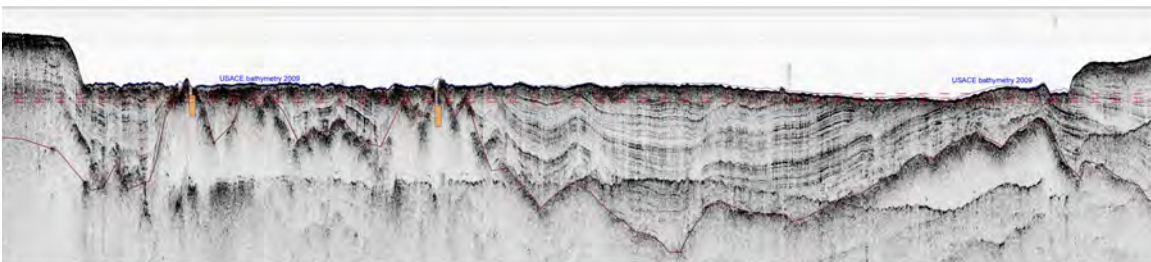




Department Of The Army
US Army Corps of Engineers
New England District
696 Virginia Road
Concord, MA 01742

Contract #W912DS-12-D-0002, DB01 Marine Geophysical and Geological Investigation, Boston Harbor, Boston Massachusetts



Appendix V

June 15, 2015

 e4sciences | Earthworks, LLC

27 GLEN ROAD, NORTH ENTRANCE
SANDY HOOK, CONNECTICUT 06482
P.O. Box 178, NEWTOWN, CT 06470
(203) 270-8100, Fax (203) 364-0480
www.e4sciences.com

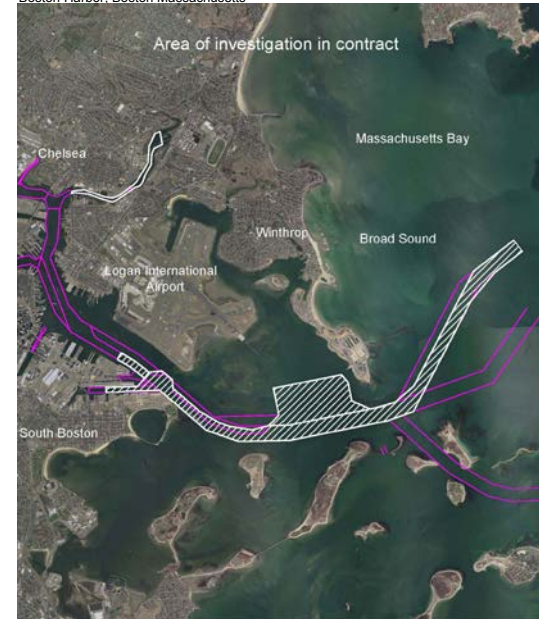
All interpretations are opinions based on inferences from seismic or other measurements. We cannot, and do not, guarantee the accuracy or correctness of any interpretation. We shall not, except in the case of gross or willful negligence on our part, be liable or responsible for any loss, costs, damages or expenses incurred or sustained by anyone resulting from any interpretations made by any of our officers, agents or employees.

Appendix V
11"x17" versions of plates



Plate 1: Location map


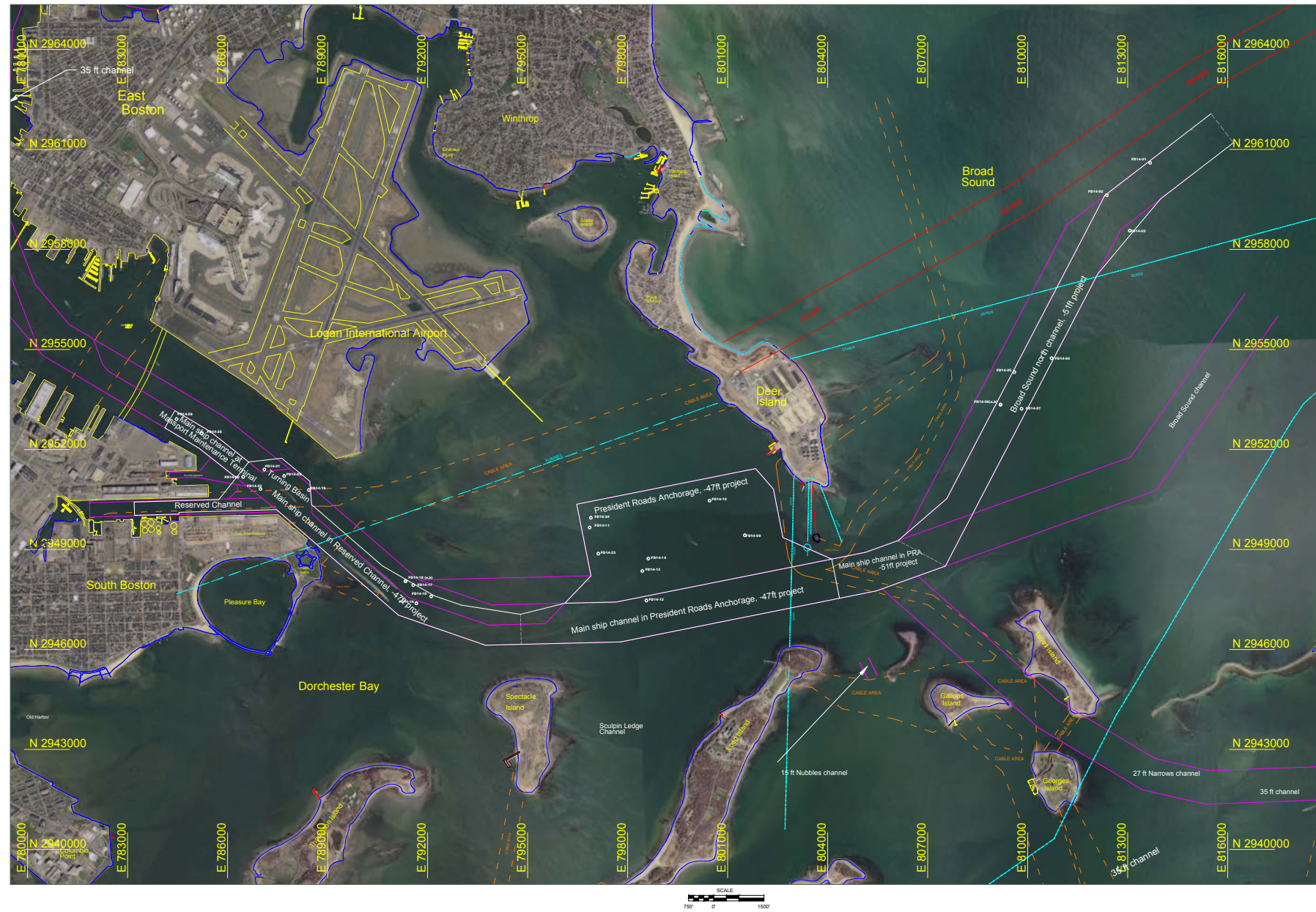
Contract #W912DS-12-D-0002, DB01: Marine Geophysical and Geological Explorations, Boston Harbor, Boston Massachusetts



Sidescan data acquired by e4sciences November - December, 2014
 Planimetrics provided by USACE-NAE, New England District

- Proposed channel
- e4sciences area divisions
- Channel outline, 2010
- Cable area
- Sewer and tunnel area
- Sewer area
- Shoreline and dock
- Shoreline and dock
- As drilled boring locations

Massachusetts Mainland State Plane Feet Coordinate System
 North American Datum of 1983 (NAD83)
 Vertical datum: MLLW (NAVD 1988)
 2013 Orthophotos: USGS and Massachusetts

Drawn By: *Bedett Boyd*

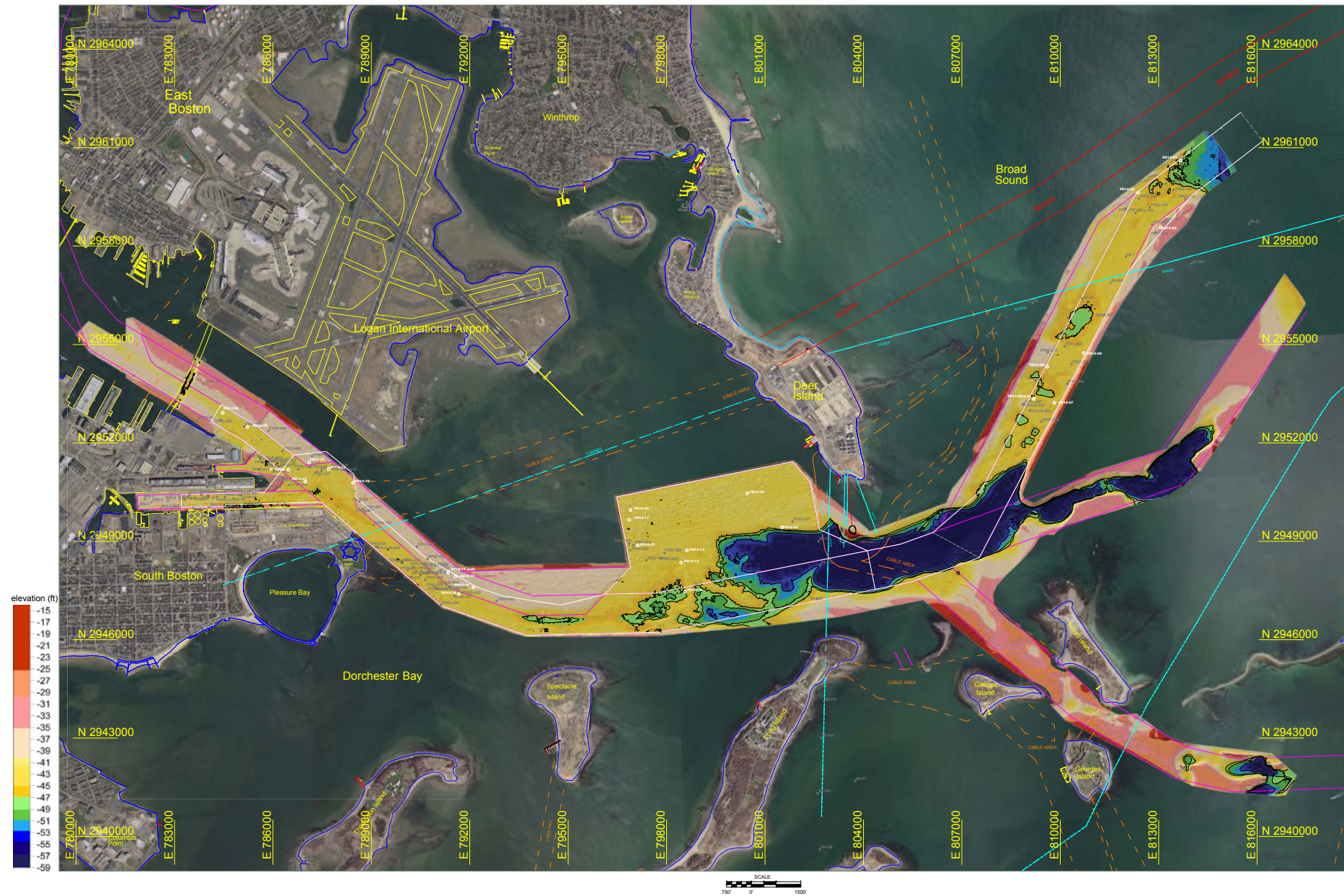
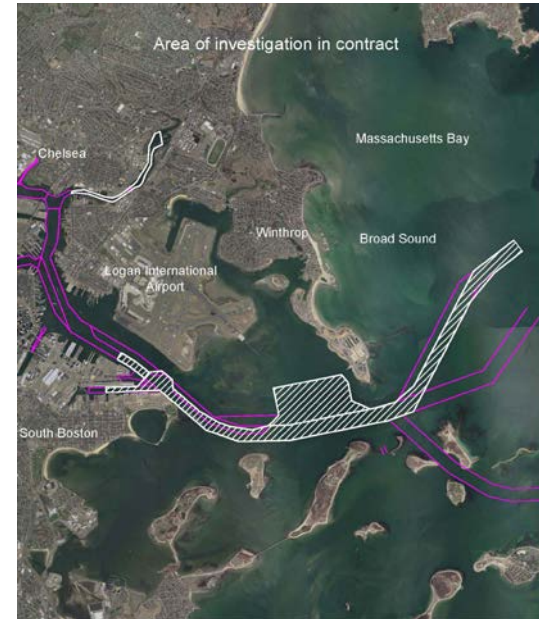
Approved By:

Date: April 27, 2015



Plate 2: Bathymetry (top of Holocene elevation), compilation of 2005-2011, 2012 and 2014

Contract #W912DS-12-D-0002, DB01: Marine Geophysical and Geological Explorations, Boston Harbor, Boston Massachusetts



Planimetrics provided by USACE-NAE, New England District

- Proposed channel
- e4sciences area divisions
- Channel outline, 2010
- Cable area
- Sewer and tunnel area
- Sewer area
- Shoreline and dock
- Shoreline and dock
- 47ft, -49ft, -53ft contours
- As drilled boring locations
- Historic boring locations

Massachusetts Mainland State Plane Feet Coordinate System
North American Datum of 1983 (NAD83)
Vertical datum: MLLW (NAVD 1988)
2013 Orthophotos: USGS and Massachusetts

Drawn By: *Bidett Boyd*

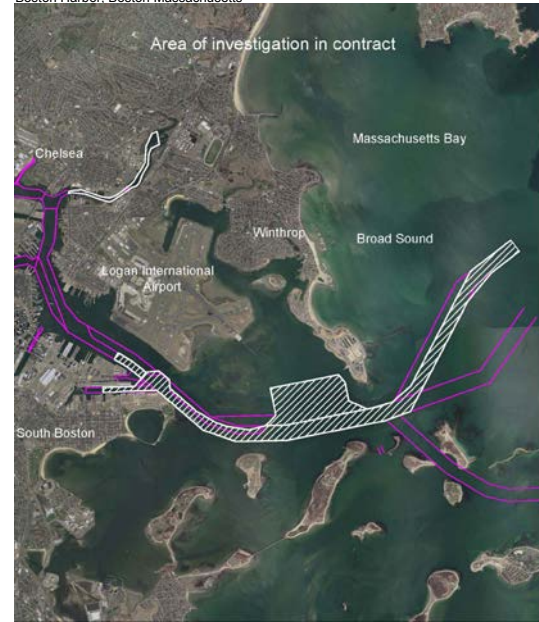
Approved By:

Date: April 27, 2015



Plate 3: Side-scan orthosonographs insonified from the south

Contract #W912DS-12-D-0002, DB01: Marine Geophysical and Geological Explorations, Boston Harbor, Boston Massachusetts



Sidescan data acquired by e4sciences November - December, 2014
Planimetrics provided by USACE-NAE, New England District

- Proposed channel
- e4sciences area divisions
- Channel outline, 2010
- Cable area
- Sewer and tunnel area
- Sewer area
- Shoreline and dock
- Shoreline and dock
- Direction of sonar illumination
- As drilled boring locations

Massachusetts Mainland State Plane Feet Coordinate System
 North American Datum of 1983 (NAD83)
 Vertical datum: MLLW (NAVD 1988)
 2013 Orthophotos: USGS and Massachusetts



Drawn By: *Bridgett Boyd*

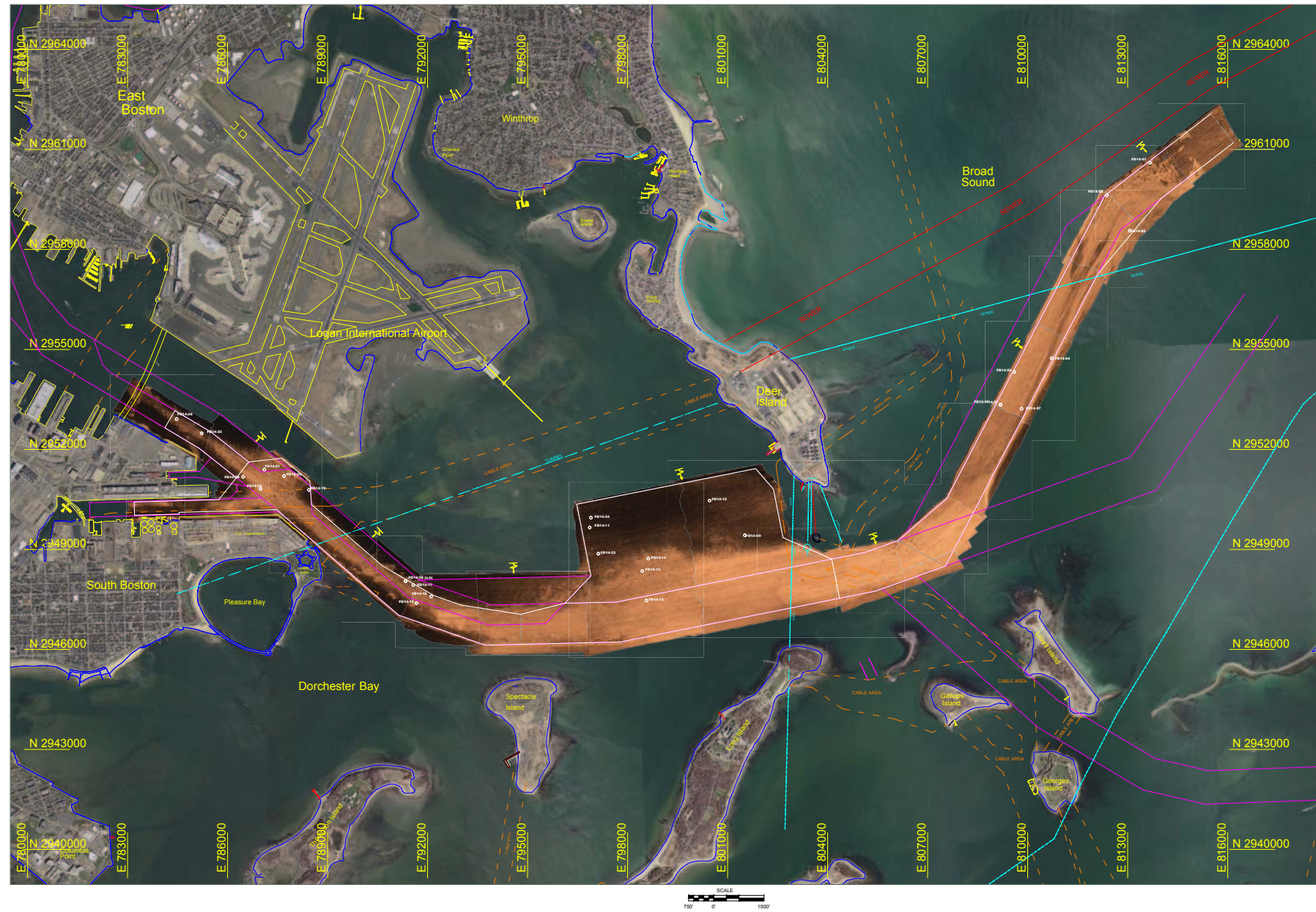
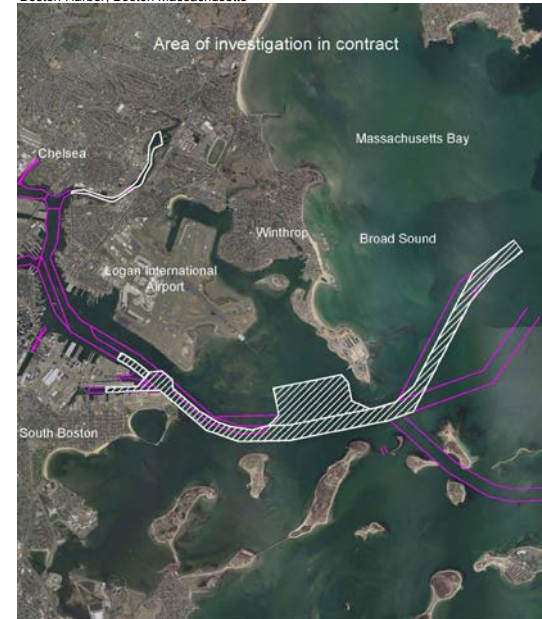
Approved By:

Date: April 27, 2015



Plate 4: Side-scan orthosonographs insonified from the north

Contract #W912DS-12-D-0002, DB01: Marine Geophysical and Geological Explorations, Boston Harbor, Boston Massachusetts



Sidescan data acquired by e4sciences November - December, 2014
 Planimetrics provided by USACE-NAE, New England District

- Proposed channel
- e4sciences area divisions
- Channel outline, 2010
- Cable area
- Sewer and tunnel area
- Sewer area
- Shoreline and dock
- Shoreline and dock
- Direction of sonar illumination
- As drilled boring locations

Massachusetts Mainland State Plane Feet Coordinate System
 North American Datum of 1983 (NAD83)
 Vertical datum: MLLW (NAVD 1988)
 2013 Orthophotos: USGS and Massachusetts

Drawn By: *Bridgett Boyd*

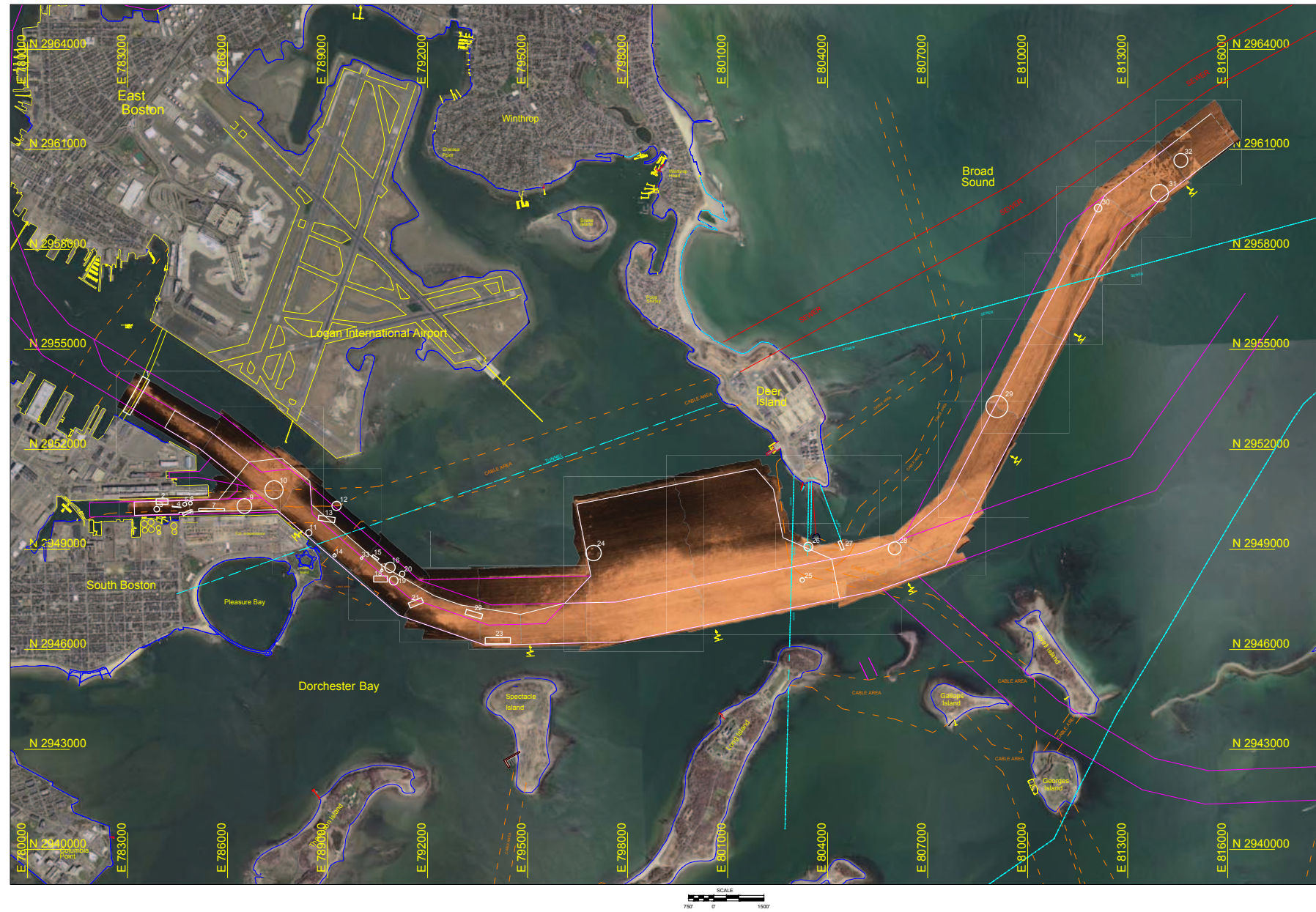
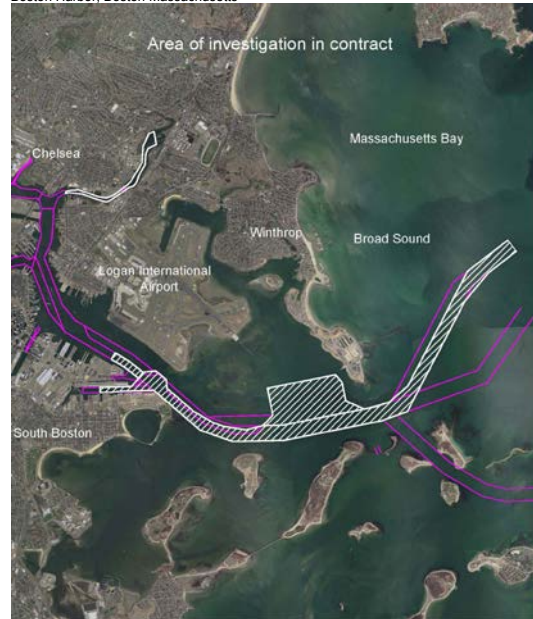
Approved By:

Date: April 27, 2015



Plate 5: Orthosonographs insonified from the south with targets

Contract #W912DS-12-D-0002, DB01: Marine Geophysical and Geological Explorations, Boston Harbor, Boston Massachusetts



Sidescan data acquired by e4sciences November - December, 2014
Planimetrics provided by USACE-NAE, New England District

- Proposed channel
- e4sciences area divisions
- Channel outline, 2010
- Cable area
- Sewer and tunnel area
- Sewer area
- Shoreline and dock
- Shoreline and dock
- Direction of sonar illumination

Massachusetts Mainland State Plane Feet Coordinate System
North American Datum of 1983 (NAD83)
Vertical datum: MLLW (NAVD 1988)
2013 Orthophotos: USGS and Massachusetts



Drawn By: *Bridgett Boyd*

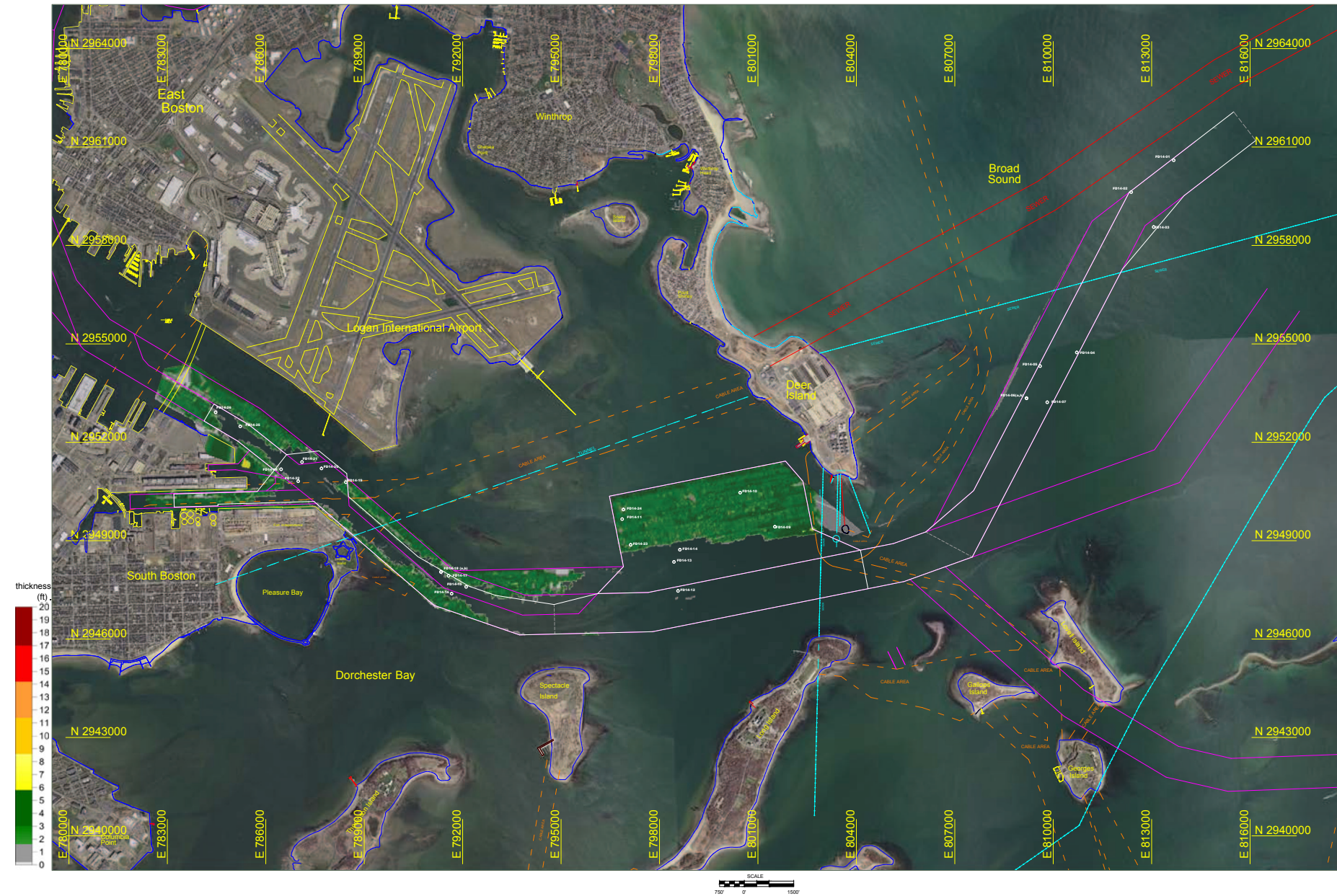
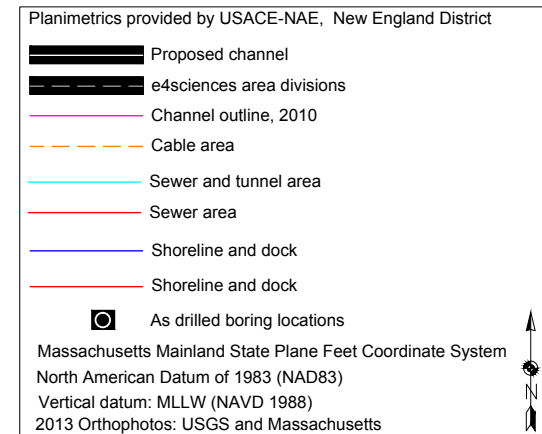
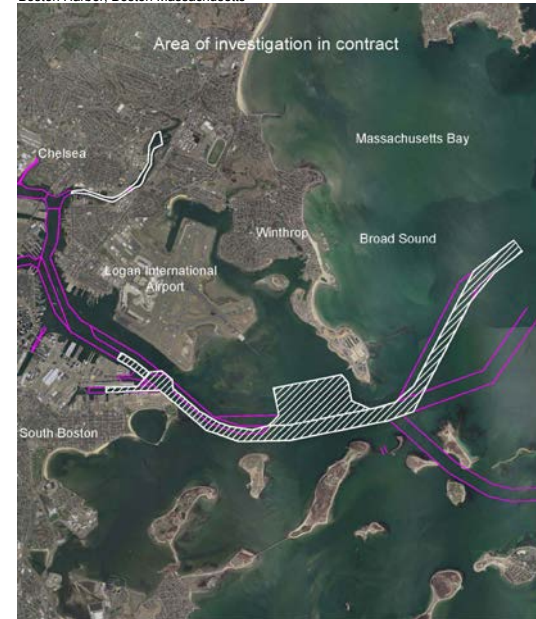
Approved By:

Date: April 27, 2015



Plate 6: Isopach map of black silt

Contract #W912DS-12-D-0002, DB01: Marine Geophysical and Geological Explorations, Boston Harbor, Boston Massachusetts



Drawn By: *Bedett Boyd*

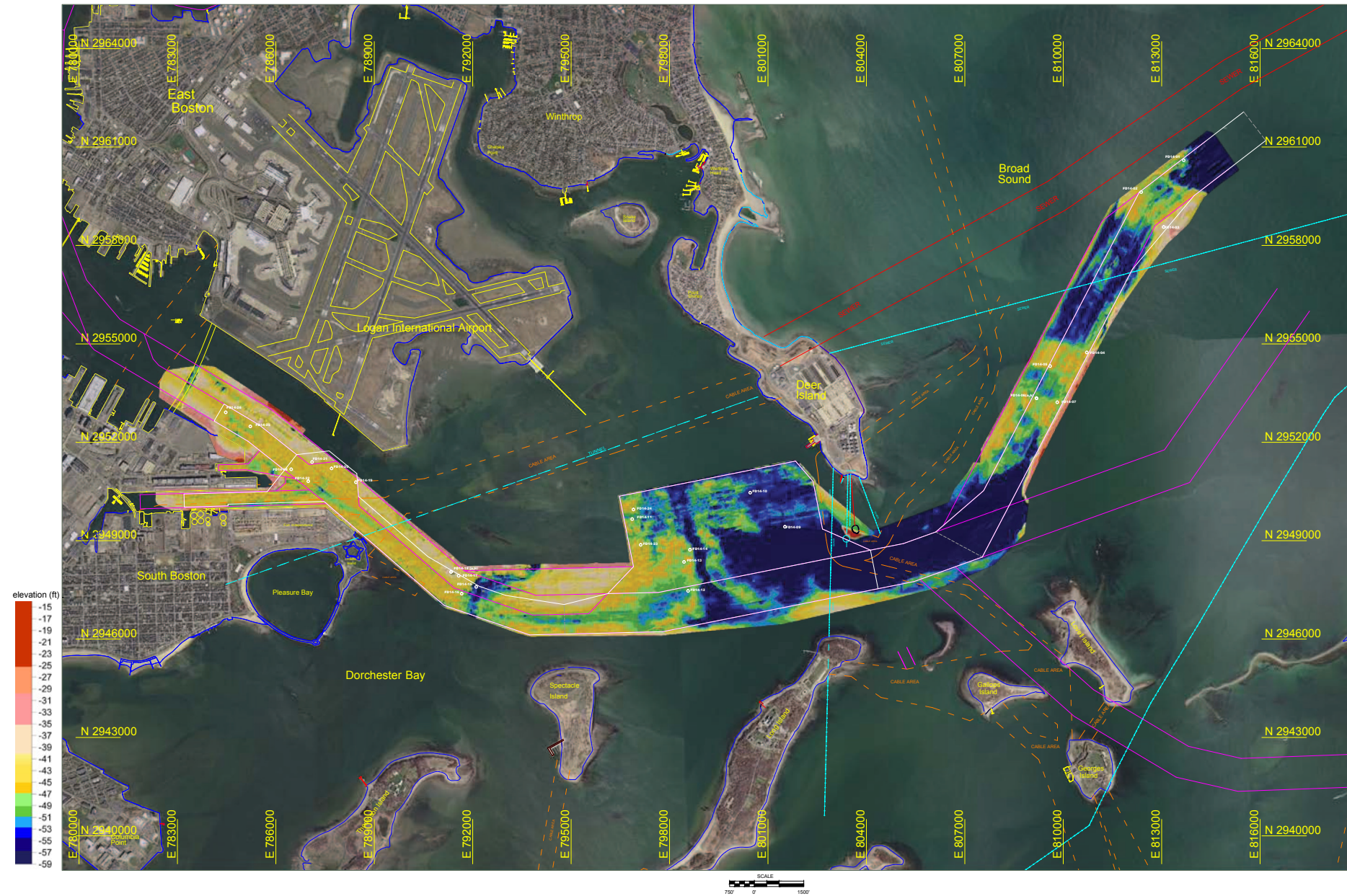
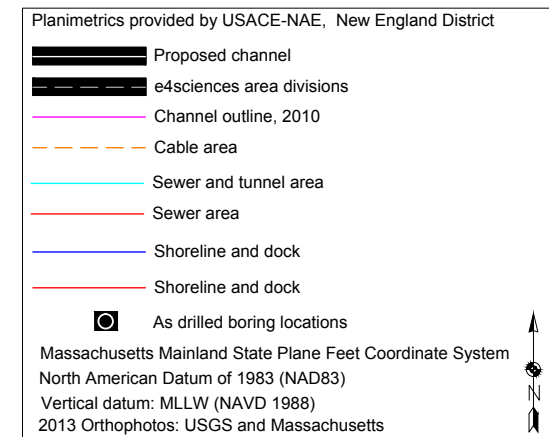
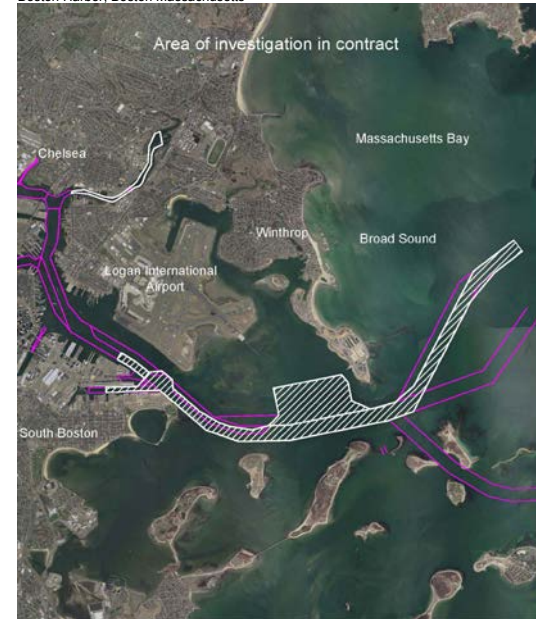
Approved By:

Date: April 27, 2015



Plate 7: Top of Pleistocene sediments elevation map

Contract #W912DS-12-D-0002, DB01: Marine Geophysical and Geological Explorations, Boston Harbor, Boston Massachusetts



Drawn By: *Bridgett Boyd*

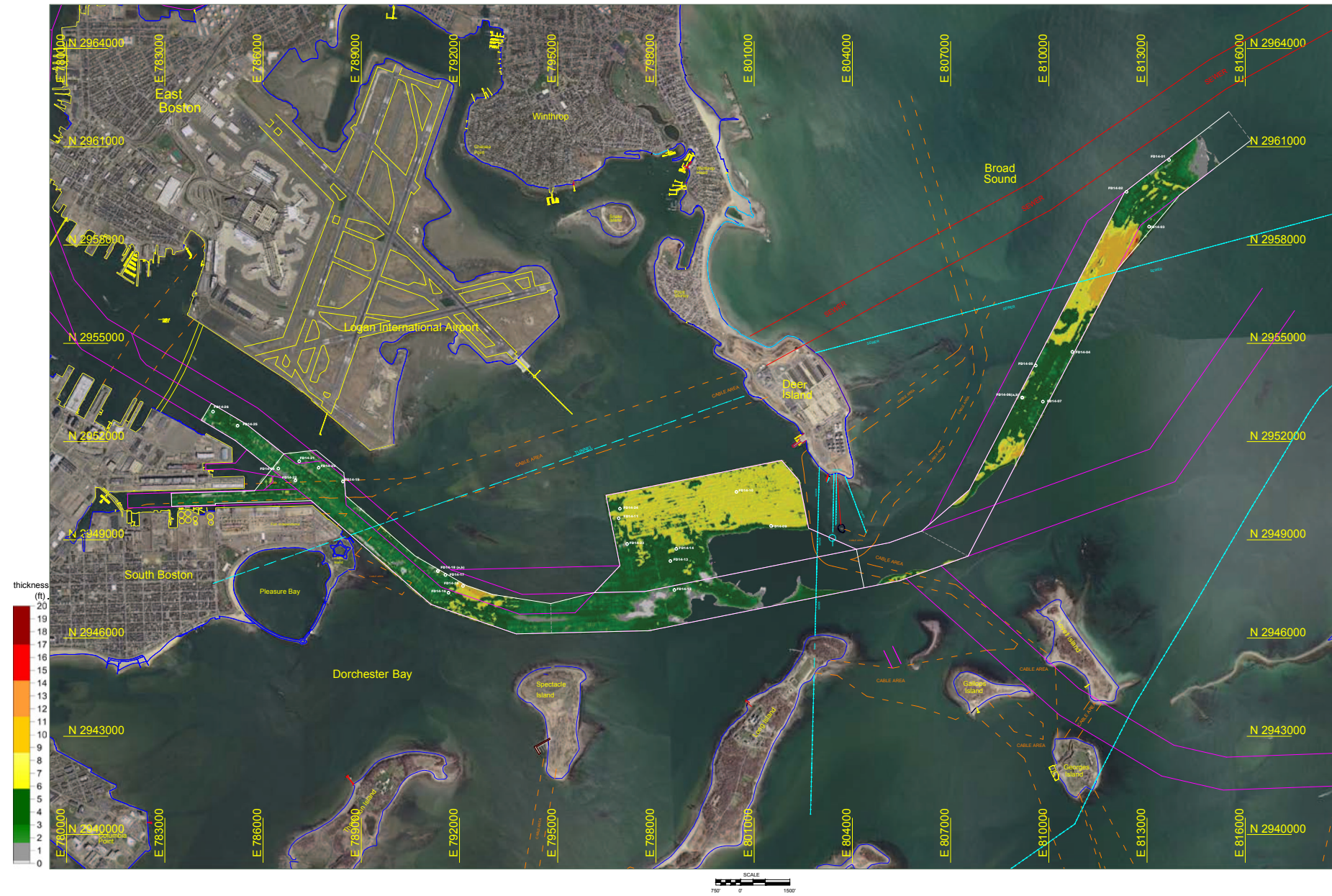
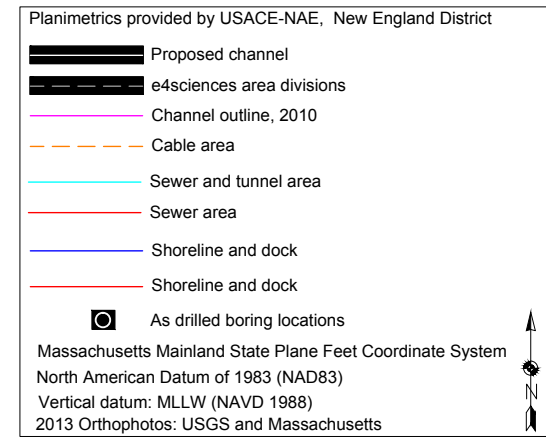
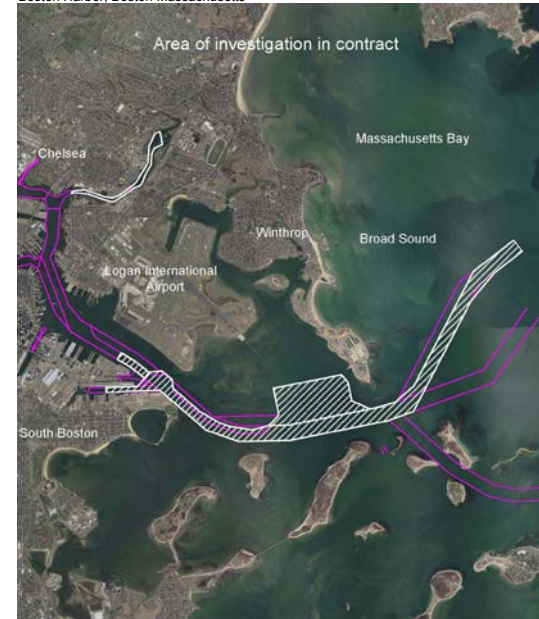
Approved By:

Date: April 27, 2015



Plate 8: Isopach map of Holocene sediments

Contract #W912DS-12-D-0002, DB01: Marine Geophysical and Geological Explorations, Boston Harbor, Boston Massachusetts



Drawn By: *Bidett Boyd*

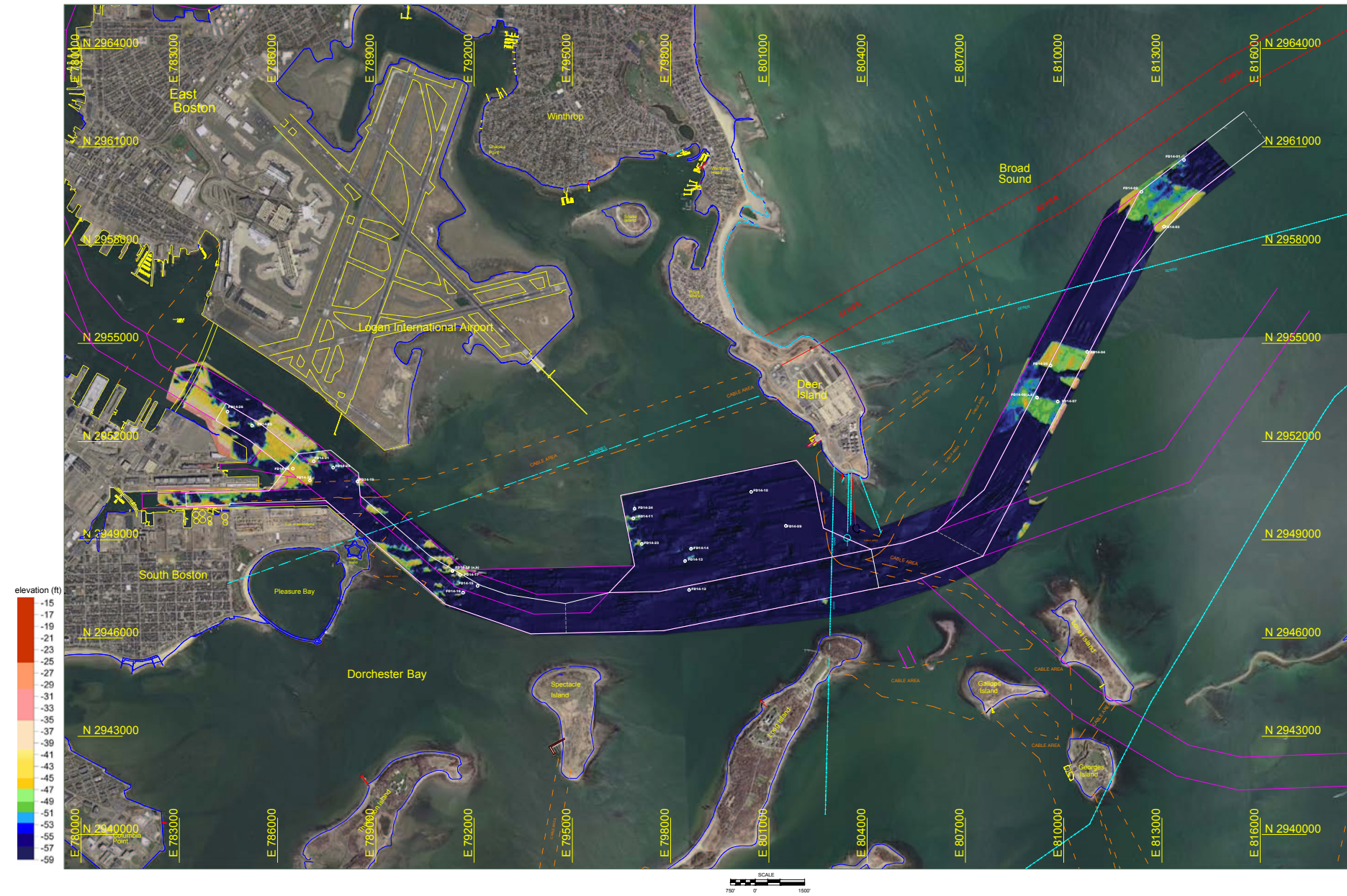
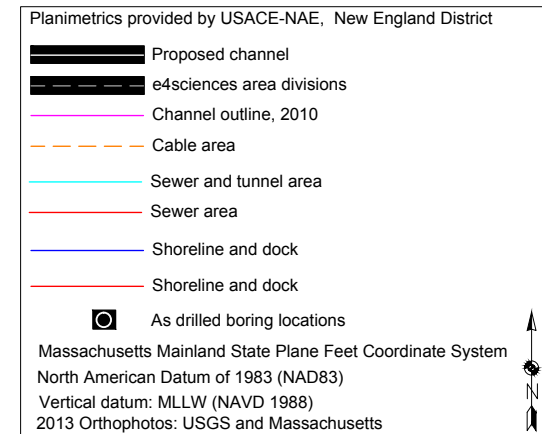
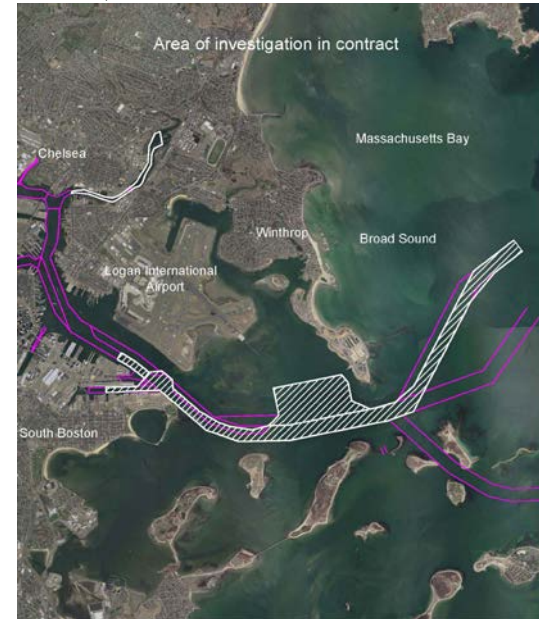
Approved By:

Date: April 27, 2015



Plate 9: Top of till and rock elevation map

Contract #W912DS-12-D-0002, DB01: Marine Geophysical and Geological Explorations, Boston Harbor, Boston Massachusetts



Drawn By: *Bridgett Boyd*

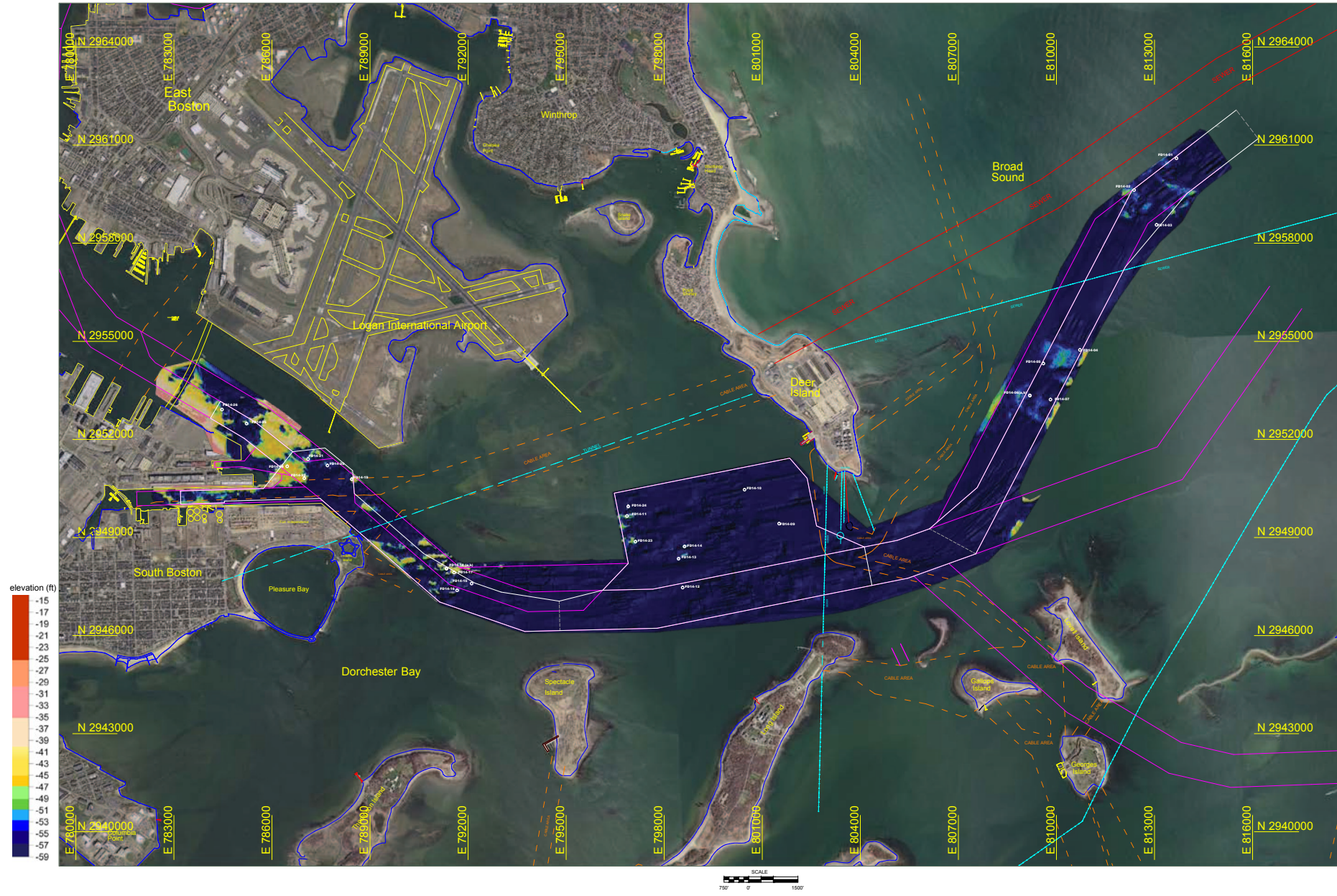
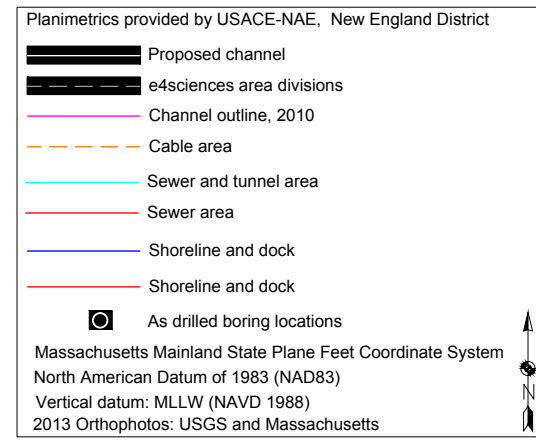
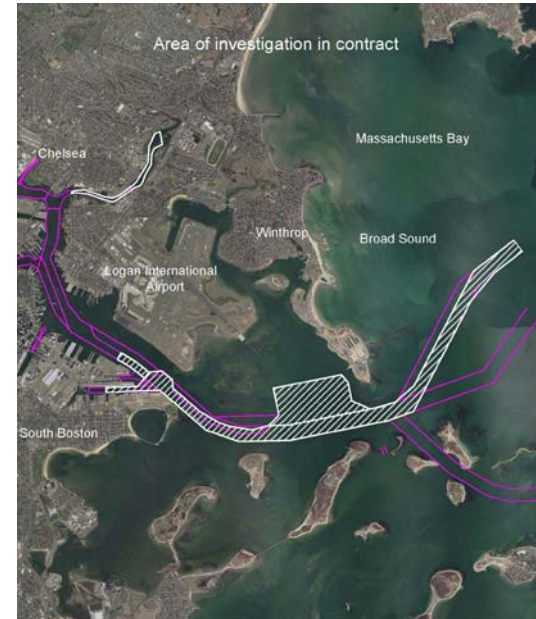
Approved By:

Date: April 27, 2015



Plate 10: Top of rock elevation map

Contract #W912DS-12-D-0002, DB01: Marine Geophysical and Geological Explorations, Boston Harbor, Boston Massachusetts



Drawn By: *Bridgett Boyd*

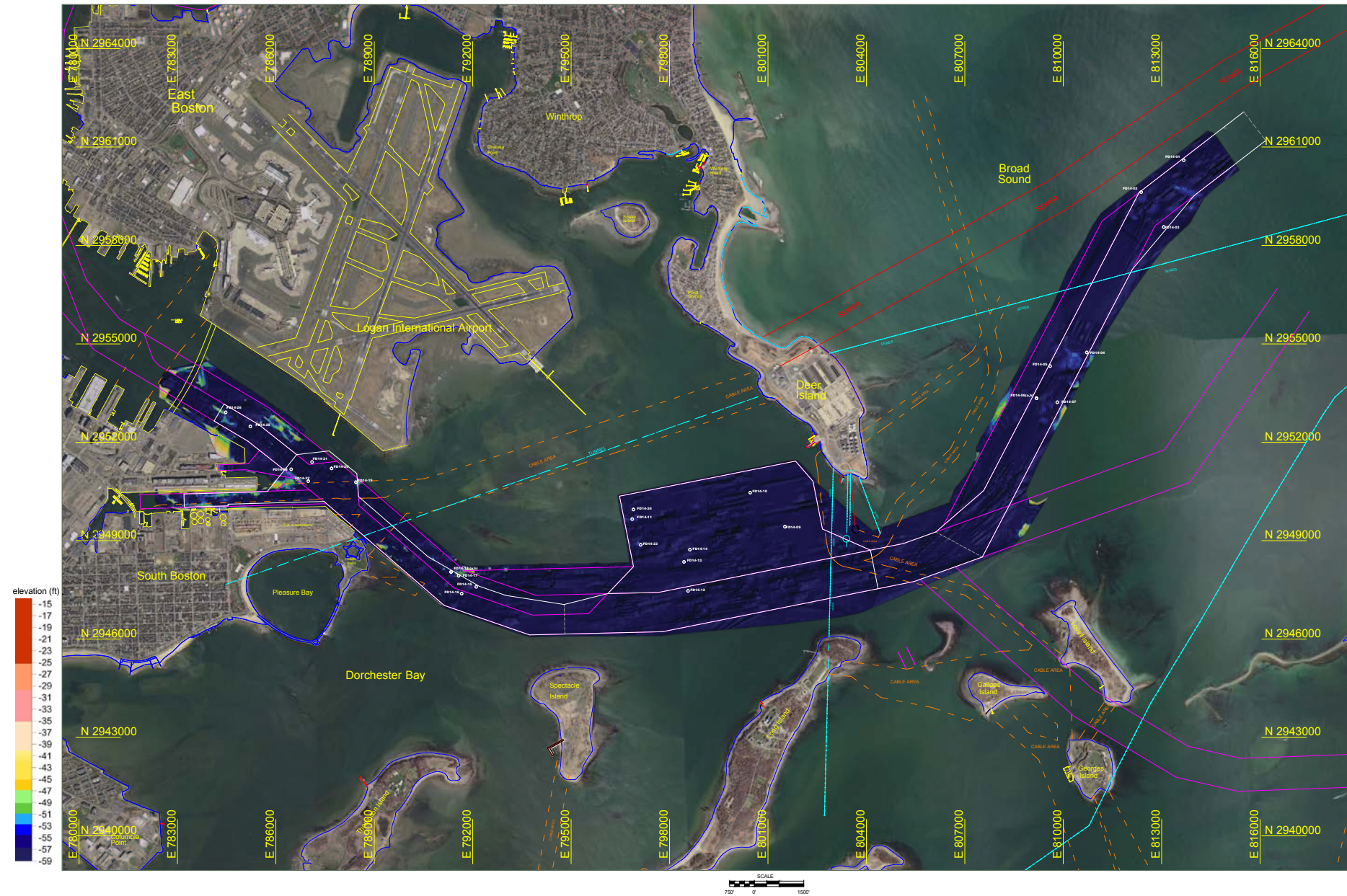
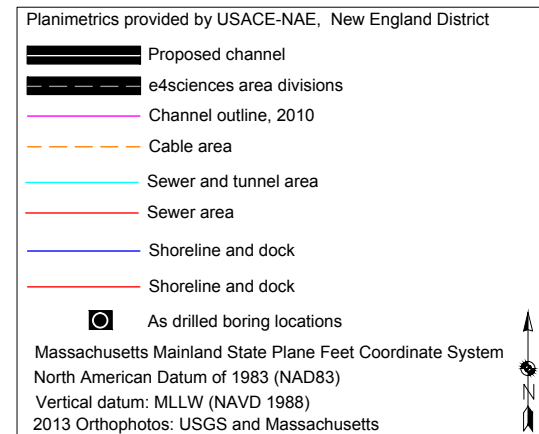
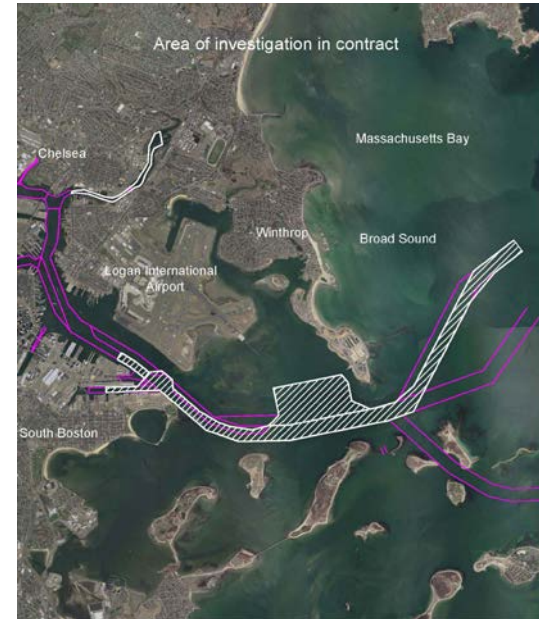
Approved By:

Date: April 27, 2015



Plate 11: Top of fast rock elevation map

Contract #W912DS-12-D-0002, DB01: Marine Geophysical and Geological Explorations, Boston Harbor, Boston Massachusetts



Drawn By: *Bridgett Boyd*

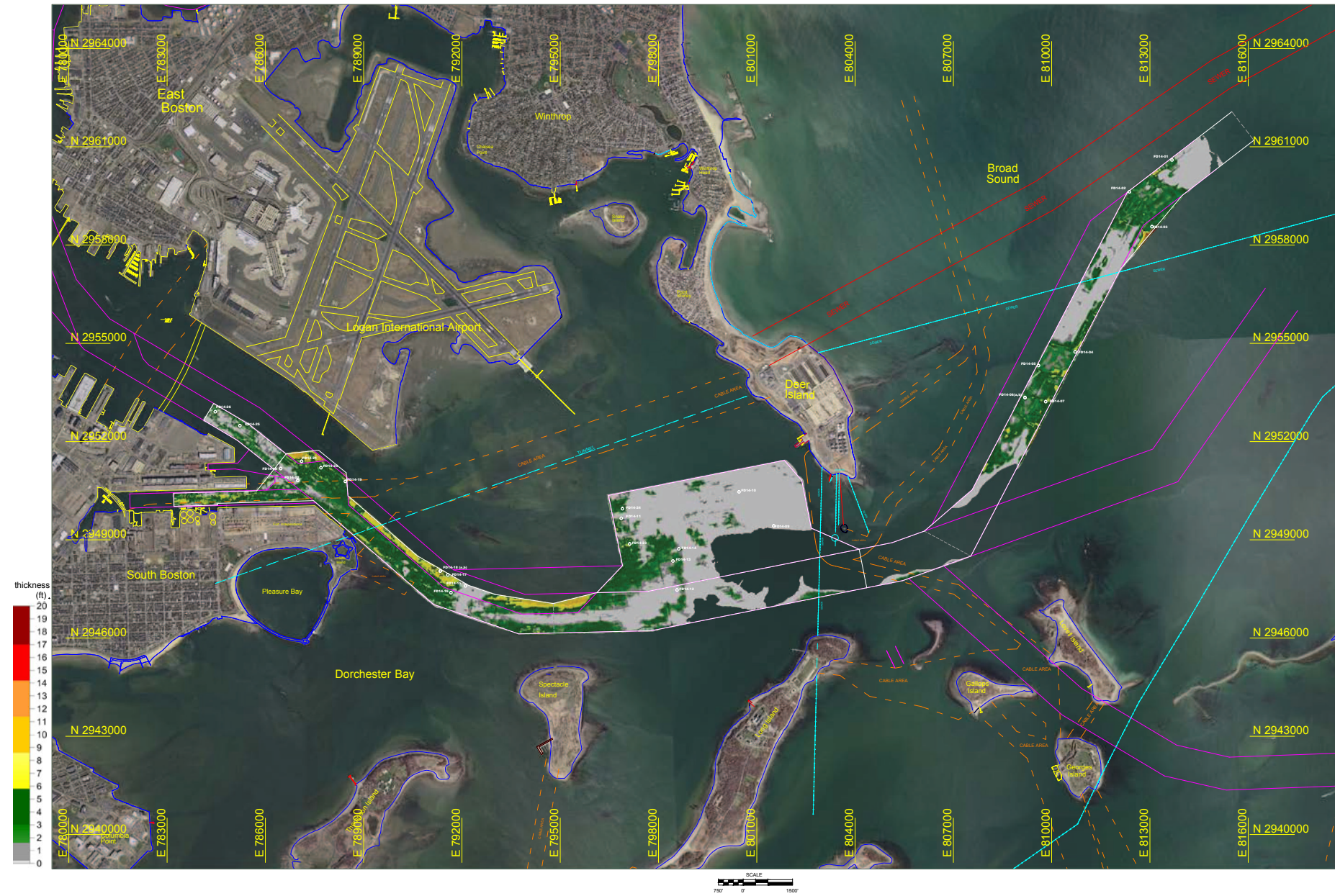
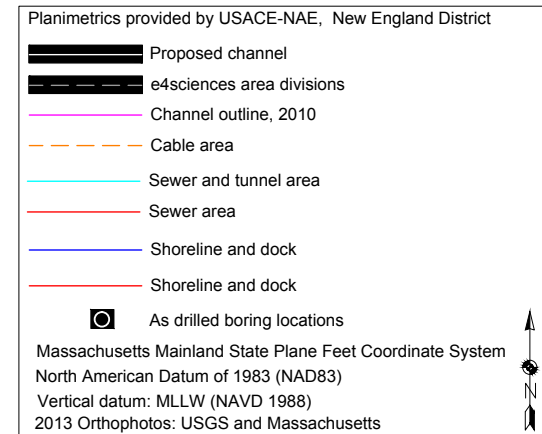
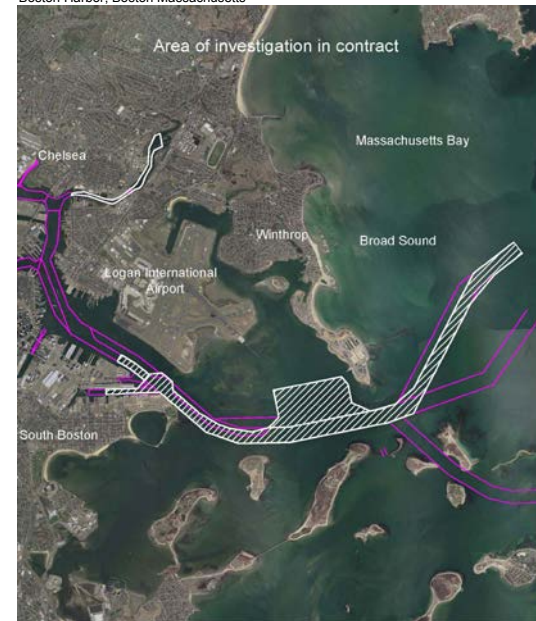
Approved By:

Date: April 27, 2015



Plate 12: Isopach map of Pleistocene sediments

Contract #W912DS-12-D-0002, DB01: Marine Geophysical and Geological Explorations, Boston Harbor, Boston Massachusetts



Drawn By: *Bidett Boyd*

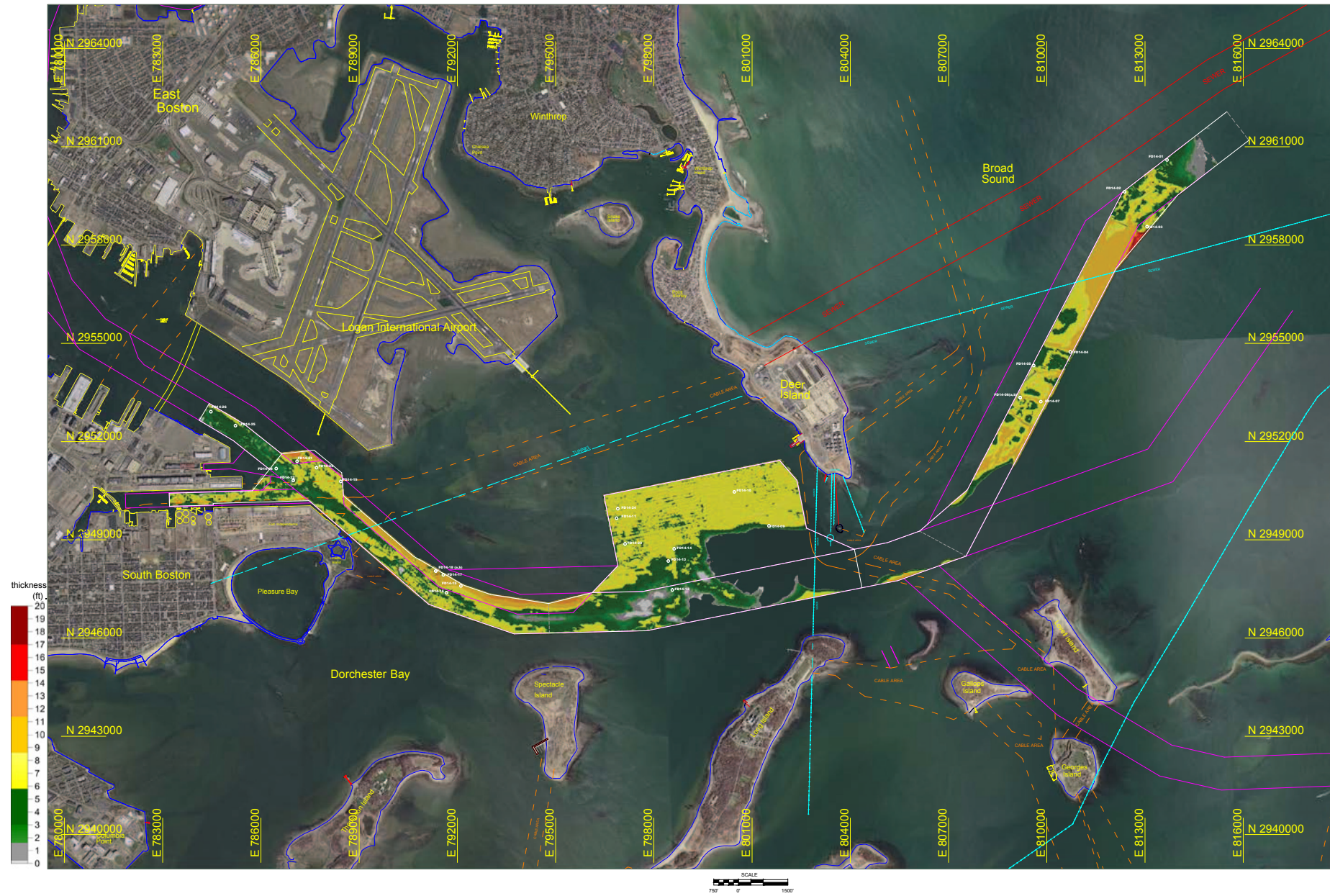
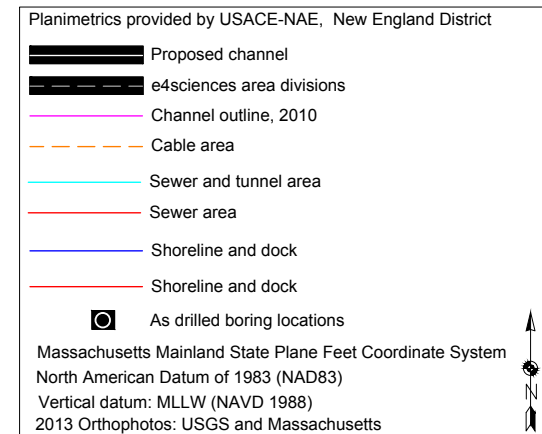
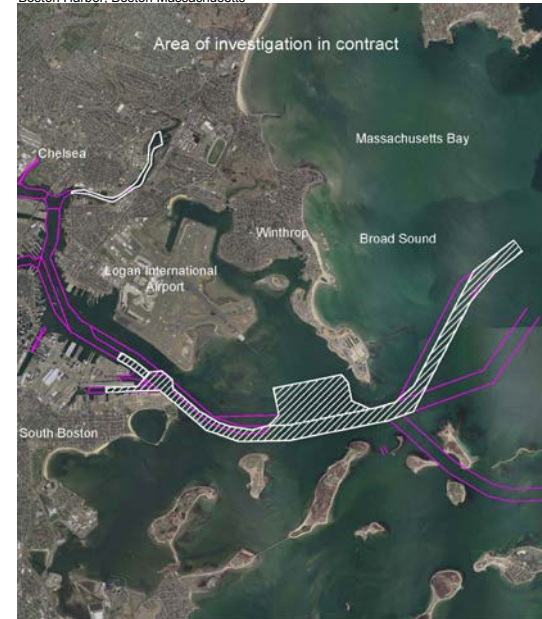
Approved By:

Date: April 27, 2015



Plate 13: Isopach map of Holocene and Pleistocene sediments

Contract #W912DS-12-D-0002, DB01: Marine Geophysical and Geological Explorations, Boston Harbor, Boston Massachusetts



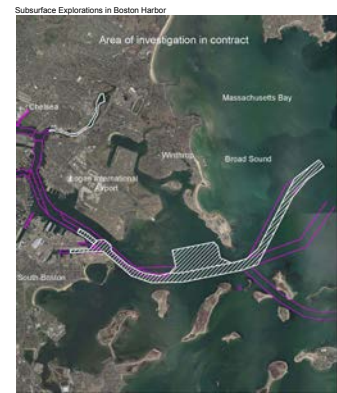
Drawn By: *Bidett Boyd*

Approved By:

Date: April 27, 2015



Plate 14: North Channel Orthoconographs



Planimetrics provided by USACE-NAE, New England District

- Proposed channel
- e4sciences area divisions
- Channel outline, 2010
- Cable area
- Sewer and tunnel area
- Sewer area
- Shoreline and dock
- Shoreline and dock
- Direction of sonar illumination
- As drilled boring locations

Massachusetts Mainland State Plane Feet Coordinate System
 North American Datum of 1983 (NAD83)
 Vertical datum: MLLW (NAVD 1988)
 2013 Orthophotos: USGS and Massachusetts

Drawn By: *Brett Boyd*
 Approved By:
 Date: April 27, 2015

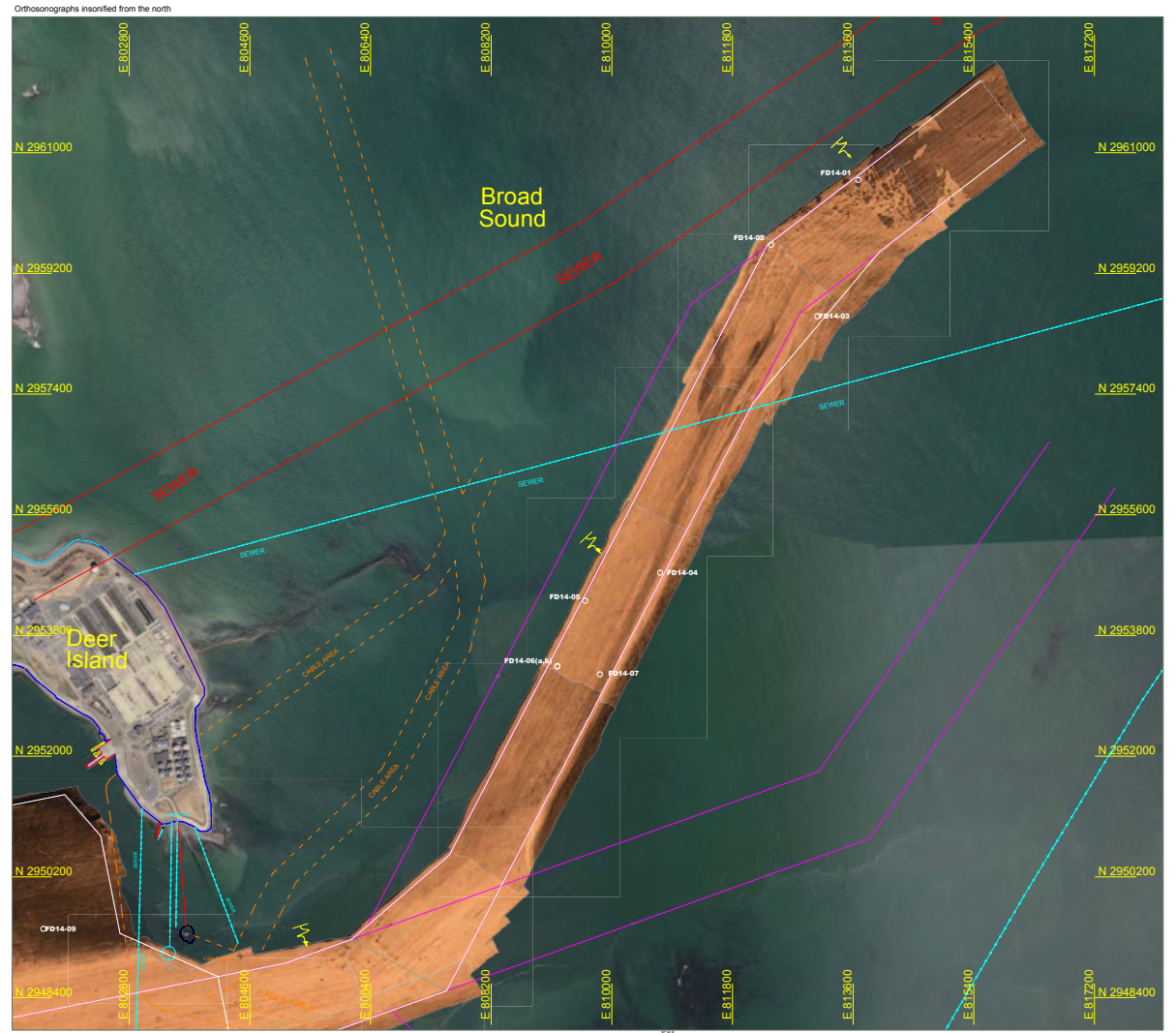
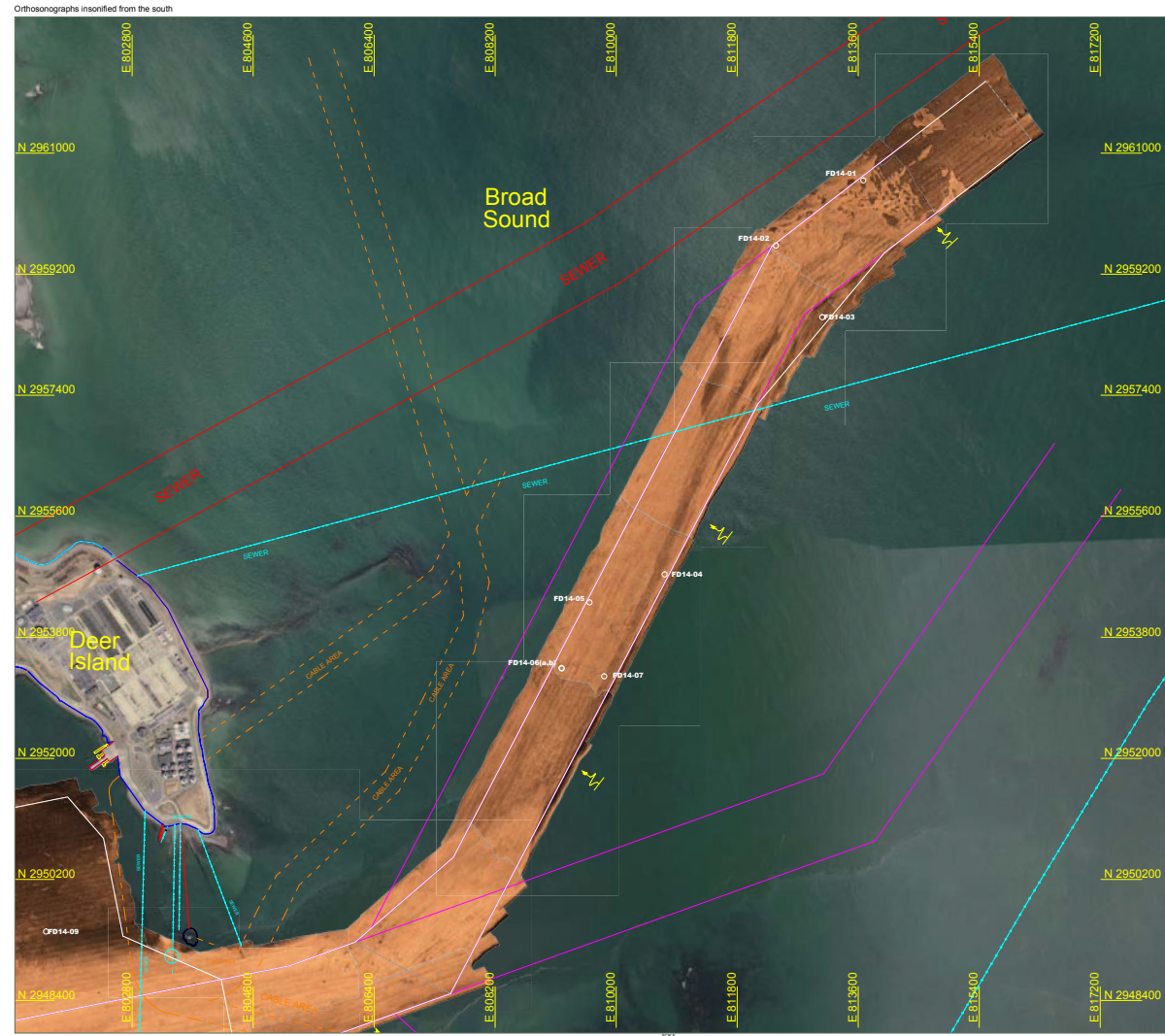
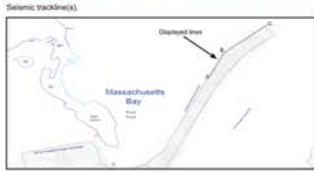




Plate 15: North Channel seismic cross sections
Contract #W9122B-12-D-0002, D601: Marine Geophysical and Geological Explorations,
Boston Harbor, Massachusetts



Drawn by:
Approved by:
Date: May 7, 2015

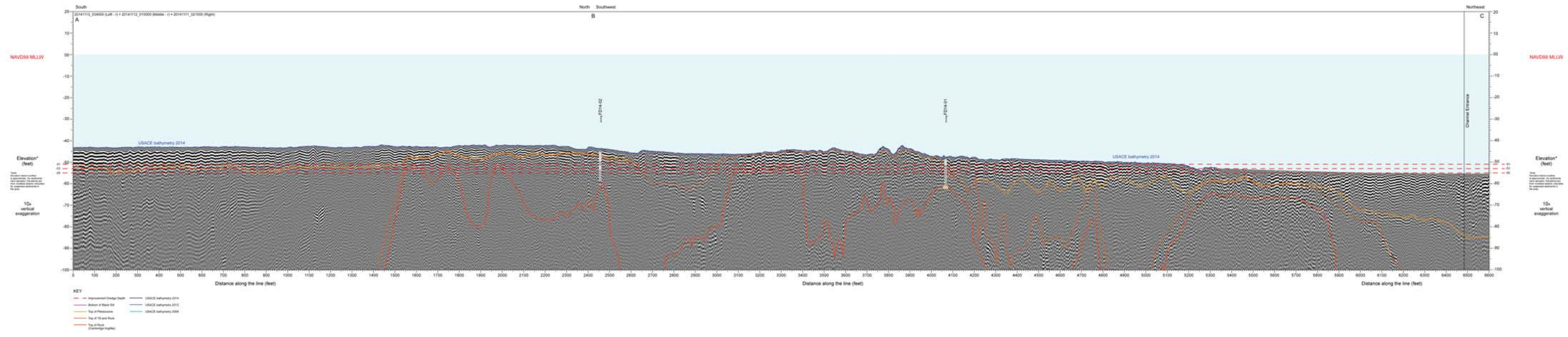
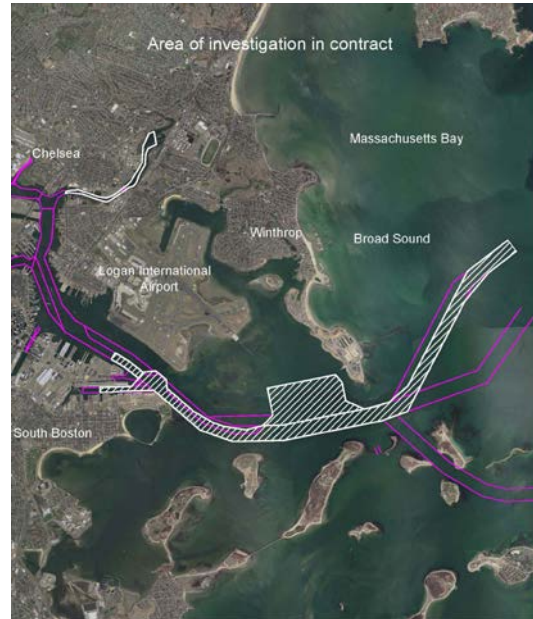


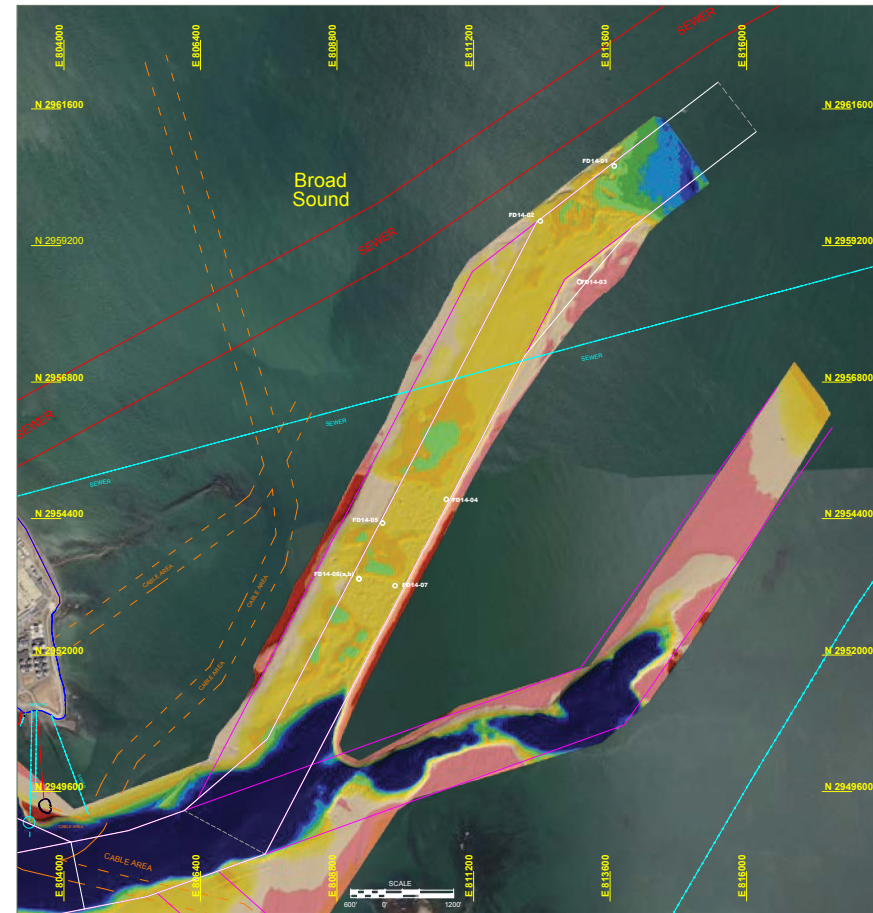


Plate 16: North Channel geology

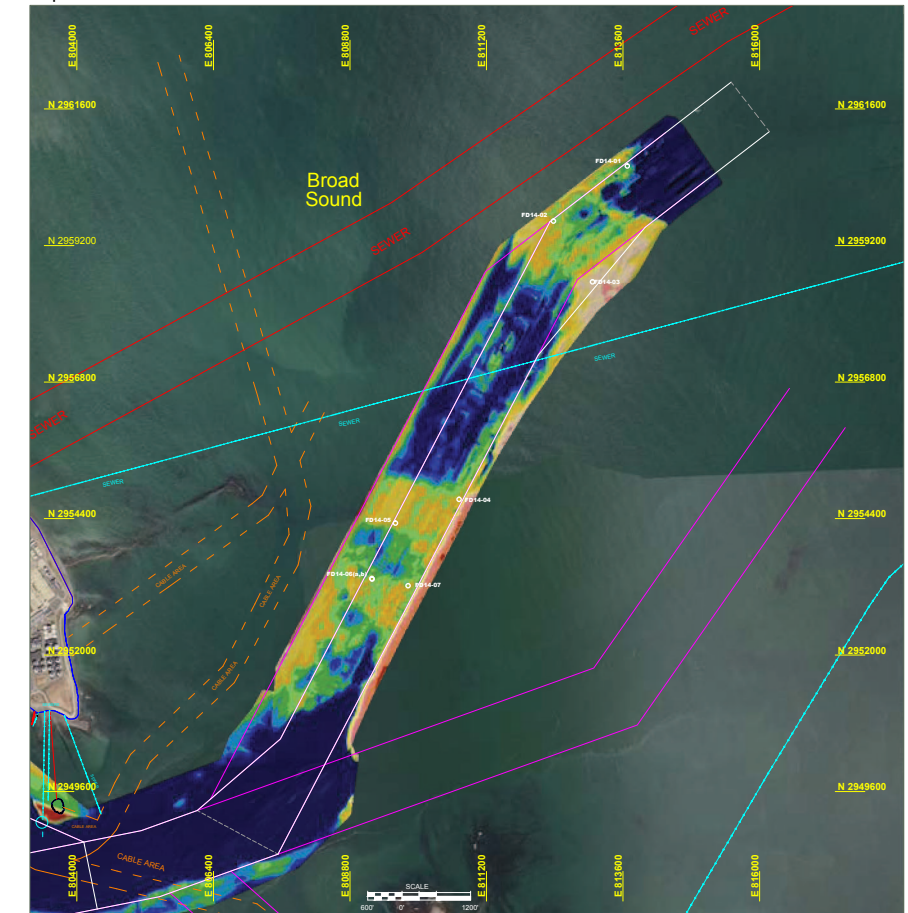
Contract #W912DS-12-D-0002, DB01: Marine Geophysical and Geological Explorations, Boston Harbor, Boston Massachusetts



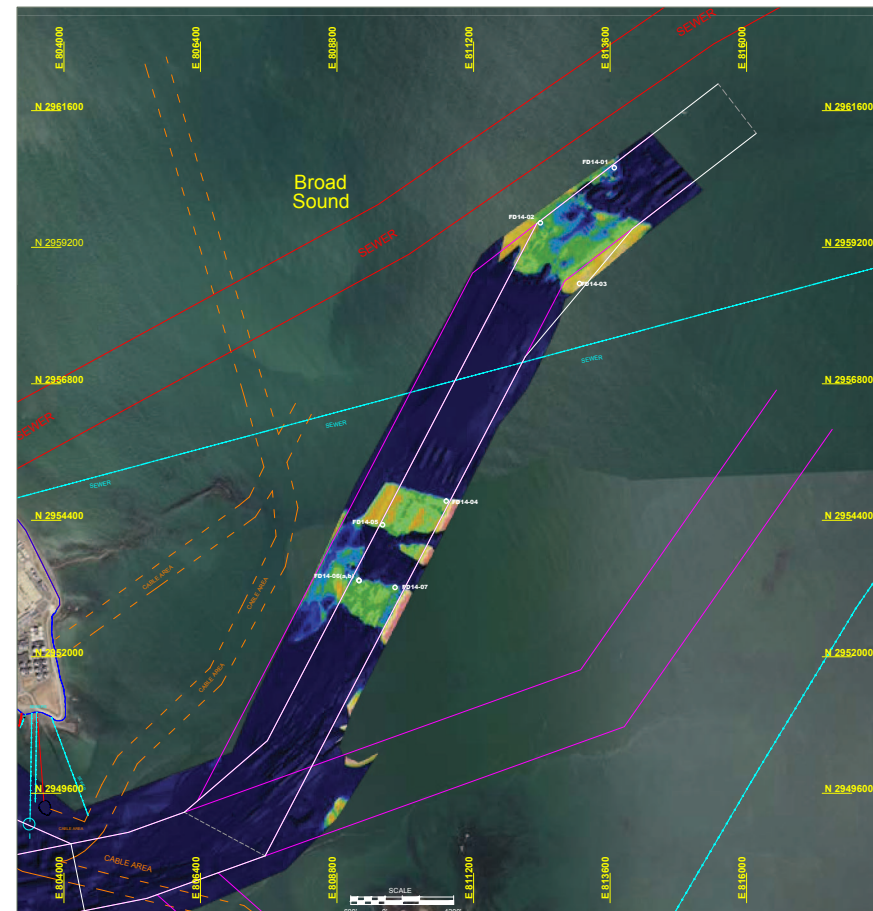
Bathymetric elevations, top of Holocene elevations



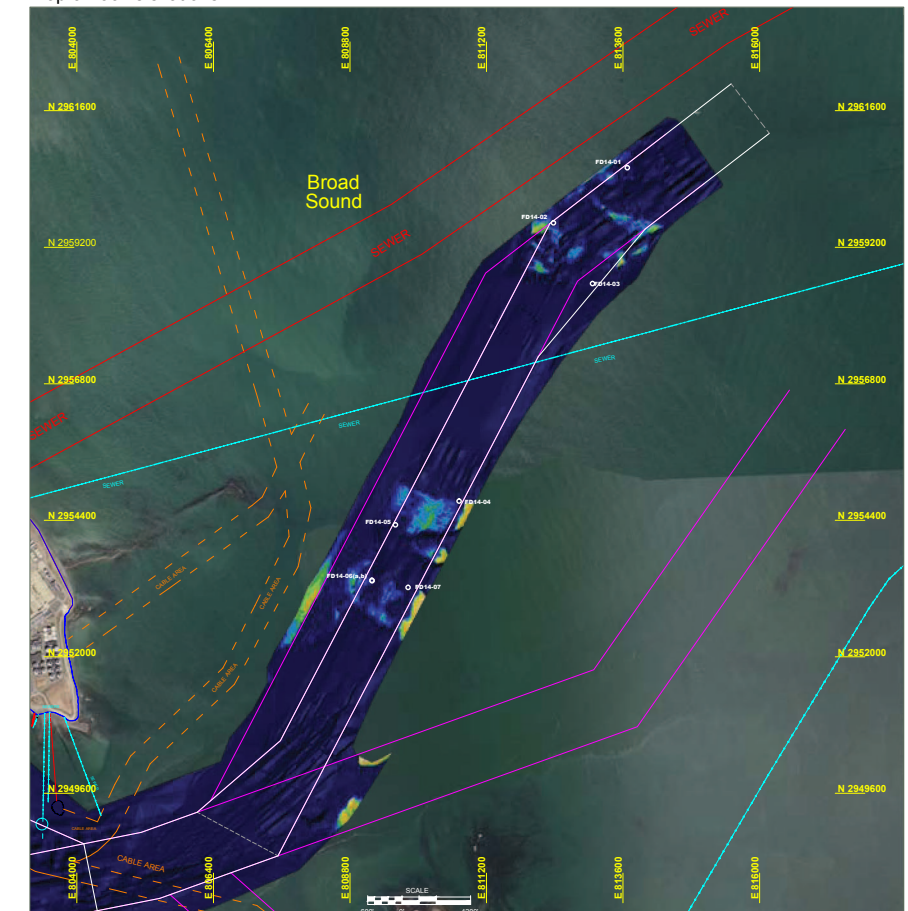
Top of Pleistocene elevations



Top of rock and till elevations



Top of rock elevations



Planimetrics provided by USACE-NAE, New England District

- Proposed channel
- e4sciences area divisions
- Channel outline, 2010
- Cable area
- Sewer and tunnel area
- Sewer area
- Shoreline and dock
- Shoreline and dock
- As drilled boring locations

Massachusetts Mainland State Plane Feet Coordinate System
North American Datum of 1983 (NAD83)
Vertical datum: MLLW (NAVD 1988)
2013 Orthophotos: USGS and Massachusetts

elevation (ft.)

- 15
- 17
- 19
- 21
- 23
- 25
- 27
- 29
- 31
- 33
- 35
- 37
- 39
- 41
- 43
- 45
- 47
- 49
- 51
- 53
- 55
- 57
- 59

Drawn By: *Bridgett Boyd*

Approved By:

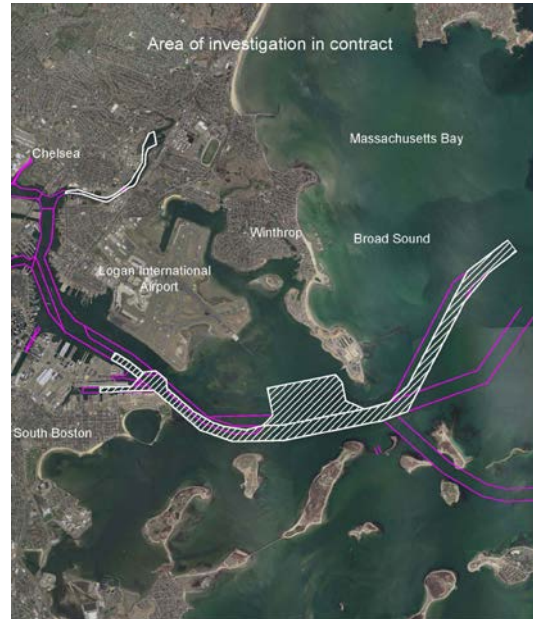
Date: April 28, 2015



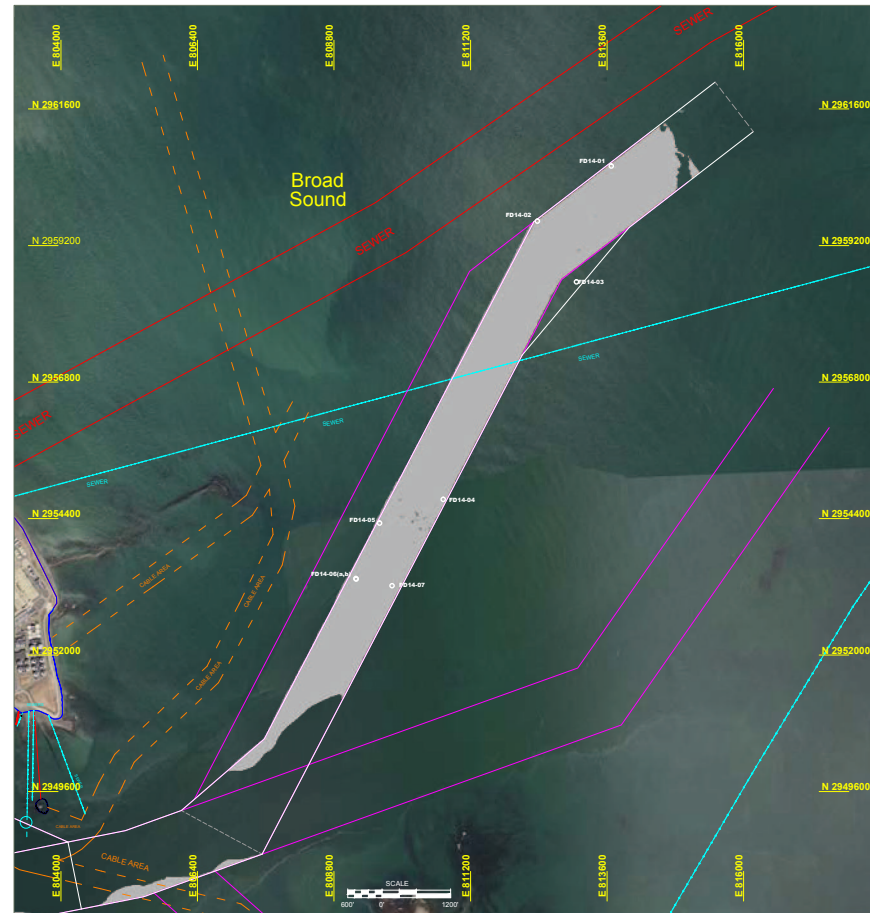
e4sciences

Plate 17: North Channel geotechnology

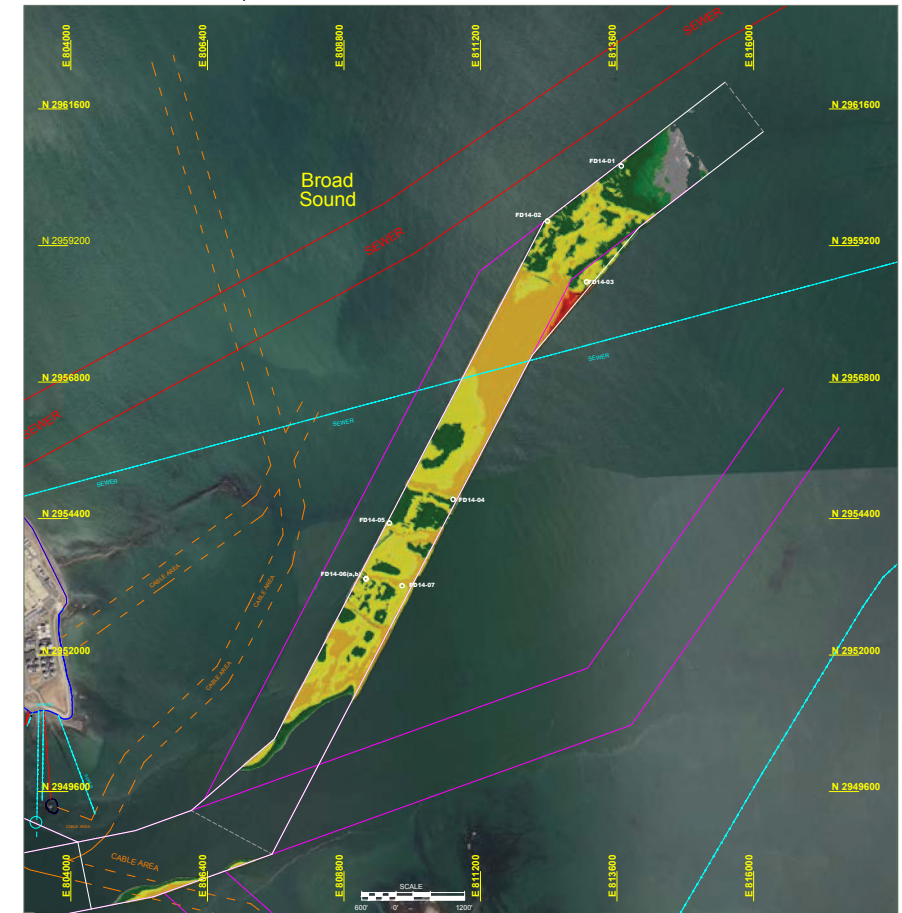
Contract #W912DS-12-D-0002, DB01: Marine Geophysical and Geological Explorations, Boston Harbor, Boston Massachusetts



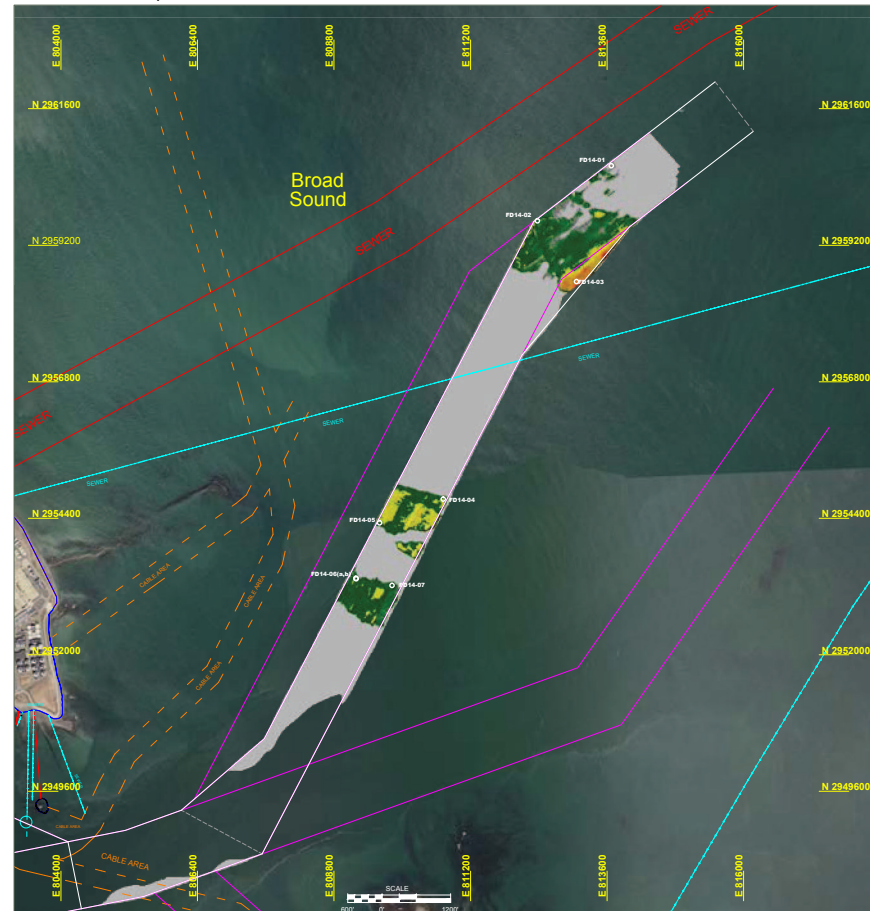
Maintenance isopach



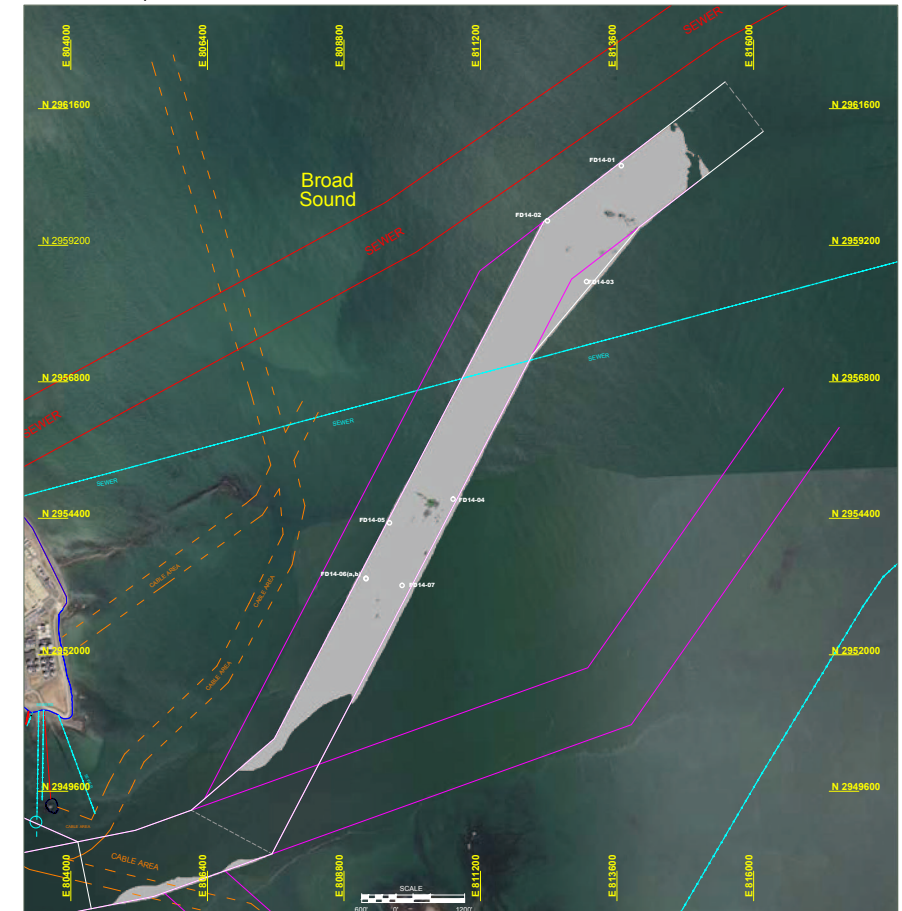
Holocene-Pleistocene isopach



Rock and Till isopach



Fast Rock isopach



Planimetrics provided by USACE-NAE, New England District

- Proposed channel
- e4sciences area divisions
- Channel outline, 2010
- Cable area
- Sewer and tunnel area
- Sewer area
- Shoreline and dock
- Shoreline and dock
- As drilled boring locations

Massachusetts Mainland State Plane Feet Coordinate System
 North American Datum of 1983 (NAD83)
 Vertical datum: MLLW (NAVD 1988)
 2013 Orthophotos: USGS and Massachusetts

thickness (ft.)

Drawn By: *Bridgett Boyd*

Approved By:

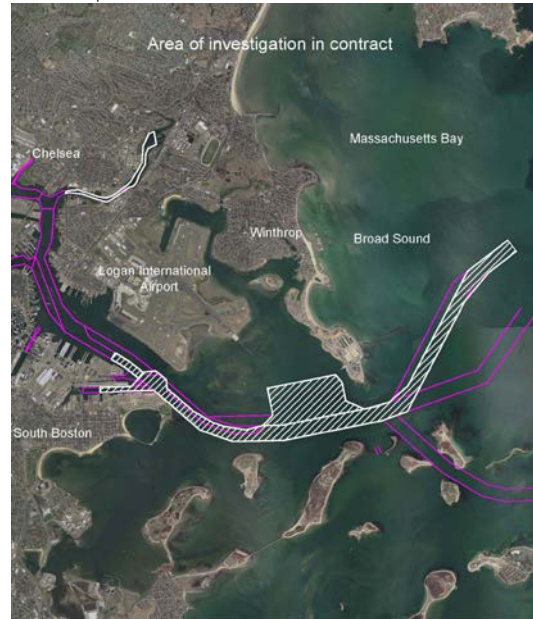
Date: April 28, 2015



e4sciences

Plate 18: Slice map at -53ft of fast rock in the entire -51ft project

Subsurface Explorations in Boston Harbor



Orange represents fast rock at -53ft
 Blue represents rock at -53ft
 Gray represents rock at -55ft
 Planimetrics provided by USACE-NAE, New England District

- Proposed channel
- e4sciences area divisions
- Channel outline, 2010
- Cable area
- Sewer and tunnel area
- Sewer area
- Shoreline and dock
- Shoreline and dock

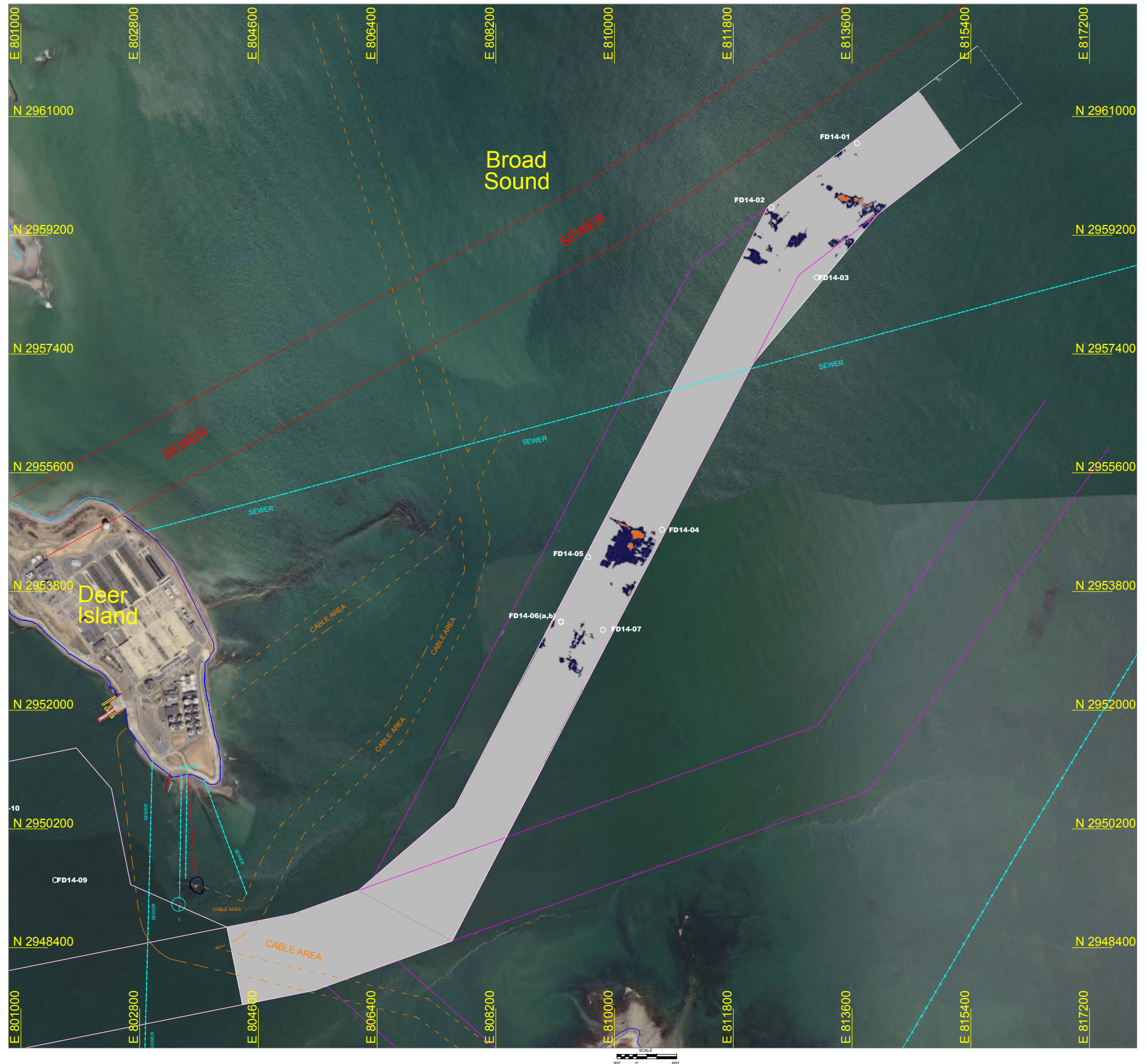
As drilled boring locations

Massachusetts Mainland State Plane Feet Coordinate System
 North American Datum of 1983 (NAD83)
 Vertical datum: MLLW (NAVD 1988)
 2013 Orthophotos: USGS and Massachusetts

Drawn By: *Bridgett Boyd*

Approved By:

Date: April 27, 2015





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Plate 19: North Channel seismic-velocity cross sections

Contract #W912DS-12-D-0002, DB01: Marine Geophysical and Geological Explorations, Boston Harbor, Massachusetts



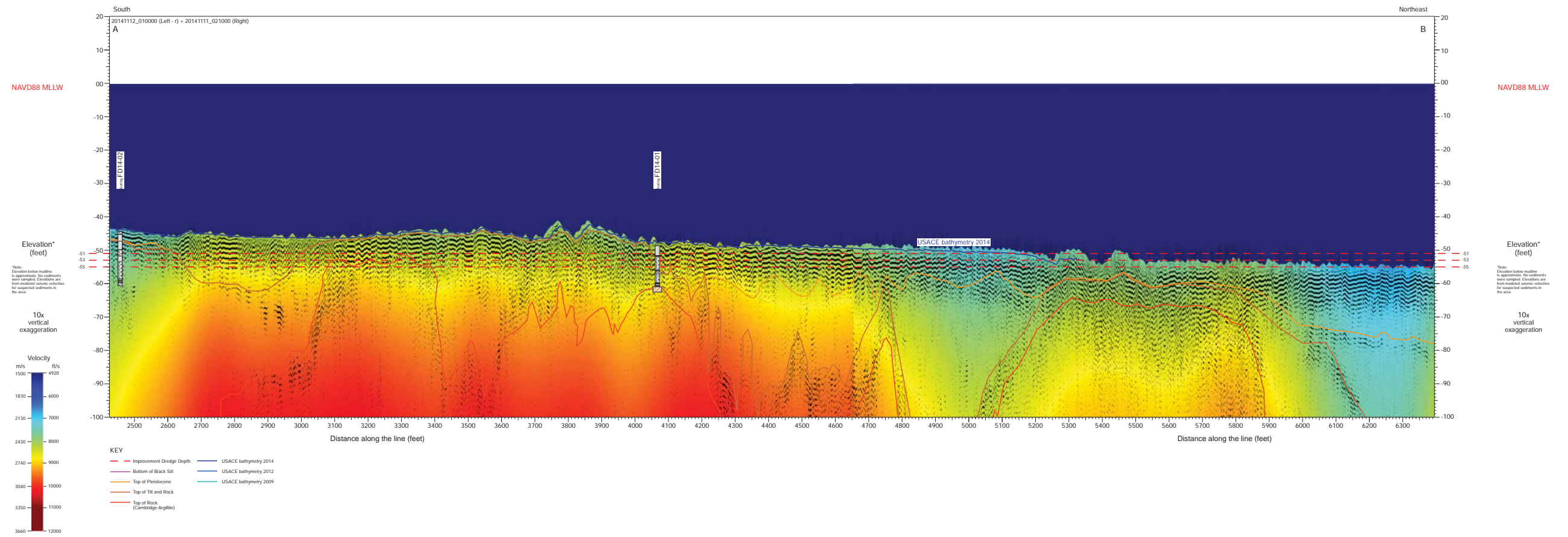
Seismic trackline(s)



Drawn By:

Approved By:

Date: May 7, 2015

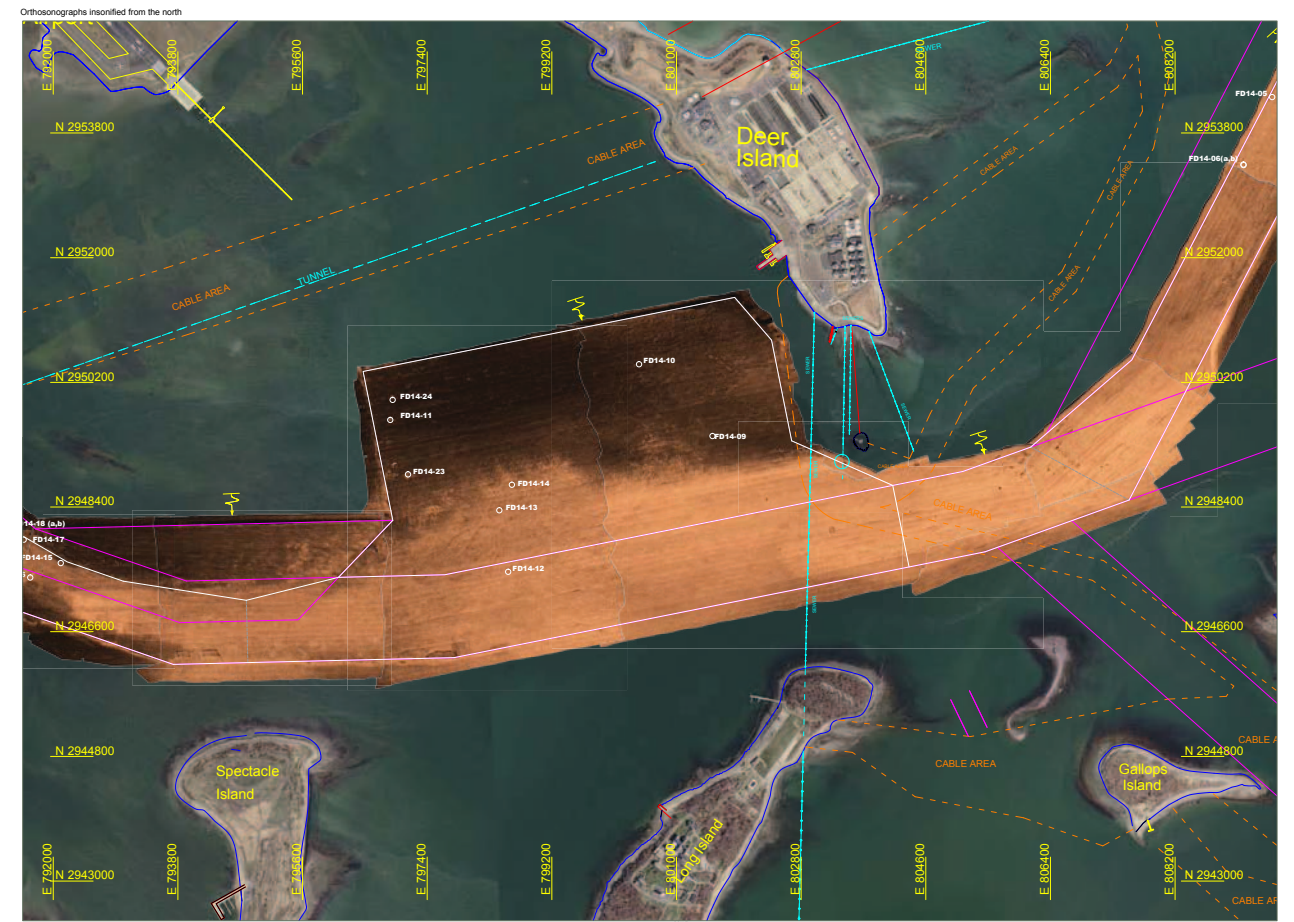
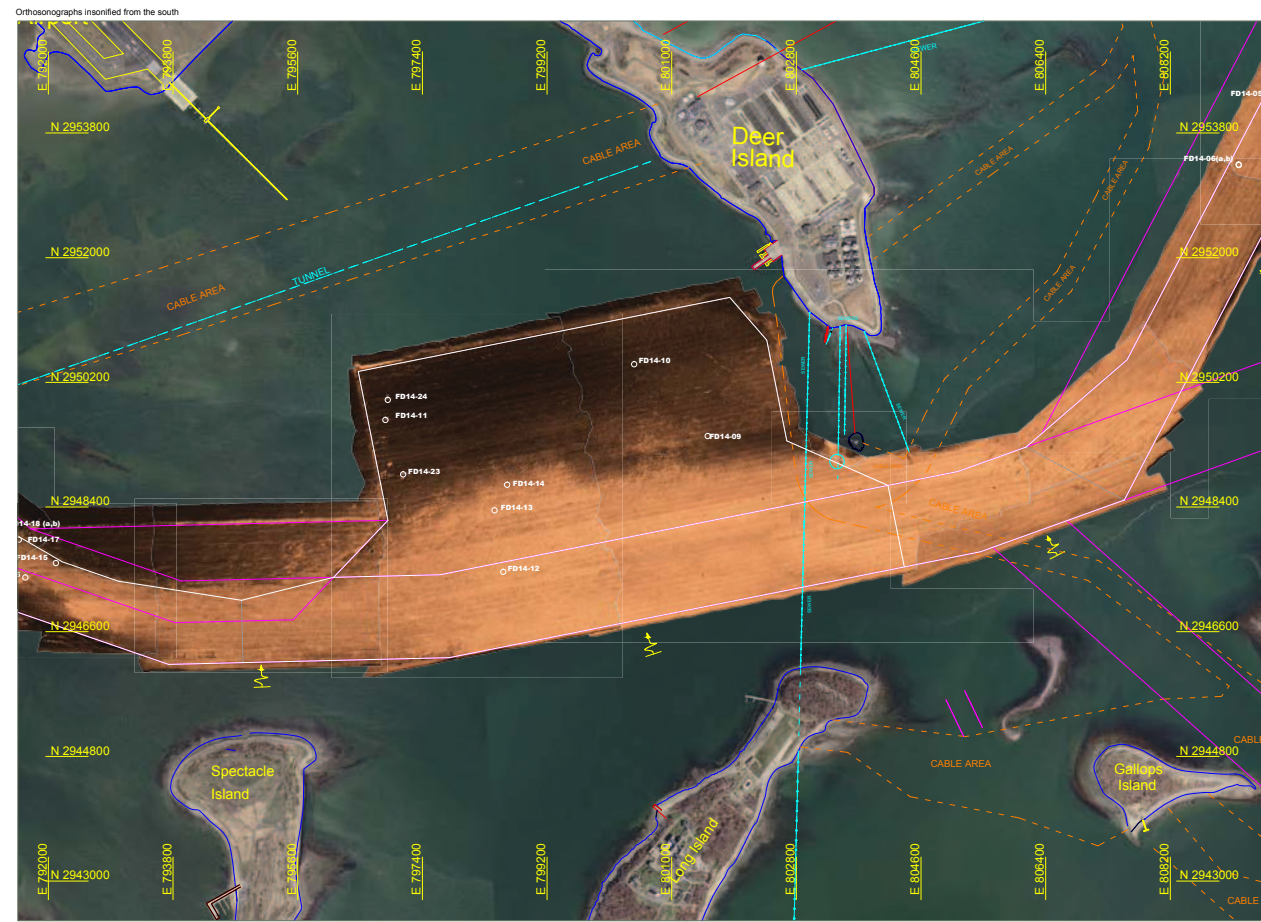
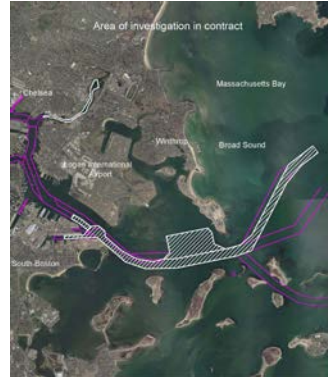




sciences

Plate 20: President Roads Anchorage Orthoimages

Contract #WY12D5-12-D-0002_DB01 Marine Geophysical and Geological Explorations, Boston Harbor, Boston Massachusetts



Planimetrics provided by USACE-NAE, New England District

- Proposed channel
- e4sciences area divisions
- Channel outline, 2010
- Cable area
- Sewer and tunnel area
- Sewer area
- Shoreline and dock
- Shoreline and dock
- Direction of sonar illumination
- As drilled boring locations

Massachusetts Mainland State Plane Feet Coordinate System
 North American Datum of 1983 (NAD83)
 Vertical datum: MLLW (NAVD 1988)
 2013 Orthophotos: USGS and Massachusetts

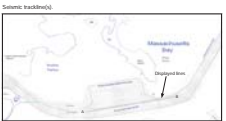
Drawn By: *Bruce Boyd*
 Approved By:
 Date: April 27, 2015



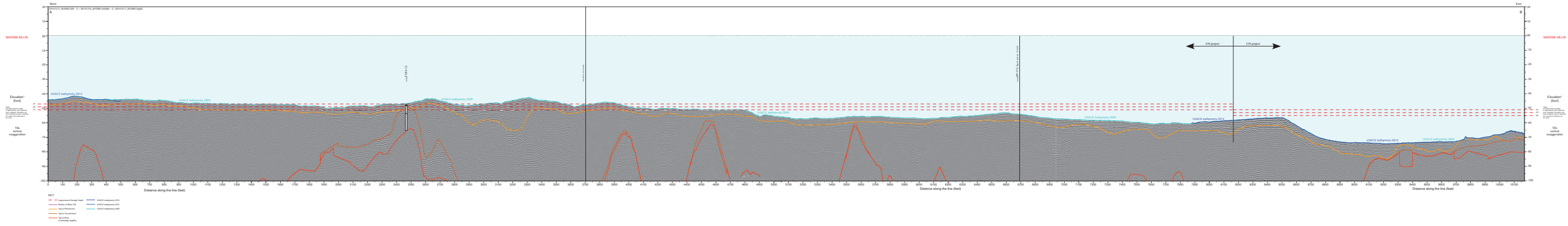
Geomatics | Earthworks, LLC

Plate 21 - Main Ship Channel in President Roads Anchorage sonic cross sections

Contract: 19111001-10-2-0002, 0001 Marine Geophysical and Geotechnical Engineering
Boston Harbor, Massachusetts - major waterway



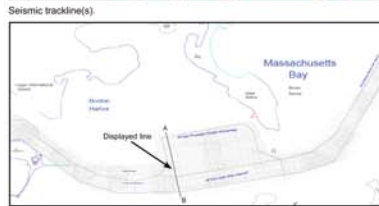
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Date: 10/1/2020



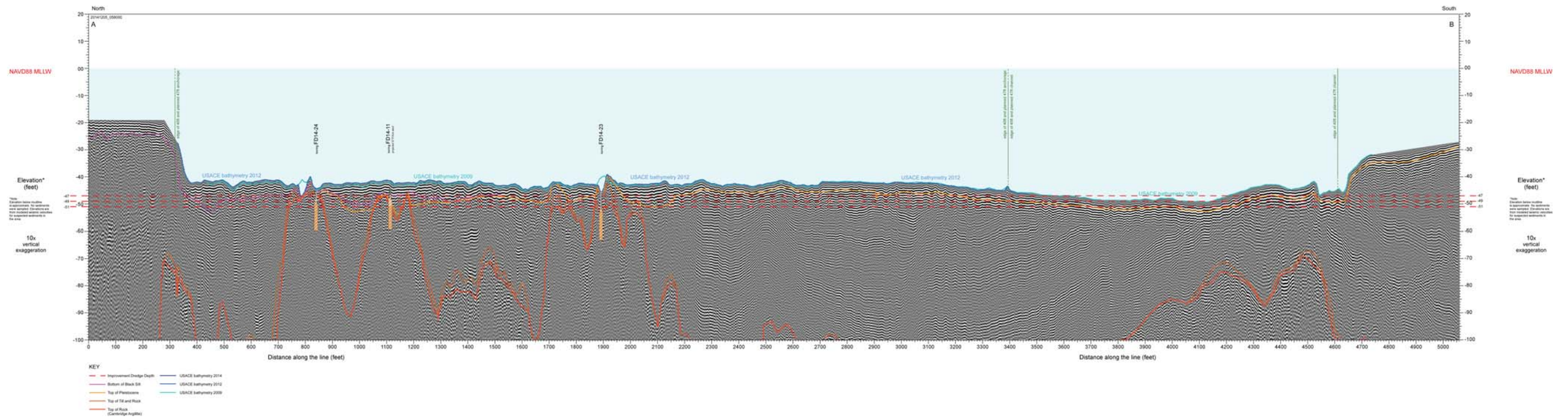


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Plate 22: President Roads Anchorage seismic cross section, line 20141205_058000
Contract #W912DS-12-D-0002, DB01: Marine Geophysical and Geological Explorations, Boston Harbor, Massachusetts



Drawn By:
Approved By:
Date: May 7, 2015

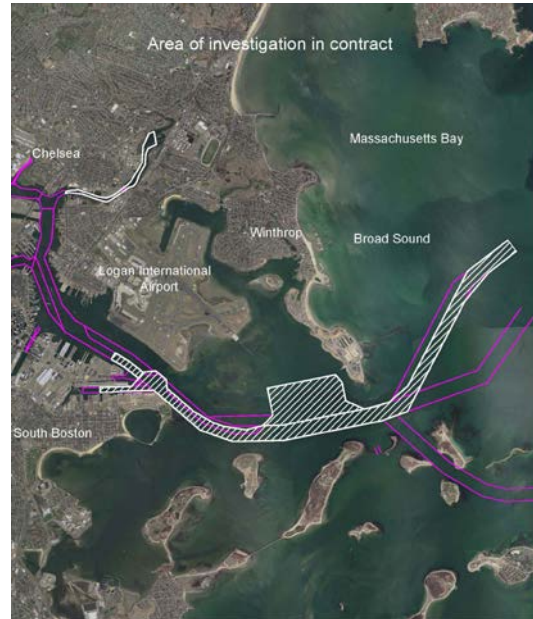




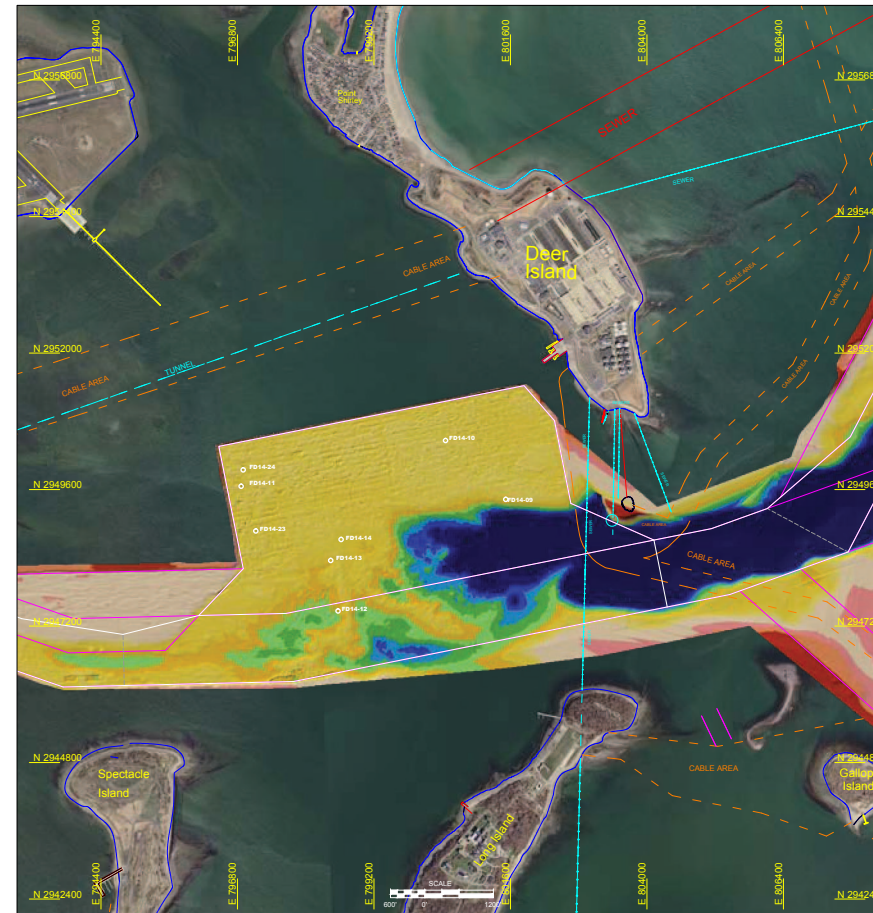
e4sciences

Plate 23: President Roads Anchorage geology

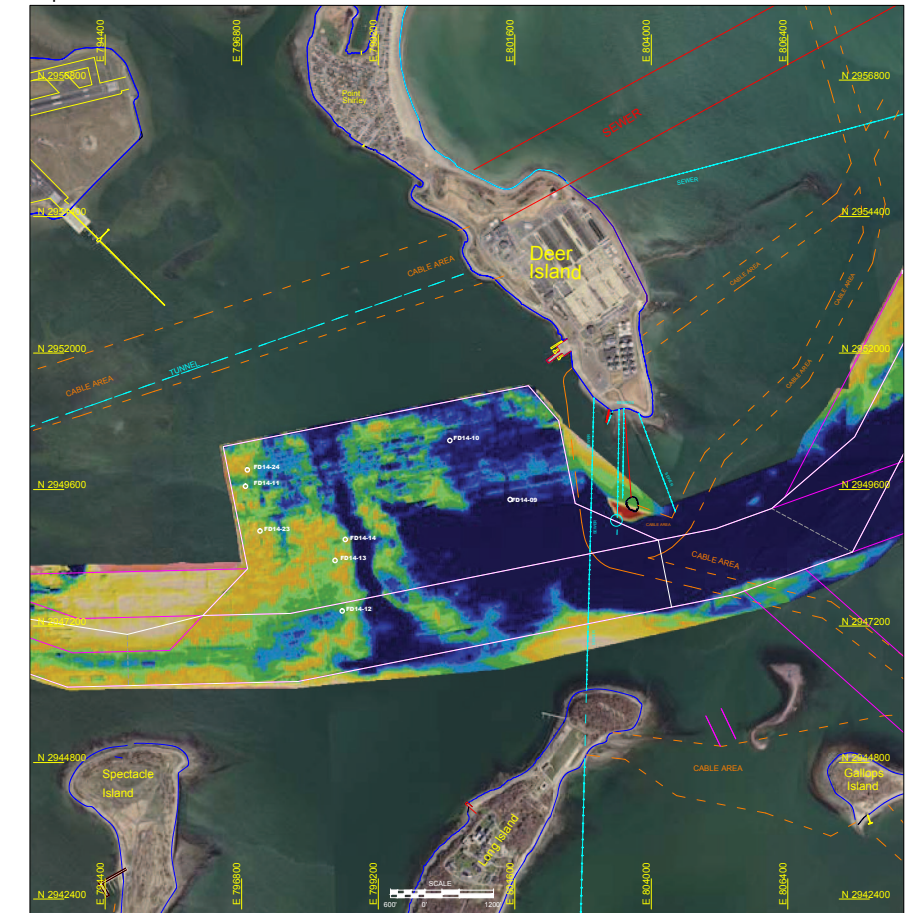
Contract #W912DS-12-D-0002, DB01: Marine Geophysical and Geological Explorations, Boston Harbor, Boston Massachusetts



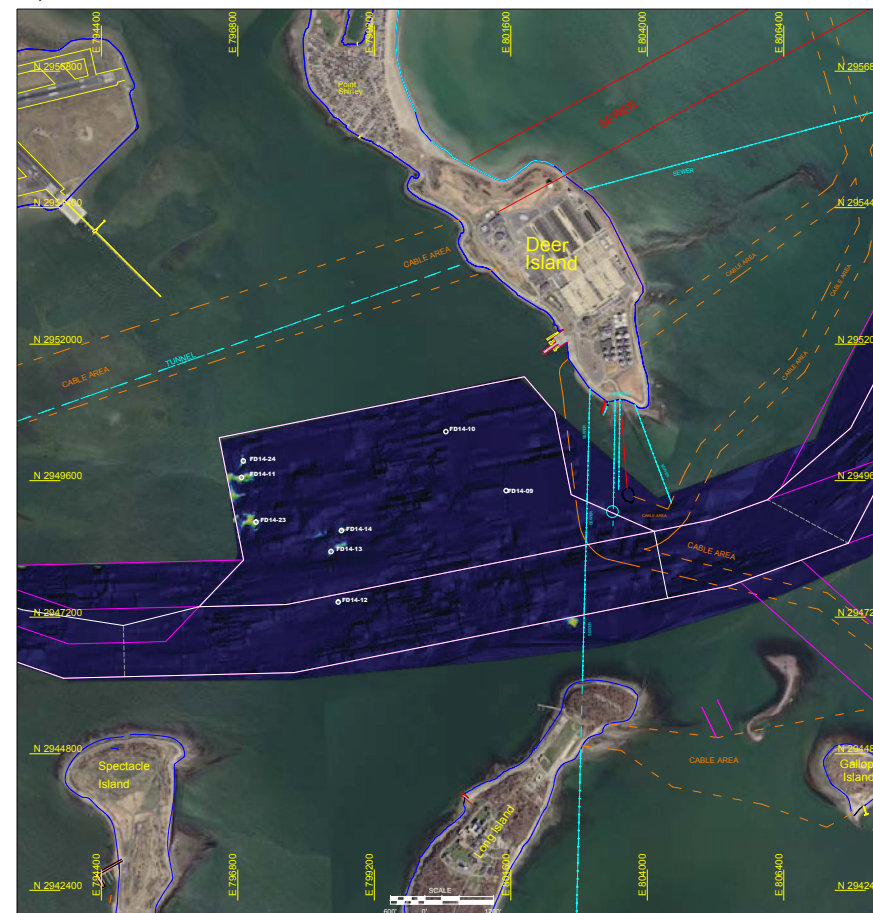
Bathymetric elevations, top of Holocene elevations



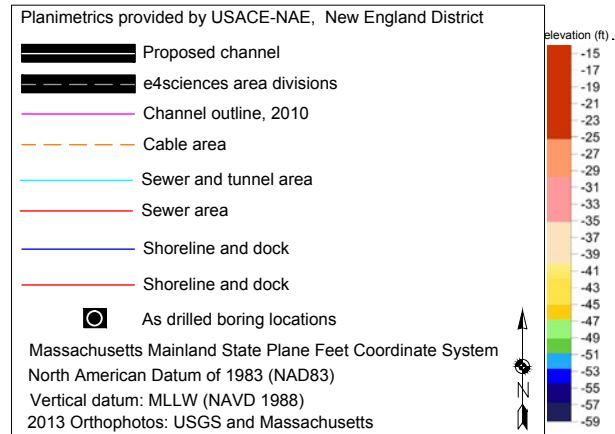
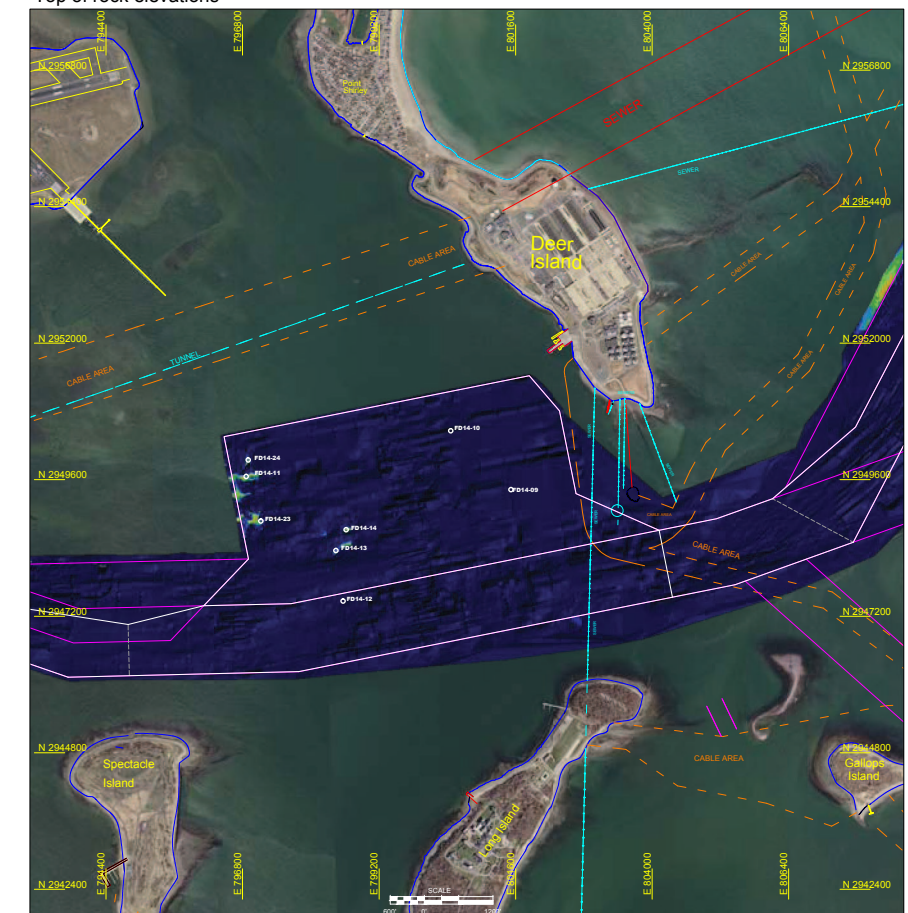
Top of Pleistocene elevations



Top of rock and till elevations



Top of rock elevations



Drawn By: *Bridgett Boyd*

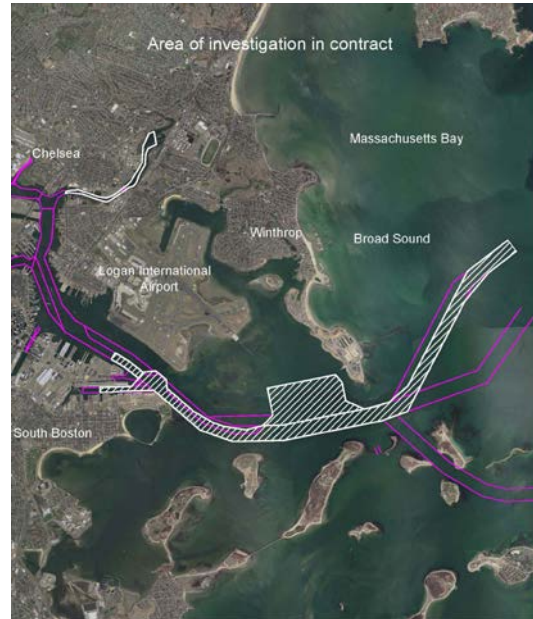
Approved By:

Date: April 28, 2015

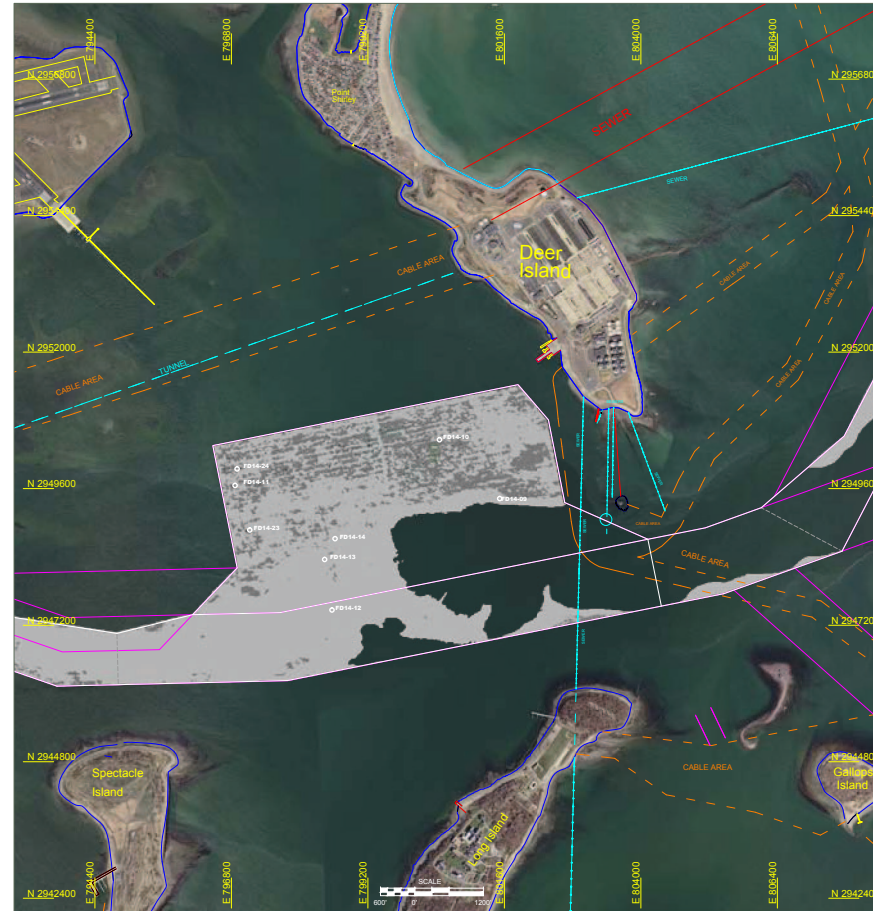


Plate 24: President Roads Anchorage geotechnology

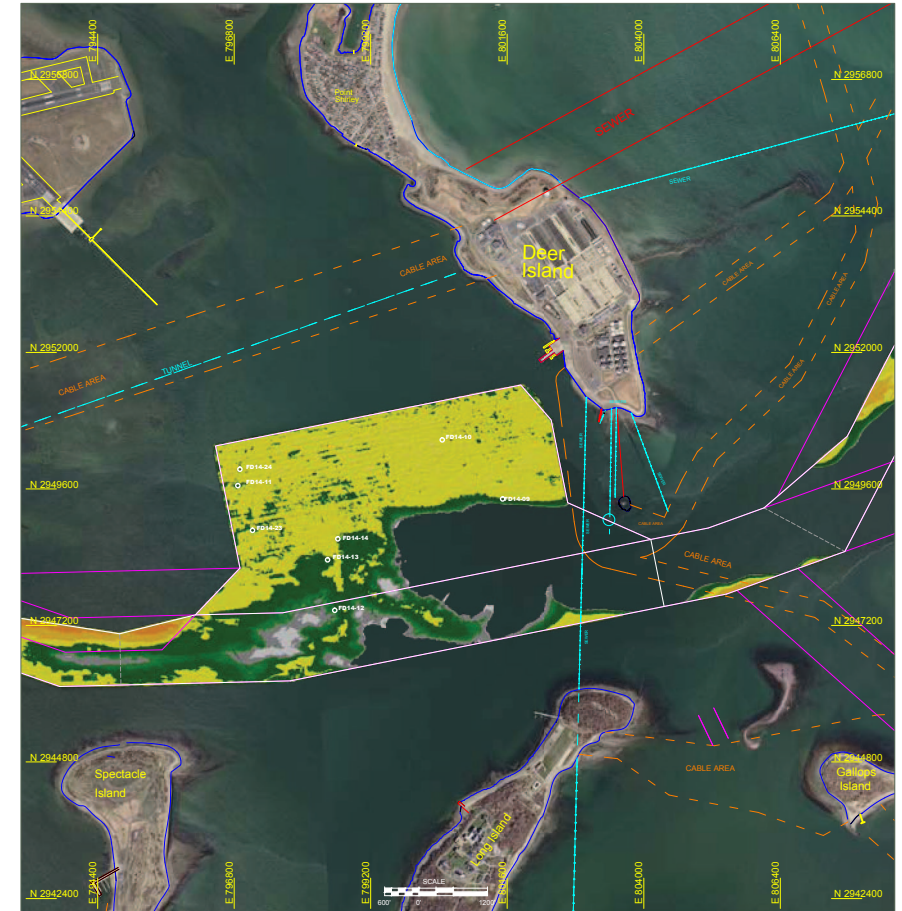
Contract #W912DS-12-D-0002, DB01: Marine Geophysical and Geological Explorations, Boston Harbor, Boston Massachusetts



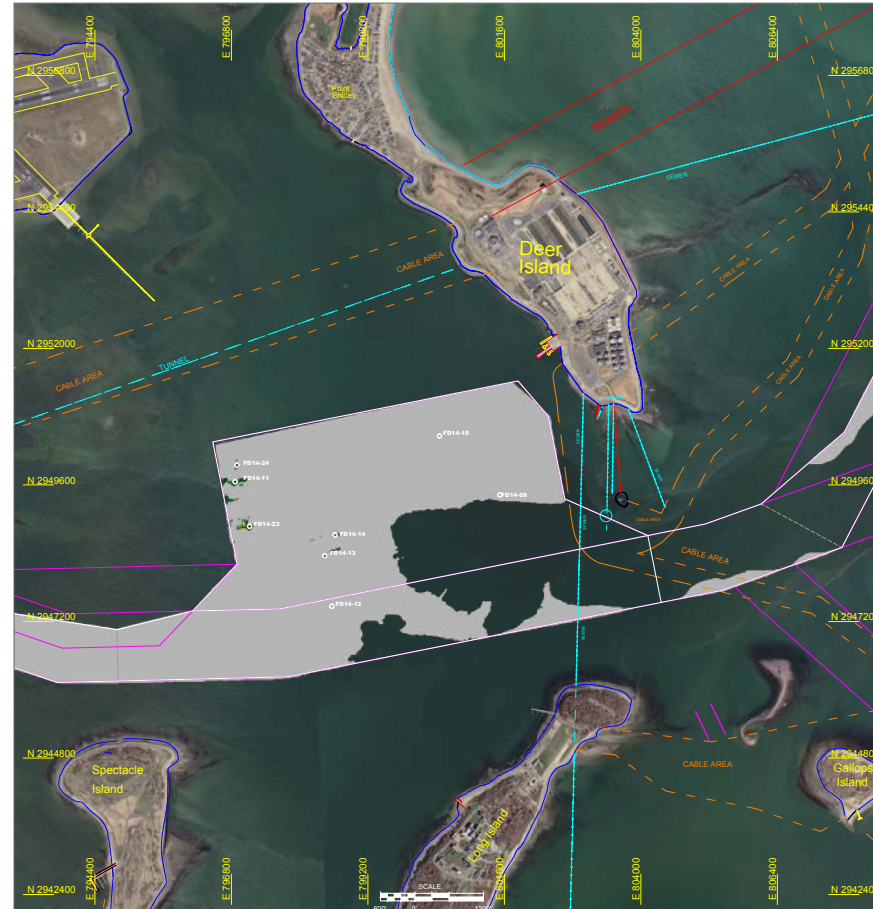
Maintenance isopach



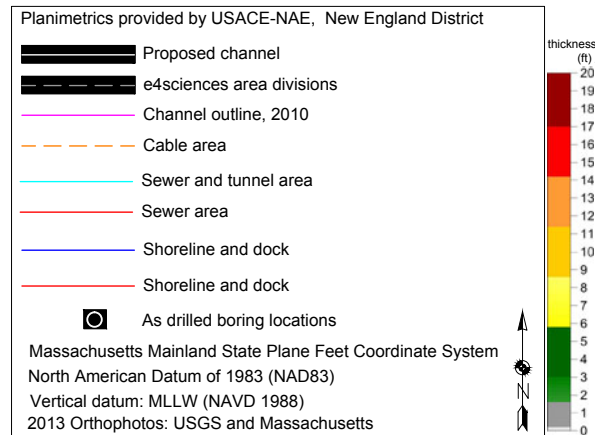
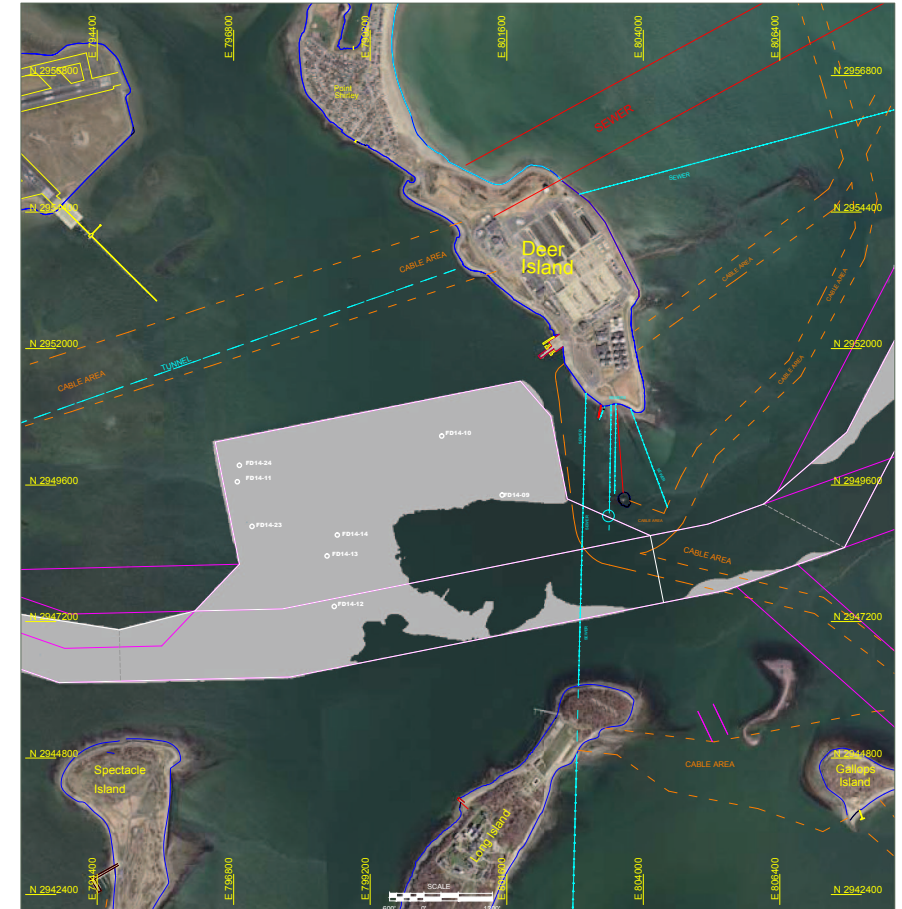
Holocene-Pleistocene isopach



Rock and Till isopach



Fast Rock isopach



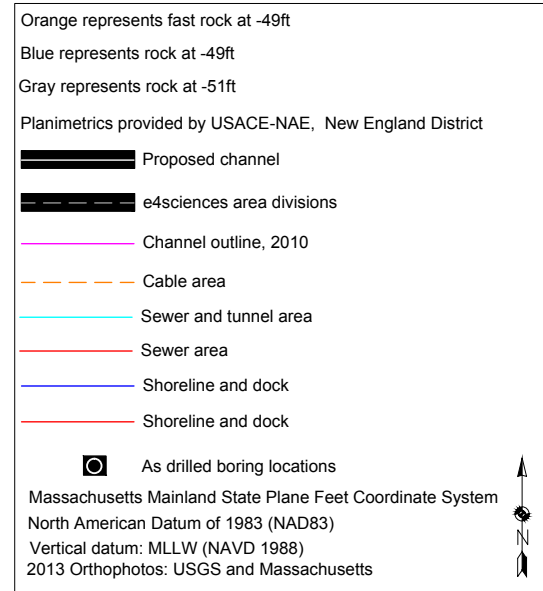
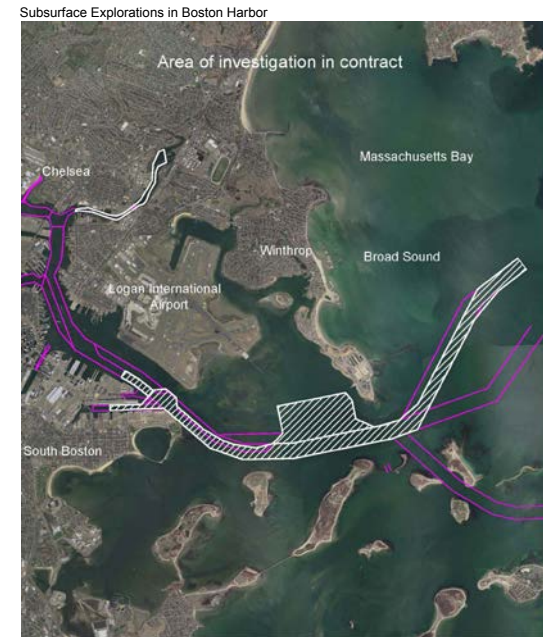
Drawn By: *Bridgett Boyd*

Approved By:

Date: April 28, 2015



Plate 25: Slice map at -49ft of fast rock in the entire -47ft project



Drawn By: *Bridgett Boyd*

Approved By:

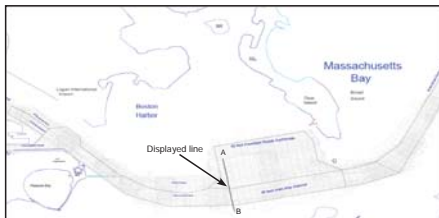
Date: April 27, 2015



Plate 26: President Roads Anchorage seismic-velocity cross section
Contract #W912DS-12-D-0002, DB01: Marine Geophysical and Geological Explorations,
Boston Harbor, Massachusetts



Seismic trackline(s).



Drawn By:
Approved By:
Date: May 7, 2015

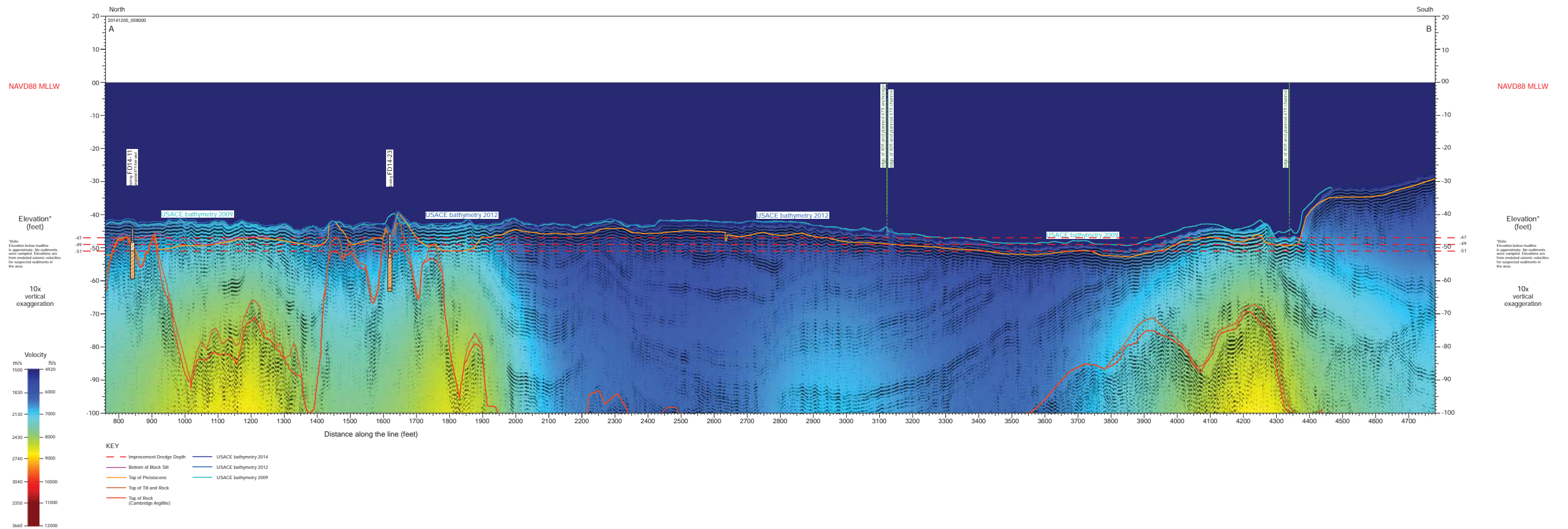




Plate 27: Reserved Channel Area Orthoisonographs

Contact #W91205-12-D-0002, DB01: Marine Geophysical and Geological Explorations, Boston Harbor, Boston, Massachusetts



Planimetrics provided by USACE-NAE, New England District

- Proposed channel
- eSciences area divisions
- Channel outline, 2010
- Cable area
- Sewer and tunnel area
- Sewer area
- Shoreline and dock
- Shoreline and dock
- Direction of sonar illumination
- As drilled boring locations

Massachusetts Mainland State Plane Feet Coordinate System
 North American Datum of 1983 (NAD83)
 Vertical datum: MLLW (NAVD 1988)
 2013 Orthophotos: USGS and Massachusetts

Drawn By: Brett Boyd
 Approved By:
 Date: April 27, 2015

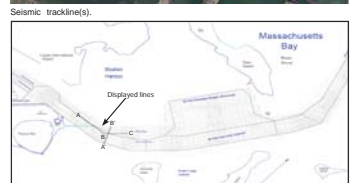
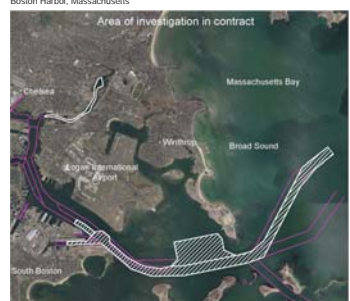




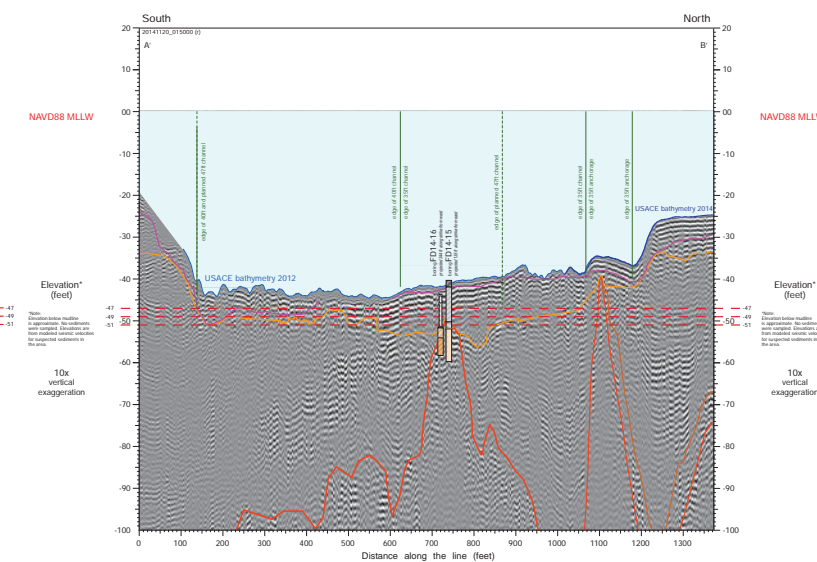
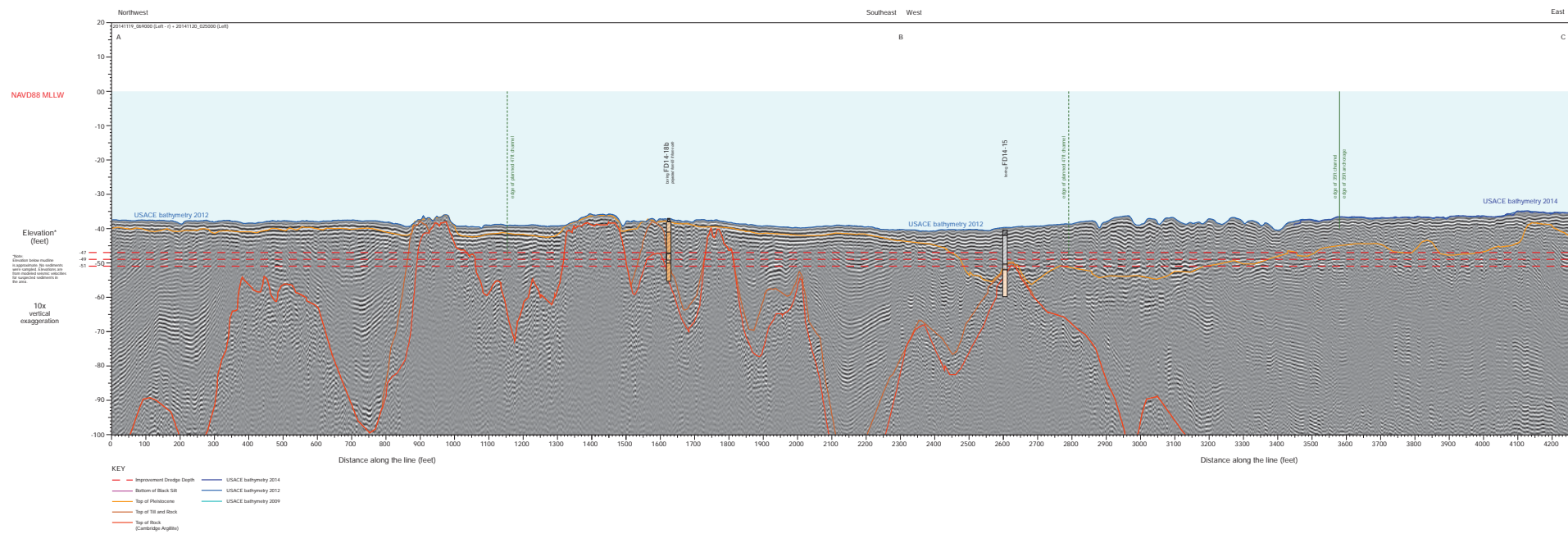
Earthworks, LLC

Plate 28: Main Ship Channel in Reserved Channel Area seismic cross sections

Contract #W912DS-12-D-0002, DB01: Marine Geophysical and Geological Explorations, Boston Harbor, Massachusetts



Drawn By:
Approved By:
Date: May 7, 2015



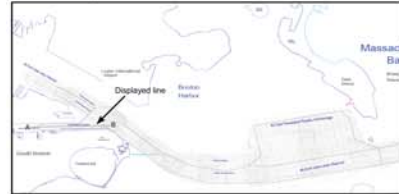


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Plate 29: Reserved Channel seismic cross section, line 20141210_011000
Contract #W912DS-12-D-0002, DB01: Marine Geophysical and Geological Explorations, Boston Harbor, Massachusetts



Seismic trackline(s)



Drawn By:

Approved By:

Date: May 7, 2015

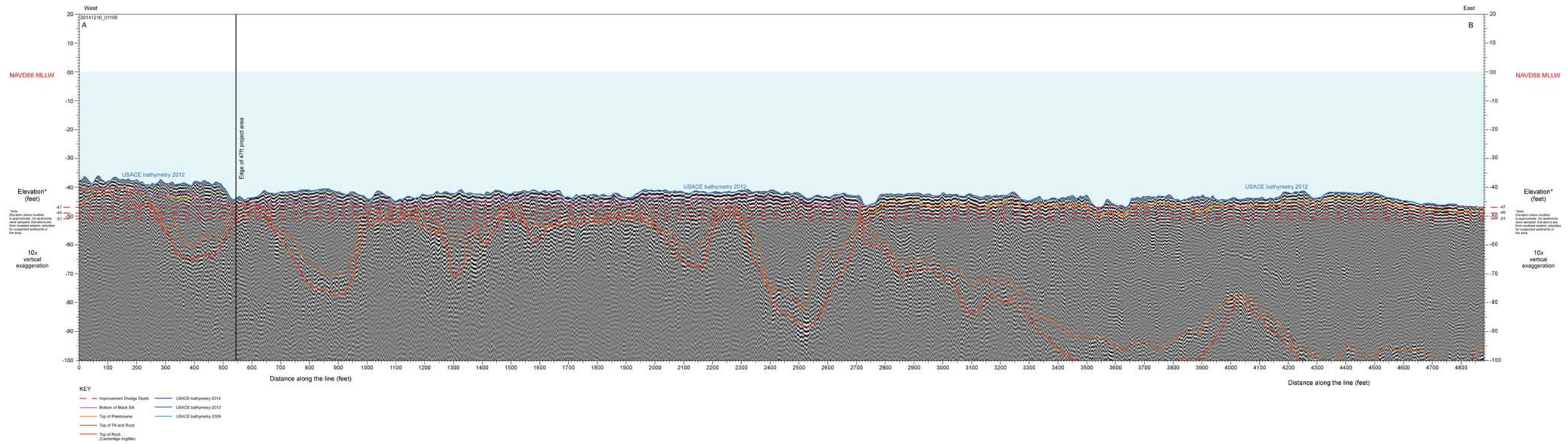
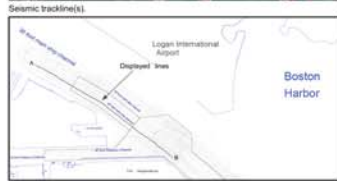
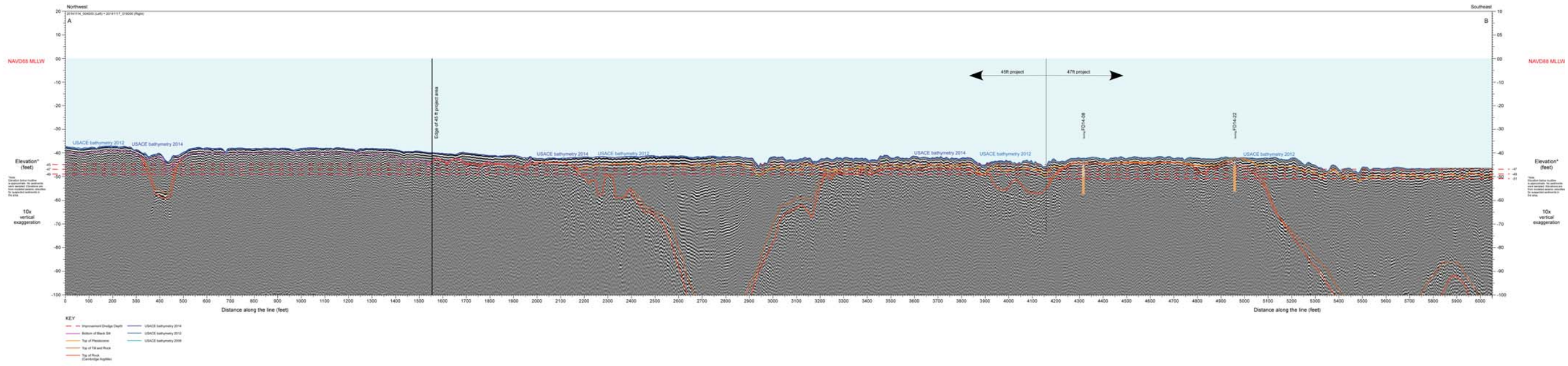




Plate 30: Main Ship Channel at Massport Maritime Terminal seismic cross sections
Contract #W912DS-12-O-002, DB01 Marine Geophysical and Geological Explorations, Boston Harbor, Massachusetts



Drawn By:
Approved By:
Date: May 1, 2016

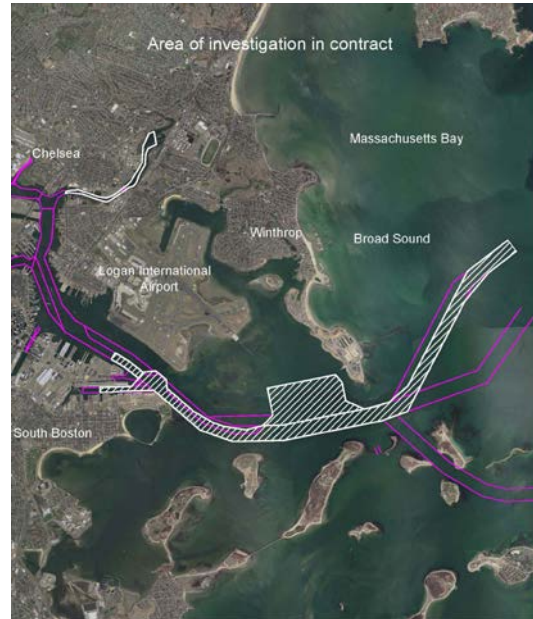




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Plate 31: Reserved Channel geology

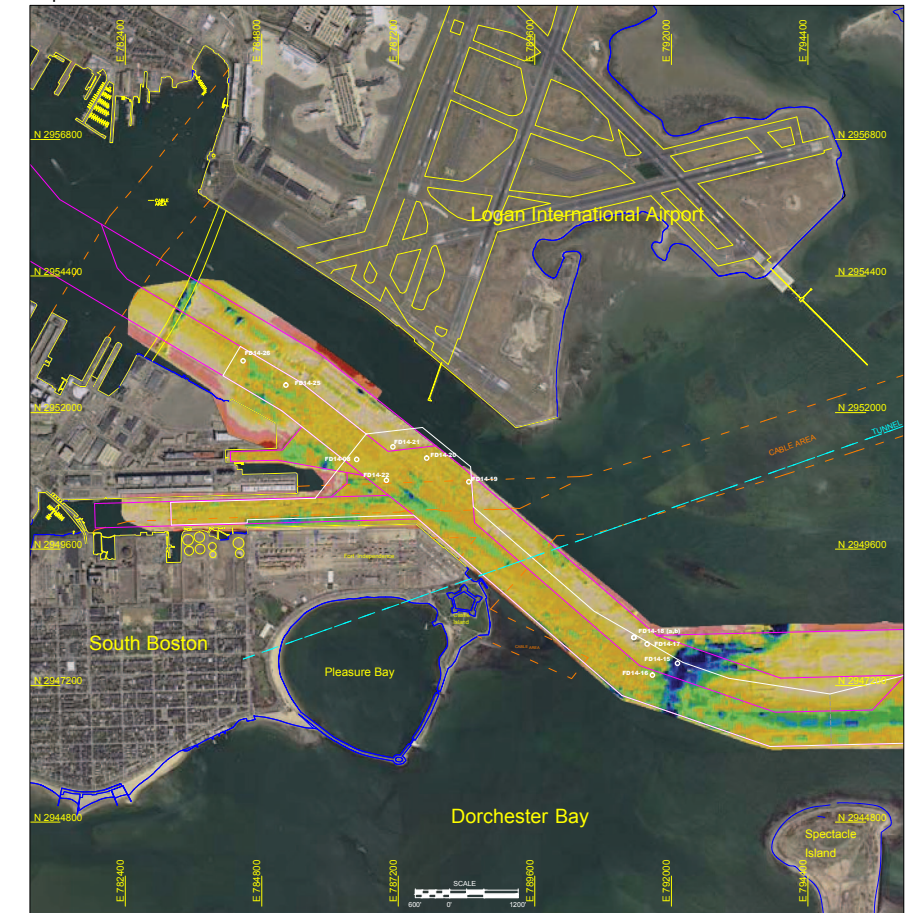
Contract #W912DS-12-D-0002, DB01: Marine Geophysical and Geological Explorations, Boston Harbor, Boston Massachusetts



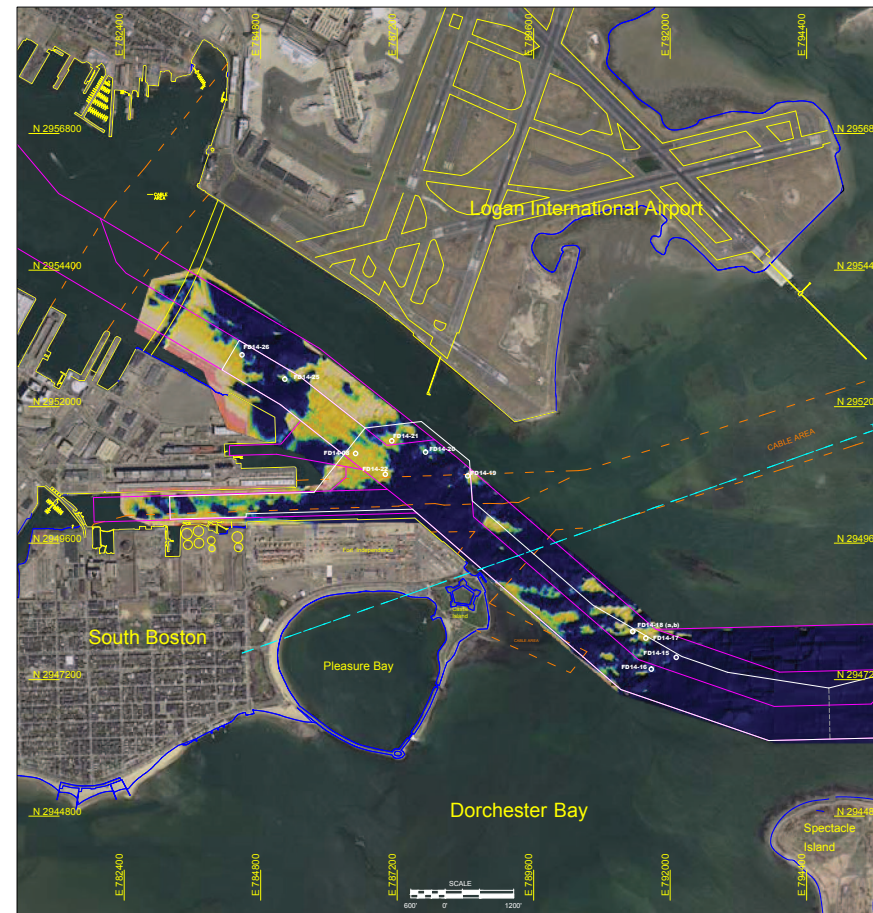
Bathymetric elevations, top of Holocene elevations



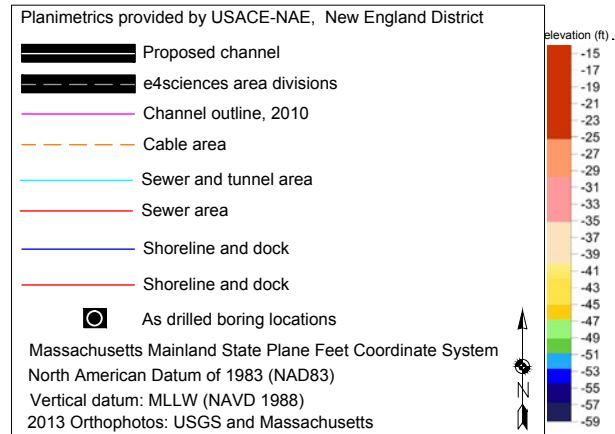
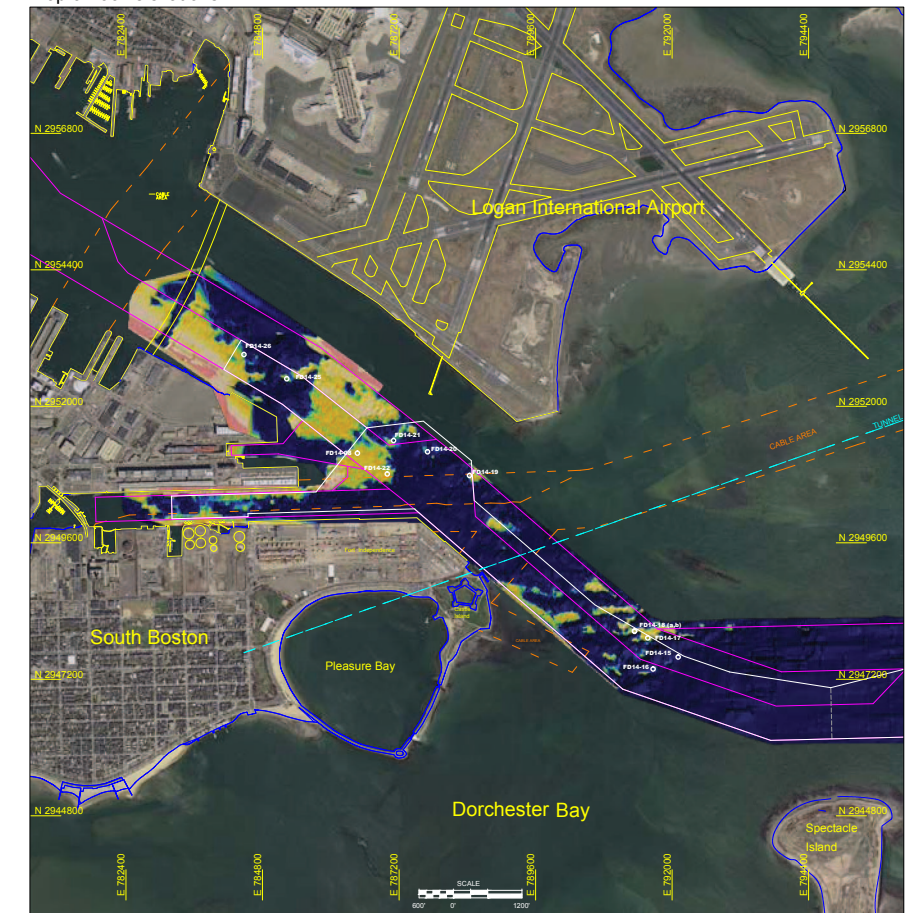
Top of Pleistocene elevations



Top of rock and till elevations



Top of rock elevations



Drawn By: *Bridgett Boyd*

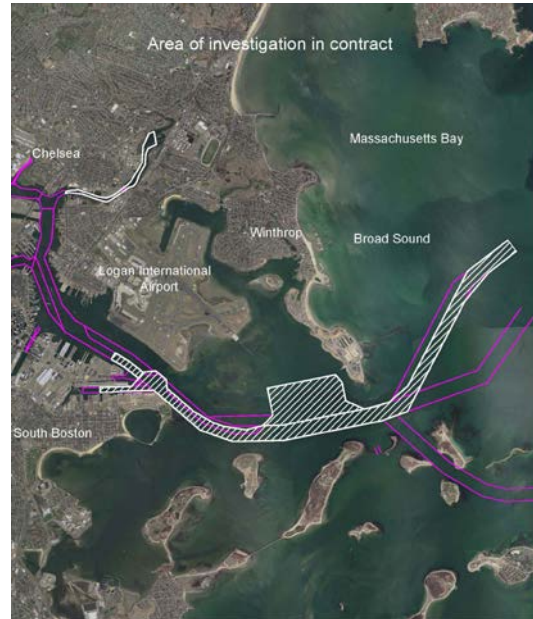
Approved By:

Date: April 28, 2015



Plate 32: Reserved channel geotechnology

Contract #W912DS-12-D-0002, DB01: Marine Geophysical and Geological Explorations, Boston Harbor, Boston Massachusetts



Maintenance isopach



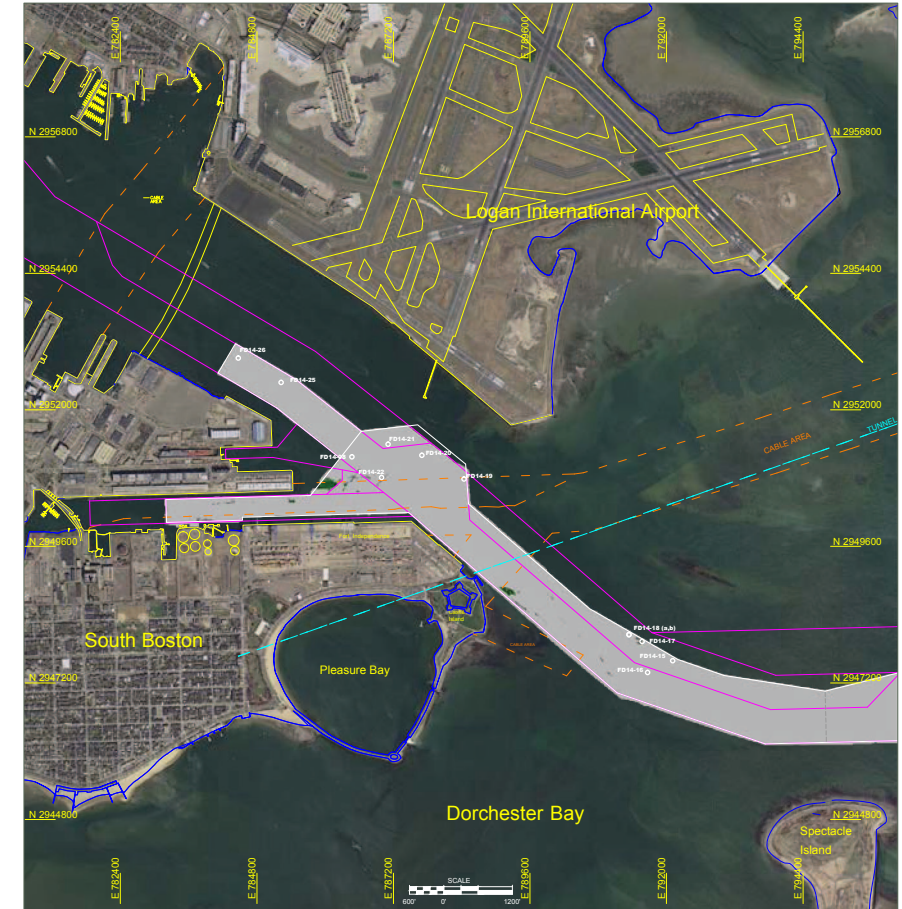
Holocene-Pleistocene isopach



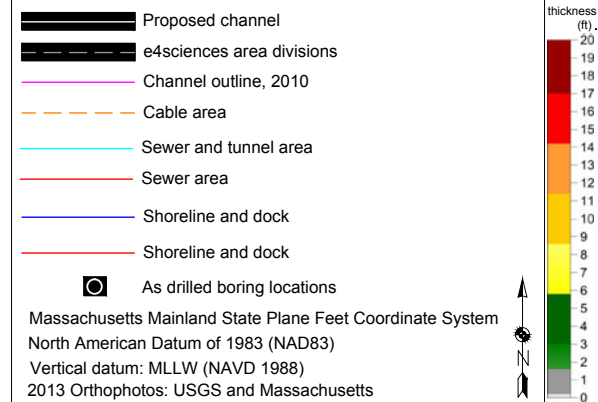
Rock and Till isopach



Fast Rock isopach



Planimetrics provided by USACE-NAE, New England District



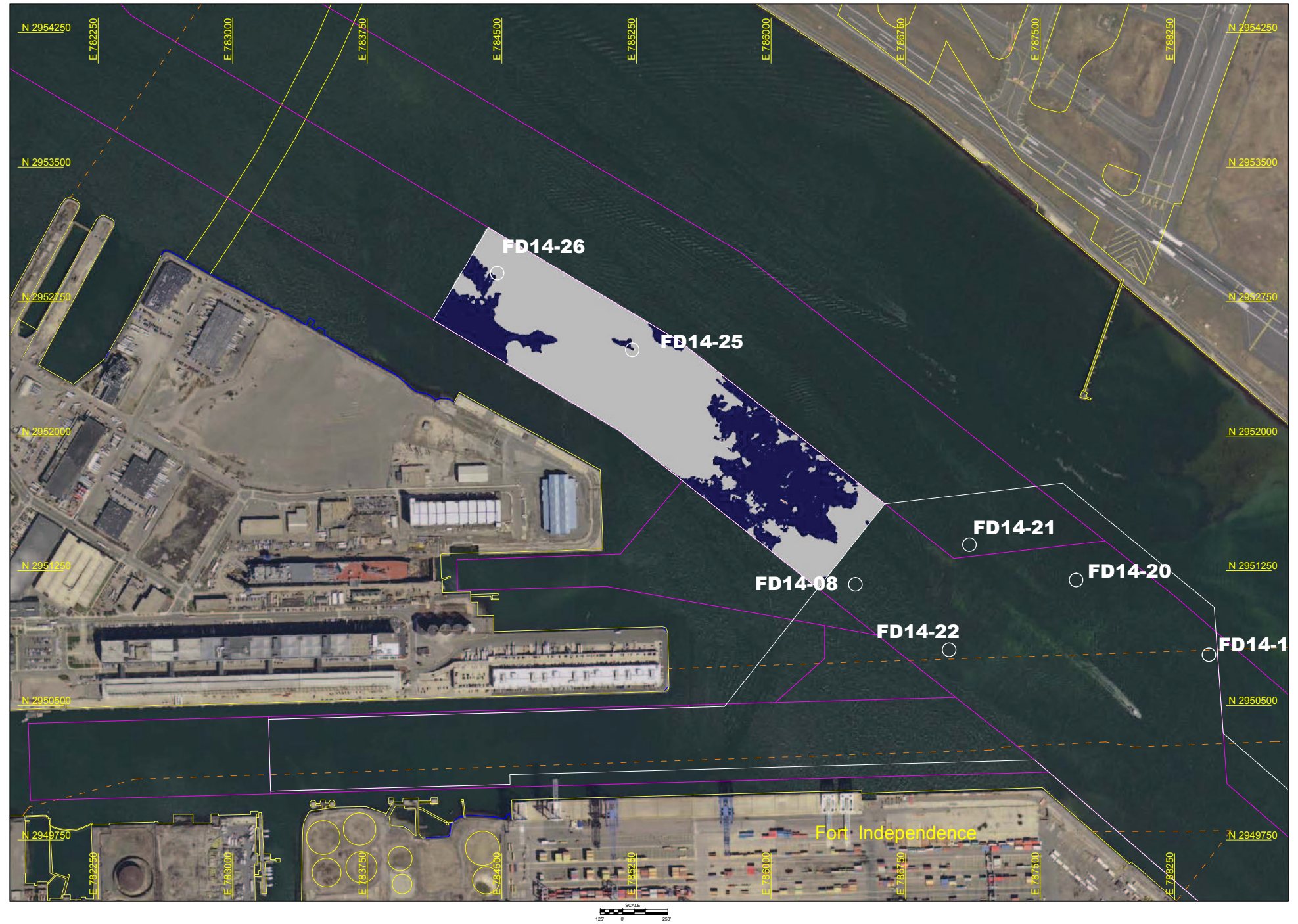
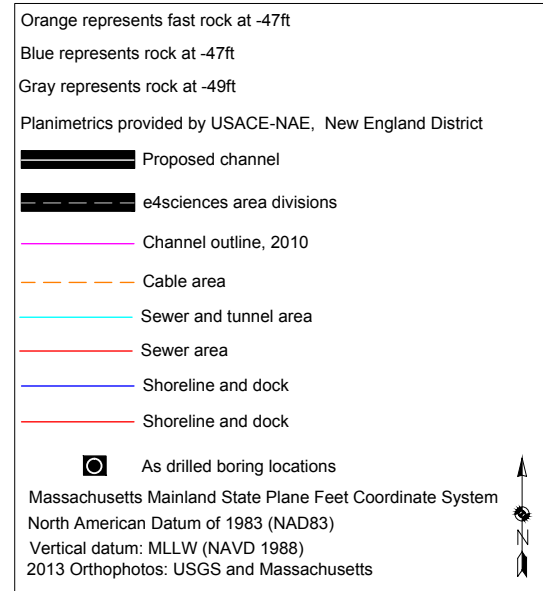
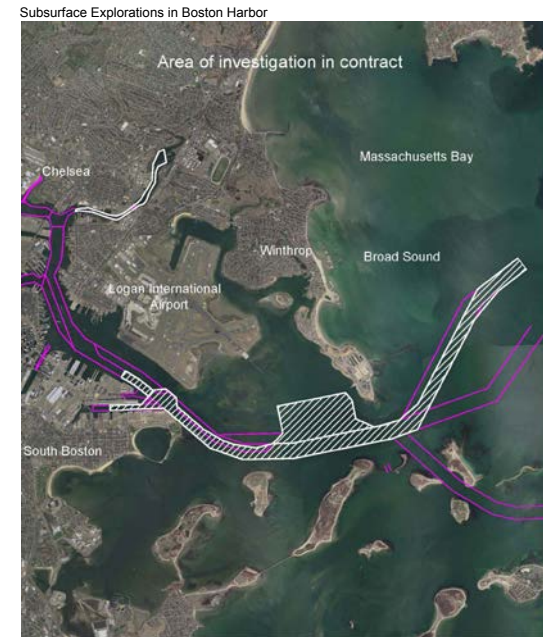
Drawn By: *Bridgett Boyd*

Approved By:

Date: April 28, 2015



Plate 33: Slice map at -47ft of fast rock in the entire -45ft project



Drawn By: *Bridgett Boyd*

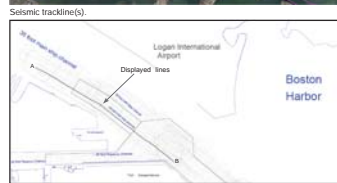
Approved By:

Date: April 27, 2015



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Plate 34: Main Ship Channel at Massport Maritime Terminal seismic-velocity cross sections
Contract #W912DS-12-D-0002, DB01: Marine Geophysical and Geological Explorations, Boston Harbor, Massachusetts



Drawn By:
Approved By:
Date: May 7, 2013

