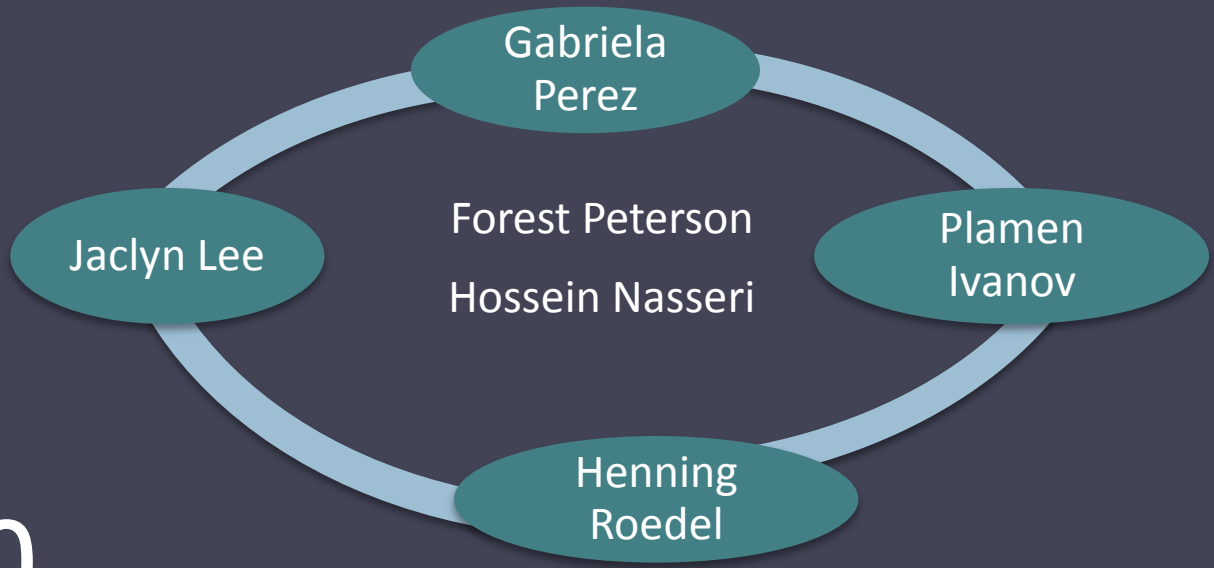
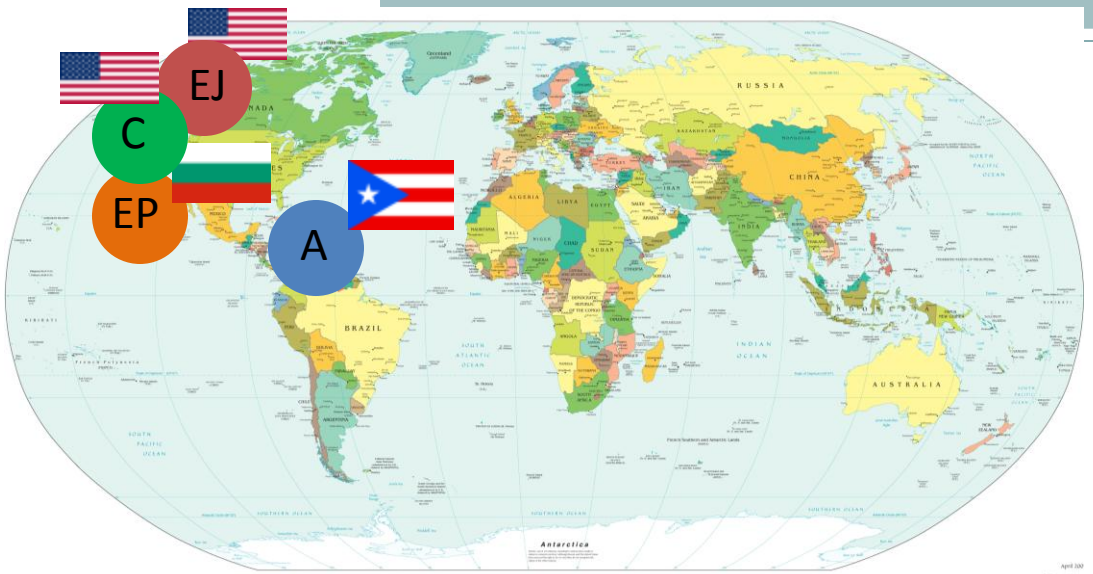


Ridge 2010

Spring Presentation



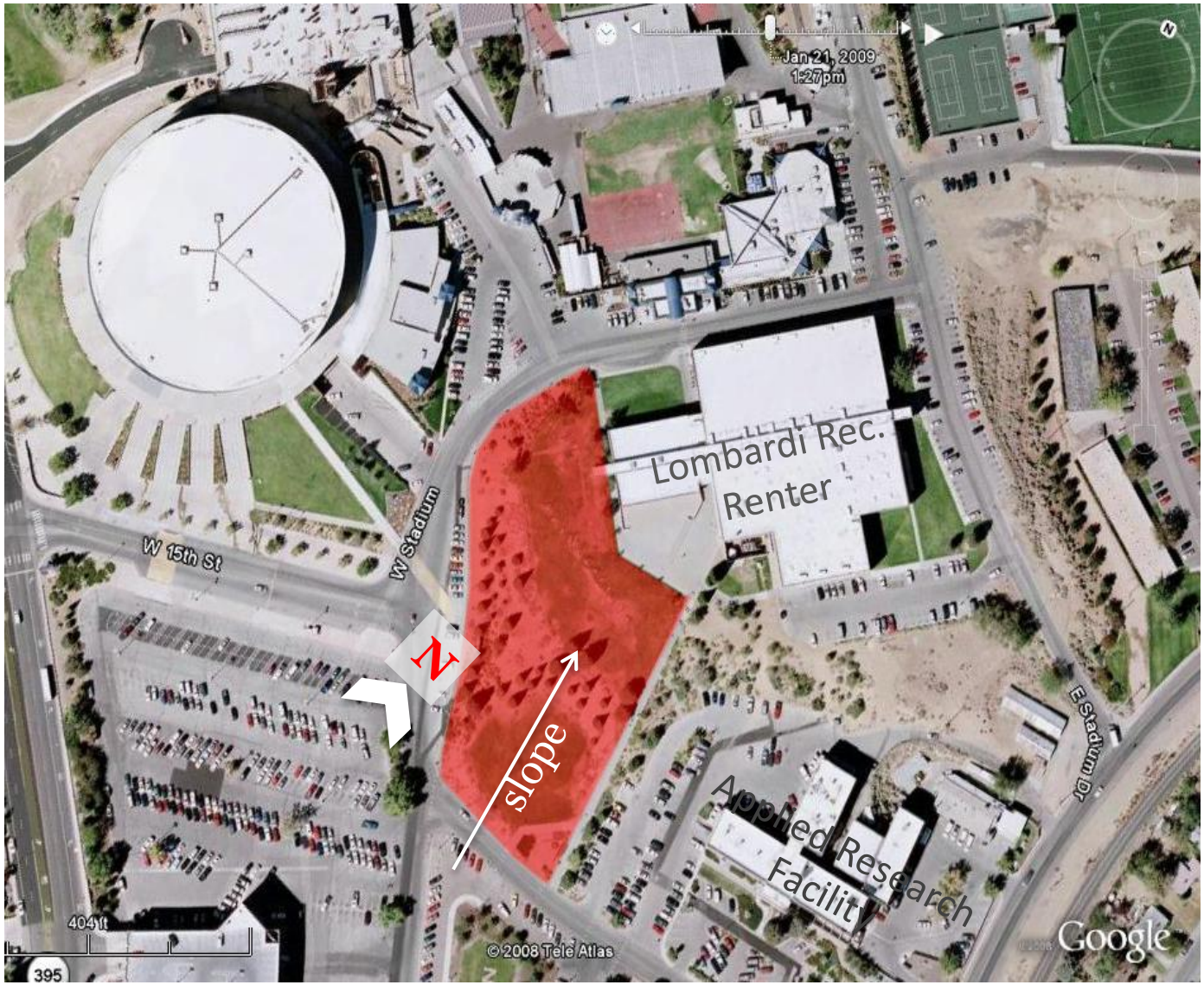
Site – University of Nevada, Reno

Challenges

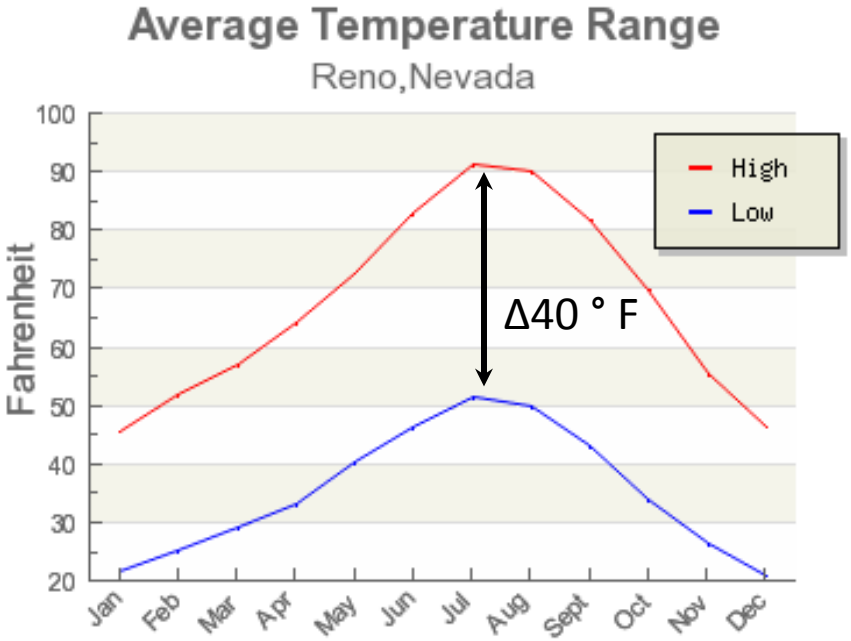
- Earthquakes
- Gusts ~70mph
- Temperature Δ40 ° F
- Cacti
- Slope 0’ – 42’

Advantages

- Location
- Views
- Solar Energy

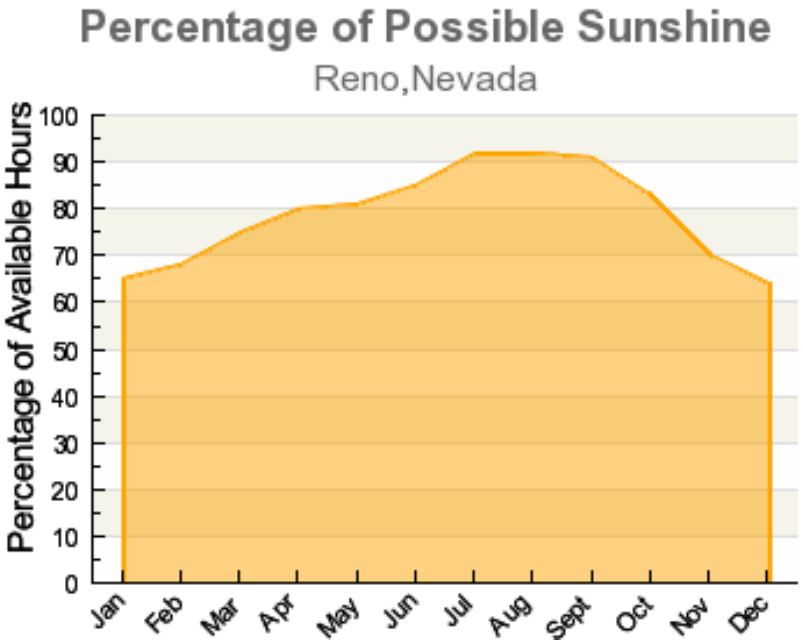


Site – Climate Considerations



Temperatures (average):

20° December: coldest
91.2° July: warmest



Days Distribution (average):

158 - Clear Days
93 - Partly Cloudy Days
114 - Cloudy Days
79% - Sunny
60% - Humidity

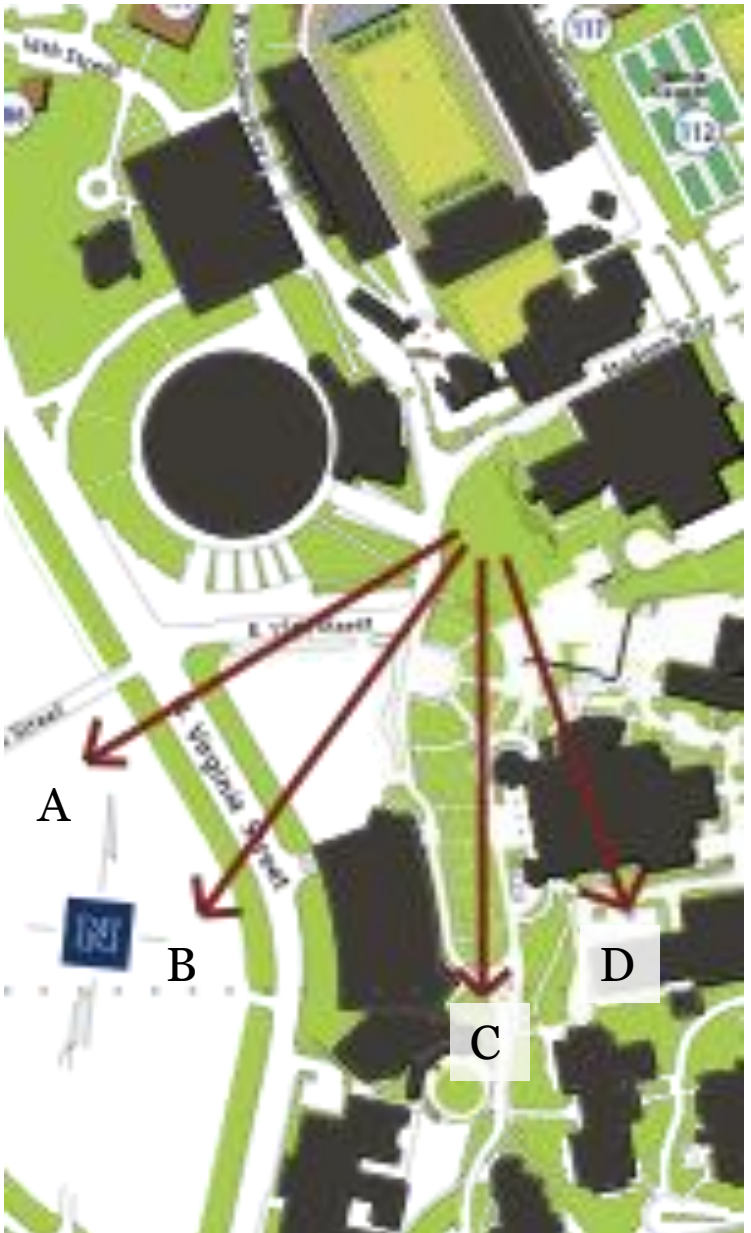
Views- University of Nevada, Reno

A

B

C

D

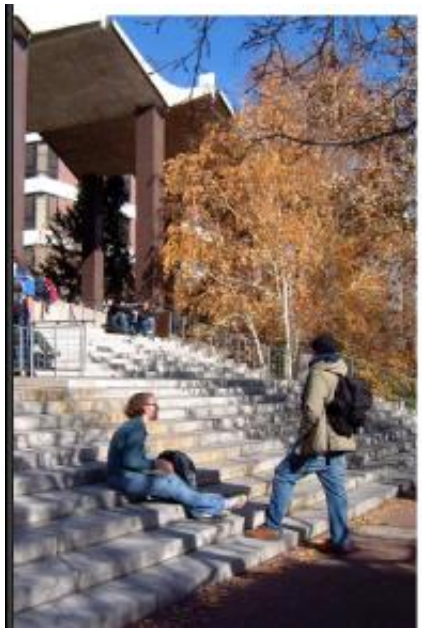


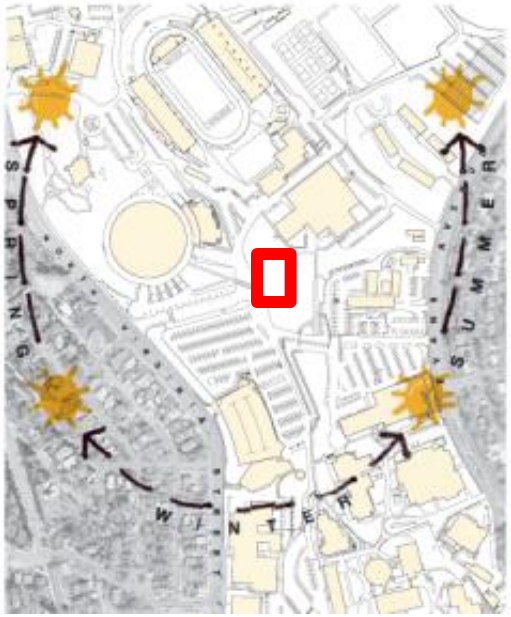
Site- Campus Considerations

2-9 Solar Orientation

Public building entrances will need to maximize their orientation to the south and southwest to facilitate year-round use.

The existing library steps serve as a prime example of orienting and designing access to serve as informal seating, thus encouraging campus community interaction





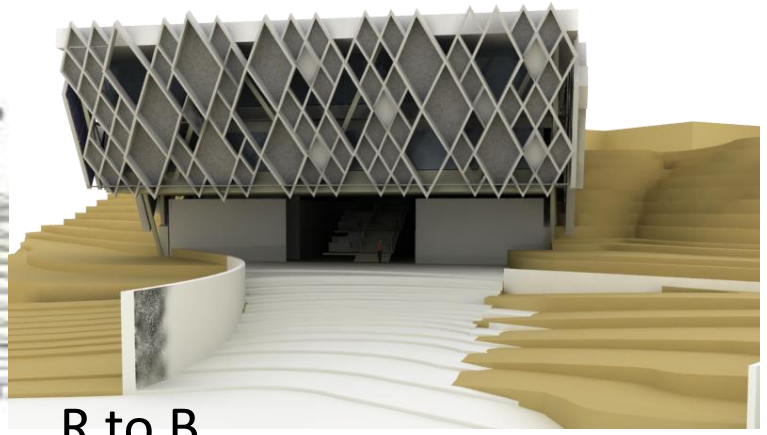
2-8 Informal Seating

Accessways, stairs, and other site features can provide informal seating areas and places of interaction.

Site Connectivity: Campus Considerations

- Pedestrian Circulation
- Vehicular Circulation

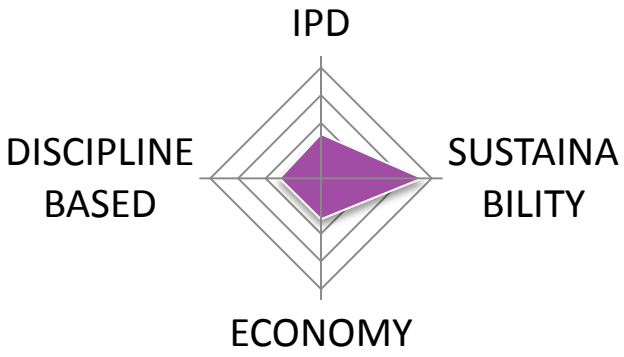
Decision Matrix



Pixel R to B

	Steel	Concrete	Steel	Dual
IPD	1	1	3	2
SUSTAINABILITY				
Natural Lighting	2	2	1	1
Campus Connectivity	0	0	3	3
Quality of Indoor Space	1	1	2	2
Creating Sustainability Awareness	1	1	2	2
ECONOMY				
Opportunity for Prefabrication	2	-1	2	1
Efficiency of Structural System	1	0	2	3
DISCIPLINE BASED				
Innovativeness of Structural Solution	0	0	3	1

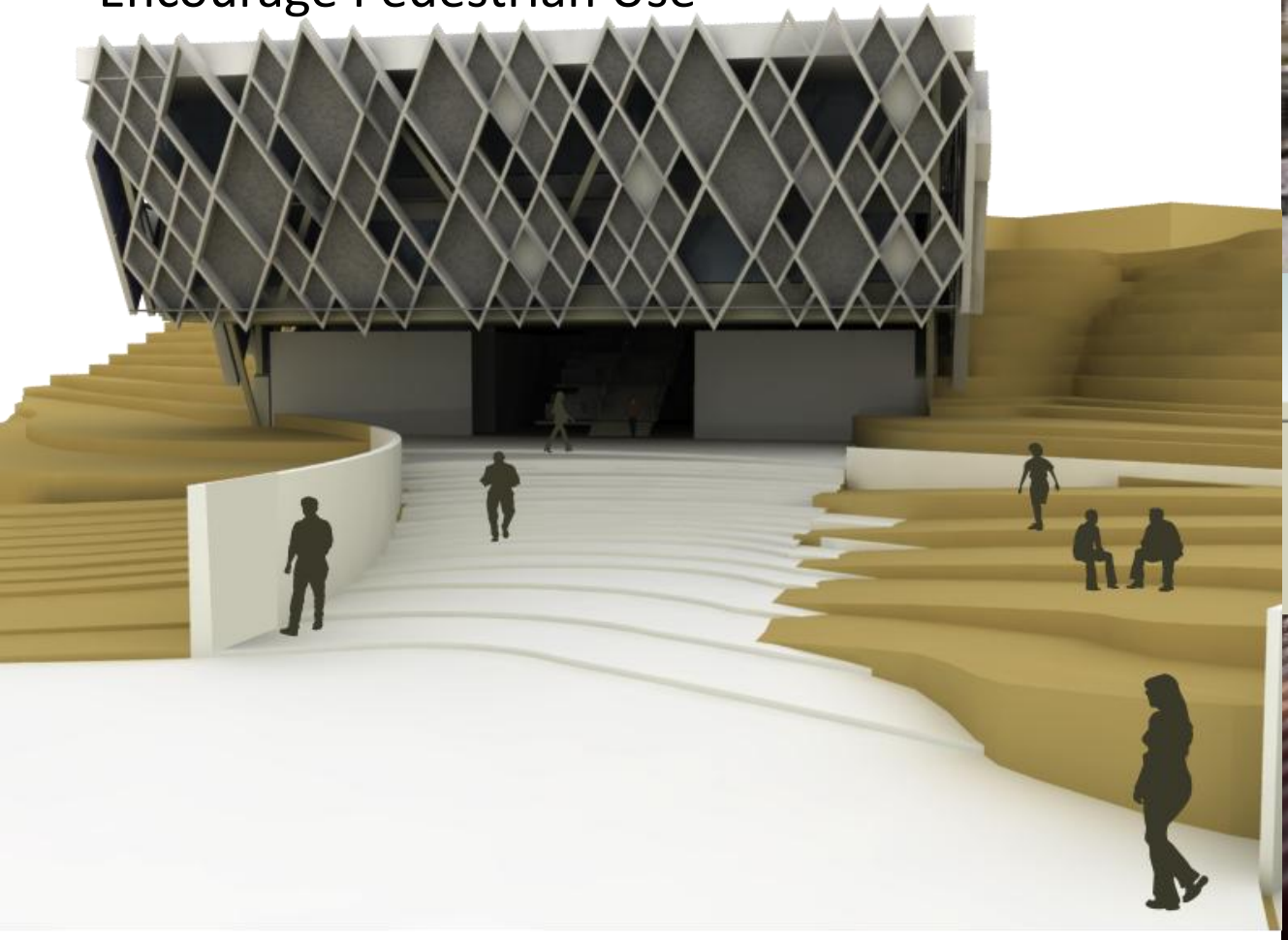
R2B A

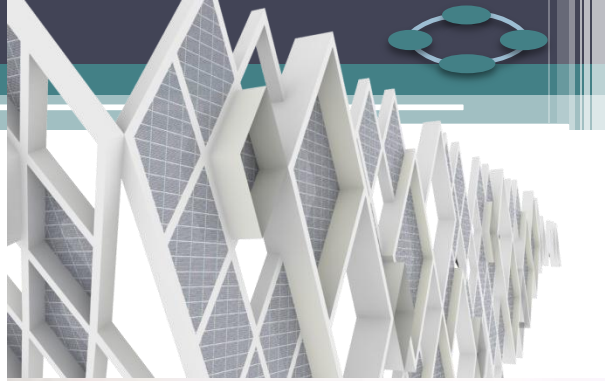


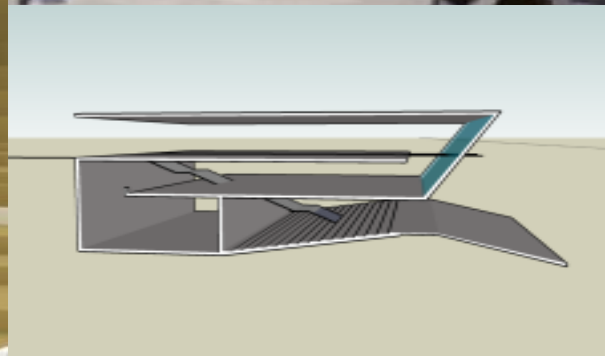
“Ridge” to Bridge

Goals:

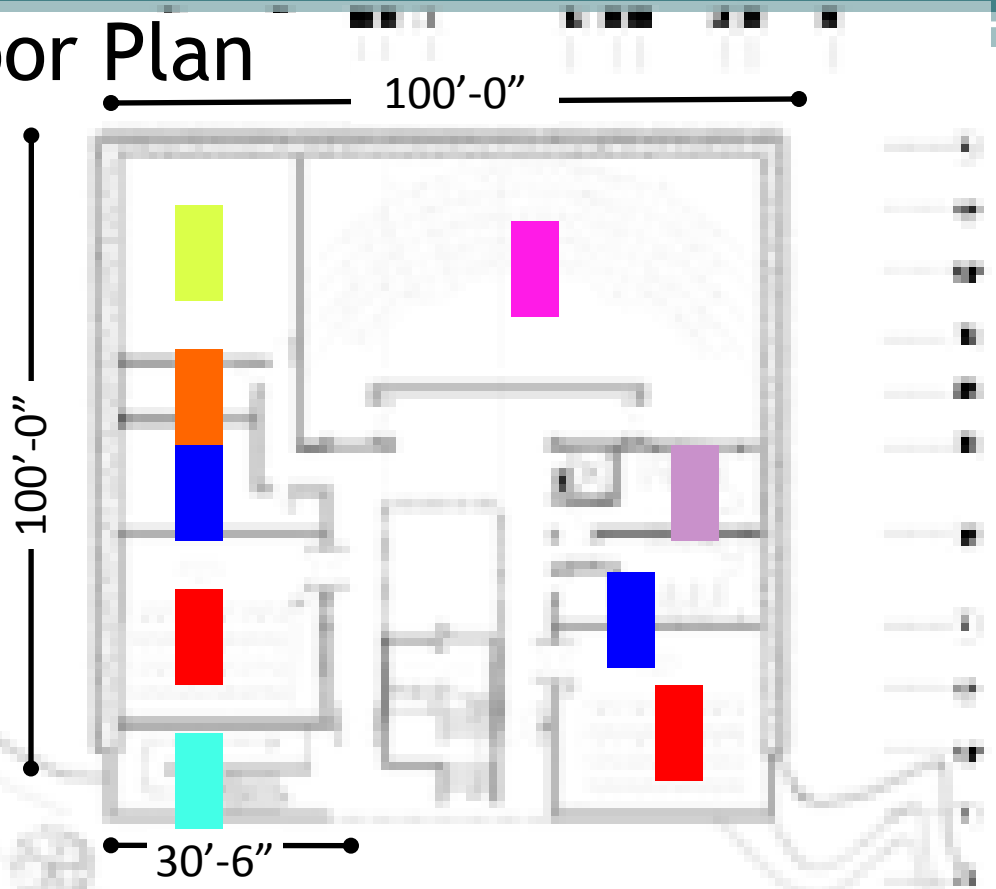
- Campus Connectivity
- Daylight Interaction
- Encourage Pedestrian Use







Floor Plan



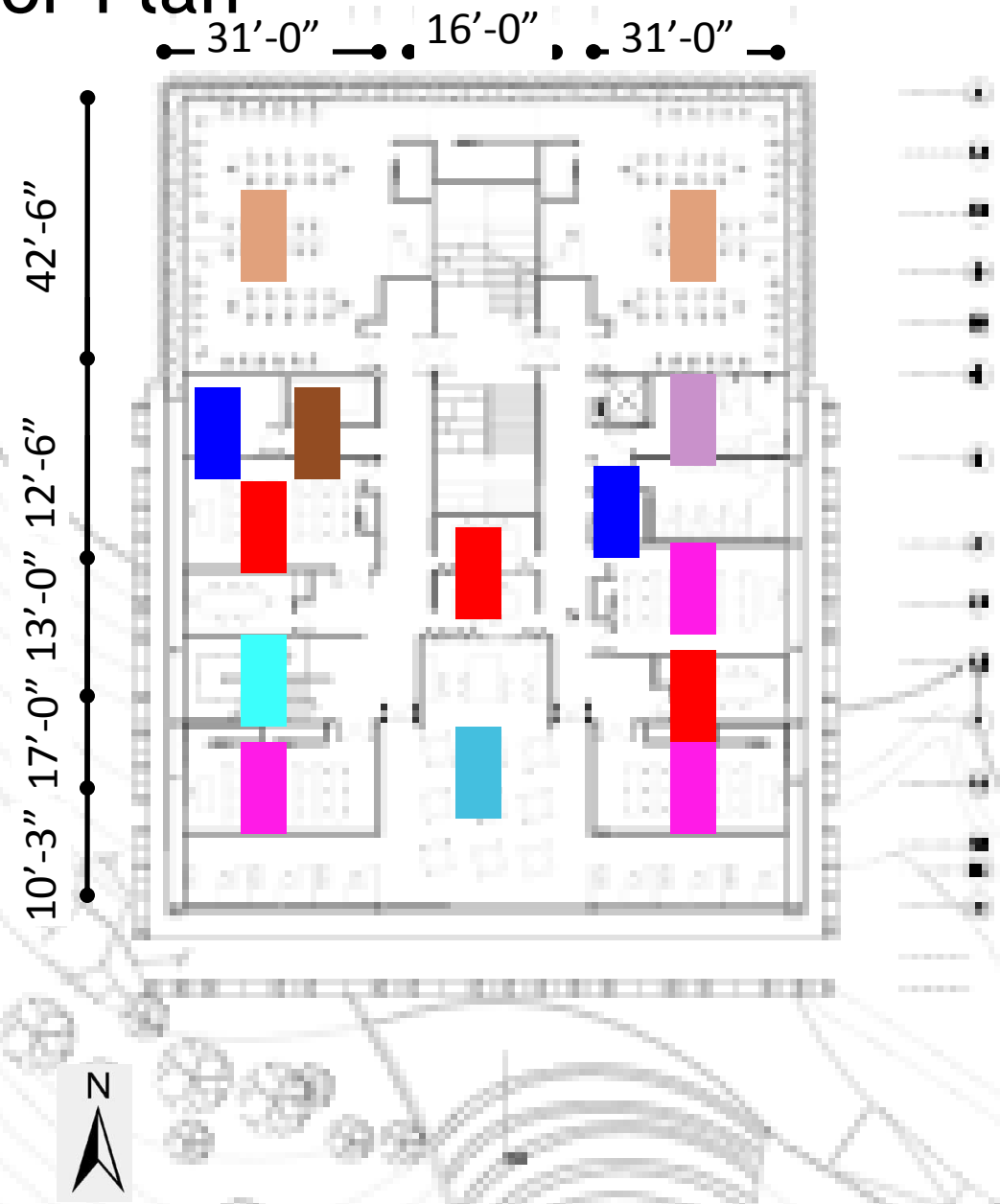
Floor 1

Level: -30’-0”

Height: 16’-0”

- Bathrooms
- MEP
- Storage
- Large Classrooms
- Auditorium
- Vertical Cores
- Server Room

Floor Plan



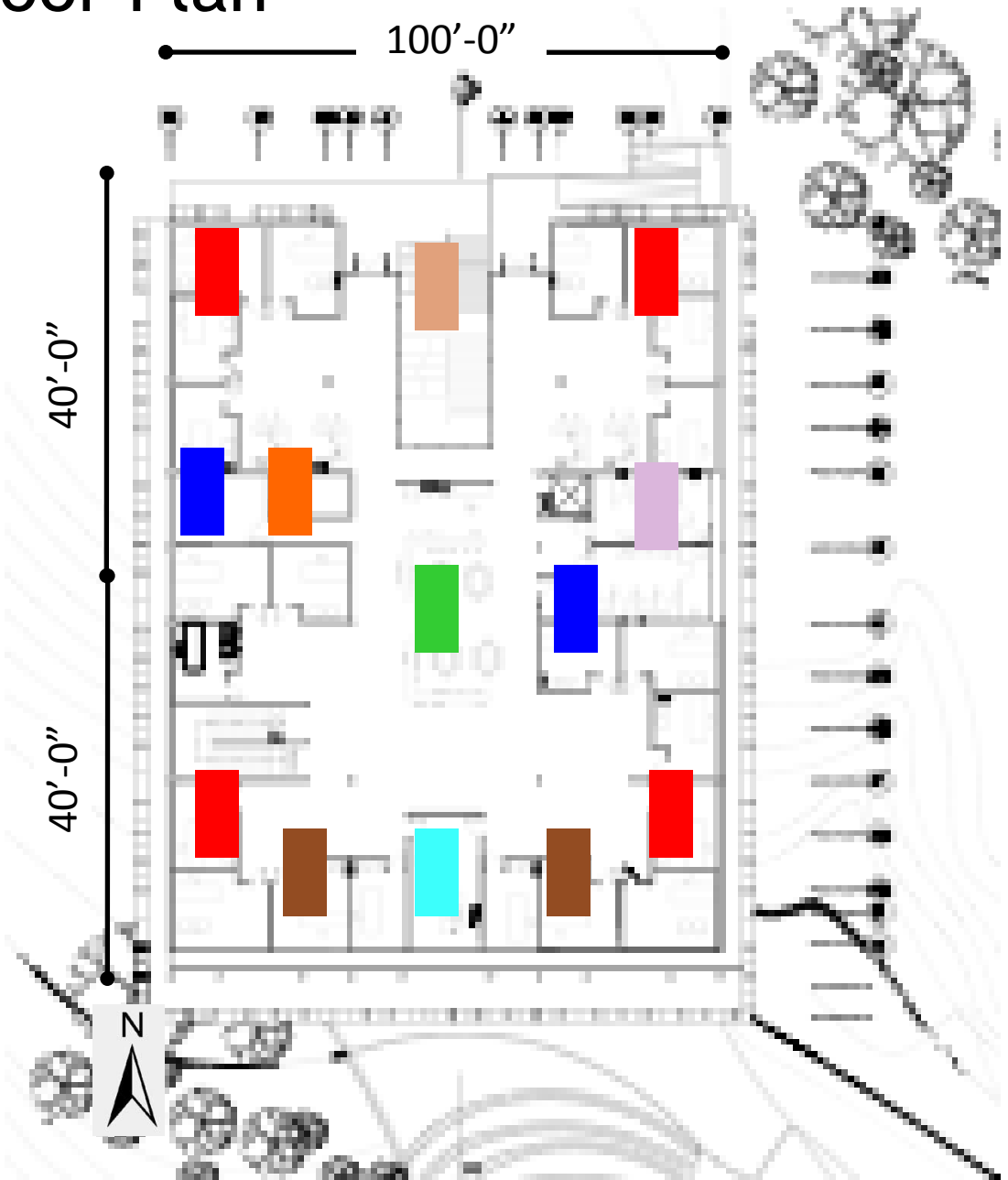
Floor 2

Level: -10’-0”

Height: 12’-0”

- Bathroom
- MEP
- Storage
- Interaction Areas
- Seminar Rooms
- Small Classrooms
- Vertical Cores
- Instructional Labs
- Student Office Area
- Tech Support

Floor Plan

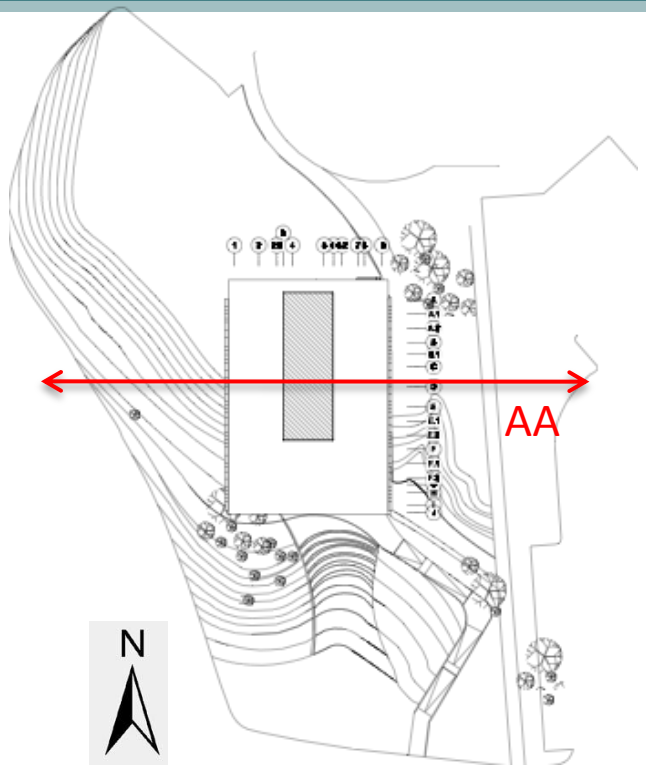


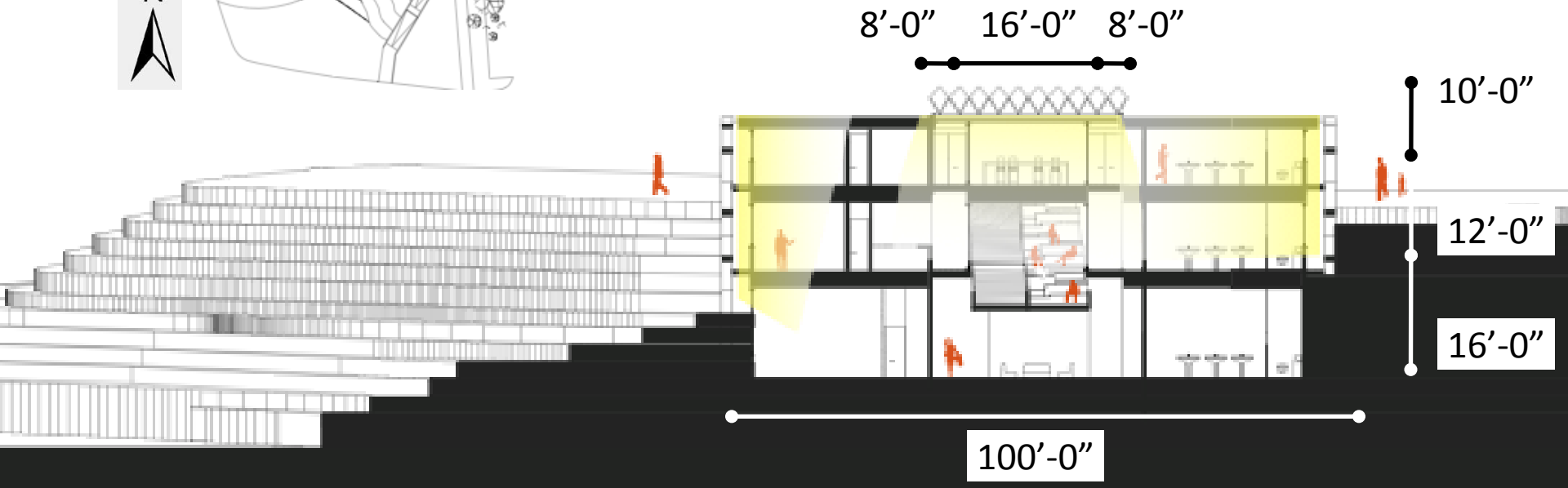
Floor 3

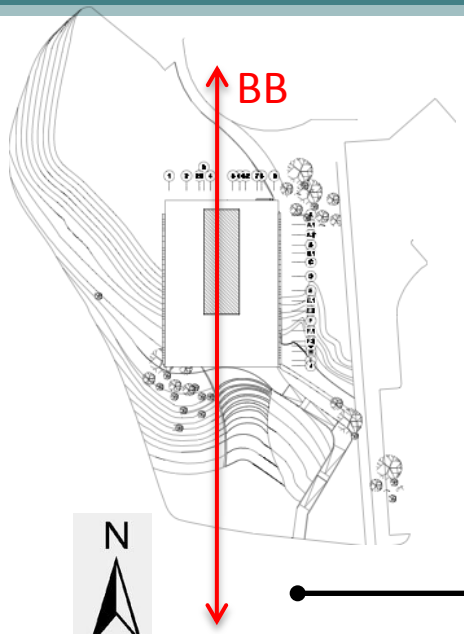
Level: 0’-0”
Height: 10’-0”

- Bathroom
- MEP
- Storage
- Faculty Offices
- Interaction/Lounge Areas
- Vertical Cores
- Department Chair Office
- Senior Administrative Assistants

Section AA







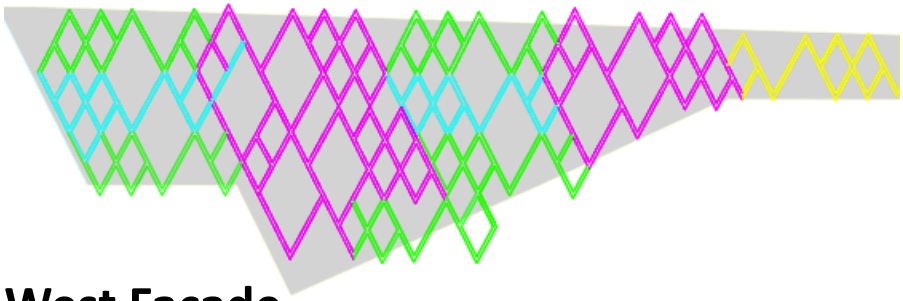
Section BB

142’-0”

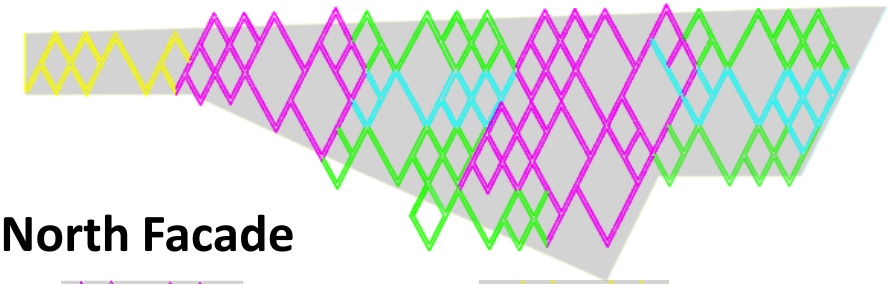
32’-2”

Façade Module Distribution

East Facade

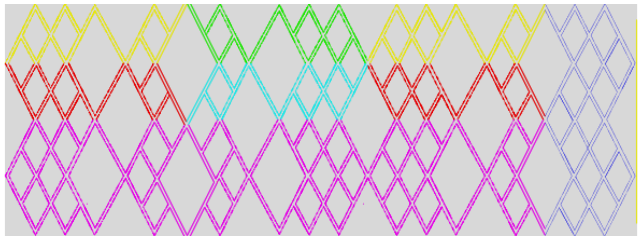


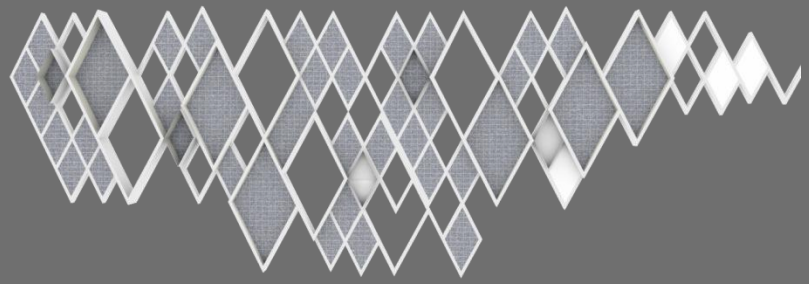
West Facade

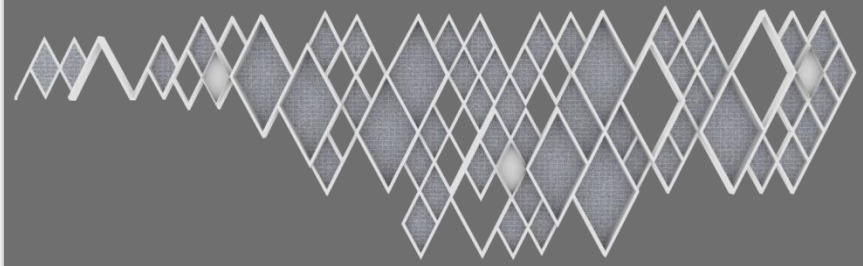


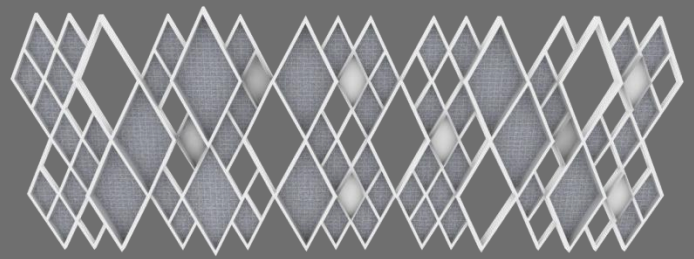
North Facade

South Facade

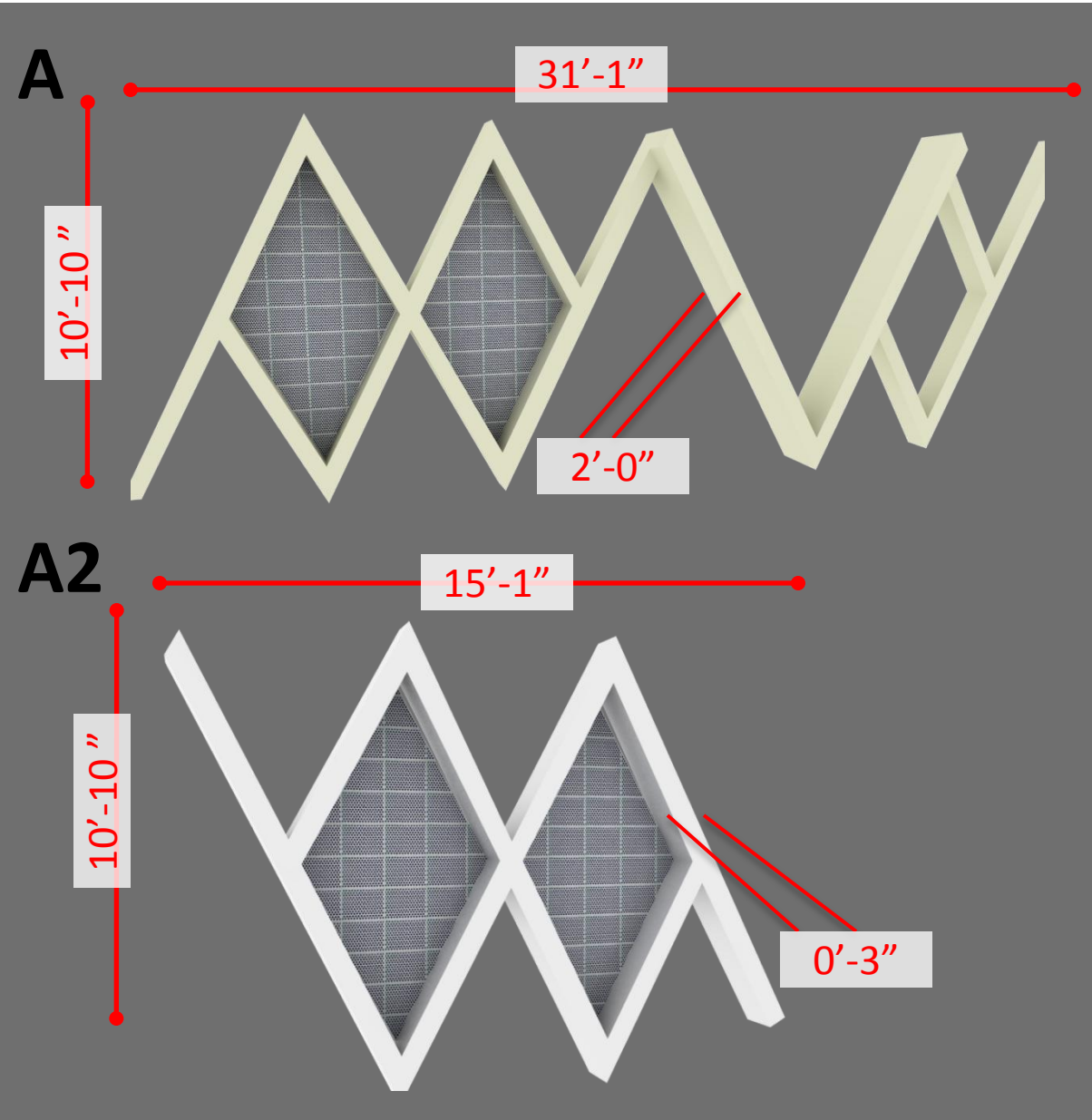








Façade Module Distribution



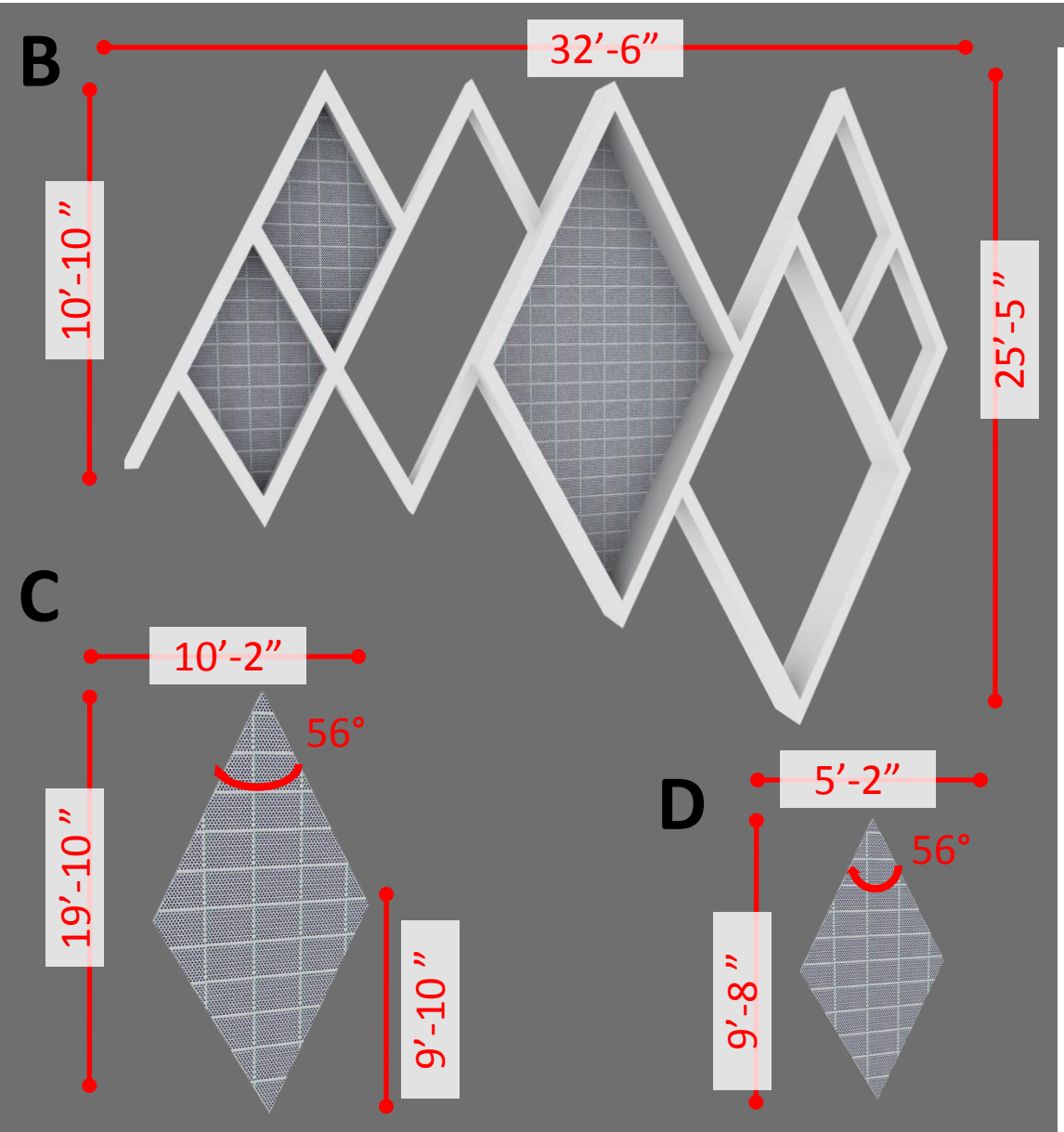
Module A
Material: Aluminum prefab.

East and West facade	16
North Façade	2
South Façade	12

Module A2
Material: Aluminum prefab.

East and West facade	0
North Façade	0
South Façade	4

Façade Module Distribution



Module B

Material: Aluminum prefab.

East and West facade	3
North Façade	0
South Façade	0

Module C

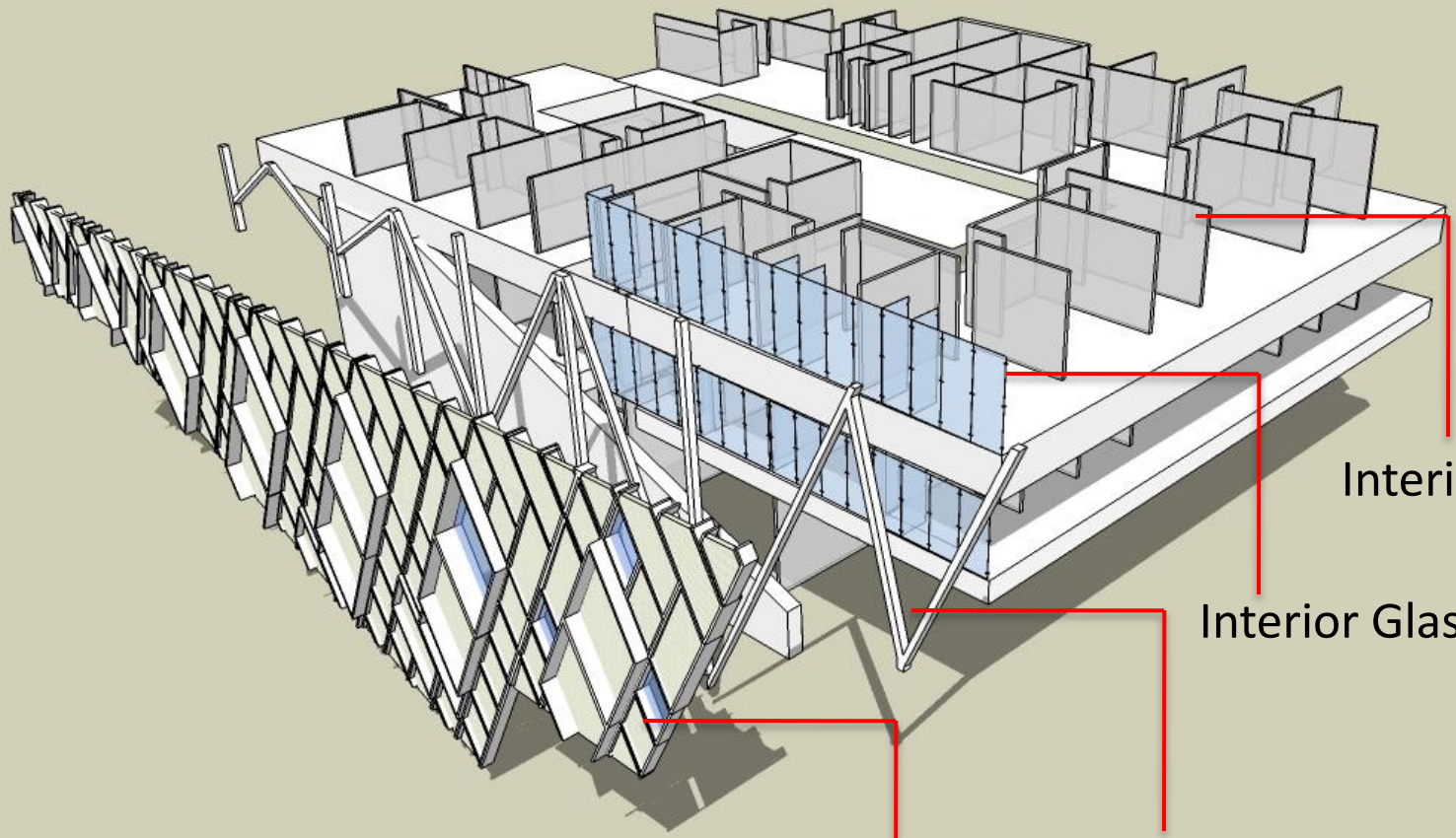
Material: perforated metal, brushed stainless steel; 1/8"radius circular openings; 1.5mm

East and West facade	39, 48
North Façade	6
South Façade	56

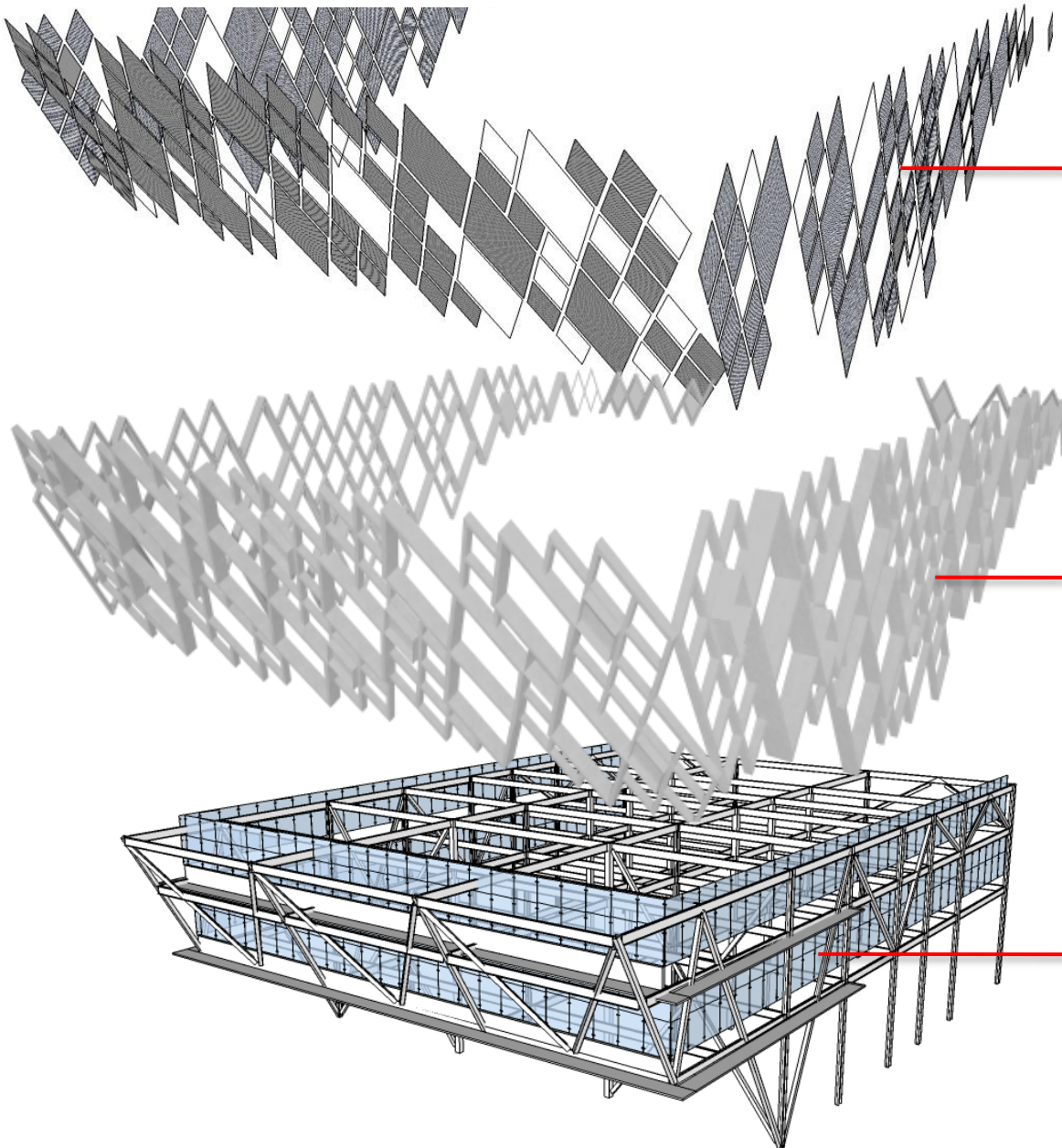
Module D

East and West facade	6, 8
North Façade	0
South Façade	9

Façade Integration



Façade Integration



Fill in panels:
Perforated metal panels

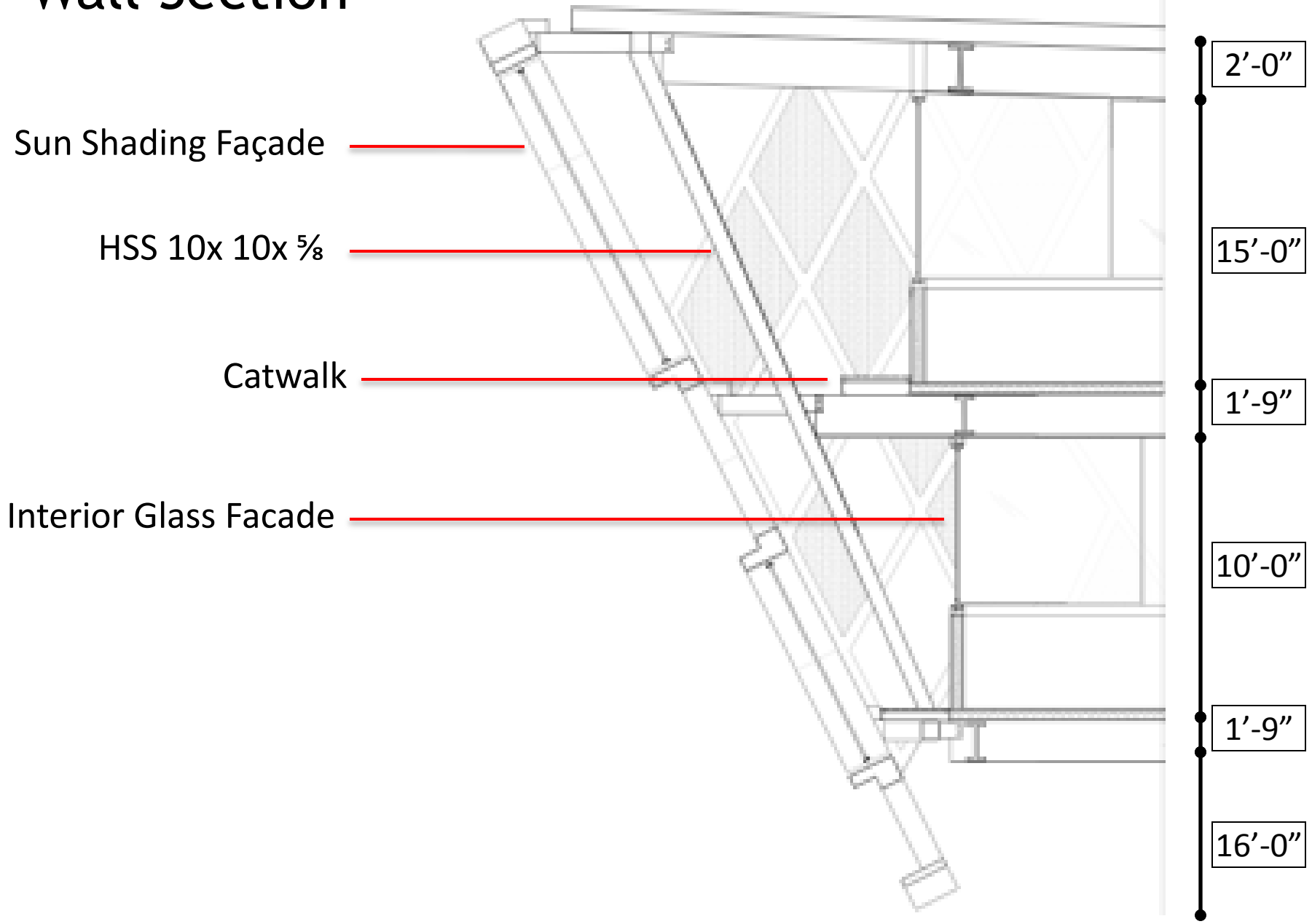
Sun Shading Façade:
Aluminum Modules

Interior Glass Facade

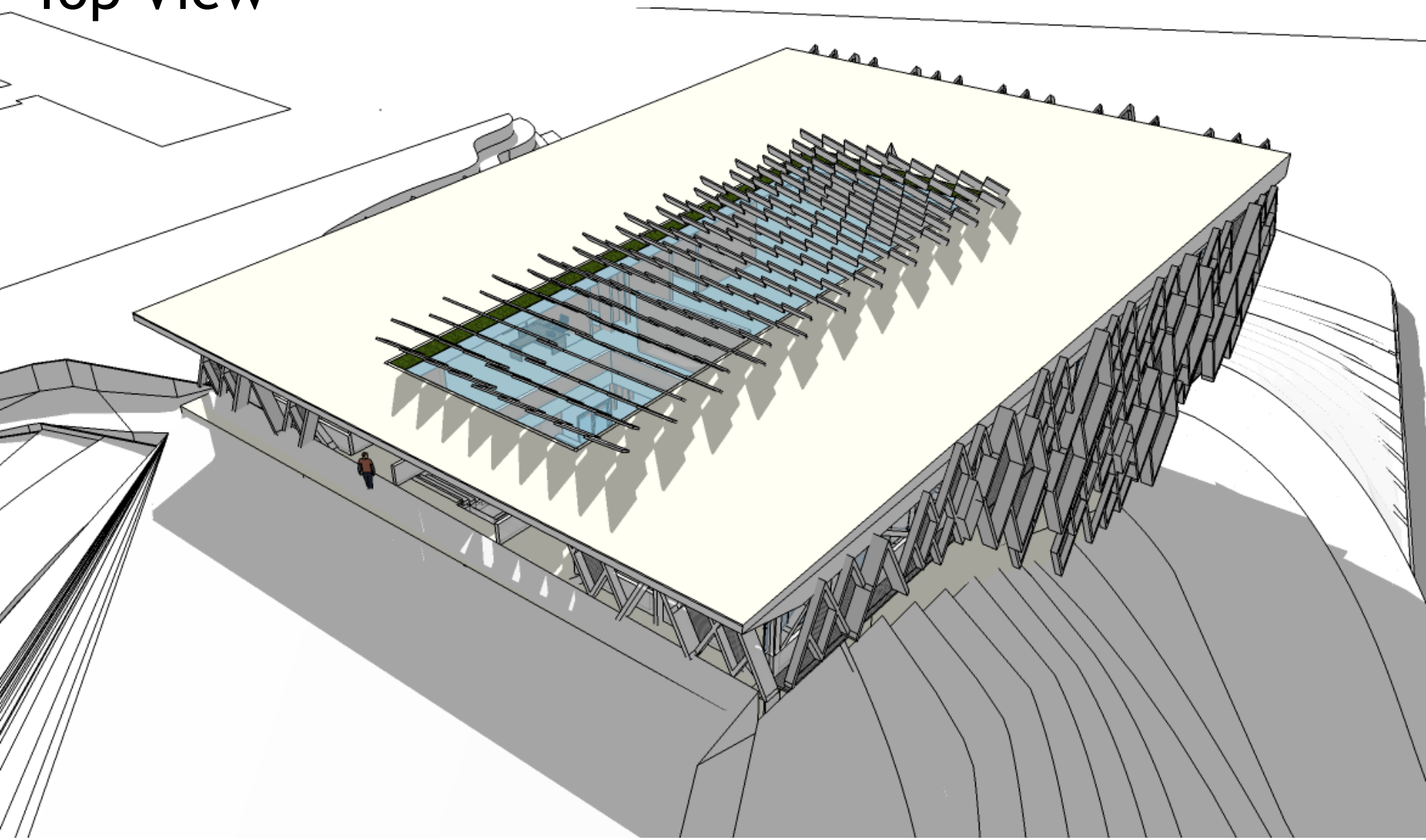
Main Structural Elements

Catwalk

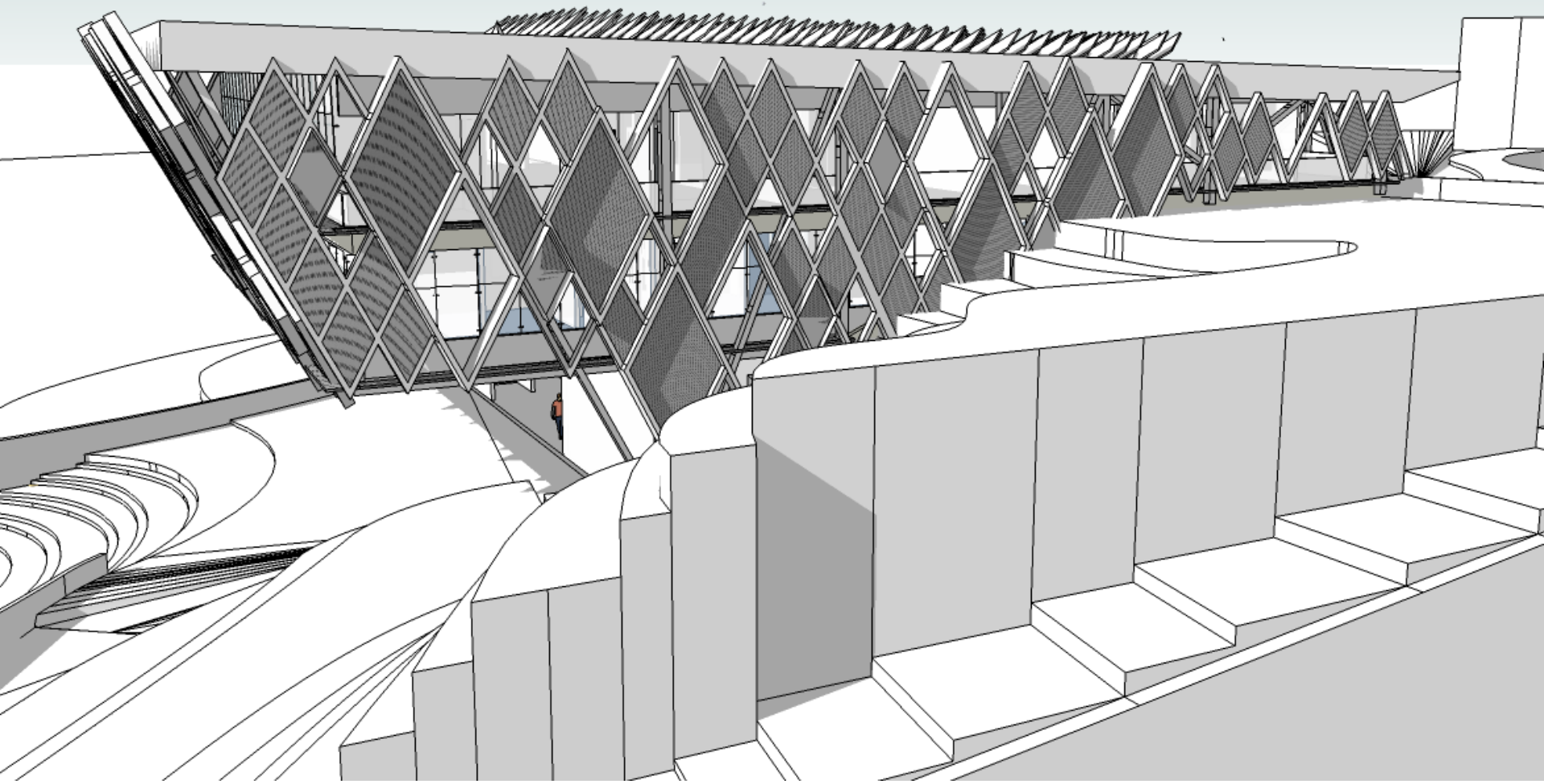
Wall Section



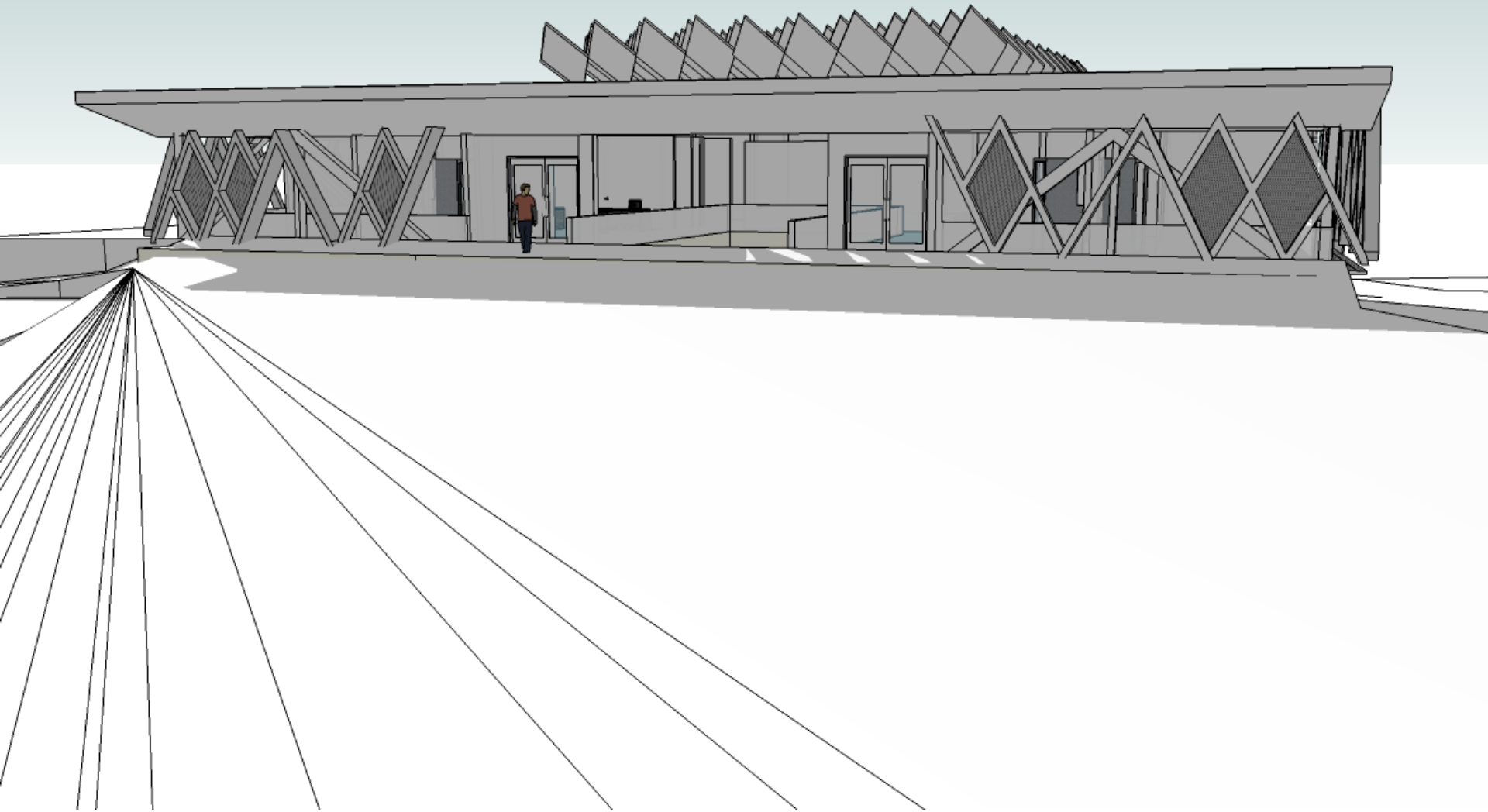
Top View



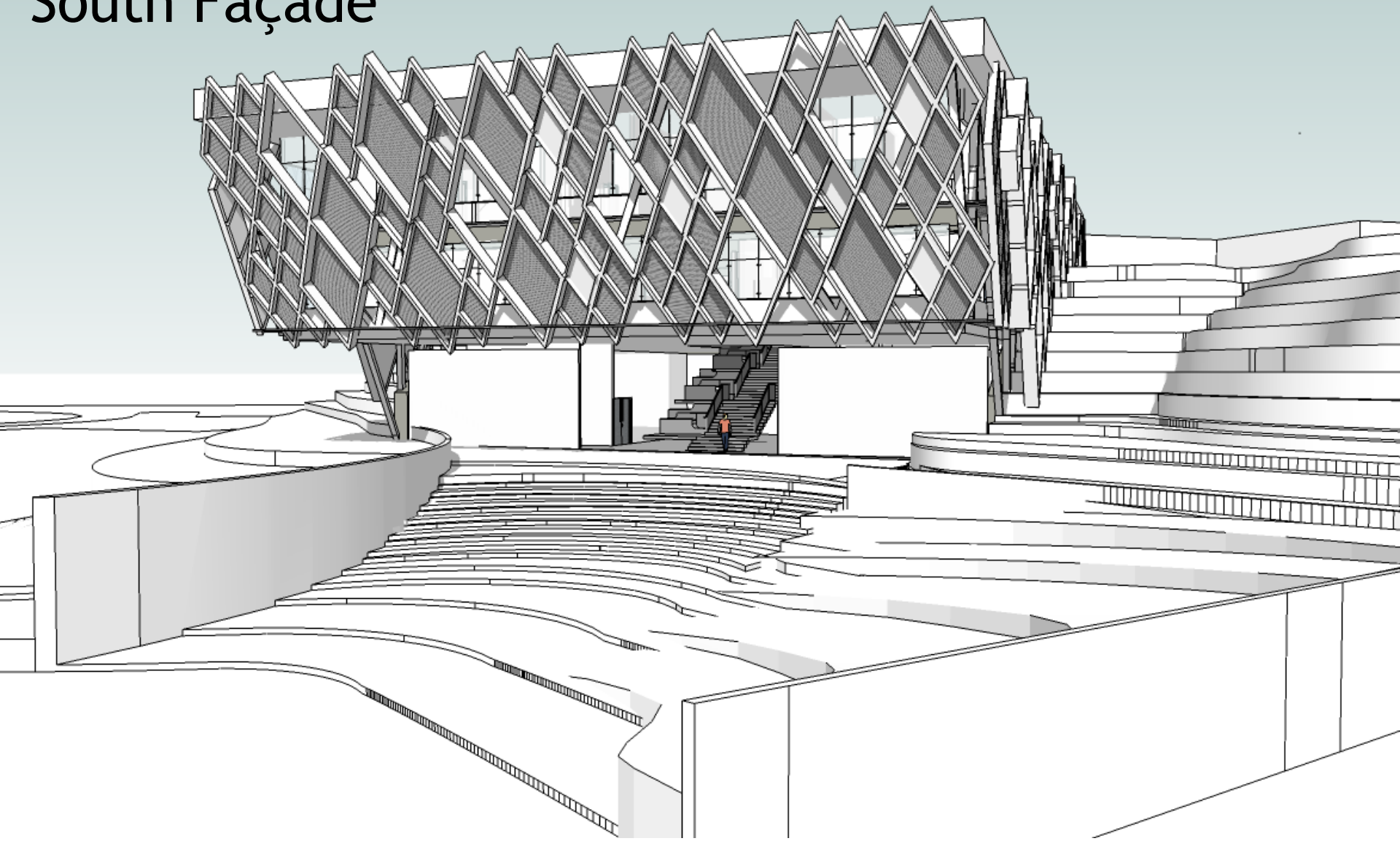
East Façade



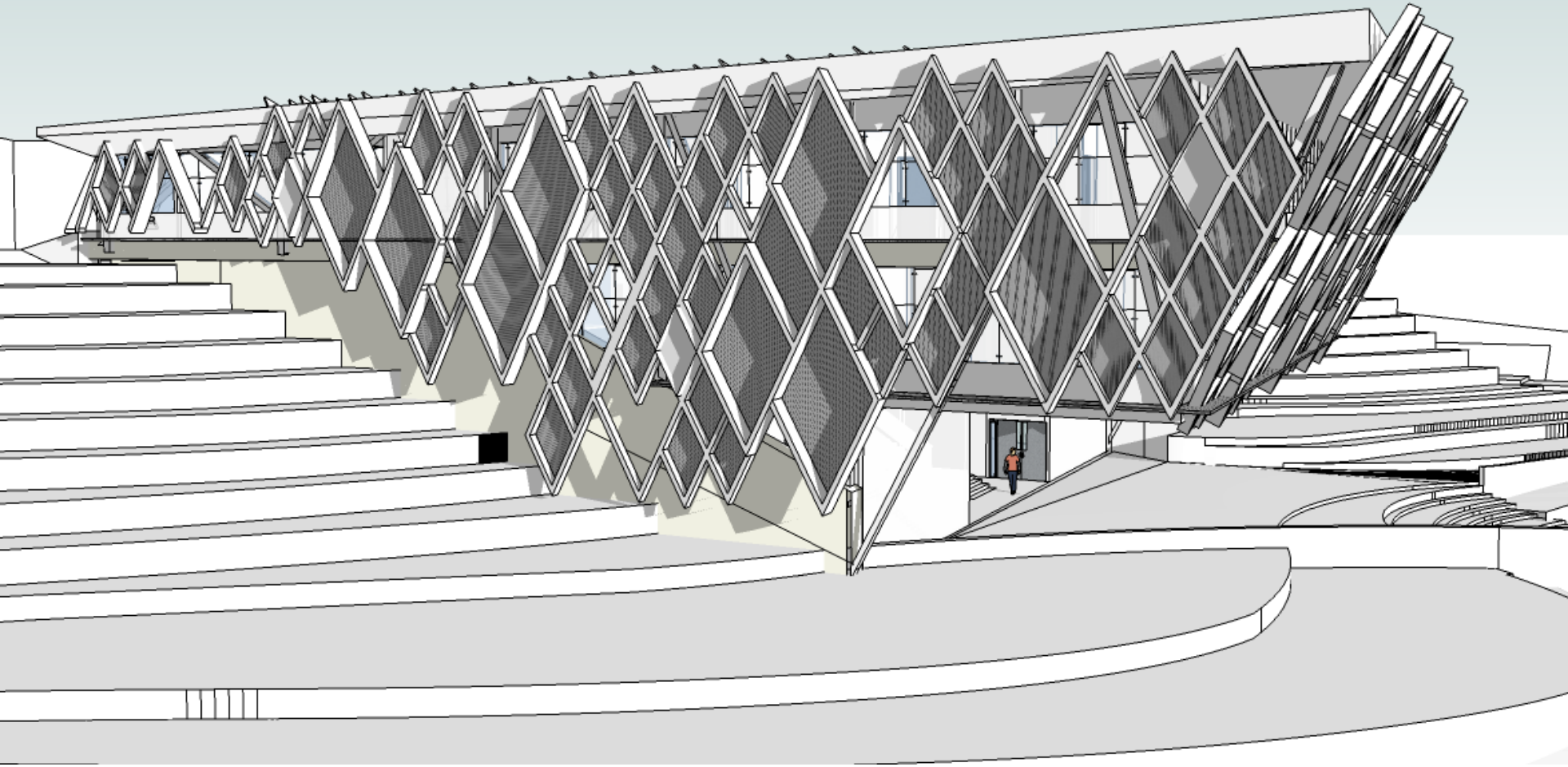
North Façade



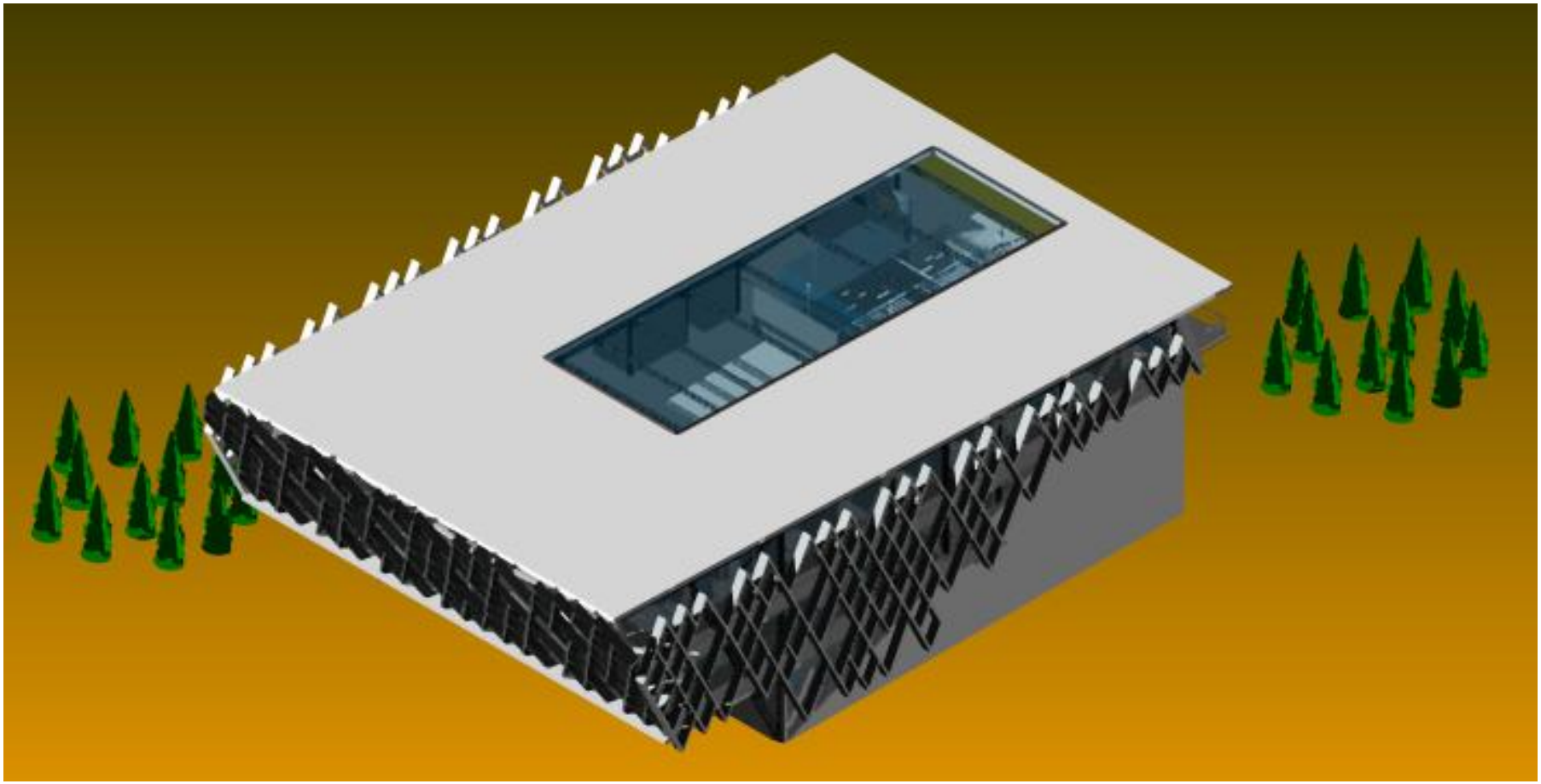
South Façade



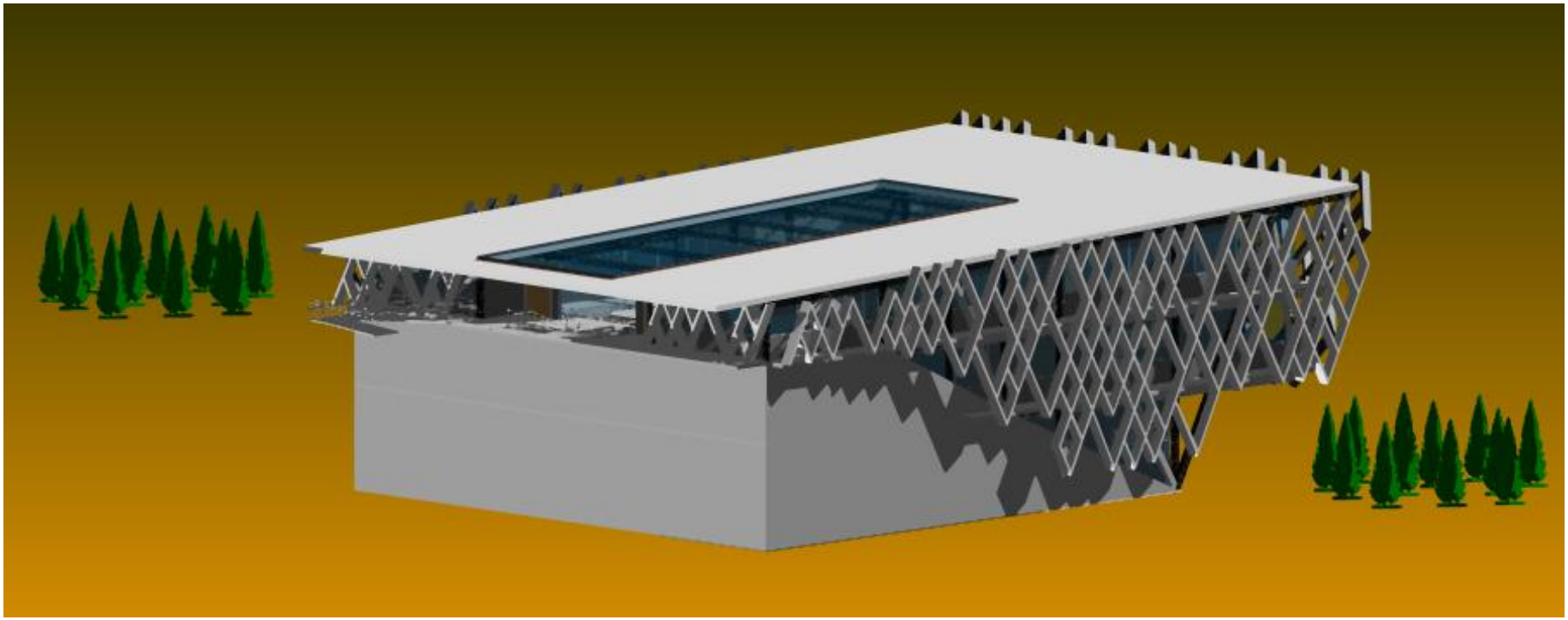
West Façade



South-East



North-West



Student Interaction Areas

Student Interaction Areas

North Entrance

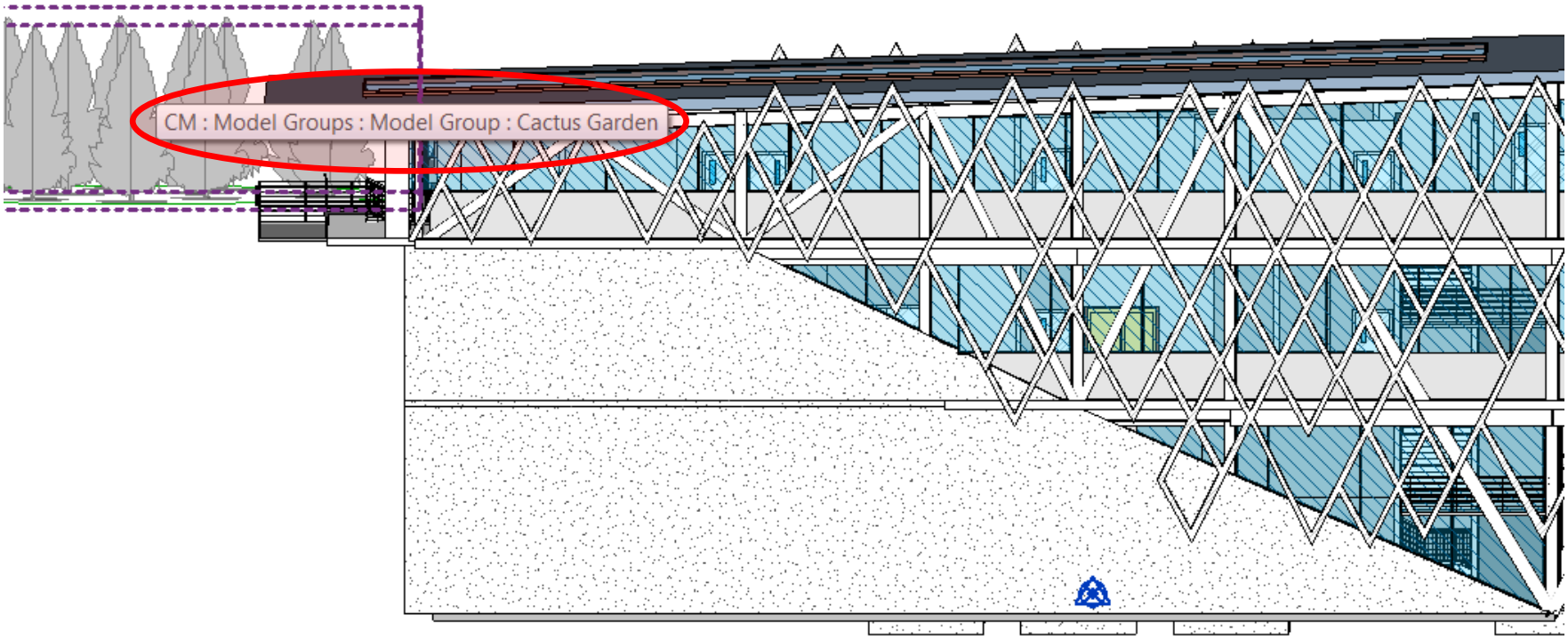
Catwalk

South Entrance

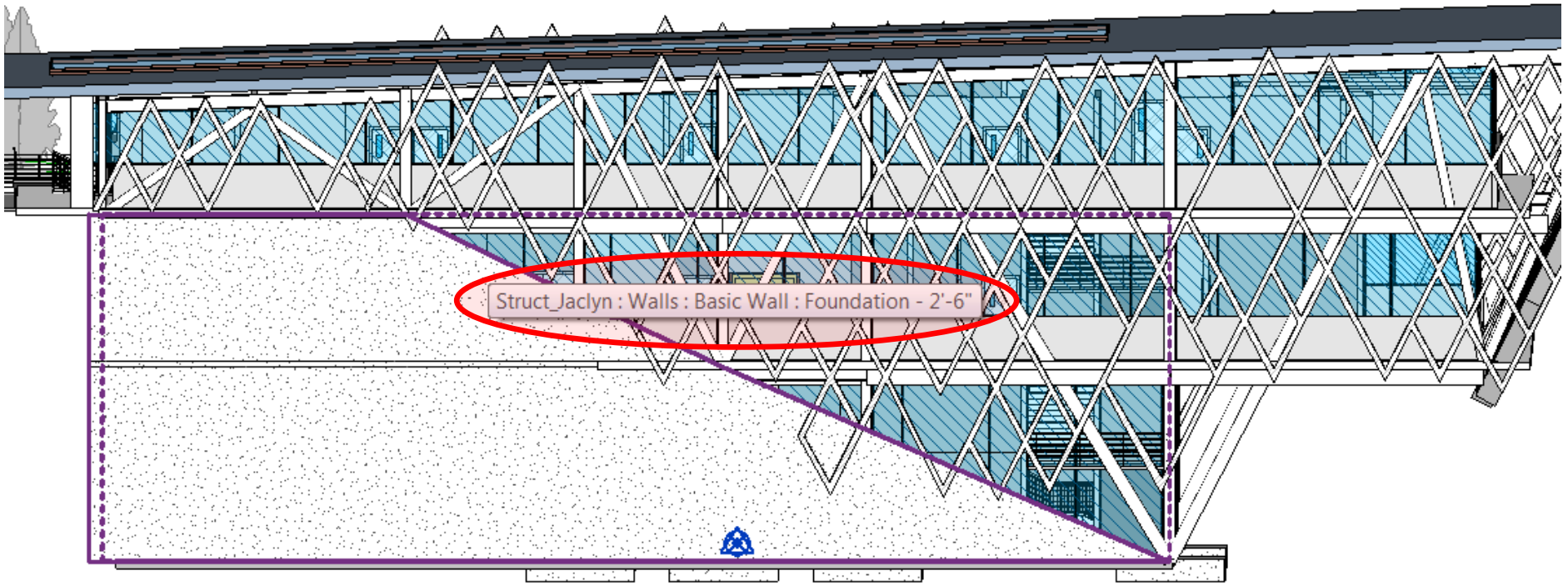
South Entrance

Main Stairway

Local Revit Model

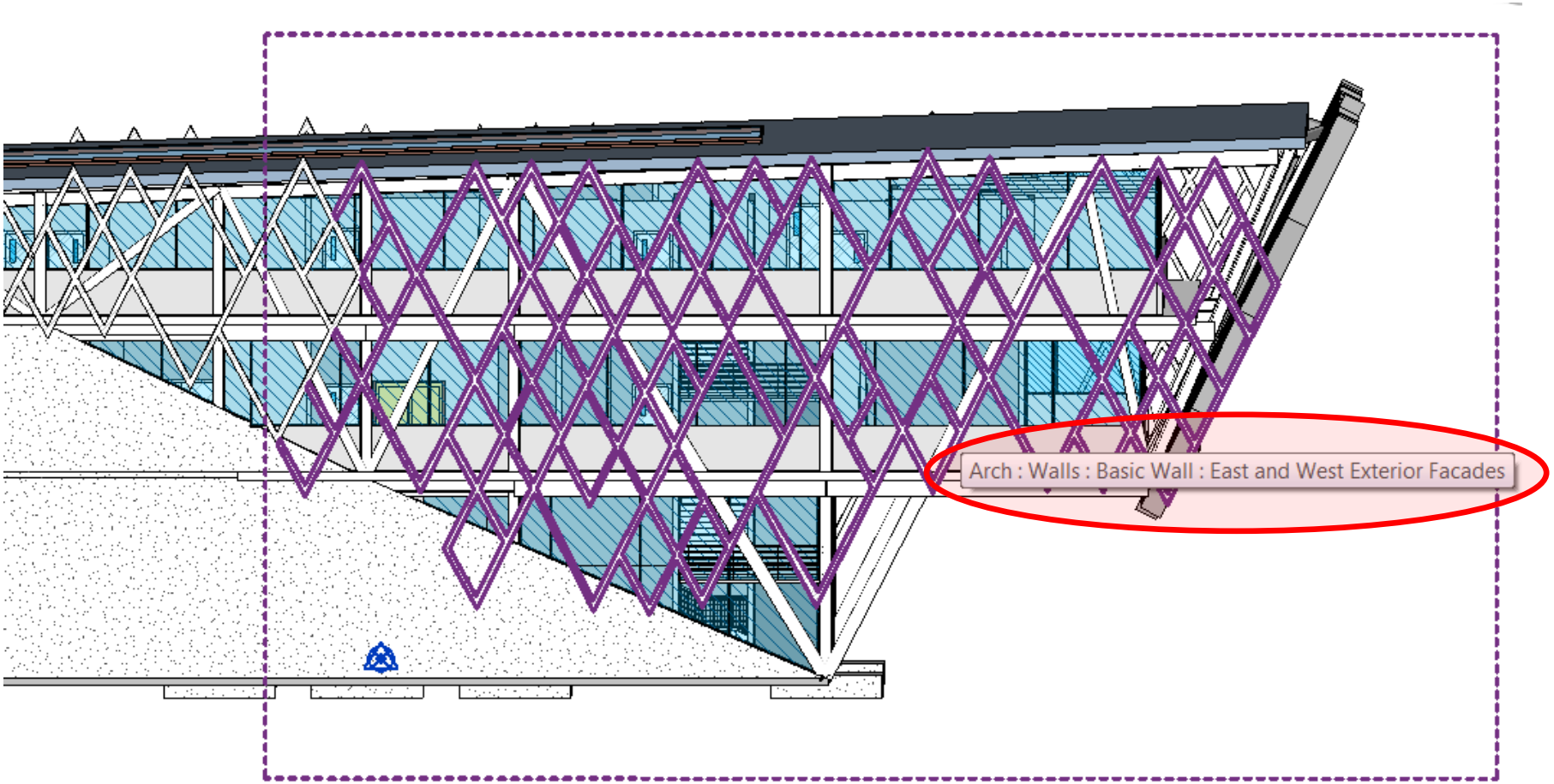


Local Revit Model



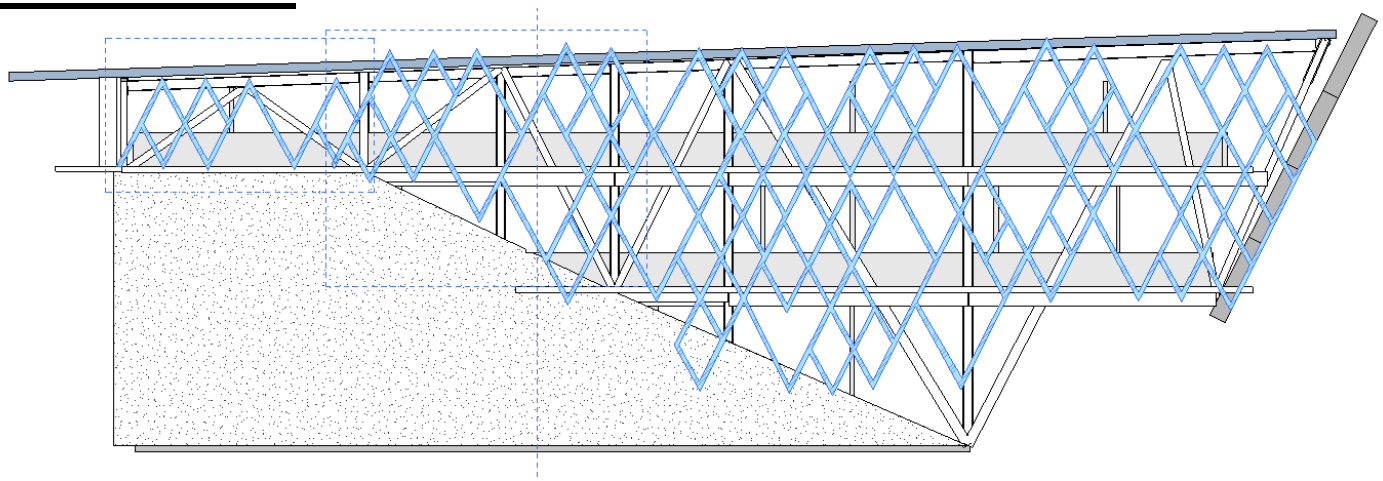
Local Revit Model

Local Revit Model

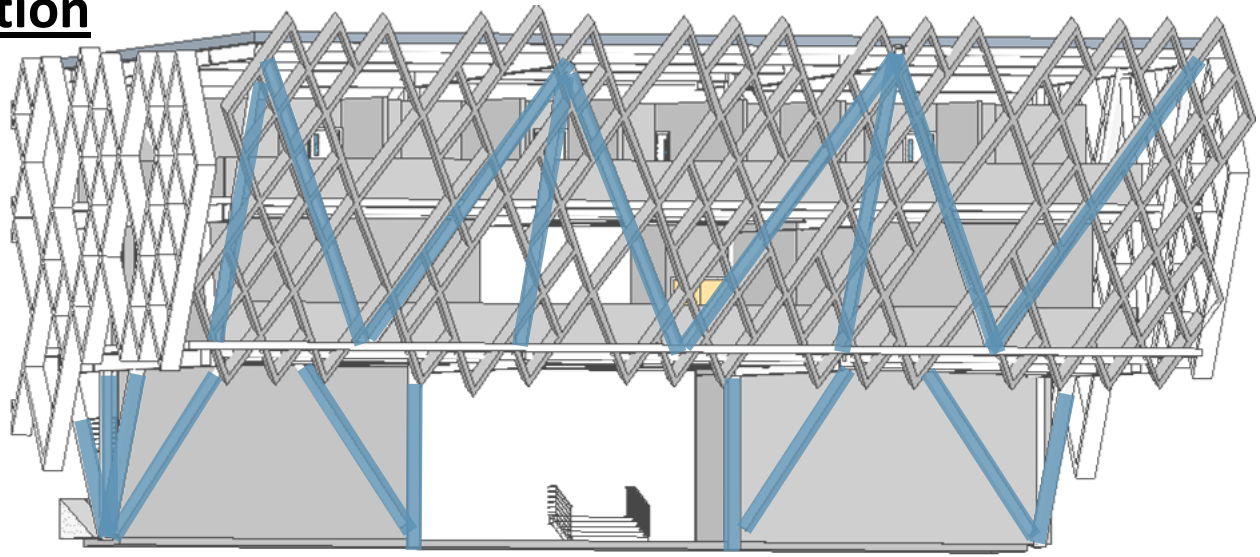


Central Revit Model

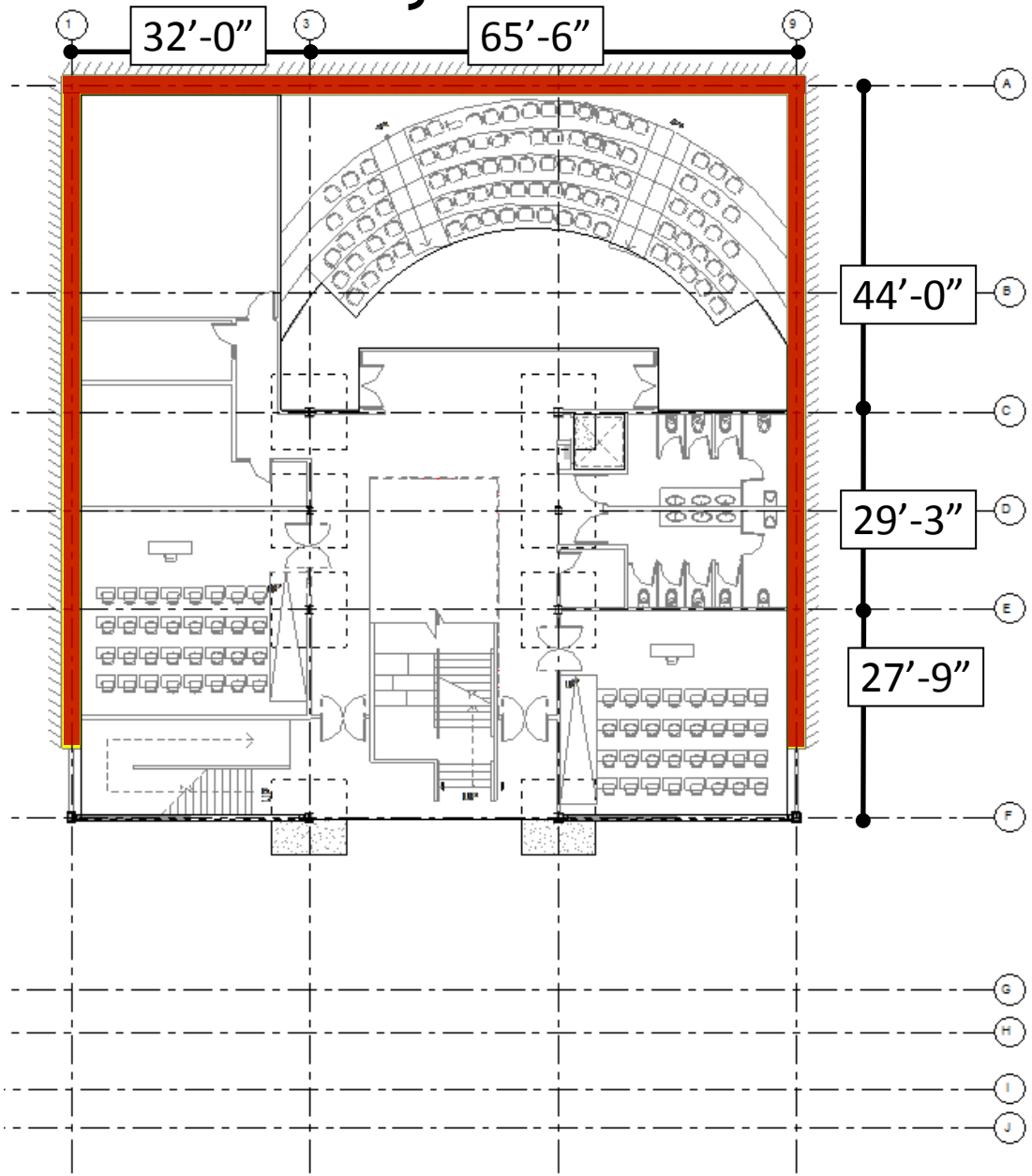
East/West Elevation



South Elevation



Structural System



Loads	
Dead: self weight+ MEP	95 psf
Live: corridors (reduced)	100 psf
EQ + soil: base shear	4000 kips
Wind: basic wind speed	100 mph

Floor 1

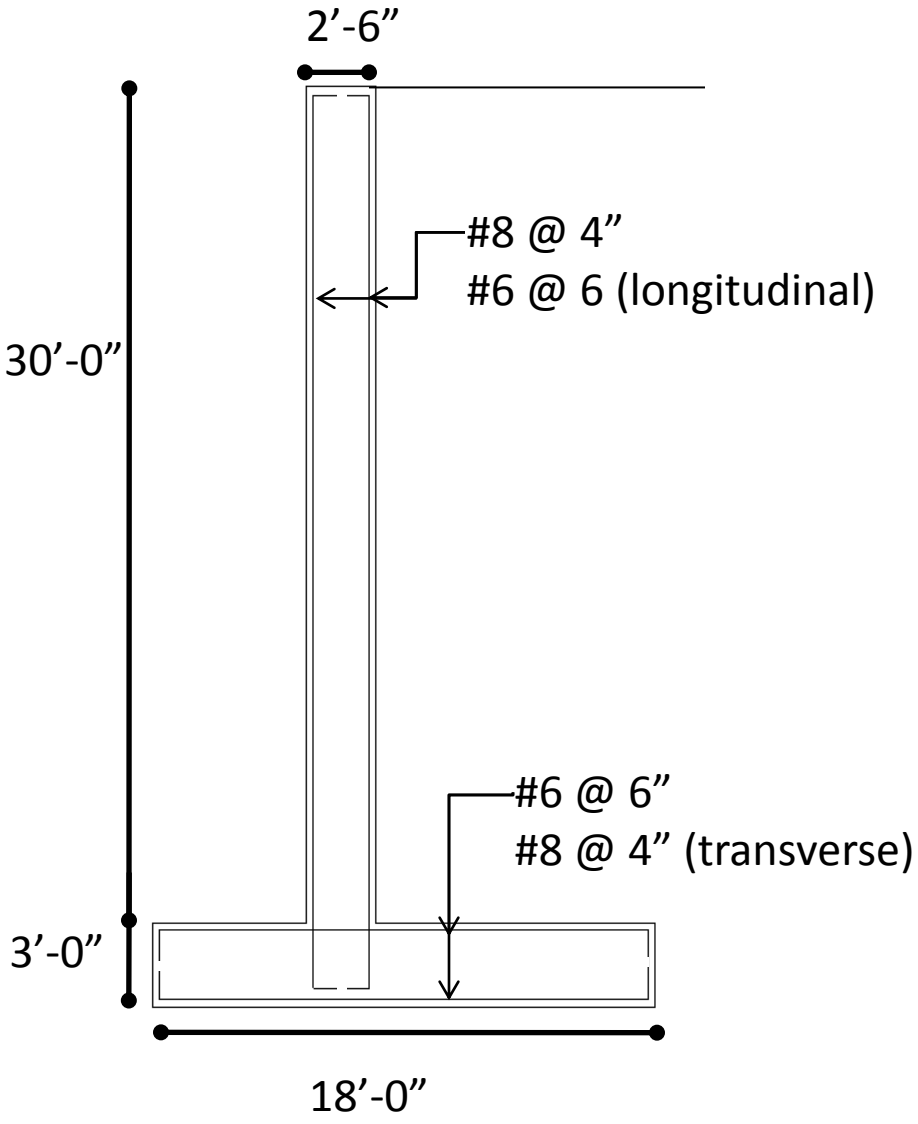
2’-6” Retaining Wall
10’x10’ Spread footing
8.5” Slab on grade

Floor 2 & 3

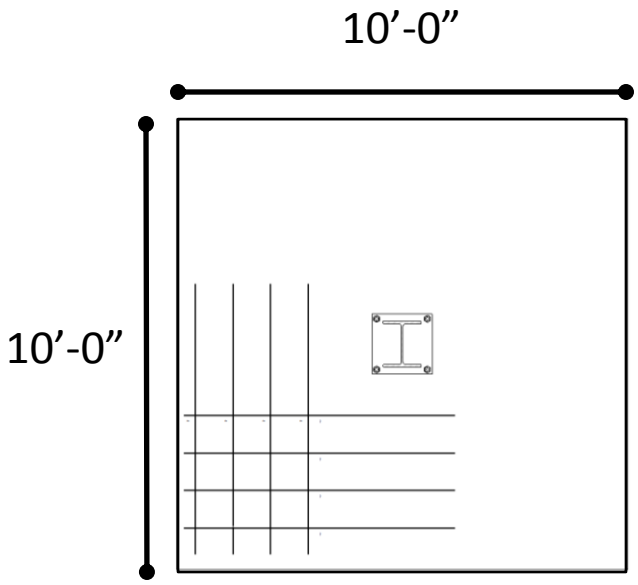
4 ½” NW 3VLI19 metal deck

Foundation System

Retaining Wall

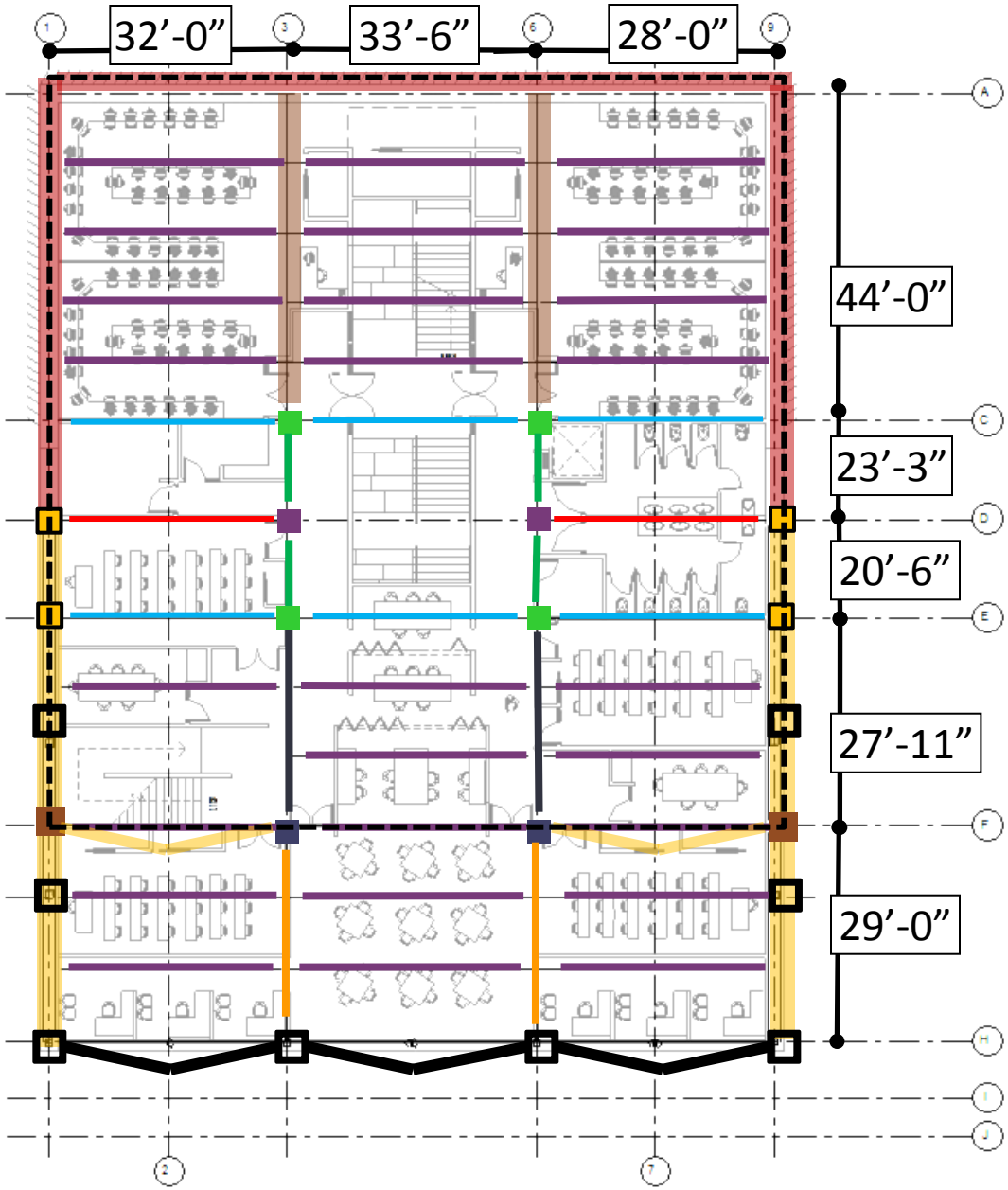


Isolated Column Footing



16”x 16”x ½” base plate
4 anchor bolt
$As_{required} = 9.6\ in^2$

Floor 2



Columns

- W12x 50
- W12x 58
- W12x 72
- W14X 68
- W14x 90

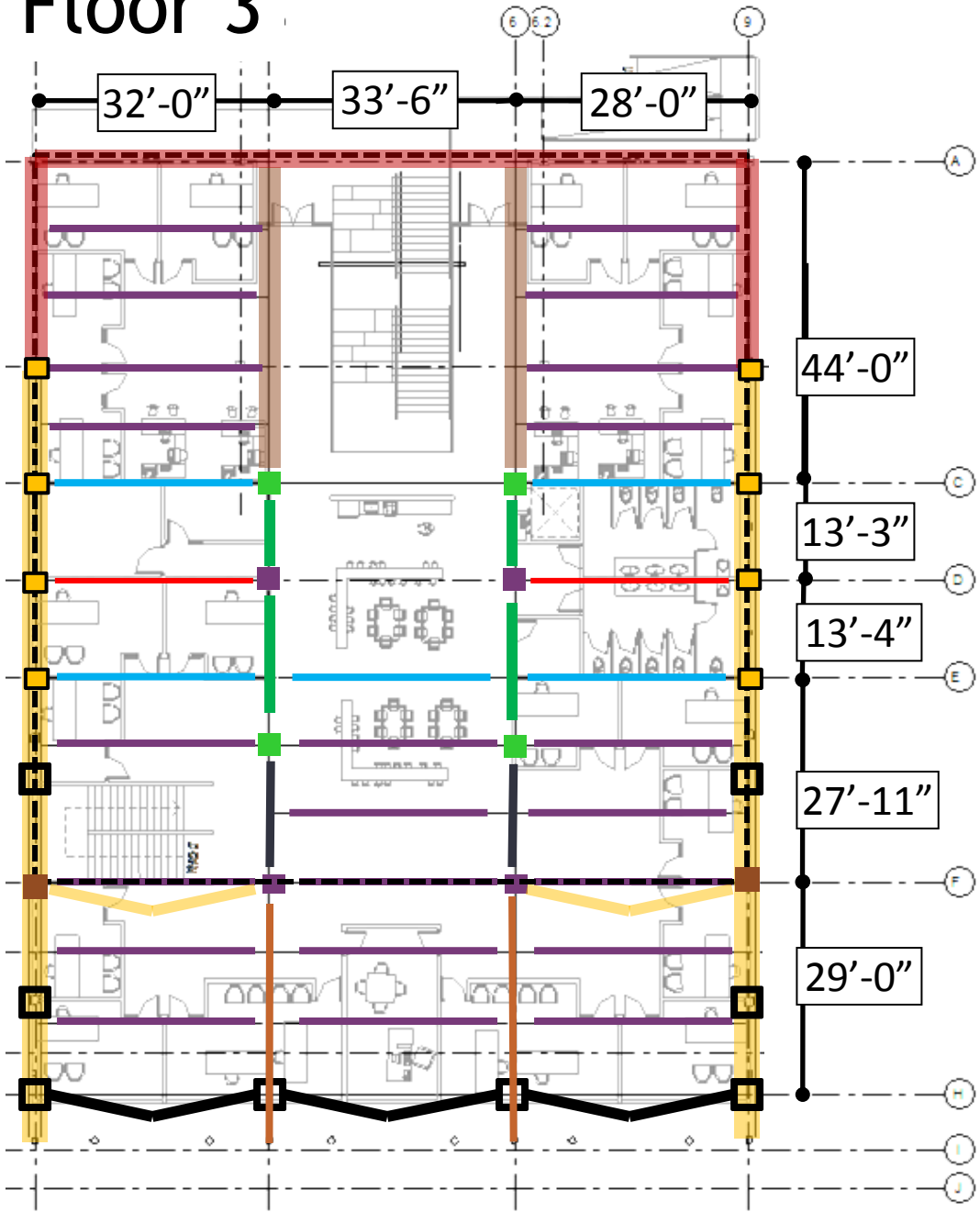
Beams

- W12x 26
- W14x 30
- W14x 22
- W14x 38
- W18x 50
- W21x 50

Challenges

- W24x 94 Auditorium-Span
- HSS 20x 12x ⅝ Perimeter Beams
- HSS 10x 10x ⅝ Slanted elements

Floor 3



Columns

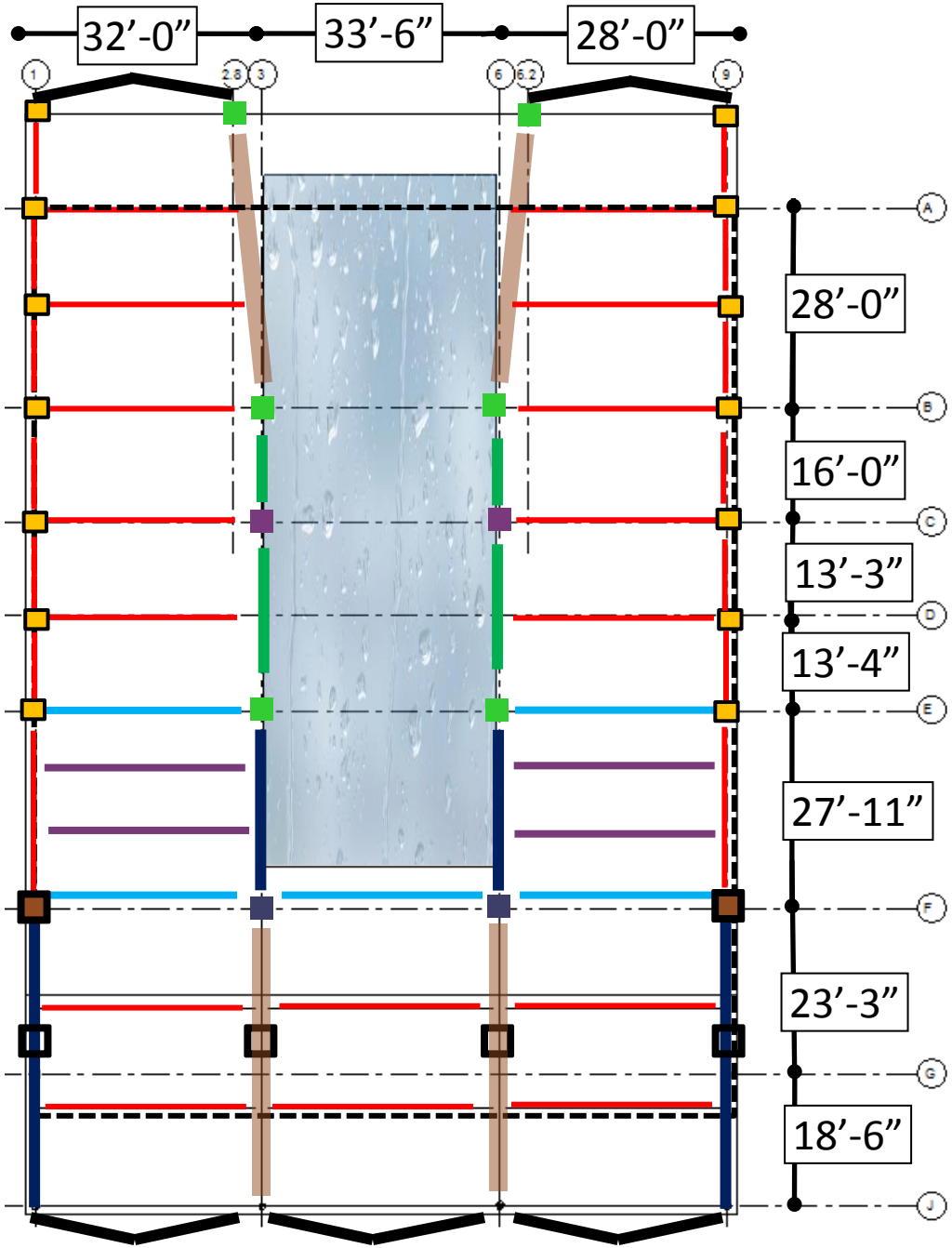
- W12x 50
- W12x 58
- W12x 72
- W14X 68
- W14x 90

Beams

- W12x 26
- W14x 30
- W14x 22
- W14x 38
- W18x 50
- W21x 50
- W21x 73

Challenges

- W24x 94 Auditorium-Span
- HSS 20x 12x ⅝ Perimeter Beams
- HSS 10x 10x ⅝ Slanted elements



Roof

Columns

- W12x 50
- W12x 58
- W12x 72
- W14X 68
- W14x 90

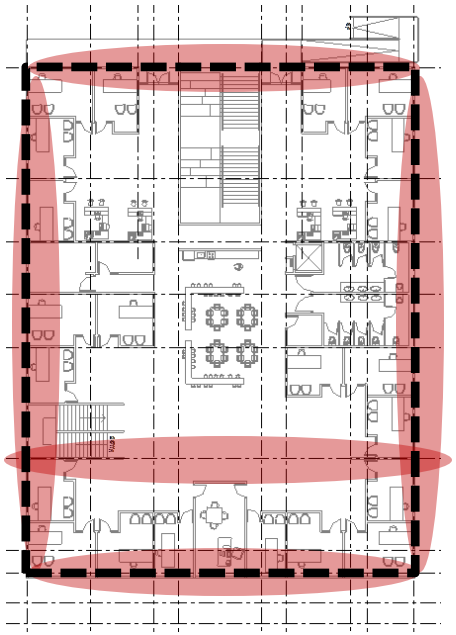
Beams

- W12x 26
- W14x 30
- W14x 22
- W14x 38
- W18x 50

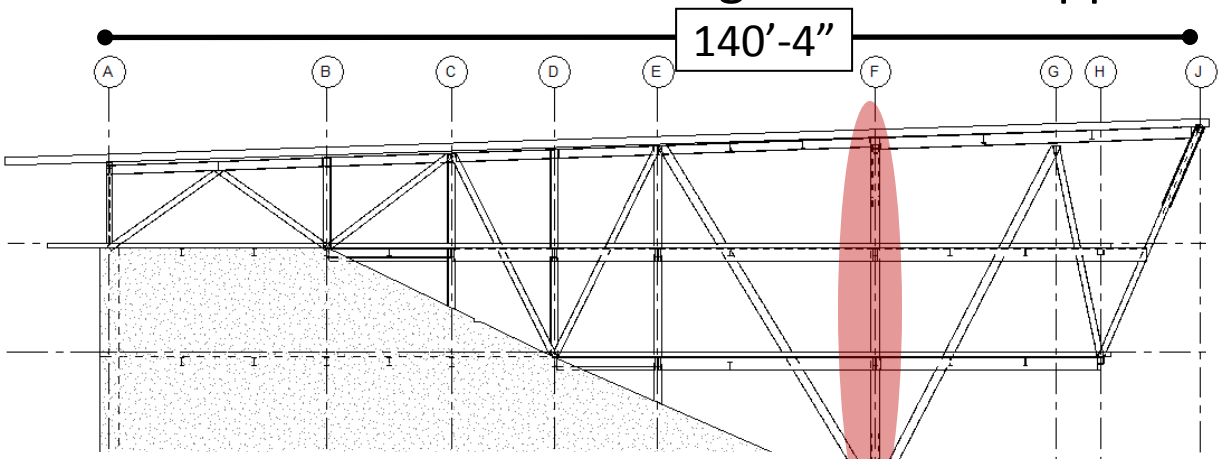
Challenges

- W24x 94 Auditorium-Span
- HSS 10x 10x ⅝ Slanted elements

Cantilever Solution



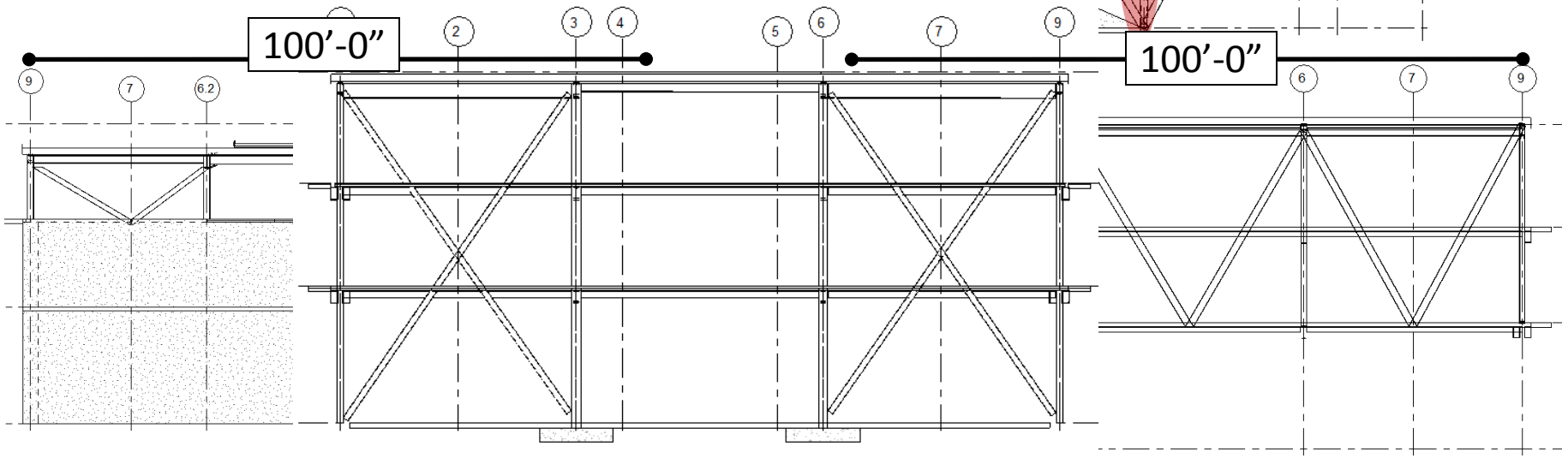
- Perimeter Trusses integrated into the façade
- HSS 10x 10x ⅝ diagonals
- Interior cross bracing for lateral support



Floor 3

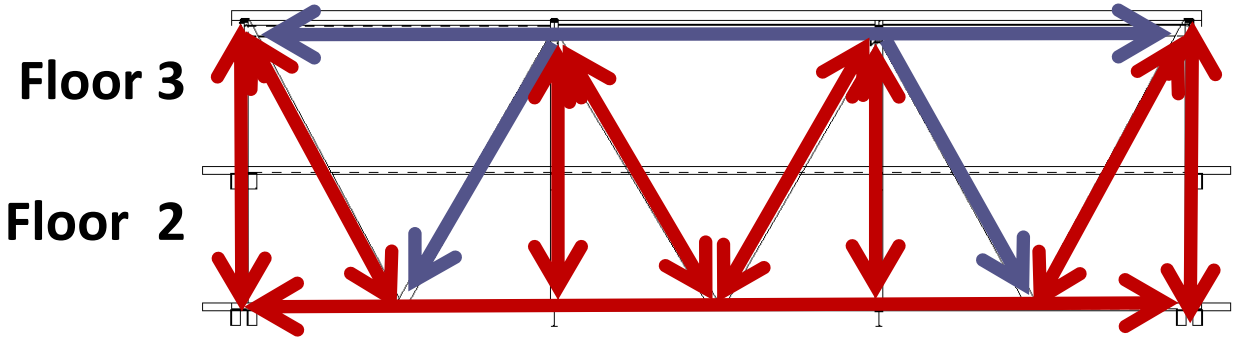
Floor 2

Floor 1

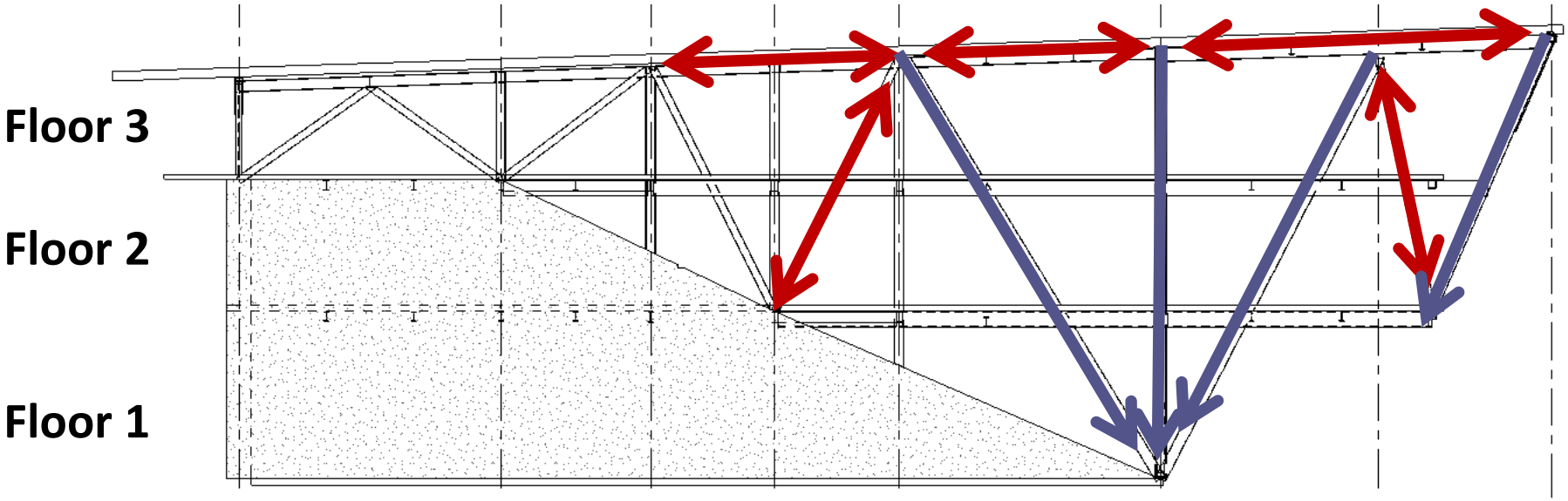


Gravity Load Path

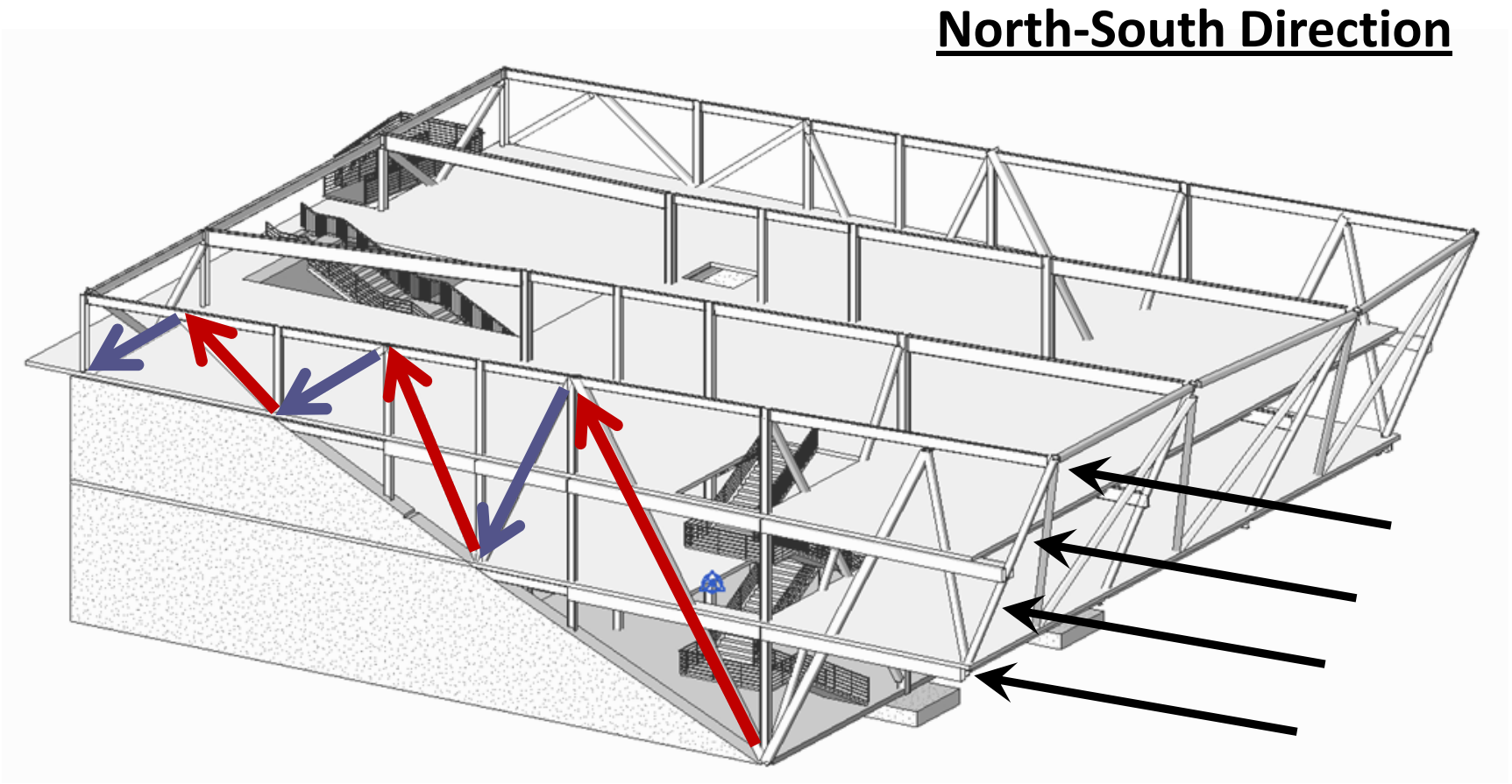
South Elevation



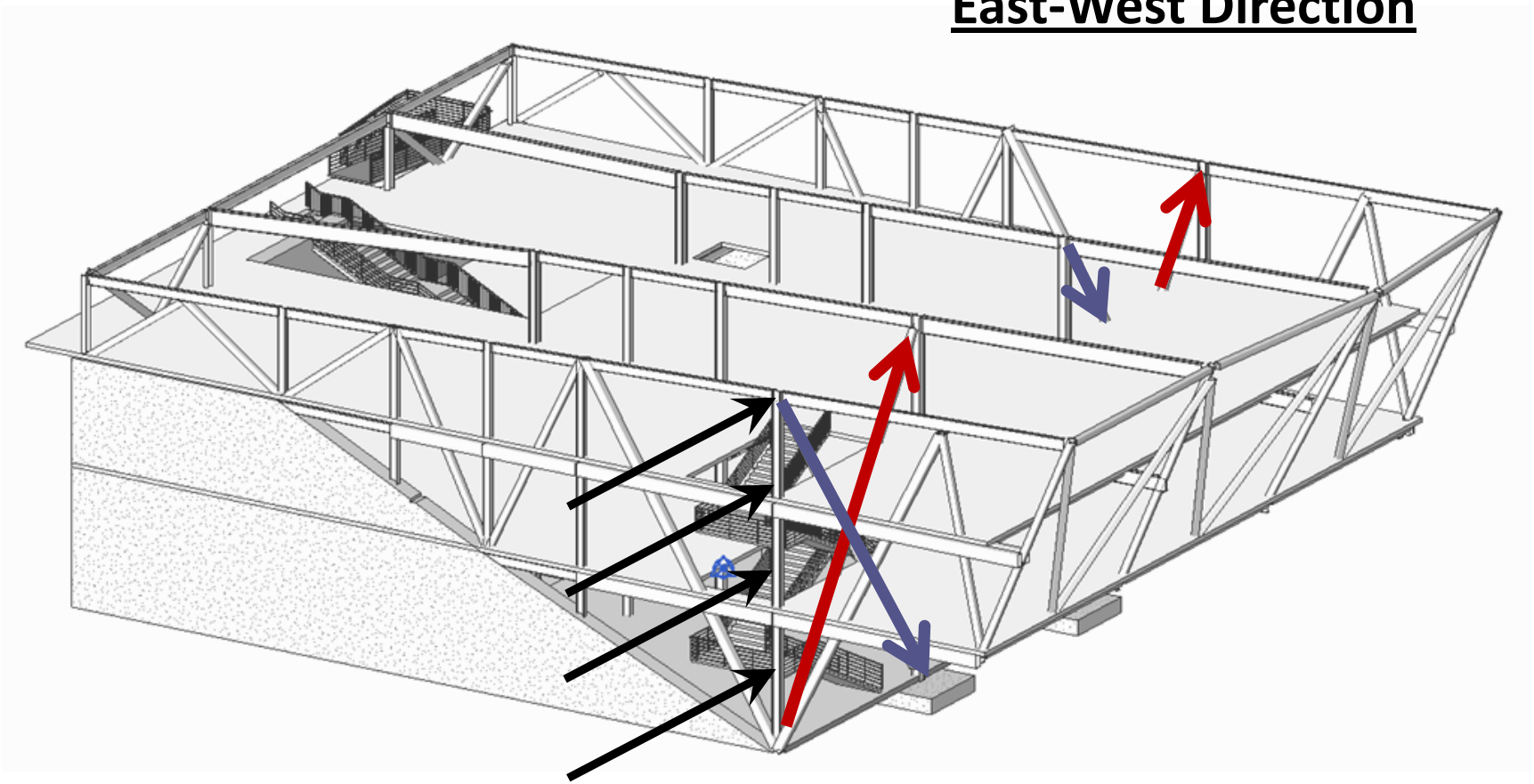
Perimeter Structural System



Lateral Load Path

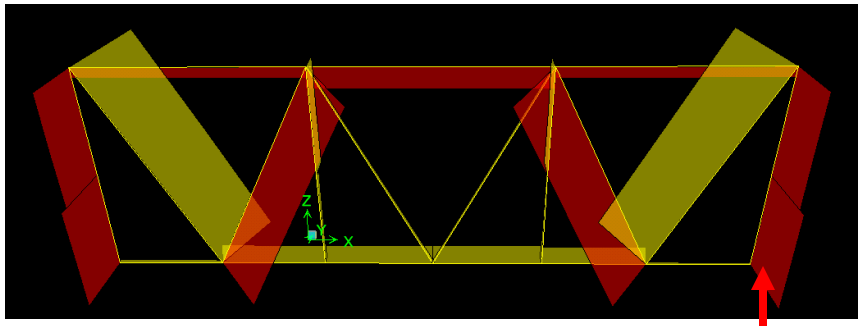


Lateral Load Path



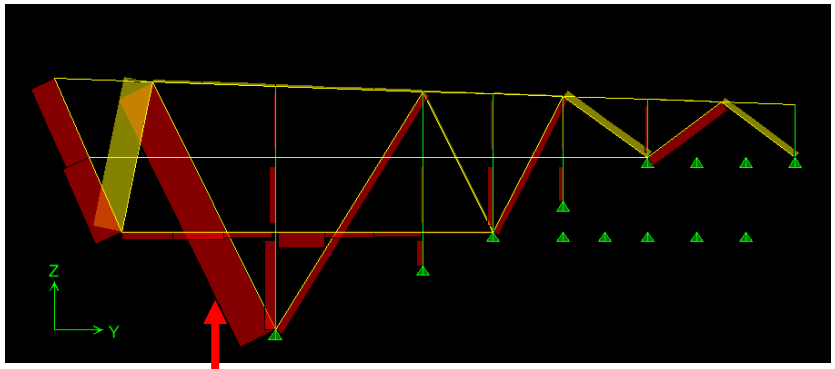
Gravity – Truss and Bridge

100’-0”

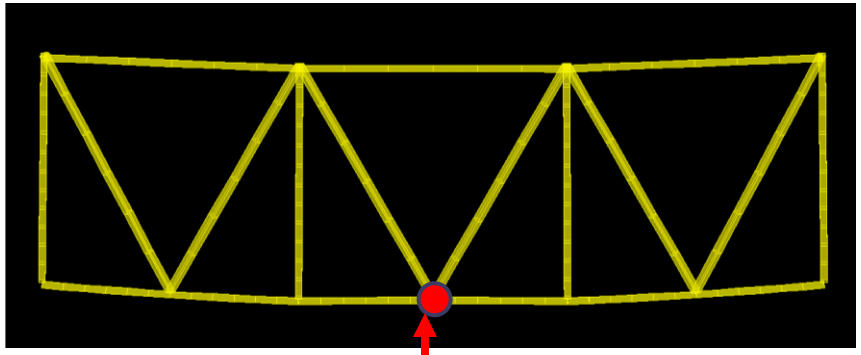


P = 675 kips

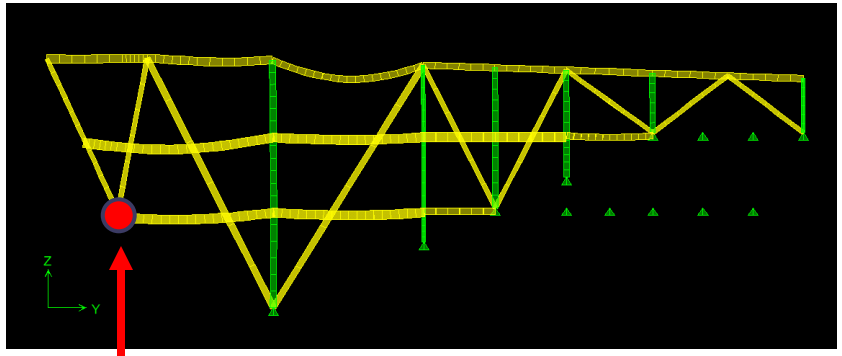
140’-4”



P = 875 kips

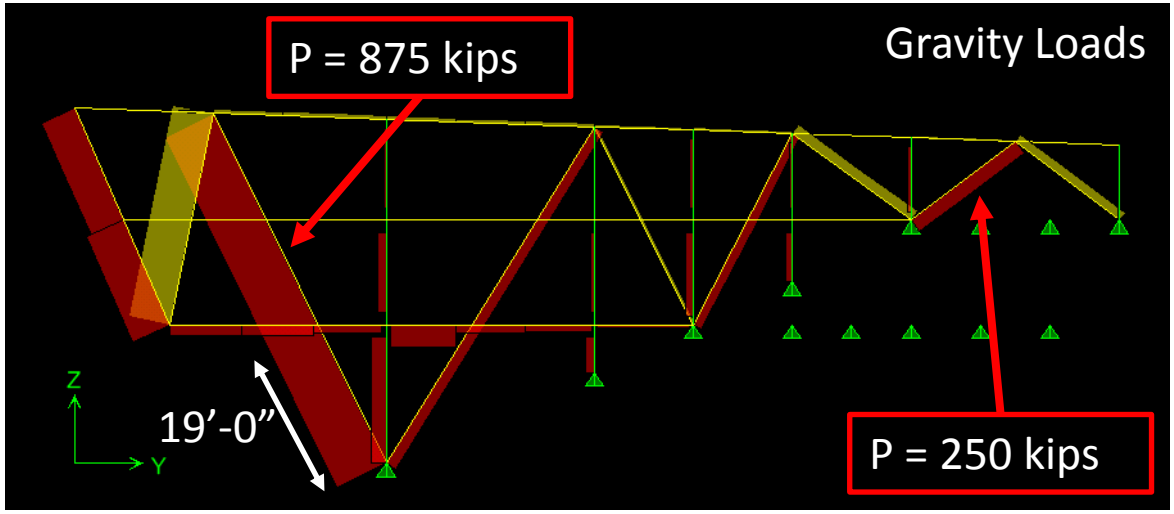


Δ = 0.21in



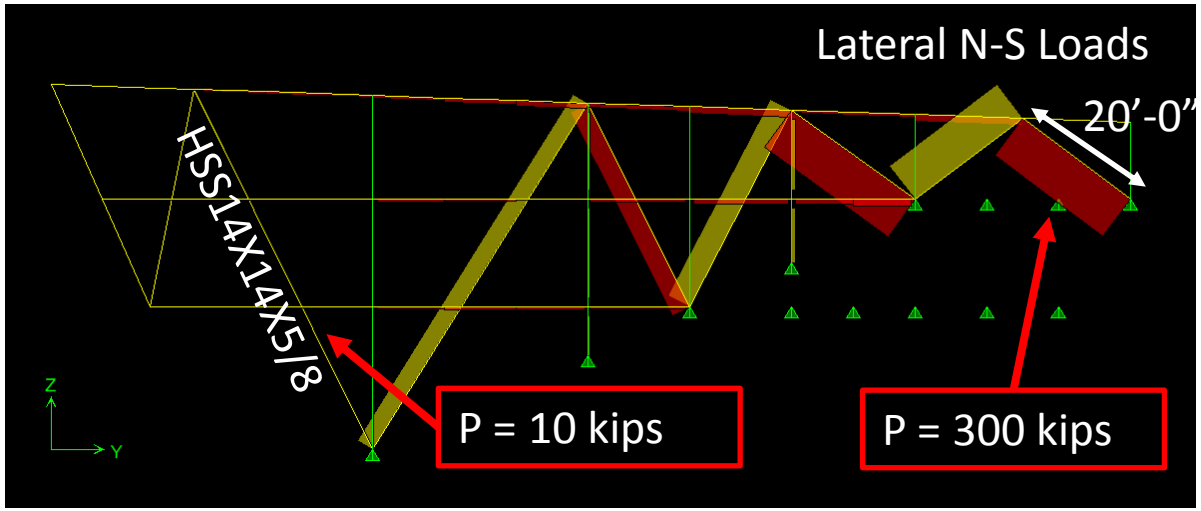
Δ = 0.50in

Gravity – Lateral System Interaction

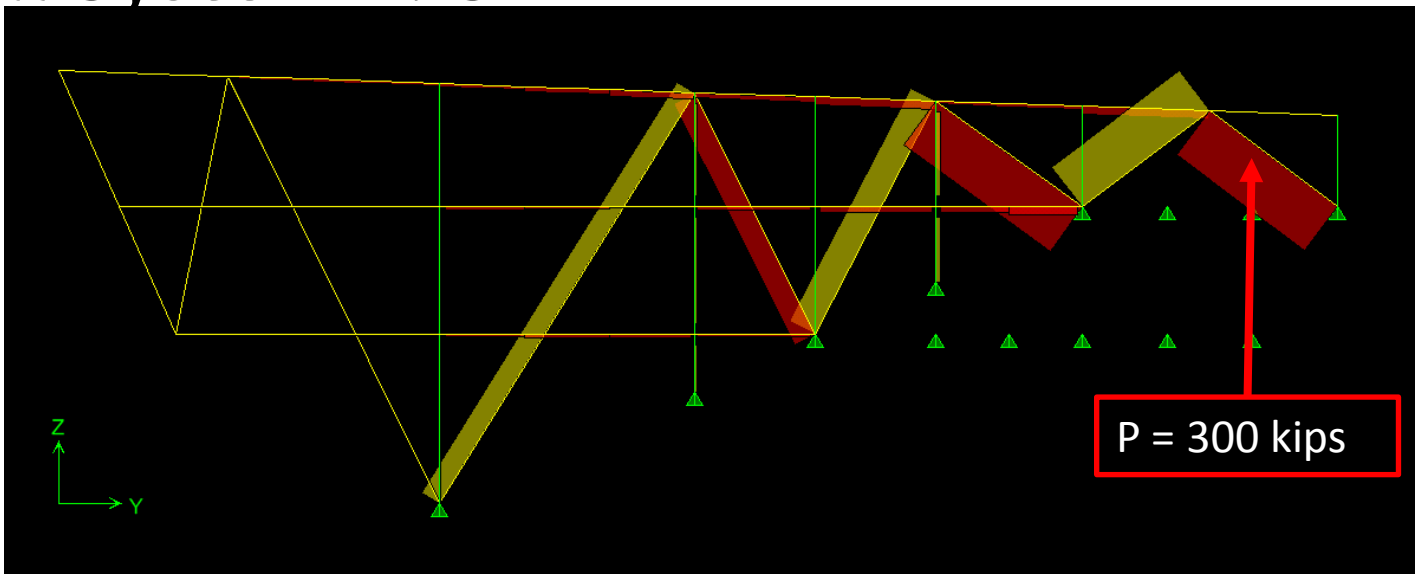


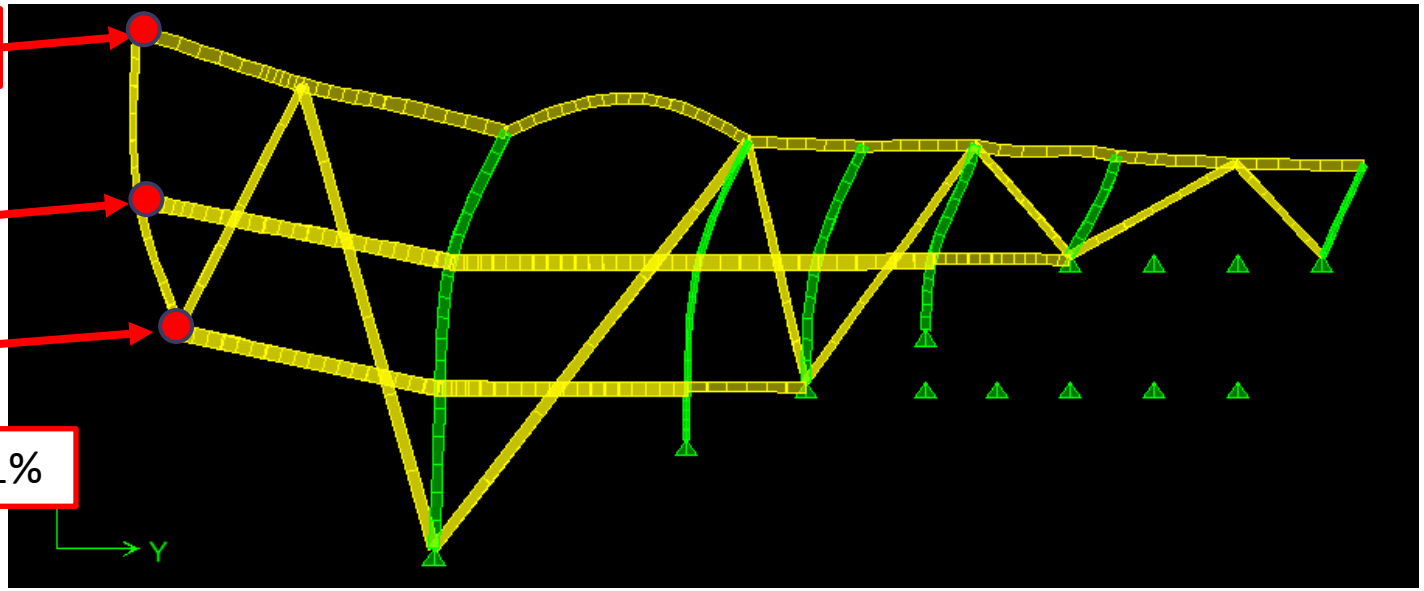
Braces Resist Lateral Loads

HSS 10x 10x ⅝ TYP.
HSS 14x 14x ⅝ for Truss Brace

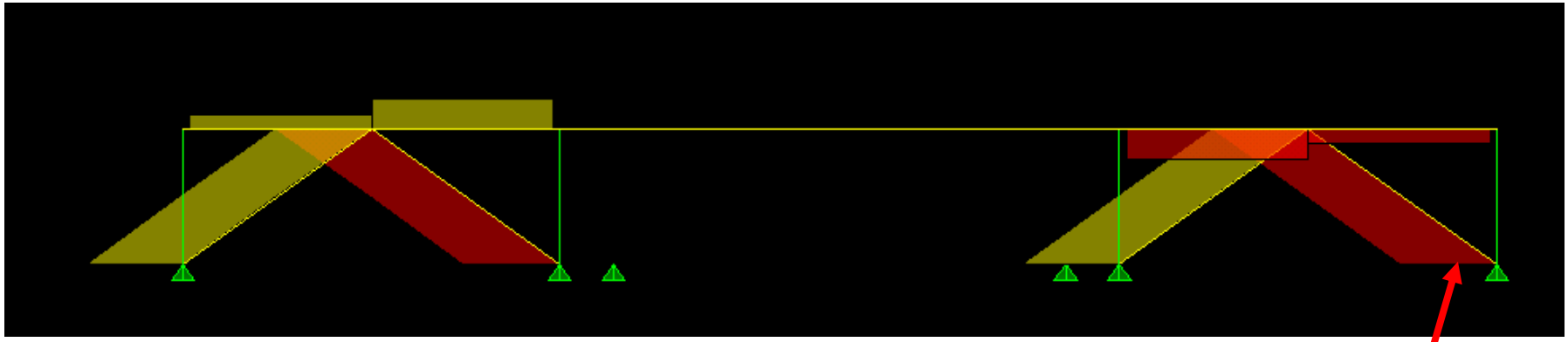


Lateral System N-S

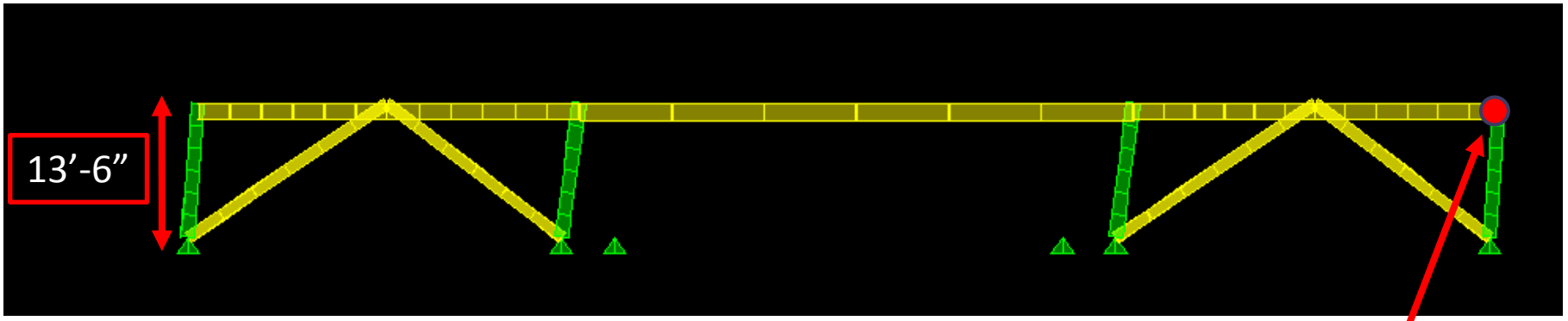




Lateral System E-W



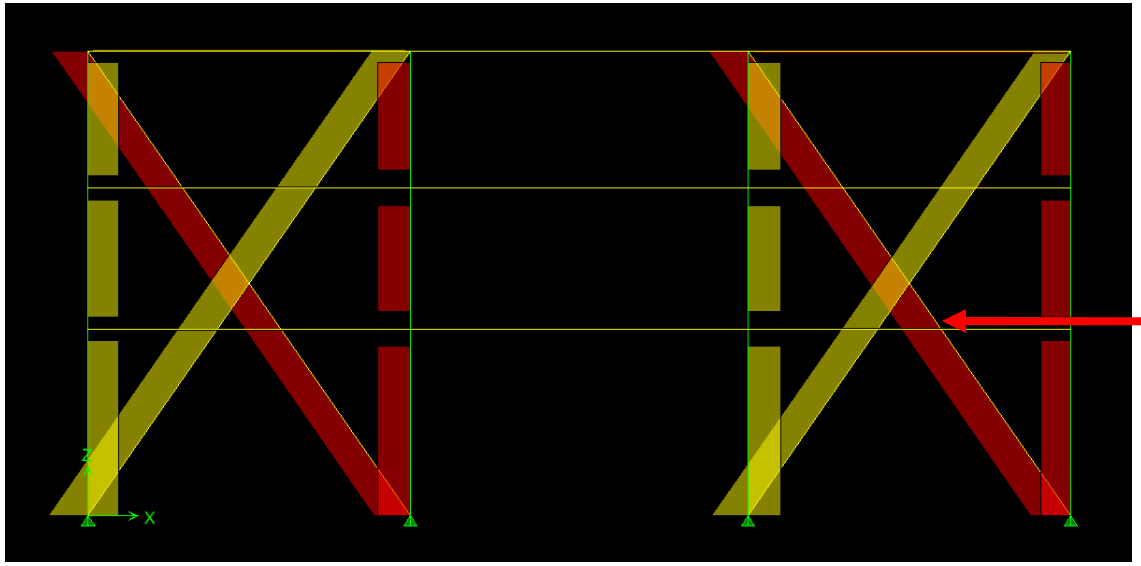
P = 300 kips

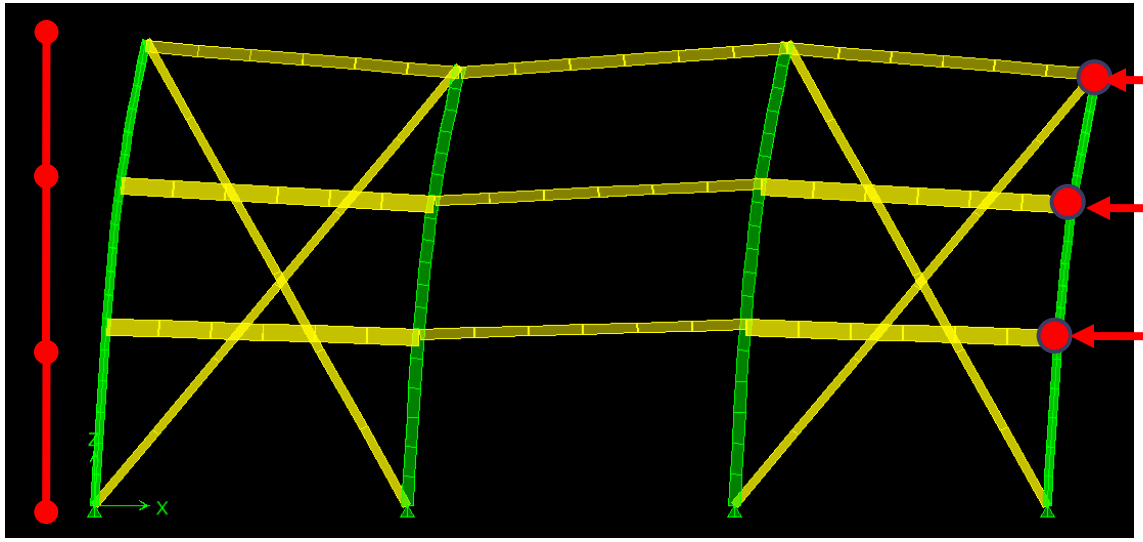


Δ = 0.1in

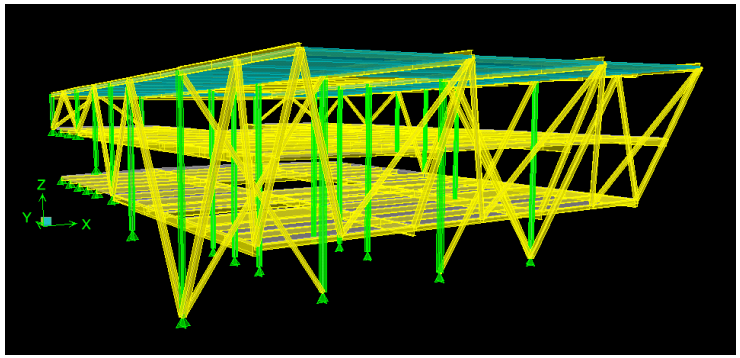
IDR = 0.1%

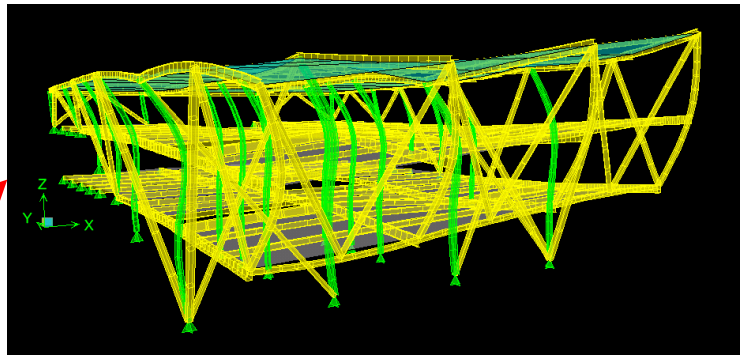
Lateral System E-W

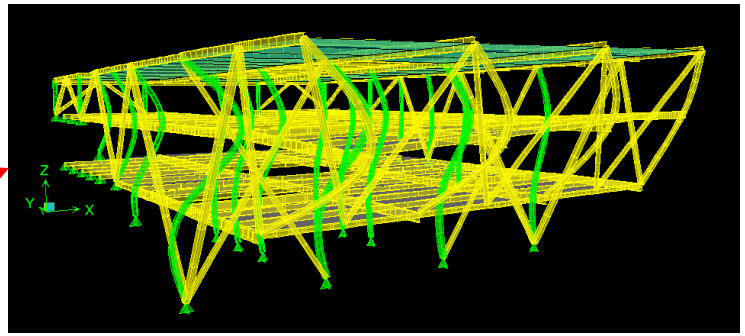


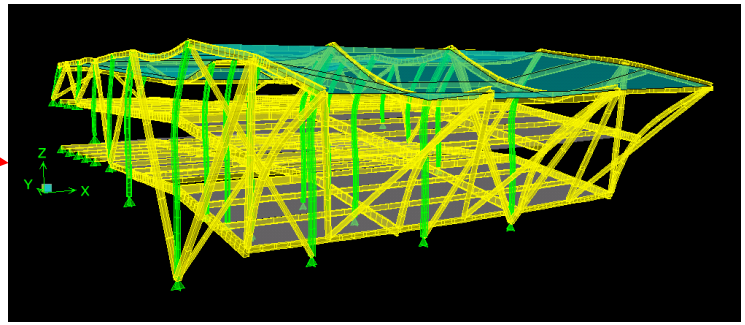


Mode Shapes







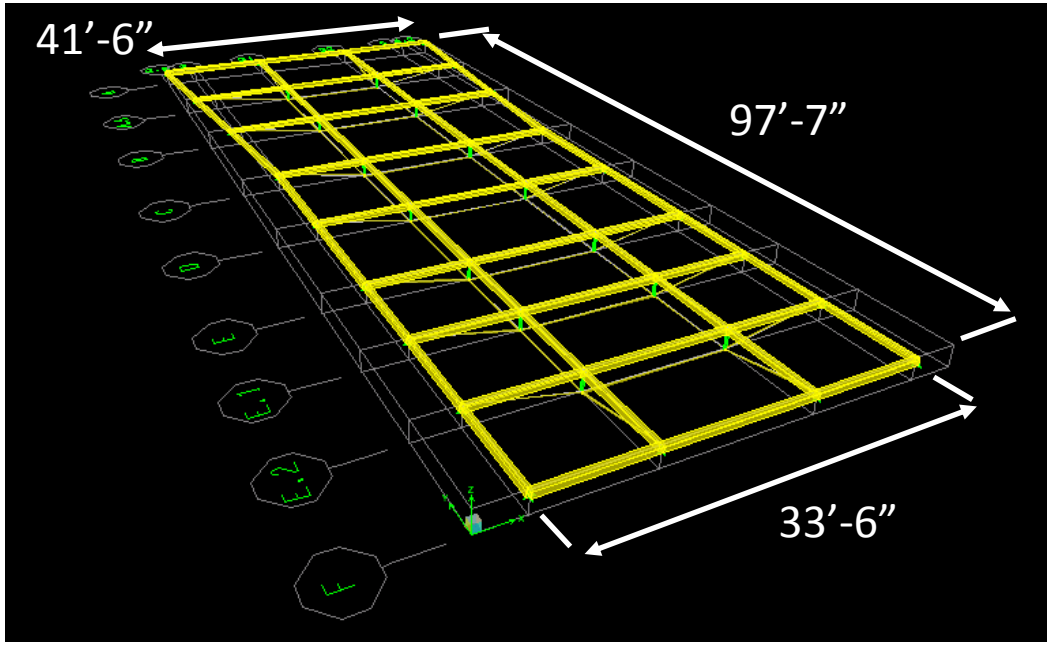


Mode 1:
T1 = 0.23 sec

Mode 2:
T2 = 0.16 sec

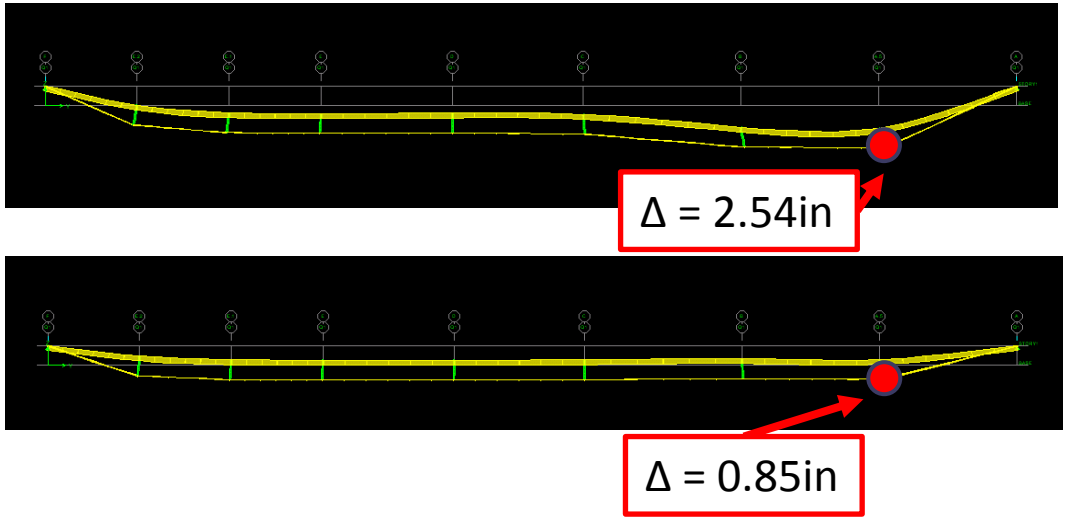
Mode 3:
T2 = 0.15 sec

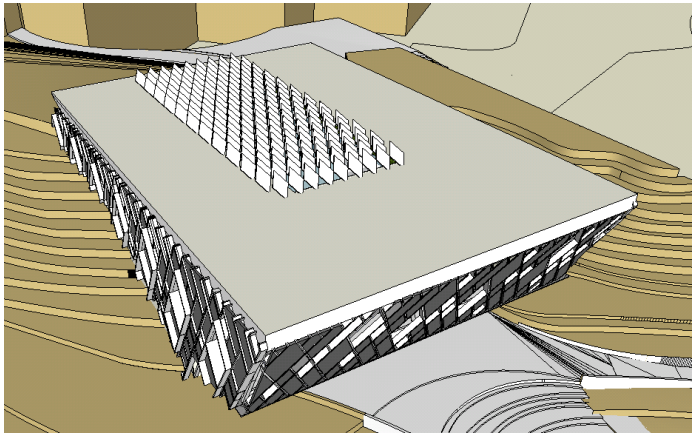
Skylight



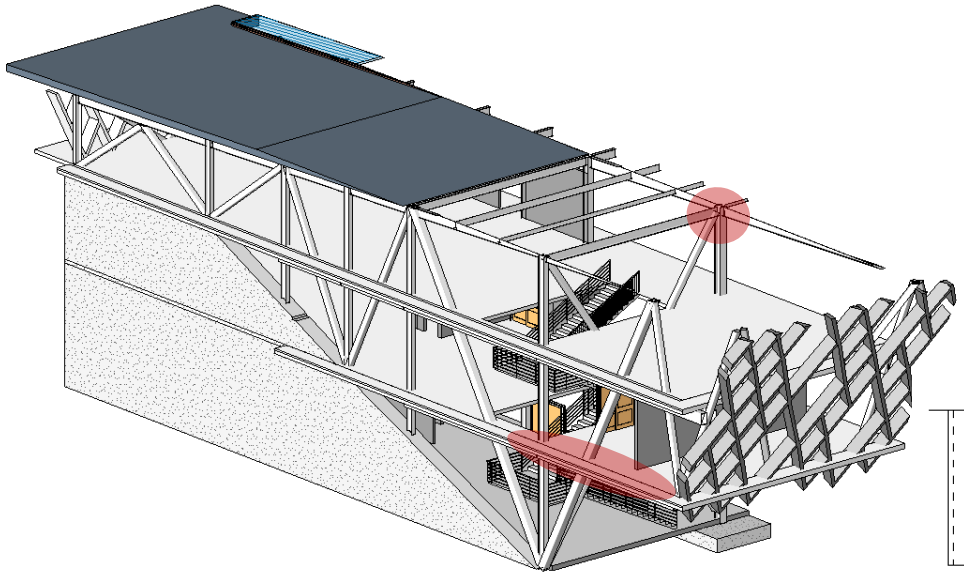
Queen-Post Truss System

- F_{pt} = 7 kips
- F_{cable} = 105 kips

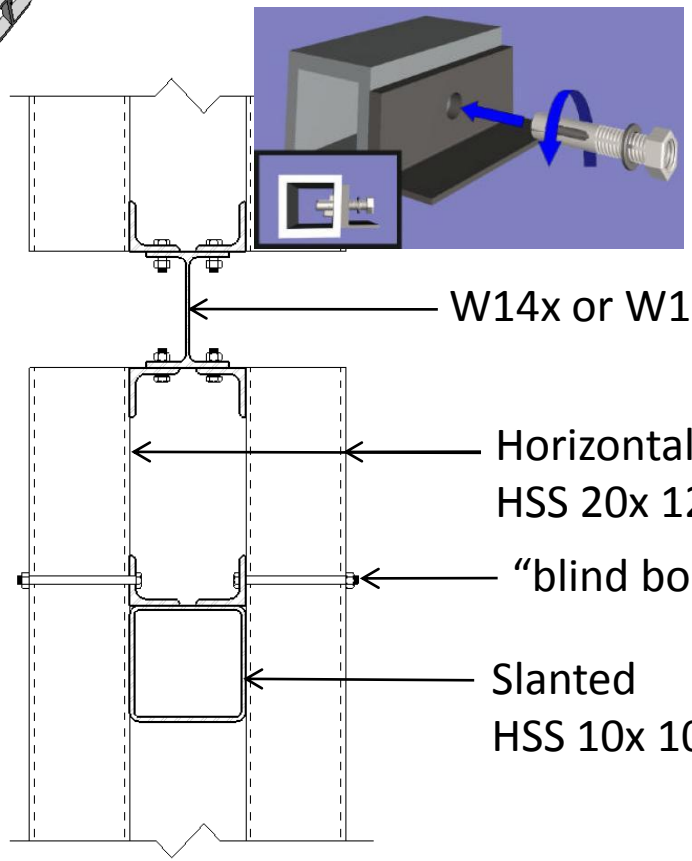


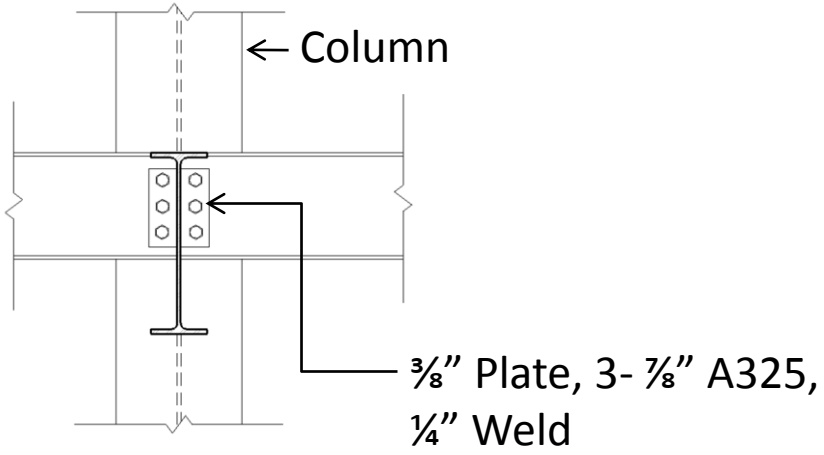


Structural Connections

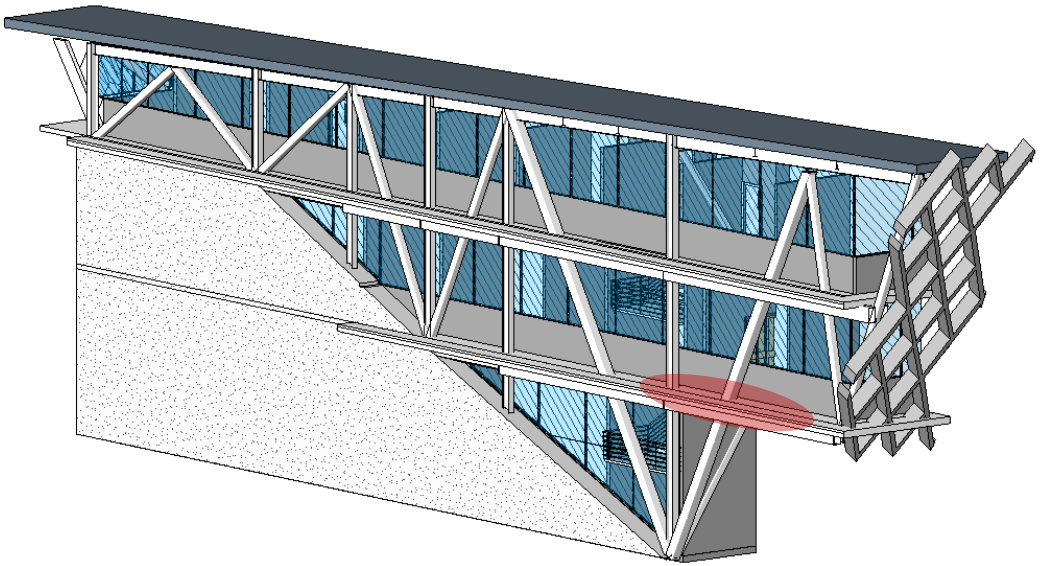


Typical Connection



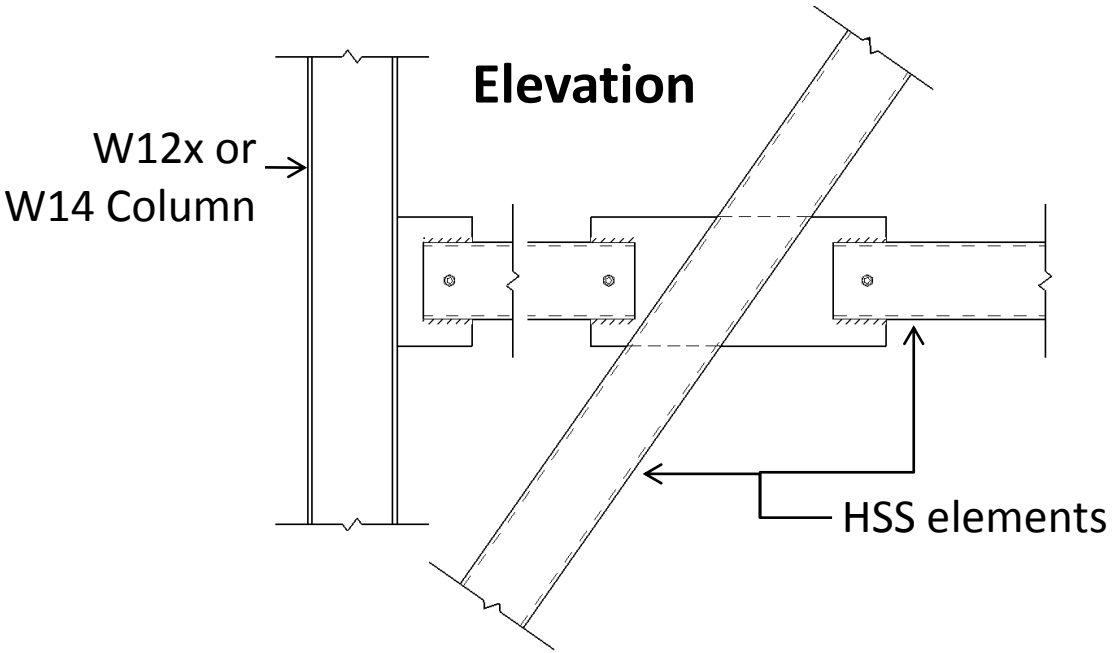


Structural Connection

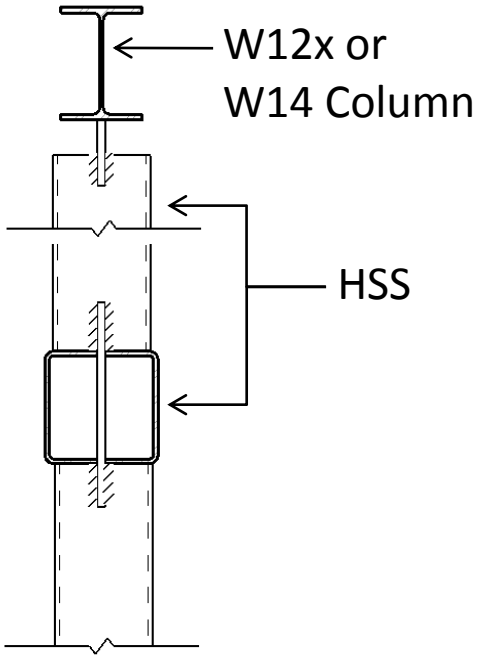


Alternate Option

Elevation

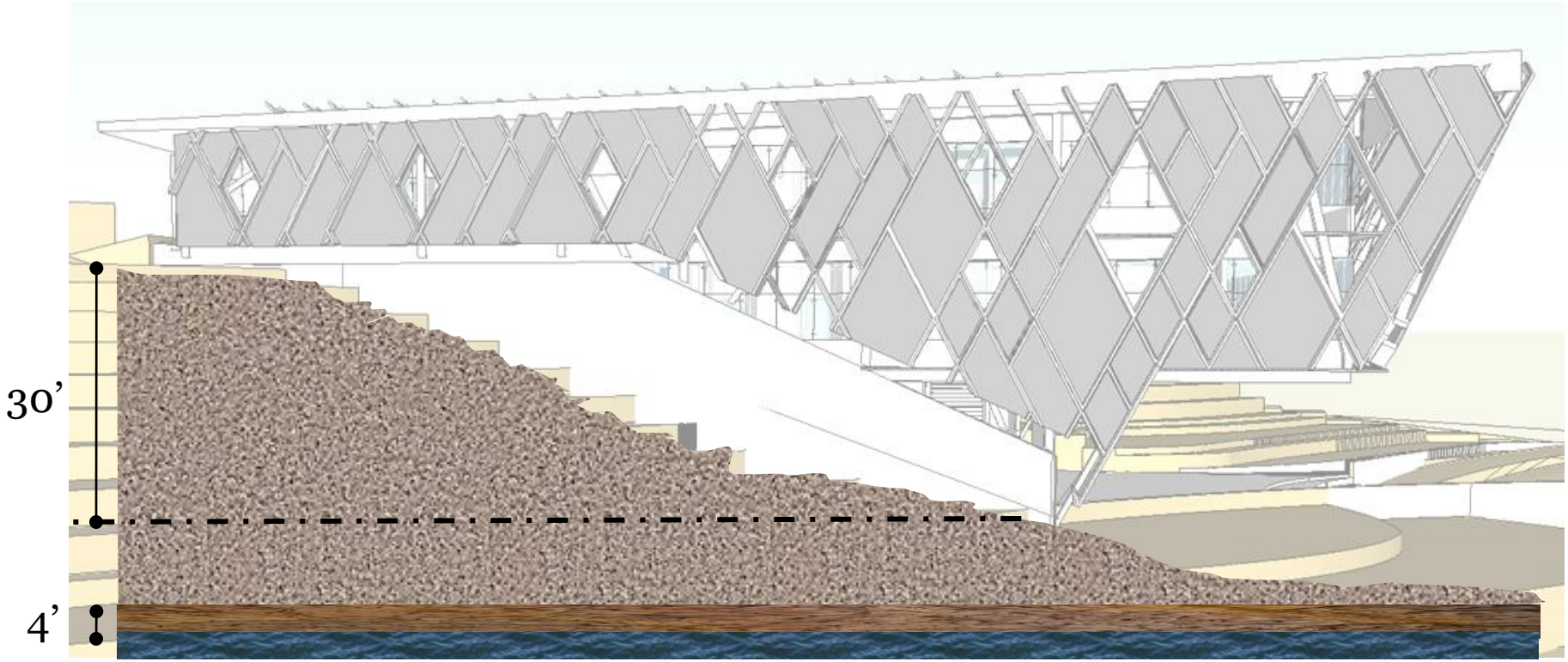


Plan

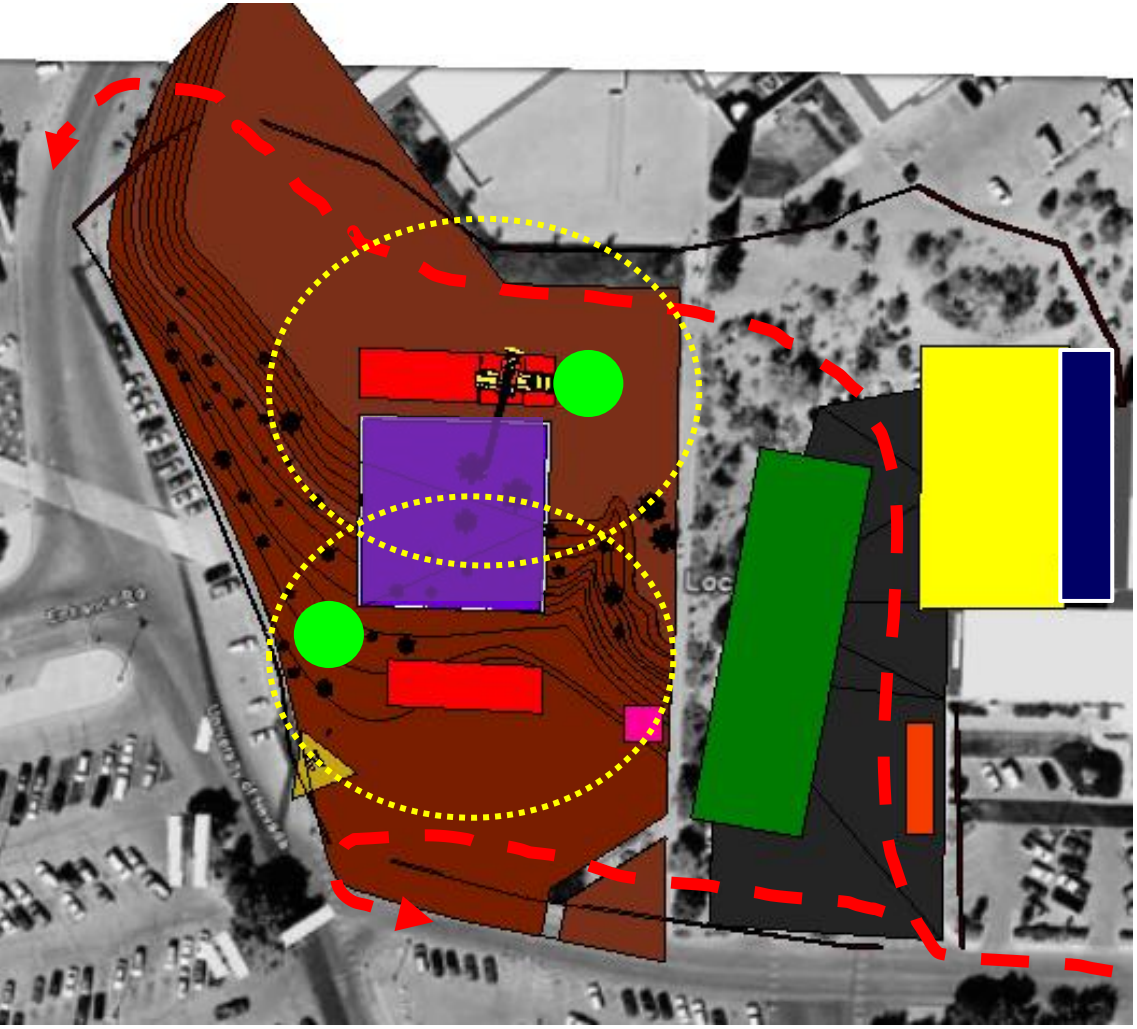


Soil Profile

Soil Profile applies to the low of the slope



Site Plan



Site Area	3.6acres
Heat Relief Area	400 SF
Parking	50-55 spots
Assembly Fabrication/ Materials Laydown	12000 SF
Site Trailers	1000 SF
Restrooms	4 Units
Recycling & Waste Control	6x20 CY bins
Crane Space	2 locations

Cactus Garden

Building Footprint

Cactus Garden Transplant

How to Transplant a Cactus

Moving a cactus need not be a daunting task. By following these easy--to-follow steps you can successfully move a cactus in the landscape. Attempt to transplant the cactus to an area that is similar to the original site in regard to light exposure, freeze potential, excessive heat, soil type and texture, irrigation method and schedule, orientation, and other abiotic factors. Cacti should not be moved during the winter or when nighttime temperatures are below 60°F (16°C) because rooting will be delayed or inhibited by the cold soil temperatures and the plant may die.

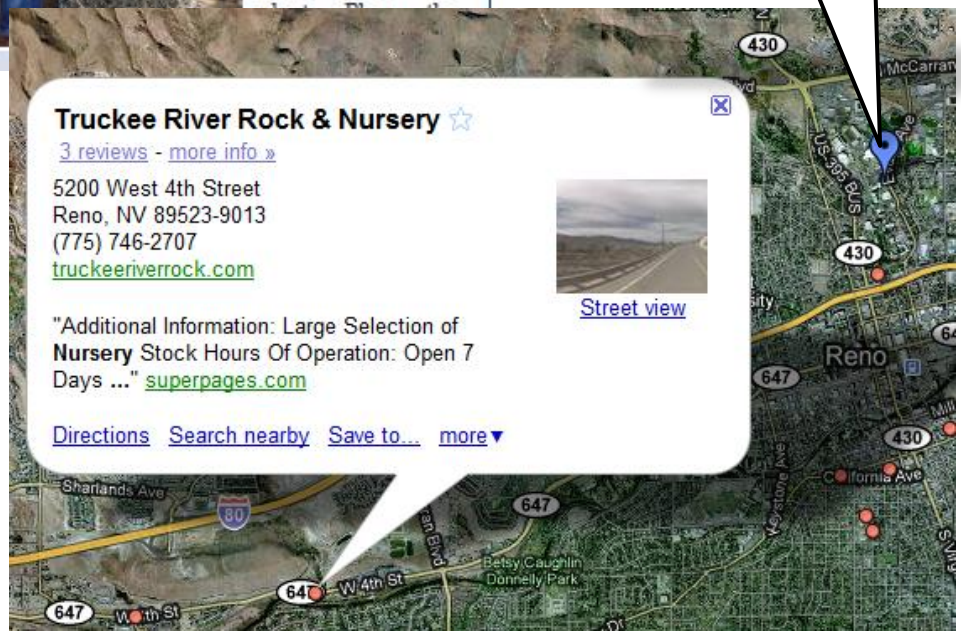
Figure 1

Step 1:
Select a healthy cactus. Choose a plump specimen that is free of blemishes, obvious disease, bruises and abrasions *(Fig. 1)*. If the plant has been lying on the ground, check for sunburning

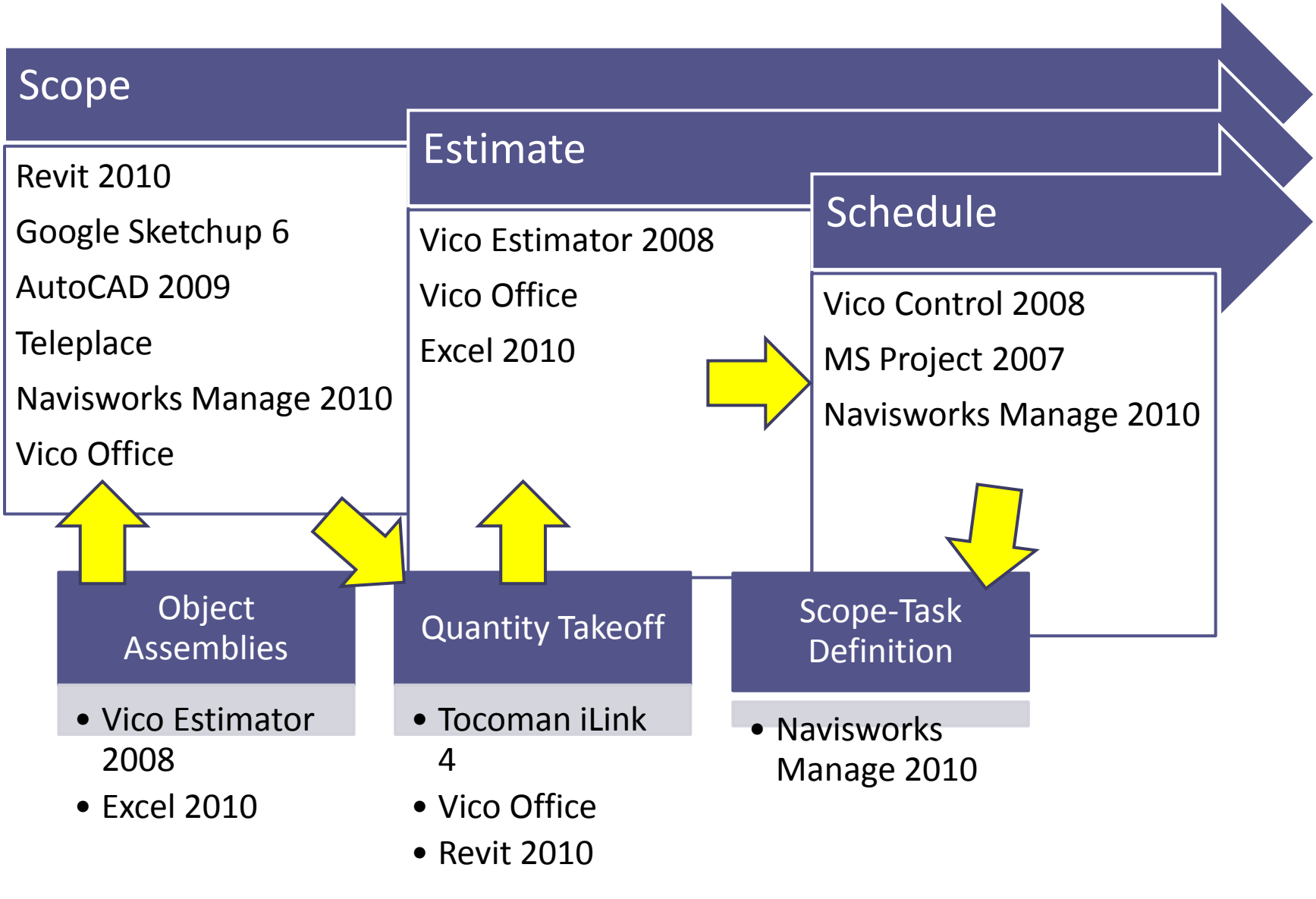
Figure 4.

Step 5:
If the plant is large or heavy, the next step may require two people. Take a garden hose and wrap it around the

Project Site



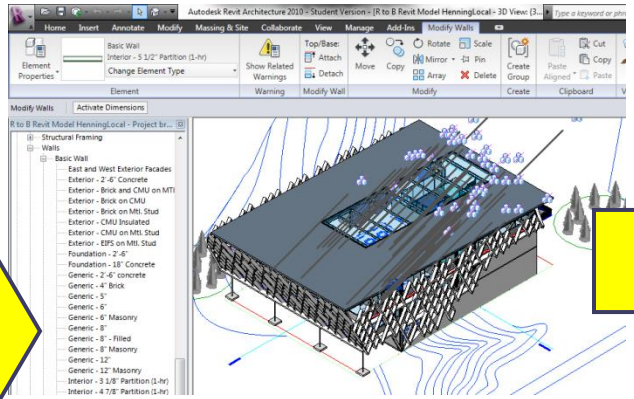
Cost and Schedule Process



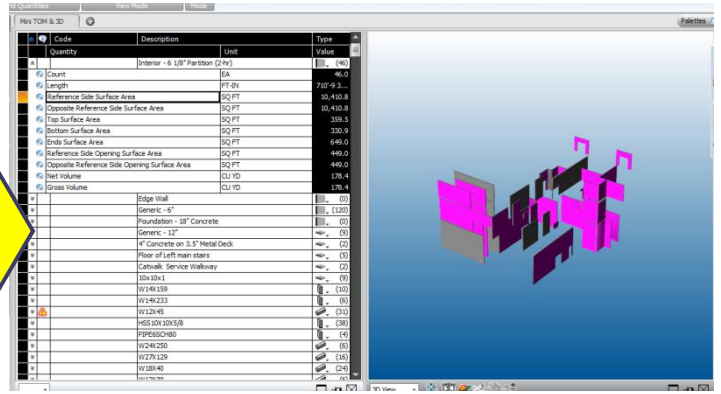
Assemblies

Wall Assemblies	Door Asser
2hr fire rated with insulation	Metal sing "panic han auditorium
2hr fire rated with acoustic insulation - Any sort of wall adjacent to main corridors need to be acoustic	Glass doul metal fram entrances
Retaining Wall - concrete with vapor barrier + rebar + drainage pipes	Glass singl metal fram entrance
Glass moving partition - seminar rooms	
Edge wall - 4' dry wall & double pane glass panels, with connections to ceilings and walls - hydrophobic glass coatings	
Interior half glass wall - 4' drywall & contraflam or promaglass (fire retardant glass)	

Define assemblies with team



Team models building, assigning correct object types



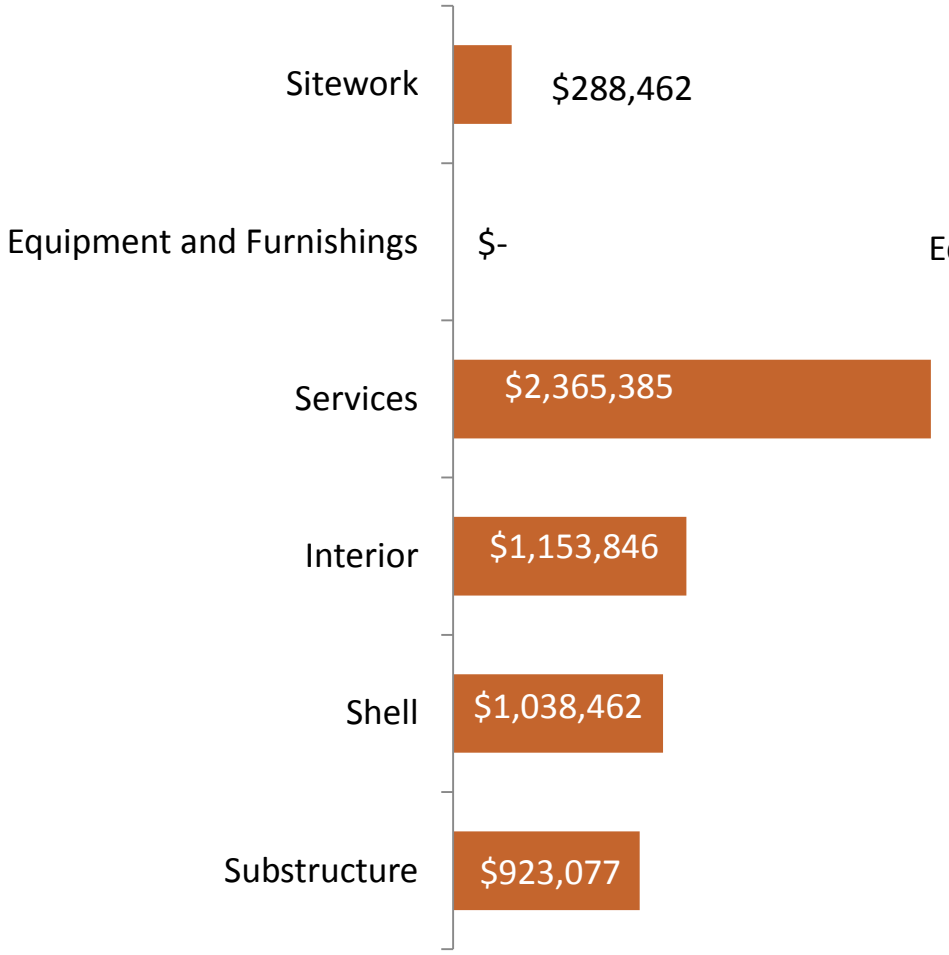
Construction manager creates quantity takeoff based on object types

Assembly	Quantity	Unit	Methods	Production Rate	Unit	No. of shif	Resources	Unit Cost	Unit	No of Crev	Cost Type		
2hr fire rated with insulation	17461	SF	Install metal studs 16" OC, 6" wide	392	sf/shift	14.8478	1 carpenter	192.15	$/hr	3	1	22824.02143	
							Metal studs	0.37	$/sf		2	6460.57	
			Install blanket insulation, paper backed, R19 6" thick	1350	sf/shift	12.9341	1 carpenter	64.05	$/hr		1	6627.419556	
							Insulation	0.52	$/sf		2	9079.72	
			Install gypsum boards+tape and finish	965	sf/shift	9.04715	2 carpenter	256.2	$/hr	2	1	18543.03917	
							5/8" gypsum	0.36	$/sf		2	6285.96	
			Paint walls	800	sf/shift	10.9131	1 pord	$108.20	$/hr	2	1	9446.401	
							paint	0.18	$/sf		2	3142.98	
												$ 82,410	Total

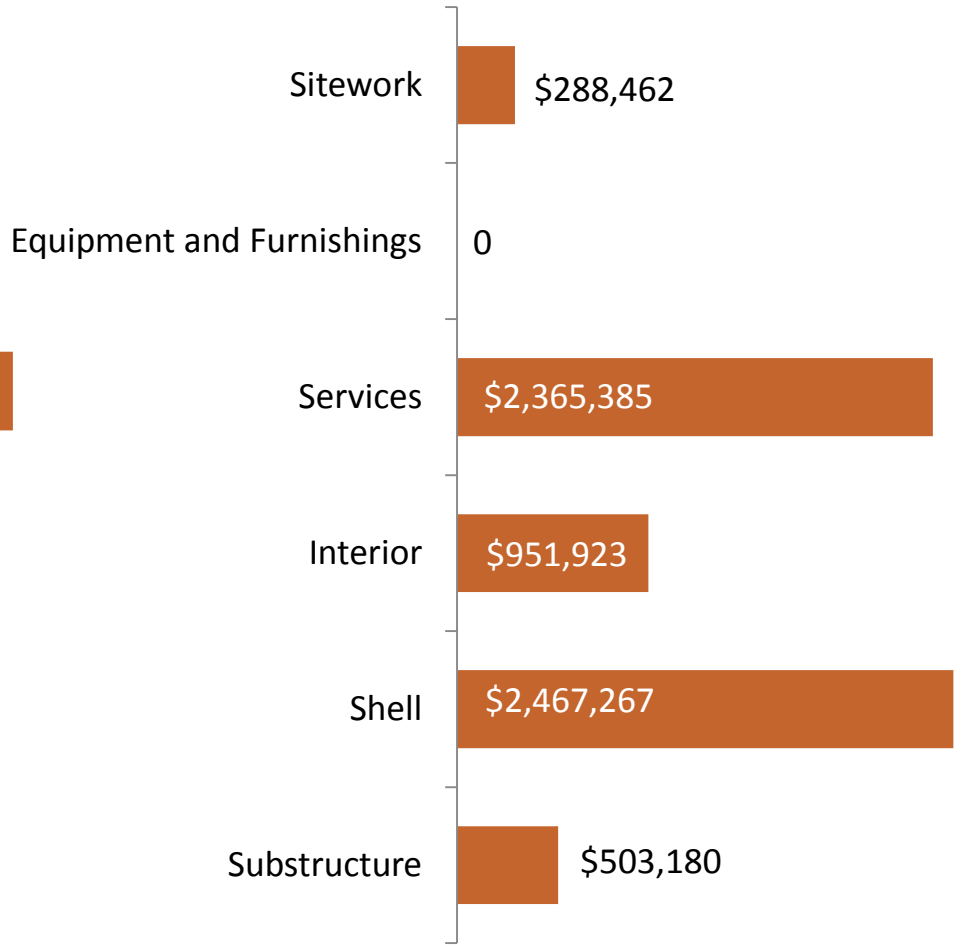
Construction manager creates assemblies database and enters quantities. Production method resultant is assembly duration, and resource resultant is assembly cost.

Estimate

Winter Quarter Target Value



Current Estimate



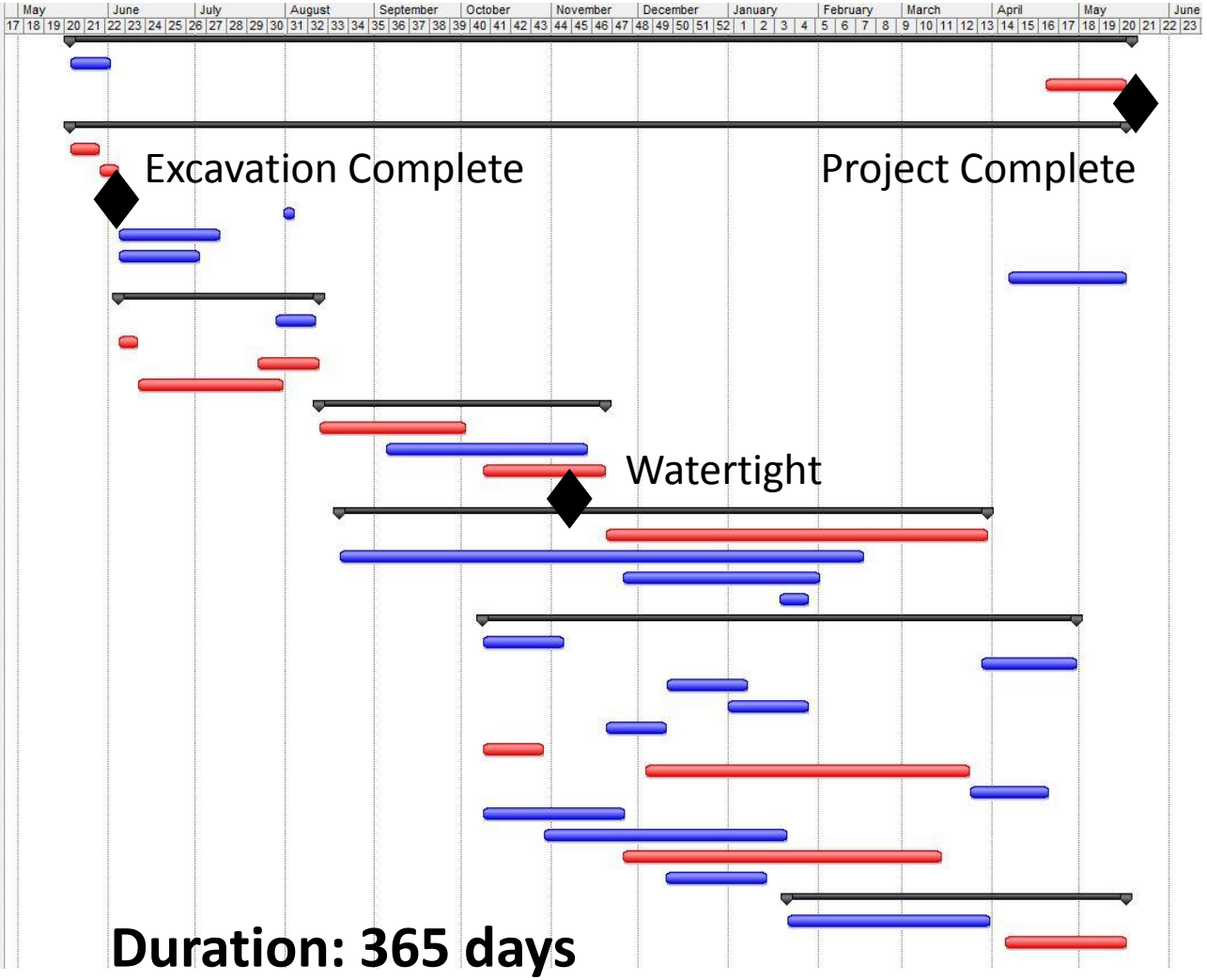
Budgeted Cost: $7.5 Million

Excel Estimate Books

- Cost estimate on left
- Cost assemblies on right

Schedule

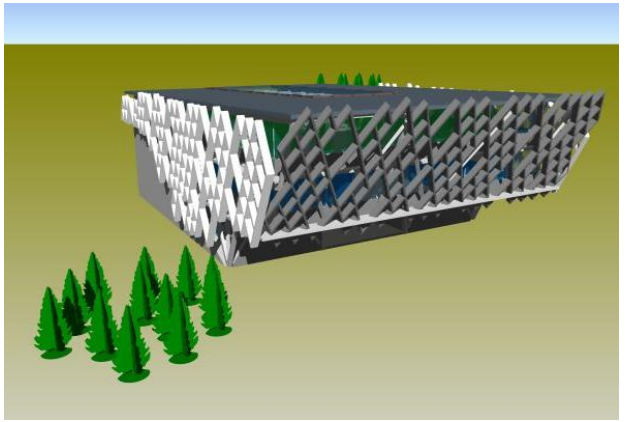
Code	Task Name	Duration
Z10	GENERAL REQUIREMENTS	262.14 days?
Z1030	Mobilize	10 days
Z1040	Project closeout	20 days
	PROJECT COMPLETE	1 day?
G	SITEWORK	260.14 days?
G1010	Cactus garden transplant	8 days
G1030	Excavation and Hauling	4.64 days
	EXCAVATION COMPLETE	1 day?
G1030	Backfill	1.8 days
G30	Civil and Mechanical	25 days
G40	Site Electrical	20 days
G20	Site Improvements	29 days
A	SUBSTRUCTURE	49.3 days
A1010	Column Foundations	9.83 days
A1010	Wall Foundations	4.6 days
A1030	Slab on Grade	15.1 days
A2020	Basement Walls	36.34 days
B	SHELL	70.5 days
B1010	Floors	36.15 days
B2020	Exterior Wall	49.8 days
B3010	Roof Coverings	30.3 days
	WATERTIGHT	1 day?
C	INTERIOR	159.16 days
C1010	Partitions	93.66 days
C2010	Stairs	128.8 days
C3020	Floor finishes	47.5 days
C3030	Ceiling finishes	8.15 days
D	SERVICES	146.86 days
D1010	Elevators	20 days
D2010	Plumbing fixtures	25 days
D2020	Domestic water distribution	20 days
D2030	Sanitary waste	20 days
D2040	Rainwater drainage	15 days
D3010	Energy supply	15 days
D3040	HVAC distribution	80 days
D3050	Terminal and packaged units	19 days
D4030	Fire protection specialties	35 days
D5010	Service and distribution	60 days
D5020	Lighting and branch wiring	78.06 days
D5030	Communication and security	25 days
E	EQUIPMENT AND FURNISHINGS	83 days
E1010	Equipment	50 days
E2010	Furnishings	30 days



Critical Task

Milestone

Milestones



Milestone 1: Excavation Complete

June 5, 2015

Milestone 2: Water tight

Nov 5, 2015

Milestone 3: Building Complete

May 19, 2016

4D Perspective

- Have next to Milestones and Gantt chart slides

4D Section

- Have next to Milestones and Gantt chart slides

Project Equipment - Heavy

Heavy material handling

Volvo L220F Hybrid

Concrete pump

SANY 5253THB

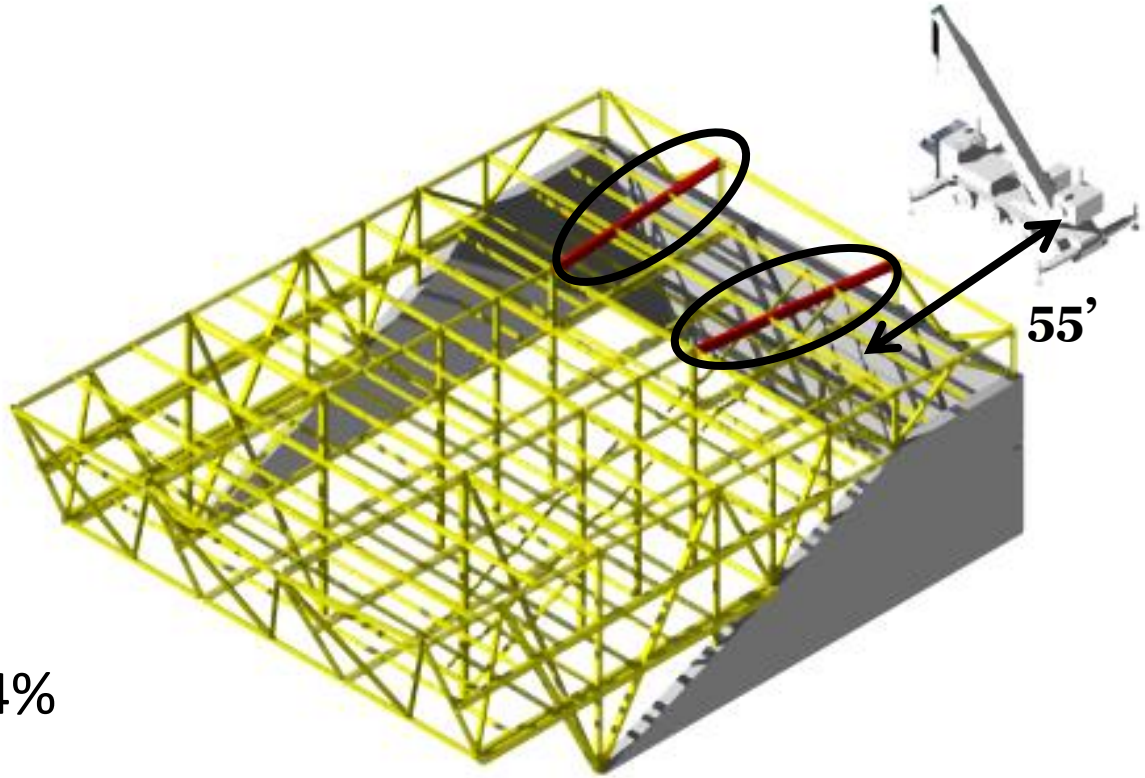
Excavation

Kamatsu PC200-8 Hybrid

Crane

Grove TM500E-2
45ton Truck Mounted-
Hydraulic Crane

Crane – Greatest Load



Beam Weight: 5,080lbs
Crane Capacity Used: 64%
Lift Radius: 55 ft
Boom Angle @ 55ft: 44^{o}

Model Integration

- Properties
- Visual Description

- Unit Costs
- Production Rates

Scope

Cost

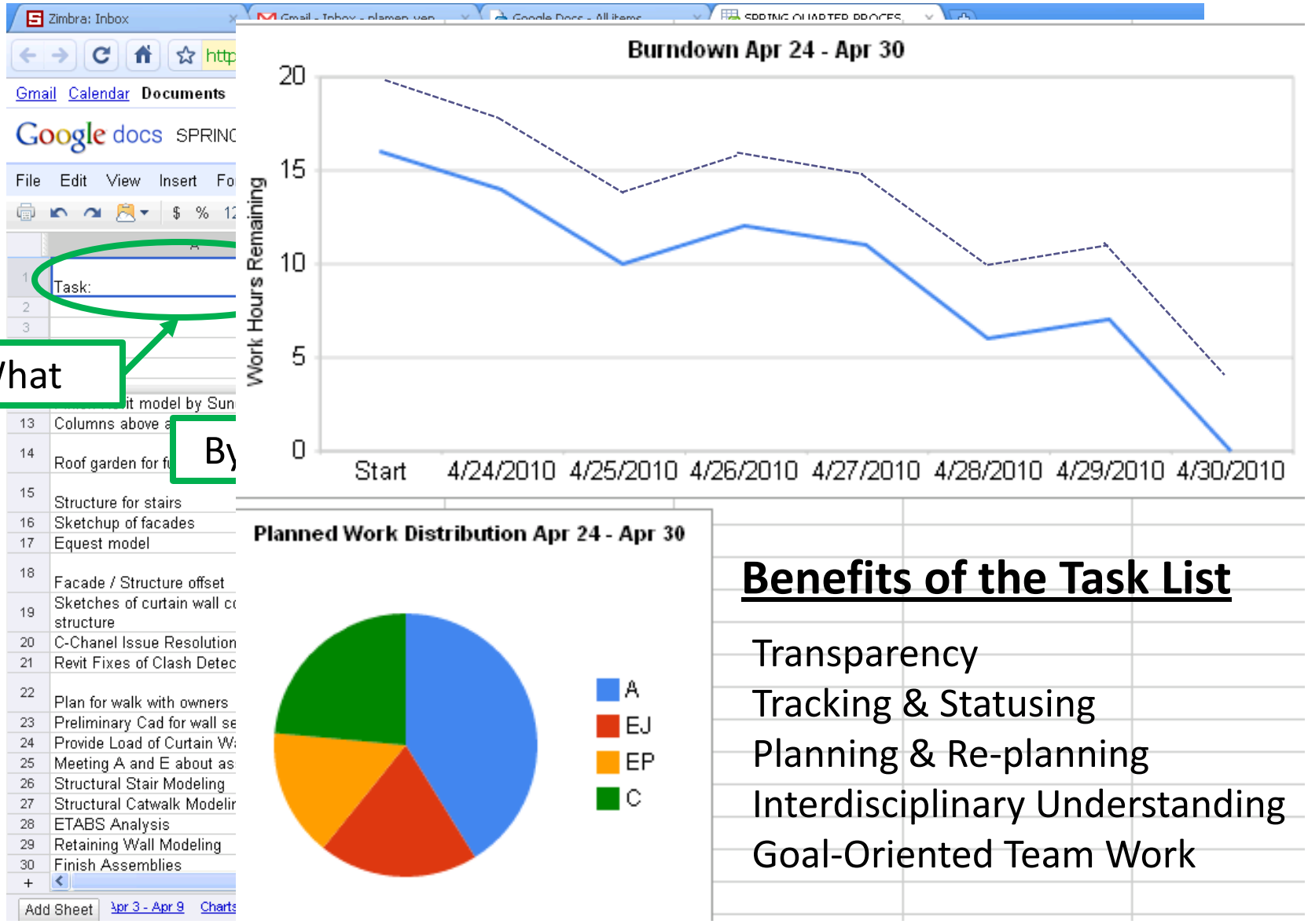
Quality

Schedule

- Performance Analysis

- Duration
- Logic

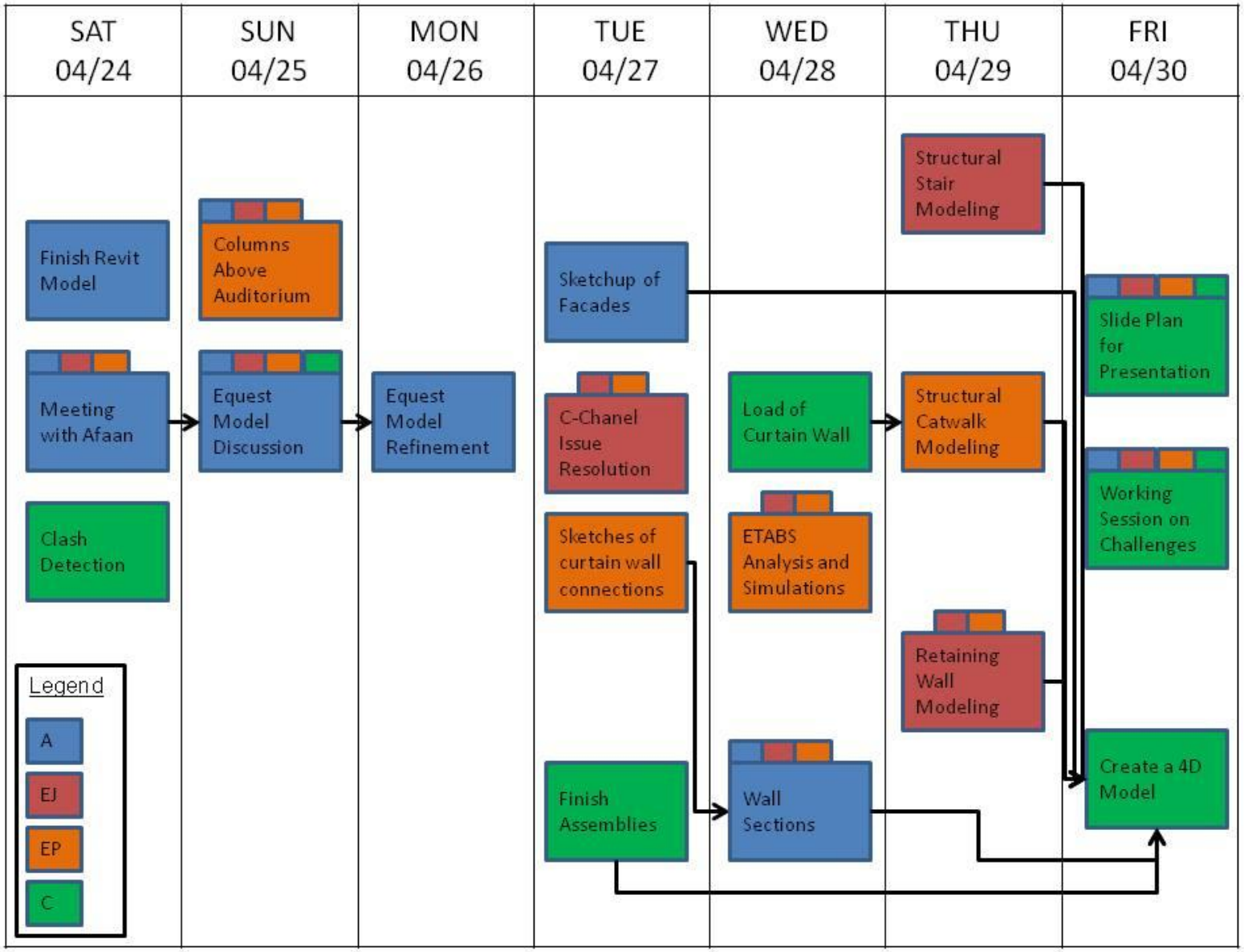
Task List → Track & Manage Design Work



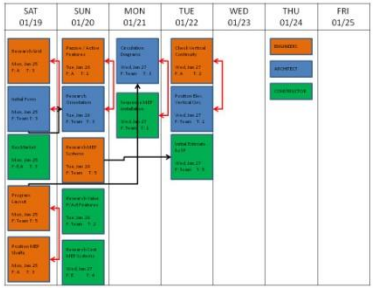
Benefits of the Task List

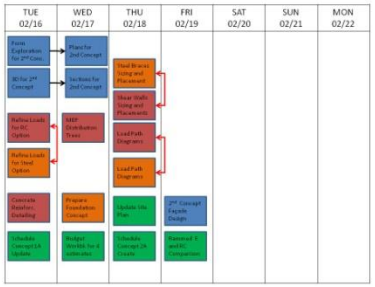
- Transparency
- Tracking & Statusing
- Planning & Re-planning
- Interdisciplinary Understanding
- Goal-Oriented Team Work

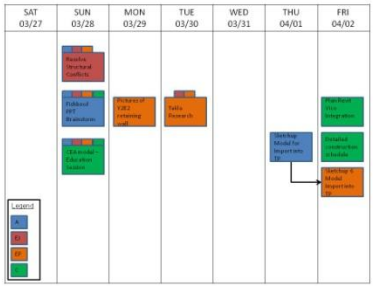
Task List → Weekly Production Plan

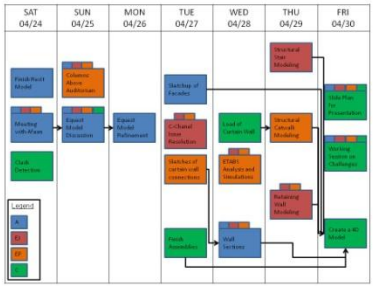


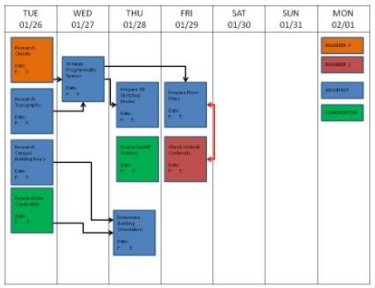
Production Plan Evolution

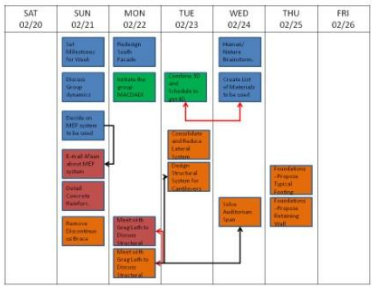


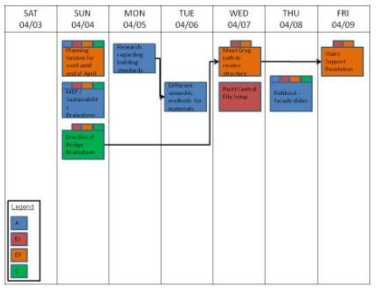


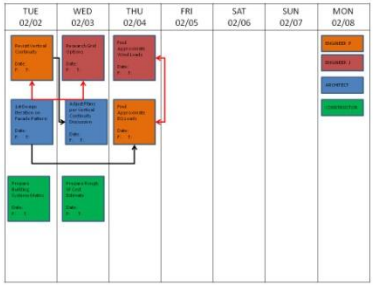


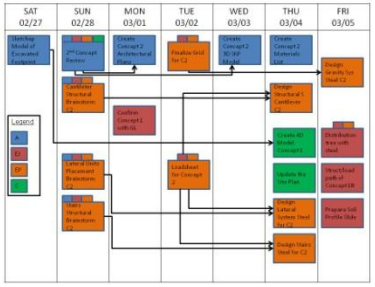


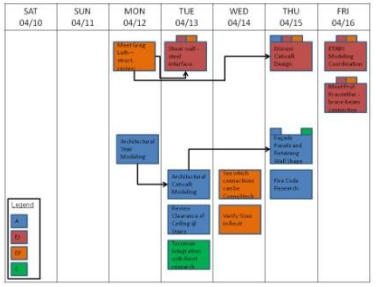


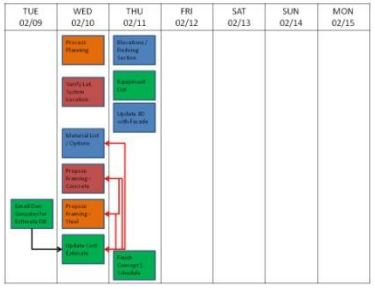


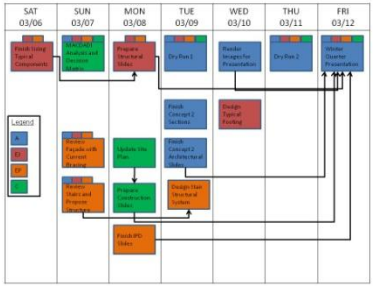


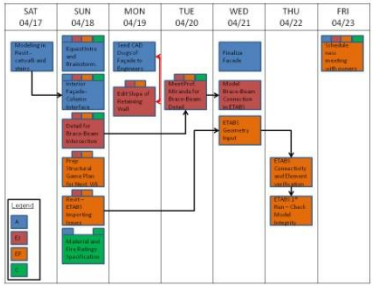




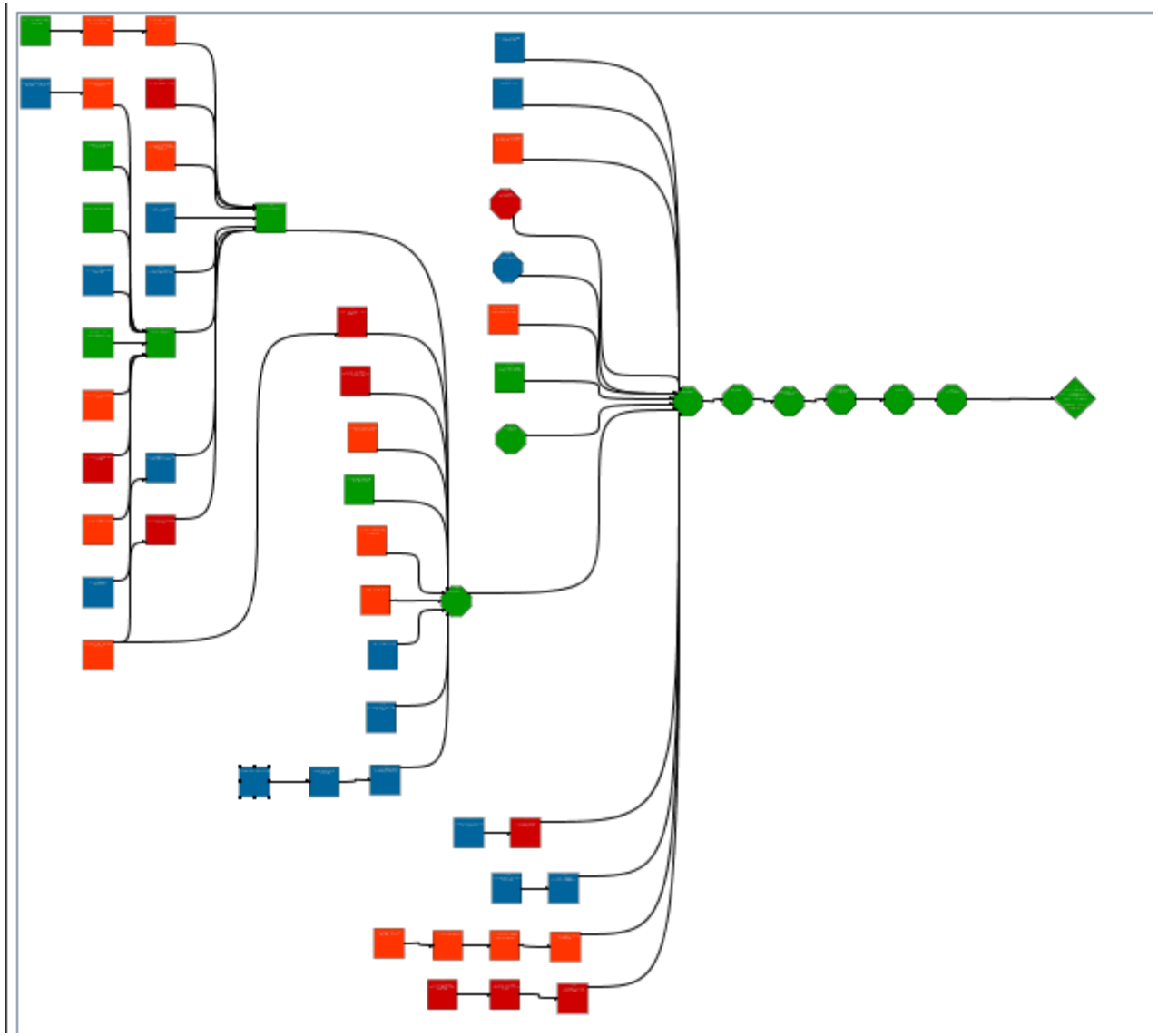




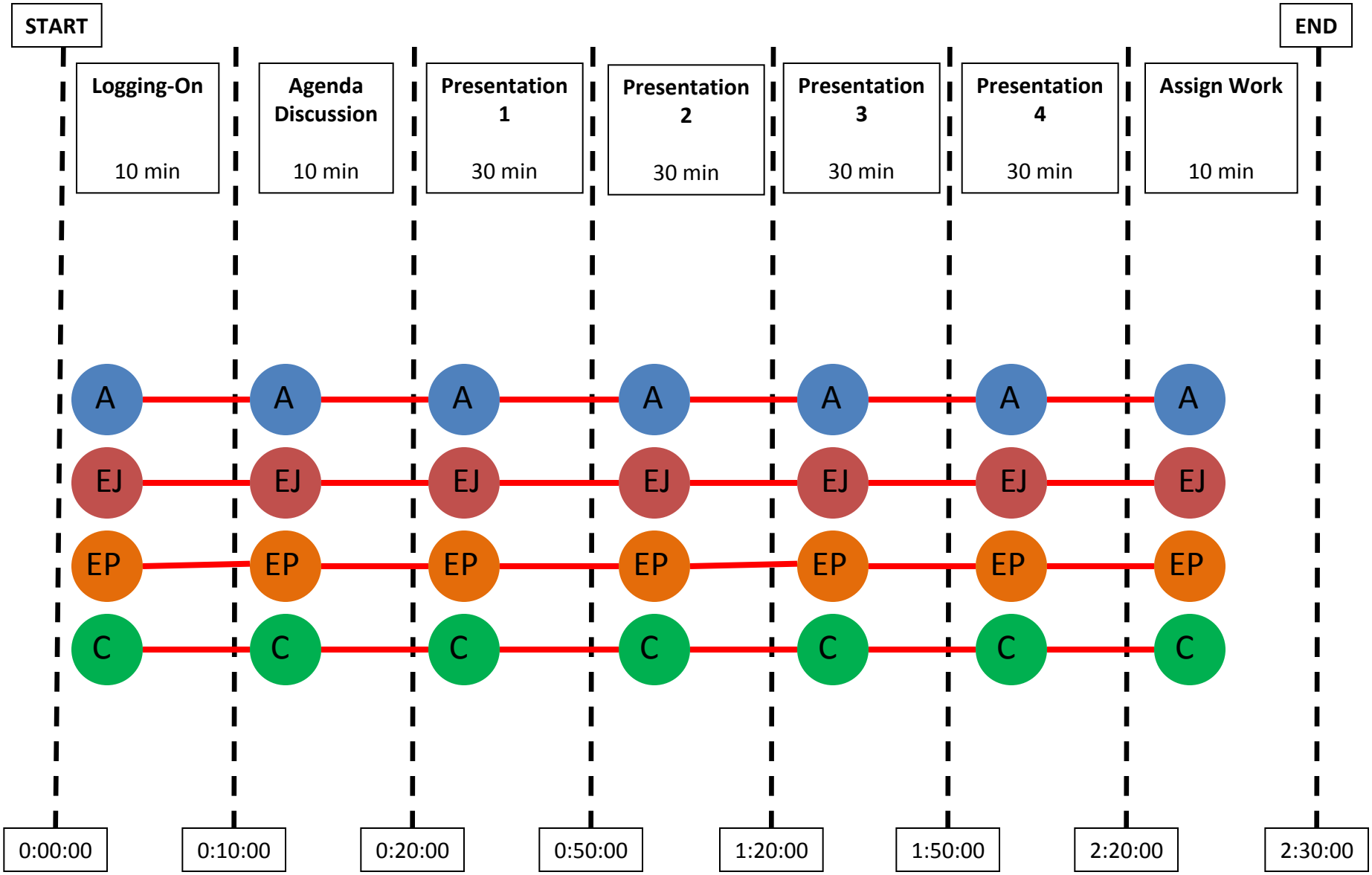




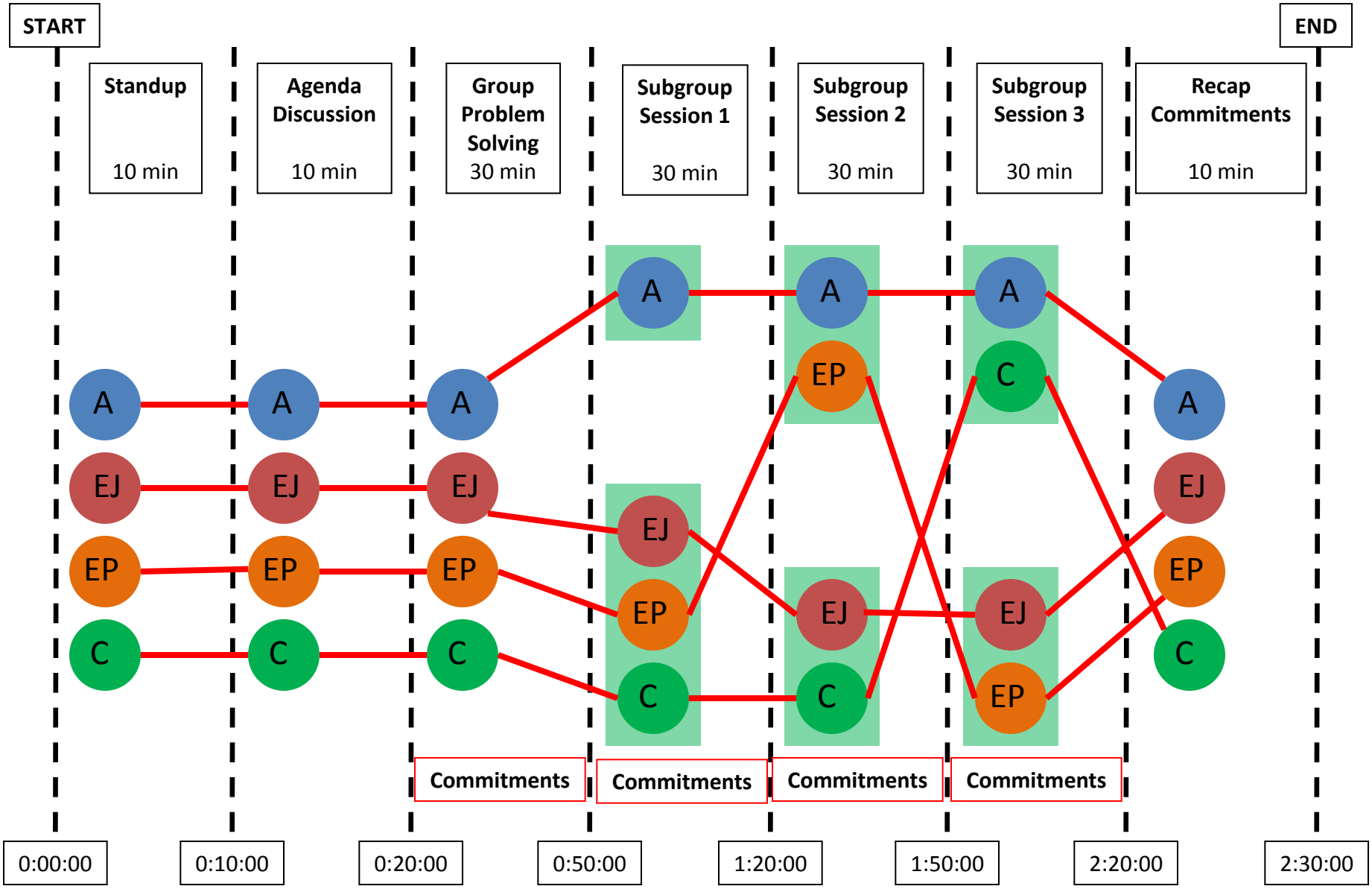
Design Work Flow in SPS



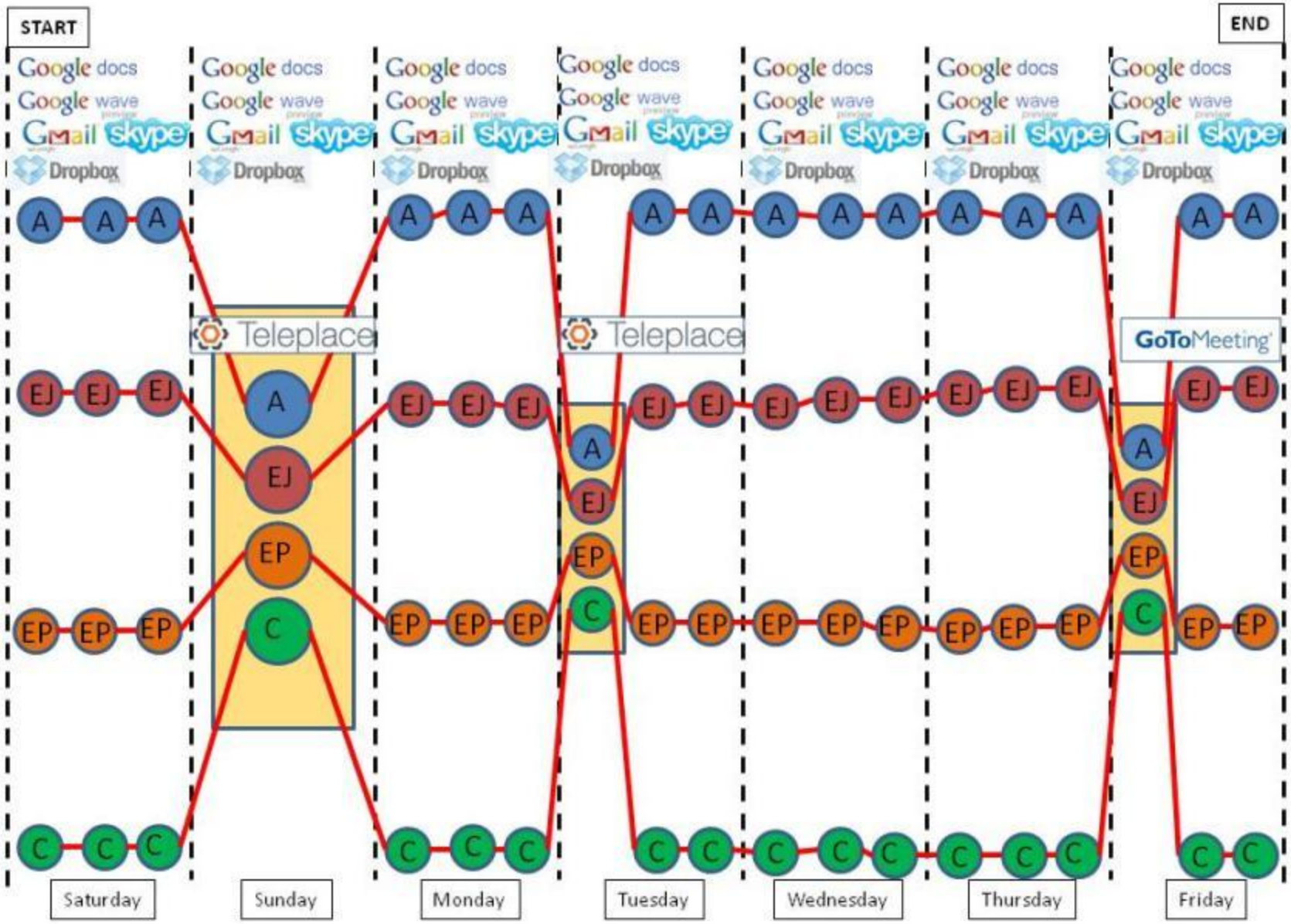
Meeting Dynamics- Winter



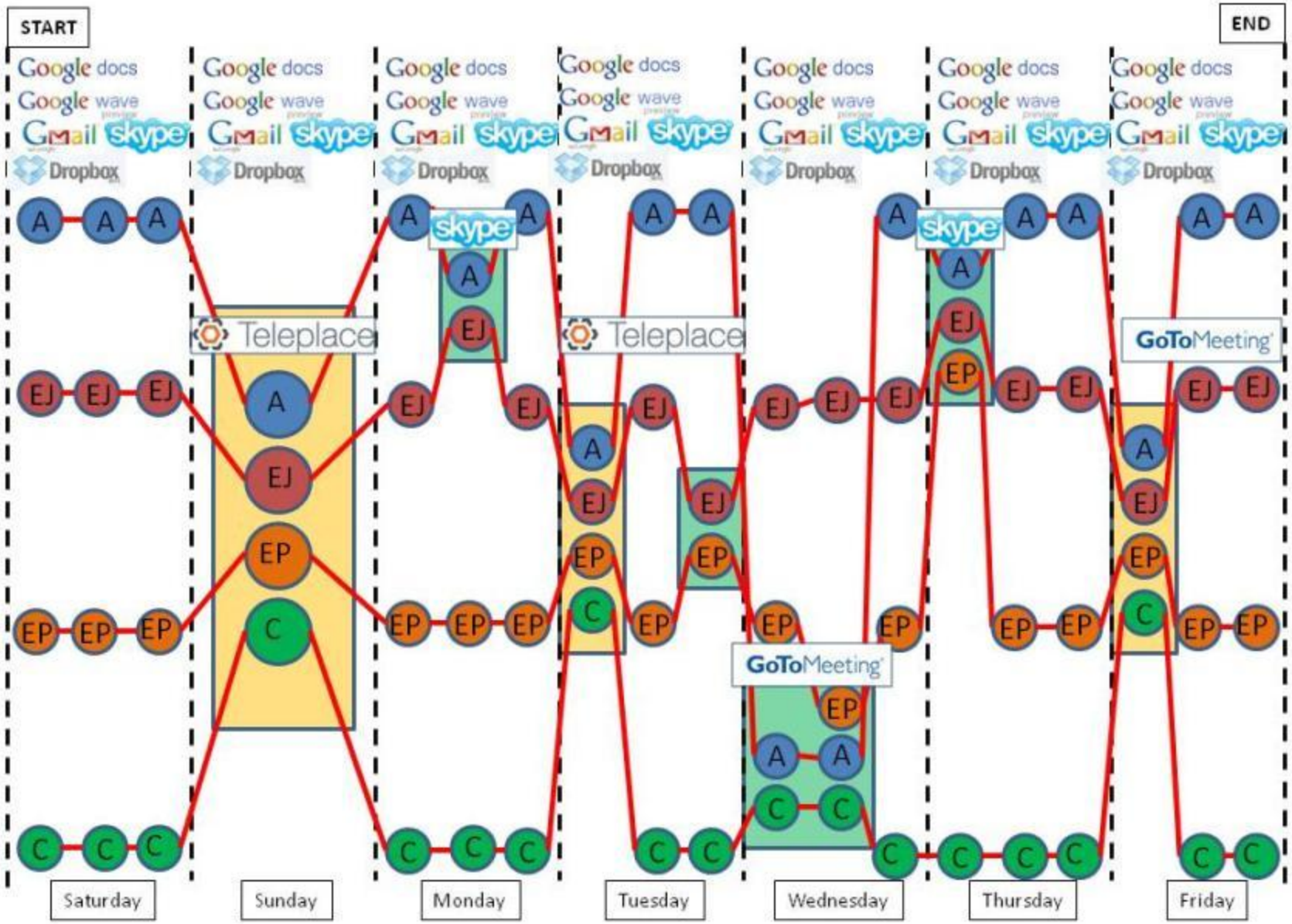
Meeting Dynamics - Spring



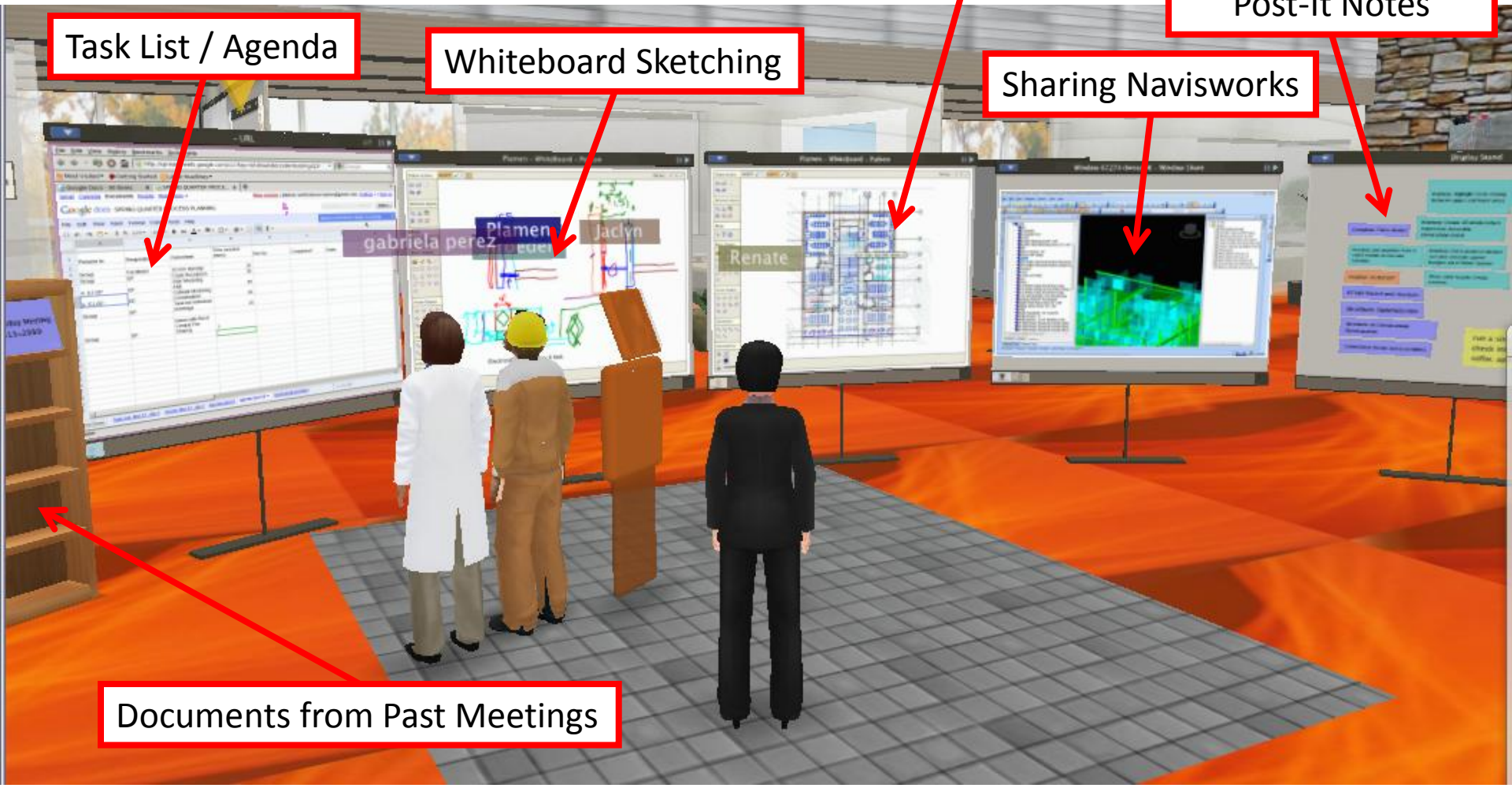
Work Week Dynamics - Winter



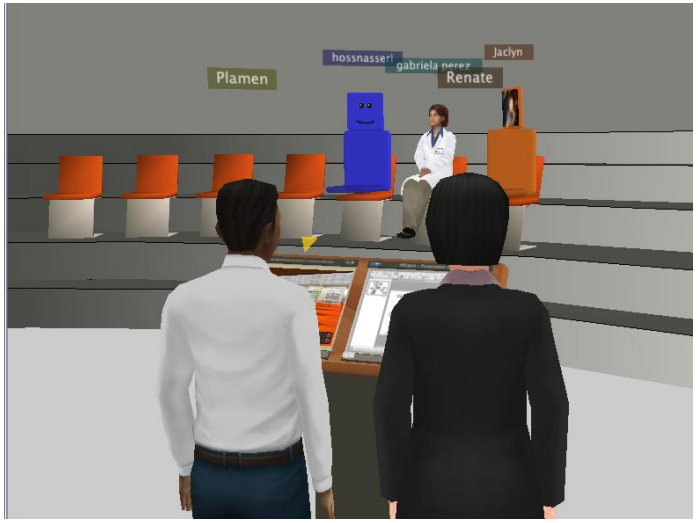
Work Week Dynamics - Spring



Interaction in Teleplace



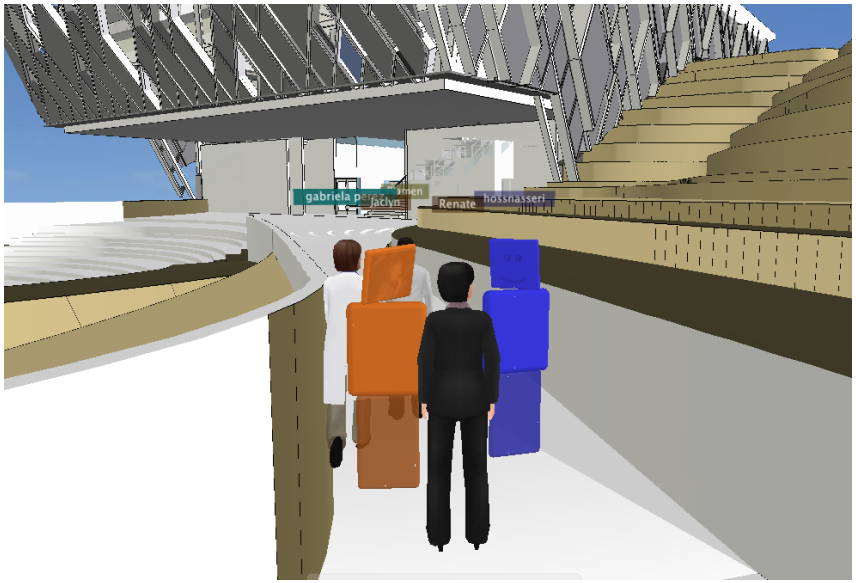
Experiencing R2B in Teleplace

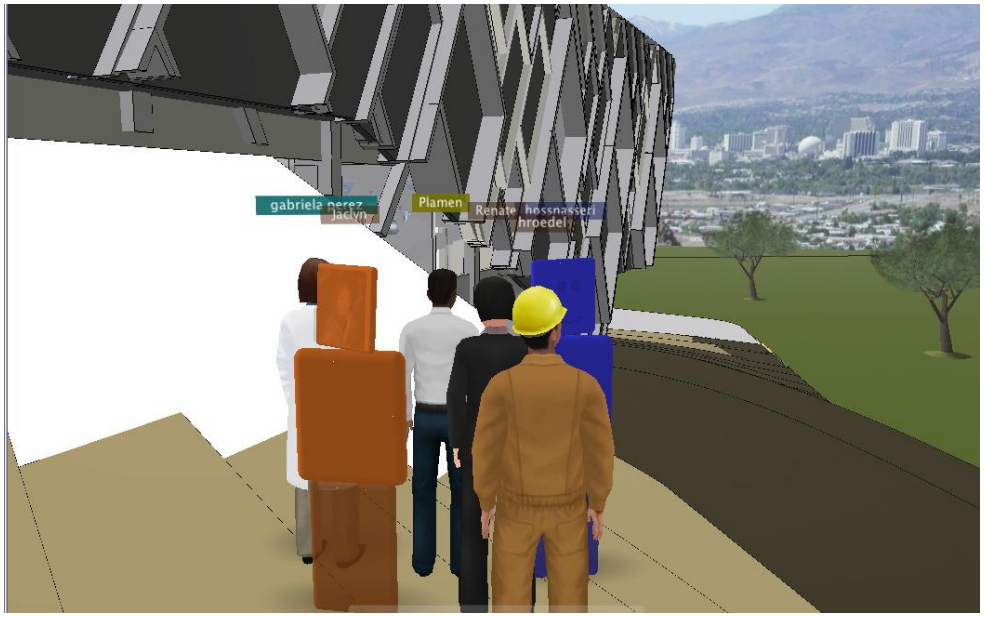


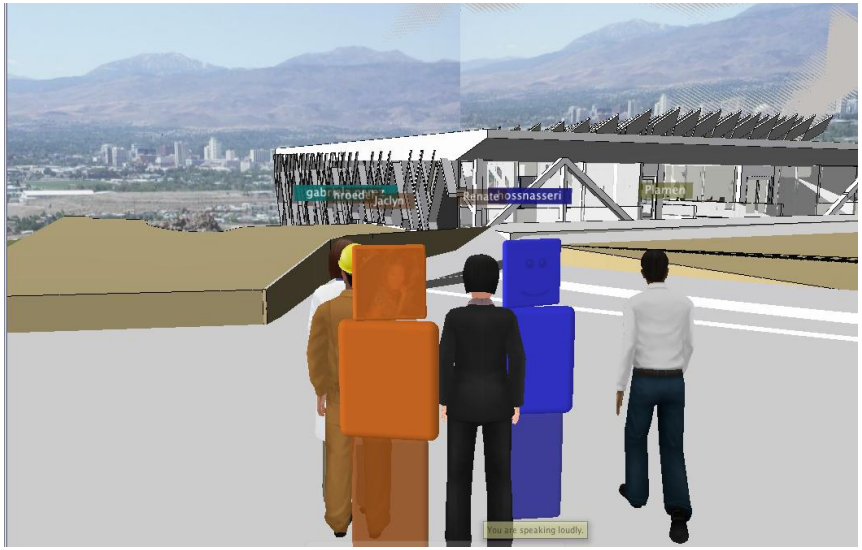
Beyond Conventional Visualization

Exploring Typical Spaces
Enacting End-User Scenarios
Performing Visual Inspections

Experiencing R2B in Teleplace







Involving the Owners in the Design

Select a view to experience
Explore building context
Perform circulation review

Birthdays in Teleplace

THANK YOU!

Renate Fruchter
Bahrath Sridharan
Ron Teitelbaum
Forest Peterson
Hossein Nasseri
Humberto Cavallin
Afaan Naqvi
Adhmina Rodriguez
Prof. Helmut Krawinkler
Prof. Eduardo Miranda
Greg Luth
Glenn Katz
David Bendet
Prof. Bob Tatum
Balazs

Team Ridge 2010

"Coordination is a negotiated agreement, Integration is an effort made together."

- Henning Roedel

"No cantilever is too big"

- Plamen Ivanov

" Integration is more than charts and lists. It is about being successful in putting yourself in the other's position and understanding what they need"

- Gabriela Perez

"Communication *truly* is a skill"

- Jaclyn Lee