

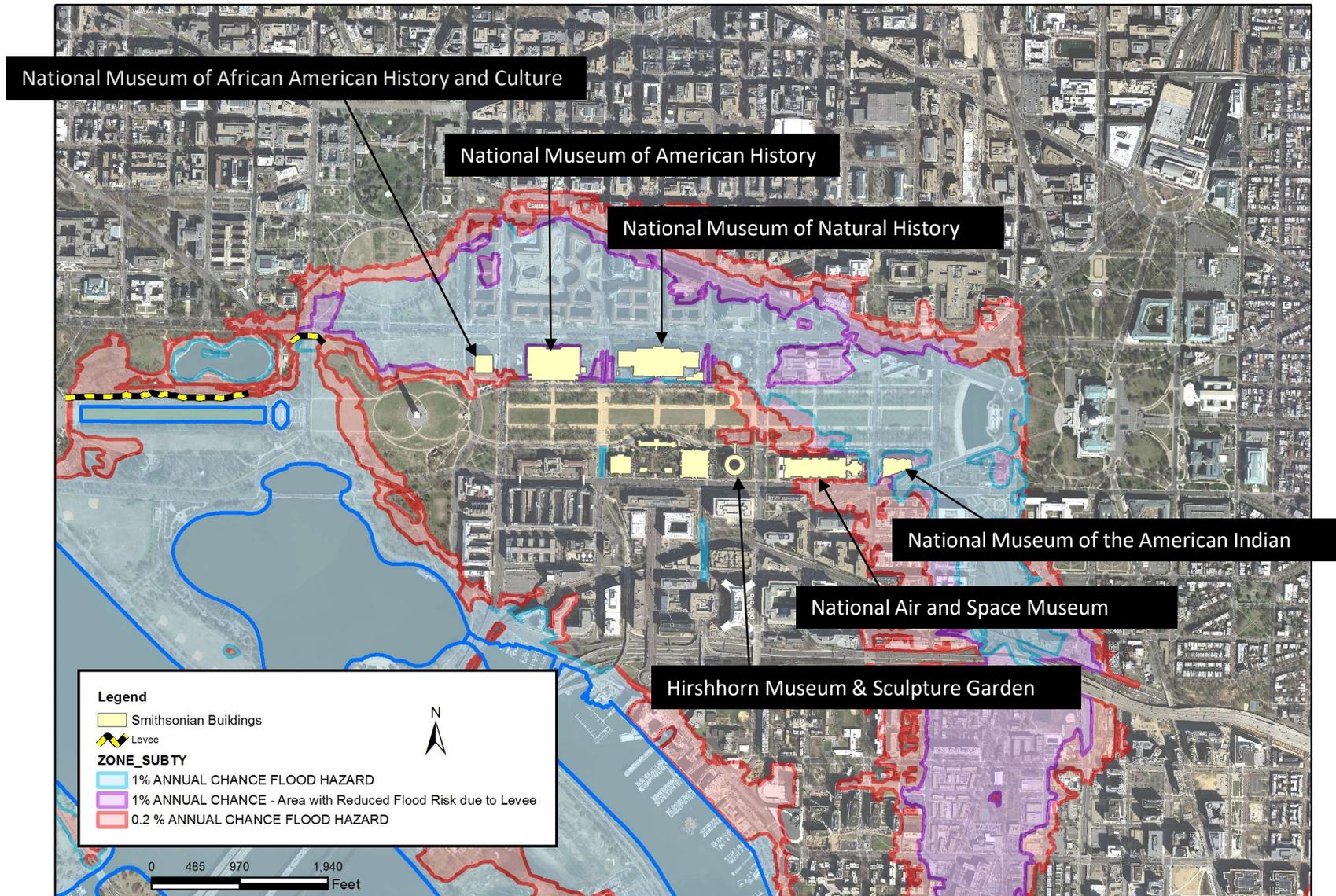
# Flood Risk Management



Smithsonian Institution



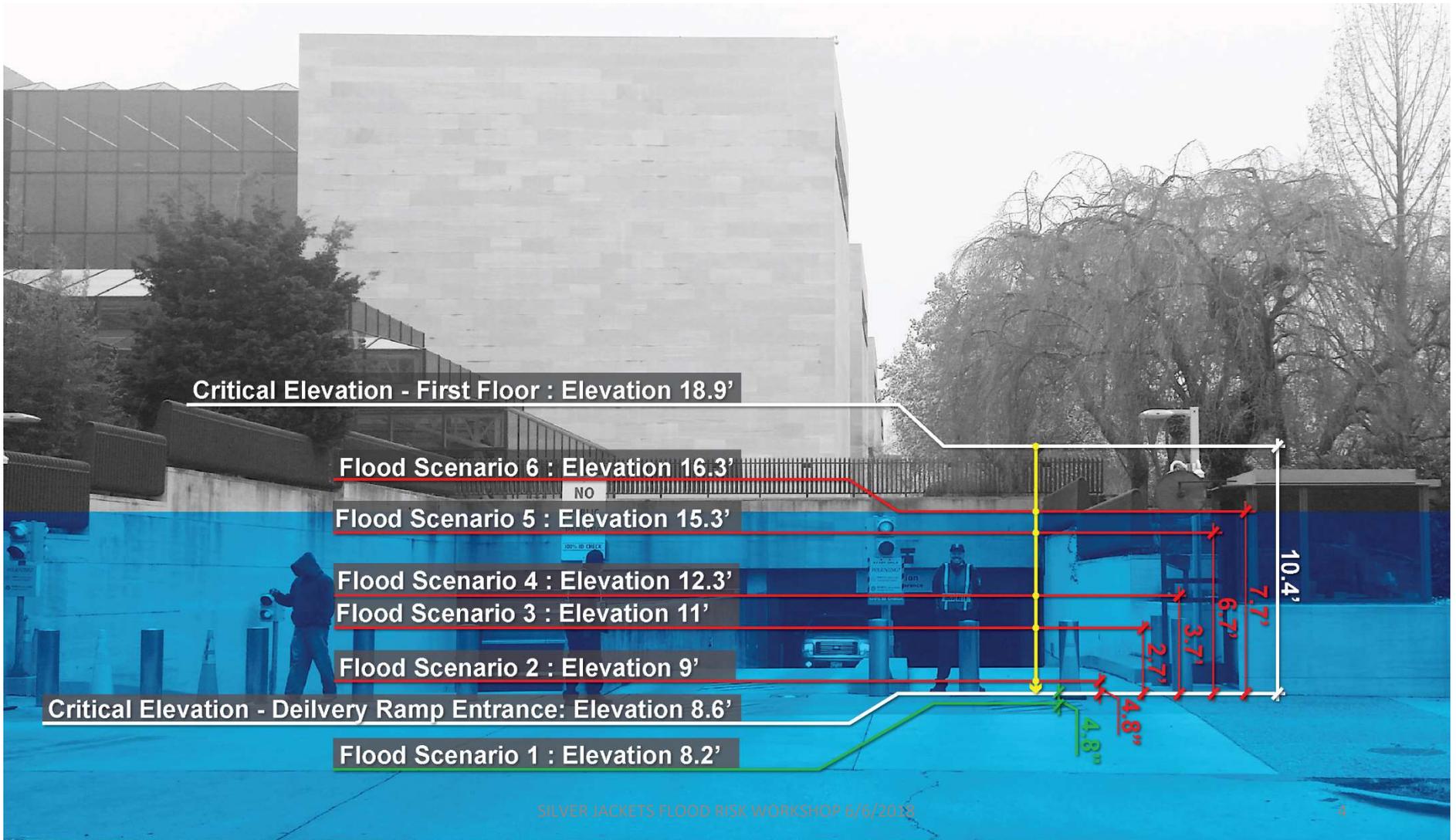
# Smithsonian on the Mall



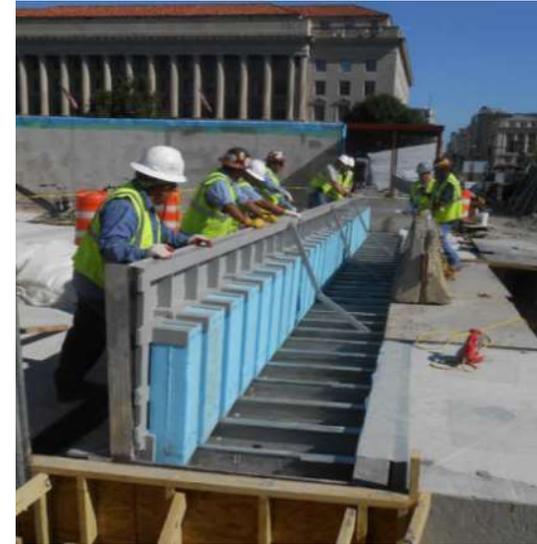
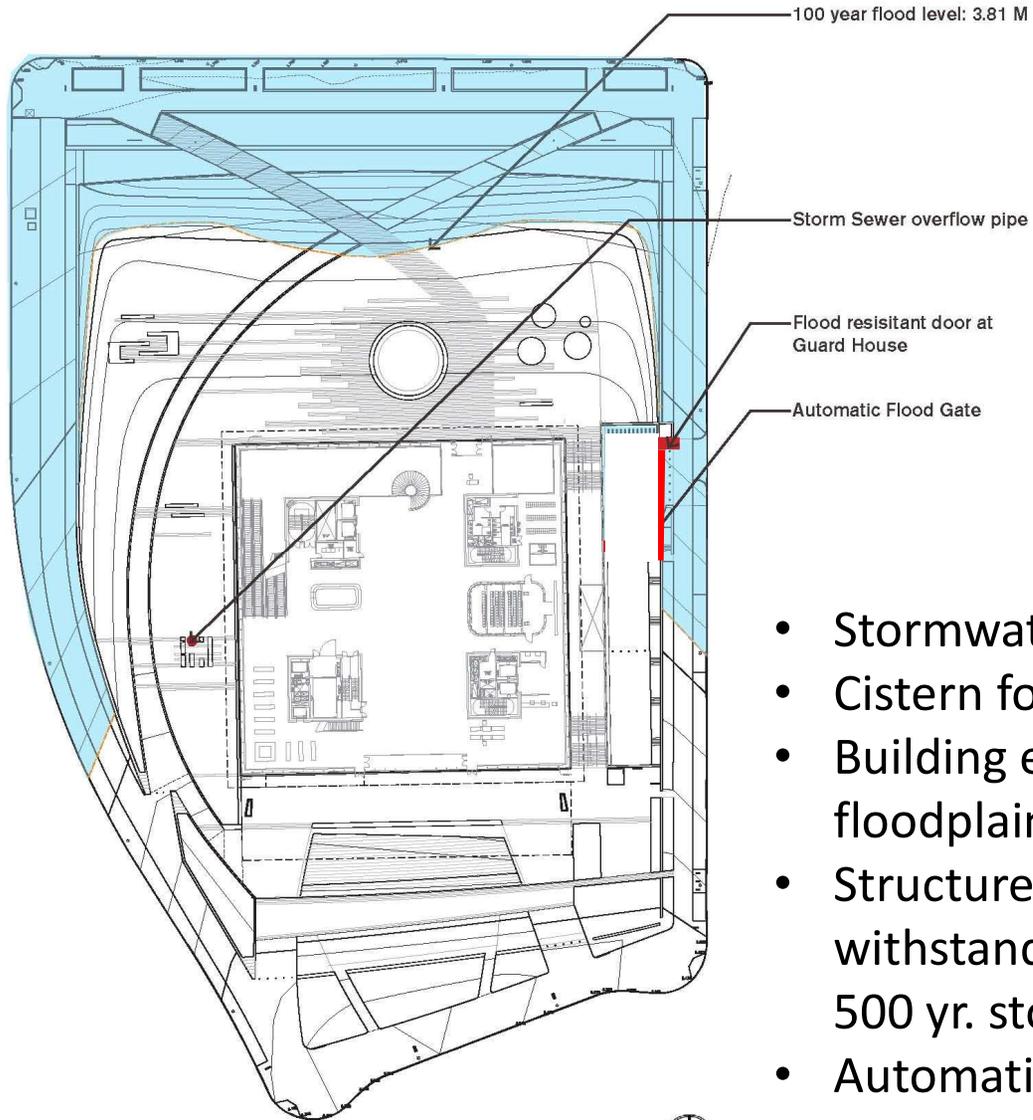
# Vulnerability Summary

National Mall Summary			AIB	Freer	Hirshorn	NASM	NMAAHC	NMAI	NMAH	NMNH	Quad	SIB
Climate Change Variable	Consequence	Time Frame										
Increased frequency & intensity of localized precipitation events	Interior Drainage Flooding (Pluvial)	Current	●	●	●	●	●	●	●	●	●	●
		2020s	●	●	●	●	●	●	●	●	●	●
		2080s	●	●	●	●	●	●	●	●	●	●
Coast Storms & Sea Level Rise	Storm Surge Flooding	Current -										
		2020s	○	○	●	●	●	●	●	●	○	○
		2050s	○	○	●	●	●	●	●	●	○	○
		2100s	○	○	●	●	●	●	●	○	○	
Vulnerability Level			●	●	●	●	●	●	●	●	○	○
	Very High	High	Moderate	Low	Minimal							

# Vulnerability – NASM



# Solution – NMAAHC

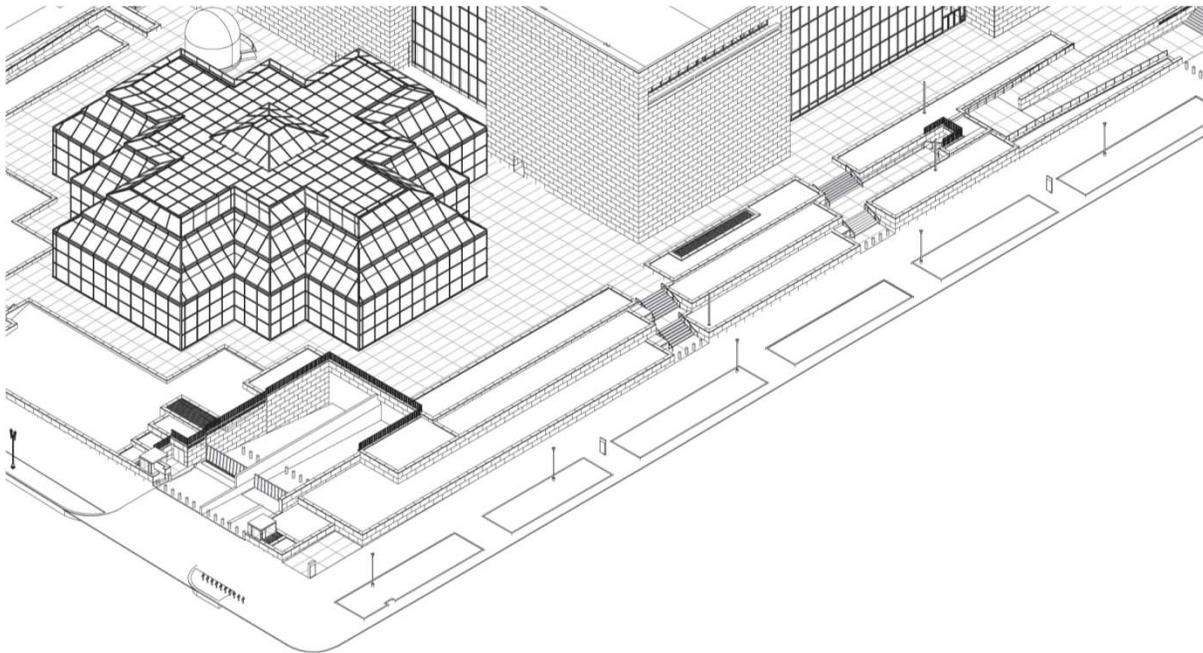


- Stormwater retention on site
- Cistern for rainwater re-use in building
- Building elevated above 100 yr. floodplain
- Structure below grade designed to withstand hydrostatic pressure of 500 yr. storm
- Automatic flood gate



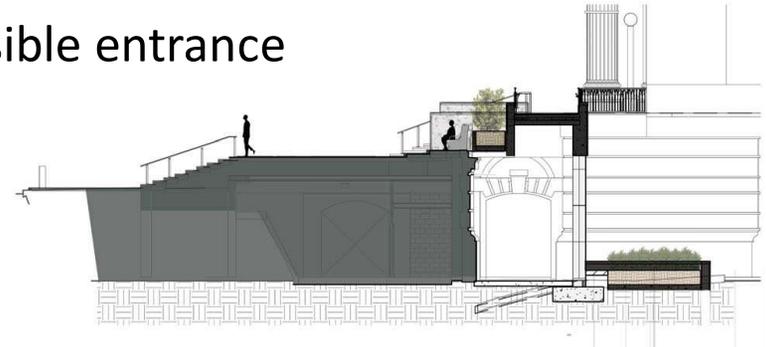
# Solution – NASM

- Floodgates at east protecting to 100 yr. + 3'
- Cisterns for stormwater retention, re-use of water for irrigation and toilets
- Tree preservation and tree planting
- Library, including rare books, moved to Hazy/Dulles



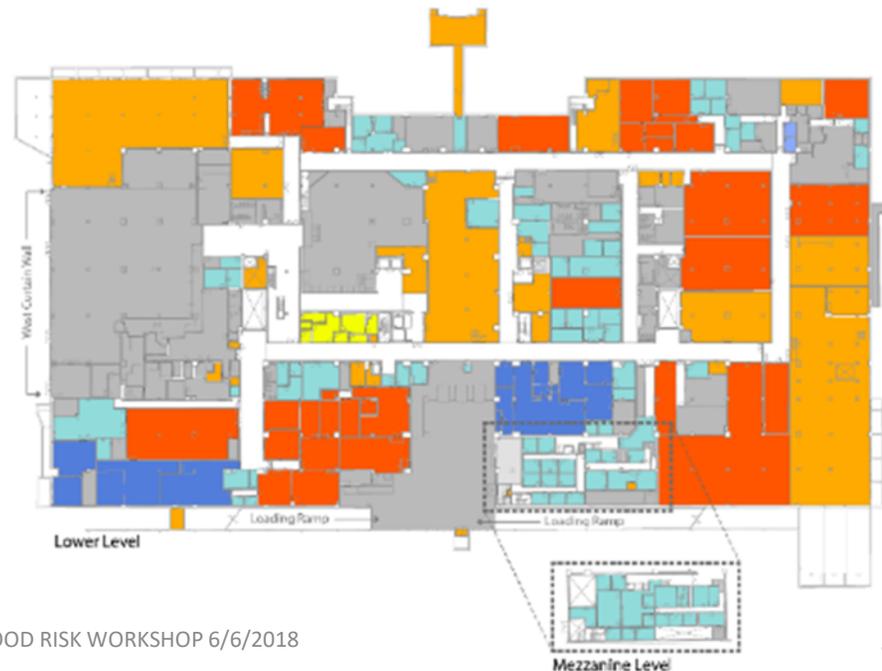
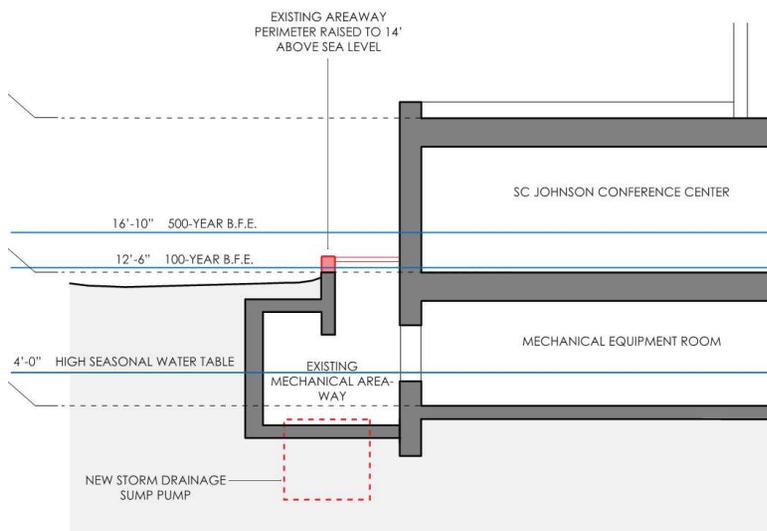
# Solution – NMNH

- Stormwater retention tank
- Sump pumps at building interstitial space and ramps & increased size of storm drain
- Waterproofing
- Bioretention planters with new accessible entrance



# Solution – NMAH Master Plan

- Hydraulically activated automatic flood barriers
- Rain gardens, bioswales, re-grading & increased tree canopy
- Cisterns
- Storm drain check valves
- Sump pumps independent of building's plumbing
- Flood wall integrated with perimeter security and light well
- Relocate collections including libraries from lower floors to upper floors
- Elevate mechanical equipment
- Raise intakes



# Continued Vulnerabilities

- Temporary flood barriers need storage and assembly
- Loss of utility service (power, steam)
- Loss of public transportation and communications
- Capacity of storm water systems
- Stress results in deterioration & increases maintenance
- Groundwater levels and quality