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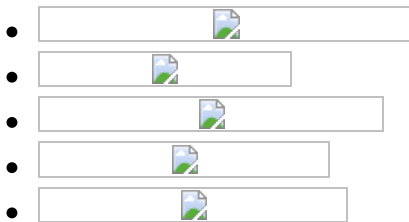
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# Concept Storm Surge Barrier

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Image 1 of 5 Barrier gates at the Ambrose Channel

## Key facts

Client:

Country:

[United States of America](#)

Date:

2009

Thanks for all the email traffic to Doug Hill and me regarding barrier designs. We both appreciate the extensive work you undertook for the ASCE conference; your contribution was by far and away the most detailed and exhaustive

*Malcolm J. Bowman*

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New York is considered to be one of the most vulnerable cities to be exposed to coastal flooding this century.

By the 2070s, the total population at risk could grow to around 150 million people worldwide, due to the combined effects of climate change (sea level rise and increased storminess), subsidence, population growth and urbanisation.

Not only will the metropolitan area of New York City be affected by sea level rise over the coming century, it is already at risk of flooding from catastrophic storms. Port facilities, major transportation infrastructure, coastal communities, and high rise commercial and residential real estate are all subject to the effects of extreme winds and flooding, and the flood risk will only increase in the future as sea levels rise due to the effects of global climate change.

Halcrow was one of only 4 companies from around the world invited to present concept designs for barrier defences against surge flooding at a conference organised by the American Society of Civil Engineers in March 2009. Options looking at barriers or barrages at locations in proximity to the Narrows, Arthur Kill, the Upper East River and others acting as integrated system were presented by others. Halcrow's concept design was more radical, looking at a longer barrier than others but which, through its shallower nature, provided the least cost solution that also protected the greatest length of shoreline.

Ship navigation requirements were just one of the design considerations for the project. Considering the importance of the New York Harbour to the regional economy, it is critical the proposed storm surge barrier does not interfere with vessel traffic, during both construction and operation. Therefore barrier gates at the Ambrose Channel must be sufficiently deep to accommodate not only today's vessels, but also potentially larger vessels which may call at New York in the future.

The hydrodynamics are another important consideration. The dynamics of the movement within the Harbour are complex, comprising the local tidal influence, the inward and outward movement of the salt and freshwater wedges in the Hudson discharge, and the general tidal flushing action throughout the entire area. In addition, the environmental considerations such as water quality and the commercial fishing grounds, as well as the established leisure usage of the area require to be considered.

The concept design proposed is based on the design of the St Petersburg flood defence barrier in the Russian Federation. The NY-NJ Outer Harbour Gateway involves a five-mile flood defence extending between the Rockaway Peninsula and Sandy Hook, plus the reinforcement of some 10-miles of the natural defences along these low lying peninsulas. The barrier would include two gates in the main navigation channel, with each gate having two leaves, each measuring the length of a football field. The barrier would also include smaller gates for two secondary navigation channels, and fifty sluice gates, each 80 feet across. The concept would allow for a transportation link to run along the top of the causeway connecting the two states

## **Benefits**

The barrier design presented had an estimated cost of US\$5.9 billion in today's terms. Halcrow's barrier concept was the only one that provided defence for the John F. Kennedy Airport. The barrier provides a transportation route for a road and/or a rail system if required, which would form a transport link skirting the south of New York.

## **Innovations**

The design elements of causeway, gates and flanking berms on the shore are all well understood engineering concepts, and were closely based on the successful designs carried out for the St Petersburg flood defence barrier. The design is therefore innovation rather than invention.

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Planning, design and management services for infrastructure development worldwide

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