



VERMILION SANDS

Investigating the Performative Atmospheres of Artificial Nature

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Vermilion Sands is a living canopy structure that was installed on Vancouver's waterfront in the summer of 2014. The installation embodies an investigation into the innovative use of materials and processes to produce experiential atmospheres that exploit the productive tensions between what is commonly perceived as the artificial and the natural.

The programmatic vehicle for the investigation is a structure that provides a loggia-like entry to an arts festival's grounds while also offering a cooling shade space in response to the August sun. The resulting canopy is comprised of 260 custom-fabricated modules, each hydro-seeded with either white clover or perennial grass, that were grown in a nursery, and then suspended from a grid of aircraft cable. Pursuing this unprecedented methodology, the result is an axial roof structure that is abstract and pure while also being heterogeneous and biotic.

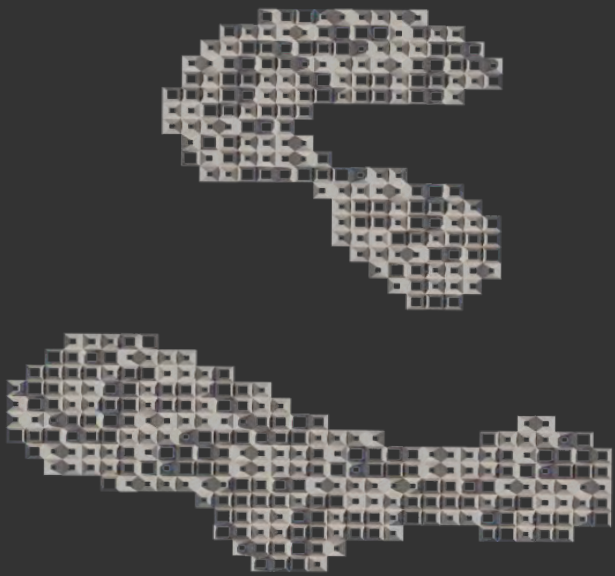
The project synthesizes four discrete domains of critical inquiry into a unified multi-sensory and haptic space. These discrete realms are as follows: 1) Form and Pattern, 2) Biotic Heterogeneity, 3) Ambient Atmospheres, and 4) Materials and Process.

Vermilion Sands is the title of a 1971 collection of short stories by JG Ballard. In this sci-fi collection, each story focuses on a particular design or artistic medium in which nature is hybridized with technology to produce surreal and baroque results – for example, singing plants, living fashion, and cloud sculptures. Within the context of the Anthropocene we currently inhabit, where the ability to disentangle the 'natural' from the 'artificial' is fleeting; we can only hope that the aesthetics and sociality of the future will be increasingly populated with designs akin to those in Ballard's prescient texts. It is our fantasy that Vermilion Sands the canopy could be a character within Vermilion Sands the book. The research embodied in this design project, in our opinion, is a significant part of the effort to find the best possible versions of a sustainable future.



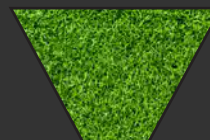
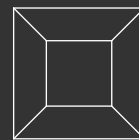
FORM & PATTERN

Studies into the form of modular units and their serial repetition, in terms of both overall scale and pattern, sought to achieve a configuration that evokes human systems of organization and abstraction. Through iterative modeling and drawing, a truncated inverted pyramid module was selected as a form for both its platonic purity and its ability to capture shadow and light. Through solar studies and full-scale mock-up testing, an alternating grid pattern was chosen in relation to desired levels of solar protection and richness of three-dimensional pattern.



BIOTIC HETEROGENEITY

Exploration into integrating living plant life into the modular pyramids and, by extension, the three-dimensional pattern of the overall canopy. The aim was to discover plants that would grow in the desired configuration in a manner that would heighten the perception of biotic diversity in contrast with the abstraction of the modules and the overall pattern. A large number of seeds were grow-tested with mock-ups of the modules. The grow-tests were evaluated with a range of criteria, from resiliency to aesthetics. Perennial Rye Grass and White Clover were selected through these tests and are the seeds used in the final installation.



AMBIENT ATMOSPHERES

Research into embedded systems that provide sustenance for the plants' survival while at the same time heightening the experiential pleasures for users. To irrigate the plants an array of 150 nozzles are integrated in the canopy grid. Through an electronic timer, various tests were performed to find a calibration that ensures adequate irrigation while also offering adiabatic cooling for people under the canopy. At the same time, LED lighting is incorporated into the columns to uplift the modules and the misting plumes. The combination of lighting and mist produce an ethereal atmospheric ambience to the installation.



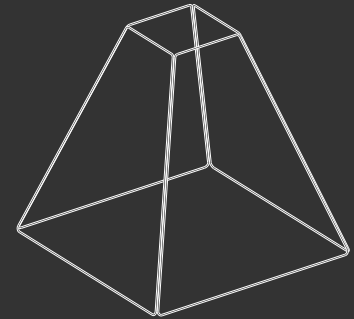
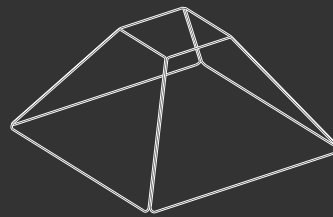
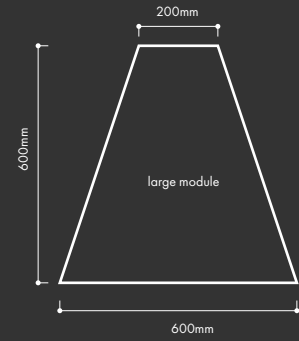
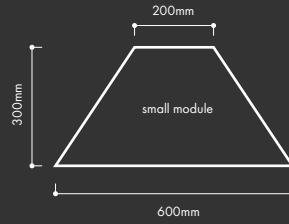
MATERIALS AND PROCESS

Research into the types of materials and processes that can afford new forms of artificial nature. This work involved close collaboration with a hydro-seeding company to test various scenarios for 'planting' the modules. Hydro-seeding is a planting process that involves spraying a slurry mixture of water, mulch, guar gum (a biodegradable adhesive), and seeds onto a surface. It is commonly used on infrastructural projects such as the spraying of highway embankments. With the hydro-seeding company we tested and evaluated different mixtures and geotextile substrates to determine a combination that performed well in this novel application of an existing technology. The fabrication process is described in greater detail on the following pages.



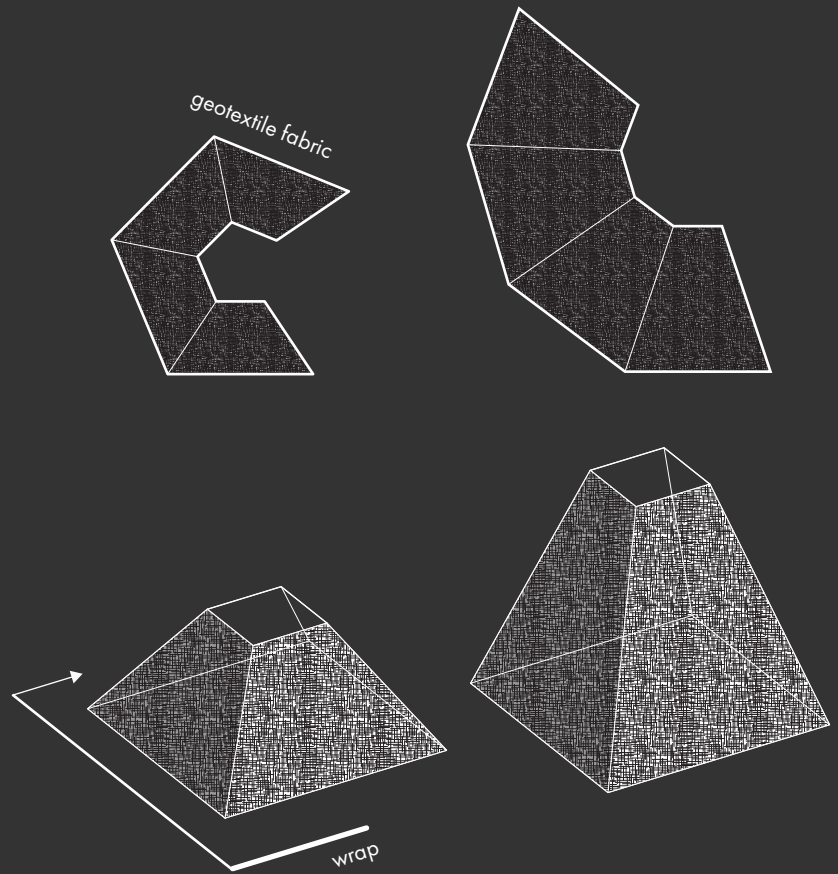
FRAME

Step one in the fabrication process is creating the wire frame. A wire fabricator produced 260 truncated pyramid-shaped frames from 10 gauge steel wire. The frames are split 50/50 between a large and a small size. This variation is a critical component in establishing the dynamic pattern of the canopy and the play of shadow and light.



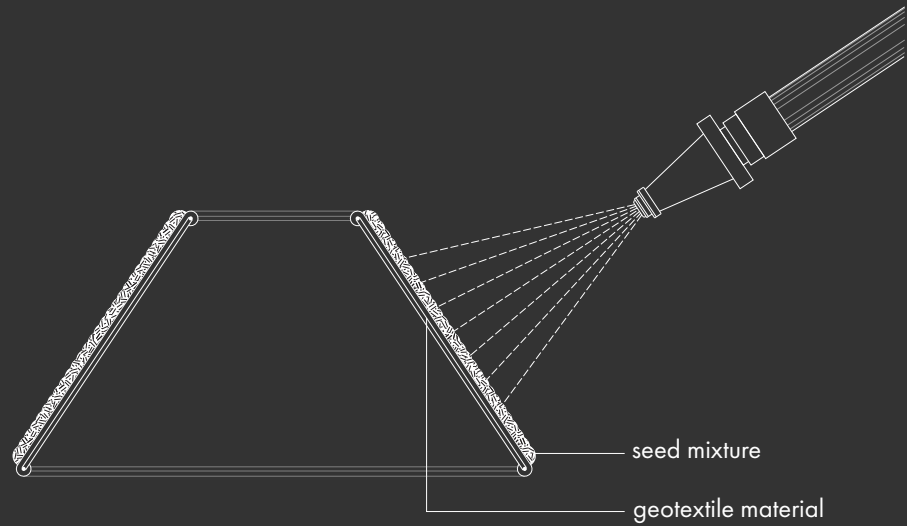
SEW

Step two is sewing a geotextile fabric to the frames. The fabric is specially designed with a weave and thickness to enmesh with an applied growing medium. Typically this material is used to help stabilize steep slopes in which plant growth is desired. This engineered characteristic proved suitable for the slope of the module faces.



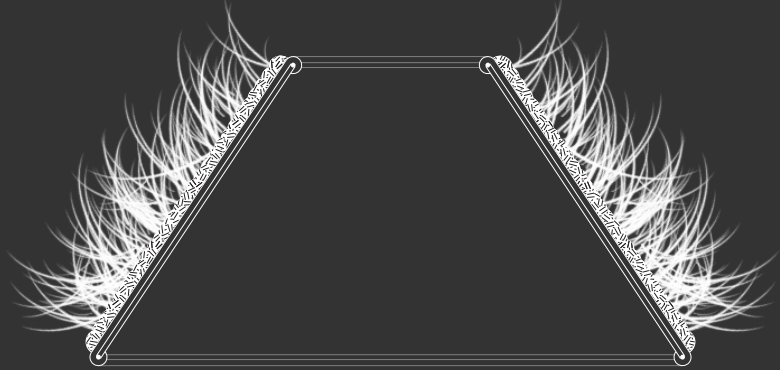
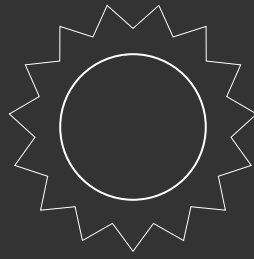
SPRAY

Step three is the hydro-seeding process. A mobile tank is towed to the spraying yard and contains a slurry mixture of water, wood pulp, guar gum, and selected seeds. Prior to the final hydro-seeding, a series of prototypes tested the viability of different seed types. From these tests, white clover and perennial ryegrass were selected for use on the modules. Half were sprayed with clover and half with ryegrass.



GROW

The final stage before on-site installation is the growing period. We were lucky to find an under-used municipal nursery in which the modules could grow for 30 days prior to installation. During this period intensive management was required to control watering and shade in relation to changing weather conditions. In addition to watering, the modules were periodically fed fertilizer.







DESIGN & PRODUCTION DATA

Canopy Dimensions

20'(W) x 90'(L) x 12'(H)

Canopy Area

1,800 ft²

Module Dimensions

Large: 2'(W) x 2'(L) x 2'(H)

Small: 2'(W) x 2'(L) x 1'(H)

Number of Modules

Large: 130

Small: 130

Structural System

Tube and clamp scaffolding

Aircraft cable

Plant Life

Modules hydro-seeded with white clover: 130

Modules hydro-seeded with perennial ryegrass: 130

Duration of Nursery Growth

30 days prior to on-site installation

Misting System

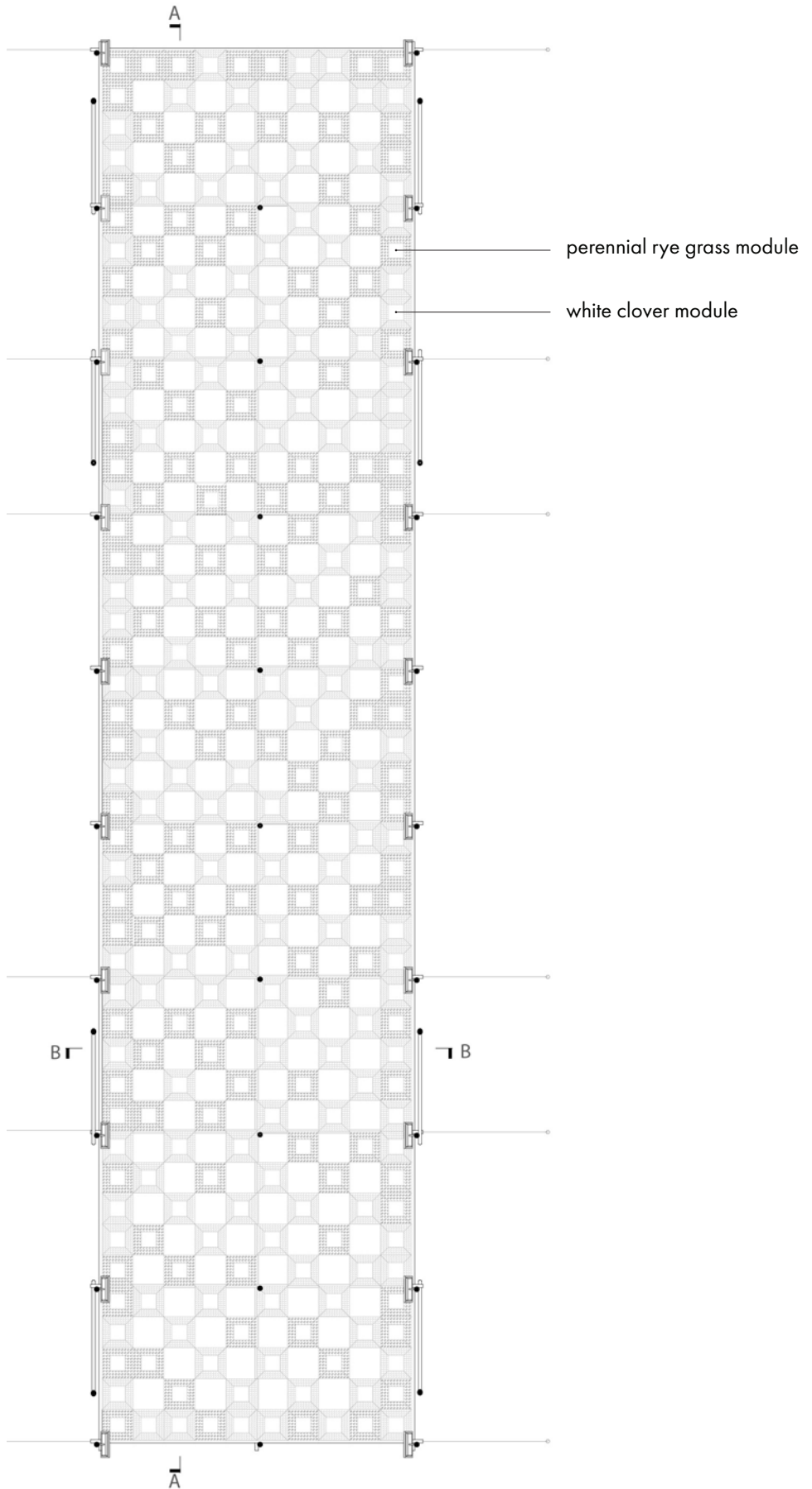
150 nozzles

Remote pump with variable timer

Lighting System

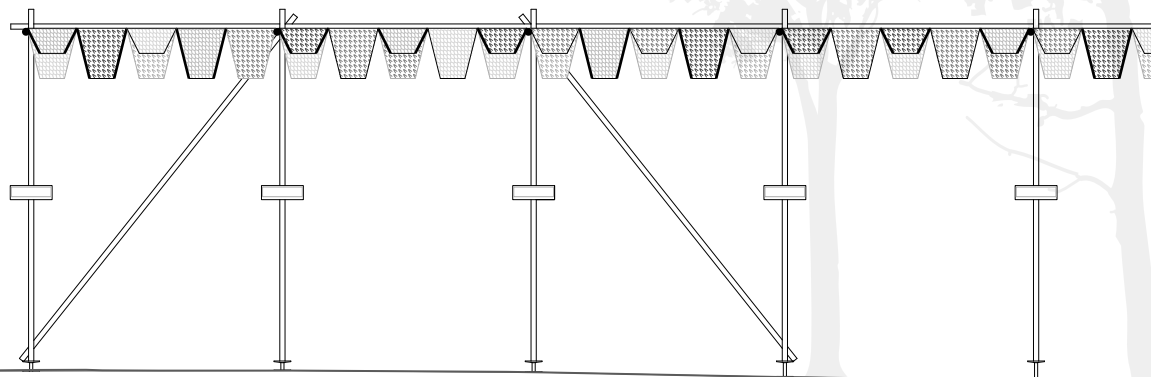
20 RGB LED fixtures

Color mixing control board



Reflected Ceiling Plan
 12 Vermilion Sands

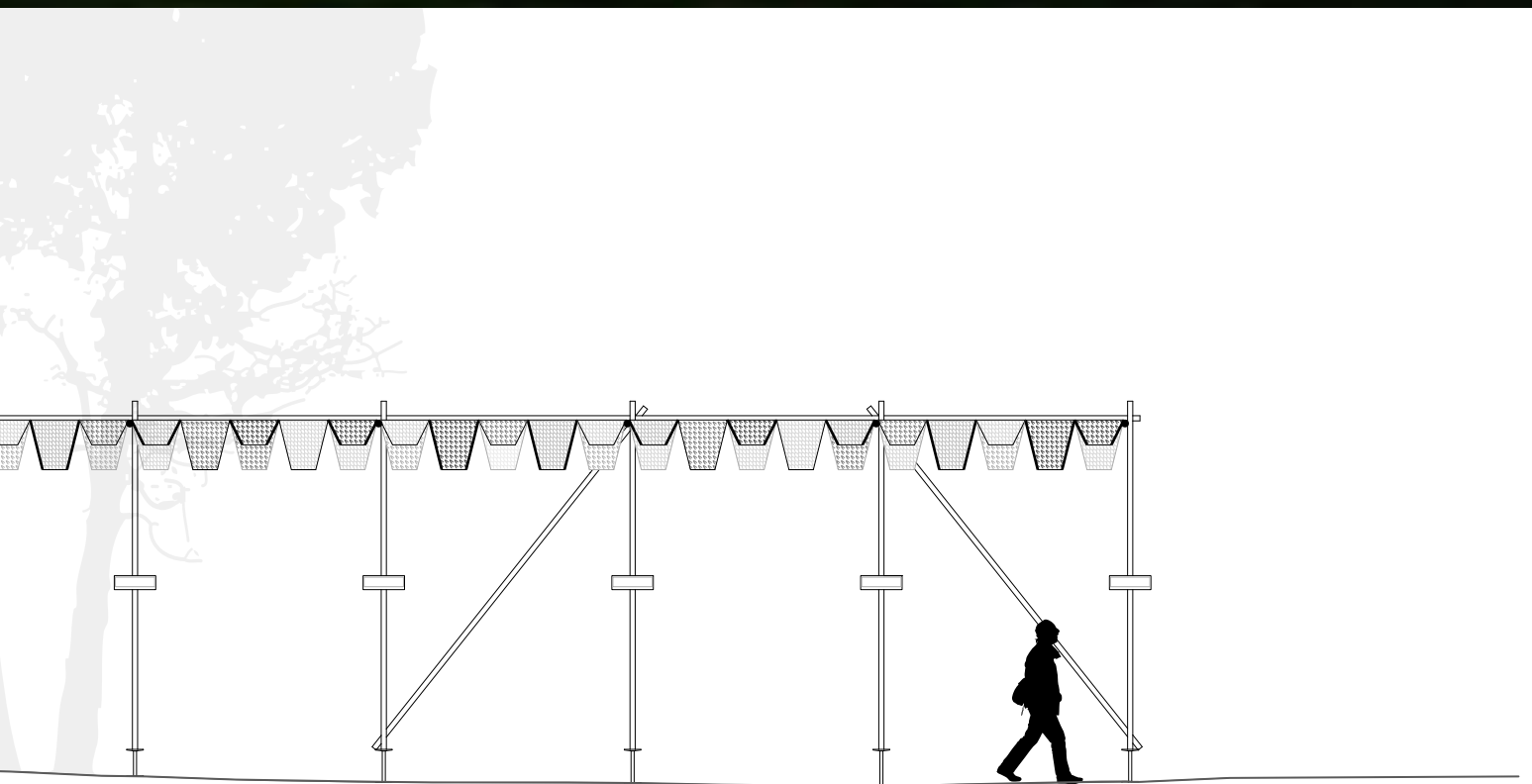


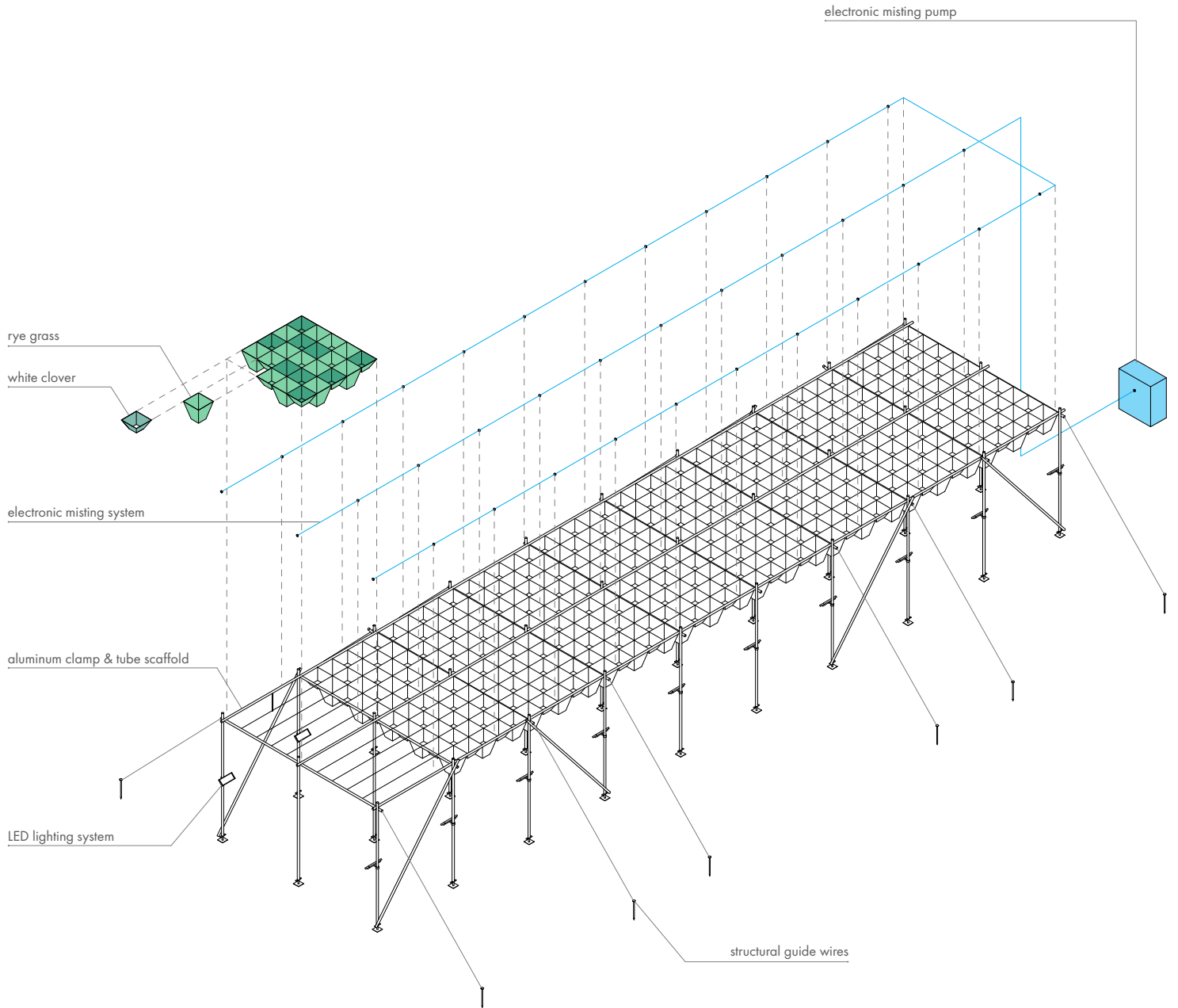


0 10ft

Long Section

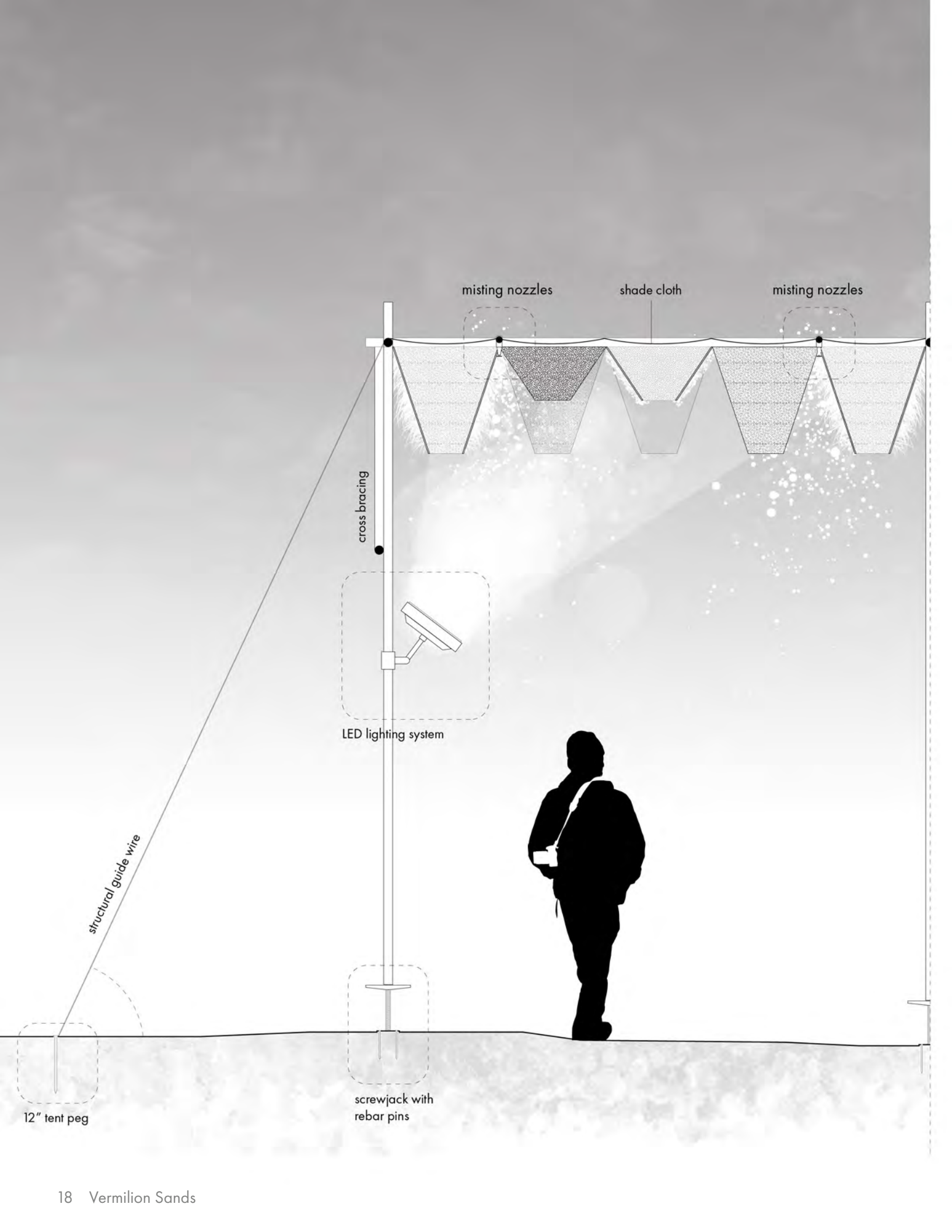
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Exploded Axonometric





misting nozzles

shade cloth

misting nozzles

cross bracing

LED lighting system

structural guide wire

12" tent peg

screwjack with rebar pins



