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Building Together: How Integrated DFMA Delivered a Complex Mass Timber Theater in Hudson Valley

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WoodWorks | The Wood Products Council

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Questions related to specific materials, methods, and services will be addressed at the conclusion of this presentation.



Course Description

Delivering successful mass timber buildings depends on early and continuous collaboration among architects, engineers, fabricators, and contractors. Using the Samuel H. Scripps Theatre Center for Hudson Valley Shakespeare as a case study, this session examines how a Design for Manufacturing and Assembly (DFMA) approach informed project delivery through an integrated design and construction process. The project team will explain how early coordination aligned architectural intent with structural performance, fabrication capabilities and construction sequencing to improve efficiency, reduce project risk, and support sustainability objectives. Participants will gain practical strategies for incorporating DFMA principles into mass timber projects, fostering interdisciplinary collaboration and making informed decisions that enhance constructability, building performance, and long-term project success.

Learning Objectives

1. Describe how early collaboration among architects, engineers, fabricators, and contractors supports the successful design and delivery of mass timber buildings while improving constructability, safety, and project performance.
2. Explain how DFMA principles influence mass timber design decisions, including structural systems, fabrication constraints, connection detailing, and construction sequencing.
3. Identify project coordination strategies that reduce construction risk, improve installation efficiency, and maintain quality through prefabrication and integrated project planning.
4. Evaluate how an integrated DFMA approach can support high-performance, sustainable mass timber buildings by aligning architectural, structural, and construction objectives throughout project delivery.

Hudson Valley Shakespeare Samuel H. Scripps Theatre Center

Building the Hudson Valley Shakespeare
Theater : Design, Engineering, and Delivery of
a complex Mass Timber Structure



October 7, 2026

Disclaimer: This presentation was developed by a third party and is not funded by WoodWorks or the Softwood Lumber Board.

Speakers



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Senior Project Leader

Studio Gang



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Senior Associate

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Dave Savard
Sales and Marketing
Director

**art
massif**



Caren Amicone
Project Executive


CONSIGLI
Since 1995

Project Team

Studio Gang, Architect

Thornton Tomasetti, structural engineer

Art Massif, timber engineer & fabricator

Nelson Byrd Woltz, landscape architect

Buro Happold, MEP, FP, IT, security & sustainability

Threshold Acoustics, acoustic and AV consultant

Fisher Dachs Associates, theater consultant

Tillotson Design Associates, lighting consultant

Badey & Watson, survey, traffic, and civil engineer

Flyleaf Creative Inc., signage and wayfinding

Consigli, construction manager

Key Info

Location, **Garrison, New York**

Status, **Under construction**

Client, **Hudson Valley Shakespeare**

Project Type, **Theater**

Size & capacity, **26,000 sf & 482 seats**

Sustainability, **Targeting LEED Platinum**

Initial Concept and Architecture



Project Context

An aerial photograph of a festival site in a lush green valley. In the foreground, a large white event tent with multiple peaks is set up on a dirt area. To its right, a grassy field contains a red baseball diamond and a group of people. The middle ground is dominated by a dense forest. In the background, a wide river winds through a vast, flat landscape, eventually leading to a larger body of water under a hazy sky with distant mountains.

Who is Hudson Valley Shakespeare?

A man in a light-colored shirt and dark vest stands in the center of a sandy outdoor stage at night. He is illuminated by a spotlight. To his left is a simple wooden chair. To his right, an audience of about eight people is seated on a bench, watching him. The background is dark with trees and a blue sky. A large metal structure is visible on the right side of the stage.

How is HVS theater-making unique?



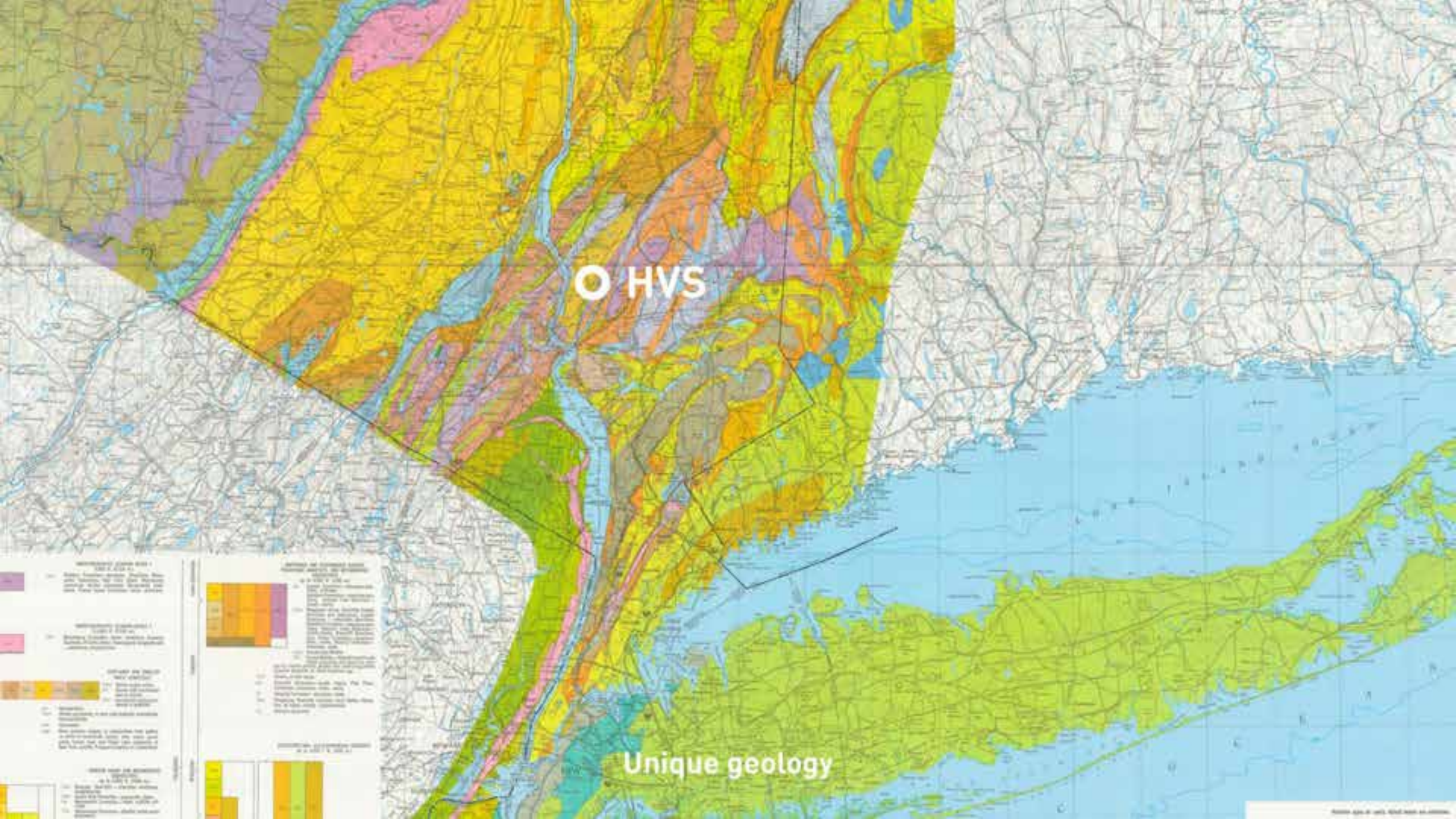
Boscobel

Why is this project happening?

Garrison

The background of the slide is a topographic map with contour lines, rendered in a dark blue color scheme. The map shows a complex terrain with various peaks and valleys. The text "Site Context" is centered over the map.

Site Context



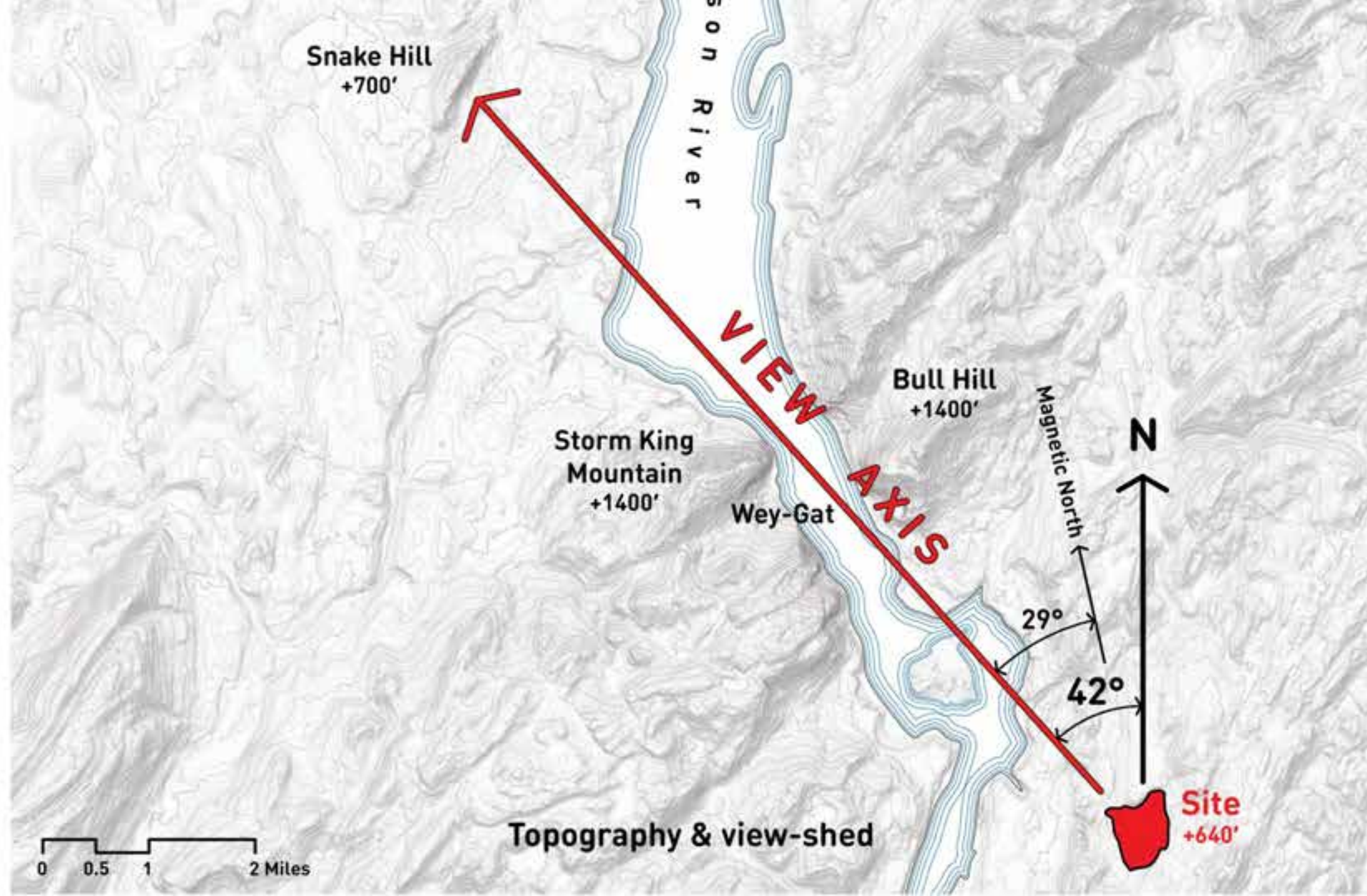
HVS

Unique geology





Where this project is happening





Riparian ecology, unique topography, and vivid skies that inspired the Hudson Valley School



Fresh water mussels



Stone revealed on site

Local ecology



Traditional half-timbered Tudor framing at the Globe Theater in London



The sky, the natural world close at hand



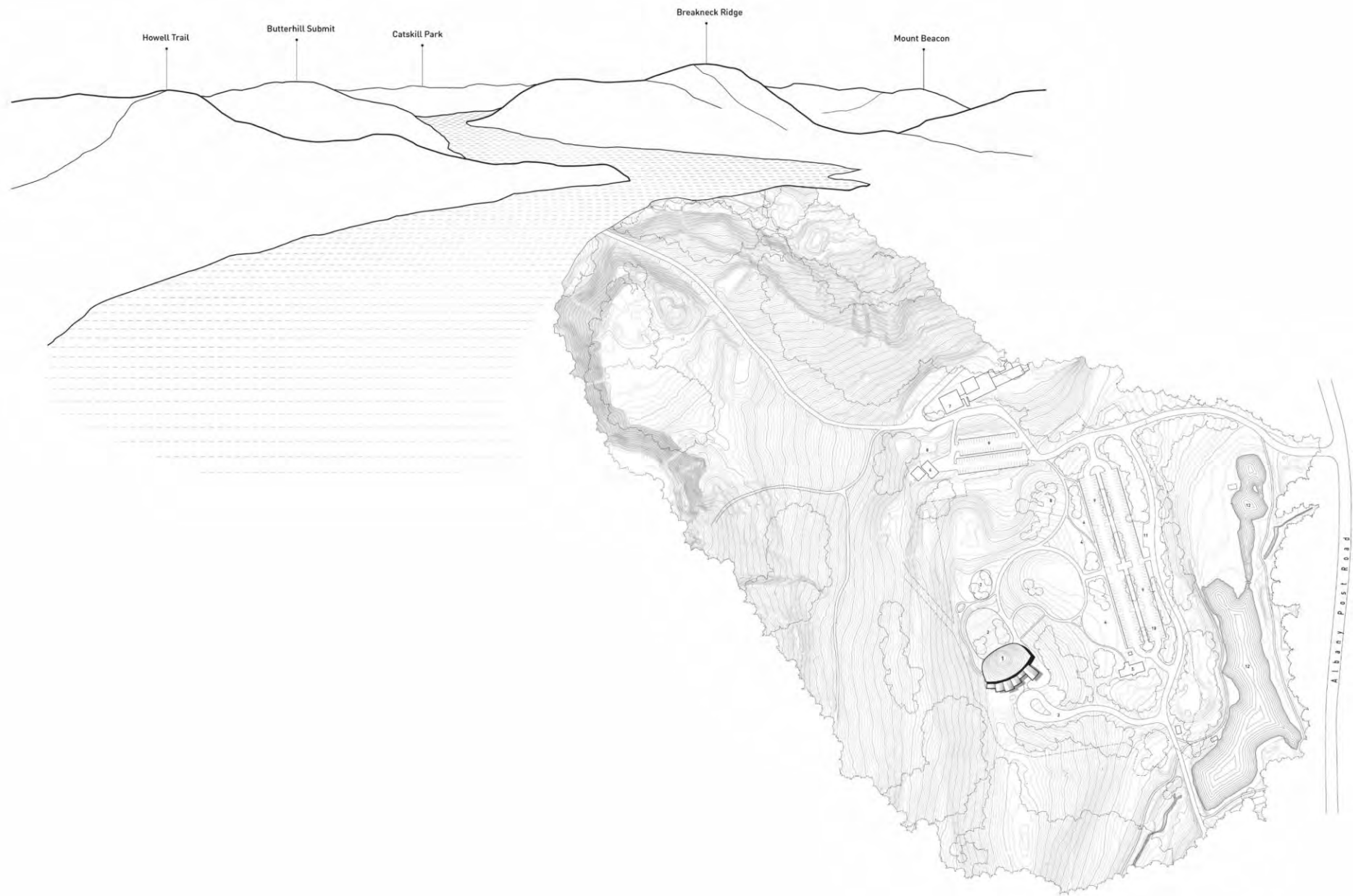
Use of natural materials throughout

Precedent



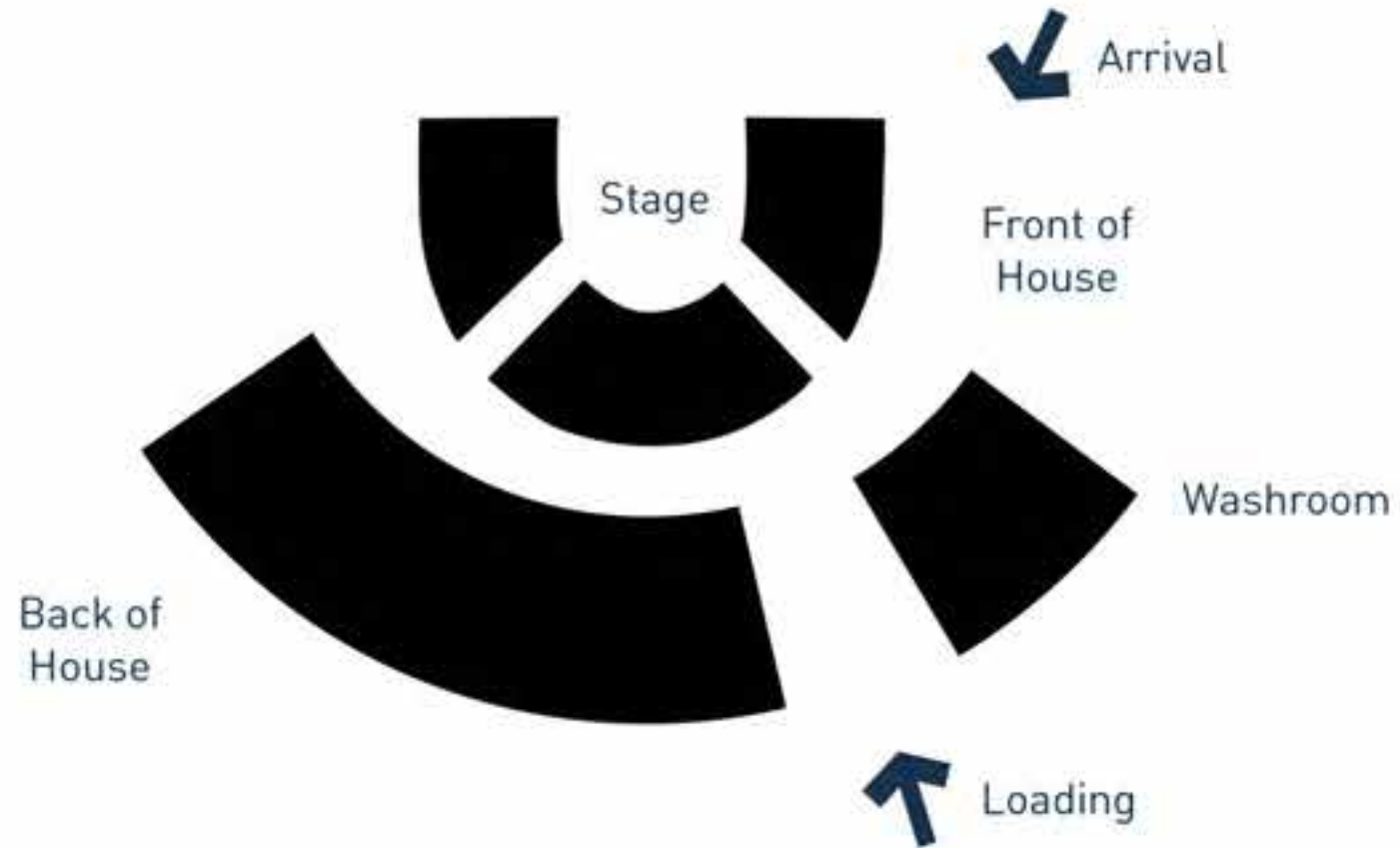
Design Concept



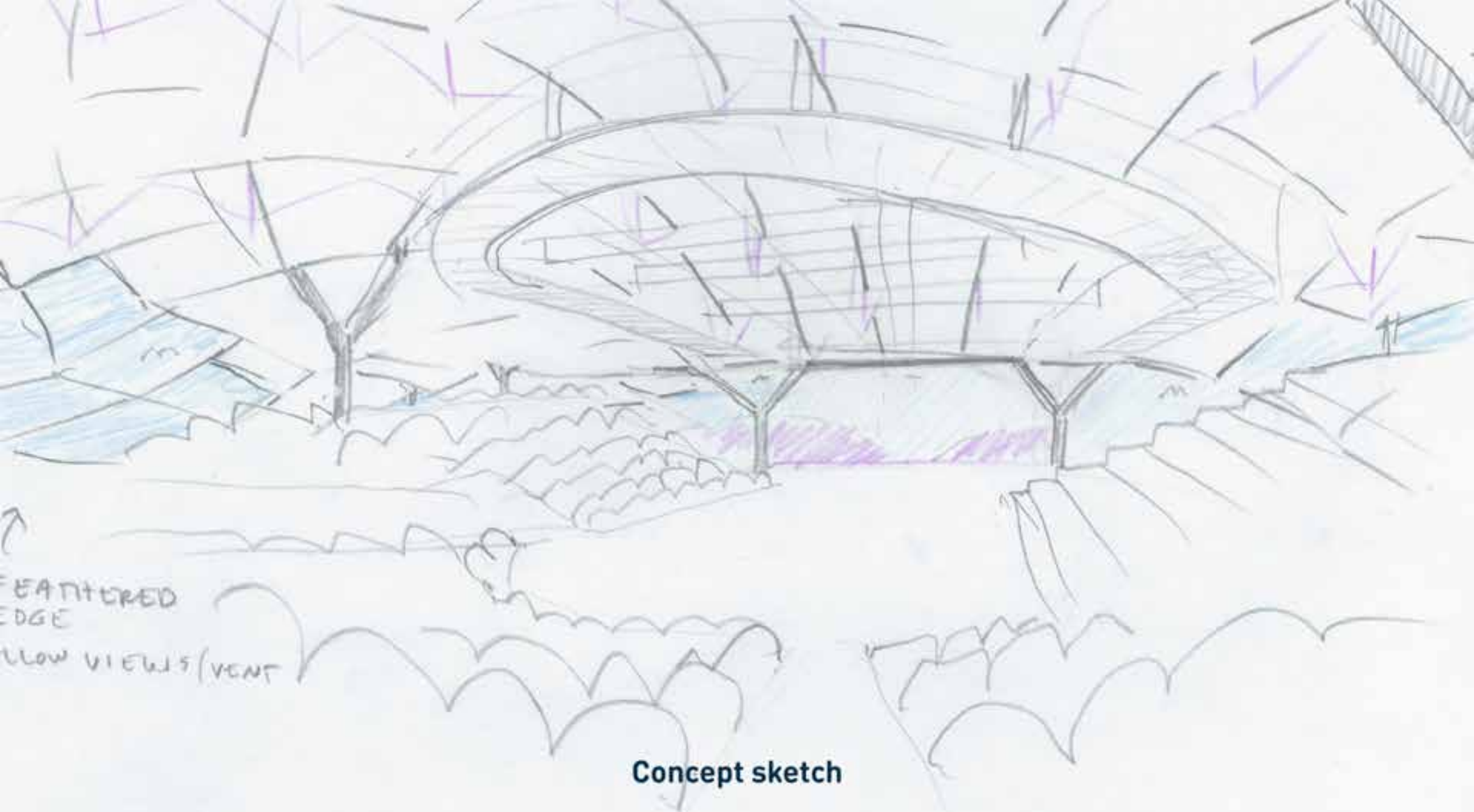


- Site Plan
1. Theater
 2. Picnic Lawn
 3. Entry Road
 4. Welcome Garden
 5. Administration
 6. Pavilion
 7. Wedding Venue
 8. Mountain Trail
 9. Parking Lot
 10. Old Chapel
 11. New Chapel
 12. Road
 13. Proposed Addition
- 0 50 100

Siting Approach

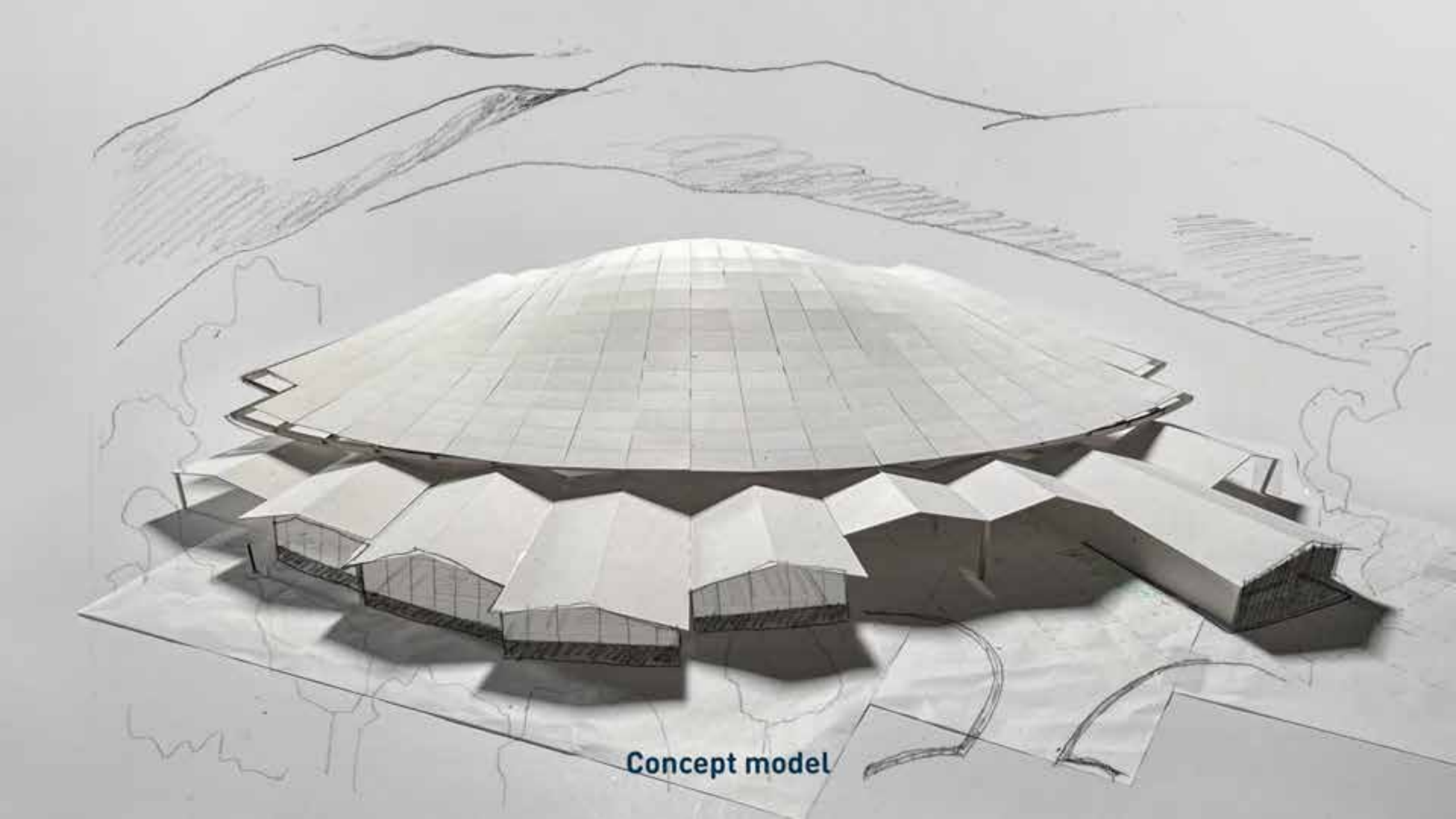


Shifted arc, closes up at rear of theater rake to screen FOH from BOH. Opens up on far side

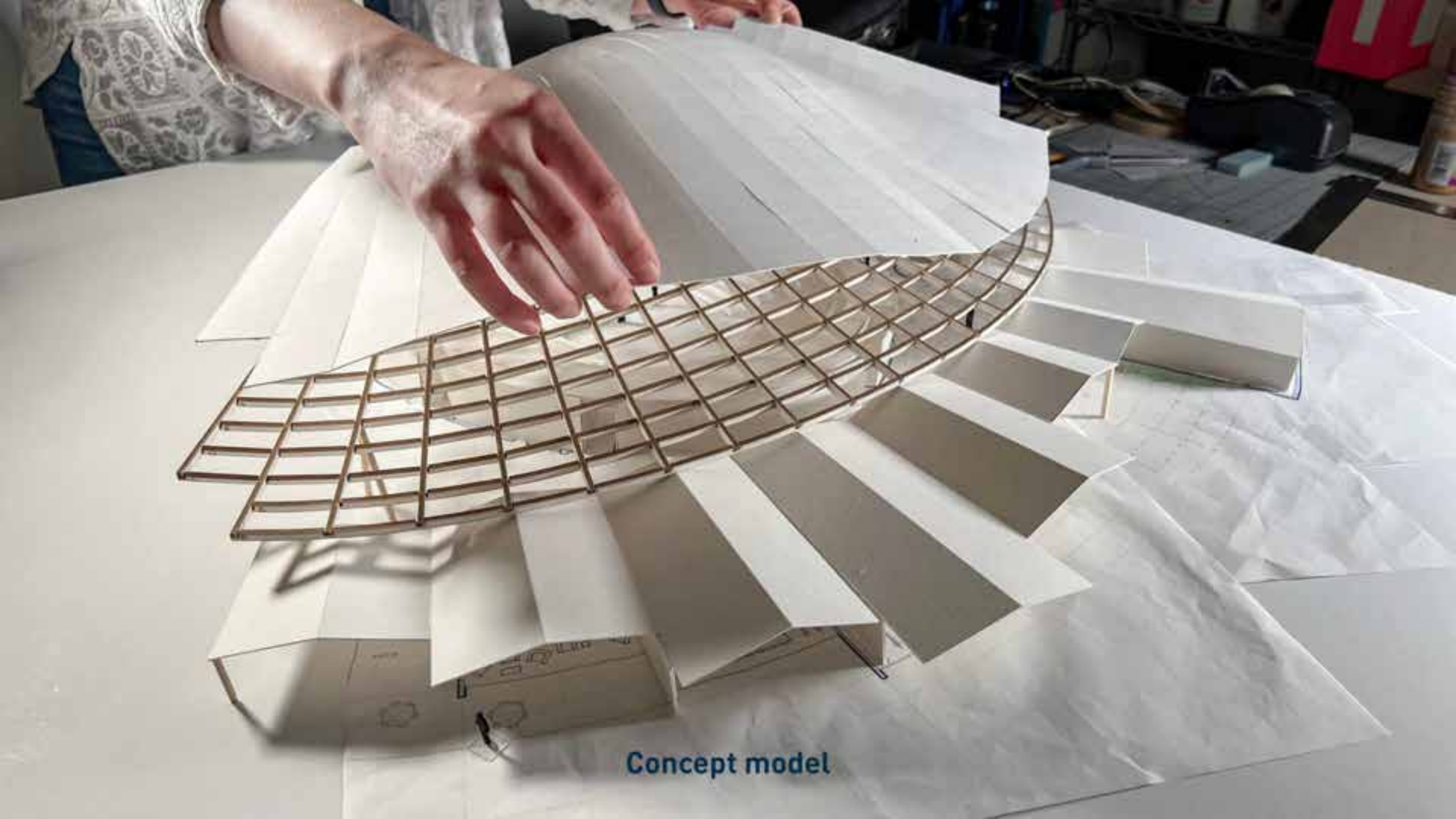


↑
FEATHERED
EDGE
LOW VIEWS / VENT

Concept sketch



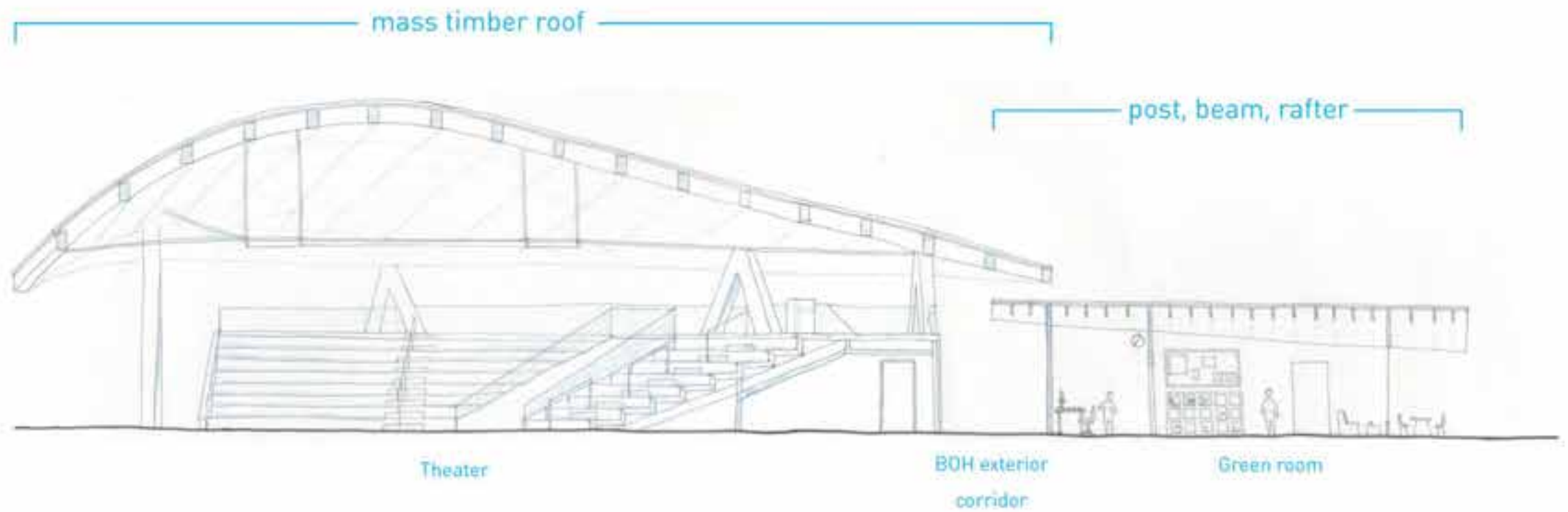
Concept model



Concept model



Concept model

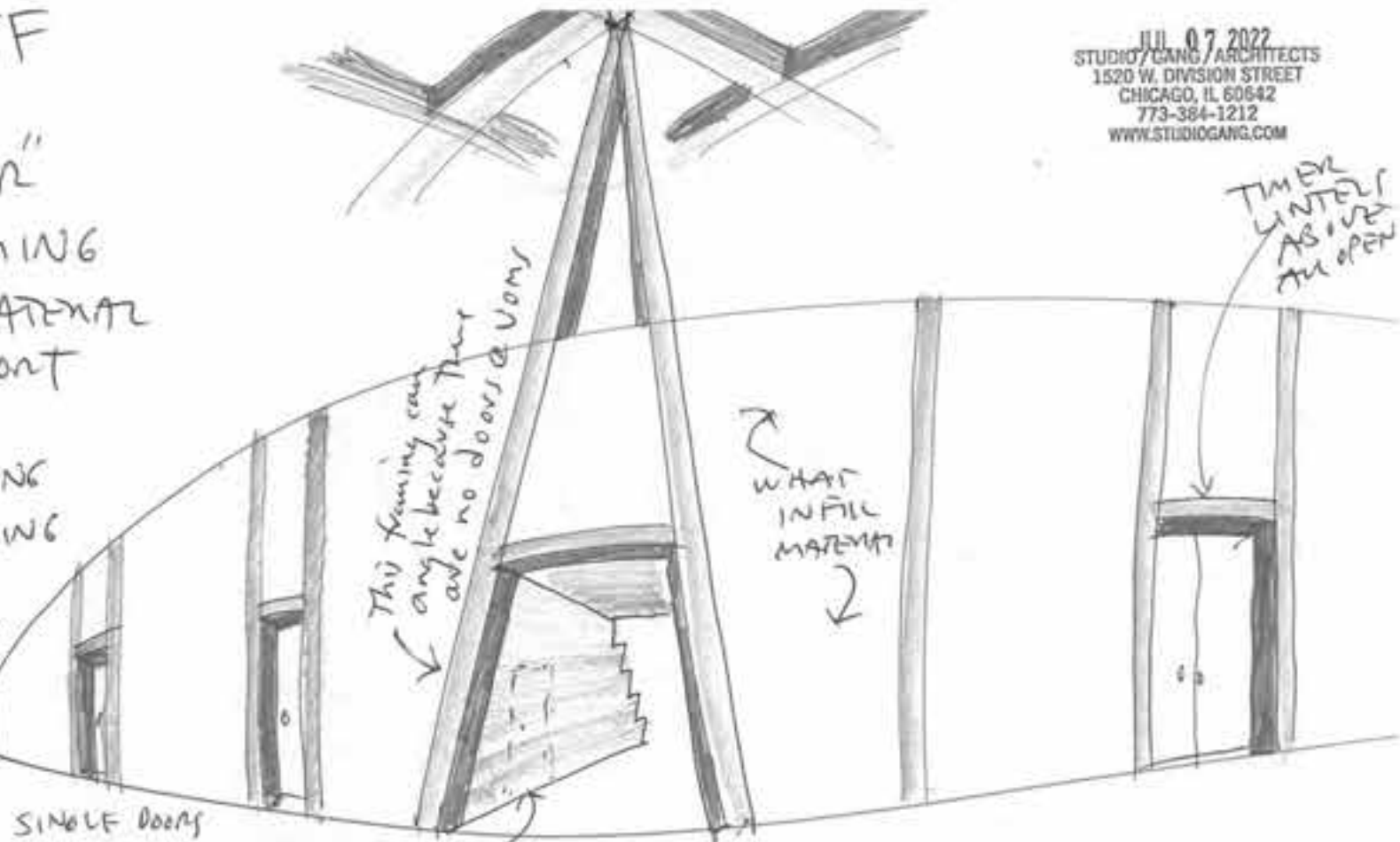


Section concept

HVSF

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1520 W. DIVISION STREET
CHICAGO, IL 60642
773-384-1212
WWW.STUDIOGANG.COM

'TUDOR'
FRAMING
@ LATERAL
SUPPORT
AND
OPENING
FRAMING
IN
SEATING
BLOCK



SINGLE DOORS

TIMBER POSTS
FRAME ALL
SPRUCE
OPENINGS
@ BACK OF
SEATING

SECRET door
location

TIMBER
LATERAL BRACE
"A-FRAME" FRAMED
VOM (BOTH VOMS)
THE TWO VOMS
ARE ORIENTED APPROX

POSTS
MIGHT
EXIST
ALONG
AROUND
BACK OF
SEATING

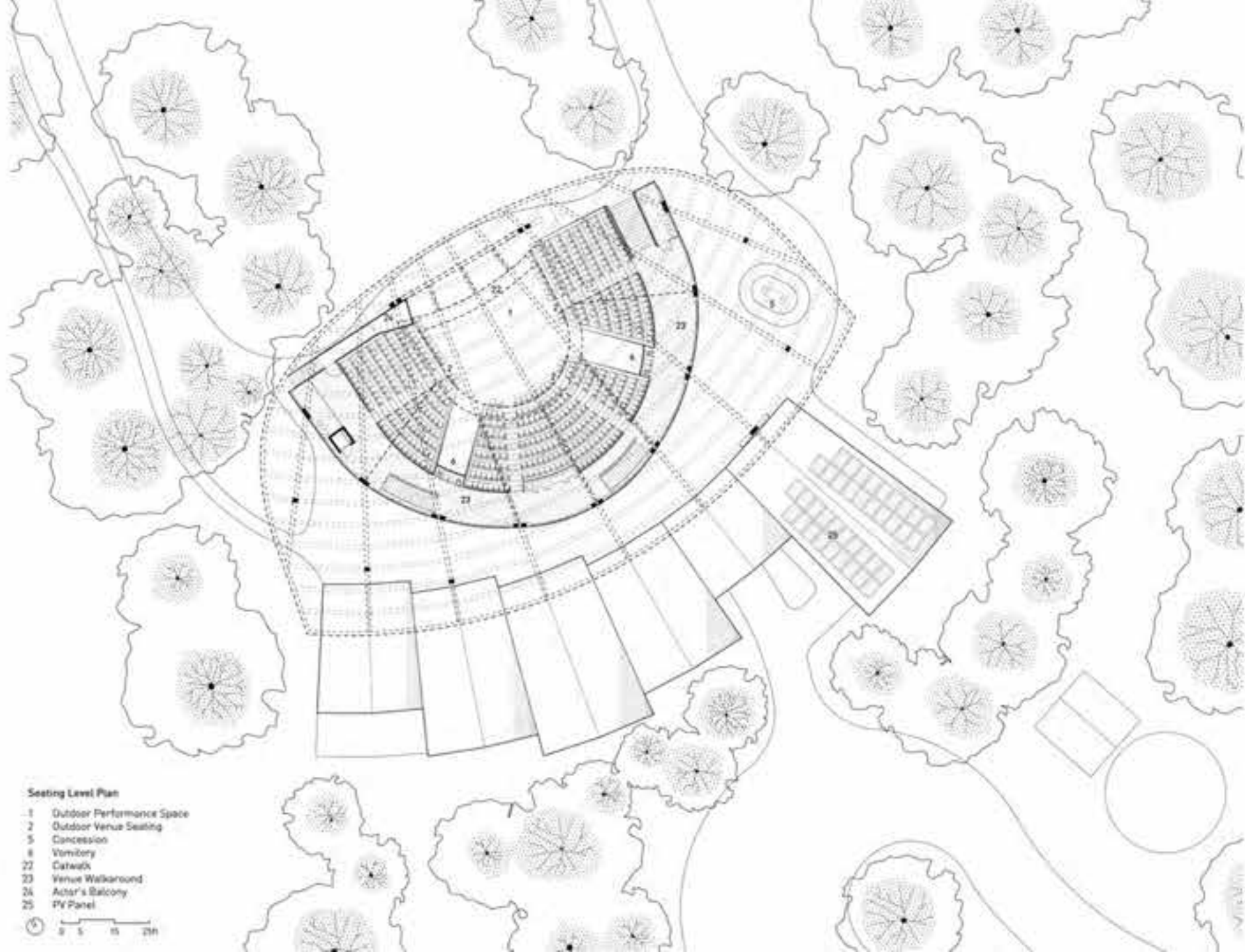
DOUBLE-DOORS
DOORS ARE
SET-BACK
DEPTH OF
TIMBER
FRAMING

Ground Floor Plan

- 1 Outdoor Performance Space
- 2 Outdoor Venue Seating
- 3 Front of House Commons
- 4 Back of House Commons
- 5 Concessions
- 6 Ventrory
- 7 Storage
- 8 Technical Equipment
- 9 Changing Alcove
- 10 Guest Services Vestibule
- 11 Green Room
- 12 Office
- 13 Dressing Room
- 14 Restroom
- 15 Public Restroom
- 16 Wardrobe Workroom
- 17 Back of House
- 18 Company Porch
- 19 Covered Passage
- 20 Fire Pumphouse
- 21 Fire Water Storage Tank

0 5 10 20ft

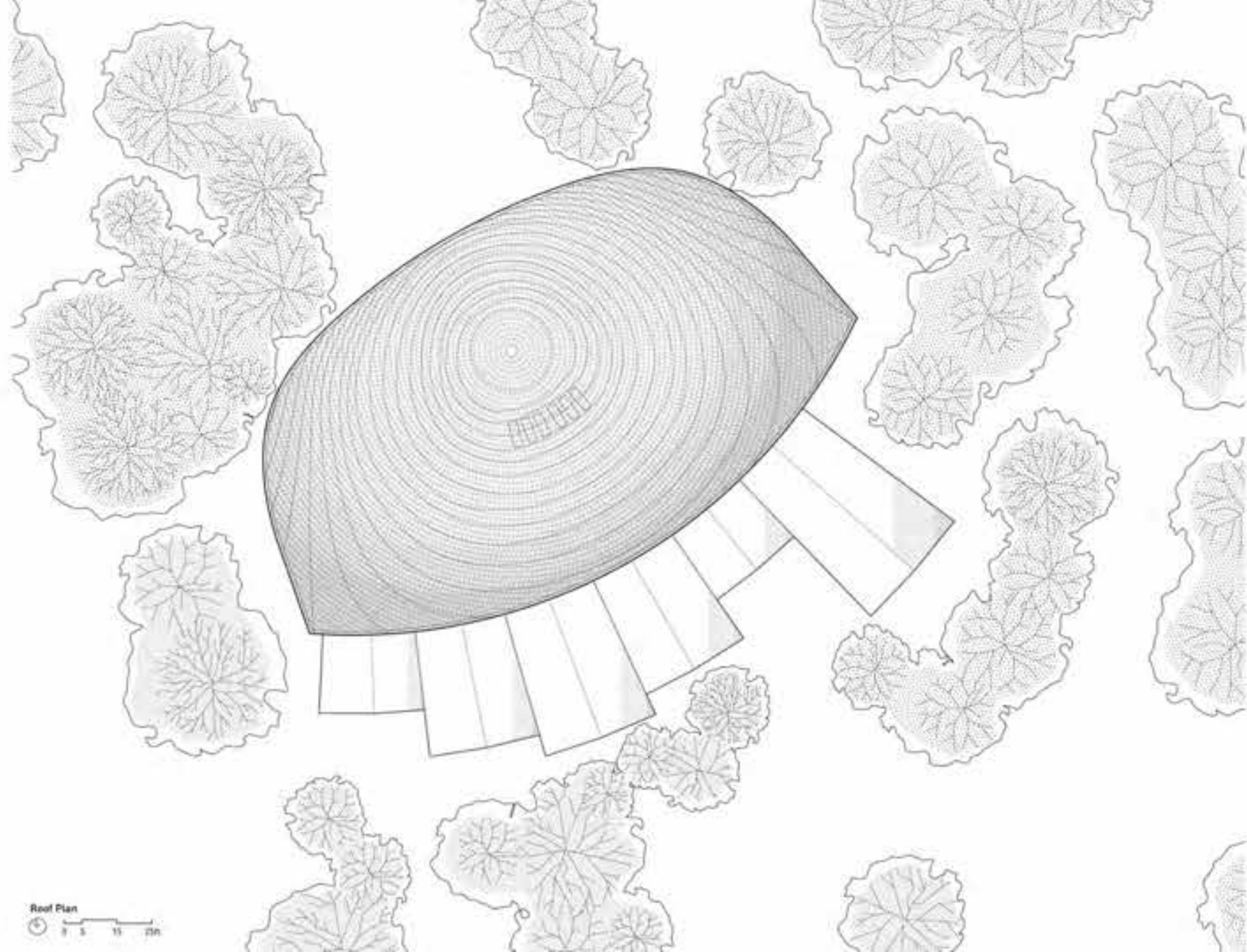


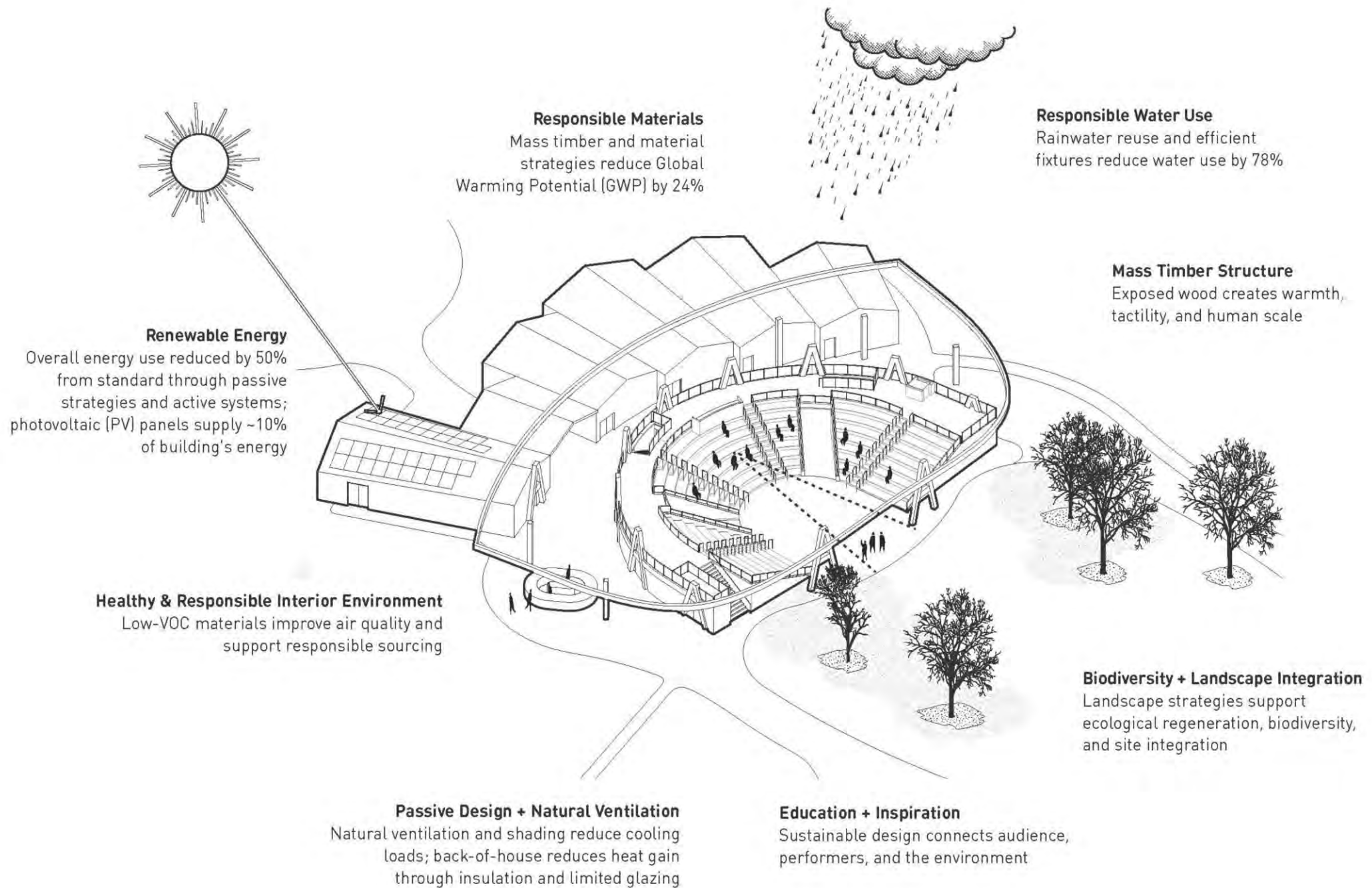


Seating Level Plan

- 1 Outdoor Performance Space
- 2 Outdoor Venue Seating
- 5 Concession
- 8 Ventrory
- 22 Catwalk
- 23 Venue Walkaround
- 24 Actor's Balcony
- 25 PV Panel







DFMA Integration

From the Design Phase

What is DFMA?

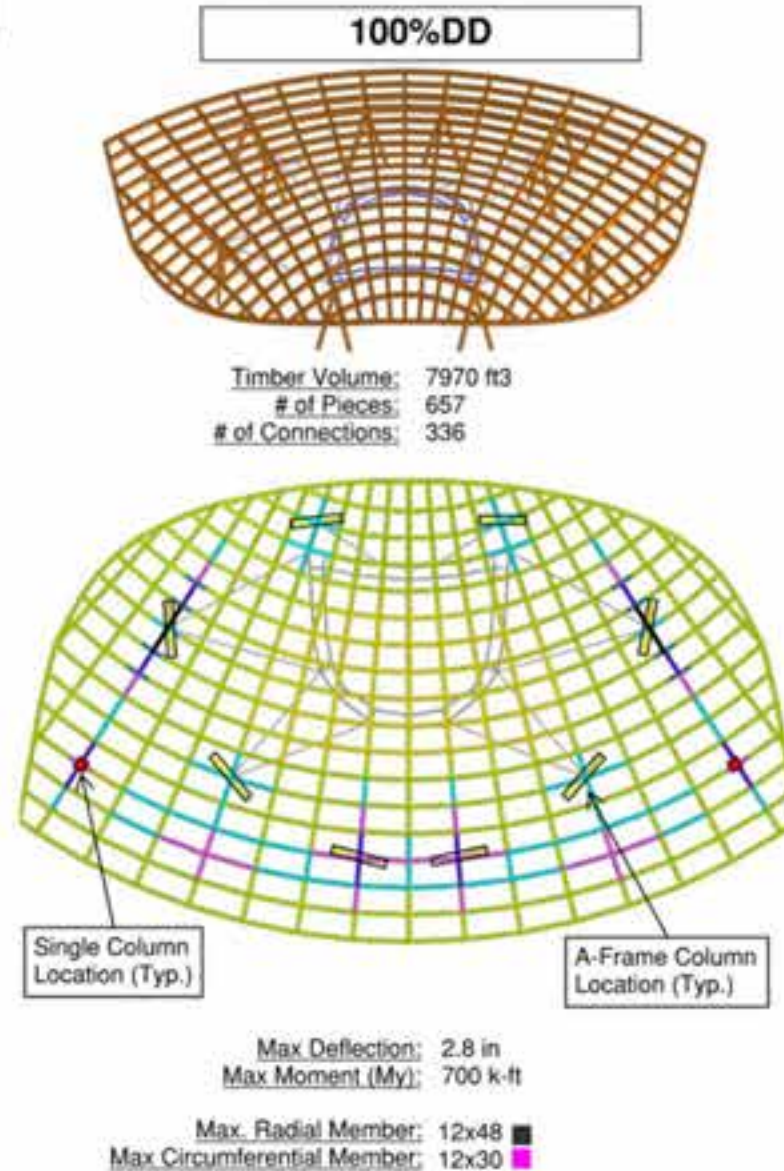
DFMA (Design for Manufacturing and Assembly) is a **process-driven** approach that integrates **design** decisions with **manufacturing** and on-site **assembly workflows** – aligning geometry, tolerances, component handling, and connection logic for mass timber projects.

Why DFMA?

- Manufacturing-Ready
- Efficient Assembly
- Quality & Waste Control
- System Alignment

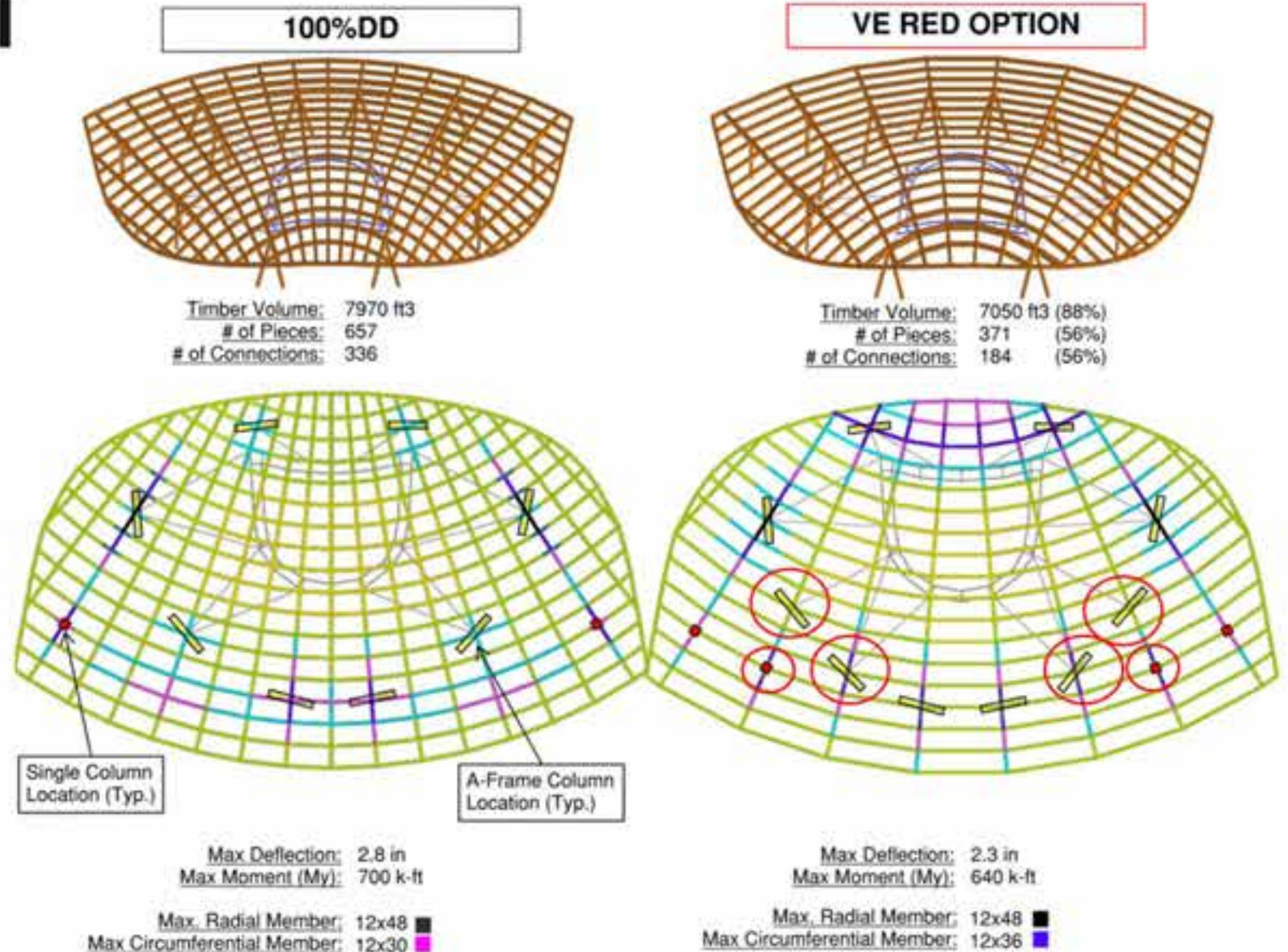
Structural Model

VE Stage



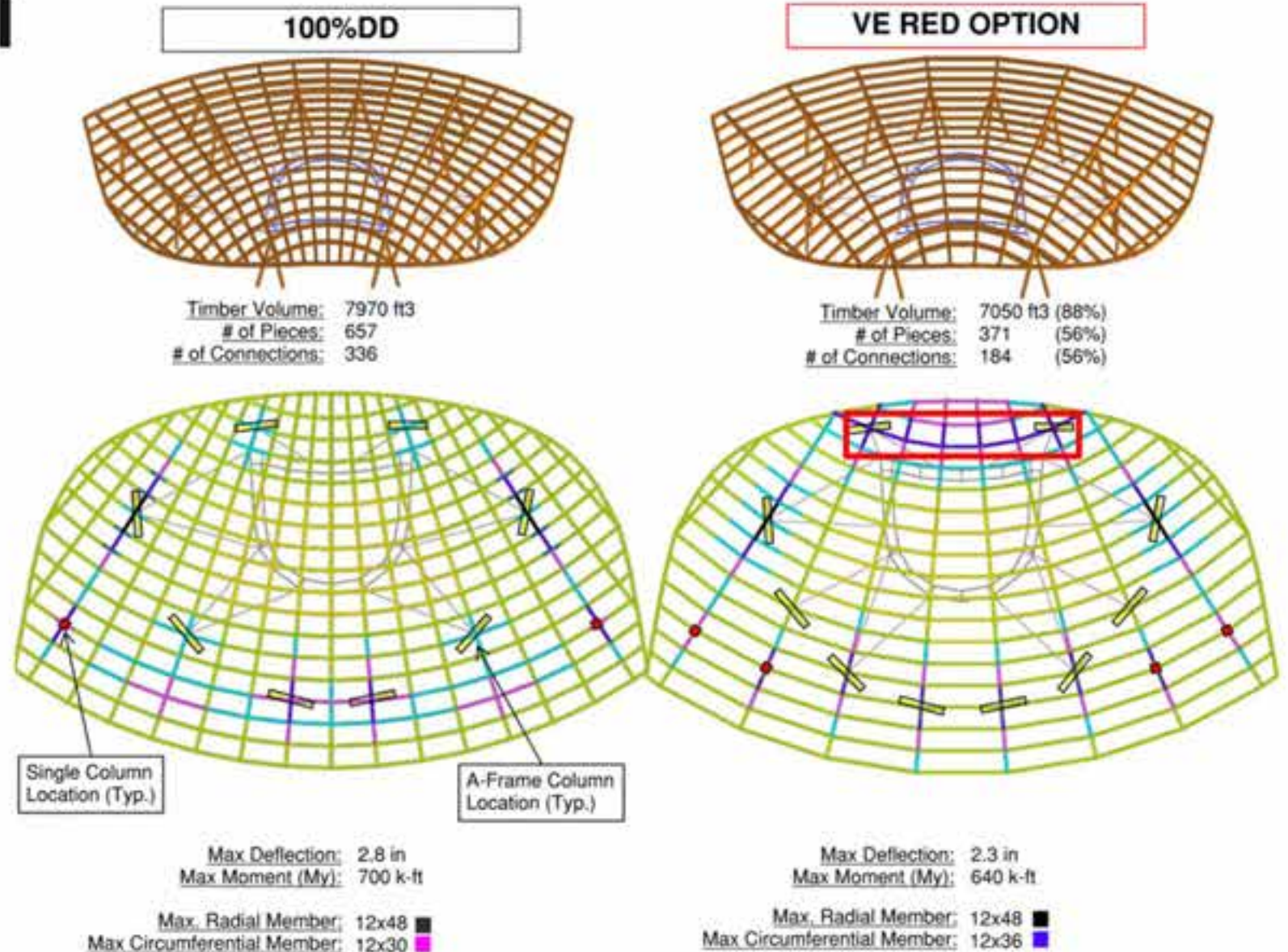
Structural Model

VE Stage



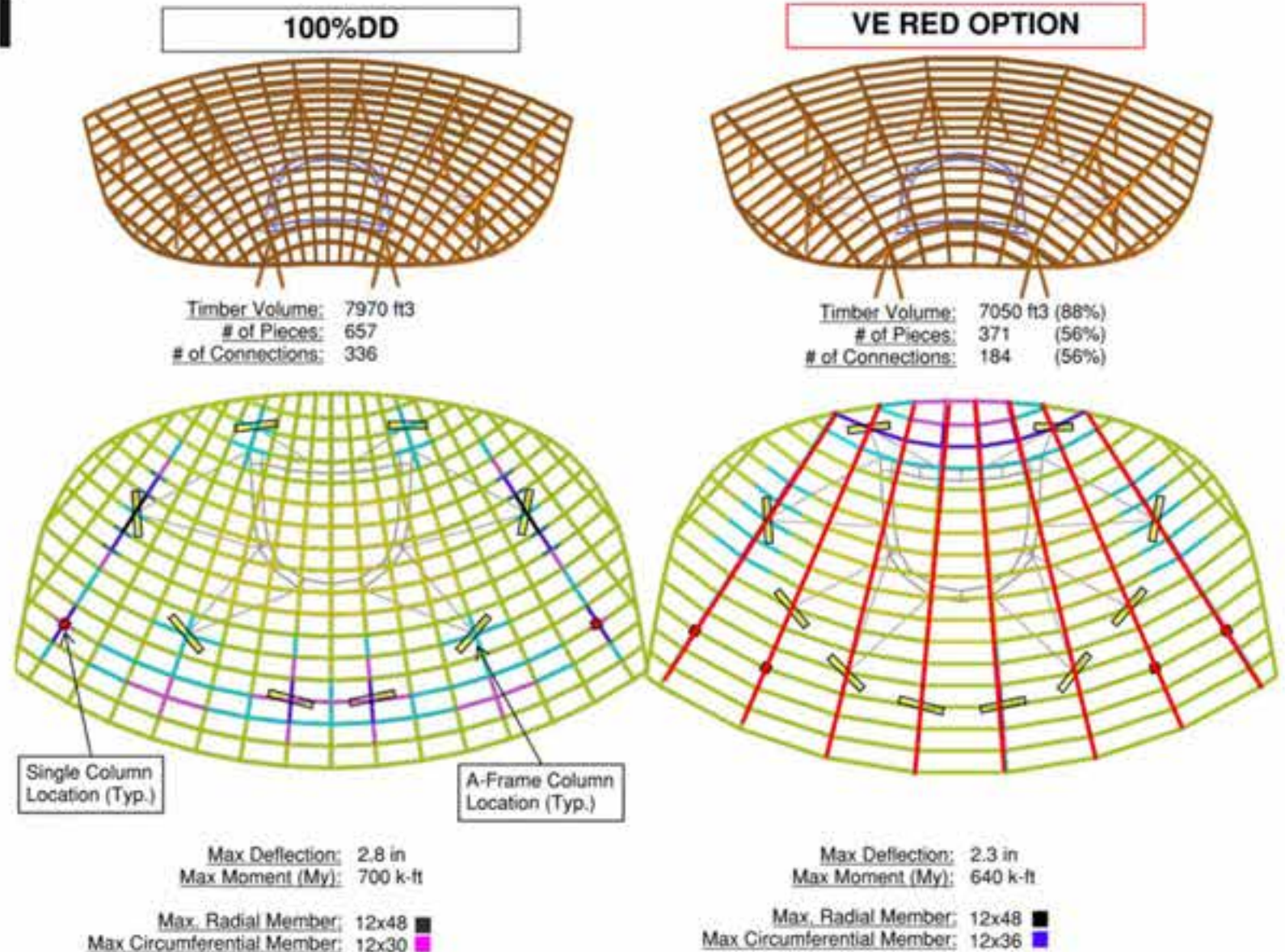
Structural Model

VE Stage



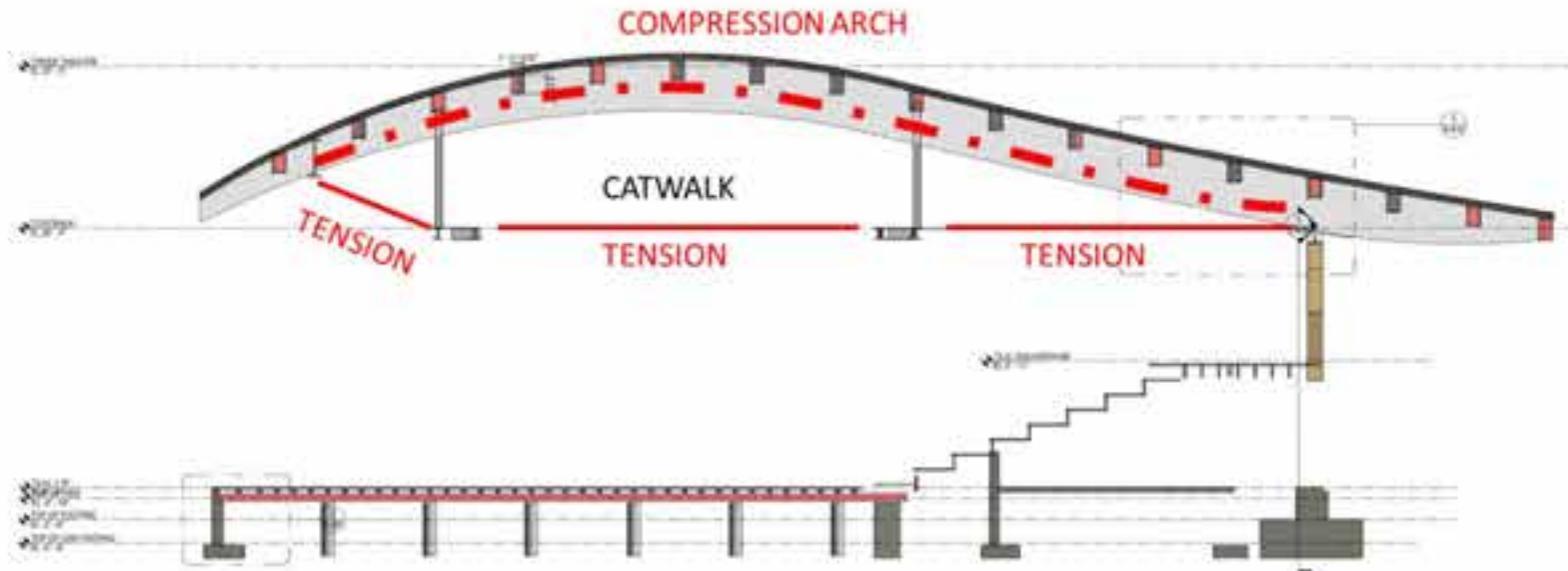
Structural Model

VE Stage



Structural Model

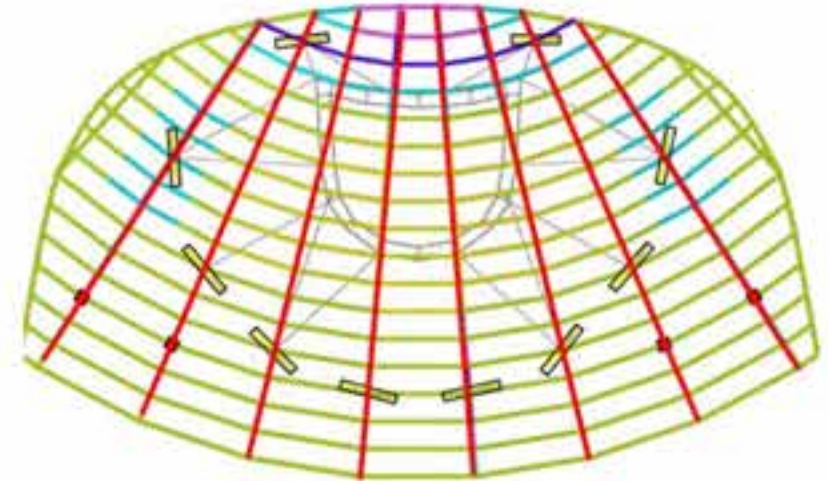
VE Stage



VE RED OPTION



Timber Volume: 7050 ft³ (88%)
of Pieces: 371 (56%)
of Connections: 184 (56%)

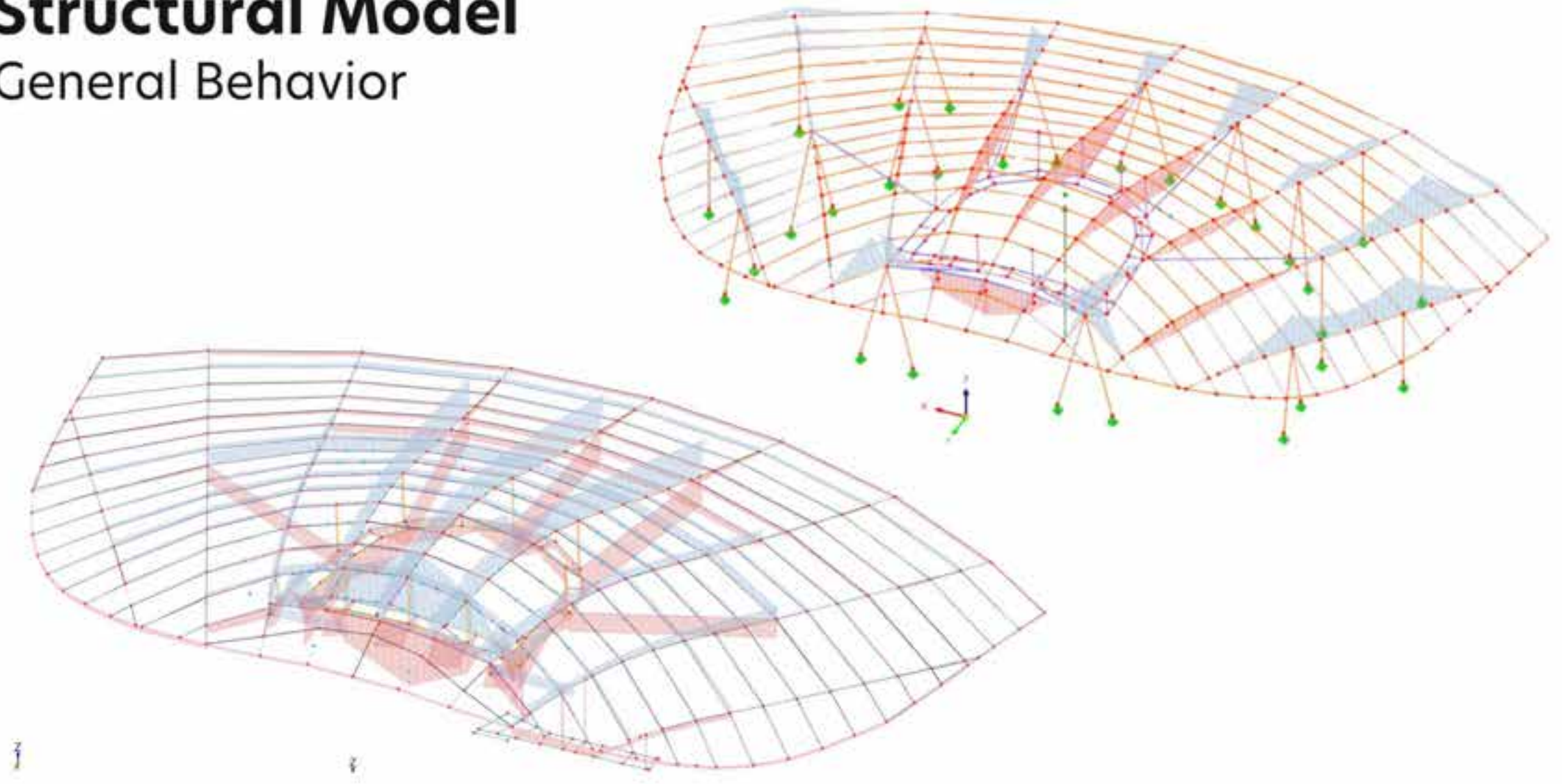


Max Deflection: 2.3 in
Max Moment (My): 640 k-ft

Max. Radial Member: 12x48 ■
Max Circumferential Member: 12x36 ■

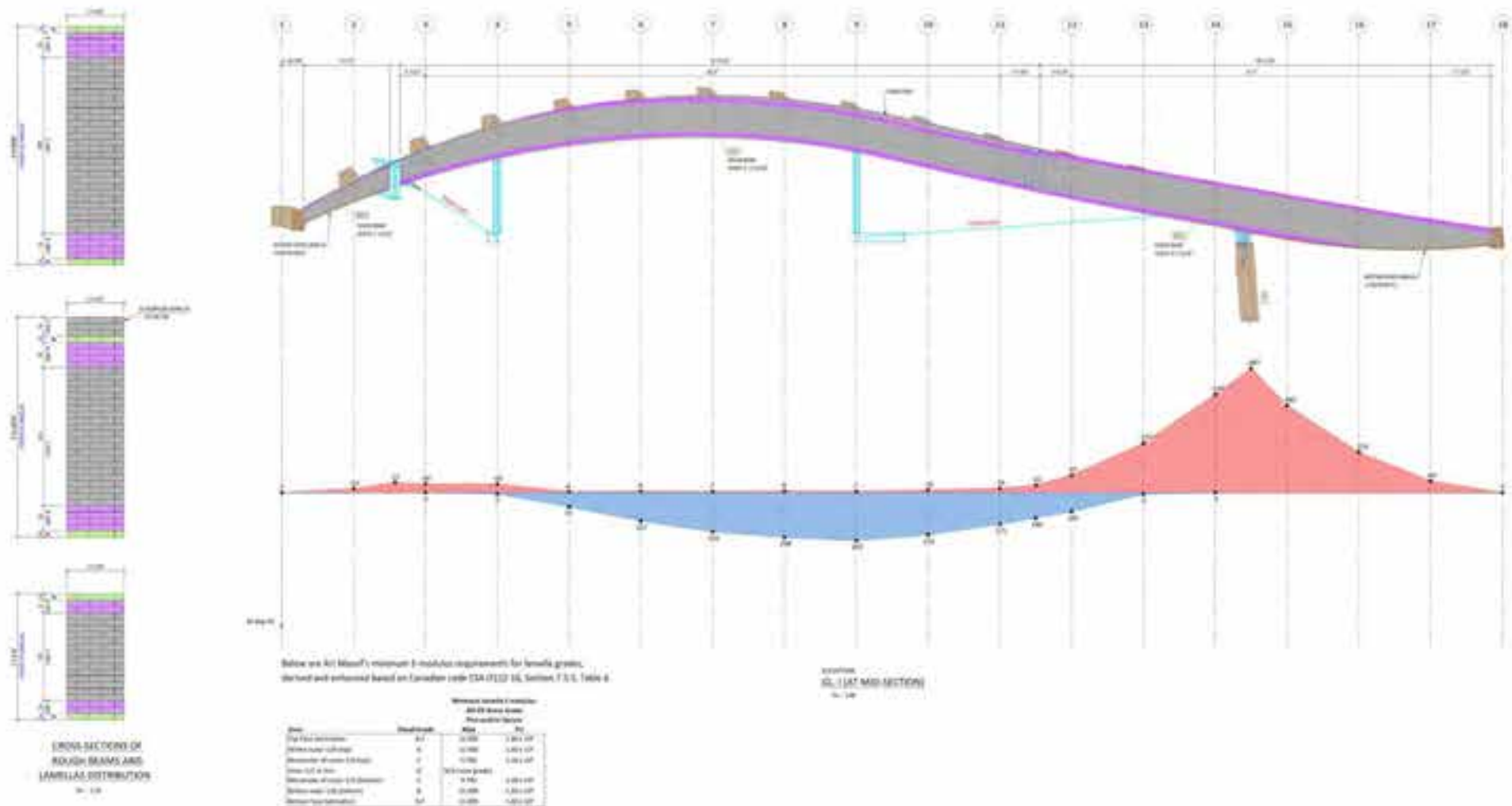
Structural Model

General Behavior



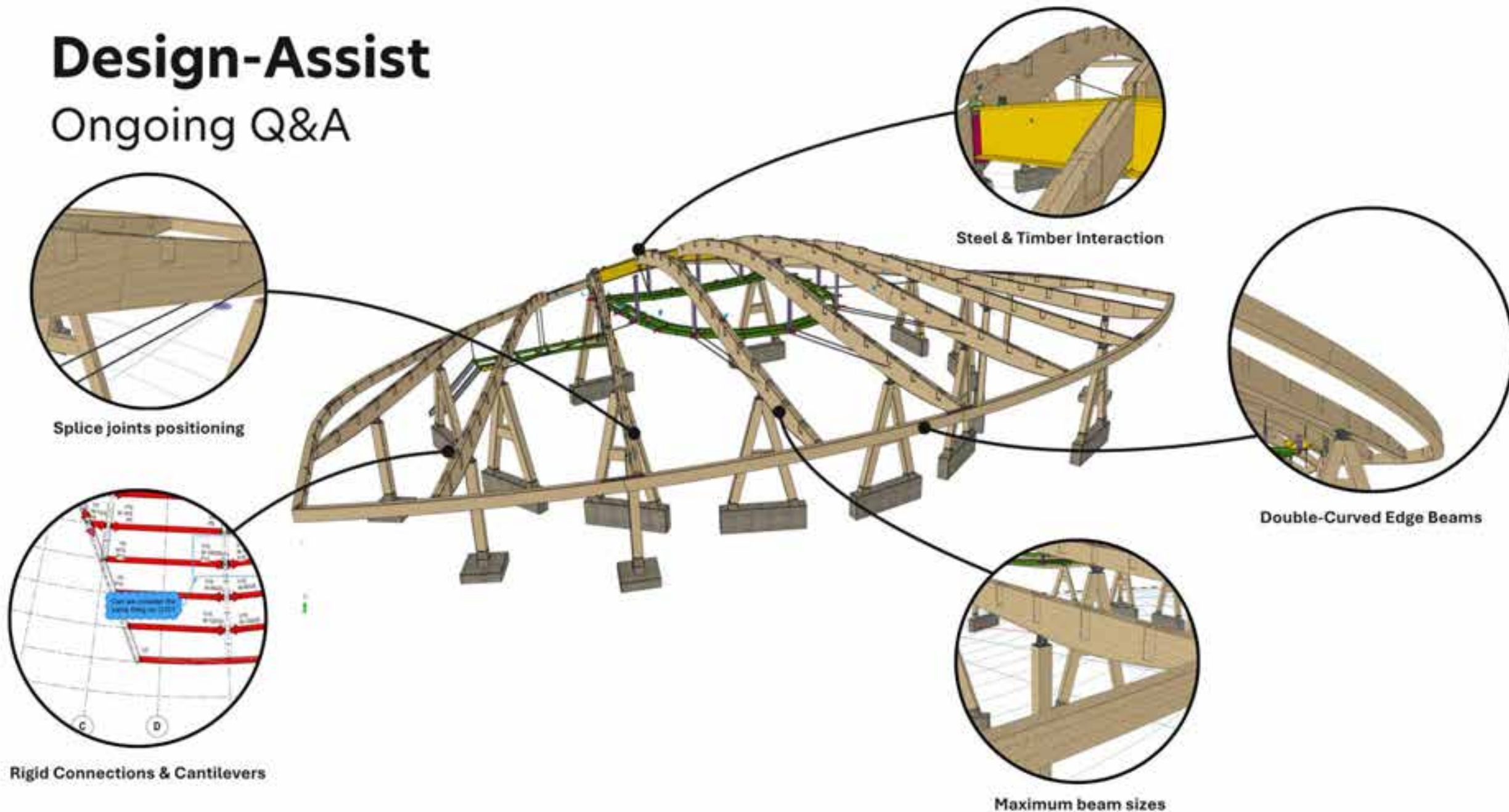
Structural Model

Member Analysis



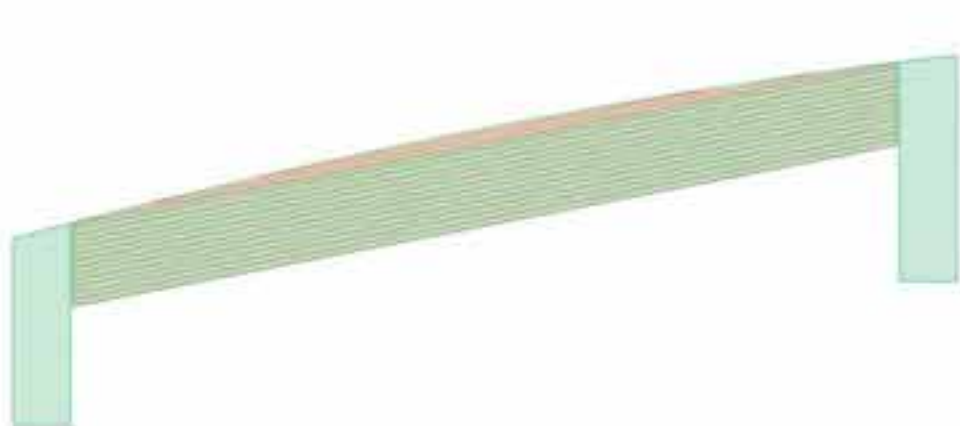
Design-Assist

Ongoing Q&A

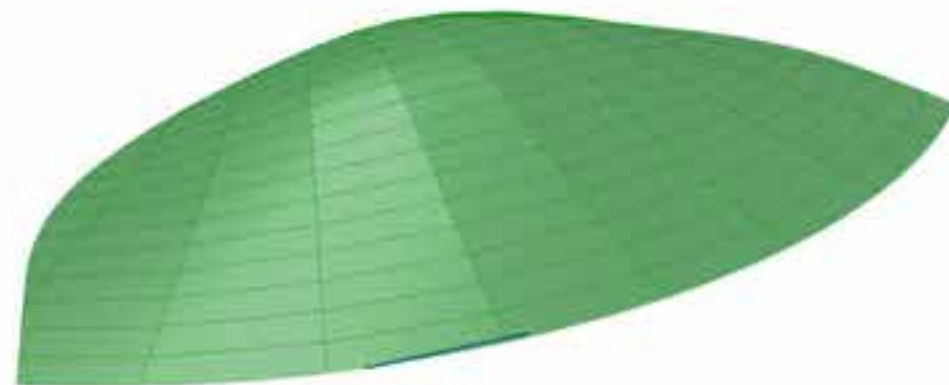


Design-Assist

Optimized Geometry for Manufacturing



SMOOTH SURFACE (WITHOUT KINKS)



NON-PLANAR QUAD FACES (WITH KINKS)
STRAIGHT LINES BETWEEN RADIAL BEAMS = STRAIGHT PURLINS

Design-Assist

Decking Options



Proposed solution: GLT Decking

Profile: 1 1/2" x 13 3/4" Halflap

We know we can do..

- Flat surfaces
- Curvature in 1 direction (barrel roofs)

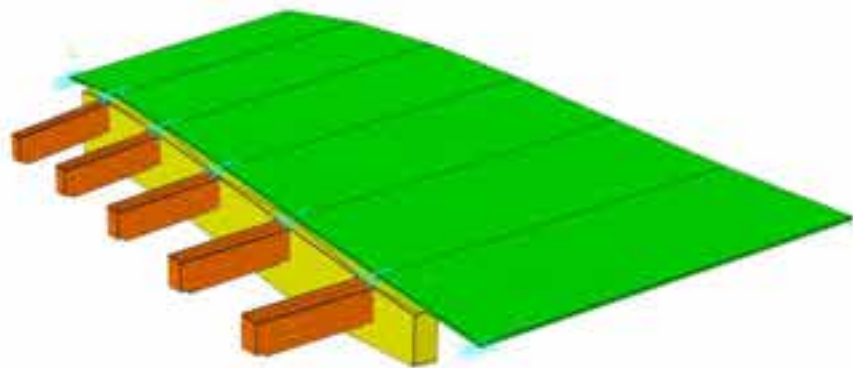
But what about..

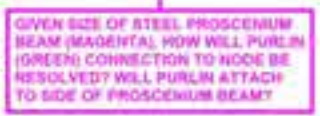
- Curvature in **2 directions? Twist?**



Design-Assist

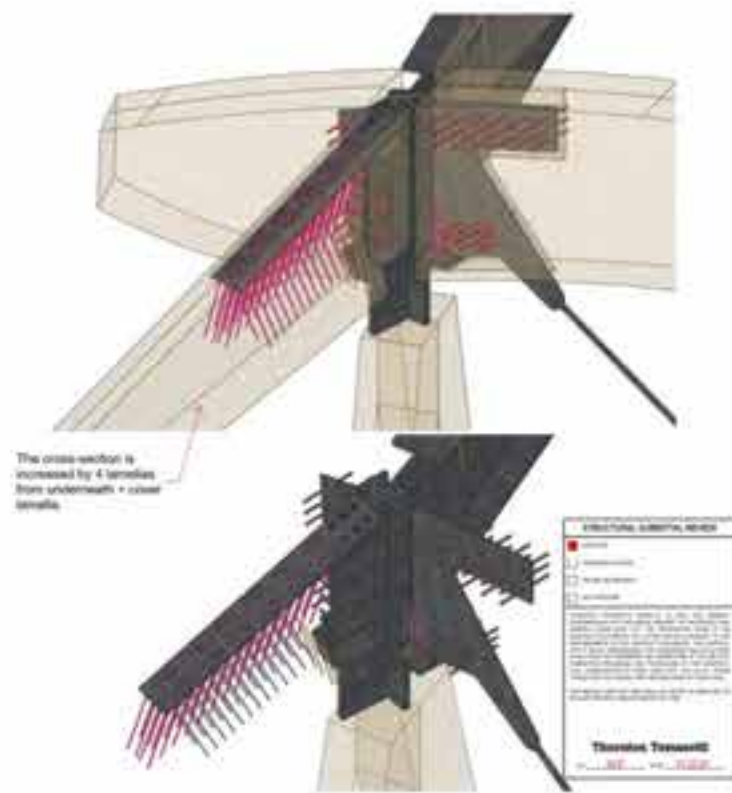
1:1 Proof of Concept





**art—
massif**

Client / Company	
Project / Project No.	NVSF
Sub Project / Project No.	P00482
Task / Subject	UKRS-507 (Ends of the procession beam)
Prepared by / Prepared by	Raphael Bouchar, ing.
Validated by / Validated by	Date 2024-11-05
	Draw



**From the Design Phase
to Construction**



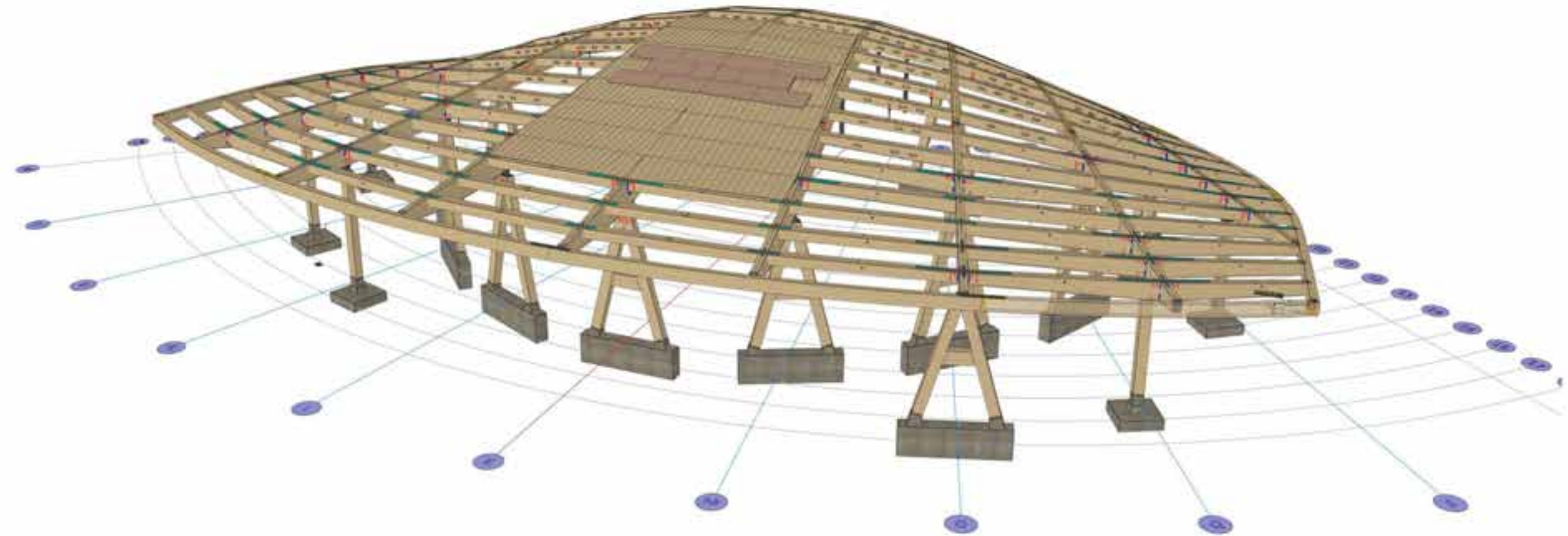
Connection Design

Geometry Set



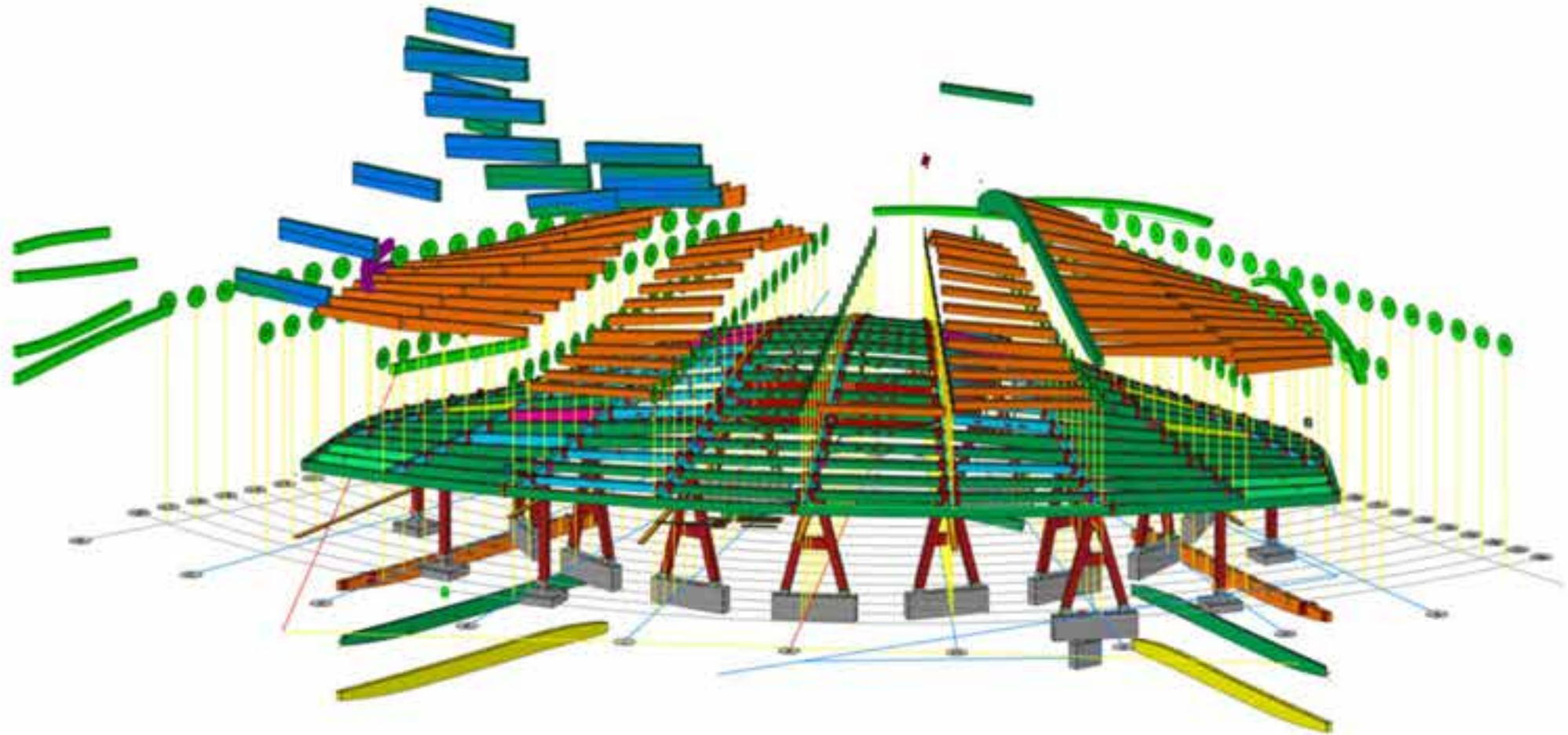
Connection Design

Master 3D Model



Connection Design

Fabrication Model



Connection Design

Team Coordination

Hi Mat,

Yes, correct, let's go with Option A - respecting the slope of the radial beam!

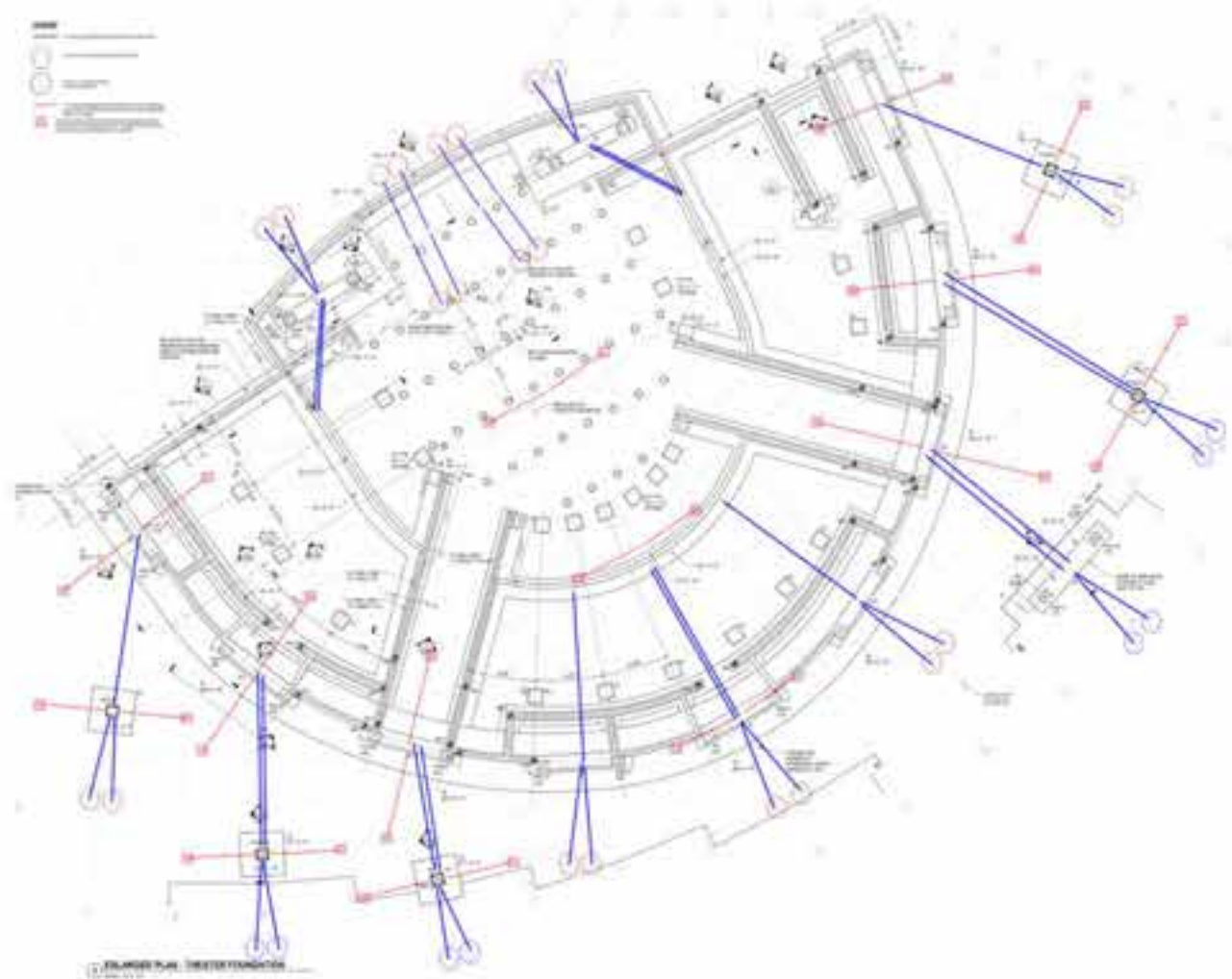
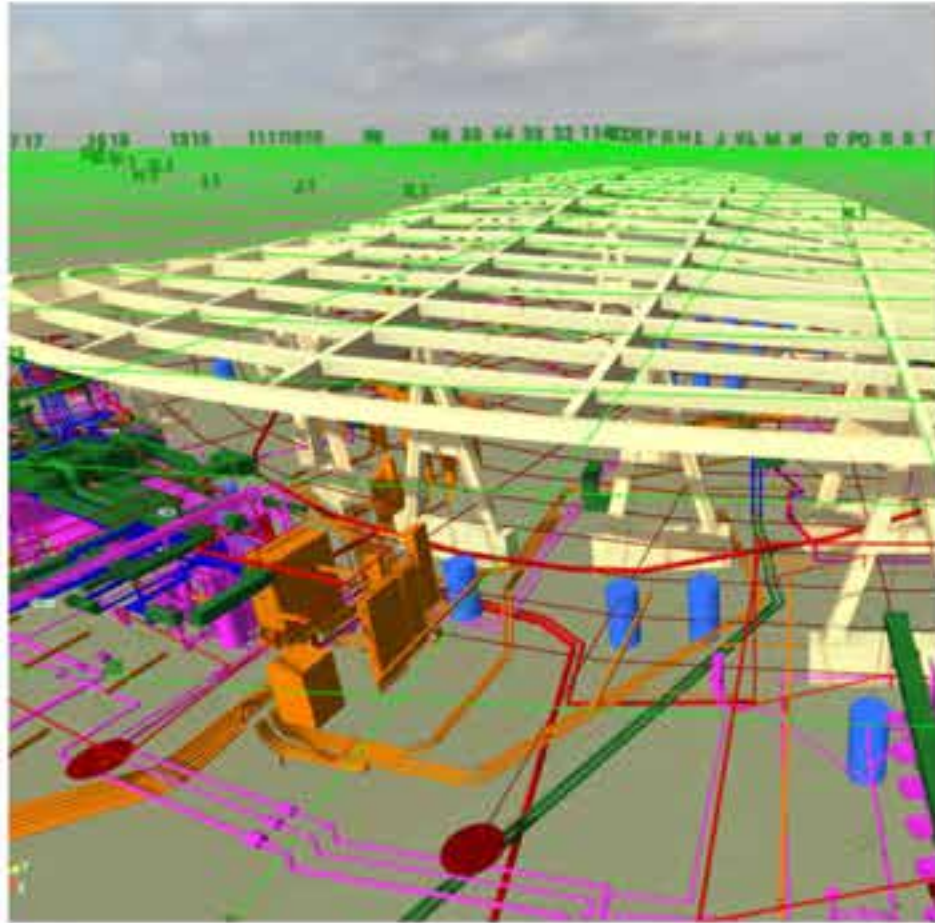
Thanks,
Teo

Teo Quintana
he/him
Project Leader

SK Status ☆ ☺										+ Ajouter un affichage	
SK	Revision	Description	Render	AM Status	Sent	TT Status	Calcs Bundle #	Ball in Court	ASB Status		
Calcs Bundle #: 5 (8)											
SKISL-1004	2	End of Radial + 30 Edge		REVISED	✓	APPROVED	5		READY		
SKISL-1009	1	2D+3D beam		READY	✓	APPROVED	5		READY		
SKRB-503	2	Portion of moment		REVISED	✓	APPROVED	5		READY		

Construction Engineering

Raising Sequence





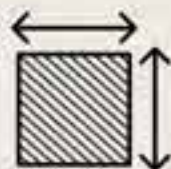
Photos : Consigli Construction



Fabrication

Pushing the limits

Fun Facts



16 000
sqft



220
m³ of glulam



215
steel connectors



6770
screws



9
radial beams



8
3D edge beams



146
purlins



269
pieces, mostly unique





Photo : Art Massif

3D Edge Beams

Standard Process

STEP 1

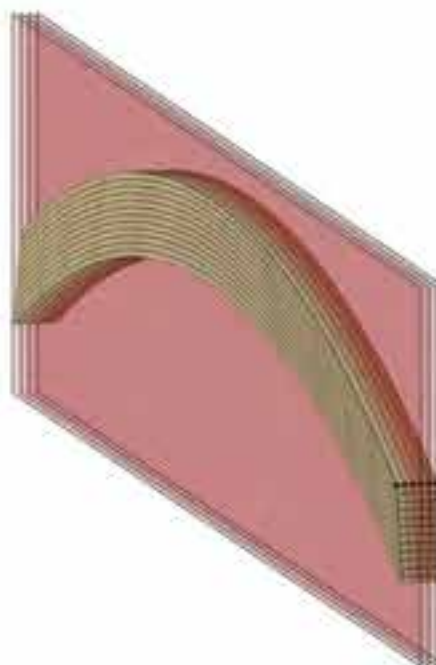
Strong-Axis Bending



Custom Process

STEP 2

Resawing for Lamellas



STEP 3

Weak-Axis Bending





Photo : Art Massif

3D Edge Beams

Digital Chain

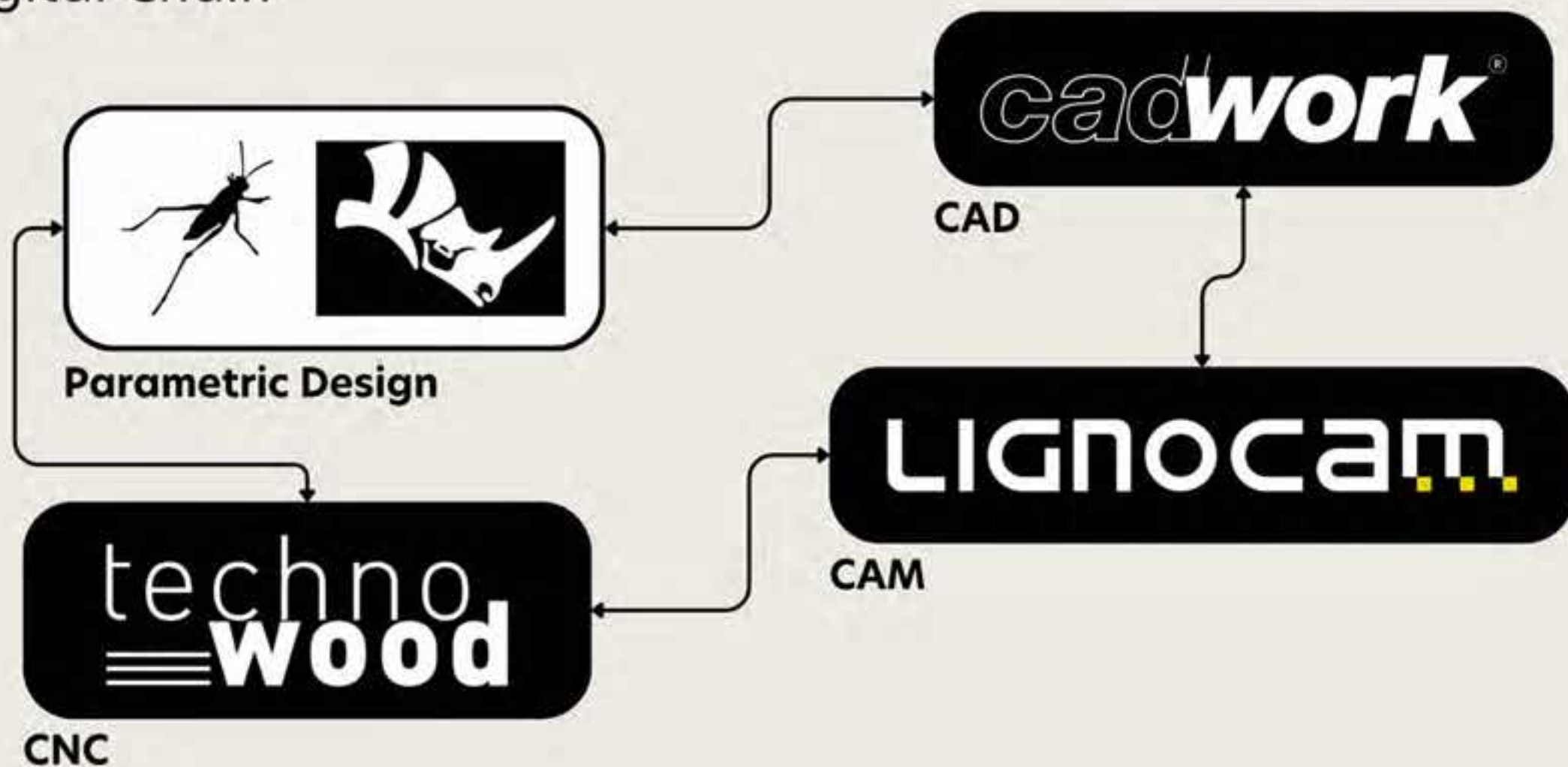




Photo : Art Massif



Photo : Art Massif



ART MASSIF

WOOD

WOOD

techno
WOOD

WOOD

Photo: Art Massif



Photo: Art Mossif

Construction

From the first « A » to the final structure in 4 months

April 17, 2025



Photo : Consigli Construction

April 18, 2025



Photo : Consigli Construction

April 21, 2025



April 29, 2025



Photo : Conagli Construction

May 20, 2025



Photo: Cassini Construction

August 1, 2025



August 5, 2025



Photo : Consigli Construction

August 6, 2025



Photo : Consign Construction

August 16, 2025



December 29, 2025



Photo: Consigli Construction

December 29, 2025



Photo : Conaigh Construction

Key Takeaways

Quality of the team









Studio Gang

Thornton
Tomasetti

art
massif

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New York

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Thomas
Tomaselli

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Associati



Questions?

This concludes The American Institute of Architects Continuing Education Systems Course



























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