



**KATRINA**



**FUKUSHIMA**



**SANDY**



**FORT McMURRAY**



# HURRICANE KATRINA, NEW ORLEANS

## 2005



Buildings Destroyed	Clean-up Costs	Economic Losses	Reconstruction and Recovery
300,000	\$150 Billion	\$108 Billion	\$260 Billion





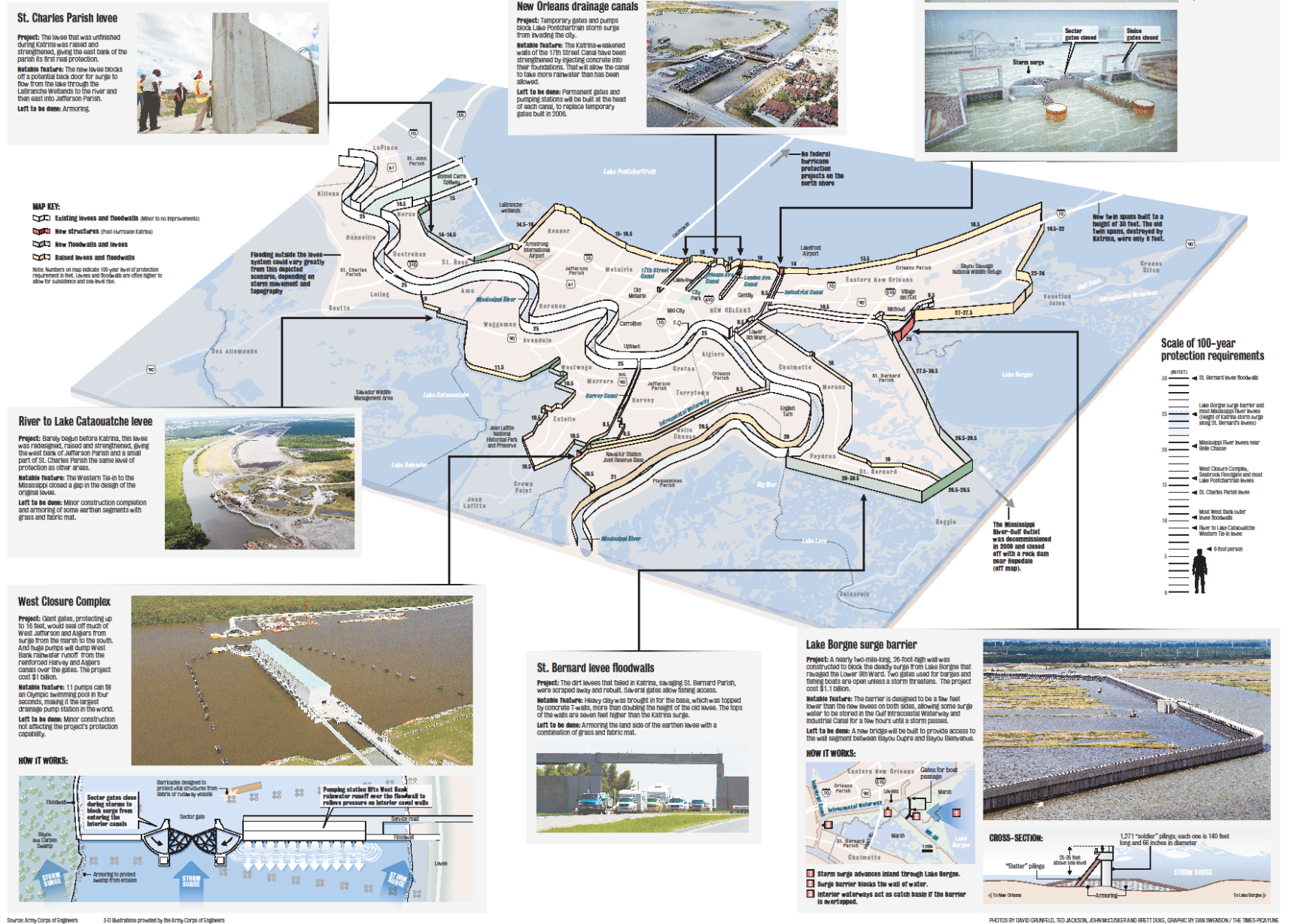






# HURRICANE KATRINA, NEW ORLEANS

## Preventative Measures



Disaster Cost

\$518 Billion

Preventative Measures Cost

\$16 Billion



# FUKUSHIMA TSUNAMI, JAPAN

2011



Before



During

Buildings Destroyed	Clean-up Costs	Economic Losses	Reconstruction and Recovery
138,000	\$15 Billion	\$360 Billion	\$250 Billion



# FUKUSHIMA TSUNAMI, JAPAN

## Preventative Measures



Disaster Cost

\$625 Billion



Preventative Measures Cost

\$8 Billion



# FORT McMURRAY WILDFIRES

2016



Buildings Destroyed	Clean-up Costs	Economic Losses	Reconstruction and Recovery
3,000	\$7.1 Billion	\$1.7 Billion	\$9 Billion



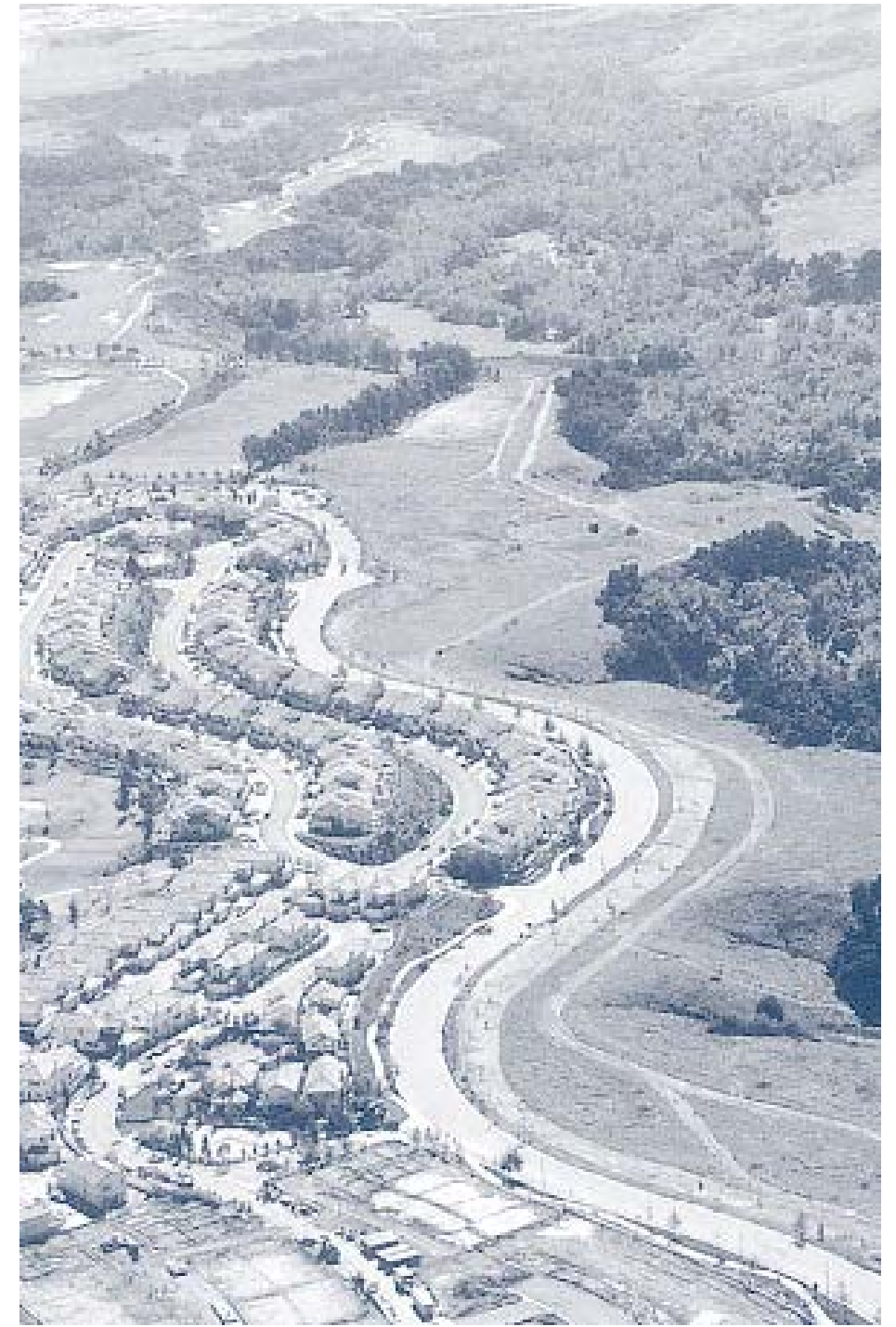
# FORT McMURRAY WILDFIRES

## Preventative Measures



Disaster Cost

\$17.8 Billion



Preventative Measures Cost

\$0.1 Billion

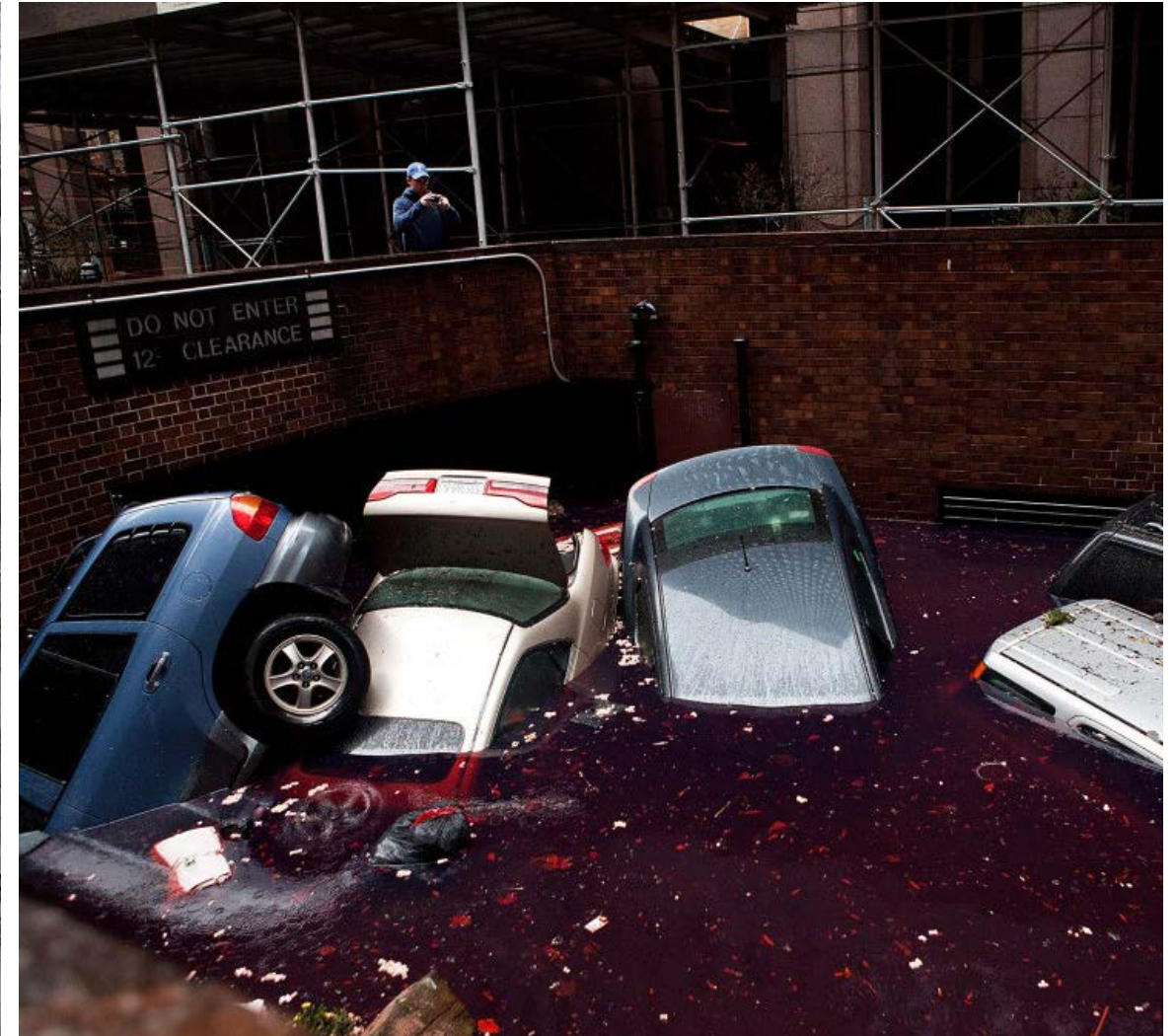


# SUPERSTORM SANDY, NEW YORK

## 2012



New Jersey



Manhattan

Buildings Destroyed	Clean-up Costs	Economic Losses	Reconstruction and Recovery
70,000	\$19 Billion	\$20 Billion	\$50 Billion



# SUPERSTORM SANDY, NEW YORK

## Preventative Measures

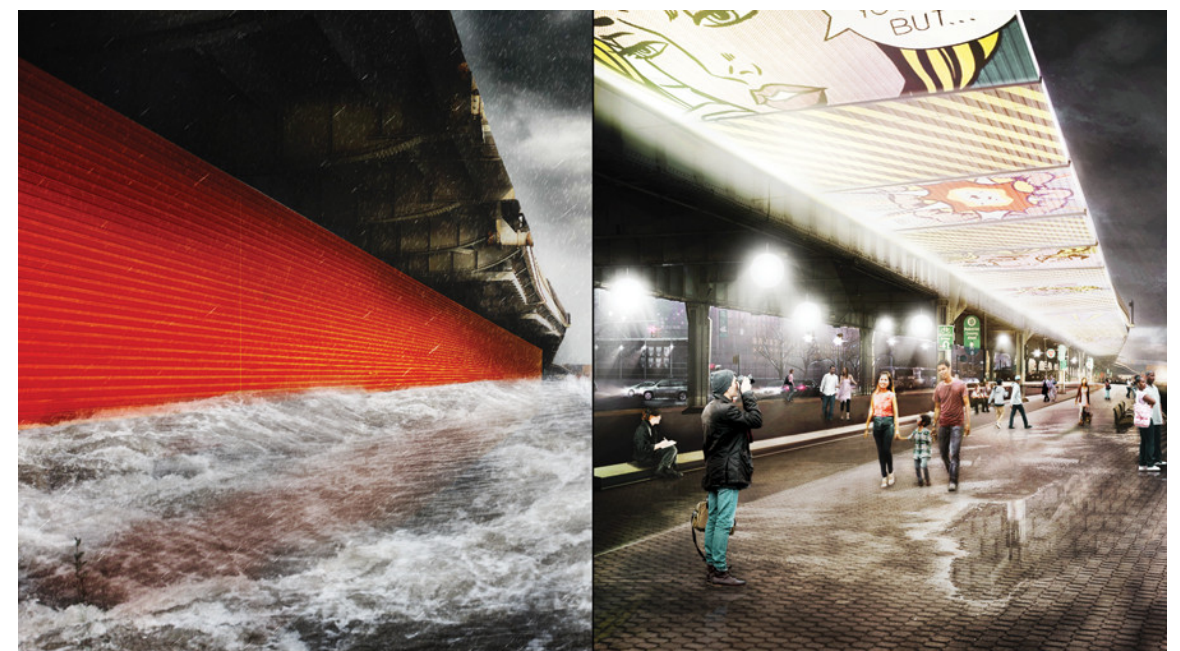


Disaster Cost

\$89 Billion



BIG U



During

After

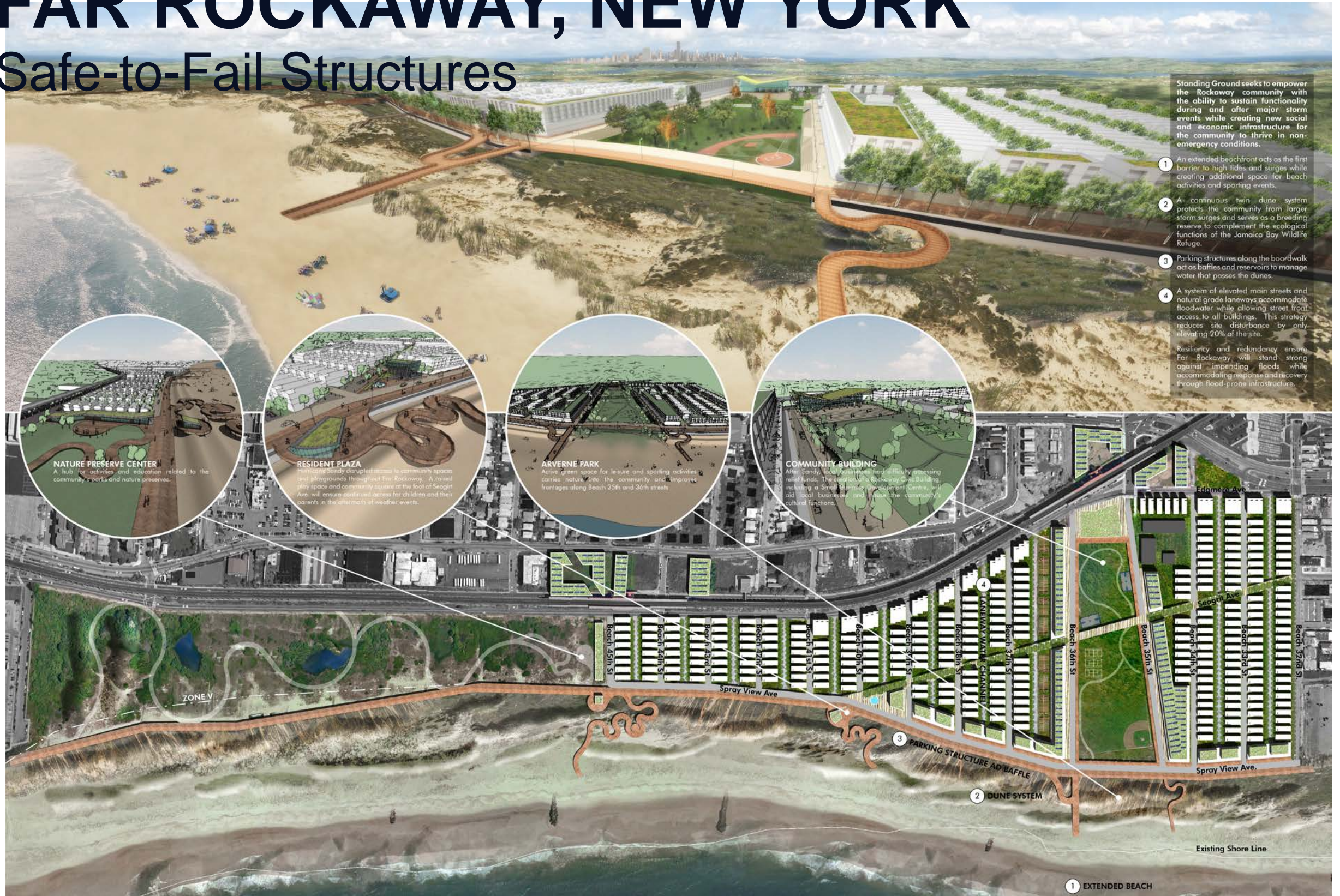
Preventative Measures Cost

\$20 Billion



# FAR ROCKAWAY, NEW YORK

## Safe-to-Fail Structures





# FAR ROCKAWAY, NEW YORK

## Safe-to-Fail Structures





# FAR ROCKAWAY, NEW YORK

## Safe-to-Fail Structures





# FAR ROCKAWAY, NEW YORK

## Safe-to-Fail Structures

### PASSIVE HOUSE

Buildings with minimal energy demand (well insulated, naturally ventilated, passively heated) benefit the environment and remain liveable even when weather events effect the power grid.

4

### LANEWAY CHANNELS

In the event of failure in the first three storm surge mitigation strategies the final strategy allows flooding to occur with minimal disruption. Laneways serve as canals to guide and concentrate flood waters away from residents until the storm passes. This allows every building to have a front door that will always be above water while only filling 20% of the site.



### TRIPLEX STREETS



### MIXED-USE STREETS

All streets accommodate motor vehicle, bicycle, and pedestrian traffic to varying degrees. Quiet residential streets on the interior of the site prioritize bicycle and pedestrian traffic, since residents park in rear laneways.

### INFRASTRUCTURE

Utilities have been buried to accommodate community requests and ensure resiliency and stability with power and communications infrastructure.



# FAR ROCKAWAY, NEW YORK

## Safe-to-Fail Structures





# FAR ROCKAWAY, NEW YORK

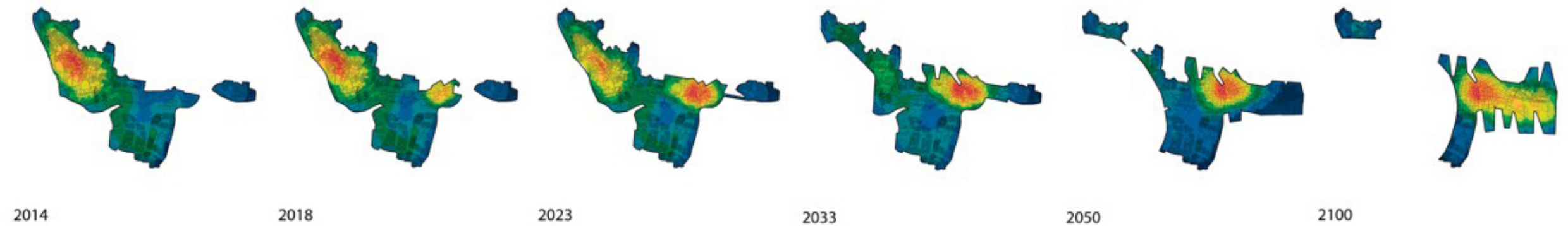
## Safe-to-Fail Structures





# KIRUNA, SWEDEN

## Preventative Measures



Disaster Cost

n/a



Preventative Measures Cost

\$2 Billion





# THANK YOU!

**SUSTAINABLE.TO**  
ARCHITECTURE + BUILDING

416.619.0848  
info@sustainable.to  
www.sustainable.to

200-943 Queen St East  
Toronto, ON  
M4M 1J6, Canada

