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Design considerations for implementing climate resilience - by Frank Ricciardi

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In Susan Bernstein's excellent article from the February 2, publication of the NEREJ, she presented the myriad of impacts and challenges posed to the city of Boston from climate issues. Numerous city departments are working diligently to prepare for climate impacts and implement sound policy/design standards for addressing climate impacts and protecting city residents, visitors, workers, and the many private employees who call Boston home. Several studies have evaluated climate impact projections in the future and identified the flood risk and flood pathways due to sea level rise and storm surge.

But now what? Many of these studies make recommendations and include incredible graphics illustrating concepts, however, detailed engineering studies are required to ensure that solutions are feasible, implementable, and effective in protecting public safety. These studies must consider numerous inter-related factors/design considerations such as a range of climate loads and projections, critical design elevations, incremental approaches, stormwater impacts, building connections, public access, subsurface infrastructure, roadways/bridges/tunnels, structural/geotechnical, and adjacent development and site constraints. Constructability of these complex designs to include co-benefits will require an interdependent approach. Complete projects rather than small, isolated pilot attempts should be considered, so that the projects provide climate resilience as well as tie into neighborhood context and function in the existing public realm.

Given the myriad of design challenges and considerations, it's no wonder that the several groups are evaluating the feasibility of a harbor barrier system to protect the city from storm surge impacts. While this type of project would run well into the billions of dollars, the investment would be negligible in relation to the amount of protection afforded the city. As of 2014, industries in South Boston contributed more than $20 billion in annual output (sales and revenues) to Boston's economy. (Climate Ready Boston, 2016). If this new revitalized economy was disrupted due to climate impacts, the private and public financial implications could be substantial. A harbor barrier will not protect the city from sea level rise, though. As we await the results of these feasibility assessments, the Ccity is still faced with selecting projects to protect the public from sea level rise and storm surge impacts.

Collaboration between public and private entities is essential for these projects to be successful in providing protection and maintaining connectivity to the waterfront. To this end, the city is working diligently to develop design standards, programmatic policies for both new and existing developments, incremental approaches that over time will provide needed protection for sea level rise and storm surge, and operation and maintenance criteria for protection measures.

Private industry, real estate development and property management professionals have also been installing and evaluating mechanisms to protect their properties from climate impacts. Occasionally, these measures are developed in a vacuum and do not consider public access, building evacuation procedures, or adjacent/abutting properties. Unintended consequences can include damage to public sidewalks from installation of deployable flood protection measures, diverting stormwater to adjacent properties (that may not have adequate protection measures), blocking public and emergency access, and excessive lead time and labor to deploy the measures. In addition, some routes of entry into the property may be overlooked and undermine the entire protection solution.

A comprehensive approach is required for evaluation of properties, structures, and building systems to develop appropriate measures to adapt to sea level rise and storm surge as well as other climate impacts such as extreme heat, wind, and increasing precipitation. Recently, the Massachusetts Division of Capital Asset Management and Maintenance (DCAMM) completed a Statewide Resilience Master Plan, which included a study to evaluate climate impacts on their portfolio of over 8,000 assets in the state. The outcome of this study was the development of adaptation guidelines for climate resilient buildings, landscape and grounds, and building systems. This process can be quickly replicated for private companies, other public agencies/municipalities, neighborhoods and sections of cities, and property developers and managers to evaluate their properties and assets.

Moving forward, protection of coastal cities such as Boston from climate impacts such as sea level rise and storm surge can take the shape of mega-engineering projects such as harbor barriers, integrated public/private projects that collectively provide city protection, individual projects for property owners, and/or a combination of solutions that collaborate for effective protection that works for everyone. Successful climate resilient design must also mean design that enables accessibility and connectivity, and finds opportunities to not only protect space, but create and improve space. This will require collaboration between municipalities, incorporation of many design considerations, and coordination and support from public and private stakeholders. While these decisions are being made at regional and local levels, real estate professionals should start to identify climate impacts and solutions to protect their investments. The most successful way to do this is to look beyond their own properties, reach out to neighbors, and find opportunities for improving the built environment while avoiding potential negative impacts in implementing climate adaptation measures.

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