

## Soil Consolidation Marmaray – City Train station

Istanbul - Republic of Turkey

Marmaray suburban rail is an essential project for Istanbul, connecting Europe with Asia under the Bosphorus and running in the heart of the city. It is crucial to connect the city's metro network over two continents; in the future it will also connect the suburbs of Istanbul with the heart of the city.



Project owner  
**City of Istanbul**

Product  
**Colbondrain CX 1000**

Function  
**Soil Consolidation**

Contractor  
**ALTERNATİF ZEMİN  
MEKANİĞİ**

Project date:  
**2014**

Volume  
**500 000 lm**

### Challenge

It is a real civil engineering challenge to shore up and stabilize weaker soils in a short time frame to allow early construction on them. Using Prefabricated Vertical Drains (PVD's) is a cost efficient solution to reach this goal and to stabilize soft soils even in 30-40 m depths. Applying PVD's a path is formed for excess pore-water created by the overburden. Water is drained off to the surface resulting in a stable subgrade on which construction can take place.

### Solution

- Installing Colbondrain CX 1000 vertical drain in a 1.2 m raster with an average depth of 15 m to speed up soil consolidation

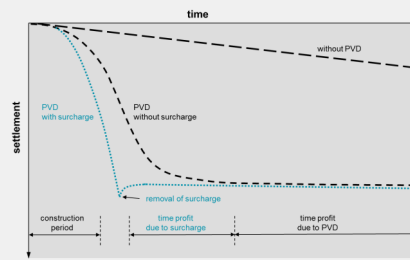
After soil measurements and investigation had been performed, the calculated 1.2 m installation raster and average 15 m installation depth delivered the calculated 0.9 m settlement in a 6 months time frame instead of years.



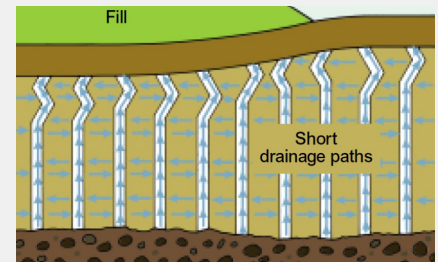
Installation machine installing Colbondrain CX1000



Colbondrain CX1000 - at work



Time benefit with Prefabricated Vertical Drain



Forms path for excess pore-water created by the overburden

## Benefits of the solution

Applying PVD's as a solution not just allowed the contractor to dramatically reduce construction time, but also delivered a significant cost savings compared to other possible civil engineering solutions for stabilizing soft soils in such depths, like piling or even replacing the complete soil.

Colbondrain with its patented core and unique production method of thermally bonding the filter at the entire surface makes a thoroughly tough and durable geocomposite with excellent drainage capacities.

Colbondrain's high tensile strength allows faster construction and the thermally bonded filter provides a tear off free - safer - installation.

## Installation benefits

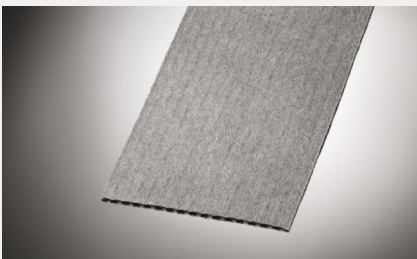
Colbondrain is easy to handle with a roll length of 280 m and is suitable for use in all soil types.

Its unique production method and its high tensile strength allows usage with all installation rig types.

## Result

Expensive and time consuming traditional methods with intensive truck and machinery demand could be replaced by installing Colbondrain CX1000. A stable sub-grade has been created for the railway superstructure in a short time, which will serve the millions of travellers in the upcoming decades.

## Products used



### Colbondrain CX1000

Prefabricated Vertical Drain (PVD) geocomposite for soil consolidation