SANSHIN CORPORATION

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

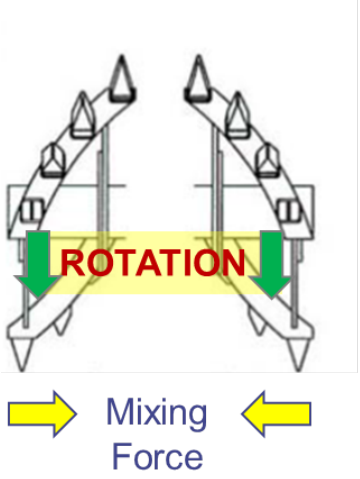
River & Basin Dam & Reservoir Coast Sabo Road Railways Airport Port Essential Utilities Urban Design &

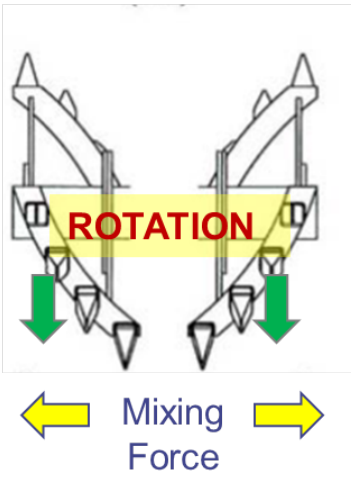
Advantages

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

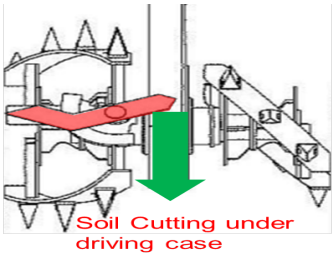
Solution Illustrated

Special mixing blades (Ribbon Screw)
• making mixed soil rocked in 3 dimension
• providing highly efficient mixing

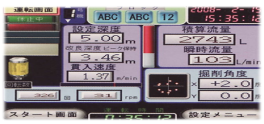




Special device (Boomerang Blade)
• helping it drive in hard ground.
• High-performance control system



Providing operator friendly monitoring
• Providing highly reliable quality control
• Navigation system



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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 prepend 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※1
0.8m³ Class	5m	N<10	N<30
1.0m³ Class	6m	N<10	N<30
1.4m³ Class	8m	N<15	N<40
	10m※2	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

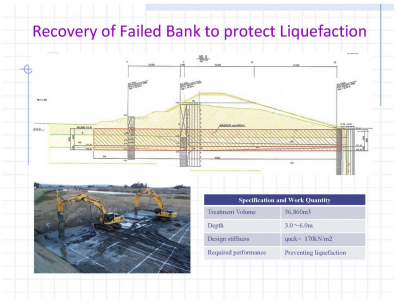
Remediation of foundation under river dike usually requires soil mixing to 10m deep and prefers WILL Mixing because the project favours simple and prompt preparation of working platform. High mixing performance produce reliable soil mixing even in inhomogeneous and gravel-bearing ground. Also Will Mixing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

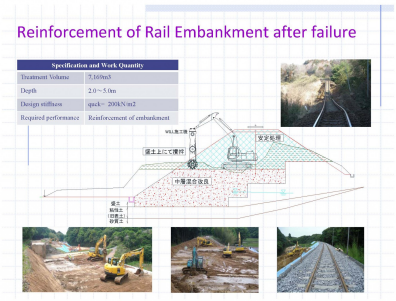
Performance in accessibility is crucial to recovery work. WILL Mixing on conventional excavator assures short assembling and installation of soil mixing even on slope and/or on uneven platform.

Achievements of Examples

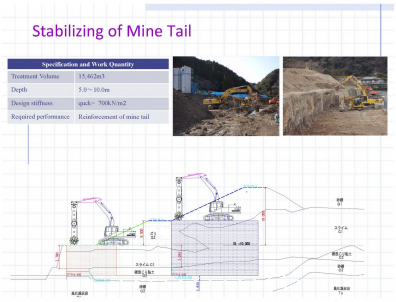
Mitigation of the foundation of failed river bank to prevend liquefaction



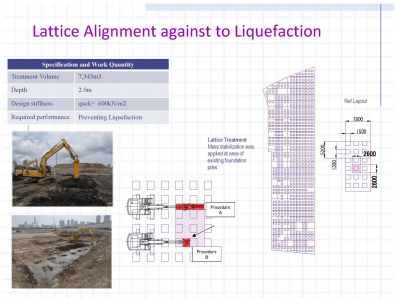
Recovering work after failure of rail embankment due to erthquake



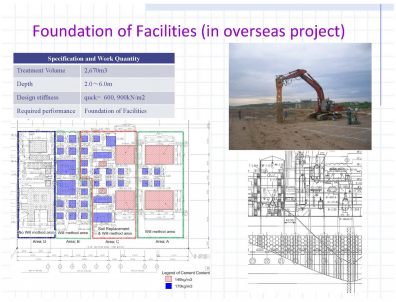
Stabilization of mining tail after earthquake



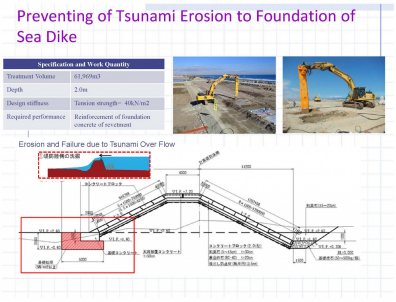
Lattice treatement against to liquefaction for facilities



Foundation of plant facilities in overseas project



Preventing of Tsunami erosion to foundation of sea dike



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