

Boston Planning and Development Agency Climate Change Checklist Guidance

In June 2017, in conformance with the Mayor's 2014 Climate Action Plan and the 2016 Climate Ready Boston recommendations, the Boston Planning and Development Agency (BPDA) updated the Climate Change policy to require all development projects subject to Boston Zoning Article 80 Large Project, Planned Development Area, and Institutional Master Plan review, including modifications and updates, to consider and analyze the impacts of future climate conditions and to incorporate measures to avoid, eliminate, or mitigate greenhouse gas emissions and impacts related to climate change in project planning, design, and construction.

Climate Change Research and Information

Following are links to information about the City of Boston's climate change policies and practices including:

- [“Climate Ready Boston”, 2016 Report](#)
- [“Climate Change and Sea Level Rise Projections for Boston”](#), 2016 report of the Boston Research Advisory Group
- [“Climate Change and Extreme Weather Vulnerability Assessments And Adaptation Options for the Central Artery”](#), MassDOT-FHWA Pilot Project, June 2015
- [“Greenovate Boston”](#), the 2014 update of the climate action plan
- [“Building Resilience in Boston: Best Practices for Climate Change Adaptation and Resilience for Existing Buildings”](#), Linnean Solutions, The Built Environment Coalition, The Resilient Design Institute, 2013.
- [“Enhancing Resilience in Boston: A Guide for Large Buildings and Institutions”](#), A Better City. 2015.
- [“The Commercial Net Zero Energy Building Market in Boston”](#), A Better City, 2017
- [“The Power of Zero, Optimizing Value for Next Generation Green”](#), BNIM, Integral Group, Davis Langdon / AECOM, and AIA COTE, 2015 (cost study of net zero energy buildings).

For additional information visit boston.gov/climate-ready.

Climate Change Resiliency and Preparedness Checklist

A completed Climate Change Resiliency and Preparedness Checklist (Climate Change Checklist) is due at each of the following Article 80 or similar filings:

- Initial Filing – with Project Notification Form, Notice of Project Change, or other initial filing or update.
- Design / Building Permit – in conjunction with BPDA final design review but prior to requesting a building permit; provide an updated CC Checklist reflecting final project planning.
- Construction / Certificate of Occupancy – in conjunction with construction competition but prior to requesting a final Certificate of Occupancy; provide an updated CC Checklist reflecting actual built conditions.

CC Checklists are to be completed online:

To better capture response data, the CC Checklist is provided as a fillable online form. Completed online forms should be saved for inclusion within each BPDA filing. The CC Checklist, along with Article 37 submissions, will be reviewed by the Interagency Green Building Committee (IGBC).

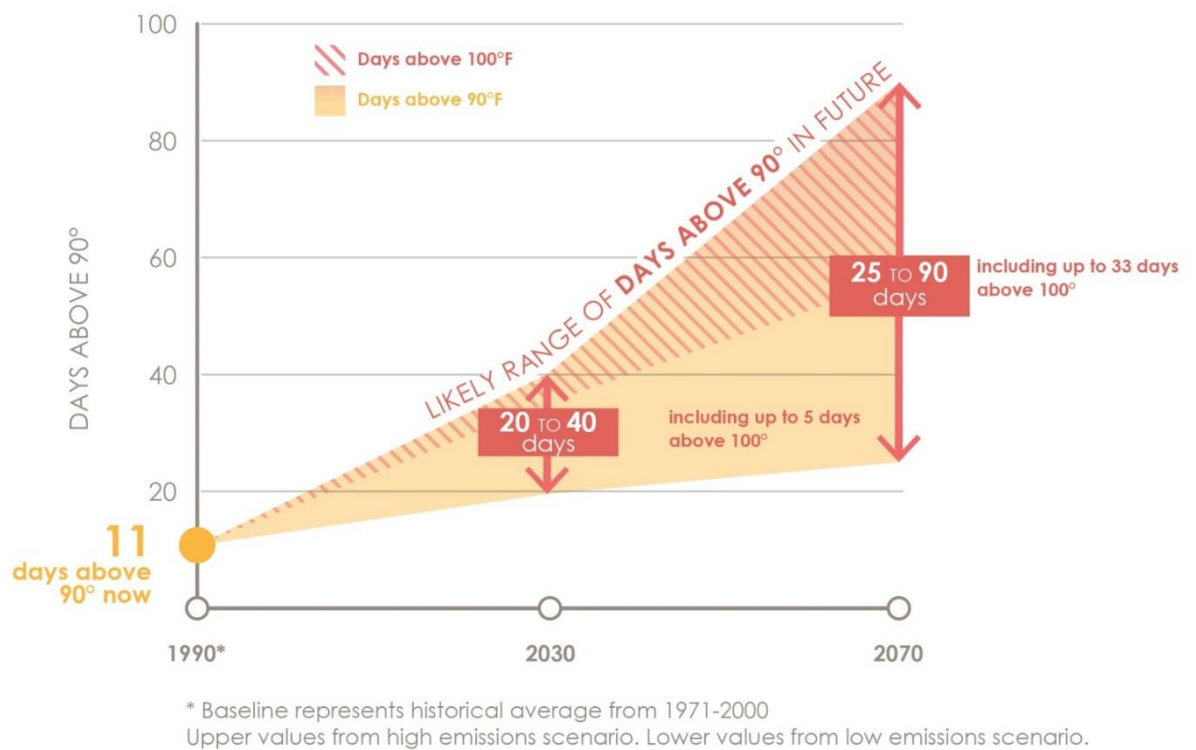
Greenhouse Gas Reduction

Reducing greenhouse gas emissions is critical to avoiding more extreme climate change conditions. Mayor Martin Walsh has set a goal for Boston to be carbon neutral by 2050. New building planning and design should employ a comprehensive approach to maximize building energy efficiency and include onsite clean and renewable energy strategies to ensure the constructed building has minimized greenhouse gas emissions.

Additionally, project planning should identify future adaptation strategies for advancing building energy efficiency, clean and renewable energy production, and other measures for achieving carbon net zero / net positive performance by 2050.

Extreme Heat

Annual average temperature in Boston increased by about 2 °F in the past hundred years and will continue to rise due to climate change. By the end of the century, the average annual temperature could be 56° (compared to 46° now) and the number of days above 90° (currently about 10 a year) could rise to 90.



Data source: Rossi et al. 2015

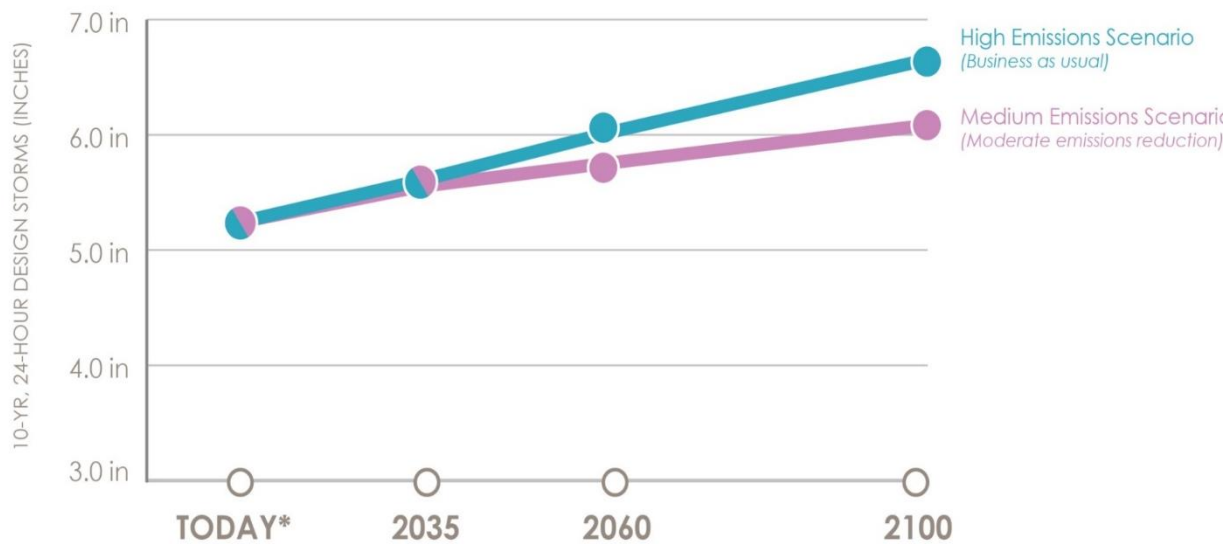
New buildings should be planned and designed to minimize thermal cooling and heating requirements. Passive strategies, including building siting, orientation, fenestration and envelope design, should be prioritized over mechanical system solutions. Building mechanical systems should

be designed to meet present and future conditioning requirements without diminishing system efficiency.

Additionally, project planning should identify future strategies for adapting to higher annual temperatures and more extreme heat waves including both building envelope and mechanical systems.

Extreme Precipitation Events

From 1958 to 2010, there was a 70 percent increase in the amount of precipitation that fell on the days with the heaviest precipitation. Currently, the 10-Year, 24-Hour Design Storm precipitation level is 5.25”. There is a significant probability that this will increase to at least 6” by the end of the century. Additionally, fewer, larger storms are likely to be accompanied by more frequent droughts.



* "Today" baseline represents historical average from 1948-2012
 Confidence intervals are not available for these projections but are likely large, so these numbers should be considered as the middle of a large range

Data Source:
 Boston Water & Sewer Commissic

New buildings should be planned and designed to manage additional annual precipitation including rainwater harvesting, on-site storm water retention and infiltration strategies.

Additionally, project planning should identify future adaptation measures for managing additional precipitation.

Sea Level Rise

Climate Ready Boston’s Research Advisory Group used three greenhouse gas emissions scenarios – high (“business as usual”), medium, and low (consistent with the 2015 Paris accords) – to project future sea-level rise in Boston. Under the medium emissions scenario, there is a 5% probability and a 65% probability that sea-level rise will be higher than three feet by 2070 and 2100, respectively.

Based on these scenarios or any plausible greenhouse gas emissions scenario, the sea level in Boston will continue to rise throughout the century and will exceed three feet sooner in the high scenario, later in the low scenario. While future research, stakeholder engagement, and our collective tolerance for risk may result in changes to our sea-level rise projection, three feet is a reasonable expectation for project planning at this time.

Projects should first evaluate if the location and site conditions are vulnerable to flooding:

- To determine if the Project site is within a FEMA SFHA, visit: <https://msc.fema.gov/portal>.
- To determine if the Project site is within the 1% Annual Flood Area with 36" Sea Level Rise Map, visit: *(see attached map. This map will be replaced with an online mapping tool)*.

Project sites and buildings located in either the FEMA SFHA or the 1% Annual Floor Area with 36" SLR may be vulnerable to flooding due to either present or future conditions, including rising sea levels, and should be planned and designed to reduce or eliminate flood risk and potential damage. Strategies could include raising the elevation of the site and access routes, elevating building ground floors, dry and wet flood proofing, locating critical building equipment and systems above potential flood heights, and deploying temporary barricades.

Project planning should identify immediate (design condition) and future adaptation strategies for managing at least a 1% Annual Flood with 36" of sea level rise and *include an additional 12"* of freeboard for all buildings and, for critical facilities and infrastructure, *include an additional 24"* of freeboard.

Climate Change Resiliency and Preparedness Checklist

Please see the 2016 Boston Research Advisory Group Report, "Climate Change and Sea Level Rise Projections for Boston" at boston.gov/climate-ready for details of heat, precipitation, and sea-level-rise projections for Boston.

AMENDMENT

Map Update August 1, 2017

The attached sea level rise map has been updated to better illustrate anticipated flood conditions.

The Sea Level Rise Flood Hazard Areas (SLR-FHA) and flood water elevations represented on this map are based upon a 1% annual chance flood event with 40 inches of sea level rise (SLR) as derived from the MassDOT-FHWA Boston Harbor Flood Risk Model (BH-FRM). The 40" of SLR is a combination of the mean sea level rise (3.2 feet above 2013 tide levels) plus 2.5 inches to account for local land subsidence.

As indicated in the Boston Research Advisory Group (BRAG) Report, under the medium emissions scenario, there is a 5% probability that sea level rise will be higher than three feet by 2070 and a 65% probability that sea level rise will be higher than three feet by 2100. Based on these greenhouse gas emission scenarios, or other plausible greenhouse gas emissions scenarios, the sea level in Boston will continue to rise throughout the century and will exceed three feet sooner in the

high emission scenario, later in the low emission scenario. For the BPDA Climate Change Checklist these scenarios represent reasonable future climate conditions and sea level rise risk thresholds for evaluating new development impacts. These measures may be updated based upon future climate science and coastal flooding assessments.

The SLR-FHA and flood water elevations represented on this map are for planning purposes. The 40-inch SLR rise forecast and resulting flood water elevations do not represent a worst case SLR scenario. Project proponents are encouraged to reference the BRAG report and evaluate their own tolerance for risk given the specifics of their project's site, location, uses and functional life to determine if additional flood hazard mitigation and prevention measures should be incorporated into their project. Compliance with these guidelines does not guarantee against present or future flooding and resulting damages.

DRAFT

One-Percent Annual Flood with 40 inches of Sea Level Rise

