SILENT & UNSEEN

COASTAL HISTORIC WATER INFRASTRUCTURE STEWARDSHIP IN THE FACE OF SEA LEVEL RISE

PRACTICAL SOLUTIONS – STRUCTURAL ADAPTATIONS PANEL


Urban underworld


Power
Cable
Water
Steam
Gas
Forgotten
Photo Tour
Transportation
Sewage
Geology
Deep Water

Storm waves at Rockaway Beach

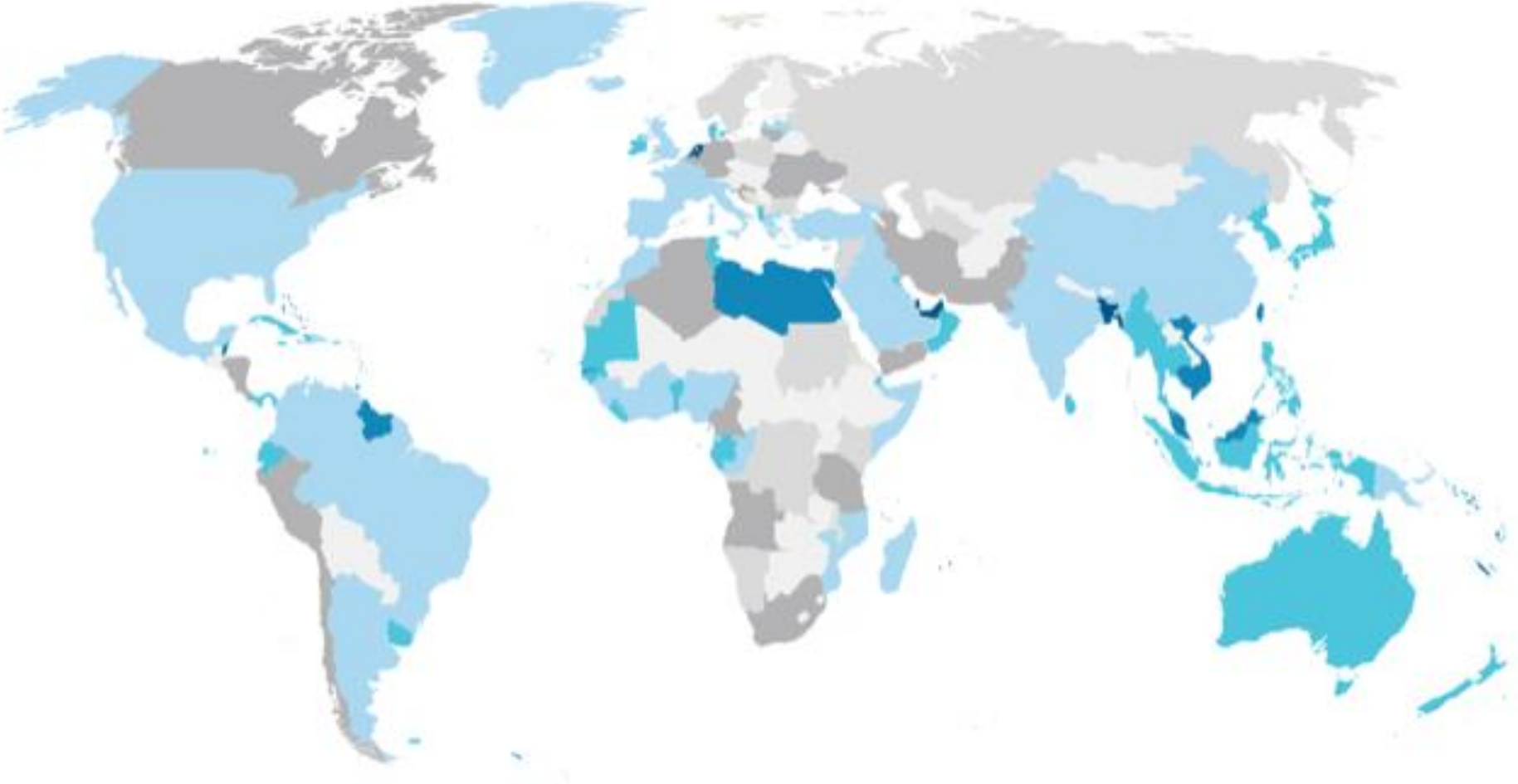

Blackout in Chelsea from Southern Manhattan power outage

Credit: Dan Nguyen

Populations at risk

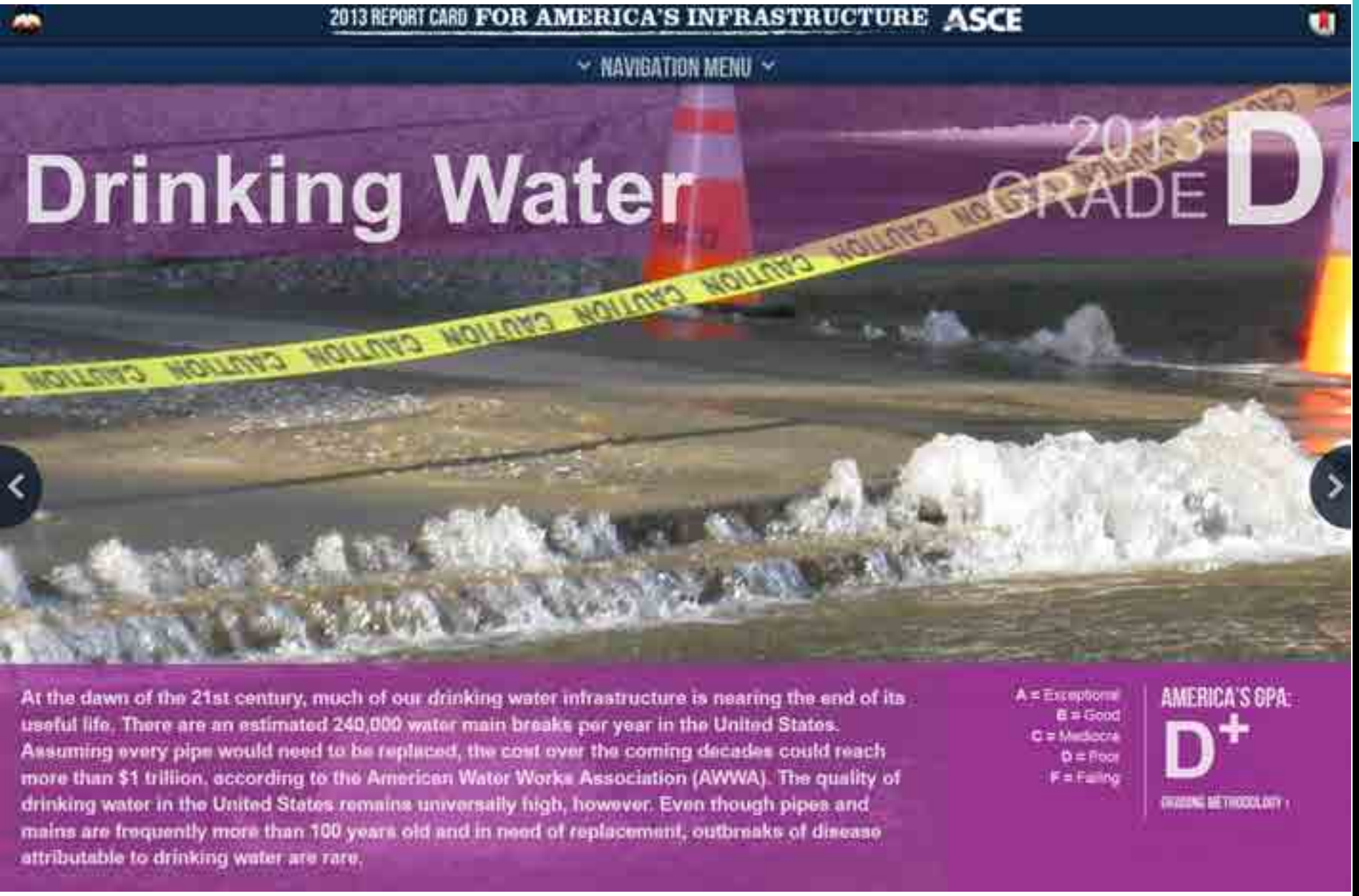
Percentage of national populations who live in places that will be drowned by a rise in long-term sea levels – even if global warming is held at 2C

0% 0.1-5 5-10 10-25 25-50 50-75 75-100



Guardian graphic

Source: Nature Climate Change

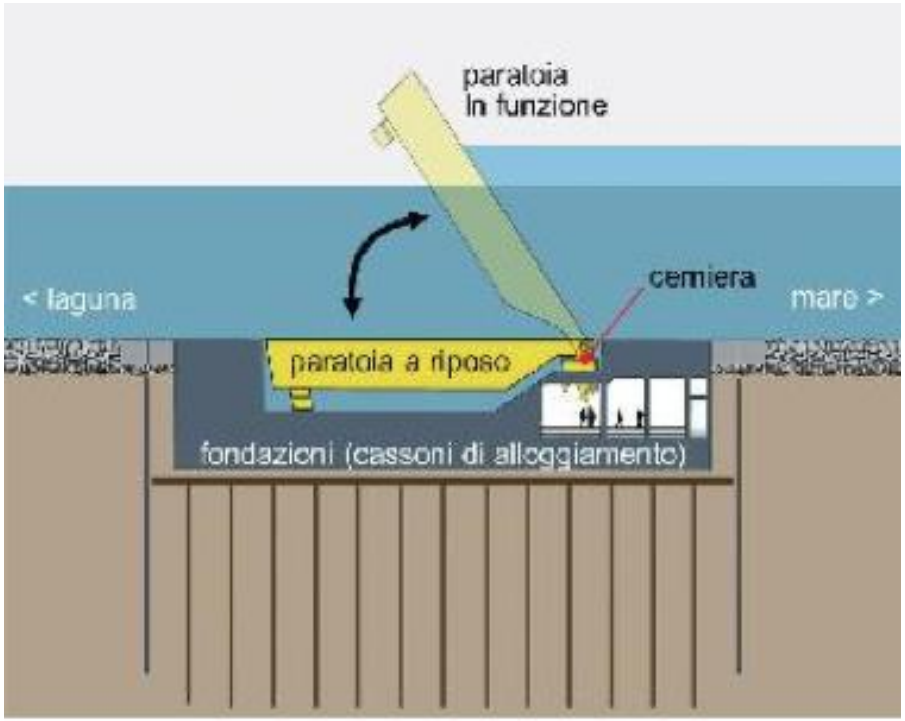

2013 REPORT CARD FOR AMERICA'S INFRASTRUCTURE ASCE
NAVIGATION MENU
Drinking Water
2013 GRADE D
CAUTION
At the dawn of the 21st century, much of our drinking water infrastructure is nearing the end of its useful life. There are an estimated 240,000 water main breaks per year in the United States. Assuming every pipe would need to be replaced, the cost over the coming decades could reach more than $1 trillion, according to the American Water Works Association (AWWA). The quality of drinking water in the United States remains universally high, however. Even though pipes and mains are frequently more than 100 years old and in need of replacement, outbreaks of disease attributable to drinking water are rare.
A = Exceptional
B = Good
C = Mediocre
D = Poor
F = Failing
AMERICA'S GPA:
D+

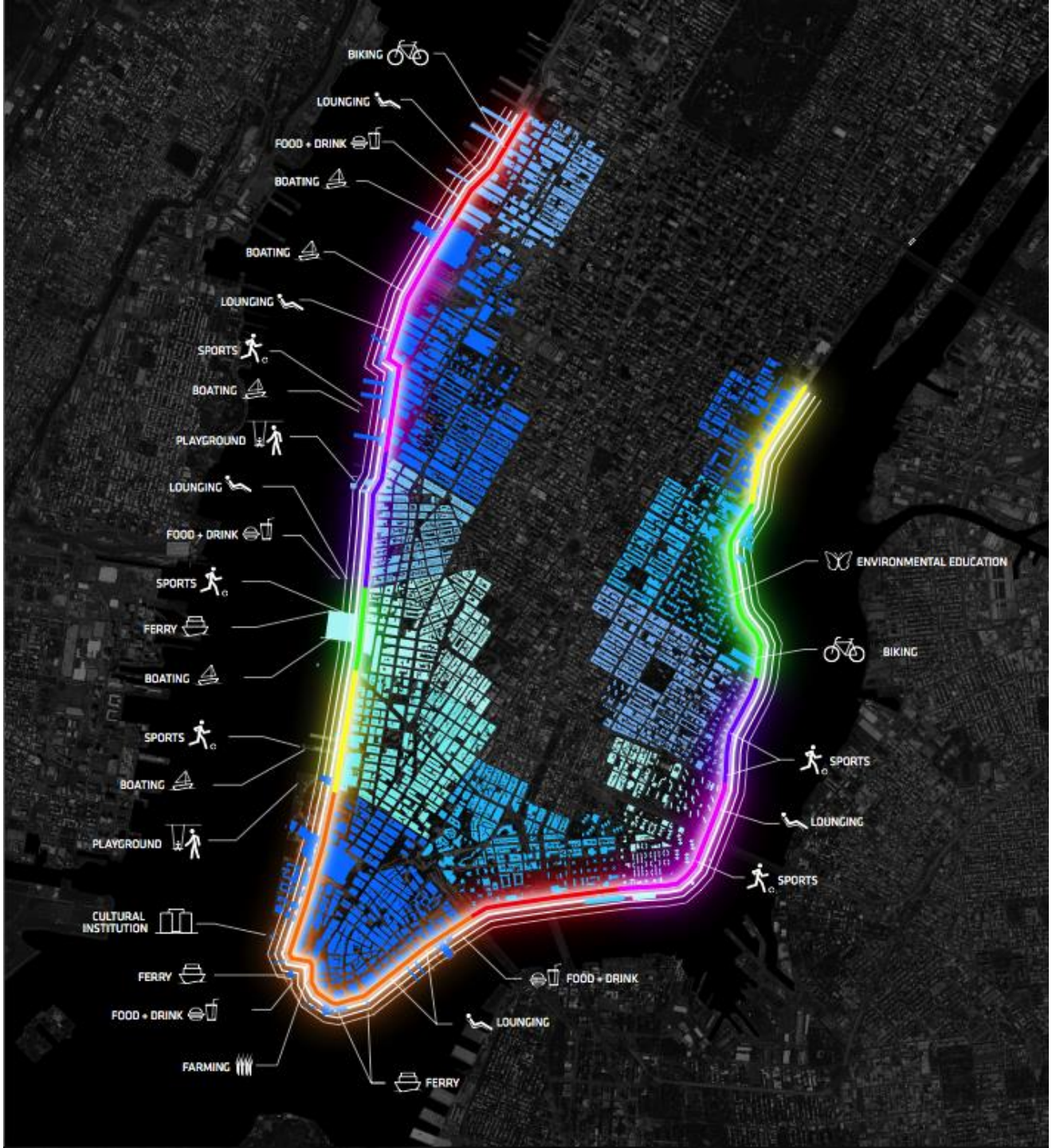
LARGE PROTECTIVE ENGINEERED PROJECTS


Venezia
Bocca di porto di Lido
Bocca di porto di Malamocco
Bocca di porto di Chioggia

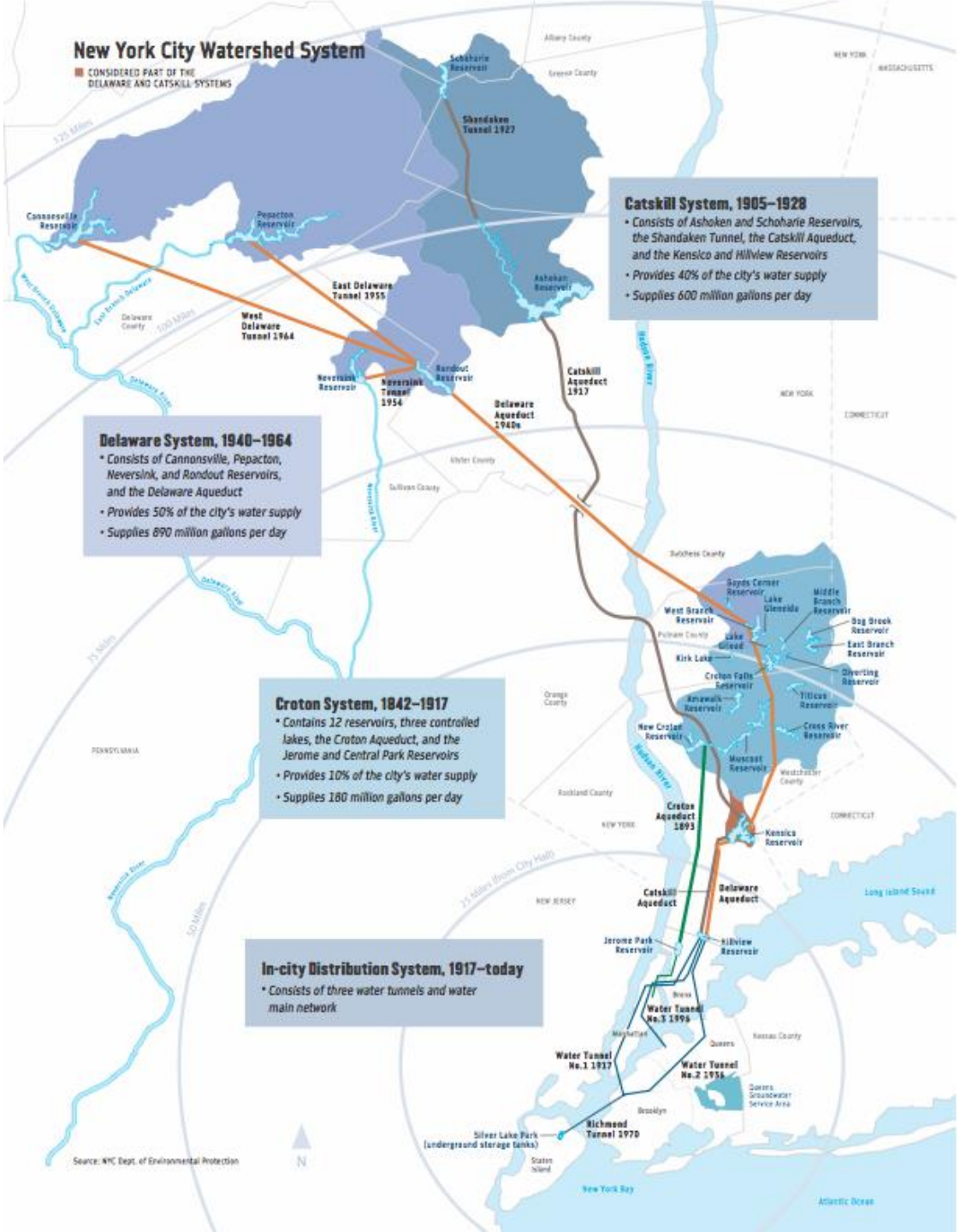

Venice Lagoon
Murano
Venice
Lido
Inlet

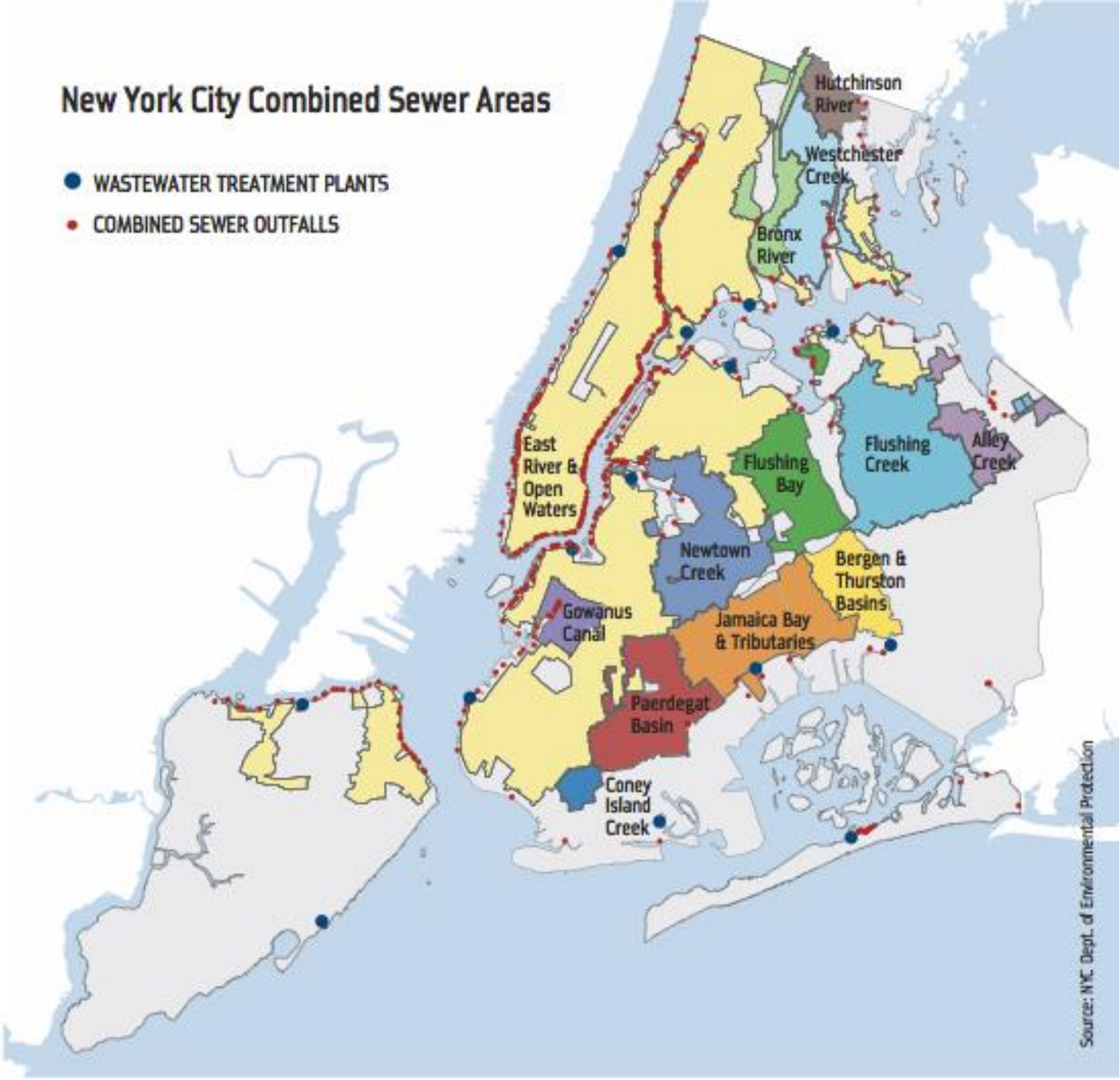

Venice
lock
Mose Island
breakwater


paratoia
in funzione
< laguna
cerniera
mare >
paratoia a riposo
fondazioni (cassoni di alloggiamento)


BIKING
LOUNGING
FOOD + DRINK
BOATING
BOATING
LOUNGING
SPORTS
BOATING
PLAYGROUND
LOUNGING
FOOD + DRINK
SPORTS
FERRY
BOATING
SPORTS
BOATING
PLAYGROUND
CULTURAL INSTITUTION
FERRY
FOOD + DRINK
FARMING
FERRY
FOOD + DRINK
LOUNGING
ENVIRONMENTAL EDUCATION
BIKING
SPORTS
LOUNGING
SPORTS

MITIGATION, ADAPTATION & SUSTAINABILITY UPGRADES


New York City Watershed System
CONSIDERED PART OF THE DELAWARE AND CATSKILL SYSTEMS
Schoharie Reservoir
Shandaken Tunnel 1927
Cannonsville Reservoir
Pepacton Reservoir
Ashokan Reservoir
East Delaware Tunnel 1955
West Delaware Tunnel 1964
Neversink Reservoir
Neversink Tunnel 1954
Rondout Reservoir
Catskill Aqueduct 1917
Delaware Aqueduct 1940s
Catskill System, 1905–1928
• Consists of Ashoken and Schoharie Reservoirs, the Shandaken Tunnel, the Catskill Aqueduct, and the Kensico and Hillview Reservoirs
• Provides 40% of the city's water supply
• Supplies 600 million gallons per day
Delaware System, 1940–1964
• Consists of Cannonsville, Pepacton, Neversink, and Rondout Reservoirs, and the Delaware Aqueduct
• Provides 50% of the city's water supply
• Supplies 890 million gallons per day
Croton System, 1842–1917
• Contains 12 reservoirs, three controlled lakes, the Croton Aqueduct, and the Jerome and Central Park Reservoirs
• Provides 10% of the city's water supply
• Supplies 180 million gallons per day
In-city Distribution System, 1917–today
• Consists of three water tunnels and water main network
Boyds Corner Reservoir
West Branch Reservoir
Lake Gleneida
Middle Branch Reservoir
Dog Brook Reservoir
East Branch Reservoir
Lake Glenida
Kirk Lake
Croton Falls Reservoir
Diverting Reservoir
Amawalk Reservoir
Titicus Reservoir
New Croton Reservoir
Cross River Reservoir
Muscoot Reservoir
Croton Aqueduct 1893
Kensico Reservoir
Catskill Aqueduct
Delaware Aqueduct
Jerome Park Reservoir
Hillview Reservoir
Water Tunnel No.3 1996
Water Tunnel No.1 1917
Water Tunnel No.2 1936
Richmond Tunnel 1970
Silver Lake Park (underground storage tanks)
Queens Groundwater Service Area
Long Island Sound
New York Bay
Atlantic Ocean
Source: NYC Dept. of Environmental Protection
N


New York City Combined Sewer Areas
WASTEWATER TREATMENT PLANTS
COMBINED SEWER OUTFALLS
Hutchinson River
Westchester Creek
Bronx River
East River & Open Waters
Flushing Bay
Flushing Creek
Alley Creek
Newtown Creek
Bergen & Thurston Basins
Gowanus Canal
Jamaica Bay & Tributaries
Paerdegat Basin
Coney Island Creek
Source: NYC Dept. of Environmental Protection

Blue roof pilot project in the Williamsburg neighborhood of Brooklyn

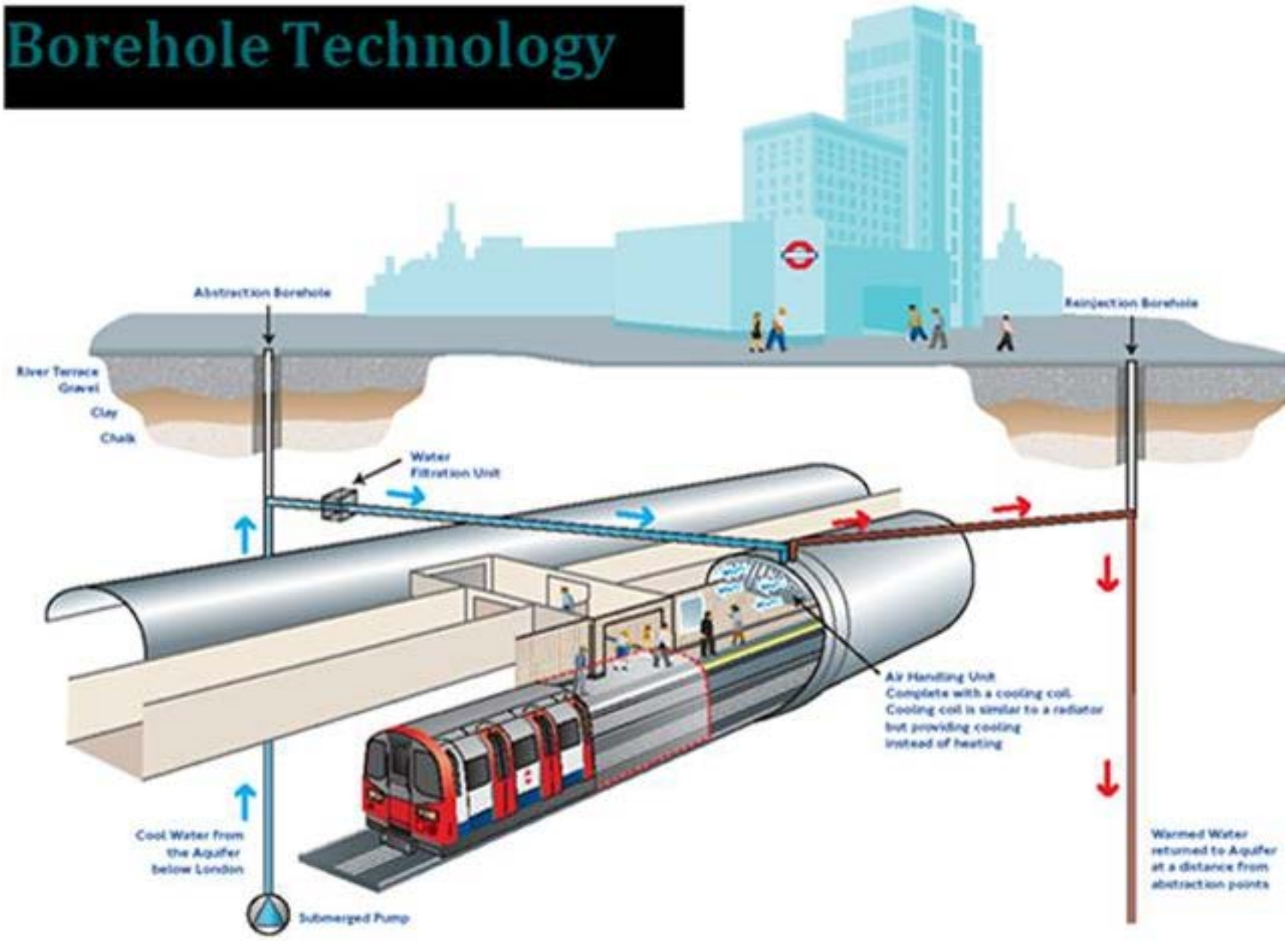

Right-of-Way Bioswale

Rotterdam Delta City

Connecting water with opportunities


photo pallesh + azarfane

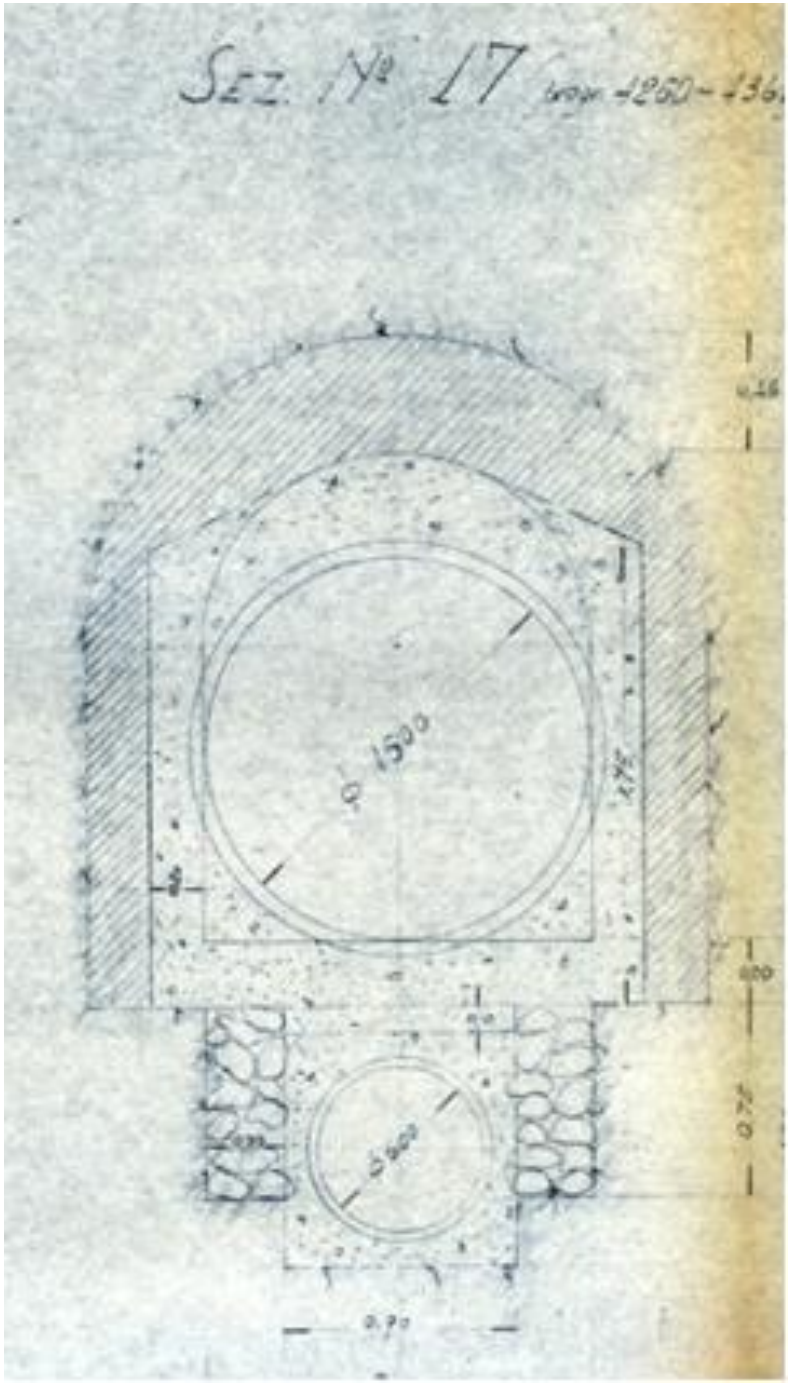
Borehole Technology

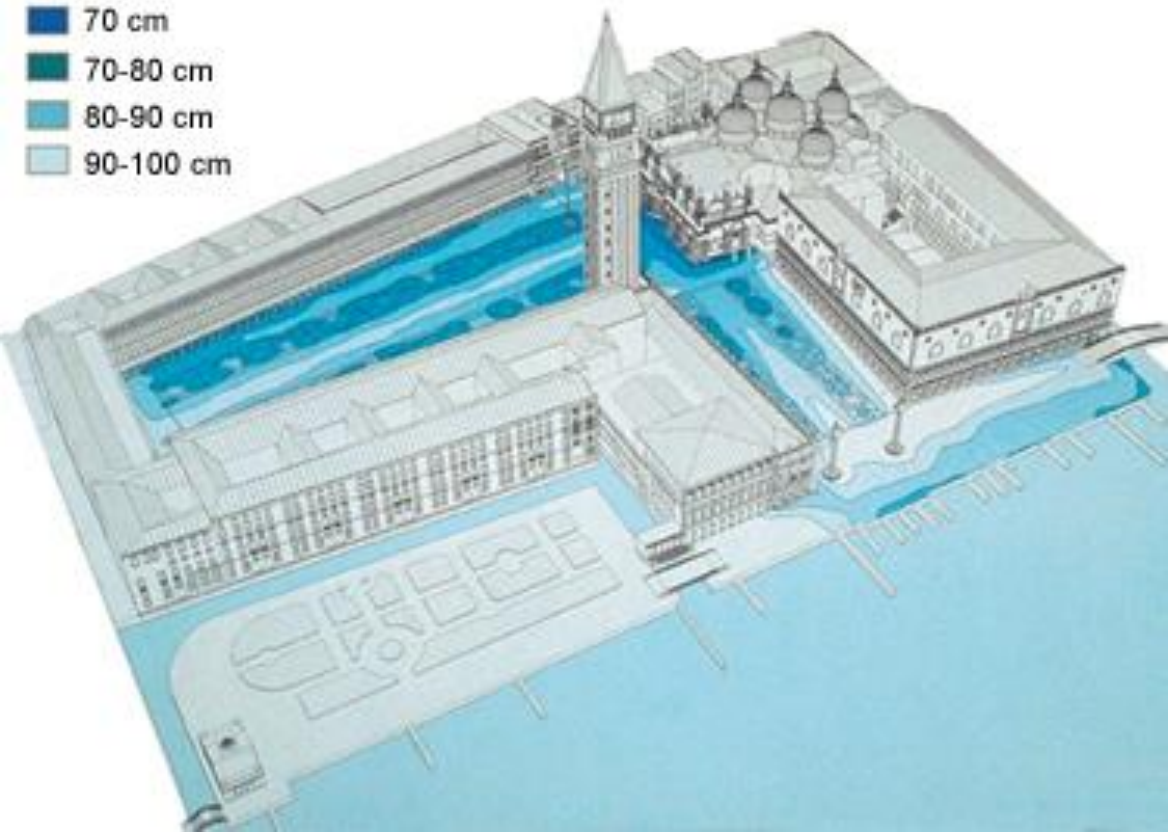


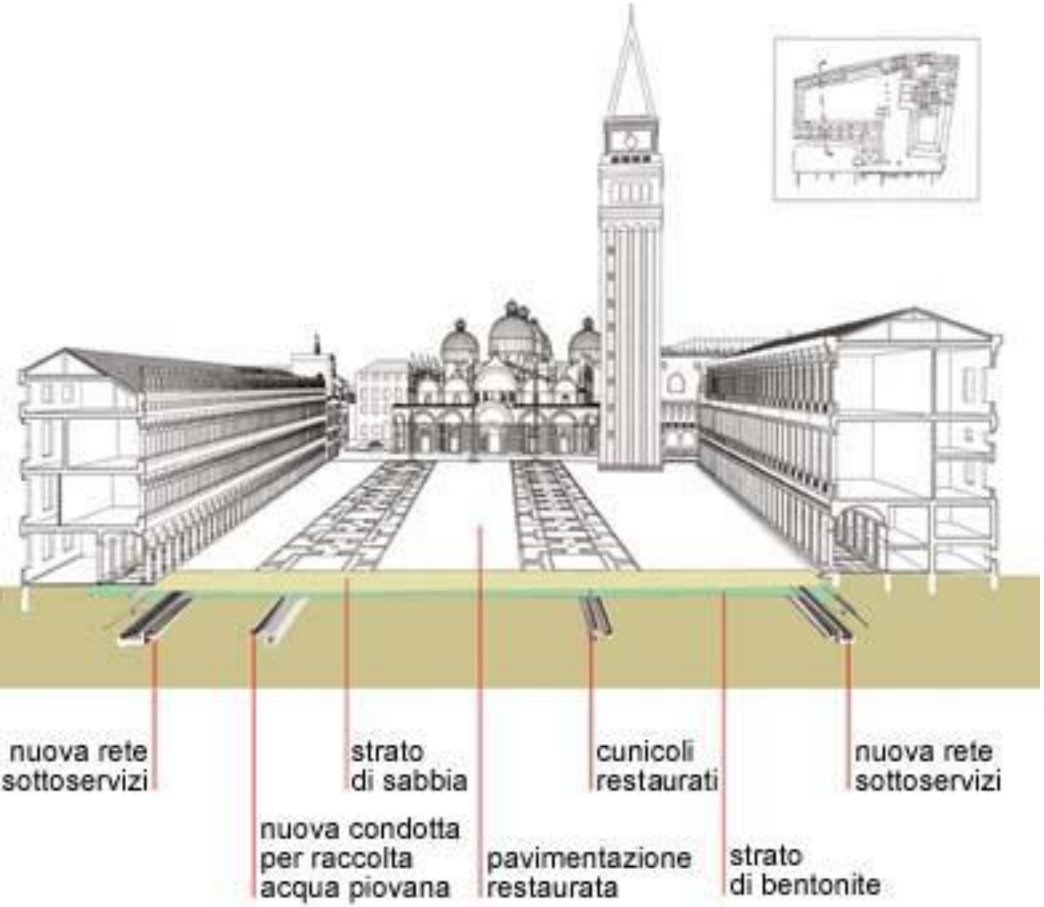

Water Supply

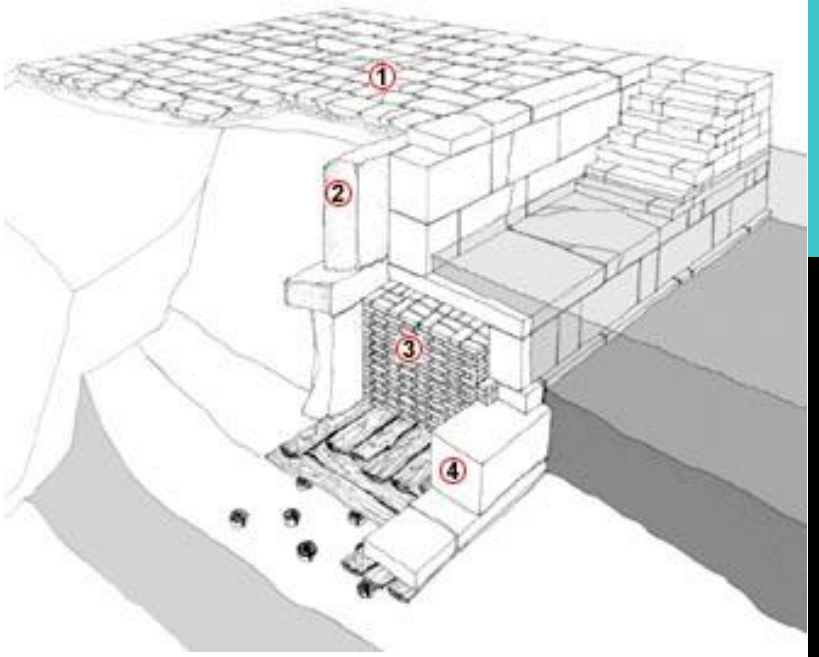
REHABILITATION

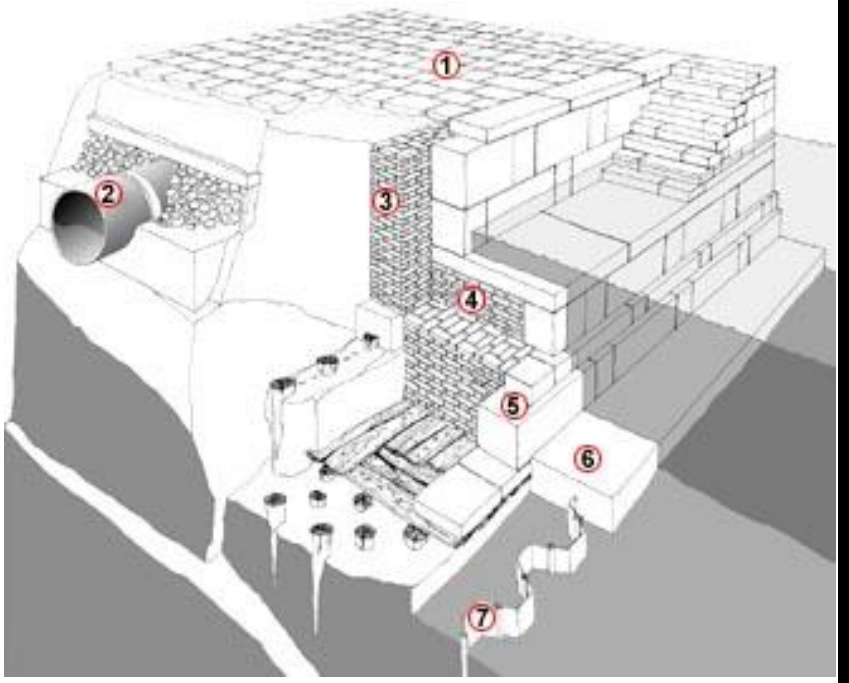

AQVAEDVCTVS


SEZ. Nº 17
Ø 1500
Ø 600

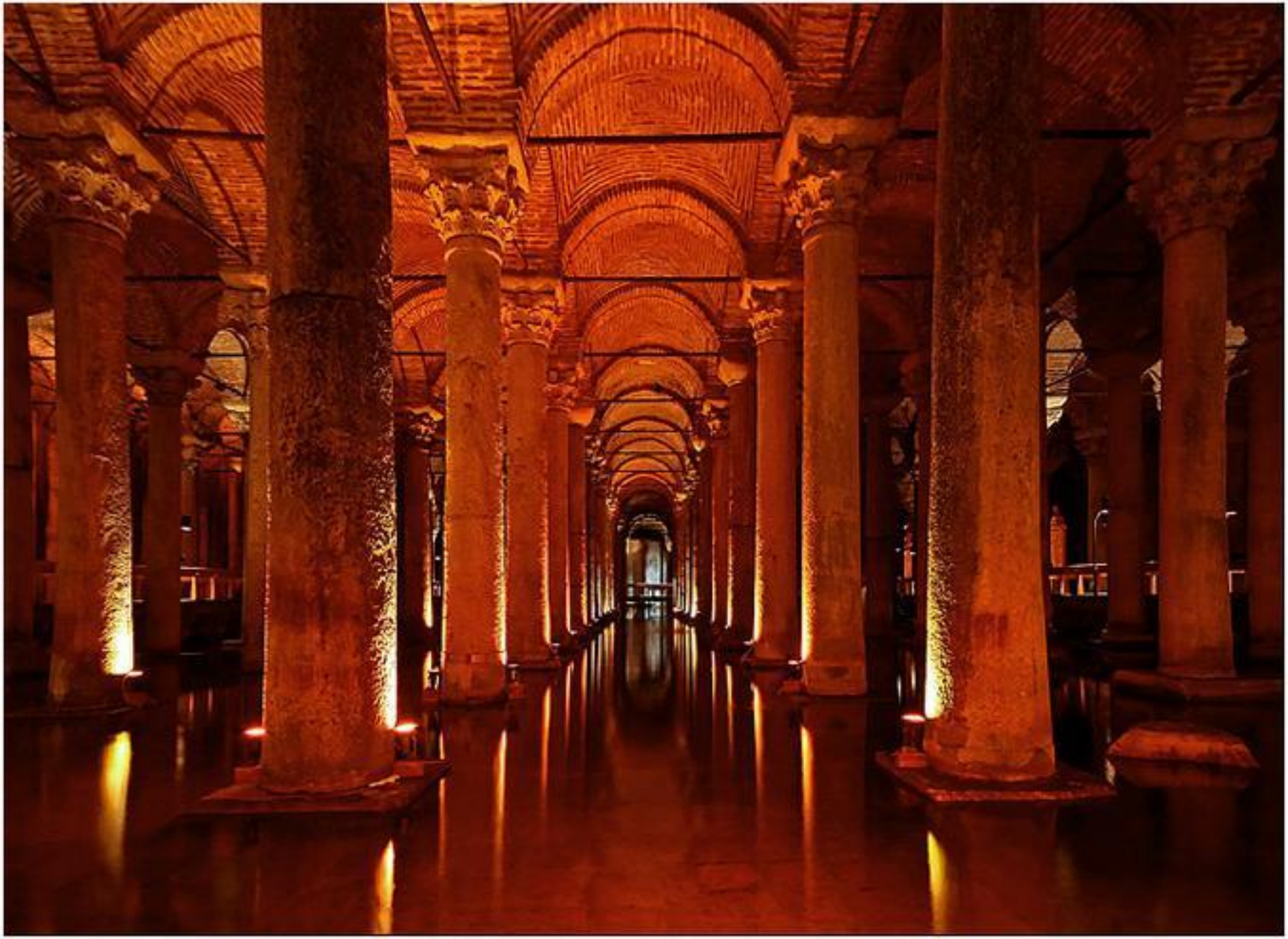

70 cm
70-80 cm
80-90 cm
90-100 cm

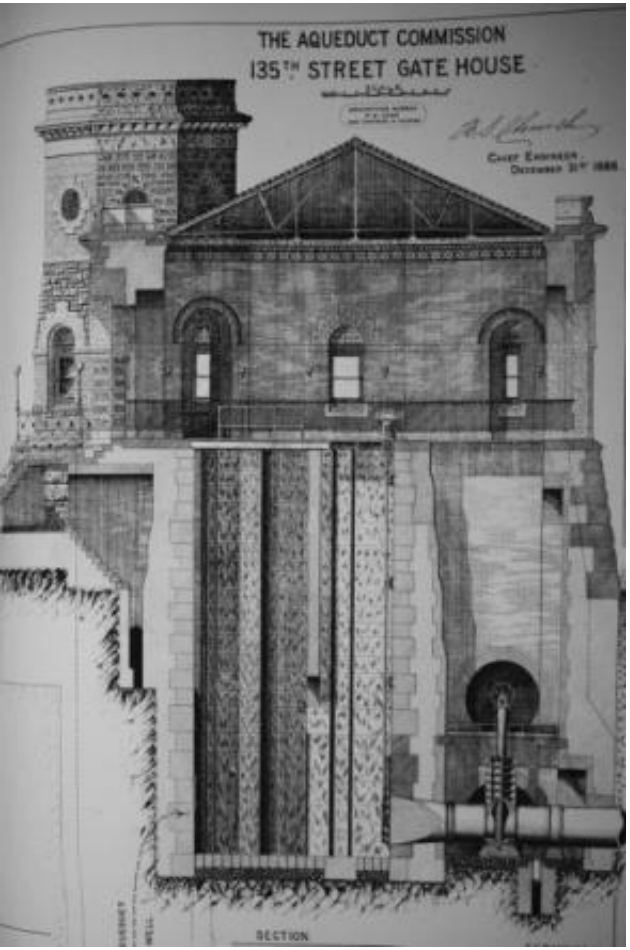

nuova rete sottoservizi
strato di sabbia
cunicoli restaurati
nuova rete sottoservizi
nuova condotta per raccolta acqua piovana
pavimentazione restaurata
strato di bentonite


1
2
3
4


1
2
3
4
5
6
7

ADAPTIVE USE




THE AQUEDUCT COMMISSION
135TH STREET GATE HOUSE
SECTION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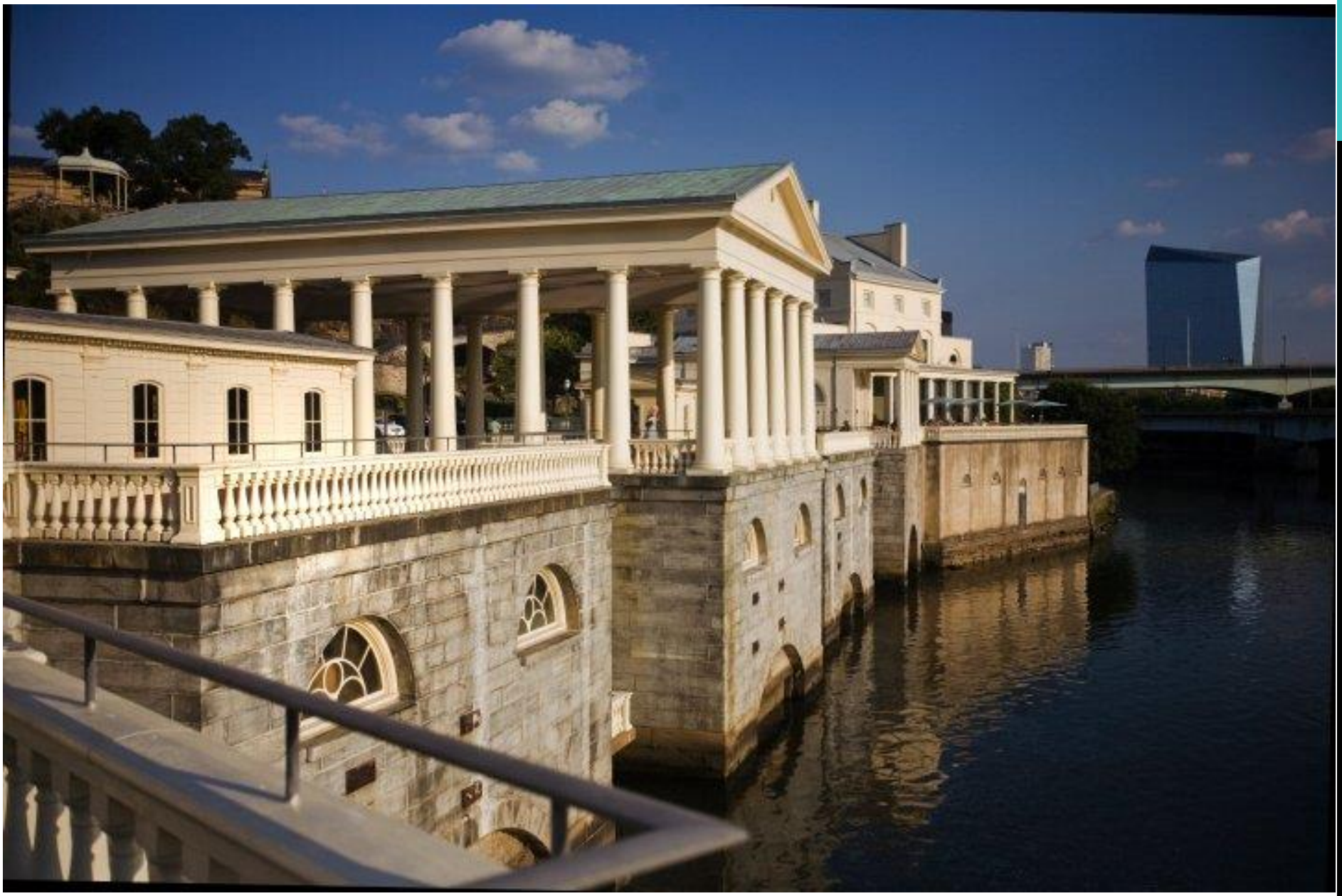

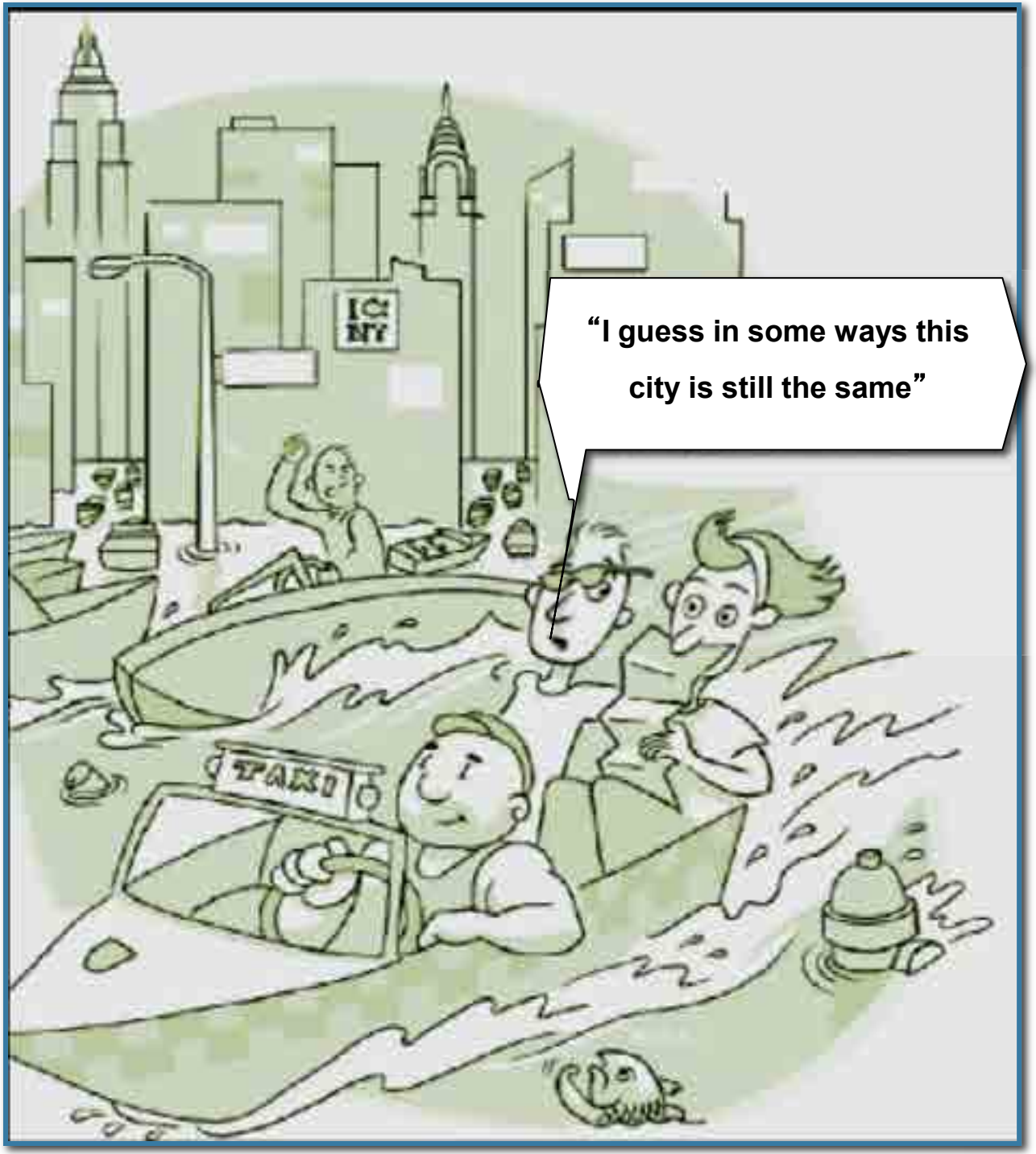
"I guess in some ways this city is still the same"