

Toyota Kohki Co., Ltd., Tokio, 183-0035 Japan

Precast Cross Beam Retaining Wall

A long time ago, a simple retaining wall called “Shigara” was used in Japan (Fig. 1). This is a kind of fence which is made by bamboos and piles. The piles are placed at a certain interval and the bamboos are knitted between piles. They were mainly used for revetment and boundary. The biggest advantages of this fence were that it is made by natural materials which blend to nature and it is easy to make requiring no construction skills. Nowadays it is hard to find them but, today you can find a concrete retaining wall as like as “Shigara” instead. In this issue, the retaining wall that highly blends with the surrounding environment “Cross Beam Retaining Wall” will be introduced.



Fig. 1: A simple boundary fence “Shigara” which is made by bamboos and piles

As shown in fig. 2 and 3, Cross Beam Retaining Wall is consisted of some types of precast concrete beams with dents. The beams for longitudinal direction (beams A, B, C) and cross direction (D-c, D-s) are pieced and piled as log cabin and filled with crashed stones, earth, etc. inside.

The dents shaped are unique and their depths are minimized to avoid cracks. The biggest advantage of these beams is that since the dents are fitted each other and they are fixed by 4 ways, no joint such as bolt, flange or concrete joint is required.

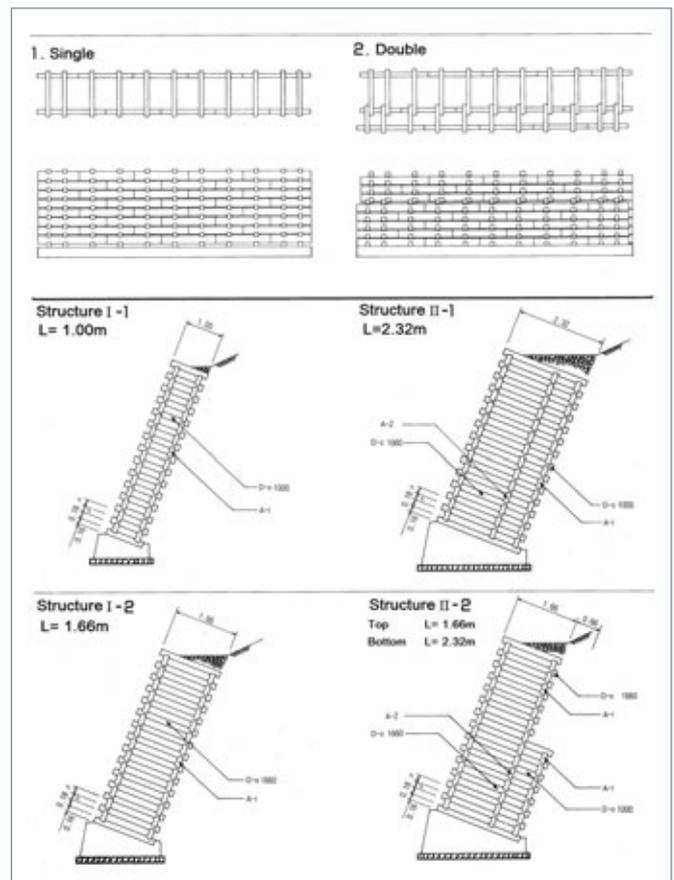


Fig. 4: Construction details



Fig. 2 and 3: Cross Beam Retaining Wall with precast concrete beams

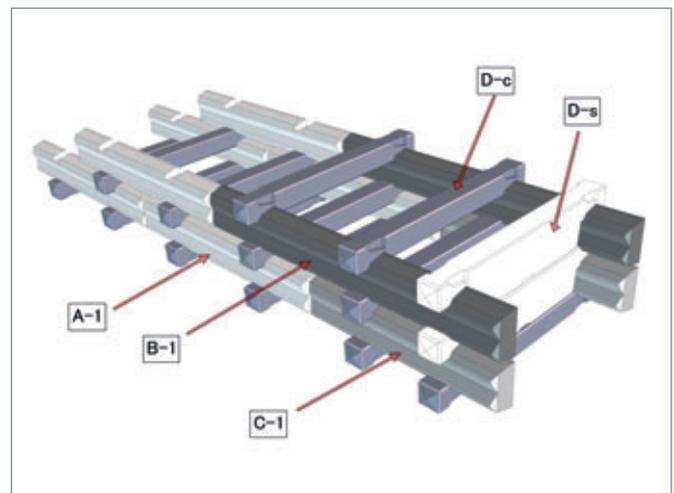




Fig. 5 and 6: Cross Beam Retaining Wall filled with crashed stones

To keep the stability for a high retaining wall, it is possible to extend the length in cross direction by using longer D-c and D-s beams or even to make a double, triple cross section structure when necessary. It is easy to design and make the beams pulling each other and form an interlocked stable wall for different height and construction condition.

Since the beams are each mating parts which allow the whole structure flexible, the Cross Beam Retaining Wall have a great stability against ground subsidence, ground movement and earthquakes.

There are 30 mm of space for draining water between the beams for longitudinal direction (beam A, B, C) on the vertical direction and the posterior part of the

retaining wall will not be affected by big water pressure because their drains function. Since the drainage work is not necessary for Cross Beam Retaining Wall excepting the foundation part, the cost and also the construction time can be reduced significantly. It is the perfect retaining wall for the areas where there are spring waters or where rain and earthquakes often occur.



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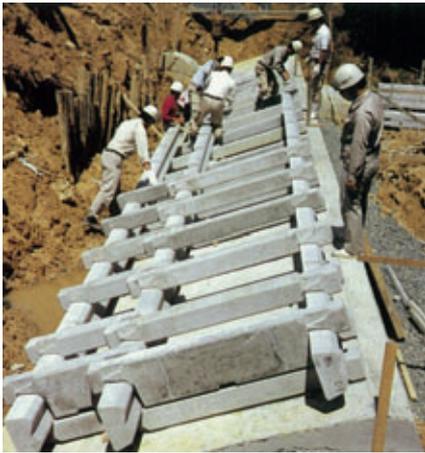


Fig. 7: Mounting of Double Cross Beam System

Since the beams for Cross Beam Retaining Wall are lightweight, small machines will be enough for the construction site. Especially, it is suitable when the heavy machines can-

not be used because of the steep slope and soft ground. Since the retaining wall is formed from beams, it is not only easy to transport, but also it can keep the construction site compacted.

It is possible to generate green by putting vegetation sandbags with the crushed stones inside them. Of course, the surplus soil that was excavated during the construction can be filled back instead of the vegetation sandbags which lead to environmental friendly behavior.

Since the beams are matched each other by their dents, the dimensional accuracy is very important.

Toyotaforms makes high quality and productivity moulds which are able to operate easily by hand with mechanical devices and designed strong enough to maintain

the same dimensions for long years. Not only the moulds, but also the whole system of the Cross Beam Retaining Wall were developed by Toyotaforms and they have been used for over 25 years in Japan. Toyotaforms also provides the assistance in other concrete product development. ■

FURTHER INFORMATION



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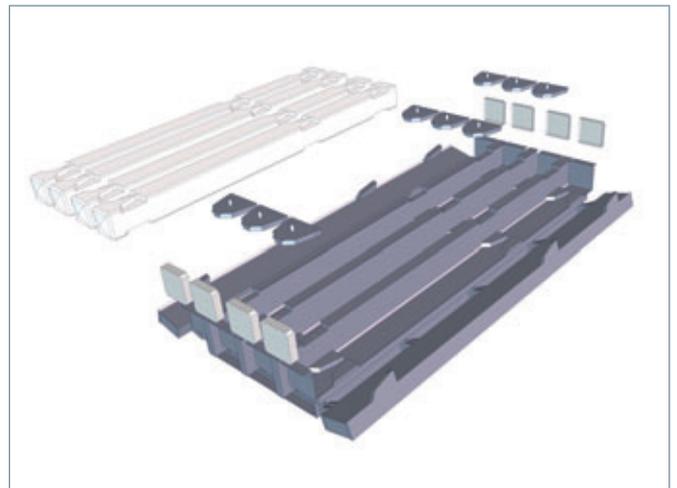
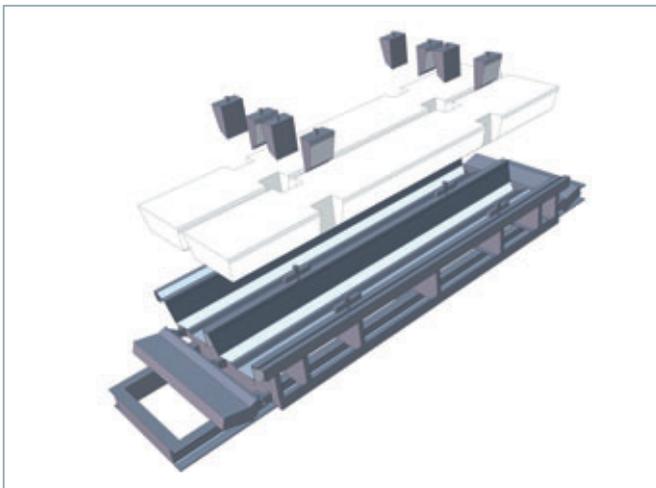


Fig. 8: Moulds for the beams D-s & D-c. They can be easily adjusted for making the beam with different length.

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