

Roadway Vulnerability Assessment



Maryland Department of Transportation
State Highway Administration

March 27, 2017

Climate Stressors

Sea Level Change

- USACE Procedures Established in Circular No. 1165-2-212 (2013)
- Newer LiDAR and Assign Nearest Tidal Station

Storm Surge

- HAZUS-MH 2.1 (Category 3 Storm Used)
- Stillwater Depth Grids Developed

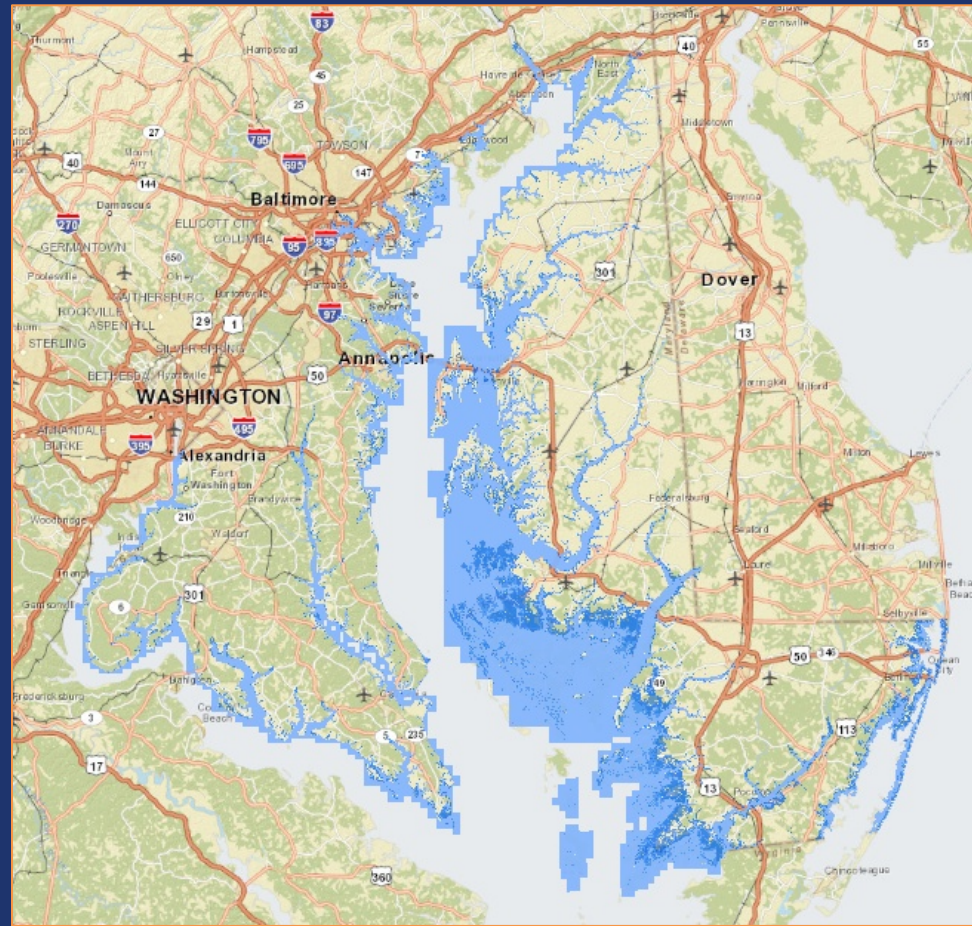
Precipitation

- Riverine Modeling in HAZUS-MH2.1 (future)

2050 & 2100 Sea Level Change

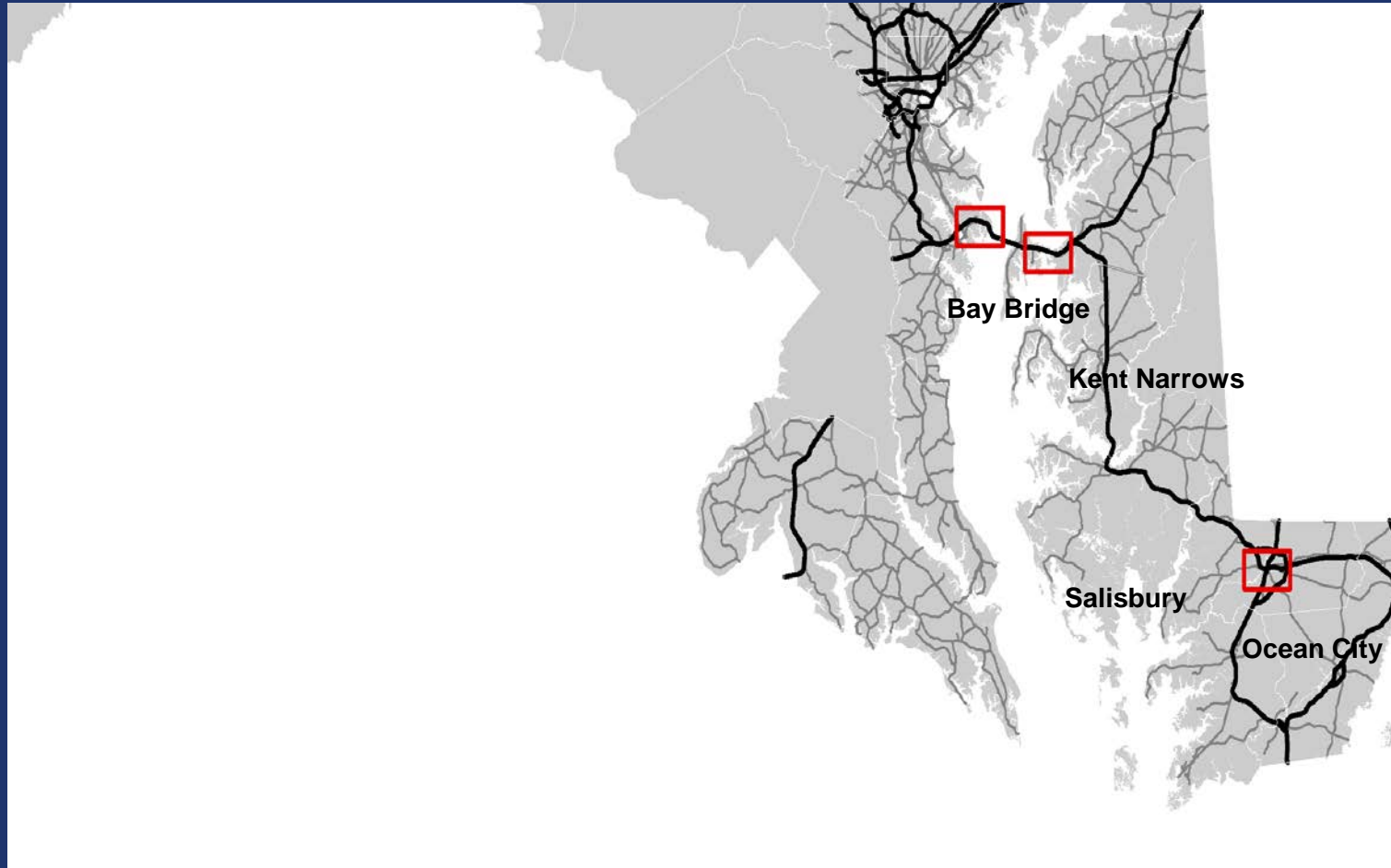
Eastern Shore Regional GIS Cooperative – Salisbury University

County	Tidal Station	2050		2100	
		MSL	MHHW	MSL	MHHW
Allegany	None	-	-	-	-
Anne Arundel	Annapolis	2.08	2.79	5.7	6.41
Baltimore	Baltimore	2.01	2.87	5.59	6.45
Baltimore City	Baltimore	2.01	2.87	5.59	6.45
Calvert	Solomons Island	2.1	2.82	5.76	6.48
Caroline	Cambridge	2.11	3.13	5.78	6.8
Carroll	None	-	-	-	-
Cecil	Chesapeake City	1.98	3.63	5.56	7.21
Charles	Washington DC	2.21	3.83	5.78	7.4
Dorchester	Cambridge	2.11	3.13	5.78	6.8
Frederick	None	-	-	-	-
Garrett	None	-	-	-	-
Harford	Baltimore	2.01	2.87	5.59	6.45
Howard	None	-	-	-	-
Kent	Annapolis	2.08	2.79	5.7	6.41
Montgomery	None	-	-	-	-
Prince Georges	Washington DC	2.21	3.83	5.78	7.4
Queen Annes	Annapolis	2.08	2.79	5.7	6.41
Somerset	Cambridge	2.11	3.13	5.78	6.8
St. Mary's	Solomons Island	2.1	2.82	5.76	6.48
Talbot	Cambridge	2.11	3.13	5.78	6.8
Washington	None	-	-	-	-
Wicomico	Cambridge	2.11	3.13	5.78	6.8
Worcester	Ocean City	2.06	3.25	5.86	7.05



Methodology – USACE: Sea-Level Change Considerations for Civil Works Programs, October 2013

Maryland Study Areas



Maryland Coastal Vulnerability

Maryland's US Roadway Infrastructure at Mean Sea Level during 1% Annual Chance Event

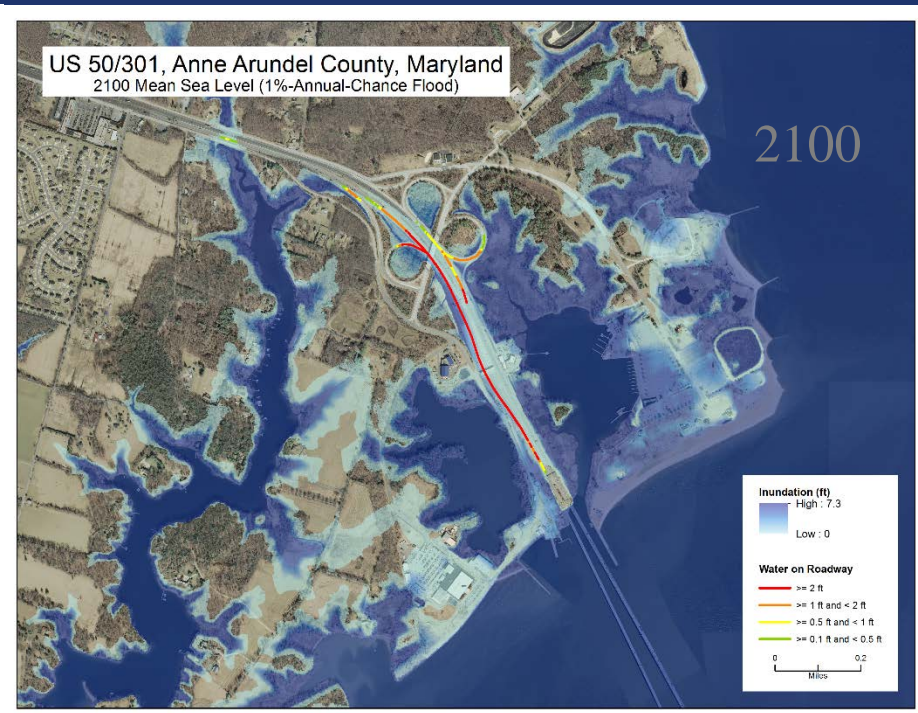
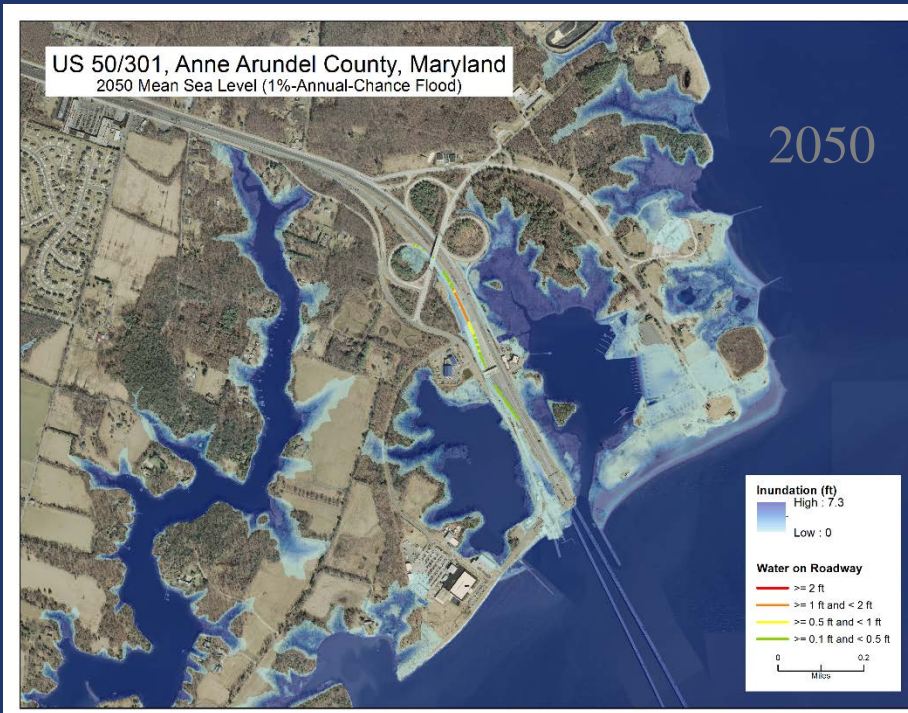
Functional Classification	Water on Roadway	Total Roadway (ft) (2015)	Total Roadway (ft) (2050)	Total Roadway (ft) (2100)
Interstate	> 0.1'	-	1,003	5,752
Other Freeways and Expressways	> 0.1'	119	2,514	13,787
Other Principal Arterial	> 0.1'	54,624	80,202	170,527
TOTAL		54,743	83,719	190,066

Maryland's US Roadway Infrastructure at Mean Sea Level during 0.2% Annual Chance Event

Functional Classification	Water on Roadway	Total Roadway (ft) (2015)	Total Roadway (ft) (2050)	Total Roadway (ft) (2100)
Interstate	> 0.1'	996	3,845	7,487
Other Freeways and Expressways	> 0.1'	2,388	7,130	22,891
Other Principal Arterial	> 0.1'	75,701	112,889	206,037
TOTAL		79,085	123,864	236,415

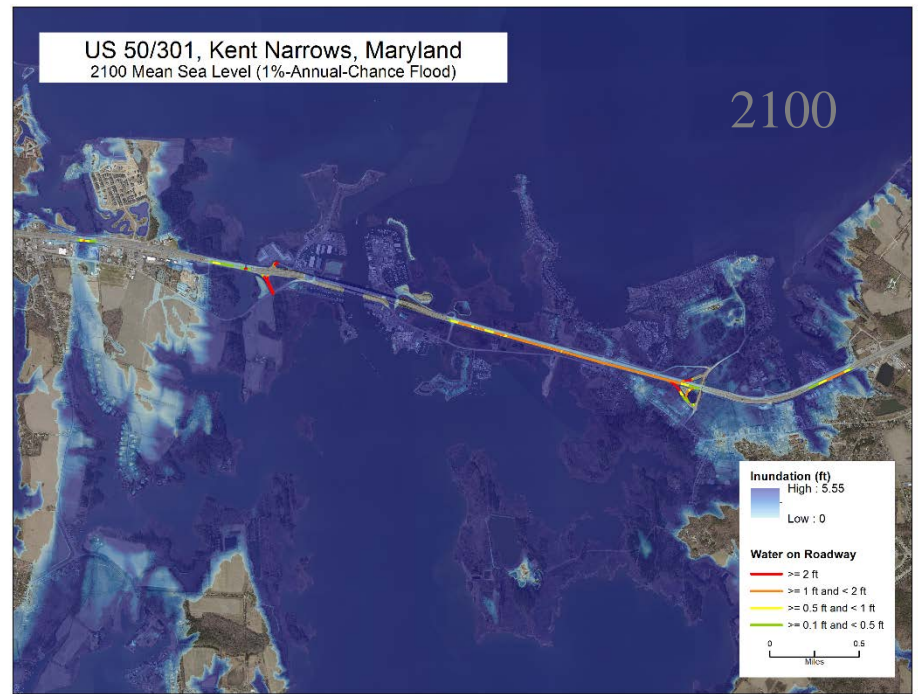
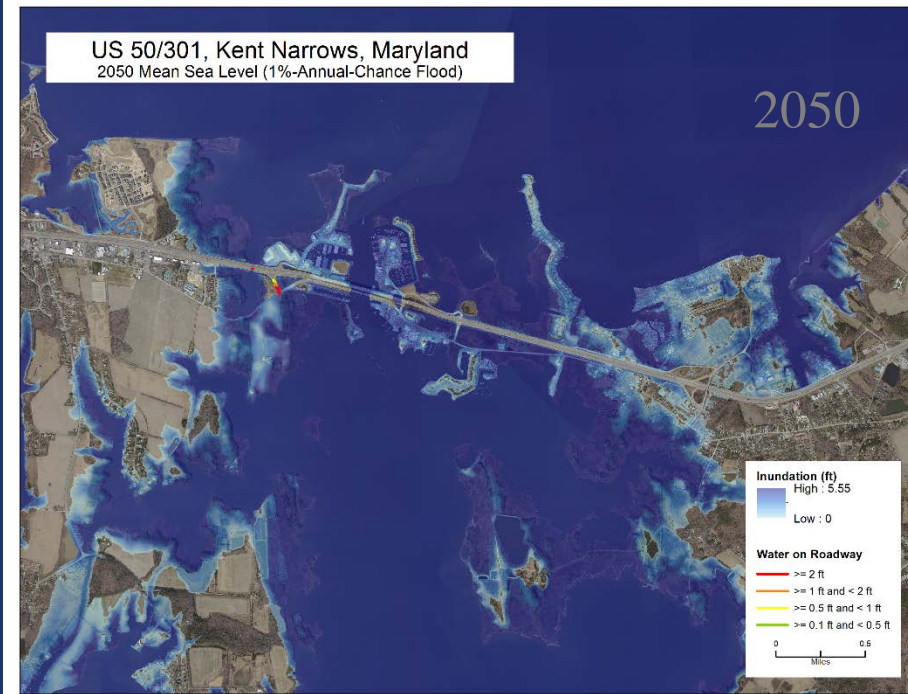
100-Year Storm in 2050 & 2100

Bay Bridge



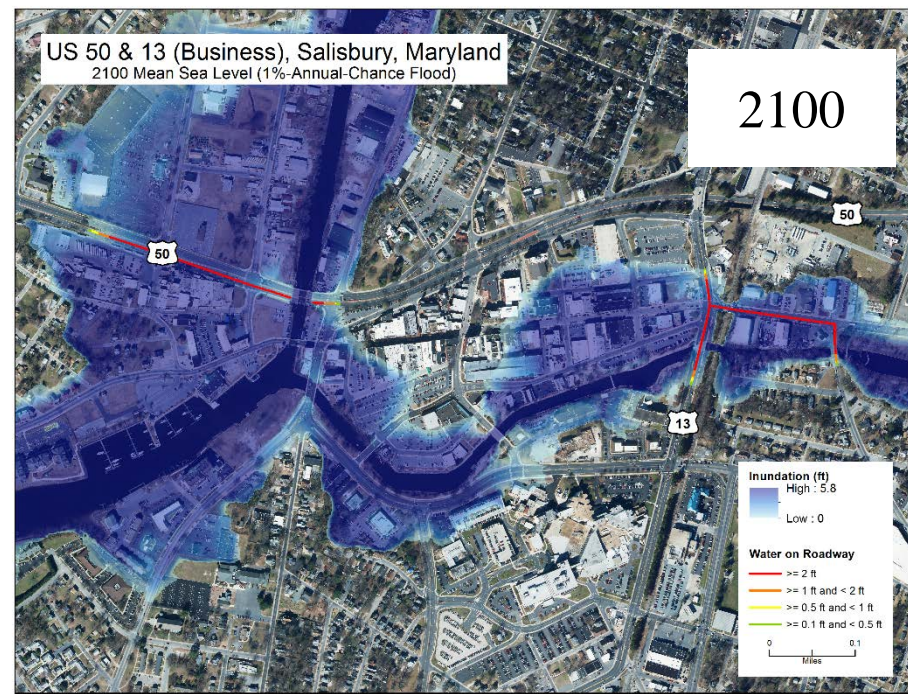
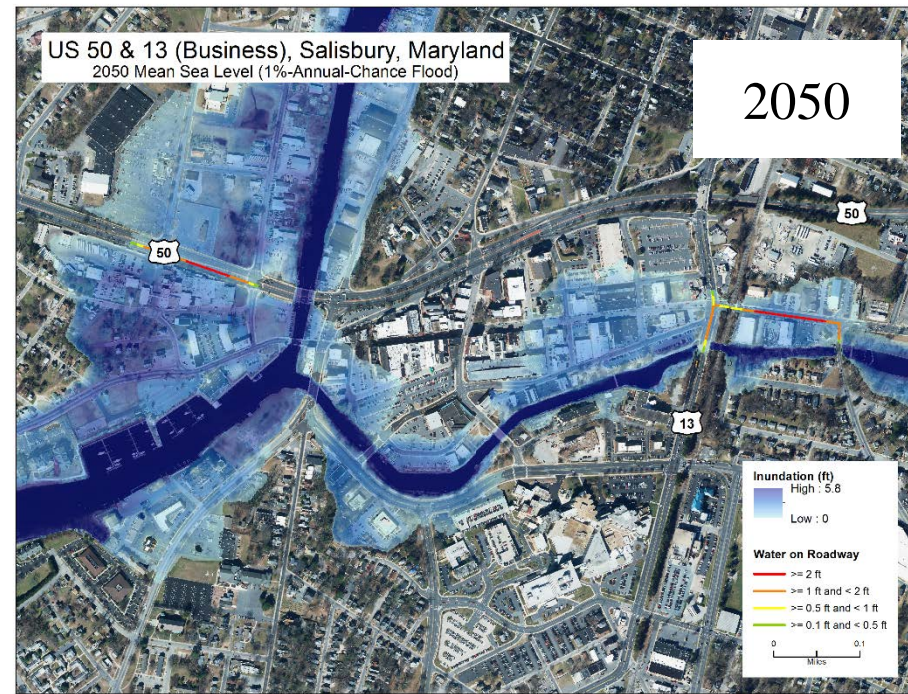
100-Year Storm in 2050 & 2100

Kent Narrows



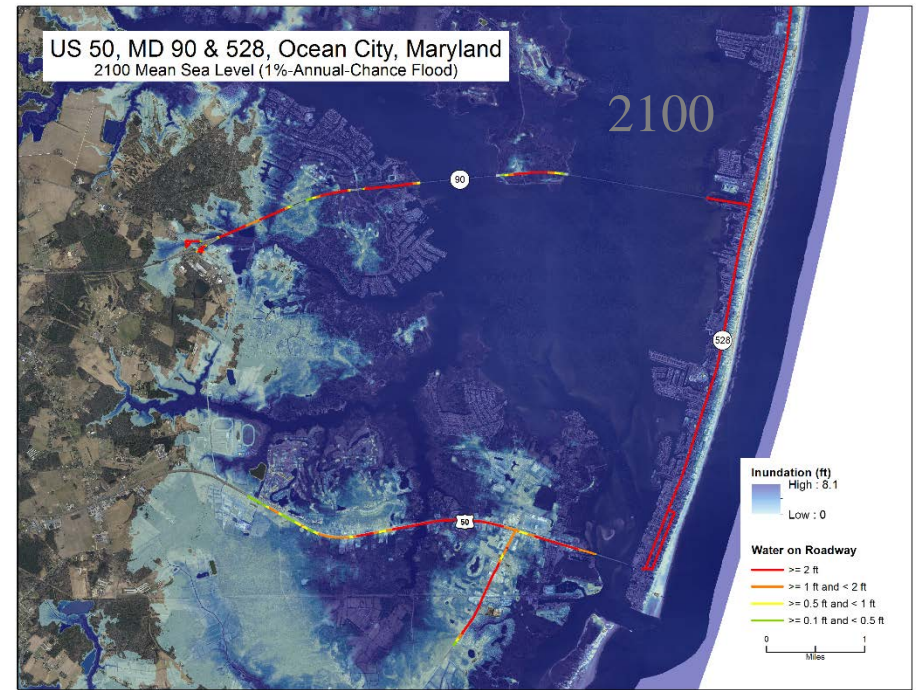
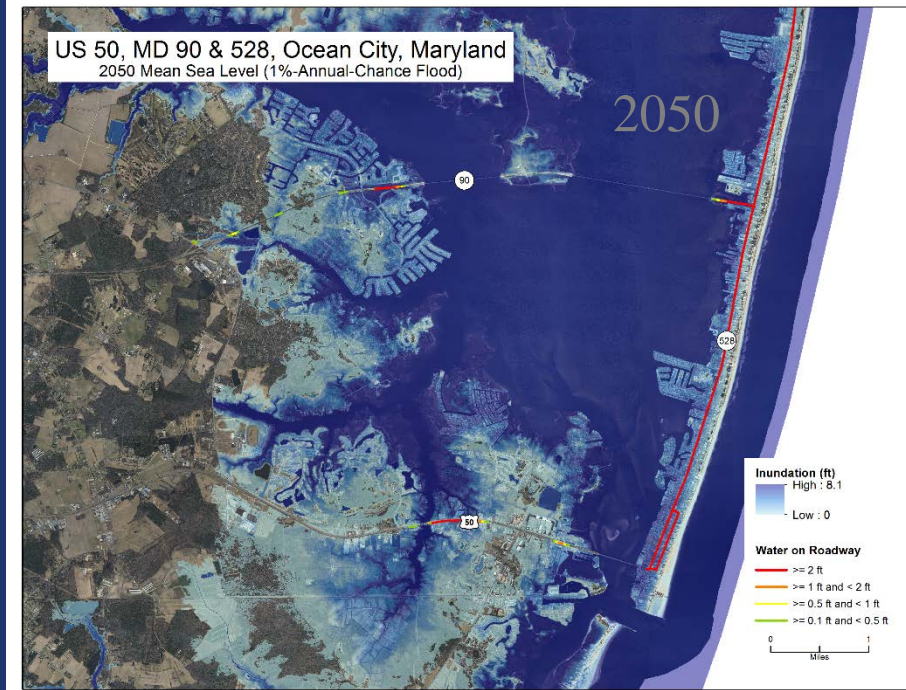
100-Year Storm in 2050 & 2100

Salisbury

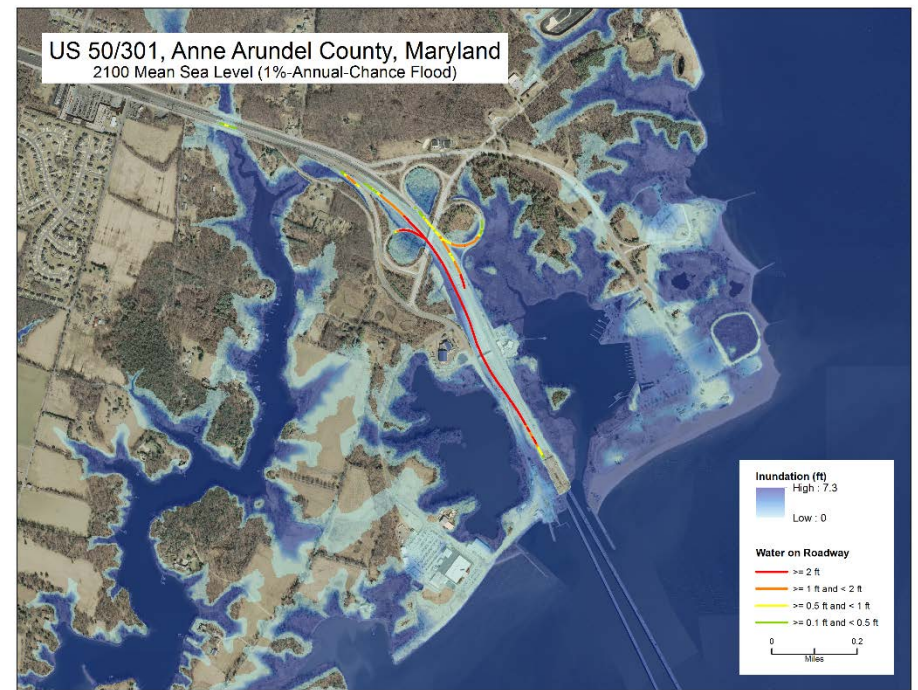
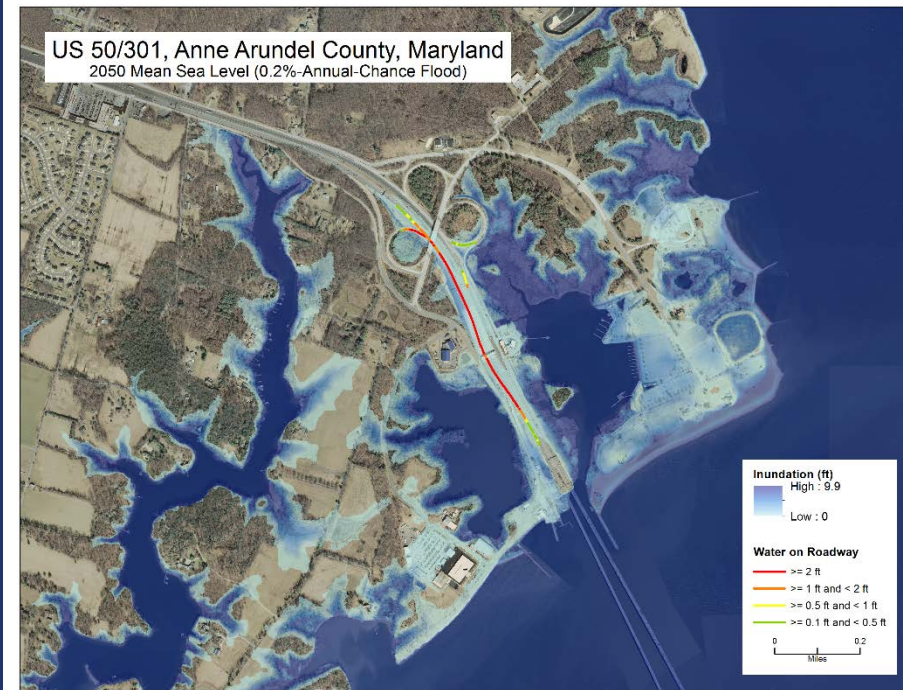


100-Year Storm in 2050 & 2100

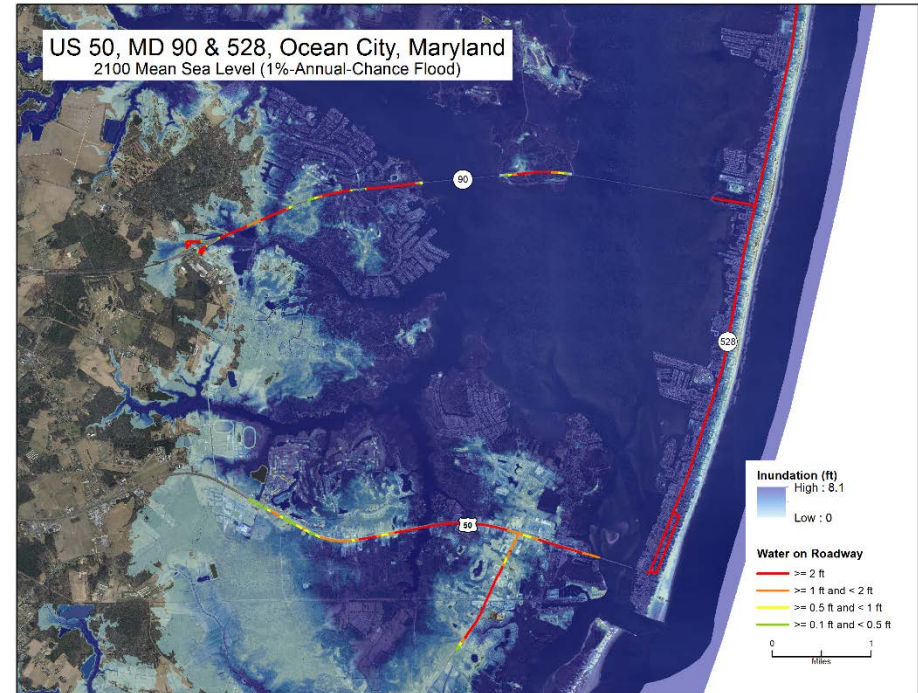
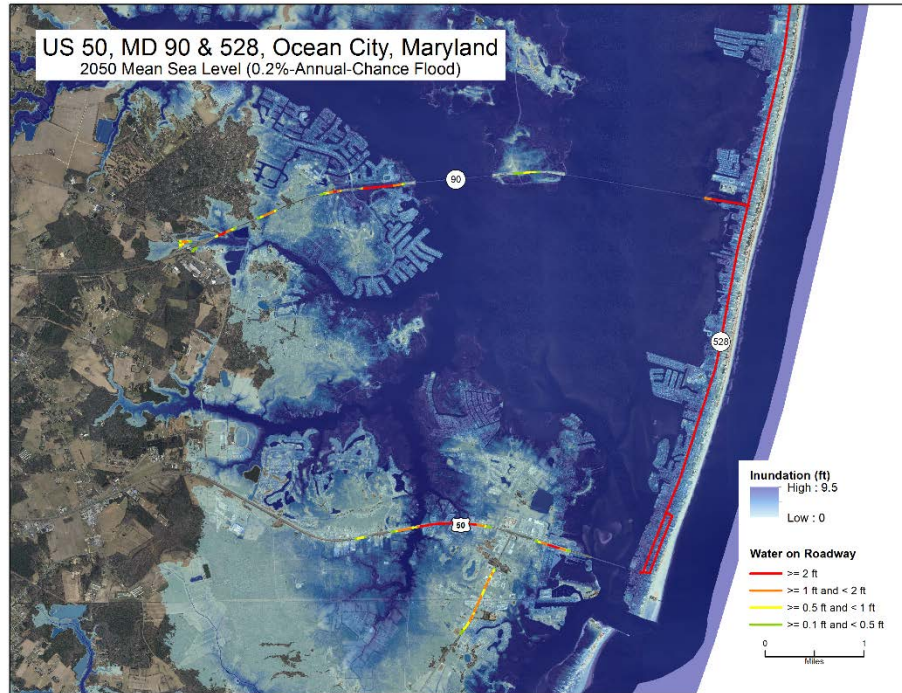
Ocean City



500-Year Storm in 2050 & 100-Year Storm in 2100 at the Bay Bridge



500-Year Storm in 2050 & 100-Year Storm in 2100 at Ocean City



Questions

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410-545-8563

**Climate Change Adaptation Plan with Detailed Vulnerability
Assessment, October 2014**

http://www.fhwa.dot.gov/environment/climate_change/adaptation/ongoing_and_current_research/vulnerability_assessment_pilots/2013-2015_pilots/index.cfm