Keeping on the Right Track: Regional transportation infrastructure& equity initiatives

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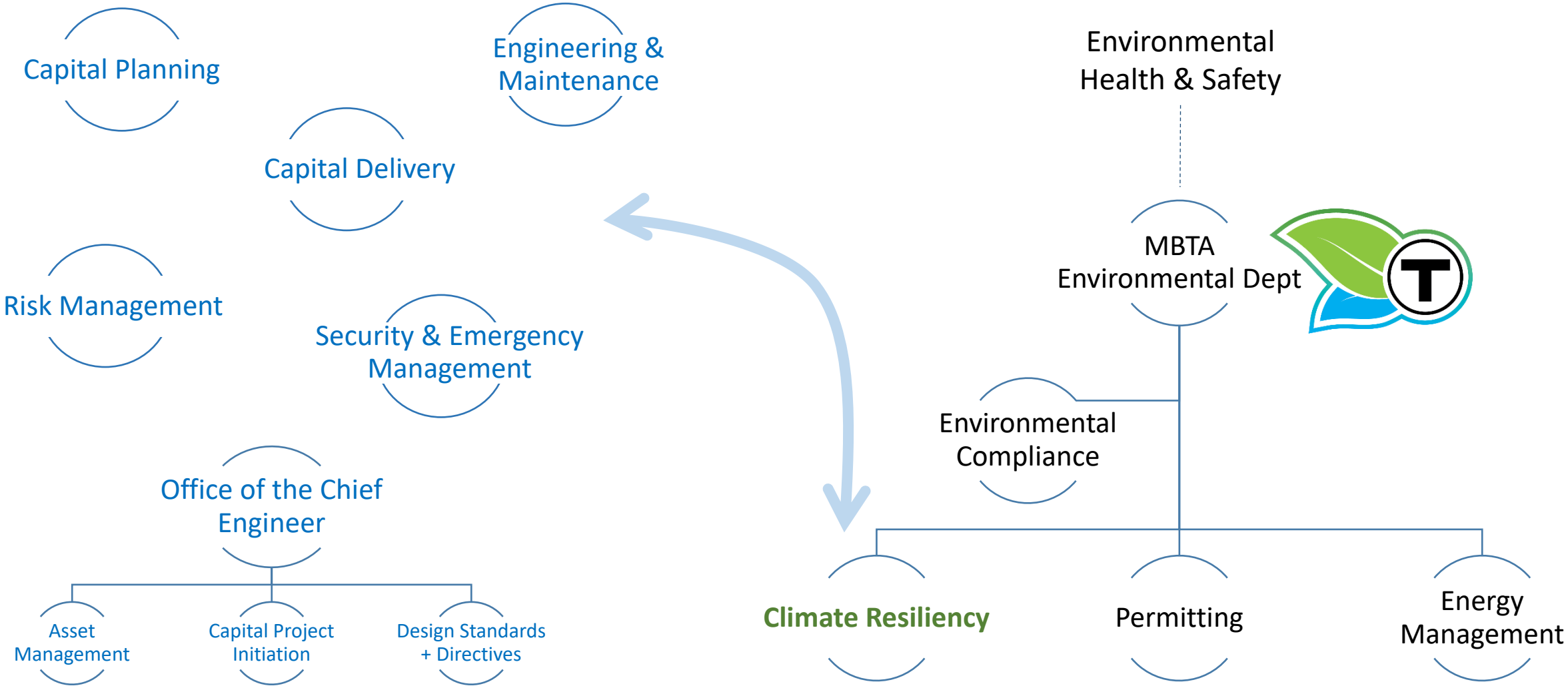
2015: Snowmageddon.

The MBTA partially shuts down

Climate Resiliency at the MBTA



Climate Resiliency Program Goals

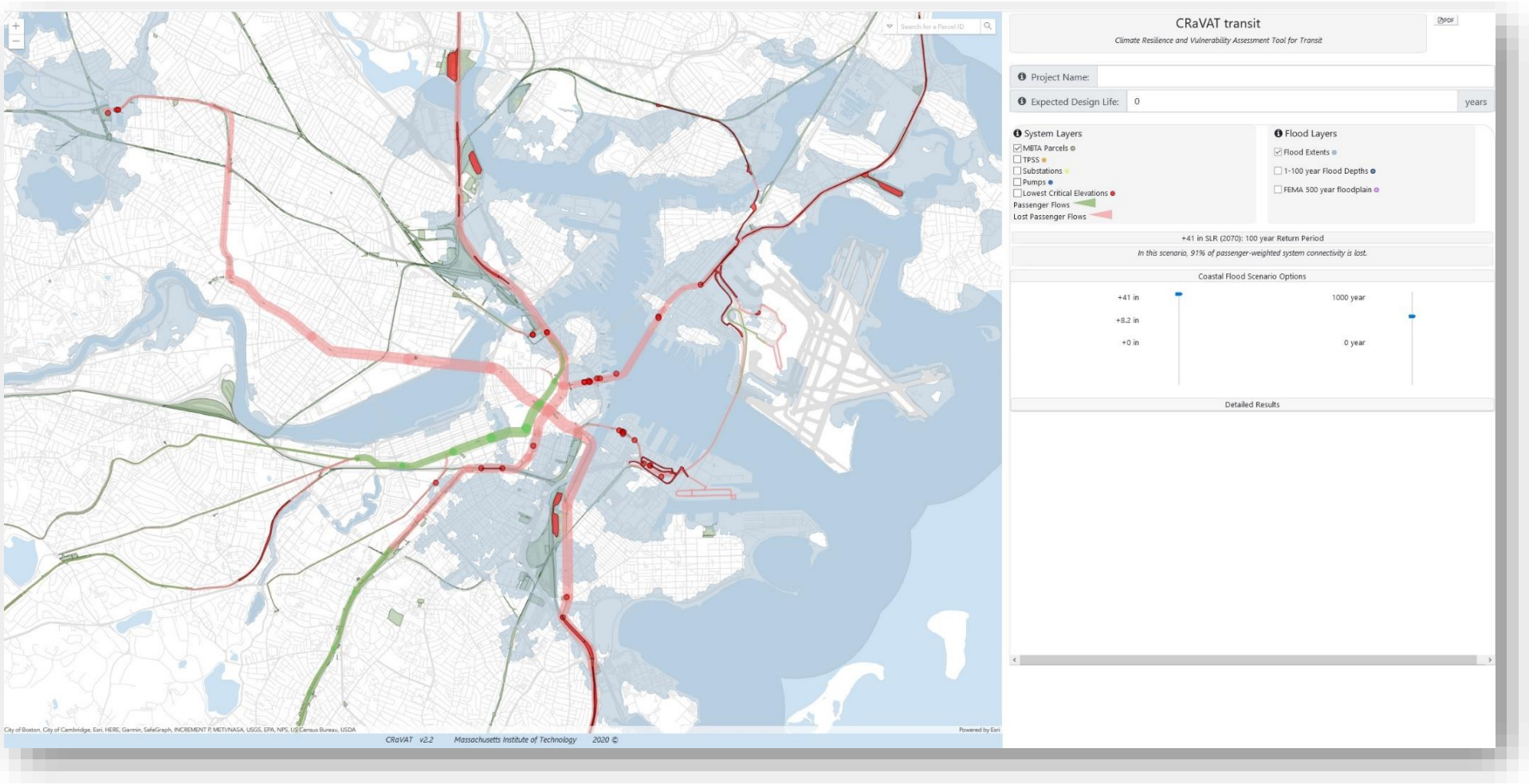
- **‘Do’:** Conduct climate change vulnerability assessments
- **‘Embed’:** Set climate resilience standards + incorporate Resiliency into Capital Projects
- **‘Coordinate’** with other state agencies and municipalities to share data & knowledge, develop policies, and work on regional protection projects that provide benefits to the MBTA’s system
- **‘Guide’:** Develop a robust MBTA climate adaptation strategy

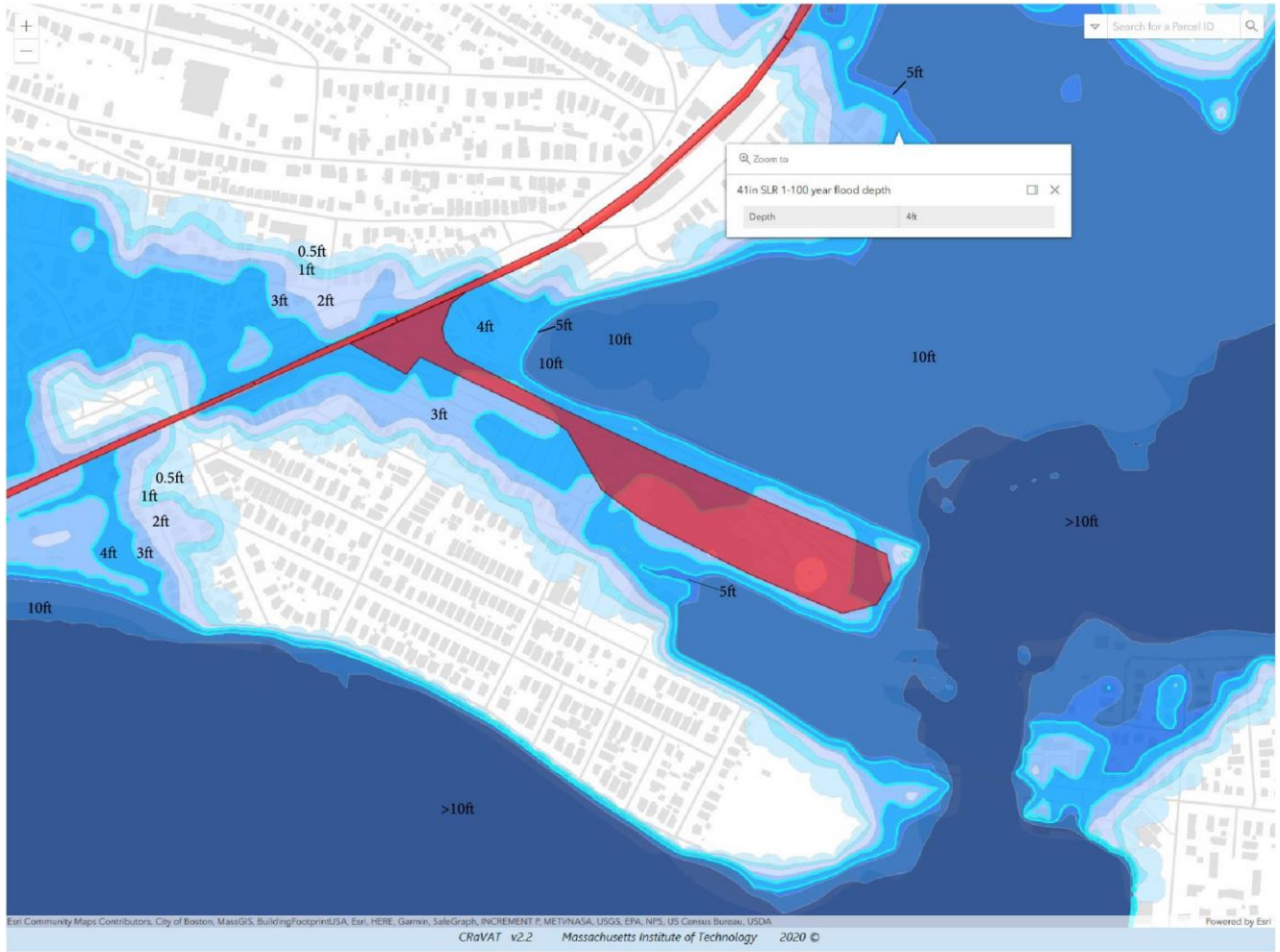
‘Do’: Analyze the MBTA’s Vulnerability to Climate Risks

System-wide Coastal Flood Risk Analysis Tool

Overlays Rapid Transit Lines + Boston Harbor Flood Risk Model,
analyzing different flood scenarios + operability of multiple transit lines:

- Track Elevations
- Dispatch Locations
- Switch Locations





CRaVAT transit

Climate Resilience and Vulnerability Assessment Tool for Transit

PDF

Project Name: Orient Heights Car House

Expected Design Life: 50 years

System Layers

- MBTA Parcels
- TPSS
- Substations
- Pumps
- Lowest Critical Elevations
- Passenger Flows
- Lost Passenger Flows

Flood Layers

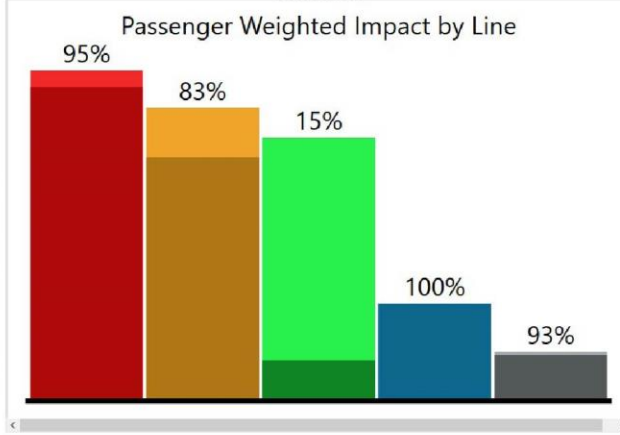
- Flood Extents
- 1-100 year Flood Depths
- FEMA 500 year floodplain

+41 in SLR (2070): 100 year Return Period

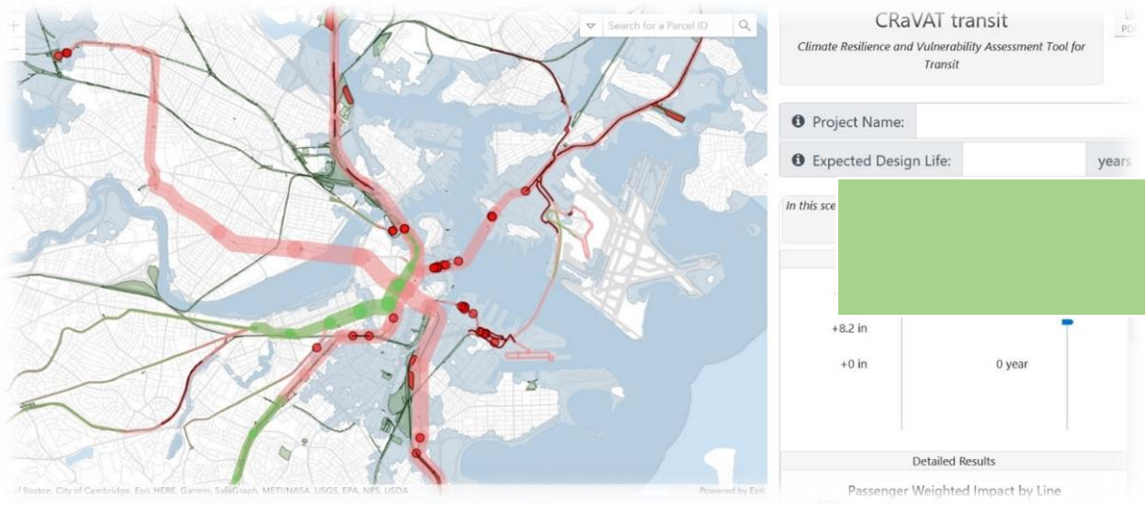
In this scenario, 91% of passenger-weighted system connectivity is lost.

Coastal Flood Scenario Options

Detailed Results



Evaluating the Vulnerability of Bus Maintenance Facilities



MBTA Bus Network and Facilities Overview

The MBTA bus network consists of 170 routes and services approximately one third of trips across all public transit modes in the Greater Boston area, with an average of 392,000 trips recorded during typical weekday service in February 2020 (MBTA, 2020c). Compared to other service modes, the bus network services a larger proportion of low income and minority residents; according to recent MBTA (2020b) data, 41.5% of bus riders are low-income and 48.0% are minority.

Shown in Figure 3, the MBTA bus network is supported by a fleet of 1051 buses housed at 9 facilities across Greater Boston. An additional facility, the Everett Maintenance Facility (Figure 3) does not dispatch or permanently house buses, but is a critical component of the bus network, as it regularly services and repairs buses. Figure 4 shows the relative percentage of the bus fleet located at each facility.

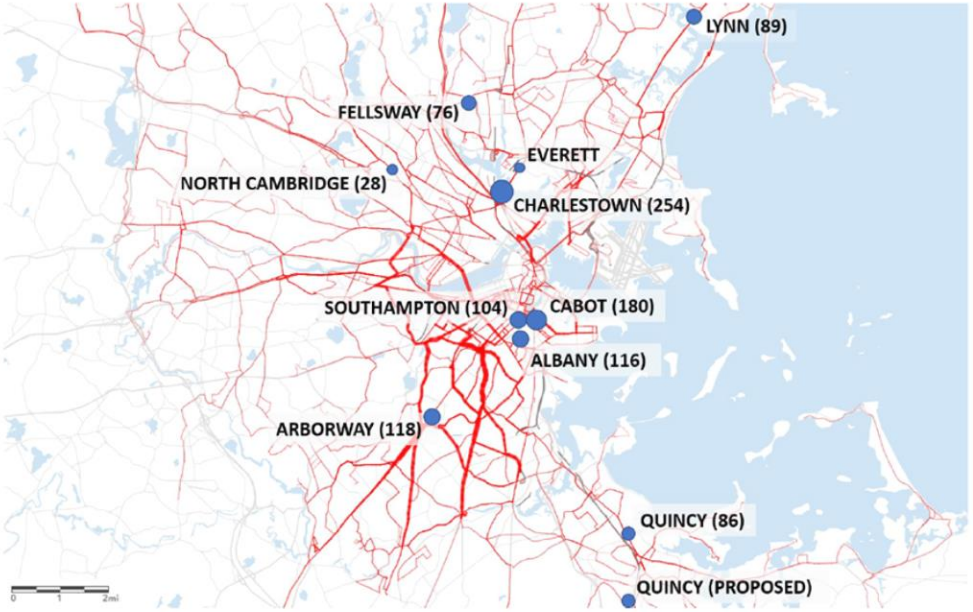
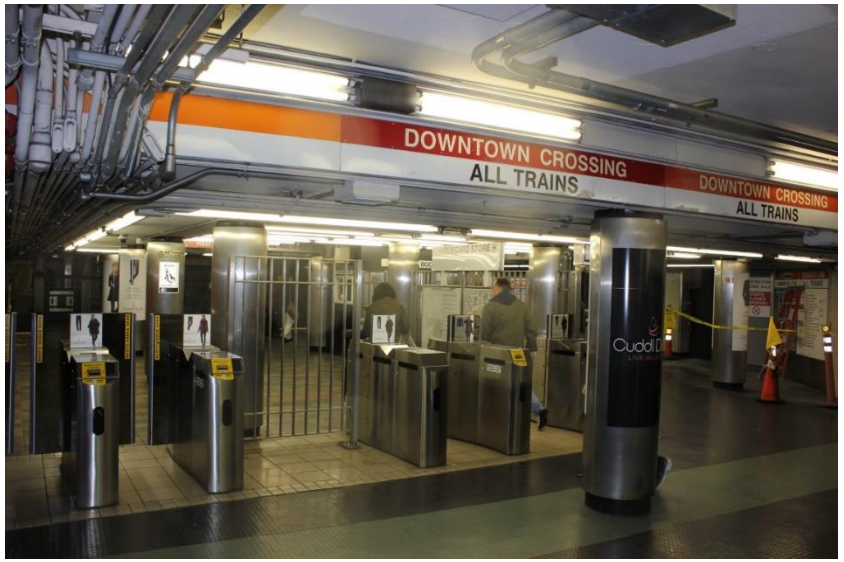
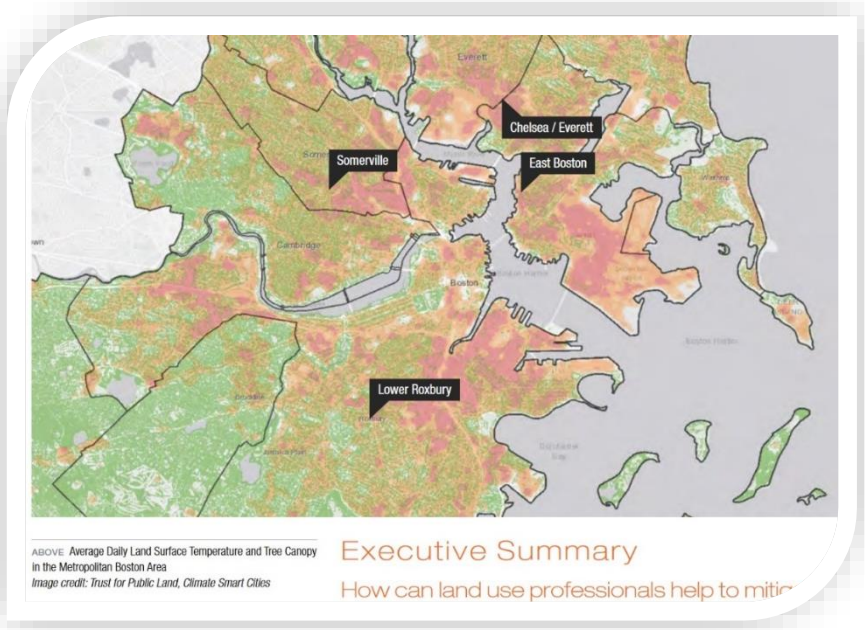


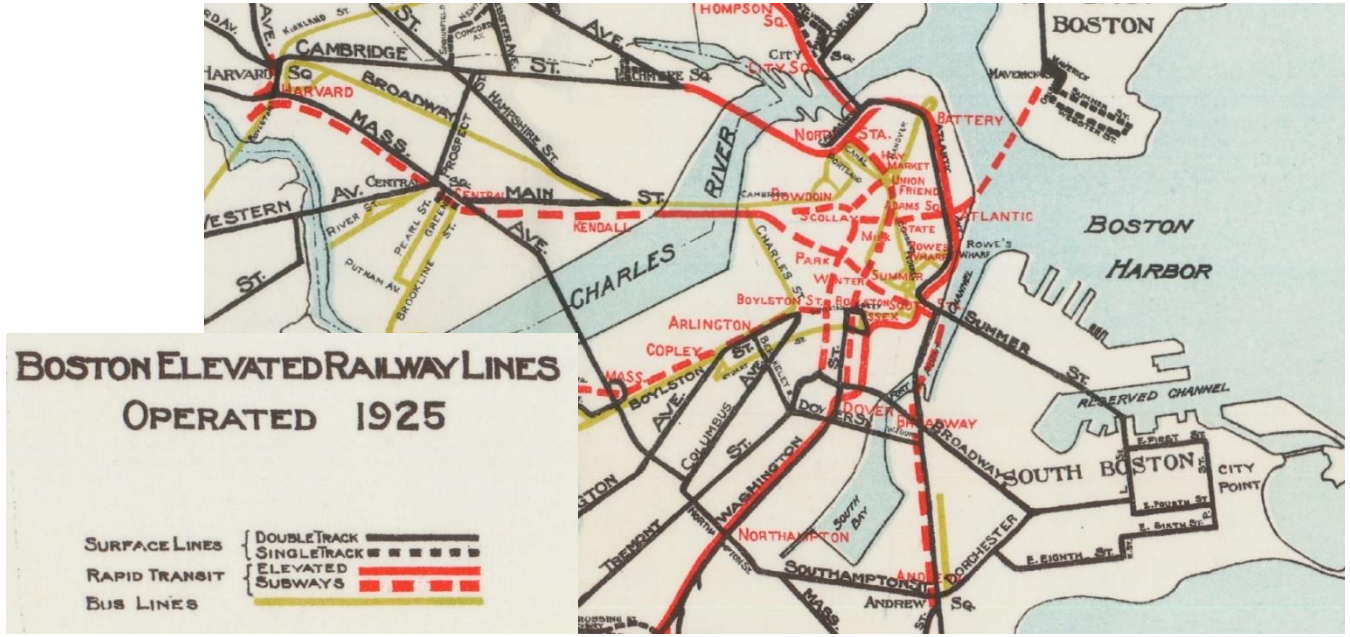
Figure 3: MBTA bus network and facility locations (with the number of buses currently housed at each facility; MBTA, 2020a). Note that the thickness of bus routes corresponds to average daily passenger flows during October 2019 (Caros, 2020).

‘Embed’: Set MBTA-specific climate resilience standards + incorporate Resiliency into Capital Projects

Heat: Rider Impacts + Service Disruptions



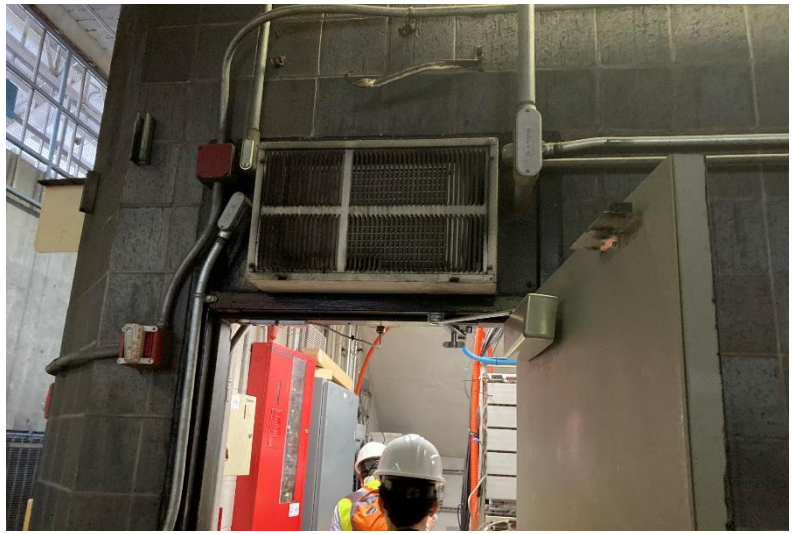




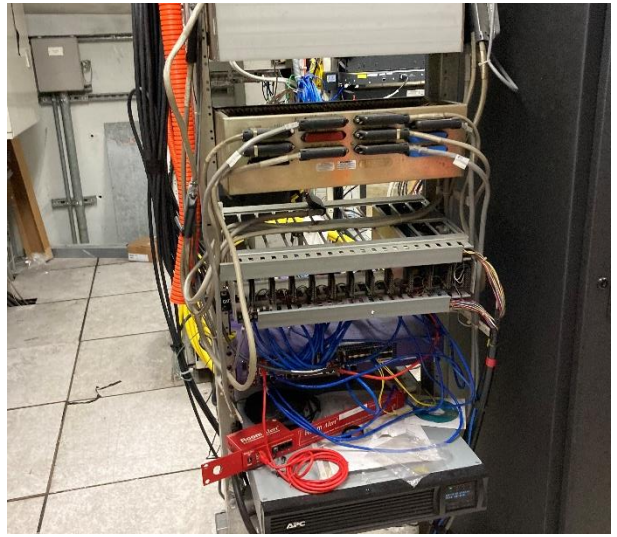
Hot, busy and slow: Heat wave may impact MBTA trains, tracks

Oak Grove, Malden (Orange Line) 2011

1) Brake dust generated from trains…



2) Clogs air-conditioners with dust, causing them to fail more frequently.



3) Resulting in over-heated communications equipment, which can lead to service disruptions.

‘Coordinate’ externally to share knowledge, develop policies, and work on regional resiliency projects

Protecting Vulnerable Infrastructure + Communities from Flooding

Exhibit A- 3. 2030 Annual Probability of Inundation

Orient Heights Car House: 2030 + 2070

Figure 15: Oil Water Separator

Figure 16: Building Systems – Fire Pump Control Unit

Figure 14: Security gate controller box

Figure 20: Blue Line Operations Signal Bungalow

Figure 19: Blue Line Operations Yard Catenary Controller and Disconnect Switch

Figure 17: Building Systems – Barn Fire Pump

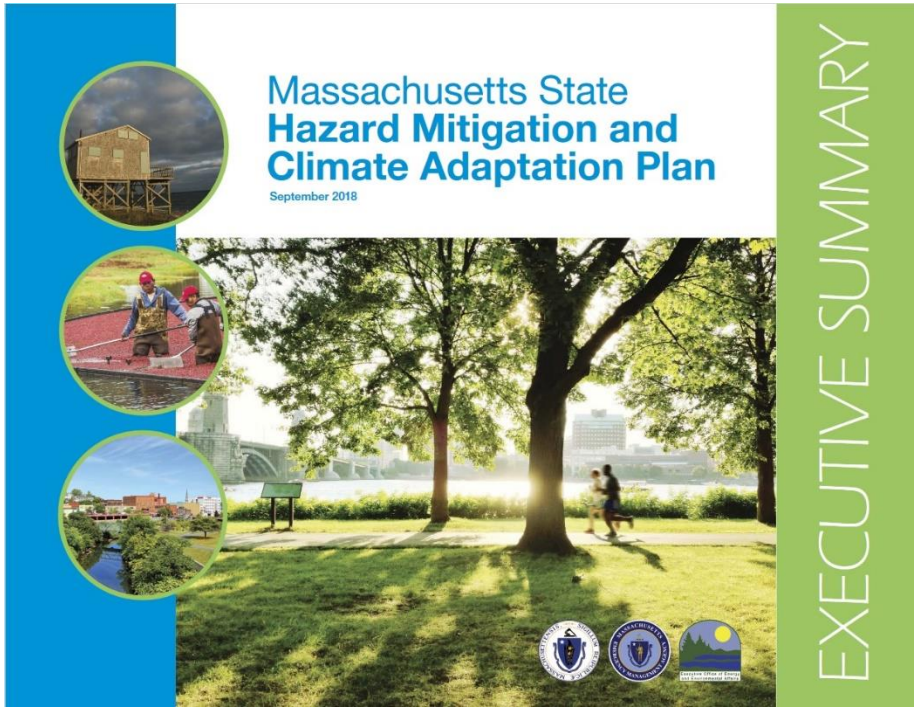
Figure 18: Maintenance Equipment – Wheel Truing Pit

Figure 21: Security Controllers (3)

Seeking Long-Term Nature-Based Solutions

Orient Heights Maintenance Facility and Train Yard, Blue Line, 2019 – USGS

‘Guide’: Develop a robust MBTA climate adaptation strategy



- Follow Federal + State Guidance
- Set Design Standards to align with latest science

- Capital Investment Plan Scoring

3	**Climate Change / Flood Risk** Infrastructrure investments that improve the system's resiliency to climate change-induced flooding over the course of the asset's intended lifetime. These efforts are focused on those projects that are within a 500-year floodplain throughout the asset's intended lifetime. Resource: CRAVAT Tool	Select the statement that most closely describes the project, and the score will auto-calculate. (Maximum of 3 points possible.)	
		Project is anticipated to make system more resilient to effects of climate change or severe weather (e.g., seawall repairs, flood protection at stations or facilities, generators, pumps, etc.) in an area expected to experience severe weather or flooding (i.e., Project is within a 500-year floodplain throughout the asset's intended lifetime.)	Select from list
		Project is not within an area likely to experience severe weather, and could easily be modified at a later time, at minimal cost, to protect against future flooding (e.g., protective wall heights, drainage, etc.)	Select from list
		Project is within a current or future 500-year floodplain and no resiliency actions are included. Additionally, any future modifications to mitigate flooding would likely be at significant cost (e.g., structure would need to be rebuilt or relocated)	Select from list
	Severe Weather Resiliency Infrastructure investments that improve the system's	Select the statement that most closely describes the project, and the score will auto-calculate. (Maximum of 1 point possible.)	

Using Enterprise Risk Management to develop Climate Change Resilience Policies & Procedures

Climate Resiliency at the MBTA