

## OYA PROJECT OF SYNCHRONIZED CAVE COMPLEX: UNDERGROUND REVITALIZATION PLAN UTILIZING ABANDONED MINES

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### Introduction

#### History of Oya

A focusing area of the “Oya project” is the town of Oya located approx. Four kilometers north-east from the center of Utsunomiya city, Tochigi prefecture, also neighboring the National Park of Nikko.

The area has a 400-year-long history of rock quarries. A type of rock quarried in this area is tuff, or tufa, produced by the earth’s historical activities such as volcanic eruptions, and it is locally called “Oya stone” derived from the place of Oya.

One of the most famous architectures using Oya stones is the Imperial Hotel, Tokyo, designed by Frank Lloyd Wright, a worldwide renowned architect. The building is preserved as a historical architecture.

#### Dormant Underground Space

The usage of Oya stone has been decreasing with its demand getting lower due to changes of society’s development. Worse, the production of Oya stone was lately tumbled spurred by the 1990’s cave-in accident that happened from long time, reckless quarrying. The underground space quarried from 400 years ago and remained until now. It has been alienated from the society and is idle now.



Fig.1 : Focusing area of Oya



Fig.2 : Inside of quarries

## Huge Space Under the Ground and Industrial Waste

The capacity of the underground space, which became abandoned mines and neglected, reaches some million cubic meters.

Various proposals including utilizing the space for an industrial waste or an incinerator, however, were unacceptable to inhabitants there. The course of measures for the place is still undecided.

## Methods

### Proposal for Creating Brand-new City

The project we propose faces the environment problems that today's world includes, and it is also unavoidable for us to tackle safety measures against cave-in of Oya region. We have come to a conclusion that we should consider about not only partial but total optimization for the whole central area of Oya region from the filtered viewpoints of countermeasures against cave-in and environmental pollution. It will be 2,000 x 2,000 meters in area. Considering the size, we should take it as a 'city'.

It is unique, and its uniqueness will bring us a brand-new creativity of the 21st century. We are convinced that the project we propose is best suited to its name, "Synchronized Cave Complex". It is to be developing an ecological city, a new theme of the 21st century.

The proposed plan is to foster people's lives, industries, cultures and arts in the area so as to be able to contribute to the 21st century, and through those a new economy market will be established from here. Considering the plan's concept of 'Eco City', the natural resource of light, water and wind is taking a pivotal role to realize it.

## Results

### Master Plan

Key gist of our plan is following: The existing scenery of tourism resources and settlements alongside the current roads are to be maintained. The existing ground level of the area where abandoned mines are concentrated under the ground is to be excavated for more depth. The planned grade is expected to be 60-80 meters beneath the current level. In the ground of the area, there are columns and tunnels left in net-like structure as quarried as in the past, so that excavating as planned could lead to expose tunnels. They are to be reused as 'Stone Corridor' after reinforced or rebuilt, which will be attracted and crowded places in the city.

Stone Corridors are planned mainly to be a functional zone for commerce facilities and logistics, collection and storage facilities, and the bottom level as excavated will be a cultural zone for people's living, education, amusement, common places and so on. An urban space will be generated filled with about 30 thousand people in a daytime.

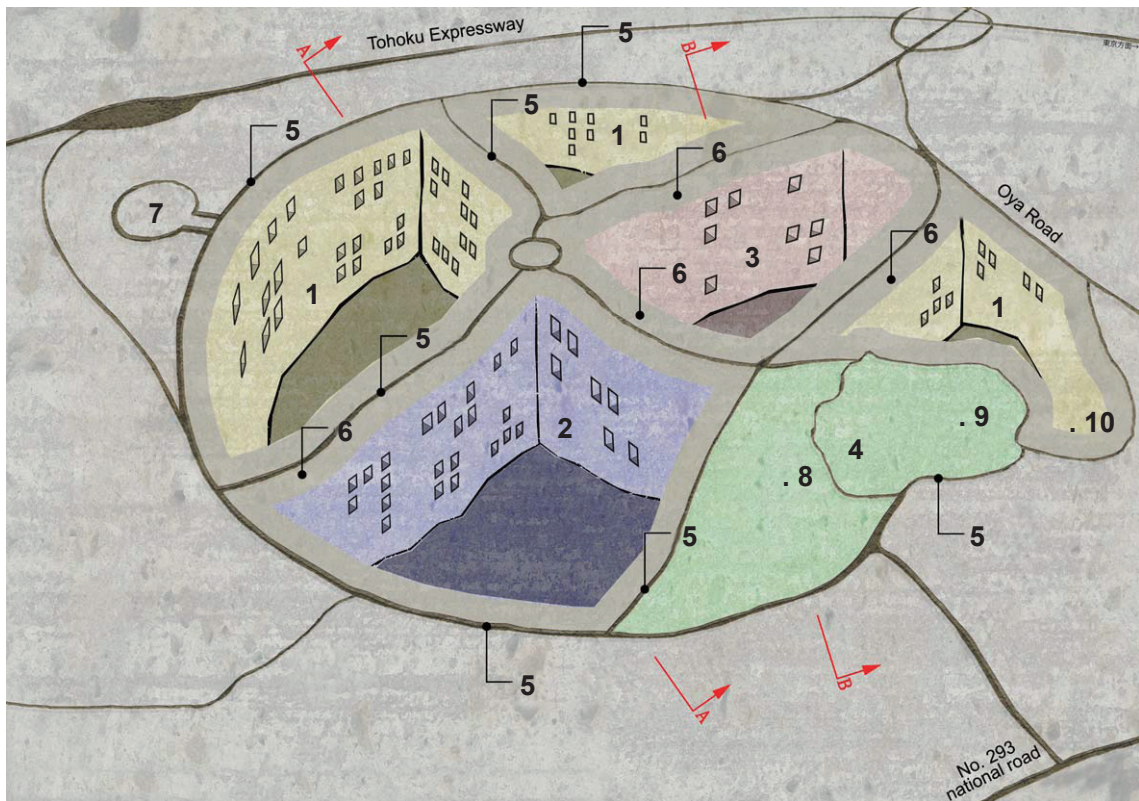


Fig.3: Plan of excavating area (approx. two kilometers square)

- 1) Residential zone    2) Culture/Government zone    3) Amenity zone    4) Tourism resources zone
- 5) Core roads (ground level)    6) Stone Corridor (under the ground)    7) Arena
- 8) Oya Museum    9) Oya Temple    10) Oya Kannon

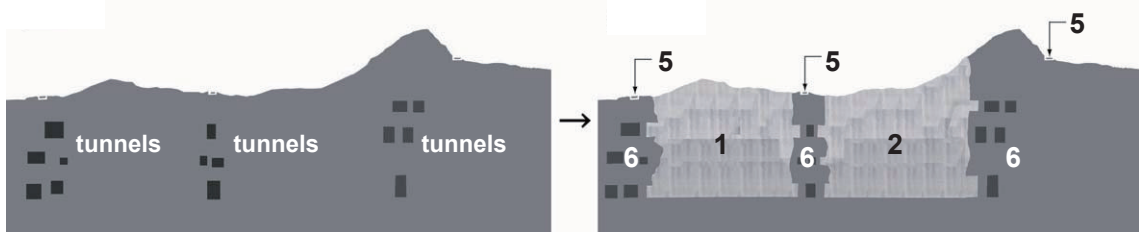


Fig.4: A-A' section view (current)

(After excavated)

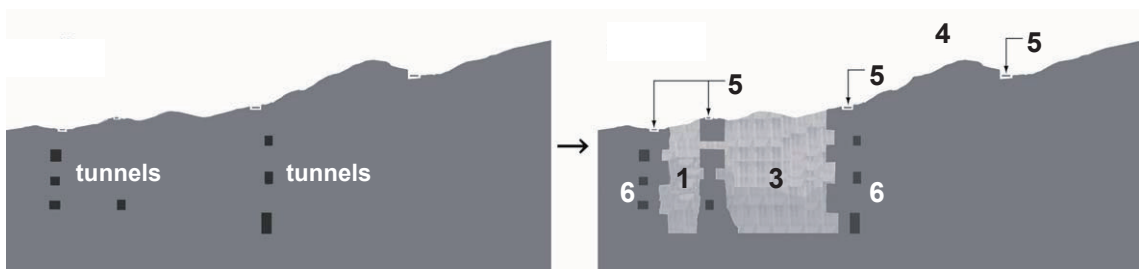


Fig.5: B-B' section view (current)

(After excavated)

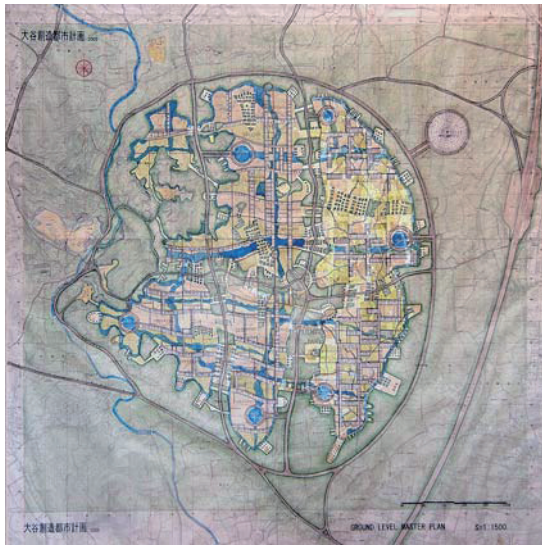


Fig.6: Master plan (Ground level)



Fig.7: Master plan (Under 60-meter level)

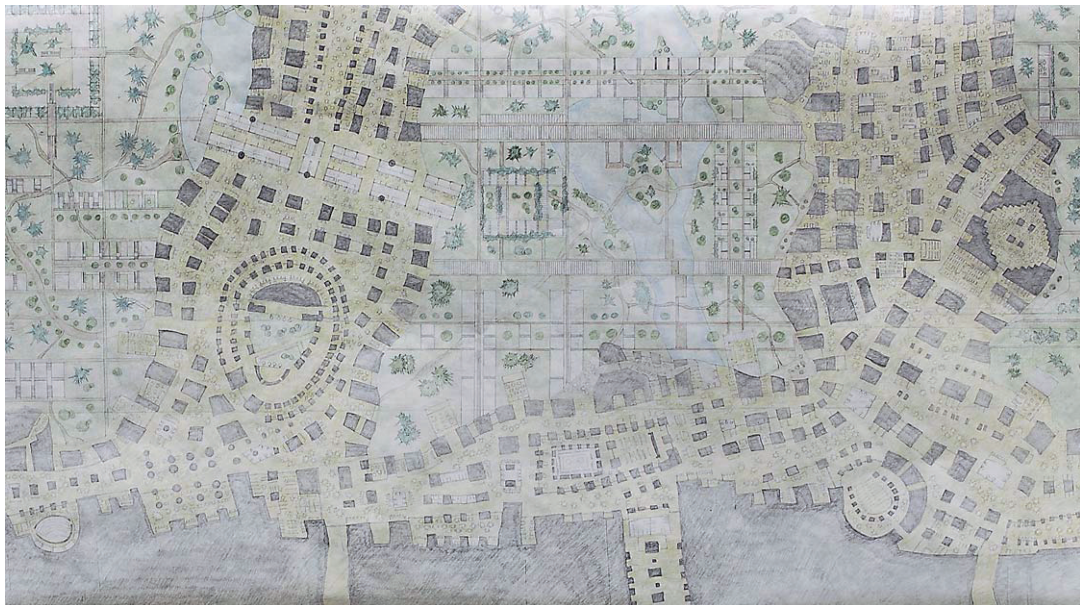


Fig.8: Plan (Underground, stone corridor)



Fig.9: Vertical section (Underground, stone corridor)



Fig.10: Replica (Underground, stone corridor)



Fig.11: Exposed tunnels after rebuilt

### Energy Resources of Ecological City

The planned city, a 21st century's eco city, will be coping with environmental concerns. Natural resources as a driving force, e.g., light, water and wind, are to be used in an active manner as follows.

Light supports the space of the basement and underground by direct sun shining or through fiber-optic illumination. Water supports the city by a recycling-based power generator using groundwater, which enables waterfront and lush greenery to be placed at the bottom. Natural convection wind brings holistically well-controlled condition in terms of air-flow, temperature and humidity.

### Discussion

Why under the ground? Why cave complex? Answers to those questions are not that it is simply because there are abandoned mines existing under the ground.

A factor of most motivated for this project originates in something primitive. Imagine a livelihood space when human-beings appeared on earth, it was cave dwellings. There was a mixed feeling of fear and reverence for nature. Moreover, underground or under the ground is the best place to survive from outside enemies.

From a historical standpoint, we must refer to the caves of Bamiyan's Archaeological Site, Afghanistan, closely associated with the Silk Road. Also, Ellora Temples, India, were built for the communities under the ground as a result of digging side by side in the wall of a cliff, where people lived their lives mingling with Buddhism, Hinduism and Islam. As for other prior cases, there are the Rock Sites of Cappadocia, Turkey, where the underground cities were built for the purpose of defense. These places are all associated closely with the Silk Road. Today, they are exploited as world historical heritages and tourism resources.



Fig.12: Bamiyan's Archaeological Site, Afghanistan [1] Fig.13: Ellora Temples, India [2]

## Conclusion

Synchronized with the existence and thought of these historical architectures, the “Oya Project” is to develop a today’s cave complex, where there will be a visible real life of people living there. This is a brand-new, 21st century’s project that concurrently includes an intention of reusing the abandoned, idle space as an ancestors’ gift. We are aiming at realizing a “Clean City”, which is planned to give less impact on environment and to consist of collection, storage, advanced technology and information facilities. It is included to establish a new city of arts, culture and living facilities.

This project has a concept of building a unique architecture with the totally different structure from once populated modern, contemporary ones. We are convinced that this project will bring us effective countermeasures against global warming our current society concerns. We will broadly announce this project to the world. Any arguments or suggestions would be appreciated in advance from those who are going to join us.



Fig.14: Master plan

## References

- [1] [http://en.wikipedia.org/wiki/Buddhas\\_of\\_Bamiyan](http://en.wikipedia.org/wiki/Buddhas_of_Bamiyan)
- [2] [http://en.wikipedia.org/wiki/Ellora\\_Caves](http://en.wikipedia.org/wiki/Ellora_Caves)