



From Dams and Reservoirs to Universal Underground Storage

-- A complete and ideal rainwater storage system --



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1 Problems with Dams and Reservoirs

The following problems have been pointed out in connection with dams and reservoirs:

No.

1

More than 30-40% of the water is lost due to evaporation.

No.

2

Deposition of flying contaminants and accumulation of sediments cannot be avoided.

No.

3

Land above dams and reservoirs cannot be used

No.

4

They can be the cause of large-scale infestation of mosquitos and other insects.

No.

5

If a large-scale "water pot" is built upstream, downstream regions are affected, which leads to disputes over water.



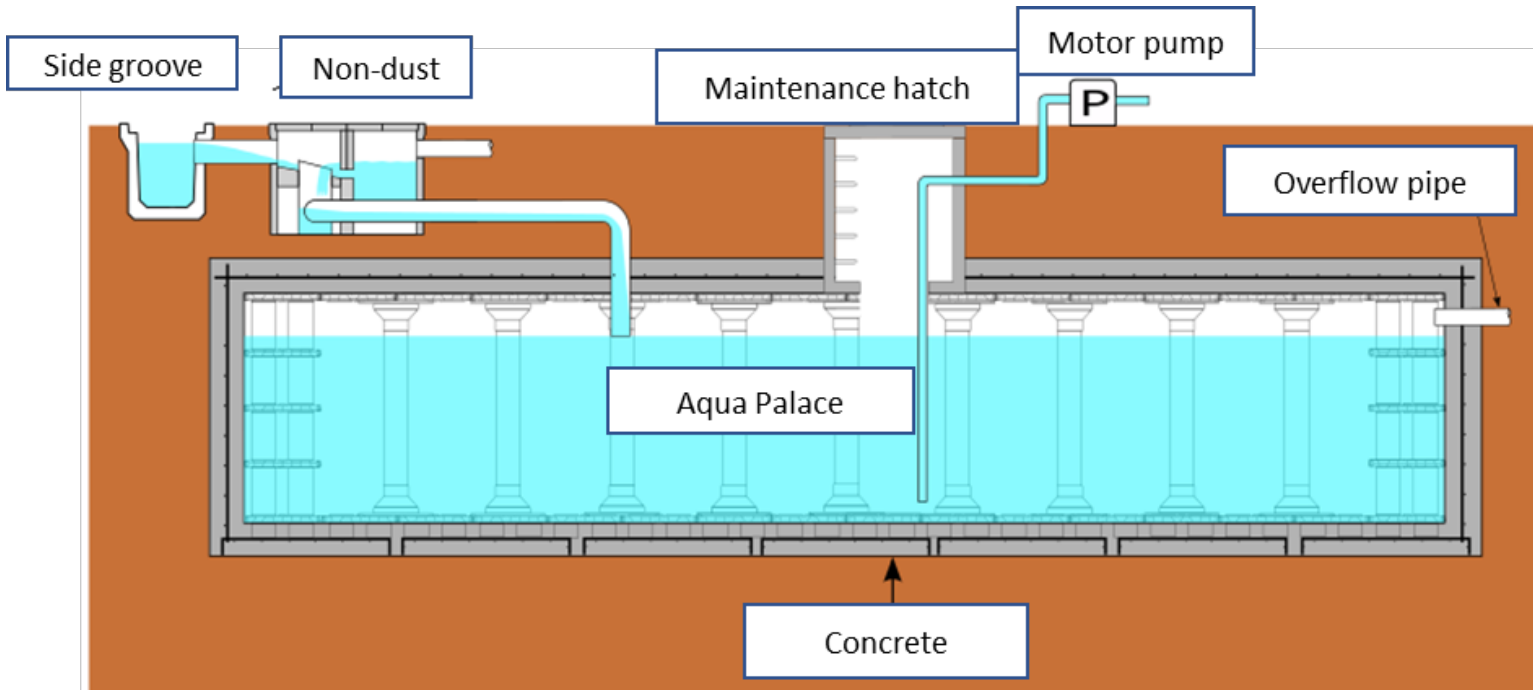
If each region could inexpensively store rainwater in large, medium, and small scales, all of these problems would disappear.

2

Completion of the Hybrid (HB) Type Universal Underground Storage System

This technology was developed with the aim of storing rainwater nearby for direct use, which can replace the current system using dams and reservoirs.

Standard Structure for HB Type Universal Underground Storage





Construction of universal underground storage system for Tamil Nadu, India

3 Main Technical Elements for Building this Underground Storage System - Part 1

Storage Material / Aqua Palace



(Unique features of Aqua Palace)

- ① A person can get inside and inspect and clean the interior.
- ② The structure can be selected based on the planned usage and location.
It can be located under a parking lot, a home, a greenhouse, etc.
- ③ Using the perimeter of the structure, a concrete retaining wall can be built with ease and large-scale expansion can be easily accommodated.

Main Technical Elements for Building This Underground Storage System - Part 2

Using the Remaining Formwork

▪ Lath Method



Cost of raw materials: Relatively inexpensive

Degree of difficulty in law material procurement:
Can be difficult. There are times when they must be exported from Japan. Slightly unstable.

Degree of difficulty of construction:
It takes some getting used to. Tends to depend on the workers' capabilities.

Brick Method



Cost of raw materials: Inexpensive

Degree of difficulty in law material procurement: Easy

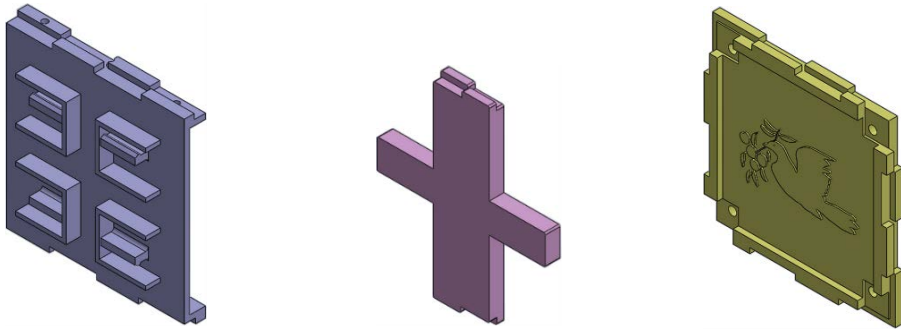
Degree of difficulty of construction:
Comparatively easy but takes a lot of labor and time. There are limits on how high items can be stacked.

5

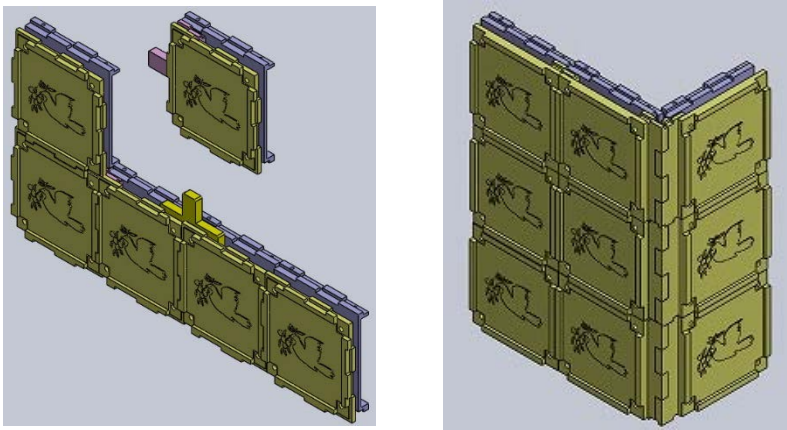
Development of the Plastic Remaining Formwork (Universal Mold)

(Three primary parts of the UN(universal) mold)

1) Substrate 2) Coupling plates 3) Decorative plates



Assembling the UN(universal) Mold



Cost of raw materials: There will be some expense for using the plastic-molded items.

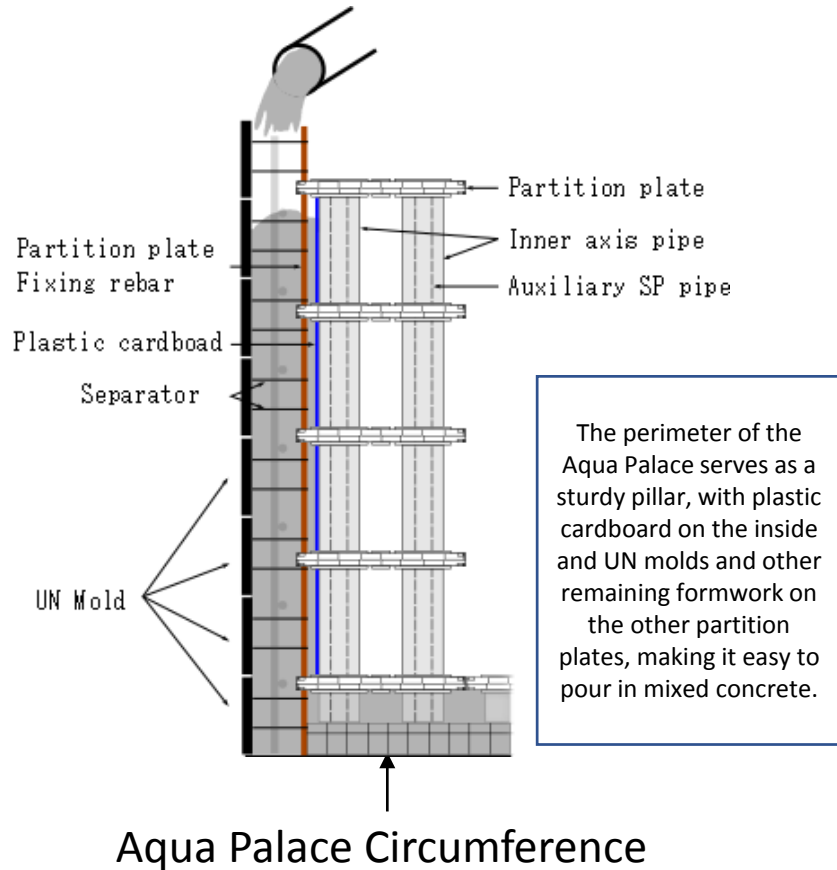
Degree of difficulty in raw material procurement: If the cost is not a problem, it should be easy.

Degree of difficulty of construction: Easy. There is little difference in completion due to workers' proficiencies.

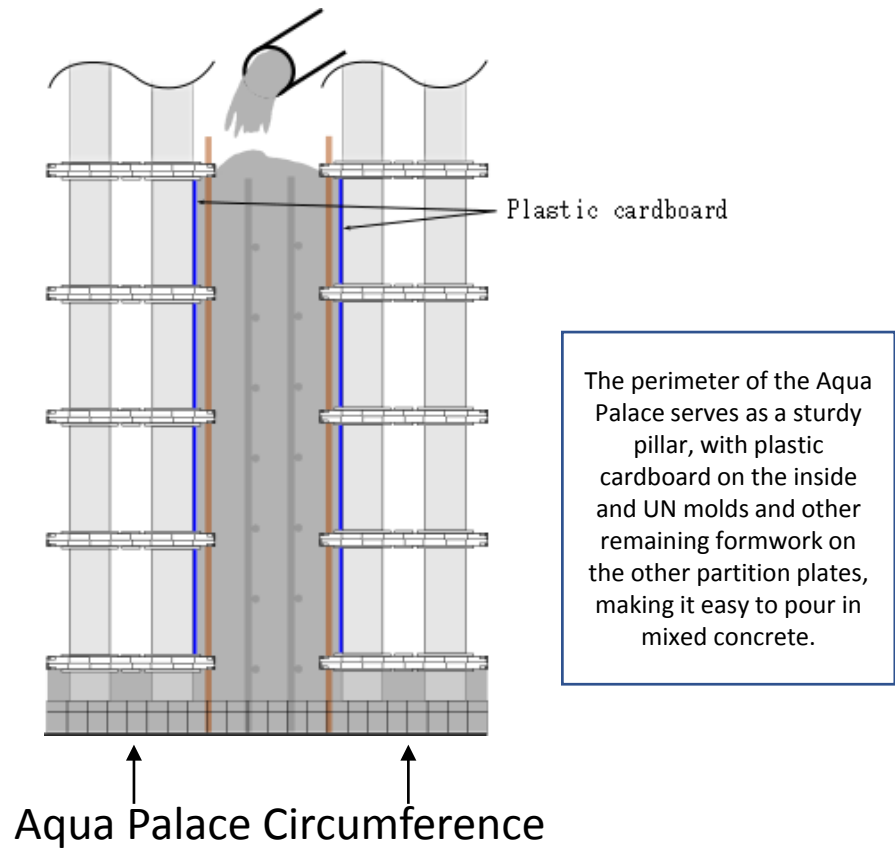
6

Forming a Retaining Wall with the HB Type Universal Underground Storage

(When building a wall around the perimeter)



(When building a partition wall on the inner axis pipe)



Massive labor and time-saving is possible because the molds do not have to be assembled or dismantled.

7

Initial Purification Technology

Technology that can physically extract impurities from rainwater and cut the rain water collected in early stages through sedimentation and filtration.

Non-dust



Mainly used for intake and purification of surface water

Split-flow Type I



Used when taking in and purifying rainwater from downspouts on rooftops

Split-flow Type II



In either case, about 95% of particulate pollutant substances are removed.

8

Construction cost of concrete basement reservoir

(1) Current Construction Costs

At present, the construction cost is too large for large-scale concrete storage tanks. Here we show the price we gathered in India for small scale storage system.

	Construction Cost	Notes
① For 200m ³ , cast-in-place concrete underground storage	Approx. ¥17000/m ³	Compressive strength is unclear. It is thought not to have sufficient compressive strength to withstand being beneath a parking lot.
② For 600m ³ , cast-in-place concrete underground storage	Approx. ¥22,000/m ³	Compressive strength is unclear. Is the price increase from example (1) due to the increase in scale and thereby levels of complexity in construction?
③ For 600m ³ , universal underground storage by Totetsu	Approx. ¥32,000/m ³	This has passed Japan's compressive strength test for the T-25 load capacity (automotive load) category and is able to withstand use beneath public parking lots in the metropolitan area. Lowering compressive strength can also reduce construction costs.

(2) Prospect of future construction cost reduction

1. With popularization, mass production will help bring down costs.
2. By using the universal mold formwork, construction costs will be reduced. We anticipate that these factors will help bring supply costs below ¥20,000/m².

1. Support for Global Standardization

The following advantages can be expected through the global standardization of this system; 1) Enable the collaborations of multiple companies on large-scale projects. 2) Enables the significant cost reduction through mass production of components. 3) Prevent the occurrence of accidents or product misuse caused by distribution of defective products.

2. Promotion of Policy to Tackle the Issue of Plastic Waste

The adoption of the “universal mold” formwork is indispensable in building this system. We’d like to consider the possibility to utilize plastic waste, continuously growing on a worldwide level, as raw materials for this system.

In the respect of the aforementioned two policies, we ask for the kind consideration and support of international organizations, such as UNIDO, and government agencies around the world