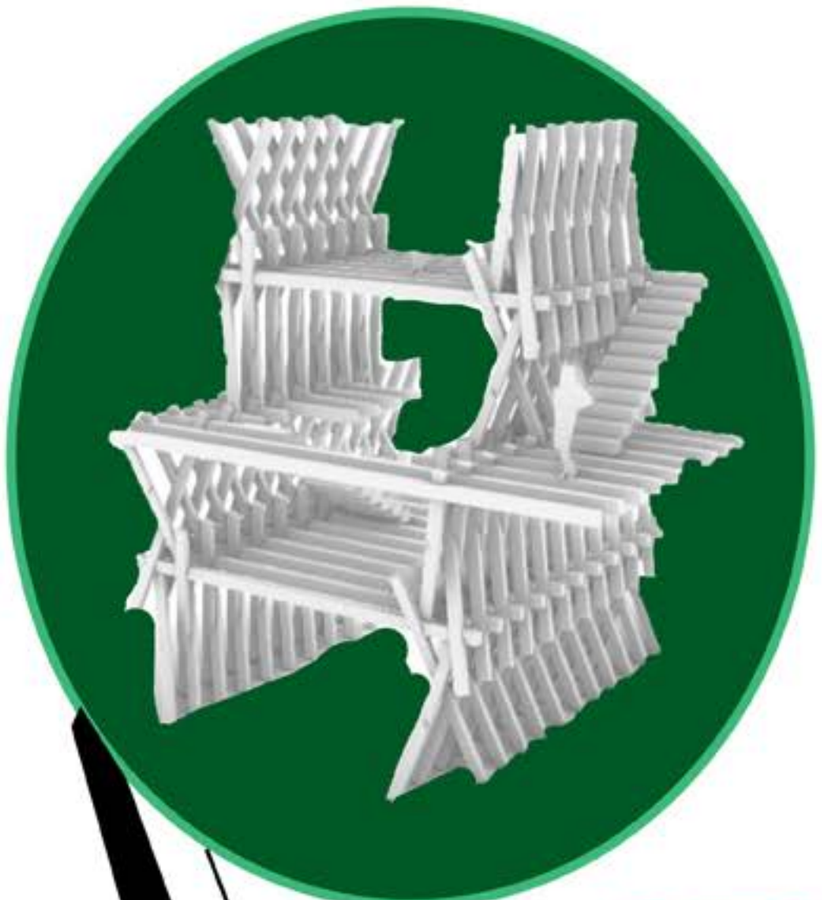
Coastal Grove

RECIPROCAL FRAME PAVILION

Joshua Spiegelman, Riley Greenheck, Ben Stalker, Namhyuck Ahn



44.1287° N, 124.1237° W
MUFFIN BEACH, OR

EMMERSON LABORATORY

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Site Plan

Location: Heceta Head Lighthouse Lane County, Oregon

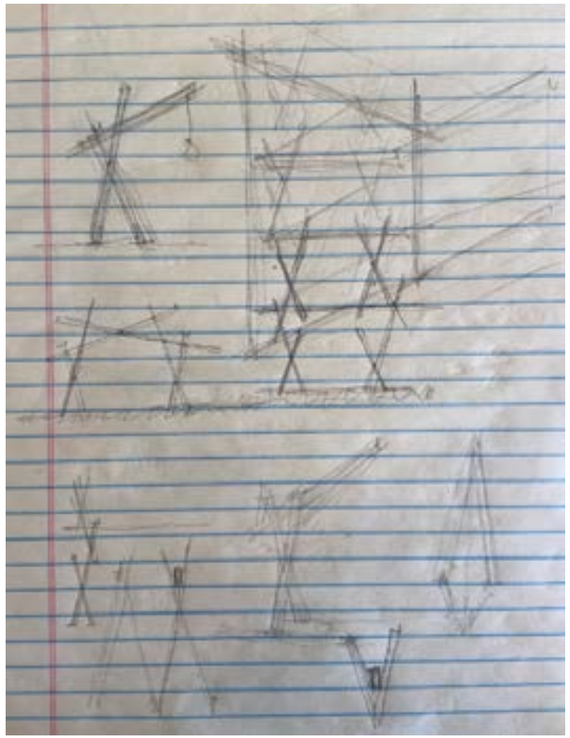
Heceta Head Light is a lighthouse on the Oregon Coast 13 miles north of Florence, and 13 miles south of Yachats, OR. The lighthouse and beach was selected as our site because of its remote, yet accessible location, stunning views, as well as having an open beach with room to expand for larger gatherings.

The site itself would be located on the beach directly South of the lighthouse. The steep terrain up to the lighthouse shield the structure from wind. There is a large parking area adjacent to the site for visitors. There are walking paths, and trails for visitors to use while at an event as well.

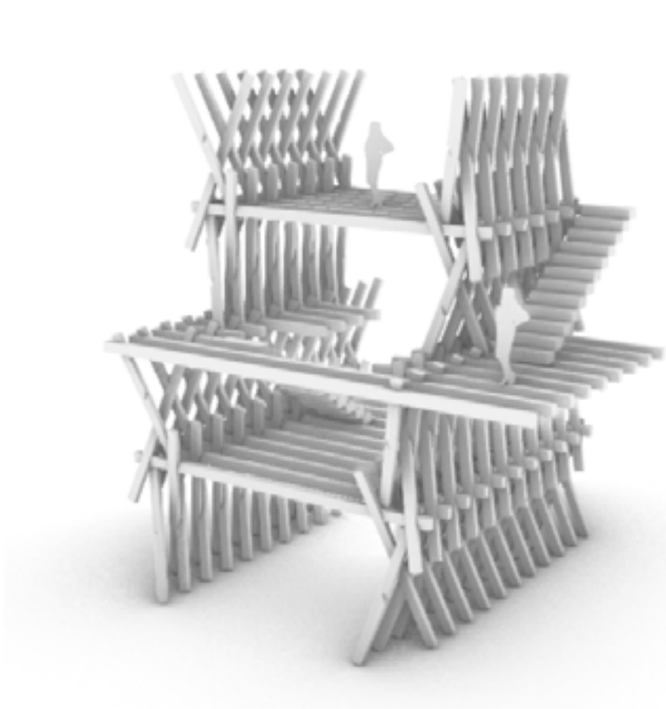
Precedent Imagery

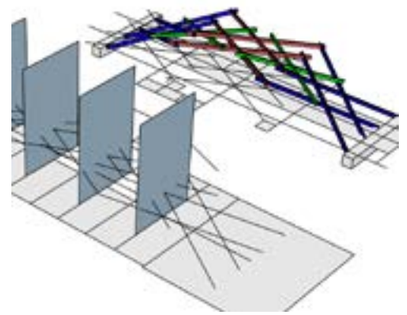
Our goal with the project was to create a simple reciprocal frame structure that could be easily moved/built in location with a limited number of components. Our team also felt that vertically was critical in our design to allow our pavilion to adapt to different environments where open spaces force us to build up and not out.

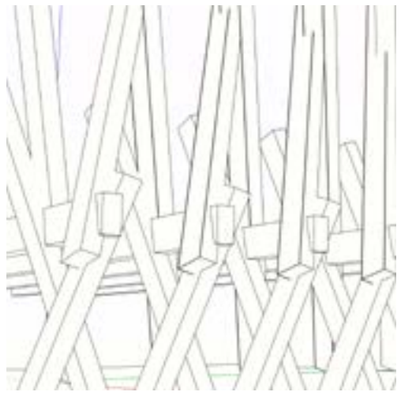
Our vertical structure, and horizontal structure work in tandem to create spaces that can be used in a wide array of functions. Our system can be placed horizontally, or build several stories high if need be, all with the same structural elements.



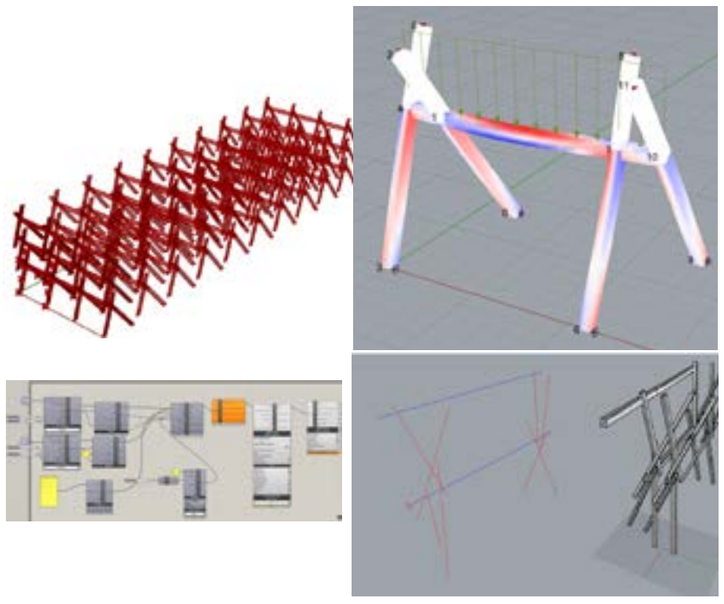
Step 1 - hand sketches





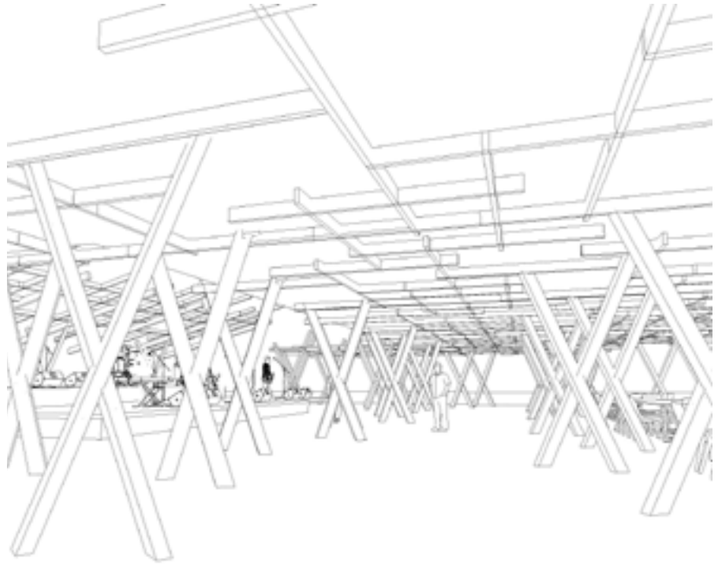


Step 2 initial digital models

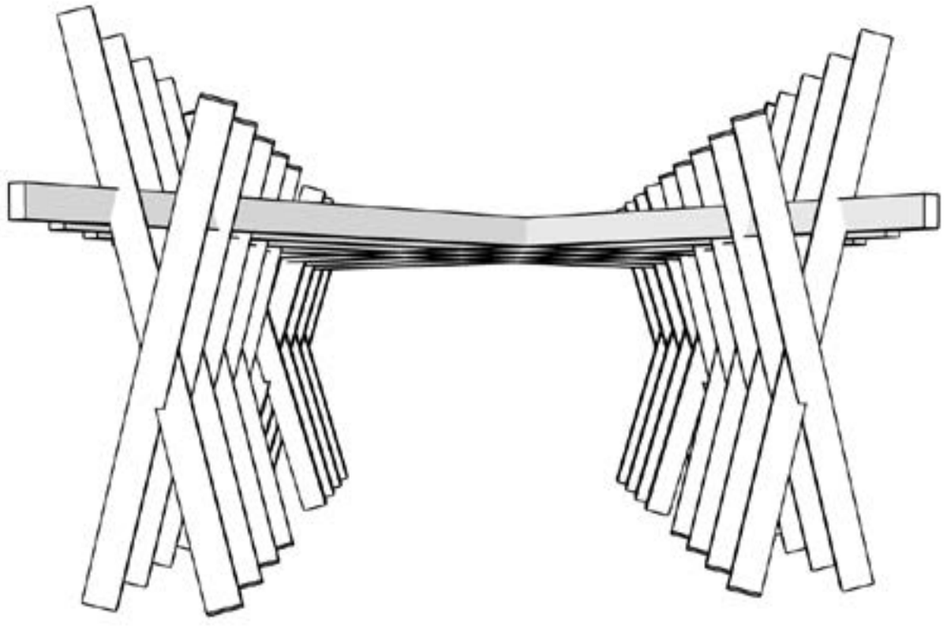


Step 3 - Karamba analysis

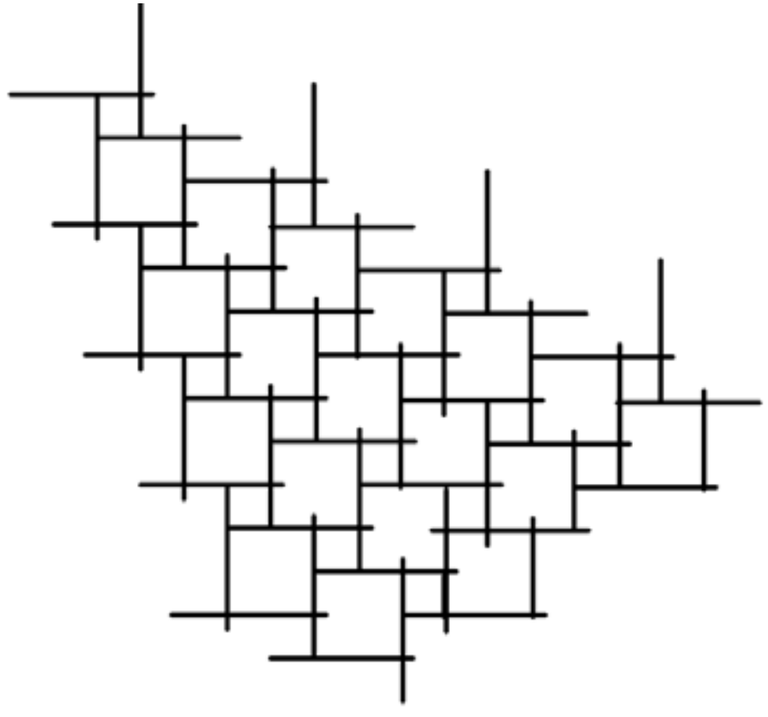
Step 4 - Physical Models



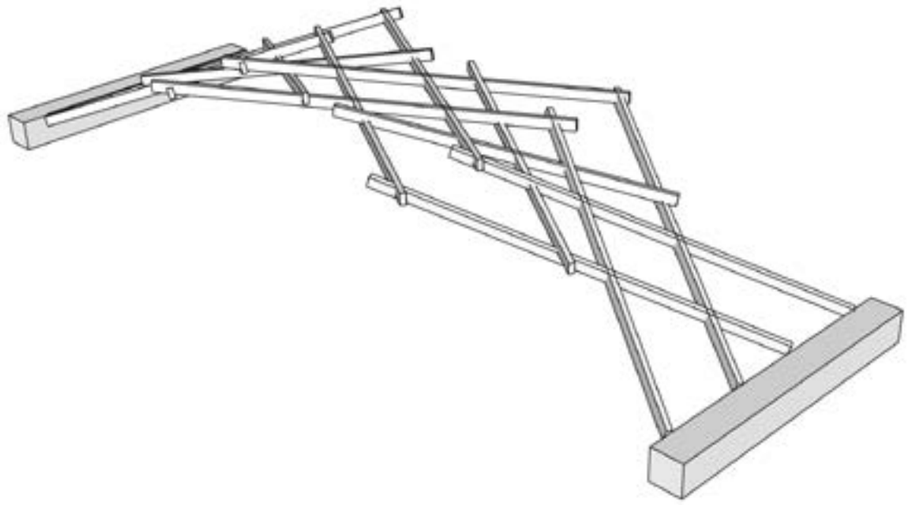
Step 5 - Digital model refinement



Vertical Structure



Horizontal/Canopy Structure



Bridge Structure

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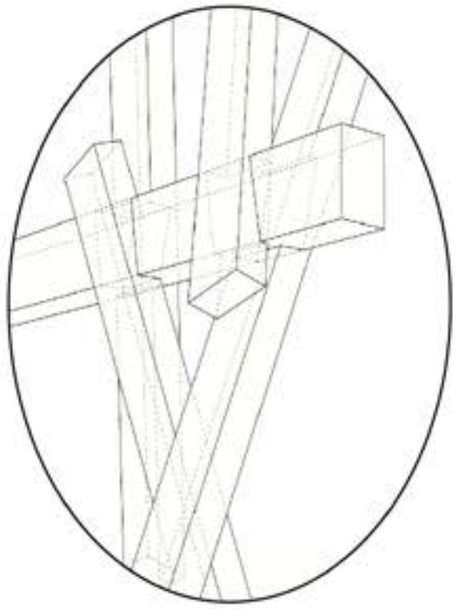

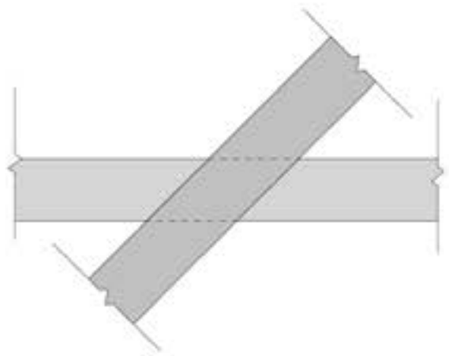

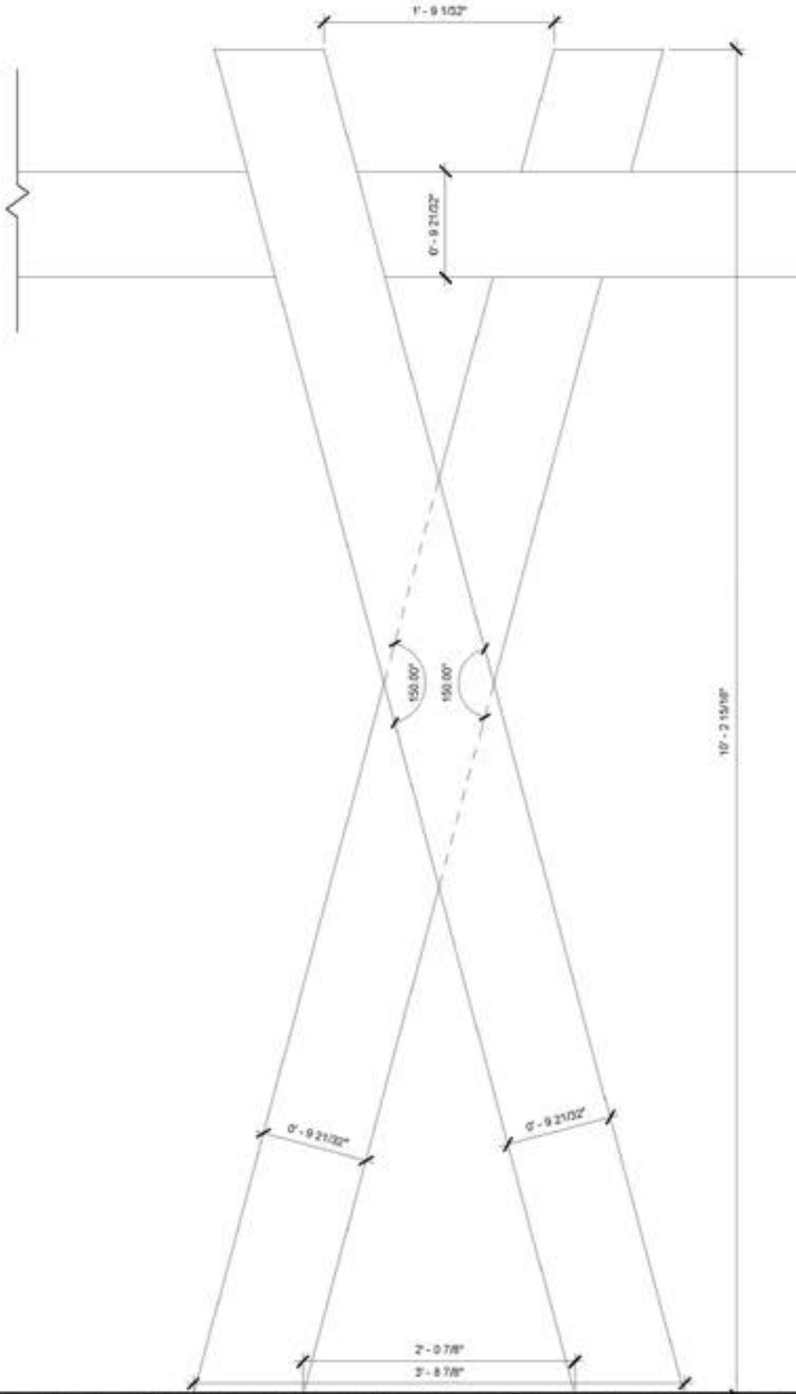

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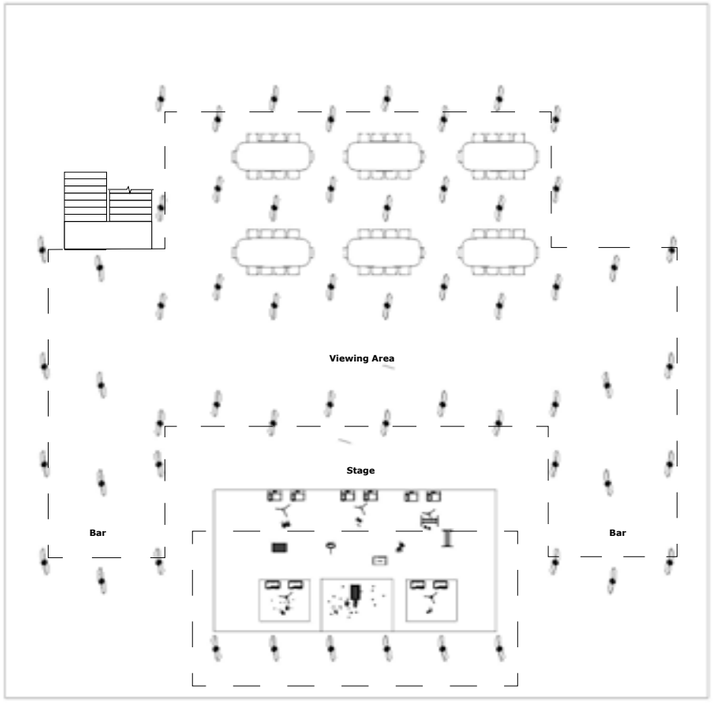
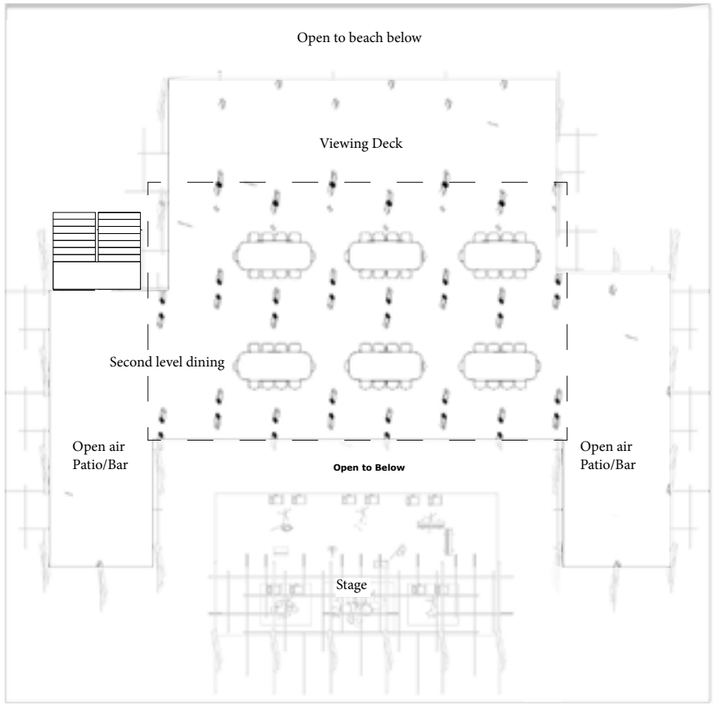
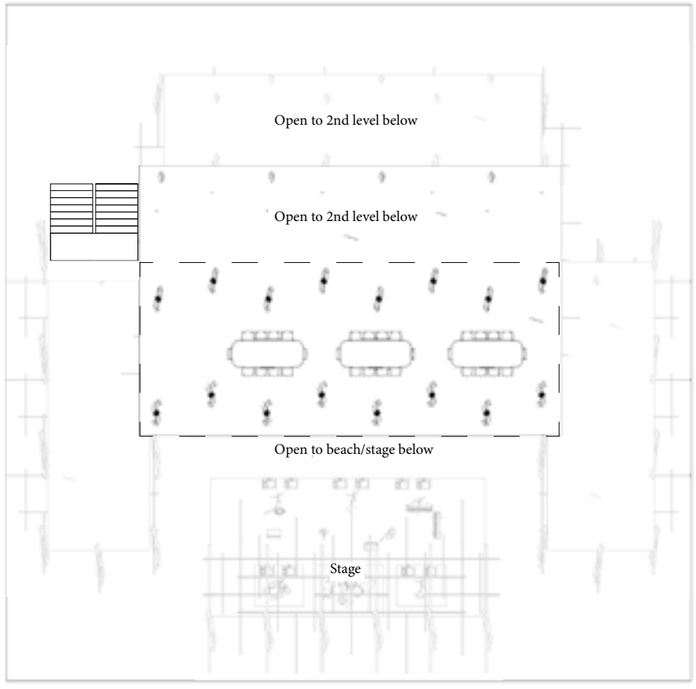


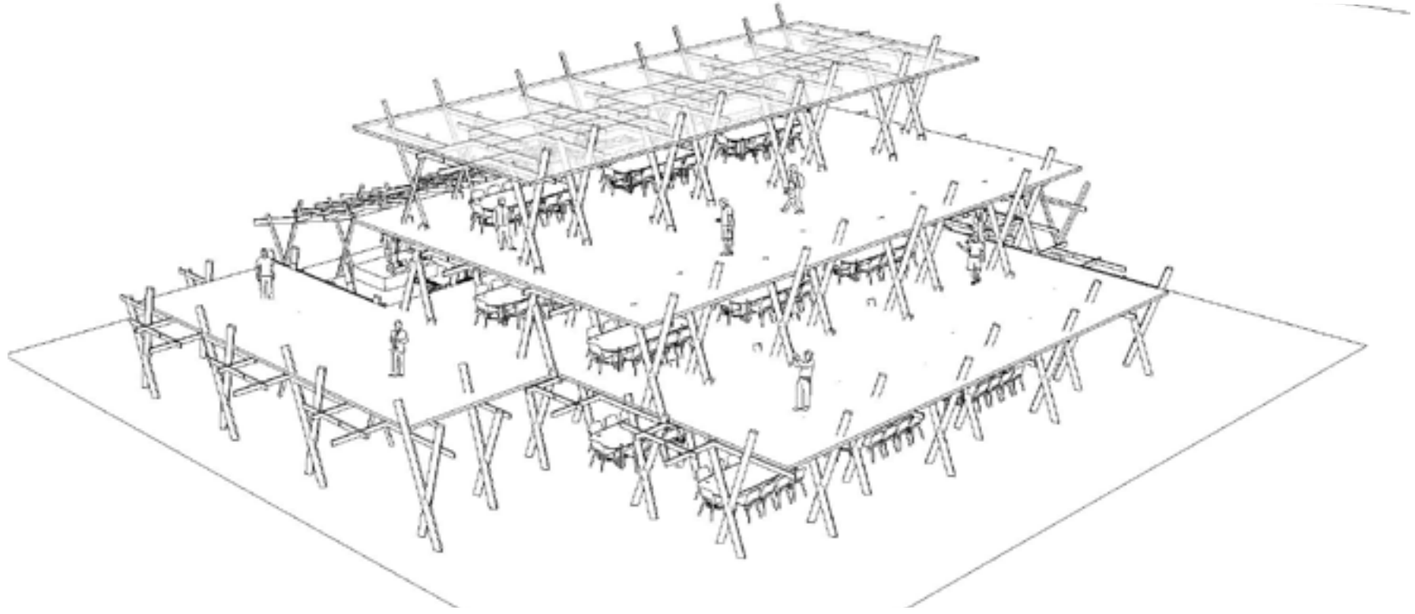
Level 1 Floor Plan



Level 2 Floor Plan



Level 3 Floor Plan



Axonometric View

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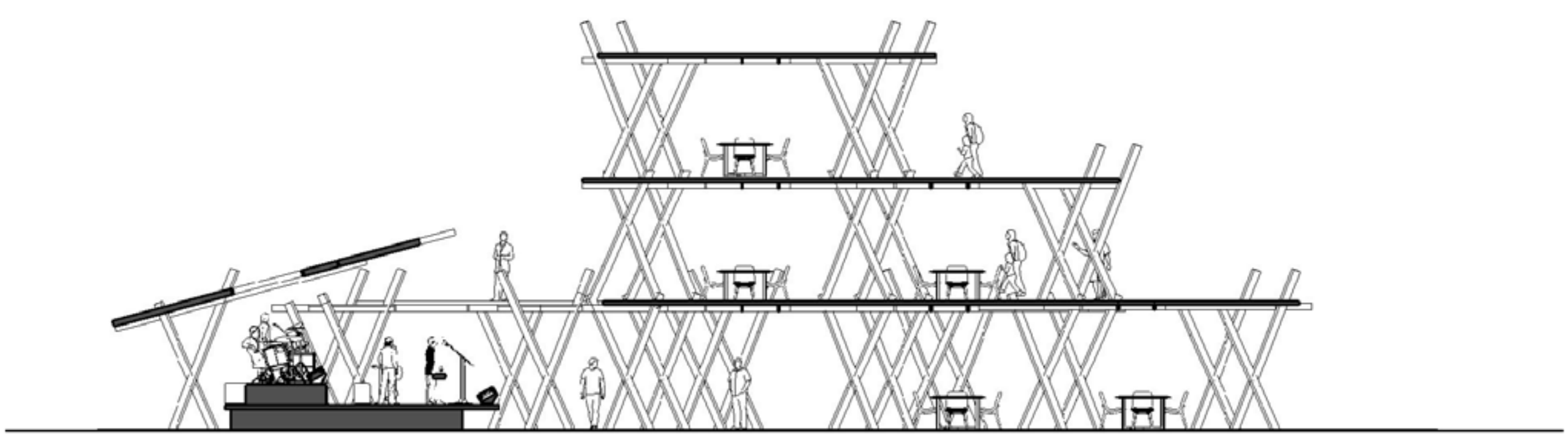
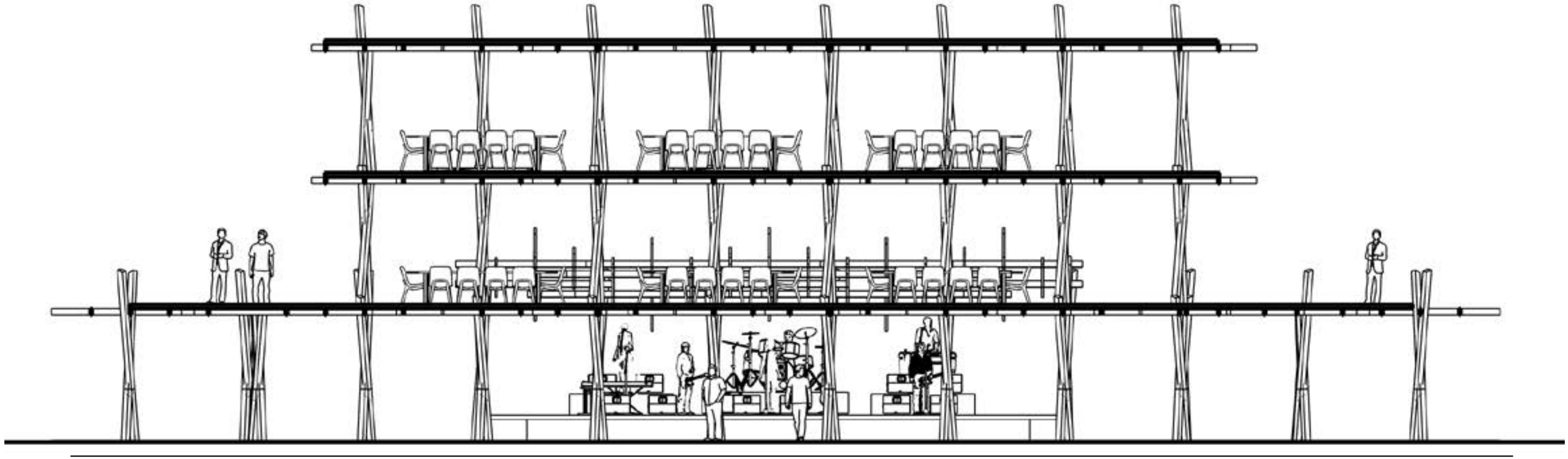
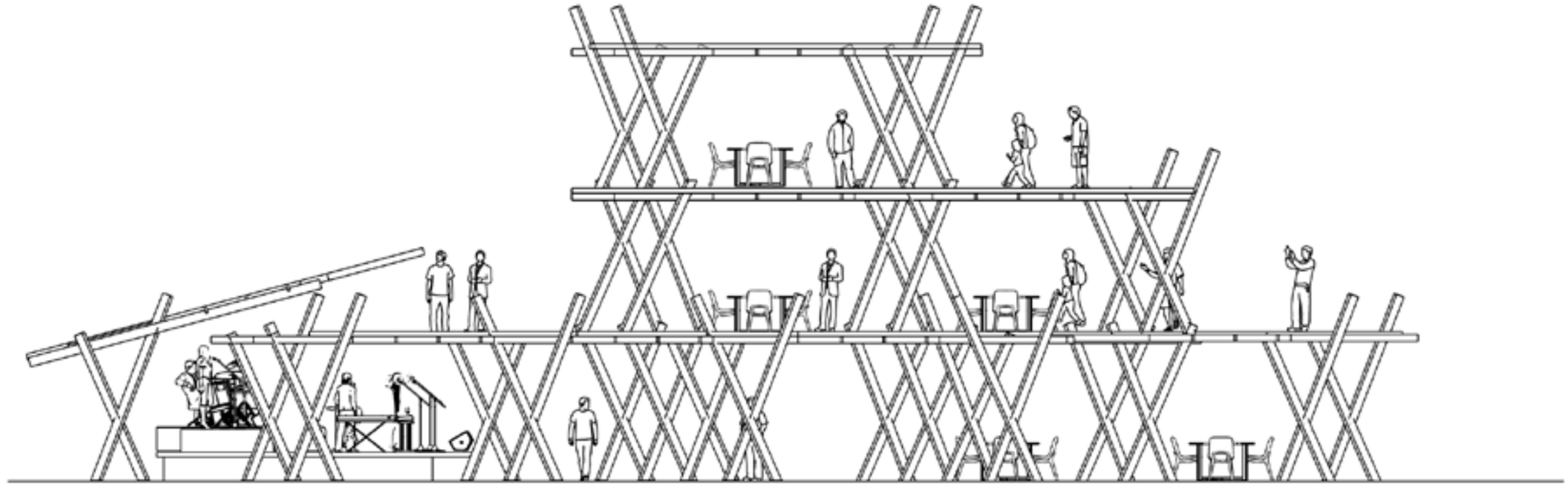


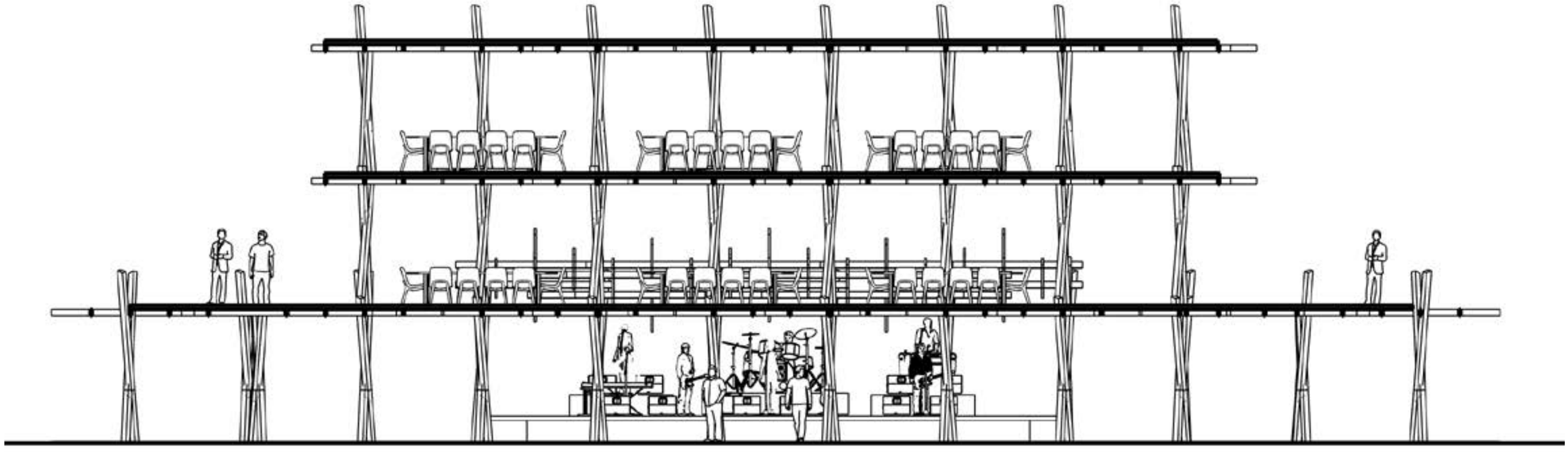
Transverse Section



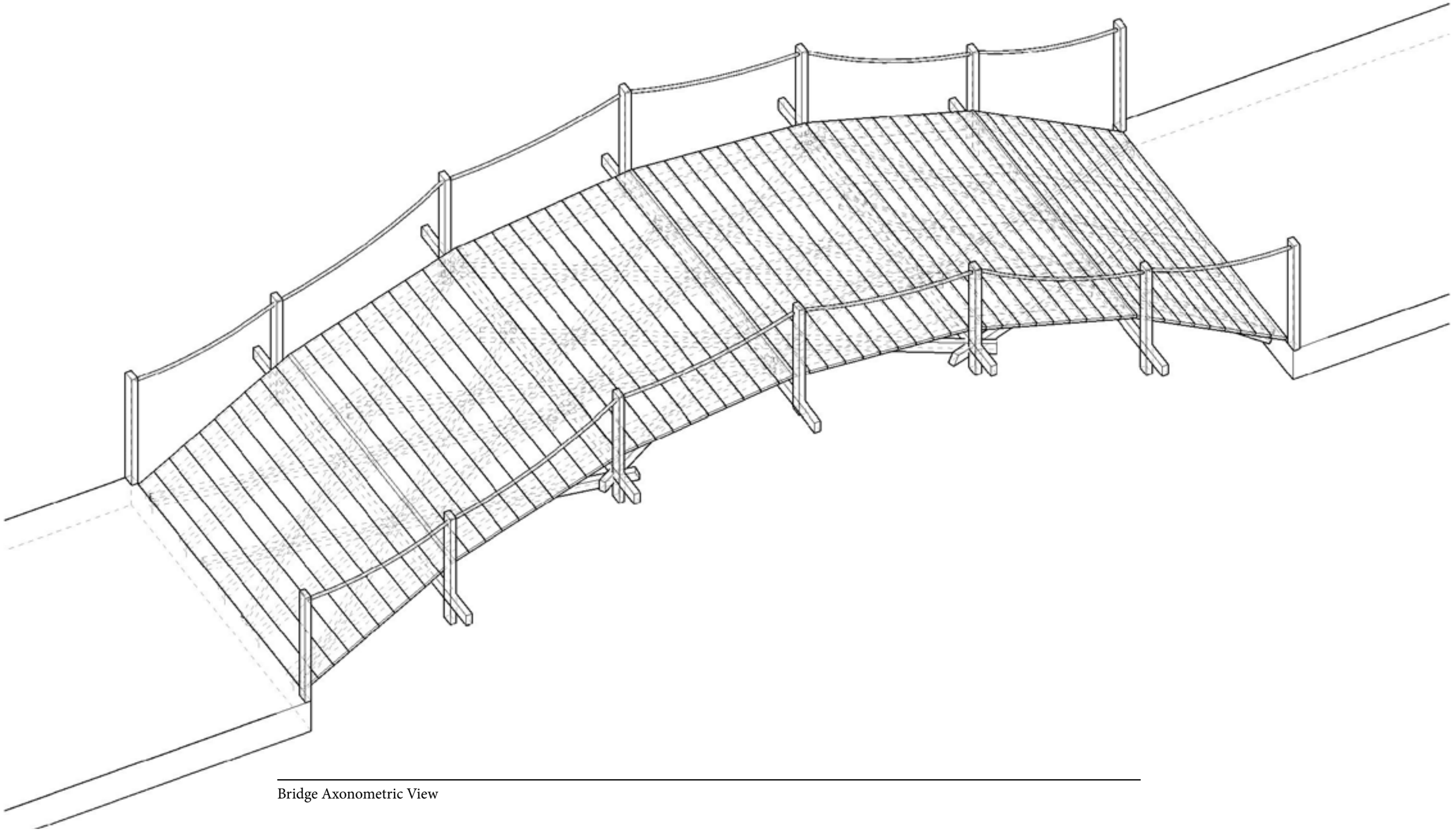
Longitudinal Section



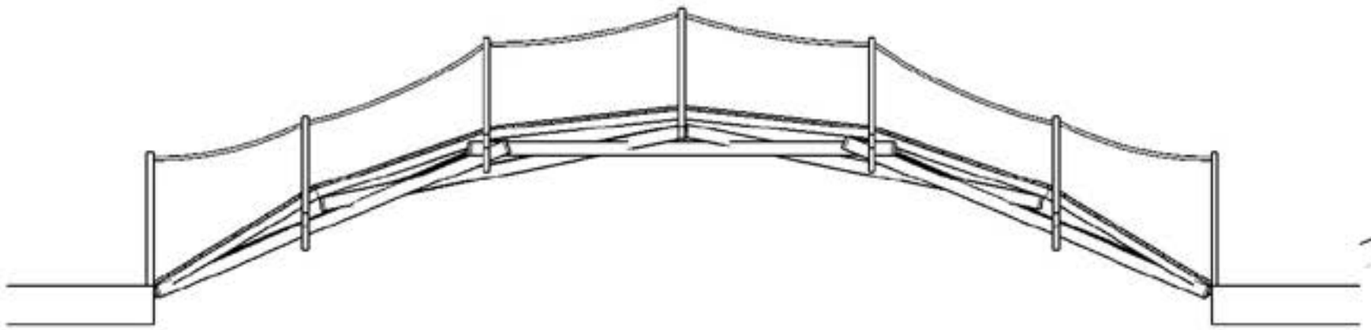
Side Elevation



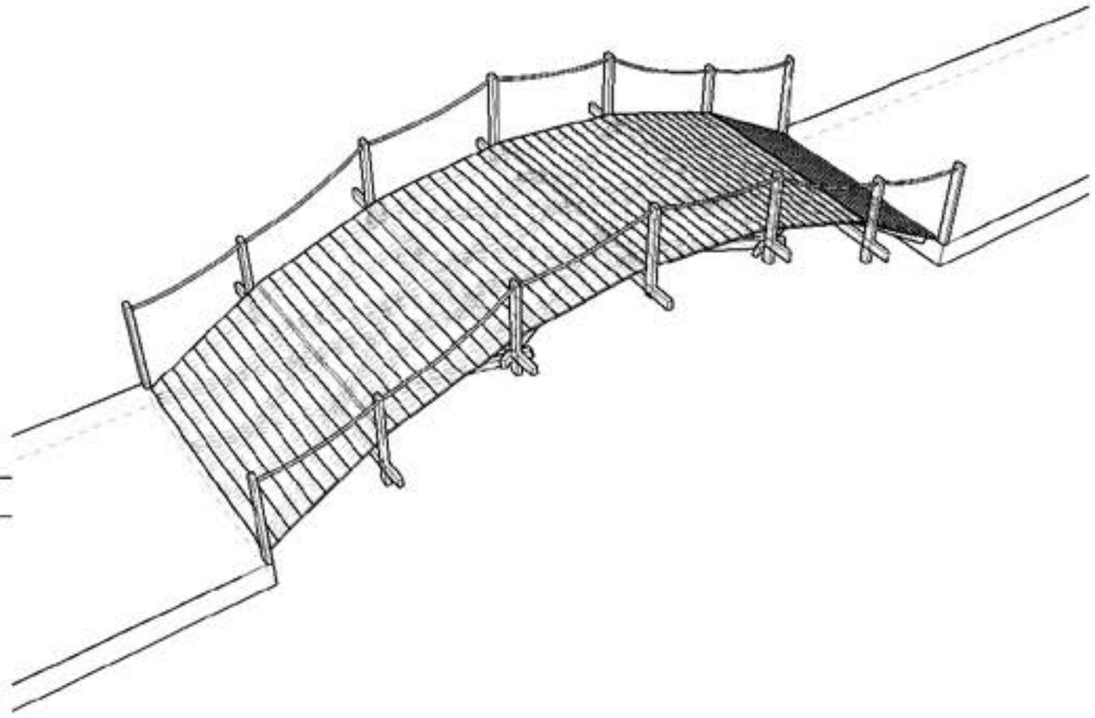
Front Elevation



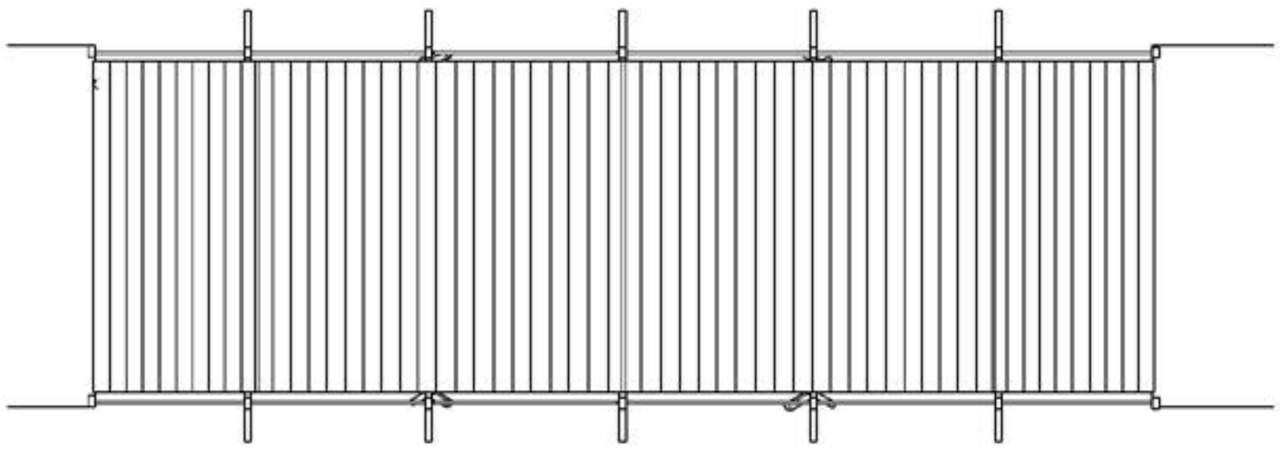
Bridge Axonometric View



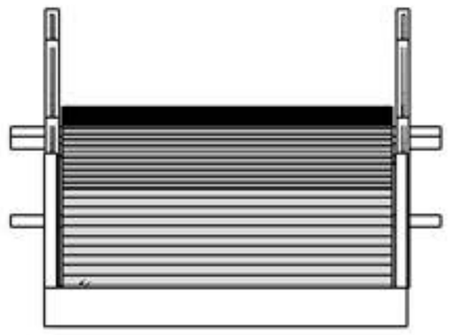
A :: Bridge Elevation
003 scale: 1/4"=1'



A :: Bridge Perspective
004 scale: NTS



A :: Bridge Plan
002 scale: 1/4"=1'



A :: Bridge Elevation
001 scale: 1/4"=1'

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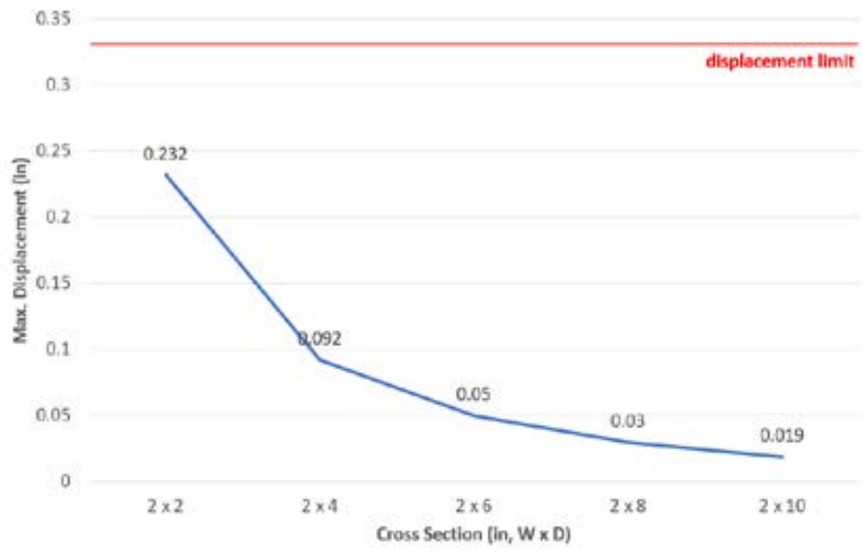
Structural Analysis: Results (displacement only)

	General Properties (Bridge)			Element Properties (Linear Member)			Criteria		
	Total Span (ft)	Total Width (ft)	Total Height (ft)	Cross Section (in, W*D)	Length (ft, L)	number of span segmentation	Displacement limit (in)	Max. displacement (in)	Meet standard?
Case 01 (Base)	10	4	1	2 x 4	4.33	3	0.333	0.093	Y
Case 02	10	4	1	**2 x 2**	4.33	3		0.232	Y
Case 03	10	4	1	**2 x 6**	4.33	3		0.050	Y
Case 04	10	4	1	**2 x 8**	4.33	3		0.030	Y
Case 05	10	4	1	**2 x 10**	4.33	3		0.019	Y
Case 06	10	4	1	2 x 4	**3.70**	**4**		0.128	Y
Case 07	10	4	1	2 x 4	**5.76**	**2**		0.097	Y
Case 08	10	**5**	1	2 x 4	**4.20**	3		0.208	Y
Case 09	10	**6**	1	2 x 4	**4.75**	3		0.414	**N**
Case 10	10	4	**0**	2 x 4	**3.66**	3		0.267	Y
Case 11	10	4	**2**	2 x 4	**3.83**	3		0.040	Y

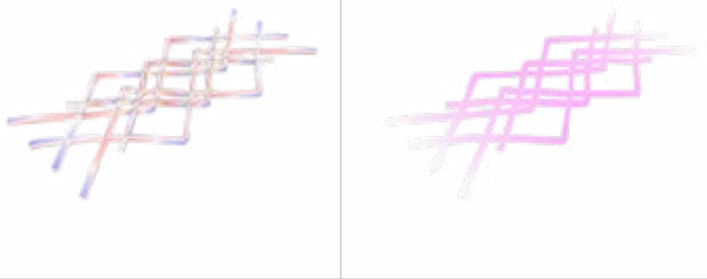
Bold in Red: Variable (Normal in Red: impacted parameter)

Sensitivity Analysis: Cross Section (displacement only)

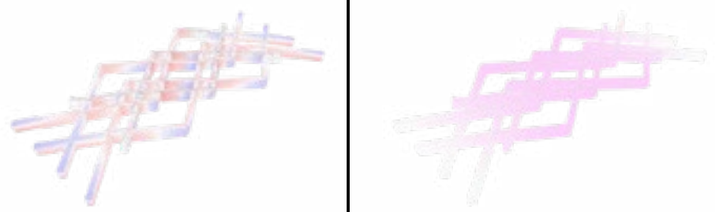


case 02

Variation 1 – Material Level



case 01 (baseline)



case 08

Variation 3 – System Level

case 03

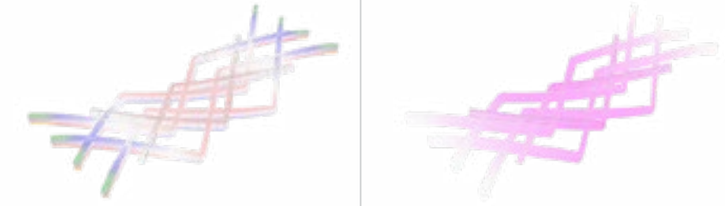
case 09

case 04

case 06

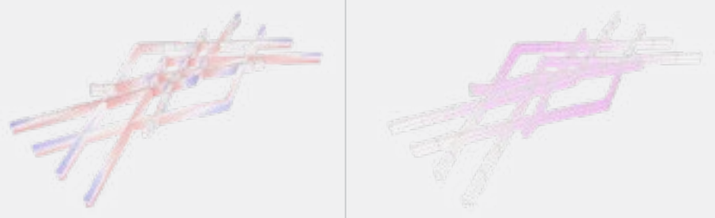
Variation 2 – Assembly Level

case 10



case 05

case 07



case 11

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