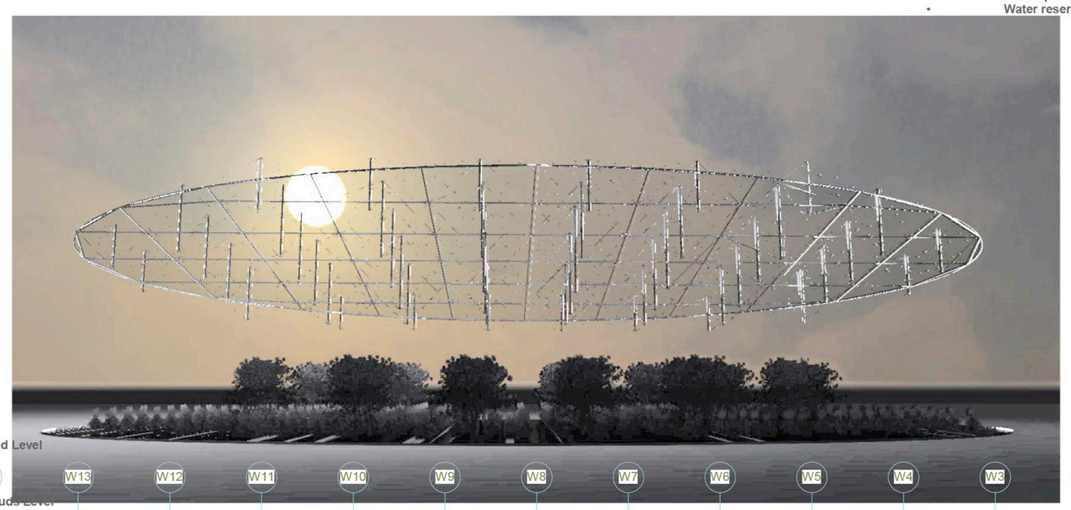
1-A3

RAINGARDENS & MICRO-CLOUDS

- Power poles' lines
- Water reservoirs' surfaces

LOCATION: Jardin de Metis Redford Gardens St. Lawrence River- North-South: geometric grid of identical rectangular spaces of 10 m x 20 m with one entry/exit from the West and/or the East.

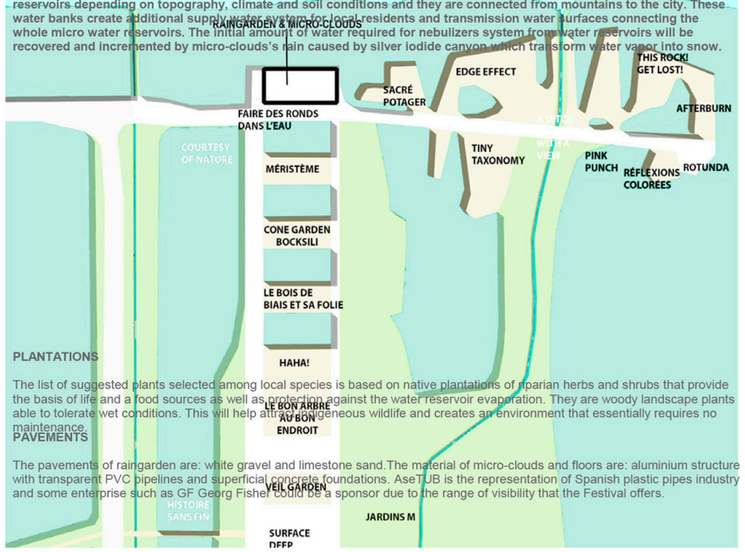


Raingadens & Micro-Clouds. Longitudinal section

LAYOUT PLAN 1:100

MEMORY

Why electric infrastructure is so important compared to water supply? How we can restore the natural balance using new prototypes of gardens? Cyberspace does not exist without electricity, humanity cannot survive without water. It is possible to take advantage of using electric grid for helping improve water resources. Transmission powwer poles' with an additional structural reinforcement could provide support to a new artificial clouds network made of light galvanized steel bars and strings, nebulizers system and silver iodide canyons. Under these clouds there are covered or open water reservoirs depending on topography, climate and soil conditions and they are connected from mountains to the city. These water banks create additional supply water system for local residents and transmission water surfaces connecting the whole micro water reservoirs. The initial amount of water required for nebulizers system from water reservoirs will be recovered and incremented by micro-clouds's rain caused by silver iodide canyon which transform water vapor into snow.

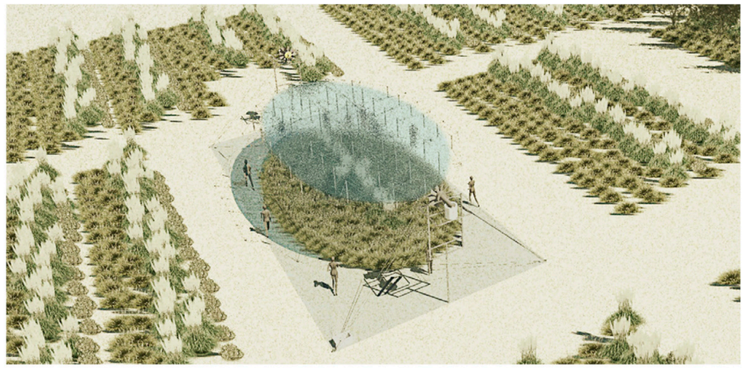


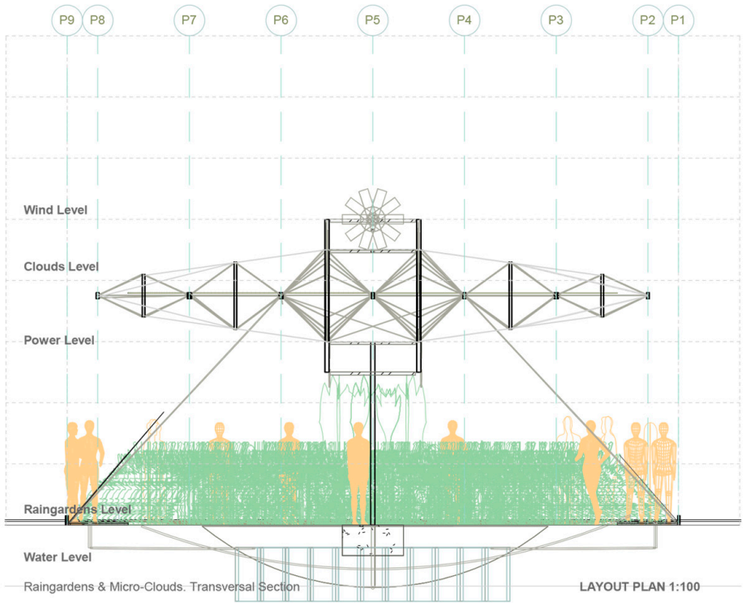
PLANTATIONS

The list of suggested plants selected among local species is based on native plantations of riparian herbs and shrubs that provide the basis of life and a food sources as well as protection against the water reservoir evaporation. They are woody landscape plants able to tolerate wet conditions. This will help attract indigeneous wildlife and creates an environment that essentially requires no maintenance.

PAVEMENTS

The pavements of raingarden are: white gravel and limestone sand.The material of micro-clouds and floors are: aluminium structure with transparent PVC pipelines and superficial concrete foundations. AseTUB is the representation of Spanish plastic pipes industry and some enterprise such as GF Georg Fisher could be a sponsor due to the range of visibility that the Festival offers.





Raingardens & Micro-Clouds. Transversal Section

LAYOUT PLAN 1:100

Fishermen structure in the Yangtze River Delta, Shanghai.

High-pressure fogging systems

Pivot irrigation in progress on a cotton farm.

Silver iodide canyon with automatic fan

SHRUBS

(S1) Cranberries (Vaccinium microcarpum)

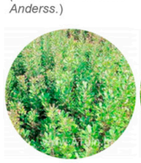
(S2) Pussy willow (Salix discolor)

(S3) Sweet gale (Myrica gale)

HERBS

(H1) Foxtail barley (*Hordeum jubatum L.*)

(H2) Eulalia, *(Miscanthus sinensis Anderss.)*



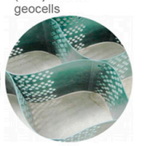
(H3) Festuca arundinacea (*Schedonorus arundinaceus)*

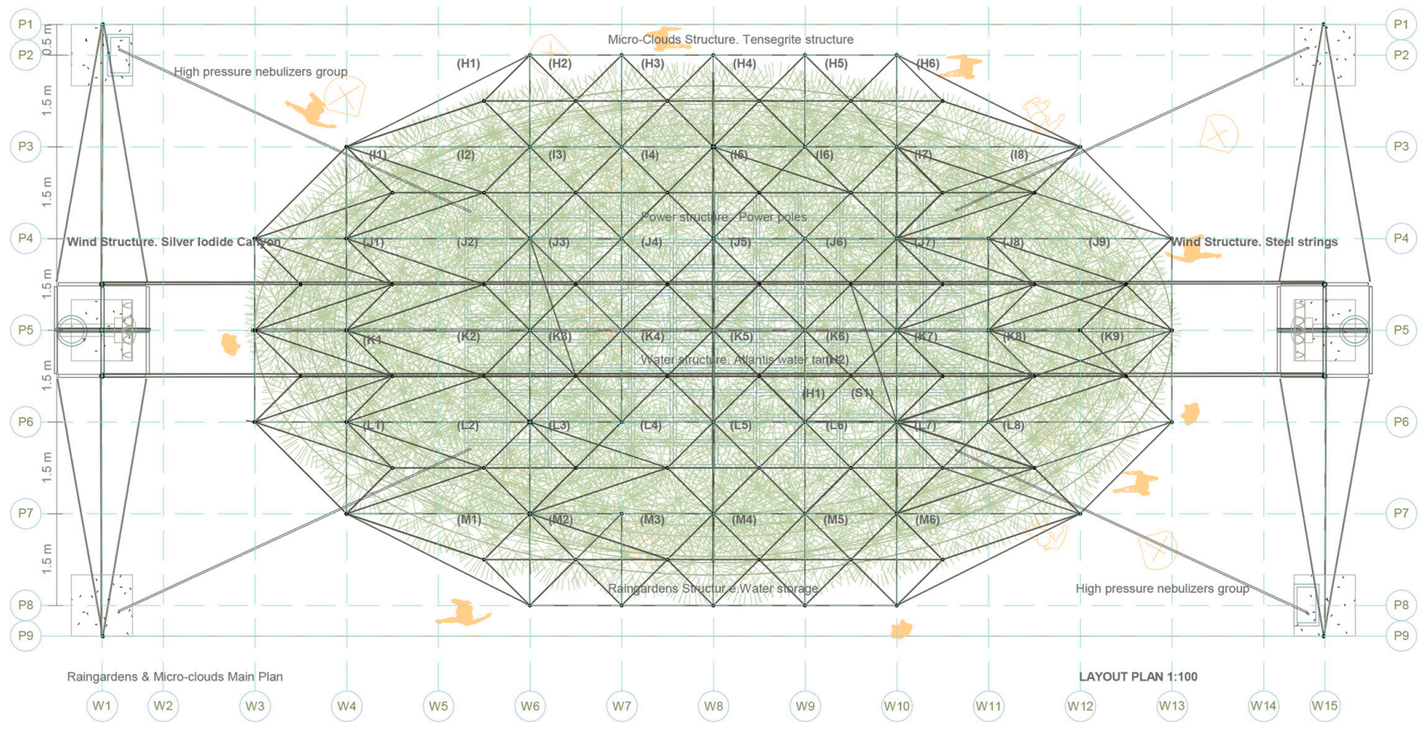
(P1A) White gravel

(P2A) Limestone sand

(P1B) Yellow geocells

(P2B) Green geocells



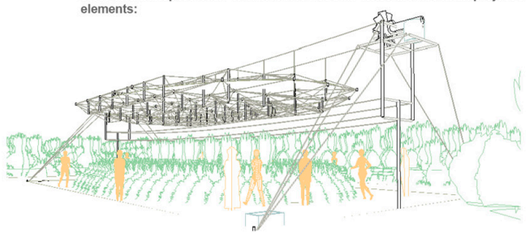


Raingardens & Micro-clouds Main Plan

LAYOUT PLAN 1:100

2-A3

METHOD. In the micro-clouds' network are employed small dust seed chimneys located in the reinforcement of transmission tower creating reservoirs for local use as well as water pipelines to build infrastructure to store and transport water to where it is needed. There are five main project's elements:



RAINGARDENS & MICRO-CLOUDS. It is prototype of a micro-cloud with a shallow depression that is planted with deep-rooted native plants and grasses

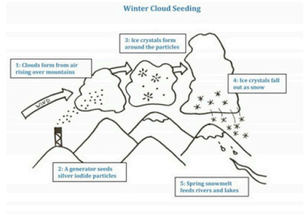
- Reduces flooding and erosion
- Less imported water used for yard irrigation
- Protect aquifers
- Less polluted stormwater runoff
- Biodiversity recovery

ATMOSPHERIC TOOLS
Water level + Rainwater level + Power level + Clouds level + Wind level

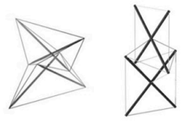
RAINGARDENS & MICRO-CLOUDS

- Power poles' lines
- Water reservoirs' surfaces

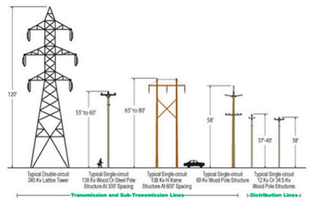
WIND LEVEL



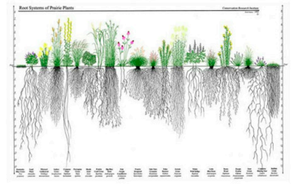
CLOUDS LEVEL



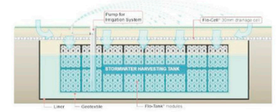
POWER LEVEL



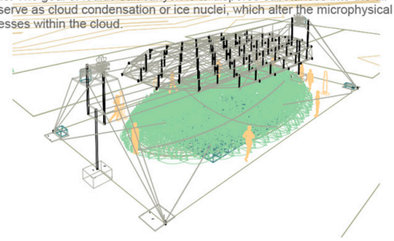
RAINGARDEN LEVEL



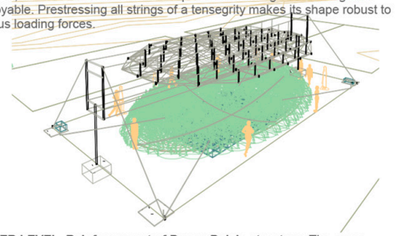
WATER LEVEL



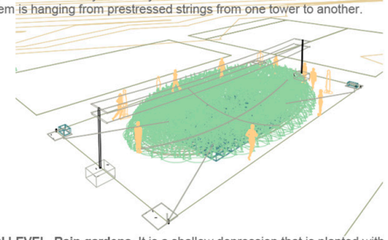
WIND LEVEL. Silver iodide canyon. The chimney located in the reinforcement of tower structure releases tiny particles of silver iodide over the micro-clouds. The goal of iodide salt canyon is to disperse substances into the air that serve as cloud condensation or ice nuclei, which alter the microphysical processes within the cloud.



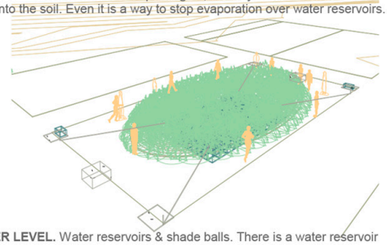
CLOUD LEVEL Micro-Cloud Structure. Tensegrity structures consist of strings (in tension) and bars (in compression). Strings are strong, light, and foldable, so these structures have the potential to be light but strong and deployable. Prestressing all strings of a tensegrity makes its shape robust to various loading forces.



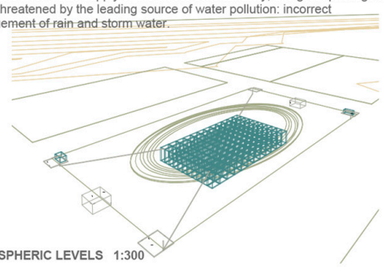
POWER LEVEL. Reinforcement of Power Pole's structure. The same galvanized steel profiles of the original transmission tower are used in the reinforcement with dry assembly and earth connection. Micro-clouds system is hanging from prestressed strings from one tower to another.



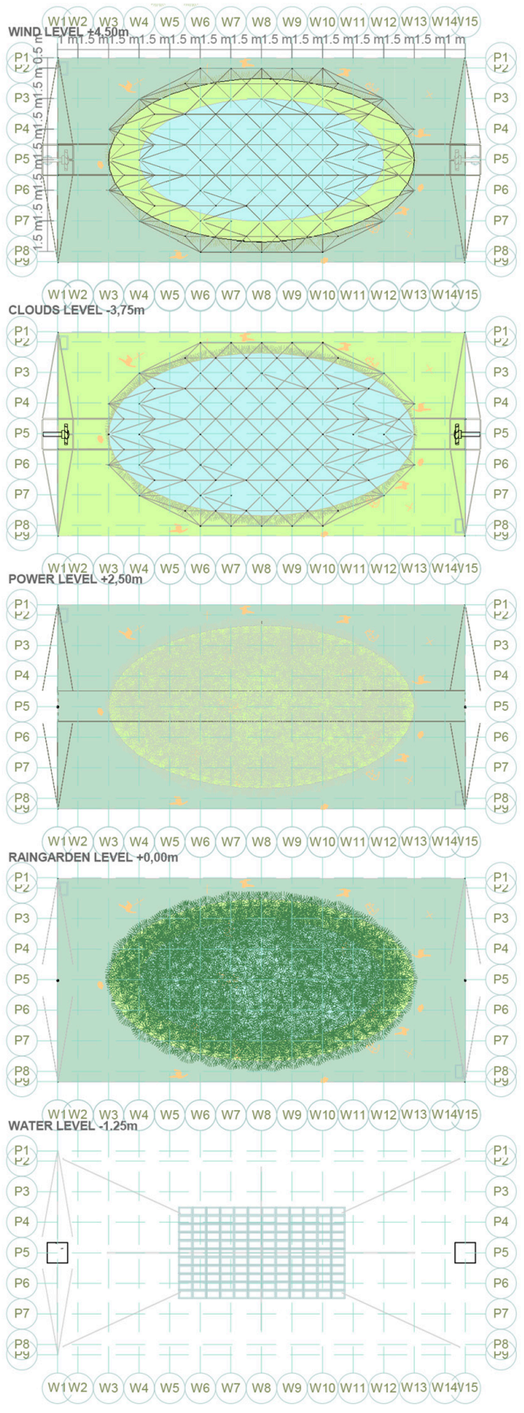
RAIN LEVEL. Rain gardens. It is a shallow depression that is planted with deep-rooted native plants and grasses. Rain gardens are designed to collect and absorb runoff from a roof or parking lot, the way nature intends rain to soak into the soil. Even it is a way to stop evaporation over water reservoirs.

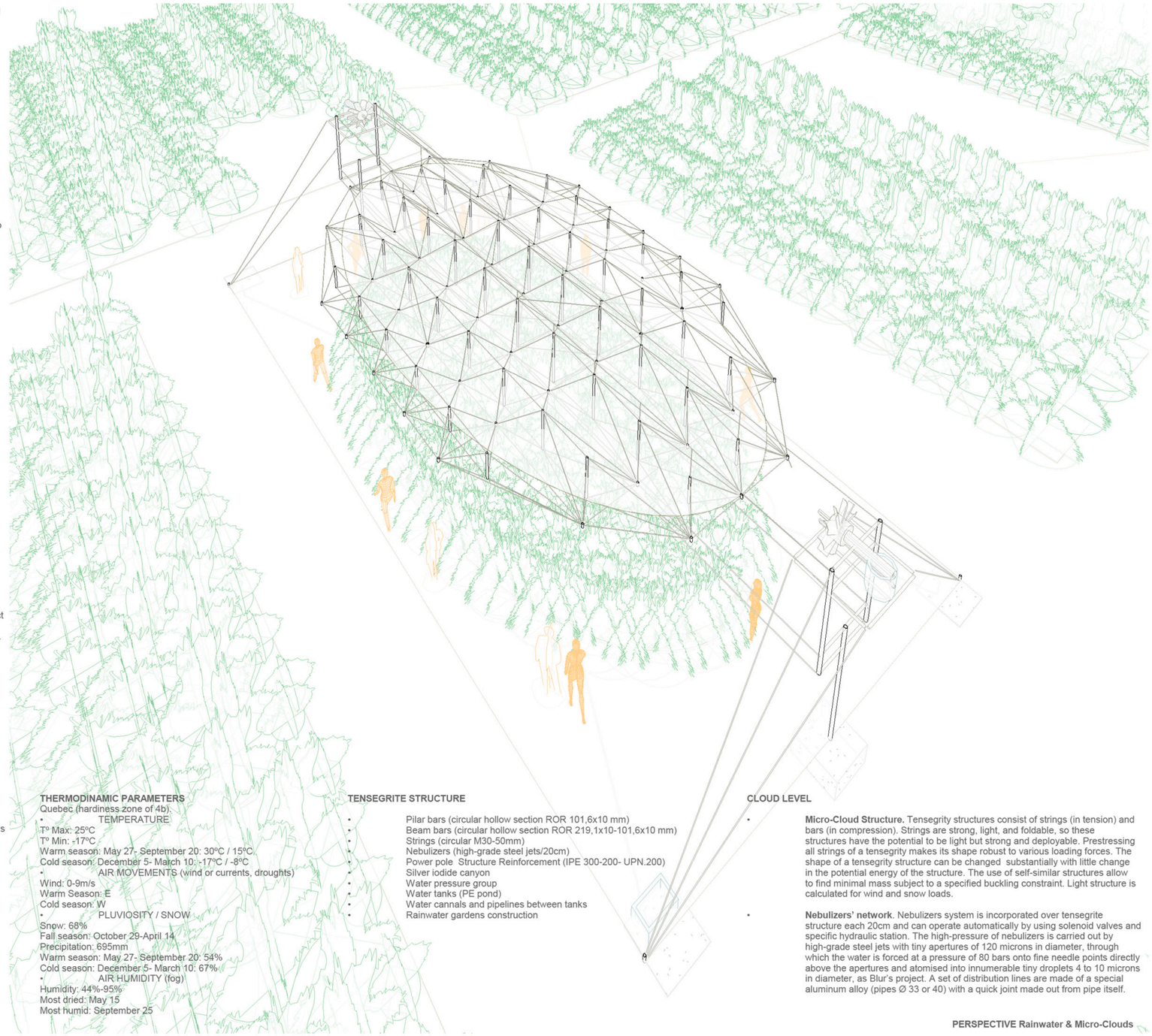


WATER LEVEL. Water reservoirs & shade balls. There is a water reservoir under each artificial micro-cloud which storages water for local use and transports it for water supply of the cities. Unfortunately, this great privilege is being threatened by the leading source of water pollution: incorrect management of rain and storm water.



ATMOSPHERIC LEVELS 1:300





THERMODINAMIC PARAMETERS
Quebec (hardiness zone of 4b)
- TEMPERATURE

T° Max: 25ºC
T° Min: -17ºC
Warm season: May 27- September 20: 30ºC / 15ºC
Cold season: December 5- March 10: -17ºC / -8ºC
- AIR MOVEMENTS (wind or currents, droughts)

Wind: 0-9m/s
Warm Season: E
Cold season: W
- PLUVIOSITY / SNOW

Snow: 68%
Fall season: October 29-April 14
Precipitation: 695mm
Warm season: May 27- September 20: 54%
Cold season: December 5- March 10: 67%
- AIR HUMIDITY (fog)

Humidity: 44%-95%
Most dried: May 15
Most humid: September 25

TENSEGRITE STRUCTURE

- Pilar bars (circular hollow section ROR 101,6x10 mm)
- Beam bars (circular hollow section ROR 219,1x10-101,6x10 mm)
- Strings (circular M30-50mm)
- Nebulizers (high-grade steel jets/20cm)
- Power pole Structure Reinforcement (IPE 300-200- UPN.200)
- Silver iodide canyon
- Water pressure group
- Water tanks (PE pond)
- Water cannals and pipelines between tanks
- Rainwater gardens construction

CLOUD LEVEL

- **Micro-Cloud Structure.** Tensegrity structures consist of strings (in tension) and bars (in compression). Strings are strong, light, and foldable, so these structures have the potential to be light but strong and deployable. Prestressing all strings of a tensegrity makes its shape robust to various loading forces. The shape of a tensegrity structure can be changed substantially with little change in the potential energy of the structure. The use of self-similar structures allow to find minimal mass subject to a specified buckling constraint. Light structure is calculated for wind and snow loads.

- **Nebulizers' network**. Nebulizers system is incorporated over tensegrite structure each 20cm and can operate automatically by using solenoid valves and specific hydraulic station. The high-pressure of nebulizers is carried out by high-grade steel jets with tiny apertures of 120 microns in diameter, through which the water is forced at a pressure of 80 bars onto fine needle points directly above the apertures and atomised into innumerable tiny droplets 4 to 10 microns in diameter, as Blur's project. A set of distribution lines are made of a special aluminum alloy (pipes Ø 33 or 40) with a quick joint made out from pipe itself.

PERSPECTIVE Rainwater & Micro-Clouds