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# DOCUMENTATION FOR THE BOSTON CLIMATE CHANGE RESILIENCE AND PREPAREDNESS CHECKLIST DATASET

## Overview

This document describes the structure and organization of the Boston Climate Change Resiliency and Preparedness Checklist dataset (*ClimateChangeChecklist.csv)*, which was constructed by Mike Wilson of the Massachusetts Institute of Technology using a series of publicly available Project Notification Forms from the Boston Planning and Development Agency's (BPDA, formerly Boston Redevelopment Authority or BRA) *Development Projects* webpage: http://www.bostonplans.org/projects/development-projects. Its construction was partially funded by the Boston Area Research Initiative's Research Seed Grant program.

The data were obtained from each of the 104 development projects' *Climate Change Preparedness and Resiliency Checklist for New Construction* form voluntarily submitted to the Boston Planning and Development Agency. An example of an unmarked checklist form is included as Appendix A.

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## 1. Description of Content

The Development Review department of the Boston Planning and Development Agency (BPDA) reviews small- and large-scale development projects within the City of Boston. As part of this process, the department makes all information associated with these coordinated development projects open to the public (http://www.bostonplans.org/projects/development-projects). Mike Wilson of MIT documented information associated with 104 large-scale development projects from December 1, 2013 to May 31, 2017 via their voluntary submission of a *Climate Change Preparedness and Resiliency Checklist for New Construction* form provided by the BPDA. Each form contains 171 unique questions related to project information, building classification, and development and planning techniques for responding to extreme weather events and sea-level rise. Additionally, the form contains five user-generated variables for tracking and location information. An example of an unaltered *Climate Change Preparedness and Resiliency Checklist for New Construction* form serves as Appendix A.

It should be noted, submission of the checklist form to the Development Review department is voluntary; therefore, the data may not include all development projects that submitted information to the BPDA within this project's time of analysis. Furthermore, the publicly available checklist form may not be the most recent version submitted by the project proponent (five projects used preliminary forms introduced prior to December 2013). In addition, since the form used a series of project-specific responses in its questioning (in particular, Sea-Level Rise and Storms Location Description and Classification), only 37 projects completed sections on building flooding and resilience in relation to sea-level rise.

### 1.1 Description of Variables

This section details the variables associated with each question on the development project's checklist form. Variable organization in this documentation corresponds with the ordering of questions on the *Climate Change Preparedness and Resiliency Checklist for New Construction* form. Project Information corresponds to sections A.1 through A.3 (and one questions from C.2), Building Information corresponds to section A.4, Green Building and Energy Information correspond to sections A.5 and A.6, Project Planning Information corresponds to sections B.1 and B.2, Sea Level Rise and Flooding Information correspond to sections C.1 through C.3, and Information on Building Resilience and Adaptability Measures corresponds to C.4.

It should also be noted for Building Information variables *A4BLDRES* through *A4TYPCON*, that many of the proposed buildings had multiple uses or used multiple construction materials; therefore, one project may have indicated multiple "1s" for these dummy-coded variables.

### 1.1.1 Tracking and Location

- *PROJECT* is the street address of the development project
- *PNFDATE* is the submission date of the Project Notification Form (or other publicly available document).
- *NGHBORHD* is filing category on the BPDA's Development Projects website that corresponds to a neighborhood within the City of Boston (NOTE: A few projects were misfiled and are corrected and re-categorized in the dataset).
- *LAT* is the latitude for the project (manually geolocated via Google Maps).
- *LONG is* the longitude for the project (manually geolocated via Google Maps).

### 1.1.2 Project Information

- *A1NAME is* the Project Name.
- *A1ADDRESS* is the Project Address Primary.
- *A2OWNER* is the Owner/Developer.
- *A2ARCH* is the Architect (of Record).
- *A2ARCH2* is the Additional Architect (of Design) if there is more than one listed.
- *A2ENG* is the Engineer (Building Systems).
- *A2ENG2* is the Engineer (Specialist) if there is more than one listed.
- *A2LEED* is the Sustainability/LEED consultant.
- *A2LEED2* is the Sustainability/LEED consultant if there is more than one listed.
- *A2PERMIT* is the Permitting Expert.
- *A2PERMT2* is the Permitting Expert if there is more than one listed.

- *A2CM* is the Construction Management consultant.
- *A2CM2* is the Construction Management consultant if there is more than one listed.
- *A2XPERT* is the Climate Change Expert.
- *A2XPERT2* is the Climate Change Expert if there is more than one listed.
- *C2APP* indicates whether the project responded to the required responses in Sea-Level Rise and Storms sections. This variable is dummy-coded where '1' indicates that the project answered the Sea-Level Rose and Storms sections.

### 1.1.3 Building Information

- *A4BLDRES* is a dummy variable where '1' indicates that the principal building use is residential and '0' indicates that it is not.
- *A4BLDCOM* is a dummy variable where '1' indicates that the principal building use is commercial/office and '0' indicates that it is not.
- *A4BLDRTL* is a dummy variable where '1' indicates that the principal building use is retail and '0' indicates that it is not.
- *A4BLDRST* is a dummy variable where '1' indicates that the principal building use is restaurant/café and '0' indicates that it is not.
- *A4BLDHOT* is a dummy variable where '1' indicates that the principal building use is hotel and '0' indicates that it is not.
- *A4BLDOTH* is a dummy variable where '1' indicates that the interpreted principal building use is other/civic and '0' indicates that it is not.
- *A4BLDPRK* is a dummy variable where '1' indicates that the principal building use is parking/garage and '0' indicates that it is not.
- *A4BLDIND* is a dummy variable where '1' indicates that the principal building use is industrial/laboratory and '0' indicates that it is not.
- *A4FLRRES* is a dummy variable where '1' indicates that the principal first floor use is residential and '0' indicates that it is not.

- *A4FLRCOM* is a dummy variable where '1' indicates that the principal first floor use is commercial/office and ‘0’ indicates that it is not.
- *A4FLRRTL* is a dummy variable where '1' indicates that the principal first floor use is retail and ‘0’ indicates that it is not.
- *A4FLRRST* is a dummy variable where '1' indicates that the principal first floor use is restaurant/café and ‘0’ indicates that it is not.
- *A4FLRLOB* is a dummy variable where '1' indicates that the principal first floor use is lobby and ‘0’ indicates that it is not.
- *A4FLROTH* is a dummy variable where '1' indicates that the interpreted principal first floor use is other/civic and ‘0’ indicates that it is not.
- *A4FLRPRK* is a dummy variable where '1' indicates that the principal first floor use is parking/garage/loading and ‘0’ indicates that it is not.
- *A4FLRIND* is a dummy variable where '1' indicates that the principal first floor use is industrial and ‘0’ indicates that it is not.
- *A4FLRUMS* is a dummy variable where '1' indicates that the interpreted principal first floor use is utilities and mechanical systems and ‘0’ indicates that it is not.
- *A4TYPWOD* is a dummy variable where '1' indicates that the principal construction type is wood frame and ‘0’ indicates that it is not.
- *A4TYPMAS* is a dummy variable where '1' indicates that the principal construction type is masonry and ‘0’ indicates that it is not.
- *A4TYPSTL* is a dummy variable where '1' indicates that the principal construction type is steel frame and ‘0’ indicates that it is not.
- *A4TYPCON* is a dummy variable where '1' indicates that the principal construction type is concrete and ‘0’ indicates that it is not.
- *A4SITE* is the site area in square feet.
- *A4HEIGHT* is the building height (if a range is provided, then tallest) in feet.

- *A4FFE* is the first-floor elevation (if range is provided, then lowest) in feet (NOTE: Boston City Base (BCB, 6.46 feet below NAVD88)).
- *A4GROSS* is the building area in square feet.
- *A4FTPRNT* is the building footprint in square feet.
- *A4ESTORY* is the number of existing stories.
- *A4PSTORY* is the number of proposed stories.
- *A4BLWGRD* represents the number of below grade spaces/levels. If there is no basement, then the project is assigned '0.'

### 1.1.4 Green Building and Energy Information

- *A5LDSYS* indicates which LEED Rating System and version the project has or will use (by area for multiple rating systems).
- *A5LDSYS2* indicates the second (if multiple) LEED Rating System and version the project has or will use (by area for multiple rating systems).
- *A5LDGOAL* is the desired LEED outcome (Certified, Bronze, Silver, Gold, Platinum).
- *A5LDREG* is a dummy variable where '1' indicates the project will be registered with the US Green Building Council.
- *A5LDCERT* is a dummy variable where '1' indicates the project will be certified by the US Green Building Council.
- *A6BELEC* is the base electric load in kilowatts.
- *A6BINTEN* is the planned energy use intensity in kilowatts per square foot.
- *A6BHEAT* is the base heating load in million BTUs per hour.
- *A6BCOOL* is the base cooling load in tons per hour.
- *A6PKELEC* is the peak electric load for critical systems in the event of a service interruption in kilowatts.
- *A6PKHEAT* is the peak heating load for critical systems in the event of a service interruption in million BTUs per hour.

- *A6PKCOOL* is the peak cooling load for critical systems in the event of a service interruption in tons per hour.
- *A6ELGEN* is the number of kilowatts of electrical generation for backup and emergencies.
- *A6FUEL* is the fuel source.
- *A6TYPE* is the system type.
- *A6UNITS* is the number of units related to the system type.

### 1.1.5 Project Planning Information

- *B1PRJLIF* is the full expected life of the project in years.
- *B1SYSLIF* is the full expected operational life of key building systems (e.g. heating, cooling, ventilation) in years.
- *B1CCTIME* is the time span of future climate conditions in years.
- *B1TEMPLO* is the lowest estimated range of temperatures used for project planning in degrees.
- *B1TEMPHI* is the highest estimated range of temperatures used for project planning in degrees.
- *B1EXHTMP* is the extreme heat peak in degrees.
- *B1EXHDUR* is the extreme heat duration in days
- *B1EXHFRQ* is the extreme heat frequency in days per year
- *B1DRDUR* is the drought duration in days.
- *B1DRFRQ* is the drought frequency in days per year.
- *B1ANRAIN* is the seasonal rain fall in inches.
- *B1PKRAIN* is the peak rain fall in inches/day.
- *B1RNEVNT* is the frequency of events per year.
- *B1PKWIND* is the peak wind speed in miles per hour.
- *B1GSTDUR* is the duration of storm event in hours.

- *B1WDEVNT* is the frequency of wind events per year.
- *B2ENBLWC* is the building's overall energy use below code as a percentage.
- *B2PERFRM* is the how the energy performance was determined.
- *B2ENVLOP* is a dummy variable where '1' indicates the project will employ a high-performance building envelope to reduce building energy consumption.
- *B2PRFMLT* is a dummy variable where '1' indicates the project will employ high performance lighting & controls to reduce building energy consumption.
- *B2DAYLT* is a dummy variable where '1' indicates the project will employ building day lighting to reduce building energy consumption.
- *B2ENSTAR* is a dummy variable where '1' indicates the project will employ Energy Star equipment and/or appliances to reduce building energy consumption.
- *B2HVACEQ* is a dummy variable where '1' indicates the project will employ high performance HVAC equipment to reduce building energy consumption.
- *B2RCVENT* is a dummy variable where '1' indicates the project will employ energy recovery ventilation to reduce building energy consumption.
- *B2NOCOOL* is a dummy variable where '1' indicates the project will employ no active cooling to reduce building energy consumption.
- *B2NOHEAT* is a dummy variable where '1' indicates the project will employ no active heating to reduce building energy consumption.
- *B2ENADD* describes any added measures to reduce building energy consumption.
- *B2RROOF* is the roof insulation R value.
- *B2RWALL* is the wall assembly insulation R value.
- *B2RCWALL* is the curtain wall assembly insulation U value.
- *B2RFOUND* is the foundation insulation R value.
- *B2RBASE* is the basement insulation R value.
- *B2RWINDO* is the window insulation U value.
- *B2RDOOR* is the door insulation U value.

- *B2CHP* is a dummy variable where '1' indicates the project will employ on-site clean energy/CHP systems to reduce building energy demands on the utilities and infrastructure.
- *B2PWRDIM* is a dummy variable where '1' indicates the project will employ building-wide power dimming to reduce building energy demands on the utilities and infrastructure.
- *B2ENSTOR* is a dummy variable where '1' indicates the project will employ thermal energy storage systems to reduce building energy demands on the utilities and infrastructure.
- *B2GHPUMP* is a dummy variable where '1' indicates the project will employ ground source heat pump to reduce building energy demands on the utilities and infrastructure.
- *B2SOLPV* is a dummy variable where '1' indicates the project will employ on-site solar PV to reduce building energy demands on the utilities and infrastructure.
- *B2SOLTHM* is a dummy variable where '1' indicates the project will employ on-site solar thermal to reduce building energy demands on the utilities and infrastructure.
- *B2WIND* is a dummy variable where '1' indicates the project will employ wind power to reduce building energy demands on the utilities and infrastructure.
- *B2UTADD* describes added measures to reduce building energy demands on utilities and infrastructure.
- *B2LCLDST* is a dummy variable where '1' indicates the project will be connected to local distributed electrical.
- *B2SGRDRD* is a dummy variable where '1' indicates the project will be building will be smart grid ready.
- *B2DSTHCM* is a dummy variable where '1' indicates the project will be connected to distributed steam, hot, chilled water.

- *B2THRMRD* is a dummy variable where '1' indicates the project will be distributed thermal energy ready.
- *B2OCCUPWR* is a dummy variable where '1' indicates the building will remain occupiable without utility power during an extended period of inundation.
- *B2OCCDUR* is how long the building will remain occupiable without utility power during an extended period of inundation in days.
- *B2ISLAND* is dummy variable where '1' indicates the building is island-able.
- *B2SOLSTH* is a dummy variable where '1' indicates the project will be solar oriented with longer south walls to support building functionality and use during an extended interruption(s) of utility services and infrastructure.
- *B2PRVWND* is a dummy variable where '1' indicates the project will be oriented to prevailing winds to support building functionality and use during an extended interruption(s) of utility services and infrastructure.
- *B2EXTSHD* is a dummy variable where '1' indicates the project will have external shading devices to support building functionality and use during an extended interruption(s) of utility services and infrastructure.
- *B2GLAZE* is a dummy variable where '1' indicates the project will have tuned glazing to support building functionality and use during an extended interruption(s) of utility services and infrastructure.
- *B2COLZON* is a dummy variable where '1' indicates the project will have building cool zones to support building functionality and use during an extended interruption(s) of utility services and infrastructure.
- *B2OWINDO* is a dummy variable where '1' indicates the project will have operable windows to support building functionality and use during an extended interruption(s) of utility services and infrastructure.

- *B2NATVNT* is a dummy variable where '1' indicates the project will have natural ventilation to support building functionality and use during an extended interruption(s) of utility services and infrastructure.
- *B2BLDSHD* is a dummy variable where '1' indicates the project will have building shading to support building functionality and use during an extended interruption(s) of utility services and infrastructure.
- *B2PWDRNK* is a dummy variable where '1' indicates the project will have potable water for drinking/food preparation to support building functionality and use during an extended interruption(s) of utility services and infrastructure.
- *B2PWSAN* is a dummy variable where '1' indicates the project will have potable water for sinks/sanitary systems to support building functionality and use during an extended interruption(s) of utility services and infrastructure.
- *B2WWSTOR* is a dummy variable where '1' indicates the project will have waste water storage capacity to support building functionality and use during an extended interruption(s) of utility services and infrastructure.
- *B2HPBENV* is a dummy variable where '1' indicates the project will have high performance building envelop to support building functionality and use during an extended interruption(s) of utility services and infrastructure.
- *B2NONMAD* describes any additional non-mechanical strategies to support utility and infrastructure interruptions.
- *B2HHPPAV* is a dummy variable where '1' indicates the project will employ high reflective paving materials to reduce urban heat-island effect and ‘0’ indicates it will not.
- *B2HSHADE* is a dummy variable where '1' indicates the project will employ shade trees & shrubs to reduce urban heat-island effect and ‘0’ indicates it will not.

- *B2HHRROF* is a dummy variable where '1' indicates the project will employ high reflective roof materials to reduce urban heat-island effect and ‘0’ indicates it will not.
- *B2HVROOF* is a dummy variable where '1' indicates the project will employ vegetated roofs for heat to reduce urban heat-island effect and ‘0’ indicates it will not.
- *B2RRETN* is a dummy variable where '1' indicates the project will employ on-site retention systems & ponds to accommodate rain events and more rain fall and ‘0’ indicates it will not.
- *B2RINFG* is a dummy variable where '1' indicates the project will employ infiltration galleries & areas to accommodate rain events and more rain fall and ‘0’ indicates it will not.
- *B2RVCAPT* is a dummy variable where '1' indicates the project will employ vegetated water captures systems to accommodate rain events and more rain fall and ‘0’ indicates it will not.
- *B2RVROOF* is a dummy variable where '1' indicates the project will employ vegetated roofs for rain to accommodate rain events and more rain fall and ‘0’ indicates it will not.
- *B2XHARD* is a dummy variable where '1' indicates the project will employ hardened building structure & elements to accommodate extreme storm events and high winds and ‘0’ indicates it will not.
- *B2XBURY* is a dummy variable where '1' indicates the project will employ buried utilities & hardened infrastructure to accommodate extreme storm events and high winds and ‘0’ indicates it will not.
- *B2XLAND* is a dummy variable where '1' indicates the project will employ hazard removal & protective landscapes to accommodate extreme storm events and high winds and ‘0’ indicates it will not.

- *B2XSOFT* is a dummy variable where '1' indicates the project will employ soft & permeable surfaces (water infiltration) to accommodate extreme storm events and high winds and '0' indicates it will not.

### 1.1.6 Sea Level Rise and Flooding Information

- *C1FLDRISK* is a dummy variable where '1' indicates the building is believed to be susceptible to flooding now or during the full expected life of the building and '0' indicates it is not.
- *C1ELEVLO* is the low point site elevation in feet BCB.
- *C1ELEVHI* is the high point site elevation in feet BCB.
- *C1WTRPRX* is the building proximity to water in feet.
- *C1COAST* is a dummy variable where '1' indicates the site or building is located in a Coastal Zone as determined by Massachusetts Office of Coastal Zone Management.
- *C1FLOOD* is a dummy variable where '1' indicates the site or building is located in a flood zone (Special Flood Hazard Area, SFHA) on a Federal Emergency Management (FEMA) Flood Insurance Rate Map (FIRM).
- *C1VEZONE* is a dummy variable where '1' indicates the site or building is located in a velocity zone SFHA on a FIRM.
- *C1FLPRON* is a dummy variable where '1' indicates the site or building is located in an area prone to flooding.
- *C1PFIRM* is a dummy variable where '1' indicates the 2013 Preliminary FEMA Flood Insurance Rate Maps will result in a change of the classification of the site or building location.
- *C1FUTMAP* is a dummy variable where '1' indicates the future floodplain delineation updates due to climate change will result in a change of the classification of the site or building location.

- *C1FZNPRX* is the project or building proximity to nearest coastal zone, flood zone, or area prone to flooding in feet.
- *C2SLR* is the sea level rise assumption in feet.
- *C2STMFRQ* is the frequency of storms assumed with climate change per year.
- *C3PRFLEV* is the Flood Proof Elevation (FPE) in feet BCB.
- *C3FFE* is the First Floor Elevation (FFE) in feet BCB.
- *C3TMP* is a dummy variable where '1' indicates the project will employ temporary measures to prevent building flooding.
- *C3TMPELV* is the elevation of these temporary measures in feet BCB.
- *C3TMPETC* describes these temporary measures.
- *C3SYSFLR* is a dummy variable where '1' indicates the project will employ systems located above first floor to ensure the integrity of critical building systems during a flood or severe storm event.
- *C3SYSCDT* is a dummy variable where '1' indicates the project will employ water tight utility conduits to ensure the integrity of critical building systems during a flood or severe storm event.
- *C3SSYSWST* is a dummy variable where '1' indicates the project will employ waste water back flow prevention to ensure the integrity of critical building systems during a flood or severe storm event.
- *C3SYSSTM* is a dummy variable where '1' indicates the project will employ storm water back flow prevention to ensure the integrity of critical building systems during a flood or severe storm event.
- *C3FRSALT* is a dummy variable where '1' indicates the project will account for the differing effects of fresh water and salt water flooding to ensure the integrity of critical building systems during a flood or severe storm event.
- *C3ACCESS* is a dummy variable where '1' indicates the project site / building(s) will be accessible during periods of inundation or limited access to transportation.

- *C3ACCHT* is the height to which access will be provided above the Base Flood Elevation (BFE).
- *C3LND* is a dummy variable where '1' indicates the project will employ hard and / or soft landscape elements as velocity barriers to reduce wind or wave impacts.
- *C3LNDETC* describes these hard and/or soft landscape elements.
- *C3SLRETC* describes any additional strategies to address sea level rise and / or severe storm impacts.

### 1.1.7 Information on Building Resilience and Adaptability Measures

- *C4STMIMP* is a dummy variable where '1' indicates the building will be able to withstand severe storm impacts and endure temporary inundation.
- *C4STMHRD* is a dummy variable where '1' indicates the project will have hardened/resilient ground floor construction.
- *C4STMTMP* is a dummy variable where '1' indicates the project will have temporary shutters and/or barricades.
- *C4STMSIT* is a dummy variable where '1' indicates the project will have resilient site design, materials, and construction.
- *C4FPEMOD* is a dummy variable where '1' indicates the site and building be reasonably modified to increase building FPE.
- *C4FPEELV* is a dummy variable where '1' indicates the surrounding site elevation can be raised.
- *C4FPEGND* is a dummy variable where '1' indicates the building ground floor can be raised.
- *C4FPEENG* is a dummy variable where '1' indicates the construction will have been engineered.
- *C4FPEETC* describes additional strategies.

- *C4FUTDSN* is a dummy variable where '1' indicates the building has been planned and designed to accommodate future resiliency enhancements.
- *C4FUTETC* describes any specific or additional resilience and adaptability strategies.

## APPENDIX A: Unaltered Checklist Form

### Climate Change Preparedness and Resiliency Checklist for New Construction

In November 2013, in conformance with the Mayor's 2011 Climate Action Leadership Committee's recommendations, the Boston Redevelopment Authority adopted policy for all development projects subject to Boston Zoning Article 80 Small and Large Project Review, including all Institutional Master Plan modifications and updates, are to complete the following checklist and provide any necessary responses regarding project resiliency, preparedness, and to mitigate any identified adverse impacts that might arise under future climate conditions.

For more information about the City of Boston's climate policies and practices, and the 2011 update of the climate action plan, *A Climate of Progress*, please see the City's climate action web pages at http://www.cityofboston.gov/climate

In advance we thank you for your time and assistance in advancing best practices in Boston.

Climate Change Analysis and Information Sources:

1. Northeast Climate Impacts Assessment (www.climatechoices.org/ne/)
2. USGCRP 2009 (http://www.globalchange.gov/publications/reports/scientific-assessments/us-impacts/)
3. Army Corps of Engineers guidance on sea level rise (http://planning.usace.army.mil/toolbox/library/ECs/EC11652212Nov2011.pdf)
4. Proceeding of the National Academy of Science, "Global sea level rise linked to global temperature", Vermeer and Rahmstorf, 2009 (http://www.pnas.org/content/early/2009/12/04/0907765106.full.pdf)
5. "Hotspot of accelerated sea-level rise on the Atlantic coast of North America", Asbury H. Sallenger Jr*, Kara S. Doran and Peter A. Howd, 2012 (http://www.bostonredevelopmentauthority.org/planning/Hotspot of Accelerated Sea-level Rise 2012.pdf)
6. "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, 2103 (http://www.greenribboncommission.org/downloads/Building_Resilience_in_Boston_SML.pdf)

Checklist

Please respond to all of the checklist questions to the fullest extent possible. For projects that respond "Yes" to any of the D.1 – Sea-Level Rise and Storms, Location Description and Classification questions, please respond to all of the remaining Section D questions.

Checklist responses are due at the time of initial project filing or Notice of Project Change and final filings just prior seeking Final BRA Approval. A PDF of your response to the Checklist should be submitted to the Boston Redevelopment Authority via your project manager.

**Please Note:** When initiating a new project, please visit the BRA web site for the most current Climate Change Preparedness & Resiliency Checklist.

*Climate Change Resiliency and Preparedness Checklist*

**A.1 - Project Information**

| | |
|---|---|
| Project Name: | |
| Project Address Primary: | |
| Project Address Additional: | |
| Project Contact (name / Title / Company / email / phone): | |

**A.2 - Team Description**

| | |
|---|---|
| Owner / Developer: | |
| Architect: | |
| Engineer (building systems): | |
| Sustainability / LEED: | |
| Permitting: | |
| Construction Management: | |
| Climate Change Expert: | |

**A.3 - Project Permitting and Phase**

At what phase is the project – most recent completed submission at the time of this response?

| | | | |
|---|---|---|---|
| PNF / Expanded PNF Submission | Draft / Final Project Impact Report Submission | BRA Board Approved | Notice of Project Change |
| Planned Development Area | BRA Final Design Approved | Under Construction | Construction just completed: |

**A.4 - Building Classification and Description**

| | |
|---|---|
| List the principal Building Uses: | |
| List the First Floor Uses: | |

What is the principal Construction Type – select most appropriate type?

| | | | |
|---|---|---|---|
| Wood Frame | Masonry | Steel Frame | Concrete |

Describe the building?

| | | | |
|---|---|---|---|
| Site Area: | *SF* | Building Area: | *SF* |
| Building Height: | *Ft.* | Number of Stories: | *Flrs.* |
| First Floor Elevation (reference Boston City Base): | *Elev.* | Are there below grade spaces/levels, if yes how many: | *No / Number of Levels* |

### A.5 - Green Building

Which LEED Rating System(s) and version has or will your project use (by area for multiple rating systems)?

| | | | | |
|---|---|---|---|---|
| Select by Primary Use: | New Construction | Core & Shell | Healthcare | Schools |
| | Retail | Homes Midrise | Homes | Other |
| Select LEED Outcome: | Certified | Silver | Gold | Platinum |

Will the project be USGBC Registered and / or USGBC Certified?

| | | | |
|---|---|---|---|
| Registered: | *Yes / No* | Certified: | *Yes / No* |
| | | | |

### A.6 - Building Energy

What are the base and peak operating energy loads for the building?

| | | | |
|---|---|---|---|
| Electric - base / peak: | / *(kW)* | Heating – base / peak: | / *(MMBtu/hr)* |
| What is the planned building Energy Use Intensity: | *(kbut/SF or kWh/SF)* | Cooling – base / peak: | / *(Tons/hr)* |

What are the peak energy demands of your critical systems in the event of a service interruption?

| | | | |
|---|---|---|---|
| Electric: | *(kW)* | Heating: | *(MMBtu/hr)* |
| | | Cooling: | *(Tons/hr)* |

What is nature and source of your back-up / emergency generators?

| | | | | |
|---|---|---|---|---|
| Electrical Generation: | *(kW)* | | Fuel Source: | |
| System Type and Number of Units: | Combustion Engine | Gas Turbine | Combine Heat and Power | *(Units)* |

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### B - Extreme Weather and Heat Events

Climate change will result in more extreme weather events including higher year round average temperatures, higher peak temperatures, and more periods of extended peak temperatures. The section explores how a project responds to higher temperatures and heat waves.

### B.1 - Analysis

What is the full expected life of the project?

| | | | | |
|---|---|---|---|---|
| Select most appropriate: | 10 Years | 25 Years | 50 Years | 75 Years |

What is the full expected operational life of key building systems (e.g. heating, cooling, and ventilation)?

| | | | | |
|---|---|---|---|---|
| Select most appropriate: | 10 Years | 25 Years | 50 Years | 75 Years |

What time span of future Climate Conditions was considered?

| | | | | |
|---|---|---|---|---|
| Select most appropriate: | 10 Years | 25 Years | 50 Years | 75 Years |

Analysis Conditions - What range of temperatures will be used for project planning – Low/High?

| | |
|---|---|
| / | *Deg.* |

What Extreme Heat Event characteristics will be used for project planning – Peak High, Duration, and Frequency?

| | | |
|---|---|---|
| *Deg.* | *Days* | *Events / yr.* |

What Drought characteristics will be used for project planning – Duration and Frequency?

| | |
|---|---|
| *Days* | *Events / yr.* |

What Extreme Rain Event characteristics will be used for project planning – Seasonal Rain Fall, Peak Rain Fall, and Frequency of Events per year?

| | | |
|---|---|---|
| *Inches / yr.* | *Inches* | *Events / yr.* |

What Extreme Wind Storm Event characteristics will be used for project planning – Peak Wind Speed, Duration of Storm Event, and Frequency of Events per year?

| | | |
|---|---|---|
| *Peak Wind* | *Hours* | *Events / yr.* |

## B.2 - Mitigation Strategies

What will be the overall energy performance, based on use, of the project and how will performance be determined?

| | |
|---|---|
| Building energy use below code: | % |
| How is performance determined: | |

What specific measures will the project employ to reduce building energy consumption?

| | | | | |
|---|---|---|---|---|
| Select all appropriate: | High performance building envelope | High performance lighting & controls | Building day lighting | EnergyStar equip. / appliances |
| | High performance HVAC equipment | Energy recovery ventilation | No active cooling | No active heating |
| Describe any added measures: | | | | |

What are the insulation (R) values for building envelope elements?

| | | | |
|---|---|---|---|
| Roof: | *R* = | Walls / Curtain Wall Assembly: | *R* = |
| Foundation: | *R* = | Basement / Slab: | *R* = |
| Windows: | *R* = / *U* = | Doors: | *R* = / *U* = |

What specific measures will the project employ to reduce building energy demands on the utilities and infrastructure?

| | | | | |
|---|---|---|---|---|
| | On-site clean energy / CHP system(s) | Building-wide power dimming | Thermal energy storage systems | Ground source heat pump |
| | On-site Solar PV | On-site Solar Thermal | Wind power | None |
| Describe any added measures: | | | | |

Will the project employ Distributed Energy / Smart Grid Infrastructure and /or Systems?

| | | | | |
|---|---|---|---|---|
| Select all appropriate: | Connected to a local electrical micro-grid | Building will be Smart Grid ready | Connected to distributed steam, hot, chilled water | Distributed thermal energy ready |

Will the building remain operable without utility power for an extended period?

| | | | |
|---|---|---|---|
| | *Yes / No* | If yes, for how long: | *Days* |
| If Yes, is building "Islandable? | | | |
| If Yes, describe strategies: | | | |

Describe any non-mechanical strategies that will support building functionality and use during an extended interruption(s) of utility services and infrastructure:

| | | | | |
|---|---|---|---|---|
| Select all appropriate: | Solar oriented – longer south walls | Prevailing winds oriented | External shading devices | Tuned glazing, |
| | Building cool zones | Operable windows | Natural ventilation | Building shading |
| | Potable water for drinking / food preparation | Potable water for sinks / sanitary systems | Waste water storage capacity | High Performance Building Envelope |
| Describe any added measures: | | | | |

What measures will the project employ to reduce urban heat-island effect?

| | | | | |
|---|---|---|---|---|
| Select all appropriate: | High reflective paving materials | Shade trees & shrubs | High reflective roof materials | Vegetated roofs |
| Describe other strategies: | | | | |

What measures will the project employ to accommodate rain events and more rain fall?

| | | | | |
|---|---|---|---|---|
| Select all appropriate: | On-site retention systems & ponds | Infiltration galleries & areas | vegetated water capture systems | Vegetated roofs |
| Describe other strategies: | | | | |

What measures will the project employ to accommodate extreme storm events and high winds?

| | | | | |
|---|---|---|---|---|
| Select all appropriate: | Hardened building structure & elements | Buried utilities & hardened infrastructure | Hazard removal & protective landscapes | Soft & permeable surfaces (water infiltration) |
| Describe other strategies: | | | | |

## C - Sea-Level Rise and Storms

Rising Sea-Levels and more frequent Extreme Storms increase the probability of coastal and river flooding and enlarging the extent of the 100 Year Flood Plain. This section explores if a project is or might be subject to Sea-Level Rise and Storm impacts.

### C.1 - Location Description and Classification:

Do you believe the building to susceptible to flooding now or during the full expected life of the building?

| | |
|---|---|
| | *Yes / No* |

Describe site conditions?

| | |
|---|---|
| Site Elevation – Low/High Points: | *Boston City Base Elev.( Ft.)* |

| | | | |
|---|---|---|---|
| Building Proximity to Water: | *Ft.* | | |

Is the site or building located in any of the following?

| | | | |
|---|---|---|---|
| Coastal Zone: | *Yes / No* | Velocity Zone: | *Yes / No* |
| Flood Zone: | *Yes / No* | Area Prone to Flooding: | *Yes / No* |

Will the 2013 Preliminary FEMA Flood Insurance Rate Maps or future floodplain delineation updates due to Climate Change result in a change of the classification of the site or building location?

| | | | |
|---|---|---|---|
| 2013 FEMA Prelim. FIRMs: | *Yes / No* | Future floodplain delineation updates: | *Yes / No* |

What is the project or building proximity to nearest Coastal, Velocity or Flood Zone or Area Prone to Flooding?

| | |
|---|---|
| | *Ft.* |

*If you answered YES to any of the above Location Description and Classification questions, please complete the following questions.* ***Otherwise you have completed the questionnaire; thank you!***

## C - Sea-Level Rise and Storms

This section explores how a project responds to Sea-Level Rise and / or increase in storm frequency or severity.

### C.2 - Analysis

How were impacts from higher sea levels and more frequent and extreme storm events analyzed:

| | | | |
|---|---|---|---|
| Sea Level Rise: | *Ft.* | Frequency of storms: | *per year* |

### C.3 - Building Flood Proofing

Describe any strategies to limit storm and flood damage and to maintain functionality during an extended periods of disruption.

What will be the Building Flood Proof Elevation and First Floor Elevation:

| | | | |
|---|---|---|---|
| Flood Proof Elevation: | *Boston City Base Elev.( Ft.)* | First Floor Elevation: | *Boston City Base Elev. ( Ft.)* |

Will the project employ temporary measures to prevent building flooding (e.g. barricades, flood gates):

| | | | |
|---|---|---|---|
| | *Yes / No* | If Yes, to what elevation | *Boston City Base Elev. ( Ft.)* |
| If Yes, describe: | | | |

What measures will be taken to ensure the integrity of critical building systems during a flood or severe storm event:

| | | | |
|---|---|---|---|
| Systems located above 1st Floor. | Water tight utility conduits | Waste water back flow prevention | Storm water back flow prevention |

Were the differing effects of fresh water and salt water flooding considered:

| |
|---|
| *Yes / No* |

Will the project site / building(s) be accessible during periods of inundation or limited access to transportation:

| | | | |
|---|---|---|---|
| *Yes / No* | | If yes, to what height above 100 Year Floodplain: | *Boston City Base Elev. (Ft.)* |

Will the project employ hard and / or soft landscape elements as velocity barriers to reduce wind or wave impacts?

| | |
|---|---|
| | *Yes / No* |
| If Yes, describe: | |

Will the building remain occupiable without utility power during an extended period of inundation:

| | | | |
|---|---|---|---|
| | *Yes / No* | If Yes, for how long: | *days* |

Describe any additional strategies to addressing sea level rise and or sever storm impacts:

| |
|---|
| |

### C.4 - Building Resilience and Adaptability

Describe any strategies that would support rapid recovery after a weather event and accommodate future building changes that respond to climate change:

Will the building be able to withstand severe storm impacts and endure temporary inundation?

| | | | | |
|---|---|---|---|---|
| Select appropriate: | *Yes / No* | Hardened / Resilient Ground Floor Construction | Temporary shutters and or barricades | Resilient site design, materials and construction |

Can the site and building be reasonably modified to increase Building Flood Proof Elevation?

| | | | | |
|---|---|---|---|---|
| Select appropriate: | *Yes / No* | Surrounding site elevation can be raised | Building ground floor can be raised | Construction been engineered |
| Describe additional strategies: | | | | |

Has the building been planned and designed to accommodate future resiliency enhancements?

| | | | | |
|---|---|---|---|---|
| Select appropriate: | *Yes / No* | Solar PV | Solar Thermal | Clean Energy / CHP System(s) |
| | | Potable water storage | Wastewater storage | Back up energy systems & fuel |
| Describe any specific or additional strategies: | | | | |

Thank you for completing the Boston Climate Change Resilience and Preparedness Checklist!

For questions or comments about this checklist or Climate Change Resiliency and Preparedness best practices, please contact: John.Dalzell@boston.gov