















*This tree's leaf, which here the East
In my garden propagates,
On its secret sense we feast
Such as sages elevates.*

Is it but one being single

*Which as same itself divides?
Are there two which choose to mingle
So that one each other hides?
As the answer to such question
I have found a sense that's true:
Is it not my songs' suggestion
That I'm one and also two?*



BorysDrawing.wmv

Dieses Baums Blatt, der von Osten
Meinem Garten anvertraut,
Gibt geheimen Sinn zu kosten,
Wie's den Wissenden erbaut.

Ist es ein lebendig Wesen,

Das sich in sich selbst getrennt,
Sind es zwei, die sich erlesen,
Daß man sie als eines kennt.

Solche Frage zu erwidern
Fand ich wohl den rechten Sinn,
Fühlst du nicht an meinen Liedern,
Daß ich Eins und doppelt bin.

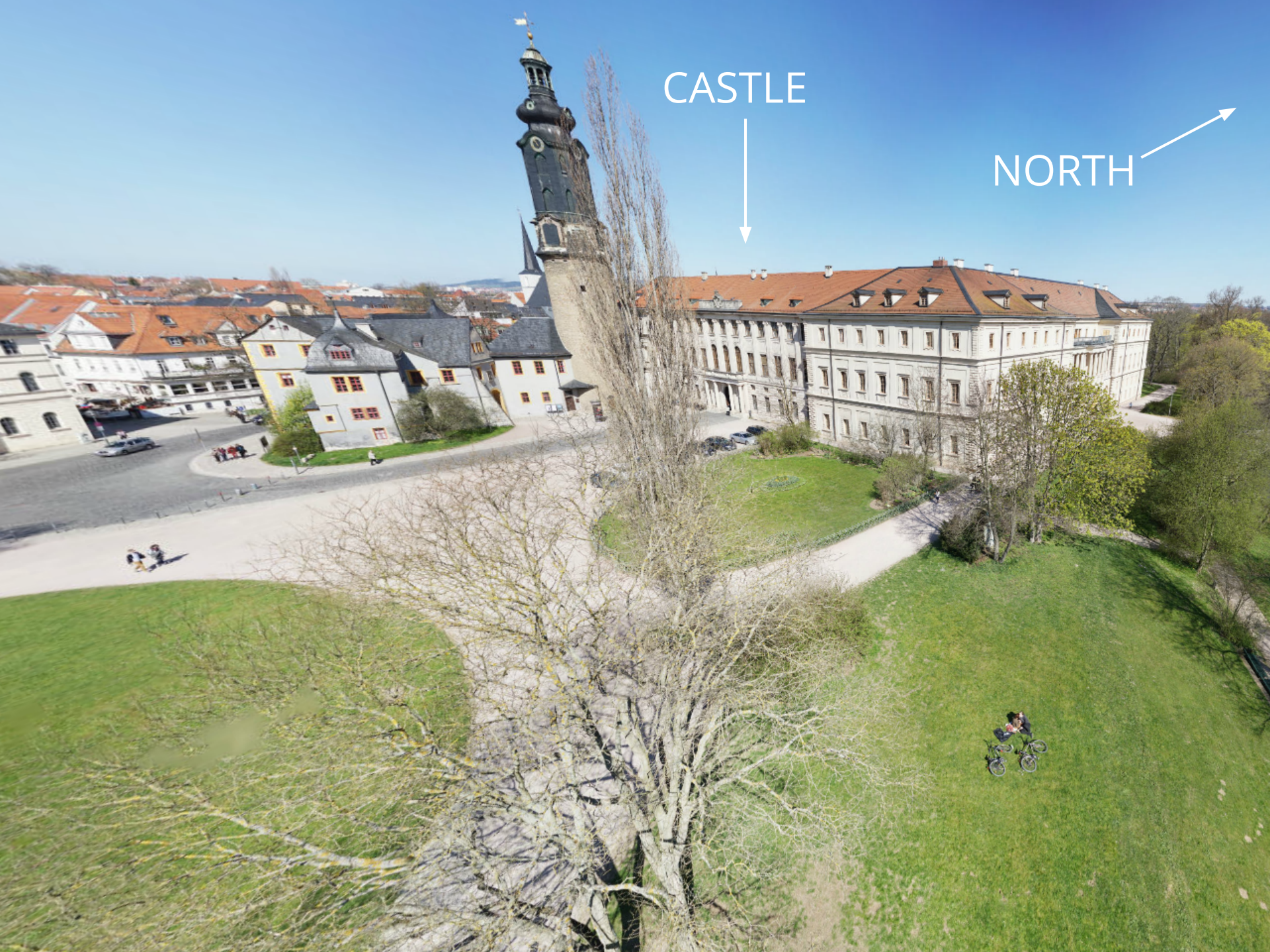


RIVER TEAM



FLOW OF PEOPLE





CASTLE



NORTH



UNESCO SITE

↑
WEST




SOUTH

BAUHAUS UNIVERSITY



BRIDGE



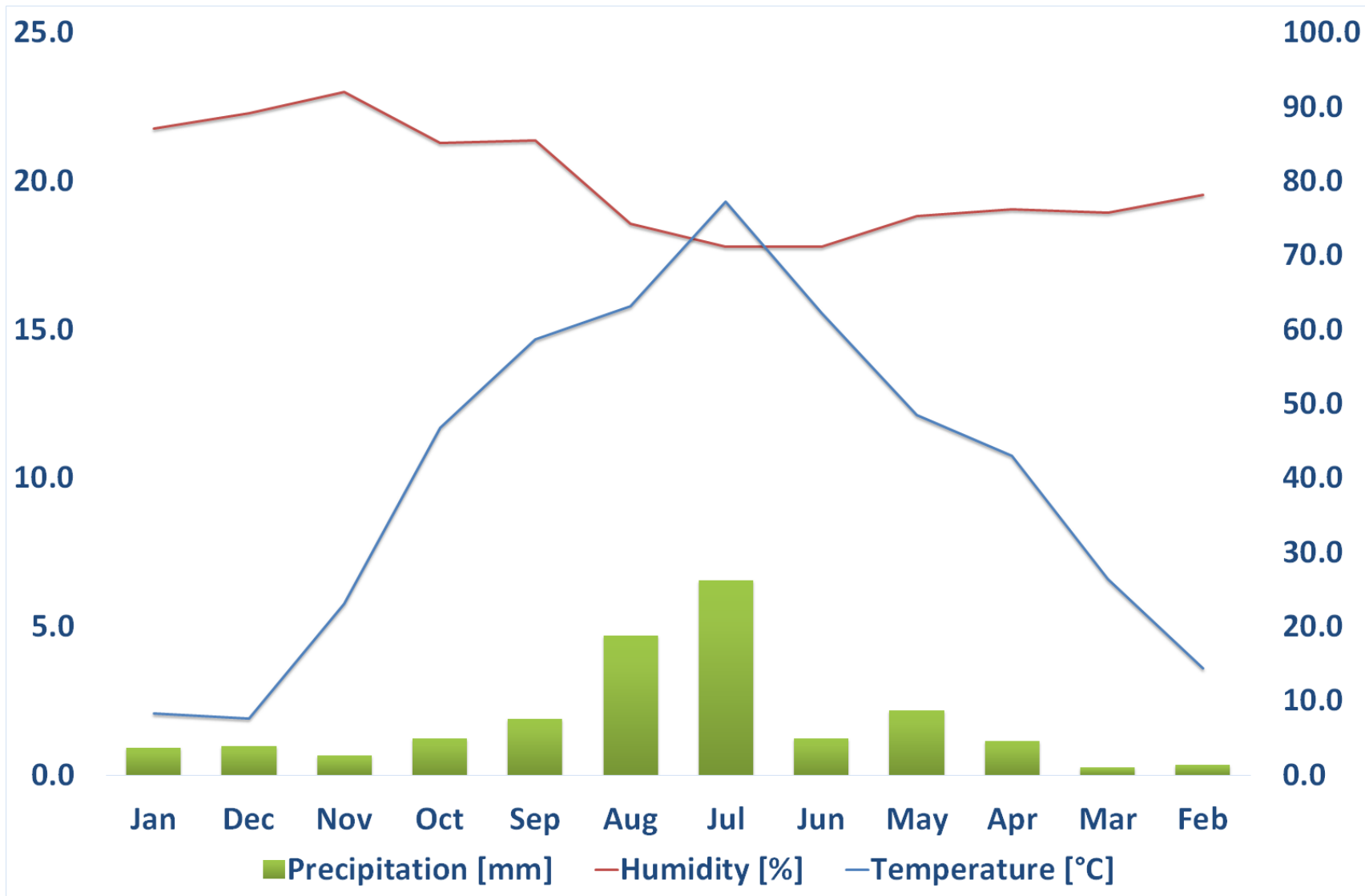
EAST



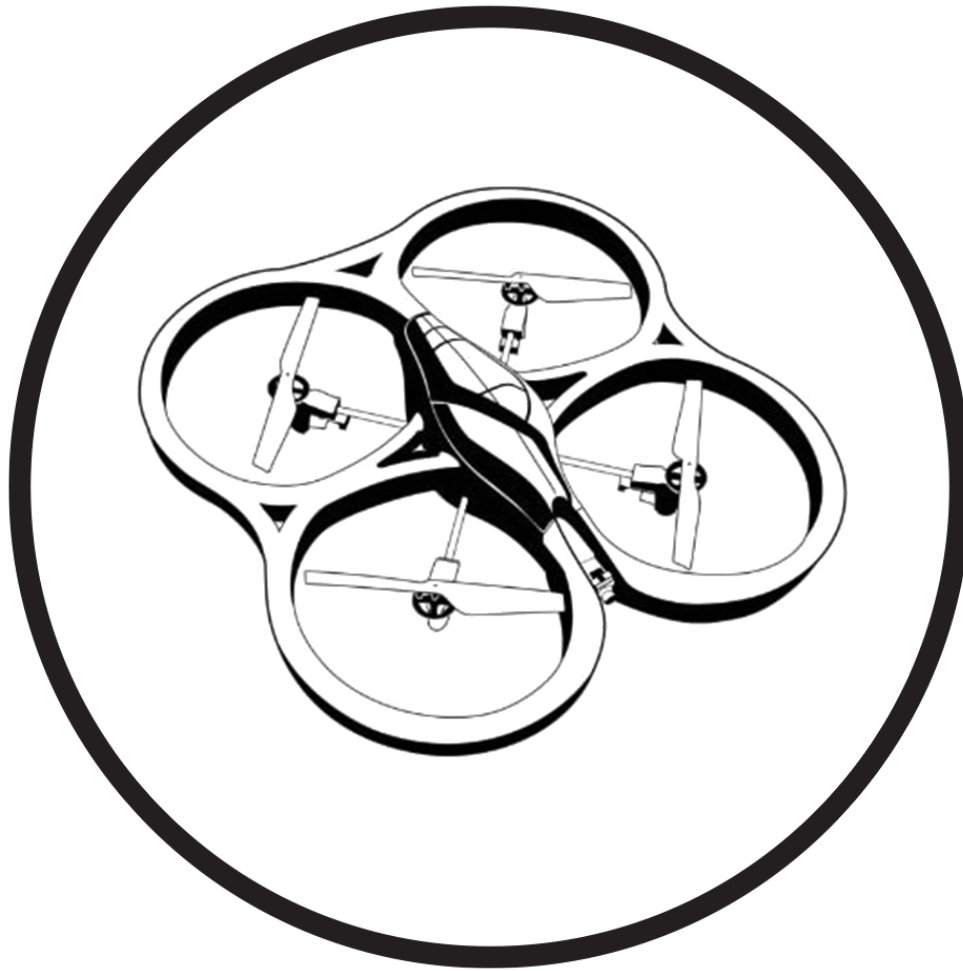
RIVER

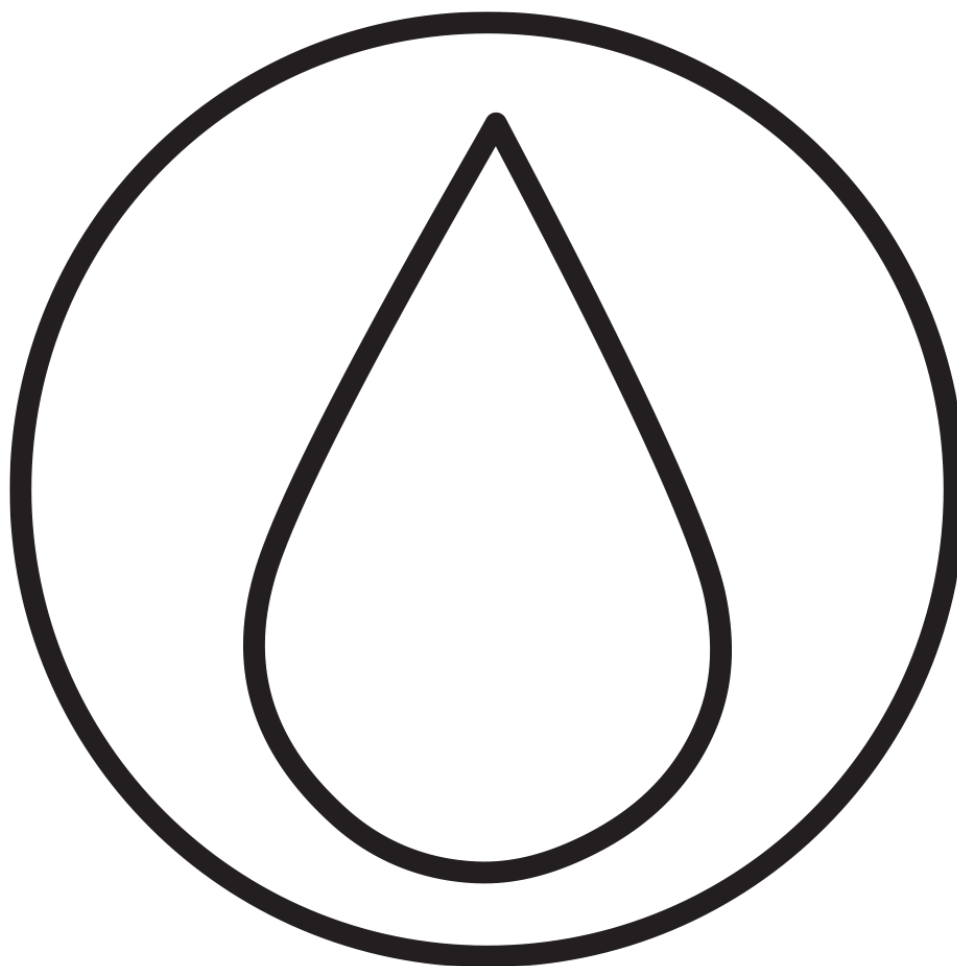
PARK

CLIMATE

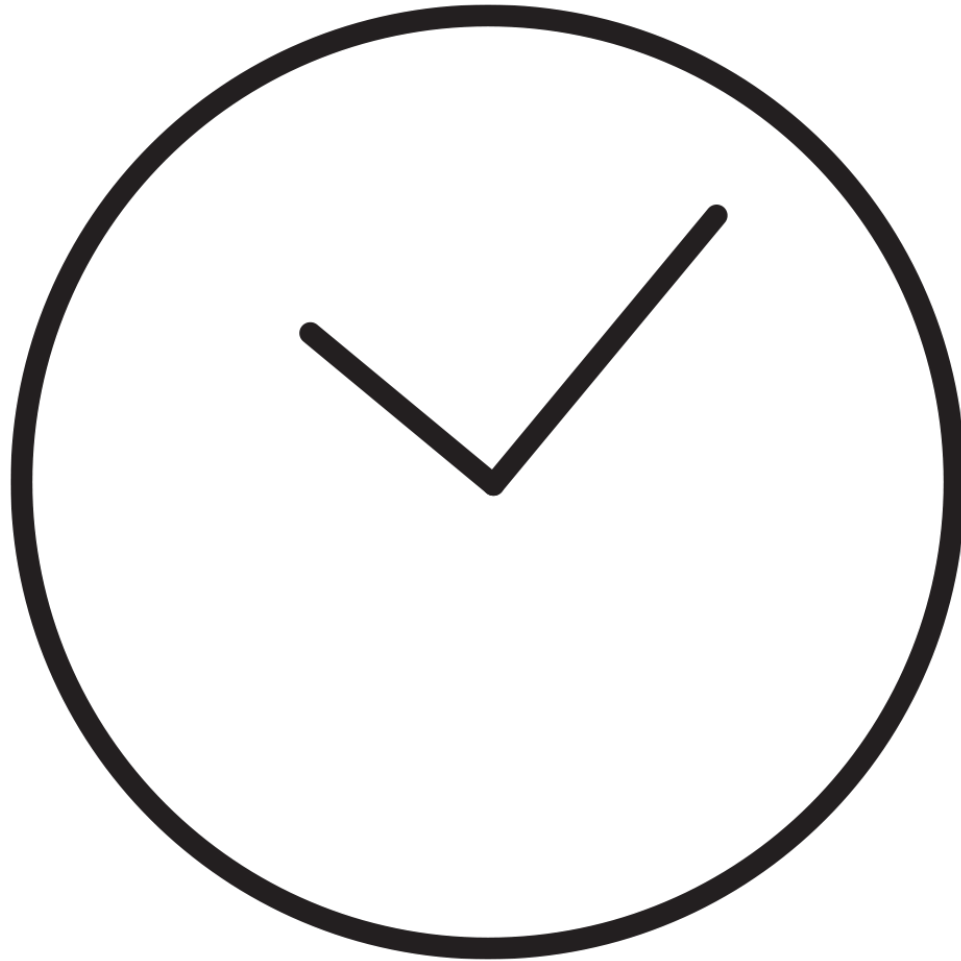


DRONE

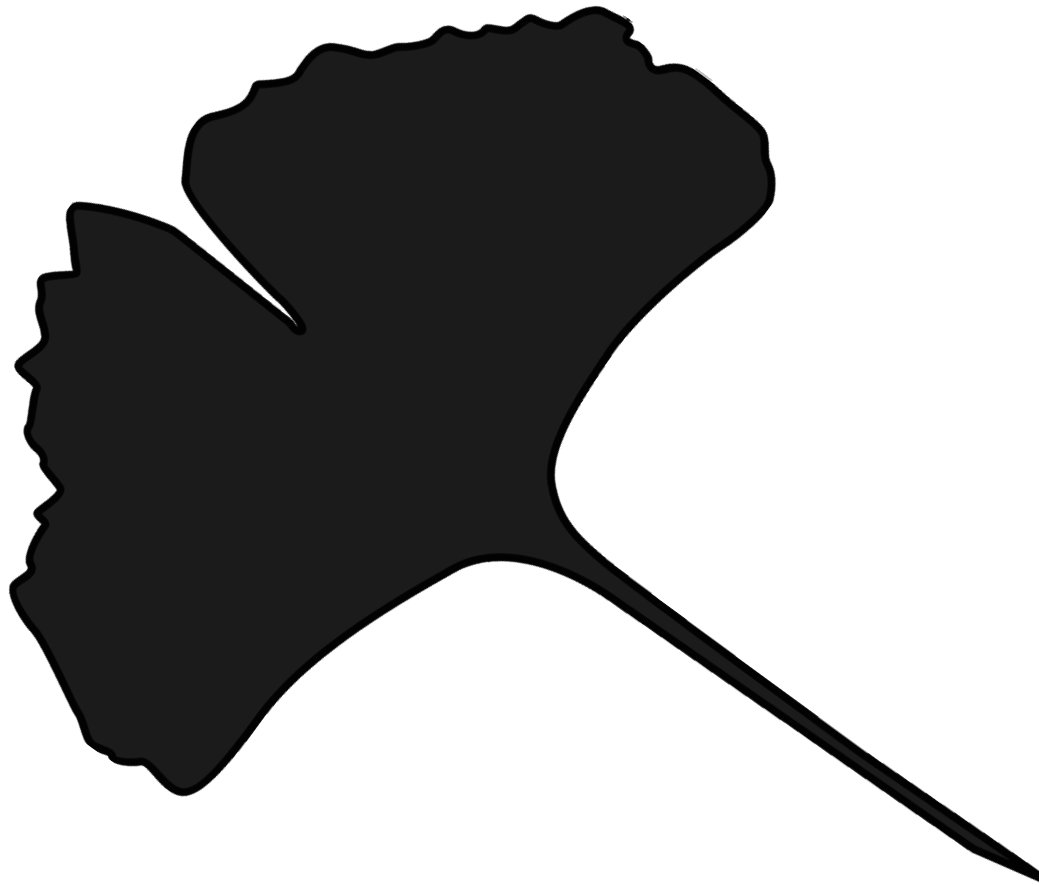




LATENCY

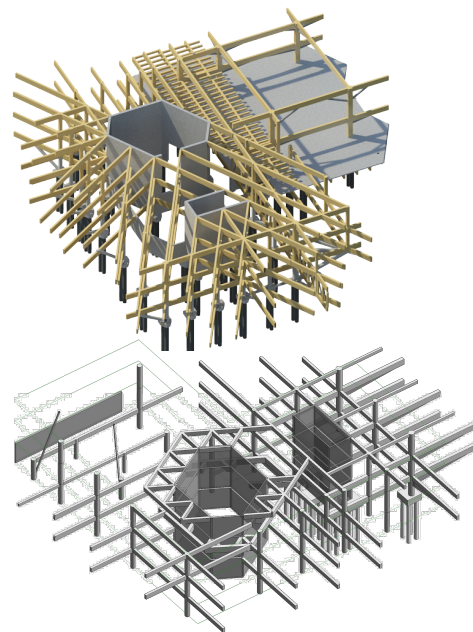
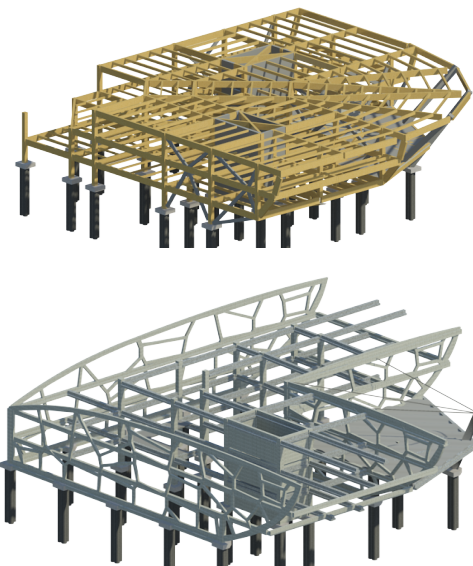


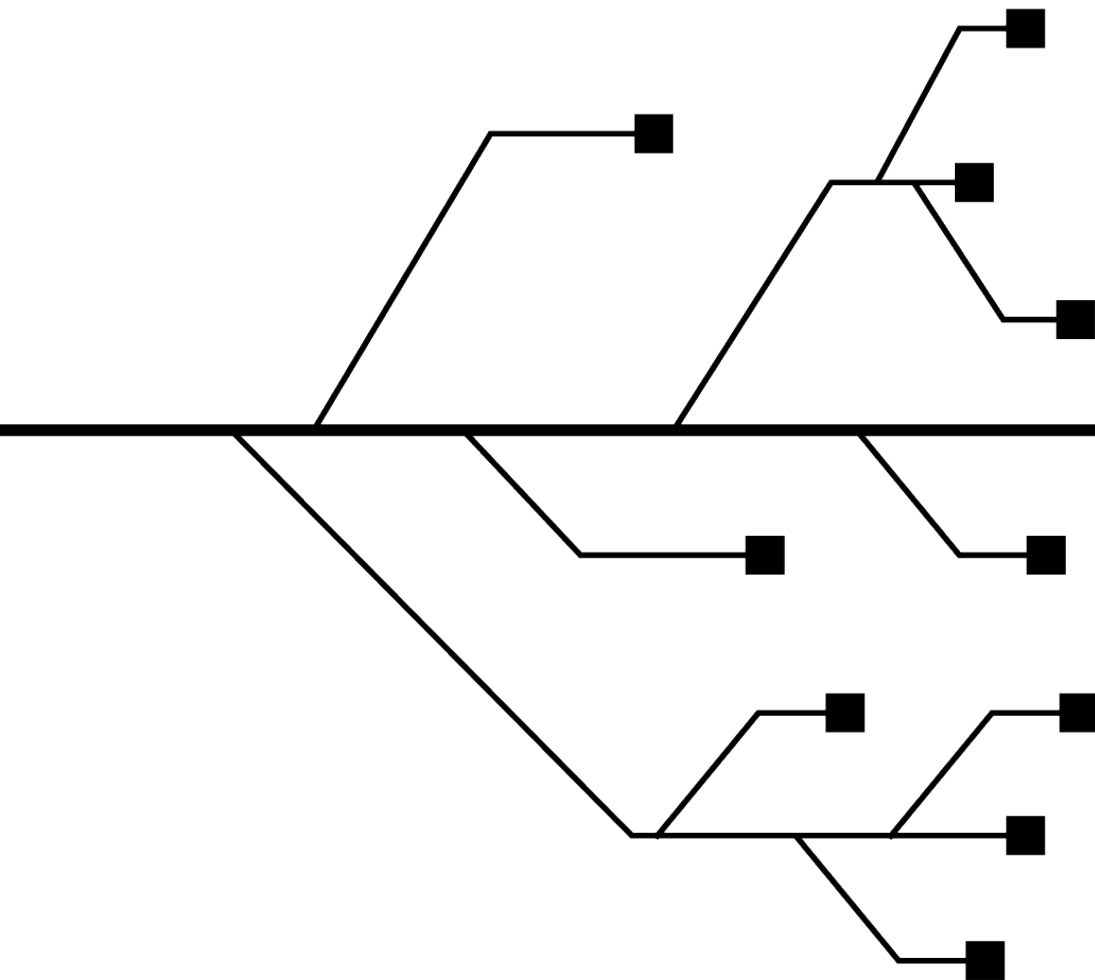
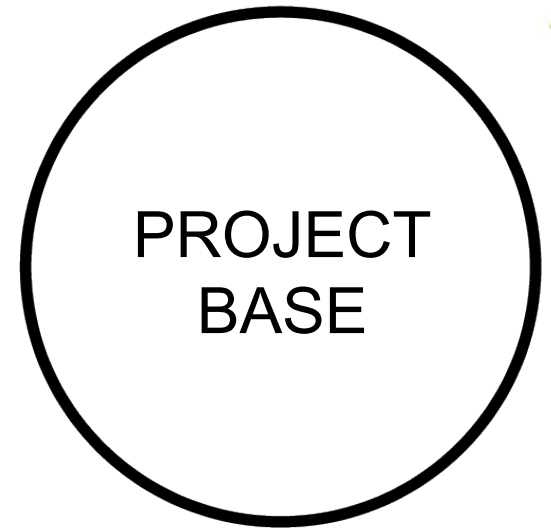
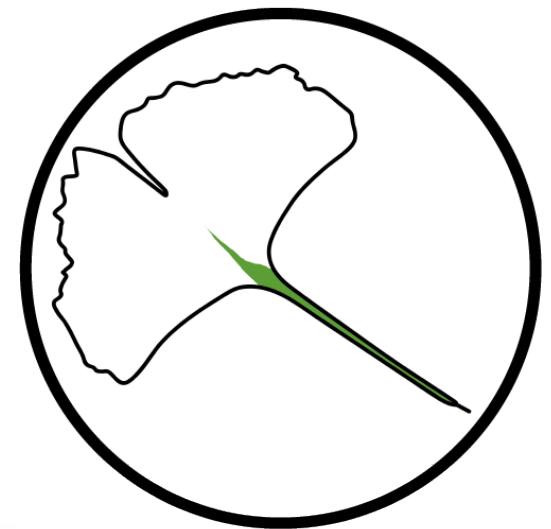
THE LEAF

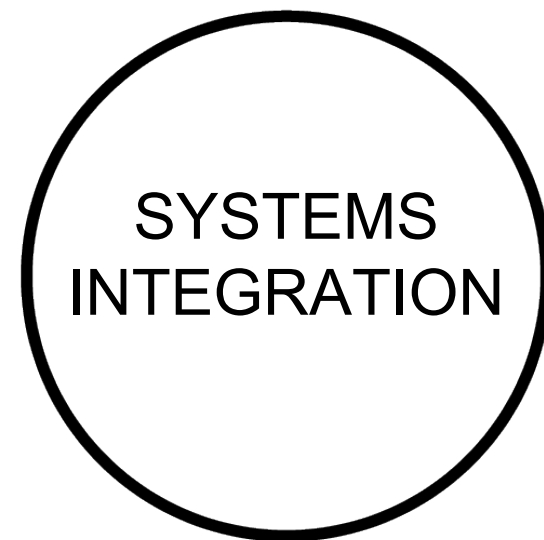
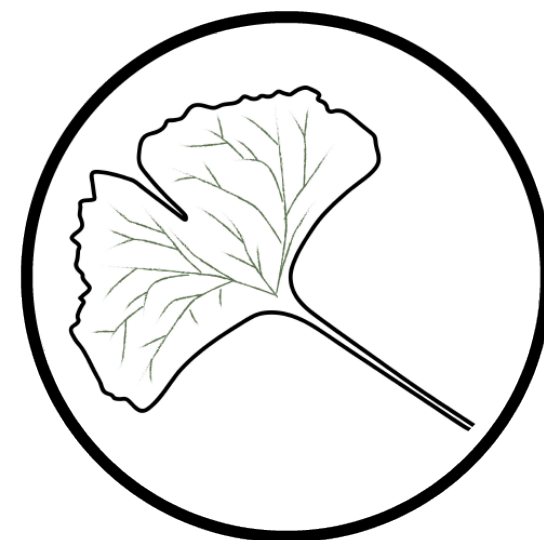


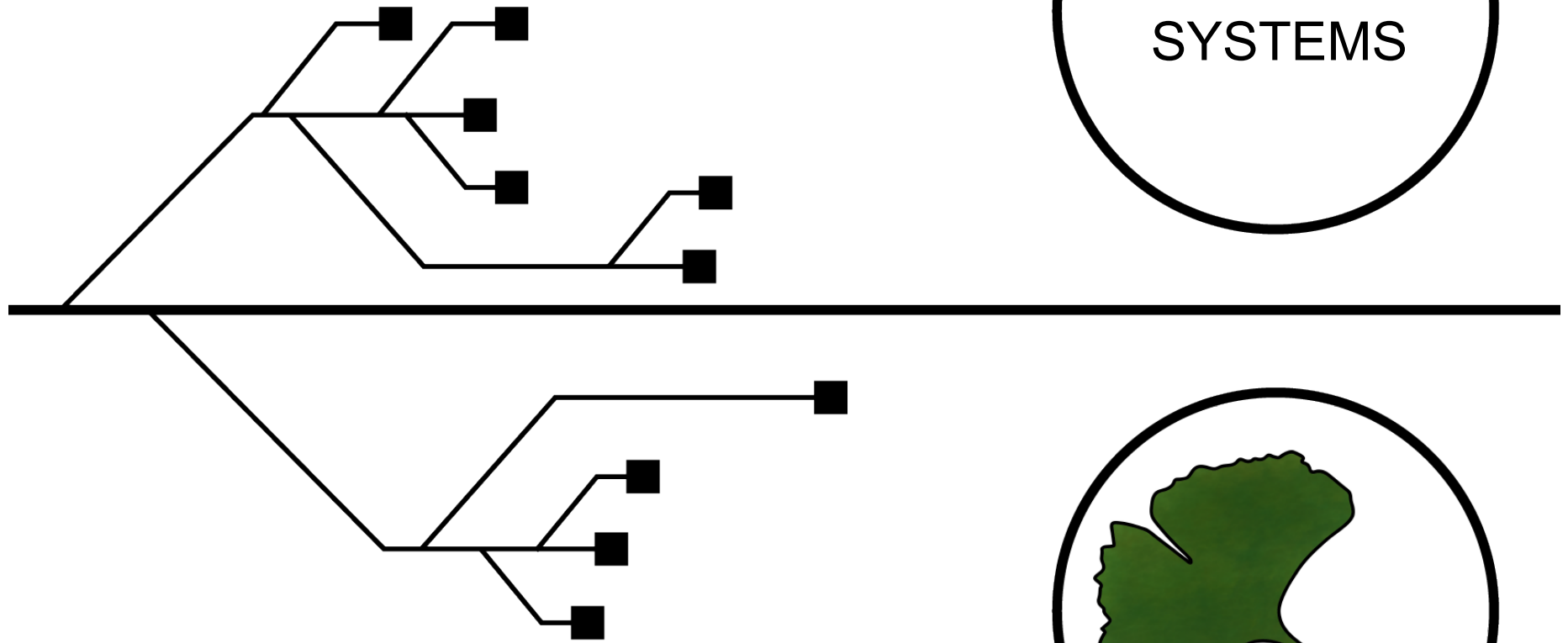
A SE MEP CM LCFM

TIMELINE

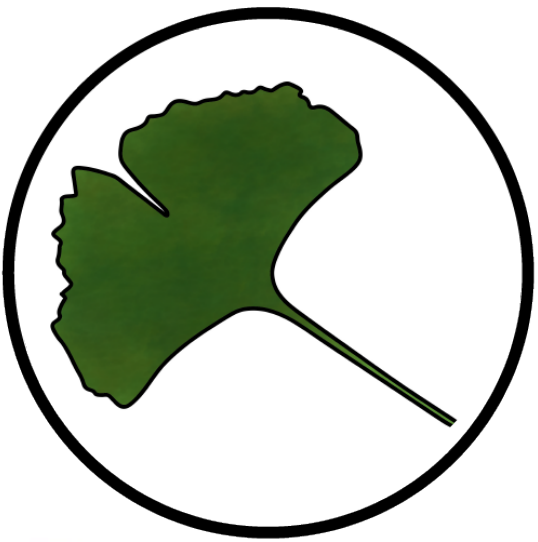




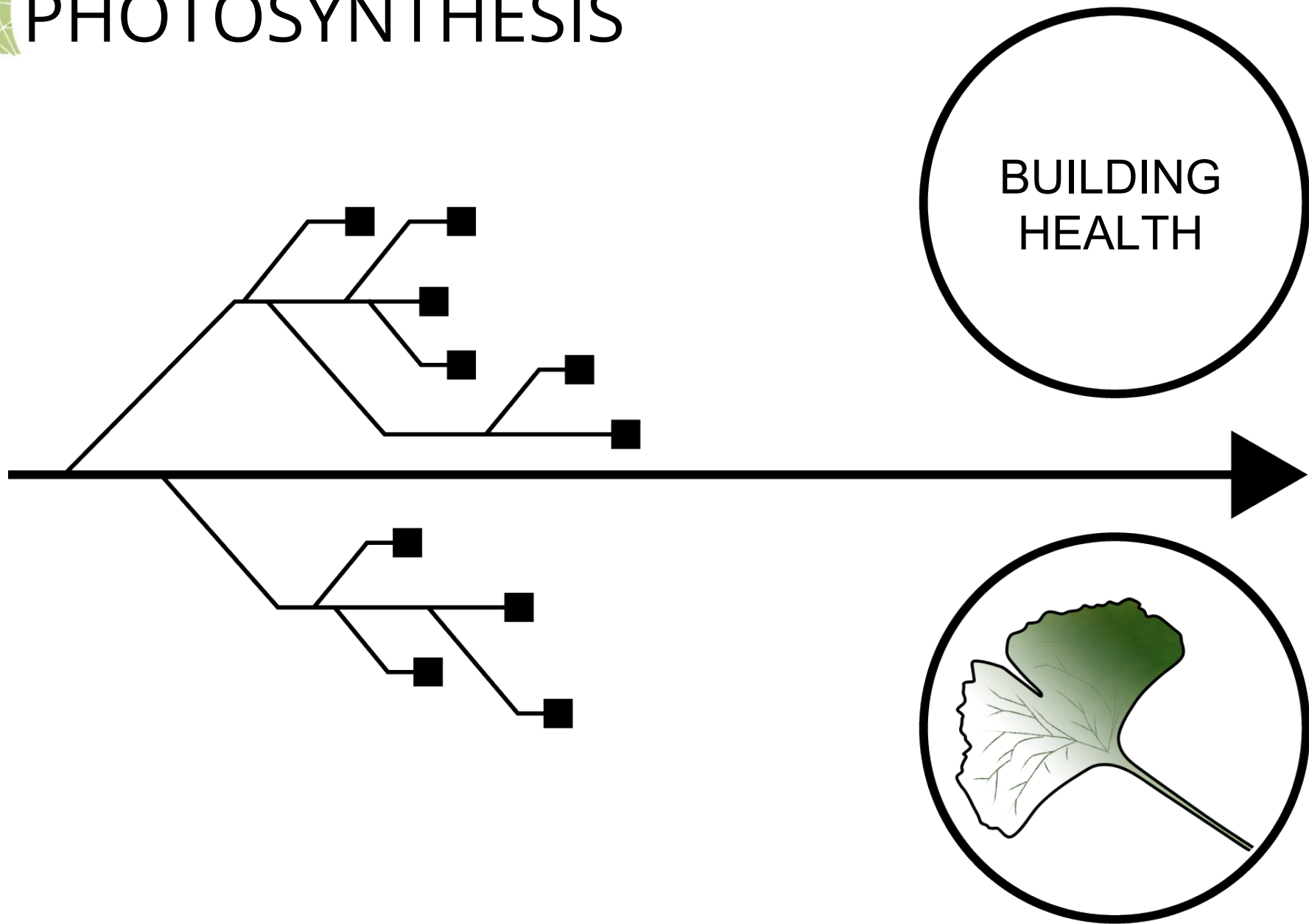




FACADE
SYSTEMS

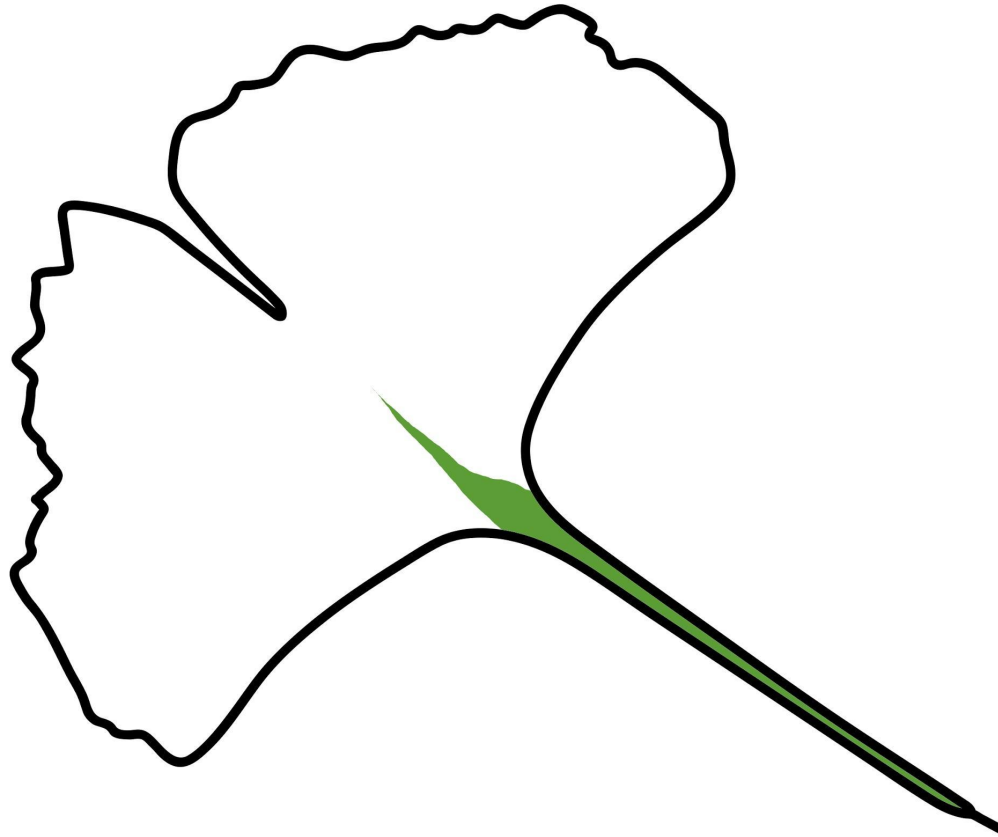


PHOTOSYNTHESIS



THE STEM

FLOOD



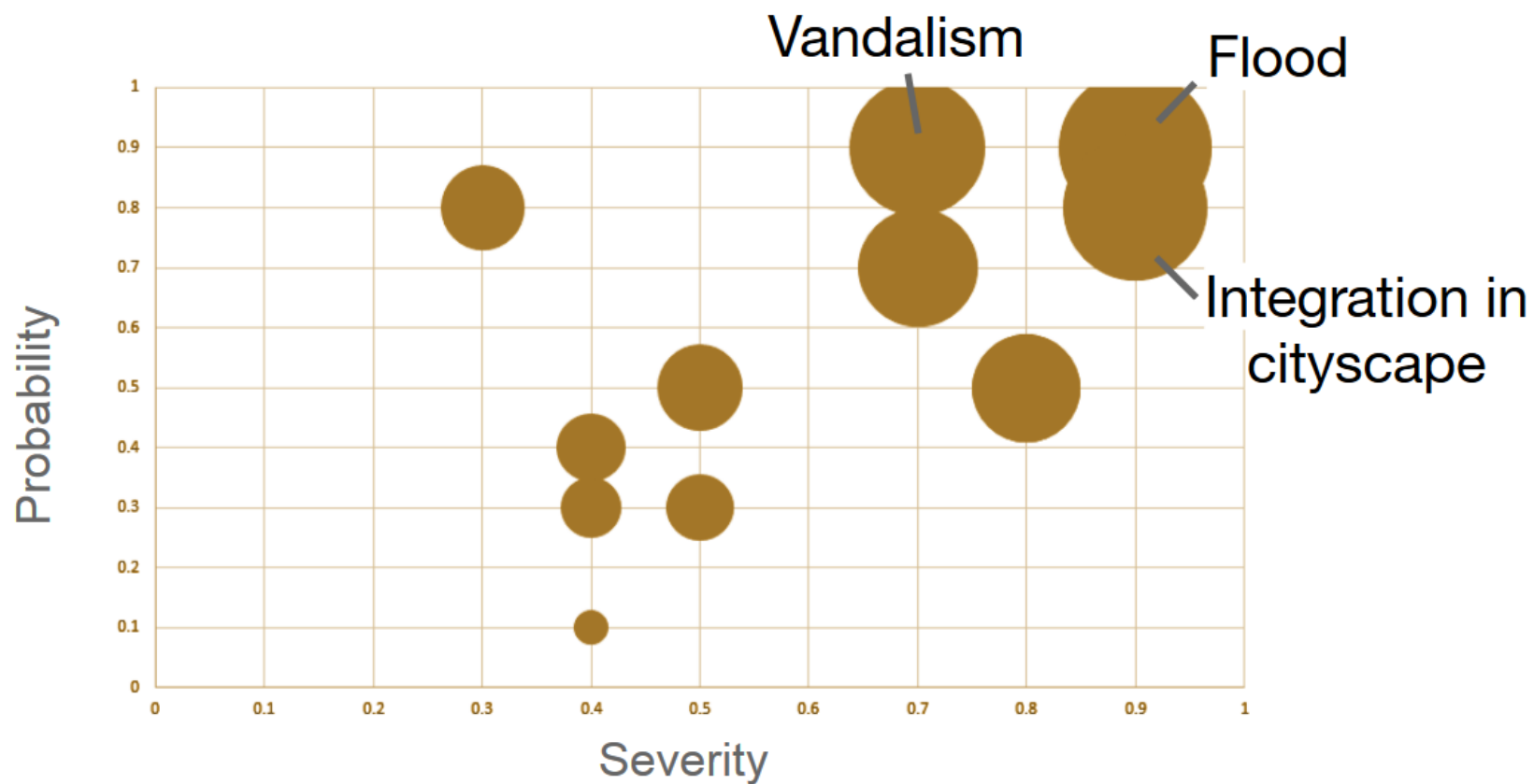
A SE MEP CM LCFM



FLOOD



ANALYSIS BEFORE DRONE

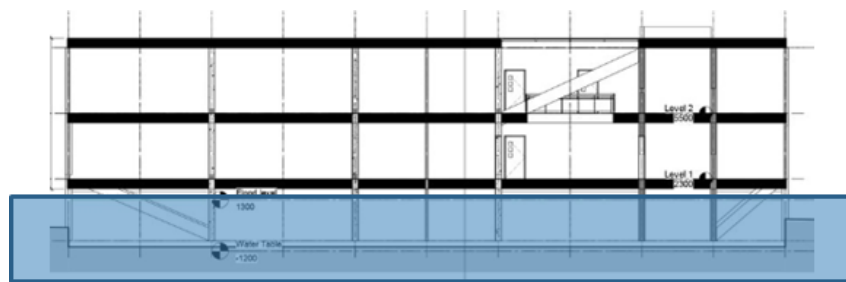
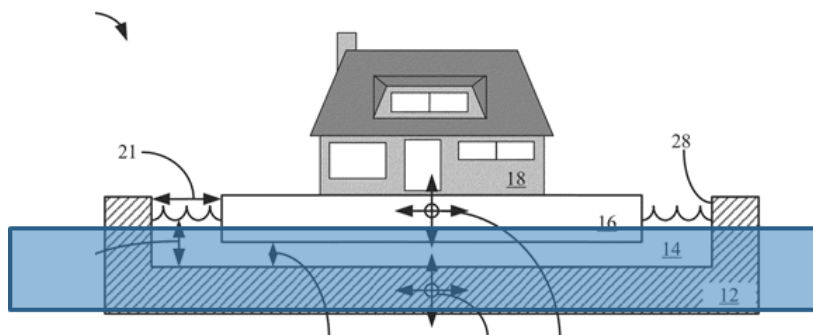




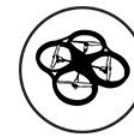
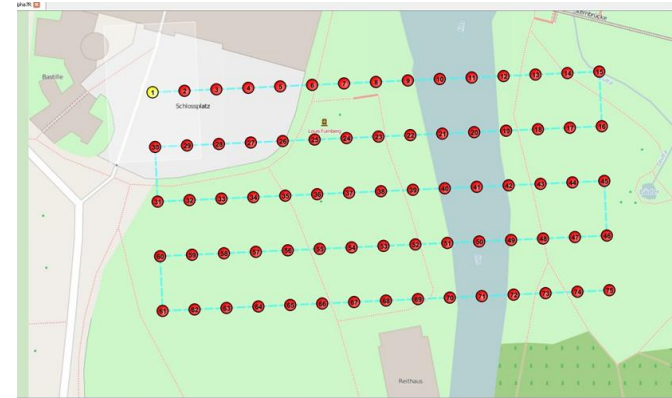
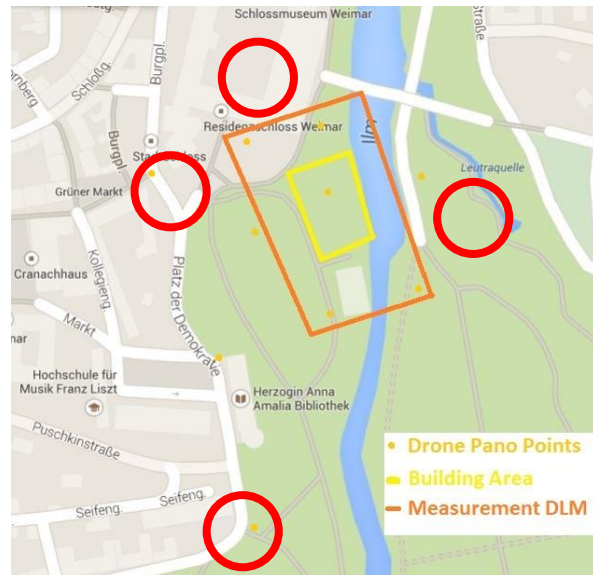
FLOOD



SOLUTIONS BEFORE DRONE



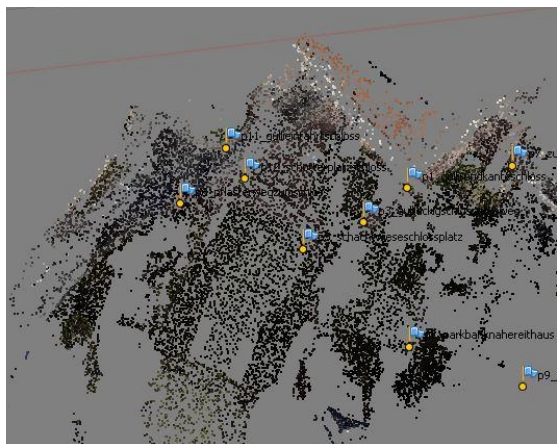
DRONE TEAM PROCESS



DRONE DEVELOPMENT



SPARSE POINT
CLOUD



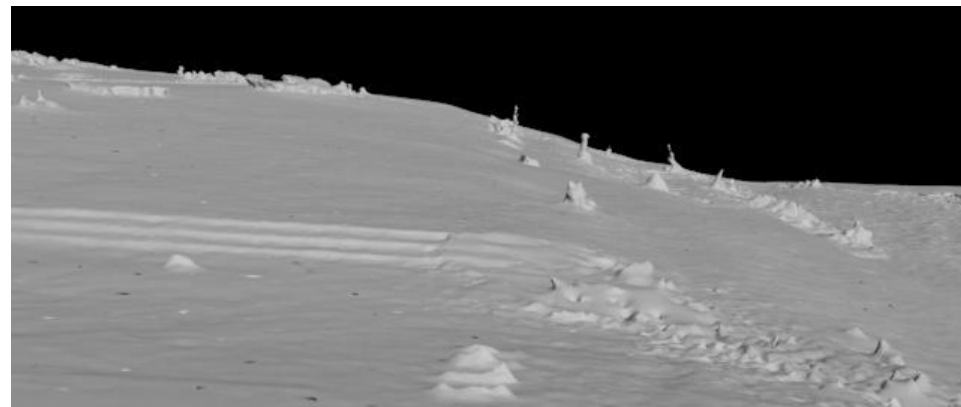
February 15

GPS



March 15

SURFACE MODEL



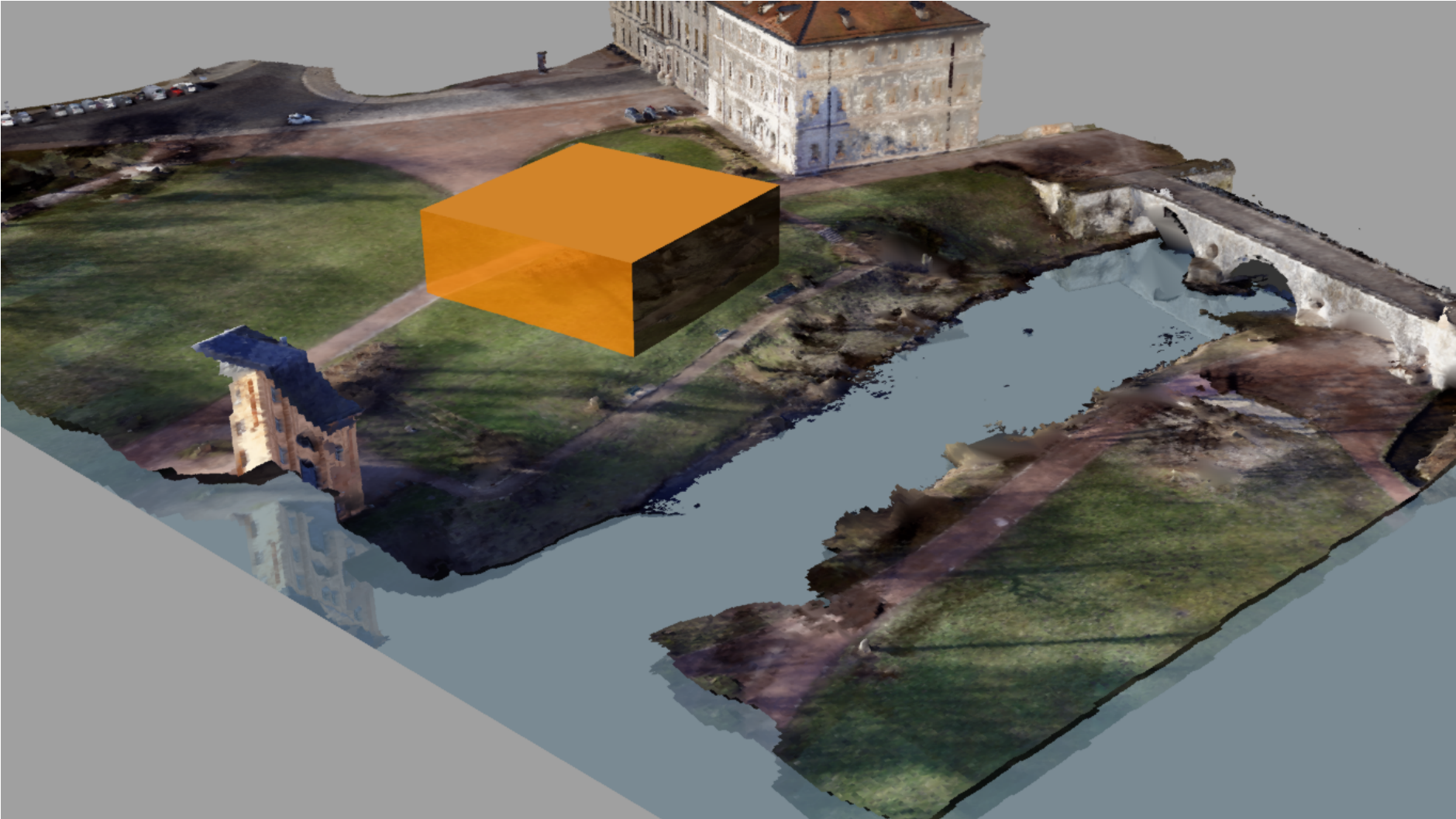
March 15

TEXTURE



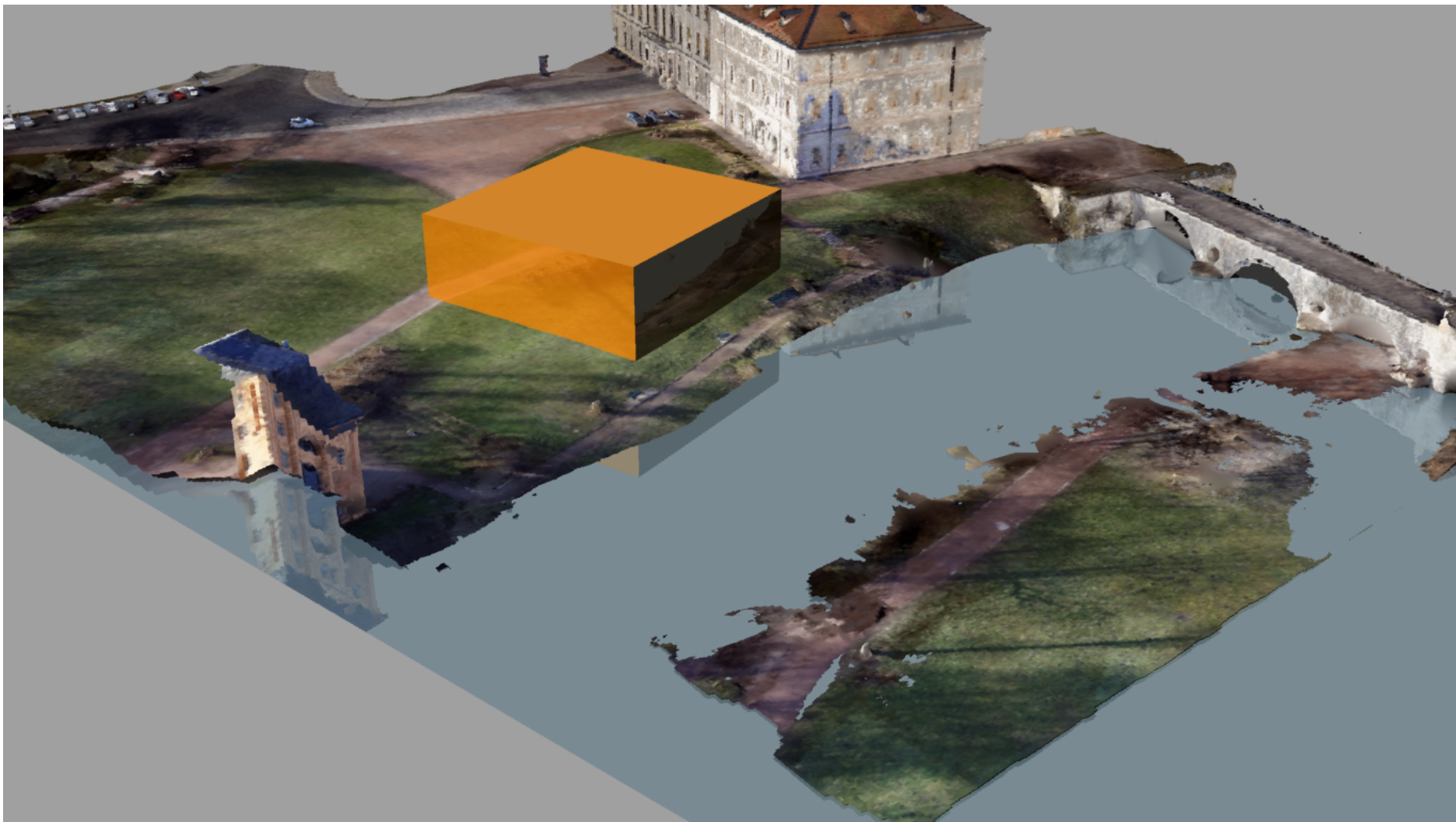
APRIL 15

DRONE DEVELOPMENT





HIGHEST RECORDED FLOOD

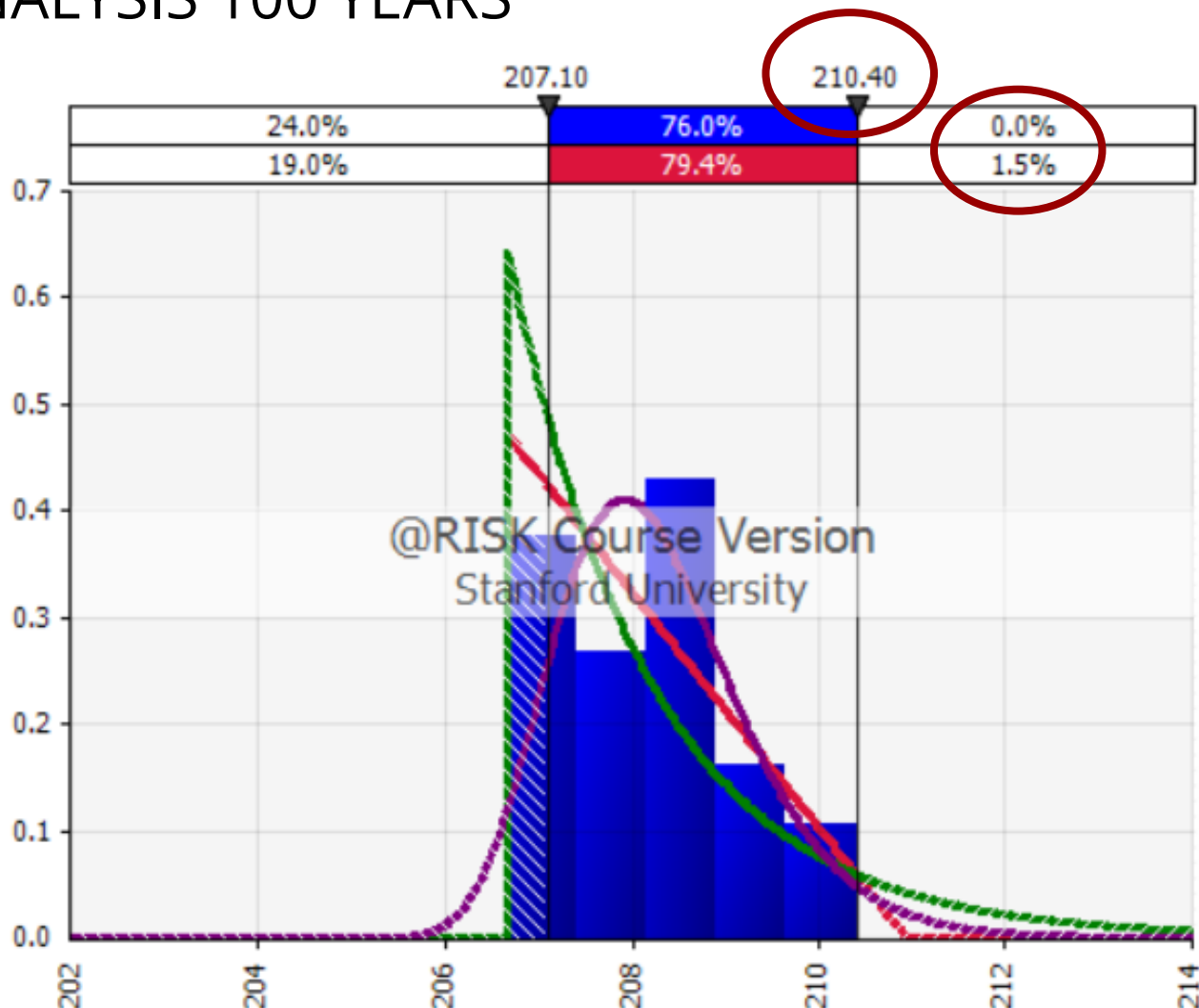




FLOOD



DATA ANALYSIS 100 YEARS

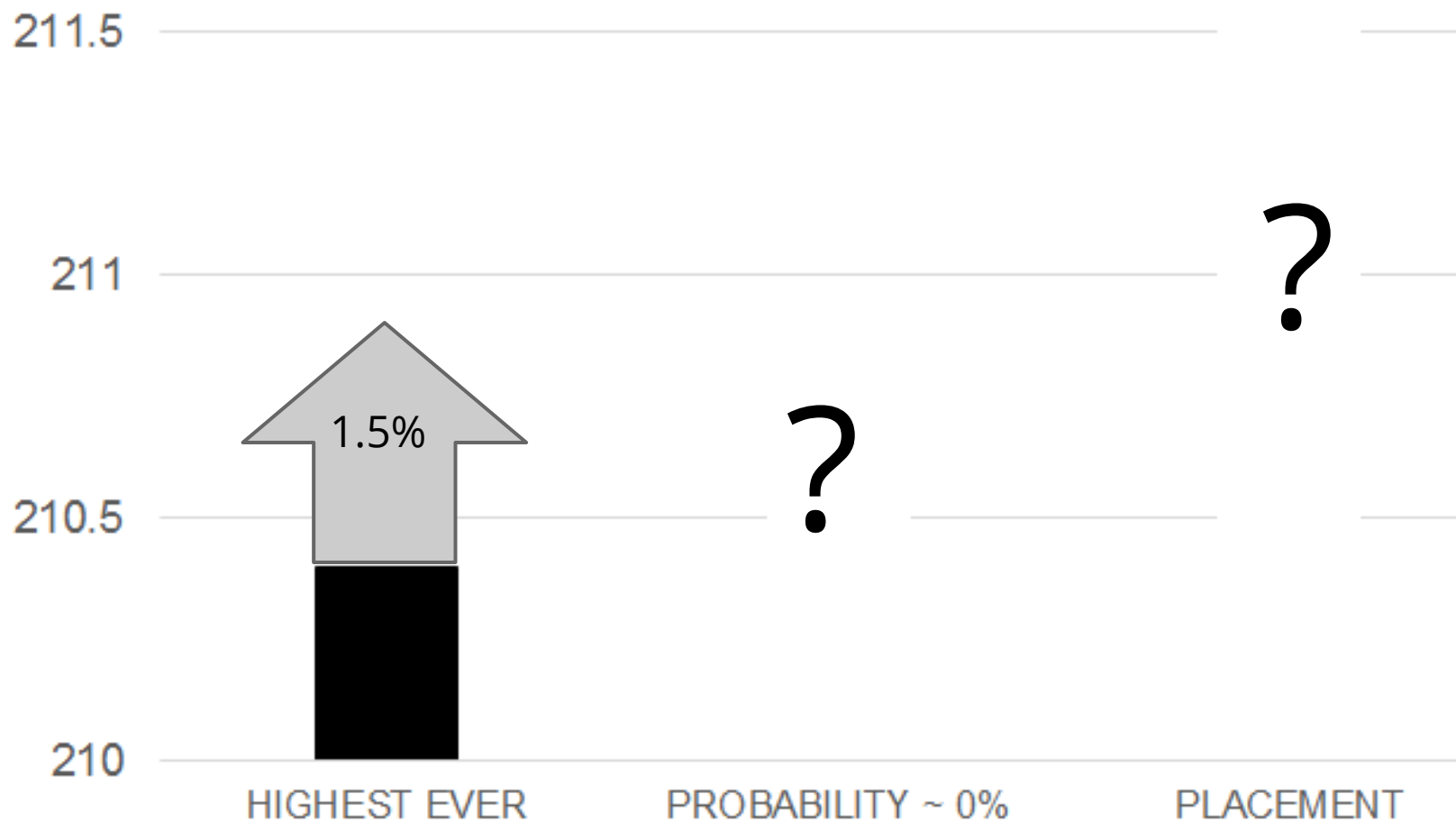




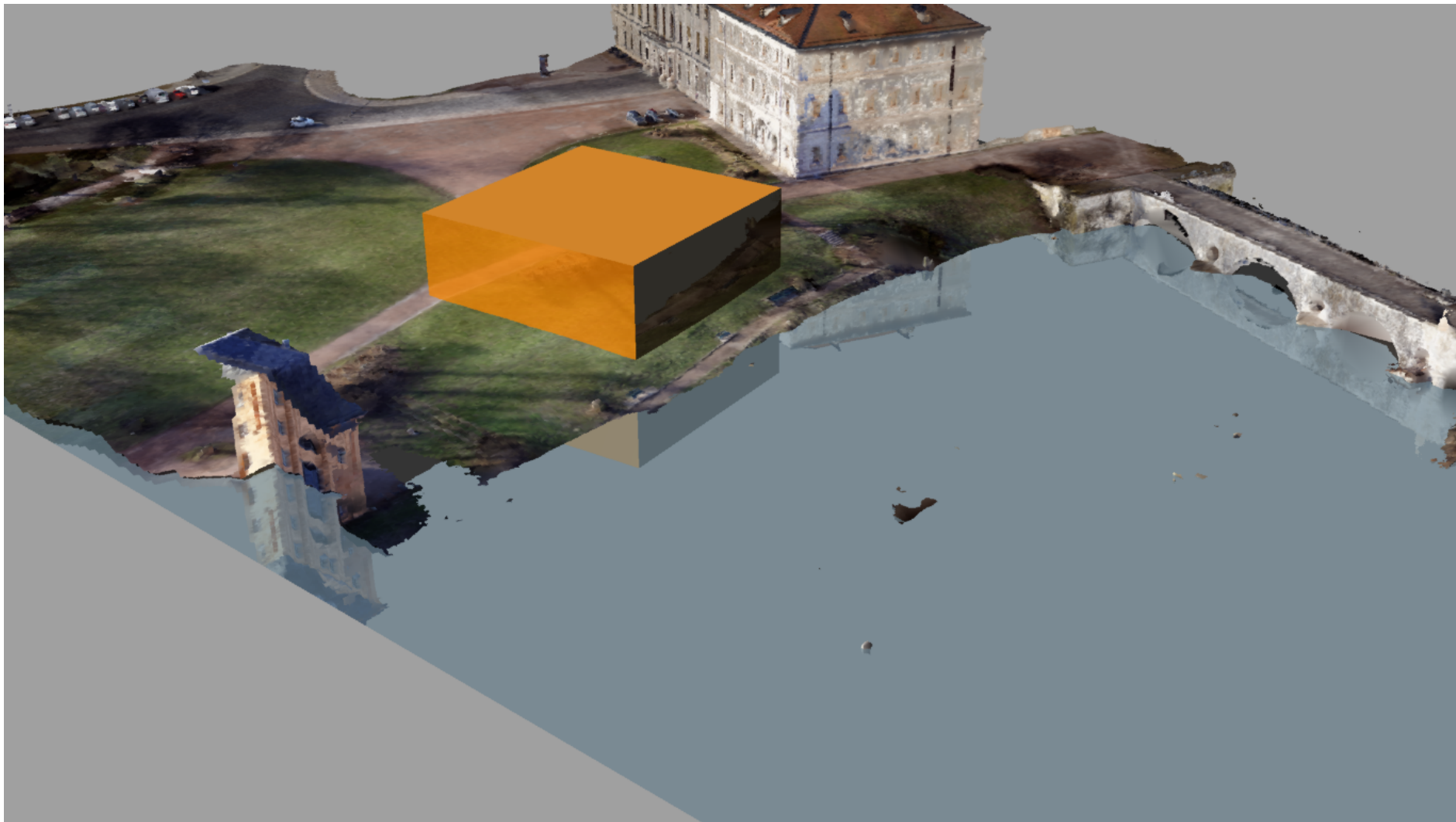
FLOOD



FIND PLACEMENT



ZERO PROBABILITY FLOOD

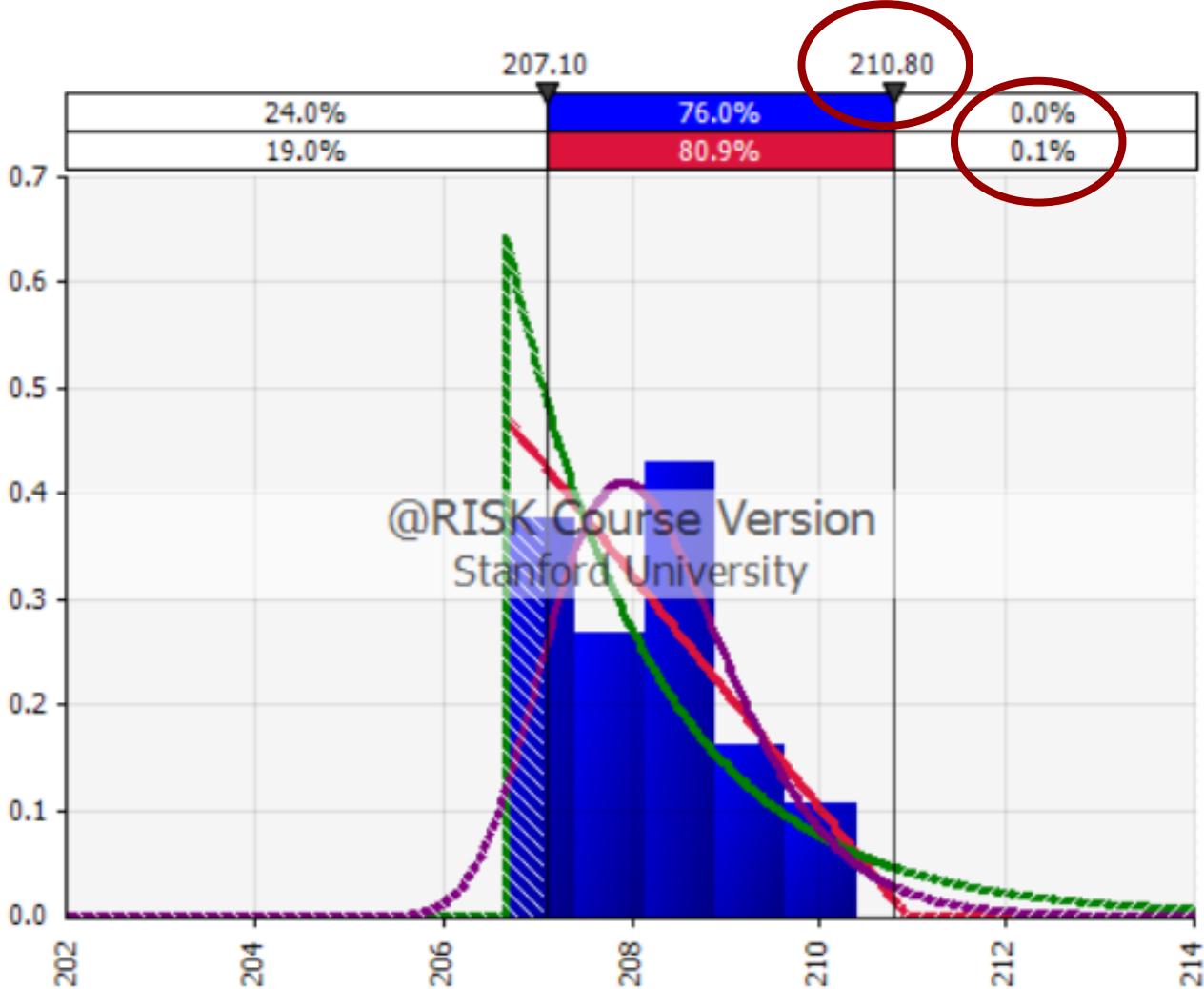




FLOOD



DATA ANALYSIS 100 YEARS

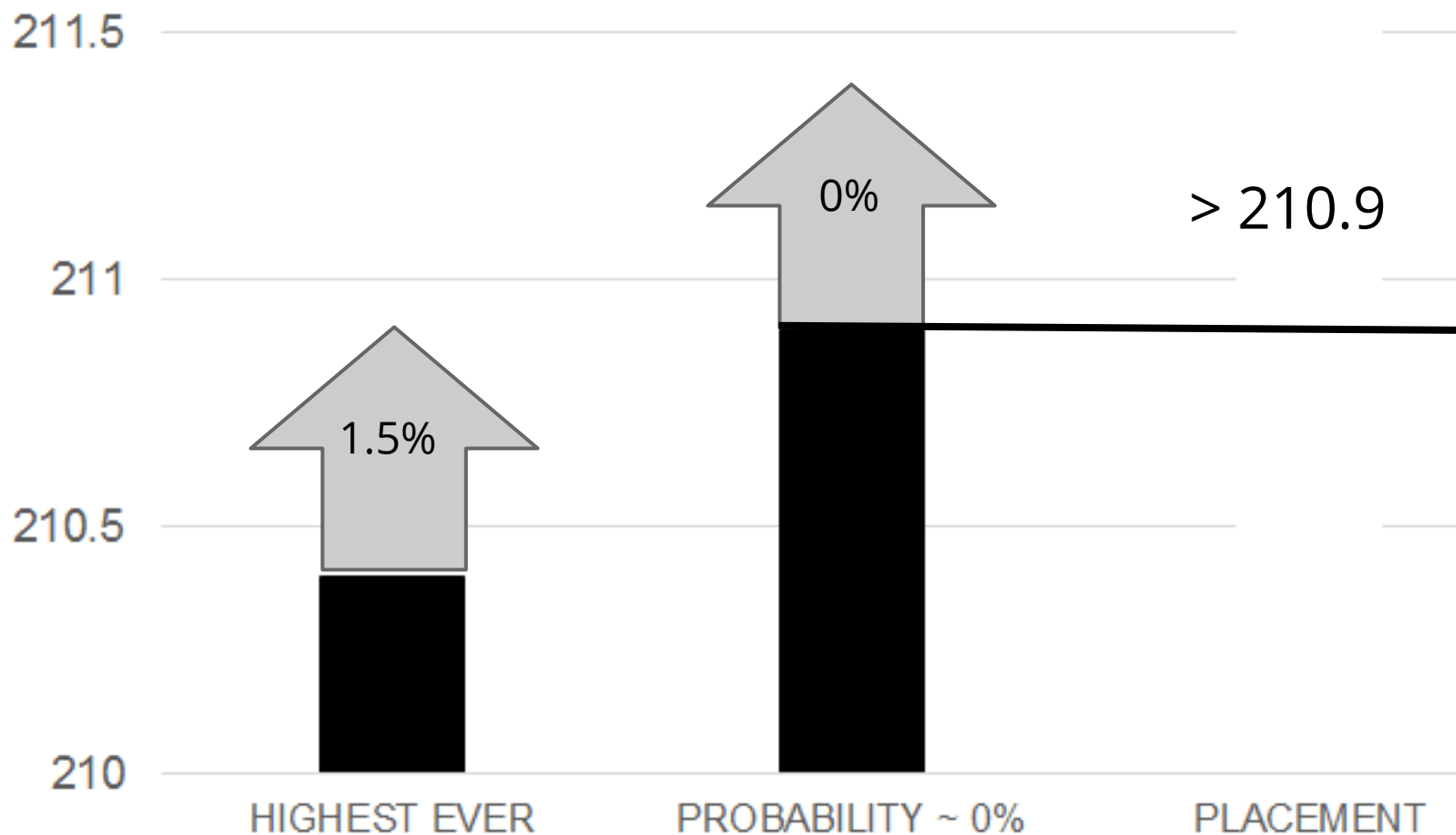




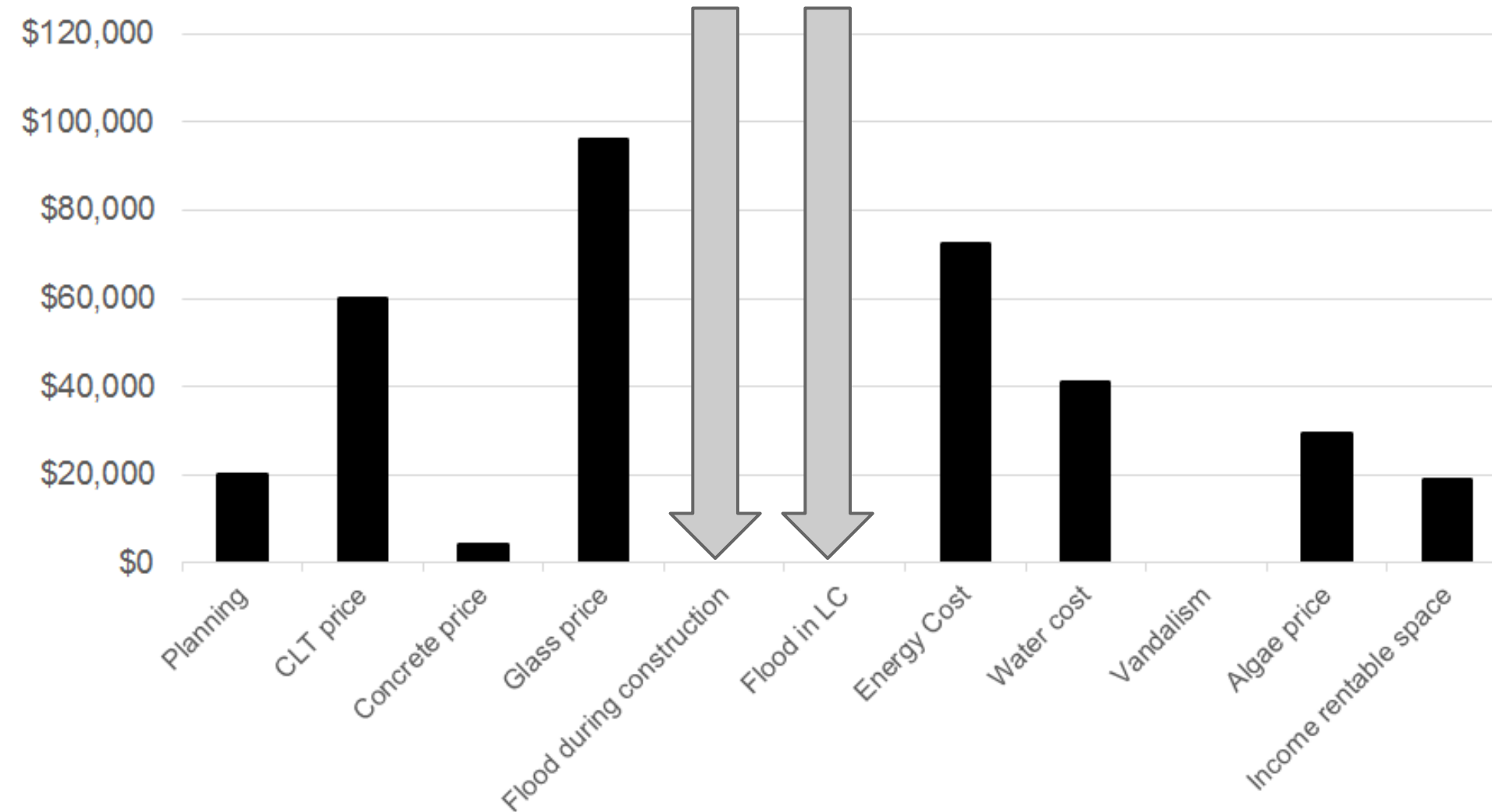
FLOOD



FIND PLACEMENT



RISK COST

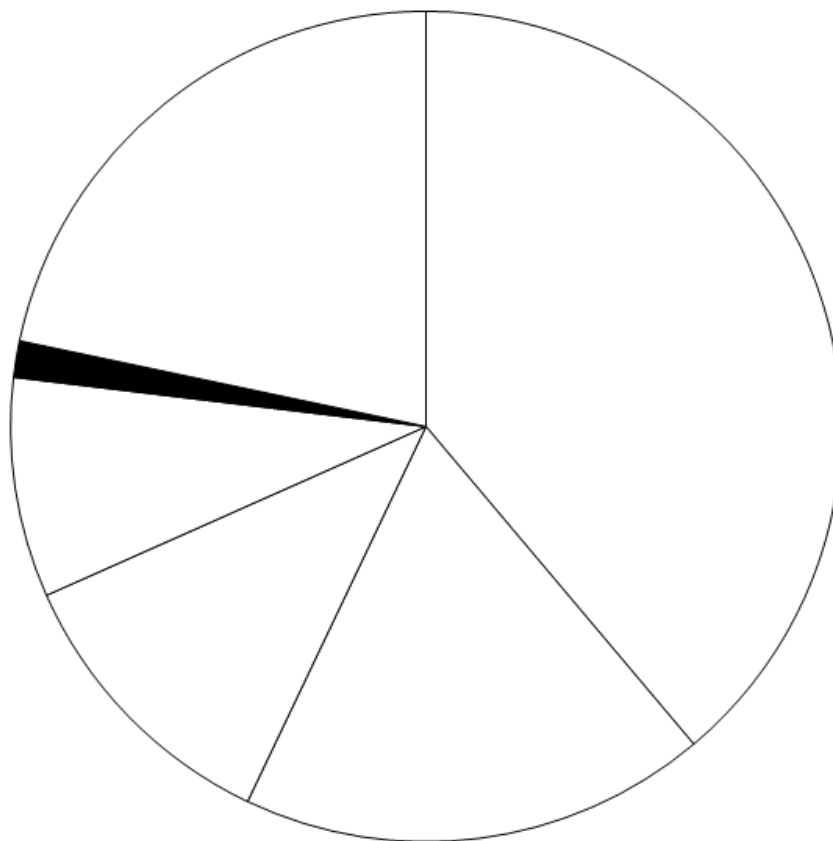


RISK COST

OVER 25 YEARS



\$ ~350,000

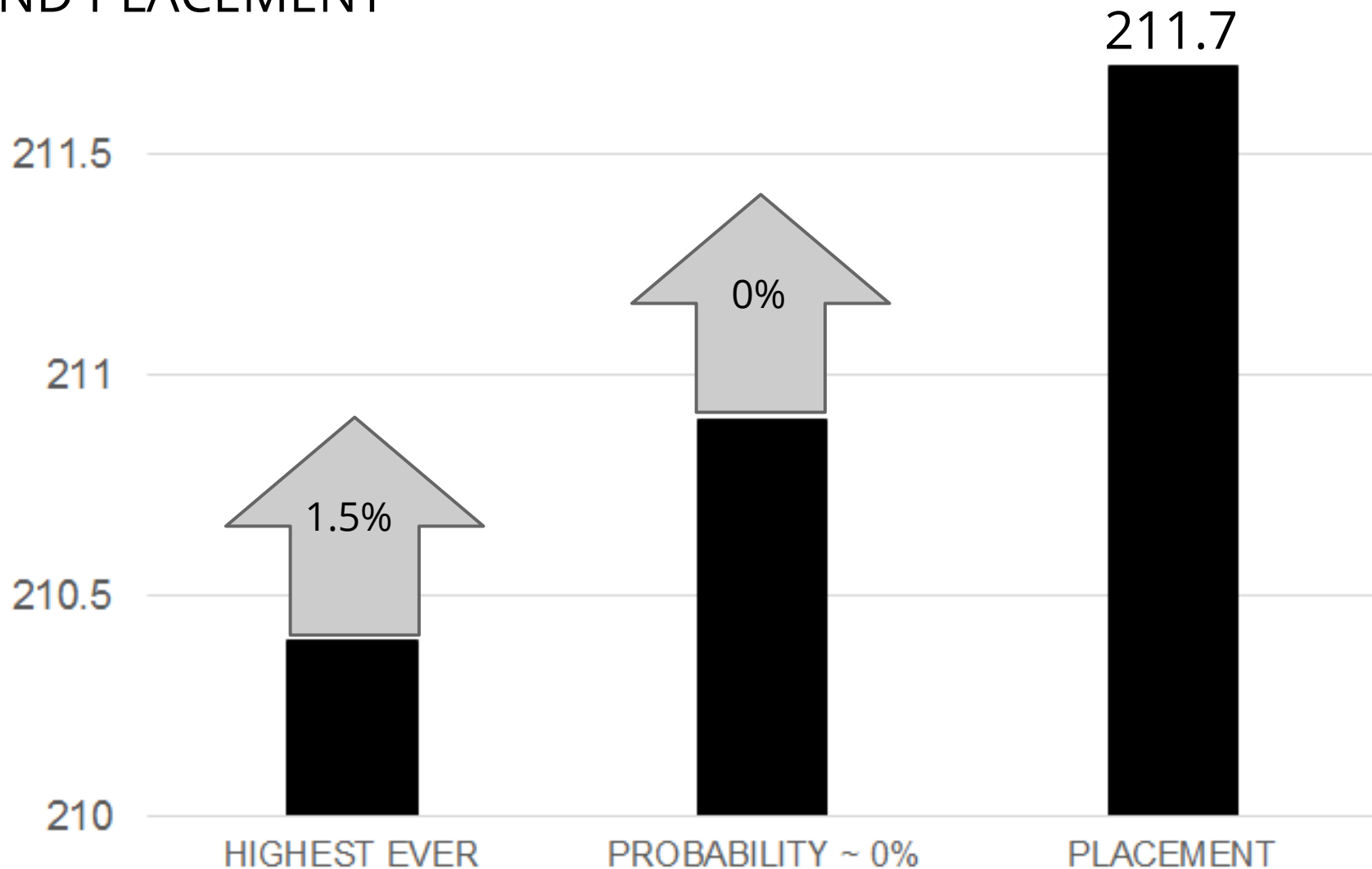




FLOOD

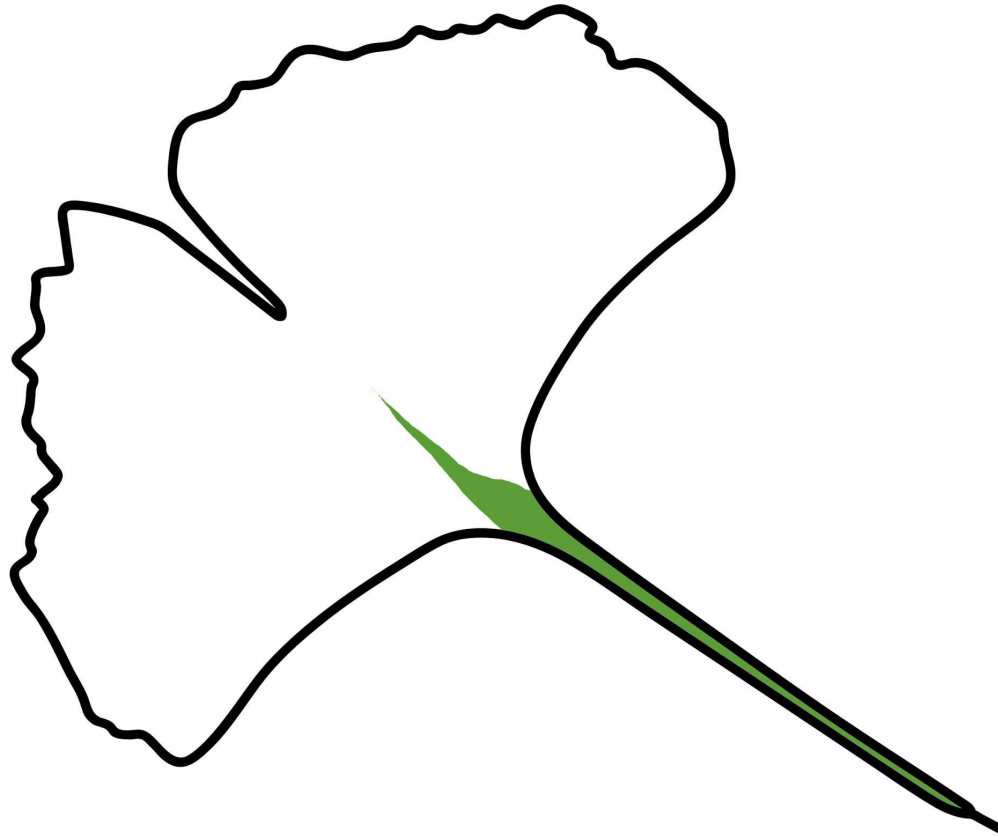


FIND PLACEMENT



THE STEM

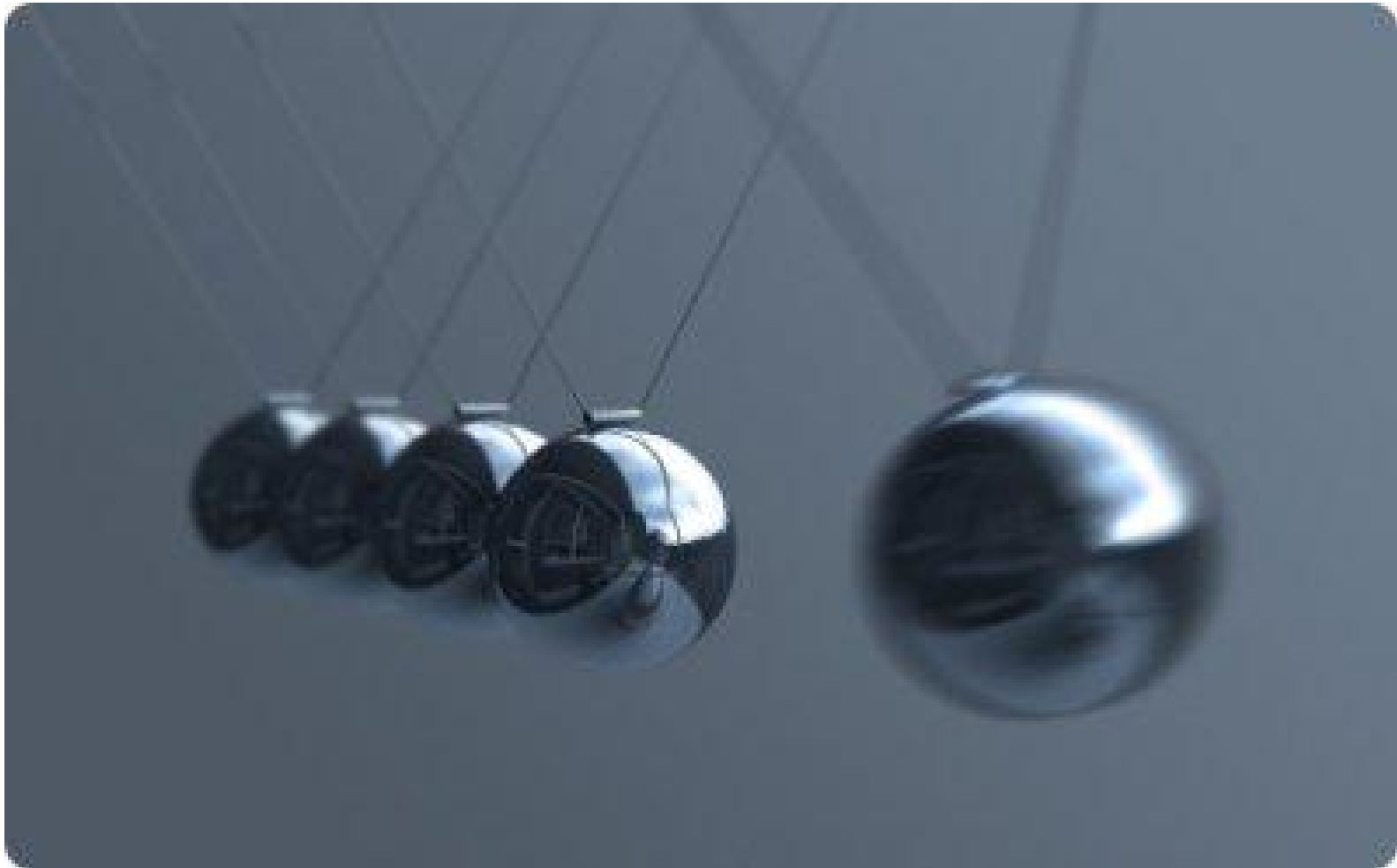
TEAM PROCESS - LATENCY



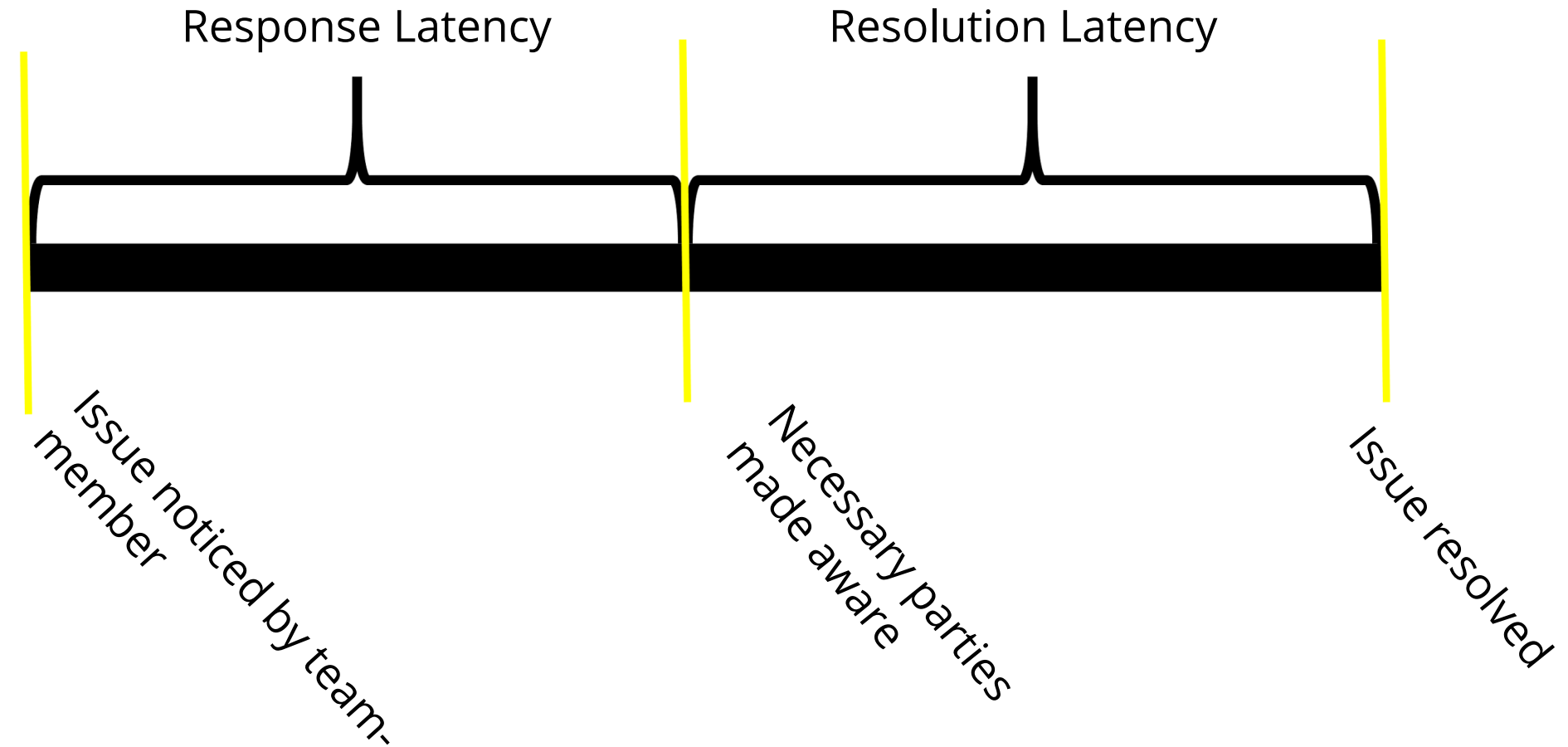
LATENCY DEFINITION



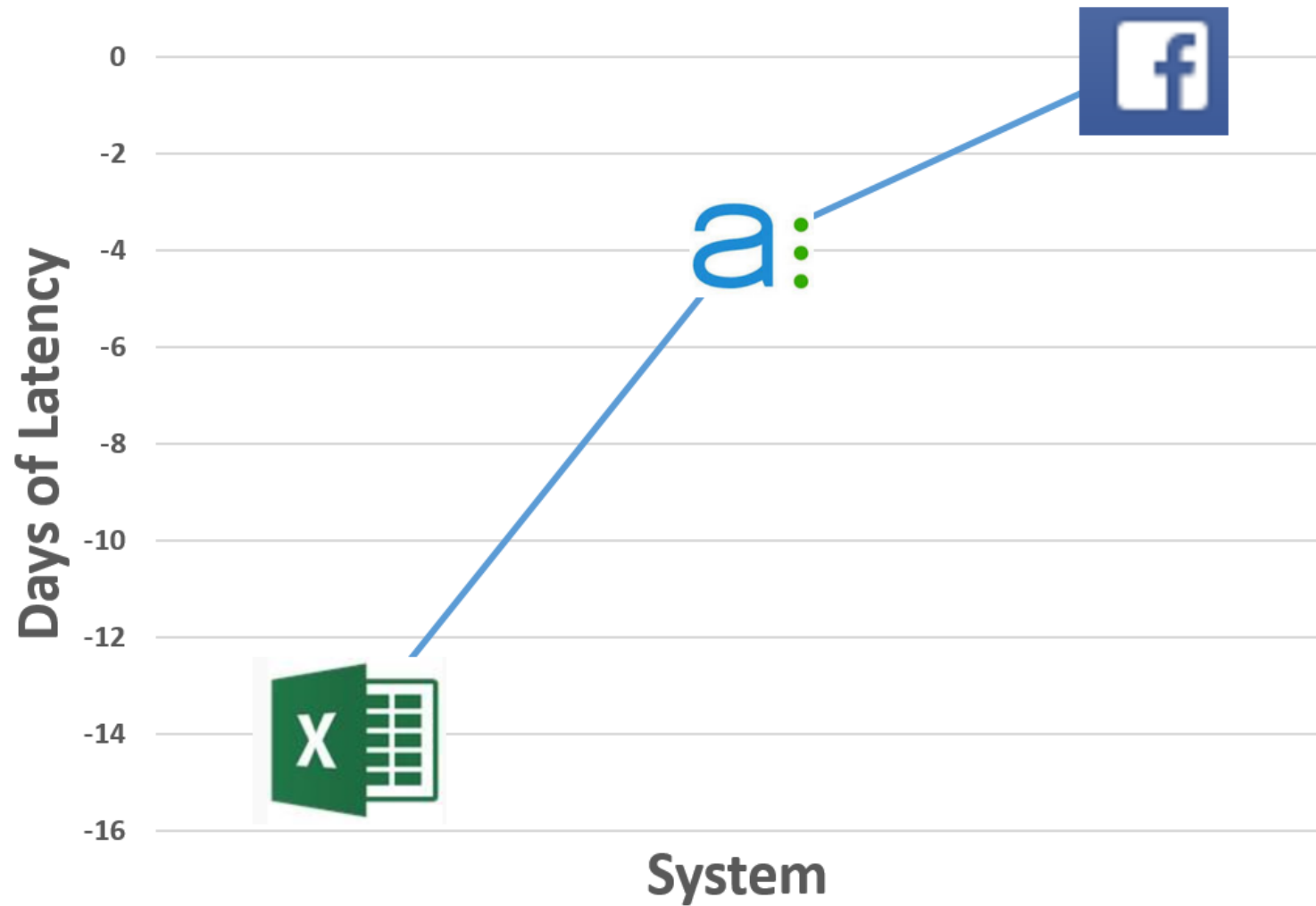
EVERY ACTION HAS A REACTION



LATENCY - KPI



LATENCY CALL TO ACTION



LATENCY ALERT



IT JUMP OUT AND BITES YOU!

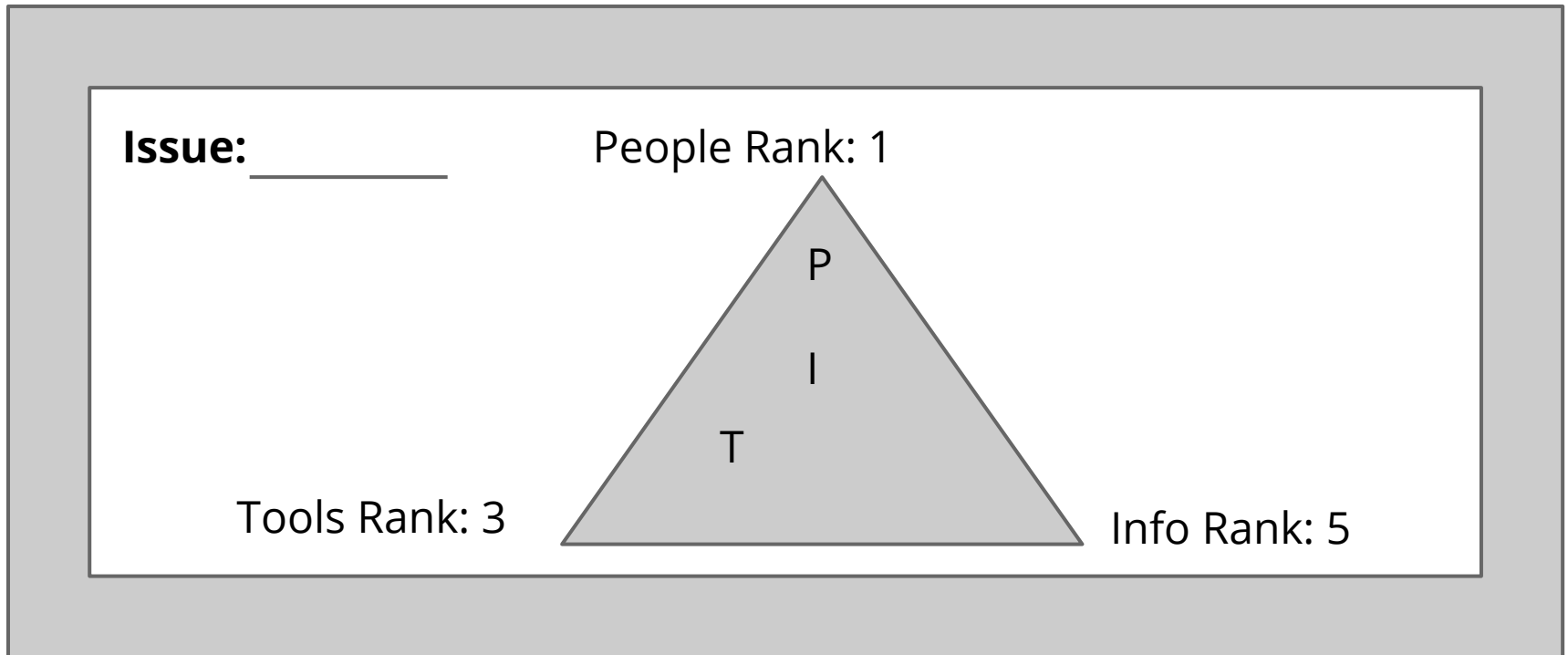


LATENCY PLUG IN

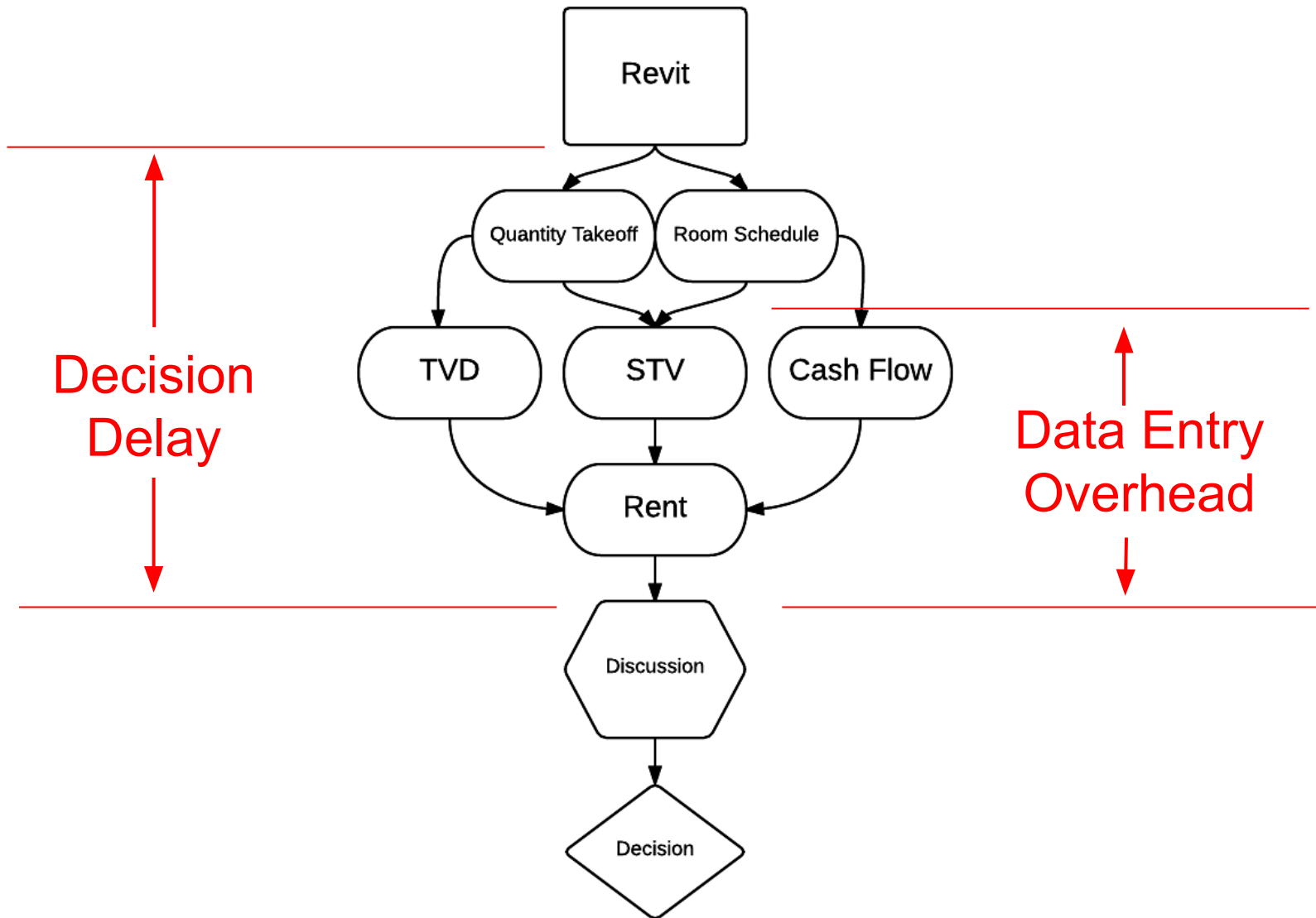


REDUCE DATA ENTRY OVERHEAD

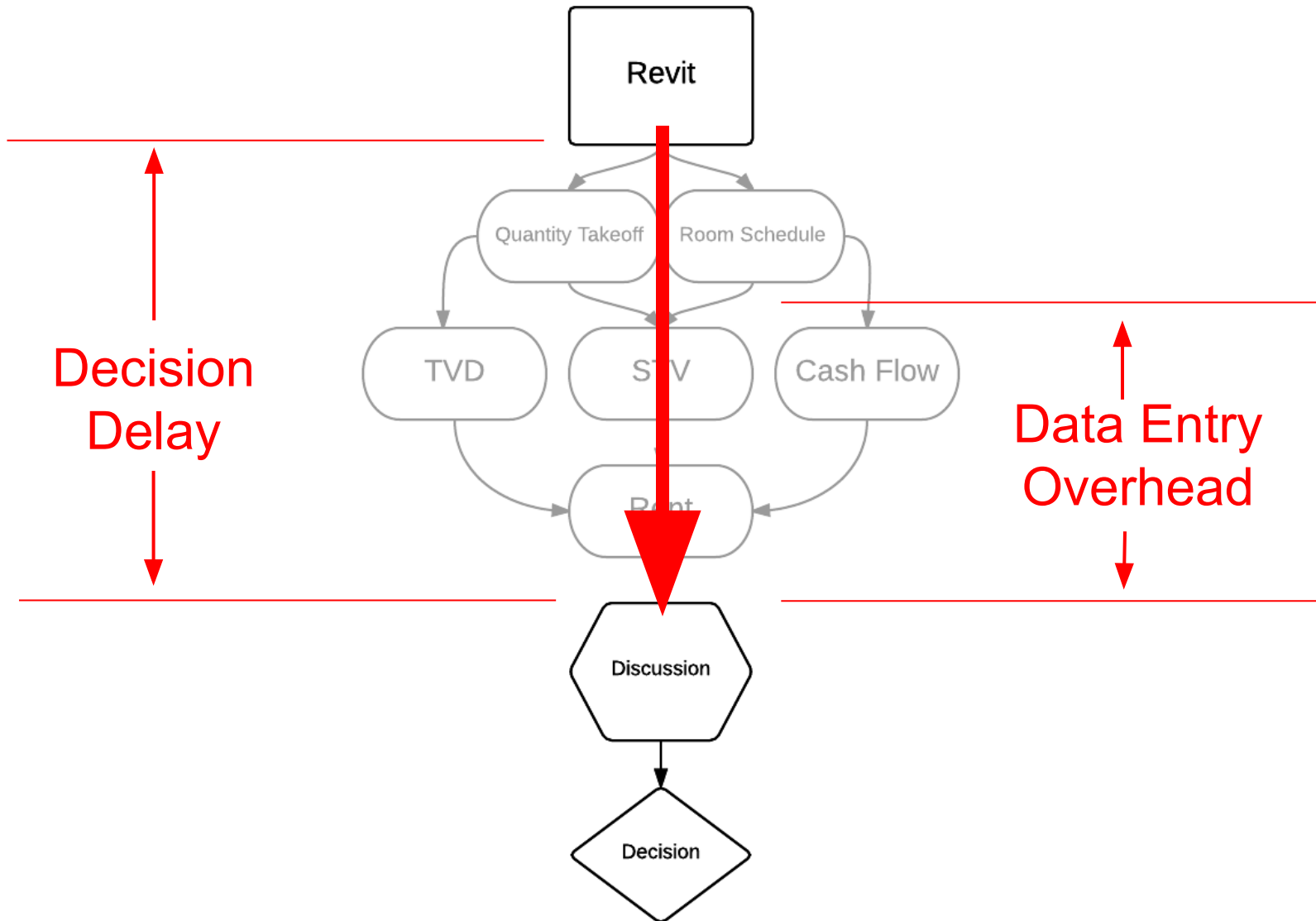
*“Unfortunately, the Mission Bay Team could not find a way to measure latency that did not require **significant time and effort by team members.**”*



LATENCY REDUCTION



LATENCY REDUCTION



LATENCY REDUCTION



SOLVING ISSUES DURING MEETING

Subgroup Meetings

Subgroup Meetings and Minutes:				
27	✓		4/15 Wed. interior finishes meeting	Apr 15 >
28	✓		4/15 Subgroup thermal meeting with Flavia	>
29	✓		4/13 Mon. slab and wall pre-fab meeting	Apr 13 >
30	✓		4/14 Tue. Windows	Apr 14 >
31	✓		Sage Glass Call	>
32	✓		4/9 Prefabrication and facade meeting	>
33	✓		4/7 Optimization meeting with Pawel	Apr 7 >
34	✓		4/12 Subgroup Janine-Marie. DGNB+LEED	>
35	✓			
36	✓		4/6 Subgroup STV-TVD-Cash Flow	>
37	✓		4/4 Subgroup meeting with flavia	>
38	✓		4/6 Subgroup SE, CM for Revit modeling w/ 4D CAD	>
39	✓		4/9 RISK/FLOOD	Apr 9 >



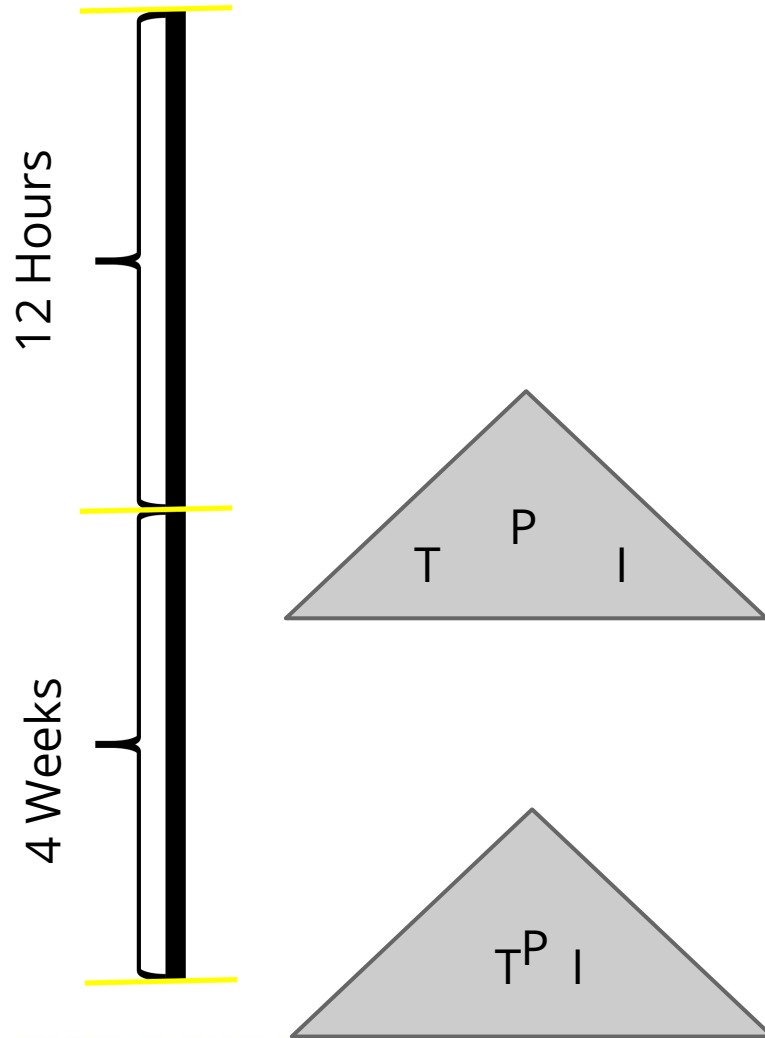
Sprints within Sprints



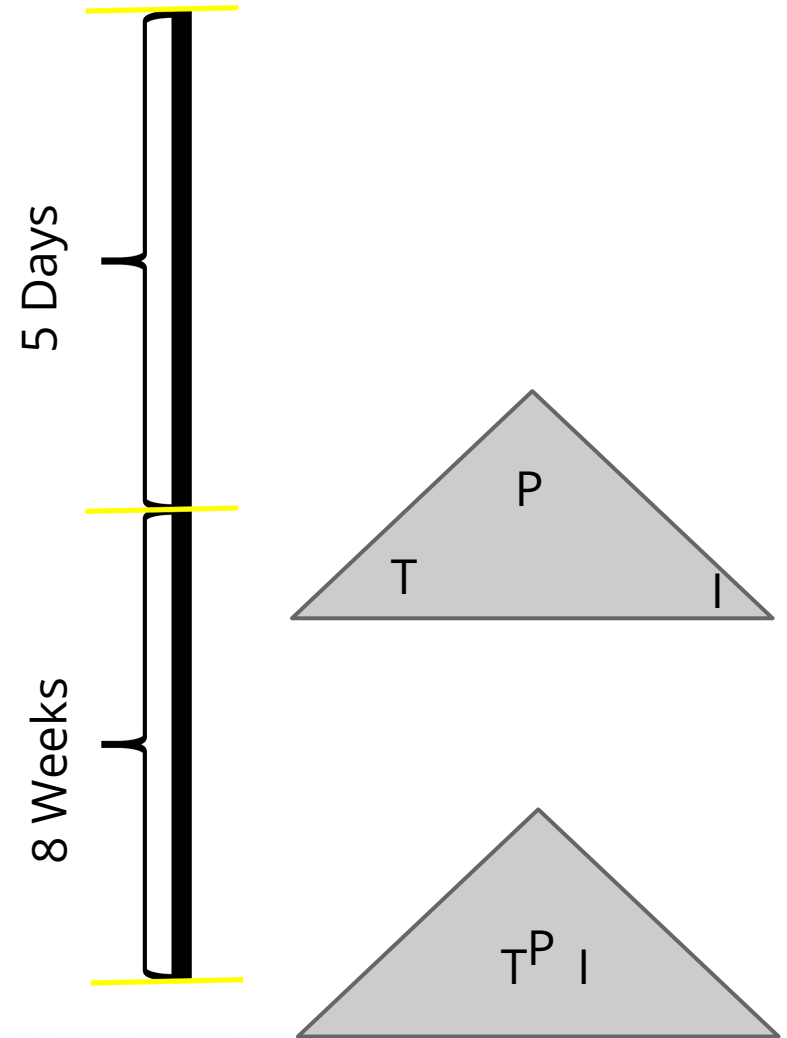
LATENCY REDUCTION



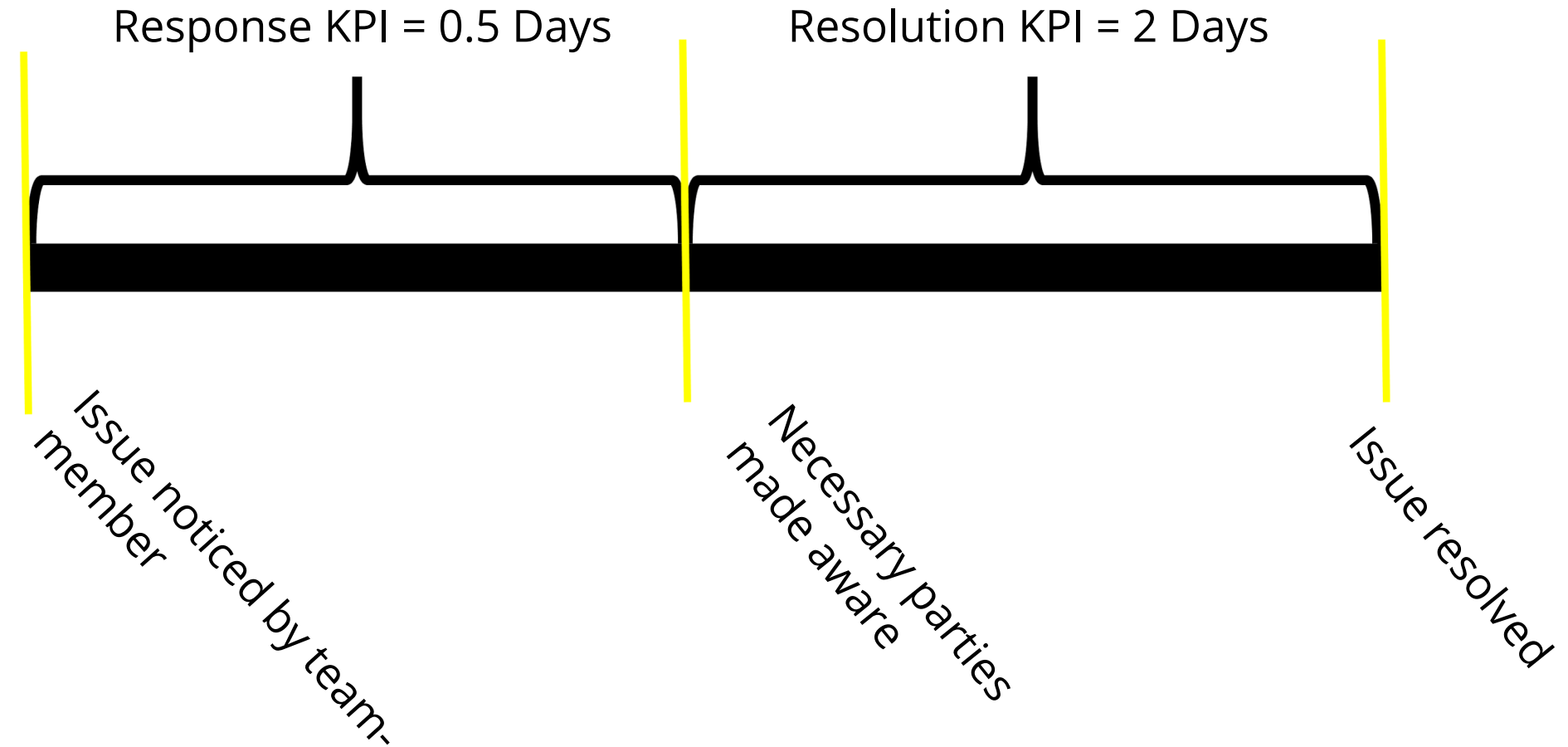
Optimizing Electrical System



Optimizing Building Siting

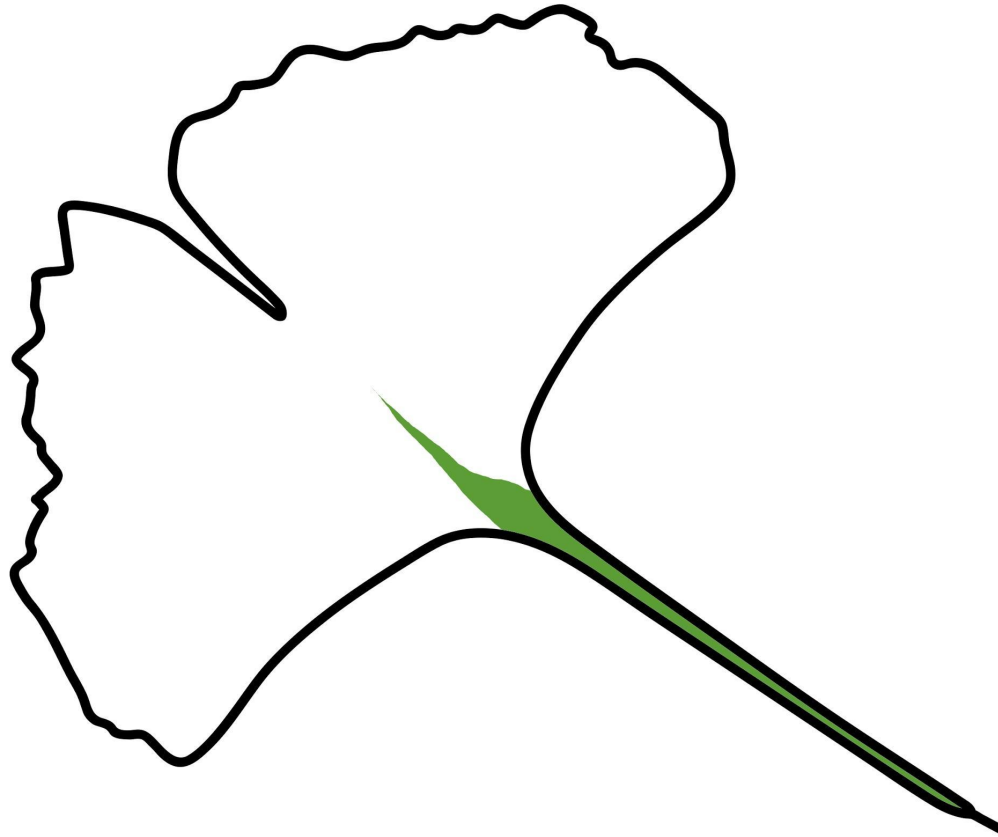


LATENCY - KPI



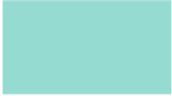
THE STEM

FLOOR PLANS

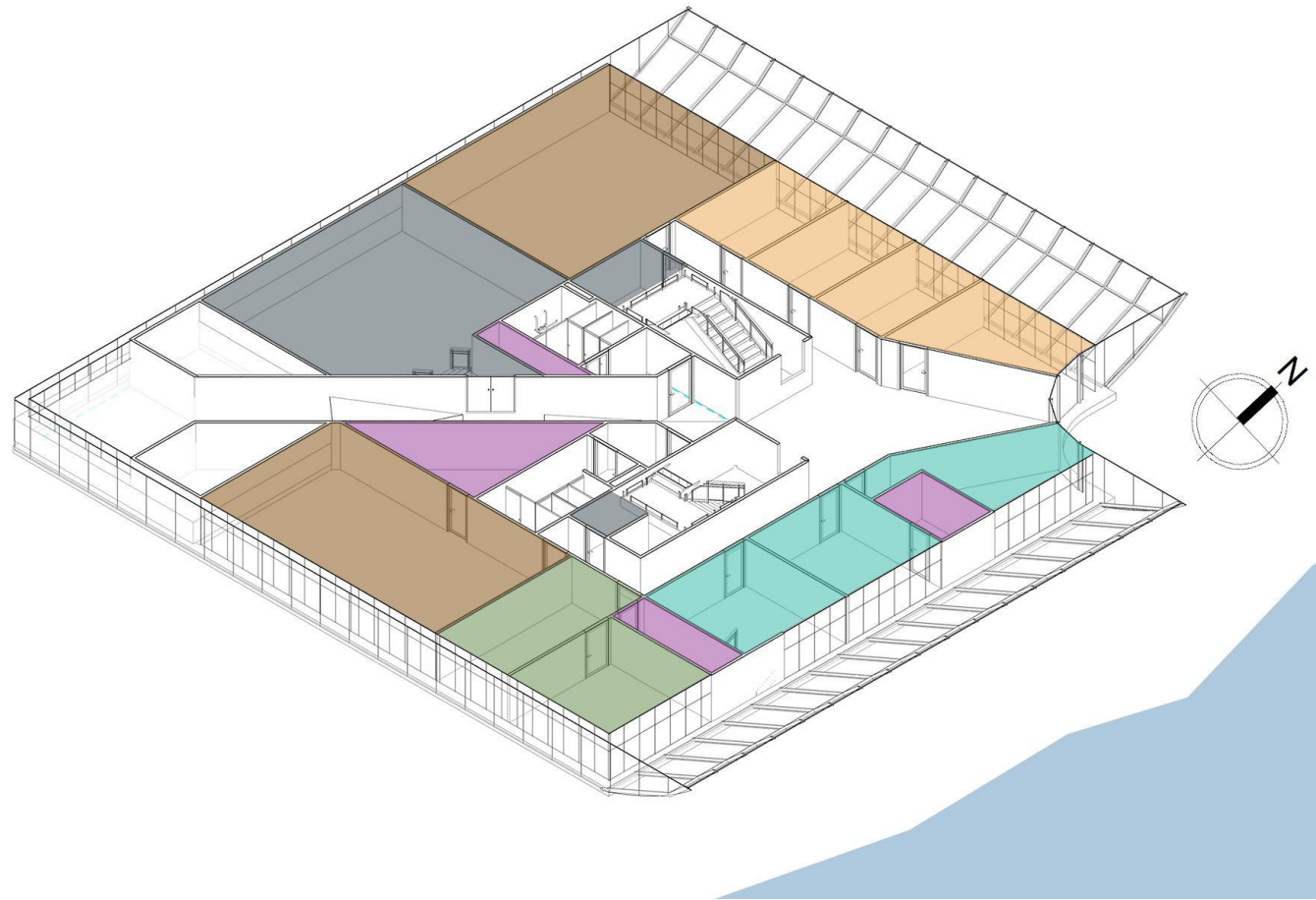


A SE MEP CM LCFM

ARCHITECTURAL - GROUND FLOOR

	INSTRUCTIONAL LAB
	SEMINAR ROOM
	SMALL CLASSROOM
	LARGE CLASSROOM
	ADMINISTRATION
	STUDENT OFFICES
	FACULTY OFFICES
	MECHANICAL
	RENTABLE
	STORAGE

ARCHITECTURAL - GROUND FLOOR

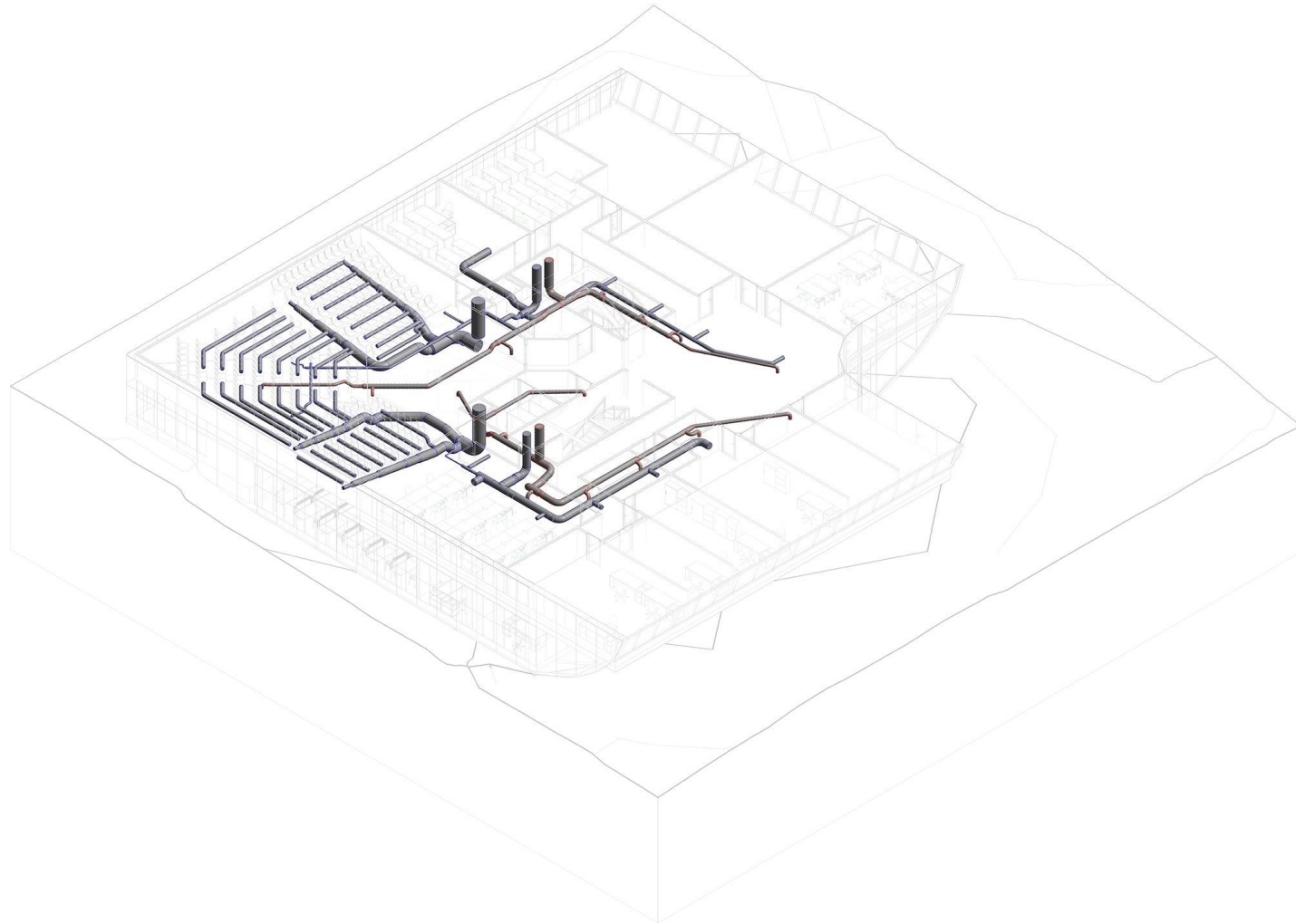




MECHANICAL - GROUND FLOOR



HVAC SYSTEM

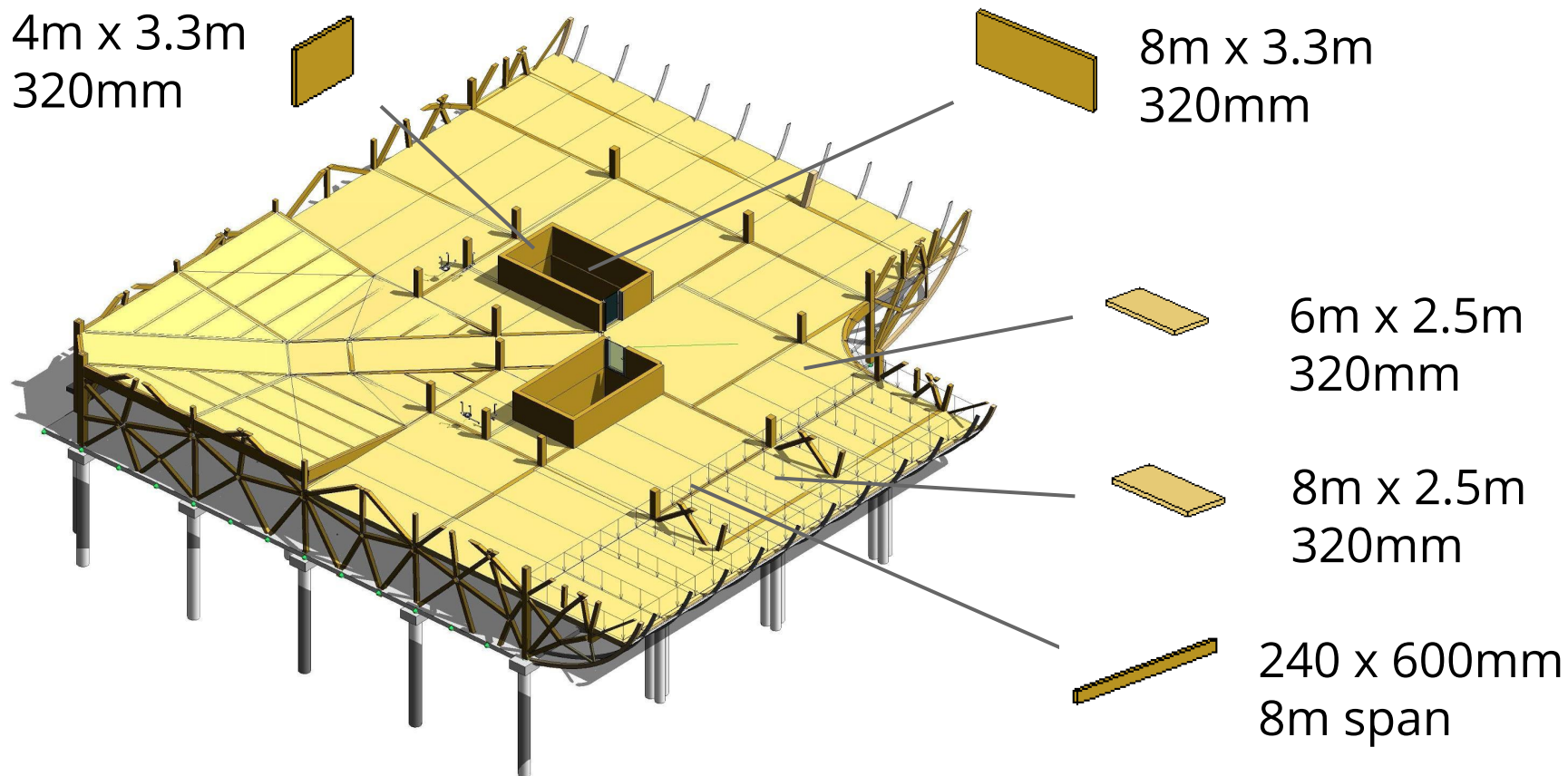




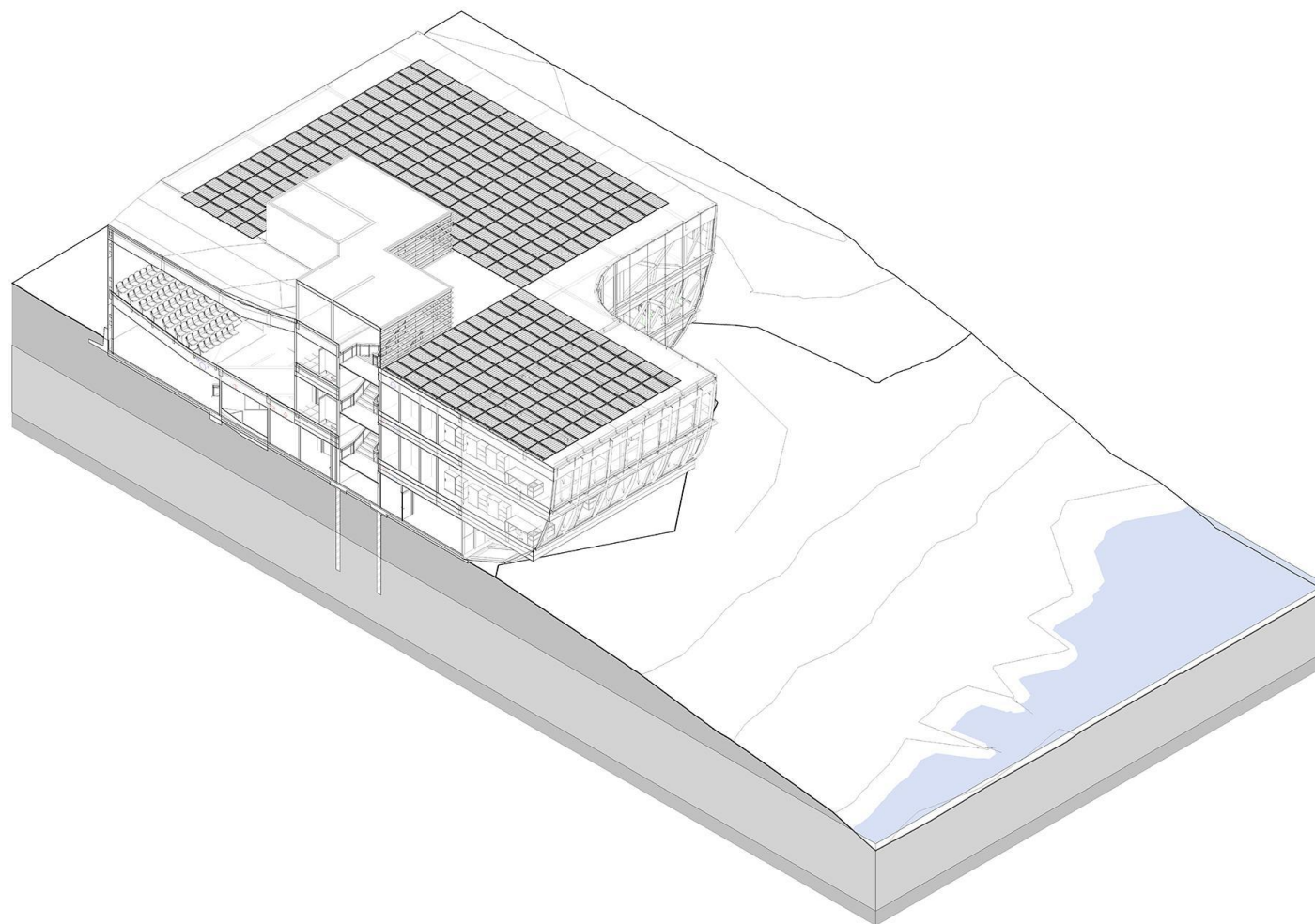
STRUCTURAL - FIRST FLOOR



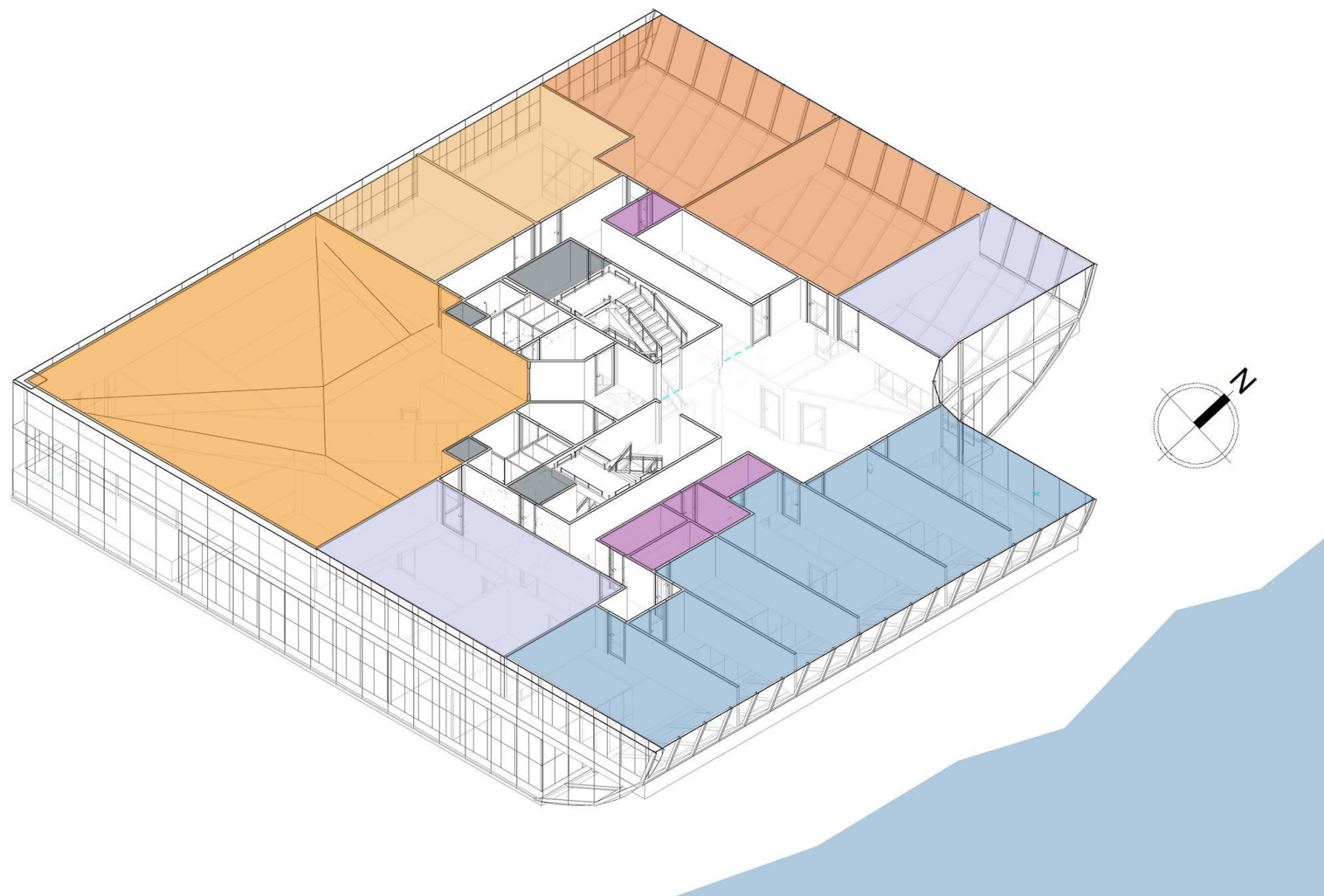
CLT & GLULAM



SECTION CUT

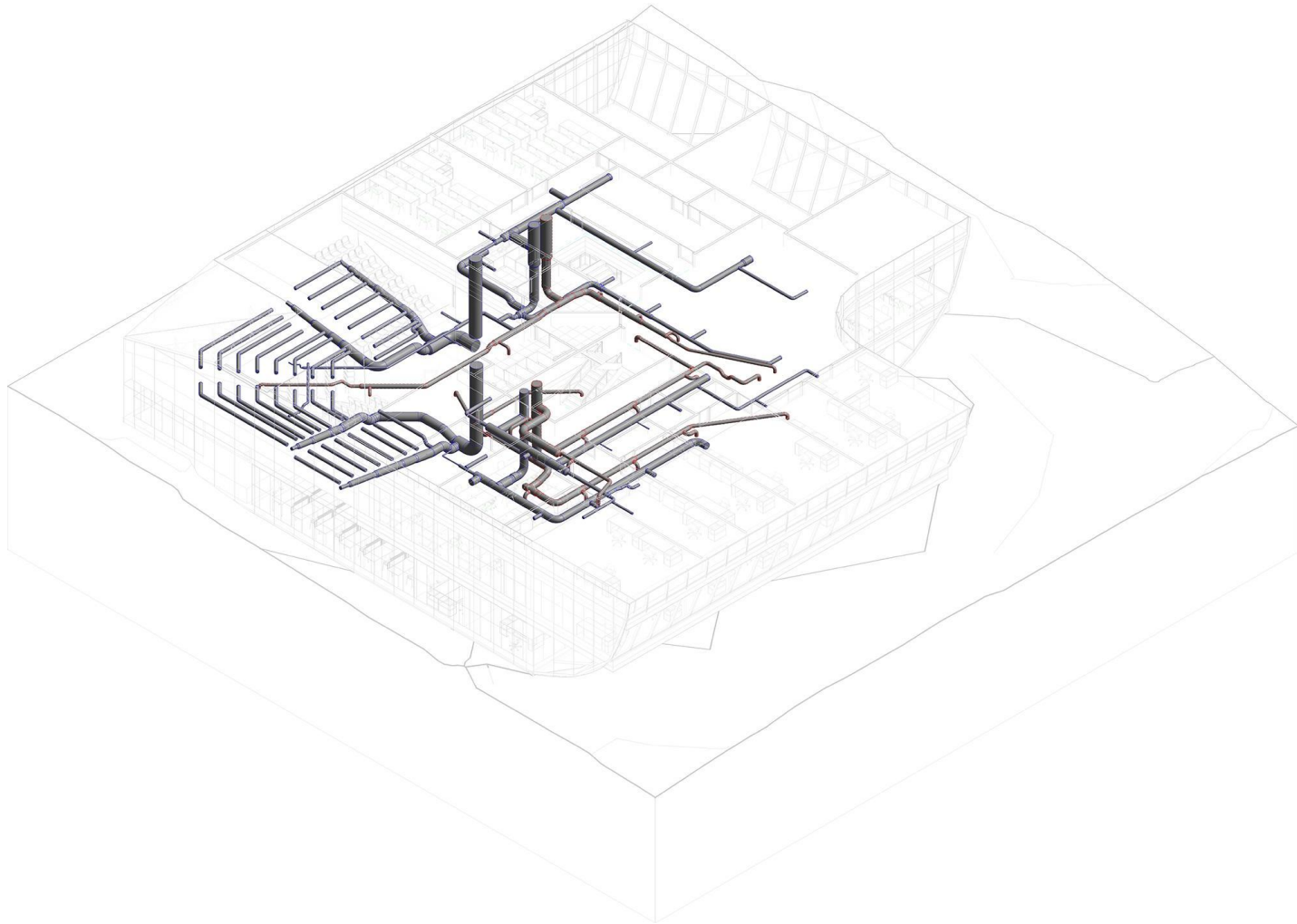


ARCHITECTURAL - FIRST FLOOR



MECHANICAL - FIRST FLOOR

HVAC SYSTEM

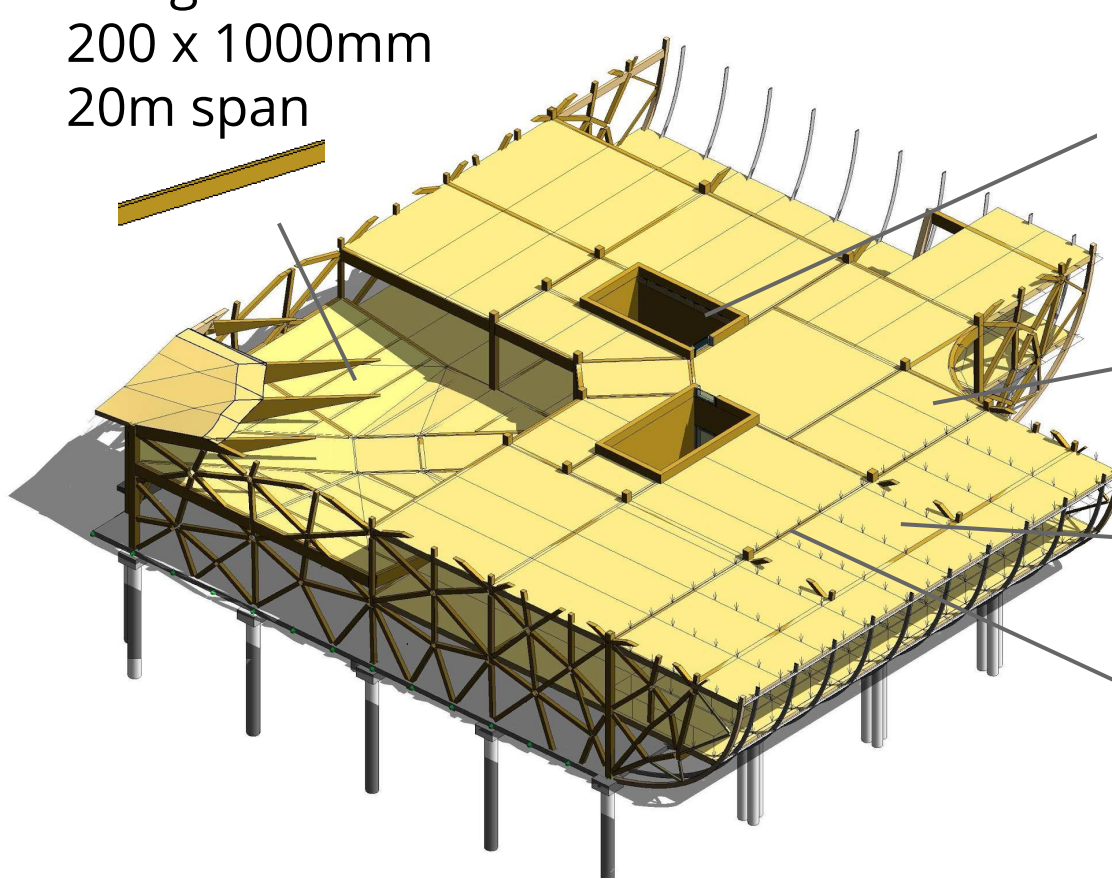


STRUCTURAL - SECOND FLOOR



CROSS LAMINATED TIMBER (CLT) & GLULAM

3 Segments
200 x 1000mm
20m span



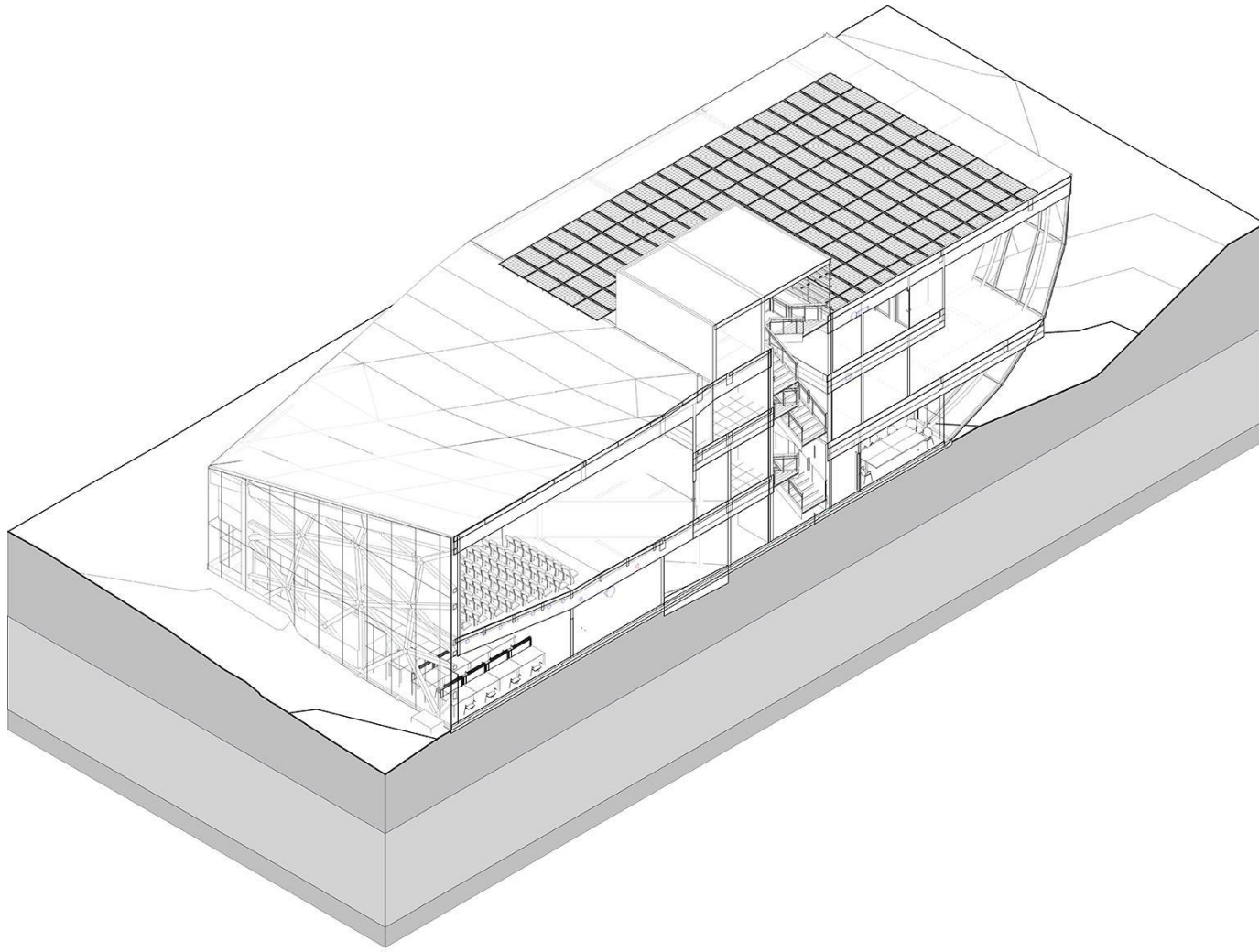
8m x 5.3m
320mm

5m x 2.5m
240mm

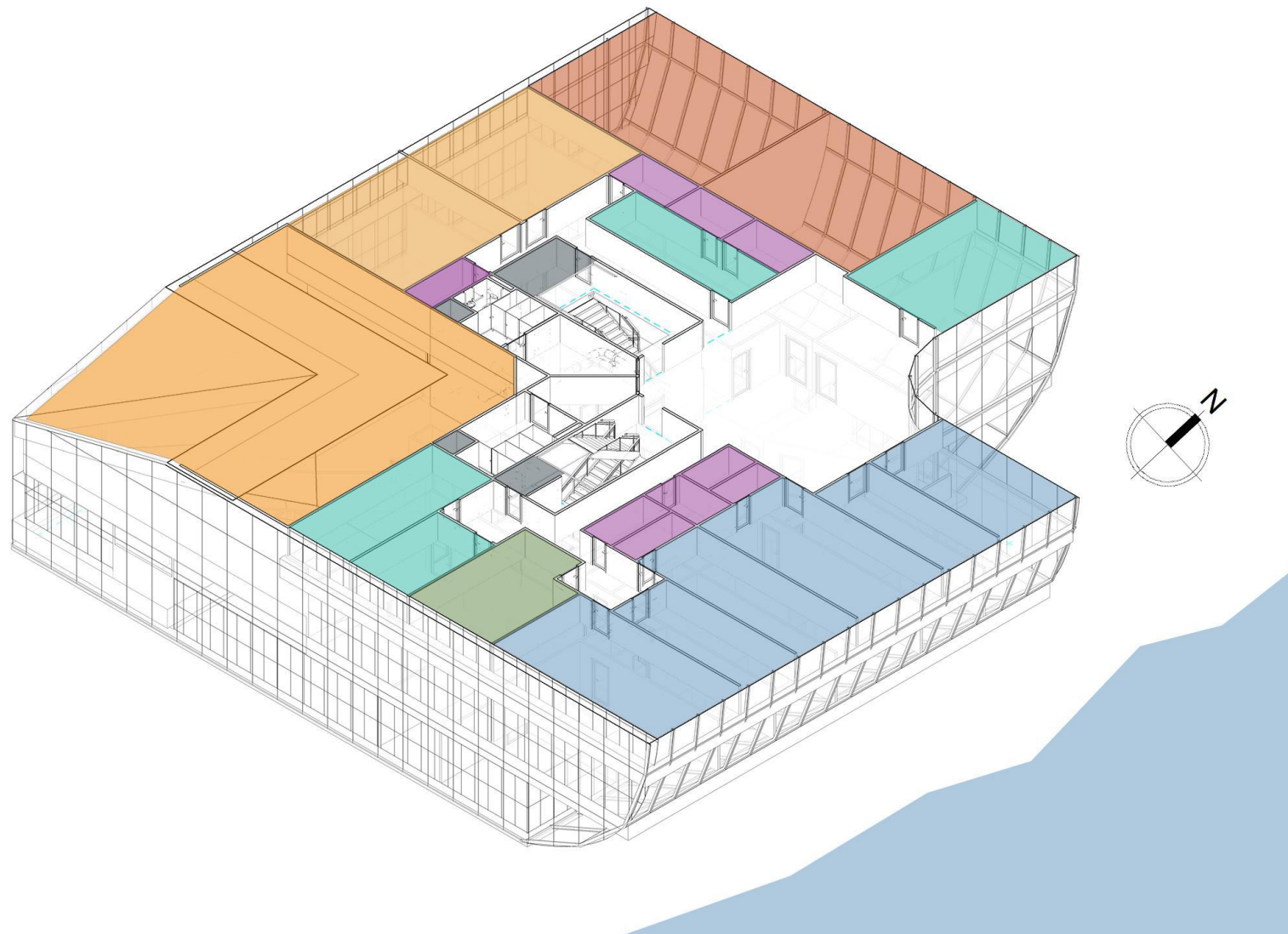
8m x 2.5m
320mm

240 x 600mm
8m span

SECTION CUT

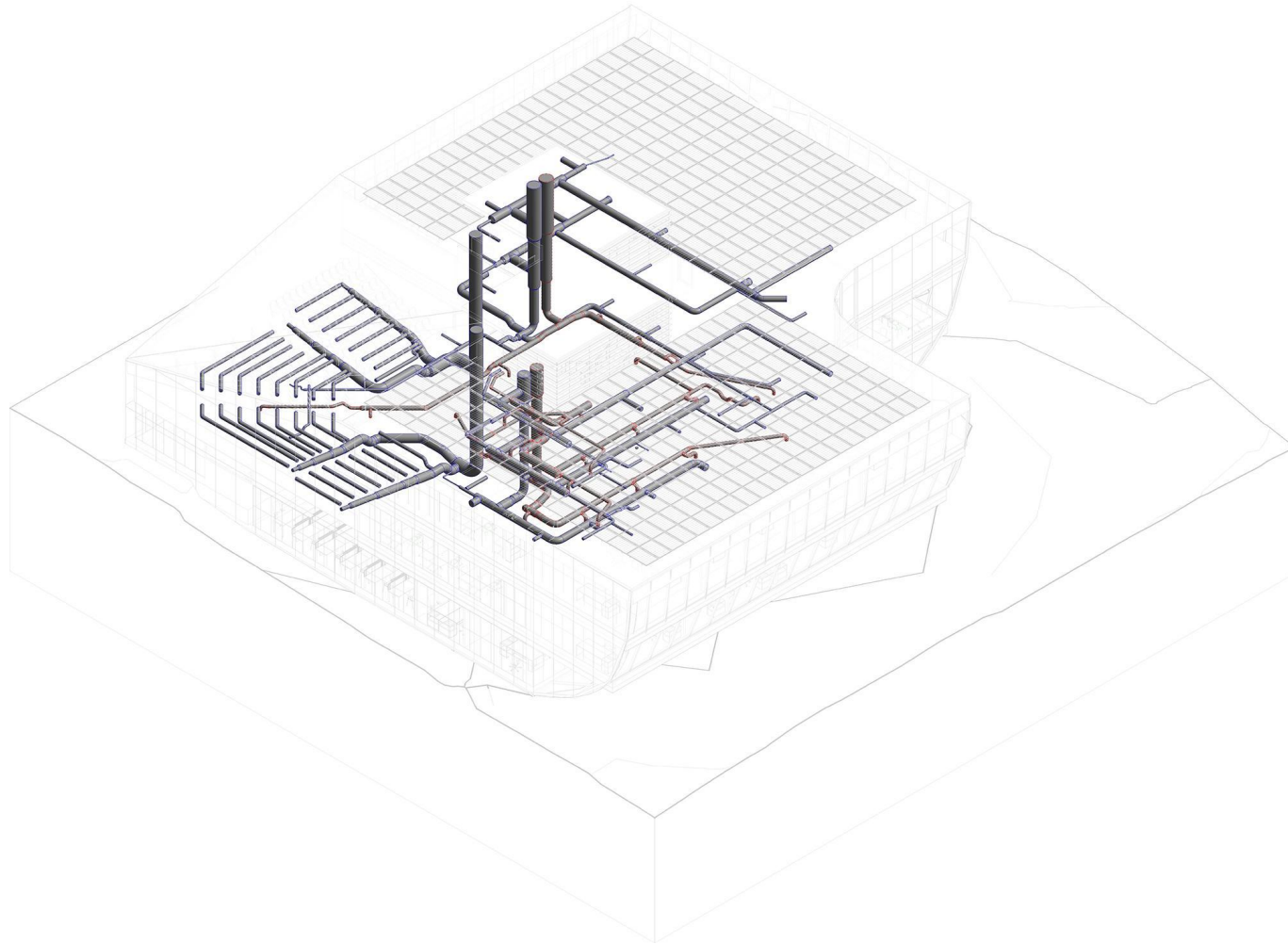


ARCHITECTURAL - THIRD FLOOR



MECHANICAL - THIRD FLOOR

HVAC SYSTEM

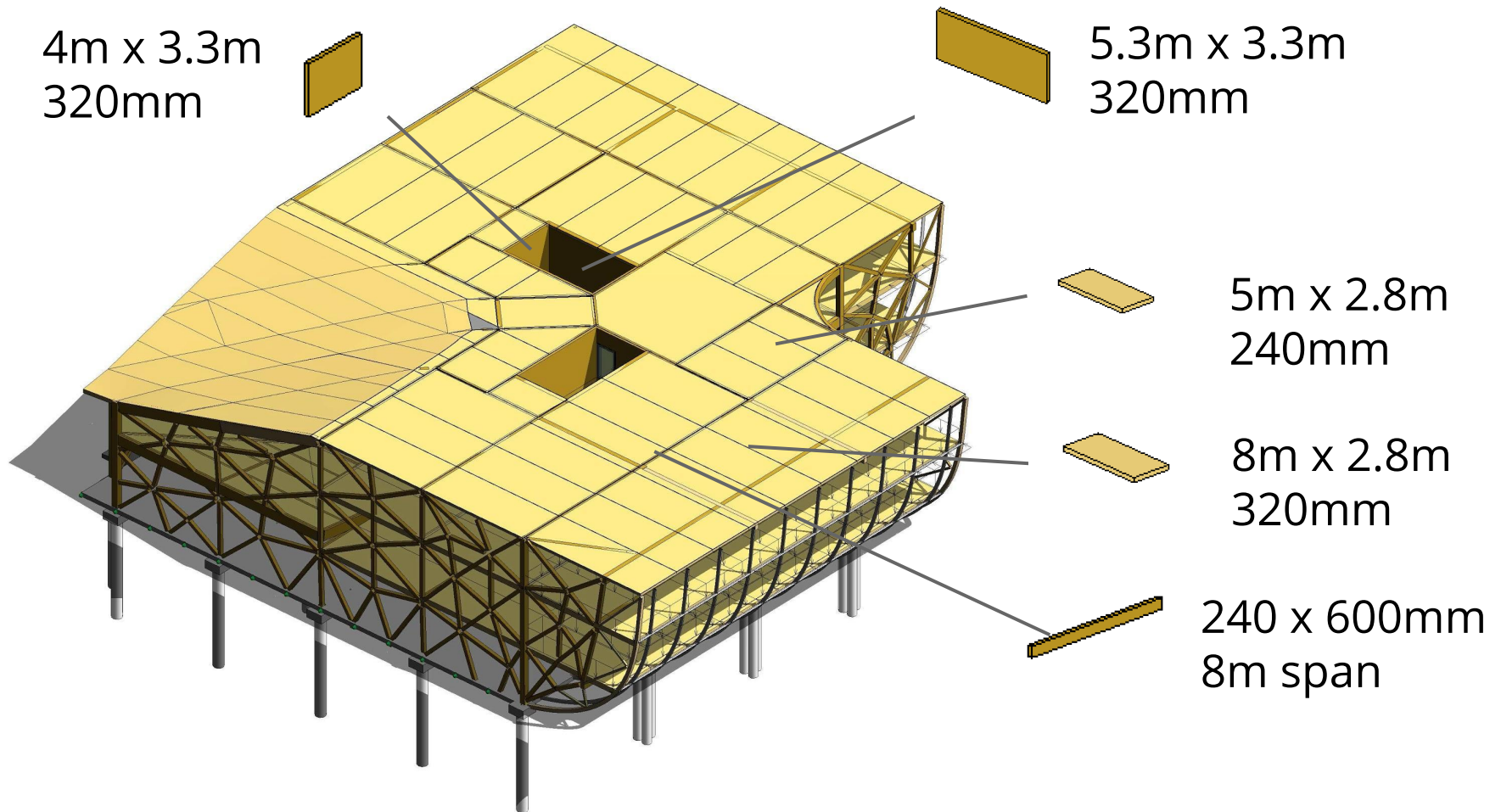




STRUCTURAL - ROOF

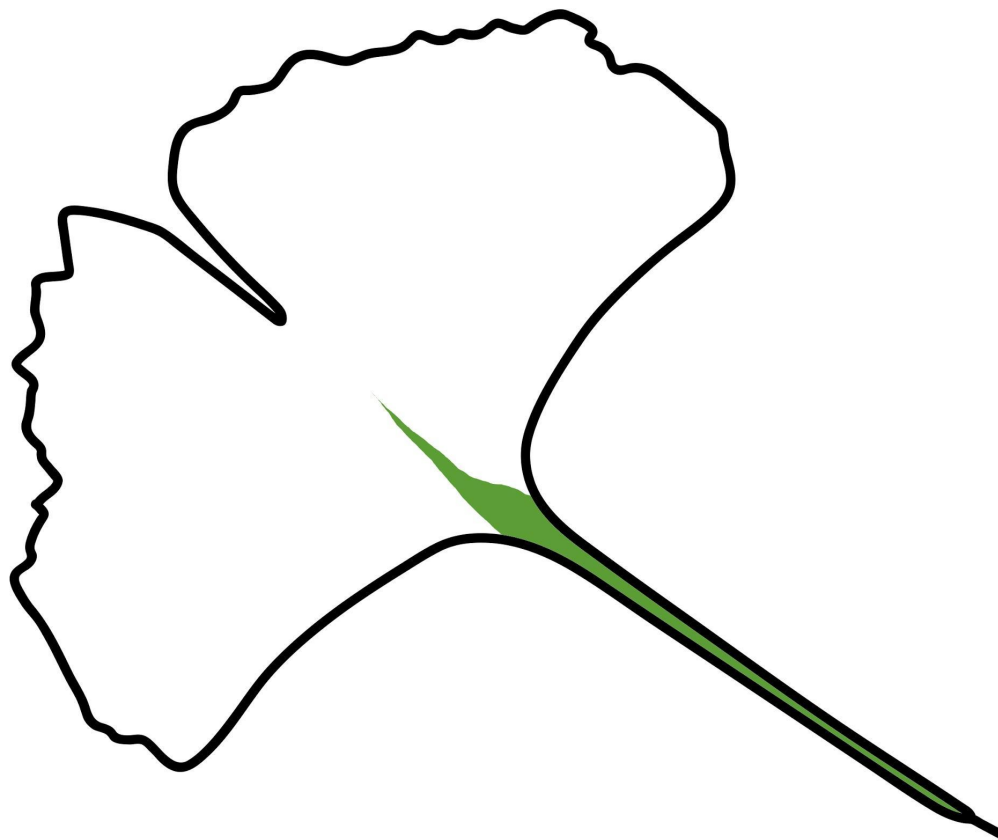


CLT & GLULAM



THE STEM

TEAM PROCESS - LINKING



A

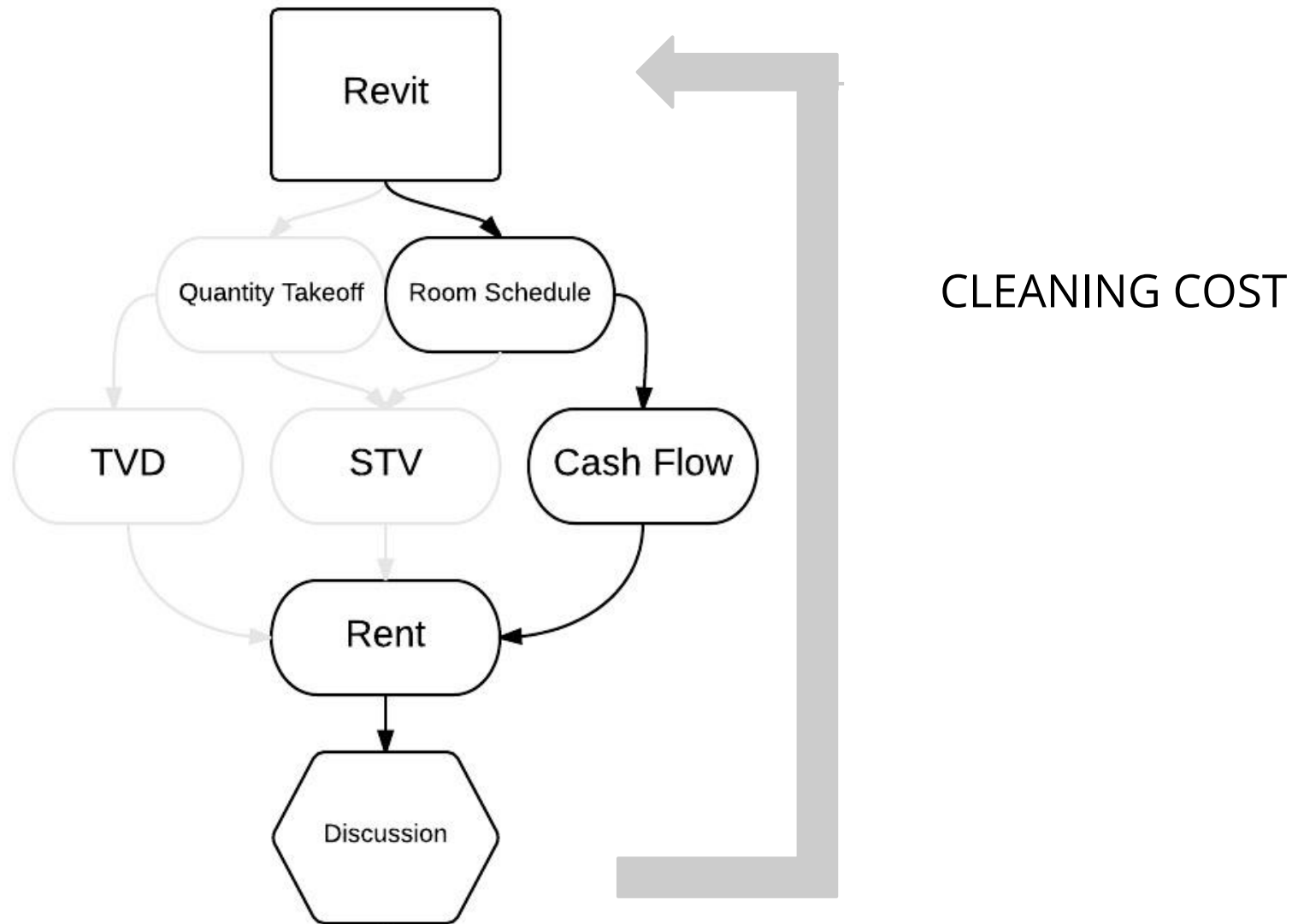
MEP

CM

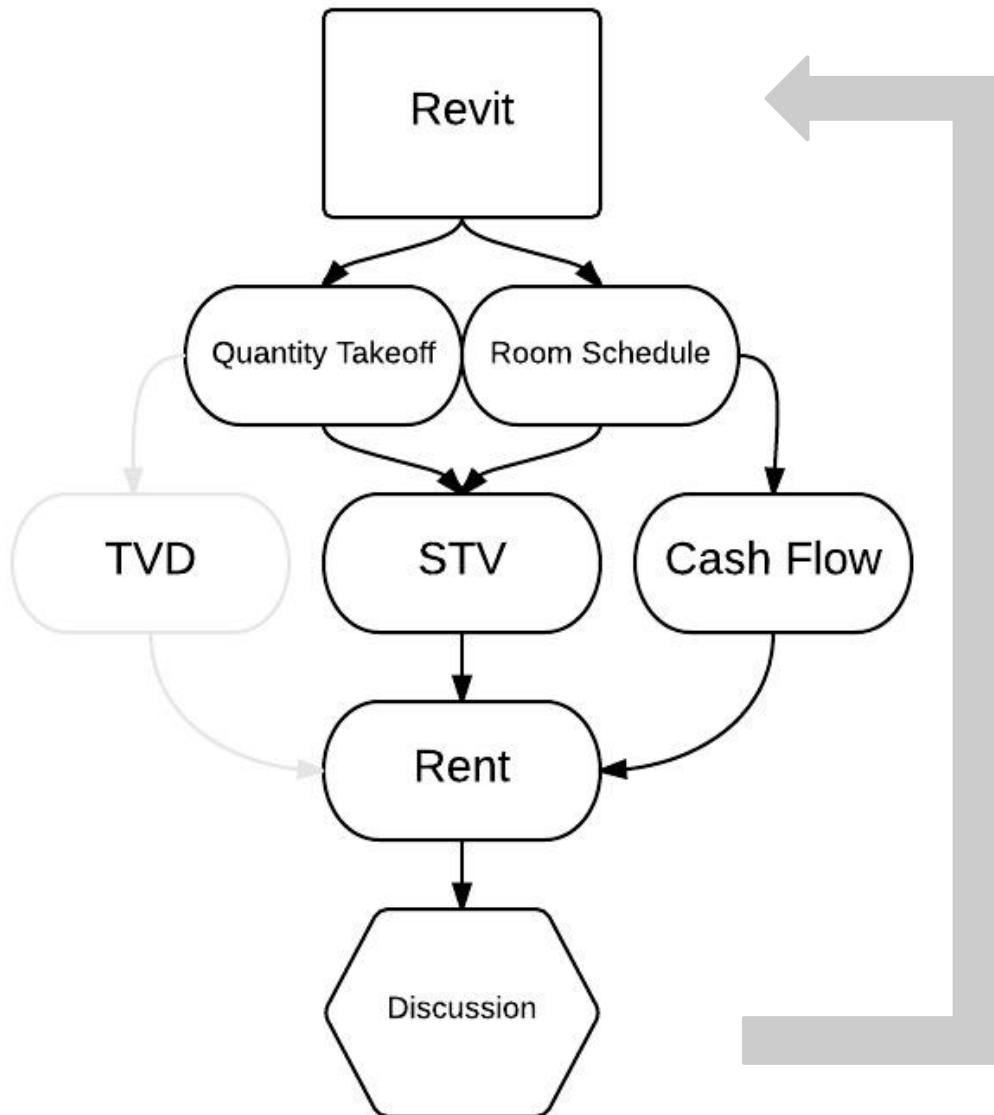
LCFM



REVIT & CASH FLOW (CF)



STV & CASH FLOW



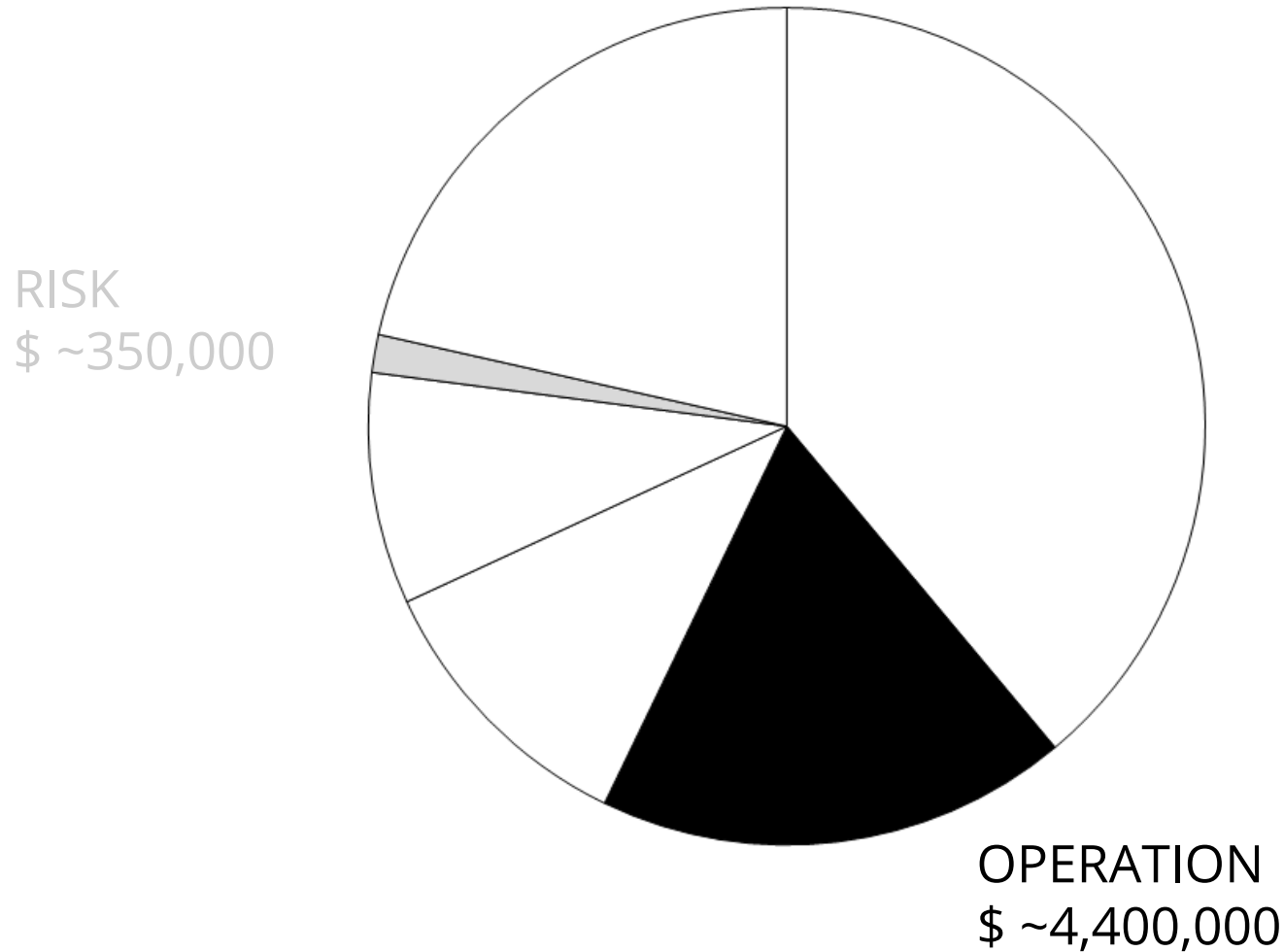
ENERGY COST

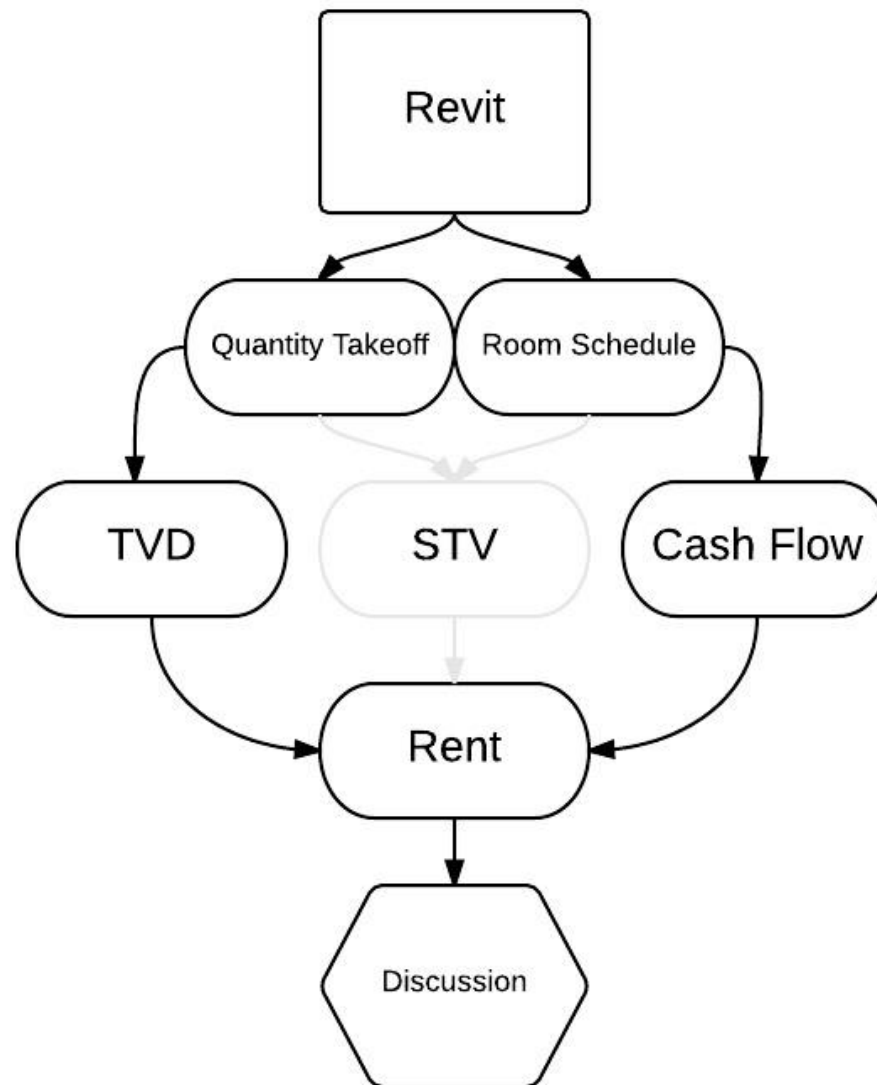
WATER SERVICE COST

WASTE WATER COST



INFLUENCE ON LC





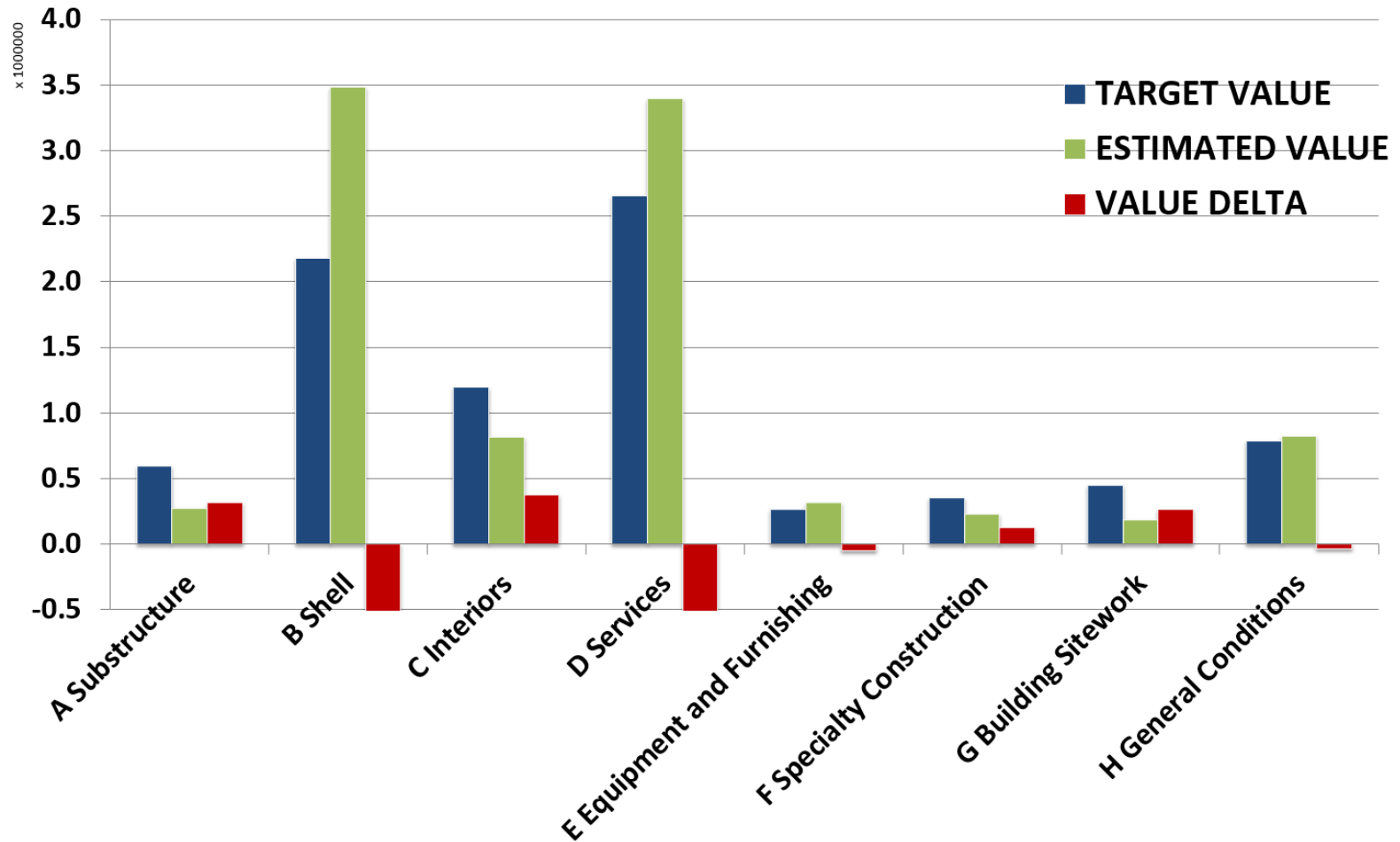
TARGET VALUE DESIGN



Target: \$8.5M

Cost: \$9.5M

TVD - TARGETS BY CLUSTER

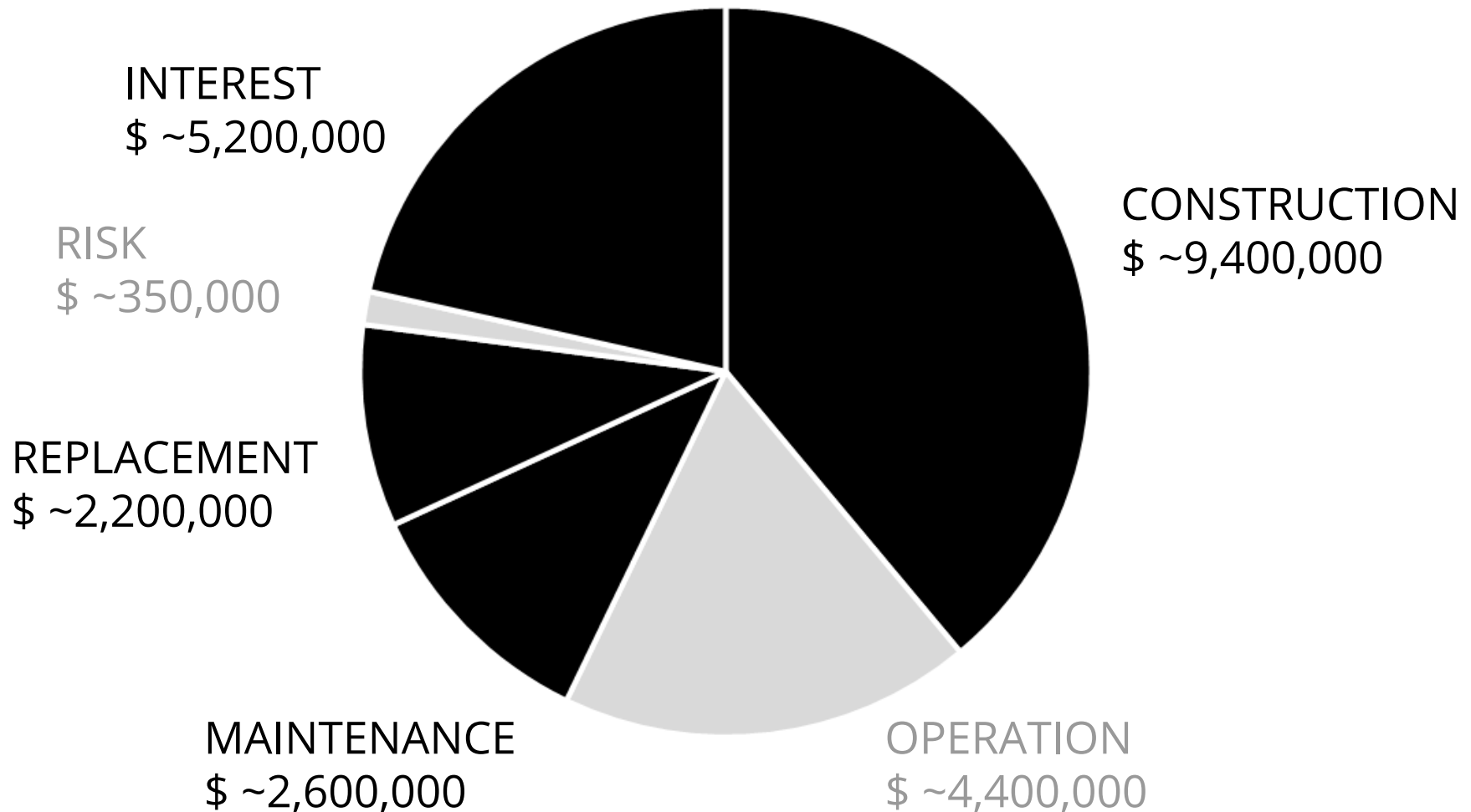


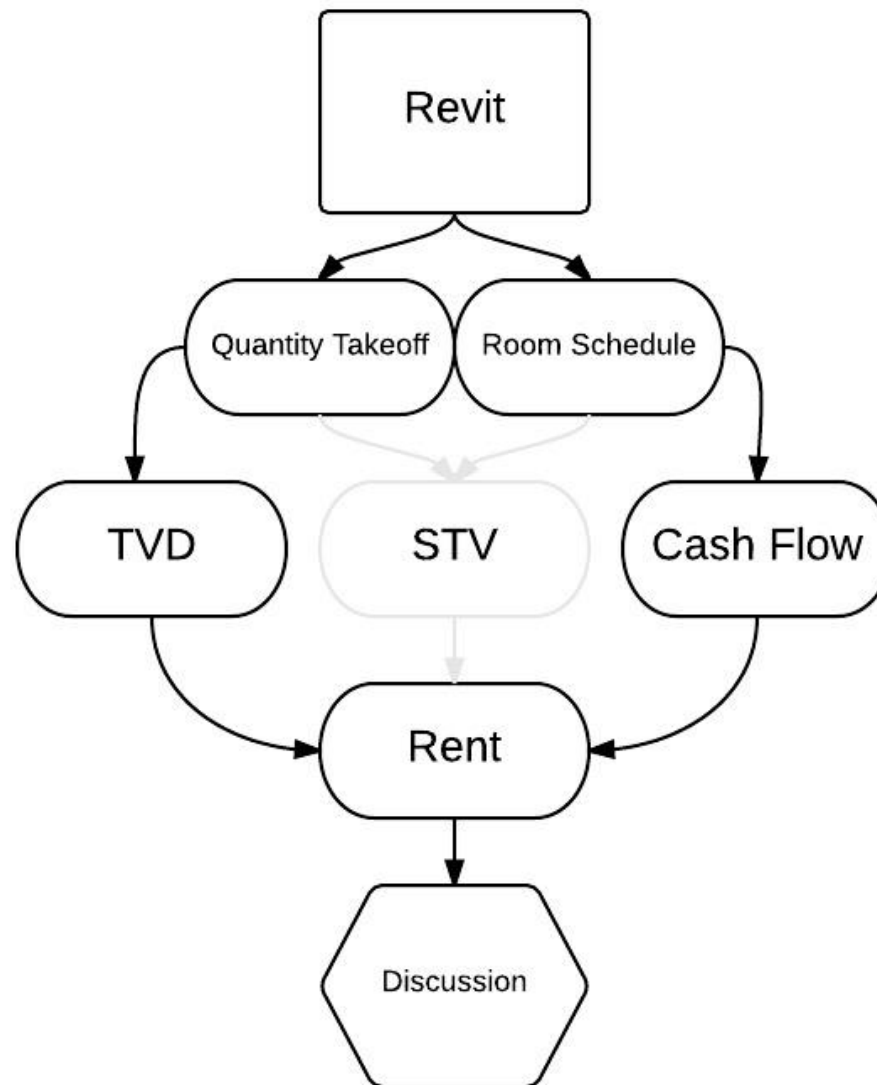


TVD & LIFE CYCLE COSTS

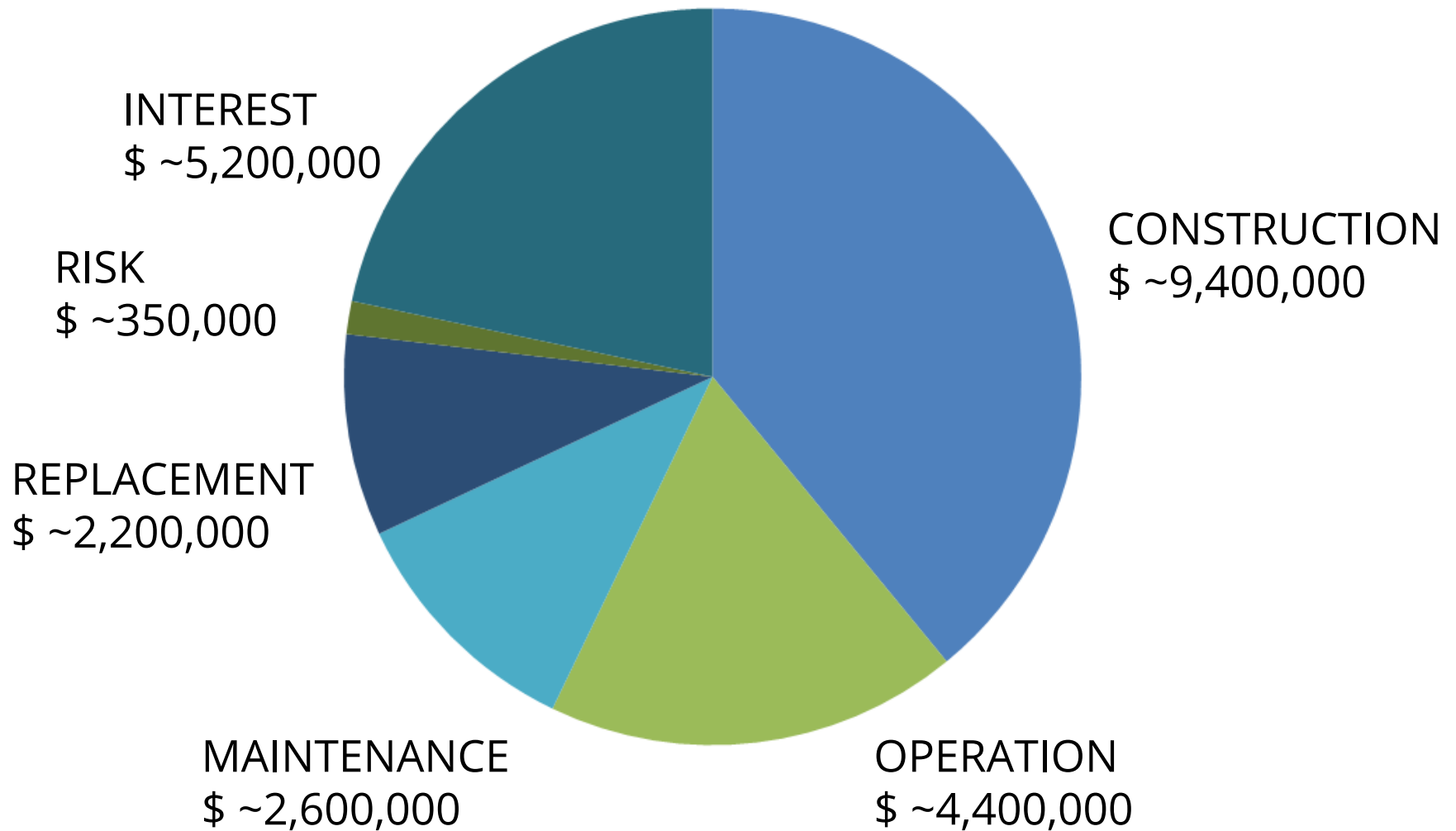


INFLUENCE ON LCC





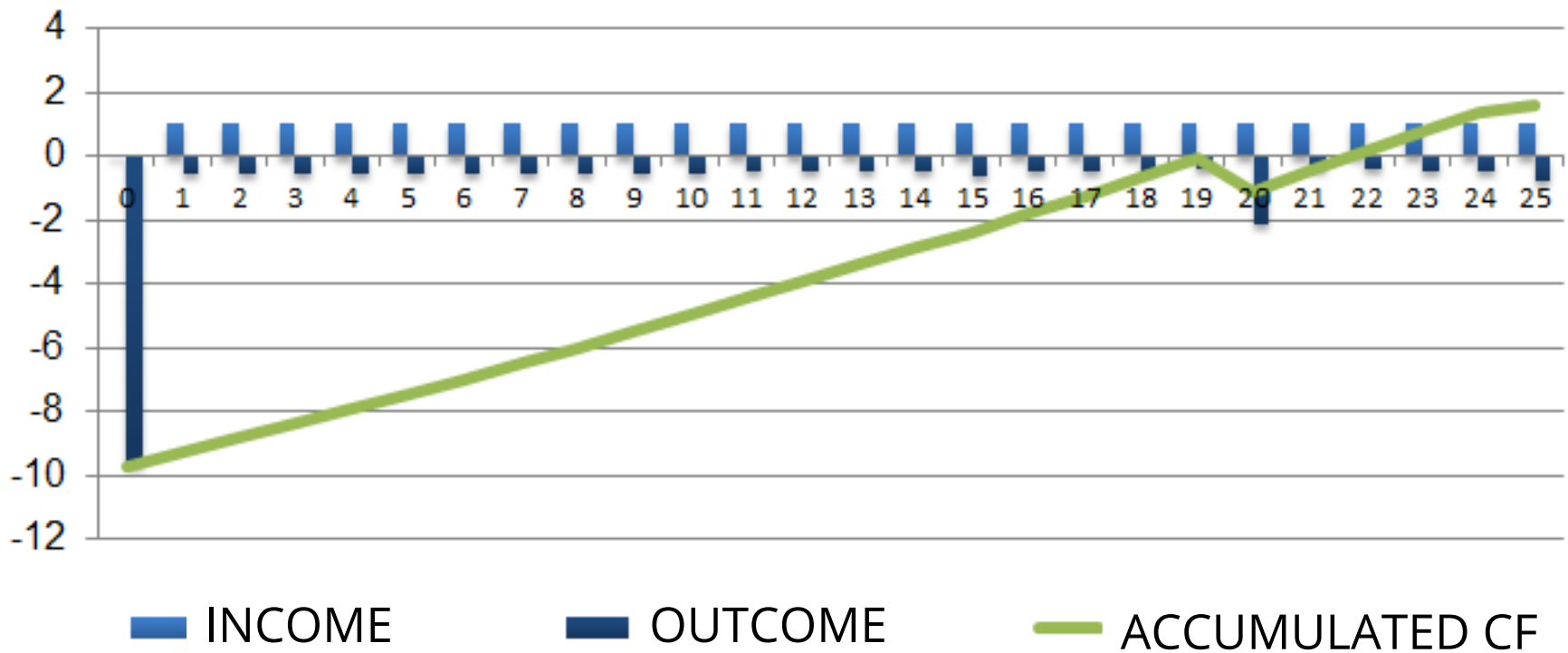
OVERALL LCC



RENT

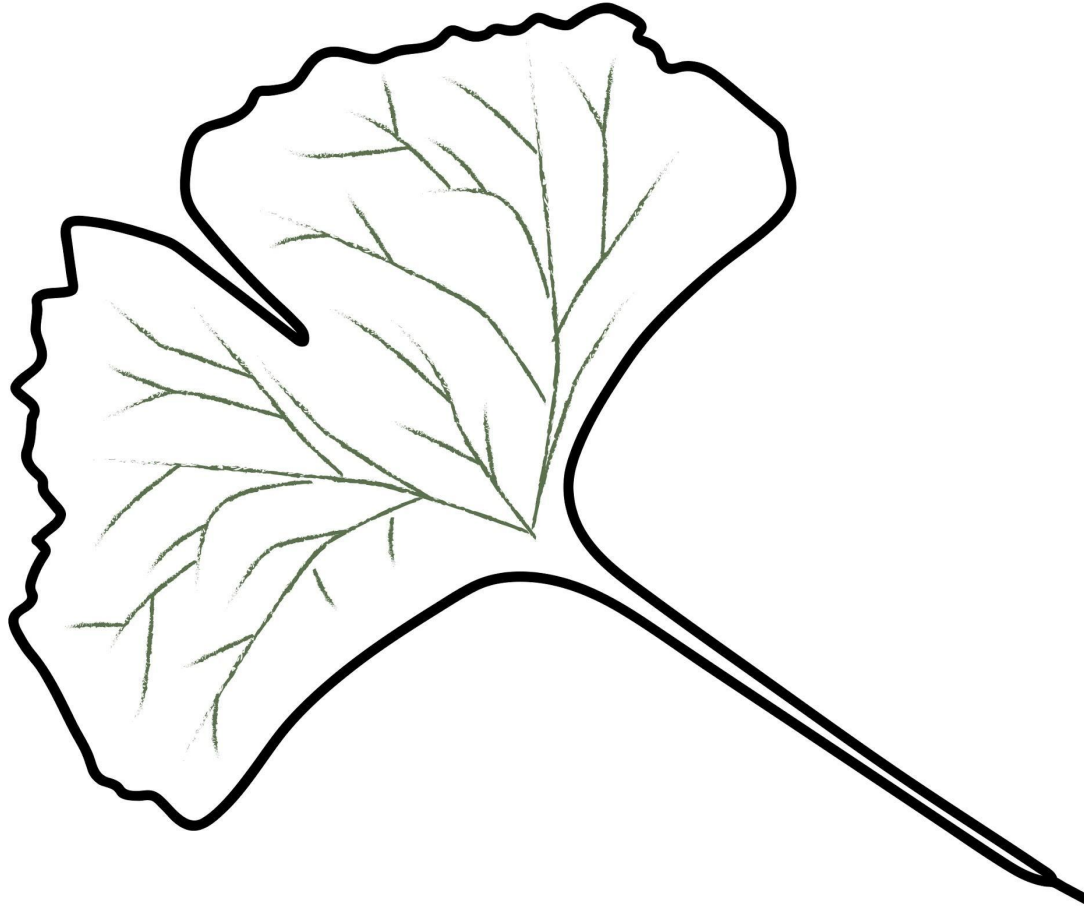


MILLION \$

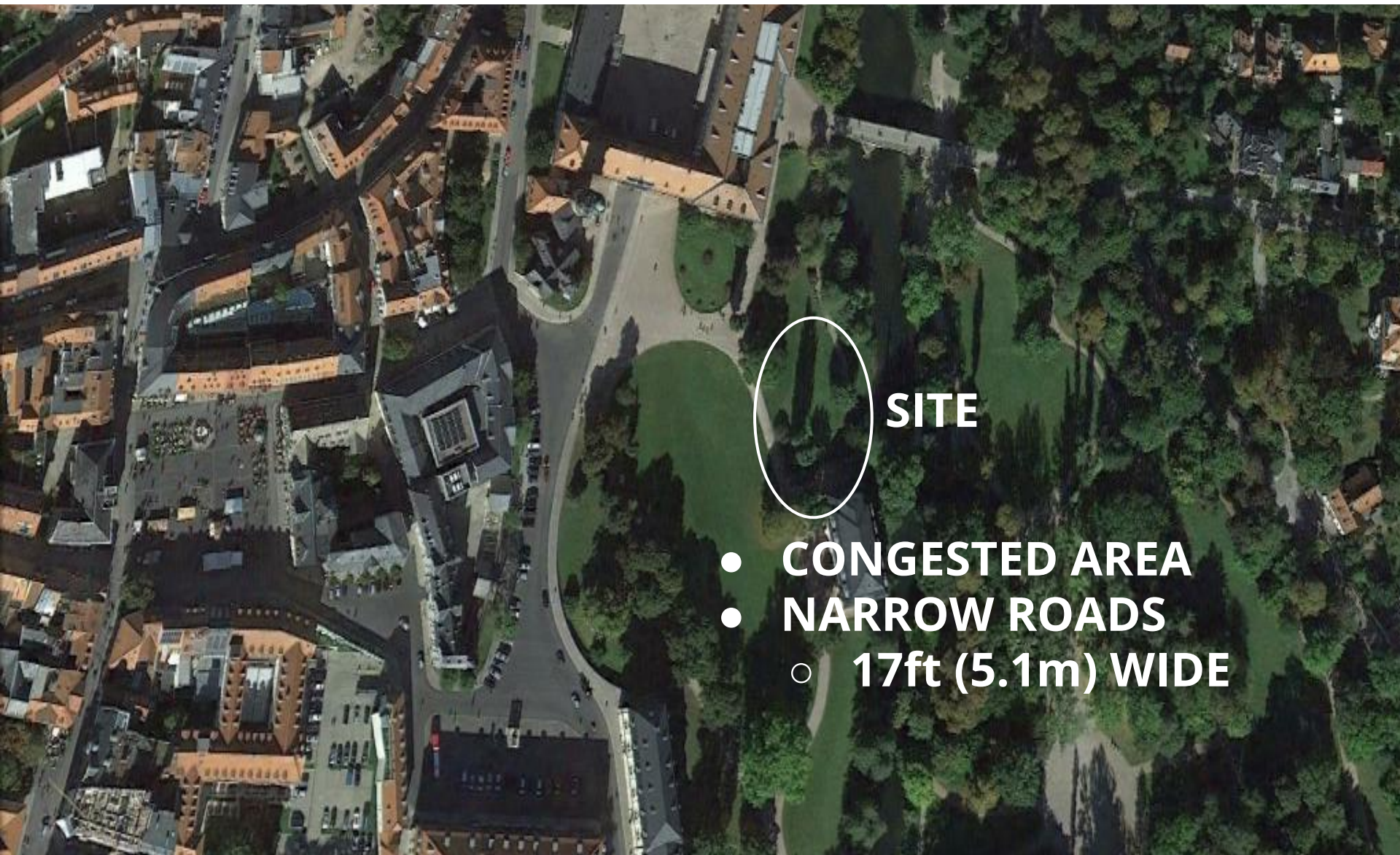


THE VEINS

SYSTEMS INTEGRATION - STRUCTURAL



SITE ACCESS



SITE

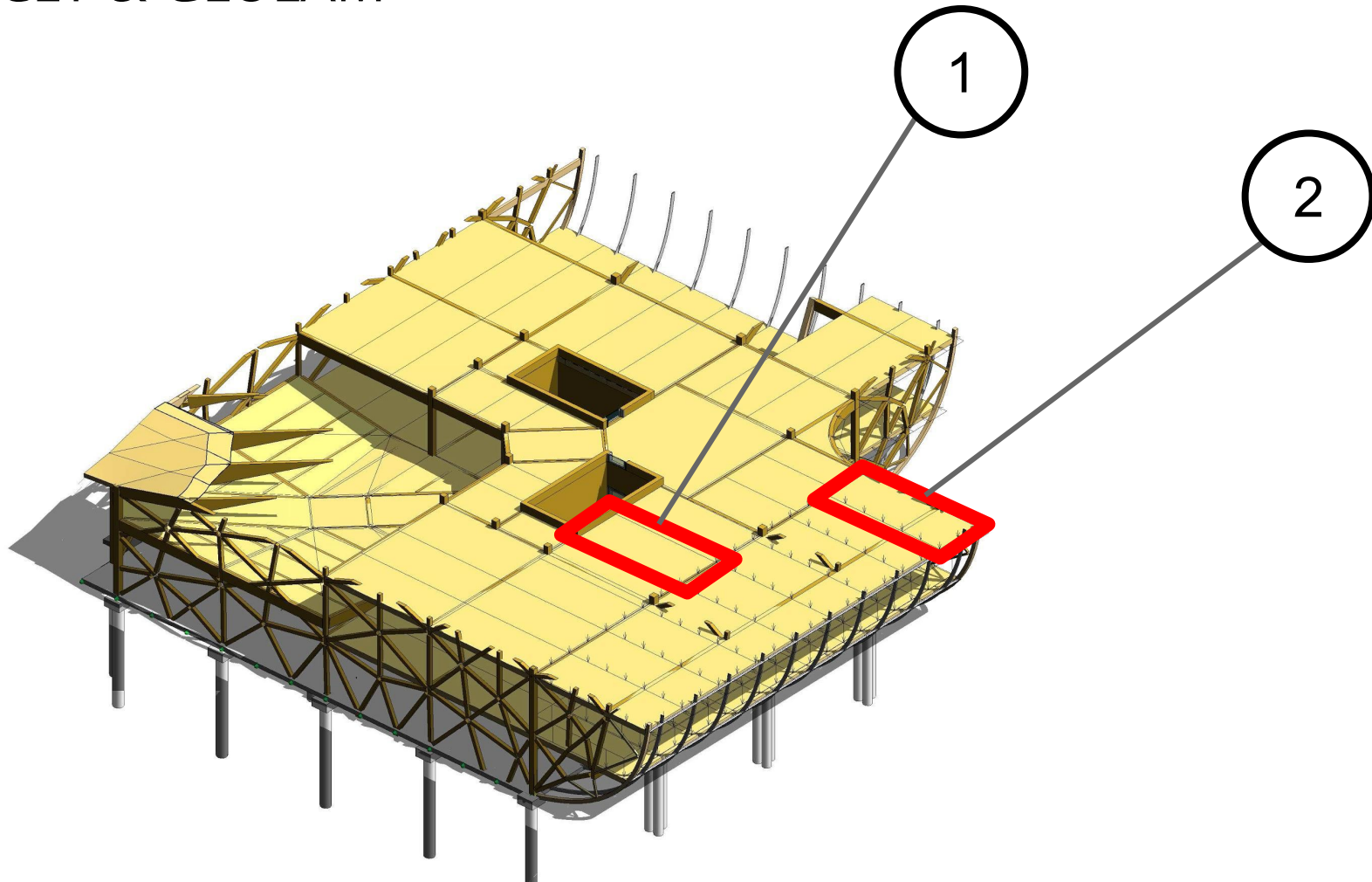
- **CONGESTED AREA**
- **NARROW ROADS**
 - **17ft (5.1m) WIDE**



SLAB DEVELOPMENT



CLT & GLULAM



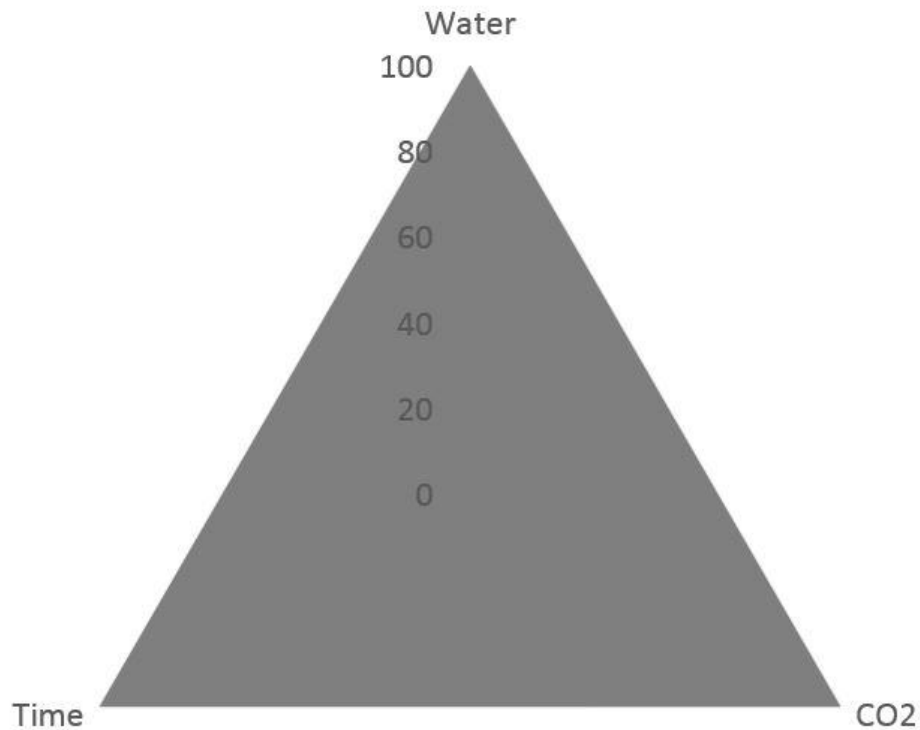
FLOOR SYSTEM EVOLUTION



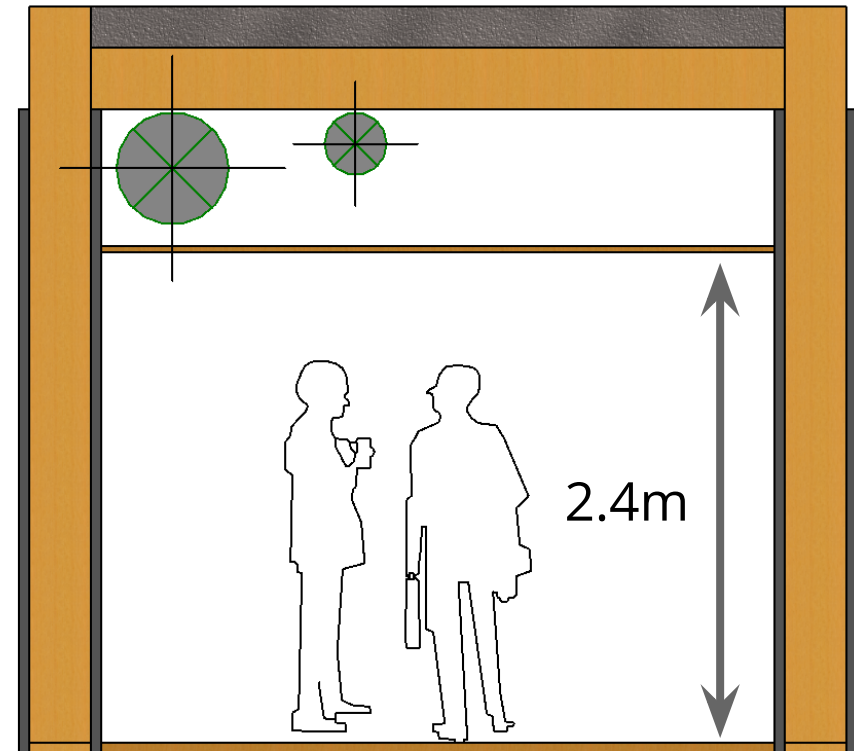
Concrete Composite System

EVOLUTION - DATA

CONCRETE



FLOOR-TO-FLOOR



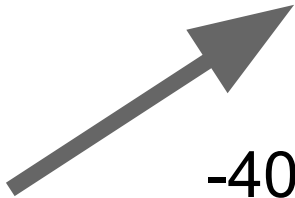
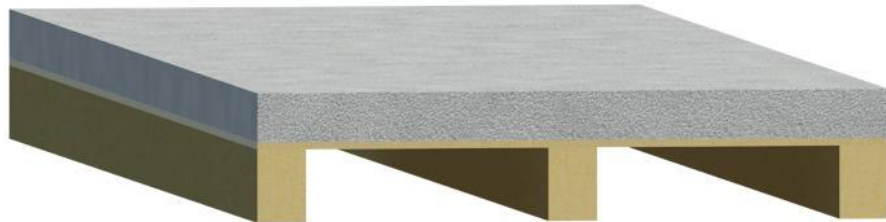
FLOOR SYSTEM EVOLUTION



Timber Beam System



-40% Water -30% CO2

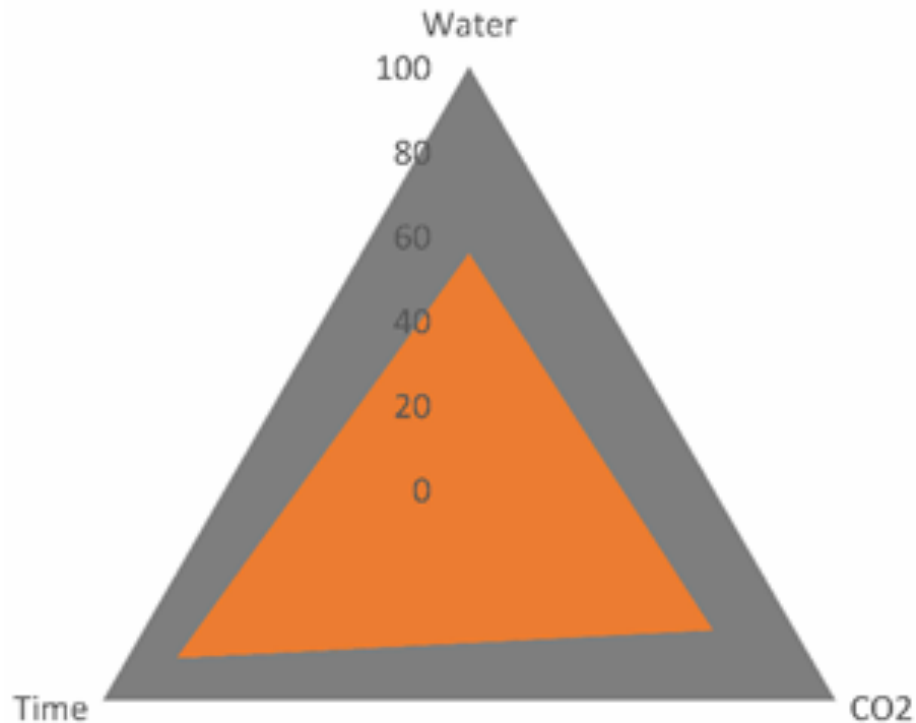


Concrete Composite System

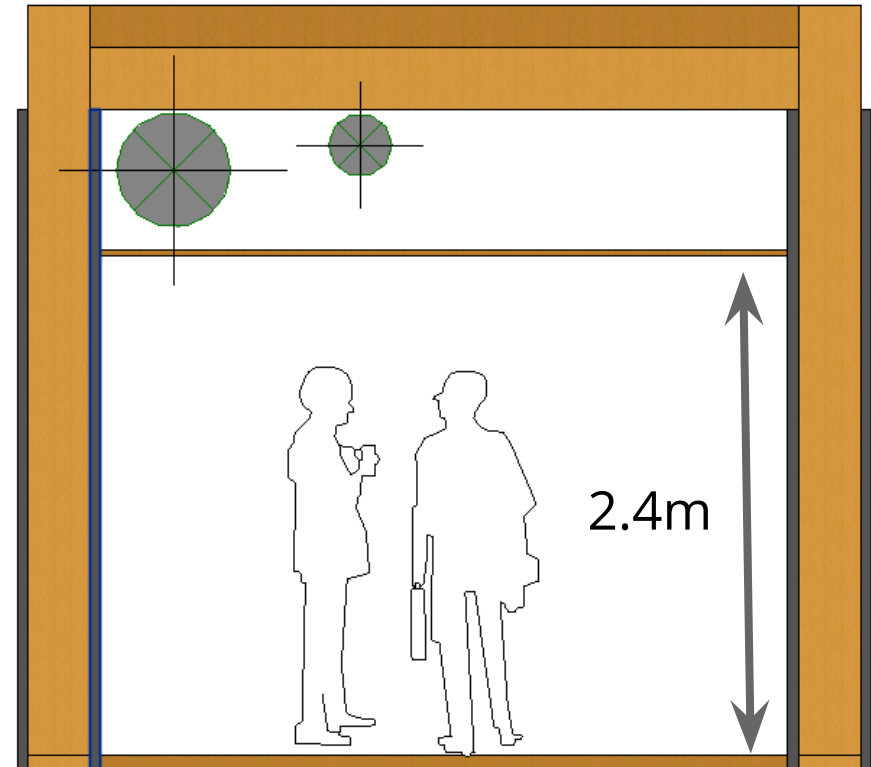


EVOLUTION - DATA

CONCRETE VS. TIMBER



FLOOR-TO-FLOOR



FLOOR SYSTEM EVOLUTION



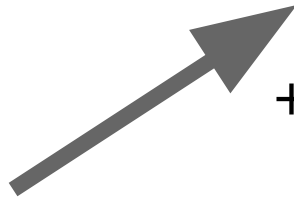
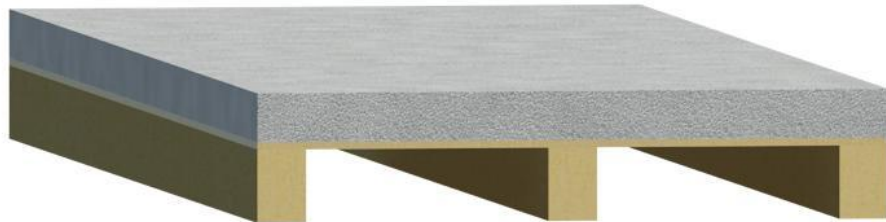
320mm CLT Slab



Timber Beam System



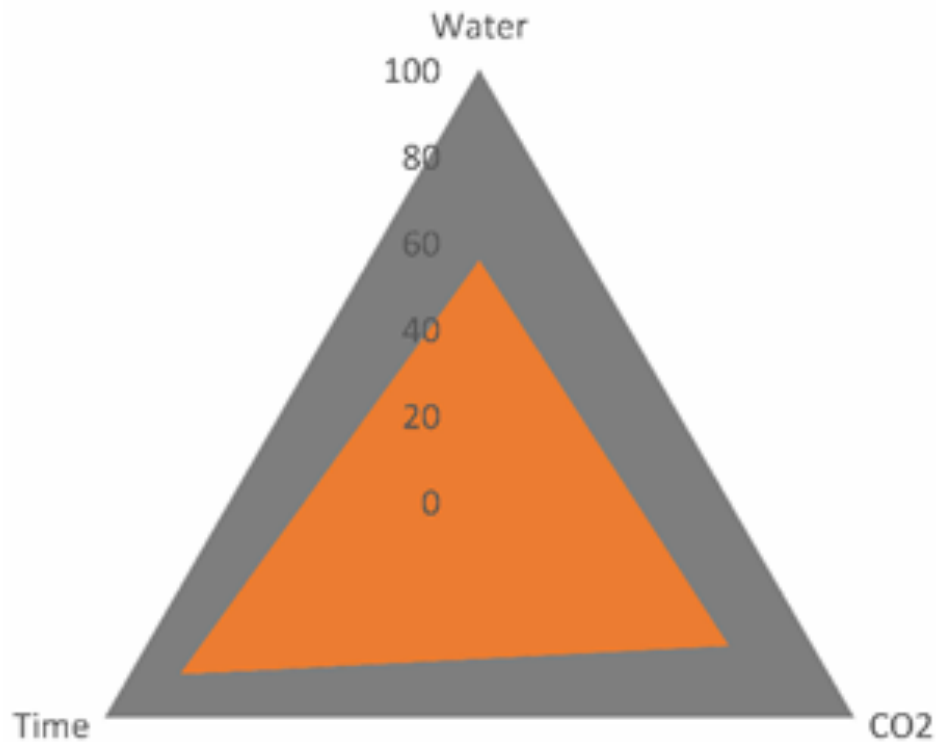
+ 30cm usable floor height



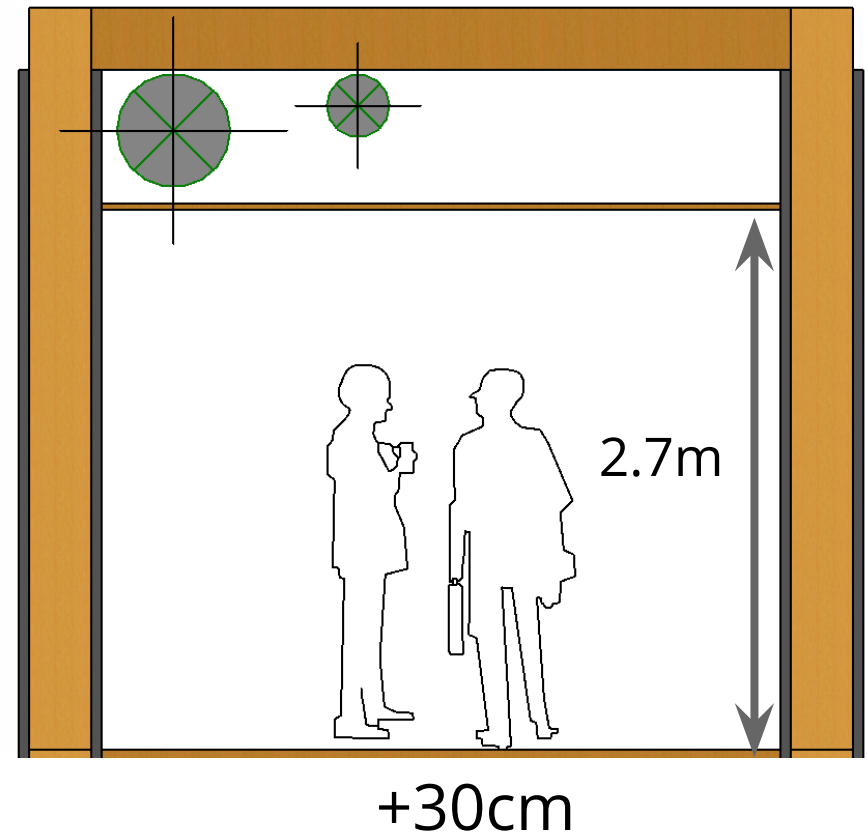
Concrete Composite System

EVOLUTION - DATA

TIMBER



FLOOR-TO-FLOOR



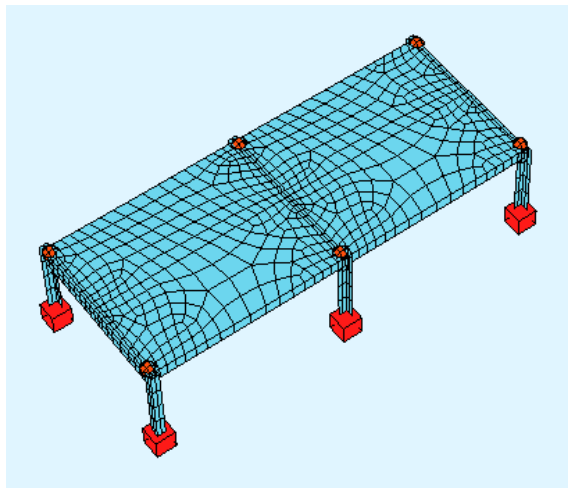
FLOOR ANALYSIS

1 SINGLE SPAN

7m



$$\Delta_{\text{allow}} = 2.3 \text{ cm} \quad \Delta_{\text{analysis}} = 2.2 \text{ cm}$$



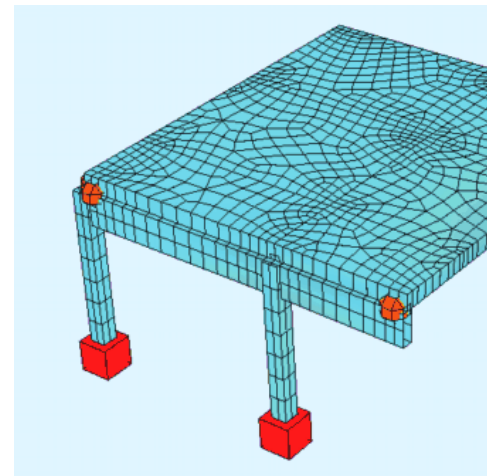
2 CANTILEVERED SLAB

6m

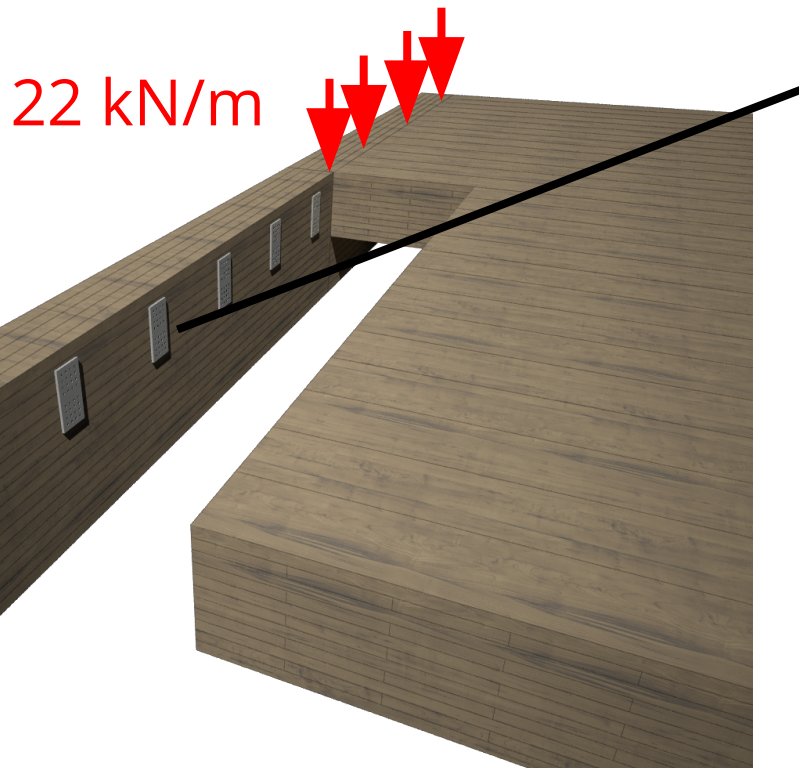
2m



$$\Delta_{\text{allow}} = 2.0 \text{ cm} \quad \Delta_{\text{analysis}} = 1.3 \text{ cm}$$



SHERPA CONNECTIONS



22 kN/m

Slab to Girder

80 x 250mm

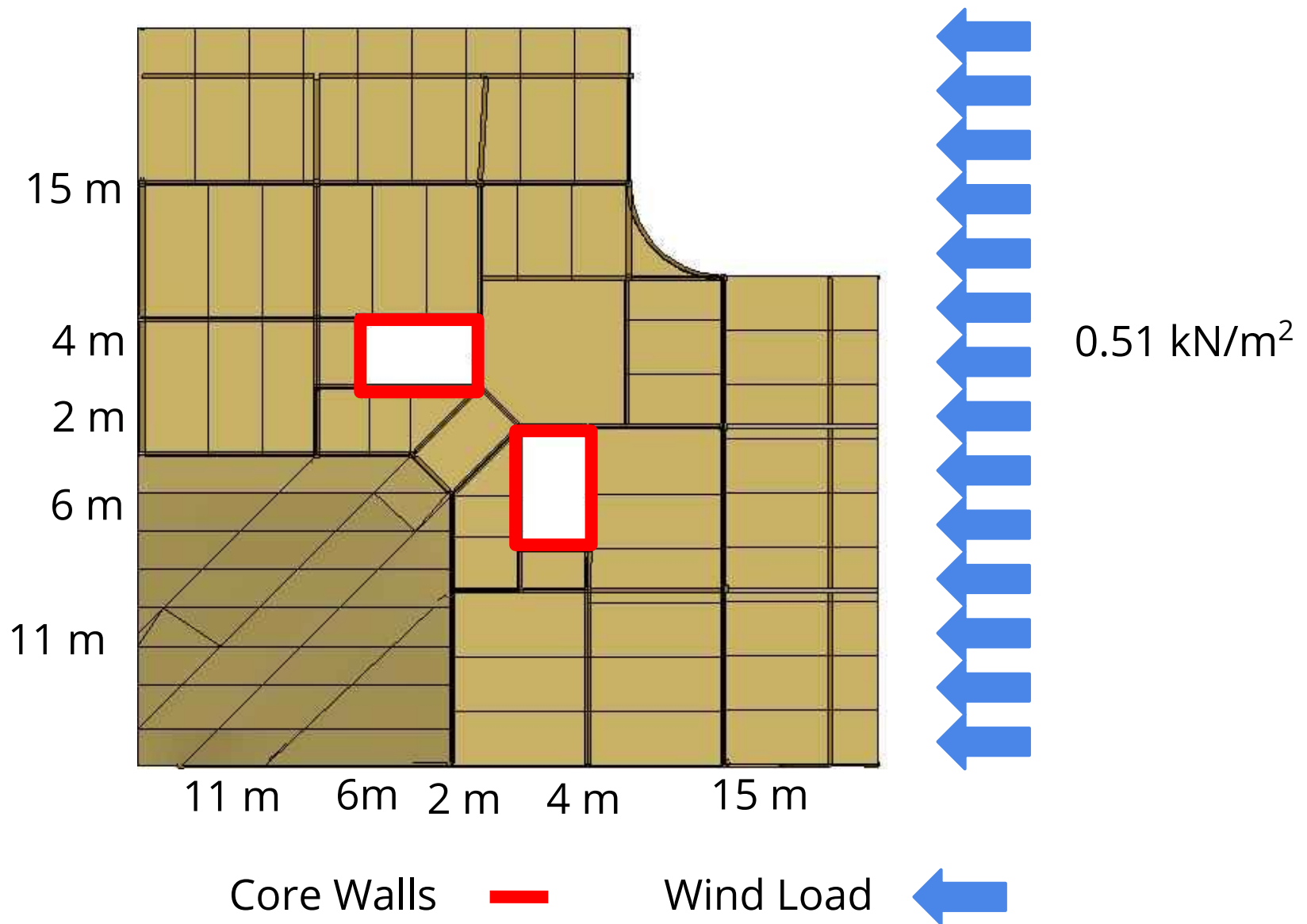
Screws: 25 pcs. 8 x 100mm



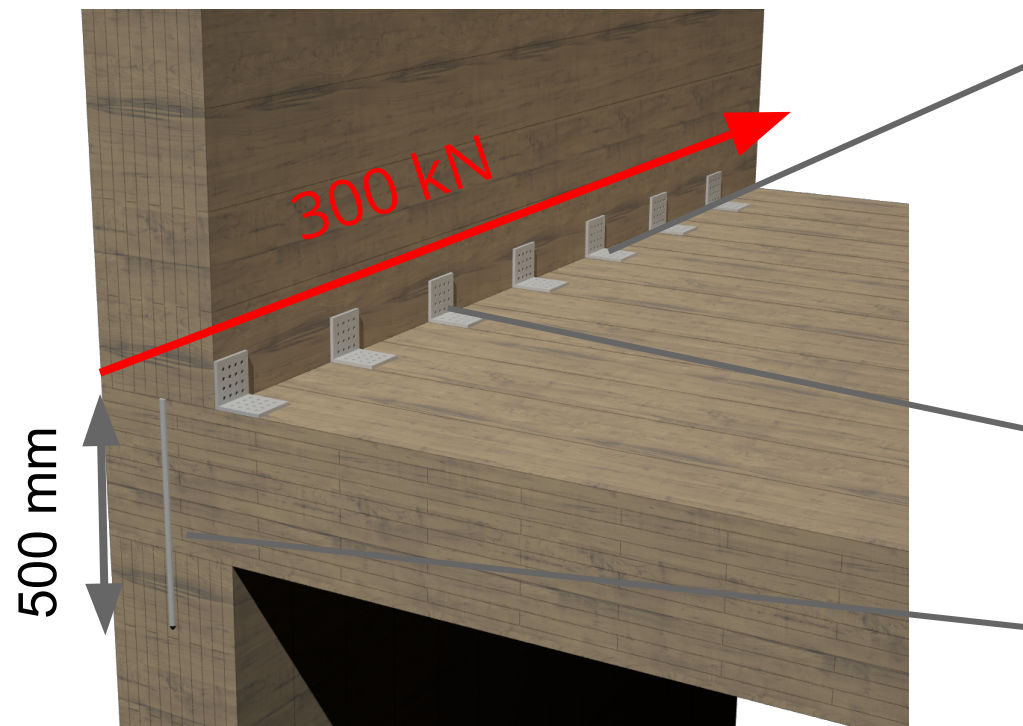
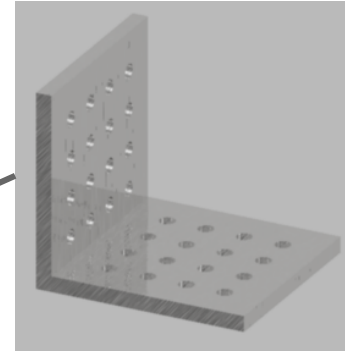
Girder to Column 140x570mm

Screws: 54 pcs. 8 x 160mm

LATERAL - PLAN VIEW

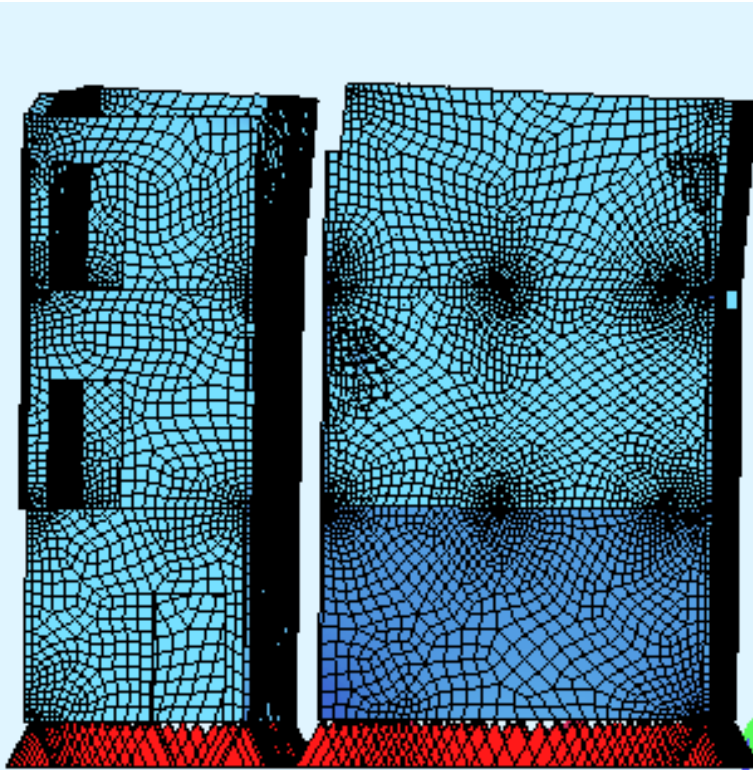


LATERAL - LOAD TRANSFER

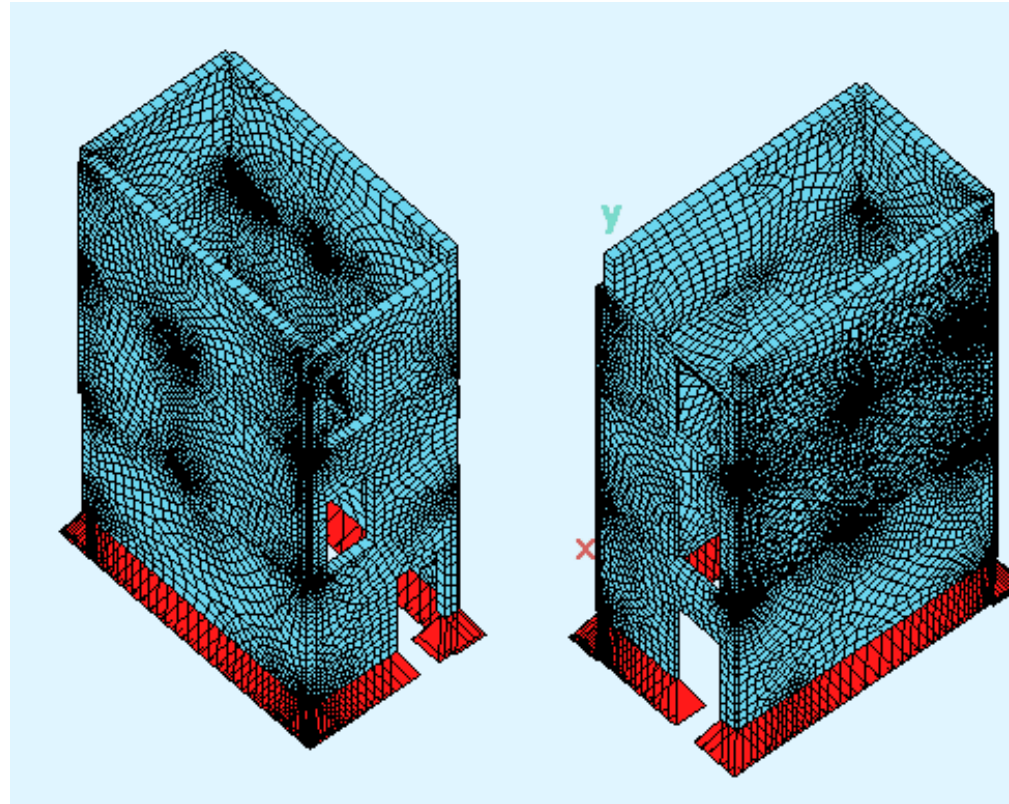


Force	Connection
Top Shear	40 tapping screws/m
Shear	5 tapping screws/m

Deflection x 5000



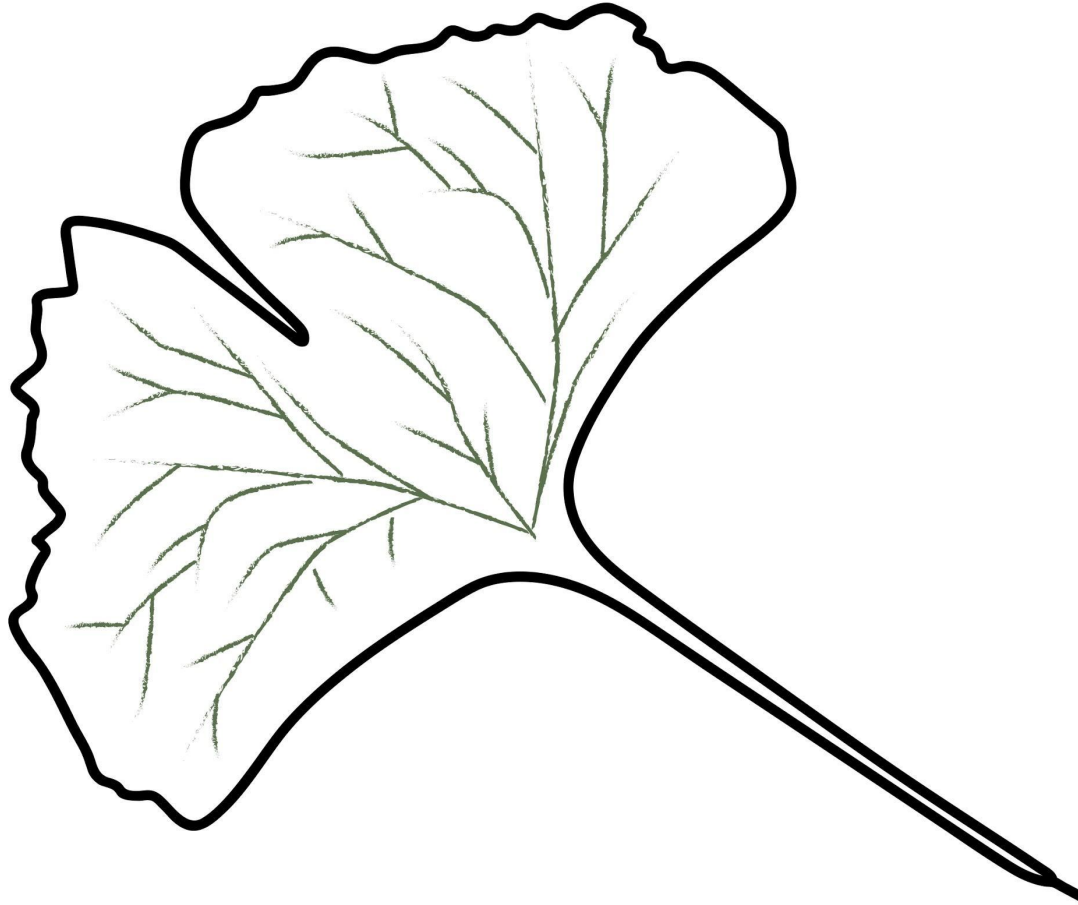
Deflection ~ 1.1 cm



Stress 12.7 MPa

THE VEINS

SYSTEMS INTEGRATION - CONSTRUCTION



SE

CM



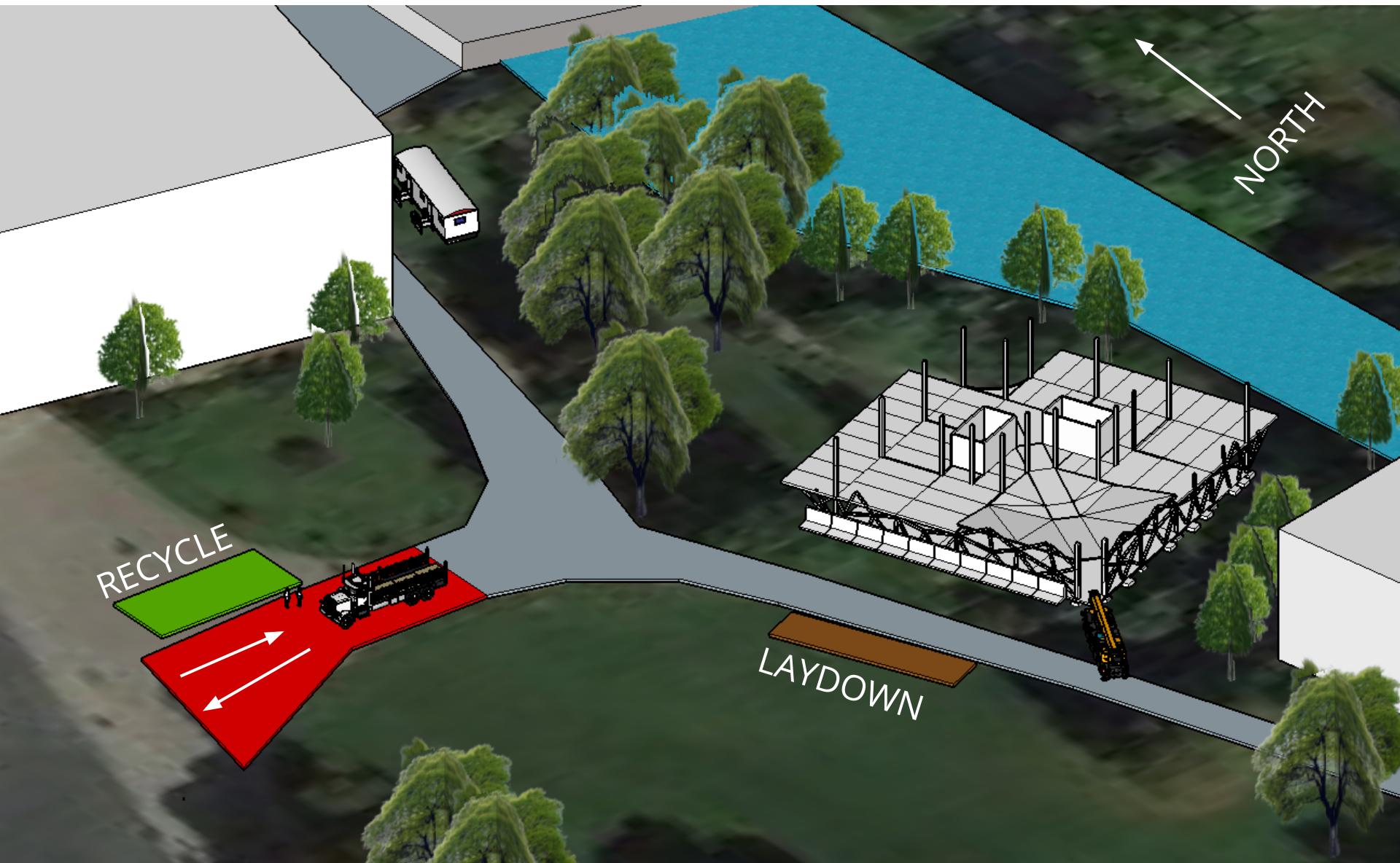
STRUCTURAL SEQUENCE



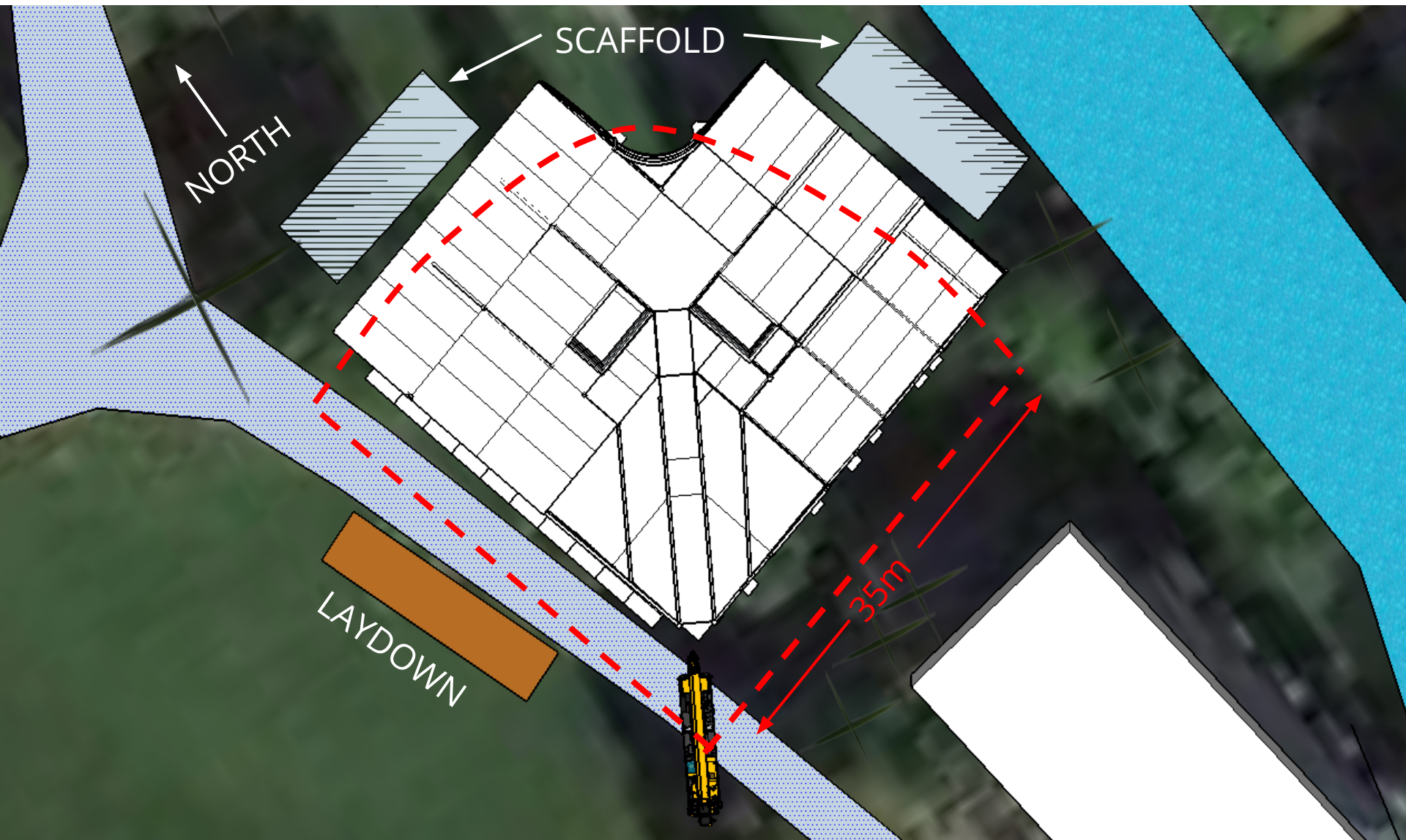
CoreSection.wmv



SITE LOGISTICS

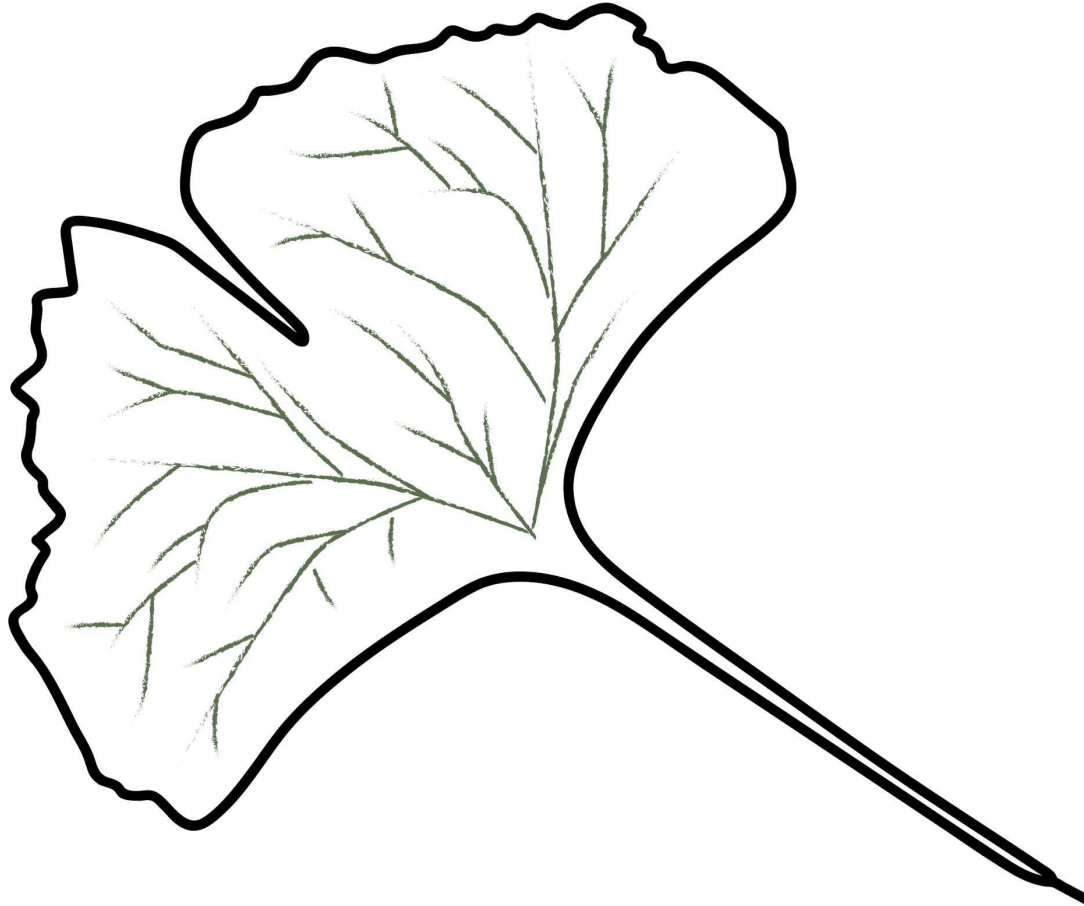


EARLY SPRING SETUP



THE VEINS

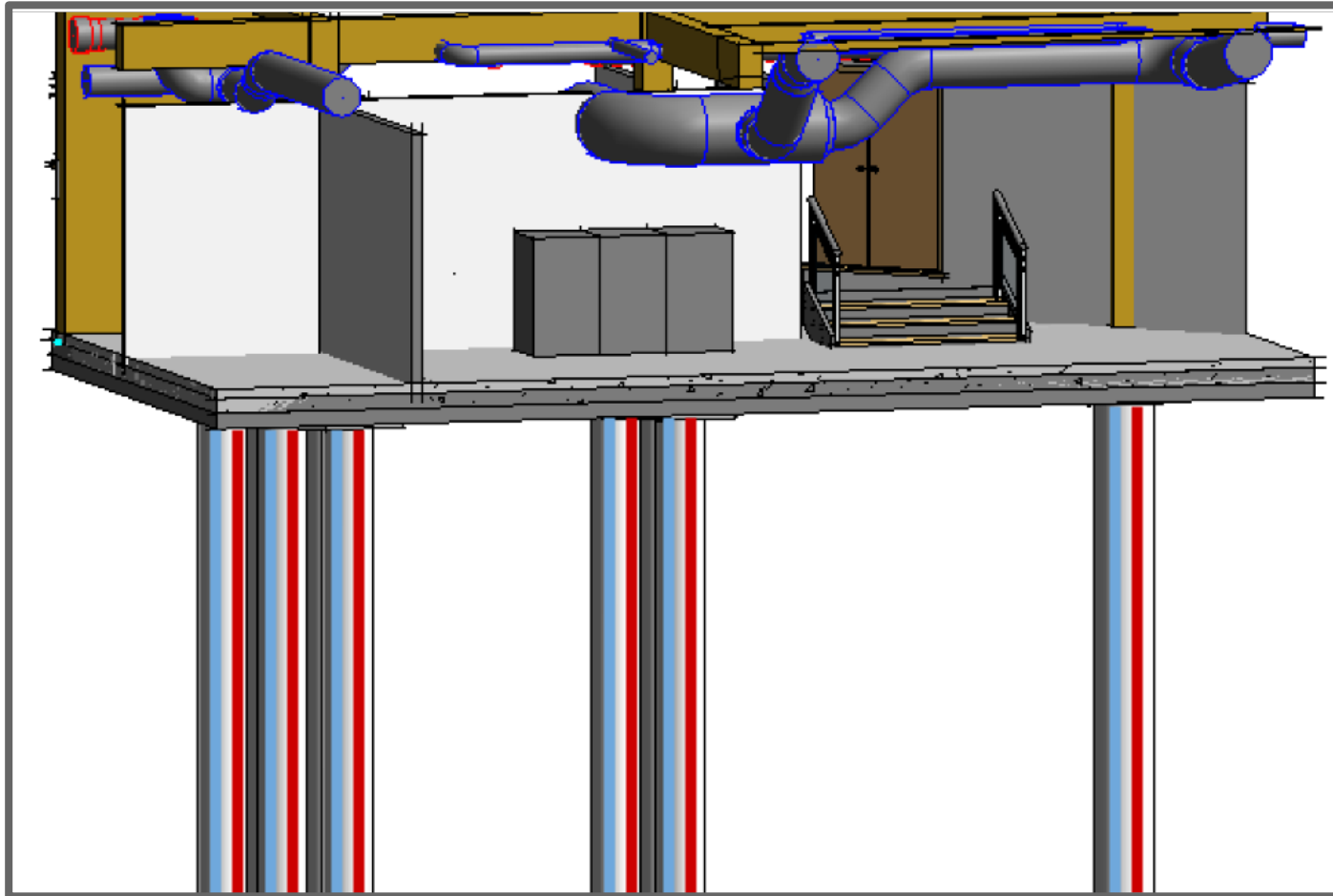
SYSTEMS INTEGRATION - HEATING AND COOLING



FOUNDATION

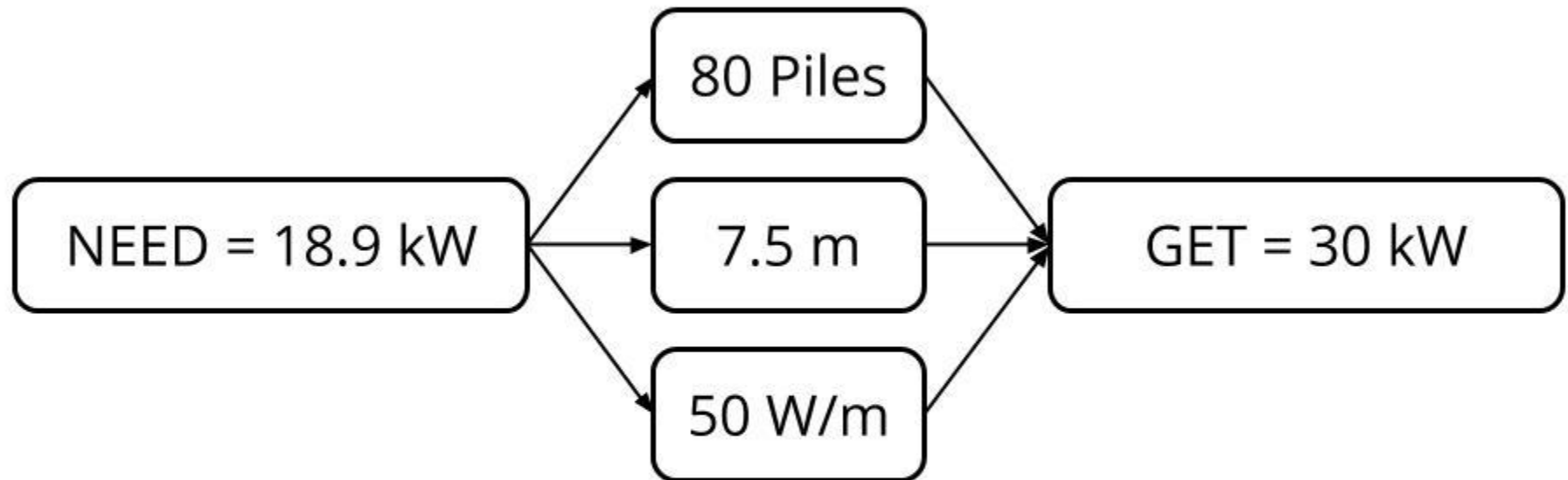


MICROPILES + GROUND SOURCE WATER = ENERGY PILES

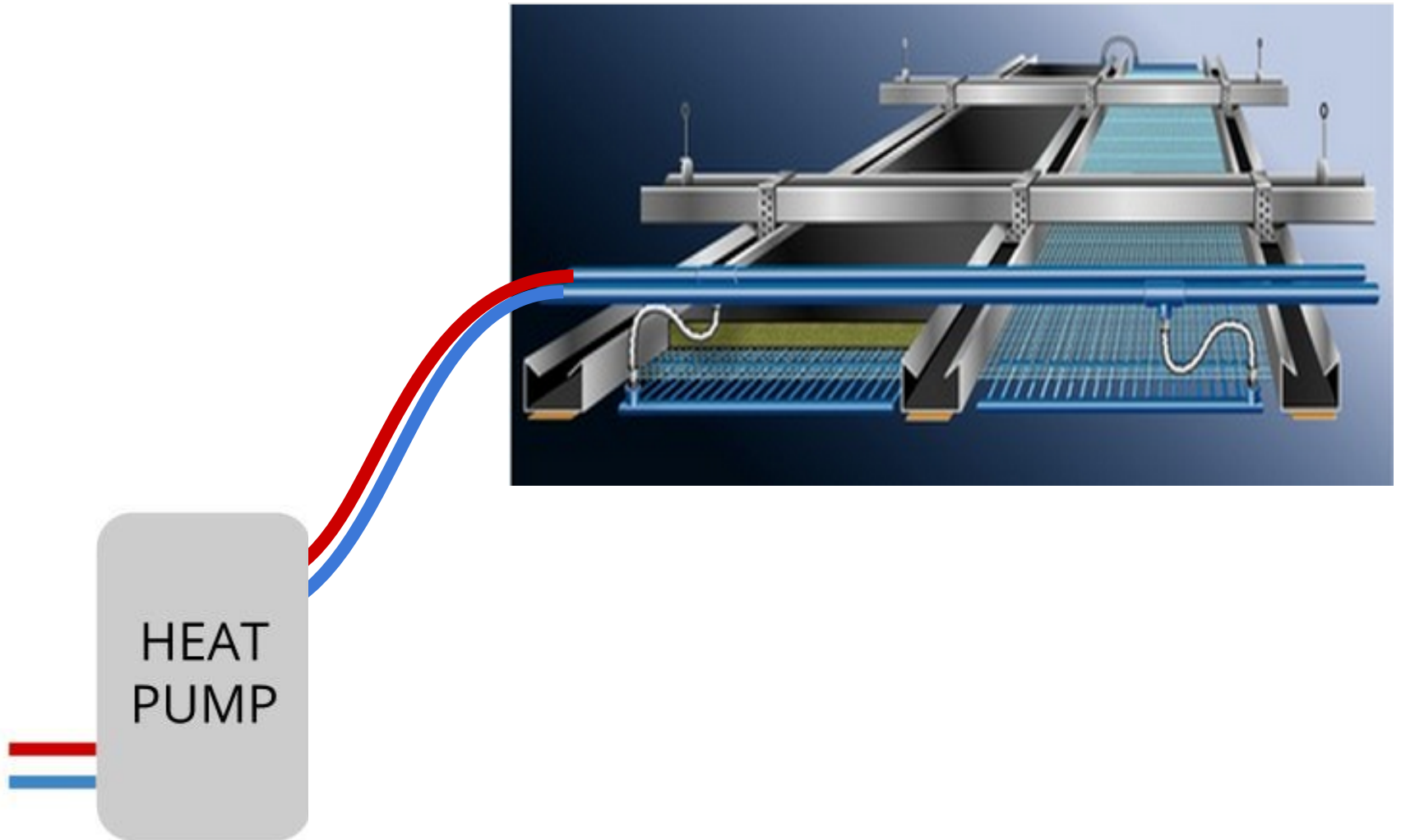




ENERGY PILES



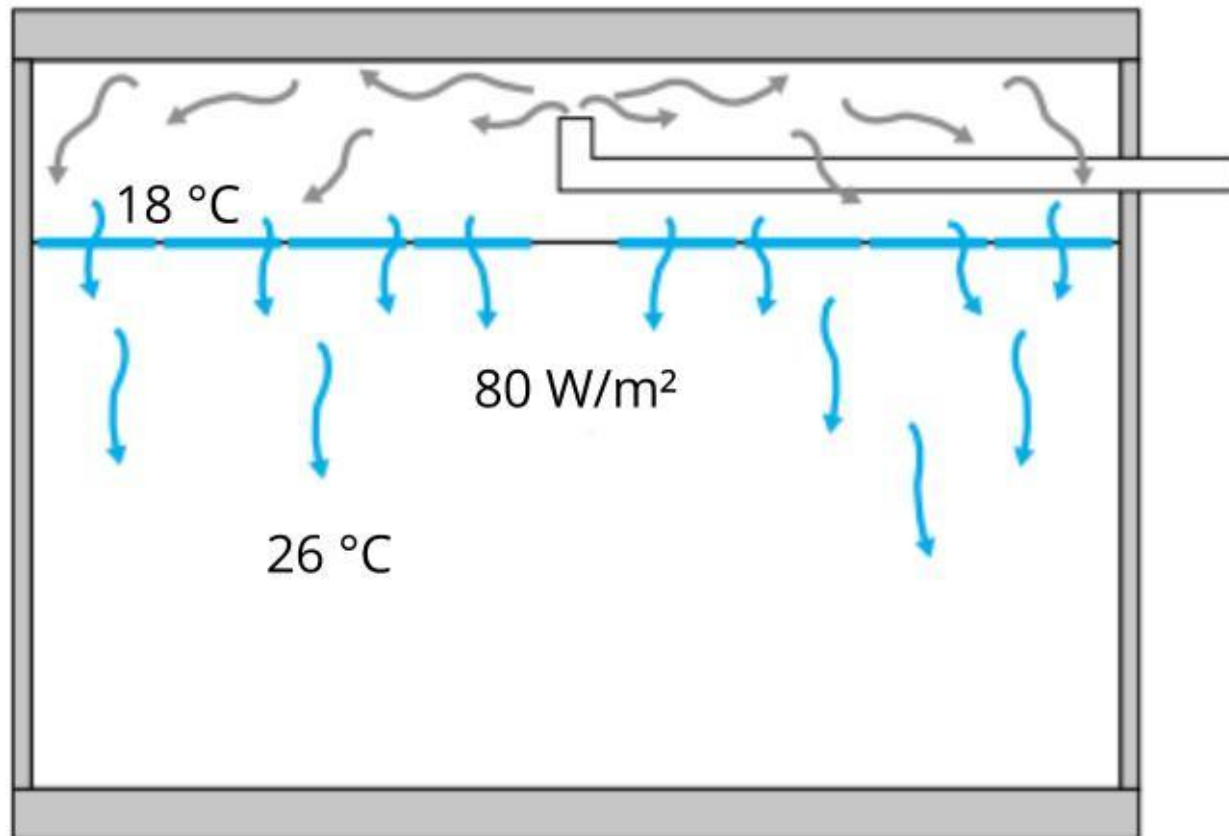
CAPILLARY CEILINGS



CAPILLARY CEILINGS



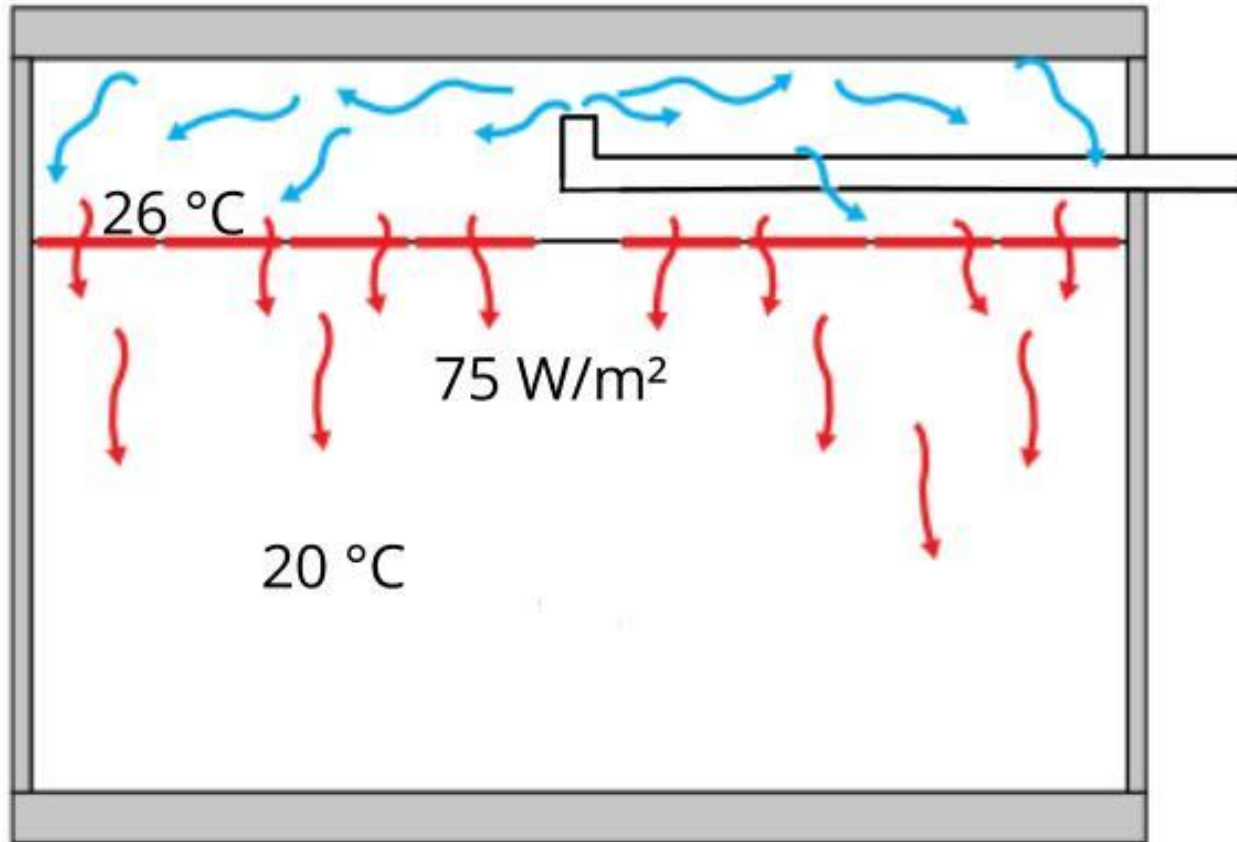
SUMMER



CAPILLARY CEILINGS



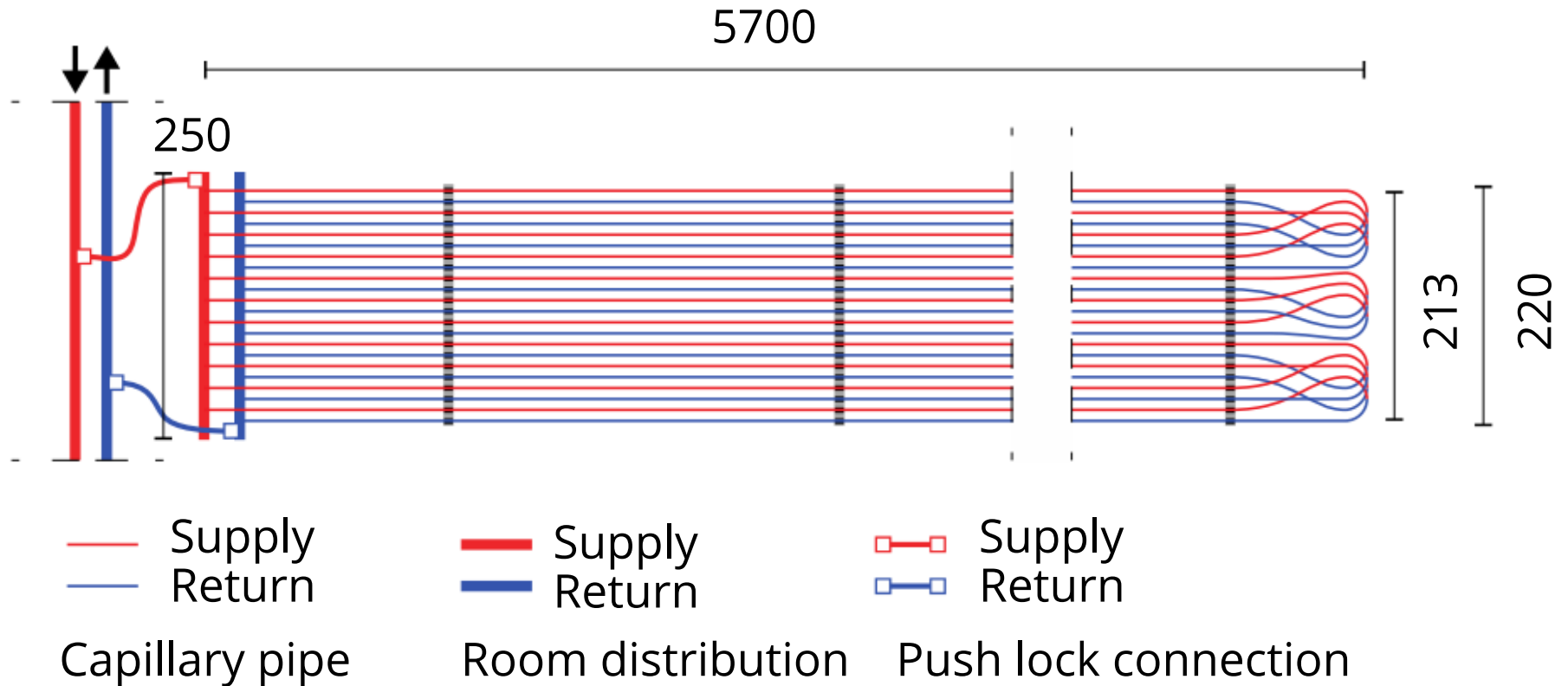
WINTER



CAPILLARY CEILINGS

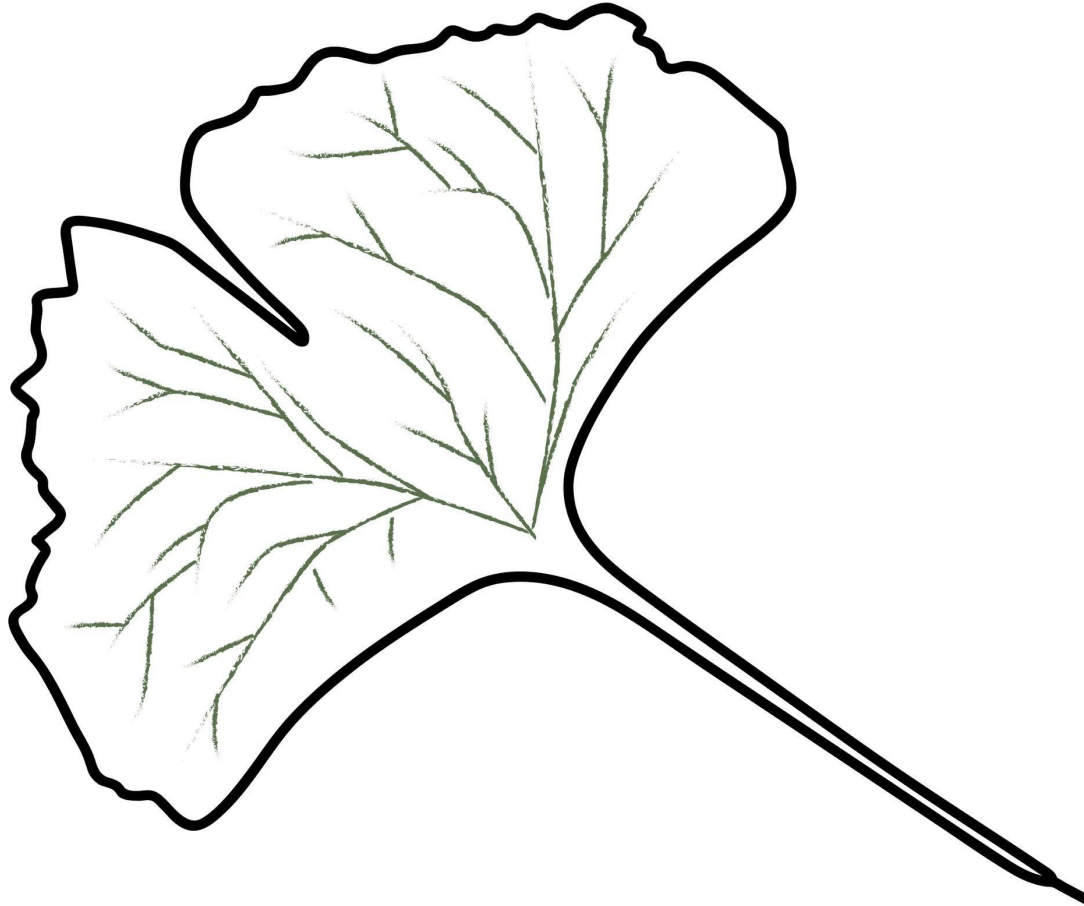


CONNECTION IN ROOM



THE VEINS

SYSTEMS INTEGRATION - ELECTRICITY

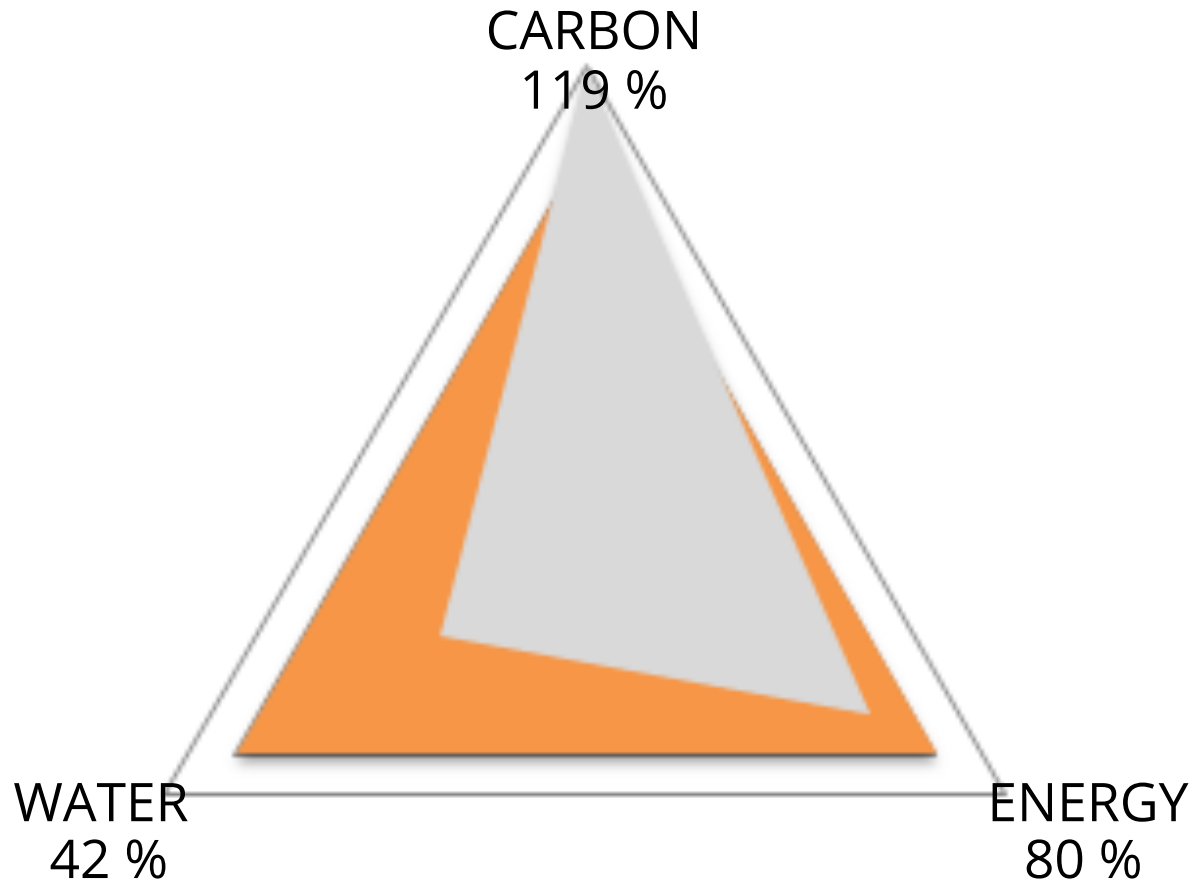


MEP CM LCFM

SUSTAINABLE TARGET VALUE



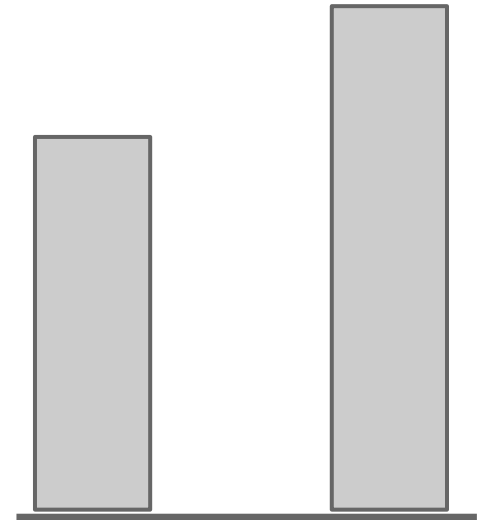
JUST HEAT PUMP



 TARGET  RESULT

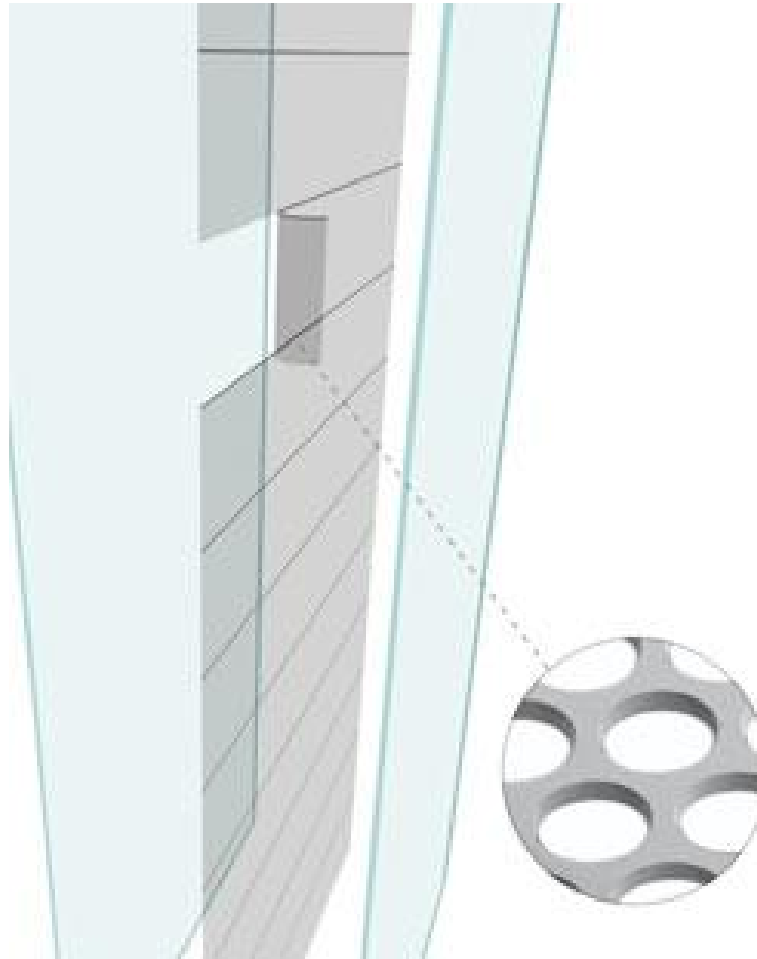
TVD
\$ 9.1 M

RENT
\$ 0.975 M



FIRST ITERATION

MICROSHADE POWER



PV

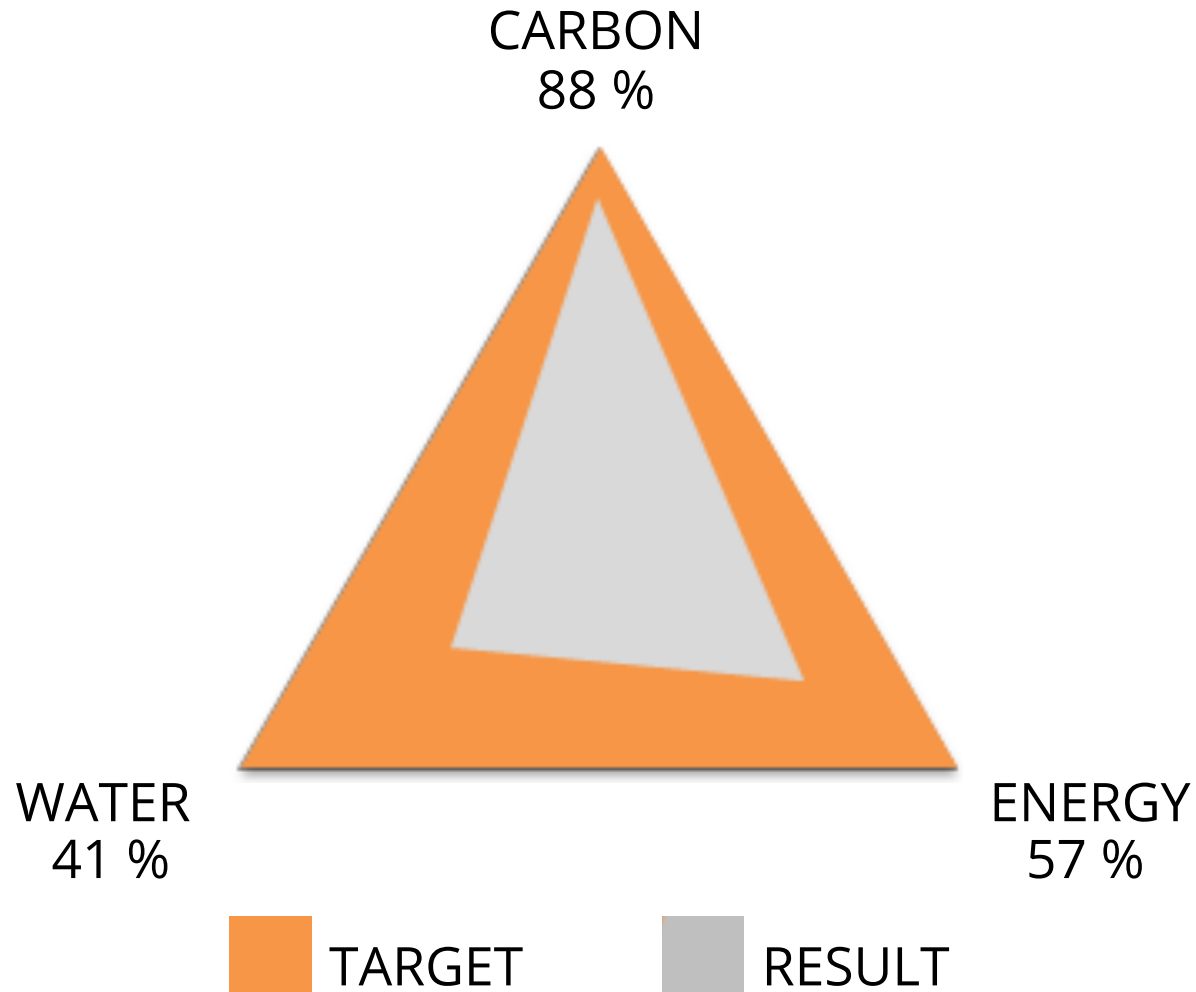
$$S = 50 \text{ W/m}^2$$

$$E/W = 40 \text{ W/m}^2$$

SUSTAINABLE TARGET VALUE

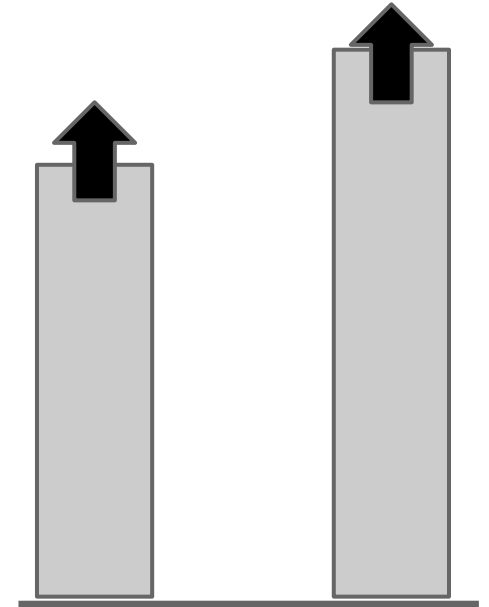


MICROSHADE POWER



TVD
\$ 9.4 M

RENT
\$ 0.977 M



SECOND ITERATION

PRODUCE ENERGY
THROUGH PV



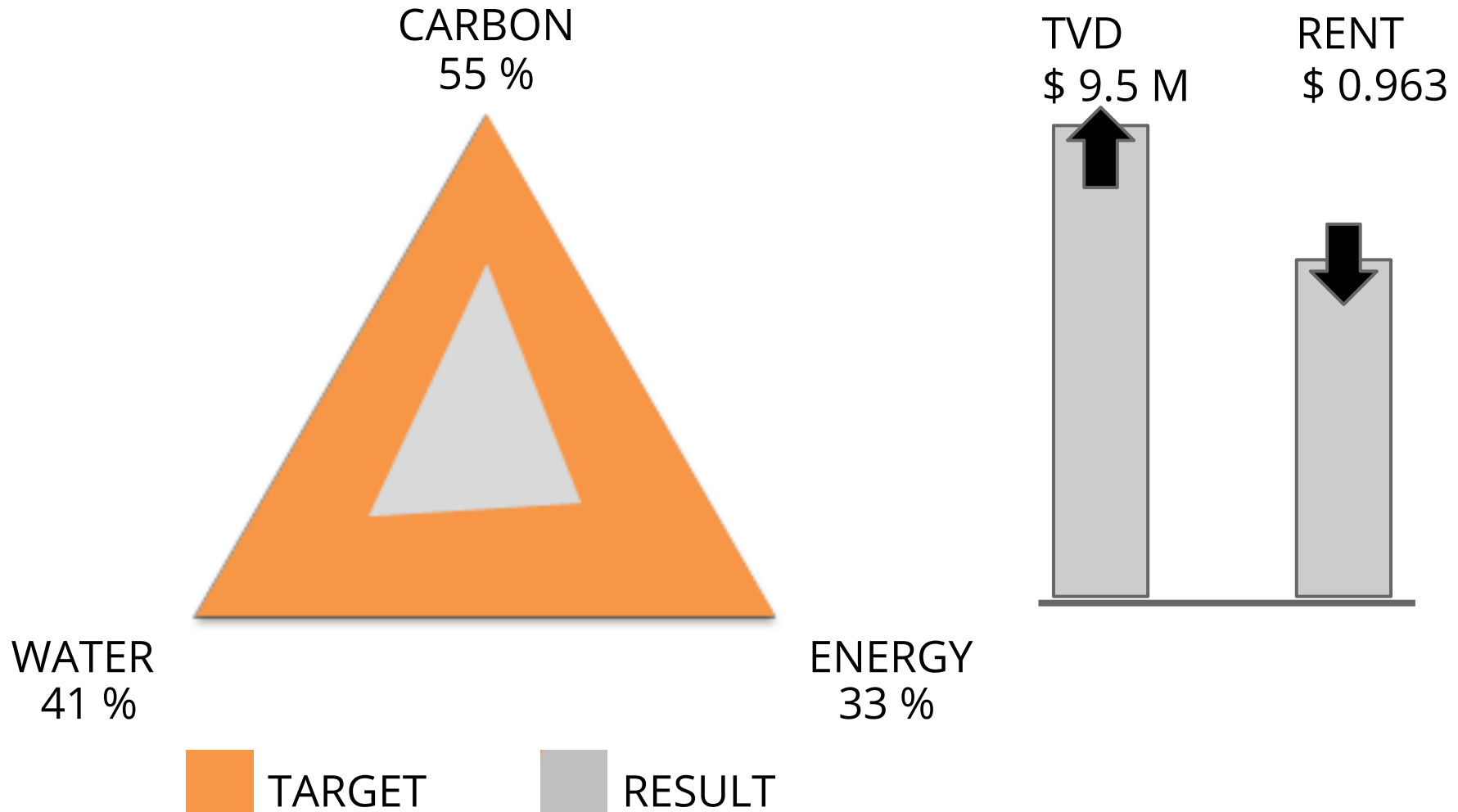
STORE WITH TESLA
BATTERY



SUSTAINABLE TARGET VALUE

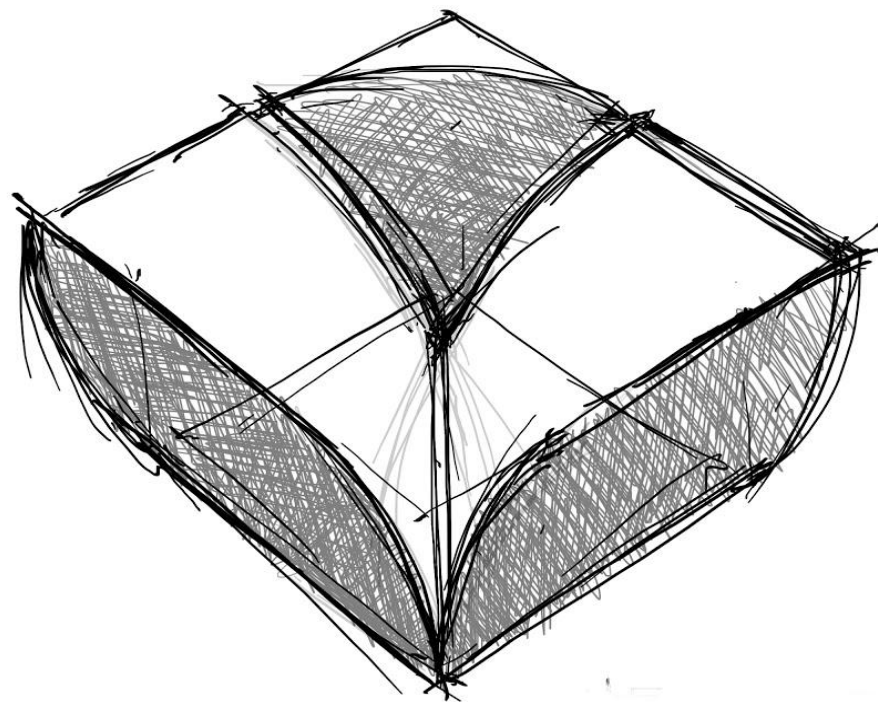
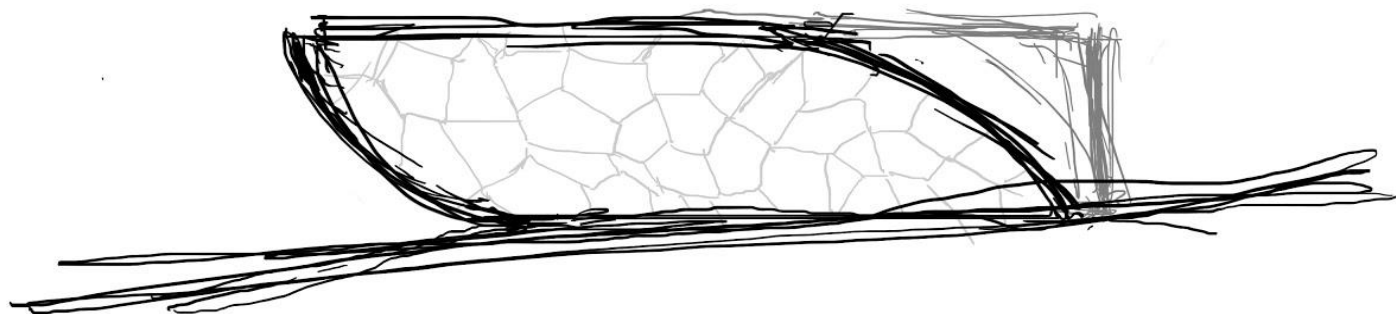


+ PV ROOF + TESLA BATTERY





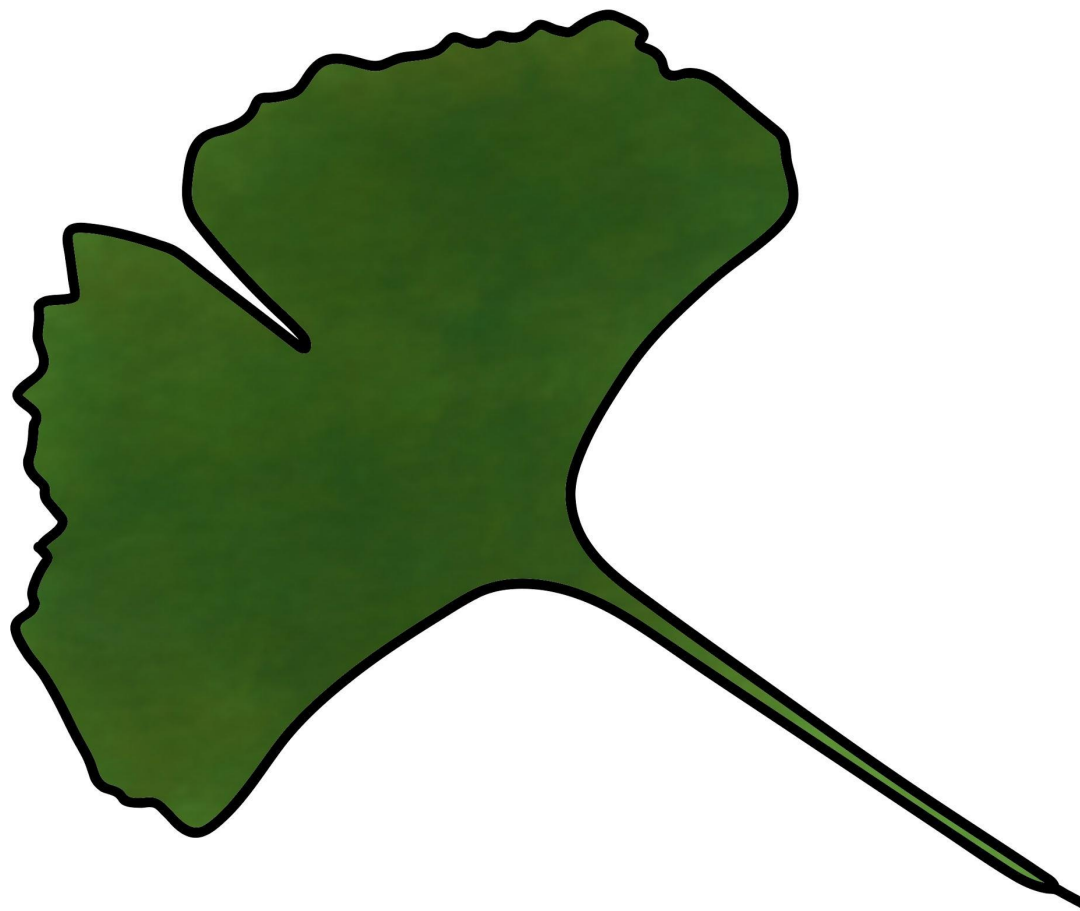






THE SKIN

FACADE - STRUCTURAL



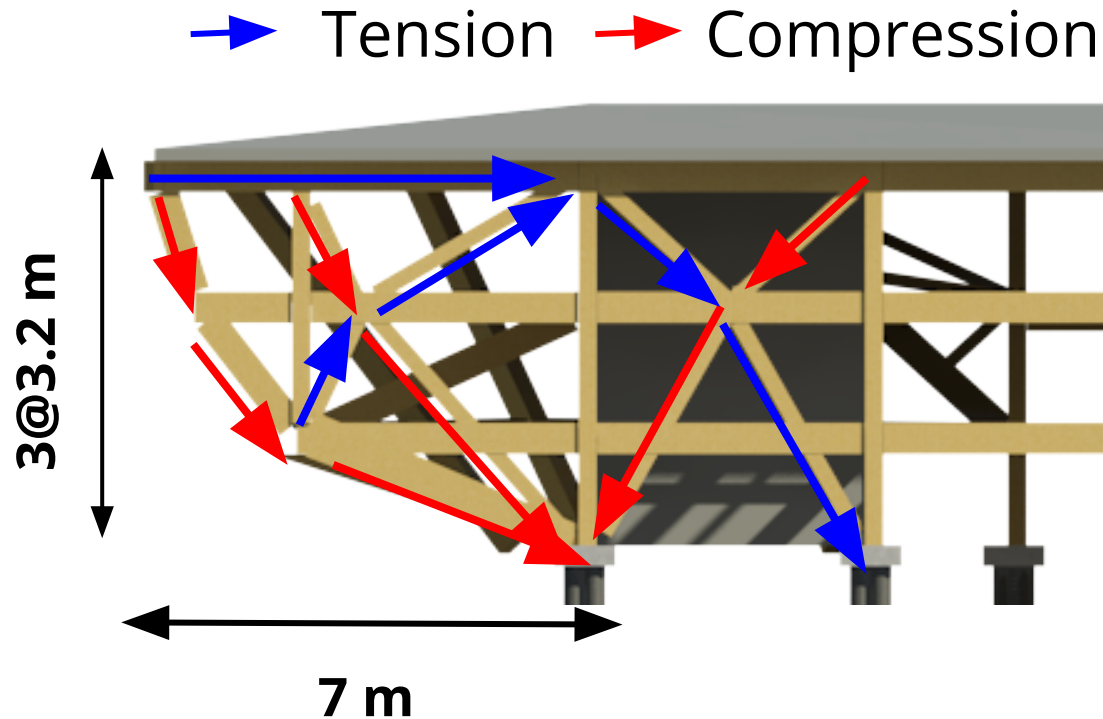
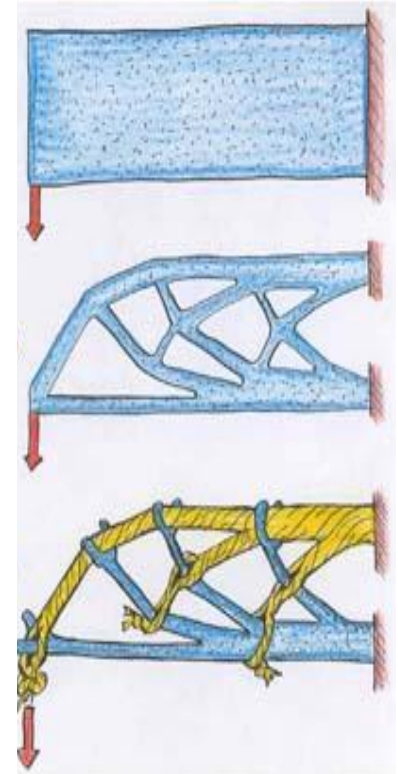
A

SE

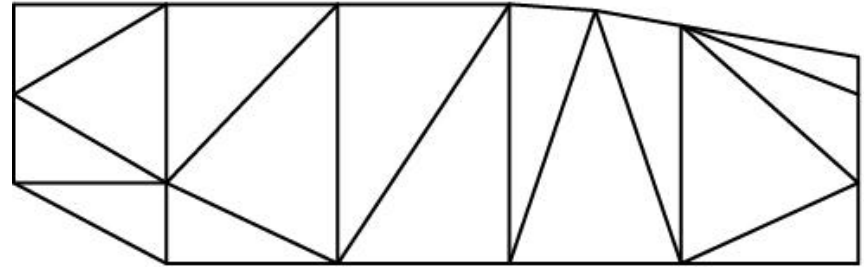
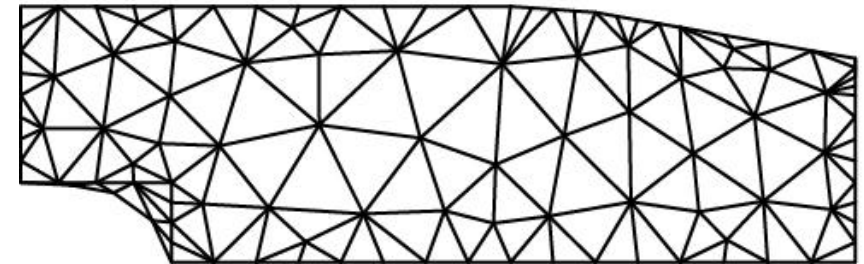
CM

EXTERIOR EVOLUTION

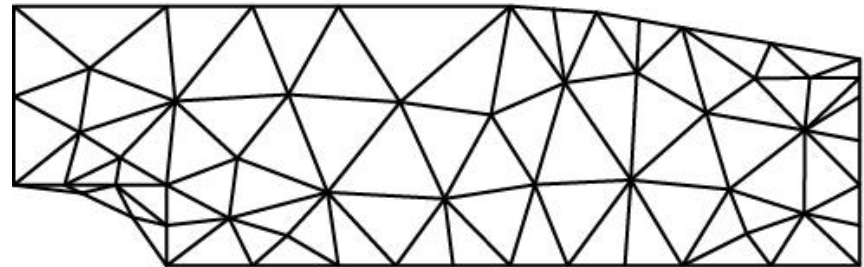
WINTER STARTING POINT



ARCHITECTURAL EVOLUTION

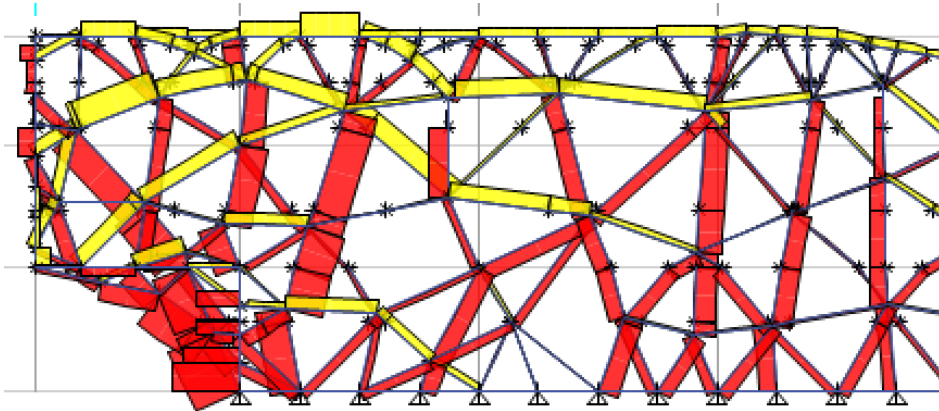
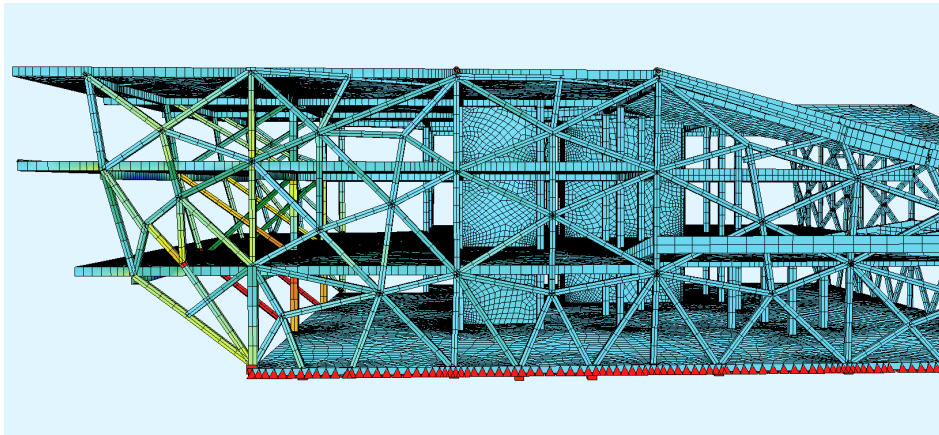
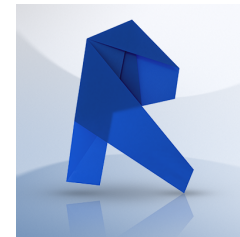


PARAMETRIC MODELING



MODEL PHYSICS

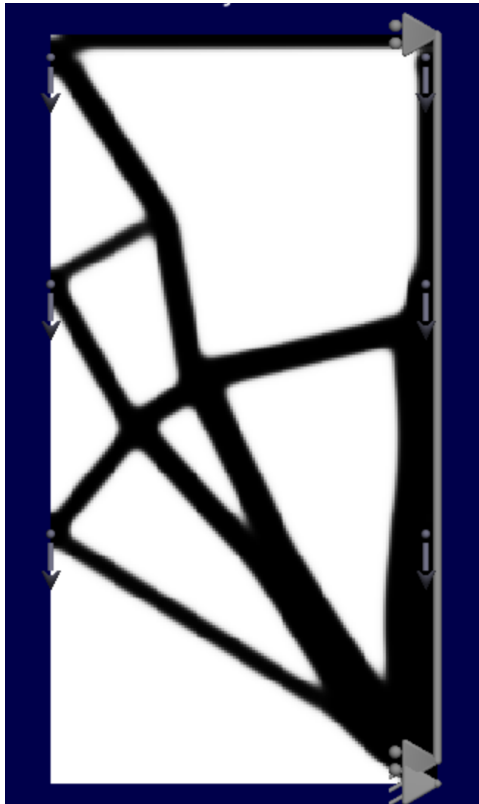
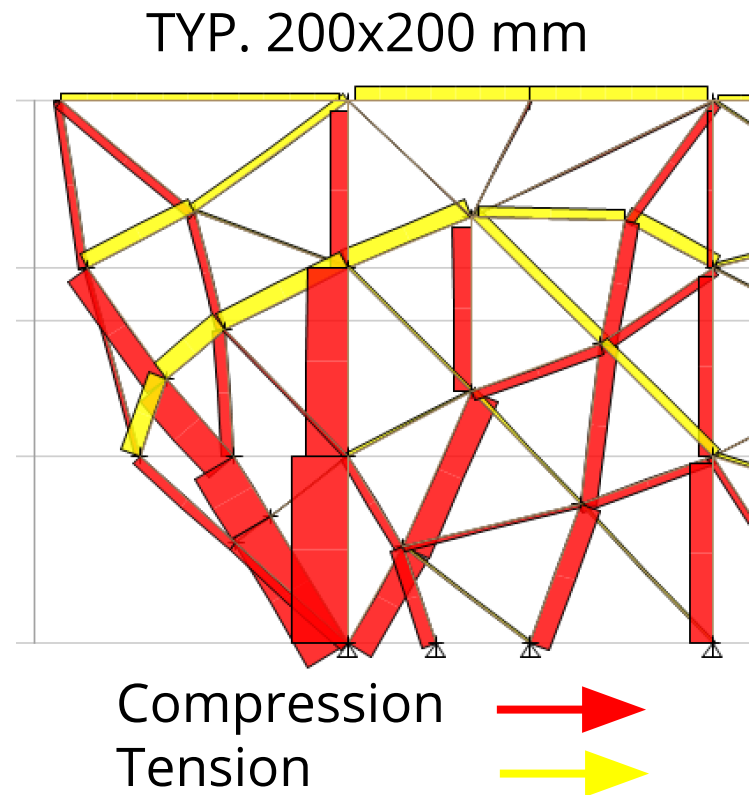
STRUCTURAL ANALYSIS



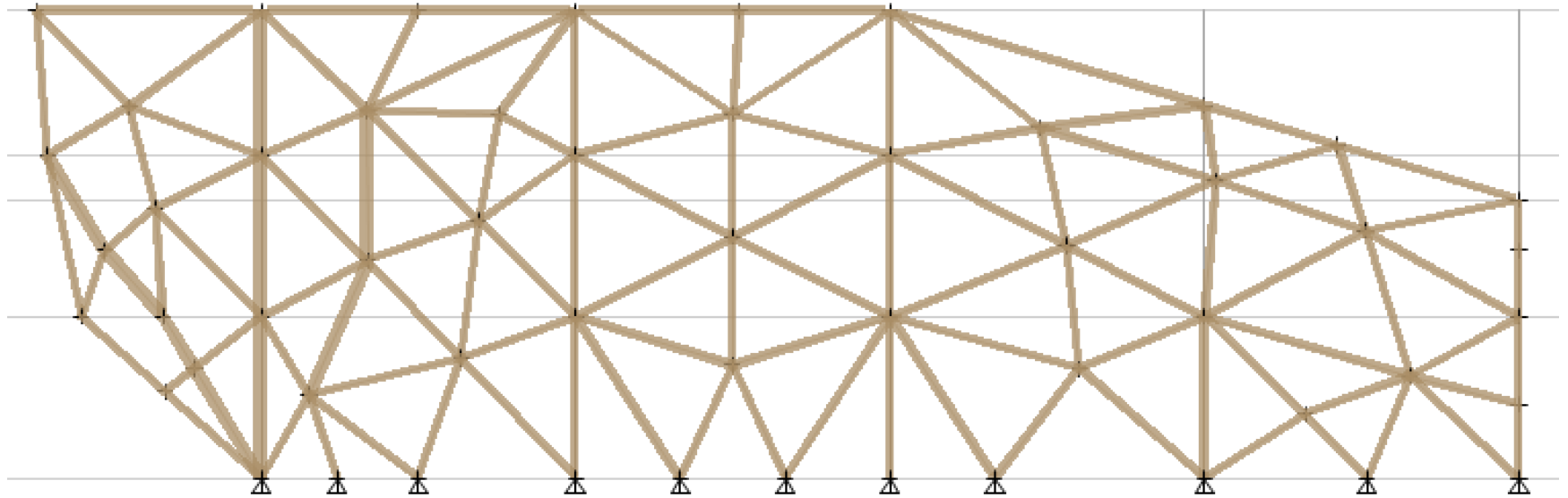
SOFiSTiK

STRUCTURAL EVOLUTION

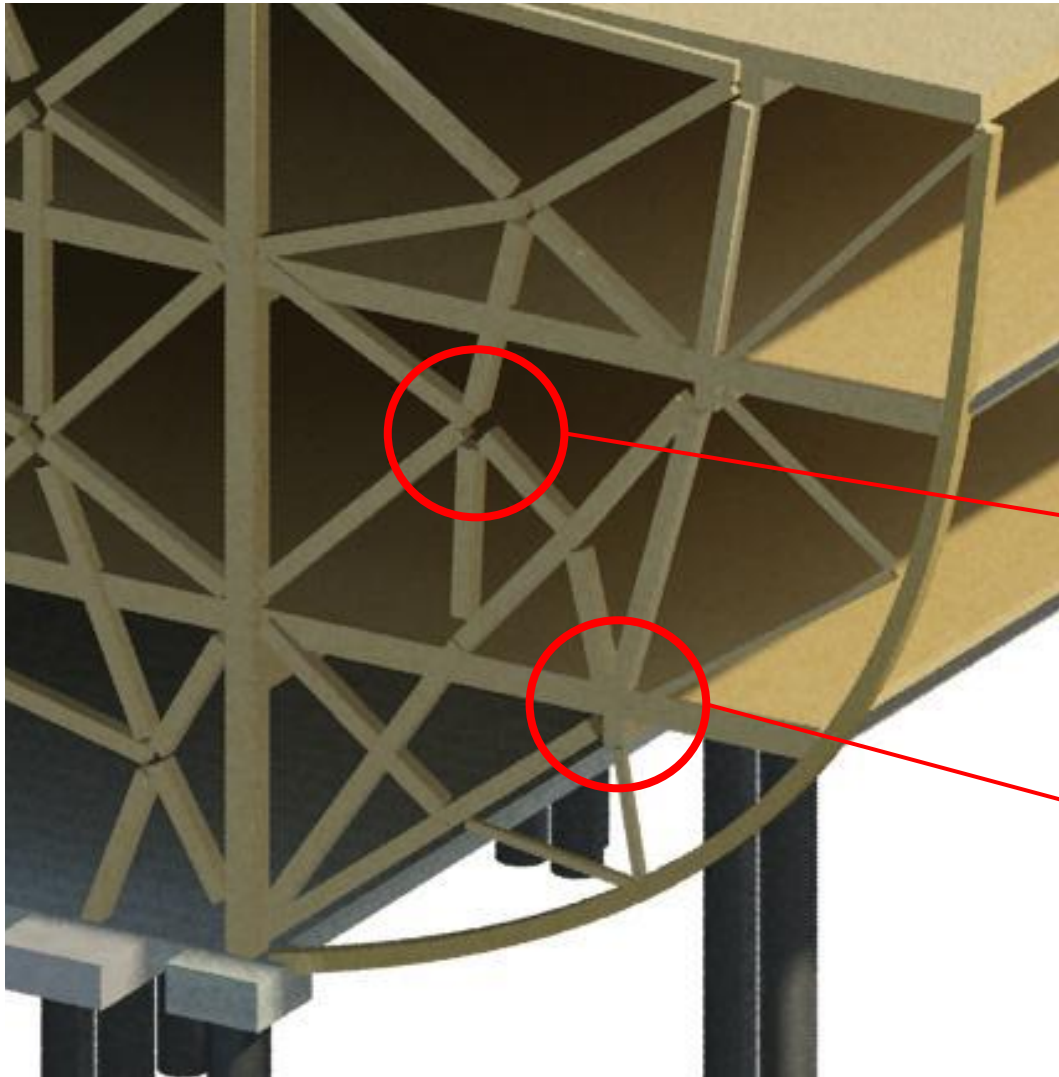
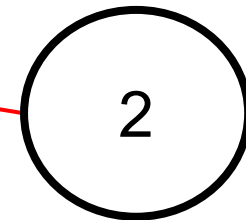
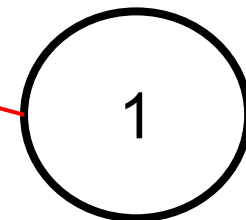
TOPOLOGY OPTIMIZATION



FINAL DESIGN



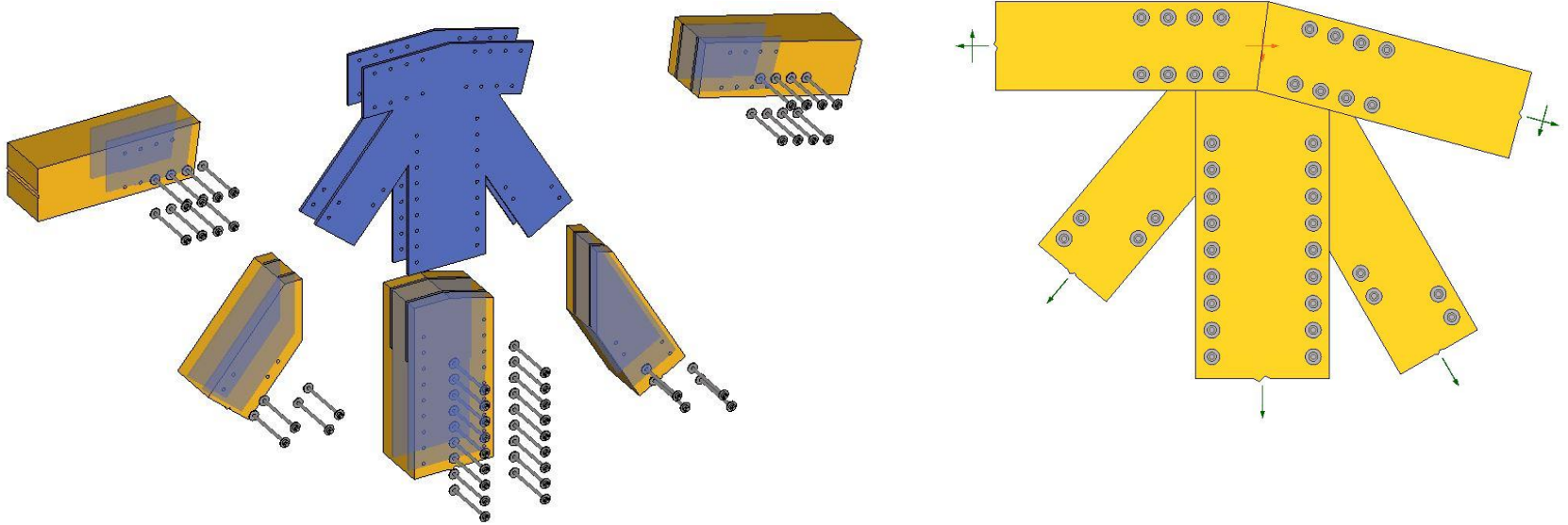
DELAUNAY CONNECTION





DELAUNAY CONNECTION

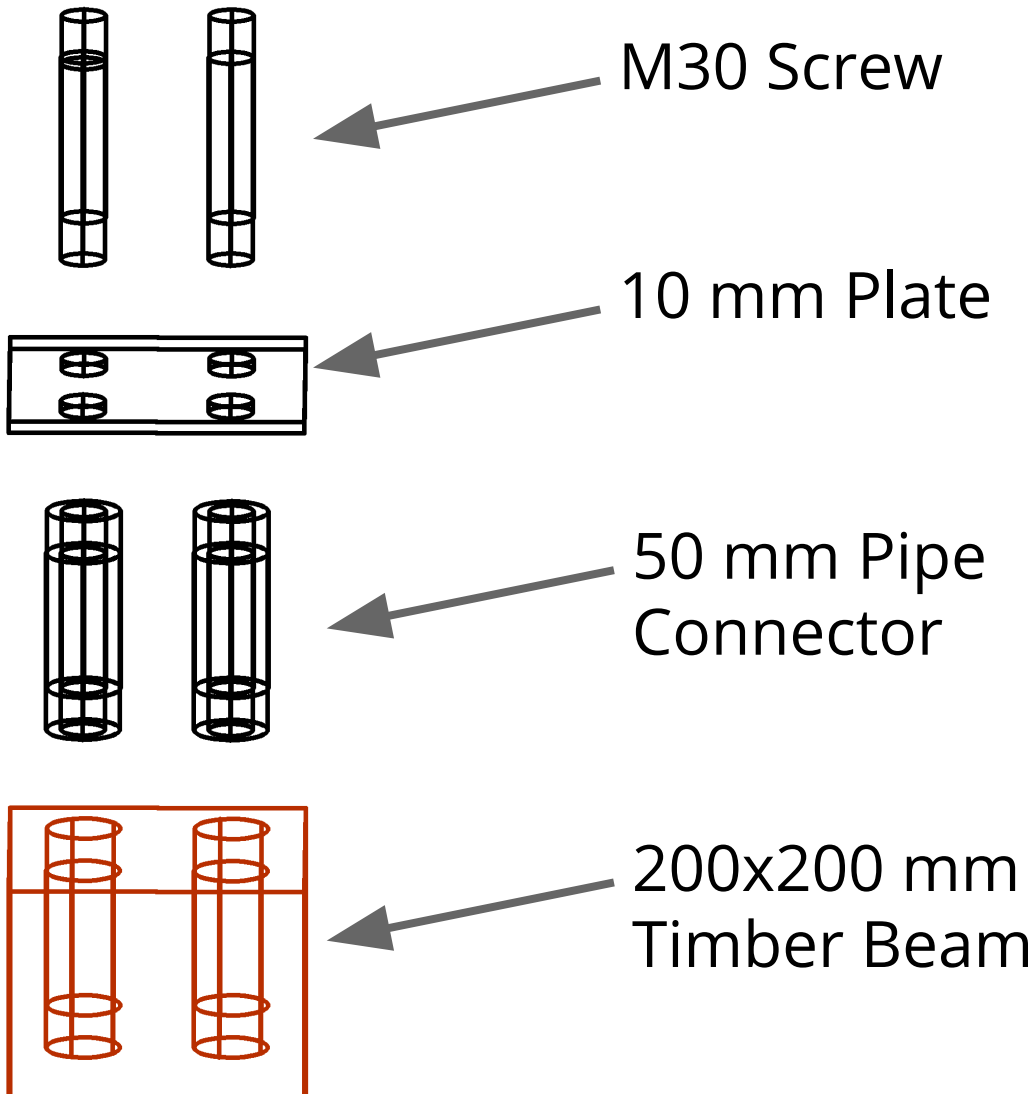
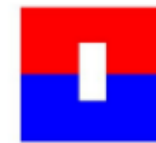
1



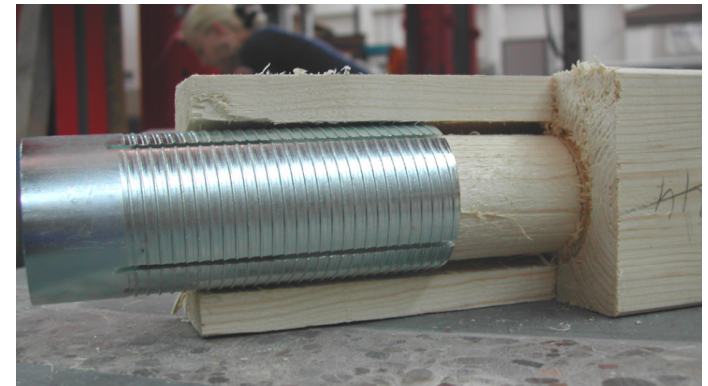
Example: 10mm plate, M12 screws



DELAUNAY CONNECTION



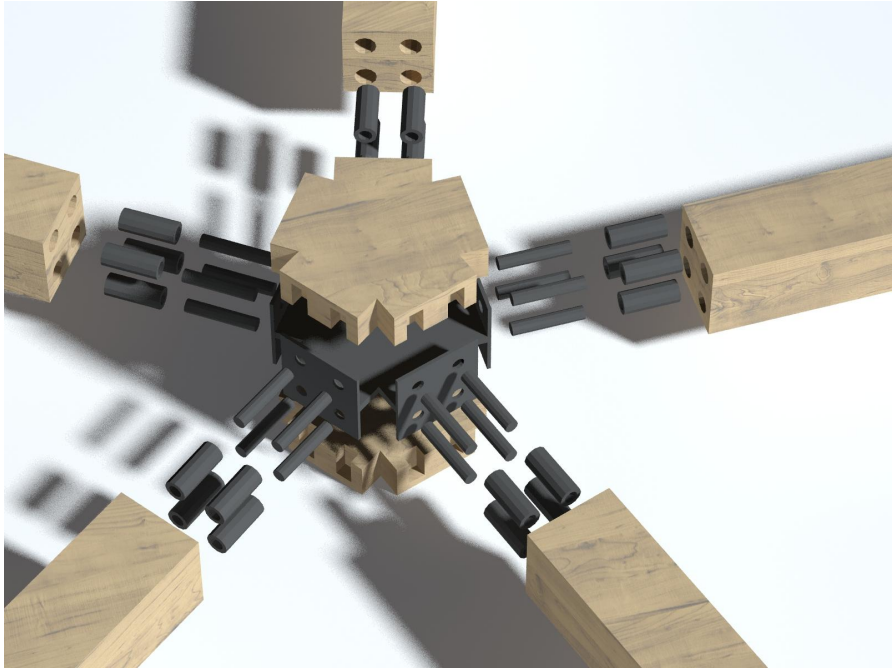
TiCOMTEC®
Holz-Verbund-Systeme





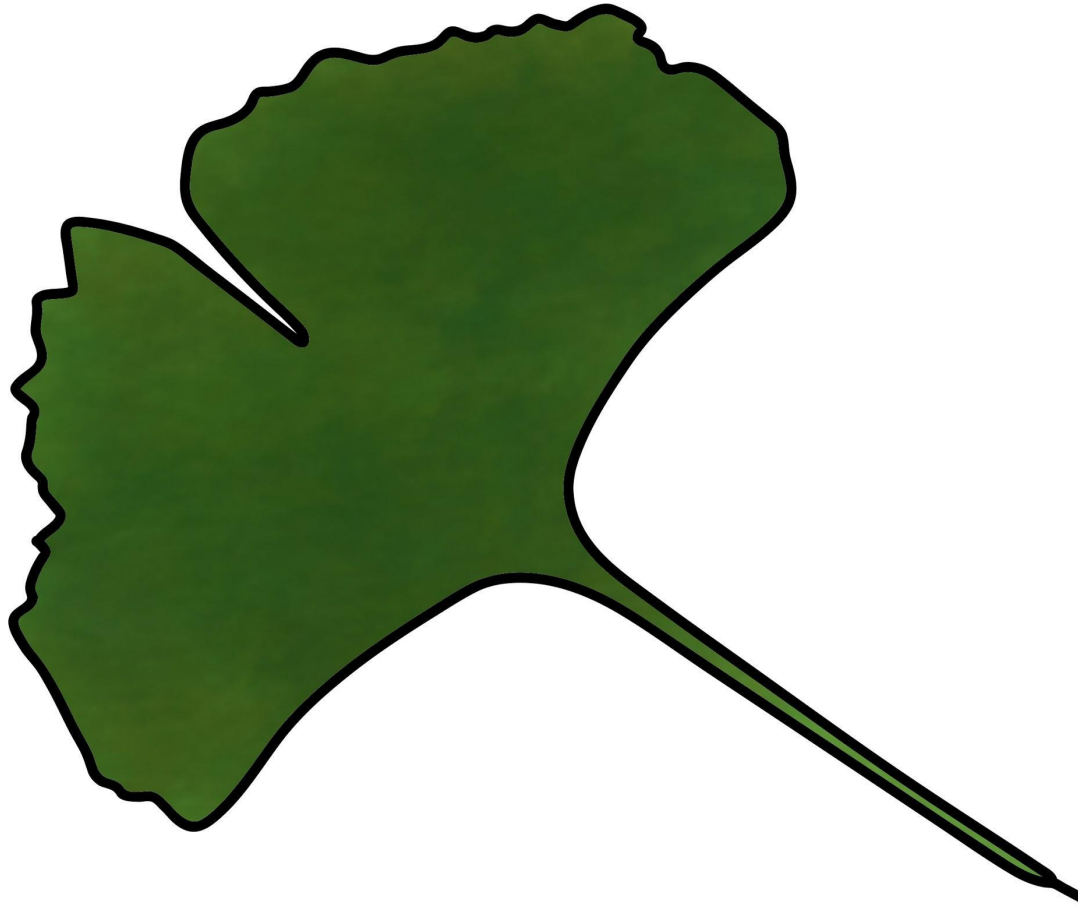
DELAUNAY CONNECTION

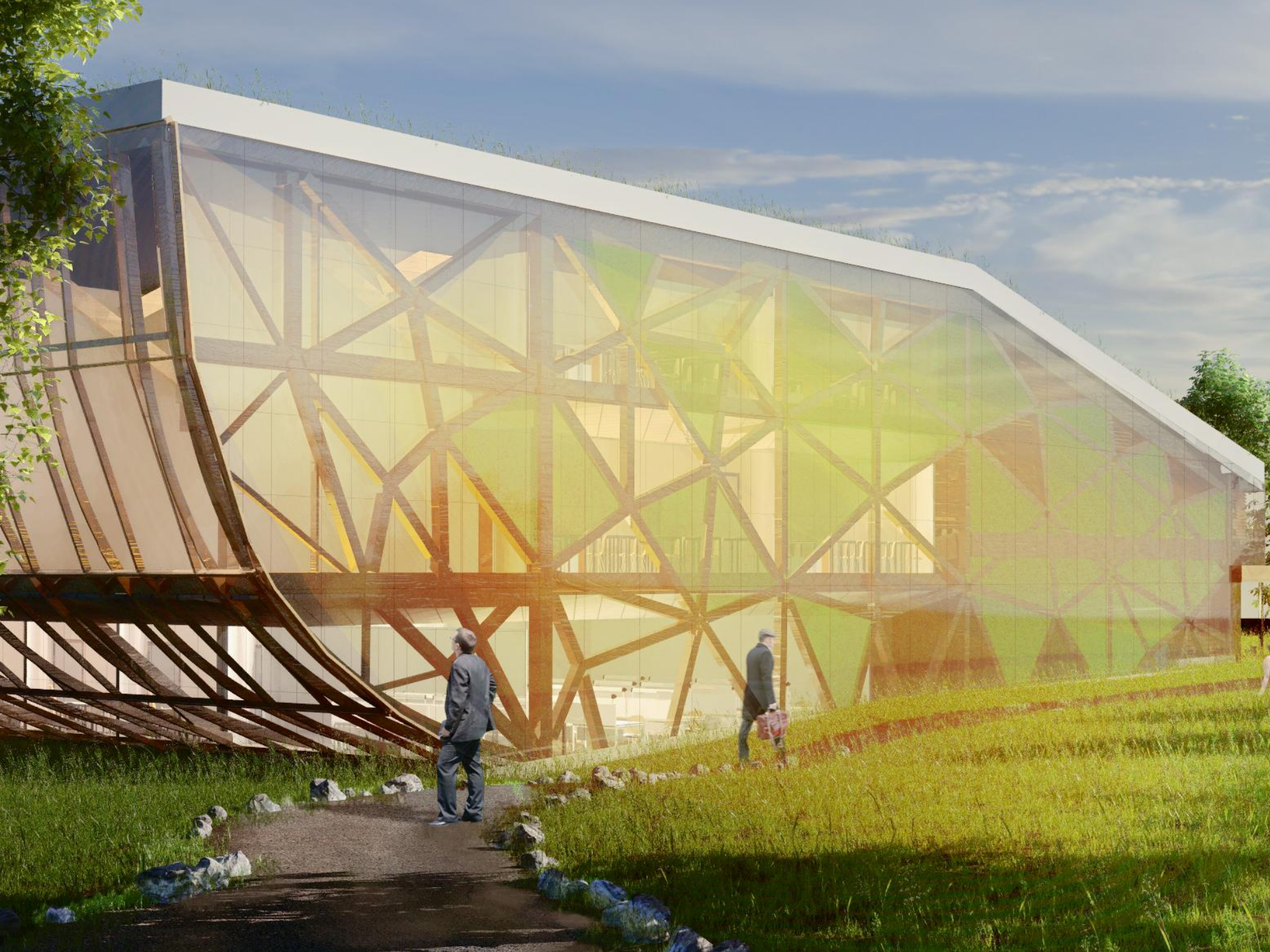
2



THE SKIN

FACADE - ENVELOPE





CUSTOM GLAZING



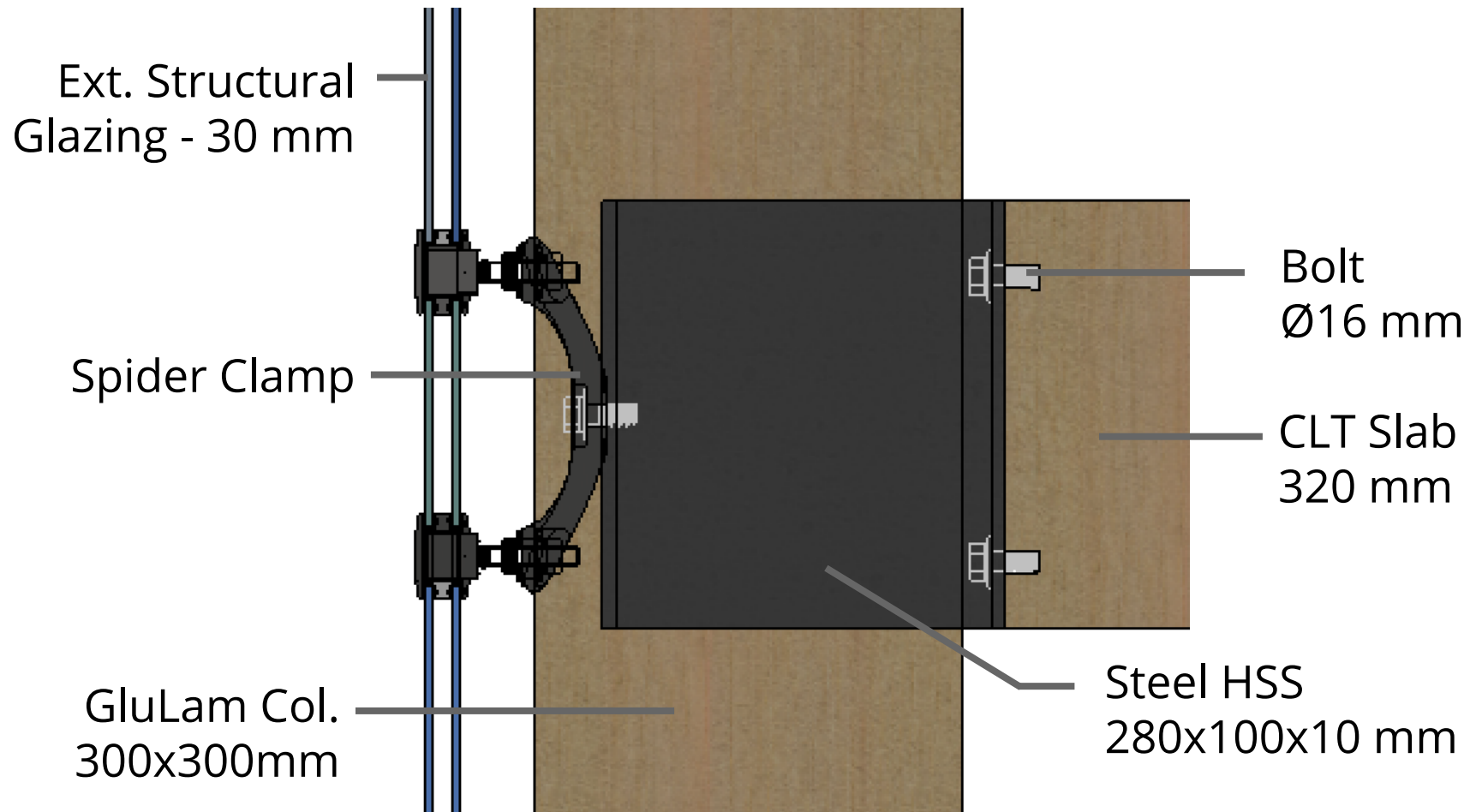
VS.

SPIDER CLAMPS



FACADE - SECTION DETAIL

SPIDER CLAMPS

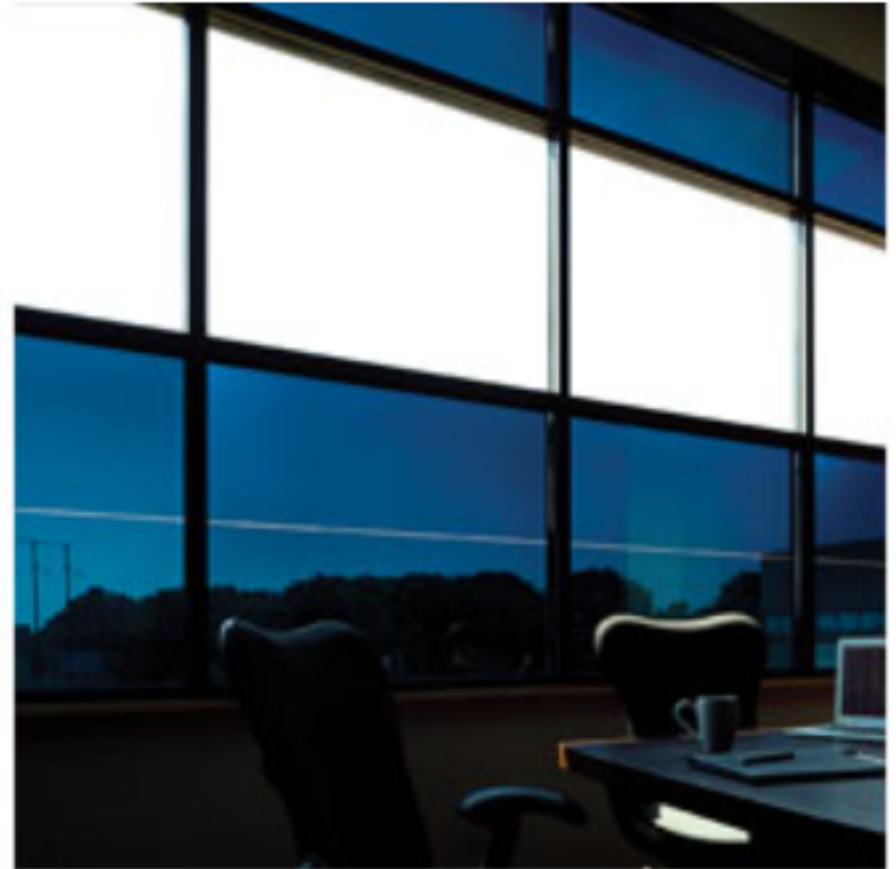


FACADE - SHADING

MicroShade

vs.

SageGlass



FACADE - SHADING

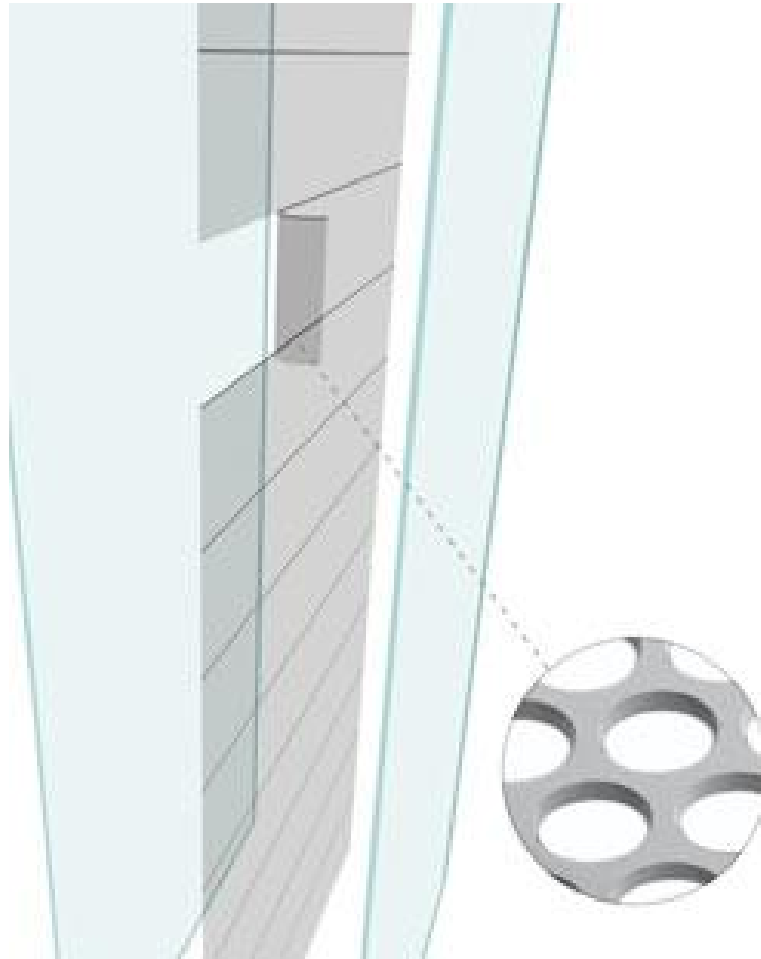
PROS & CONS

	MicroShade Power	Sageglass
Thermal efficiency	✓	✗
Daylight above 2 %	✓	✗
Reduce solar gain	✓	✓
Maintenance cost	✓	✓
Cleaning cost	✓	✓
Energy positive	✓	✗

FACADE - SHADING

MICROSHADE POWER

U-Value
 $0.9 \text{ W/m}^2\text{K}$

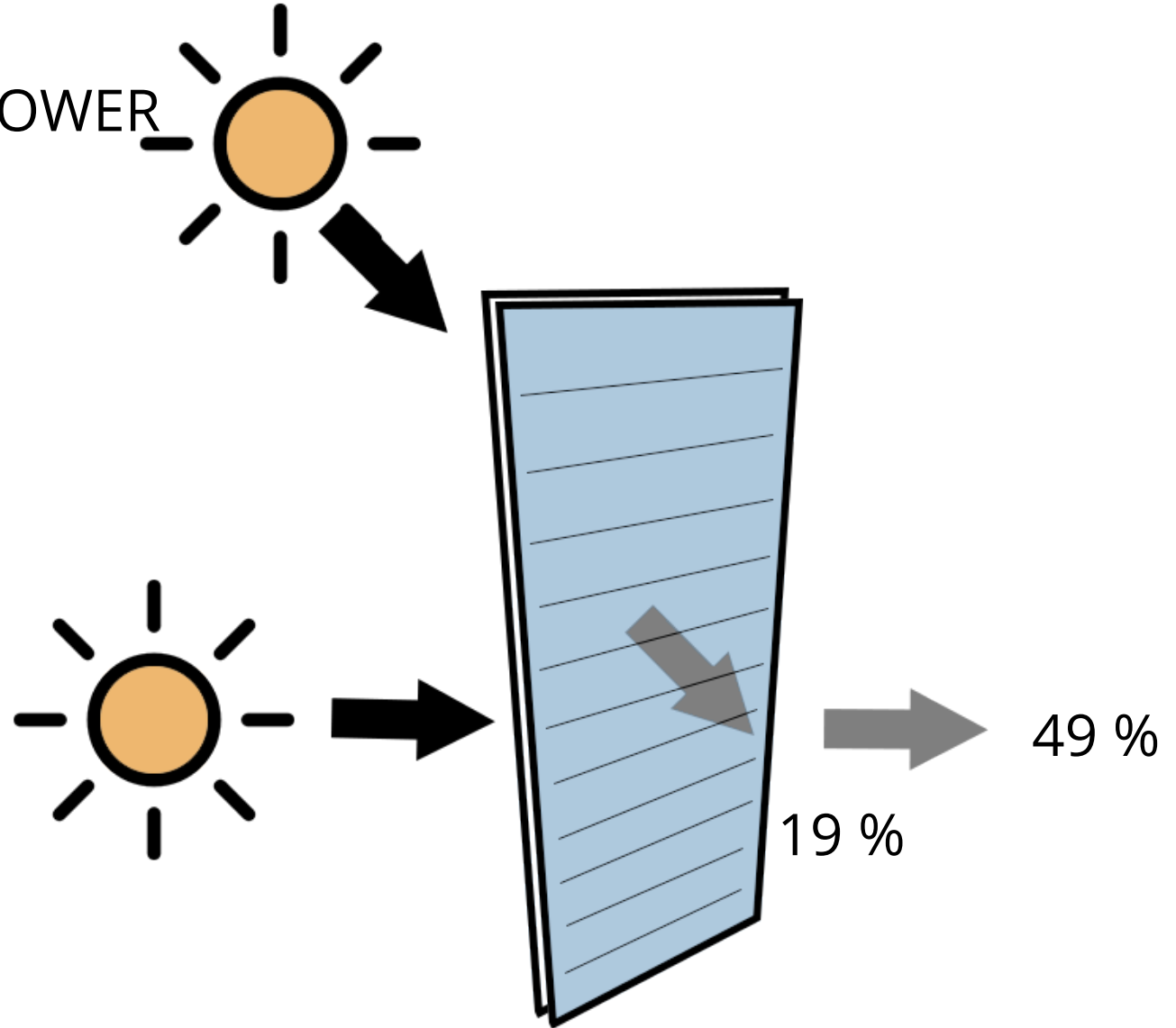


PV

$S = 50 \text{ W/m}^2$
 $E/W = 40 \text{ W/m}^2$

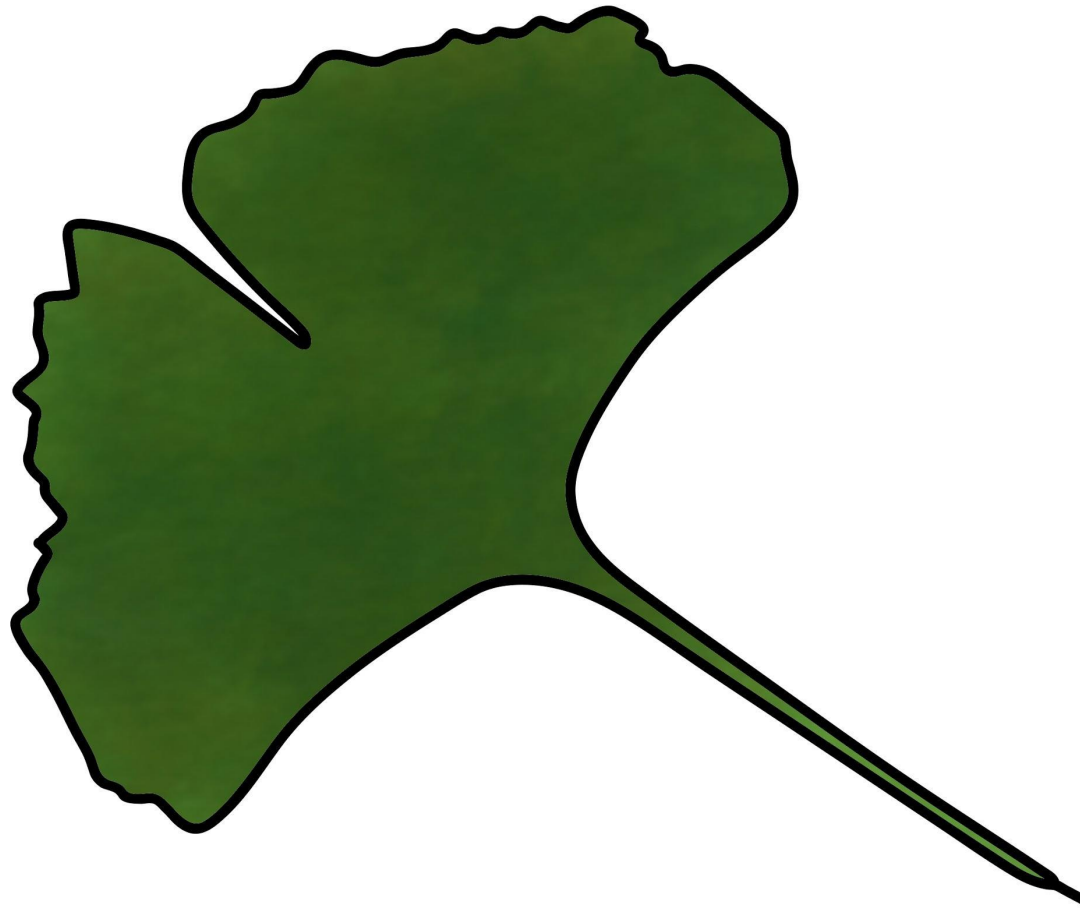
FACADE - SHADING

MICROSHADE POWER



THE SKIN

FACADE - ACOUSTICS

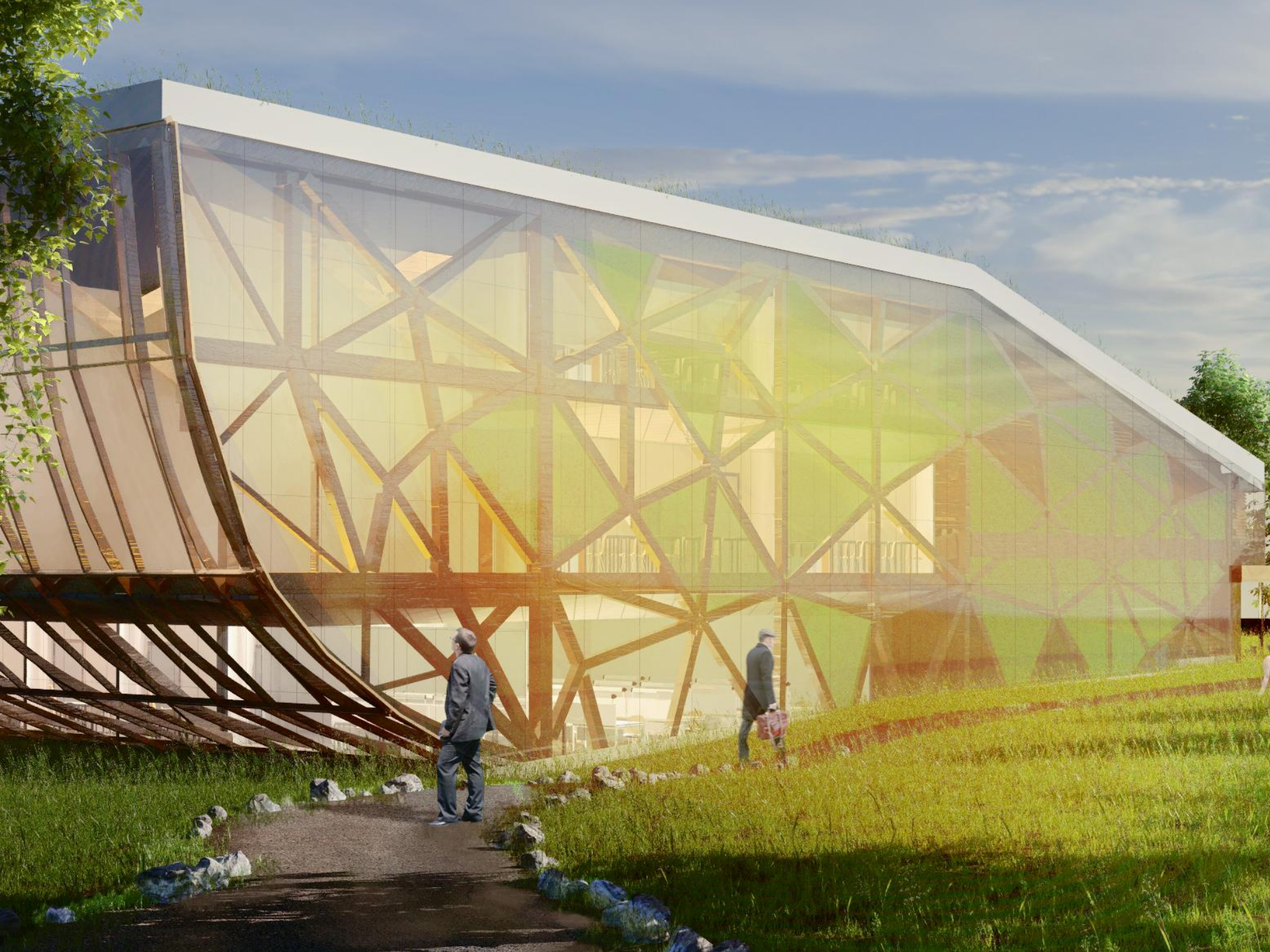


A

MEP

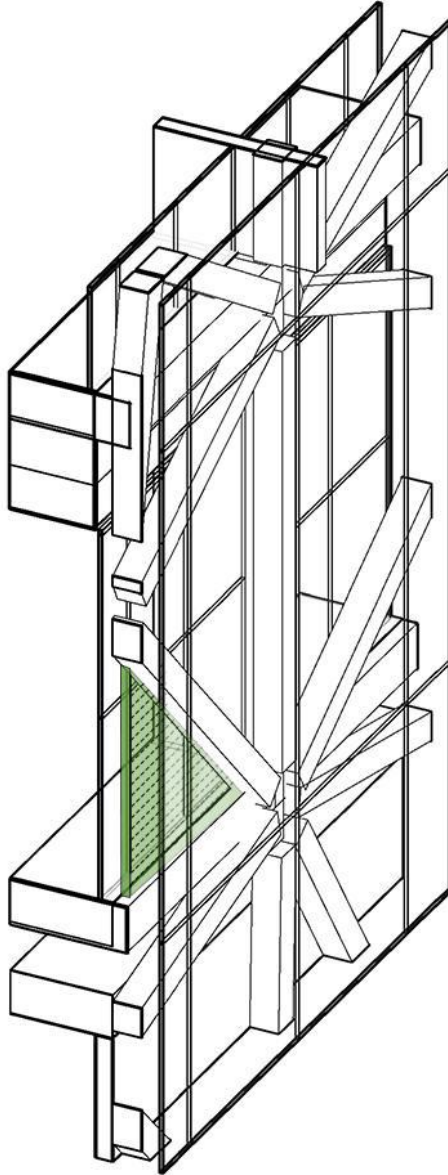
CM

LCFM



INTERIOR GLASS

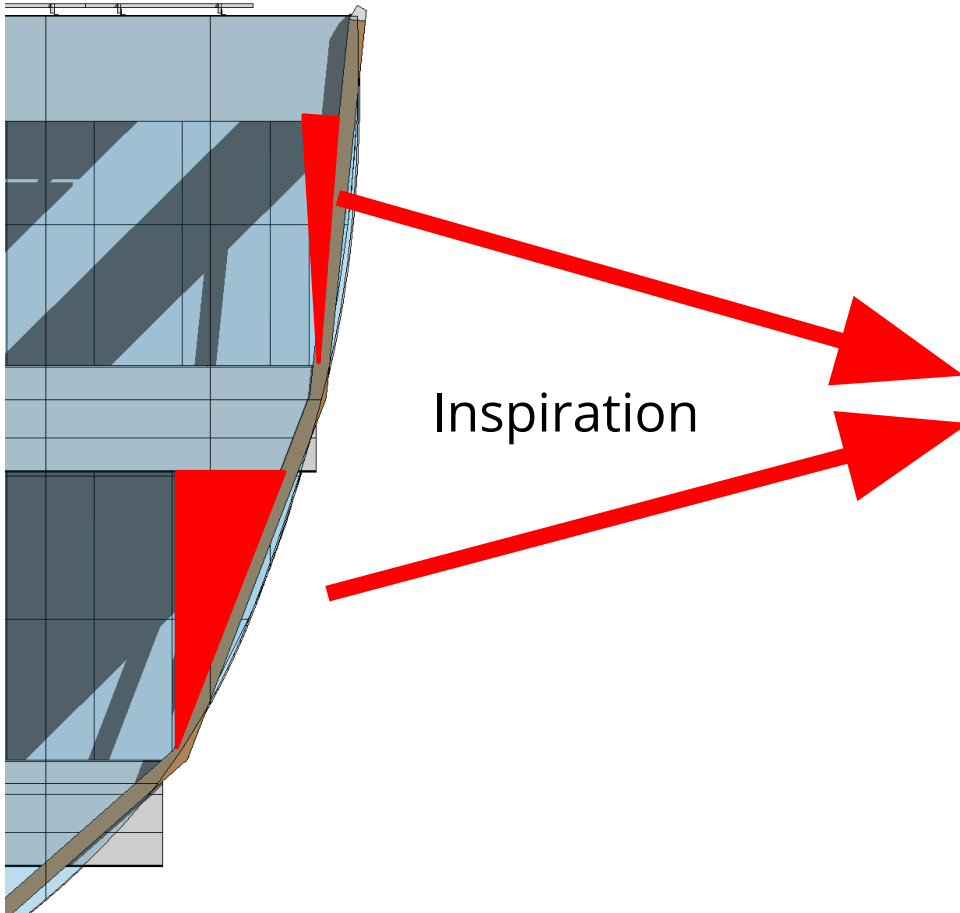
SOUTH & WEST







NORTH & EAST



Pink noise

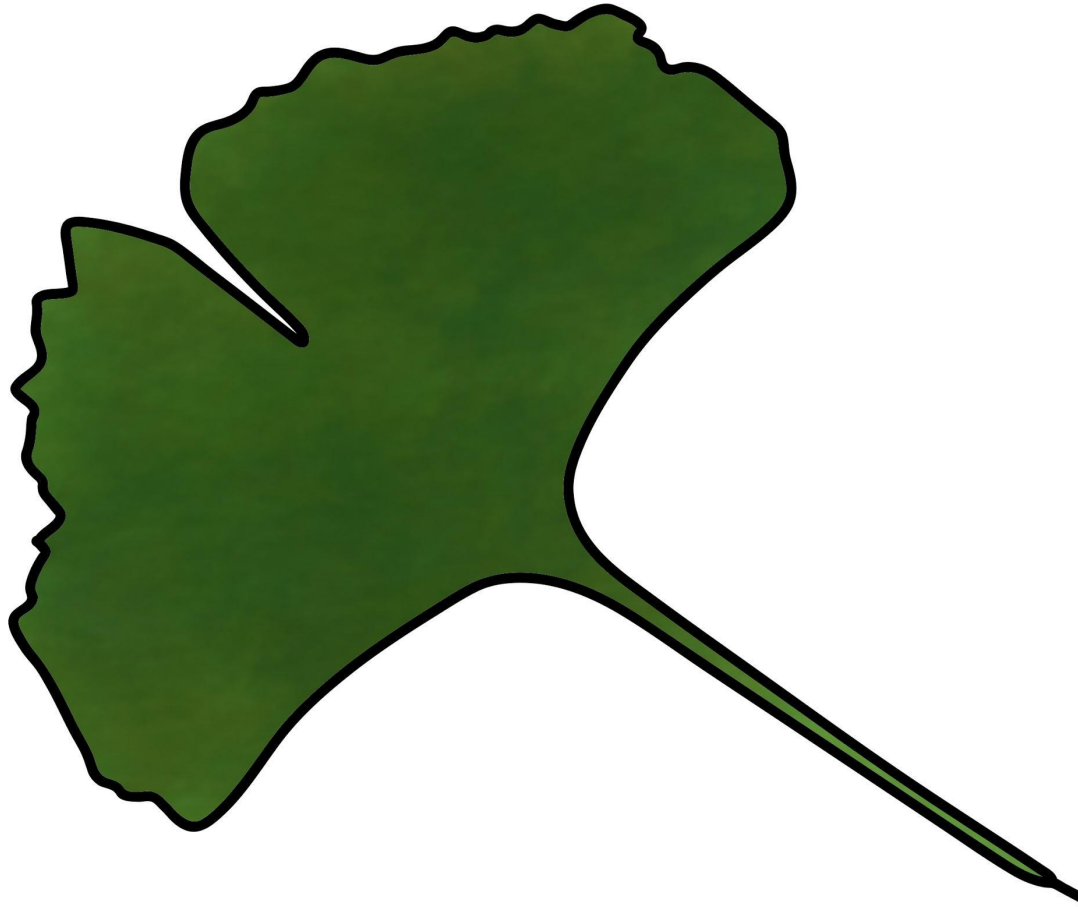


AUDITORIUM



THE SKIN

FACADE - ALGAE

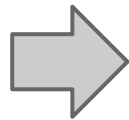
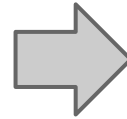


A SE MEP CM LCFM

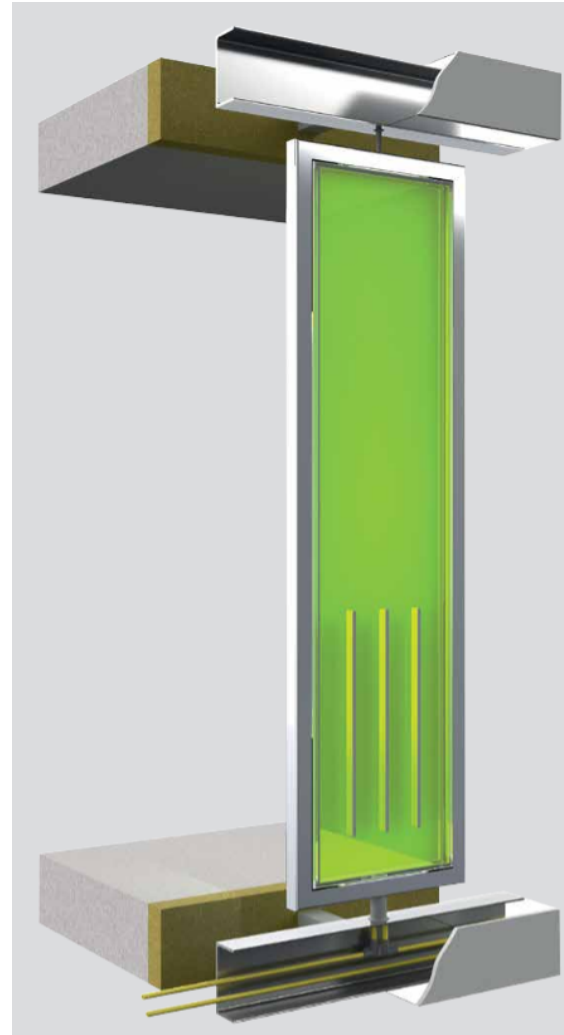




CO₂



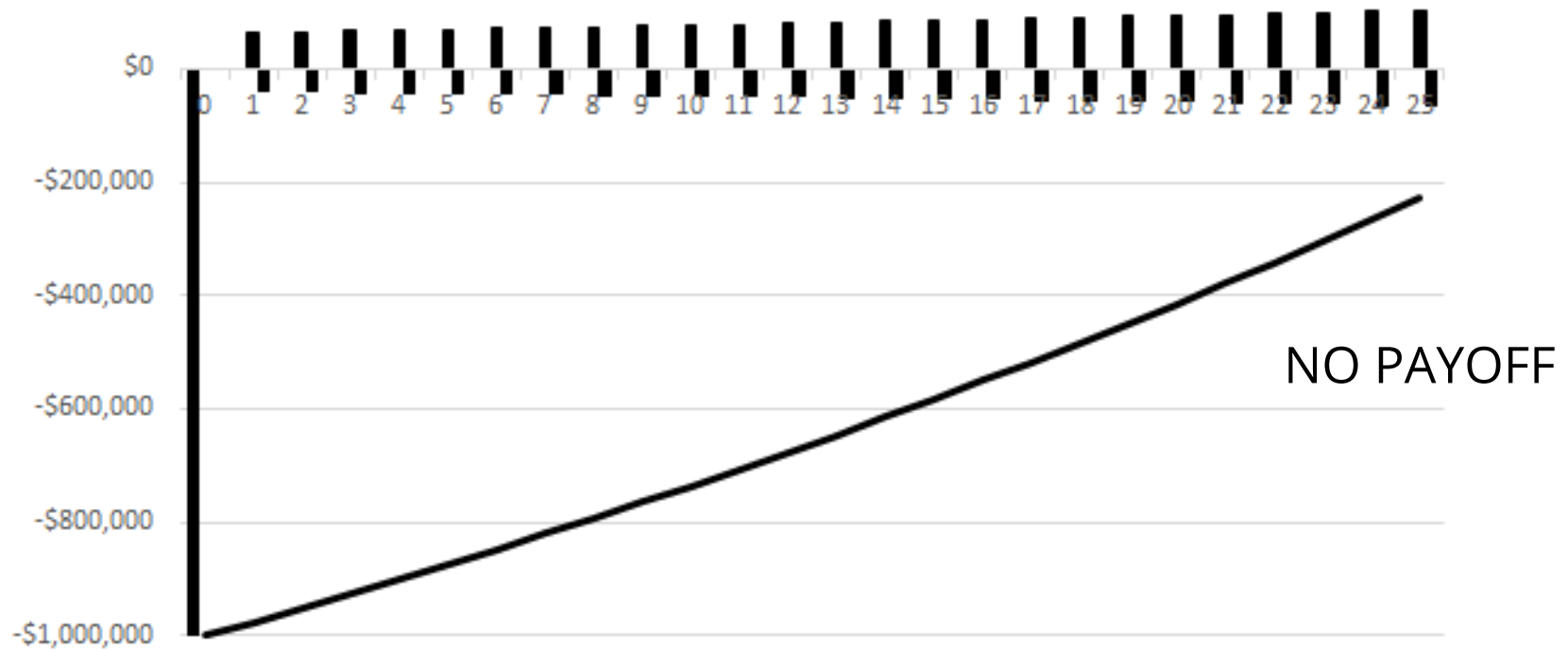
ALGAE GLASS PANELS



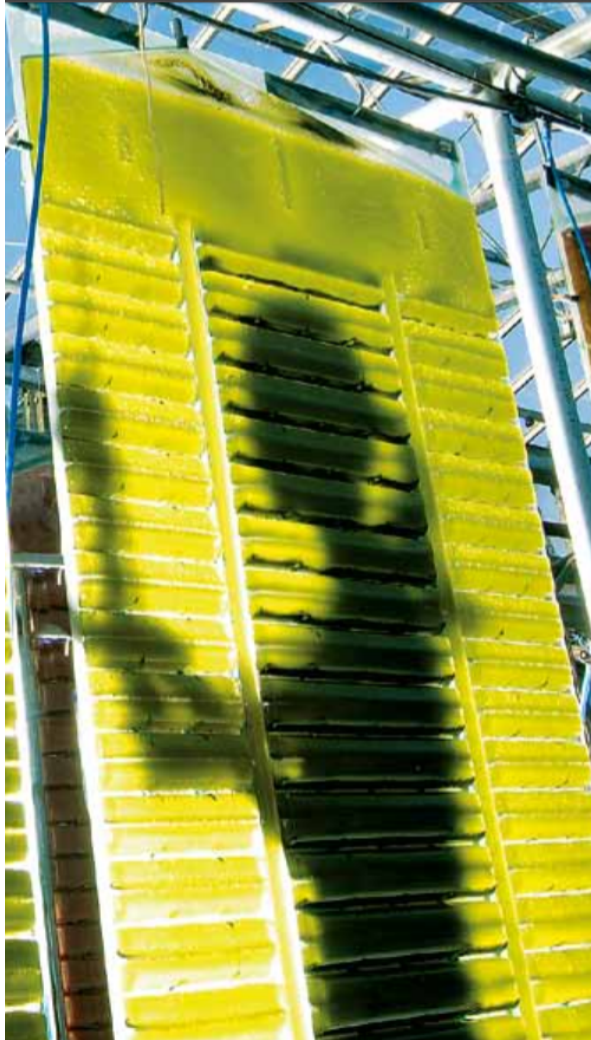
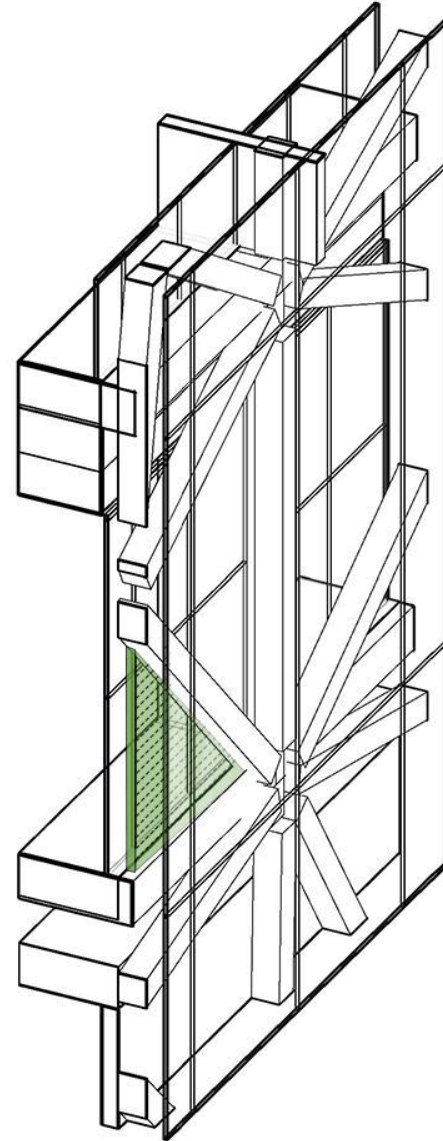
CHALLENGE COST



ALGAE GLASS PANELS



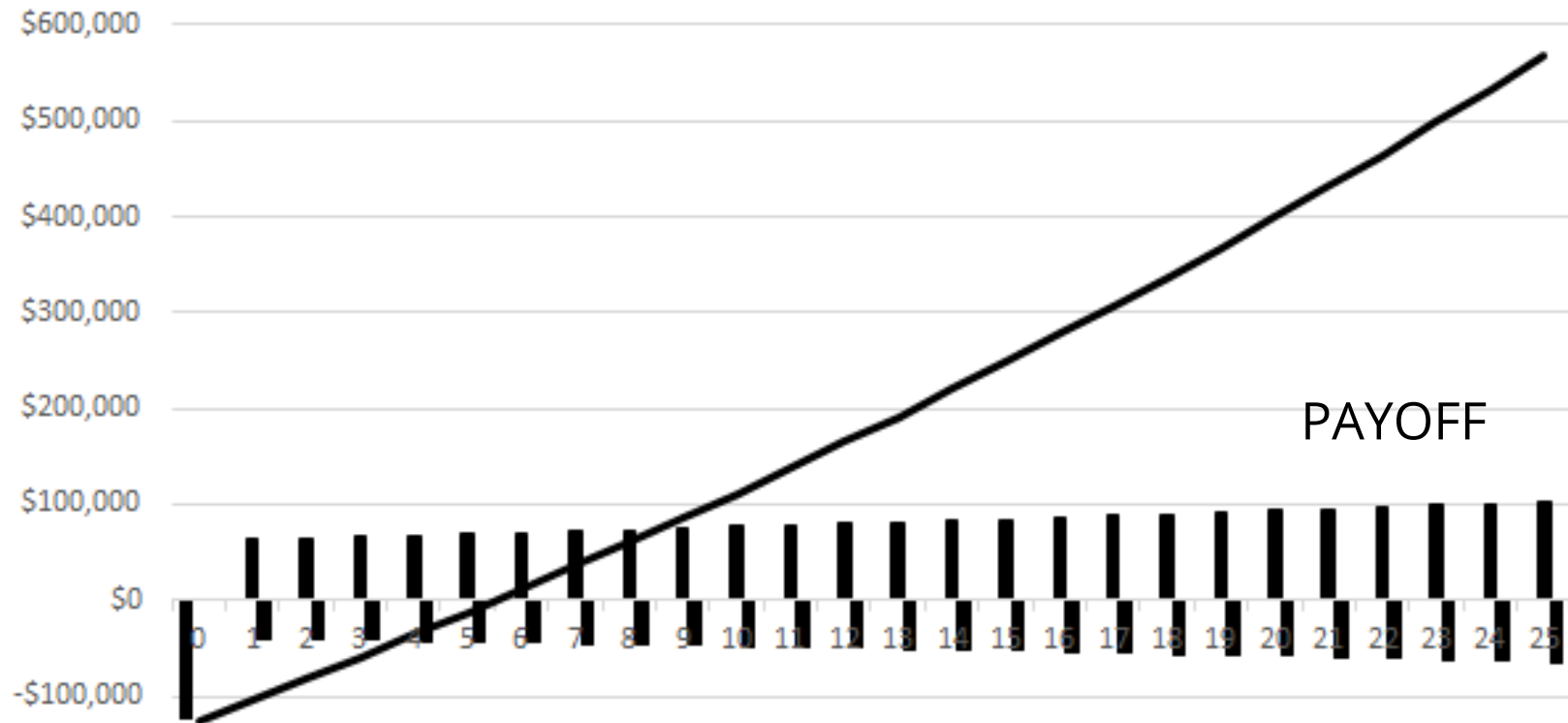
ALGAE PLASTIC BAGS



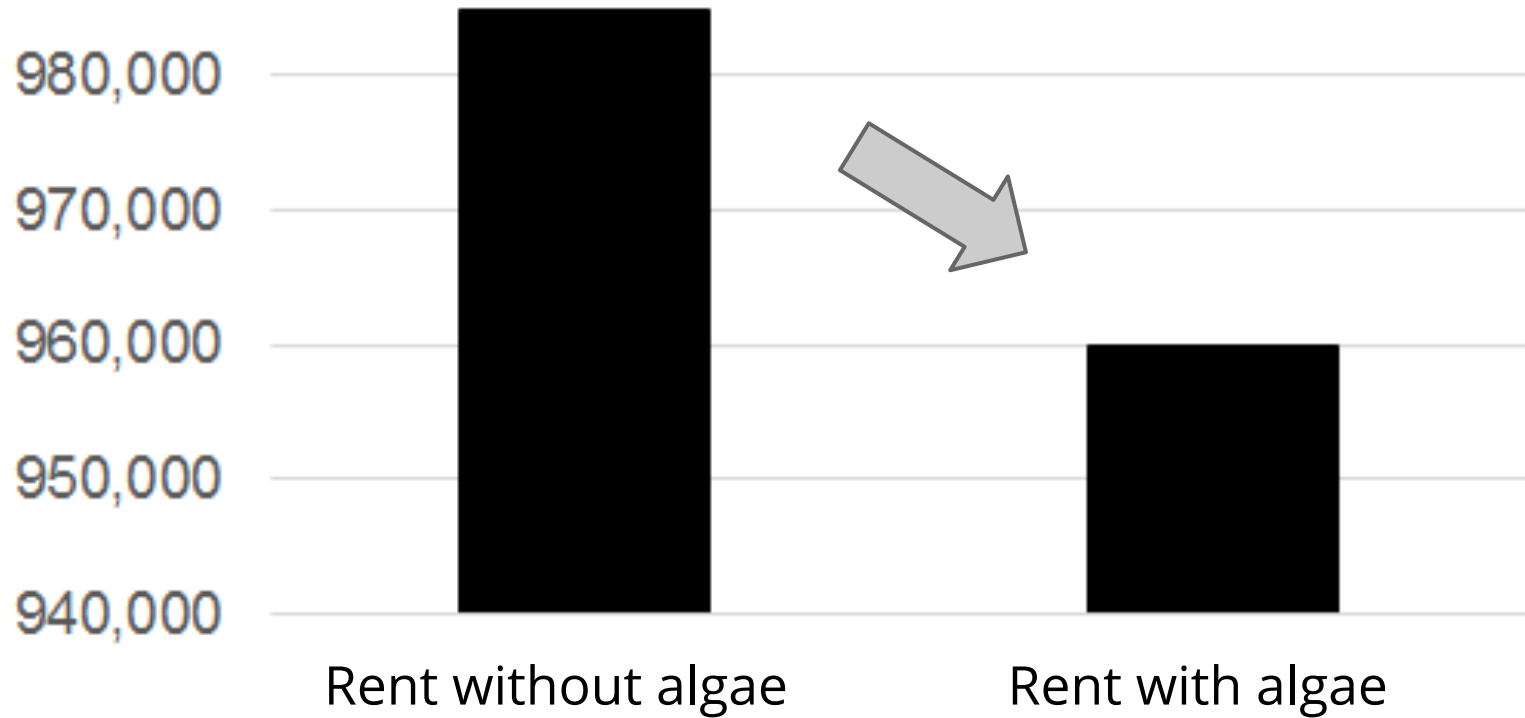
CHALLENGE COST



ALGAE GLASS PANELS



INFLUENCE ON RENT



BENEFITS



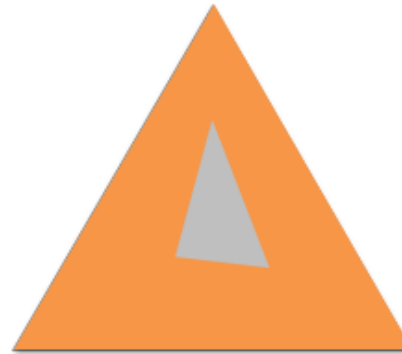
FOOD



WATER EDUCATION



CO2 REDUCTION: 1%

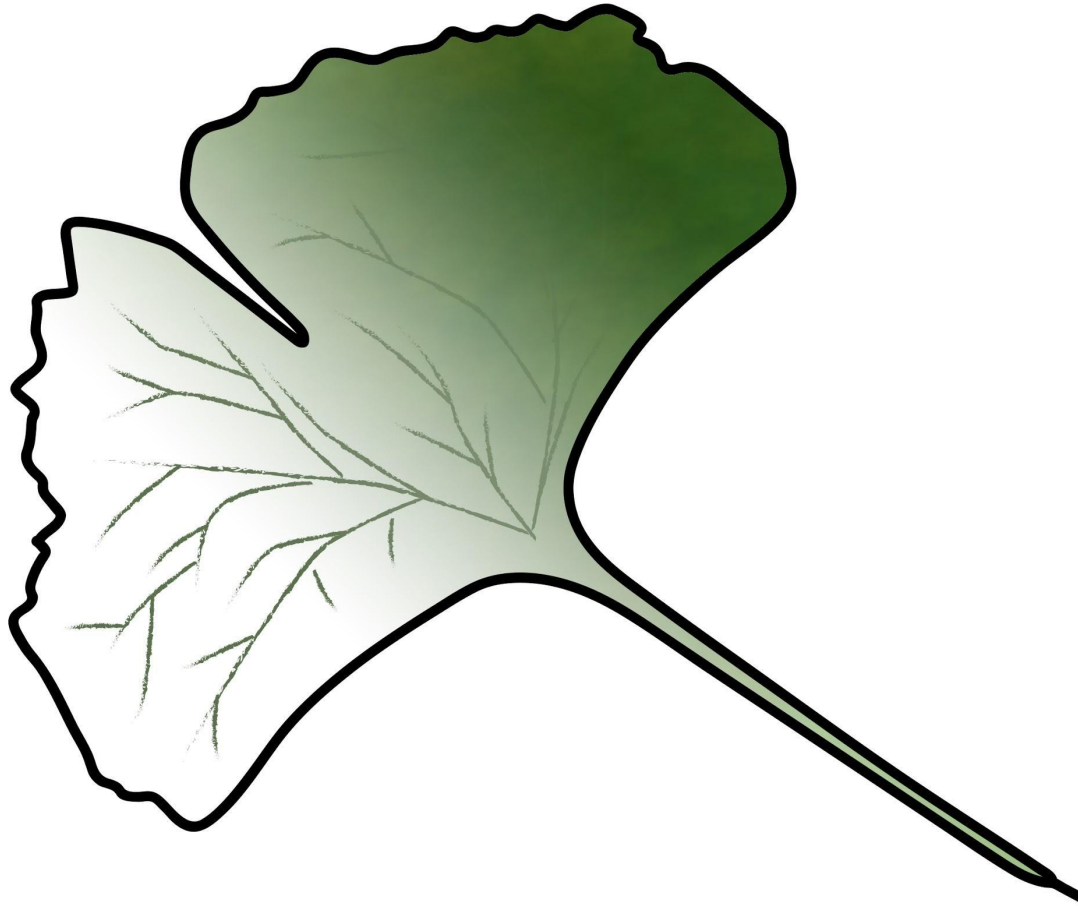


PHOTOSYNTHESIS

SUN

WATER

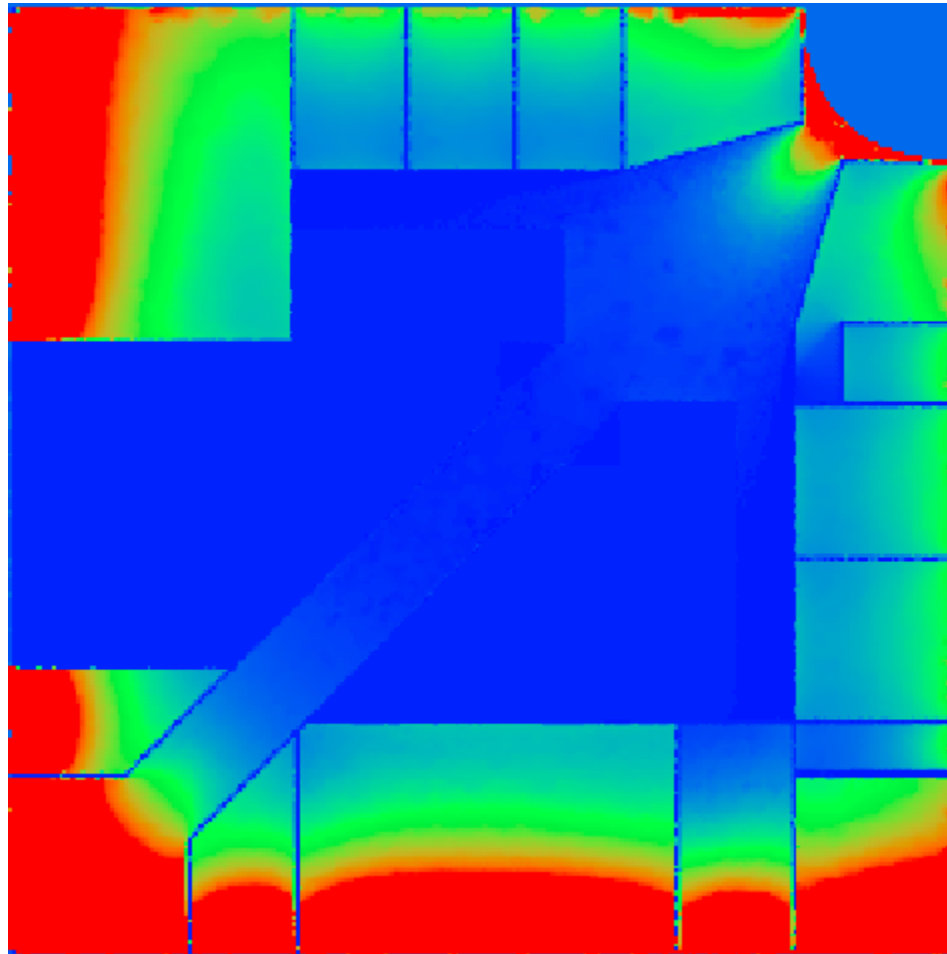
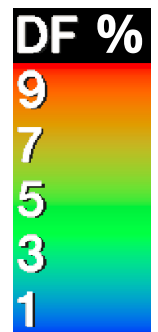
CO₂



MEP CM LCFM

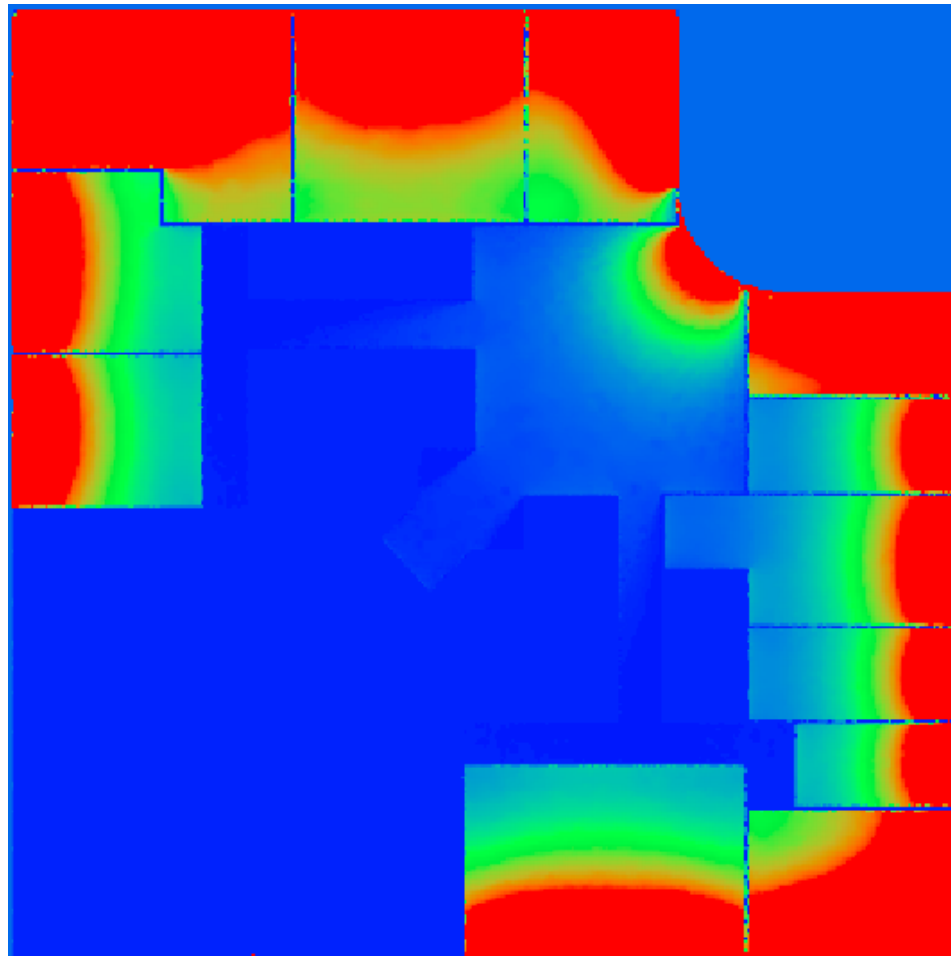
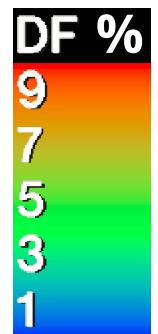
DAYLIGHT FACTOR

GROUND FLOOR



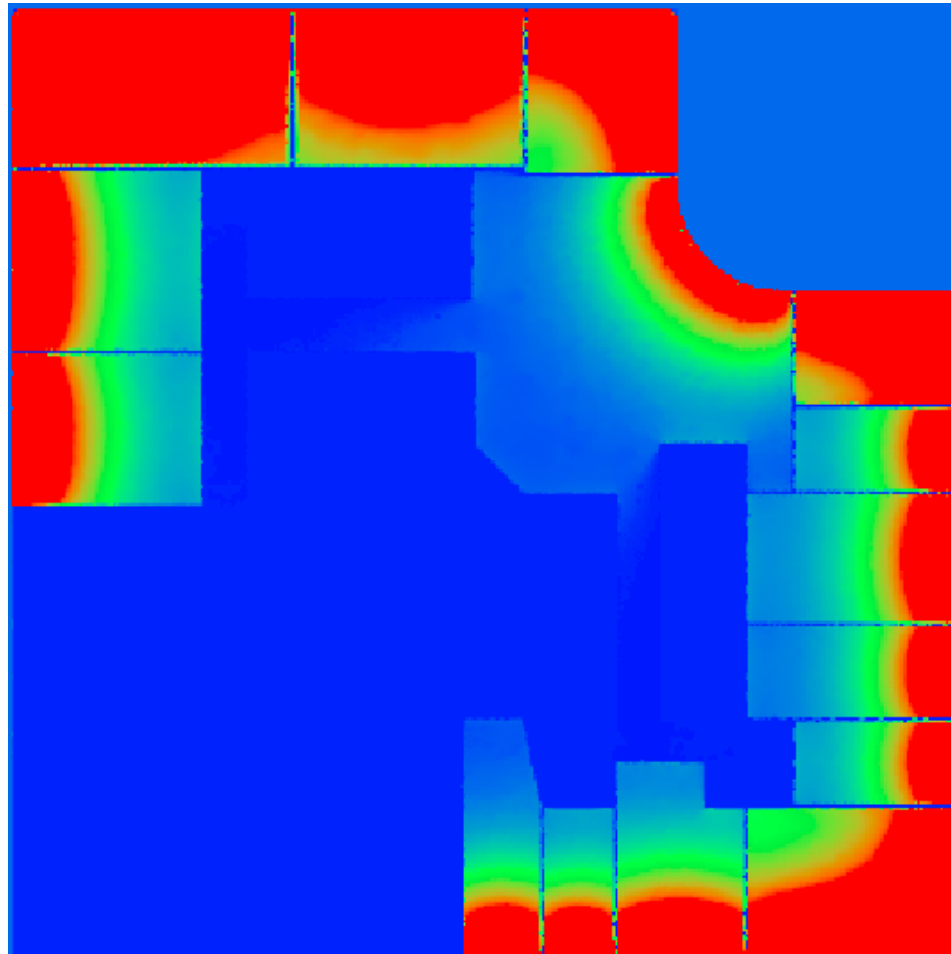
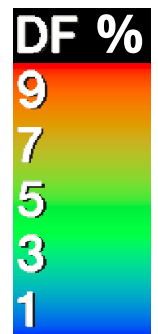
DAYLIGHT FACTOR

FIRST FLOOR



DAYLIGHT FACTOR

SECOND FLOOR

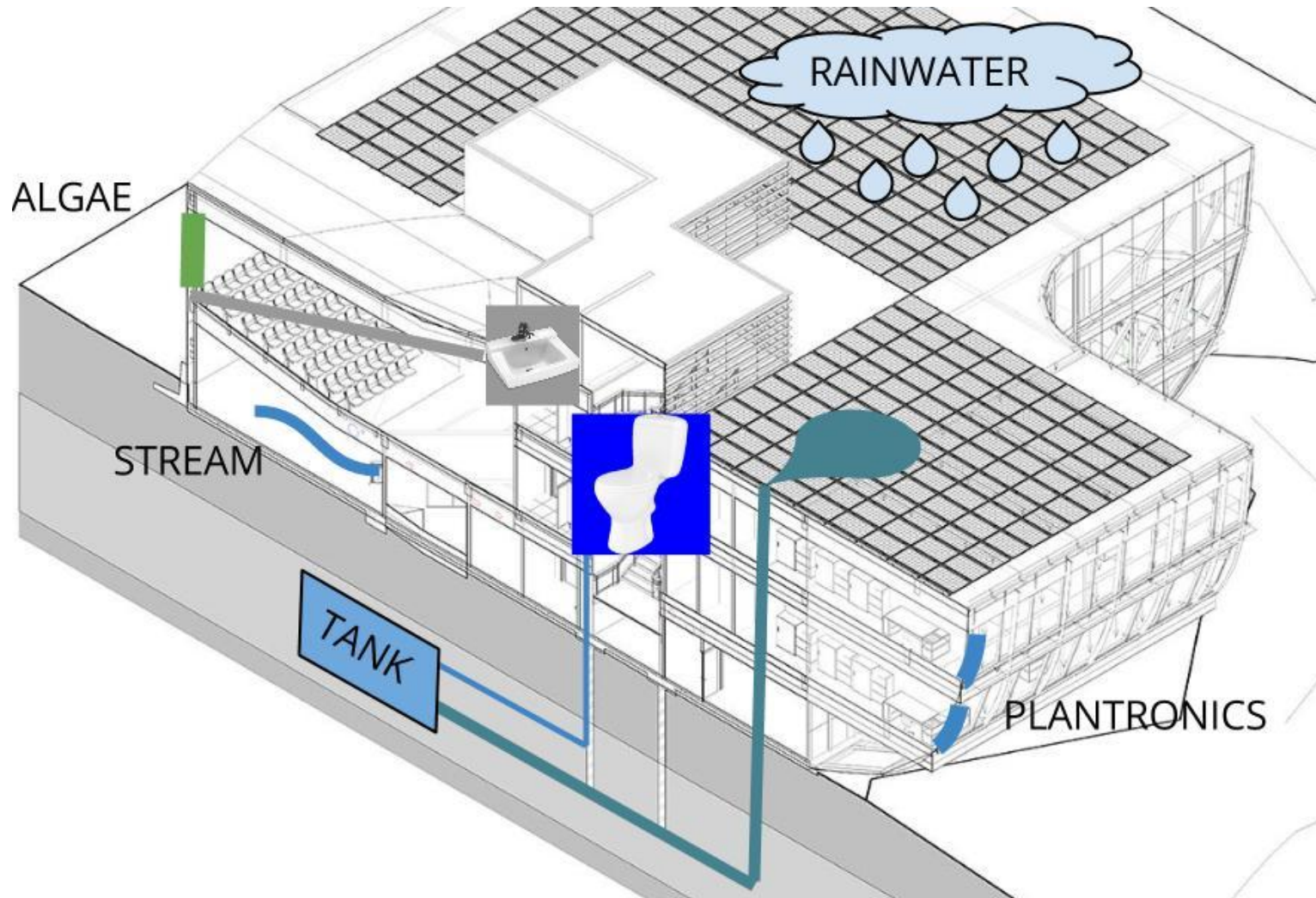




WATER



BUILDING WATER SUPPLY



OPTIMIZATION

HEAT PUMP

+ MICROSHADING

+ PV ROOF
+ BATTERY

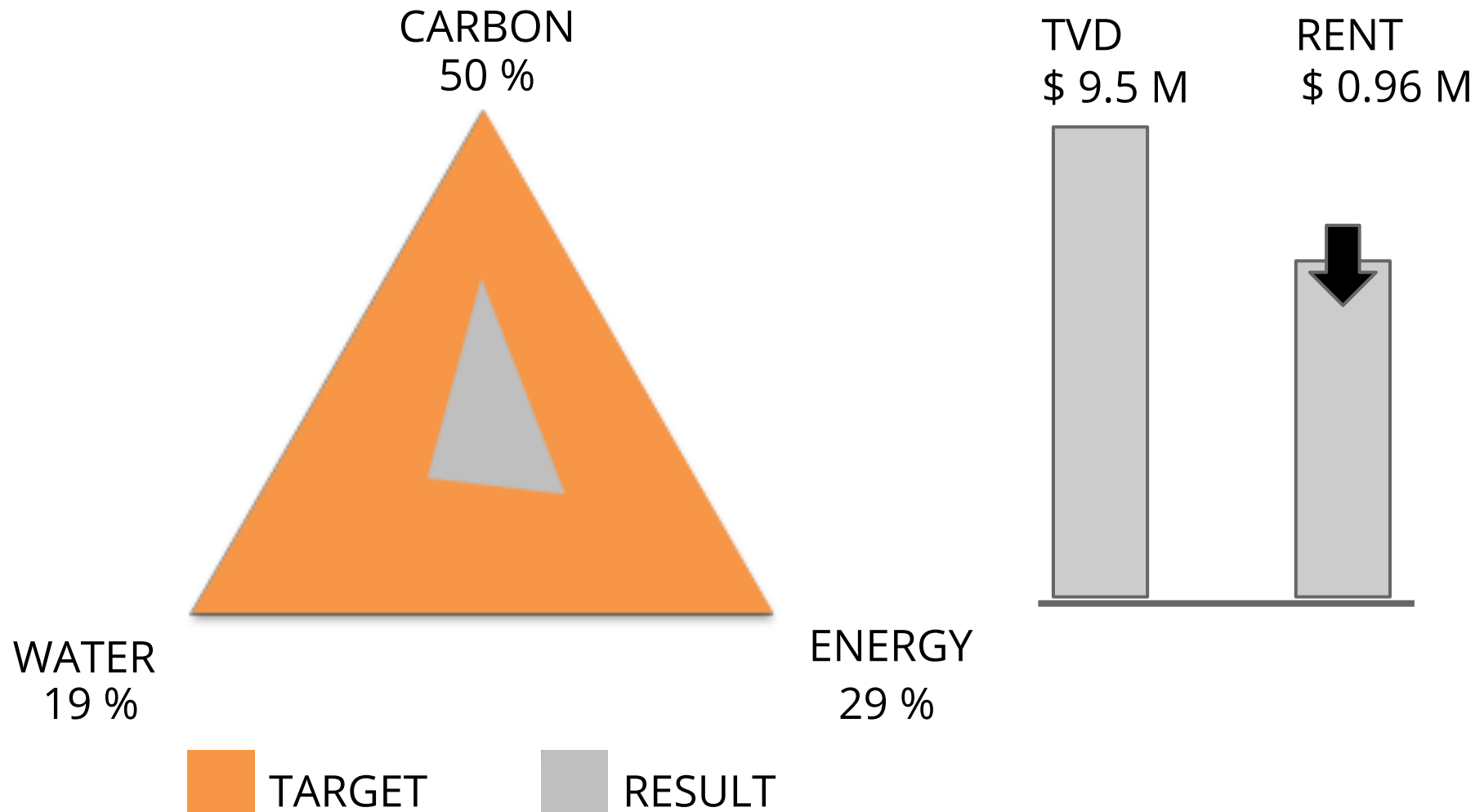
OPTIMIZATION



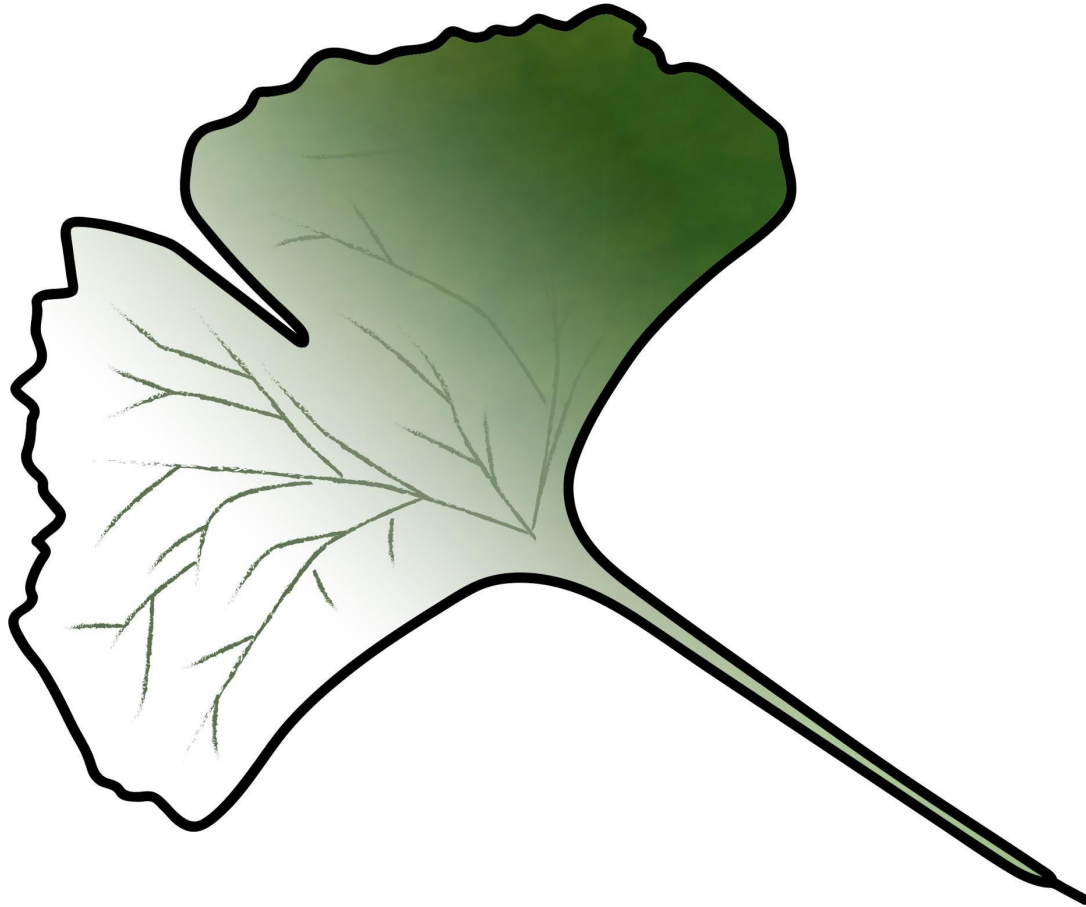
SUSTAINABLE TARGET VALUE



ENERGY OPTIMIZATION + WATER



CERTIFICATIONS



A SE MEP CM LCFM

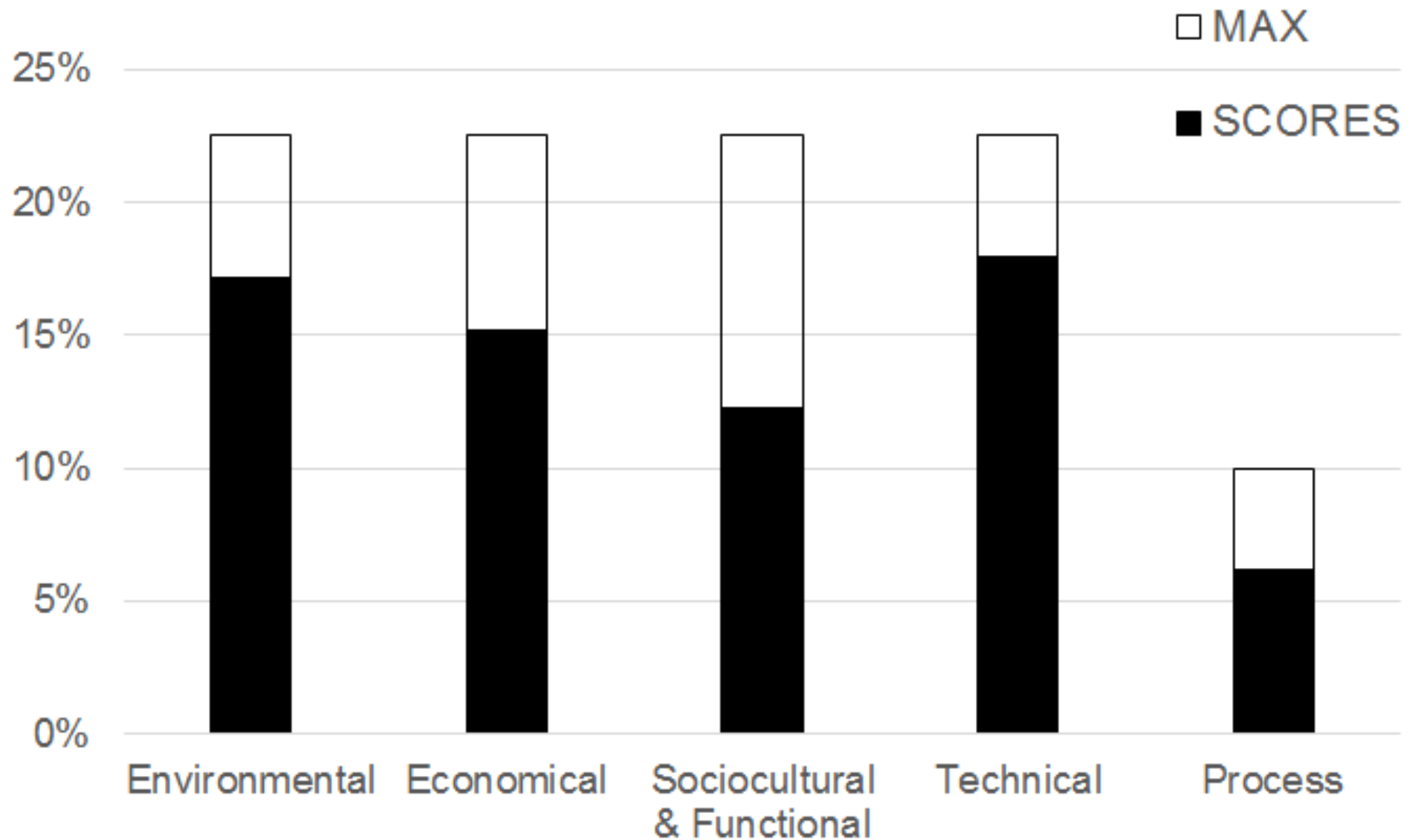


DGNB[®]

Deutsche Gesellschaft für Nachhaltiges Bauen e.V.



CRITERIA SCORING



RESULTS

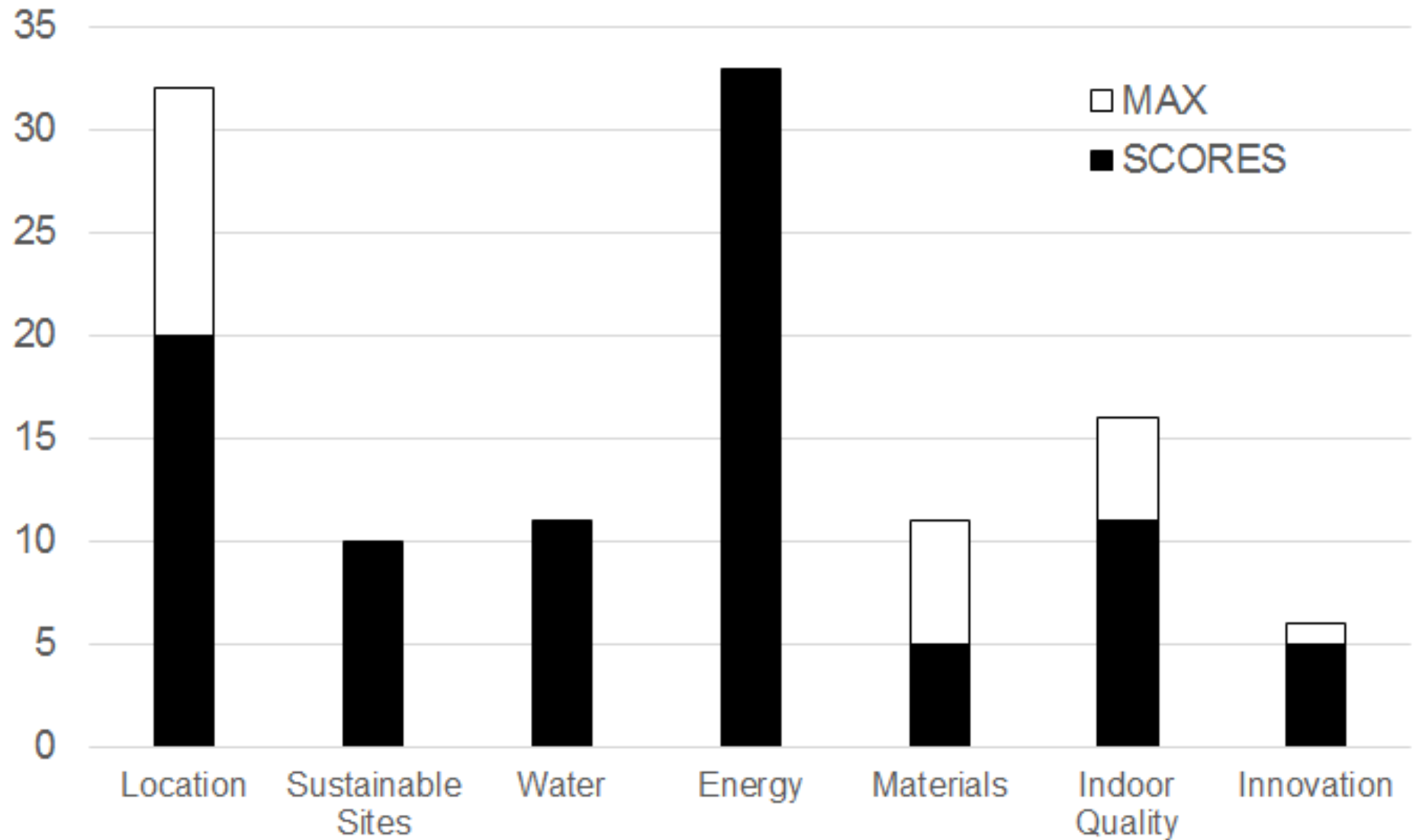


67.7%

95/126



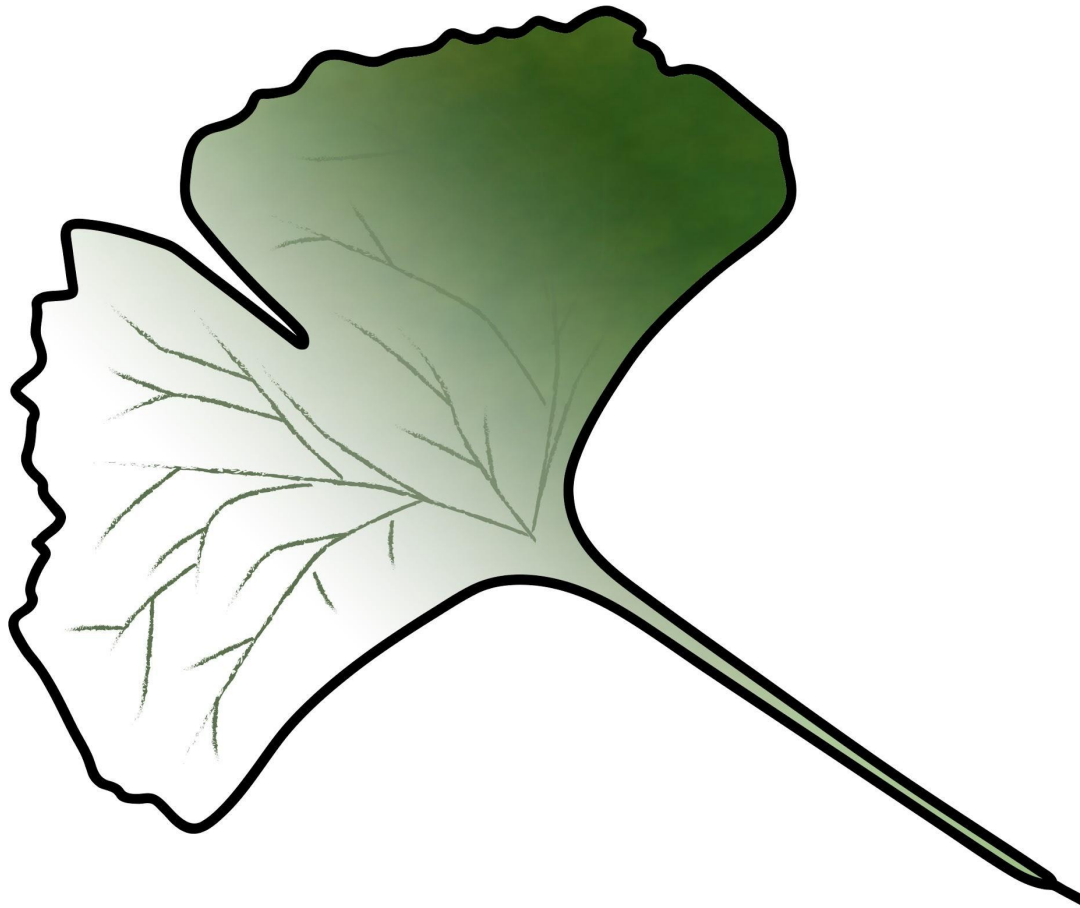
CRITERIA SCORING





PHOTOSYNTHESIS

WATER

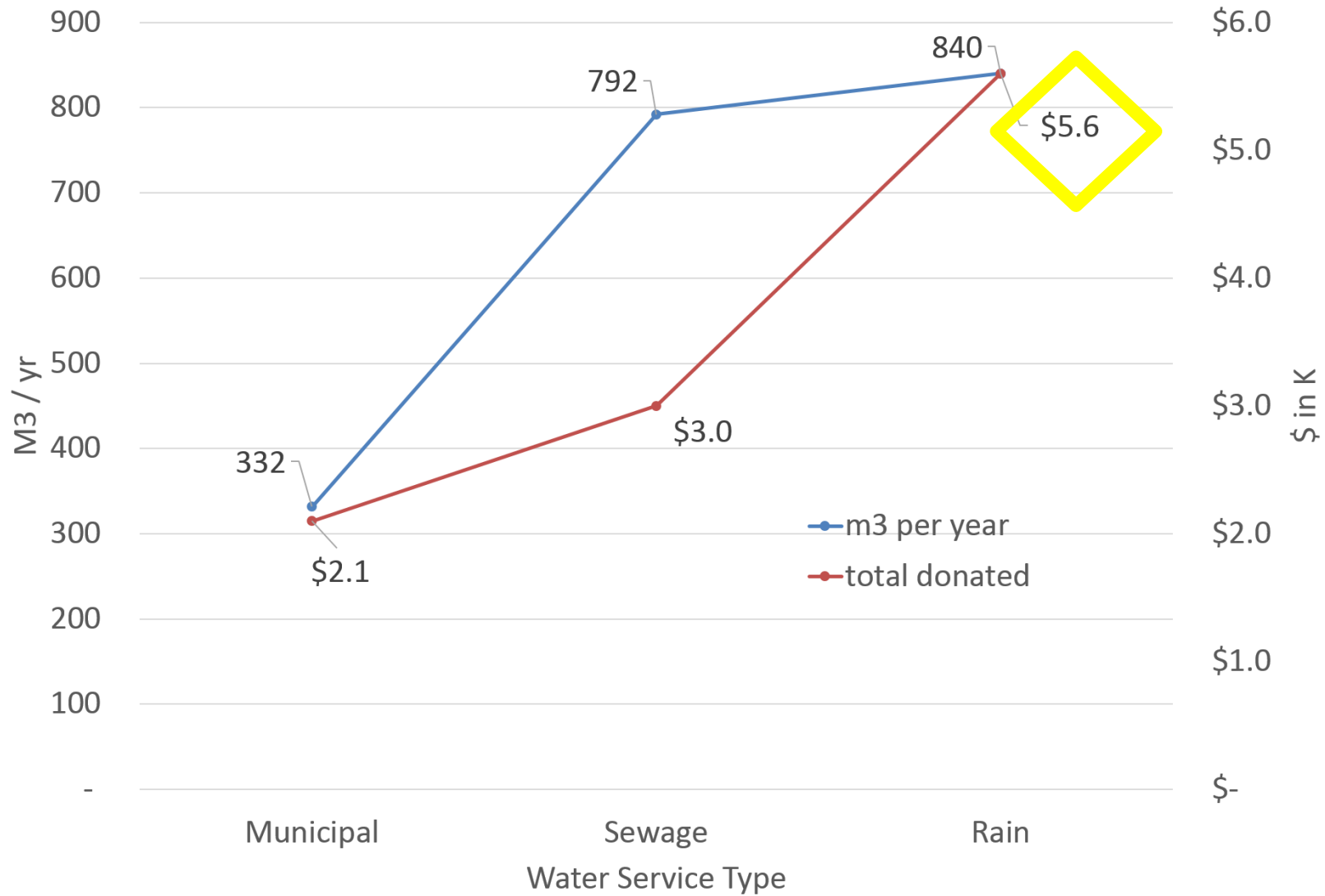


A SE MEP CM LCFM

WATER ABUNDANCE



WATER USE



WATER COST



Rent p.a.	\$960k
Our Equity p.a.	\$97k
Total Water Use p.a.	\$11.2k

CHARITABLE CAUSE



SHARING THE WATER



charity: water

Transform an entire community or school
with a gift of \$10,000 or more.

Have questions about sponsoring a project? Please get in touch with our team.

📞 646.688.2323 ✉ sponsoraproject@charitywater.org

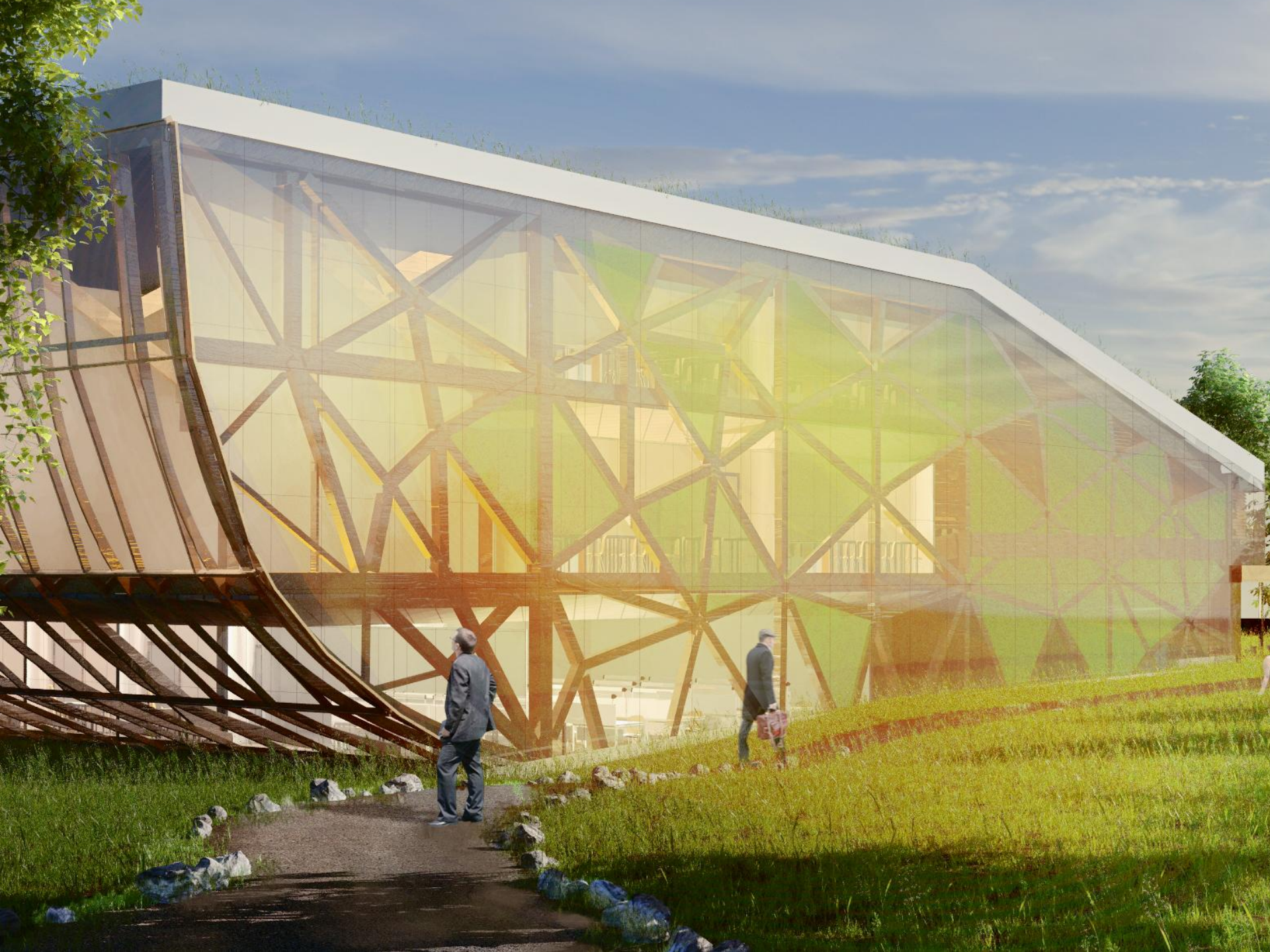


OCCUPANT INTERACTION

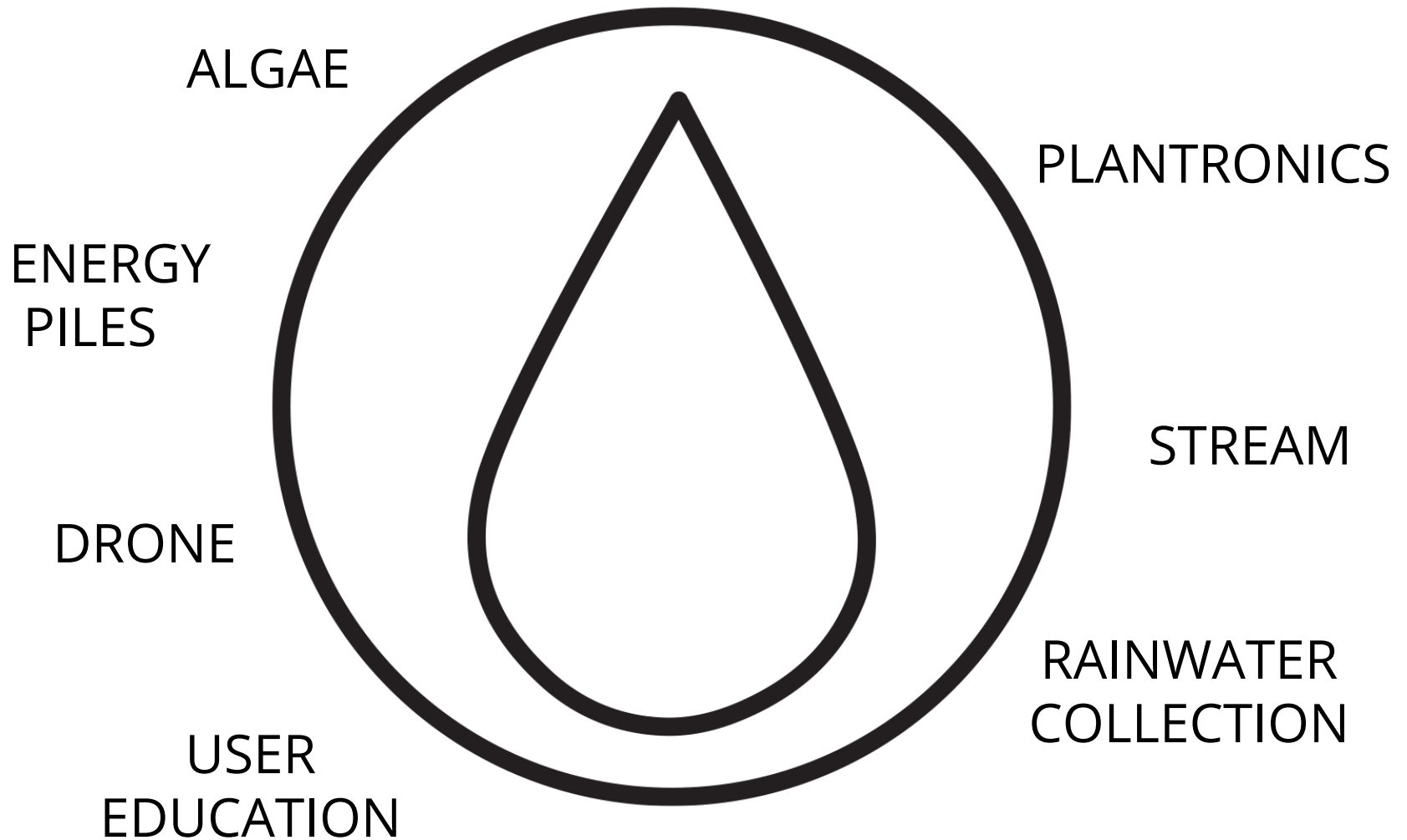


CONSCIOUS STREAM





WATER SUMMARY



SPECIAL THANKS TO:

Greg Luth, SE Mentor
Justin Schwaiger, SE Mentor
Eric Borchers, SE Mentor
Erik Kneer, SE Mentor
Luis Rivera, MEP Mentor
John Nelson, MEP Mentor
Stefan Thielemann, MEP Mentor
Christian A. Hviid, MEP Mentor
Glenn Katz

Danny Hall, AEC Alumnus
Norman Hallermann, Drone
Drew Wenzel, Google
Roy Griffith, Clark Pacific
Martin Scheiber, Clark Pacific
Plamen Ivanov, Clark Construction
Jim Day, Clark Construction
Matthias Ehrlich, KfW
Björn Wündsche, LCFM Mentor

Super owner/mentor: Renate Fruchter

Our Owners:

Flavia Grey, Norayr Badasyan, Mandy Bugzel,
Fernando Castillo, Paweł Wołęjsza

LESSONS LEARNED

No matter how great a system or process seems, no one will use it unless it's simple and it jumps out and bites them. - Ryan, CM

ALWAYS inform the owners! - Janine, LCFM

Collaboration is a key. - Borys, A

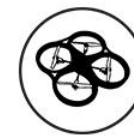
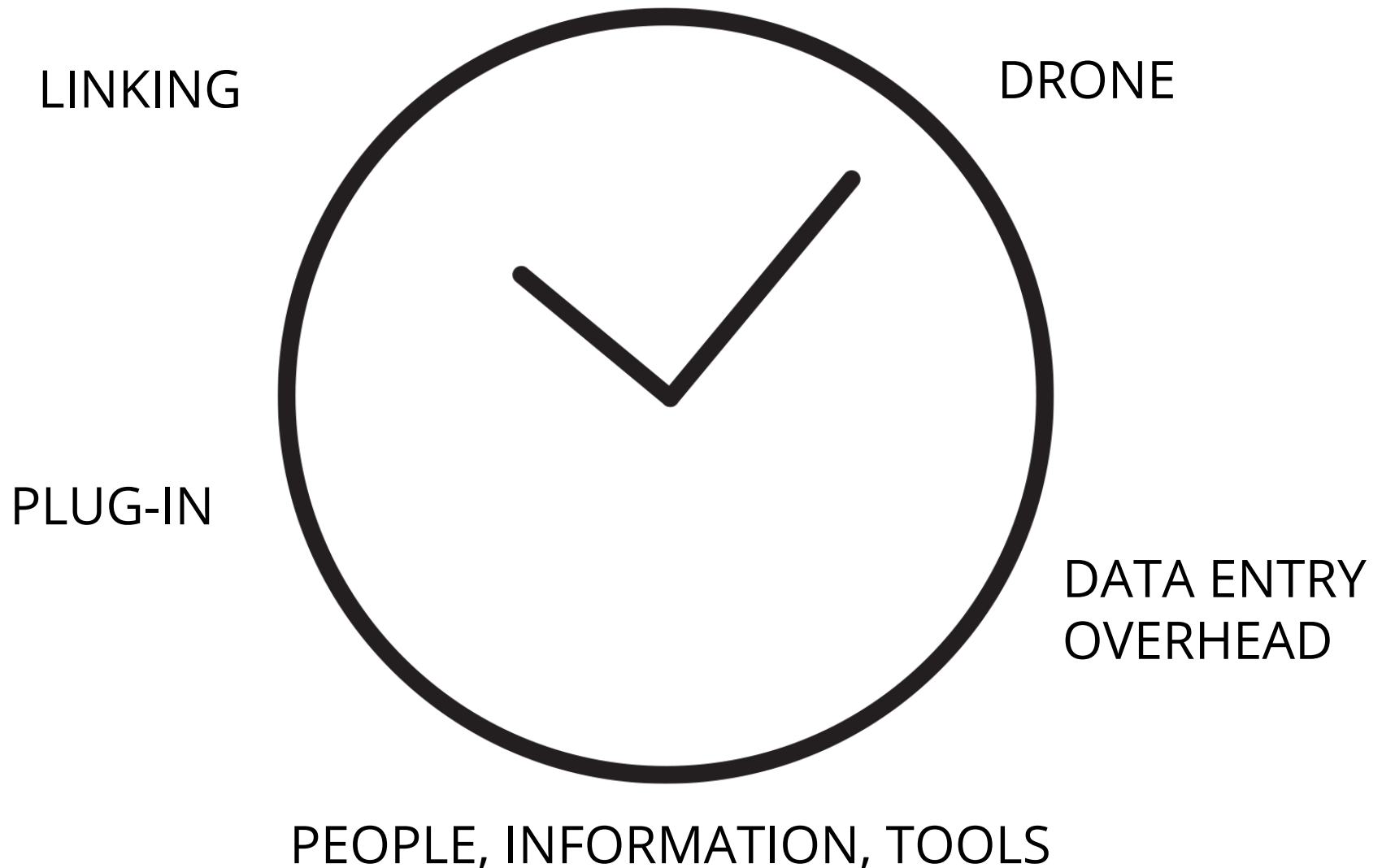
When you talk you tell what you know, when you listen
you learn something new. - Marie, MEP

Be humble and ask questions. You have something to
learn from everyone. - Luke, SE

Present what you did! - Steve, SE

Share early, share often. - Tyler, CM

LATENCY SUMMARY

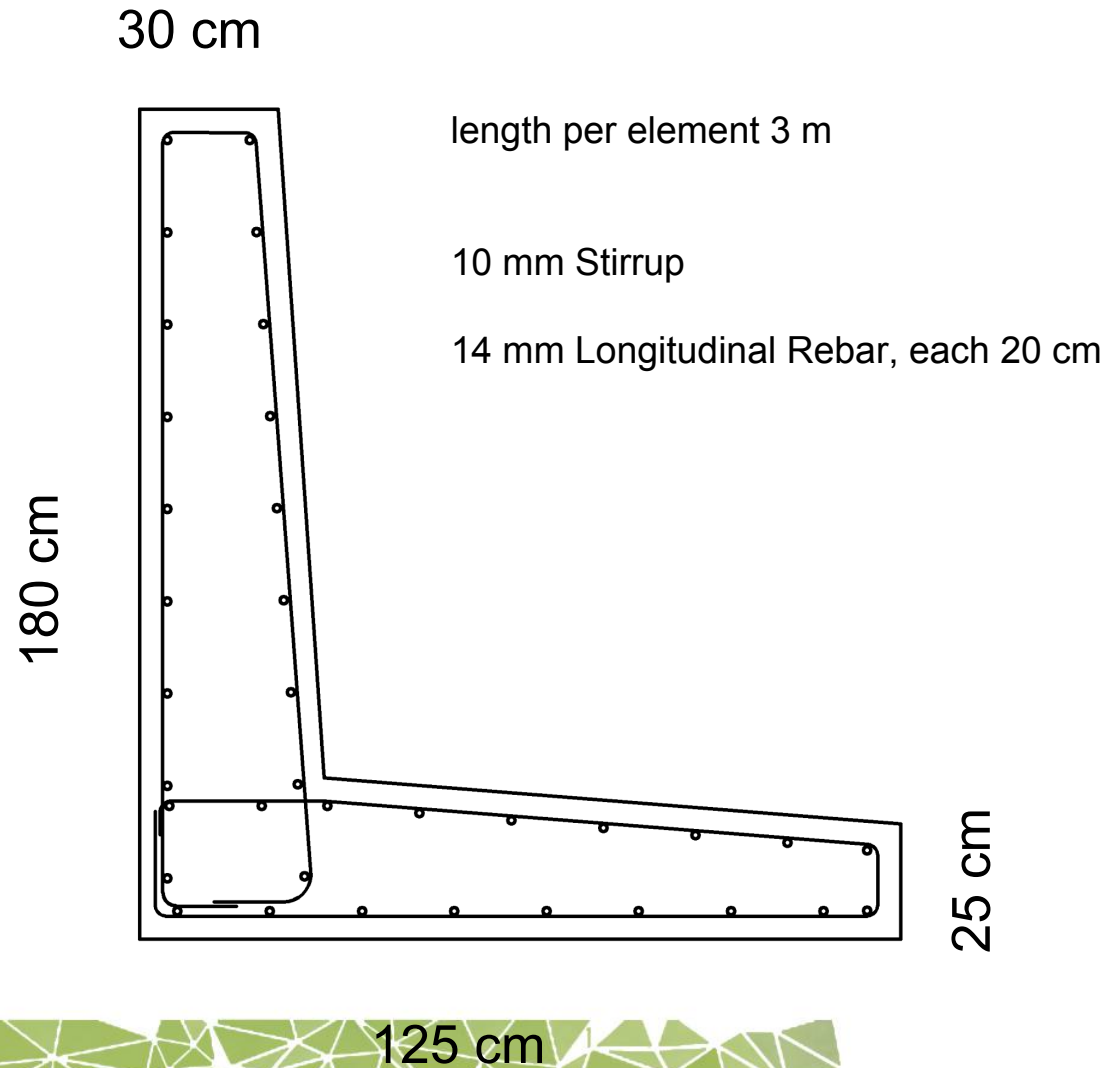






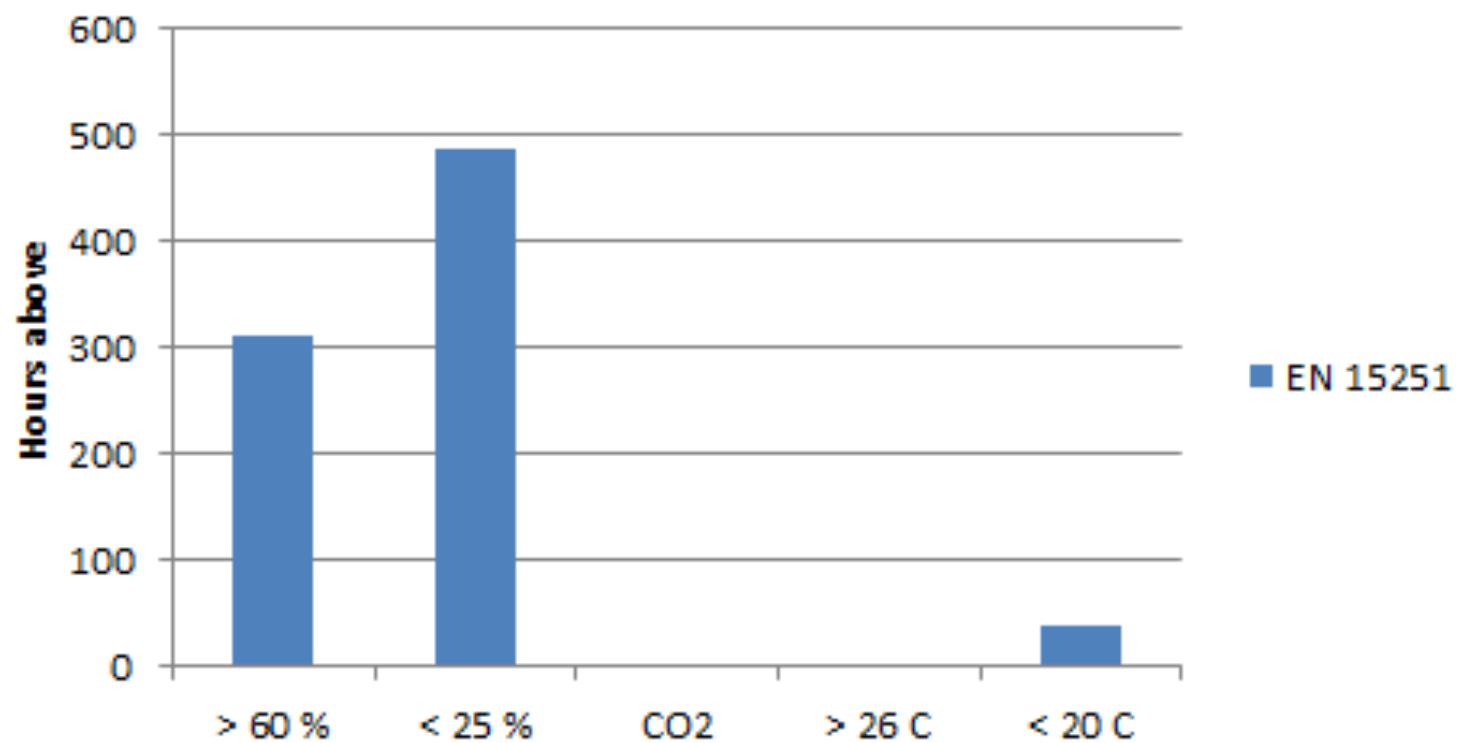
APPENDIX

Retaining Wall





INDOOR CLIMATE



ELECTRICITY



X

	WITH HEAT PUMP	MICROSHADE POWER	+ PV ON ROOF + BATTERY
CARBON [%]	119	88	55
WATER [%]	42	41	41
ENERGY [%]	80	57	33
TVD [\$*10^6]	9.1	9.35	9.5
RENT [\$]	975,000	977,000	963,000

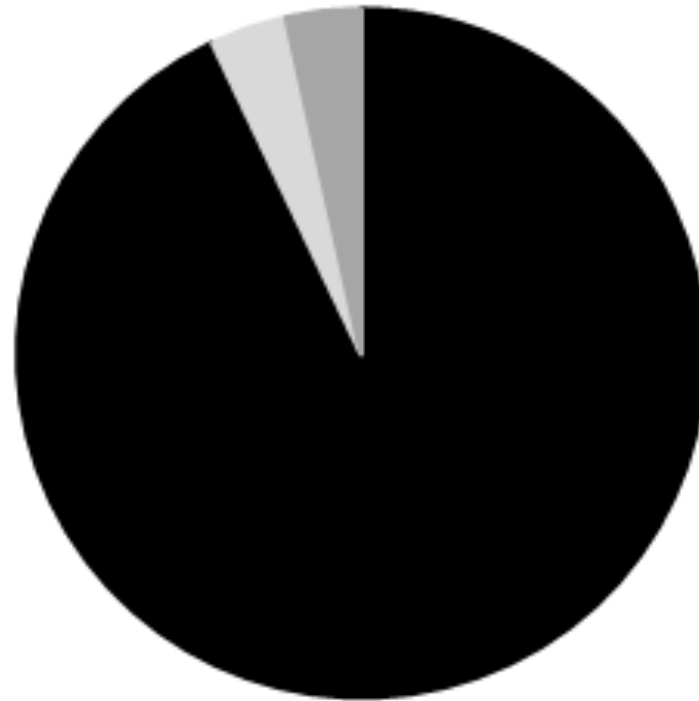
ELECTRICITY



X

	WITH HEAT PUMP	MICROSHAD E POWER	+ PV ON ROOF + BATTERY	ENERGY + WATER
CARBON [%]	119	88	55	50
WATER [%]	42	41	41	19
ENERGY [%]	80	57	33	29
TVD [\$*10^6]	9.1	9.35	9.5	9.5
RENT [\$]	975,000	977,000	963,000	960,000

INFLUENCE ON RENT



■ Rent ■ Algae Powder ■ Rentable Space



