Summer 2022
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01 Beyond farming: A Vertical Farm and Pasture for future

[Location] Hakodate, Japan
[Directors] Naoya Numakura
[Academic] IEGM SNSD Sanyo Studio
[Group/individual] Individual Work,
[Phone] 011 922 023 027 220 222
[Email] 14 WAHOO

Why?
As global warming intensifies, we must keep global temperature rise to 1.5 degrees Celsius to avoid severe carbon emissions must be cut in half by 2030 and entirely eliminated by 2050. It is worth noting that buildings, which contribute 40% of global emissions, are expected to double in the next 30 years. Therefore, it is essential to find ways to significantly reduce the total amount of carbon in all buildings, which are also dramatically increasing the number of buildings, to avoid irreversible catastrophe.

What?
Hakodate is an important base for agriculture and animal husbandry in Japan. The vertical farm and pasture will serve as a new model for farming prototypes, gradually replacing part of the former horizontal farming system over the next few decades.

How?
The design focuses on the food production industry and aims to address carbon emissions problem in two directions: one is to address the inefficiency and low productivity through vertical growth structures, and the other is to address carbon emissions prevention from creating new carbon through plant capture and photosynthesis.

Looking at the bigger picture, this design is poised to serve as a "bridge" project that will span several decades, bringing together cutting-edge technology, sustainable farming practices, and a forward-thinking approach. As our dietary preferences continue to evolve, and we make adjustments in our consumption patterns, the demand for food is expected to decrease significantly. This, in turn, will lessen the impact of cattle farming on global temperature change. As we move towards the new reality, the innovative combination of vertical farming and pasture that this design incorporates will be transformed into a state-of-the-art vertical farm.
feed need - 6h(12 times)/day
chew the cud - 7h(10 times)/day
social need - 2h/dy
rest need - 14h/day
Scenario 2025

The first vertical farm and pasture will be built in Hokkaido, Japan, serving as an experimental new prototype. The building brings together sustainable farming practices and a forward-thinking approach. So far, due to the technical limitations, the vertical farm and pasture haven't been able to reach net zero.

Scenario 2040

By establishing more vertical farms, farmers attempt to cultivate most of the plants suitable for vertical growth in the buildings. This, in turn, improves the land use efficiency and relieves the pressures on traditional land cultivation practices, returning more land to nature. The increase in the proportion of vertical farms also gives birth to a new farming model: horizontal and vertical mixed pattern.

Scenario 2060

With the development of cutting-edge technology, vertical farms have reached net zero. This breakthrough has transformed the market for vertical farms, bringing the proportion of them to over 50% in food production industry. The number of vertical farms increases, leading to the transformation of the interior space of the buildings—part of the pasture will be demolished and rebuilt as plants cultivation area.

Scenario 2080

As human diets continue to evolve, the demand for beef is expected to increase significantly. This, in turn, will ease the pressure on cattle farming in global temperature change, paving the way for cattle to return to their natural free-grazing patterns. By far, the buildings have completed their role as a "bridge" and will transition from their current use to become fully functioning vertical pasture farms.
A museum with nothing inside for Tomkins Cove Quarry

Tomkins Cove Quarry is the size of a 200-year-old Starsbury rift. After three-week-long research, I found out that a quarry is an educational project, like the whole quarry, as a museum with nothing inside and everything outside. So that all I draw is parts on the edge of the quarry that I thought could provide visitors with different experiences. And that made two huge sliding walls inside the quarry, front-to-back. At several levels, an enclosed facing space was extended to allow access to the rear of the quarry. Then, I saw several levels in three connections among the five stories. The trail allows people to observe the quarry from different points of view, providing an educational experience. At the end of each trail, visitors get to the bench, on different levels. Look back to the desk. To take the whole quarry as a museum, you can connect these areas as outdoor exhibits that are regularly linked to the trail, which are usually known as installations. So keep moving on the trail and consider these unique areas, visitors are like going from one installation to another.

The exterior of the path is in light lime, the three-stage lime, like what I told in this text. And the path represents the arithmetic story. It represents the change, compared to the process without a specific story and interaction story. And I think there is a special pattern. In the process of life, the story of the government in some kind of need attracts the government. Despite a few objections, the progress of work will not fail down until the needs are satisfied. I call this the path of the pattern. Obviously, this model is not clear. Because the time the government realizes the severity of the problem and with conservation strategies to protect the environment, the problem is somewhat severe. So I'm thinking about a new pattern where we can make it perfect and prevent it from happening. In order to make people aware of the importance of the shift from a pattern to the new one, Tomkins Cove Quarry has a special significance. Because the quarry itself is the strength diagram of 200 years of non-stop quarrying. So, if you are not clear about what we mean, do an educational project. Like this whole quarry is a museum. And if we think about 200 years of extraction, it's a museum with nothing inside and everything outside because all the limestone were shipped to capture or defer or deferral of naturalness. Then I'm thinking that a simple museum may not be educational enough, so I decide to add some interactive element through the design. In a nutshell, I'm taking the whole quarry as a museum, and the main keywords are educational and interactive.

The first problem I found in the design part was that when I showed the visitors, since my concept was a museum with nothing inside. In the case of the visitors of the site from a pedestrian perspective, I showed them parts of the path. But I thought the visitors would be given more educational experiences. So I decided to add some interactive elements in the quarry at the front of the path. For example, the visitors should be able to interact with some objects. And at several levels, an enclosed facing space was extended to allow access to the rear of the quarry, which is the last part. I want to know the visitors.

Then, I saw several levels in three connections among the five stories. The trail allows people to observe the quarry from different points of view. Open back to the keyword, interactive and educational. I'm assuming that every visitor could get a pair of AR glasses to enhance their experiences. Inspired by a key experience at a similar level, visitors stepping on different levels from the bottom to the top, not only to provide several experiences and exit for visitors, but also to connect the benches at different levels. Because of the scale of the site, these huge open-air slides can be used for temporary net and exhibition. And at several levels, an enclosed facing space was extended to allow access to the rear of the quarry, which is the last part.
Site Analysis

After analyzing the site, it is evident that there are several key features to consider. First, the topography of the site is quite varied, with steep slopes on the eastern and western sides, and gentler terrain in the center. Vegetation is sparse, with a few scattered trees and shrubs. The water body is small, but it plays a significant role in the site's overall character. There are also several old structures, including a small stone building and a dilapidated shed, that could be repurposed or removed for better use of the space. A detailed map shows the existing conditions, while a series of diagrams illustrate potential design solutions. A section through the site highlights the layers of soil and rock, providing insight into the site's subsurface conditions. Overall, the site presents a challenging but rewarding opportunity for design and development.
3 A wastewater treatment and detection center for NY

Located: Pier 14, NY
Initiative: Don Wood
Academic: 2023 NYSAAD Summer Studio
Group/Individual: Individual Work
Date: 06/1/2023-06/18/2023
Duration: 11 Weeks

Hello everyone, my design is an wastewater treatment and detection institution, focusing on the invisible information hidden in wastewater. New York has a long history of wastewater treatment. Nowadays, there are 14 wastewater treatment facilities and combined together, 3.5 billion gallons of wastewater will be treated. Undergoing 5 main processes, water treated goes back to rivers and at the same time, the system produces useful bio-water and biogas.

With the outbreak of covid-19 in 2020, the sewage detection system was brought into public view. So far, NYC has two types of wastewater detection systems: one for covid-19 and the other for illicit drugs. It’s really interesting that besides the reusing of wastewater, public sanitation authorities begin to pay attention to the hidden part of wastewater.

Actually, since the history of wastewater detection is short, I believe that the system has the potential to undertake more responsibilities in the future. What I’ve can tell one’s health condition through the detection of their excrement. Or what if we can predict and prevent upcoming virus outbreak? Or what if the information collected through waste-detection help us to distribute resources when confronted extreme catastrophes?

So, I think about a new vision that in the near future in 2050, a series of wastewater treatment and detection institutions will be established near by Hudson River, cooperating the former 14 factories and focusing on neighborhood scale. As one of these institutions, my design will renovate the old Pier 32 and serve for 50,000 people in the nearby neighborhoods of Tribeca, SoHo, and Hudson Square.

To be more specific, besides testing covid-19, common virus and illicit drugs, the institution will also undertake the responsibilities of neighborhood health condition surveillance, biowaste research, biogas research and public education.
The Government is planning to renovate Hudson River piers and build up a series of wastewater treatment and desalination centers.