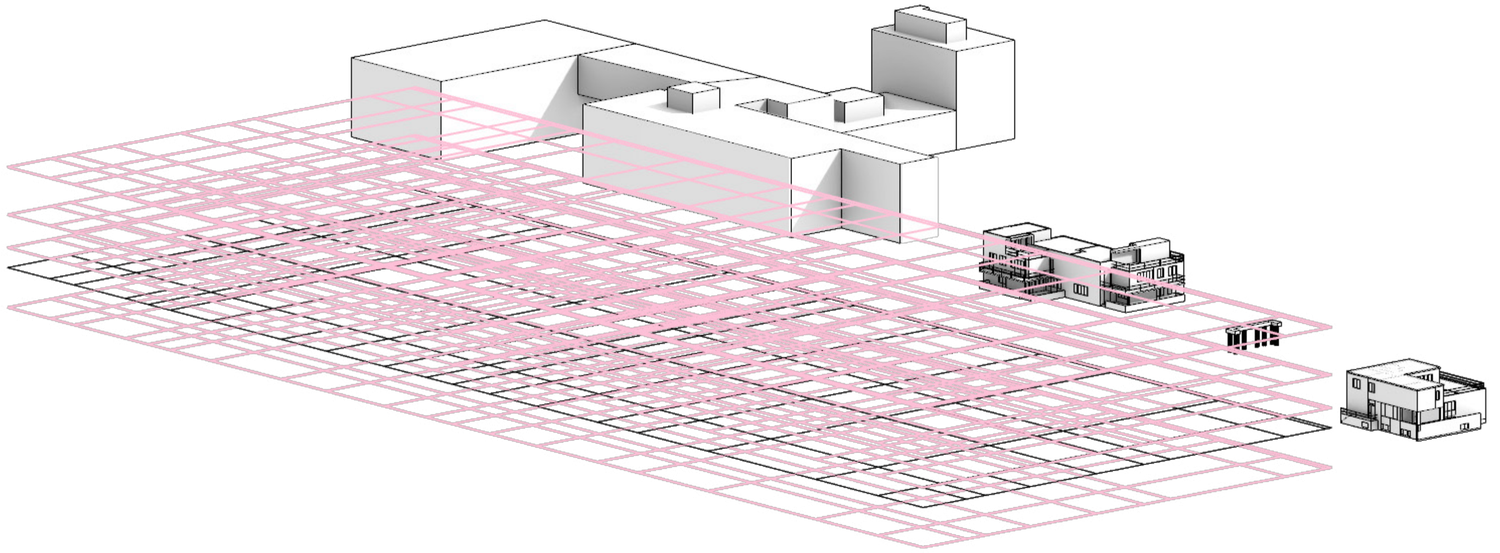
grid offset

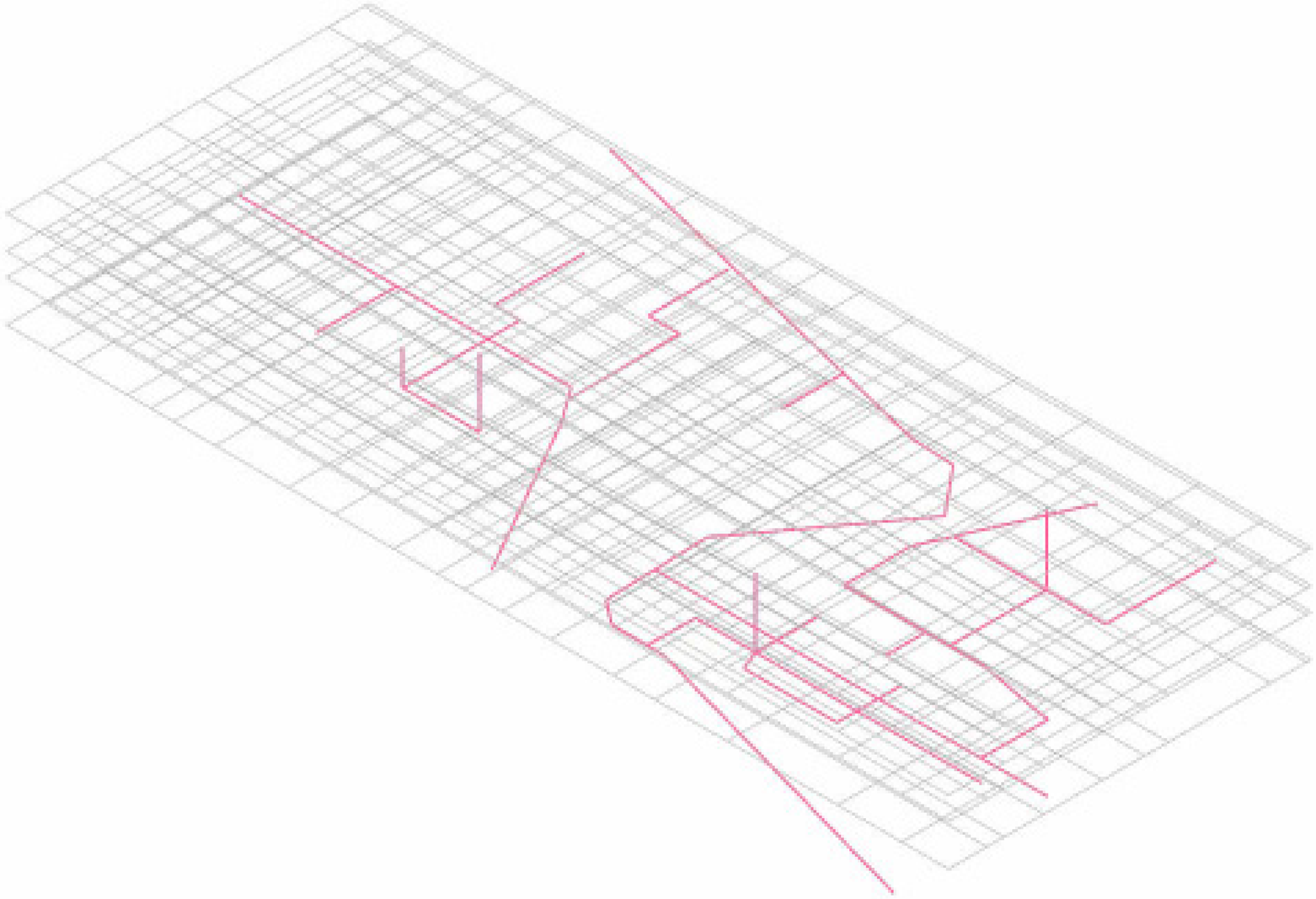


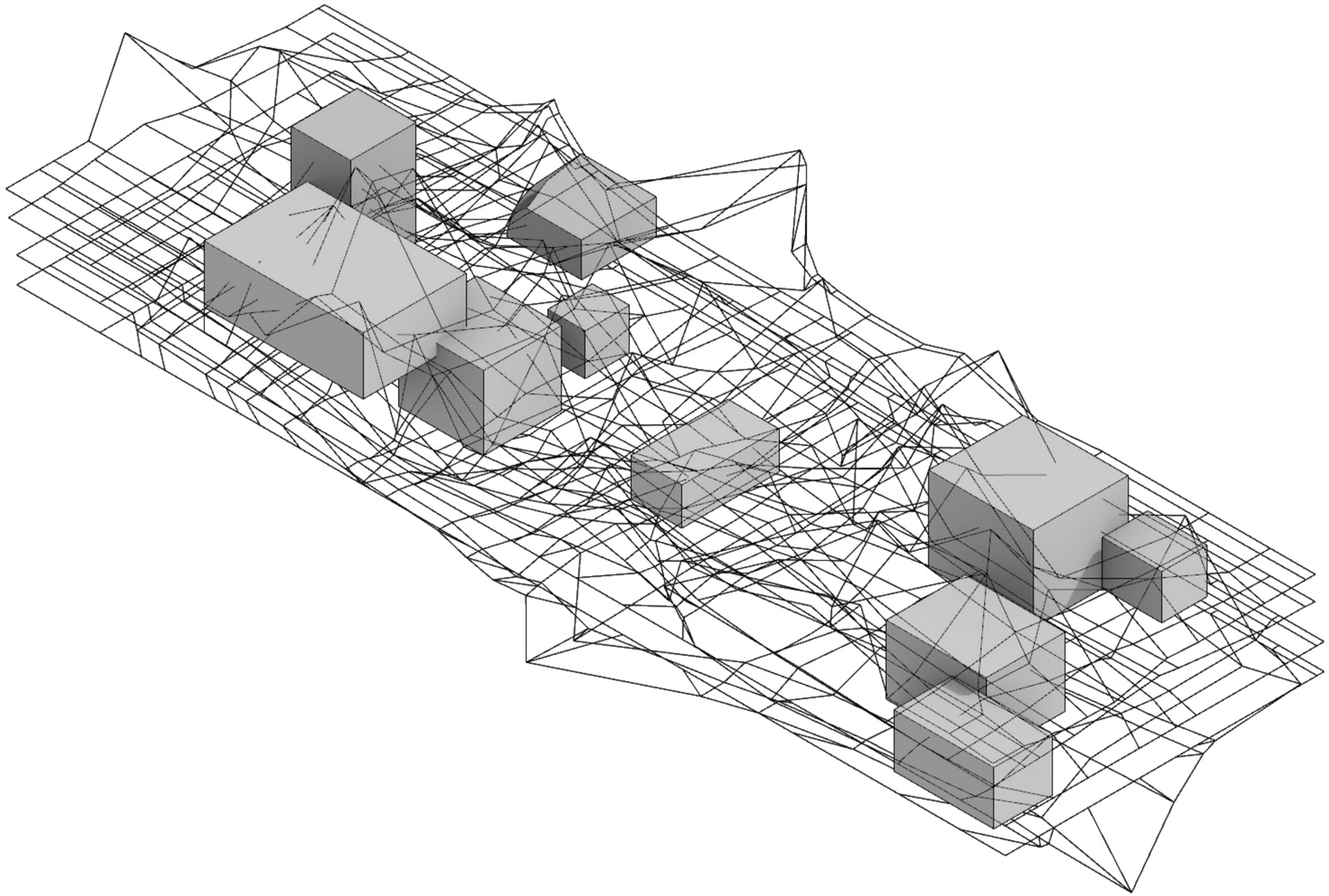




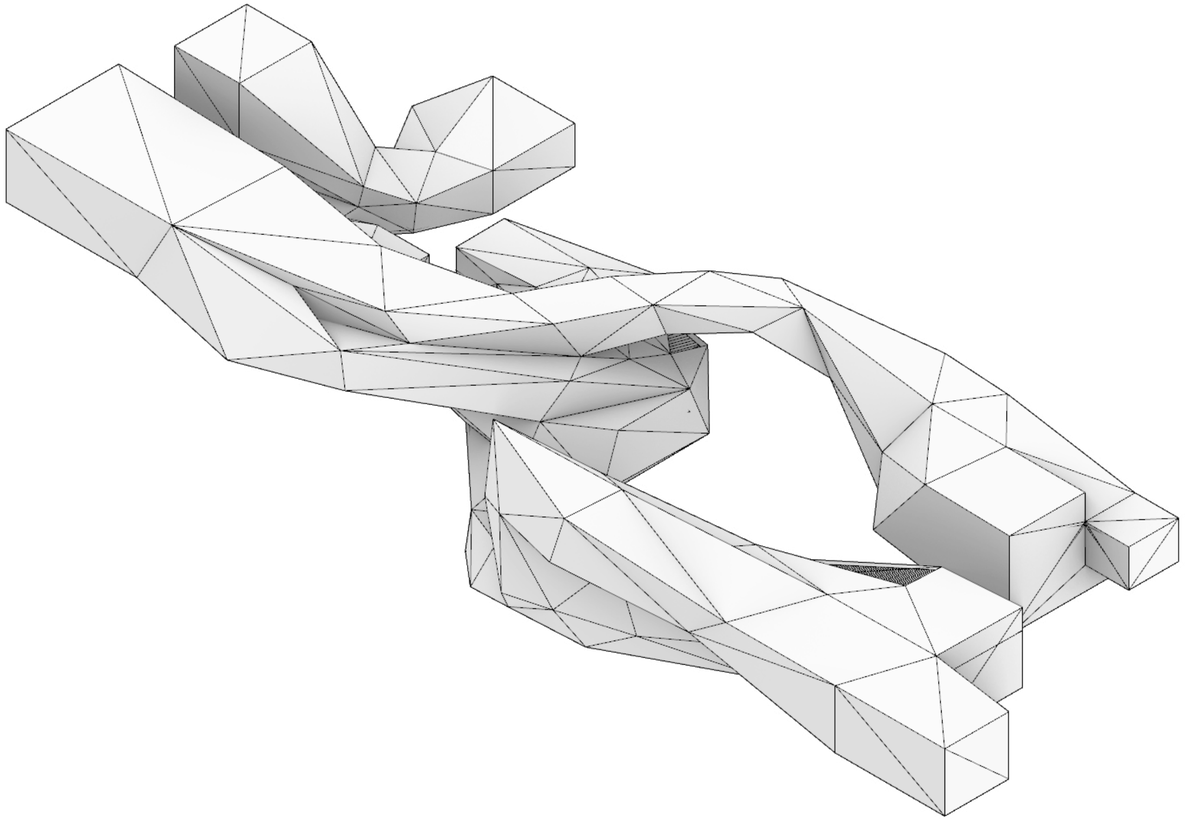


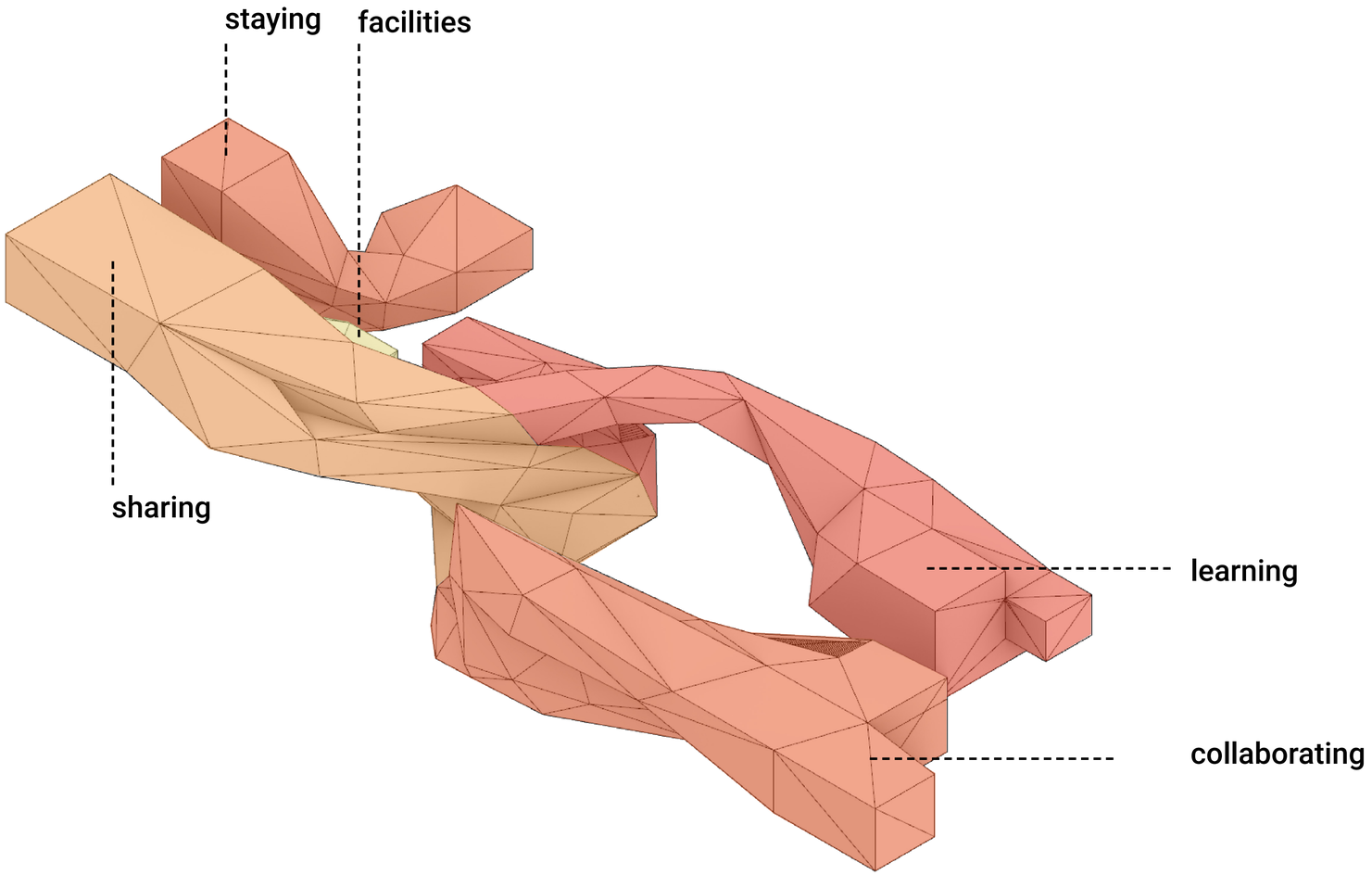


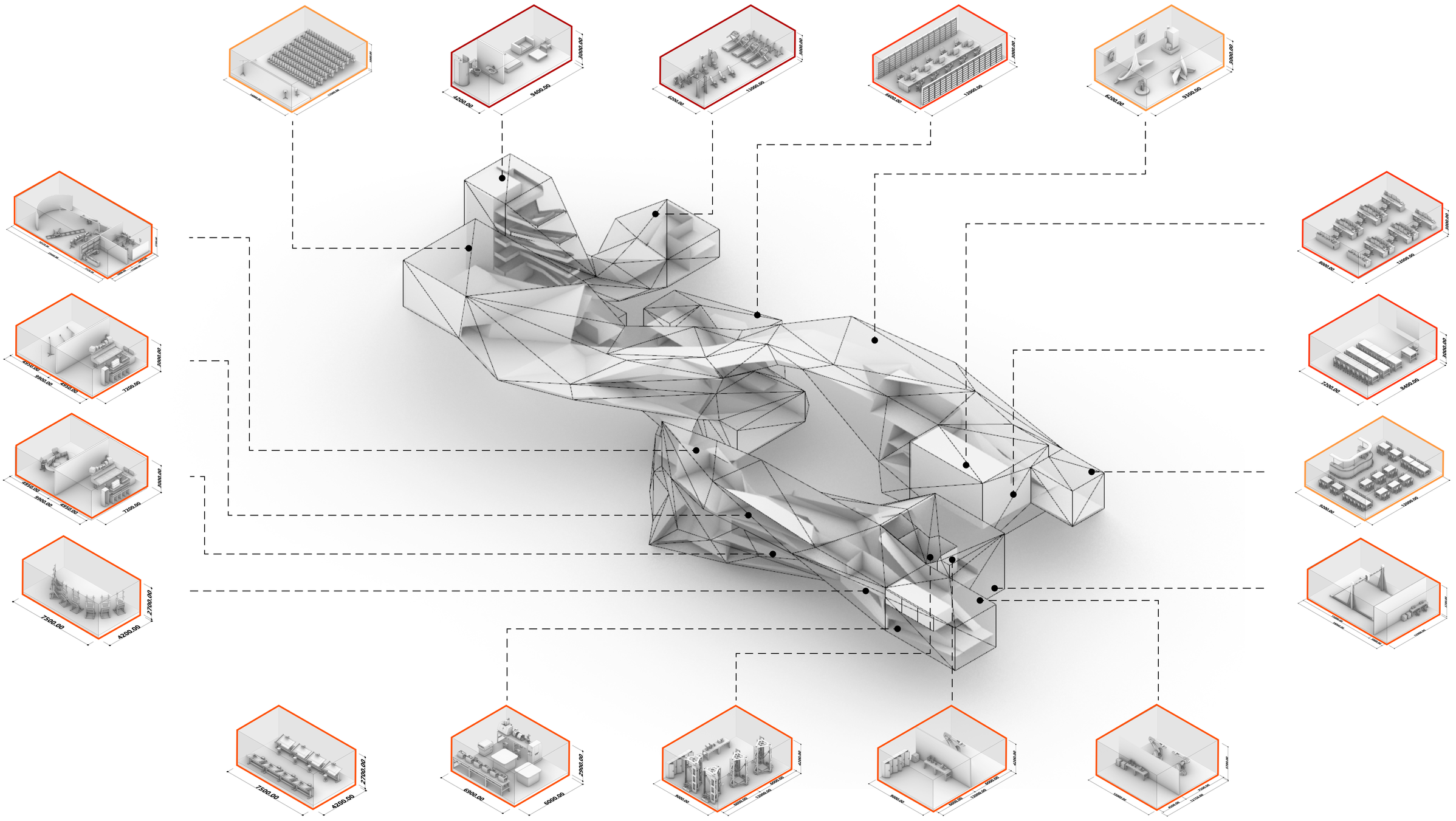


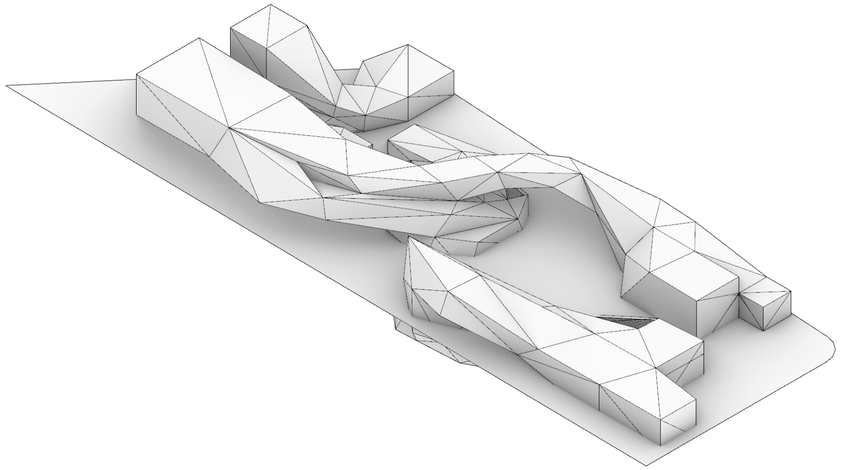


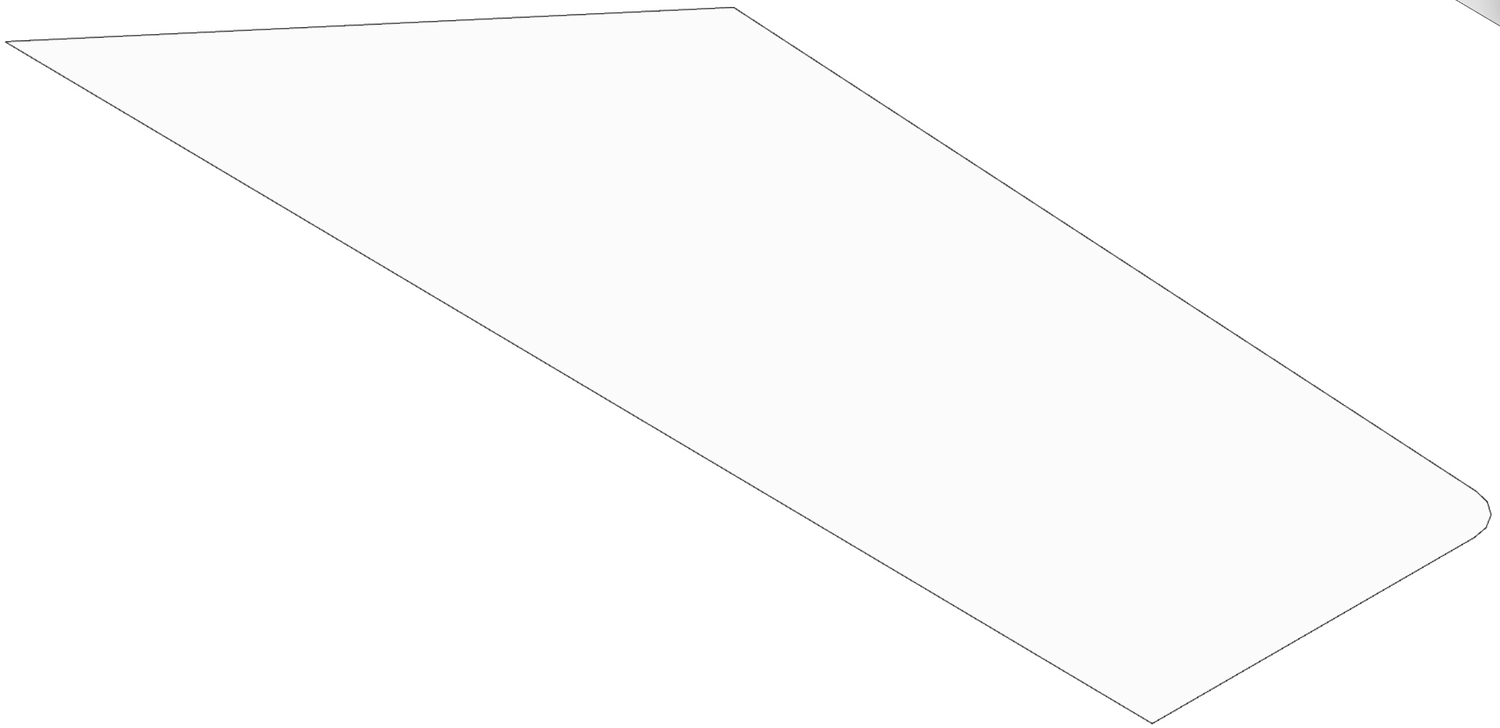
resulting design

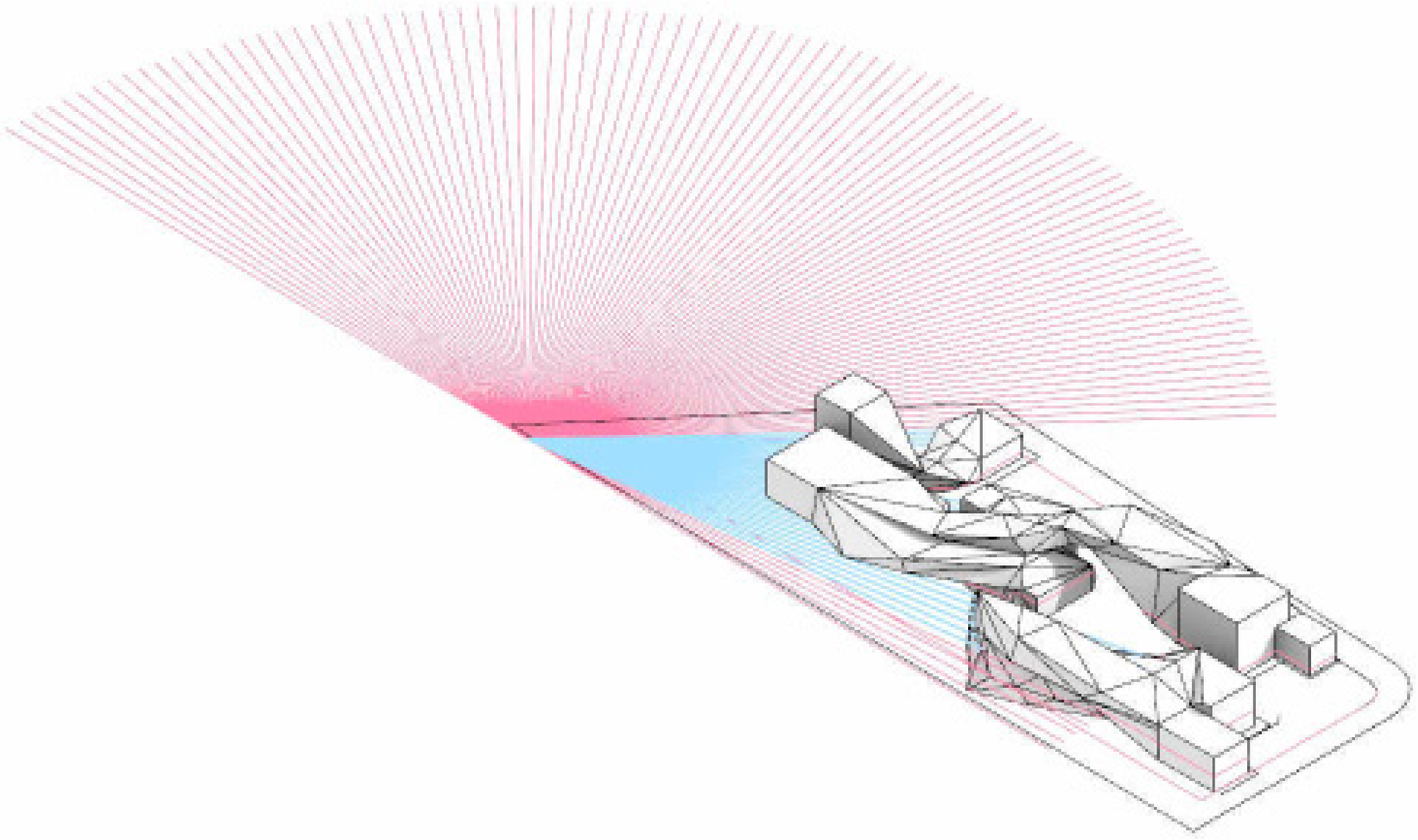



staying
facilities
sharing
learning
collaborating









informed extrustion of landscape

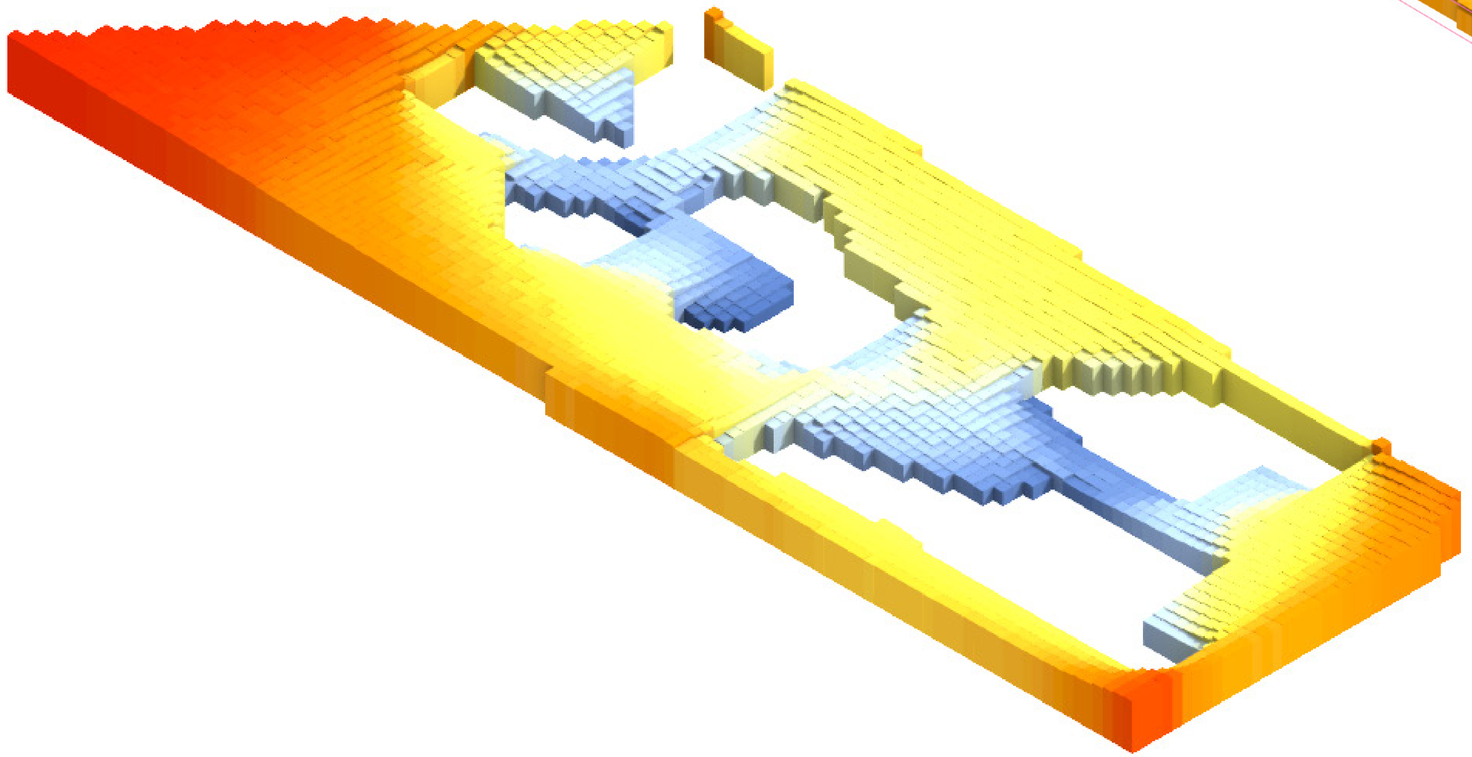
extrustion amount

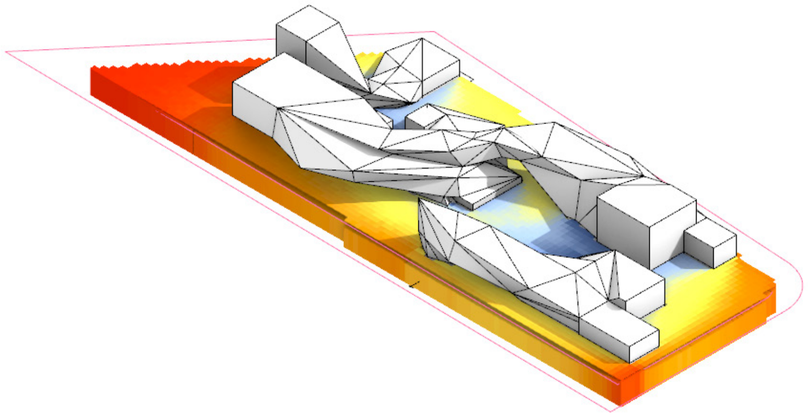
high

5m

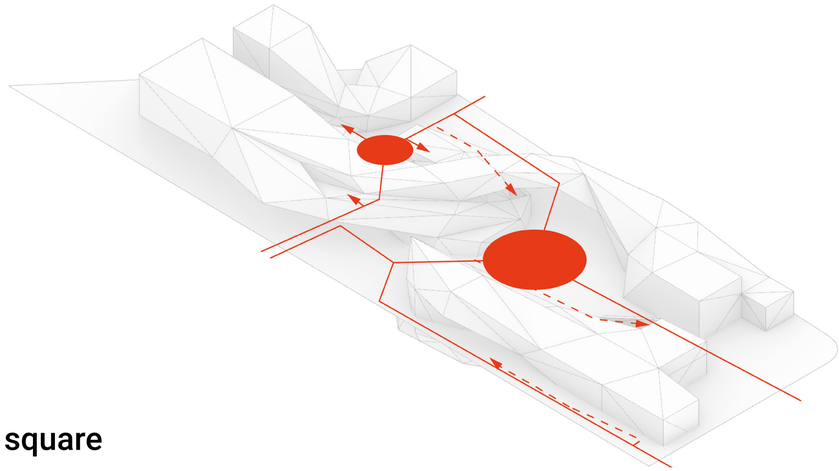
1m

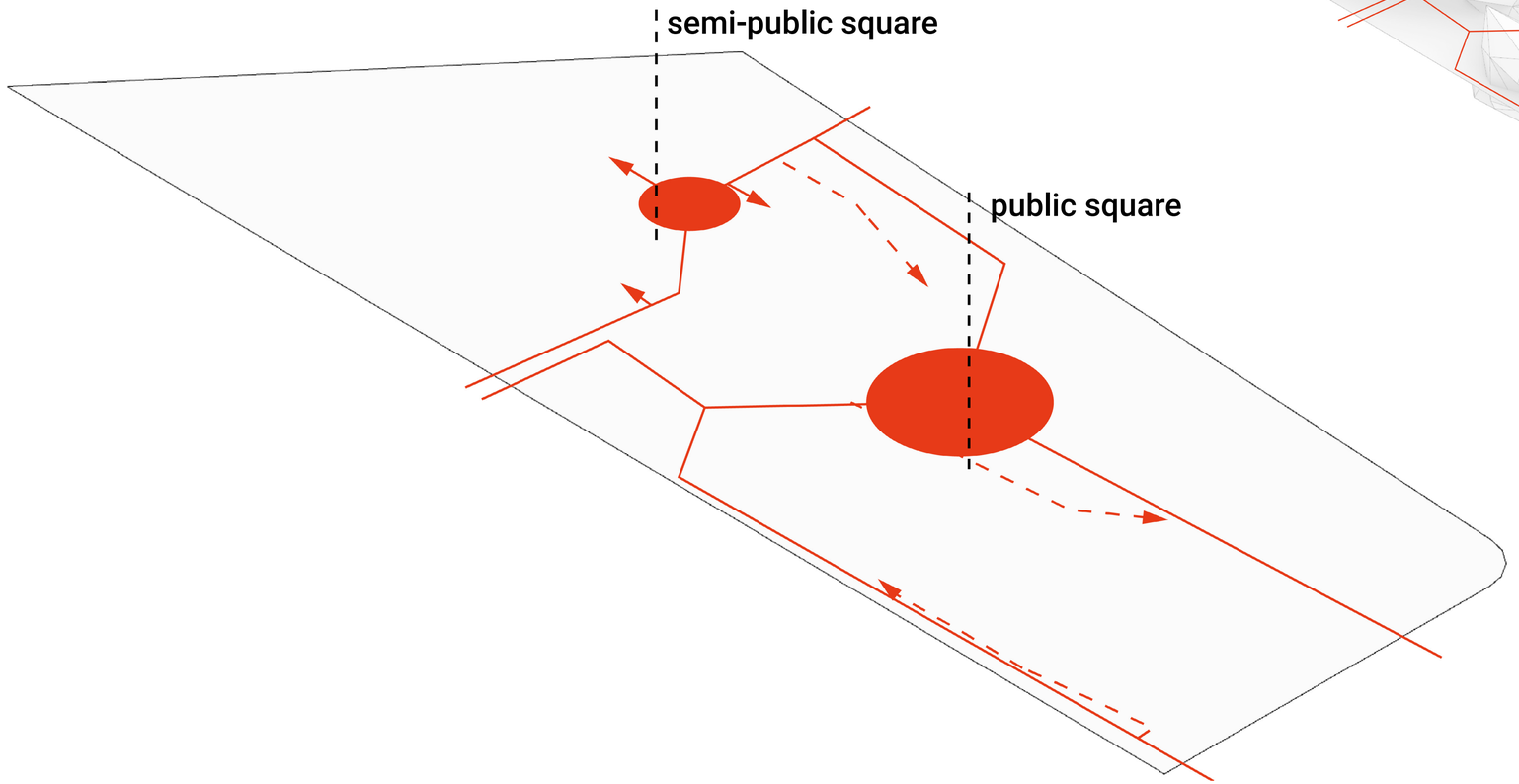
low



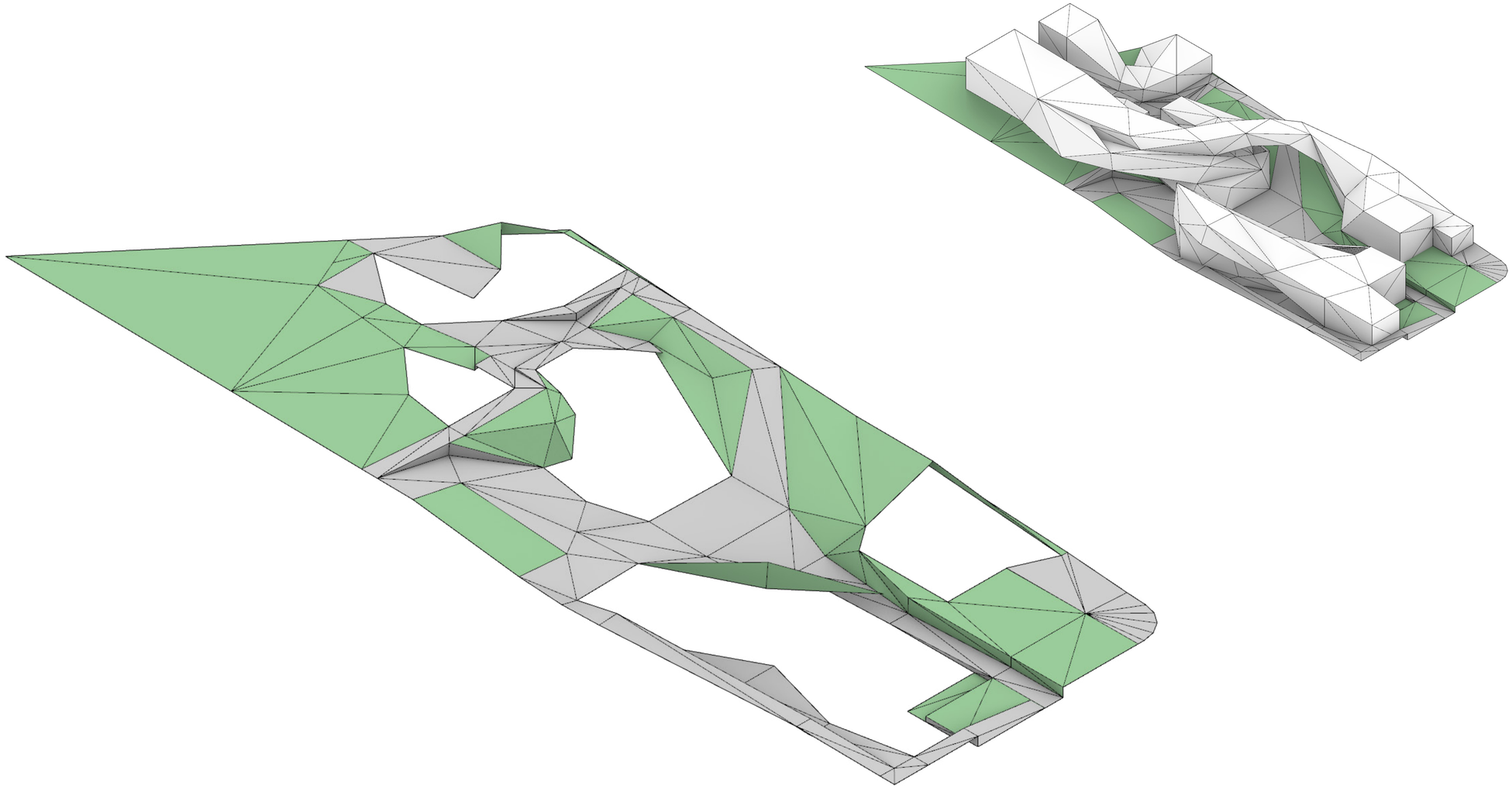


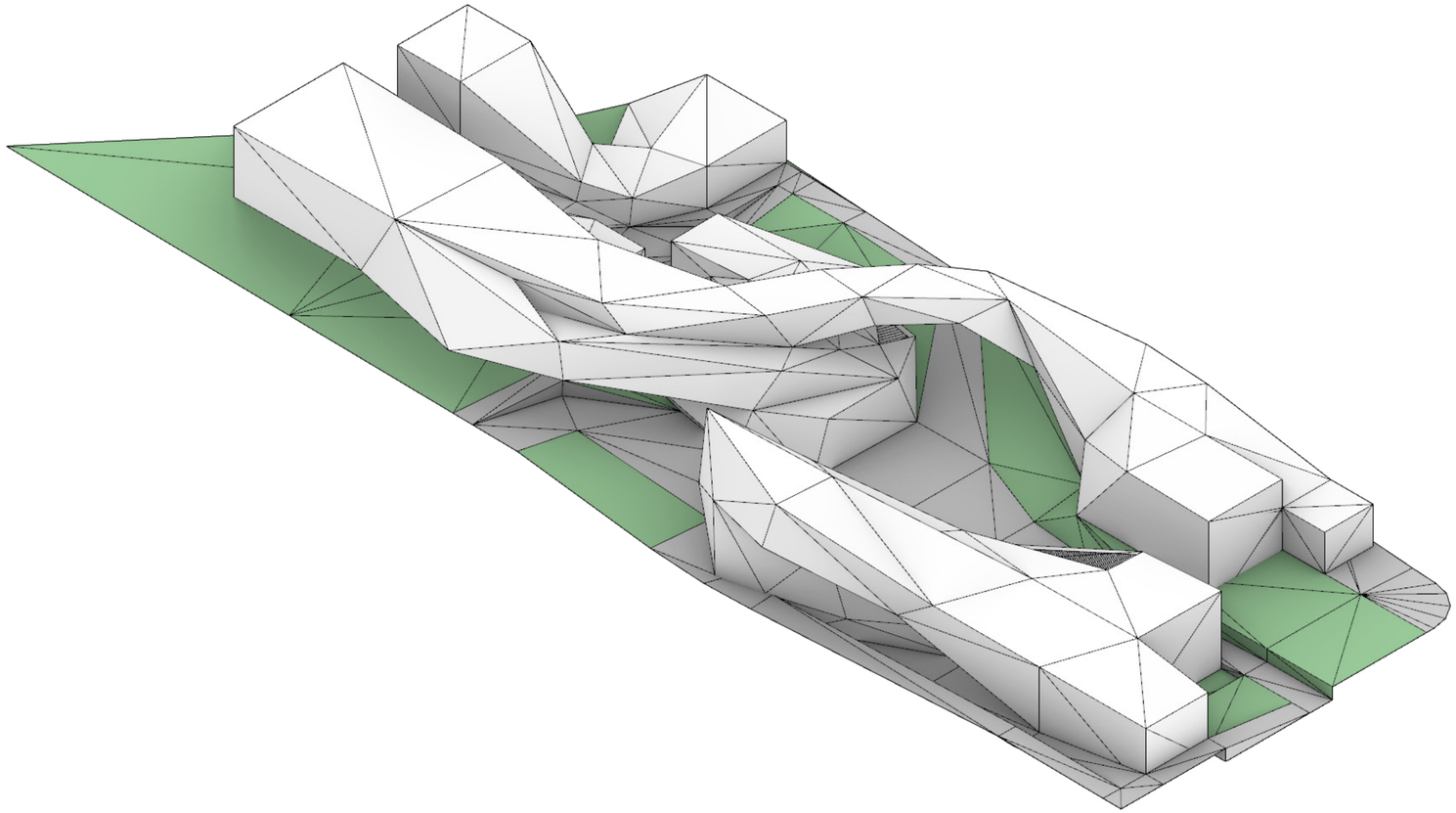
landscape circulation



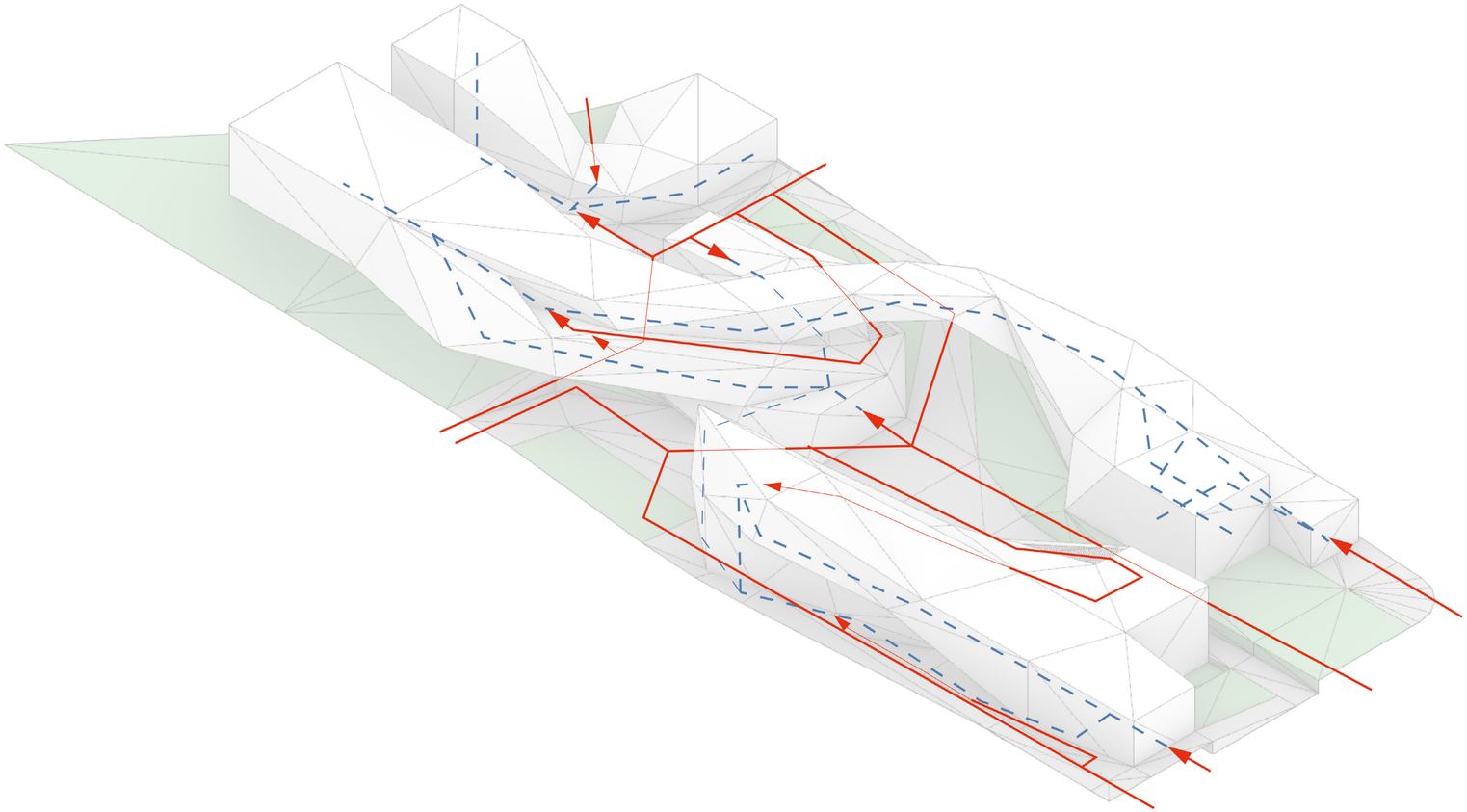


landscape



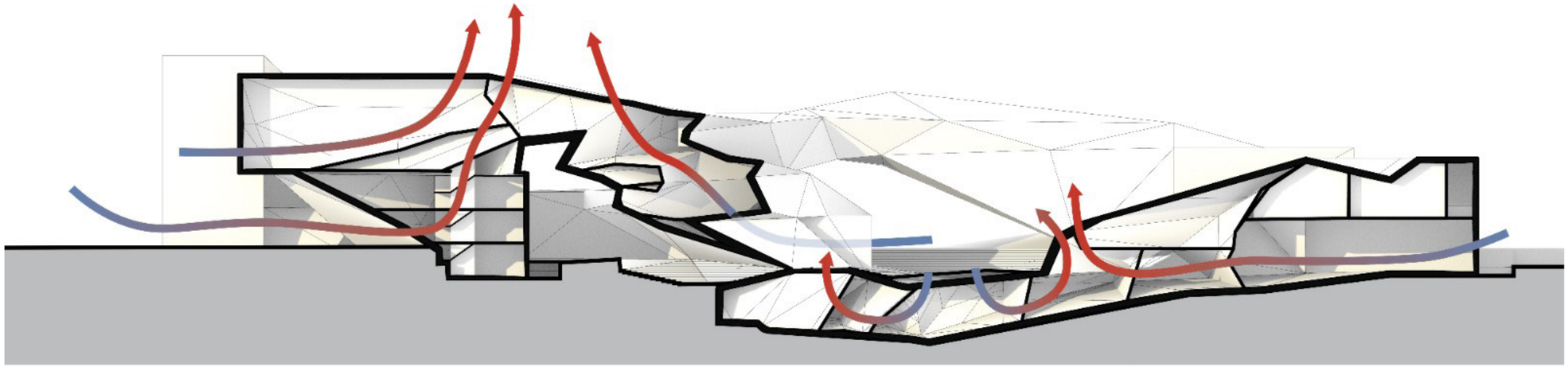


circulation



external circulation

internal circulation



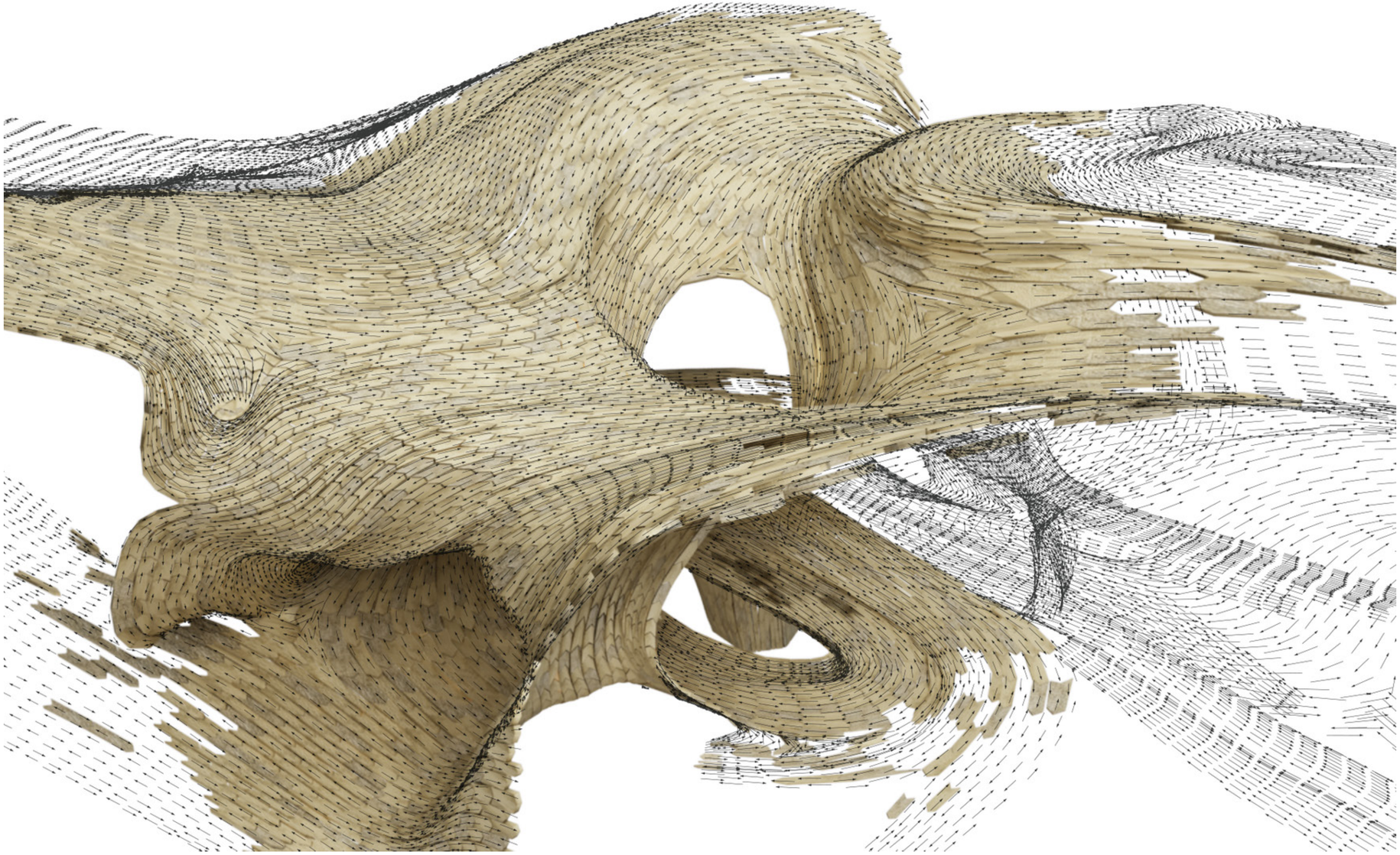
1m 10m 100m

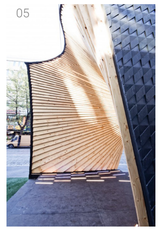
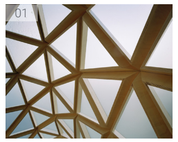
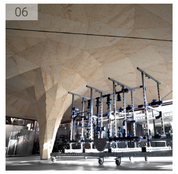
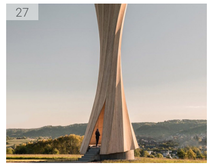
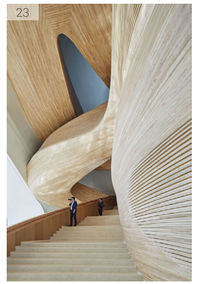
#7 Materiality

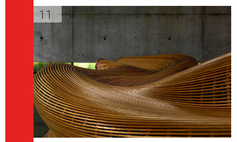
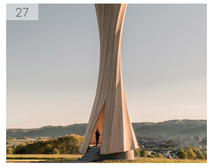
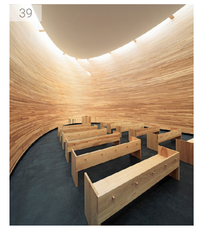
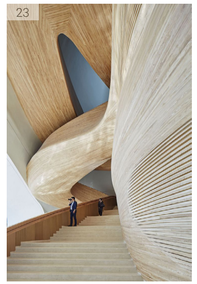
context + sustainability

freeform wood

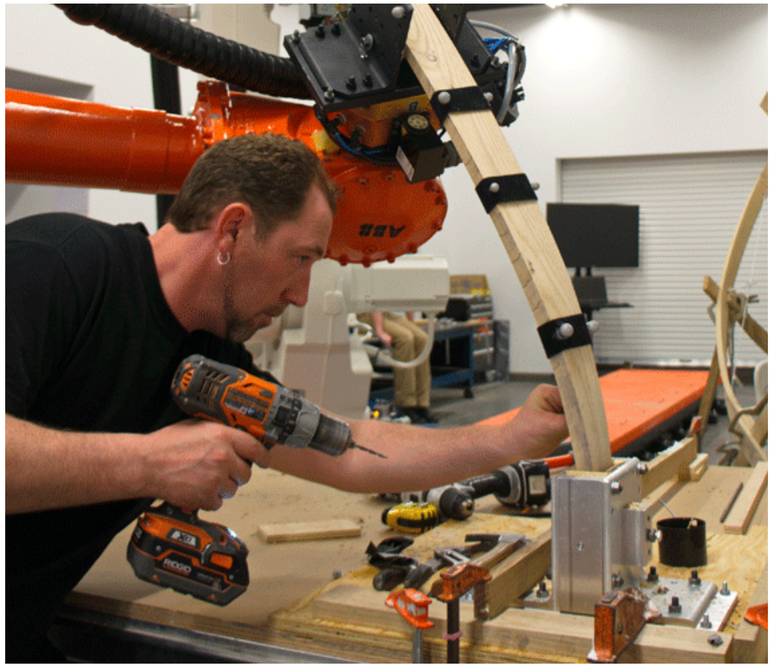
Stuart Smith - Helsinki Library

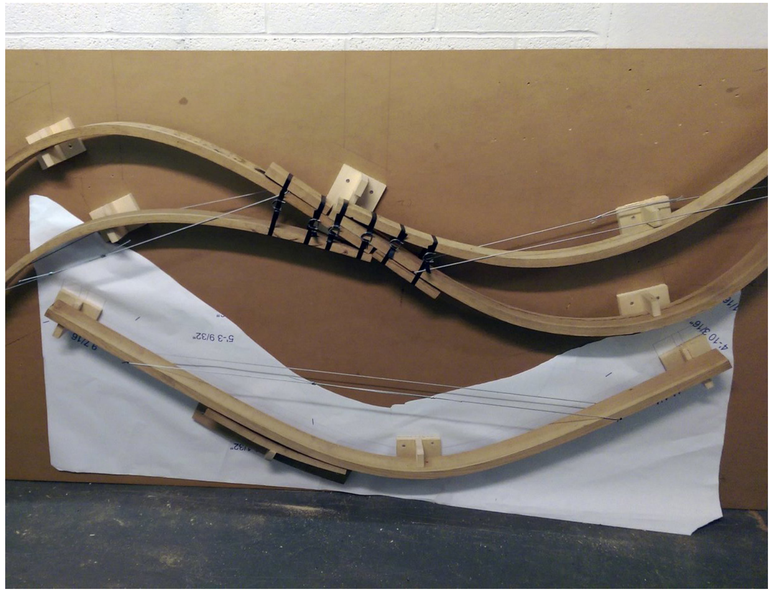


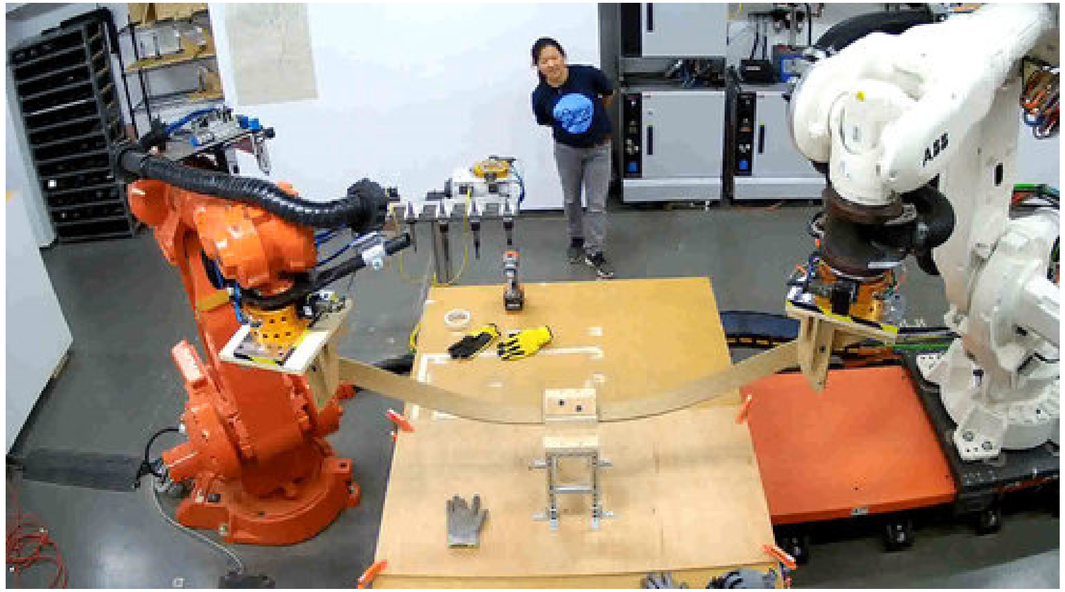
scale \ method	STEAM	CNC	CLT	VENEER	OTHERS
S	09 22 11 35	12 37 34 36		24 30 31	 05
M	10 13	 01 15  06 06 16	04  27	08 25 19 26	39 07 28 38
L		14 17	18 21 32	20  23	08 40 29

scale \ method	STEAM	CNC	CLT	VENEER	OTHERS
S	09 22  11 35	12 37 34 36		24 30 31	05
M	10 13	01 15 06 16 06	04  27	08 25 19 26	 39 07 28 38
L		14 17	18 32 21	20  23	08 40 29

steam bending wood





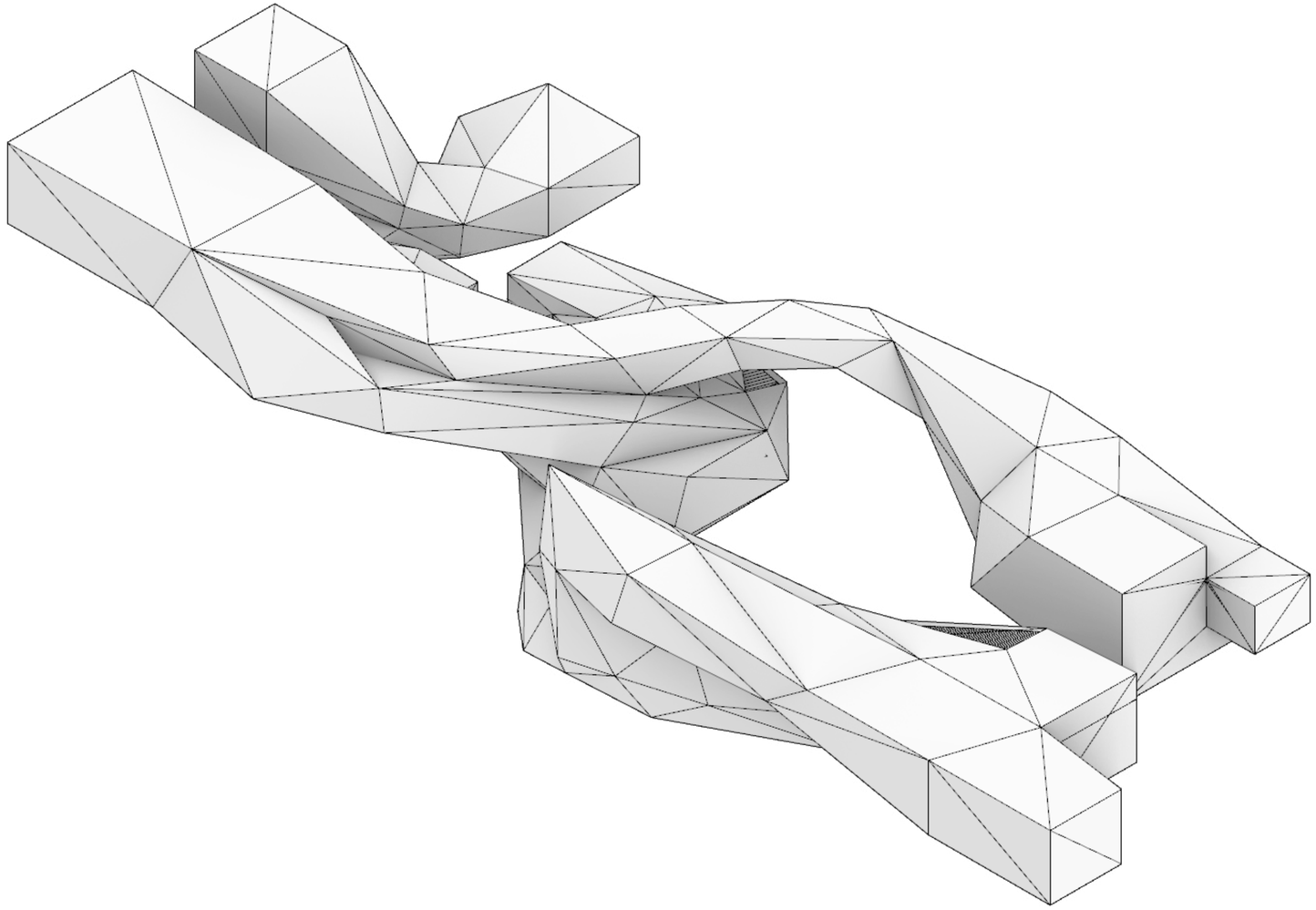


Research Question: Construction

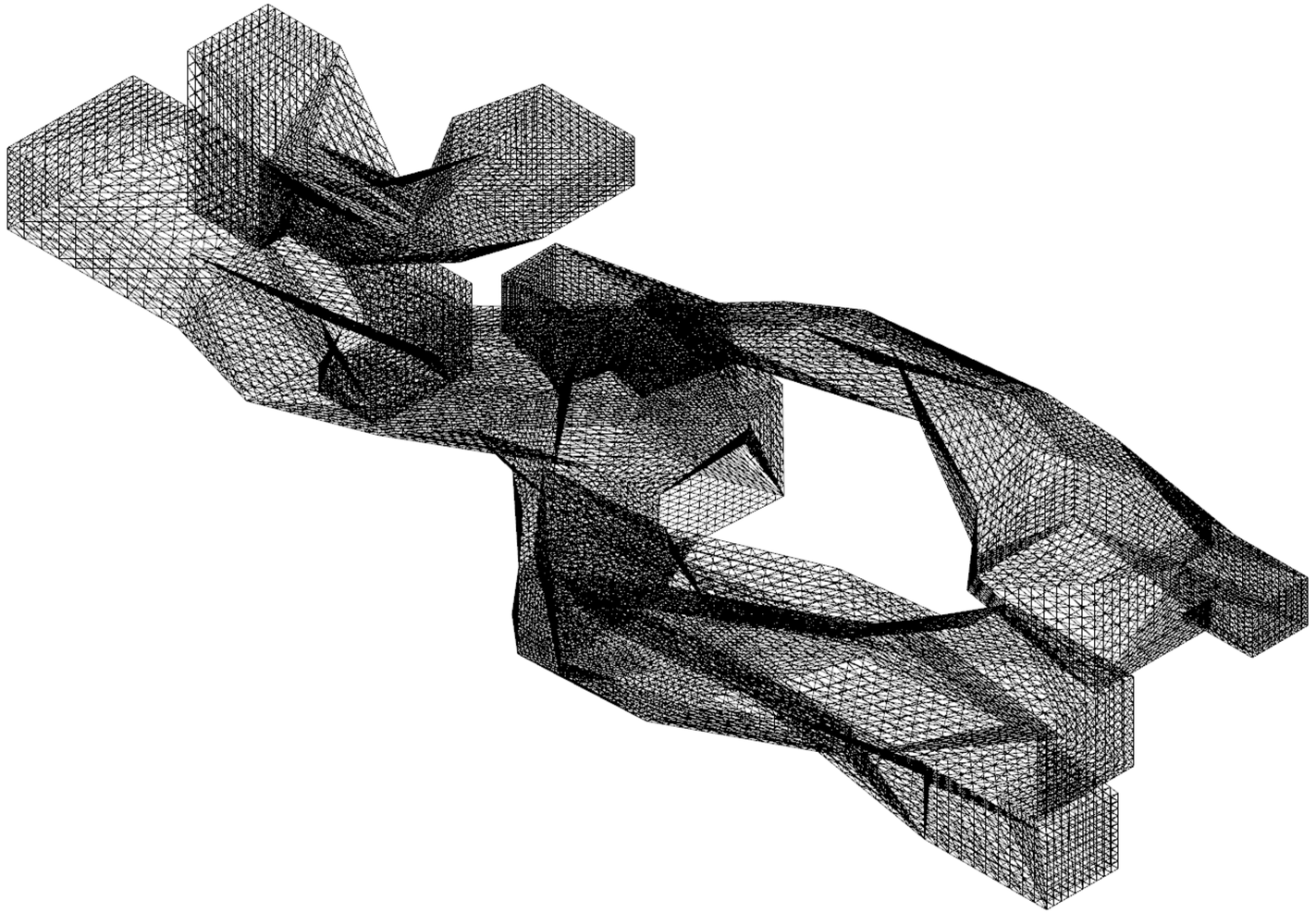
How to construct a locally informed envelope?

#8 Algorithm

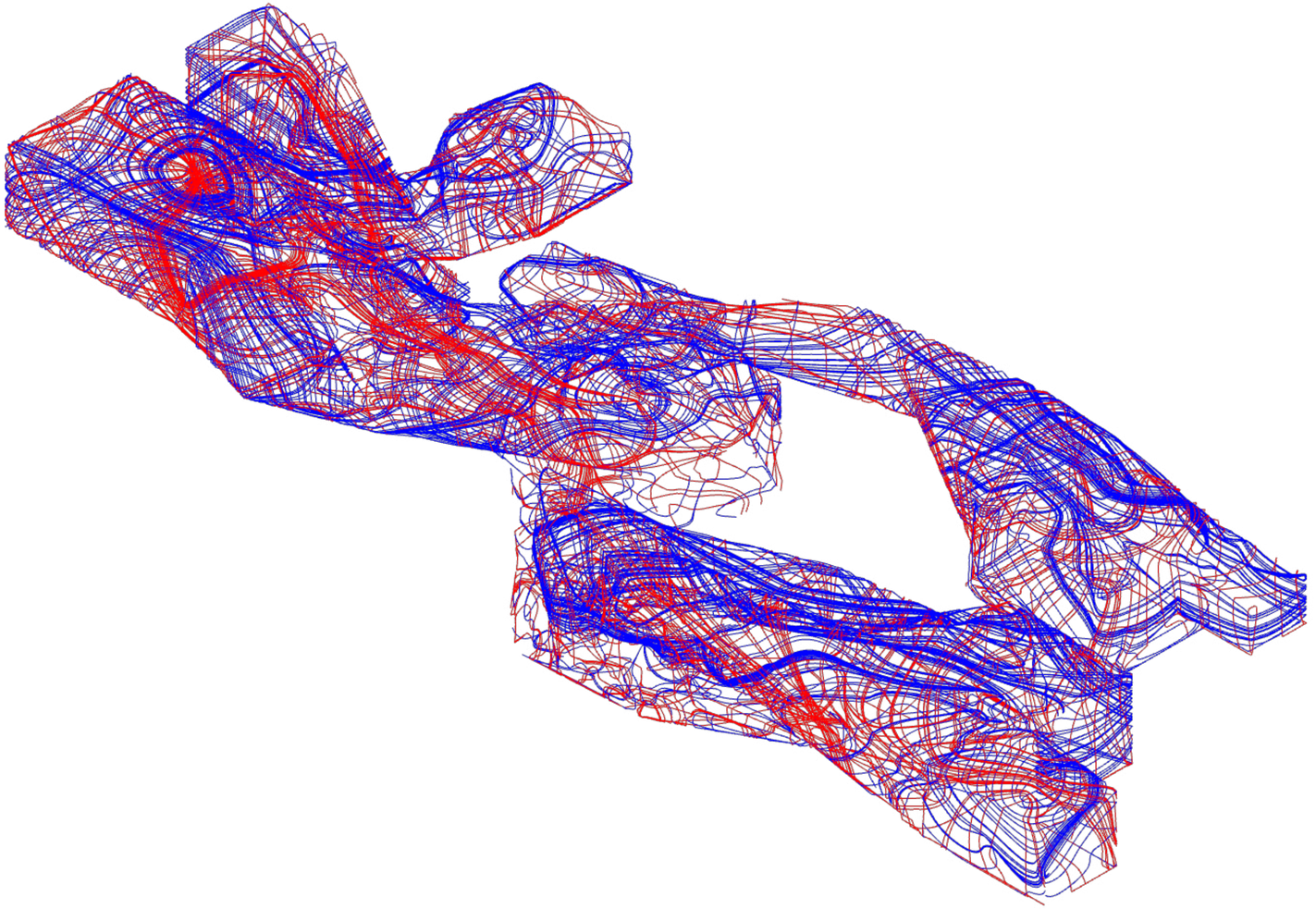
mesh subdivision



mesh subdivision



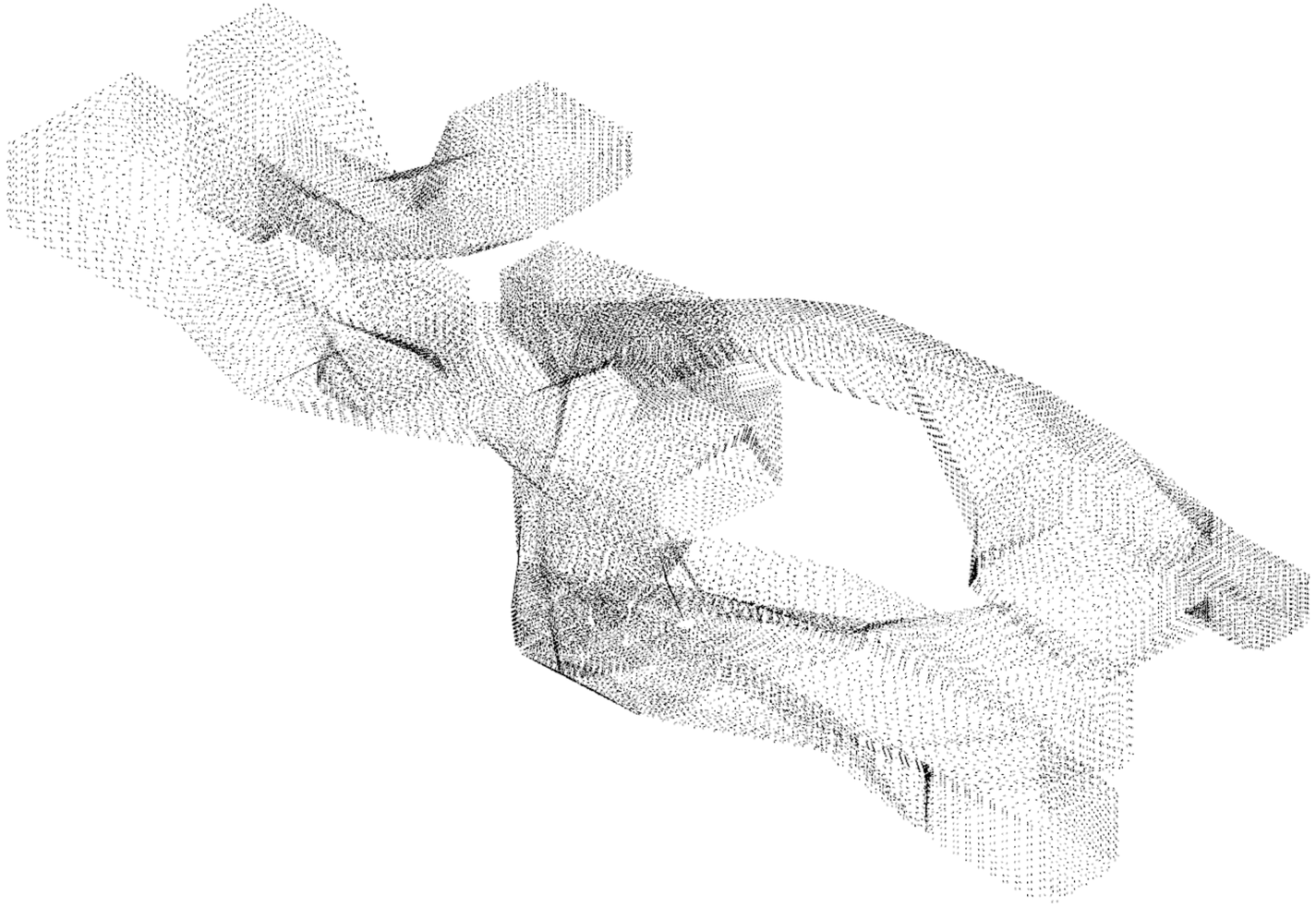
stress lines



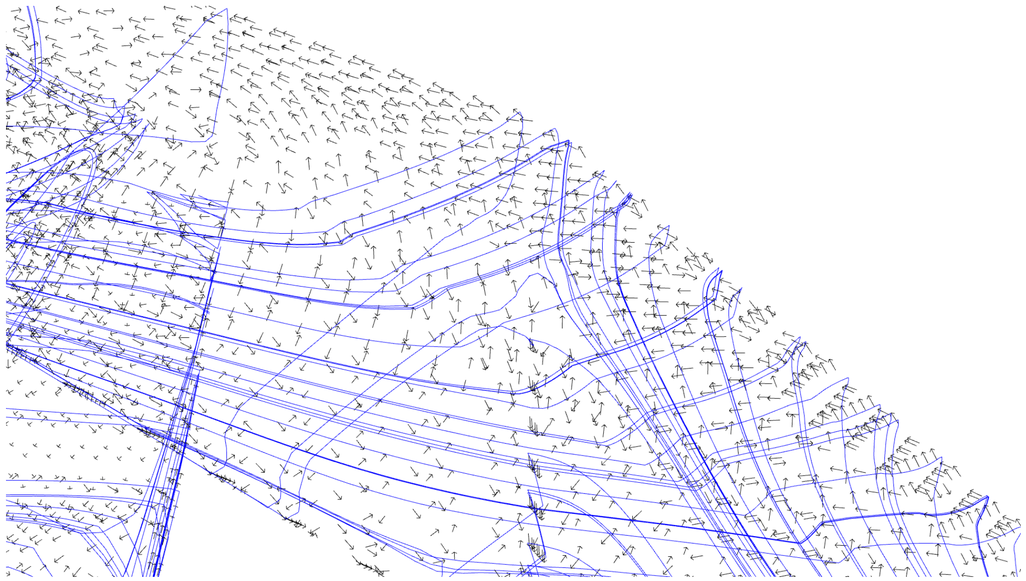
compression

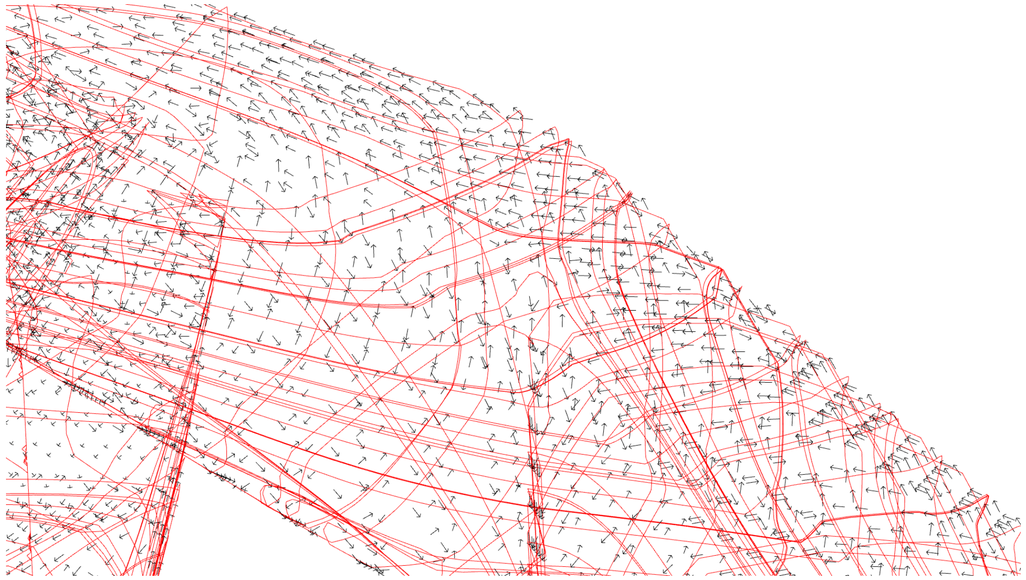
tension

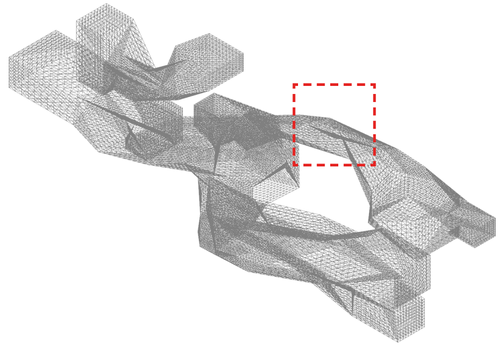
vectors locally informed



vectors locally informed



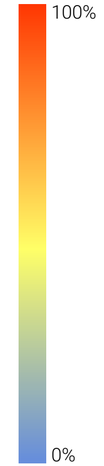




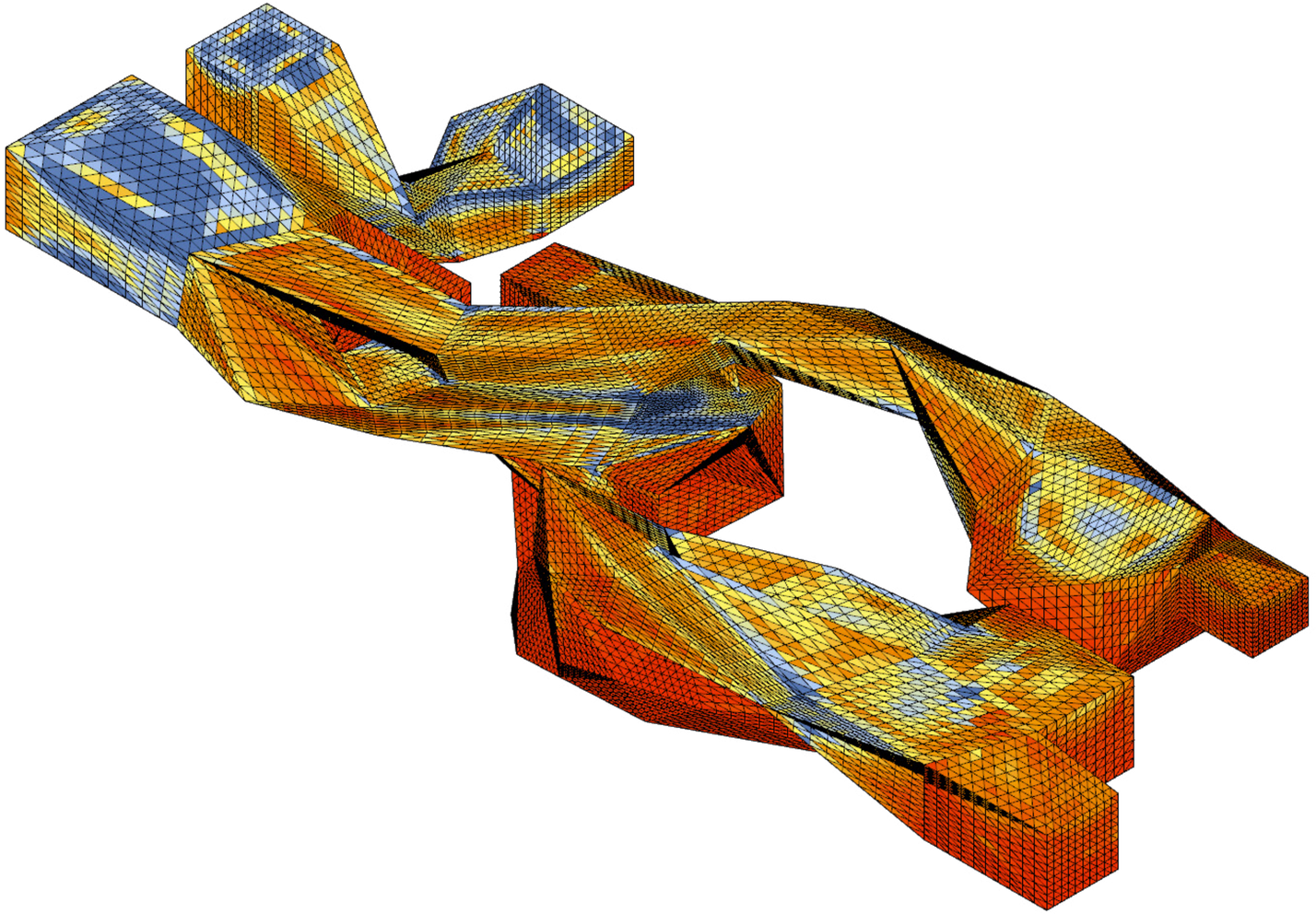
utlization

utilization amount

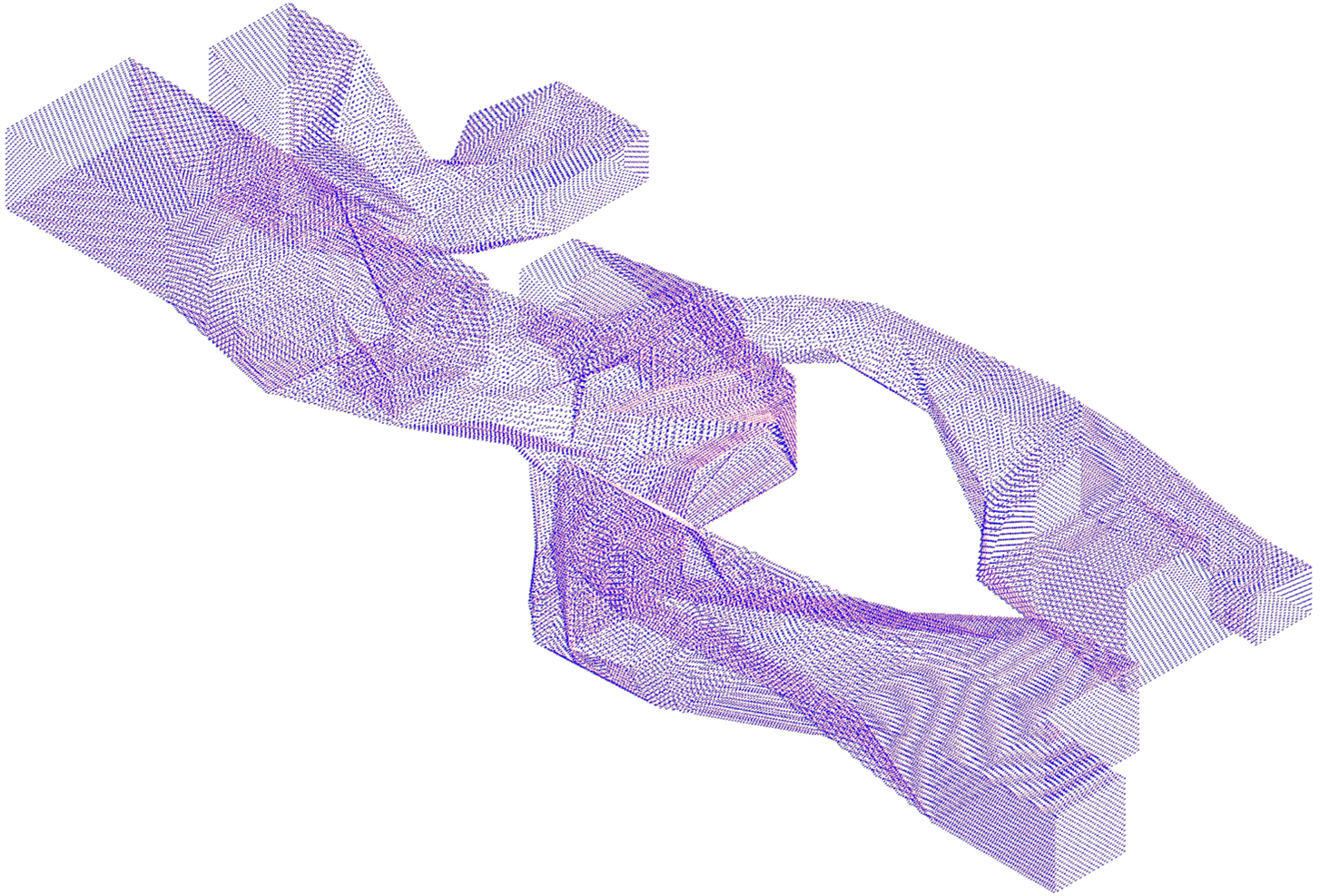
high



low

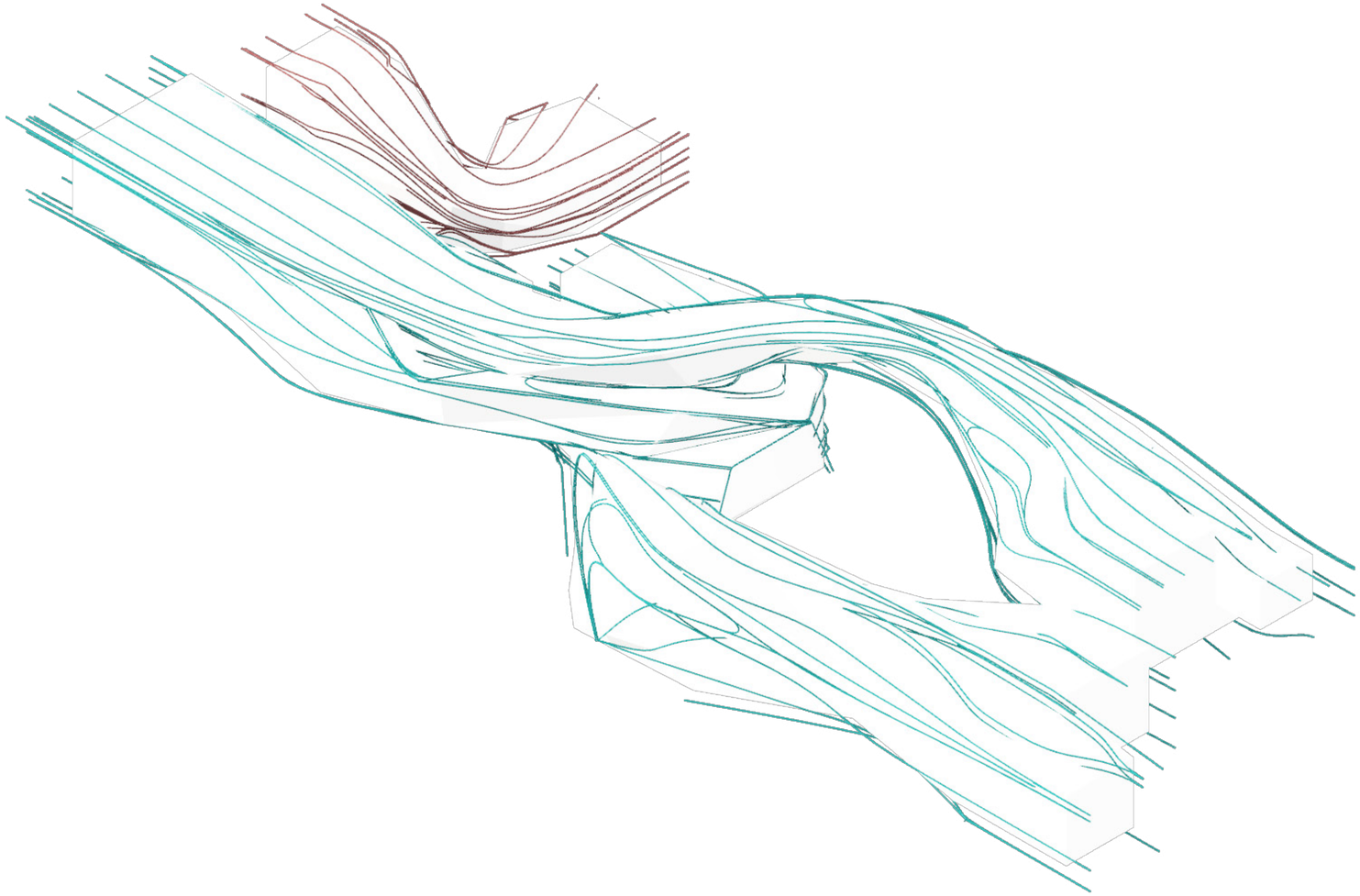


guide curves



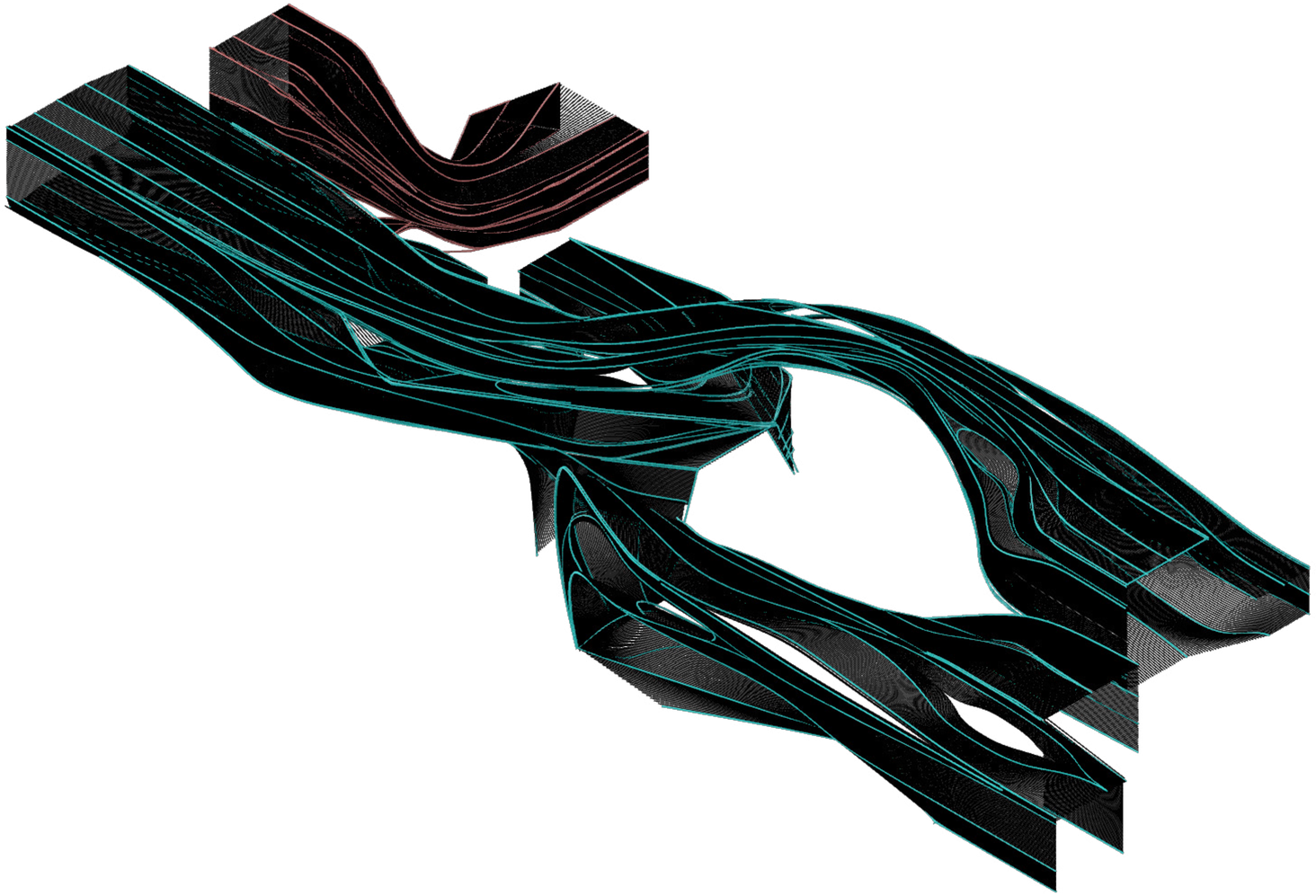
mesh agents

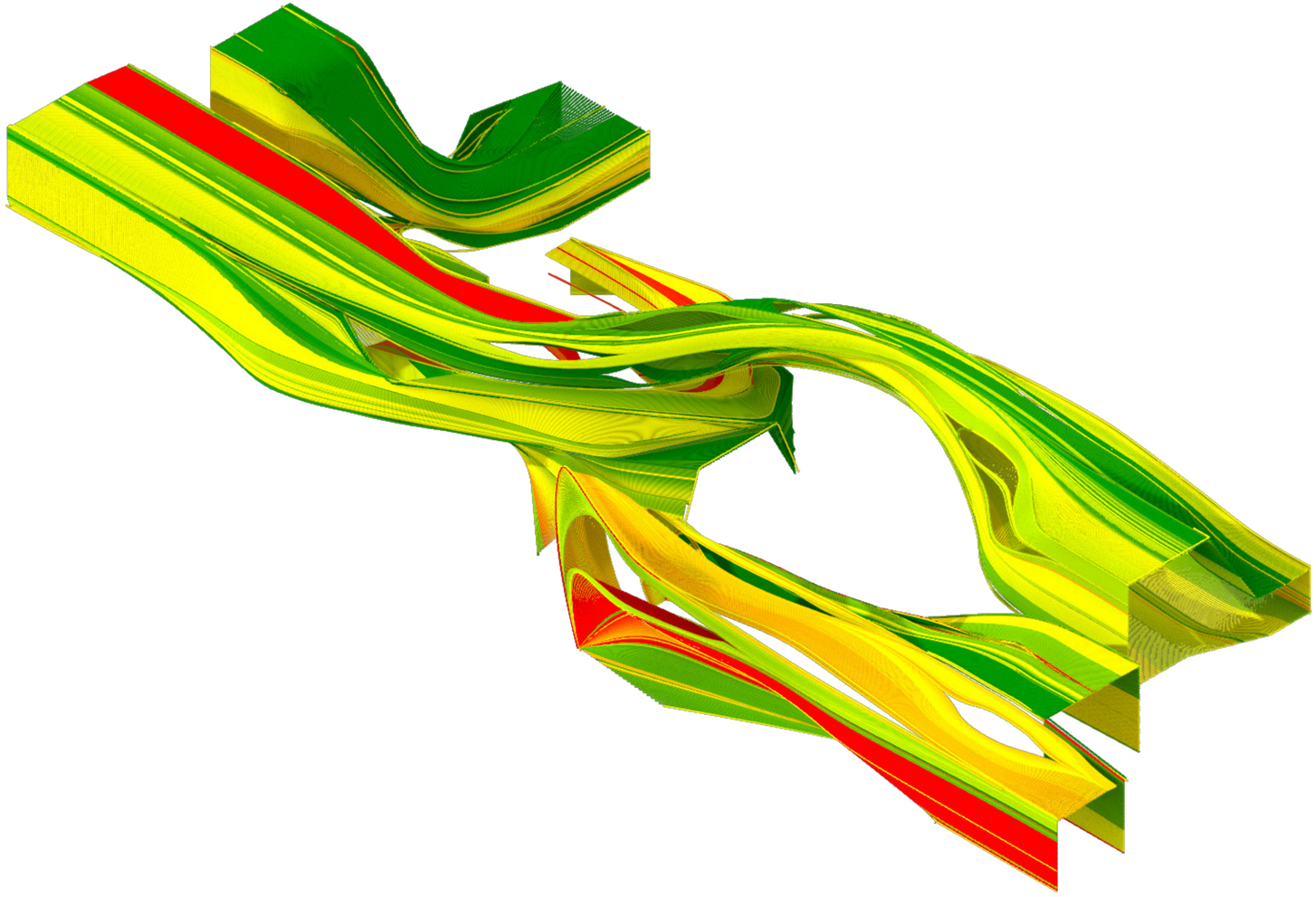
agent parameter
mesh area / 2 = amount mesh agents



baked curves

curve parameter
point influence = radius of 100 points
field element weight = 1



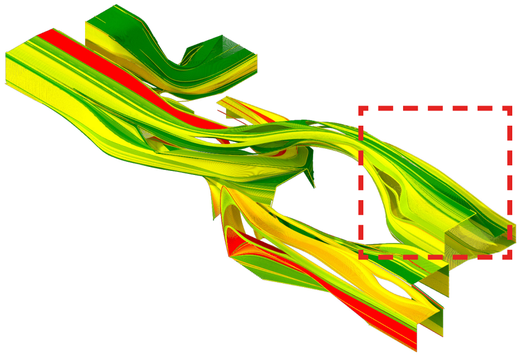


angle based culling

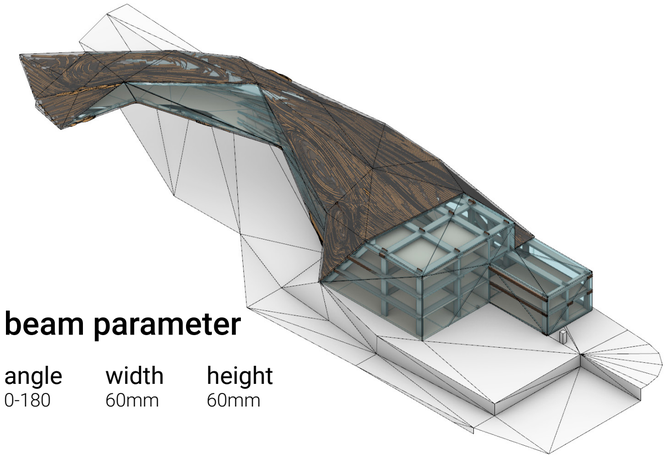
curvature

high

low

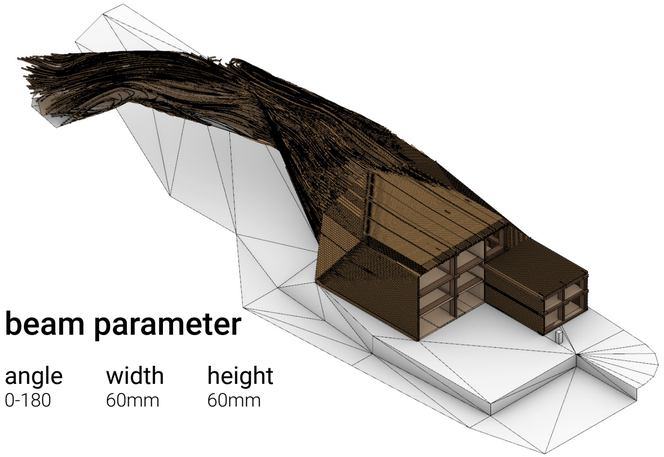


design experiments



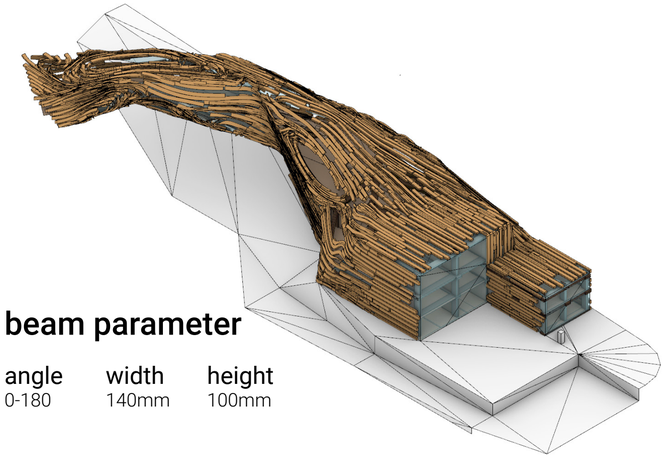
beam parameter

angle	width	height
0-180	60mm	60mm



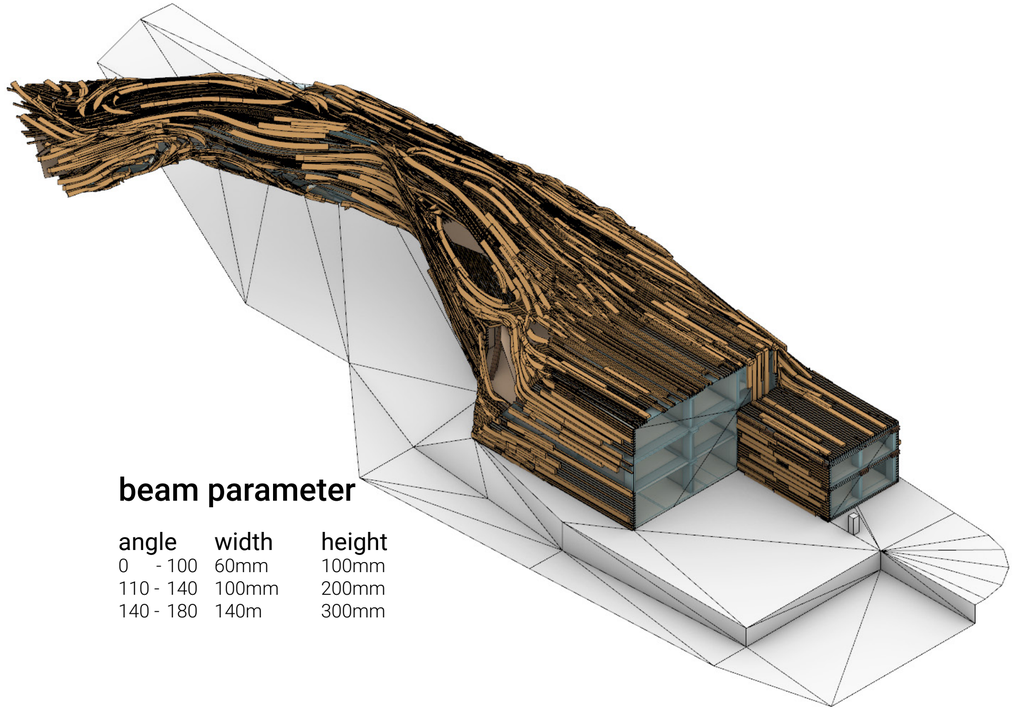
beam parameter

angle	width	height
0-180	60mm	60mm



beam parameter

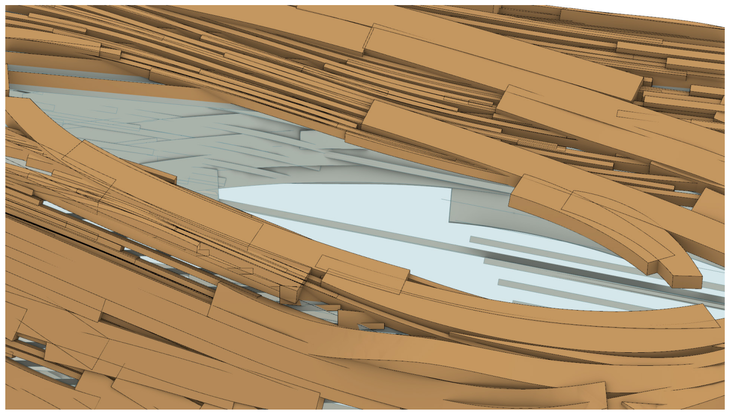
angle	width	height
0-180	140mm	100mm



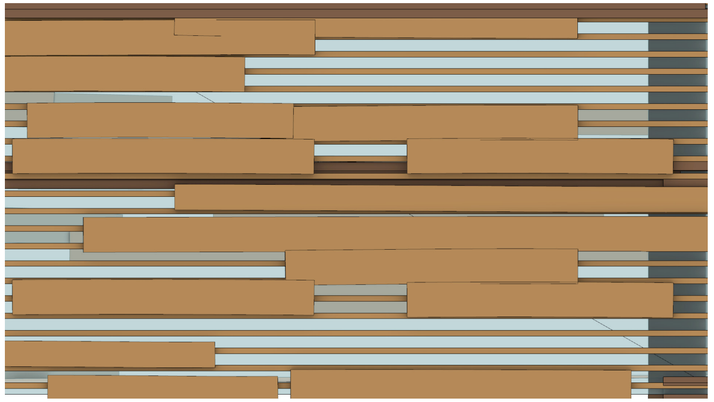
beam parameter

angle	width	height
0 - 100	60mm	100mm
110 - 140	100mm	200mm
140 - 180	140m	300mm

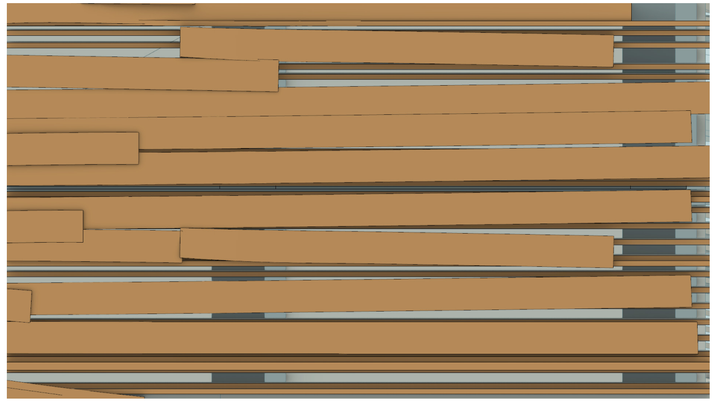
openings



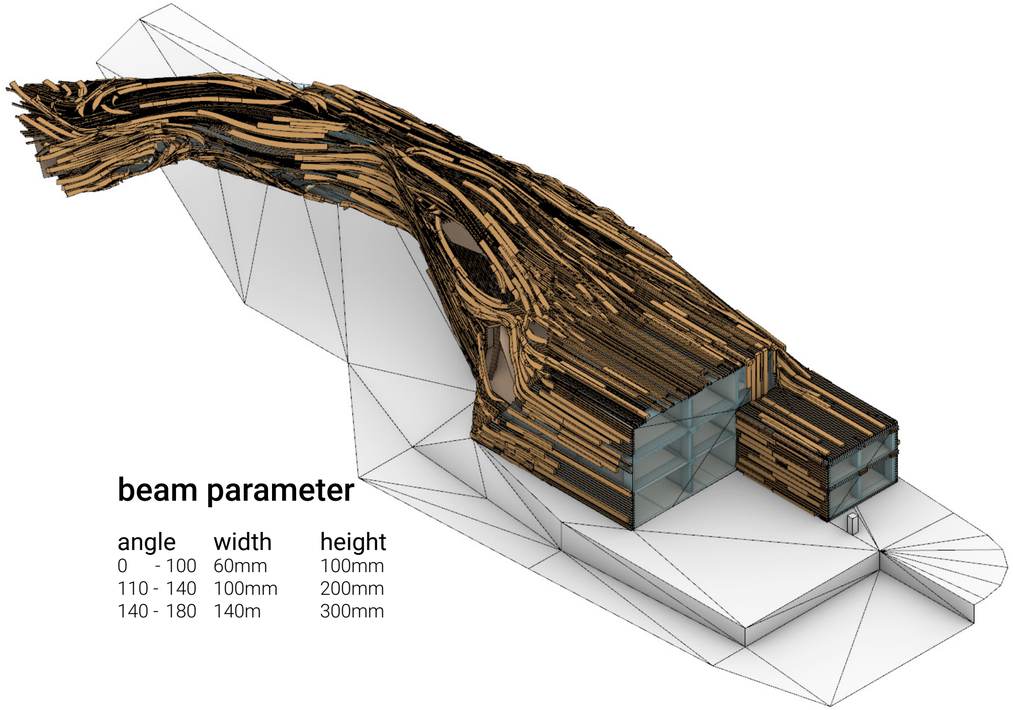
freeform opening



medium density



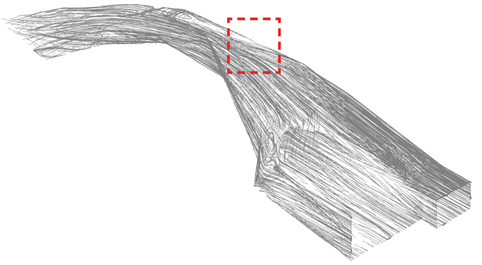
high density



beam parameter

angle	width	height
0 - 100	60mm	100mm
110 - 140	100mm	200mm
140 - 180	140m	300mm

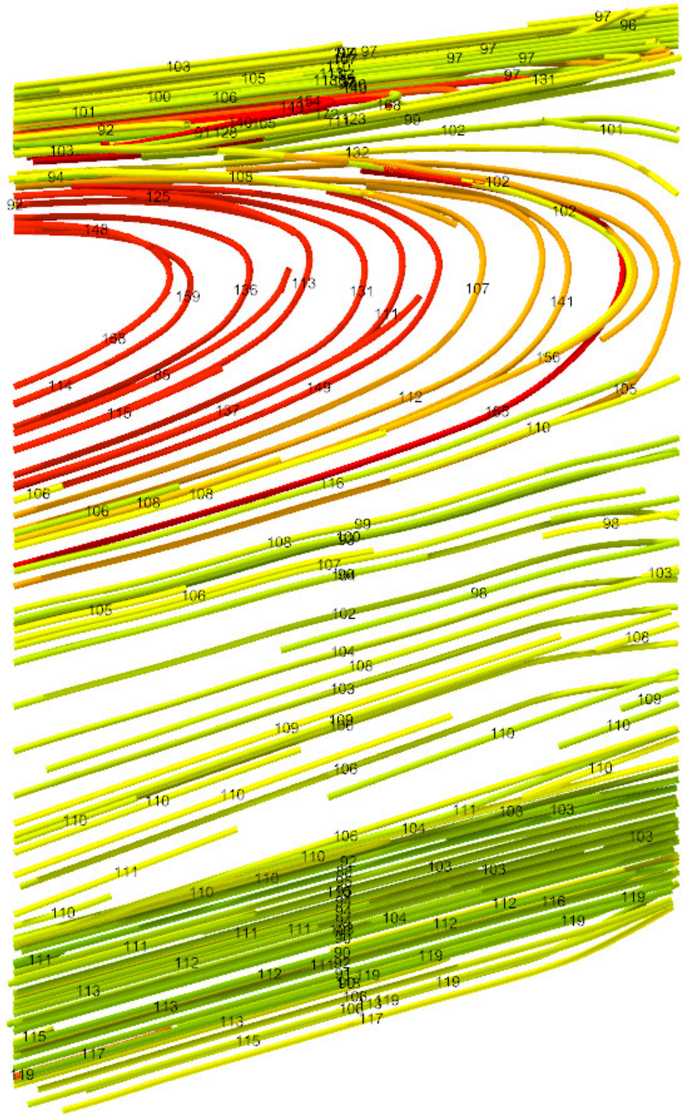
resulting curves



angle analysis

culling parameter

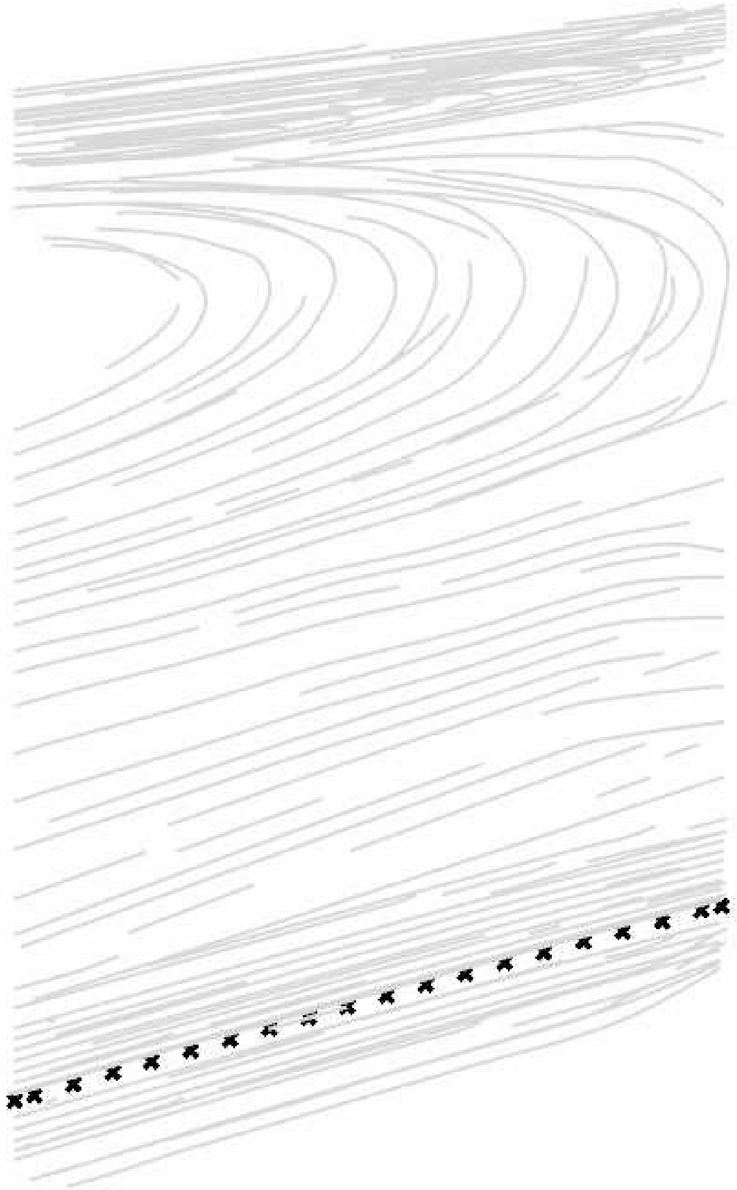
angle	range
0 - 100	60mm
110 - 140	100mm
140 - 180	140mm



curve culling

cu

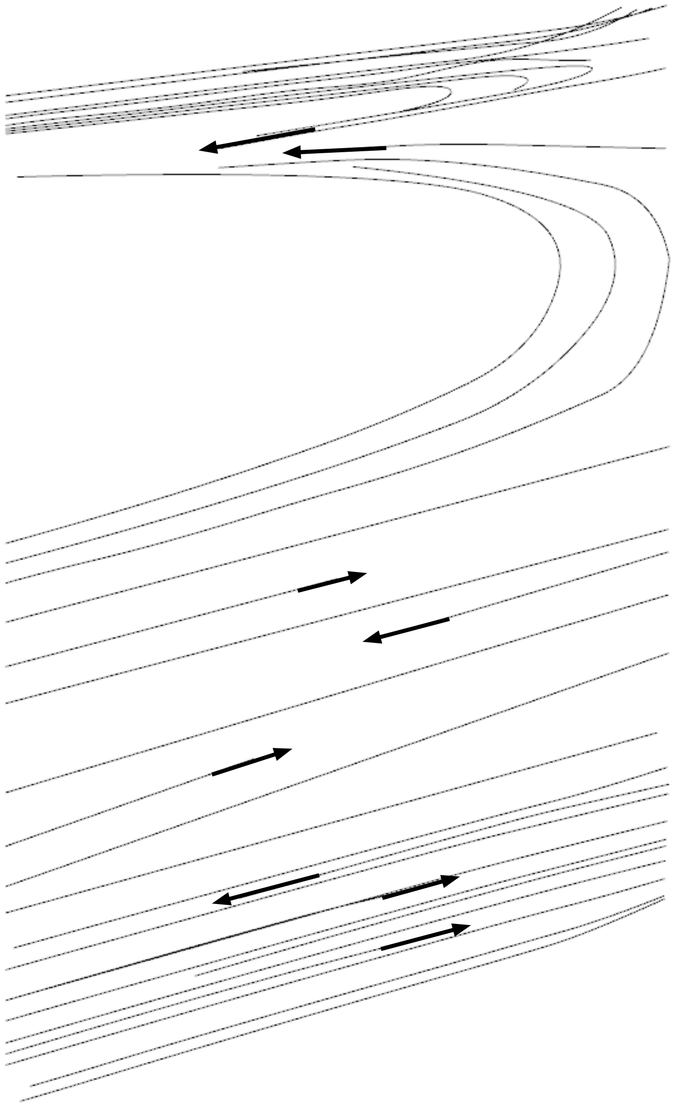
ang
0
110
140



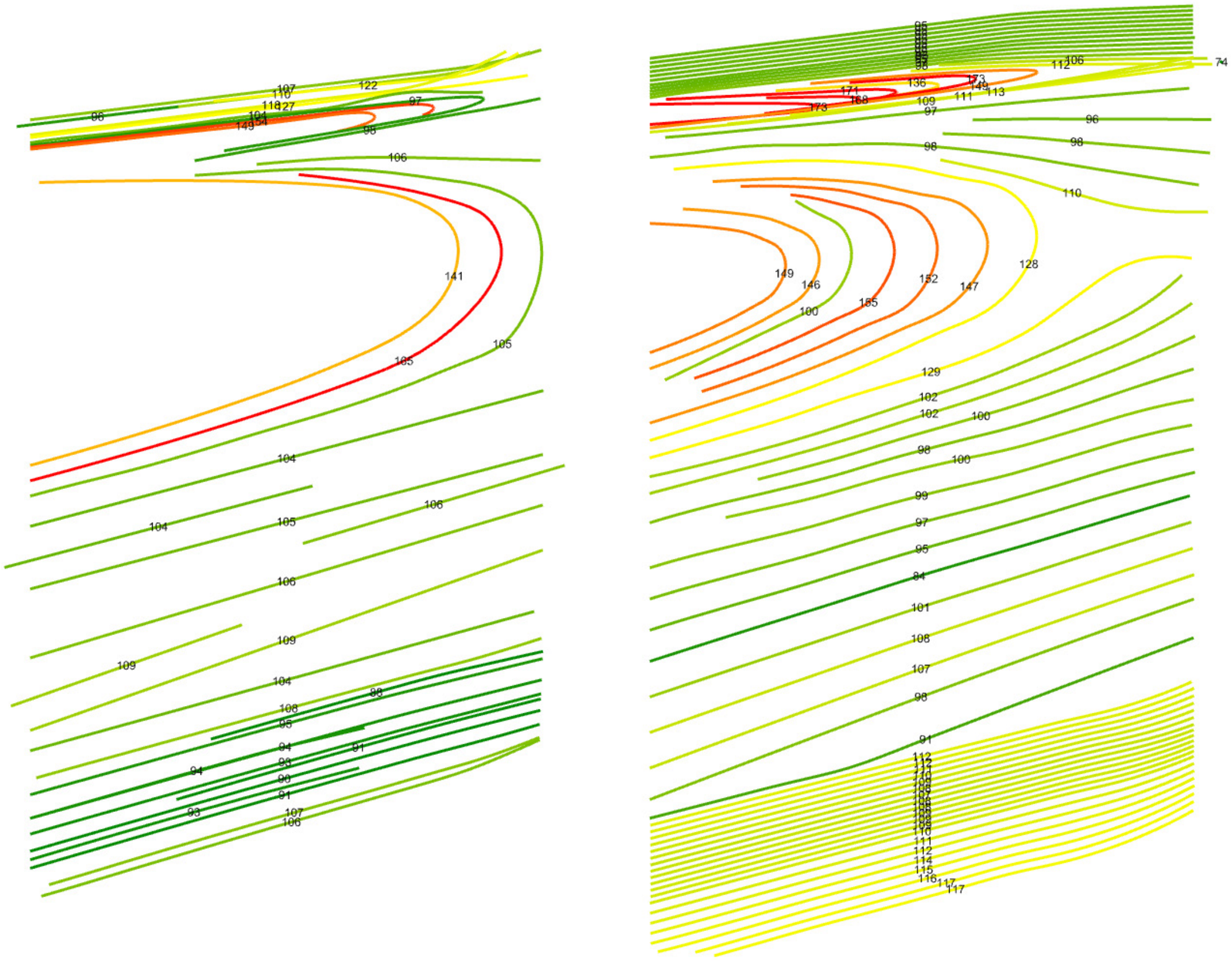
curve extension

extension parameter

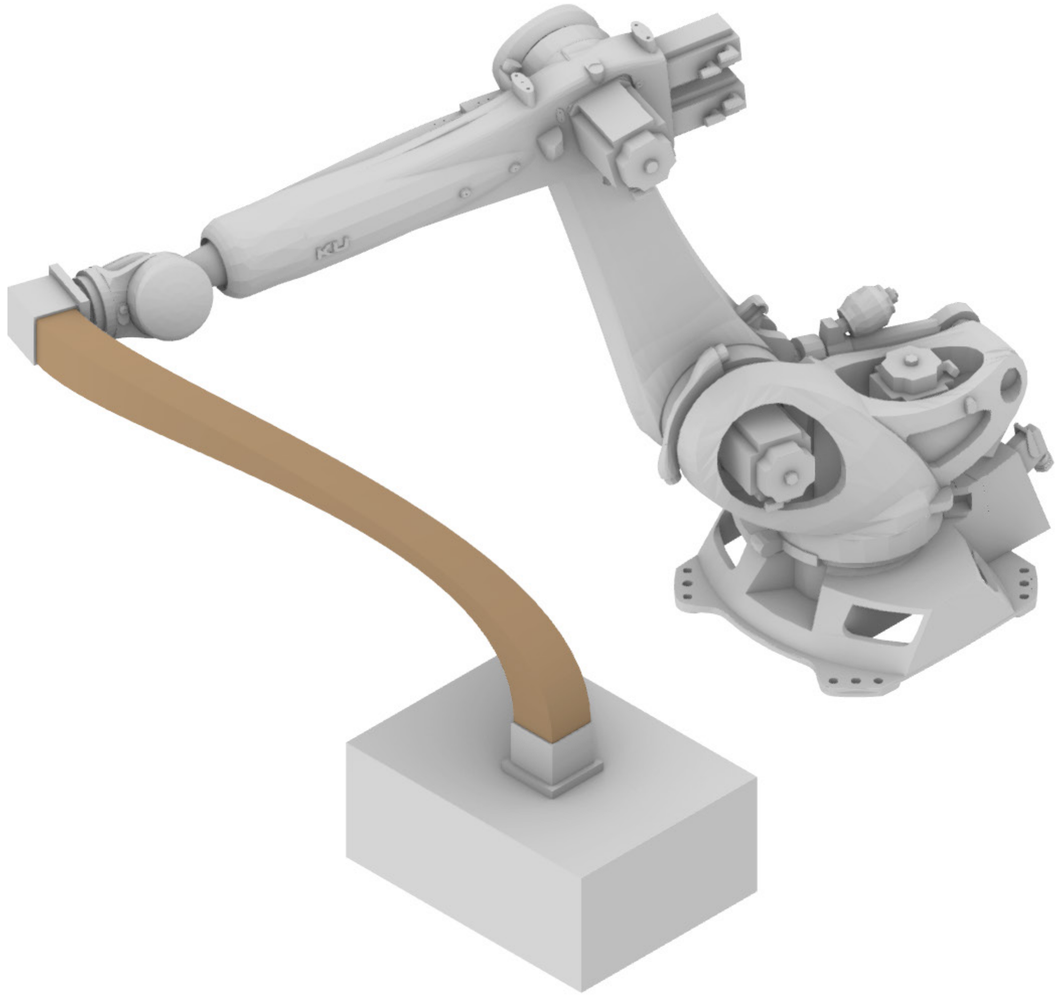
length
cp = control point
distance = v(last cp - second last cp) * 2



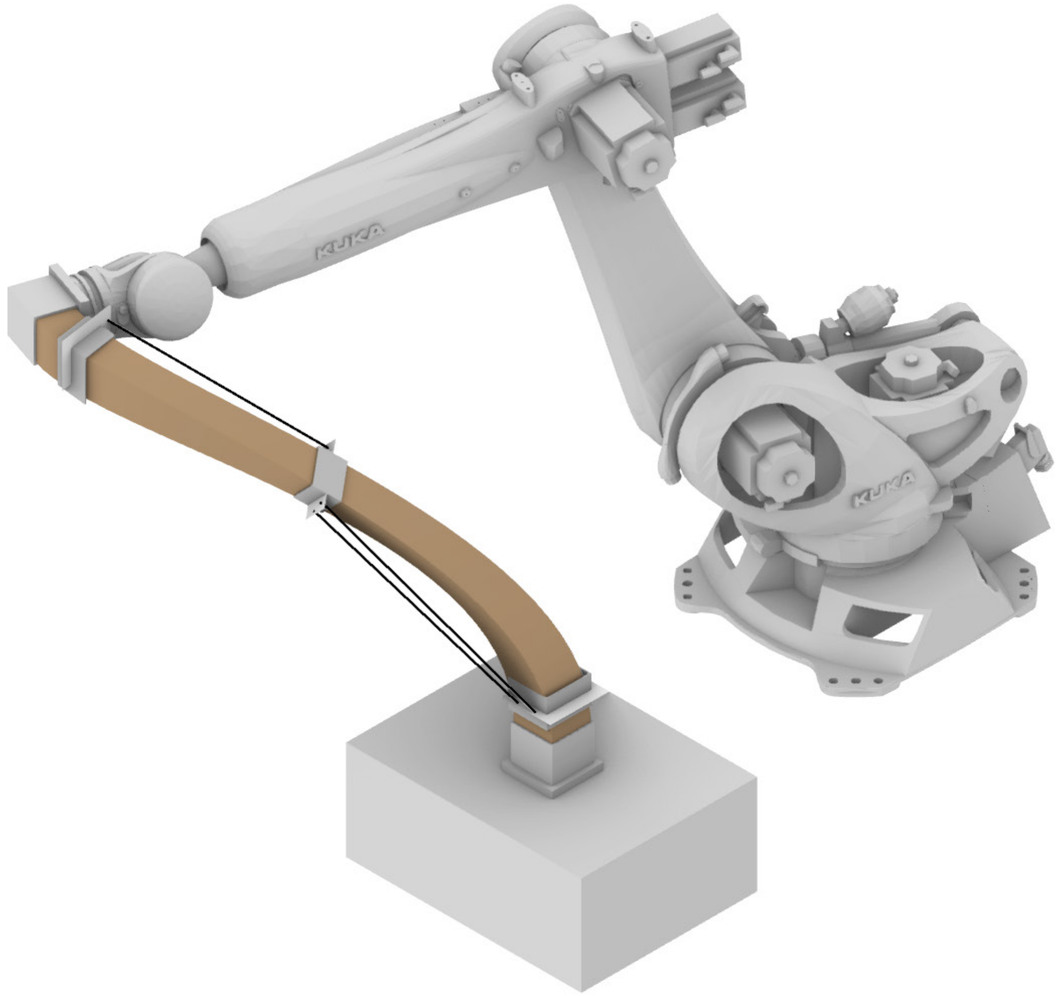
angle analysis



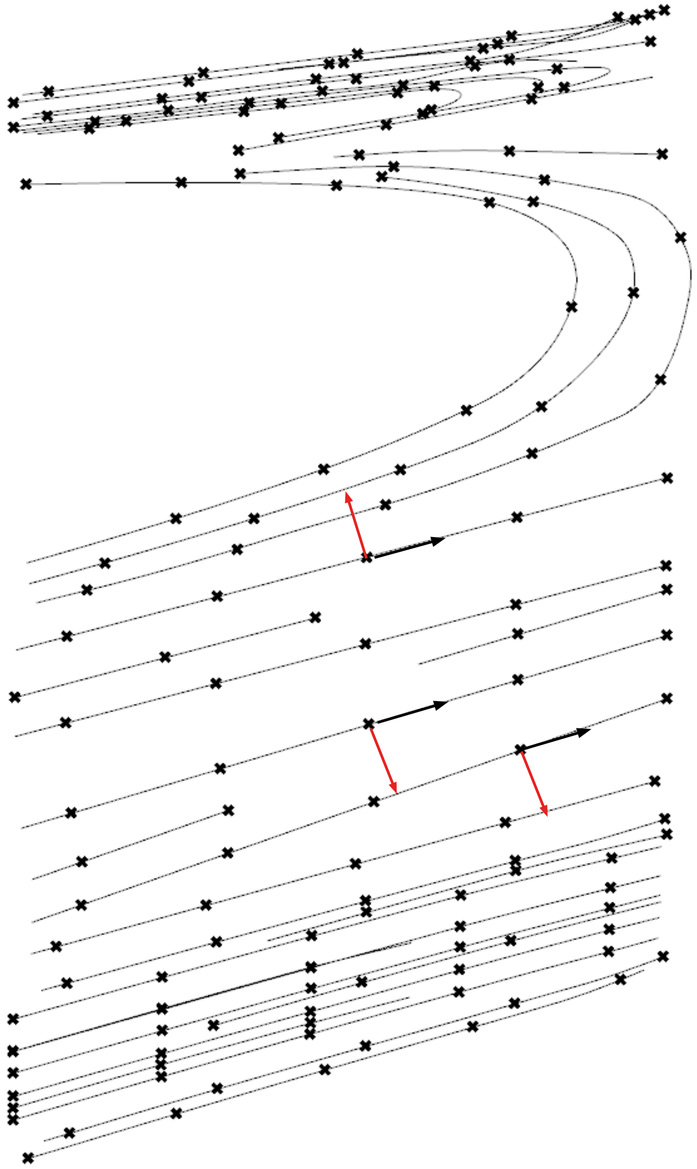
robotic bending

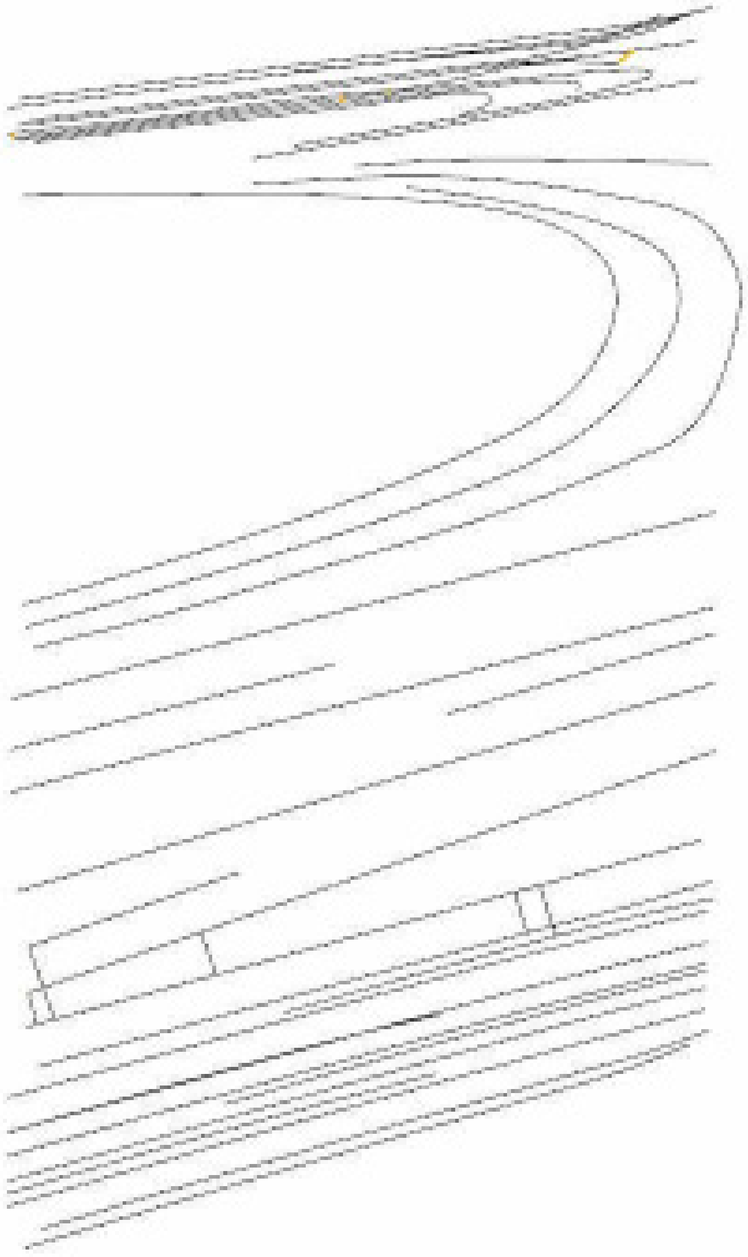


beam fixation



perpendicular joints

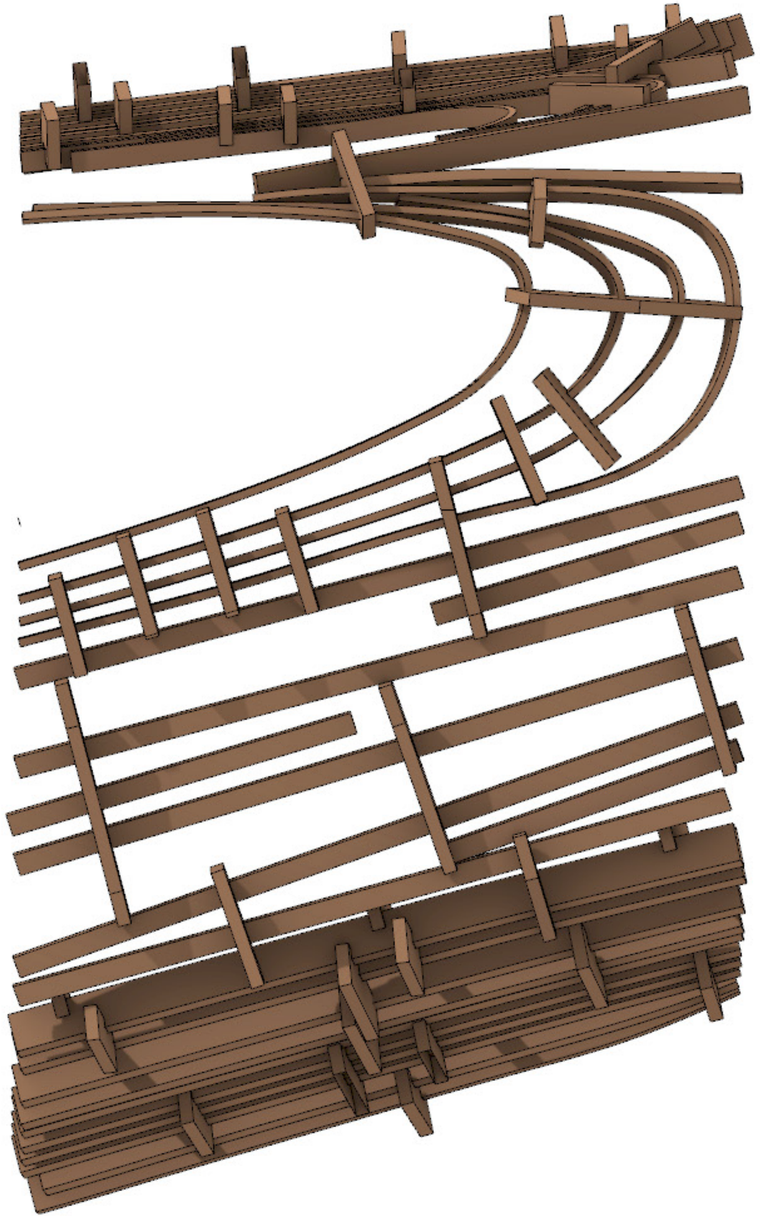


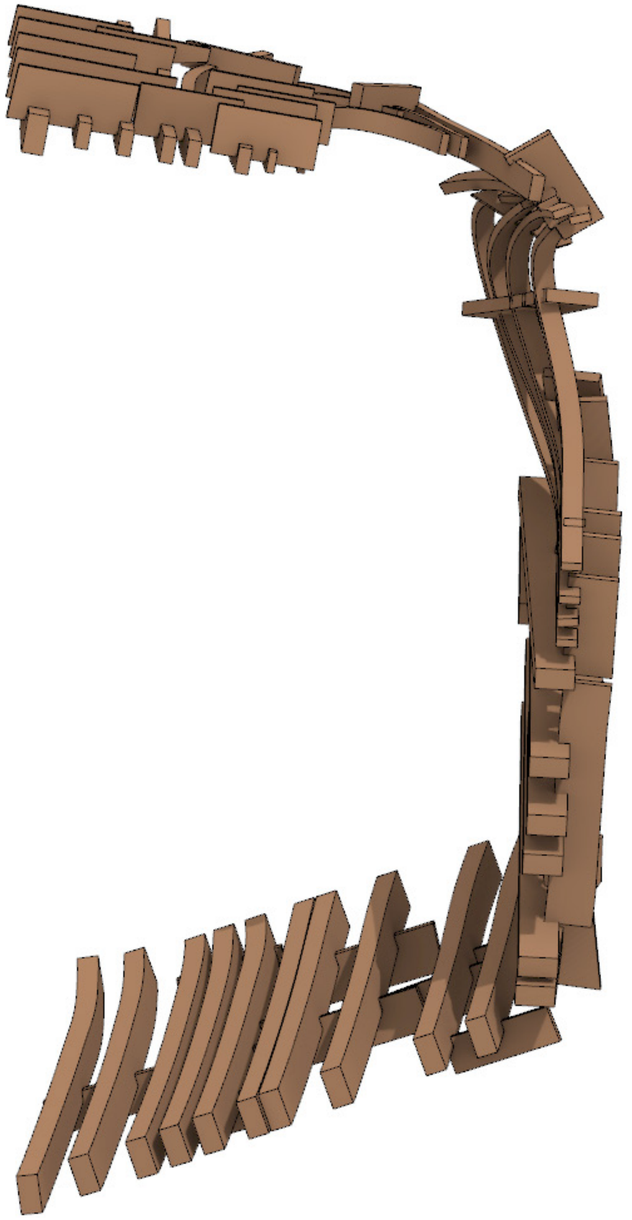


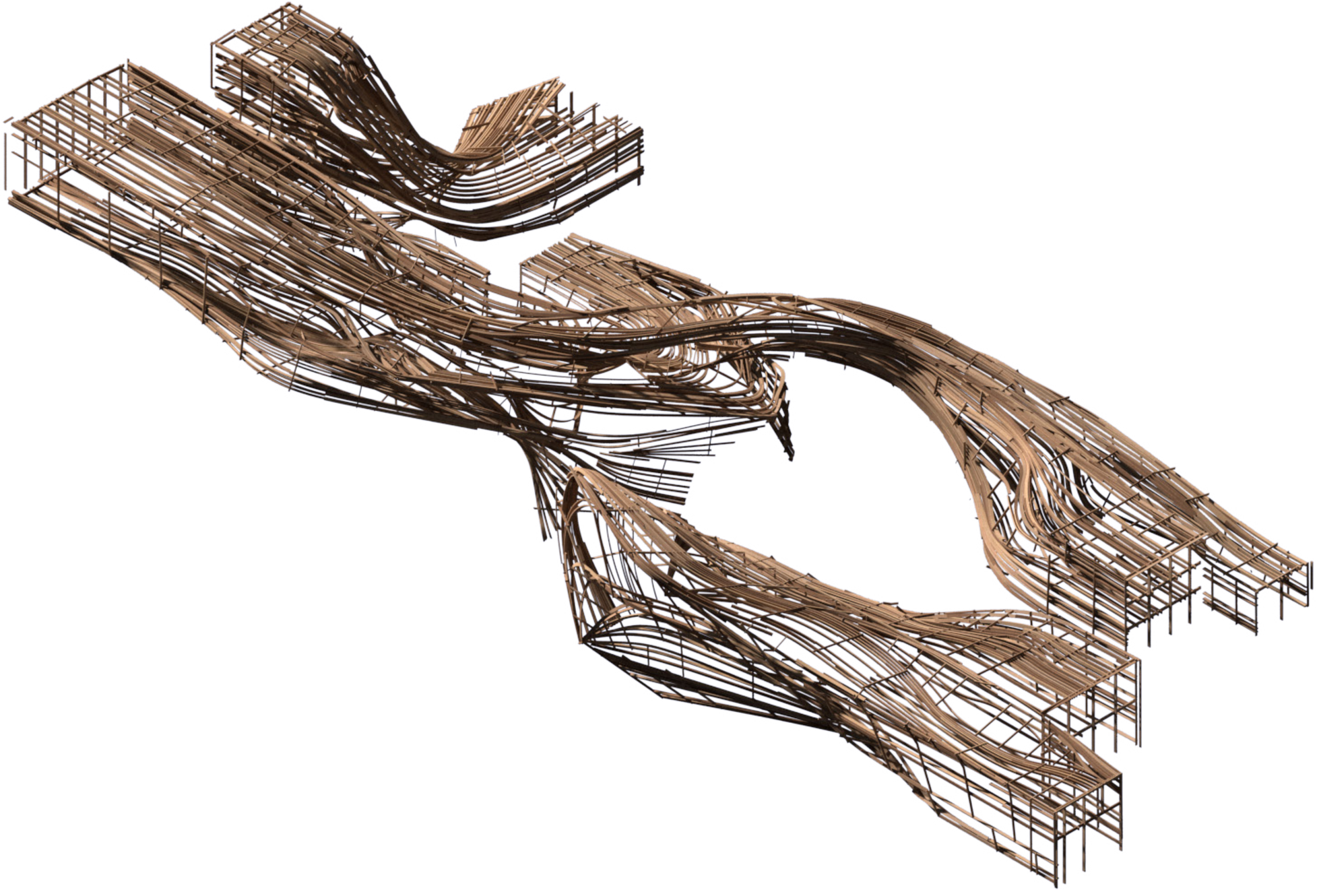
culling joints

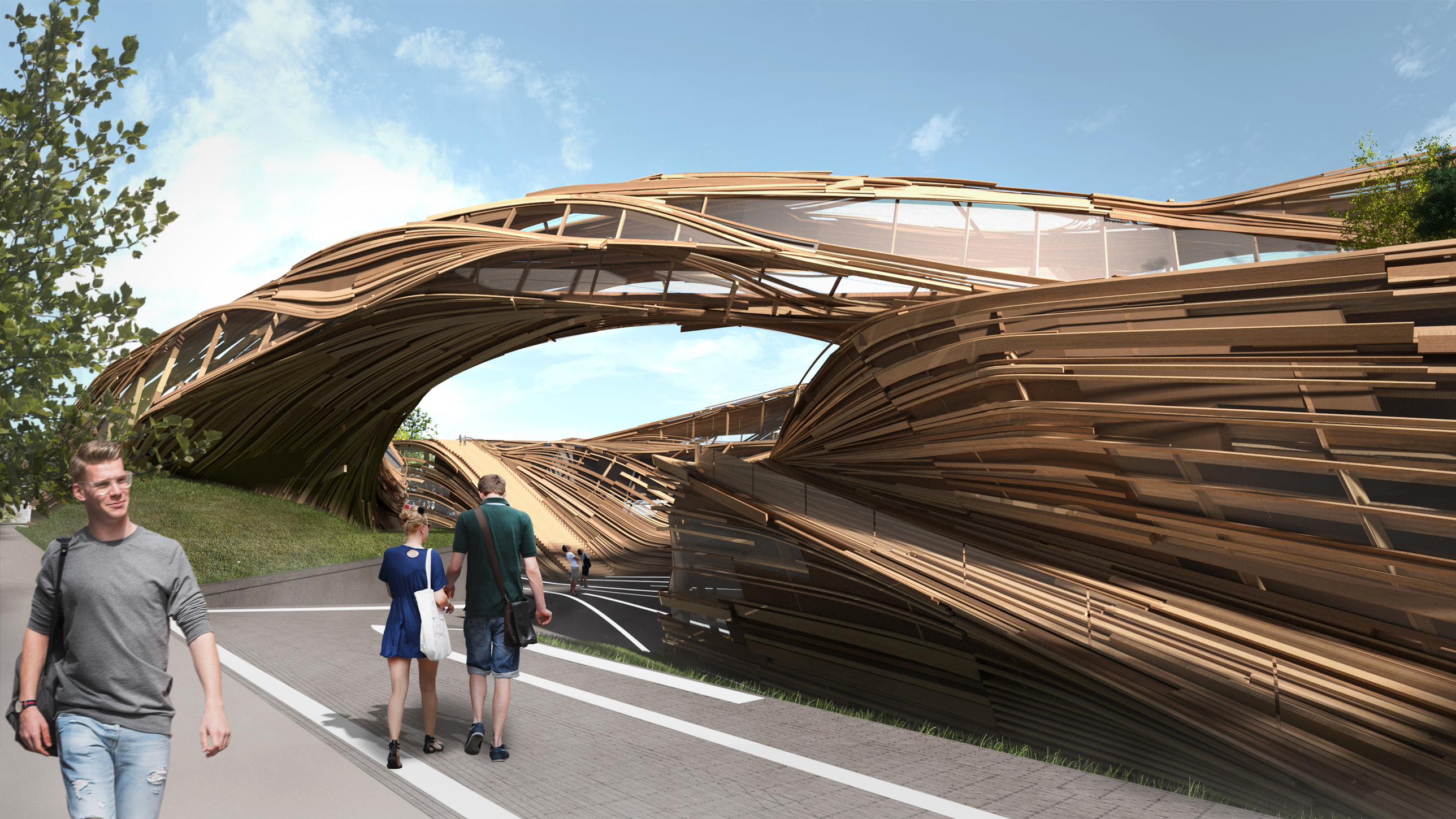
culling parameter

distance
cull joint if proximity <1m or # > 2



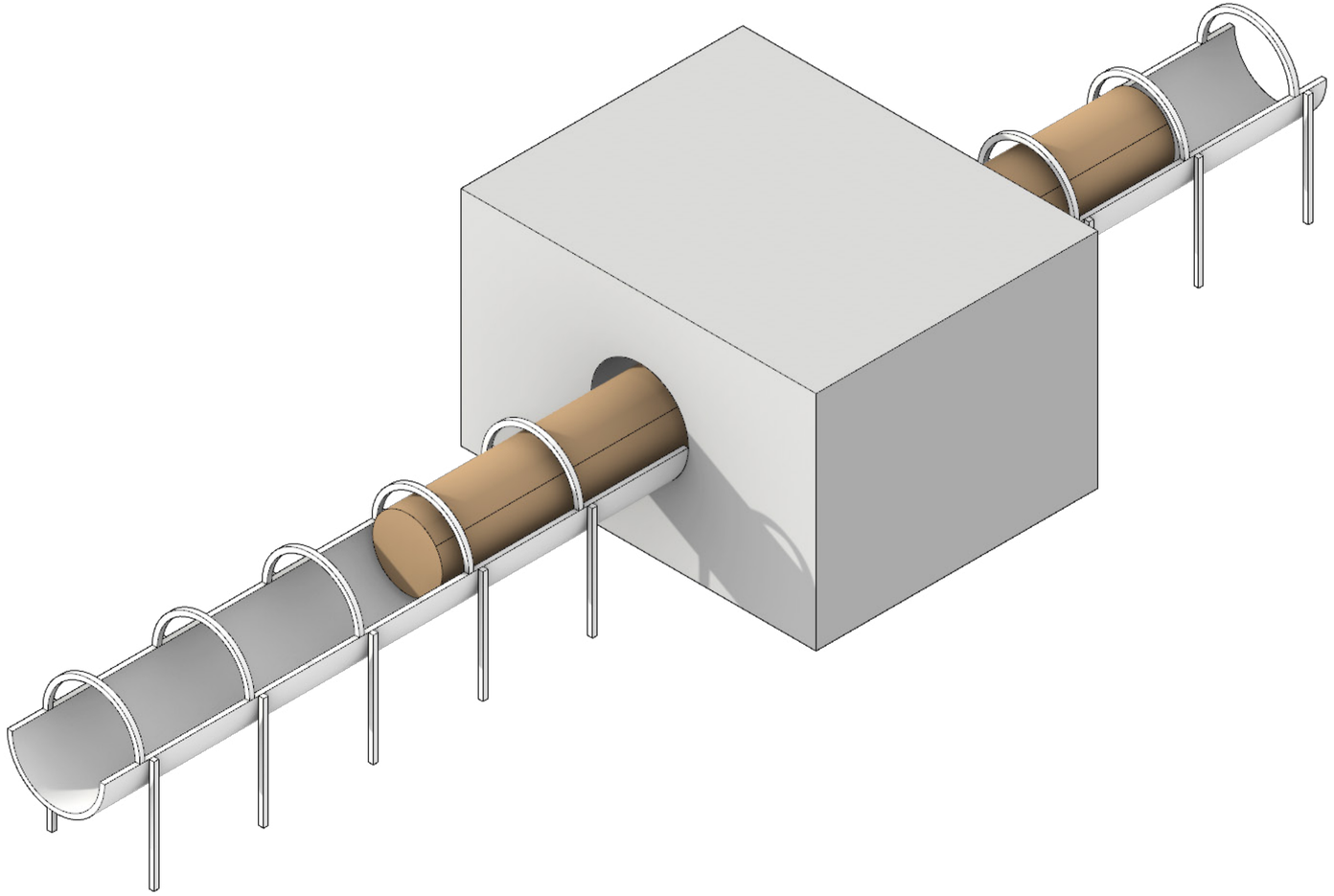




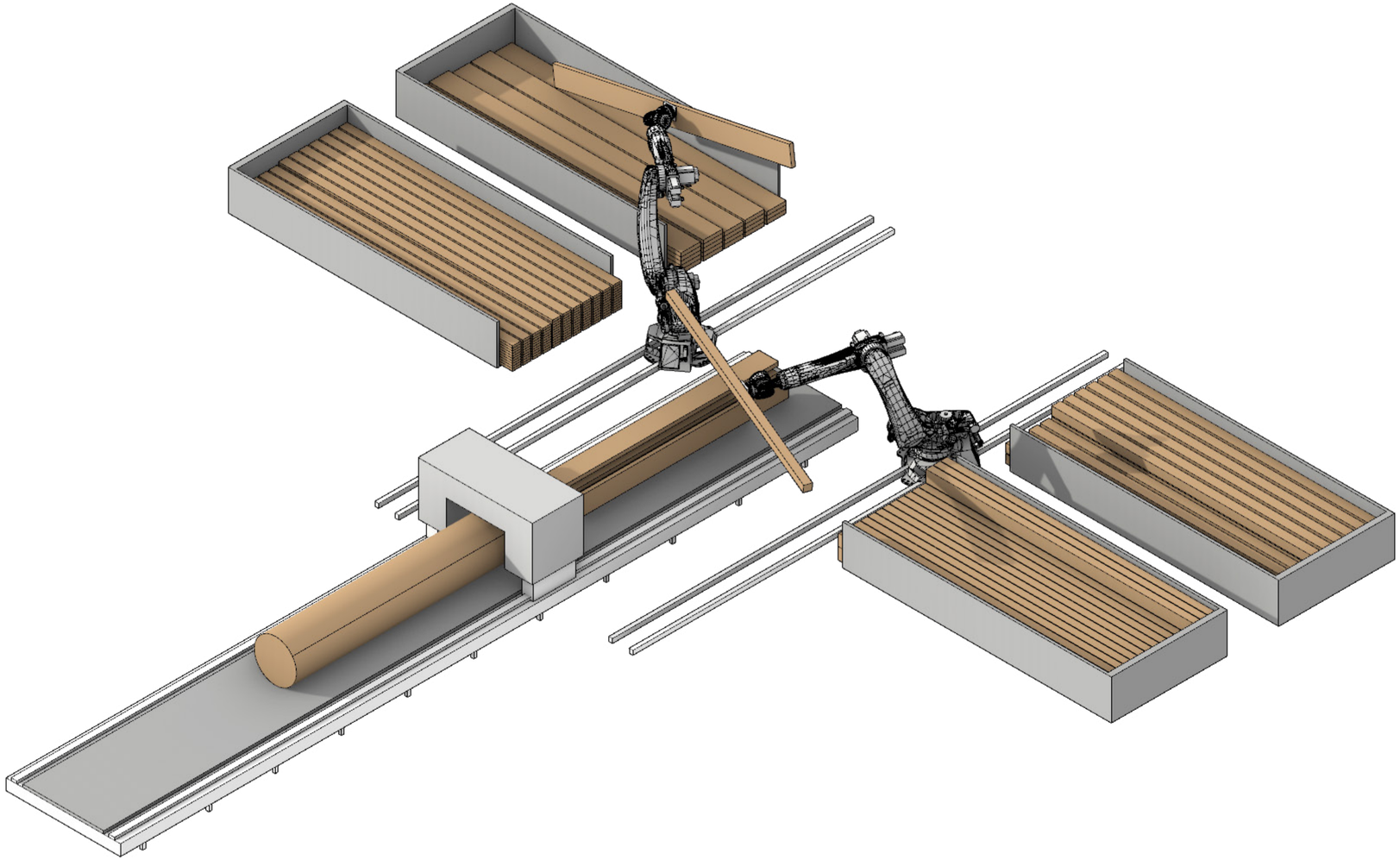


#9 Construction

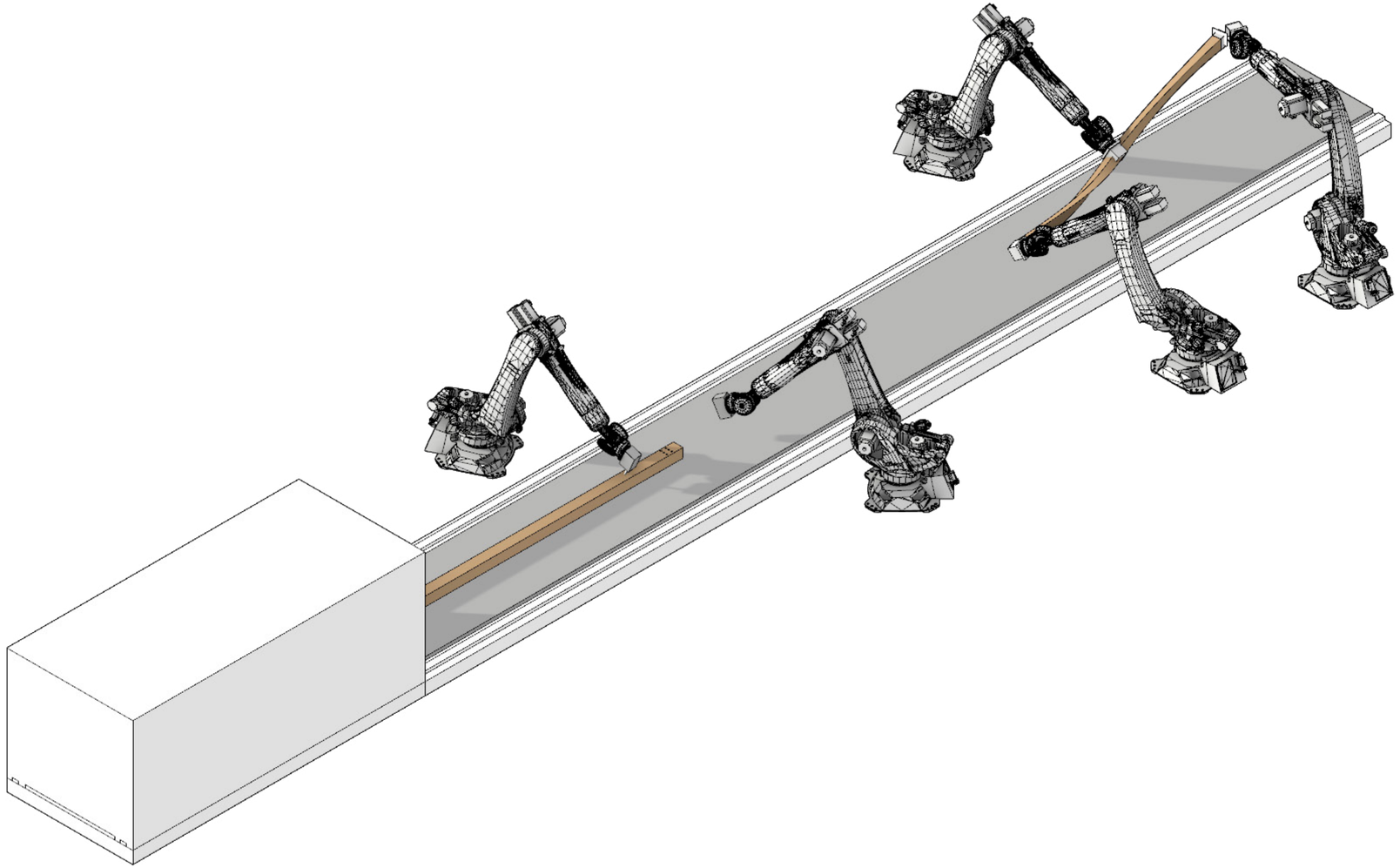
x-ray log scanning



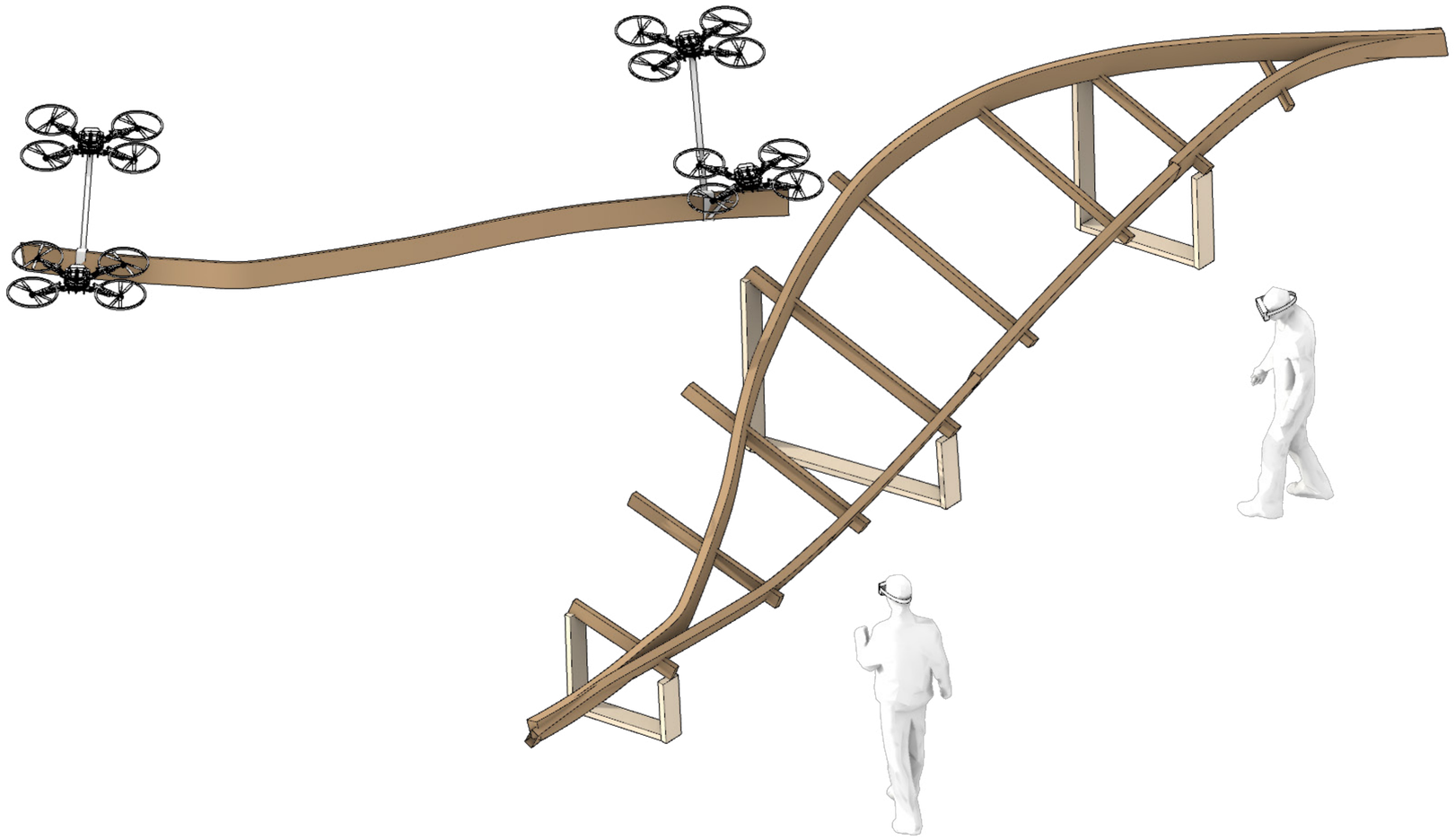
robotic cutting



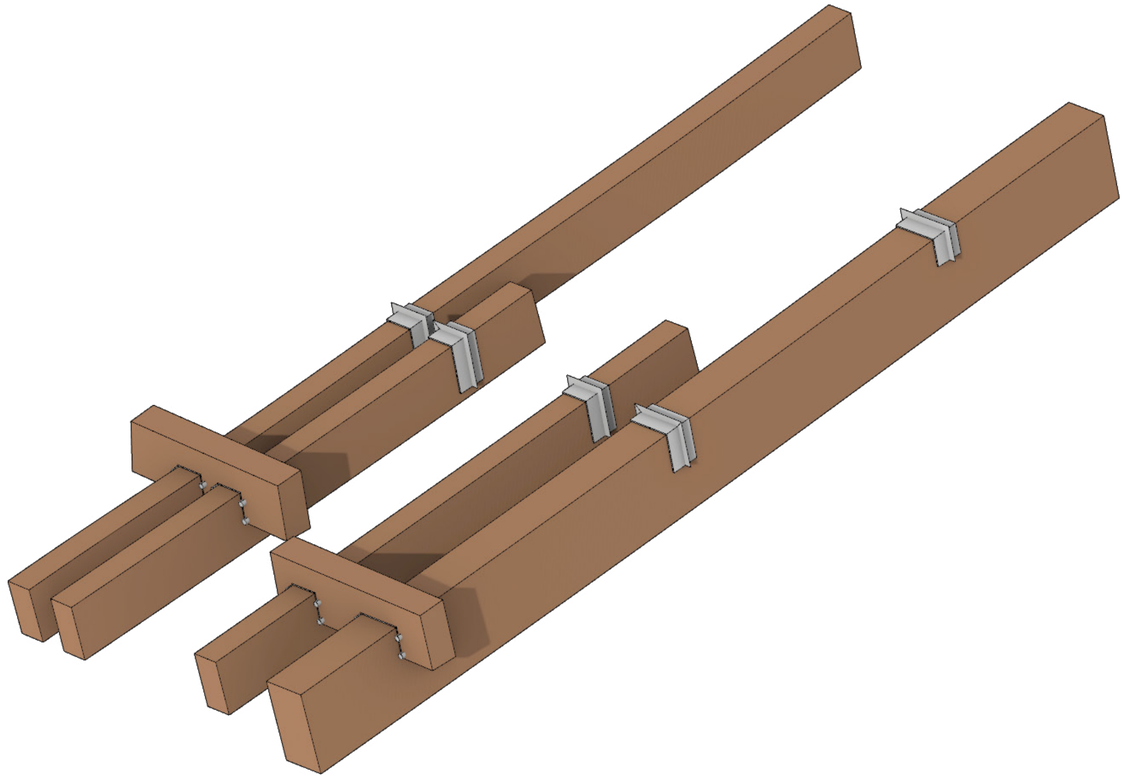
robotic drilling + robotic bending

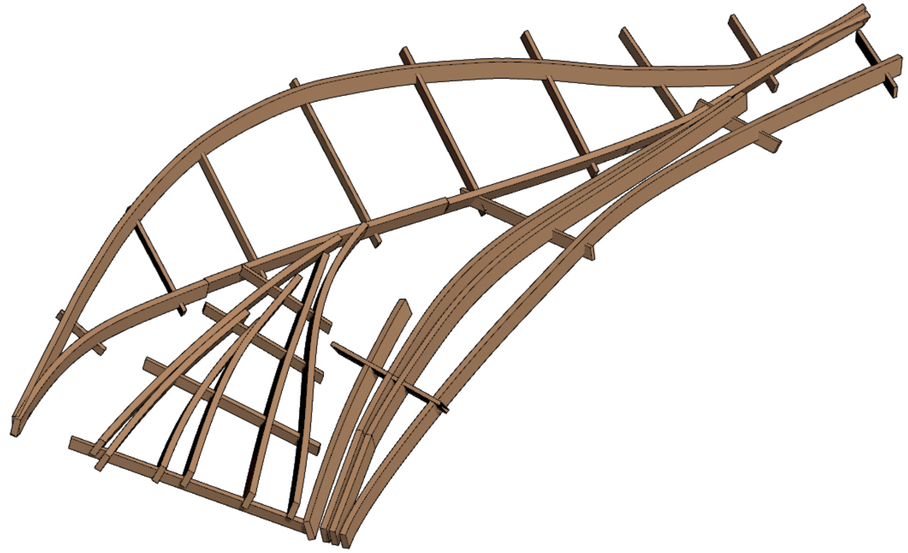


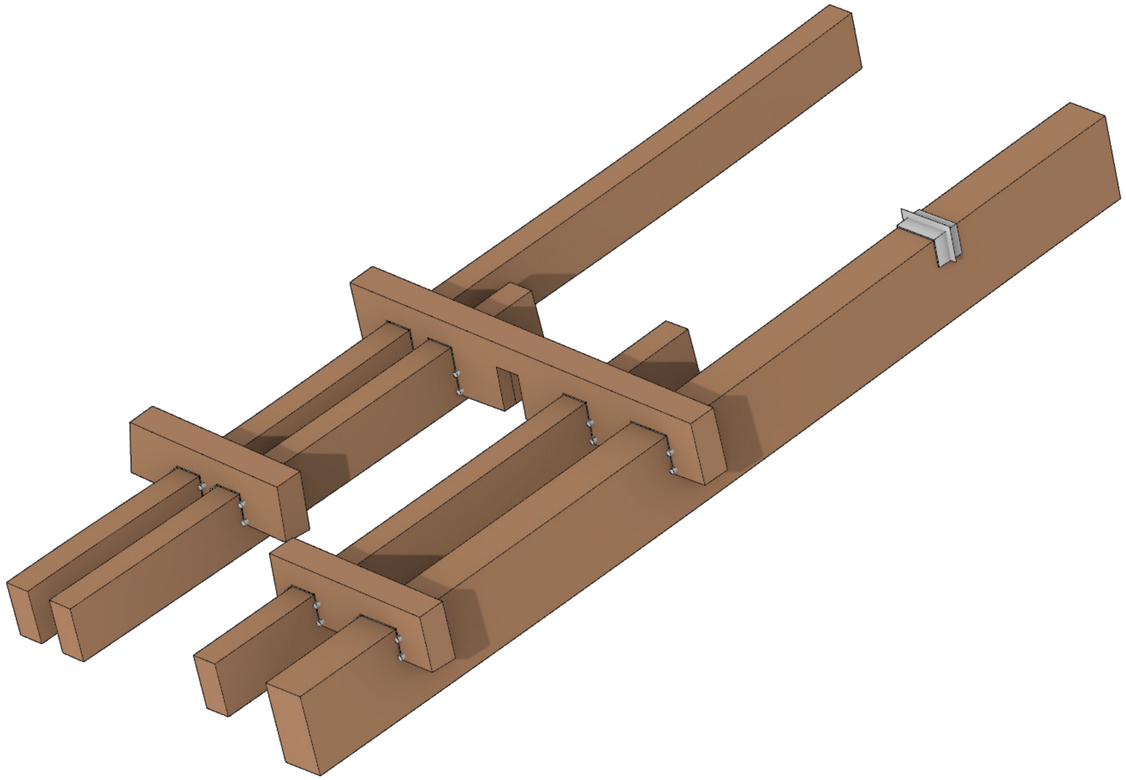
robot human(cyborg) collaboration

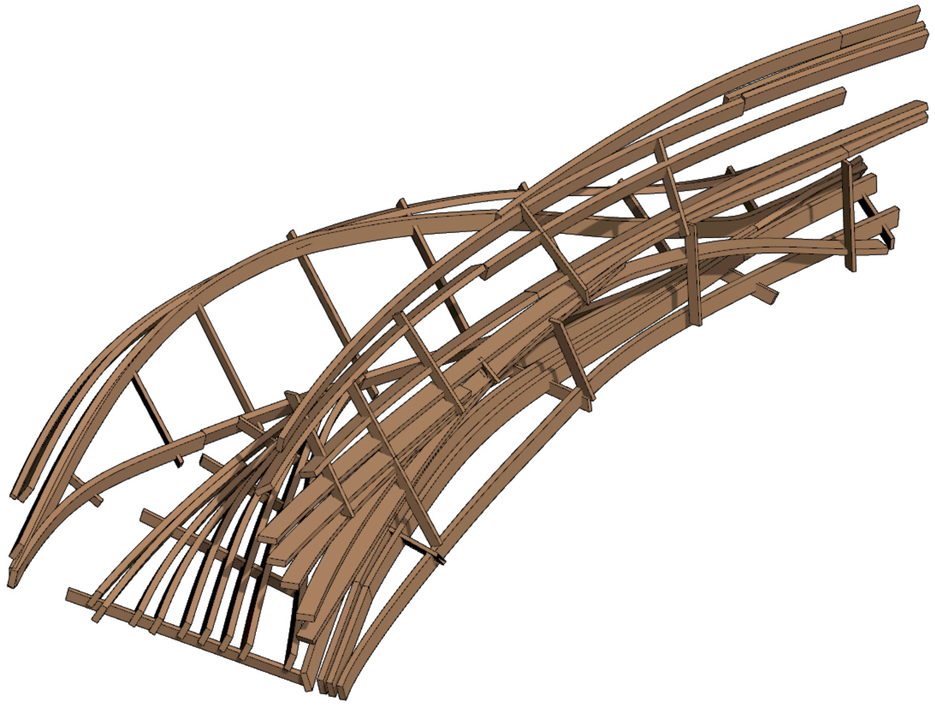


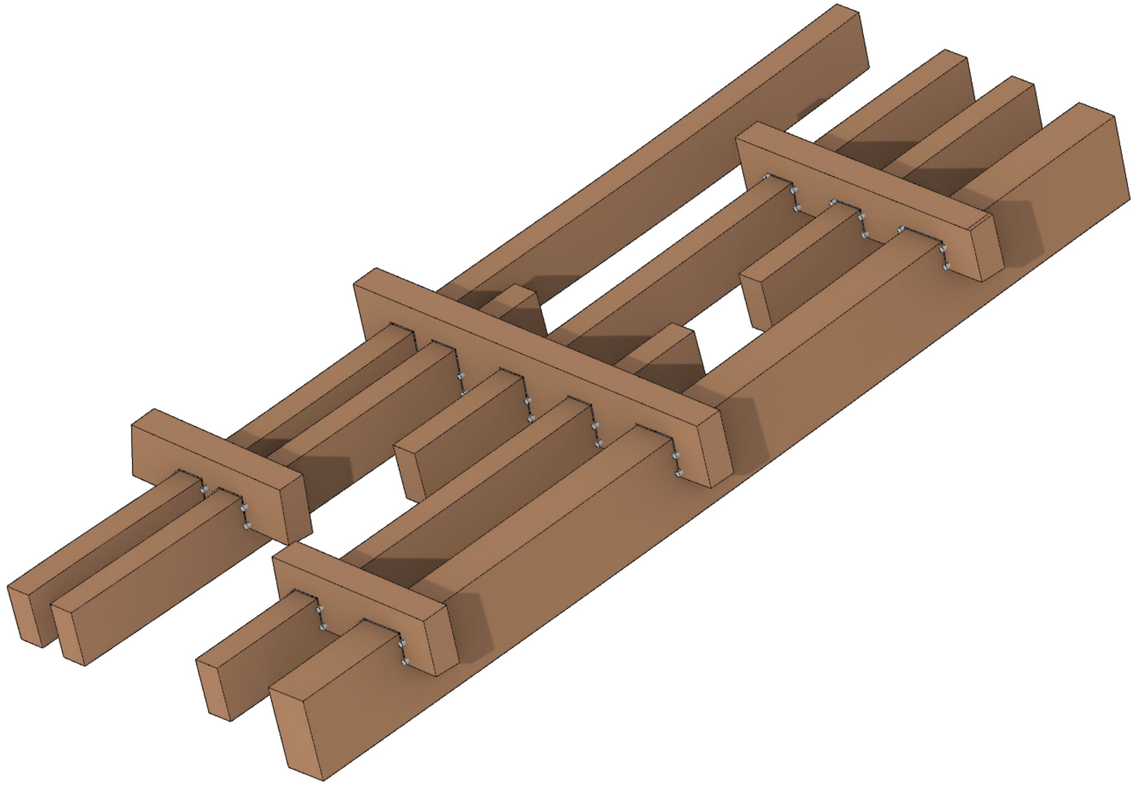
assembly

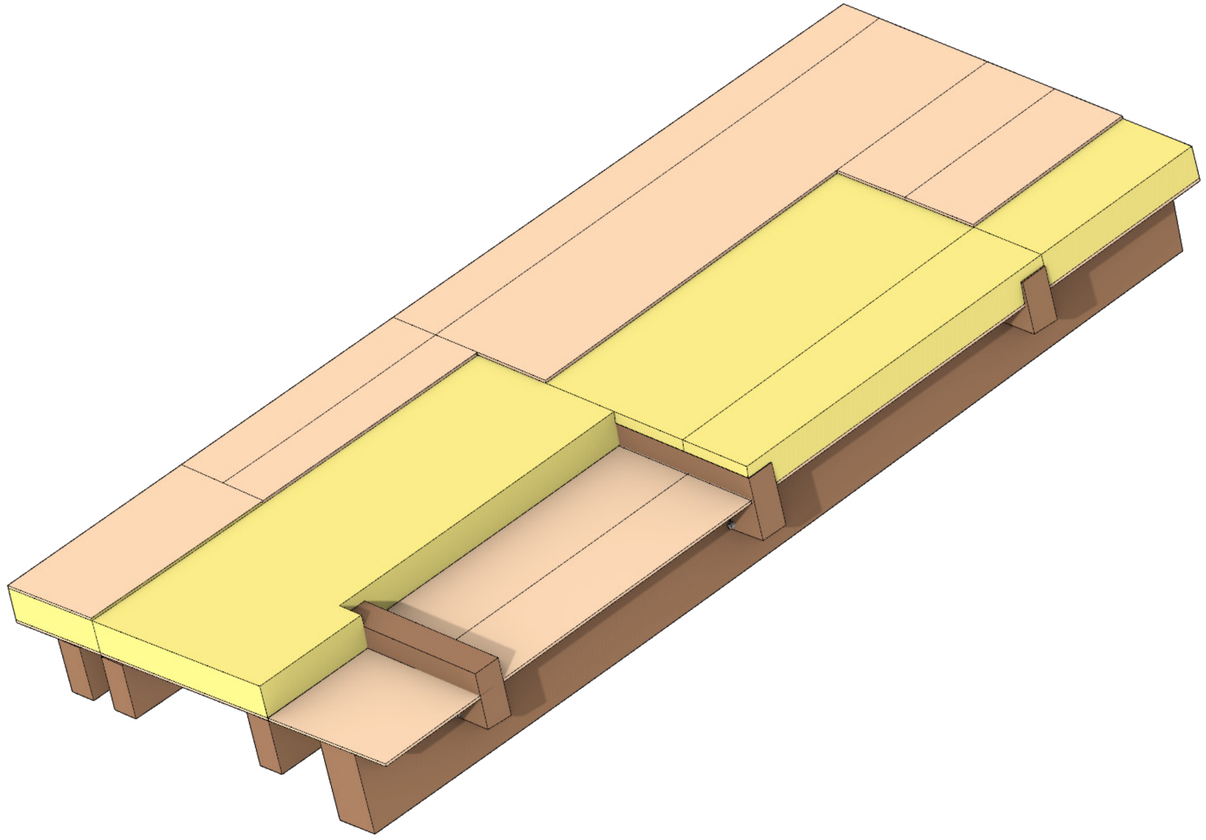


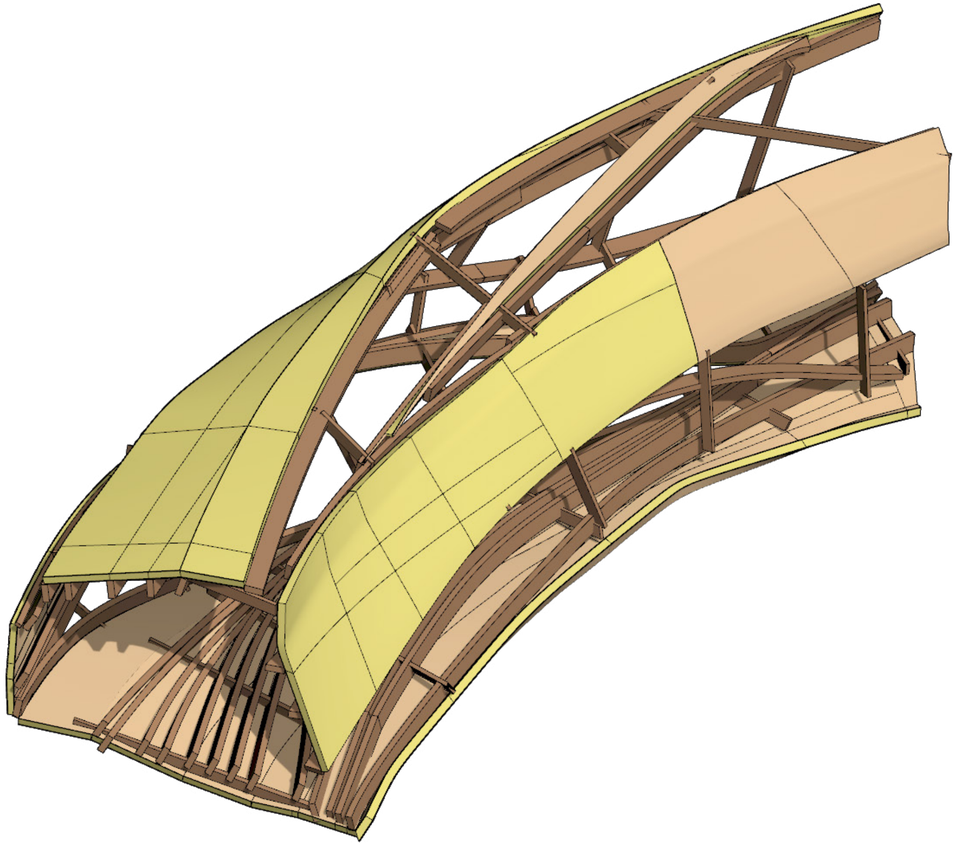


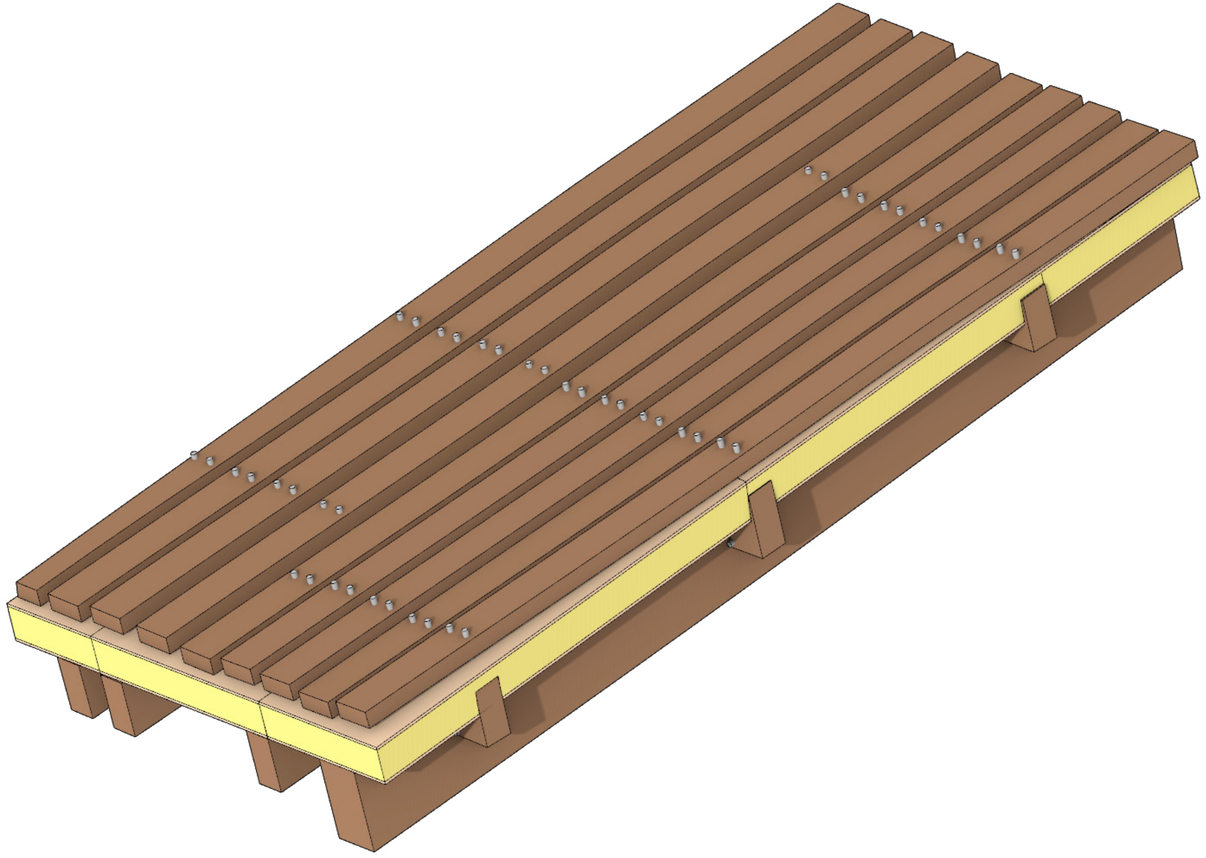


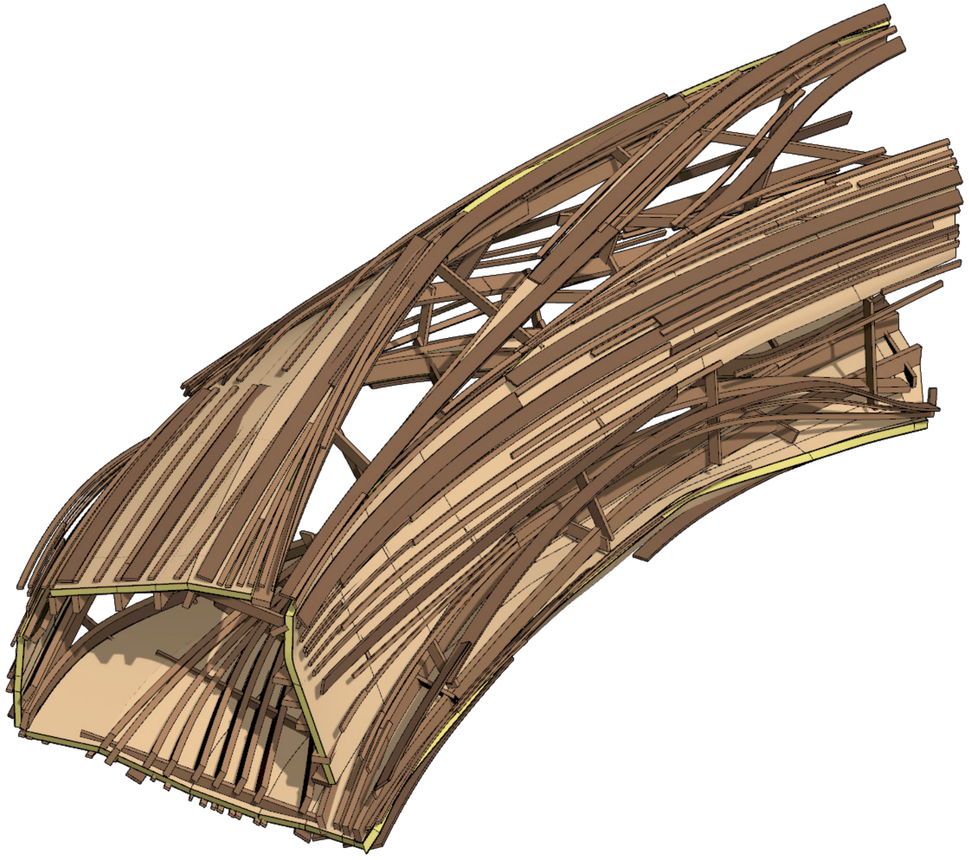












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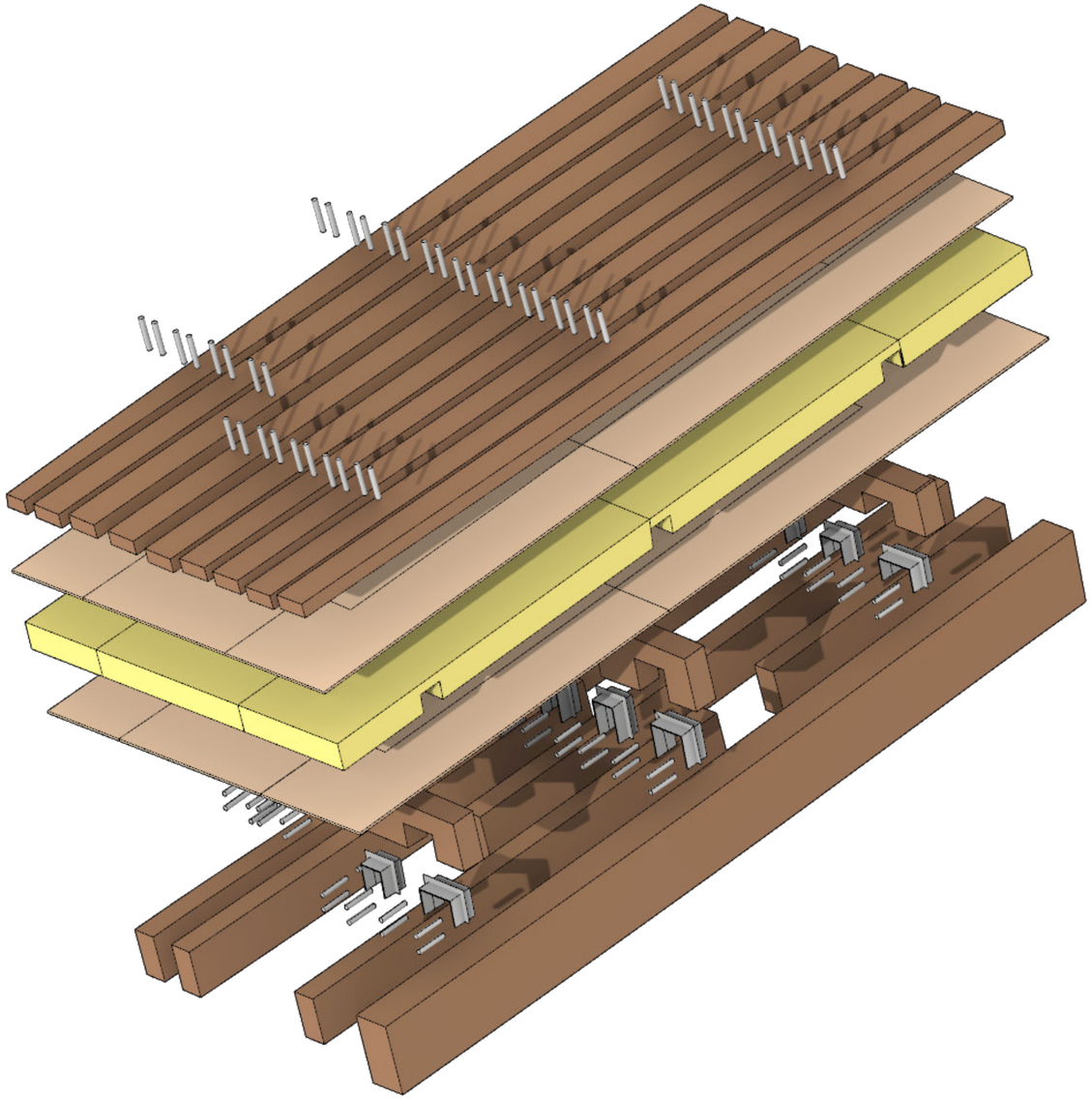
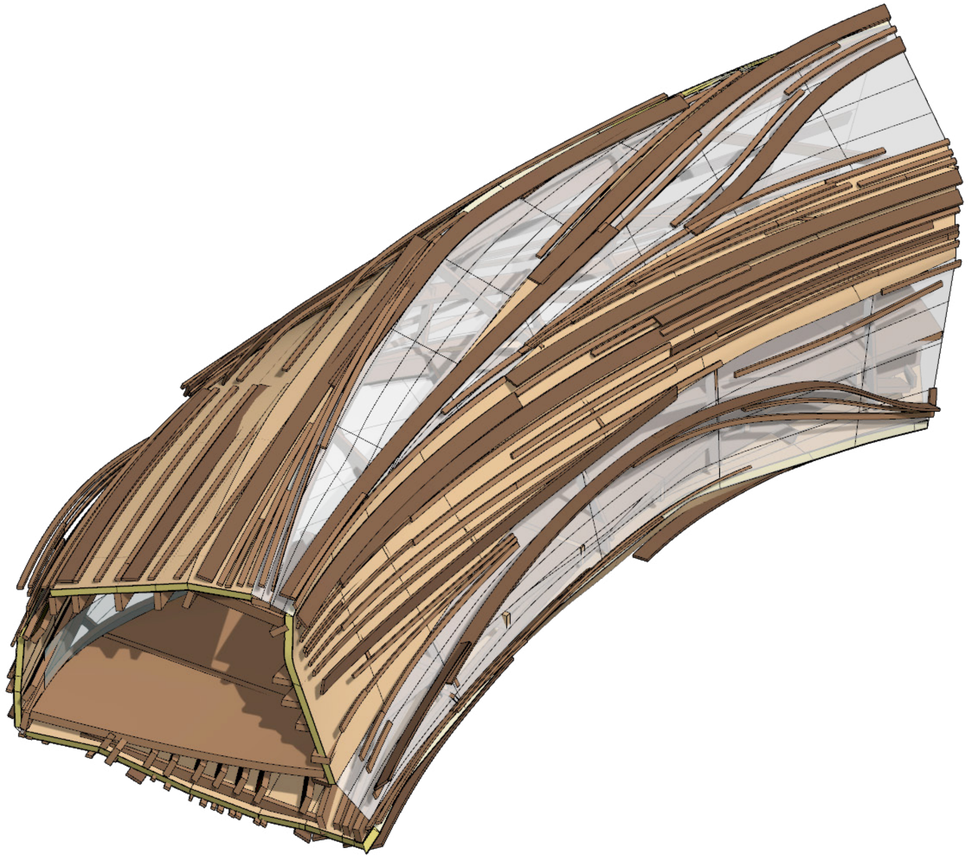
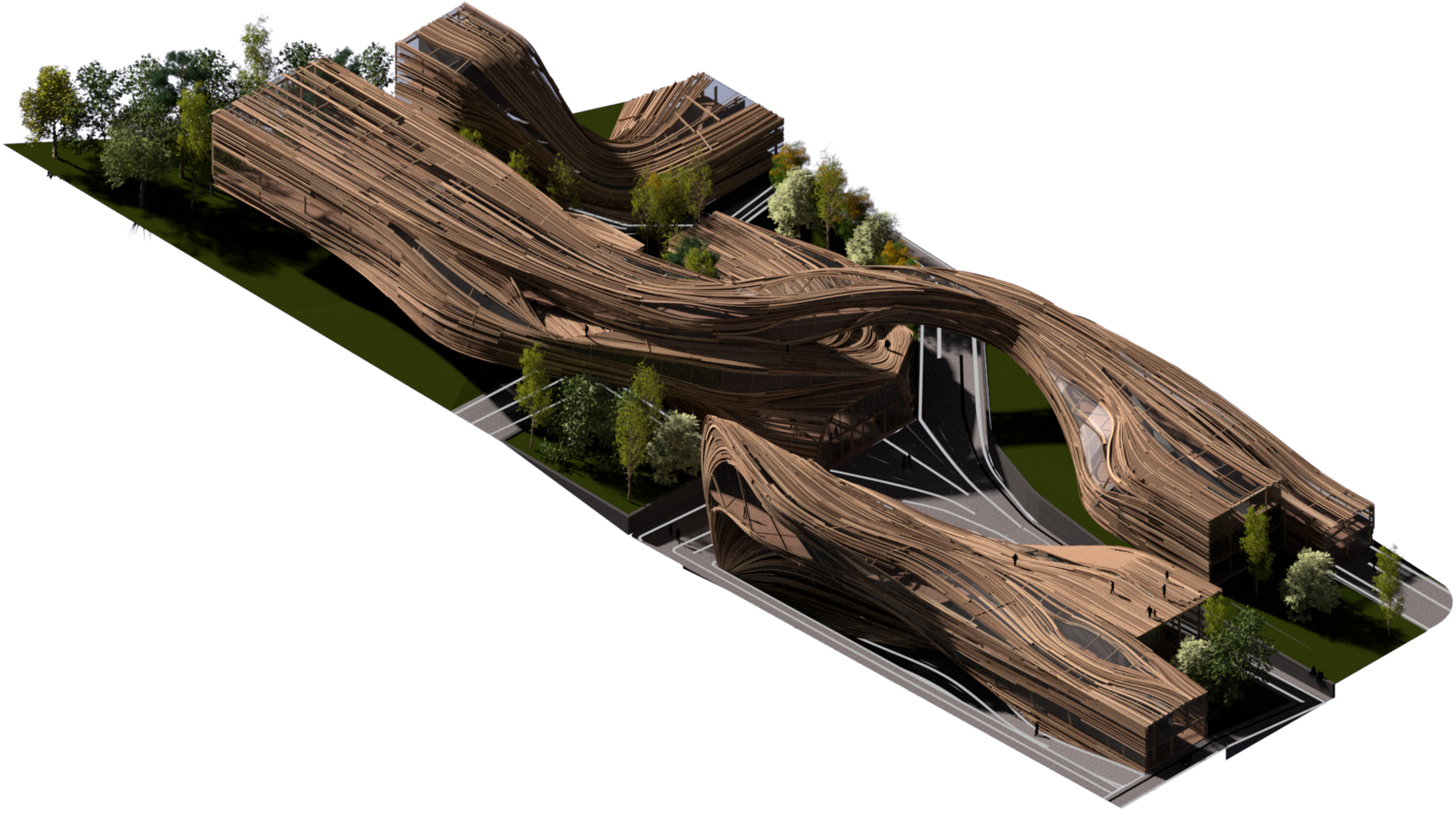
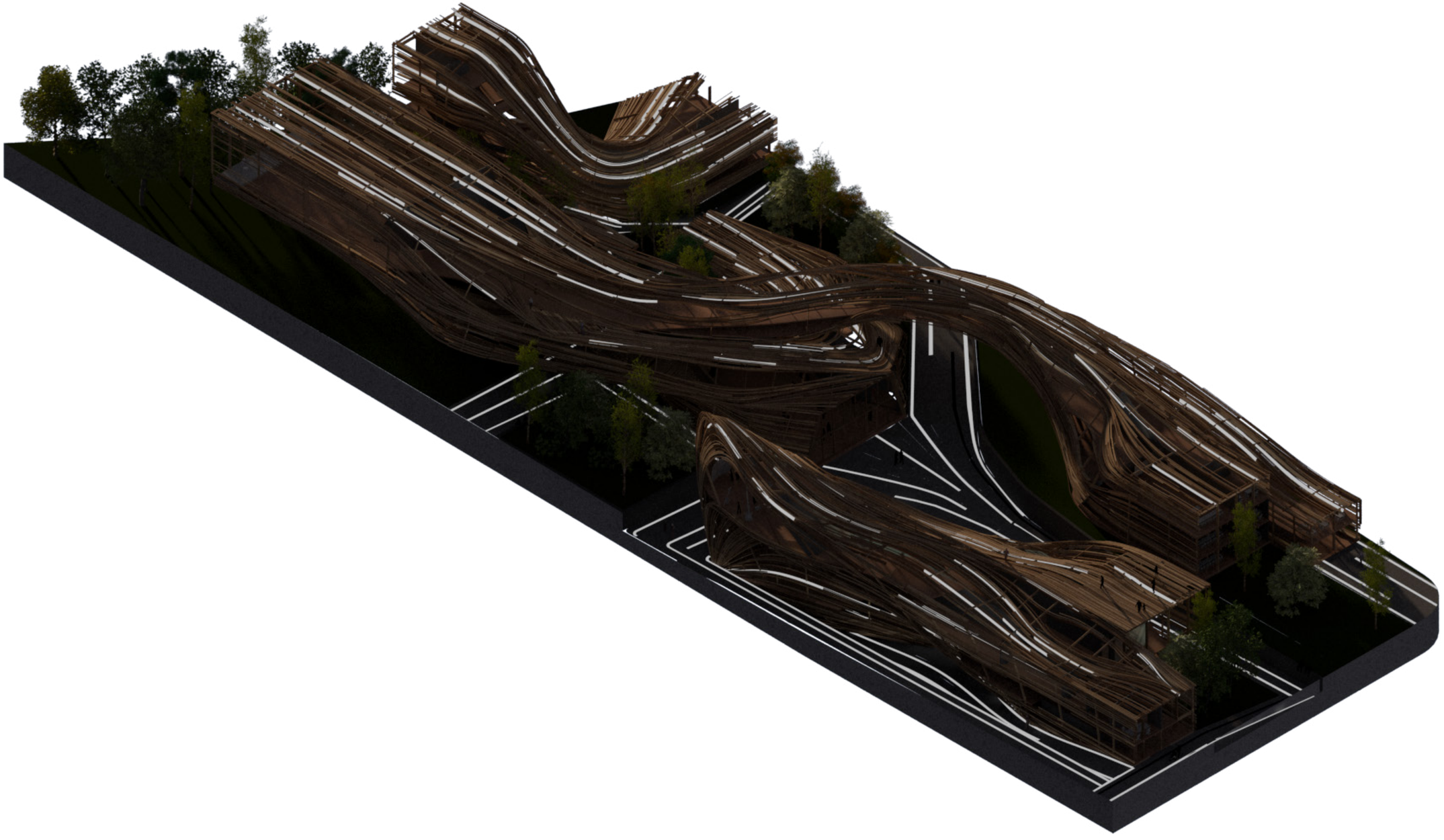








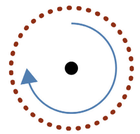
CONCLUSION

#1 Theory - Who is the new bauhaus master?
#2 Process - How can the user be involved in the design process?
#3 Design - How to design topological transformation through one material?
#4 Construction - How to construct a locally informed envelope?

Theory - Who is the new bauhaus master?

young teaching old

old teaching young



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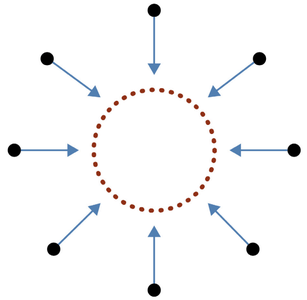

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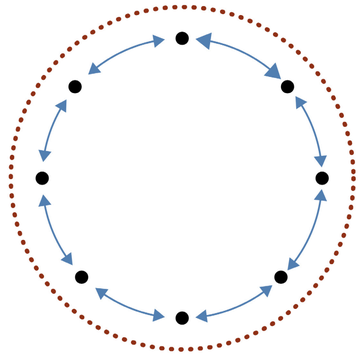

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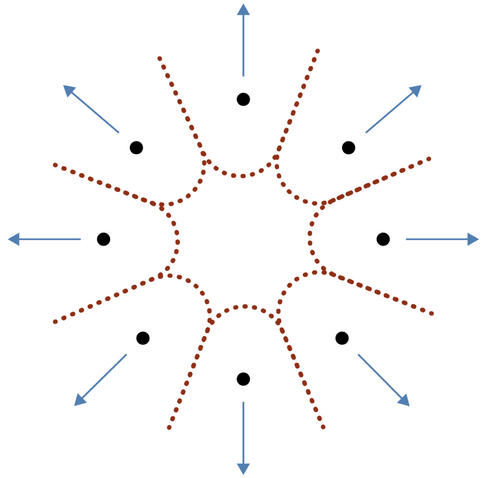
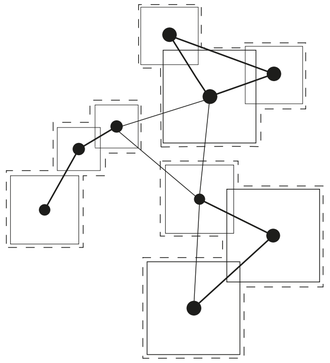
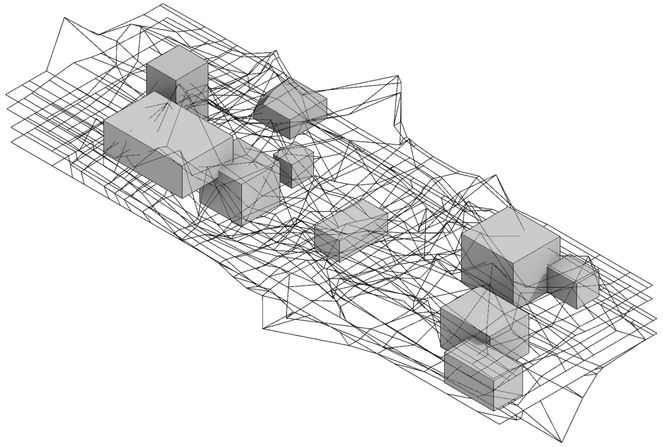


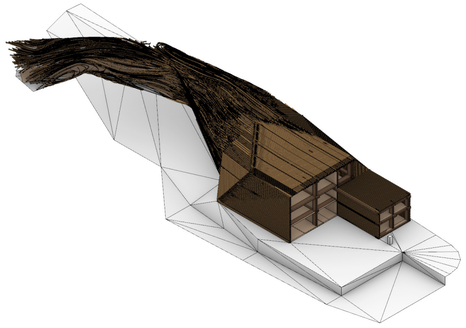
sharing

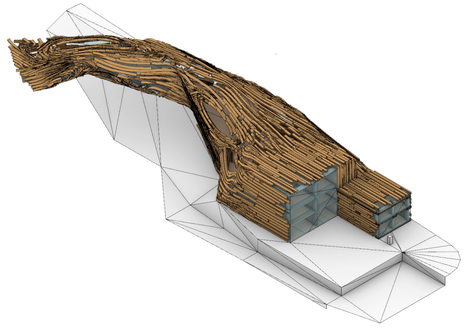
Process - How can the user be involved in the design process?

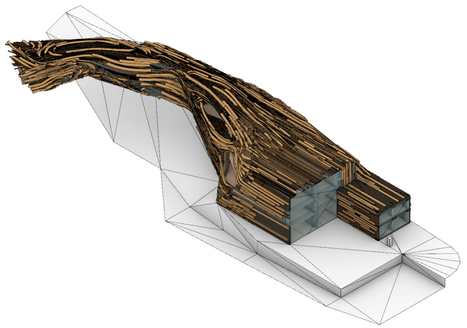
parametric design

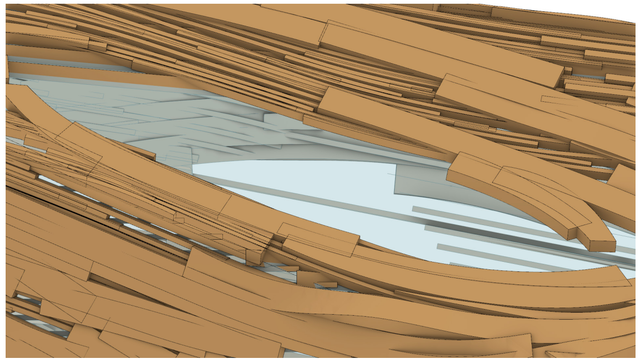


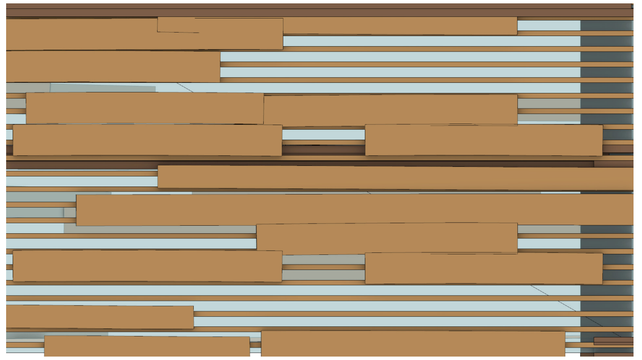


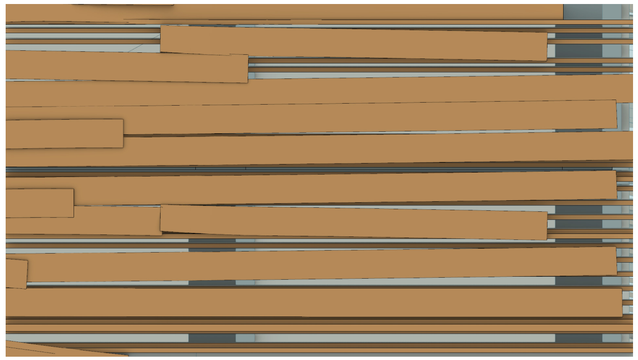




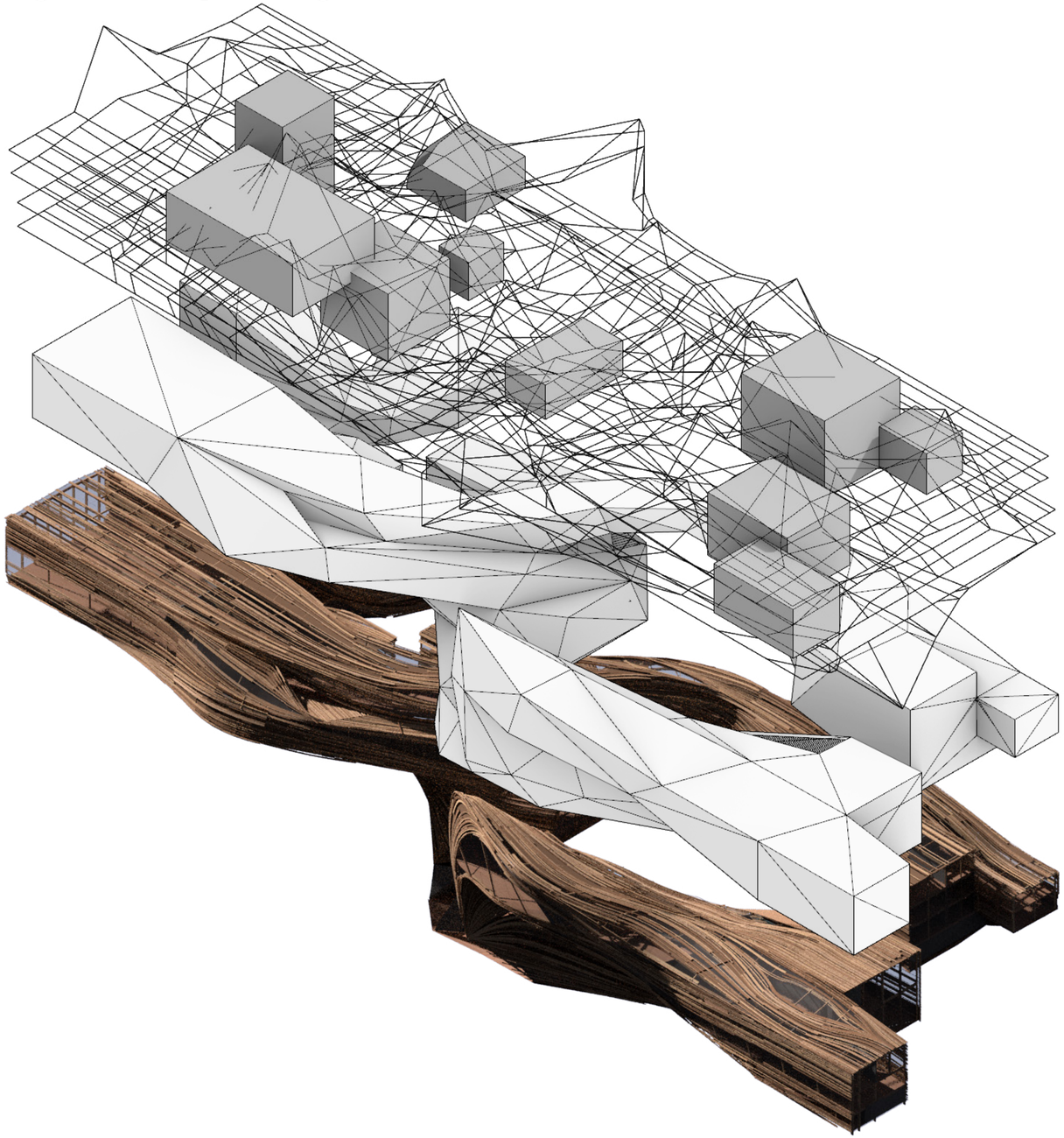




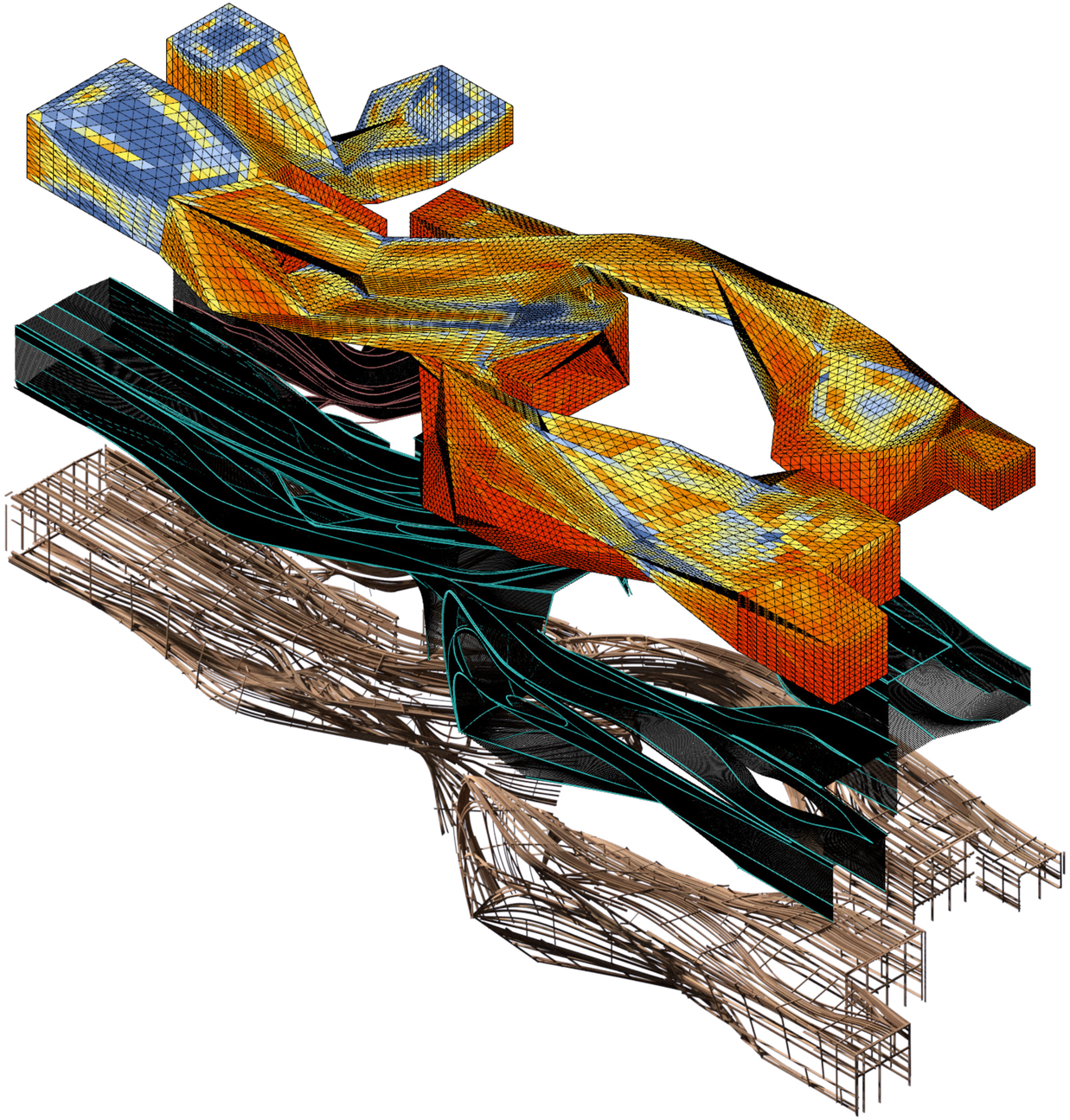




Design - How to design a topological transformation from orthogonal to freeform?



Construction - How to construct a locally informed envelope?



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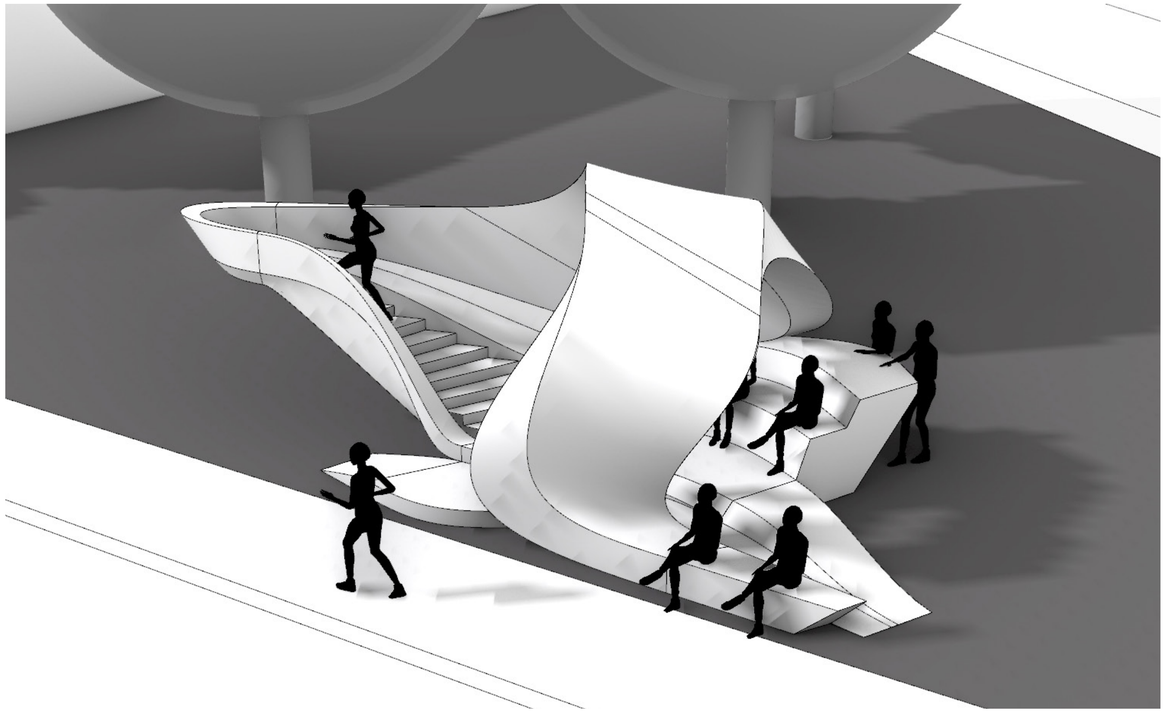

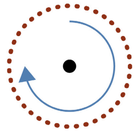

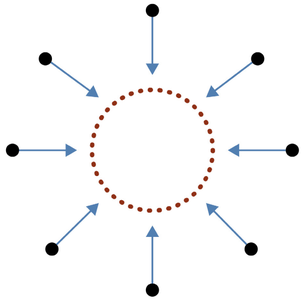

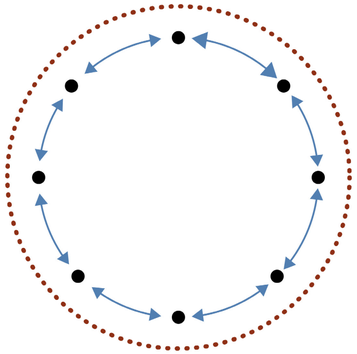

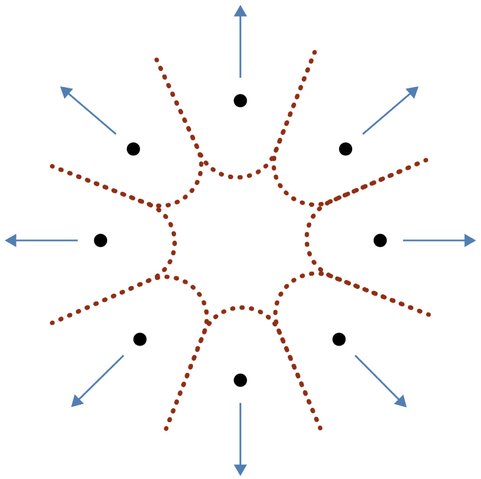

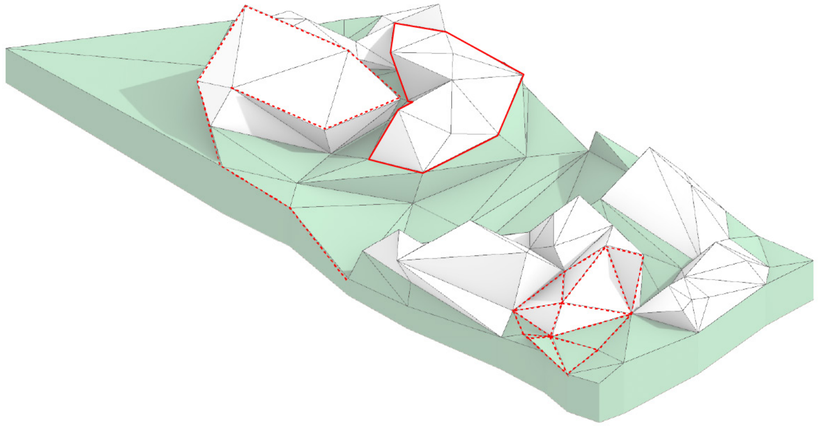

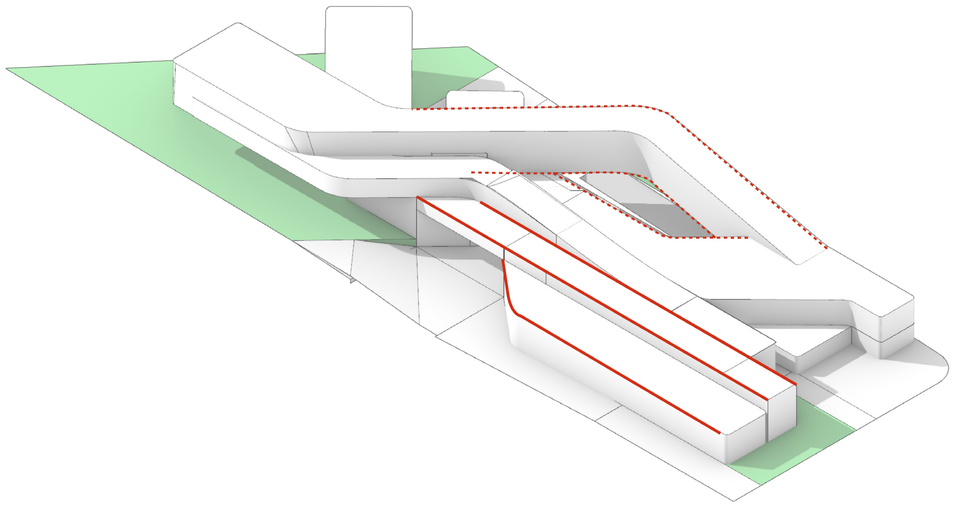

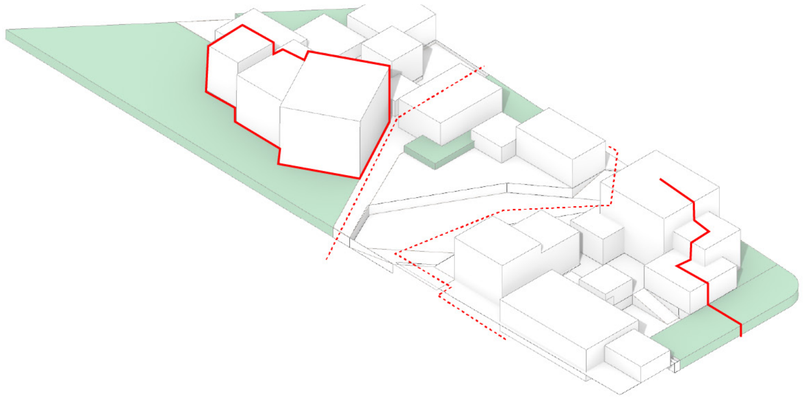

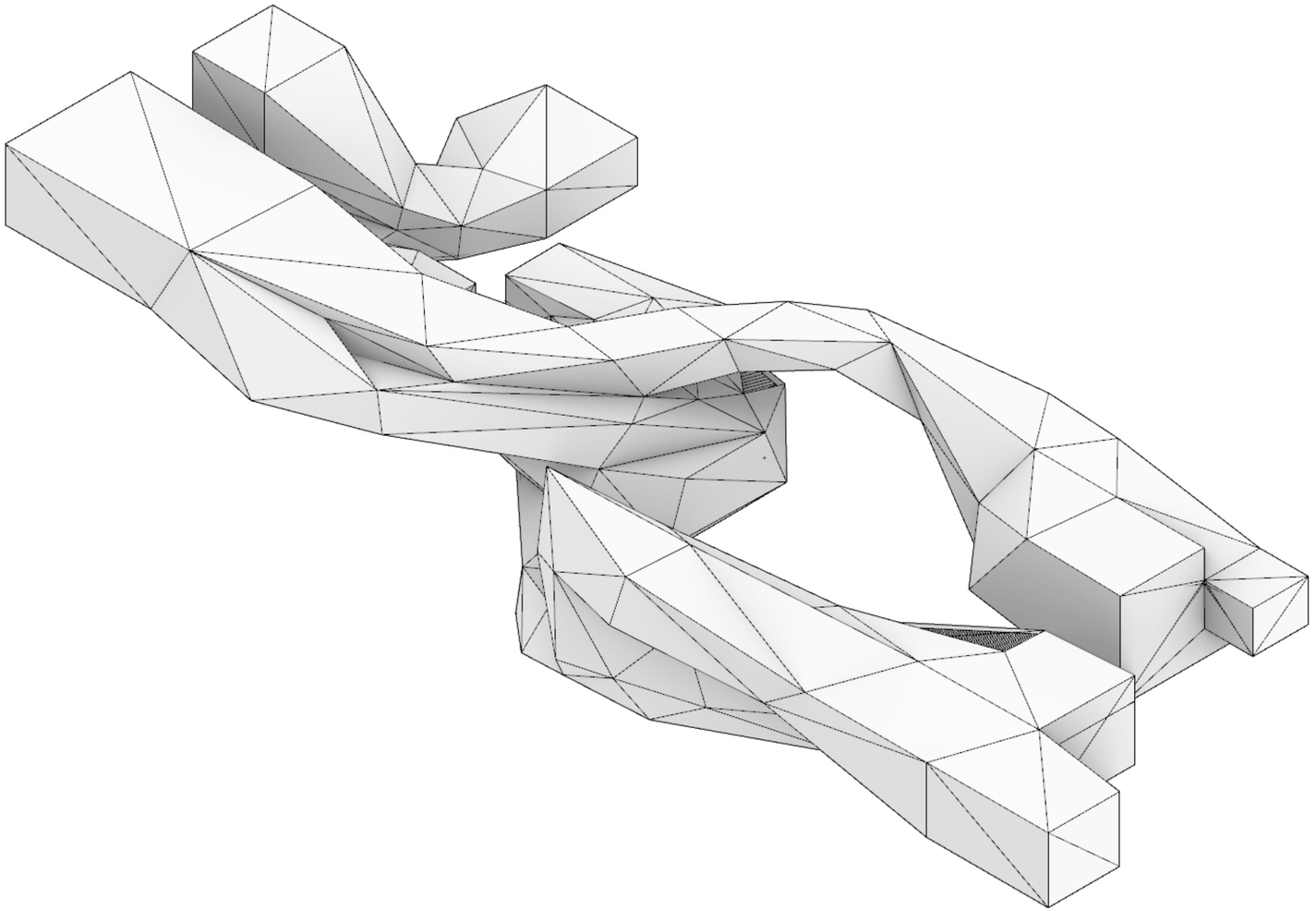

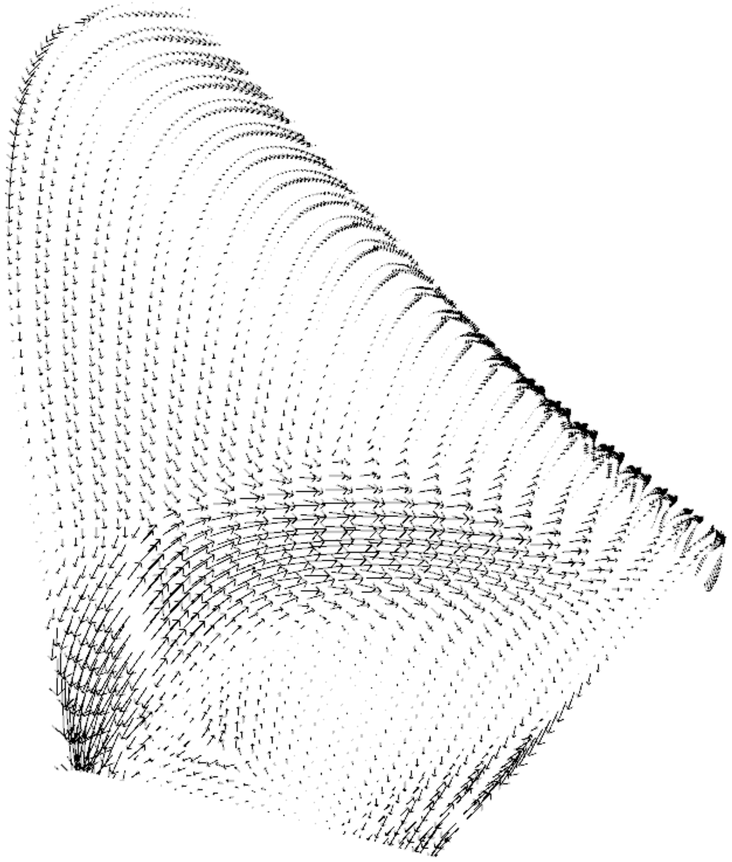

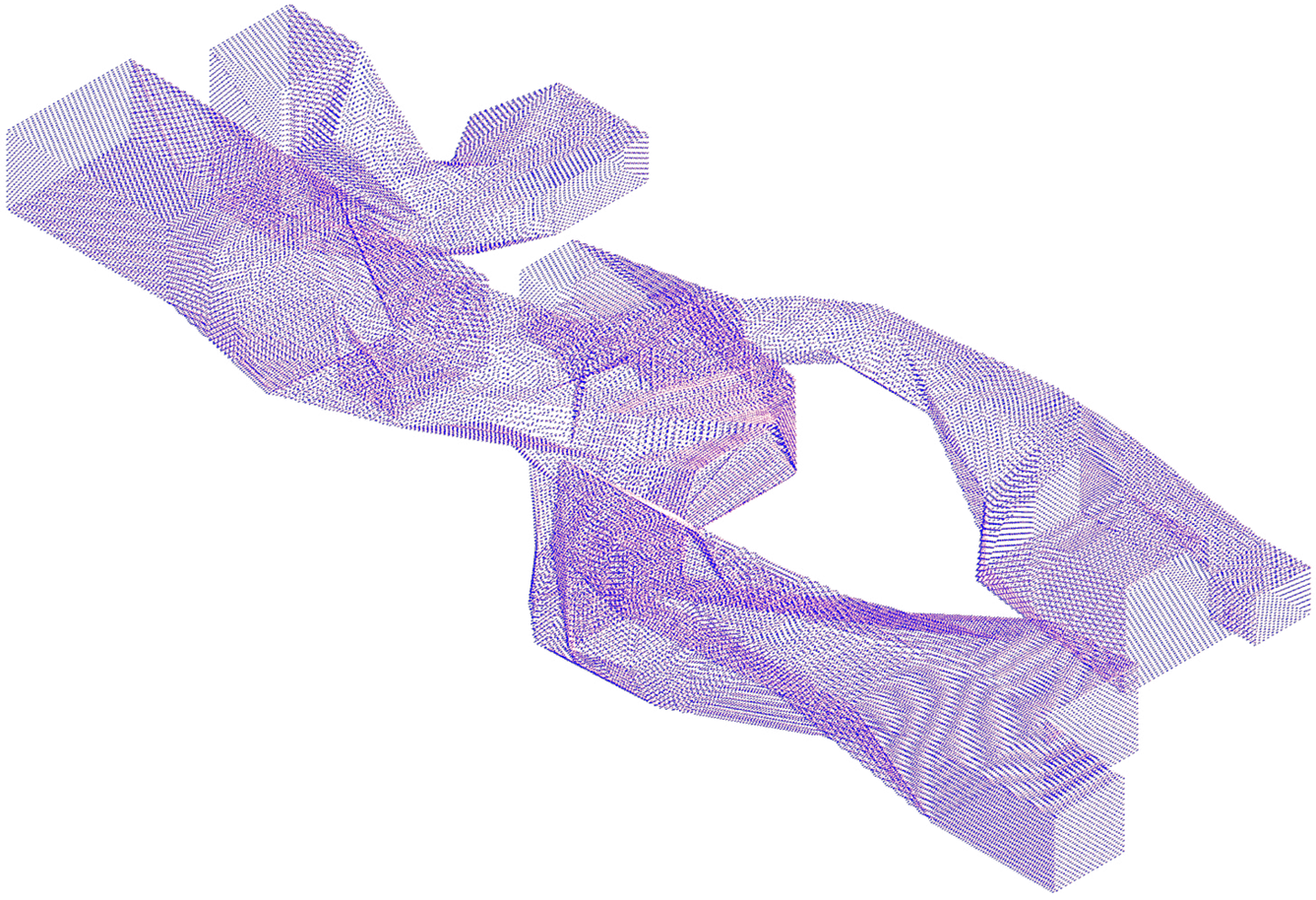

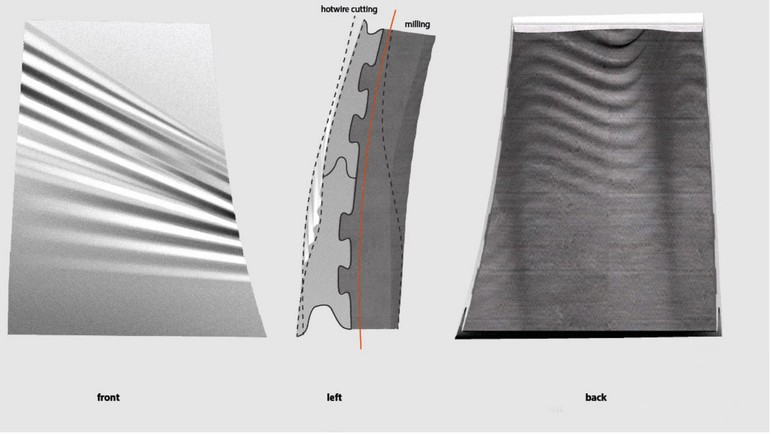
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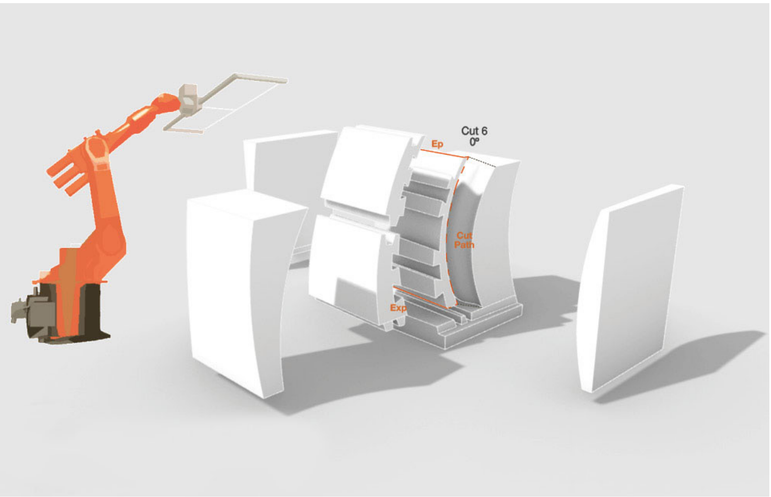
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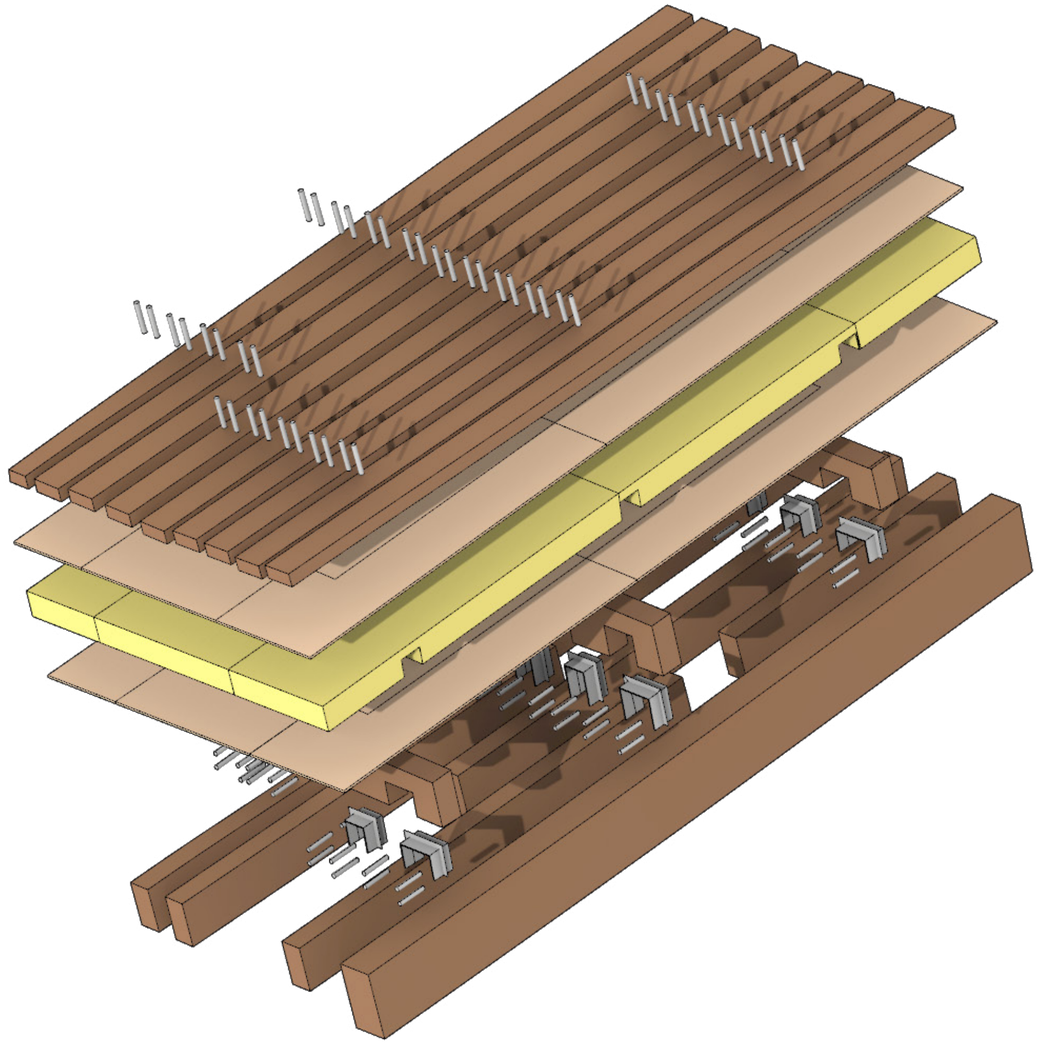

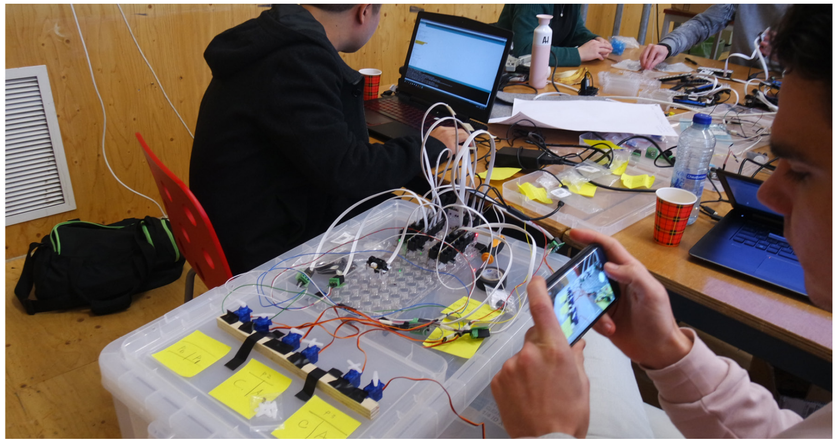

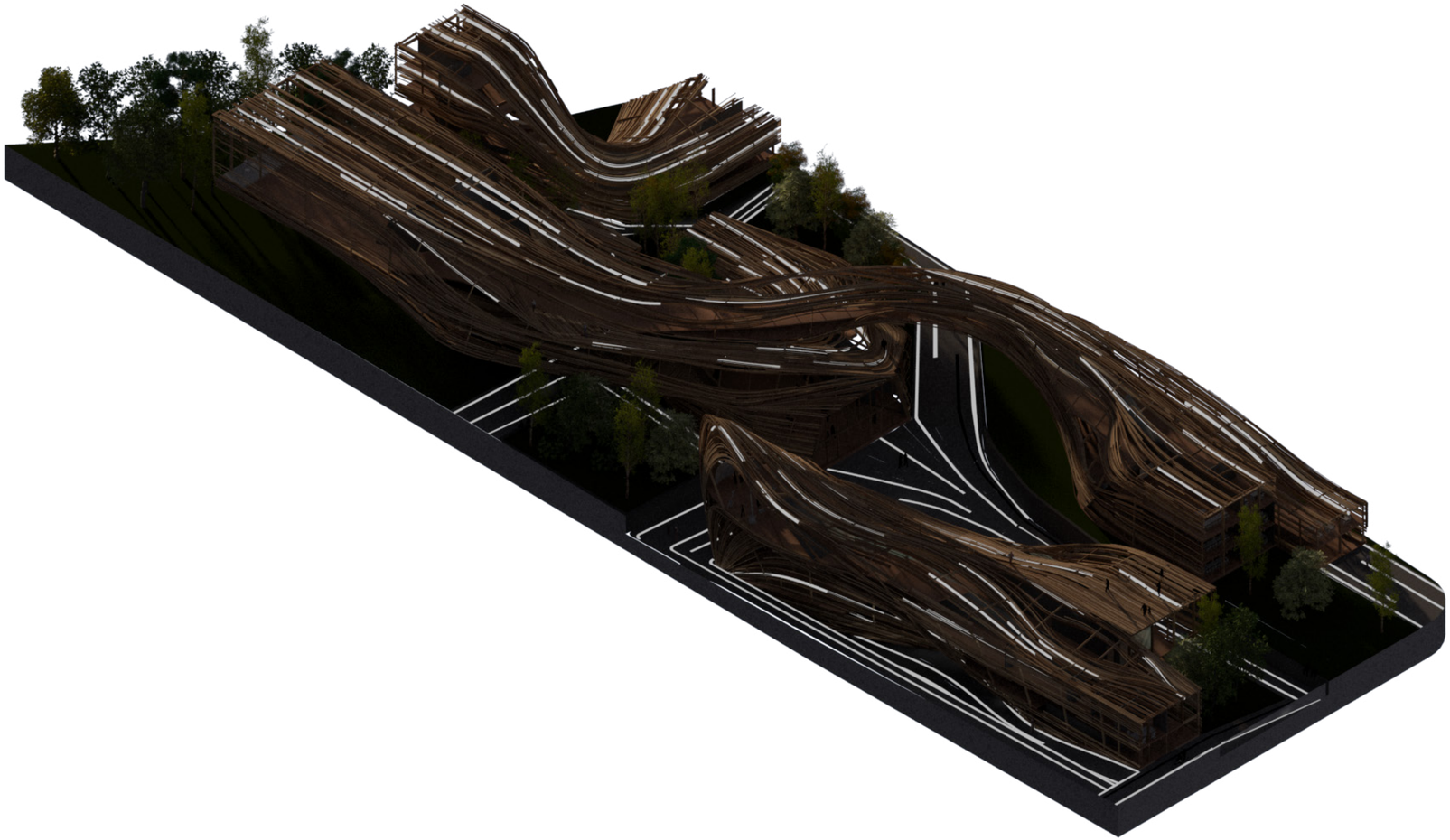

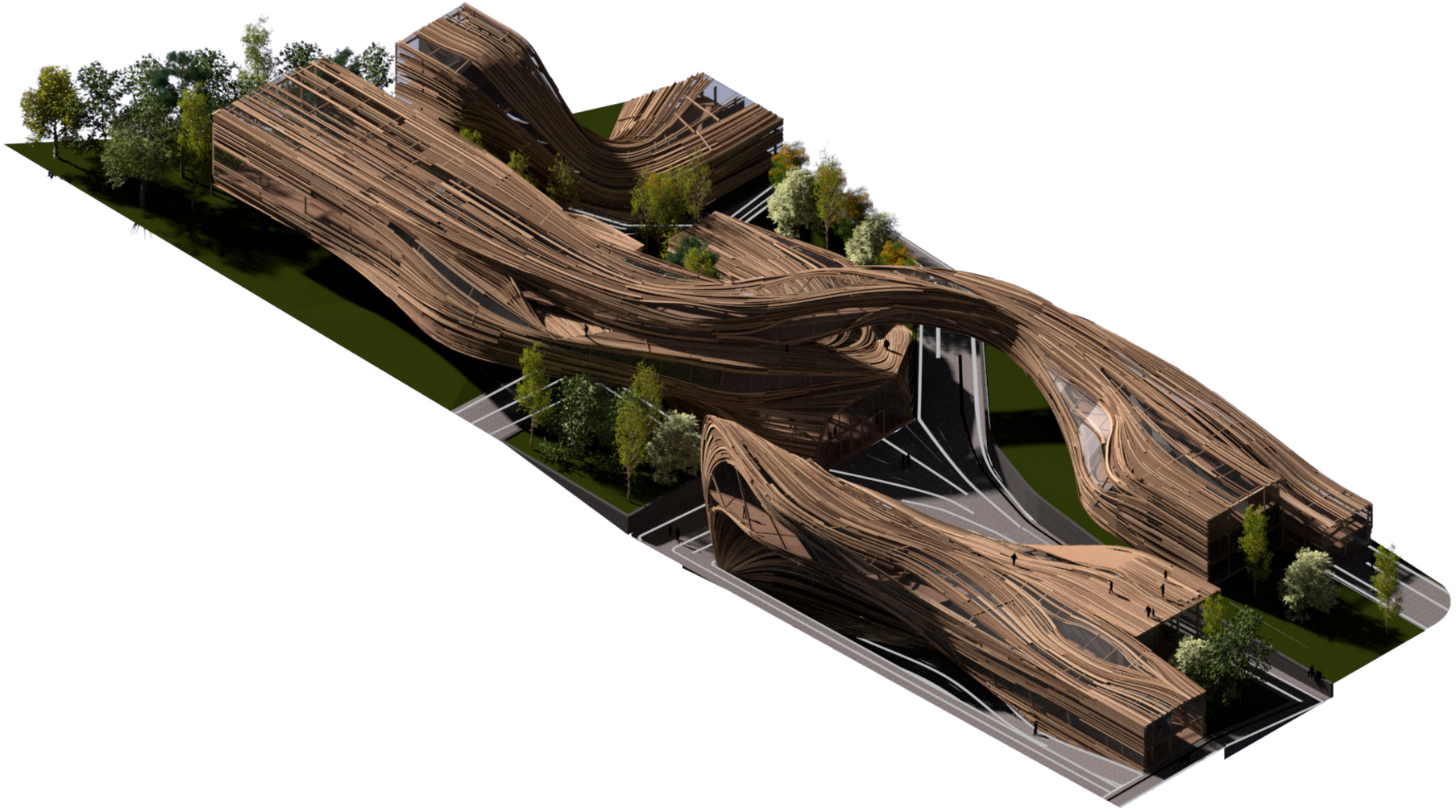

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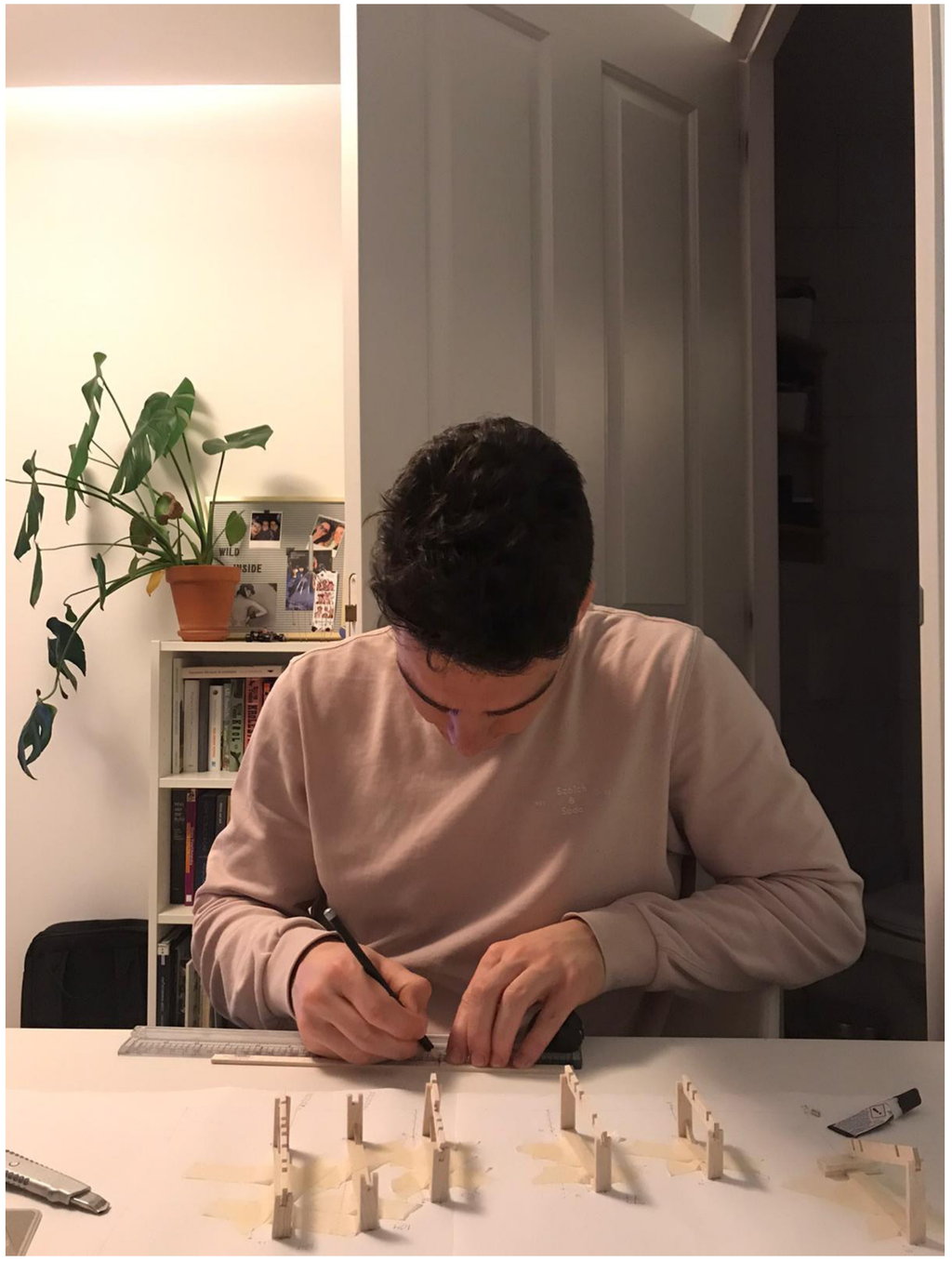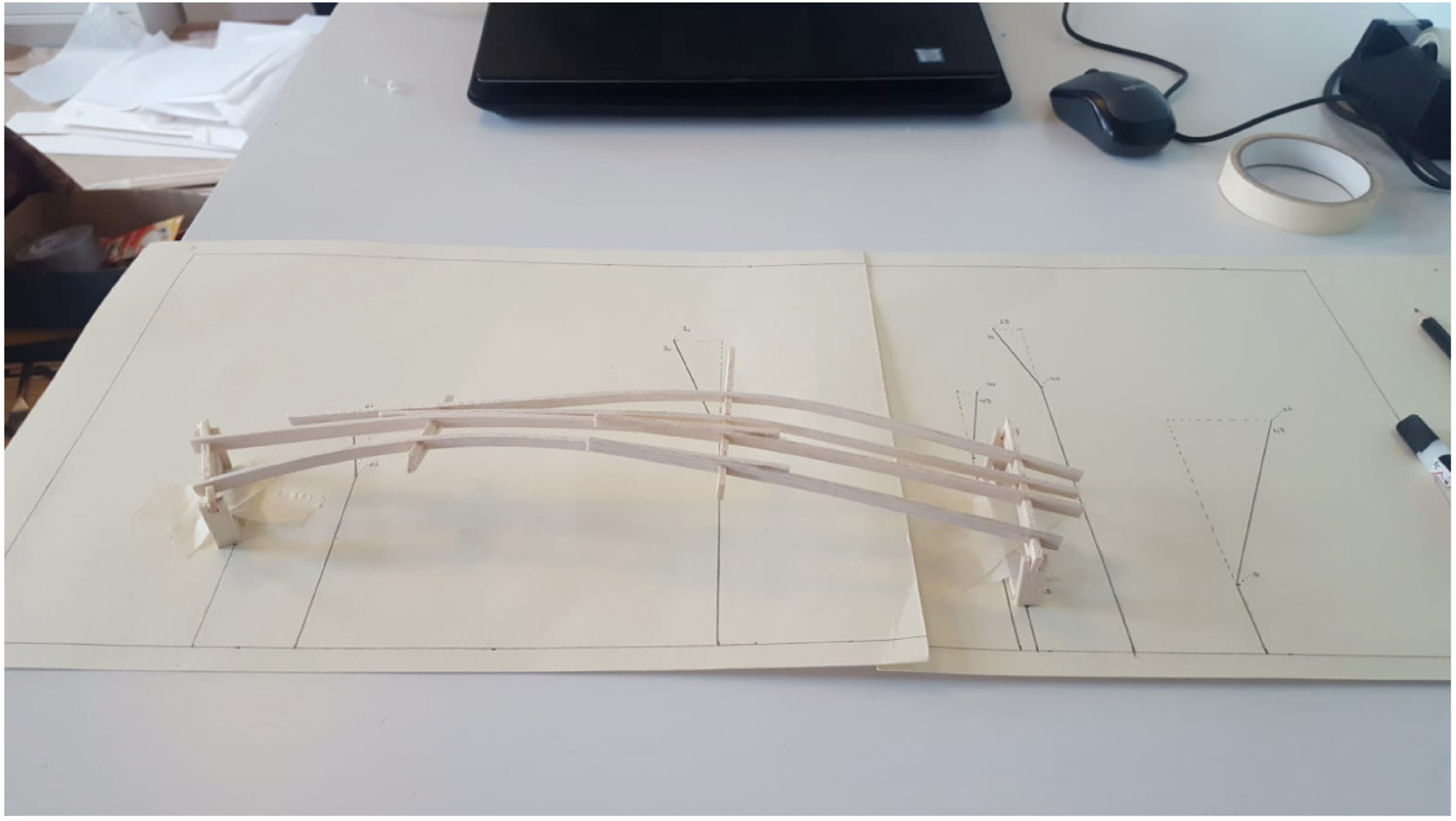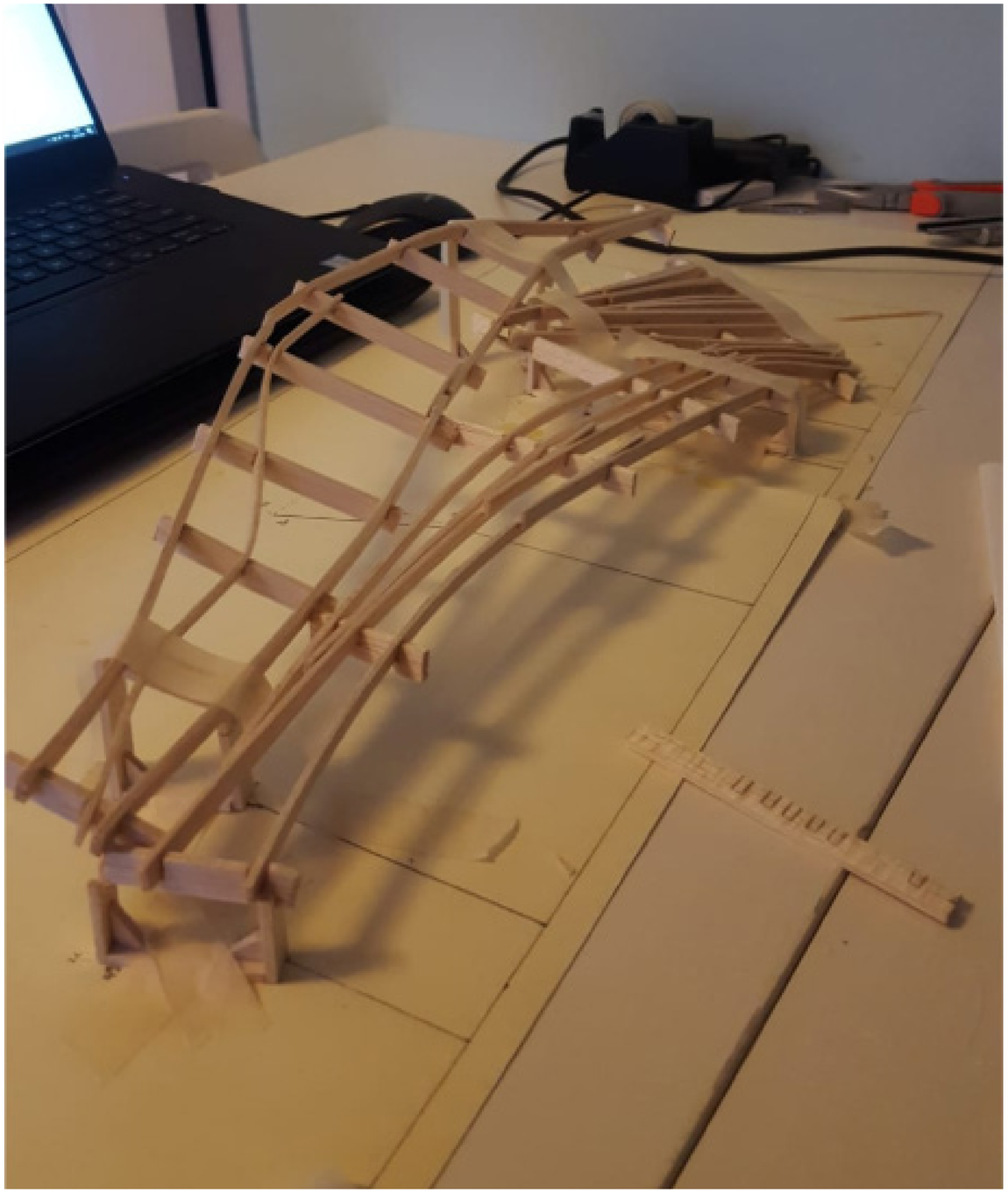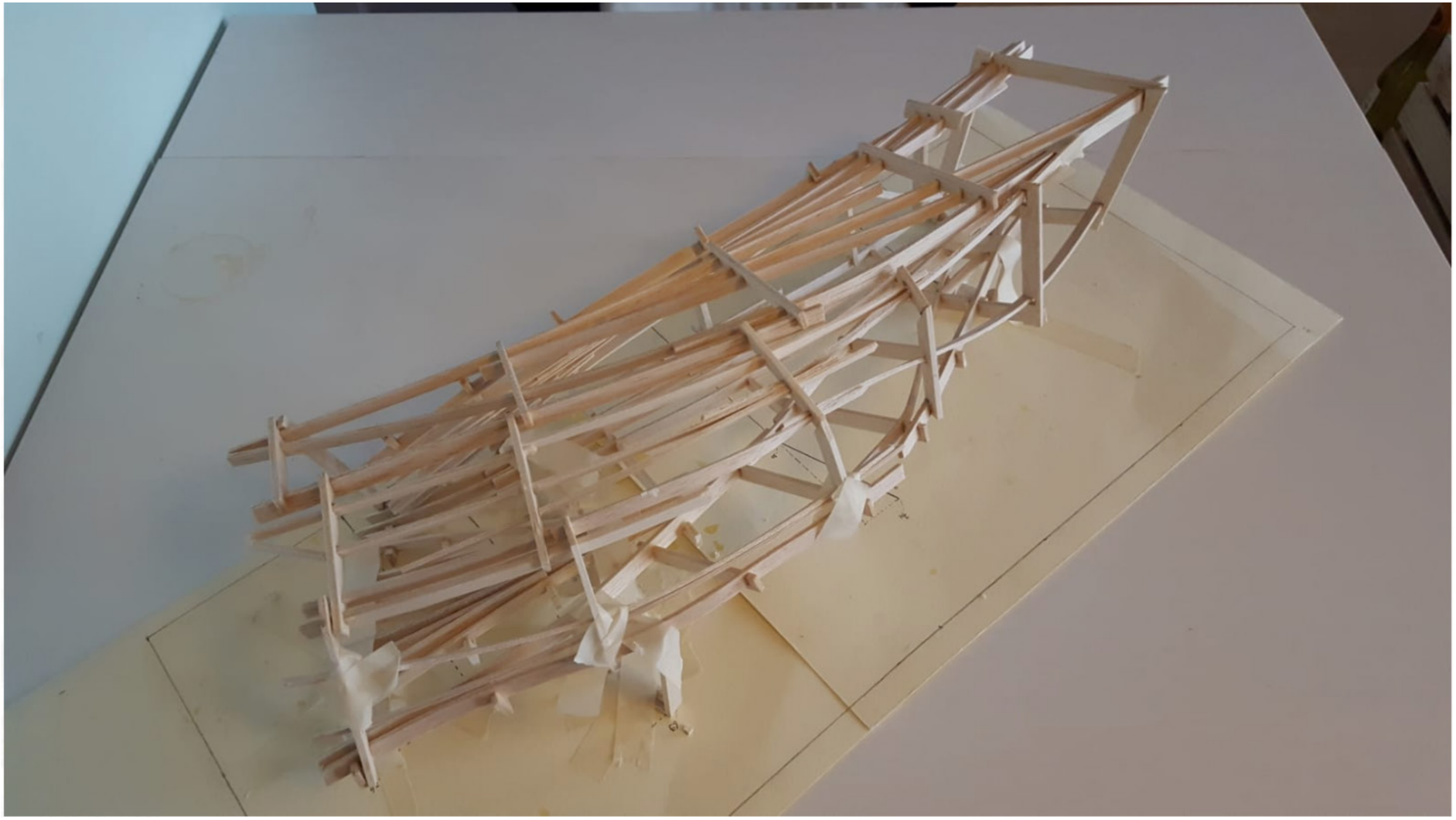
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