



A Rising Tide: New Design Considerations for Rising Sea Levels

Coastal areas and flood plains present a significant challenge to urban planners, developers and architects who are working in regions this will affect – so, a lot of people. If you haven't seen a graphic of some sort depicting what your city might look like in the future if sea levels continue to rise as predicted, check out the Fast Company article, "Look How Much of Your City Will Be Underwater by 2100 (So Much)."

(<http://www.fastcoexist.com/3058601/look-how-much-of-your-city-will-be-underwater-by-2100-so-much/1>)



Battery Wharf, The Architectural Team. Photography: courtesy of The Architectural Team

A few firms around the country are taking the lead in becoming expert resources for this type of work. Boston-based architectural and planning firm The Architectural Team (TAT) spearheads projects with rising sea level challenges, and much of its recent work presents a great starting point for developing innovative solutions that will help preserve our cities, our people, and their livelihoods – building by building.

“Behind any new waterfront project must be the understanding that as sea levels rise, the conditions under which waterfronts and nearby areas presently exist will not be the same as the conditions we’ll see long-term, and periodically in the near future,” said Michael Liu, principal at The Architectural Team, in a topical project brief about rising sea level design considerations. “This strategy of elevating living space, is a necessary response to the long-term challenges of sea level rise in order to safeguard projects in these areas.”



Battery Wharf ariel view

Much of this work has been driven by building codes hoping to address rising sea levels and the reality of increasingly flood-prone neighborhoods. And one logical solution to the problem is to raise habitable space above the street level. This “simple” solution of raising the first floor of a building, however, brings many new design challenges to a project.

“One of the most challenging perspectives of sea level rise is the fact that many of the existing streets and pedestrian walkways are not typically located on the development property,” said Mr. Liu, in an interview. “We have to put our habitable space significantly above those walkway levels, but what is the pedestrian experience if the surrounding structures are so much higher?”

Architects and developers will need to form new strategies for connecting their elevated buildings to existing street levels, making sure to maintain a relationship with the surrounding architectural context. TAT’s recent projects in Lynn, Salem and East Boston, for example, “were designed with their first floors seven to eight feet above the surrounding streets, even though many of the structures are several blocks from the water,” notes the project brief.

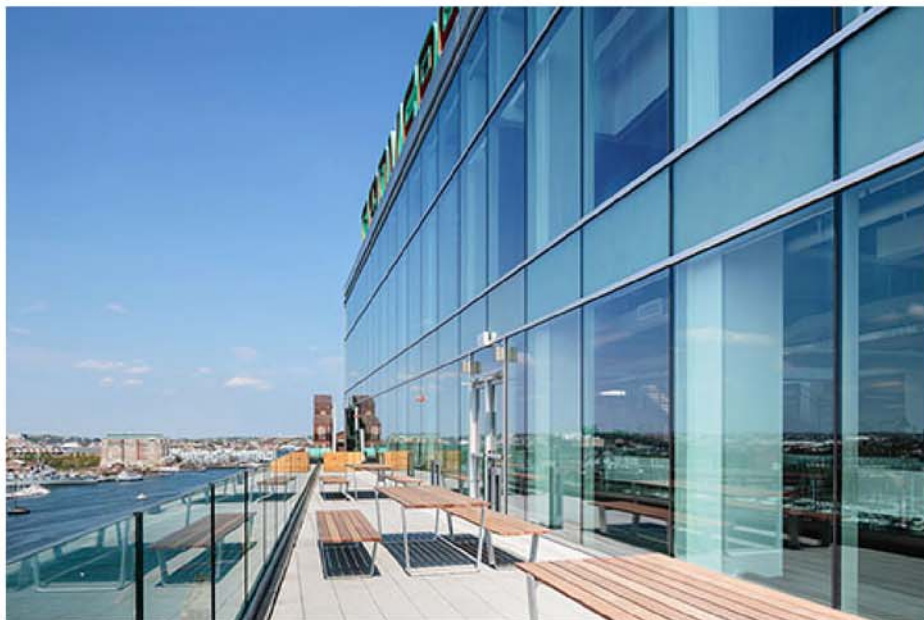
Commercial and retail space doesn’t typically work well if not at the ground level, noted Mr. Liu. Architects and planners must think about how to maintain spaces with those functions.



Lovejoy – Front, The Architectural Team

And if a building does become inundated, how will people get out? How does your egress work from a safety point of view?

In its Clippership Wharf project in East Boston, one special technical issue involved the fire stairways; some parties involved wanted the stairways to discharge at the street level, but in a flood event, those stairways might be underwater. Instead, the project team created a louvered door solution that would enable the door to open, allowing to water to come into the stairway – and allowing people to exit.



Lovejoy – Terrace, The Architectural Team

At Clippership Wharf, a project featuring four separate buildings and a road along the shore, The Architectural Team employed a few different solutions. At other areas, they raised the floor elevation to be above the flood elevation to act as a temporary flood barrier. At other areas, they changed the elevation by raising the building to keep window levels elevated.



Lovejoy – Deck, The Architectural Team

In this project, one egress per building spills out onto a raised outdoor deck plaza.

“We had to use a lot of thoughtful design to connect that elevated structure to the street plane.”

The Clippership Wharf project also highlights the importance of protecting utilities, and the consequences of doing so.

“The habitable space and utilities are elevated above the street level, so we had to give up potential saleable square footage.”



Rendering of Clippership Wharf, The Architectural Team

While many projects directly on the water's edge feature a “hard edge” approach – meaning a pier form and/or concrete walls or riprap (rock or other material used to protect shorelines by breaking up and cutting into waves), The project team wanted to think outside the box in its Clippership Wharf project. Instead of a hard edge, they created a “living shoreline” featuring carefully selected vegetation that acts the same way as a concrete wall or riprap would.

“It’s a different way of treating the water’s edge,” said Andrew Stebbins, senior project manager at TAT. “The living shoreline is just as effective in mitigating the wave action, but has the advantage over rip rap in that as sea level rises the vegetated areas will evolve as a mitigator.”



Rendering of Clippership Wharf, The Architectural Team

Aside from practical, functional design challenges, architects and developers must also contend with many regulatory and institutional factors.

“Massachusetts has a very robust set of regulations regarding the water’s edge,” noted Mr. Liu. “There’s an underlying assumption in the law that the land surrounding the water’s edge is really for public use, and the laws intend to preserve the public’s rights. This “public access interest” translates to an intense permitting process. And there are also environmental agency and federal agency issues.”

Part of the design process regarding rising sea levels will be future proofing in nature; other projects in the coming years will have to do more with damage control and adapting projects so that they can remain viable when existing streets become permanently inundated.



Harbor Place – Rendering

“The learning is going to be an evolving process as these floods happen and as coastlines continue to suffer damage,” noted Mr. Liu. “We’re going to learn how all of these techniques and devices are working, and we’re going to find that some of these safeguards we’ve put into place are not working as we had planned.”

Mr. Liu suggests keeping up with industry literature on the relevant topics, and ensuring your team is integrating closely with the right permitting consultants, marine engineers, landscape designers and myriad other subcontractors and regulatory experts.

Additional Photos

