

RIVER TEAM

TEAM:



Charles
BOVET
[CM]



Mareike
DEURLOO
[LCFM]



Ronnie
HAAGENSEN
[MEP]



Danny
HALL
[SE]



Danielle
PETERSON
[SE]



Joanna
PIETRZYKOWSKA
[A]



Sijie
ZHANG
[CM]

OWNERS:



David
BOROWICZ

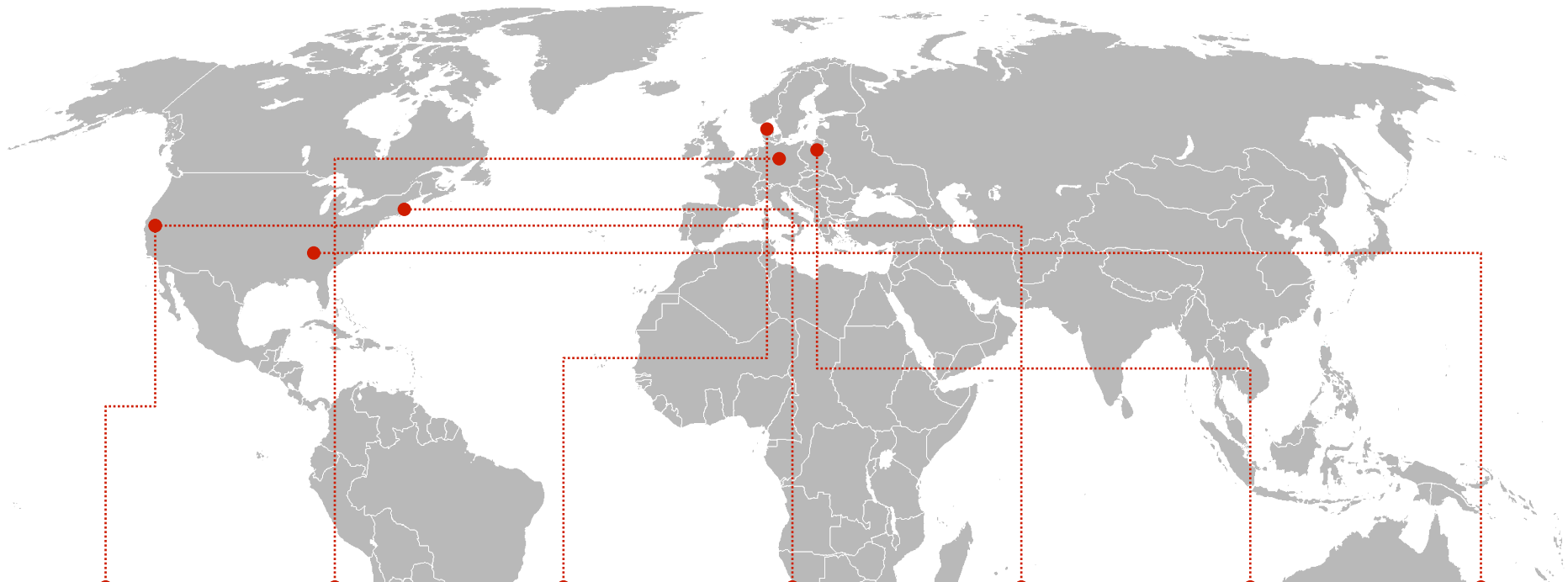


Fernando
CASTILLO



Zuzanna
KOŁTOWSKA

RIVER TEAM



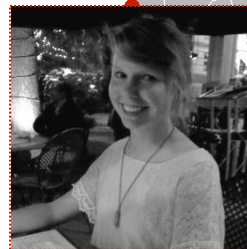
Charles
BOVET
[CM]
Stanford



Mareike
DEURLOO
[LCFM]
Bauhaus



Ronnie
HAAGENSEN
[MEP]
DTU



Danielle
PETERSON
[SE]
USMA



Danny
HALL
[SE]
Stanford



Joanna
PIETRZYKOWSKA
[A]
WUT



Sijie
ZHANG
[CM]
Georgia Tech

A

MEP

SE

CM

LCFM

River Team Contract

General Rules

Rule #1: be polite , words like thanks and please will make the work easier

Rule #2: be transparent, how do you feel, what plans do you have for the next months

Rule #3: be available, its just as good to show that you are on the same step as your team members (give messages likes or comments)

Rule #4: Say AND, not BUT! (Give every idea a chance!)

Rule #5 : work and decide together

Rule #6: Decisions should come from the whole group and send on owner/renate

Rule #7: 24 hours before our official meeting the agenda should be fix so we can discuss all issues between the group before our official owner meeting starts. TRY to upload the files not too late. That everyone have a early access to the files to be prepared.

Rule #8: Please mute yourself if there is anybody else talking

Technology Implementation Plan

File sharing: We will use Box. Please download the "Box Sync" extension. You will have

Signature:

Charles Bovet

Sijie Zhang

Danny Hall

Ronnie Haagensen

Joanna Pietrzykowska

DANIELLE PETERSON

Mareike Deurloo

TEAM PROCESS

Meeting Leader	Week #	Date
Danny	2	January 29 , 2013
Charles	3	February 5, 2013
Danielle	4	February 12, 2013
Ronnie	5	February 19, 2013
Sijie	6	February 26, 2013
Joanna	7	March 5, 2013
Mareike	7	March 8, 2013 (No Class)
Danny	8	March 11-14 (Dry Run #1)
Charles	8	March 11-14 (Dry Run #2)

A

MEP

SE

CM

LCFM

TEAM PROCESS

“I wish, I like, How to...”

Description	Danny	Sijie	Danielle	Mareike	Joanna	Ronnie	Charles	Votes
Wish: More subgroup meeting	xx	x	x	x	x	x	x	8
Wish: have a party!	x	x	x	x	x	x	x	7
Howto: More productive but how?	x	x	x	x	x	x	x	7
Wish: This is the only class!		x	x		x	x	x	7
Like: Owners/Profs are very present. Available	x	x	x	x	x	x	x	7
Like: Great team spirit	x	x	x	x	x		x	6
Wish: more construction/industry experience with IPD and etc.		x	x	x	x		x	6
Wish: difference between team updates/presentation vs. discussion. Two type of meetings.	x	x	x	x	x	x	x	6
Wish: to integrate technology without being distraction		x	x	x	x	x	x	6
Wish: More quality time		x	x	x	x		x	5
Wish: leap frog idea for movable space	x	x	x	x	x			5
Howto: make concept clear for winter presentation	x	x	x	x	x	x		5
Wish: general team concept understanding. what is important?	x		x	x	x	x		5
How to make all of our work shown? how to integrate our the work clearly?	x	x	x		x	x		5
Like: big idea for the project			x	x	x	x	x	4
Like: understand everyone's workload		x	x	x	x		x	4
Like: presentation feedback from the crit, lesson learned.			x	x	x	x		4
Wish: could manage time better			x	x			x	3
Wish: more group meeting time	x		x		x		x	3
Wish: Less time difference	x		x			x		3
Wish/Howto: rsmeans, vico, revit model, a in bewteen method	x		x				x	3
Howto: work more efficiently with different concept	x		x			x		2

Solution

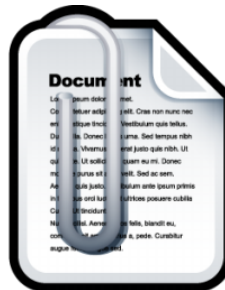
Before

After

Communication



Collaborate



Google Drive

Coordination



Basecamp
Project Collaboration

Here's what's been happening in your projects.

AEC River Project



Ronnie H. commented on [What's the BIG idea for our project?](#)

8:51pm

I have tried to elaborate on the big idea of "Connection" and what we have so far. I have tried narrow a lot of our work down to four con...

Feb 22

AEC River Project

11:03pm



Joanna P. forwarded an email: [AEC class - possible coaching session?](#)

Feb 21

AEC River Project



Sijie Z. completed a to-do: [Both CM Discuss risk list with LCFM](#)

8:44pm

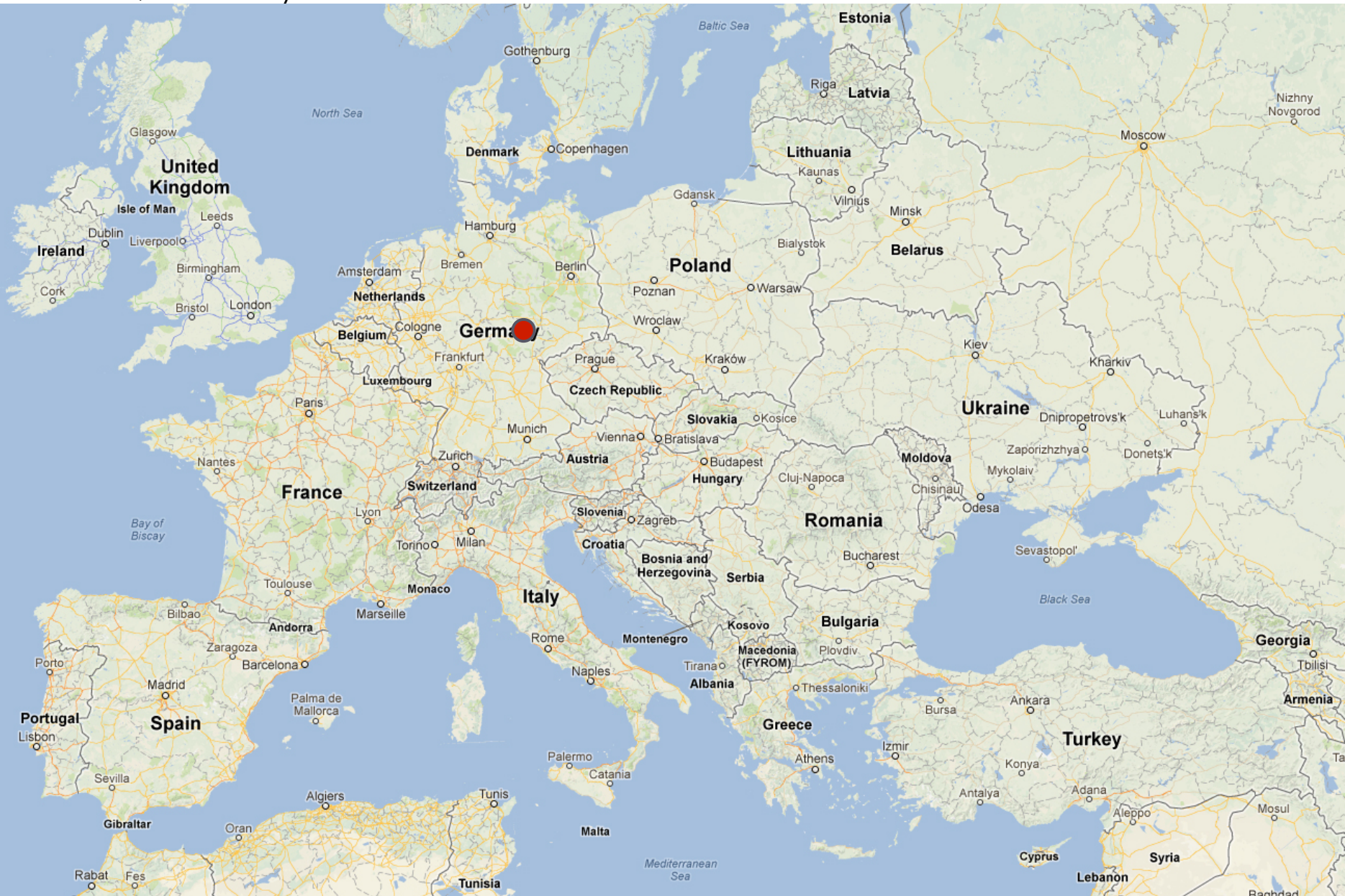


Sijie Z. completed a to-do: [Both CM Update site access #1 to make to feasible and verify with M...](#)

8:44pm

SITE INFORMATION

WEIMAR, Germany



A

MEP

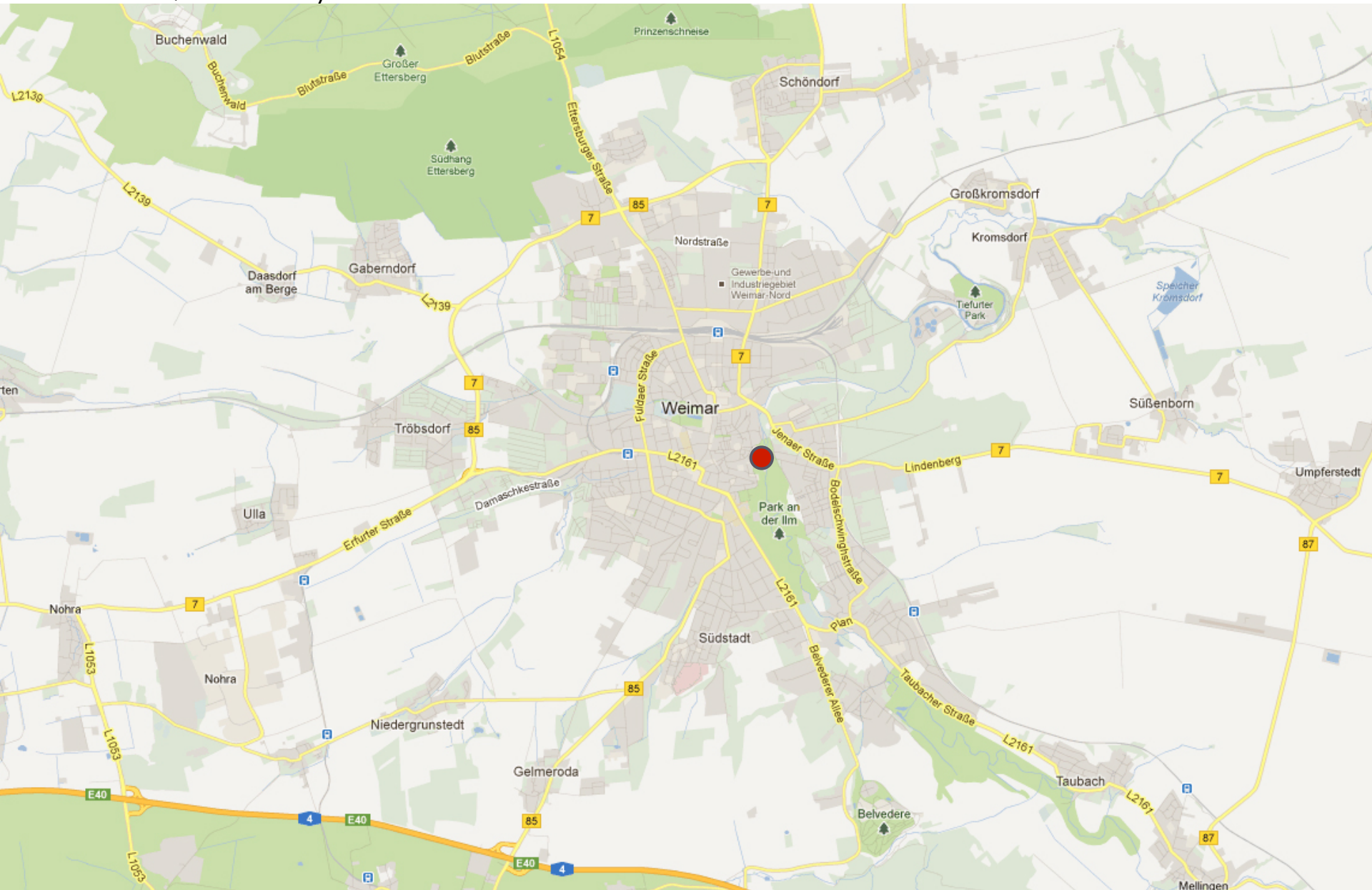
SE

CM

LCFM

SITE INFORMATION

WEIMAR, Germany



A

MEP

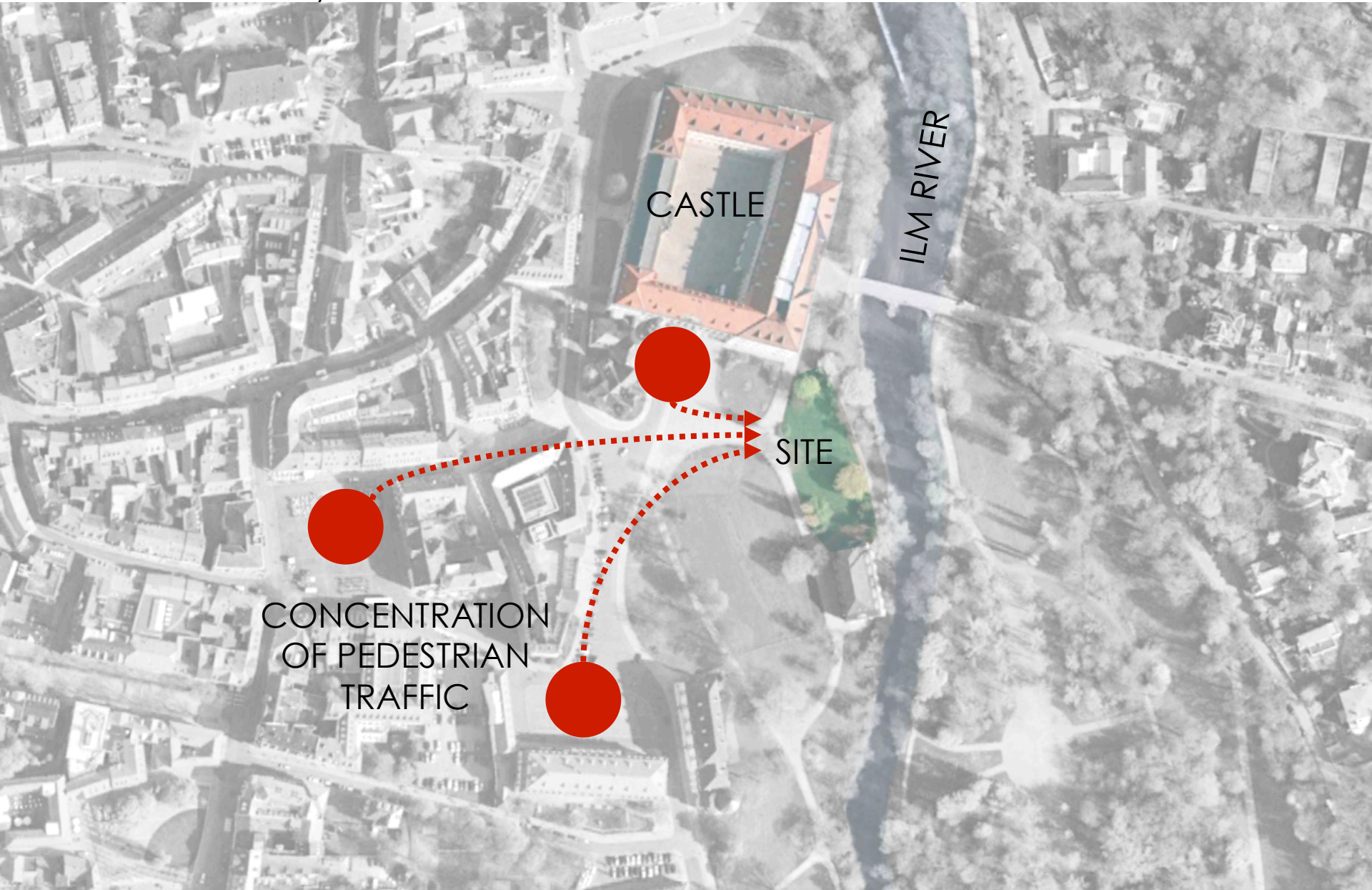
SE

CM

LCFM

SITE INFORMATION

WEIMAR, Germany



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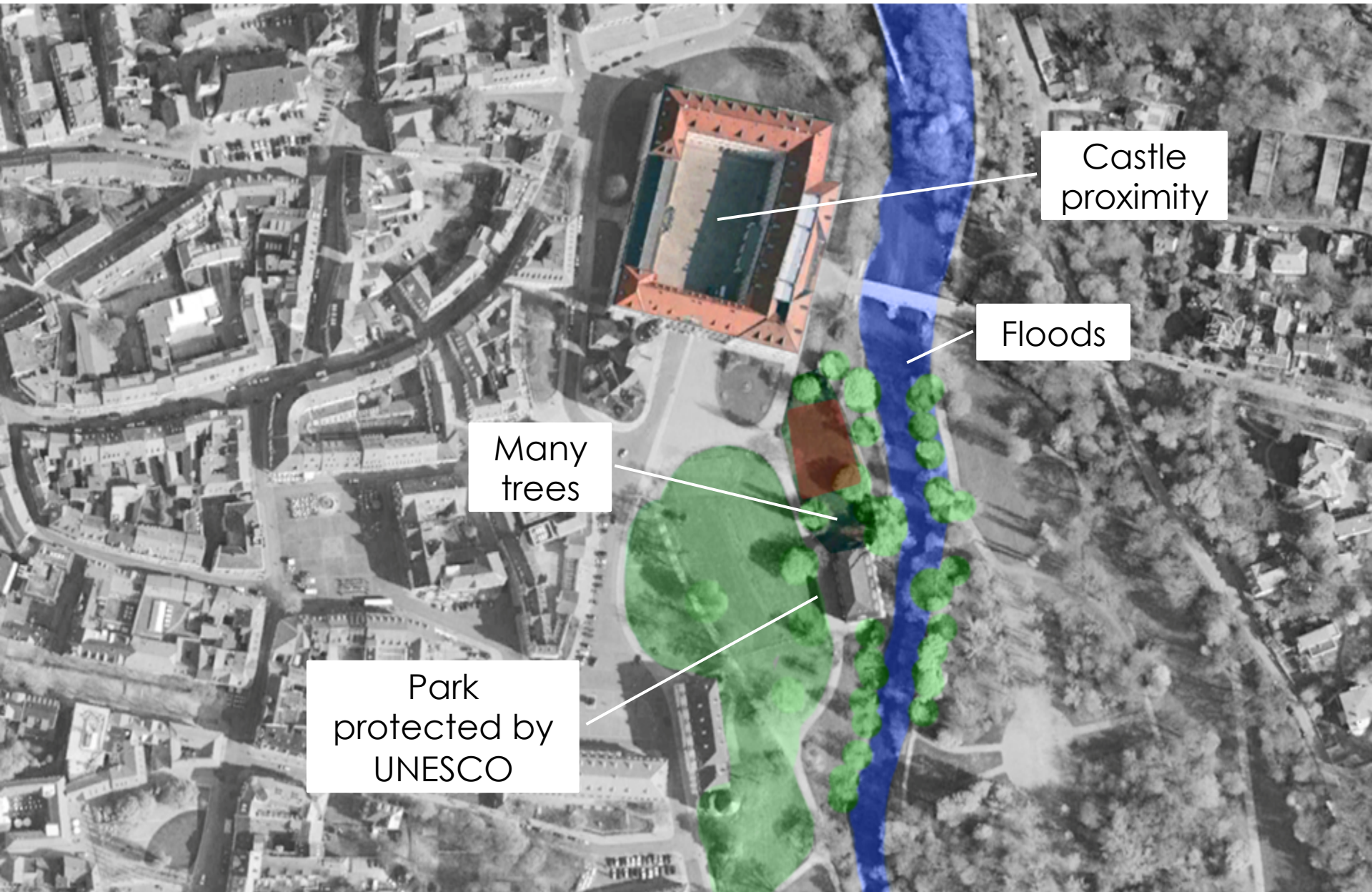
MEP

SE

CM

LCFM

SITE HAZARDS & CHALLENGES



Castle proximity

Floods

Many trees

Park protected by UNESCO

A

MEP








SE

CM

LCFM

VALUES

- Economic
- Social
- Environmental

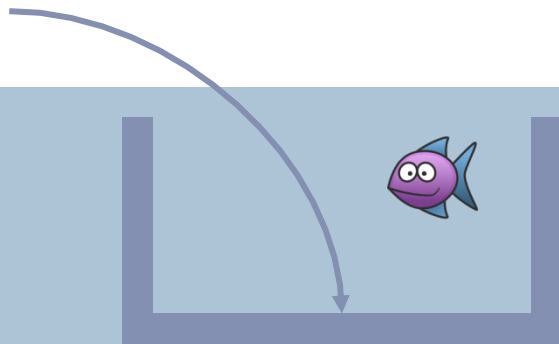
Sustainability	
Big Idea	
Innovation	
Connection with Environment	
Collaborative Space	
Aesthetic Value	
Risk Factor	
Comfort	
Efficiency	
Constructability / Phasing	
Total Value	26 points
Cost	\$7.03M
Value for Cost	3,70

CHALLENGE:



SOLUTIONS:

LET WATER IN



A

MEP

MEP

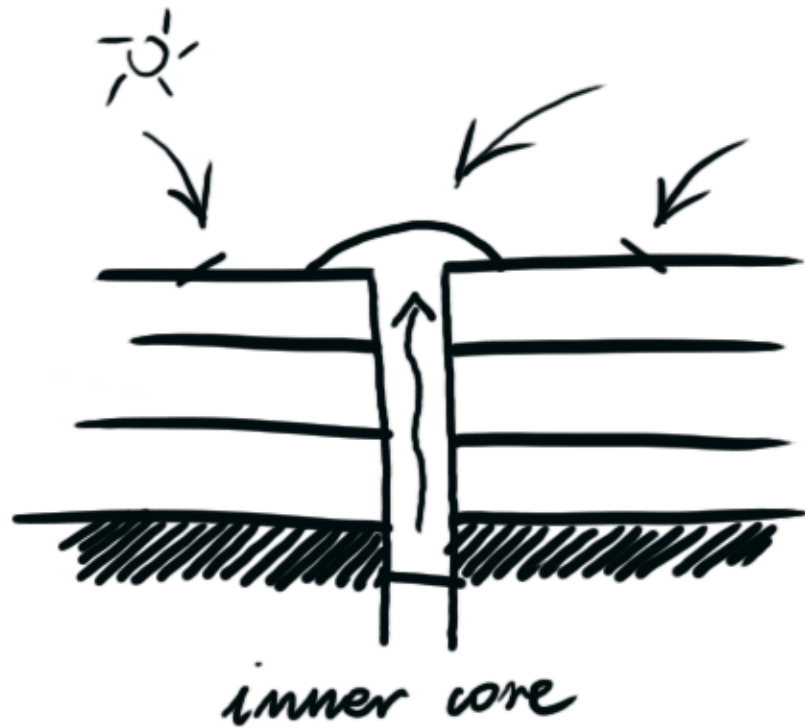
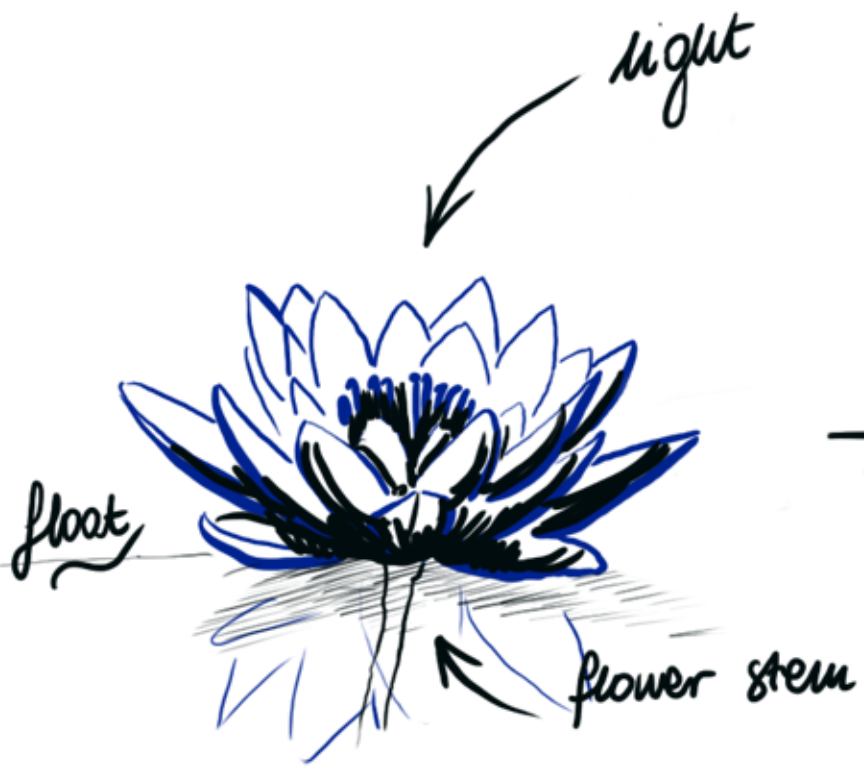
KEEP WATER OUT



SE

CM

LCFM



VIEW FROM THE STREET



A

MEP

SE

CM

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SITE PLAN



A

MEP

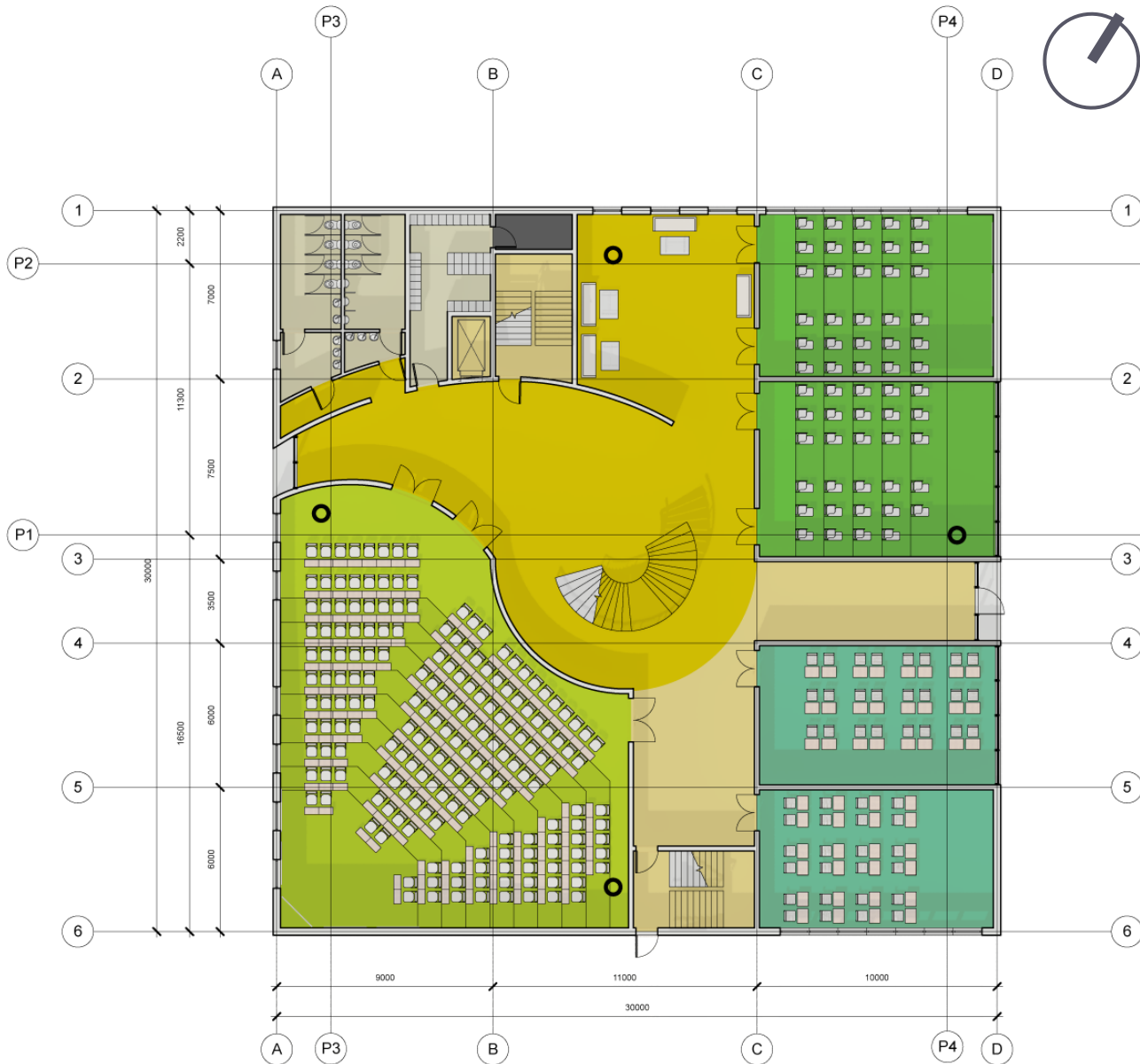
SE

CM

LCFM

FIRST FLOOR

- MEP
- storage
- restrooms
- circulation
- lounge
- auditorium
- large classrooms
- small classrooms



A

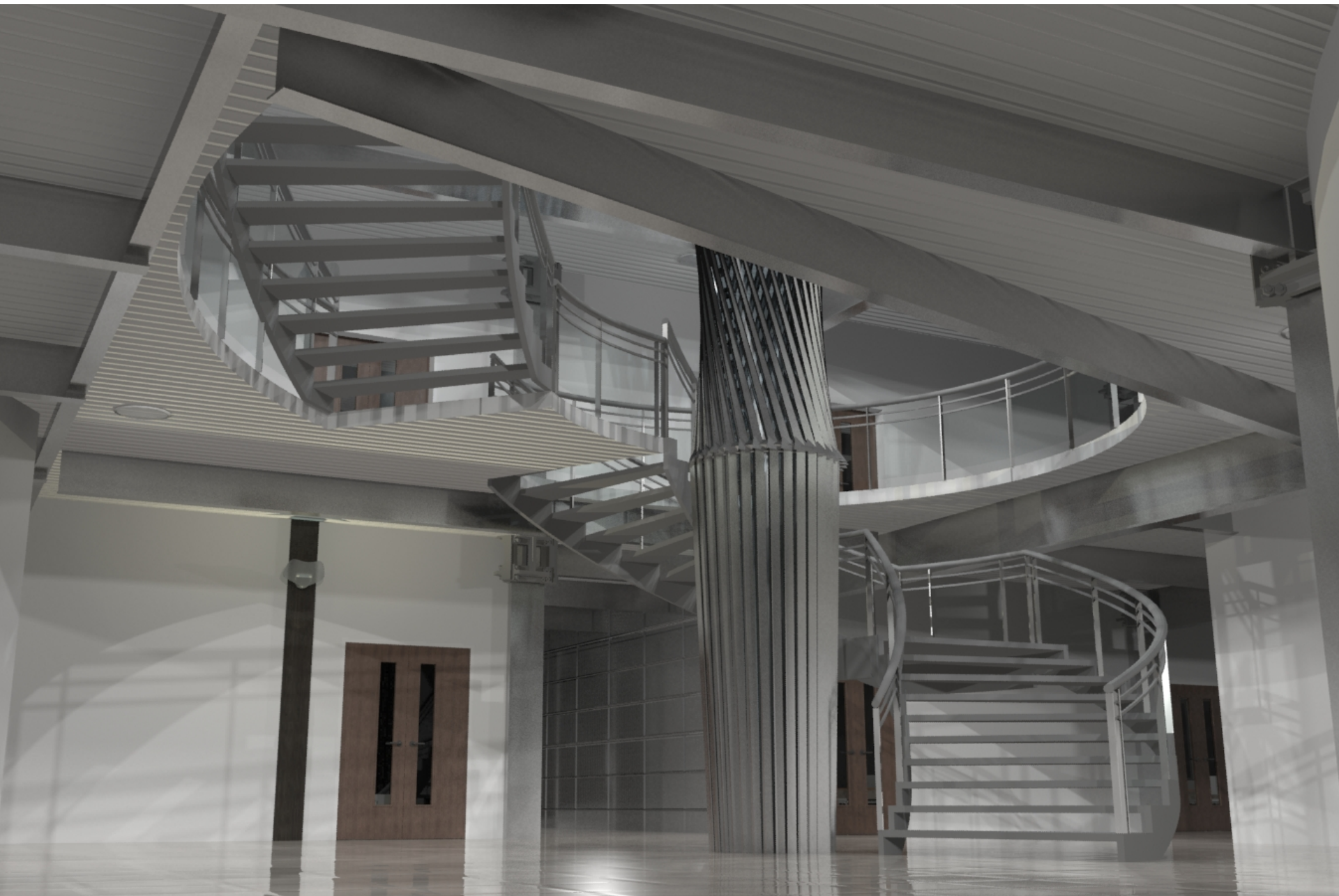
MEP

SE

CM

LCFM

FIRST FLOOR



A

MEP

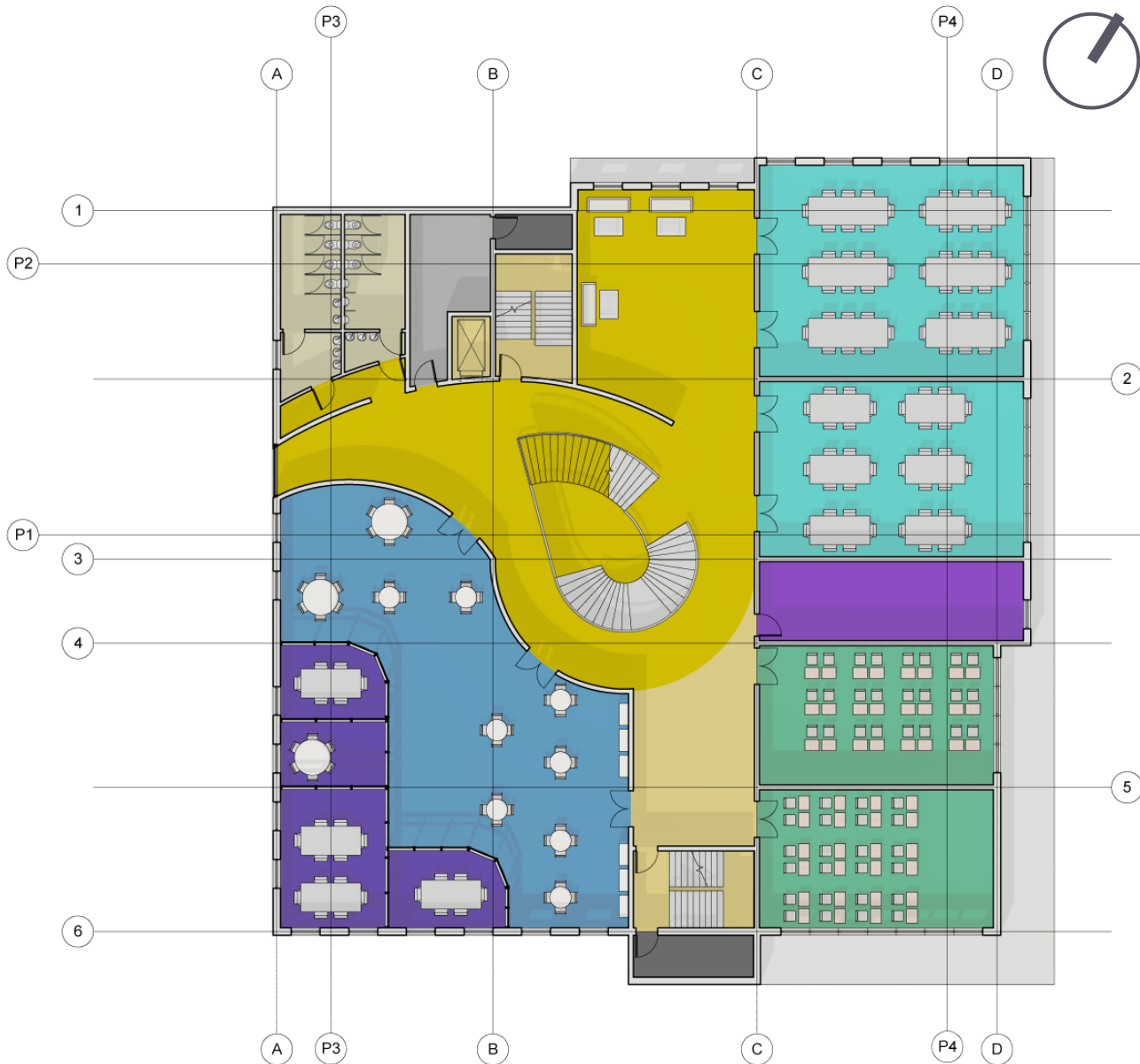
SE

CM

LCFM

SECOND FLOOR

- MEP
- storage
- restrooms
- circulation
- lounge
- small classrooms
- instructional labs
- student offices
- seminar rooms
- server room
-
-



STUDENT OFFICES



A

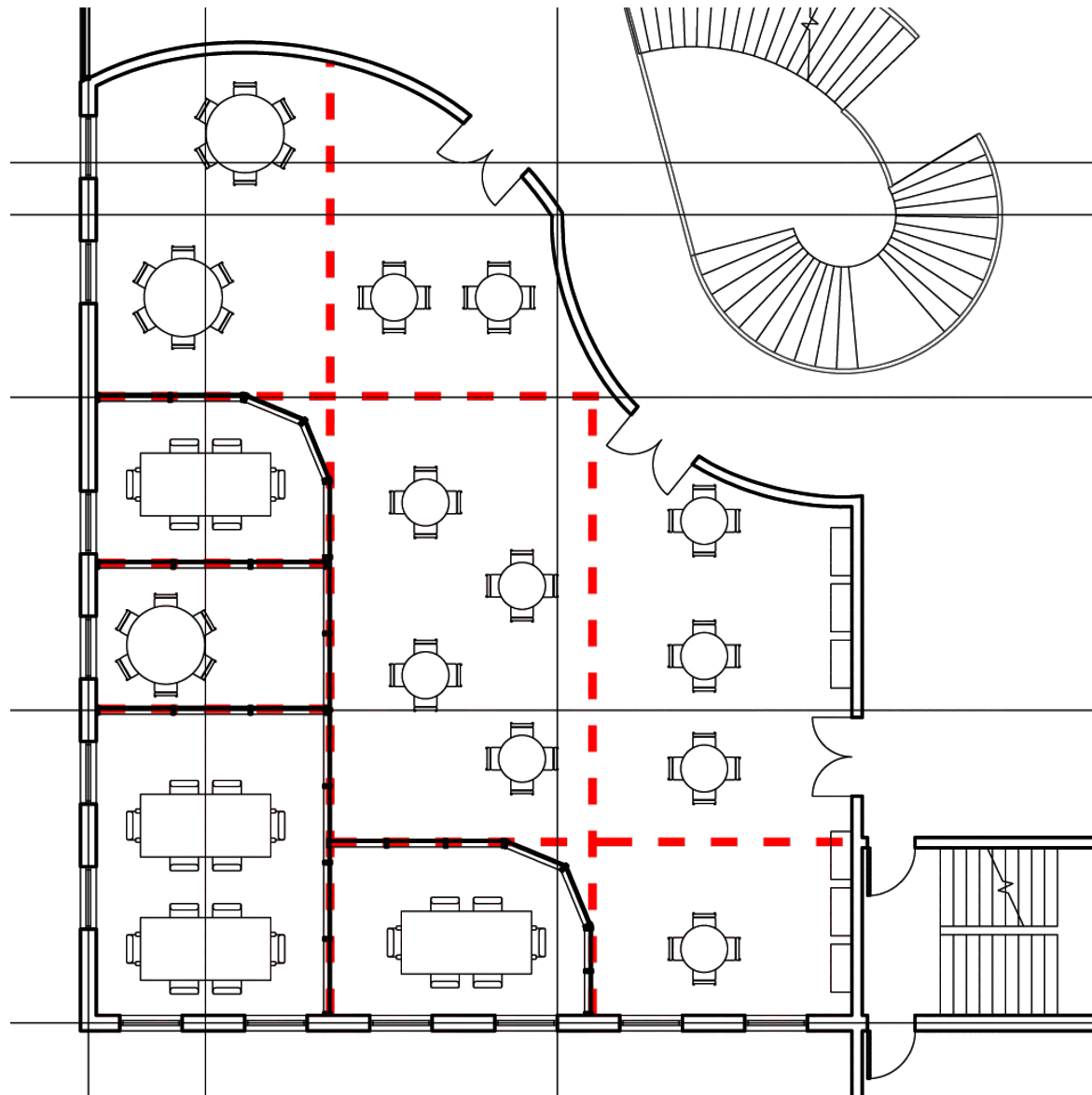
MEP

SE

CM

LCFM

STUDENT OFFICES – MOVABLE WALLS



A

MEP

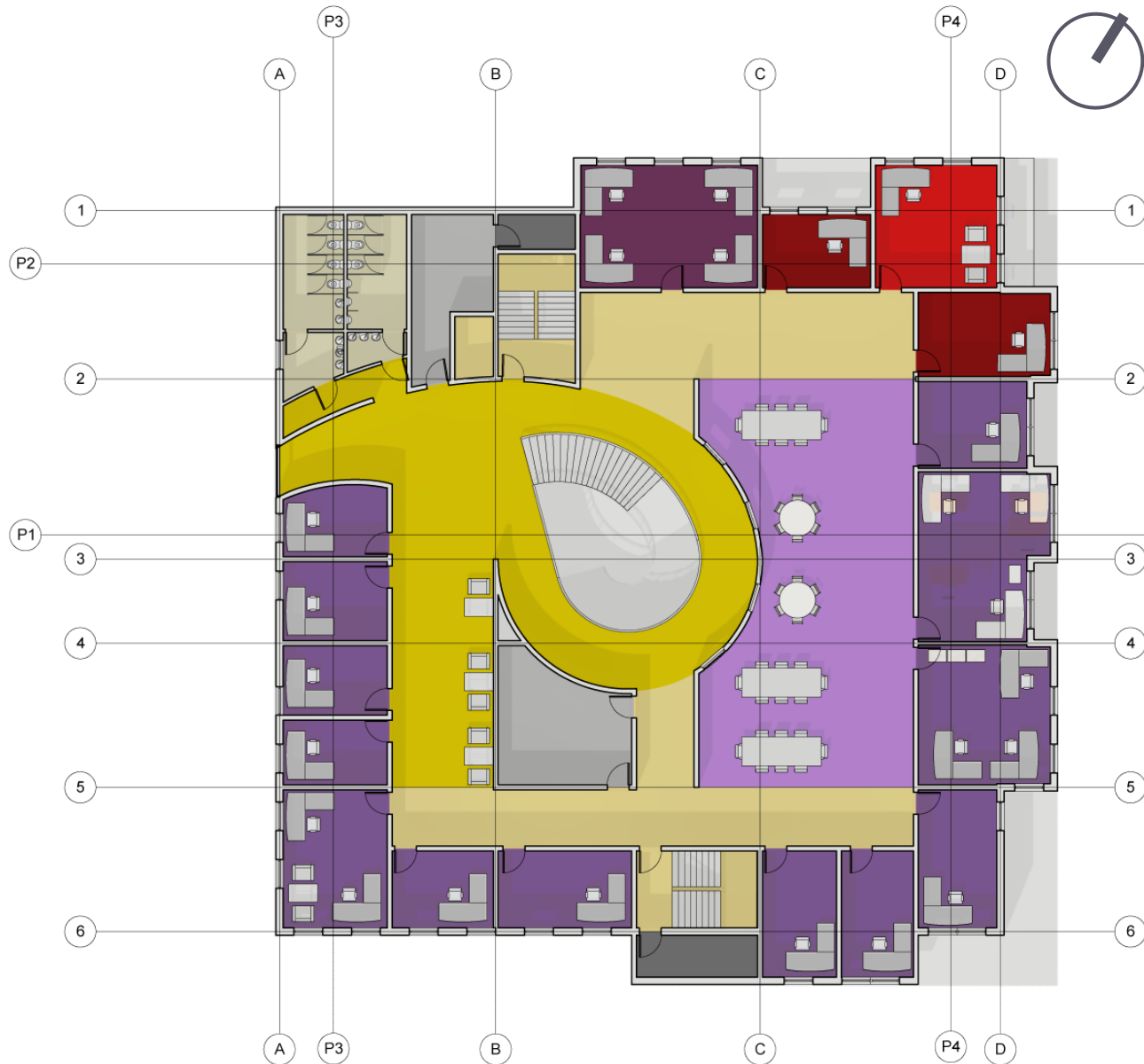
SE

CM

LCFM

THIRD FLOOR

- MEP
- storage
- restrooms
- circulation
- lounge
-
-
-
-
-
- faculty lounge
- faculty offices
- administrative assistants
- senior administration office
- department chair's office



A

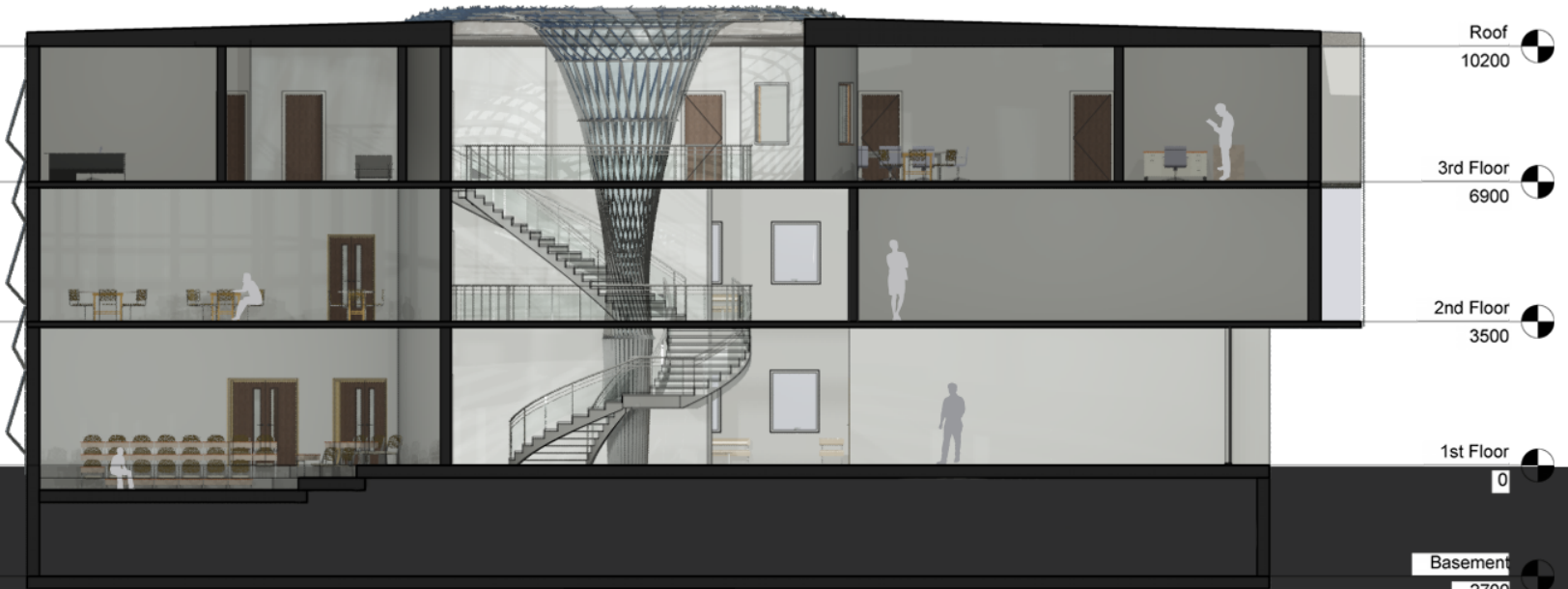
MEP

SE

CM

LCFM

SECTION 1



A

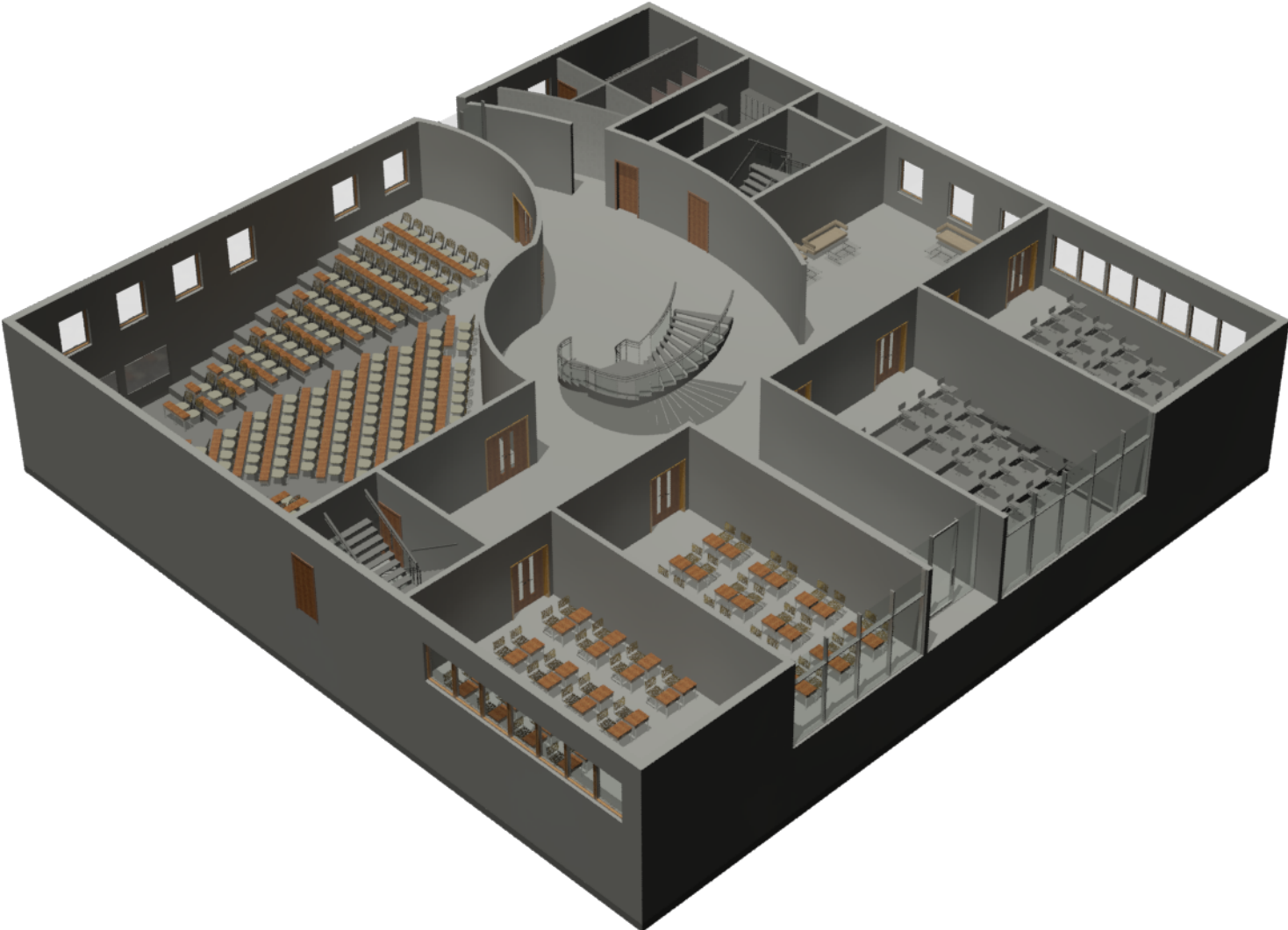
MEP

SE

CM

LCFM

FIRST FLOOR



A

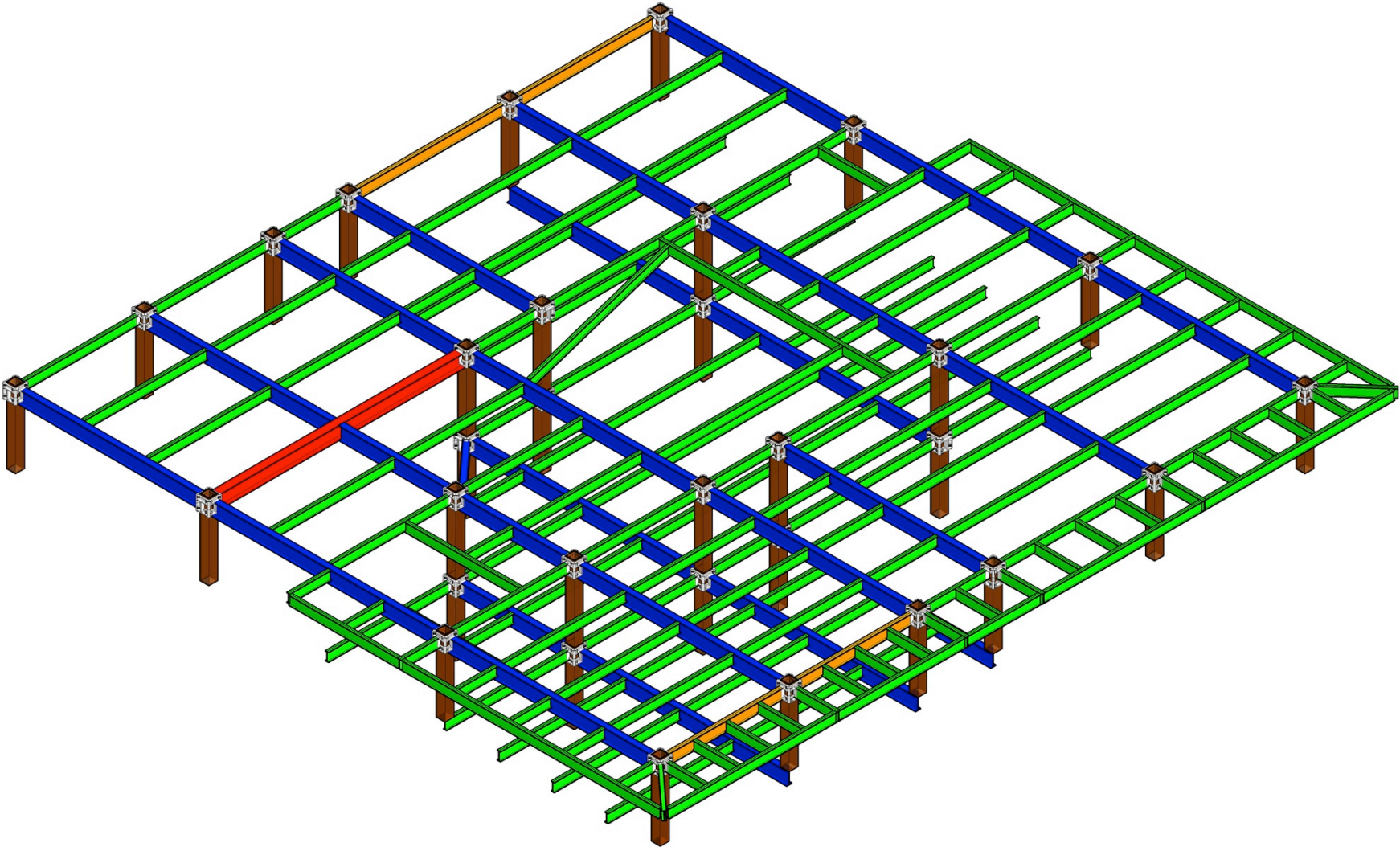
MEP

SE

CM

LCFM

FIRST FLOOR



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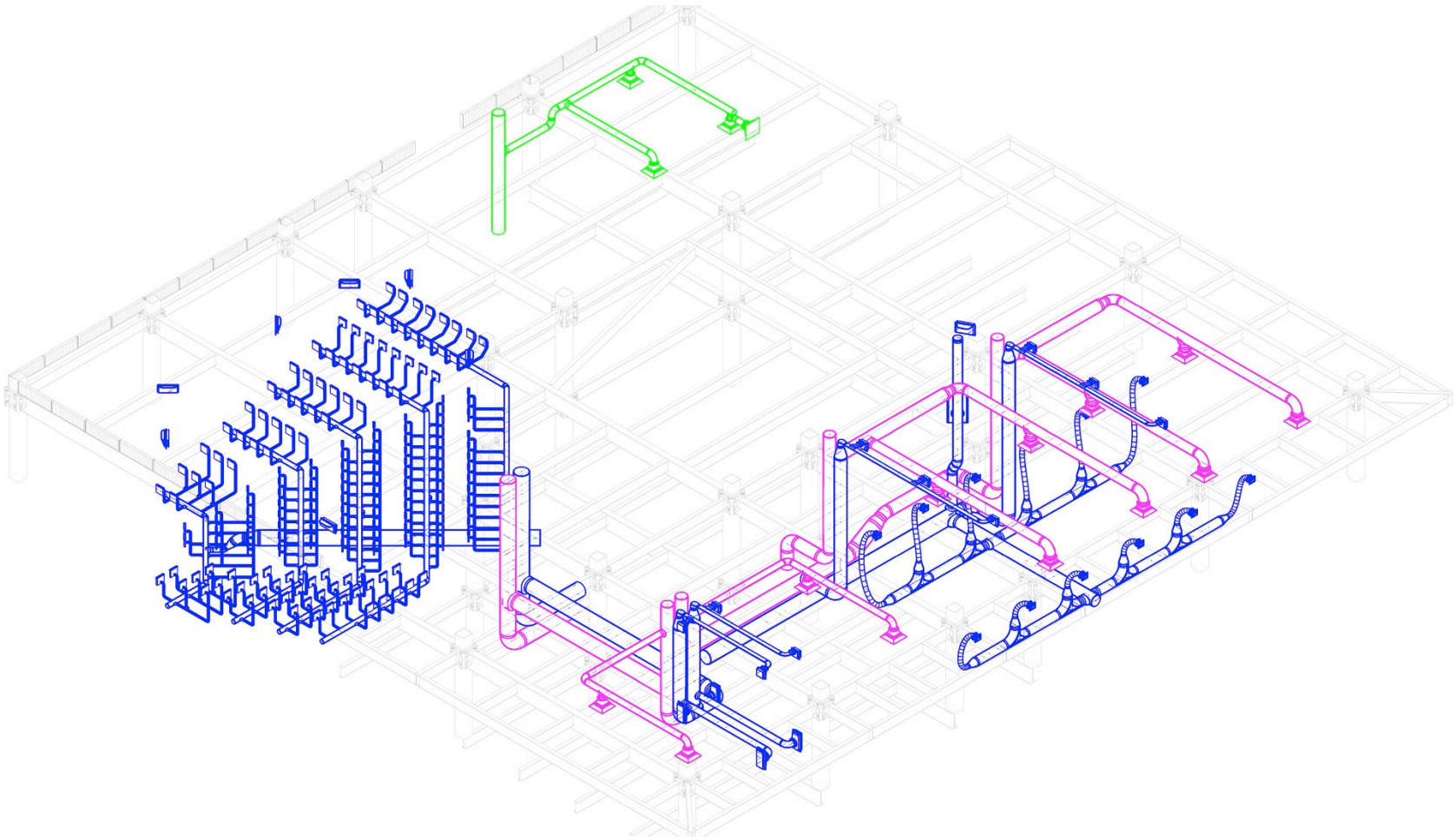
MEP

SE

CM

LCFM

FIRST FLOOR



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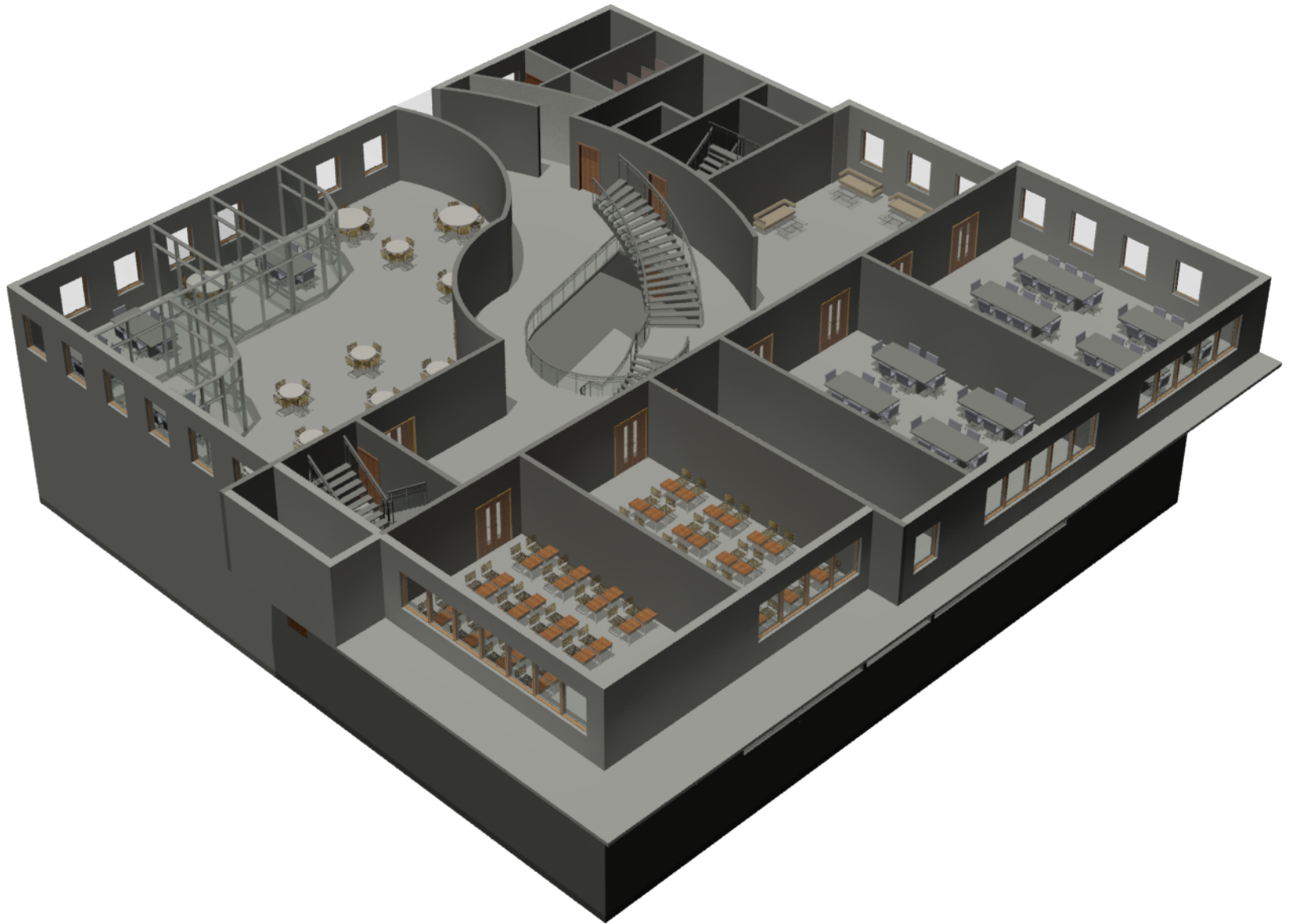
MEP

SE

CM

LCFM

SECOND FLOOR



A

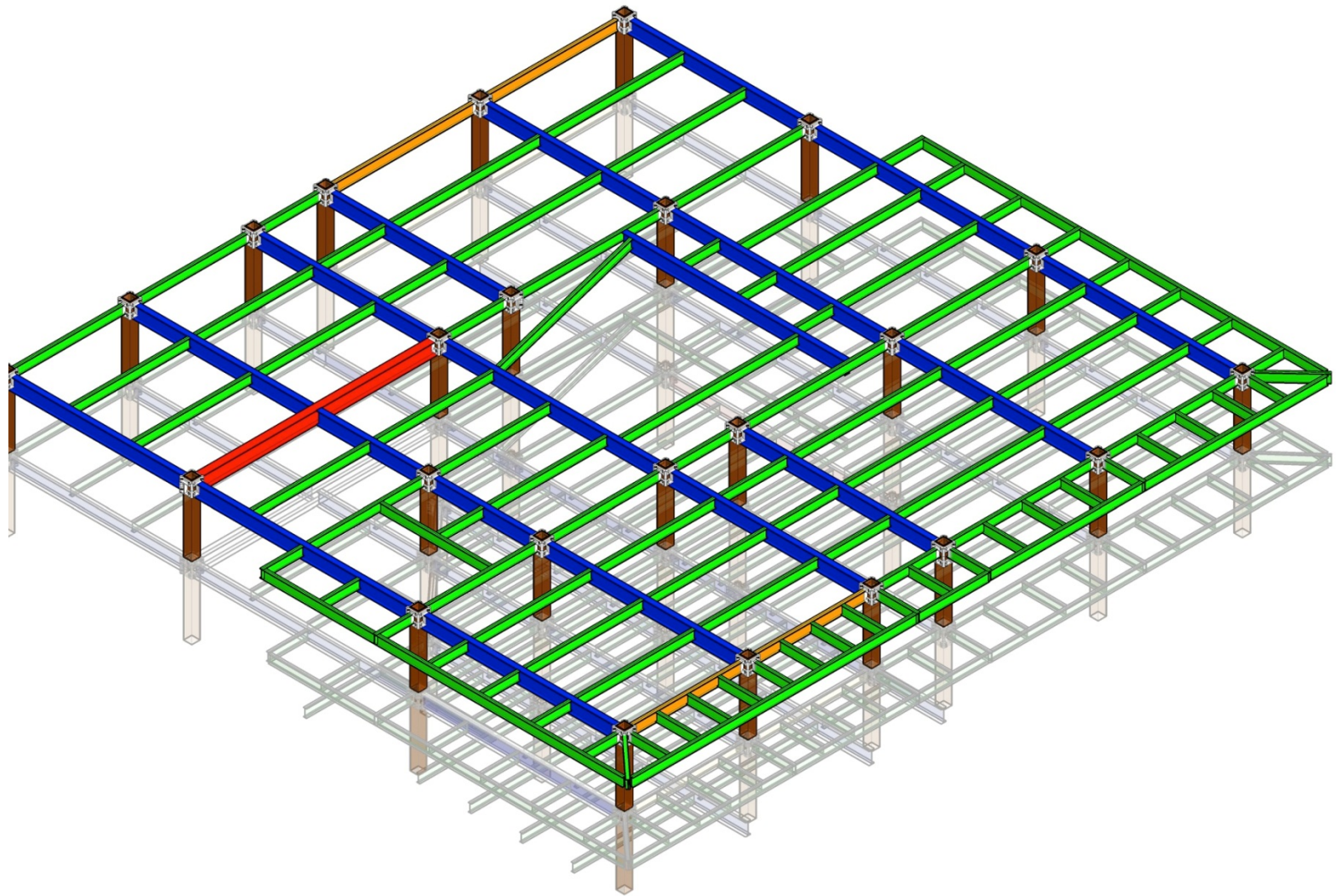
MEP

SE

CM

LCFM

SECOND FLOOR



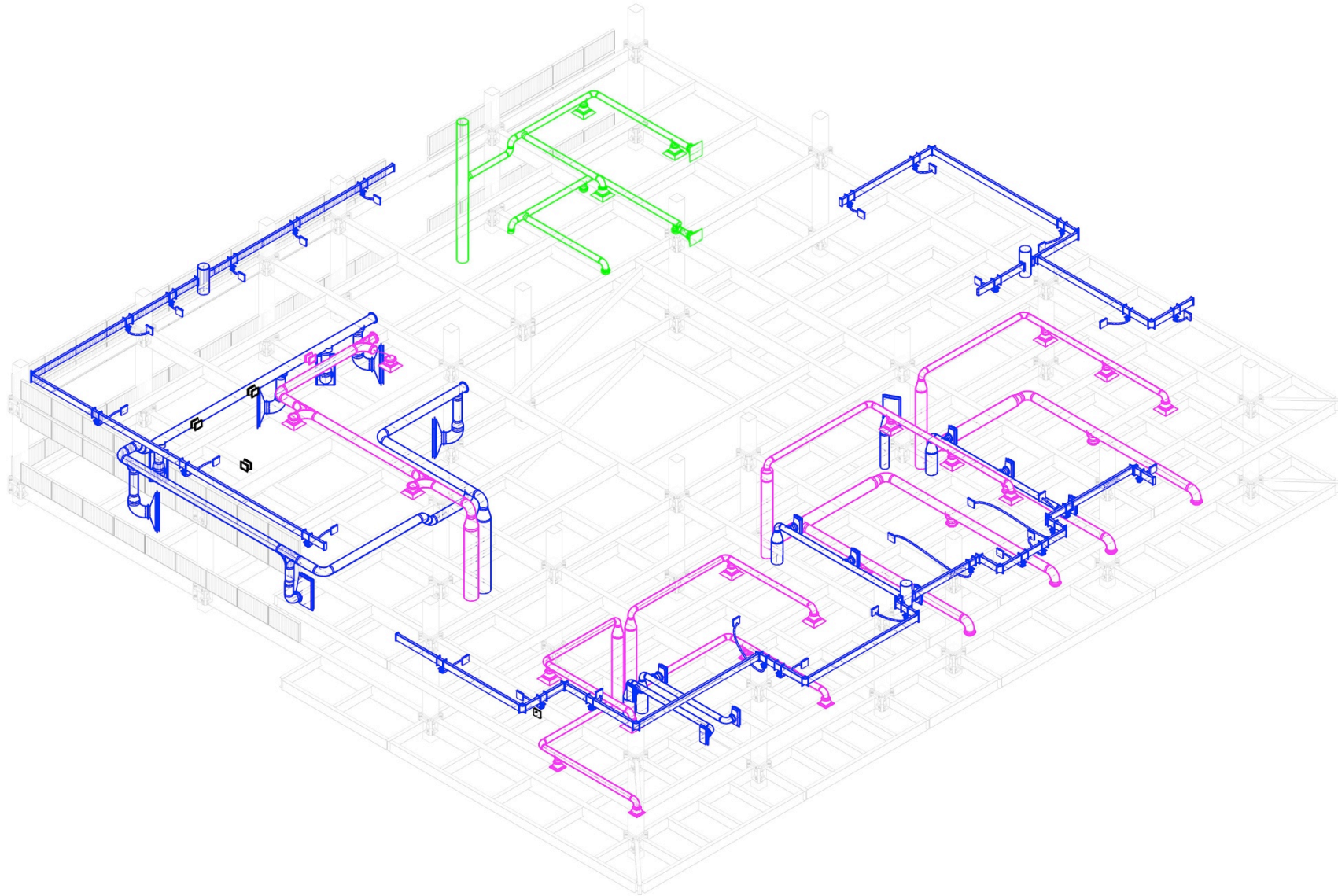
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MEP

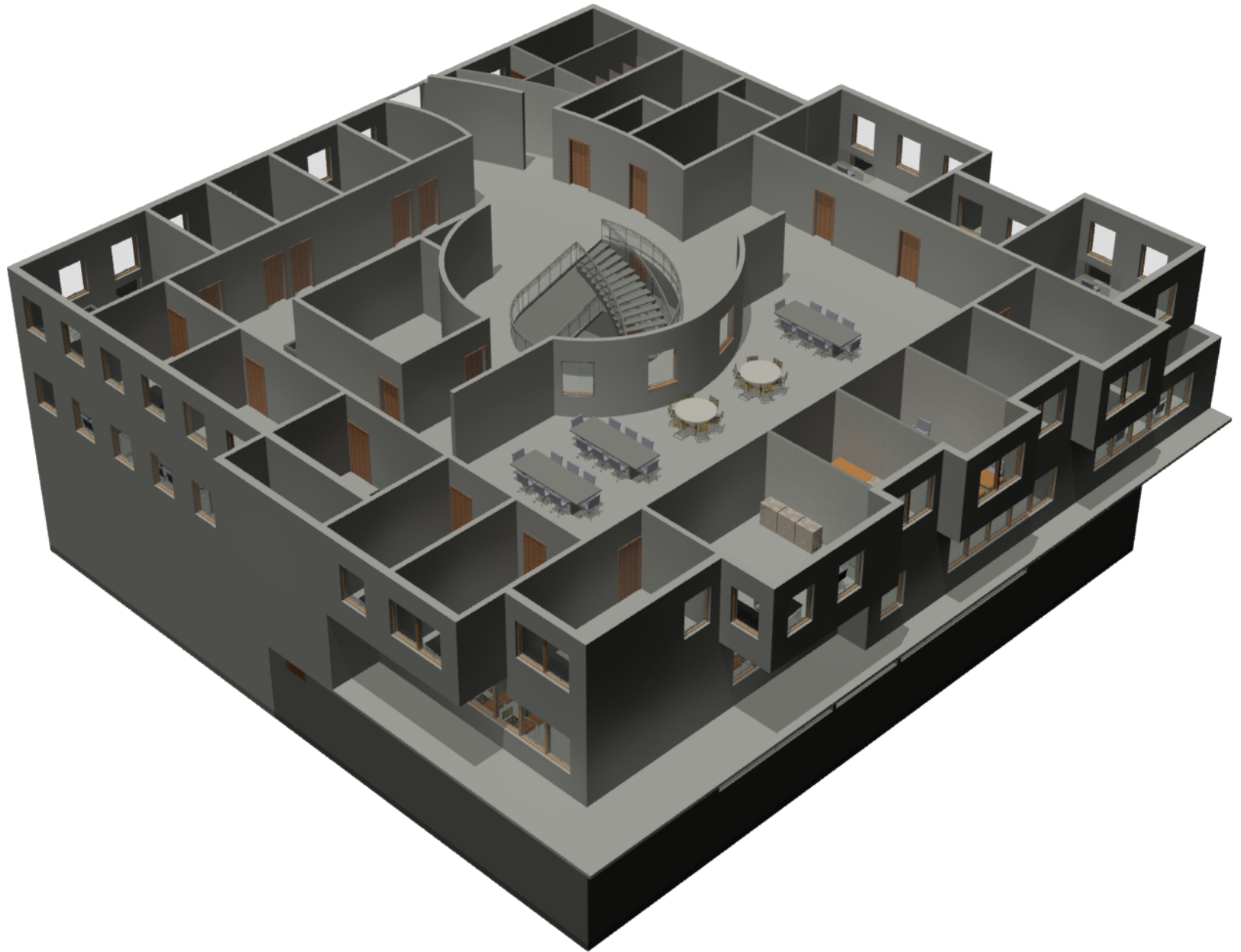
SE

CM

LCFM



THIRD FLOOR



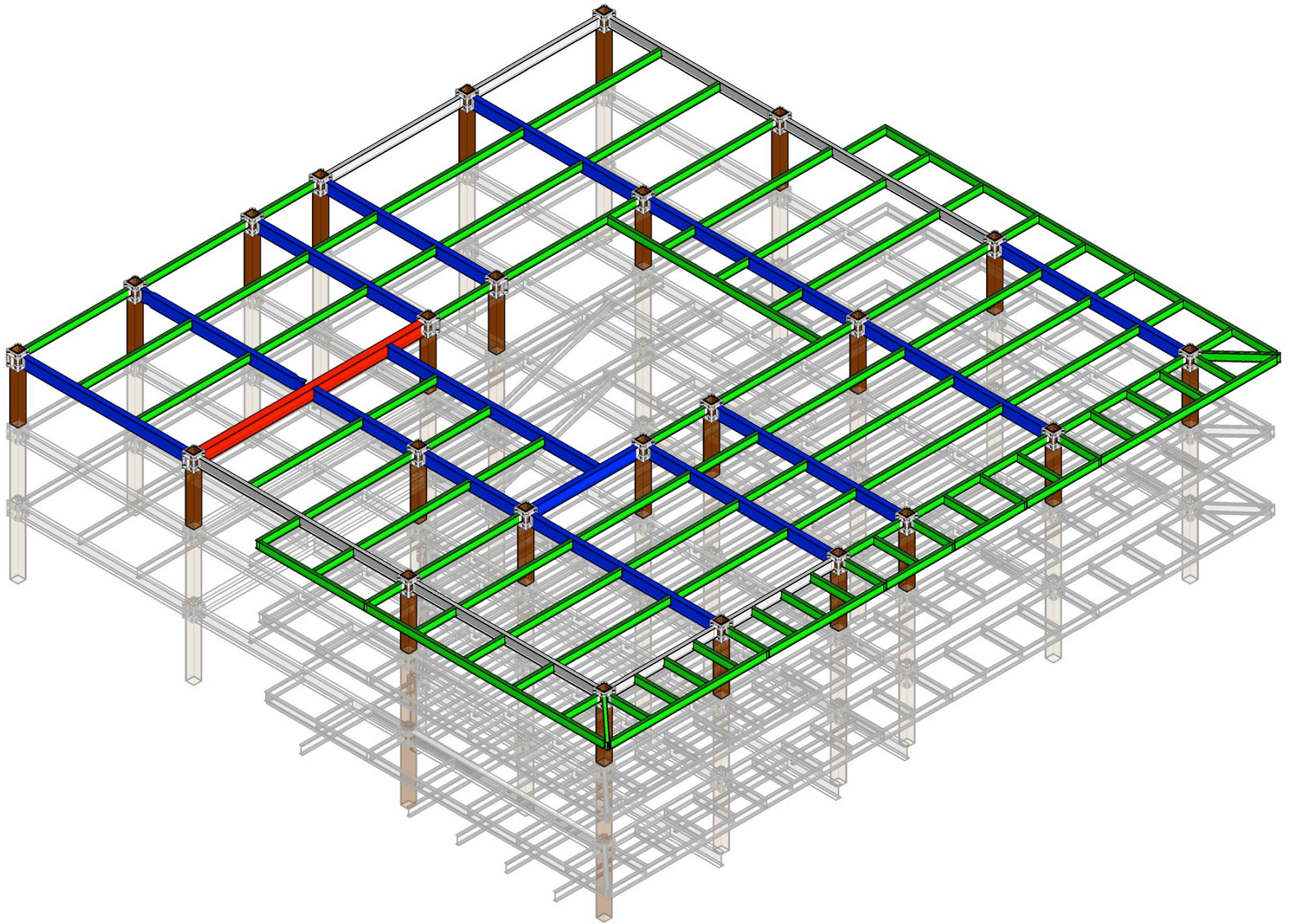
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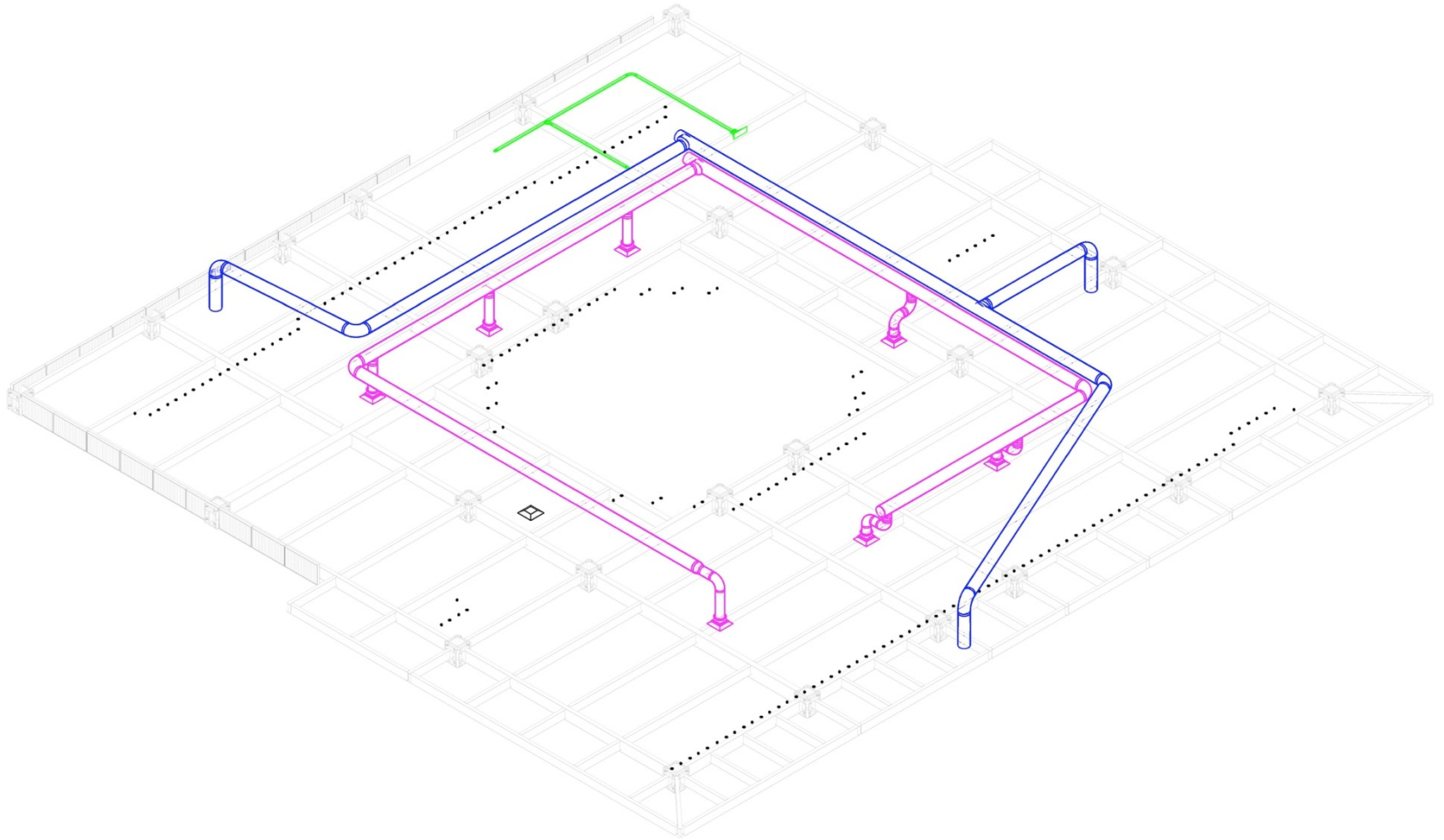
MEP

SE

CM

LCFM

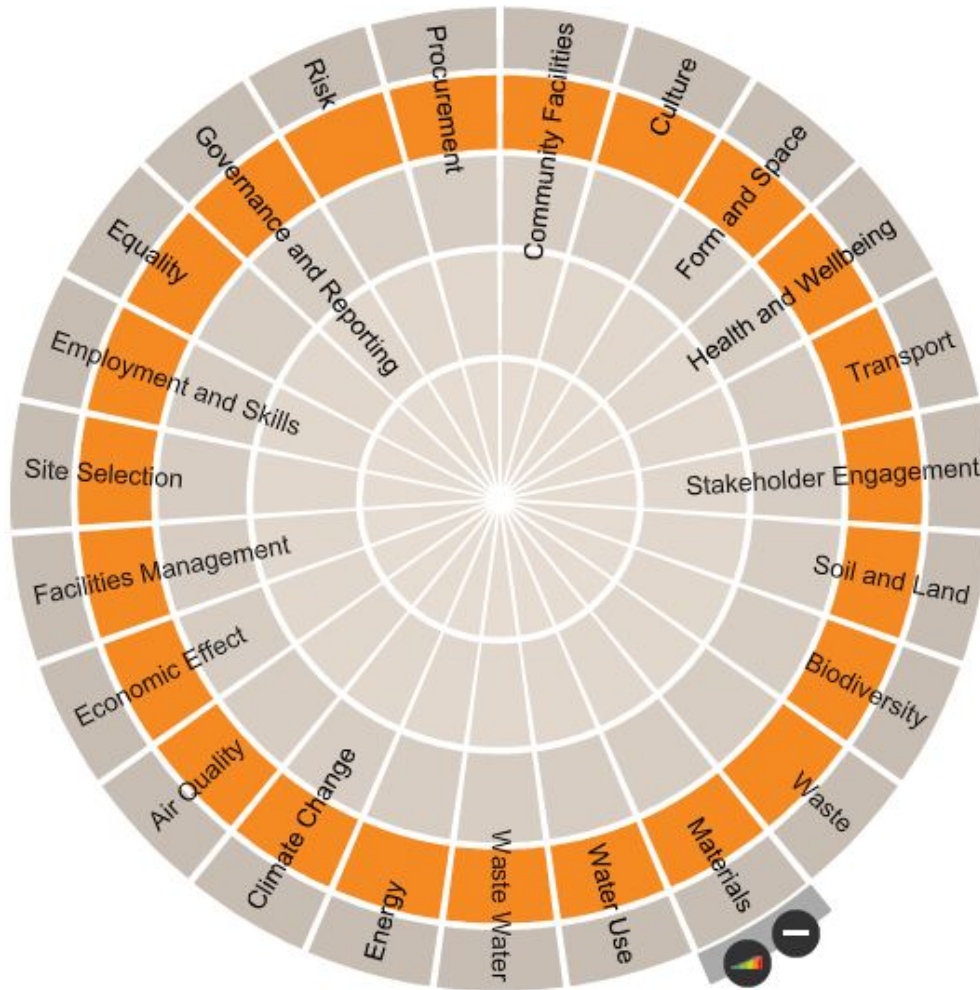




DECISION POINTS

Erosion	Best = 3 Points	Water Lily
	Better = 2 Points	
	Good = 1 Point	
●	Sustainability	●
●	Big Idea	●
●	Innovation	●
●	Connection with Environment	●
●	Collaborative Space	●
●	Aesthetic Value	●
●	Risk Factor	●
●	Comfort	●
●	Efficiency	●
●	Constructability / Phasing	●
24 points	Total Value	26 points
\$6.51M	Cost	\$7.03M
3,69	Value for Cost	3,70

SUSTAINABILITY PROCESS



DGNB[®]
Deutsche Gesellschaft für Nachhaltige
German Sustainable Building Cou

A

MEP

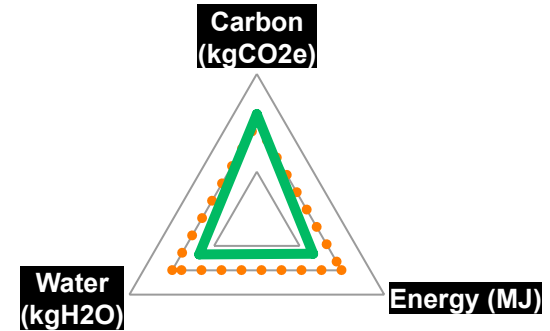
SE

CM

LCFM

THE METRICS

CARBON EMISSION



O&M

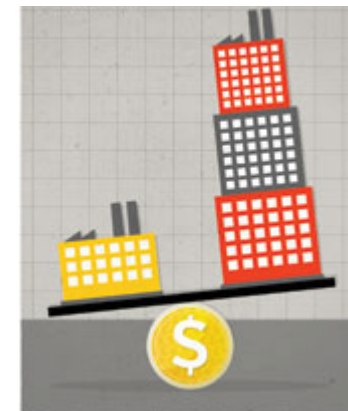


COST
LIFE CYCLE COST
RENT

RISK CHARGE

REPLACEMENT

VALUE FOR MONEY



FOUR innovations

Amphibious Defense System



Energy & Water

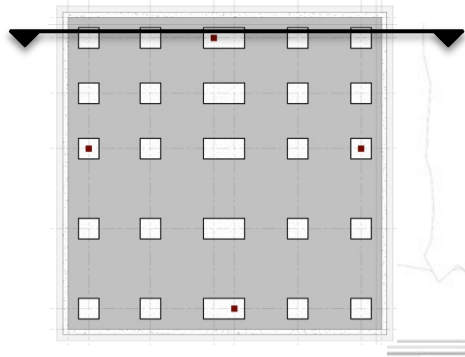


Indoor Environment

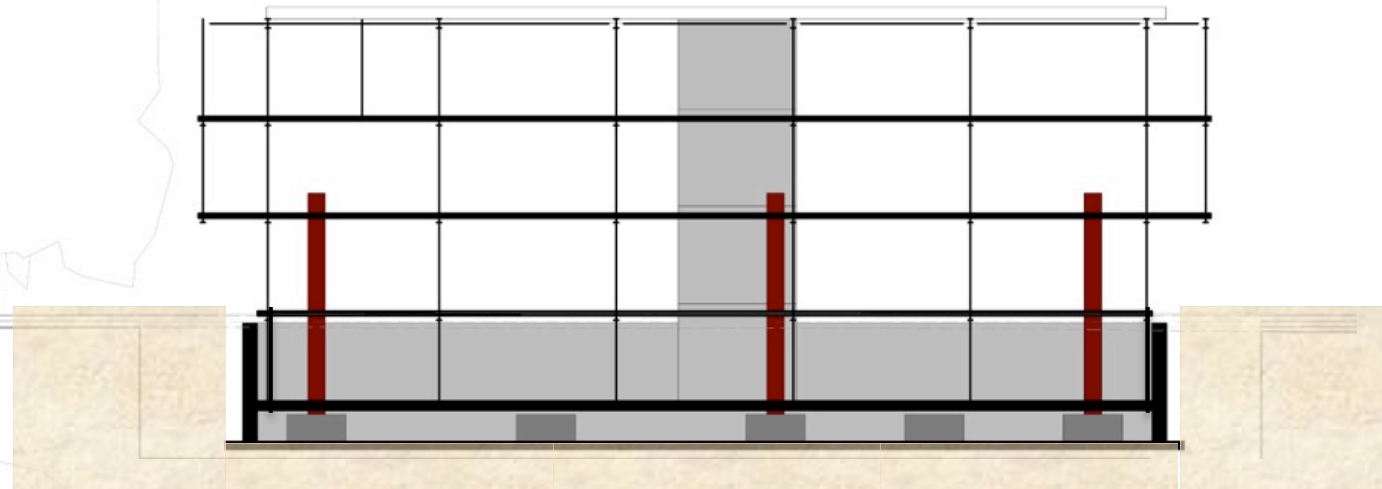


Safety & Lean

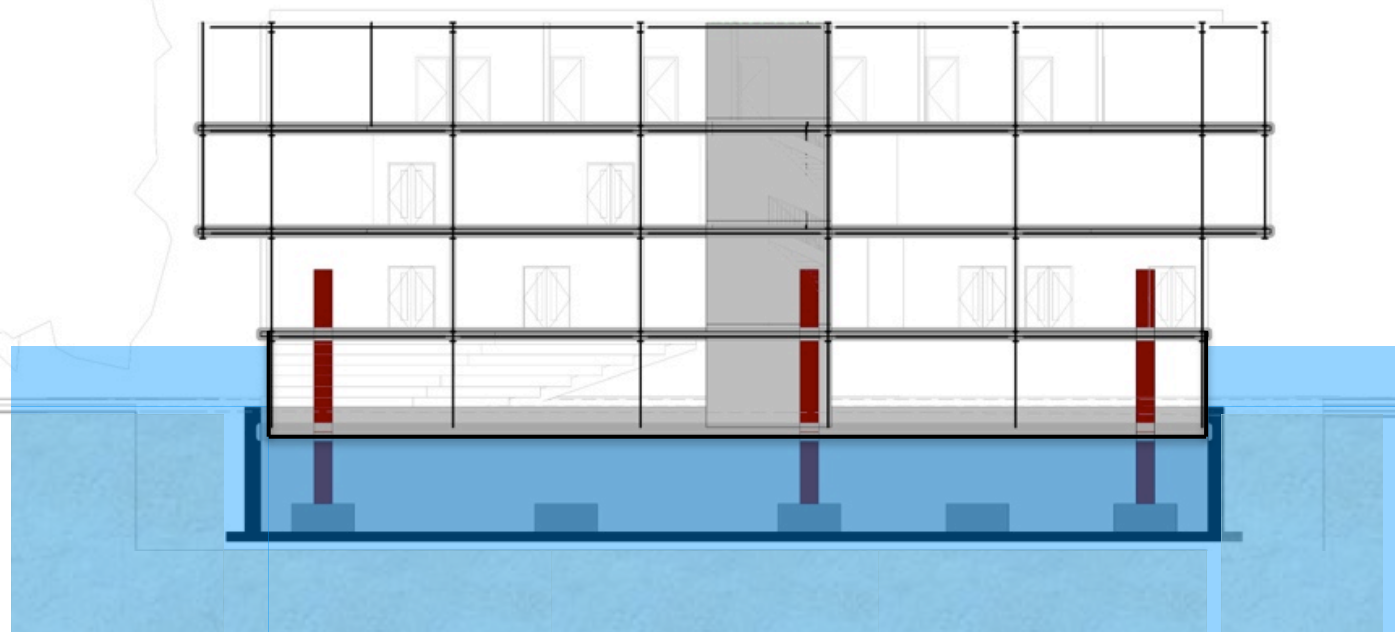
AMPHIBIOUS DEFENSE SYSTEM



Resting Position



Flood Position



A

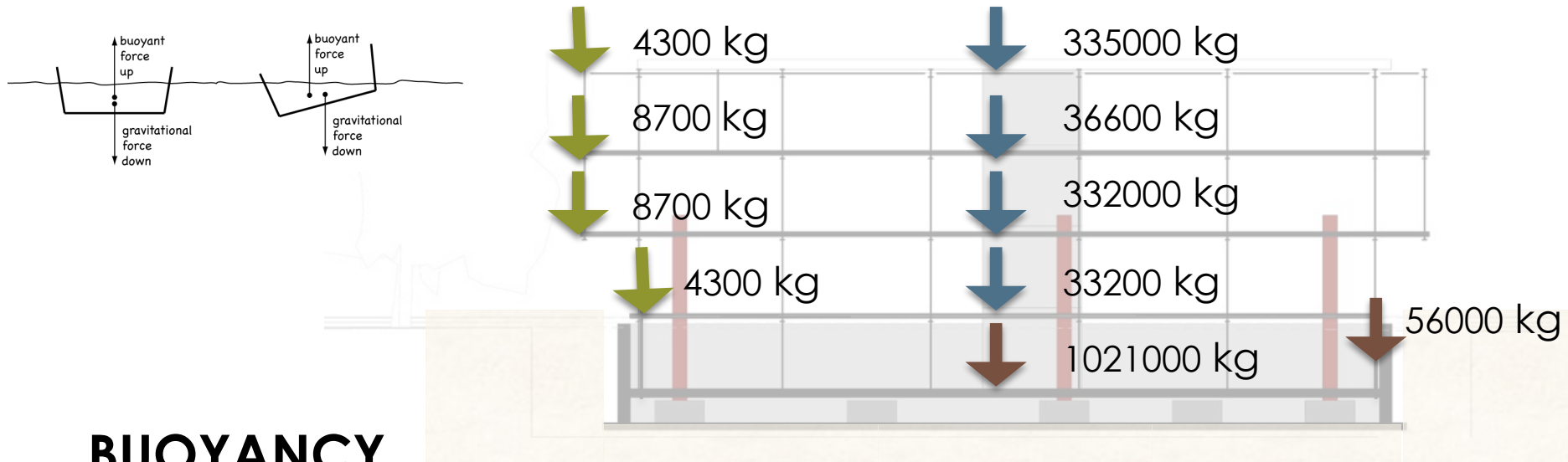
MEP

SE

CM

LCFM

AMPHIBIOUS DEFENSE SYSTEM



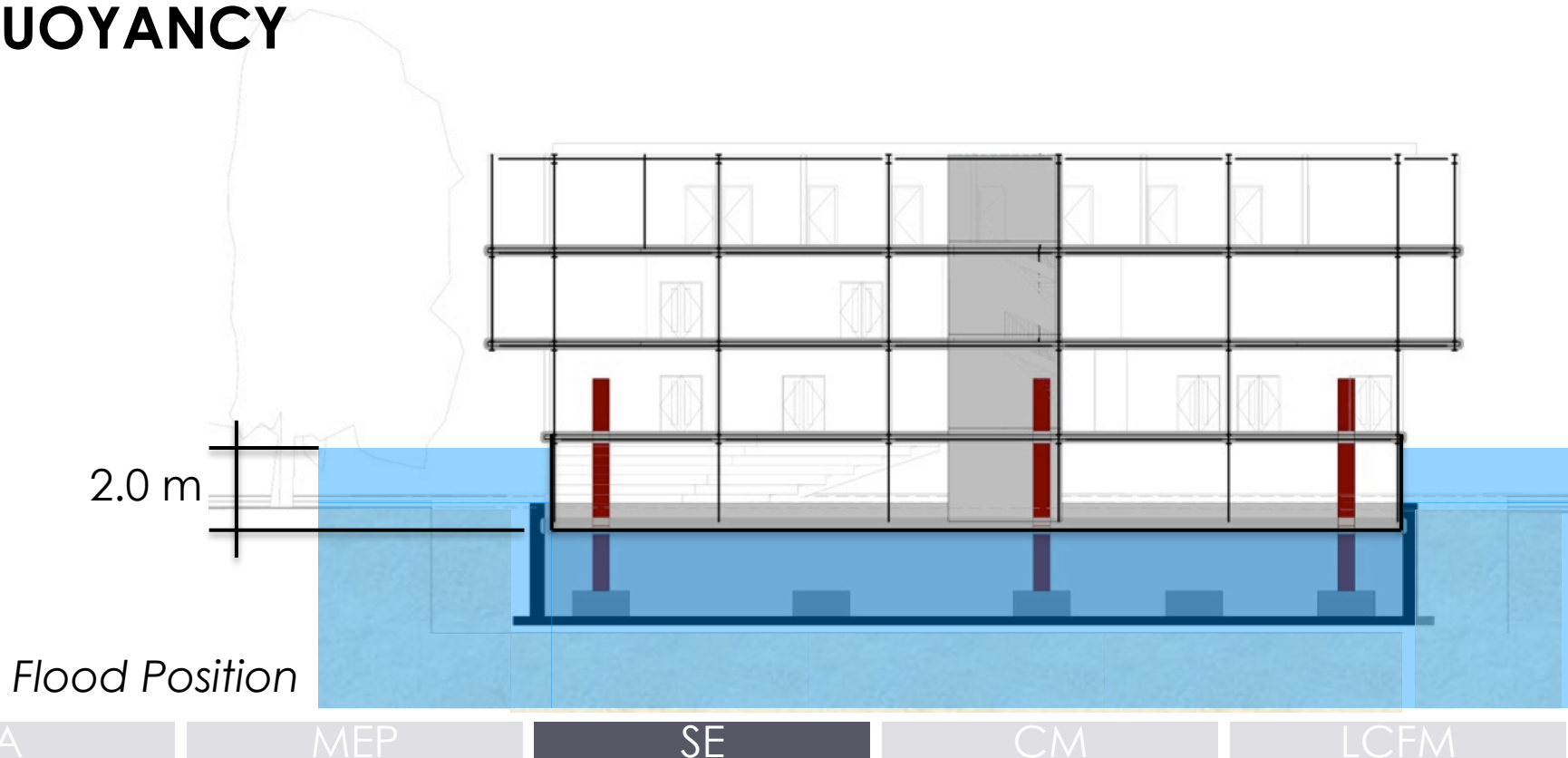
BUOYANCY

Floor Mass	1364000	kg
Cladding Mass	26000	kg
Foundation Mass	1078000	kg
Total Mass	2469000	kg
Total Volume	12116	m ³
Density of Structure	204	kg/m ³
Density of Water	1000	kg/m ³

AMPHIBIOUS DEFENSE SYSTEM

Volume of Replaced Fluid	1847	m ³
Basement Footprint	930	m ²
Depth of Replaced Fluid (Volume / Basement Footprint)	2.0	m
Fraction of Body Submerged	15.2	%

BUOYANCY



AMPHIBIOUS DEFENSE SYSTEM



A

MEP

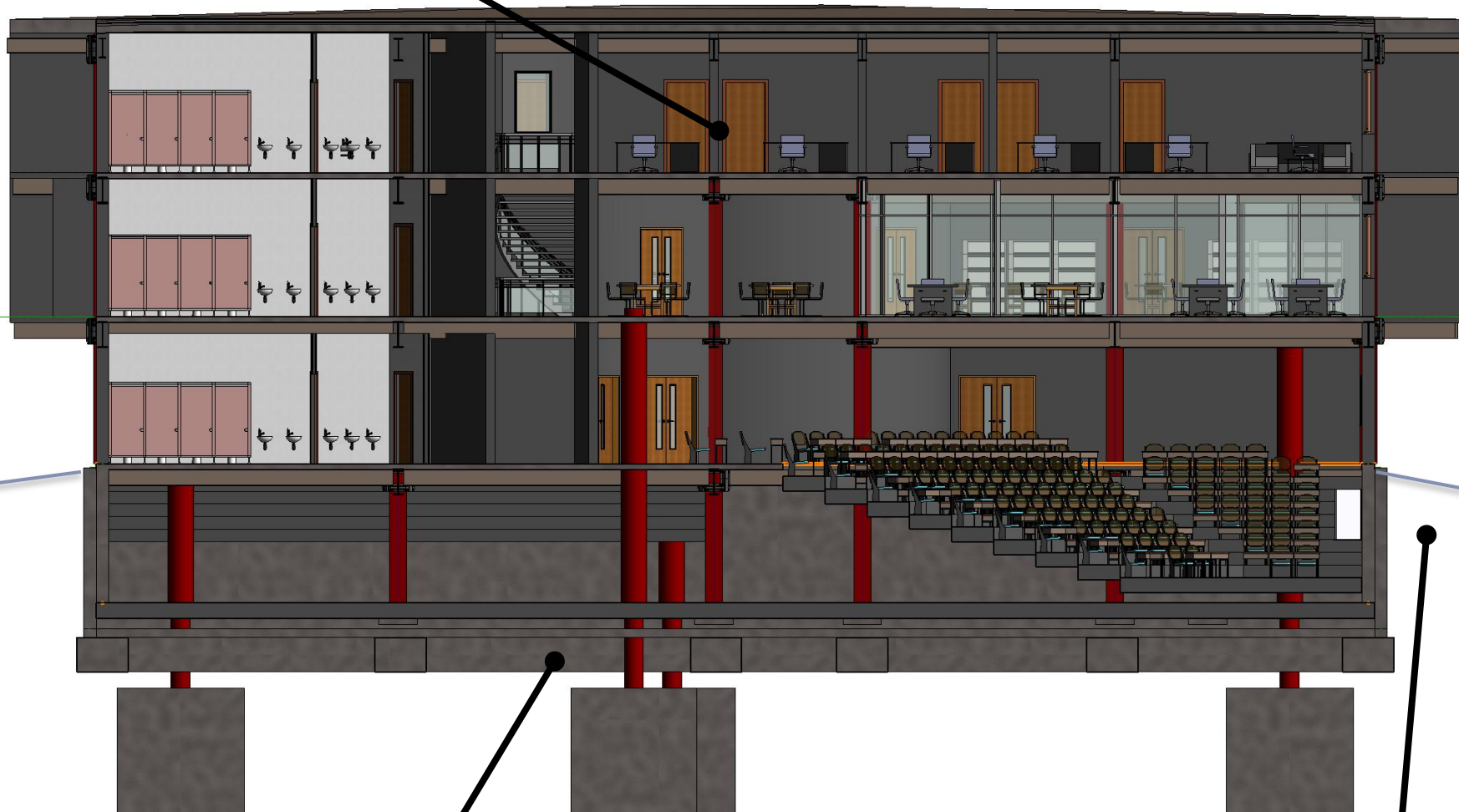
SE

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LCFM

AMPHIBIOUS DEFENSE SYSTEM

Steel
Superstructure



Concrete
Substructure

Breakaway
Connections

A

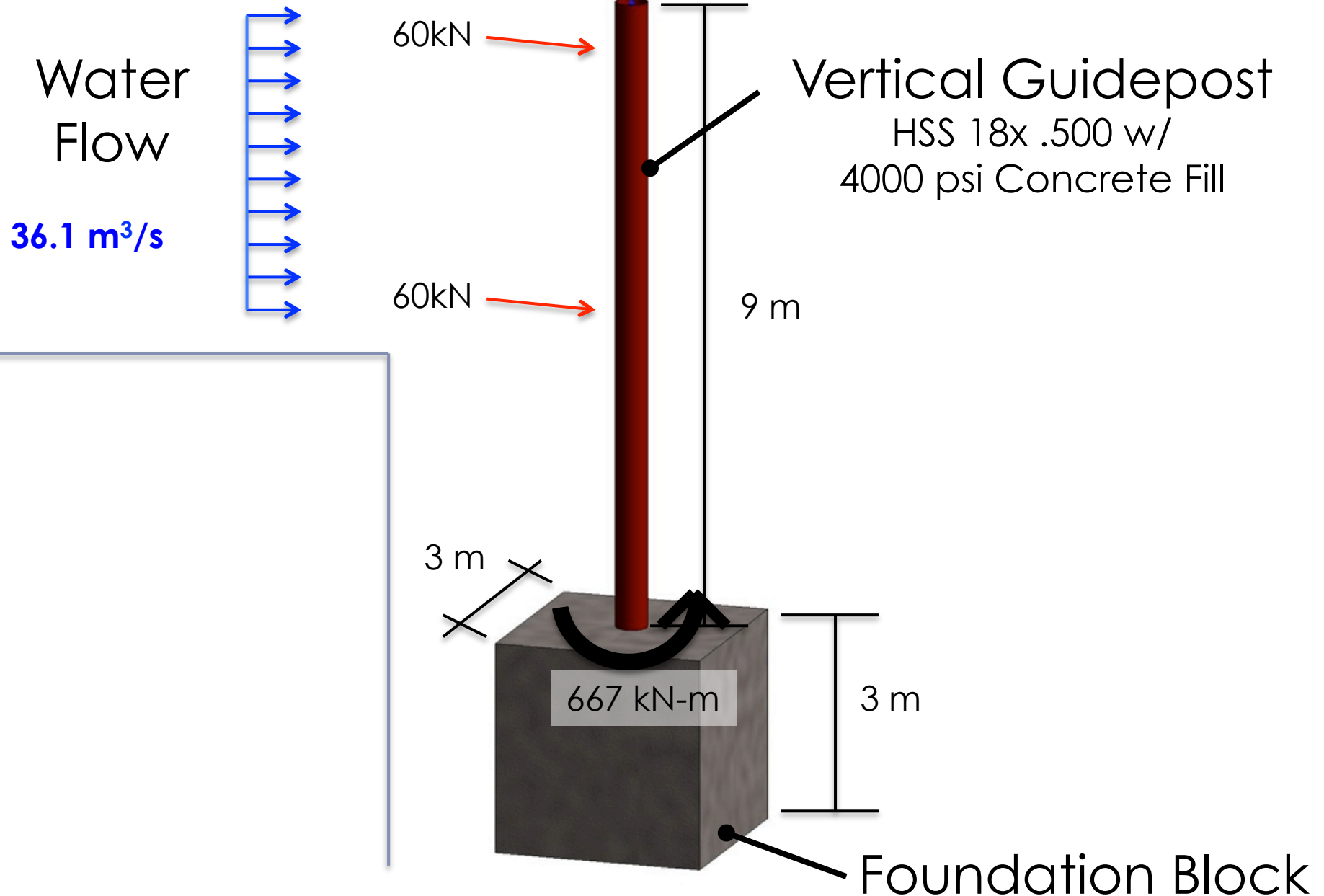
MEP

SE

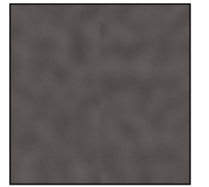
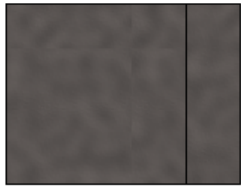
CM

LCFM

FOUNDATION SYSTEM



CONSTRUCTION SEQUENCE



A

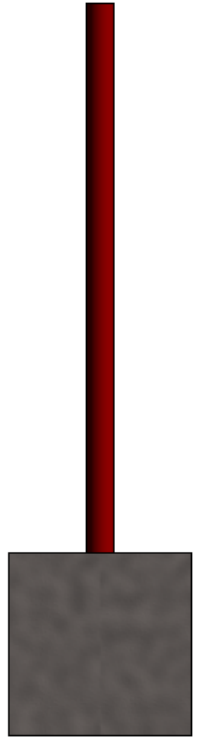
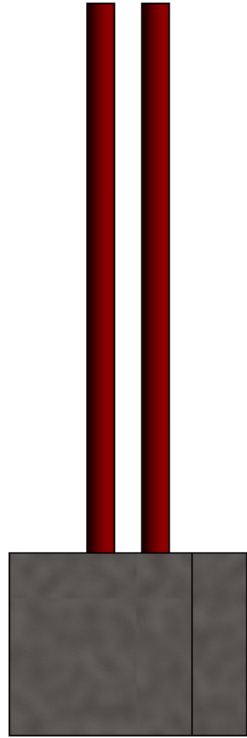
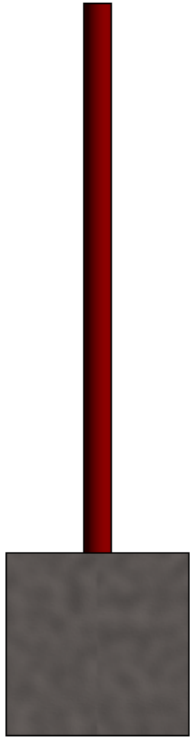
MEP

SE

CM

LCFM

CONSTRUCTION SEQUENCE



A

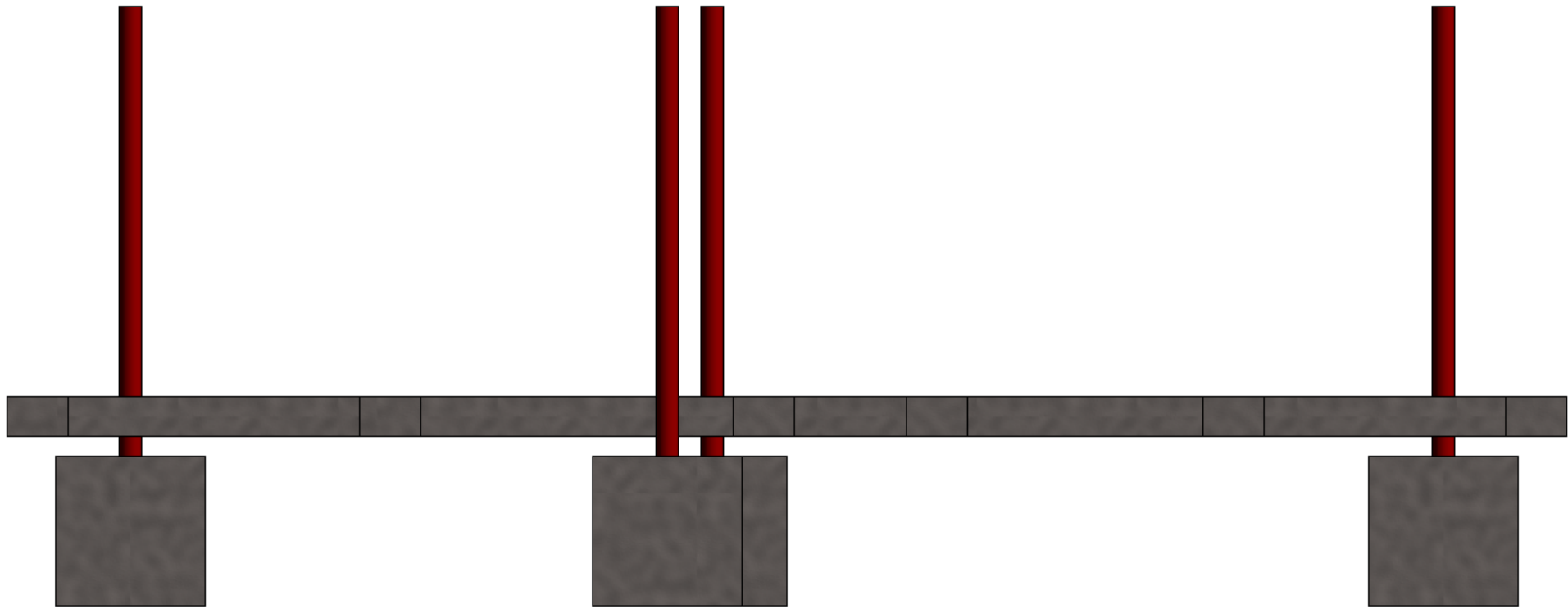
MEP

SE

CM

LCFM

CONSTRUCTION SEQUENCE



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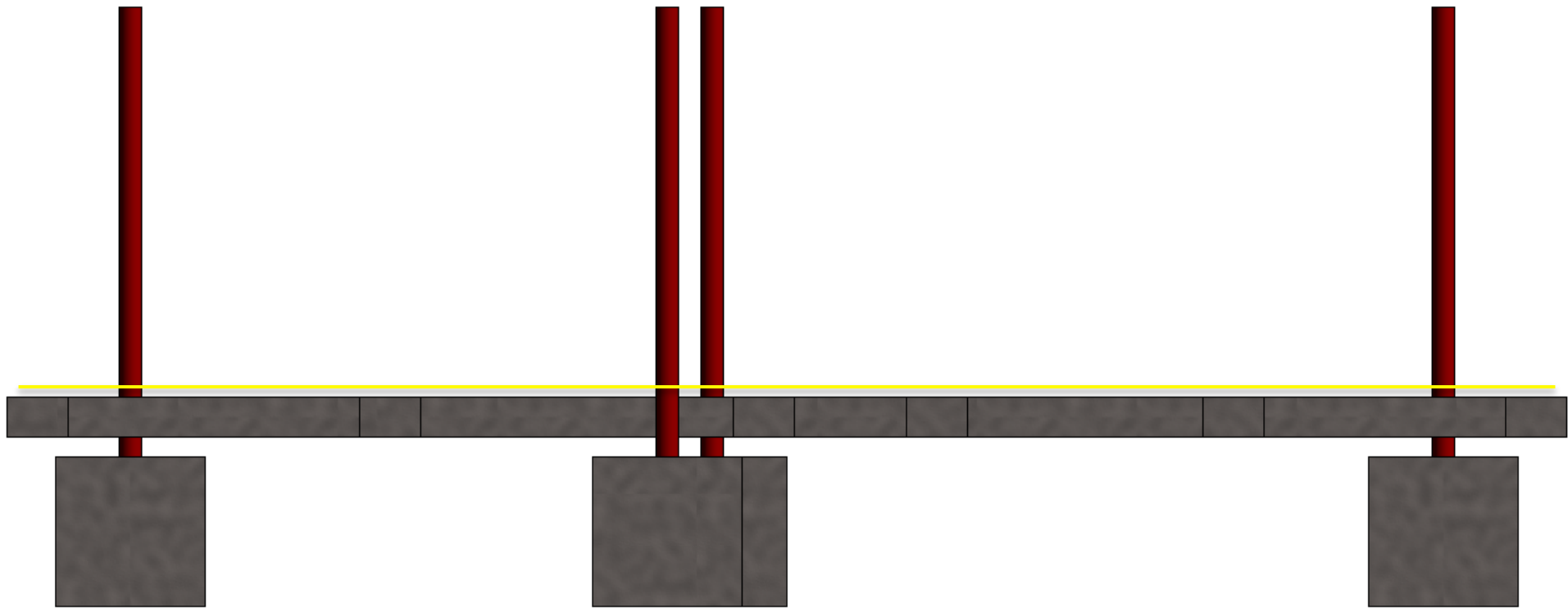
MEP

SE

CM

LCFM

CONSTRUCTION SEQUENCE



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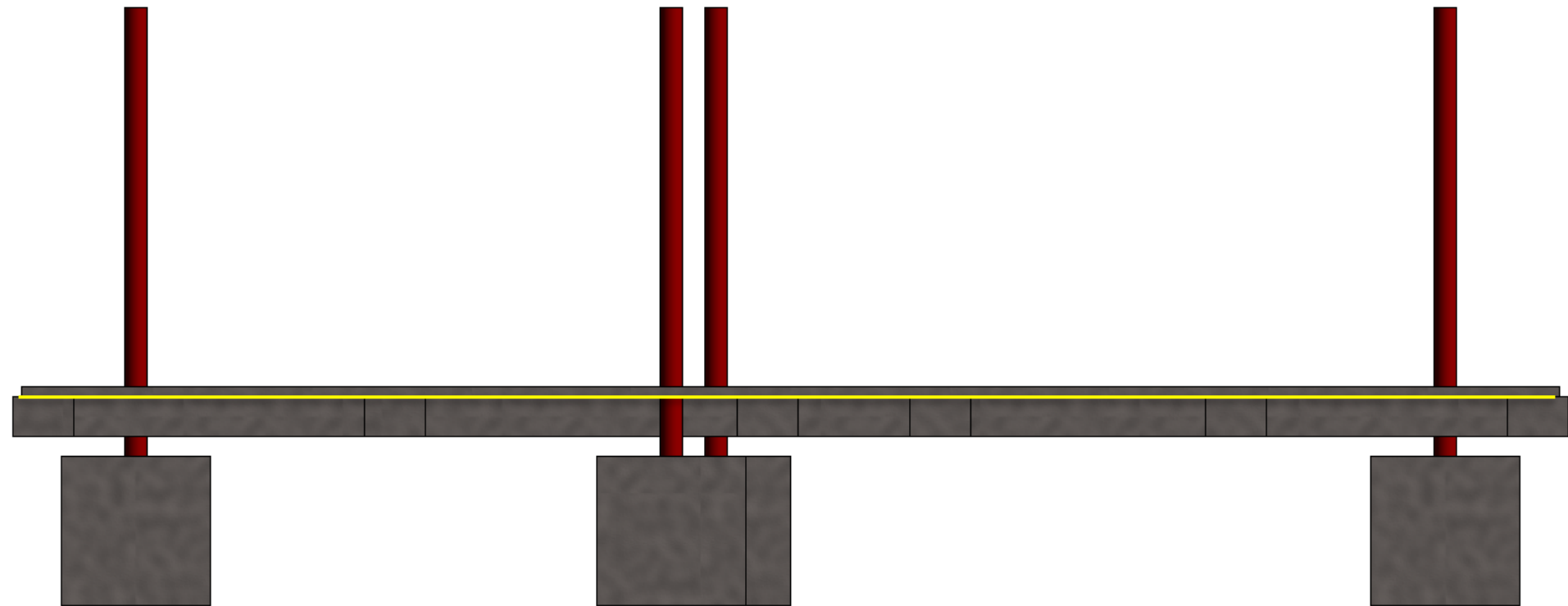
MEP

SE

CM

LCFM

CONSTRUCTION SEQUENCE



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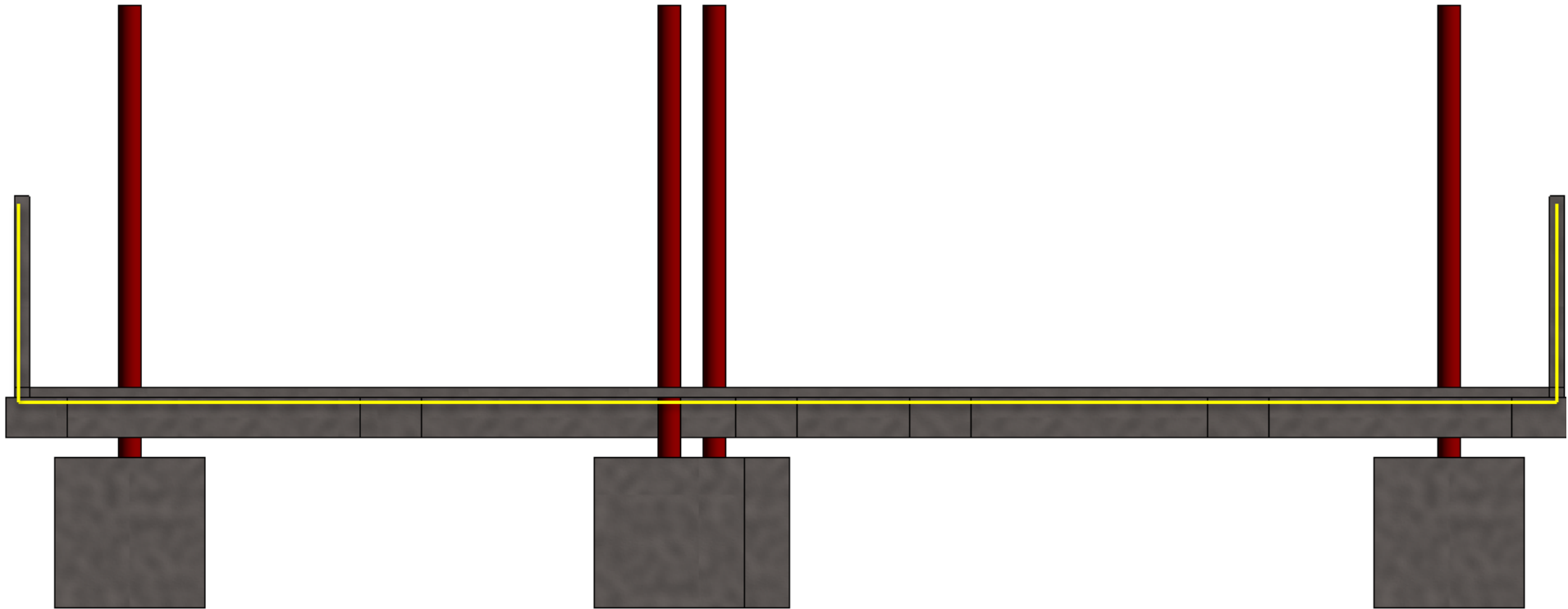
MEP

SE

CM

LCFM

CONSTRUCTION SEQUENCE



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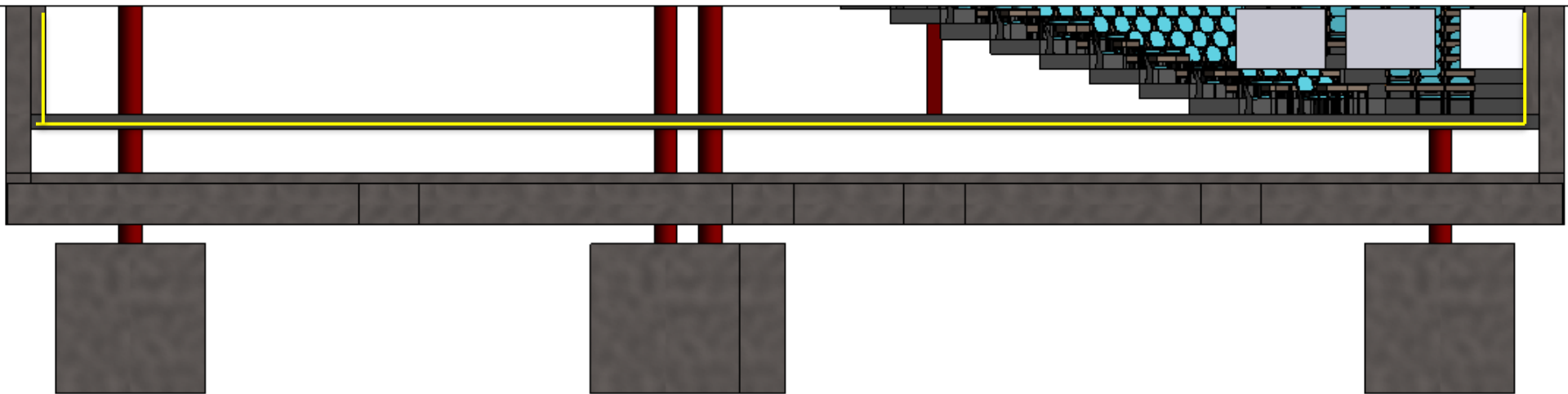
MEP

SE

CM

LCFM

CONSTRUCTION SEQUENCE



A

MEP

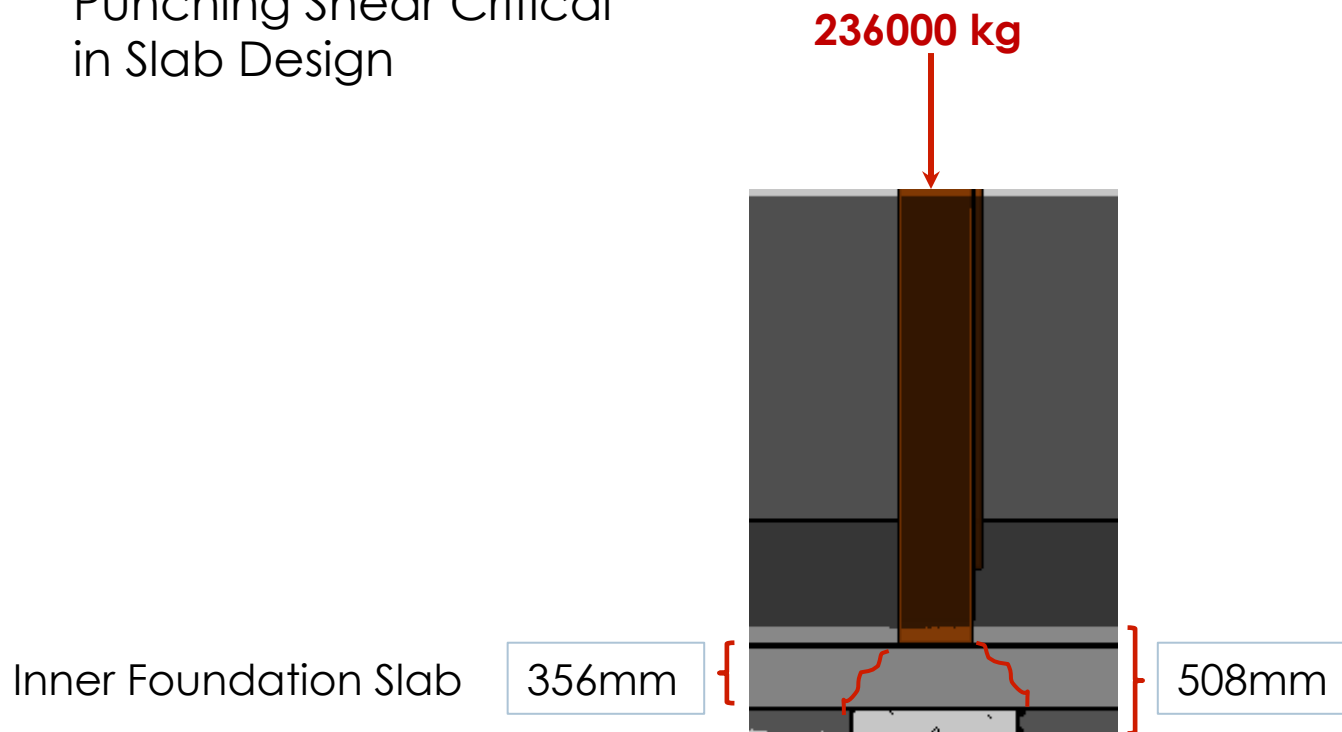
SE

CM

LCFM

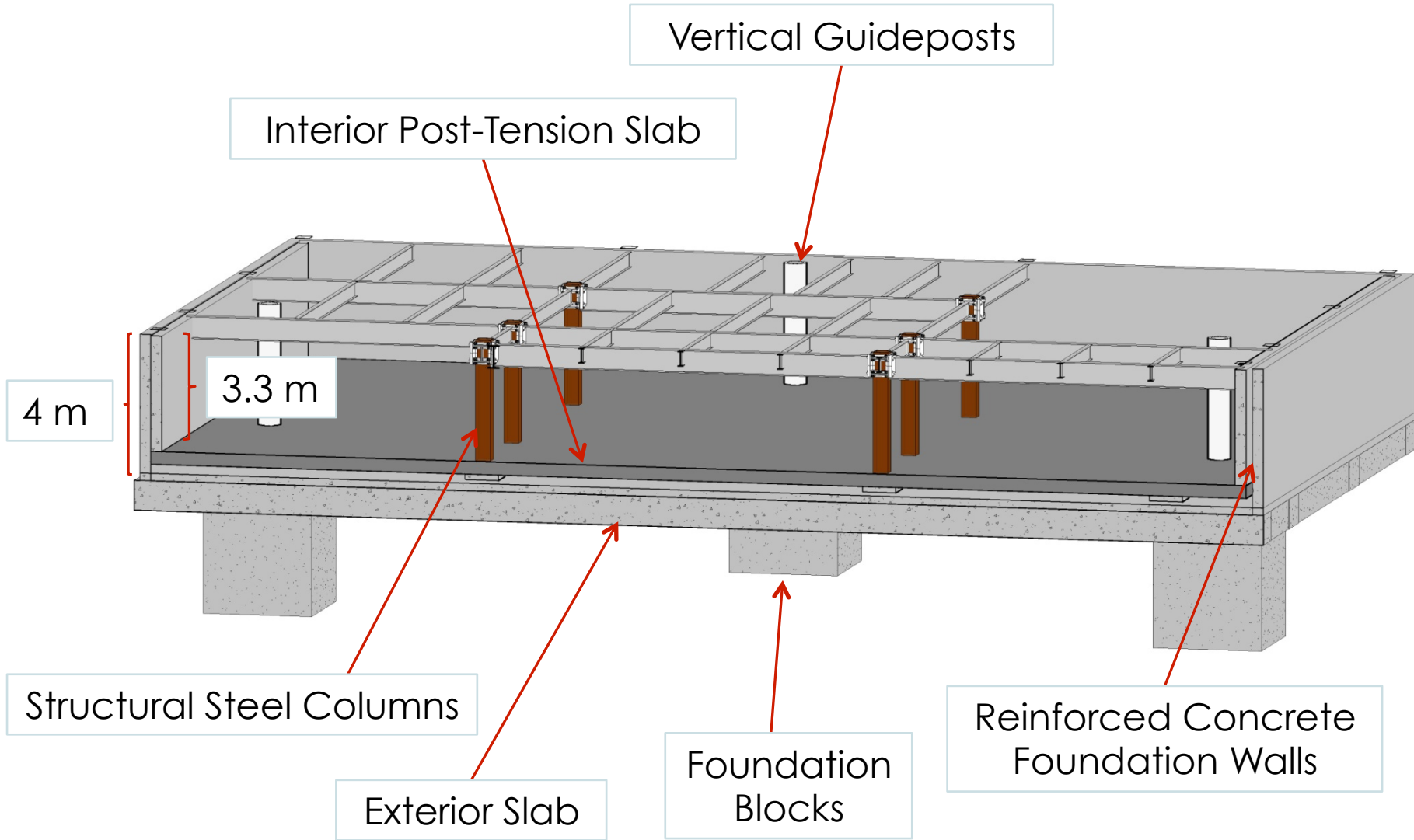
FOUNDATION SYSTEM

Punching Shear Critical
in Slab Design



FOUNDATION SYSTEM

Entire Substructure



A

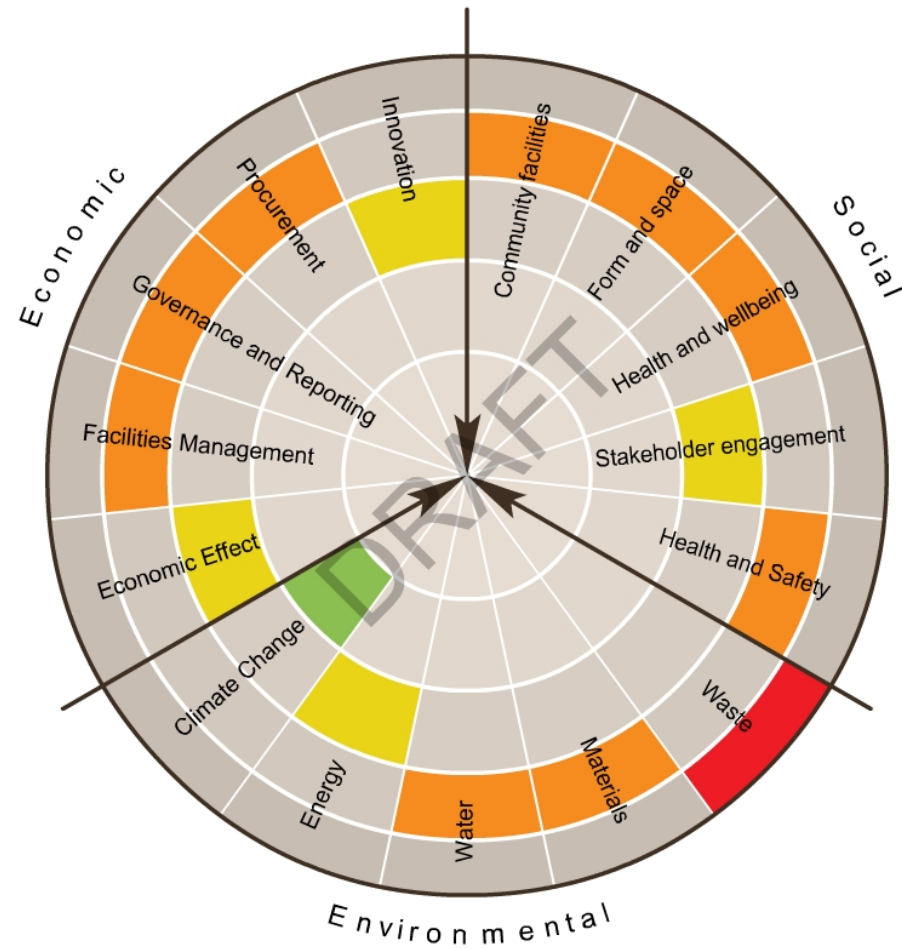
MEP

SE

CM

LCFM

1.1 AMPHIBIOUS DEFENSE SYSTEM

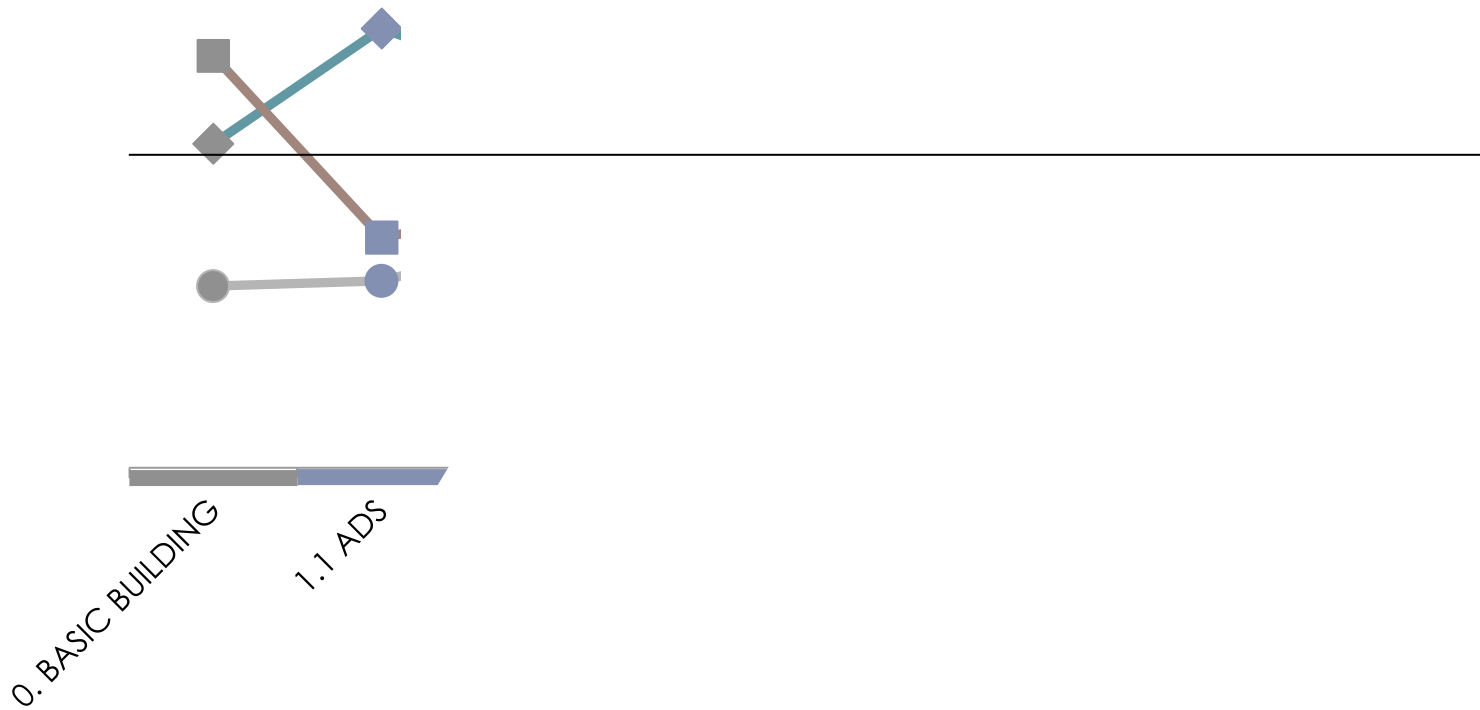


SPeAR[®]



1.1 AMPHIBIOUS DEFENSE SYSTEM

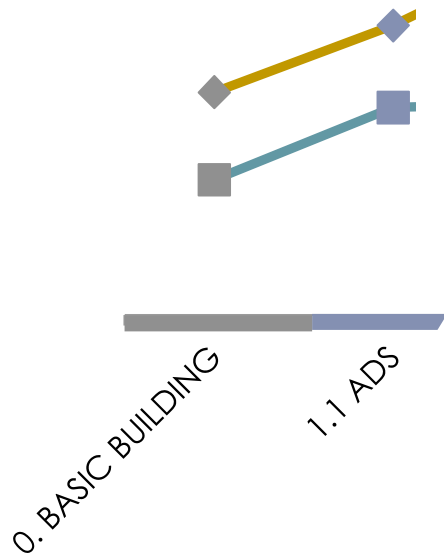
◆ Carbon emission ■ Rent ● Cost



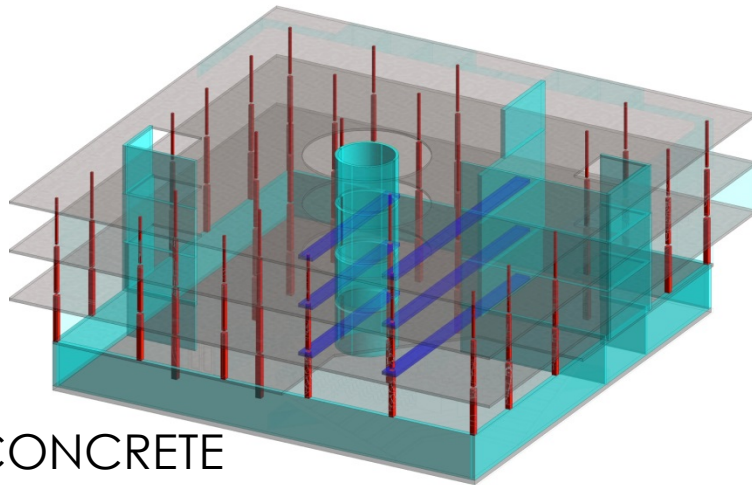
1.1 AMPHIBIOUS DEFENSE SYSTEM

Value for money

Value

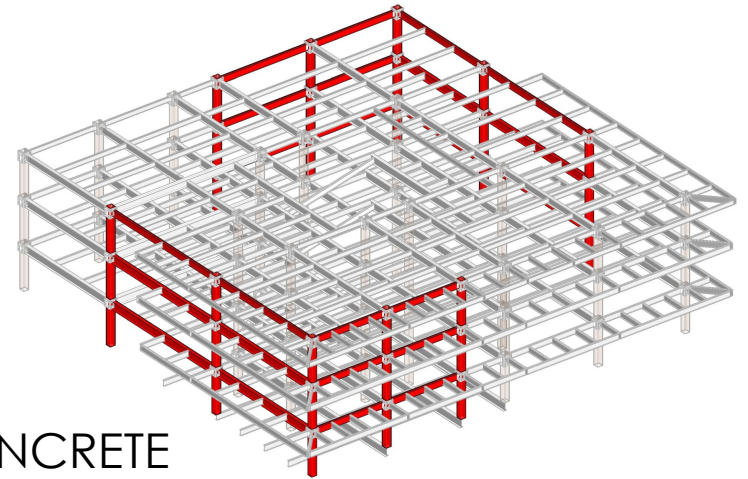


SUPERSTRUCTURE WEIGHT



CONCRETE

2463000 kg



CONCRETE

1008000 kg

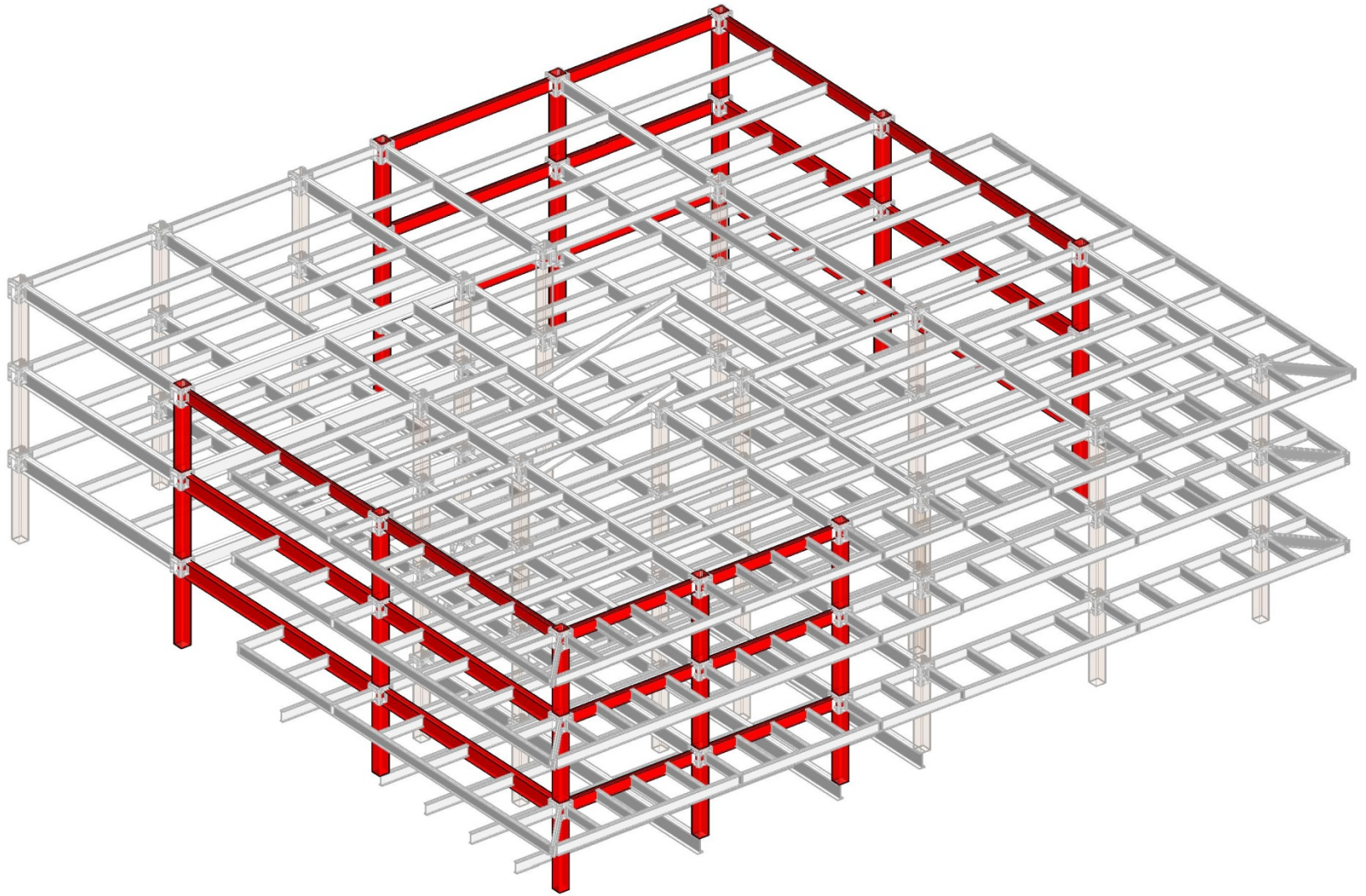
STEEL

+ 162000 kg

1170000 kg

32% building weight savings

MOMENT FRAME



A

MEP

SE

CM

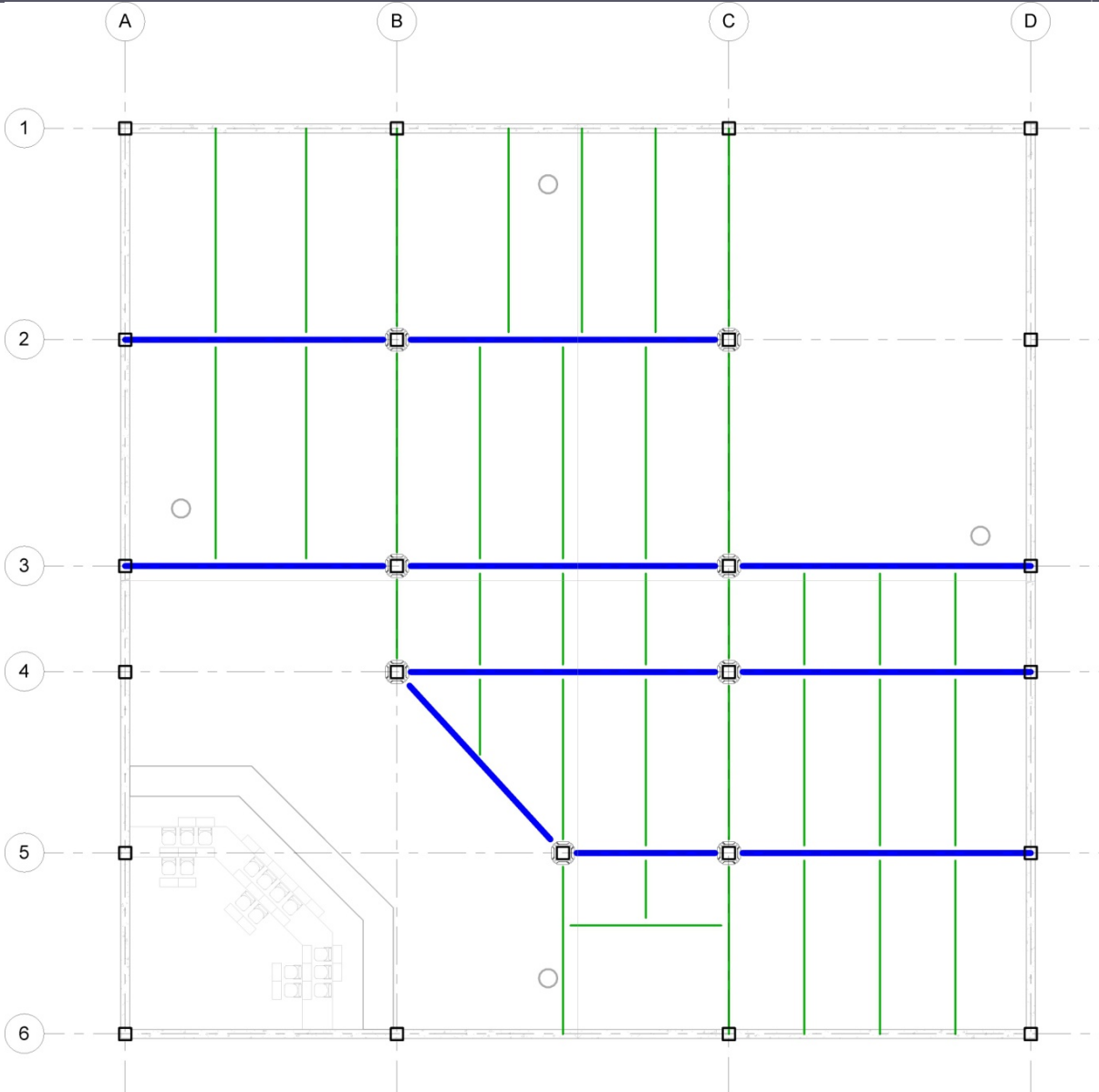
LCFM

FRAMING PLAN

1st Floor

W24x94

W16x31



A

MEP

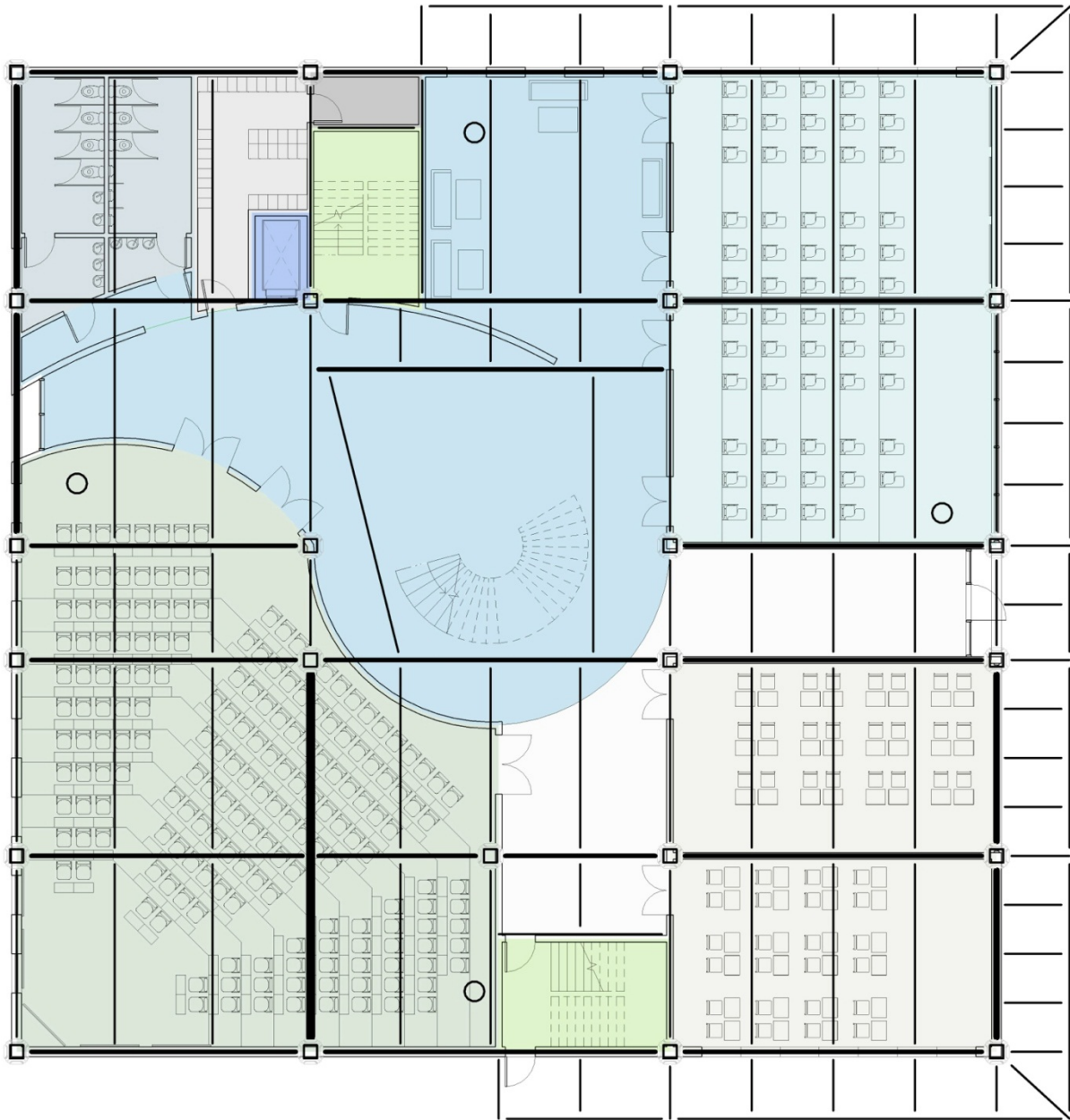
SE

CM

LCFM

FRAMING PLAN

2nd Floor



A

MEP

SE

CM

LCFM

FRAMING PLAN

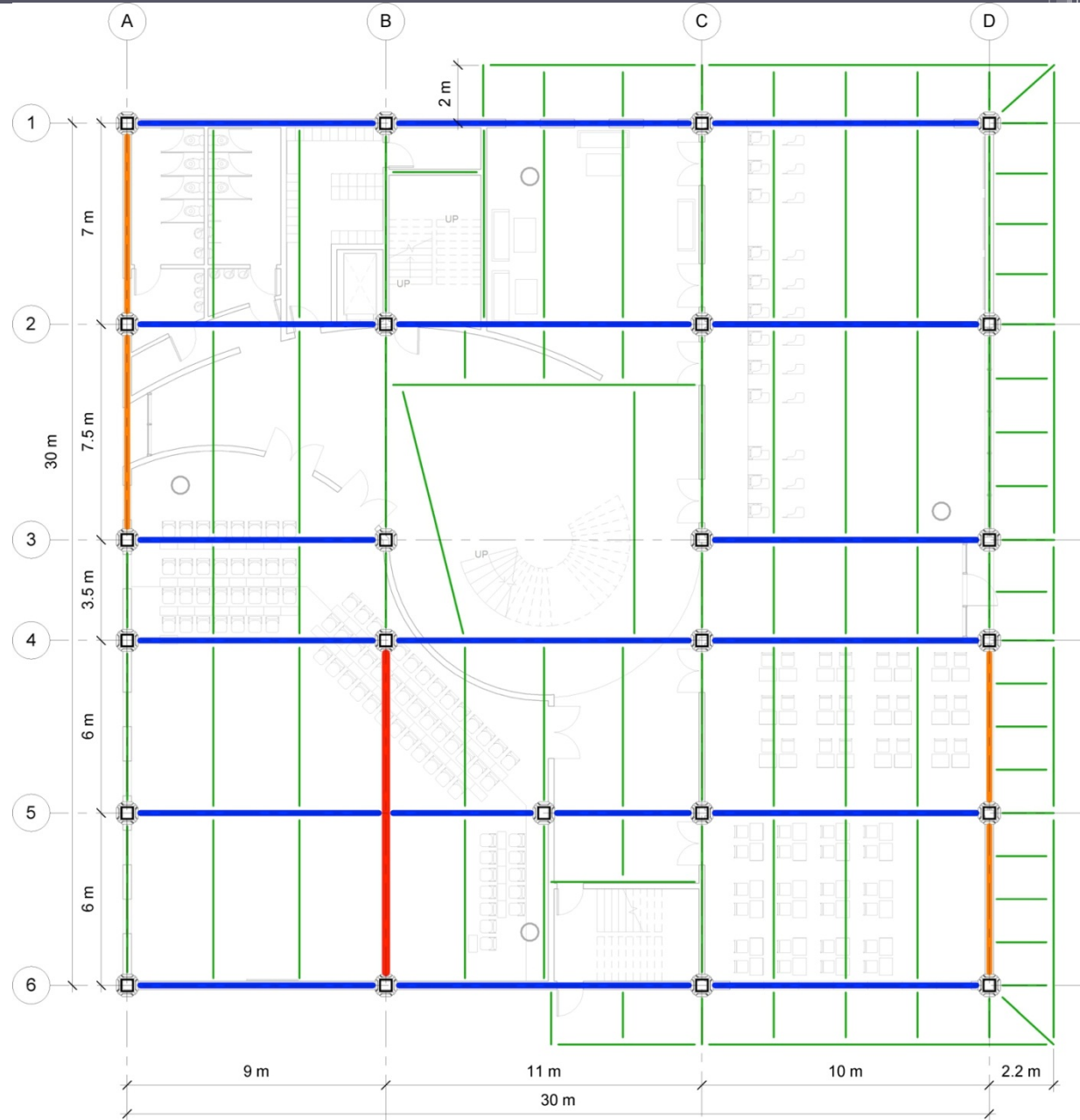
2nd Floor

W24x94

W16x31

W18x46

W24X131



A

MEP

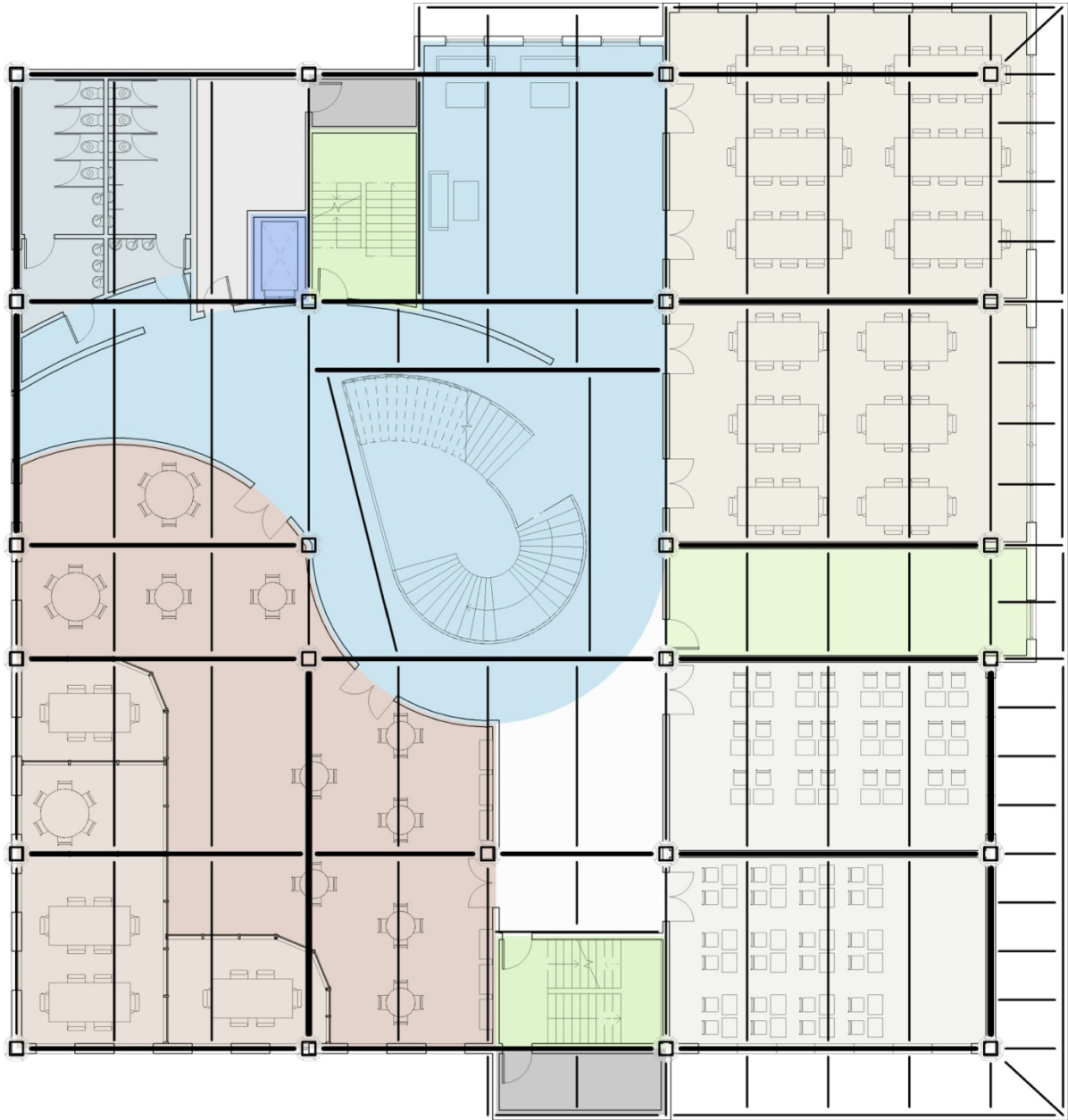
SE

CM

LCFM

FRAMING PLAN

3rd Floor



A

MEP

SE

CM

LCFM

FRAMING PLAN

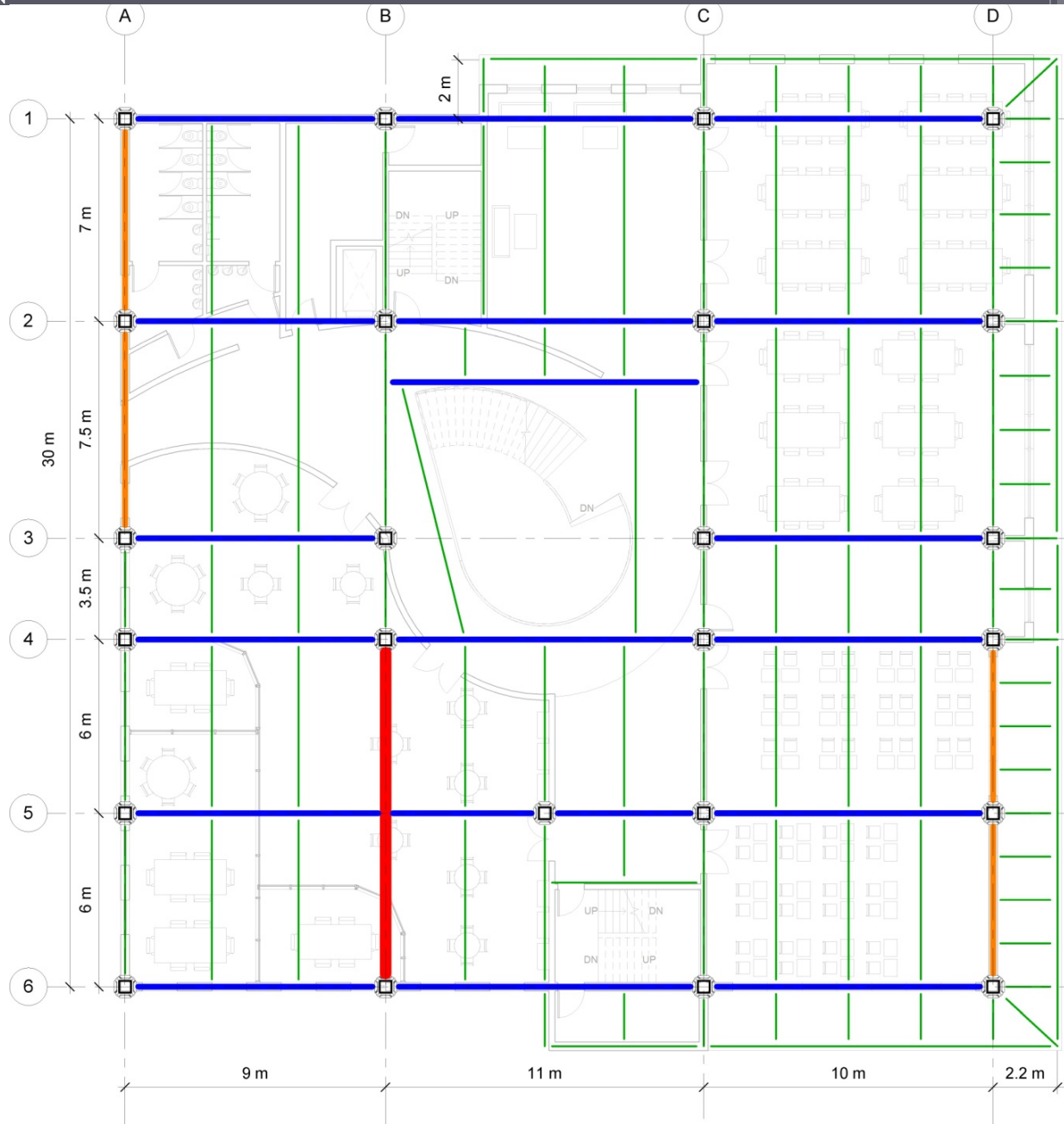
3rd Floor

W24x94

W16x31

W18x46

W24X131



A

MEP

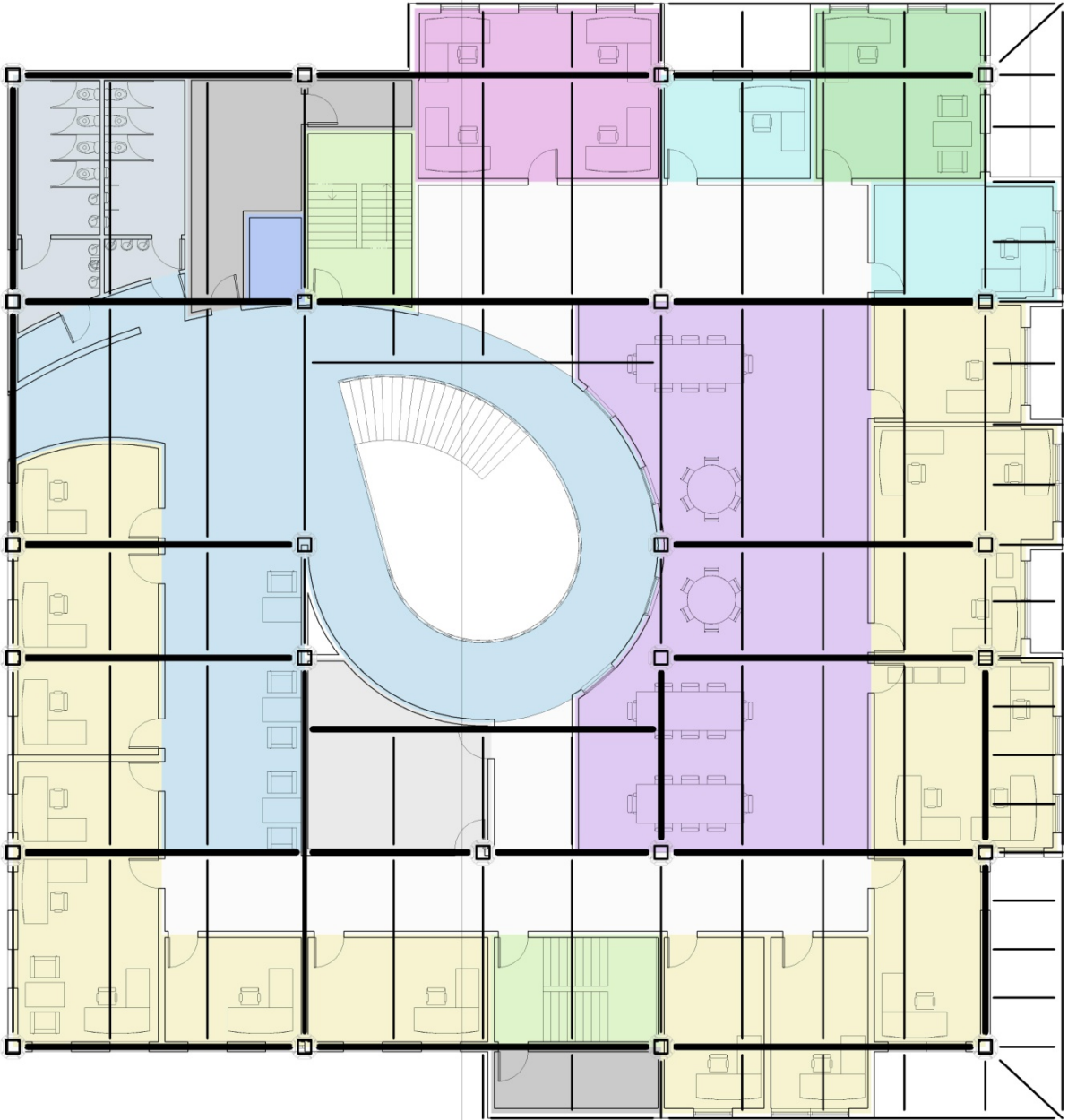
SE

CM

LCFM

FRAMING PLAN

Roof



A

MEP

SE

CM

LCFM

FRAMING PLAN

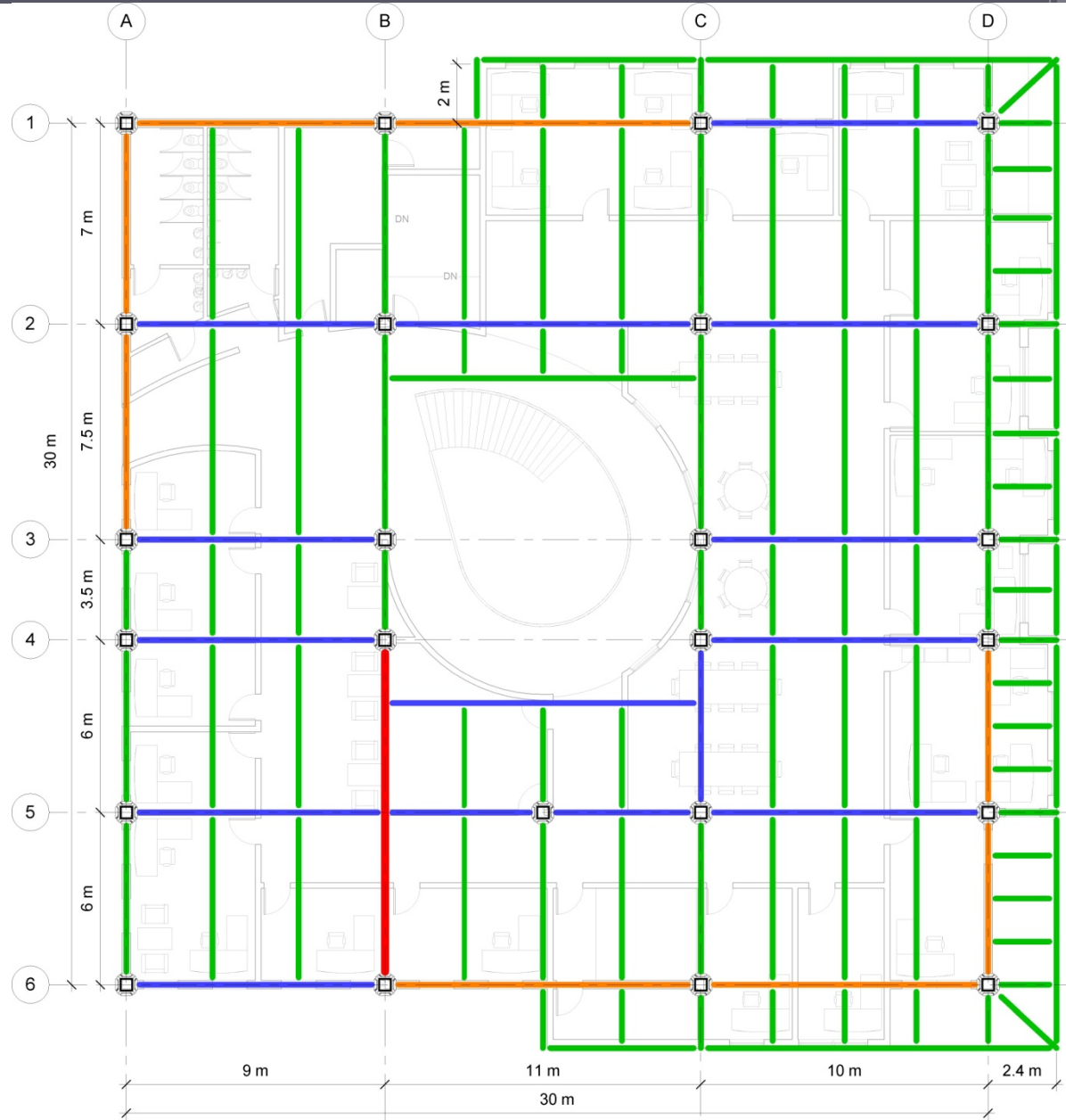
Roof

W14x22

W21x68

W18x46

W21x111



A

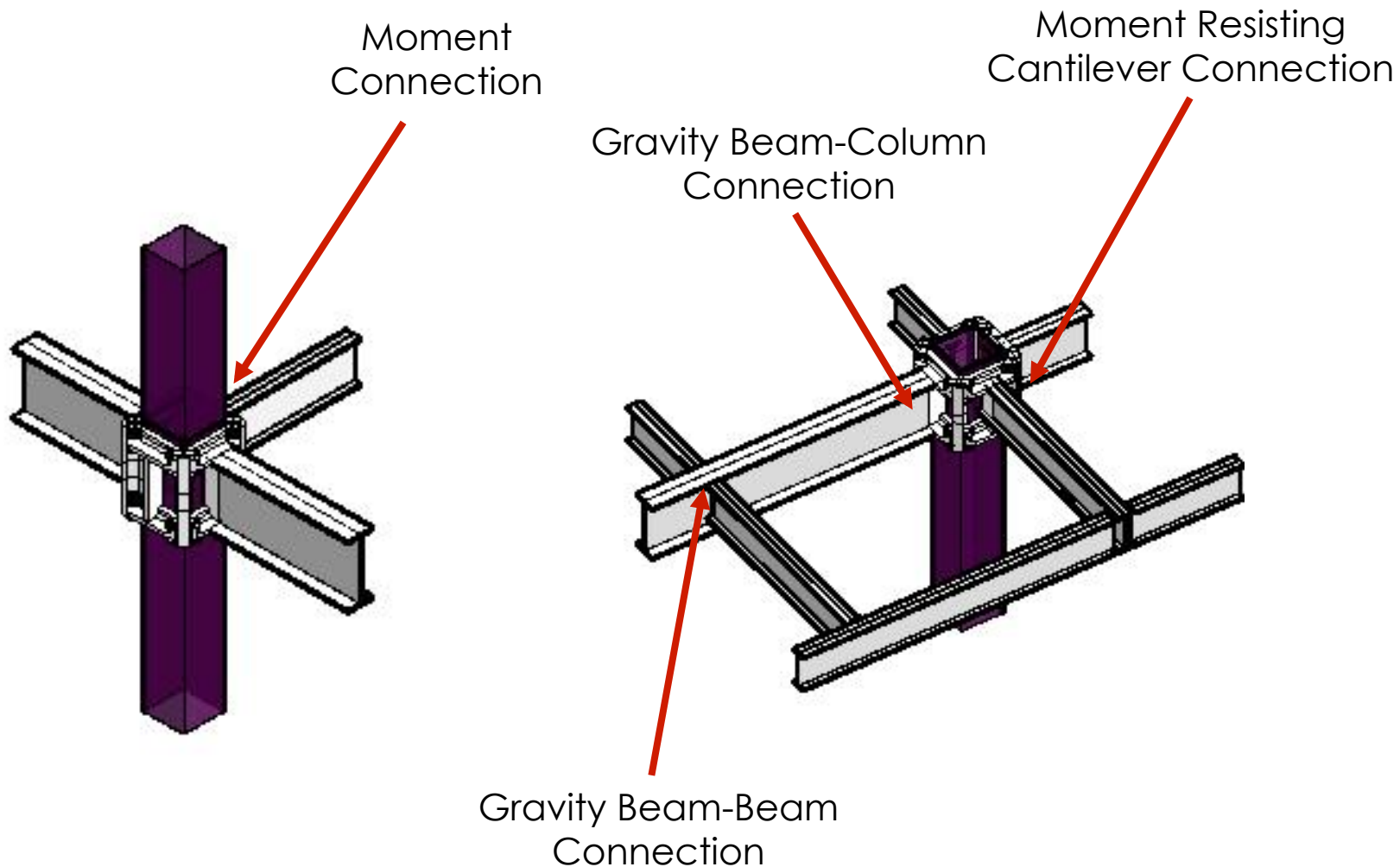
MEP

SE

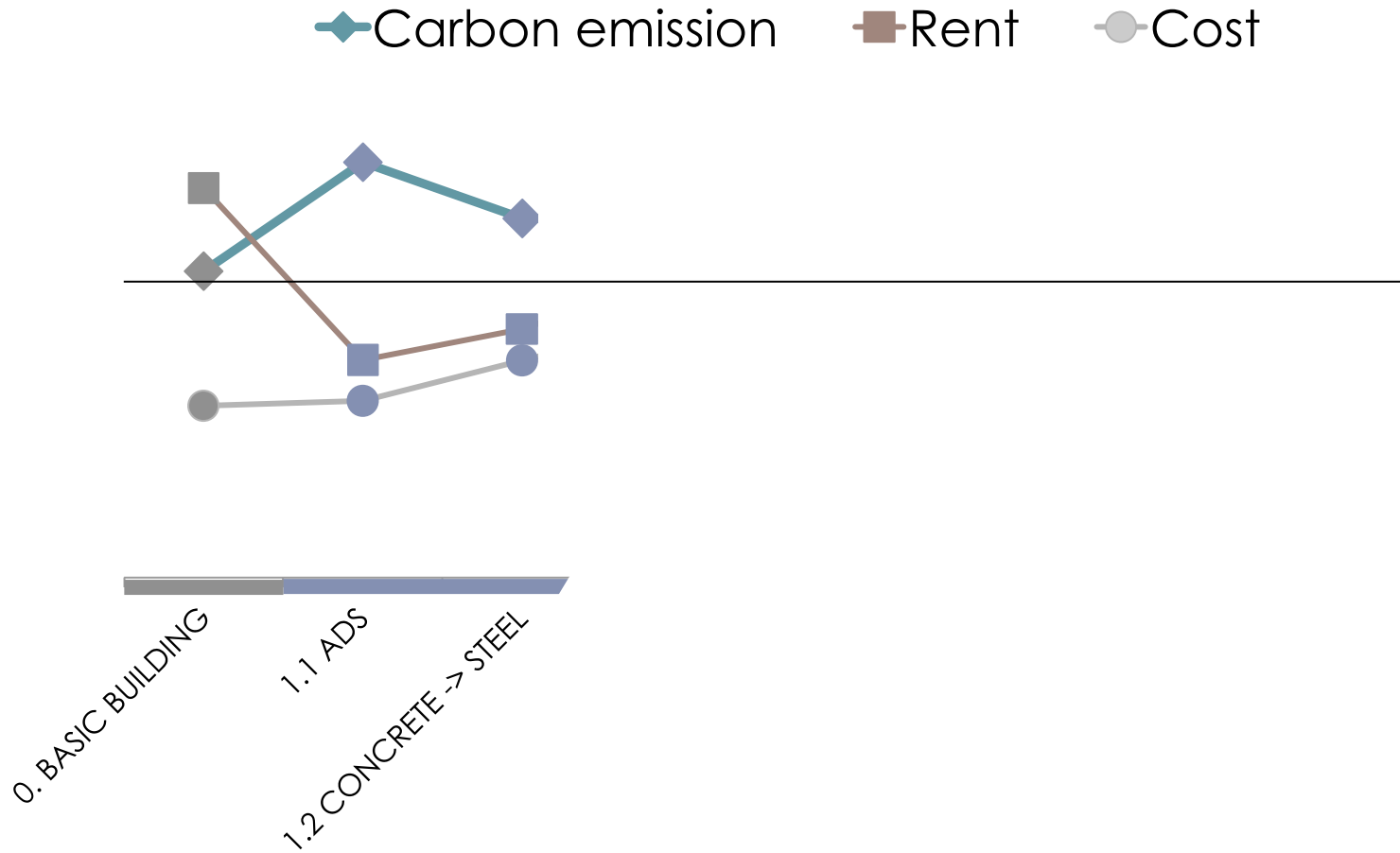
CM

LCFM

CONX Tech CONNECTION DETAILS



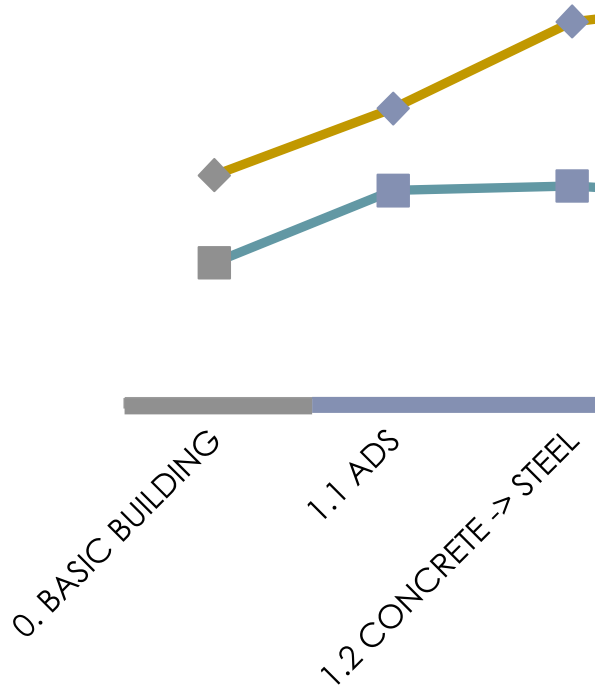
1.2 CONCRETE to STEEL



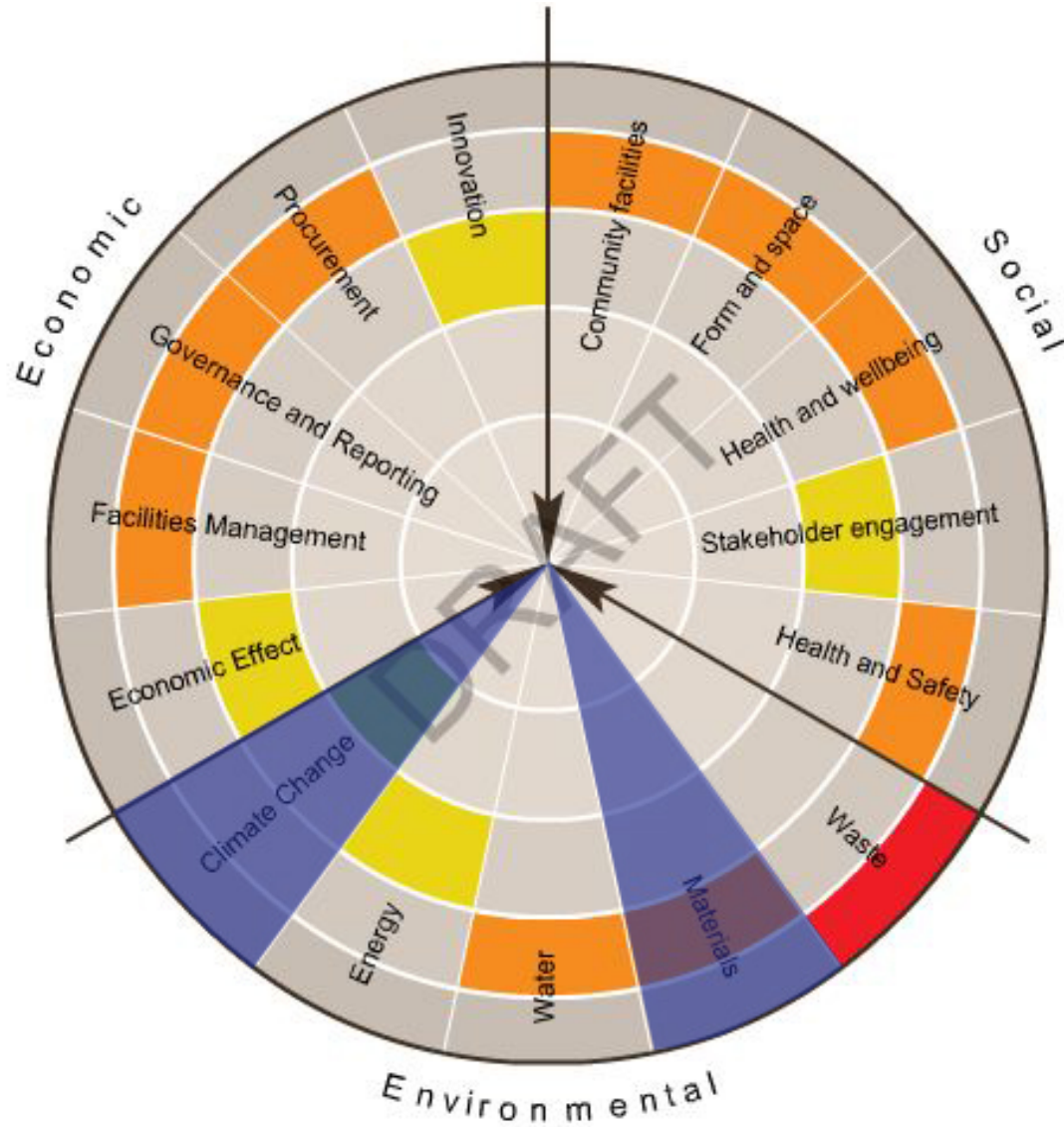
1.2 CONCRETE to STEEL

Value for money

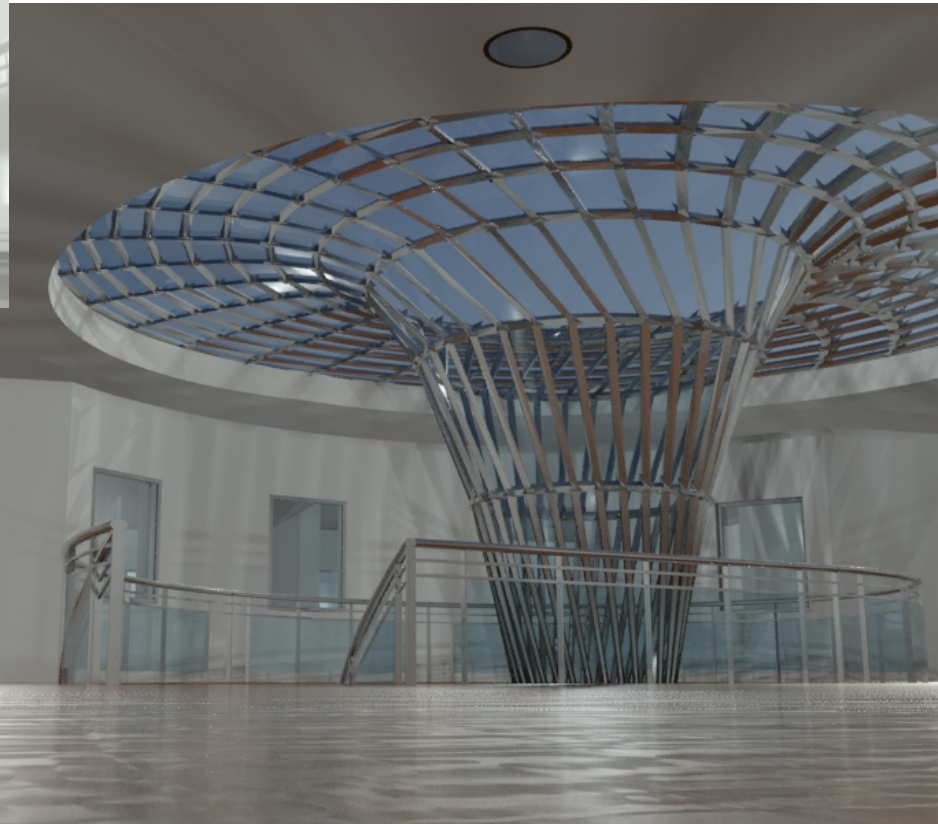
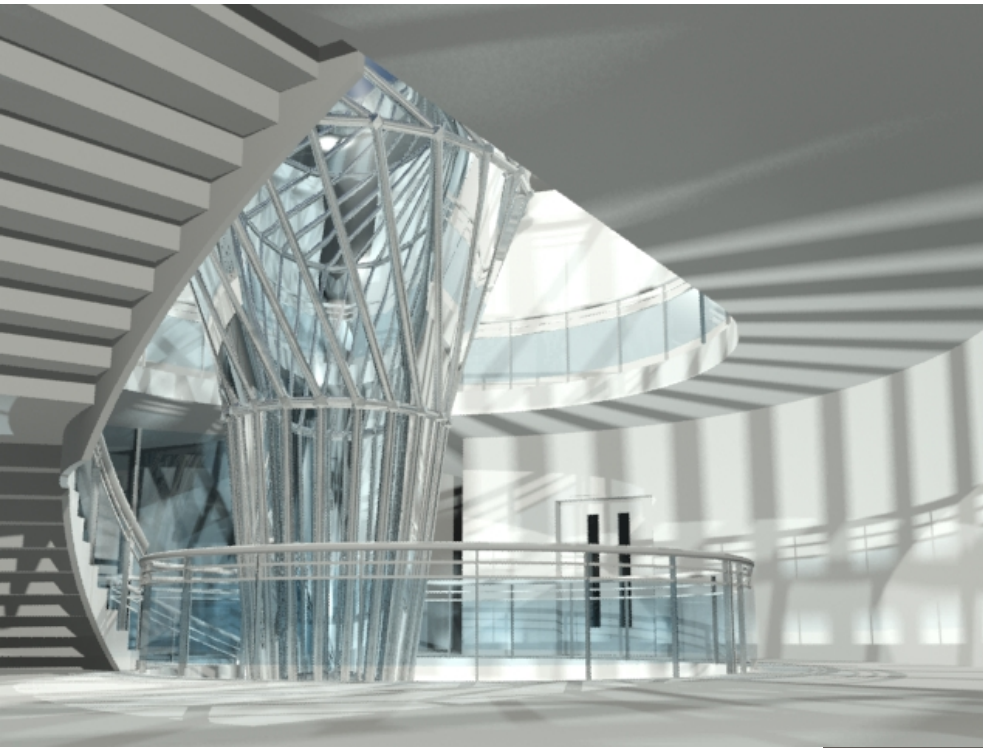
Value



1. AMPHIBIOUS defense system



INDOOR ENVIRONMENT



A

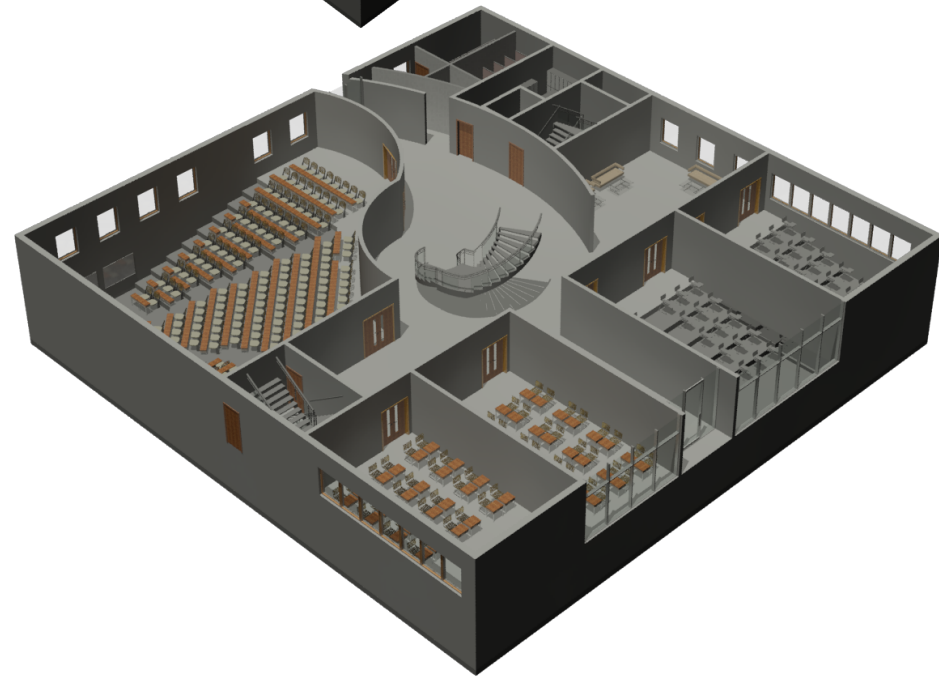
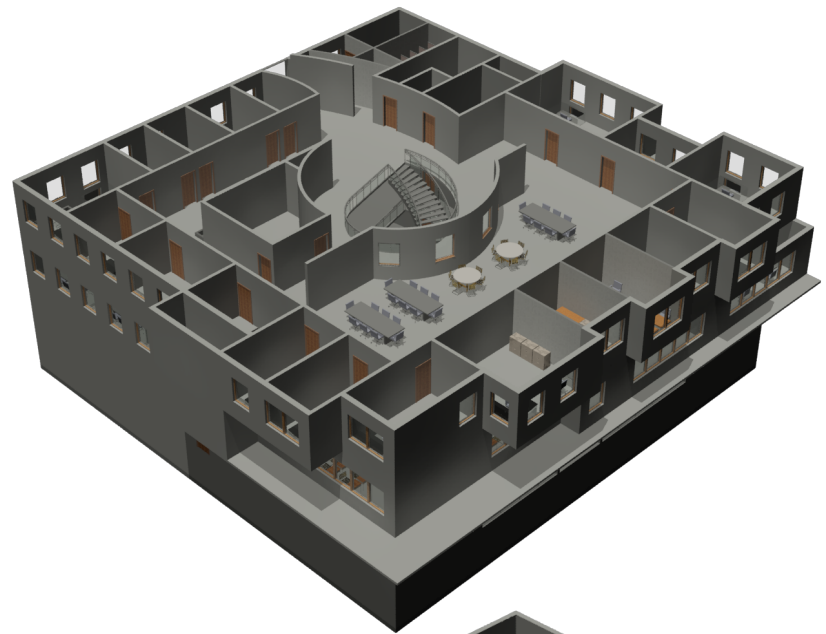
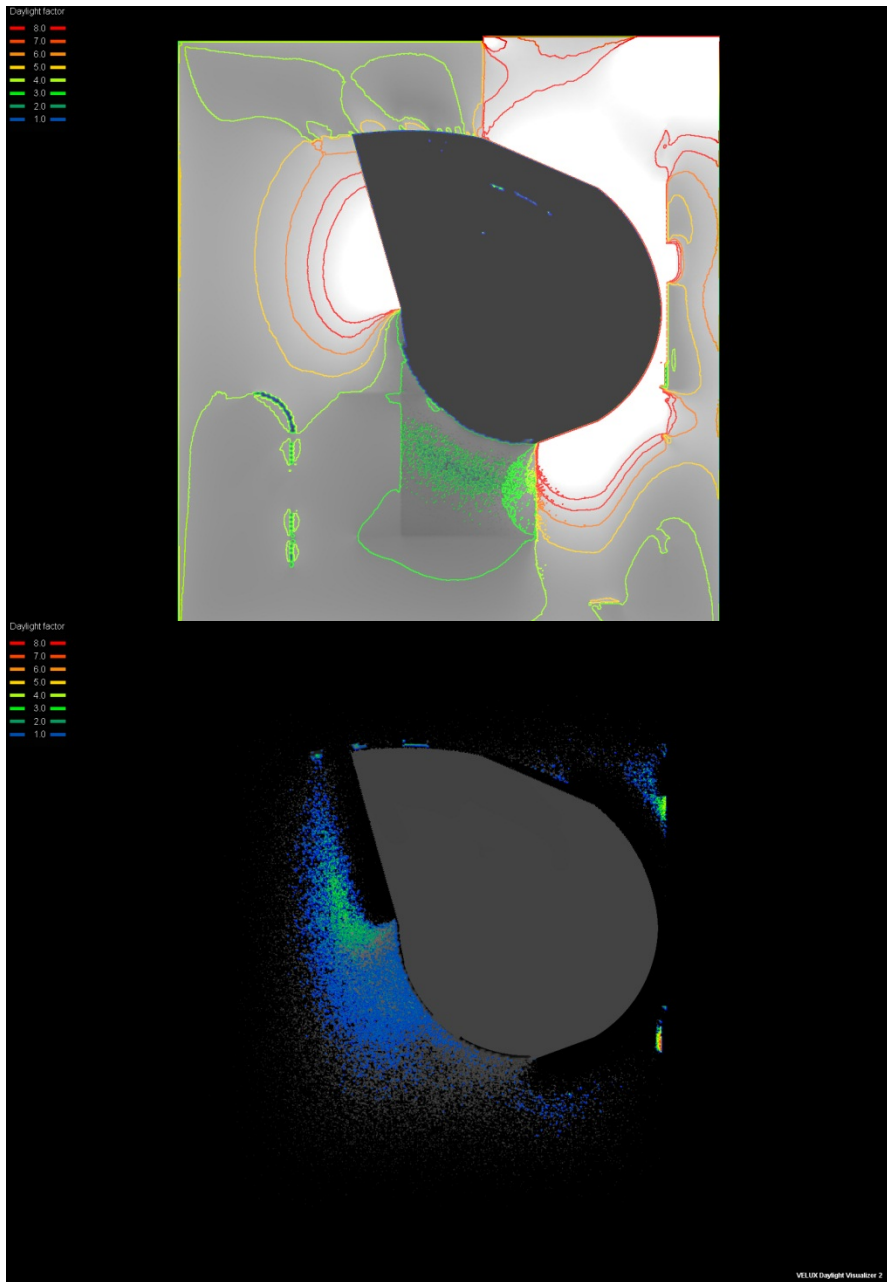
MEP

SE

CM

LCFM

INDOOR ENVIRONMENT



A

MEP

SE

CM

LCFM

DYNAMIC SHADING PANELS



A

MEP

SE

CM

LCFM

INDOOR ENVIRONMENT



A

MEP

SE

CM

LCFM

INDOOR ENVIRONMENT



A

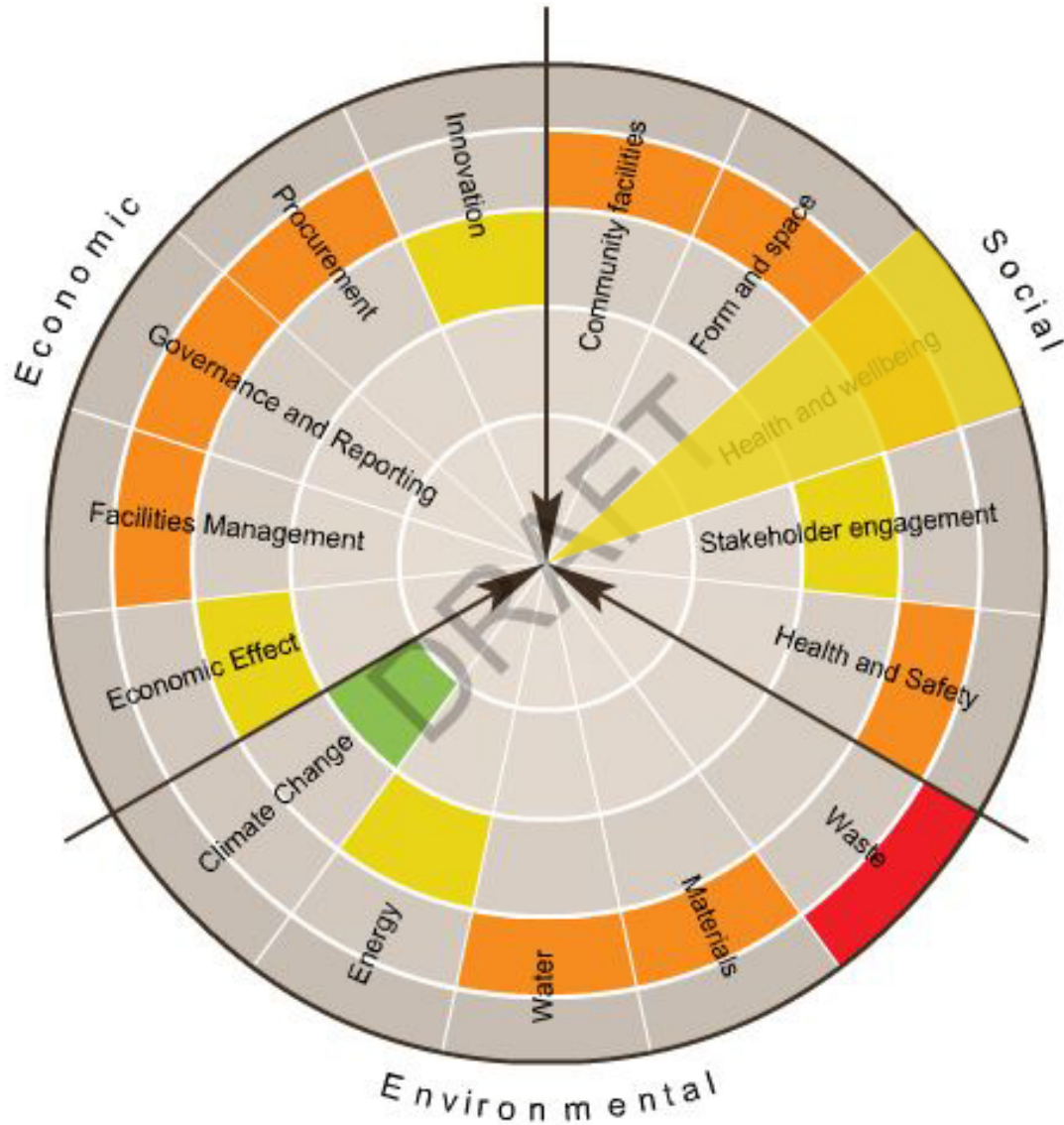
MEP

SE

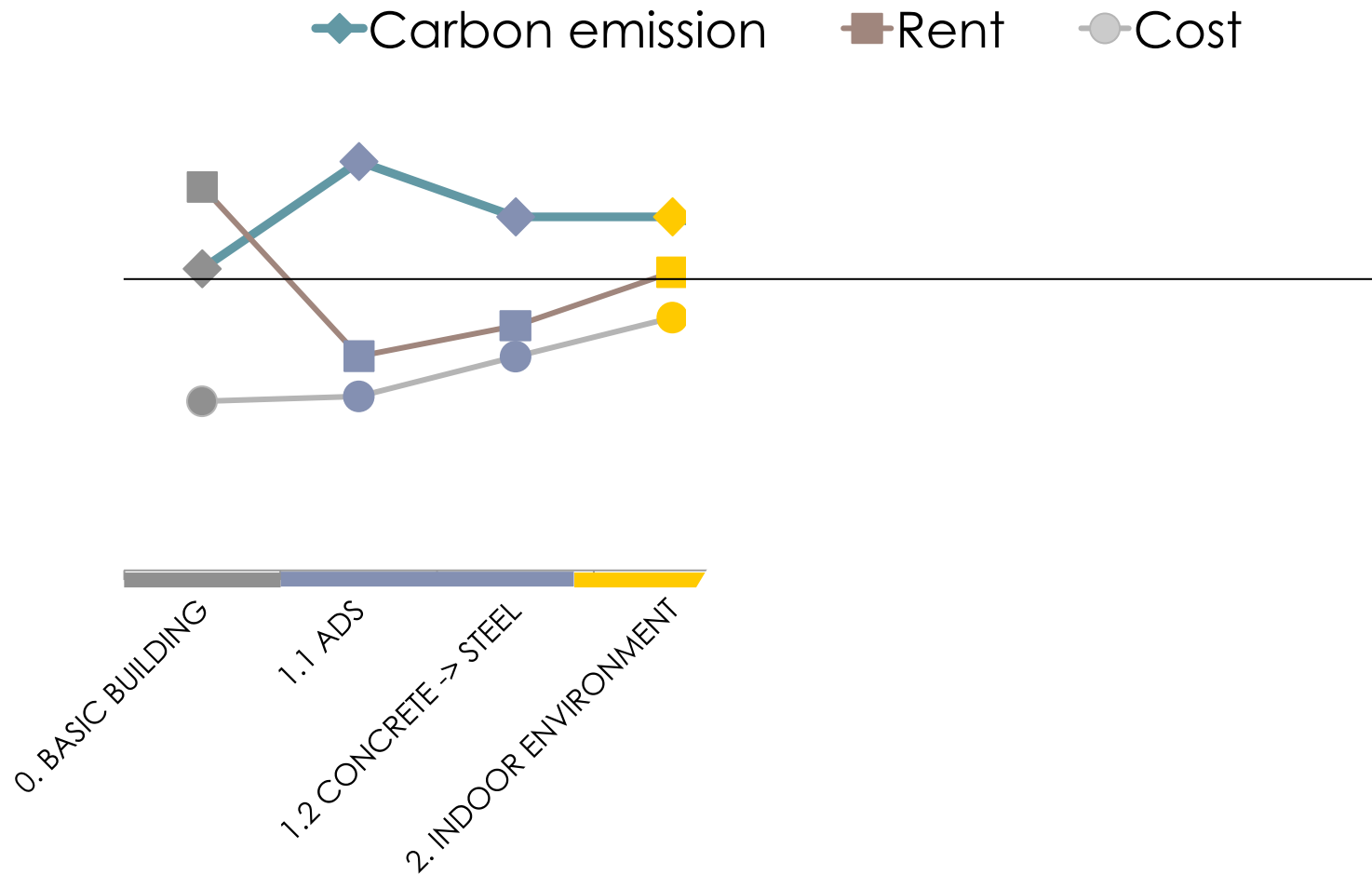
CM

LCFM

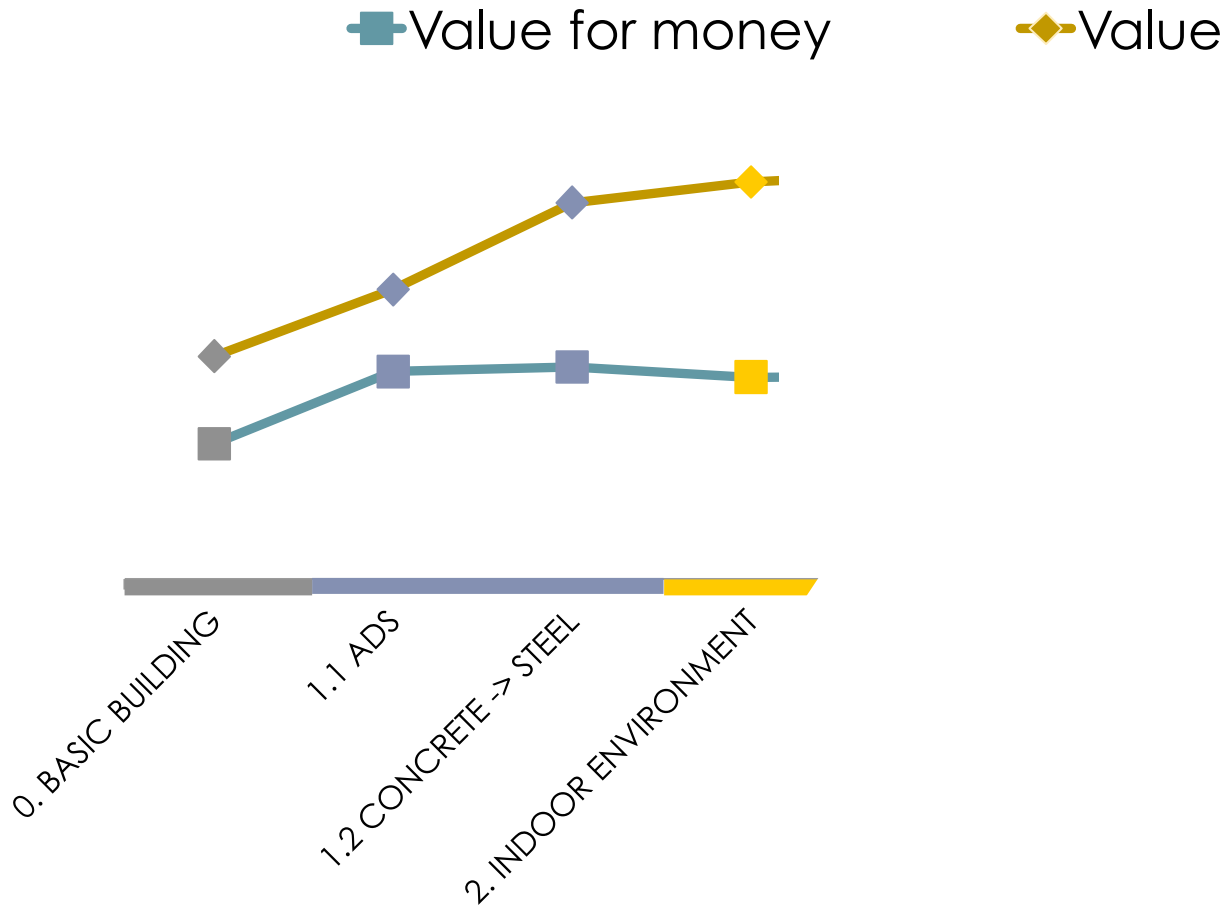
2. INDOOR environment



2. INDOOR environment

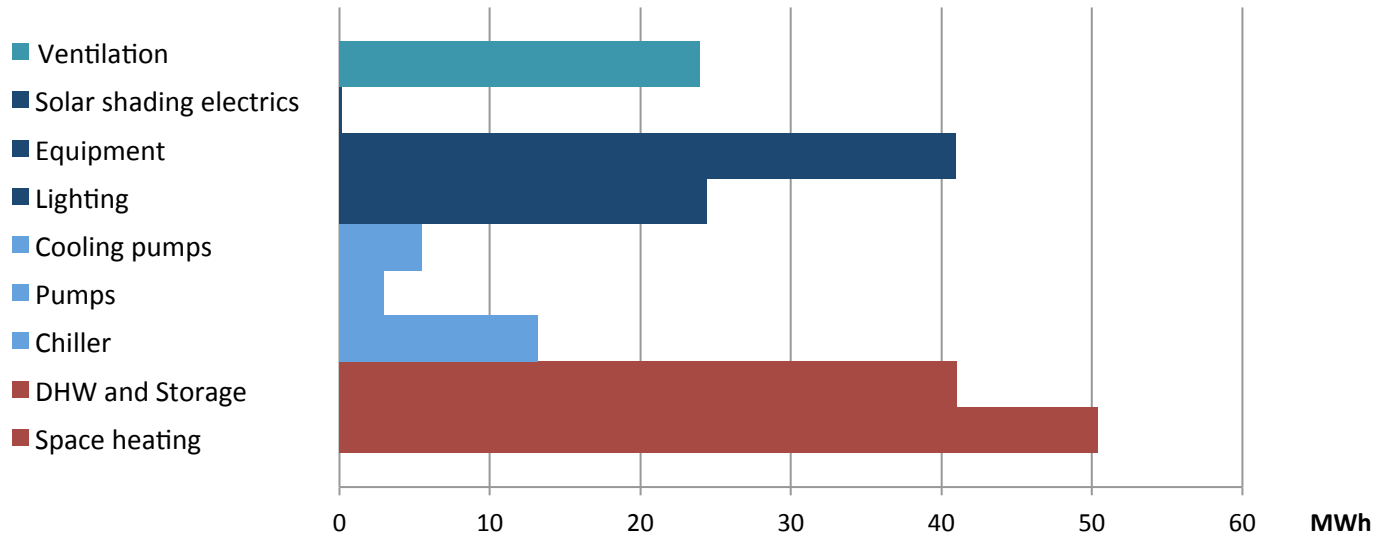
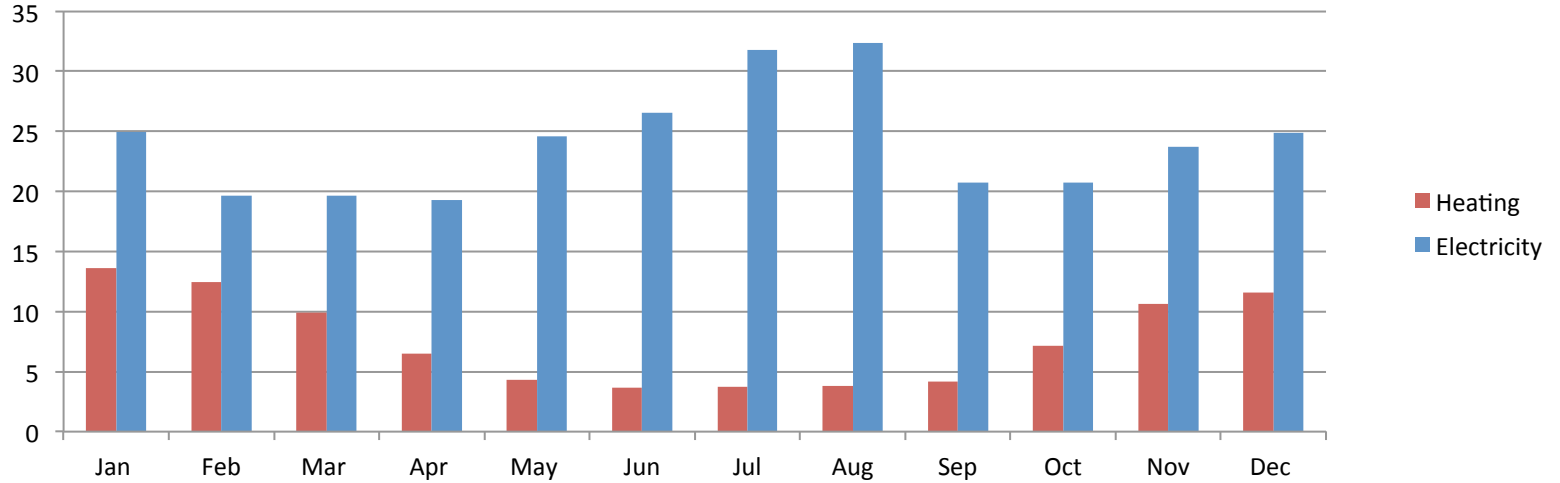


2. INDOOR environment

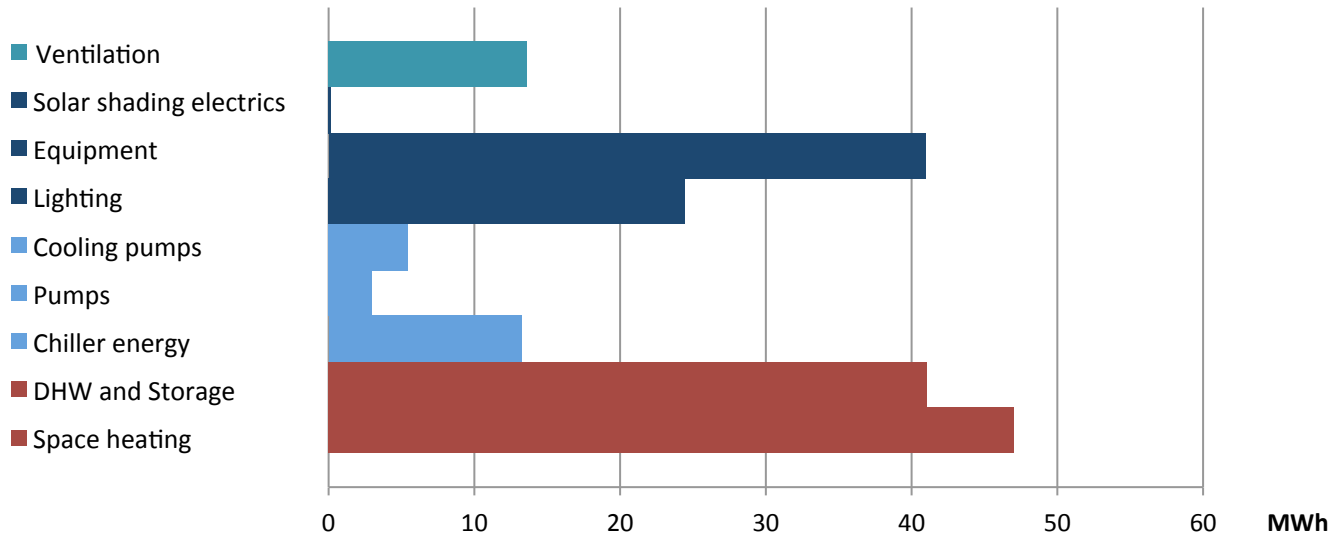
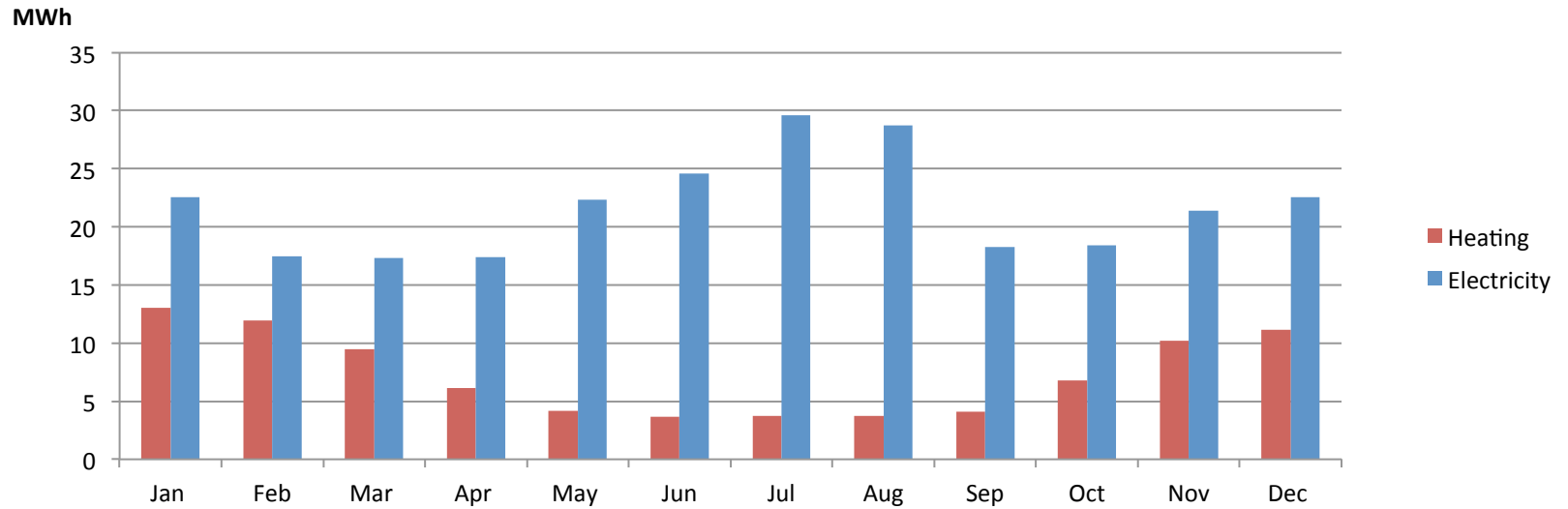


ENERGY CONSUMPTION

MWh

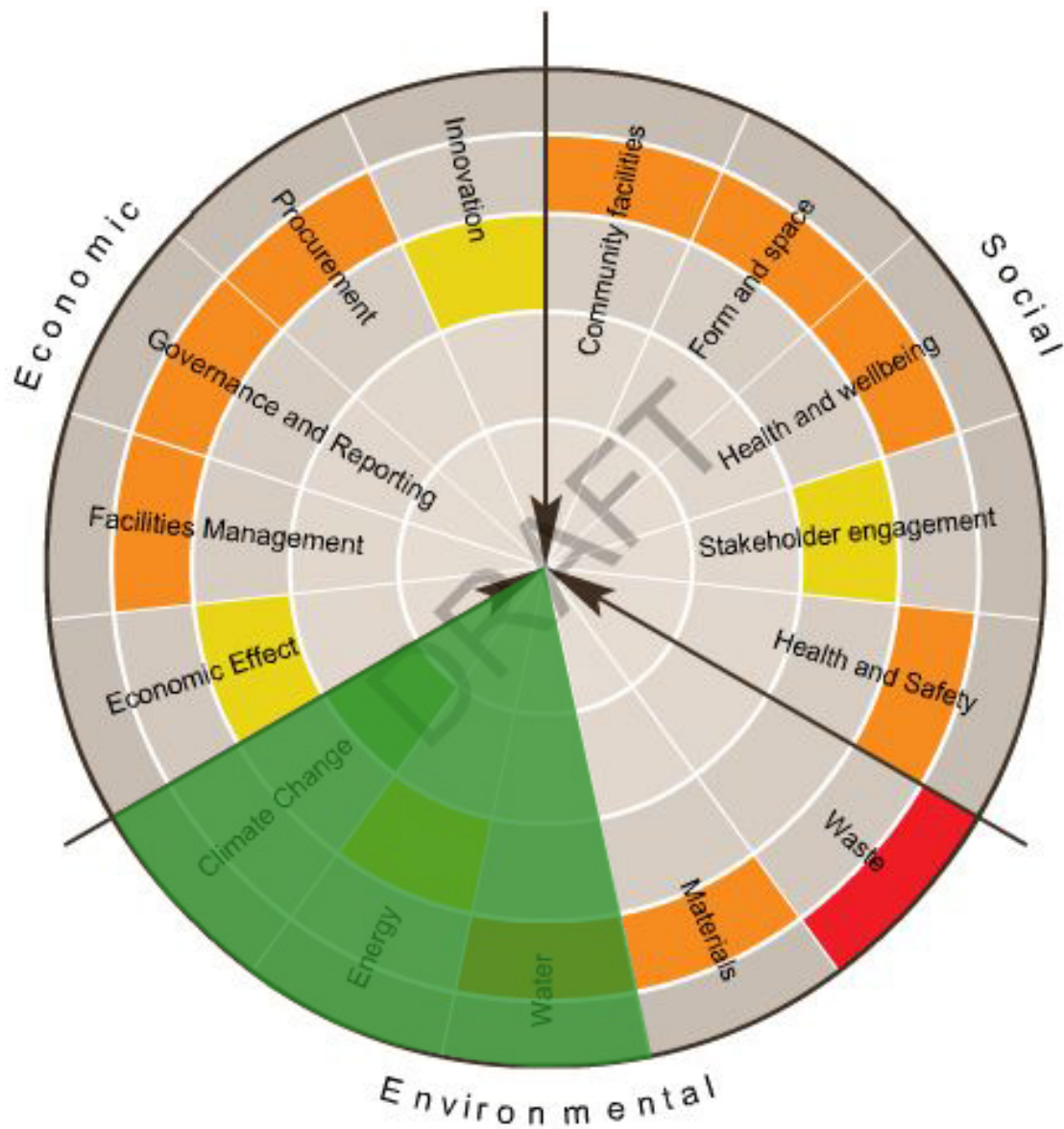


PERSONALIZED VENTILATION

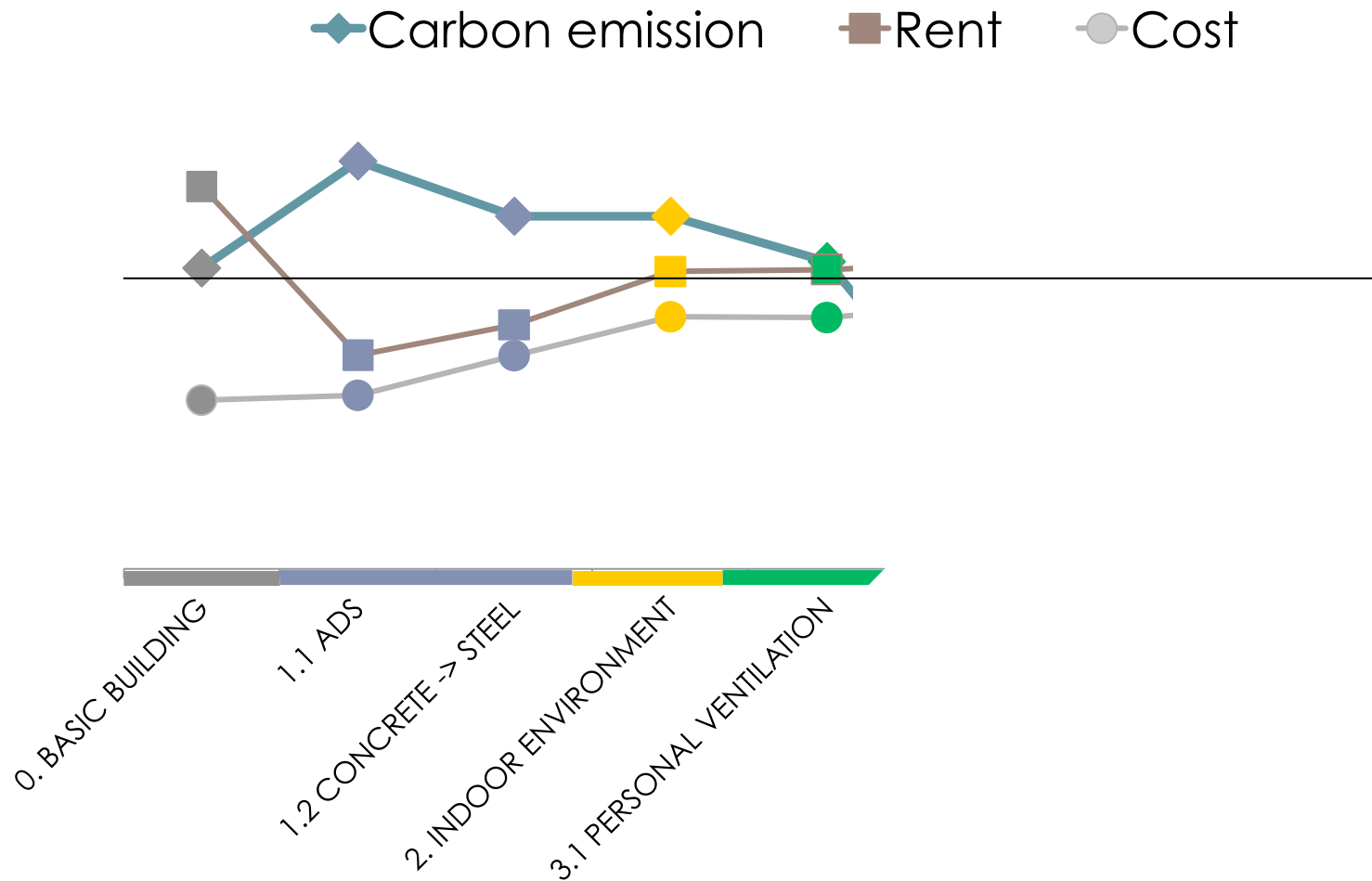


CO₂ penalty: 4.600 USD

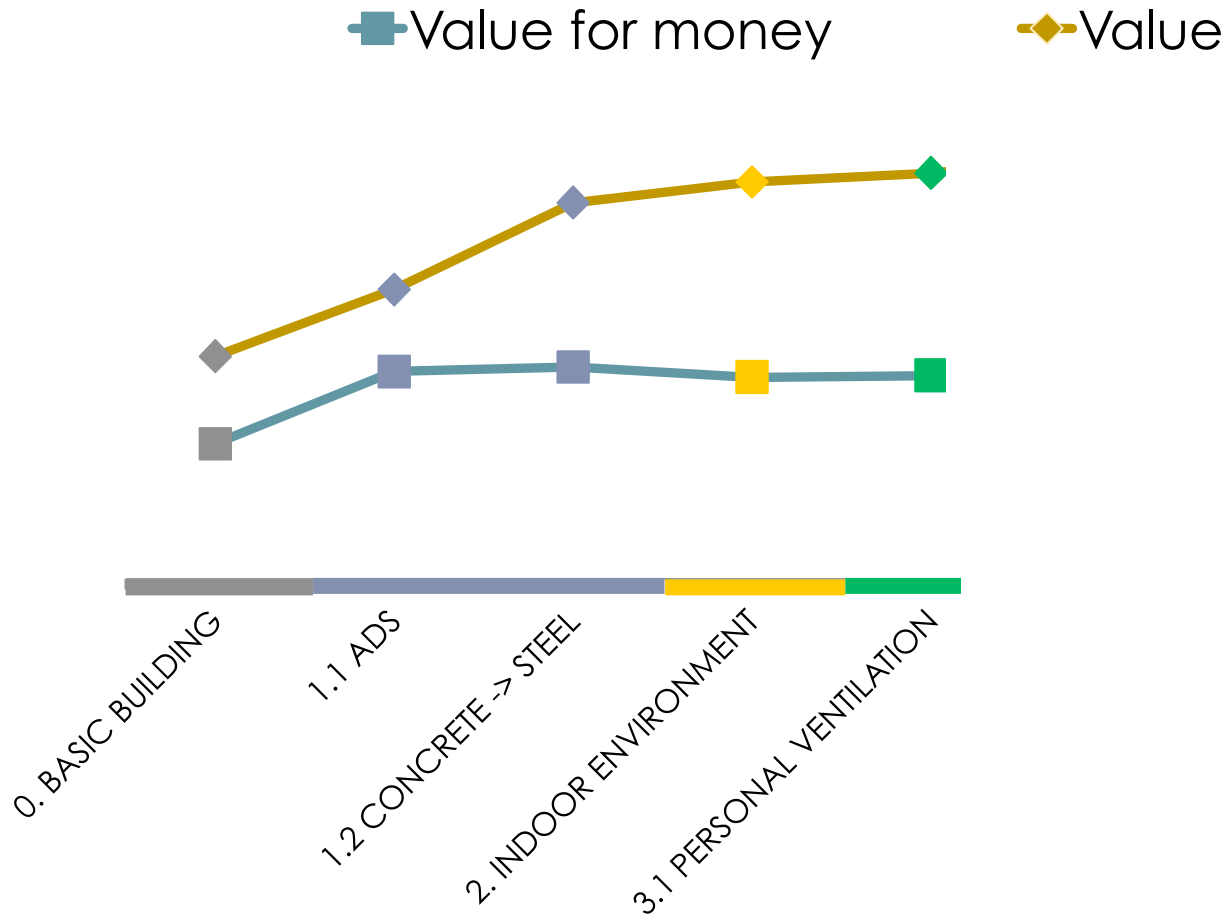
3. ENERGY and WATER



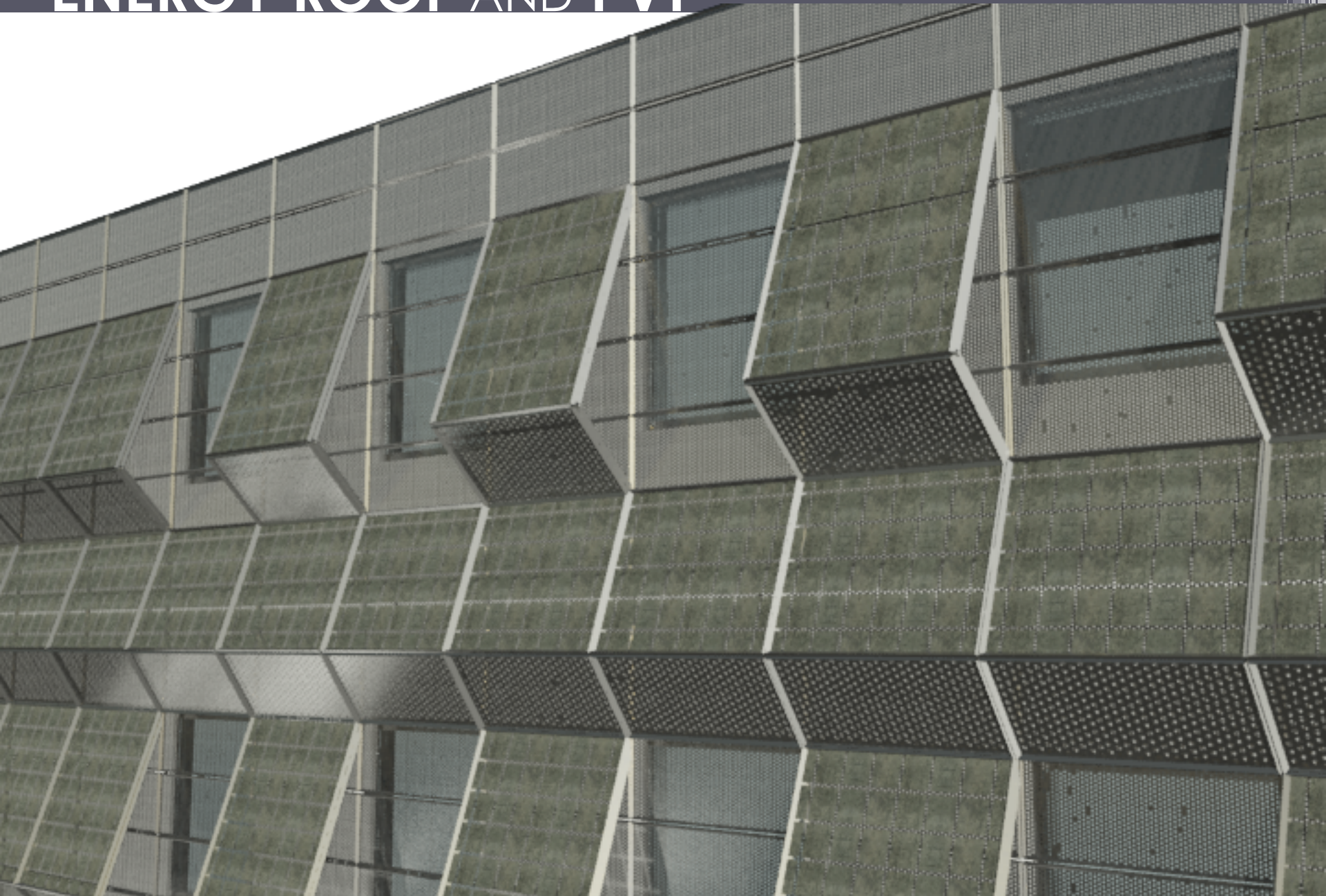
3.1 PERSONALIZED ventilation



3.1 PERSONALIZED ventilation



ENERGY ROOF AND PVT



A

MEP

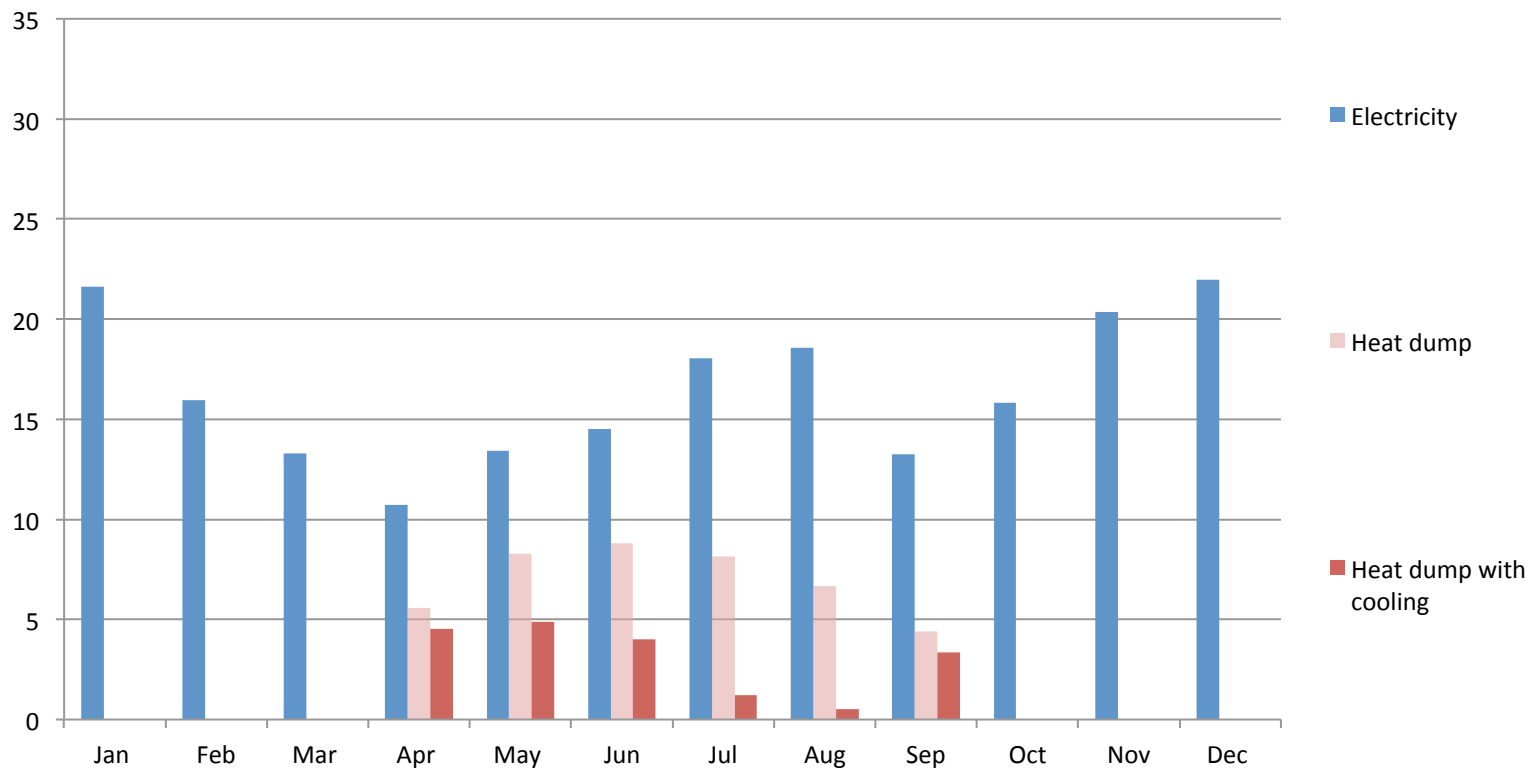
SE

CM

LCFM

ENERGY ROOF AND PVT

MWh



CO₂ sale: 21.900 USD

A

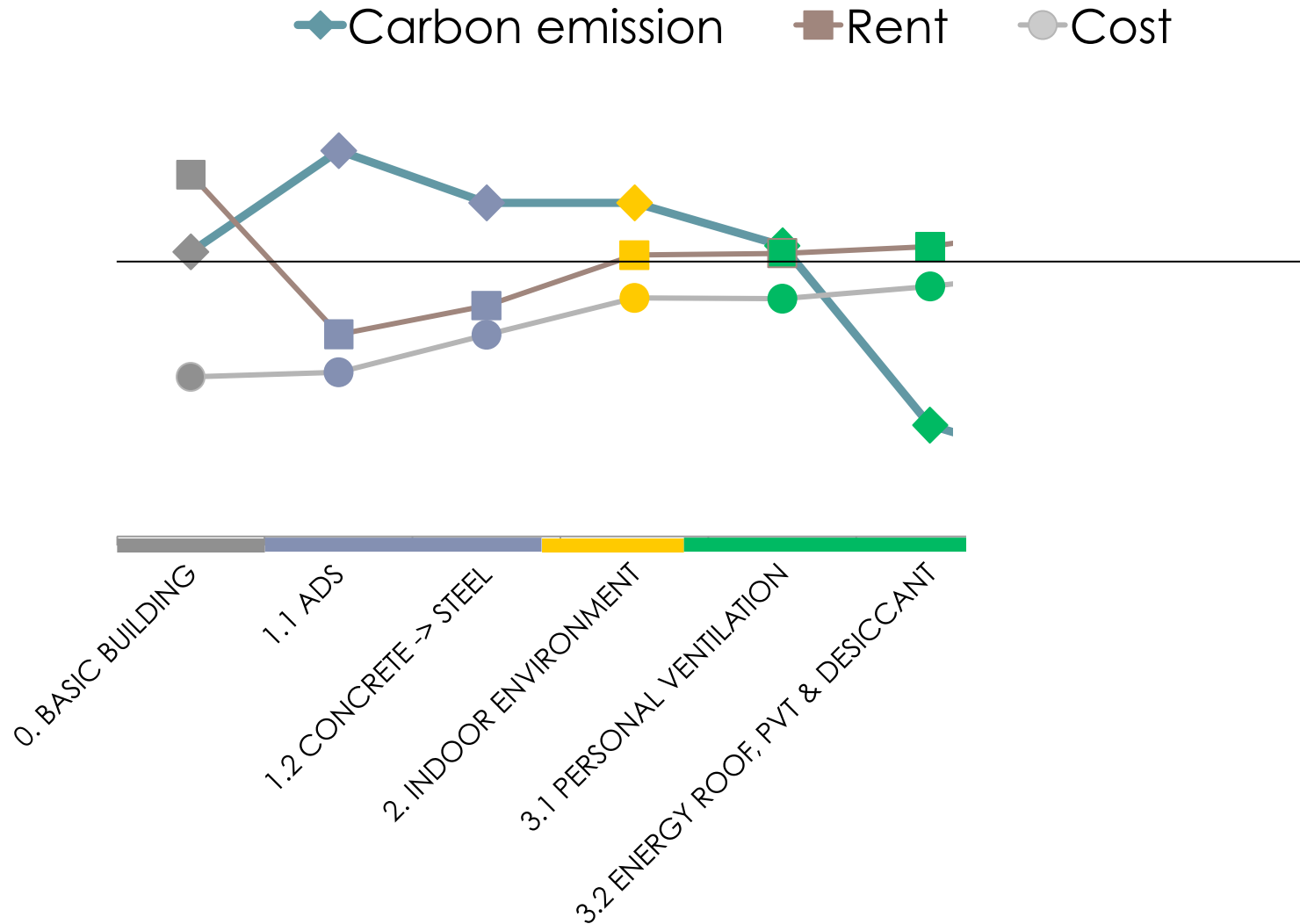
MEP

SE

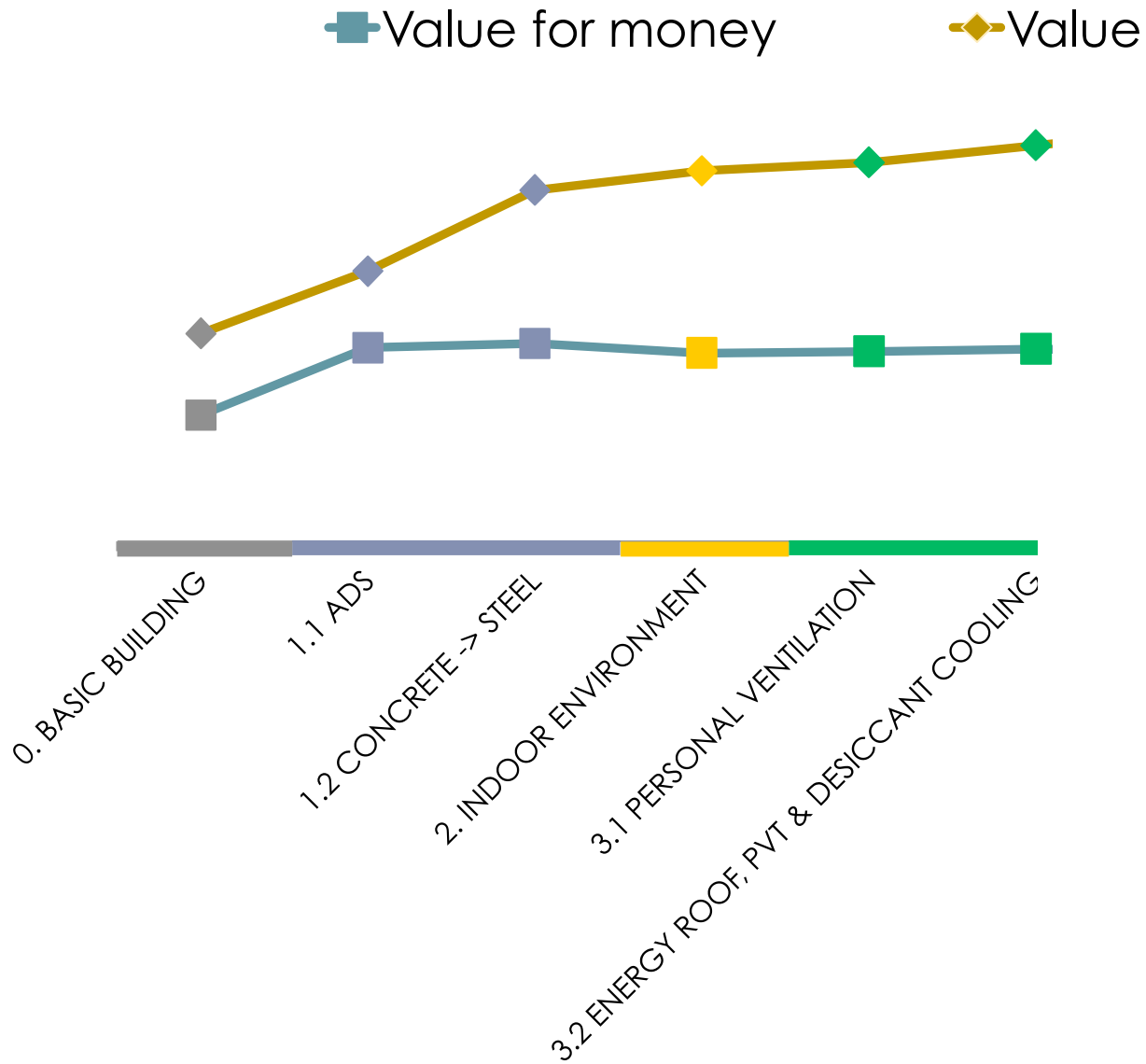
CM

LCFM

3.2 ENERGY ROOF, PVT & COOLING



3.2 ENERGY ROOF, PVT & COOLING



EXTRA PV AND WATER REUSE



A

MEP

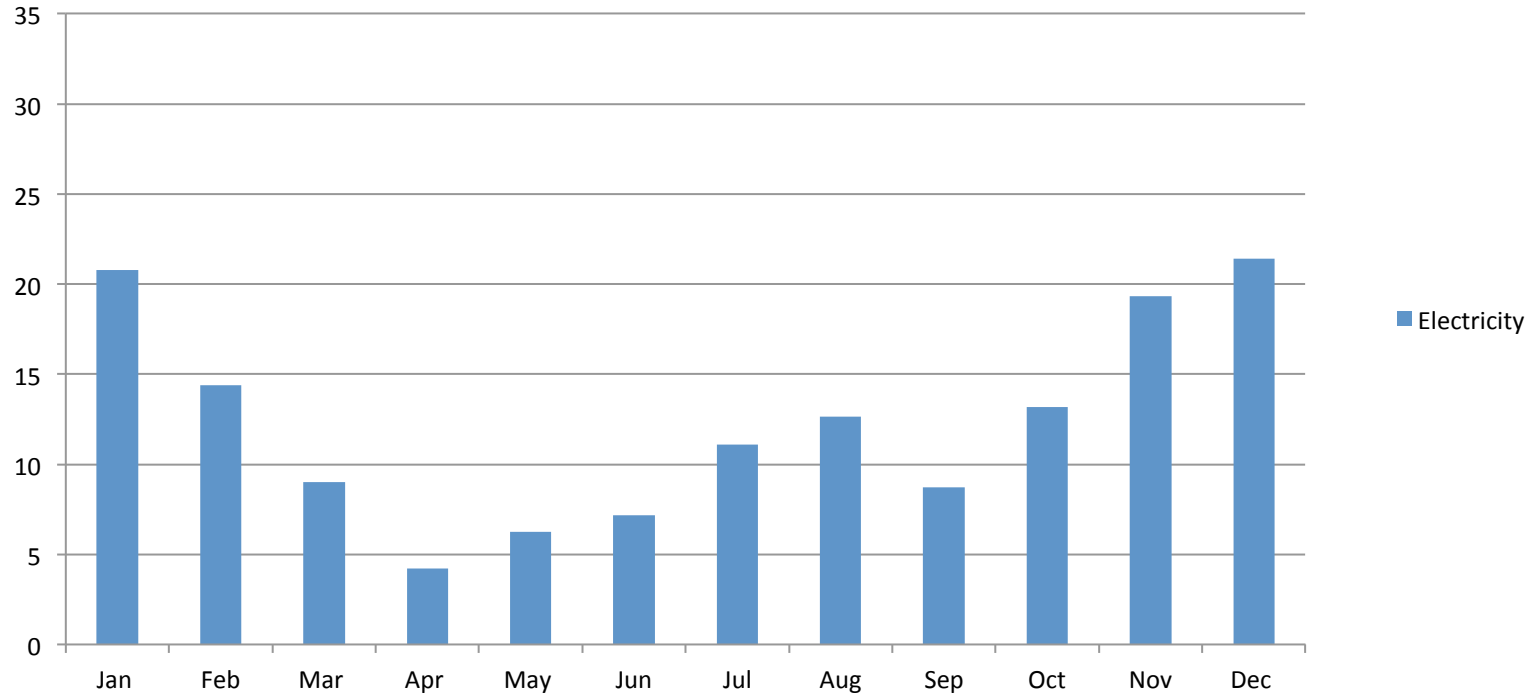
SE

CM

LCFM

EXTRA PV AND WATER REUSE

MWh



CO₂ sale: 50.900 USD

Primary energy consumption
= 61.8 kWh/m² per year

A

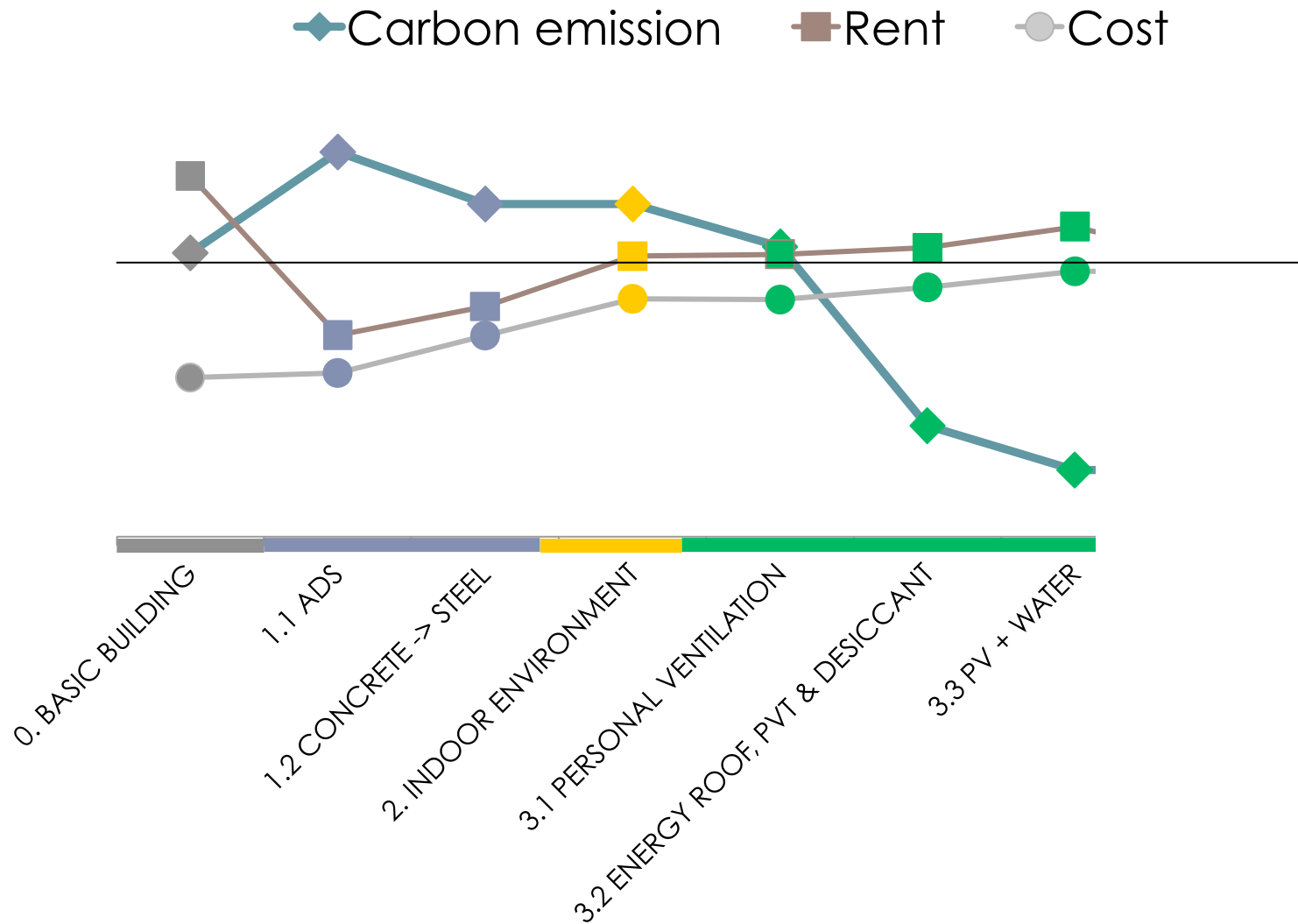
MEP

SE

CM

LCFM

EXTRA PV and WATER REUSE



A

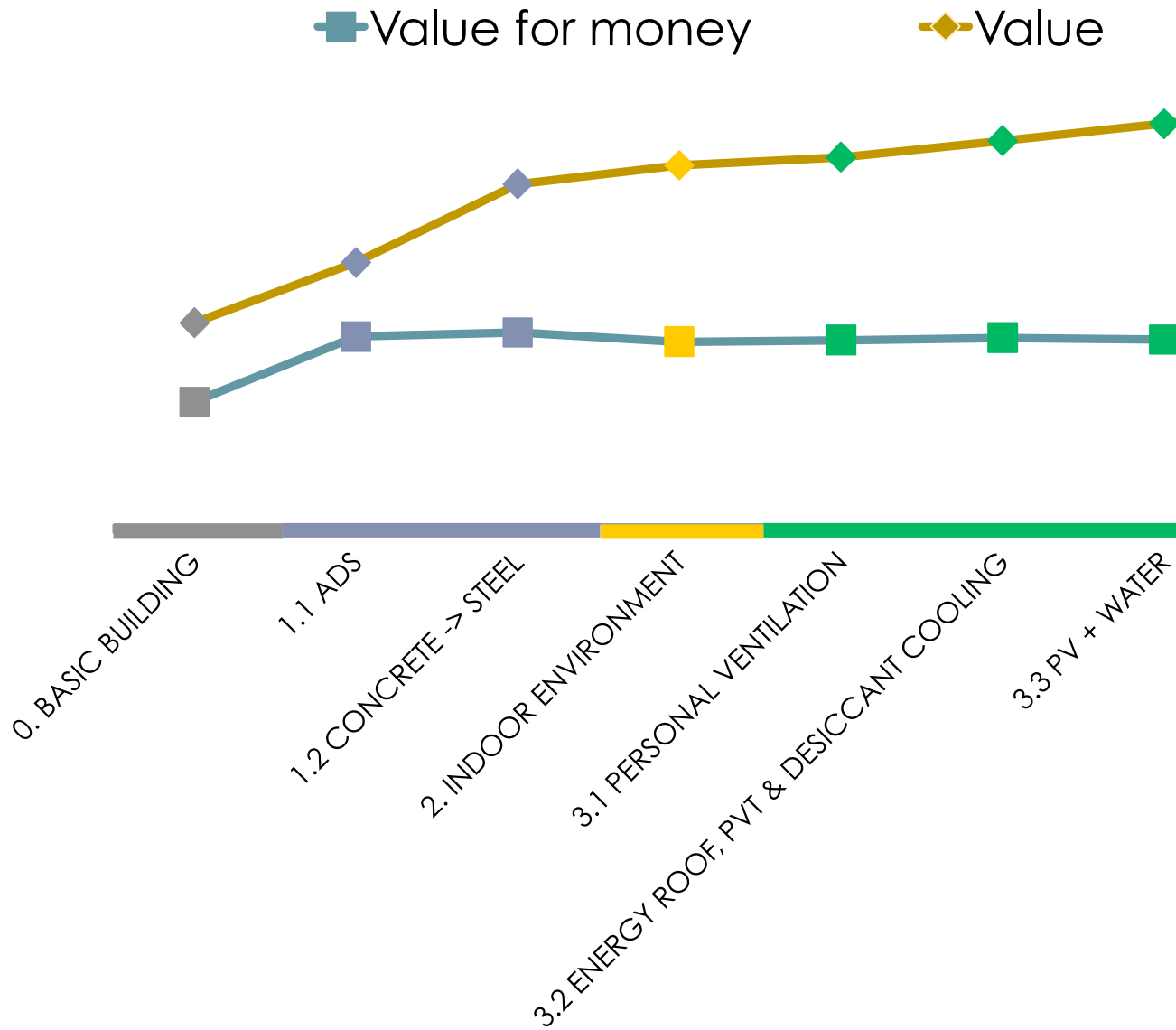
MEP

SE

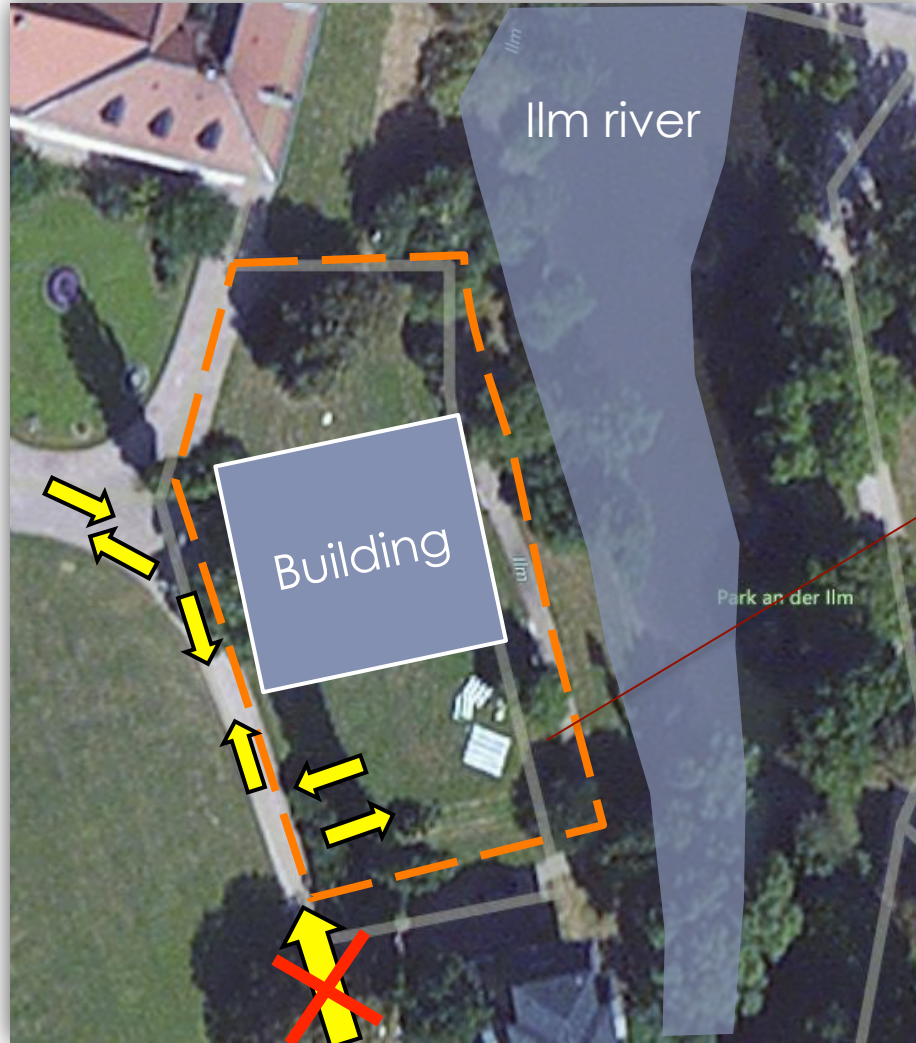
CM

LCFM

3.3 EXTRA PV and WATER REUSE



SITE ACCESS

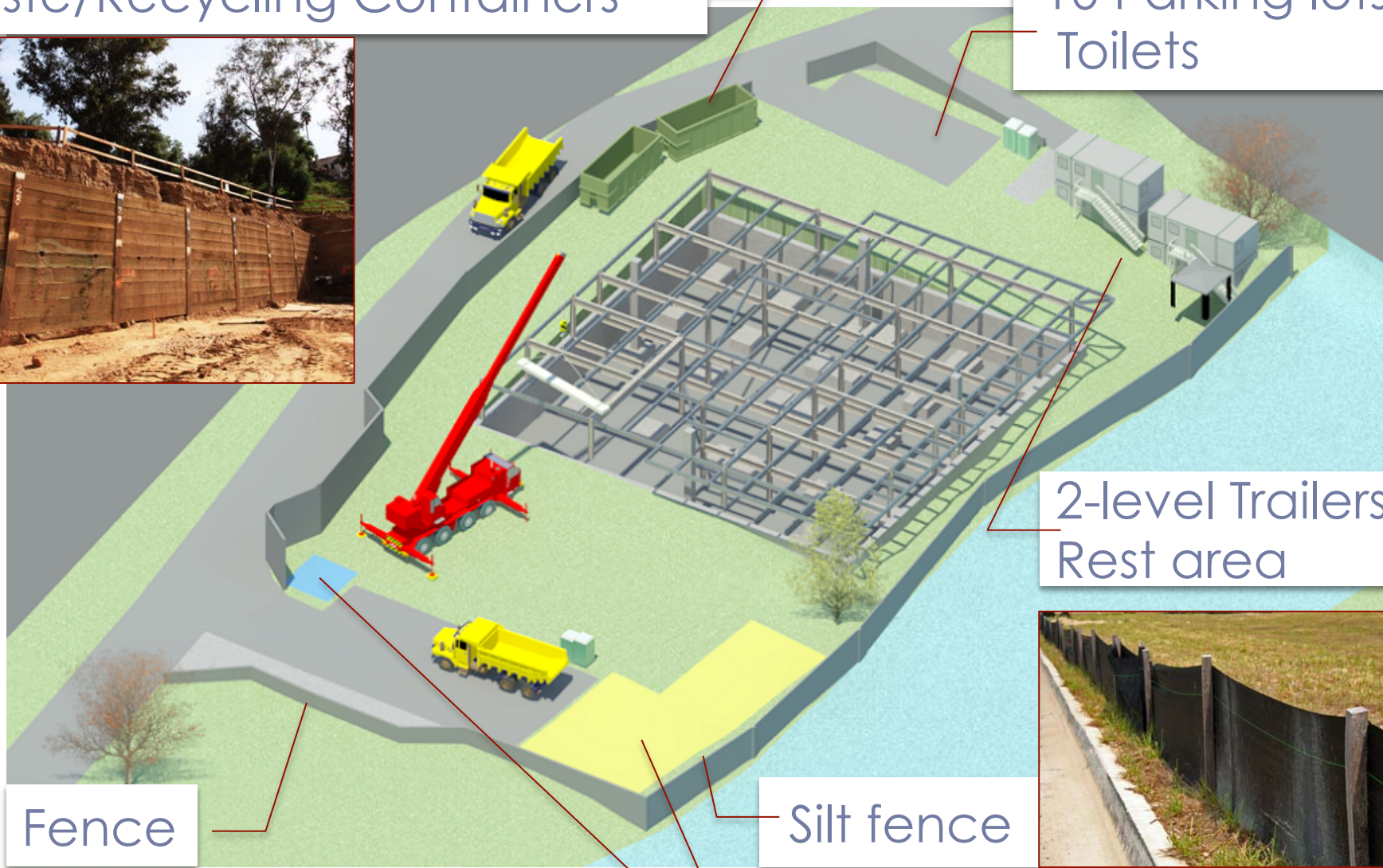


Construction Site

SITE LAYOUT – WITHOUT FLOOD

Waste/Recycling Containers

10 Parking lots
Toilets



2-level Trailers
Rest area



Fence

Silt fence

Wheel & Concrete washout

Material Laydown

A

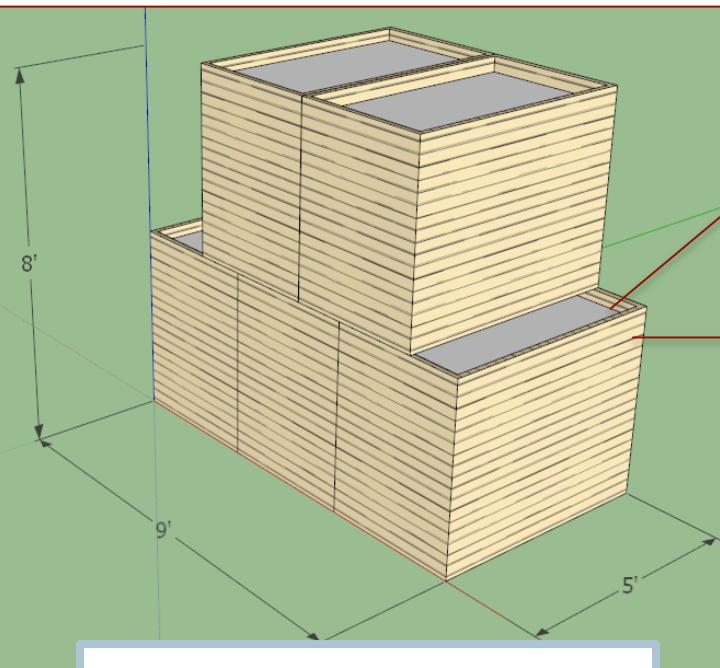
MEP

SE

CM

LCFM

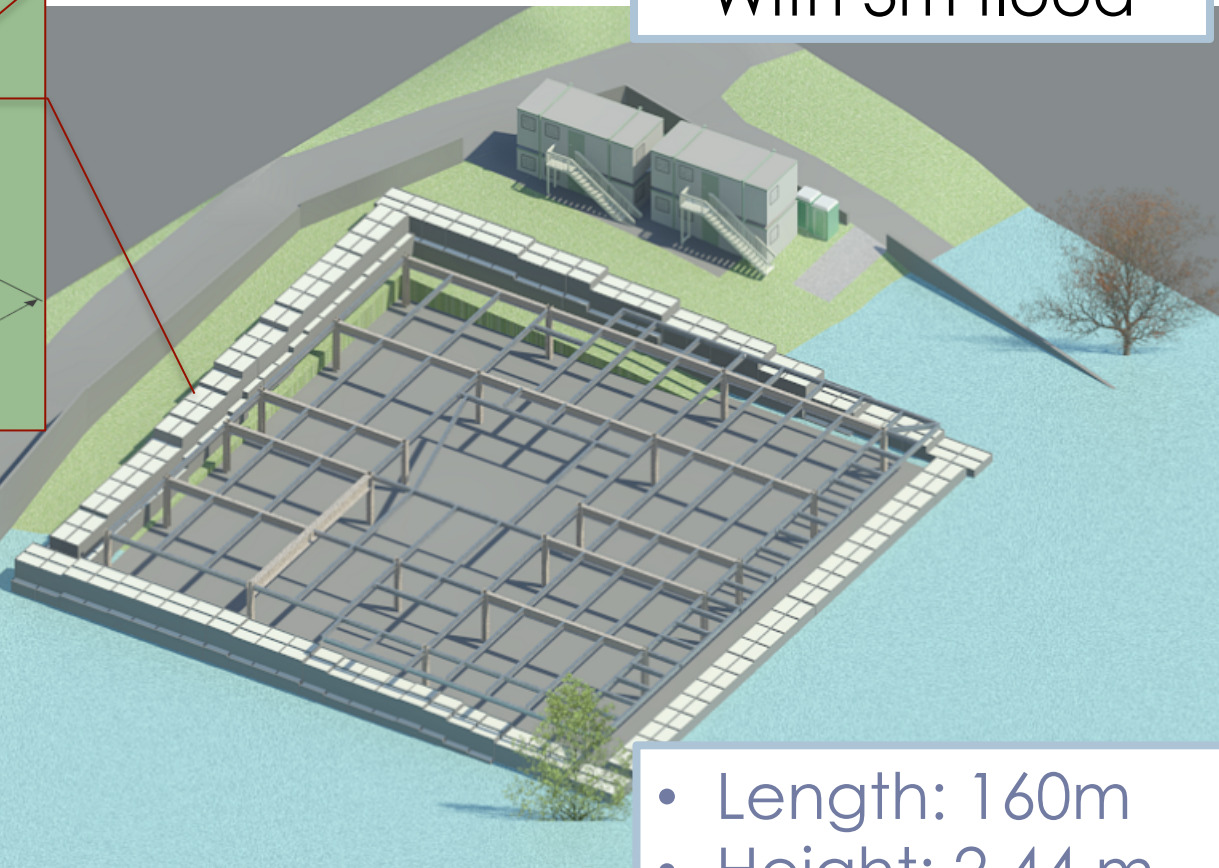
SITE LAYOUT – WITH FLOOD



Sand fill

With 3m flood

HESCO Unit



- Length: 160m
- Height: 2.44 m
- 5 hour to install



Terrain data - Courtesy of River 2010

A

MEP

SE

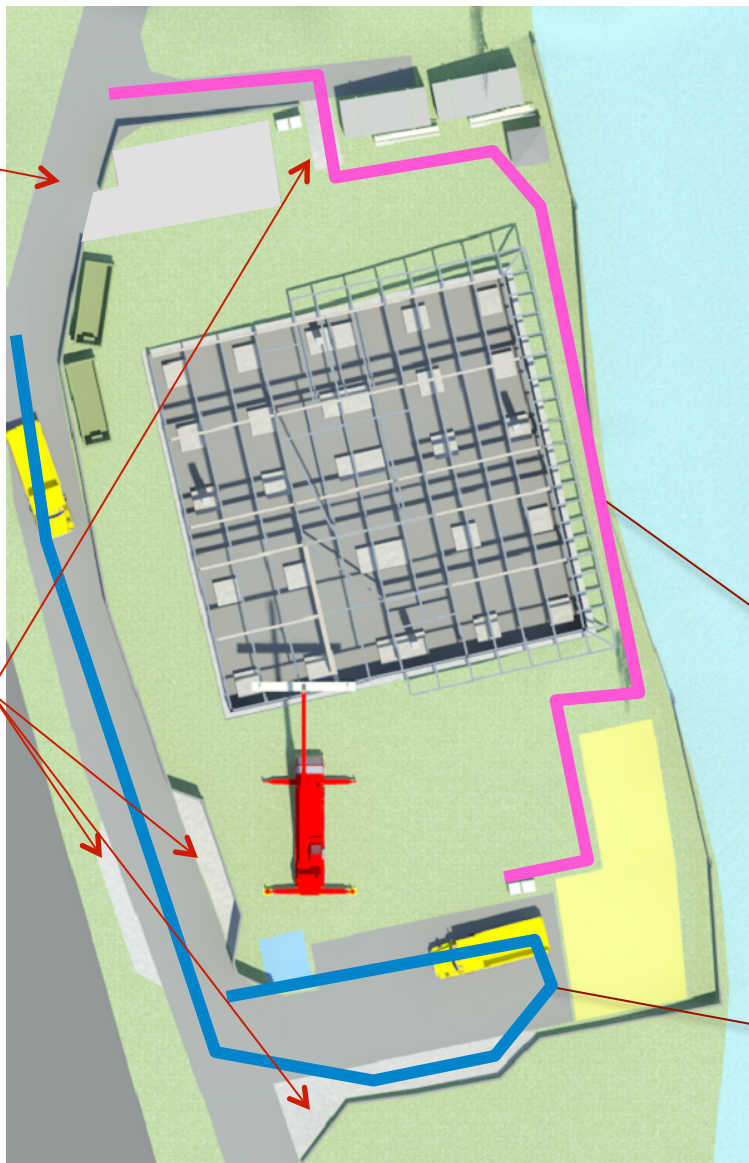
CM

LCFM

SITE TOP VIEW & LOGISTICS

Existing road

Temporary road

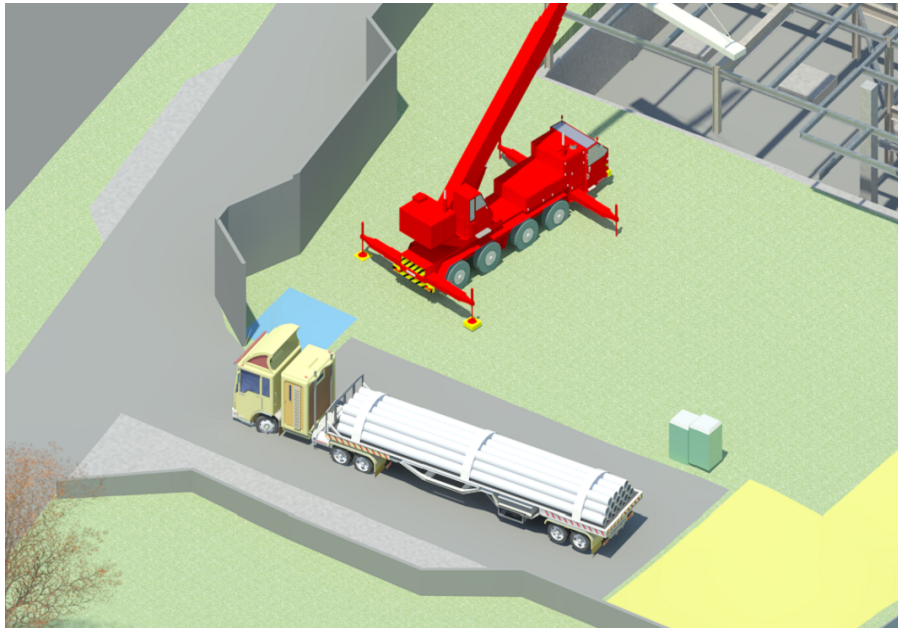


Worker path

Truck path

EXTREME CONDITION CONSIDERATION

LIEBHERR LTM 1095-5.1



Longest beam: 12m

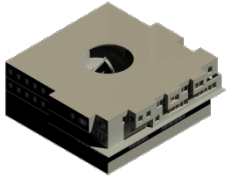


Heaviest lift: 3.28t

Boom: 58m

Crane capacity: 4.4 t @ 35m

SITE VISUALIZATION & SAFETY TRAINING



BIM & Site Layout + Equipment Operation



Site Layout Validation + Worker Safety Training

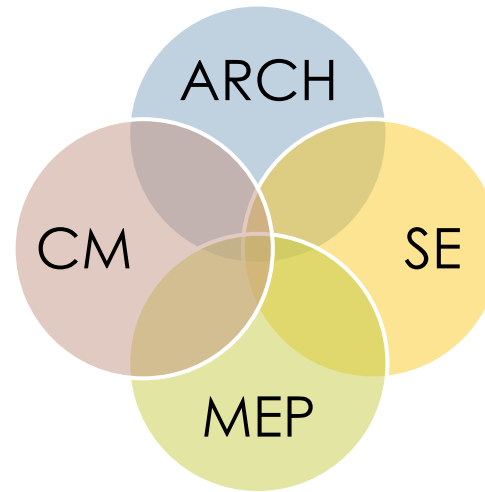




DESIGN-FOR-SAFETY CHECKLISTS



Design for Construction Safety Toolbox
Version 2.0



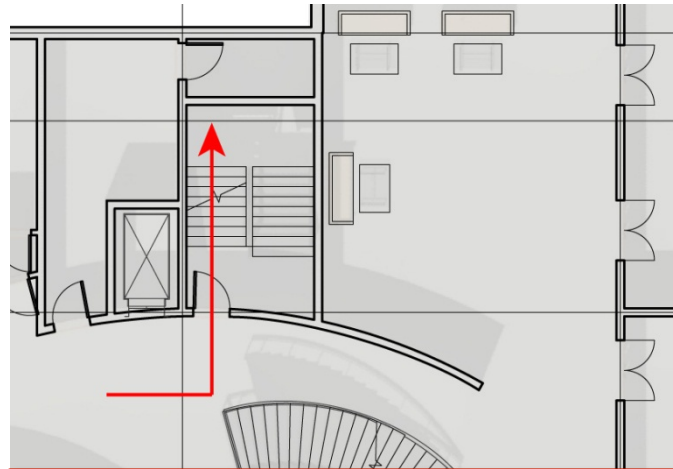
Apply?

Yes

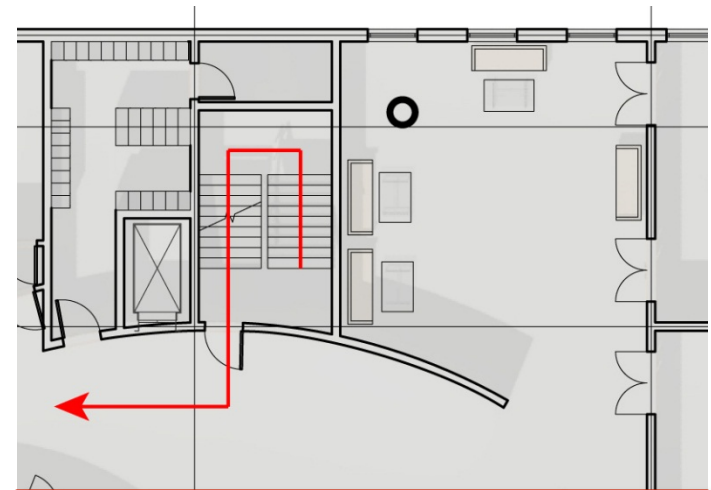
Design change!

DESIGN-FOR-SAFETY CHECKLISTS EXAMPLES 1

A



Swing away - passageway



Swing open - exit travel

SE



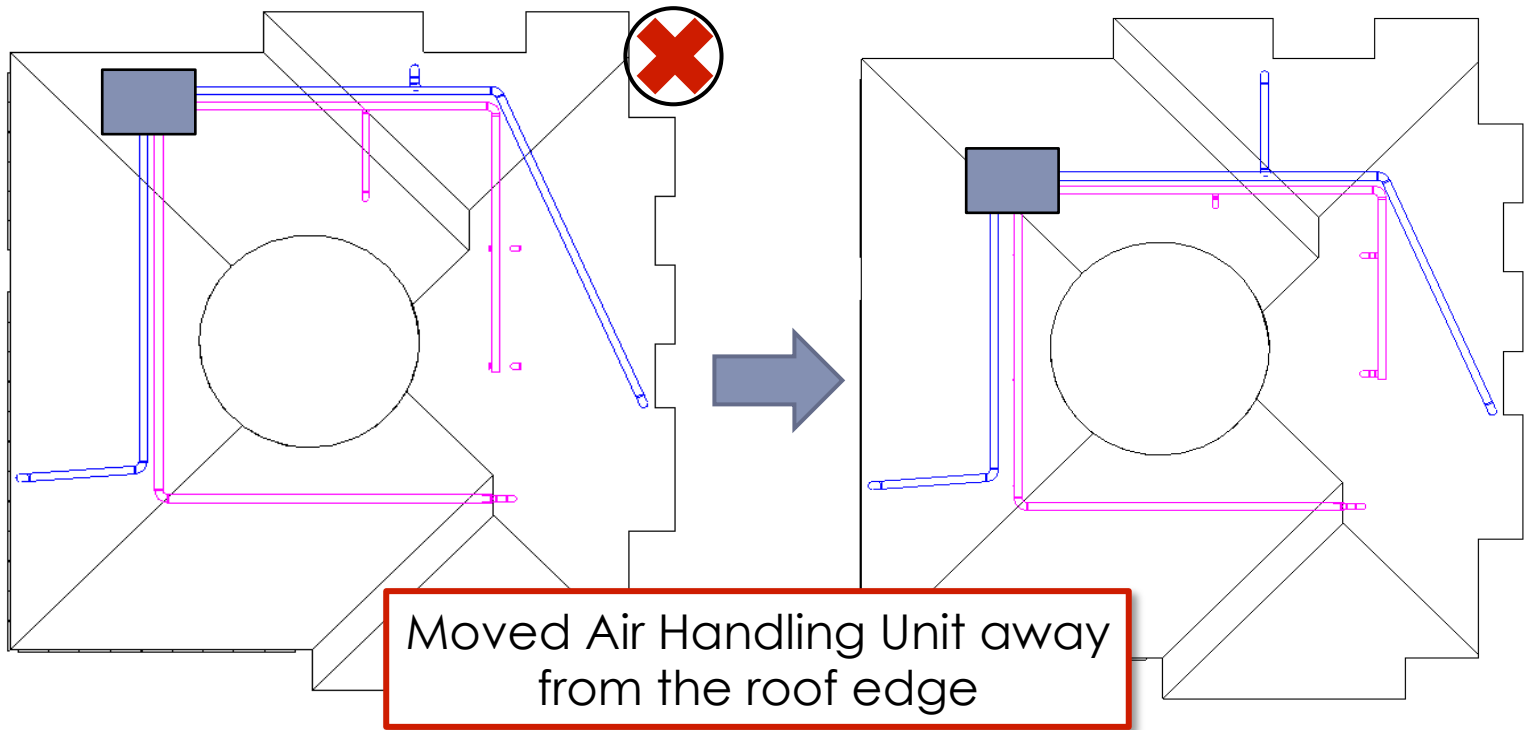
High potential fall hazard



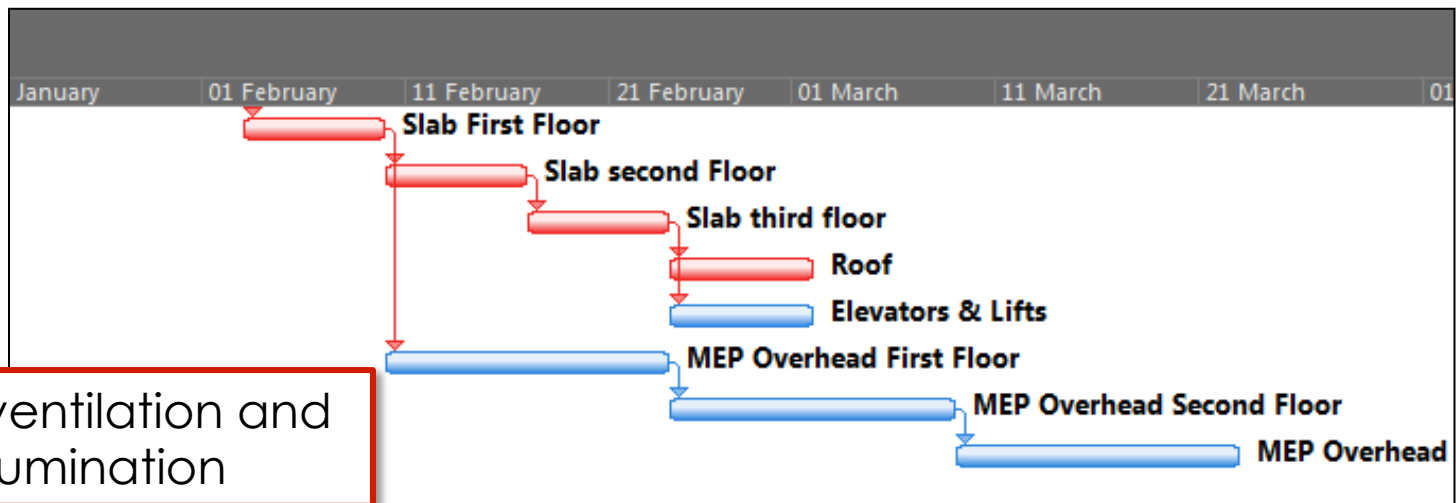
ConXtech welded in the shop

DESIGN-FOR-SAFETY CHECKLISTS EXAMPLES 2

MEP



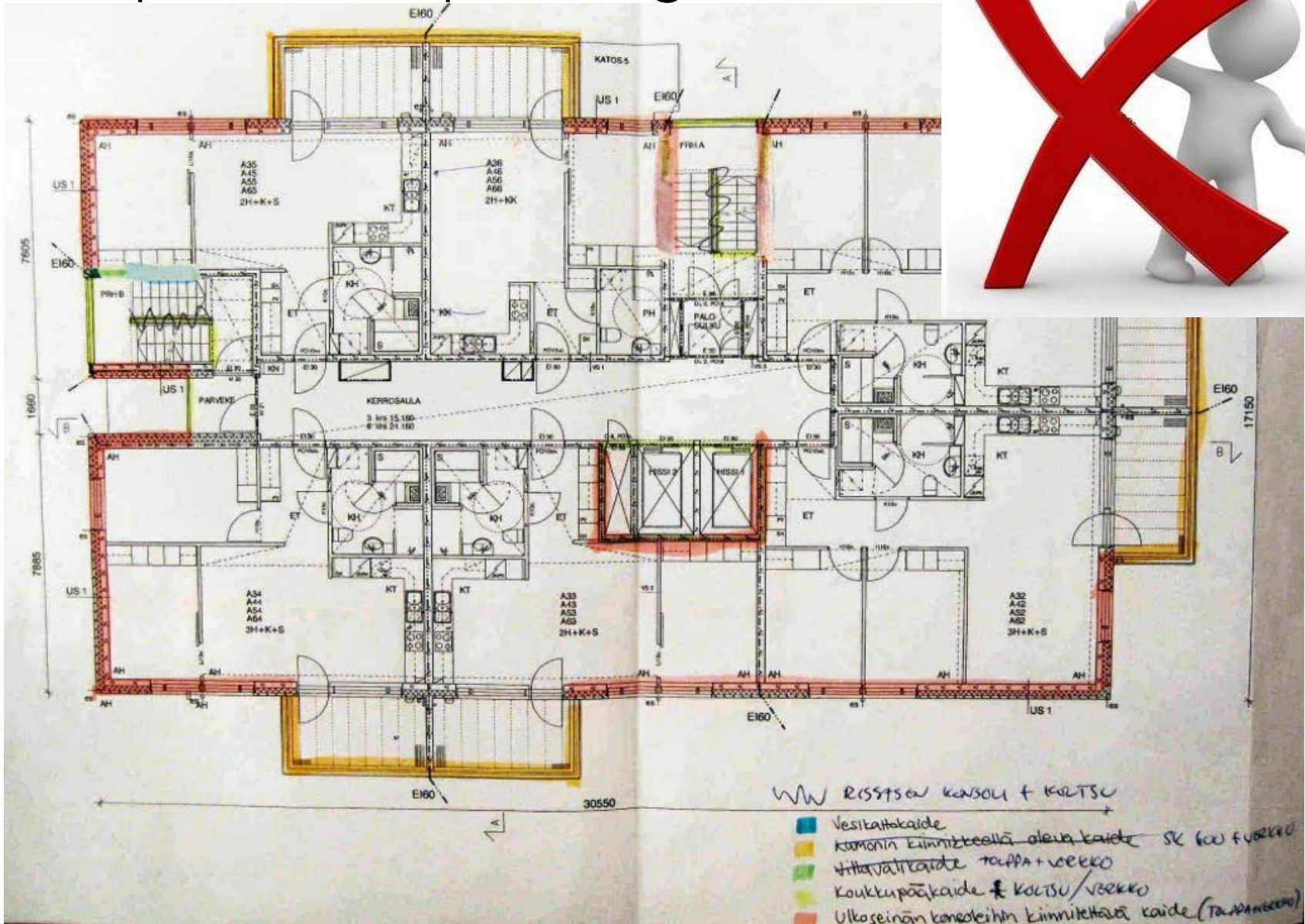
CM



Early ventilation and illumination

SAFETY PLANNING – TRADITIONAL

- Fall protection planning



A

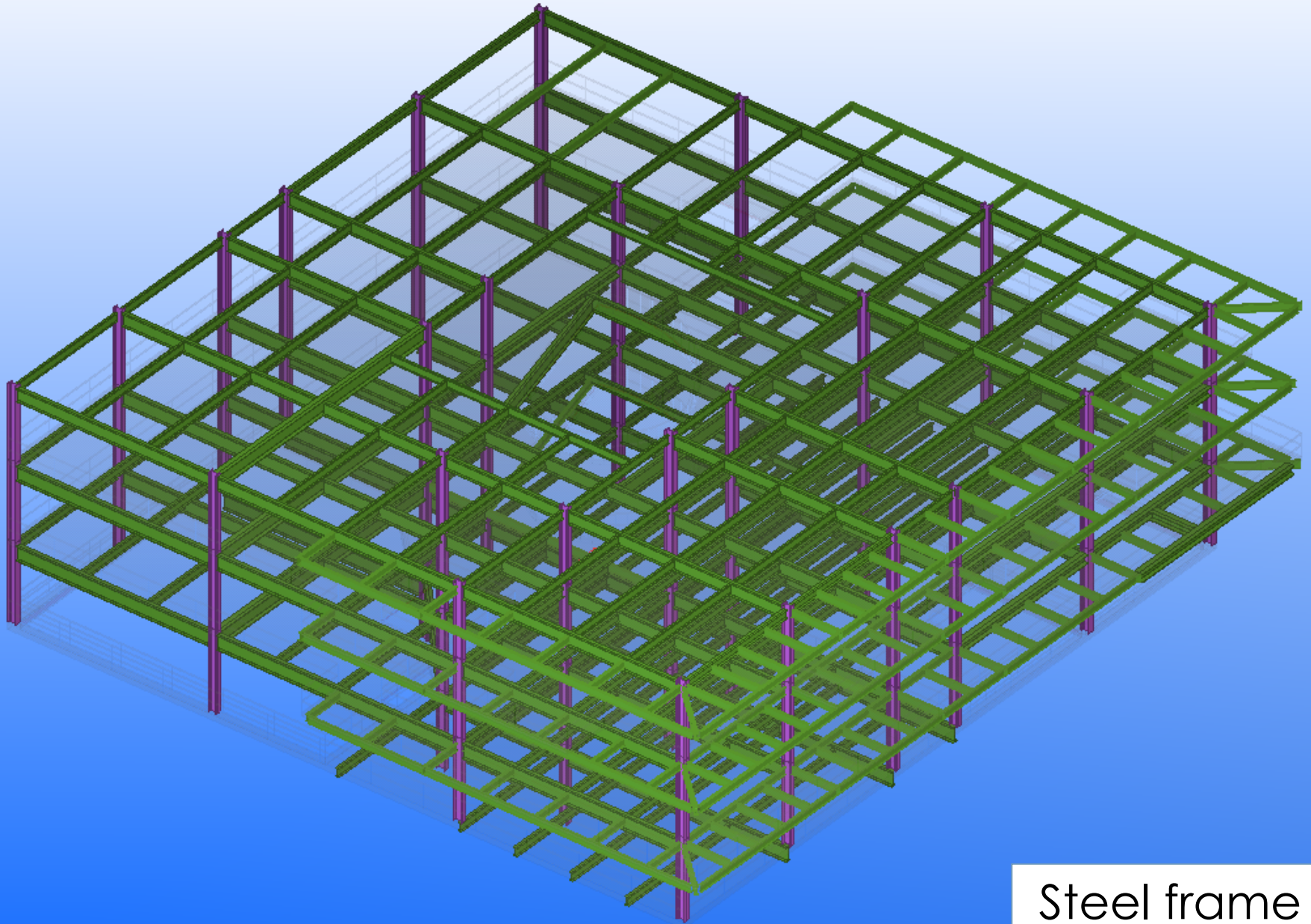
MEP

SE

CM

LCFM

AUTOMATED FALL HAZARD DETECTION



Steel frame

A

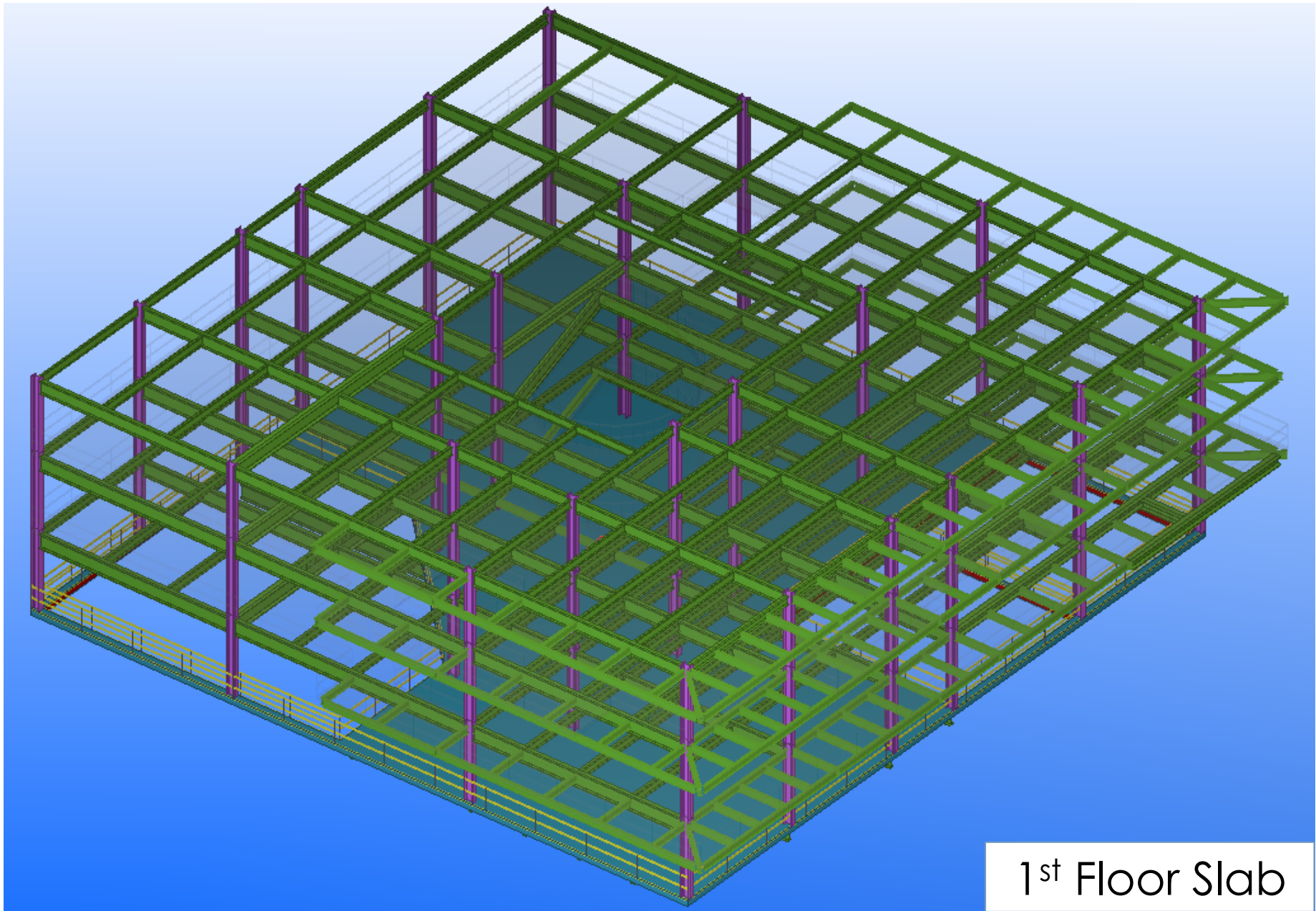
MEP

SE

CM

LCFM

AUTOMATED FALL HAZARD DETECTION



1st Floor Slab

A

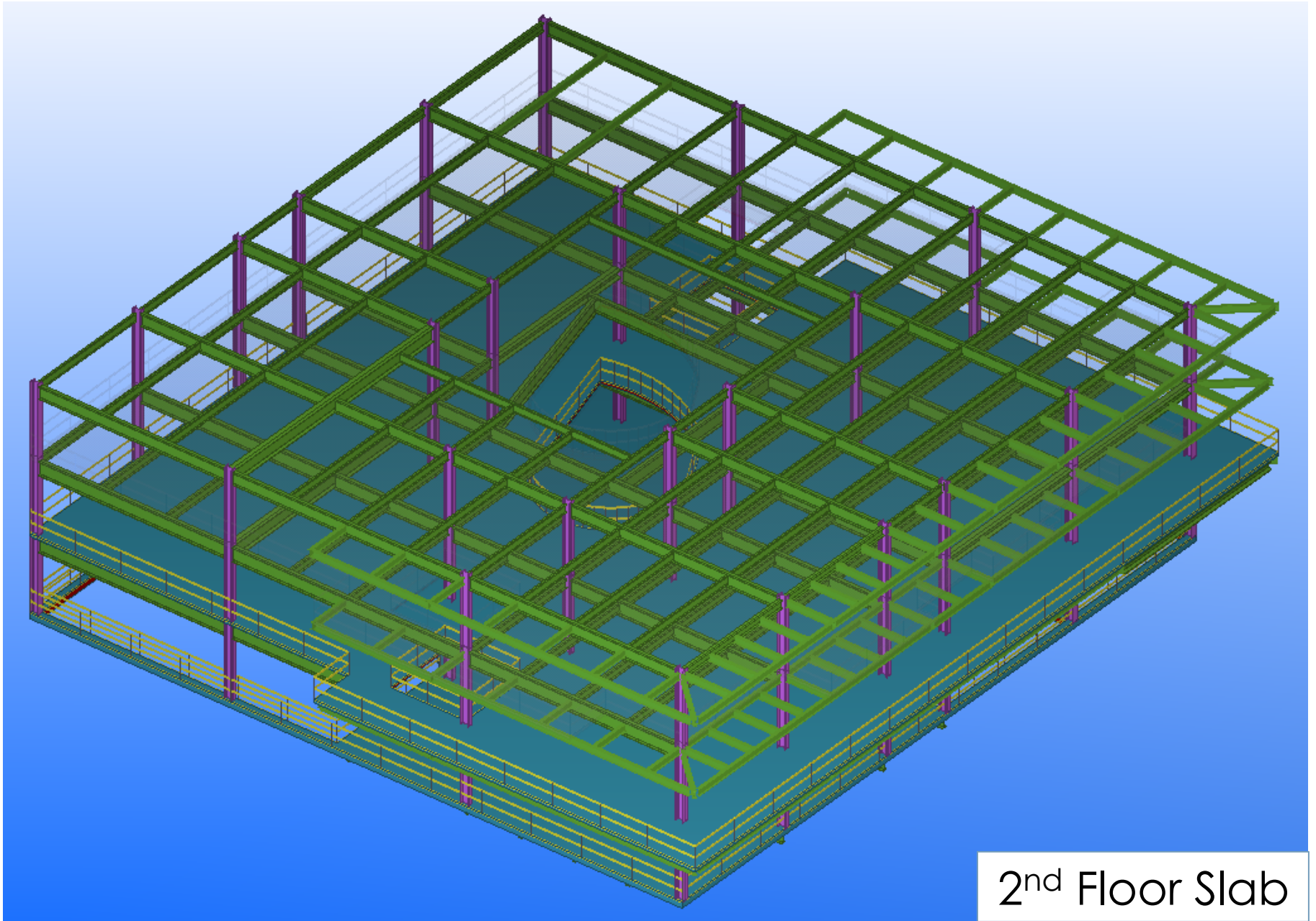
MEP

SE

CM

LCFM

AUTOMATED FALL HAZARD DETECTION



2nd Floor Slab

A

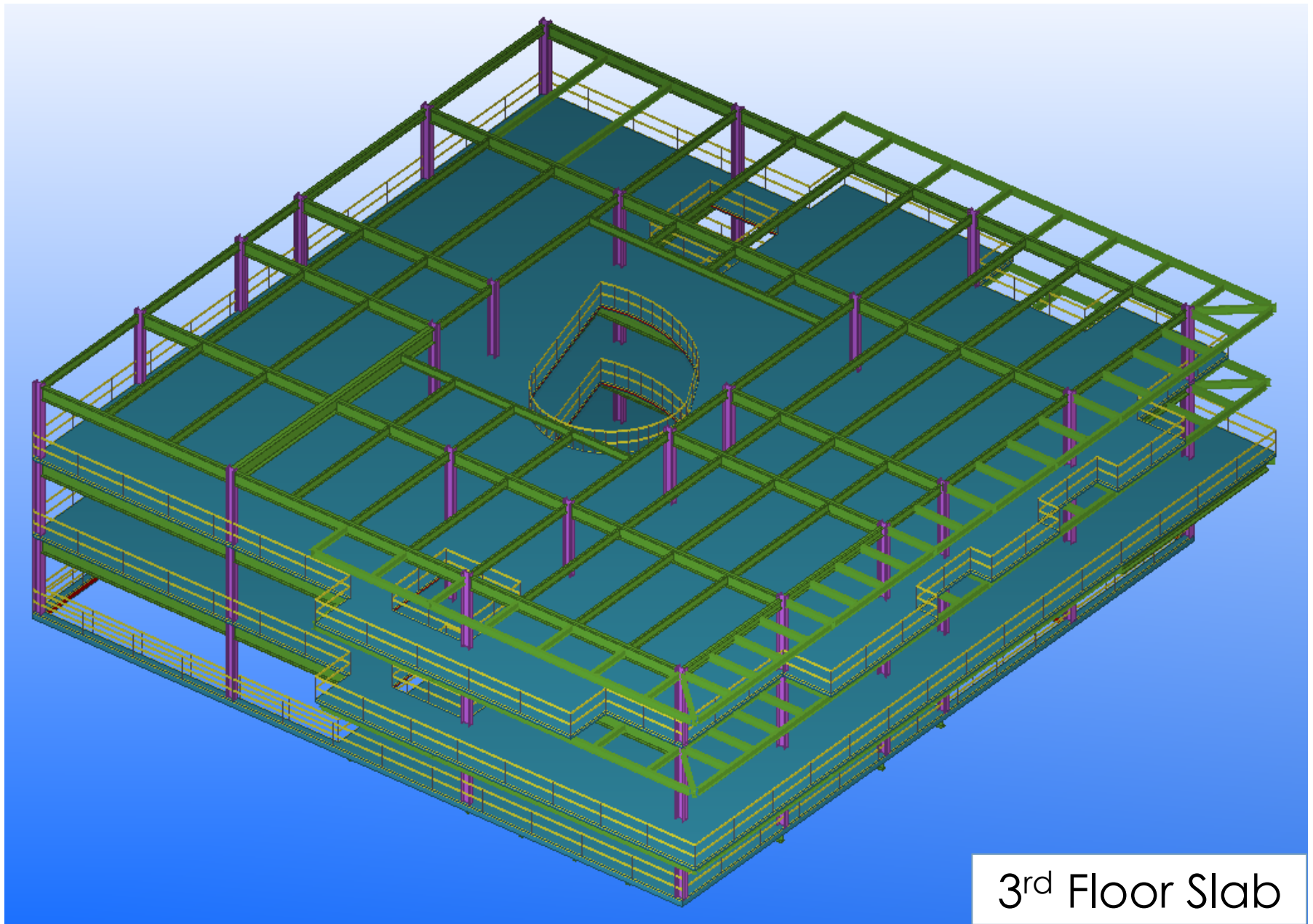
MEP

SE

CM

LCFM

AUTOMATED FALL HAZARD DETECTION



3rd Floor Slab

A

MEP

SE

CM

LCFM

SLAB HOLE DETECTION & CHECKING RESULTS

Checking results + Quantity-take-off of safety protective equipment

GUID	Level	DisToLowerLevel (mm)	Length(mm)	Width(mm)	Area(m2)	Prevention Method	Check
11112	1	0	13725.81	13725.81	4.12	Guardrail System	<input type="checkbox"/>
93616	1	0	600	600	0.17	Cover	<input type="checkbox"/>
93568	1	0	600	600	0.17	Cover	<input type="checkbox"/>
93603	1	0	602.62	600	0.17	Cover	<input type="checkbox"/>
11133	1	0	8250	6750	2.48	Guardrail System	<input type="checkbox"/>
11151	1	0	8250	7300	2.19	Guardrail System	<input type="checkbox"/>
94803	2	3500	600	600	0.17	Cover	<input type="checkbox"/>
94848	2	3500	600	600	0.17	Cover	<input type="checkbox"/>

Print to Excel Cancel



Slab Hole Checking Results									
Project Name: River_Waterlily				Analyst: Sijie Zhang			Date: 5/9/2013 9:58:09 AM		
No.	GUID	Level	Distance to L	Length (mm)	Width (mm)	Area(m2)	Prevention Method	Check	
1	93568	1	0	600	600	0.17	Cover	FALSE	
2	11112	1	0	13725.81	13725.81	4.12	Guardrail System	FALSE	
3	11133	1	0	8250	6750	2.48	Guardrail System	FALSE	
4	11151	1	0	8250	7300	2.19	Guardrail System	FALSE	
5	93616	1	0	600	600	0.17	Cover	FALSE	
6	93603	1	0	602.62	600	0.17	Cover	FALSE	
7	11197	2	3500	3209.5	3546.64	0.96	Guardrail System	FALSE	
8	11181	2	3500	3496.64	3209.5	0.96	Guardrail System	FALSE	



JOB HAZARD ANALYSIS – TRADITIONAL

JOB HAZARD ANALYSIS

Form No. RMS-003

Rev. No.: N.A.

Issued:05-10-10

Location/System:	Date:	JHA TEAM:	
Task Description			
	TEAM LEADER:		
REQUIRED PPE:	REQUIRED PERMITS:	APPROVED BY:	
SEQUENCE OF BASIC JOB STEPS	POTENTIAL HAZARDS	RECOMMENDED ACTION OR PROCEDURE	



JOB HAZARD ANALYSIS

BIM + Safety Database = Automated JHA + Estimated Workspace

Job Hazard Analysis

Project Name: River_WaterLily

Analyst: Sijie Zhang

Date: 5/8/2013 5:28:45 PM

Task Name: Guide Post

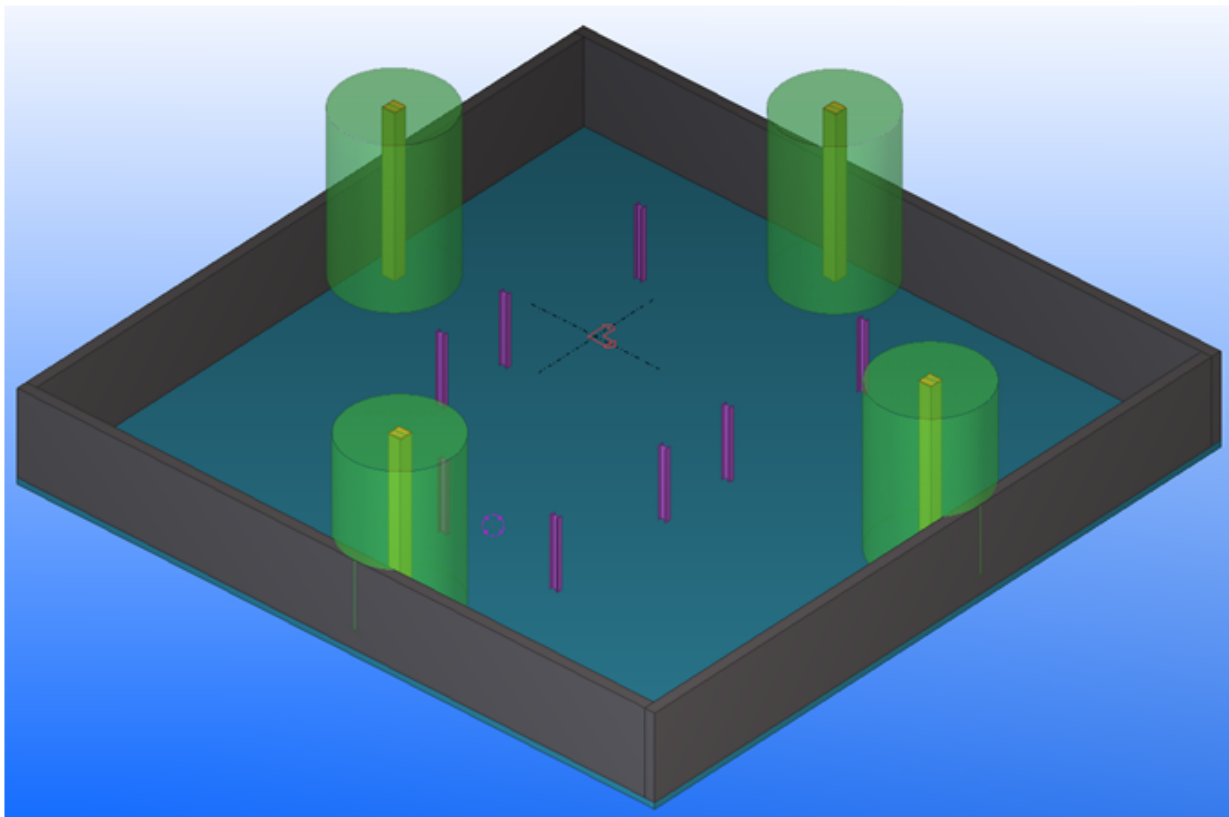
Activity: Frame_Guide_Post

Job Step: Stand_Forms_Into_Place

Potential Hazard: Fall

Recommended Procedures:

- (1) Use ladder or scaffold, do not use top 2 rungs of ladder
- (2) Ensure area around ladder/scaffold is clear of debris and flat



A

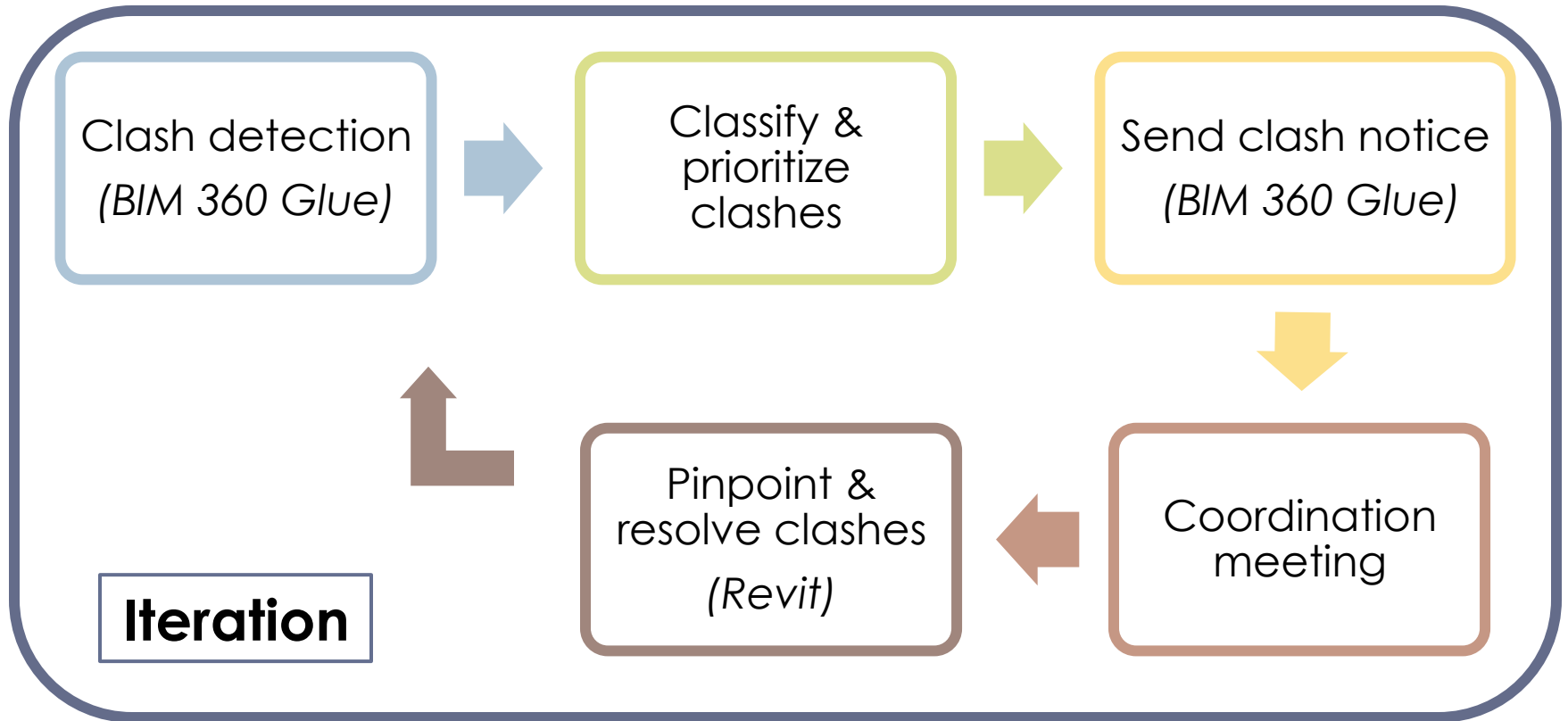
MEP

SE

CM

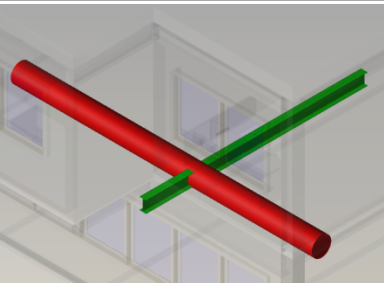
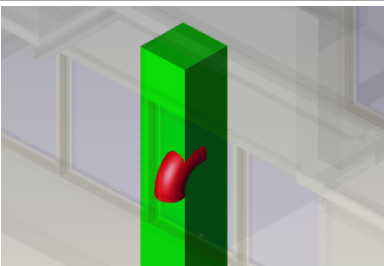
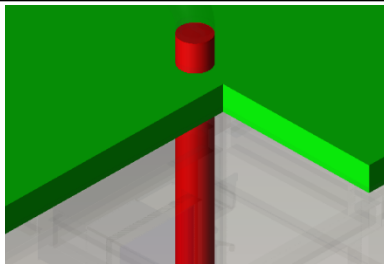
LCFM

CLASH DETECTION & COORDINATION



CLASH DETECTION & COORDINATION

Number of Clashes	Arch	SE - Super	MEP	SE - Base	SUM
Arch	-	1992	988	16	2996
SE - Super	-	-	3510	5	3515
MEP	-	-	-	5	5

<p>MEP vs. SE – Super</p> <p>★</p>	<p><i>Ducts vs. Steel beams</i></p> <p>- Coordination meeting (SE, MEP, CM)</p>	
<p>MEP vs. SE - Base</p> <p>★</p>	<p><i>Ducts vs. Foundation</i></p> <p>- Re-route the duct</p>	
<p>MEP vs. Arch</p> <p>★</p>	<p><i>Ducts vs. Furniture</i> <i>Ducts vs. Slabs</i></p> <p>- Can be handled on site</p>	

Clash Matrix

Before:

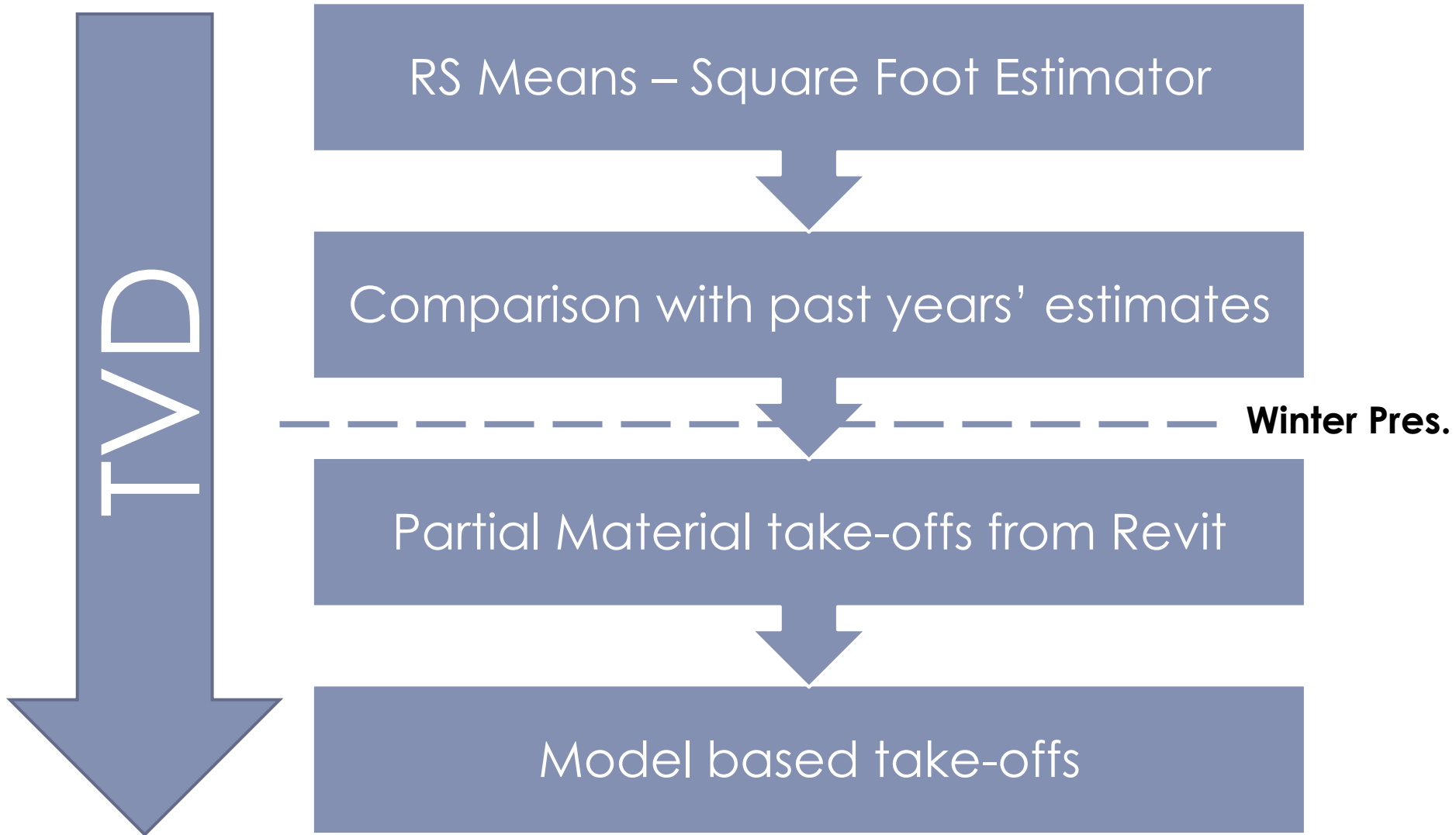
Number of Clashes	Arch	SE - Super	MEP	SE - Base	SUM
Arch	-	1992	988	16	2996
SE - Super	-	-	3510	5	3515
MEP	-	-	-	5	5



After:

Number of Clashes	Arch	SE - Super	MEP	SE - Base	SUM
Arch	-	1017	1236	0	2253
SE - Super	-	-	4	0	4
MEP	-	-	-	0	0

COST ESTIMATION APPROACH



A

MEP

SE

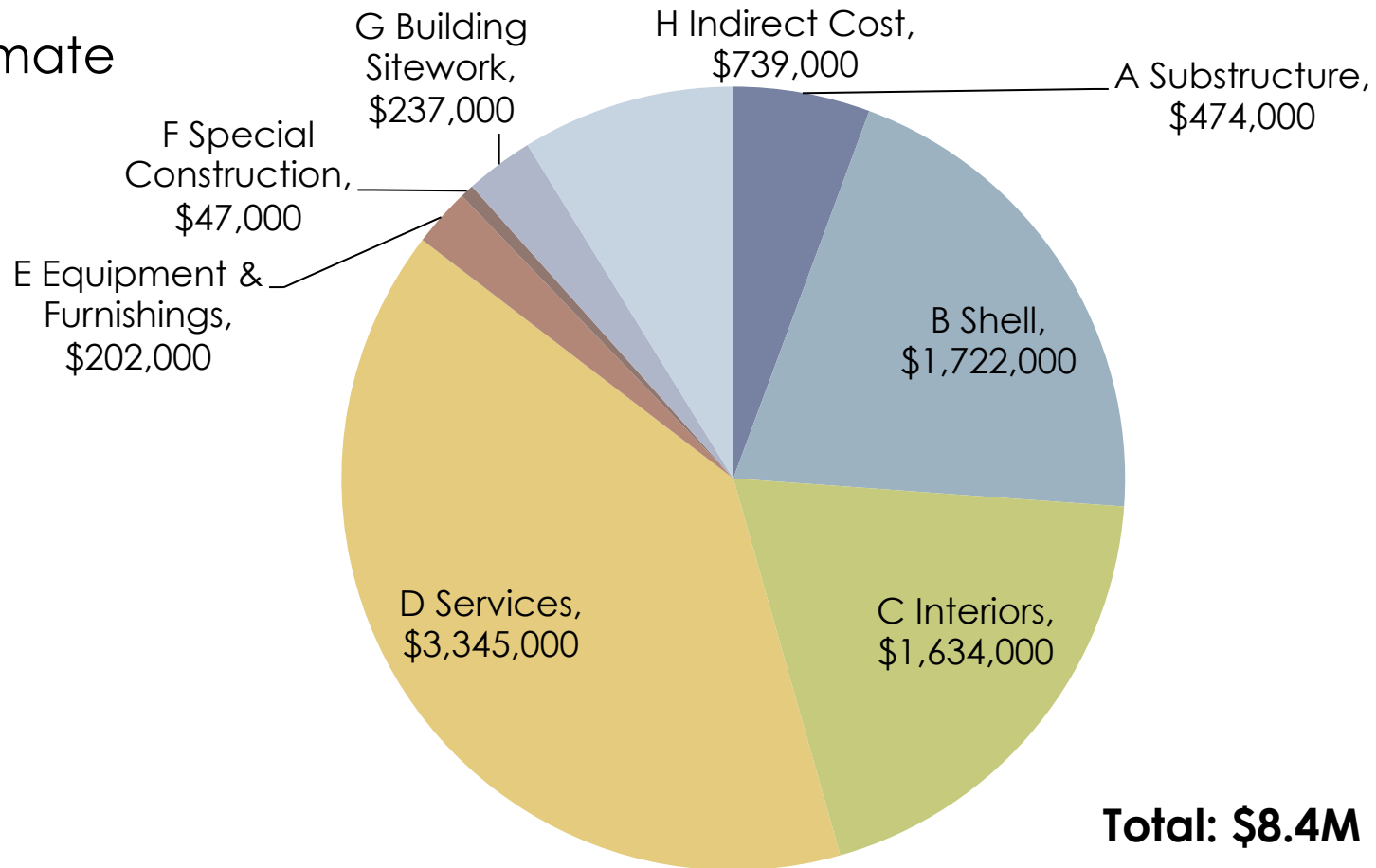
CM

LCFM

TARGET VALUE COSTS

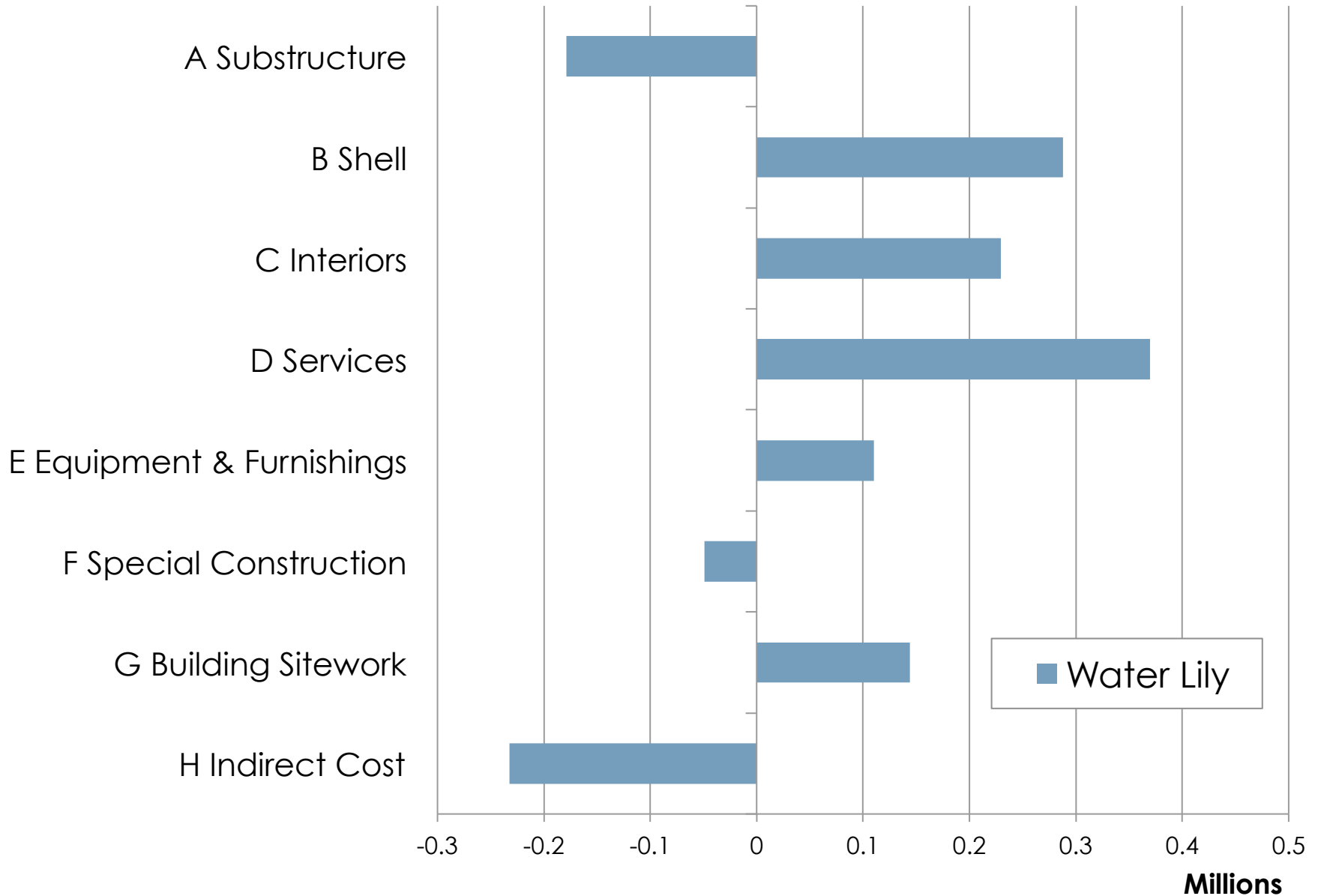
TARGET SET BASED ON:

- Owners input
- Previous projects
- First cost estimate



REMAINING BUDGET

Remaining Budget



A

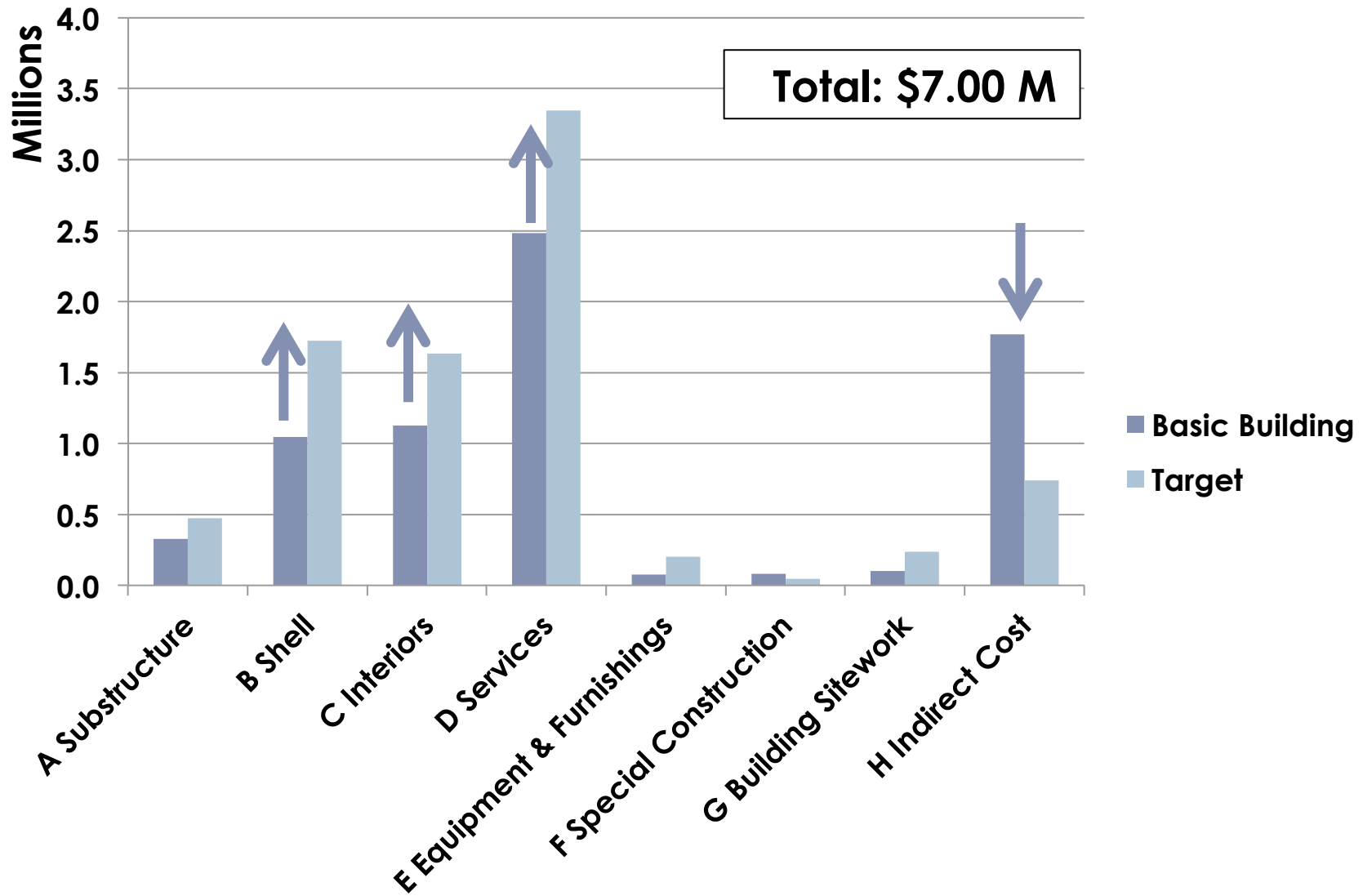
MEP

SE

CM

LCFM

INITIAL COST VS TARGET



A

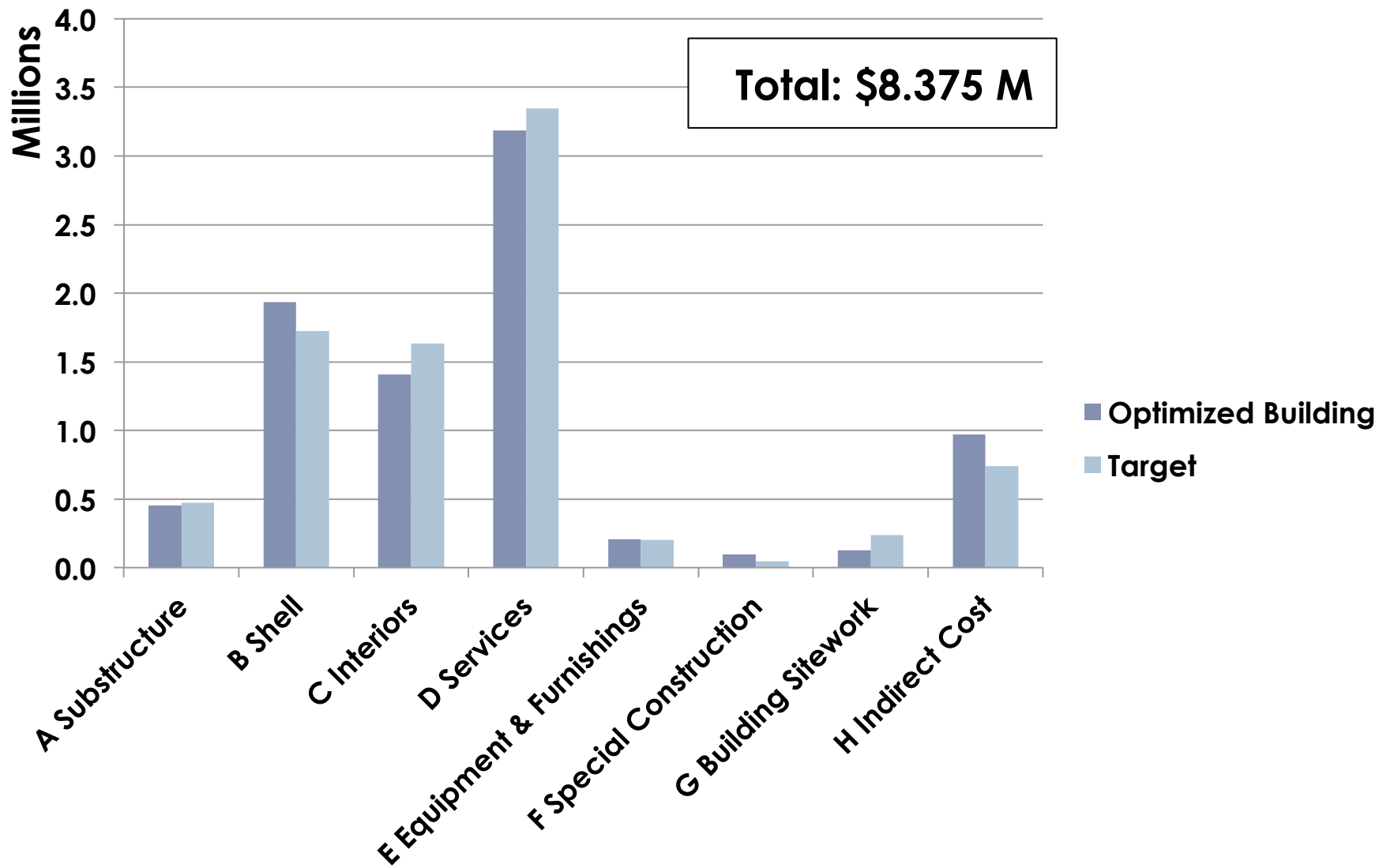
MEP

SE

CM

LCFM

FINAL BUILDING COST VS TARGET



A

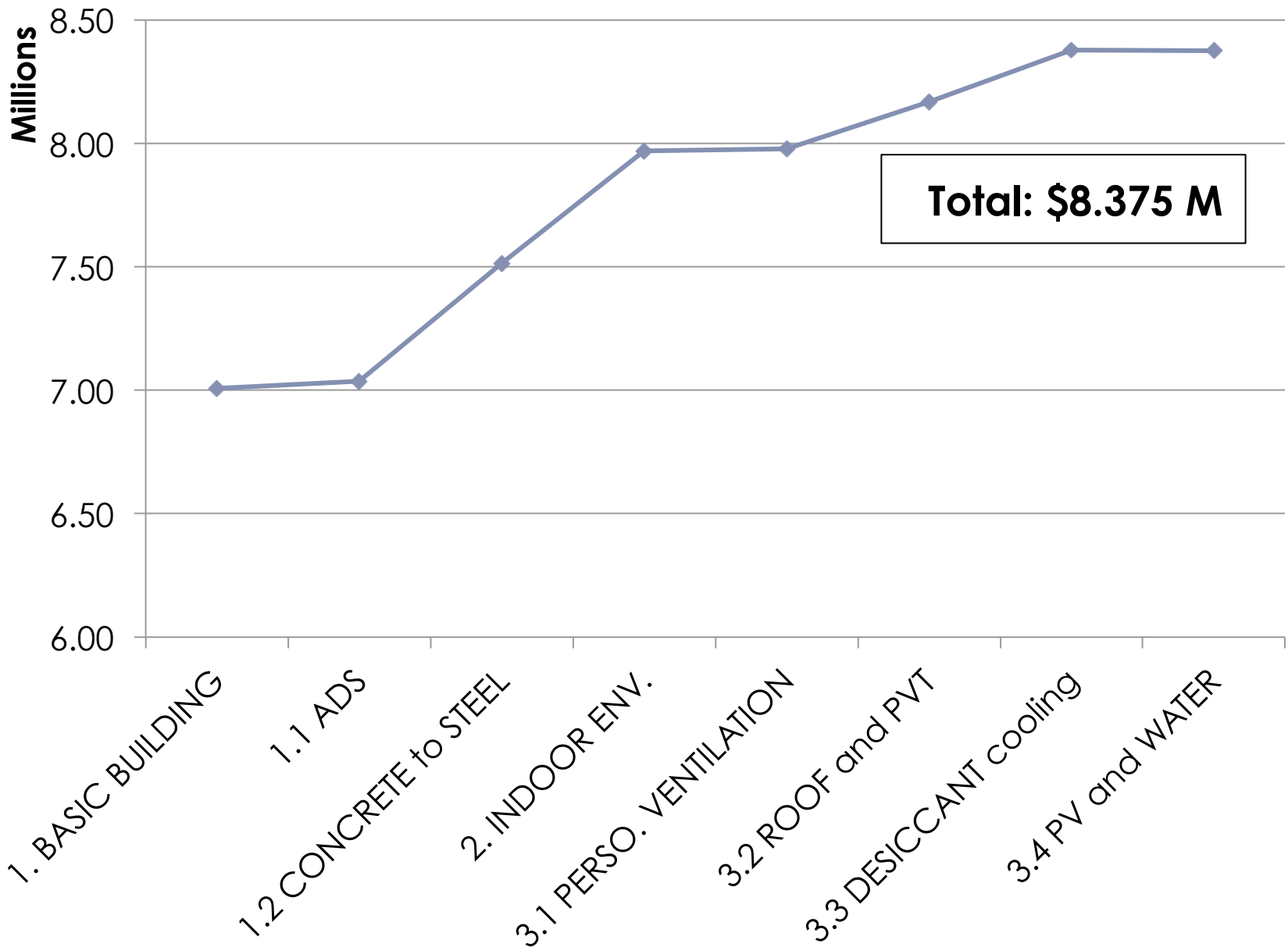
MEP

SE

CM

LCFM

FINAL BUILDING COST VS TARGET



A

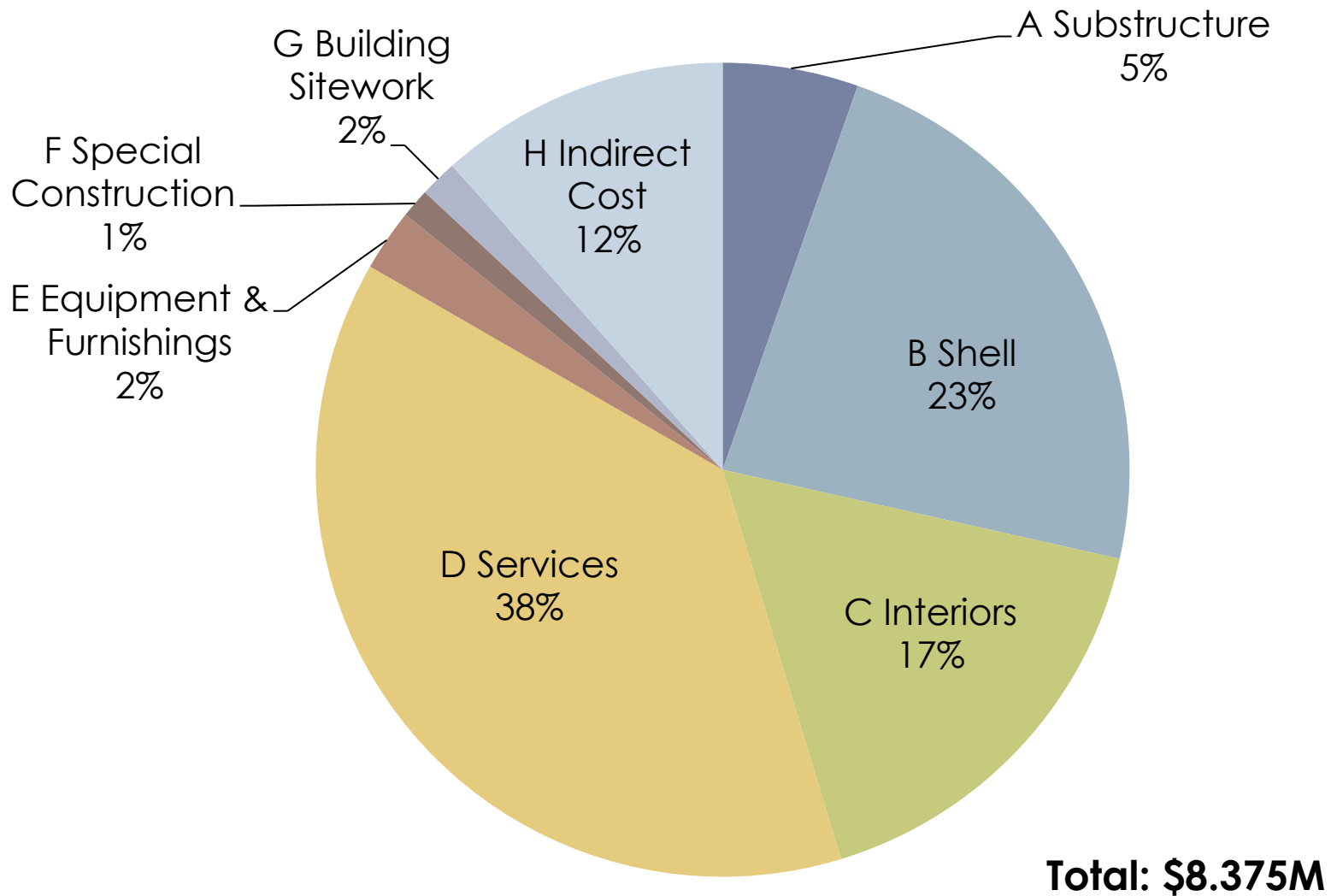
MEP

SE

CM

LCFM

FINAL COST DISTRIBUTION



Thousands (\$)

A

MEP

SE

CM

LCFM

- Computer Manager (May 1st)
- Risk of flooding during construction
- Winter

SCHEDULING APPROACH

MS Project

Comparison with past years' estimates

Winter Pres.

?

LBS → Vico Office

A

MEP

SE

CM

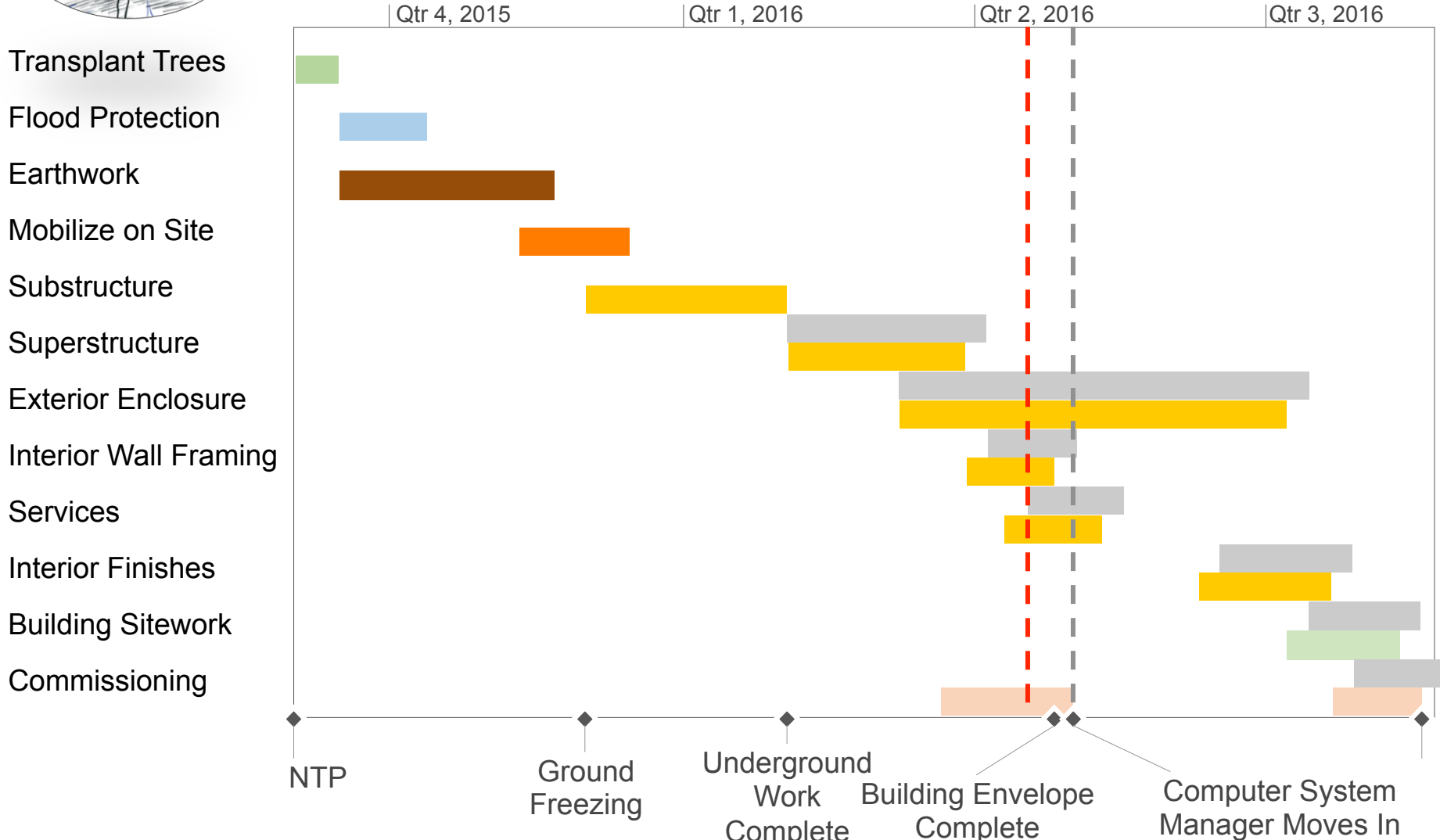
LCFM

SCHEDULE

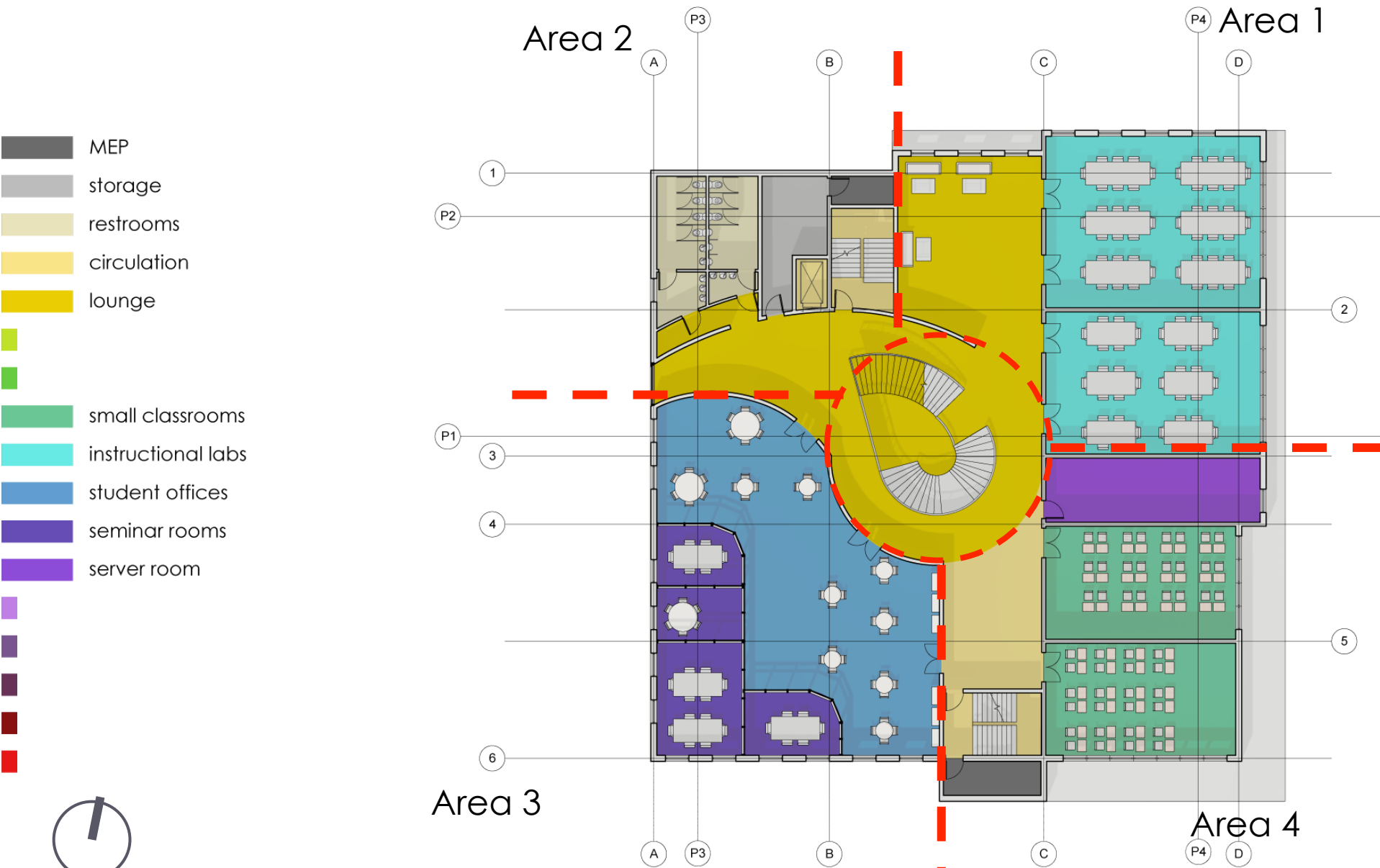


Start
01/09/15

Finish
18/08/16



CONSTRUCTION SEQUENCE

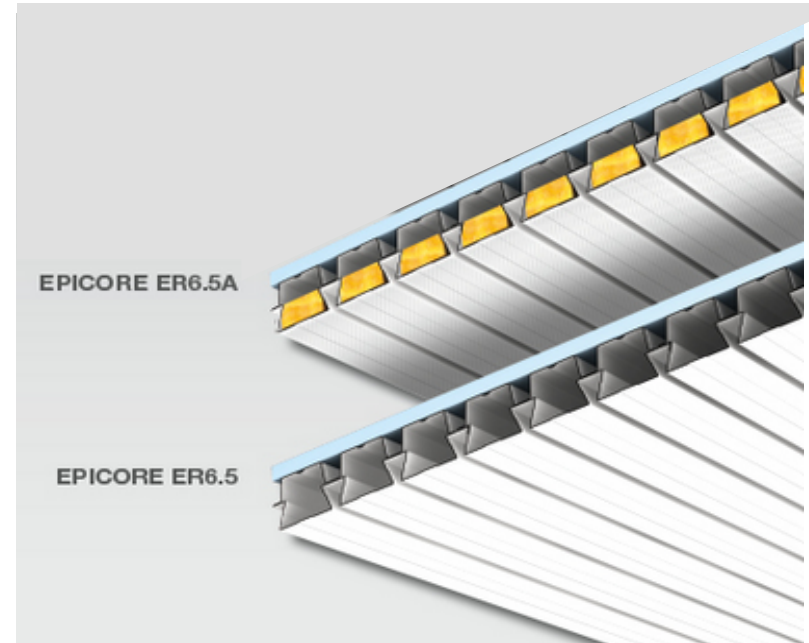


Milestone: Computer Manager Move in date: May 1st, 2016

ConXtech system



EPIC Metal Steel deck



LOCAL SUPPLIERS

- Concrete - thomas-gruppe 2.6km
- Precast concrete - Betonwerk Streichardt 2.9km
- Construction equipment - zeppelin-rental 19km



TIMELINE

Start
01/09/15

Finish
18/08/16

Qtr 4, 2015

Qtr 1, 2016

Qtr 2, 2016

Qtr 3, 2016

Transplant Trees

Flood Protection

Earthwork

Mobilize on Site

Substructure

Superstructure

Exterior Enclosure

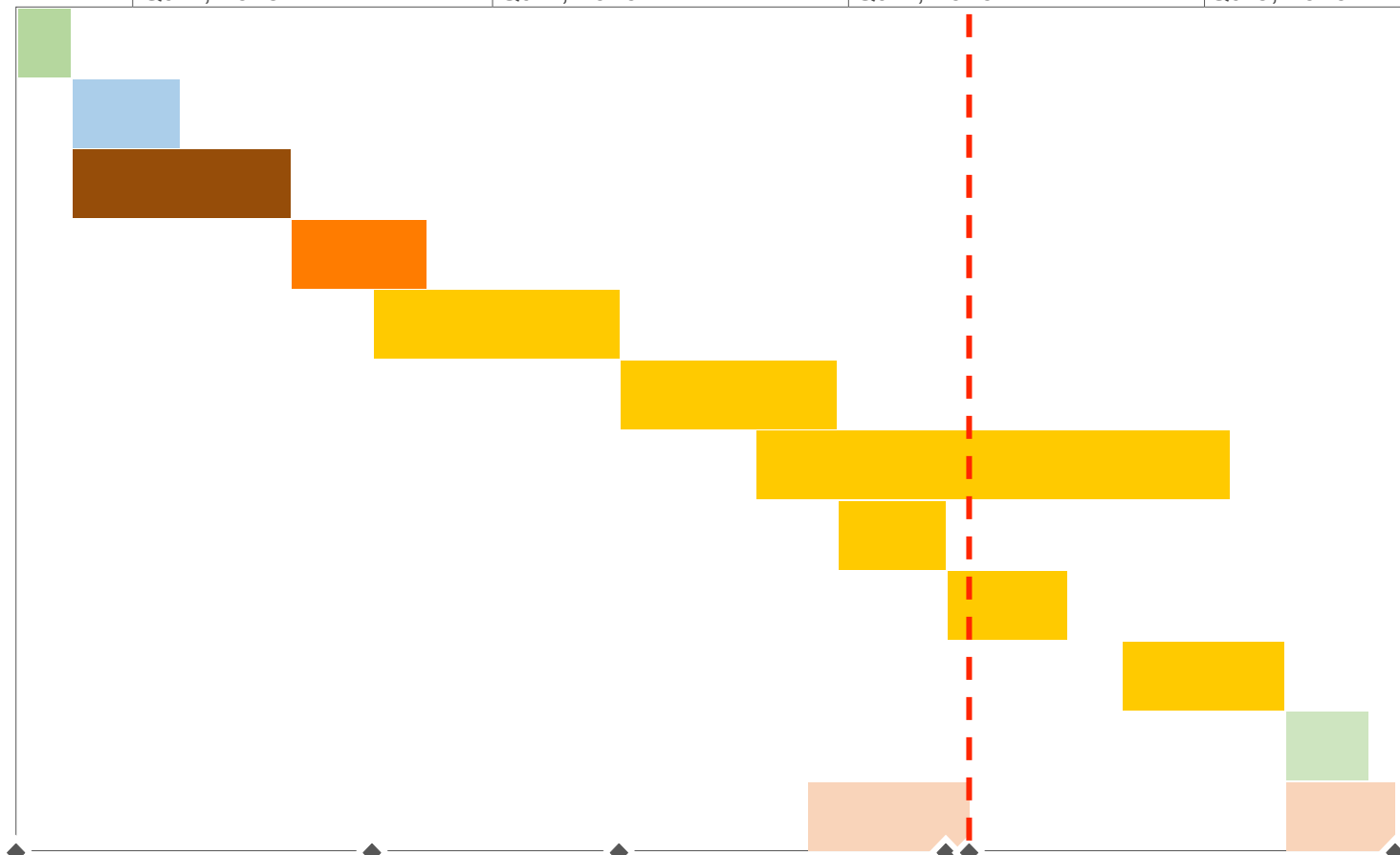
Interior Wall Framing

Services

Interior Finishes

Building Sitework

Commissioning



NTP

Ground Freezing

Underground Work Complete

Building Envelope Complete

Computer System Manager Moves In

A

MEP

SE

CM

LCFM

4D SCHEDULE

A

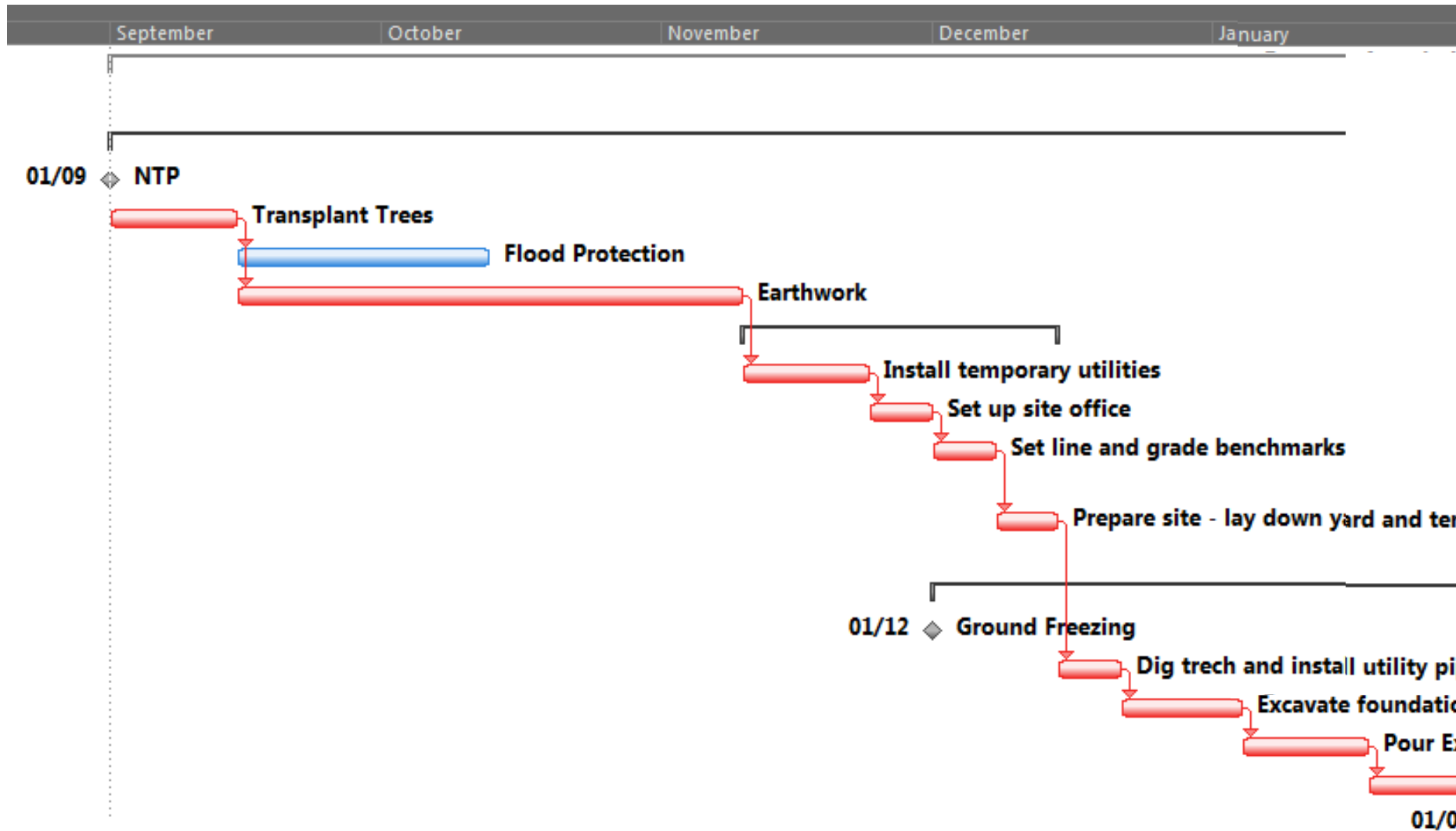
MEP

SE

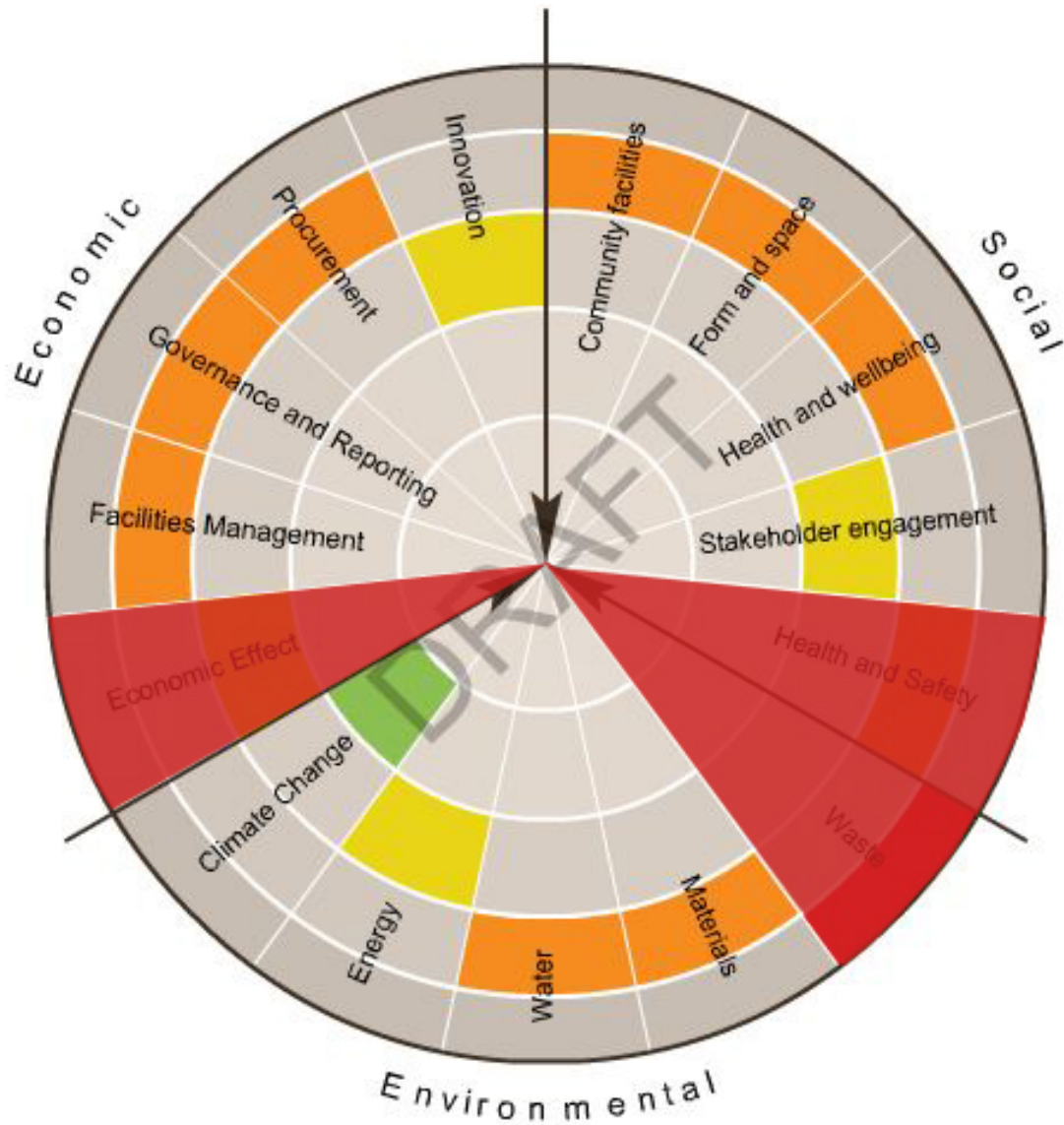
CM

LCFM

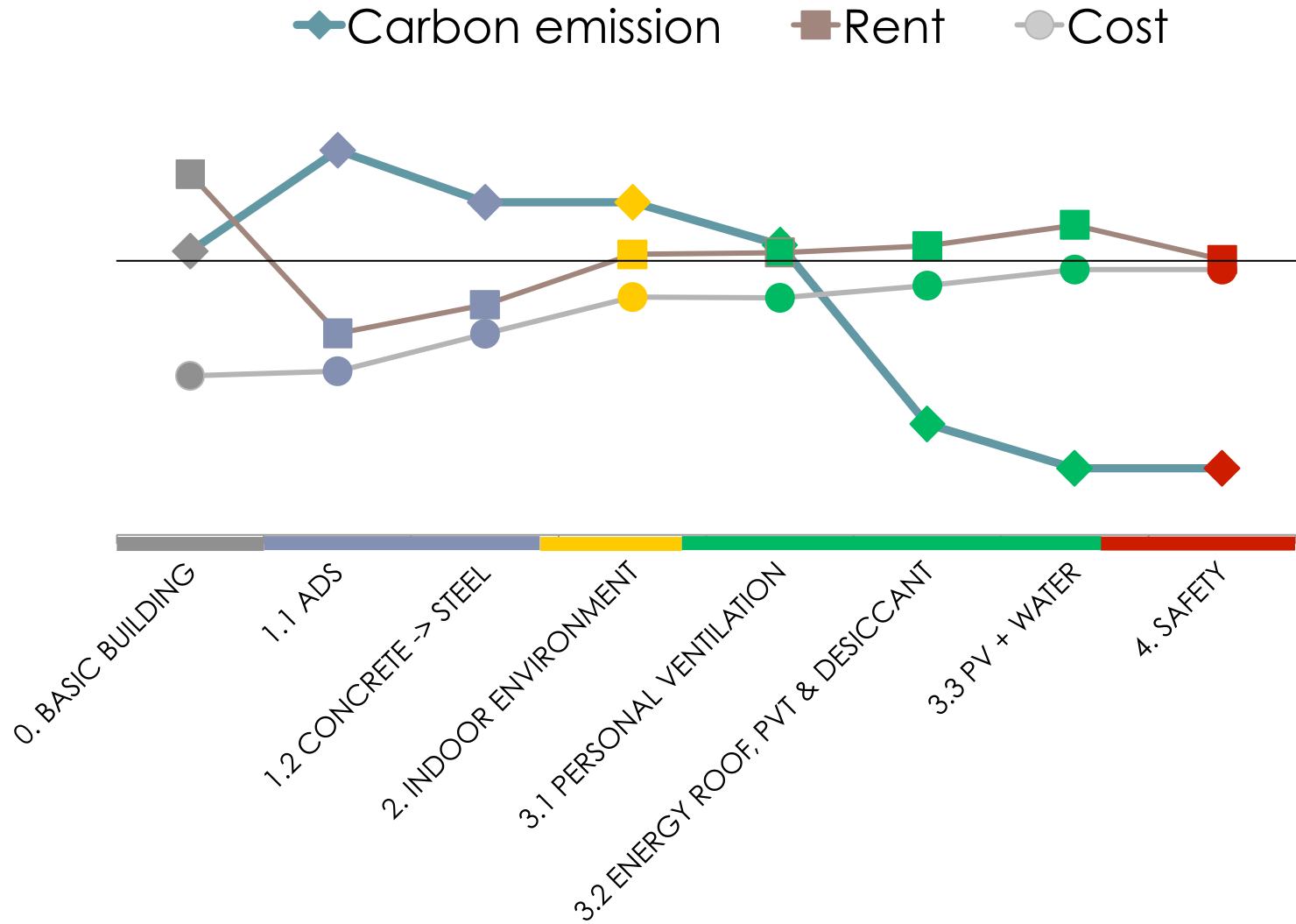
SCHEDULE



4. LEAN + SAFETY



4. LEAN + SAFETY



A

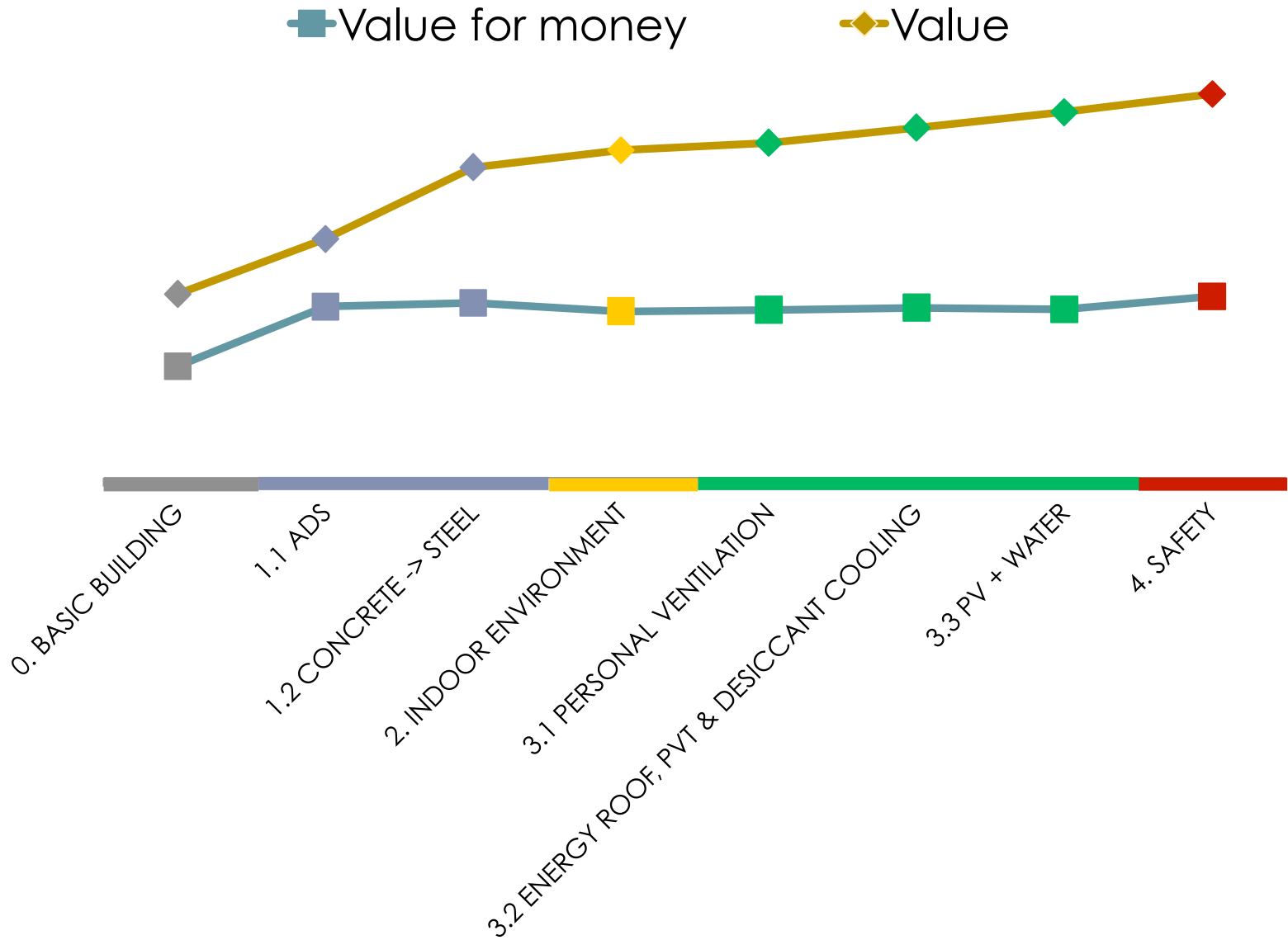
MEP

SE

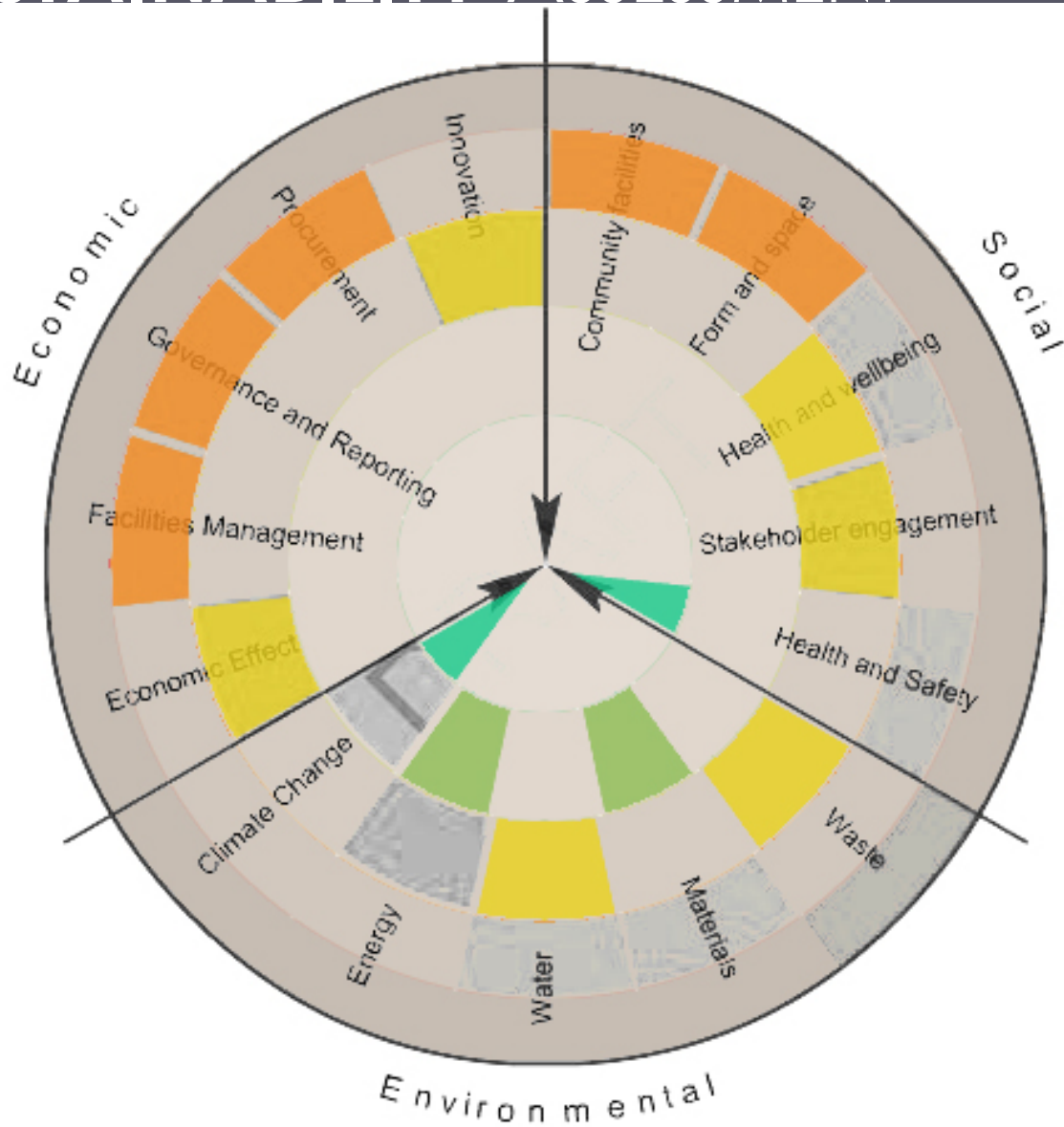
CM

LCFM

4. LEAN + SAFETY



SUSTAINABILITY ASSESSMENT



63 points =



SPeAR®

Optimum Worst Case

A

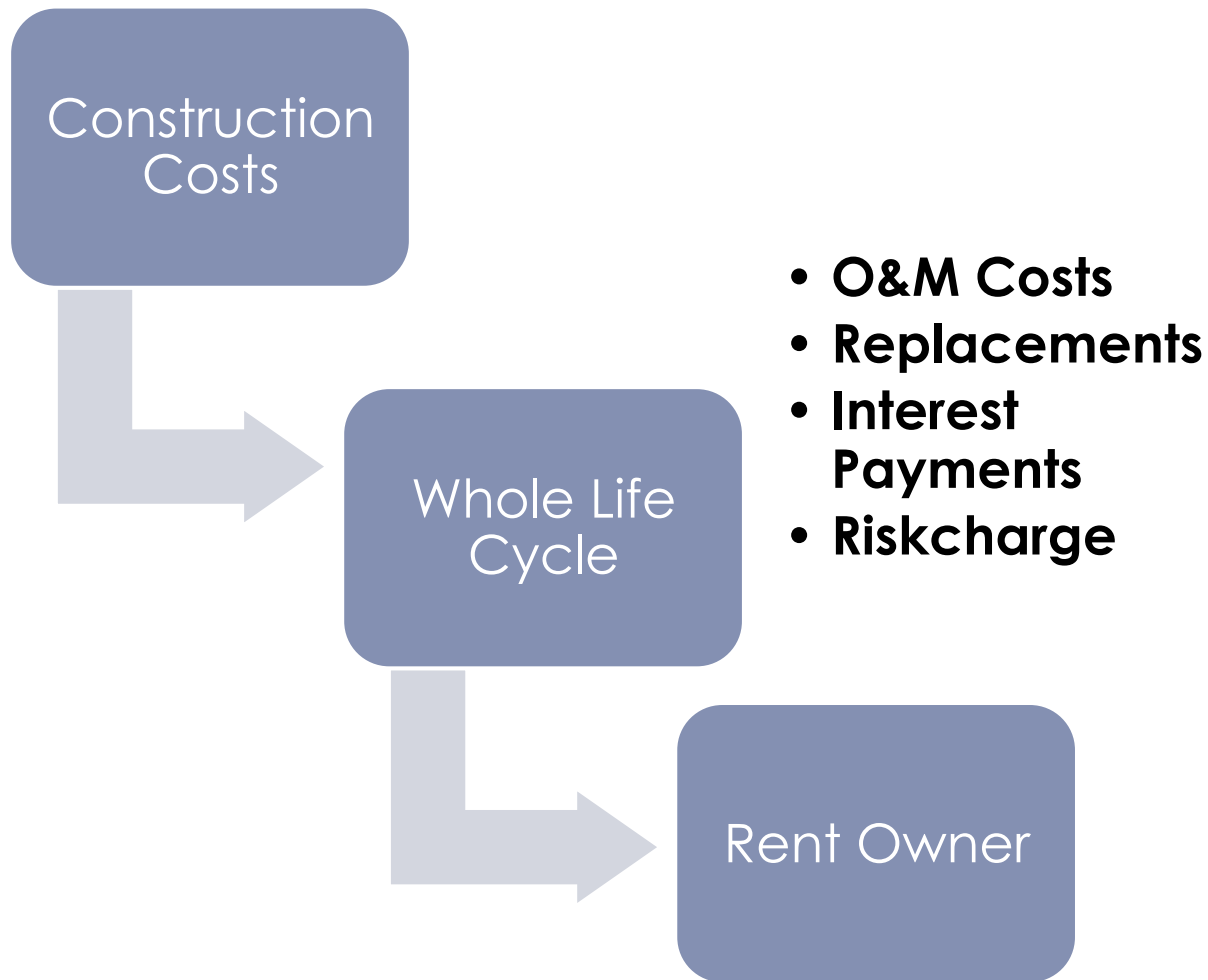
MEP

SE

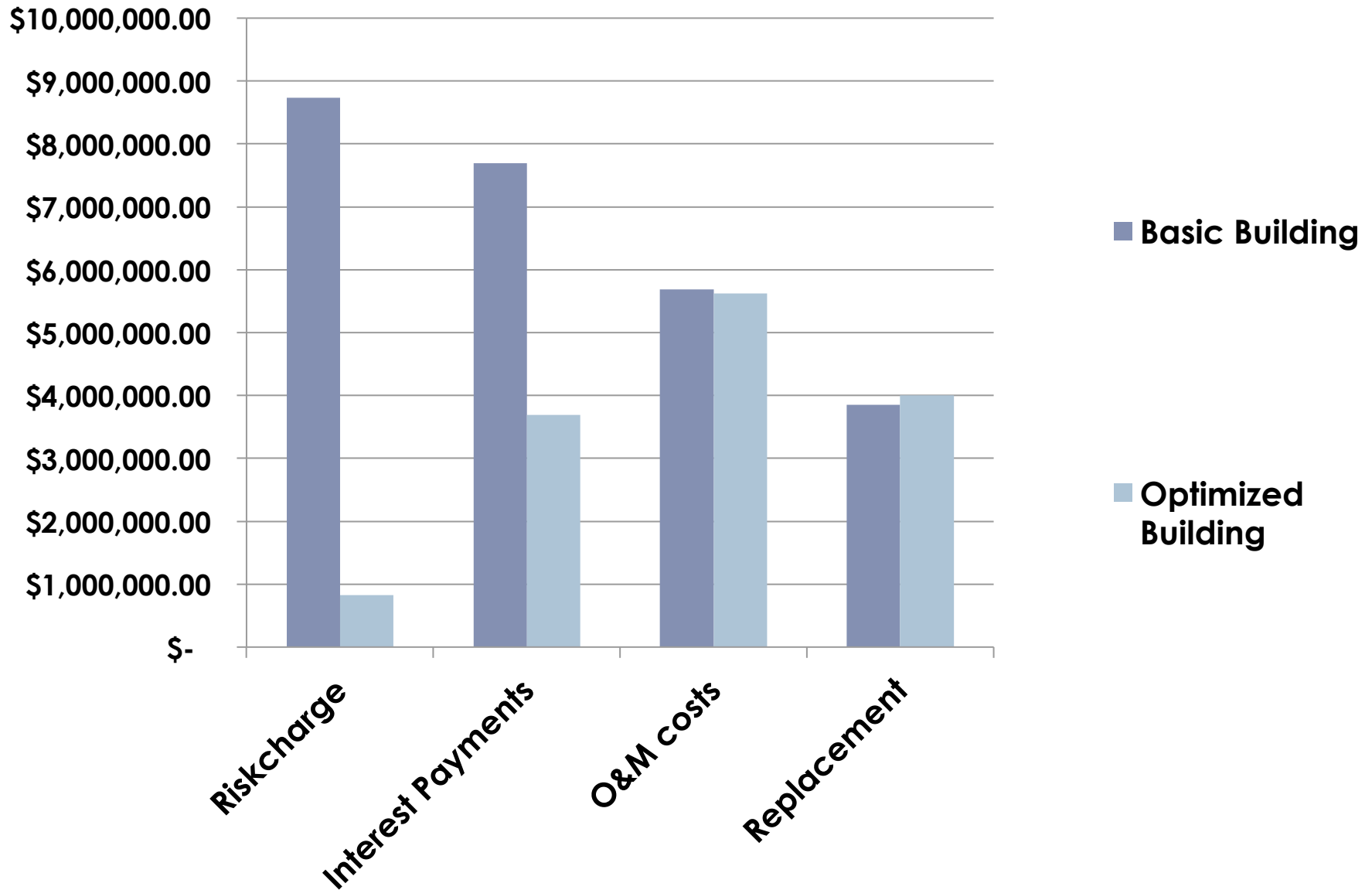
CM

LCFM

Maximize value without increasing the rent



WHOLE LIFE CYCLE COSTS



A

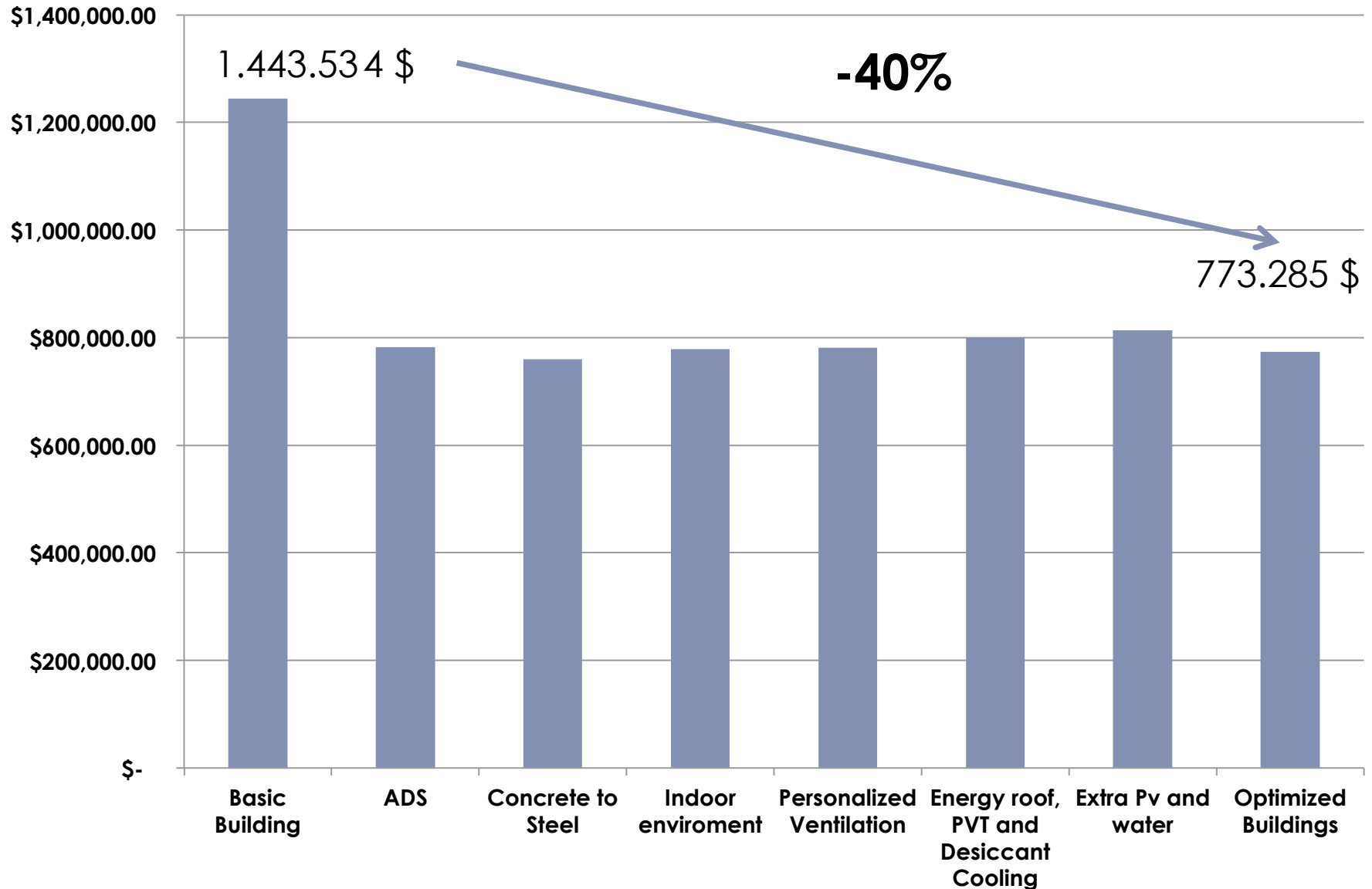
MEP

SE

CM

LCFM

MINIMIZING RENT



A

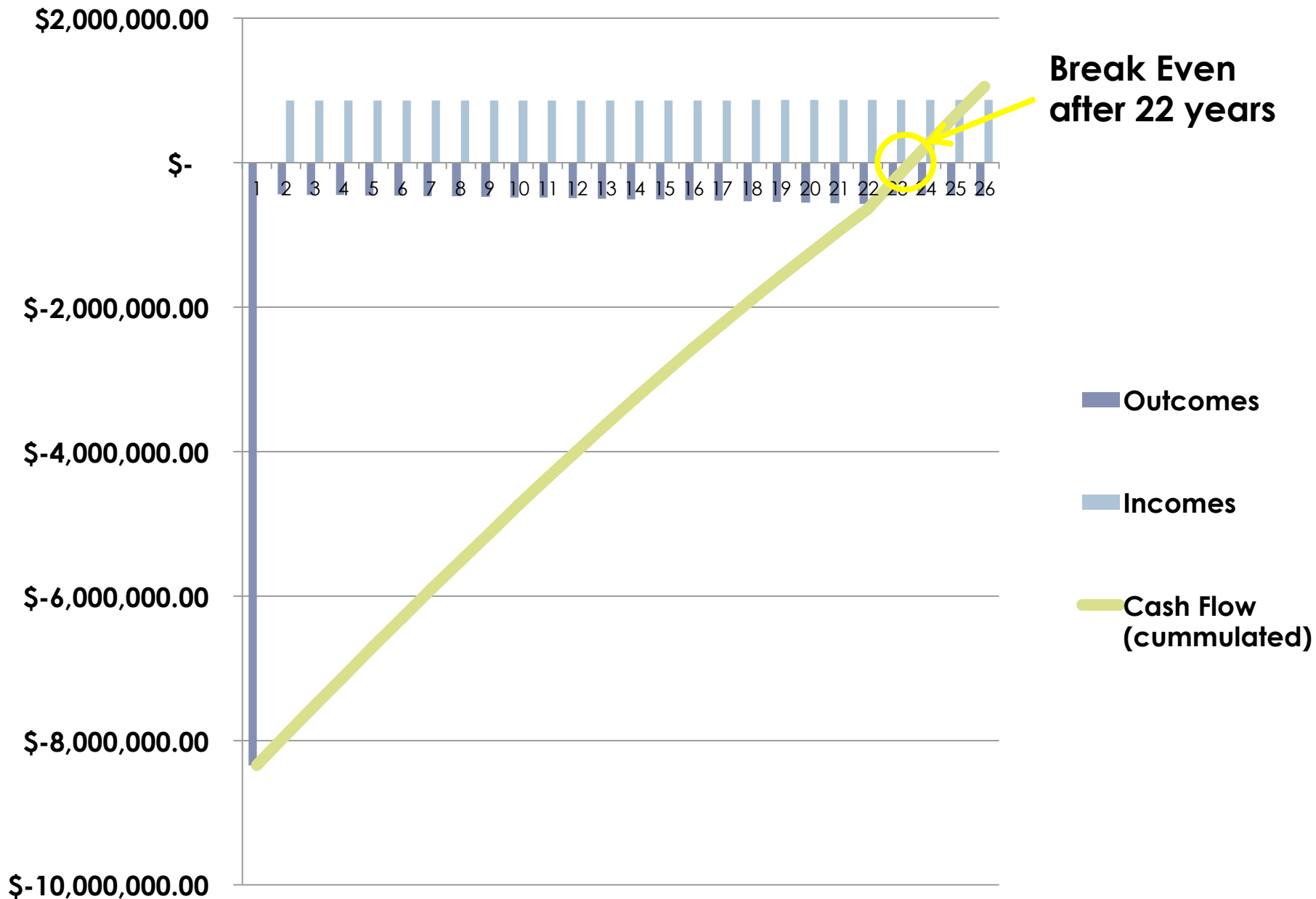
MEP

SE

CM

LCFM

CASH FLOW OPTIMIZE BUILDING



A

MEP

SE

CM

LCFM

“The one thing I will always remember is...”



RONNIE

“Integration does not happen by chance”

“The one thing I will always remember is...”



“how one decision impacts all other disciplines”

“The one thing I will always remember is...”



“Technology is only a tool; it all comes down to process”

“The one thing I will always remember is...”



DANIELLE

“how to work efficiently in an ever-changing environment”

“The one thing I will always remember is...”



“7 > 1+1+1+1+1+1+1 “

“The one thing I will always remember is...”



“communication is the key to teamwork”

“The one thing I will always remember is...”



“don’t underestimate the power of
Google Docs”

A Special Thanks To:

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