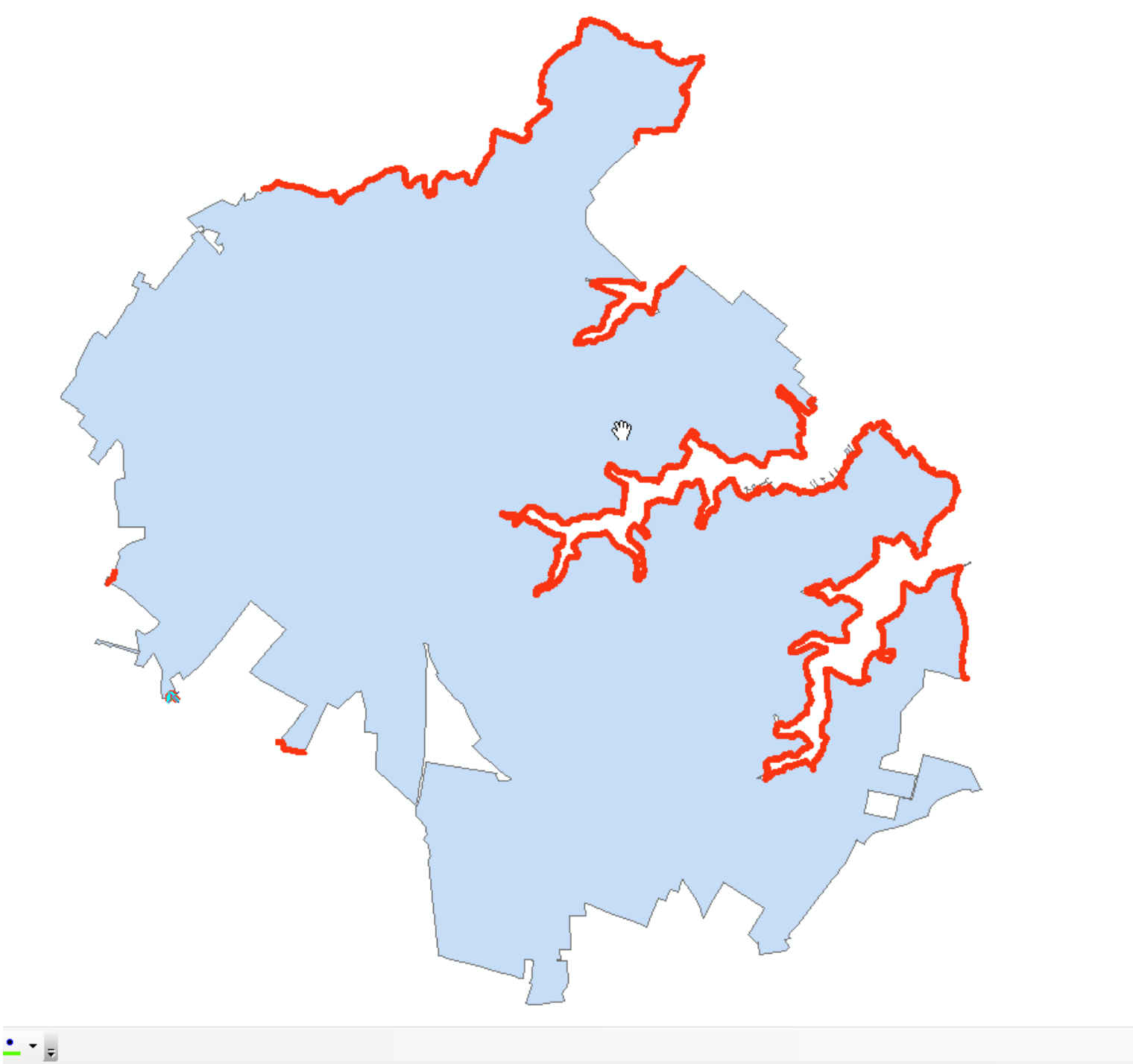
Annapolis, Maryland
Notes from the Front

Michael Dowling **ARCHITECT**

YAMAHA
SEA HUNT

NO
DOCKING
LONG FENCE

Look up. Look out.
NORTH SAILS
Marine Art Gallery



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MIT GIS

N
W E
S

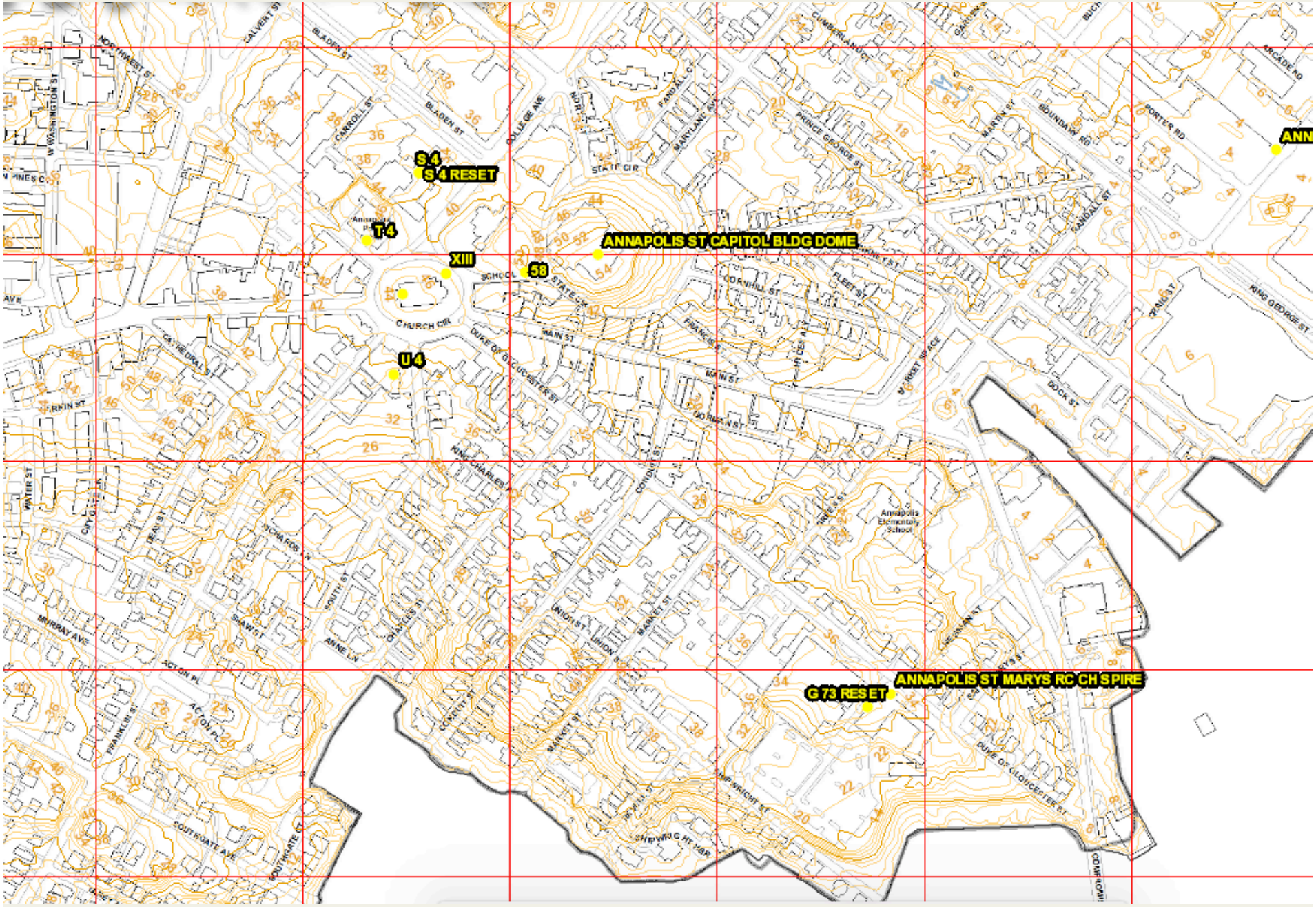
Title: Hazard Mitigation Project Area

Legend

Date Prepared:	Required Field
Time Represented:	Required Field
Map Created By:	User: SWampler
Map Checked By:	Required Field
Department Use:	Required Field

City of Annapolis MIT GIS

Total Number of Properties: 167
Commercial Properties: 101
Residential Properties: 66
Number of Dwelling Units: 90
Approximate Total of Residents: 270


S 4
S 4 RESET
T 4
XIII
58
U 4
ANNAPOLIS ST CAPITOL BLDG DOME
G 73 RESET
ANNAPOLIS ST MARYS RC CH SPIRE
ANN
CALVERT ST
BLADEN ST
CARROLL ST
COLLEGE AVE
STATE CIR
PRINCE GEORGE ST
MARTIN ST
BOUNDARY RD
PORTER RD
ARCADE RD
RANDALL ST
KING GEORGE ST
CHURCH CIR
DUKE OF GLOUCESTER ST
MAIN ST
CORNHILL ST
FLEET ST
FRANCIS ST
MARKET SPACE
DOCK ST
CATHEDRAL ST
KING CHARLES ST
CONDUIT ST
UNION ST
MARKET ST
SHIPWRIGHT ST
SHIPWRIGHT HBR
SOUTH ST
CHARLES ST
ANNE LN
SHAW ST
MURRAY AVE
ACTON PL
FRANKLIN ST
SOUTHGATE AVE
SOUTHGATE CT
WATER ST
CITY GATE LN
DEAN ST
Annapolis Elementary School

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations tables in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations tables should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 18N. The **horizontal datum** was NAD 83, GRS 80 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of information shown on this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242**, or visit its website at http://www.ngs.noaa.gov.

Base map information was provided by the Anne Arundel County GIS Department. The digital ortho imagery was compiled by Axis Geospatial at a scale of 1:100 with a 6 inch ground pixel resolution, and published by the Maryland Department of Information Technology in 2011.

This map reflects more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to confirm to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

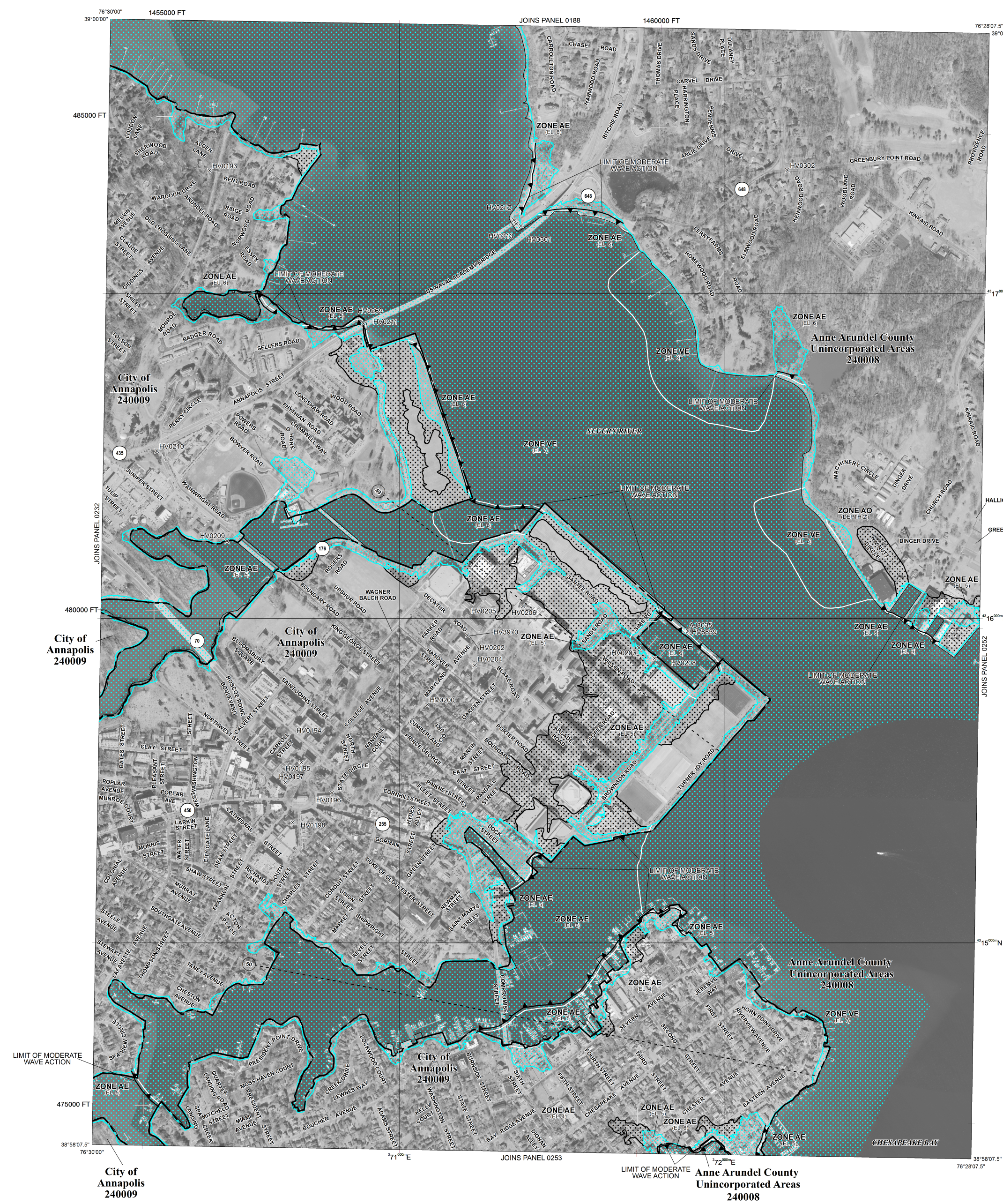
Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

The AE Zone category has been divided by a **Limit of Moderate Wave Action (LiMWA).** The LiMWA represents the approximate landward limit of the 1.5-foot breaking wave. The effects of wave hazards between the VE Zone and the LiMWA (or between the shoreline and the LiMWA for areas where VE Zones are not identified) will be similar to, but less severe than those in the VE Zone.

Contact the **FEMA Map Information eXchange** at 1-877-336-2627 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study report, and/or digital versions of this map. The FEMA Map Information eXchange may also be reached by Fax at 1-800-358-9620 and their website at http://www.msc.fema.gov/.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMA MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/business/nfip.



LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X Areas determined to be outside the 0.2% annual chance floodplain.

ZONE D Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

1% annual chance floodplain boundary

0.2% annual chance floodplain boundary

Floodway boundary

Zone D boundary

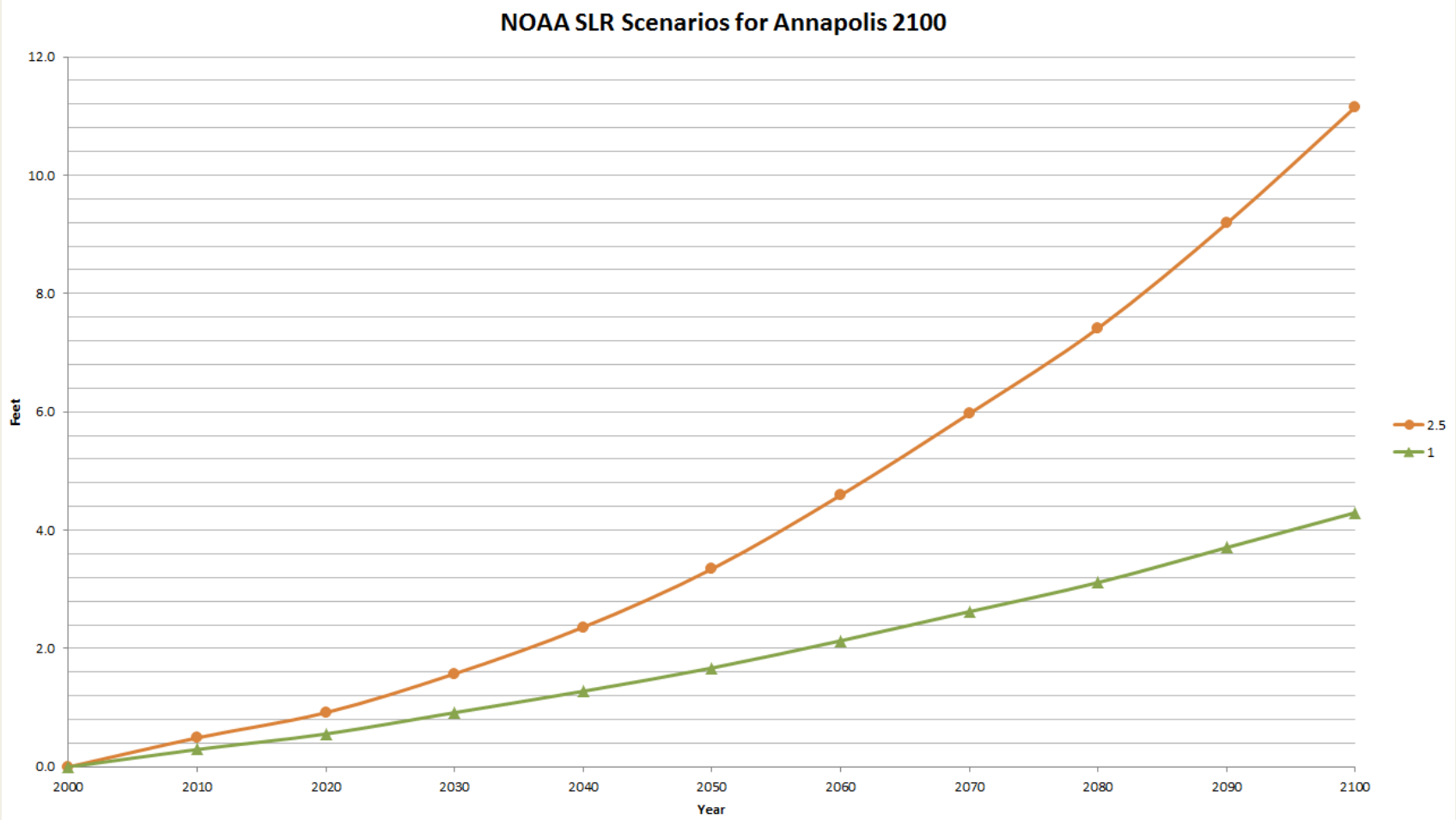
CBRS and OPA boundary

Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.

Limit of Moderate Wave Action

~~~ 513 ~~~ Base Flood Elevation line and value; elevation in feet*

(EL 987) Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988

(A)——(A) Cross section line

(23)- - -(23) Transect line

87°07'45", 32°22'30" Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere

$^{24}76^{000m}$N 1000-meter Universal Transverse Mercator grid values, zone 18N

600000 FT 5000-foot grid values: Maryland State Plane coordinate system (FIPSZONE 1900), Lambert Conformal Conic projection

DX5510 × Bench mark (see explanation in Notes to Users section of this FIRM panel)

● M1.5 River Mile

MAP REPOSITORY
Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
October 16, 2012

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
February 18, 2015 - To incorporate new detailed coastal flood hazard analysis and to reflect updated topographic information.

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your Insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

N

MAP SCALE 1" = 500'

250 0 500 1000 FEET

150 0 150 300 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0251F

FIRM
FLOOD INSURANCE RATE MAP

ANNE ARUNDEL COUNTY, MARYLAND
AND INCORPORATED AREAS

PANEL 251 OF 385

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
ANNAPOLIS, CITY OF	240009	0251	F
ANNE ARUNDEL COUNTY	240008	0251	F

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
24003C0251F

MAP REVISED
FEBRUARY 18, 2015

Federal Emergency Management Agency
~~~

Consider 2 Scenarios



Protecting Our Historic Seaport

Tropical Storm Isabel – Sept. 19, 2003

Protecting Our Historic Seaport

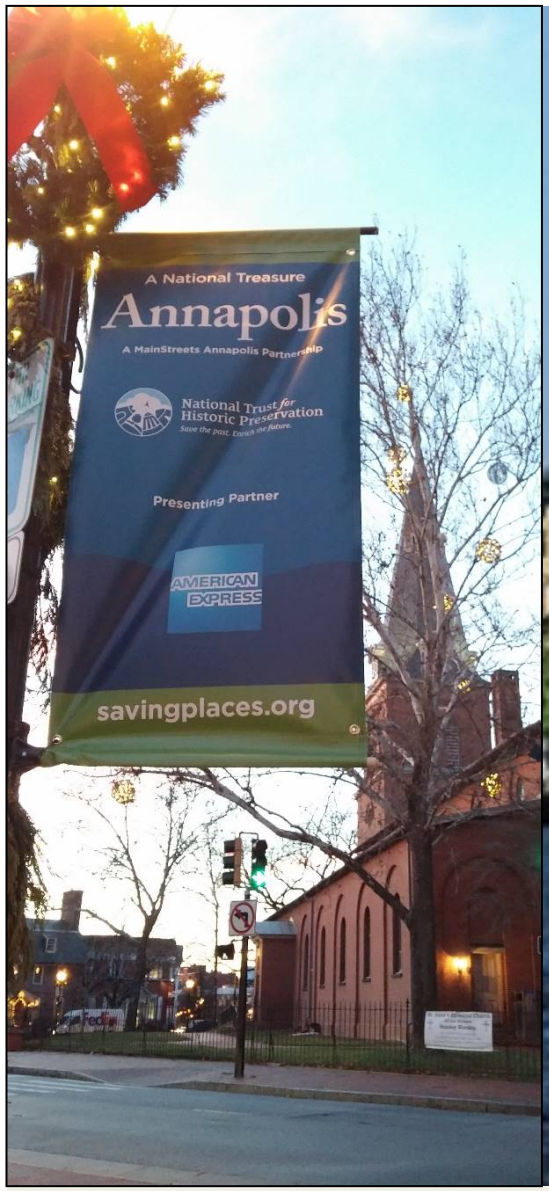
Tropical Storm Isabel - Annapolis

Protecting Our Historic Seaport

Tropical Storm Isabel – US Naval Academy

ARMADILLO's
ARMADILLO'S BAR & GRILL
132
DUCK STREET
featuring
cones · shakes · floats · sundaes · sodas
ATM
Open
Storm Bros
Ice Cream Factory
STARBUCKS COFFEE
NAVY

JEWELRY & GIFTS
HARBOUR SQUARE



WEATHER IT TOGETHER
Building Resilience

The Annapolis Model for Cultural Resource Hazard Mitigation Planning

CITY OF ANNAPOLIS

City of Annapolis / USNA

Risk Assessment: FEMA Flood Insurance Rate Map

Current FIRM

Blue shading 1% annual chance (100-year) flood

Orange shading is 0.2% annual chance (500-yr) flood

City of Annapolis / USNA

Risk Assessment: 2100 FIRM

Flood elevation 8.2 ft.

1% annual chance flood (4.5') plus 3.7 feet for sea level rise by 2100

Protecting Our Historic Seaport

FEMA Hazard Mitigation Planning

Integrating Historic Property and Cultural Resource Considerations Into Hazard Mitigation Planning

State and Local Mitigation Planning How-To Guide

FEMA 386-6 / May 2005

FEMA

Hazard mitigation planning is the process of determining how to reduce or eliminate the loss of life and property damage resulting from natural and manmade hazards.

1. Organizing your efforts to develop a mitigation plan;
2. Identifying hazards and assessing losses to your community;
3. Setting mitigation priorities and goals and writing the plan;
4. Implementing the mitigation plan, including project funding.

Step 1 – Organize Resources

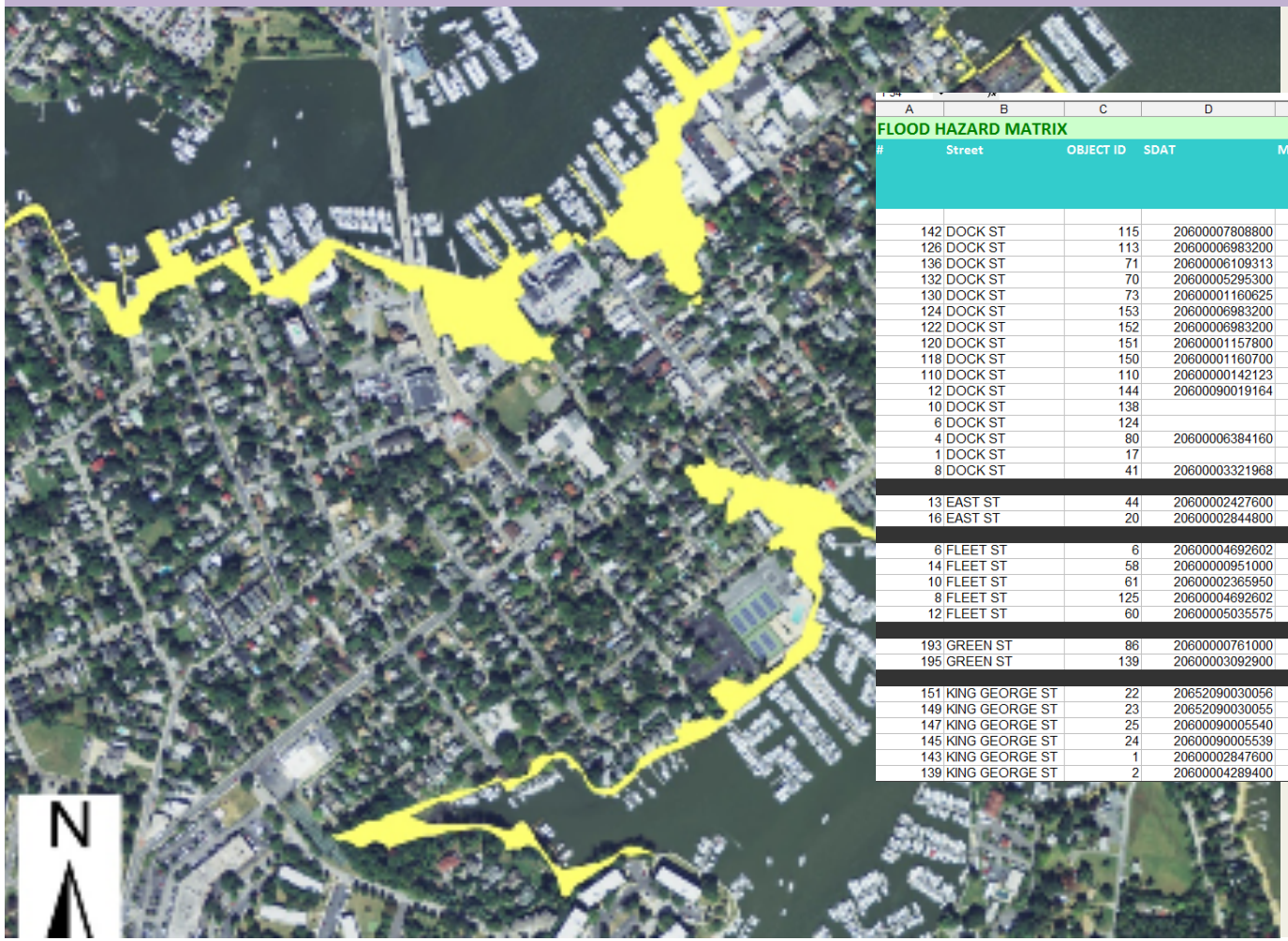
Build the Planning Team

Organize your efforts to develop an effective mitigation plan… bringing together the appropriate planning team, consultants, technology, community support and financial resources.

Step 1 – Organize Resources

Utilize the Necessary Technology (GIS)

Develop a database of historic survey, risk assessment and elevation information for City Dock and Eastport cultural resources.



FLOOD HAZARD MATRIX

#	Street	OBJECT ID	SDAT	MHT Inventory	Date of Construction	Use	First Floor Elevation	Lowest Opening Elevation	Total Square Footage
142	DOCK ST	115	20600007808800	AA-548	1880	Attached Comr	3.74	3.74	5720
126	DOCK ST	113	20600006983200	AA-1239	1875	Commercial			6026
136	DOCK ST	71	20600006109313	AA-457	1850	Commercial	1.76	1.76	4320
132	DOCK ST	70	20600005295300	AA-457	1825	Commercial	3.17	3.17	2340
130	DOCK ST	73	20600001160625	N/A		Commercial	2.06	2.06	780
124	DOCK ST	153	20600006983200	AA-455	1900	Commercial	2.16	2.16	6026
122	DOCK ST	152	20600006983200	AA-1239 AA-456	1875	Commercial	2.16	2.16	6026
120	DOCK ST	151	20600001157800	AA-456	1916	Commercial	2.04	2.04	1612
118	DOCK ST	150	20600001160700	AA-455	1891-1897	Commercial	2.04	2.04	3542
110	DOCK ST	110	20600000142123	AA-455	1930	Commercial	3.22	3.22	11446
12	DOCK ST	144	20600090019164	N/A	1960	Commercial	1.48	1.48	4550
10	DOCK ST	138		N/A		Commercial			10556
6	DOCK ST	124		AA-455	1940's	Commercial	3.03	3.03	3246
4	DOCK ST	80	20600006384160	AA-455	1974	Commercial	2.62	2.62	3950
1	DOCK ST	17		N/A		Commercial	3.57	3.57	
8	DOCK ST	41	20600003321968	N/A	1960	Commercial			10556
13	EAST ST	44	20600002427600	N/A	N/A	Other	8.53	8.53	3078
16	EAST ST	20	20600002844800	AA-1803	1891-1897	Residential	9.61	7.86	2114
6	FLEET ST	6	20600004692602	AA-1265	1885-1889	Commercial	6.96	6.96	2751
14	FLEET ST	58	20600000951000	N/A	1946	Residential	10.06	10.06	2280
10	FLEET ST	61	20600002365950	AA-1266	1975	Residential	8.97	8.97	835
8	FLEET ST	125	20600004692602	AA-1265	1885-1889	Residential	6.74	6.74	2751
12	FLEET ST	60	20600005035575	AA-1267	1885-1889	Residential	9.61	9.61	840
193	GREEN ST	86	20600000761000	AA-521	1819	Commercial	10.30	7.38	1264
195	GREEN ST	139	20600003092900	N/A		Commercial			4488
151	KING GEORGE ST	22	20652090030056	N/A	1980	Residential	9.55	9.55	1456
149	KING GEORGE ST	23	20652090030055	AA- 1112	1880	Residential	9.55	9.55	1392
147	KING GEORGE ST	25	20600090005540	AA-1111	1913-1921	Residential	6.30	6.30	1080
145	KING GEORGE ST	24	20600090005539	AA-1110	1891-1897	Residential	7.11	7.11	1120
143	KING GEORGE ST	1	20600002847600	AA_1109	1891-1897	Residential	6.33	6.33	1204
139	KING GEORGE ST	2	20600004289400	Pending	1885-1891	Residential	6.38	4.97	2568

Step 2 – Identify Hazards

Identify & Map the Floodplain Study Area

FLOOD HAZARD MATRIX

#	Street	OBJECT ID	SDAT	MHT Inventory	Date of Construction	Use	First Floor Elevation	Lowest Opening Elevation	Total Square Footage	Number of Stories	Basement
142	DOCK ST	115	20600007808800	AA-548	1880	Attached Comr	3.74	3.74	5720	2	No
126	DOCK ST	113	20600006983200	AA-1239	1875	Commercial			6026	3	No
136	DOCK ST	71	20600006109313	AA-457	1850	Commercial	1.76	1.76	4320	3	No
132	DOCK ST	70	20600005295300	AA-457	1825	Commercial	3.17	3.17	2340	2	No
130	DOCK ST	73	20600001160625	N/A		Commercial	2.06	2.06	780	1	No
124	DOCK ST	153	20600006983200	AA-455	1900	Commercial	2.16	2.16	6026	3	No
122	DOCK ST	152	20600006983200	AA-1239 AA-456	1875	Commercial	2.16	2.16	6026	3	No
120	DOCK ST	151	20600001157800	AA-456	1916	Commercial	2.04	2.04	1612	2	No
118	DOCK ST	150	20600001160700	AA-455	1891-1897	Commercial	2.04	2.04	3542	2	No
110	DOCK ST	110	20600000142123	AA-455	1930	Commercial	3.22	3.22	11446	2	No
12	DOCK ST	144	20600090019164	N/A	1960	Commercial	1.48	1.48	4550	2	Yes
10	DOCK ST	138		N/A		Commercial			10556	2	No
6	DOCK ST	124		AA-455	1940's	Commercial	3.03	3.03	3246	3	No
4	DOCK ST	80	20600006384160	AA-455	1974	Commercial	2.62	2.62	3950	3	No
1	DOCK ST	17		N/A		Commercial	3.57	3.57		2	No
8	DOCK ST	41	20600003321968	N/A	1960	Commercial			10556	2.5	No
13	EAST ST	44	20600002427600	N/A	N/A	Other	8.53	8.53	3078	1	NO
16	EAST ST	20	20600002844800	AA-1803	1891-1897	Residential	9.61	7.86	2114	2	NO
6	FLEET ST	6	20600004692602	AA-1265	1885-1889	Commercial	6.96	6.96	2751	2	No
14	FLEET ST	58	20600000951000	N/A	1946	Residential	10.06	10.06	2280	3	No
10	FLEET ST	61	20600002365950	AA-1266	1975	Residential	8.97	8.97	835	2	No
8	FLEET ST	125	20600004692602	AA-1265	1885-1889	Residential	6.74	6.74	2751	2	No
12	FLEET ST	60	20600005035575	AA-1267	1885-1889	Residential	9.61	9.61	840	2	NO
193	GREEN ST	86	20600000761000	AA-521	1819	Commercial	10.30	7.38	1264	2	NO
195	GREEN ST	139	20600003092900	N/A		Commercial			4488	2	No
151	KING GEORGE ST	22	20652090030056	N/A	1980	Residential	9.55	9.55	1456	2	Yes
149	KING GEORGE ST	23	20652090030055	AA- 1112	1880	Residential	9.55	9.55	1392	2	Yes
147	KING GEORGE ST	25	20600090005540	AA-1111	1913-1921	Residential	6.30	6.30	1080	2	No
145	KING GEORGE ST	24	20600090005539	AA-1110	1891-1897	Residential	7.11	7.11	1120	2	No
143	KING GEORGE ST	1	20600002847600	AA_1109	1891-1897	Residential	6.33	6.33	1204	2	No
139	KING GEORGE ST	2	20600004289400	Pending	1885-1891	Residential	6.38	4.97	2568	2.5	No

Formulas for Matrix Values – Coastal Flooding

Residential

Loss to Structure:
Affected Floor Area Rehabilitation Construction Cost
(SDAT Floor Area / Number of Stories = First Level Area) X $275

Loss to Contents:
Affected Floor Area X Industry Standard
(SDAT Improvement Value / Number of Stories = Value of Affected Area) X 50%

Loss of Function / Use:
Generally Not Applicable to Residential

Displacement Cost:
Cost of Relocation X Period of Displacement
Rental of Apartment and Mortgage on Home ($3200) X Months Displaced (10)

Commercial

Loss to Structure:
Affected Floor Area Rehabilitation Construction Cost
(SDAT Floor Area / Number of Stories = First Level Area) X $300

Loss to Contents:
Affected Floor Area X Industry Standard
(SDAT Improvement Value / Number of Stories = Value of Affected Area) X 50%

Loss of Function / Use:
Loss of Sales (per type of use) X Period of Displacement
Restaurant: SDAT Floor Area X Industry Average Sales Per Month ($100) X Displaced (12)
[Average Restaurant sales are $1000 / sf per year]

Retail: SDAT Floor Area / Number of Stories X Industry Average Sales Per Month ($30) X Months Displaced (12)
[Average Retail sales are $360 / sf per year]

Office: SDAT Floor Area – First Floor X Industry Average Monthly Rent ($3.00 / sf) X Months Displaced (12)
[Using an Office Rent of $36 / sf per year]

Displacement Cost – Not Generally Applicable to Commercial

Current Function / Use	Current Condition	Owner_interest_mit	Total Assessment	Land Value	Improvement Value	Loss to Contents	Loss to Structure	Displacement Cost	Total Loss for Flood Hazard	Integrity	Risk Level / Vulnerability
Residential	GRAD Very Good		2132900	1474700	658200	164550	409875	41800	$616,225	High	High
Residential	GRAD Very Good		1232233	711900	535000	133750	396750	41800	$572,300	High	Medium
Residential	GRAD Above Average		1121300	619800	501500	125375	558500	41800	$725,675	Medium	Medium
Residential	GRAD Very Good		2212600	1512600	700800	140160	429300	41800	$611,260	Low	Medium
Residential	GRAD Average		954900	703500	251400	62850	343750	41800	$448,400	Medium	High
Residential	GRAD Above Average		1699200	1348700	350500	87625	388500	41800	$517,925	Medium	Medium
Marina	GRAD Average		2401500	2034600	366900	73380	435240		$508,620	Med	Medium
Marina	GRAD Below Average		1988733	1777700	455400	113875	482250	41800	$637,925	Low	High
Marina	GRAD Below Average		1988733	1777700	455400	113875	482250	41800	$637,925	Low	High
Municipal Property	NA		295700	286000	9700	4850	687500	N/A	$692,350	NA	Medium
Park	GRAD Very Good		1360367	723800	651000	65100	N/A	N/A	$65,100	NA	High
Residential	GRAD Very Good		723667	400000	336900	67380	187200	41800	$296,380		Medium
Residential	GRAD Very Good		719767	400000	334900	66980	187200	41800	$295,980	Low	Medium
Residential	GRAD Very Good		718367	400000	333500	66700	187200	41800	$295,700	Low	Medium
Residential	GRAD Very Good		833533	400000	448000	89600	243600	41800	$375,000	Med	Medium
Residential	GRAD Very Good		784167	400000	399000	79800	230400	41800	$352,000	Med	Medium
Residential	GRAD Very Good		858067	400000	472400	94480	273000	41800	$409,280	Low	Medium
Residential	GRAD Very Good		854733	400000	469100	93820	270600	41800	$406,220	Low	Medium
Residential	GRAD Very Good		810733	400000	425300	85060	230000	41800	$356,860	Medium	Medium
Residential	GRAD Very Good		1799067	1073300	748200	149640	495100	41800	$686,540	Medium	Medium
Residential	GRAD Very Good		1730667	1075500	673200	134640	430600	41800	$607,040	Medium	Medium
Residential	GRAD Average		1381600	1201900	179700	35940	147200	41800	$224,940	High	Medium
Residential	GRAD Above Average		1853200	1372400	481100	120275	467500	41800	$629,575	High	Medium
Residential	GRAD Very Good		2390333	1481300	909500	227375	612625	41800	$881,800	High	High
Government / Vacant	GRAD Average		2625633	2414600	211800	52950	1680000	322560	$2,136,150	Med/High	Medium
			$428,611,497	$165,355,100	$271,316,700	$18,280,026	$85,267,856	$5,092,532	**$228,193,978**		

Current Function / Use	current_condition	Owner_Interest_mit	Total Assessment	Land Value	Improvement Value	Loss to Contents	Loss to Structure	Displacement Cost	Total Loss for Flood Hazard	Integrity	Risk Level / Vulnerability	Community Value Ranking
Entertainment	GRAD Below Average	Yes	1306200	1229200	80500	20125	331500	61200	$1,183,750	Medium	Medium	High
Store Retail	GRAD Average	Yes	3234567	1634600	1612700	806350	3697850	6600	$8,606,880	Low	High	NA
Commercial / Office	GRAD Below Average		1440133	1101700	349500	87375	929500	171600	$3,492,008	High	Medium	High
Restaurant	GRAD Good		1509567	1158400	363700	60633	652817	6600	$3,130,450	High	High	High
Restaurant/Restaurant/O	GRAD Below Average		1754333	1013000	984700	164117	468000	6600	$2,366,717	High	High	High
Restaurant	GRAD Good		1277367	1020600	264700	66175	380250	6600	$1,857,025	High	High	High
Restaurant	GRAD Below Average		925133	992700	45000	22500	253500	6600	$1,218,600	High	High	High
Store Retail	GRAD Below Average		1509567	1158400	363700	60633	652817	6600	$1,443,170	High	High	High
Restaurant	GRAD Below Average		1509567	1158400	363700	60633	652817	6600	$3,130,450	High	High	High
Store Food Store	GRAD Below Average		1089133	999500	92500	23150	261950	6600	$1,742,500	High	High	High
Restaurant	GRAD Economy		1443667	1266200	183900	46000	575575	6600	$2,753,375	High	High	High
Store Shopping Center	GRAD Below Average		2073900	1671400	564700	141175	1859975	6600	$4,068,030	Low	High	High
Institutional / Comm / Re	GRAD Average		1495833	1020400	490000	81667	411992	6600	$1,632,146	High	Medium	High
Store Retail	GRAD Below Average		1172300	893300	279000	55820	583440	6600	$1,292,132	High	Medium	High
Store Retail	GRAD Good		1167200	866900	300300	60060	387920	6600	$884,276	High	Medium	High
Store Retail	GRAD Below Average		3607033	1201300	2429300	404883	2965300	6600	$6,661,423	Medium	Medium	High
Store Retail/ Vacant	GRAD Below Average		1095400	807500	287900	72000	487500	6600	$1,106,100	Medium	Medium	High
Store Retail	GRAD Below Average		1081733	811700	328400	54733	418167	6600	$942,700	Medium	Medium	High
Store Retail	GRAD Below Average		1118300	963200	155100	38775	386100	6600	$859,155	High	Medium	High
Restaurant/Restaurant/V	GRAD Average		3737100	1048100	2839200	709800	1565363	6600	$8,061,563	High	Medium	High
Store Retail	GRAD Below Average		2725800	987000	1738800	343463	1360125	6600	$3,216,788	High	Medium	High
Spa	GRAD Below Average		982933	800700	187600	46900	379925	6600	$854,265	High	Medium	High
Store Retail	GRAD Below Average		1111800	886900	224900	37483	260000	6600	$592,083	High	Medium	High
Store Retail with Apartme	GRAD Below Average		945167	804800	141700	35425	350025	6600	$779,770		Medium	High
Store Retail	GRAD Below Average		1172300	893300	279000	69775	729300	6600	$1,613,515	High	Medium	High
Store Retail	GRAD Below Average		1172300	893300	279000	69775	729300	6600	$1,613,515	high	Medium	High
Bank	GRAD Below Average		2328033	1114100	1342200	204788	821681	6600	$1,943,239	high	Medium	High
Store Liquor	GRAD Below Average		1410300	1126200	292000	146000	1056250	6600	$7,058,850	high	High	High
Restaurant	GRAD Average		1115533	1023600	171700	34360	331500	6600	$1,596,460	High	Medium	High
Store Retail	GRAD Below Average		1111800	886900	224900	37483	260000	6600	$592,083		High	High
retail/storage	GRAD Average		1273733	1126500	151800	30360	241800	6600	$1,139,000	High	Medium	High
Bank	GRAD Below Average		2328033	1114100	1342200	204788	821681	121356	$1,147,825	High	High	High
Restaurant/Restaurant/S	GRAD Average		2130867	1087100	1264800	210800	529317	6600	$4,827,187	High	Medium	High
Commercial / Rest / Reta	GRAD Average		2356067	1180500	1508800	377200	914550	6600	$5,689,640	High	Medium	High
Restaurant	GRAD Below Average		1165200	1007300	290500	116233	421200	6600	$2,099,233	High	High	High
Store Retail	GRAD Below Average		1829533	1199500	738600	184650	1534650	6600	$3,425,820	High	Medium	High
Store Retail	GRAD Below Average		1210767	1061900	152600	25433	141483	6600	$330,237	High	Medium	High
Restaurant	GRAD Average		1692900	1271900	421100	210550		6600	$217,150	Low	Medium	High
Restaurant	GRAD Below Average		1433800	1068600	454800	90960	217750	6600	$1,119,310	High	Medium	High
Restaurant/Office	GRAD Below Average		1204833	1016000	194000	48525	384800	6600	$1,860,725	High	Medium	High
Vacant	GRAD Below Average		875000	785800	89200	22300	257400		$279,700	High	Medium	High
Restaurant	GRAD Below Average		934600	800000	134600	33650	359775	6600	$1,728,425	Medium	Medium	High
Restaurant	GRAD Below Average		1403400	1052600	384600	96150	464750	6600	$2,283,500	High	Medium	High
restaurant	GRAD Below Average		1541633	1025000	636600	127320	323400	6600	$2,009,640	medium	High	High
Store Retail with Apartme	GRAD Below Average		1297833	1145600	176100	83383	865150	6600	$1,913,453	High	High	High
Store Retail with Apartme	GRAD Below Average		1297833	1145600	176100	83383	865150	6600	$1,913,453	High	High	High
			$67,059,264	$45,657,500	$23,683,500	$5,181,268	$28,513,943	$563,556	$98,486,685			

Step 2 – Survey / Assess Risks

Complete a Non-Structural Mitigation Assessment

Nonstructural Mitigation Assessment for the City of Annapolis Historic District
Annapolis, Maryland

Prepared for: **City of Annapolis**
145 Gorman Street, 3rd Floor
Annapolis, Maryland 21401

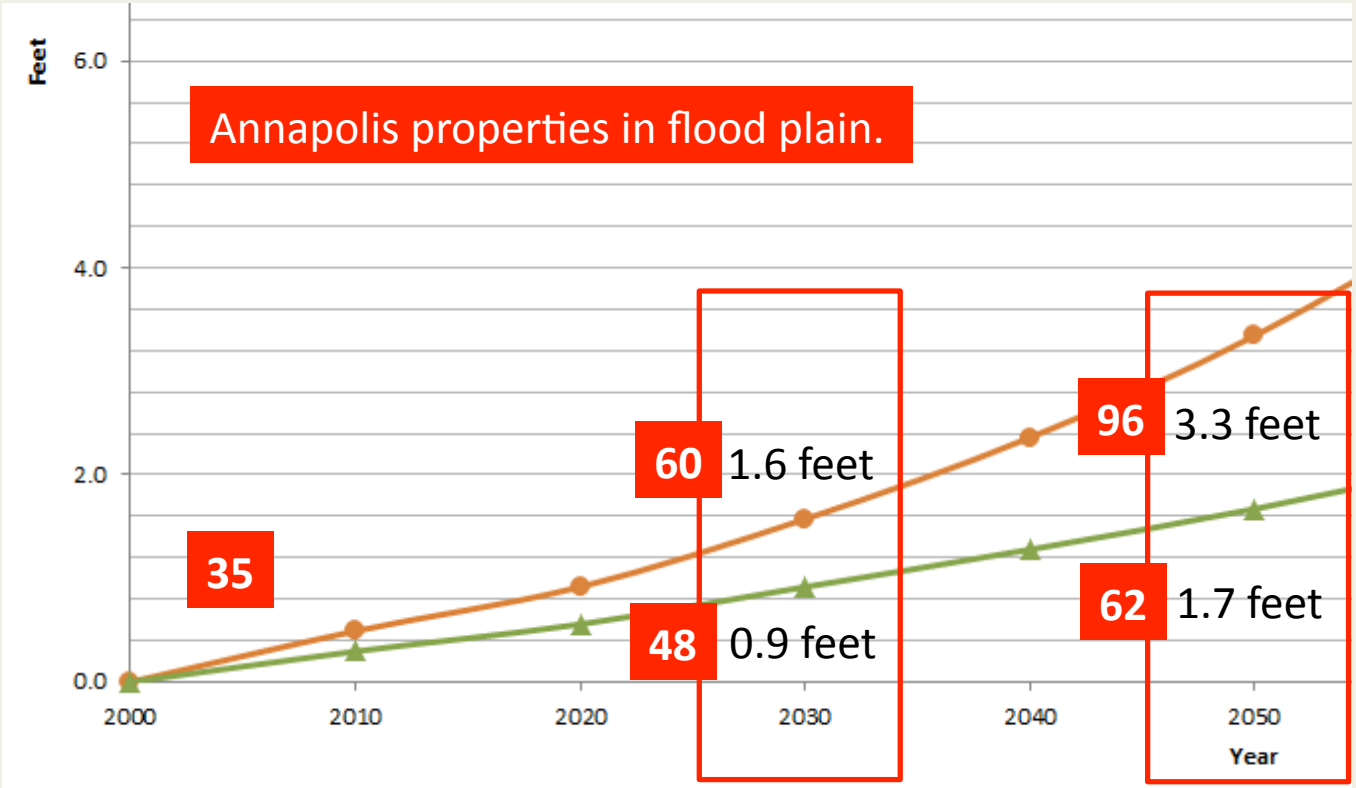
Prepared by: **Planning Division**
U.S. Army Corps of Engineers, Baltimore District
P.O. Box 1715
Baltimore, Maryland 21203-1715

DECEMBER 2014

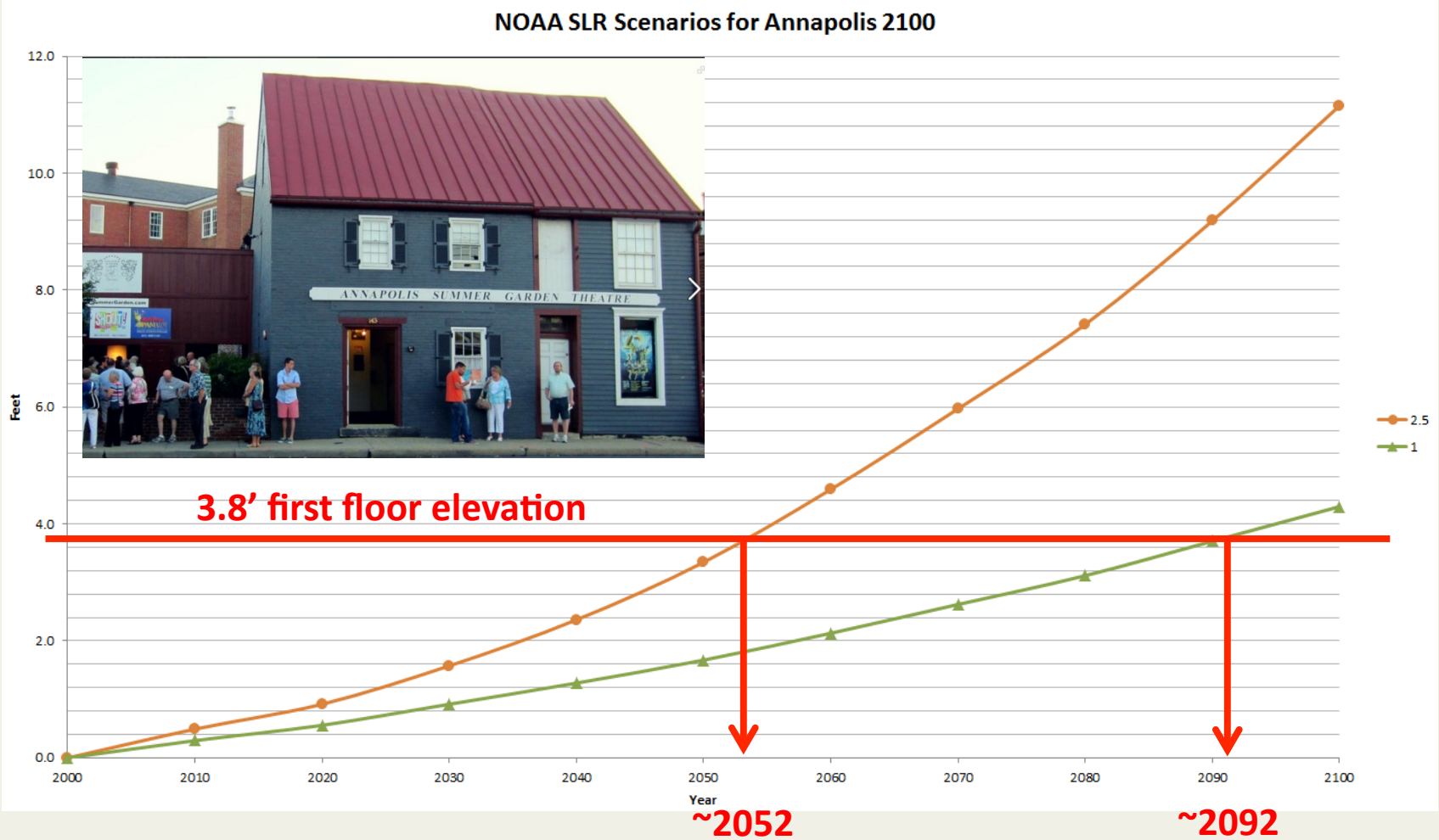
FIGURE 2-1 BUILDING ELEVATION SURVEY POINT TYPES

Lowest adjacent grade in this example is the front left corner, the lowest point closest to where the water is coming from. **Low opening** in this example is the basement window, where water would first enter the building during flooding. **First floor opening** here is the front door, where the most damage would typically occur if flood waters reached this elevation.

Year 2030, Year 2050



One Annapolis Property

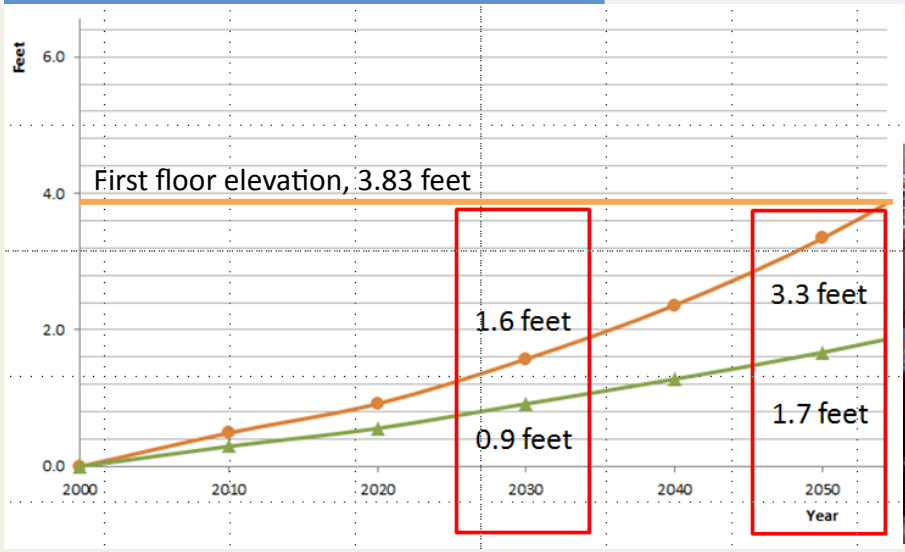


Now - 2017

3.8' first floor elevation
Isabel
1:100 BFE
NWS Moderate
MHW
scale

Property-specific flood scenarios

Name or Description	Annapolis Summer Garden Theatre	
Location	141-143 Compromise Street	
Occupancy Type	Theater (Assembly)	
Lowest Adjacent Grade / First Floor	2.92 feet / **3.83 feet**	
Year Estimated to Experience Flood at:	Extreme SLR Scenario (2.5)	Moderate SLR Scenario (1.0)
FEMA BFE = 4.6 feet	**now**	**now**
NWS Moderate 0.71 m = 2.33 feet	**~2022**	**~2032**
NWS Flood Stage (nuisance) = 1.6 ft		
MHHW (high tide) 0.29 m = ~1 foot	**~2032**	**~2052**
MSL	**~2052**	**~2092**



What we might expect 2050 – 1.0 scenario

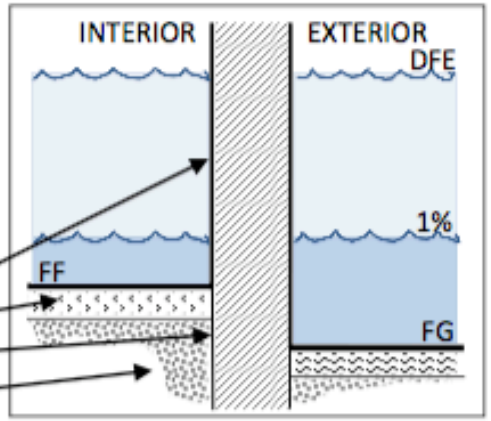
What we might expect 2050 – 2.5 scenario

ANNAPOLIS, MARYLAND - HISTORIC DISTRICT – NONSTRUCTURAL ASSESSMENT SAMPLING

4.0 STRUCTURE DATA/ASSESSMENT SHEETS
STRUCTURE #13 - 141-143 COMPROMISE STREET

Structure Information / Data

Name/Description:	Annapolis Summer Garden Theatre
Location:	141-143 Compromise Street
Occupancy type:	Theater (Assembly)
No of Stories:	2 ½
Building Construction:	
Exterior Walls:	Masonry……
Floor Construction (1st Flr):	Concrete……....
Foundation:	Masonry……
Grade/Crawlspace/Basement:	Grade……



BUILDING SECTION (at Grade)
Not to Scale

Structure/Flood Elevations Table

FG	LO	FF	Δ FF-FG	1%	DFE	Δ 1%-FF	Δ DFE-FF	Δ 1%-FG	Δ DFE-FG
2.92′	3.83′	3.83′	0.91′	4.50′	8.20′	0.67′	4.37′	1.58′	5.28′

Abbreviations: FG – Finish Grade [low point]; LO – Low Opening; FF – First Floor; 1% - One Percent Exceedance Flood [100 yr]; DFE - Design Flood Elevation; Δ-Delta/Difference

Structure Photographs

East & North Elevations

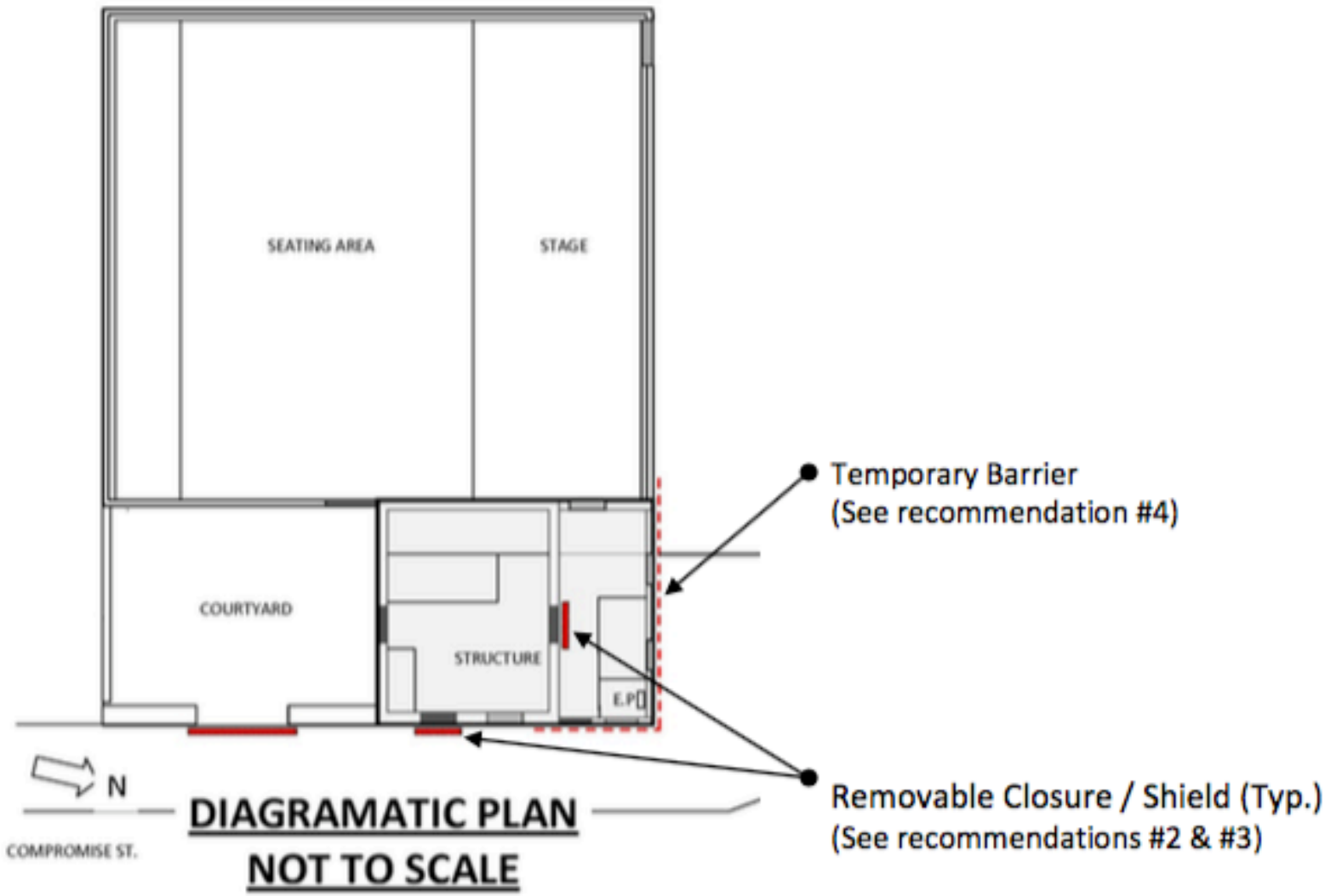
North & West Elevations

Interior Detail

1. Basic/ Minimum Action(s):
• Elevate HVAC equipment and electrical panels, building contents (and other?) as necessary above floor elevation as high as feasibly possible.
• Dry floodproof individual interior areas/rooms.
• Pros/Cons/Relative Cost
o Pros: Least expensive; Addresses nuisance flooding; Passive system.
o Cons: Minimal flood risk reduction; No insurance rate reduction. o Cost Magnitude: Very Low to Low (dependent on actions taken).

2. Dry floodproof to 1% :
• Maintenance/repair/rehab/renovate masonry foundation and exterior wall up to 1% elevation.
• Investigate and analyze the structural integrity of the foundation wall. Repair/modify as required.
• Inspect and verify sidewalk integrity. Rehab sidewalk to be more impervious with positive drainage if/as necessary.
• Provide interior drainage system and sump pump with emergency power.
• Provide check valve/backflow preventer on building sewer line.
• Provide closures/shields at door openings in the structure and openings the masonry wall at the courtyard.
• Pros/Cons/Relative Cost
o Pros: Flood risk reduction to 1% flood event/ nuisance flooding; possible flood insurance rate reduction.
o Cons: Active system, May be difficult to implement (many variables/unknowns). o Cost Magnitude: Low to Medium to High (dependant on actions taken).

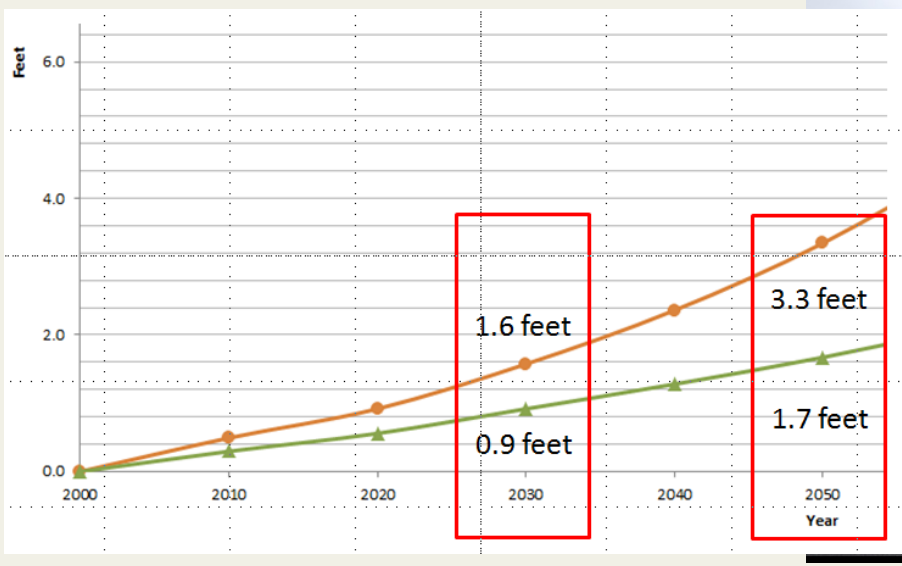
3. Dry floodproof to 3' above finished floor (first floor):
• In addition to Item #2.
• Pros/Cons/Relative Cost
o Pros: Highest level of flood risk reduction; possible flood insurance rate reduction. o Cons: Active system, May be difficult to implement (many variables/unknowns). o Cost Magnitude: Medium to High (dependent on actions taken).
4. Dry floodproof wood framed portion of structure with temporary barrier (3 feet max above the grade).Pros/Cons/Relative Cost
• Pros: Addresses entire structure; possible flood insurance rate reduction.
o Cons: Active system, May be difficult to implement (many variables/unknowns). o Cost Magnitude: Medium to High (dependent on actions taken).

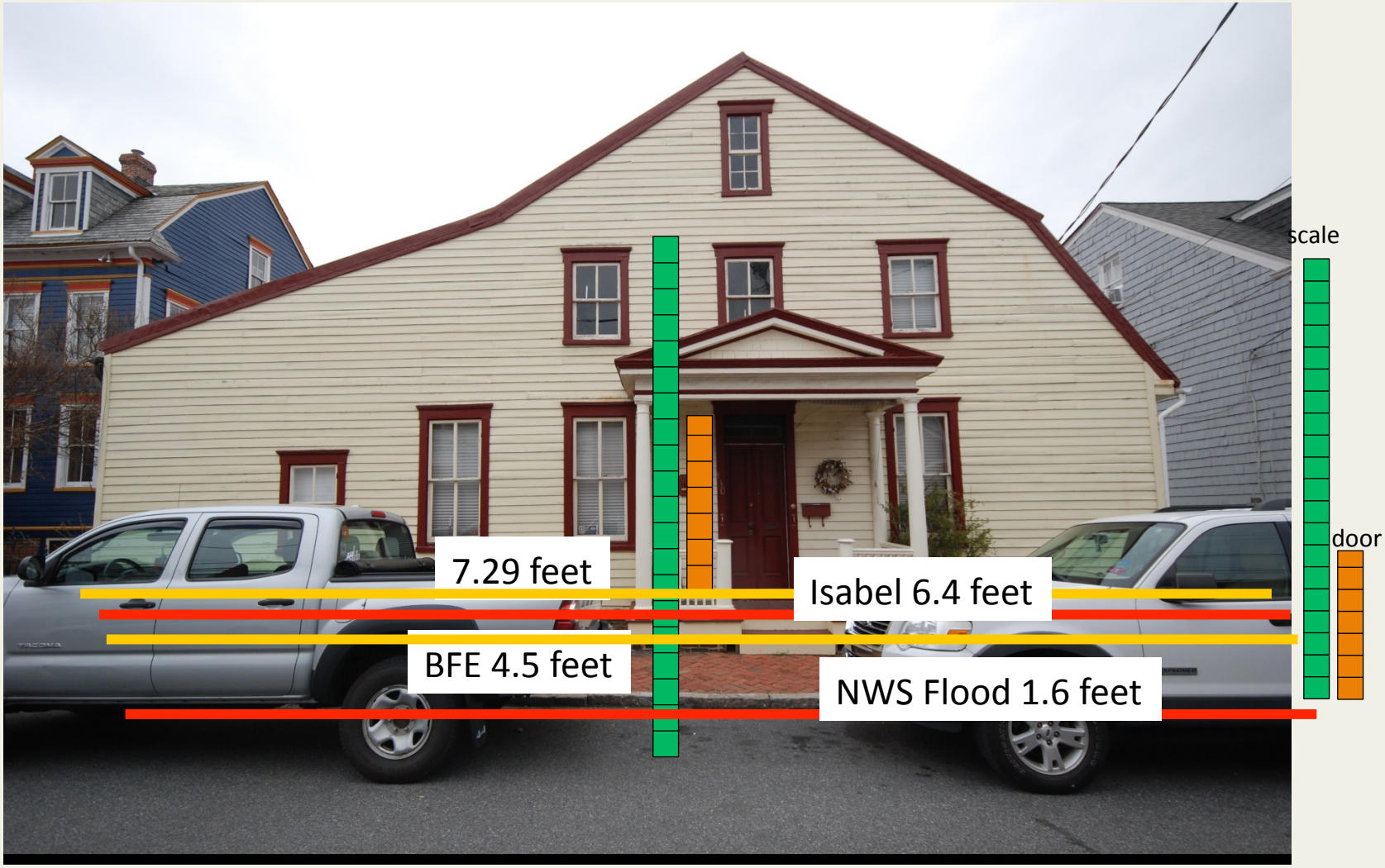

SEATING AREA
STAGE
COURTYARD
STRUCTURE
E.P.
N
COMPROMISE ST.
DIAGRAMATIC PLAN
NOT TO SCALE
Temporary Barrier
(See recommendation #4)
Removable Closure / Shield (Typ.)
(See recommendations #2 & #3)

Property-specific flood scenarios

Name or Description	Sands House	
Location	130 Prince George Street	
Occupancy Type	Residence	
Lowest Adjacent Grade / First Floor	5.53 feet / **7.29 feet**	
Year Estimated to Experience Flood at:	Extreme SLR Scenario (2.5)	Moderate SLR Scenario (1.0)
FEMA BFE = 4.6 feet	~	~
NWS Moderate 0.71 m = 2.33 feet	~	~
NWS Flood Stage (nuisance) = 1.6 ft		
MHHW (high tide) 0.29 m = ~1 foot	~	~
MSL	~	~

First floor elevation, 7.29 feet




7.29 feet
Isabel 6.4 feet
BFE 4.5 feet
NWS Flood 1.6 feet
scale
door

Zillow

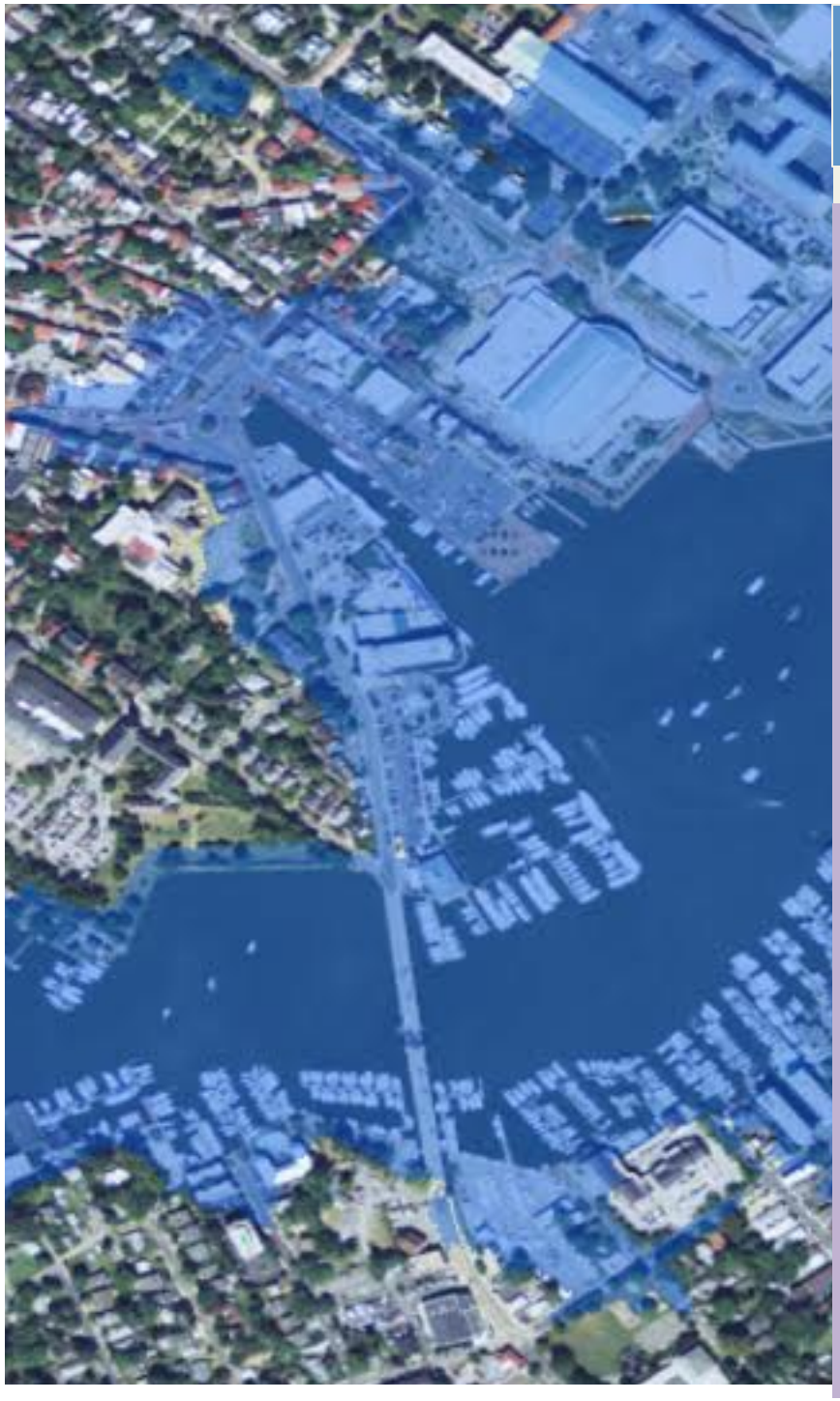
Will a rising tide sink all homes?

Zillow

Nationwide, almost 1.9 million homes (or roughly 2 percent of all U.S. homes) worth a combined $882 billion are at risk of being underwater by 2100 if sea levels rise by six feet. Some states will be hit harder than others.

State	Number of Potentially Underwater Properties	Fraction of Total Housing Stock Underwater	Total Value of Potentially Underwater Properties
California	42,353	0.44%	$49.2B
Texas	46,804	0.61%	$12B
New York	96,708	2.10%	$71B
Florida	934,411	12.56%	$413B
Pennsylvania	2,661	0.06%	$730M
Georgia	24,379	0.75%	$10.2B
North Carolina	57,259	1.64%	$20.6B
New Jersey	190,429	7.35%	$93.1B
Virginia	46,287	1.77%	$14.4B
Washington	31,235	1.32%	$13.7B
Massachusetts	62,069	3.10%	$51.2B
Maryland	64,299	3.09%	$19.6B
Alabama	[illegible]	[illegible]	$3.8B
South Carolina	83,833	4.42%	$45B
Louisiana	80,080	5.88%	$13.2B
Oregon	4,959	0.37%	$1B
Connecticut	18,173	1.61%	$13.2B
Mississippi	5,572	0.72%	$1B
Hawaii	37,556	9.07%	$25.3B
Maine	5,412	0.98%	$3.1B
New Hampshire	4,064	0.71%	$1.7B
Rhode Island	[illegible]	[illegible]	$2.9B
Delaware	11,670	3.09%	$3.6B

Source: National Oceanic and Atmospheric Administration (NOAA); Zillow data



GOALS

Protect our City's historic character and economic vitality from flooding hazards by minimizing loss to structures, cost to stakeholders and impact on the Annapolis economy through:

- Implementing a public awareness and engagement program
- Leading building resilience efforts in flood adaptation and mitigation
- Developing a disaster response and recovery plan to *Build Back Better.*
- Aligning City land use, economic development, environmental and regulatory activities to protect the City's historic and natural assets
- Incentivize public and private investment for flooding adaptation

Financial / In-Kind Resources

Maryland Historical Trust/SHPO ($25,000)
National Trust for Historic Preservation ($25,000)
Preservation Maryland ($4,000)
MD Dept. of Natural Resources/NOAA ($48,000)
Urban Land Institute, Baltimore Chapter ($20,000)
USACE (est. $120,000+ in-kind)
MEMA/FEMA ($106,000)
National League of Cities – ($10,000+)

Michael Dowling **ARCHITECT** 410 269-0621 MDowlingRA@gmail.com