

Report 2012-Overseas activity of Fudo Tetra Corporation

January 2013

International Department/ Fudo Tetra Corporation

1. Our overseas activity and future forecast of construction market

We specialize in the soft ground improvement work such as Deep Mixing, Gravel Compaction Pile and Sand Drain method, which is our best field of construction, and we intend to receive both public and private works as a subcontractor. Ground improvement works that consist of nine projects (Deep Soil Mixing) in Vietnam, ten projects (Sand Compaction Pile; SCP and Deep Soil Mixing) in the U.S.A., one project (Offshore SCP) in South Korea and one project (Offshore Deep Soil Mixing) in Hong Kong have been completed so far until the end of 2012.

(1) Vietnam

Project	Year	Location	Remarks
Can Tho airport	2006	Can Tho	Test of deep mixing (wet type)
Thermal Power Plant	2006	Can Tho	Deep Mixing, dia.1,600mm Q'ty:200,000m ³
Container Terminal	2007	Ho Chi Minh	Deep Mixing, dia.1,600mm, Depth:-40m, Q'ty:150,000m ³
Container Terminal	2008	Ho Chi Minh	Deep Mixing, dia.1,000mm-1,300mm, Depth:-36m, Q'ty:850,000m ³
Container Terminal	2009	Ho Chi Minh	Deep Mixing, dia.1,300mm, Depth:-36m, Q'ty:200,000m ³
Container Terminal	2010	Ho Chi Minh	Deep Mixing, dia.1,300mm, Depth:-36m, Q'ty:100,000m ³
Railway	2012	Hanoi	Deep Mixing (Low Displacement type), dia.1,000mm, Depth:-25m, Q'ty:30,000m ³

(2) Hong Kong

From 2011 to 2012, we have performed offshore deep mixing test installation work in Hong Kong. The quality of DM column and environmental impact has been investigated and successful results have obtained.



(2) U.S.A.

Fudo Tetra Corporation has established its US subsidiary "Fudo Construction Inc. (Fudo US)" (URL:<http://www.fudo-const.com>) in San Mateo, California in 2005. Fudo US has performed liquefaction mitigation works using the Sand Compaction Pile (SCP) and non-vibratory sand compaction pile method (called as SAVE-Compozer) for foundations of urban facilities. Both SCP and SAVE were quite effective to mitigate liquefaction during the Great East Japan Earthquake that occurred on March 11, 2011.

Regarding the new infrastructure projects, Fudo US has completed huge volume of ground improvement (640,000m³) by Deep Soil Mixing method on the levee improvement work in New Orleans, Louisiana with great admiration by the clients. Please see Annual report 2010 or the following document.

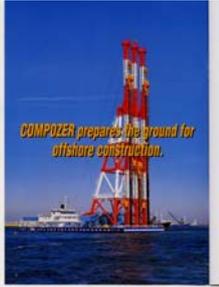
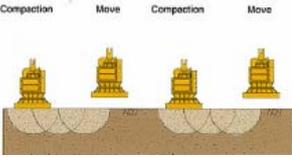
http://www.issmge.org/images/Attachments/ISSMGE_Bulletin_Volume_5_Issue1_Ver3.pdf

In addition, we have already started huge densification project in Fort Lauderdale airport runway expansion project (2012-2014), in Florida by using MVT (Mammoth Vibro-Tamper) system. MVT is capable of compacting loose sandy ground up to -10 to 15ft (3-4.5m) in depth by using a heavy steel plate and a strong vibrator on it. MVT was developed by Fudo Tetra Corporation and has been receiving superior reputation in both Japan and U.S. We are planning to compact around 500,000 square yards of the runway area within 10 months (1,000-1,500sy/shift/rig).

Vibration velocity was measured less than 0.5in/sec at 25ft distance from tamping plate while 0.2in/sec at 50ft distance. Accordingly, we could perform tamping work adjacent to the existing structure.



2. Ground Improvement method for oversea project

Method	Features	Machine
<p>Deep Mixing</p>	<p>Soil-cement mixing column with 1,000-1,600mm in diameter is installed by mixing blades. This method was developed in 1970's in Japan. Both laboratory mixing test and check boring are both required to keep its quality. Different from drain methods, this method does not need long curing time to obtain strength.</p> <p>Recently, special design technique called ALiCC method which realizes low DM improvement ratio (12-20%) has been developed so that we can achieve more economical design.</p> <p>In Vietnam, at a container terminal construction projects, we have assembled the DM special barge by renting local flat barge. Increase of stability of inclined river dike has been achieved by the DM method.</p> <p>In 2011, we completed offshore Deep Soil mixing test project in Hong Kong marine side. This is the first trial of Deep Mixing in Hong Kong.</p>	
<p>Sand/Gravel Compaction Pile (SCP,GCP)</p>	<p>Very dense sand/gravel pile with 700-900mm in diameter is installed in both clayey and sandy ground. This method is effective for increasing stability of clayey ground and mitigating liquefaction of loose sandy ground.</p> <p>Recently, no-vibration (static) sand compaction pile machine has been introduced to the U.S. for mitigation of liquefaction in urban area.</p>	
<p>Off-shore Sand Compaction Pile</p>	<p>Large diameter sand pile (1600-2000mm) is installed by special barge. It is useful for foundation improvement at many harbor structures such as breakwater and various types of quay-wall. Construction speed is much faster than the other methods. Both gravel and sand are applicable as infilling materials; however, daily quantity of around 2,500m³ is required.</p>	
<p>MVT</p>	<p>Crawler crane and attachments are used to suspend the heavy vibrator and vibrating plate.</p> <p>This method has higher energy, higher productivity yet lower noise/vibration than conventional Dynamic Compaction.</p>	

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