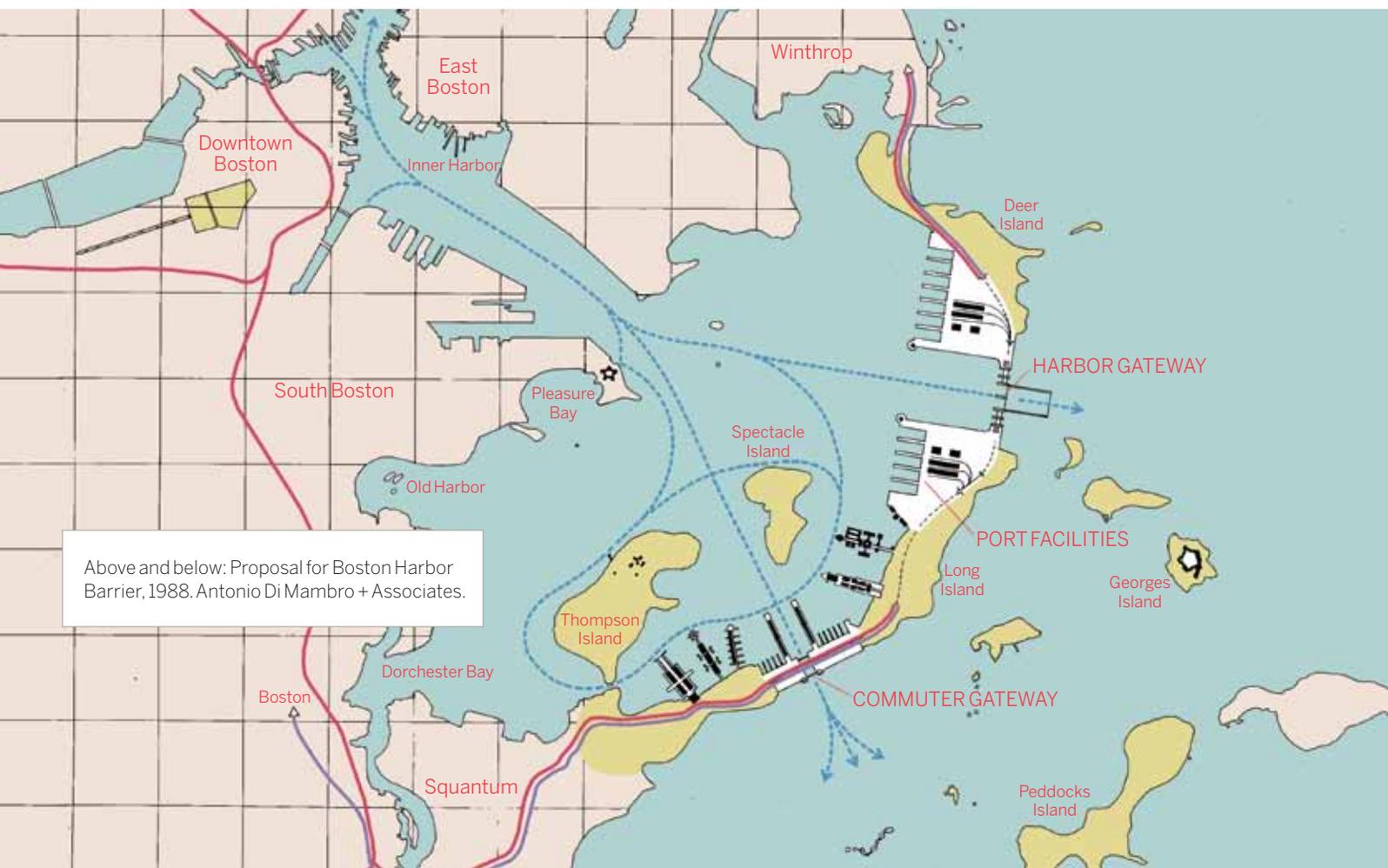


THE HIGH TIDE OF OPPORTUNITY



Above and below: Proposal for Boston Harbor Barrier, 1988. Antonio Di Mambro + Associates.

Working with water is a lot better than working against it.

by Hubert Murray FAIA, RIBA and Antonio Di Mambro FAIA

In the space of four centuries, Boston has increased its land area by 39 times, from 1.2 square miles in 1630 to 48 square miles today. The entire area of the city is now 90 square miles, of which 54 percent is land and 46 percent water. Over the past century, the sea level has risen a little over 10 inches. By a conservative estimate, it will have risen a further 30 inches by 2100.

Why Does This Matter?

Boston, no less than Amsterdam, is a water city. In topography and climatology, as in history and culture, the past is prologue. If, as forecast, there is a significant rise in the level of the ocean, the expansionist narrative of the city's development will be reversed so that by the year 2100, absent immediate and radical action, Bostonians will be revisiting the shoreline of the 1880s.

Boston, much like other coastal cities, has become increasingly aware of the challenges that sea-level rise poses for both existing and future development and the choices to be made — technical, economic, and social. In 2009, the San Francisco Bay Conservation and Development Commission held an international design competition for ideas responding to sea-level rise in San Francisco Bay and beyond. This year, the Museum of Modern Art and PS1 have joined forces to address the challenge of sea-level rise as it would affect New York City: project proposals by architects, artists, engineers, and others are the subject of a workshop and exhibition, *Rising Currents*. As stimulating as such events may be for ambitious designers, without political leadership, they are simply tinkering at the edge. To understand the gravity of the situation, imagine a replication of the inundation caused by Hurricane Katrina visited upon every coastal community in the United States. The tragedy of New Orleans in 2005 laid bare not only the vulnerability of the city's physical infrastructure and its critical part in the economy of the nation, but also the social inequities sustained within that fragile crucible.

Facing the Facts

Published jointly by Allianz, a global financial services provider, and the World Wildlife Fund, *Major Tipping Points in the Earth's*

Climate System and Consequences for the Insurance Sector provides the most recent evaluation of the effects of climate change and the likely effects on the insurance industry. Combined sea-level rise is one of four critical areas addressed in the report, with a focus on exposed assets in port megacities and specifically those on the northeast coast of the United States.

The financial stakes for Boston are not trivial. Assuming low and high projections of a 20-to-26-inch rise in sea level by 2050 (by the time today's infant is in mid-career), the report projects an "exposed risk" to property damage and consequential loss ranging from \$409 billion to more than \$460 billion (think of 20 Big Digs or half the cost of the Iraq war).

In trying to imagine how such a flood might look and feel in Boston, there is some instruction in looking back to the flooding of Paris in 1910. Weeks of heavy rain and swollen watercourses upstream caused the Seine to overflow its banks and submerge the city, including the Île de la Cité and Notre Dame. This had happened 250 years earlier, in 1658, but the difference in modern Paris was that the flood water found new conduits in the sewers laid by Haussman and in the recently constructed Metro lines. So in addition to filling the cellars, the floods permeated the underground infrastructure of the city, water gushing in at every orifice, issuing forth into major railway stations such as the Gare D'Orsay and bringing the city to a halt.

Transpose this scenario to Boston. A relatively modest 12-inch rise in sea level is projected to happen, at the latest, by 2046 and, at worst, by 2016, a mere six years from now. Combined with a stiff northeaster of some days' duration, the waves of the Atlantic are likely to top the threshold of subway stations such as Aquarium and South Station and to rush down the access ramps of the Central Artery and the Tip O'Neill tunnel to Logan Airport. In most readers' lifetimes, and within the space of a few hours, high tides, aided and abetted by a full moon and high winds, could drown the modern city of Boston in the bathtub of the Atlantic. The floods of February 1978 (the "Great Blizzard") and October 1991 (the "Perfect Storm") not only presage the magnitude of what can be expected, but as "extreme events" they are also predicted to occur with increasing frequency.

What Are the Choices?

There are two choices before us as a city and as a country: to do nothing (or too little, too late); or to do what has to be done, and fast. Contrary to the conclusions of the *Tipping Points* report, damage to property would in some sense be the least of our problems, the greater being social abandonment, as we have seen in New Orleans.

Consider the do-nothing or “proceed cautiously” approach. Absent government intervention, decisions will be left to individuals and corporations. Some may choose to ignore the warnings, some may take adaptive measures, and others may choose to move inland out of trouble. And some, the poor, will have no choice at all except to bear witness to a generation of disinvestment followed by a catastrophic failure of the infrastructure. In other words, to do nothing is to make an undemocratic and unjust choice. Every man for himself and let the devil take the hindmost is not a strategy — it would be an abdication of leadership and social justice.

This leaves us with having to do something and, if the facts are faced, doing it fast.

What Are Others Doing?

While other cities and metropolitan areas have already taken action, it is worth noting that they have also taken time to accomplish their goals. The most common form of protection is the flood barrier. The floating barriers of Venice will protect the lagoon from storm surges of up to 10 feet. With completion scheduled for 2012, the project has been 25 years in the making.

If Bostonians want to preserve their quality of life for the next generation, they had better act now.

London’s Thames Barrier was a mere 10-year project, completed in 1984 — but in response to the devastating floods of 1953. The Delta Works in the Netherlands is a series of 250 miles of dams, dikes, locks, and barriers started in 1950, accelerated after the same North Sea flooding of 1953, and completed in 1997.

The Dutch Delta Commission Report of 2008 is a deeply impressive document outlining the next phase of that country’s defenses through the year 2100. The commission spells out and embraces principles of humanism and sustainability as fundamental values driving its recommendations, committing an average of \$2 billion per year through the end of this century.

What Can Boston Do?

Climate scientists and actuaries have spelled out the probabilities and the consequences of sea-level rise for metropolitan Boston. Other port cities faced with similar challenges have shown us a range of strategies that are transferable to this city. We have learned from these examples that it takes a generation, say 35 years, to see a major civil project through from inception to completion. Within that span, by 2045, the water level of Boston Harbor will have risen somewhere between 12 and 36 inches. If, like the Dutch, Bostonians want to preserve and enhance the quality of life that

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they have enjoyed to bequeath to the next generation, then they had better act now.

Meeting this challenge requires forceful and visionary leadership at all levels of government to articulate a strategy that looks decades into the future. It is also clear that Boston cannot face this alone but must find common cause, nationally, with other coastal cities and towns.

We propose three parts to an effective strategy to “work together with water,” as the Dutch have put it:

■ **Articulate the Vision.** The crisis of sea-level rise obliges us to reexamine the value of the city as the crucible of our economy, our culture, and our community. While Boston may be a world center for medical research, the city is also a leader in social inequality. A vision for preemptive reconstruction is an opportunity to right that wrong. In the words of Governor Winthrop, “the only way to avoid this shipwreck and provide for our posterity...we must be knit together in this work as one man.”

■ **Establish the Scale.** Antonio Di Mambro’s 1988 scheme for a protective harbor barrier running from Quincy to Winthrop is as important for establishing the scale and complexity of the response as it is for its physical vision. This multi-layered proposal combines a tidal-surge barrier, reconfigured harbor facility, transit line, highway, reclaimed land, and industrial, commercial, and residential redevelopment.

It is an infrastructure that both protects the present and promotes the future.

■ **Act Now.** With a clear vision and a long-term goal, there are myriad actions that can be undertaken immediately: protect highway and subway entrances; raise the Harborwalk and create seawalls; establish an elevated datum for buildings; relocate electrical and mechanical equipment out of basements and above the flood levels; and develop storm-surge reservoirs with windmill pumping stations in the lowlands of the South Boston seaport.

The threat of sea-level rise is not immediate but it is urgent. The idea is not to respond to disaster but to preempt it. The challenge is not to succumb to fears (of inundation, decline, or increased taxes) but to see opportunities (of employment, urban revitalization, and social equity). Viewed with vision and discipline, sea-level rise presents the opportunity of a generation to refloat the city, its economy, and its people. ■

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An expanded version of this story, including a slideshow and bibliography, is available online at: www.architectureboston.com.

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