SENSING THE FOREST

Month/Year Completed: May 2024

Role of Nominee in the Project: Lead Faculty and Founding Director of the Urban Design Build Studio (UDBS).

Collaborators & Funding Sources Expenses: Six Paid Student Summer Interns (2023), full time ($43,200.00); Nine Undergraduate Advanced Elective Studio Students Fall 2023, 6 Credit Hours per student; Two Undergraduate Advanced Elective Studio Students Spring 2024, 6 Credit Hours per student; One Compensated UDBS Fellow/Project Manager, part time Spring 2024 ($12,700.00); Three Compensated fabrication lab staff members, part time Spring 2024; Compensated General Contractor Partner (Nabholz Construction), by negotiated contract ($167,000.00); Compensated Structural Engineer (Tatum Smith Welcher Engineering), by negotiated contract ($19,000.00); Compensated Surveyor (Center for Advanced Spatial Technologies), by negotiated contract ($3,000); Materials and supplies Funding for completion of installation/pilot project obtained through private gift/grant made in support of the Forest Education Center Project by the Ross and Mary Whipple Family, $3,000,000.00 with 10% allowance ($300,000.00) for construction and materials related research assigned to the Sensing the Forest Pilot Project.

Student Compensation: Outlined Above, Six Paid Student Summer Interns (2023), full time ($43,200.00); Nine Undergraduate Studio Students Fall 2023, 6 Credit Hours per student; Two Undergraduate Studio Students Spring 2024, 6 Credit Hours per student.

Image of Sensing the Forest in the forest and of the forest.

Sensing the Forest is an installation and pilot project that serves two purposes, one practical and the other phenomenological. As an intervention with a site in the Ouachita Mountain Plateau, it invites transformative interactions with a majestic but often familiar landscape. Form, space, and material contribute to a sensory experience that shapes individual memory and understanding of the forest. **"In the Forest and Of the Forest,"** the project aspires to intensify visual, tactile, auditory, and olfactory dimensions of experience. Practically, the structure foreshadows the implementation of the Ross and Mary Whipple Family Forest Education Center, which will employ innovative mass timber technologies through off-site and on-site construction methods involving a complex network of collaborators.

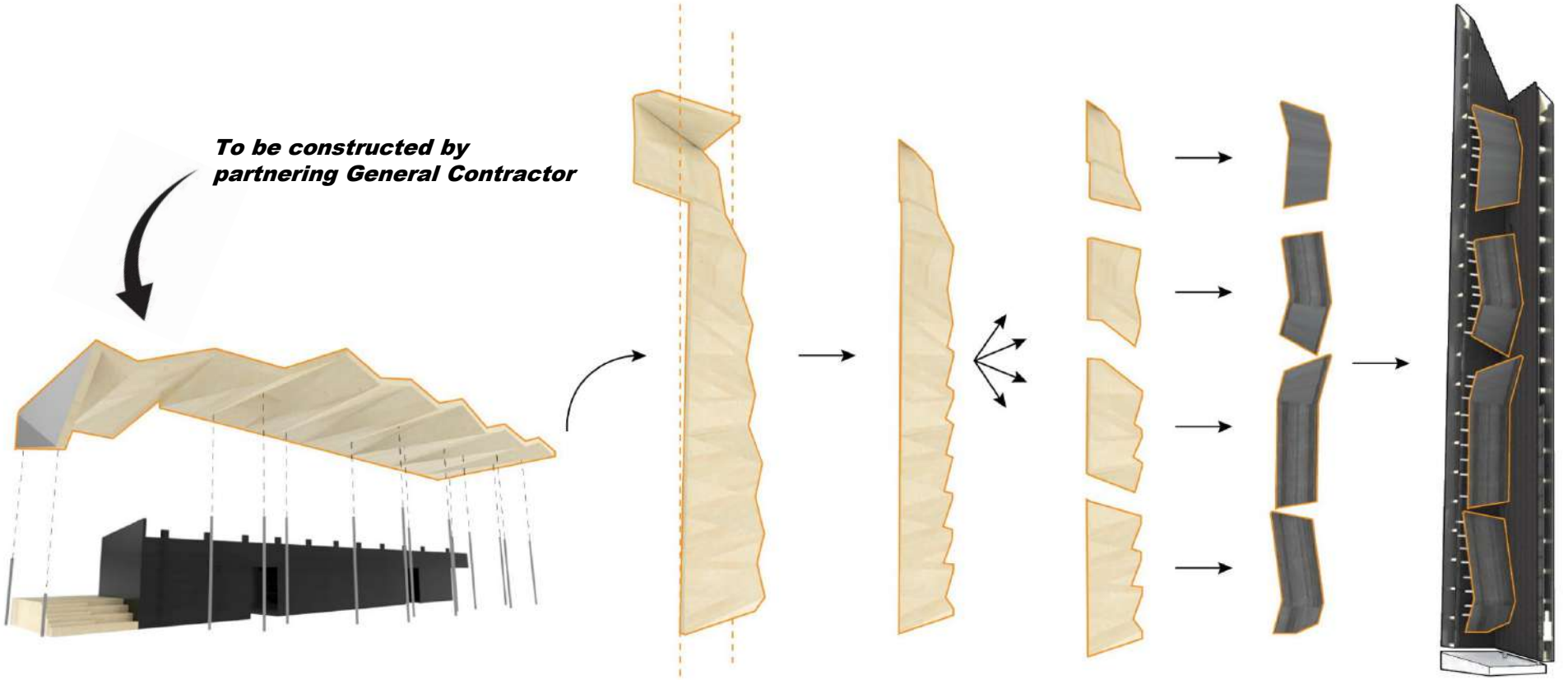
Image of Sensing the Forest and its mirrored surface reveal its intention to be "in the forest and of the forest."

Rendering of Sensing the Forest in relationship to future project phases including the Ross and Mary Whipple Family Forest Education Center, for which it serves as a pilot project.

Sensing the Forest (STF) is a pilot project employing mass timber, structural, and enclosure strategies that will be incorporated into the Ross and Mary Whipple Family Forest Education Center located in the Ouachita Mountains outside Hot Springs, Arkansas. **"In the Forest and Of The Forest,"** the project aspires to seamlessly dematerialize in the surrounding forest while providing new experience-based perspectives on the natural landscape.

Investment in a Mock-up for Proof of Concept in the Forest Education Center Construction Technologies and Strategies Provided Opportunity for a Permanent Installation.

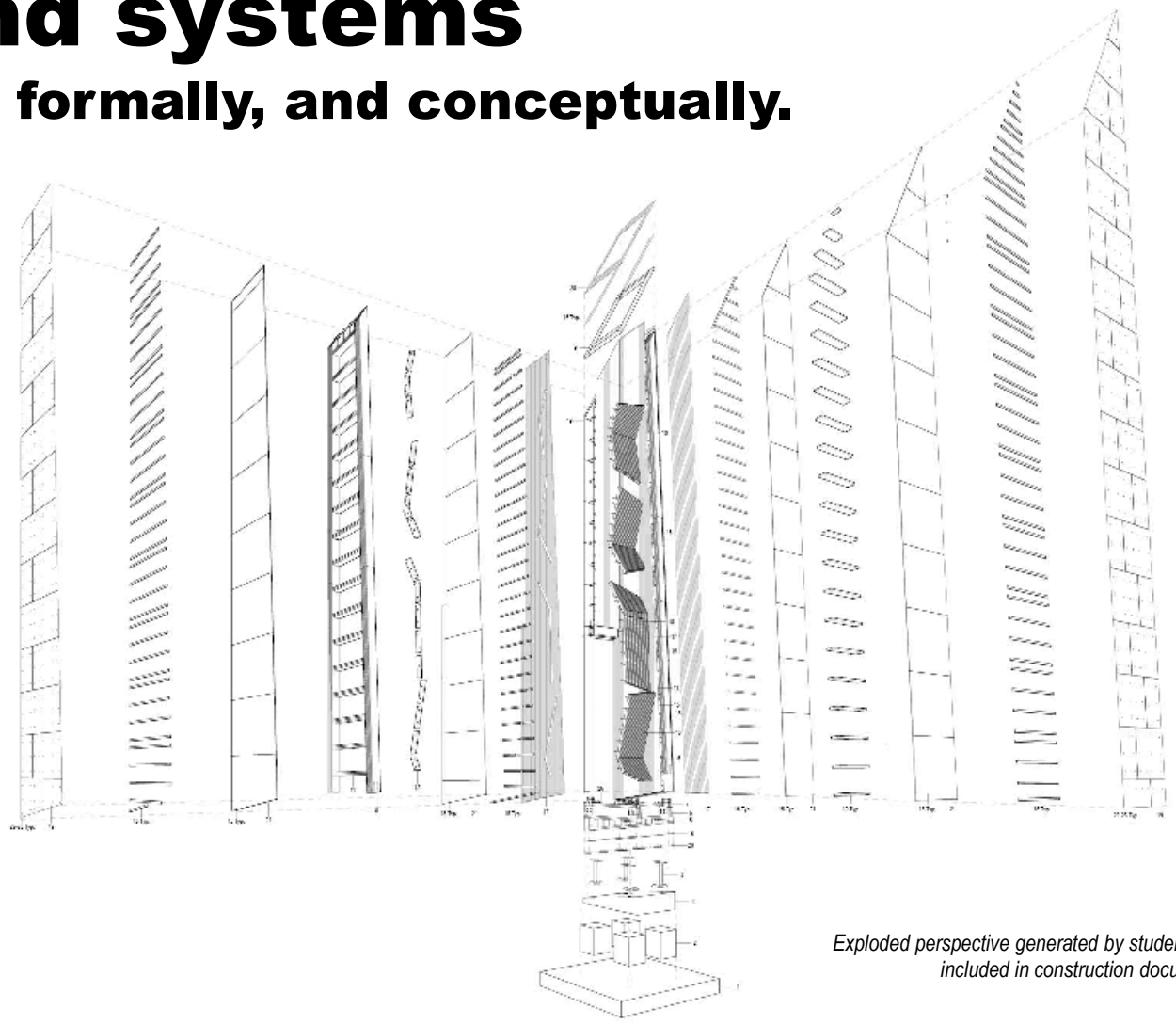
The development of the $3,000,000.00 Ross and Mary Whipple Family Forest Education Center, which will involve off-site pre-fabricated construction by the Urban Design Build Studio, has required extensive collaboration with clients, stakeholders, the center's end-users, and a general contractor (Nabholz Construction) who will be engaged in realizing the project.



Sensing the Forest is
an amalgamation of layers and systems
constructively, formally, and conceptually.

Keynotes:

1. Reinforced concrete footing.
2. Reinforced concrete pedestal.
3. Steel column and plate assembly.
4. Polished concrete finished slab.
5. Dimensional lumber framing.
6. Beam.
7. Simpson strong tie.
8. Column.
9. Dimensional lumber termination framing.
10. 2x8 dimensional lumber framing 2 ft. on center maximum.
11. Double 2x8 framing members along column line 2.
12. 2x8 dimensional lumber blocking for baffle support between framing.
13. 3-1/2" schedule 40 round steel pipe section pivot and pick point rod.
14. Four [4] 2x12 dimensional lumber pieces laminated, nailed, and connected to columns.
15. 1/2" APA rated plywood sheathing attached to framing with 8D common nails at 6" on center along panel edges and 12" on center at intermediate studs.
16. 1-1/2" x 3/4" cellular furring strips 18" on center.
17. Shou-sugi ban interior cladding attached to sheathing.
18. Nail laminated timber [NLT] 2x4 nominal lumber baffles with shou-sugi ban finish.
19. 16 guage #5 finish stainless steel.
20. Built up 2x girt.
21. Fluid applied synthetic air and vapor permeable membrane Exoair 230/230LT.
22. Square drive flat head stainless steel screws 18-8, #12 x 1-1/2".
23. Counter sunk finishing washer 18-8 stainless steel.
24. 3/4-10 A307 all thread rod, galvanized.
25. Bolt
26. Steel plate.
27. Steel column.
28. Shou-sugi ban exterior finish cladding.

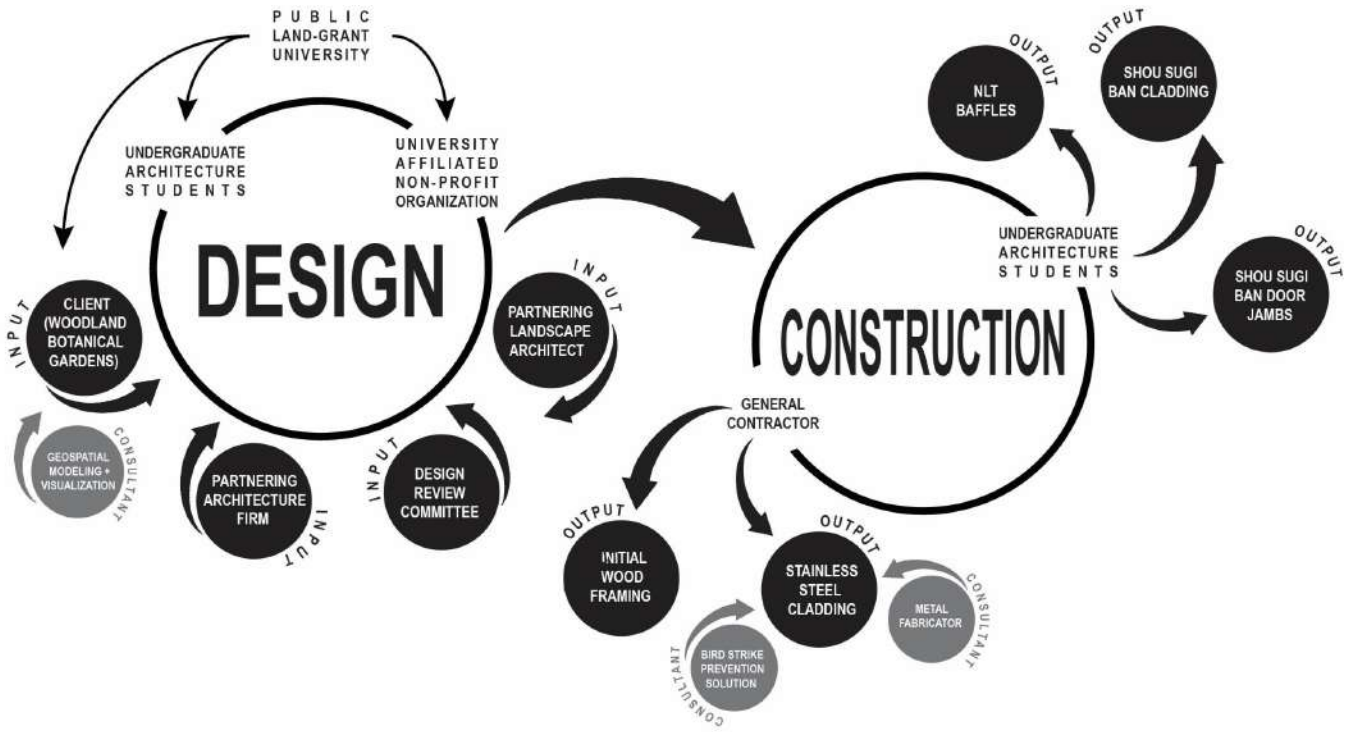


Exploded perspective generated by students and included in construction documents.

Polished concrete slab, steel columns, NLT columns, dimensional lumber framing, NLT baffles, plywood sheathing, vapor permeable membrane, cellular furring strips, Shou-sugi ban interior cladding, stainless steel exterior cladding – these name just a few of the layers that make up Sensing the Forest, coming together to create a layered experience for the viewer from inside to outside. The process of constructing and installing Sensing the Forest required layers of collaboration between UDBS students, faculty, and project partners.

The realization of Sensing the Forest was predicated on

collective intelligence.



The Urban Design Build Studio (UDBS) worked with students through a summer internship and two consecutive advanced undergraduate studios to design and develop Sensing the Forest. This process involved the engagement of external consultants, a Design Review Committee (DRC), and client group stakeholders. Industry partnerships and internal university resources complimented expertise in achieving the aspirations of the project.

Images of students engaged in conversation with collaborating partners and DRC.

Taking cues from Alice's Adventures in Wonderland in course pedagogy and processes

In Lewis Carol's depictions of ***Alice in Wonderland***, the young girl enters a fantastical landscape by climbing through a mirror, where she then occupies a world beyond. Referencing Alice's point of departure, the sequence of advanced undergraduate studios that led to the development of **Sensing the Forest** promoted a similar shift in perception of the world; one specific to the Arkansas Forest, the Ouachita Mountains, and eco-regions beyond.

The studio pedagogy that led to the realization of Sensing the Forest was organized into **four incrementally intensifying phases of work,** inspired by Alice's story.

GLANCING in the introductory phase of work, collaborative groups of UDBS students were assigned responsibilities in communicating the relationship of individual parts of the project to the whole

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GAZING involved intensified studies of systems, including the detailing of connections and productive processes. Student responsibilities involved identification of procurement channels, project mobilization/preparation and small scope/full scale prototyping.

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PEERING engaged the most intensive dimension of work, prefabrication and construction of a full-scale section mock-up of Sensing the Forest. Work in this phase involved intensive making and collaboration, both internally and externally. UDBS students studied detailing and systems through construction of the mock-up and used it to communicate with partnering specialists.

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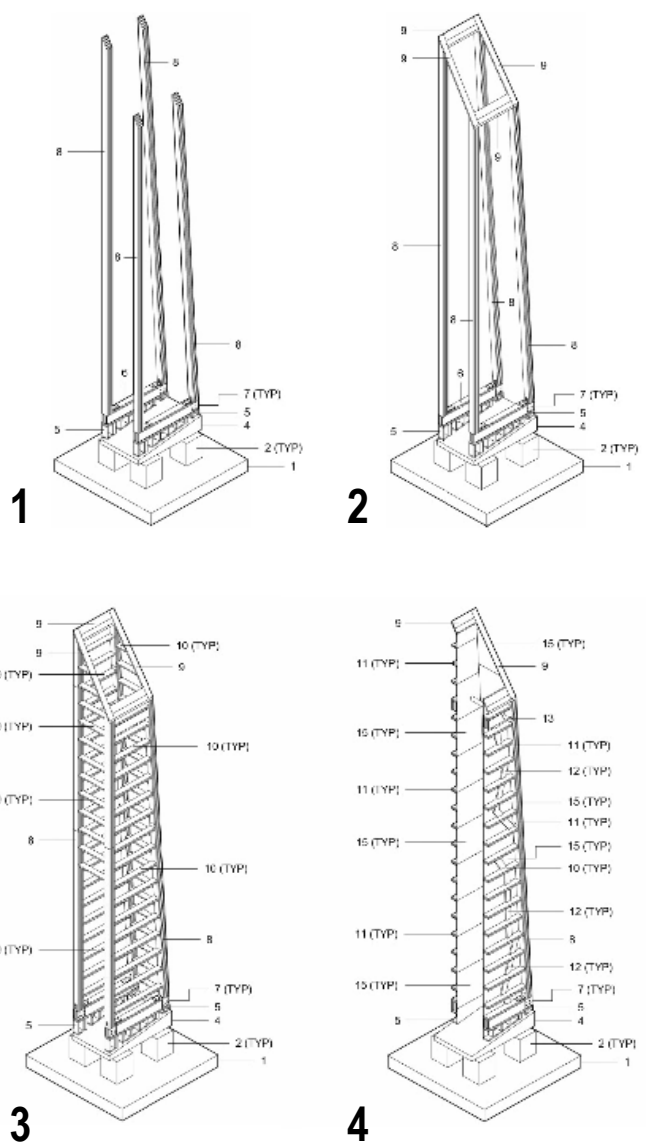
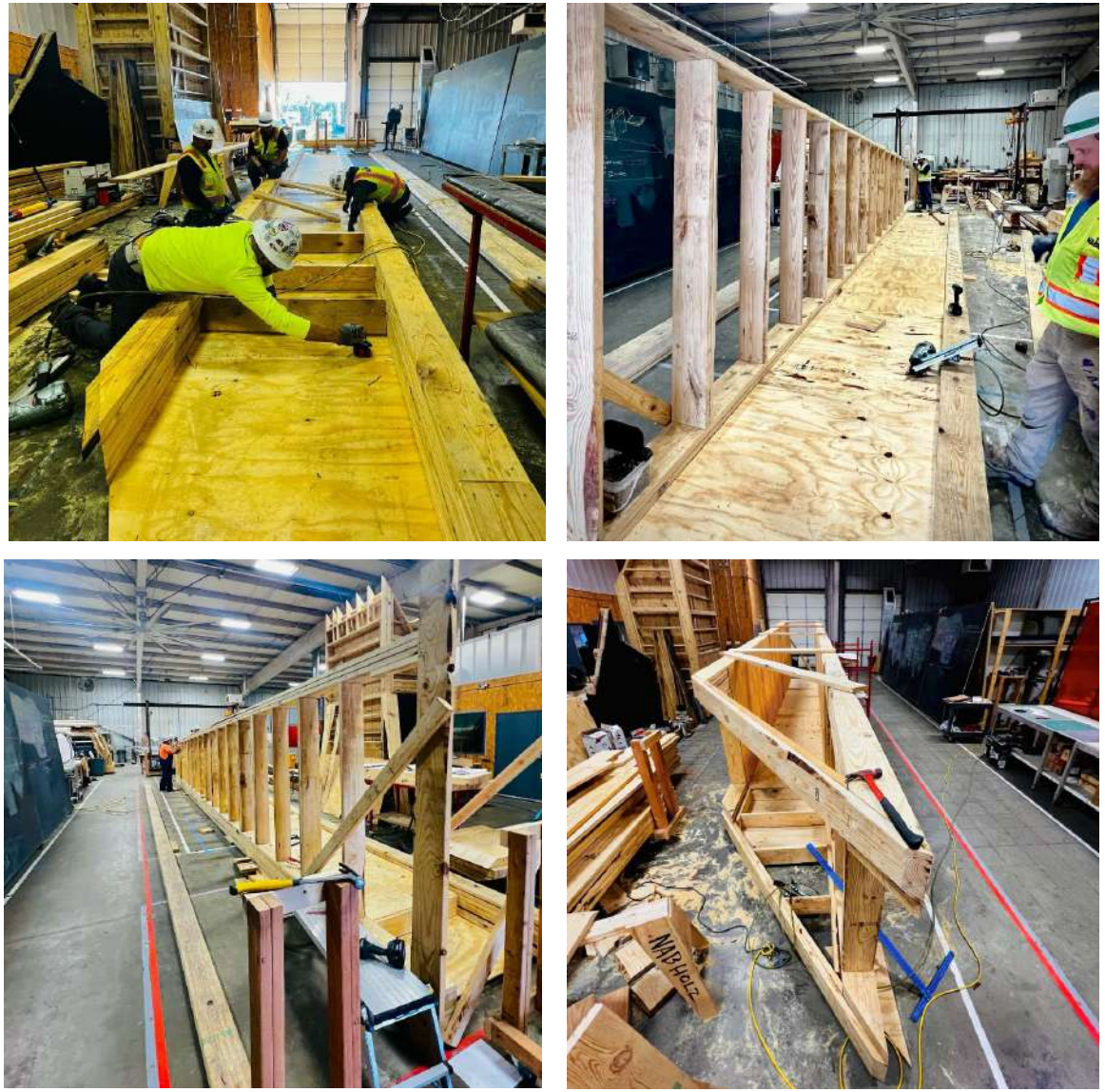
PROJECTING literally and figuratively extended the work beyond the school and into the public realm – including transit of the structure and enclosure to the site for placement and completion of construction.

Through the Looking Glass...





LEFT: Construction drawings produced by UDBS students to communicate with the Nabholz Construction, the partnering General Contractor.
RIGHT: Images of Nabholz constructing the framing components with UDBS students inside the fabrication lab at the University of Arkansas.

Construction was a collaborative effort focused on efficiencies.

Nabholz Construction, the general contractor who will execute the Ross and Mary Whipple Family Forest Education Center, worked closely with the Urban Design Build Studio in the Fay Jones School of Architecture and Design fabrication lab to maximize effectiveness of off-site construction. Working shoulder to shoulder with students and the UDBS team, the general contractor developed confidence in the strategies proposed. Work executed by UDBS students demonstrated abilities in meeting time and performance expectations. Sequencing drawings developed by students established confidence in precise communication. This collaborative environment provided an invaluable learning experience for students in understanding responsibilities of designers and contractors.

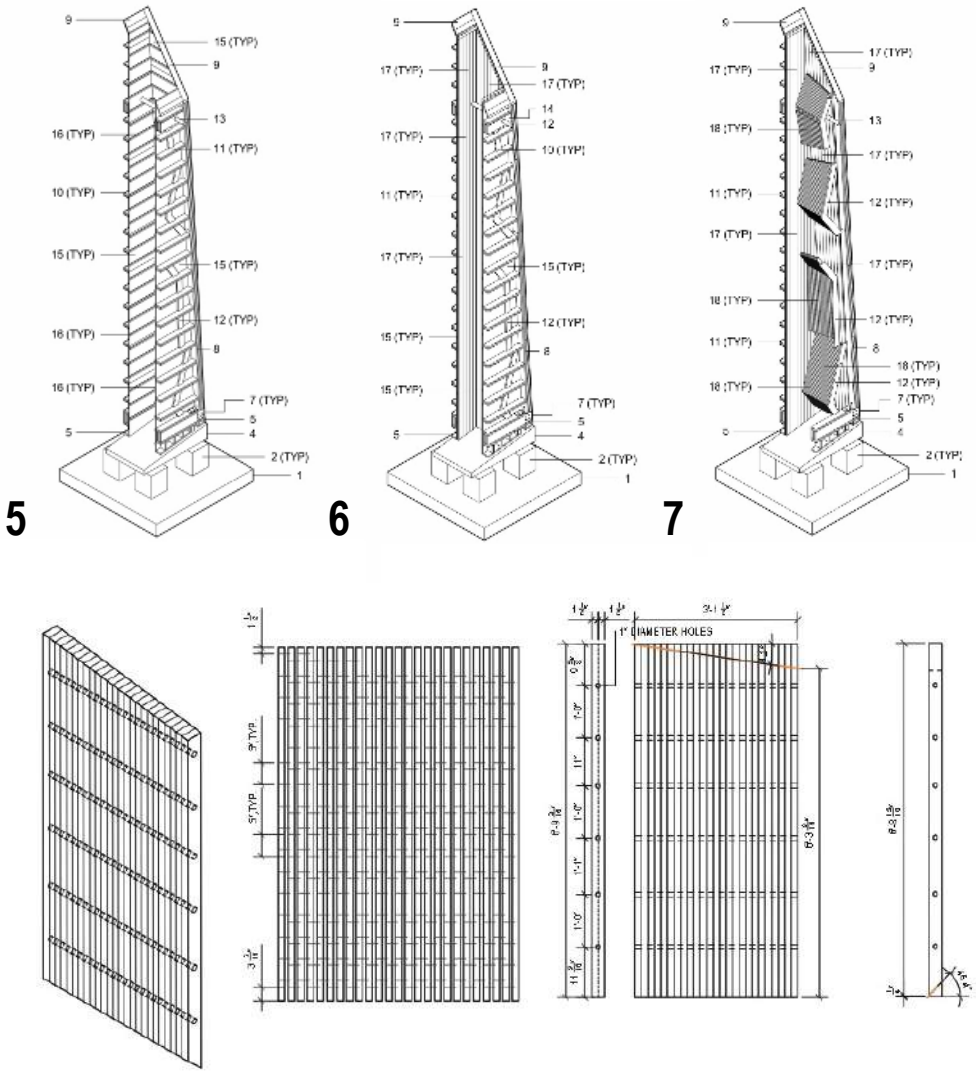




Images of UDBS students constructing a full-scale section mockup of Sensing the Forest, used to study details and understand logistics of constructing and cladding the structure.

Students developed the details and methods for construction through full-scale prototyping.

Working with faculty and collaborators, undergraduate architecture students developed the project through summer internship and two 6 credit hour studios. In the semester prior to implementation, during the **PROJECTING** phase, students mocked-up a hybrid full-scale prototype that included elements of the foundation system, tower shaft, and upper termination. This allowed them to study details and strategies at full scale with consideration of all conditions – including framing, the jambs and head of the entry, the installation of Nail Laminated Timber (NLT) baffles, interior and exterior cladding systems, and foundations. It also provided a proof-of-concept demonstration of capacity for partnering engineers and contractors on the path to construction of the project.



LEFT: Examples of shop drawings produced by UDBS students for fabrication of the NLT baffles employed in Sensing the Forest.
RIGHT: Images of UDBS students constructing the NLT Baffles employed in Sensing the Forest.

Parametrically derived NLT Baffles included in the project prove viability of the primary structural system that will be employed in the Ross and Mary Whipple Family Forest Education Center.

The roof canopy of the Ross and Mary Whipple Family Forest Education Center will be constructed utilizing prefabricated NLT cassettes constructed by students in the university's build lab. The NLT baffles designed and executed by students and suspended within the installation demonstrated performative abilities necessary in planning implementation of the Ross and Mary Whipple Family Forest Education Center. The final array of NLT baffles were constructed from over 200 sticks of dimensional 2x4 lumber, dowel laminated at terminations, and CNC milled to achieve desired surface articulation on the interior of the structure.

The traditional Japanese method of

Shou-Sugi Ban (yakisugi)

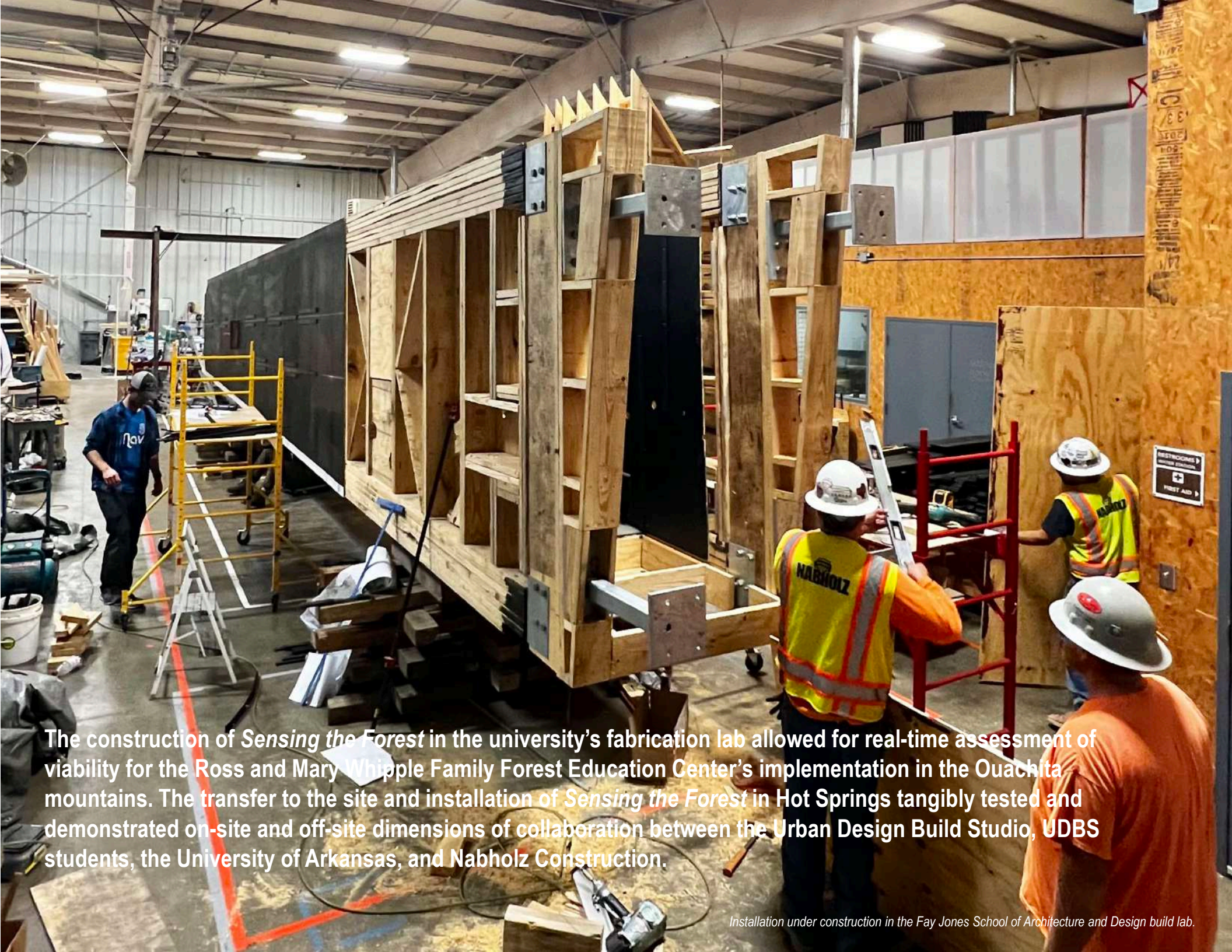
was utilized to preserve all exposed wood elements.

UDBS students learned how to set up and operate a propane-fueled kiln with roller tables to produce Shou-Sugi Ban cypress wood members that were utilized for the interior cladding of Sensing the Forest. This process involved burning, sweeping, and finishing the wood with penetrating oil. Students also charred the Southern Yellow Pine NLT baffles using a propane torch. The resulting charred interior creates a place for visitors to engage their senses through an abstracted hollowed-out tree – accentuating the sky above while ensuring long term sustainability of the structure.

Students used a propone-fueled kiln and propane torch to apply the Shou-Sugi Ban finish on all exposed wood members.

Images of an NLT Baffle before and after the yakisugi process.

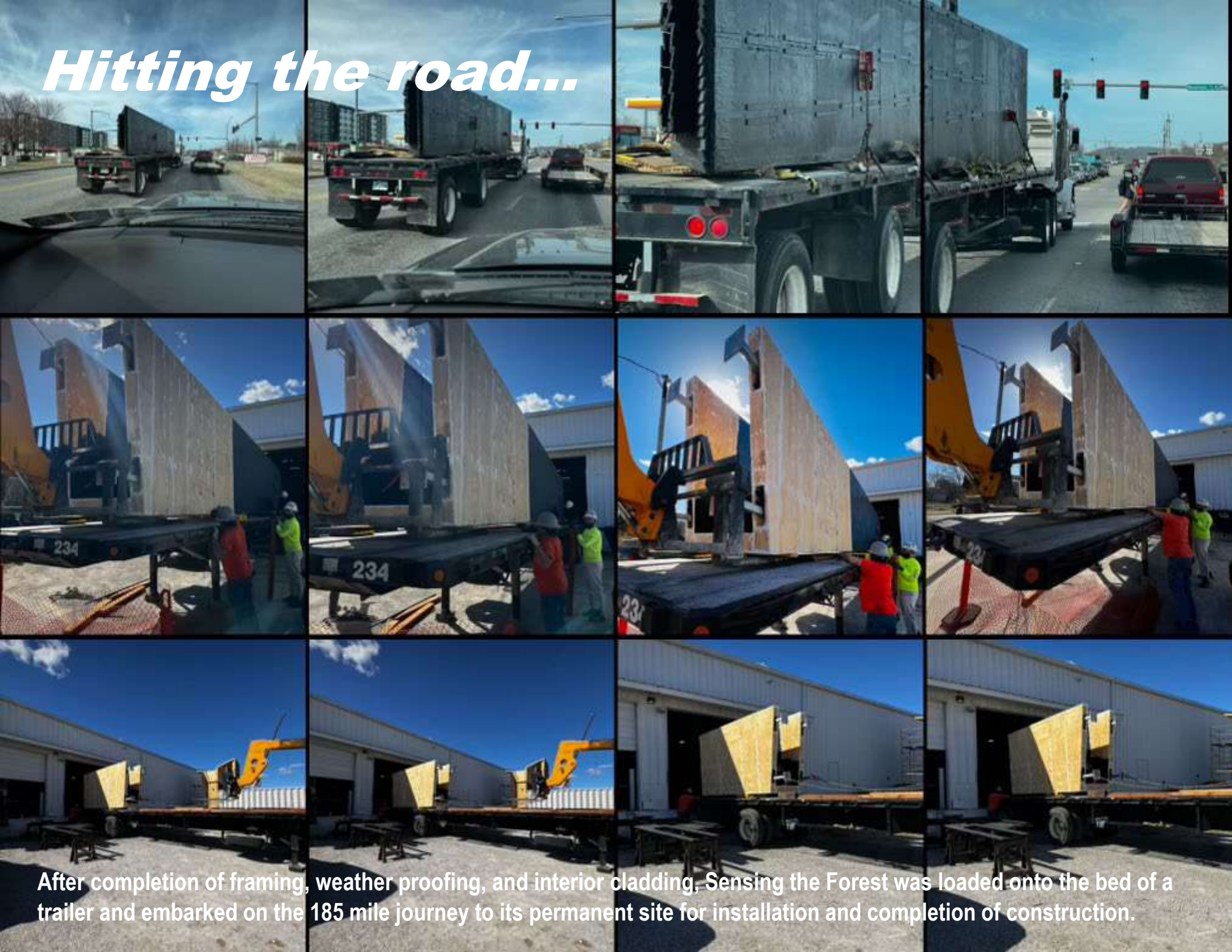
Photo from the interior of Sensing the Forest, looking toward the sky surrounded by the Shou-Sugi Ban interior.



The construction of *Sensing the Forest* in the university's fabrication lab allowed for real-time assessment of viability for the Ross and Mary Whipple Family Forest Education Center's implementation in the Ouachita mountains. The transfer to the site and installation of *Sensing the Forest* in Hot Springs tangibly tested and demonstrated on-site and off-site dimensions of collaboration between the Urban Design Build Studio, UDBS students, the University of Arkansas, and Nabholz Construction.

Installation under construction in the Fay Jones School of Architecture and Design build lab.

Hitting the road...

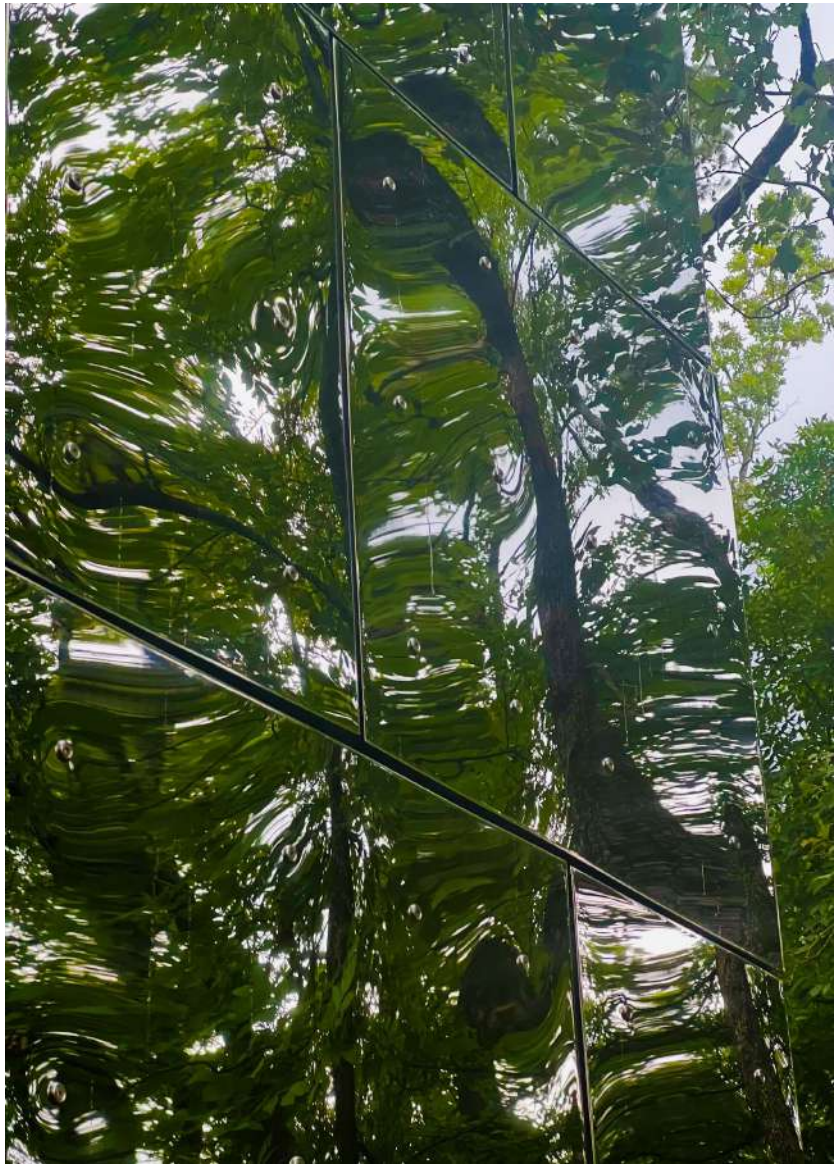


After completion of framing, weather proofing, and interior cladding, Sensing the Forest was loaded onto the bed of a trailer and embarked on the 185 mile journey to its permanent site for installation and completion of construction.

In the forest, of the forest

Upon arrival to the site, Sensing the Forest was finally vertical and craned into place, ready for on-site construction and completion.

Images of stainless-steel cladding installation.



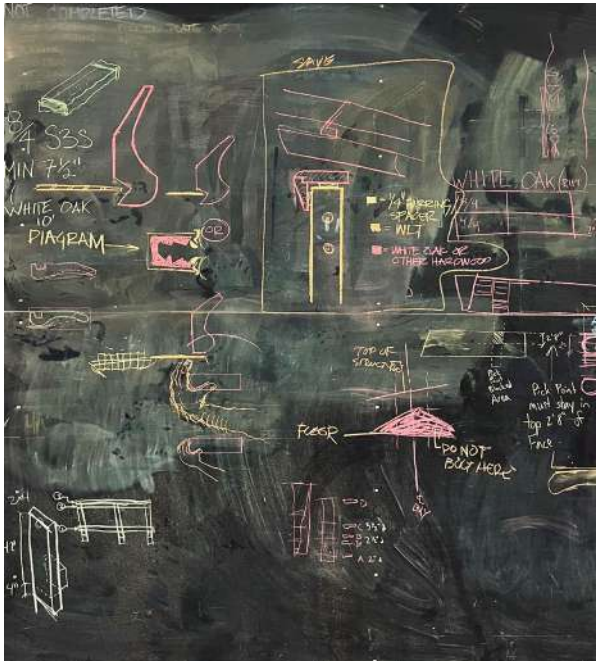
Detail image of dematerializing effect and deformation characteristics.

A mirror-finish, stainless steel rain-screen dematerializes the tower within the forest.

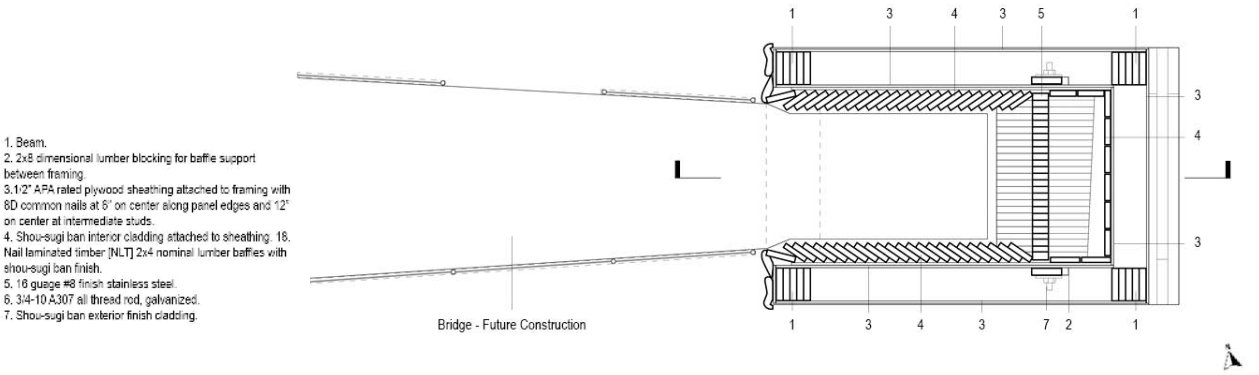
The #8 finish stainless steel rain-screen employed in the exterior cladding system of Sensing the Forest dematerializes the volume of the installation into the surrounding forest. The mirror finish surface is intentionally deformed, offering a new interpretation of the forested surroundings, similar to Alice's looking glass.

Peering into the looking glass...

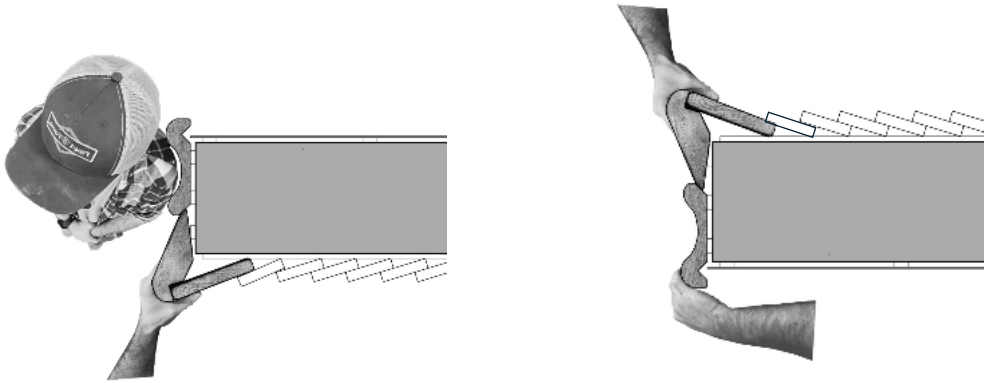
The moment of contrast between the dematerialized exterior and dark, charred interior of Sensing the Forest is celebrated with an ergonomically designed door jamb studied and executed by UDBS students in the PEERING phase of work. Two parts of this door jamb detail work together to encourage physical interaction with the built project. Much like Alice pulling back the curtain to reveal the looking glass, the door jamb members at the threshold offer a firm handhold from which to lean in and peer inside.



Example of student work - Initial sketches exploring intentions for the door jamb detail.

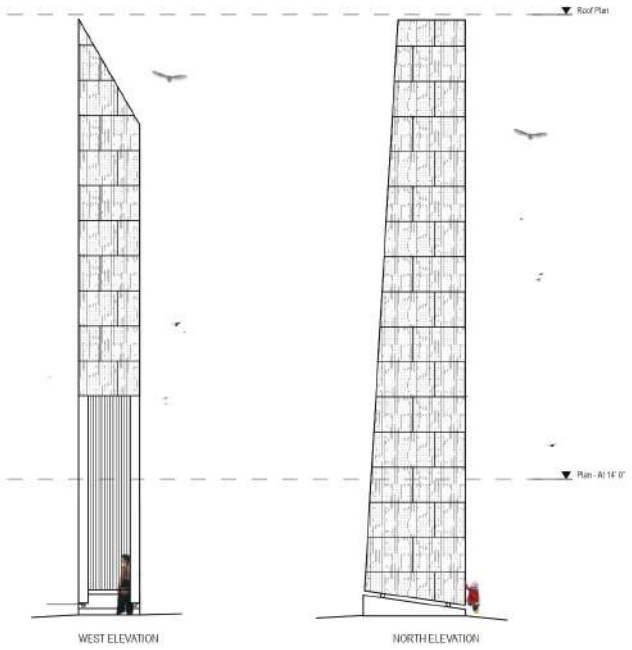


Example of student work – plan drawing at the level of entry into Sensing the Forest.



Example of student work - door jamb ergonomics diagrams to communicate intentions.

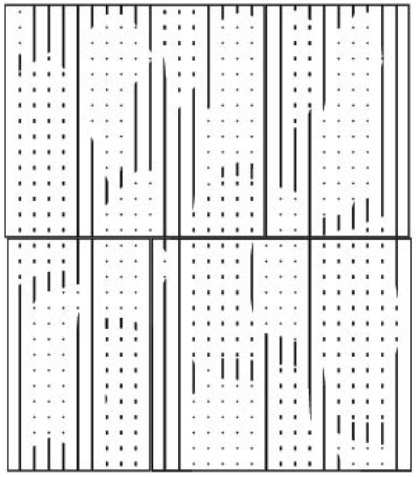
Example of student work - image of an initial mockup of the door jamb detail.



Diagrams depicting the avian strike prevention strategy deployed at scale on elevations of STF.

Image of Sensing the Forest with applied avian strike prevention pattern produced by students.

Loblolly bark



Loblolly pattern produced by students

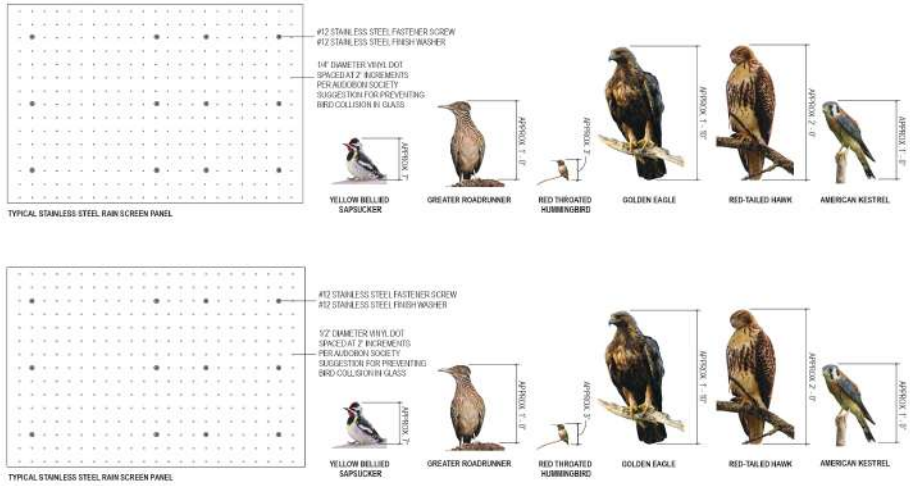


Diagram communicating 2" spacing suggestions from Audubon and the U.S. Fish and Wildlife Service compared to the scale of birds native to the area.

Understanding the position Sensing the Forest occupies within the forest and the intentional dematerialization of the exterior cladding system, the project was designed with consideration of potential avian interaction. The mirror-finish rain screen panel system is predicated on a 4-inch module with ¼-in. seams between panels to create shadow lines, and fasteners are exposed as visual cues for wildlife. Additionally, students developed a visual cue pattern informed by recommendations from the Audubon society and United States Fish and Wildlife Service. The aggregated pattern is reminiscent of the bark of the loblolly pine trees that populate the forest location, reinforcing intentions to dematerialize the tower within the forest while providing cues to mitigate avian strikes.

Example of UDBS student work - West-East Section drawing of Sensing the Forest.

Similar to Alice's looking glass, Sensing the Forest illuminates an alternative existence from the forest floor.

Nestled in the forest and in harmony with its surroundings, Sensing the Forest awaits future construction of the "Forest Experience" bridge, a steel bridge to be constructed in future phases with which visitors are raised above the forest floor and invited to engage with the forest from a new point of view. The installation offers the opportunity for new perspectives of the surrounding forest at the intersection of interrelated patterns characteristic of the state's forest ecology. For the public and in service of the public, the project reveals what might otherwise remain camouflaged.

Image of completed installation with future phases of work montaged to illustrate context of the full Ross and Mary Whipple Family Forest Education Center build out.