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I-shaped / X-shaped Concrete Elements for Stormwater Reservoir

In Japan, urbanization in recent years leads deforestation and the grounds paved with concrete or asphalt. It prevents the rain penetrating into the soil and all the water to flow to the river directly. In the result, it causes not only flooding when torrential downpour hits the city, but also water shortage and deterioration of river water during rainless season. Furthermore, the rain water of sudden torrential downpour caused by extreme weather could exceed easily the urban water discharge capacity and turn into a disaster in a very short time. As an actual case, Japan was hit by a record amount of deadly torrential downpour of 138.5 mm per hour which result in injury and loss of life in July 2013.

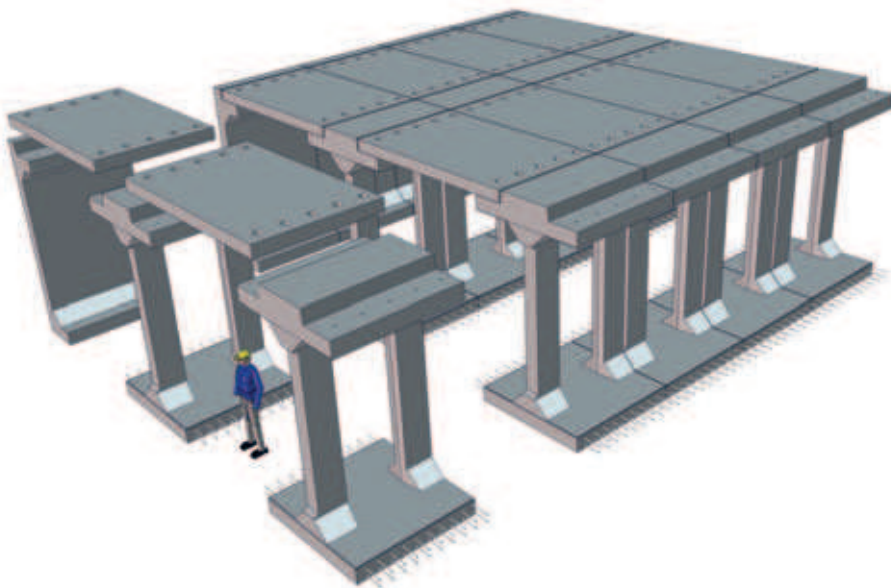


Fig. 1 shows the construction image of the I-shaped Stormwater Reservoir.



Fig. 4 shows the joining procedure

To avoid these problems, many systems are developed to retain or to penetrate the rainwater effectively into the ground in urban area in Japan. Installing underground water storage system in an open wide space such as public park, school yard, parking area,

etc. is one of the effective method because, it is able to retain a huge amount of rainwater and utilize the space effectively. But, the systems also have to have the advanced earthquake-proof ability for meet the needs of the condition in Japan.

In this issue, precast concrete water storage "I-shaped / X-shaped Stormwater Reservoir" will be introduced.

This concrete element (Fig. 1) consists of 3 parts; I-shaped Pillar, Top Panel and External Wall. It is able to change the height of



Fig. 2 and 3: Assembly on the construction site



Figures 5 and 6: Assembly of the X-shaped Stormwater Reservoir

I-shaped Pillar and External Wall according each construction site from 1.5 m to 5.0 m in 0.5 m increment. Since the base slab of reservoir is made in combination of I-shaped Pillar and concreting in site, the distance between I-shaped Pillars is free to modify based on the design condition. Precast concrete elements make it possible to save the construction term and cost because of the easy installation by machine on site. I-shaped Stormwater Reservoir is an

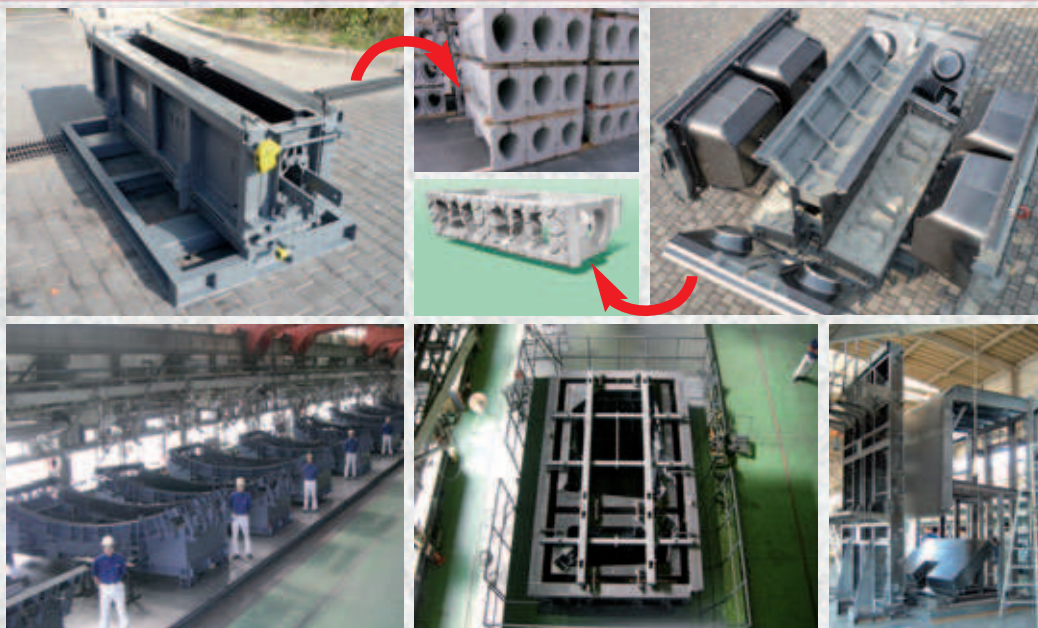
earthquake proof construction which is designed to withstand very powerful earthquake which shakes the buildings more than 50 cm/s. Since it is an emergency facility, it should fulfill its function when disaster occurs. For that reason the I-shaped Stormwater Reservoir is designed for preparing for the worst-case scenario — considering the element strength, joint method, waterproof method, etc. The I-shaped elements are joined together with pre-stressed

steel bars for a strong joint to improve the seismic capacity. On the other hand, rain-water will be able to penetrate into the underground if not pouring the concrete to form the part of base slab and only feed-back by using soil or crashed stone.

The main features of X-Shaped Elements for Stormwater Reservoir are its safety and easy installation. The shape of the support pillar is X-shaped and the pillars are not

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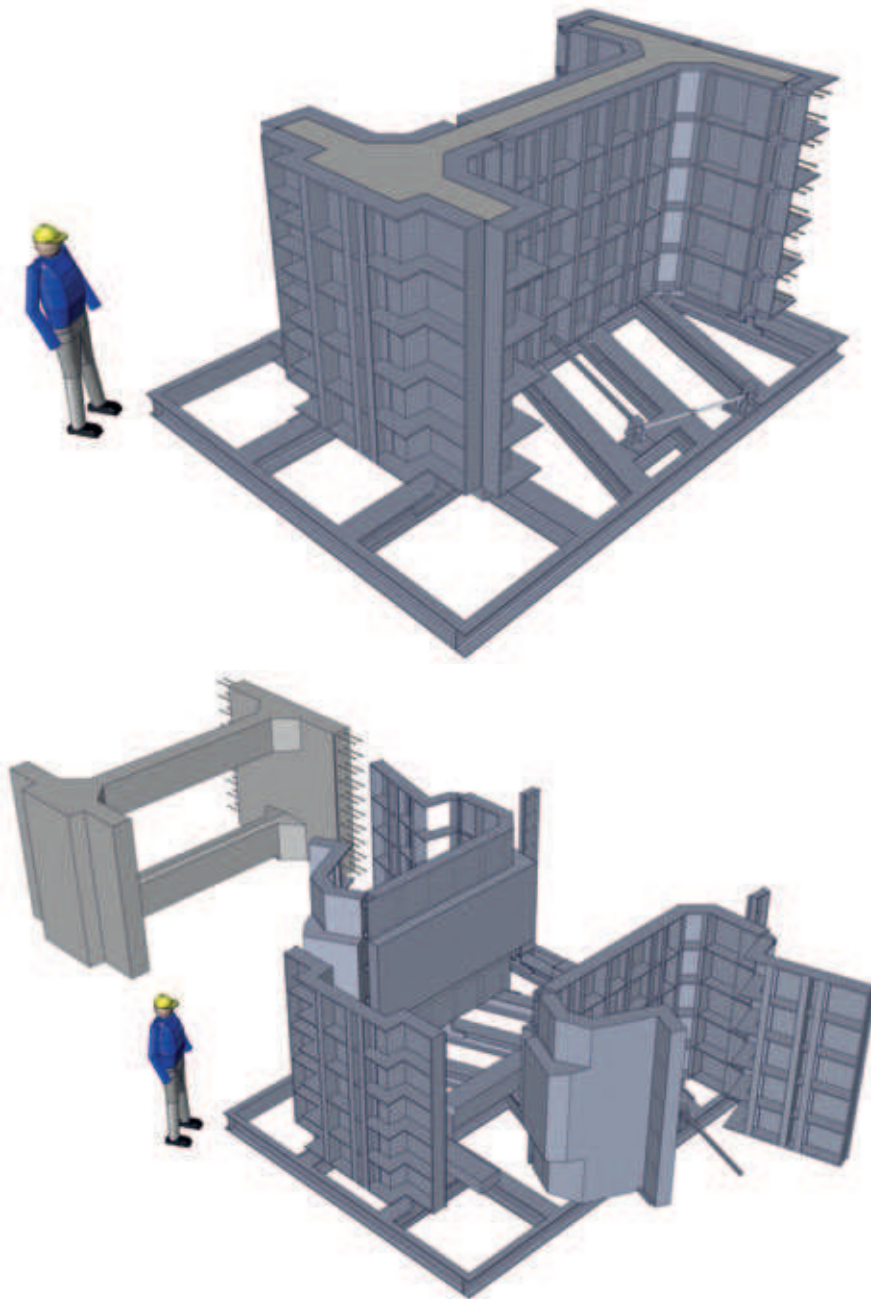
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necessary to joint each other. Since its stabilized structure, only a simple joint onto the base concrete plate and Top Panel will be enough for the installation.

Furthermore, this pillar's shape also gives a large contact area with the Top Panel. For that reason, as already mentioned above, only simple joints are enough with extremely low risk of the panel falling even when shook by a very powerful earthquake. In addition, the large contact area allows the Top Panel be more slim in thickness even where heavy load passes over the panel such as at underground of factory. This Stormwater Reservoir allows a great reduction of cost and construction term by the easy-installation and little concrete volume.

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The products introduced in this issue belong to a precast concrete manufacturer in Japan called Nitto. They have a lot of construction achievements giving a great contribution to the society with more than 10,000 m³ (water storage volume) of construction experience since its release. ■

FURTHER INFORMATION



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Fig. 7 and 8: Mould for I-shaped Concrete Element