





# Express 2012



# MEET THE TEAM



**COURTNEY WONG**  
Stanford  
*Structural Engineer*



**CURTIS WONG**  
Stanford  
*Structural Engineer*



**DIANA LOUIE**  
Stanford  
*Construction Manager*



**SARA SUNDELIN**  
Stanford  
*Construction Manager*



**JOHN DODINI**  
Stanford  
*Apprentice*



**KAROLINA  
OSTROWSKA**  
Warsaw Univ. of Tech  
*Architect*







# SITE LOCATION



*Albuquerque, NM, 35°06'39"N 106°36'36"W*



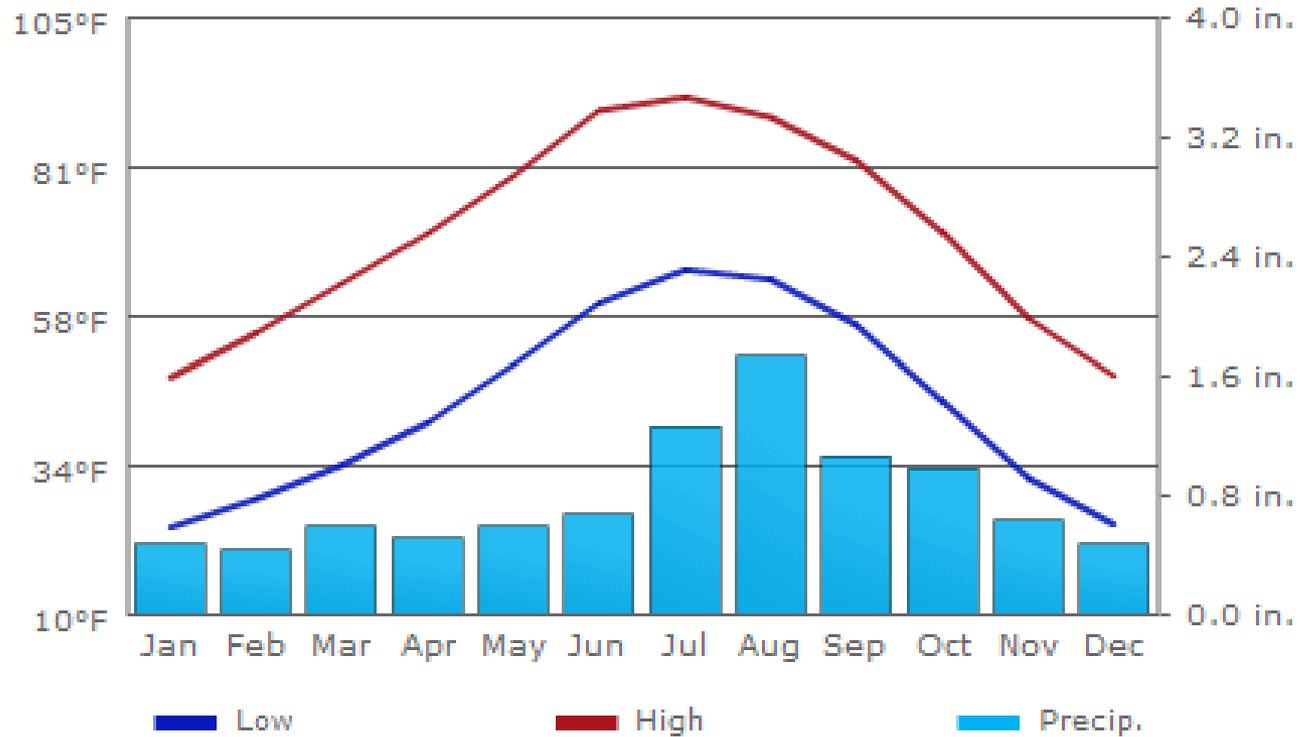
# SITE LOCATION



**Albuquerque, NM, 35°06'39"N 106°36'36"W**



# SITE CLIMATE CONDITIONS



***Temperature & Precipitation***



# ***SITE CLIMATE CONDITIONS***

- ❑ Annual average high temperature: **70.4 °F**
- ❑ Annual average low temperature: **43.2 °F**
- ❑ Annual average precipitation: **9.4 inches**
- ❑ Annual average sunshine: **3418 hours**

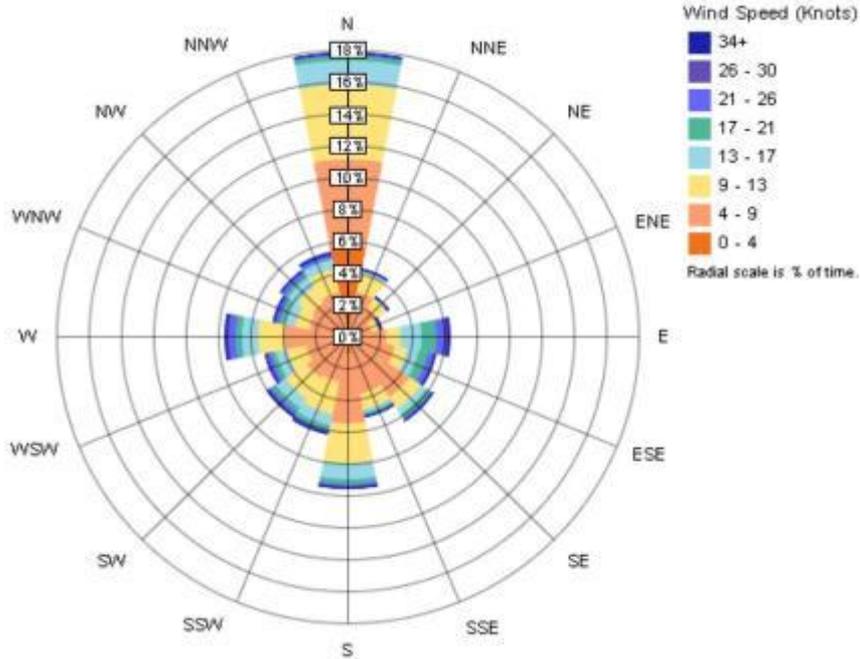
***Temperature & Precipitation***



# SITE CLIMATE CONDITIONS

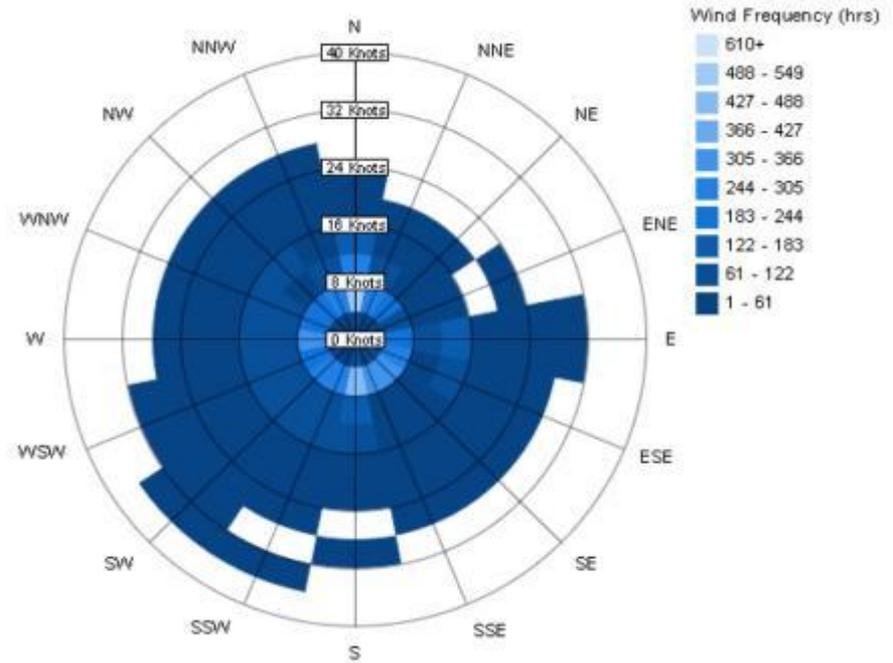
## Annual Wind Rose (Speed)

Annual Wind Rose (Speed Distribution)



## Annual Wind Rose (Frequency)

Annual Wind Rose (Frequency Distribution)

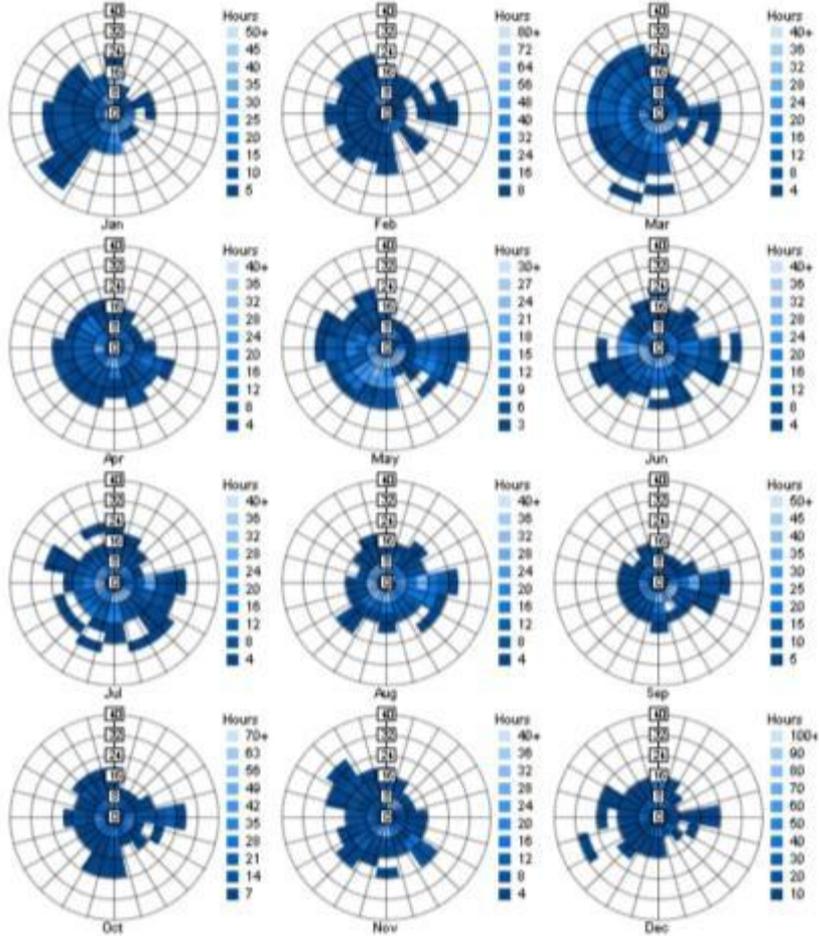


**Wind**

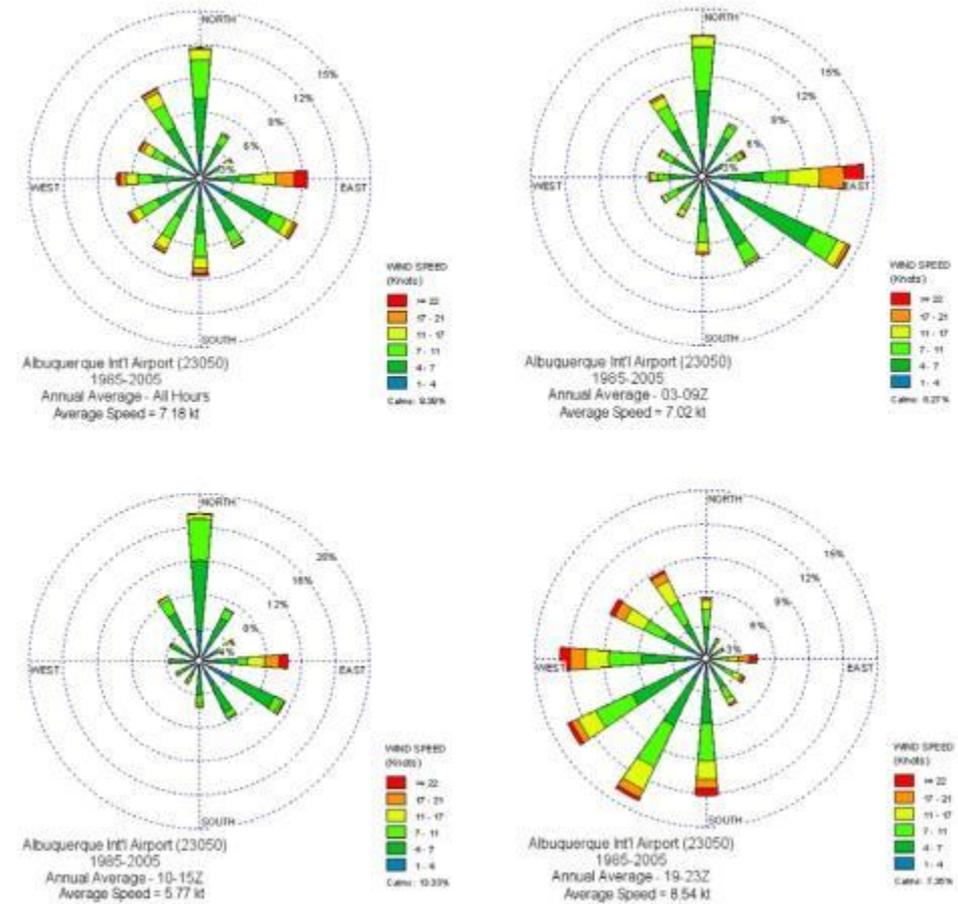


# SITE CLIMATE CONDITIONS

## Monthly Wind Roses (Frequency Distribution)



## Frequency distribution throughout day



**Wind**







# BIOMIMICRY TEAM INSPIRATIONS

## BIOMIMICRY WALL

### MAIN GOAL:

IMPLEMENTING NATURAL VENTILATION

"RIDDLE FACADE" - perforated wall



### FACADE CONSIDERATIONS

### SOLUTIONS:

"LAYERED FACADE" - double skin facade with mobile shadings or louvers



### MAIN ASSUMPTION:

WORKS BEST WITH A LOT OF SMALL VENTS THAN A FEW BIGGER ONES

"HIDDEN FACADE" - "single skin" facade obscured by mobile shadings



### FACADE MATERIALS

#### MUDBRICKS



#### STONE VENEER

LIMESTONE  
SANDSTONE  
TRAVERTINE



#### WOOD



### MATERIALS

### INSULATION & GLAZING



# ***TERMITE MOUND FEATURES***

Natural  
Ventilation

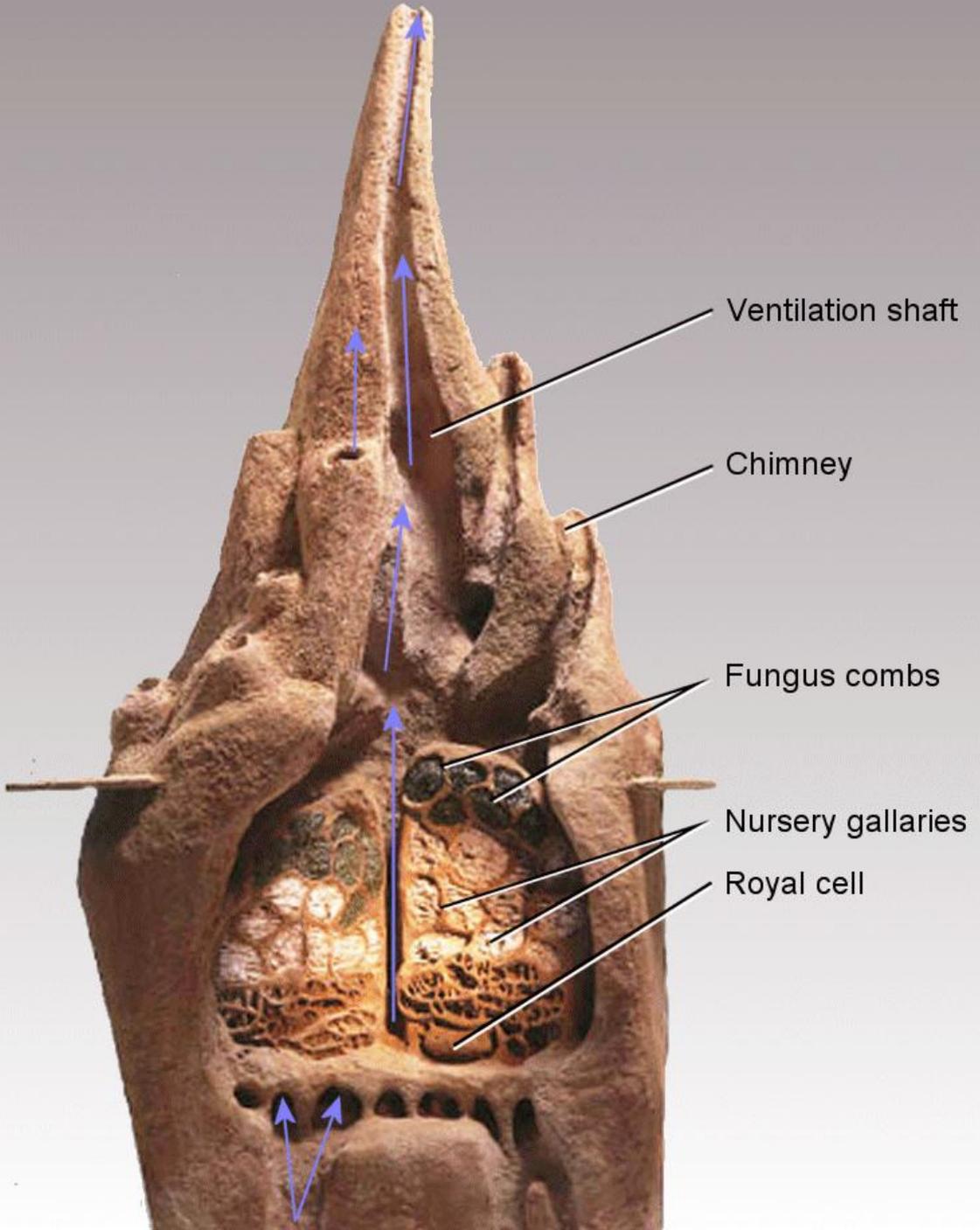
Communal &  
Flexible Colony  
Home

Termites  
Regulate  
Temperature

Energy  
Efficient  
Buildings

Foster Social &  
Collaborative  
Space

Operable Vents  
& Fenestration





# SITE LOCATION



Albuquerque, NM, 35°06'39"N 106°36'36"W



# SURROUNDINGS



# NEARBY BUILDINGS



# SURROUNDINGS



# NEARBY BUILDINGS



# SURROUNDINGS



**GREENERY**



# SURROUNDINGS



# COMMUNICATION



# DECISION MATRIX – WINTER QUARTER



	Parameters	TERMITE ENTERPRISE		INVERTED MOUND	
		Cellular beams	Post-tensioned	Regular steel	Bubble deck
Arch.	Design (interior) space	3	3	3	3
	Overall Aesthetics / Impression	3	3	2	2
	Effective Organization	2	2	3	3
Construction	Relation to Site	1	1	2	2
	Prefabrication	3	1	2	3
	Achievement of Milestones	3	1	2	3
	Constructability	2	1	3	3
	Local Materials Available	1	3	2	1
	Estimate Cost Compliance	1	1	2	3
Structural	MEP Installation / Compatibility	3	2	1	2
	Structural Cost	2	1	2	3
	Structural Aesthetics	3	1	2	1
General	Natural Ventilation	3	3	2	2
	Energy Efficiency	2	2	3	3
	Sustainability	2	3	2	3
	Biomimicry	3	2	2	3
	Overall Preference	3	1	1	2
Team Score		94	75	85	102
Combined Owner Score		96	88	81	82
<b>Total Overall Score</b>		<b>95</b>	<b>84</b>	<b>82</b>	<b>89</b>



# ***DECISION MATRIX***



***TERMITE ENTERPRISE CONCEPT***





# REVISED DECISION MATRIX

## FINAL DECISION MATRIX CONCEPTS COMPARISON



TERMITE ENTERPRISE

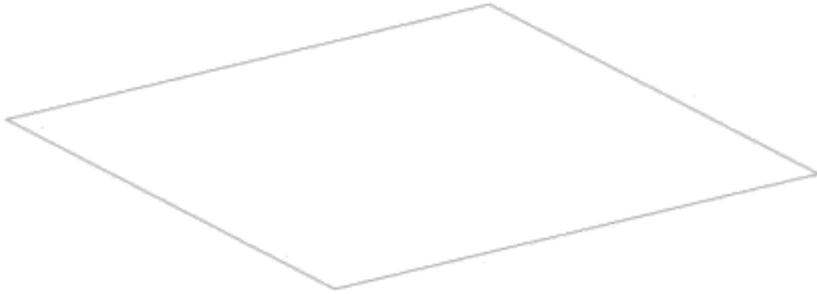
INVERTED MOUND

	TERMITE ENTERPRISE	INVERTED MOUND
Functional efficiency	<ul style="list-style-type: none"> <li>+ providing different level of privacy to different floors</li> <li>+ found space for additional functionality - small cafe</li> <li>- not all the suggested affinities are met - auditorium close to faculty offices</li> <li>- inefficient communication - about 40% of total area</li> <li>- complicated communication on the top floor - zigzagging corridors, wasted space</li> </ul>	<ul style="list-style-type: none"> <li>+ providing different level of privacy and security to different floors</li> <li>+ found space for additional functionality - small cafe</li> <li>+ about 10% savings in gross total SqFt - total building area is less than 27 000 SqFt</li> <li>+ very efficient relation between circulation and assignable square footage - communication takes less than 30% of gross total SqFt</li> <li>+ clear organization of floor plans</li> <li>+ compactness transfers into cost efficiency</li> </ul>
Egress	<ul style="list-style-type: none"> <li>- insufficient egress possibilities from auditorium - all egress paths lead to the middle of the building</li> </ul>	<ul style="list-style-type: none"> <li>+ clear and easy egress from every zone</li> <li>+ egress paths shorter than in Termite Enterprise</li> </ul>
Flexibility	<ul style="list-style-type: none"> <li>+ possibility of opening and manipulating student offices and classrooms</li> <li>- inflexible top floor</li> </ul>	<ul style="list-style-type: none"> <li>+ possibility of opening and manipulating most of the rooms: student offices, large/small classrooms, auditorium, seminar rooms</li> </ul>

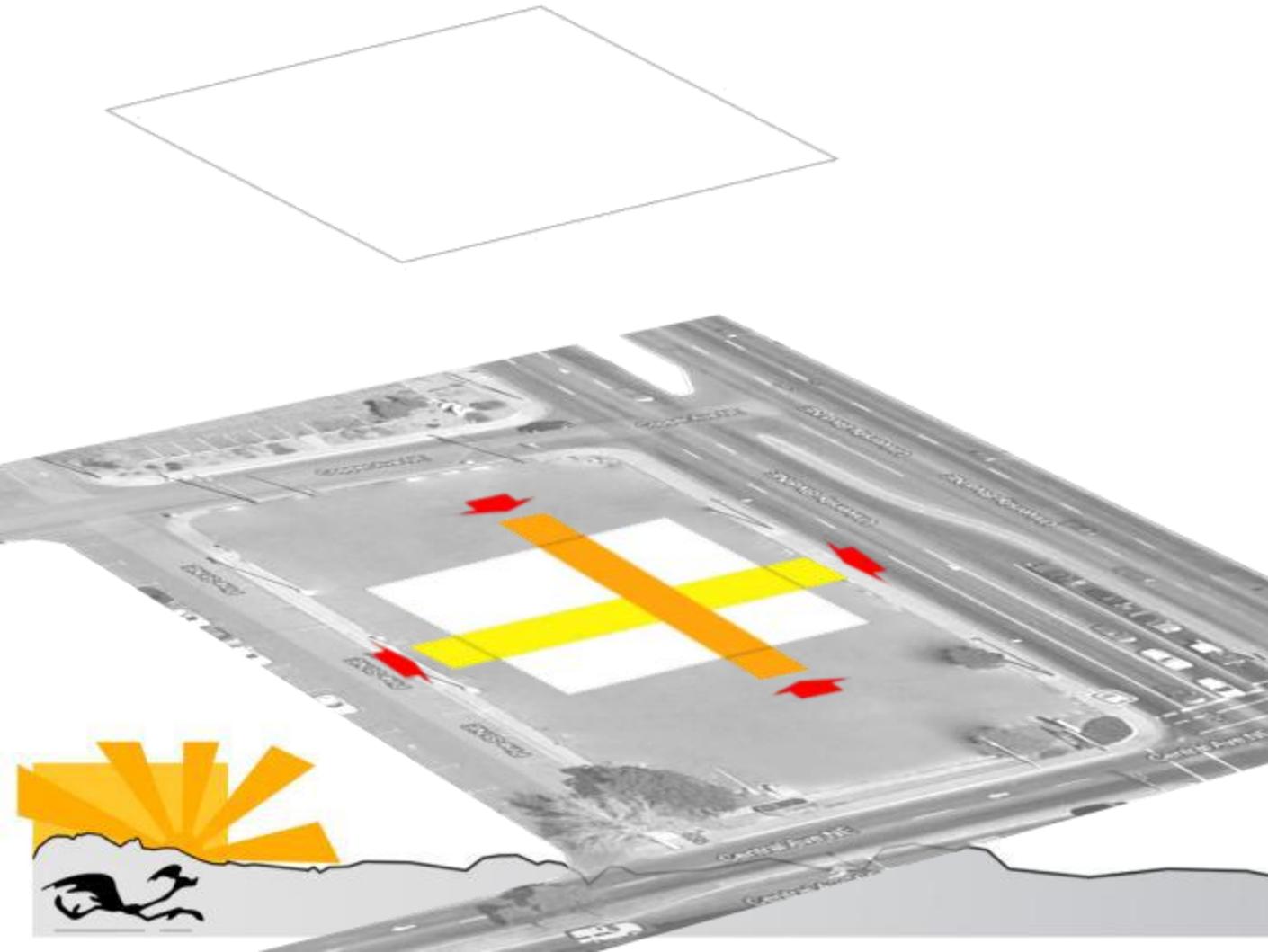
Biomimicry	<ul style="list-style-type: none"> <li>+ North-South orientation referring to termite mound</li> <li>- flat-looking form</li> <li>- extensive</li> <li>- low efficiency of natural ventilation</li> </ul>	<ul style="list-style-type: none"> <li>+ more organic shape</li> <li>+ thanks to smooth shape wind from different directions is way easier to catch</li> <li>+ self-shading form - self-protecting from sun at its peak</li> <li>+ more sustainable thanks to good functional organization</li> </ul>
Overall impression	<ul style="list-style-type: none"> <li>- chaotic, complicated design</li> <li>- engages too many ideas</li> </ul>	<ul style="list-style-type: none"> <li>+ more well balanced look</li> <li>+ simpler, more friendly design</li> </ul>
Rework needed	<ul style="list-style-type: none"> <li>- need of redesigning the entire auditorium area, which would change the whole impression of the building</li> <li>- need of decreasing communication area</li> <li>- need of redesigning the facade</li> </ul>	<ul style="list-style-type: none"> <li>- need of redesigning the facade</li> </ul>
Structural compatibility	<ul style="list-style-type: none"> <li>+ stacking of large rooms - more efficient location of large spans</li> <li>- complicated floor plans</li> <li>- complicated facade</li> </ul>	<ul style="list-style-type: none"> <li>+ simple floor plans</li> <li>+ stacking of rooms</li> <li>- complicated facade</li> </ul>
MEP compatibility	<ul style="list-style-type: none"> <li>- some parts of the building unavailable for natural ventilation</li> <li>- building shape not supporting natural ventilation</li> <li>- because of building's expanse air stack effect is impossible</li> <li>- building's expanse requires complicated MEP design</li> <li>- long distances between rooms implicate need of more wires, pipes, ducts</li> </ul>	<ul style="list-style-type: none"> <li>+ availability of stack effect</li> <li>+ building shape more supporting natural ventilation</li> <li>+ compact form allows easier and cheaper heating as well as cooling</li> <li>+ compact form impicates less complicated MEP design</li> <li>+ shorter distances between rooms that need to be connected to certain MEP services</li> </ul>



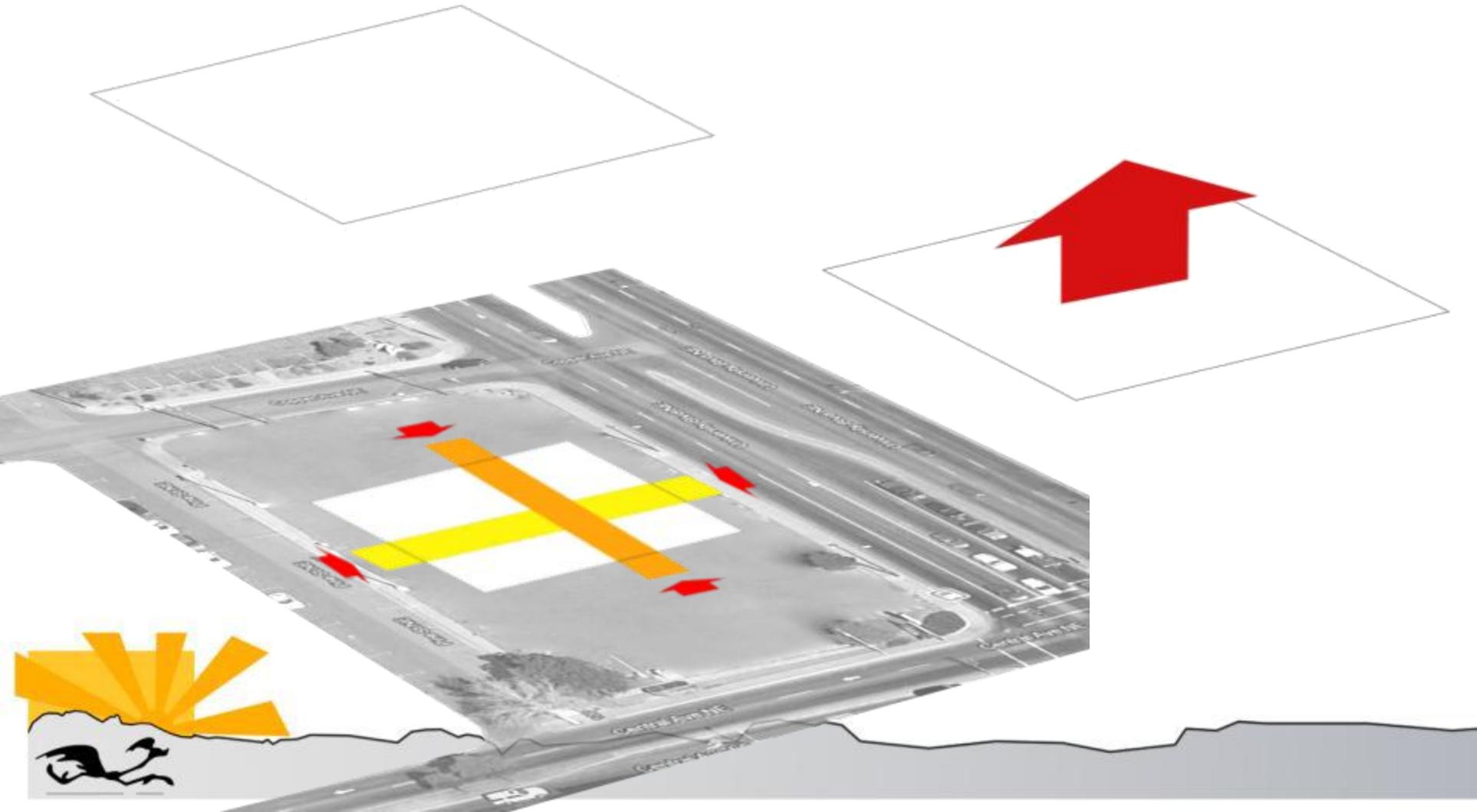
# ***PHASE I - FEBRUARY***



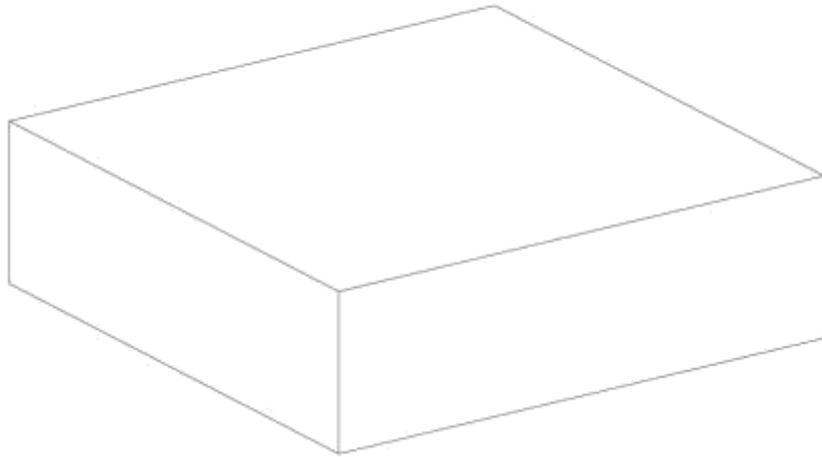
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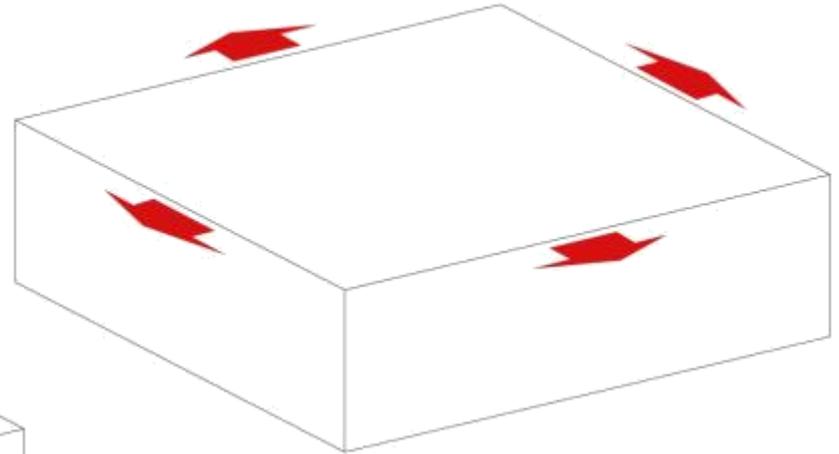
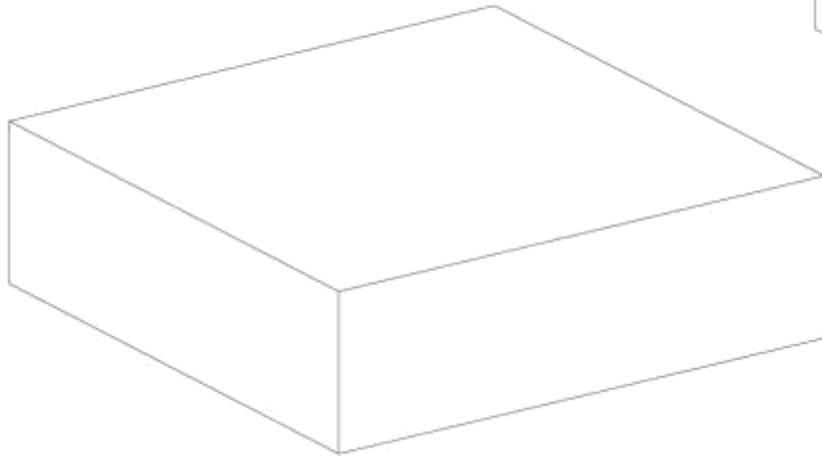
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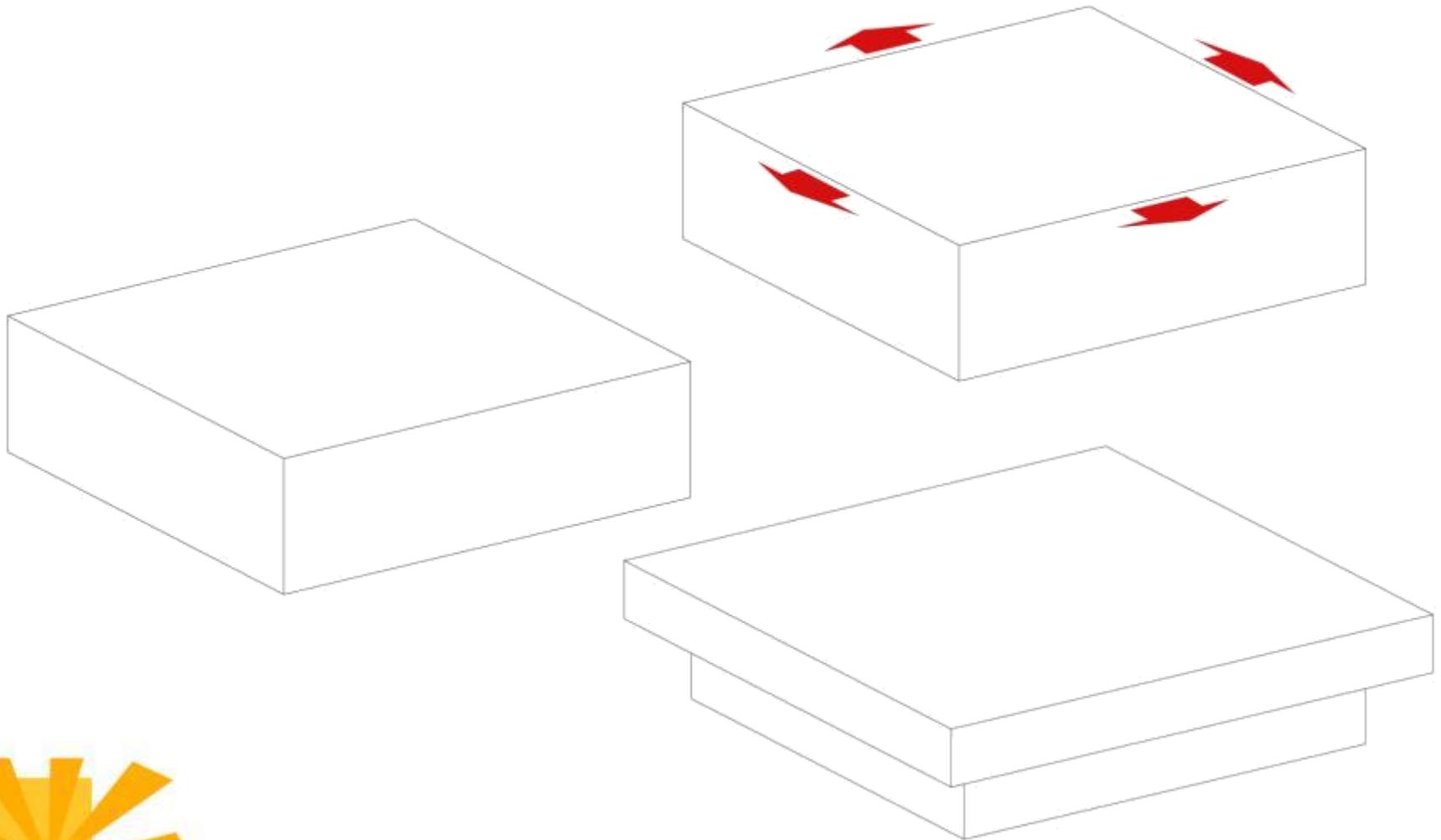
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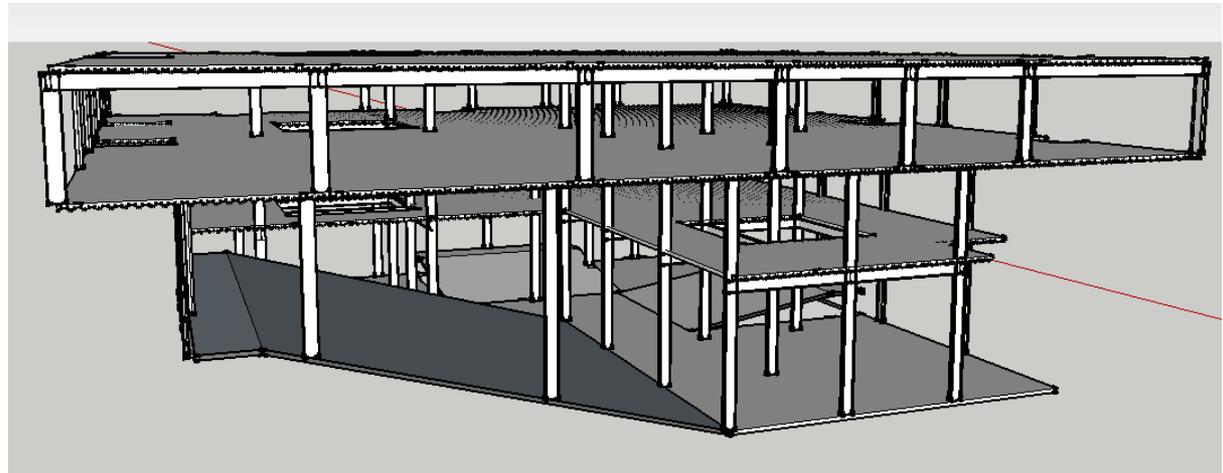
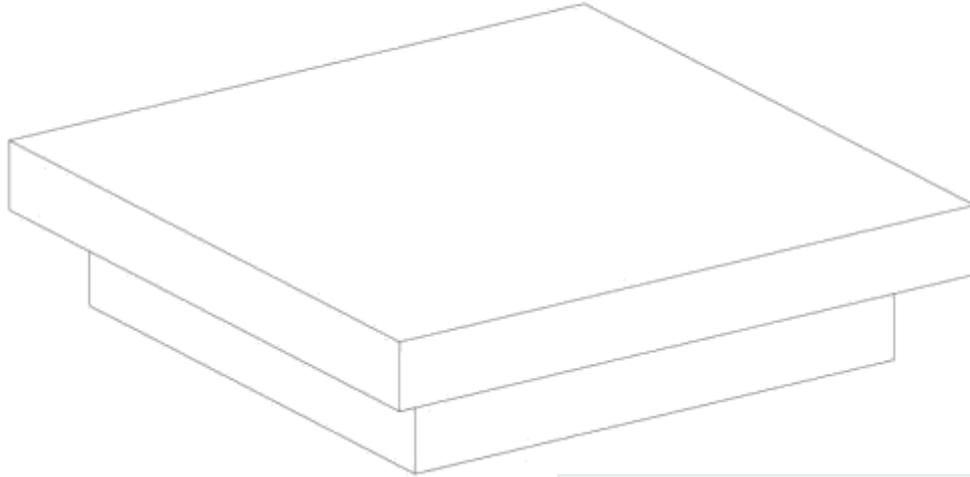
# ***PHASE I - FEBRUARY***



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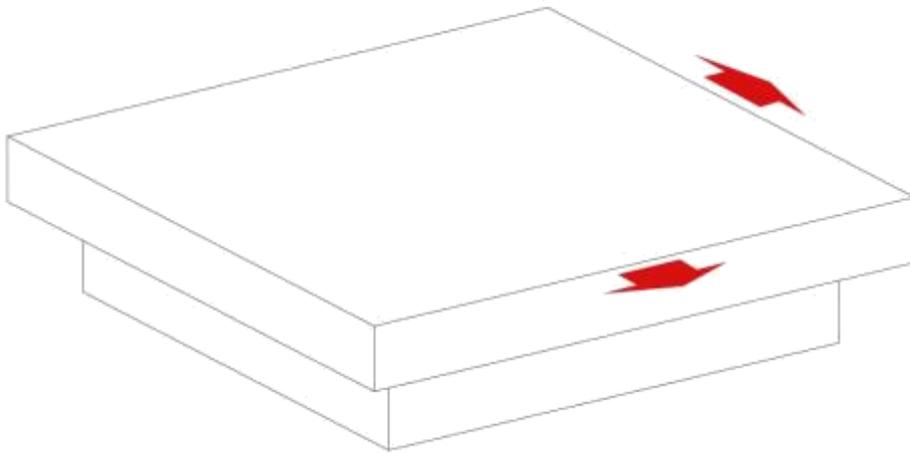
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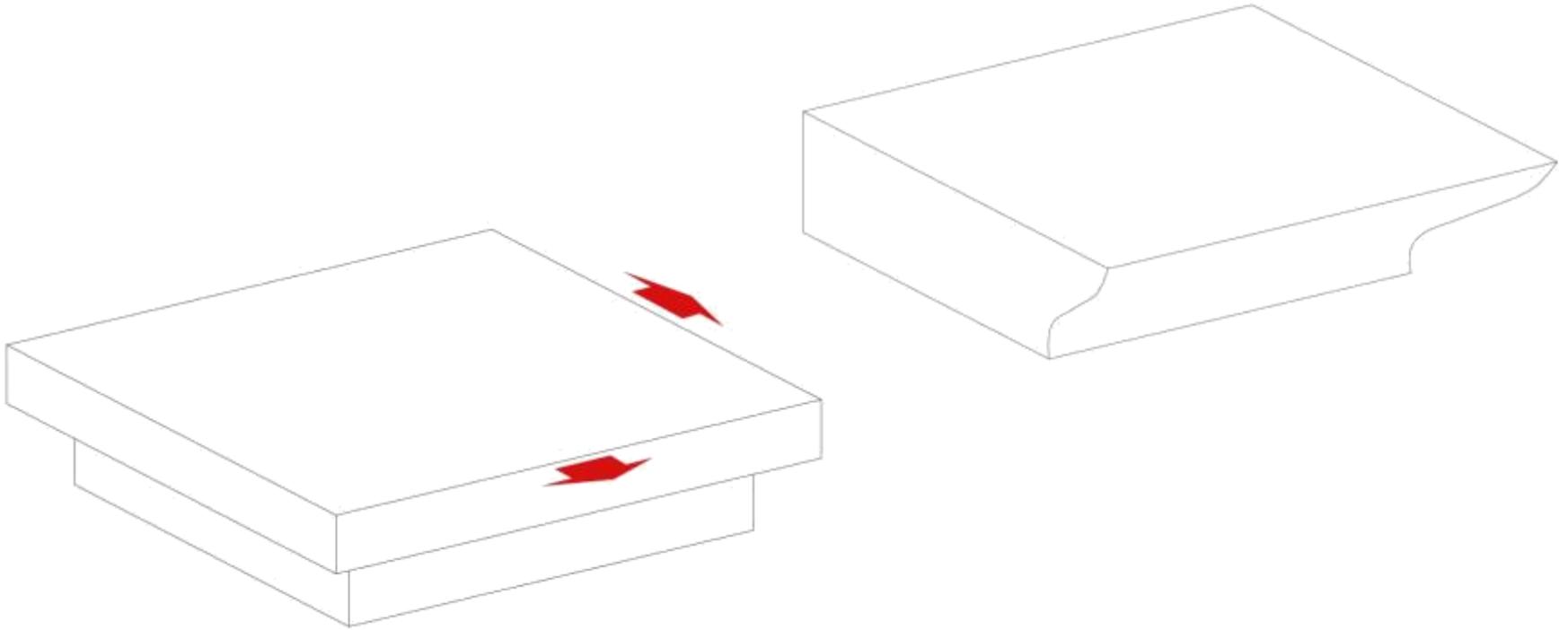
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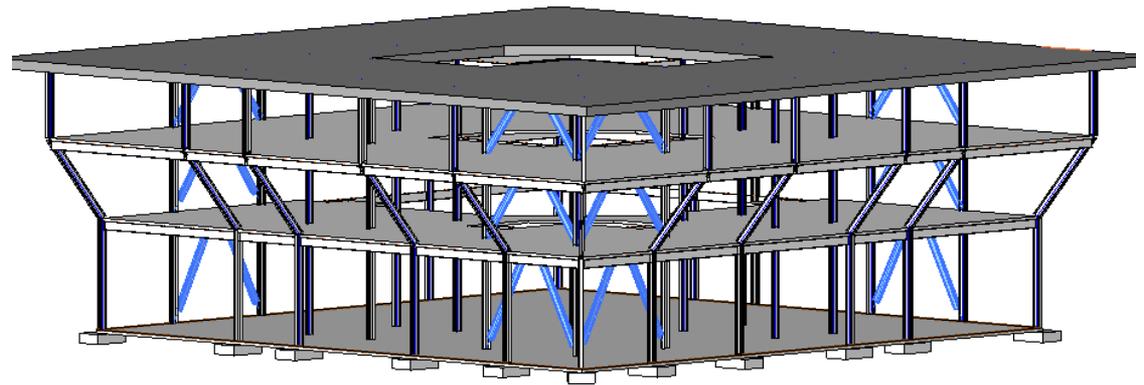
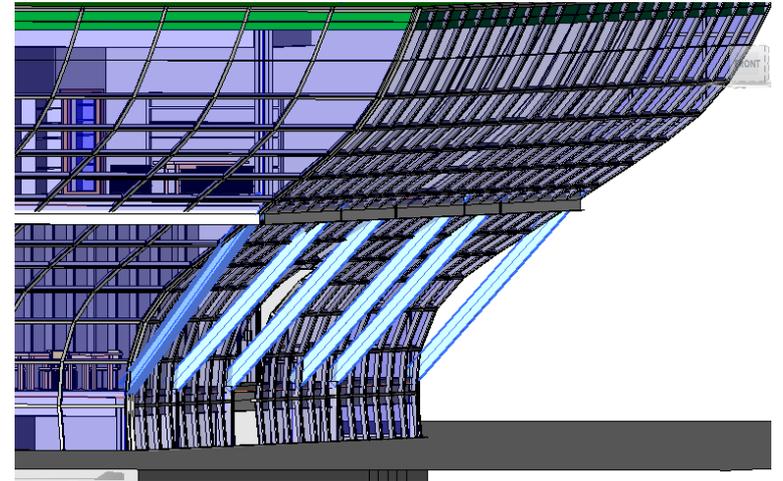
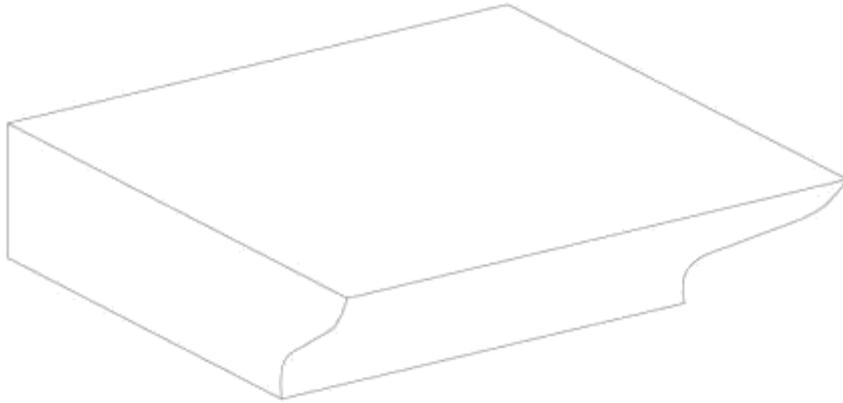
# PHASE II - MARCH



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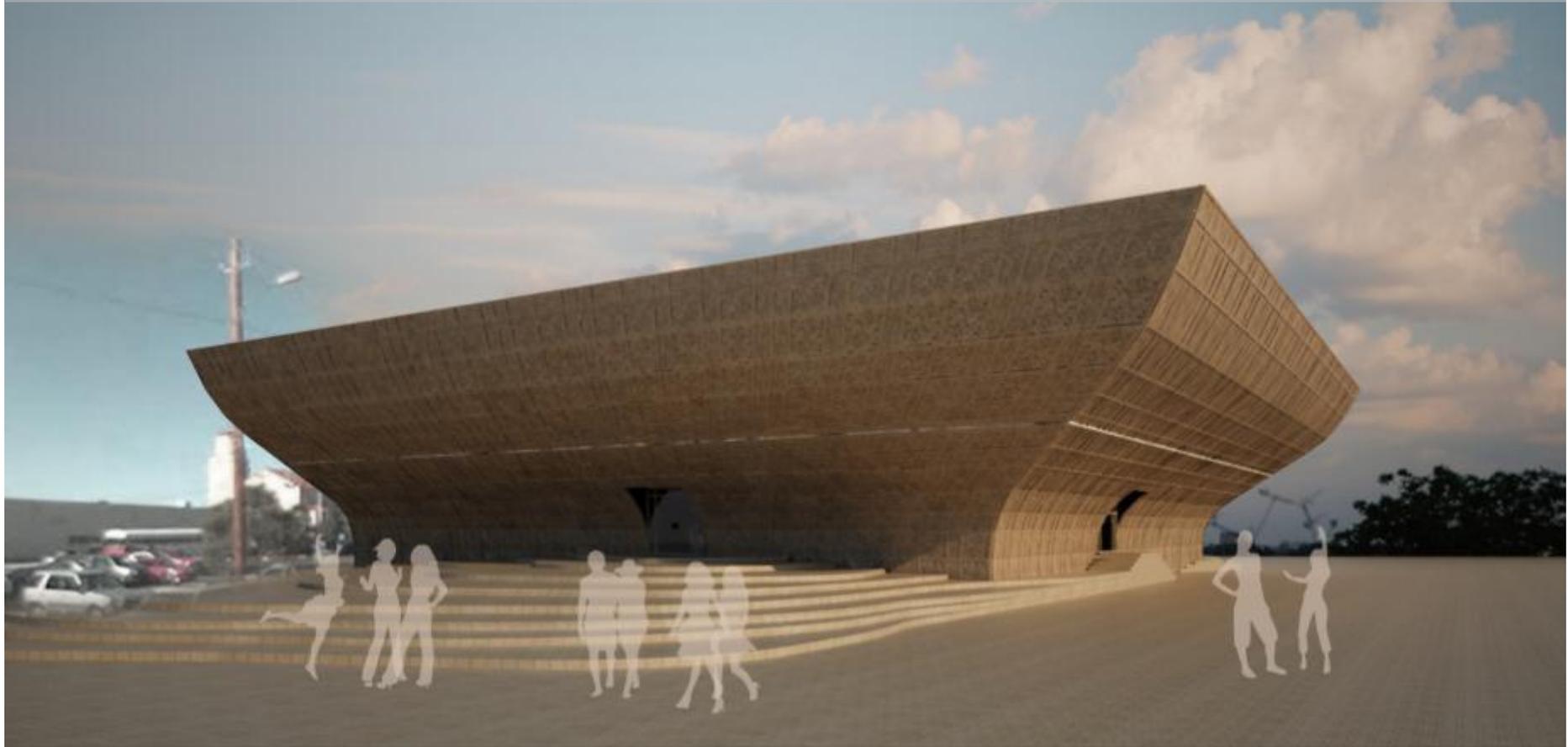


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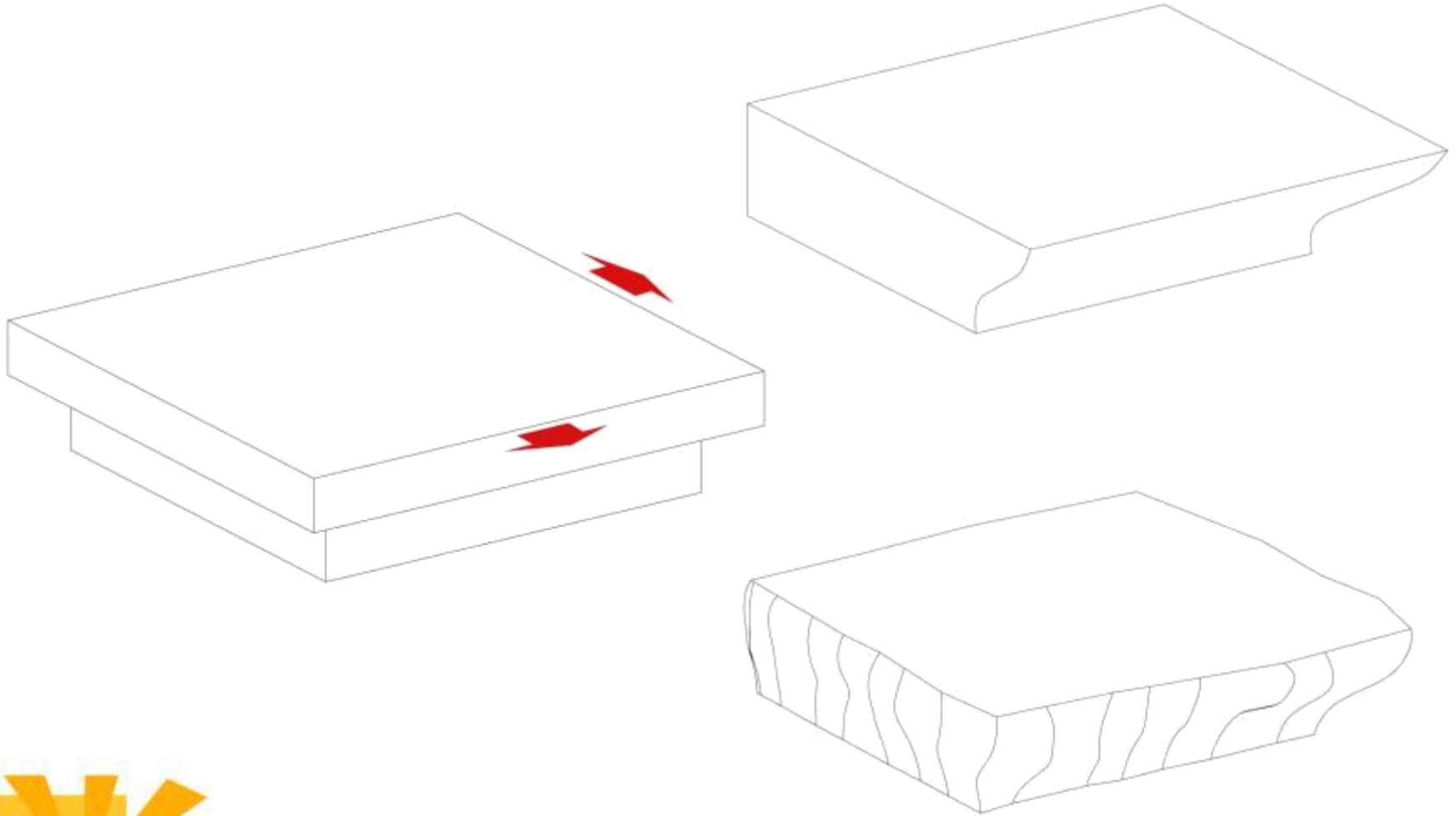


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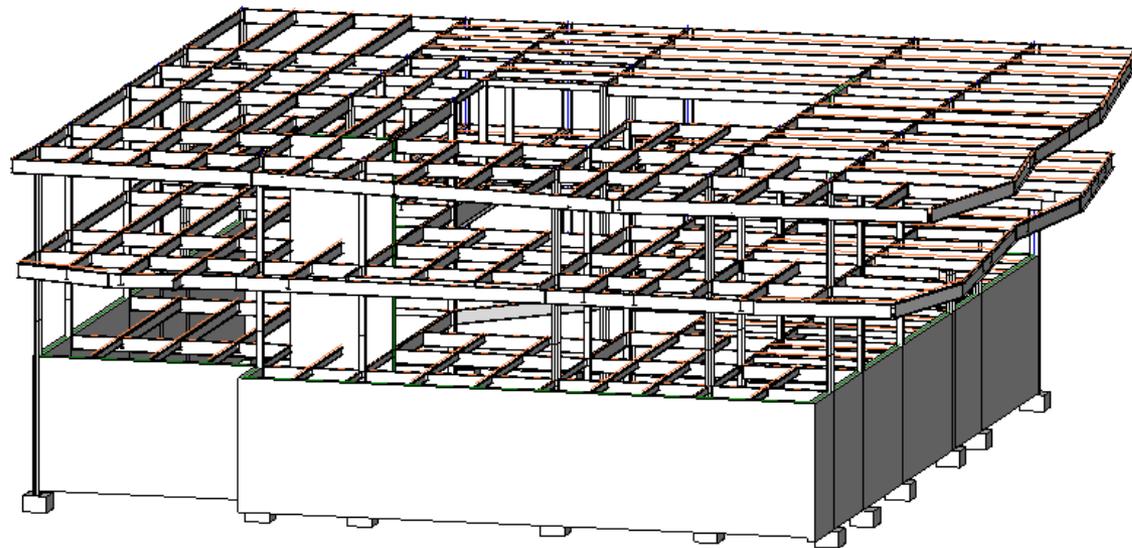
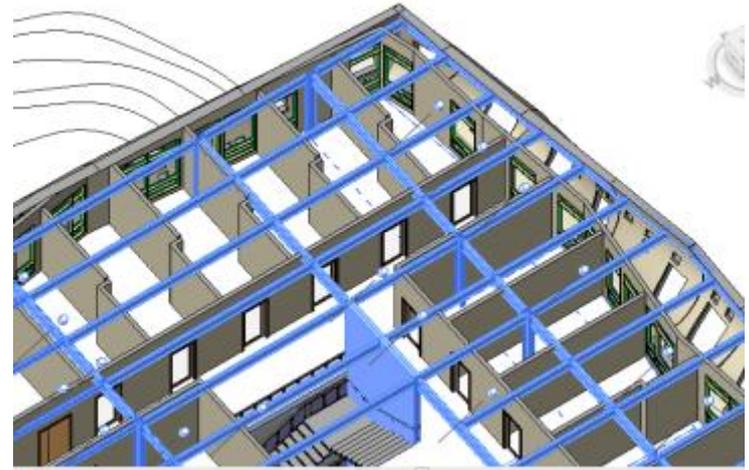
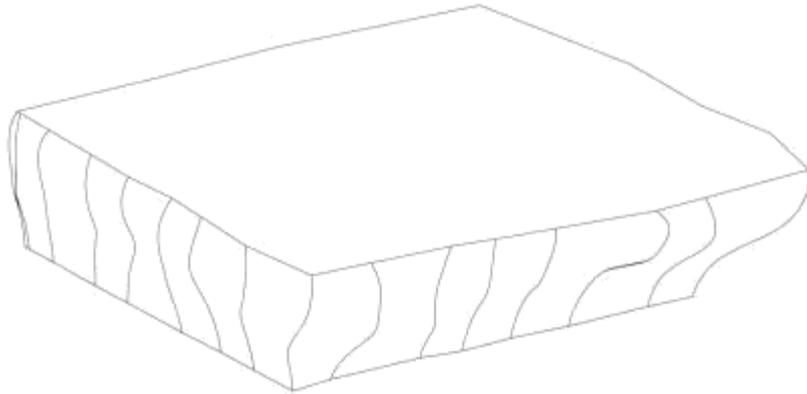
## *VERSION FROM WINTER PRESENTATION*



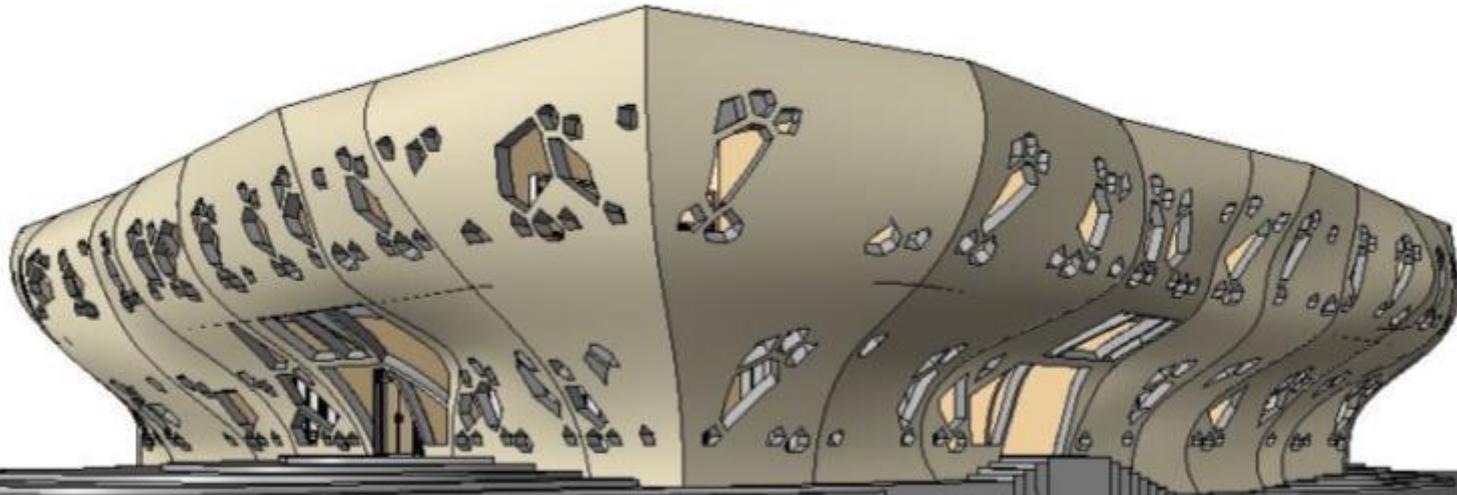
# PHASE III - APRIL



# PHASE III - APRIL



# *PHASE III - APRIL*



# ***PHASE III - APRIL***



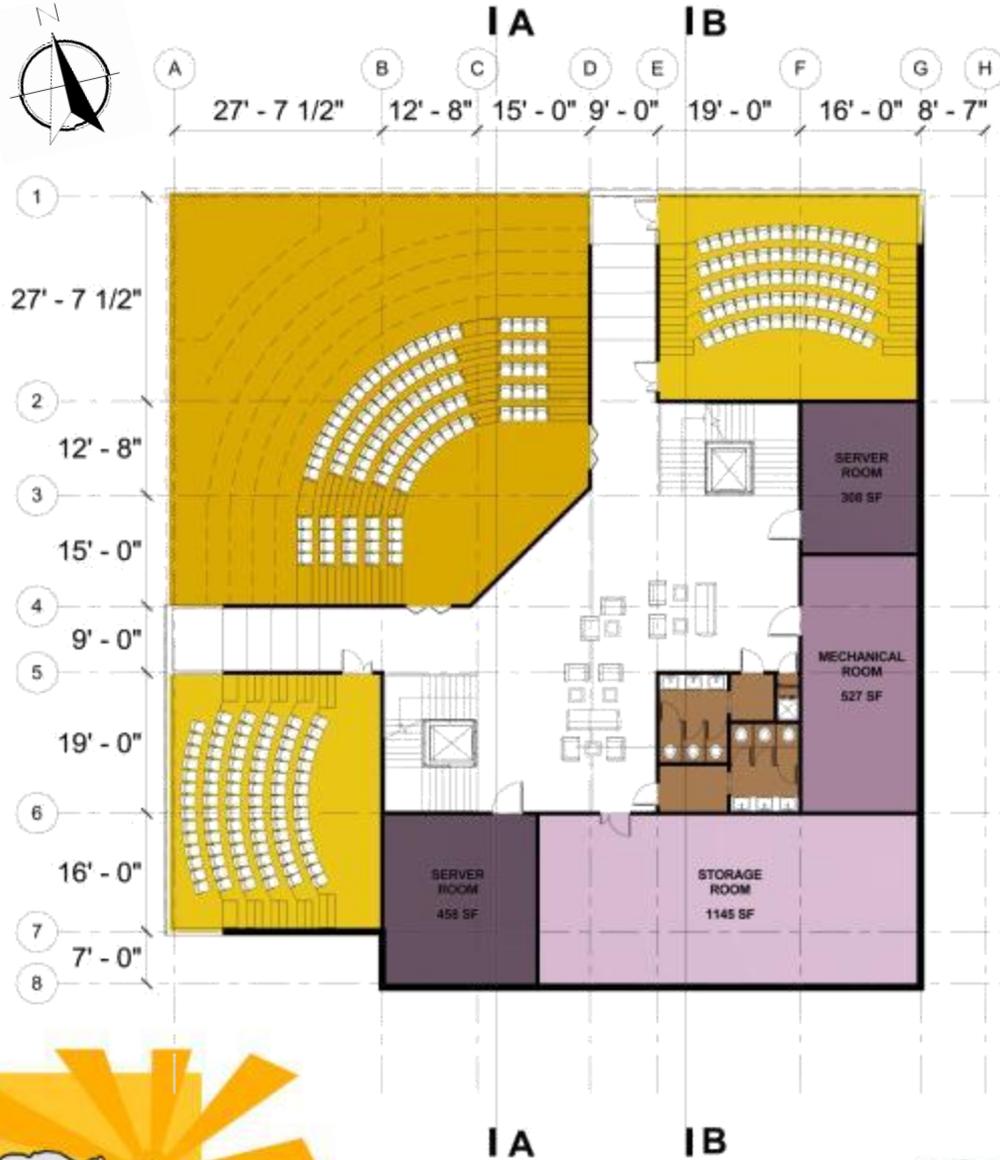
# *FUNCTIONS ALLOCATION*

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PUBLIC NO DAYLIGHT NEED TECHNICAL  
LEISURE



# FLOOR PLAN & SPACE ALLOCATION



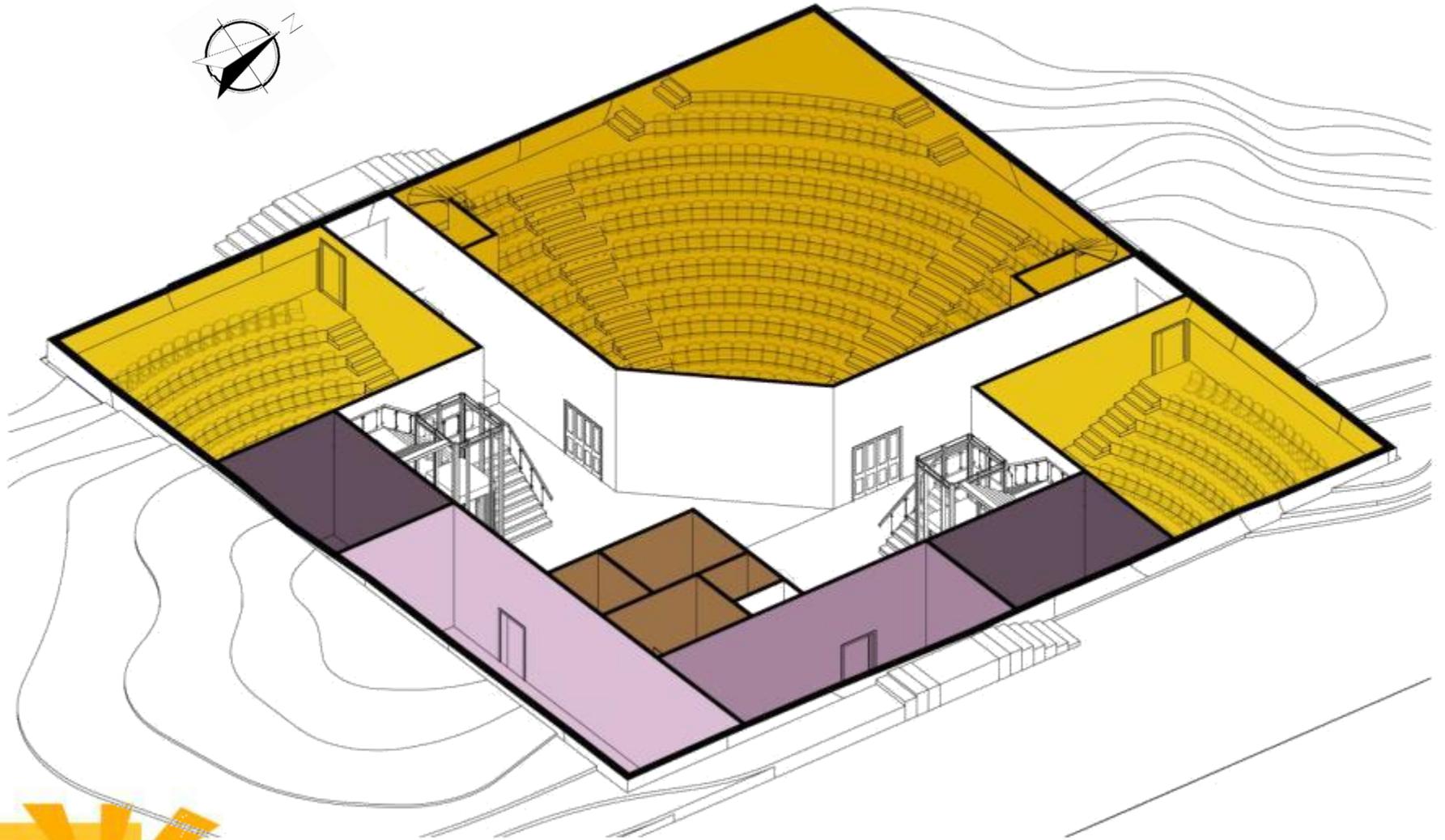
EDUCATION	Auditorium	3,000
	Large classrooms	1,928

TECHNICAL & STORAGE COMMUNICATION & LOUNGES	Server rooms	766
	Mechanical room	527
	Storage room	1,145
		2,438

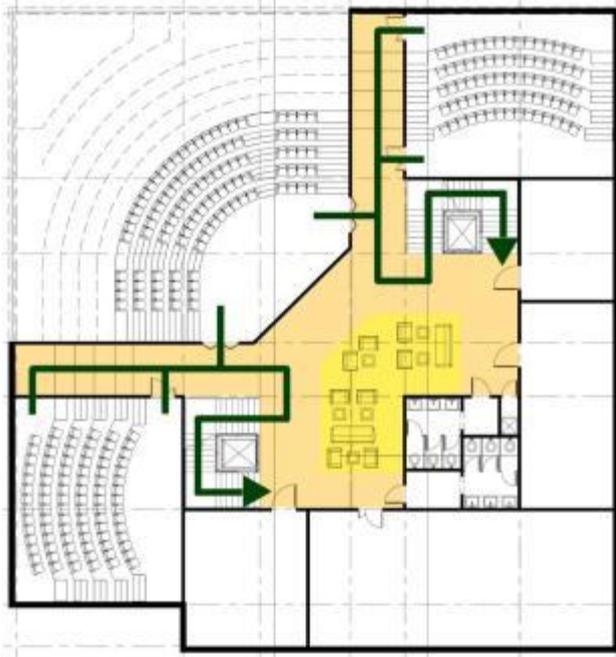
RESTROOMS



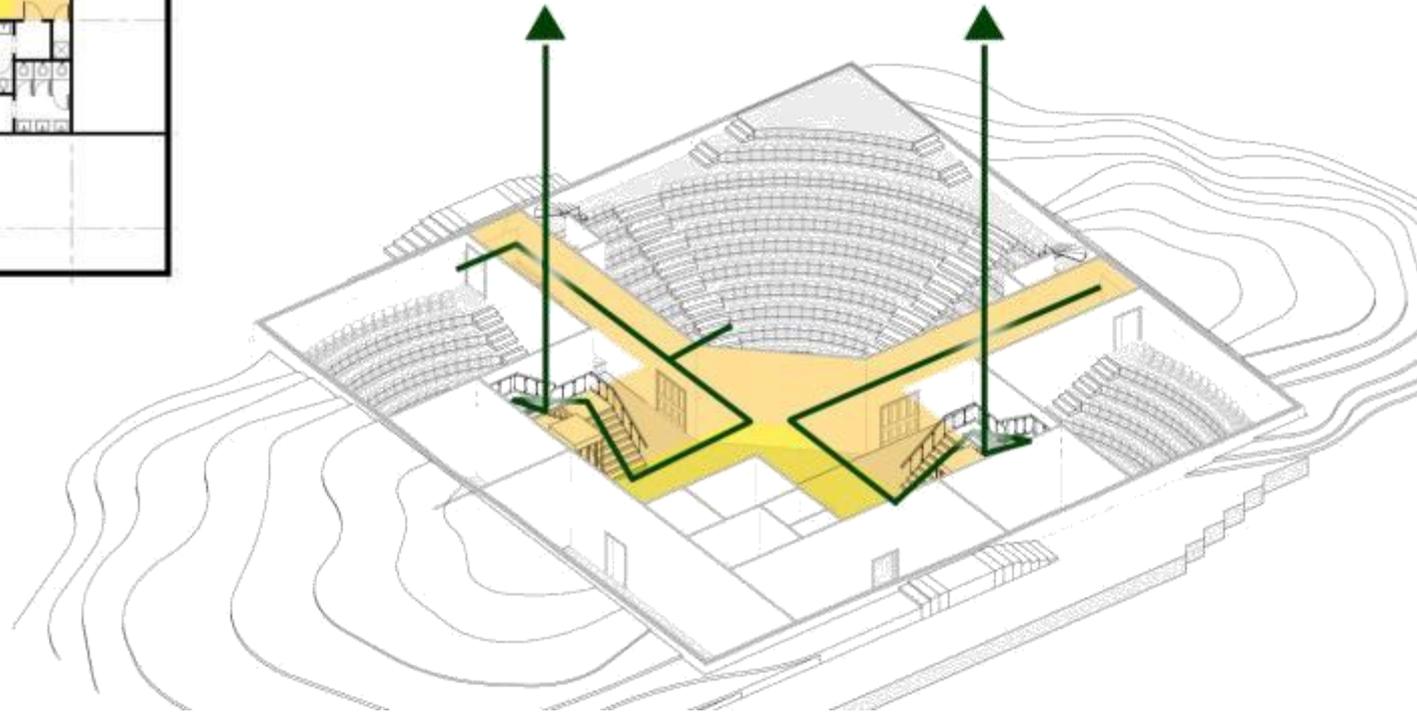
# UNDERGROUND



# UNDERGROUND - EGRESS



-  CORRIDORS
-  LEISURE AREAS / LOUNGES
-  ATRIUM
-  BOTTOM FLOOR EGRESS
-  GROUND FLOOR EGRESS
-  TOP FLOOR EGRESS



# ***UNDERGROUND – INTERIOR VIEW***



# ***UNDERGROUND – INTERIOR VIEW***



# FUNCTIONS ALLOCATION

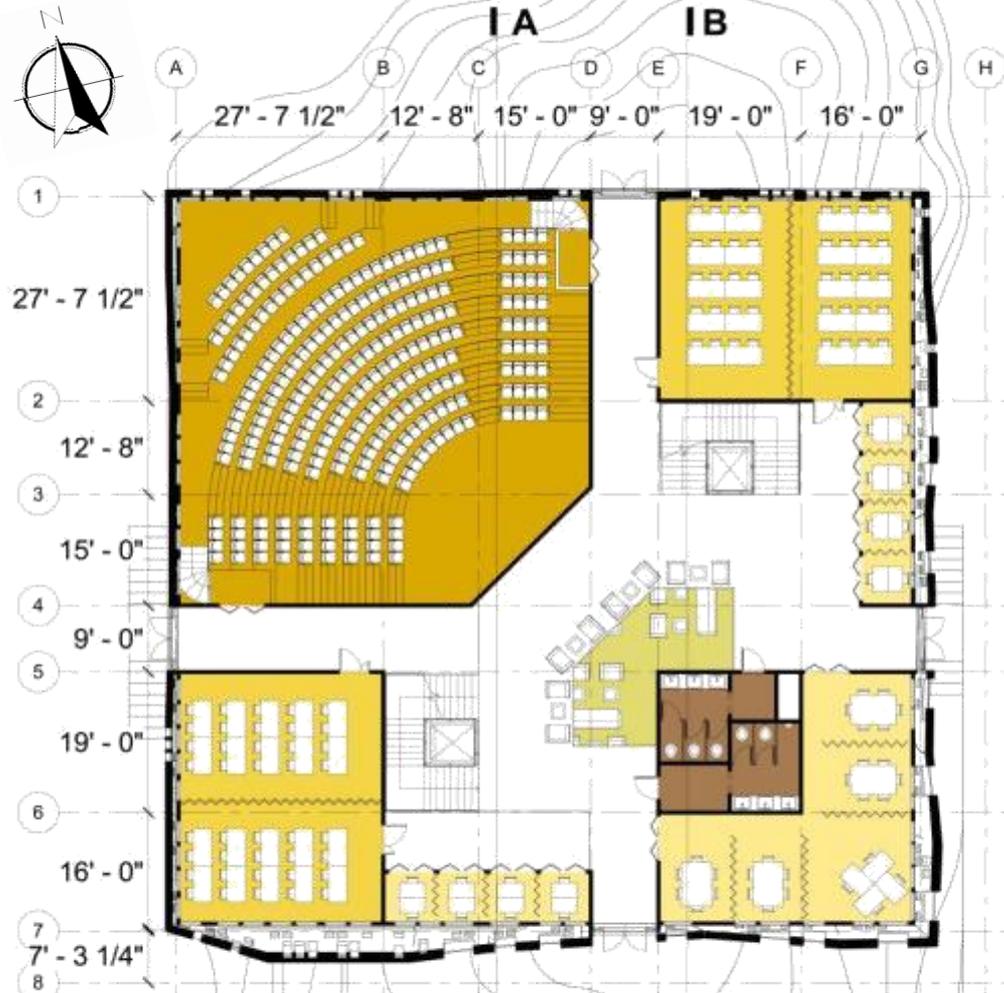
SEMI PUBLIC ATRIUM STUDENTS  
COLLABORATION SPACES  
NO DAYLIGHT  
PUBLIC NEED TECHNICAL  
LEISURE



# GROUND FLOOR – SITE VIEW



# GROUND FLOOR – FLOOR PLAN



EDUCATION	
Auditorium	3,000
Large classrooms	1,928
Small classrooms	1,936
Student offices	1,241

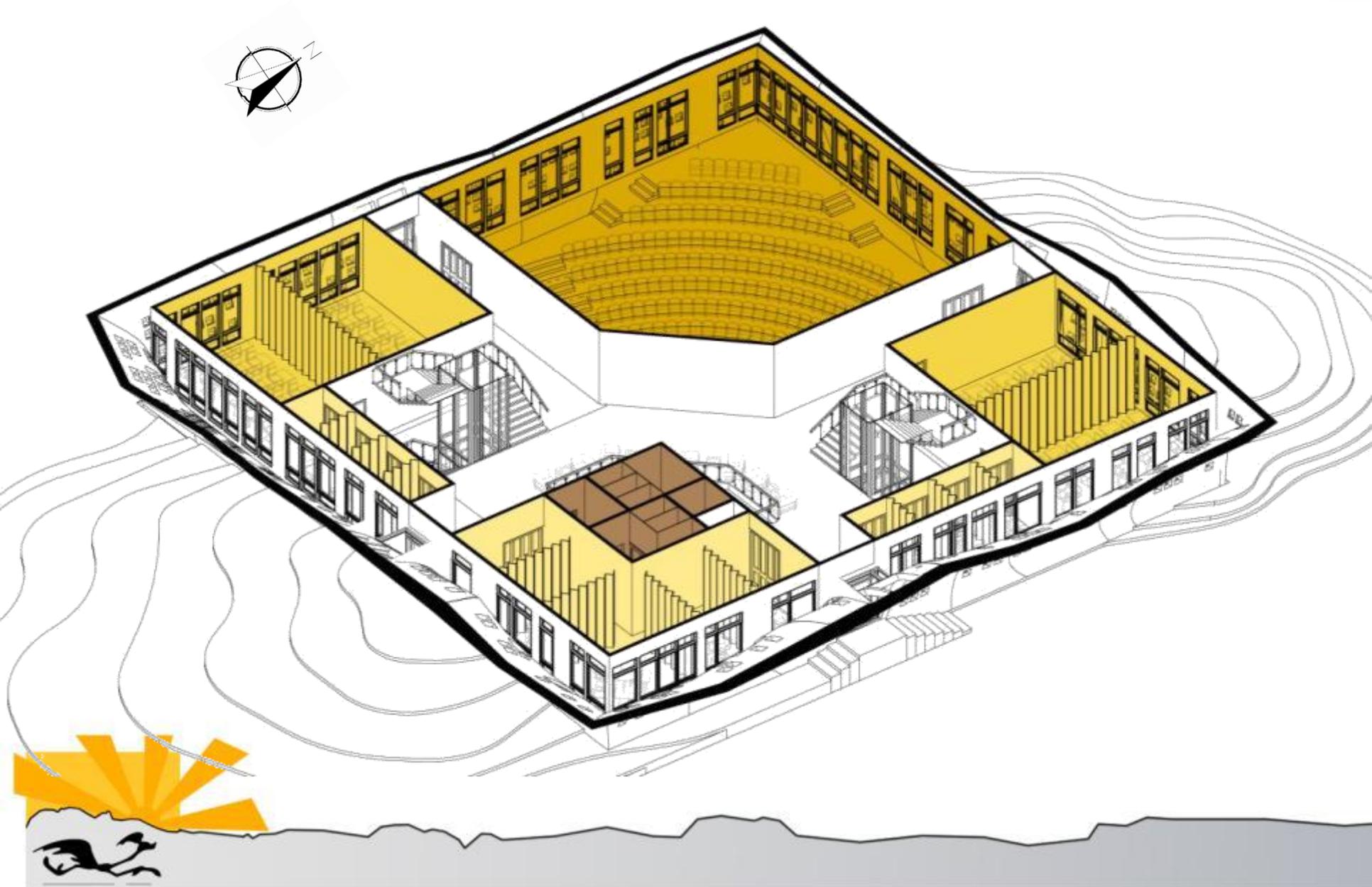
TECHNICAL & STORAGE	
Server rooms	766
Mechanical room	527
Storage room	1,145
<b>2,484</b>	

RESTROOMS

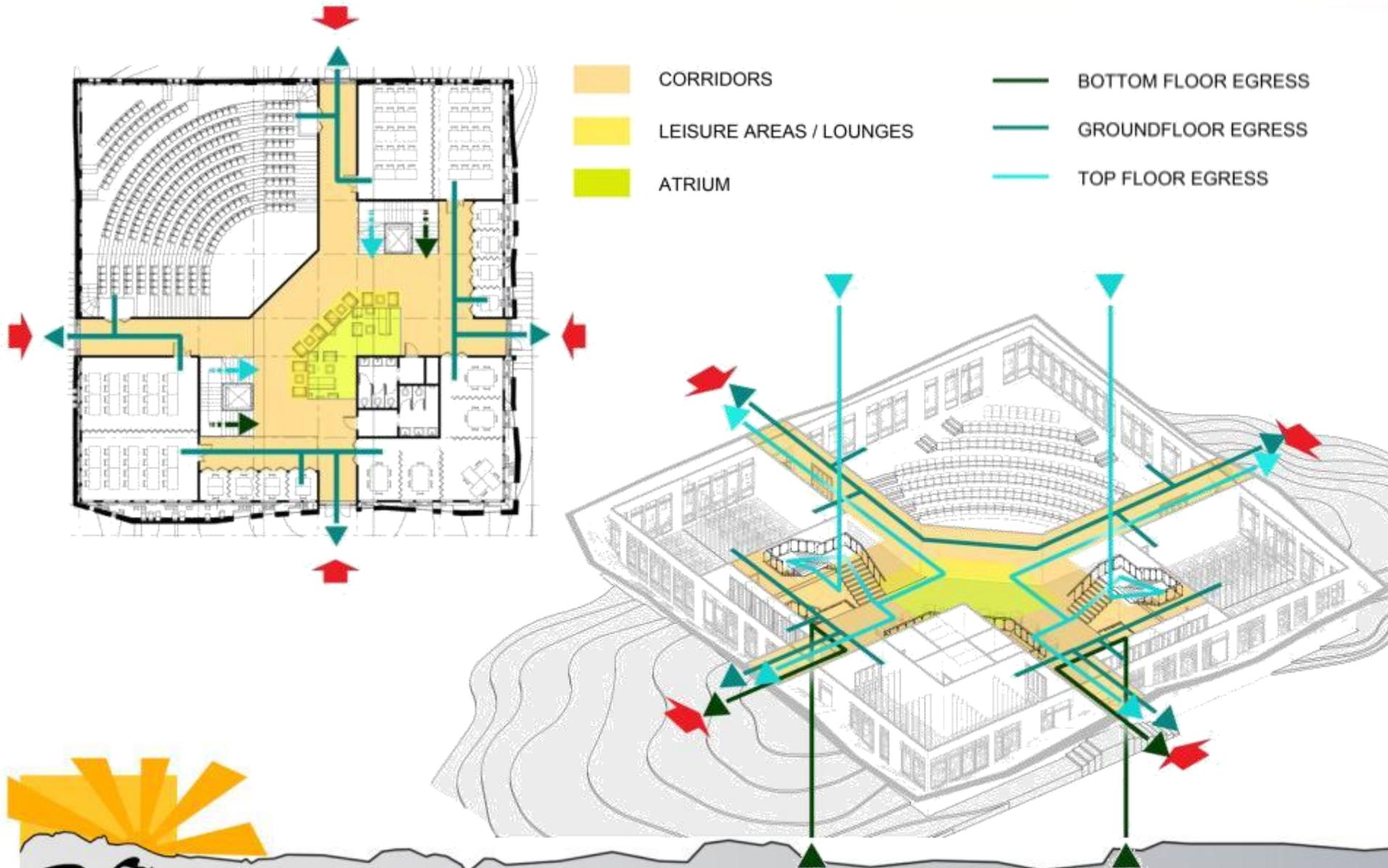


IA IB

# GROUND FLOOR – 3D VIEW



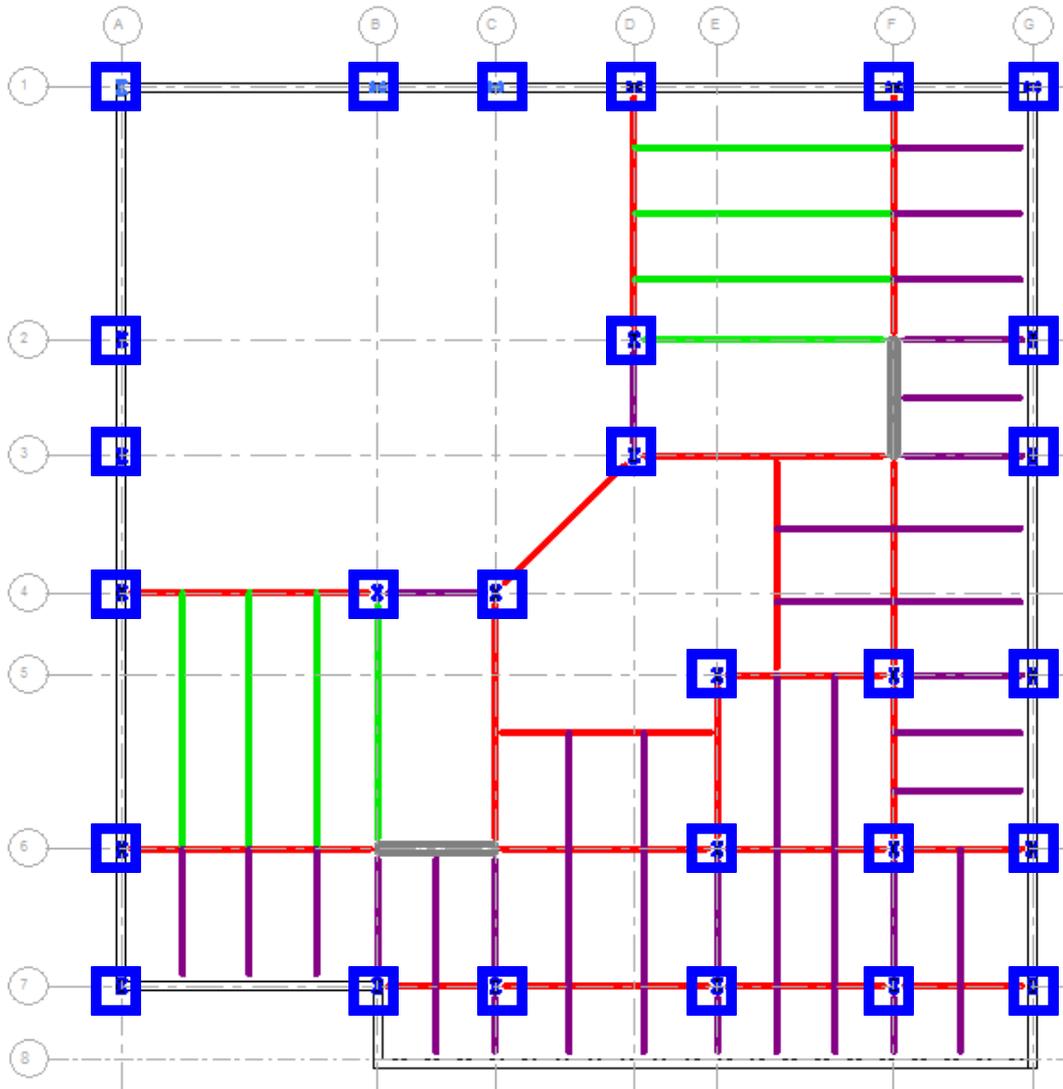
# GROUND FLOOR – EGRESS



# ***GROUND FLOOR – INTERIOR VIEW***



# GROUND FLOOR - GRAVITY SYSTEM

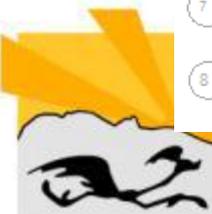


## Beams:

- 、 W10x15
- 、 W16x26
- 、 W21x44

## Columns:

- 、 W14x53



# FUNCTIONS ALLOCATION

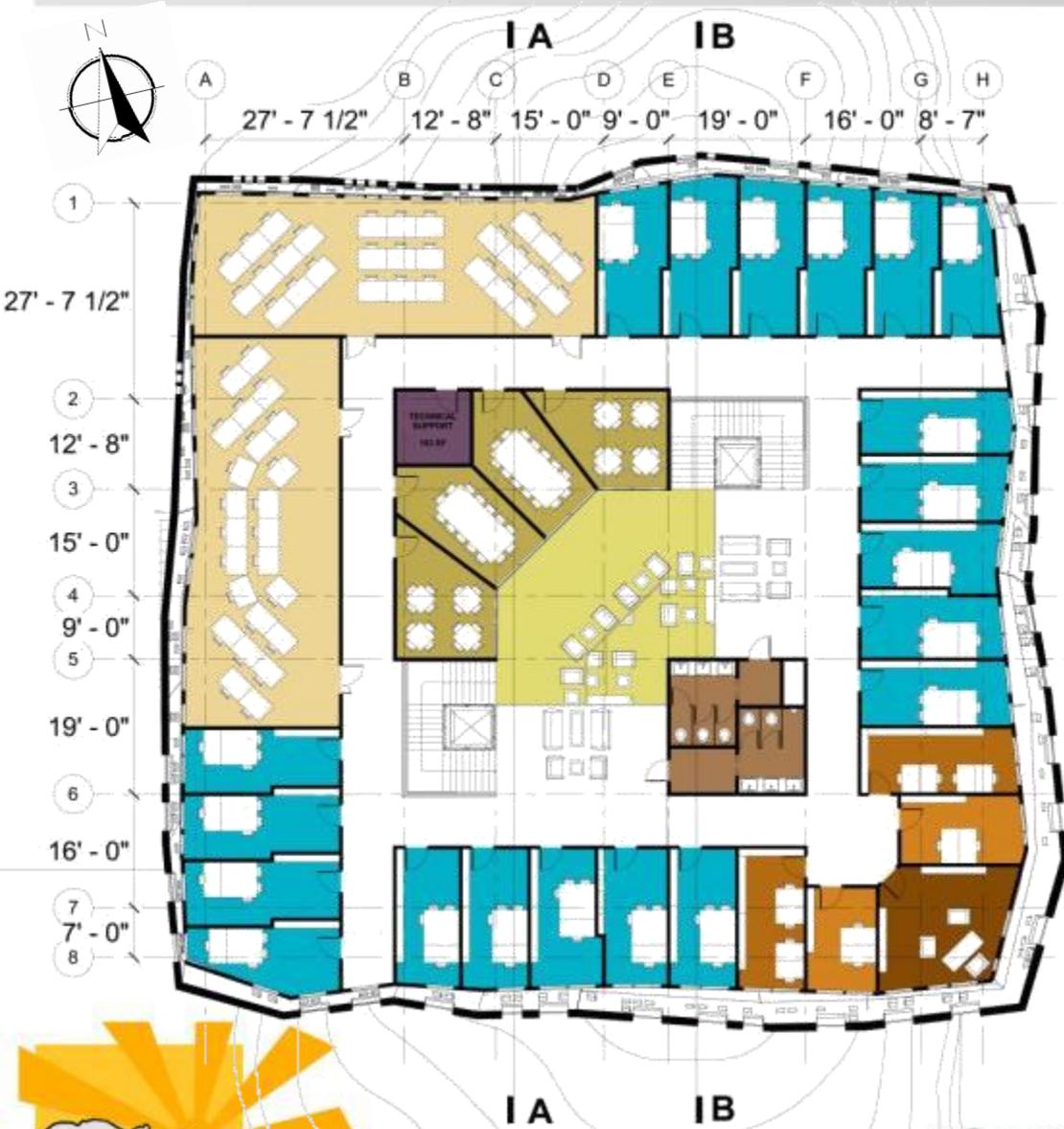
HIGH SECURITY FACULTY  
LOUNGES PRIVATE OFFICES  
SEMI PUBLIC ATRIUM STUDENTS  
COLLABORATION SPACES  
PUBLIC NEED TECHNICAL  
NO DAYLIGHT  
LEISURE



# ENTRANCES



# TOP FLOOR – FLOOR PLAN

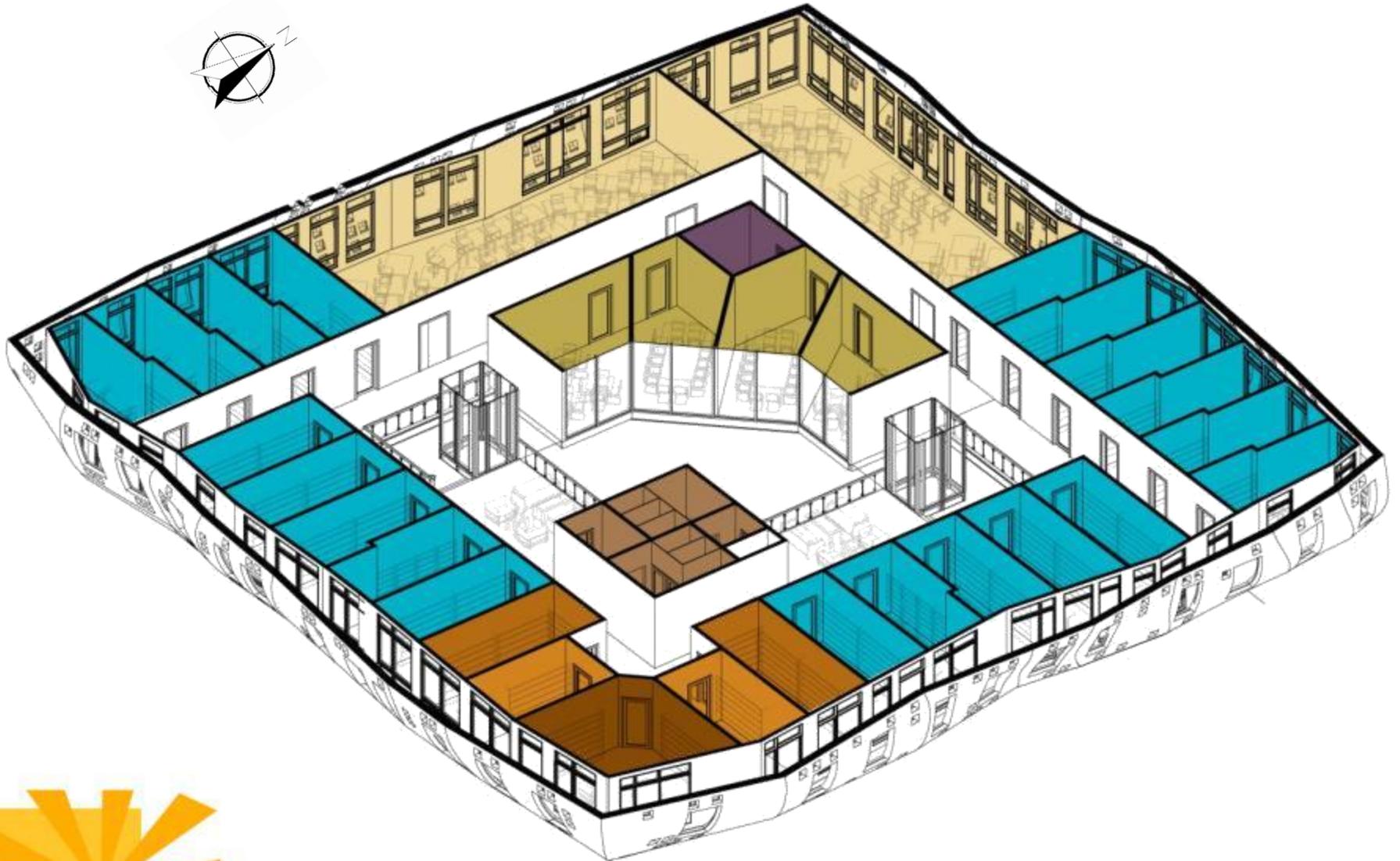


EDUCATION	Auditorium	3,000
	Large classrooms	1,928
	Small classrooms	1,936
	Student offices	1,241
	Instructional labs	2,012
	Seminar rooms	810
FACULTY	Faculty offices	3,560
ADMINISTRATION	Dean's office	312
	Senior admin. off.	368
	Admin. assistant	284
TECHNICAL & STORAGE	Server rooms	766
	Mechanical room	527
	Storage room	1,145
	Technical support	105
COMMUNICATION & LOUNGES		2,484
		2,873
RESTROOMS		2,871
		990

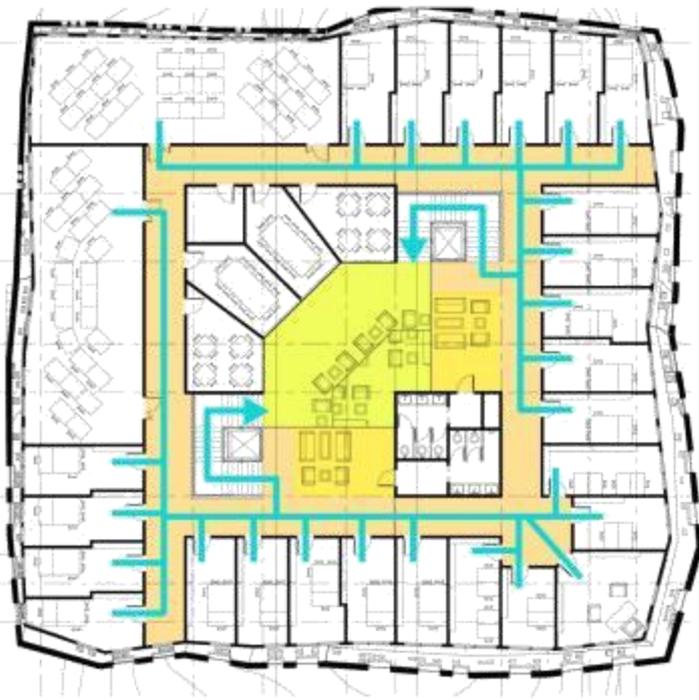
**OVERALL 27,212 SqFt**



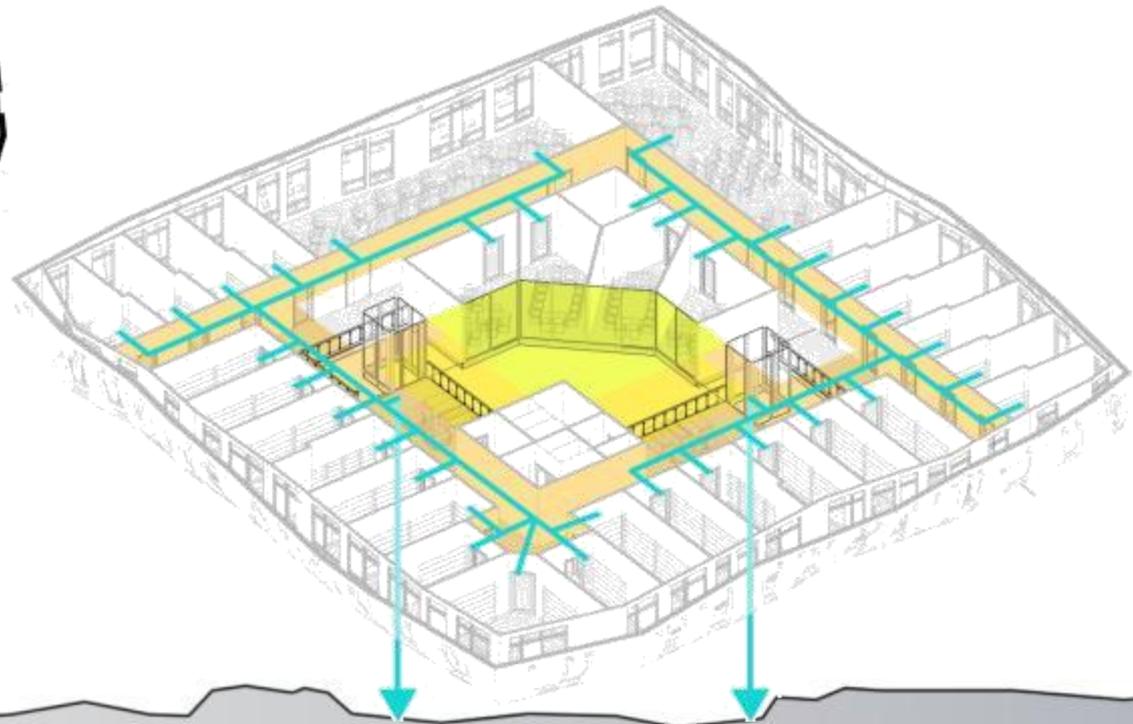
# TOP FLOOR – FLOOR PLAN



# TOP FLOOR – EGRESS



-  CORRIDORS
-  LEISURE AREAS / LOUNGES
-  ATRIUM
-  BOTTOM FLOOR EGRESS
-  GROUND FLOOR EGRESS
-  TOP FLOOR EGRESS



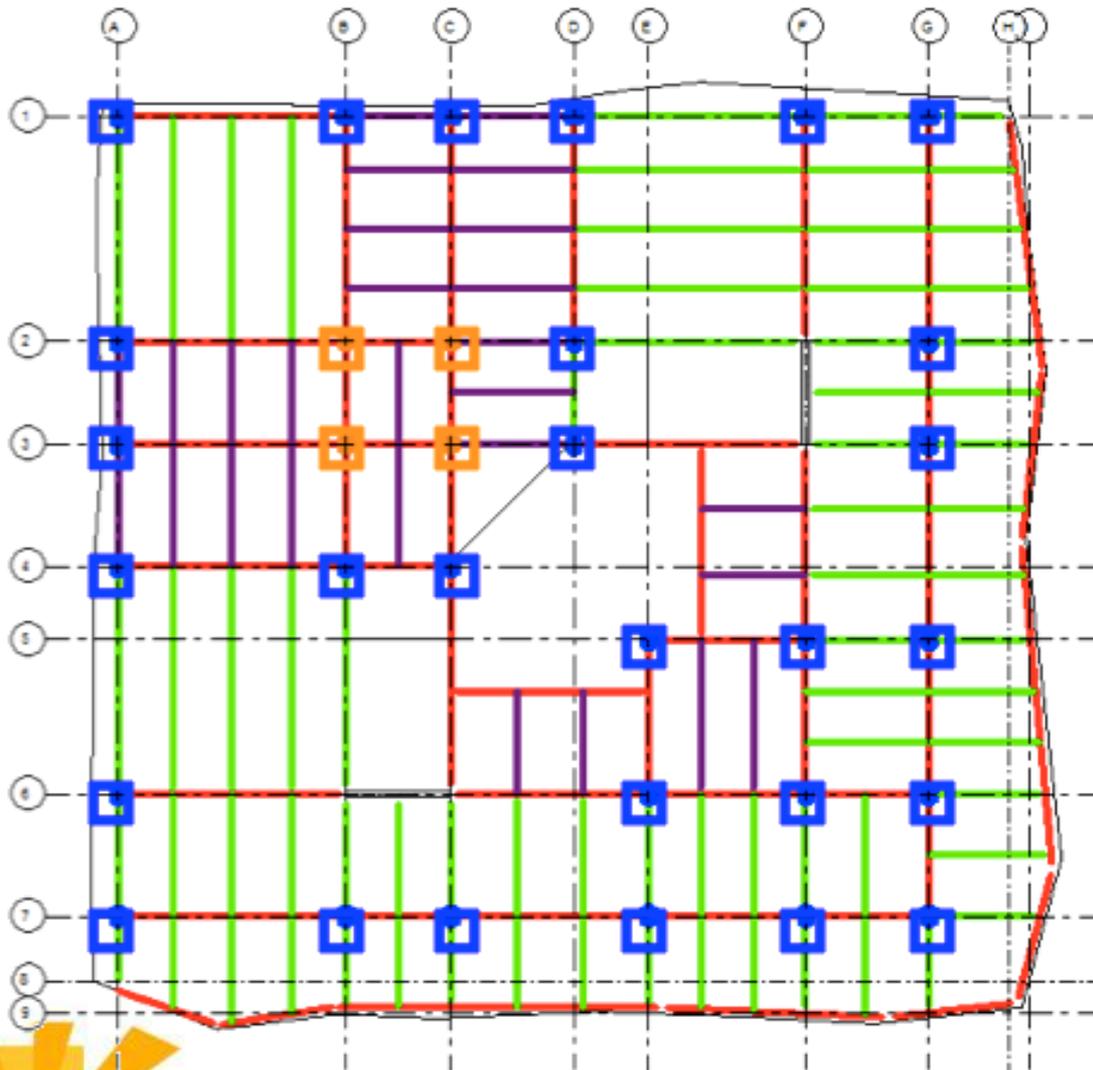
# TOP FLOOR – ATRIUM VIEW



# ***TOP FLOOR – DEAN'S OFFICE***



# TOP FLOOR - GRAVITY SYSTEM



## Beams:

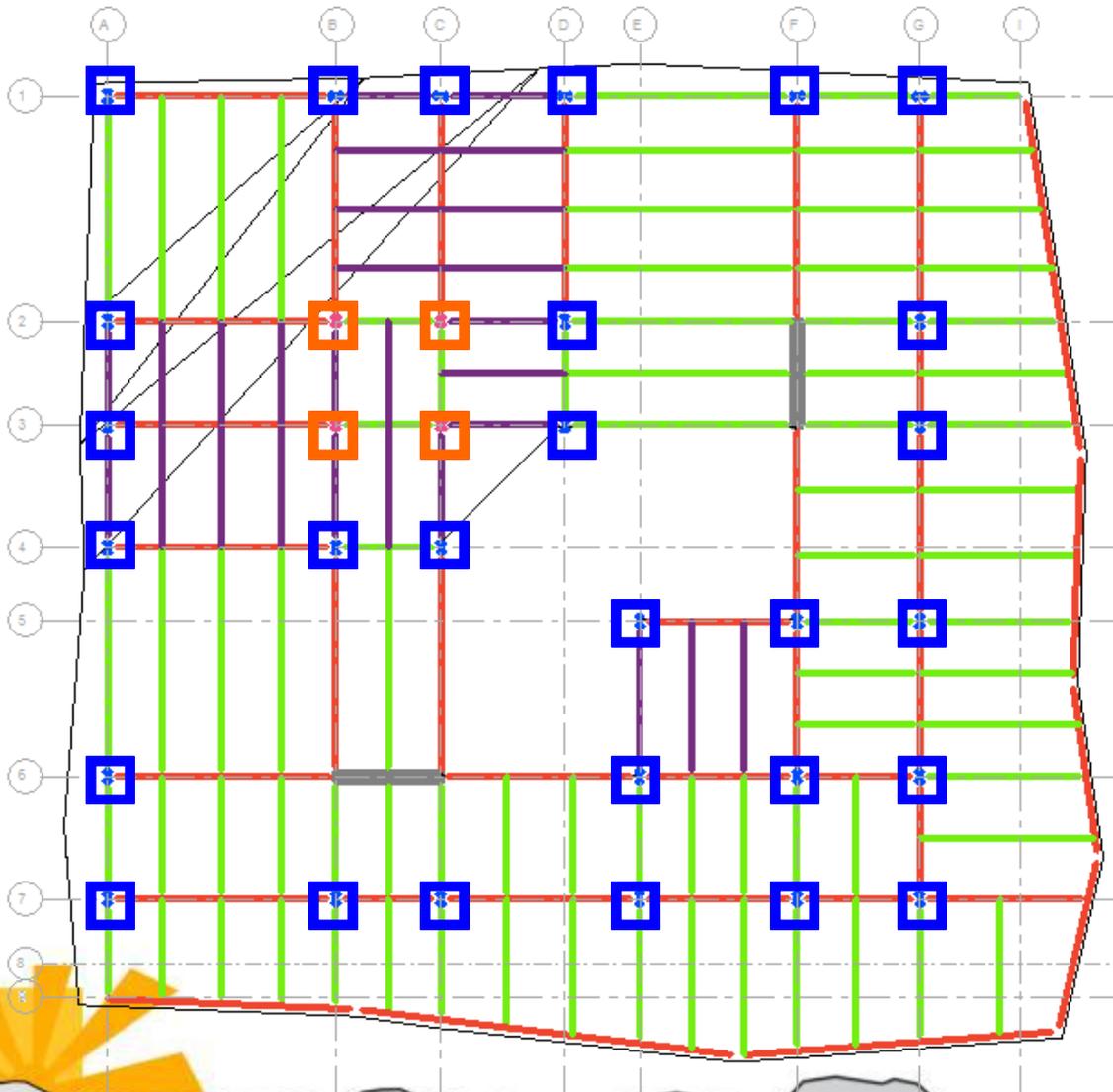
- 、 W10x15
- 、 W16x26
- 、 W21x44

## Columns:

- 、 W14x53
- 、 W10x49



# ROOF - GRAVITY SYSTEM



## Beams:

- 、 W10x15
- 、 W16x26
- 、 W21x44

## Columns:

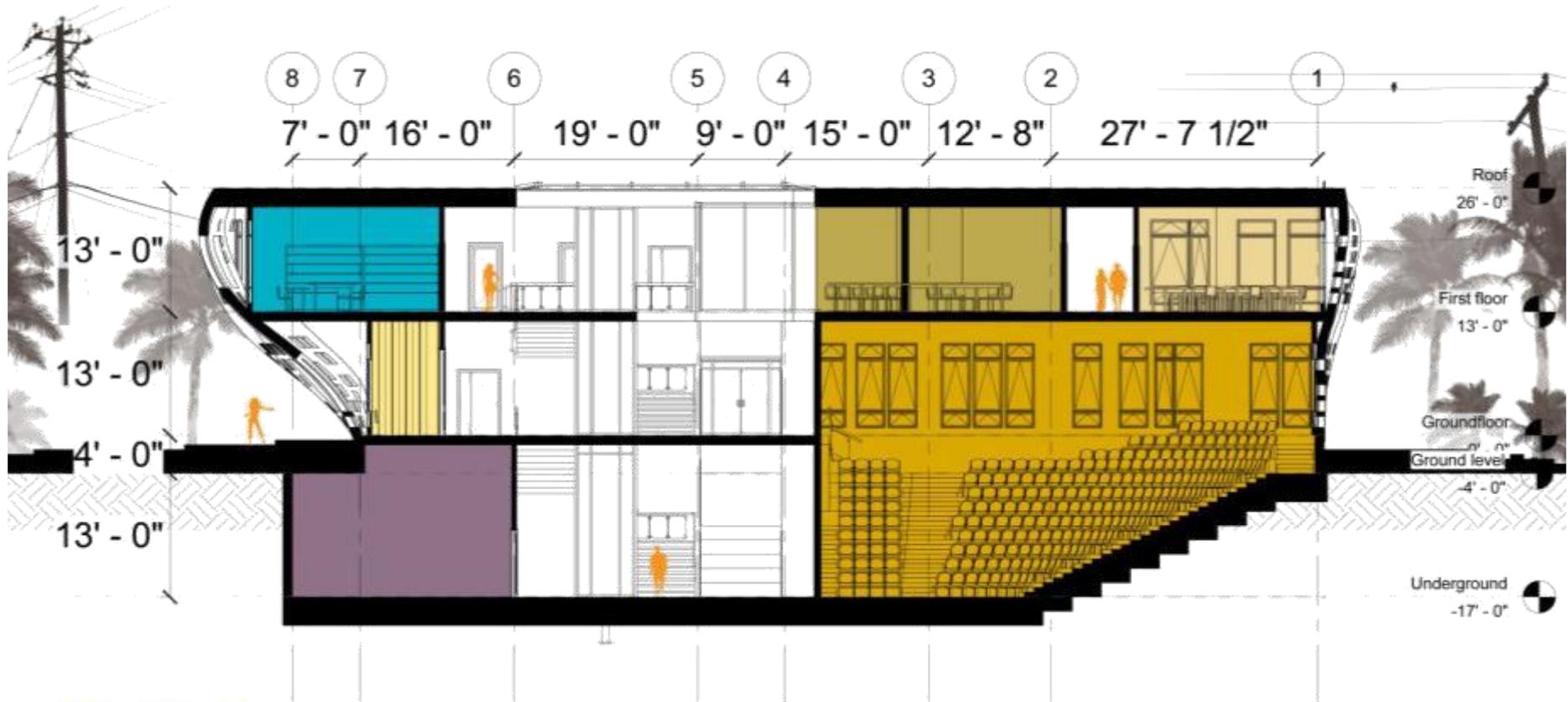
- 、 W14x53
- 、 W10x49



# ***ELEVATION – EAST VIEW***

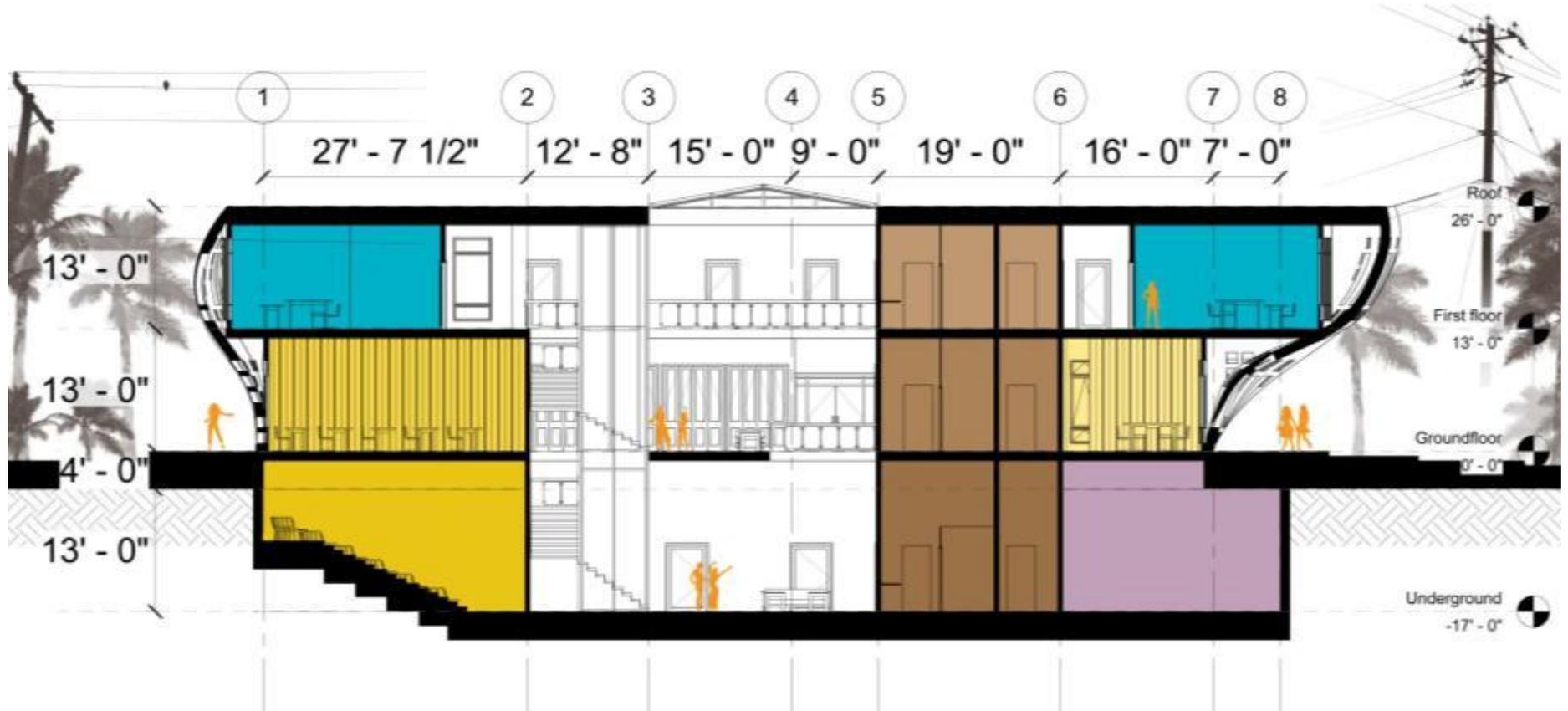


# SECTION VIEW A-A



# SECTION VIEWS

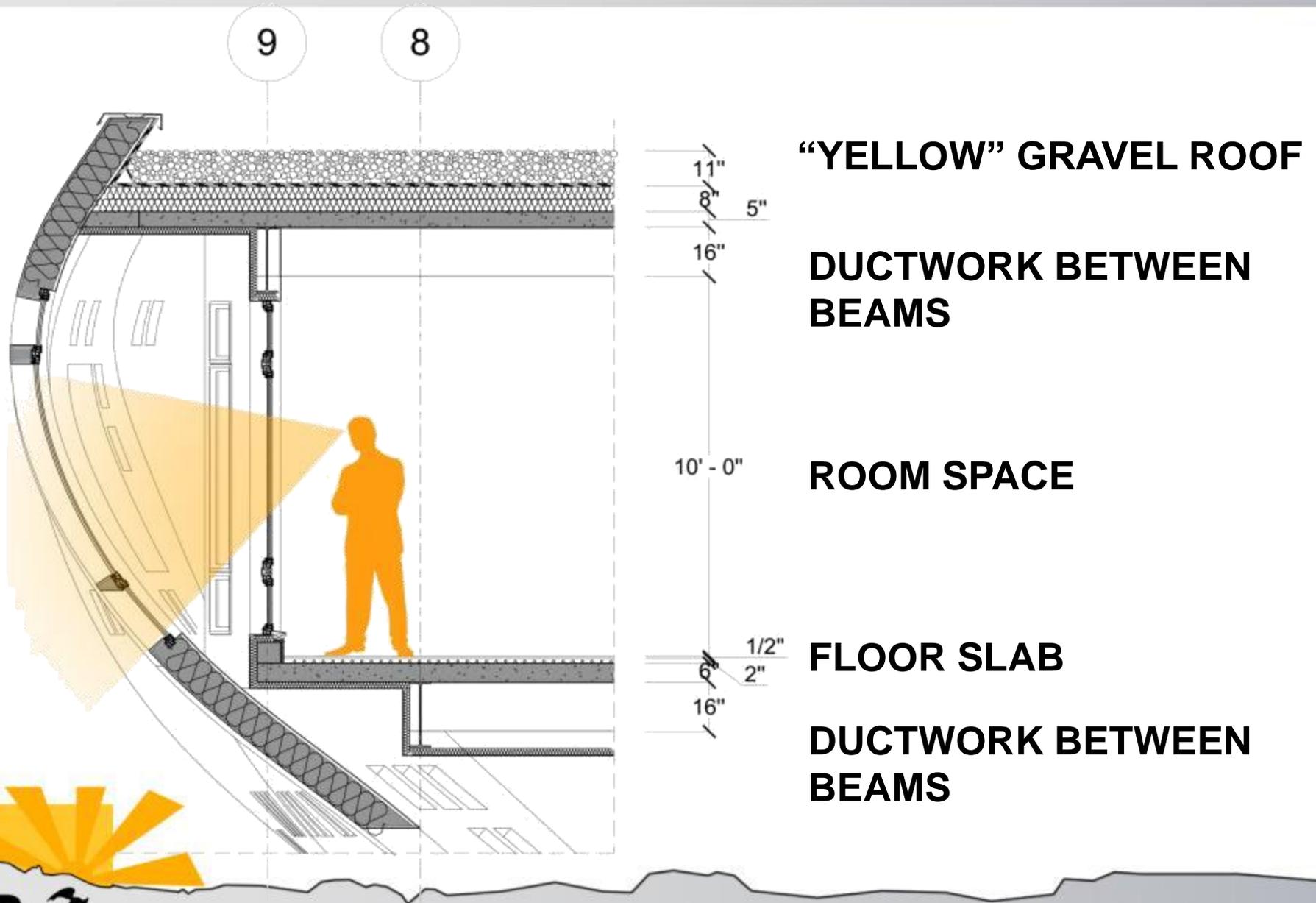
B - B



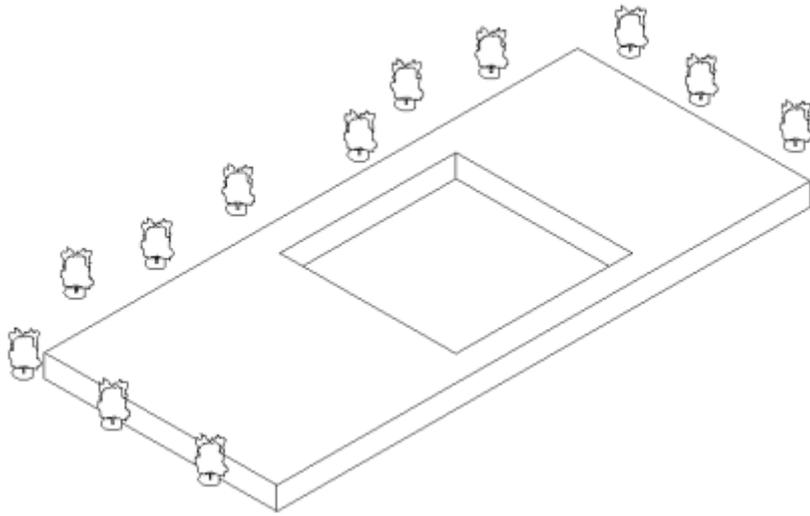
# ***ELEVATION – WEST VIEW***



# FLOOR SANDWICH



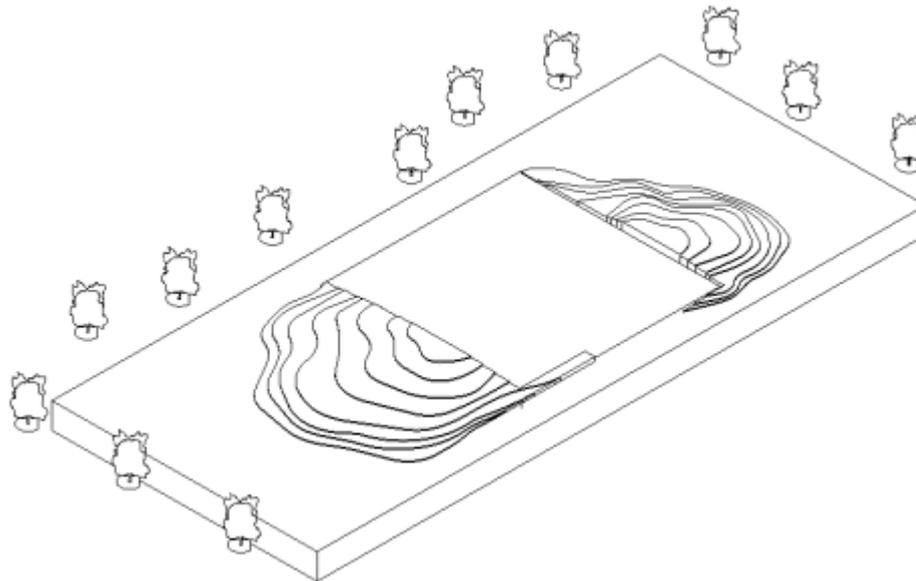
# EXCAVATION PROCESS



## BASEMENT EXCAVATION

17 FEET DEEP

5800 CY OF SOIL



# FOUNDATION DESIGN SOLUTION

## Soil Conditions:

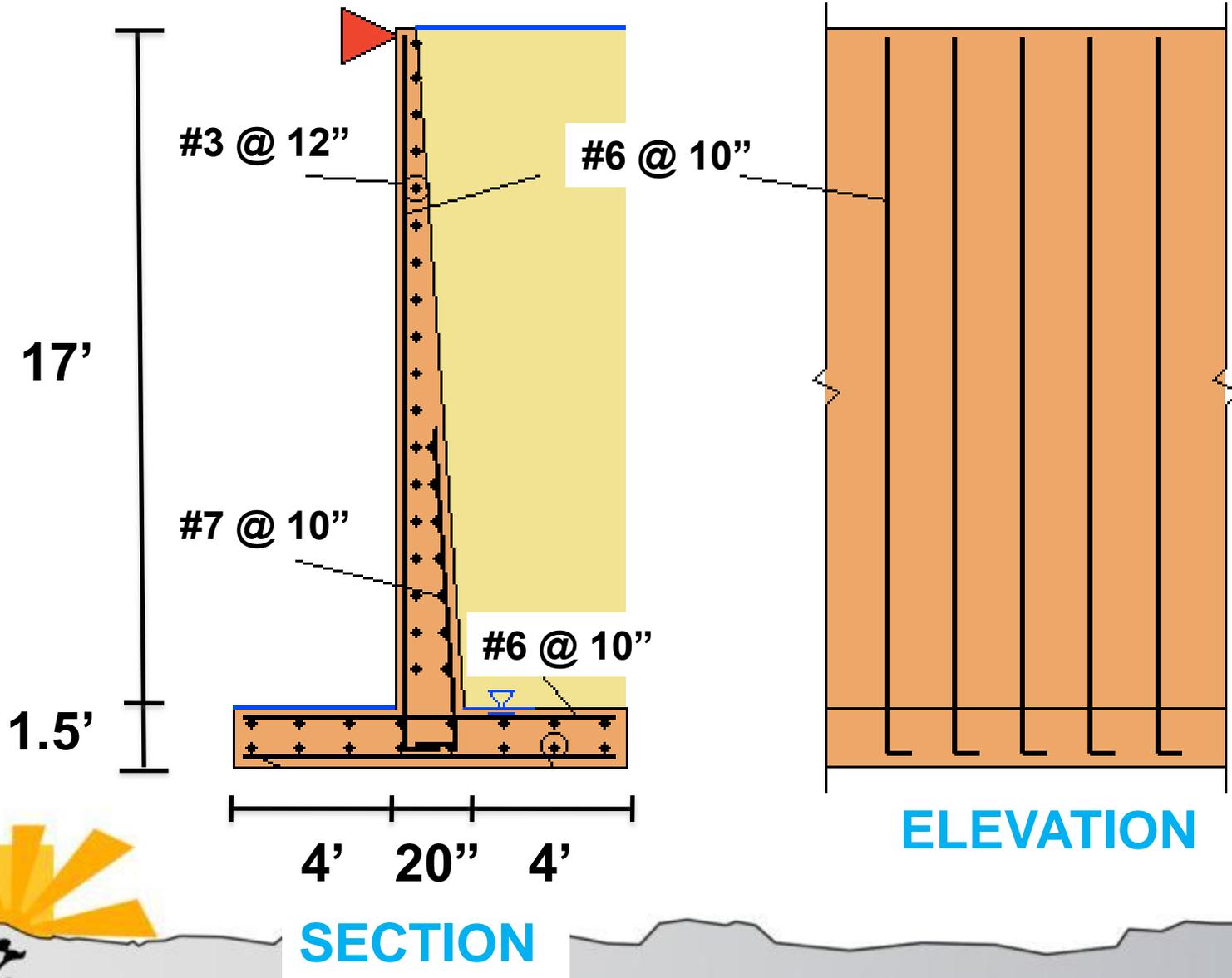
- Bearing Capacity = 4 ksf
- Medium compact sand
- Inorganic silts

## Design Parameters:

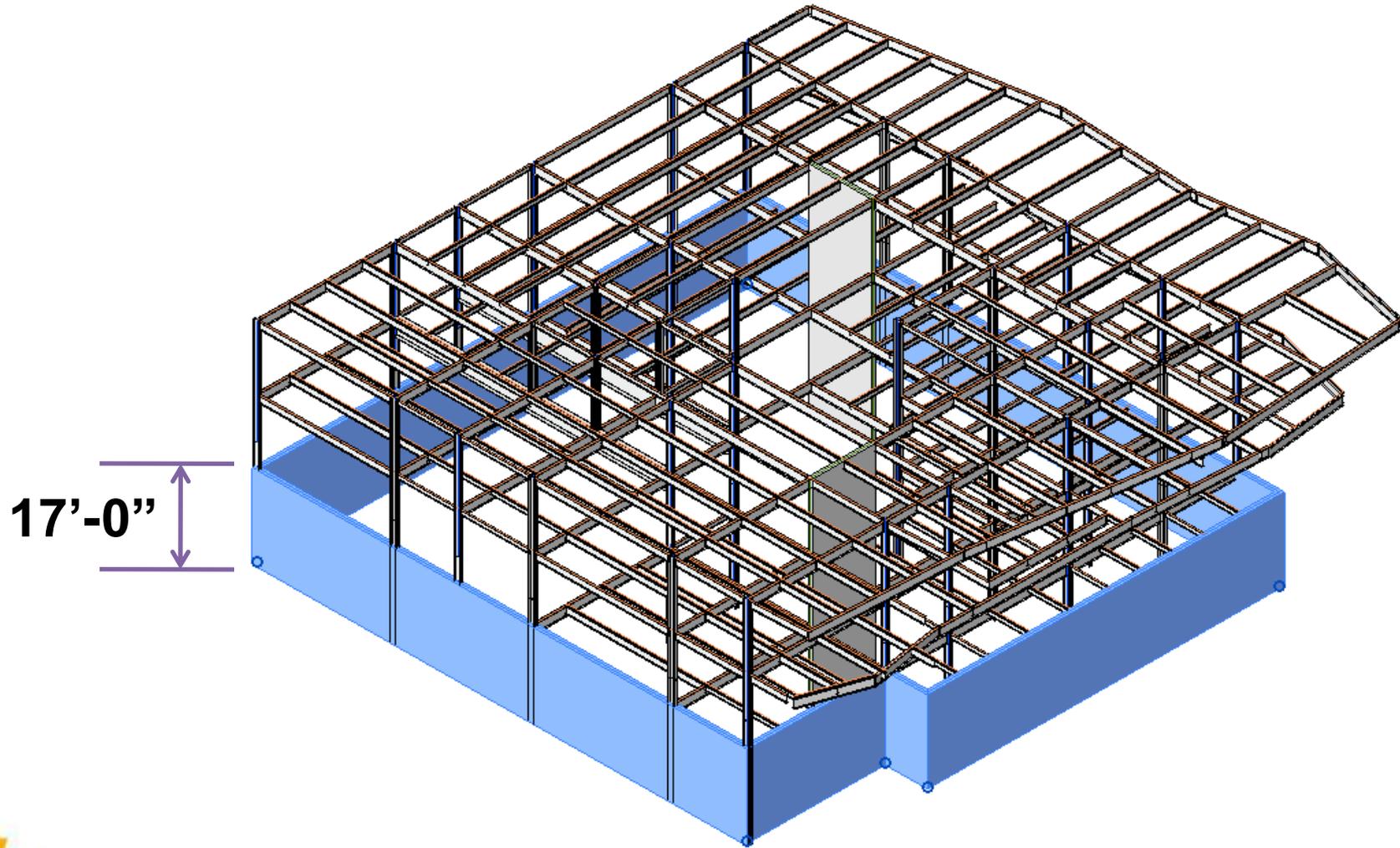
- $w_{\text{soil}} = 125 \text{ pcf}$
- $\phi = 30^\circ$
- $f = 0.45$



# CONCRETE RETAINING WALL



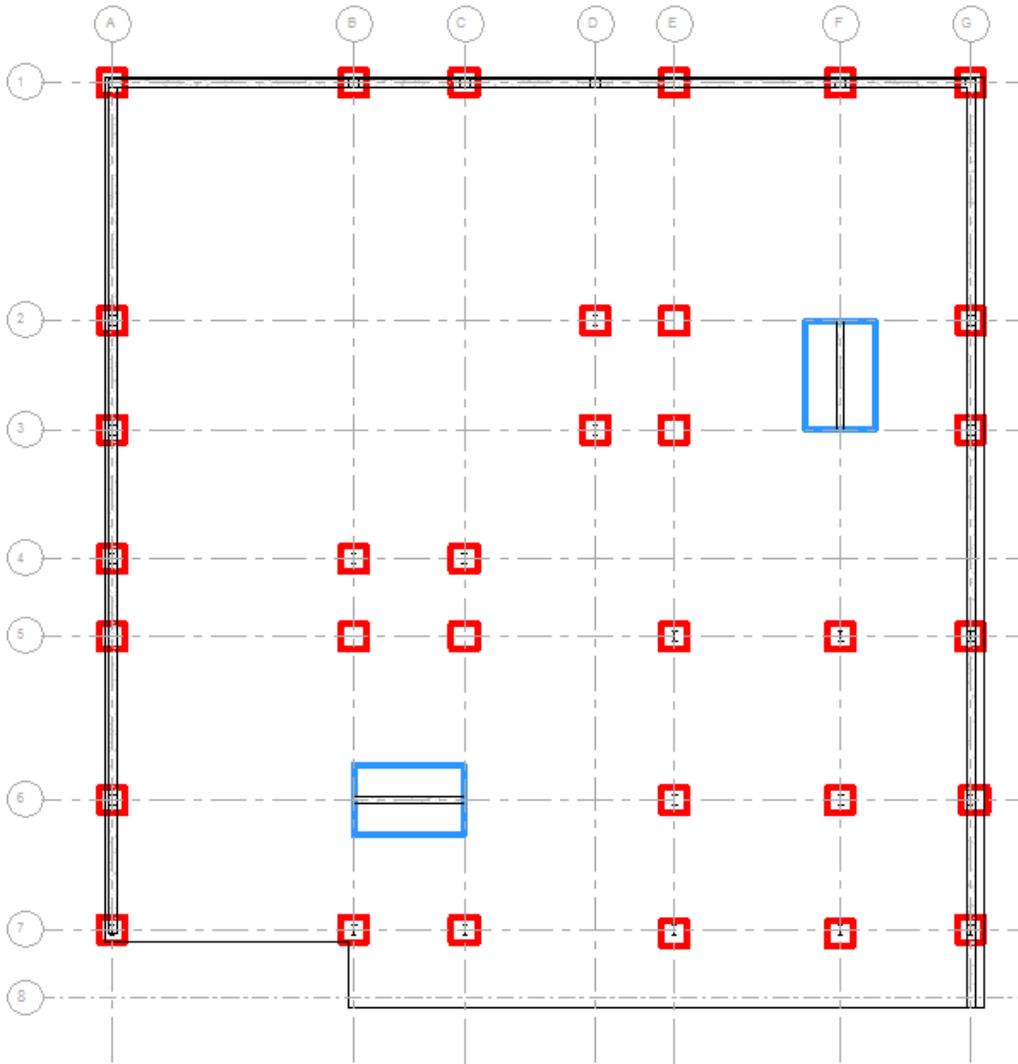
# CONCRETE RETAINING WALL – 3D VIEW



17'-0"



# SPREAD FOOTINGS



## Columns:

- 3' x 3' x 2'

## Shear Walls:

- Length = 12' - 8"
- Width = 8'
- Depth = 15"

*FOUNDATION PLAN*



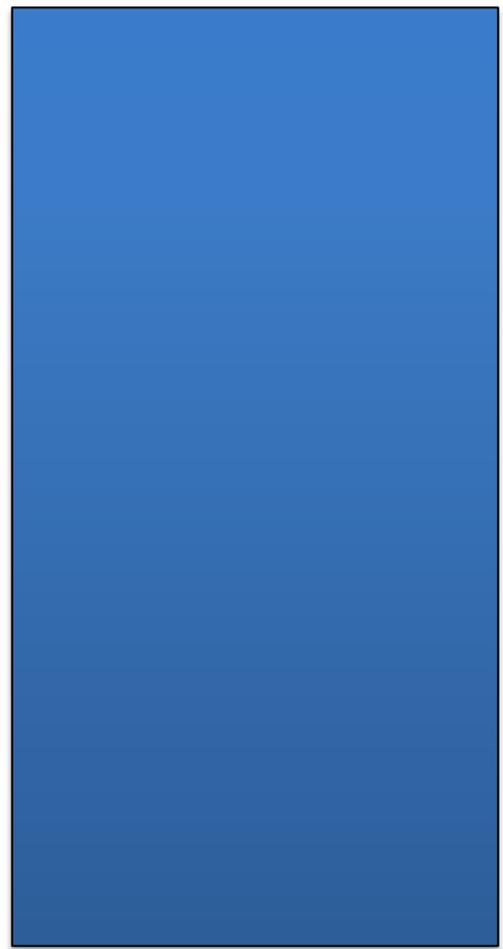
# SHEAR WALL DESIGN

235 kips

114 kips



**Pu = 396 kips**



47'

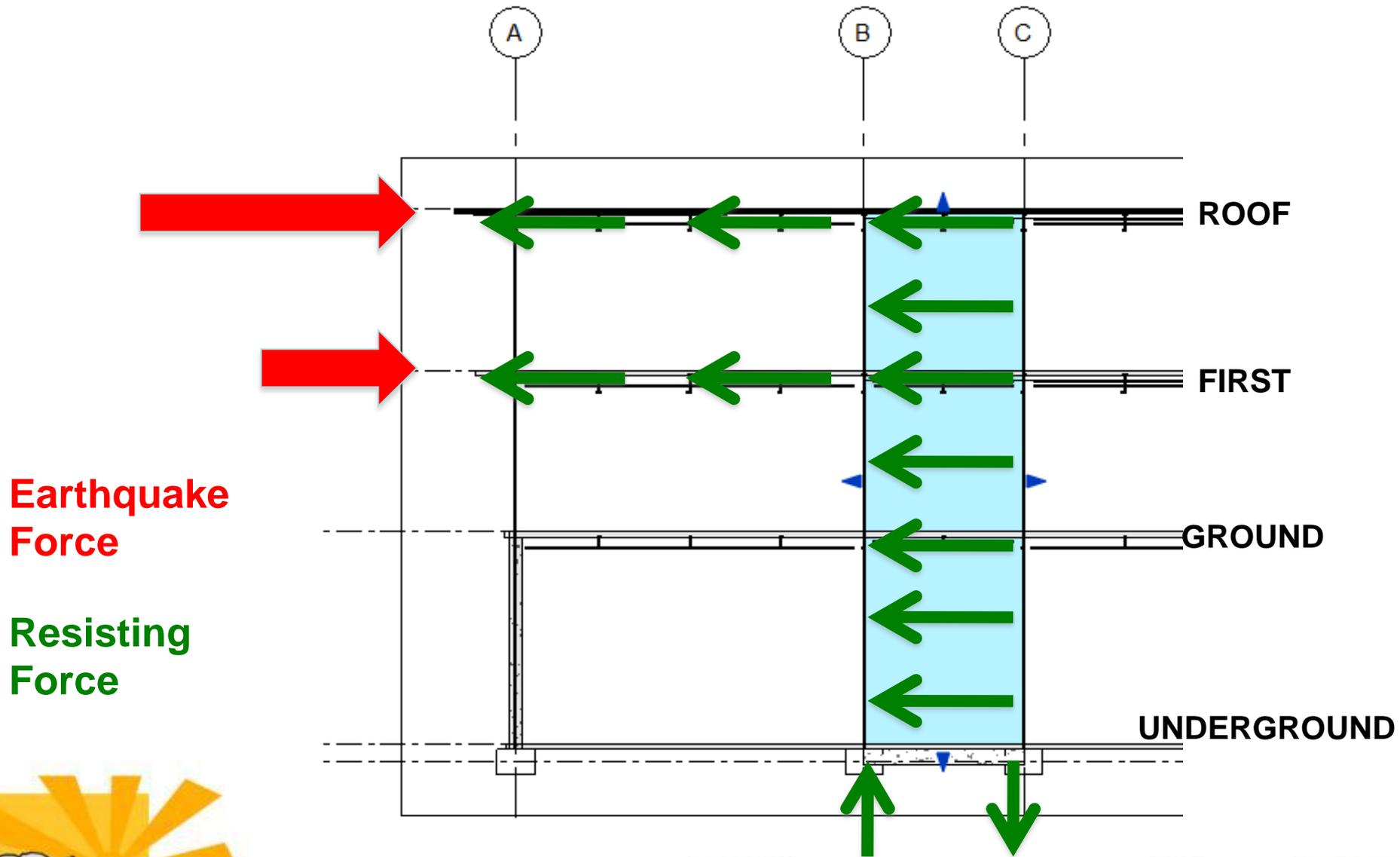
12'-8"



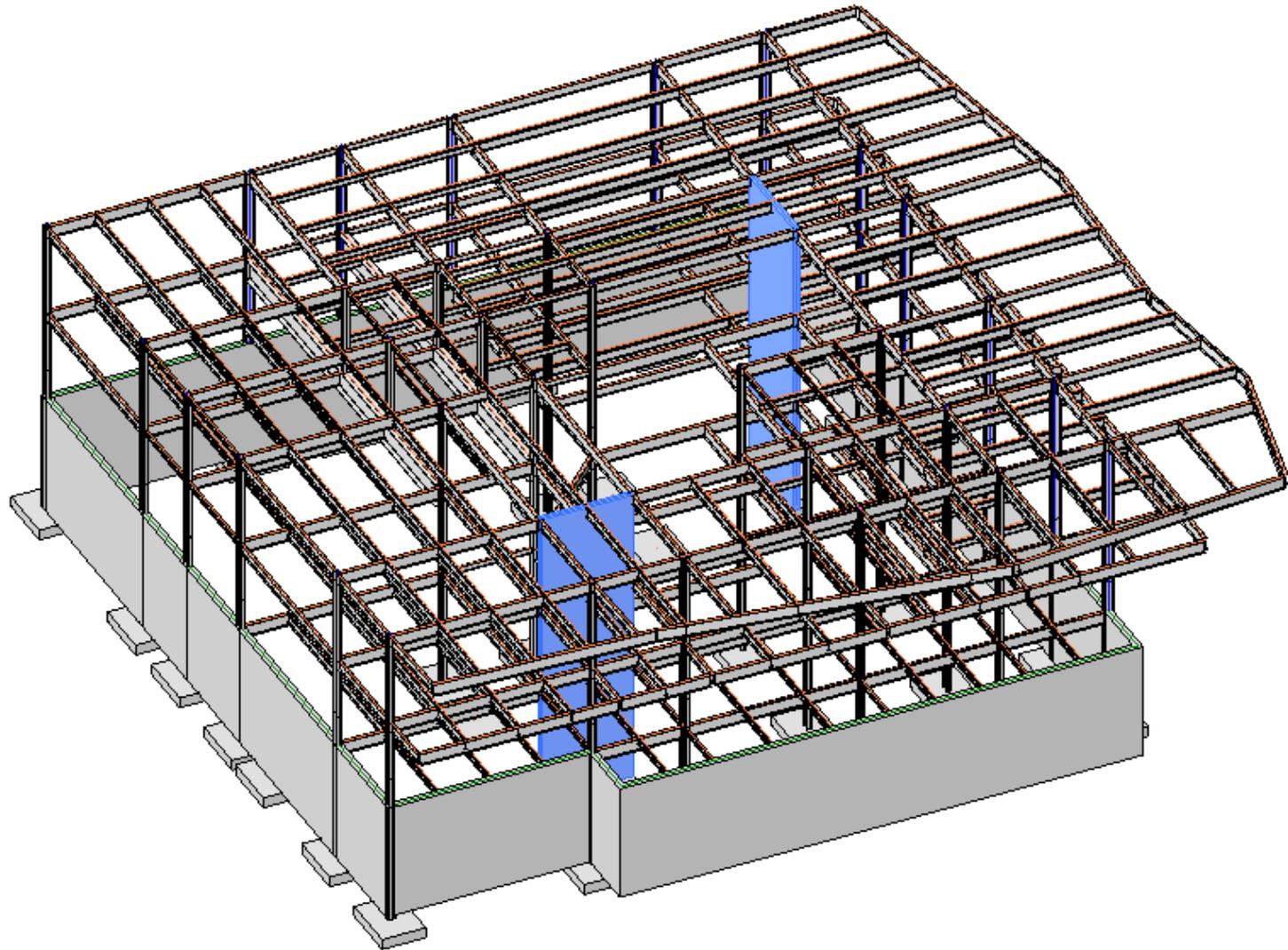
# LOAD PATH – 3D



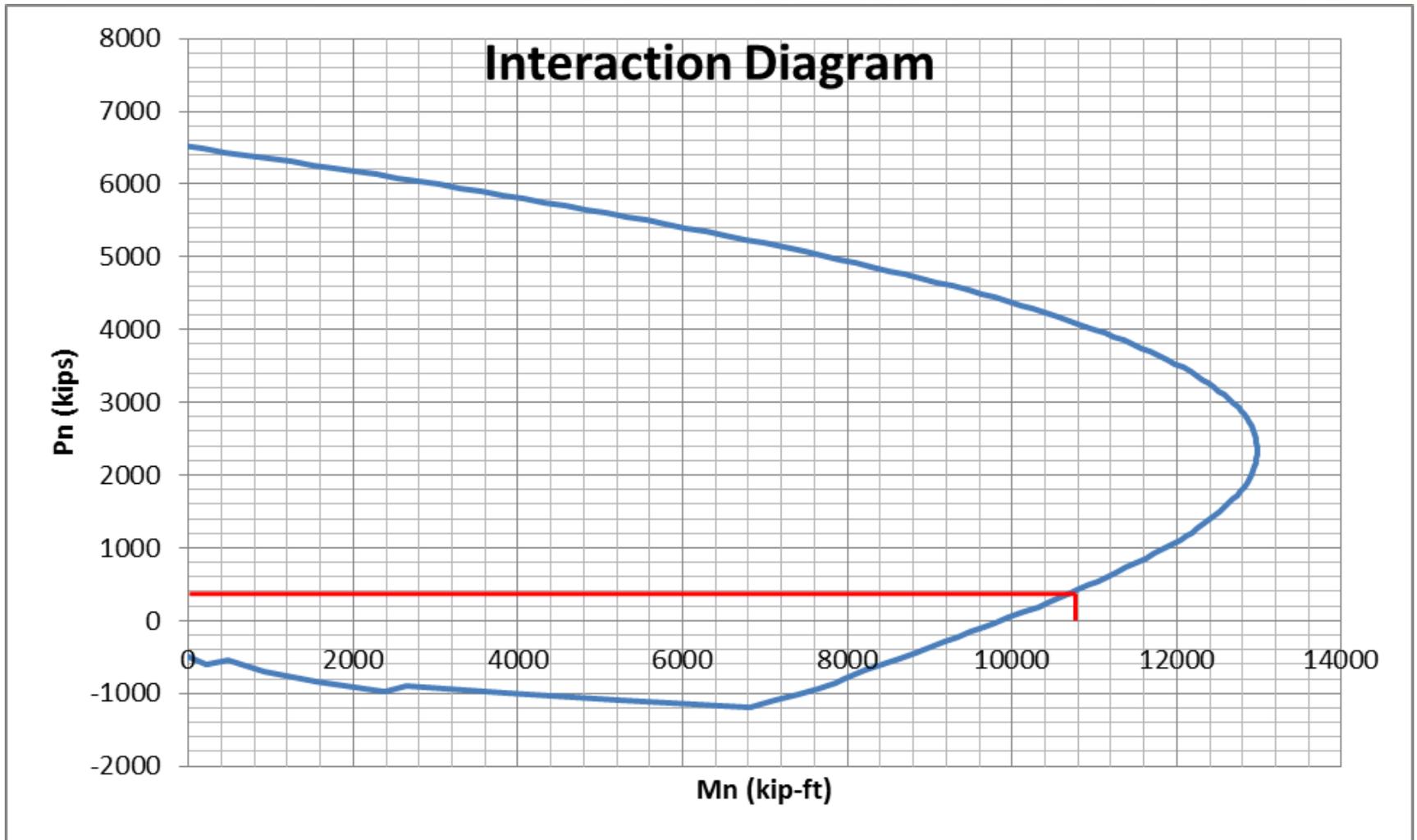
# LOAD PATH - ELEVATION



# CONCRETE SHEAR WALLS – 3D VIEW



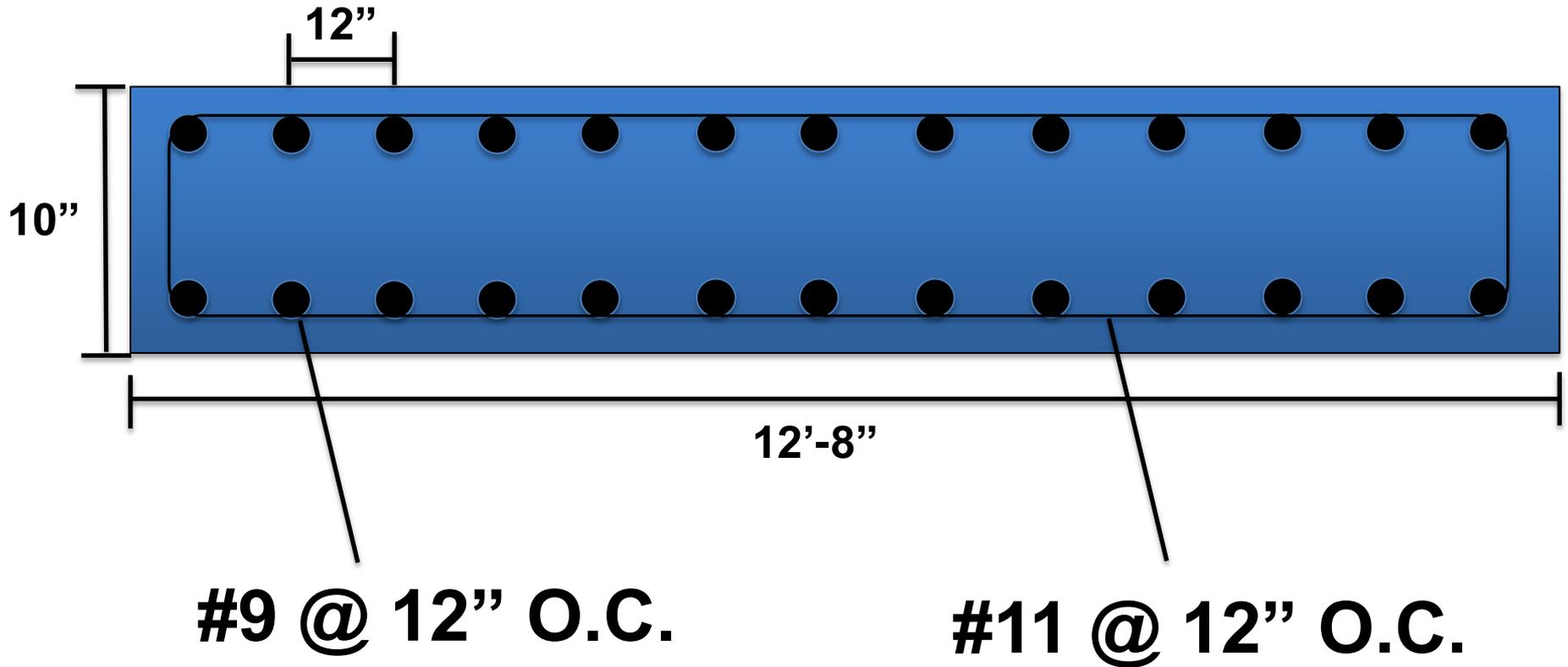
# SHEAR WALL CAPACITY



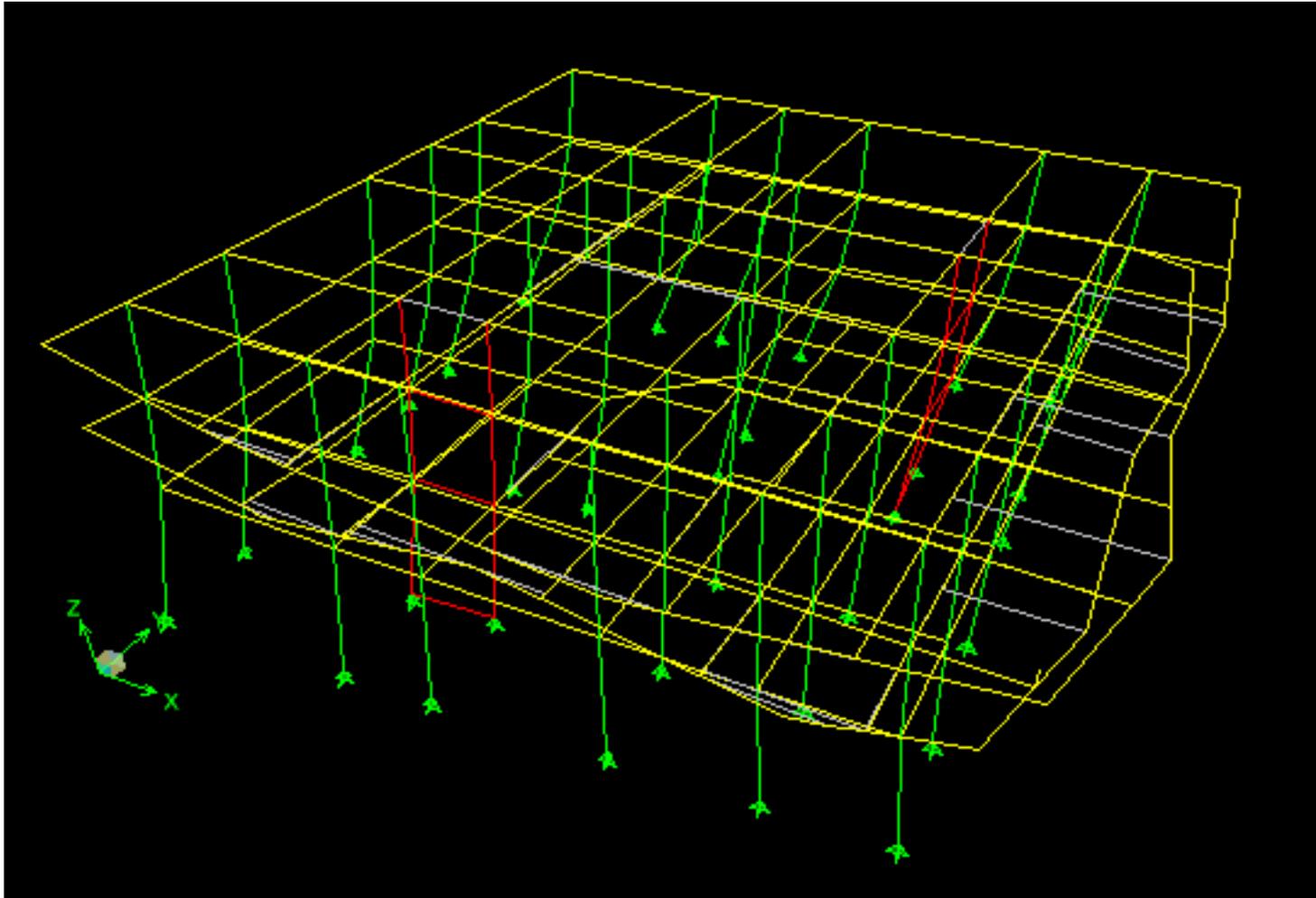
- *Moment Capacity of 10,800 kip-ft*



# SHEAR WALL – PLAN VIEW



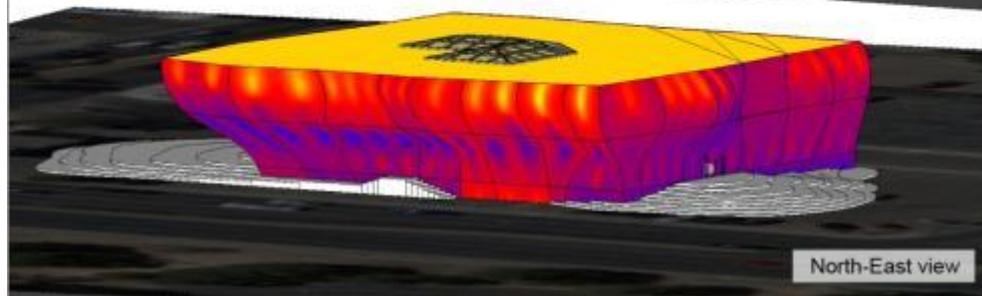
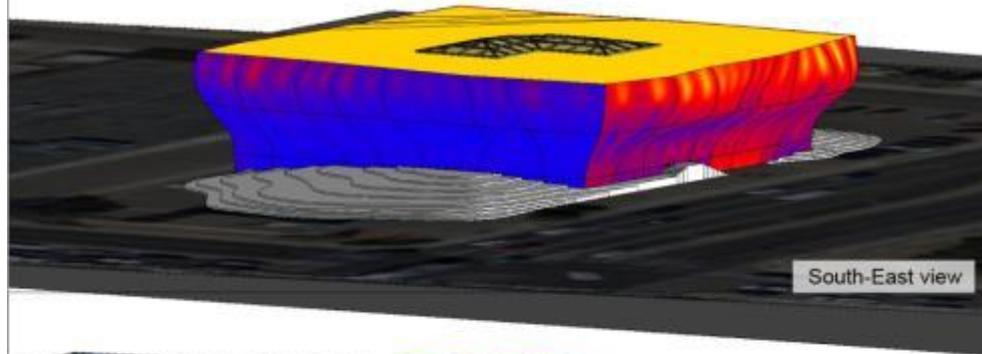
# *SHEAR WALL – PLAN VIEW*



**Max Interstory Drift of 0.019**



# SUN SHADING - SUMMER

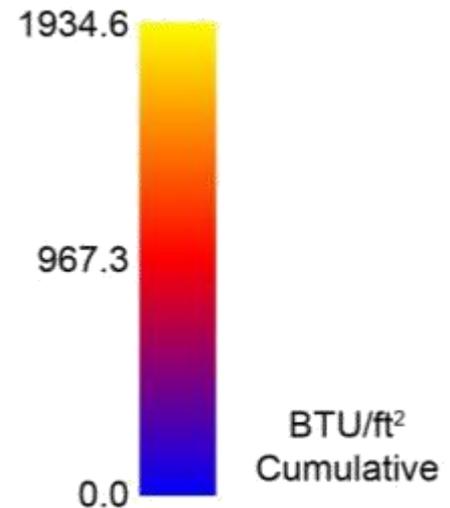


## SOLAR RADIATION ANALYSIS

### SUMMER SOLSTICE

Sun study start date time:  
6/22 5:57 AM

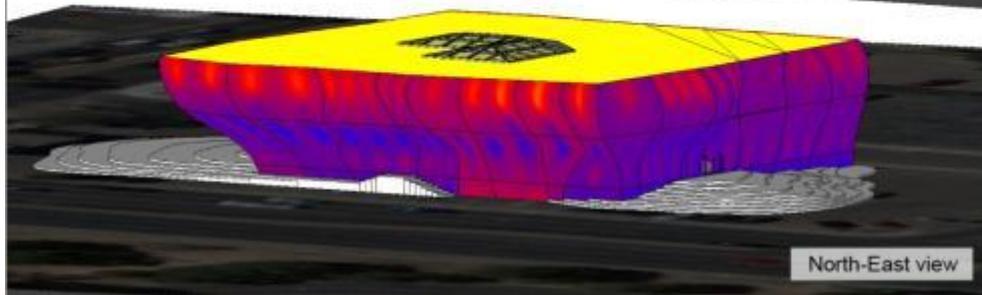
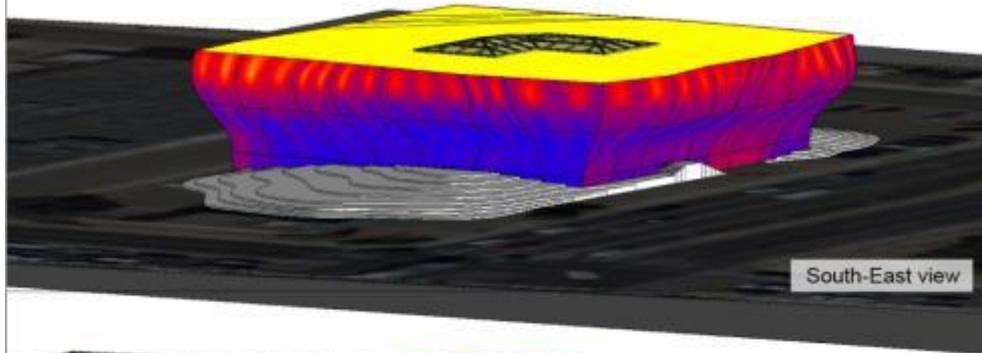
Sun study end date time:  
6/22 8:19 PM



# SUMMER SUN ANGLE



# SUN SHADING – SPRING/AUTUMN

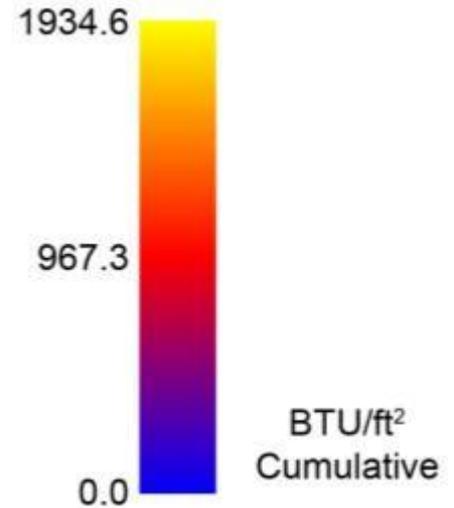


## SOLAR RADIATION ANALYSIS

### SPRING/AUTUMN EQUINOX

Sun study start date time:  
3/21 7:14 AM

Sun study end date time:  
3/21 7:12 PM



# SPRING/AUTUMN SUN ANGLE



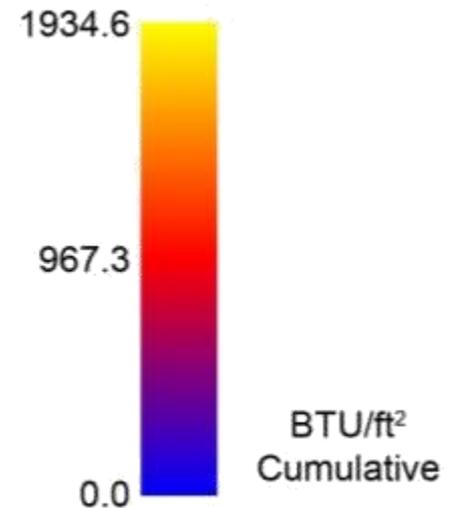
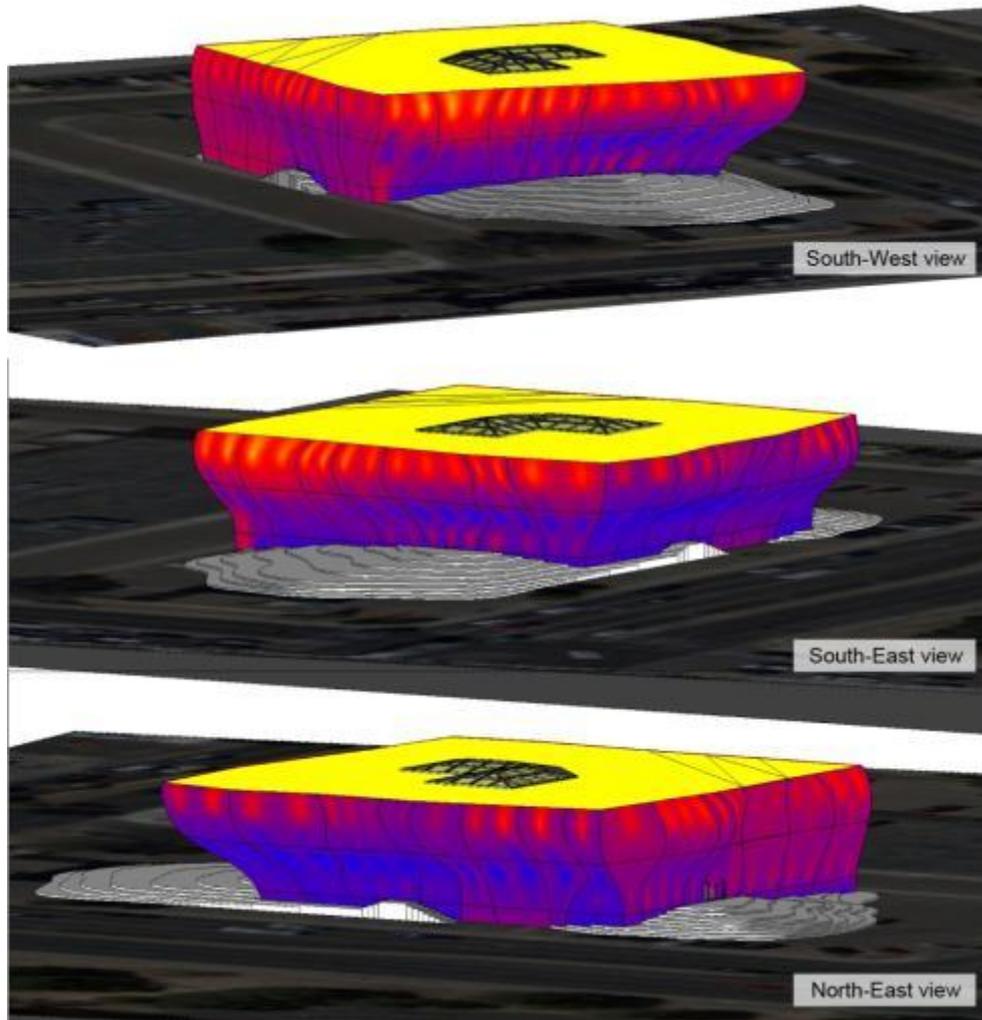
# SUN SHADING - WINTER

## SOLAR RADIATION ANALYSIS

### WINTER SOLSTICE

Sun study start date time:  
12/22 8:15 AM

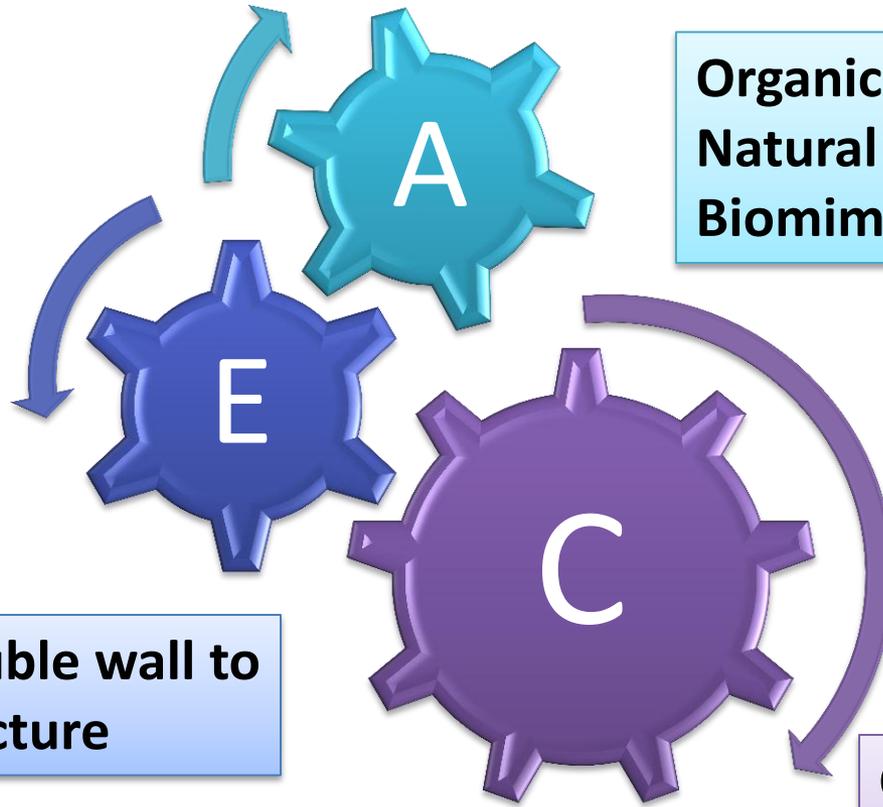
Sun study end date time:  
12/22 5:53 PM



# WINTER SUN ANGLE



# EXTERIOR WALL CHALLENGE



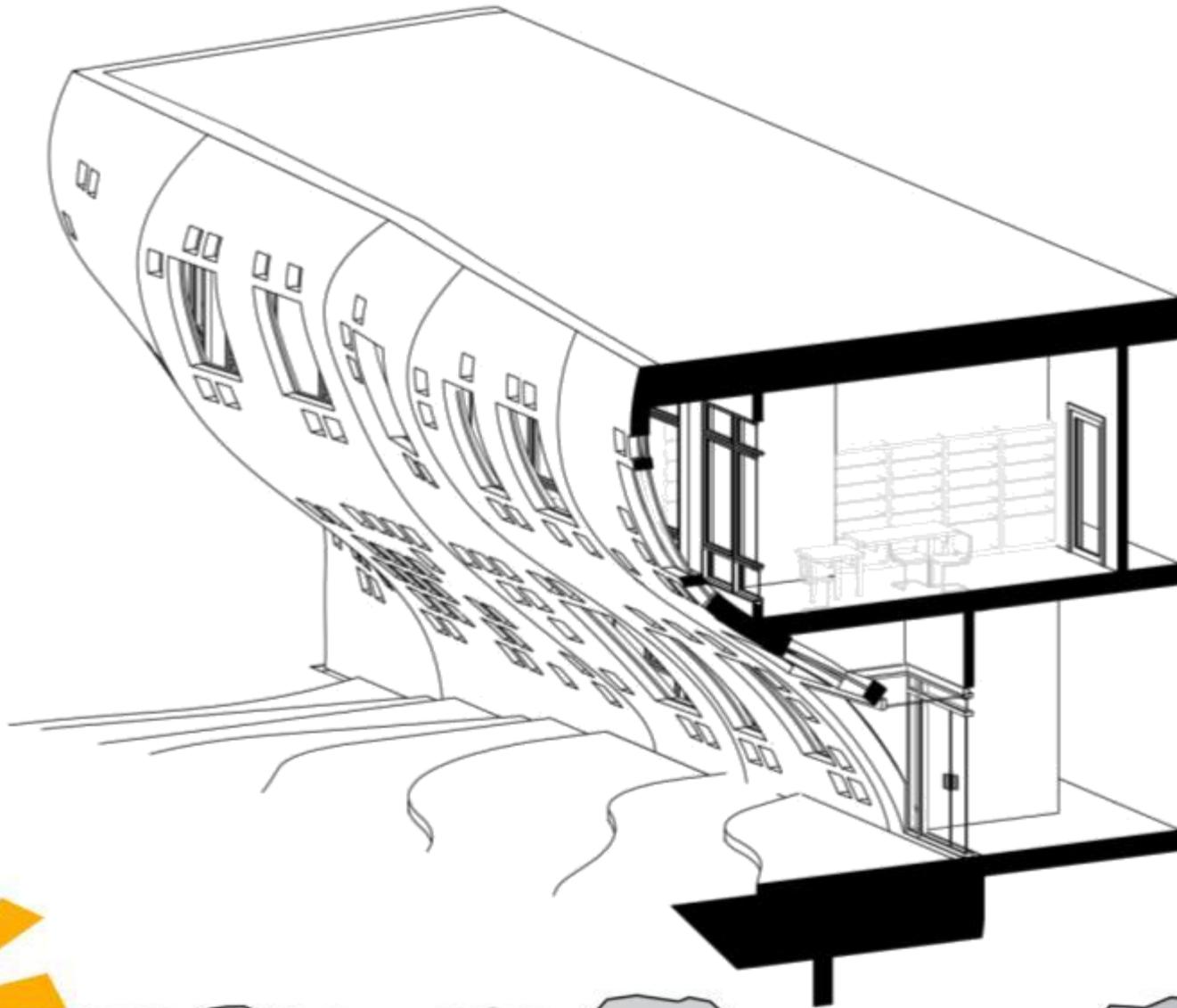
**Organic shape**  
**Natural Ventilation**  
**Biomimicry Inspiration**

**Attach double wall to structure**

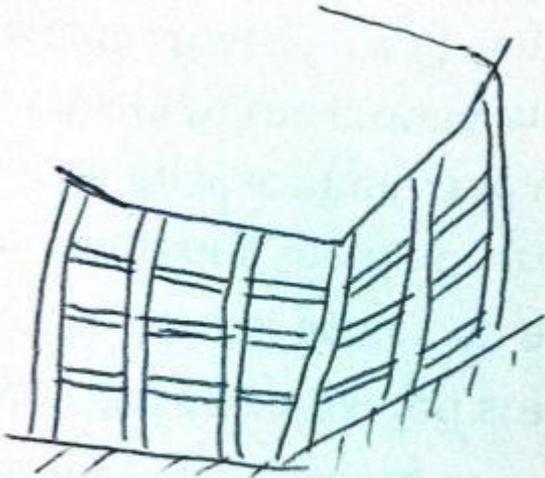
**Constructability concerns**  
**Almost double the cost**  
**Unique fabrication**



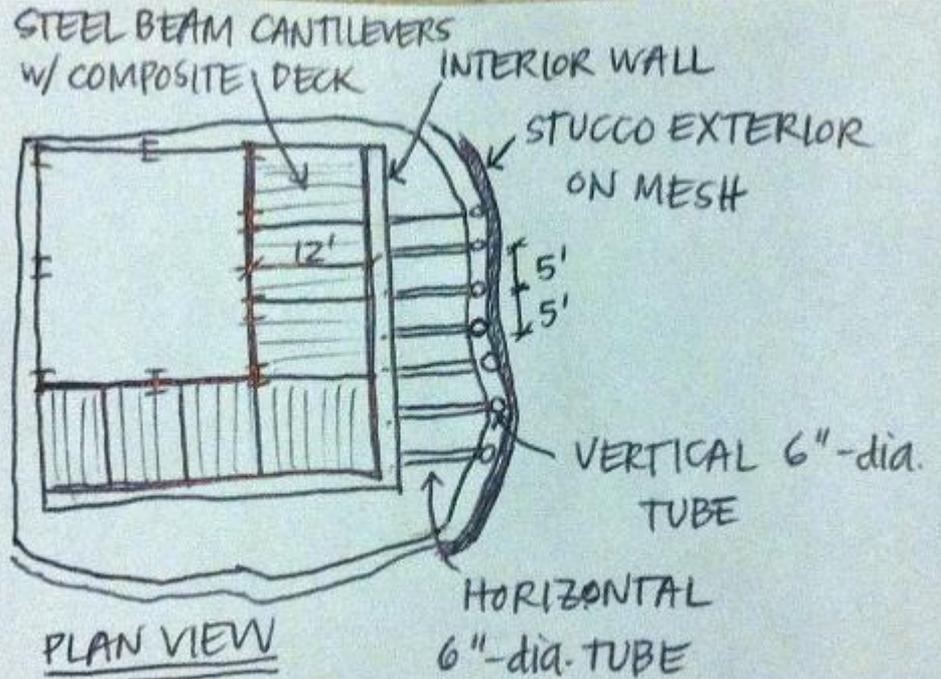
# ***DOUBLE EXTERIOR FAÇADE***



# "DOUBLE WALL" SKETCHES



3D-VIEW

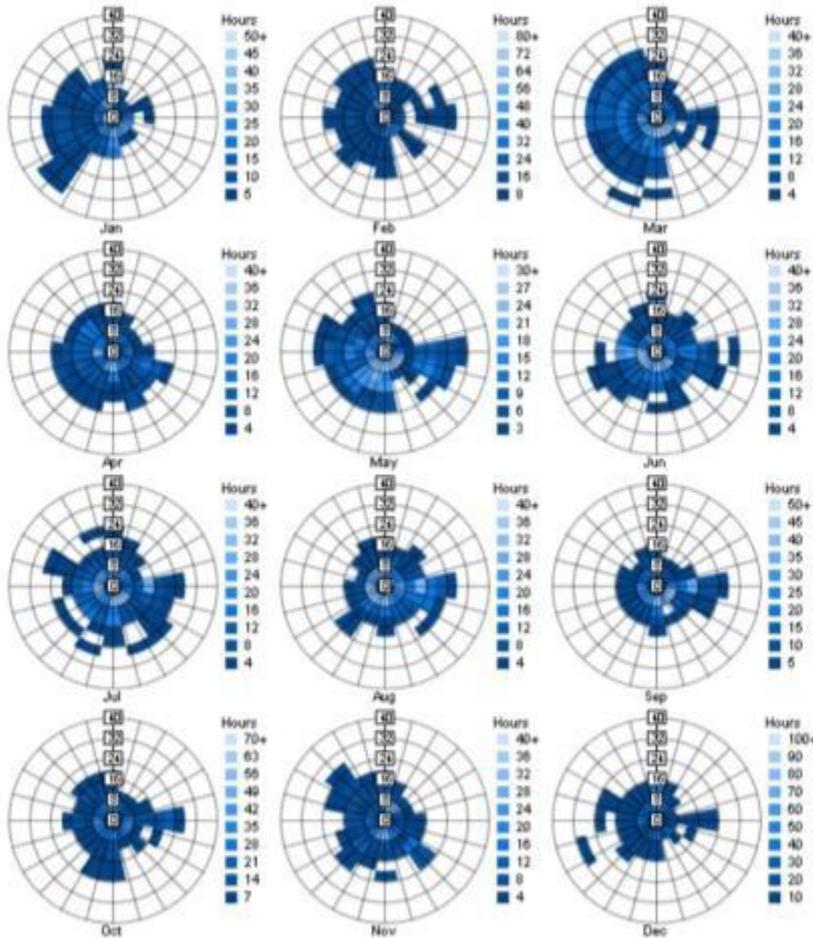


PLAN VIEW

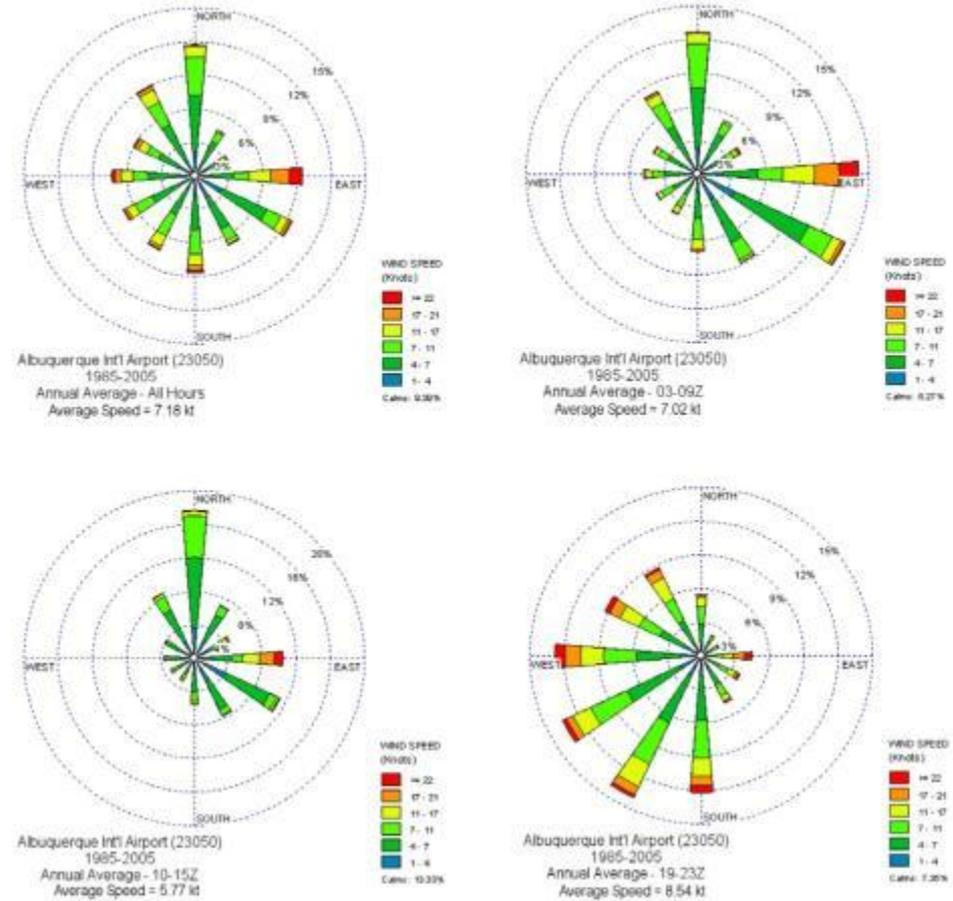


# SITE WIND CONDITIONS

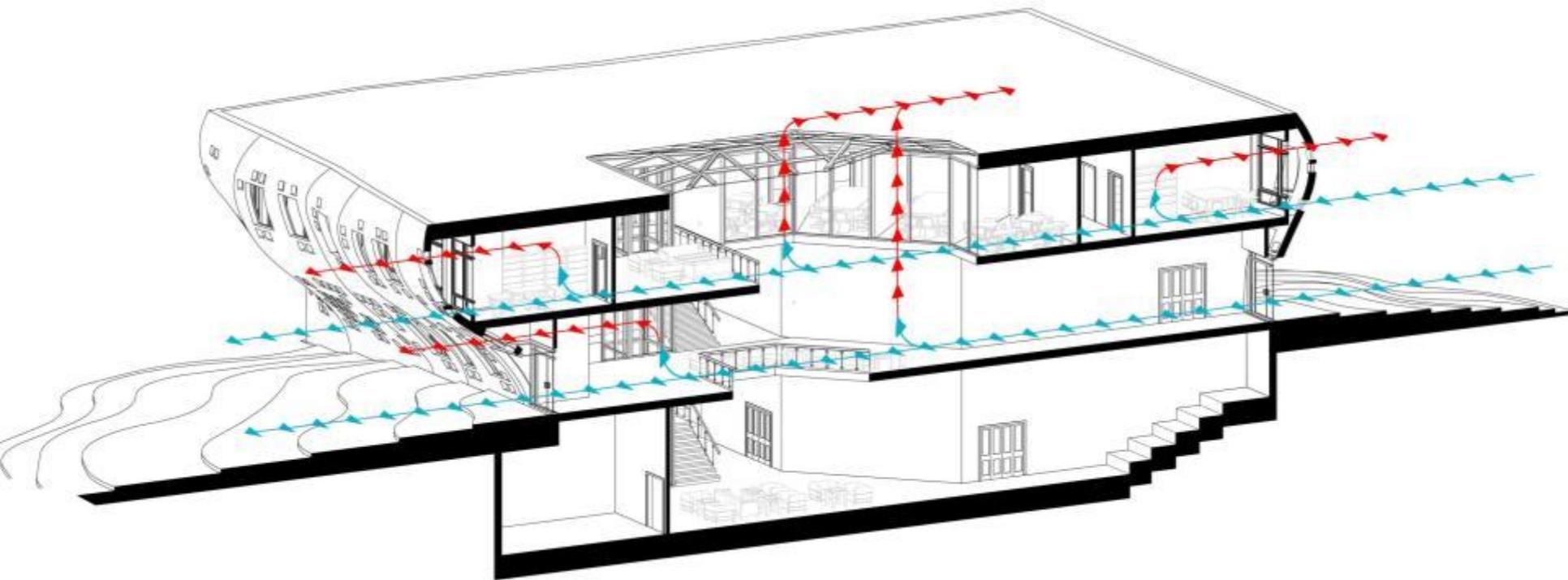
Monthly Wind Roses (Frequency Distribution)



Frequency distribution throughout day

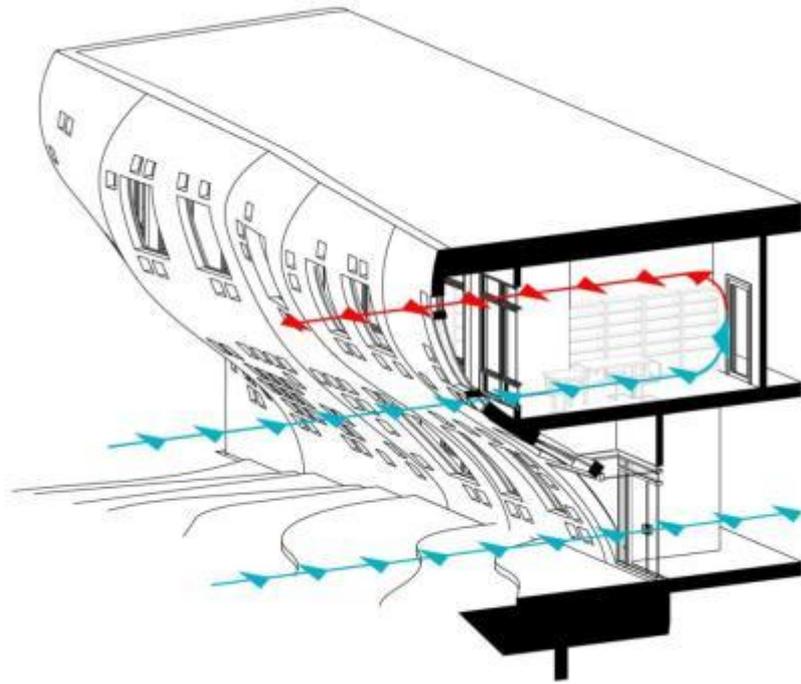


# ***NATURAL VENTILATION – AIR CIRCULATION***

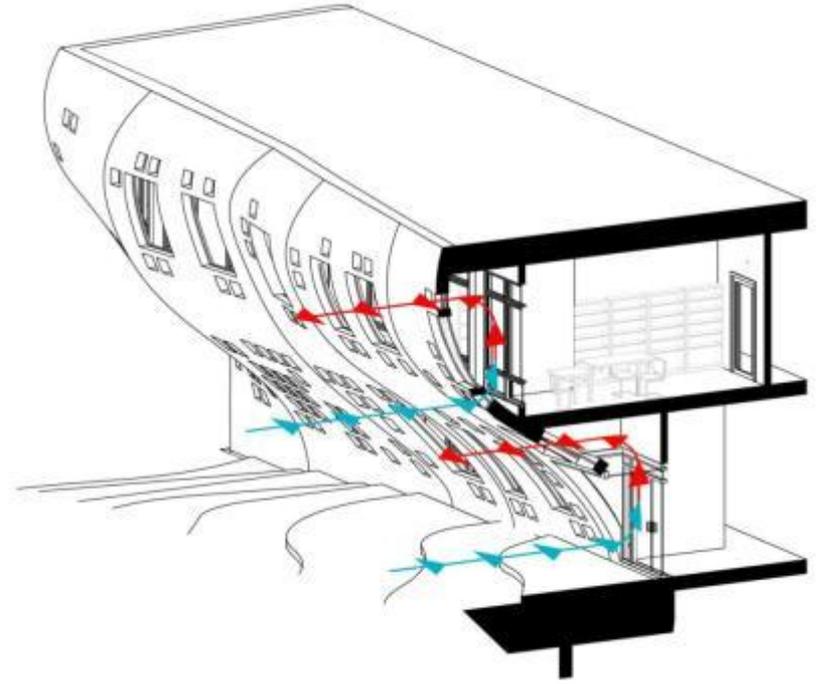


# NATURAL VENTILATION – AIR CIRCULATION

## SINGLE SIDED VENTILATION



## VENTILATED CAVITY



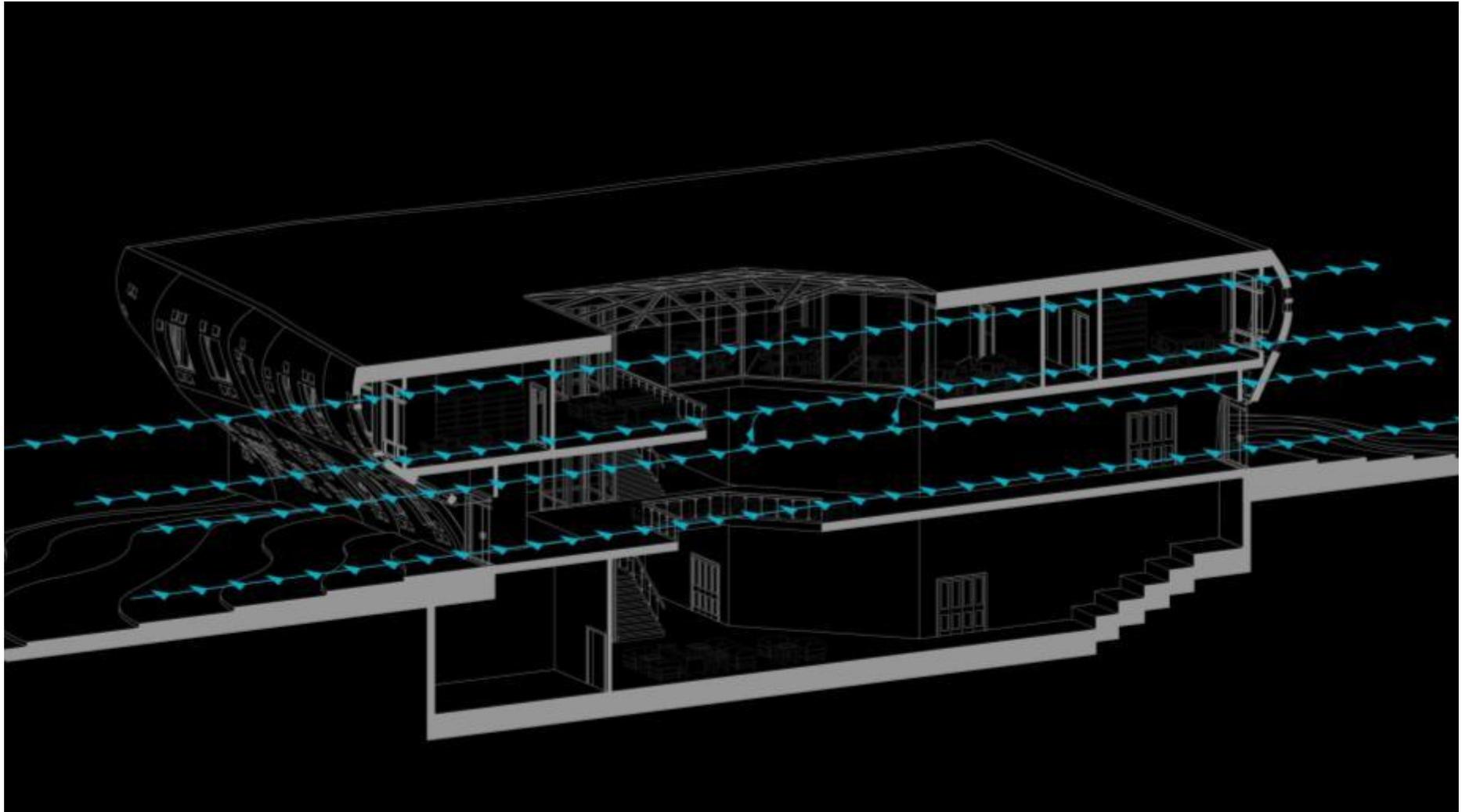
# ***FENESTRATION – SOUTH VIEW***



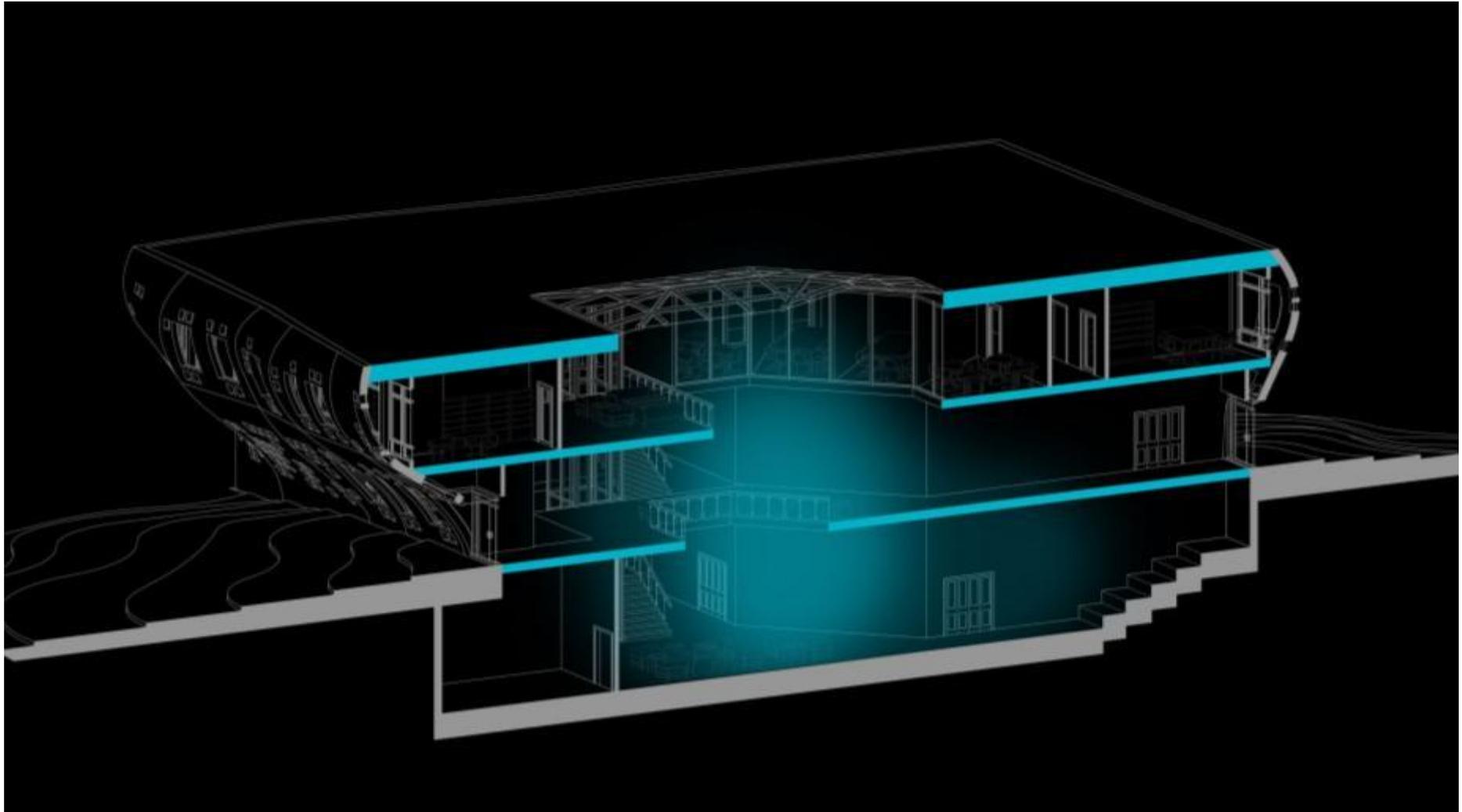
# ***FENESTRATION – NORTH VIEW***



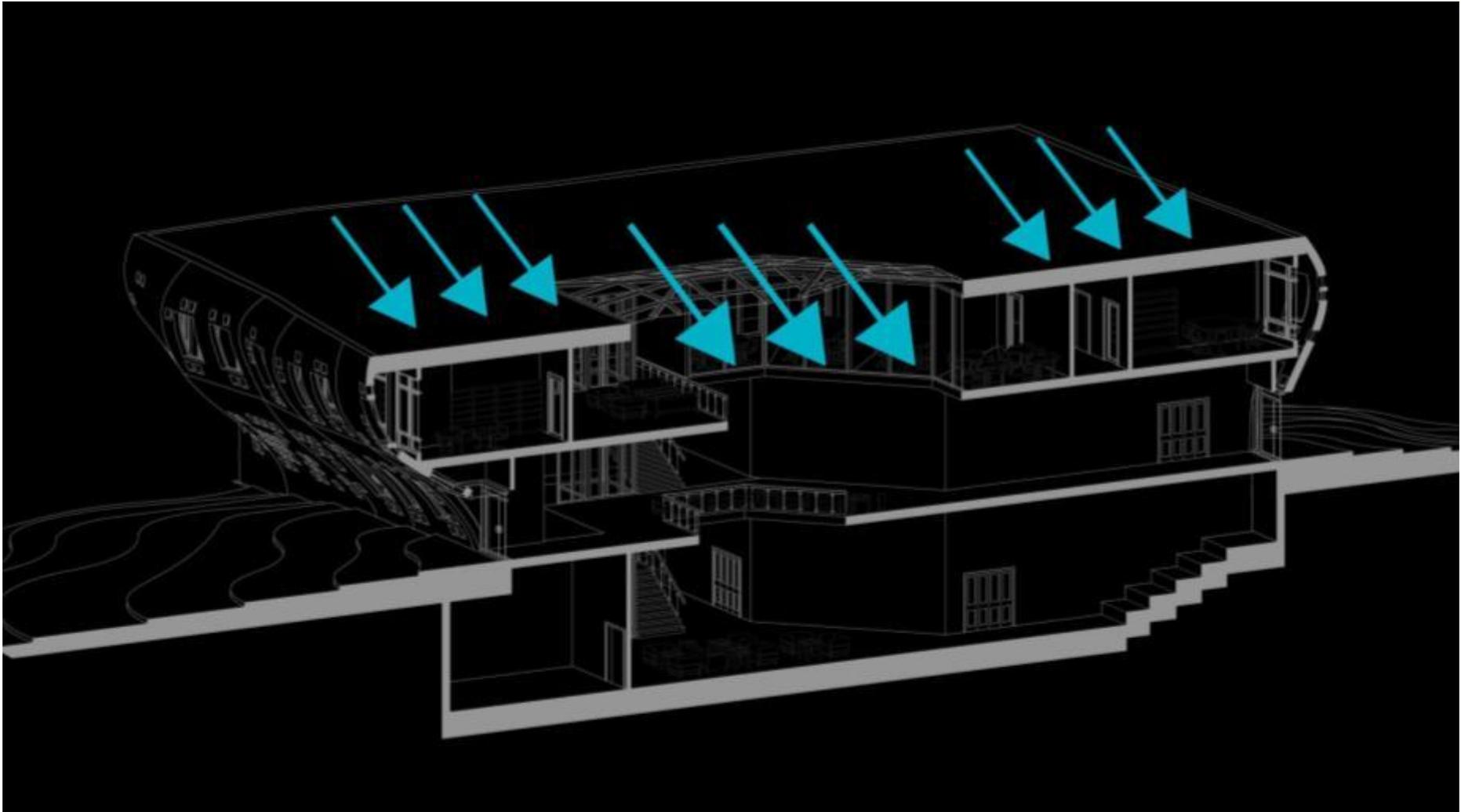
# ***NATURAL VENTILATION – NIGHT COOLING***



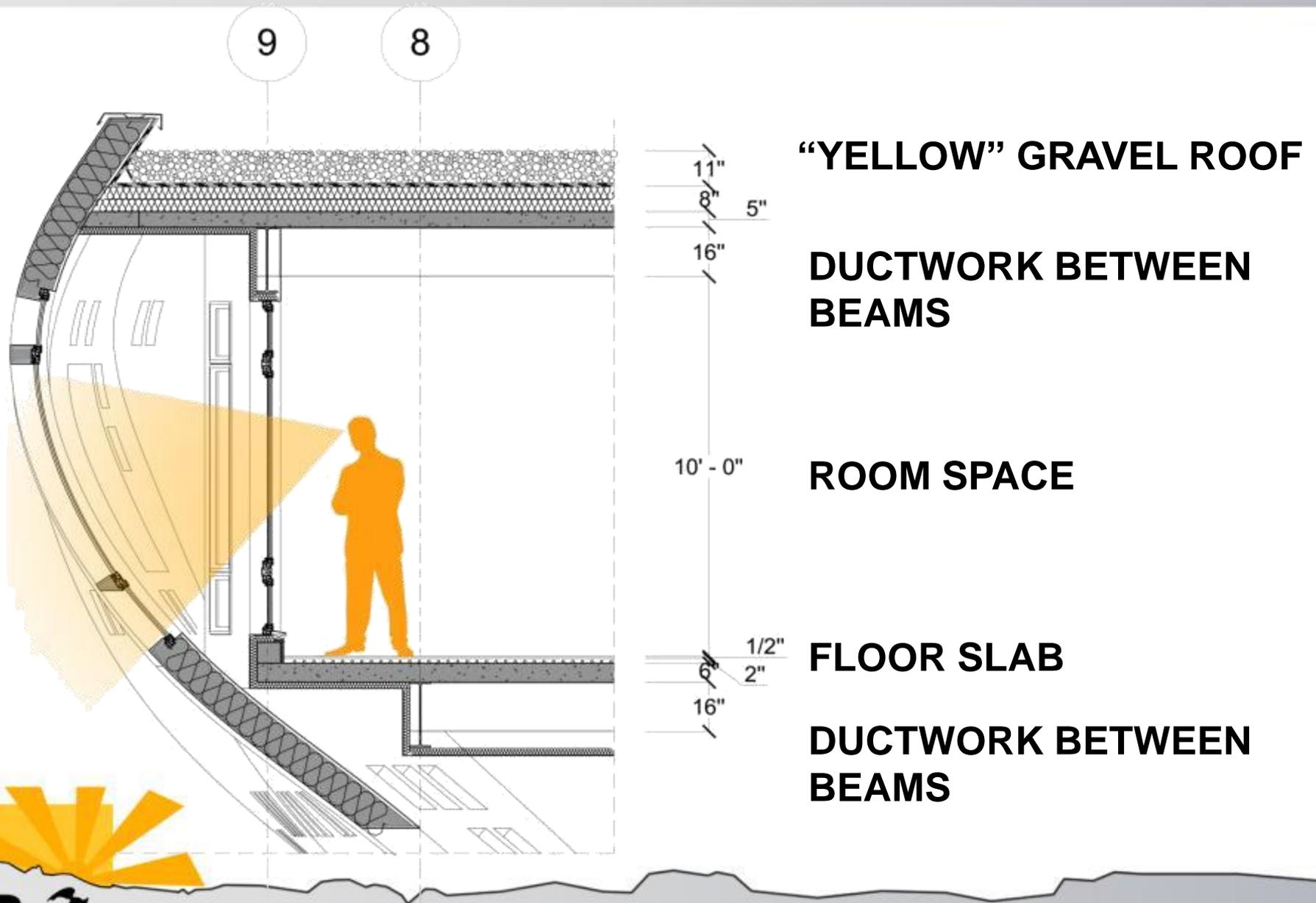
# ***NATURAL VENTILATION – NIGHT COOLING***



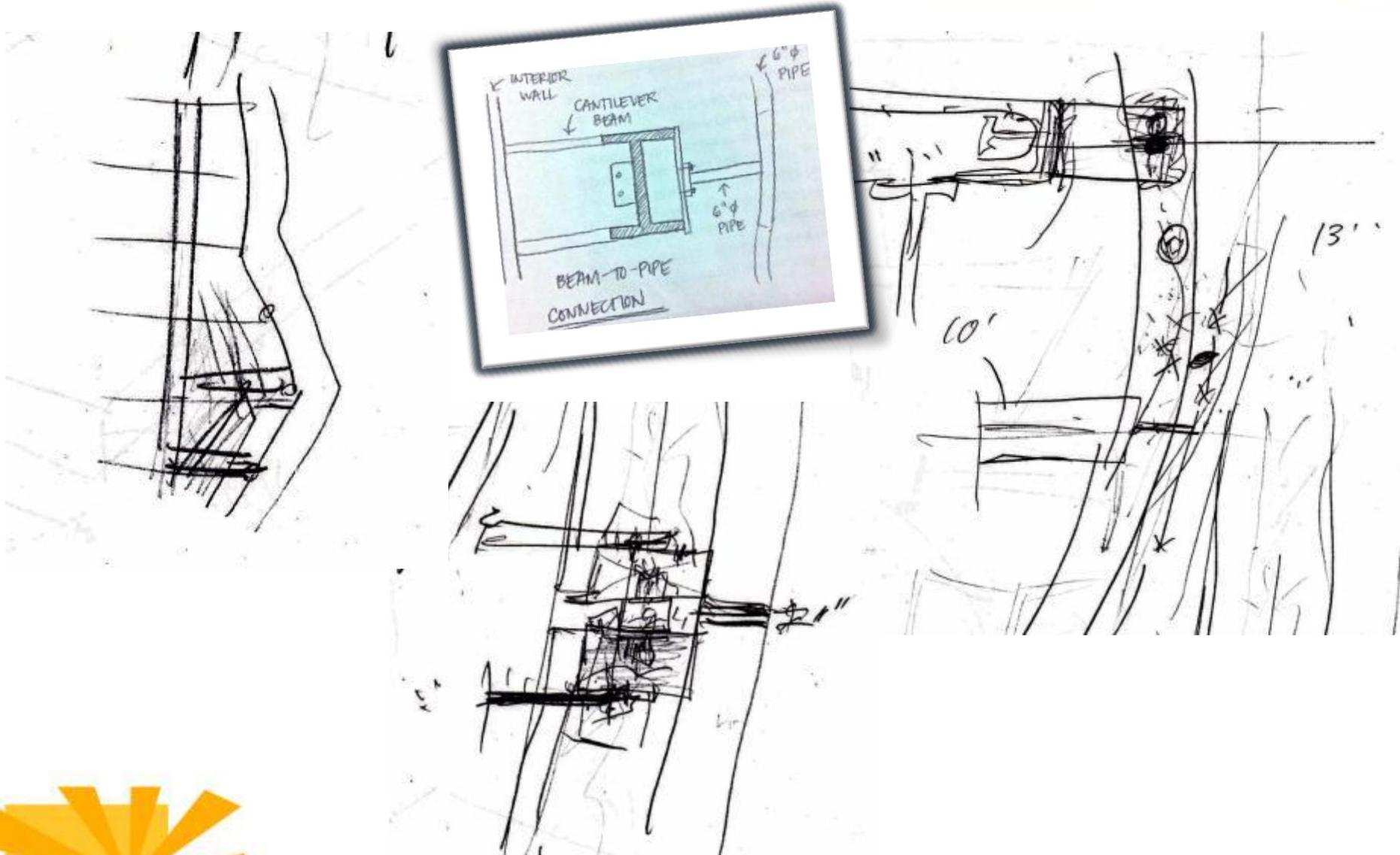
# NATURAL VENTILATION – NIGHT COOLING



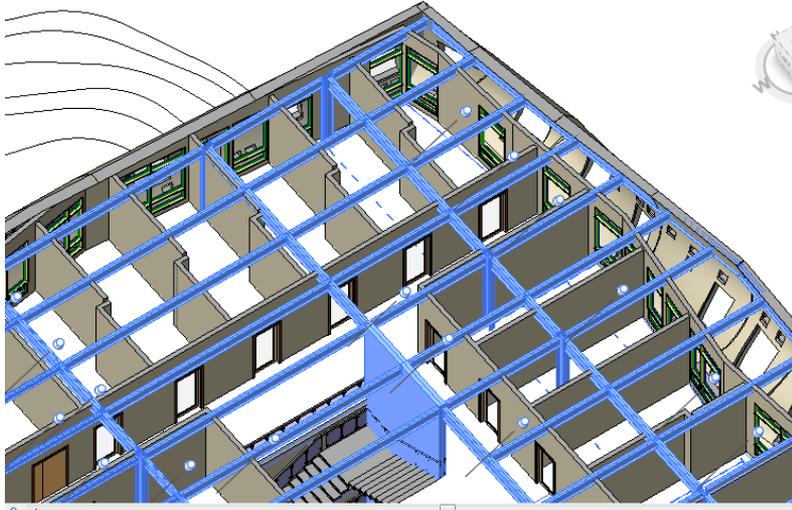
# FLOOR SANDWICH



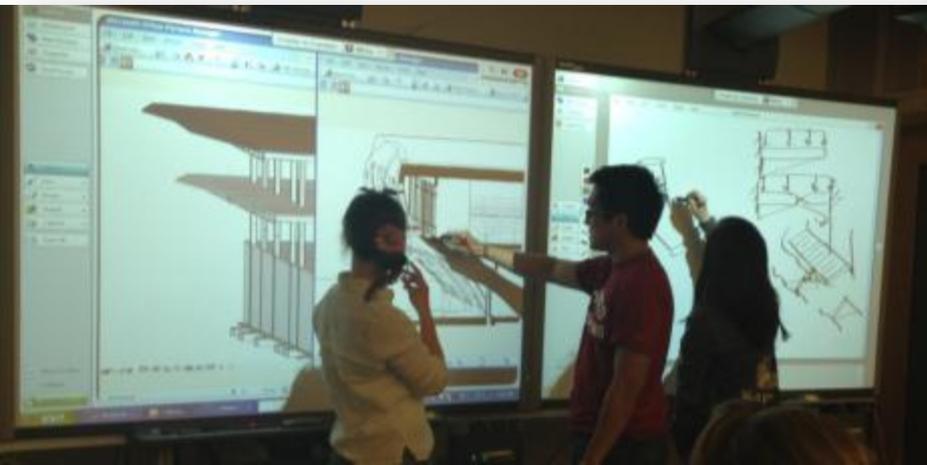
# "DOUBLE WALL" PRELIMINARY SKETCHES



# EXTERIOR WALL PROBLEM-SOLVING

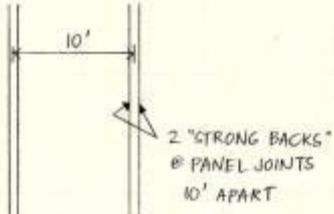


**A+E Collaboration**



# DESIGN OF PANEL "STRONG BACK"

## DESIGN OF PANEL "STRONG BACK"



CHECK WALL FOR 25 PSF LATERAL LOAD:

$$W_u = 1.6 (5') (0.025 \text{ KSF}) = 0.2 \text{ KLF}$$

$$L = 13'$$

ASSUME SIMPLY-SUPPORTED (CONSERVATIVE)

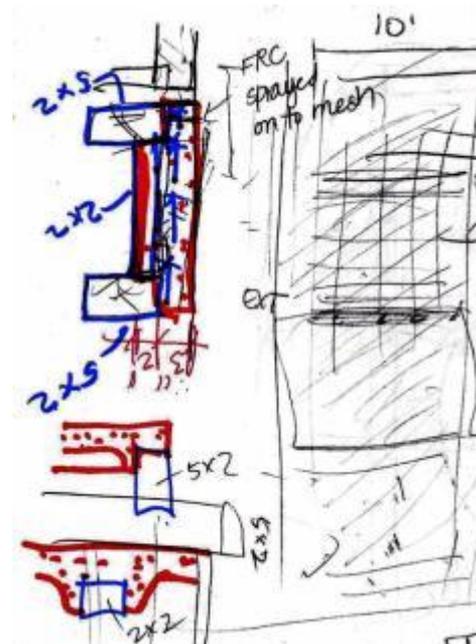
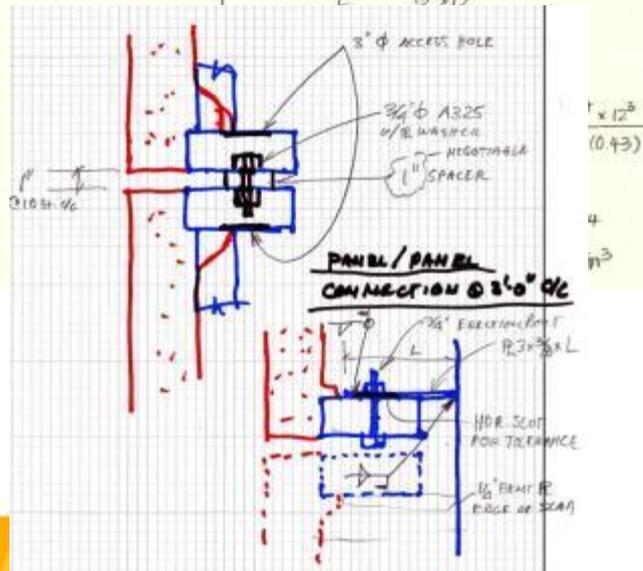
$$M_u = \frac{W_u L^2}{8} = \frac{(0.2)(13')^2}{8} = 4.2 \text{ K/FT}$$

$$Z_{REQ'D} = \frac{4.2(12)}{0.9(46)} = 1.2 \text{ in}^3$$

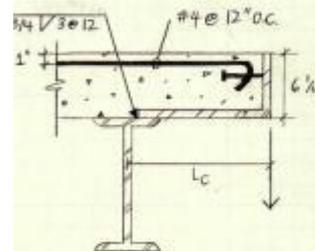
TRY HSS 2 1/2 x 2 1/2 x 3/16

CHECK DEFLECTION LIMIT:

$$L = 13' \times 12$$



## EDGE OF SLAB - BENT PLATE DETAIL



CONSTRUCTION:

NORMAL WT CONG = 120 PCF

CONSTRUCTION LL = 20 PSF

$$W_D = 1.2 \left( \frac{6.25}{12} \right) (0.12 \frac{\text{K}}{\text{FT}^2}) = 0.075 \text{ KSF}$$

$$W_L = 1.6 (0.02 \text{ KSF}) = 0.032 \text{ KSF}$$

$$W_u = W_D + W_L = 0.107 \text{ KSF}$$

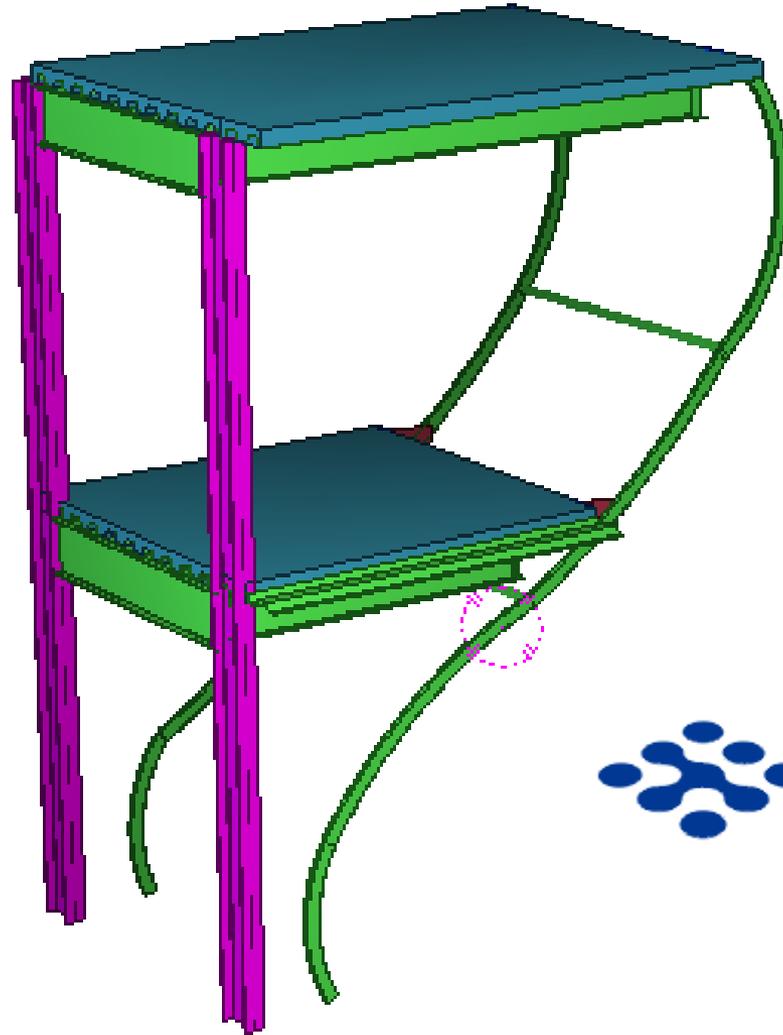
$$M_u = \frac{0.07 (L_c)^2 \times 12}{2}$$

$$\phi M_n = (0.9) \frac{12 (0.25)^2}{4} (36) = 6 \frac{\text{K-FT}}{\text{FT}}$$

$$L_c = \sqrt{\frac{2(6)}{0.107(12)}} = 3 \text{ FT}$$



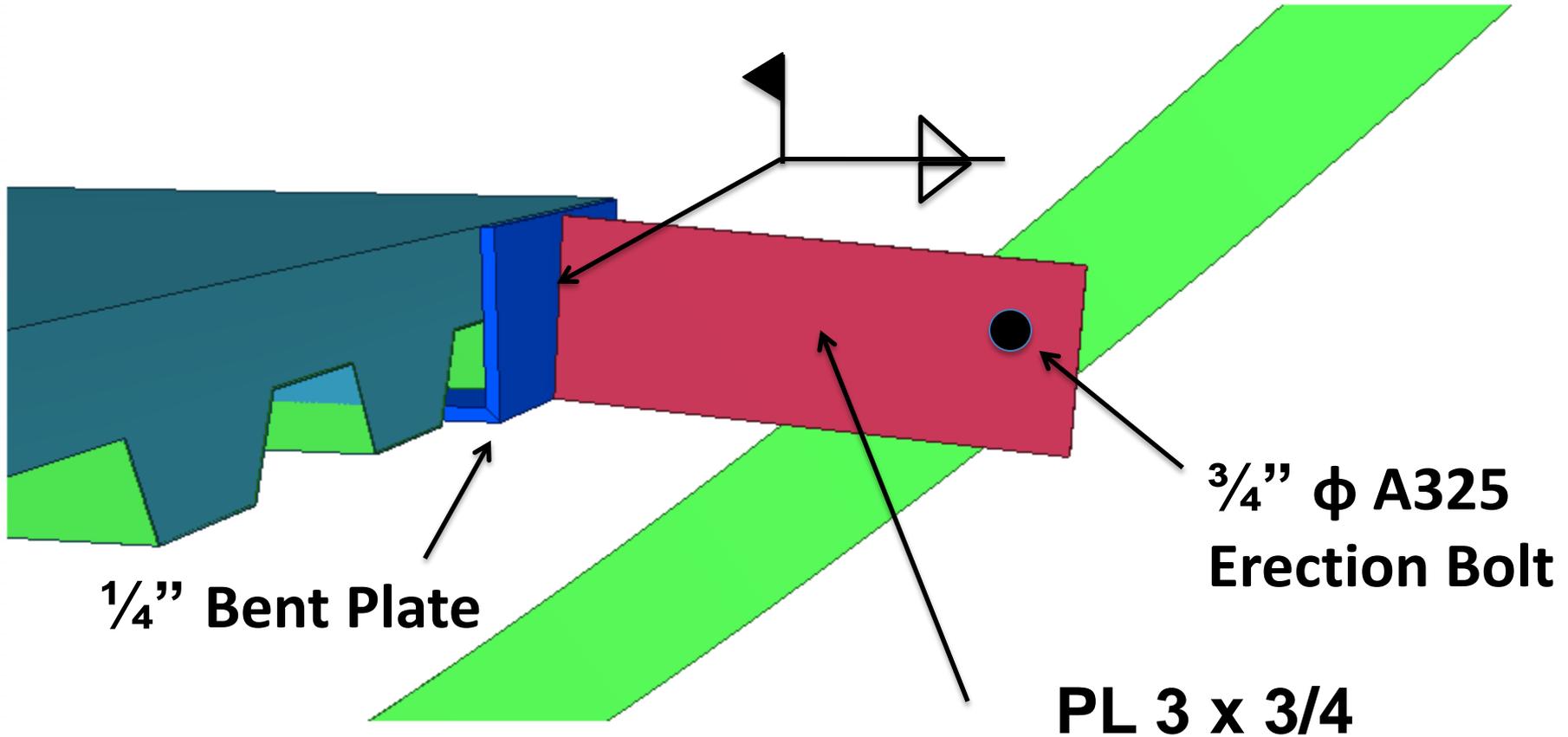
# FAÇADE CONSTRUCTION



**TEKLA**



# FAÇADE CONSTRUCTION



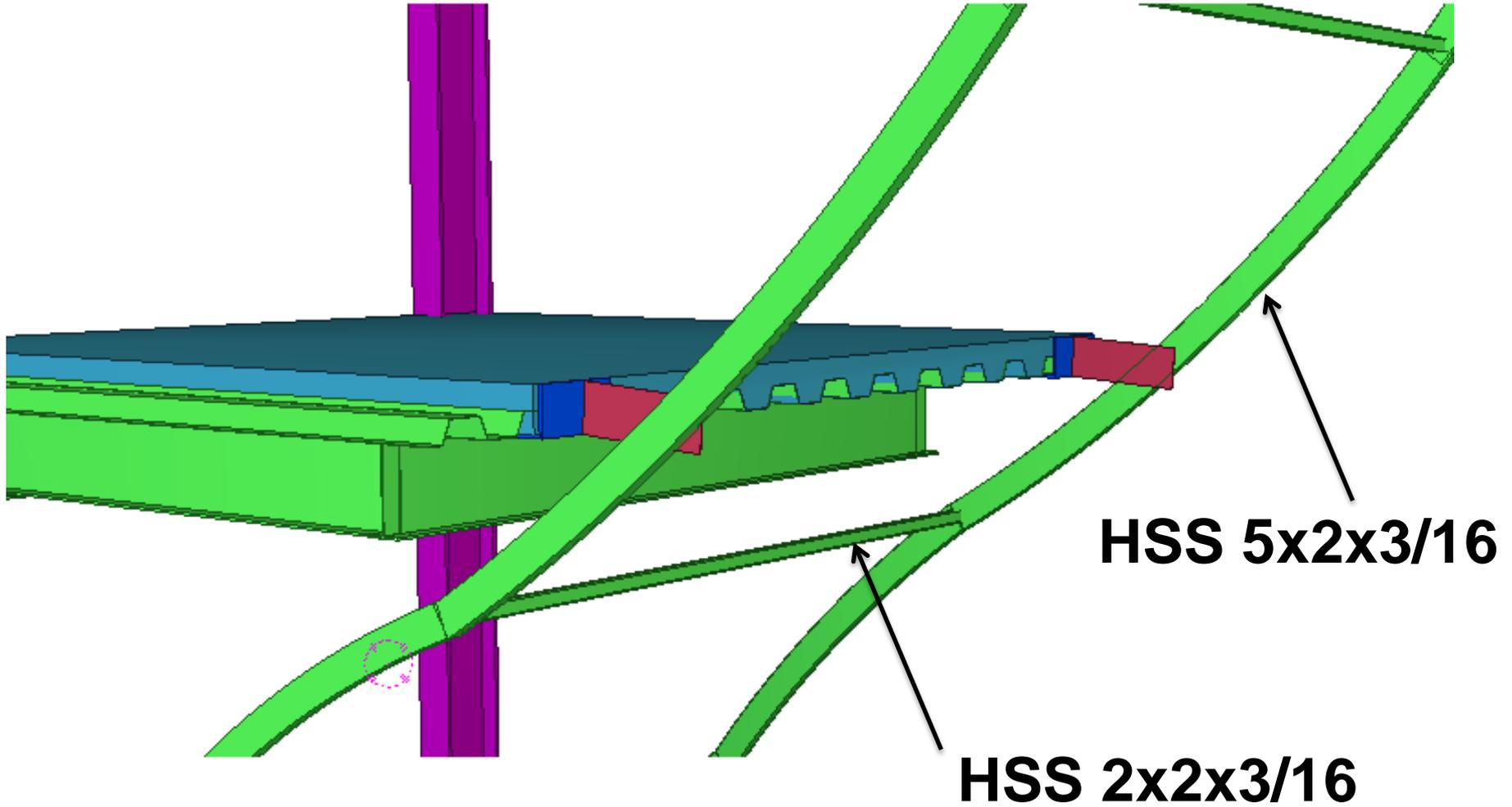
**1/4'' Bent Plate**

**3/4''  $\phi$  A325  
Erection Bolt**

**PL 3 x 3/4**



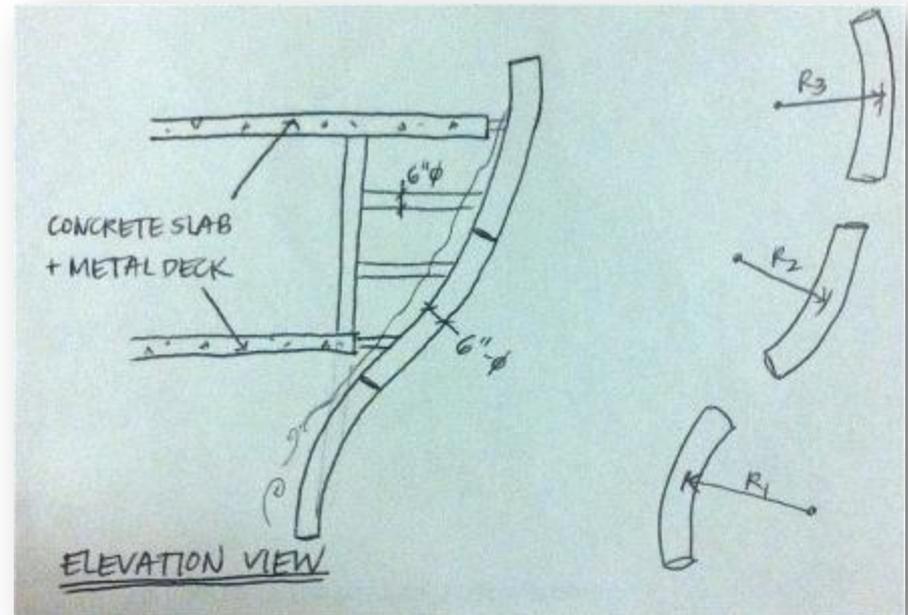
# FAÇADE CONSTRUCTION



# REPETITION, REPETITION, REPETITION...



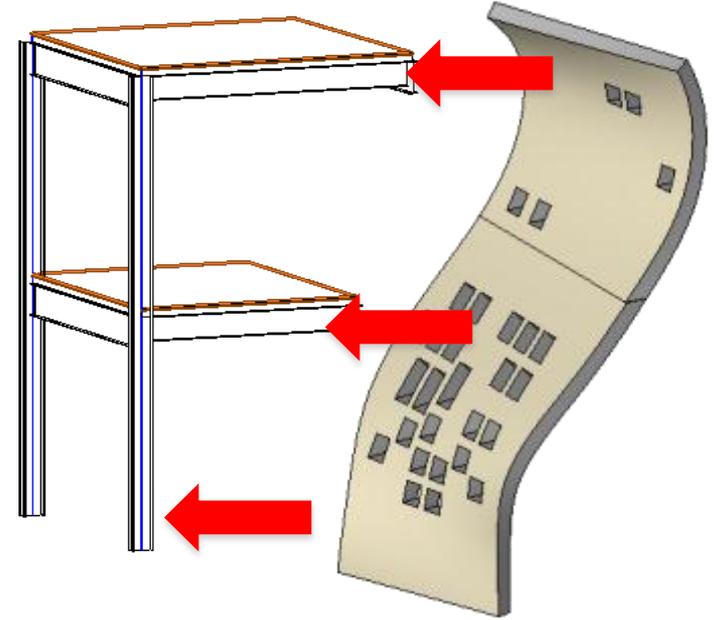
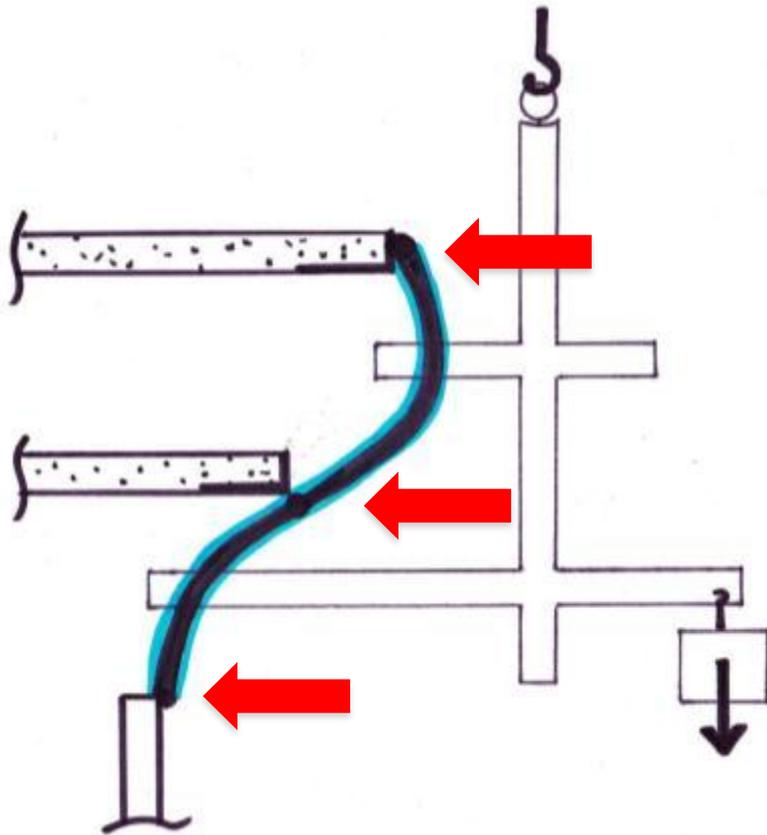
“How can we make something  
*atypical... typical?*”



• DR. GREG P. LUTH



# HOISTING MECHANISM



- *RIGGING SYSTEM WITH COUNTERWEIGHTS*



# ***BENEFITS OF DOUBLE WALL***

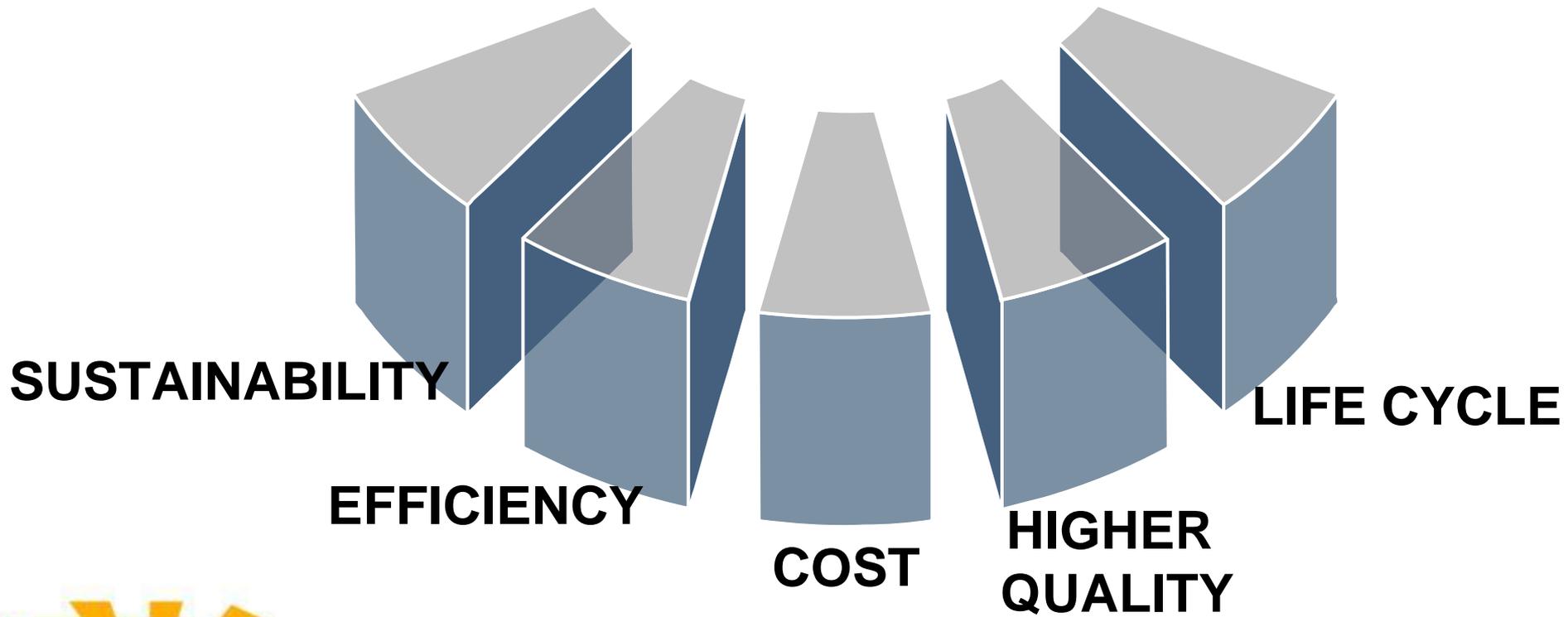
**6 LABORERS**

**3 DAYS**

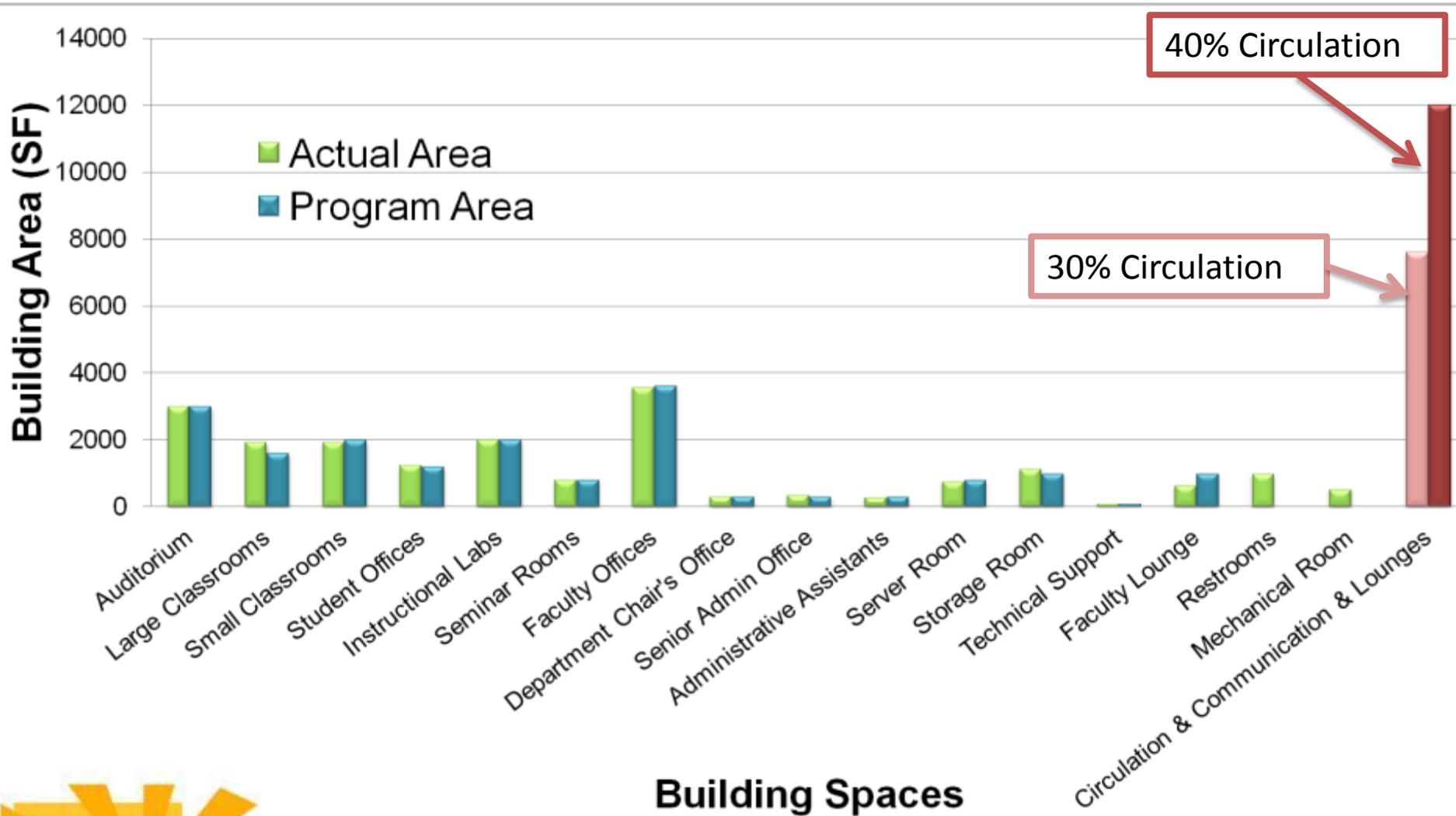


# ***BUILDING SQUARE FOOTAGE***

**27,000 SF vs. 30,000 SF**



# BUILDING SQUARE FOOTAGE



# EFFICIENCY OF CIRCULATION

No waste of space  
Less energy for heating and cooling  
Reduce carbon footprint  
Creative & compact

Less efficient use of space  
Carbon footprint greater  
High life cycle cost

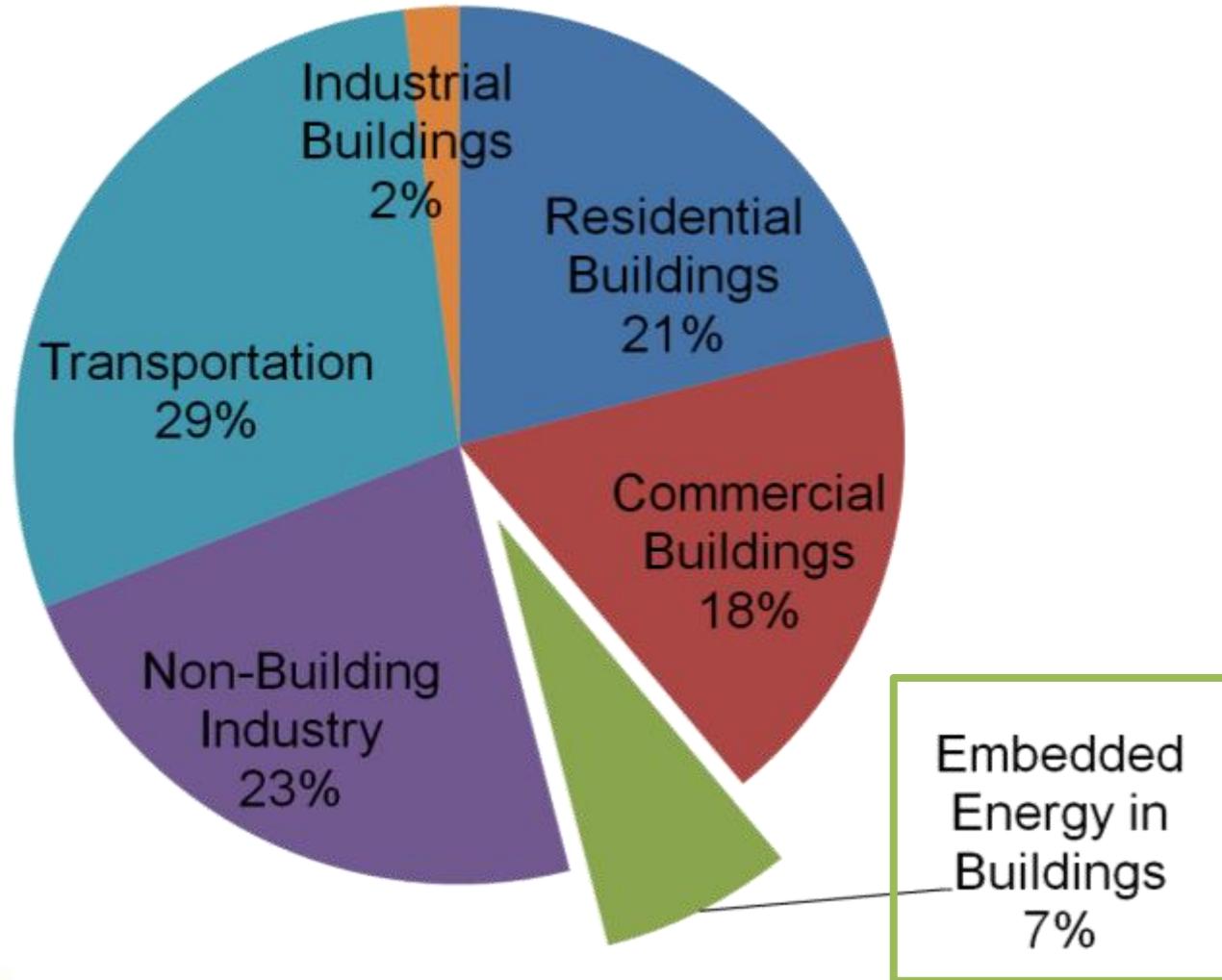
**30% circulation**

**40% circulation**

**27,000 SF is  
more efficient**



# ***HALF OF U.S. CARBON EMISSIONS ARE FROM BUILDING SECTOR***



# OWNER CONCERNS

Category	Description	Owner's Value (Hoss)	Owner's Value (Sinan)	Owners' Average
A. Substructure	Building Location on Site	7	10	8.5
B. Shell	<b>Exterior Enclosure (Façade)</b>	<b>9</b>	<b>9</b>	<b>9</b>
	Roof	8	7	7.5
	Exterior Enclosure (Walls)	7	6	6.5
C. Interiors	Interior Finishes (Partitions, Floors, Doors)	8	9	8.5
D. Services	<b>Energy Efficiency</b>	<b>10</b>	<b>10</b>	<b>10</b>
	Indoor Air Quality	9	8	8.5
	Elevators	6	4	5
	Lighting	8	8	8
	Communications and Electrical Services	7	7	7
E. Equipment and Furnishings	Auditorium Furnishing	9	6	7.5
	Classroom Furnishing	9	6	7.5
F. Specialty Construction	Special or Distinguishing Features	10	7	8.5
G. Building Sitework	Landscaping	7	8	7.5
H. Conditions	Contingency	7	8	7.5



# LEED GOLD 60 POINTS

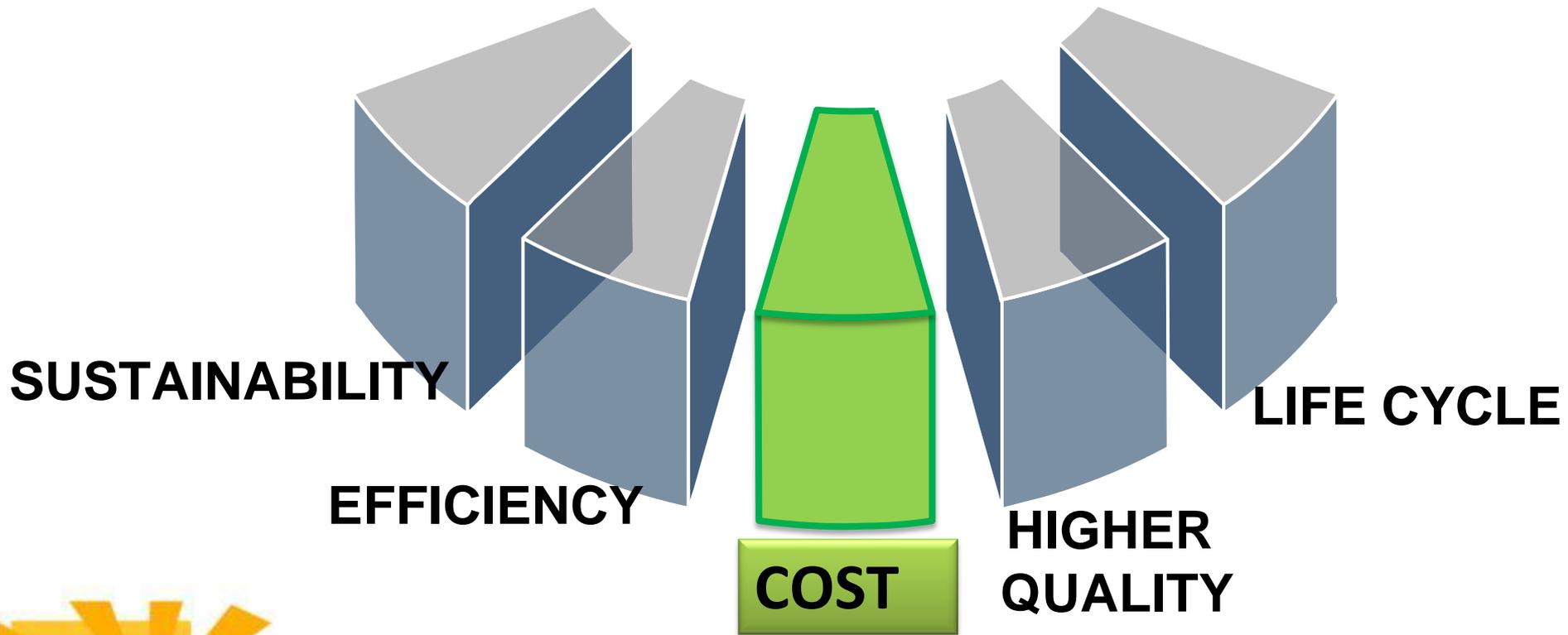
## LEED 2009 for New Construction

Chapter	Possible Points	Received Points
Sustainable Sites	26	18
Water Efficiency	10	2
Energy and Atmosphere	35	24
Materials and Resources	14	8
Indoor Environmental Quality	15	7
Innovation and Design Process	6	1
Regional Priority Credits	4	0
<b>Total</b>	<b>110</b>	<b>60</b>



# ***DIRECT COST SAVINGS***

**27,000 SF vs. 30,000 SF**



# THE FIXED TARGET

Return on Investment = 0.8%  
Inflation = 4%

Grant (in 2012 Dollars): **\$8,500,000**

Start of Construction on August 3, 2015: **\$7,293,000**

**TARGET VALUE: \$7.2 MILLION**



# HIGHER QUALITY BUILDING

27,000 SF vs. 30,000 SF

Decreased  
Square  
Footage

Decreased  
Building  
Costs

Higher  
Quality  
Building

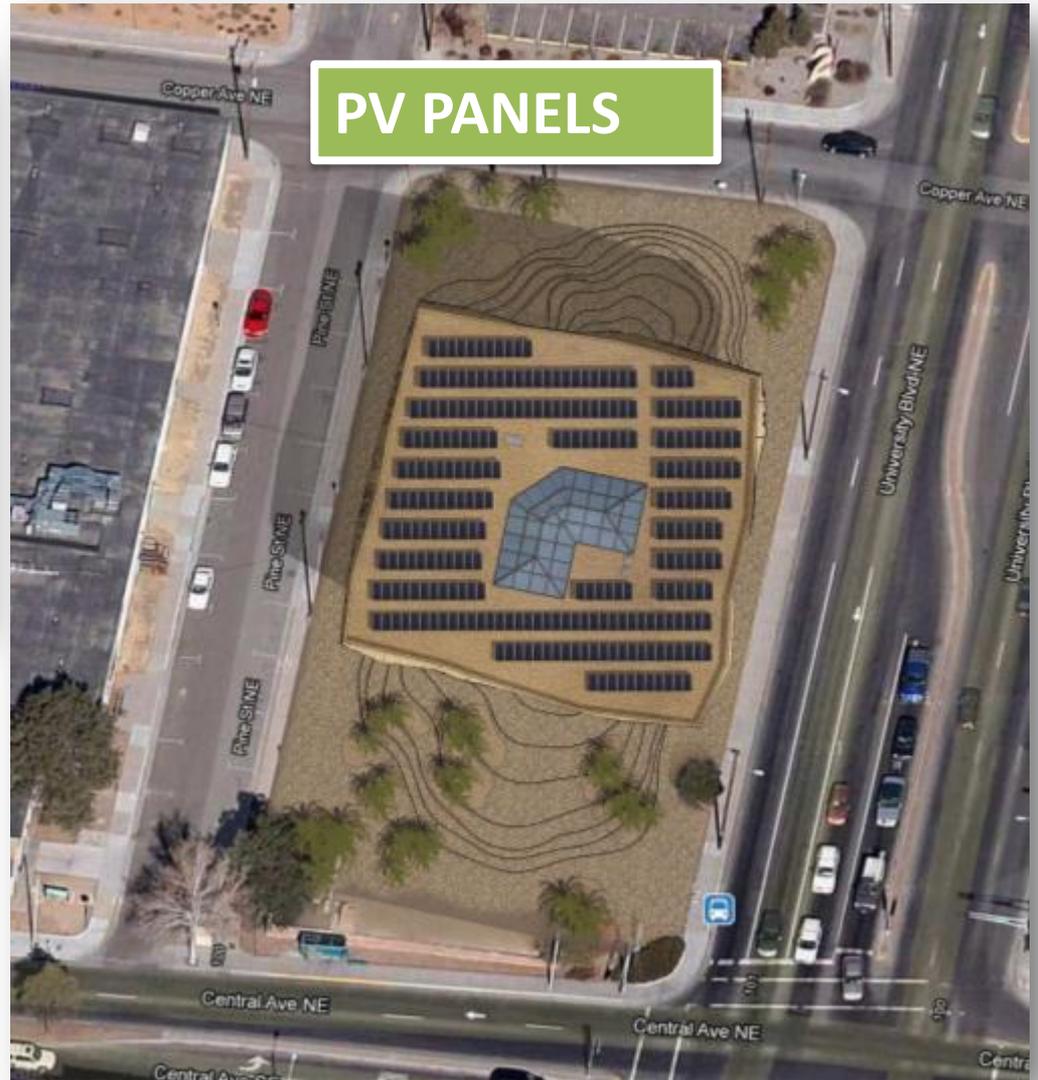
Additional  
Building  
Features



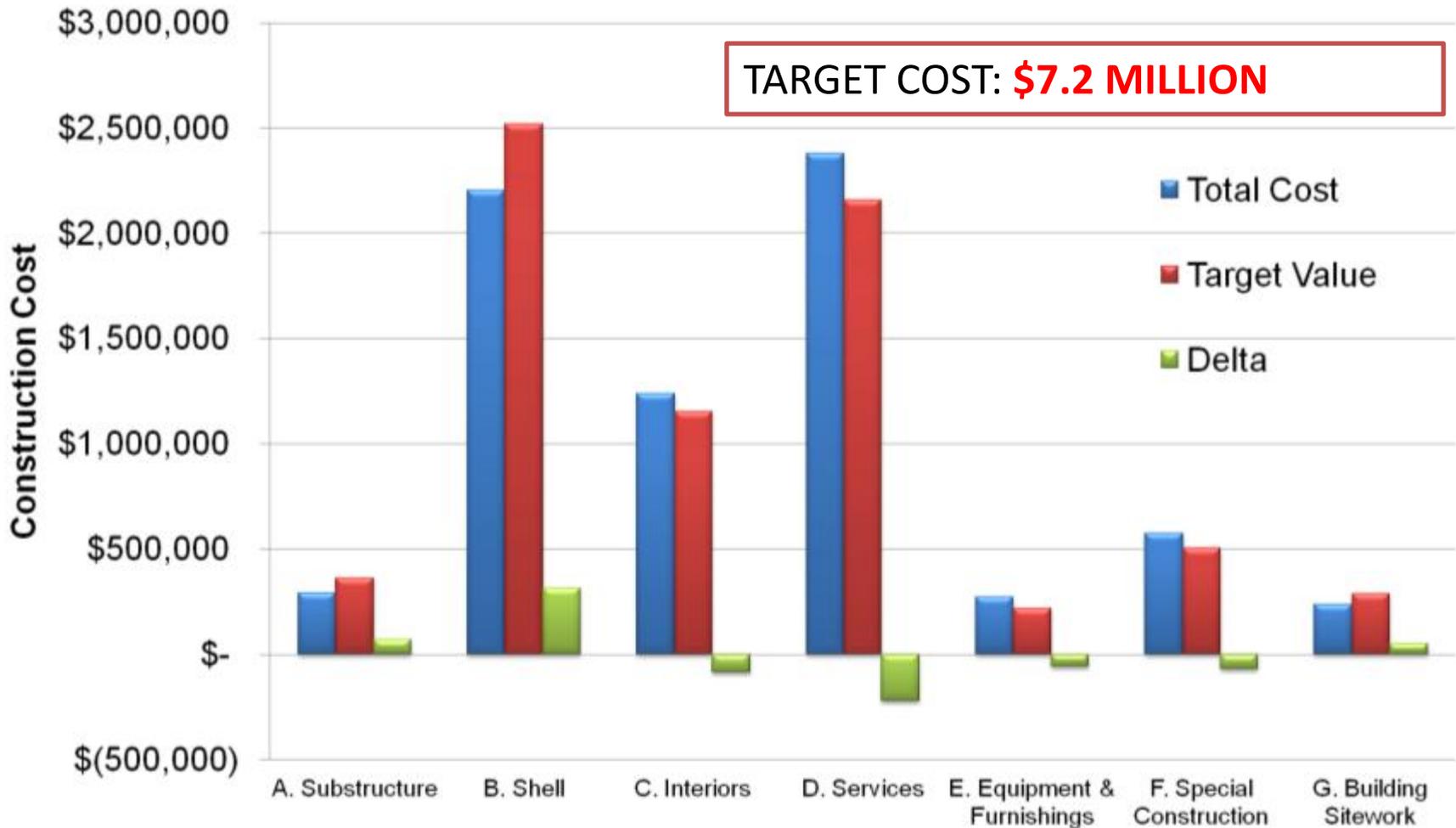
# ADDITIONAL BUILDING FEATURES



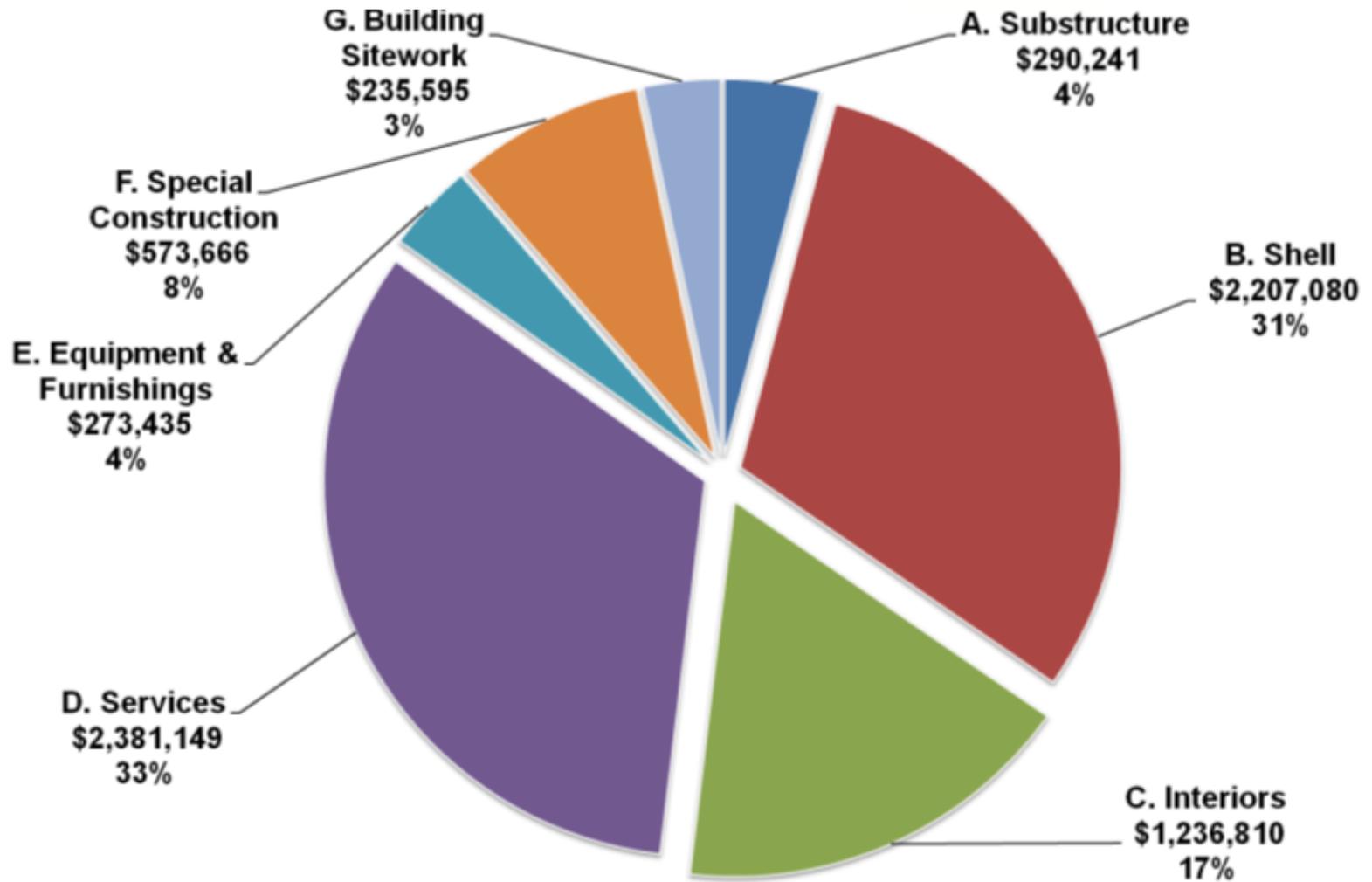
HIGHER QUALITY  
FINISHES



# COST ESTIMATE



# ESTIMATE RESULTS



TARGET VALUE: **\$7.2 MILLION**



# COMPANIES NEARBY



**Structural Steel**  
*14 min*

**Cement Supplier**  
*11 min*

**Construction Equipment**  
*10 min*

**Hospital**  
*5 min*

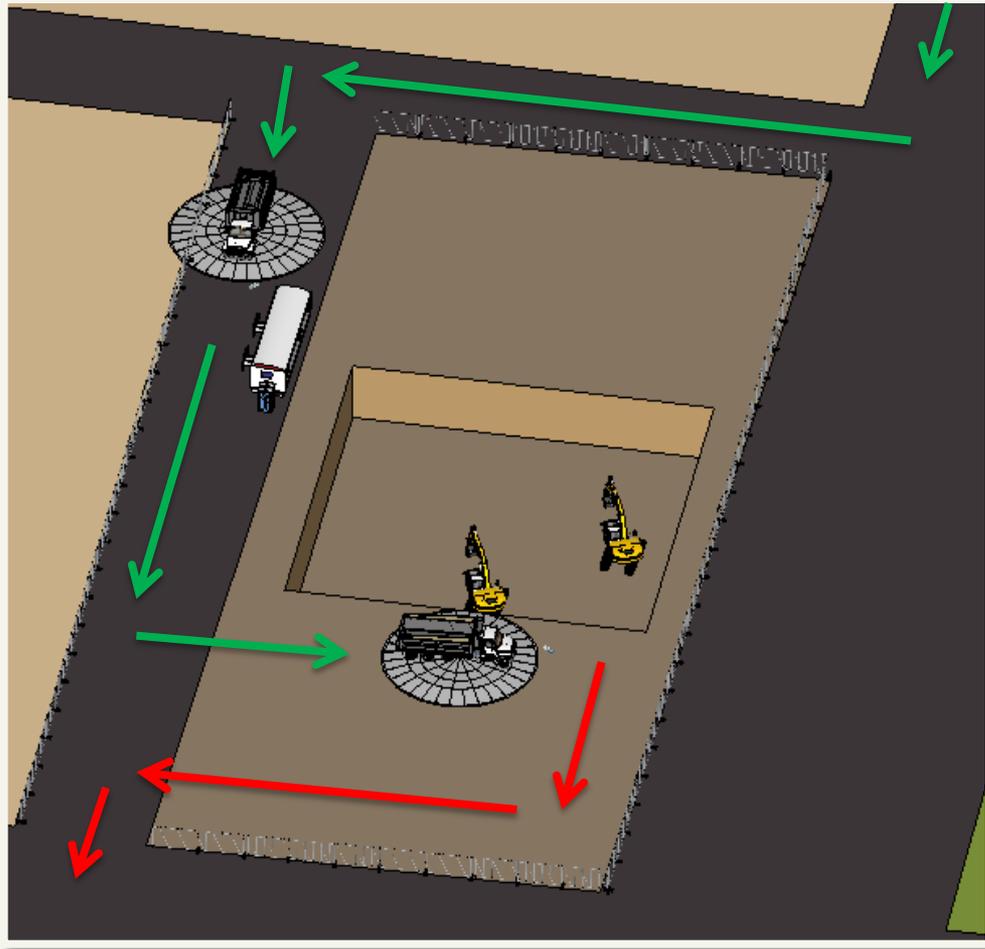
**Concrete plant**  
*15 min*



# SITE ACCESS



# SITE PLAN - EXCAVATION



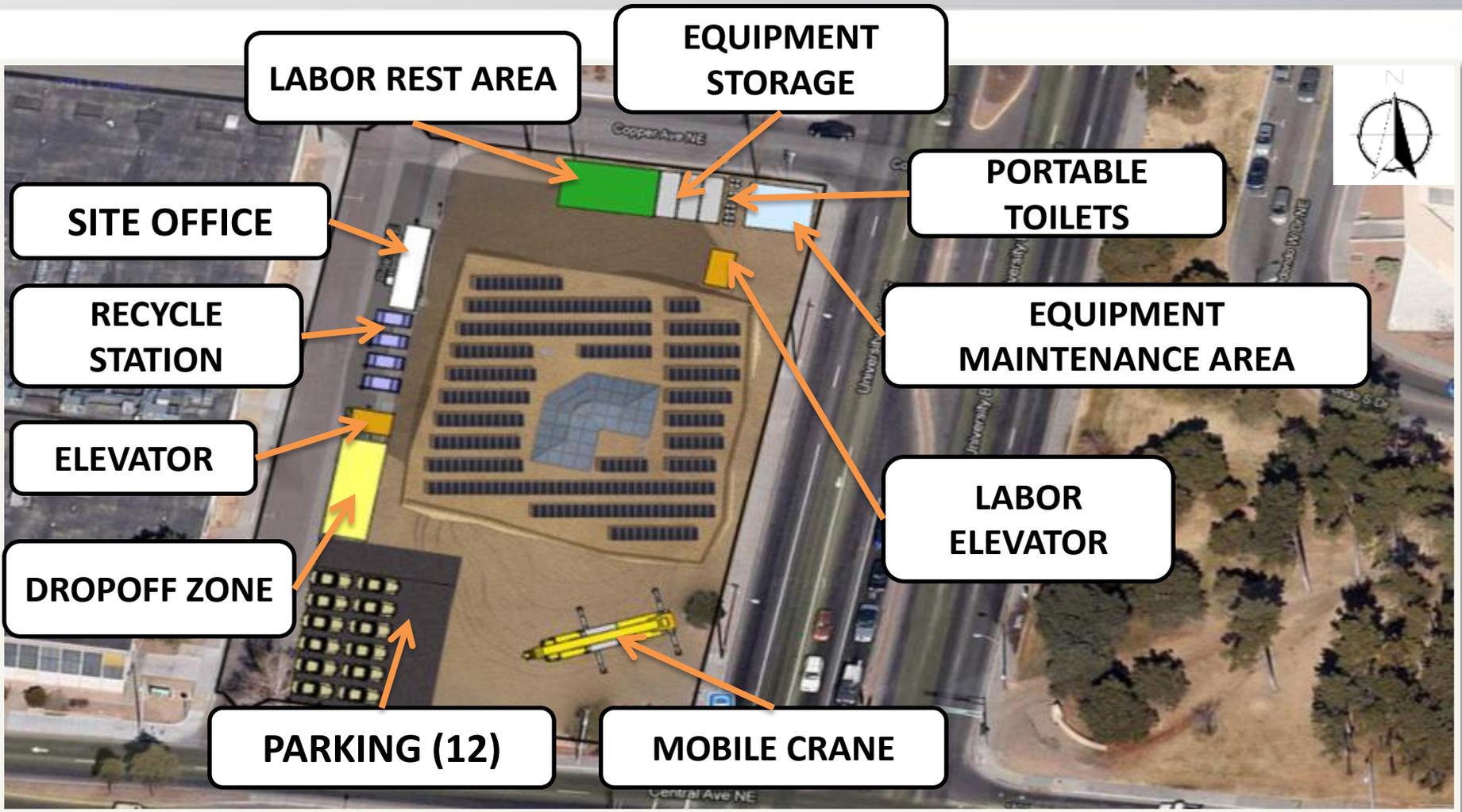
2 Excavators



Crawler 56,800 Lbs.  
(Ec240Blc)  
Max digging 33' – 8"



# SITE PLAN



# SITE PLAN – CRANE CAPACITY



**1 Mobile Crane**



Grove TM9120  
120 ton  
Boom 130'  
Jib 58'  
Reach 105'



# EQUIPMENT



**1 Fork Lift**



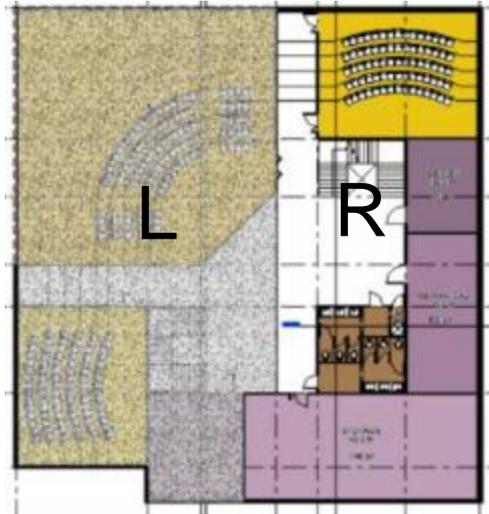
**2 Construction Elevators**



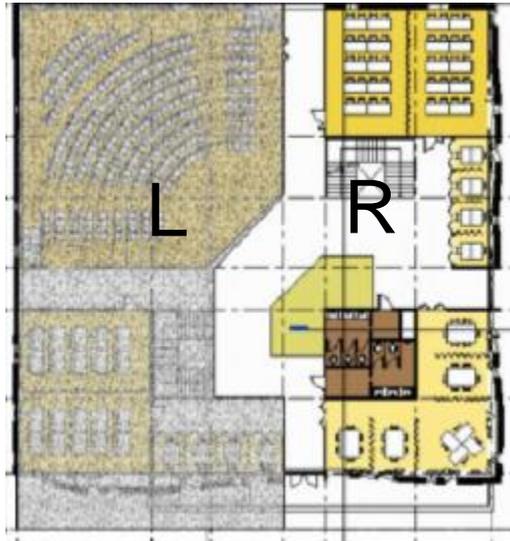
**2 Excavator Trucks**



# CONSTRUCTION ZONES



**Underground Floor**



**Ground Floor**



**Top Floor**

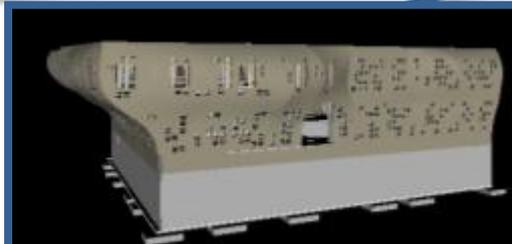


# SCHEDULE

ID	Task Name	Duration	September 01		November 01		January 01		March 01		May 01		July 01			
			08-03	08-31	09-28	10-26	11-23	12-21	01-18	02-15	03-14	04-11	05-09	06-06	07-04	08-01
1	<b>Construction time</b>	<b>257,5 days</b>	[Gantt bar from 08-03 to 08-01]													
2	<b>Sitework</b>	<b>15 days</b>	[Gantt bar from 08-03 to 08-18]													
9	<b>Substructure</b>	<b>63 days</b>	[Gantt bar from 08-18 to 10-20]													
39	<b>Superstructure</b>	<b>39 days</b>	[Gantt bar from 10-20 to 11-19]													
72	<b>Shell</b>	<b>55 days</b>	[Gantt bar from 11-19 to 01-13]													
73	<b>Exterior walls - interior part</b>	<b>25 days</b>	[Gantt bar from 11-19 to 01-13]													
76	<b>Exterior walls - exterior part</b>	<b>27 days</b>	[Gantt bar from 11-19 to 01-15]													
81	<b>Gravel Roof</b>	<b>25 days</b>	[Gantt bar from 11-19 to 01-13]													
83	<b>Services</b>	<b>177 days</b>	[Gantt bar from 08-18 to 04-11]													
88	<b>Interior</b>	<b>85 days</b>	[Gantt bar from 01-13 to 03-28]													
89	<b>Firstfloor</b>	<b>50 days</b>	[Gantt bar from 01-13 to 02-23]													
108	<b>Groundfloor</b>	<b>44 days</b>	[Gantt bar from 01-13 to 02-27]													
127	<b>Undergroundfloor</b>	<b>35 days</b>	[Gantt bar from 01-13 to 02-18]													
146	<b>Equipment and Furnishing</b>	<b>39 days</b>	[Gantt bar from 04-11 to 05-20]													
147	<b>Firstfloor</b>	<b>4 days</b>	[Gantt bar from 04-11 to 04-15]													
150	<b>Groundfloor</b>	<b>4 days</b>	[Gantt bar from 04-11 to 04-15]													
153	<b>Undergroundfloor</b>	<b>4 days</b>	[Gantt bar from 05-09 to 05-13]													
156	<b>Building Sitework</b>	<b>30 days</b>	[Gantt bar from 06-06 to 07-06]													
159	<b>Final move in date</b>	<b>1 day</b>	[Gantt bar at 08-01]													



**Enclosed Building**  
02/02/2016



**Lab Access**  
04/28/2016



**Finish Building**  
07/27/2016

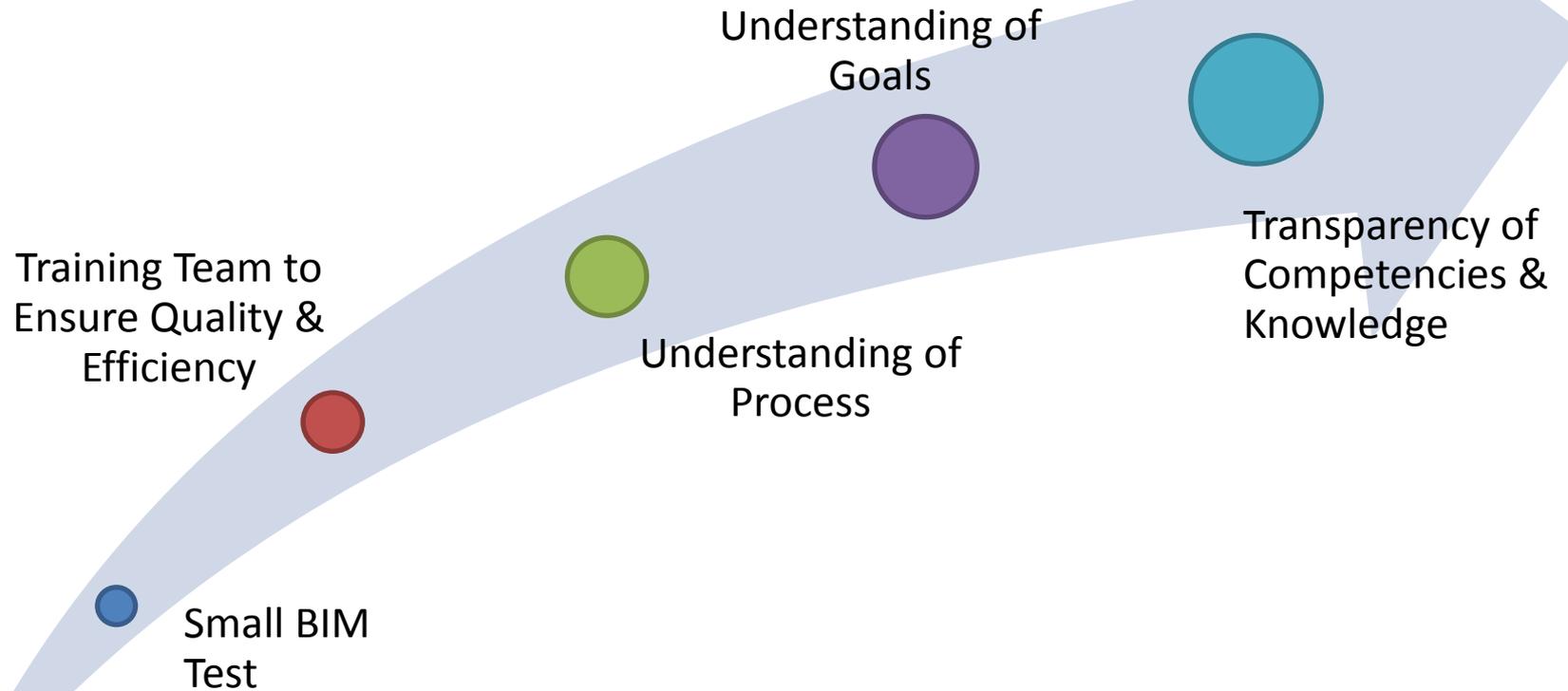


# 4D MODEL

torsdag 09:00:00 2015-08-20 Day=1 Week=1



# ***BIM COORDINATION PROCESS - TRAINING***



# MODEL-BASED COST ESTIMATE



Uniformat

- UNIFORMAT II
- [-] A Substructure
  - [-] B Shell
  - [-] C Interiors
  - [-] D Services
  - [-] E Equipment & Furnishings
  - [-] F Special Construction
  - [-] G Building Sitework

Masterformat

- MasterFormat™ 2018
- [-] 1 General Requirements
  - [-] 2 Existing Conditions
  - [-] 3 Concrete
  - [-] 4 Masonry
  - [-] 5 Metals
  - [-] 6 Wood, Plastics, and Composites
  - [-] 7 Thermal and Moisture Protection
  - [-] 8 Openings
  - [-] 9 Finishes
  - [-] Specialties
  - [-] Equipment
  - [-] Furnishings
  - [-] Special Construction
  - [-] 10 Conveying Equipment
  - [-] 11 Fire Suppression
  - [-] 12 Plumbing
  - [-] 13 Heating, Ventilating, and Air Conditioning (HVAC)
  - [-] 14 Electrical
  - [-] 15 Telecommunications
  - [-] 16 Electronic Safety and Security
  - [-] 17 Earthwork
  - [-] 18 Exterior Improvements
  - [-] 19 Utilities

Quantity

Quantity	LineNumber	Description	Crew	Daily Output	Labor Hours	Unit	Material	Labor	Equipment	Total	Ext. Mat.	Ext. Labor	Ext. Equip.	Ext. Total
<b>G. Building Sitework</b>														
<b>G10. Site Preparation</b>														
<b>G1030. SITE EARTHWORK</b>														
<b>G1030210. COMMON EARTH BACKFILL</b>														
<b>Backfill for landscaping to form tiers/layers; Haul unused soil 20 miles away</b>														
180	312323145420	Backfill, structural, common earth, 300 H.P. dozer, 300' haul, from existing stockpile, excludes compaction	B10M	1350	0.009	L.C.Y.	\$ -	\$ 0.41	\$ 1.41	\$ 1.82	\$ -	\$ 73.80	\$ 253.80	\$ 327.60
8	312323240100	Compaction, structural, 10 tons, steel wheel tandem roller	B10F	8	1.5	Hr.	\$ -	\$ 68.48	\$ 31.66	\$ 100.14	\$ -	\$ 547.84	\$ 253.28	\$ 801.12
5700	312323201078	Cycle hauling(wait, load,travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 15 min load/wait/unload, 12 C.Y. truck, cycle 20 miles, 40 MPH, excludes loading equipment	B34B	120	0.067	L.C.Y.	\$ -	\$ 2.51	\$ 5.41	\$ 7.92	\$ -	\$ 14,307.00	\$ 30,837.00	\$ 45,144.00
<b>Total</b>											\$ -	\$ 14,928.64	\$ 31,344.08	\$ 46,272.72

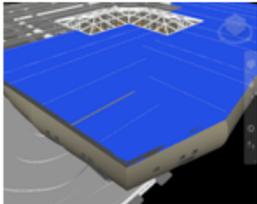
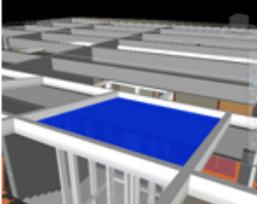


# BIM COORDINATION PROCESS

CODING	QUANTITY	DISCIPLINE	RESPONSIBLE	NOTES
B2010_3L_interior	3	Architecture	Karolina	Interior facade top level
B2010_3R_interior	3	Architecture	Karolina	Interior facade top level
B2020_3L_groups_windows	14	Architecture	Karolina	Exterior facade windows
B2020_3R_groups_windows	15	Architecture	Karolina	Exterior facade windows
B2020_3L_interior_windows	42	Architecture	Karolina	Interior large windows
B2020_3L_interior_vents	84	Architecture	Karolina	Interior vents
B2020_3R_interior_windows	36	Architecture	Karolina	Interior large windows
B2020_3R_interior_vents	72	Architecture	Karolina	Interior vents
B3010_3L_roof	1	Architecture	Karolina	"Yellow" roof
B3010_3R_roof	1	Architecture	Karolina	"Yellow" roof
B3010_3L_skylight	1	Architecture	Karolina	
B1010_1L_column	12	Structural	Curtis	W14x53
B1010_2L_column	4	Structural	Curtis	W10x49
B1010_1R_column	17	Structural	Curtis	W14x53
B1010_1L_fillerbeam	14	Structural	Curtis	5 W16x26, 9 W10x15
B1010_1R_fillerbeam	42	Structural	Curtis	5 W16x26, 35 W10x15
B1010_2L_fillerbeam	45	Structural	Curtis	23 W16x26, 22 W10x15
B1010_2R_fillerbeam	52	Structural	Curtis	49 W16x26, 3 W10x15
B1010_3L_fillerbeam	51	Structural	Curtis	27 W16x26, 24 W10x15
B1010_3R_fillerbeam	50	Structural	Curtis	47 W16x26, 3 W10x15



# CLASH DETECTION PROCESS

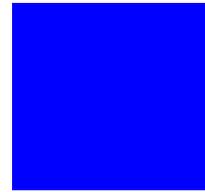
Clash Number	Clash Date	Item 1	Item 2	Image	Responsible Person		Fixed By	Fixed On	Remarks
1	4/23/2012	Roof Slab	Beams and Girders		Curtis	Karolina Courtney	4/24/2012	4/25/2012	Lowered beams and girders throughout building
2	4/23/2012	Roof Slab	Skylight		Karolina		4/24/2012	4/24/2012	Okay - not an actual clash (model detailing issues)
3	4/23/2012	Floor Slab	Columns		Karolina		4/24/2012	4/24/2012	Okay - not an actual clash (model detailing issues)
4	4/23/2012	Double wall exterior	W14x53 Column		Curtis	Karolina Courtney	4/26/2012	4/26/2012	Aligned structural model to "inner" grid; will replace with pipes



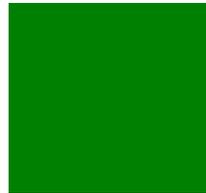
# MEMBER COLOR CODING



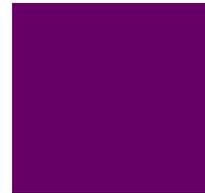
Curtis



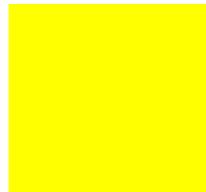
Diana



Courtney



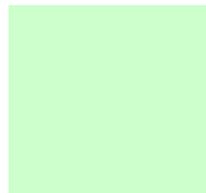
Sara



John



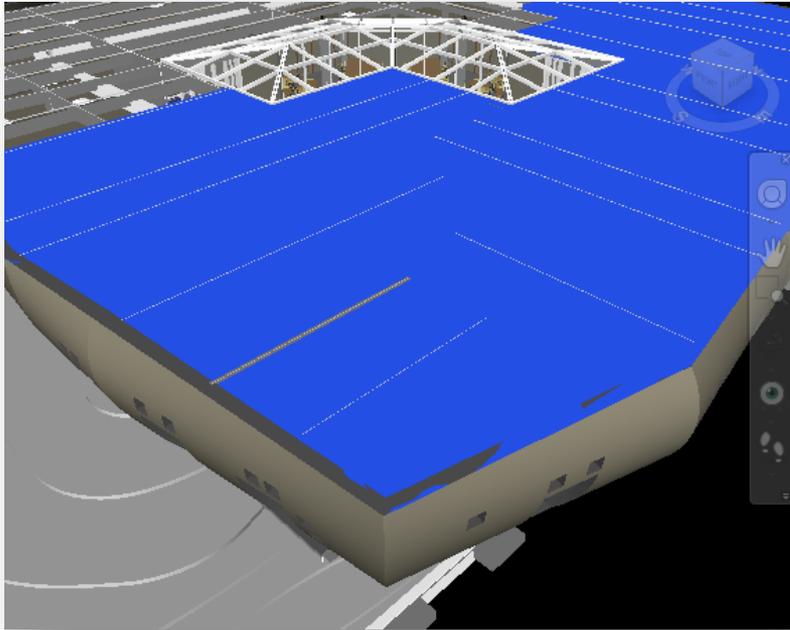
Karolina



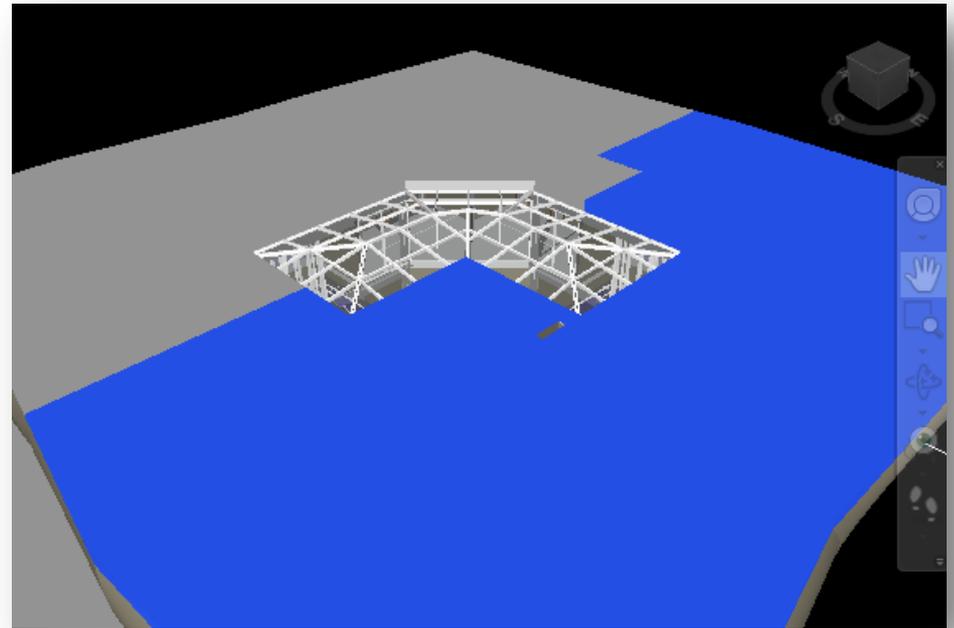
All



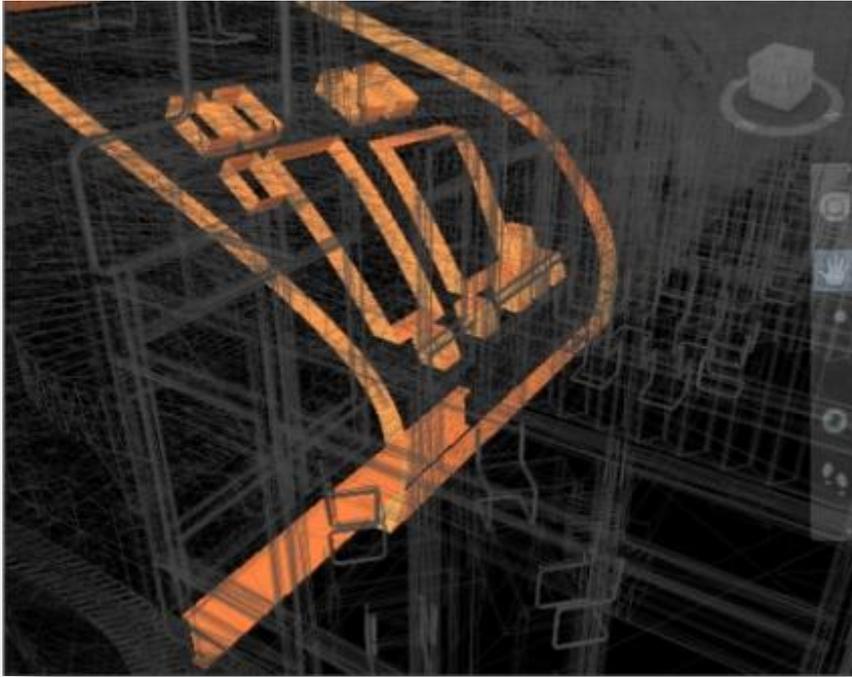
# EARLY CLASH DETECTION



**2000+ CLASHES!**

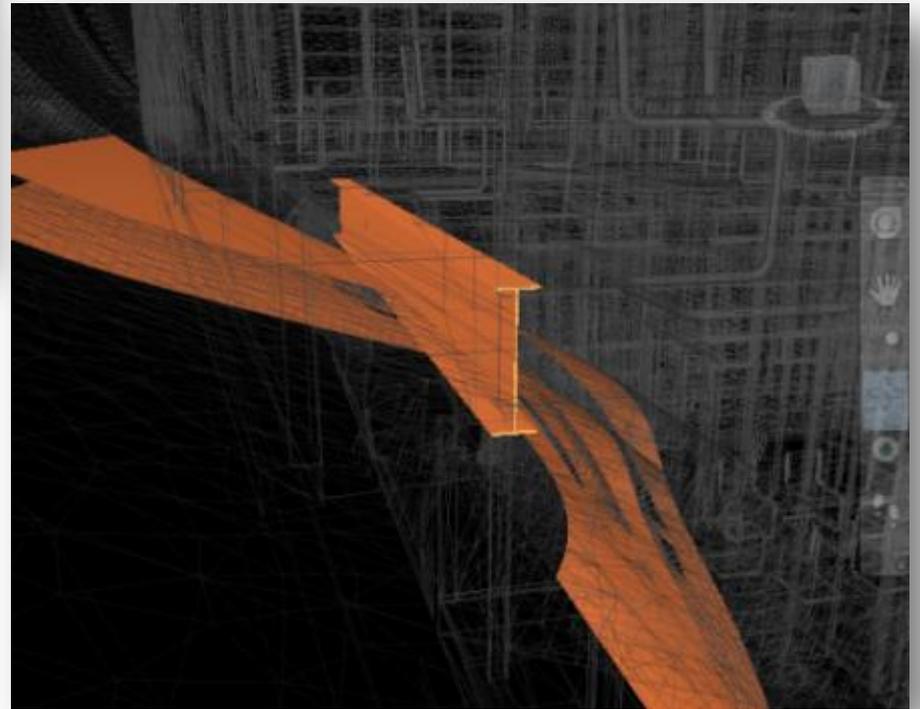


# CLASH DETECTION

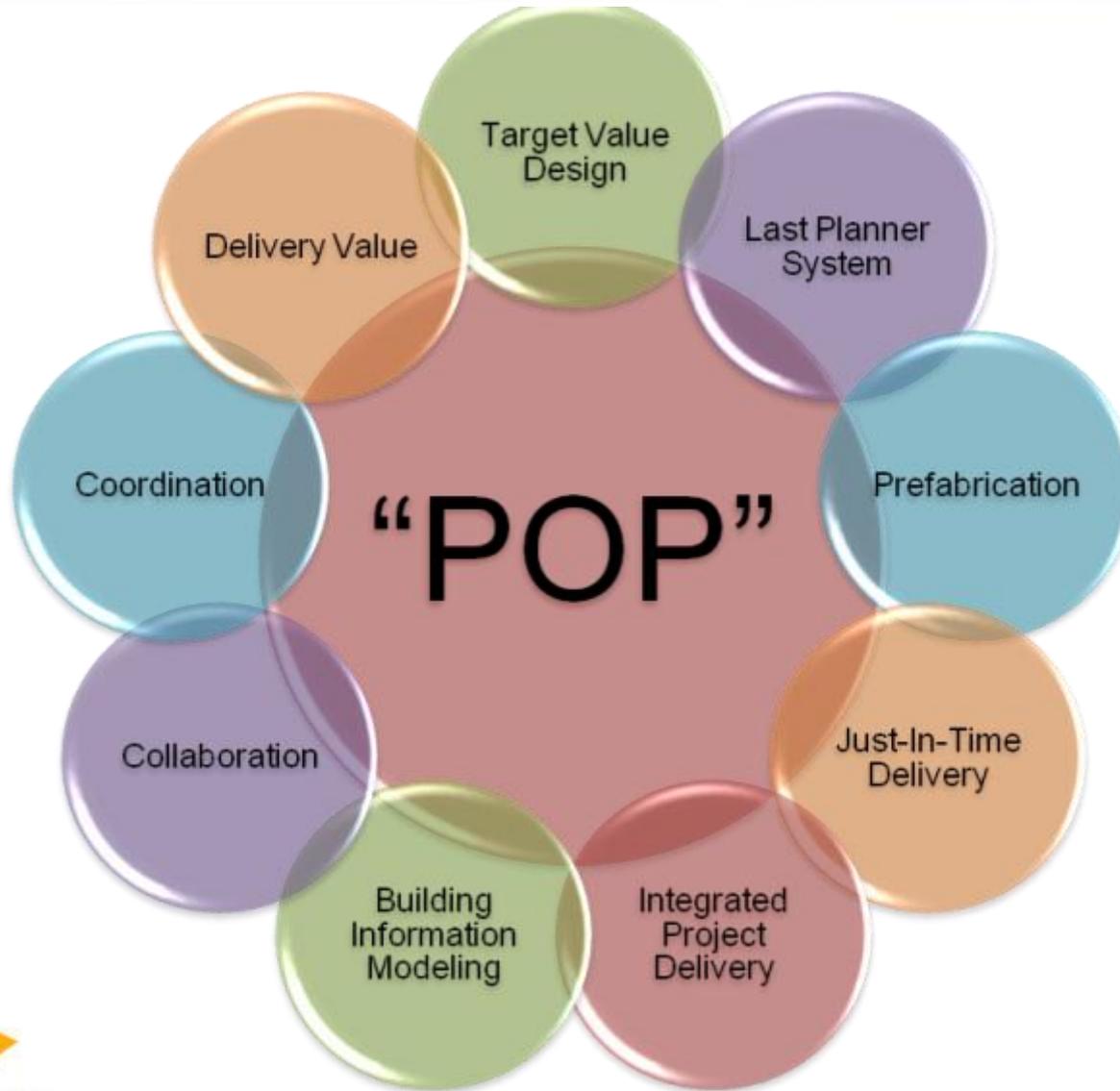


*Exterior double wall & beams*

*New exterior wall support system*



# ***PRODUCT, ORGANIZATION, PROCESS***



# ***PRODUCT, ORGANIZATION, PROCESS***

***“POP”! It’s what we’ve been doing all along!***



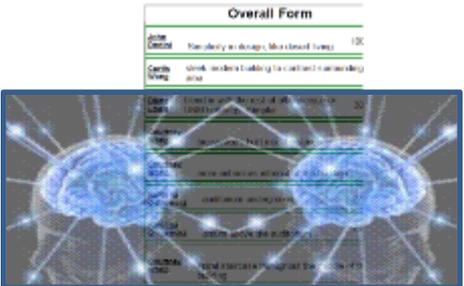
# WHAT IS "POP"?

## Product

## Organization

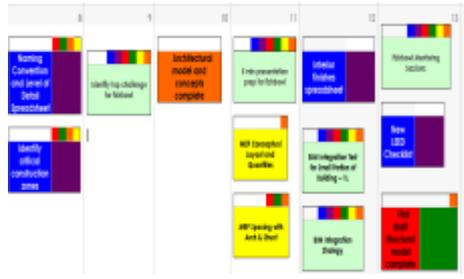
## Process

### Function

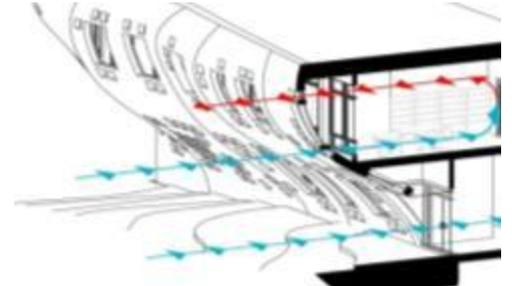


Category	Description	Owner's Value (2008)	Owner's Value (2010)	Owner's Average
A. Substructure	Substructure on site	7	10	8.5
B. Shell	Exterior Enclosure (Façade)	9	9	9
	Interior Enclosure (Shell)	7	8	7.5
C. Services	Energy Efficiency	10	10	10
	Interior Air Quality	8	8	8
	Lighting	8	8	8
	Communications and Electrical Services	7	7	7
E. Equipment and Furnishings	Acoustic Furnishings	8	8	8
	Operational Furnishings	8	8	8
F. Specialty Construction	Specialty Construction Features	10	7	8.5
G. Building Systems	Liftshafts	7	8	7.5
H. Contingency	Contingency	7	8	7.5

### Form

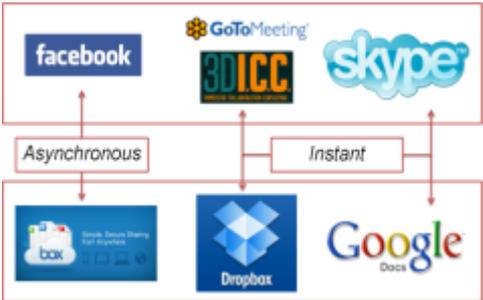


### Behavior



**Structural**

Priority	Assignee	Date	New	Archive
1	CW	RESEARCH: Structural Load Definitions	Jan 23	
2	CW	[1 hour] Research: Lateral Loads		
3	CW	[1 hour] PLANS: Structural Concept #2	Feb 3	
4	CW	[1 hour] PLANS: Structural Concept #1	Feb 16	
5	CW	[5 hours] DIAGRAM: Structural Grids + Floor Heights + 3	Feb 20	
6	CW	[2 hours] DIAGRAMS: Preliminary Foundation Design Co	Feb 23	
7	CW	[0.5 hours] Research: Bubble decks	Mar 3	
8	CW	***CALS: Cantilever calculator!!!!	Feb 22	



# PRODUCT - FUNCTION

Product

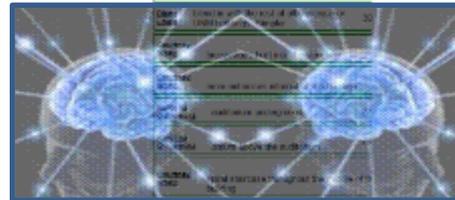
Organization

Process

Function



Overall Form

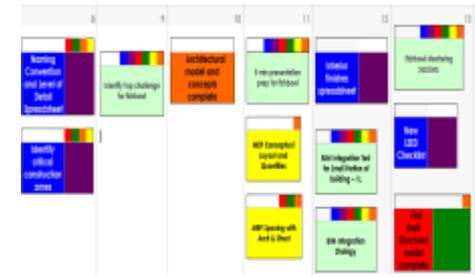


Category	Description	Owner's Value (100%)	Owner's Value (20%)	Owner's Value (10%)
A. Substructure	Substructure on site	7	10	8.5
B. Shell	Exterior Enclosure (Façade)	9	9	9
	Interior Enclosure (Shell)	7	8	8.5
C. Services	Energy Efficiency	10	10	10
	Interior Air Quality	8	8	8.5
D. Services	Electricity	8	8	8
	Lighting	7	7	7
E. Equipment and Furnishings	Audiovisual Furnishings	8	8	7.5
	General Furnishings	8	8	7.5
F. Specialty Construction	Specialty Construction	10	7	8.5
G. Building Systems	Landscape	7	8	7.5
H. Contingency	Contingency	7	8	7.5

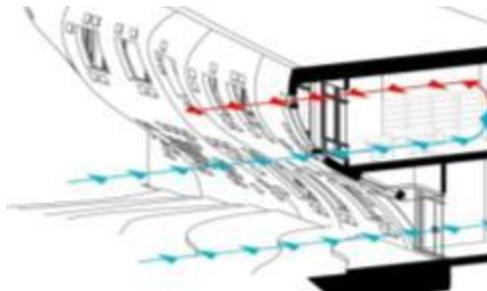
Form



Express Project



Behavior



Structural

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2	CW	[1 hour] Research Lateral Loads		
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7	CW	[0.5 hours] Research: Bubble decks	Mar 3	
8	CW	***CACLS: Cantilever calculator!!!!	Feb 22	



# *IMPROVED PERFORMANCE - EFFICIENCY*



# ***IMPROVED PERFORMANCE - EFFICIENCY***



# PRODUCT - FORM

Product

Organization

Process

Function

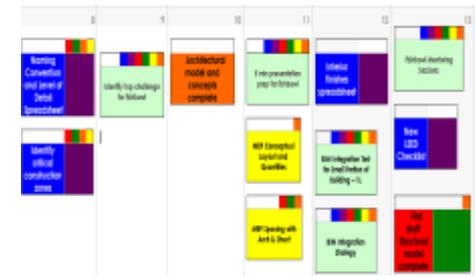
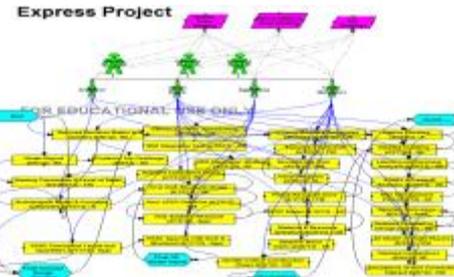


Overall Form

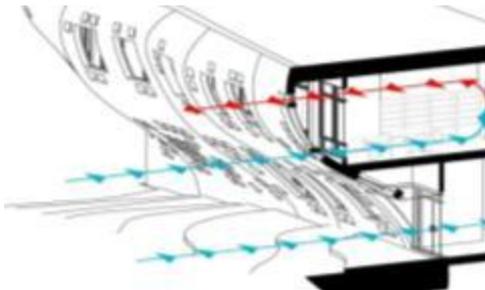


Category	Description	Owner's Value (2006)	Owner's Value (2008)	Owner's Answer
A. Substructure	Substructure on site	7	10	8.5
B. Shell	Exterior Enclosure (Facade)	9	9	9
C. Services	Energy Efficiency	10	10	10
D. Services	Interior Air Quality	8	8	8.5
E. Equipment/Furnishings	Interior Furnishings	8	7	7.5
F. Specialty Construction	Specialty Construction	7	7	7.5
G. Building Systems	Building Systems	7	8	7.5
H. Contingency	Contingency	7	8	7.5

Form



Behavior



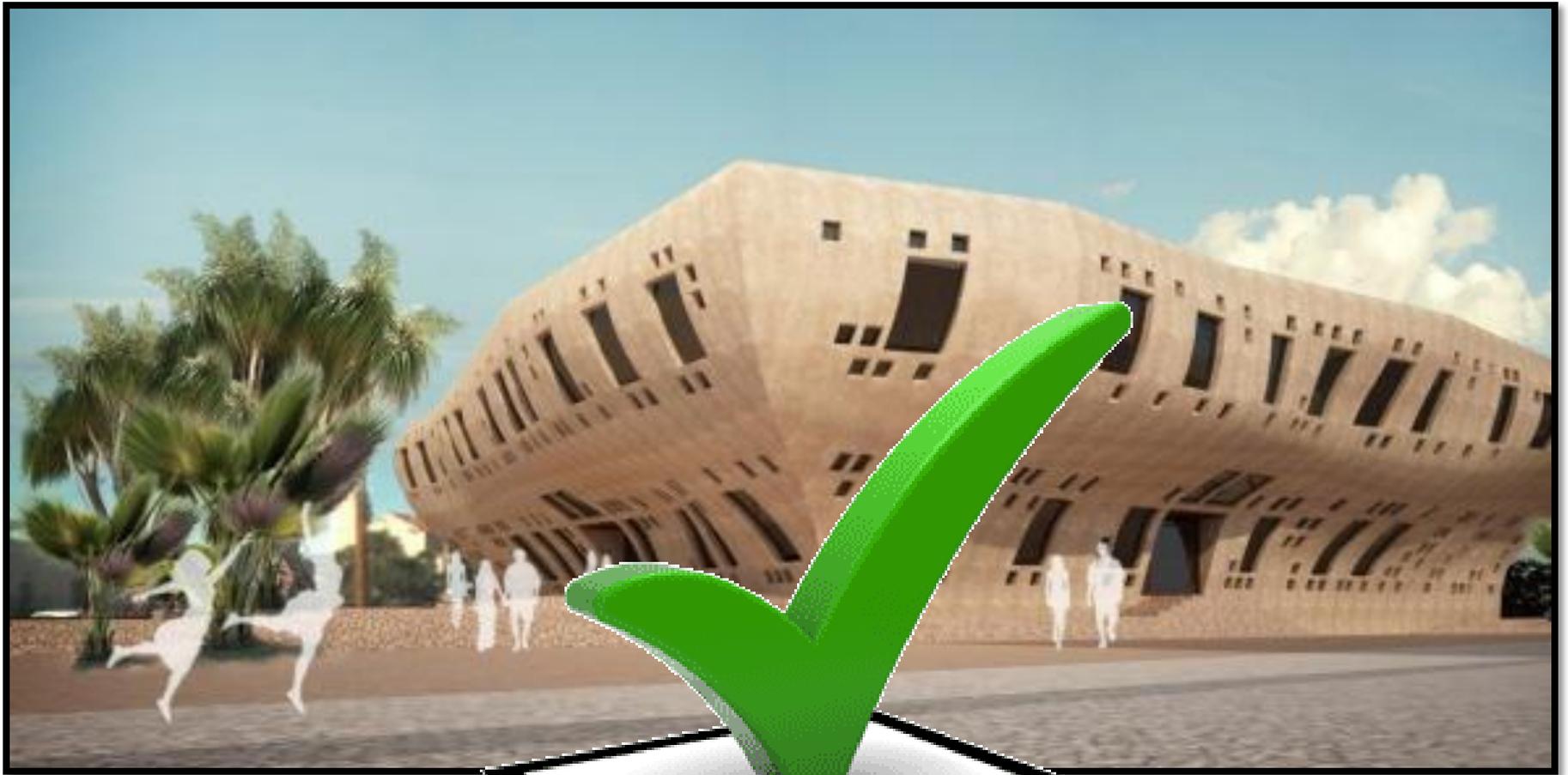
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# ***BIOMIMICRY – ORGANIC SHAPE***



# ***BIOMIMICRY – ORGANIC SHAPE***



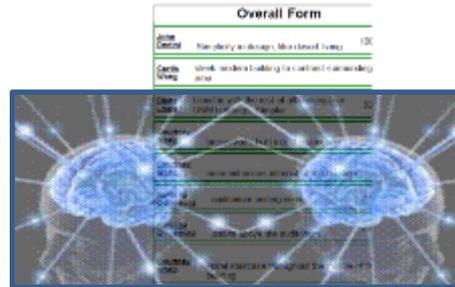
# PRODUCT - BEHAVIOR

Product

Organization

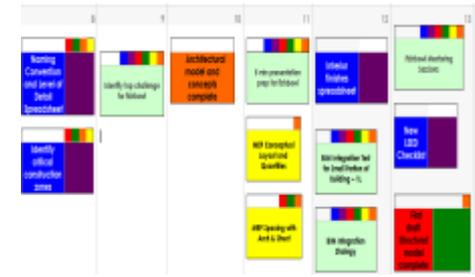
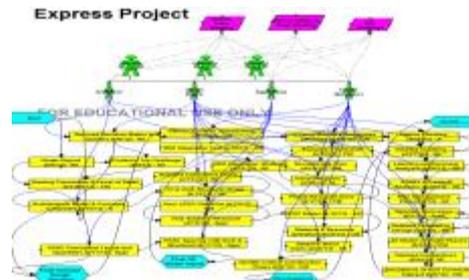
Process

Function

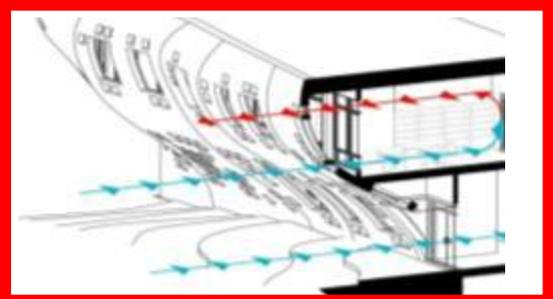


Category	Description	Owner's Value (100%)	Owner's Value (50%)	Owner's Average
A. Substructure	Substructure on site	7	10	8.5
B. Shell	Exterior Enclosure (Façade)	9	9	9
C. Services	Energy Efficiency	10	10	10
D. Services	Interior Air Quality	8	8	8.5
E. Equipment and Furnishings	Lighting	8	8	8
F. Specialty Construction	Communications and Electrical Services	7	7	7.5
G. Building Structure	Acoustic Furnishings	8	8	7.5
H. Conditions	General Construction	8	8	7.5
	Specialty Construction	10	7	8.5
	Lighting	7	8	7.5
	Challenges	7	8	7.5

Form



Behavior

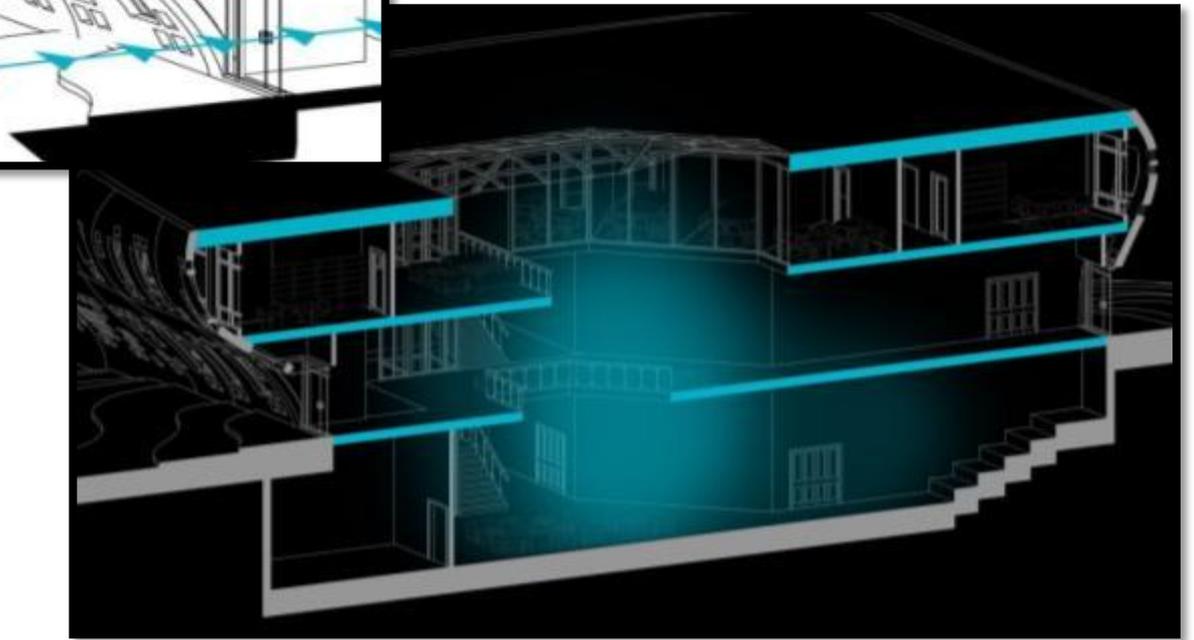
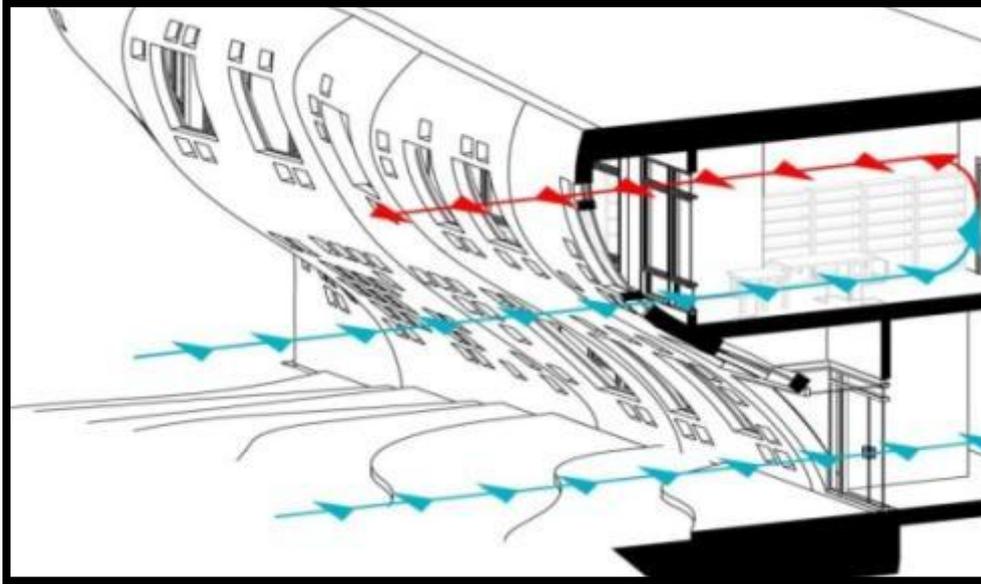


Structural

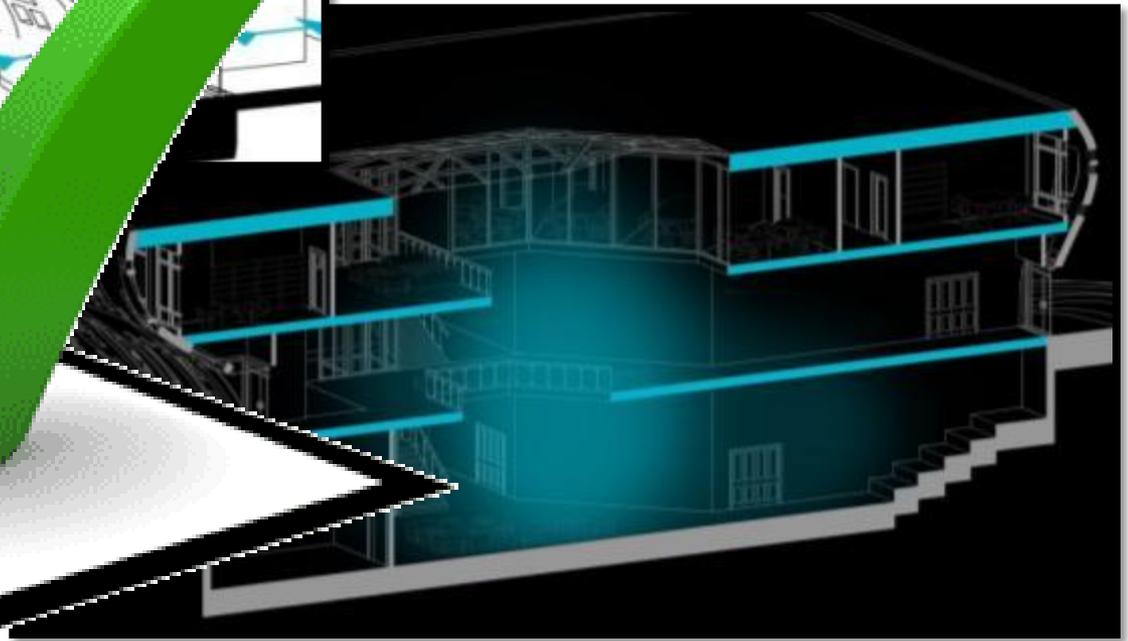
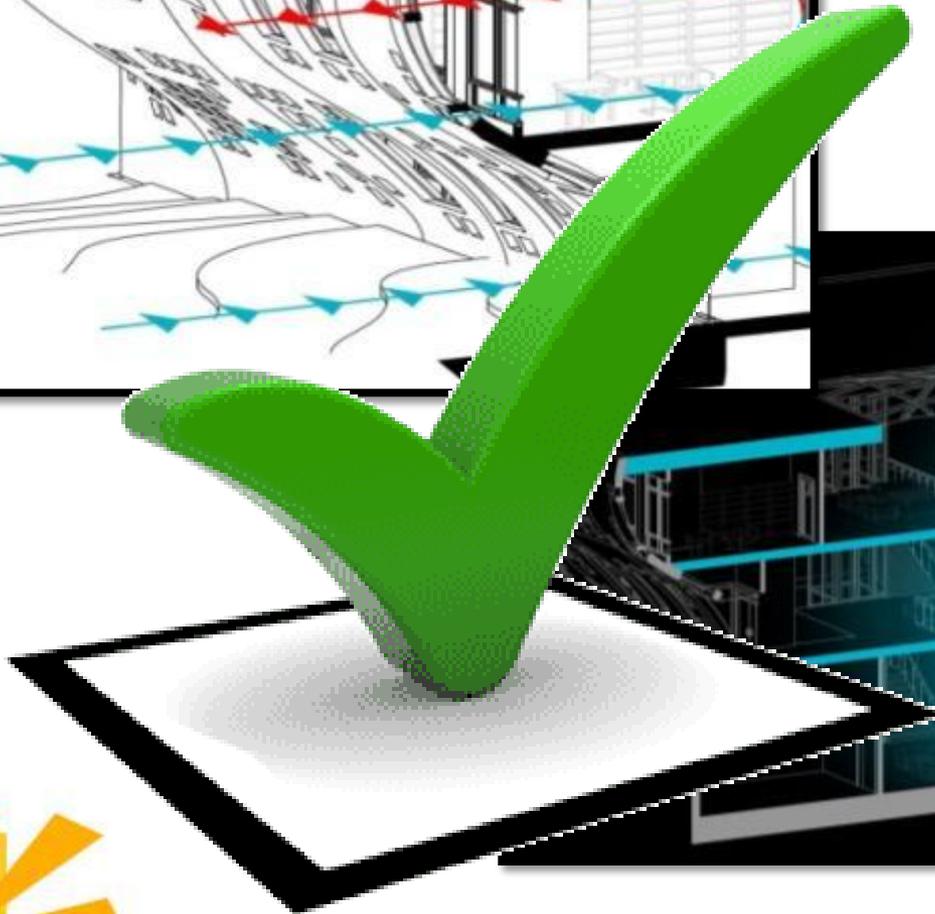
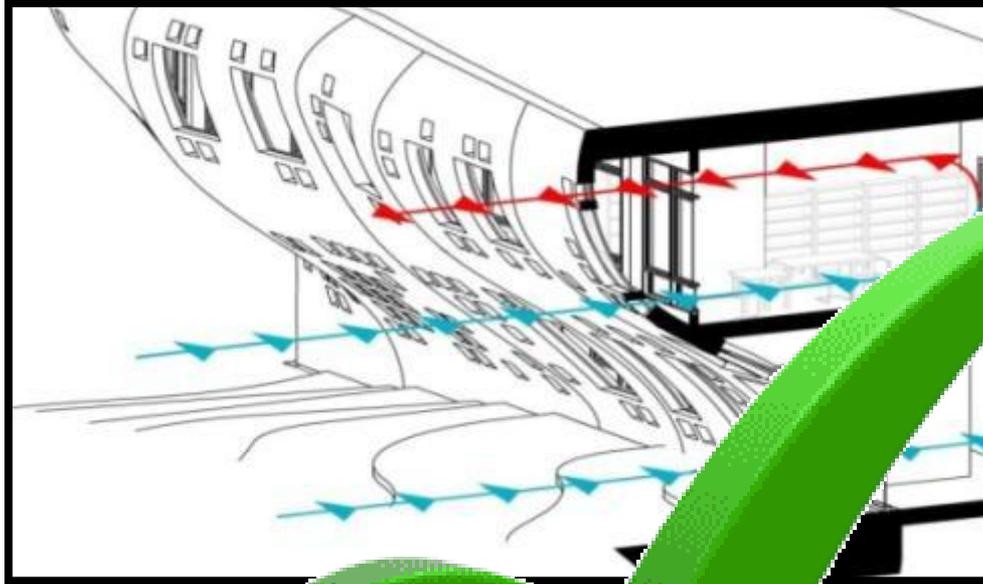
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# ***BUILDING PERFORMANCE VS. TARGETS***



# ***BUILDING PERFORMANCE VS. TARGETS***



# ORGANIZATION - FUNCTION

Product

Organization

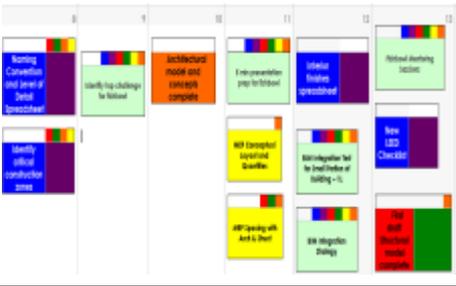
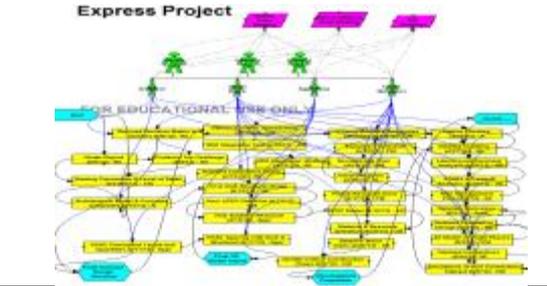
Process

Function

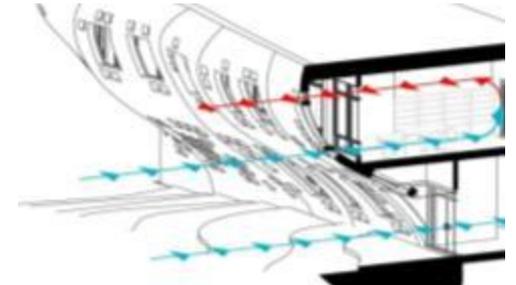


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C. Services	Energy Efficiency	10	10	10
	Interior Air Quality	8	8	8
D. Services	Utilities	8	8	8
	Communications and Electrical Services	7	7	7
E. Equipment and Furnishings	Audiovisual Furnishings	8	8	8
	General Furnishings	8	8	8
F. Specialty Construction	Specialty Construction Features	10	7	8.5
G. Building Systems	Landscape	7	8	7.5
H. Contingency	Contingency	7	8	7.5

Form



Behavior



**Structural**

Priority	Assignee	Date	New	Archive
1	✓ CW	RESEARCH Structural Load Definitions	Jan 23	
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6	✓ CW	[2 hours] DIAGRAMS: Preliminary Foundation Design Co	Feb 23	
7	✓ CW	[0.5 hours] Research: Bubble decks	Mar 3	
8	✓ CW	***CACLS: Cantilever calculator!!!!	Feb 22	



# OUR VISION & GOALS - BRAINMERGE

## Idea List

The brighter (orange) the ideas are, the more popular they are !

#1 <u>CourtneyWong</u>	incorporating the outside/desert "feel" on the interior design - including furniture, walls, architectural finishes	100
---------------------------	---	-----

#2 <u>SaraSundelin</u>	natural ventilation	61
------------------------	---------------------	----

#3 <u>DianaLouie</u>	native species/plants	57
----------------------	-----------------------	----

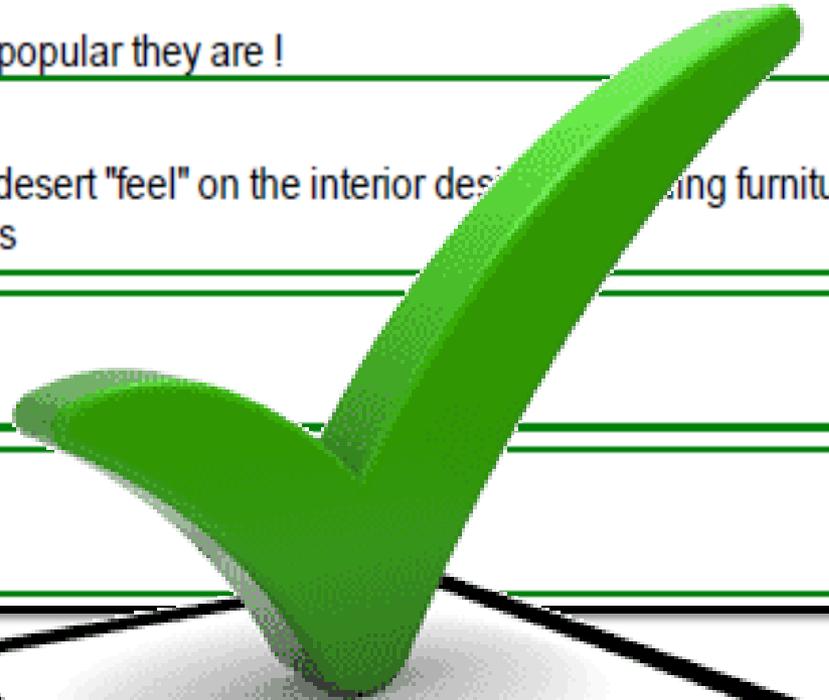


# OUR VISION & GOALS - BRAINMERGE

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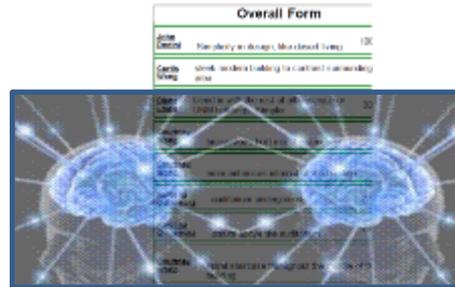
# ORGANIZATION - FORM

Product

Organization

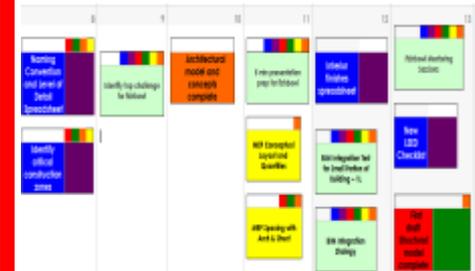
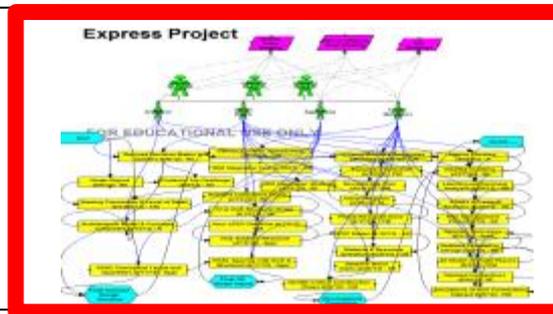
Process

Function

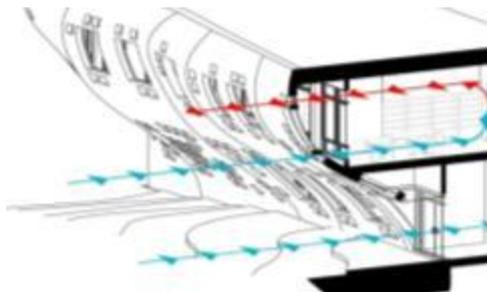


Category	Description	Owner's Value (2000)	Owner's Value (2000)	Owner's Value (2000)
A. Substructure	Substructure on site	7	10	8.5
B. Shell	Exterior Enclosure (Facade)	9	9	9
	Roof	8	7	7.5
C. Interiors	Interior Enclosure (Walls)	7	8	8.5
	Interior Partition (Walls, Floor, Ceilings)	8	8	8.5
D. Services	Energy Efficiency	10	10	10
	Interior Air Quality	8	8	8.5
E. Equipment and Furnishings	MECHANICAL	8	8	8
	COMMUNICATIONS AND ELECTRICAL SERVICES	7	7	7
F. Specialty Construction	Acoustic Furnishings	8	8	7.5
	Generators, Elevators	8	8	7.5
G. Building Systems	Security, Observation Features	10	7	8.5
H. Contingency	Laboratory	7	8	7.5
	Contingency	7	8	7.5

Form



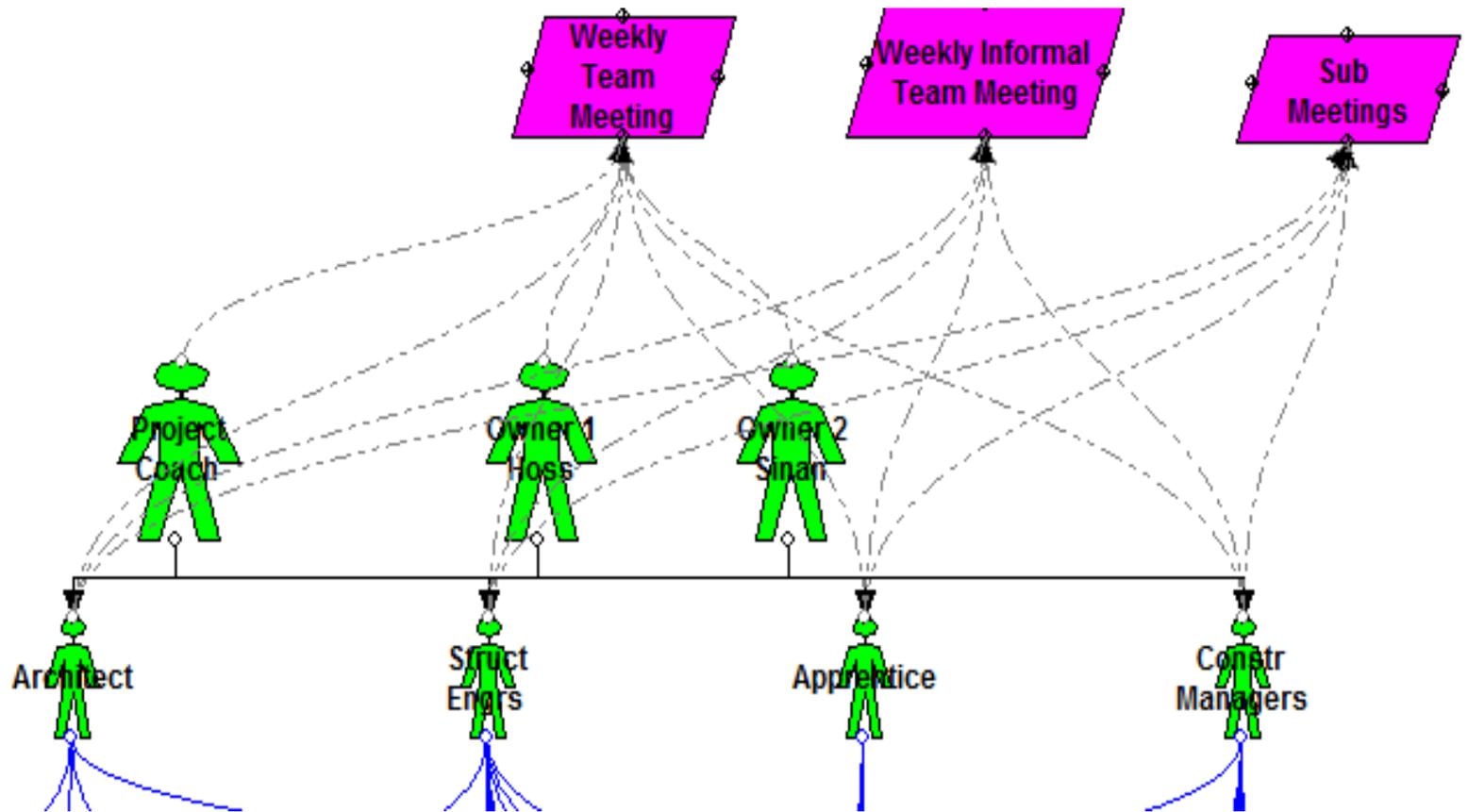
Behavior



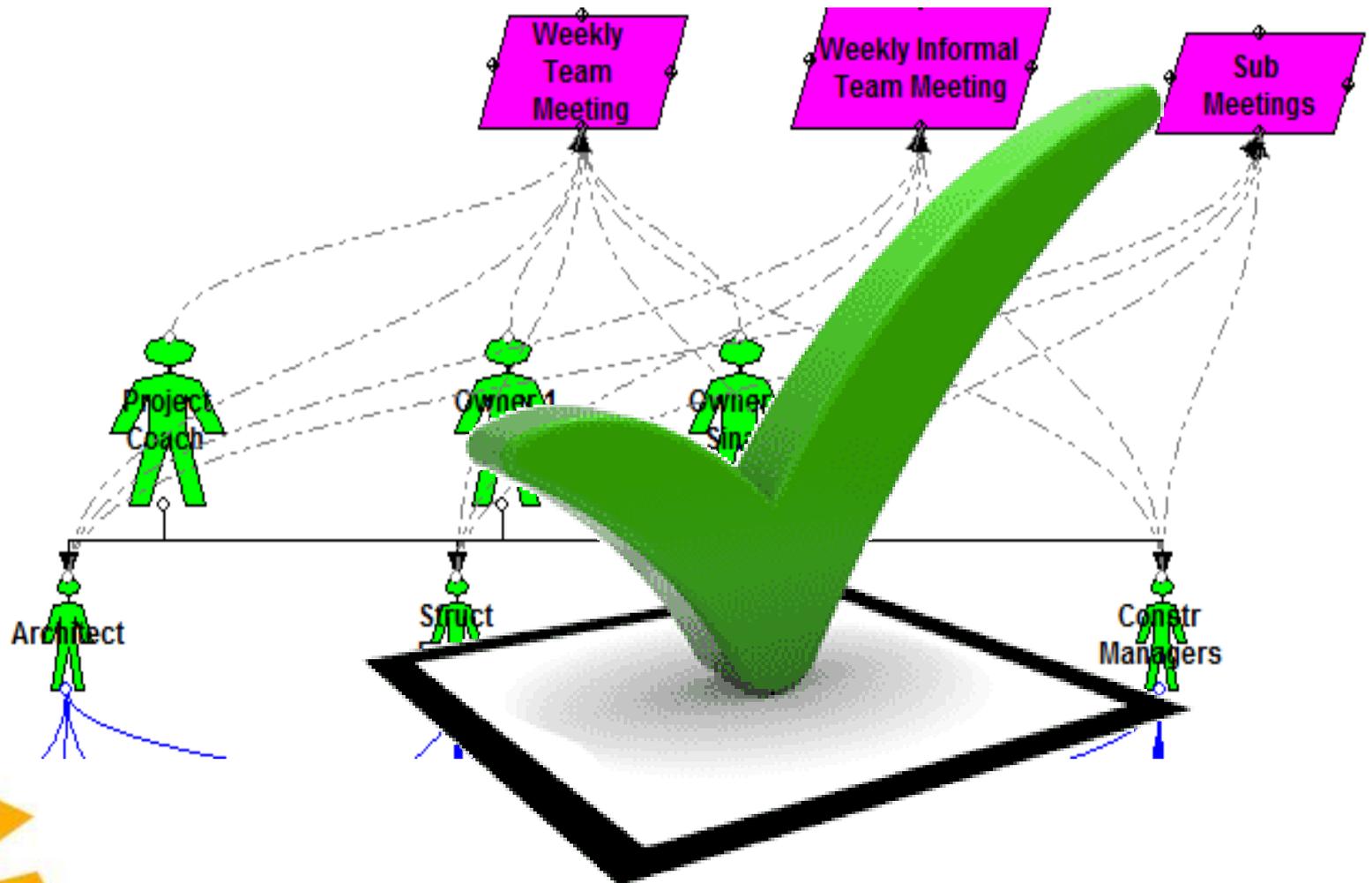
Priority	Assignee	Date	New	Archive
1	CW	RESEARCH: Structural Load Definitions	Jan 23	
2	CW	[1 hour] Research: Lateral Loads		
3	CW	[1 hour] PLANS: Structural Concept #2	Feb 3	
4	CW	[1 hour] PLANS: Structural Concept #1	Feb 16	
5	CW	[5 hours] DIAGRAM: Structural Grids + Floor Heights + 3	Feb 20	
6	CW	[2 hours] DIAGRAMS: Preliminary Foundation Design Co	Feb 23	
7	CW	[0.5 hours] Research: Bubble decks	Mar 3	
8	CW	***CALS: Cantilever calculator!!!!	Feb 22	



# HOW TO ACHIEVE OUR GOALS: FLAT HIERARCHY & "SWIFT" TEAM



# HOW TO ACHIEVE OUR GOALS: FLAT HIERARCHY & "SWIFT" TEAM





# MEASURING PERFORMANCE

✓ Completed ⌵ ✕

## [2 hours] DIAGRAMS: Preliminary Foundation Design Concepts

Add Notes

Assignee Courtney Wong

Projects Structural

Due Date Feb 23

Tags | Attach a file

Followers Courtney W Curtis W Diana 📡 Unfollow

John D

[View earlier activity](#) ⌵

John D  
Completion? What date? How Long?  
Feb 29 at 12:46pm



# MEASURING PERFORMANCE

✓ Completed

**[2 hours] DIAGRAMS: Preliminary Foundation Design Concepts**

Add Notes

Assignee Courtney Wong

Projects Structural

Due Date Feb 23

Tags | Attach a file

Followers Courtney W Curtis W Diana John D

[View earlier activity](#)

John D  
Completion? What date? How Long?  
Feb 29 at 12:46pm



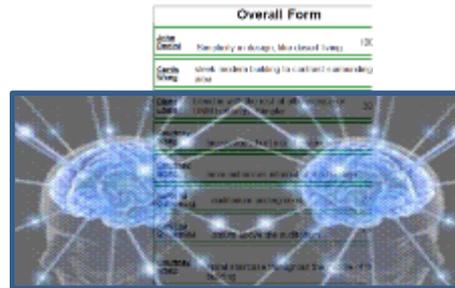
# PROCESS - FUNCTION

Product

Organization

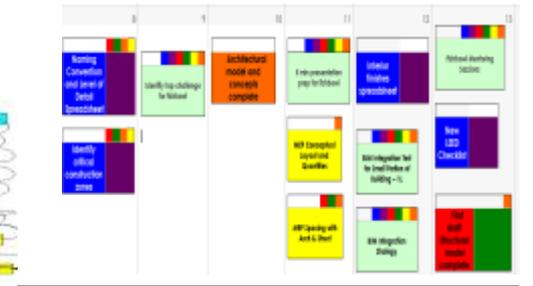
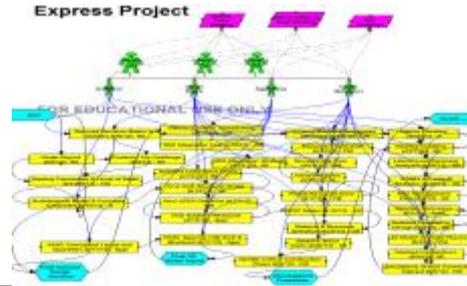
Process

Function

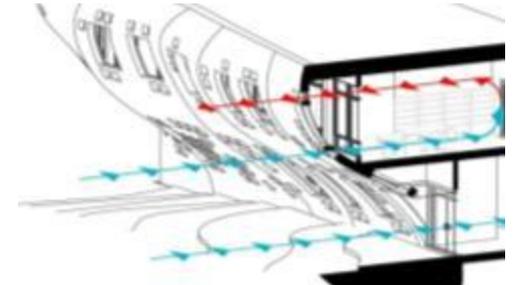


Category	Description	Owner's Value (100%)	Owner's Value (100%)	Owner's Value (100%)
A. Substructure	Substructure on site	7	10	8.5
B. Shell	Exterior Enclosure (Façade)	9	9	9
C. Services	Energy Efficiency	10	10	10
D. Services	Interior Enclosure	8	8	8.5
E. Equipment and Furnishings	Interior Enclosure	8	8	8.5
F. Specialty Construction	Specialty Construction	7	7	7.5
G. Building Systems	Building Systems	7	7	7.5
H. Contingency	Contingency	7	8	7.5

Form



Behavior



Priority	Assignee	Date	New	Archive
1	CW	RESEARCH: Structural Load Definitions	Jan 23	
2	CW	[1 hour] Research: Lateral Loads		
3	CW	[1 hour] PLANS: Structural Concept #2	Feb 3	
4	CW	[1 hour] PLANS: Structural Concept #1	Feb 16	
5	CW	[5 hours] DIAGRAM: Structural Grids + Floor Heights + 3	Feb 20	
6	CW	[2 hours] DIAGRAMS: Preliminary Foundation Design Co	Feb 23	
7	CW	[0.5 hours] Research: Bubble decks	Mar 3	
8	CW	***CALS: Cantilever calculator!!!!	Feb 22	



# WORK TOGETHER TO DELIVER VALUE



**SINAN** sinanmihelcic@gmail.com

to me ▾

yes, this is a big GO from me!

**Hoss Nasser** hossnasser@gmail.com

Apr 10



to me, Karolina, fruchter, sara.sundelin86, Curtis, Courtney, SINAN, John ▾

More discussion can be done tomorrow night but as far as I am concerned this is a "go" unless Sinan has an objection. Please advise Sinan :)



# WORK TOGETHER TO DELIVER VALUE



**SINAN** sinanmihelcic@gmail.com

to me ▾

yes, this is a big GO from me!

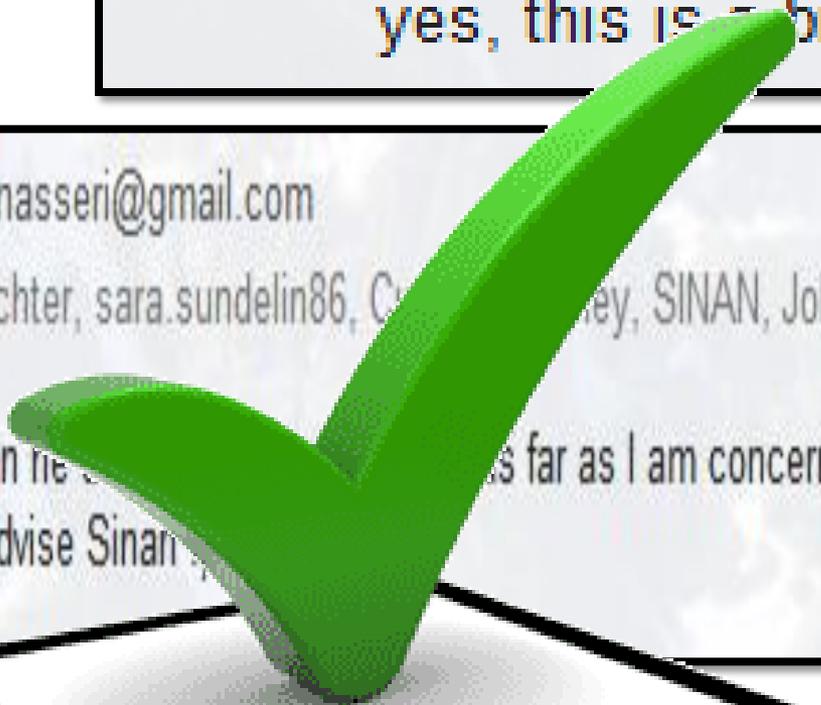
**Hoss Nasser** hossnasser@gmail.com

Apr 10



to me, Karolina, fruchter, sara.sundelin86, C..., ..., ..., ..., SINAN, John ▾

More discussion can be found here. As far as I am concerned this is a "go" unless Sinan has an objection. Please advise Sinan.



# PROCESS - FORM

Product

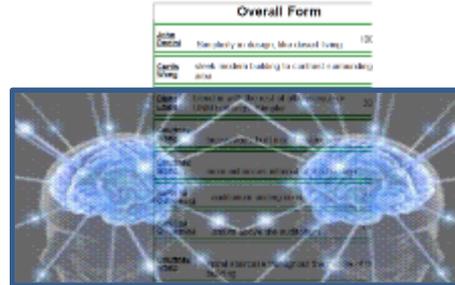
Organization

Process

Function

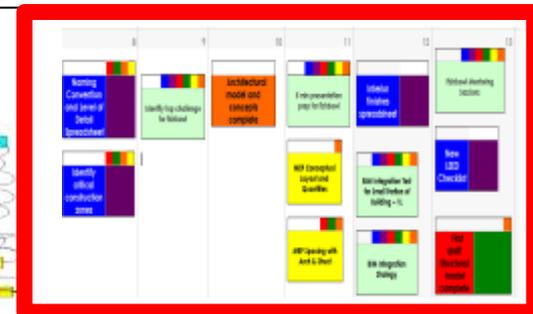
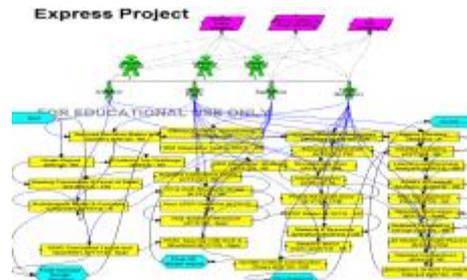


Overall Form

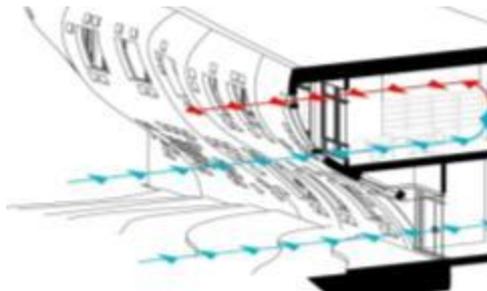


Category	Description	Owner's Value (0-10)	Owner's Value (0-10)	Owner's Answer
A. Substructure	Substructure on site	7	10	8.5
B. Shell	Exterior Enclosure (Facade)	9	9	9
C. Services	Energy Efficiency	10	10	10
D. Services	Interior Encl. Quality	8	8	8.5
E. Equipment/Furnishings	Interior Furnishings	8	8	8
F. Specialty Construction	Specialty Construction	7	7	7.5
G. Building Systems	Building Systems	7	8	7.5
H. Conditions	Conditions	7	8	7.5

Form



Behavior



Structural

Priority	Assignee	Date	New	Archive
1	CW	RESEARCH: Structural Load Definitions	Jan 23	
2	CW	[1 hour] Research: Lateral Loads		
3	CW	[1 hour] PLANS: Structural Concept #2	Feb 3	
4	CW	[1 hour] PLANS: Structural Concept #1	Feb 16	
5	CW	[5 hours] DIAGRAM: Structural Grids + Floor Heights + 3	Feb 20	
6	CW	[2 hours] DIAGRAMS: Preliminary Foundation Design Co	Feb 23	
7	CW	[0.5 hours] Research: Bubble decks	Mar 3	
8	CW	***CALS: Cantilever calculator!!!!	Feb 22	



# LAST PLANNER SYSTEM



8

Naming Convention and Level of Detail Spreadsheet

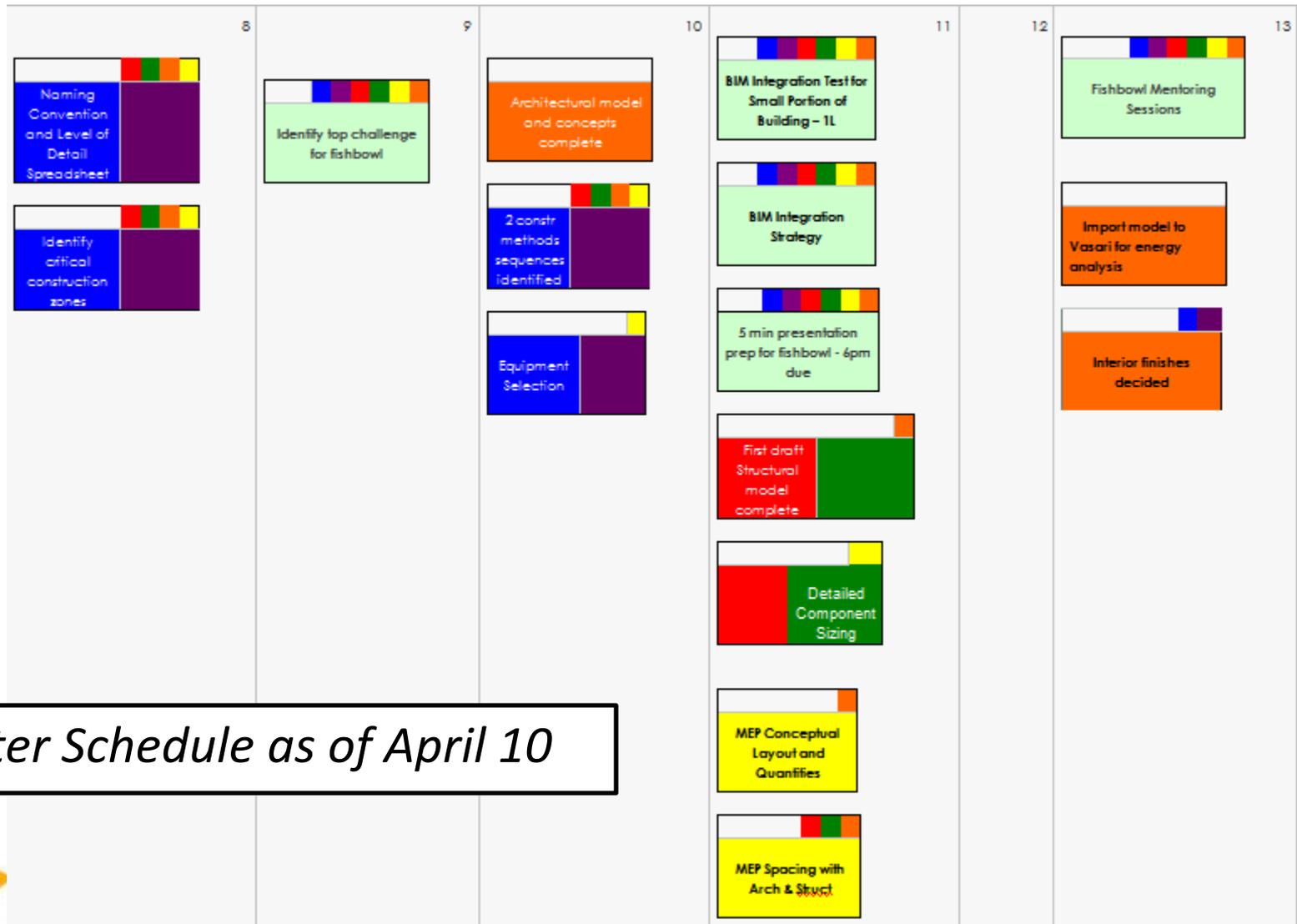
Identify critical construction zones

April 2012						
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
					<div style="background-color: green; padding: 2px;">White Paper Report Due at 11:00</div> <div style="background-color: blue; padding: 2px;">Marked Decision Made - Send to Diana</div>	
<div style="background-color: blue; padding: 2px;">Design Development (2nd) - 10:00 AM</div> <div style="background-color: purple; padding: 2px;">Design Development (2nd) - 10:00 AM</div>	<div style="background-color: green; padding: 2px;">Marketing Meeting - 10:00 AM</div>	<div style="background-color: orange; padding: 2px;">Marketing Meeting - 10:00 AM</div>	<div style="background-color: green; padding: 2px;">Engineering (2nd) - 10:00 AM</div> <div style="background-color: yellow; padding: 2px;">RFP Development - 10:00 AM</div> <div style="background-color: yellow; padding: 2px;">RFP Opening - 10:00 AM</div>	<div style="background-color: blue; padding: 2px;">Design Development (2nd) - 10:00 AM</div> <div style="background-color: purple; padding: 2px;">Design Development (2nd) - 10:00 AM</div> <div style="background-color: green; padding: 2px;">RFP Development - 10:00 AM</div> <div style="background-color: green; padding: 2px;">RFP Opening - 10:00 AM</div>	<div style="background-color: green; padding: 2px;">Marketing Meeting - 10:00 AM</div> <div style="background-color: purple; padding: 2px;">Marketing Meeting - 10:00 AM</div> <div style="background-color: red; padding: 2px;">Project Change Order - 10:00 AM</div> <div style="background-color: yellow; padding: 2px;">Design Development - 10:00 AM</div>	
<div style="background-color: yellow; padding: 2px;">Marketing Meeting - 10:00 AM</div> <div style="background-color: purple; padding: 2px;">Design Development (2nd) - 10:00 AM</div> <div style="background-color: purple; padding: 2px;">Design Development (2nd) - 10:00 AM</div> <div style="background-color: purple; padding: 2px;">Design Development (2nd) - 10:00 AM</div> <div style="background-color: orange; padding: 2px;">Design Development (2nd) - 10:00 AM</div>		<div style="background-color: blue; padding: 2px;">Marketing Meeting - 10:00 AM</div>	<div style="background-color: green; padding: 2px;">RFP Development - 10:00 AM</div>		<div style="background-color: blue; padding: 2px;">Design Development (2nd) - 10:00 AM</div> <div style="background-color: purple; padding: 2px;">Design Development (2nd) - 10:00 AM</div>	
				<div style="background-color: red; padding: 2px;">Design Development - 10:00 AM</div> <div style="background-color: orange; padding: 2px;">Marketing Meeting - 10:00 AM</div>	<div style="background-color: red; padding: 2px;">Design Development - 10:00 AM</div>	<div style="background-color: green; padding: 2px;">Marketing Meeting - 10:00 AM</div> <div style="background-color: green; padding: 2px;">Marketing Meeting - 10:00 AM</div>

May 2012						
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
<div style="background-color: green; padding: 2px;">Marketing Meeting - 10:00 AM</div> <div style="background-color: purple; padding: 2px;">Design Development (2nd) - 10:00 AM</div>		<div style="background-color: green; padding: 2px;">Marketing Meeting - 10:00 AM</div>	<div style="background-color: red; padding: 2px;">Design Development - 10:00 AM</div> <div style="background-color: green; padding: 2px;">Marketing Meeting - 10:00 AM</div>	<div style="background-color: blue; padding: 2px;">Design Development (2nd) - 10:00 AM</div> <div style="background-color: purple; padding: 2px;">Design Development (2nd) - 10:00 AM</div>	<div style="background-color: red; padding: 2px;">Design Development - 10:00 AM</div> <div style="background-color: green; padding: 2px;">Marketing Meeting - 10:00 AM</div>	<div style="background-color: blue; padding: 2px;">Design Development (2nd) - 10:00 AM</div> <div style="background-color: purple; padding: 2px;">Design Development (2nd) - 10:00 AM</div>
<div style="background-color: green; padding: 2px;">Marketing Meeting - 10:00 AM</div>	<div style="background-color: blue; padding: 2px;">Curt &amp; Courtney have meeting today</div>	<div style="background-color: orange; padding: 2px;">Dry Run #1 @ 1 PM</div>		<div style="background-color: orange; padding: 2px;">Dry Run #2 @ 1 PM</div>	<div style="background-color: green; padding: 2px;">Marketing Meeting - 10:00 AM</div>	<div style="background-color: blue; padding: 2px;">Design Development (2nd) - 10:00 AM</div> <div style="background-color: purple; padding: 2px;">Design Development (2nd) - 10:00 AM</div>
<div style="background-color: green; padding: 2px;">Marketing Meeting - 10:00 AM</div>	<div style="background-color: blue; padding: 2px;">Curt &amp; Courtney have meeting today</div>	<div style="background-color: orange; padding: 2px;">Dry Run #1 @ 1 PM</div>		<div style="background-color: orange; padding: 2px;">Dry Run #2 @ 1 PM</div>	<div style="background-color: green; padding: 2px;">Marketing Meeting - 10:00 AM</div>	<div style="background-color: blue; padding: 2px;">Design Development (2nd) - 10:00 AM</div> <div style="background-color: purple; padding: 2px;">Design Development (2nd) - 10:00 AM</div>
				<div style="background-color: green; padding: 2px;">Marketing Meeting - 10:00 AM</div>	<div style="background-color: red; padding: 2px;">Design Development - 10:00 AM</div> <div style="background-color: green; padding: 2px;">Marketing Meeting - 10:00 AM</div>	<div style="background-color: blue; padding: 2px;">Design Development (2nd) - 10:00 AM</div> <div style="background-color: purple; padding: 2px;">Design Development (2nd) - 10:00 AM</div>



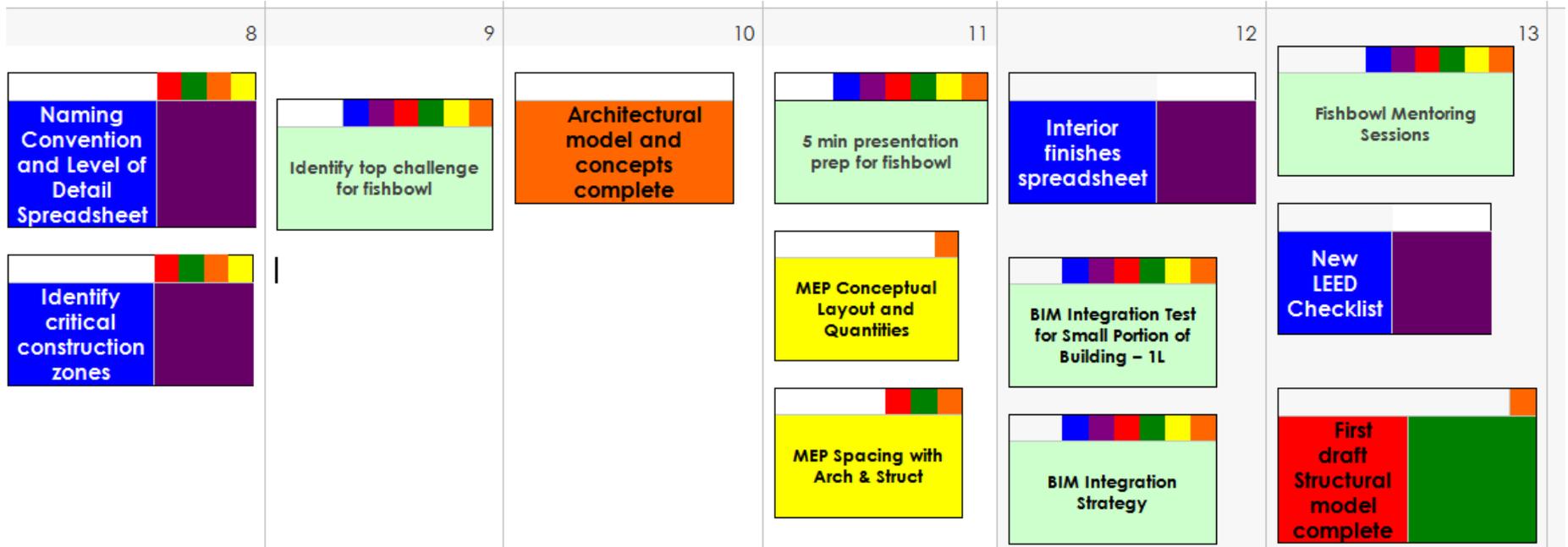
# PULL PLANNING SESSIONS



*Master Schedule as of April 10*



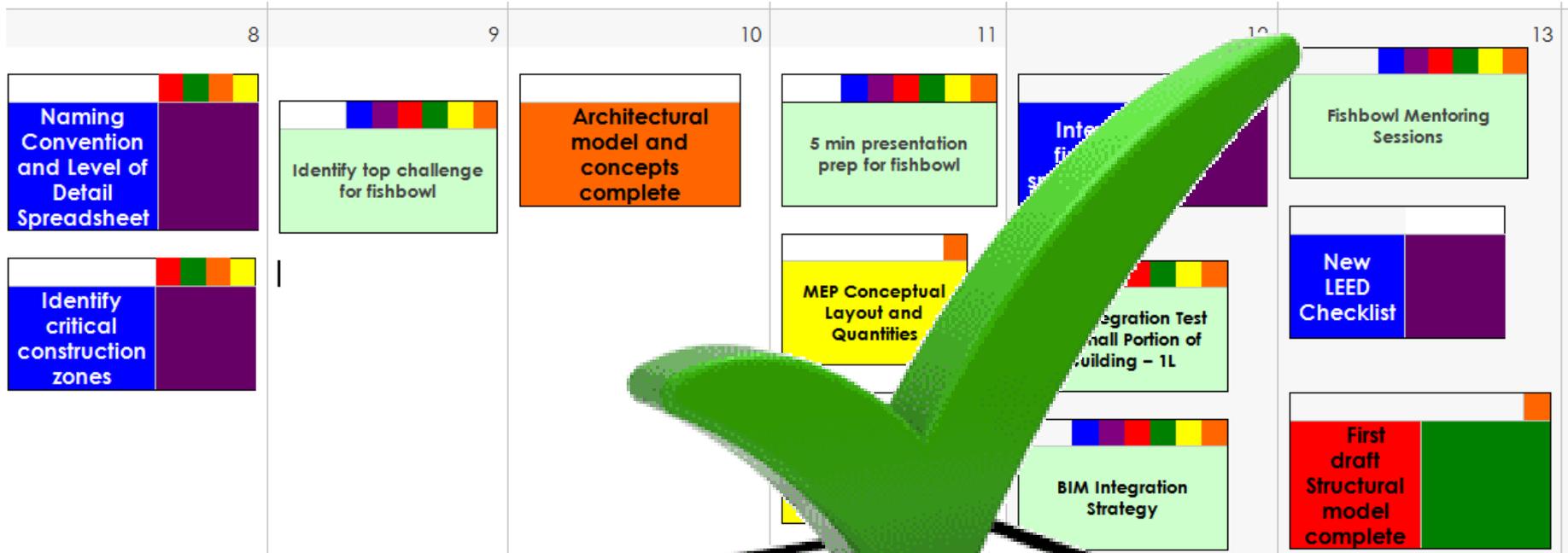
# PULL PLANNING SESSIONS



*Master Schedule as of April 25*



# PULL PLANNING SESSIONS

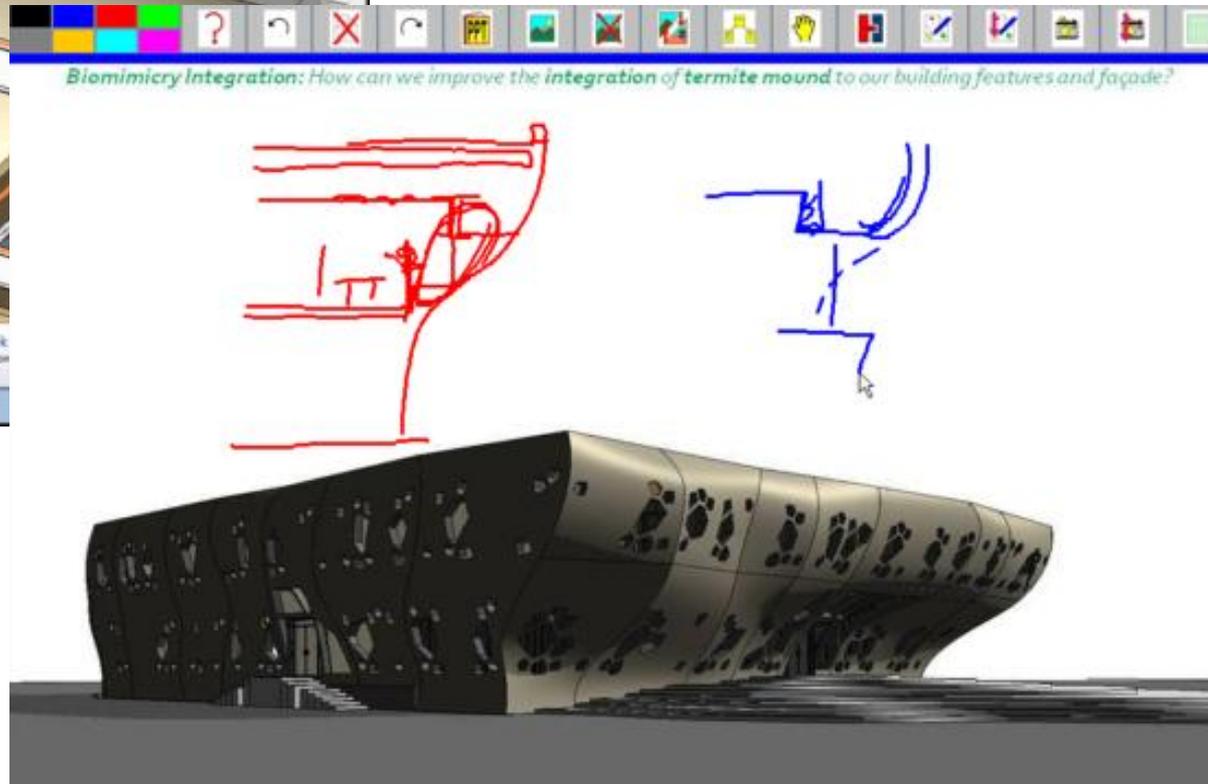
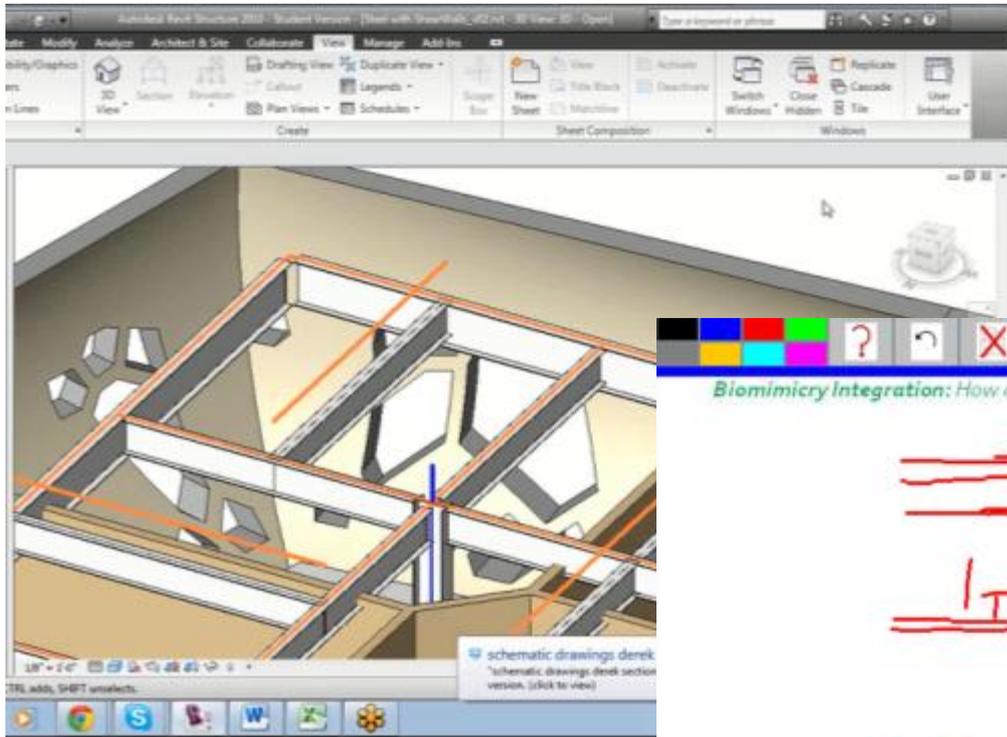


Master Schedule

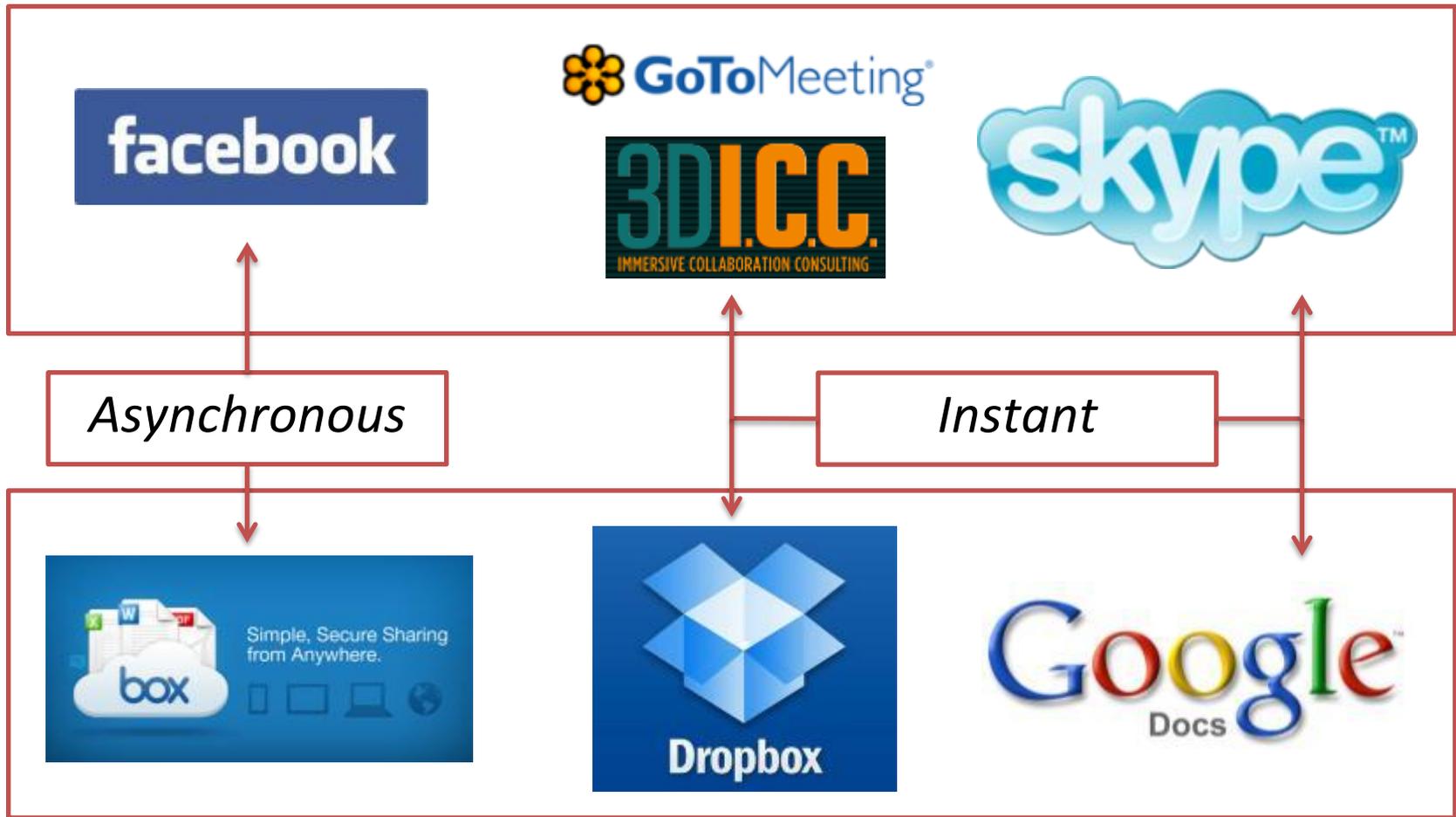




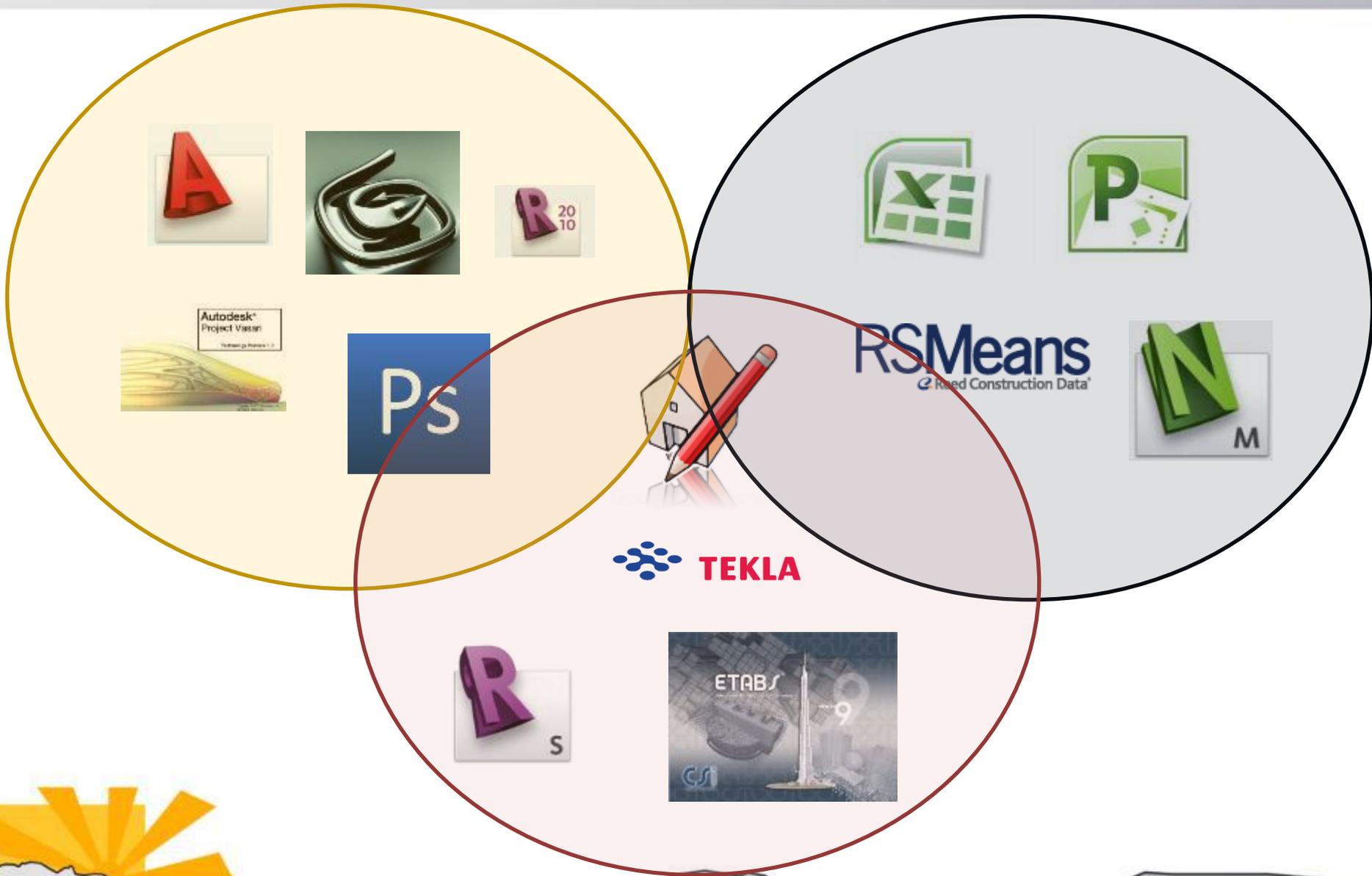
# IMPROVING PERFORMANCE VIA COMMUNICATION



# COMMUNICATION - TOOLS



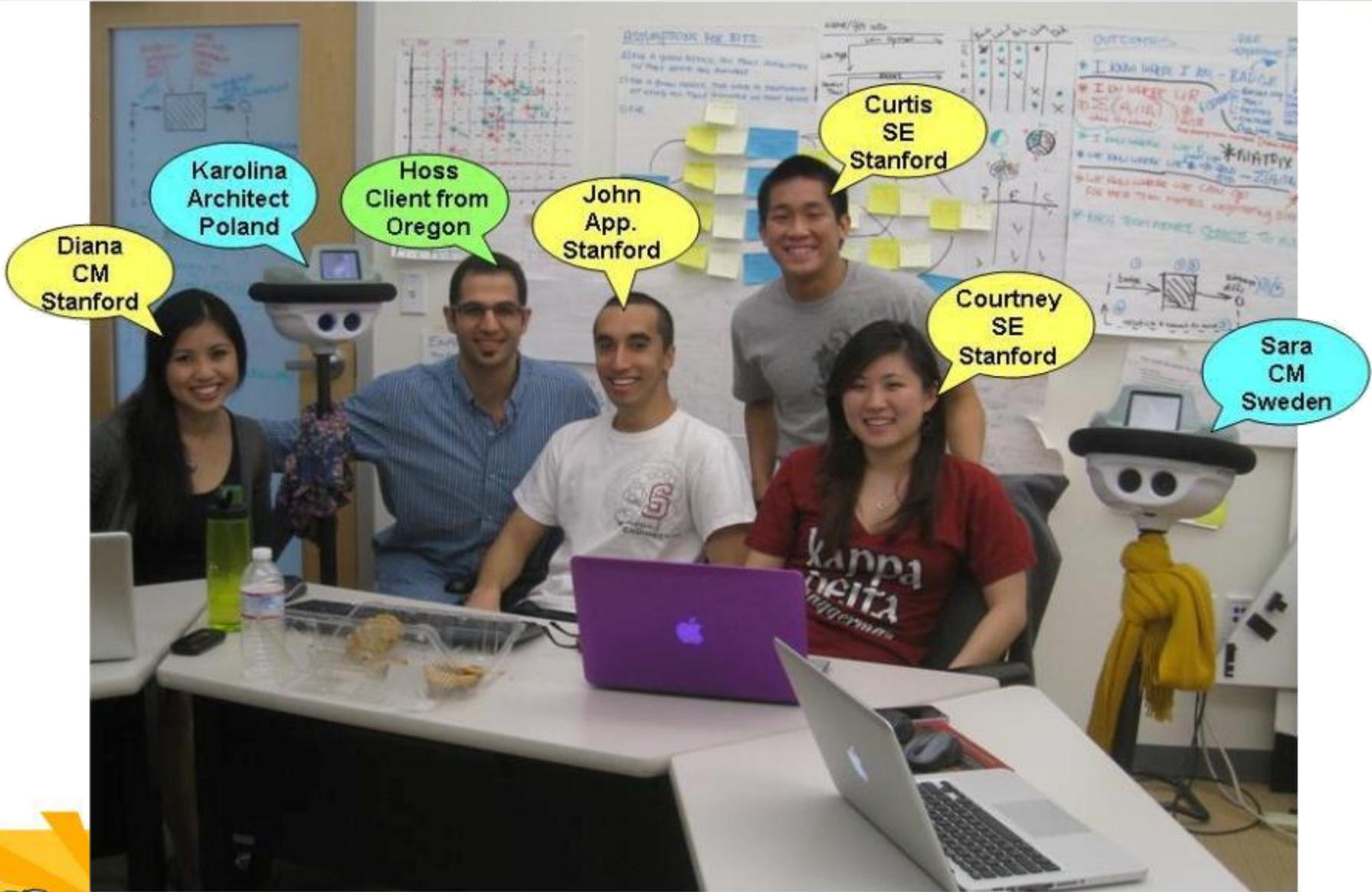
# COMMUNICATION - SOFTWARE



# VIRTUAL LOUNGING & HANGING OUT



# TEAM MEETING USING ROBOTS



# TEAM COLLABORATION





# WHAT IS "POP"?

Product

Organization

Process

Function



Category	Description	Element	Value	Element	Value
A. Substructure	Substructure of the Exterior Enclosure (Façade)		9	9	9
B. Shell	Shell		7	7	7
C. Services	Services		7	7	7
D. Services	Services		10	10	10
E. Equipment/Furnishings	Equipment/Furnishings		8	8	8
F. Specialty Construction	Specialty Construction		7	7	7
G. Building Structure	Building Structure		8	8	8
H. Core/Shell	Core/Shell		8	8	8

Form



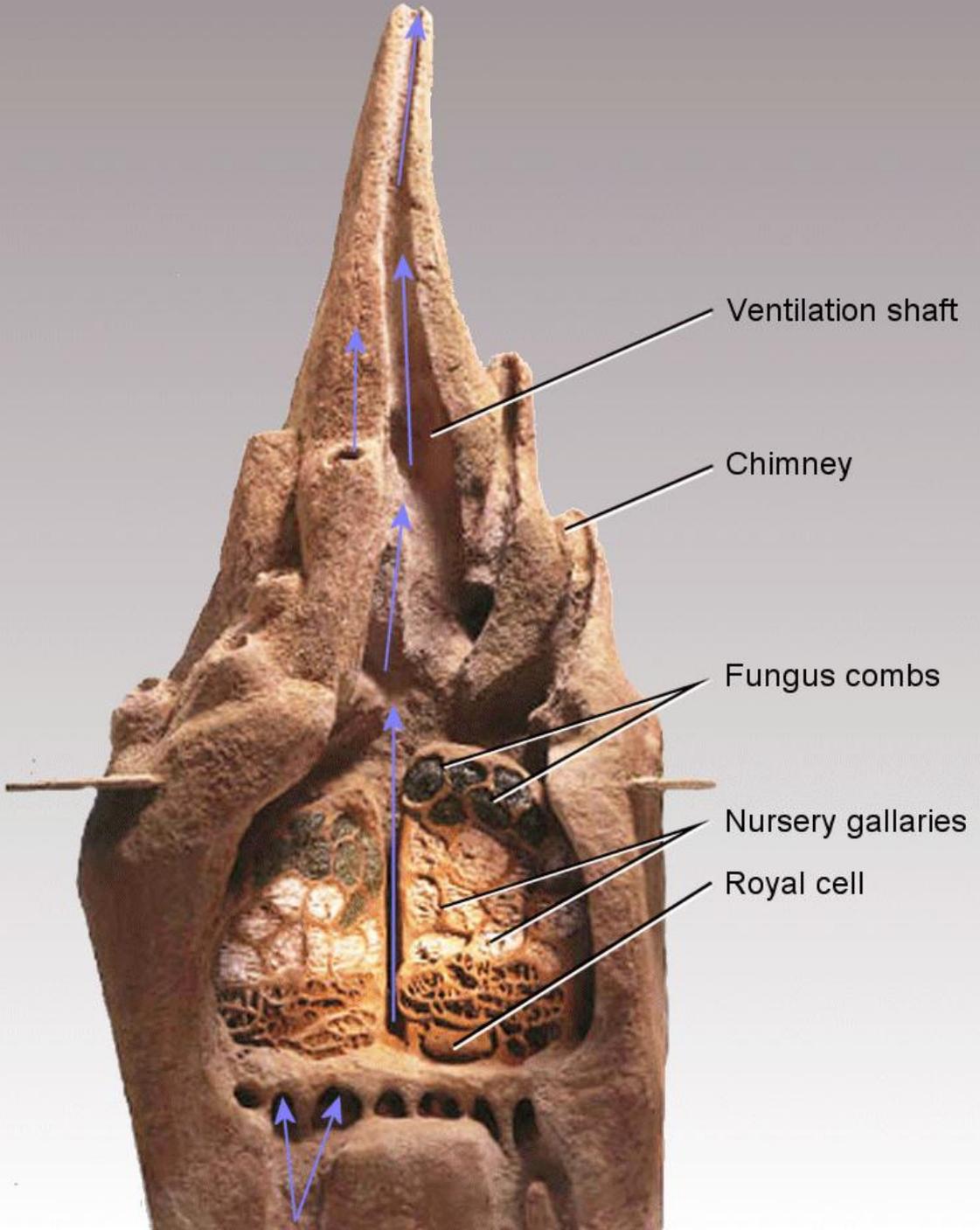
Behavior



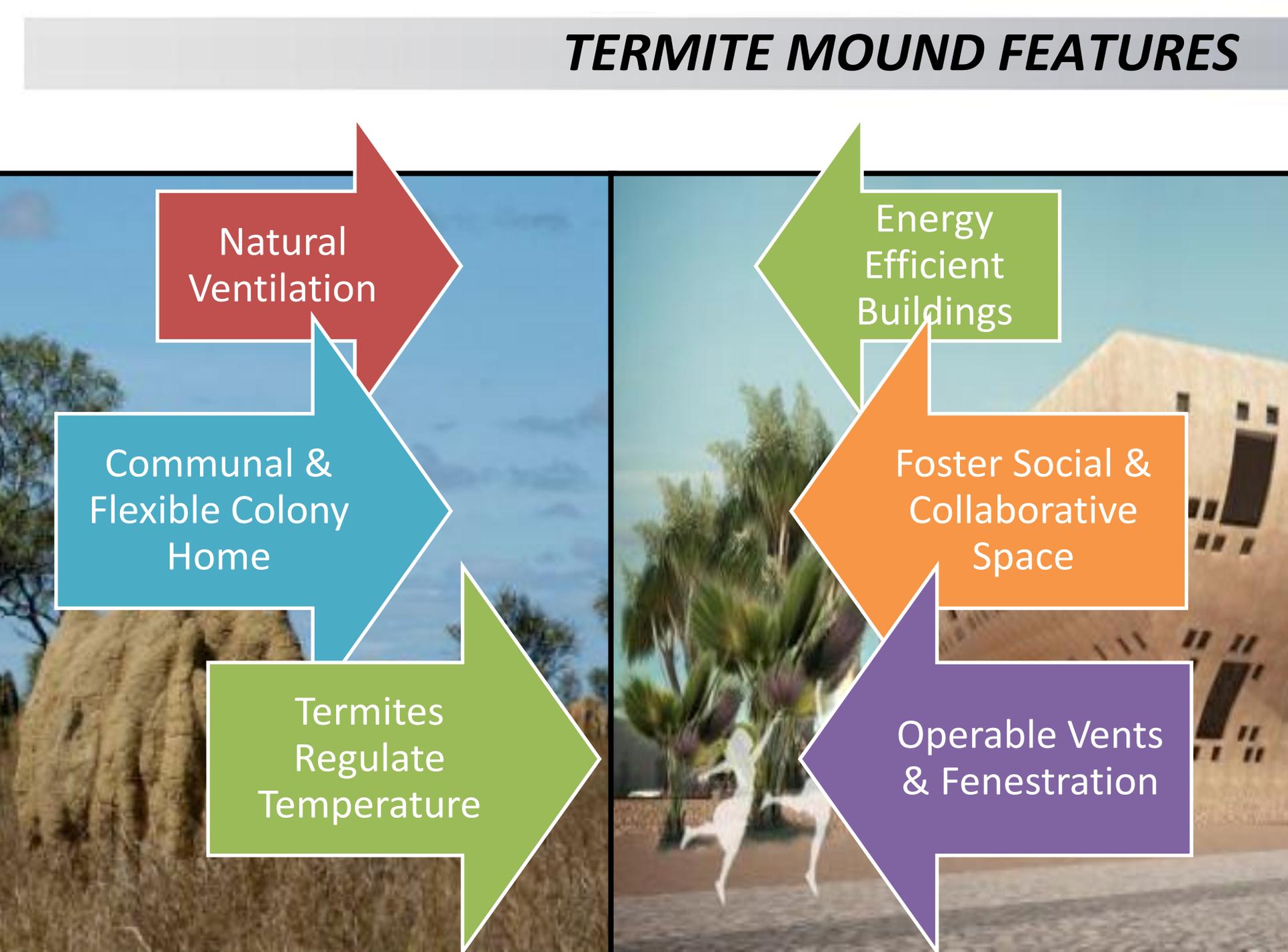
Priority	Assignee	Date	Archive
1	CW	RESEARCH Structural Load Definitions	Jan 23
2	CW	[1 hour] Research Lab/Workshop	
3	CW	[1 hour] PLANS: Structural	Feb 3
4	CW	[1 hour] PLANS: Structural	Feb 16
5	CW	[5 hours] DIAGRAMS	Feb 20
6	CW	[2 hours] DIAGRAMS	Feb 23
7	CW	[0.5 hours] Research: B...	Mar 3
8	CW	***CACLS: Cantilever calculator!!!!	Feb 22







# TERMITE MOUND FEATURES

The diagram is split into two vertical panels. The left panel shows a natural termite mound in a savanna setting with a blue sky and trees. Three arrows point from the mound towards the right: a red arrow at the top, a teal arrow in the middle, and a light green arrow at the bottom. The right panel shows a modern building with a textured facade and several windows, with palm trees and a white dog in the foreground. Three arrows point from the building towards the left: a light green arrow at the top, an orange arrow in the middle, and a purple arrow at the bottom. The arrows are arranged in a staggered, overlapping fashion.

Natural Ventilation

Communal & Flexible Colony Home

Termites Regulate Temperature

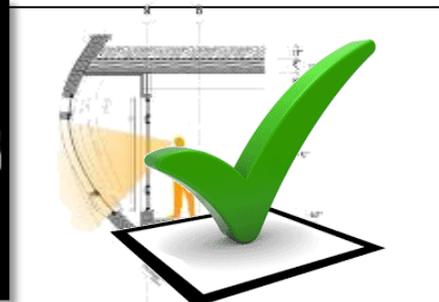
Energy Efficient Buildings

Foster Social & Collaborative Space

Operable Vents & Fenestration

# BIOMIMICRY – TERMITE MOUND

Natural  
Ventilation



Communal &  
Flexible Home



Termites  
Regulate  
Temperature







THANK YOU!







**Eye on the prize!**

**There comes a time  
when you have to  
stop making  
changes.**

**Remember the  
big picture!**

**You have less  
time than you  
think.**

**We are always  
pushing the  
boundaries of what  
we can do.**

**Every individual  
decision should  
benefit the team.**