Envision Heritage
3D Digital Visualization of Sea Level Rise

Keeping History Above Water
Annapolis, Maryland
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Transforming the world through 60 years of historic preservation education.
Launched in 2012, Envision Heritage explores how digital technologies can be employed to document, conserve, manage, and interpret heritage.
3D LASER SCANNING
Laser Scanner is any device that collects 3D coordinates of a given region of an object’s surface automatically and in a systematic pattern at a high rate achieving the results in real time.

W. Bohler and A. Marbs
“3D Scanning Instruments”
Proceedings of CIPA WG6 Scanning for Cultural Heritage Recording September 1-2, Corfu, Greece
Phase shift scanners measure the difference of the wavelength of light. When the light hits the object it changes the wavelength, and this difference is calculated to determine distance.
Registration or Alignment
Laser scanning generates a ‘point cloud’ – a collection of xyz coordinates in a common coordinate system that portrays to the viewer an understanding of the spatial distribution of a subject.

*3D Laser Scanning for Heritage, Second Edition*
*English Heritage (2011)*
Nantucket, Massachusetts

IMAGE SOURCE:
http://www.bing.com/images/search?q=island+of+nantucket+from+air&view=detailv2&id=B97FDA6B8B1495BE5AF7902EEFEAF8E85394D6E3&selectedIndex=0&ccid=hKMUyMED&simid=608034878917774226&thid=OIP.M84a314c8c103d76e9a2fff174a574447o0&ajaxhist=0
Nantucket Historic Architecture
Orange Street, Nantucket Town

1969 Documentation vs. 2012 Documentation
Envision Nantucket
3D Digital Documentation Program

A public-private partnership to apply 3D digital documentation techniques, focusing on laser scanning, to record the historic environment of Nantucket.

+ Town of Nantucket (Community Preservation Committee)

+Nantucket Preservation Trust

+University of Florida Preservation Institute Nantucket
Envision Nantucket
3D Digital Documentation Initiative

DOCUMENTATION USES

+ Planning
+ Management
+ Mitigation
+ Record
+ Interpretation
Envision Nantucket
3D Digital Documentation Initiative

PRIORITIES

+ Streetscapes and Urban Context

+ Landmarks and Historic Sites

+ Threatened Properties (Interiors)
Nantucket Flooding
Wat Chaiwatthanaram
Ayutthaya, Thailand
Wat Chaiwatthanaram
Wat Chaiwatthanaram
Wat Chaiwatthanaram
Wat Chaiwatthanaram, Thailand
C4 South Elevation (Test)

Drawing: Sujin Kim, The University of Florida, August, 2015
Wat Chaiwatthanaram
CEDAR KEY PILOT PROJECT
Second Street
Cedar Key, Florida
Island Hotel

Elevation: 3.25m (10.7ft) above NAD88 (1.237m)

Cedar Key Now

MSL: 1.171m (3.8ft) = -0.066m (-0.2ft) below NAD88 (1.237m)

MHHW: 1.708m (5.6ft) = 0.471 (1.5ft) above NAD88

Cedar Key Projection for 2100

SLR (intermediate): 3ft above MHHW = 4.5ft above NAD88 (This closely matches Annapolis' SLR scenario relative to NAD88)

SLR (High): 6ft above MHHW = 7.5ft above NAD88 (It seems that this graphical map closely matches the 6ft scenario.)

Storm Surge, 100-year flood event (1% annual chance): 11ft above NAD88

Elevation: 1.57m (5.2ft) above NAD88 (1.237m)

SLR: The SLR 3ft and 6ft are not Cedar Key specific. Need to verify the values. 3ft rise of water by 2100 is what people typically agree on, and 6ft was randomly chosen.

Storm Surge: Is the 11ft flood intermediate or high? Kathryn wasn't sure. Is 11ft today or 2100? - Today. Cedar Key specific. Hermine almost reached this level.
Cedar Key, Florida

Sea Level Rise Visualization

Elevation:
- 3.25m (10.7ft) above NAD88
- 1.57m (5.2ft) above NAD88

SLR (High)
- 6ft above MHHW = 7.5ft above NAD88

100-year (1% annual chance) Storm Surge
- 11ft added to 3ft SLR (intermediate) = 15.5ft above

Island Hotel (1859)
- National Register of Historic Places

D St., C St., B St.

Ground elevation was measured from GIS.

Elevation:
- 1.57m (5.2ft) above NAD88

Elevation:
- 3.25m (10.7ft) above NAD88
Cedar Key, Florida Flooding Visualization
Cedar Key, Florida Flooding Visualization
Hurricane Hermine, September 2, 2016
Annapolis Pilot Project
Compromise, Main, and Francis Streets
Annapolis, Maryland
Scope: Waterfront – Main Street – Francis Street (1200 feet long)
Challenges:
People & Traffic
GIS data used to relate the 3D laser scan to NAVD88:

1. USACE Storm Water Project Dataset
   Point shapefile with drains’ elevation

2. Anne Arundel County LiDAR 2011
   DEM Resolution: 3ft
   Vertical Accuracy: 15cm [6 in]
1% Annual Chance Flood Elevation 4.5ft
(≈ SLR 2100 Intermediate 4.36ft)