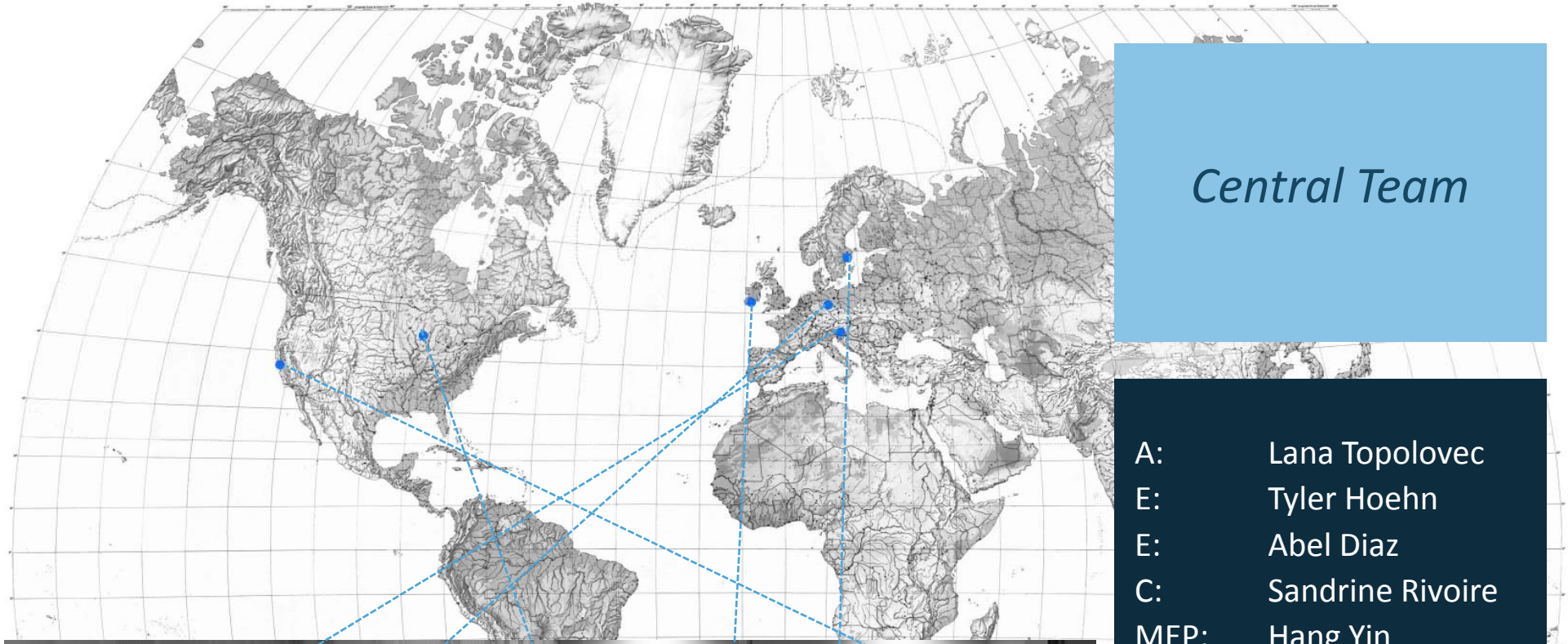
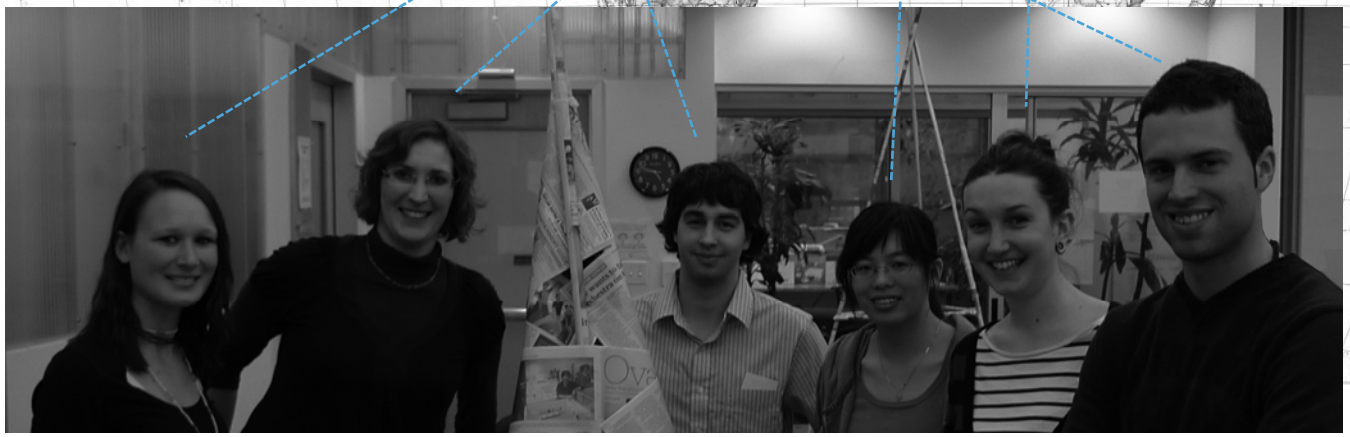


Central Team

A:	Lana Topolovec
E:	Tyler Hoehn
E:	Abel Diaz
C:	Sandrine Rivoire
MEP:	Hang Yin
LCFM:	Charlotte Thomas



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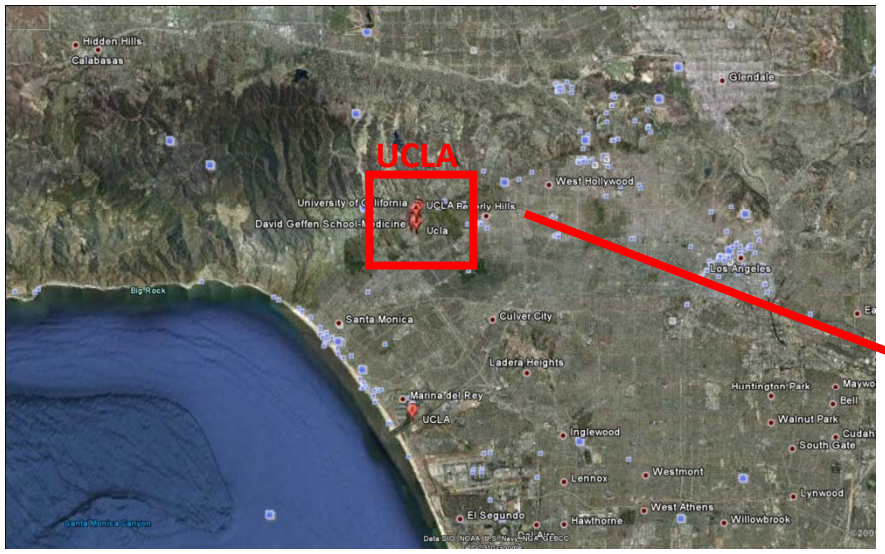
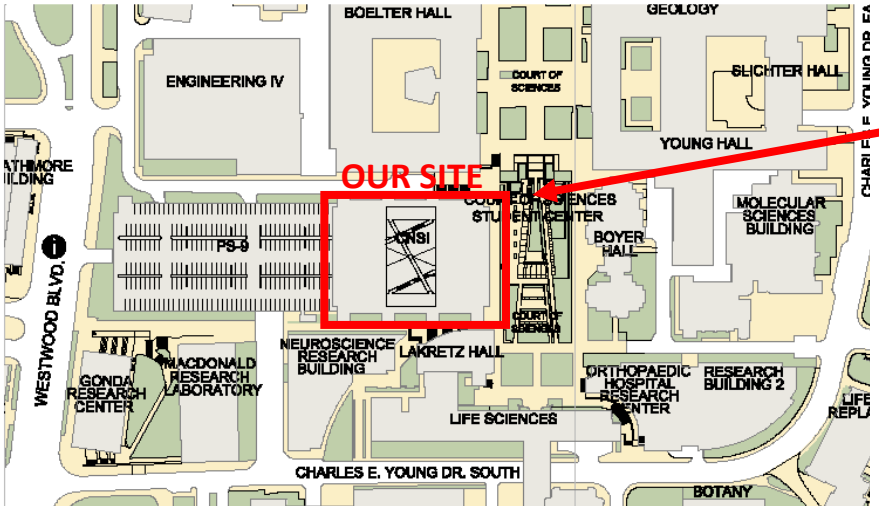
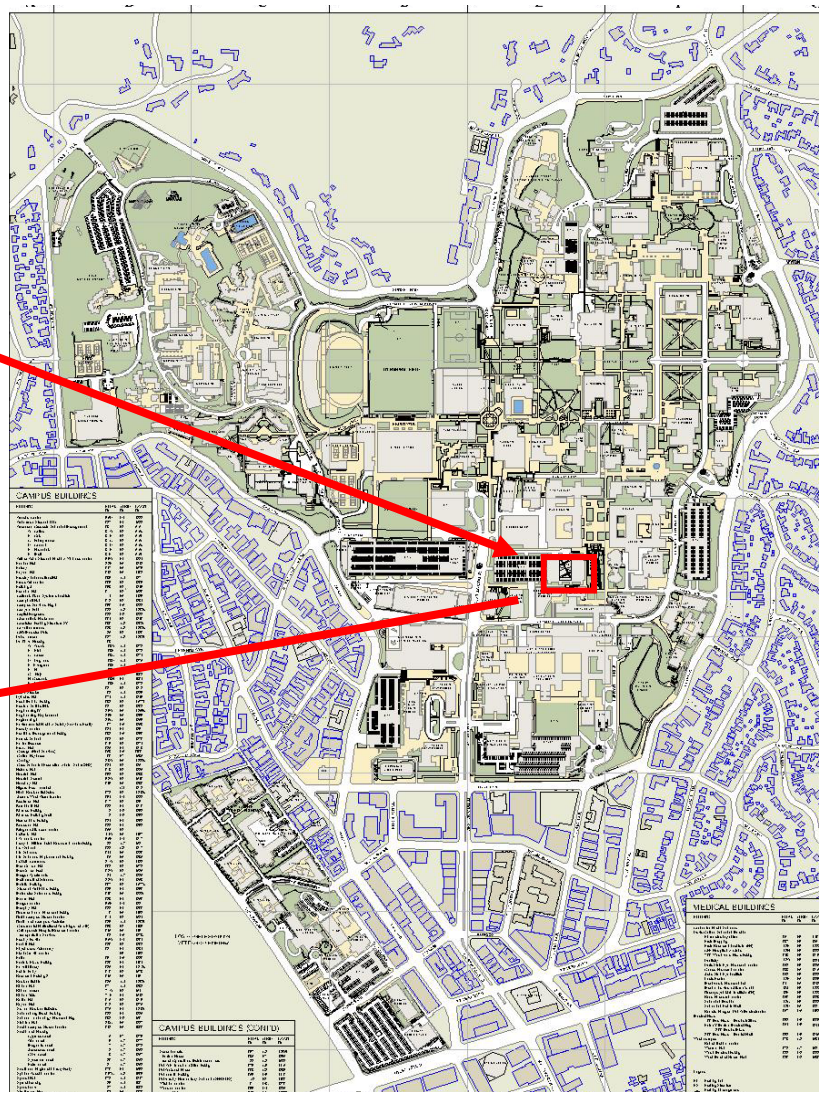
SITE ANALYSIS







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CLIMATE DATA

Central Team

Los Angeles Climate Data

Month	Average Max. Temperature		Average Min. Temperature		Average Temp.		Sun shine	Average Total Precipitation		Average Total SnowFall		Average Snow Depth		Relative Humidity		Wind Speeds
														Morning	Afternoon	
	F	C	F	C	F	C	%	in	cm	in	cm	in	cm	%	%	MPH
January	66.3	19.1	48.3	9.1	57.3	14.1	72	3.23	8.2	0	0	0	0	71	61	6.7
February	67.3	19.6	49.6	9.8	58.45	14.7	69	3.4	8.6	0	0	0	0	75	64	7.4
March	68.8	20.4	51.1	10.6	59.95	15.5	72	2.41	6.1	0	0	0	0	79	66	8.1
April	71	21.7	53.4	11.9	62.2	16.8	73	1.01	2.6	0	0	0	0	79	64	8.5
May	72.9	22.7	56.5	13.6	64.7	18.2	75	0.25	0.6	0	0	0	0	83	67	8.4
June	77	25.0	59.7	15.4	68.35	20.2	80	0.07	0.2	0	0	0	0	85	68	8
July	82.3	27.9	63.2	17.3	72.75	22.6	96	0.01	0.0	0	0	0	0	86	68	7.9
August	83.1	28.4	63.8	17.7	73.45	23.0	96	0.05	0.1	0	0	0	0	85	69	7.7
September	81.8	27.7	62.6	17.0	72.2	22.3	89	0.28	0.7	0	0	0	0	83	67	7.3
October	77.6	25.3	58.6	14.8	68.1	20.1	82	0.45	1.1	0	0	0	0	79	66	6.9
November	72.8	22.7	53.3	11.8	63.05	17.3	80	1.27	3.2	0	0	0	0	72	62	6.7
December	67.4	19.7	49.1	9.5	58.25	14.6	74	2.34	5.9	0	0	0	0	68	59	6.6

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SITE ANALYSIS

Central Team

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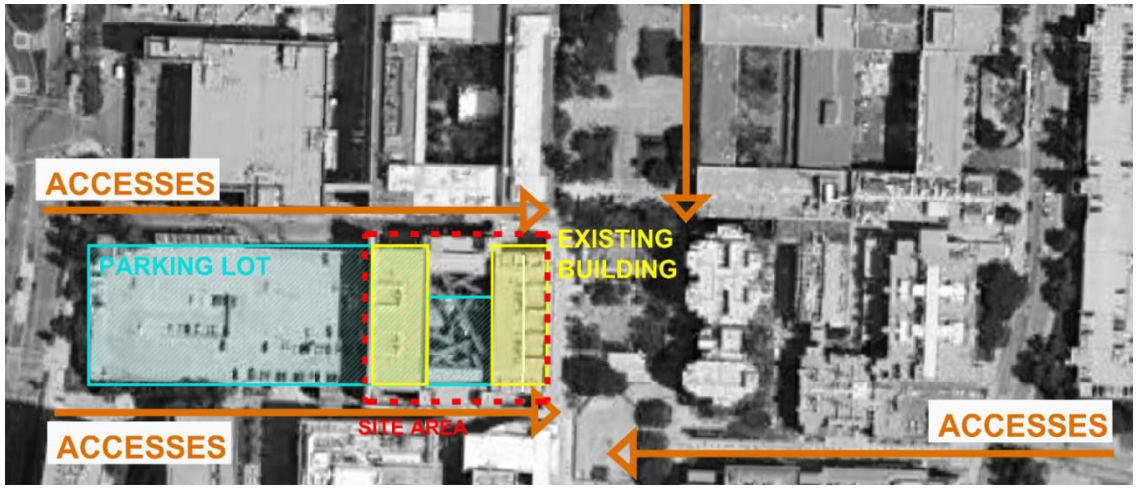
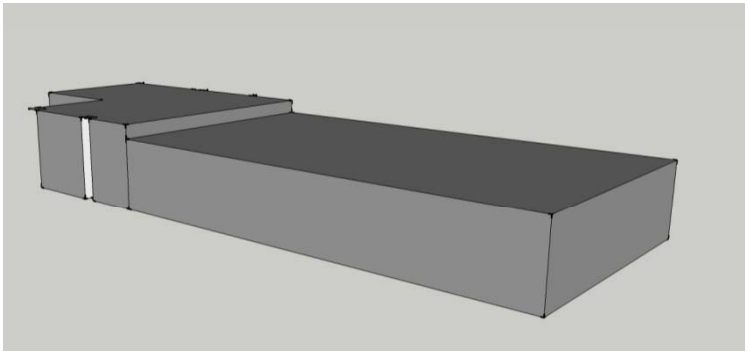
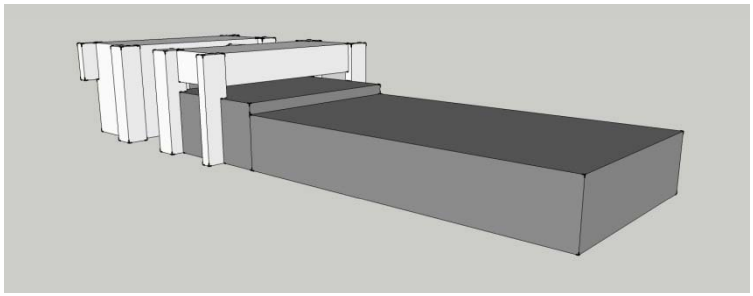
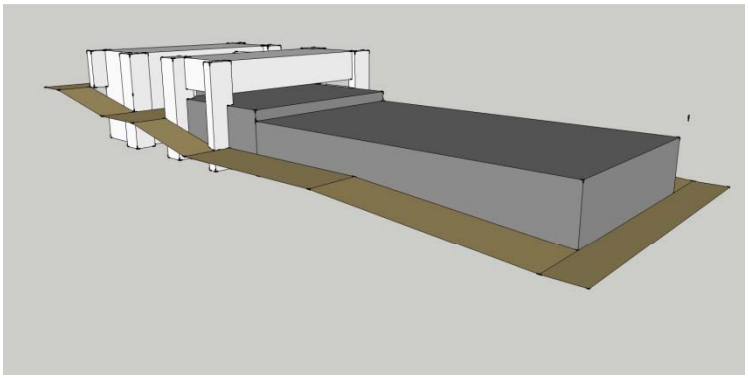
SITE ANALYSIS



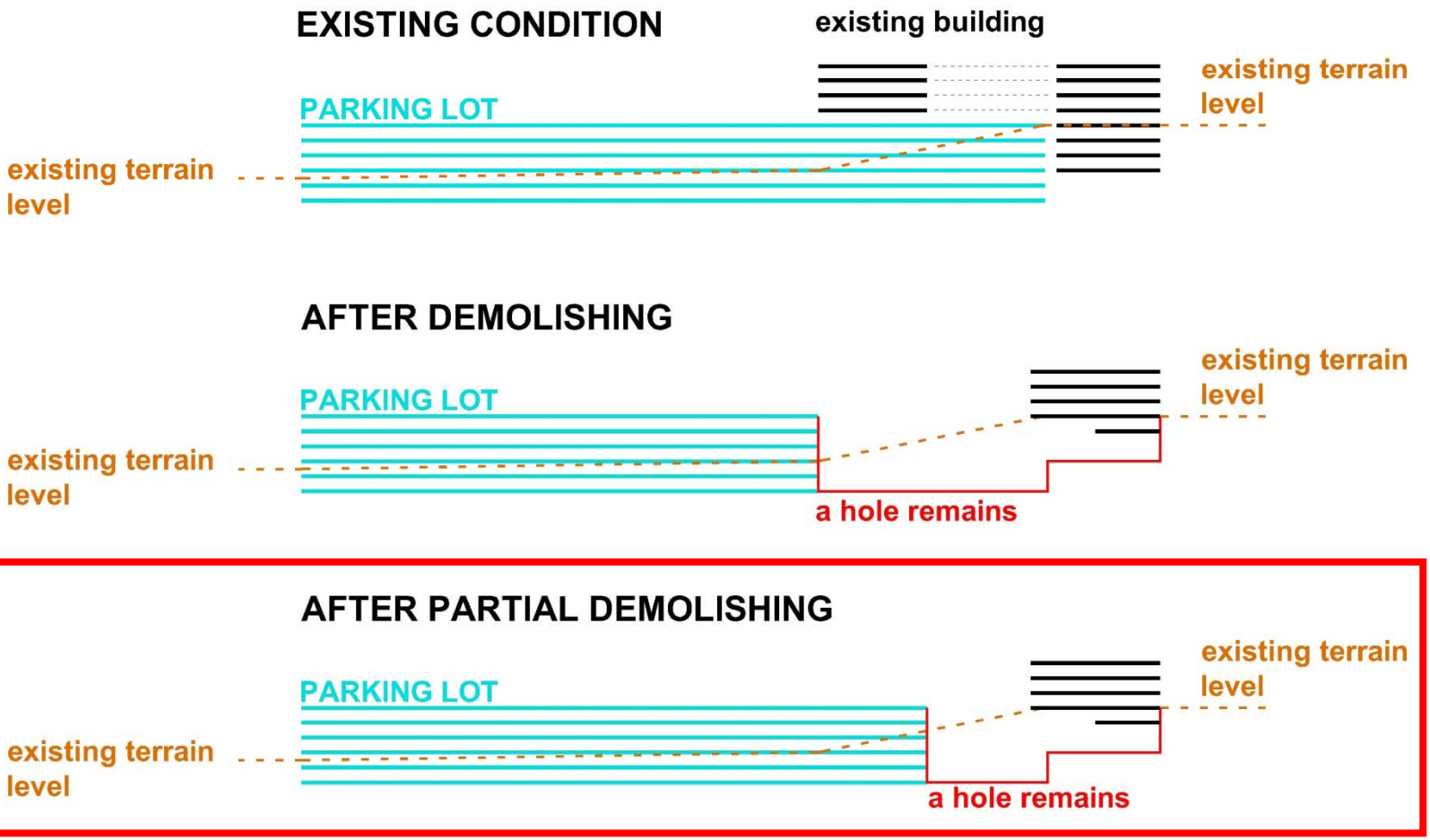






SITE ANALYSIS

ELEVATION OF EXISTING CONDITION and our OPTIONS



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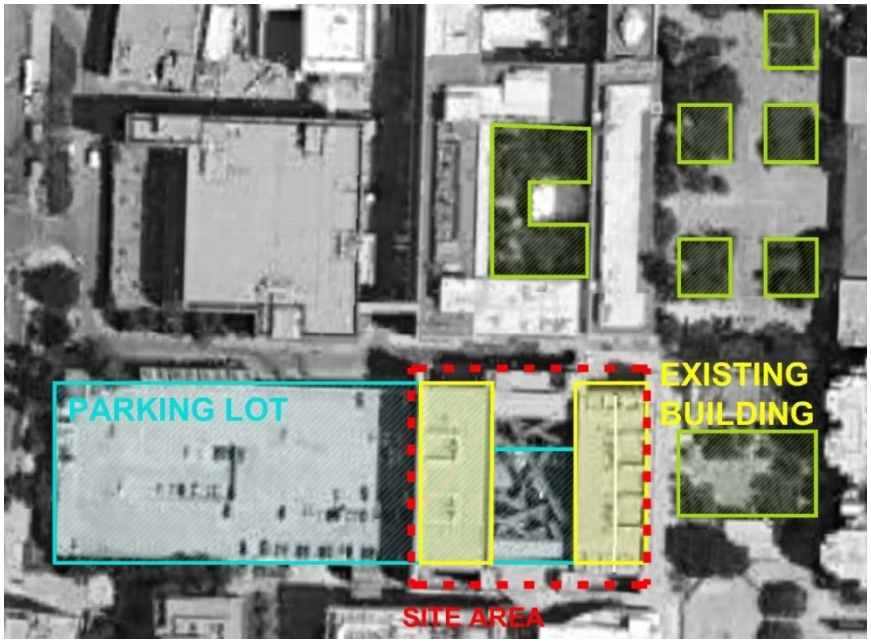
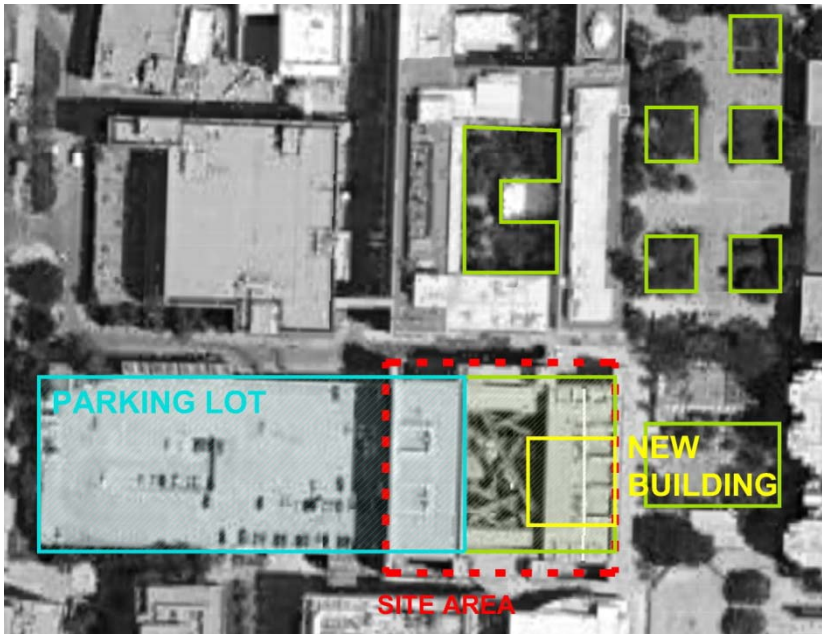
SITE ANALYSIS

KEY CHALLENGE

EXISTING CONDITION



NEW CONDITION



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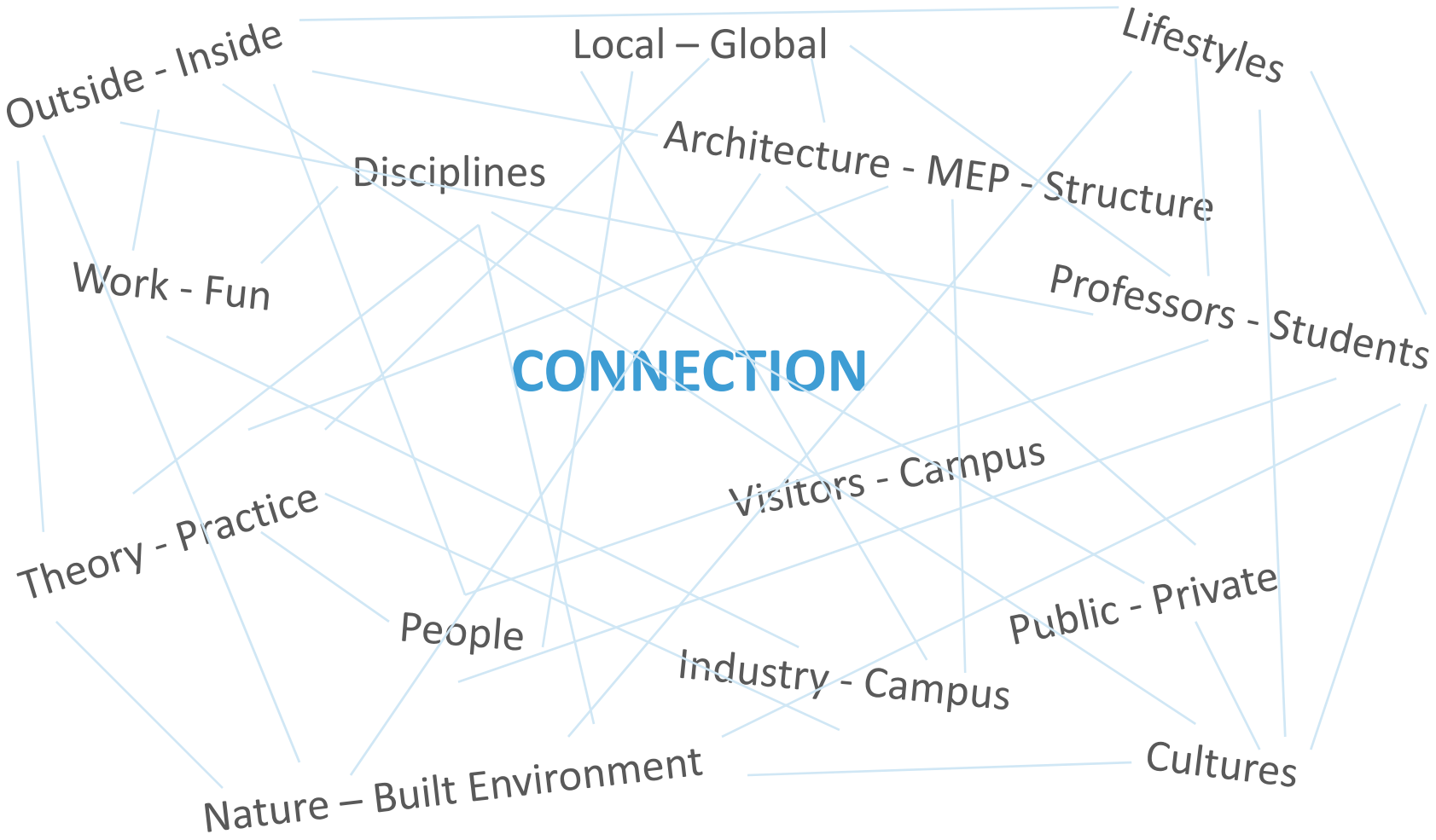
BIG IDEA



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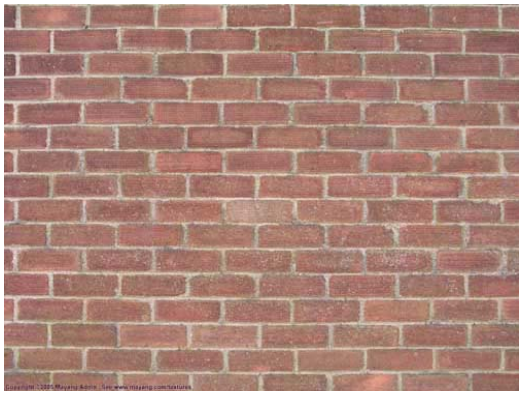
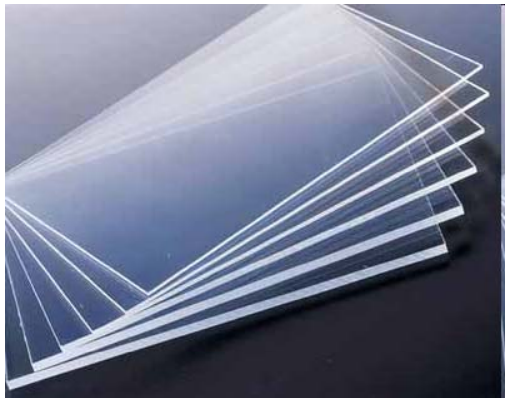
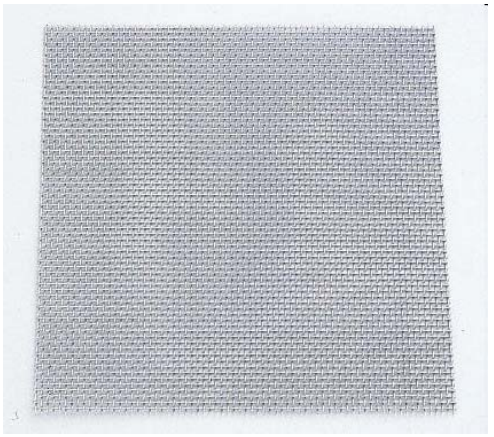
MATERIALS USED



BRICK



GLASS



STEEL - NET

1. HOLLOWING

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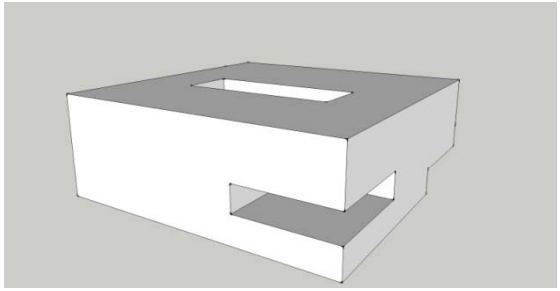
ARCHITECTURE

Central Team

1. HOLLOWING

CONCEPT “A” → A CUBE → HOLLOWING



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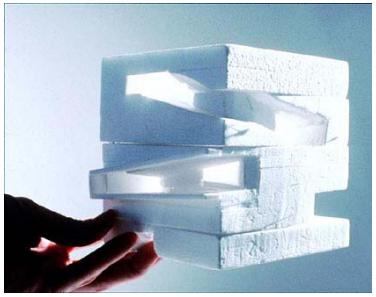
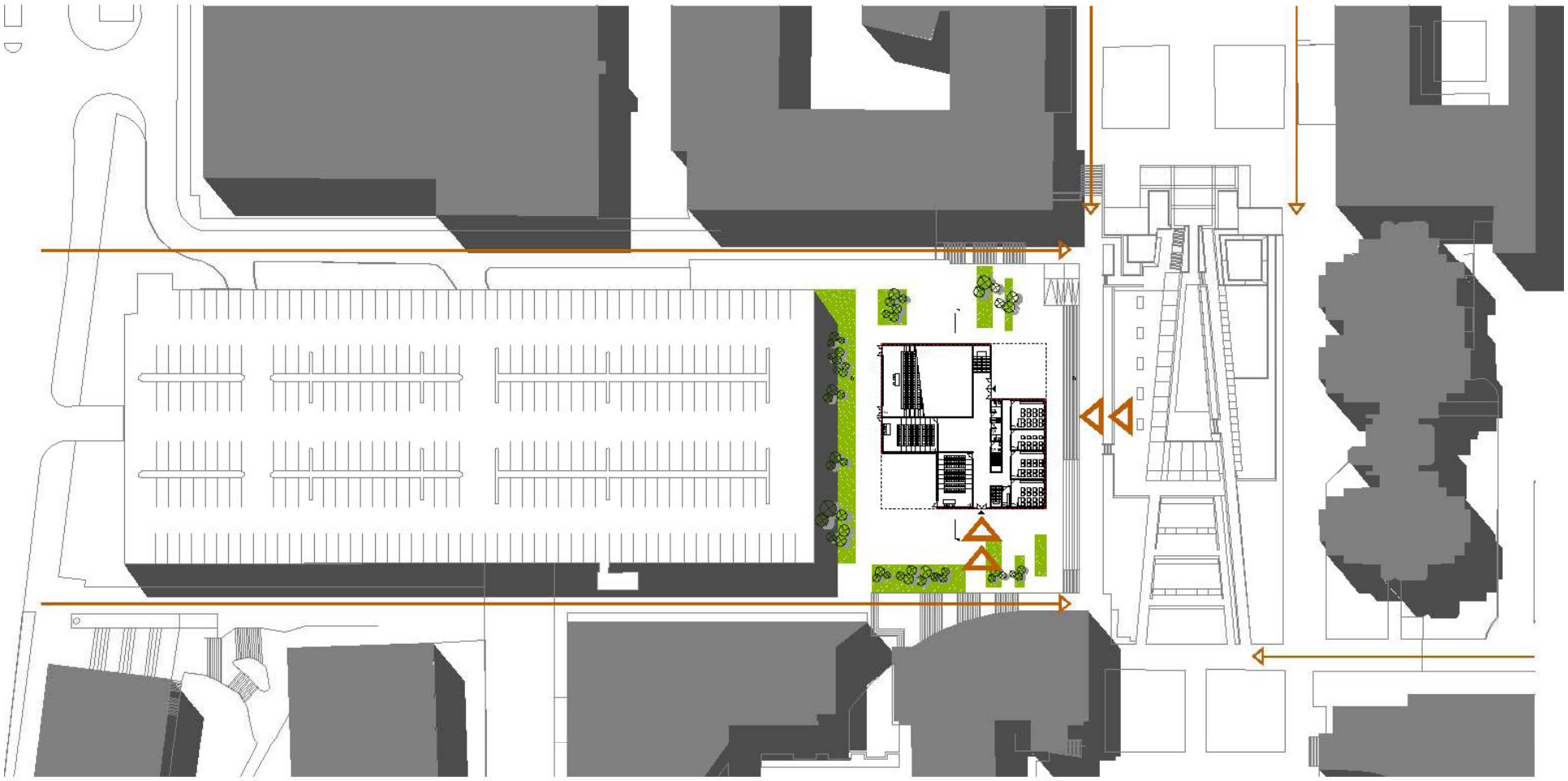
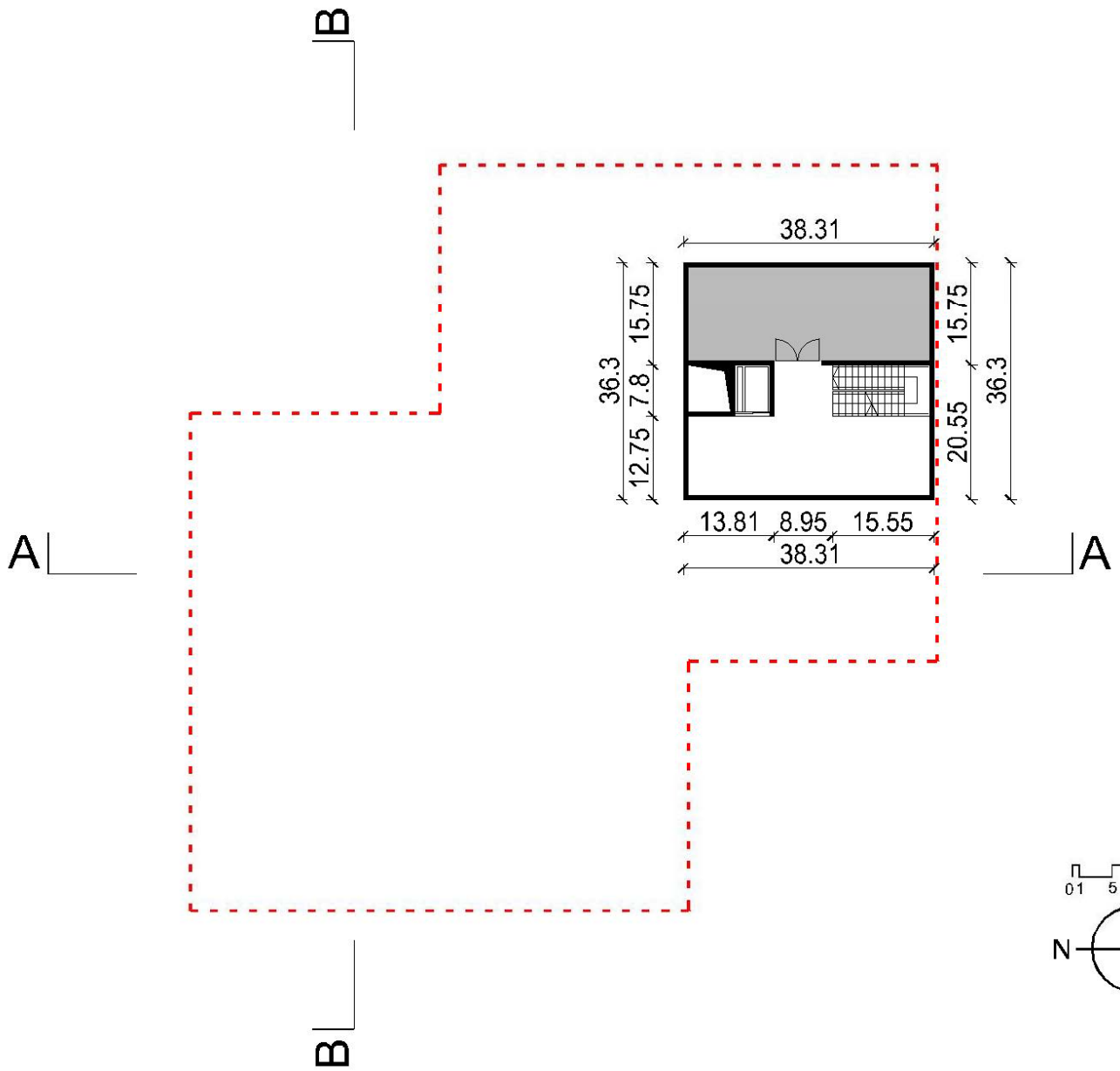


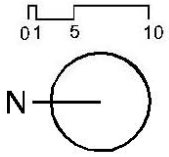


FOOTPRINT POSITION

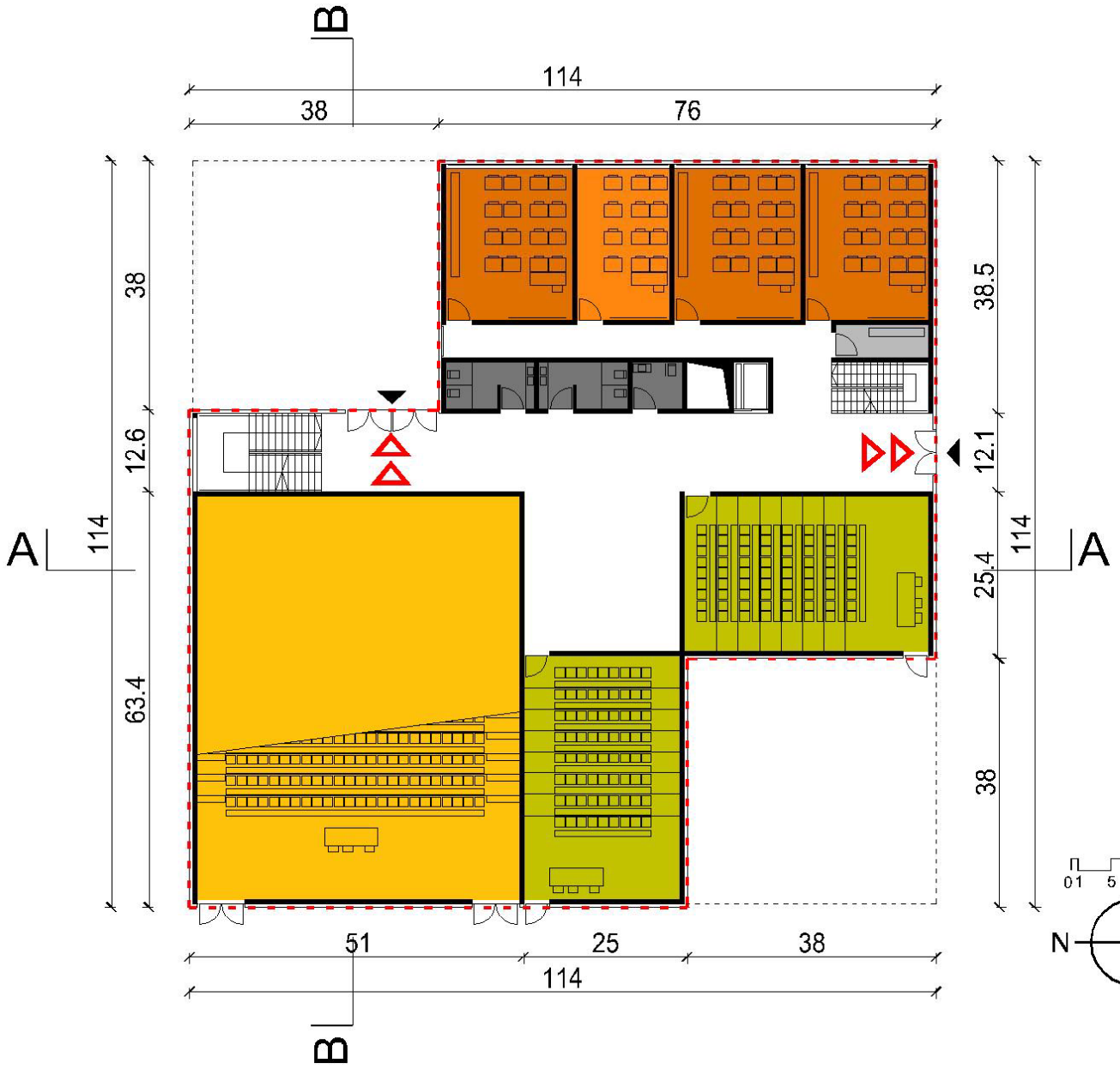
N



FACULTY OFFICES
DEPARTMENT CHAIR'S OFFICE
SENIOR ADMINISTRATION OFFICE
ADMINISTRATIVE ASSISTANTS
STUDENT OFFICES
AUDITORIUM
LARGE CLASSROOMS
SMALL CLASSROOMS
SEMINAR ROOMS
INSTRUCTIONAL LABS
SUPPORTING ROOMS
RESTROOMS
CORRIDORS



BASEMENT



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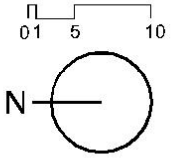
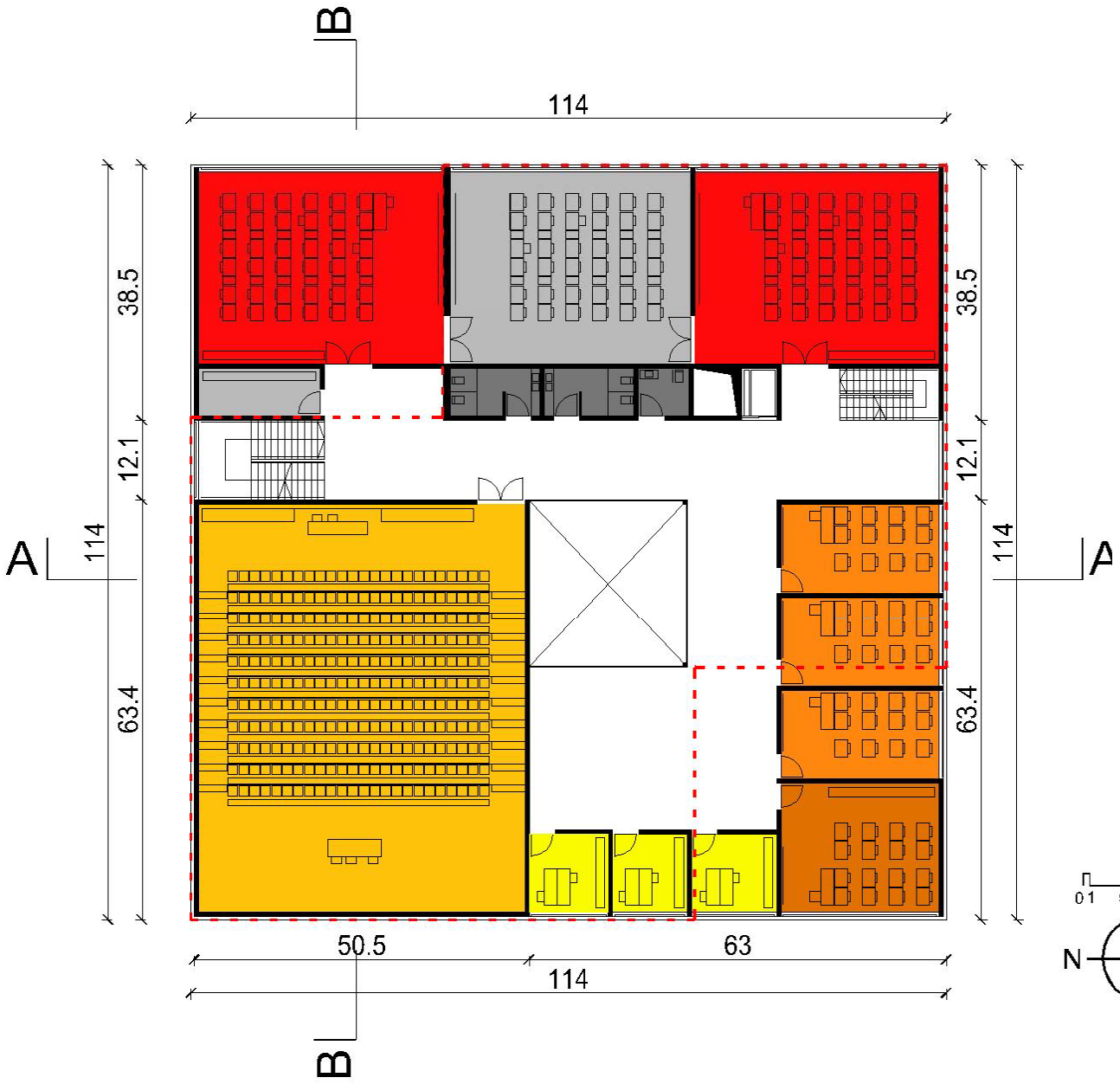


GROUNDFLOOR



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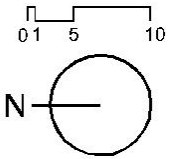
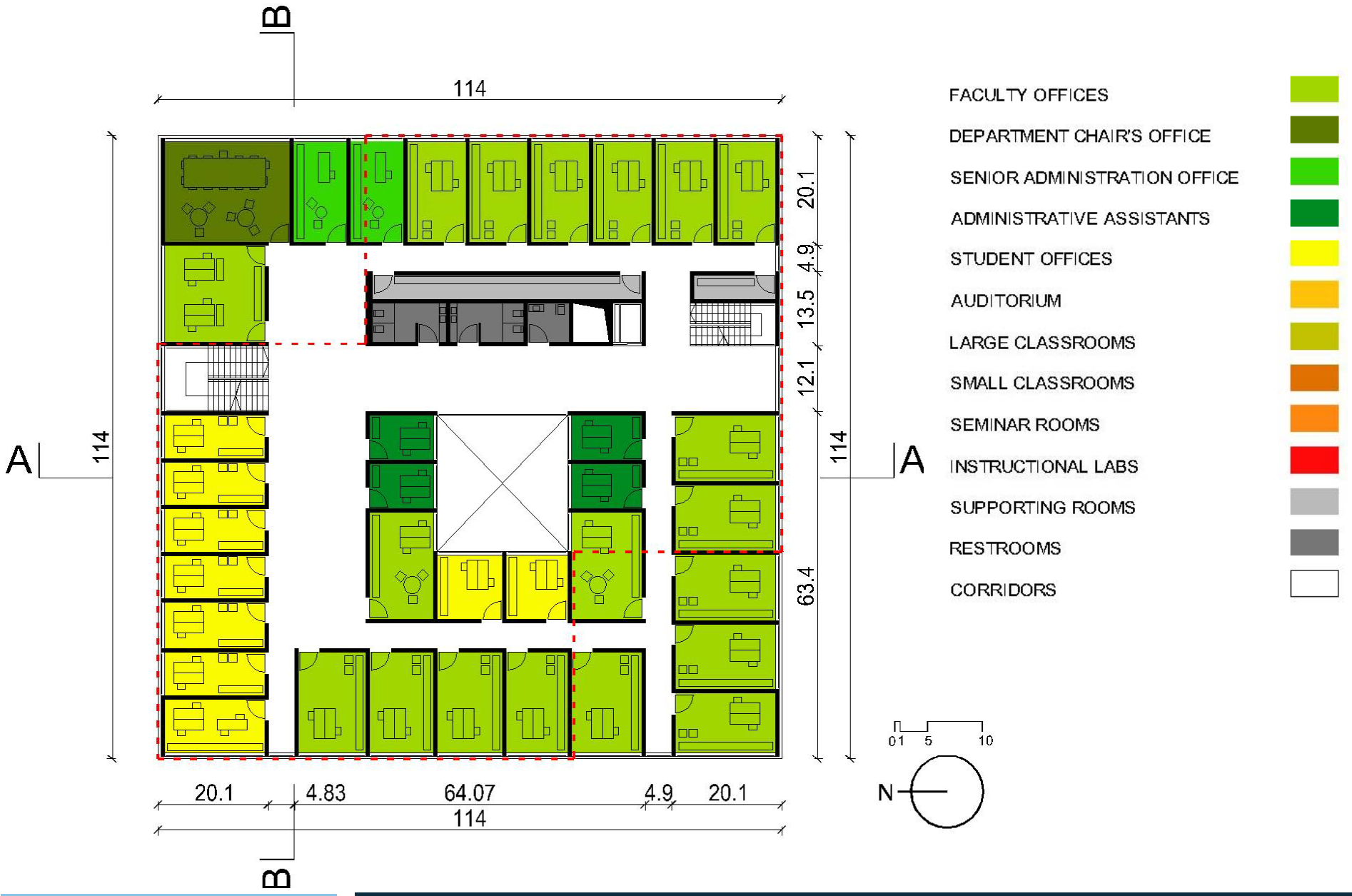
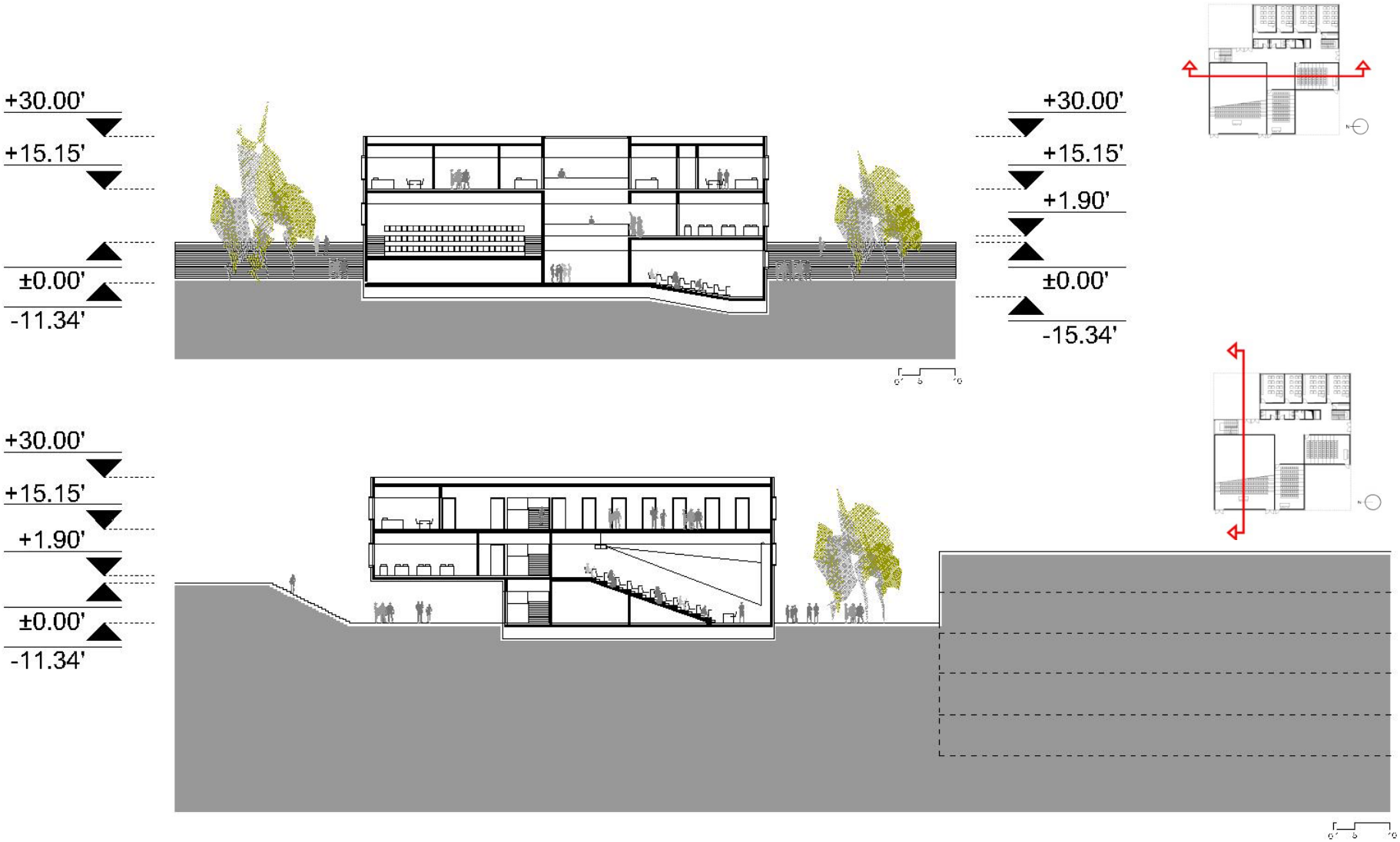


FIRST FLOOR

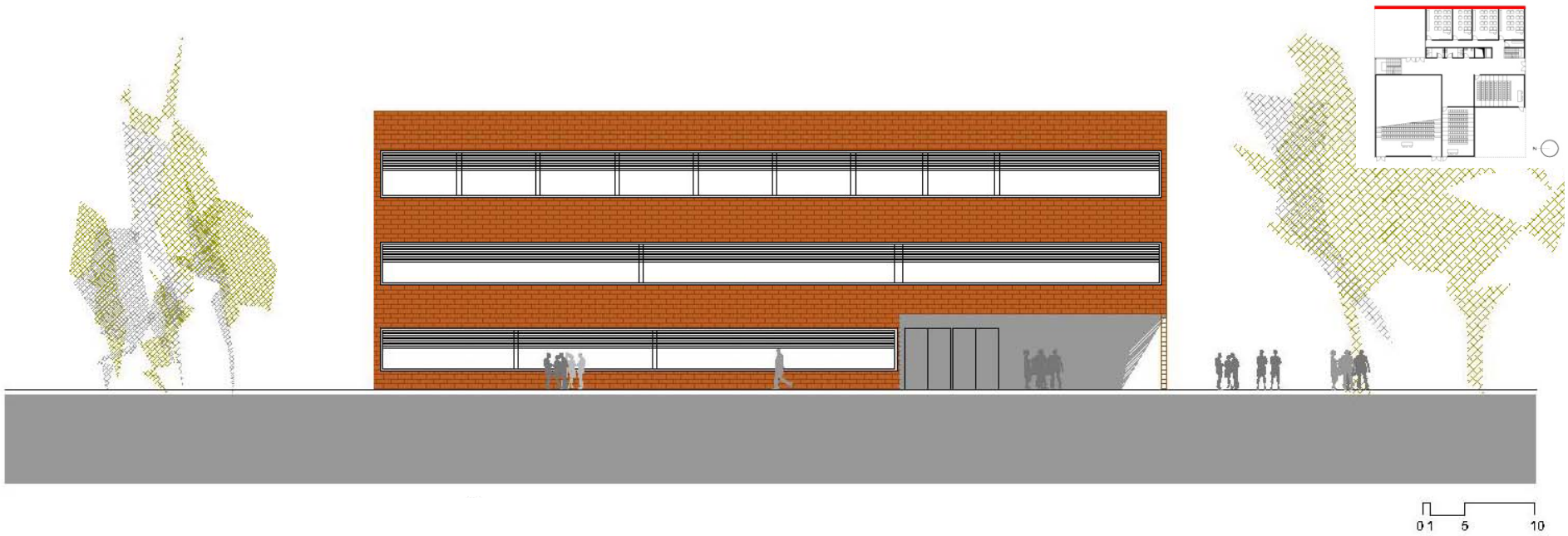


SECOND FLOOR

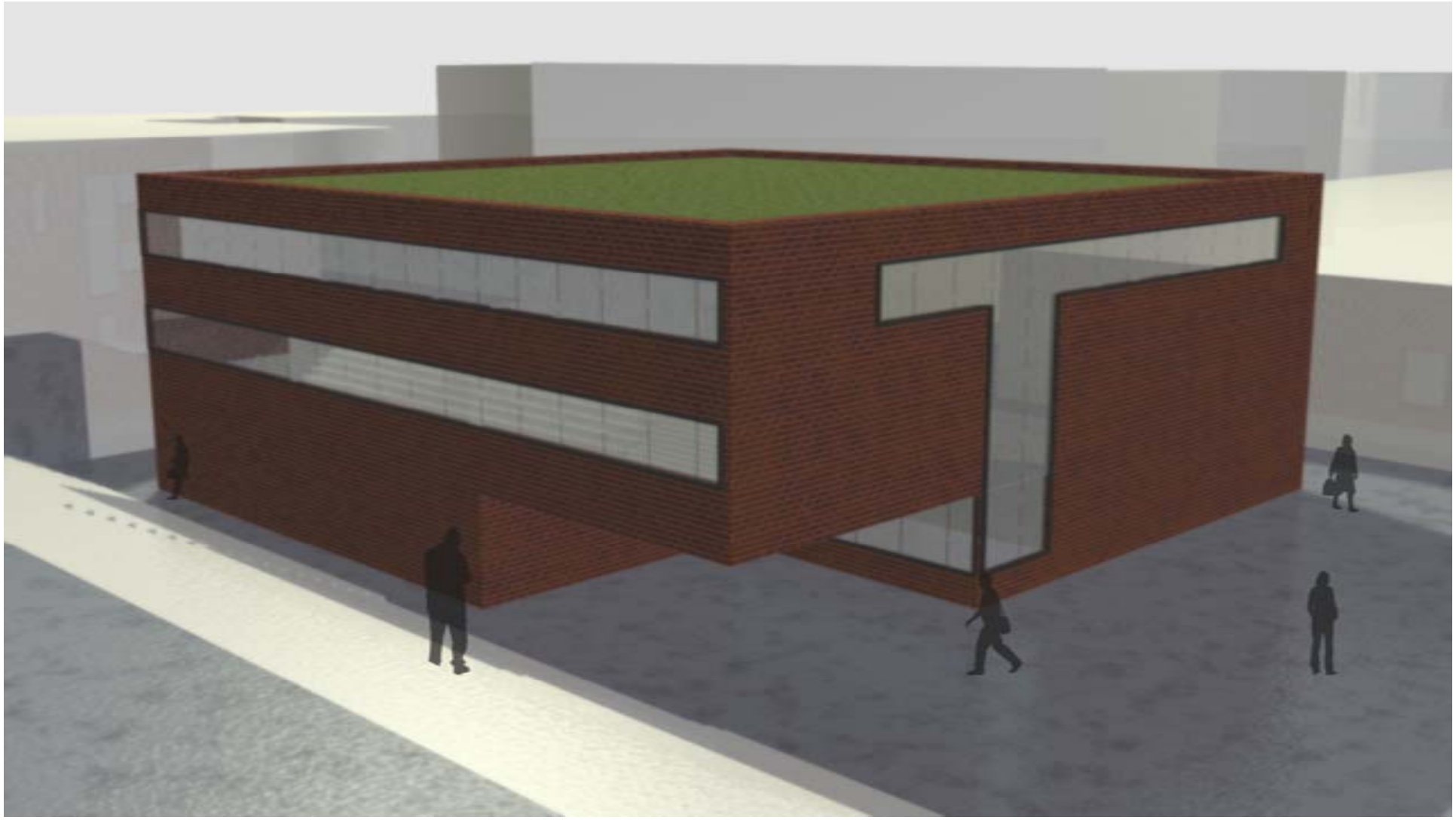


CROSS – SECTION A – A and B - B

WEST and SOUTH ELEVATION



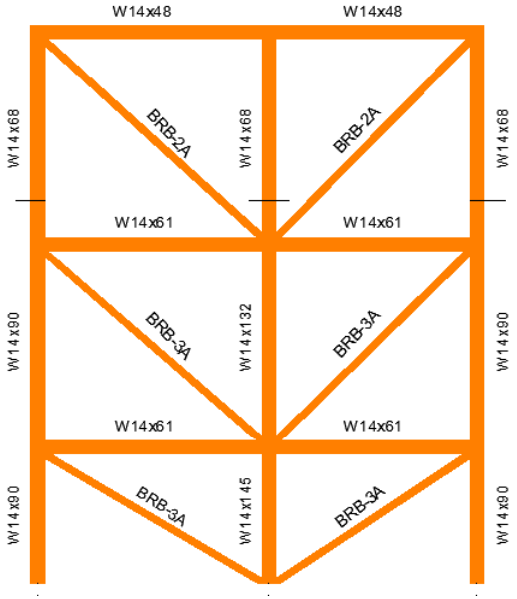
NORTH and EAST ELEVATION



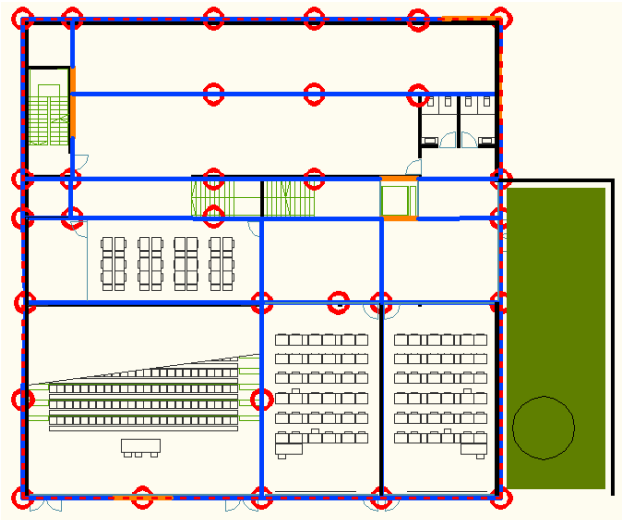
3D VIEW

3D VIEW

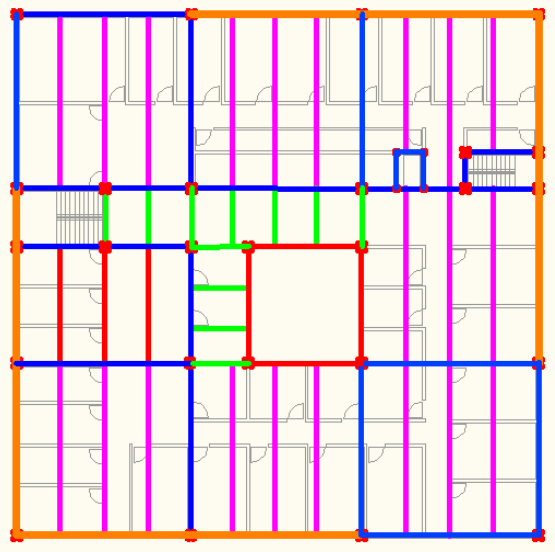
Goals as Structural Engineers



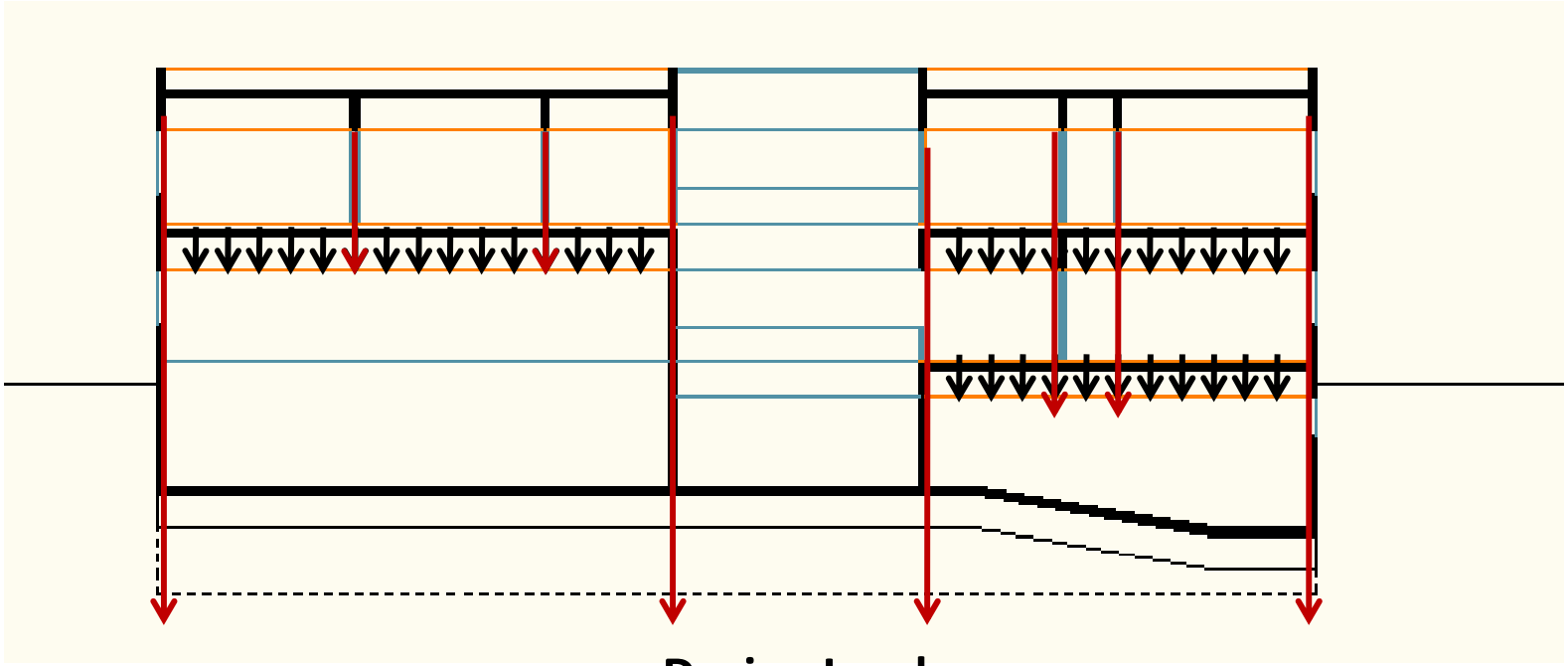
Ductility to give safety for earthquake events



Simple inexpensive system



Simple repetitive system for fast construction



Design Loads

Dead Load:

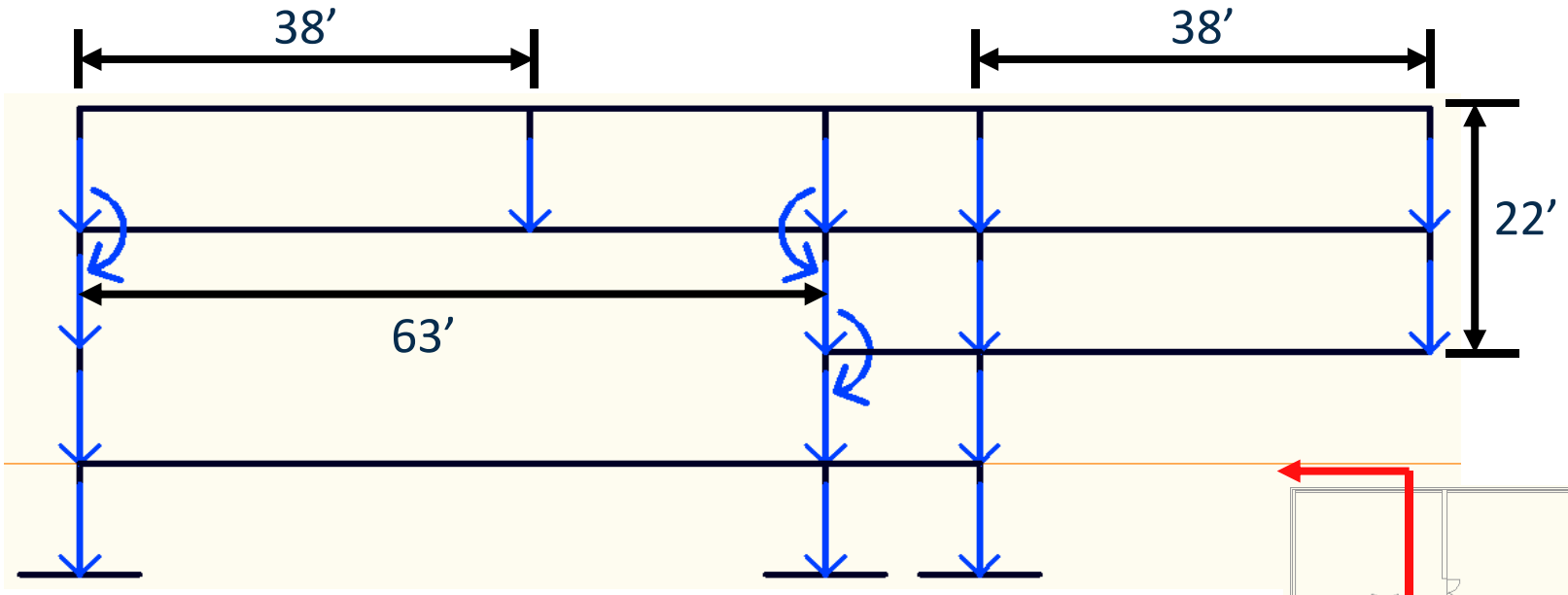
Miscellaneous Loads: 30 psf

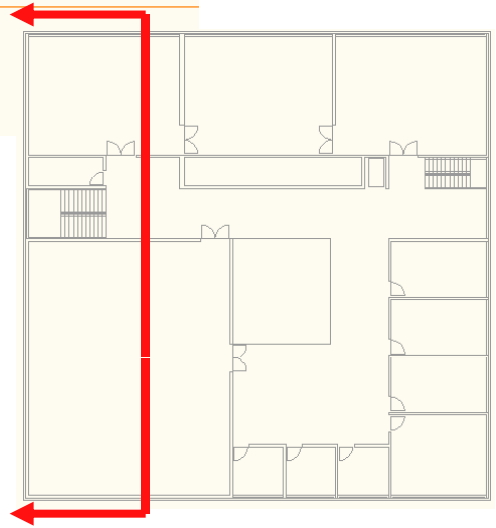
Concrete and Deck: 60psf

Live Load:

For Flexibility: 100 psf

Most Intense FBD Section Cut Through Building





- Large cantilevers
- Long spans because large rooms
- Lateral load paths depend on lateral system

HOLLOWING – SOLUTION 1

Why Composite Structural System?

Architectural

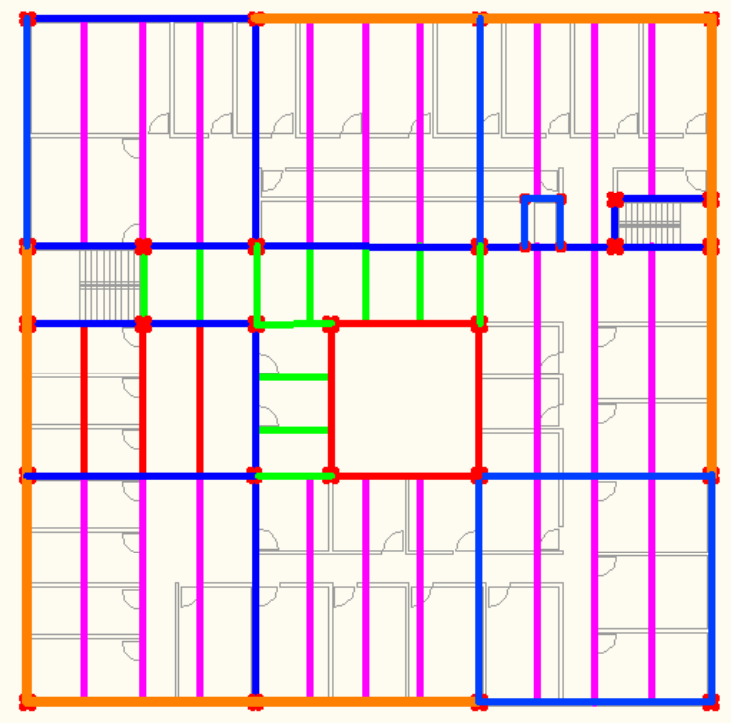
- Program allowed for very regular, rectangular bays

Construction Management

- Repetitive Steel Sizes = Faster Construction
- Metal deck removes need for shoring

Lateral System

- Allows use of steel moment resisting frame



Composite Floor System over Architecture

W 12 x 58 For Typical 38’ Filler Beams

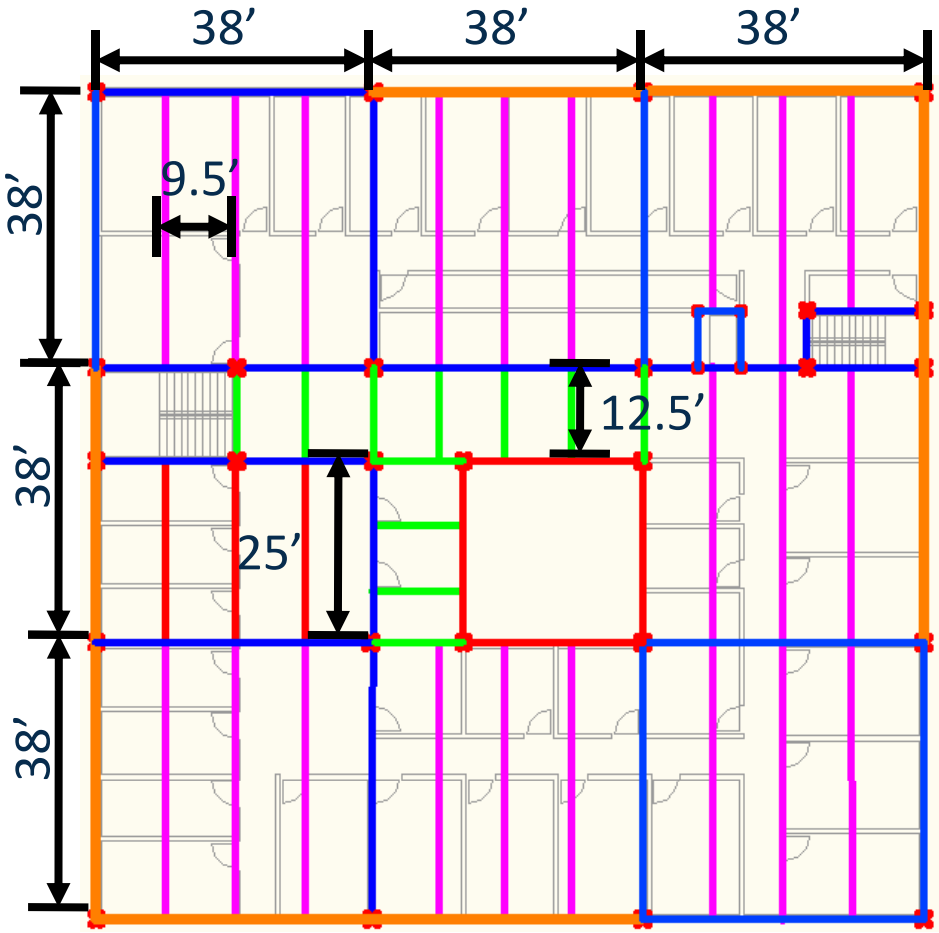
W 18 x 143 For Typical 38’ Joists

W 10 x 26 For Typical 25’ Filler Beams

W 8 x 15 For Typical 12.5’ Filler Beams

Moment Resisting Frame

3rd Floor:



Composite Floor System over Architecture

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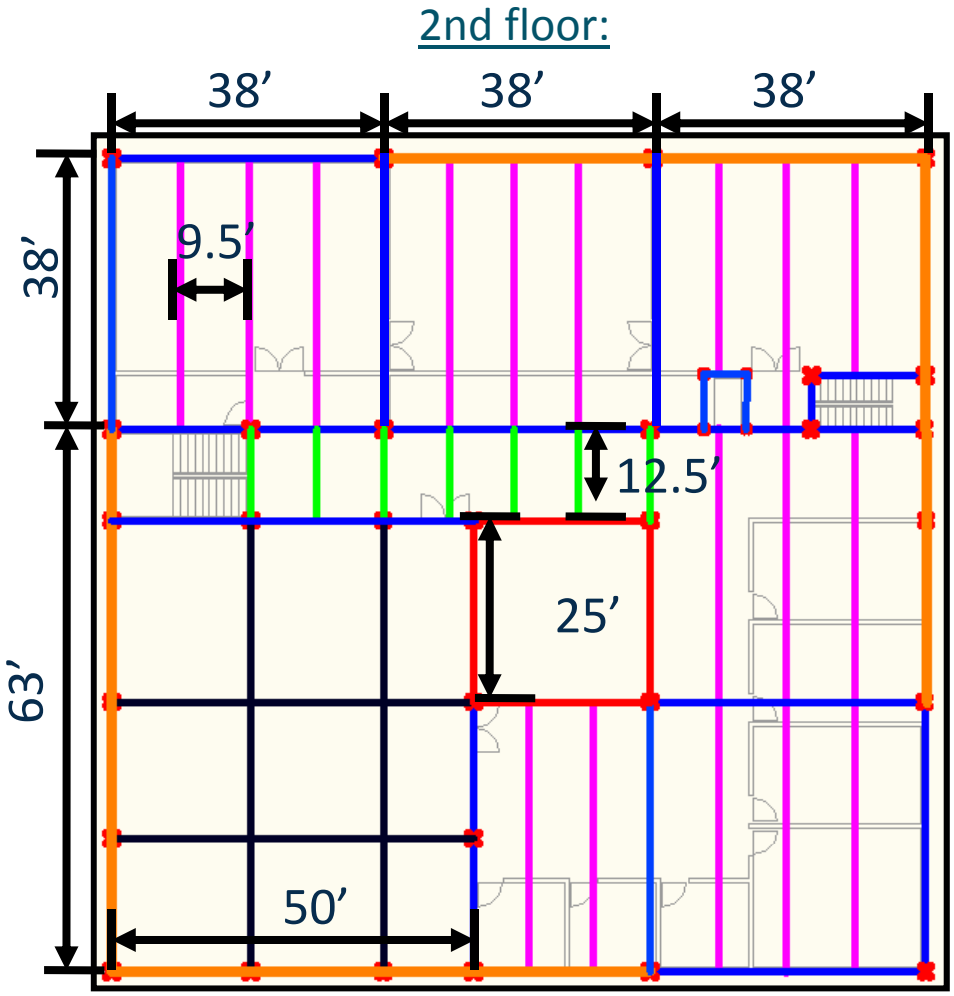
W 18 x 143 For Typical 38’ Joists

W 10 x 26 For Typical 25’ Filler Beams

W 8 x 15 For Typical 12.5’ Filler Beams

Moment Resisting Frame

Auditorium



Composite Floor System over Architecture

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W 18 x 143 For Typical 38’ Joists

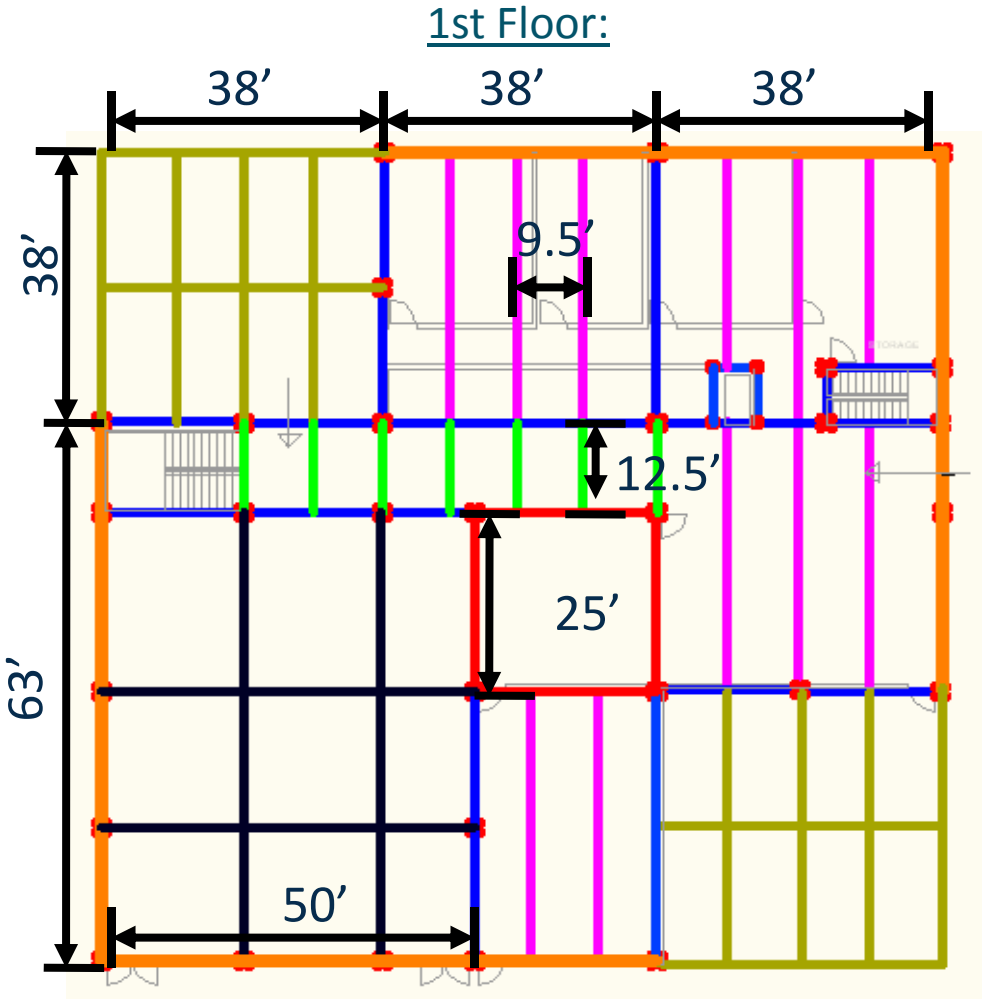
W 10 x 26 For Typical 25’ Filler Beams

W 8 x 15 For Typical 12.5’ Filler Beams

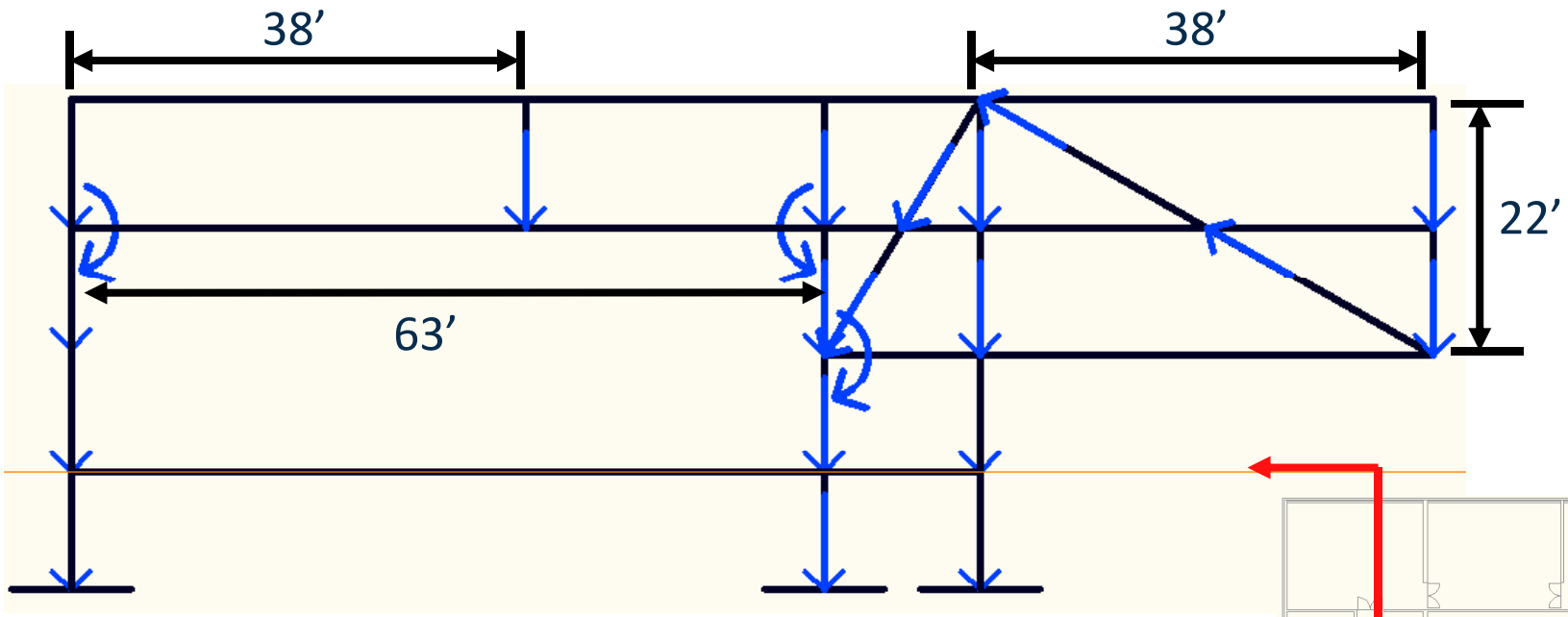
Moment Resisting Frame

Auditorium

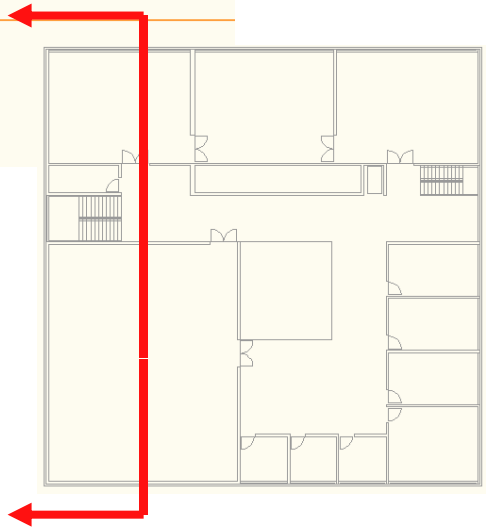
Cantilever



Diagonal Solution to Cantilever

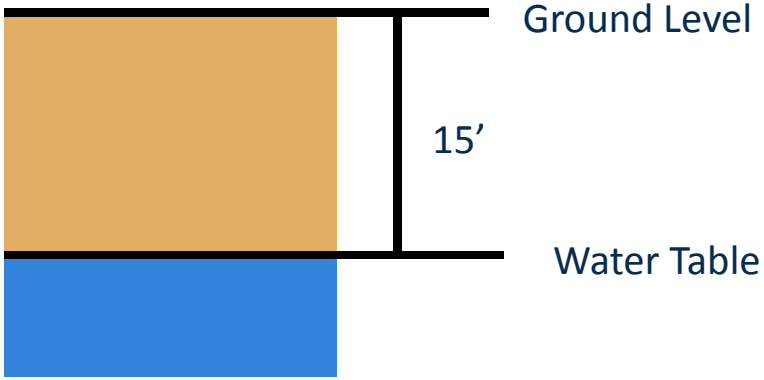


- Diagonal placed on each face of cantilever
- Tie back will make size smaller
- Preliminary Size - W 14 x 99

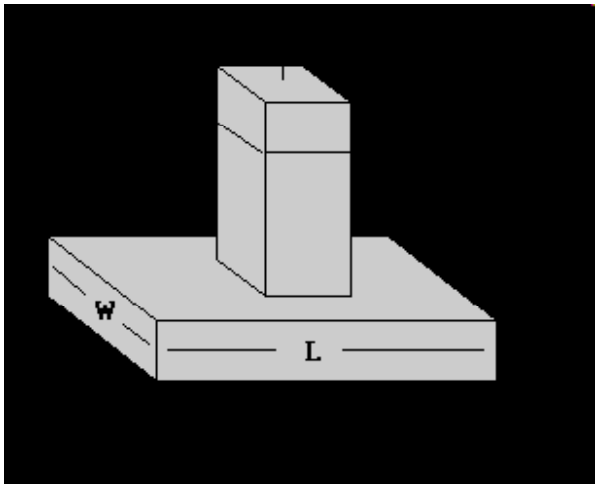


Structural Engineering (Hollowing 1)

Spread Footing Foundation System



Soil properties: Sandy
5000psf admissible net stress
Water table at -15ft



Footings will be located to ensure uniform behavior without differential settlements

Preliminary Design

✓Based off an approximate weight of building to be 7000kips

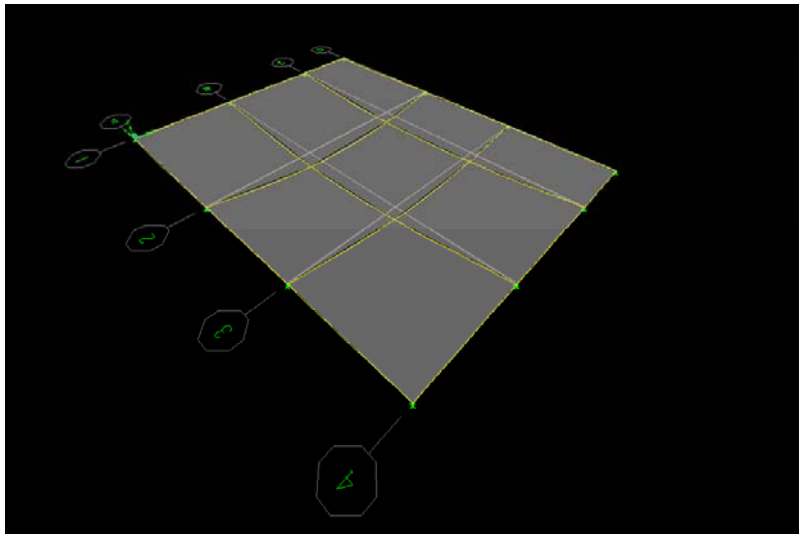
✓We need 14,000 ft^2 of bearing area

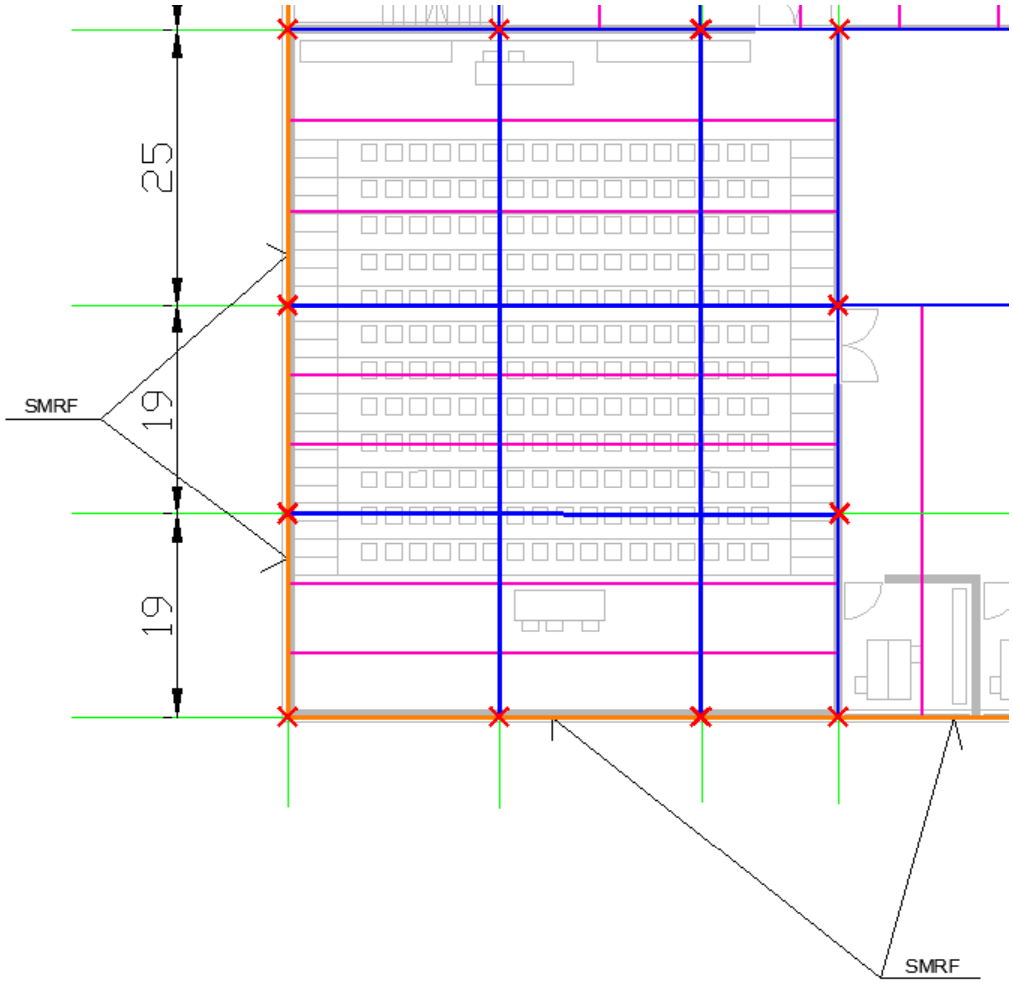
✓We need 14 square spread footings 10’ x 10’

Structural Engineering (Hollowing 1)

Auditorium:

- 63ft x 50ft of free-column space
- Grid of W30x90 girders with moment connections



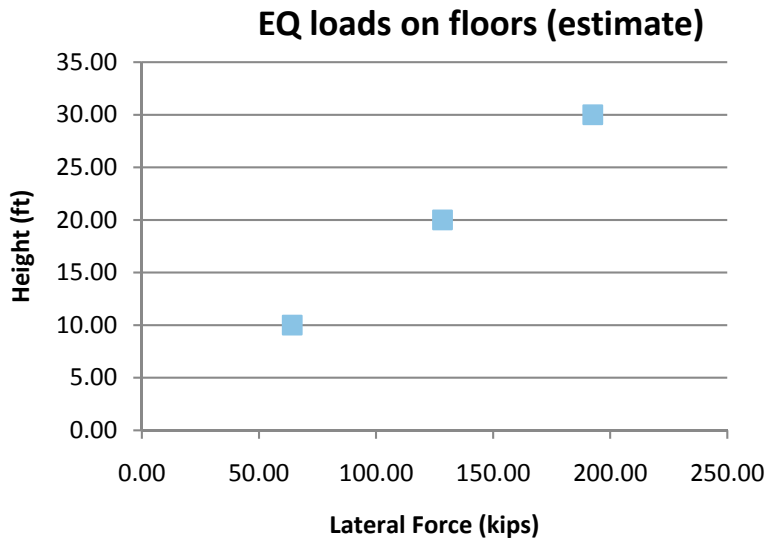


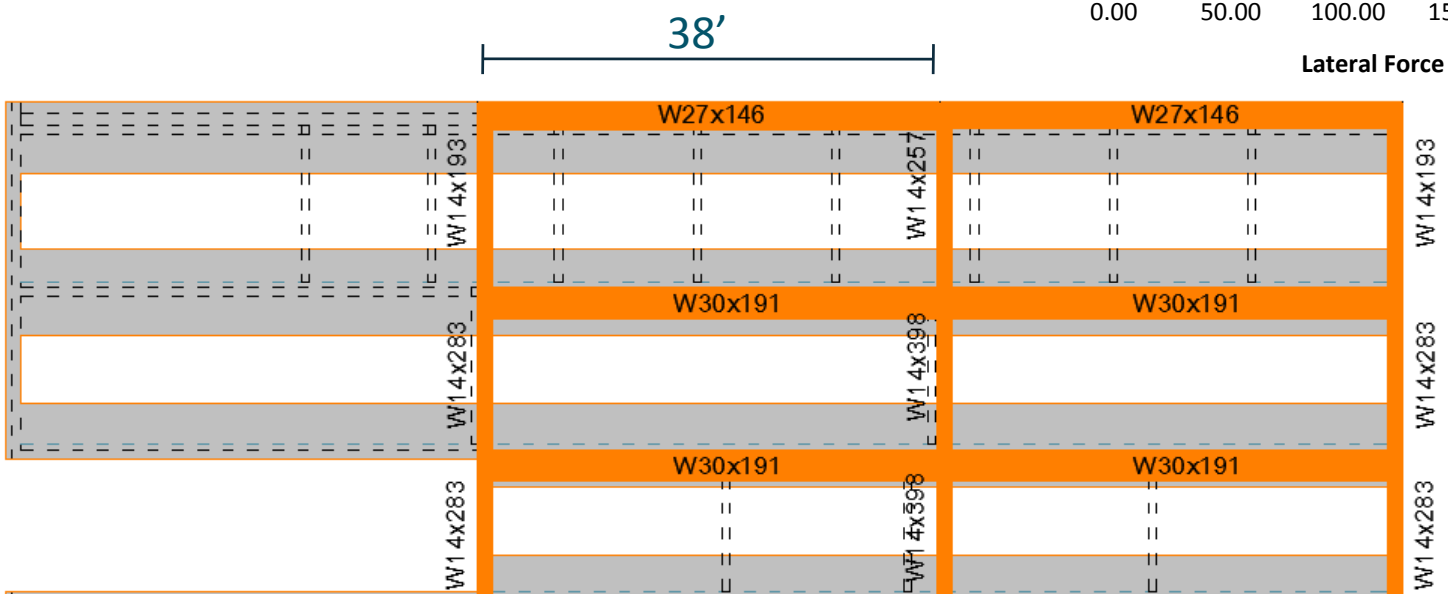
Structural Engineering (Hollowing 1)

Central Team

Lateral System:

- ✓Spectral acceleration: Ss = 1.779g, S1 = 0.609g
- ✓Design base shear (ELF) = 385 kips, R = 8
- ✓2-bay Special Moment Resisting Frames





HOLLOWING– SOLUTION 2

Structural Engineering (Hollowing 2)

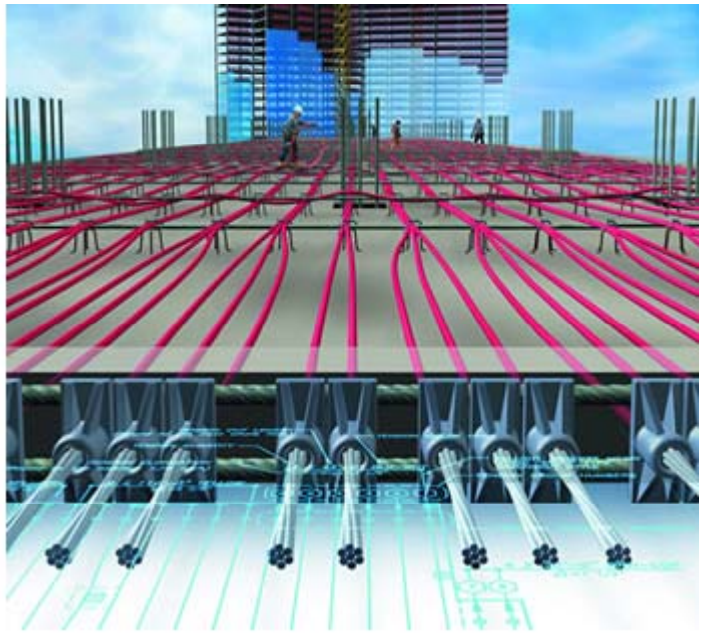
Concrete shear walls with post-tensioned slabs

Benefits:

- Increase floor to ceiling height
- Best way to tie into concrete shear walls

Issues:

- More time in construction
- More expensive



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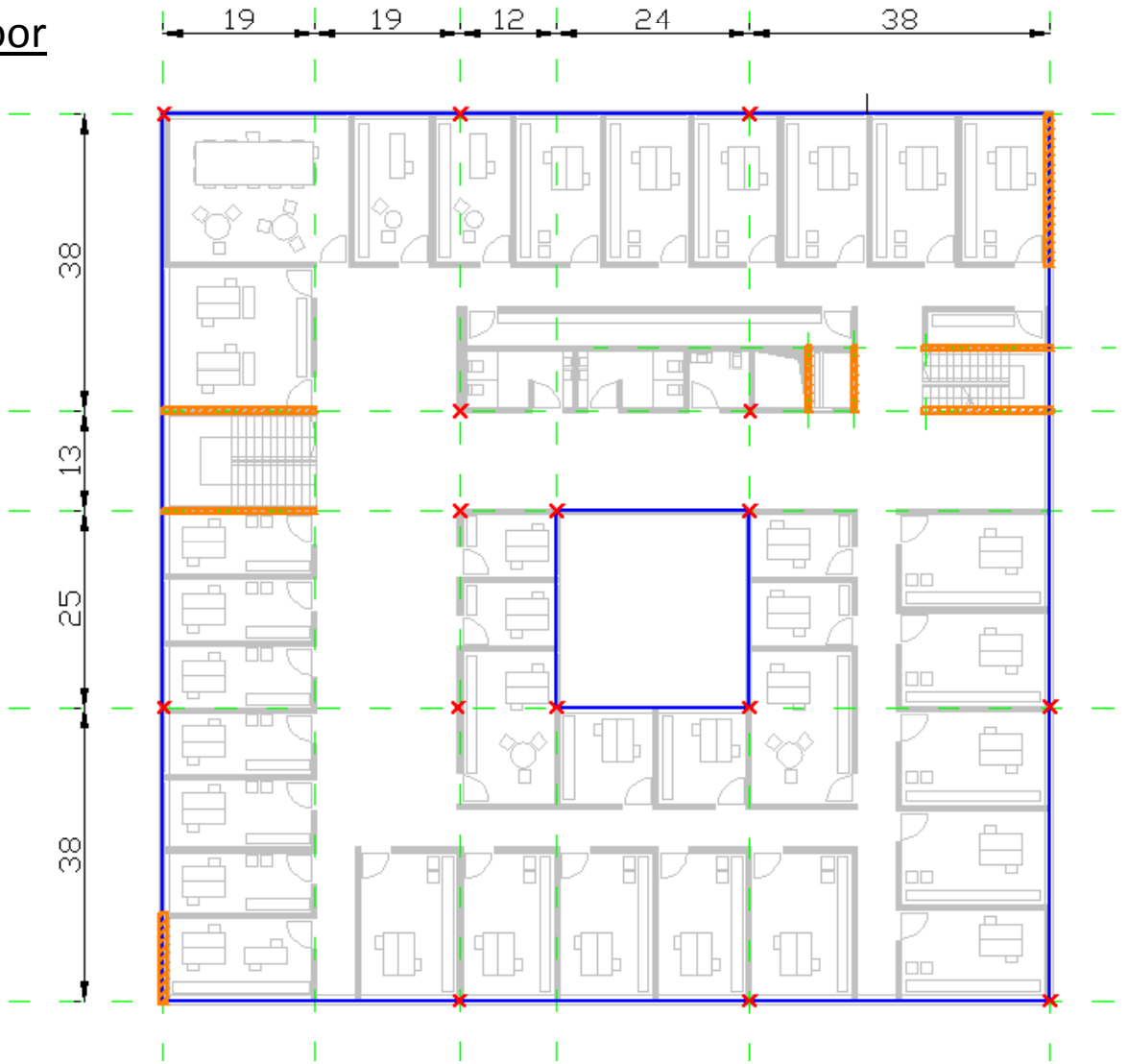
Structural Engineering (Hollowing 2)

3rd Floor



Post – tensioned floor

- Flat Slab thickness = 12’’
- Capitals at columns (18’’)
- Strand layout: 4’’ spacing

Shear Walls

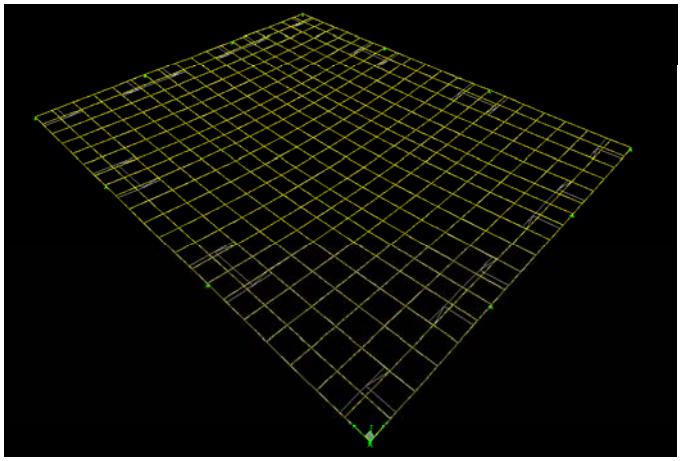
- Design Base shear = 600 kips
- R = 5
- t = 10’’ N-S direction
- t = 8’’ E-W direction

Structural Engineering (Hollowing 2)

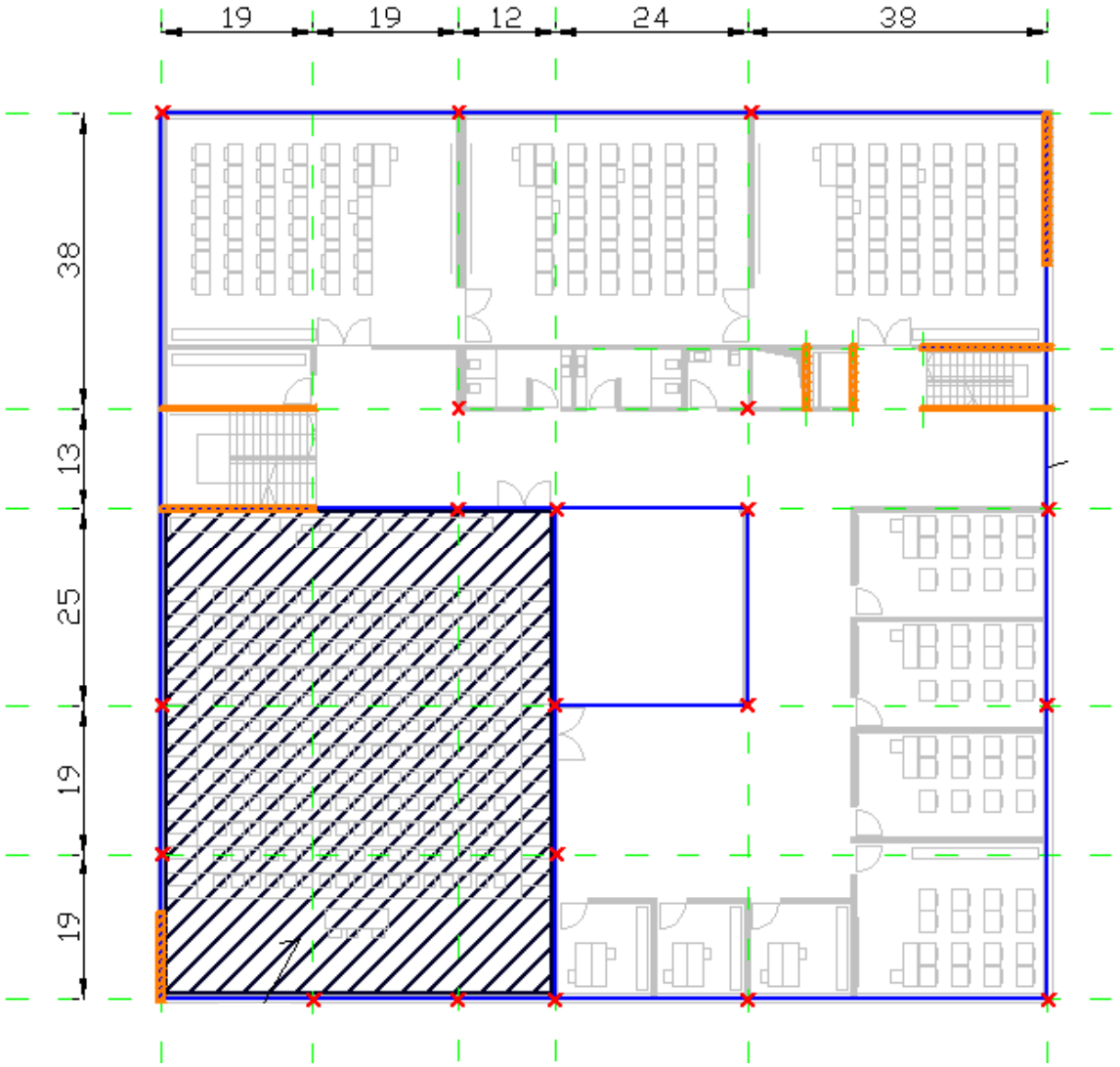
Central Team

Auditorium:

- 63 ft x50 ft
- 2-way ribbed (waffle) slab
- 18'' depth - 36'' rib spacing

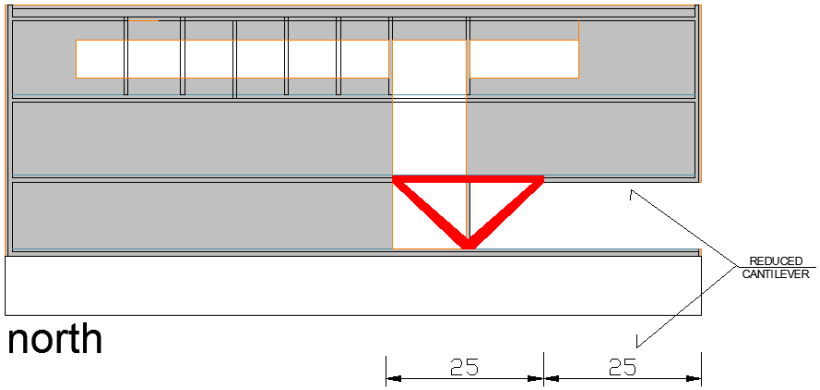


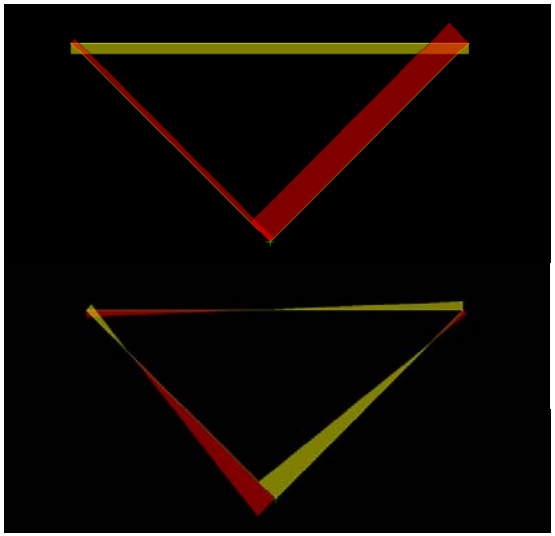
2nd Floor



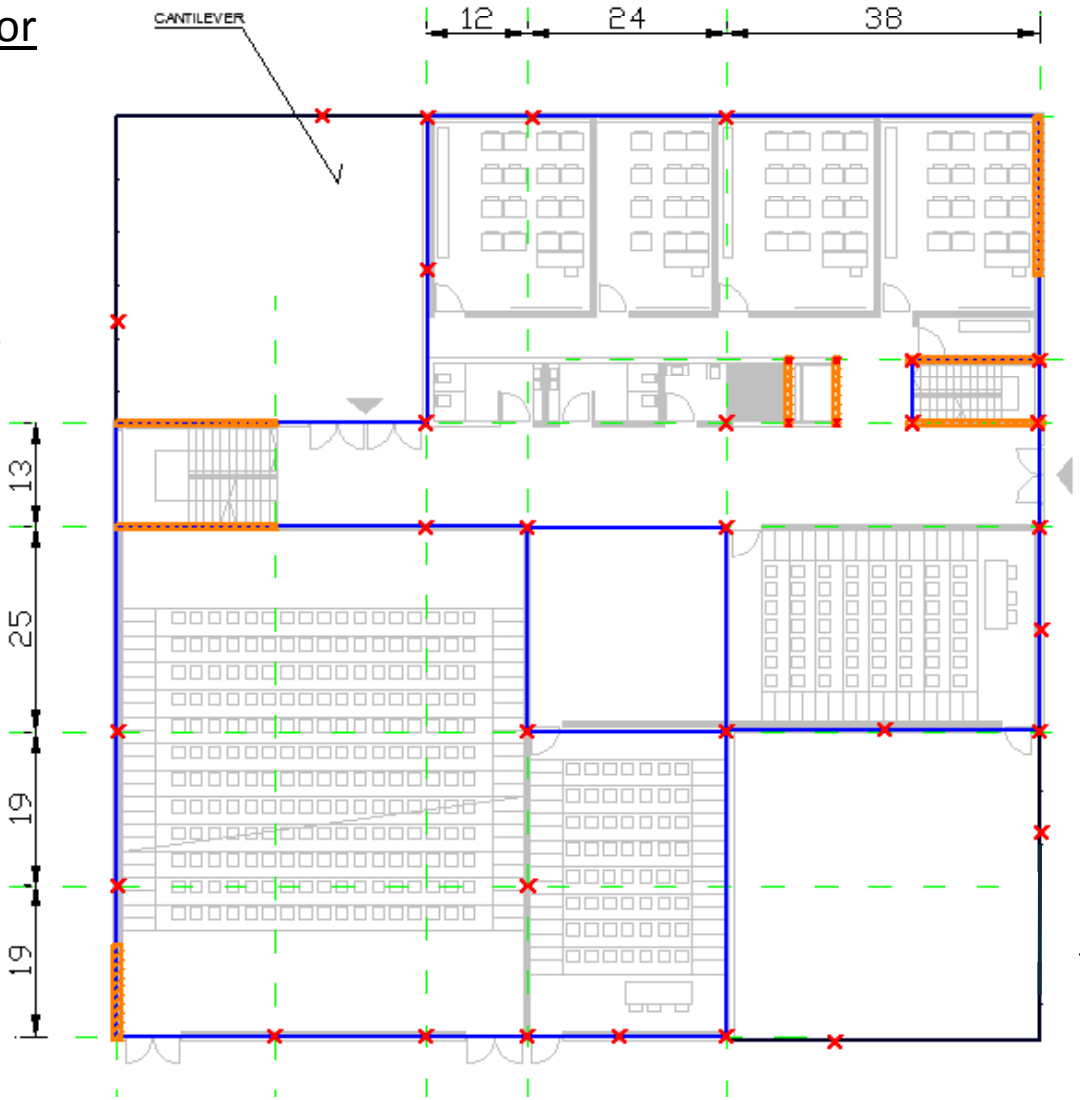
Structural Engineering (Hollowing 2)

Cantilever (38 ft)





1st Floor



Hollowing

	Steel	Concrete	Budget
Substructure	1 010 336	1 010 336	675 000
Superstructure	1 322 922	1 027 780	750 000
Shell	1 135 019	887 150	1 042 500
Interiors	1 105 500	1 221 000	1 582 500
Services	2 644 500	2 644 500	3 000 000
Equipment & Furnishings	90 000	90 000	75 000
Landscaping	75 000	75 000	75 000
Building Sitework	256 975	256 975	300 000
TOTAL	**7 640 253**	**7 212 741**	**7 500 000**

Detailing Example: Hollowing Steel

	Quantity	Unit	Time/Unit	Time Total	Cost/Unit	Cost Total	Budget	% of total
Superstructure								
Steel Structure								
Beam, W 12*58	4009	L.F.	0,075	300,675	101,07	405189,63		
Beam, W 10*26	300	L.F.	0,093	27,9	49,96	14988		
Beam, W 6*20	383	L.F.	0,093	35,619	39,96	15304,68		
Beam, W 30	912	L.F.			350	319200		
Cantilever	228	L.F.						
Cantilever	76	L.F.						
Column, W 14*193	104	L.F.			300	31200		
Column, W 14*257	52	L.F.			320	16640		
Column, W 14*283	208	L.F.			350	72800		
Column, W 14*398	104	L.F.			400	41600		
Special Moment Resisting Frame								
Beam, W 27*146	304	L.F.			300	91200		
Beam, W 30*191	608	L.F.			350	212800		
Column, W 12*65	360	L.F.	0,055	19,8	100	36000		
Column, W 14*99	400	L.F.	0,057	22,8	165	66000		
						1322922,31	750000	10
TOTAL					**$**	**7640253**	$ 7500000	100

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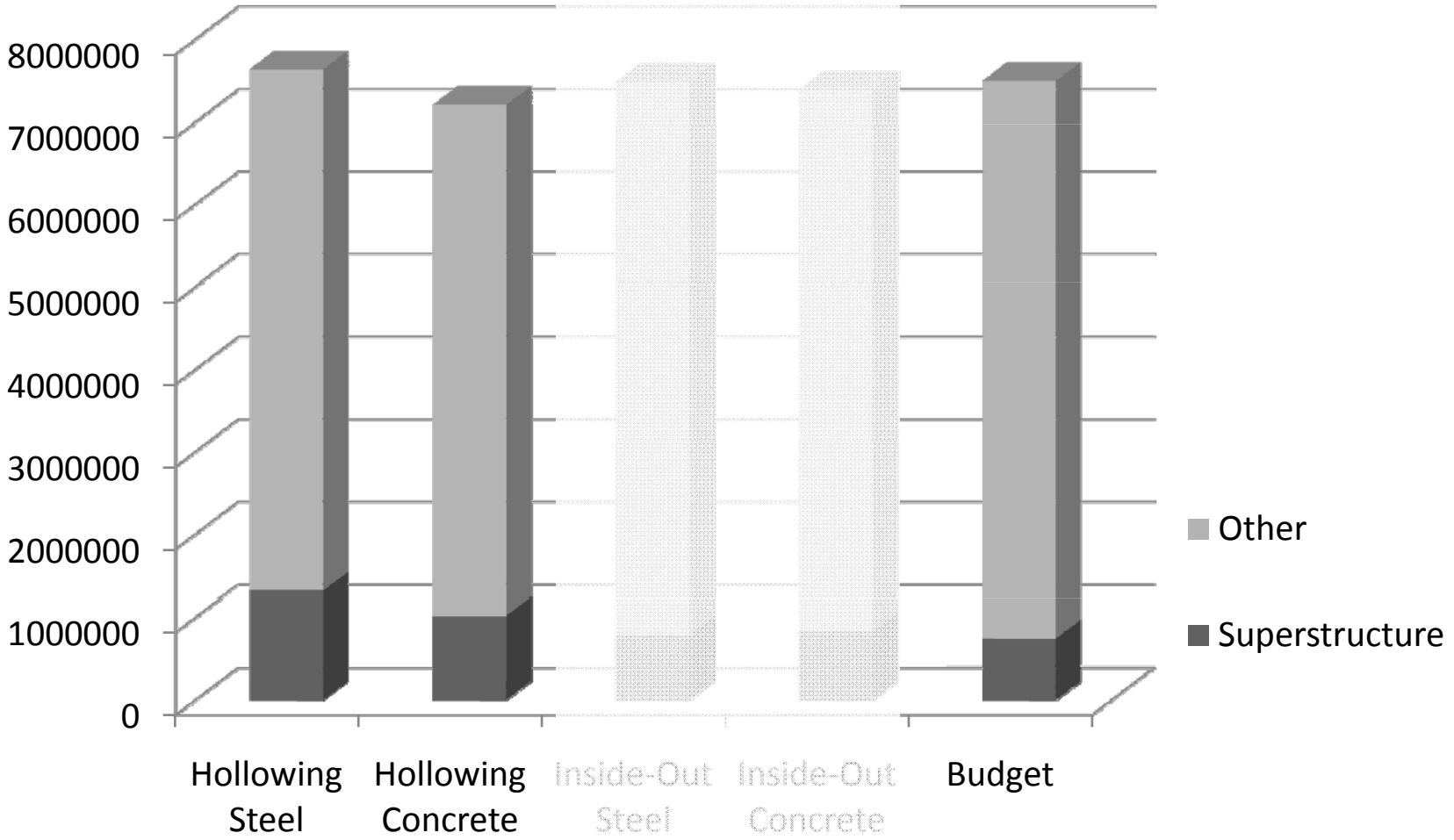
Construction Management – Cost Estimation

Central Team



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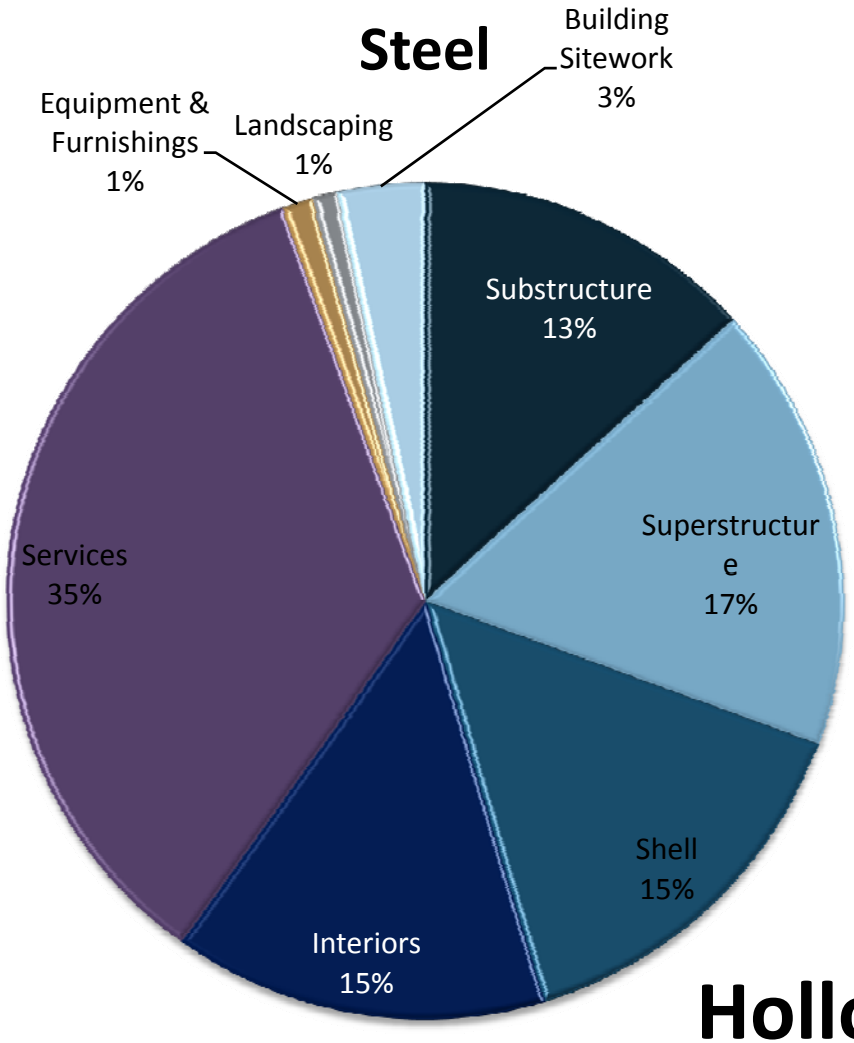
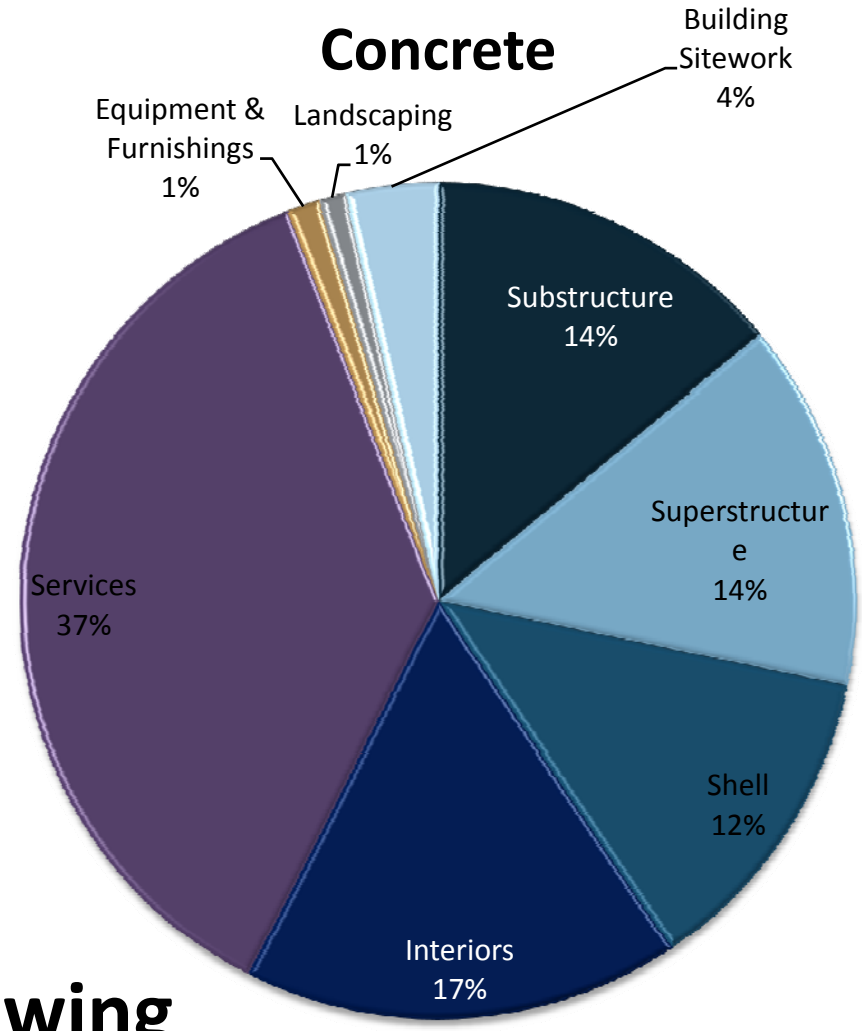
Construction Management – Cost Estimation

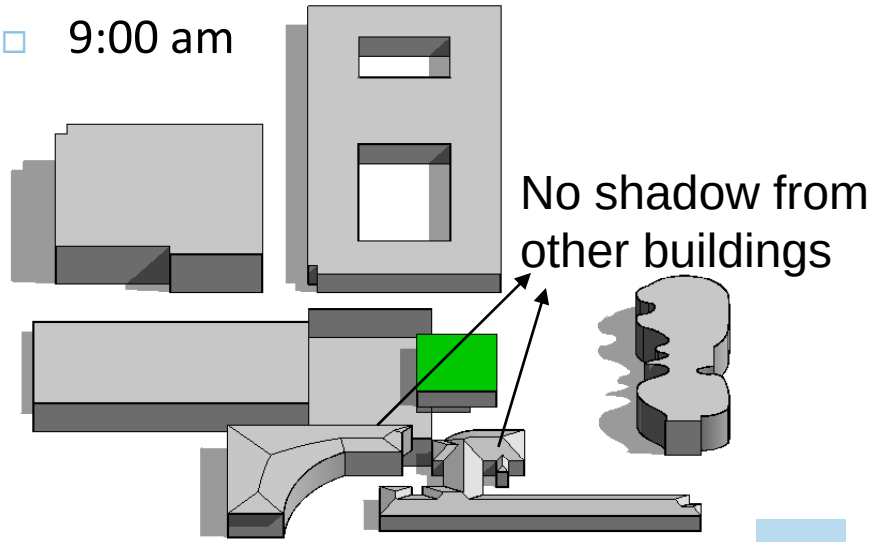
Central Team



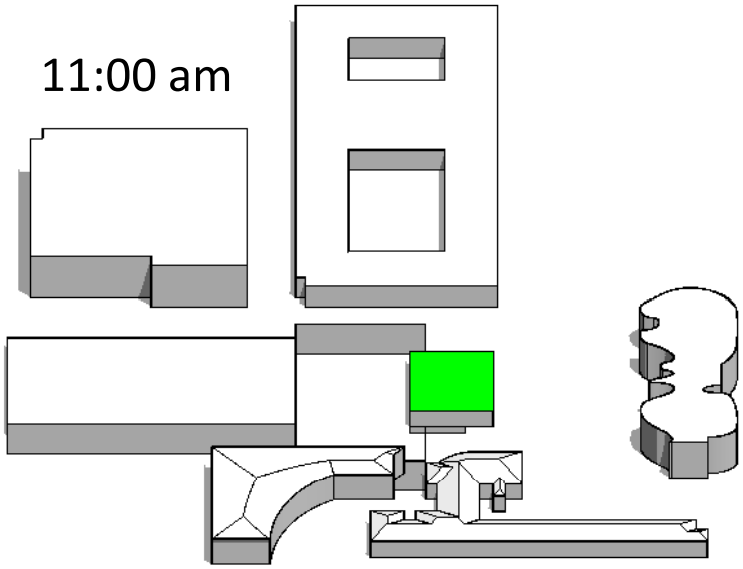


Hollowing

- 9:00 am

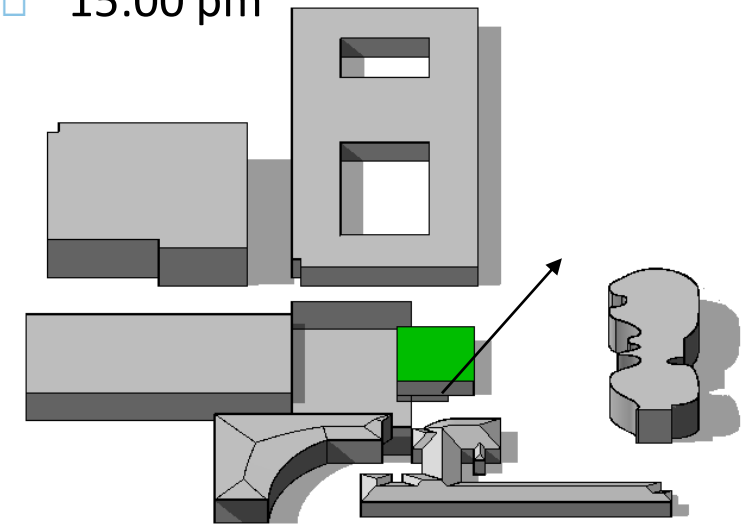


- 11:00 am

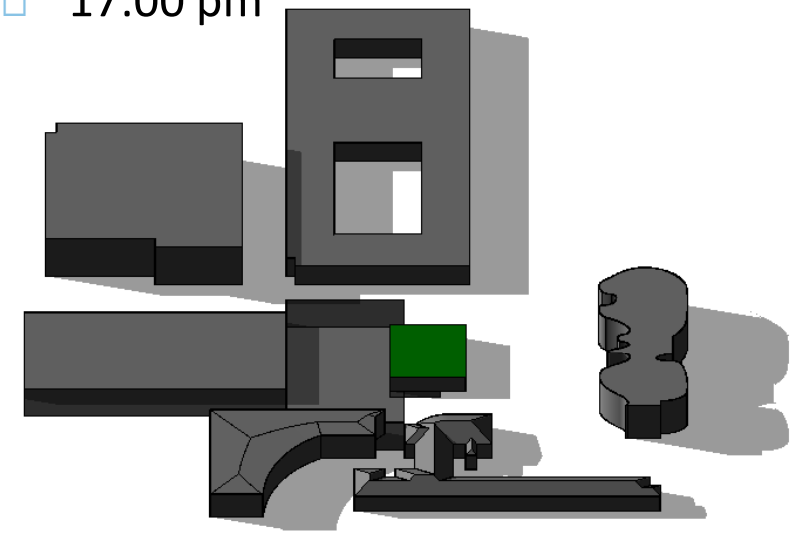


N

- 15:00 pm



- 17:00 pm



SUN PATH - SUMMER SOLSTICE

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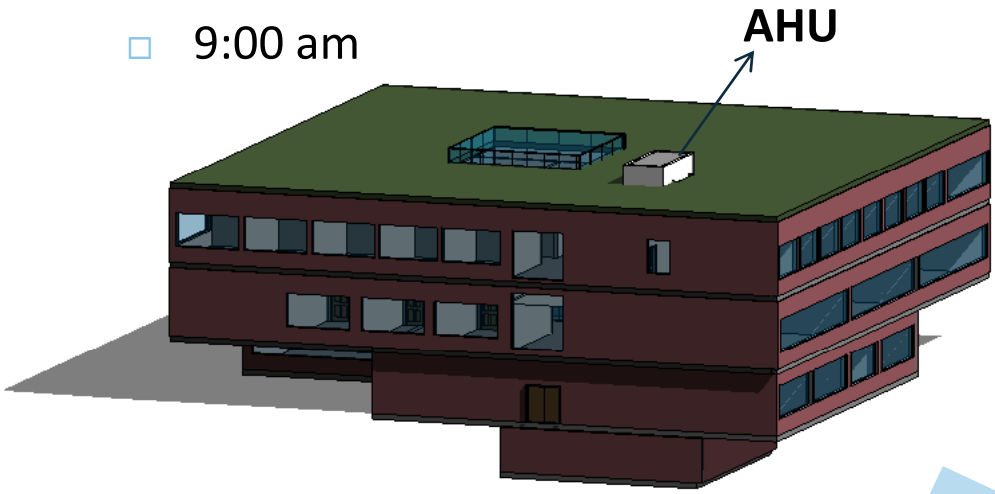
Hollowing: Sun Path - Summer Solstice

- 9:00 am



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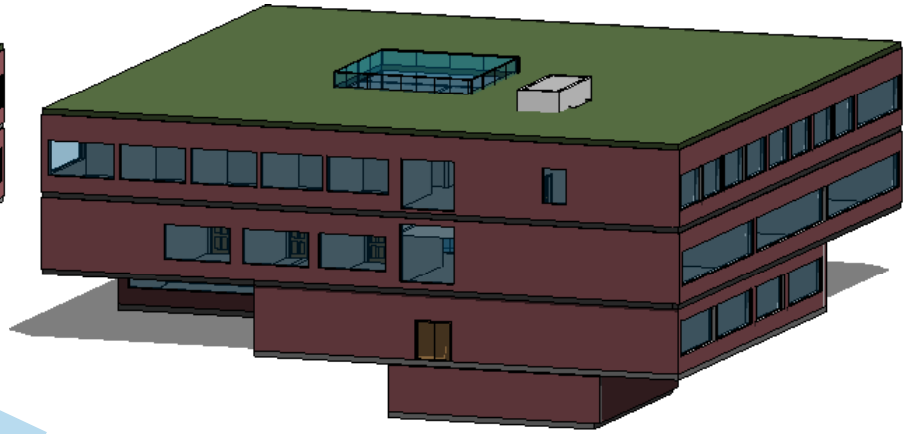

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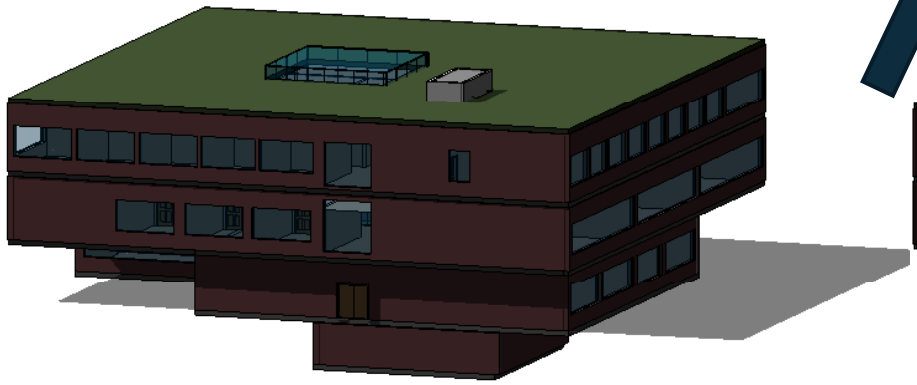
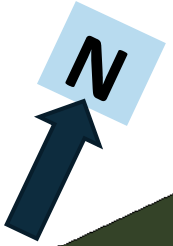
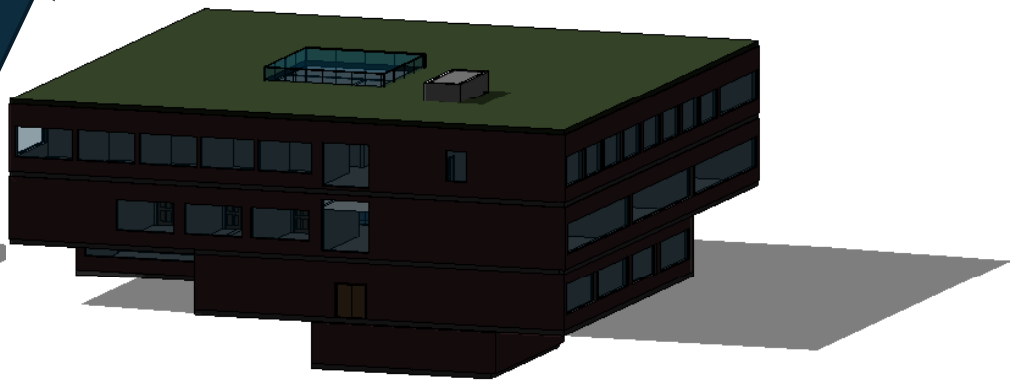




- 16:00 pm



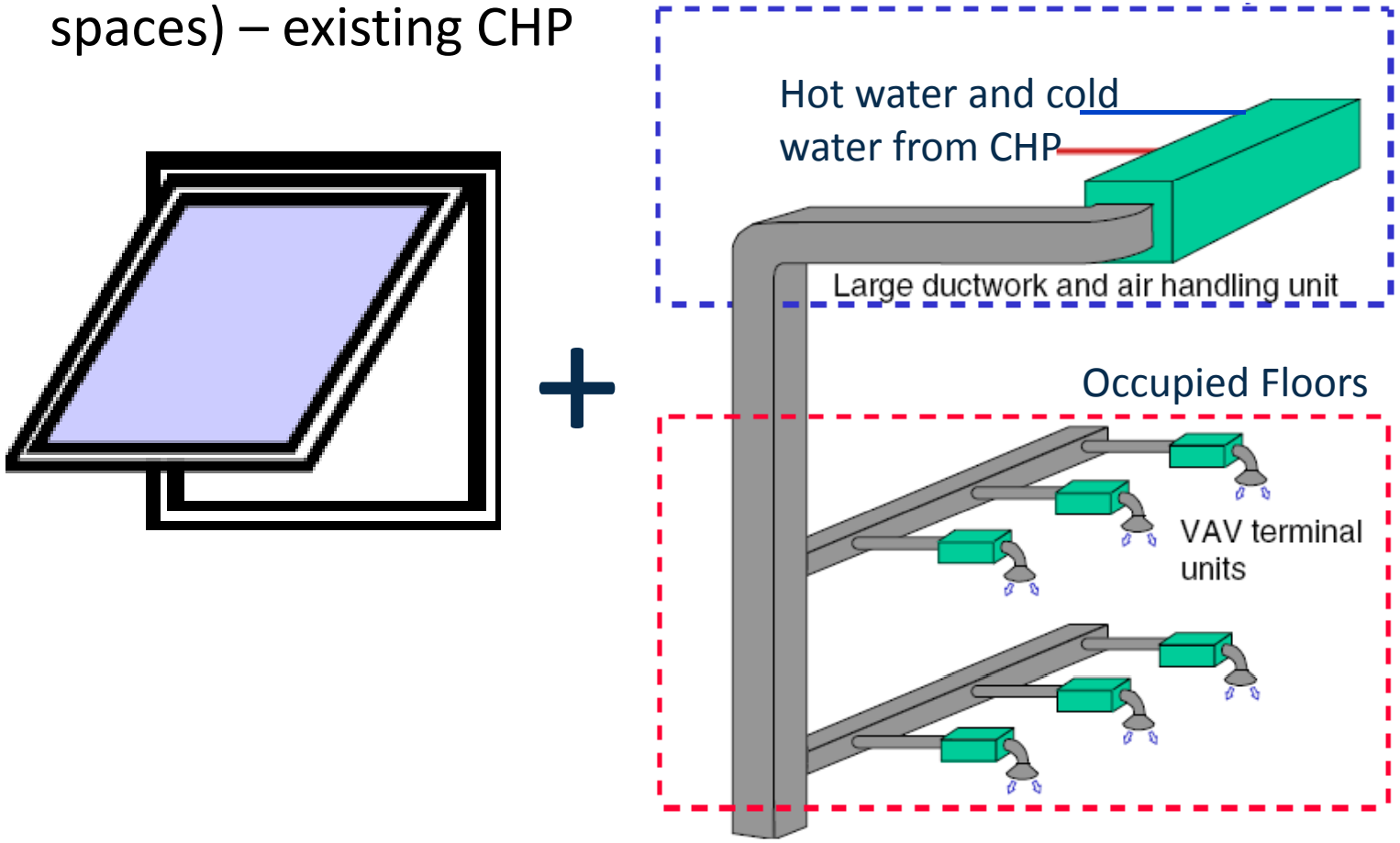
Central Team

MEP Options

- **Option 1** Mixed-mode Conditioning System
  - Scenario 1: Natural ventilation with ceiling-based air distribution (every spaces) – existing CHP
  - Scenario 2: Natural Ventilation with UFAD (underfloor air distribution) (large classrooms, auditorium etc.) and ceiling-based air distribution (offices, small spaces)
- **Option 2** Radiant Heating/Cooling System with Dehumidified Ventilation system
  - Scenario 1: use existing CHP (Combined heat and power) in UCLA to supply heat/cool water and power
  - Scenario 2: install Solar Photovoltaic to supply power

Solution - Option 1 Scenario 1

Natural ventilation with ceiling-based air distribution (every spaces) – existing CHP



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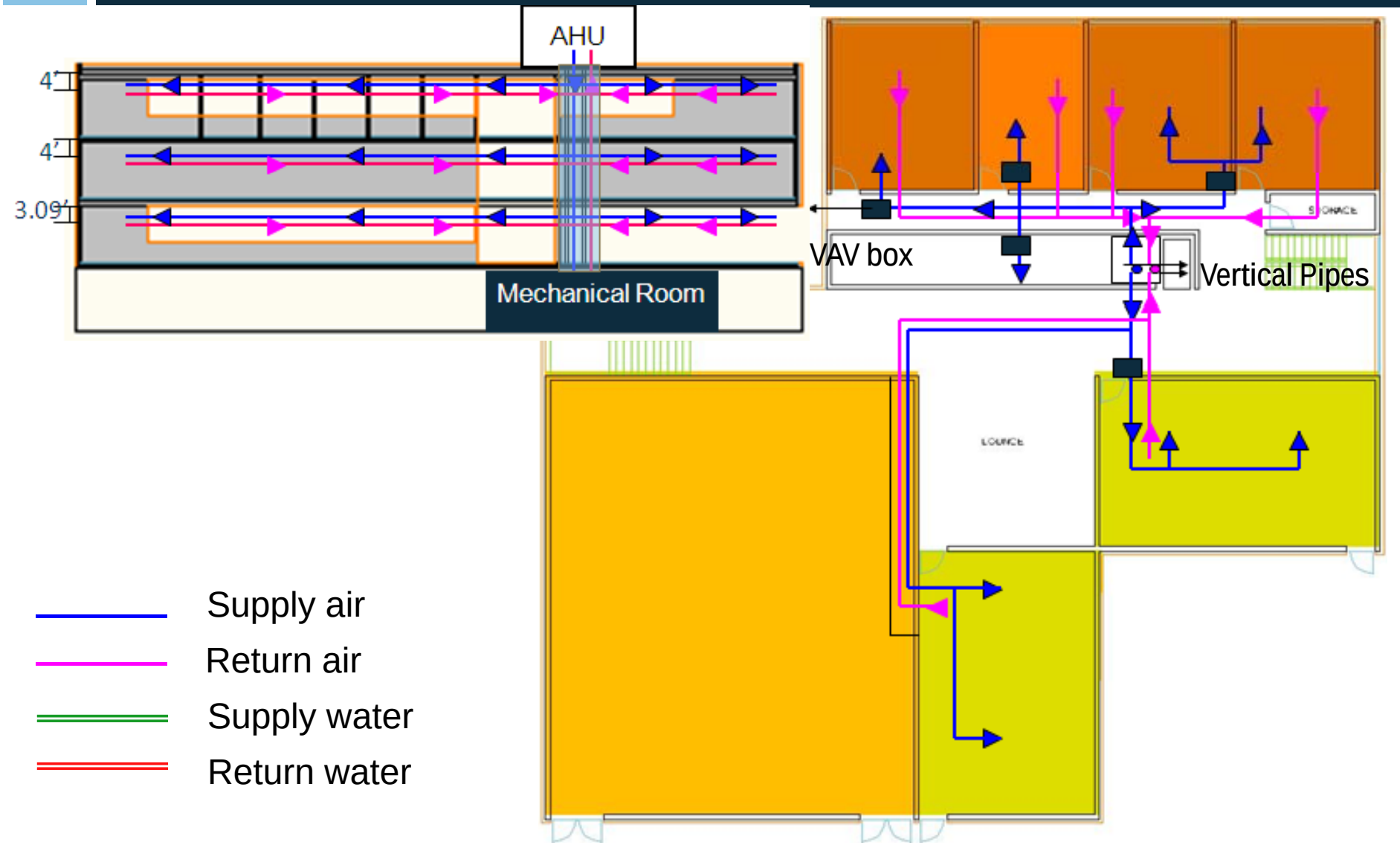
Hollowing: MIX-MODE CONDITIONING SYSTEM



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Hollowing: Energy Usage

- **U-Value:** thermal mass ground floor-0.15W/m2K, Brick cavity walls-0.69W/m2K, others-use ASHRAE benchmark – Max U-Value

Building Summary

Inputs	
Building Type	SchoolOrUniversity
Area (m²)	2,702
Volume (m³)	8,882.10
Calculated Results	
Peak Cooling Total Load (W)	311,976 **115W/m2**
Peak Cooling Month and Hour	September 10:00 AM
Peak Cooling Sensible Load (W)	265,026
Peak Cooling Latent Load (W)	46,950
Maximum Cooling Capacity (W)	372,943
Peak Cooling Airflow (L/s)	24,203.6
Peak Heating Load (W)	68,056 **25W/m2**
Peak Heating Airflow (L/s)	3,912.7
Checksums	
Cooling Load Density (W/m²)	115.46
Cooling Flow Density (L/(s·m²))	8.96
Cooling Flow / Load (L/(s·kW))	77.58
Cooling Area / Load (m²/kW)	8.66
Heating Load Density (W/m²)	25.19
Heating Flow Density (L/(s·m²))	1.45

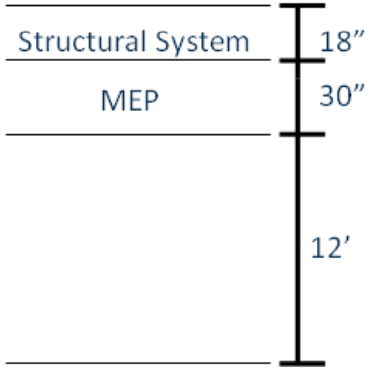
Team Learning Process

Central Team

Interaction with A, C, Rest of team, and Mentor Critic

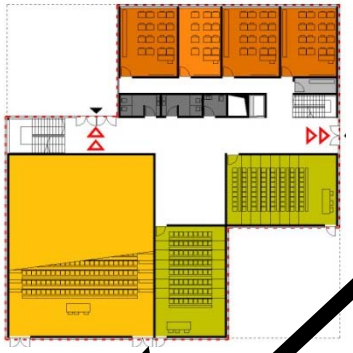
E + A+ MEP

Communicate system depths



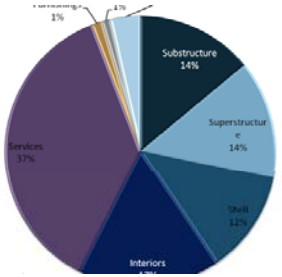
A

Set floor heights and layouts



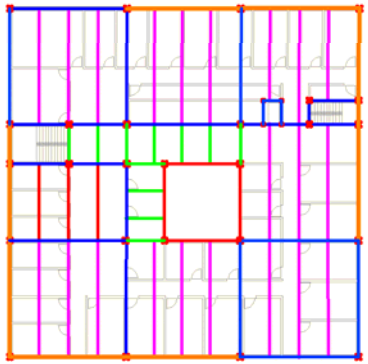
C

Communicate cost estimates



E + MEP

Design system and do takeoffs

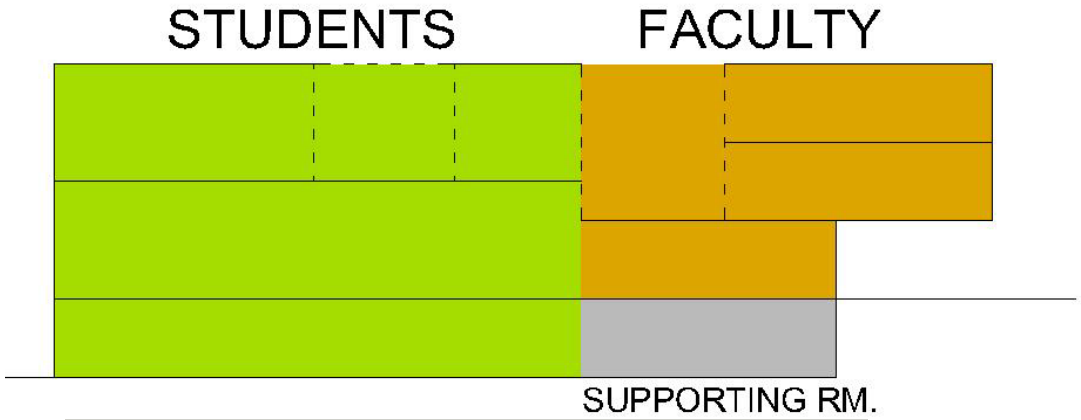


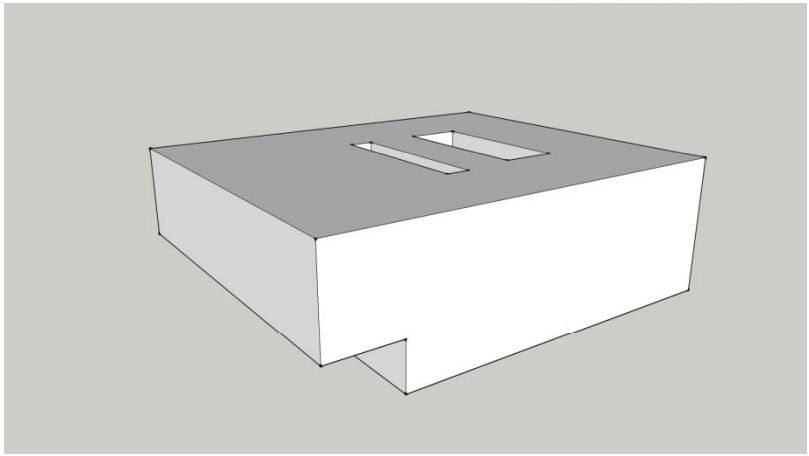
A + E + C + MEP + LCFM

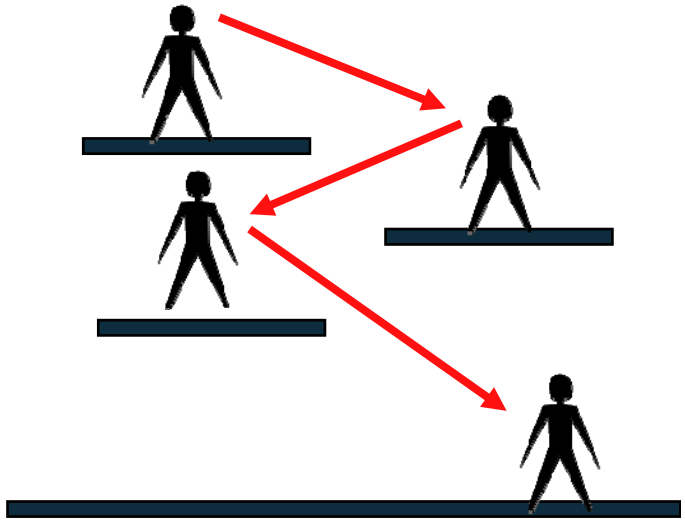
Adjust next concept with LEARNED KNOWLEDGE!!

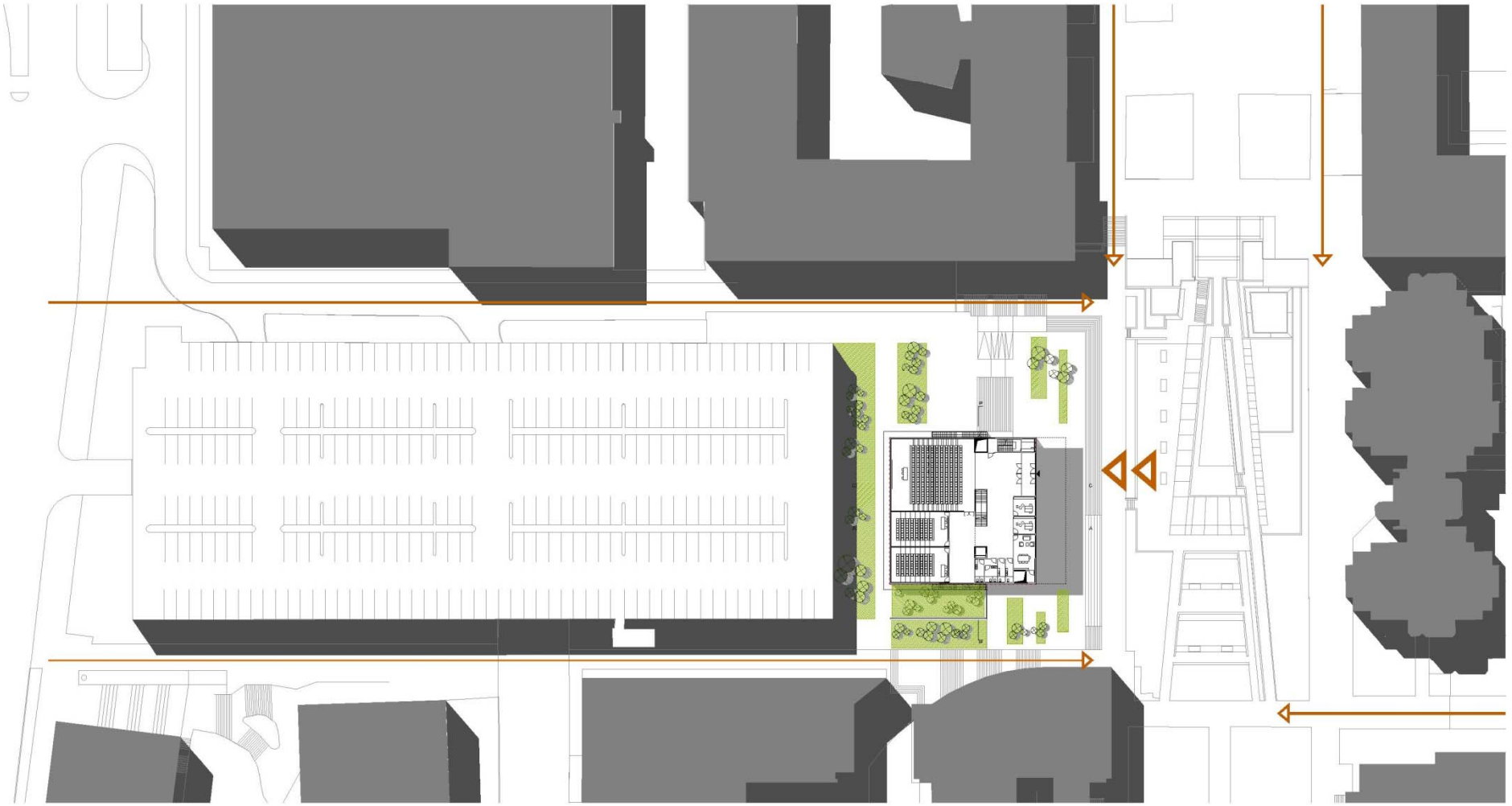
2. INSIDE-OUT

2. INSIDE OUT

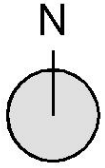


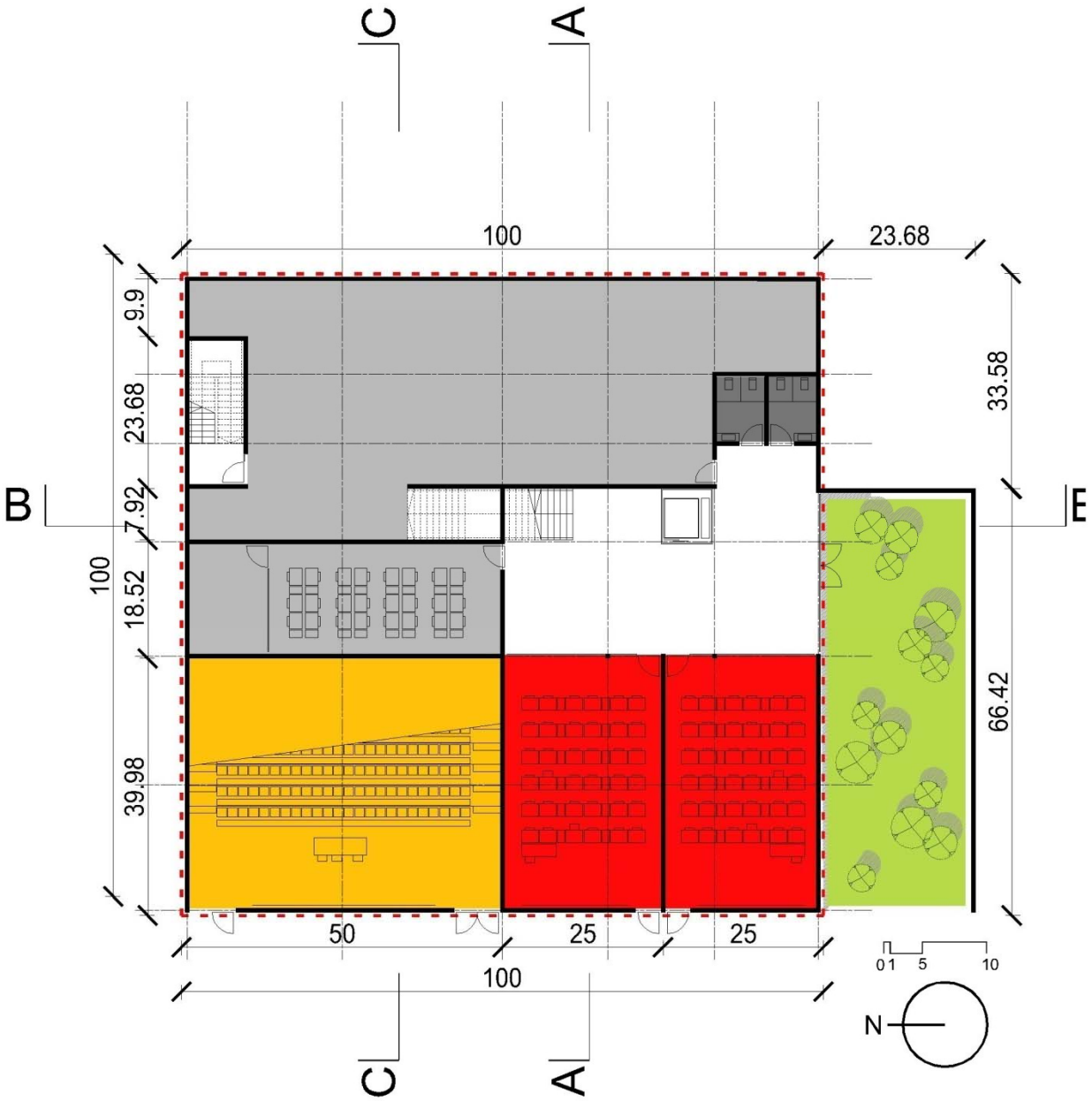






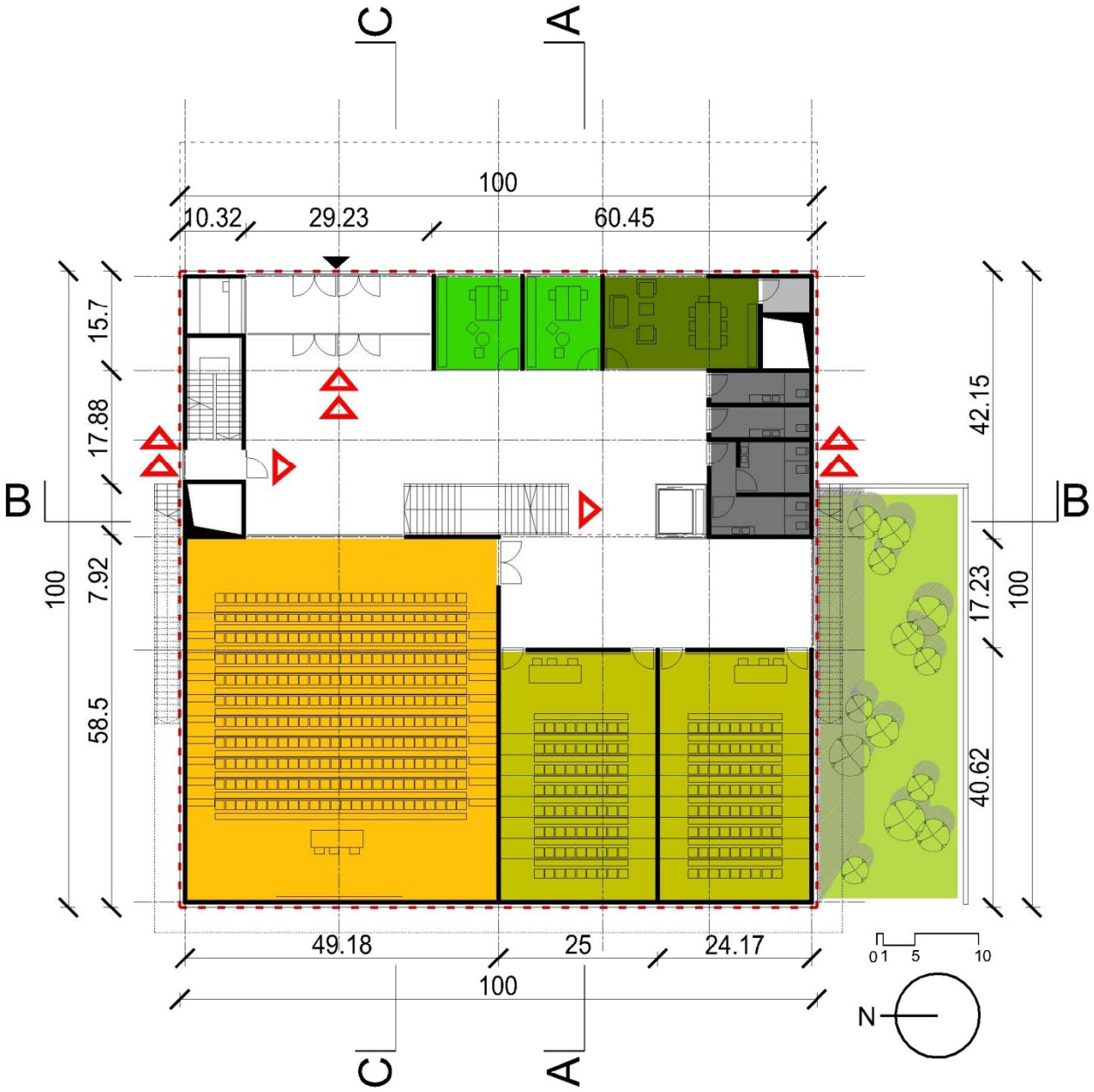
FOOTPRINT POSITION





FACULTY OFFICES
DEPARTMENT CHAIR'S OFFICE
SENIOR ADMINISTRATION OFFICE
ADMINISTRATIVE ASSISTANTS
STUDENT OFFICES
AUDITORIUM
LARGE CLASSROOMS
SMALL CLASSROOMS
SEMINAR ROOMS
INSTRUCTIONAL LABS
SUPPORTING ROOMS
RESTROOMS
CORRIDORS

BASEMENT



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ADMINISTRATIVE ASSISTANTS

STUDENT OFFICES

AUDITORIUM

LARGE CLASSROOMS

SMALL CLASSROOMS

SEMINAR ROOMS

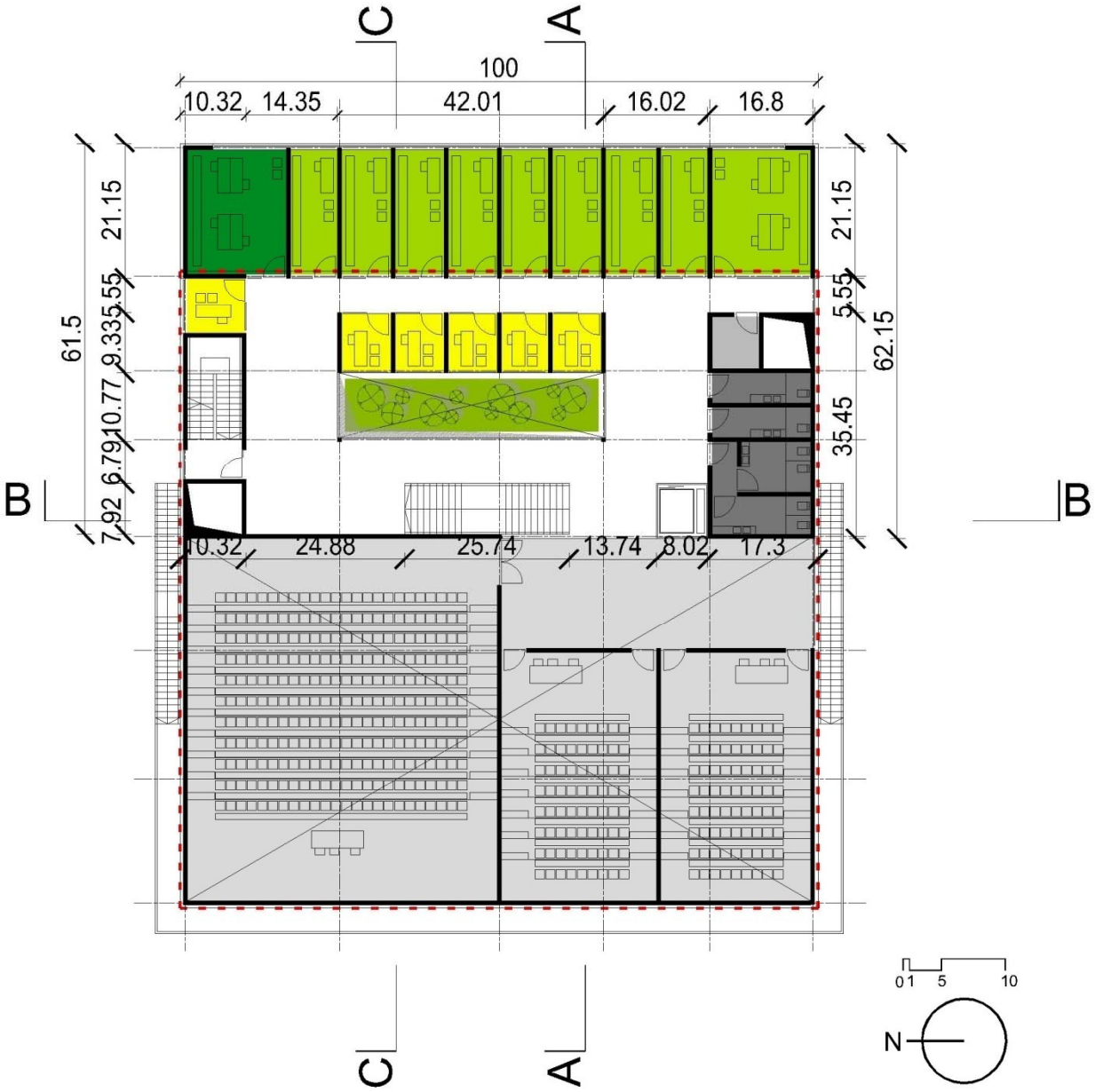
INSTRUCTIONAL LABS

SUPPORTING ROOMS

RESTROOMS

CORRIDORS

GROUND FLOOR



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SMALL CLASSROOMS

SEMINAR ROOMS

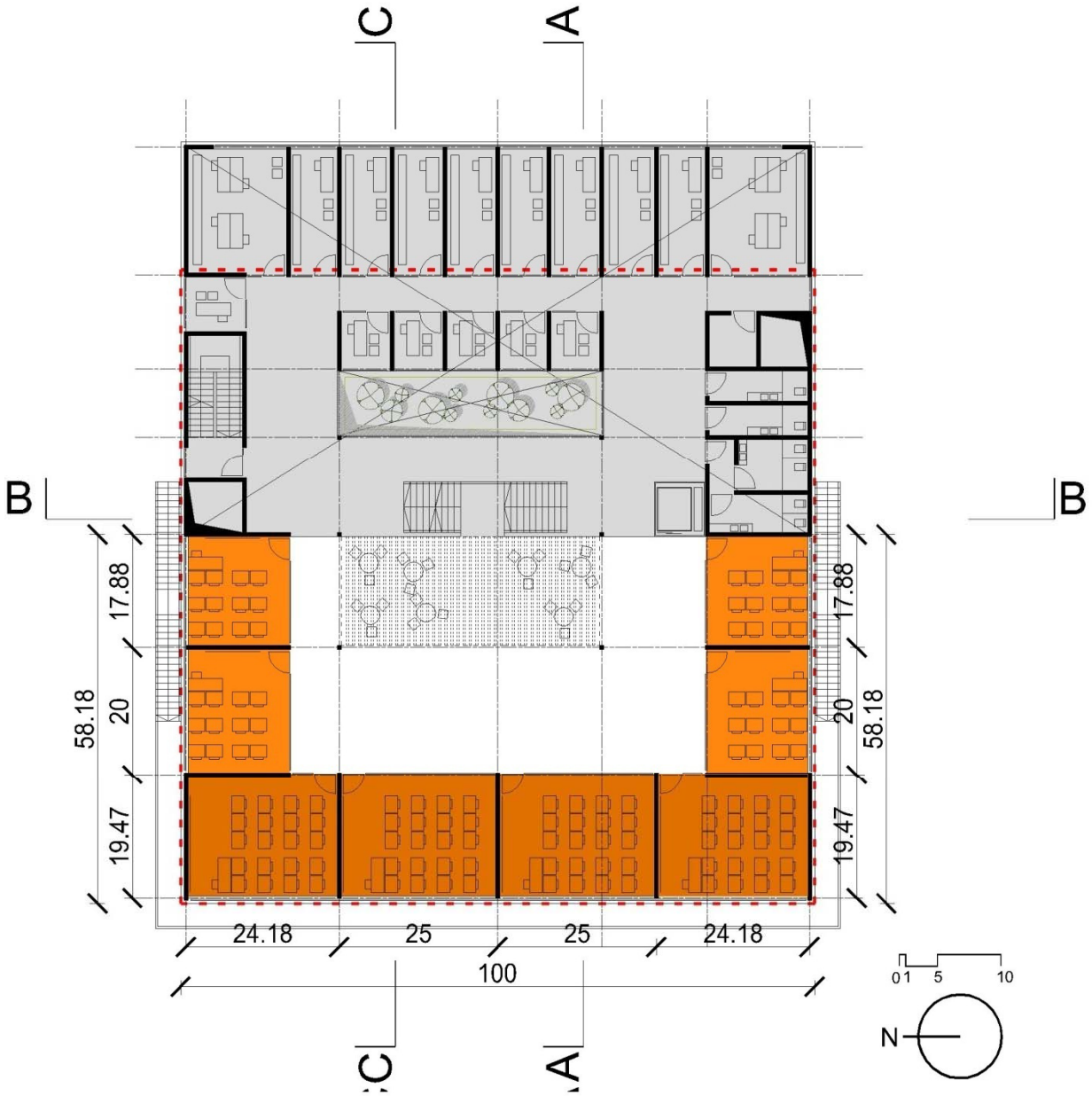
INSTRUCTIONAL LABS

SUPPORTING ROOMS

RESTROOMS

CORRIDORS

FIRST FLOOR



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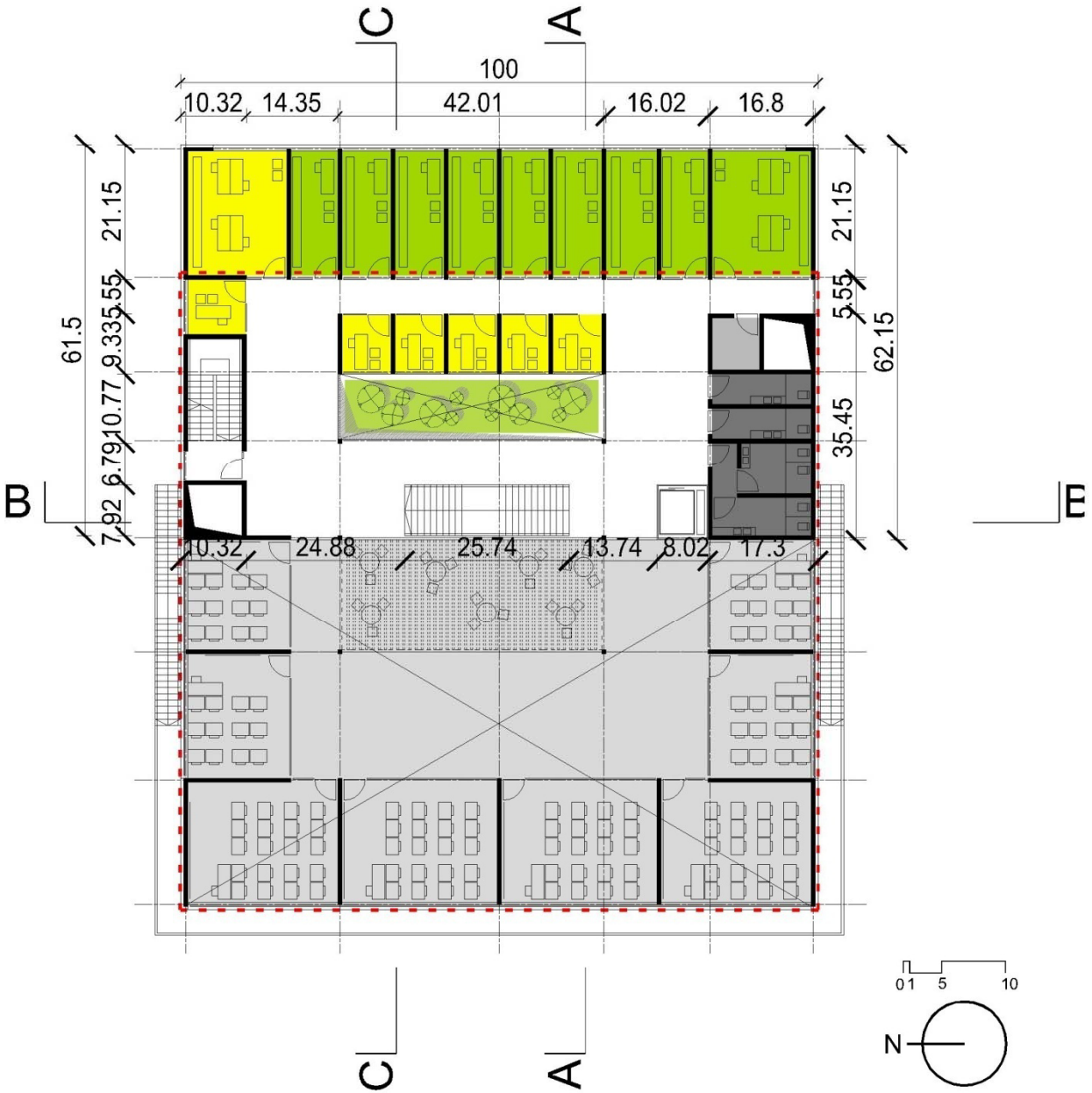
SECOND FLOOR



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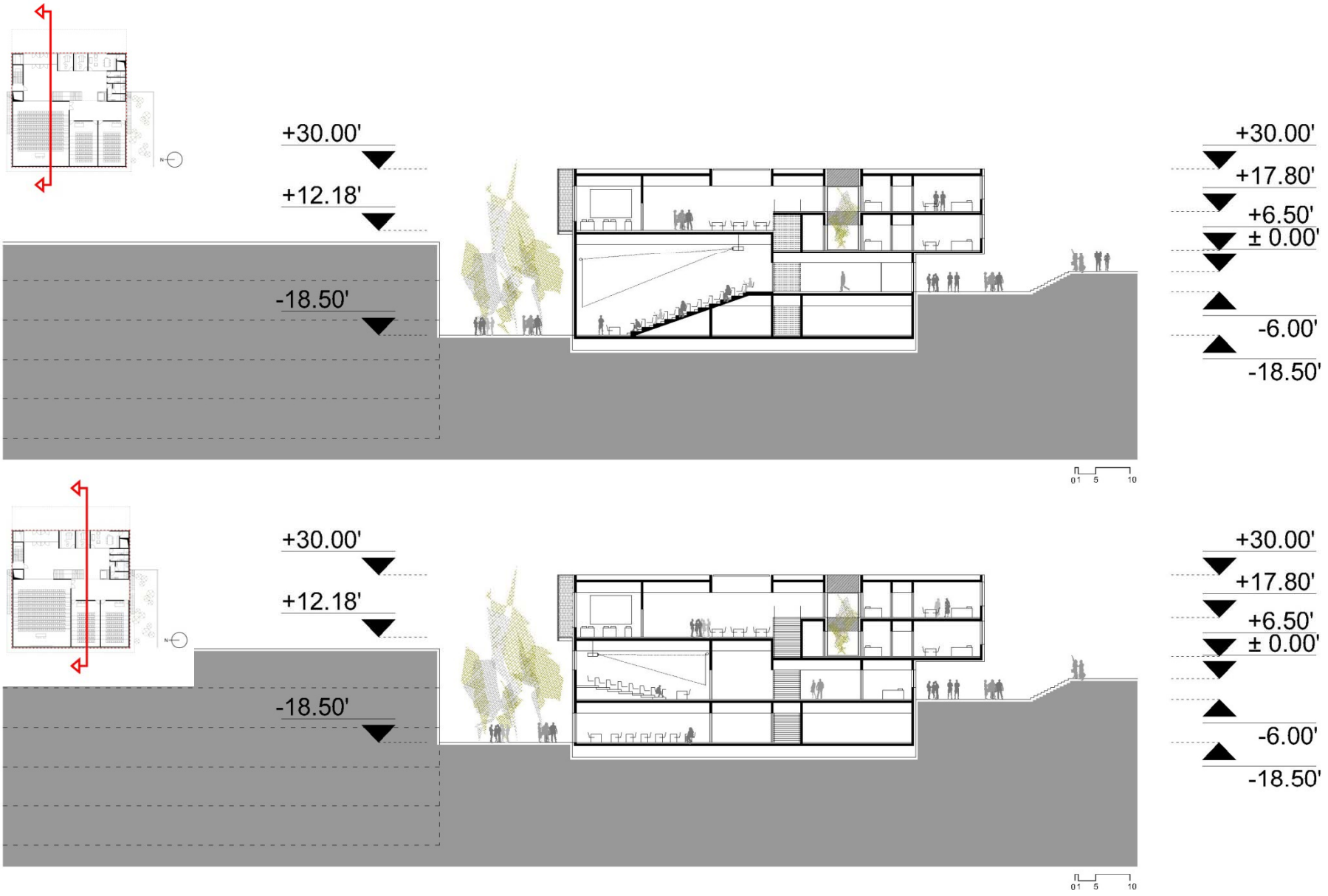
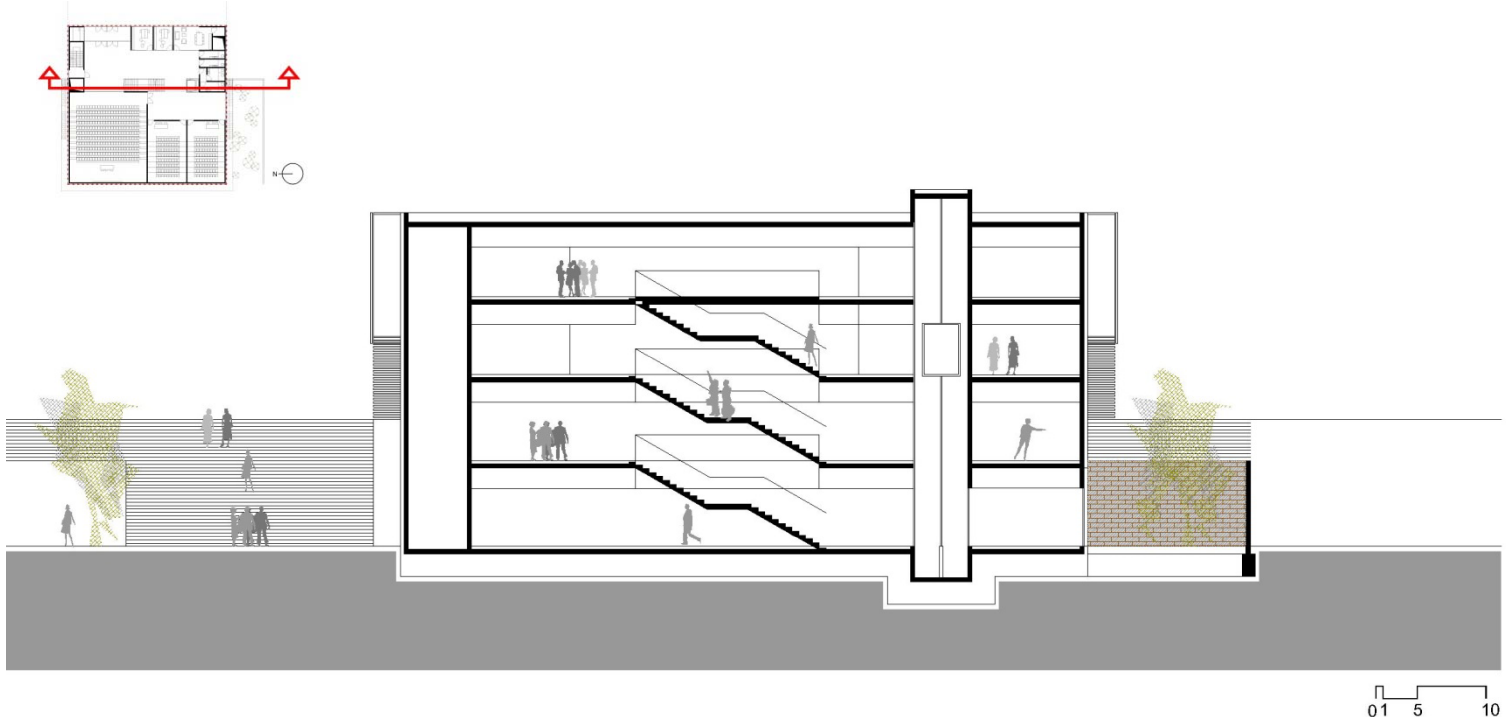
SUPPORTING ROOMS
RESTROOMS
CORRIDORS

THIRD FLOOR

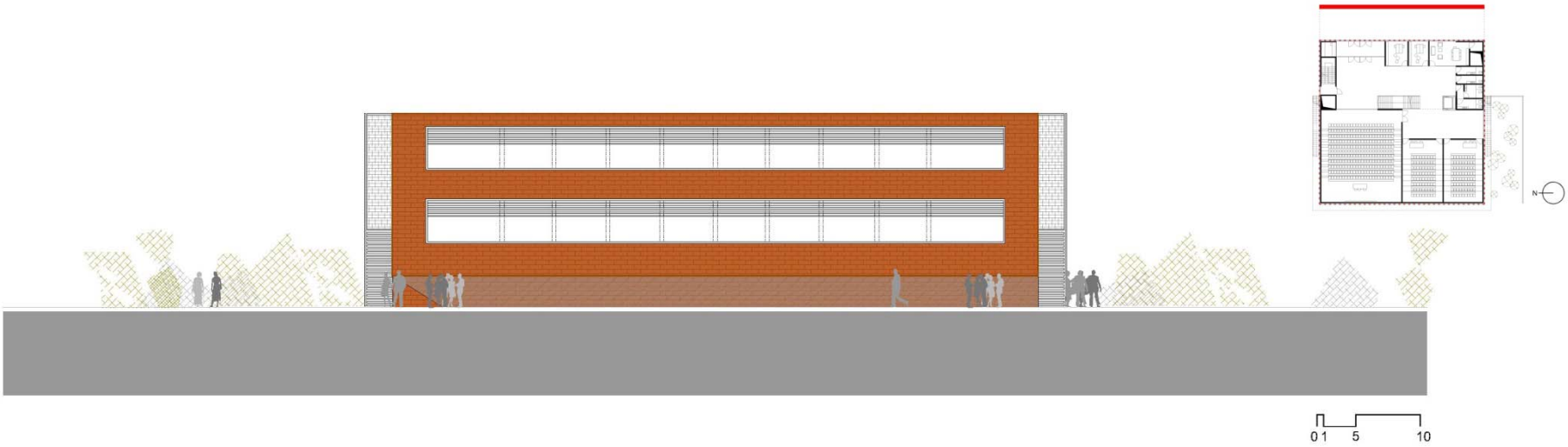


CROSS-SECTION C – C and A - A



CROSS-SECTION B - B

NORTH and SOUTH ELEVATIONS

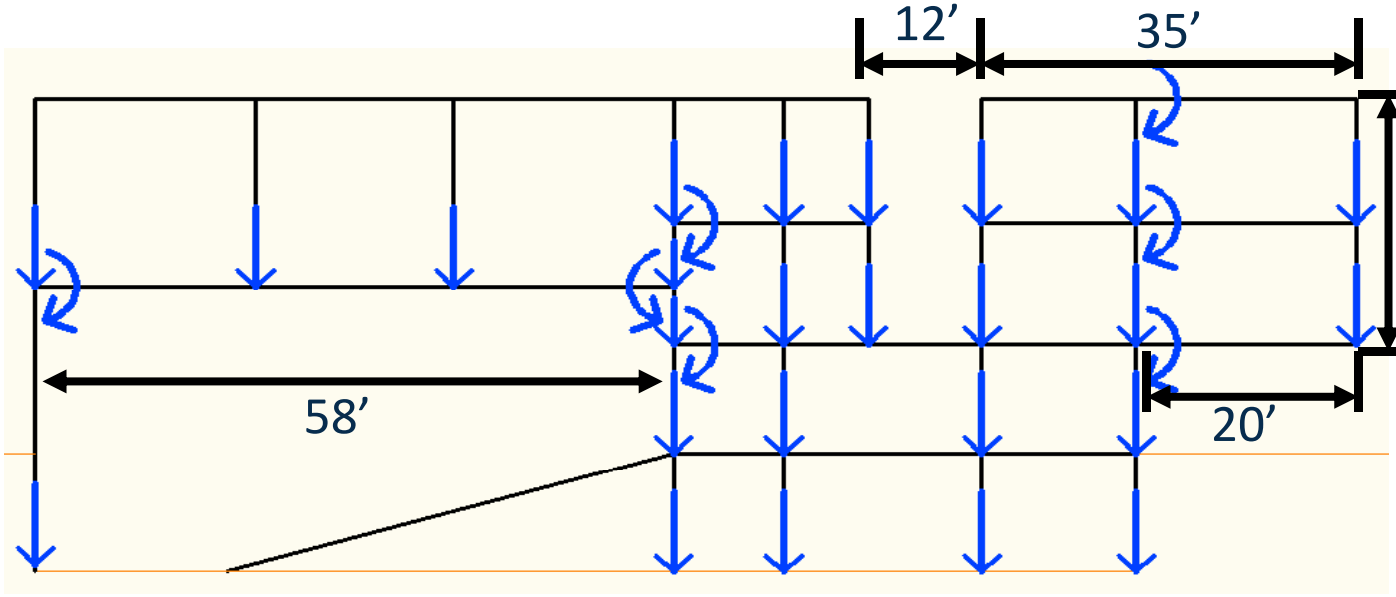


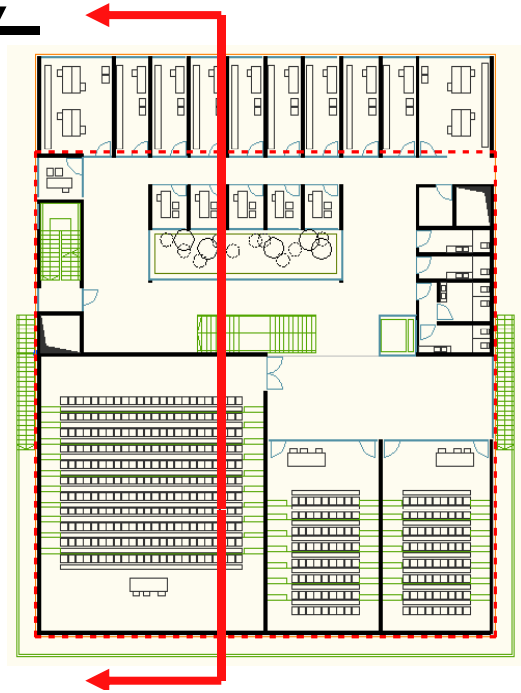
EAST and WEST ELEVATION

3D VIEW

3D VIEW

Most Intense FBD Section Cut Through Building





- Different levels cause unbalanced moments on middle column
- Can not fully tie back cantilever because of atrium
- Lateral load paths depend on lateral system

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Central Team

INSIDE-OUT – SOLUTION 1

Structural Engineering (Inside-Out 1)

New challenges and objectives:

✓More efficient lateral system → STEEL BRACED FRAME

✓Avoid long typical spans over 35 ft

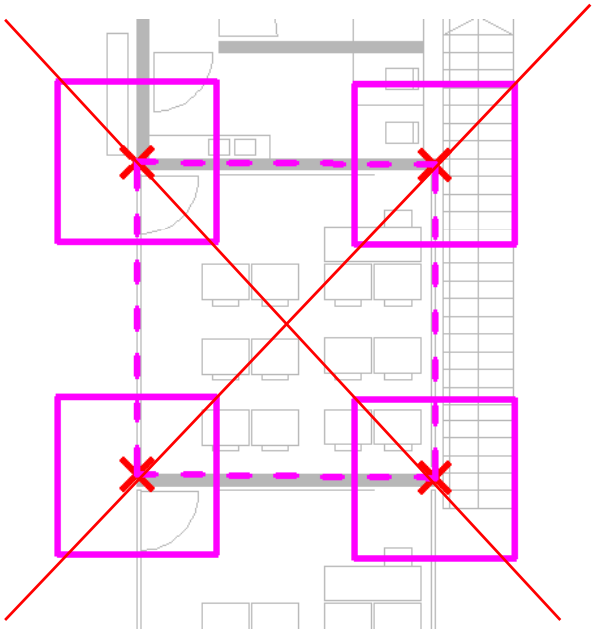
Foundation system:

✓Maximum load on column: 375 kips

✓Footings: require 9x9 sf

✓Foundation mat: 13 in thick

✓Retaining walls: 12 ft height - 10 in thick



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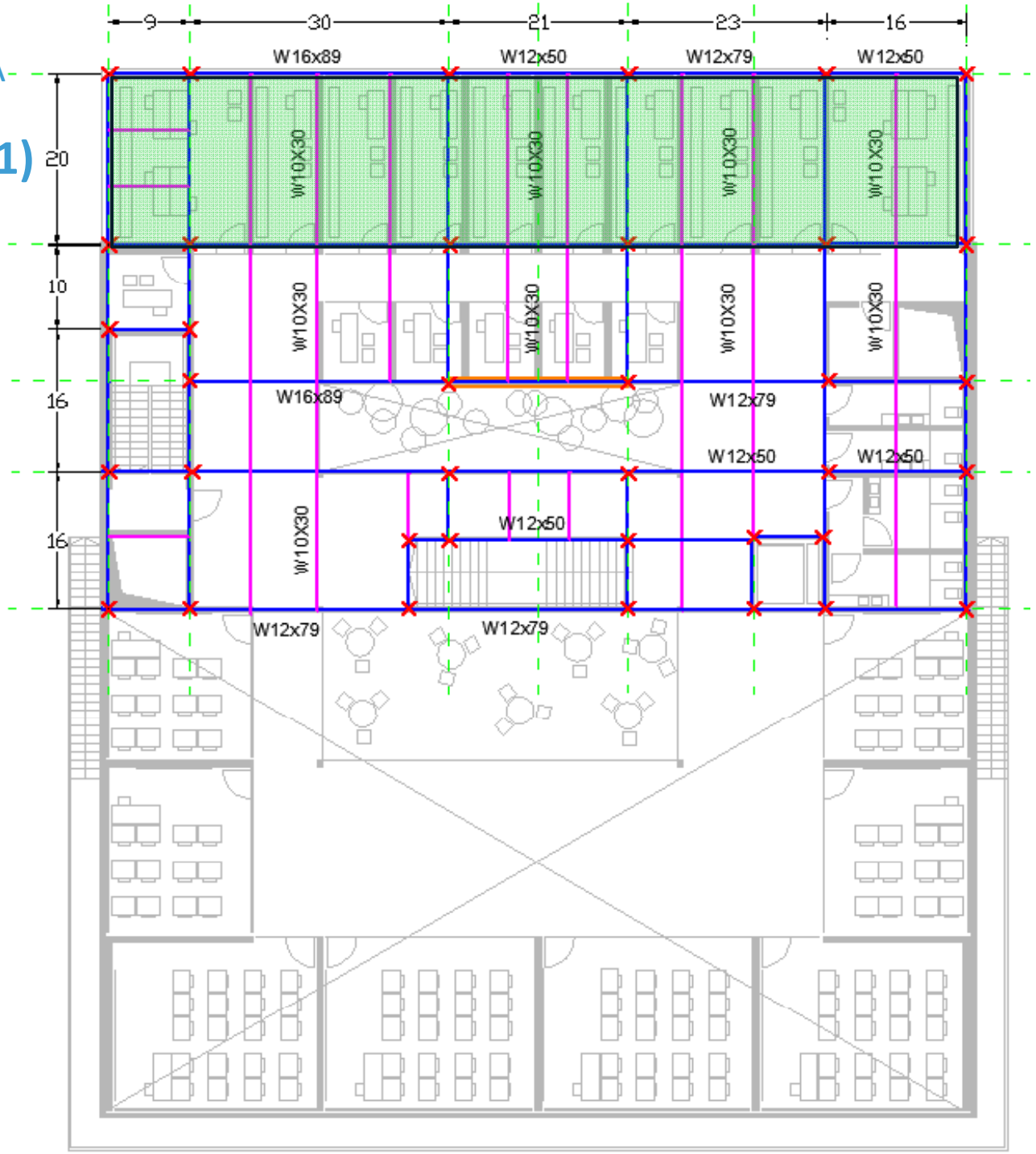
Engineering (Inside-Out 1)

3rd floor/2nd floor E:

- ✓Composite floor system
- ✓Typical spans: 20-30 ft
- ✓20 ft cantilever



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Engineering (Inside-Out 1)

2nd floor W:

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Engineering (Inside-Out 1)

1st floor:

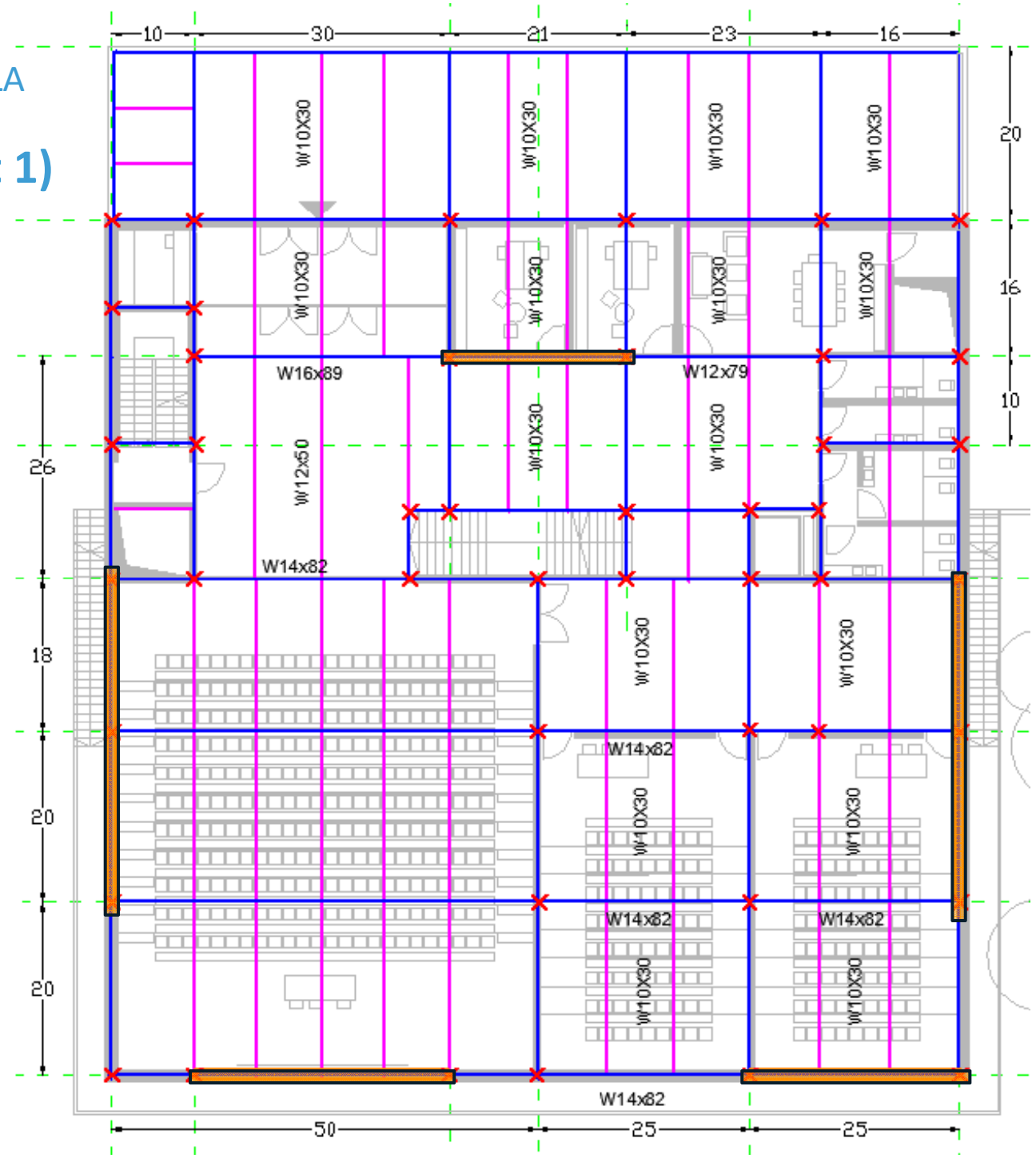
Auditorium (58x50 sf):

✓50 ft girders:

OWSJ 30x42.8

✓18-20 ft beams:

OWSJ 20x9.8



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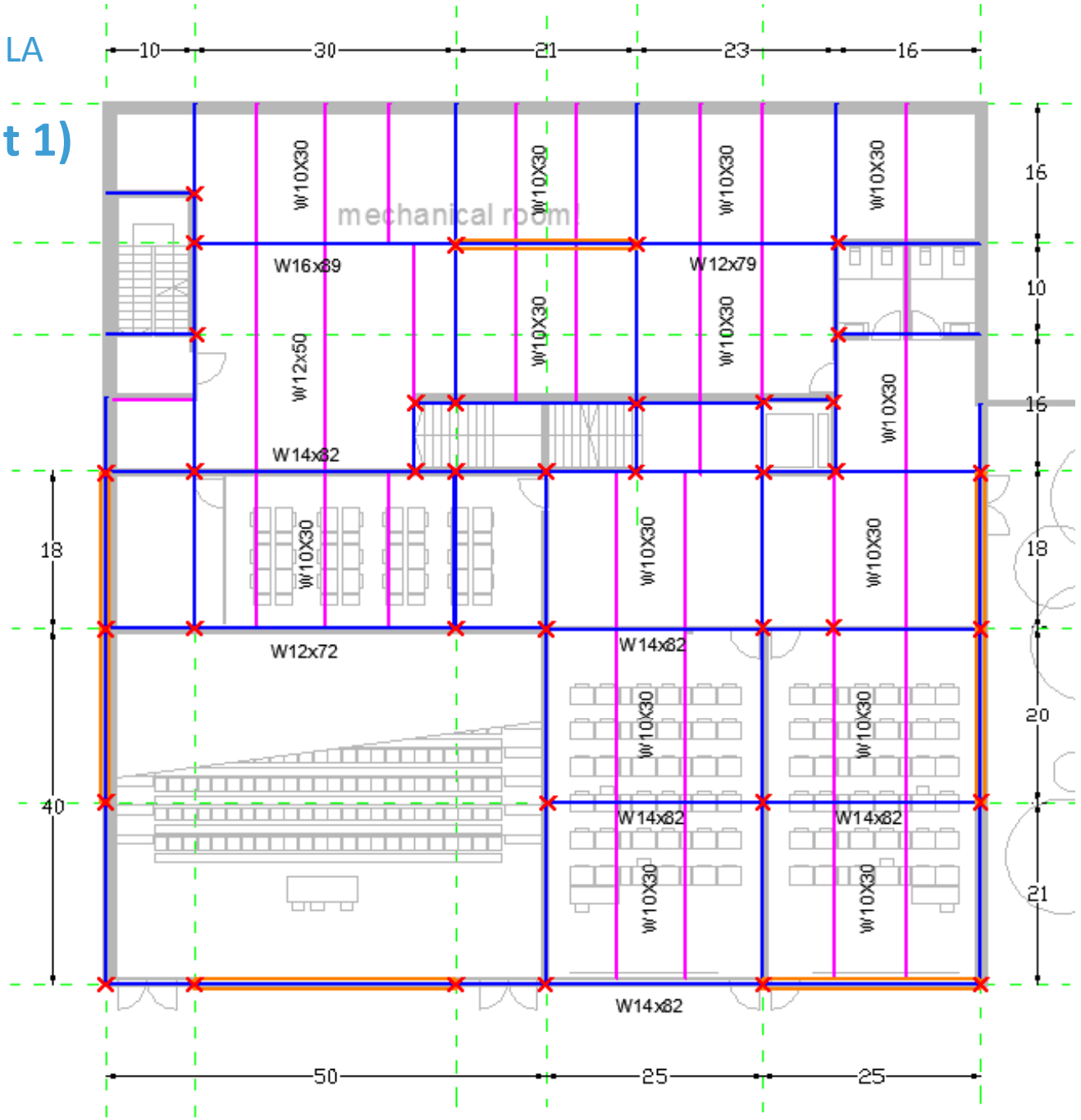
Engineering (Inside-Out 1)

Basement:

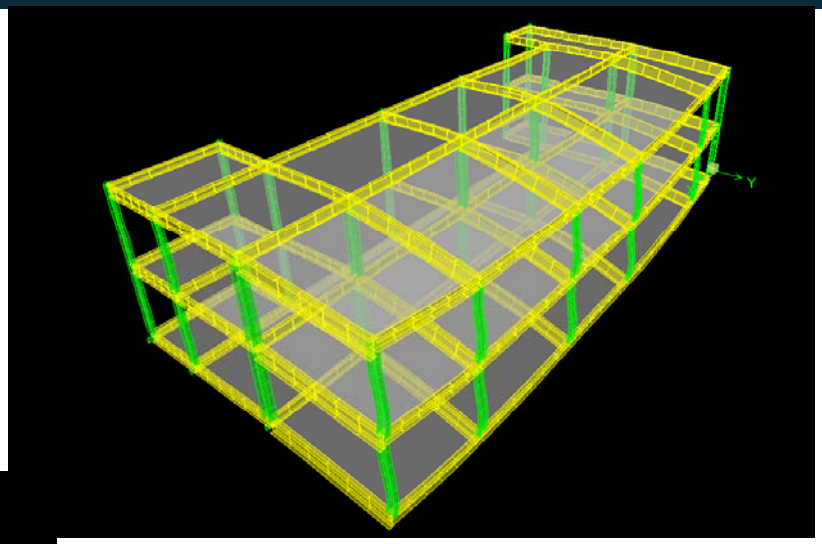


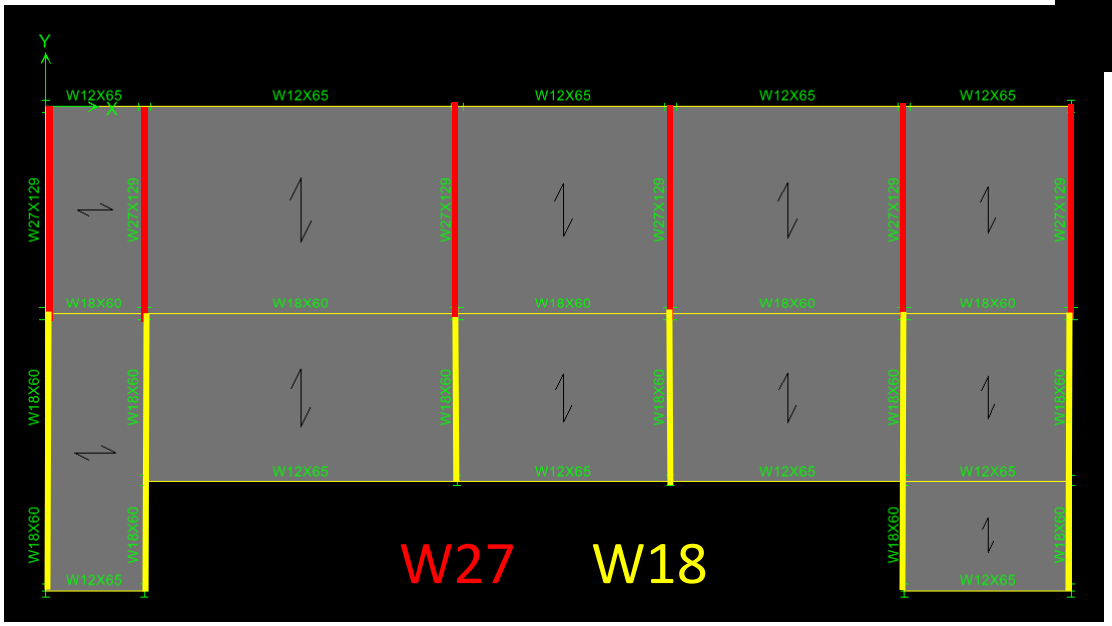
Structural Engineering (Inside-Out 1)

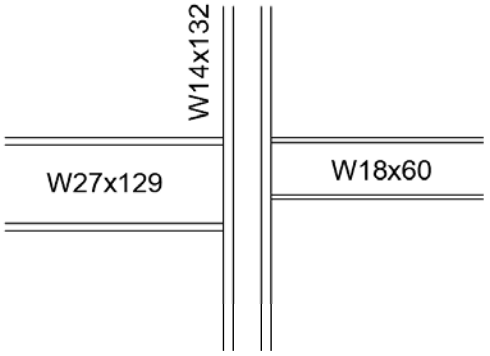
Central Team

Cantilever (20 ft)

- Deep beams with backspans:
  - Center : 16 ft (atrium)
  - Sides: 26 ft







Structural Engineering (Inside-Out 1)

Lateral System :

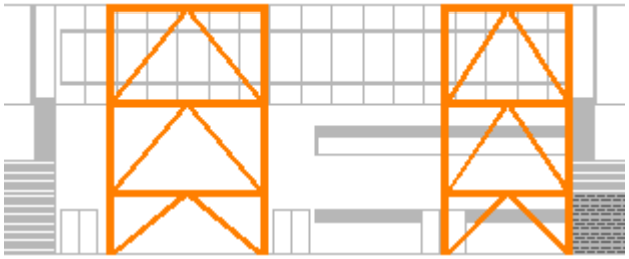
✓Buckling Restrained Braced Frames

✓Design base shear: 290 kips, R = 8

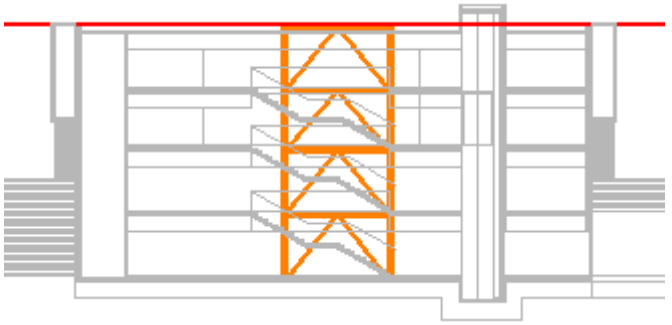
✓E-W: Perimeter 2-bay frames with single bracing

✓N-S : Perimeter and interior frames with Chevron configuration

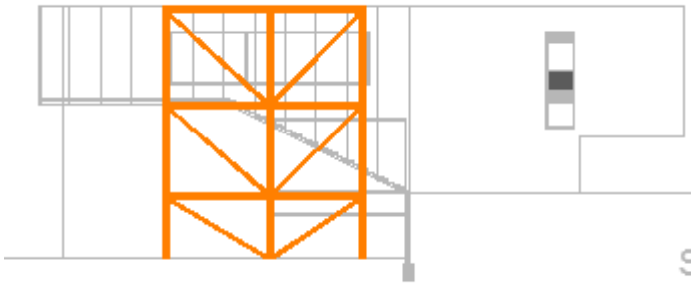
N-S Exterior



N-S Interior



E-W



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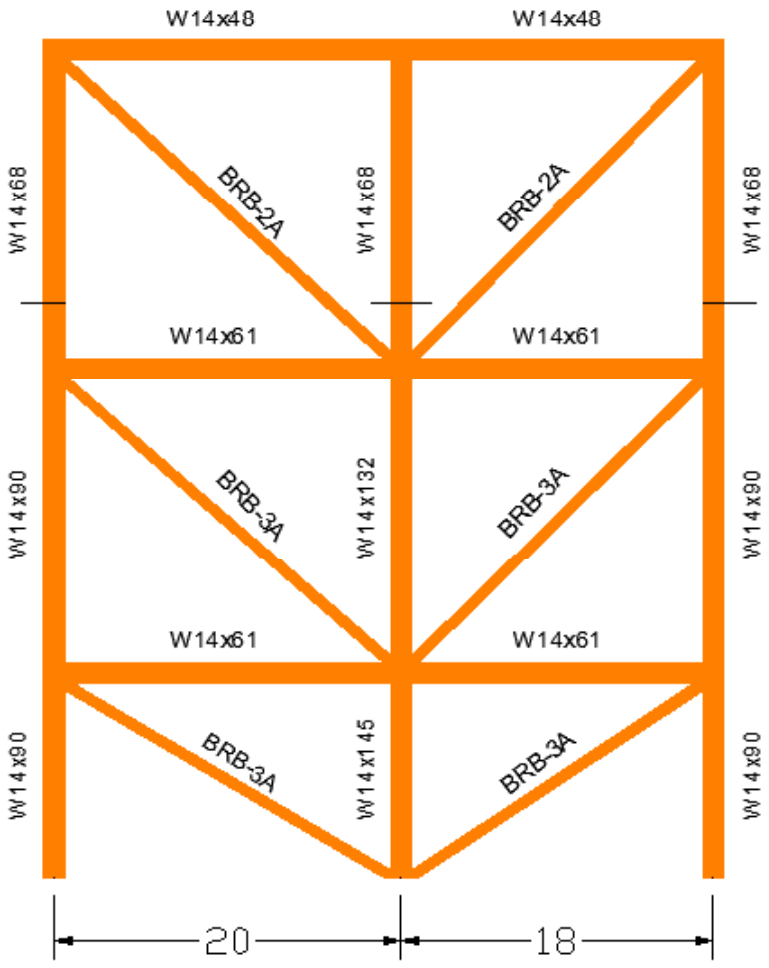
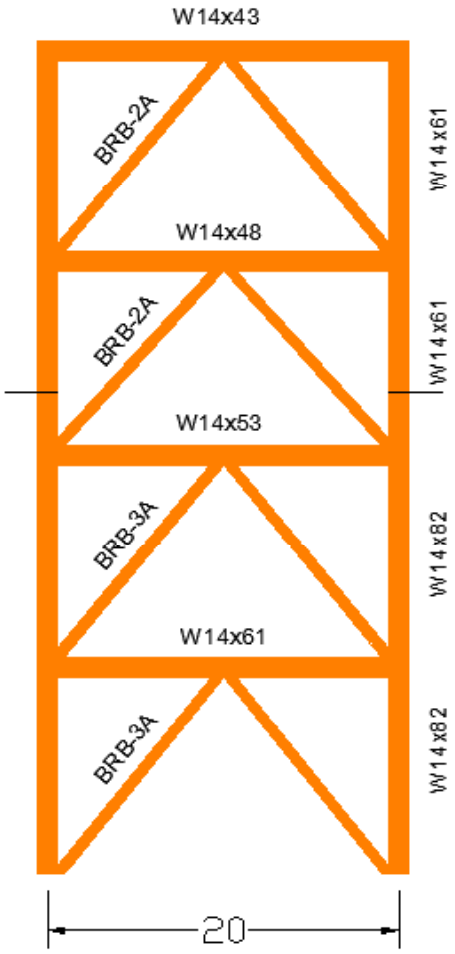
Structural Engineering (Inside-Out 1)

Central Team



E-W



N-S

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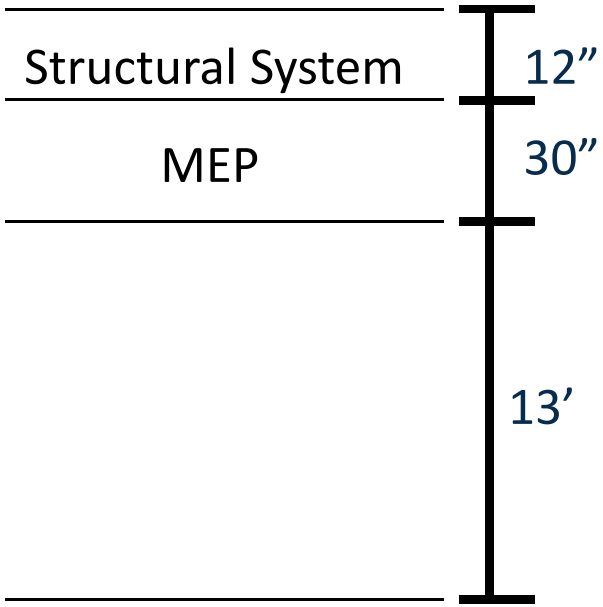
Central Team

INSIDE-OUT – SOLUTION 2

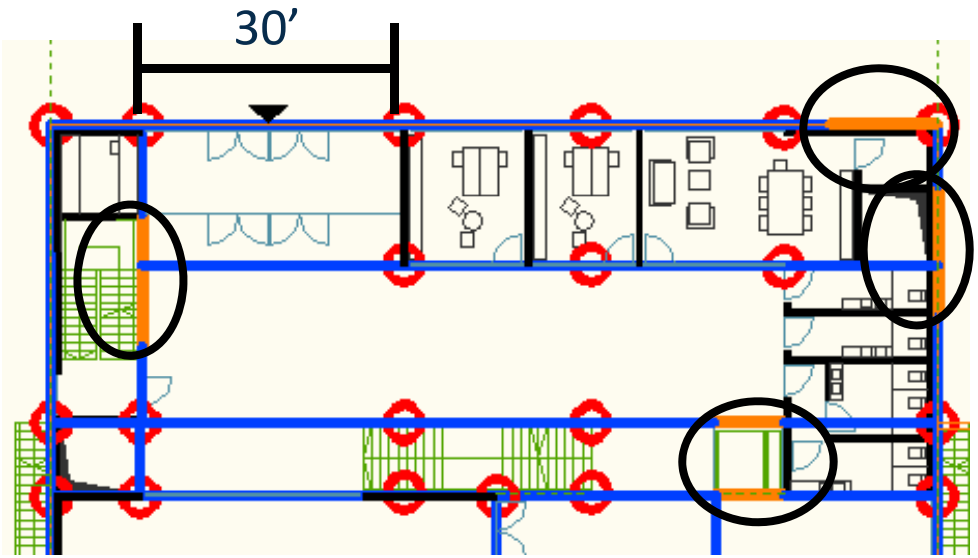
Structural Engineering (Inside – Out 2)

Why Post Tension Floors?



Architectural and MEP

- Save floor to ceiling height

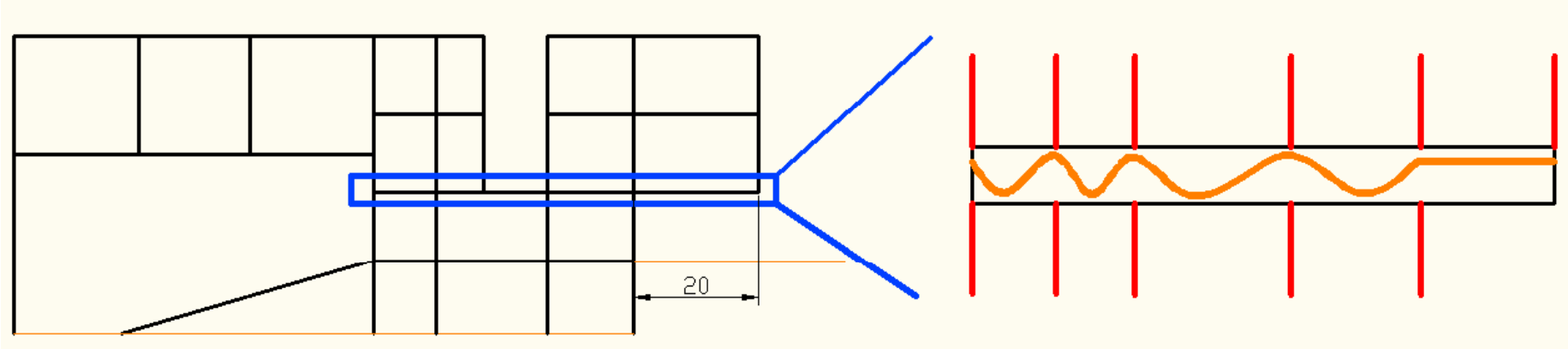


Architectural and Structural

- Longer spans
- Allows better diaphragm action with shear walls

Structural Engineering (Inside – Out 2)

What Will Post Tension Look Like?



- Use drape tendons
- Will help tie back cantilever
- Preliminary numbers for the typical bays

½” 7 – Wire Strands, 270 Ksi

Tendons will be offset every foot

Post Tensioned to 650 kips

Structural Engineering (Inside – Out 2)

Post Tension Floor System over Architecture

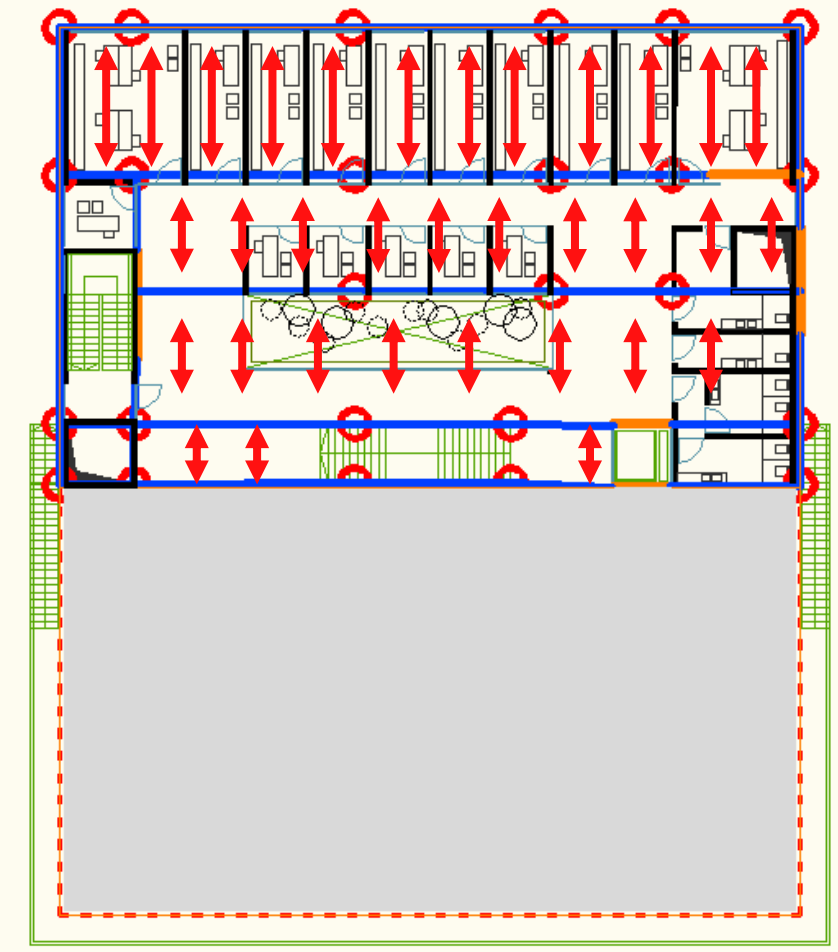
Slab Depth of 6”

One-way slabs utilizing tendons in the direction of the arrows

Beams will also be post tensioned

Beam Depth 12” from top of slab

3rd /2nd East Side Floor:



Structural Engineering (Inside – Out 2)

Post Tension Floor System over Architecture

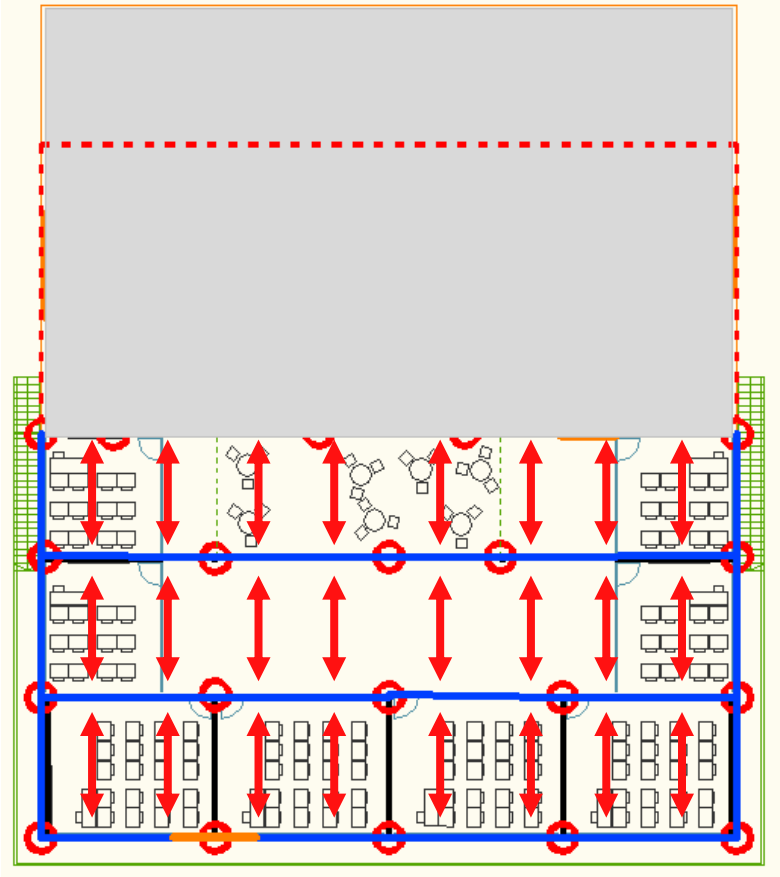
Slab Depth of 7”

One-way slabs utilizing tendons in the direction of the arrows

Beams will also be post tensioned

Beam Depth 9” from top of slab

2nd East Side Floor:



Structural Engineering (Inside – Out 2)

Post Tension Floor System over Architecture

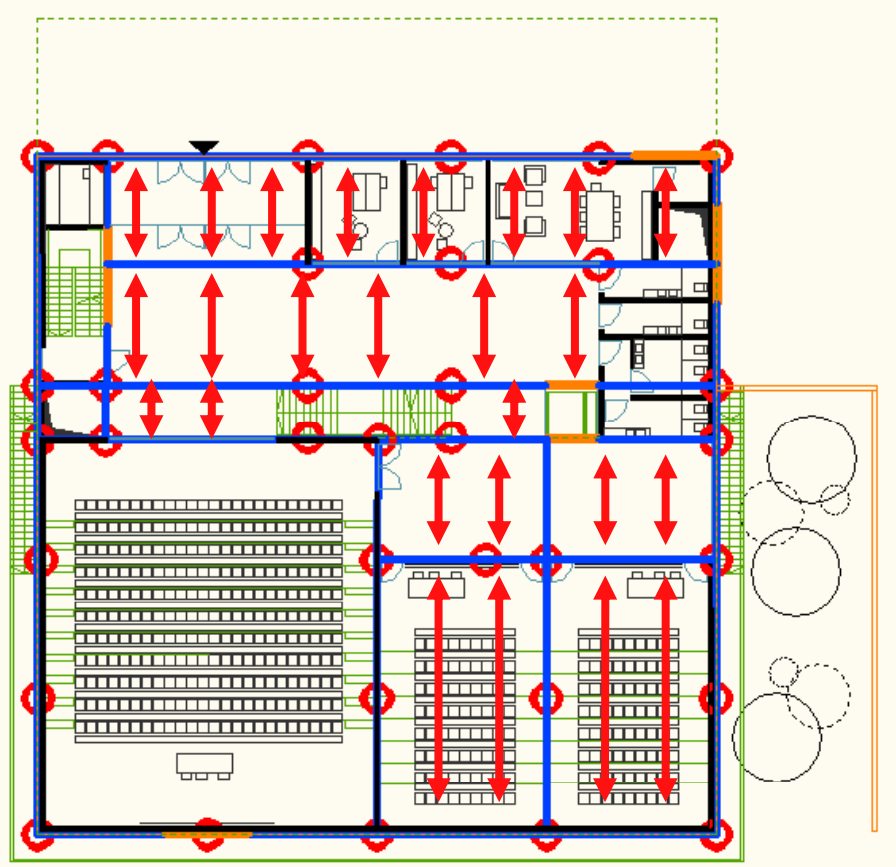
Slab Depth of 8”

One-way slabs utilizing tendons in the direction of the arrows

Beams will also be post tensioned

Beam Depth of 12” from top of slab

1st Floor:



Structural Engineering (Inside – Out 2)

Post Tension Floor System over Architecture

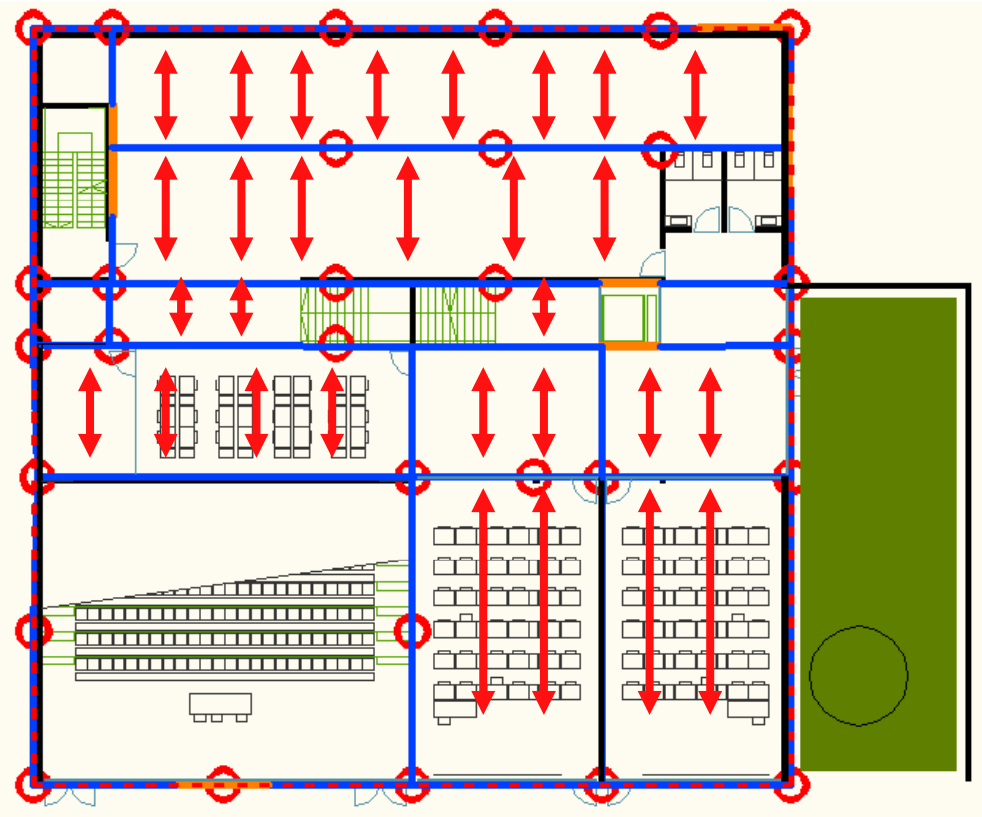
Slab Depth of 8”

One-way slabs utilizing tendons in the direction of the arrows

Beams will also be post tensioned

Beam Depth of 12” from top of slab

Basement:

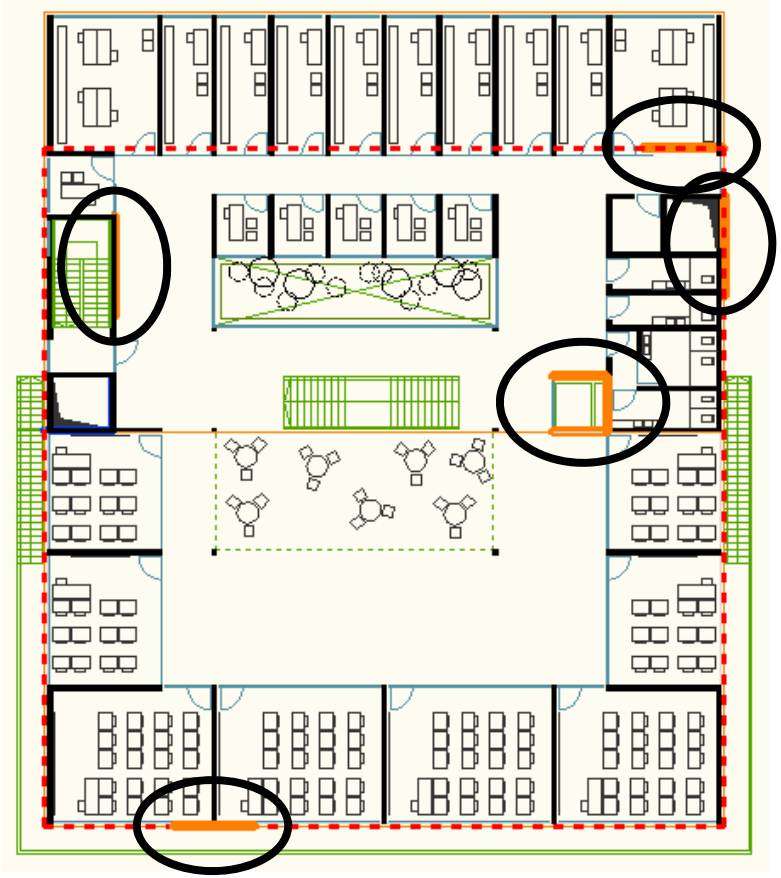


Structural Engineering (Inside – Out 2)

Rationale for locations of shear walls

Two Guiding Principles

- Located for strength and limit torsion
- Located for ease of future rehabilitation



Structural Engineering (Inside – Out 2)

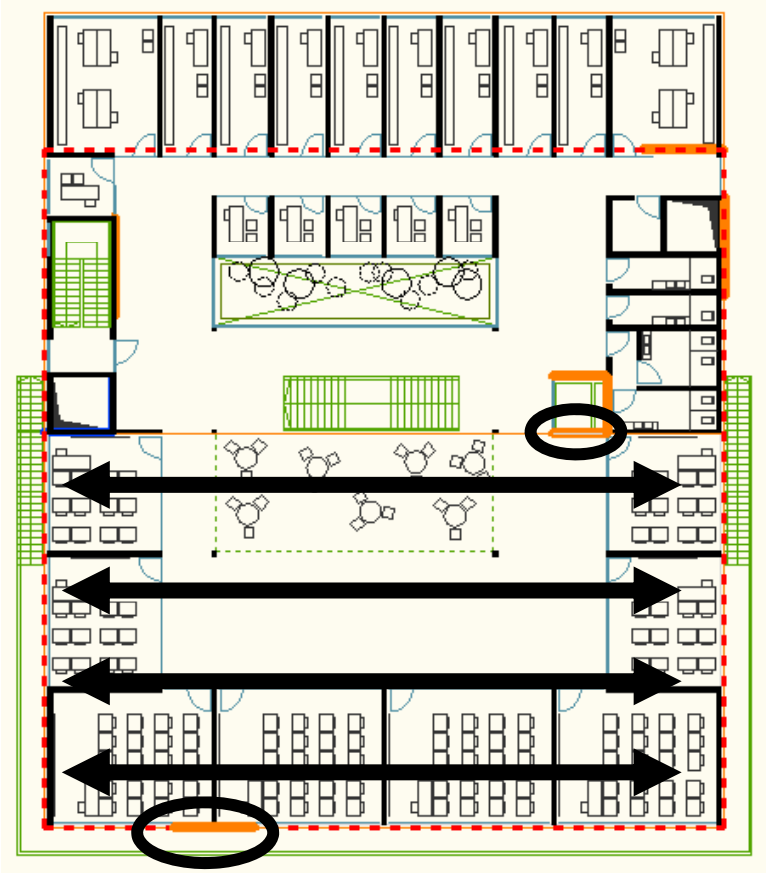
Lateral Load for Shear Wall FBD

Floors at different heights cause shear walls to work separately

West Top Half

Two Shear Walls working with floor diaphragm

Walls are 8’ and 12’ in length



Structural Engineering (Inside – Out 2)

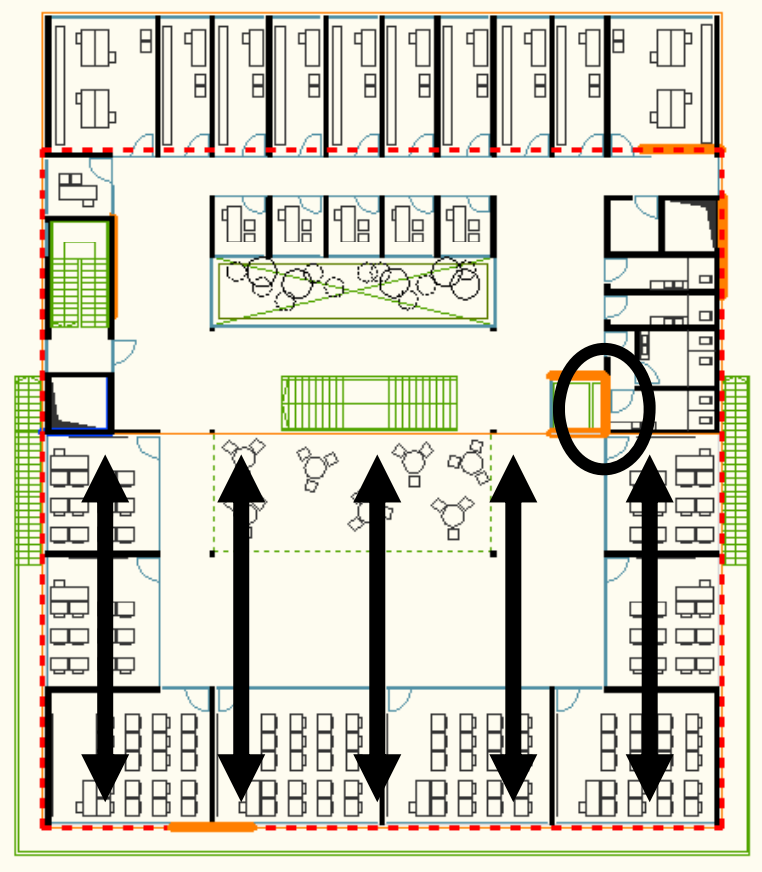
Lateral Load for Shear Wall FBD

West Top Half

One Shear Wall utilizing a tension tie

Only carrying lateral from one floor

Wall is 11.5’ in length



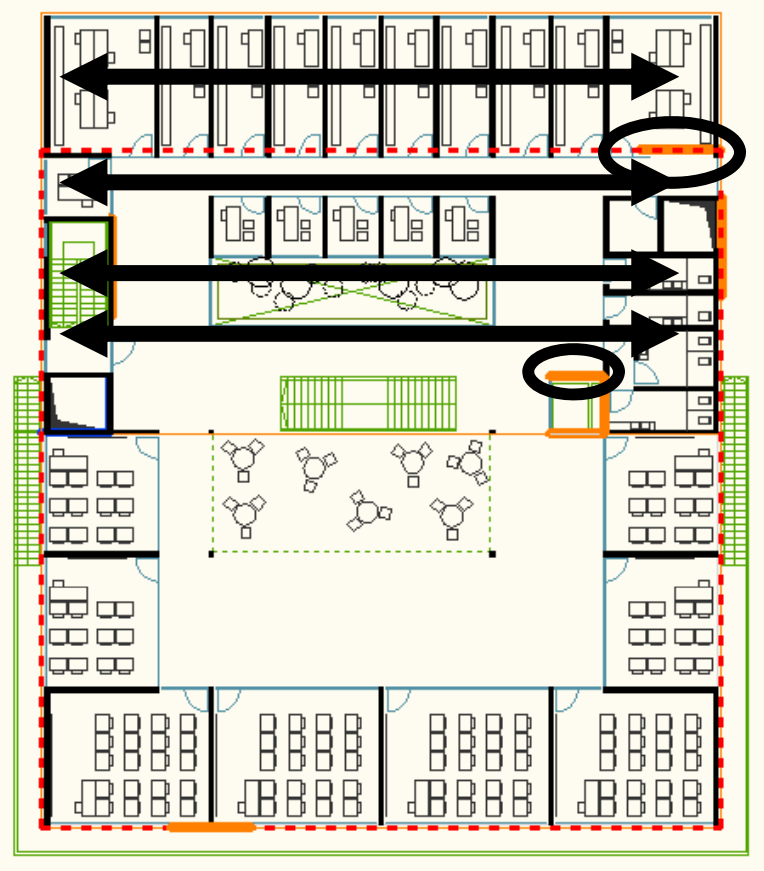
Structural Engineering (Inside – Out 2)

Lateral Load for Shear Wall FBD

East Half

Two Shear Walls working with floor diaphragm

Walls are 13’ and 8’ in length



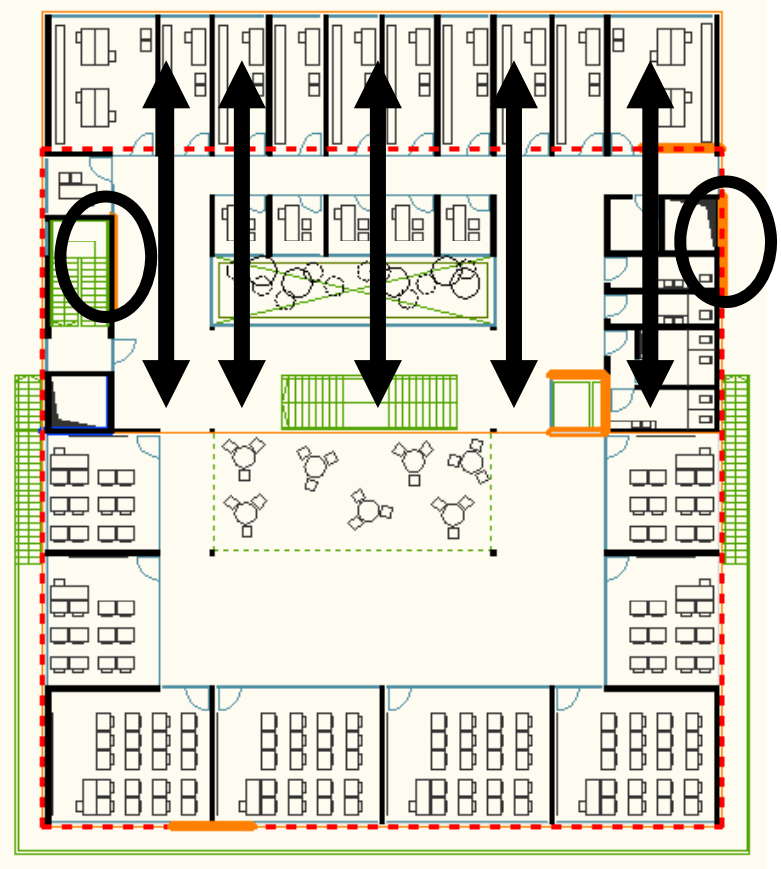
Structural Engineering (Inside – Out 2)

Lateral Load for Shear Wall FBD

East Side

Two Shear Walls working with floor diaphragm

Both walls are 15’ in length



Inside-Out

	Steel	Concrete	Budget
Substructure	1068696,4	1068696,4	675000
Superstructure	794862,1	832340	750000
Shell	1266760	995400	1042500
Interiors	1169500	1308500	1582500
Services	2770500	2770500	3000000
Equipment & Furnishings	90000	90000	75000
Landscaping	75000	75000	75000
Building Sitework	256975,04	256975,04	300000
TOTAL	**7492294**	**7397411,44**	**7500000**

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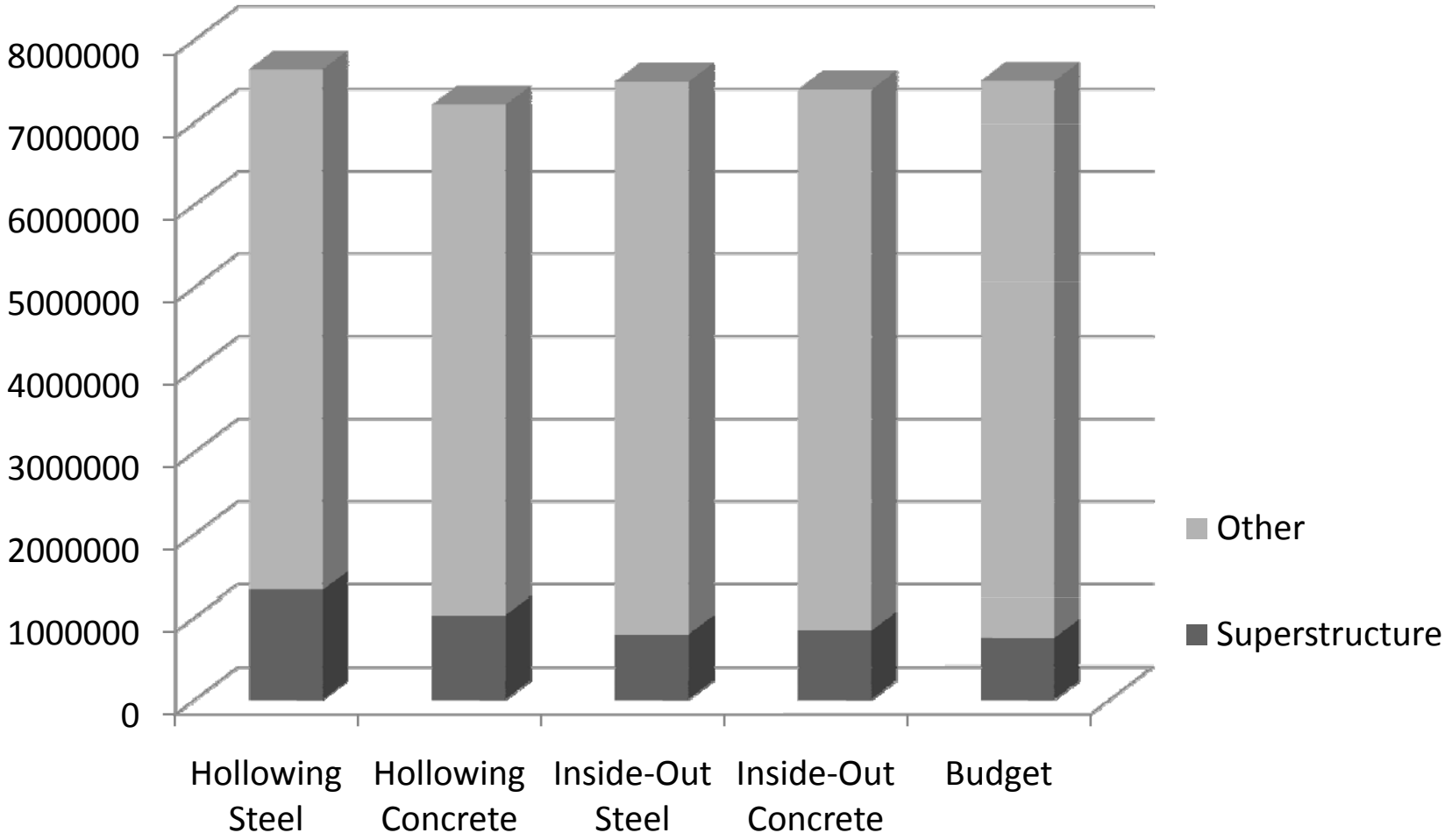
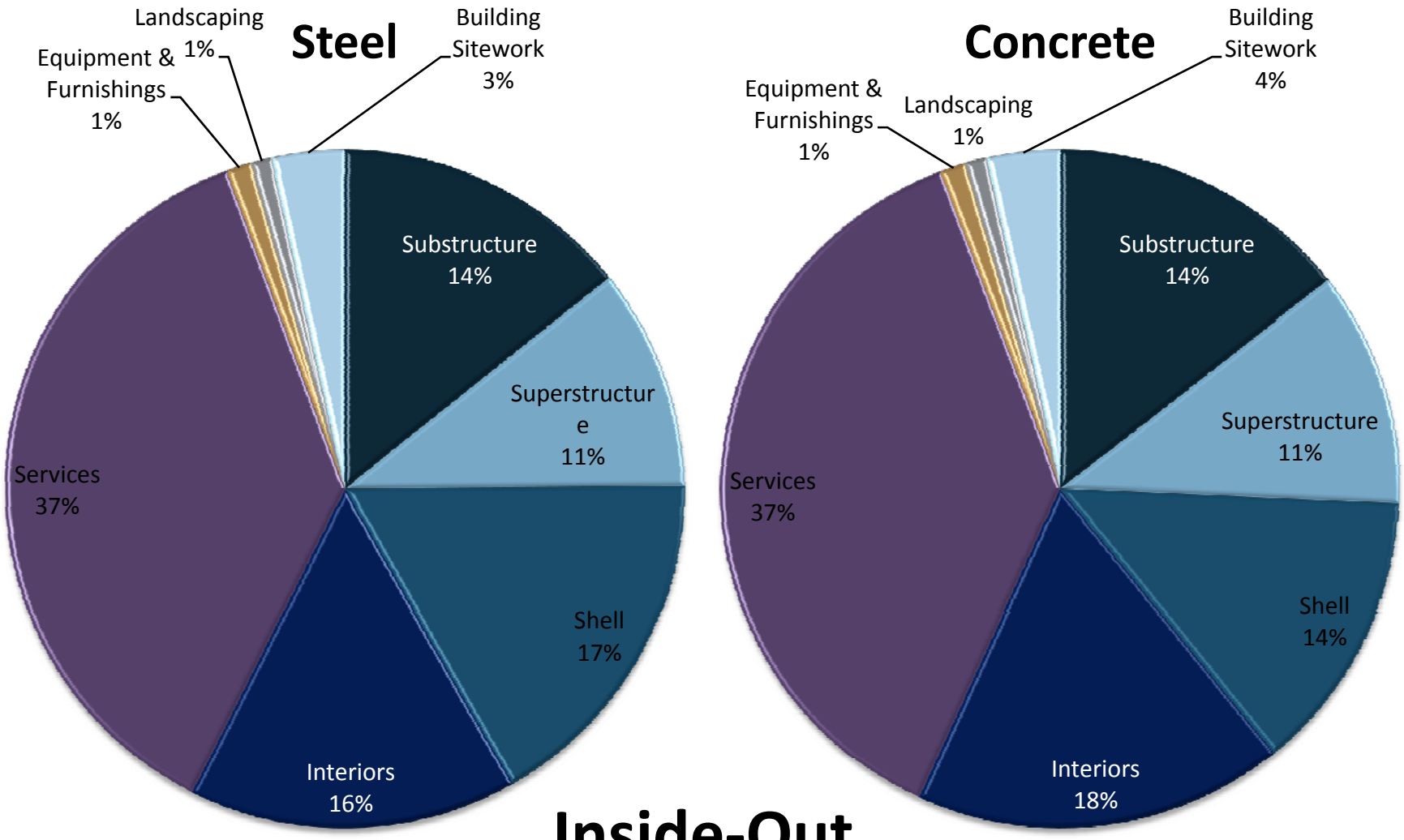
Construction Management – Cost Estimation

Central Team

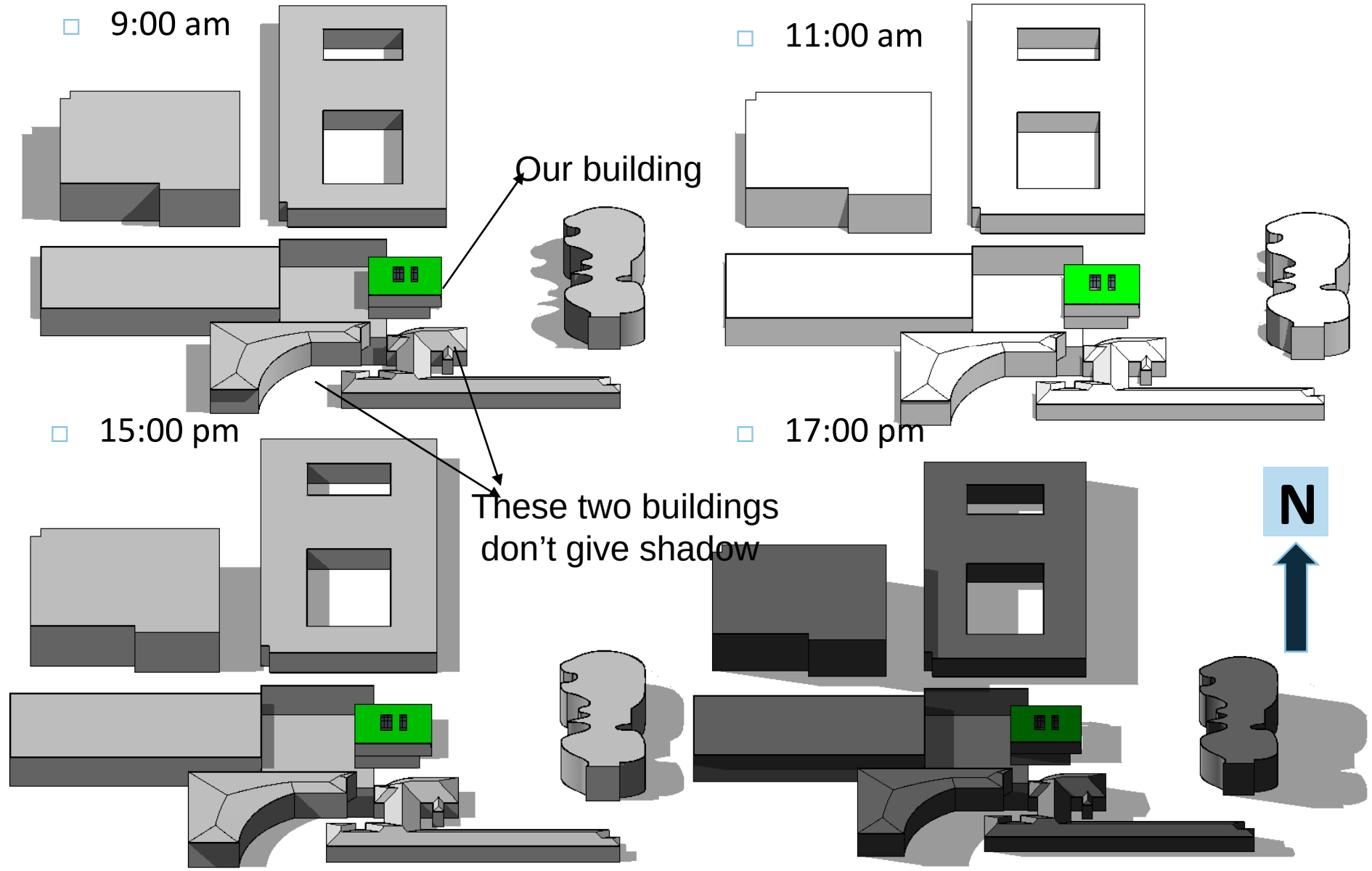


Construction Management – Cost Estimation

Central Team



Inside-Out



SUN PATH - SUMMER SOLSTICE

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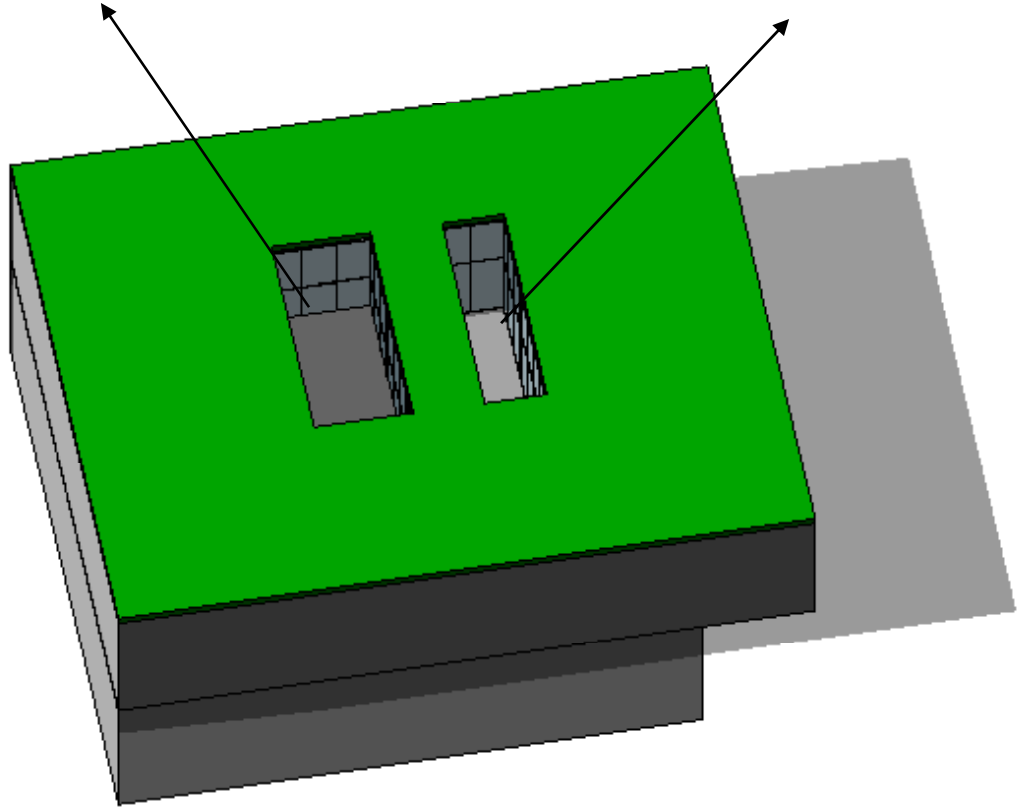
Inside-out: Sun Path - Atrium

Sunshine time
Spring: 8:30 to 14:15
Summer: 7:00 to 14:30
Fall: 8:00 to 14:15
Winter: 9:30 to 13:30

Sunshine time
Spring: 11:00 to 15:30
Summer: 10:30 to 16:00
Fall: 10:30 to 15:30
Winter: 11:00 to 14:00



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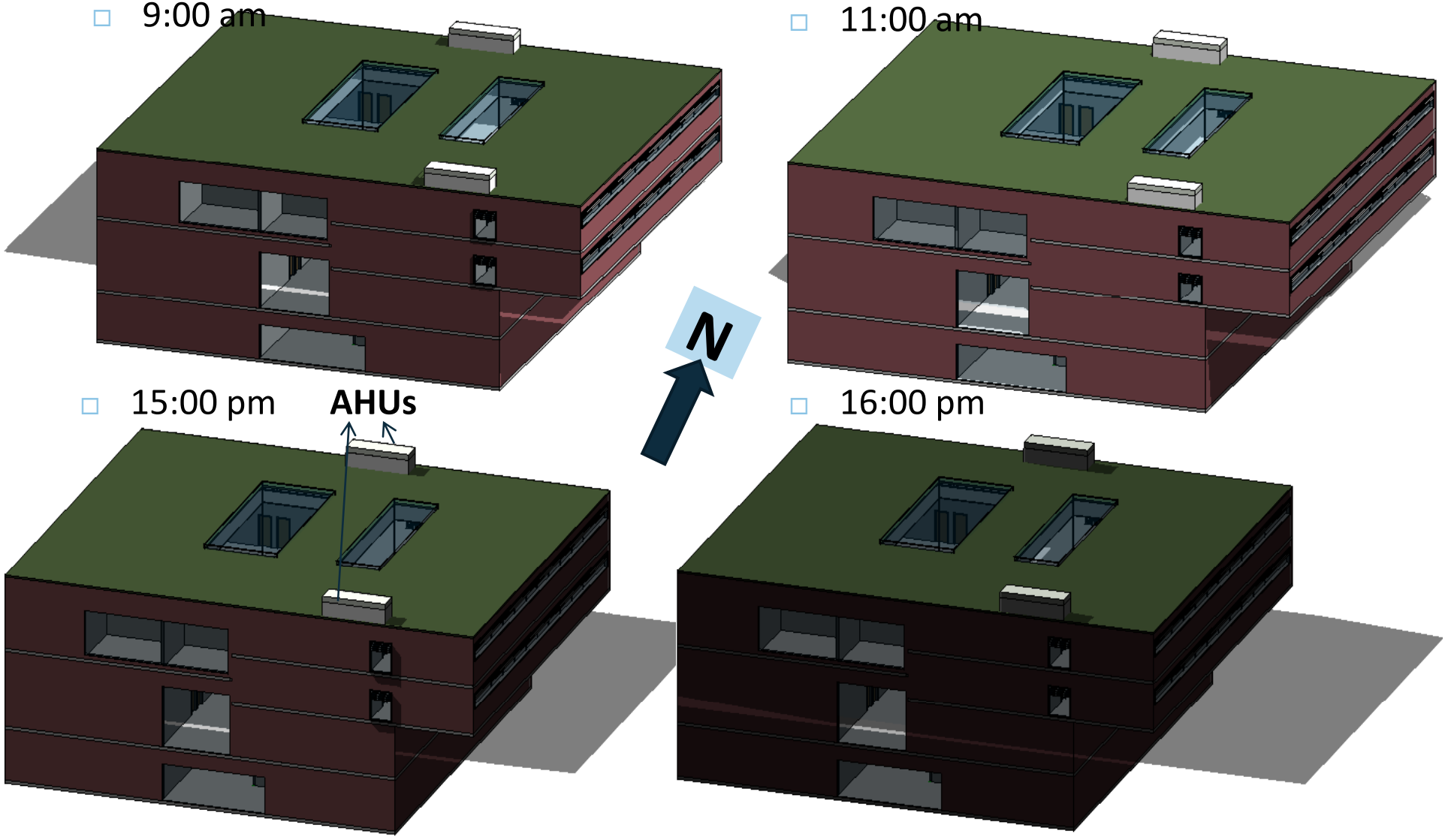
Inside-out : Sun Path - Summer Solstice

Central Team

- 9:00 am
- 11:00 am
- 15:00 pm **AHUs**
- 16:00 pm



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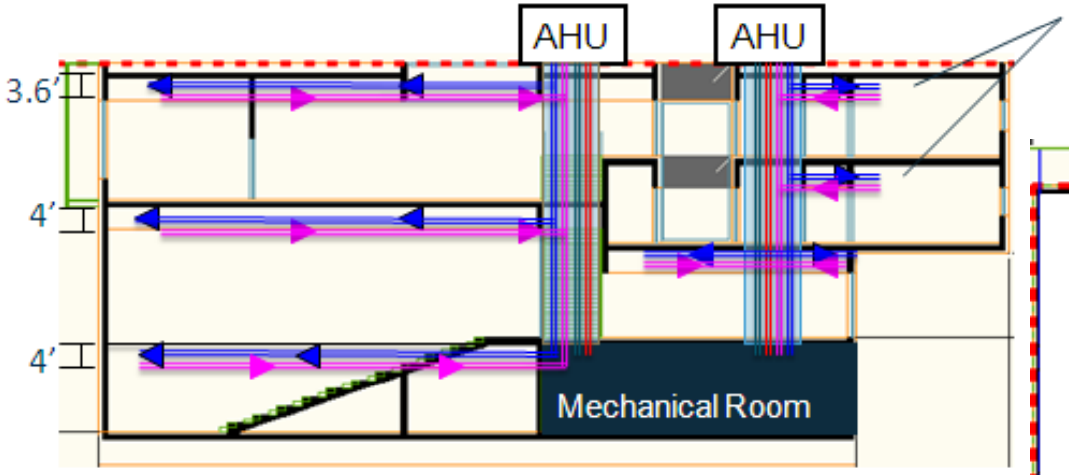
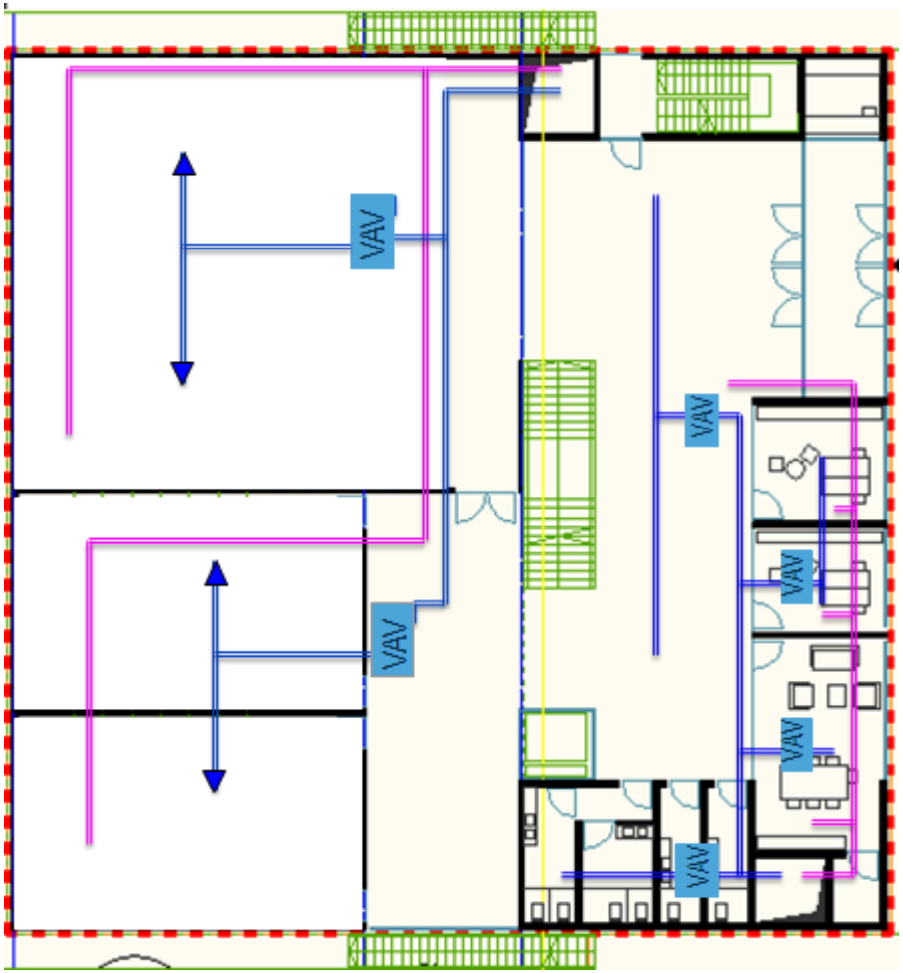
Central Team

Inside-out: MIX-MODE CONDITIONING SYSTEM



No ceilings in offices

Ground Floor



Supply air

Return air

Supply water

Return water

Central Team

Inside-out: Energy Usage

- **U-Value:** thermal mass ground floor-0.15W/m2K, Brick cavity walls-0.69W/m2K, others-use ASHRAE benchmark – Mix U-Value

Building Summary

Inputs	
Building Type	SchoolOrUniversity
Area (m²)	3,048
Volume (m³)	10,069.68
Calculated Results	
Peak Cooling Total Load (W)	290,848 **96 W/m2 < A**
Peak Cooling Month and Hour	September 2:00 PM
Peak Cooling Sensible Load (W)	247,980
Peak Cooling Latent Load (W)	42,869
Maximum Cooling Capacity (W)	365,443
Peak Cooling Airflow (L/s)	23,692.3
Peak Heating Load (W)	45,290 **15 W/m2 < A**
Peak Heating Airflow (L/s)	2,603.8
Checksums	
Cooling Load Density (W/m²)	95.44
Cooling Flow Density (L/(s·m²))	7.77
Cooling Flow / Load (L/(s·kW))	81.46
Cooling Area / Load (m²/kW)	10.48
Heating Load Density (W/m²)	14.86
Heating Flow Density (L/(s·m²))	0.85

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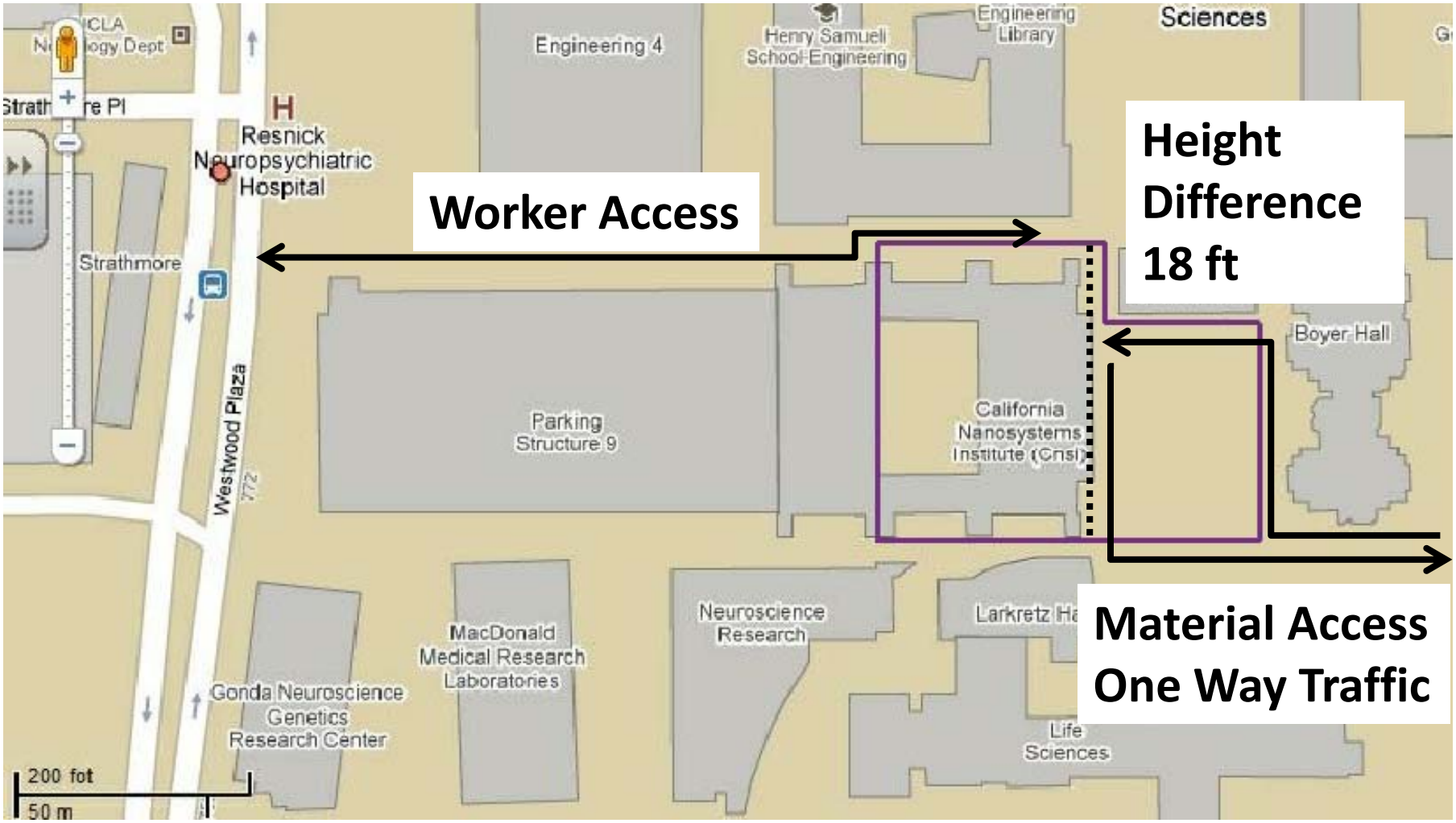
Construction Management – Site Access

Central Team



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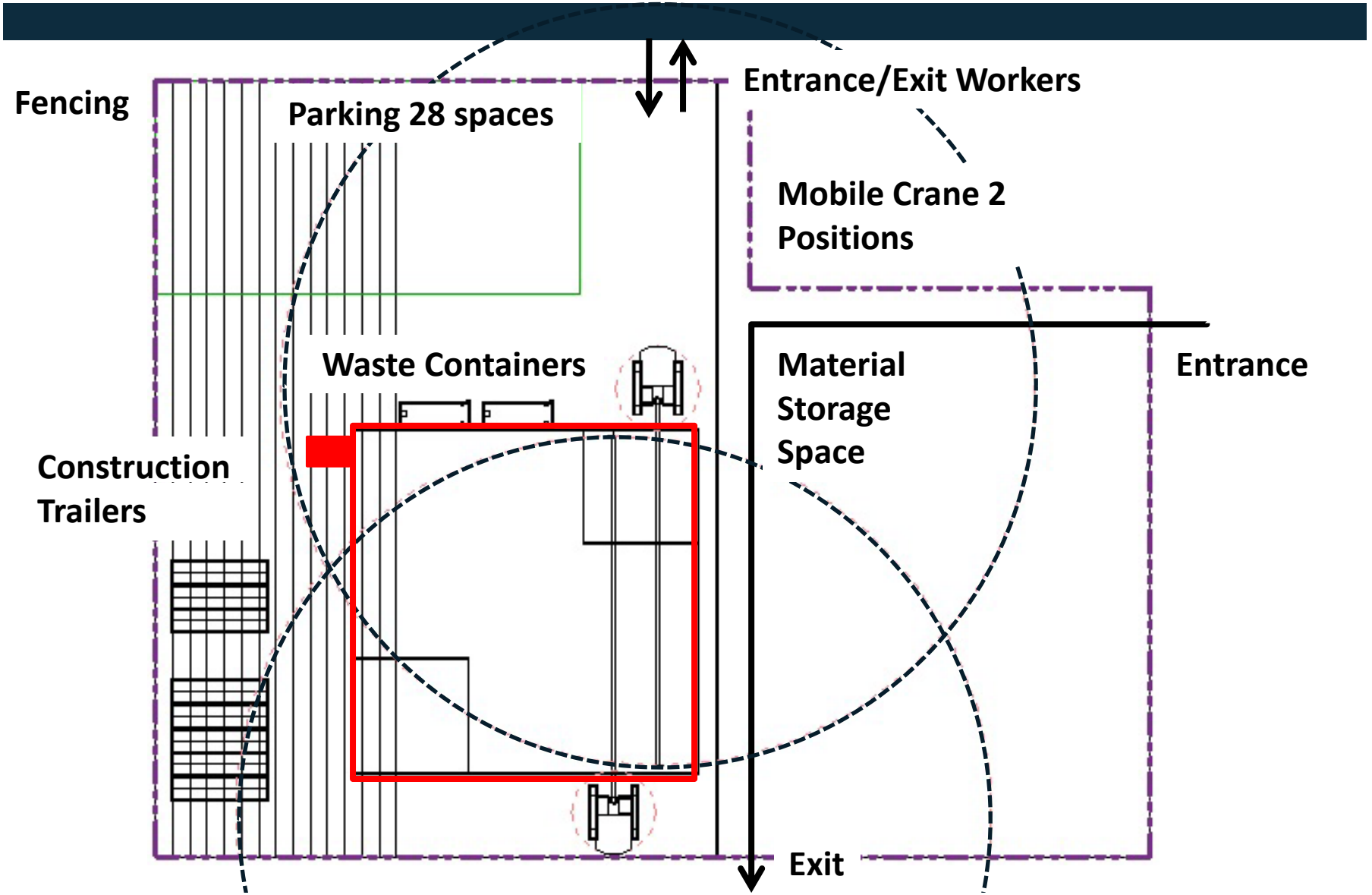
Construction Management – Site Logistics



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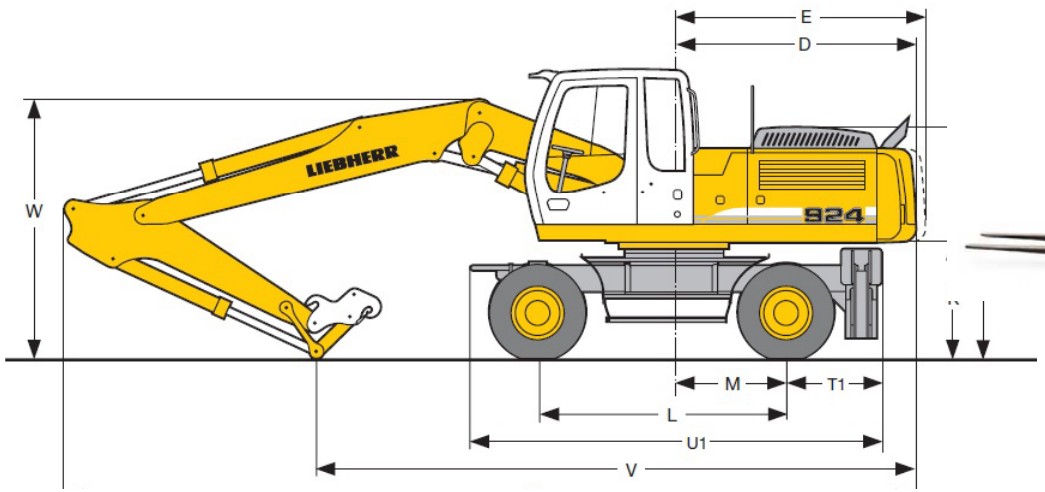
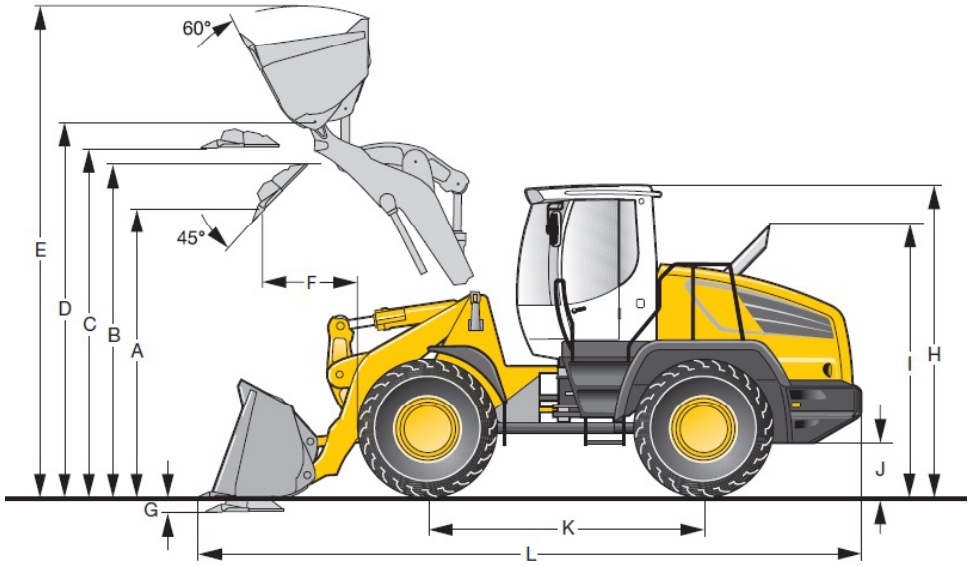
Construction Management – Equipment Selection

Central Team





3 Key Milestones

- Getting site ready for construction i.e. Fill the hole
- Roof Coverings
- Instructional Labs and Computer Room ready for move-in

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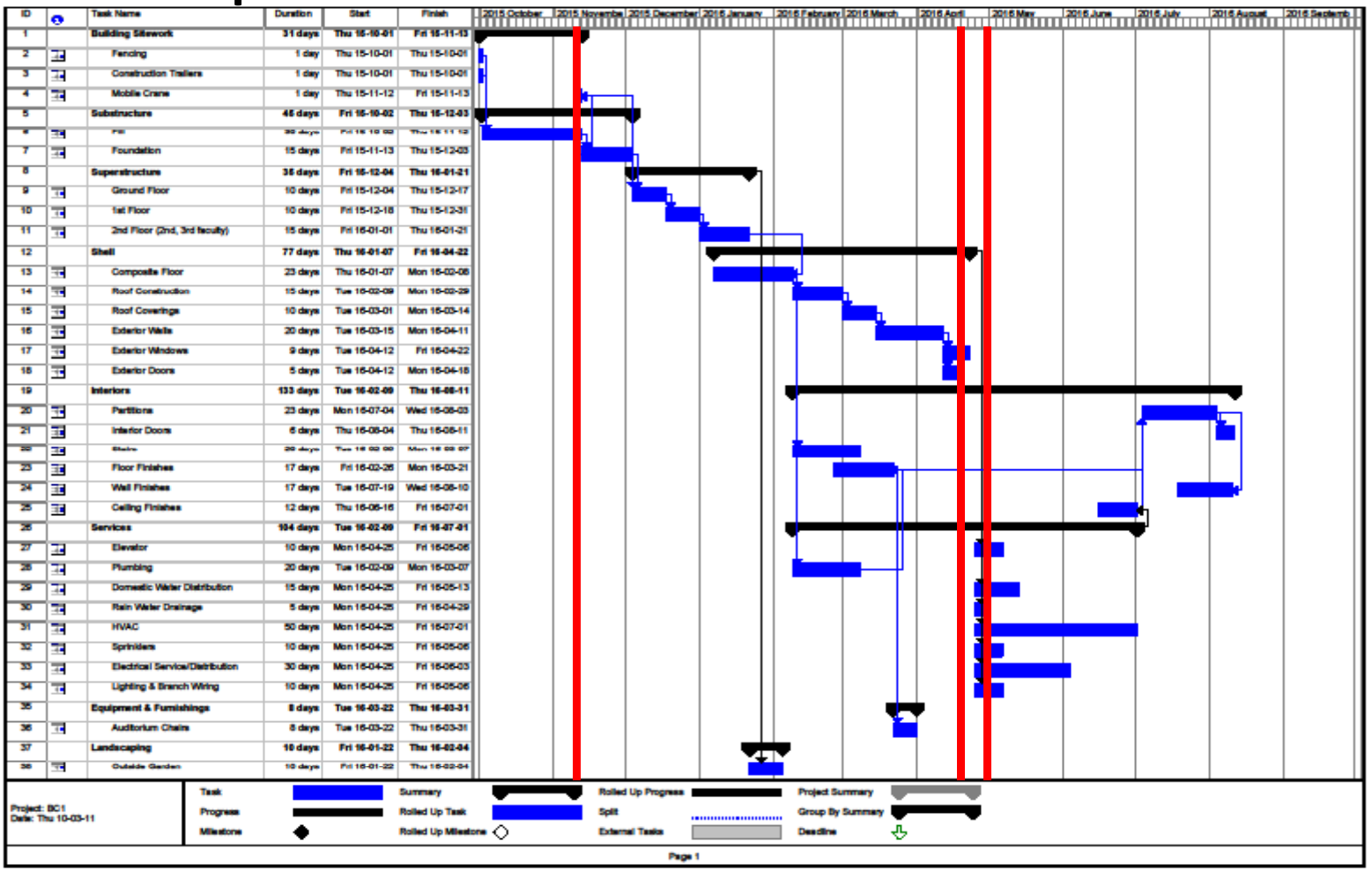
Construction Management - Scheduling

Central Team

Example: Inside-Out Steel with milestones in RED



Project Time

Starting time all: October 1st 2015

Finishing times;

Hollowing Steel: July 29th 2016

Hollowing Concrete: August 19th 2016

Inside-Out Steel: August 11th 2016

Inside-Out Concrete: September 1st 2016

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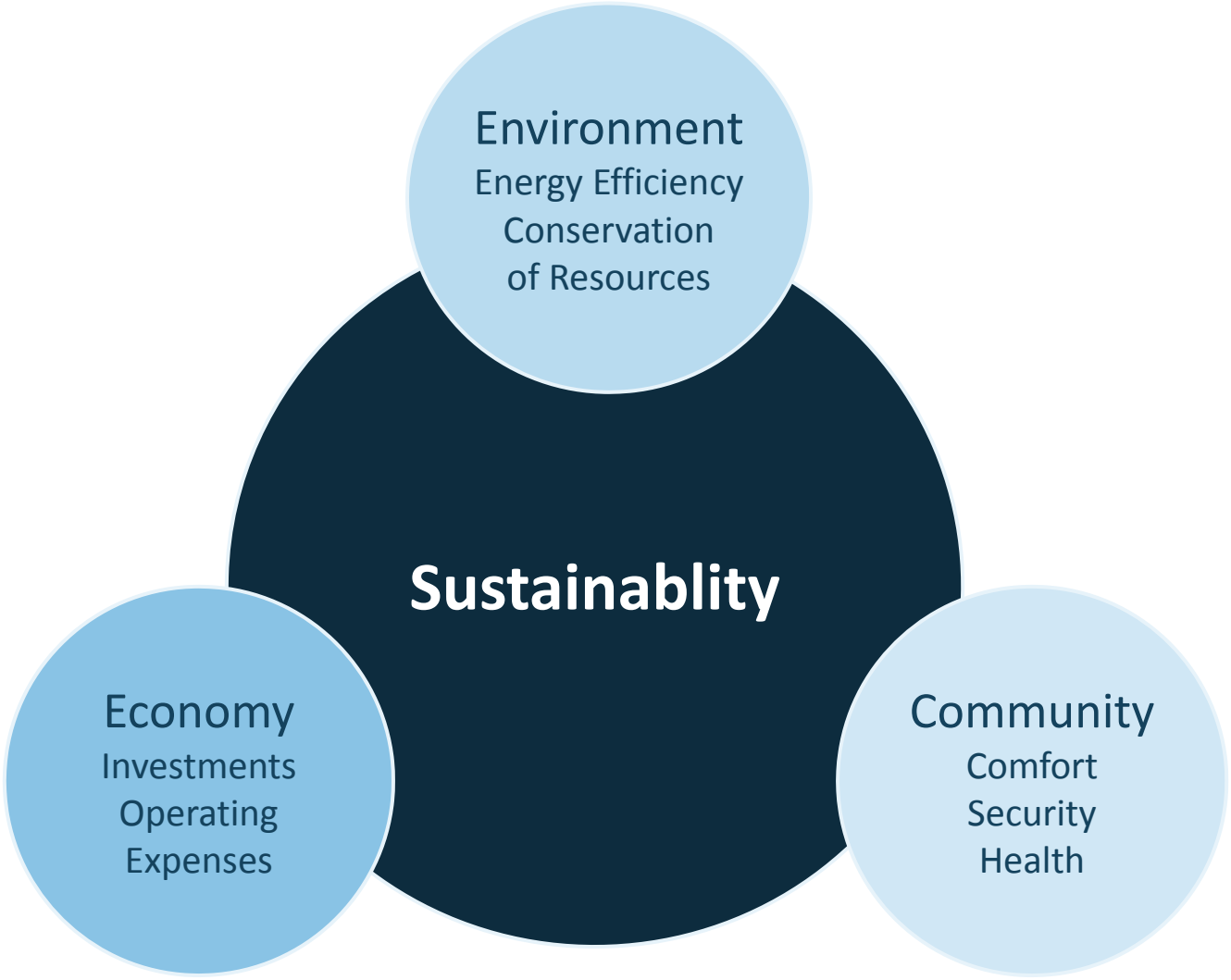
Sustainable Development

Central Team



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Project Structre

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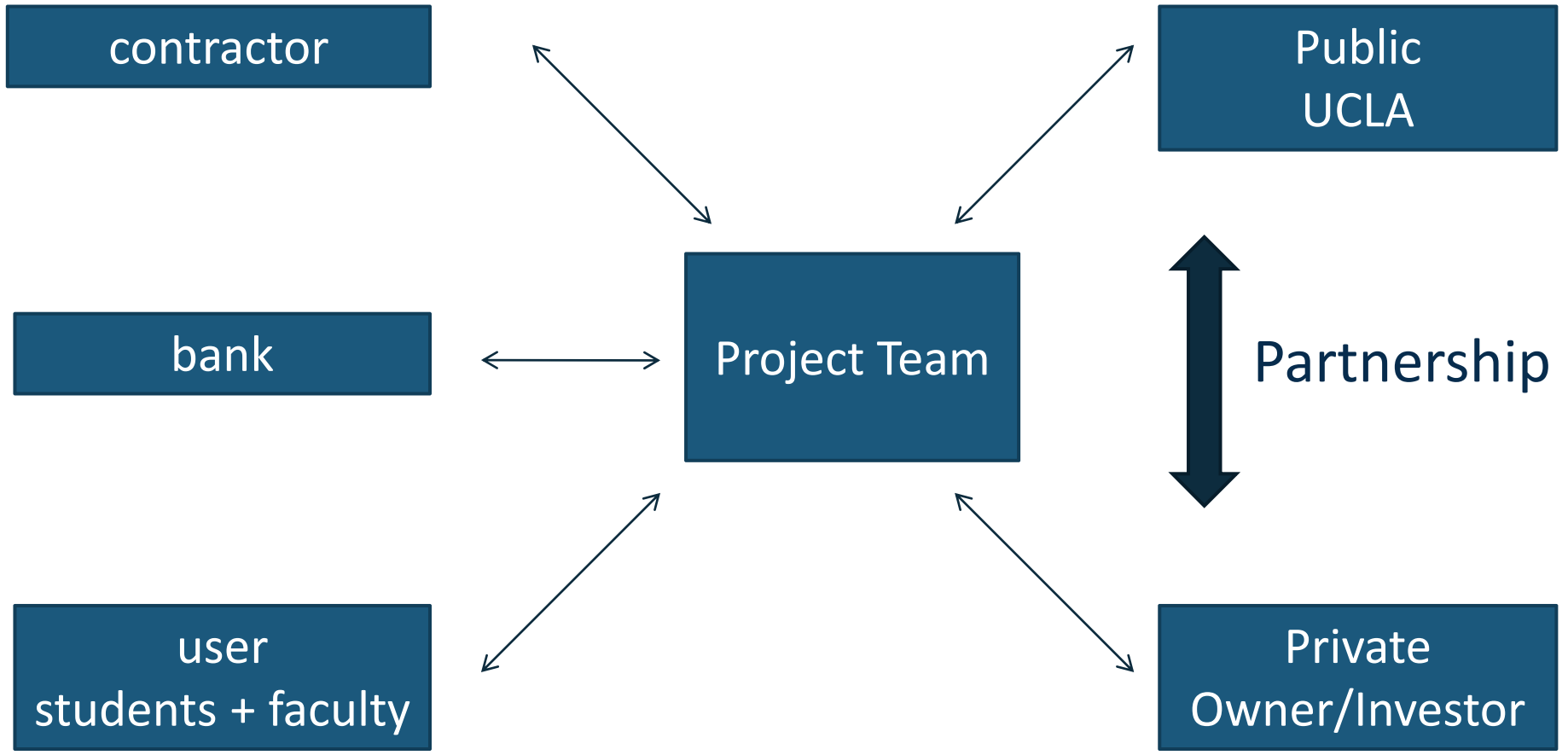

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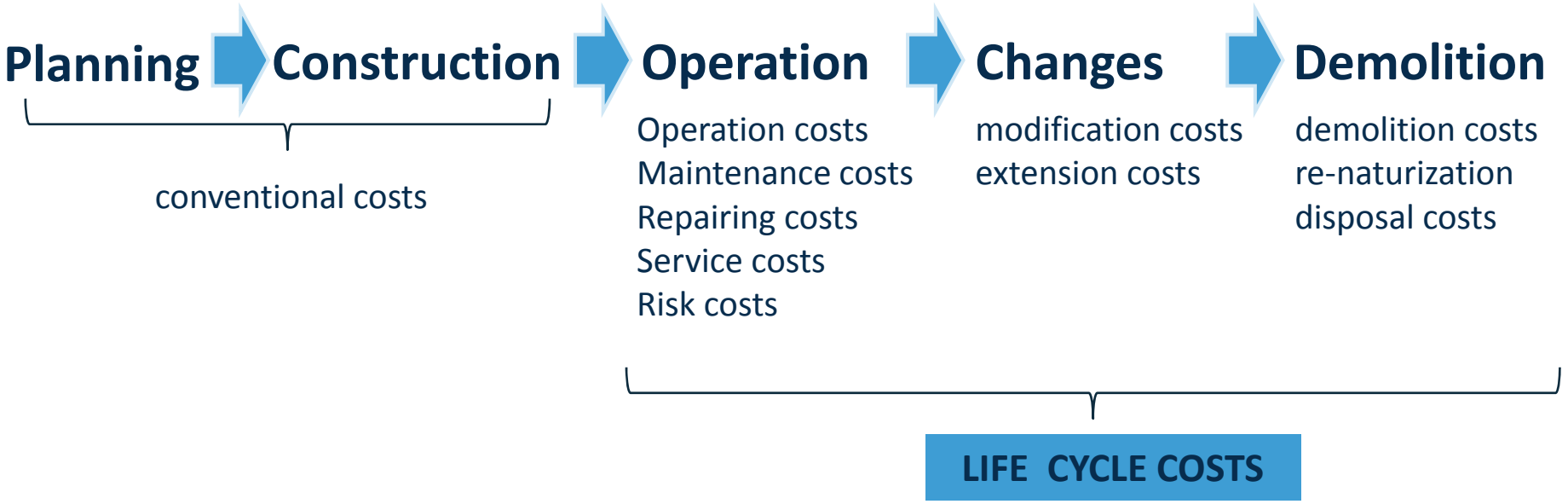
Central Team

Life Cycle Costs of a building



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Cash Flow Model – Input Data

Central Team

Revenues	Rental fee
−	
Expenses	Construction costs Investment costs Operation costs Maintenance costs Service costs Risk charge
=	Cash Flow

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Risk Allocation Table

Central Team

Period of LC	Risk name	Description	Consequences	Risk Allocation		ACE Responsibility	Risk Management
				Contractor Risk	Owner Risk		
construction							
1	planning risks	f.e. wrong sizing	problems to fulfil the time schedule > increasing costs	x		A,E,C,MEP	careful planning, good communication between disciplines
operation							
17	inflation		loss of value		x		global risk
maintenance							
21	earthquake	material/structure could be damaged	repairing costs	x	x	all	insurance, innovative protection design
services							
25	changes of costs for service		increasing costs	x		FM	contracts

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How does LC impact design?

Central Team

Architect

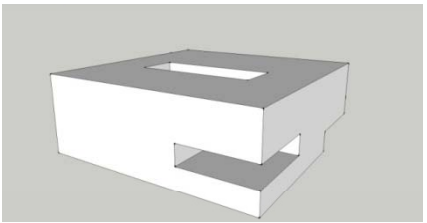
Structural Engineer

Construction Manager

MEP

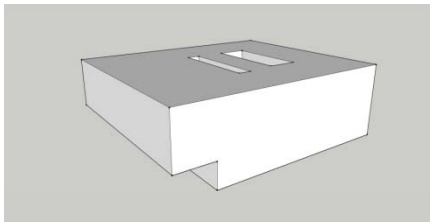
LCFM

HOLLOWING



Location of Auditorium

INSIDE-OUT



Operation Costs

Maintenance Costs

Energy Costs

Construction Costs

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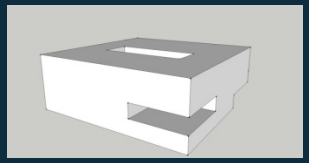
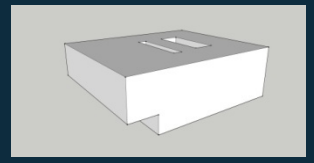
Building Areas

Central Team

Gross floor area



HOLLOWING
33.311,7



INSIDE-OUT
34.443,1

Net usable area

HOLLOWING
29.967,8

INSIDE-OUT
31.664,8

Structural area

HOLLOWING
3.343,9

INSIDE-OUT
2.778,3

Net assignable area

HOLLOWING
20.362,3

INSIDE-OUT
19.644,2

Non-assignable area

HOLLOWING
9.605,5

INSIDE-OUT
12.020,6

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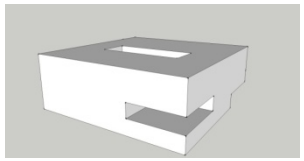
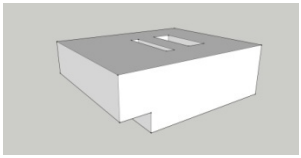
Central Team

Ratios





	HOLLOWING	INSIDE-OUT
Building Surface/Building volume (S/V)	0,13	**0,12**
Usable floor area/gross floor area (UFA/GFA)	0,89	**0,91**
Circulation area /usable floor area (CA/UFA)	**0,45**	0,63

Communication

- Google Wave – Formal and informal communication
- Dropbox – For files, clear file naming system
- Google Cal – To see open times for people to meet

Meetings

- Weekly meetings Sundays – GoToMeeting
- Backup meetings Tuesdays – GoToMeeting or Skype
- Use Wave for Meeting Agenda
  - Take live meeting notes
  - Write up in same wave progress made in meeting
  - Put wave in a meeting folder

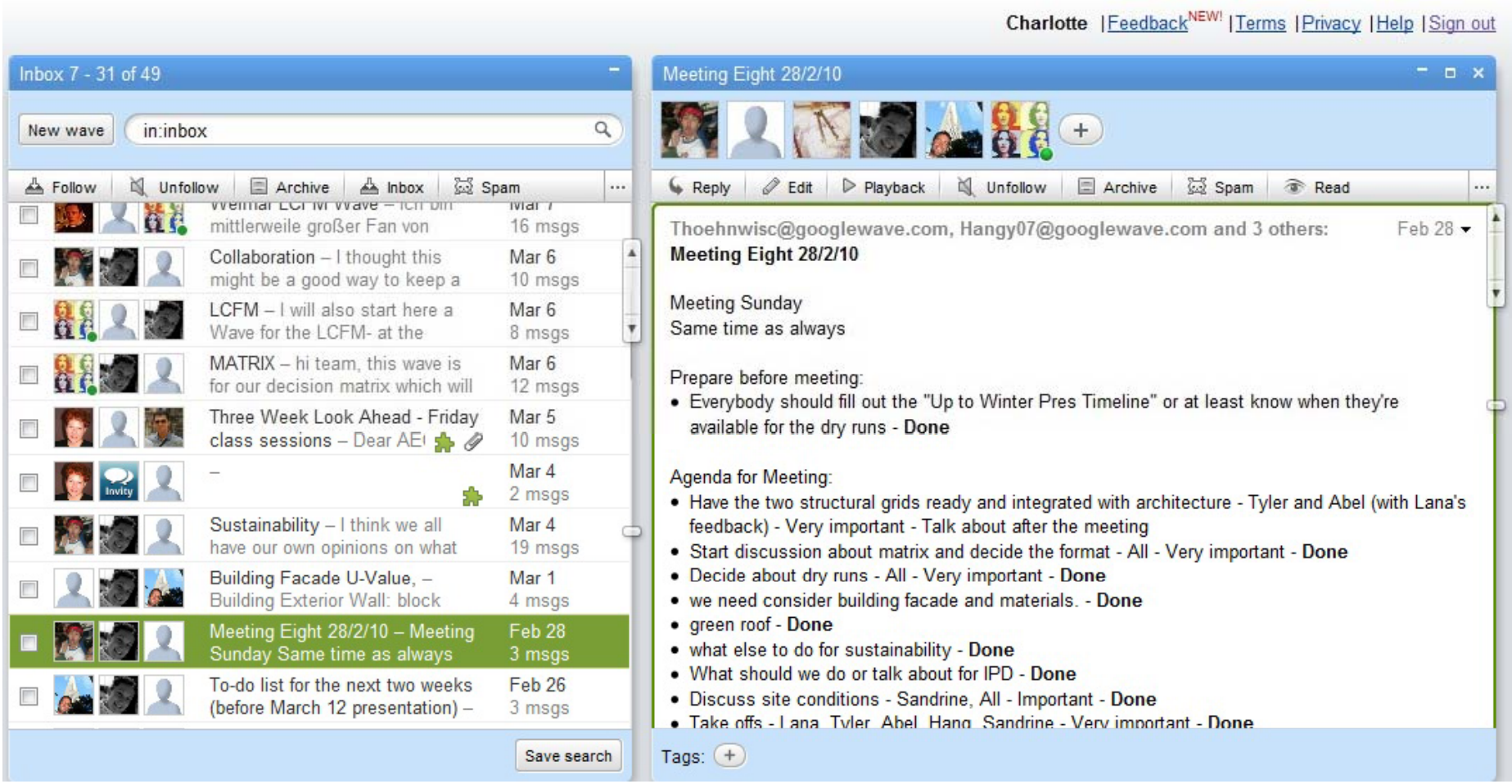
Coordination

- Team Schedule – What is everybody doing and what was done

UCLA University of California, LA

IPD

Central Team



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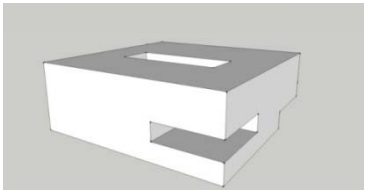
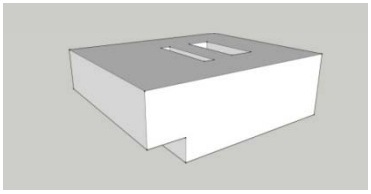
Descision Matrix

Central Team

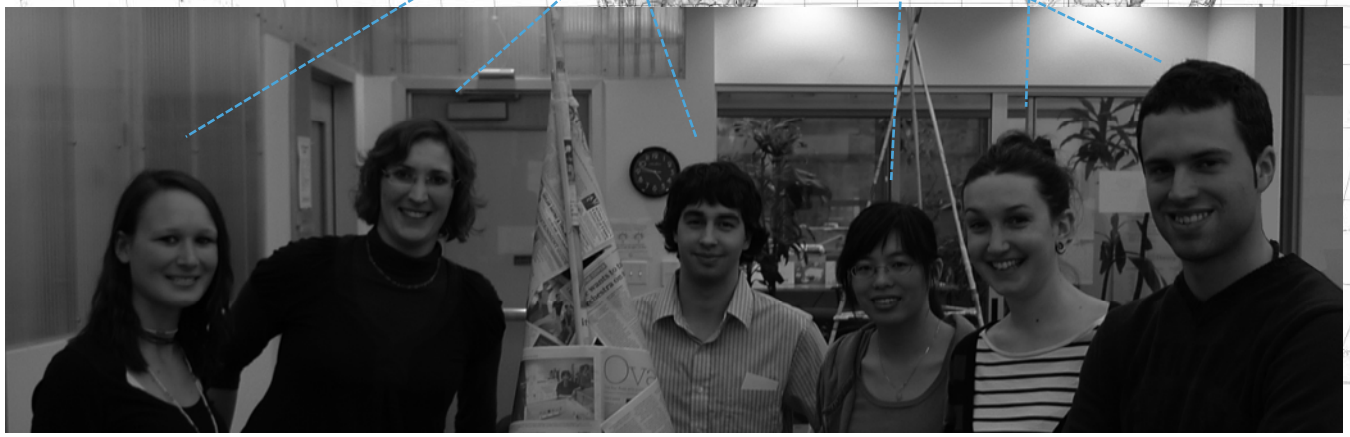




Key points	Weight	Hollowing				Inside-Out			
		Steel		Concrete		Steel		Concrete	
Strengh of Concept	7	2	14	2	14	4	28	4	28
Design/Astehic	8	2	16	2	16	4	32	4	32
Integration	10	2	20	3	30	4	40	4	40
Efficient lateral system	6	3	18	1	6	4	24	2	12
Quality of Space	10	2	20	2	20	4	40	4	40
Flexibility	5	4	20	3	15	3	15	2	10
Sustainability	12	3	36	2	24	4	48	3	36
Life Cycle Cost	15	4	60	4	60	3	45	3	45
Building Cost	11	2	22	2	22	3	33	1	11
Construction Time - Constructability	6	4	24	3	18	3	18	2	12
Indoor Quality	10	2	20	3	30	3	30	4	40
	100		270		255		353		306
RANKING			3		4		1		2

Central Team

A:	Lana Topolovec
E:	Tyler Hoehn
E:	Abel Diaz
C:	Sandrine Rivoire
MEP:	Hang Yin
LCFM:	Charlotte Thomas



THANK YOU FOR YOUR ATTENTION