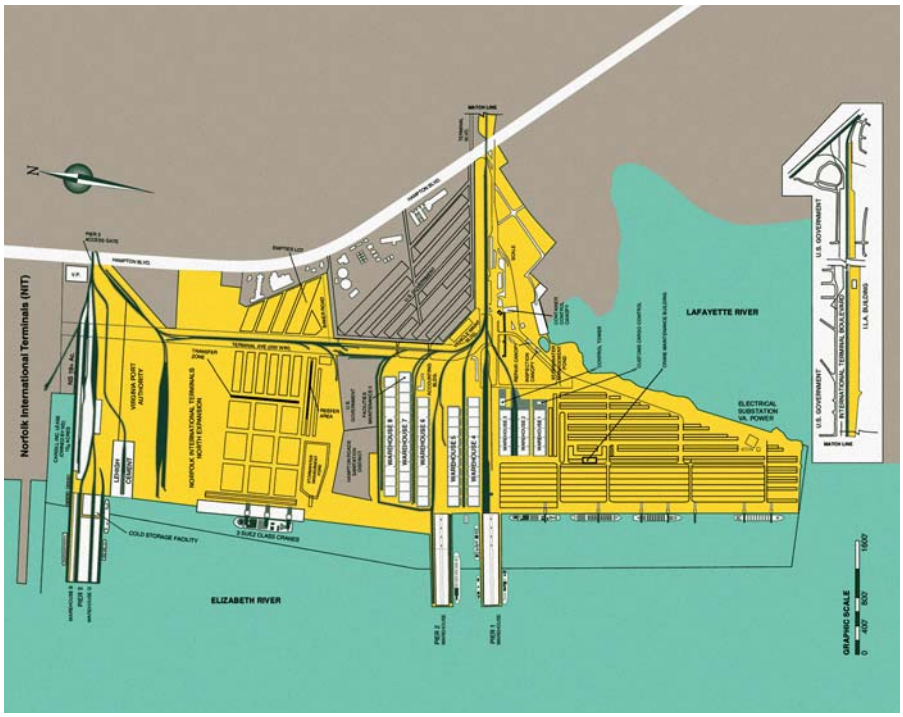
Norfolk, Virginia, USA

NIT South Wharf Renovation Project, Port of Virginia

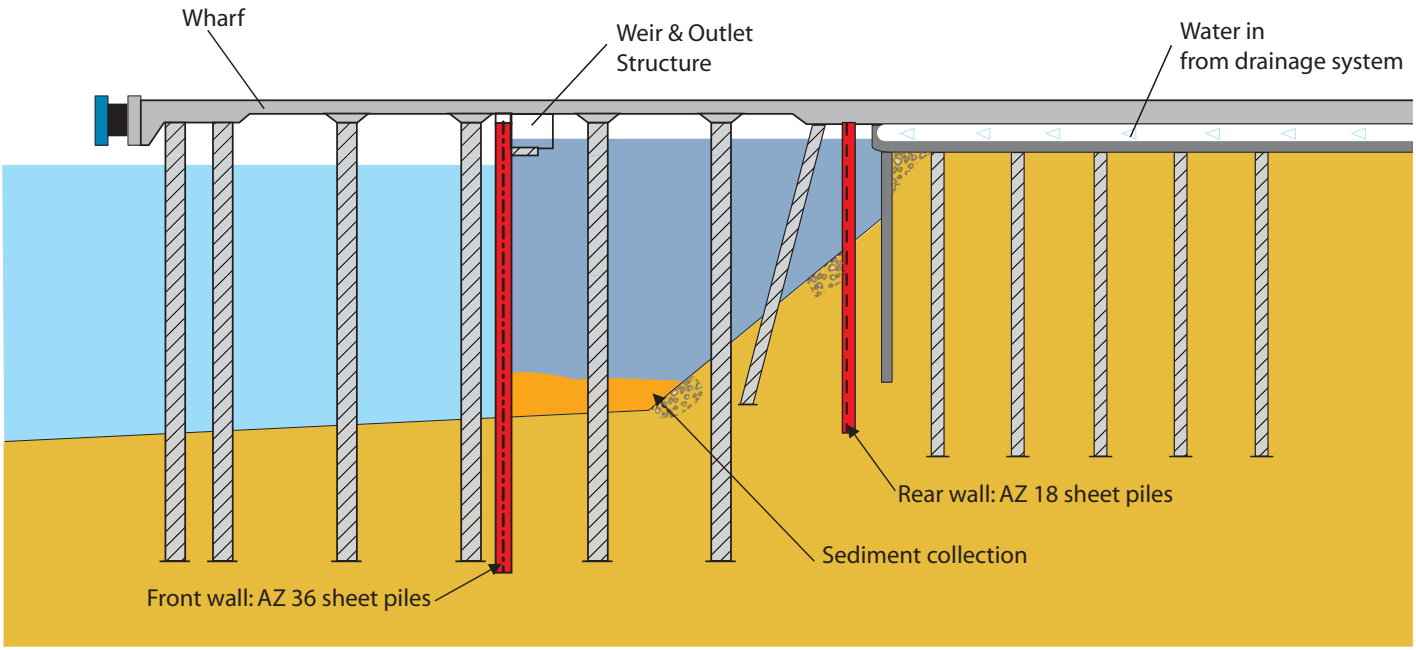


The new terminal is built on the Elizabeth river, some 29 km from the Atlantic Ocean

In recent years, the Port of Virginia on the East Coast of the United States has registered explosive growth in Asian cargo. This growth has led to ambitious terminal renovation and expansion projects to accommodate the increasing volume of cargo. Northeast Asia, primarily China, accounts for up to one third of U.S. container traffic with yearly growth rates in the range of 10 - 15%. As ports on the U.S. West Coast reach their maximum capacity, the rise in container traffic is also being felt on the U.S. East Coast.

The Port of Virginia, one of the world's largest natural ice-free harbours is located 29 km from the Atlantic Ocean. The port's annual shipping volume reached 1.98 million TEU in 2005 – a growth of roughly 10%

The NIT south wharf was renovated using two rows of steel sheet piles

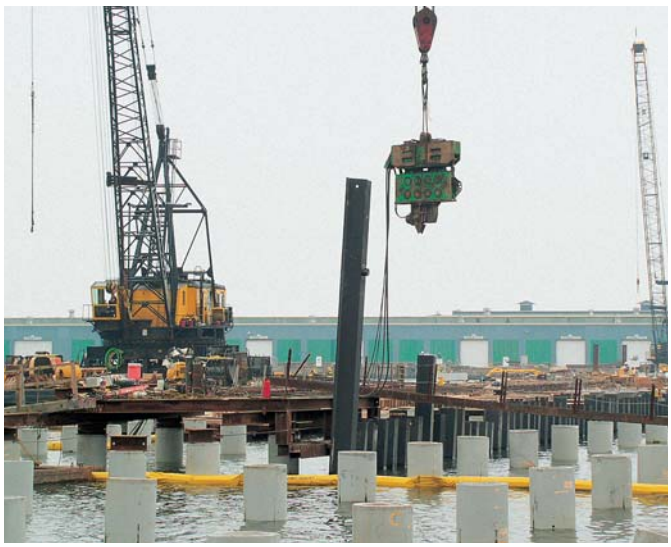


Cross-section of the expanded terminal with the stormwater detention basin set between two rows of AZ sheet piles

compared to the previous year. In order to accommodate both increasing cargo volumes and the increasing size of cargo ships, the Virginia Port Authority [to whom we credit the pictures shown] decided to renovate Norfolk International Terminal's (NIT's) South Terminal. The Port of Virginia boasts a 15-metre-deep inbound channel that will ultimately be dredged to 18 metres, making it the deepest on the U.S. East Coast. This new access channel will allow deep-draught Suez Class container ships (10 - 12,000 TEU vessels) to call at the port.

Launched in 2002, the renovation of the port's largest container cargo terminal included the replacement of 1,290 metres of marginal wharf with a state-of-the-art structure designed specifically for containerised cargo operations. Eight 30.5-m-gauge post-Panamax cranes were installed to cope with the increased cargo. The container yard was also reconfigured to improve its efficiency.

The NIT South Wharf Renovation project involved replacing and widening the wharf by installing precast concrete piles, a steel sheet pile wall and an innovative under-wharf stormwater detention system. The wharf construction and landside renovations were completed in stages to keep three of the terminal's four container berths operational throughout the renovation project.



Installation of the basin's impervious sheet pile wall

Supporting piles for the front side of NIT's new South Wharf

Norfolk, Virginia, USA

Consulting engineers Moffatt & Nichol designed the renovation of the South Wharf, including the stormwater treatment measures required by state and federal environmental regulations. An under-wharf detention basin system formed by a front and a rear sheet pile wall was installed. This basin eliminated the need for a conventional treatment pond while maximising the land area available for cargo operations.

A vital goal of the project's stormwater detention measures was to create a highly impervious basin. At a width of 630 mm, the AZ 36 sheet piles were suitable not only to take up the statical loads, but also to contain stormwater. The watertightness of the system was further increased by the following measures:

- Particularly high watertightness of the Larssen interlock due to its tight shape,
- The number of permeable interlocks was halved by welding the middle interlocks,
- Large sheet pile width (1,260-mm double piles), and
- Filling of the non-welded interlocks with a Roxan sealing system.

Owner:
The Virginia Port Authority (VPA)

Design Engineer:
Moffatt & Nichol

Contractor:
Tidewater Skanska, Inc.

Sheet pile system:
AZ 36, AZ 18

Steel grade:
Grade ASTM A690

Total quantity of sheet piles:
3,950 metric tons

The AZ double piles were brought in by barge


Installation by land-based crane equipped with vibratory hammer


The AZ 36 sheet piles take the statical loads and act as an impervious water barrier

A template ensures the straightness of the sheet pile walls

A hole was cut into the piles to pass the rebar tie rods

A waling system evenly distributes anchor forces into the sheet pile wall

The Roxan system is based on a urethane-prepolymer product. Its volume doubles after 24 hours of exposure to water. The contractor has to avoid having driving-process interruptions of more than two hours during installation, otherwise he risks damaging the partly swollen sealing system. Contrary to bituminous sealing products, Roxan exhibits excellent durability properties in mineral oil, crude oil or petroleum and is thus ideal for containing stormwater. The sheet piles were delivered from Arcelor in Luxembourg to their U.S. sales agency Skyline Steel who applied the sealing system in their shop in Savannah, Georgia. The piles were then taken by truck to the project site in Norfolk, Virginia.

A coating system was applied to the AZ sheet piles in Skyline's shop to counter all corrosion risks caused by the water contained in the stormwater detention basin. The sheet piles were made of Marine Steel Grade A690, which has approximately two to three times greater resistance to seawater 'splash zone' corrosion than ordinary carbon steel compliant with the U.S. ASTM A690 standard.

The AZ 36 and the AZ 18 sheet piles were driven in front of the existing wharf as double piles, using a vibratory hammer. The wharf itself is a deck-on-pile structure partly incorporating the detention basin and extending the terminal approximately 30 m into the Elizabeth River. ■

Overview of the construction site