S

L

A

N

D

TEAM

CAMILA HERNANDEZ	WENJIN SITU	LI DENG	ANNA BURISCH	NATHAN HILL	NIRUPAMA KUTCHARLAKOTA	CHRISTINE BAUMER
A	SE	SE	MEP	CM	CM	LCFM

OWNERS

SARAH
SAXON

CHRISTOPHER
GÖRSCH

JURE
CESNIK

MIKE
MILLER

LUKE
LOMBARDI

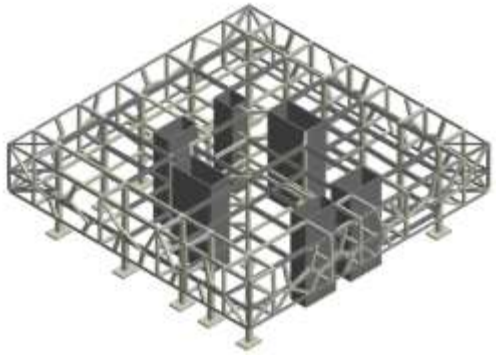
BIANCA
MORELL

CONCEPT DECISION

OPTIONS

Bird Concrete

Bird Steel /C



Air Cube Concrete

Air Cube Steel /C

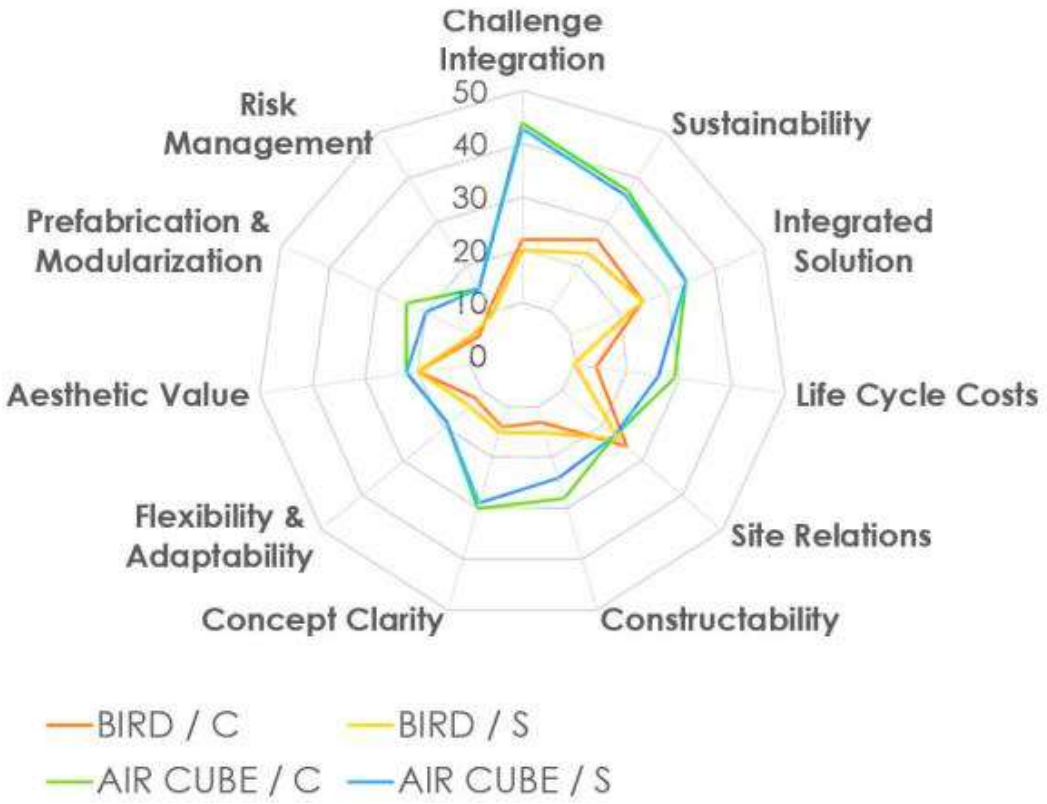
DECISION based on weighted criteria in cooperation with the owners

CRITERIA

1. Challenge Integration
2. Sustainability
3. Integrated Solution
4. Life Cycle Costs
5. Site Relations
6. Constructability
7. Concept Clarity
8. Flexibility & Adaptability
9. Aesthetic Value
10. Risk Management
11. Prefabrication & Modularization

CONCEPT DECISION

RATING BY OWNERS AND TEAM



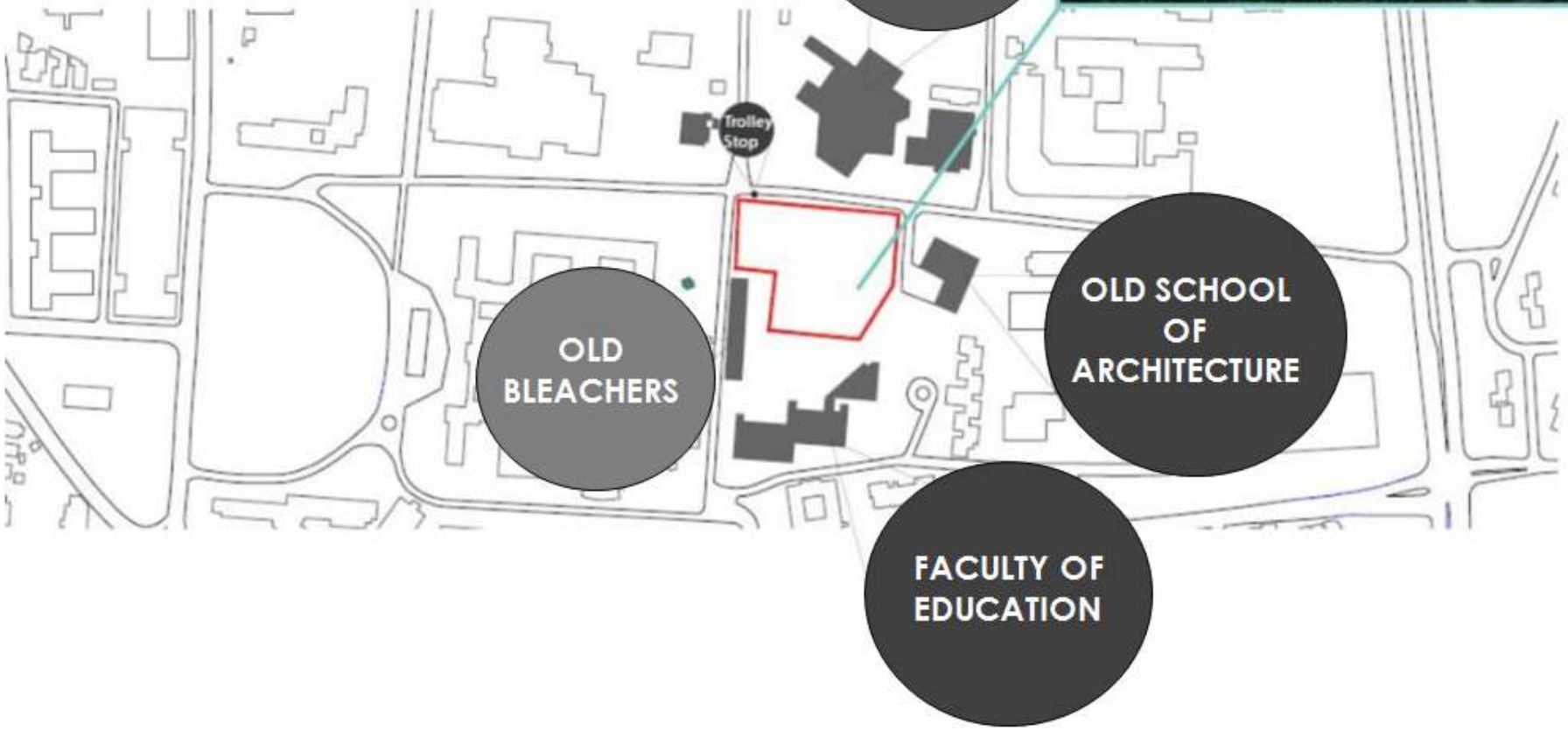
	Reached Points *Points*	Ratio to max. points *%*	Annual Rent *US$*	Value for Cost* *Points*
BIRD-Concrete	192	48	880,000	58
BIRD-Steel /C	187	47	910,000	41
AIR CUBE-Concrete	293	73	830,000	124
AIR CUBE-Steel/C	291	72	850,000	109

** = Ratio to max.* ***x*** *(1Mio. $ - Annual rent)* ***/*** *100,000*

LOCATION

San Juan, Puerto Rico

LOCATION ON SITE



WEATHER CONDITIONS

Rainy Seasons

Hurricanes and Dust Storms

Humid Outdoor Air

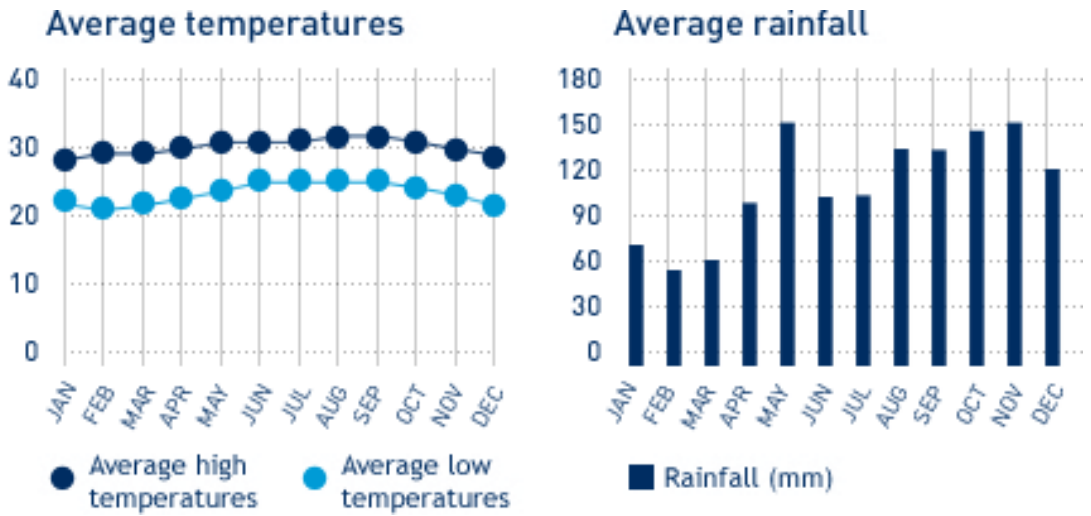
Av. relative humidity: 76 %

Wind

Average Sunlight Hours: 8 hrs

High Cooling Capacity Demand

SAN JUAN



SOLAR CONDITIONS

March 10 am – 8 pm

June 8 am – 10 pm

December 11 am – 7 pm

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WE **WORK** WITH THE CONDITIONS
INSTEAD OF **IMPOSING** ON THEM

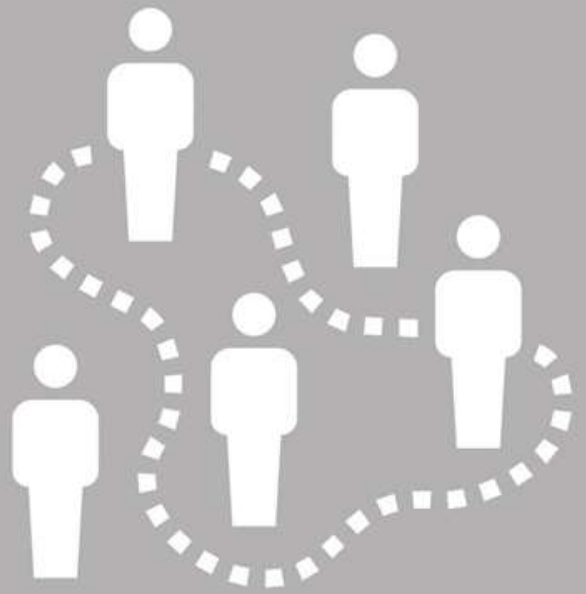
PROJECT CHALLENGES


AIR
QUALITY

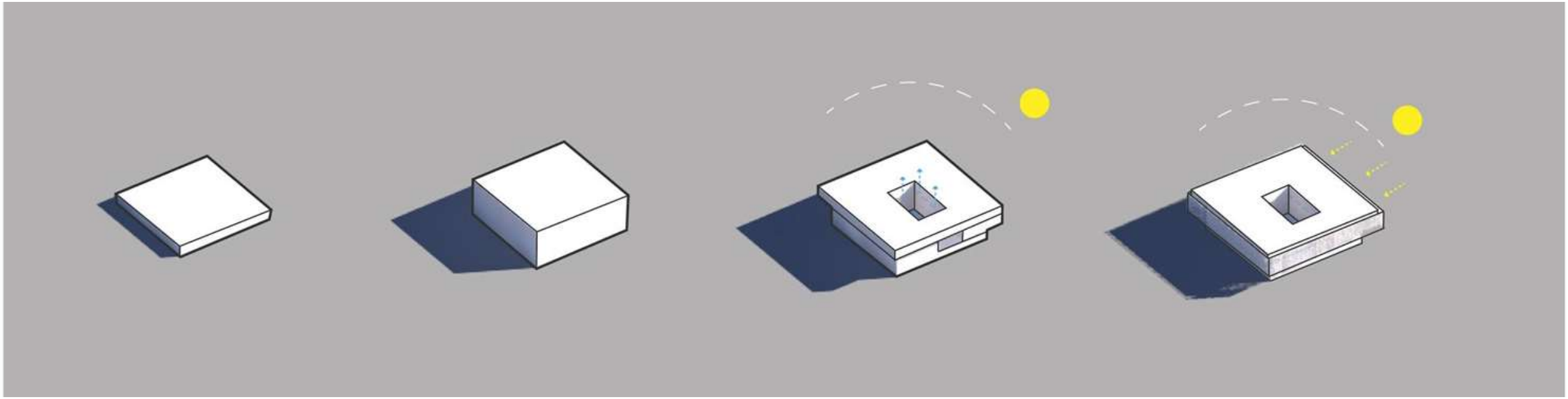
CLIENTS

USERS

PROJECT GOALS



DEVELOPMENT PROCESS



SITE PLAN

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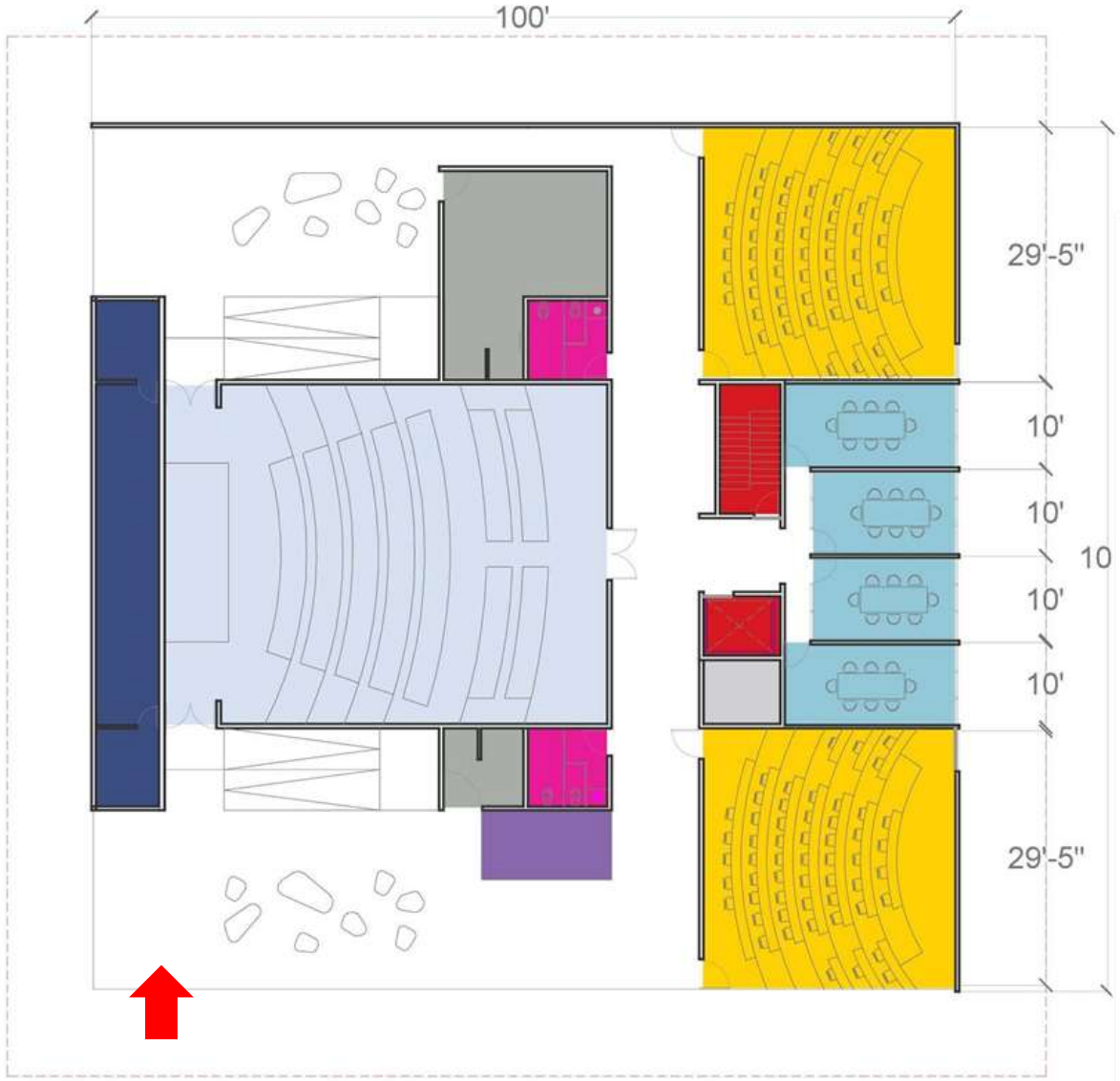
OPEN AUDITORIUM

(1938)

(2016)

UNDERGROUND LEVEL



Entrance

- Large Classrooms
- Auditorium
- Storage
- Vertical Circulation
- Seminars
- Mech Rooms
- Bathrooms
- Elevator Mech Room
- Cafeteria

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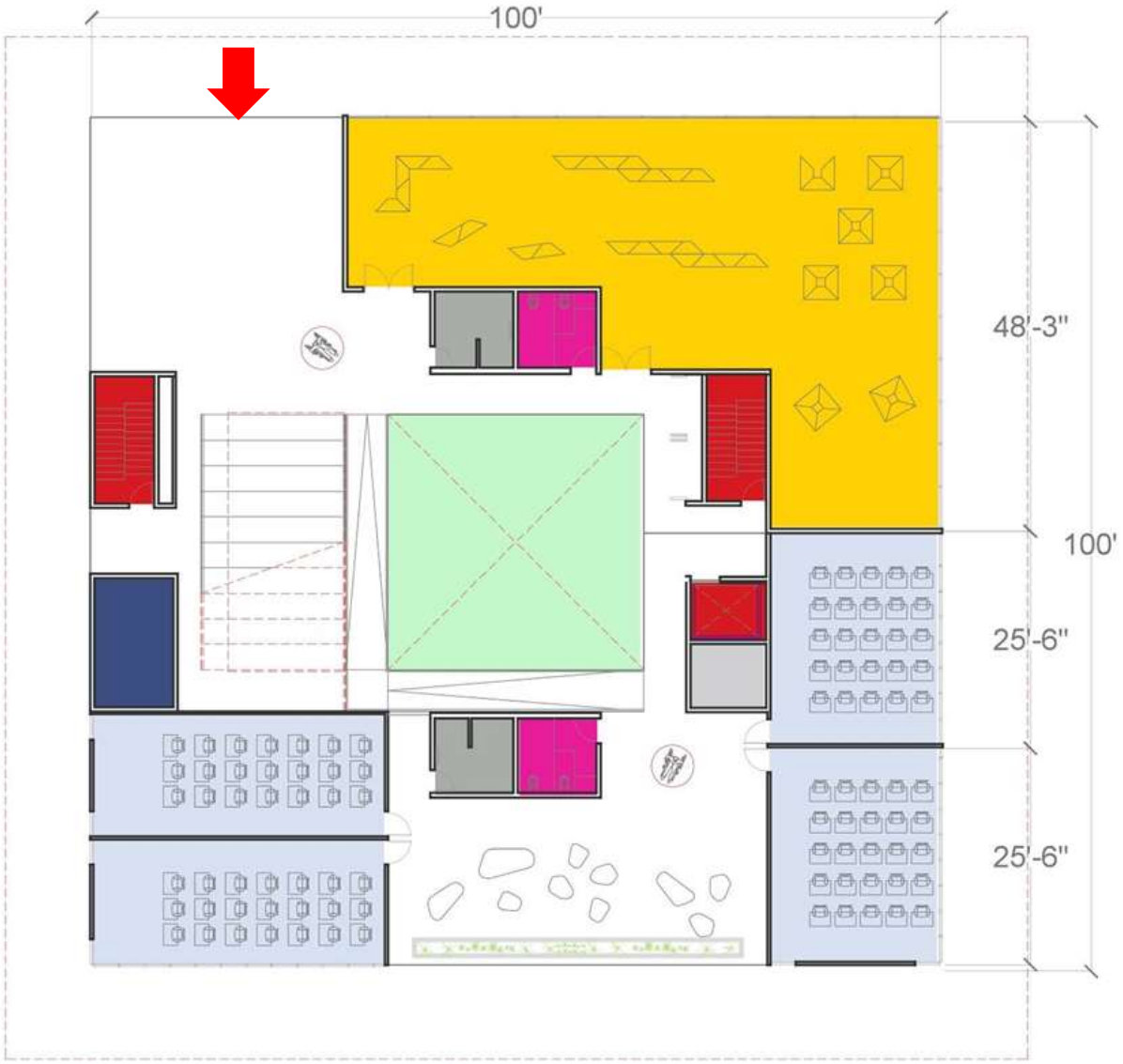
GROUND LEVEL



Entrance

Labs

Small Classrooms

Storage

Vertical Circulation

Mech Rooms

Bathrooms

Janitor's Room

Atrium

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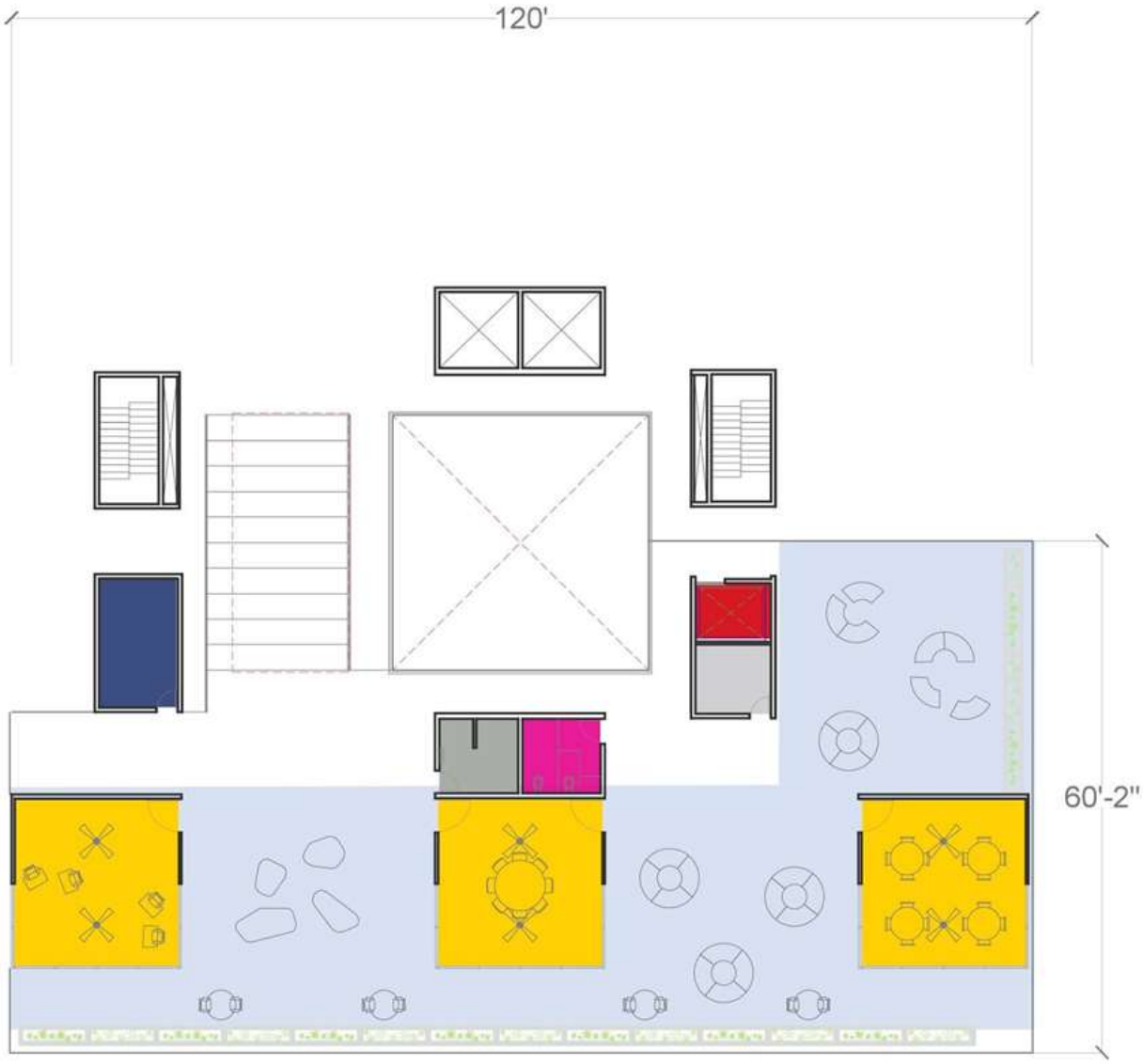
INTERMEDIATE LEVEL



- Students Offices
- Open Collaboration Space
- Storage
- Vertical Circulation
- Mech Room
- Bathrooms
- Janitor's Closet

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SECOND LEVEL

- Faculty Offices
- Faculty Lounge
- Storage
- Vertical Circulation
- Mech Room
- Bathrooms
- Janitor's Closet
- Faculty Open Space
- Administration

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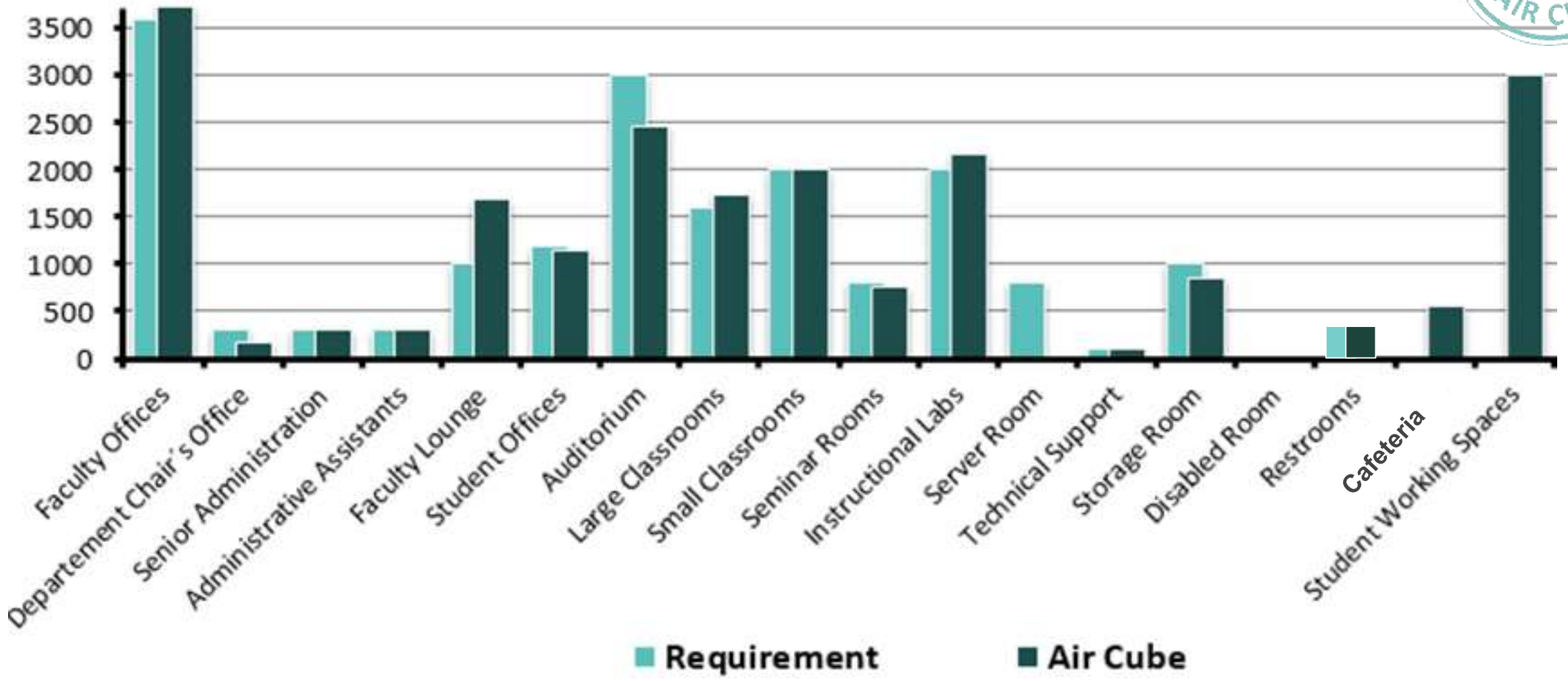
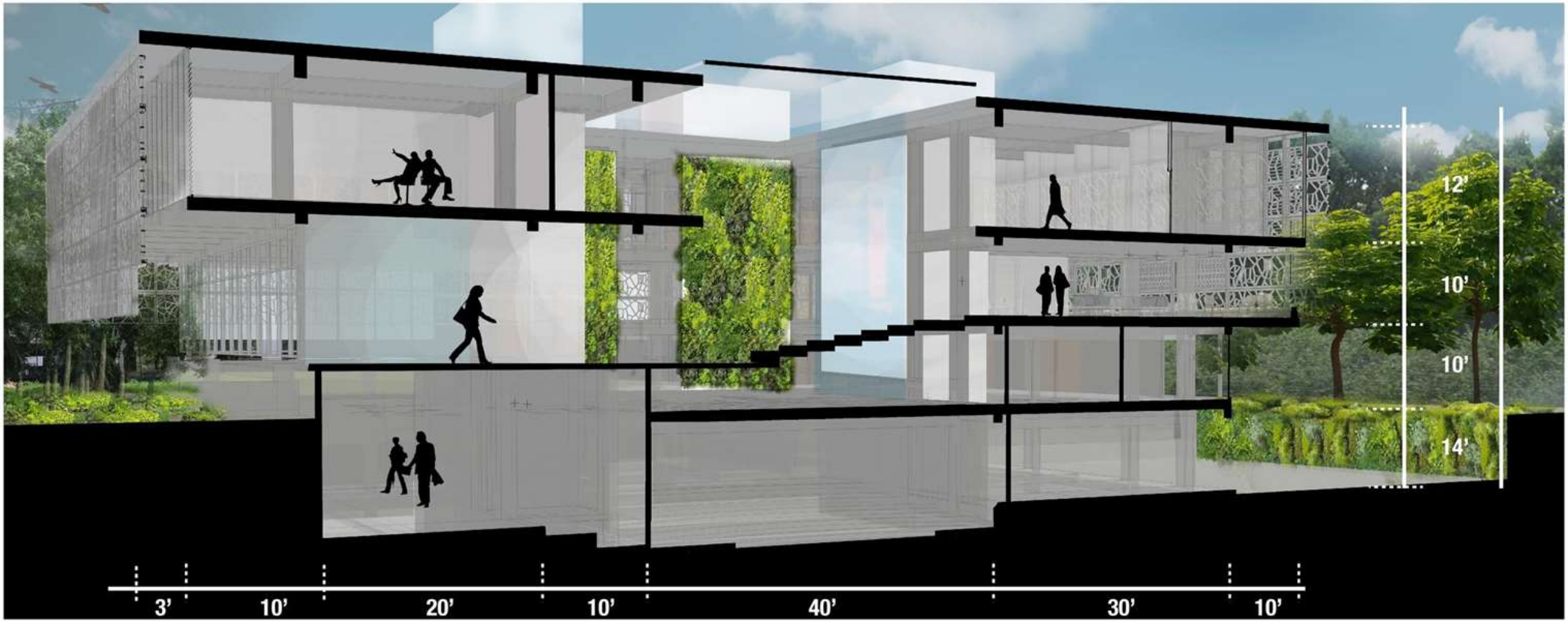
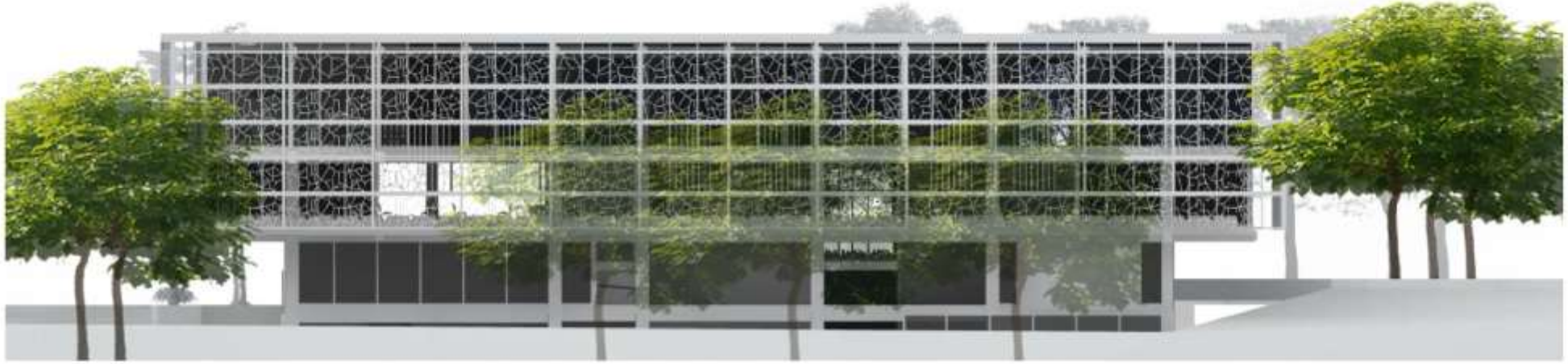
FLOORPLAN ANALYSIS



SECTION

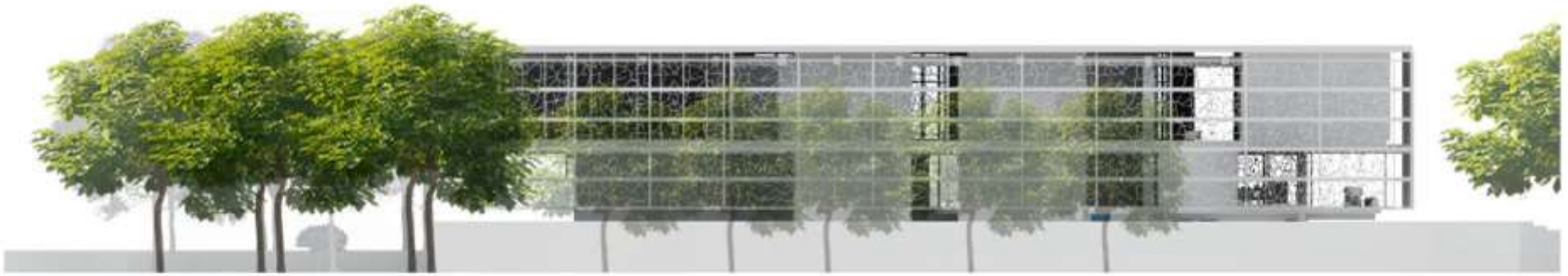



400 ppm
81° F
85%



SOUTH ELEVATION

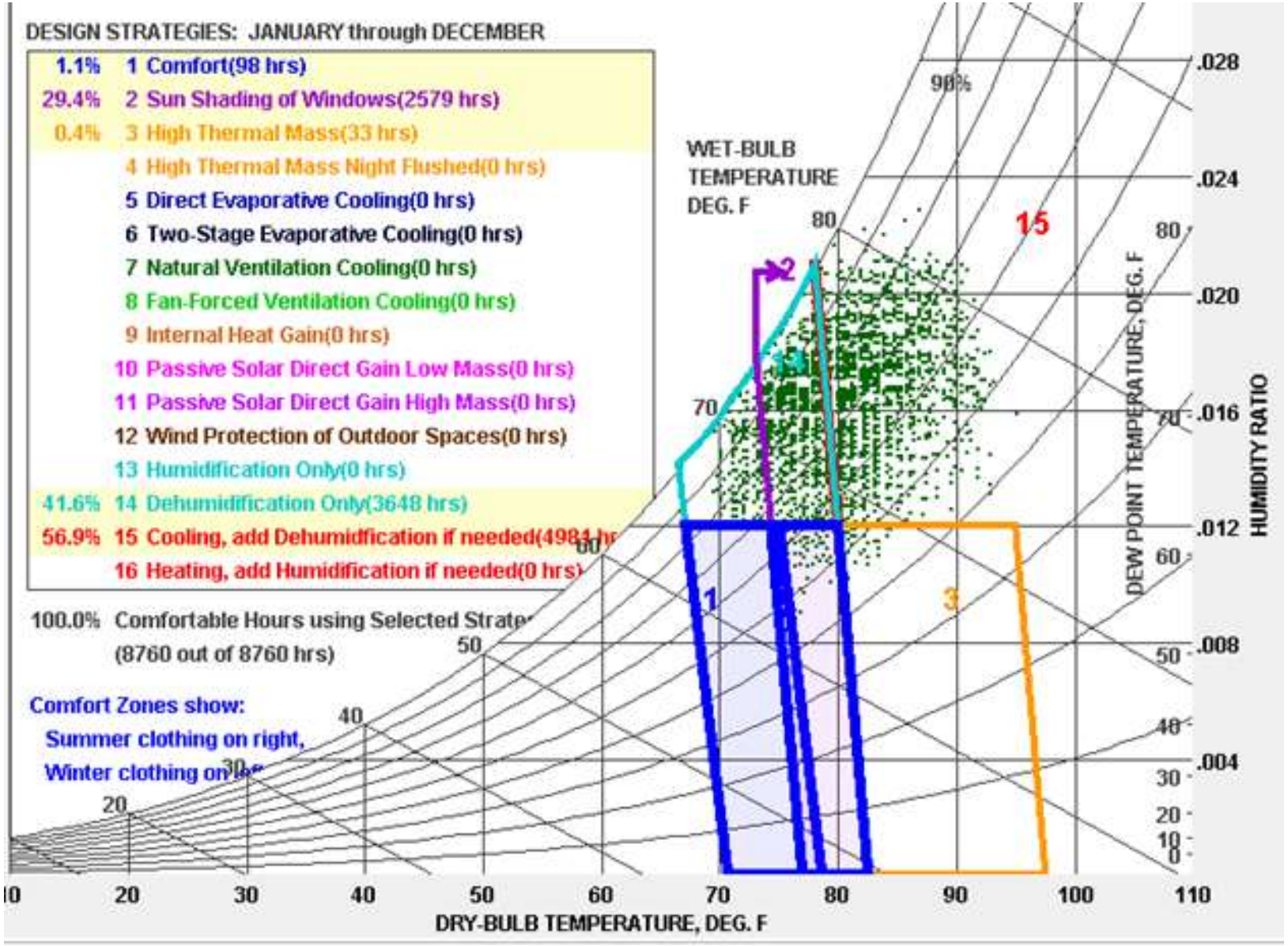
EAST ELEVATION



WEST ELEVATION

NORTH ELEVATION

DESIGN STRATEGIES



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ROOM ANALYSIS - FIRST FLOORS

Class rooms

Auditorium

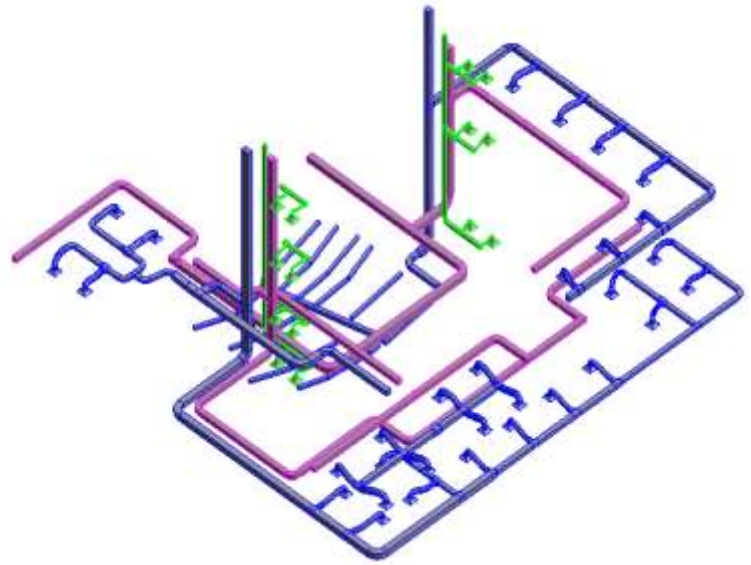
Seminar rooms

Labs

=HIGH COOLING LOAD

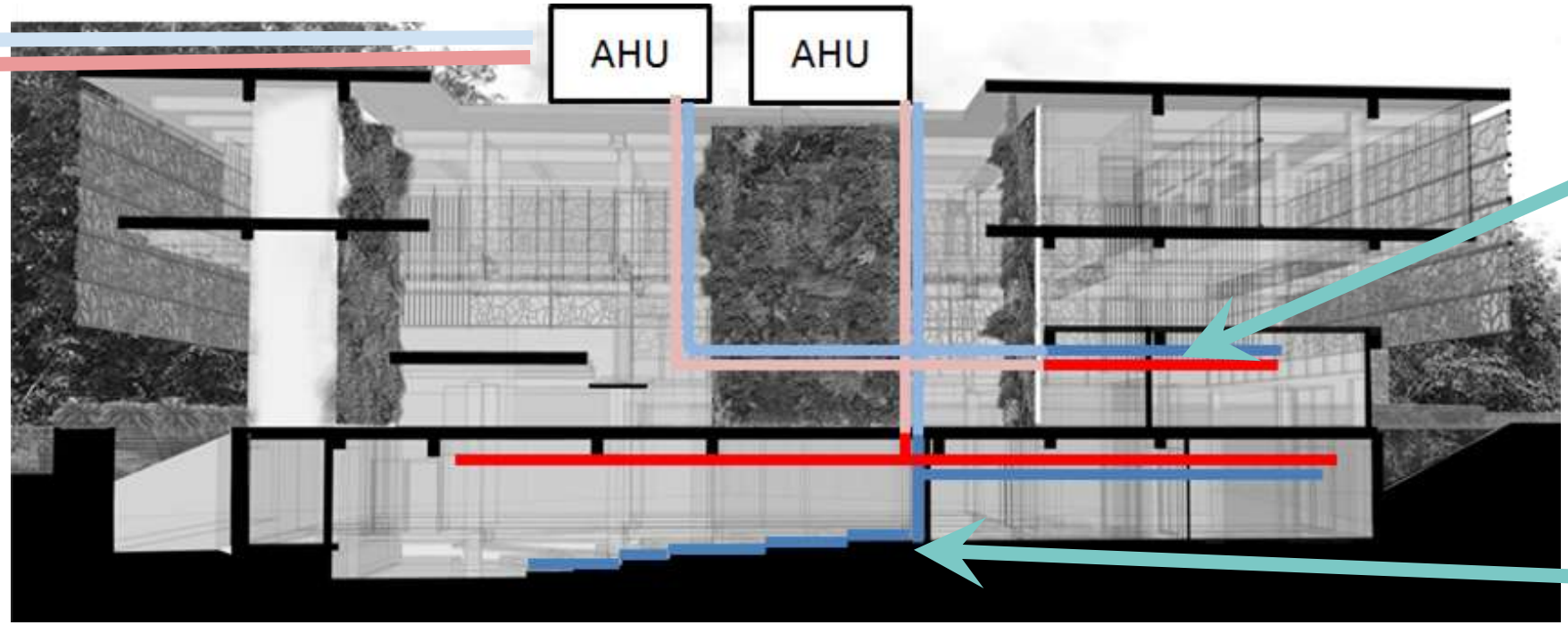
STRATEGY

SOLUTION

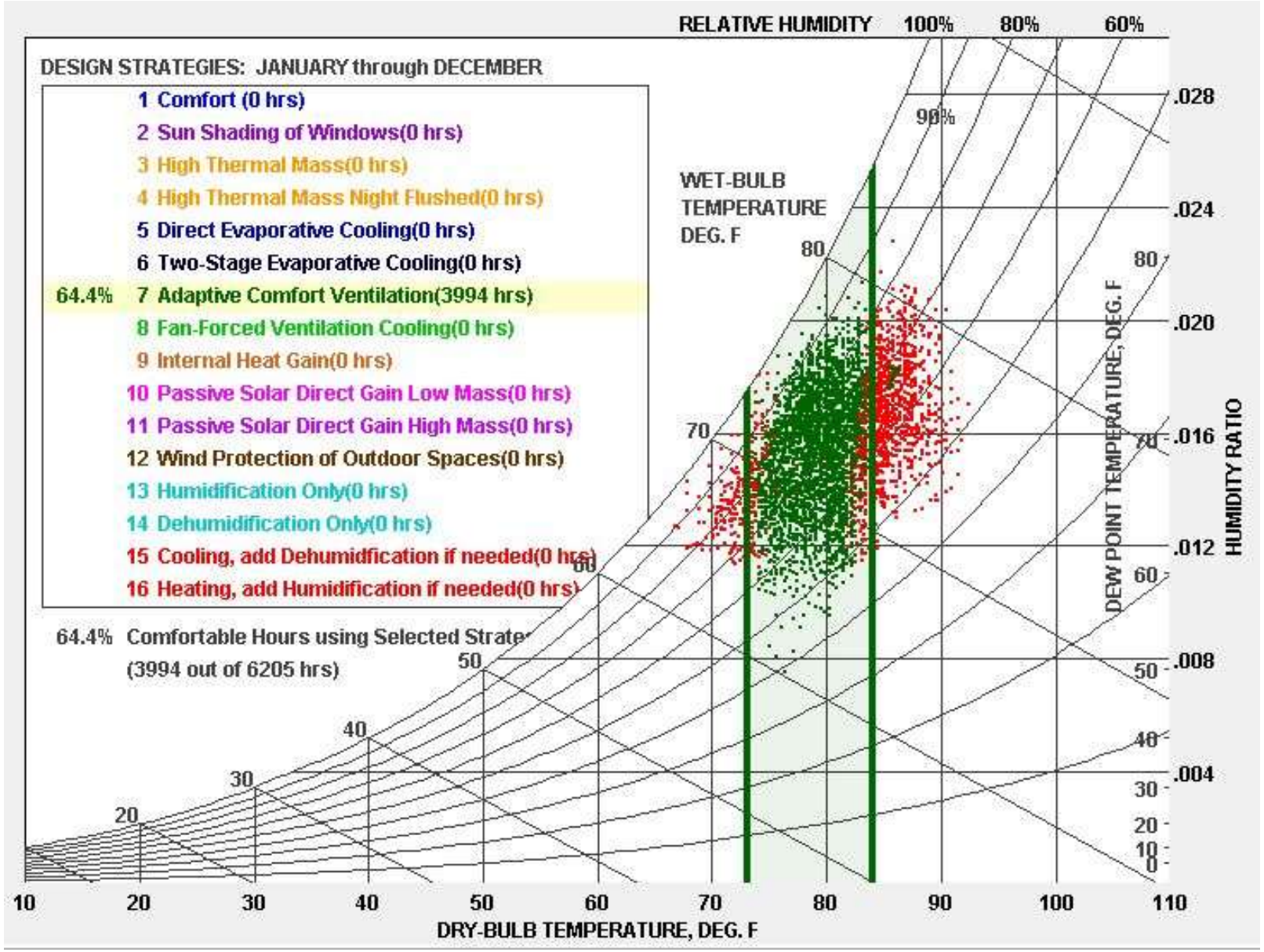


\+ **Dessicant wheel**

HVAC DESIGN


AHU
AHU
Classroom+Labs
Ceiling supply
and return
Auditorium
UFAD
Chilled
water

POTENTIAL FOR ADAPTIVE COMFORT



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ROOM ANALYSIS - SECOND FLOOR

TYPE	STRATEGY	SOLUTION
Offices		Portable unit
Administration		used during extreme weather conditions
= OCCUPANT CONTROL		

Meet R2D2

NORMAL CONDITION

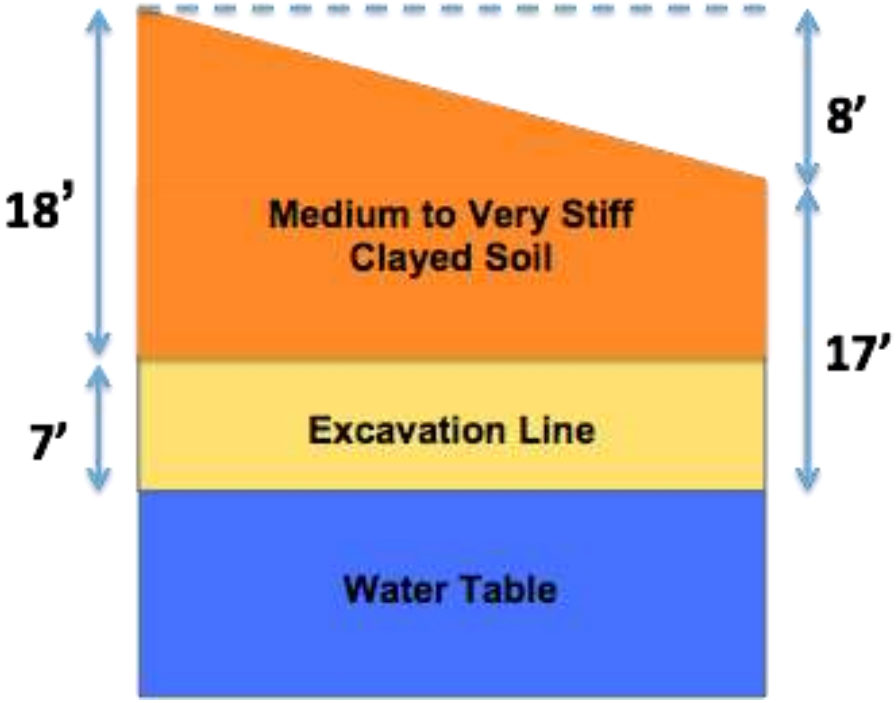
Office on second floor

LOAD INFORMATION (GRAVITY)

Function	Live Load (psf)
Office	50
Corridor	100
Roof	40
Classrooms	40
Storage	250
Lab	200
Auditorium	100

Soil Profile

Bearing Capacity: 5000 psf



HAZARD CONDITIONS

Earthquake

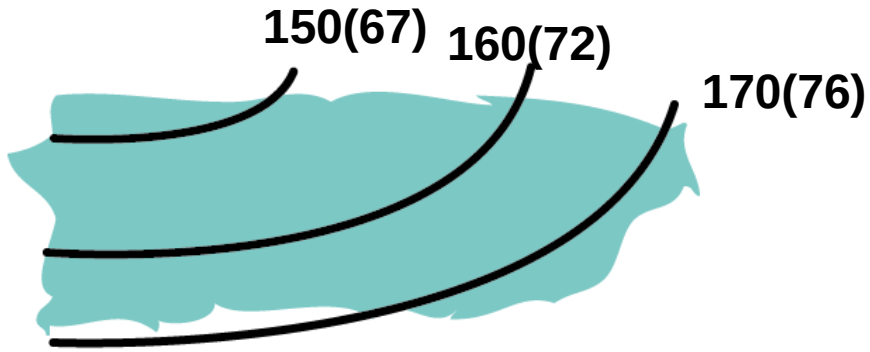
S_s=1.0g

S_1=0.4g

Site Class C

Damping ratio = 5%

Base Shear = **979** kips



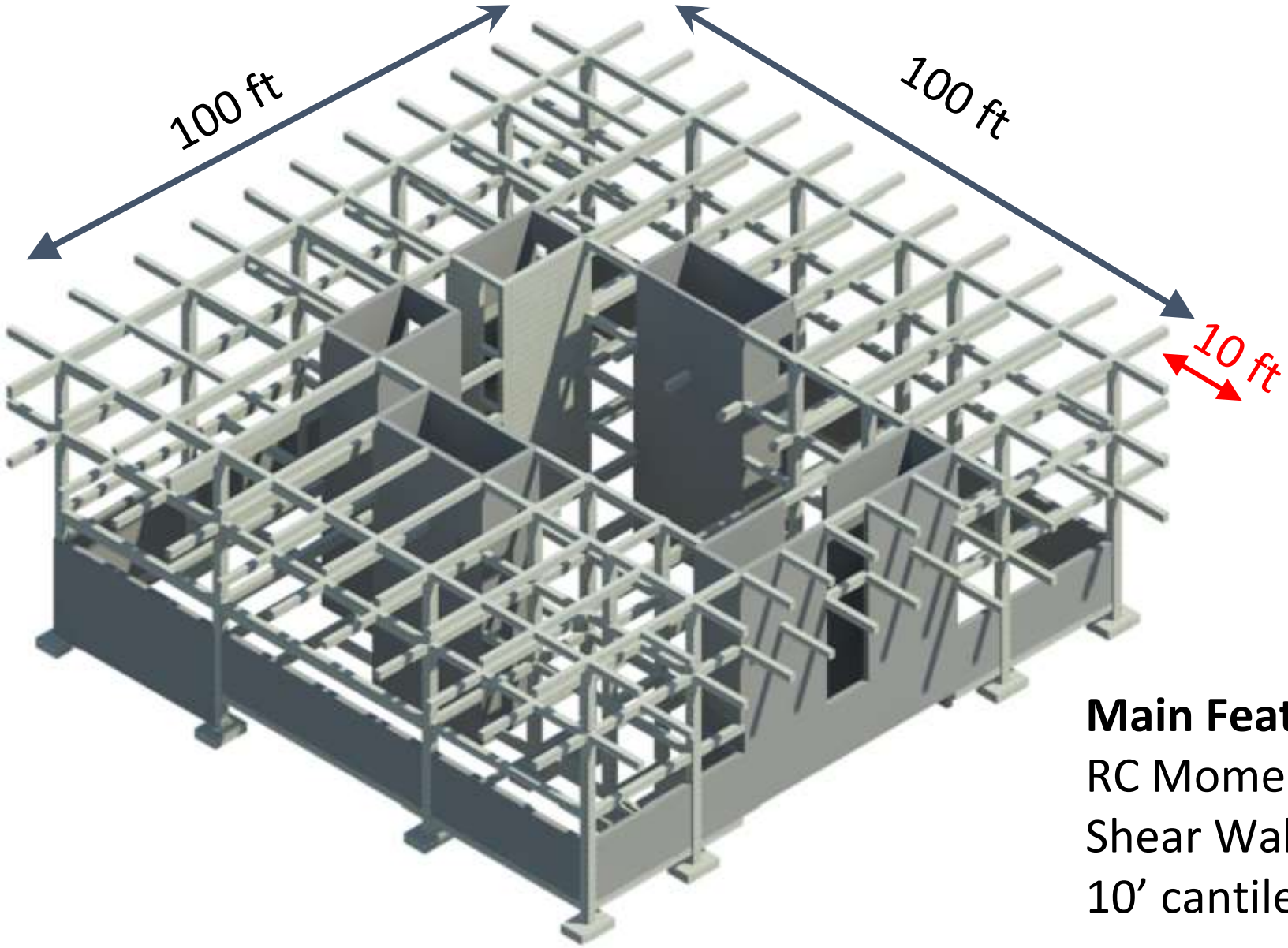
Hurricane

Hurricane season Jun-Nov

wind pressure = **70** psf

max. speed = **170** mph

STRUCTURAL SYSTEM



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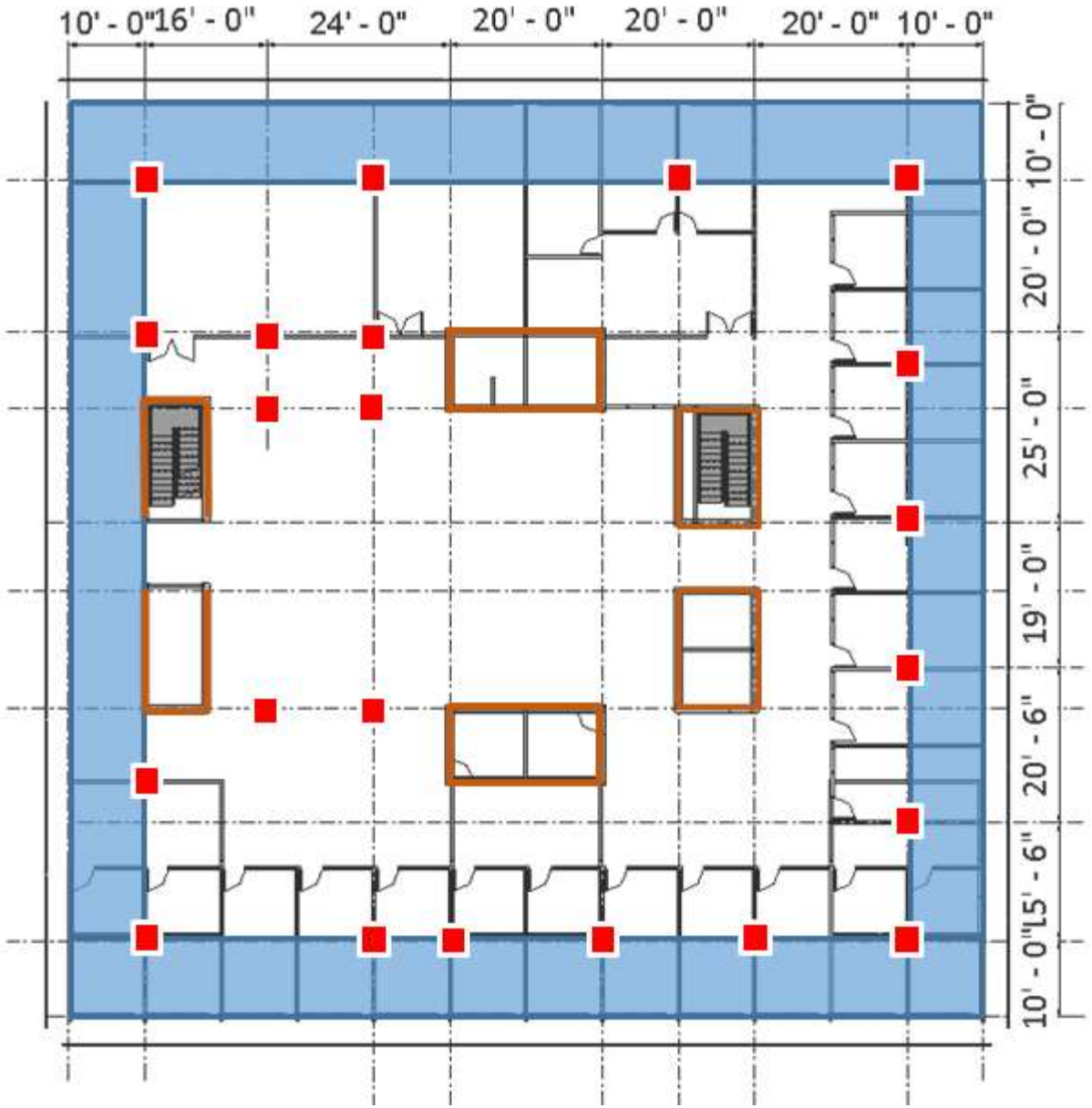
Main Features

RC Moment Resisting Frame

Shear Wall Cores (Rocking shear walls)

10’ cantilevers all-sided

TYPICAL STRUCTURAL LAYOUTS



- Cantilever Regions
- Shear Wall 12''
- Int. Column 18'' x 18''
  Ext. Column 16'' x 16''
- Beams (Auditorium Long Span) 24''
  Beams (Cantilever & Core) 16''
- Reinforced Concrete Slabs 6''

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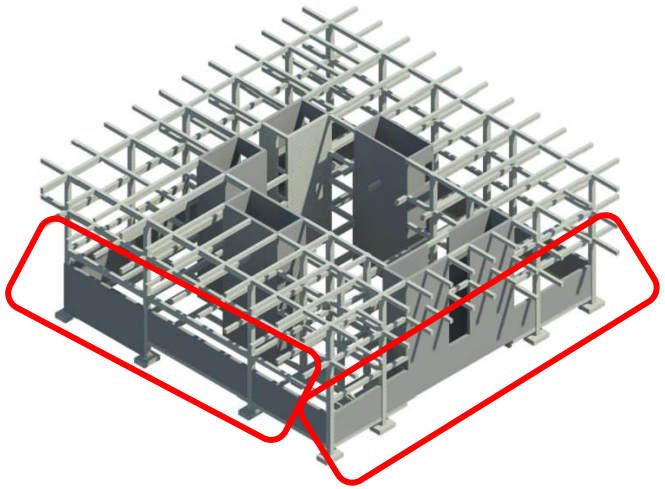
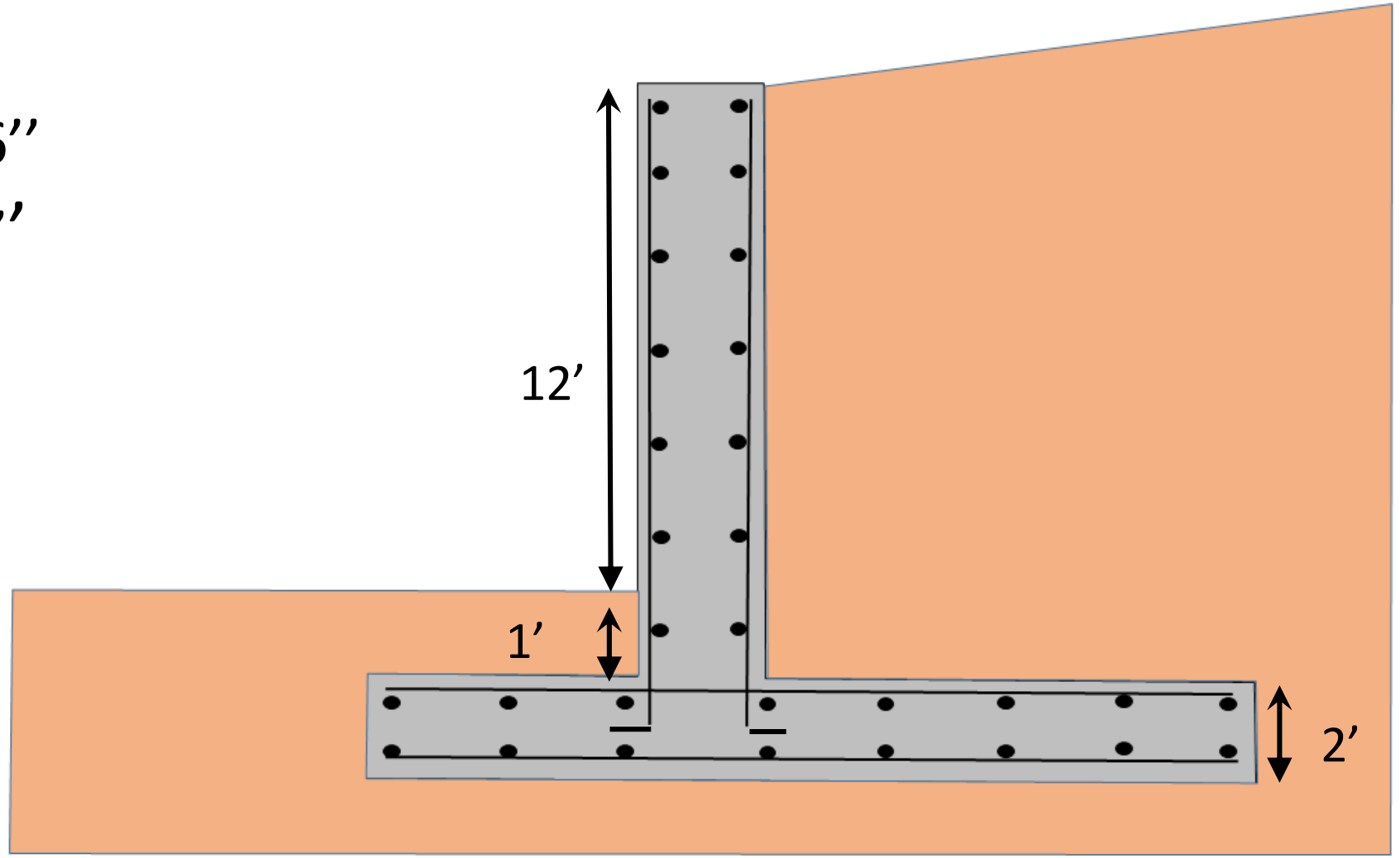
FOUNDATION (RETAINING WALL)

Thickness: 18’’

Ext Vert Bar: #7 @ 16’’

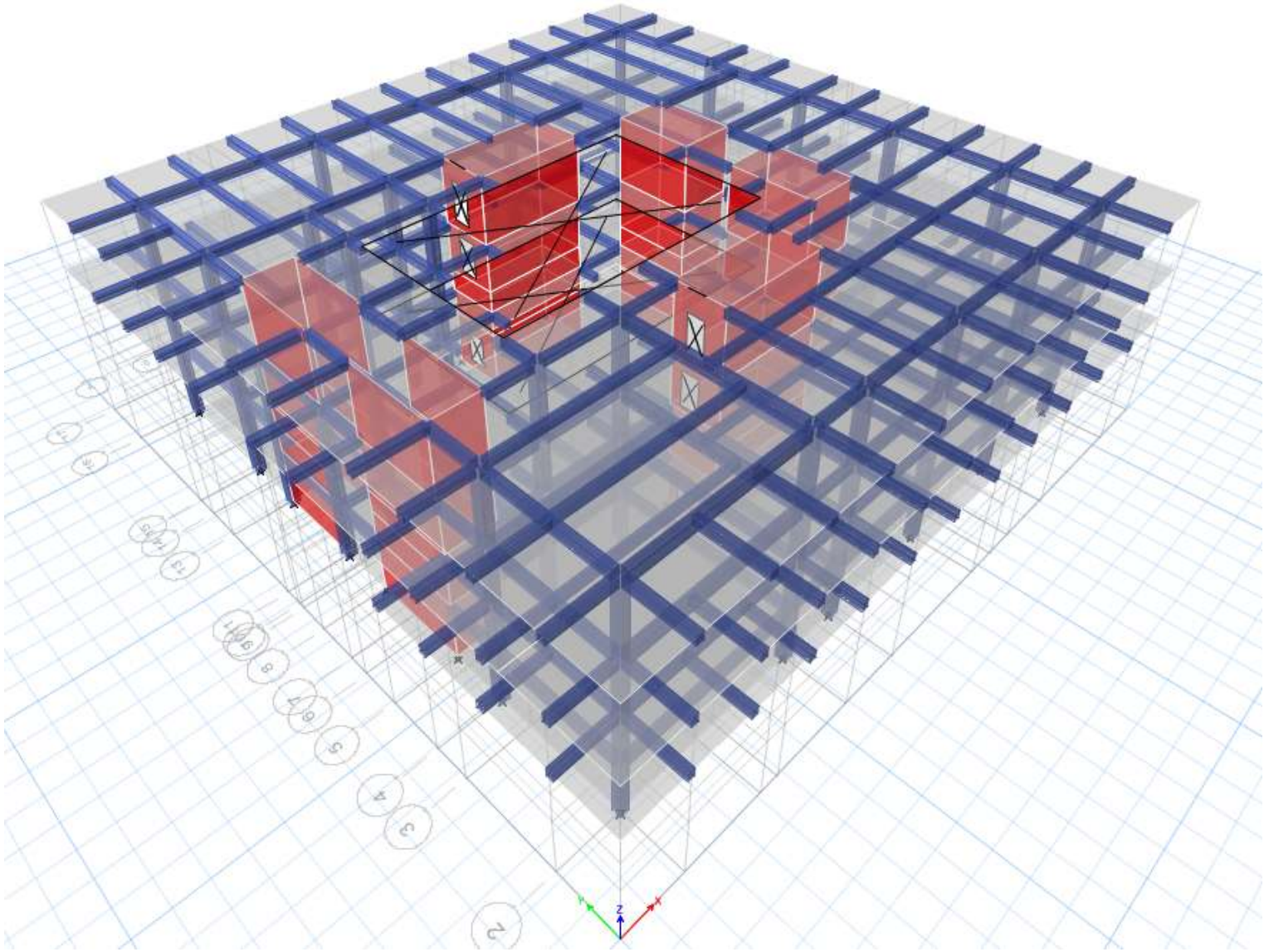
Horz. stirrup: #5 @ 6’’



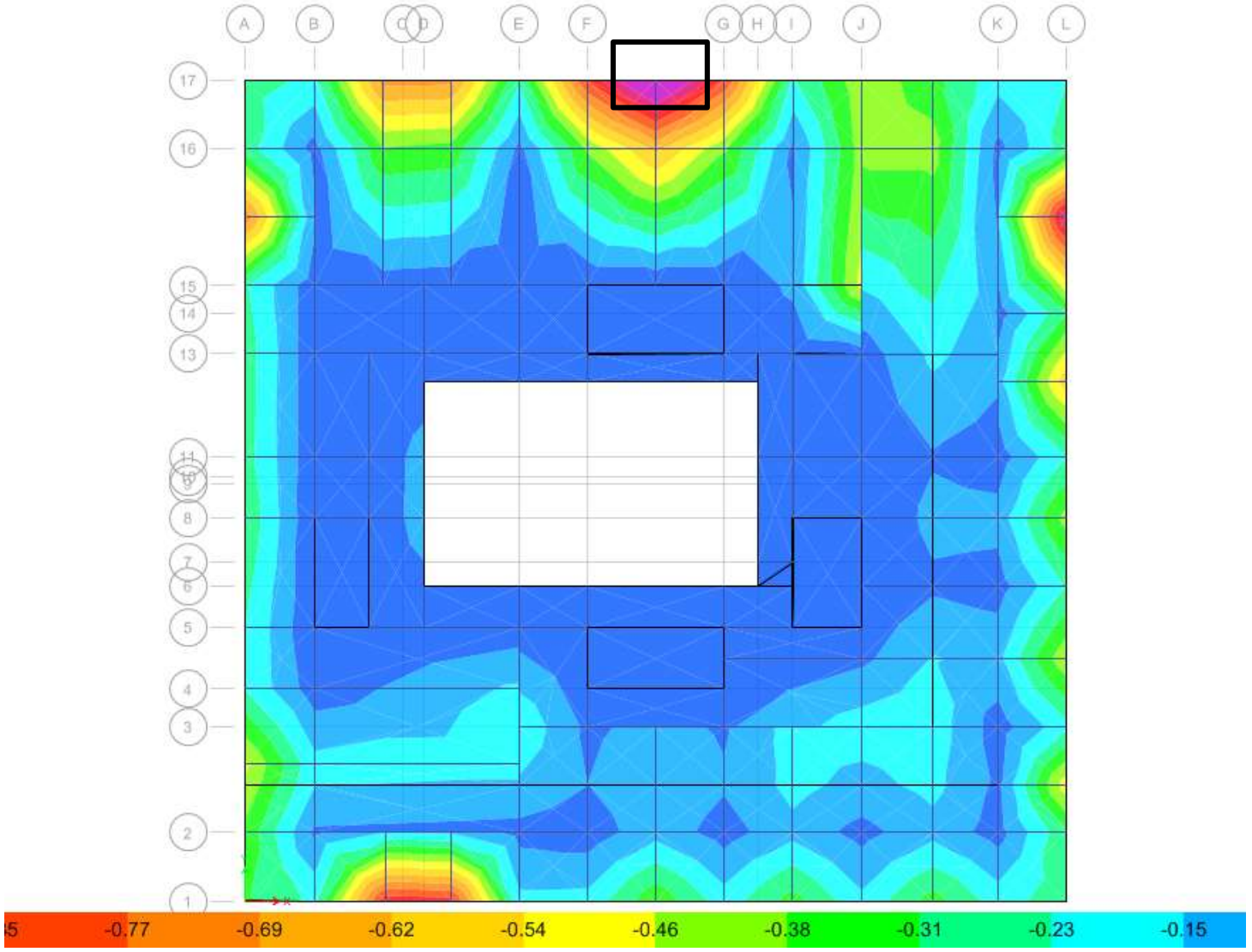



EARTHQUAKE

ETABS ANALYSIS MODEL 3D



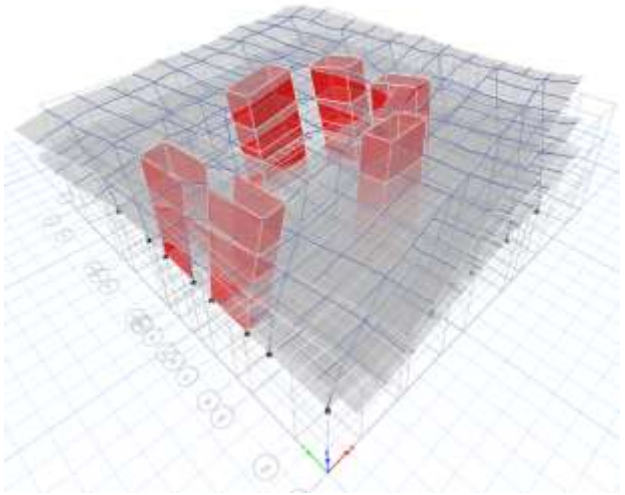
STATIC ANALYSIS (SLAB DEFLECTION)



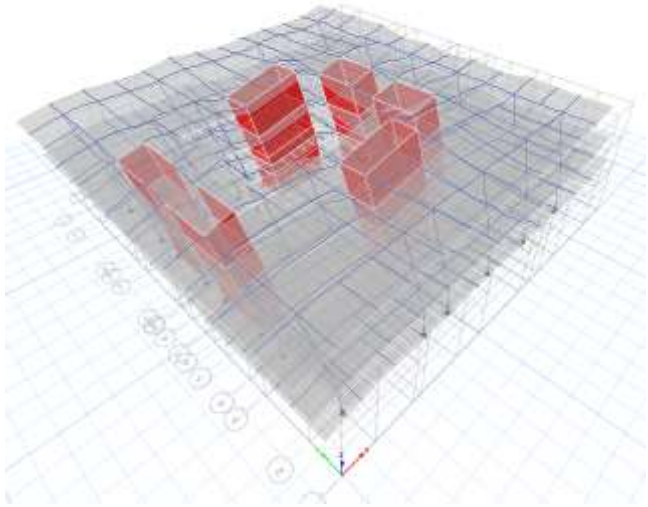
10 ft Cantilever Region

Max. Disp. 1.18 in< L/360

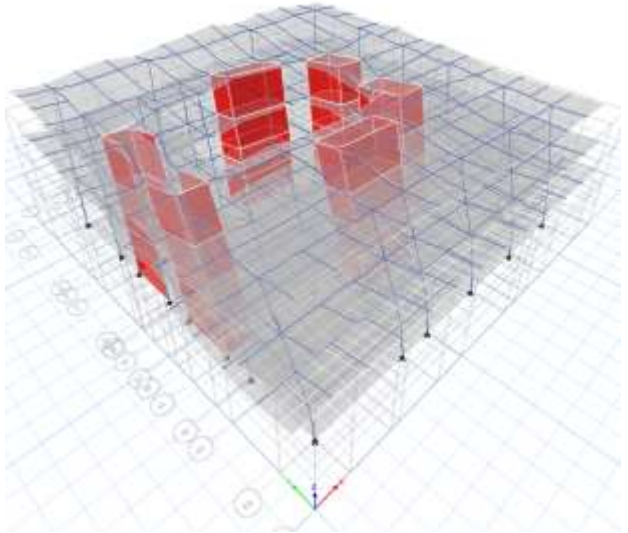
DYNAMIC MODEL ANALYSIS



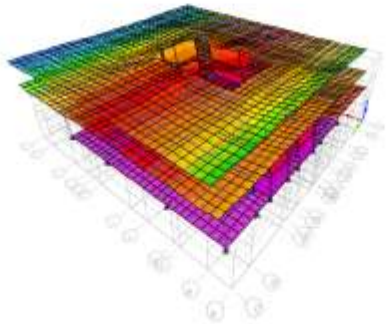
T_1 = 0.215s (Torsion Dominate)



T_2 = 0.18s



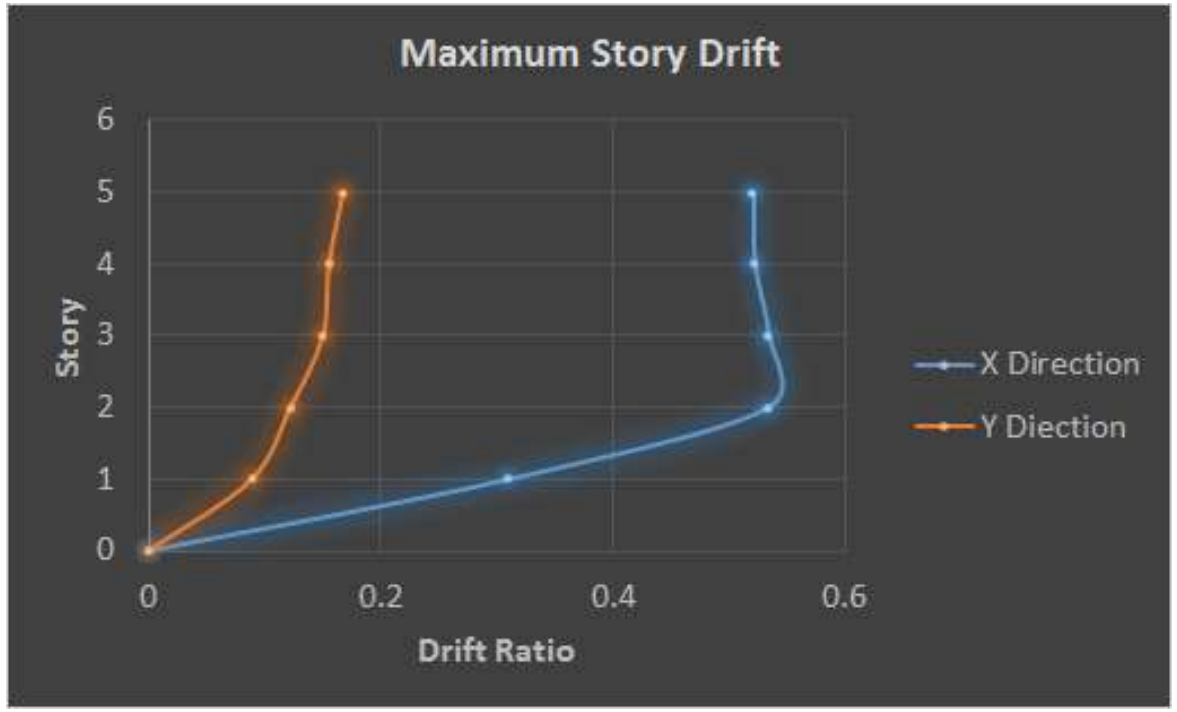
T_3 = 0.158s



Max Disp.

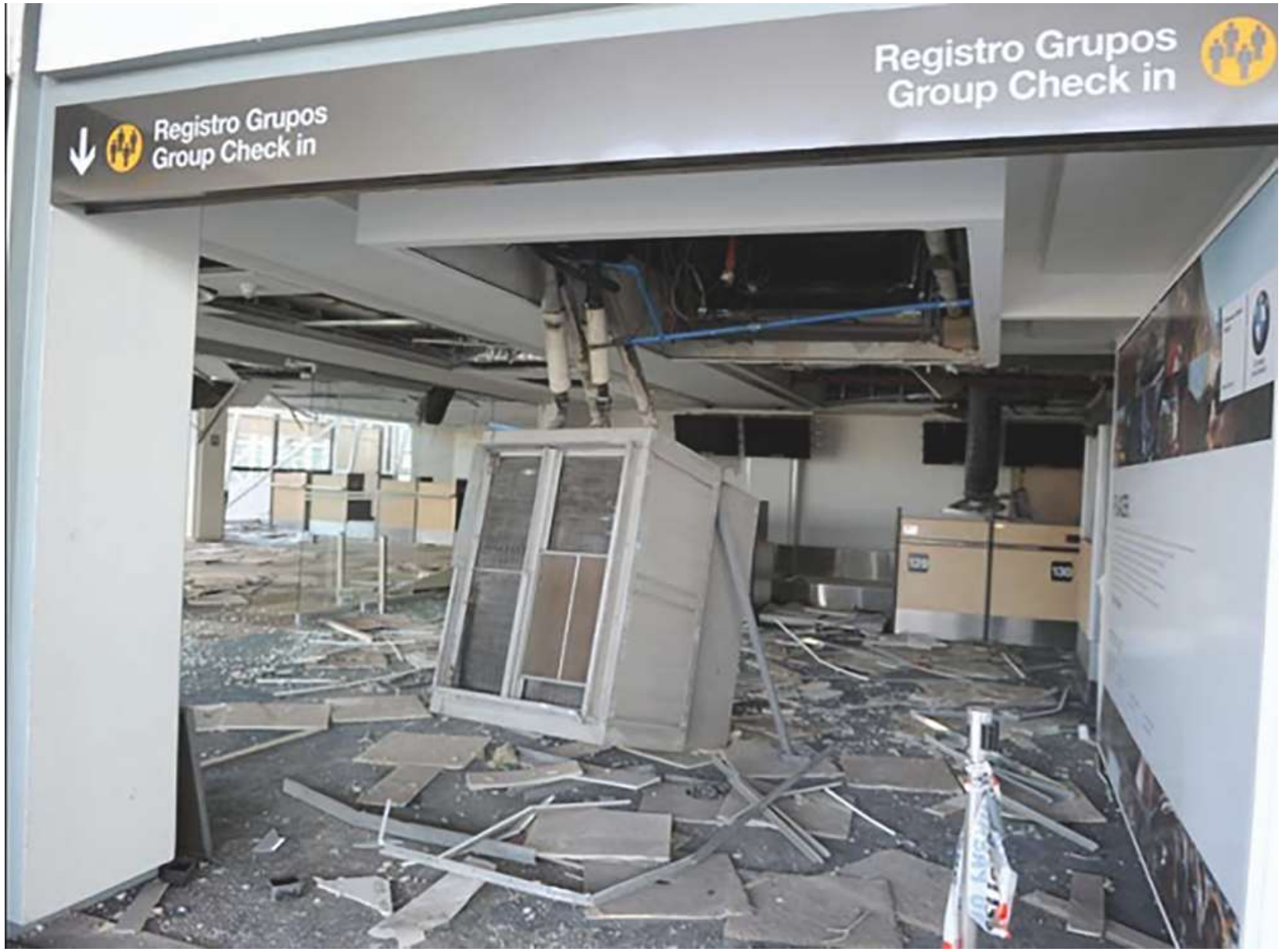
X direction 0.72 in
Y direction 0.64 in

SPECTRA SEISMIC ANALYSIS



Amplified Max. Displacement = **2 in < L/360**
Amplified Inter-Story Drift Ratio = **0.5% < 2%**

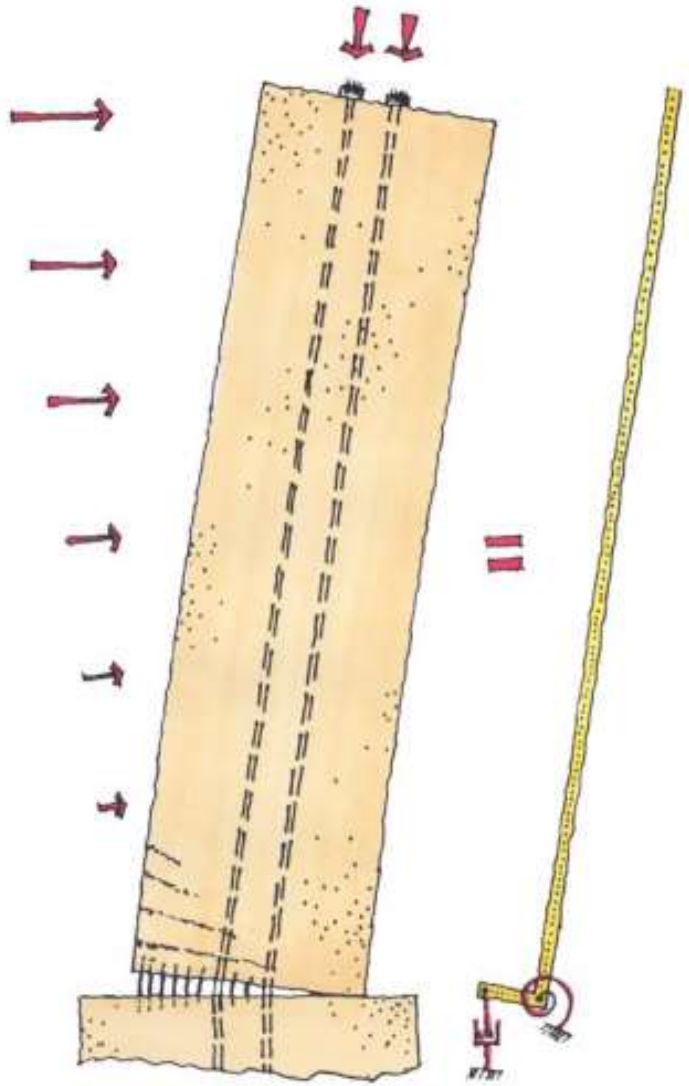
NON-STRUCTURAL DAMAGE

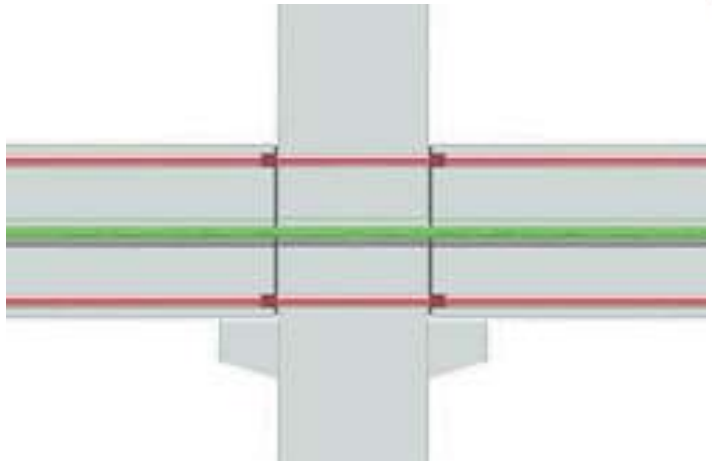


WORTH 80% OF LOSS!

CONTROL NON-STRUCTURAL DAMAGE BY CONTROLLING DRIFT

EARTHQUAKE TECHNOLOGY (RESILIENT DESIGN)

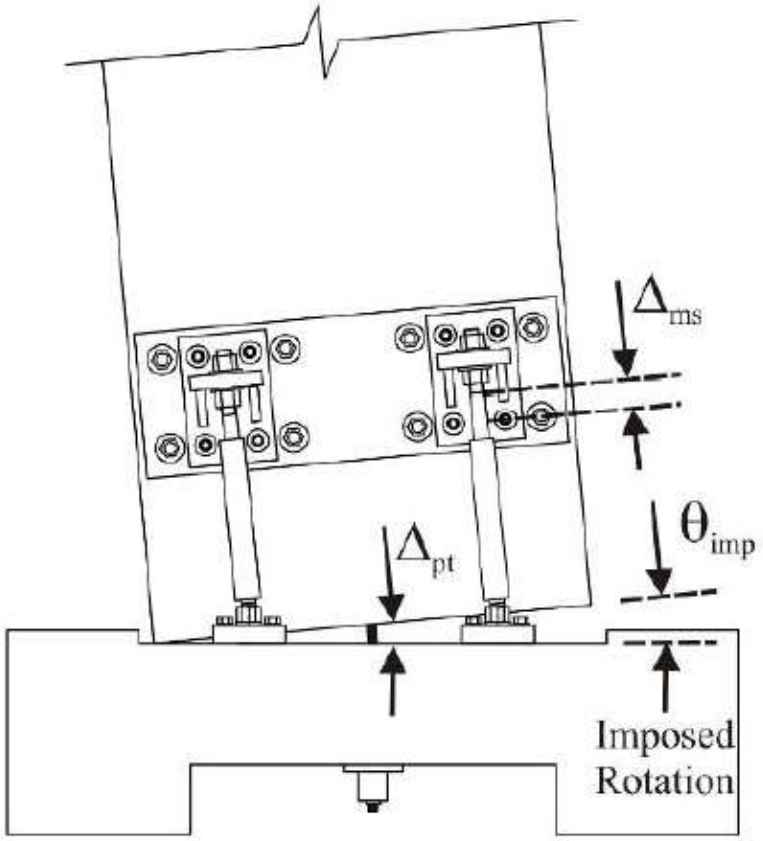




Benefits:

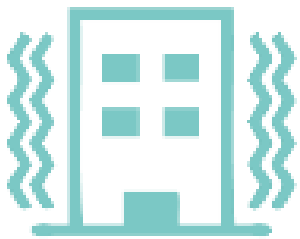
- Self centering mechanism
- 50% reduced Base Shear
- Larger drift capacity
- Reduced residual drift after seismic event

EARTHQUAKE TECHNOLOGY (RESILIENT DESIGN)

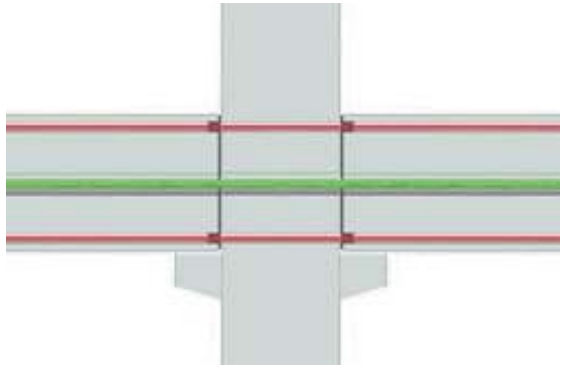


ROCKING SHEAR WALL DESIGN *Based on ACI ITG-5.2-09*	
Special Reinforcement Bar Size	#11
Total quantity of bars (equal number each side)	7
PT Strand diameter	0.5’’
# of stands	25
Concrete Strength (f'c)	5 ksi
Effective prestress after losses	175 ksi
PT Steel Strength (f_{py})	270 ksi
reinforcement yield strength	60 ksi
Total Prestress Force	**1136 kips**

RISK MANAGEMENT



RISK



Self centering shear wall

STRATEGY

REDUCED DAMAGES

REDUCE RISK OF INTERRUPTION OF OPERATIONS

REDUCTION OF IMPACT

-60%

($1,300,000)

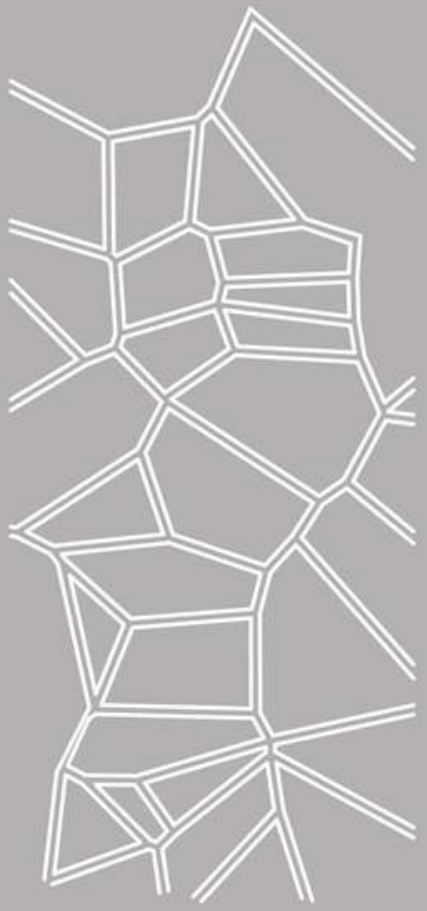
Over 25 years

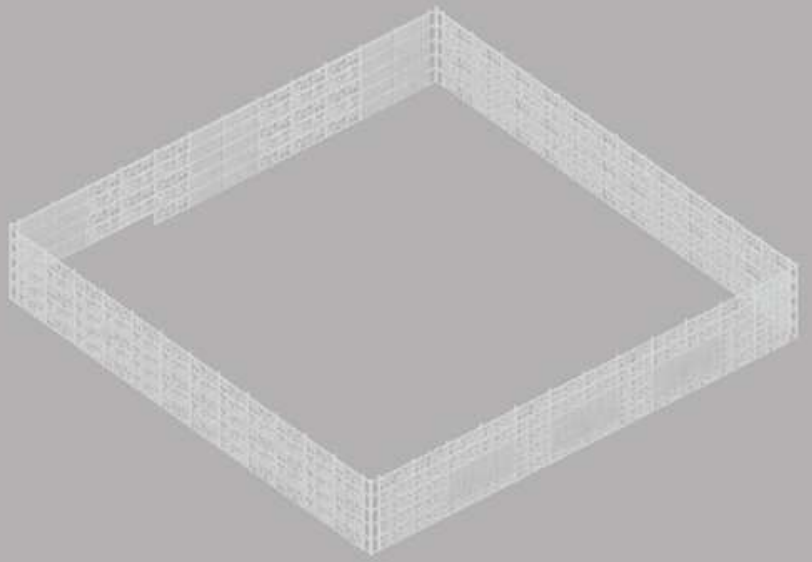
RISK COST REDUCTION


FACADE


HURRICANE

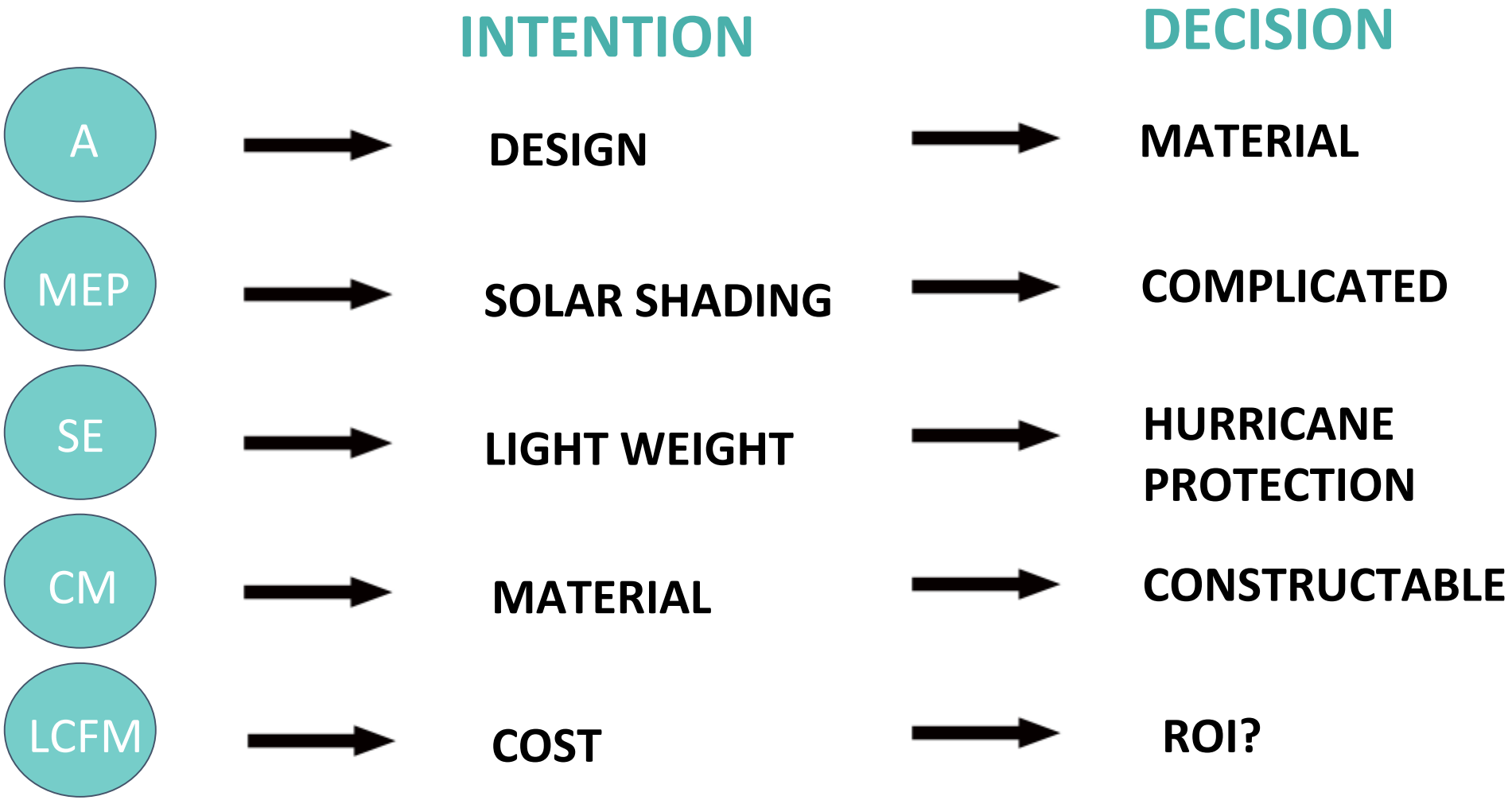
FACADE INSPIRATION





WINTER QUARTER: STRUCTURAL FACADE

DISCIPLINE INTERACTION



Why create new problems? Keep occupants in mind.

IMPLEMENTATION

STEEL

CONCRETE

ALUMINUM

HURRICANE PROTECTION

STRUCTURAL

AIR PURIFICATION

MATERIAL

COST

SOLUTION

80% Strength of Steel

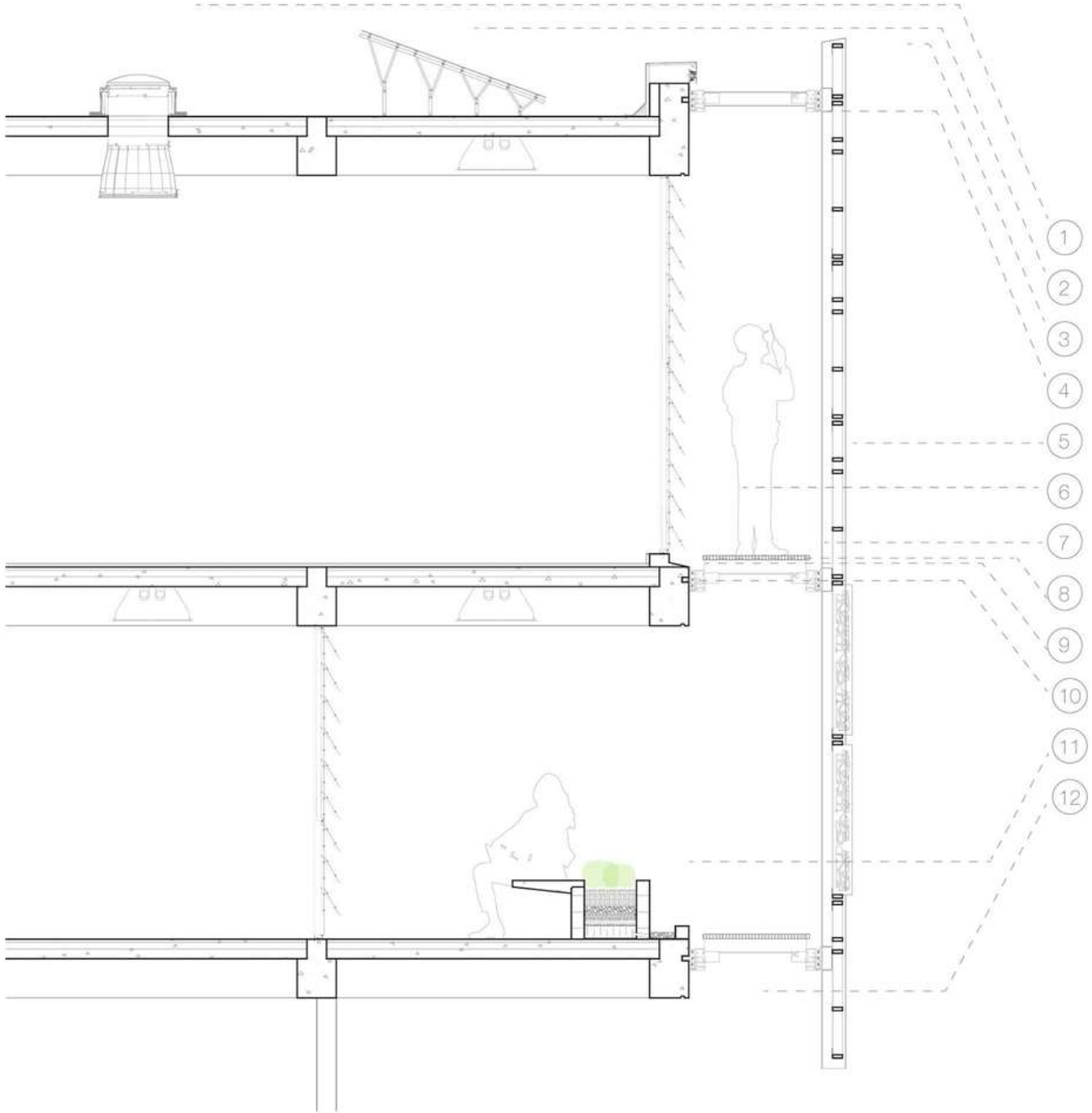
30% Cheaper than Steel

15% Cheaper than Concrete

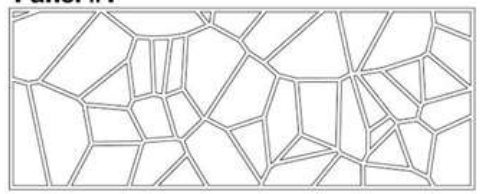
Locally Manufactured

Light & Easily Constructable

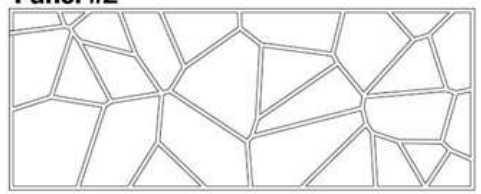
ALUMINUM



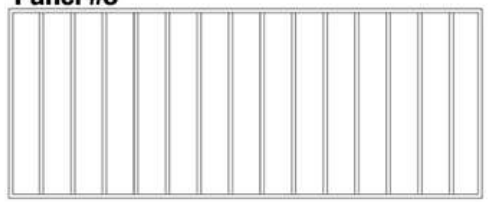
Panel #1



Panel #2



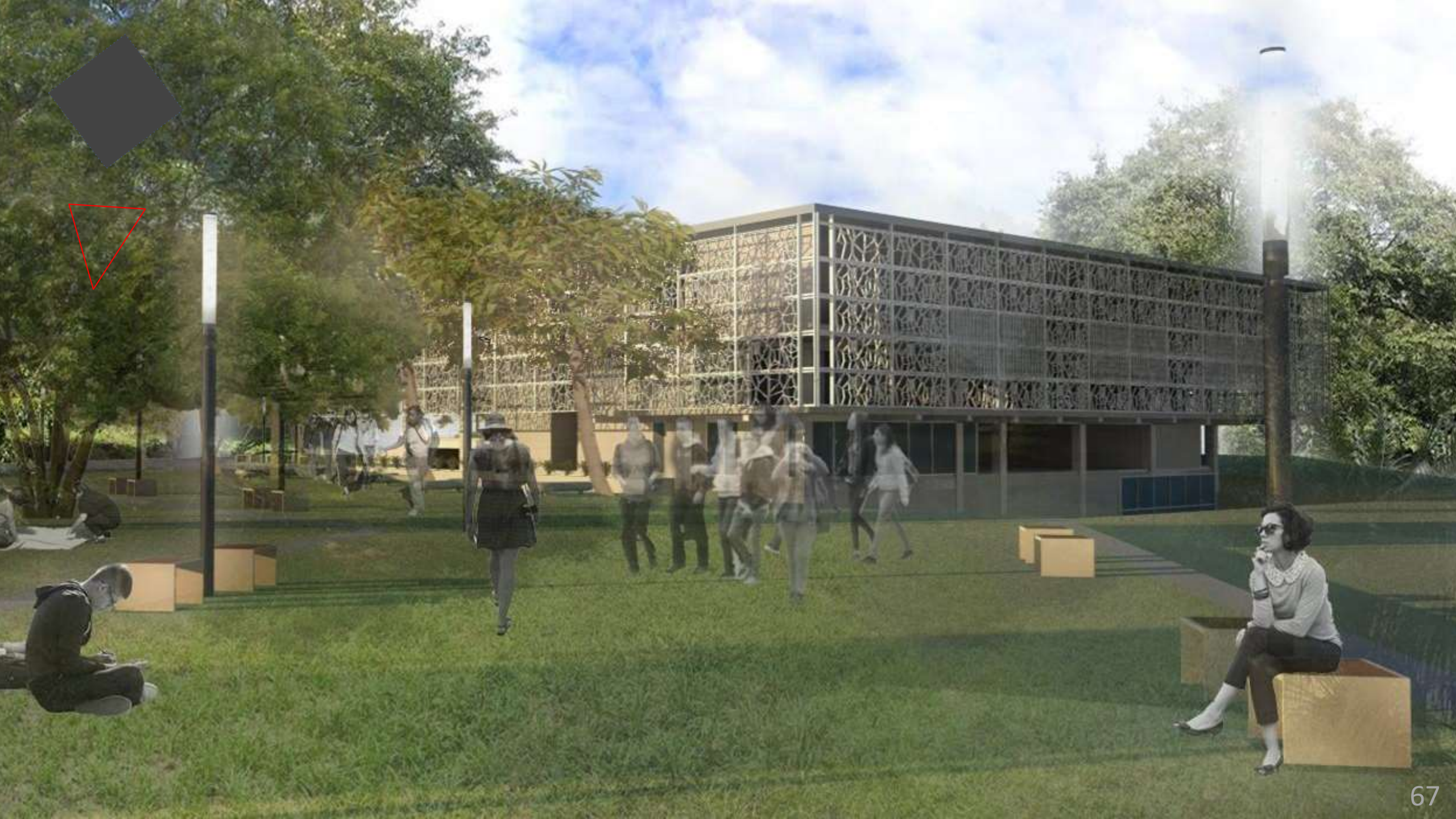
Panel #3



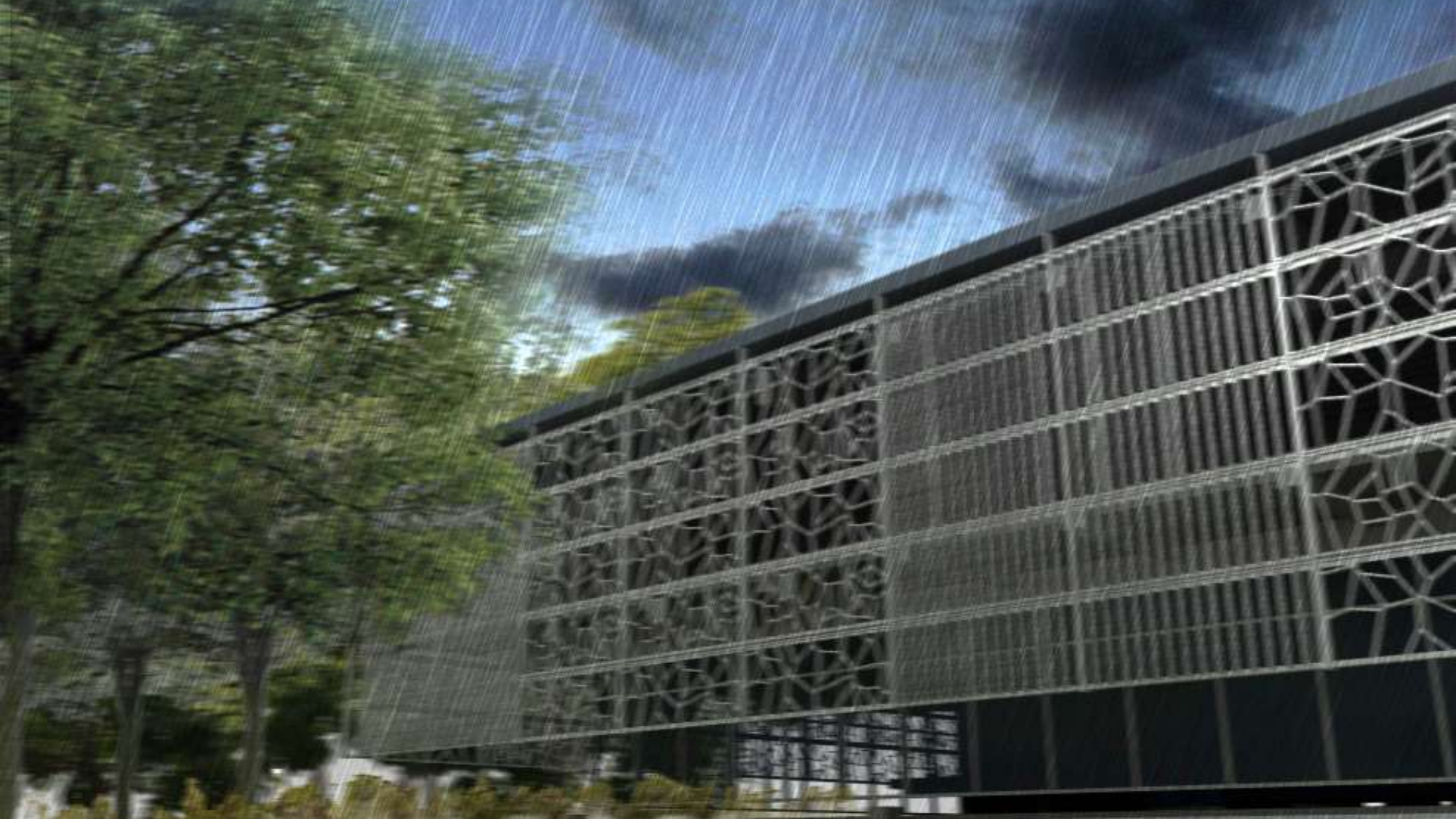
Façade Wall Section

1 Solar light bulb
2 Solar Energy Panel
3 Alumuminum Frame
4 Steel Angle
5 Aluminum Panel #2
6 Glass Operable Louvers
7 Aluminum Panel #3
8 Cat-Walk Mesh
9 Cat-Walk
10 Pre-cast Concrete Slab
11 Green Planter Seating
12 Pre-cast Concrete Beam

FACADE



SECTION



HURRICANE PROTECTION STRATEGY

Exterior Aluminum Facade Glass

Interior Impact Resistant

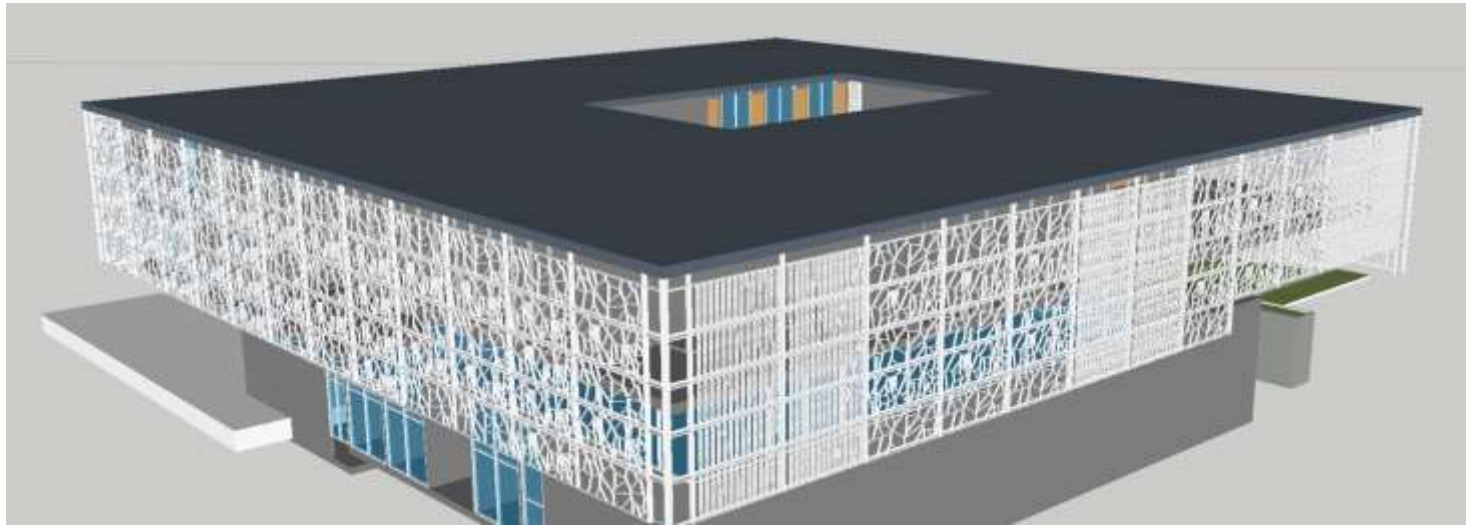
VEROTECH GLAZING SYSTEM

- Retains its properties when subjected to equivalent wind speed = **220** mph
- Stays intact after a simulation cycle forces of hours-long storm

HURRICANE PROTECTION (EXTERIOR)

WHY ALUMINUM?

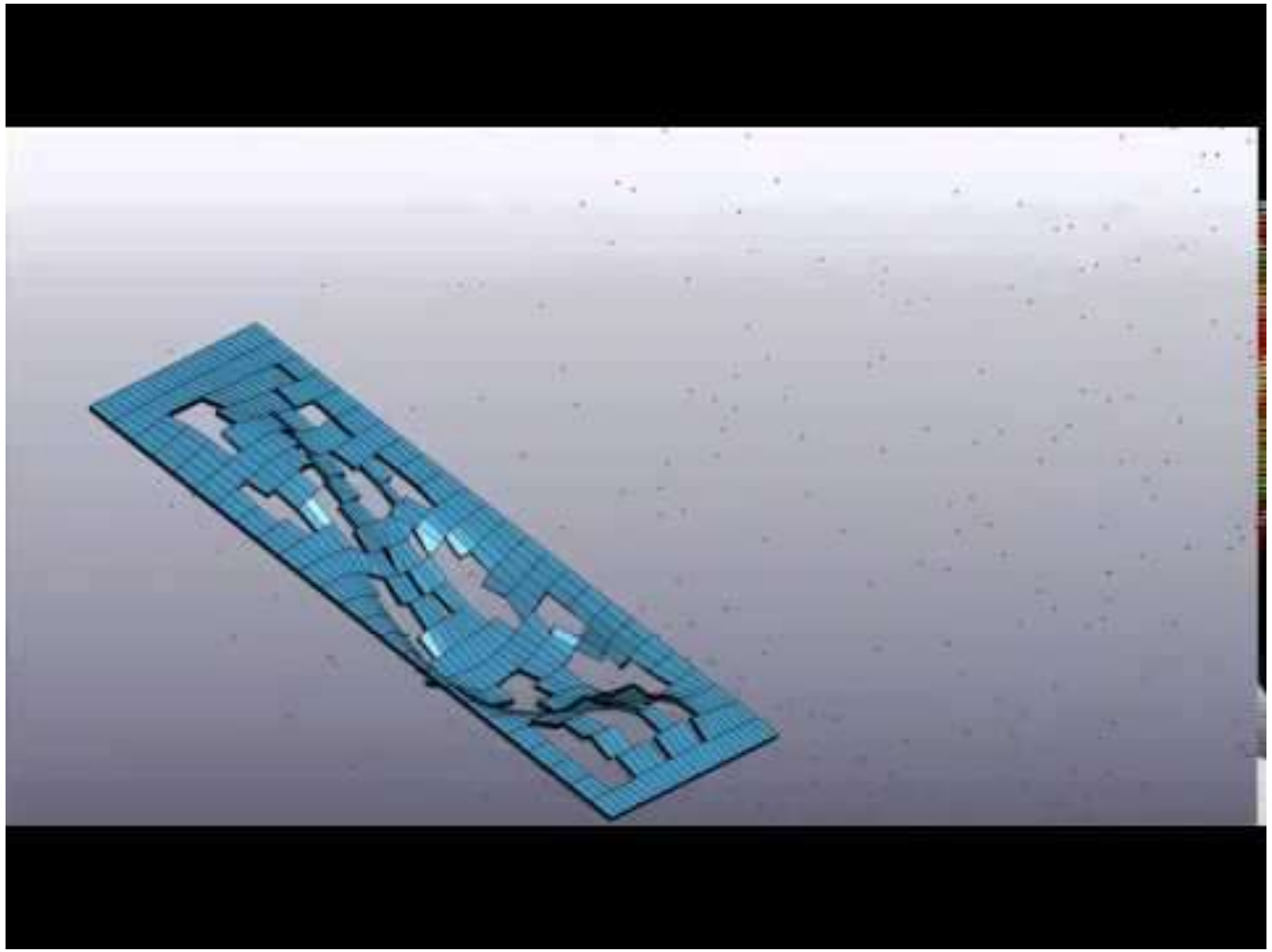
- **2.5** x **Lighter** than Steel
- **80%** **Strength** of Steel
- **30%** **Less Expensive**
- **Green:** produced by electricity
- **Corrosion Resistant**



FACADE ANALYSIS ITERATION

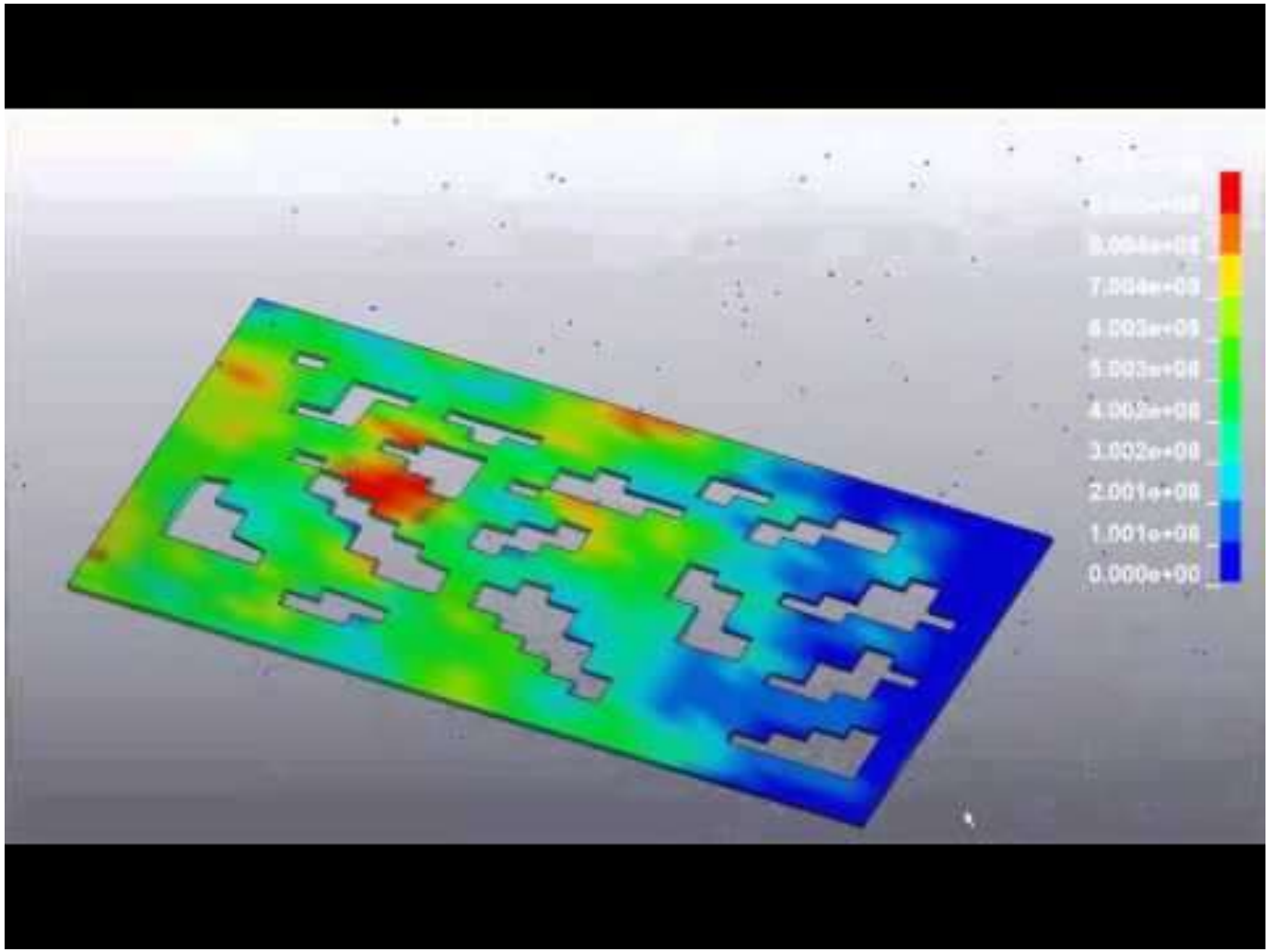
- Minimum Thickness of Facade
- Optimize Voronoi openings

INITIAL ITERATION



- Thickness **1 *in***
- Initial Speed of particles: 170 *m/h*
- Young's Modulus: 10^4 *ksi*
- Element Type: Plate

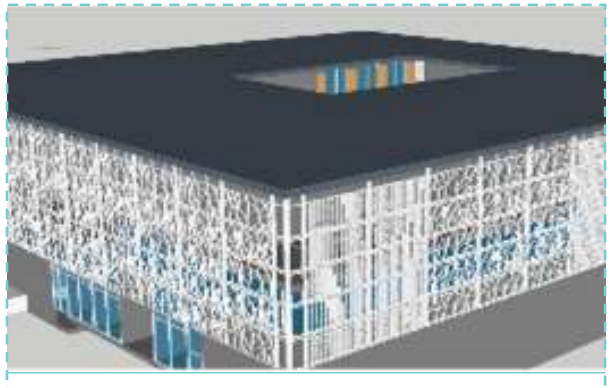
FINAL ITERATION



- Thickness **3 *in***
- Initial Speed of particles: 170 *m/h*
- Young's Modulus: 10^4 *ksi*
- Element Type: Plate

LIFE CYCLE IMPACT - FACADE

RISK MANAGEMENT



Façade system

-25%

($250,000)

RISK

STRATEGY

RISK COST REDUCTION
Over 25 years

LIFE CYCLE COST

OPERATION & MAINTENANCE COST

REPLACEMENT COST

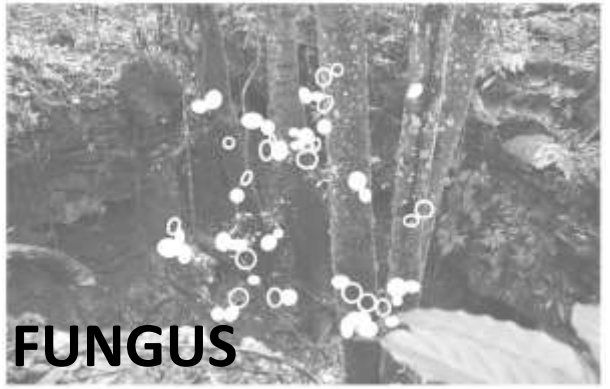
-15%

($90,000)

Over 25 years

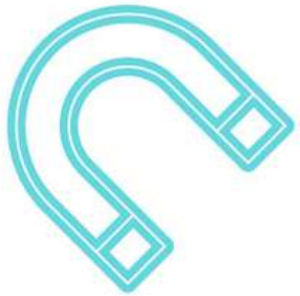
SAVINGS

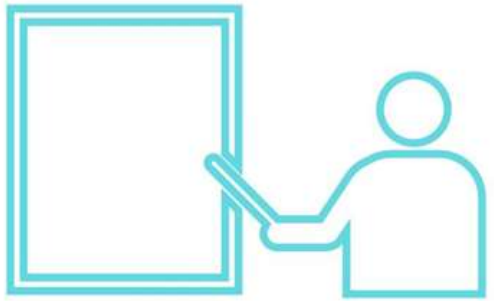
AIR QUALITY CHALLENGE



MAKING THE INVISIBLE VISIBLE

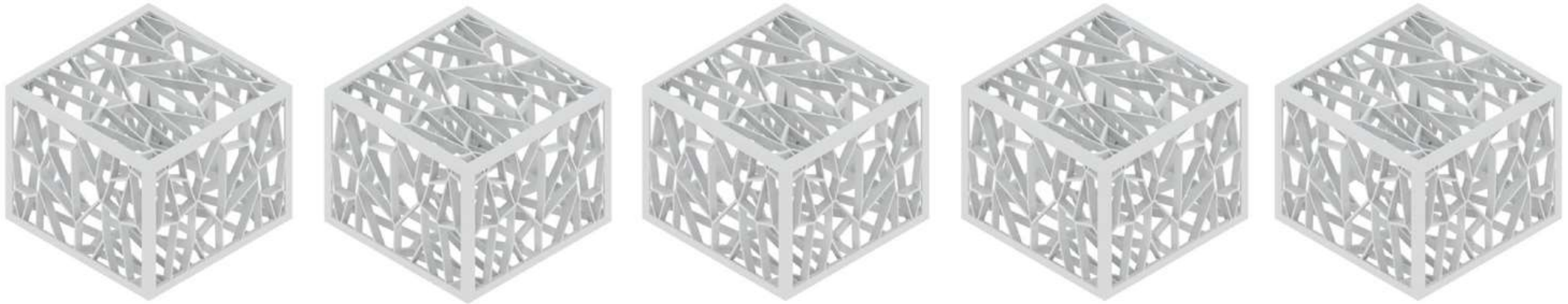
INTENTION





ATTRACT **INFORM** **EDUCATE**

AIR POLLUTANTS



CO_2

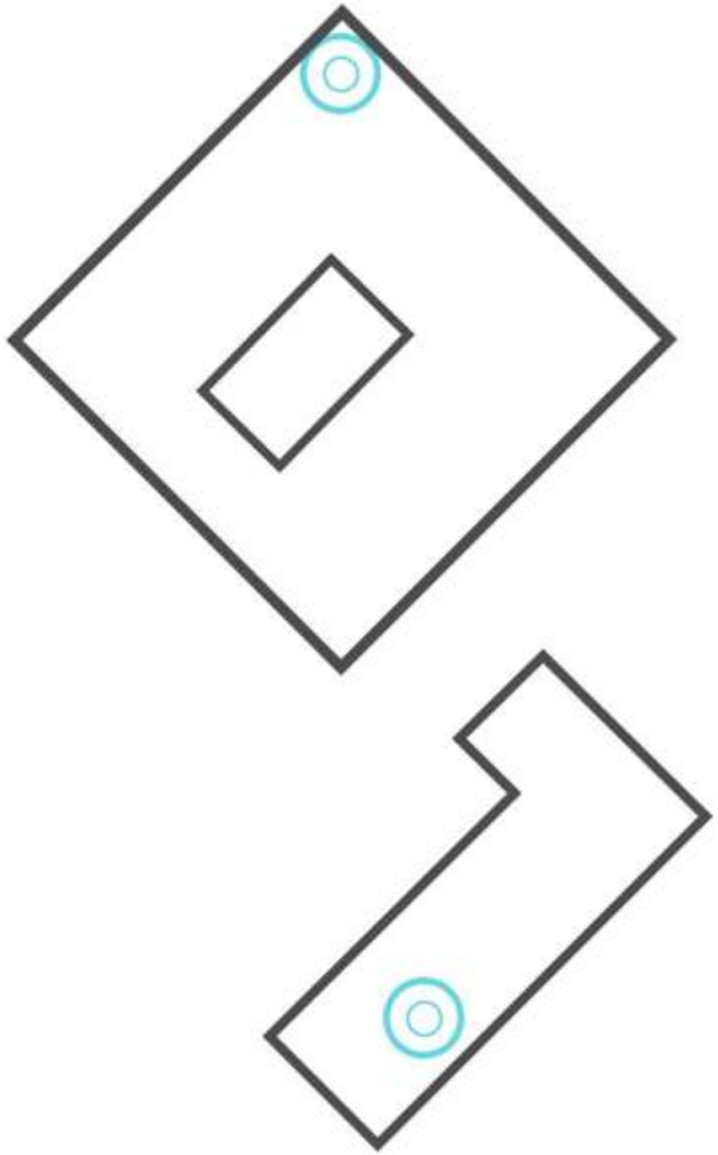
HUMIDITY

POLEN
FUNGUS

SMALL PARTICLES
SAHARA DUST

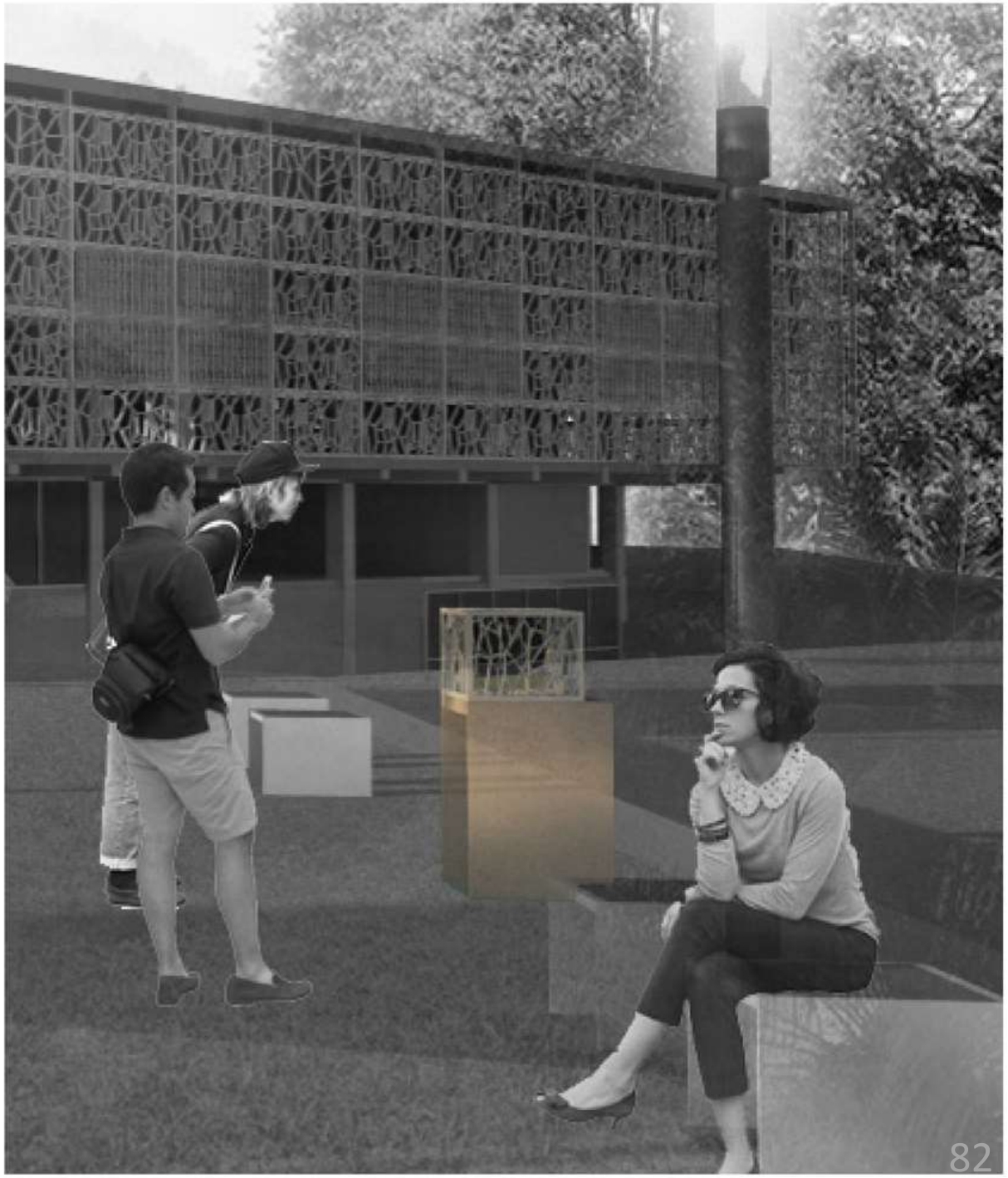
STORM WARNING

MINI AIR CUBE'S LOCATION



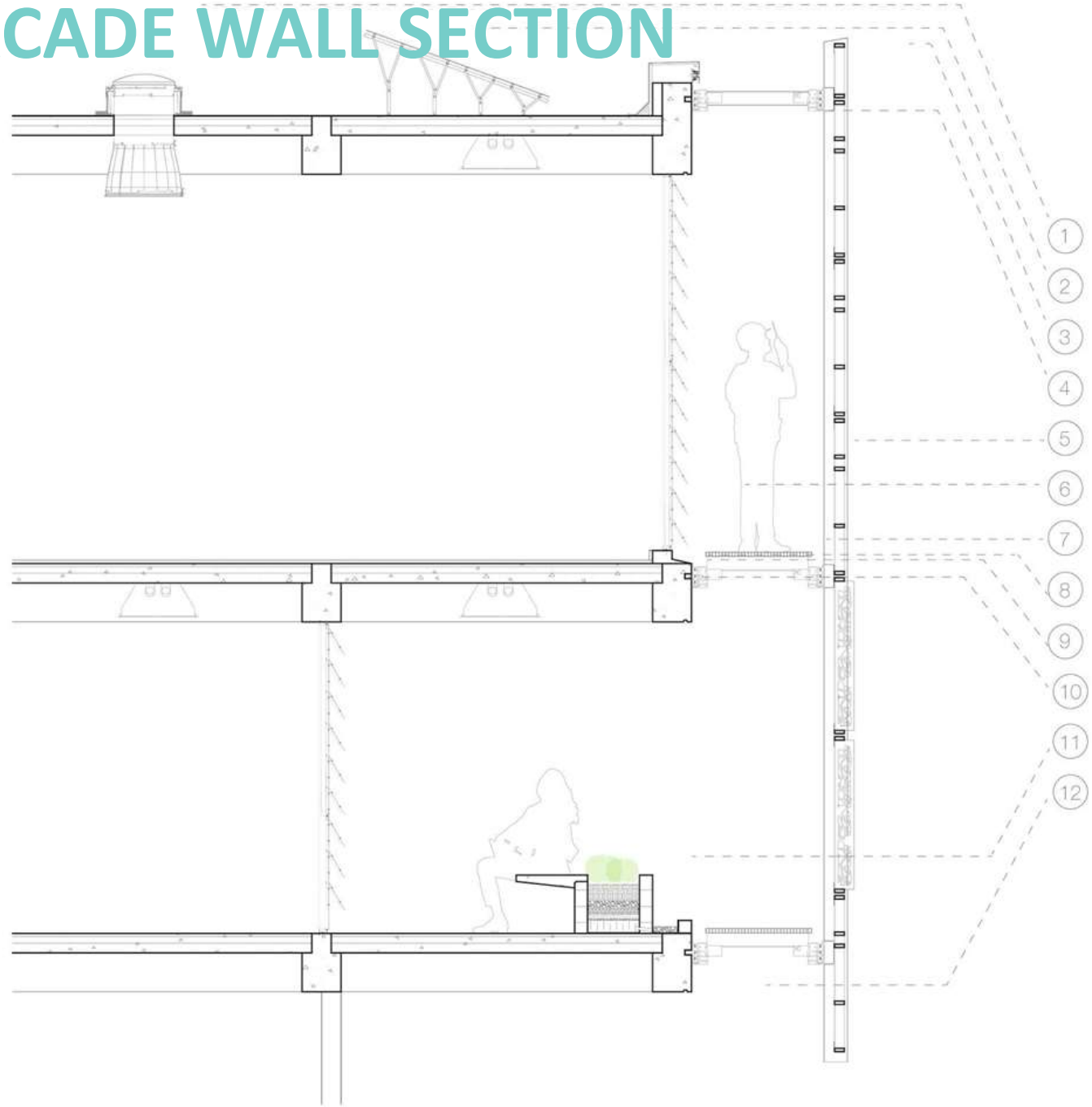
N

MINI AIR CUBES

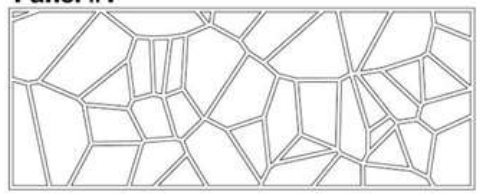


GREEN WALLS

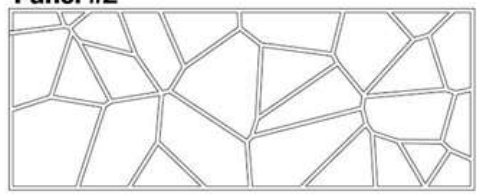
FACADE WALL SECTION



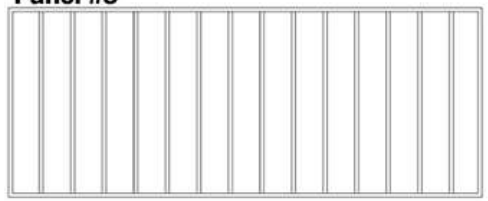
Panel #1



Panel #2



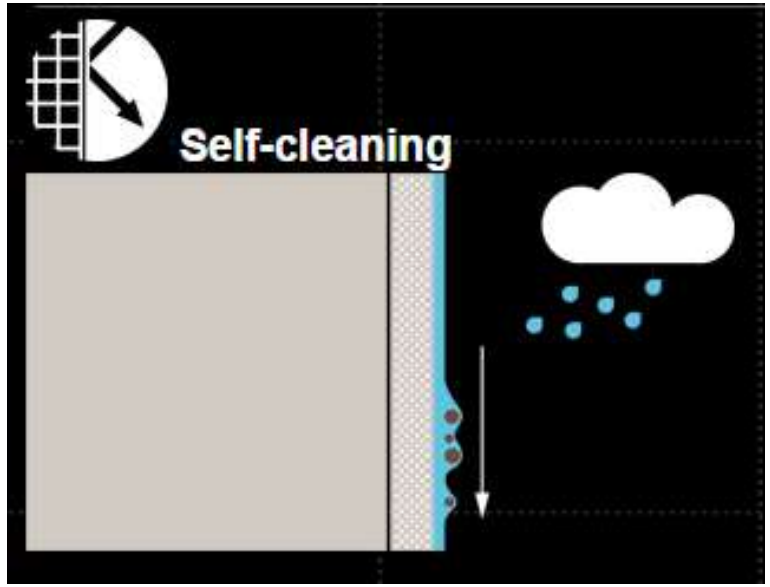
Panel #3



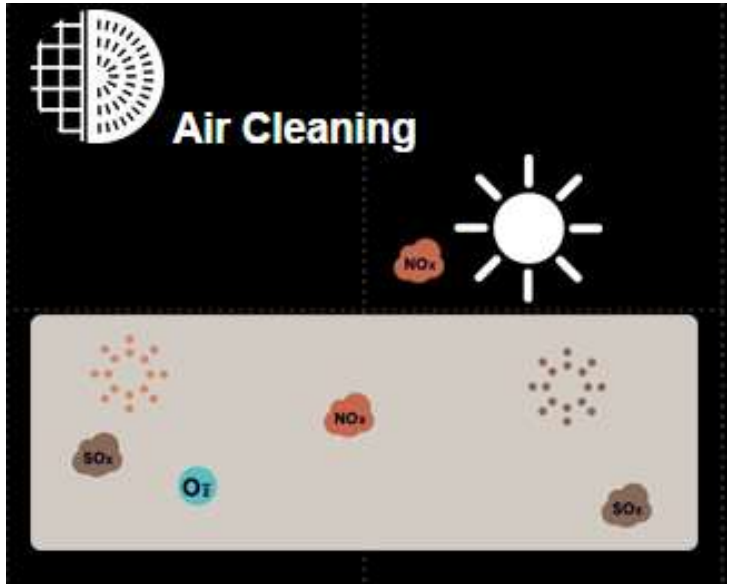
1 Solar light bulb
2 Solar Energy Panel
3 Alumuminum Frame
4 Steel Angle
5 Aluminum Panel #2
6 Glass Operable Louvers
7 Aluminum Panel #3
8 Cat-Walk Mesh
9 Cat-Walk
10 Pre-cast Concrete Slab
11 Green Planter Seating
12 Pre-cast Concrete Beam

PANEL COATING

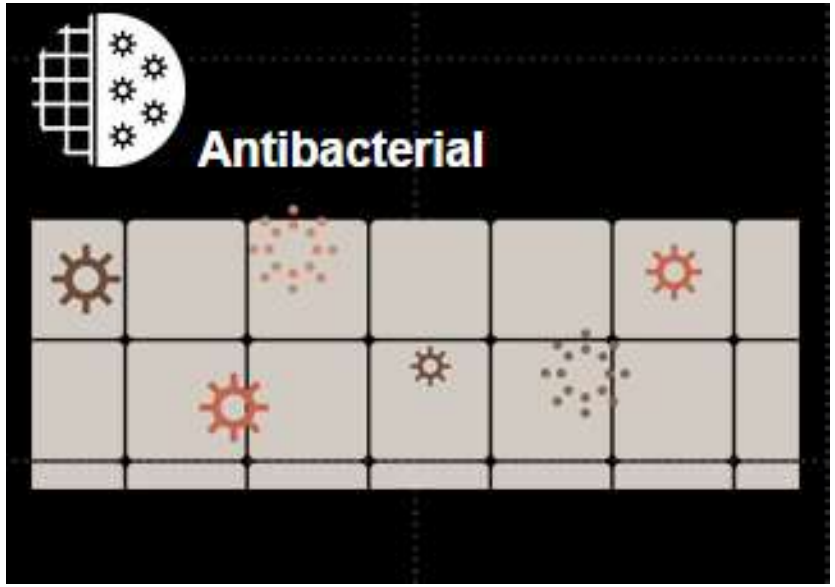
SELF CLEANING



AIR CLEANING



ANTIBACTERIAL



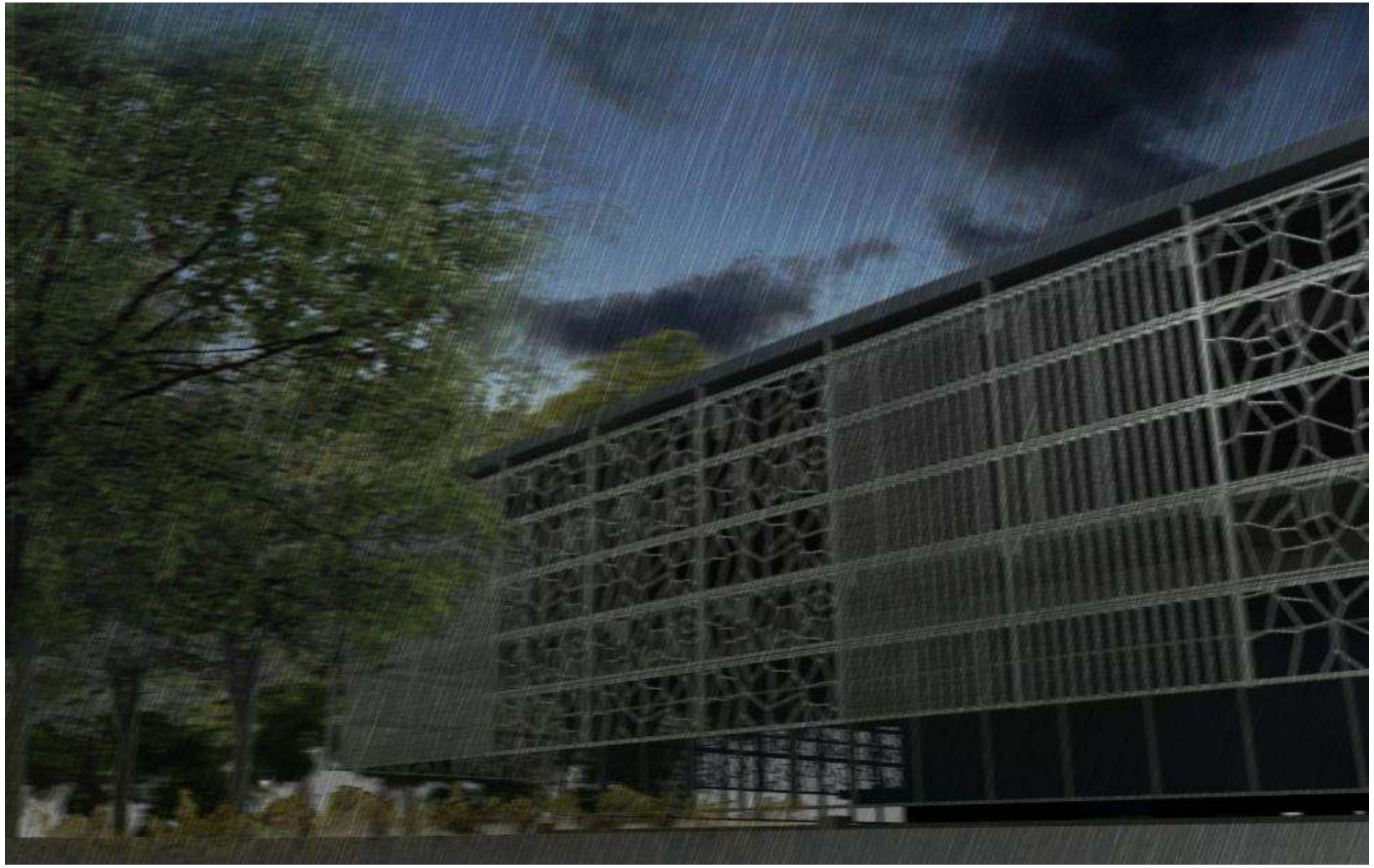
SITE LOGISTICS - AIR QUALITY


SCHEDULE

SCHEDULE CONSTRAINTS

Hurricane Season
June- November

Construction Window
8 months

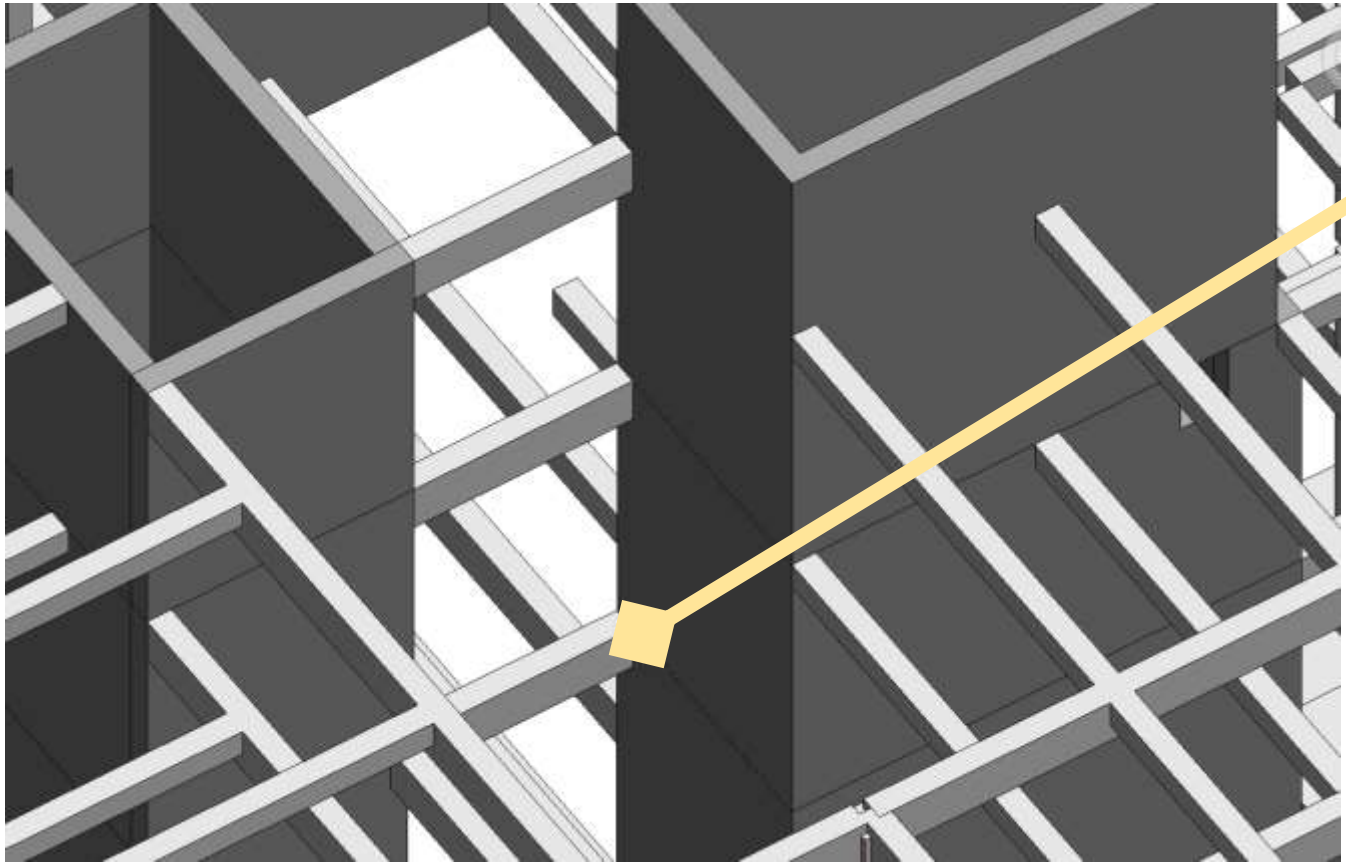


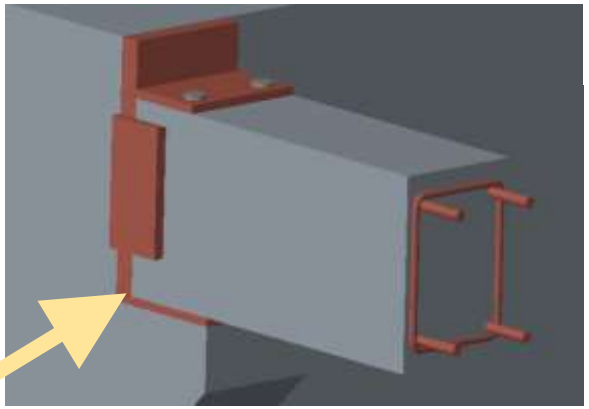
CIP VS. PRECAST

Cast-In-Place	Precast
Longer Duration	Shorter Duration
• Column **4 Hrs + 24 Hrs** • Beams **6 Hrs + 24 Hrs** • Shear Walls **24 Hrs + 24 Hrs**	• Columns **0.72 Hrs + 24 Hrs** • Beams **0.38 Hrs + 24 Hrs** • Shear Walls **1 Hrs + 24 Hrs**
(Formwork + Rebar + Concrete + Curing + Strip)	(Installation + Grouting)

CIP 4 X Longer

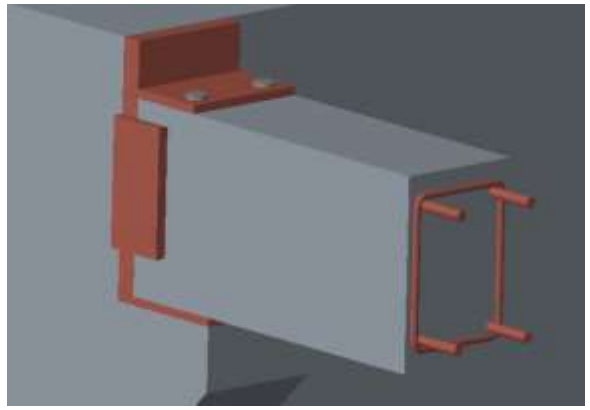
PRECAST JOINT BEAM / SHEAR WALL

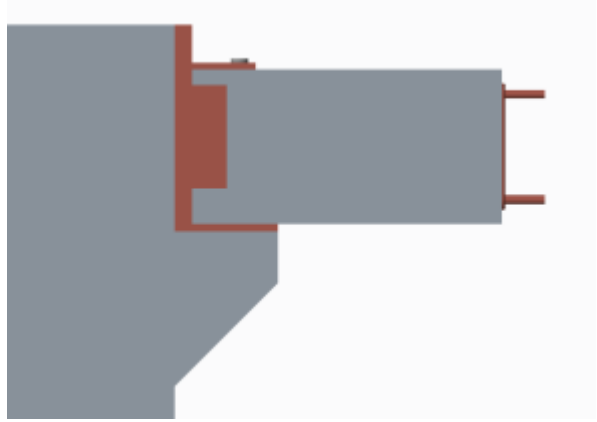


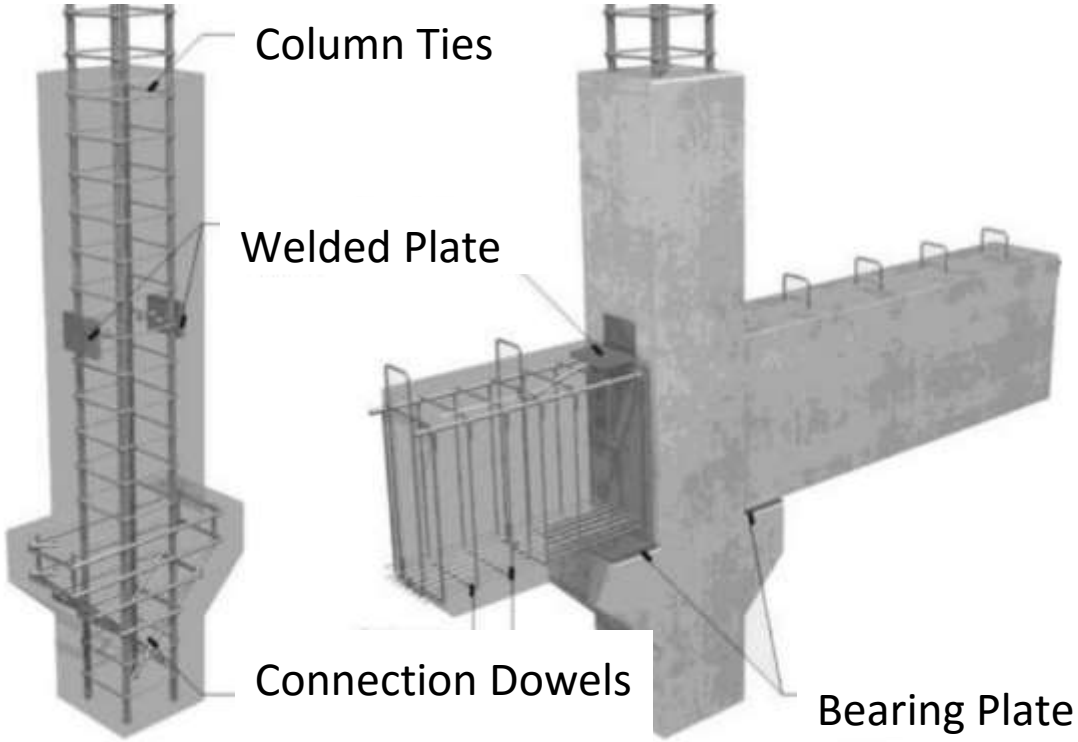


PRECAST JOINT BEAM / SHEAR WALL

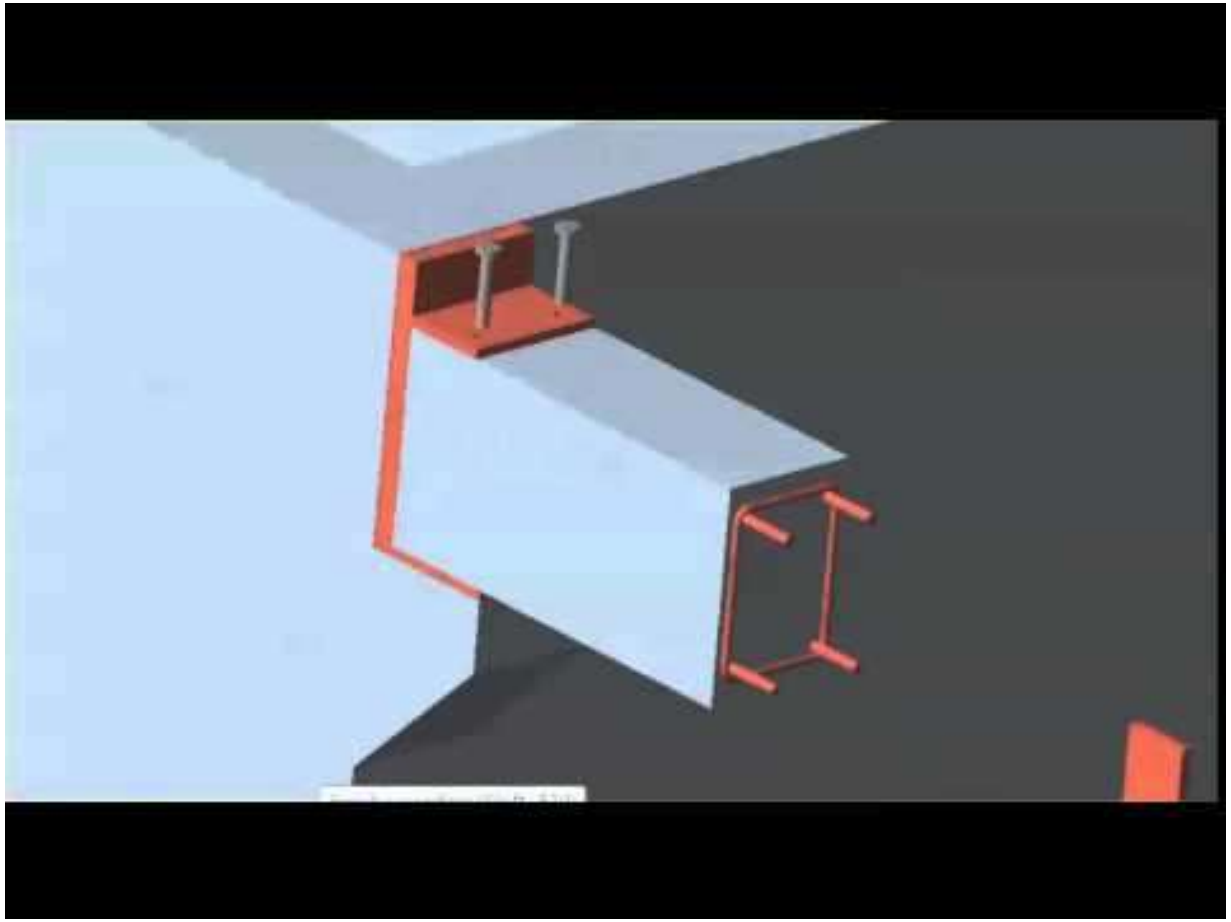
PTC® Creo®

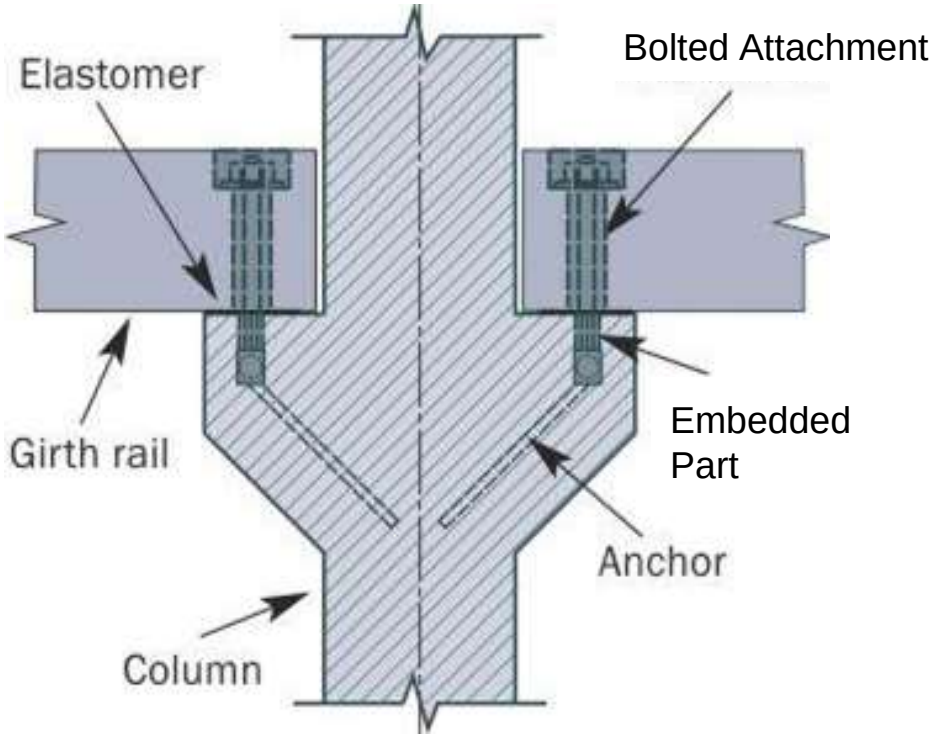




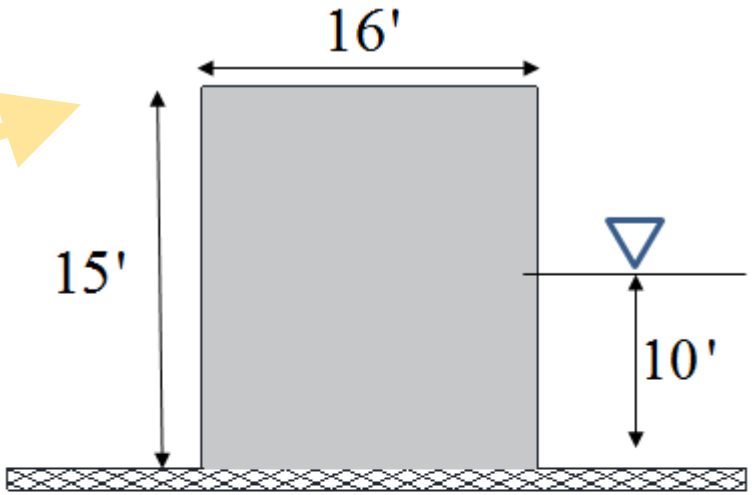


PRECAST JOINT BEAM / SHEAR WALL





SHEAR WALL OVERVIEW



$l_w = 16\,ft$

$h_w = 15\,ft$

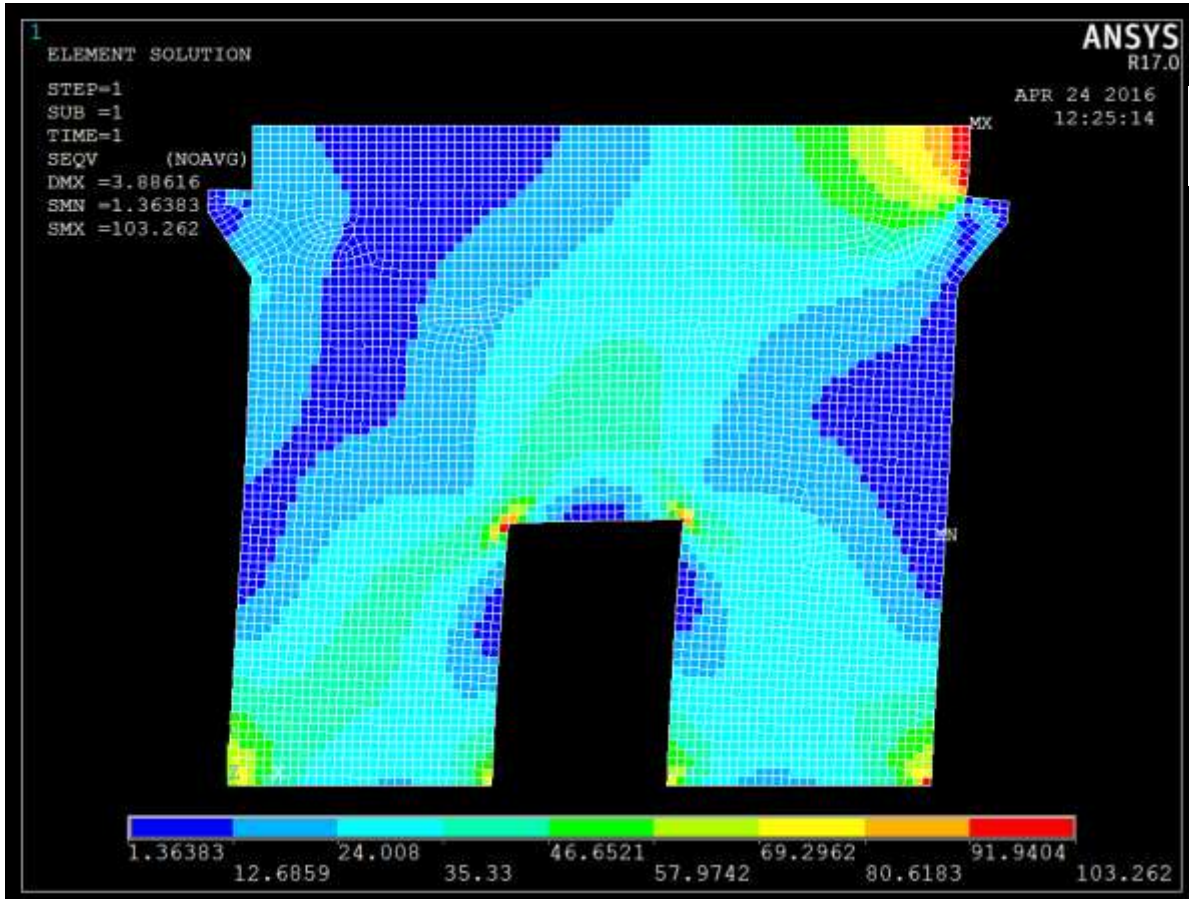
$h_w / l_w < 1$

Squat Wall

Shear Failure Dominates

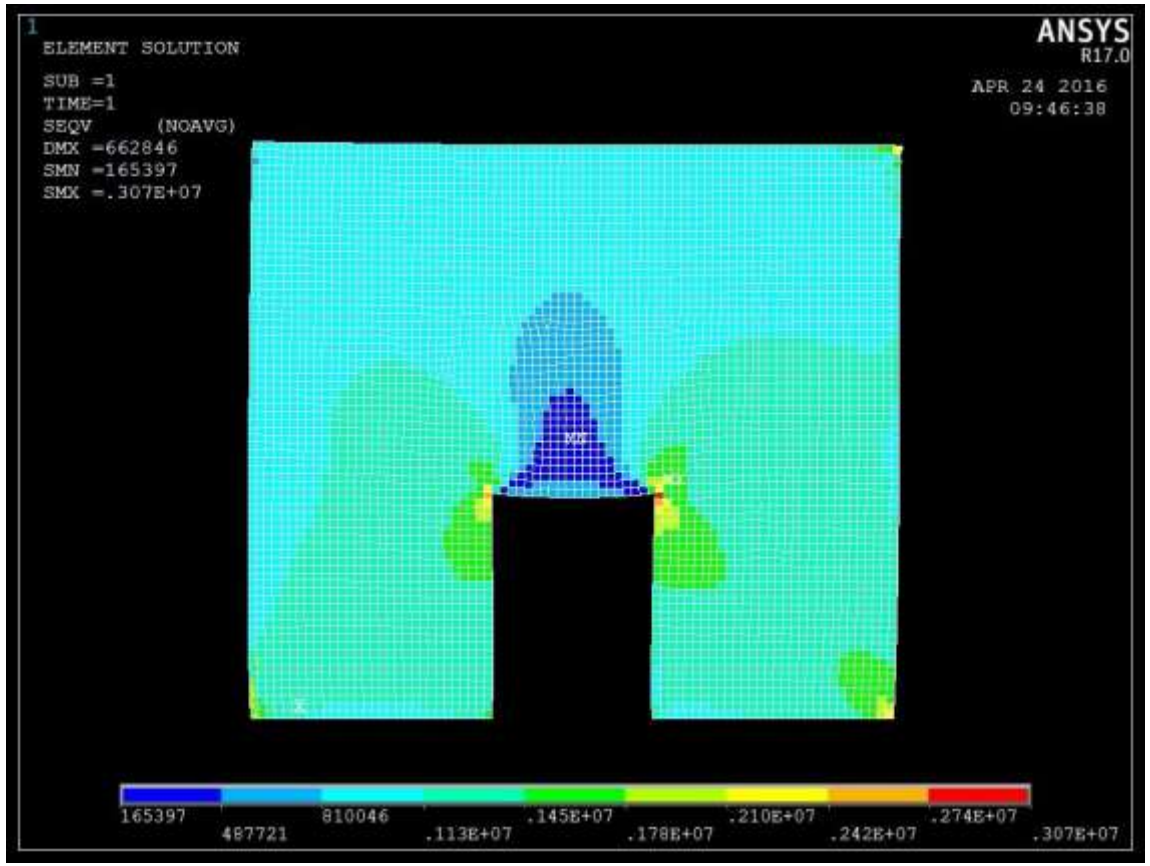
SHEAR WALL MODELLING

With Precast Joint

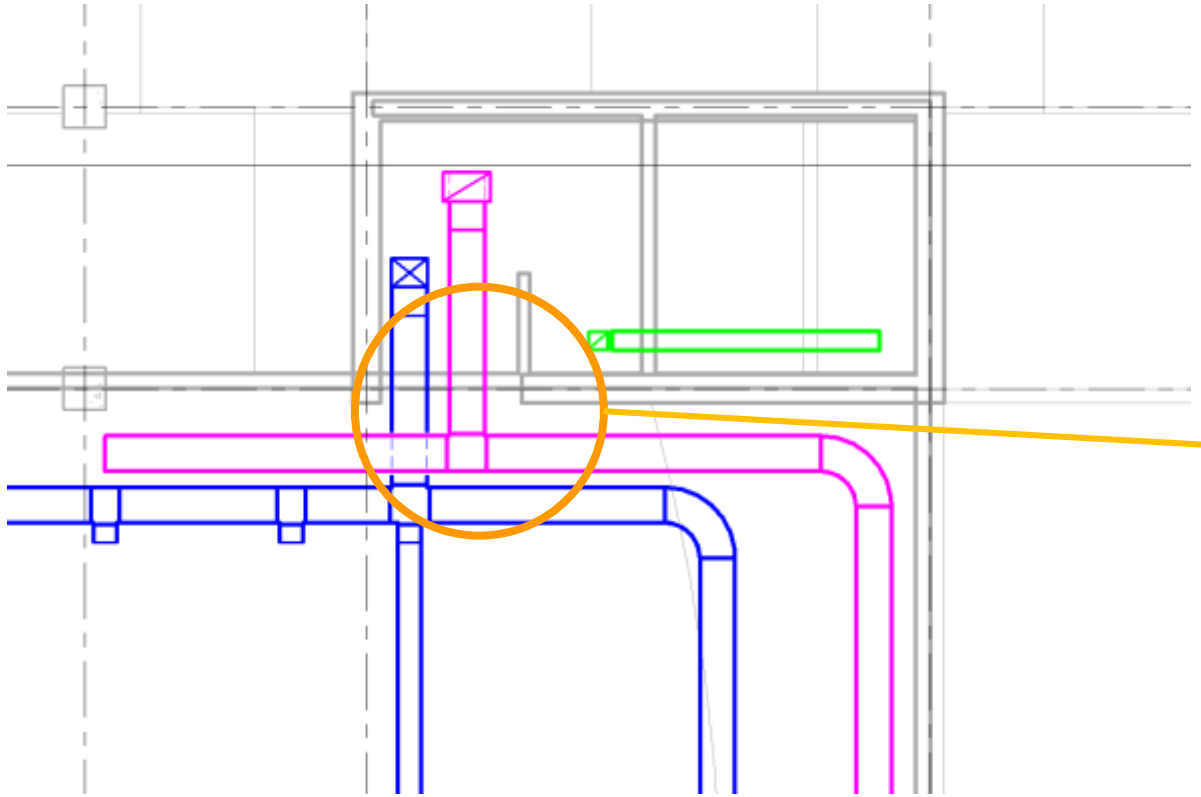


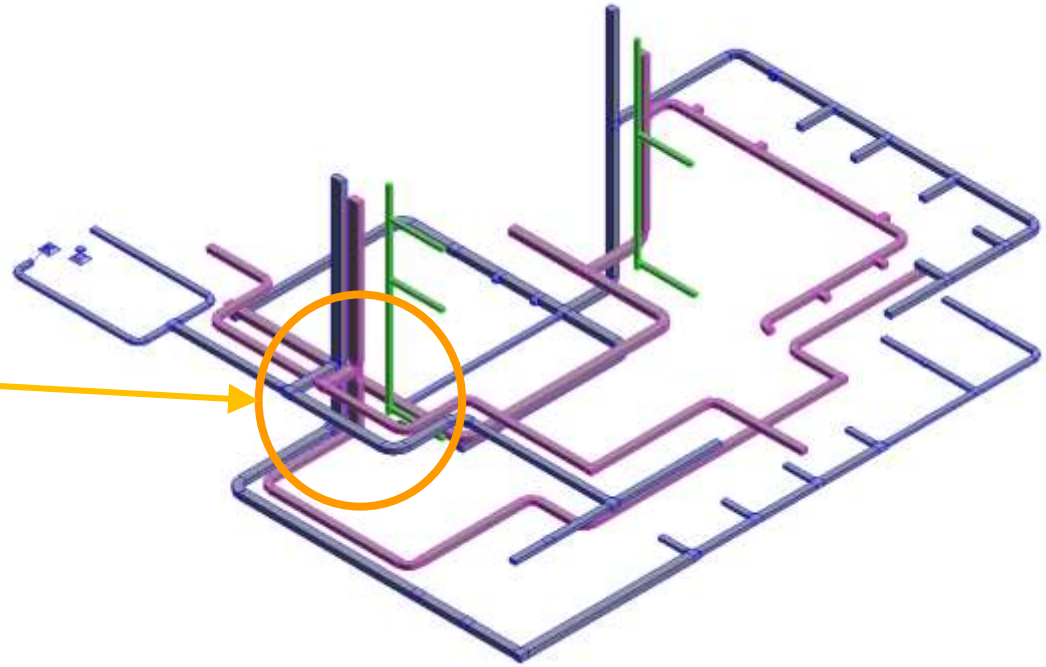
- *Tip Force = 455 k on both sides*
- Tip deflection: **2.7 in**

Ordinary Wall - without Supporting Platform



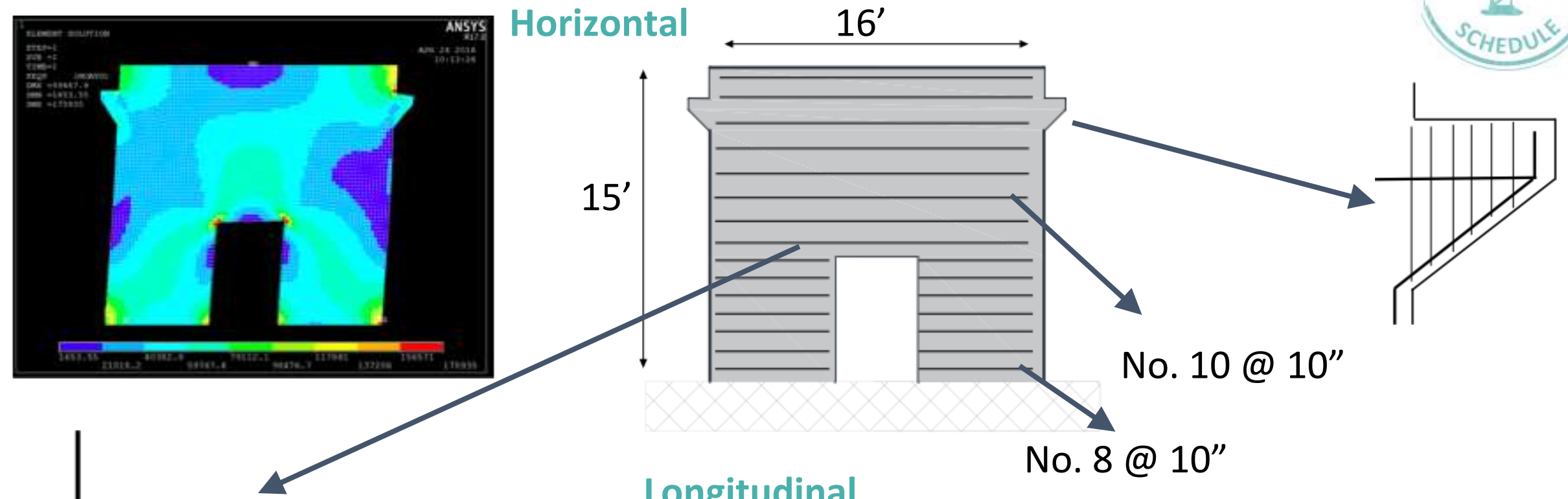
SYSTEM COORDINATION



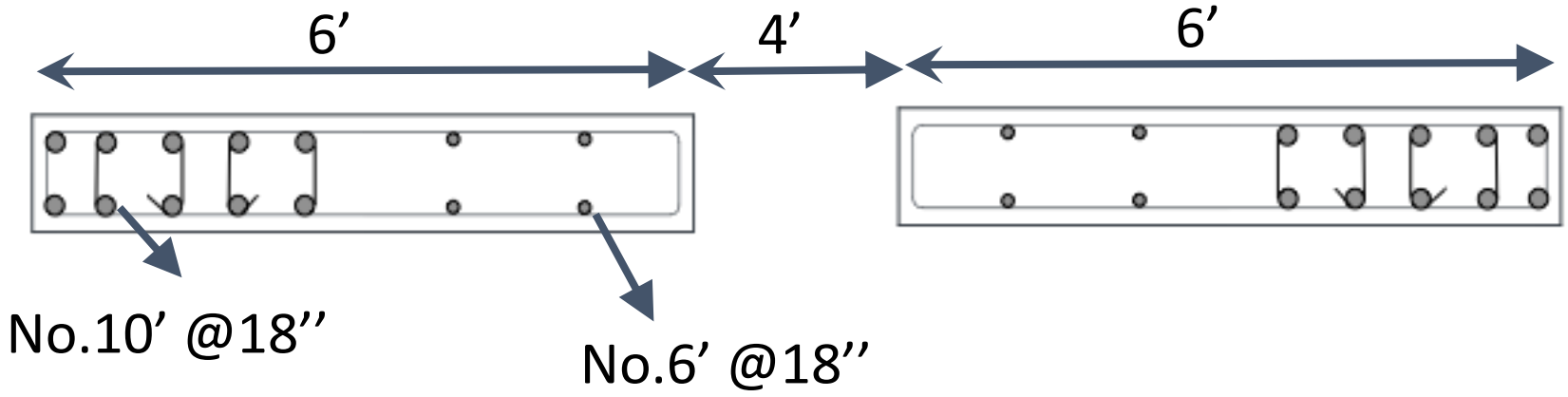


SHEAR WALL DETAIL DESIGN

Horizontal



Longitudinal



OFFSITE LOGISTICS

Site

EQUIPMENT

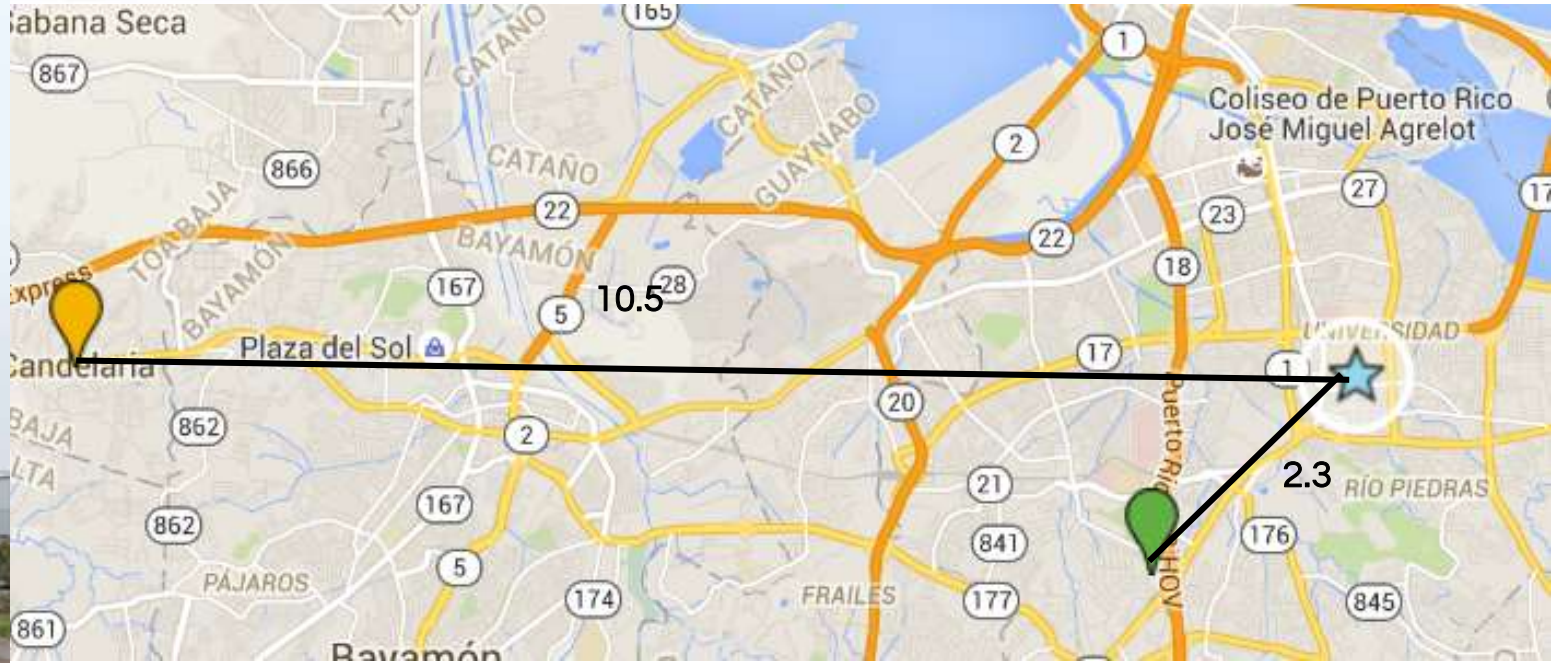
Site

Esmo Gruas Hidraulicas

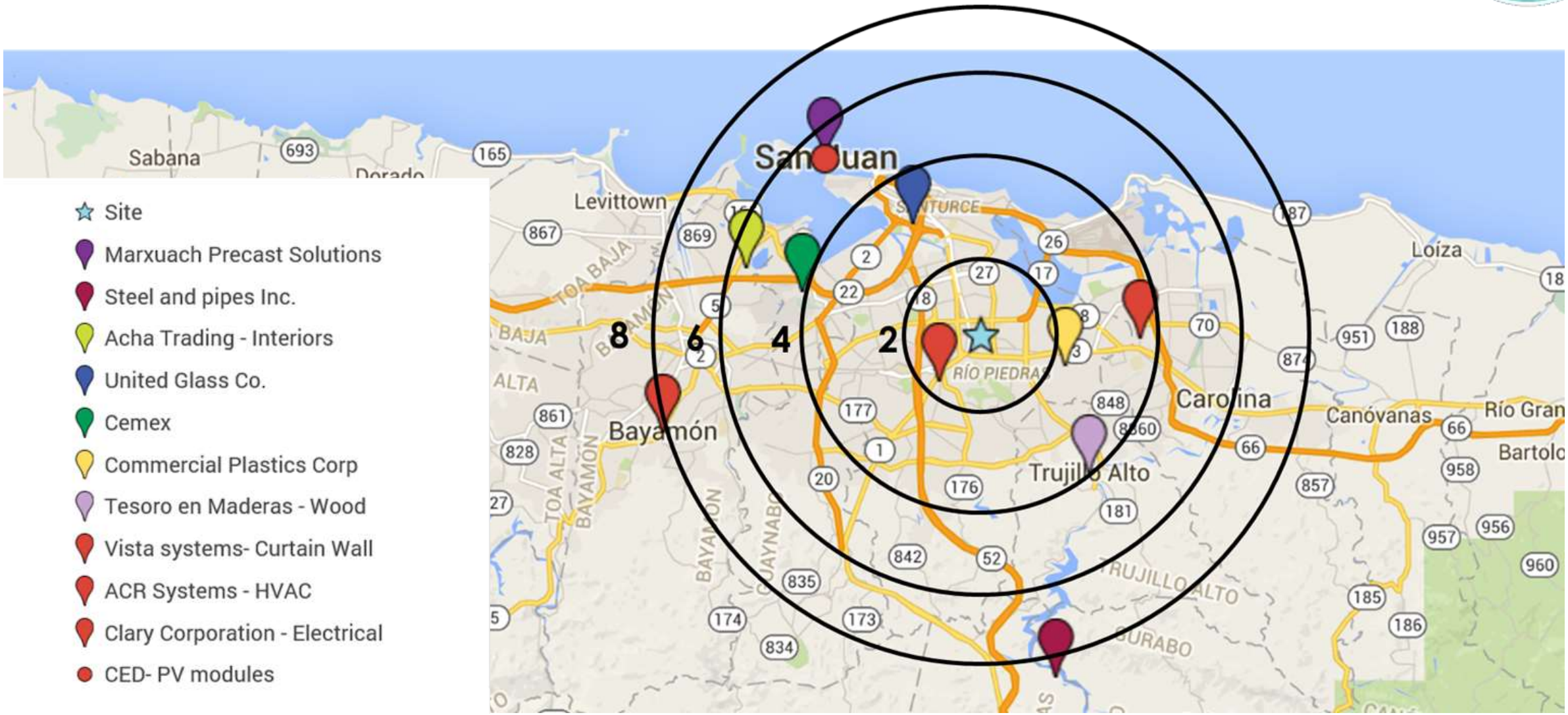
BlueLine Rental

Cranes

Excavators and Man lifts



MATERIAL PROCUREMENT



CONSTRUCTION SAFETY

ZONING

ZONE A 3930 Sq.ft

ZONE B 6085 Sq.ft

Zoning Plan

PHASING

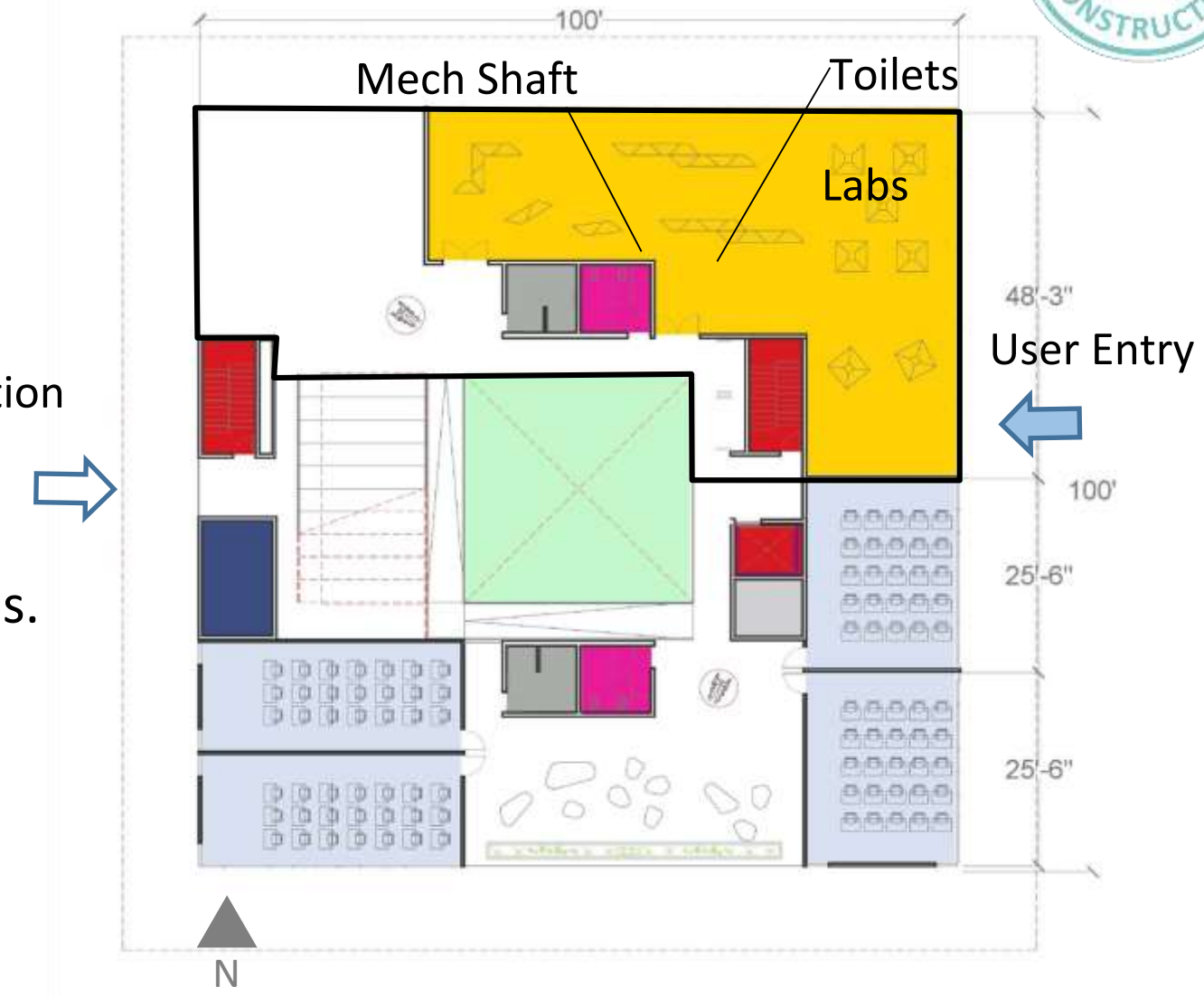
Labs located on the ground floor.

Façade on the side of user entry completed.

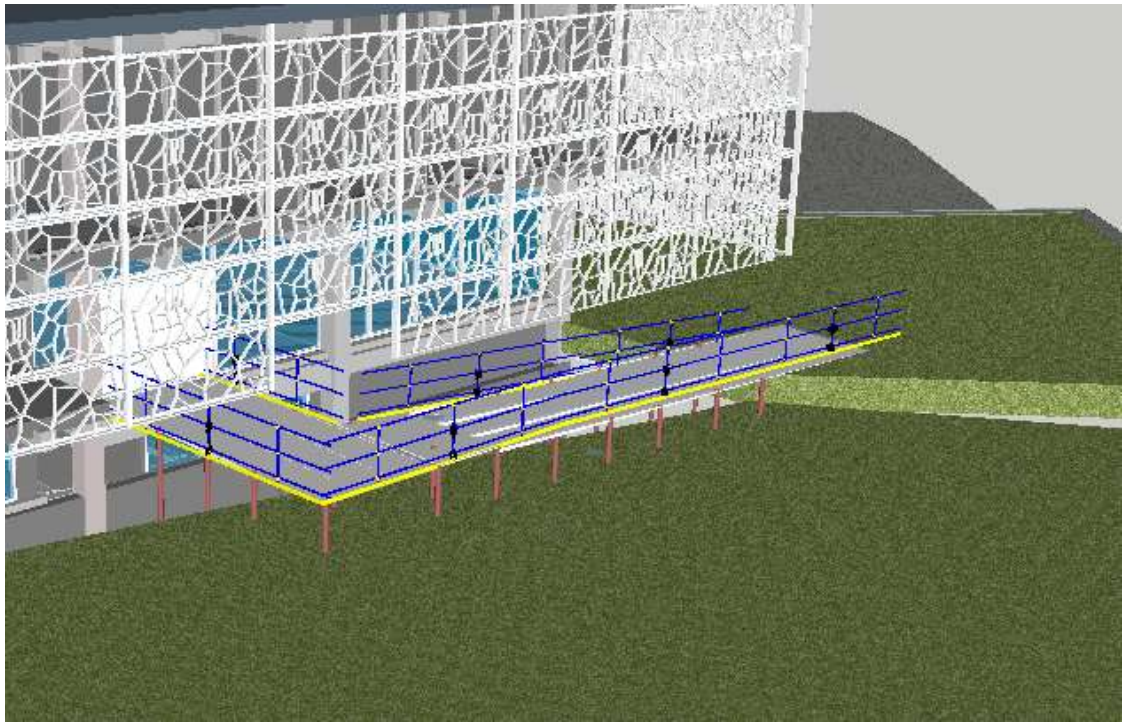
Labs occupied by May 11th.

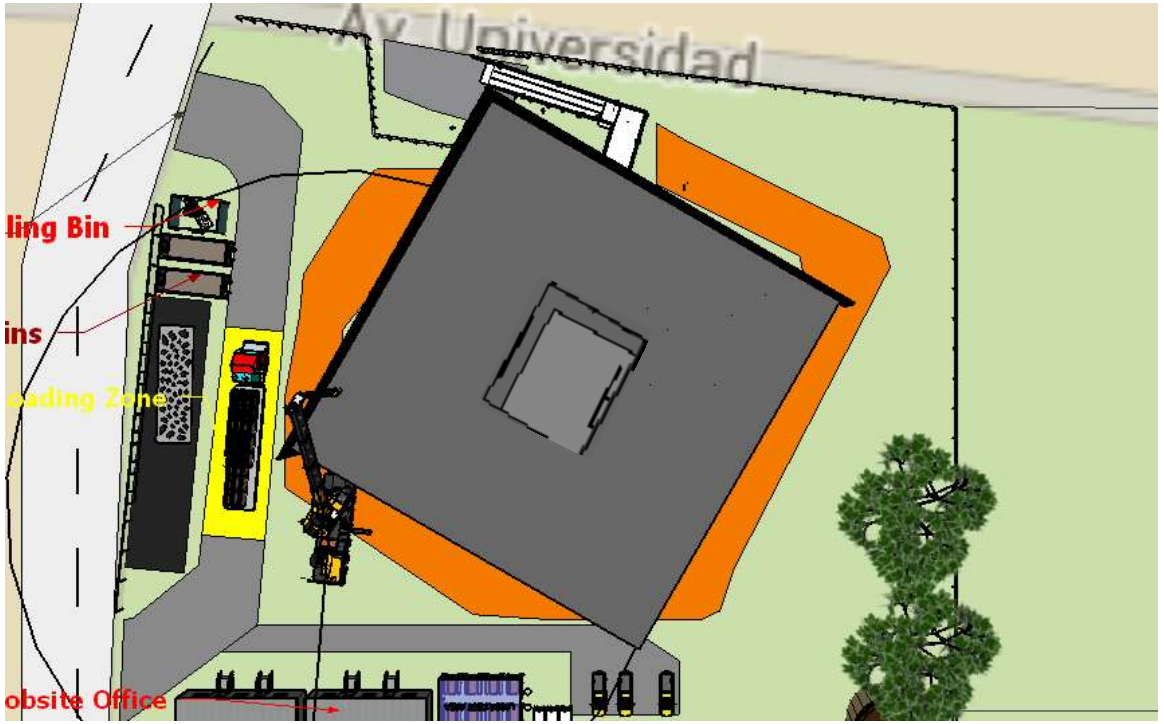
Temporary cooling provided for the labs.

Lab Areas cordoned off.



PHASING

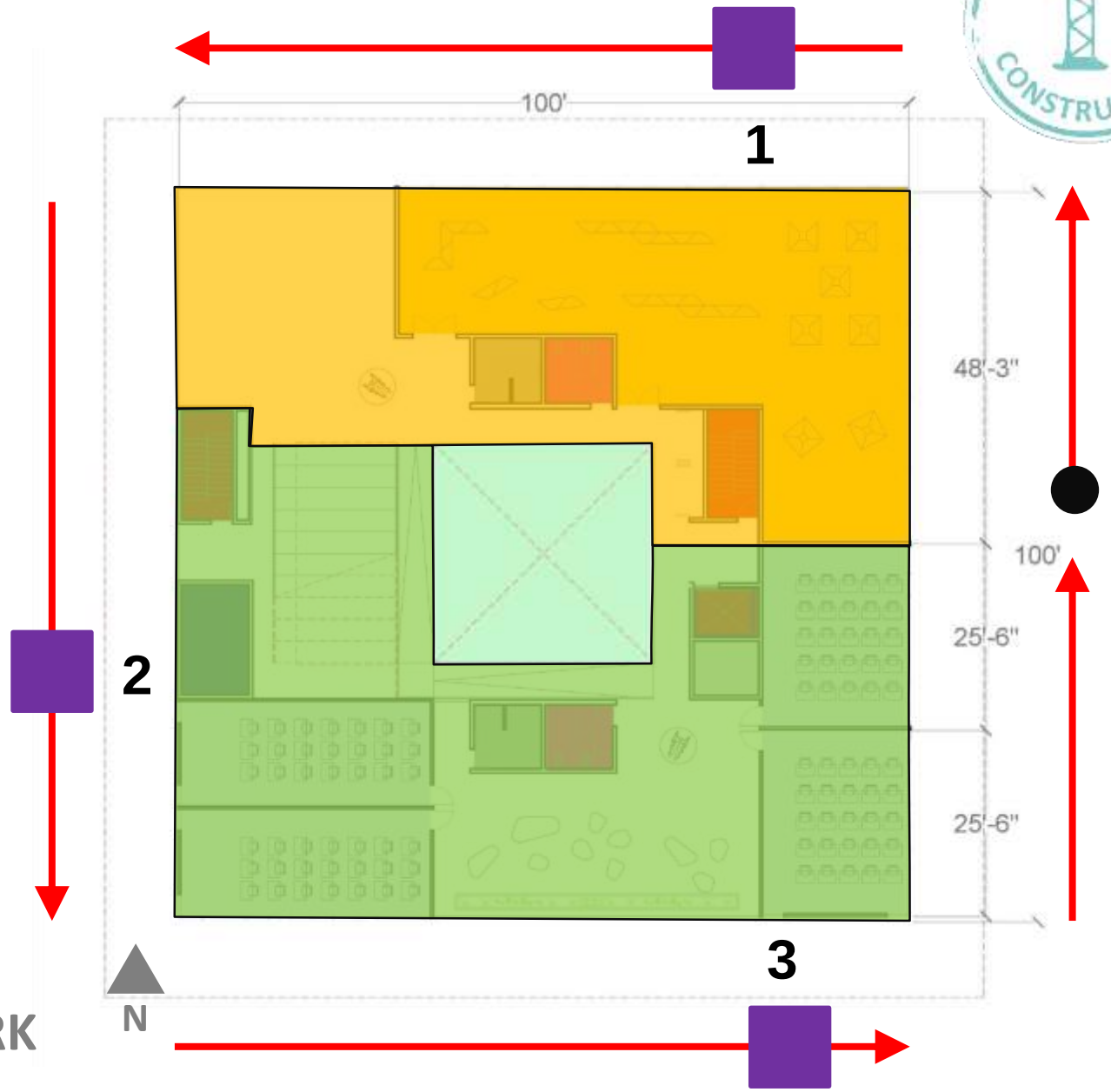




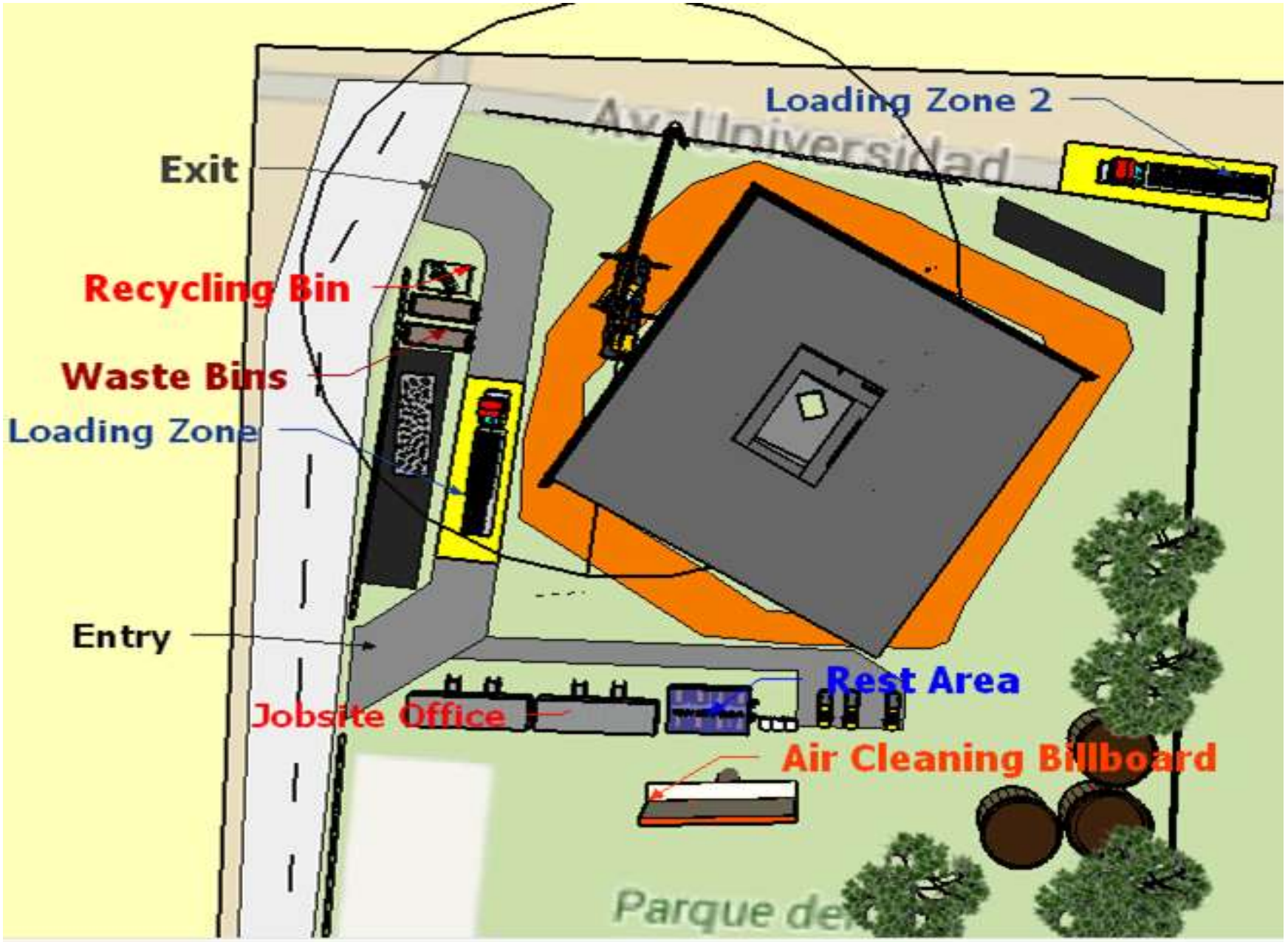
Pedestrian Entry for Labs

CONSTRUCTION WORK FLOW

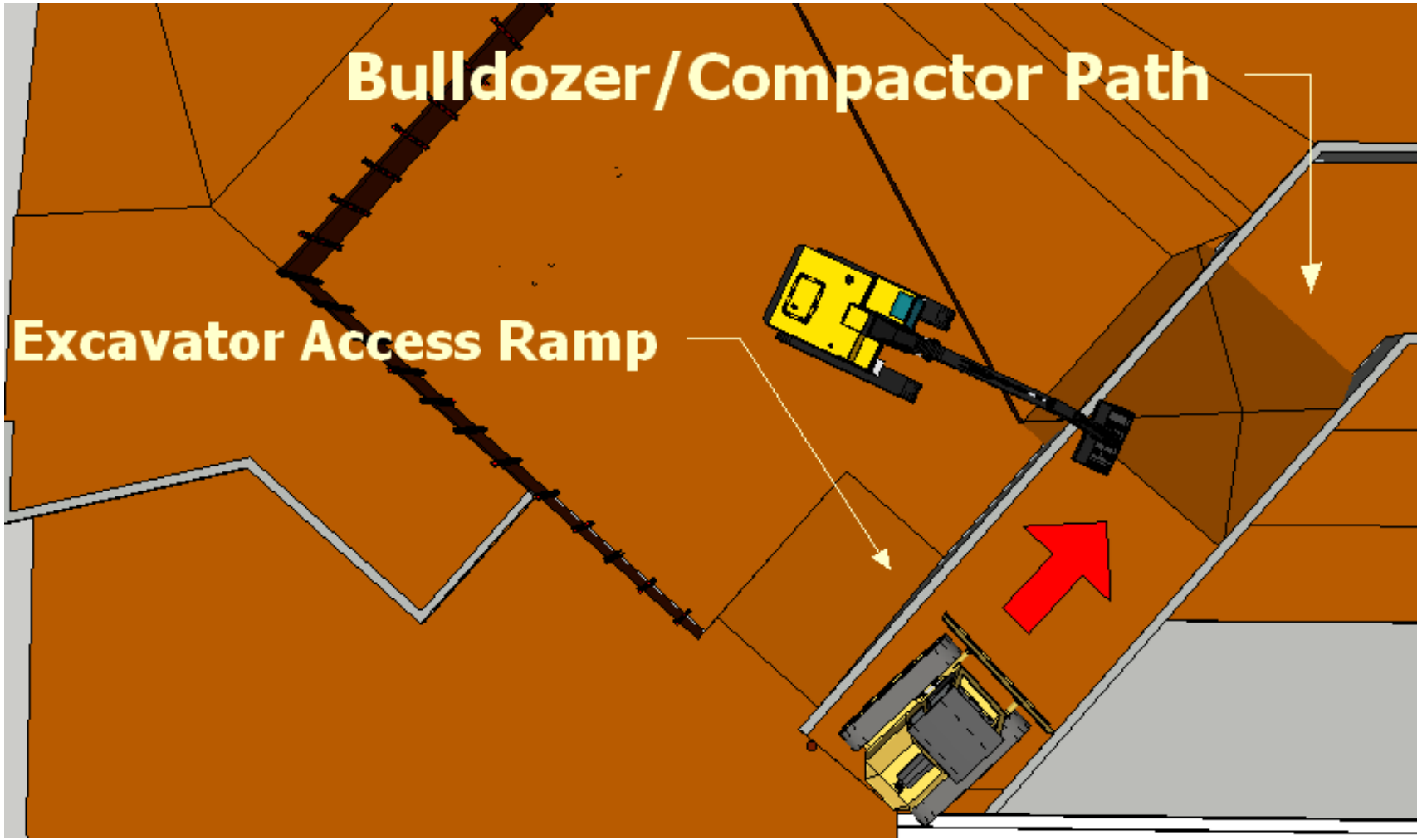
SEQUENCE OF WORK



SITE LOGISTICS



SITE LOGISTICS - EXCAVATION



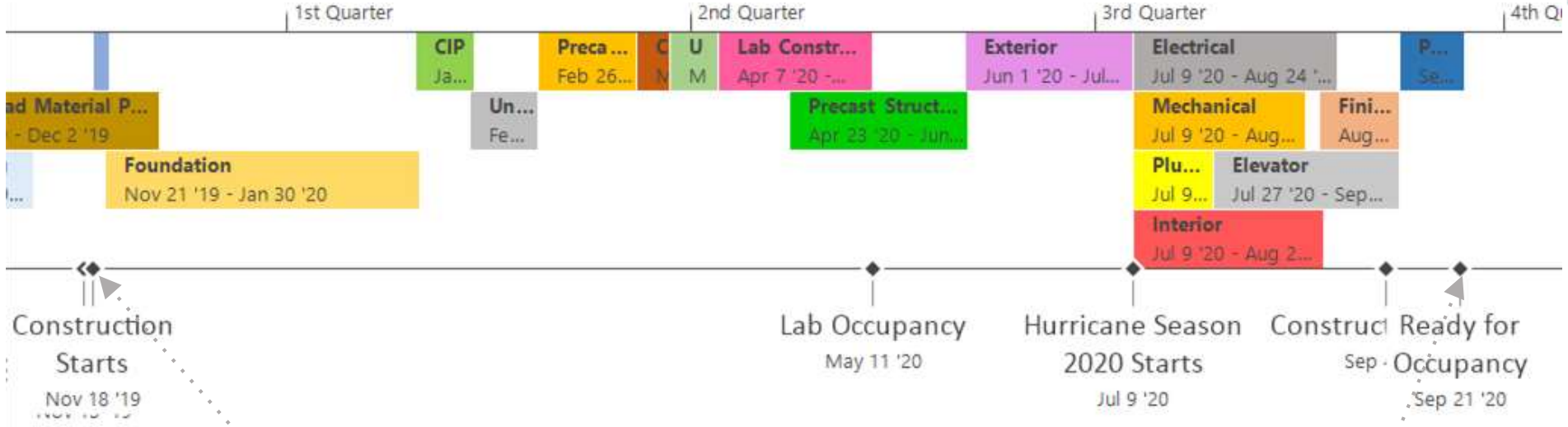
Fast & Economical Sequencing

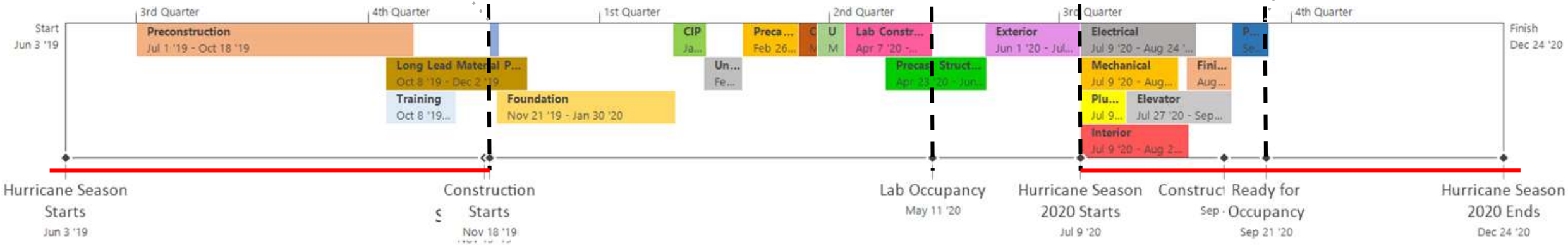
- Excavate
- Pile Drive
- Excavate
- Bulldoze
- Compact

UTILITY LOCATIONS

- Water Supply
- Sewer Tie-In
- Electrical

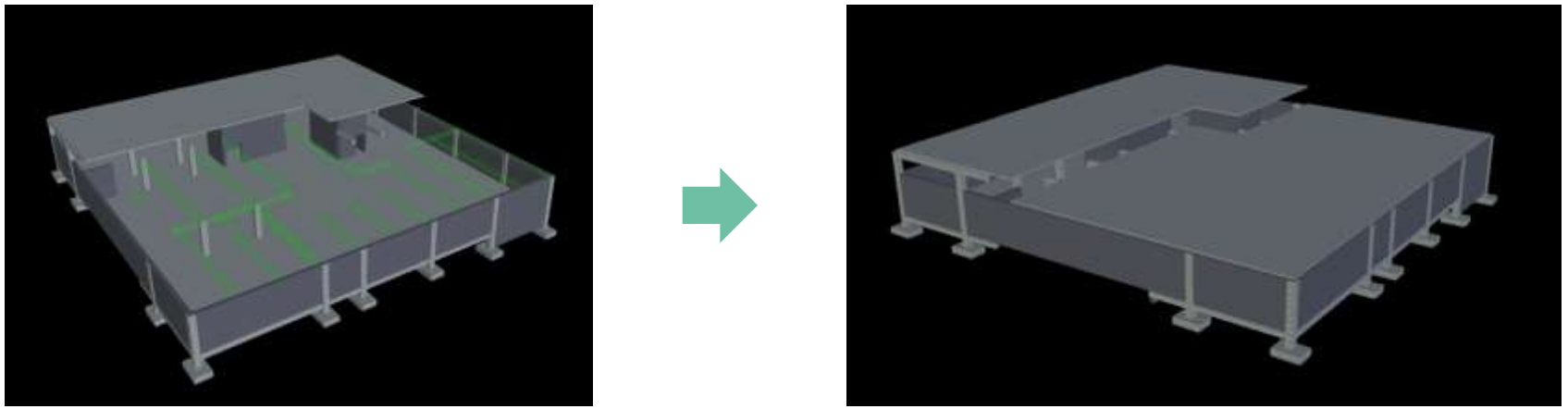
CONSTRUCTION SCHEDULE

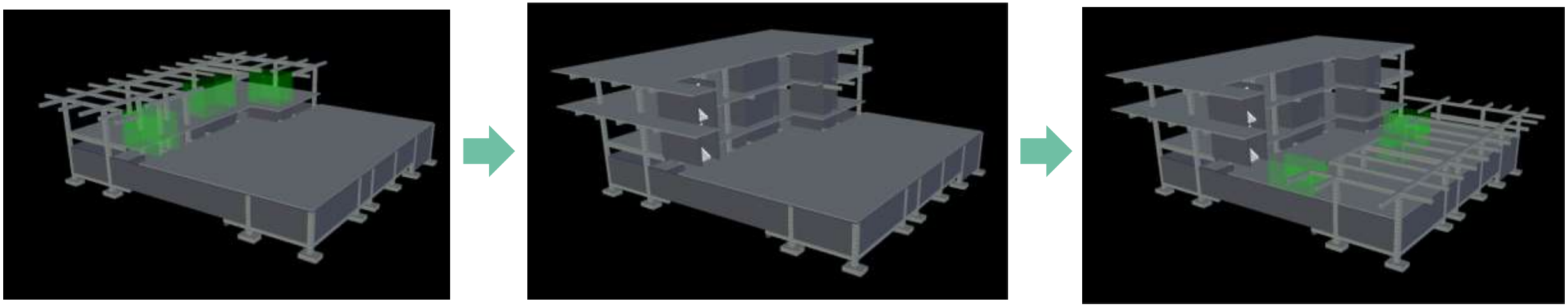




Preconstruction
Post construction
Long Lead Material Procurement
Training
Site work and Mobilization
Foundations
CIP
Underground Precast
Precast Structure ZoneA
Lab Construction
Precast Structure ZoneB
Electrical
Mechanical
Plumbing
Interior
Elevator
Finishes

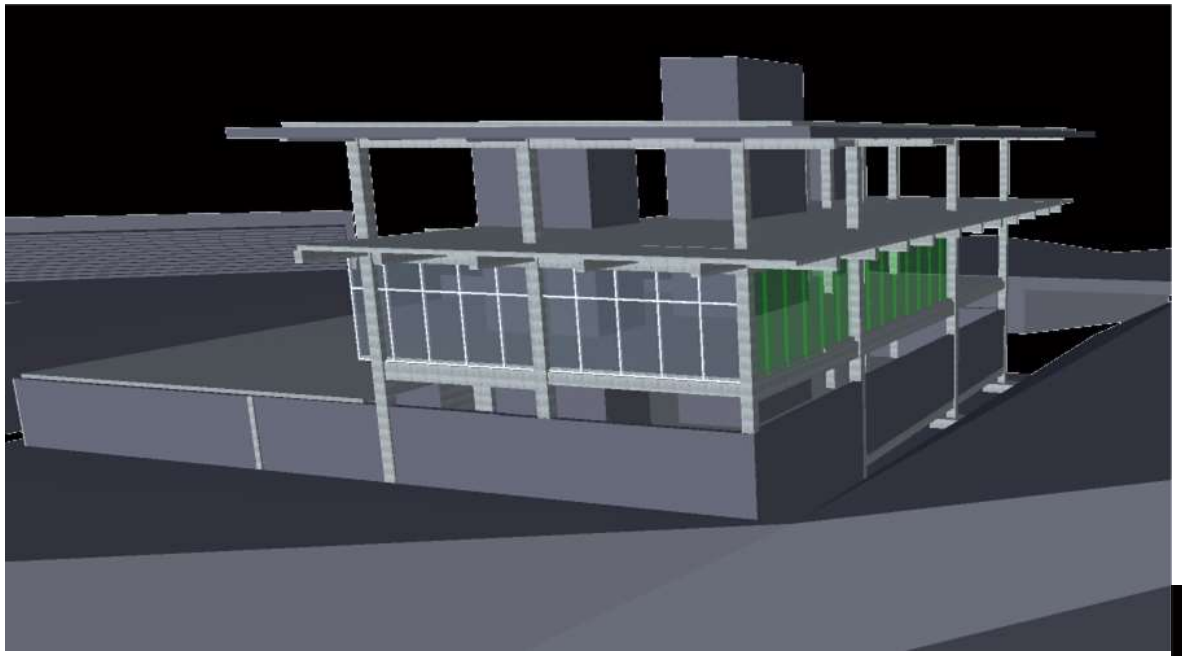
PHASING

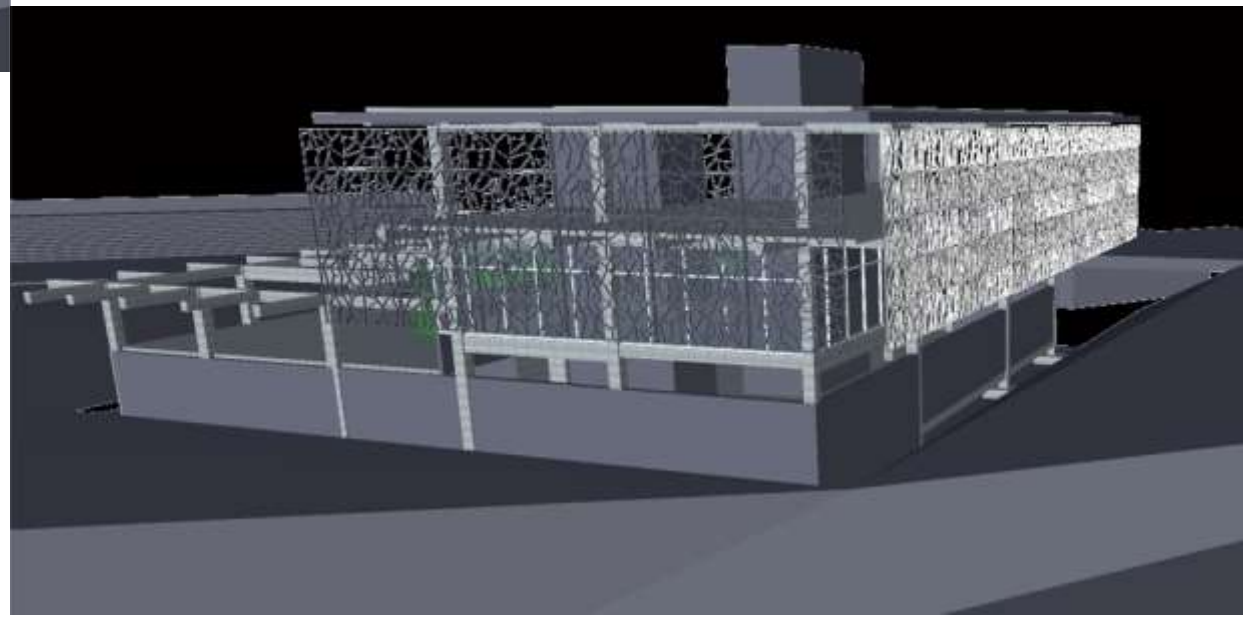




BILLBOARDING- CONSTRUCTION SEQUENCE

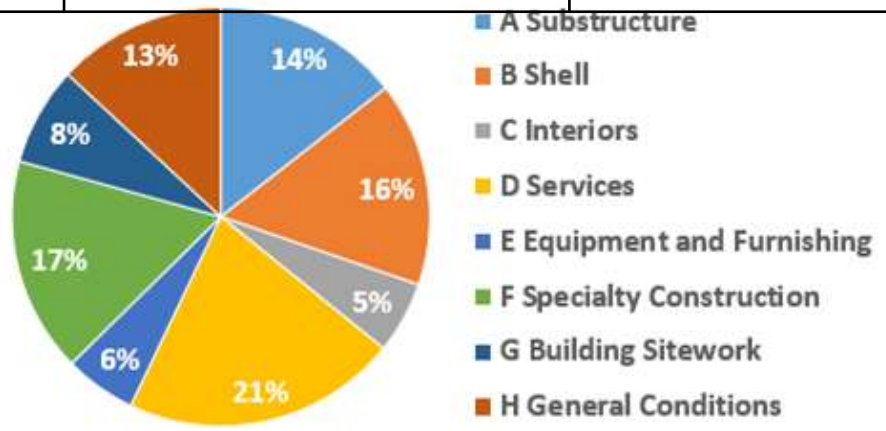
4D MOVIE



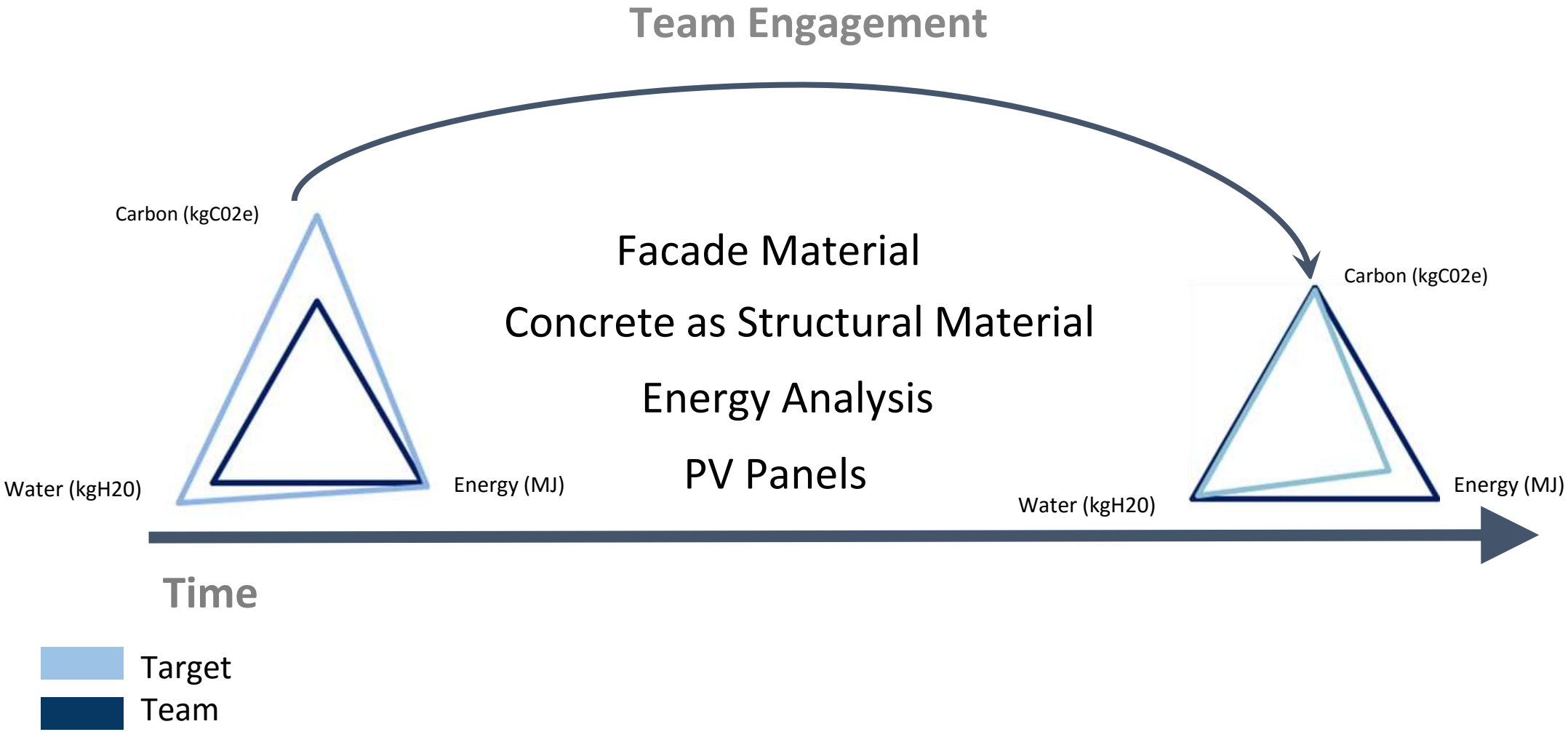


AIR CUBE - TVD

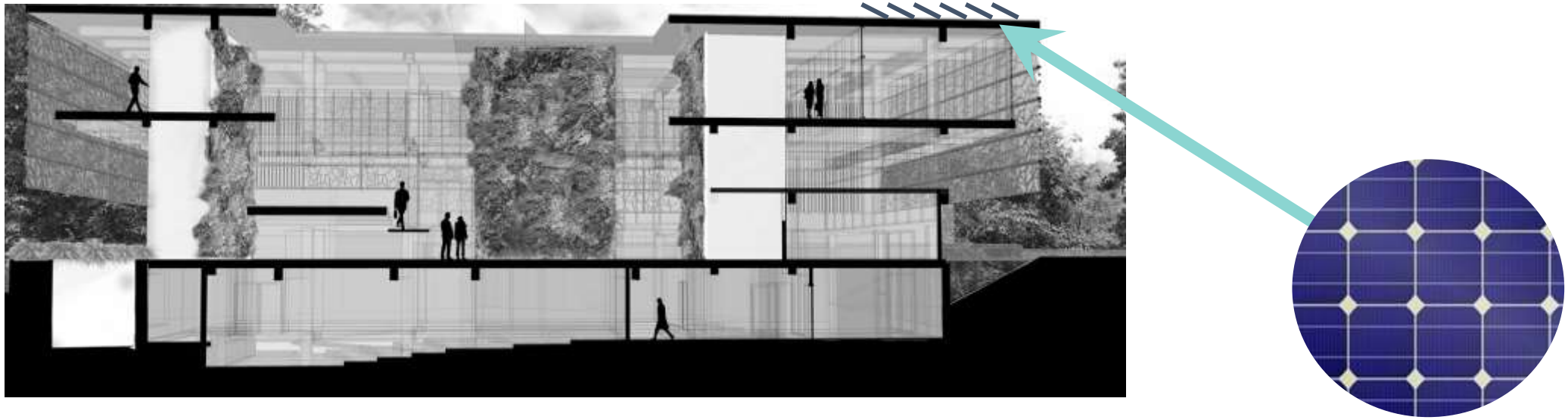
	ESTIMATED VALUE	TARGET VALUE	VALUE DELTA
TOTAL	**$9,372,000**	**$9,776,000**	**$404,000**
A Substructure	$ 1,355,000	$ 1,575,000	$ 220,000
B Shell	$ 1,482,000	$ 1,305,000	$ (177,000)
C Interiors	$ 520,000	$ 545,000	$ 25,000
D Services	$ 1,995,000	$ 2,031,000	$ 36,000
E Equipment and Furnishing	$ 520,000	$ 500,000	$ (20,000)
F Specialty Construction	$ 1,558,000	$ 1,940,000	$ 382,000
G Building Sitework	$ 715,000	$ 575,000	$ (140,000)
H General Conditions	$ 1,227,000	$ 1,305,000	$ 78,000



STV EVOLUTION



PHOTOVOLTAIC PANELS



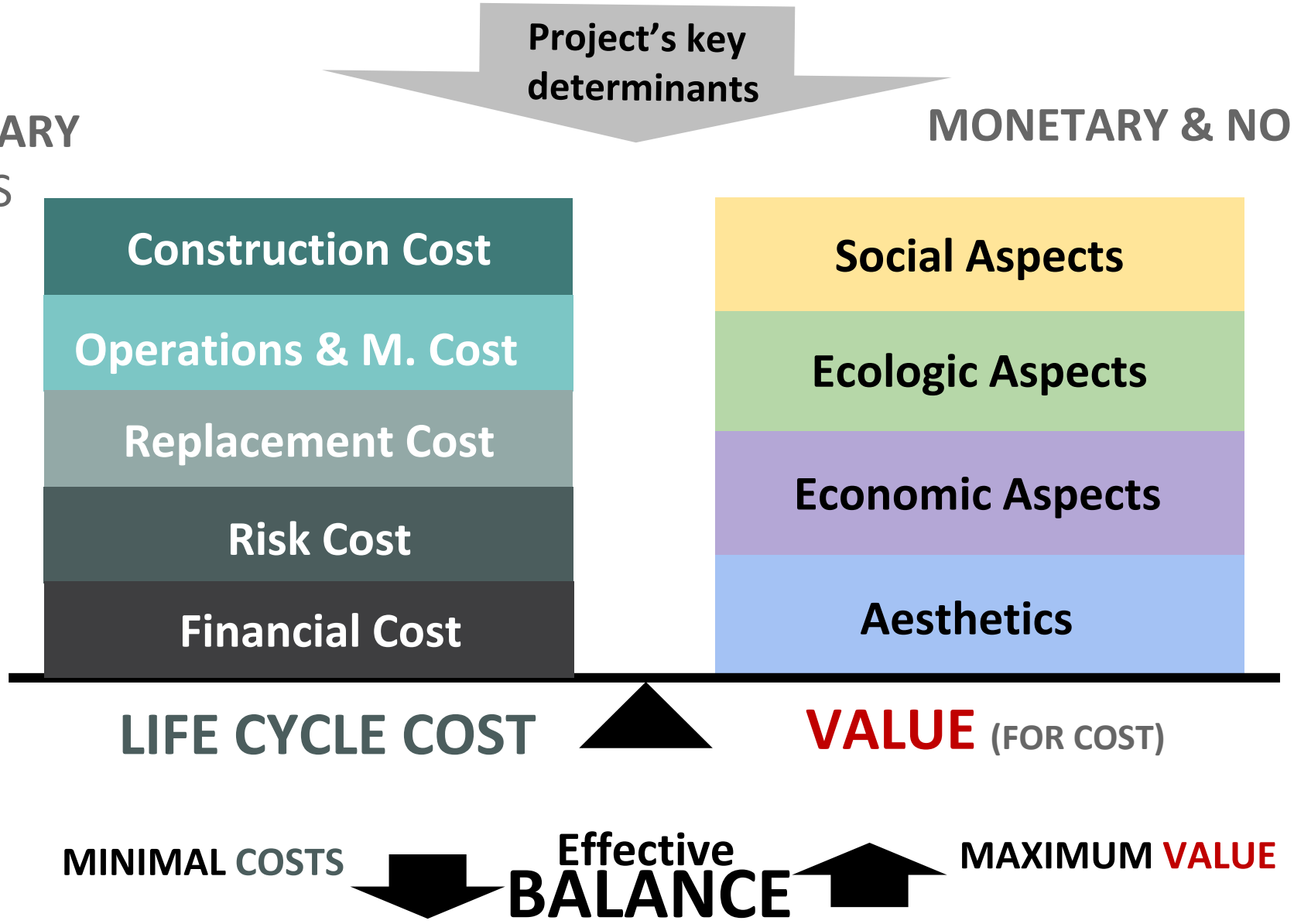
Panel Coverage - **40%** roof area

Power Supply: 250 panels - **122 000 kWh**

Produce **1/3** of Total Energy Consumption

17% Energy Cost Savings

LIFE CYCLE MANAGEMENT




OPEN
AUDITORIUM

OPEN AUDITORIUM – VALUE FOR COST ANALYSIS

LIFE CYCLE COST

$105,000	Construction Cost
$ 210,000	Operations & M. Cost
$ 16,000	Replacement Cost
$ 35,000	Risk Cost
$ 31,000	Financial Cost

SUM

Total LCC:
(over 25 years)
400,000 $

TRANSFER
1000$≙1 Point

400
COST points

VALUE

OWNER	WEIGHT	RATE (1-5)	WEIGHTED SCORE
Social Aspects	30	5	150
Ecologic Aspects	35	4	140
Economic Aspects	25	3	75
Aesthetics	10	5	50

SUM

TRANSFER
1 W. P. ≙1 P.

Total score:
430 points

415
VALUE points

- Open for everyone
- Collaboration space
- Space for demonstration

- Reuse of old bleachers
- Ecological materials

- Additional space for events
- Increase in value of property

- High quality of stay
- Views to green landscape

LIFE CYCLE MANAGEMENT

STRATEGIES

- Utilize Cost Management and Value Engineering throughout the Design & Development Process
- Collaboration & Integration

IMPROVE:
Productivity
Sustainability
Quality

REDUCE:
Waste
Risk
Cost

IMPLEMENTATION

- Floor plan analysis (Space Efficiency)
- Decision for alternatives based on life cycle assessment & Value for Cost approach
- Financial engineering
- Integrated risk management approach

LIFE CYCLE MANAGEMENT

VALUE FOR OWNER & USERS

SOCIAL

- Design according users needs
- Collaboration spaces
- Open auditorium
- Aesthetical value

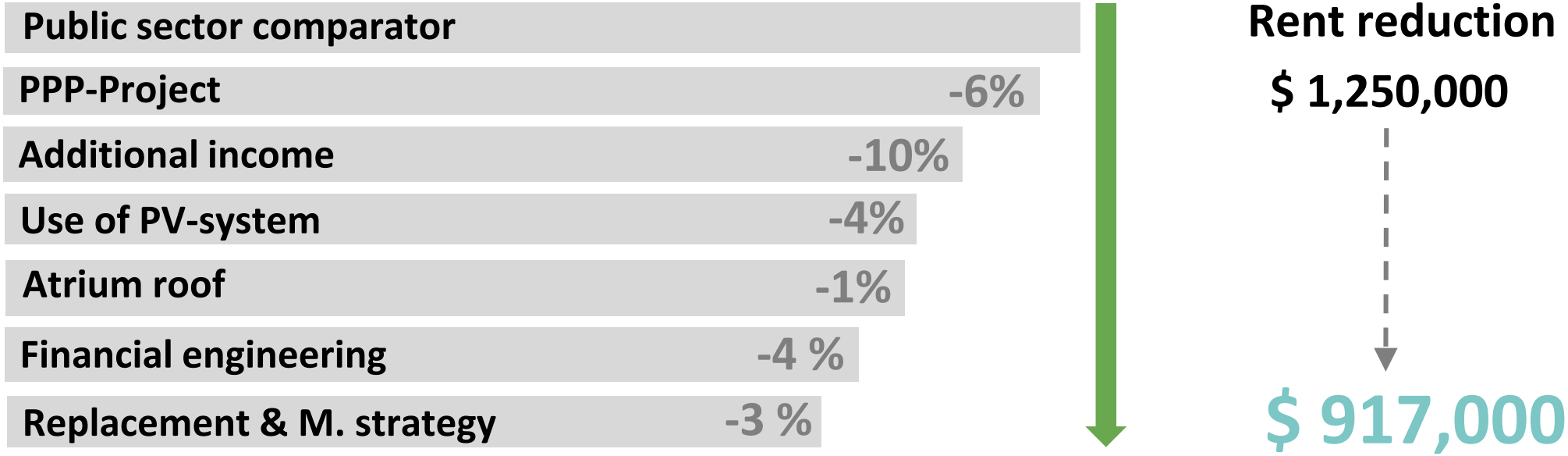
ECOLOGIC

- LEED silver certification
- Low environmental impact
- Energy & water system optimization

ECONOMIC

- Additional Income
- Increased property value
- Increased attractiveness to students
- LCC reduction

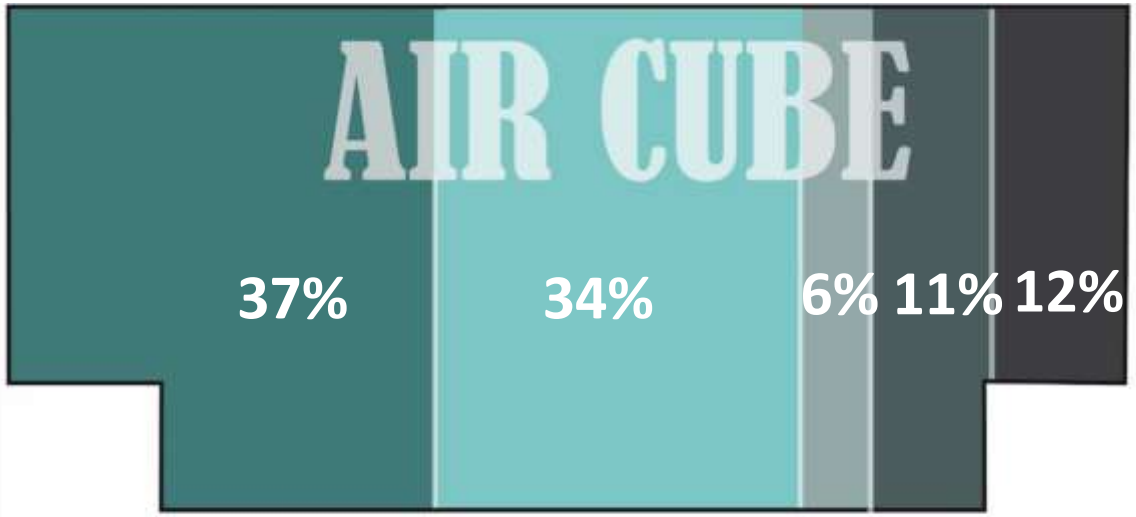
MONETARY BENEFITS



LIFE CYCLE COST

Expenses

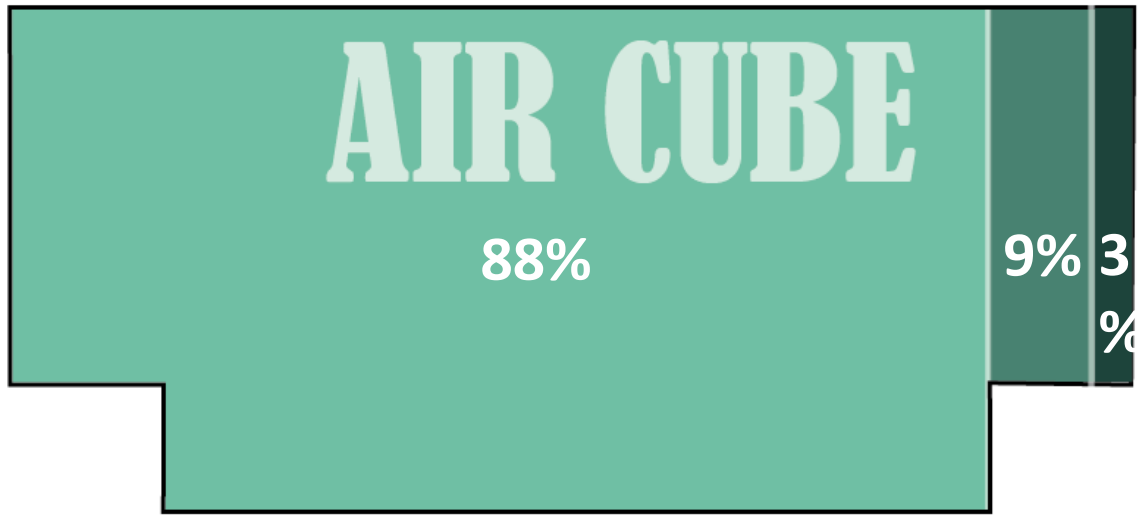
Total LCC (over 25 years) **$ 23,635,000**



CONSTRUCTION COST	$ 9,352,000	37%
OPERATIONS & MAINTENANCE COST	$ 7,758,000	34%
REPLACEMENT COST	$ 1,215,000	6%
RISK COST	$ 2,609,000	11%
FINANCIAL COST	$ 2,701,000	12%

Income

Total Income (over 25 years) **$ 26,091,000**



RENT FOR BUILDING	$ 22,952,000	88%
RENTABLE SPACES	$ 712,000	9%
RENT FOR CAFE	$ 2,453,000	3%

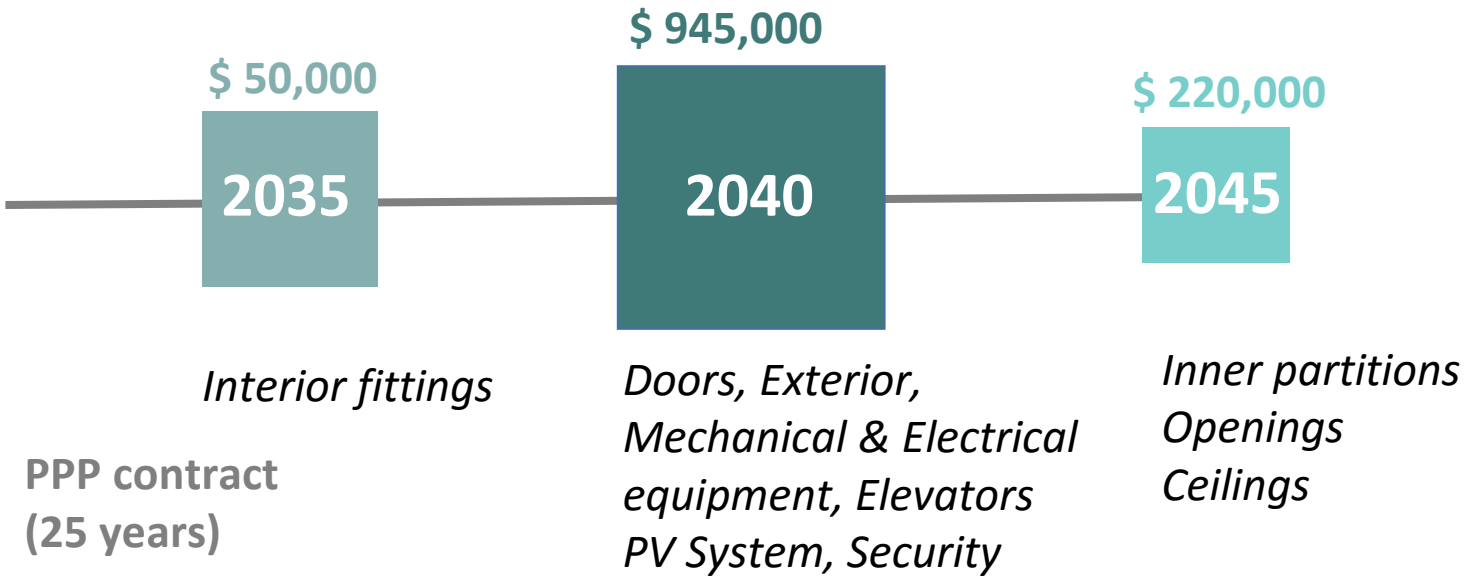
REPLACEMENT & MAINTENANCE STRATEGY

Preventive maintenance program

DETECT & CORRECT problems before they occur

Maximize efficiency
Minimize excessive labor

Replacement STRATEGY



11 %
reduced Replacement & Maintenance cost over 25 years

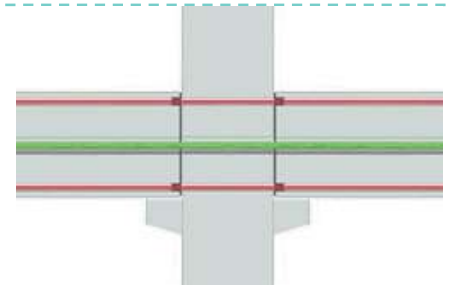
RISK MANAGEMENT

FINANCE

RISK

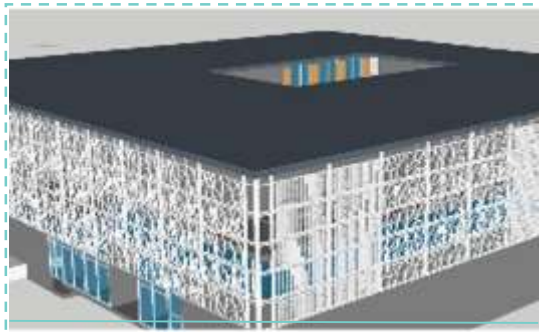
STRATEGIES

SAVINGS



Self centering shear Wall

- 60%

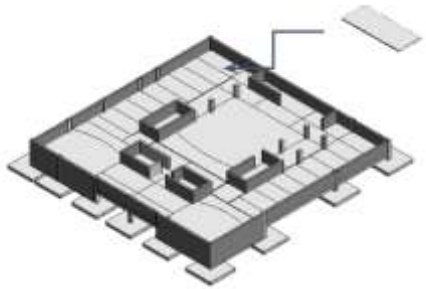


Façade system

- 25%

Security system

- 45%



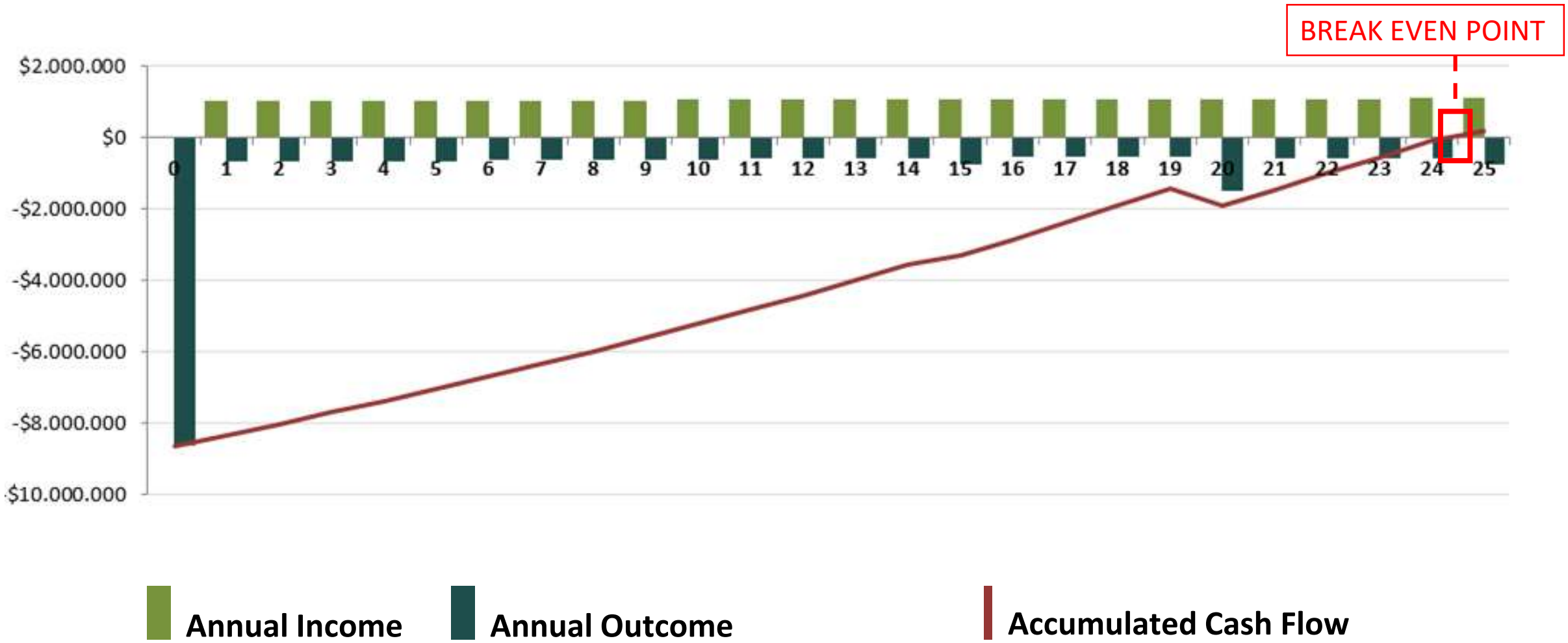
Local materials Precast

- 40%

REDUCED
TOTAL RISK COST

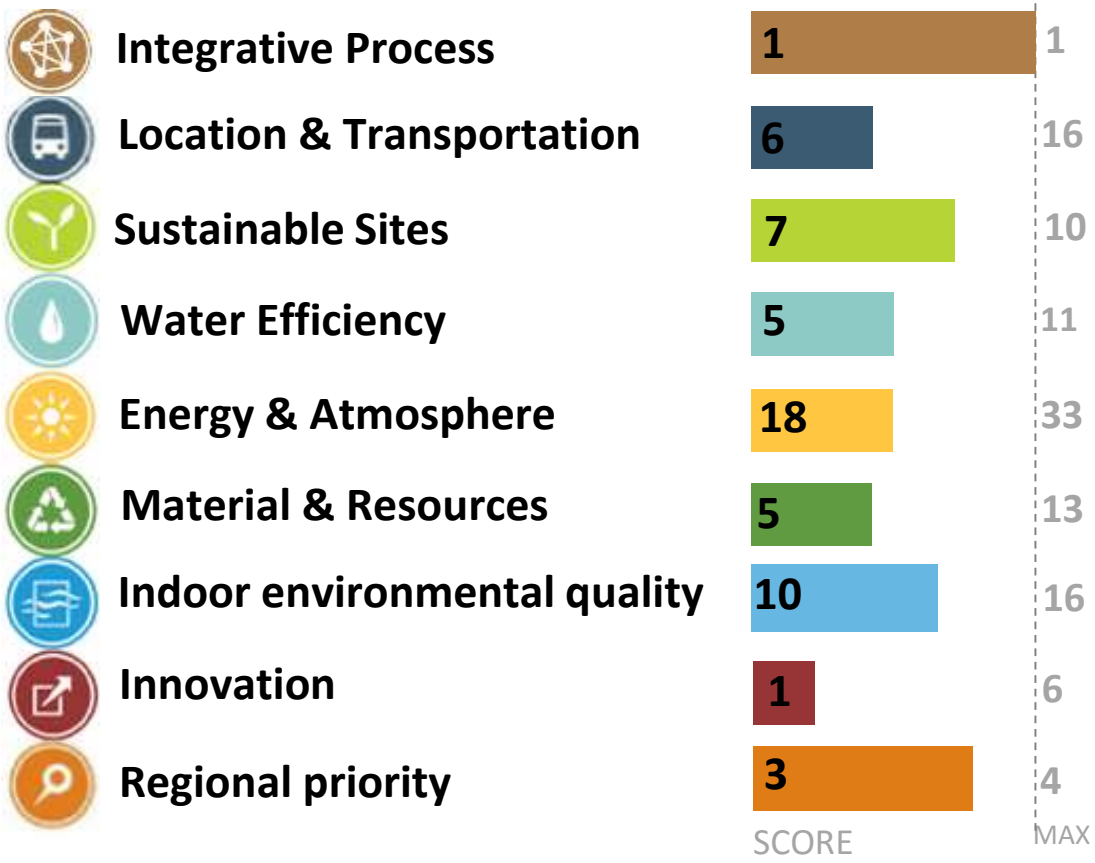
$3,540,000 → **$2,600,000**

ACCUMULATED CASH FLOW



BUILDING RATING

LEED



Total 56 /110

WELL BUILDING STANDARD
FOR EDUCATIONAL FACILITIES

… focuses on the health and wellness impacts that buildings have on occupants.

AIR								X	
WATER							X		
NOURISHMENT						X			
LIGHT						X			
FITNESS					X				
COMFORT							X		
MIND						X			
				silver		gold		platinum	

ALL preconditions &
40 % Optimization Features


CLIENT
AFFINITY

COMMUNICATION

How the owner explained it

How the architect understood

How the engineer designed

How the CM managed

How the MEP planned

How the LCFM calculated

What the client really wanted

Different: **Disciplines, Cultures, Knowledge, Personality**

→ Different **understanding**

→ **Clear and understandable conversation necessary**

WHAT OUR CLIENT NEEDS IS WHAT WE ENVISION AND FINALLY DELIVER

GOAL SETTING

OWNER GOALS

TEAM GOALS

MULTI-DISCIPLINARY PROJECT SOLUTIONS

THE BUILDING IS A LANDMARK IN UPR

PREFABRICATION & MODULARIZATION

SUSTAINABILITY- TRIPLE BOTTOM LINE

INTEGRATED SOLUTIONS

SUSTAINABILITY

RISK MITIGATION

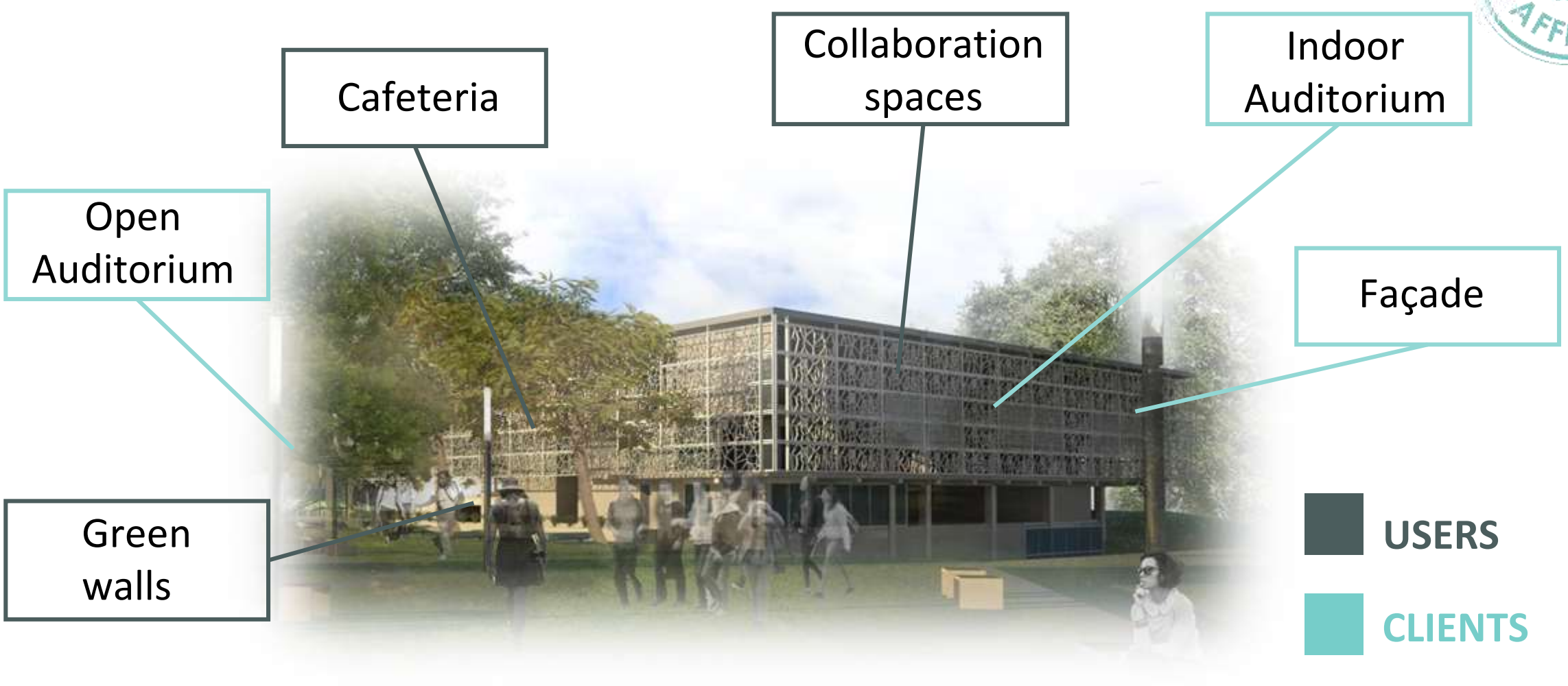
FLEXIBILITY OF DESIGN

MAXIMIZE DAYLIGHTING AND VIEWS

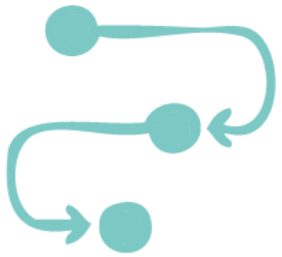
BUILDING MUST RESPOND TO USER'S NEEDS

MINIMIZE DEPENDENCE ON ELECTRICITY GRID

IMPACT ON DESIGN



DEFINITION



PROCESS

PRODUCT

SATISFACTION

Understand clients needs

Deliver the maximum value

Create memorable experience

STRATEGIES

STRATEGIES	INFORM	ENGAGE	EQUIP
IMPLEMENTATION			PowerPoint
METRIC	5 Posts/week 7 Visitors/week	9 Comments/week 8 Surveys/period	4 #No. of decisions

COMMUNICATION PREFERENCES

INVOLVED IN EVERY SINGLE DECISION

OWNER

INTERVAL

ARCHITECTURE

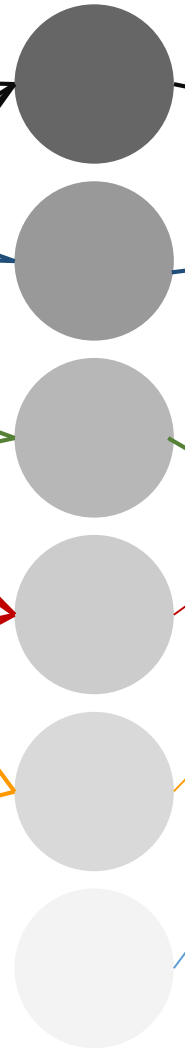
STRUCTURE

CONSTRUCTION

MECHANICAL

LIFE CYCLE MANAGEMENT

INNOVATIONS



ASAP

~~Once a week~~

Once every 2 weeks

ADVANTAGES OF WORDPRESS

1

PREFERENCES
check at own time & level of detail

2

COMMENTS
stay on page

3

NO overload
of information

SURVEYS IN WINTER QUARTER

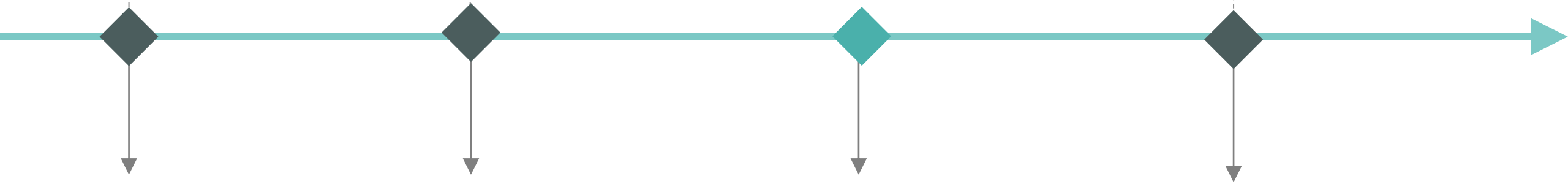
Average 4/6 Responses

Big Idea I-
Puerto Rican Parrot
Feb 2

Decision
Matrix
March 1

Rating Air
Cube Winter
March 10

Evaluation
Winter Quarter
March 13



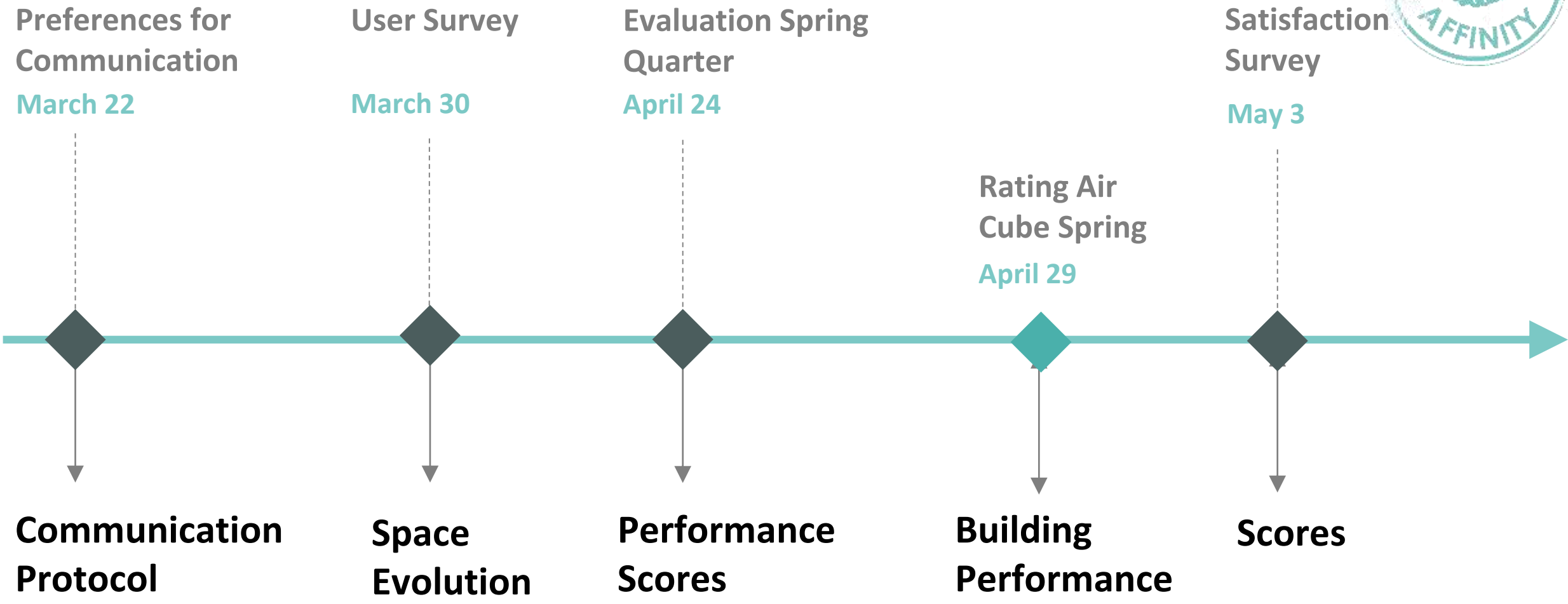
Design Outcome

Criteria

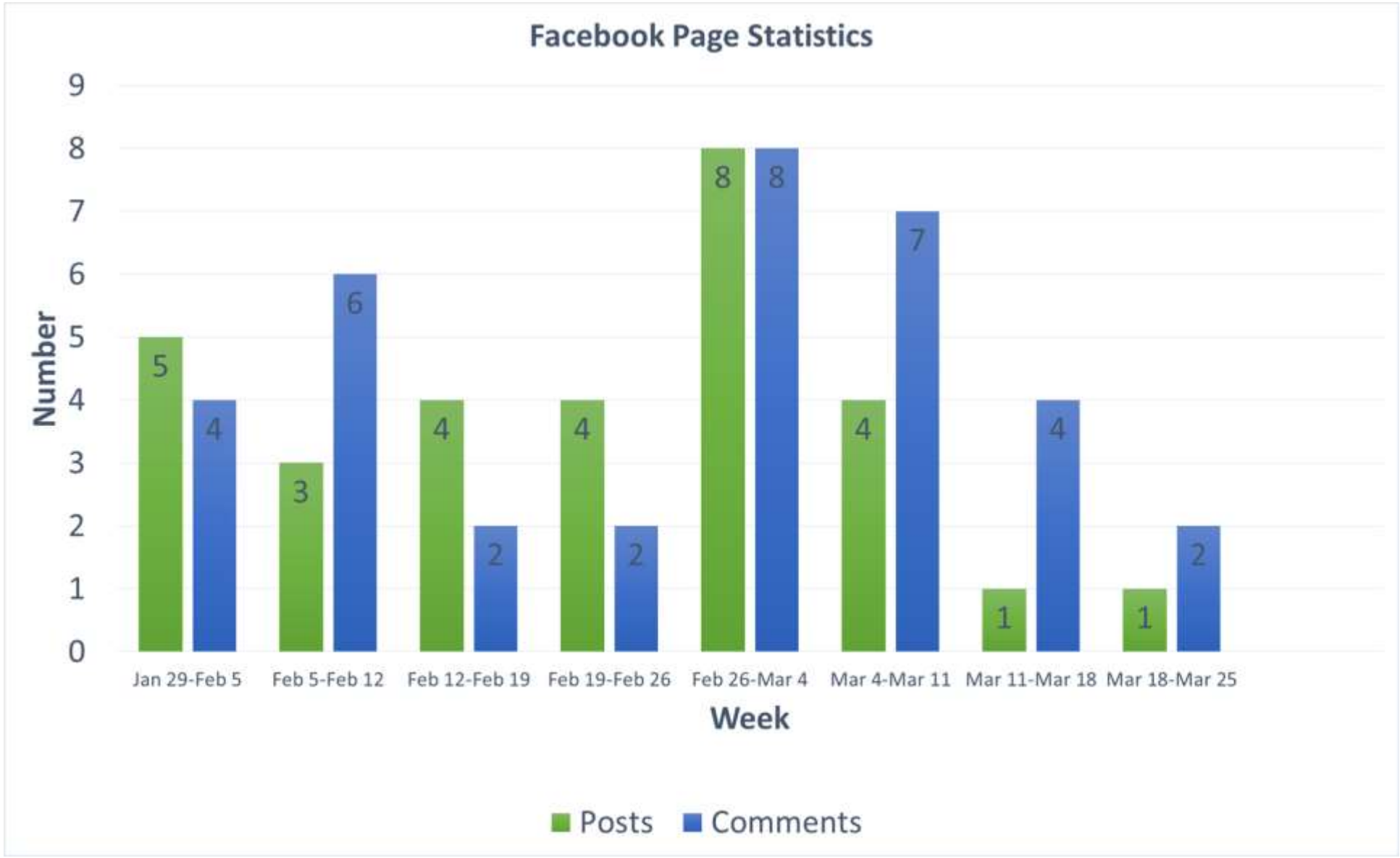
Building Performance

Performance Scores

SURVEYS IN SPRING QUARTER



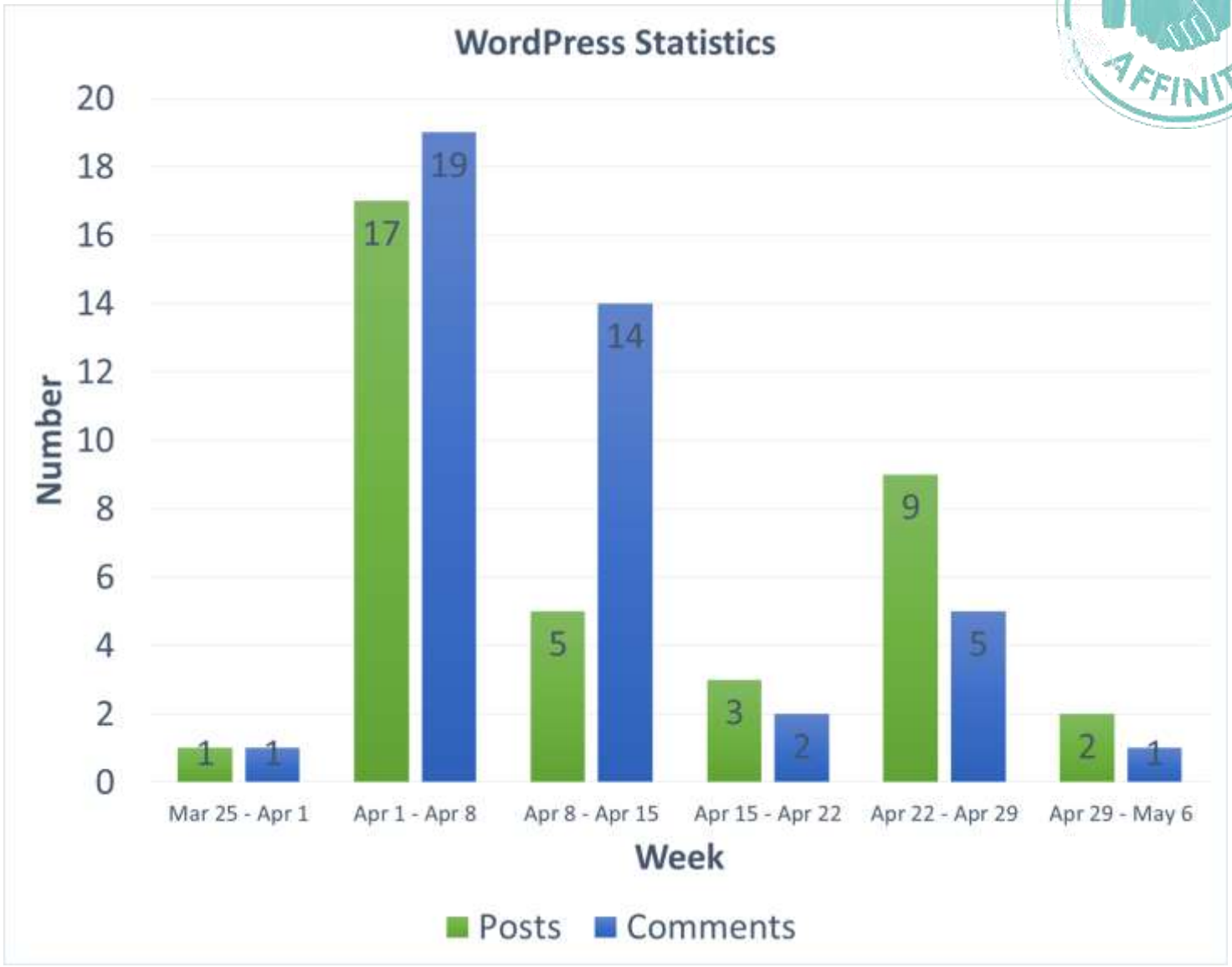
METRICS- WINTER QUARTER



METRICS- SPRING QUARTER

5 Posts/ Week
7 Visitors/Week

9 Comments/ Week
8 Surveys

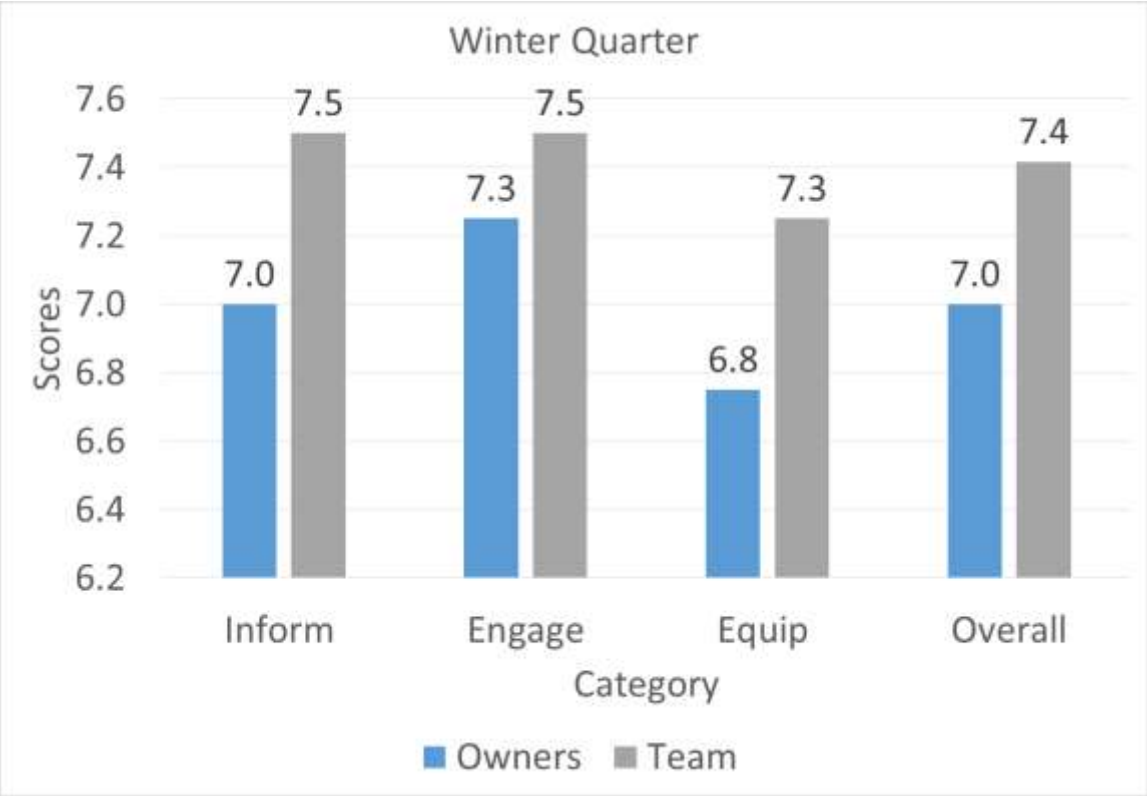


CLIENT AFFINITY SCORES- TEAM ISLAND

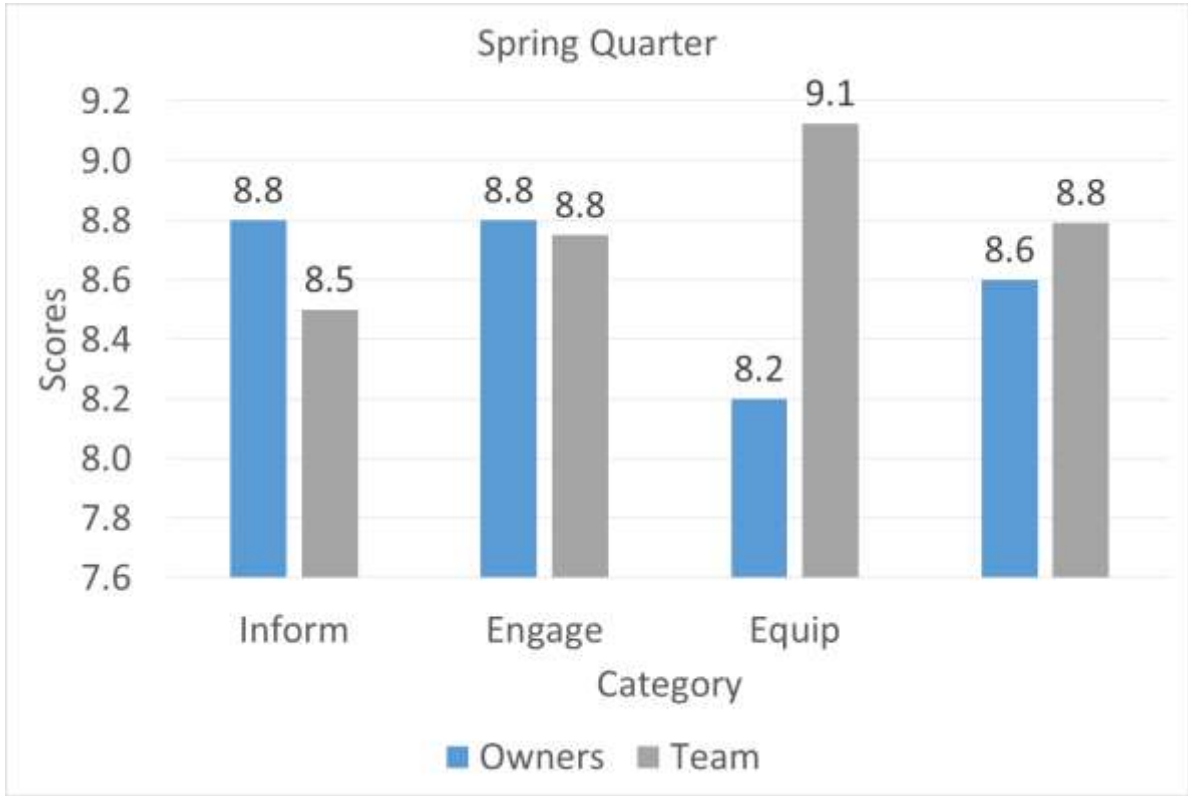
Inform Scores
19%

Engage Scores
19%

Equip Scores
24%



Winter Quarter Scores



Spring Quarter Scores

SCORES - TEAM ISLAND

Overall Scores

21%

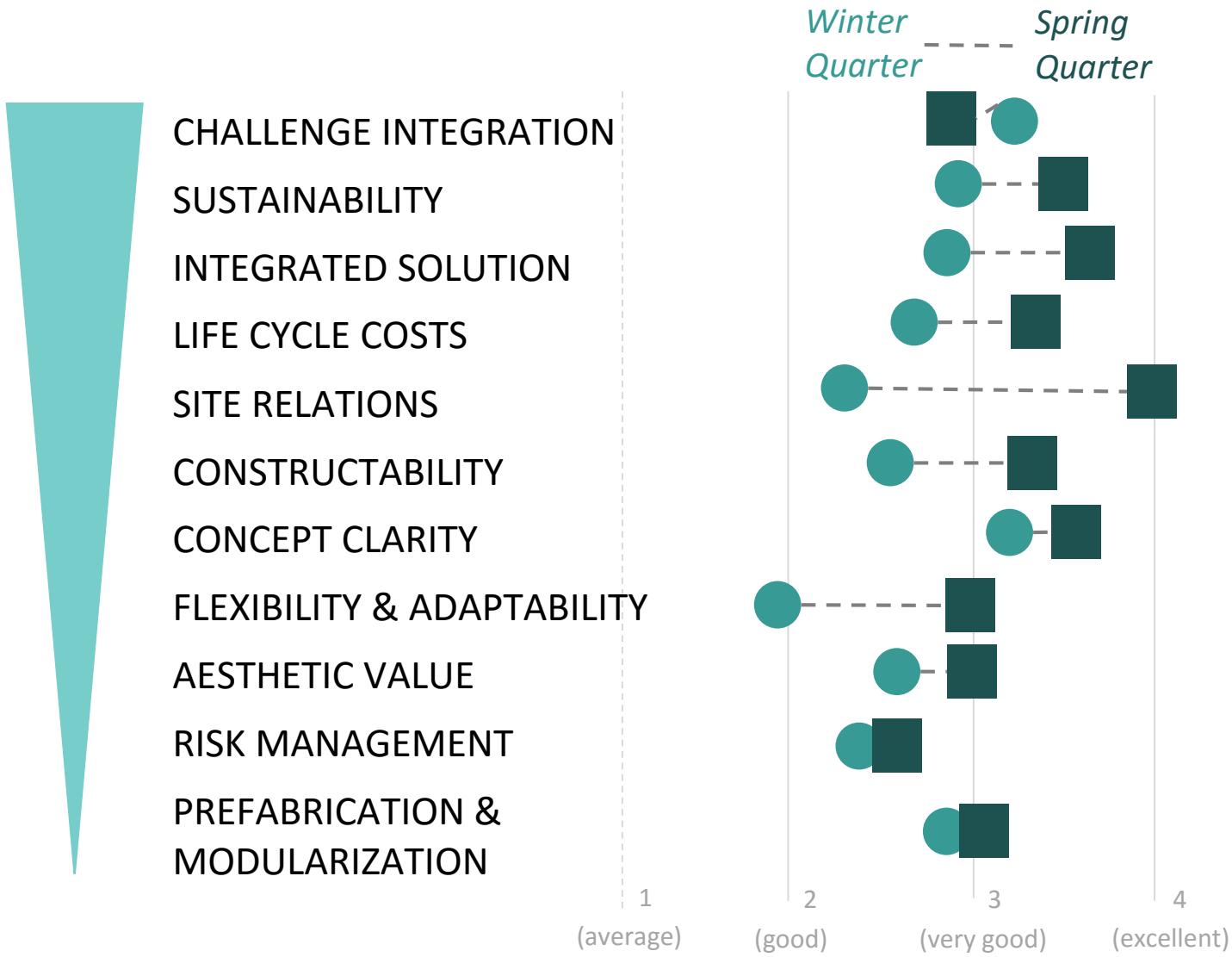
*"This site kicks a**"*

" I like the creative solutions and appreciate your effort to keep owners updates."

"The Wordpress page really improved the overall communication."

Converging Scores-Client affinity

BUILDING PERFORMANCE EVOLUTION



	Winter Quarter	Spring Quarter
Reached Points *Points*	290	330
Ratio to Max. Points *%*	72	83

Weight **Criteria** **Rating** **Total Weighted Score**

CLIENT AFFINITY - LESSONS LEARNED

Client **EASE** of communication is important

Understand client **PERSONALITY** hands-on

Information **PREFERENCES**

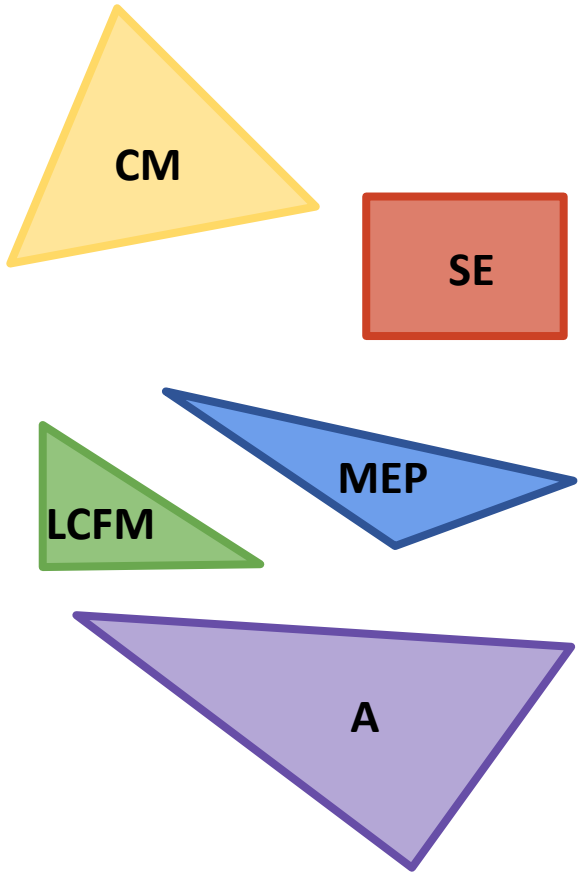
Avoid **TOO MUCH** information

LISTEN carefully

DELIVER on your promises

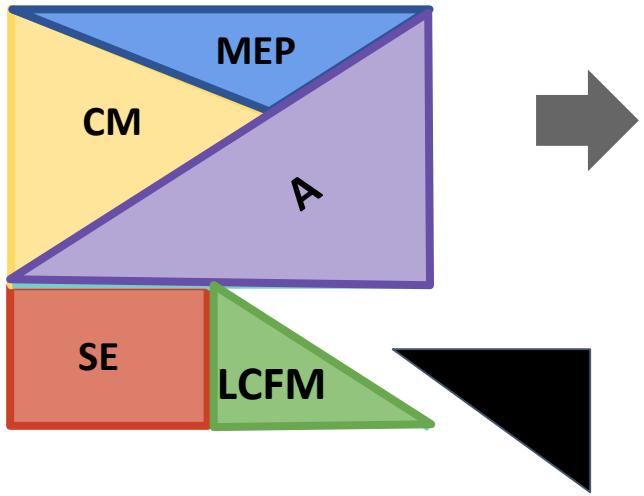
TEAM PROCESS

RECOGNIZE

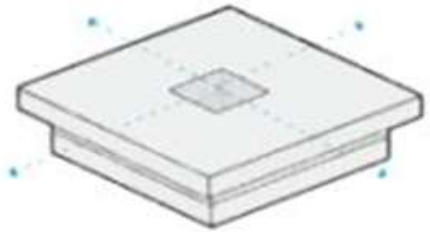


DEDICATED EFFORT

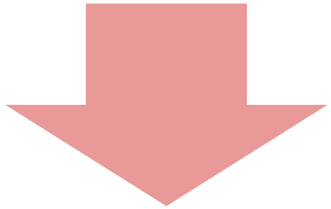
TALK
LISTEN
UNDERSTAND
LEARN
TRUST



THE 'A' TEAM



TEAM INTERACTION



TEAM COMFORT

MEETING EFFECTIVENESS

CLARITY

EXCITEMENT/MOTIVATION

TRUST

WASTAGE OF TIME

TEAM INHIBITIONS

SKEPTICISM

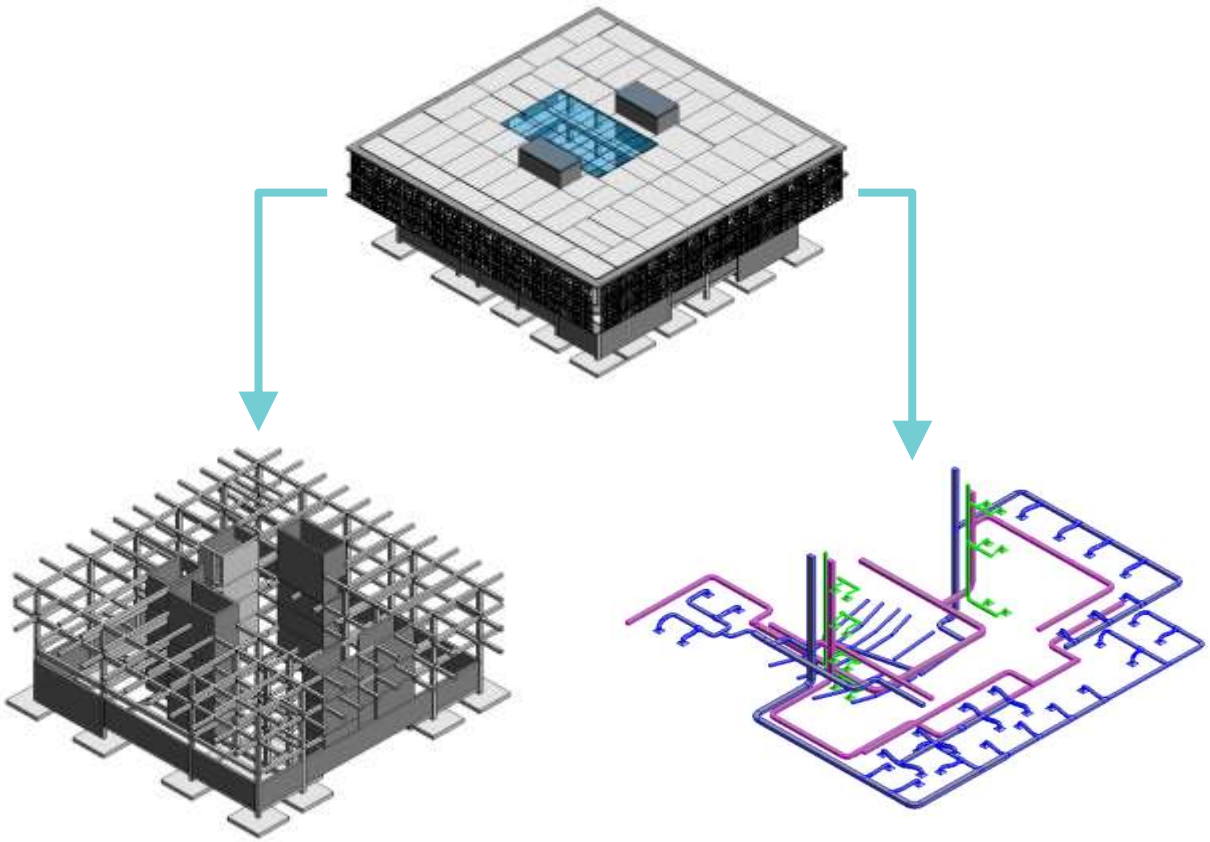
CONFUSION

LULLNESS

BIM COORDINATION

Modeling

AUTODESK® REVIT® 2016



Project Development

ETABS® 2015

DYNA MORE

ANSYS®

Climate Consultant 5

eQUEST

BIM INTERACTION

Clash Avoidance

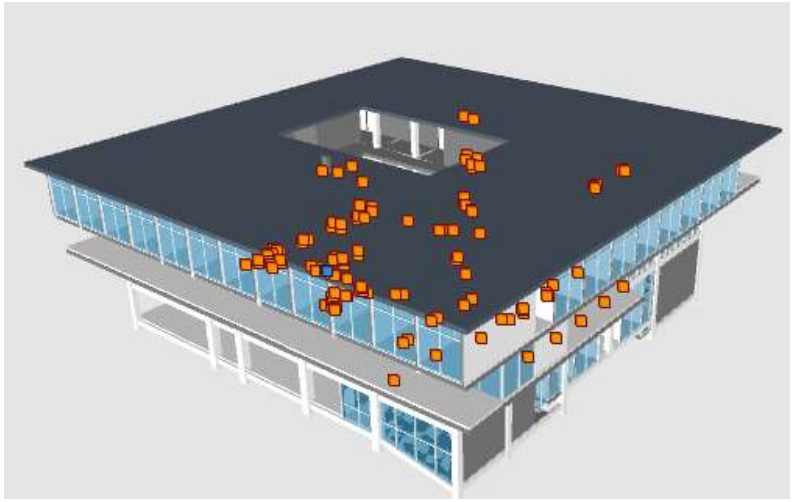
AUTODESK® REVIT® 2016

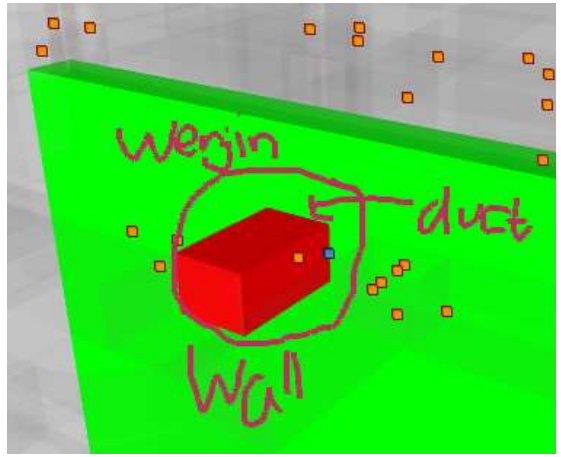
Clash Detection

360 GLUE

Coordination

360 GLUE





SUMMARY CLIENT AFFINITY CHALLENGE

- Aligning **Goals** and Converging **Scores**
- Interactive **Wordpress Blog**- Ease of Client
- **Dialogue** Established with Comment Threads
- **Surveys** to Collect Feedback
- **Customized** Information Delivery

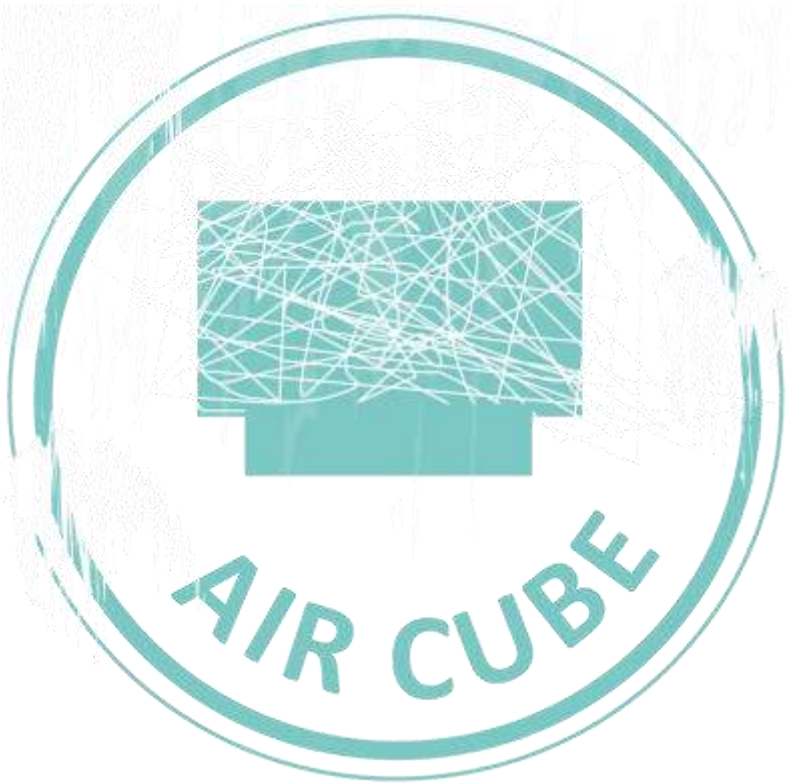
SUMMARY AIR QUALITY CHALLENGE

- **Clean** Construction - Billboard at Construction Site
- **Local** Material
- **Green** Walls
- **Sensors** Placed Strategically to Collect Data
- **Attract, Inform and Educate** Users & Visitors!

SPECIAL THANKS TO

MENTORS

Humberto Cavallin
John Nelson
Glenn Katz
David Bentlett
Björn Wündsch
Norayr Badasyan
Elizabeth Joyce
Dorian Curcanu
Ronnie Piil Haagensen
Eric Borchers
Greg Luth
and many others...



OWNERS

Jure Česnik
Christopher Görsch
Luke Lombardi
Mike Miller
Bianca Morell
Sarah Saxon

PBL TEAM

Renate Fruchter
Flavia Grey
Maria Frank

Tak! *Danke!* धन्यवाद!

Thank you! 谢谢！ ***Gracias!***

LESSONS LEARNED

Remember to take a step back.

Hello from the other side.

You can’t do it alone.

Make things to work not to win.

It is a process to discover true passion.

What is of the most value becomes more clear.

Every problem can be solved by talking to your team members.