



## WILL Mixing Method

Soil Mixing Technology showing high-performance mounted on conventional excavator



### Hazard

Earthquake Tsunami Land Slide Storm Surge Flood

### Solution Purpose

Prevention & Mitigation Response Recovery

### Solution Theme

Infrastructure Technology Building Technology

### Technology Subject

River & Basin Dam & Reservoir Coast Sabo Road Railways Airport Port Essential Utilities Urban Design &

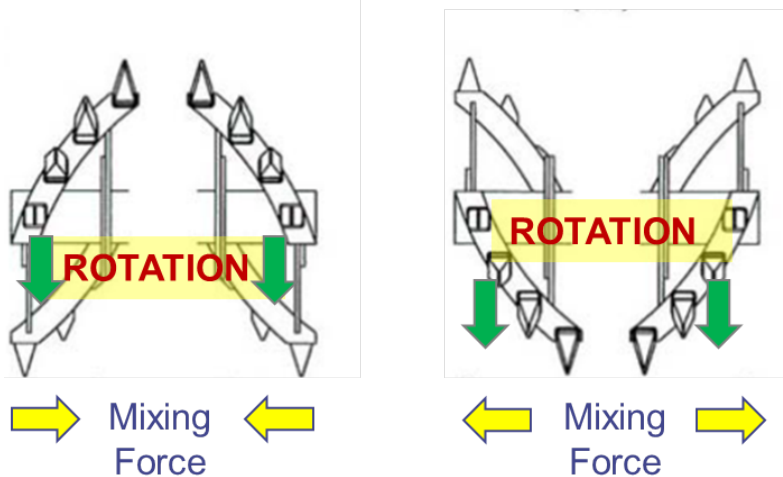
## Advantages

High mixing performance by special mixing blades (Ribbon Screw)  
Easy installation even to stiff and hard ground by assisting device (Boomerang Blade)  
High-performance control system including track navigation

## Solution Illustrated

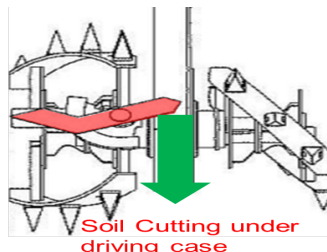
Special mixing blades (Ribbon Screw)

- making mixed soil rocked in 3 dimension
- providing highly efficient mixing



Special device (Boomerang Blade)

- helping it drive in hard ground.
- High-performance control system



Providing operator friendly monitoring

- Providing highly reliable quality control
- Navigation system



Low environmental impact

- vibration, noise and ground displacement
- Conventional excavator
- providing easy and prompt mobilization
  - assuring safety

## Background

River bank on alluvial ground has higher potential of serious failure during and after earthquake. The failure is caused not only by soft ground but by liquefaction.

Ground replacement or cement soil mixing may be preferred as suitable measure because soft soil bearing silt and clay refuse compaction procedure like Sand compaction piles.

The Tohoku earthquake has realized that Tsunami attacks easily eroded the foundation of sea dike. It is necessary to reinforce the foundation to prehend the erosion. The foundation of river bank also need such reinforcement during flood.

On the other hand, large piling machine usually utilized in deep soil mixing faces to difficulties to apply to recovering work after failure of river dike and embankment after earthquake.

## Exposition of the Solution

WILL Mixing has higher performance and productivity comparing with other deep soil mixing due to utilizing conventional excavator. Treatment depth commonly ranges to 10m deep although the maximum depth is to 13m.

### Performance and Soil Type

Excavator	Maximum Depth	Recommended Soil Type	
		Clay and Silt	Sand & Gravel <sup>※1</sup>
0.8m <sup>3</sup> Class	5m	N<10	N<30
1.0m <sup>3</sup> Class	6m	N<10	N<30
1.4m <sup>3</sup> Class	8m	N<15	N<40
	10m <sup>※2</sup>	N<10	N<30

※1 Usually not more than 100mm in diameter

※2 Specified condition for installation shall be required as self-extension attachment is mounted

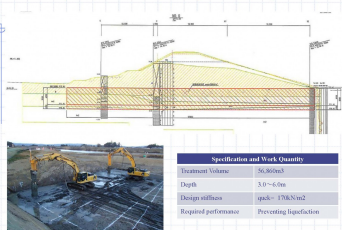
Remediation of foundation under river dike usually requires soil mixing to 10m deep and prefers WILL Mixing because the project favours simple and prompt preparation of working platform. High mixing performance produce reliable soil mixing even in inhomogeneous and gravel-bearing ground. Also Will Mixing provides various alignment including block treatment and lattice treatment.

Investigations about erosion of sea dike foundation demonstrates efficiency of WILL Mixing at foundation of revetment. High mixing performance guarantees uniform and hard soil mixing block as foundation.

Performance in accessibility is crucial to recovery work. WILL Mixing on conventional excavator assures short assembling and installation of soil mixing even on slope and/or on uneven platform.

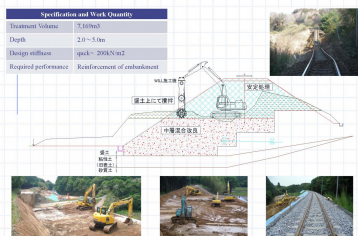


## Recovery of Failed Bank to protect Liquefaction



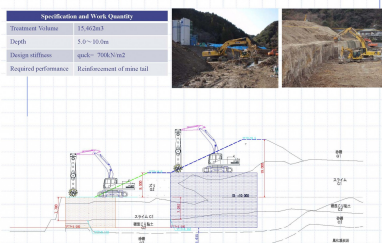
Recovering work after failure of rail embankment due to earthquake

## Reinforcement of Rail Embankment after failure



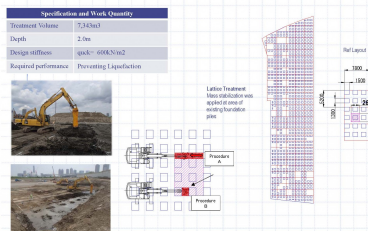
Stabilization of mining tail after earthquake

## Stabilizing of Mine Tail



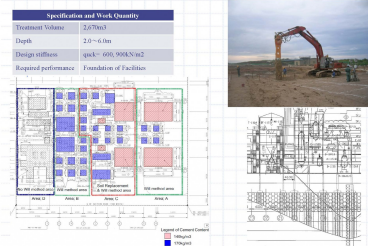
Lattice treatment against to liquefaction for facilities

## Lattice Alignment against to Liquefaction



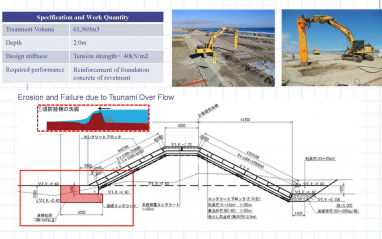
Foundation of plant facilities in overseas project

## Foundation of Facilities (in overseas project)



Preventing of Tsunami erosion to foundation of sea dike

## Preventing of Tsunami Erosion to Foundation of Sea Dike





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