

# BATTLE McCARTHY®

Consulting Engineers & Landscape Architects



## PROJECT:

Freedom Tower, World Trade Center, New York

## CLIENT:

Silverstein Properties

## ARCHITECTS:

Skidmore Owings Merrill, NY

## BM SERVICES:

MEP concepts  
Facade design  
Renewable energy  
Vertical Wind Farm Integration

## VALUE:

Classified

## DESIGN BRIEF

The first and tallest of the replacement towers on the World Trade site in New York set out in Studio Daniel Libeskind's masterplan provides 2.6 million square feet of premium speculative offices, alongside public viewing areas and retail at street level.

Power for the building is to be partly generated via a number of wind turbines integrated into the upper portion of the tower design, capturing the strong winds coming off the Hudson River.

LEED Silver rating

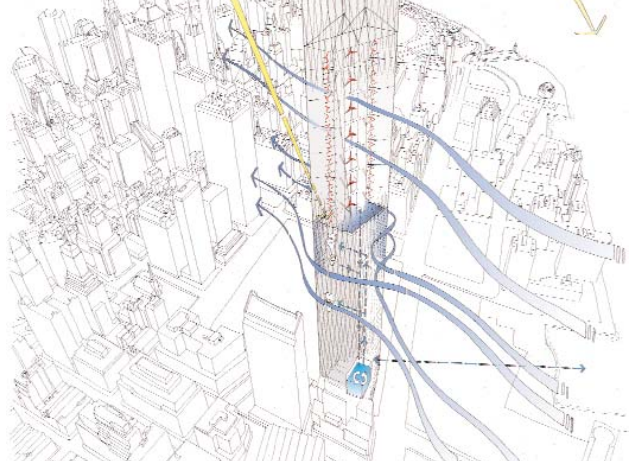
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## DESIGN INITIATIVES/ACTIONS UNDERTAKEN

The design process worked through the shaping of the building to capture the prevailing winds at high level, whilst reducing the overshadowing created by using a filagree cable-net structure. This allowed the inclusion of up to forty seven wind turbines in a vertical wind farm above the occupied office floors, the first of its kind to be built

The vertical wind farm in the world. Seven 15m diameter AOC turbines stacked vertically between shaped cores mounted on horizontal aerofoil bridges. A further 40 turbines are mounted on outriggers from the cores within the outline of the cable net grid. These turbines are arranged so that they can utilise the large potential wind resource from the strong winter winds off the Hudson River and the summer winds from the south.

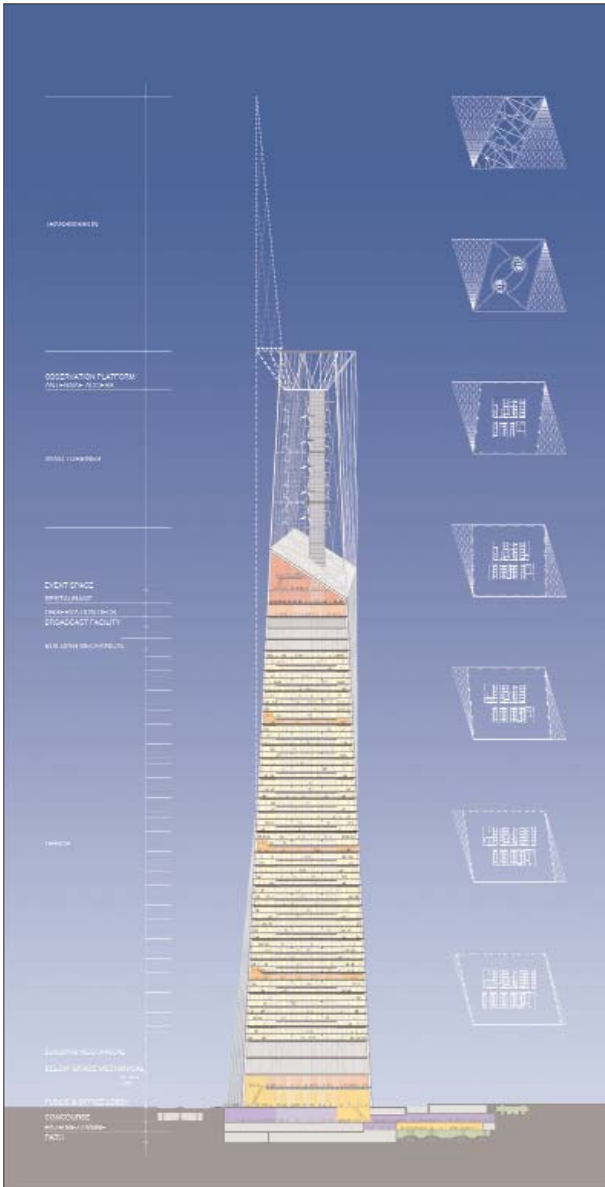
The design of the building elements above the occupied floor zones are intended to aid the capture and speed-up of the winds to maximise the power output. A number of CFD models were tested, alongside physical wind tunnel testing carried out by RWDI.



## AWARDS

Building Services Journal International Achievement Award

2004



The wind regime for the upper portion of the tower had to be transposed and re-calculated from collected data to account for the nature of the site and the increase of wind speeds with height.



The Freedom Tower cornerstone was laid in a ceremony on the 4th July 2004. Construction is scheduled to be complete in late 2009.



The building aims to reduce its impact through the use of energy saving servicing strategies and a high quality facade, as well as utilising the Hudson River as a source of cooling water.

The design is shaped to maximise the use of the plot, whilst providing generous surfaces for the integration of photovoltaics, and the inclusion of a high-level wind farm to harness the strong northwesterly winds.

