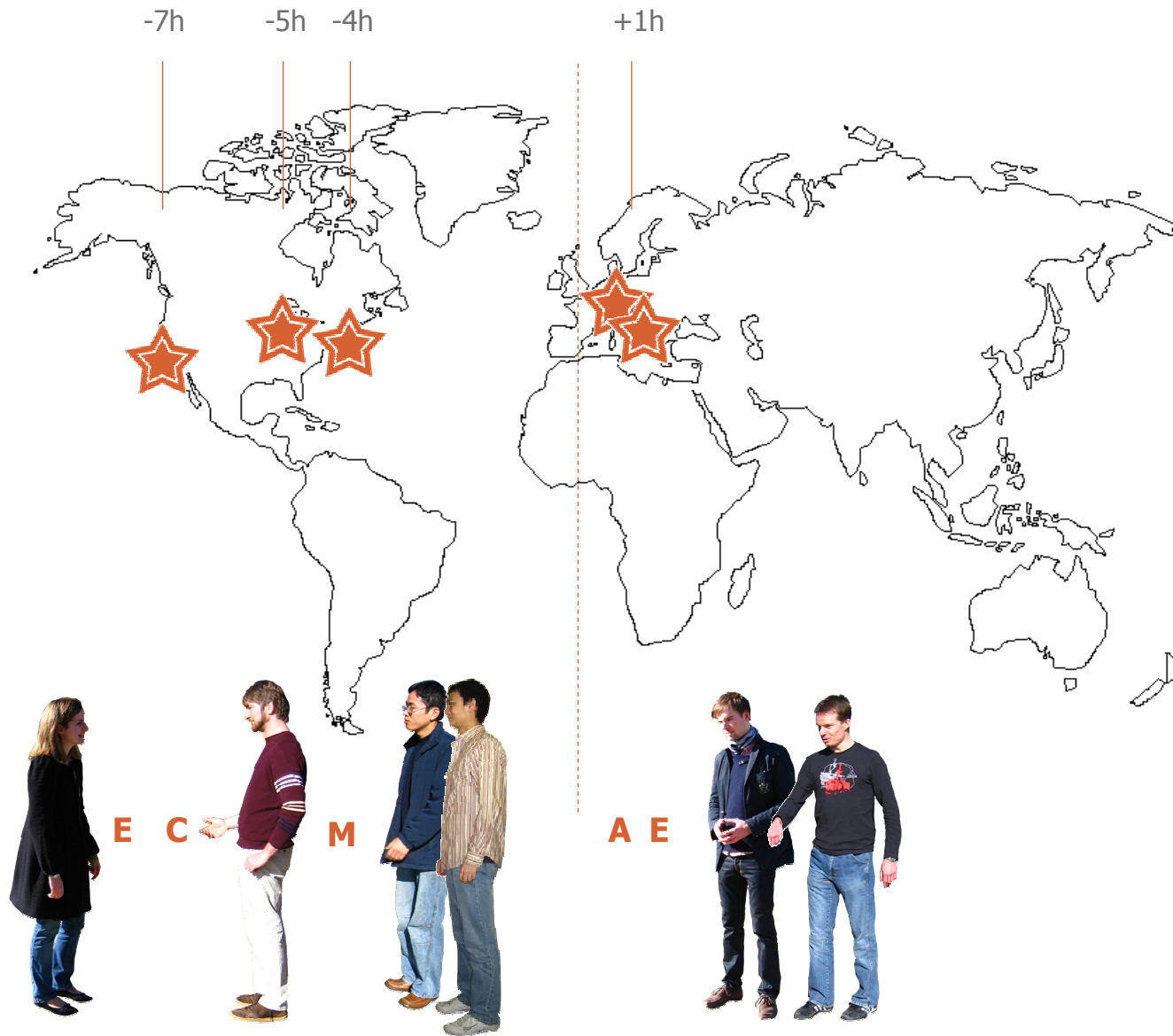




Atlantic Team

Dimitra from Stanford, CA (born in Greece)

Noah from Madison, WI

Fei Zhao and Li Zhengwei from Atlanta, GA (born in China)

Michael from Weimar, Germany

Matic from Ljubjana, Slovenia

Atlantic owners

Claudio from Stanford

Wafaa from San Francisco

Atlantic Team

team

Michael Kraus
Dimitra Ioannidou
Matic Ozbolt
Noah Bachmann
Li Zhengwei
Fei Zhao

owner

Claudio Mourgues
Wafaa Sabil



map of Wisconsin, indicating site



map of Madison, indicating site

Site Location

**University of Wisconsin
Madison**

Lake Mendota

Muir Woods

**Lakeshore Nature
Preserve.**

**moderate,
continental
climate**

**high average wind
speeds from west**

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Muir Woods, a green belt between UW-Madison Campus and Lake Mendota, adjacent to the site between Helen C. White Hall (1971, far left) and Hasler Laboratory of Limnology (1963, middle)

Muir Woods

7-acre forested tract northwest of Bascom Hall and east of the Sewell Social Science Building.

„John Muir Park“
a **tribute to the great naturalist**

wooded north-facing slope

since 1848



Muir Woods, 1940

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Muir Knoll in the Lakeshore Nature Preserve, view to the site and towards Helen C. White Hall and Lake Mendota

Muir Knoll

„There is a lesson to note here about the many in-formal teaching and learning opportunities that occur on our great campus. Recall that young John Muir received his lesson from a fellow student outside of a formal classroom setting.

While great lecture halls and advanced technology are essential to the academic experience, we should not forget that students can —and do — learn in many ways, from many teachers, in many places.”

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Li Zhengwei
Fei Zhao

owner

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*Lakeshore Path within the Lakeshore Nature Preserve;
the site and future building as a new „gateway" to the preserve*

Lakeshore Path

**ties the entire
Lakeshore Nature
Preserve together**

two trail segments
make up the

Lakeshore Path:

**Howard Temin Path
Lake Mendota Path**



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Fei Zhao

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Muir Woods in fall; view towards Helen C. White Hall



Muir Woods: stairs up to Muir Knoll



seeds and leaves of Larch and Oak

Vegetation

top of the hill

european larch
 red and white oak
 black locusts
 sugar maples
 basswood
 hickories
 Hackberries

middle section of slope

hophornbeam
 tulip trees

forest mid-layer

American elm
 hackberry
 green and black ash
 basswood

shrub layer

chokecherry
 highbush cranberry

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 Noah Bachmann
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owner

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Helen C. White Hall
shading
massive volume

Existing Building
demolished

future **site**

Muir Woods
shading

Hasler Laboratory
limits space

Site constraints

limited **space**

tall building (Helen C. White Hall) to the southeast and hill and forest in the south:

shading

unobstructed **views**
only towards the north

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team

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Fei Zhao

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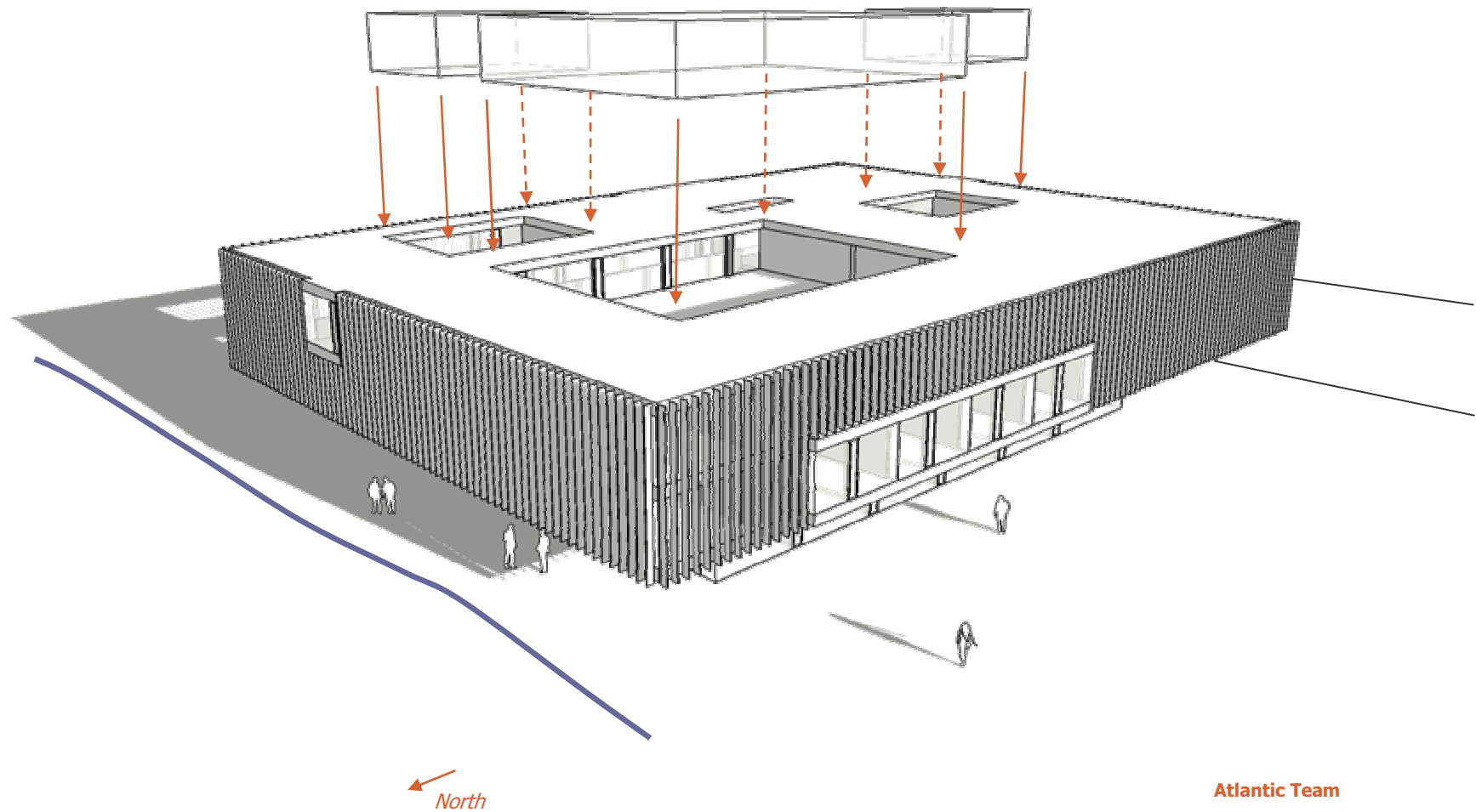


Concept I: *Hidden Light*

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Claudio Mourgues
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Concept



AEC – Concept 1 Hidden Light

Project

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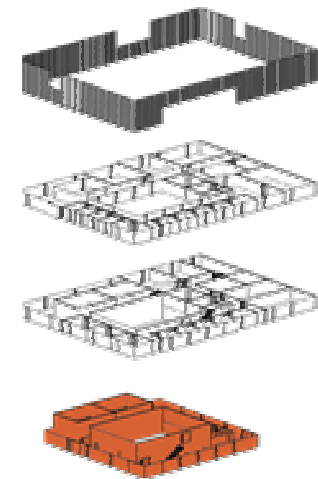
team
 Michael Kraus
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 Matic Ozbolt
 Noah Bachmann
 Li Zhengwei
 Fei Zhao
owner
 Claudio Mourgues
 Wafaa Sabil

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Floorplans

AEC – Concept 1 Hidden Light

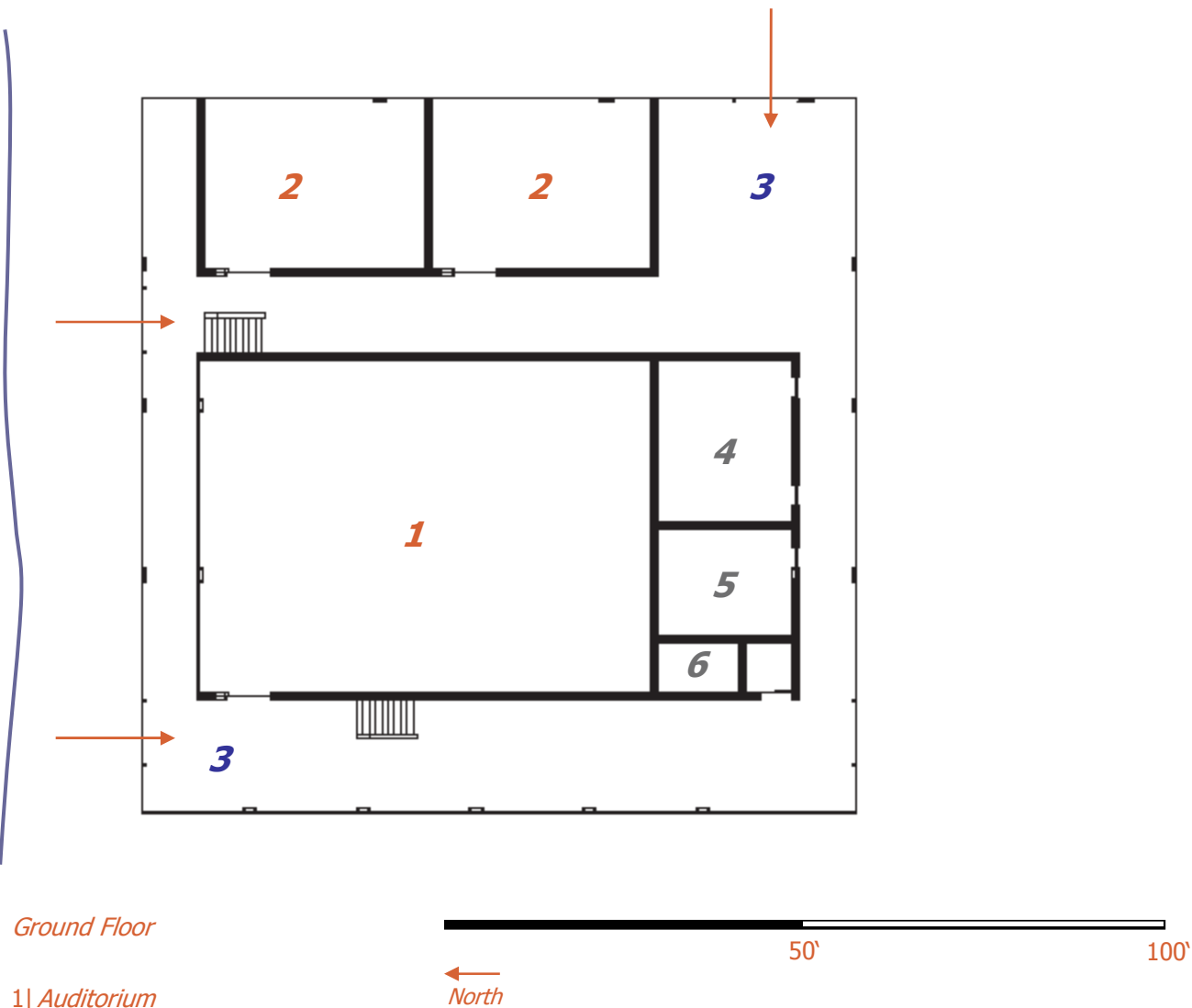
Project

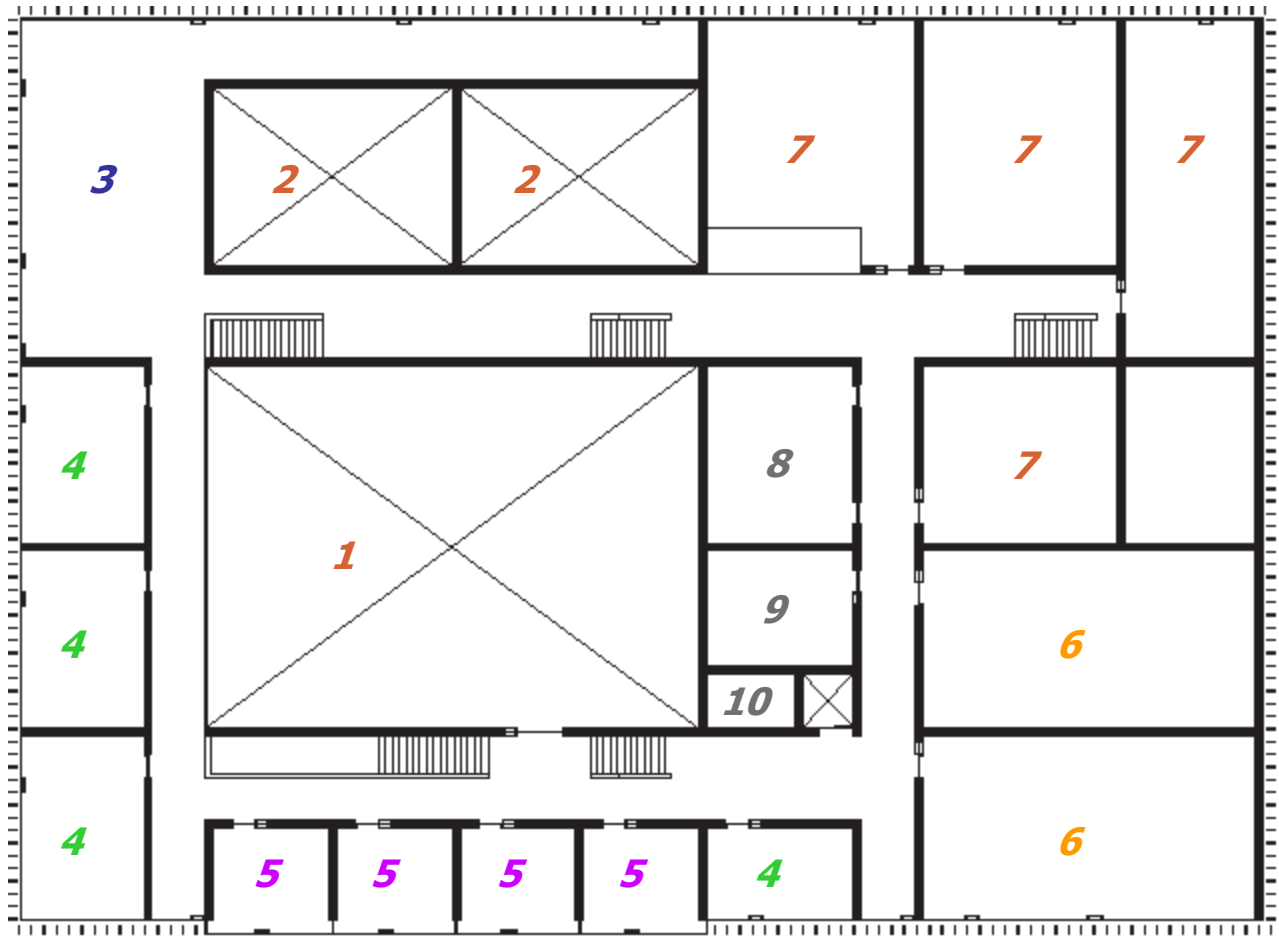


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 Matic Ozbolt
 Noah Bachmann
 Li Zhengwei
 Fei Zhao
owner
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 Wafaa Sabil

mk-1stconcept-031008.ppt



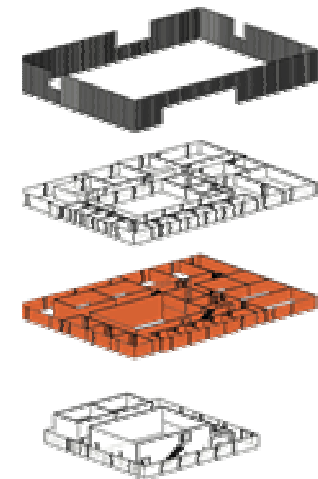


First Floor

- 1| Auditorium
- 2| Large Classrooms
- 3| Student Lounge
- 4| Student Workspaces
- 5| Seminar Rooms
- 6| Instructional Labs

- 7| Small Classrooms
- 8| Restrooms
- 9| MEP/ Storage Space
- 10| MEP & Elevator Shaft

Floorplans



Atlantic Team

team
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 Matic Ozbolt
 Noah Bachmann
 Li Zhengwei
 Fei Zhao
owner
 Claudio Mourgues
 Wafaa Sabil

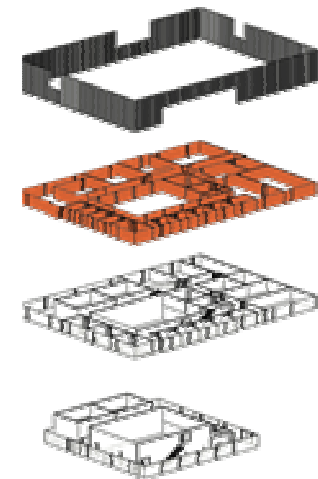


2nd Floor

- 1| Patio/ Courtyard
- 2| Common Faculty Offices
- 3| Professor's Offices
- 4| Department Chair's Office
- 5| Administrative Assistants
- 6| Senior Administrative's Offices

- 7| Faculty Lounge
- 8| Restrooms
- 9| MEP/ Storage Space
- 10| MEP & Elevator Shaft

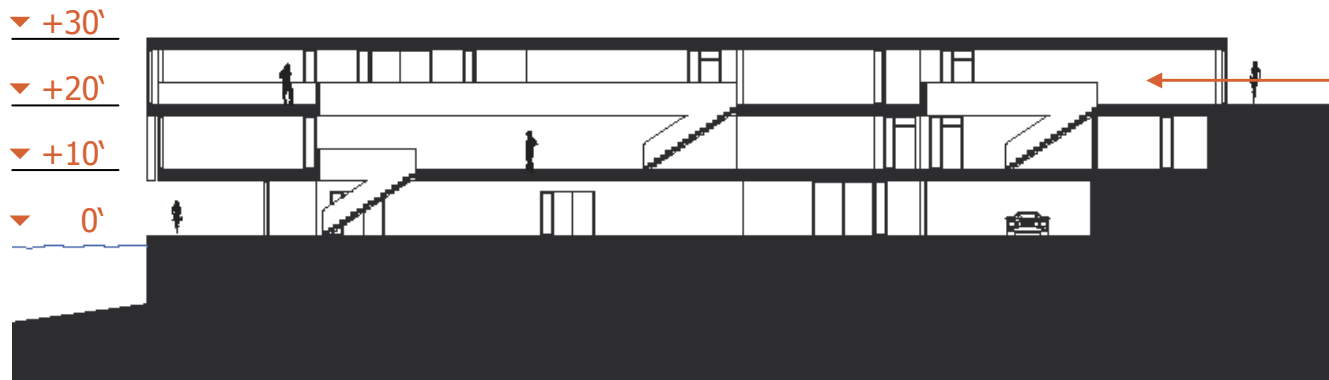
Floorplans



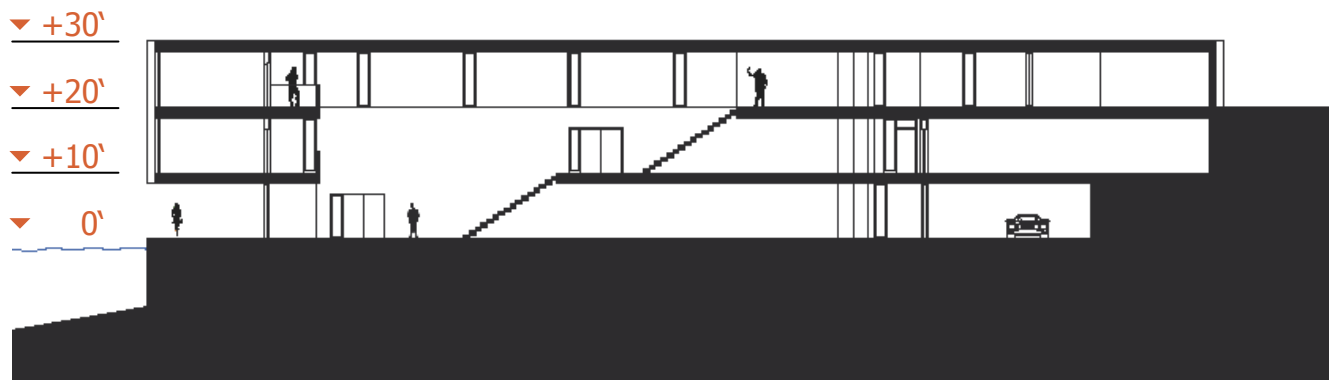
Atlantic Team

team
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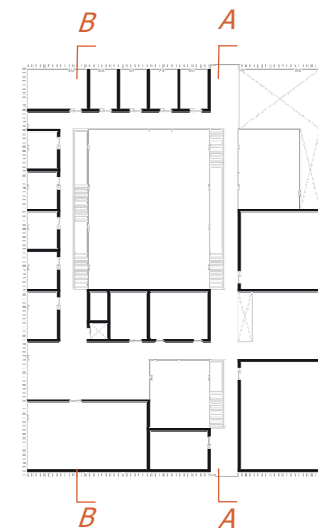
Sections



Section A-A North - South

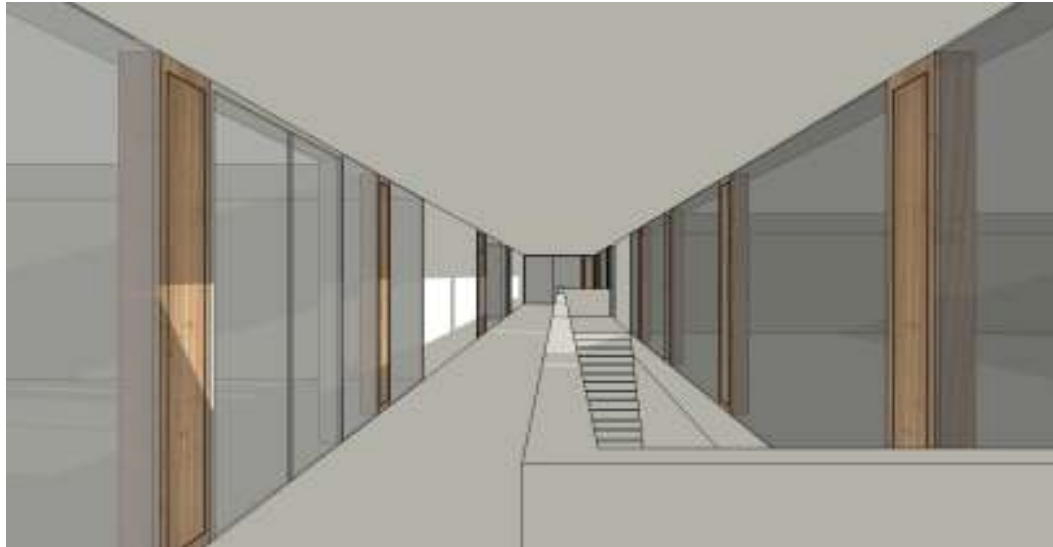


Section B-B North - South



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 Matic Ozbolt
 Noah Bachmann
 Li Zhengwei
 Fei Zhao
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 Claudio Mourgues
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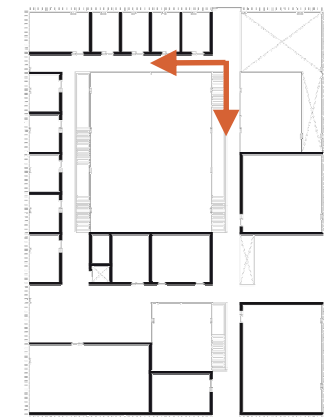


Perspective view of corridor with patios left and right



Perspective view of corridor with main patio to the left

Interior



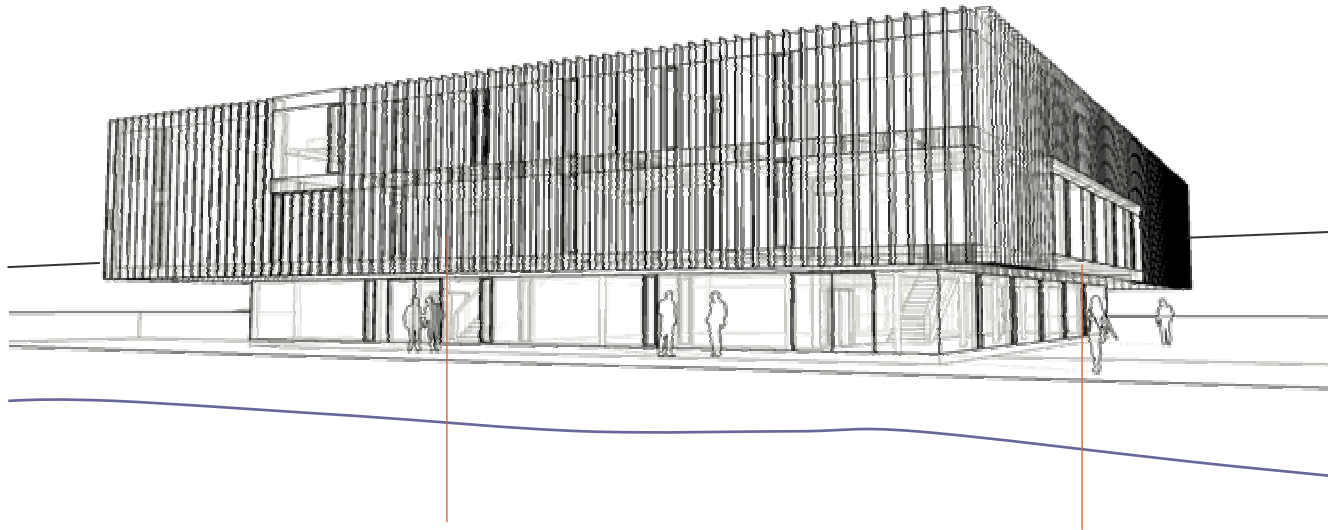
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team

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owner

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Materiality

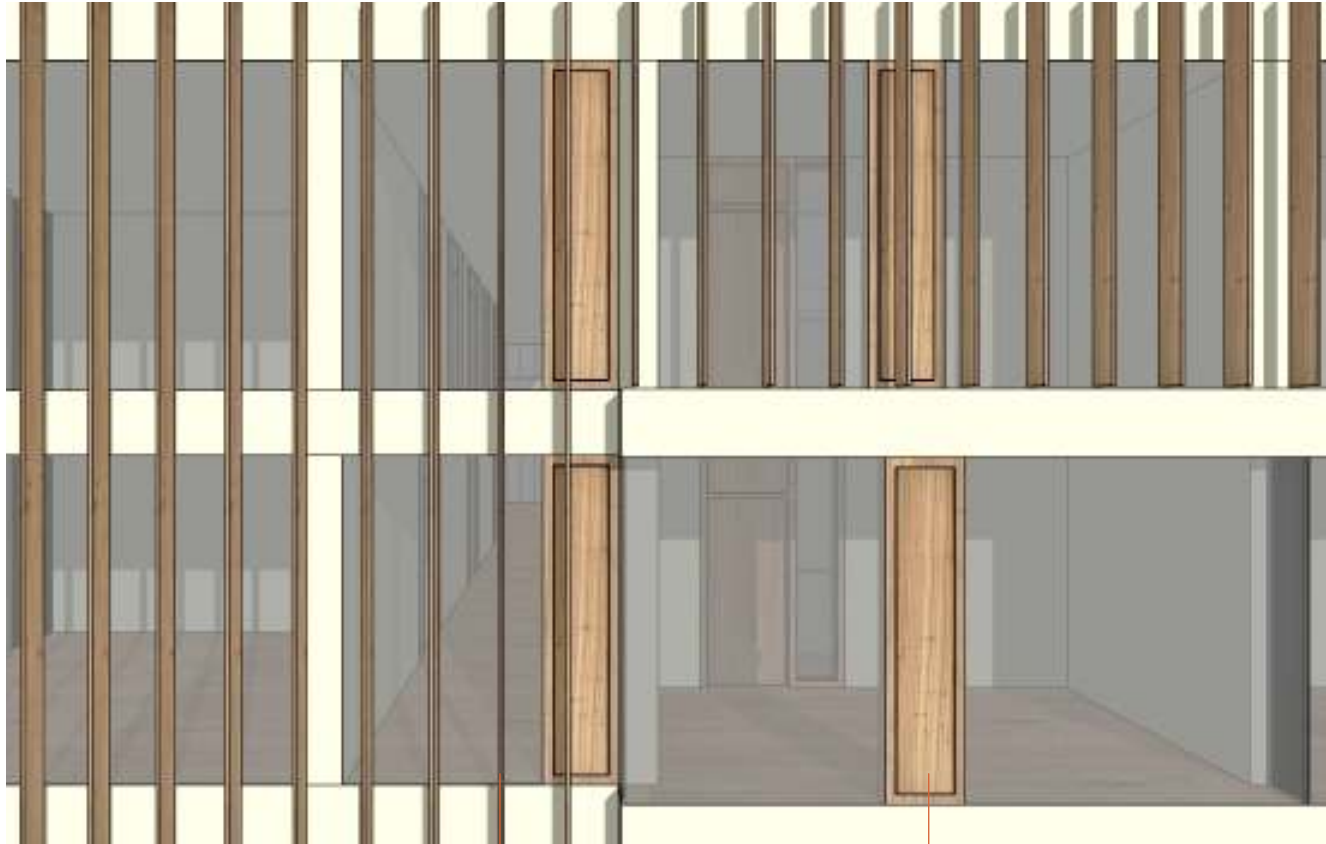
Reclaimed **Wood**
-Larch

Crushed Aggregate
Concrete
-demolished building



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Facade

Detailed Elevation

vertical **blinds**
provide shading

operable elements to allow
natural **ventilation**



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owner
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Wafaa Sabir



SANAA – Cultural Center



Kees Christiaanse – Renault Headquarters



Diller, Scofidio + Renfro – ICA Boston



Diller, Scofidio + Renfro – ICA Boston

References

Patio
Courtyards
Cantilever
Auditorium

Atlantic Team

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Fei Zhao
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Wafaa Sabil

Structural Engineering

Concept I: *Hidden Light*

Atlantic Team

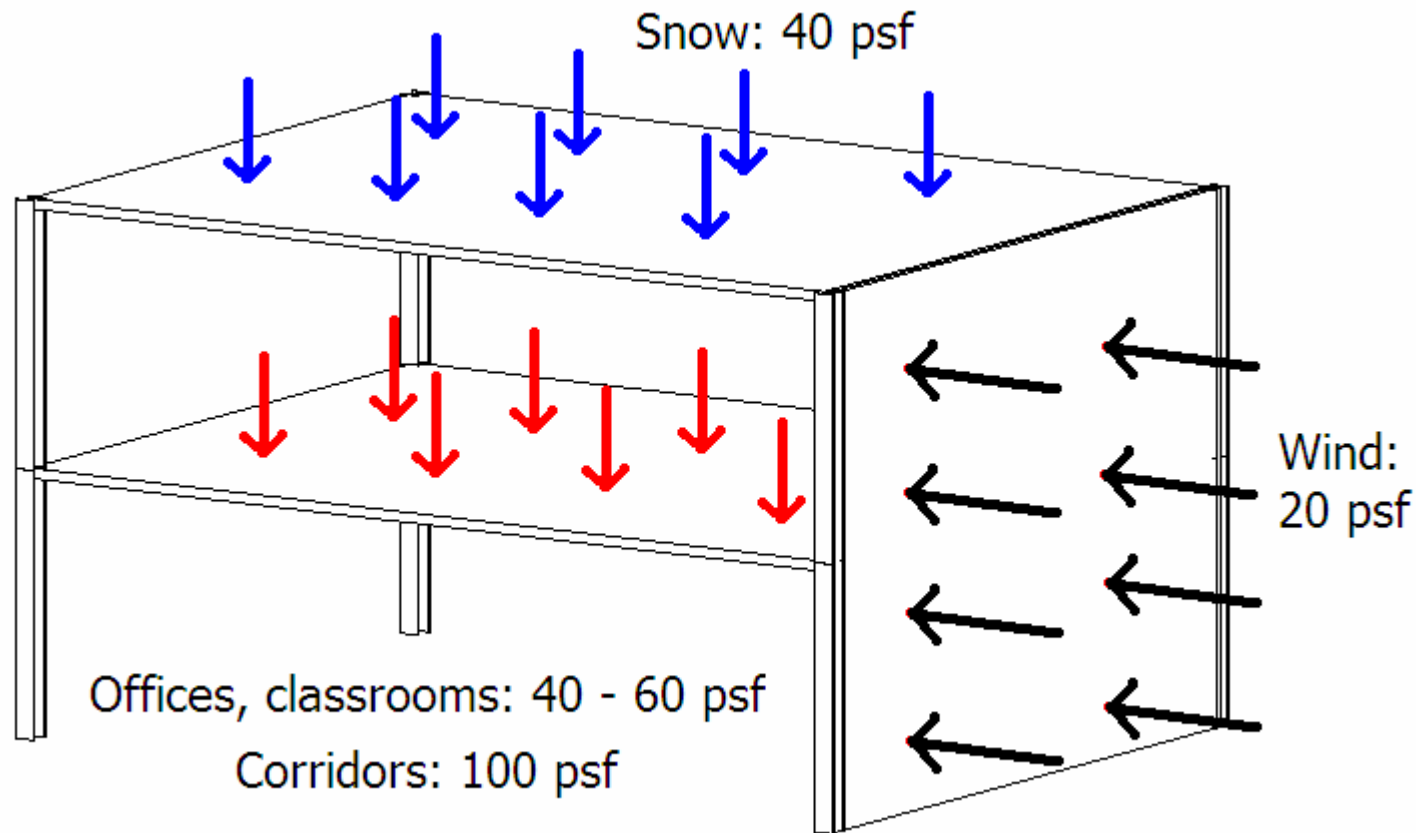
team

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owner

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Loads according to ASCE 7-02



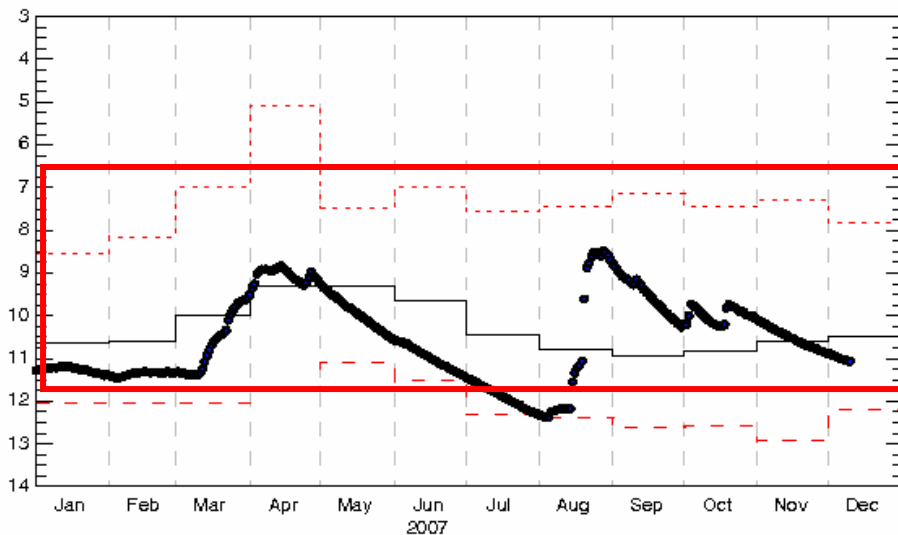
No earthquake problems.

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Li Zhengwei
Fei Zhao
owner
Claudio Mourgues
Wafaa Sabli

Soil Conditions

- Mainly Gravel & Sand → Good Bearing Value (~ 8,000PSF)
- Small Percentage of Clay



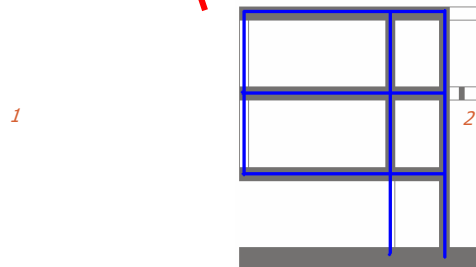
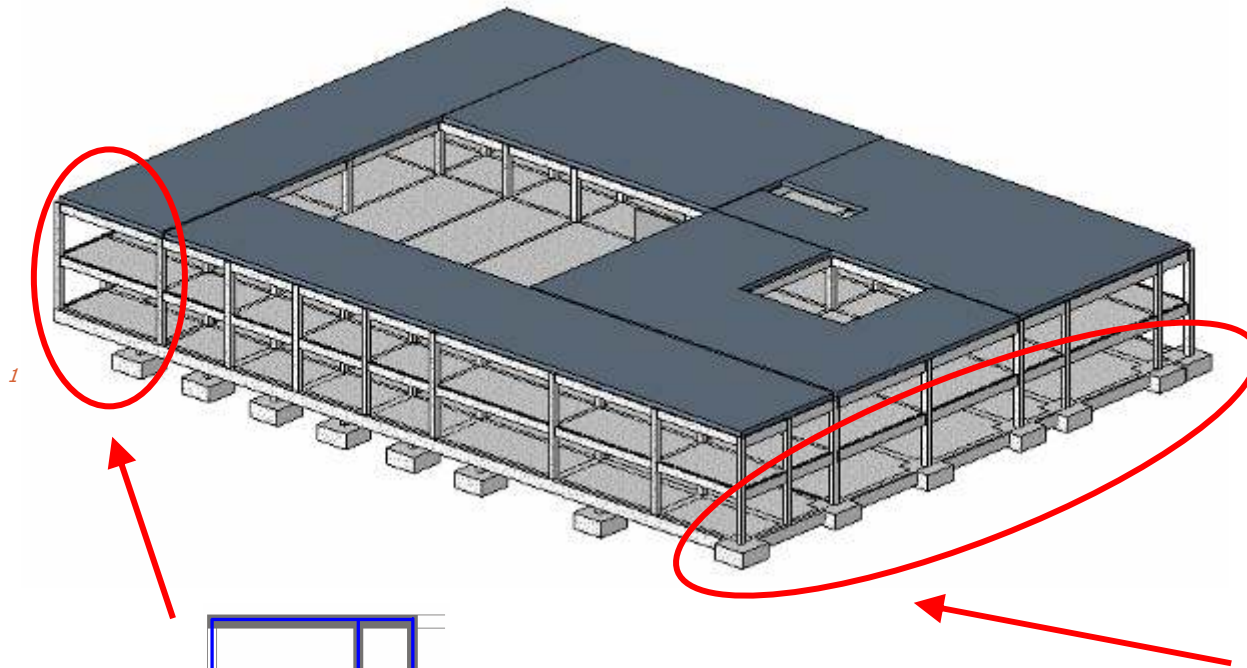
Foundation above water level → Spread Footings

Foundation above water level → Mat Foundation

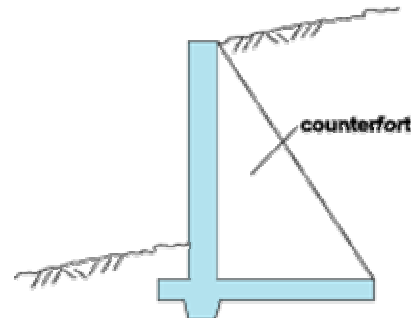
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Fei Zhao
owner
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Wafaa Sabil

Concrete Structural System



Vierendeel
Truss for the
Cantilevers



support structure to
the slope

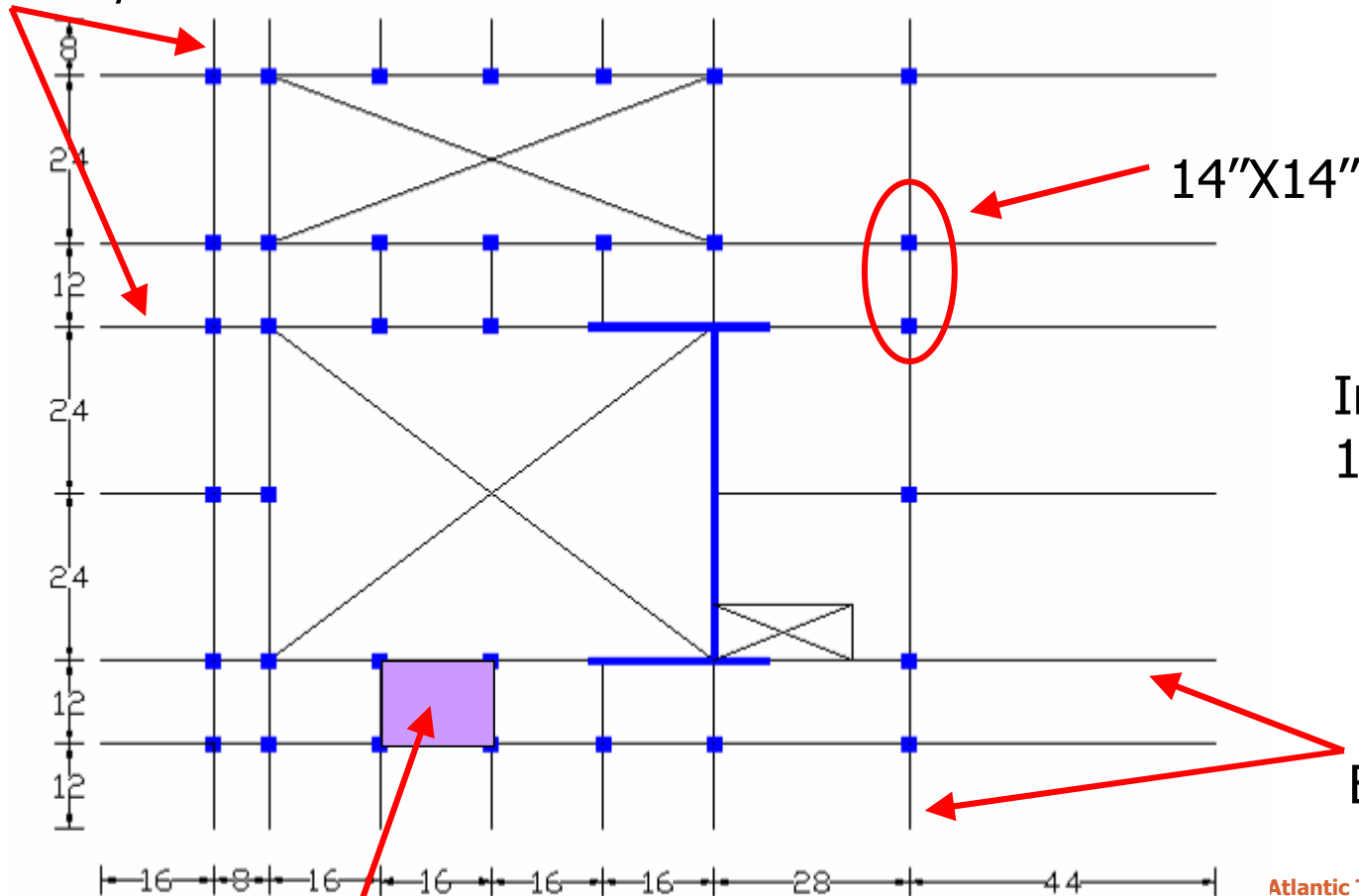
- Spread Footings for Columns
- Retaining Wall

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Concrete Structural System – Ground Floor

Beams 12"/24"



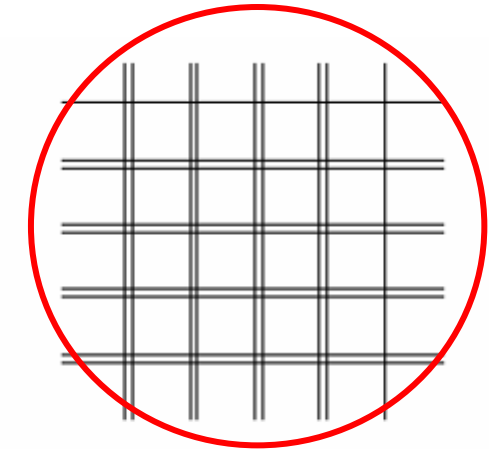
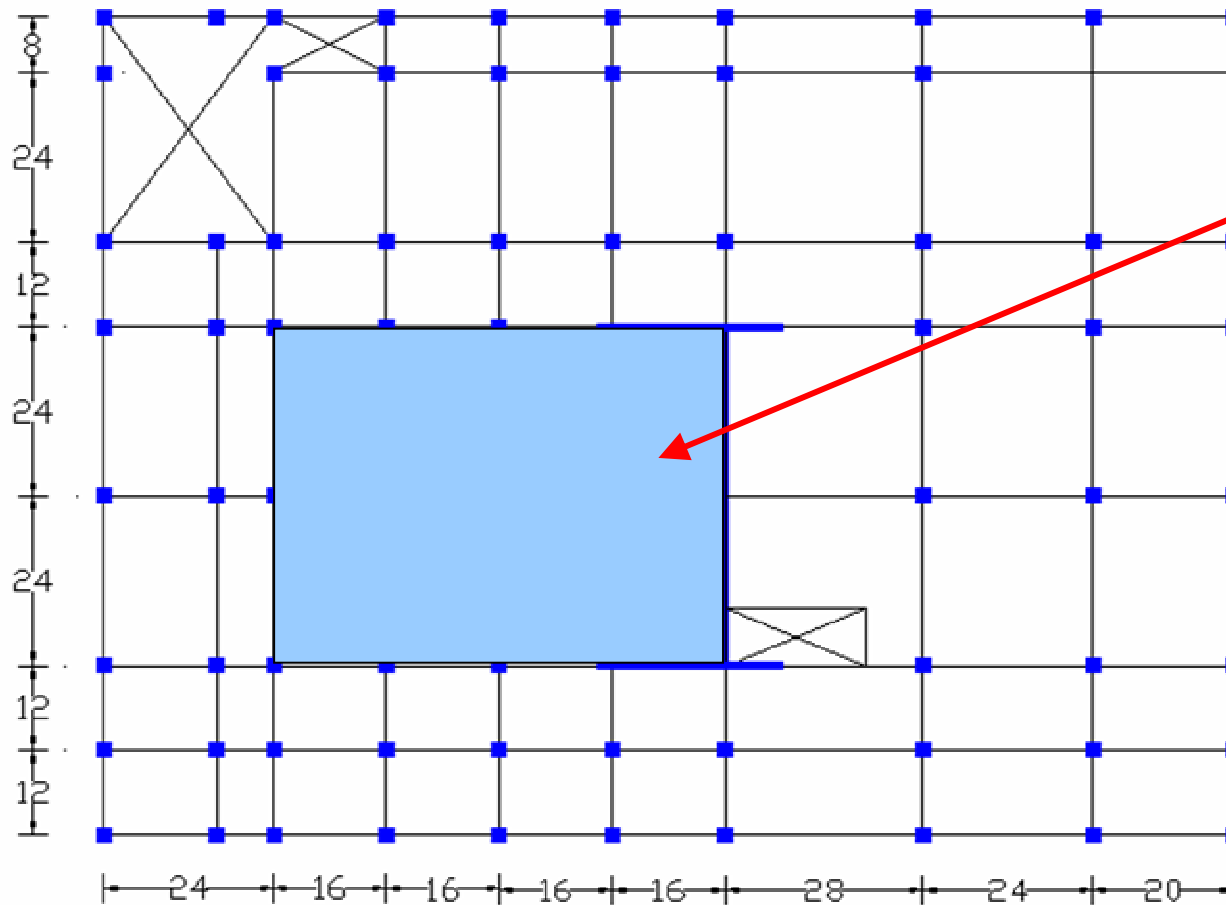
Input from C

→ Use of Cast-In-Place Slabs $d = 7''$

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team
Michael Kraus
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Matic Ozbolt
Noah Bachmann
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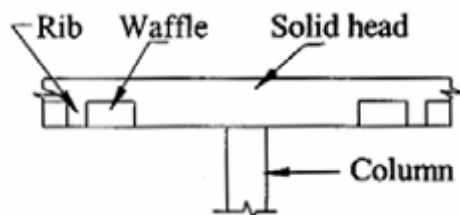
Concrete Structural System – First Floor



AEC – Concept 1 Hidden Light

Waffle Slab $d = 16''$

- can carry heavy loads
- constructed quickly
- formwork with panels expensive



Slab: 8''

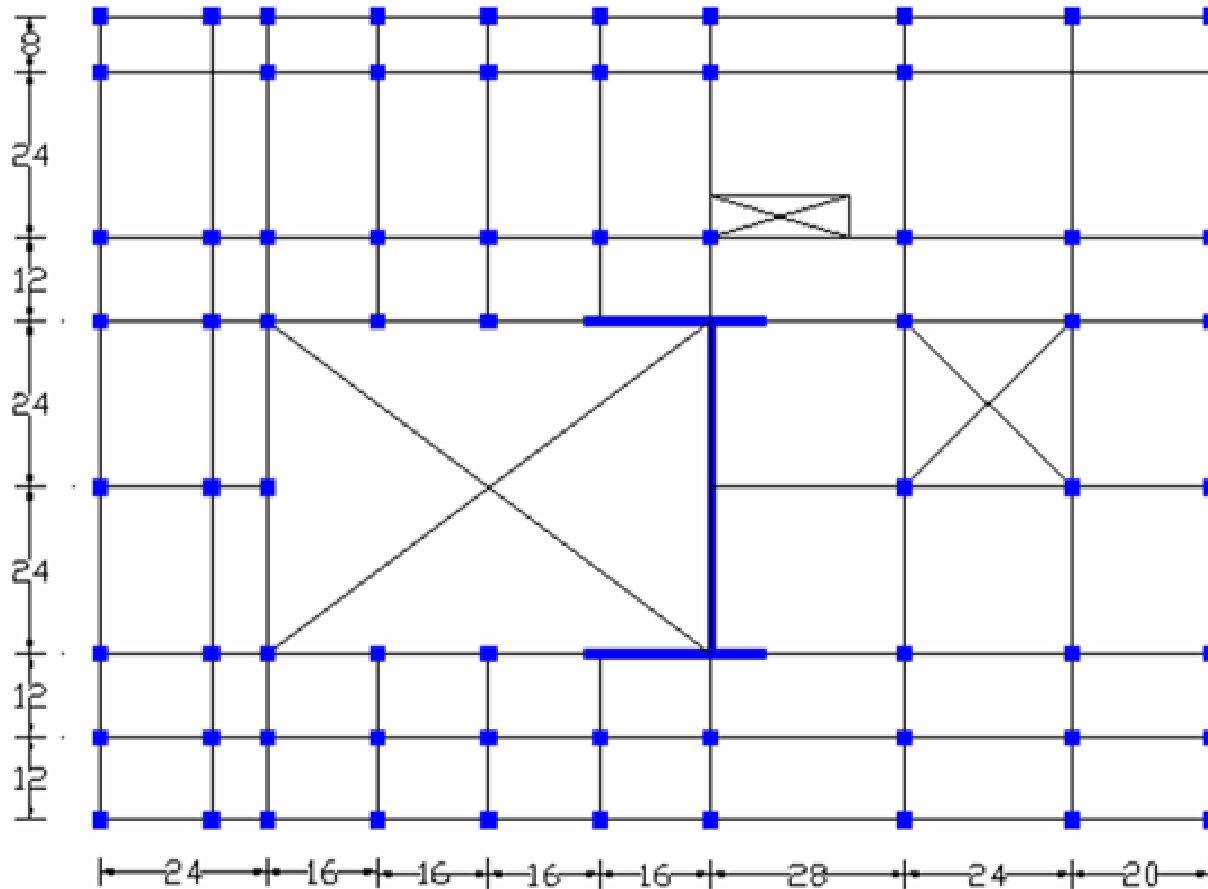
Rib: 4''/ Spacing: 30''

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 Noah Bachmann
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 owner
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mk-pres-2ndconcept-ppt-030808.ppt

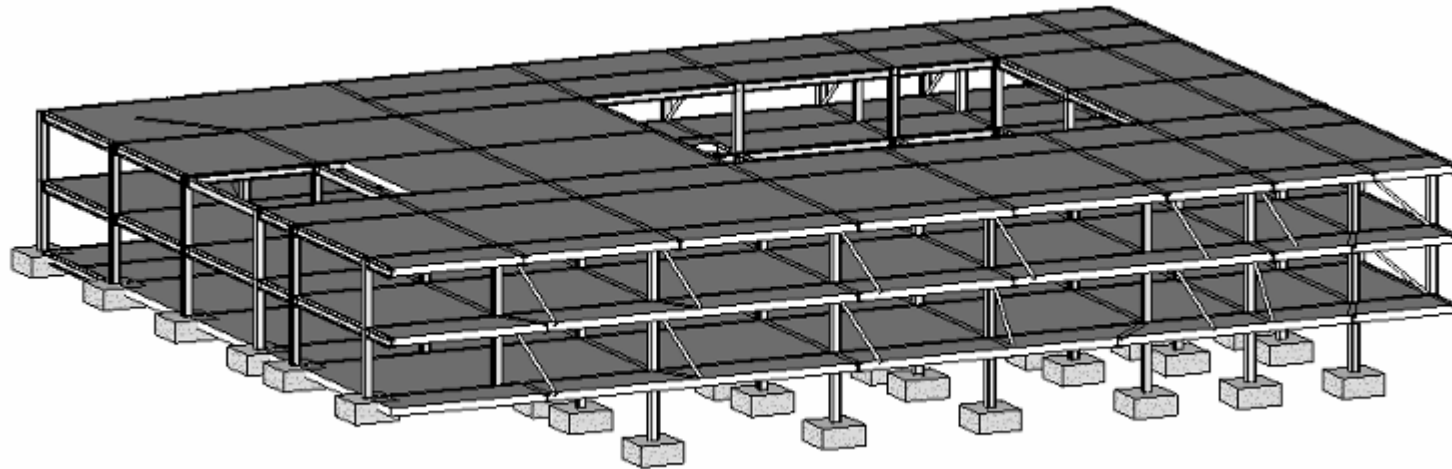
Concrete Structural System – Third Floor



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 Matic Ozbolt
 Noah Bachmann
 Li Zhengwei
 Fei Zhao
owner
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Steel Structural System



- + Steel Lighter than Concrete
- + Erected quickly
- Expensive Material
- Needs Fireproofing
- Not commonly used in Wisconsin

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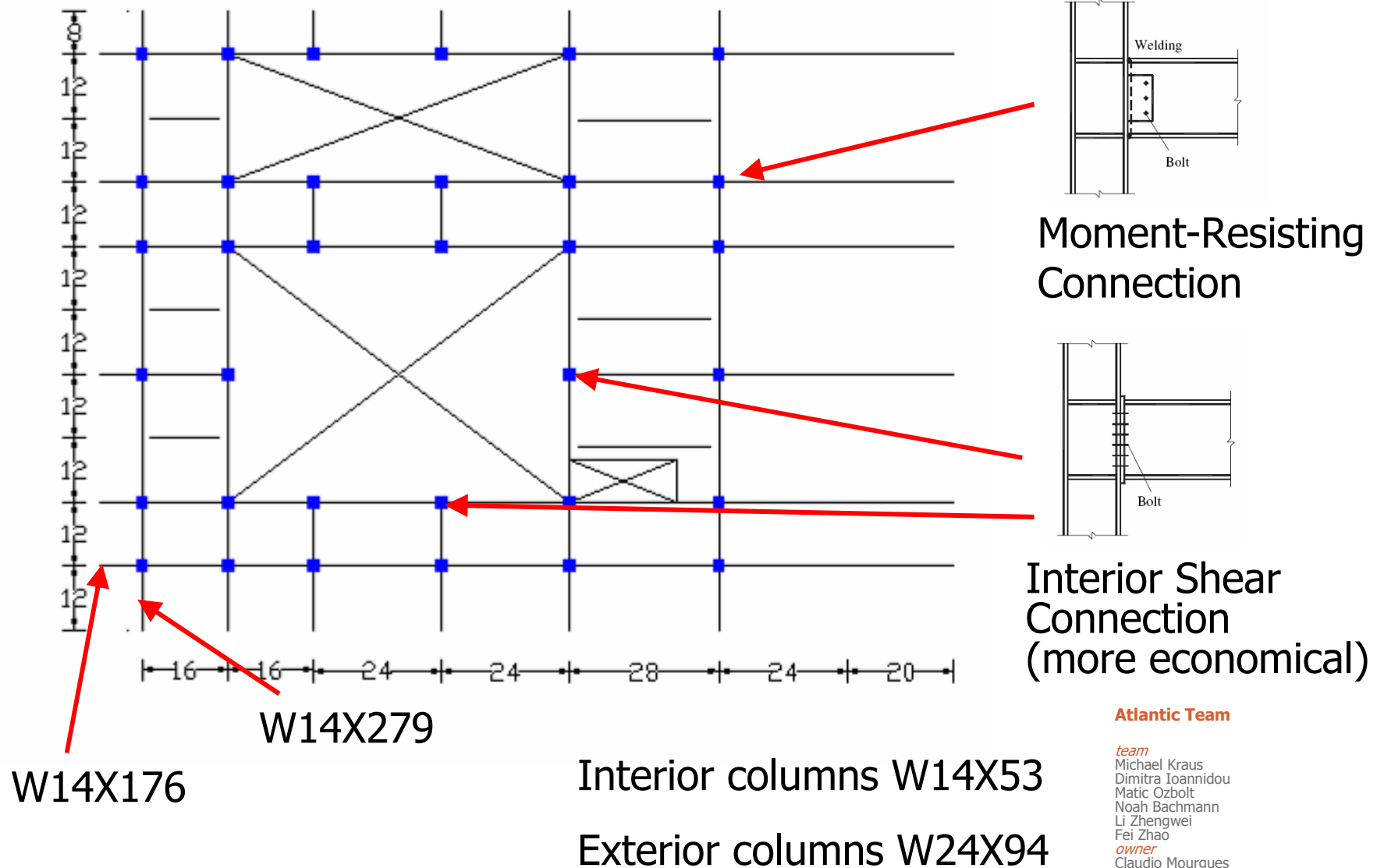
team

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Matic Ozbolt
Noah Bachmann
Li Zhengwei
Fei Zhao

owner

Claudio Mourgues
Wafaa Sabir

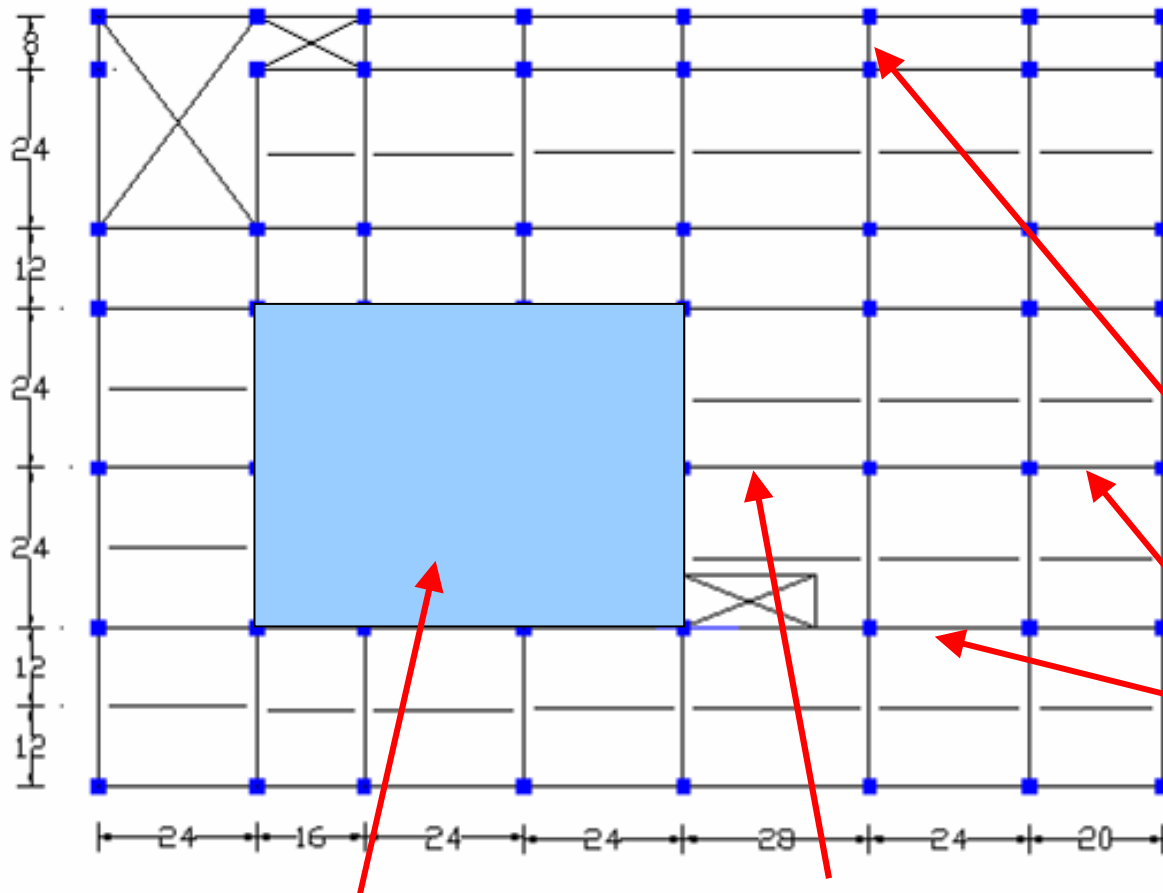
Steel Structural System – Ground Floor



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Steel Structural System – First Floor



Interior Beams:
Castellated
+ Run Services through

W14X53

W14X176

W14X257



Steel Truss above the Auditorium

Diagonal members HSS12.750X0.500

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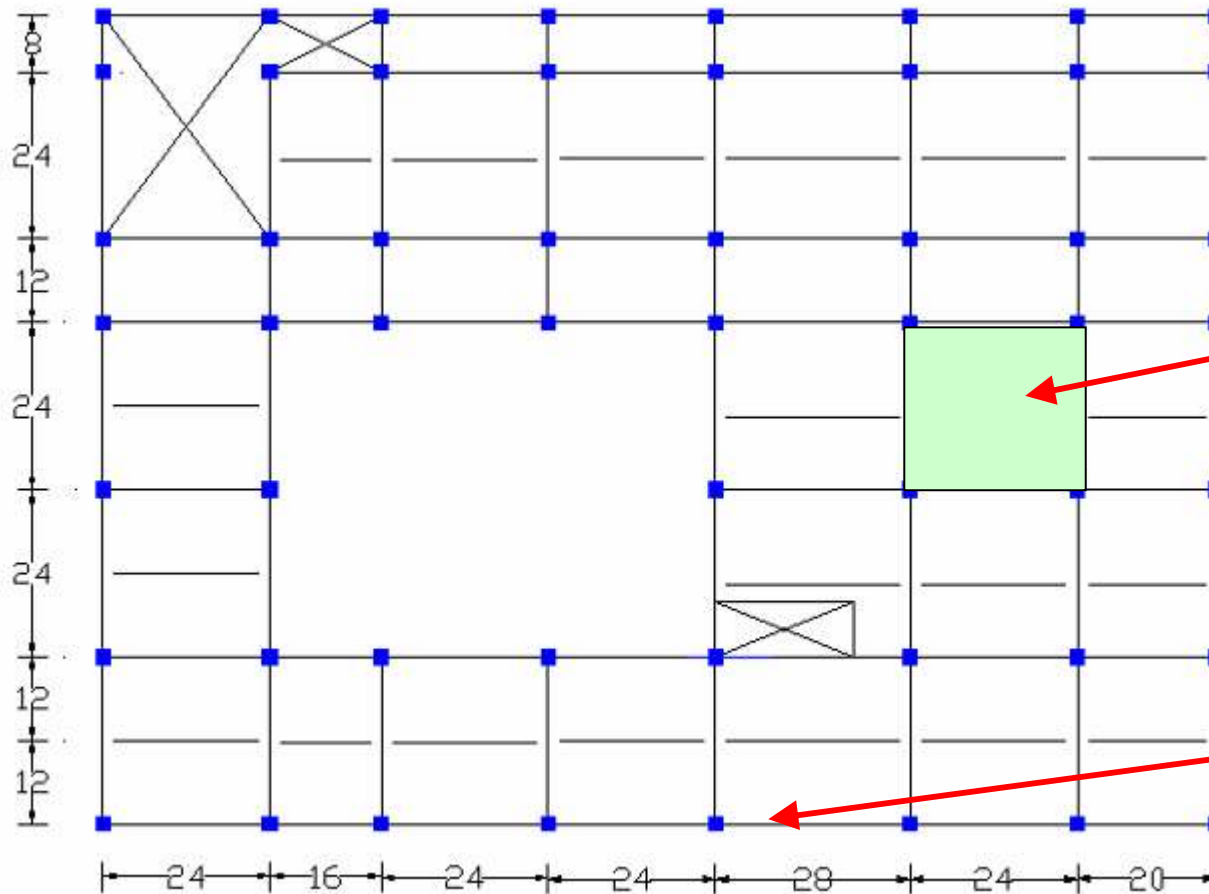
team

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Fei Zhao

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Steel Structural System – Second Floor



composite slab

4 ¼ in of lightweight concrete

+ easy, quick erection

Perimeter beams
W14X145
(Ground and First
Floor W14X120)

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Building Technology

Concept I: *Hidden Light*

Atlantic Team

team

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Li Zhengwei
Fei Zhao

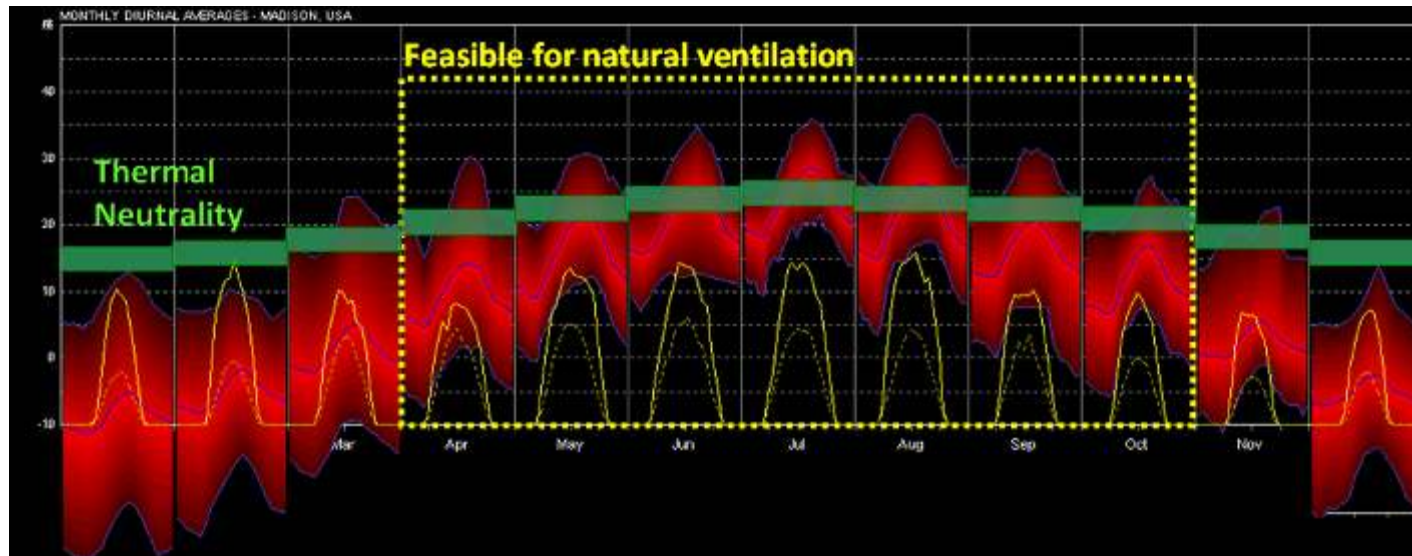
owner

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Project

AEC – Concept I *Hidden Light*

Atlantic-Spring-BT-031308.ppt

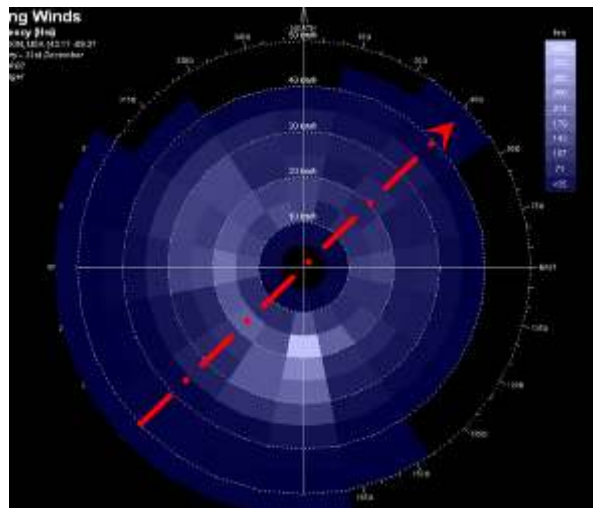


Climate

Cold in winter

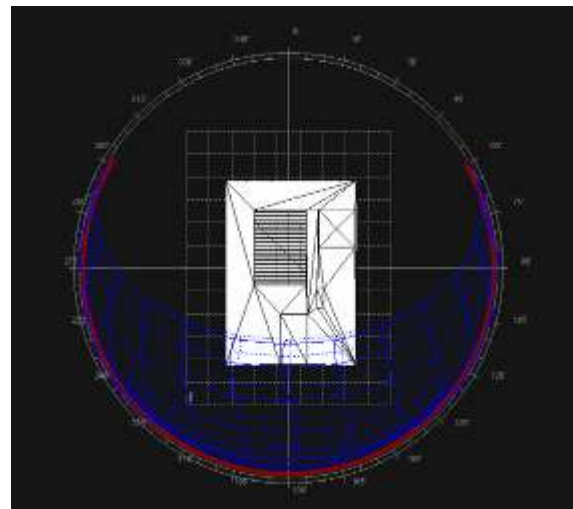
Feasible for natural ventilation in spring and fall

Hourly Dry Bulb Means for a Typical Year



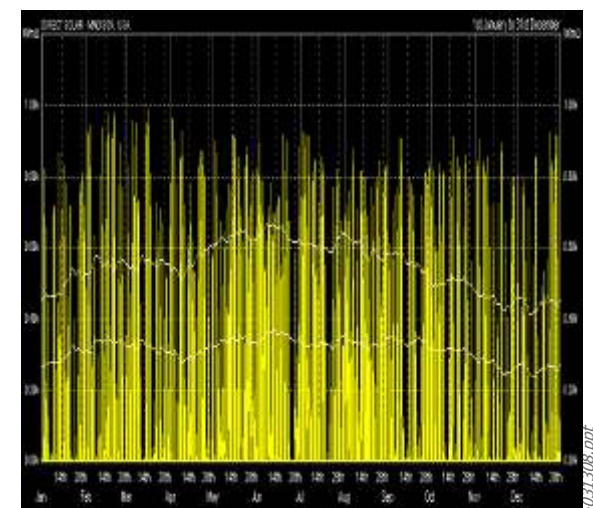
Wind

Dominating wind direction is southwest



Sun Path

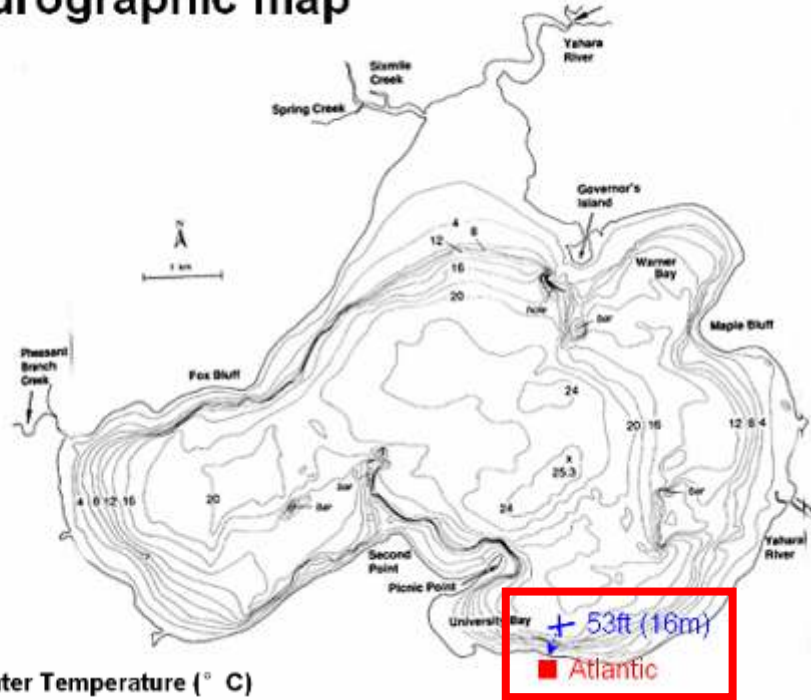
A pure south sun path in Madison, Wisconsin



Solar Radiation

Average Direct Radiation: 600 W/m²
Average Diffuse Radiation: 100 W/m²
Eligible for solar collectors.

Hydrographic map

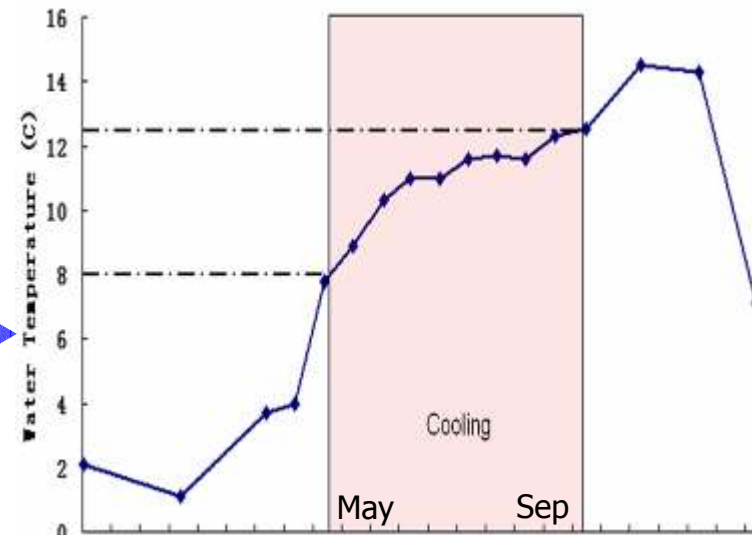
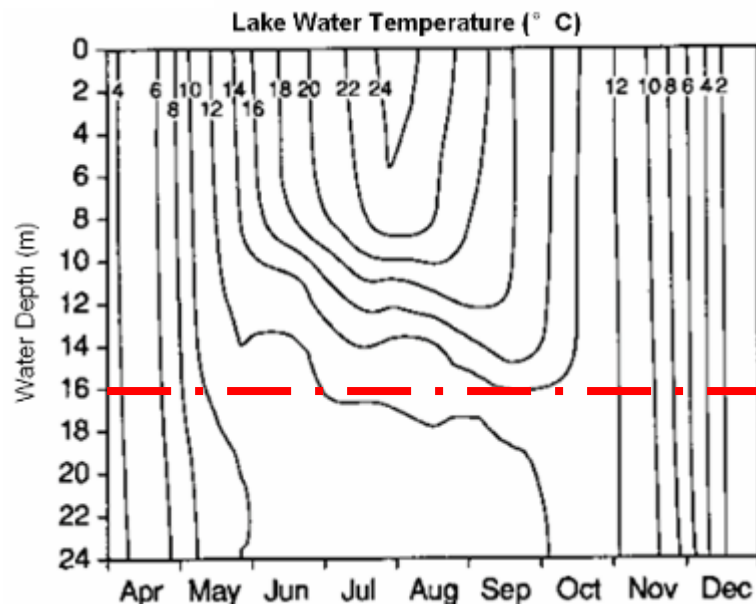


Lake Mendota

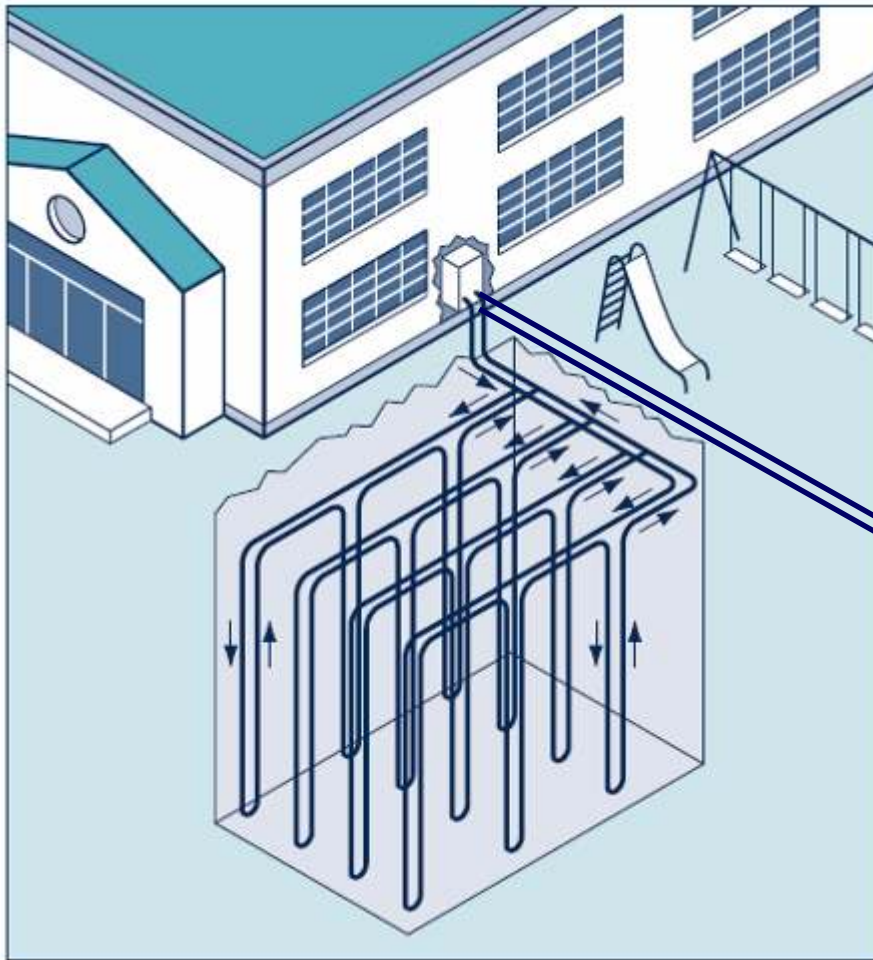
Max depth: 24m

Distance to 16m depth: 100m

Lake temperature is too high for lake source cooling



Annual lake water temperature, 16m under surface



Back up

Purchase steam heating and chilled water from cogeneration facility company



Heat & Chilled Water Production

Option 1

Ground Source Heat Pump (GSHP)

Option 2

High efficient chiller + Boilers



GSHP

25-50% energy us reduction com pared to traditional systems

Payback period 2-8 years

Less mechanical space

Low noise

Flexibility for part-load condition

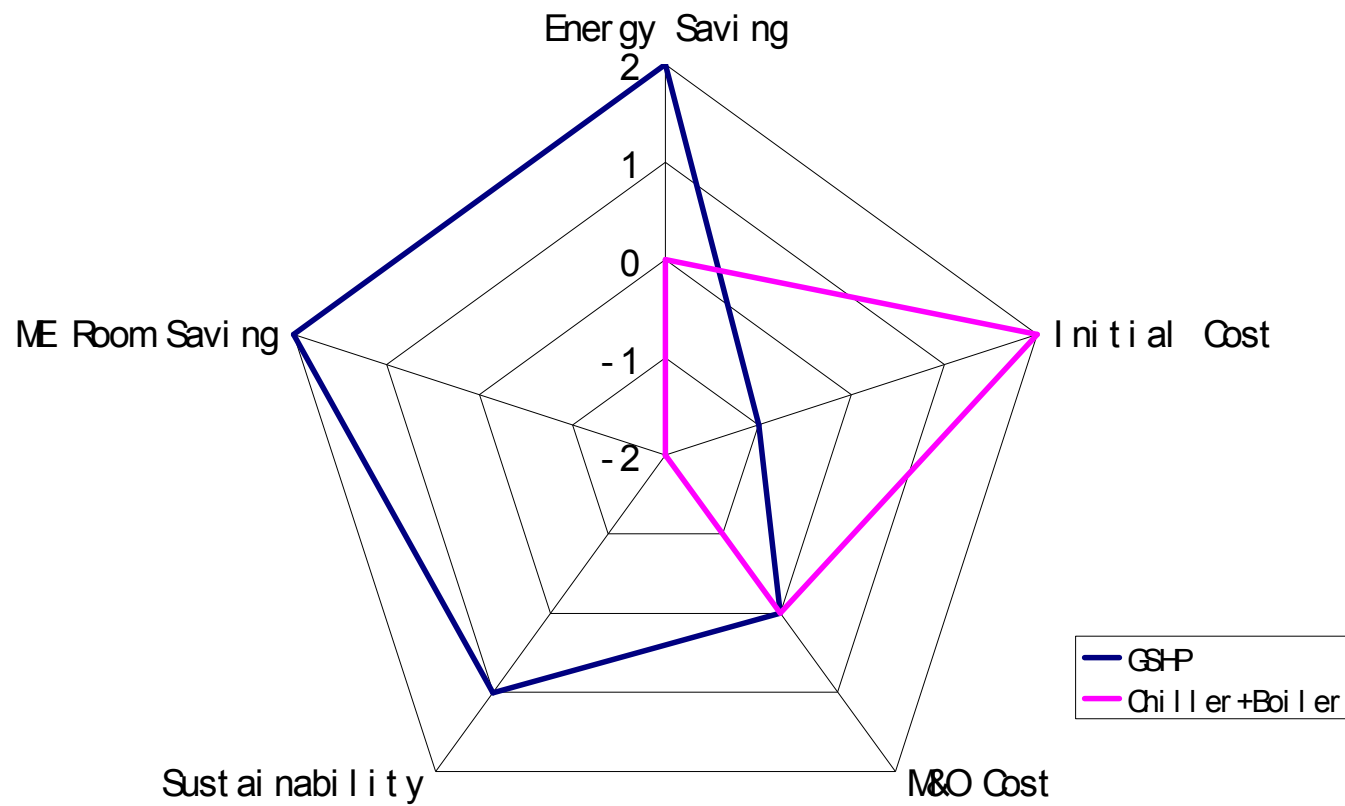
Atlantic Team

team

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Heat & Chilled Water Production

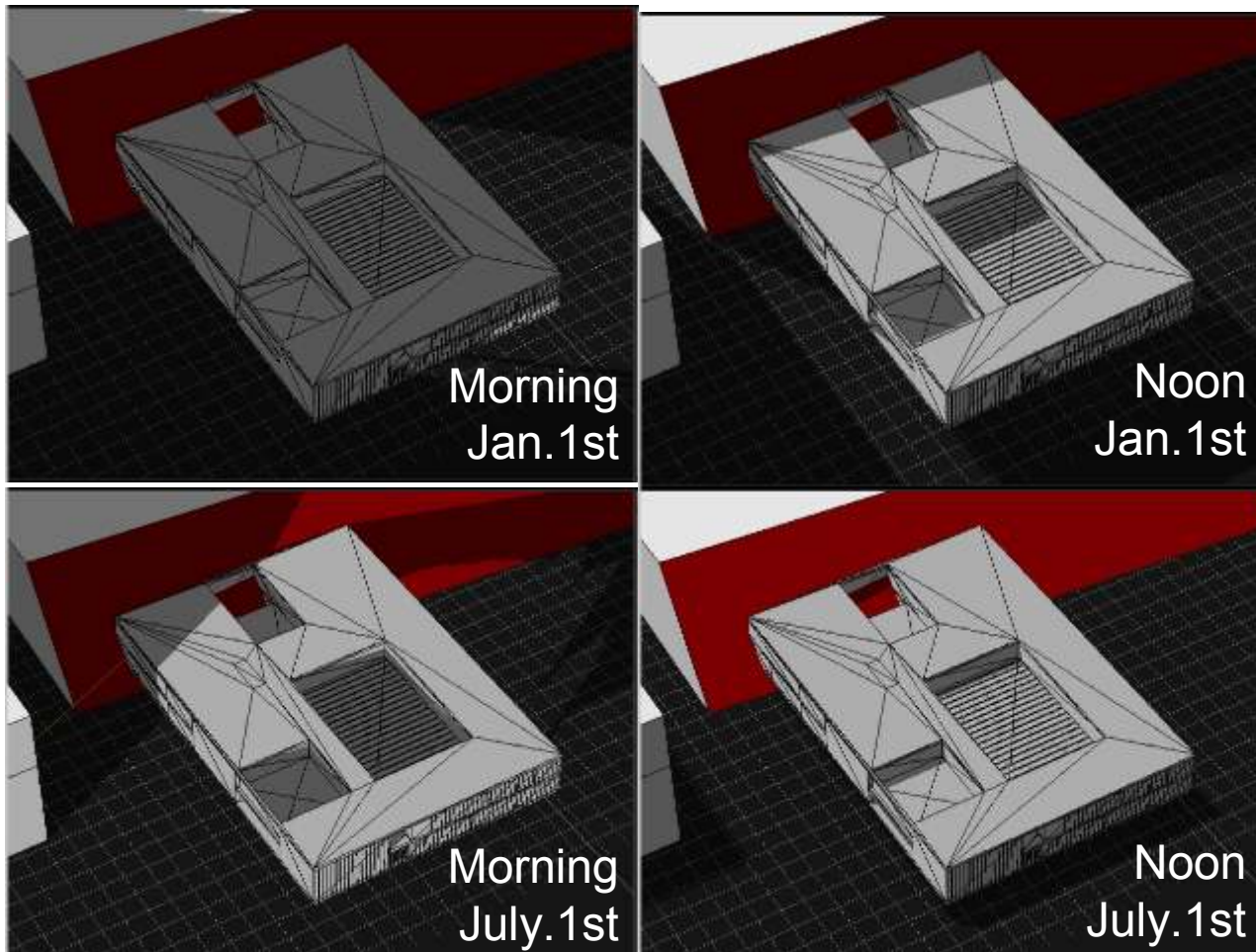
Decision matrix

Decision

Ground Source Heat Pump

Atlantic Team

team
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owner
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Sun lighting can be used
80% of area is feasible for PV Panels

Sun lighting

Concept 1

Shading
simulation



Elevation

A 100ft hill locates south to
the Atlantic building

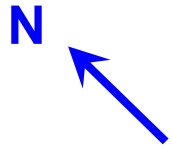
Atlantic Team

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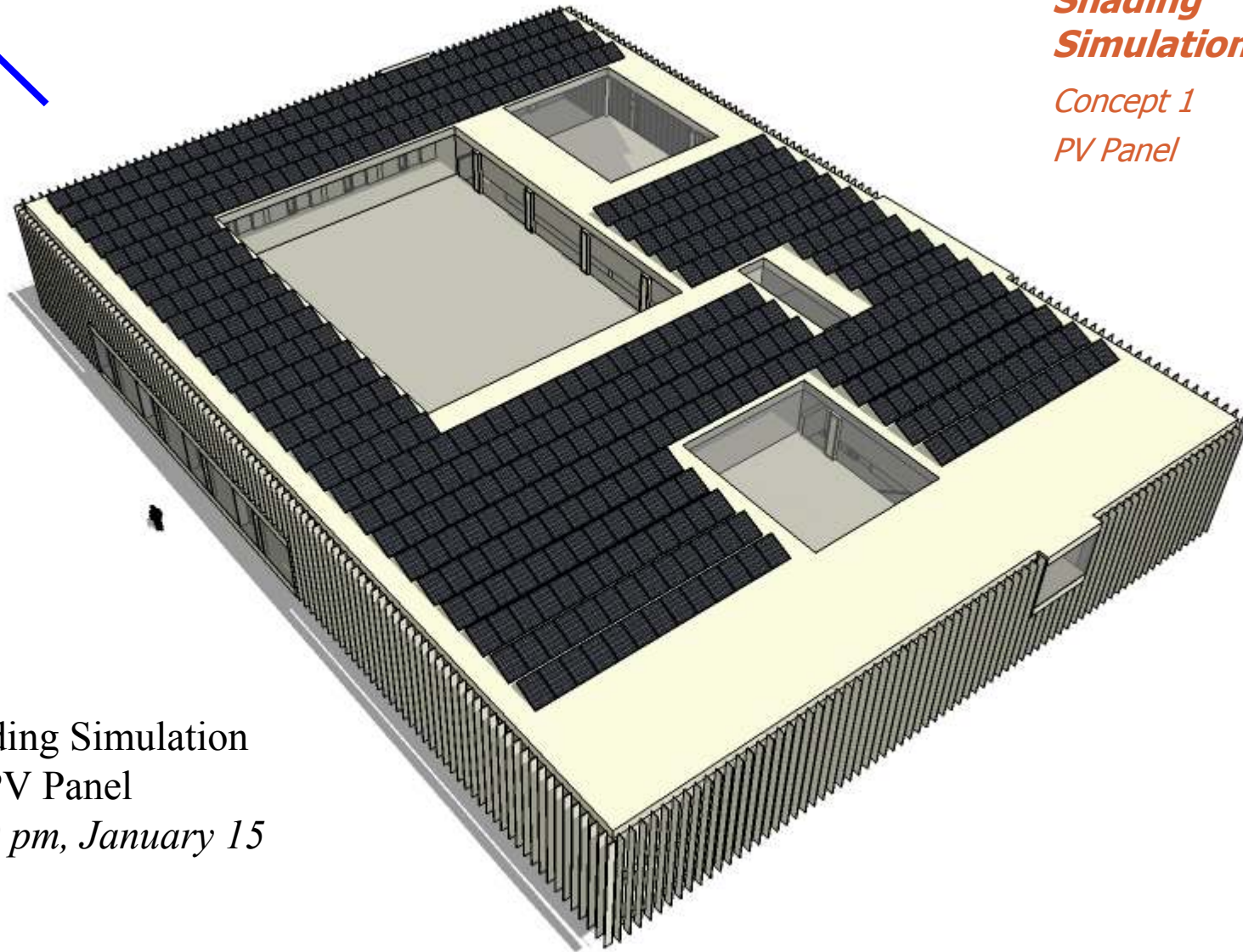
owner

Claudio Mourgues
Wafaa Sabir



Shading Simulation

*Concept 1
PV Panel*



Shading Simulation
of PV Panel
4:00 pm, January 15

Energy saving for buildings in Madison

Area: (ft ²)	6,000
Gross Cost:	\$880,000
Federal Tax Credit:	\$9,000
State/Utility Rebate:	\$160,000
Net Initial Cost:	\$711,000
Electricity Generation Rate: (kWh/ft ² /year)	923
Annual Electricity Generation: (kWh/year)	5,540,000

providers



Photovoltaic panels

Options



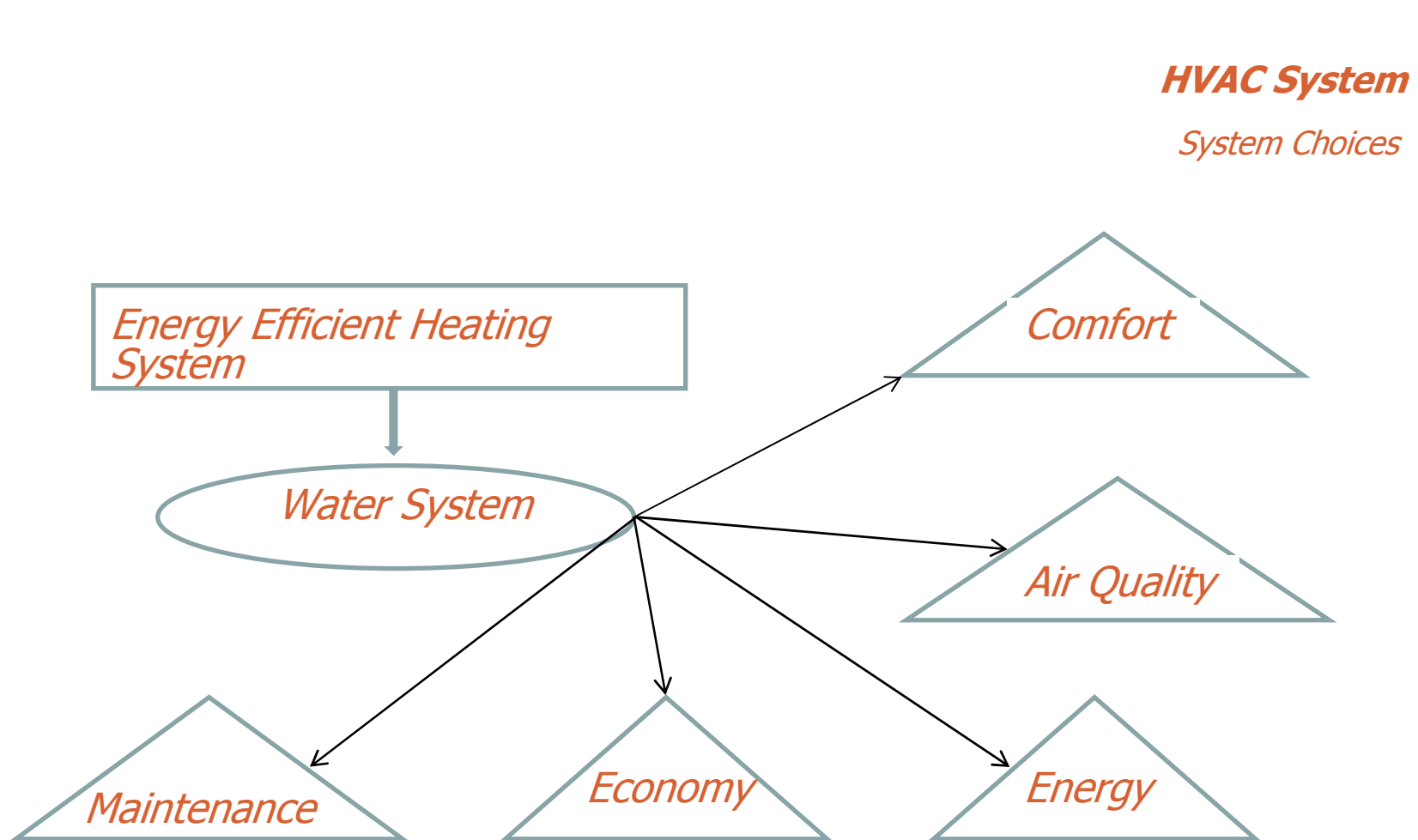
Atlantic Team

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HVAC System

	Heating	Cooling	Fresh air
Ground Floor	UF (Under Floor) Ventilation	UF (Under Floor) Ventilation	UF (Under Floor) Ventilation



UF ventilation

Alternative 1: High comfort, Low energy consumption

	First Floor	Second Floor
Heating	UFHH (Under floor hydronic heating)	UFHH (Under floor hydronic heating)
Cooling	UFHH	UFHH
Fresh air	Dedicated Fresh Air Unit	Dedicated Fresh Air Unit



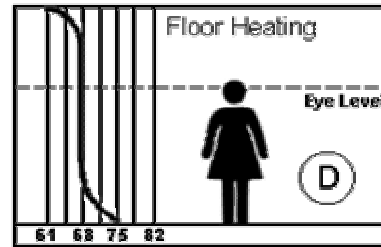
UFHH (Under floor hydronic heating)

Alternative 2: Low energy consumption, High reliability

	First Floor	Second Floor
Heating	Fan coil	Fan coil
Cooling	Fan coil	Fan coil
Fresh air	Dedicated Fresh Air Unit	Dedicated Fresh Air Unit



Fan coil



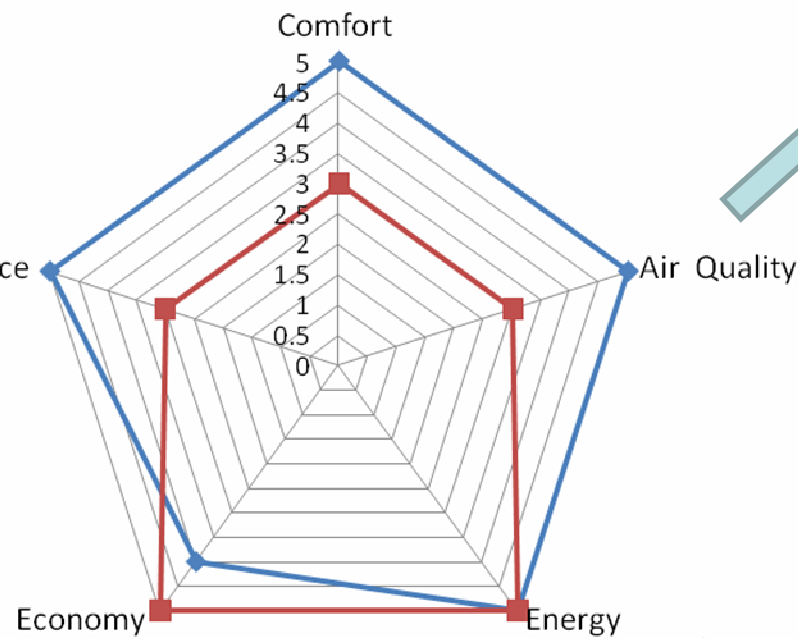
HVAC System



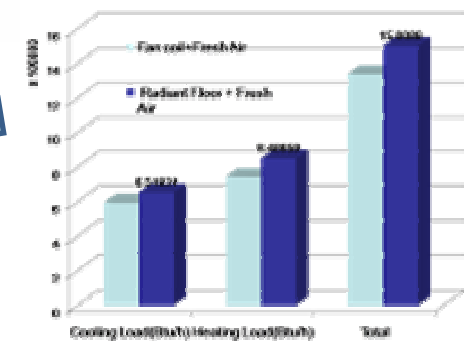
Project
AEC – Concept 1 Hidden Light

Quietness
Complexity

Maintenance

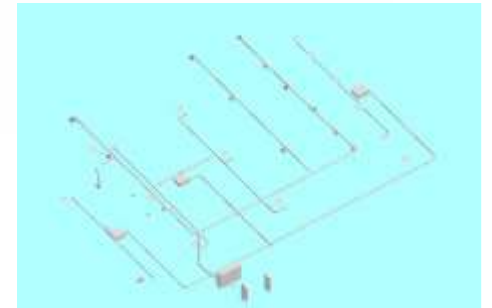
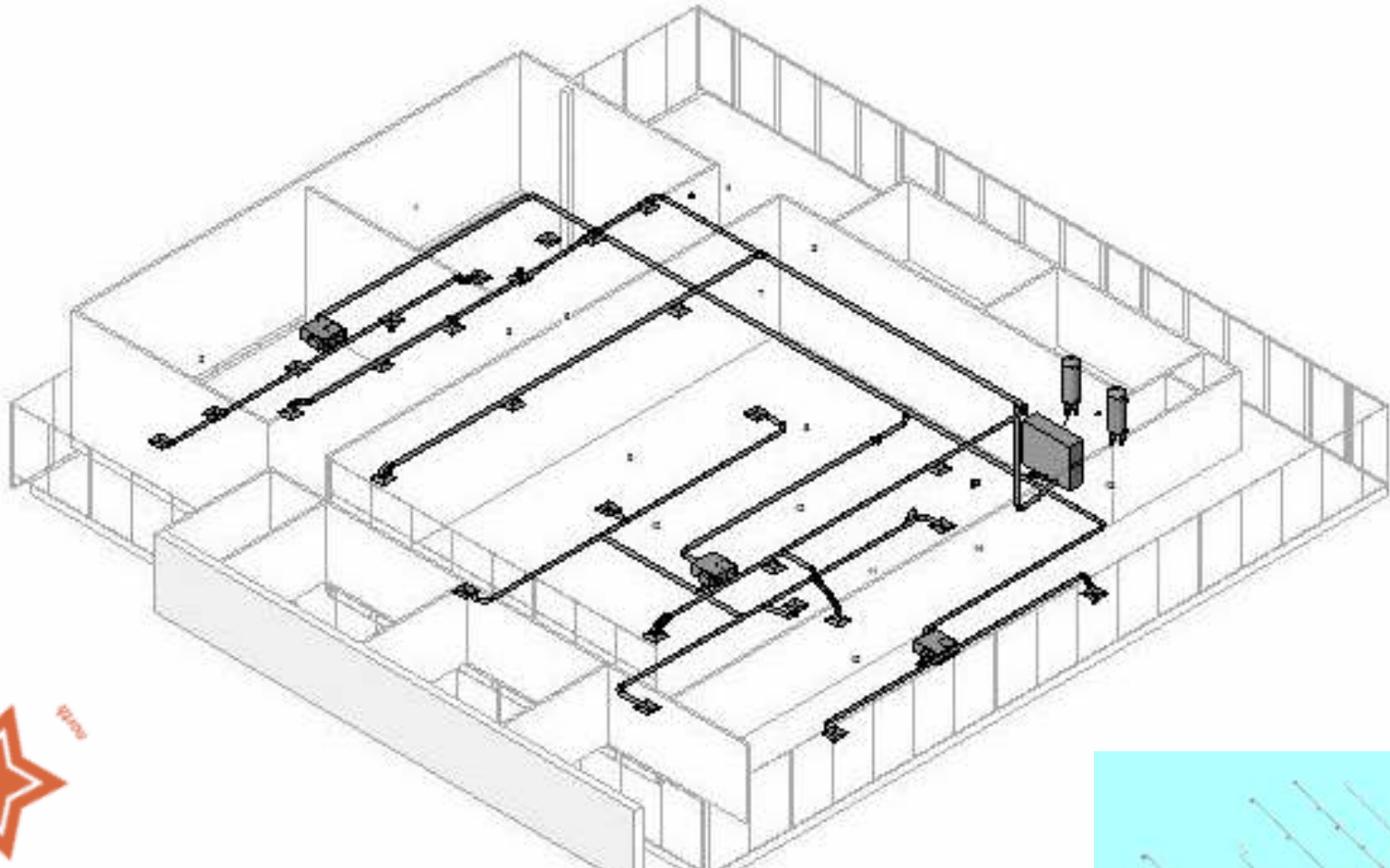


Initial cost
Lifecycle Cost

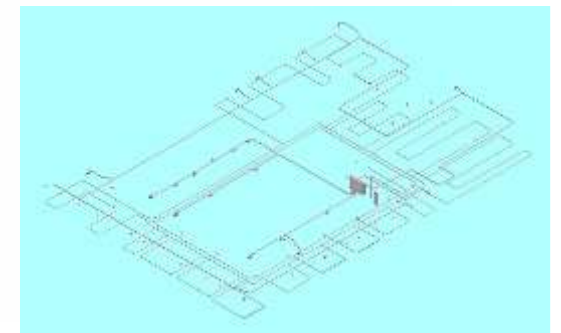
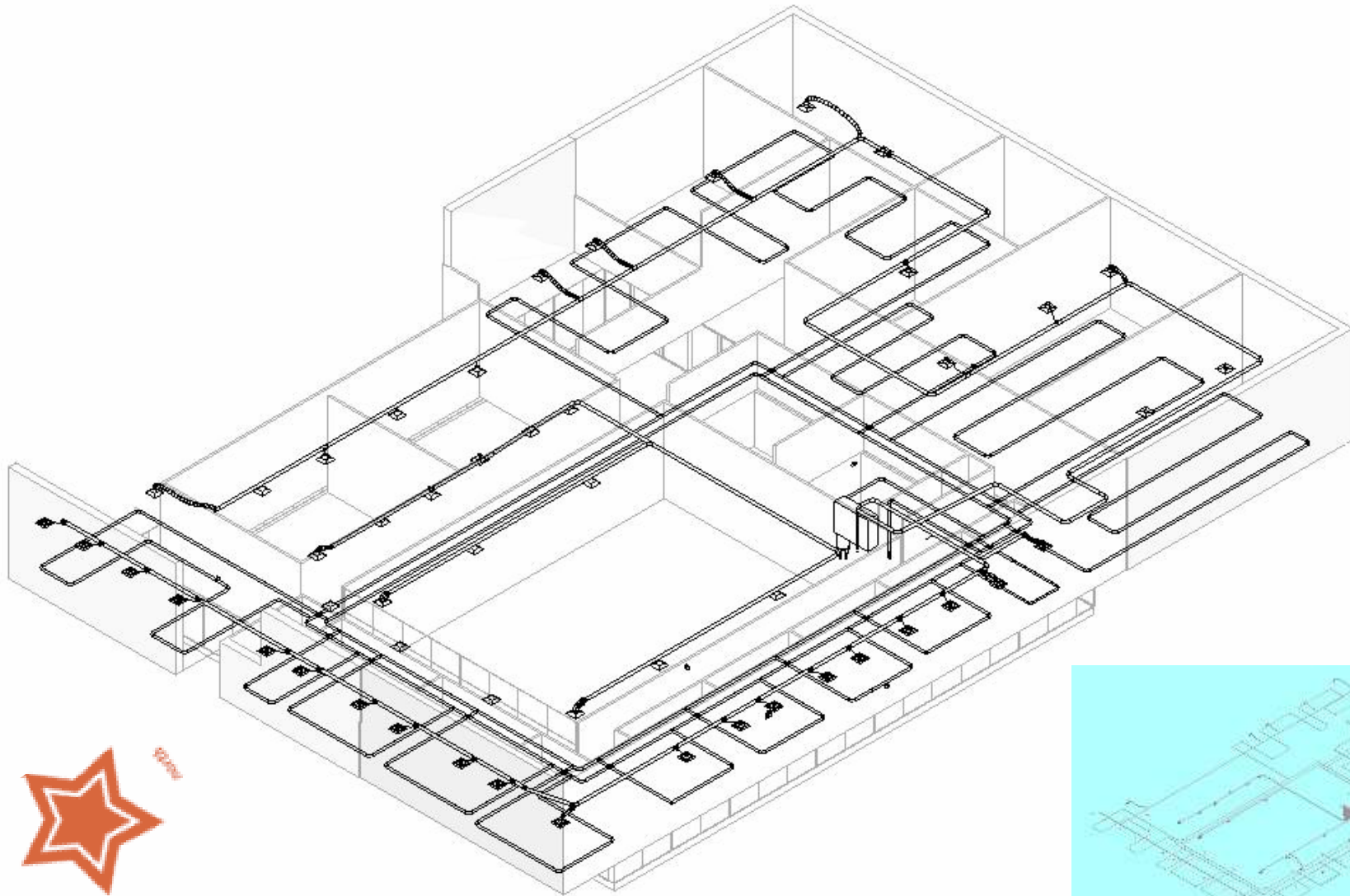


Atlantic-Spring-BT-031308.ppt

Ground Floor

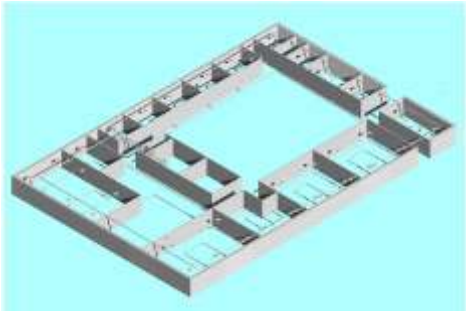
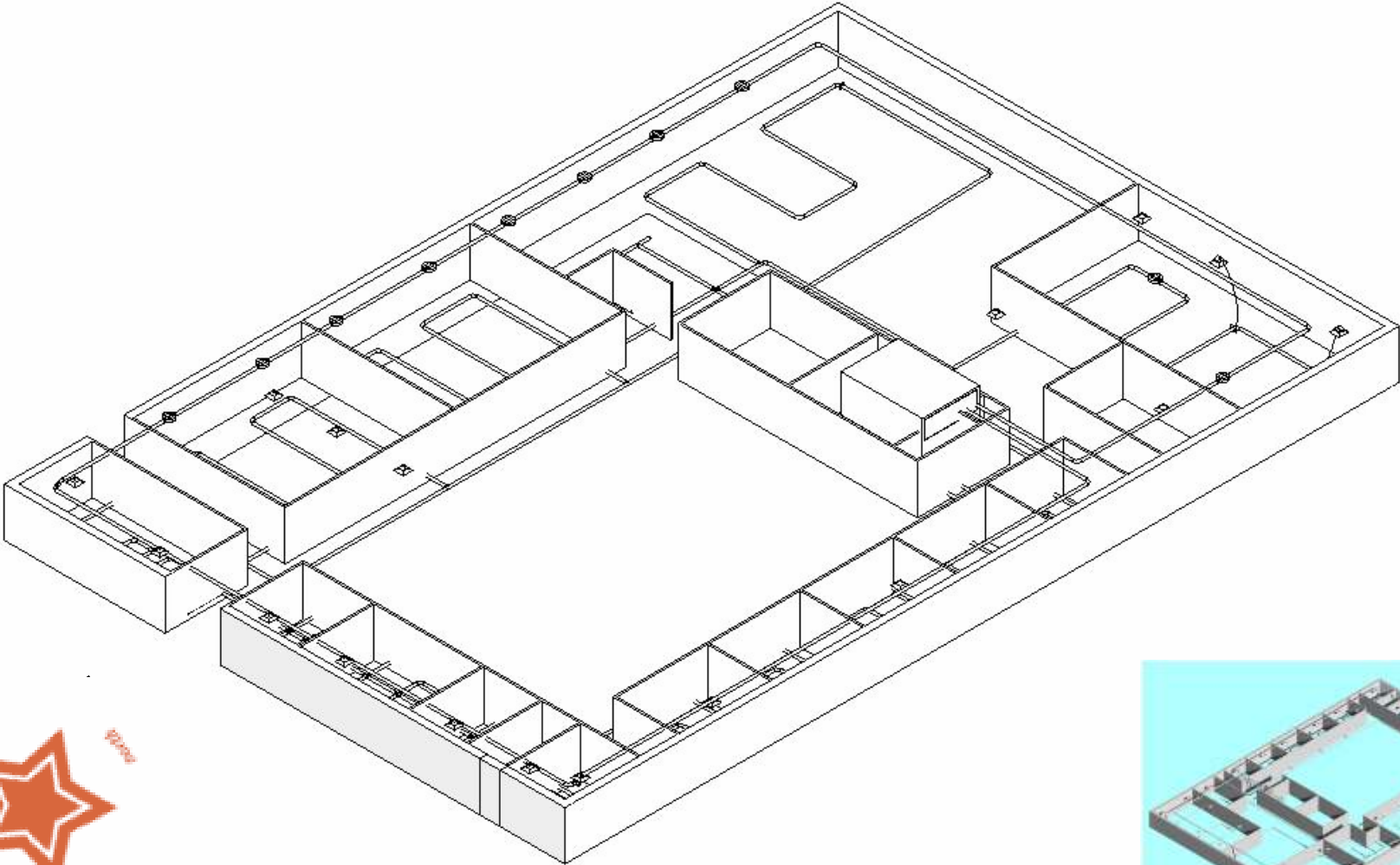


First Floor

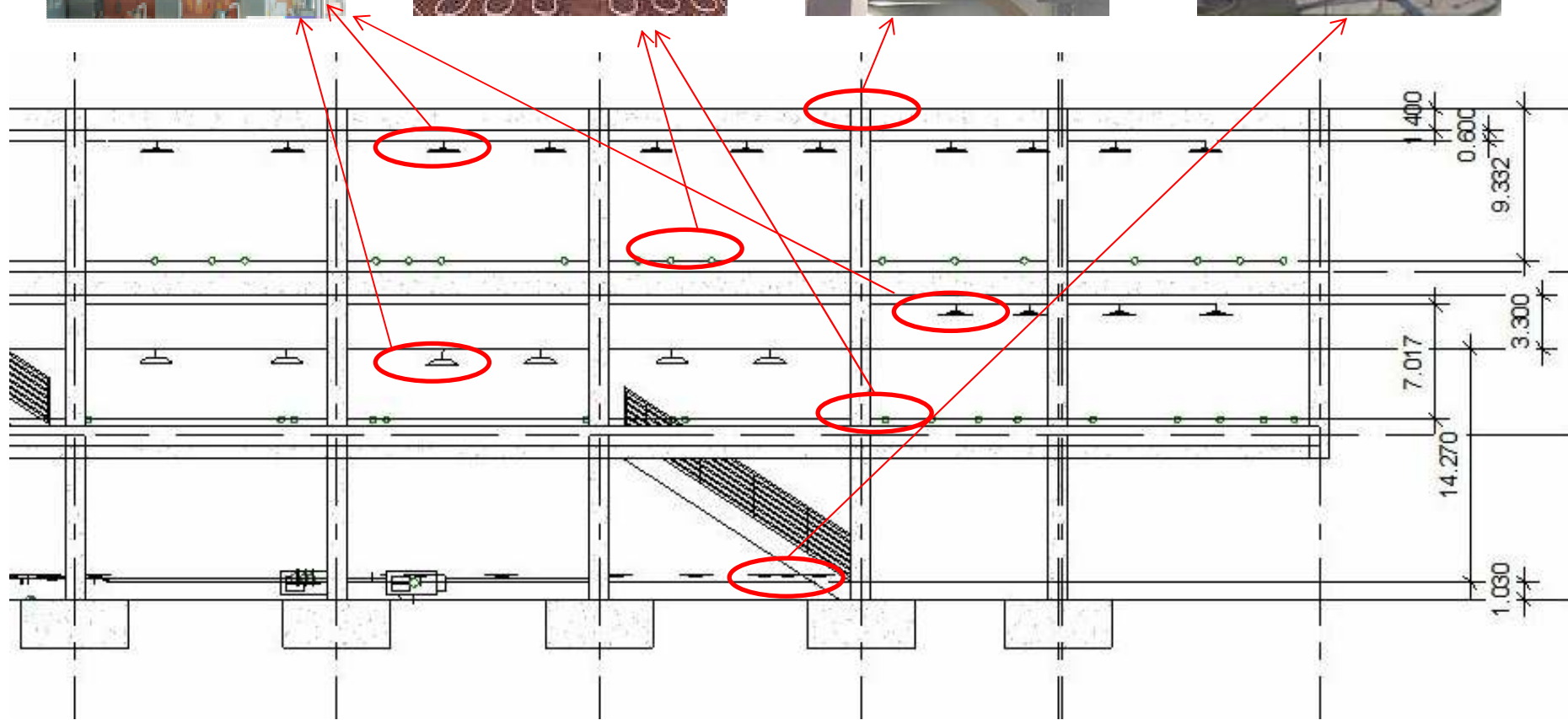
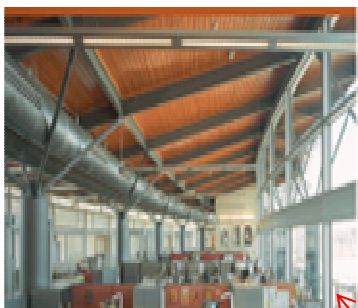


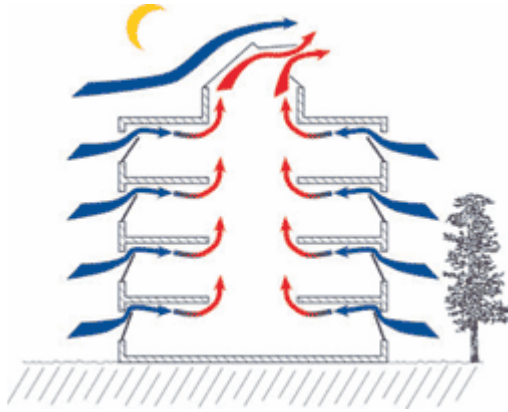
Second Floor

Project **AEC – Concept 1 Hidden Light**

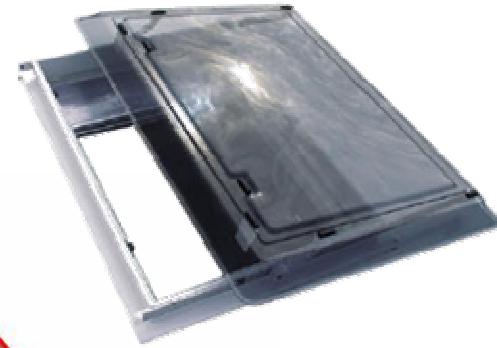
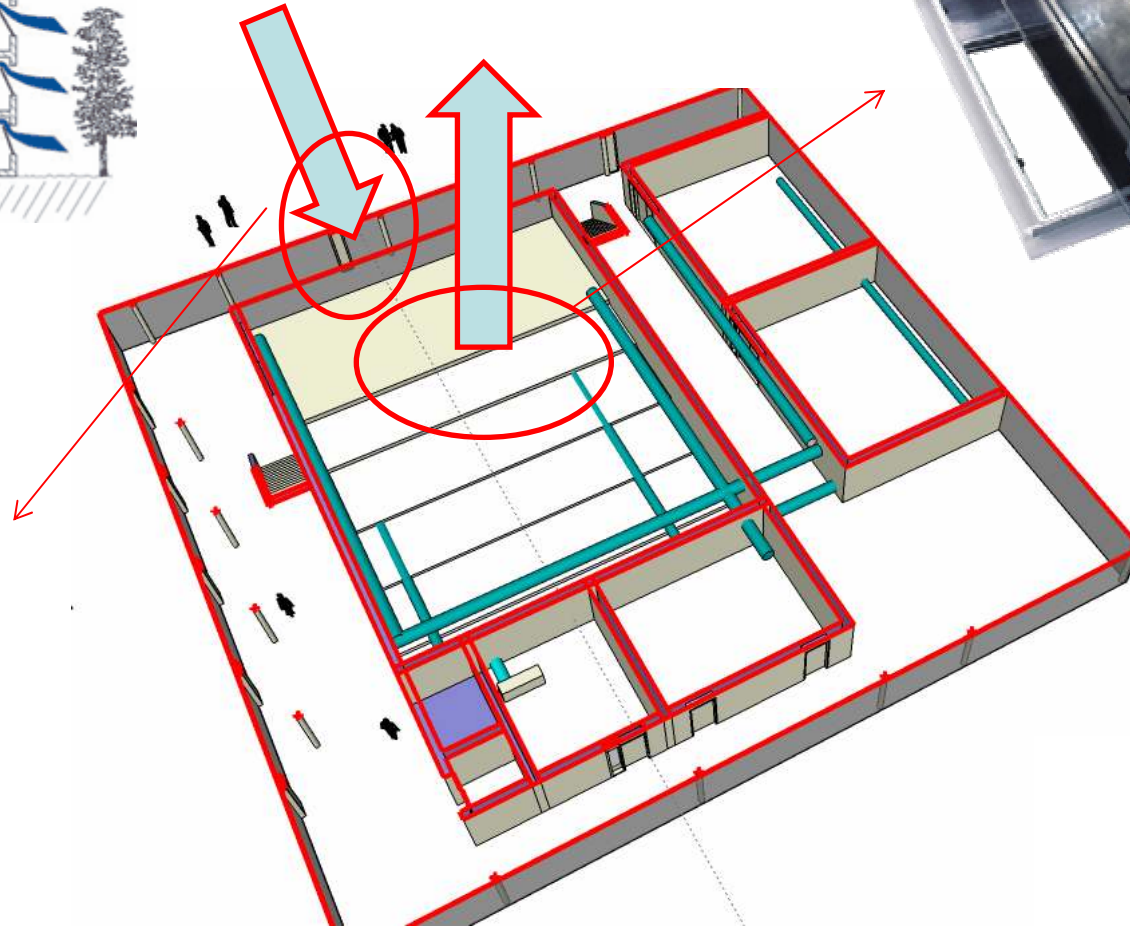


Section





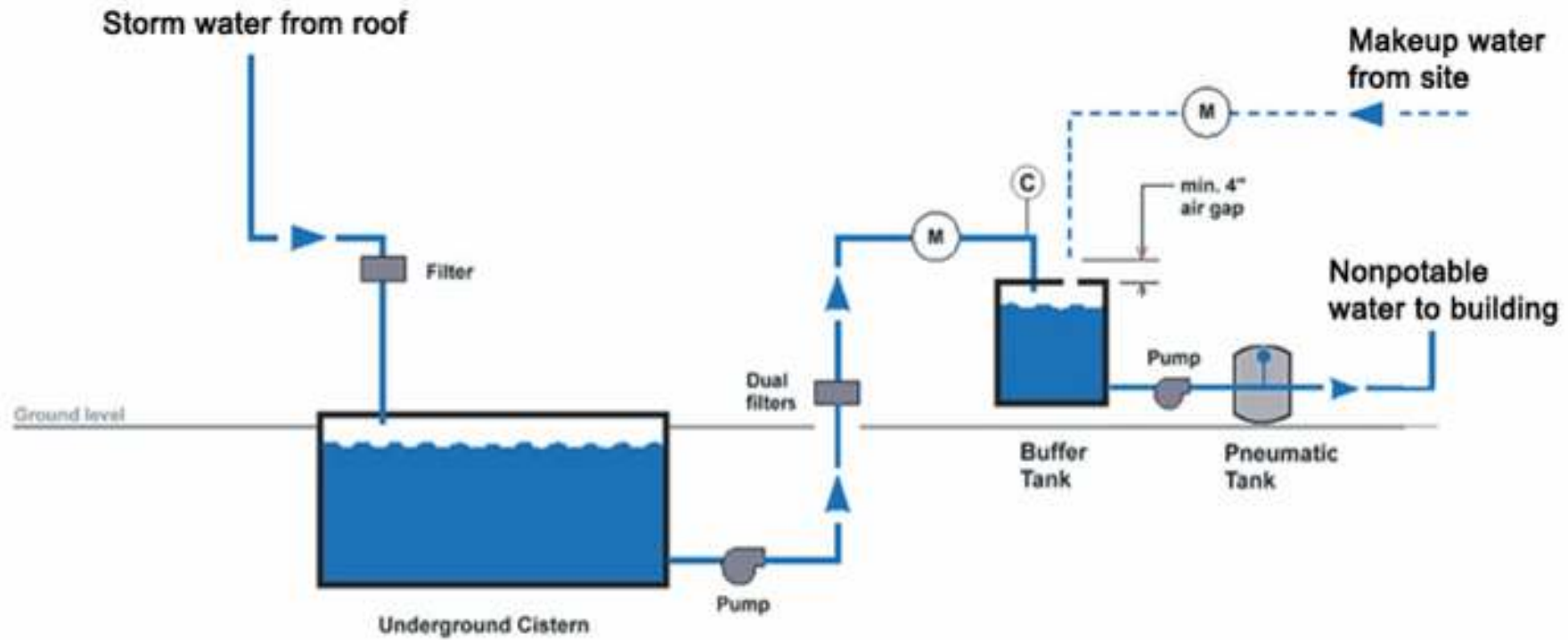
Auditorium Natural Ventilation Design

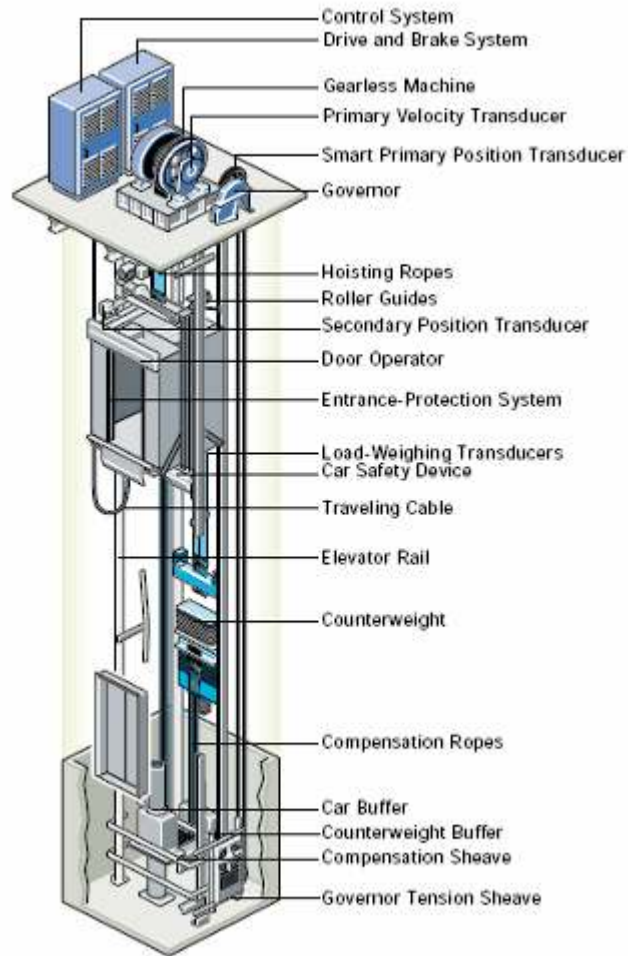




*Eco-friendly gutter protection,
drainage and rain water
collection systems*

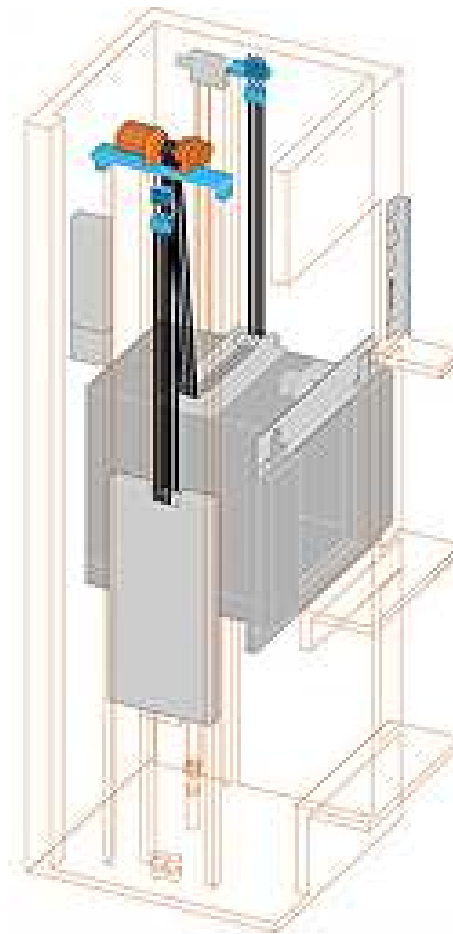
*Rainwater
Harvesting
(Gray water)
Both concepts*





Traditional Elevator System

About Elevators, OTIS



Machine-Roomless Elevators

Products, OTIS

Machine-Roomless Elevators

Both concepts

Atlantic Team

team
 Michael Kraus
 Dimitra Ioannidou
 Matic Ozbolt
 Noah Bachmann
 Li Zhengwei
 Fei Zhao
owner
 Claudio Mourgues
 Wafaa Sabir

Construction Management

Concept I: *Hidden Light*

Atlantic Team

team

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Dimitra Ioannidou
Matic Ozbolt
Noah Bachmann
Li Zhengwei
Fei Zhao

owner

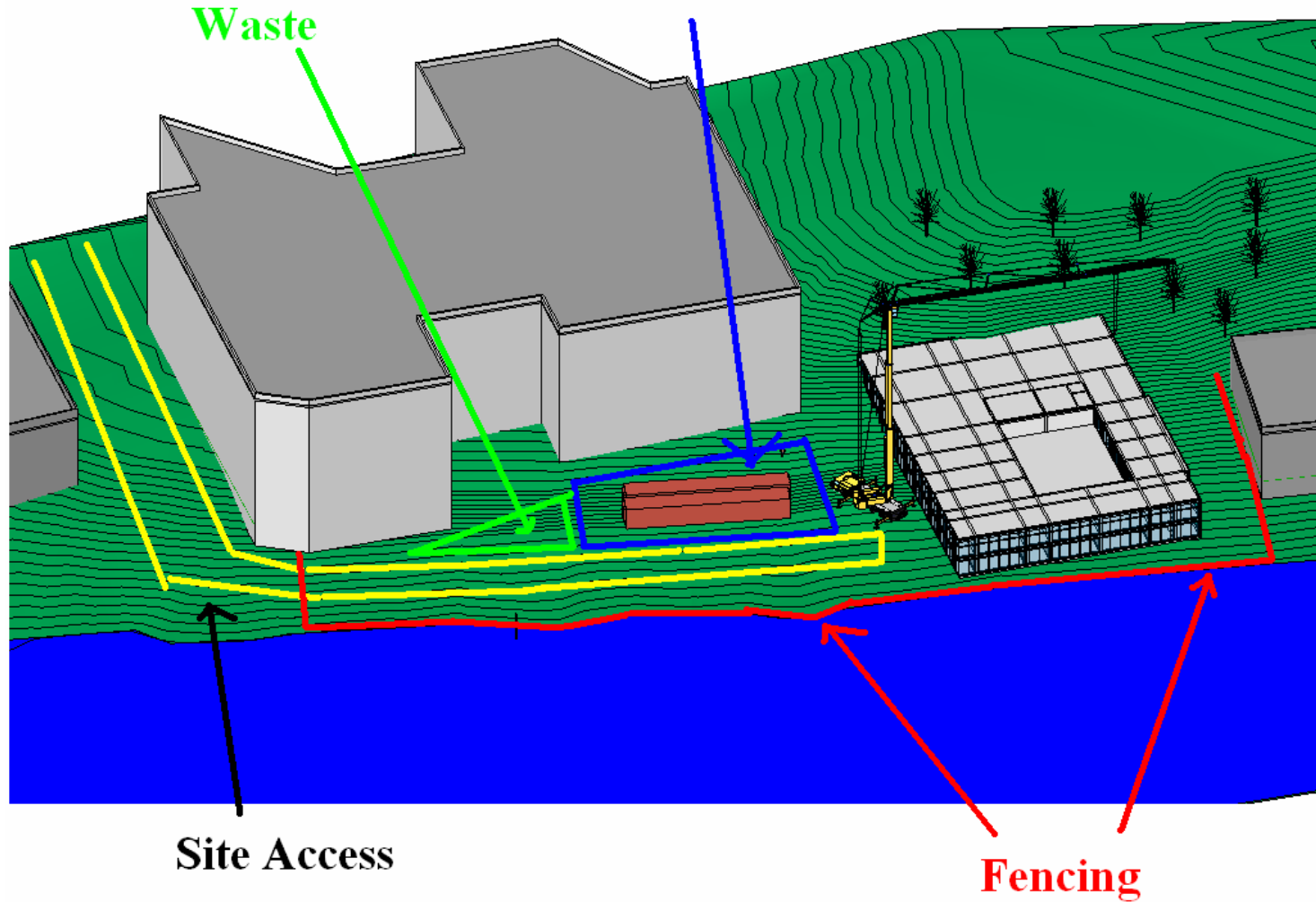
Claudio Mourgues
Wafaa Sabil

Project

AEC – Concept I *Hidden Light*

Atlantic-Spring-BT-031308.ppt

Trailers and Laydown



Site Layout

Atlantic Team

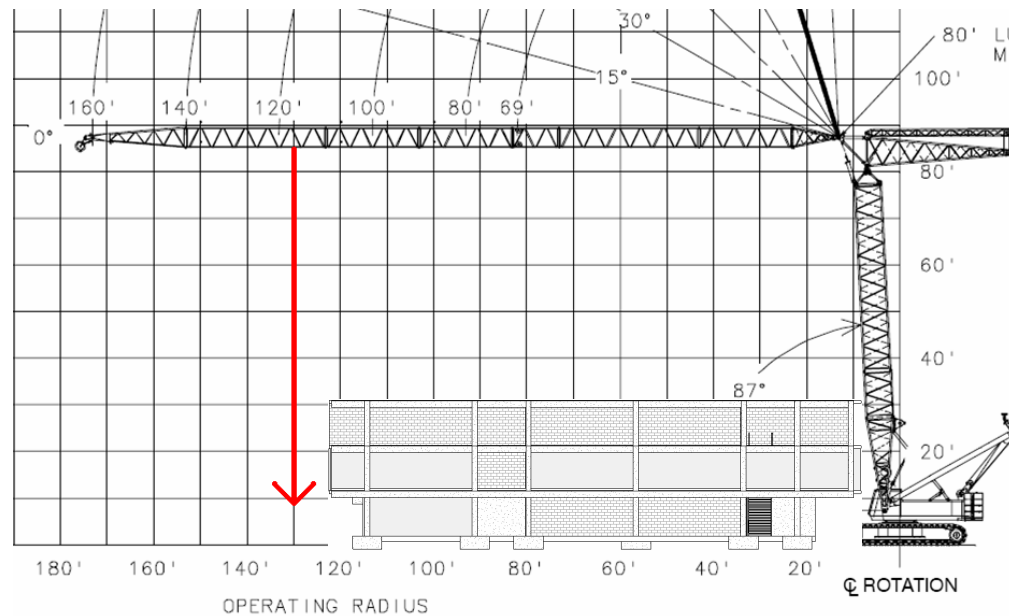
team
Michael Kraus
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Noah Bachmann
Li Zhengwei
Fei Zhao
owner
Claudio Mourgues
Wafaa Sabil



Link-Belt 248 HYLAB 5

**200-ton (181.44 mt)
Lattice Boom Crawler Crane**

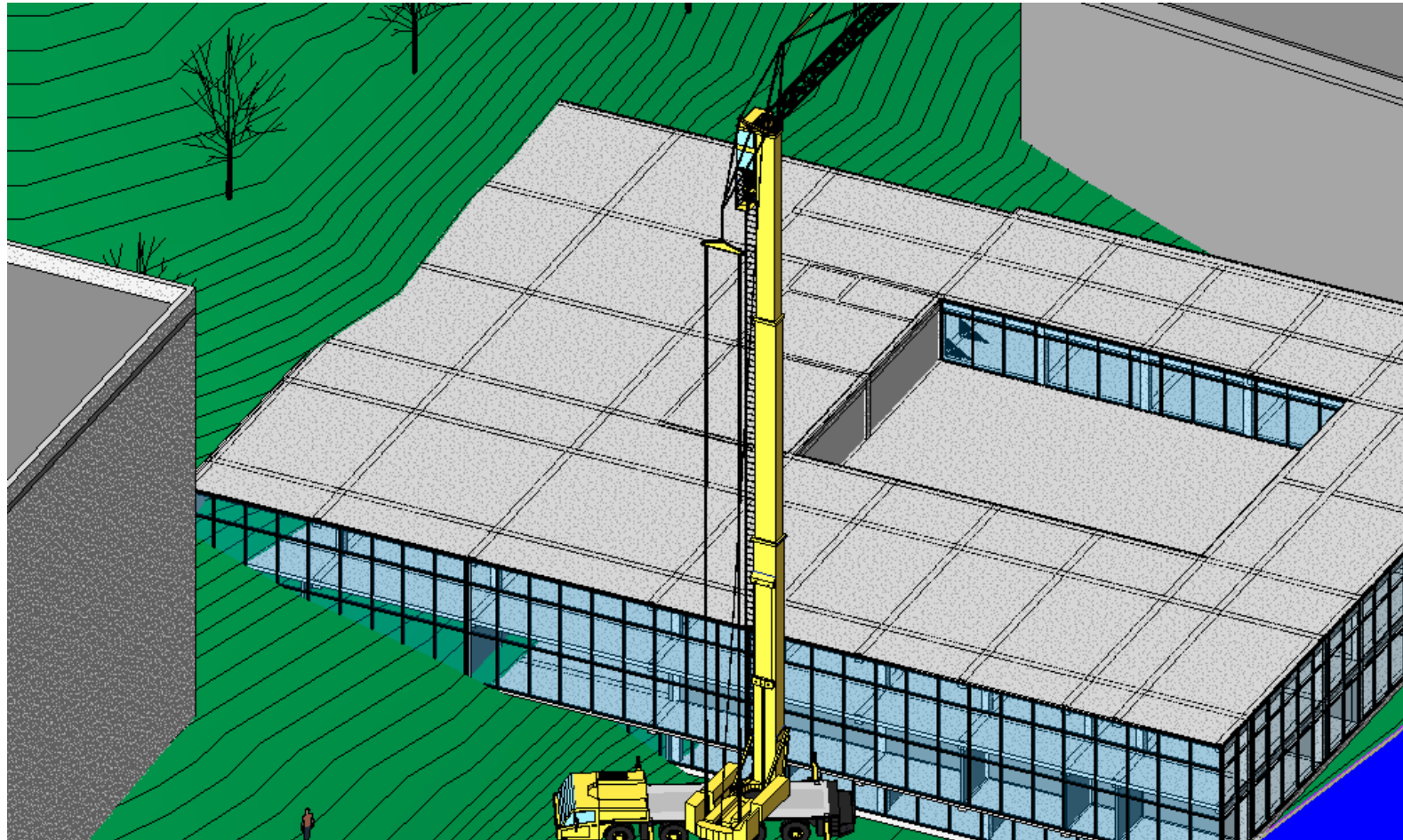
Luffing Attachment



Crane Selection

Atlantic Team

team
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Matic Ozbolt
Noah Bachmann
Li Zhengwei
Fei Zhao
owner
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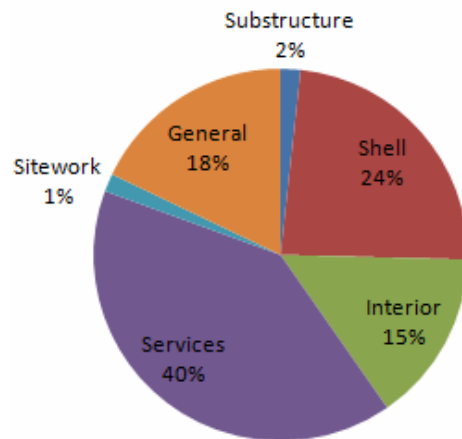
Excavation: 1,800 Cubic Yards

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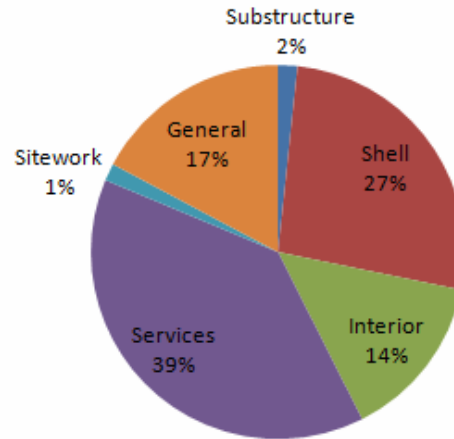
team
 Michael Kraus
 Dimitra Ioannidou
 Matic Ozbolt
 Noah Bachmann
 Li Zhengwei
 Fei Zhao
owner
 Claudio Mourgues
 Wafaa Sabil

	CIP	Precast	Steel
Substructure	\$94,682	\$94,682	\$91,897
Shell	\$1,299,899	\$1,517,838	\$2,652,131
Interior	\$819,280	\$819,280	\$682,000
Services	\$2,210,391	\$2,210,391	\$2,210,391
Sitework	\$85,390	\$85,390	\$85,390
General	\$983,100	\$983,100	\$877,300
Bare Costs Total	\$5,492,743	\$5,710,681	\$6,599,109
15% Contingancy Total	\$6,316,654	\$6,567,283	\$7,588,976
Budget After Inflation	\$610,000		

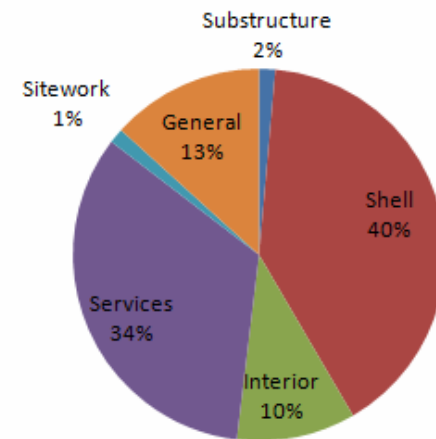
CIP



Precast



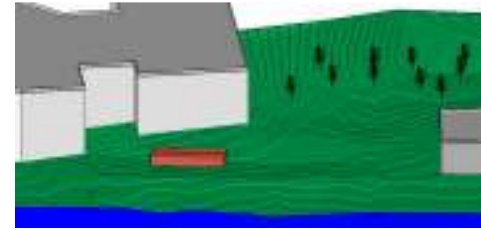
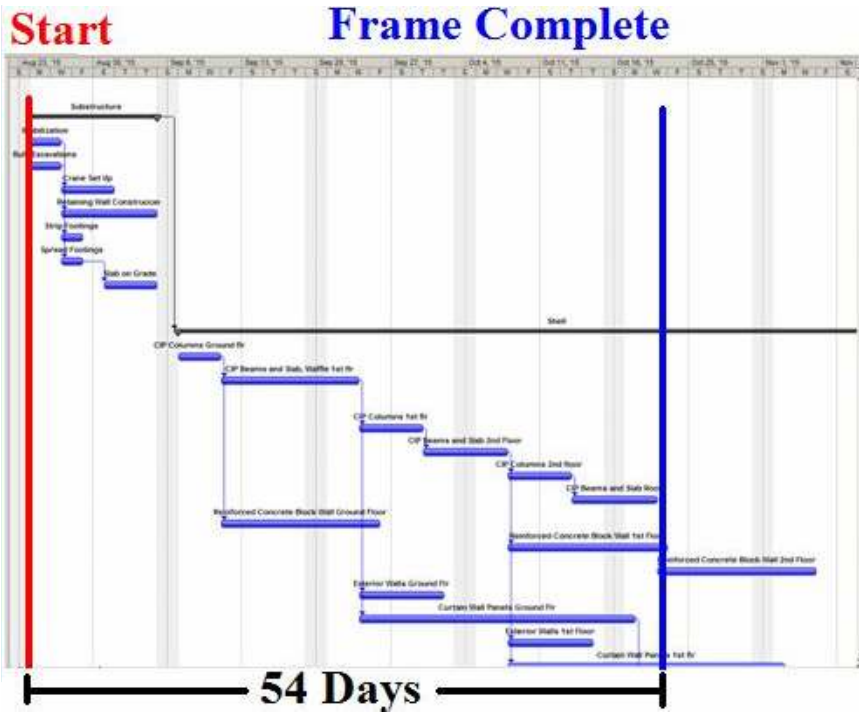
Steel



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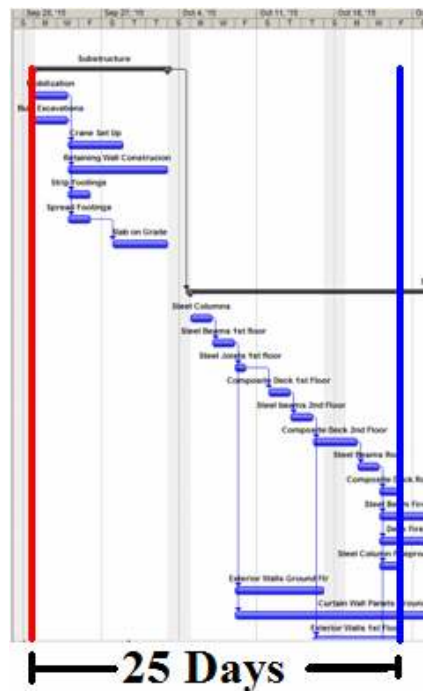
team
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Fei Zhao
owner
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Wafaa Sabil

Concept 1 Estimates



Project Start

Concrete:
August 24, 2015

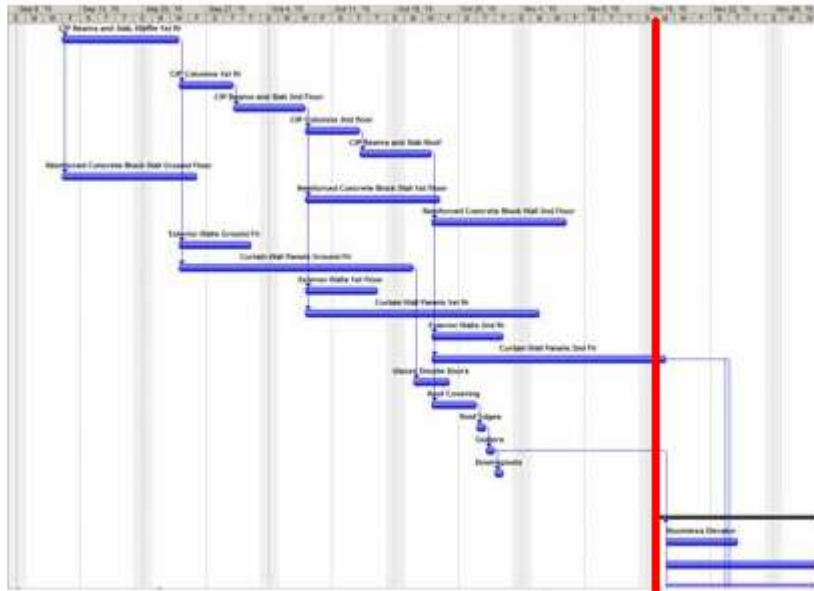


Steel :
Sept 21, 2015

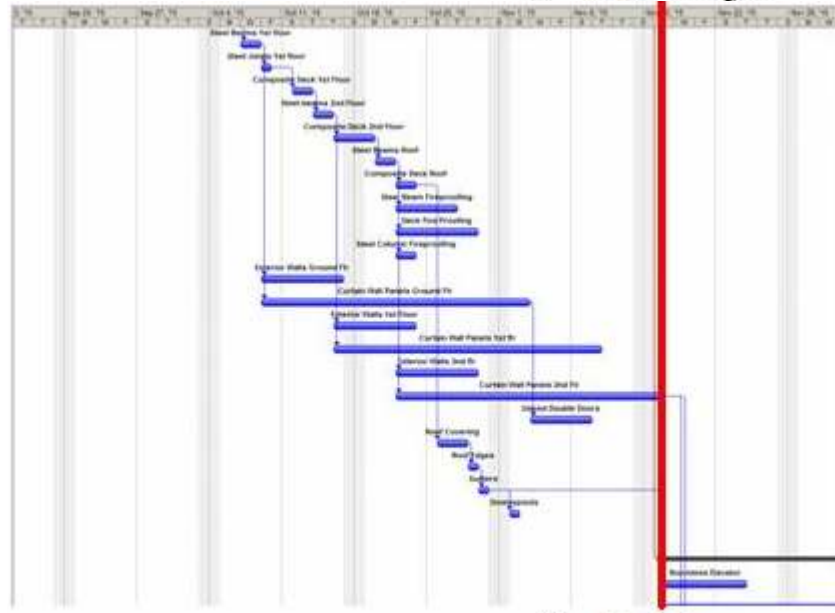
Atlantic Team

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Claudio Mourgues
Wafaa Sabil

Enclosed Shell



→ 61 Days



→ 41 Days



Enclosed Shell

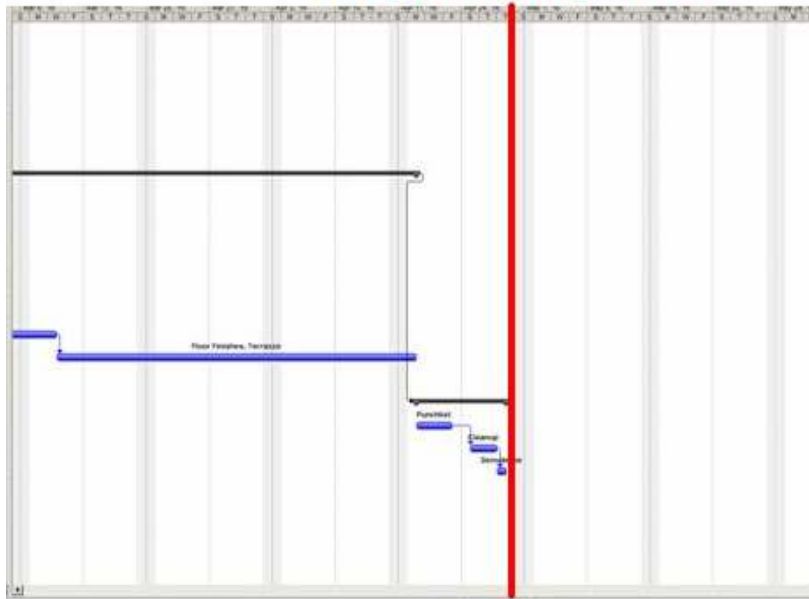
Concrete:
Nov 16, 2015

Steel:
Nov 16, 2015

Atlantic Team

team
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Fei Zhao
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Wafaa Sabir

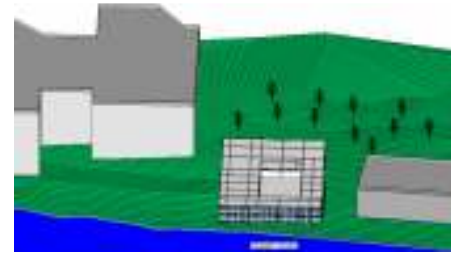
Project Completion



→ 179 Days



→ 148 Days



Project Complete

**Concrete:
April 28, 2016**

**Steel:
April 13, 2016**

Atlantic Team

team
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Fei Zhao
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Claudio Mourgues
Wafaa Sabir

First Concept Options

Concrete

- + Lower Cost
- Long Schedule
- Limited Prefab

Steel

- + Short Schedule
- + Prefabrication
- Expensive

Atlantic Team

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Matic Ozbolt
Noah Bachmann
Li Zhengwei
Fei Zhao

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Claudio Mourgues
Wafaa Sabil



Concept II: *STACK*

Atlantic Team

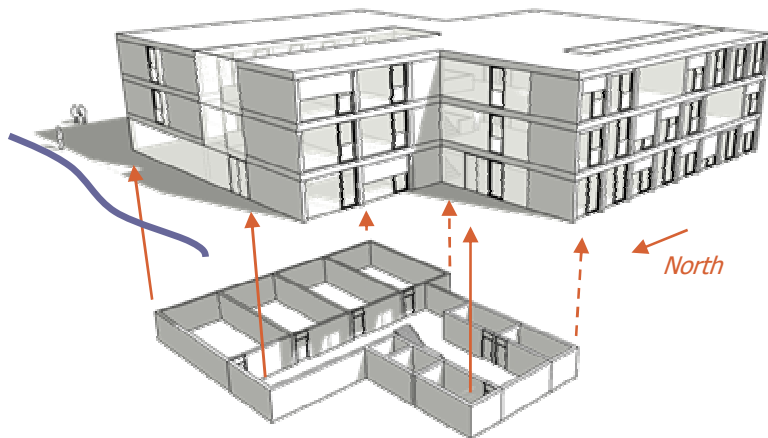
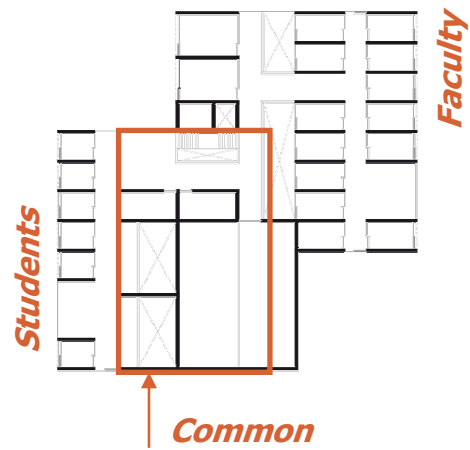
team

Michael Kraus
Dimitra Ioannidou
Matic Ozbolt
Noah Bachmann
Li Zhengwei
Fei Zhao

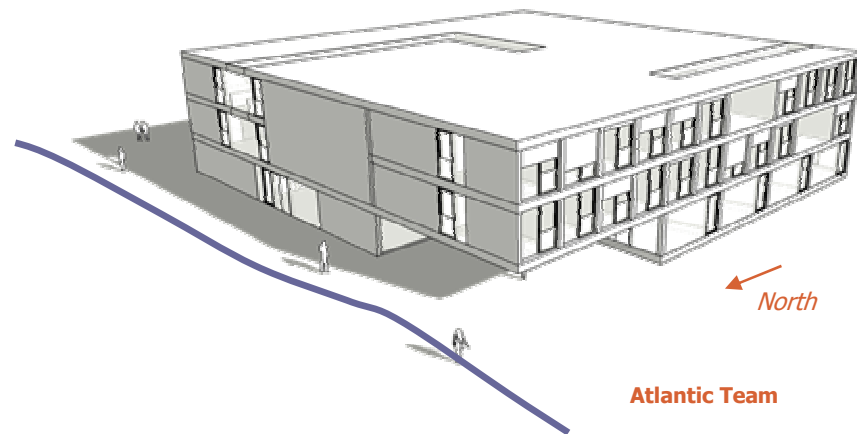
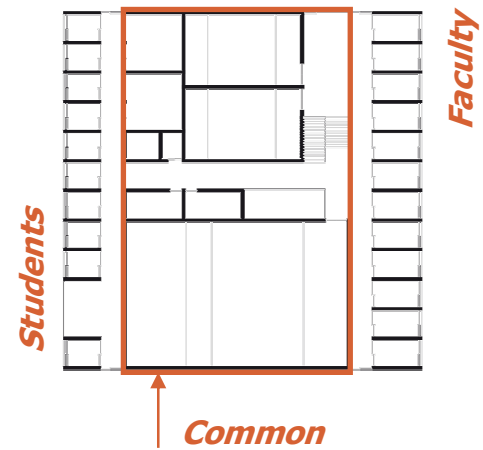
owner

Claudio Mourgues
Wafaa Sabil

Option I

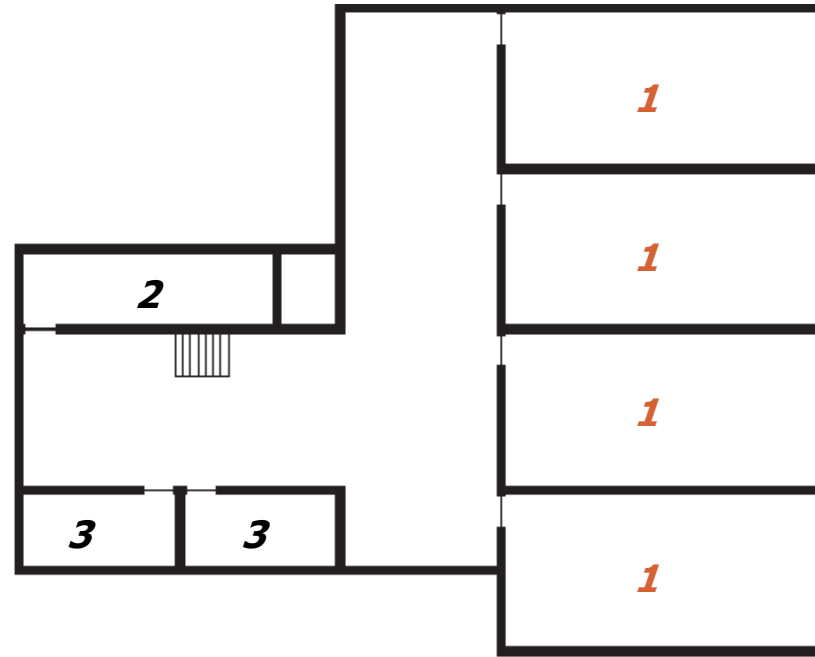


Option II

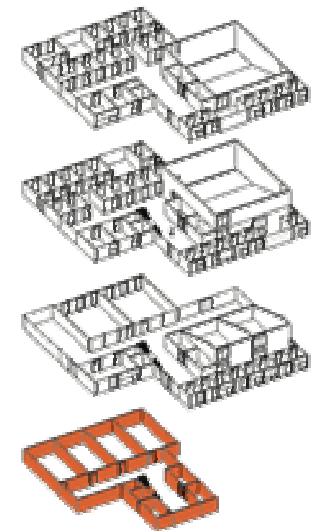


Atlantic Team

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Noah Bachmann
Li Zhengwei
Fei Zhao
owner
Claudio Mourgues
Wafaa Sabil



*Concept II – Option 1
Floorplans*



Project
AEC – Concept II Stack

Basement

- 1| *Small Classrooms*
- 2| *MEP/ Storage Space*
- 3| *MEP & Elevator Shaft*

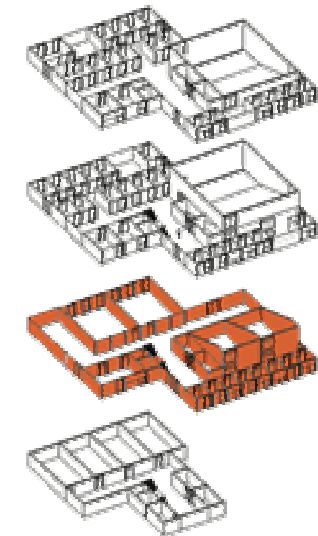


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 Matic Ozbolt
 Noah Bachmann
 Li Zhengwei
 Fei Zhao
owner
 Claudio Mourgues
 Wafaa Sabil



Concept II – Option 1
Floorplans



Groundfloor

- 1| Instructional Labs
- 2| Server Room
- 3| Cafeteria
- 4| MEP & Elevator Shaft
- 5| Foyer Space
- 6| Student's Offices

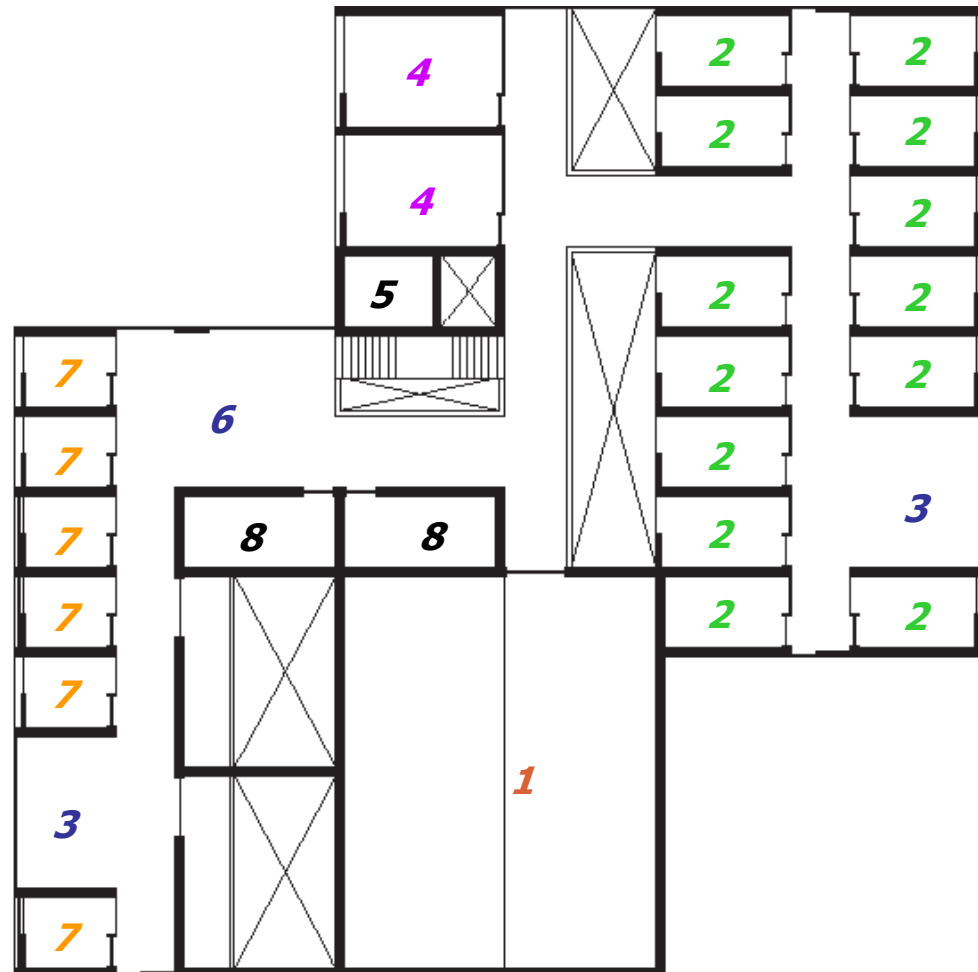
- 7| Large Classrooms
- 8| Restrooms

Atlantic Team

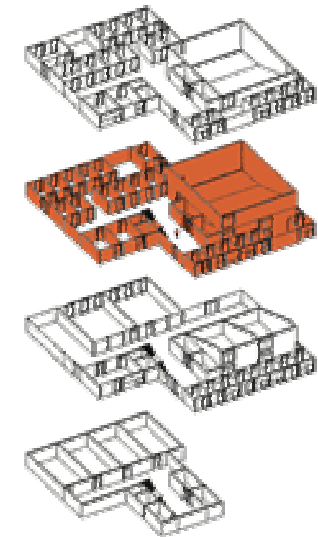
team
Michael Kraus
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Matic Ozbolt
Noah Bachmann
Li Zhengwei
Fei Zhao
owner
Claudio Mourgues
Wafaa Sabil

Project
AEC – Concept II Stack

mk-pres-2ndconcept-ppt-031008.ppt



Concept II – Option 1
Floorplans



First Floor

- 1| Auditorium
- 2| Faculty Offices
- 3| Common Meeting Spaces
- 4| Seminar Rooms
- 5| MEP & Elevator Shaft
- 6| Foyer Space

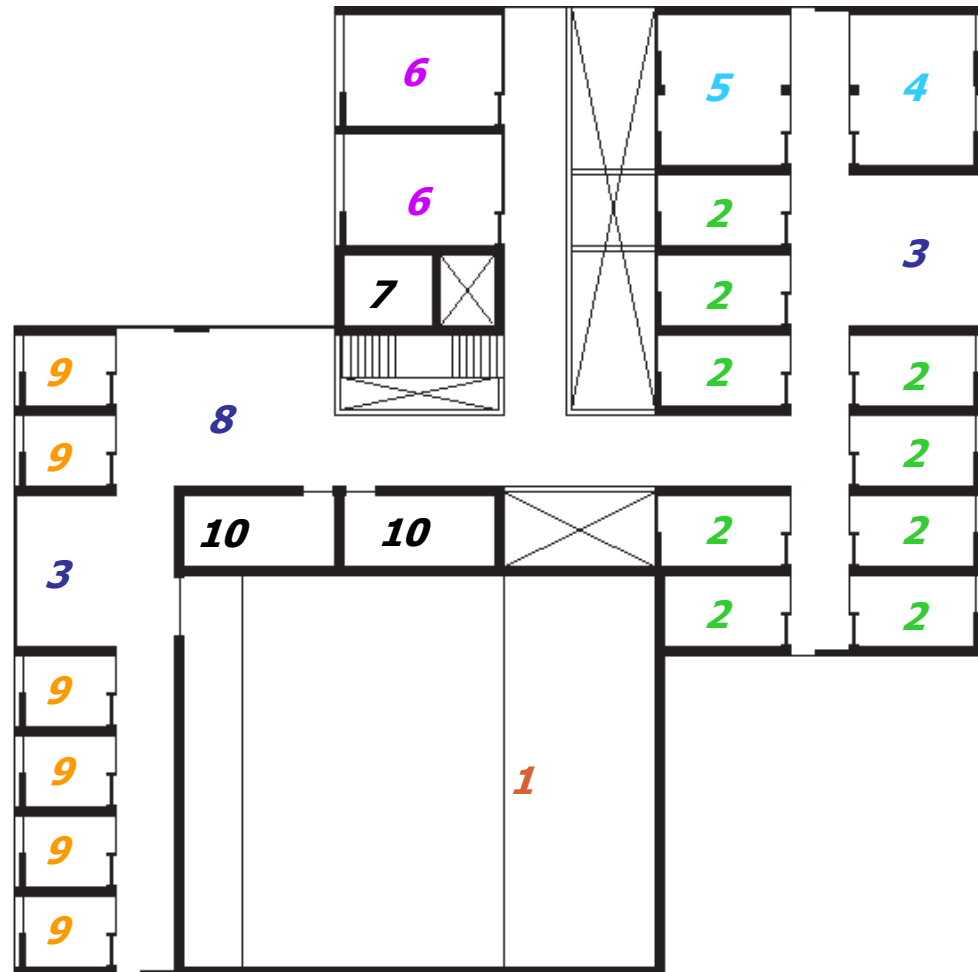
- 7| Student's Offices
- 8| Restrooms

Atlantic Team

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Noah Bachmann
Li Zhengwei
Fei Zhao
owner
Claudio Mourgues
Wafaa Sabil

Project
AEC – Concept II Stack

mk-pres-2ndconcept-ppt-031008.ppt



mk-pres-2ndaconcept-ppt-031008.ppt

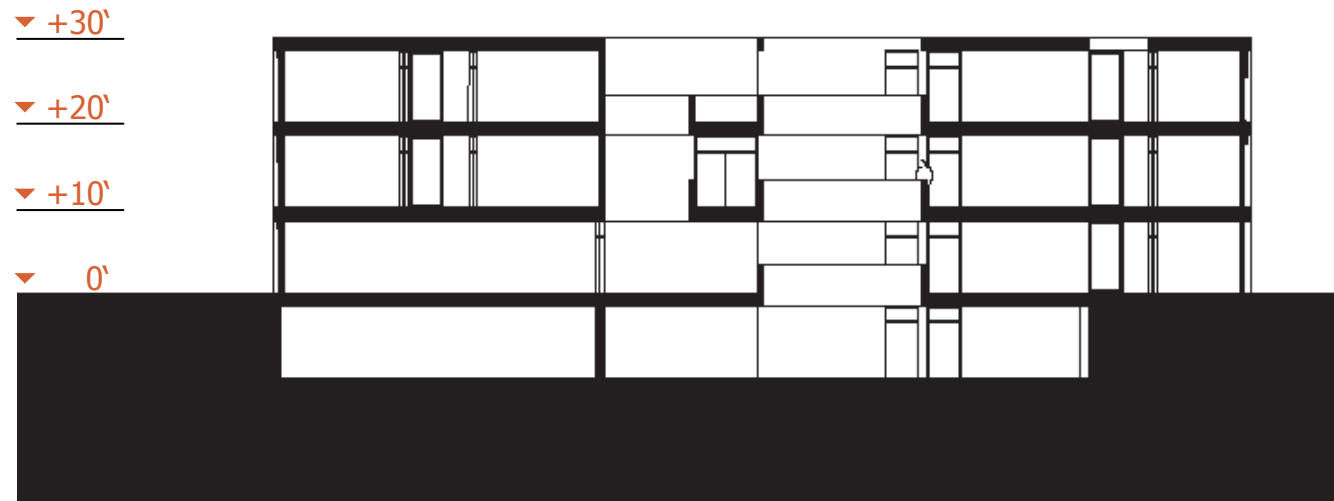
- 1| Auditorium
- 2| Faculty Offices
- 3| Common Meeting Spaces
- 4| Department Chair's Office
- 5| Administrative Assistants
- 6| Seminar Rooms

7| MEP & Elevator Shaft
8| Foyer Space
9| Student's Offices
10| Restrooms

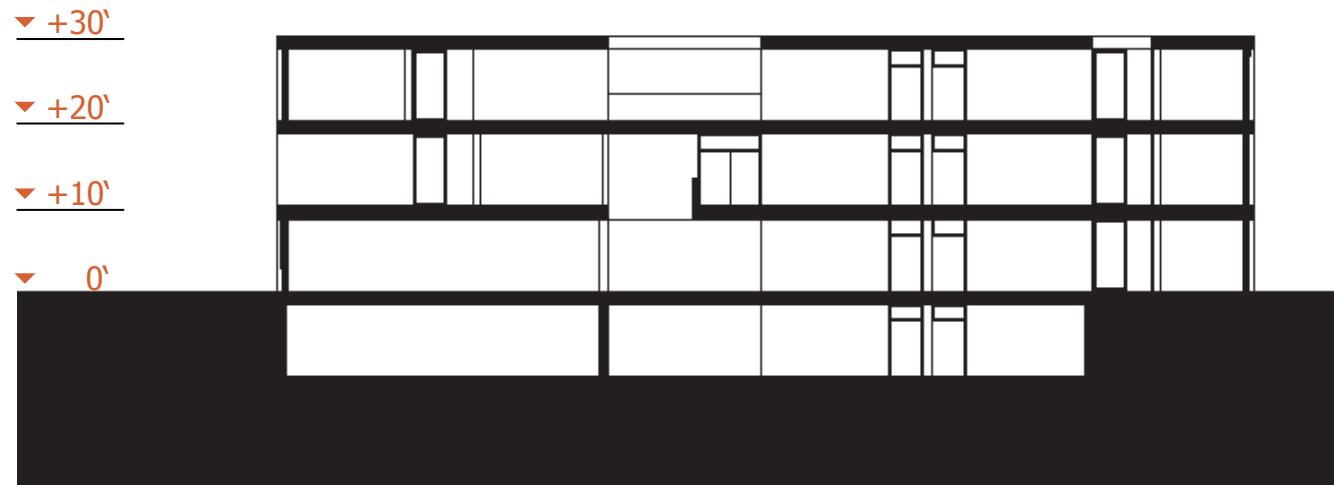
team
Michael Kraus
Dimitra Ioannidou
Matic Ozbolt
Noah Bachmann
Li Zhengwei
Fei Zhao
owner
Claudio Mourgues
Wafaa Sabil

Concept II – Option 1
Sections

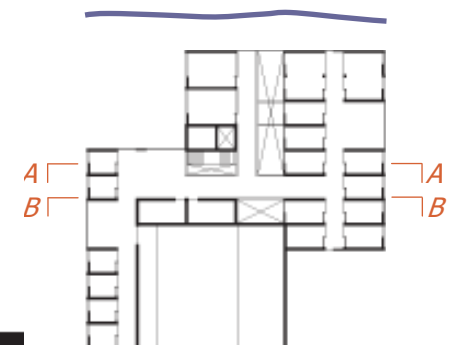
Project
AEC – Concept II Stack



Section East – West



Section East – West



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team
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Noah Bachmann
Li Zhengwei
Fei Zhao
owner
Claudio Mourgues
Wafaa Sabil

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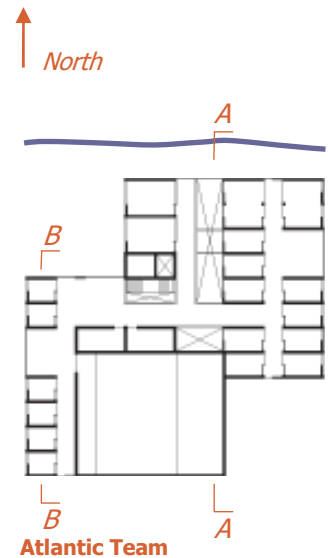


Section A-A North – South



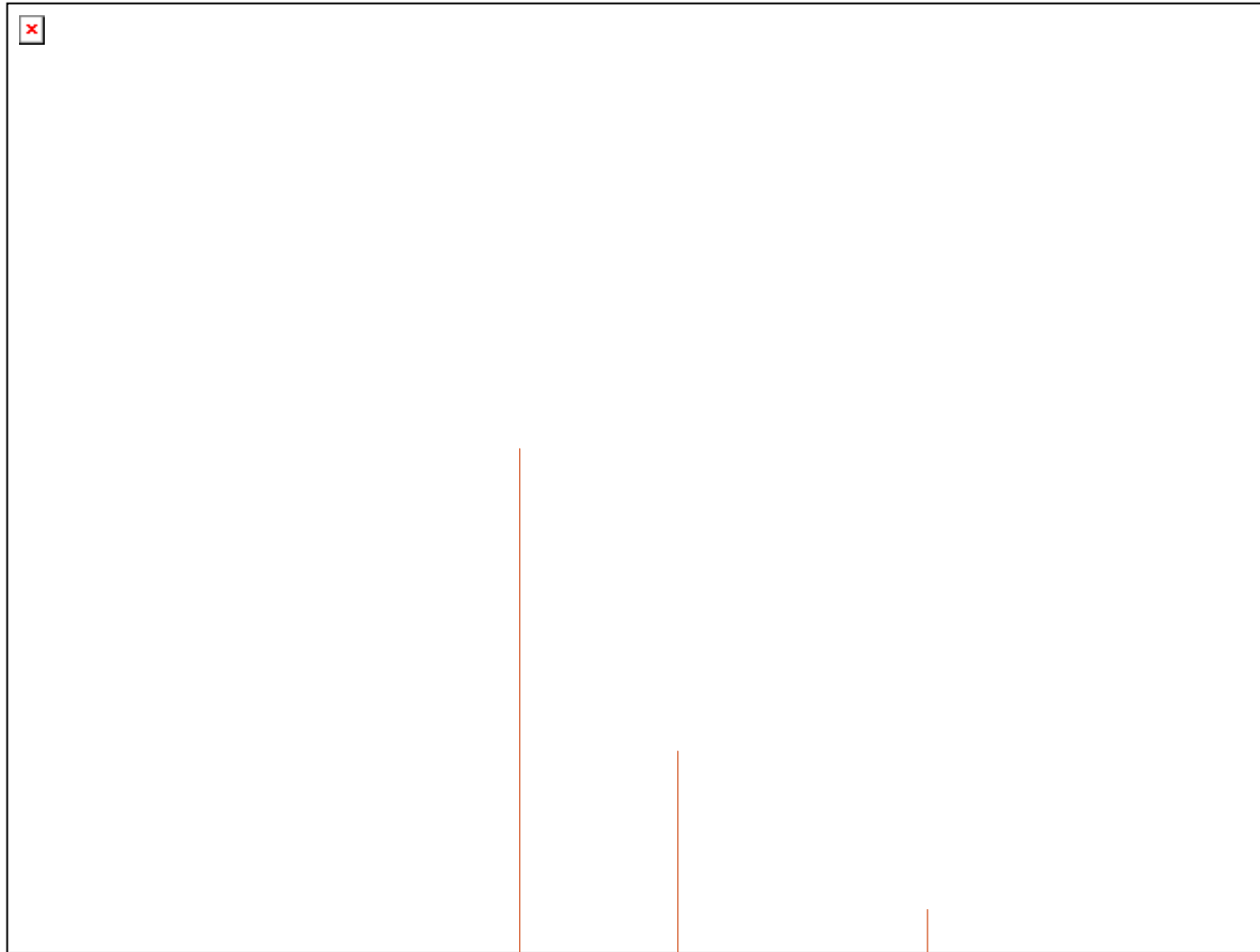
Section B-B North – South

Concept II – Option 1 Sections



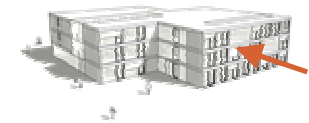
Atlantic Team

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Matic Ozbolt
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Fei Zhao
owner
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*Concept II – Option 1
Facade*

Project
AEC – Concept II Stack



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Matic Ozbolt
Noah Bachmann
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Fei Zhao
owner
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Wafaa Sabil

Detailed Elevation

textile blinds
provide shading

fixed glazing
unobstructed views

operable **windows** for
natural **ventilation**

*Concept II – Option 1
Exterior*

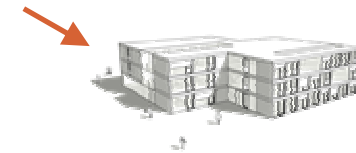
Project **AEC – Concept II Stack**



Perspective View from Northwest

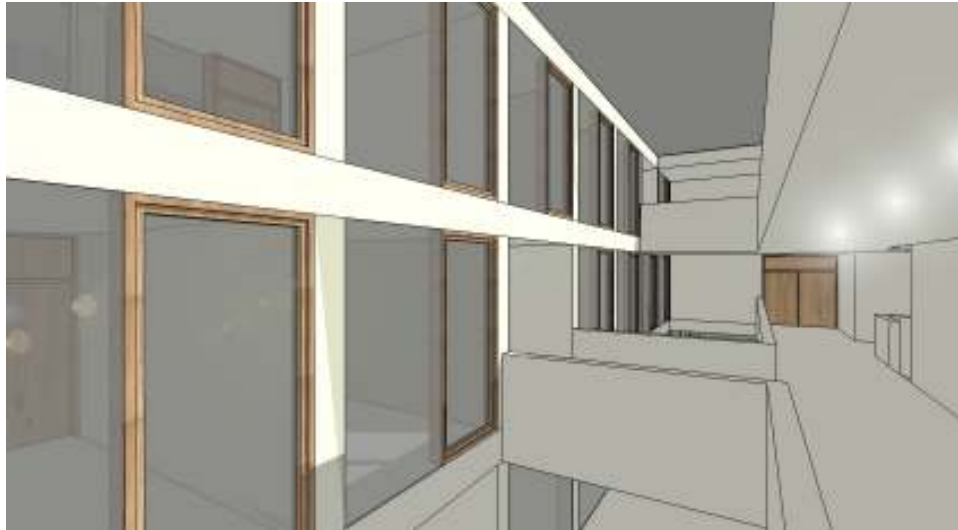


Perspective view from Northeast



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team
Michael Kraus
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Matic Ozbolt
Noah Bachmann
Li Zhengwei
Fei Zhao
owner
Claudio Mourgues
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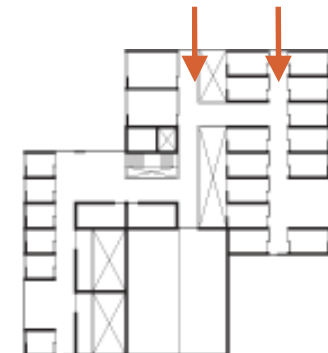
Perspective view towards atrium



Perspective view through faculty corridor

*Concept II – Option 1
Interior*

Project
AEC – Concept II Stack



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team
Michael Kraus
Dimitra Ioannidou
Matic Ozbolt
Noah Bachmann
Li Zhengwei
Fei Zhao
owner
Claudio Mourgues
Wafaa Sabil

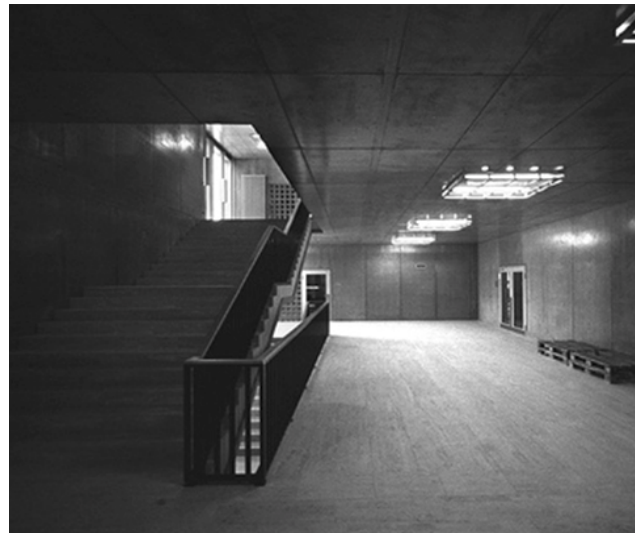
mk-pres-2ndconcept-ppt-031008.ppt



Van Hise Hall, UW Madison Campus



Peter Märkli – Schoolbuilding Birch, Zurich



Peter Märkli – Schoolbuilding Birch, Zurich

*Concept II – Option 1
References*

Project
AEC – Concept II Stack

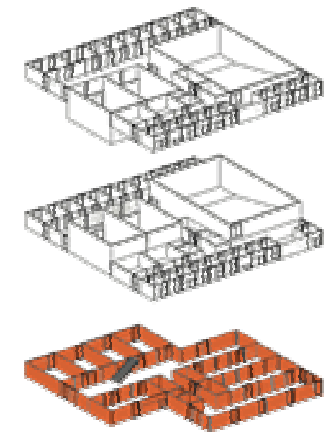
Atlantic Team

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Matic Ozbolt
Noah Bachmann
Li Zhengwei
Fei Zhao
owner
Claudio Mourgues
Wafaa Sabil

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Concept II – Option 2
Floorplans



Groundfloor

- 1| Instructional Labs
- 2| Small Classrooms
- 3| Foyer Space
- 4| Server Room
- 5| Storage
- 6| MEP & Elevator Shaft

7| Restrooms

50'

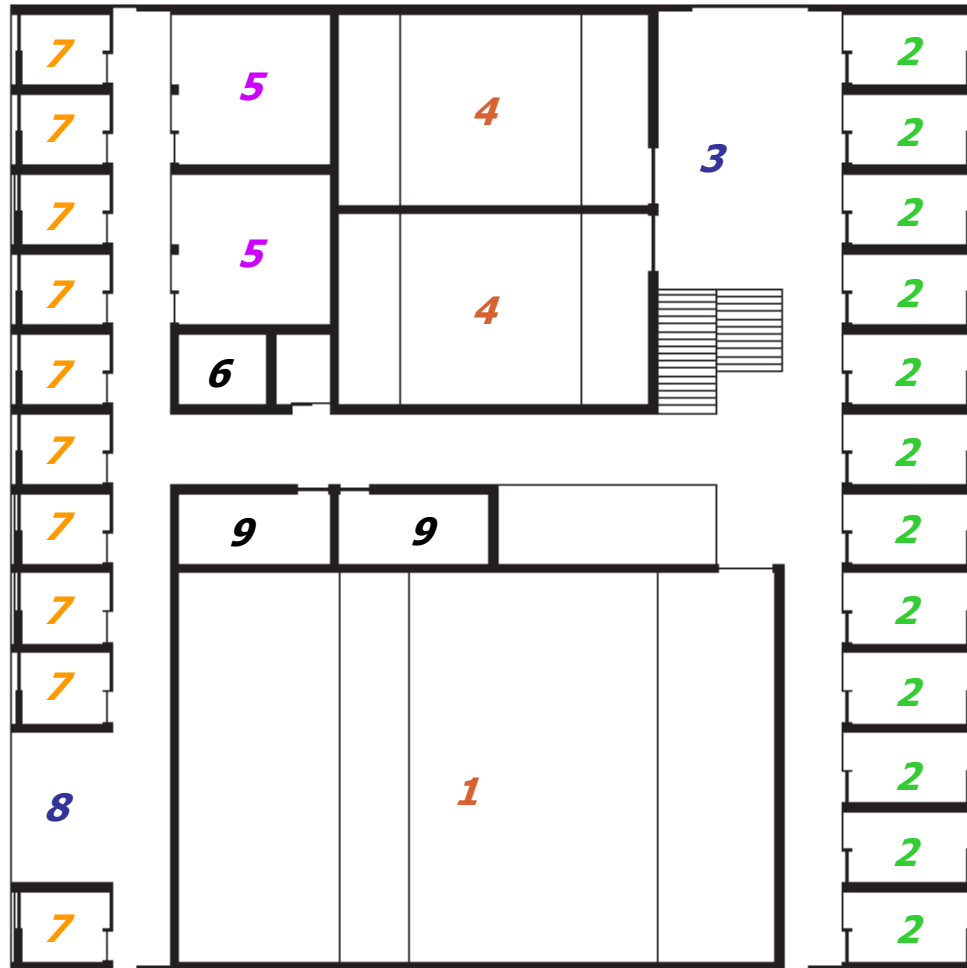
100'

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team
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Matic Ozbolt
Noah Bachmann
Li Zhengwei
Fei Zhao
owner
Claudio Mourgues
Wafaa Sabil

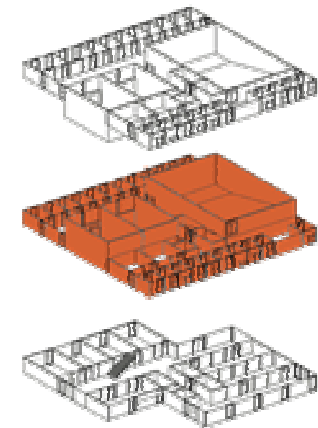
Project
AEC – Concept II Stack

mk-pres-2ndconcept-ppt-031008.ppt



Concept II – Option 2 Floorplans

Project
AEC – Concept II Stack



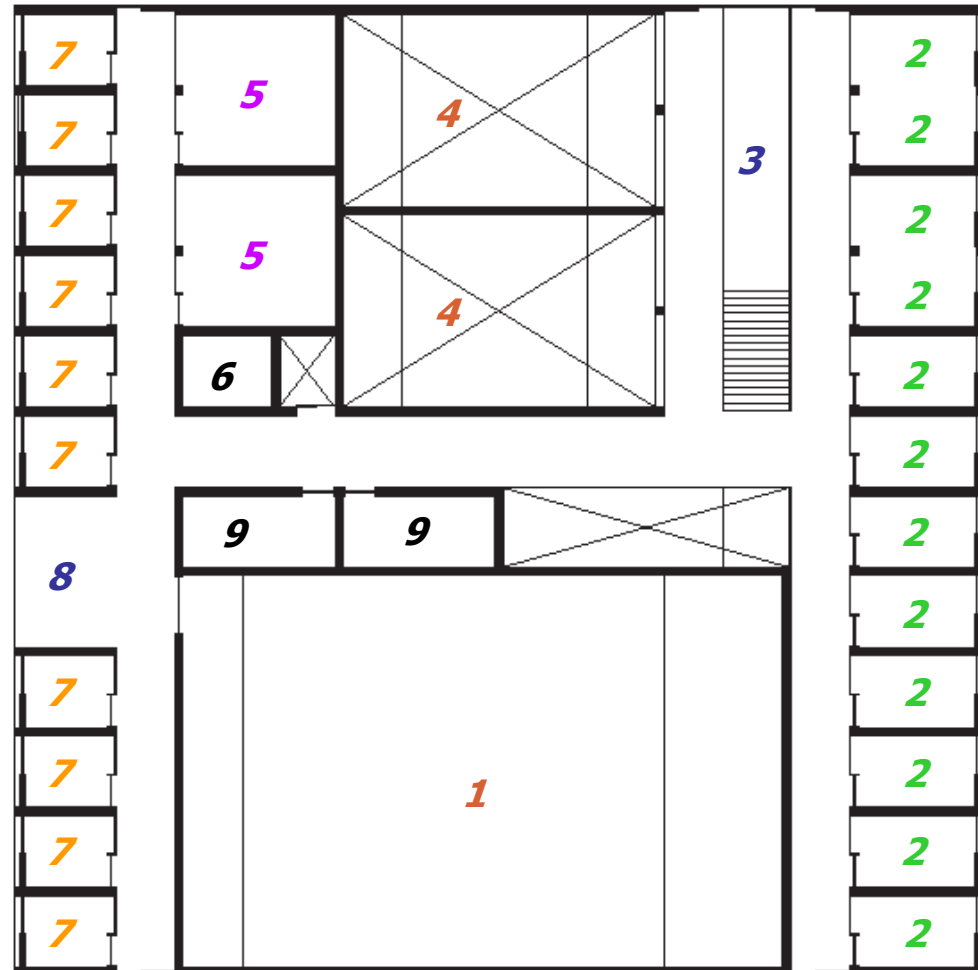
First Floor

- 1| Auditorium
- 2| Faculty Offices
- 3| Foyer Space
- 4| Large Classrooms
- 5| Seminar Rooms
- 6| MEP & Elevator Shaft

- 7| Student's Offices
- 8| Common Meeting Space
- 9| Restrooms

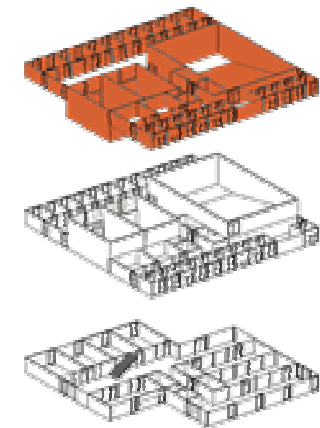
Atlantic Team

team
Michael Kraus
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Matic Ozbolt
Noah Bachmann
Li Zhengwei
Fei Zhao
owner
Claudio Mourgues
Wafaa Sabil



Concept II – Option 2
Floorplans

Project
AEC – Concept II Stack



Second Floor

- 1| Auditorium
- 2| Faculty Offices
- 3| Foyer Space
- 4| Large Classrooms
- 5| Seminar Rooms
- 6| MEP & Elevator Shaft

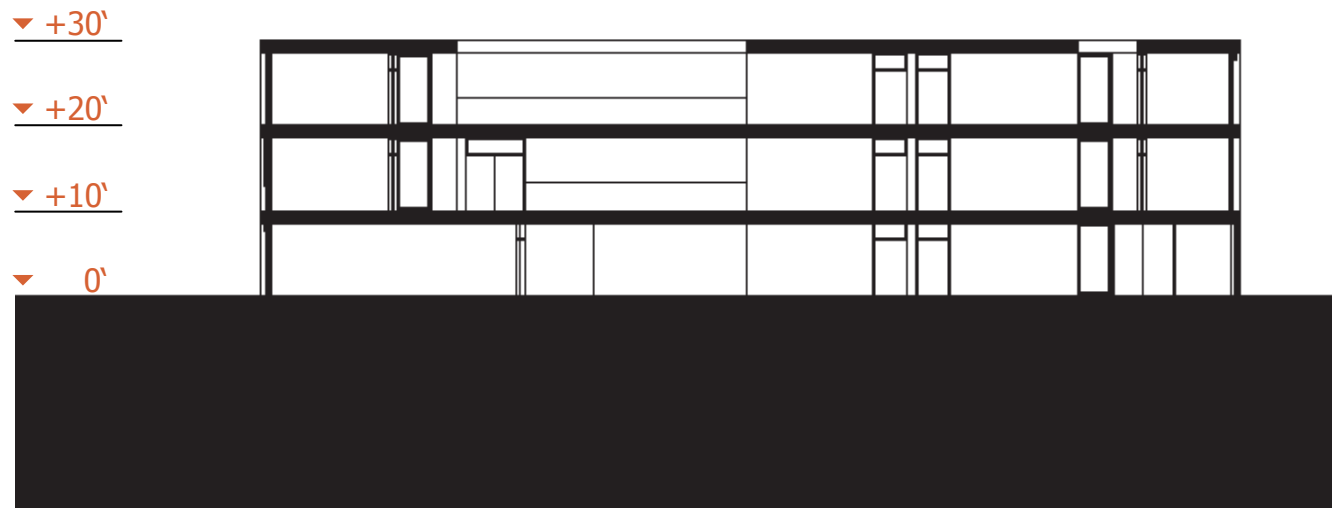
- 7| Student's Offices
- 8| Common Meeting Space
- 9| Restrooms

Atlantic Team

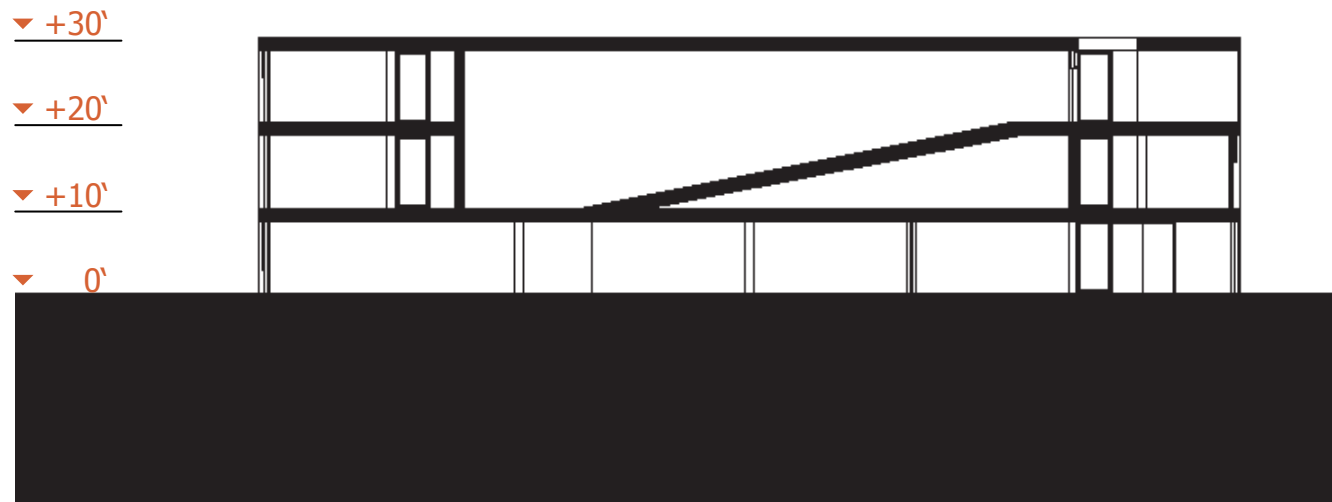
team
Michael Kraus
Dimitra Ioannidou
Matic Ozbolt
Noah Bachmann
Li Zhengwei
Fei Zhao
owner
Claudio Mourgues
Wafaa Sabil

Concept II – Option 2
Sections

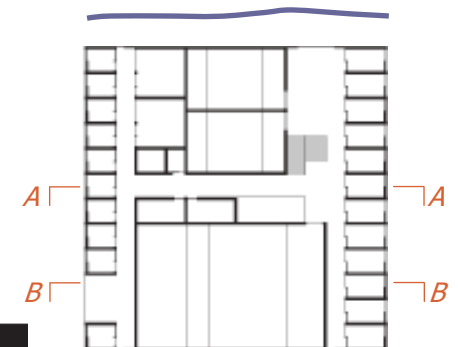
Project
AEC – Concept II Stack



Section A-A East – West



Section B-B East – West



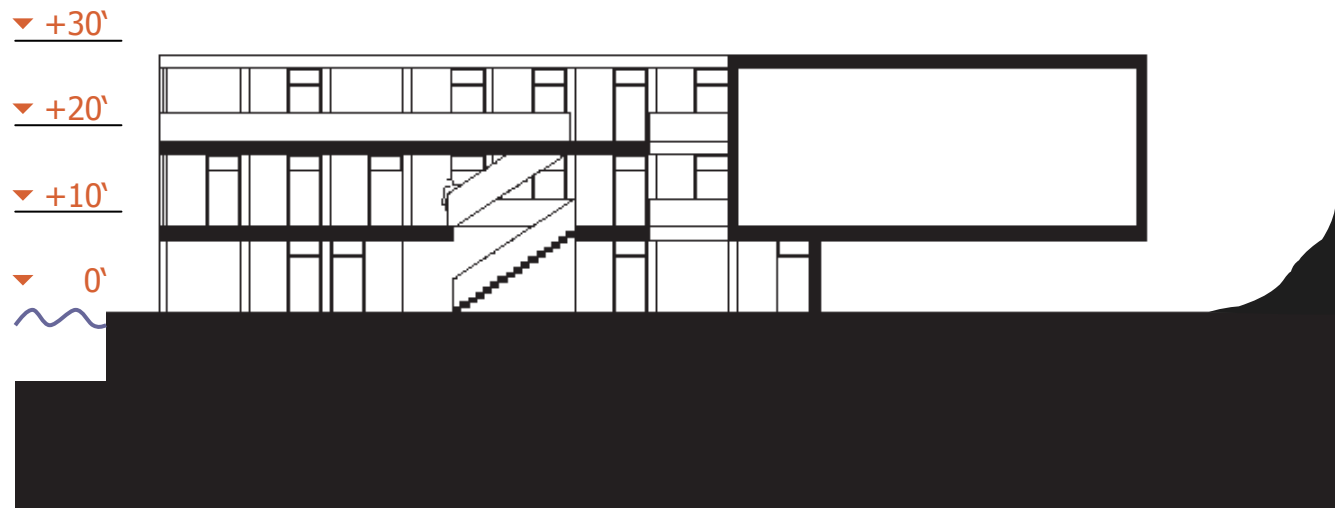
Atlantic Team

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Matic Ozbolt
Noah Bachmann
Li Zhengwei
Fei Zhao
owner
Claudio Mourgues
Wafaa Sabil

mk-pres-2ndconcept-ppt-031008.ppt

Concept II – Option 2
Sections

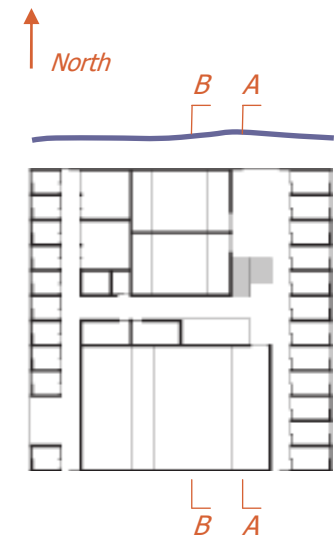
Project
AEC – Concept II Stack



Section A-A North – South



Section B-B North – South



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*Concept II – Option 2
Exterior*

Project
AEC – Concept II Stack

Perspective View of Entrance Area



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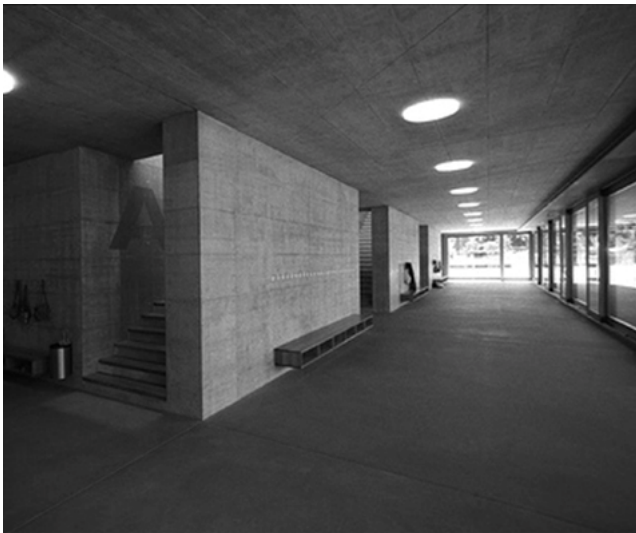
mk-pres-2ndconcept-ppt-031008.ppt



Buenzli Courvoisir – Schoolbuilding Niederhasli



Buenzli Courvoisir – Schoolbuilding Niederhasli



Buenzli Courvoisir – Schoolbuilding Niederhasli



Poppe Prehal – Engineering School Mistelbach

*Concept II – Option 2
References*

Project
AEC – Concept II Stack

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mk-pres-2ndconcept-ppt-031008.ppt

Structural Engineering

Concept II: *Stack*

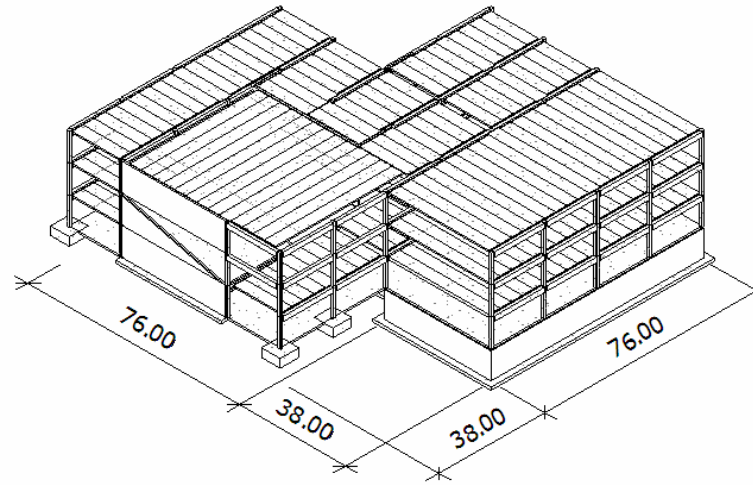
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1.) CONCRETE

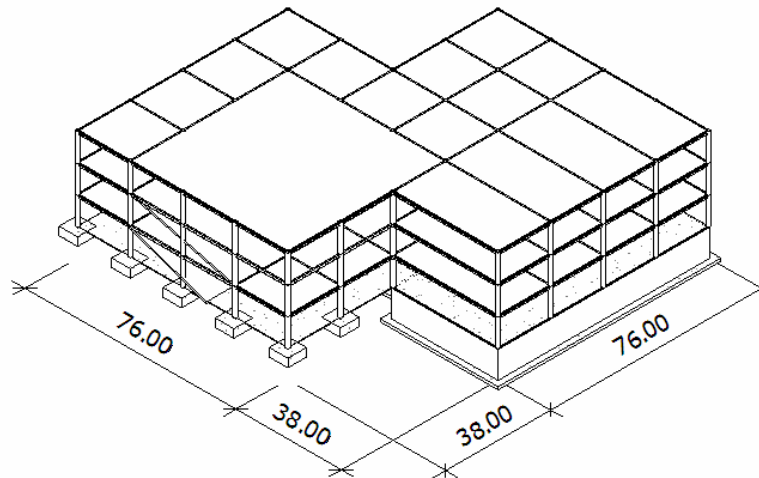
– precast elements

WHY: input from CM,
prefabrication



2nd concept:
STRUCTURE

2.) STEEL



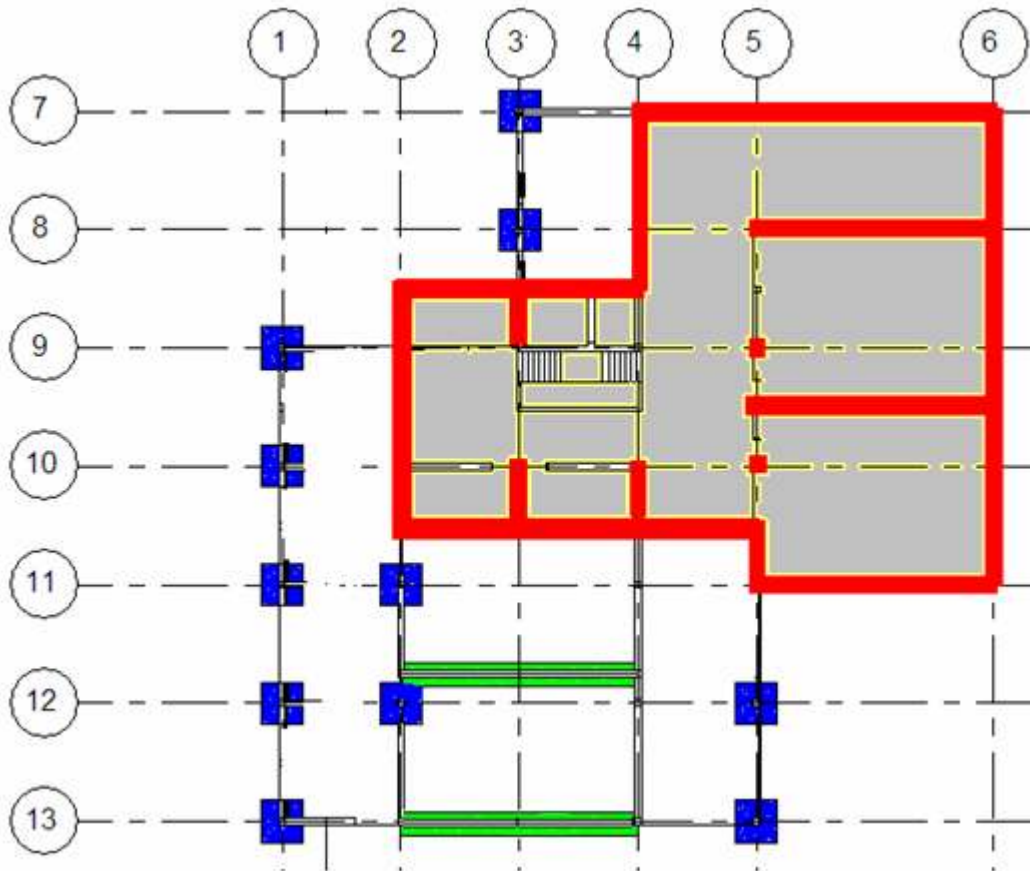
Problem:

-Basement => excavation,
if costs are going to be too high, try:

3.) ALTERNATIVES with OVERHANG

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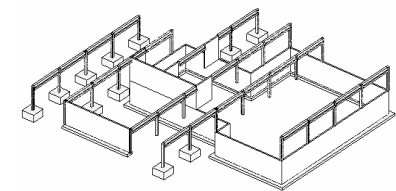


2nd concept:

FOUNDATION SYSTEM

Problem:

- Excavation for the basement



2nd concept: foundation 3D view

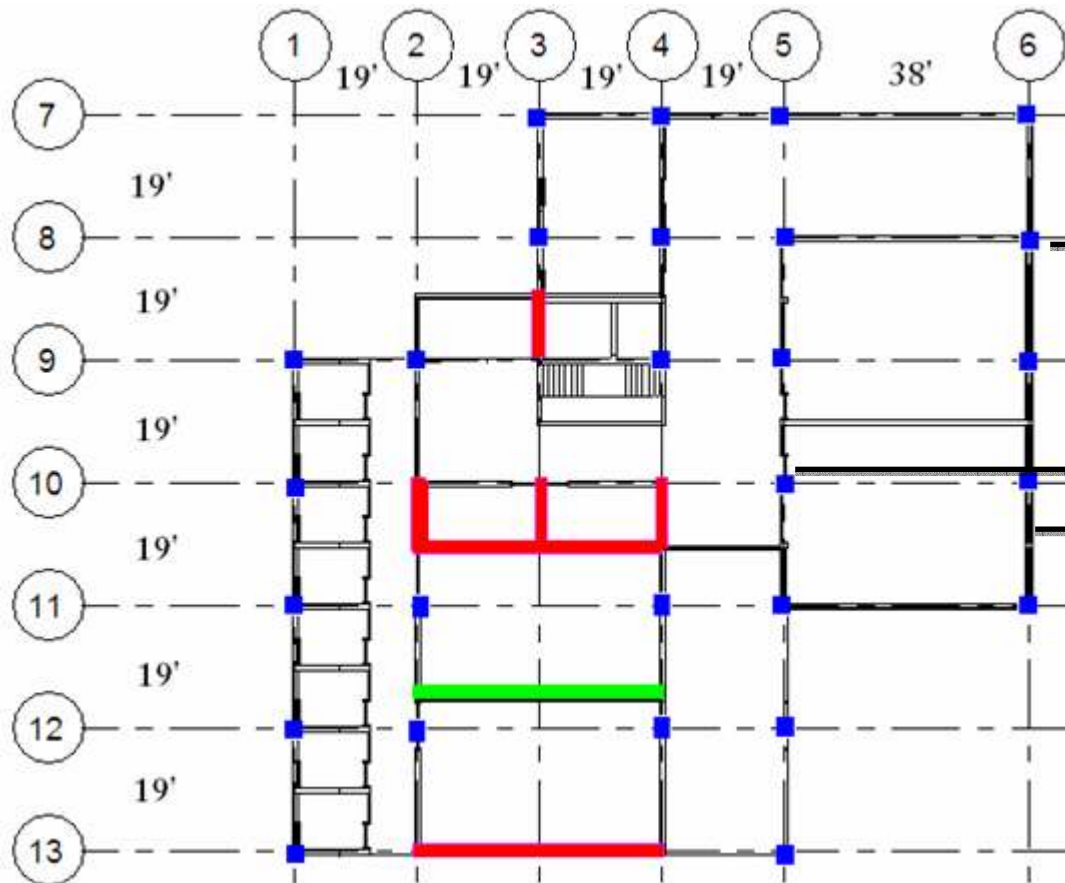
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For the basement excavation we need:

- Dewatering of the site
- Foundation waterproofing
- Uplift forces - solution:

Mat foundation - Less expensive than piles



2nd concept:

CONCRETE:

-> Precast elements

▪ Columns:

-12"×12"

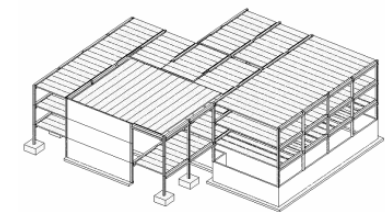
-16"×16"

▪ Beams:

- Inverted Tee

19' span=> 10"

▪ Shear wall: 8"



2nd concept: concrete – 3D view

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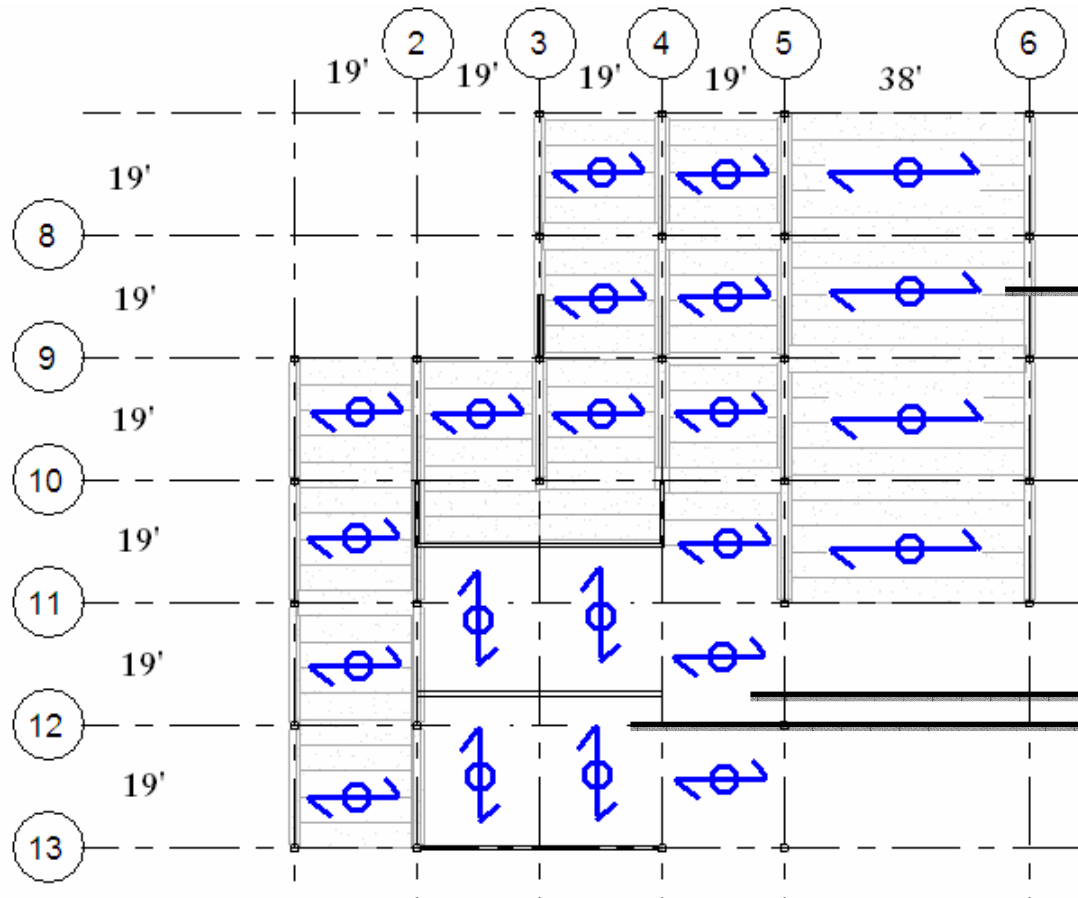
Goal:

minimize the number of different element types => lower cost

■ Column

■ Shear wall

■ Bearing wall



2nd concept:

CONCRETE:

->Precast slabs:

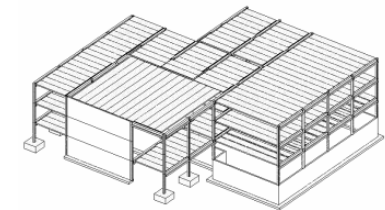
Hollow core

-38' => 12"

-19' => 6"

- 24'=> 7"

-Above the auditorium: 52'=>18"



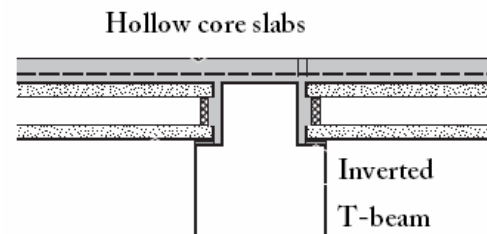
2nd concept: concrete – 3D view

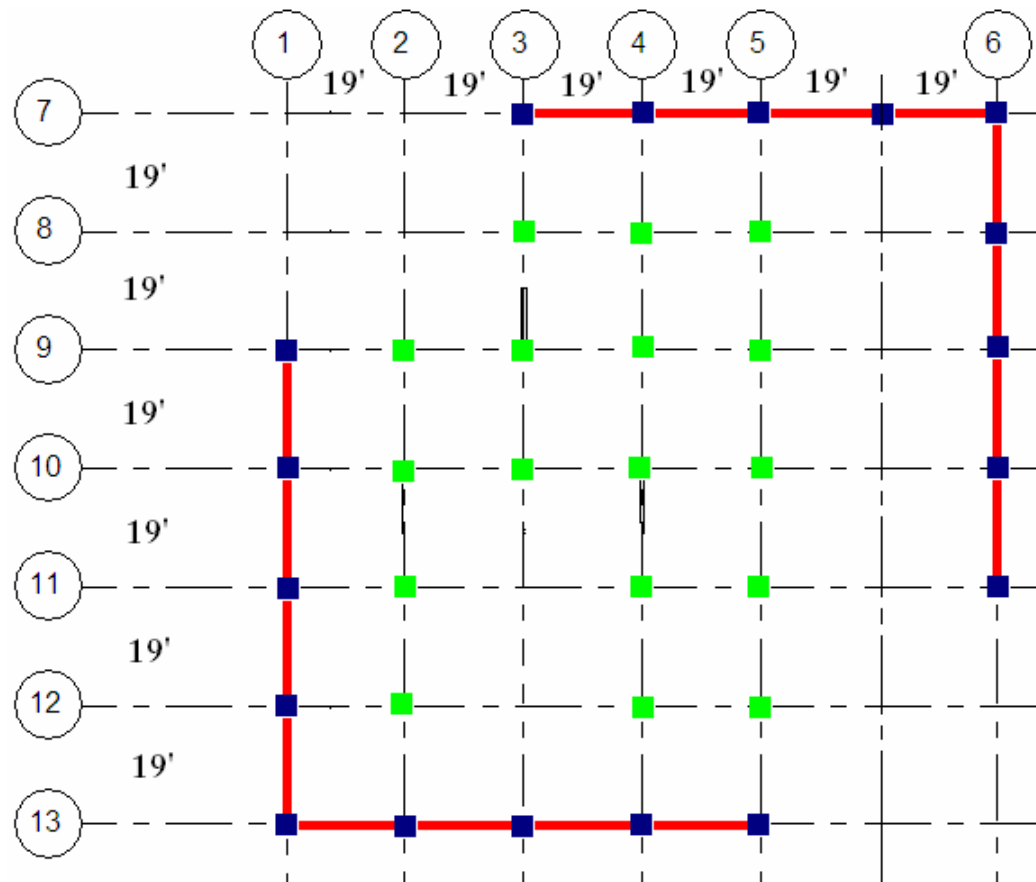
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Detail:

Connection, which minimizes the structural height



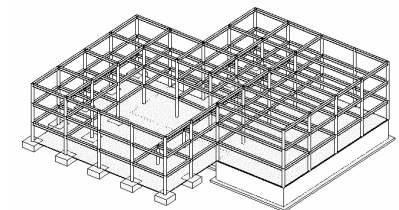
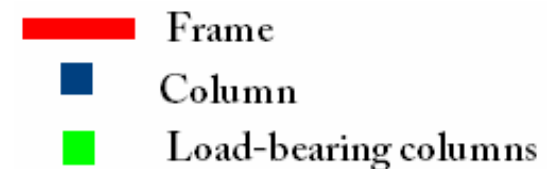


2nd concept:

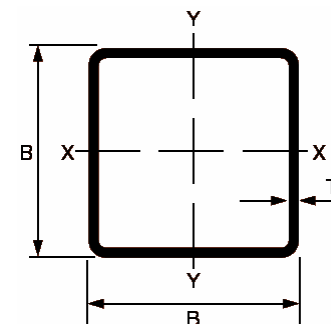
STEEL:

-> Moment resisting frame on the edges

-> Interior gravity bearing columns – easier+cheaper connections



- Columns: HSS rectangular sections 12"×12"×0.5"
- Beams: Wide flange asymmetric beams :
 - 38'=> W 18×46
 - 19'=> W 10×30



2nd concept: steel- 3D view

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Wide flange asymmetric section,
wider lower flange is supporting the metal deck

Benefits:

- Height reduction
- Space for services
- Fast construction
- Composite action without shear stud connectors

Con:

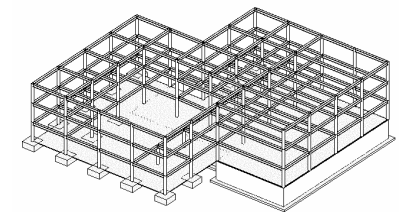
- Lower beam flange needs fire protection

2nd concept:

STEEL:

-> **Floor system:**

- Slim deck:
 - Composite slab
 - Depth: 6,5"



2nd concept: steel- 3D view

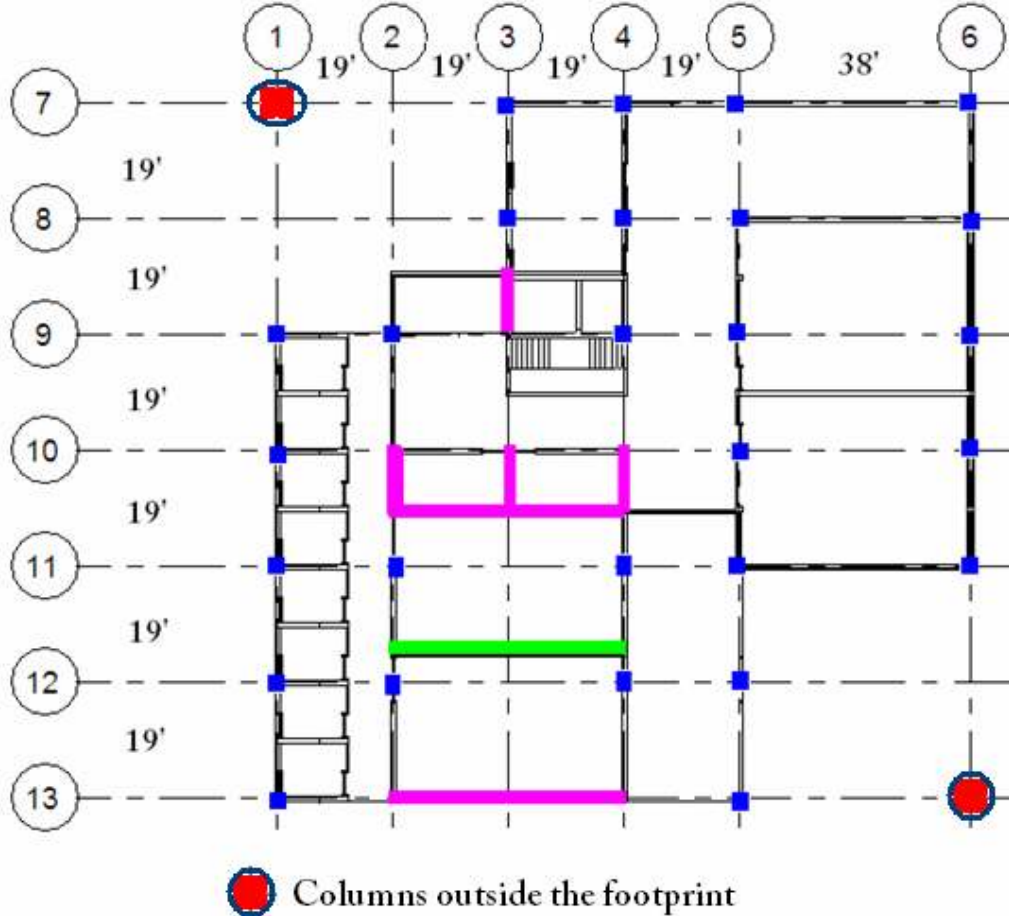
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Pro:

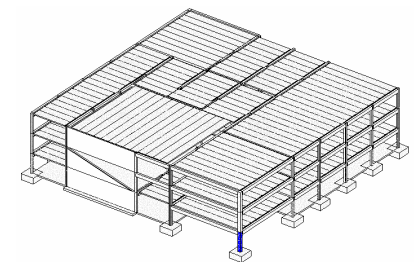
- An extra exposed column on the edge would mean, that the structure is still simple.
- Similarity with original structural idea for the second concept.
- Lower costs.

2nd concept:

- **ALTERNATIVE**, if costs for excavation are too high

-> **CONCRETE** – an extra column outside the footprint – needs **permission** from our owner

-> **Permission granted!**



2nd concept: alternative– 3D view

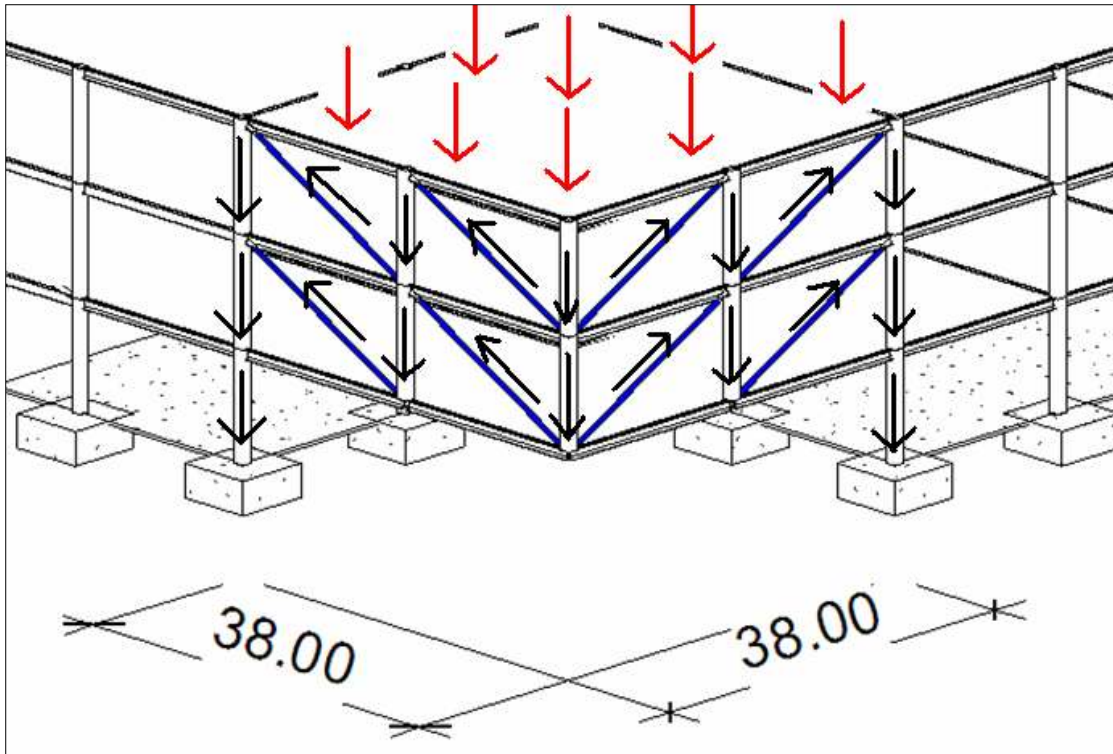
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2nd concept:

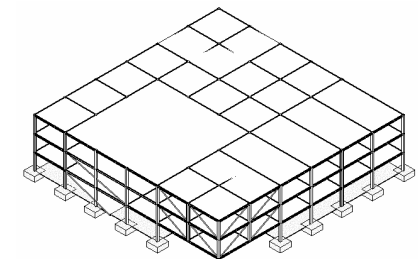
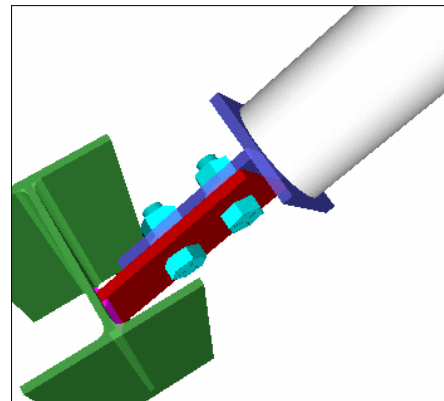
- **ALTERNATIVE**, if costs for excavation are too high
- > **STEEL** – overhang truss system
- Diagonal members:
HSS round structural tubing 11"1/4×0.625
- Needs more detailed analysis!

Detail:

Connection, created with tee plate

Challenge:

investigate different diagonal members + connections => choose the most efficient one



2nd concept: alternative– 3D view

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Building Technology

Concept II: *Stack*

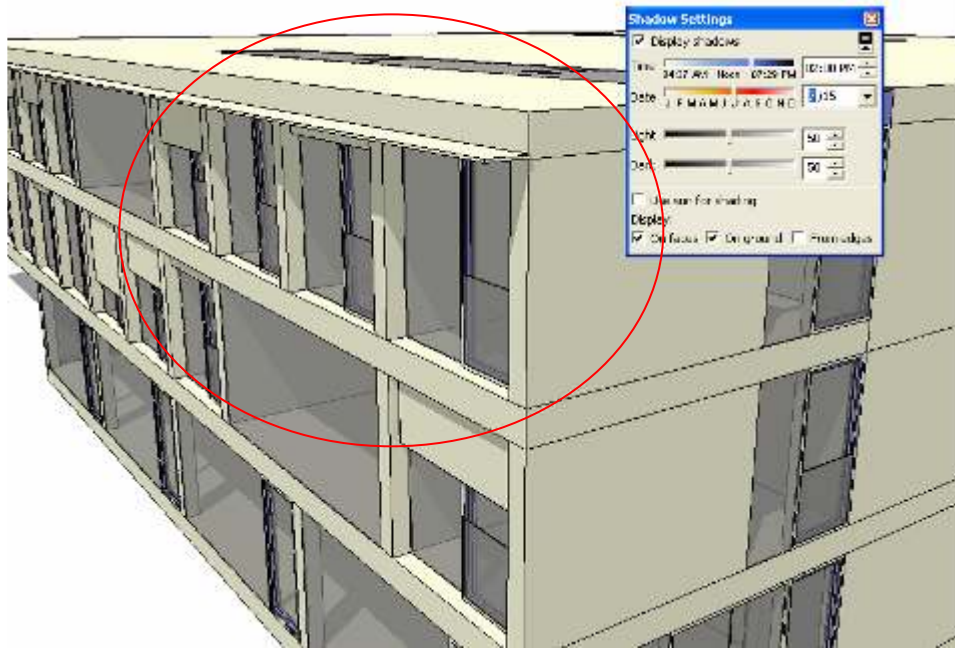
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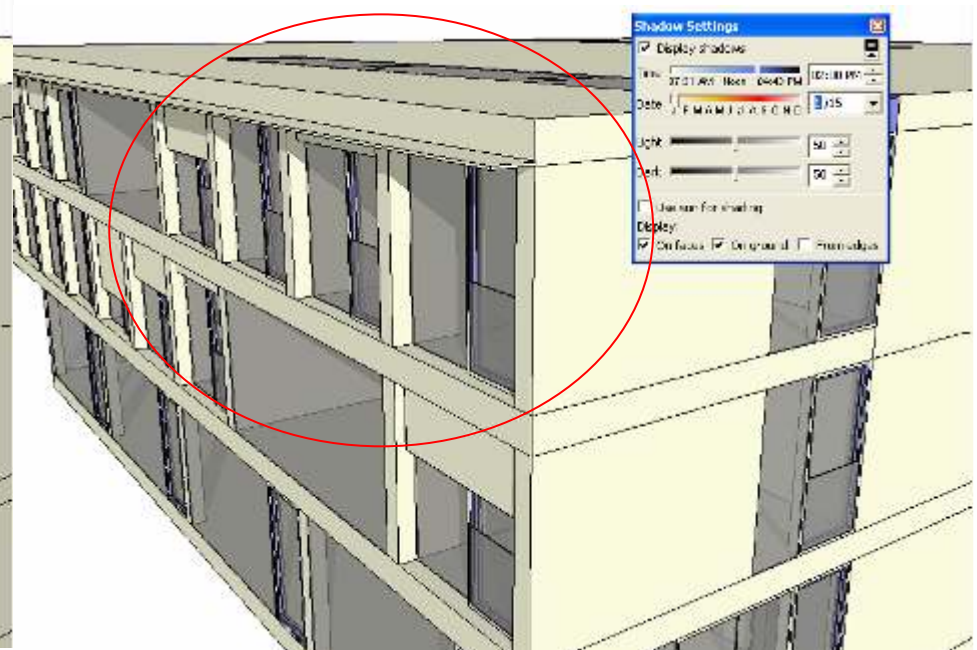
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2pm, July 15th

Width: 1 foot

*Overhead
extended*



2pm, Jan 15th

Width: 1 foot



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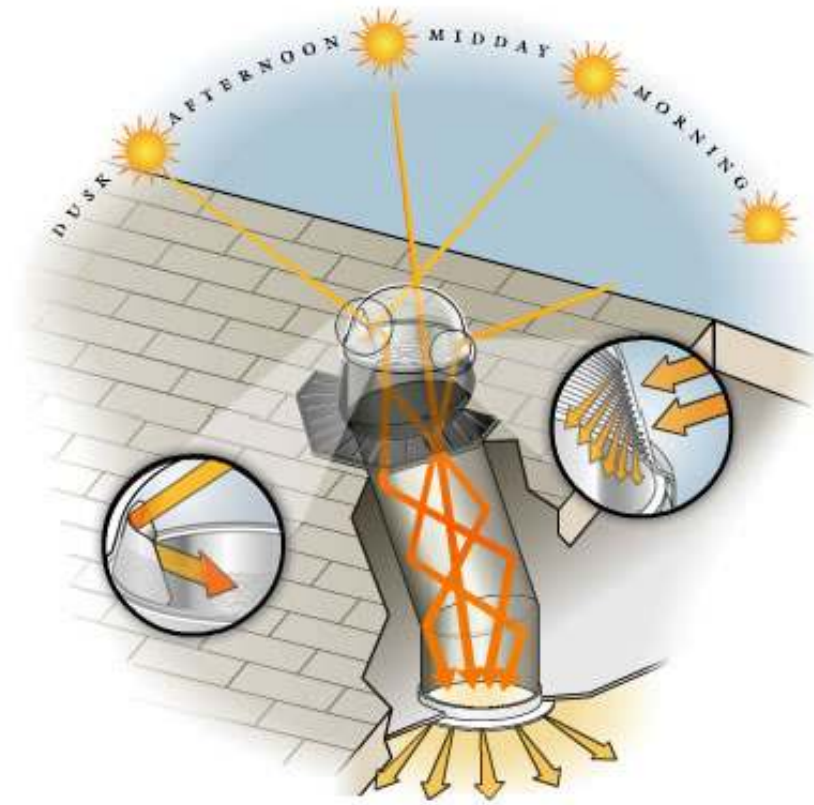
team

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owner

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Natural Lighting – Solar Tube

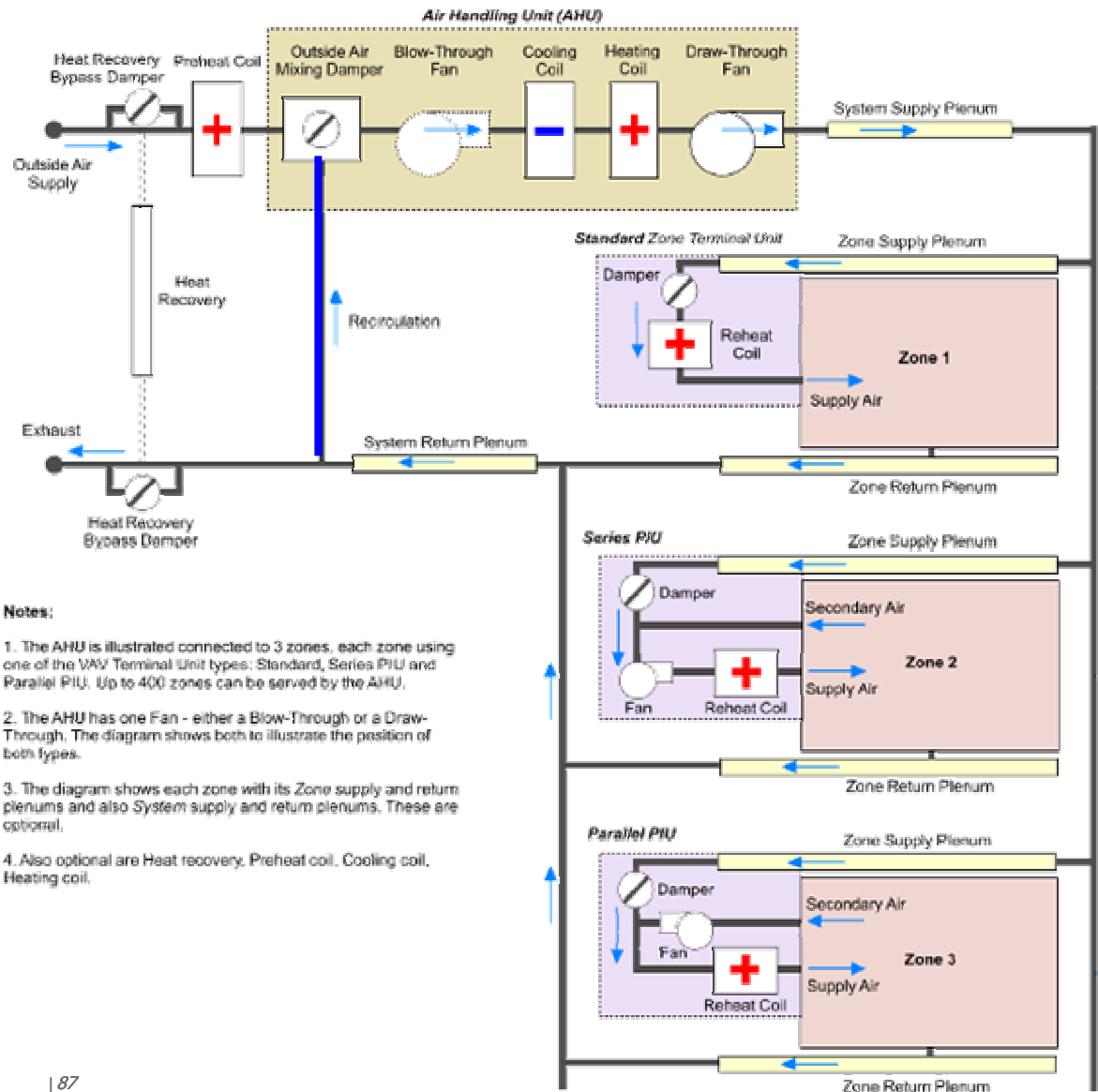


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Air-distribution Option 1

Variable air volume (VAV) system schematic



Notes:

1. The AHU is illustrated connected to 3 zones, each zone using one of the VAV Terminal Unit types: Standard, Series PIU and Parallel PIU. Up to 400 zones can be served by the AHU.
2. The AHU has one Fan - either a Blow-Through or a Draw-Through. The diagram shows both to illustrate the position of both types.
3. The diagram shows each zone with its Zone supply and return plenums, and also System supply and return plenums. These are optional.
4. Also optional are Heat recovery, Preheat coil, Cooling coil, Heating coil.

Notes:

1. Applicable for **variable energy load** building, e.g. conference room, class room, computer lab, etc.
2. Air volume rate changes according to **CO₂ & T sensors**
3. **Air recirculation** reduces primary air heating load in winter

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Ground floor: Underfloor Air Deliver (UFAD)



Notes:

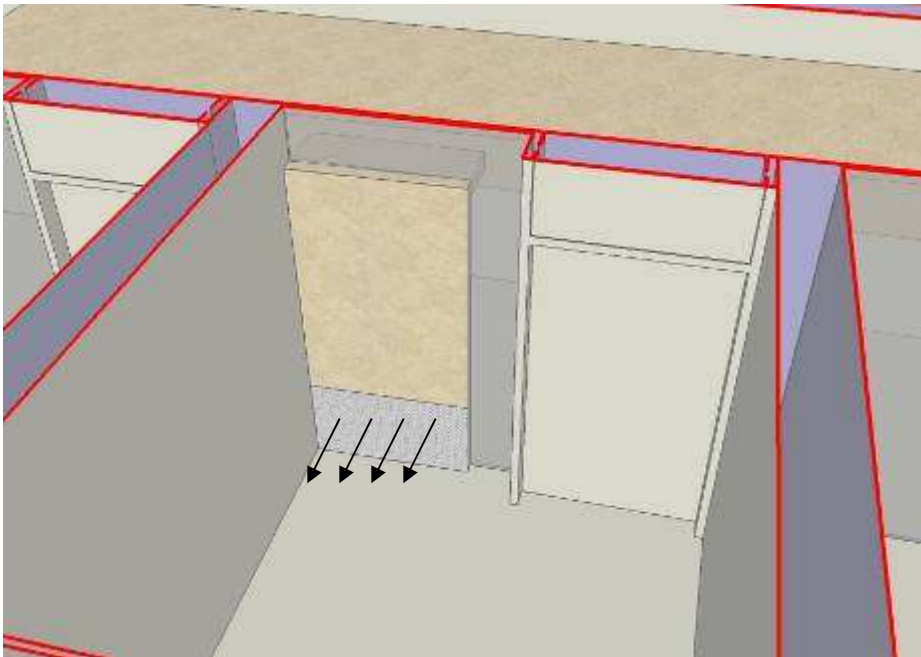
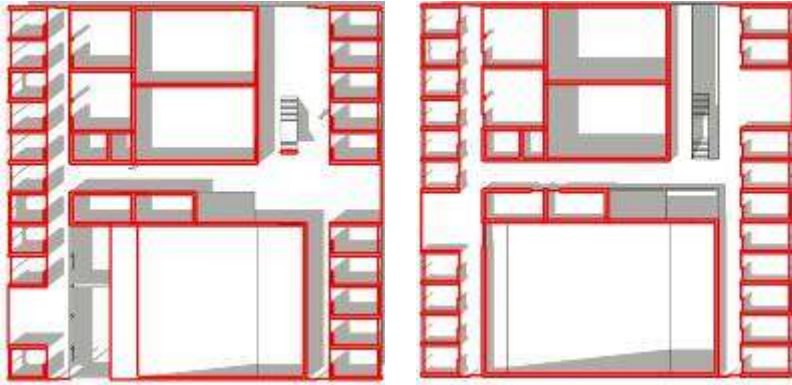
1. 18in clear space above floor slab, suitable for computer lab, classroom.
2. Sealed for <5% air leakage
3. Provides best IAQ and requires warmer air supply in summer
4. Personalized control by occupants

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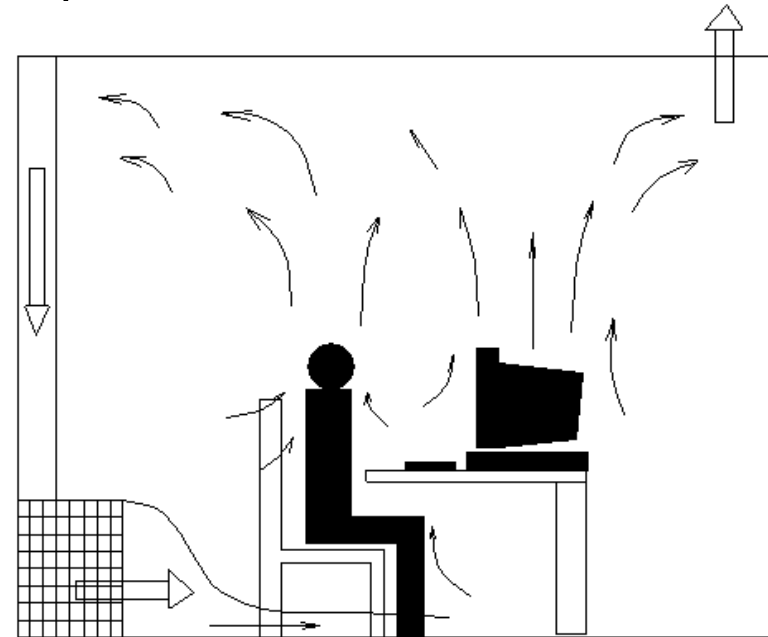
Air-distribution Option 1

1st & 2nd floor: Overhead distribution



Notes:

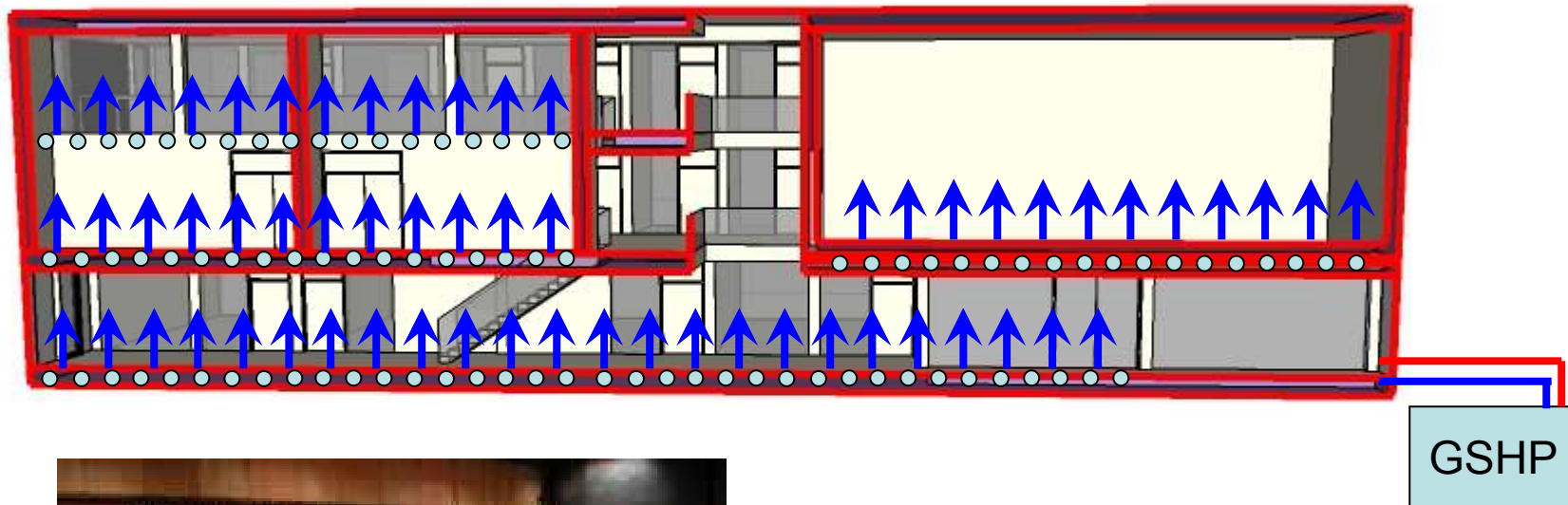
1. Suspended ducts in corridor
2. Displaced ventilation for offices: bottom providing + top return



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Air-distribution Option 2

All: Radiant slabs help heat and cool the building



Project
AEC – Concept II Stack



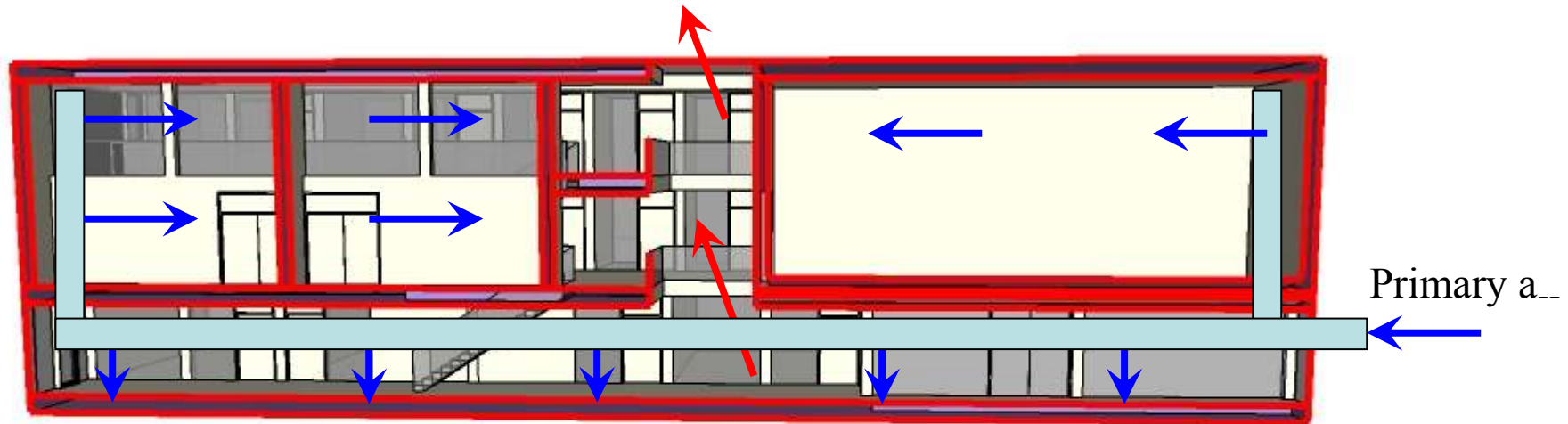
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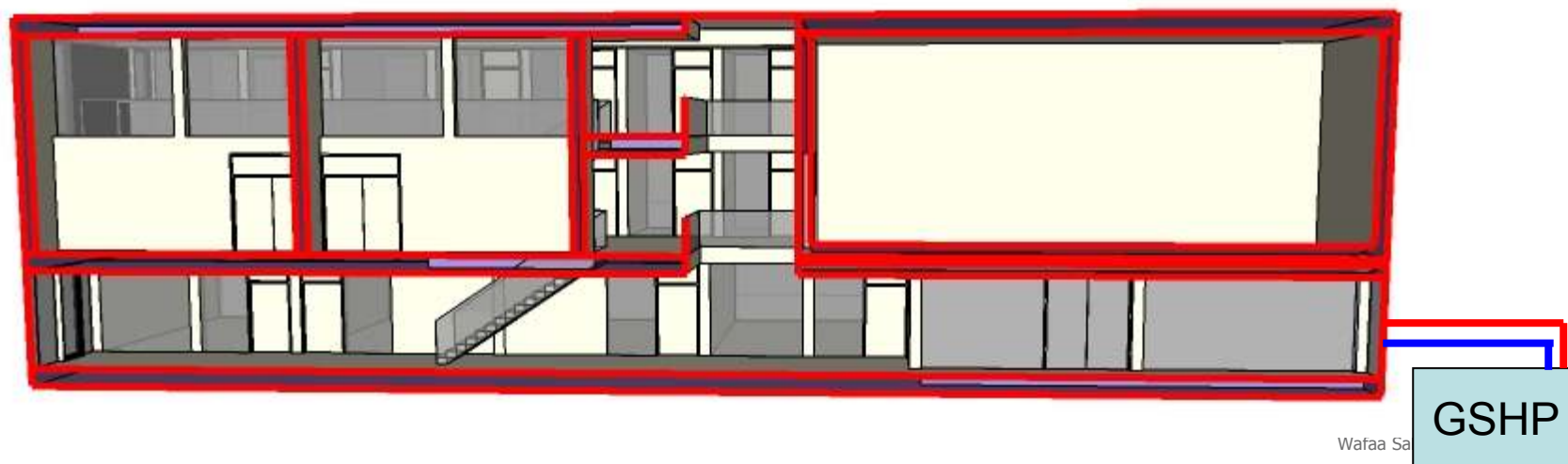
Atlantic-Spring-BT-031308.ppt

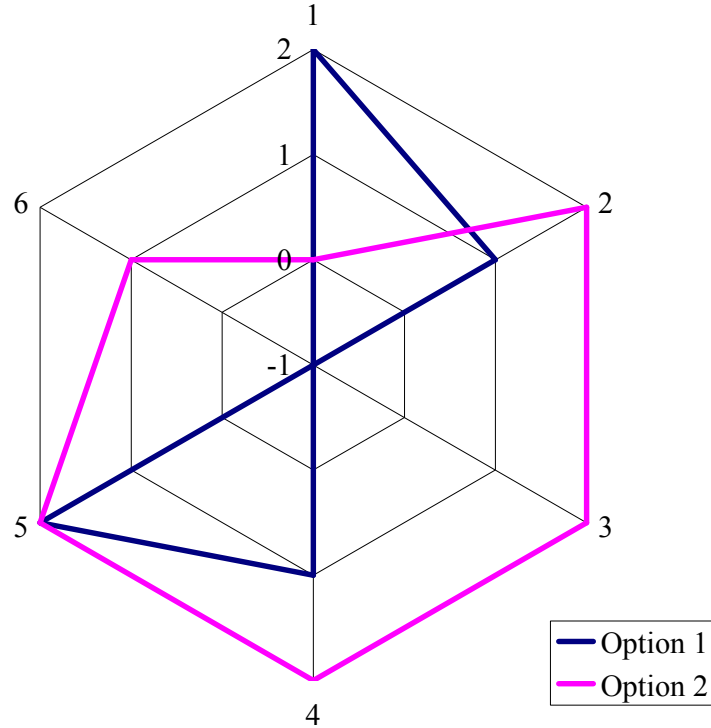
Air-distribution Option 2

Spring/Fall: Natural Ventilation & Free Cooling



Summer/Winter: Dedicated outside air system (DOAS) for fresh air





Air-distribution Option 2

Final decision:
Radiant Slab
Fresh air

		Option 1	Option 2
No.		Ground: VAV+UFAD(Clear) Base,1&2: Displacement	Radiant Slab Fresh air
1	Indoor Air Quality	2	0
2	High Thermal Comfort	1	2
3	Energy Saving	-1	2
4	Sustainability	1	2
5	Initial Cost	2	2
6	M&O Cost	-1	1
	Total score	4	9

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Construction Management

Concept II: *Stack*

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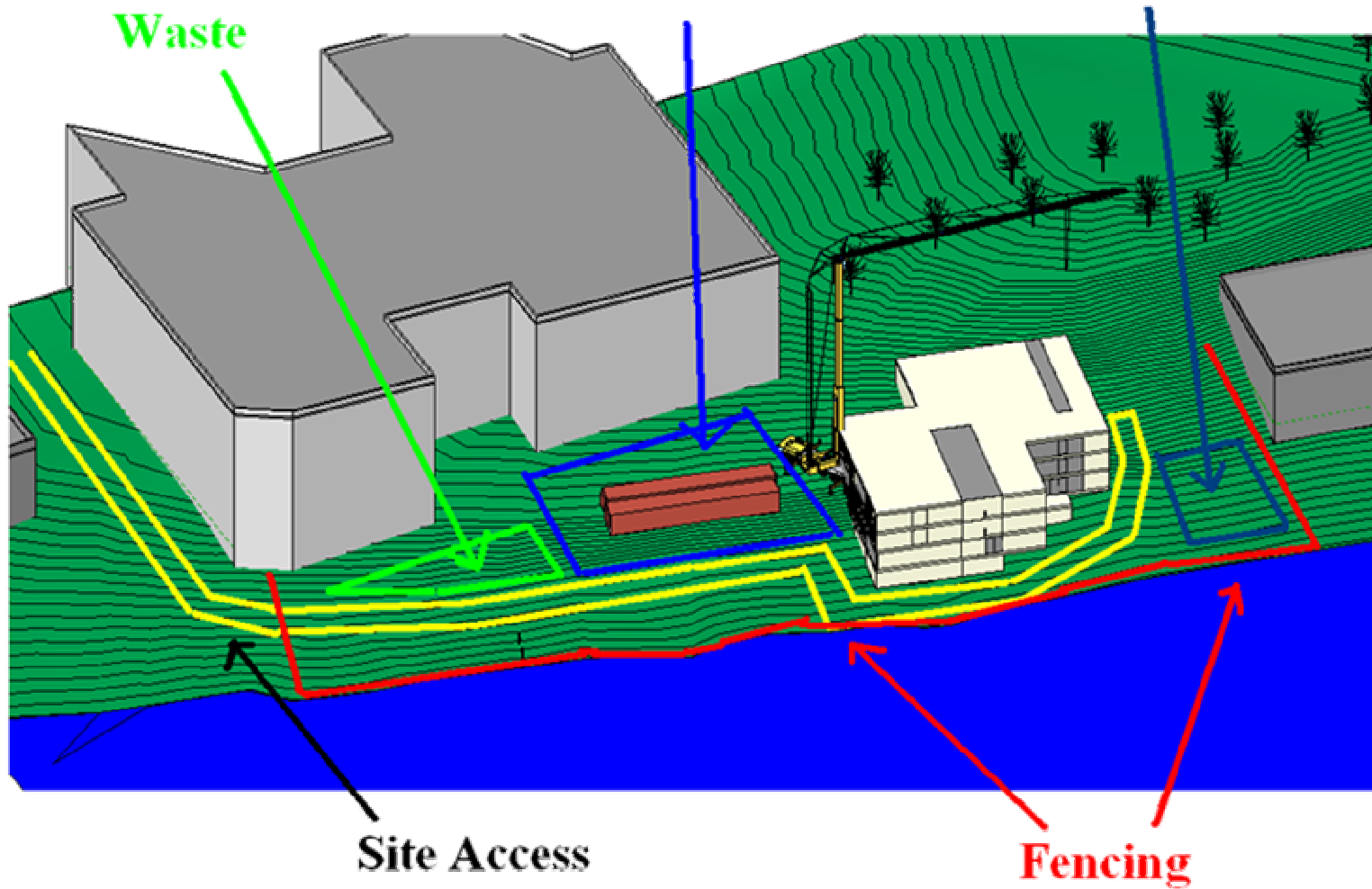
team

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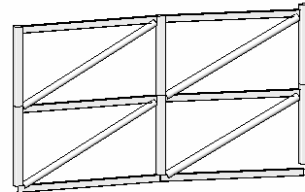
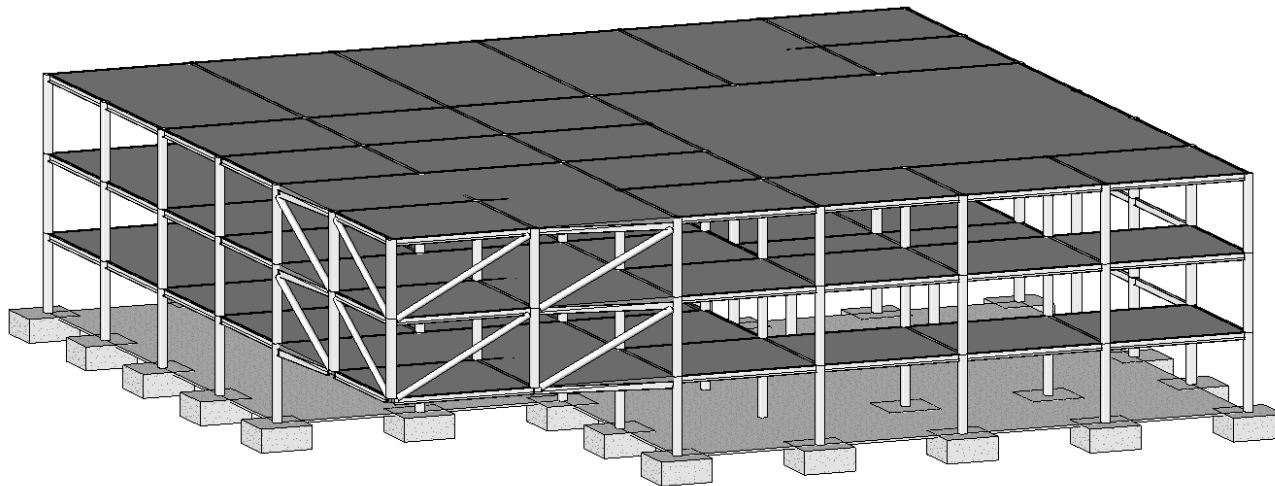
Trailers and Laydown Pre-Fabrication



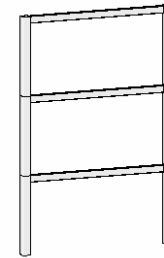
Site Layout

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Braced Frames



Rigid Frames

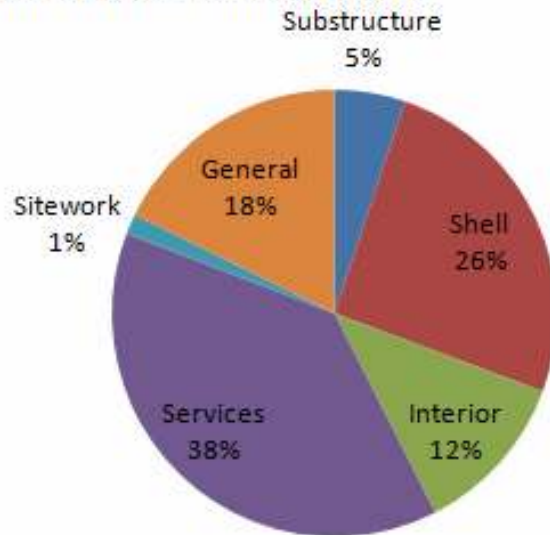
Pre-Fabrication

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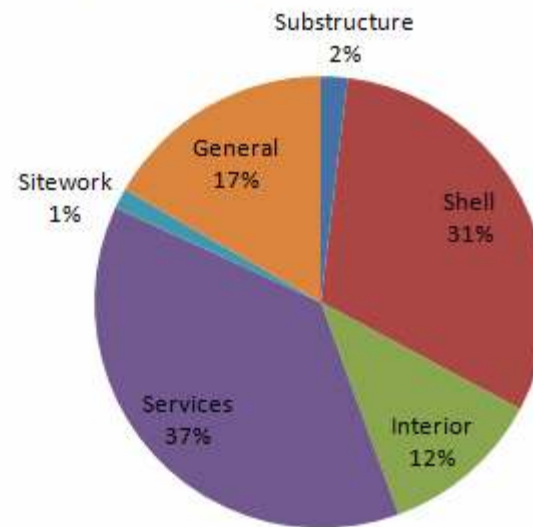
team
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owner
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	Concrete-Basement	Concrete-Overhang	Steel-Basement	Steel-Overhang
Substructure	\$296,239	\$112,062	\$296,239	\$112,062
Shell	\$1,475,547	\$1,613,225	\$1,743,848	\$1,825,468
Interior	\$682,000	\$682,000	\$682,000	\$682,000
Services	\$2,210,391	\$2,210,391	\$2,210,391	\$2,210,391
Sitework	\$85,390	\$50,230	\$85,390	\$85,390
General	\$1,020,000	\$1,020,000	\$983,100	\$983,100
Bare Cost Total	\$5,769,567	\$5,687,908	\$6,000,968	\$5,898,412
15% Contingency Total	\$6,635,002	\$6,541,095	\$6,901,113	\$6,783,173
Budget After Inflation	\$6,010,000			

Concrete- Basement



Steel-Overhang



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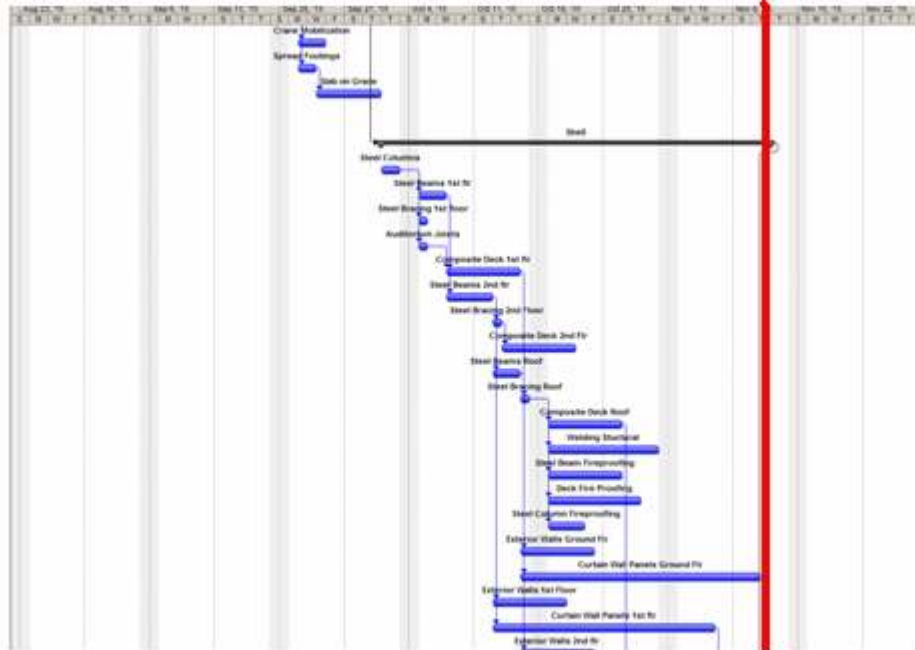


Project

Enclosed Shell



→ 77 Days



→ 43 Days



Enclosed Shell

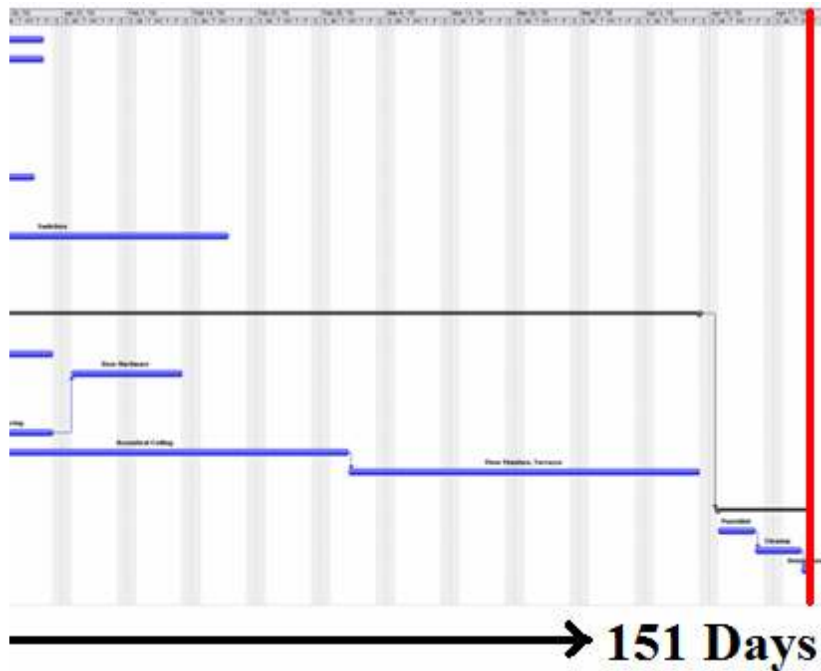
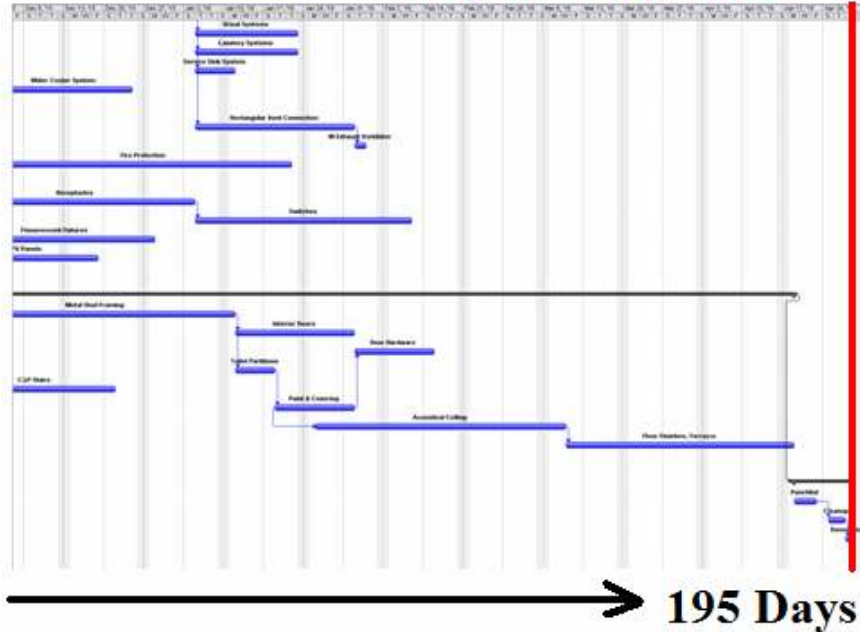
*Concrete-Basement:
Nov 15, 2015*

*Steel-Overhang:
Nov 15, 2015*

Atlantic Team

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Project Completion



Project Completion

Concrete-Basement: April 28, 2016

Steel-Overhang: April 20, 2016

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Wafaa Sabil

Second Concept Options

Precast

- +Lower Cost
- +Offsite Fabrication
- Longer Schedule

Steel

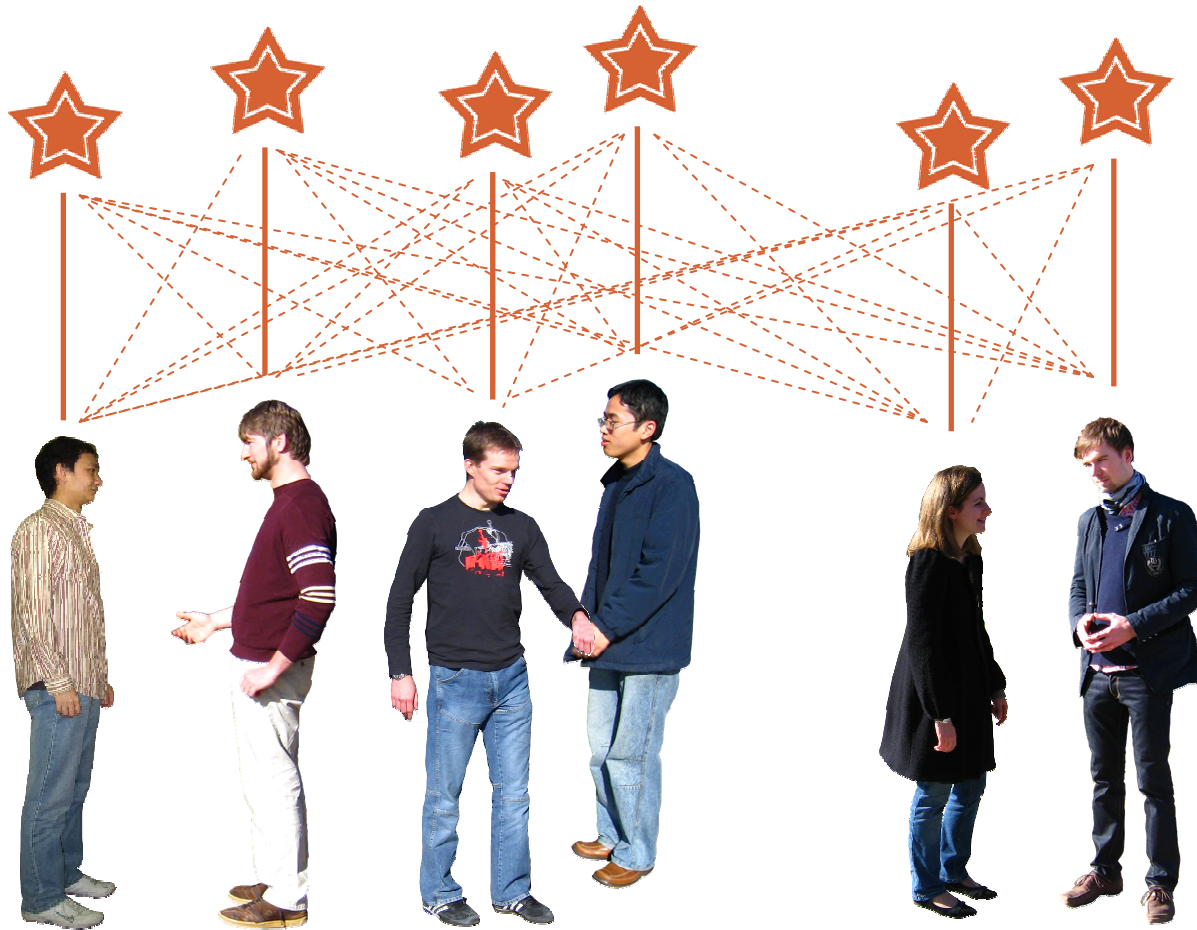
- +Short Schedule
- + On/Off-site Prefabriacation
- Expensive

Overhang

- +Less Expensive
- +Shorter Schedule
- +No Flooding Concerns
- Structural Challenge

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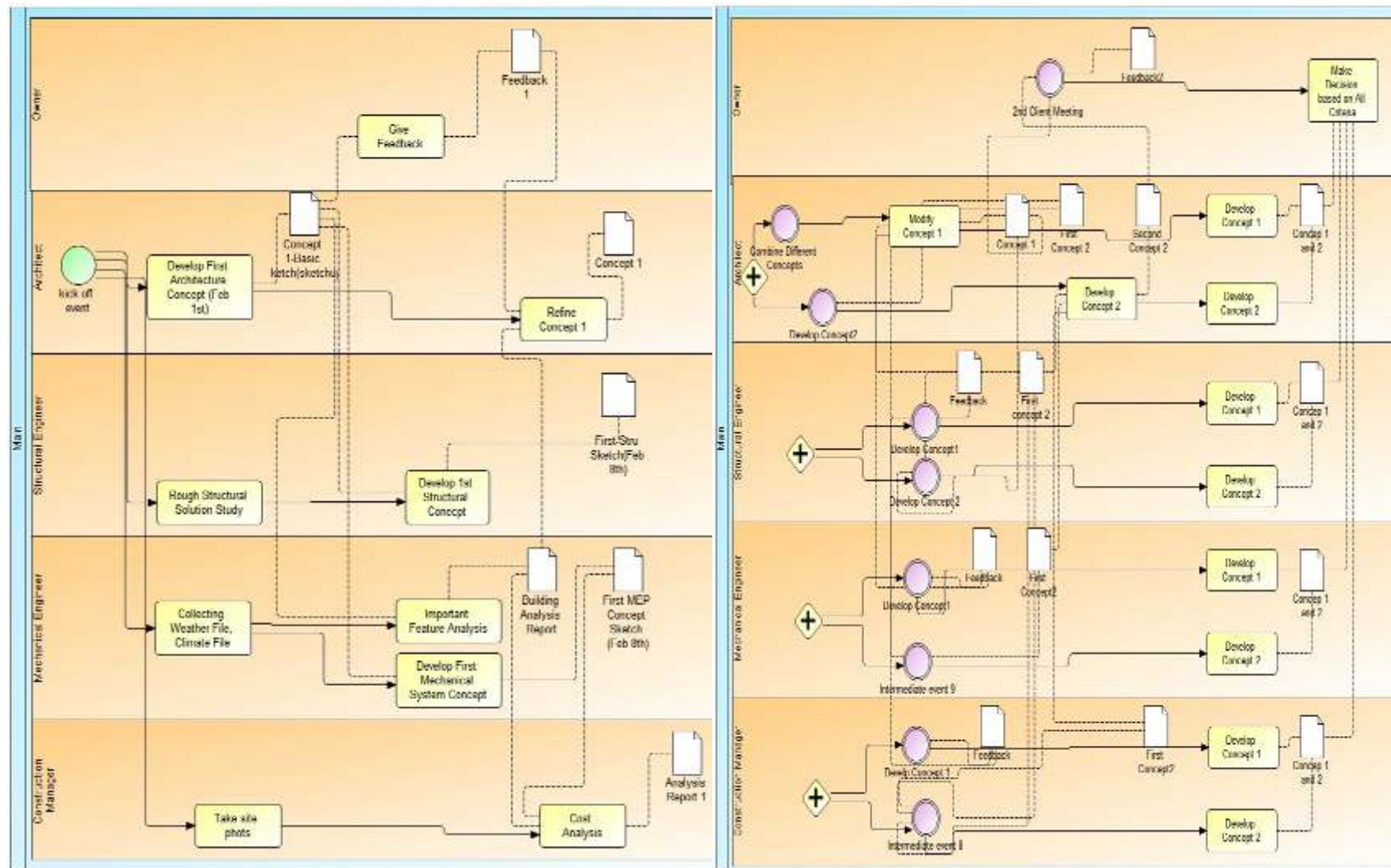


Team Process & Decision Making

Atlantic Team

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Li Zhengwei
Fei Zhao
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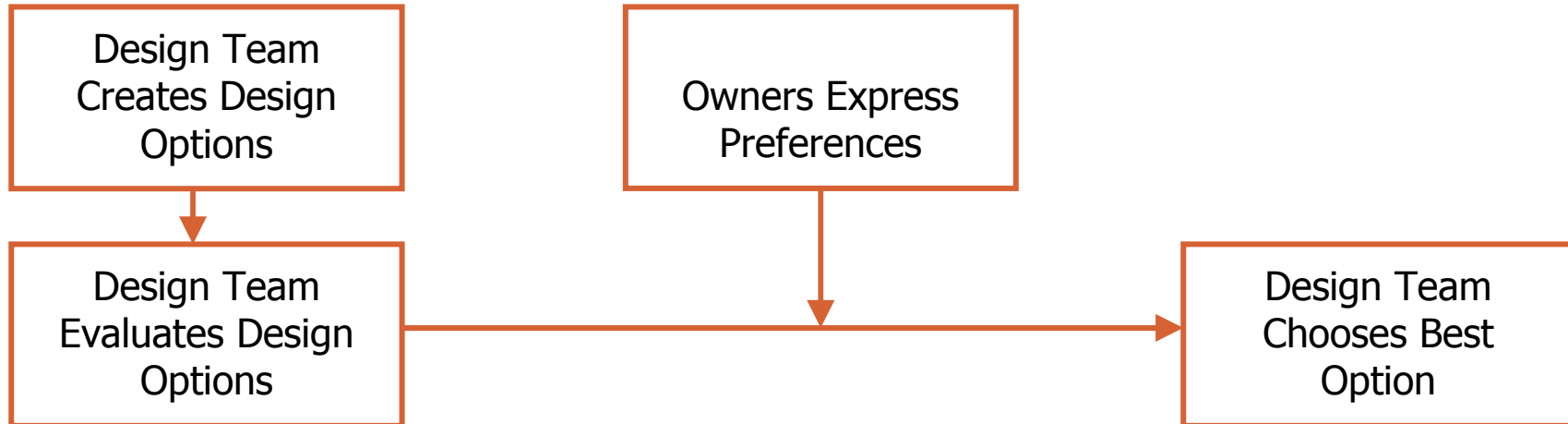
Team Workflow Model



Phase 1 Kick-Off – 1st Team Concept

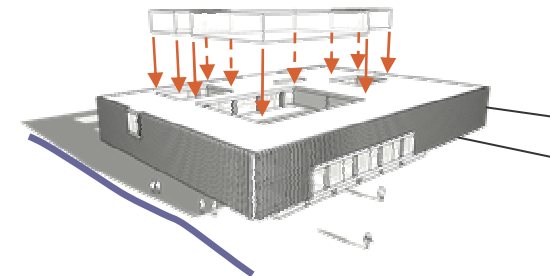
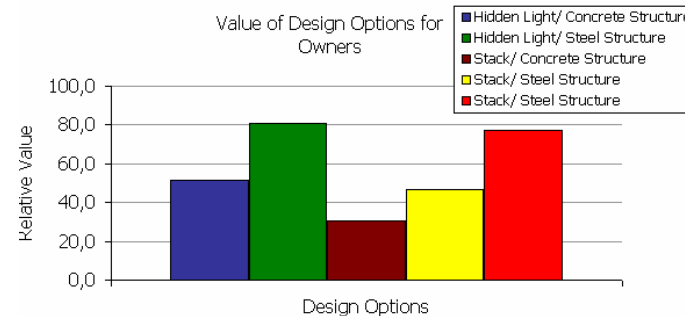
Phase 2 – 1st and 2nd Team Concept

Decision Analysis



Project
AEC – Atlantic Team

	A
1	Multi Attribute Collaborative Decision A
2	MACDADI GOALS
3	
4	Please enter the main goals of the project.
5	
6	Goals
7	Strength of Concept
8	Simplicity of Design
9	Creativity of Design
10	Challenging Solution
11	Connection of Interior and Exterior
12	Material Use
13	Quality of Indoor Space
14	Natural Lighting
15	Energy Saving
16	Sustainability
17	Initial Cost
18	M & O Cost
19	Short Schedule
20	Efficient Use of Space on Site
21	Prefabrication
22	Reusable Components
23	Owner's Preference



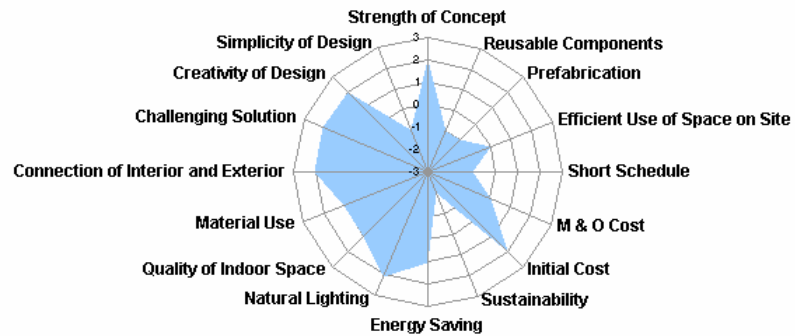
Atlantic Team

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 Dimitra Ioannidou
 Matic Ozbolt
 Noah Bachmann
 Li Zhengwei
 Fei Zhao
owner
 Claudio Mourgues
 Wafaa Sabil

DL_final1st_concept_structure_03132008.ppt

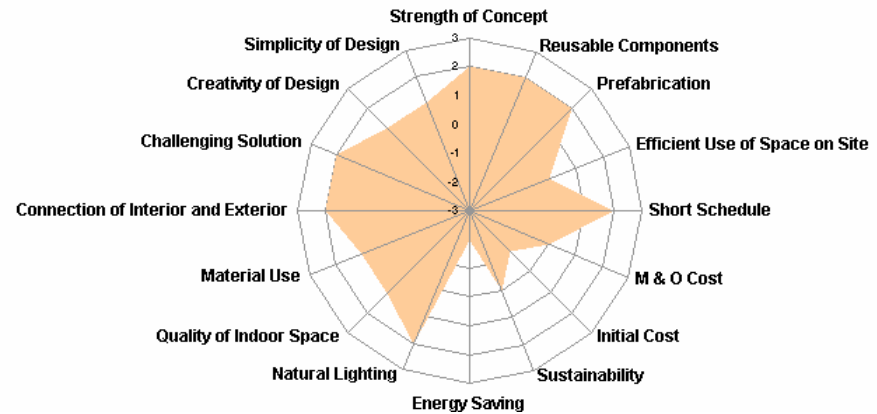
Decision Analysis

Design #1 Analysis



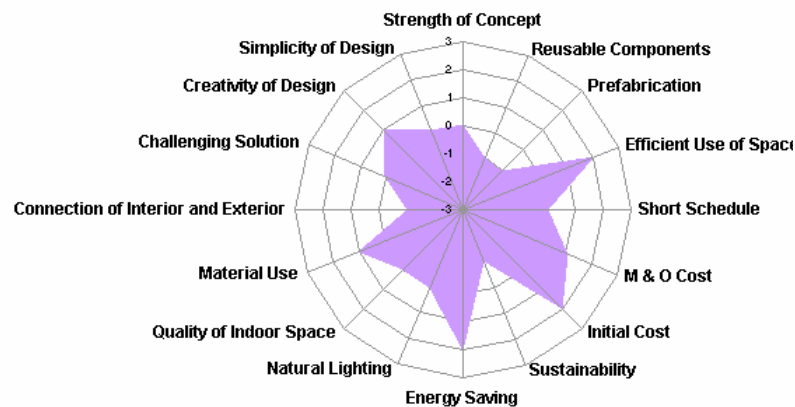
Analysis: Hidden Light Concrete

Design #2 Analysis



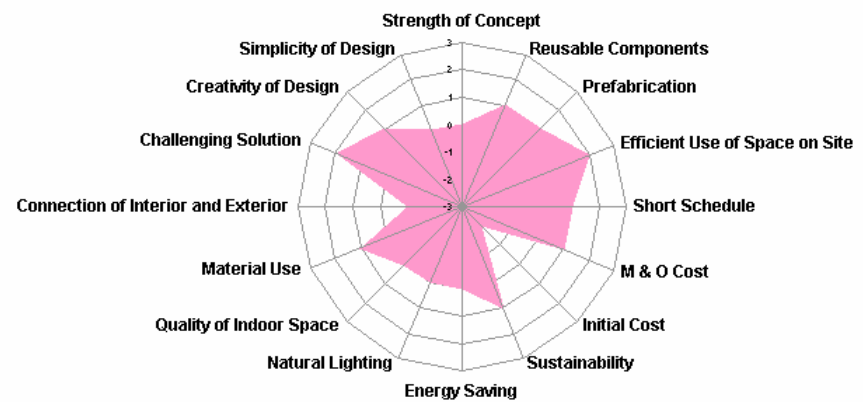
Analysis: Hidden Light Steel

Design #3 Analysis



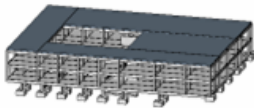
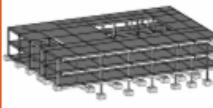
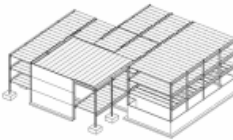
Analysis: Stack Concrete

Design #4 Analysis



Analysis: Stack Steel

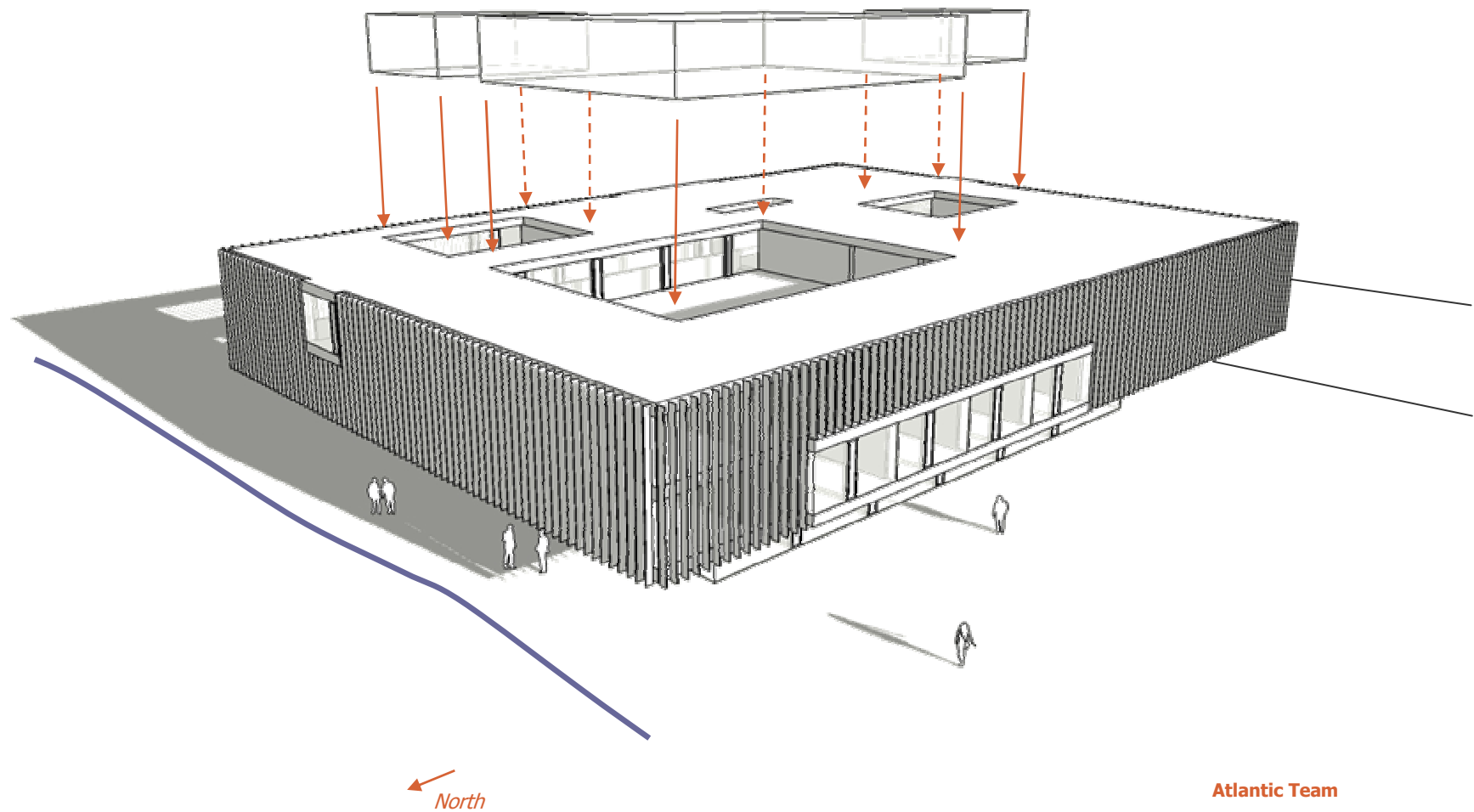
Decision Analysis

	A	B	C	D	E	F	G
1					Evaluation Options		
2			Hidden Light		Stack		
3							
4	No.		Concrete Structure (1-C)	Steel Structure (1-S)	Concrete Structure (2-C)	Steel Structure (2-S1)	Steel Structure (2-S2)
5	1	Strength of Concept	2	2	0	0	1
6	2	Simplicity of Design	-1	1	0	0	2
7	3	Creativity of Design	2	1	1	1	-1
8	4	Challenging Solution	2	2	0	2	-1
9	5	Connection of Interior&Exterior	2	2	-1	-1	-1
10	6	Material Use	1	1	1	1	1
11	7	Quality of Indoor Space	1	1	0	0	1
12	8	Natural Lighting	2	2	0	0	1
13	9	Energy Saving	1	-2	2	0	-1
14	10	Sustainability	-2	0	-1	1	2
15	11	M&O Cost	0	0	1	1	1
16	12	Initial Cost	2	-1	2	-2	1
17	13	Short Schedule	-1	2	0	1	2
18	14	Efficient Use of Space on Site	0	0	2	2	1
19	15	Prefabrication	-1	2	-1	1	2
20	16	Reusable Components	-1	2	-1	1	2
21	17	Owner's Preference	1	2	0	0	1
22							
23		Total score	10	17	5	8	14

Chosen Option

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