

Competition: The Legendary Highway 14 Tower – Buildner – 2023

Competition Prompt:

Participants were tasked with designing an observation tower and landscape features fitting the natural and historical context of the area (De Smet, North Dakota, U.S.) on a site which offers an ideal vantage point for viewing the area's historic natural features while remaining easily accessible for visitors. The project's goal is to enhance visitor experiences and promote local and regional tourism, while also prioritizing accessibility, safety, and sustainability. By focusing on creating a design solution that facilitates a user experience that enables movement, observation, and contemplation of the Silver Lake and Big Slough ecosystem, this project has ambitions to create a harmonious balance between natural beauty and innovative architecture.

The Concept(150 words):

The proposal explores the feasibility of a tower clad in wood fins, each fin programmed to continuously move with the seasonal patterns of native bird songs, creating a kinetic sculpture imitating bird song, without disturbing the birds. This rhythmic kinetic movement references nature surrounding it: the movement of prairie grass, the pattering of animal hooves and the hypnotic melodies of the birds.

An instrument mimicking bird songs is prone to scaring the birds away and disrupts birds who mistake the mimicking song as their own. Rather, the mechanism produces no tangible sound, save for a soft mechanical thud as the operable wood fins pivot to the percussive pattern of native bird songs.

The tower moves the most starting from mating season through summer, while lying dormant during the winter. Thus, a respectful and constant dialogue with the bird population.

melody in motion

Bound to antiquity,
the sod brick base ascends,
welcoming those of diverse abilities,
where harmony extends.

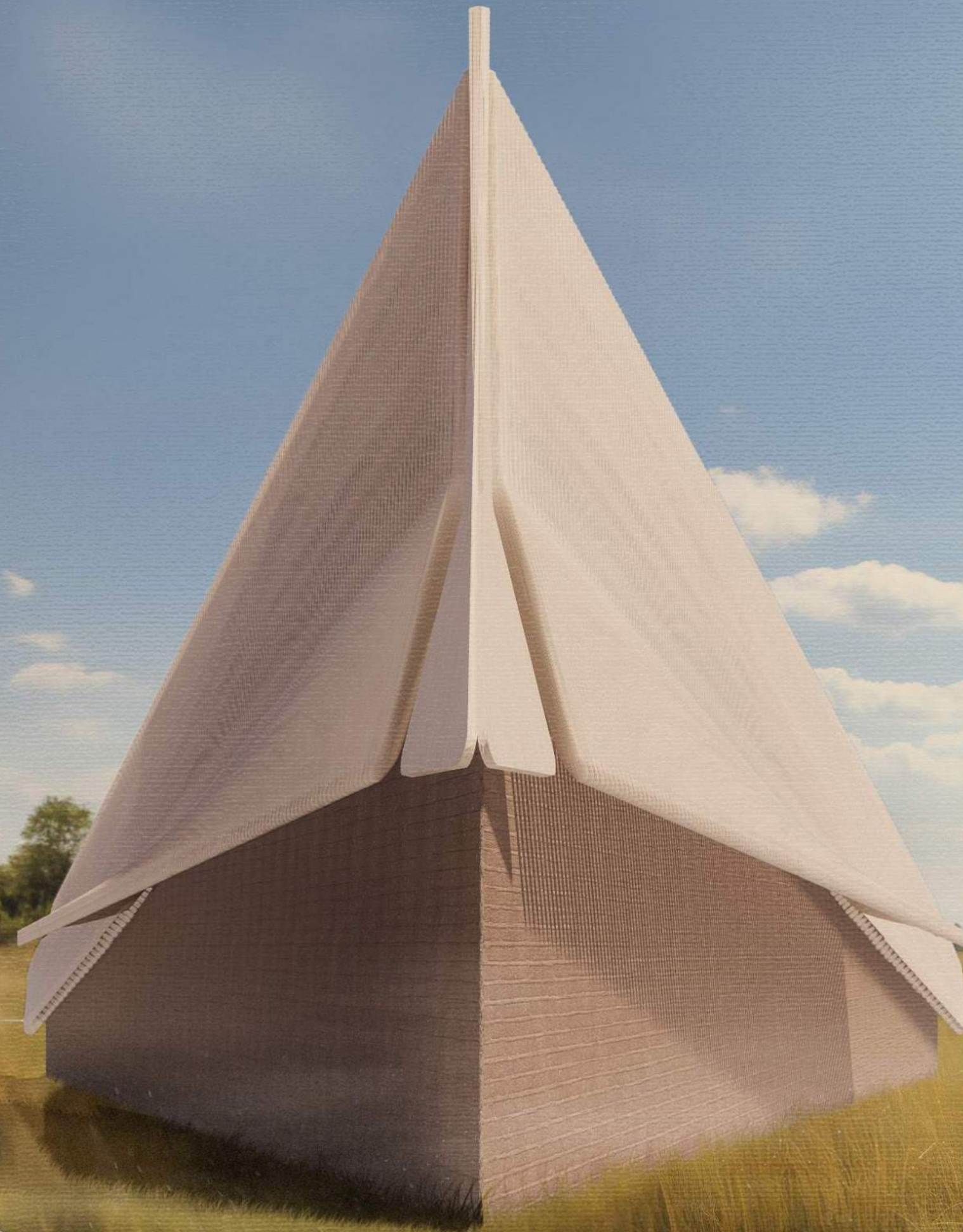
Amid the blossoms,
linger as you wish.

Wood fins gently sway,
humming their soft refrain,
of Big Slough bird songs,
whispering from the summit.

Close your eyes and drift with the flow,
of wind through the grass,
of echoing hooves and chittering birds.

Find peace,
however you please.

Kinetic sculpture.
Respite for contemplation.
A symbol of South Dakota.



Blue Thimble



Sweet William



Pasque Flower



Leadplant



Buffalo Bean



Native Planting

In *Pioneer Girl*, Laura Ingalls Wilder describes a handful of flower species native to De Smet, including the Blue Thimble, Sweet William and Buffalo Bean.

The very same flowers that nourished Laura's sense of wonder mingle with fellow native pollinators in the central garden bed.

Diverse Views

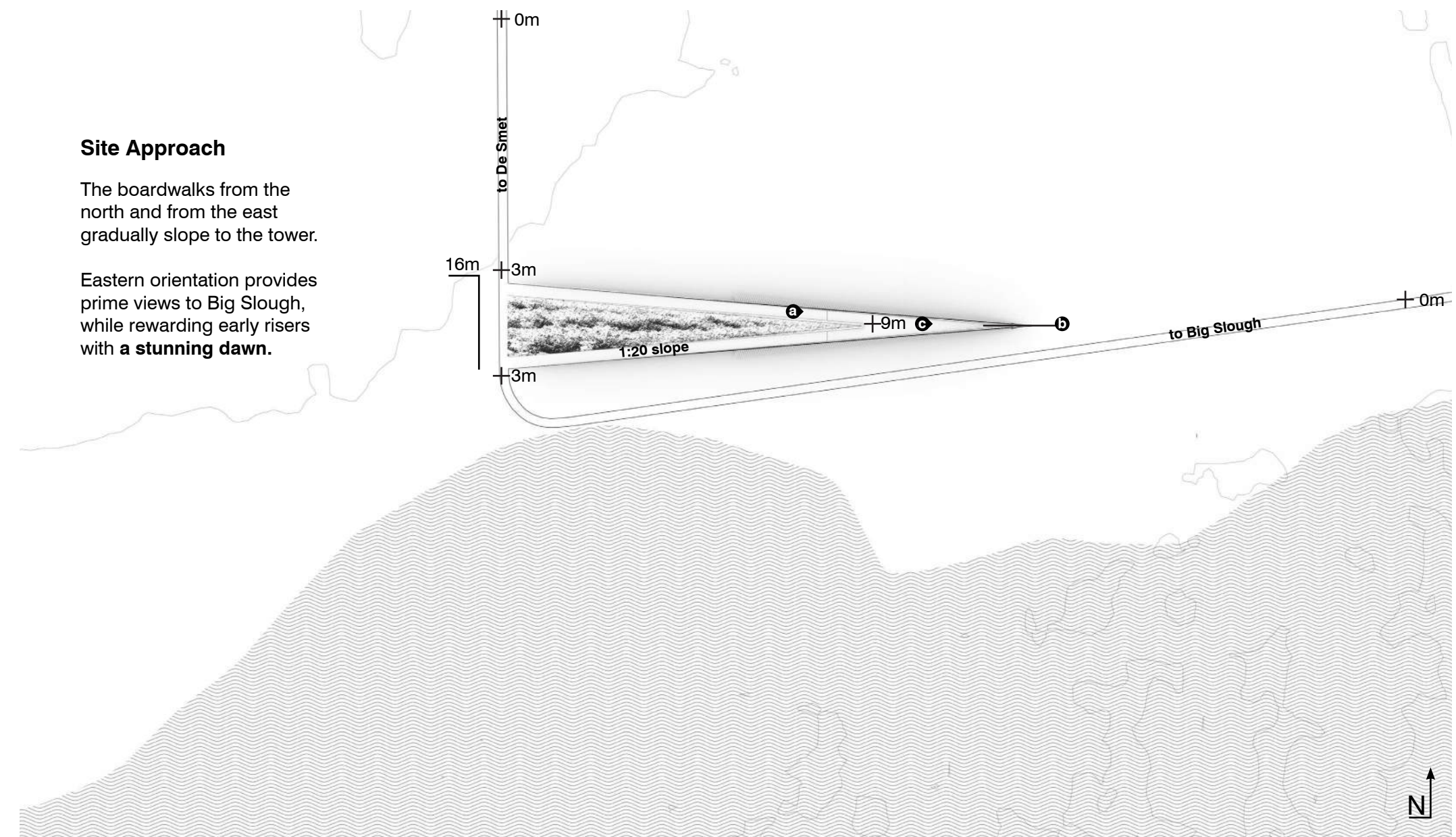
The wood fins gradually taper to a lower height from the walkable surface as one ascends. While the gaps between are wide enough for the human gaze, it reveals the vista slowly and purposefully.



Site Approach

The boardwalks from the north and from the east gradually slope to the tower.

Eastern orientation provides prime views to Big Slough, while rewarding early risers with a stunning dawn.



Universal Design

Attempts at accessible design often fall short of the intended goal: to maximize usability by individuals with a wide variety of characteristics.

To truly achieve this goal, as outlined by isUD - Innovative Solutions for Universal Design, providing alternate accommodations simply is not enough; rather, a design must strive to provide access for all visitors.

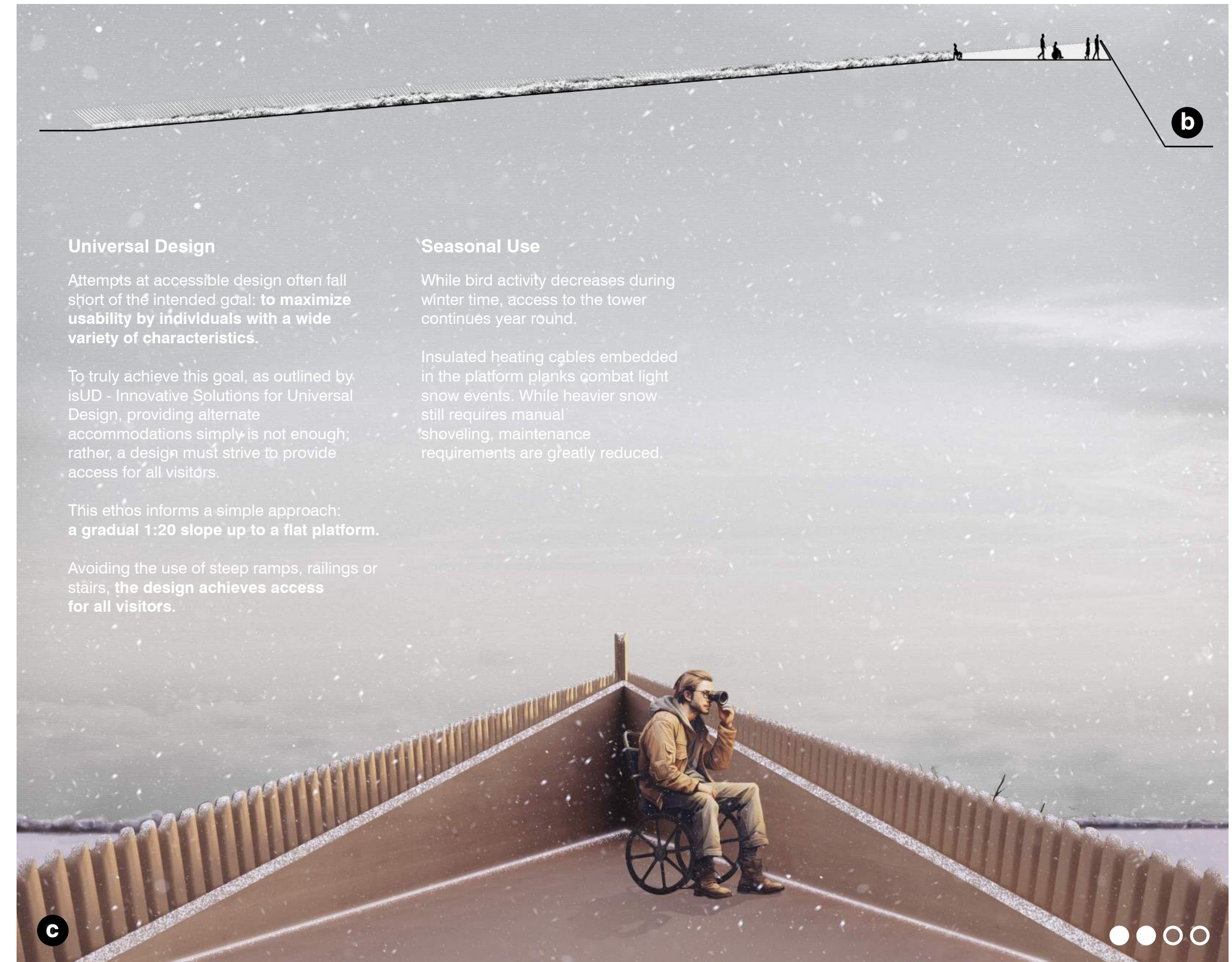
This ethos informs a simple approach: a gradual 1:20 slope up to a flat platform.

Avoiding the use of steep ramps, railings or stairs, the design achieves access for all visitors.

Seasonal Use

While bird activity decreases during winter time, access to the tower continues year round.

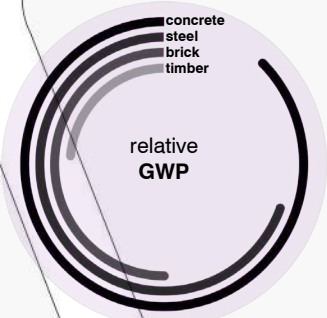
Insulated heating cables embedded in the platform planks combat light snow events. While heavier snow still requires manual shoveling, maintenance requirements are greatly reduced.



Eliminate Concrete

The use of timber in observation tower construction is commonplace and achieves sustainability goals, as an alternative to concrete and steel - concrete accounts for nearly 10% of emissions worldwide.

Global warming potential (GWP) is a metric to express how much a substance contributes to global warming compared to carbon dioxide. While studies vary, some indicate that timber's global warming potential could be up to **70% lower than concrete**.



So, if the goal is to eliminate concrete entirely, an alternative solution to a typical concrete foundation must be devised.

To that end, we look to **sod brick construction**.

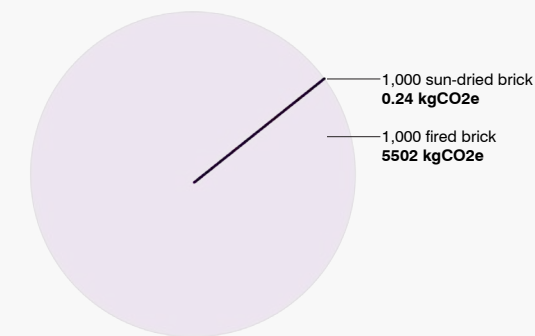
Sod Brick Base

Referred to as 'Nebraska marble', sod brick construction was a **vital building practice** for native tribes and homesteaders in the region.

The sod base is constructed during September, when the buffalo grass roots are the thickest. Cut into 300mm x 600mm slabs, the bricks are laid in alternating directions every few courses with the root side up. The first rain settles the sod and fills the cracks.

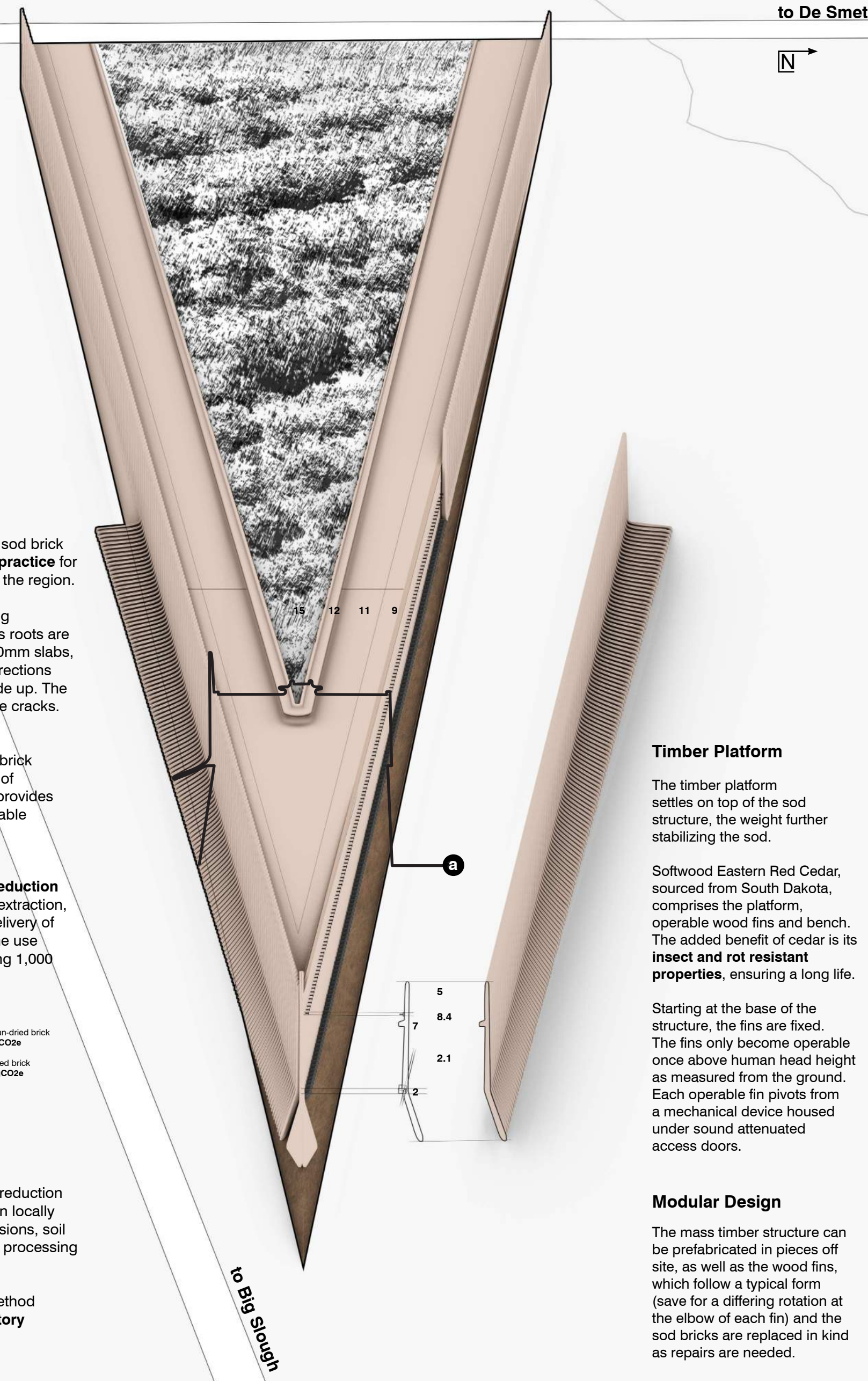
While little research is available on the benefits of specifically sod brick construction, research on the use of sun-dried bricks over fired bricks provides a close comparison to the sustainable effects of sod construction.

The *Journal of Cleaner Production* estimates an **embodied carbon reduction of over 10,000%** for raw material extraction, processing, manufacturing and delivery of material to the building site with the use of sun-fired bricks, when measuring 1,000 bricks.



In addition to the massive carbon reduction compared to fired brick, sod grown locally has negligible transportation emissions, soil can be re-used/recycled with zero processing and engages local labor.

Above all, the sod construction method **grounds the structure to the history of its home**.



Timber Platform

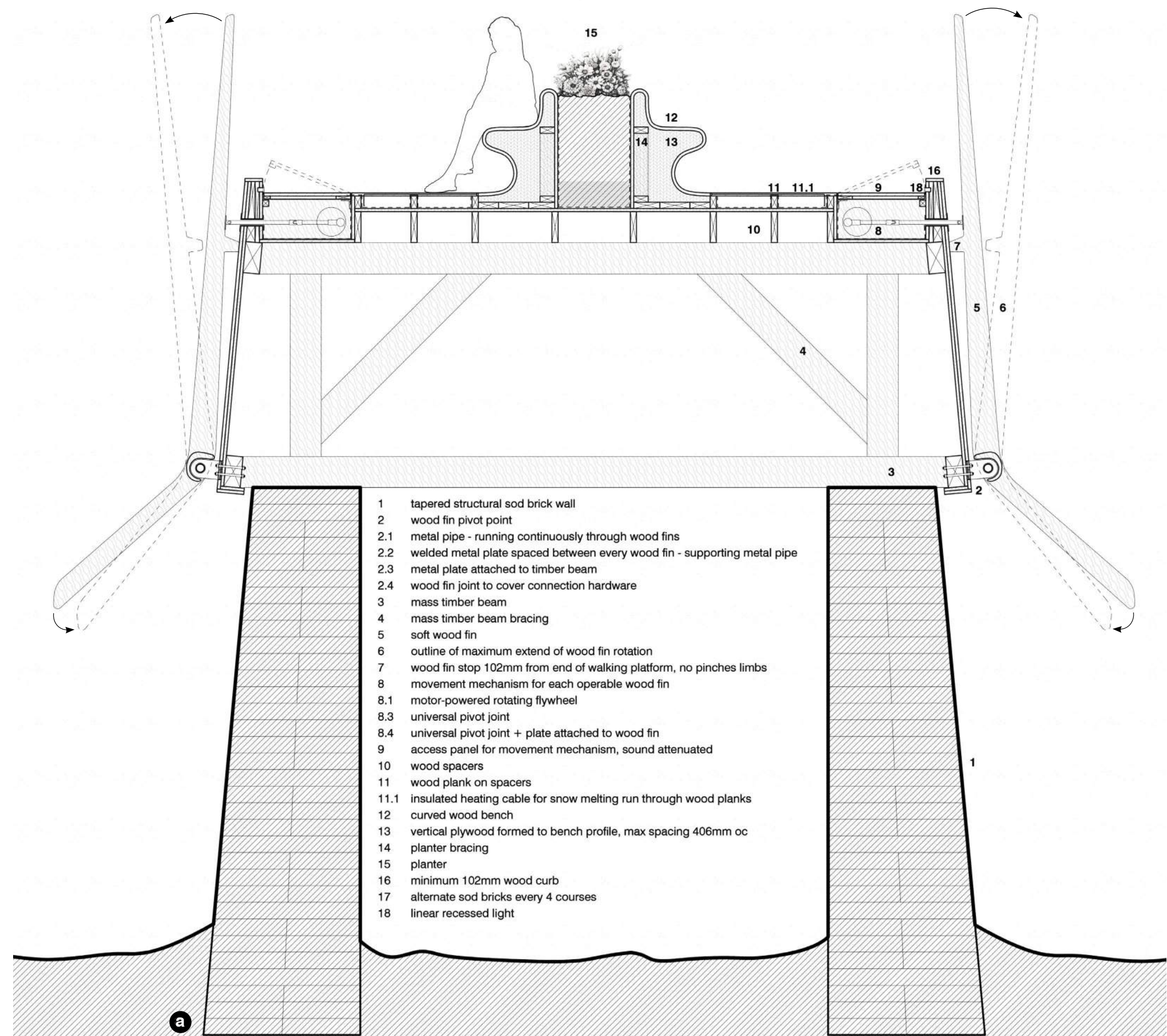
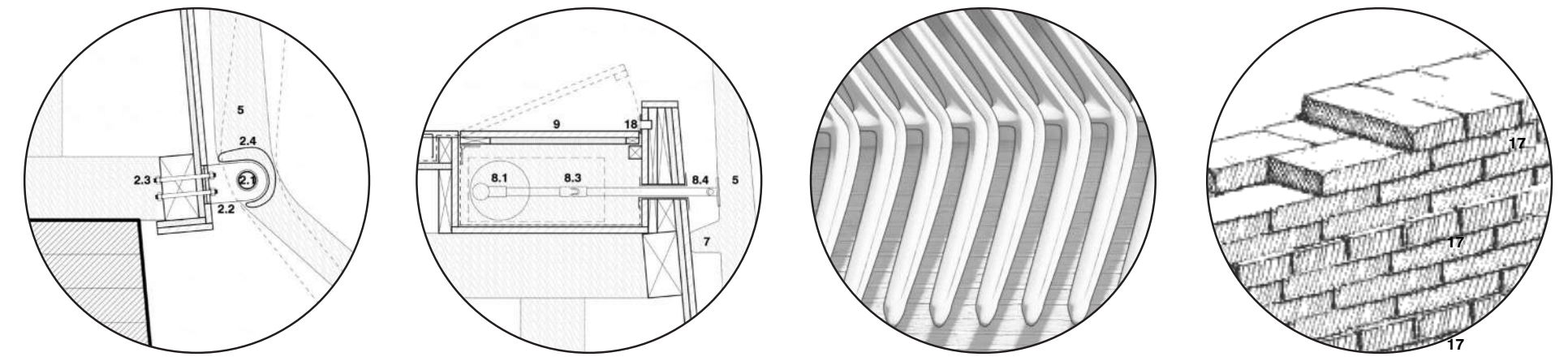
The timber platform settles on top of the sod structure, the weight further stabilizing the sod.

Softwood Eastern Red Cedar, sourced from South Dakota, comprises the platform, operable wood fins and bench. The added benefit of cedar is its **insect and rot resistant properties**, ensuring a long life.

Starting at the base of the structure, the fins are fixed. The fins only become operable once above human head height as measured from the ground. Each operable fin pivots from a mechanical device housed under sound attenuated access doors.

Modular Design

The mass timber structure can be prefabricated in pieces off site, as well as the wood fins, which follow a typical form (save for a differing rotation at the elbow of each fin) and the sod bricks are replaced in kind as repairs are needed.



- 1 tapered structural sod brick wall
- 2 wood fin pivot point
- 2.1 metal pipe - running continuously through wood fins
- 2.2 welded metal plate spaced between every wood fin - supporting metal pipe
- 2.3 metal plate attached to timber beam
- 2.4 wood fin joint to cover connection hardware
- 3 mass timber beam
- 4 mass timber beam bracing
- 5 soft wood fin
- 6 outline of maximum extend of wood fin rotation
- 7 wood fin stop 102mm from end of walking platform, no pinches limbs
- 8 movement mechanism for each operable wood fin
- 8.1 motor-powered rotating flywheel
- 8.3 universal pivot joint
- 8.4 universal pivot joint + plate attached to wood fin
- 9 access panel for movement mechanism, sound attenuated
- 10 wood spacers
- 11 wood plank on spacers
- 11.1 insulated heating cable for snow melting run through wood planks
- 12 curved wood bench
- 13 vertical plywood formed to bench profile, max spacing 406mm oc
- 14 planter bracing
- 15 planter
- 16 minimum 102mm wood curb
- 17 alternate sod bricks every 4 courses
- 18 linear recessed light





Sedge Wren



Great-Tailed Grackle



Red-Breasted Nuthatch



Cooper's Hawk

Kinetic Fins

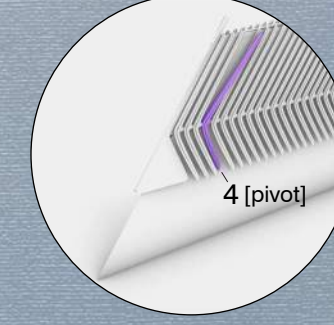
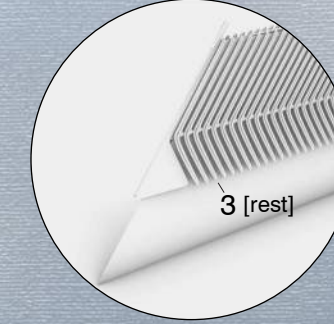
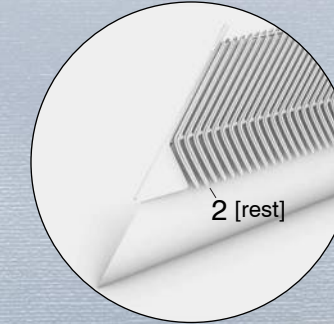
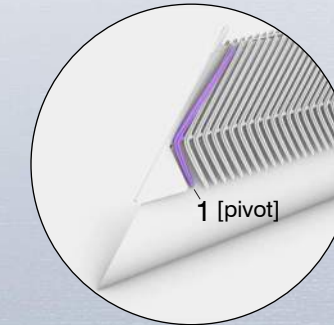
While studying opportunities for kinetic connections with the site, the simplest reference was clear: **bird song**.

The dilemma with an architectural element literally functioning like a musical instrument is the production of loud noise, which is counter to the purpose of a bird observation tower. An instrument mimicking bird songs is prone to scaring the birds away and disrupts birds who mistake the mimicking song as their own.

Rather, the mechanism produces **no tangible sound**, save for a soft mechanical thud as the operable wood fins pivot to the percussive pattern of native bird songs, with the Great-Tailed Grackle, Red-Breasted Nuthatch and the Cooper Hawk in it's repertoire.

In this example, I translated the bird song of the Sedge Wren into a simple persuasive score, consisting of eighth notes and eighth rests.

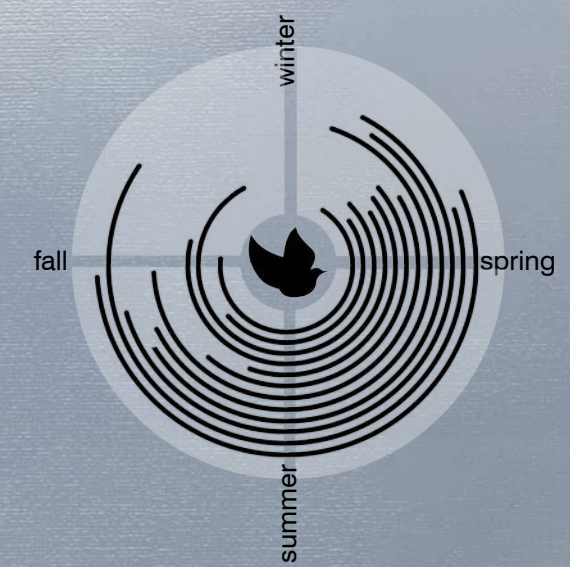
The score begins at the top of the structure, each fin weighted as a single "note", pivoting independently of the others. As the score repeats down the structure, only fins represented in purple pivot, while the others rest.



Reactive Programming

Programmed with the seasonal patterns of native bird songs, the tower moves the most starting from mating season through summer, while lying dormant during the winter. Thus, a **respectful and constant dialogue** with the bird population.

The beauty of this intentional, rhythmic kinetic movement is its abundance of references to the nature surrounding it: the movement of prairie grass oscillating in the wind, the soft pattering of animal hooves and, of course, the hypnotic melodies of birds.



eighth note | pivoting fin
eighth rest | resting fin

