

PROJECT SHEET

ST. PETERSBURG, RUSSIA

COMPLETING A FLOOD PROTECTION BARRIER, A NAVIGATION CHANNEL AND TUNNEL CONSTRUCTION PIT

INTRODUCTION

St. Petersburg is a UNESCO World Heritage City, but its location along the River Neva means that it has been threatened by over 300 floods since its founding by Peter the Great in 1703. The completion of the new 25-km-long storm-surge barrier across the Gulf of Finland ensures that the city will no longer be vulnerable to high tides and devastating floods. As a result of the new Flood Protection Barrier, however, the old winding access channel had to be replaced with a new, straighter, more easily navigable channel.

PROJECT CHARACTERISTICS

In August 2006 Boskalis as sole contractor was awarded a contract to dredge a new Access Channel including repositioning and deepening cables that cross the channel. In April 2007 Boskalis was granted additional dredging works in the construction pit of the shipping passage.

In July 2007, Boskalis was awarded another contract for the closure of the final sections of the Flood Protection Barrier and the tunnel pit under the shipping channel. Boskalis was the leading partner and had a 60% share in the contract, implemented in a consortium with Hochtief.

FEATURES

Client	Ministry of Regional Development of the Russian Federation
Location	St. Petersburg, Russian Federation
Period	August 2006 to May 2011
Performed by	For the Access Channel: Boskalis bv. For the Dam: Consortium Boskalis bv / Hochtief AG/OO "Mortekhnika"



- A Location map
- B Boskalis' TSHD 'Barent Zanen in action
- C Boskalis' 'Nordic Giant', one of the world's largest backhoes, dredging hard clay
- D Overview of the project

WHY IS THIS PROJECT UNIQUE?

The project comprised not only the storm-surge dam, but an entire transportation plan including navigation channels with two shipping passages, part of the six-lane Ring Road around St. Petersburg, with a tunnel underneath the new shipping canal. Unique challenges included guarding the ecology of the Neva delta and retrieving unexploded ordnance left lying on



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the seabed from the siege of the city during World War II. To ensure that this dangerous debris was cleared, Boskalis commissioned their affiliate Heinrich Hirdes to survey the seabed with magnetometers. The presence of ordnance was then verified and removed by divers, and disposed of by local authorities.

The Russian winter was also challenging as dredging was not possible at all and earth works were limited. Traditionally St. Petersburg Port allows for on average 150 ice days where shipping cannot be done without an ice-breaker. Unlike in Western Europe, however, where concreting crews stop work at the freezing point, in Russia they continue till -20 Celsius.

PROJECT SPECIFICATIONS

The Access Channel required dredging some $8,000,000 \text{ m}^3$. At the Dam closure, some 1.9 million m^3 were dredged for soil improvement, $900,000 \text{ m}^3$ of rock, comprising rock mass, crushed stone and sandy gravel and 5.2 million m^3 sand were supplied. Hochtief placed $182,000 \text{ m}^3$ concrete. The Russian government

granted Boskalis and Minregion a concession for the removal of 25 million m^3 sand from Londonskaya Sand Bank.

EQUIPMENT

The new Access Channel was dredged by five trailing suction hopper dredgers, assisted by a plough boat to level the seabed during and after dredging. For dredging the stiffer clays, a backhoe assisted by split barges was deployed.

For the dam closure contract starting in 2007 through 2008 Boskalis used five self-propelled trailers varying in size from $3,500$ to $16,000 \text{ m}^3$ hopper volume as well as backhoes, one with 24 m^3 volume bucket. The works started with the soil improvement below the future tunnel where almost 2 million m^3 of weak unsuitable soils were dredged. Backfilling with sand was done afterwards using trailer dredgers. Construction of the benches for the future tunnel pit were then begun. Using trailer dredgers, about 5.2 million m^3 sand were hydraulically deposited. To protect the sand from washing away, 1.5 million tons of rock mass from quarries in the region were placed. All rock was positioned with large excavators equipped with the Boskalis in-house Crane Monitoring System.

In total, at the peak of operations, 16 different vessels were used for various aspects of the job. Instead of the initial 63 months, the work was completed in 49 months, an indication of the speed and efficiency with which the Boskalis team moved forward.



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- E Aerial view, showing a part of the dam and its connection to the barrier
- F Two of the many Boskalis TSHDs at work: the 'Waterway' and the 'Barent Zanen'

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