Case studies of Advanced Construction and Demolition waste(CDW) Recycling initiatives and technologies In JAPAN

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Title	Construction project of temporary exhibition hall on the eastern side of Tokyo Big Site ~ Construction project of 100% recycling exhibition hall that can be easily removed ~	
Theme classification	O Prevention	
	Re-use	
	Recycle	
	Reduce Co2	
	Legacy	
	Business to overseas	
	Etc.	
Technology	O Practical use	
development stage	Scheduled to be put into practical use by 2020	
	Scheduled to be put into practical use after 2020	
Specific content	 -This project is an Olympic-Paralympic-related facility. And it was ordered with the design build method of design and construction bulk order including technical proposal considering to be removed and used for about 10 years after construction We also built eco-friendly buildings that can be recycled, minimizing environmental impacts in new construction work and future demolition work. At this site, we adopted a pile head ring socket (developed by our company) which eliminated the underground beam for all foundations We are also assuming that steel pipe piles will be drawn and reused in the future. The upper structure adopts a pure steel structure, double folded roof and outer wall ALC, both of which can be recycled. 	
Appeal point	 Efforts to 3R ,especially waste prevention of large-scale buildings from the planning stage are the first in Japan. Construction production activities are multi-varieties and one product production, there is not the same building as one, the production place also changes every time, the lifetime visits someday in any building someday, its role ends As in the construction work of this case, there are rare cases where 3Rs could be promoted from design to construction to removal of dismantling. I hope that by transmitting this content, such efforts will increase 	

Project for Construction of a Temporary Exhibition Hall on the East Side of Tokyo Big Site Construction of an exhibition hall, which is constructed totally from recycled materials and can be readily removed

1. Introduction

As the existing exhibition hall at Tokyo Big Site cannot be used for about ten years because of large-scale rehabilitation work, a temporary exhibition hall was planned to enable various events to be held continuously.



Photo 1 whole exhibition hall

The design and build contract was used for this project which orders design and construction as a package. As a result of comprehensive evaluation, we were awarded the project.

In our technical proposal, we proposed construction of Eco Building, which would use recycled materials at high ratio and would be environmentally friendly because this building would be removed after use for about 10 years.

2. Outline of the Building

Location	Within the lot of Tokyo Big Site, 3-10-1 Ariake, Koto-ku, Tokyo
Lot area	124,186.54m ²
Total floor area	19,905.m ²
Scale	Two stories above ground
Building height	16.44m
Application	Exhibition hall
Structure	Steel frame structure
Construction	November 2015 to October 2016
period	



Photo 2 Exhibition Hall



Photo 3 inside the exhibition hall

3. Employment of a steel-pipe piles rotary jacking method, which ensures easy removal (design stage)

A steel-pipe pile rotary jacking method is to jack steel-pipe piles while rotating them. As shown in Figure 1, a circular blade is installed at the front end of steel-pipe pile, and both the pile and blade rotate to cut into the ground.



Fig.1 Tip of steel pipe pile

For removal, the pile is turned in an opposite direction to facilitate easy withdrawal. (Figure 2)



Figure 2 Structure of pile removal

This is an environmentally-friendly method with the minimum noise and vibration, which does not generate any sludge. In addition,

require underground suppor

legs of steel frame column are jointed.

(design stage)

- steel-pipe piles that are used can be totally reused and recycled after removal.
- Since the pile jacking depth to the pile bearing stratum is 70 m underground.
- Namely this work method involves extreme difficulty because pile off-center must be prevented positively to secure the quality.







Figure 3 Sectional view of building and pile head ring socket

This method enables the piles to bear the stress from the column legs, which in turn can eliminate the underground support and foundation. This can reduce excavated soil and concrete mass volumes substantially and thus CO2 emission and wastes.



Photo 5 - Installation status of ring socket



Photo-6 Concrete Filling Status

5. Employment of recyclable members (design stage)

The walls of about 2,650 t of steels are of a suspended structure to allow for subsidence and are capable of recycling. The outer wall is made from ALC and metal plates. ALC of about 8,760 m^2 is also totally recyclable. When disassembled as units during removal, the steels and ALC plates of outer walls can be reused as they are. For the roof of about 17,000 m^2 , the double folded-plate roof with sandwiched heat-insulation glass wool is employed, which is totally recyclable.



Photo-7 External wall steel construction situation







Photo-9 Roof construction situation

6. Conclusion

Construction production activities are multi-varieties and one product production, there is not the same building as one, the production place also changes every time, the lifetime visits someday in any building someday, its role ends

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