

THIN-LAYER PLACEMENT PROJECT SHEET



IJburg Project

August 2016

Location: IJburg

Type: Island creation

Area: 200 hectares (500 acres)

City: Amsterdam

Agencies: Municipality of Amsterdam, Gemeentelijk Grondbedrijf Amsterdam, Ingenieursbureau Amsterdam, Omegam (Amsterdam), Hydronamic (Papendrecht), Combinatie IJburg, Boskalis, Ballast Nedam Dredging, Fernhout Aannemingsbedrijf.

Country: The Netherlands



Taken from Leeuw et al. 2002

Background

The demand for new housing in areas in the Amsterdam required the evaluation of sites to determine their suitability for housing. The aspects being evaluated included: the surroundings, support of the city, costs and completion, and mobility. IJburg, located in the east of Amsterdam, was selected for housing which required the creation of artificial islands. The main issue associated with the site was that the subsoil is very soft hence it would be challenging to place the material without removing the soft subsoil or placing a large amount of geotextile on top of the subsoil which could result in high construction costs. The artificial islands were constructed by spraying thin layers of dredged sand on top of the subsoil. A pilot scale project was conducted in 1995 to define parameters required for the final design of the project. Another challenge presented with this project included the presence of a large volume of clay on top of the sand that would be used for placement. The clay needed to be removed prior thin layer placement of the dredged sand. The dredged material obtained for this project was located in Lake Markermeer, which required deepening of a navigation channel and was located near the reclamation site.

Project Description

The pilot scale project conducted in 1995 consisted of creating a 3 hectares (7.5 acres) island. This study was used to refine the final design aspects of the full scale project. The aspects that are part of the final design include: settlement requirements, design level, volume of sand needed for reclamation, sand excavation, temporary shore protections, accelerating consolidation, geotextiles use, reclaiming by spraying thin layers, precautions against wind erosion of the reclaimed area, and the total project cost. The thin layer placement aspects of the final design will be discussed herein. Sand dredged from Lake Markermeer, which was located 25 km (15 mi) from the reclamation site, was placed in thin layers

of 50 cm (20 in.) using a computer-controlled spray pontoon for the first three layers and conventional hydraulic

placement for the rest of the layers. The spray pontoon was utilized to ensure placement of a constant thickness to avoid load differences and instability. Each layer was allowed to consolidate for 4 weeks to ensure local stability of the subsoil. The total thickness of material placed for island creation is 5.2 m (16.5 ft). Prior to removing the sand from the lake, approximately 9,700,000 m³ (12,687,121 yd³) of clay, 8 m (26 ft) thick layer, had to be removed by cutter suction and placed back in the lake using the “clay relocation method”.

Findings

The use of the computer-controlled spray pontoon allowed for controlled thin layer placement of sand in soft subsoil. This system allowed for high accuracy placement of the first three layers of sand which resulted in high stability of the island creation project. The pilot scale project, monitoring and modeling efforts with finite element models in combination with validation tools resulted in accurate predictions and better understanding of soil structure behavior (de Leeuw et al. 2002). These practices along with careful planning resulted in a successful beneficial use project utilizing thin layer placement techniques to ensure stability of the subsoil.

References

de Leeuw, H.A.; Smits, E.P.T.; Mathijssen, F.A.J.M.; Estourige, A.L.Ph. (2002) Reclamation on Soft Subsoil by Sparging Thin Layers of Sand: The “IJburg” Project near Amsterdam. *Terra et Aqua*, Number 89, pp. 9-30.

Points of Contact

Information on thin layer placement (TLP) case studies has been compiled as part of a DOTS/EWN project to provide a source of information, knowledge, and experience on TLP of sediment or dredged material in aquatic environments. The Thin Layer Placement Website and Map-Portal are funded by the US Army Engineer Research and Development Center (ERDC). POCs for the Thin Layer Placement Website and Map-Portal are:

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