TETRA TECH, INC.

October 6, 2020

Lynn Nakashima
Project Manager
Department of Toxic Substances Control
700 Heinz Avenue
Berkeley, CA 94710

Subject: **University of California, Berkeley, Richmond Field Station Site**
2020 Groundwater Sampling Results Technical Memorandum
Site Investigation and Remediation Order I/SE-RAO 07/07-004, Section 5.16

Dear Ms. Nakashima:

Groundwater sampling at the Richmond Field Station (RFS) has been reported on a yearly basis since 2010. The yearly monitoring report includes water levels from the dry season and water levels and groundwater sample results from the following wet season. The most recent completed groundwater report included groundwater levels measured in August 2018 and groundwater levels and results from the April 2019 sampling event.

Groundwater levels were measured on October 1, 2019. The April 2020 groundwater level and sampling event was not conducted as directed by the Order of The Health Officer of the County of Contra Costa, dated March 16, 2020. The Order directed all individuals in the county to shelter at their place of residences, except as to provide or receive certain essential services, as defined by Section 10 of the Order. Environmental services were not included as essential services within Section 10. The March 16, 2020 Order was in effect until April 7, 2020. On March 16, 2020, UC Berkeley recommended and DTSC concurred that groundwater sampling would be postponed until restrictions on the Order were removed.

The Order was reissued on March 31, 2020 to extend the same restrictions until May 3, 2020. On April 29, the Order was amended to allow for the resumption of environmental site remediation services. At the May 14, 2020 monthly meeting, UC Berkeley proposed and DTSC concurred to postpone the wet season groundwater levels and sampling until April 2021, consistent with the recommendations within the Draft 5-Year Review Report, dated December 31, 2019. The purpose of the postponement was to ensure that the groundwater sampling event capture the wet season levels, which become less applicable beyond April.

As a result, no formal yearly groundwater monitoring report will be submitted in 2020. The letter includes the updated set of groundwater elevation contour maps, including the results from the October 1, 2019 event. The historic maps and October 1, 2019 map are included as Attachment 1 to this letter. The abbreviated submittal was documented in the July 14, 2020 RFS Monthly Summary Report.

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During this period, repairs were completed at B280A and PZ-8, which had damaged upper casings as a result of local traffic. Photographs of the repaired piezometers are included as Attachment 2.

If you have any questions or comments regarding this submittal, please call me at (415) 497-9060.

Sincerely,

Jason Brodersen, P.G.
Project Manager

Enclosures:

Attachment 1: Groundwater Level Contour Maps
Attachment 2: Piezometer Repair Photographs

cc: Alicia Bihler, Office of EH&S, University of California, Berkeley
Bill Marsh, Edgcomb Law Group

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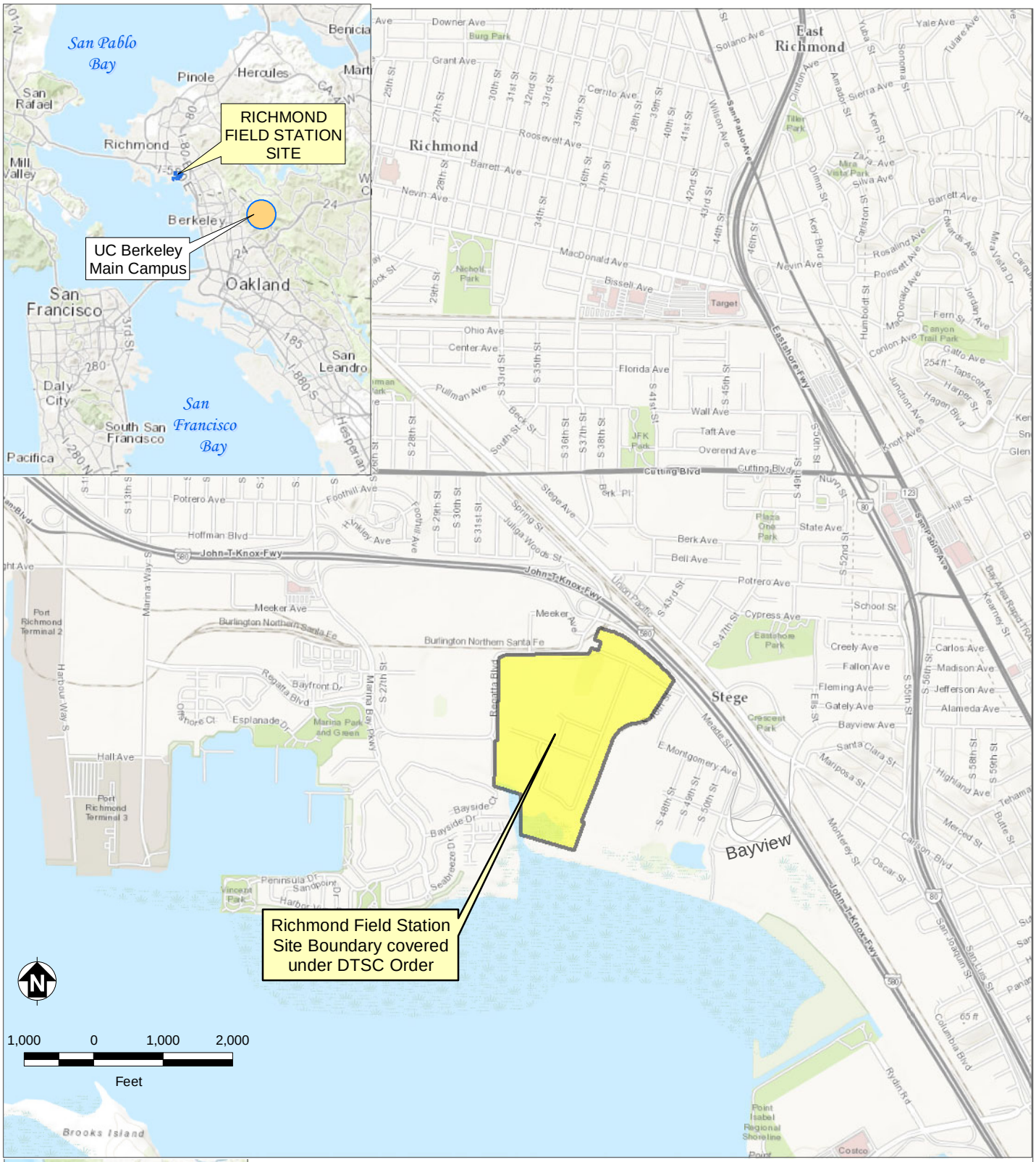
ATTACHMENT 1

GROUNDWATER LEVEL CONTOUR MAPS



Notes:
DTSC Department of Toxic Substances Control.

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Richmond Field Station Site
University of California, Berkeley

FIGURE 1

SITE LOCATION MAP

2020 Groundwater Sampling Results

Bay Trail
Meeker Slough
Western Stege Marsh
Transition Area (Including Bulb)
Upland

Richmond Field Station Site Boundary

Notes:
EBRPD East Bay Regional Parks District
EERC Earthquake Engineering Research Center
EPA Environmental Protection Agency
NRLF Northern Regional Library Facility
RFS Richmond Field Station

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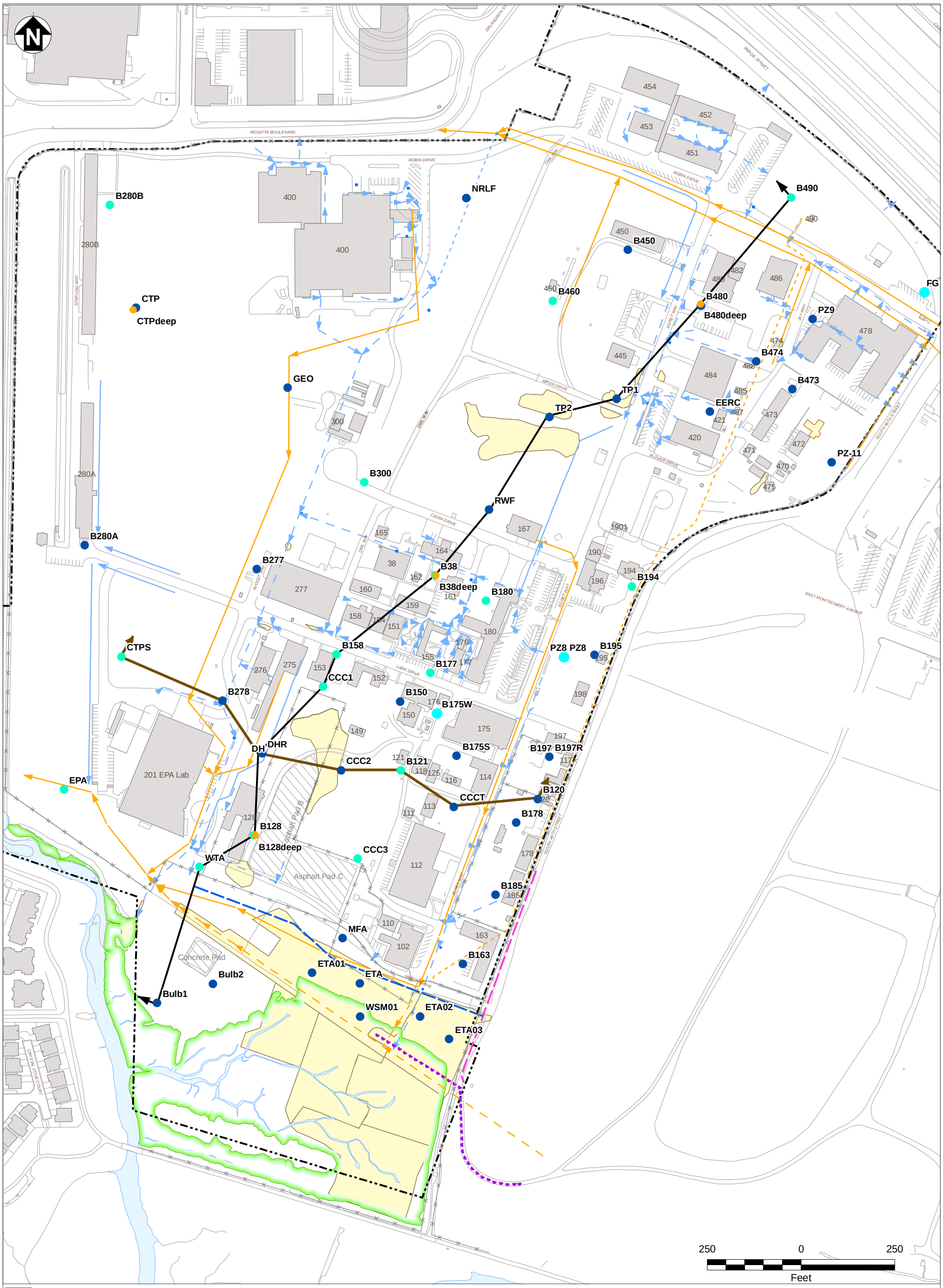
Richmond Field Station Site
University of California, Berkeley

FIGURE 2

SITE MAP

2020 Groundwater Sampling Results

9/21/2016 V:\Misc_GIS\Richmond_Field_Station\Projects\009_GW_Sampling_Results_2016\02_Site Map.mxd TtEMI-OAK simon.cardinale



Existing Buildings
Asphalt/Concrete Pads
Remediated Areas
Surface Water
Marsh Boundary
Richmond Field Station Site Boundary
Roads and Other Landscape Features
Fenceline
A-A' Cross-Section, see Figure 18
B-B' Cross-Section,see Figure 19

Biologically Active Permeable Barrier Wall
Former Seawall (Approximate)
Slurry Wall

Storm Drain Lines:
Open Swale
Underground Culvert
Underground Culvert, Abandoned (Grouted at Manholes)

Sanitary Sewer Lines:
Existing Sewer Line
Removed Sewer Line
Abandoned Sewer Line

Piezometer Sampled in April 2018
Piezometer Not Sampled in April 2018
Deep piezometer not sampled in April 2018

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Richmond Field Station Site
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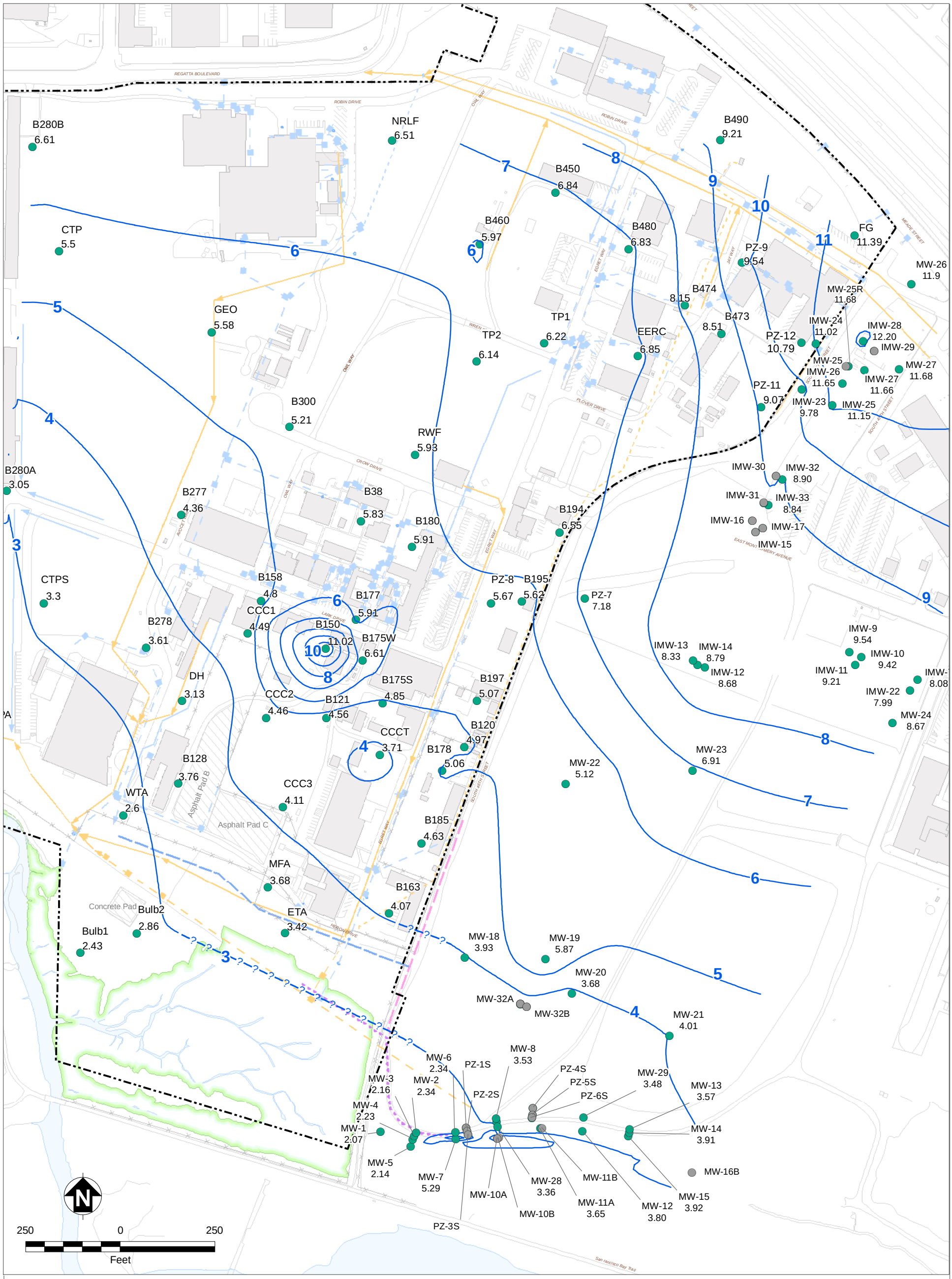
FIGURE 3
GROUNDWATER SAMPLING LOCATIONS

2020 Groundwater Sampling Results



- Piezometer Groundwater Elevation Measured in November 2010
- Piezometer Groundwater Elevation Not Measured in November 2010
- November 2010 Groundwater Contours
- Contour Estimated due to Proximity to BAPB Wall, Slurry Wall, or Marsh
- Existing Building
- Asphalt/Concrete Pad
- Surface Water
- Marsh Boundary
- Richmond Field Station Site Boundary
- Roads and Other Landscape Features
- Fenceline
- BAPB Wall
- Former Seawall (Approximate)
- Slurry Wall

Storm Drain Lines:

- Open Swale
- Underground Culvert
- Underground Culvert, Abandoned (Grouted at Manholes)

Sanitary Sewer Lines:

- Existing Sewer Line
- Removed Sewer Line
- Abandoned Sewer Line

Piezometer ID
MW-10A
5.27
Groundwater Elevation (FT NGVD29)

Note:
All data points surveyed to NGVD29.
Mean sea level = NGVD29 elevation (in feet) – 0.58 feet NGVD and mean sea level datum representative of Stege Marsh is derived from NOAA Richmond Inner Harbor tide gauge.

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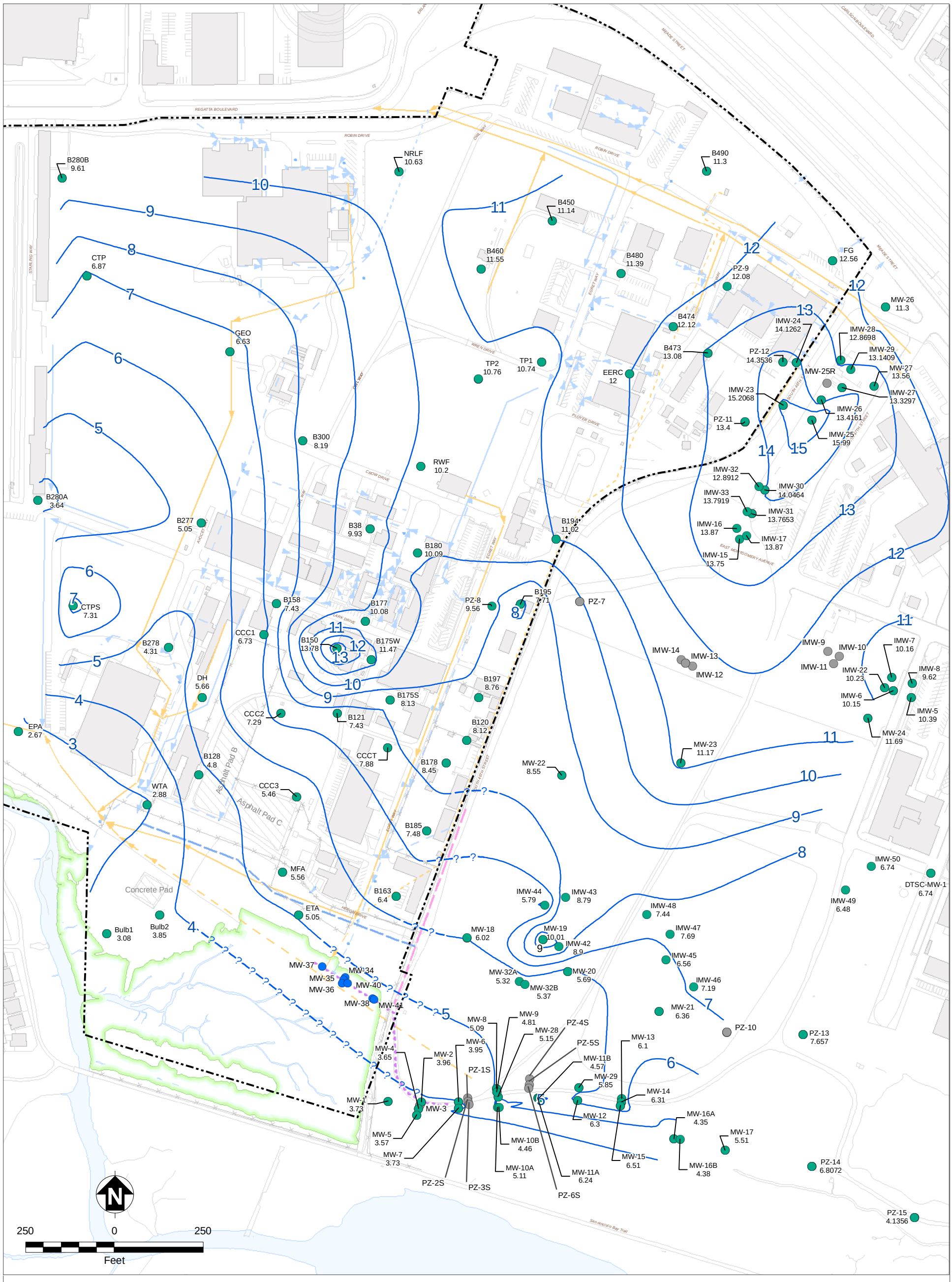
Richmond Field Station Site
University of California, Berkeley

FIGURE 4
SHALLOW GROUNDWATER ELEVATION CONTOURS, NOVEMBER 1, 2010

2020 Groundwater Sampling Results



- Piezometer Groundwater Elevation Measured in April 2011
- Piezometer Groundwater Elevation Not Measured in April 2011
- BAPB Piezometers on RFS Property Not Measured in April 2011
- April 2011 Groundwater Contours
- Contour Estimated due to Proximity to BAPB Wall, Slurry Wall, or Marsh
- Existing Building
- Asphalt/Concrete Pad
- Surface Water
- Marsh Boundary
- Richmond Field Station Site Boundary
- Roads and Other Landscape Features
- Fenceline
- Biologically Active Permeable Barrier Wall
- Former Seawall (Approximate)
- Slurry Wall

Storm Drain Lines:

- Open Swale
- Underground Culvert
- Underground Culvert, Abandoned (Grouted at Manholes)

Sanitary Sewer Lines:

- Existing Sewer Line
- Removed Sewer Line
- Abandoned Sewer Line

Piezometer ID
MW-10A
5.27
Groundwater Elevation (FT NGVD29)

Note:
All data points surveyed to NGVD29.
Mean sea level = NGVD29 elevation (in feet) – 0.58 feet NGVD and mean sea level datum representative of Stege Marsh is derived from NOAA Richmond Inner Harbor tide gauge.

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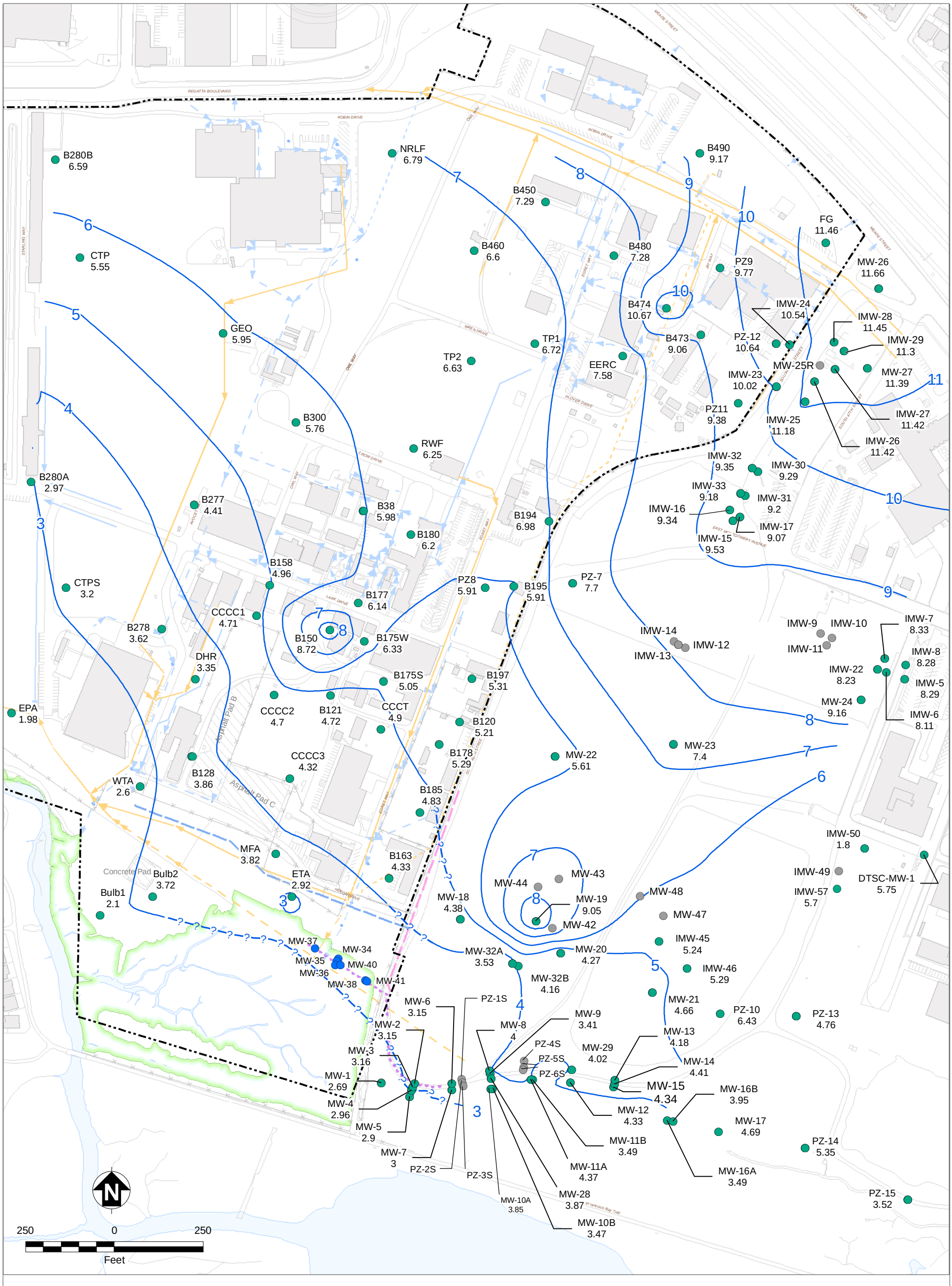
Richmond Field Station Site
University of California, Berkeley

FIGURE 5
SHALLOW GROUNDWATER ELEVATION CONTOURS, APRIL 11, 2011

2020 Groundwater Sampling Results



Piezometer Groundwater Elevation Measured in October 2011
Piezometer Groundwater Elevation Not Measured in October 2011
BAPB Piezometers on RFS Property Not Measured in October 2011
October 2011 Groundwater Contours
Contour Estimated due to Proximity to BAPB Wall, Slurry Wall, or Marsh
Existing Building
Asphalt/Concrete Pad
Surface Water
Marsh Boundary
Richmond Field Station Site Boundary
Roads and Other Landscape Features
Fenceline
BAPB Wall
Former Seawall (Approximate)

Slurry Wall

Storm Drain Lines:
Open Swale
Underground Culvert
Underground Culvert, Abandoned (Grouted at Manholes)

Sanitary Sewer Lines:
Existing Sewer Line
Removed Sewer Line
Abandoned Sewer Line

Note:
All data points surveyed to NGVD29.
Mean sea level = NGVD29 elevation (in feet) – 0.58 feet NGVD and mean sea level datum representative of Stege Marsh is derived from NOAA Richmond Inner Harbor tide gauge.

MW-10A 5.27
Piezometer ID
Groundwater Elevation (FT NGVD29)

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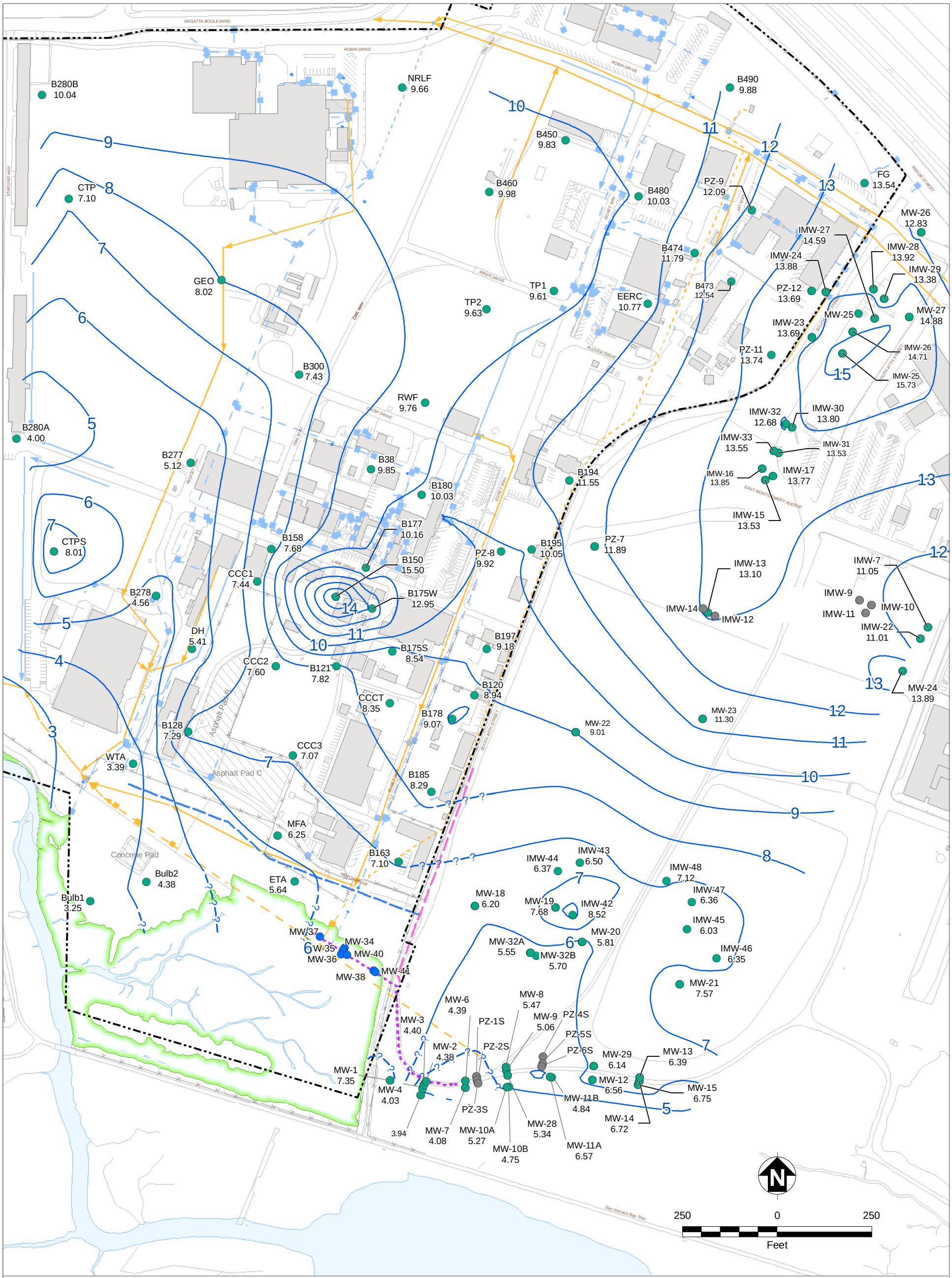
FIGURE 6
SHALLOW GROUNDWATER ELEVATION CONTOURS, OCTOBER 3, 2011

2020 Groundwater Sampling Results



- Piezometer Groundwater Elevation Measured in April 2012
- Piezometer Groundwater Elevation Not Measured in April 2012
- BAPB Piezometers on RFS Property Not Measured in April 2012
- April 2012 Groundwater Contour
- Contour Estimated due to Proximity to BAPB Wall, Slurry Wall, or Marsh
- Existing Building
- Asphalt/Concrete Pad
- Surface Water
- Marsh Boundary
- Richmond Field Station Site Boundary
- Roads and Other Landscape Features
- Fenceline
- BAPB Wall
- Former Seawall (Approximate)
- Slurry Wall

Storm Drain Lines:

- Open Swale
- Underground Culvert
- Underground Culvert, Abandoned (Grouted at Manholes)

Sanitary Sewer Lines:

- Existing Sewer Line
- Removed Sewer Line
- Abandoned Sewer Line

Piezometer ID
MW-10A
5.27
Groundwater Elevation (FT NGVD29)

Note:
All data points surveyed to NGVD29.
Mean sea level = NGVD29 elevation (in feet) – 0.58 feet NGVD and mean sea level datum representative of Stege Marsh is derived from NOAA Richmond Inner Harbor tide gauge.

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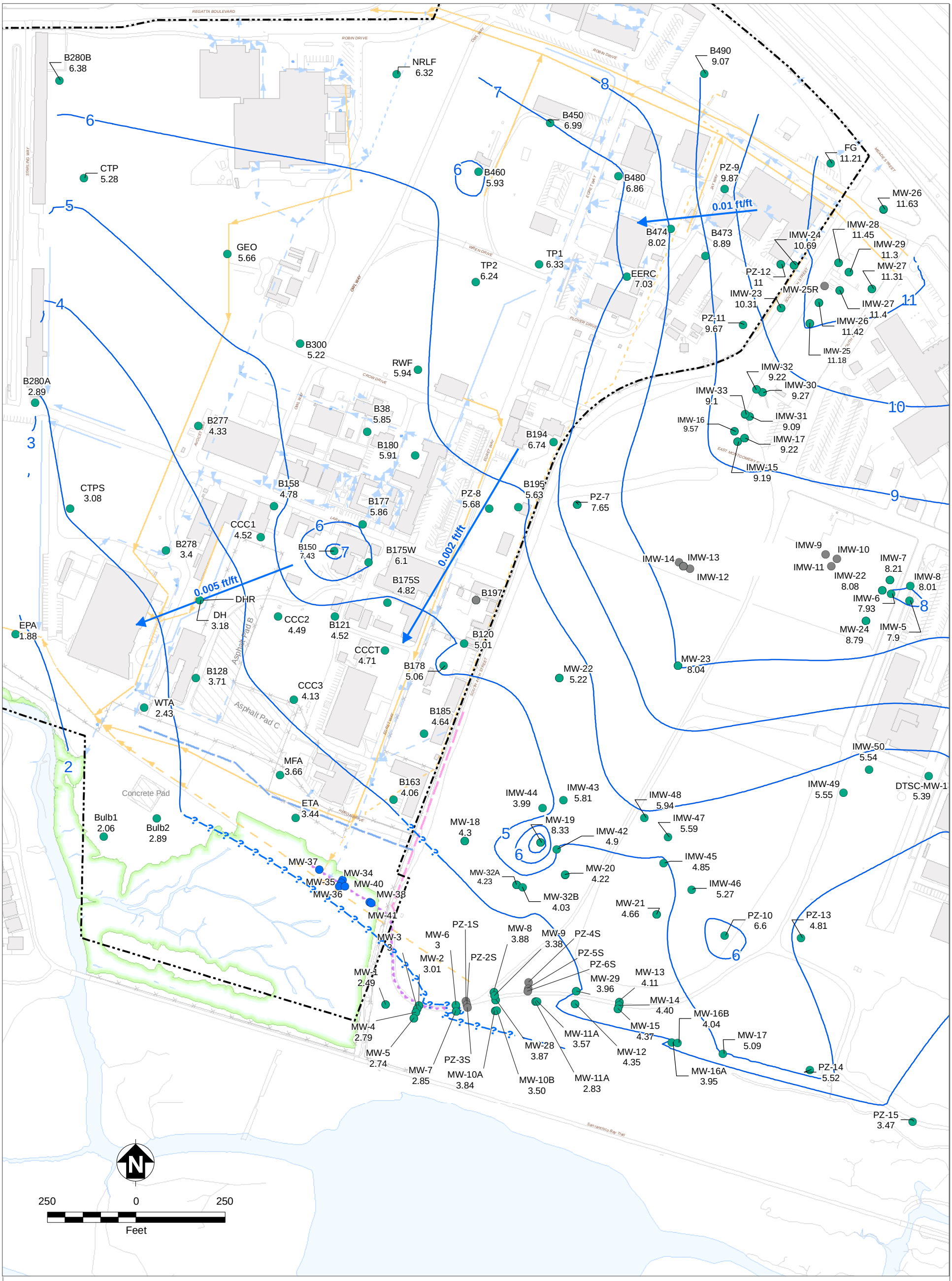
FIGURE 7
SHALLOW GROUNDWATER ELEVATION CONTOURS, APRIL 2, 2012

2020 Groundwater Sampling Results



- Piezometer Groundwater Elevation Measured in October 2012
- Piezometer Groundwater Elevation Not Measured in October 2012
- BAPB Piezometers on RFS Property Not Measured in October 2012
- October 2012 Groundwater Contours
- Contour Estimated due to Proximity to BAPB Wall, Slurry Wall, or Marsh
- Estimated Horizontal Groundwater Gradient Direction (Value)
- Existing Building
- Asphalt/Concrete Pad
- Surface Water
- Marsh Boundary
- Richmond Field Station Site Boundary
- Roads and Other Landscape Features
- Fenceline
- BAPB Wall
- Former Seawall (Approximate)
- Slurry Wall

Storm Drain Lines:

- Open Swale
- Underground Culvert
- Underground Culvert, Abandoned (Grouted at Manholes)

Sanitary Sewer Lines:

- Existing Sewer Line
- Removed Sewer Line
- Abandoned Sewer Line

Note:
All data points surveyed to NGVD29.
Mean sea level = NGVD29 elevation (in feet) – 0.58 feet NGVD and mean sea level datum representative of Stege Marsh is derived from NOAA Richmond Inner Harbor tide gauge.

Piezometer ID
MW-10A
5.27
Groundwater Elevation (FT NGVD29)

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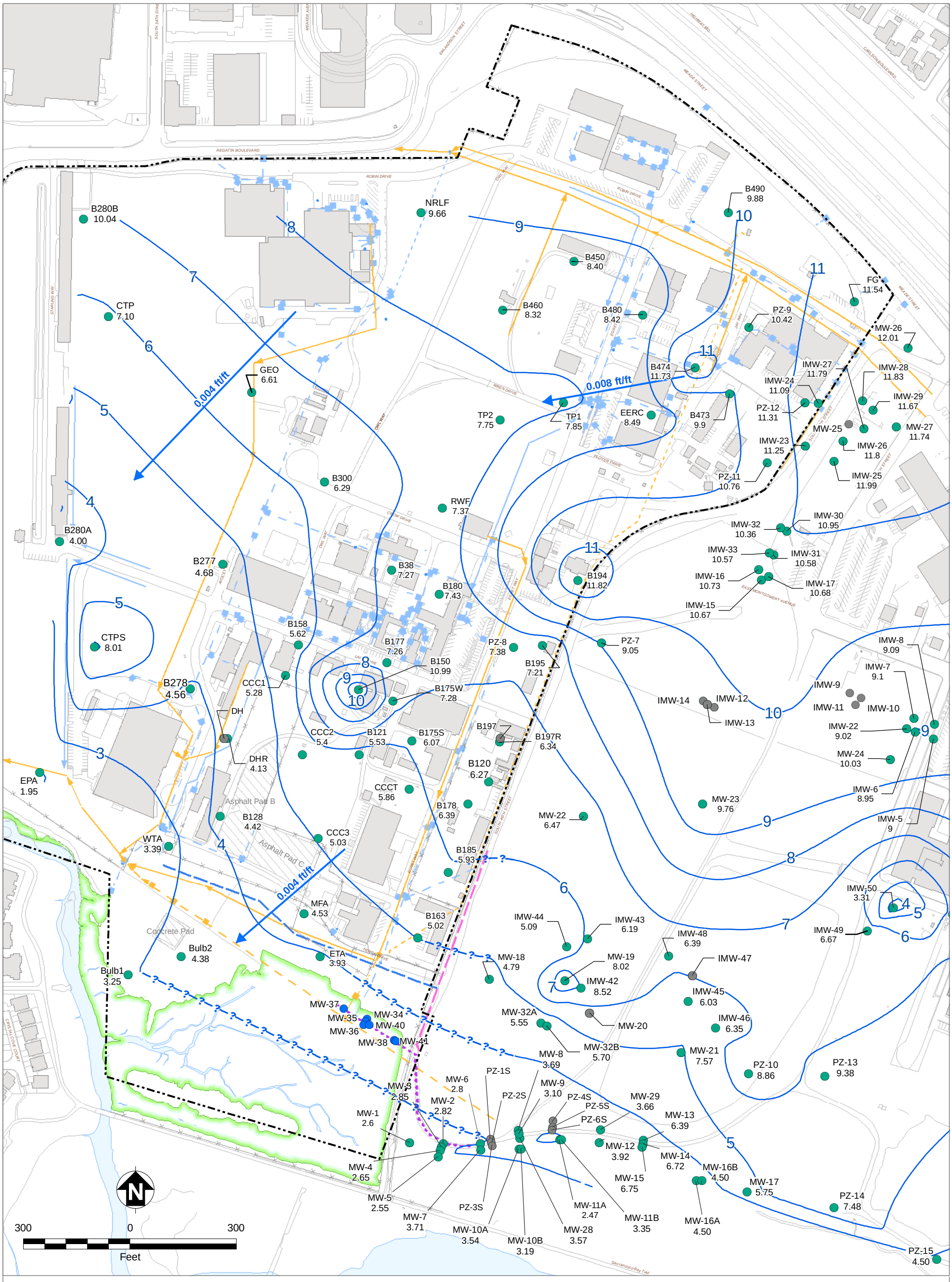
FIGURE 8
SHALLOW GROUNDWATER ELEVATION CONTOURS, OCTOBER 1, 2012

2020 Groundwater Sampling Results

9/21/2016 V:\Misc_GIS\Richmond_Field_Station\Projects\009_GW_Sampling_Results_2016\08_Shallow GW Elevation Contours 2012 Oct 1.mxd TtEMI-OAK simon.cardinale



Piezometer Groundwater Elevation Measured in April 2013
Piezometer Groundwater Elevation Not Measured in April 2013
BAPB Piezometers on RFS Property Not Measured in April 2013
April 2013 Groundwater Contour
Contour Estimated due to Proximity to BAPB Wall, Slurry Wall, or Marsh
Estimated Horizontal Groundwater Gradient Direction (Value)
Existing Building
Asphalt/Concrete Pad
Surface Water
Marsh Boundary
Richmond Field Station Site Boundary
Roads and Other Landscape Features
Fenceline
BAPB Wall

Former Seawall (Approximate)
Slurry Wall

Storm Drain Lines:
Open Swale
Underground Culvert
Underground Culvert, Abandoned (Grouted at Manholes)

Sanitary Sewer Lines:
Existing Sewer Line
Removed Sewer Line
Abandoned Sewer Line

Piezometer ID
MW-10A
5.27
Groundwater Elevation (FT NGVD29)

Note:
All data points surveyed to NGVD29.
Mean sea level = NGVD29 elevation (in feet) – 0.58 feet NGVD and mean sea level datum representative of Stege Marsh is derived from NOAA Richmond Inner Harbor tide gauge.

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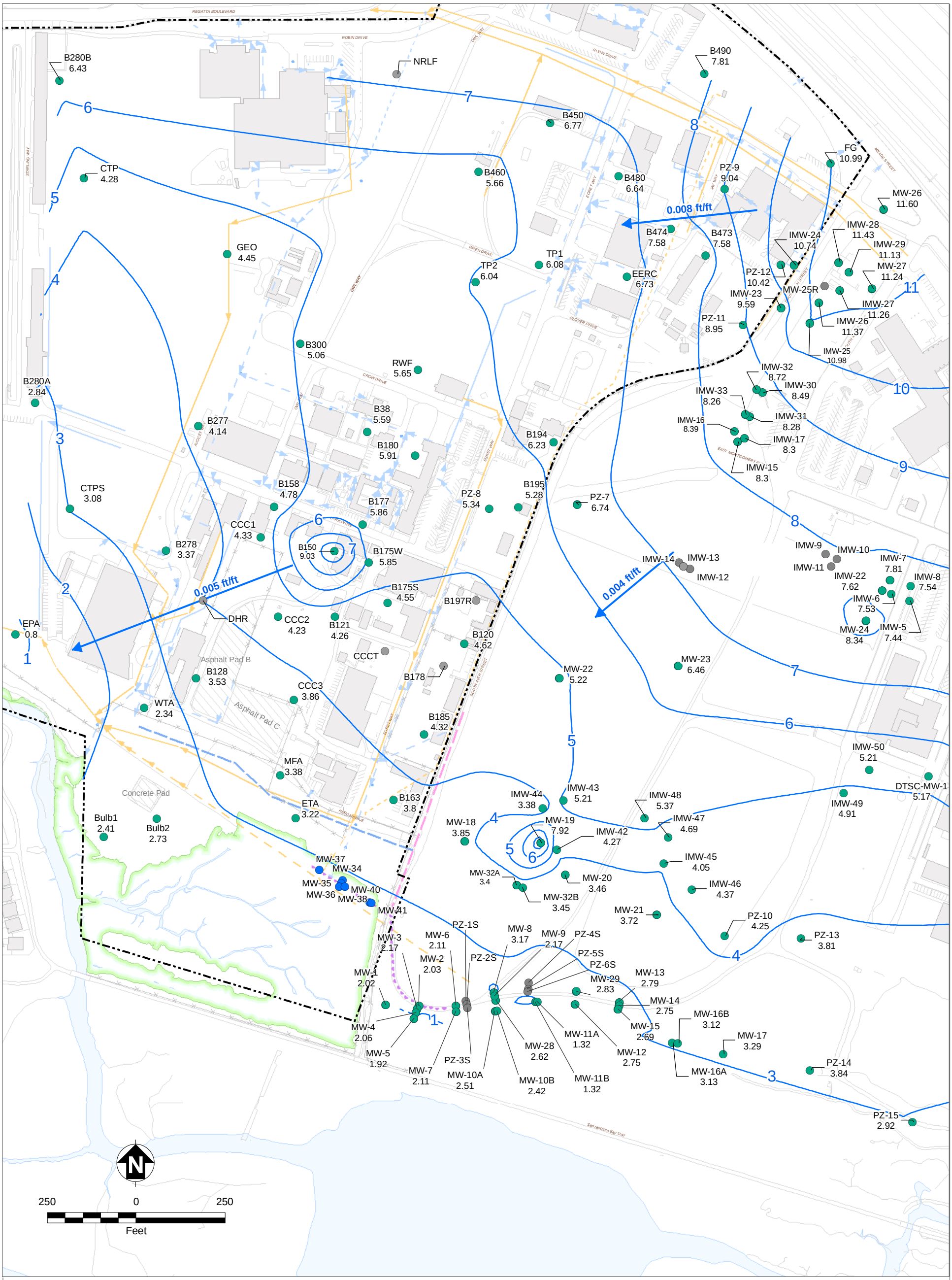
FIGURE 9
SHALLOW GROUNDWATER ELEVATION CONTOURS, APRIL 1, 2013

2020 Groundwater Sampling Results



- Piezometer Groundwater Elevation Measured in October 2013
- Piezometer Groundwater Elevation Not Measured in October 2013
- BAPB Piezometers on RFS Property Not Measured in October 2013
- Estimated Horizontal Groundwater Gradient Direction (Value)
- Existing Building
- Asphalt/Concrete Pad
- Surface Water
- Marsh Boundary
- Richmond Field Station Site Boundary
- Roads and Other Landscape Features
- Fenceline
- BAPB Wall
- Former Seawall (Approximate)
- Slurry Wall

Storm Drain Lines:

- Open Swale
- Underground Culvert
- Underground Culvert, Abandoned (Grouted at Manholes)

Sanitary Sewer Lines:

- Existing Sewer Line
- Removed Sewer Line
- Abandoned Sewer Line

Note:
All data points surveyed to NGVD29.
Mean sea level = NGVD29 elevation (in feet) – 0.58 feet NGVD and mean sea level datum representative of Stege Marsh is derived from NOAA Richmond Inner Harbor tide gauge.

MW-10A
5.27
Piezometer ID
Groundwater Elevation (FT NGVD29)

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Richmond Field Station Site
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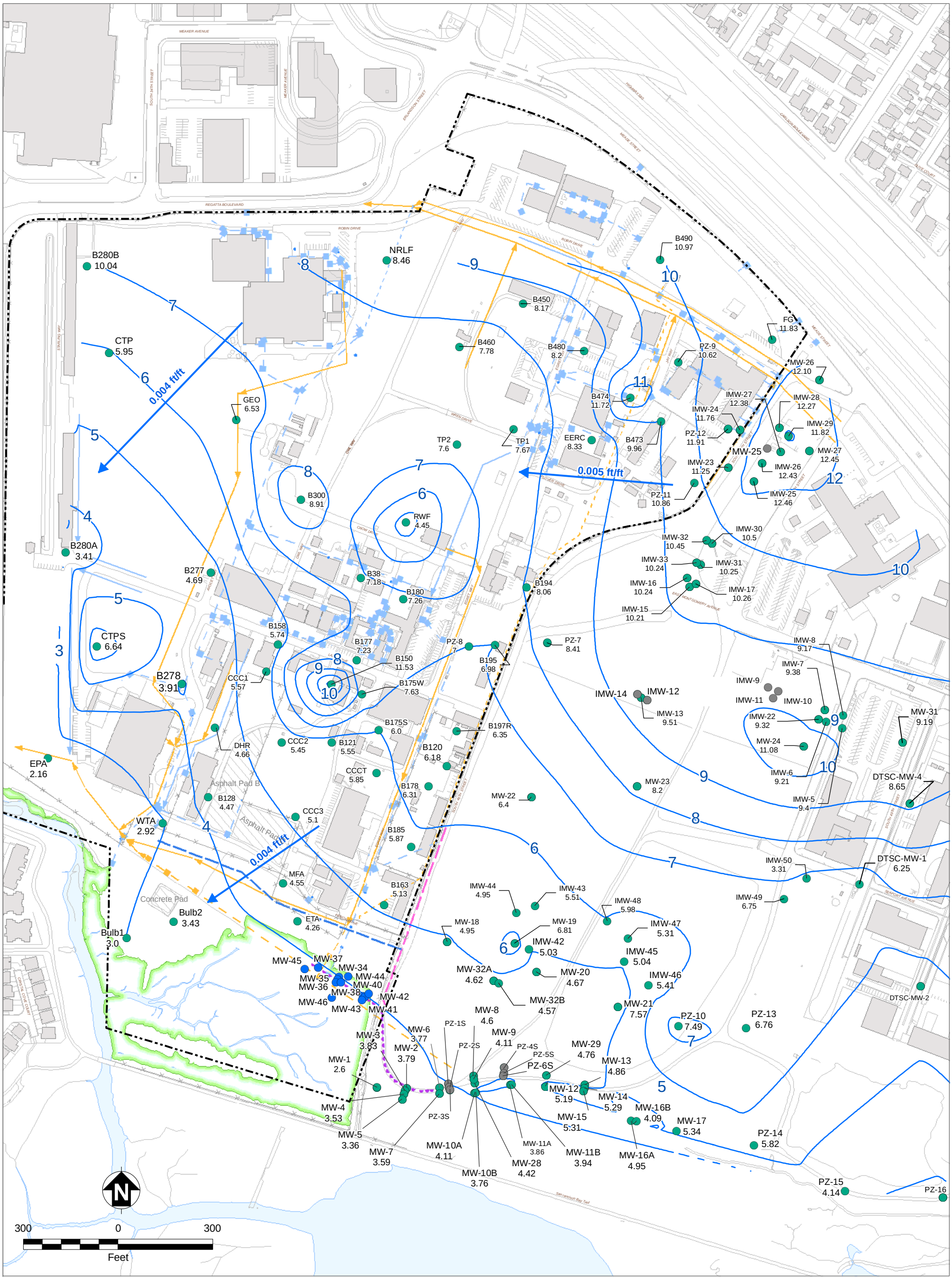
FIGURE 10
SHALLOW GROUNDWATER ELEVATION CONTOURS, OCTOBER 7, 2013

2020 Groundwater Sampling Results



- Piezometer Groundwater Elevation Measured in March 2014
- Piezometer Groundwater Elevation Not Measured in March 2014
- BAPB Piezometers on RFS Property Not Measured in March 2014
- April 2014 Groundwater Contour
- Estimated Horizontal Groundwater Gradient Direction (Value)
- Existing Building
- Asphalt/Concrete Pad
- Surface Water
- Marsh Boundary
- Richmond Field Station Site Boundary
- Roads and Other Landscape Features
- Fenceline
- BAPB Wall
- Former Seawall (Approximate)
- Slurry Wall

Storm Drain Lines:

- Open Swale
- Underground Culvert
- Underground Culvert, Abandoned (Grouted at Manholes)

Sanitary Sewer Lines:

- Existing Sewer Line
- Removed Sewer Line
- Abandoned Sewer Line

Piezometer ID
MW-10A
5.27
Groundwater Elevation (FT NGVD29)

Note:
All data points surveyed to NGVD29.
Mean sea level = NGVD29 elevation (in feet) – 0.58 feet NGVD and mean sea level datum representative of Stege Marsh is derived from NOAA Richmond Inner Harbor tide gauge.

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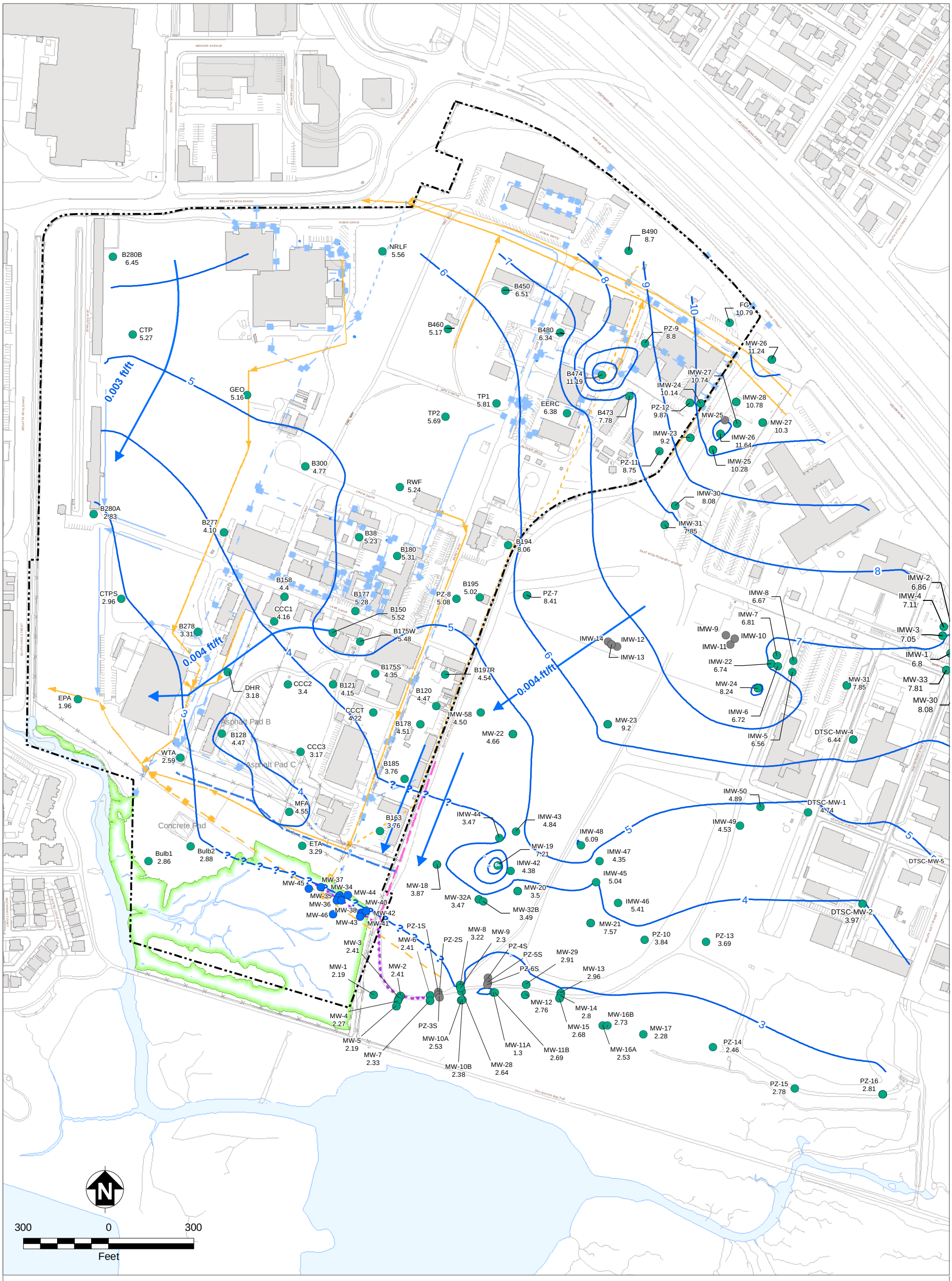
FIGURE 11
SHALLOW GROUNDWATER ELEVATION CONTOURS, MARCH 28, 2014

2020 Groundwater Sampling Results



- Piezometer Groundwater Elevation Measured in October 2014
- Piezometer Groundwater Elevation Not Measured in October 2014
- BAPB Piezometers on RFS Property Not Measured in October 2014
- 1 Estimated October 2014 Groundwater Contour
- ? Contour Estimated due to Proximity to BAPB Wall, Slurry Wall, or Marsh
- Estimated Horizontal Groundwater Gradient Direction (Value)
- Existing Building
- Asphalt/Concrete Pad
- Surface Water
- Marsh Boundary
- Richmond Field Station Site Boundary
- Roads and Other Landscape Features
- Fenceline
- BAPB Wall
- Former Seawall (Approximate)
- Slurry Wall

Storm Drain Lines:

- Open Swale
- Underground Culvert
- Underground Culvert, Abandoned (Grouted at Manholes)

Sanitary Sewer Lines:

- Existing Sewer Line
- Removed Sewer Line
- Abandoned Sewer Line

MW-10A 5.27 — Piezometer ID; Groundwater Elevation (FT NGVD29)

Note:
All data points surveyed to NGVD29.
Mean sea level = NGVD29 elevation (in feet) – 0.58 feet NGVD and mean sea level datum representative of Stege Marsh is derived from NOAA Richmond Inner Harbor tide gauge.
Contours do not include data from Phase IV piezometers completed in January 2015.

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Richmond Field Station Site
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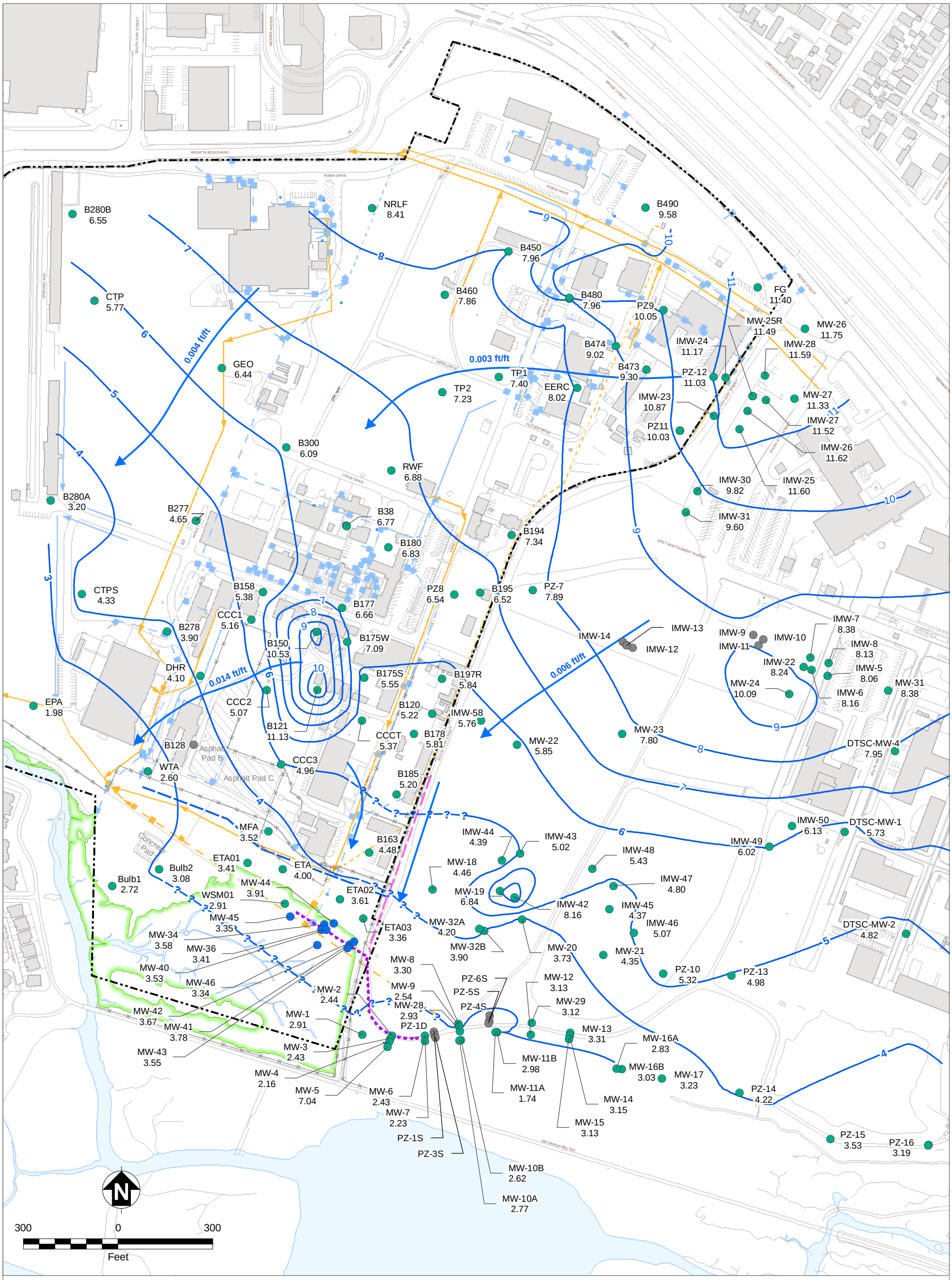
FIGURE 12
SHALLOW GROUNDWATER ELEVATION CONTOURS, OCTOBER 1, 2014

2020 Groundwater Sampling Results



- Piezometer Groundwater Elevation Measured in April 2015
- Piezometer Groundwater Elevation Not Measured in April 2015
- BAPB Piezometers on RFS Property Measured in April 2015

Estimated April 2015 Groundwater Contour

- Horizontal Groundwater Gradient
- Proximity to BAPB Wall
- Estimated Horizontal Groundwater Gradient Direction (Value)
- Existing Building
- Asphalt/Concrete Pad
- Surface Water
- Marsh Boundary
- Richmond Field Station Site Boundary
- Roads and Other Landscape Features
- Fenceline

- BAPB Wall
- Former Seawall (Approximate)
- Slurry Wall

Storm Drain Lines:

- Open Swale
- Underground Culvert
- Underground Culvert, Abandoned (Grouted at Manholes)

Sanitary Sewer Lines:

- Existing Sewer Line
- Removed Sewer Line
- Abandoned Sewer Line

Piezometer ID
MW-10A
5.27
Groundwater Elevation (FT NGVD29)

Note:
All data points surveyed to NGVD29.
Mean sea level = NGVD29 elevation (in feet) – 0.58 feet and mean sea level datum representative of Stege Marsh is derived from NOAA Richmond Inner Harbor tide gauge.

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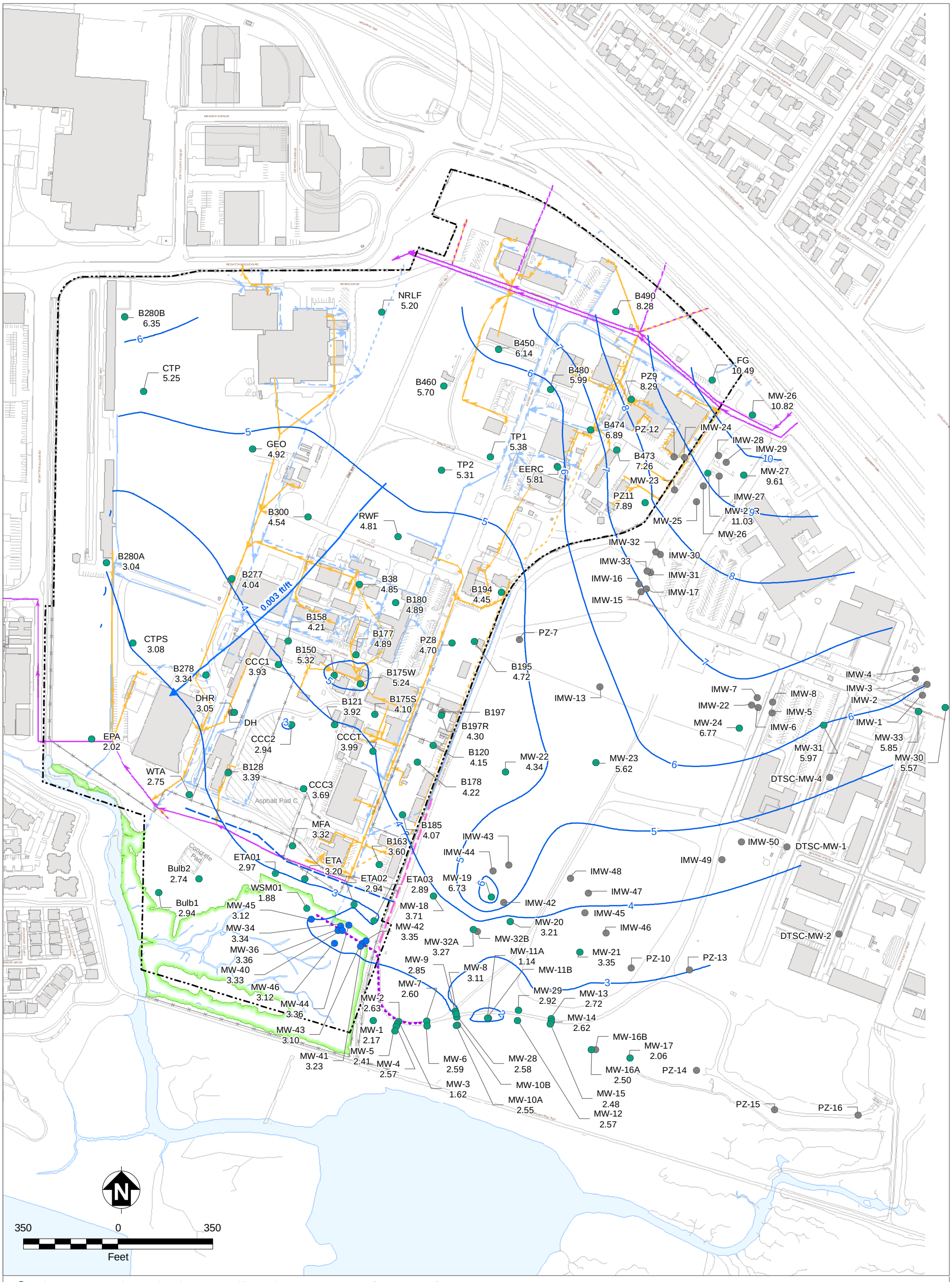
FIGURE 13
SHALLOW GROUNDWATER ELEVATION CONTOURS, APRIL 1, 2015

2020 Groundwater Sampling Results



- Piezometer Groundwater Elevation Measured in October 2015
- Piezometer Groundwater Elevation Not Measured in October 2015
- BAPB Piezometers on RFS Property Measured in October 2015
- Estimated October 2015 Groundwater Contour
- Estimated Horizontal Groundwater Gradient Direction (Value)
- Existing Building
- Asphalt/Concrete Pad
- Surface Water
- Marsh Boundary
- Richmond Field Station Site Boundary
- Roads and Other Landscape Features
- Fenceline
- BAPB Wall
- Former Seawall (Approximate)
- Slurry Wall

Sanitary Sewer Lines:

- Existing City of Richmond Sewer
- Abandoned City of Richmond Sewer
- Existing RFS Sewer
- Abandoned RFS Sewer

Storm Drain Lines:

- Open Swale
- Underground Culvert
- Gutters
- Underground Culvert, Abandoned (Grouted at Manholes)

MW-10A 5.27 — Piezometer ID; Groundwater Elevation (FT NGVD29)

Note:
All data points surveyed to NGVD29.
Mean sea level = NGVD29 elevation (in feet) – 0.58 feet and mean sea level datum representative of Stege Marsh is derived from NOAA Richmond Inner Harbor tide gauge.

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Richmond Field Station Site
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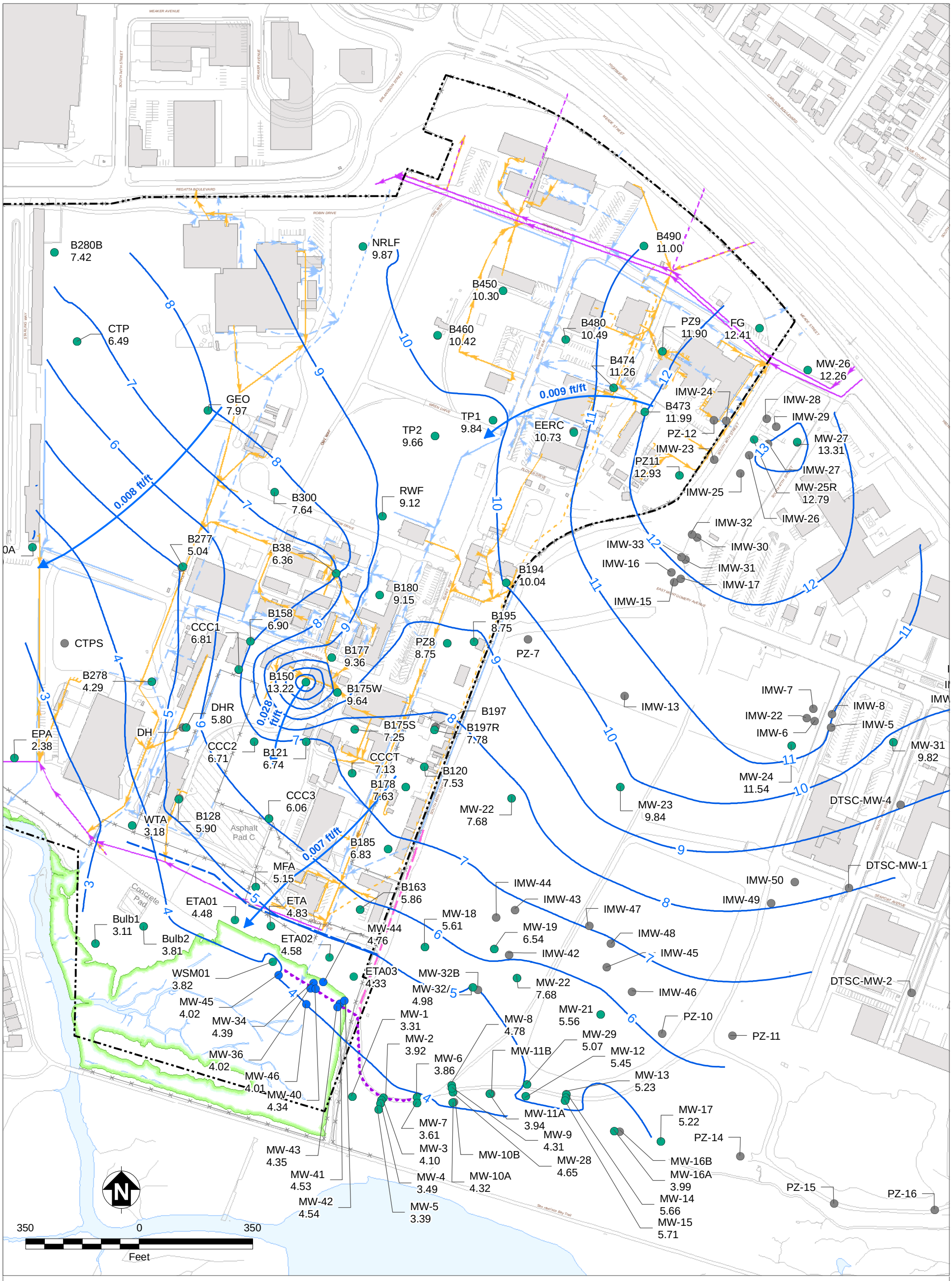
FIGURE 14
SHALLOW GROUNDWATER ELEVATION CONTOURS, OCTOBER 5, 2015

2020 Groundwater Sampling Results



- Piezometer Groundwater Elevation Measured in April 2016
- Piezometer Groundwater Elevation Not Measured in April 2016
- BAPB Piezometers on RFS Property Measured in April 2016
- 1 — Estimated April 2016 Groundwater Contour
- Estimated Horizontal Groundwater Gradient Direction (Value)
- Existing Building
- Asphalt/Concrete Pad
- Surface Water
- Marsh Boundary
- Richmond Field Station Site Boundary
- Roads and Other Landscape Features
- Fenceline
- BAPB Wall
- Former Seawall (Approximate)
- Slurry Wall

Sanitary Sewer Lines:

- Existing City of Richmond Sewer
- Abandoned City of Richmond Sewer
- Existing RFS Sewer
- Abandoned RFS Sewer

Storm Drain Lines:

- Open Swale
- Underground Culvert
- Gutters
- Underground Culvert, Abandoned (Grouted at Manholes)

MW-10A 5.27 — Piezometer ID; Groundwater Elevation (FT NGVD29)

Note:
All data points surveyed to NGVD29.
Mean sea level = NGVD29 elevation (in feet) – 0.58 feet and mean sea level datum representative of Stege Marsh is derived from NOAA Richmond Inner Harbor tide gauge.

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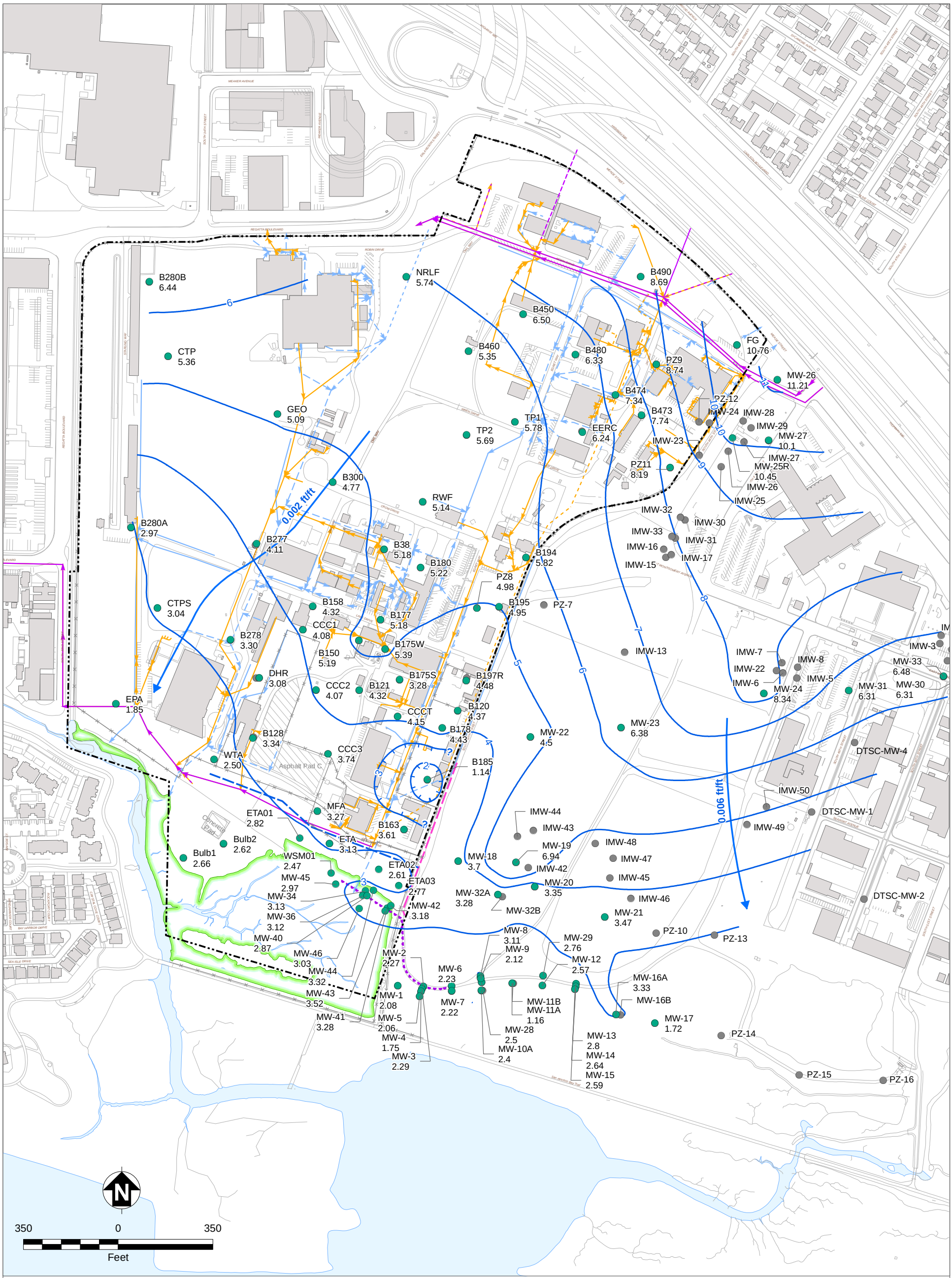
Richmond Field Station Site
University of California, Berkeley

FIGURE 15
SHALLOW GROUNDWATER ELEVATION CONTOURS, APRIL 4, 2016

2020 Groundwater Sampling Results



- Piezometer Groundwater Elevation Measured in October 2016
- Piezometer Groundwater Elevation Not Measured in October 2016
- Estimated October 2016 Groundwater Contour
- Estimated Horizontal Groundwater Gradient Direction (Value)
- Existing Building
- Asphalt/Concrete Pad
- Surface Water
- Marsh Boundary
- Richmond Field Station Site Boundary
- Roads and Other Landscape Features
- Fenceline
- BAPB Wall
- Former Seawall (Approximate)
- Slurry Wall

Sanitary Sewer Lines:
- Existing City of Richmond Sewer
- Abandoned City of Richmond Sewer
- Existing RFS Sewer
- Abandoned RFS Sewer

Storm Drain Lines:
- Open Swale
- Underground Culvert
- Gutters
- Underground Culvert, Abandoned (Grouted at Manholes)

Piezometer ID
MW-10A
5.27
Groundwater Elevation (FT NGVD29)

Note:
All data points surveyed to NGVD29.
Mean sea level = NGVD29 elevation (in feet) – 0.58 feet and mean sea level datum representative of Stege Marsh is derived from NOAA Richmond Inner Harbor tide gauge.

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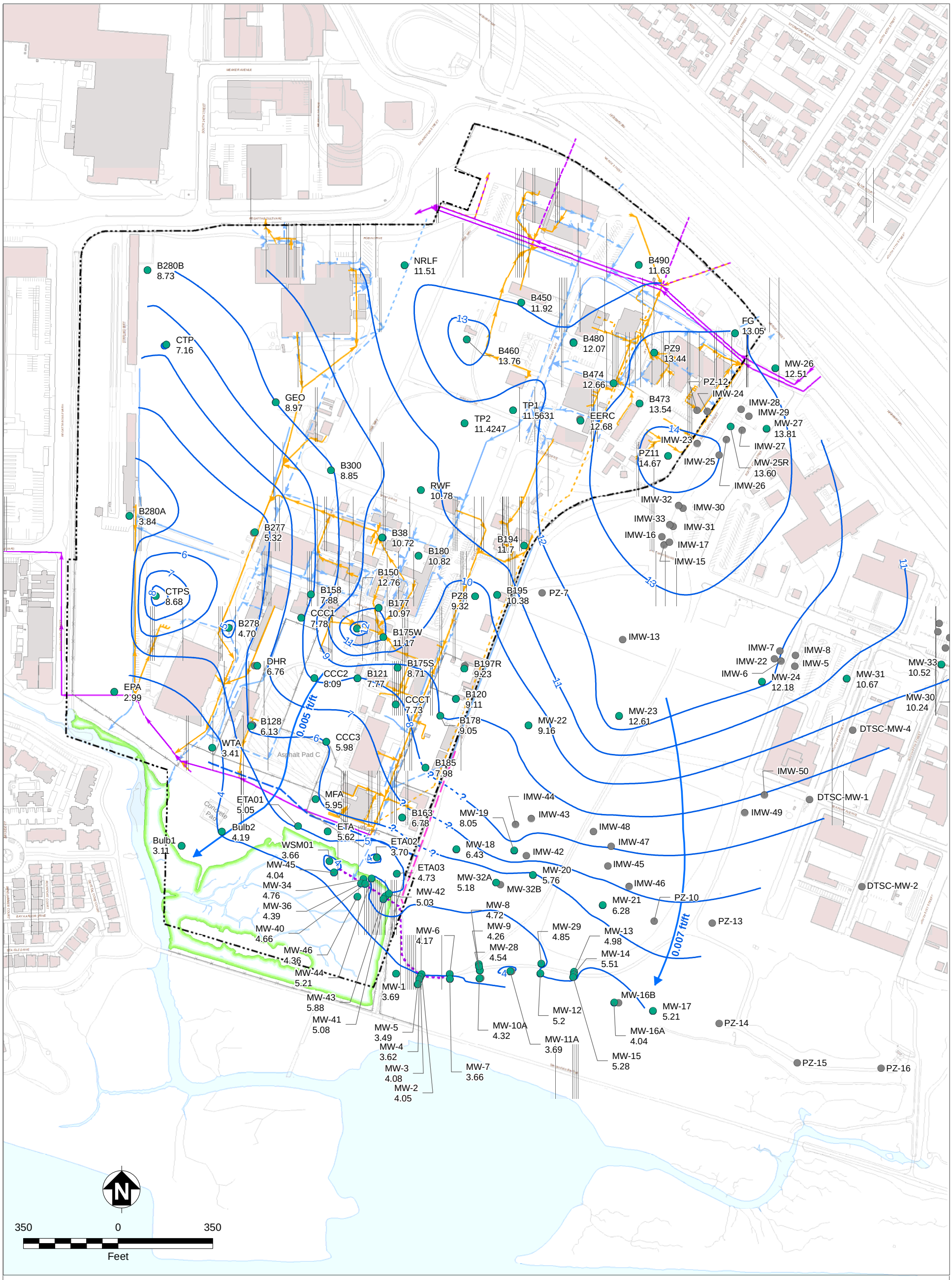
Richmond Field Station Site
University of California, Berkeley

FIGURE 16
SHALLOW GROUNDWATER ELEVATION CONTOURS, OCTOBER 3 and 4, 2016

2020 Groundwater Sampling Results



Piezometer Groundwater Elevation Measured in April 2017

Piezometer Groundwater Elevation Not Measured in April 2017

Estimated April 2017 Groundwater Contour

Estimated Horizontal Groundwater Gradient Direction (Value)

Existing Building

Asphalt/Concrete Pad

Surface Water

Marsh Boundary

Richmond Field Station Site Boundary

Roads and Other Landscape Features

Fenceline

BAPB Wall

Former Seawall (Approximate)

Slurry Wall

Sanitary Sewer Lines:

Existing City of Richmond Sewer

Abandoned City of Richmond Sewer

Existing RFS Sewer

Abandoned RFS Sewer

Storm Drain Lines:

Open Swale

Underground Culvert

Gutters

Underground Culvert, Abandoned (Grouted at Manholes)

Piezometer ID
MW-10A
5.27
Groundwater Elevation (FT NGVD29)

Note:
All data points surveyed to NGVD29.
Mean sea level = NGVD29 elevation (in feet) – 0.58 feet and mean sea level datum representative of Stege Marsh is derived from NOAA Richmond Inner Harbor tide gauge.

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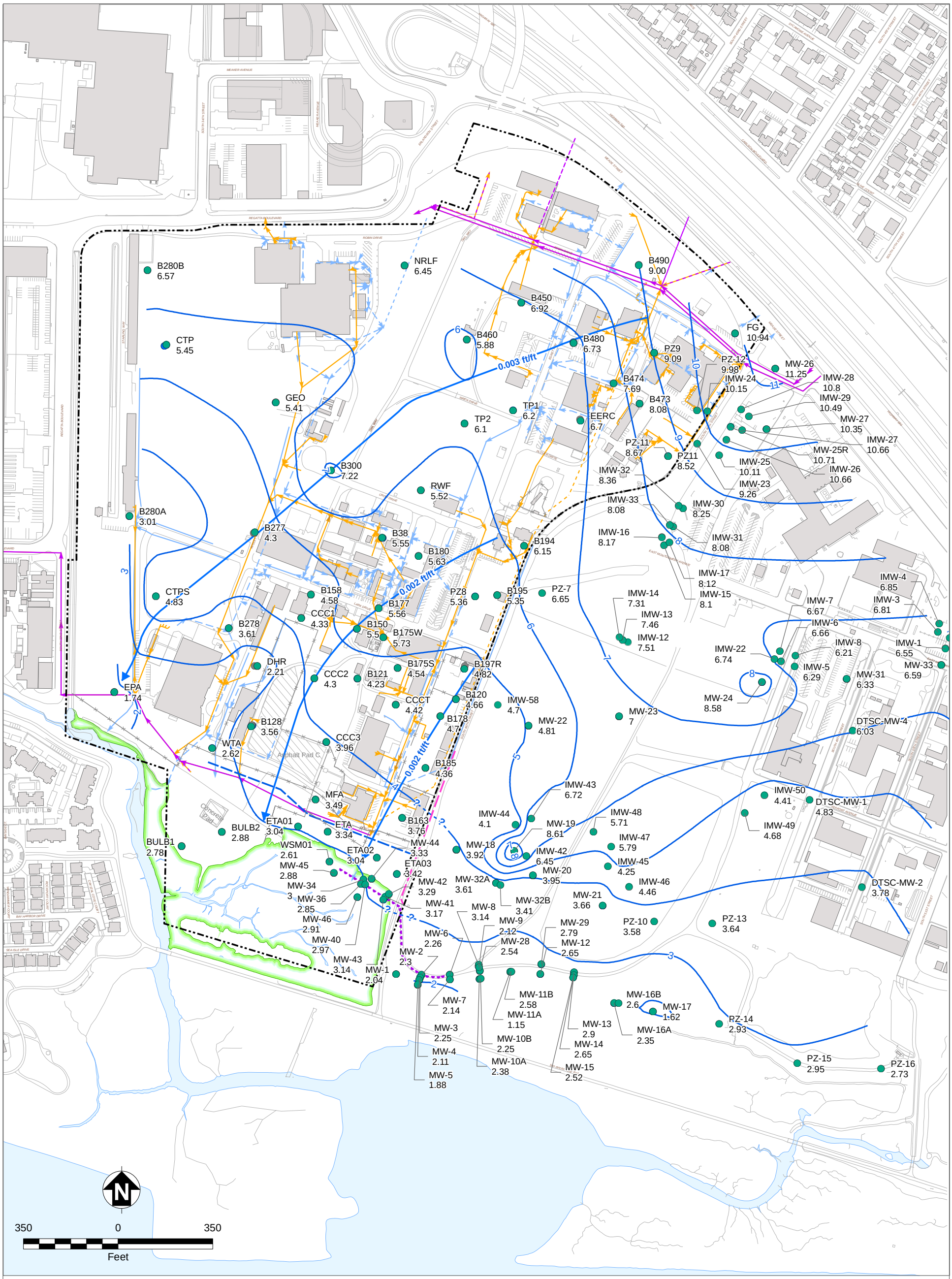
FIGURE 17
SHALLOW GROUNDWATER ELEVATION CONTOURS, APRIL 3, 2017

2020 Groundwater Sampling Results



- Piezometer Groundwater Elevation Measured in October 2017
- Piezometer Groundwater Elevation Not Measured in October 2017
- Estimated October 2017 Groundwater Contour
- Estimated Horizontal Groundwater Gradient Direction (Value)
- Existing Building
- Asphalt/Concrete Pad
- Surface Water
- Marsh Boundary
- Richmond Field Station Site Boundary
- Roads and Other Landscape Features
- Fenceline
- BAPB Wall
- Former Seawall (Approximate)
- Slurry Wall

Sanitary Sewer Lines:
- Existing City of Richmond Sewer
- Abandoned City of Richmond Sewer
- Existing RFS Sewer
- Abandoned RFS Sewer

Storm Drain Lines:
- Open Swale
- Underground Culvert
- Gutters
- Underground Culvert, Abandoned (Grouted at Manholes)

Piezometer ID
MW-10A
5.27
Groundwater Elevation (FT NGVD29)

Note:
All data points surveyed to NGVD29.
Mean sea level = NGVD29 elevation (in feet) – 0.58 feet and mean sea level datum representative of Stege Marsh is derived from NOAA Richmond Inner Harbor tide gauge.

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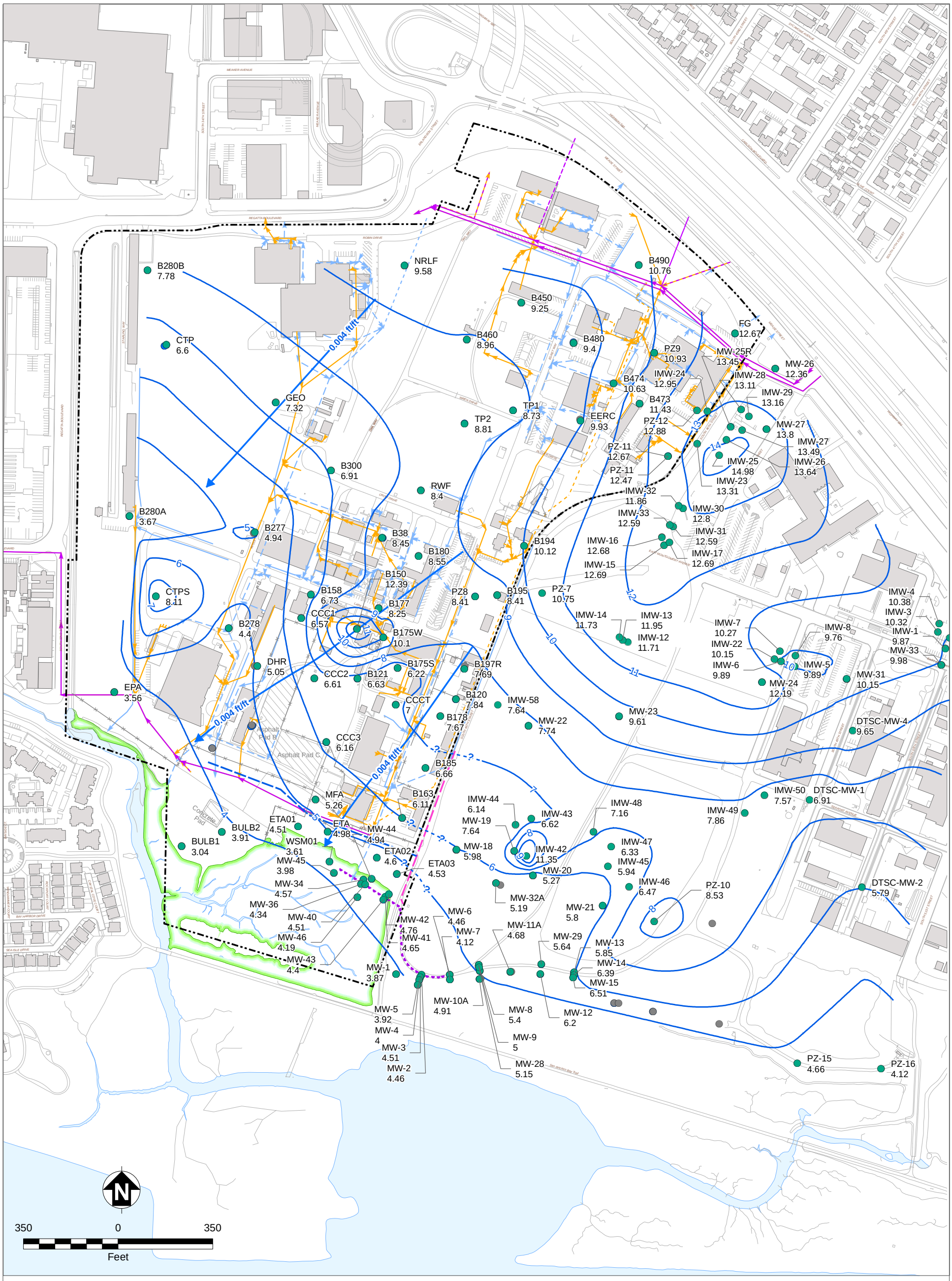
FIGURE 18
SHALLOW GROUNDWATER ELEVATION CONTOURS, OCTOBER 2 AND 3, 2017

2020 Groundwater Sampling Results



- Piezometer Groundwater Elevation Measured in April 2018
- Piezometer Groundwater Elevation Not Measured in April 2018
- Estimated April 2018 Groundwater Contour
- Estimated Horizontal Groundwater Gradient Direction (Value)
- Existing Building
- Asphalt/Concrete Pad
- Surface Water
- Marsh Boundary
- Richmond Field Station Site Boundary
- Roads and Other Landscape Features
- Fenceline
- BAPB Wall
- Former Seawall (Approximate)
- Slurry Wall

Sanitary Sewer Lines:
- Existing City of Richmond Sewer
- Abandoned City of Richmond Sewer
- Existing RFS Sewer
- Abandoned RFS Sewer

Storm Drain Lines:
- Open Swale
- Underground Culvert
- Gutters
- Underground Culvert, Abandoned (Grouted at Manholes)

Piezometer ID: MW-10A
5.27
Groundwater Elevation (FT NGVD29)

Note:
All data points surveyed to NGVD29.
Mean sea level = NGVD29 elevation (in feet) – 0.58 feet and mean sea level datum representative of Stege Marsh is derived from NOAA Richmond Inner Harbor tide gauge.

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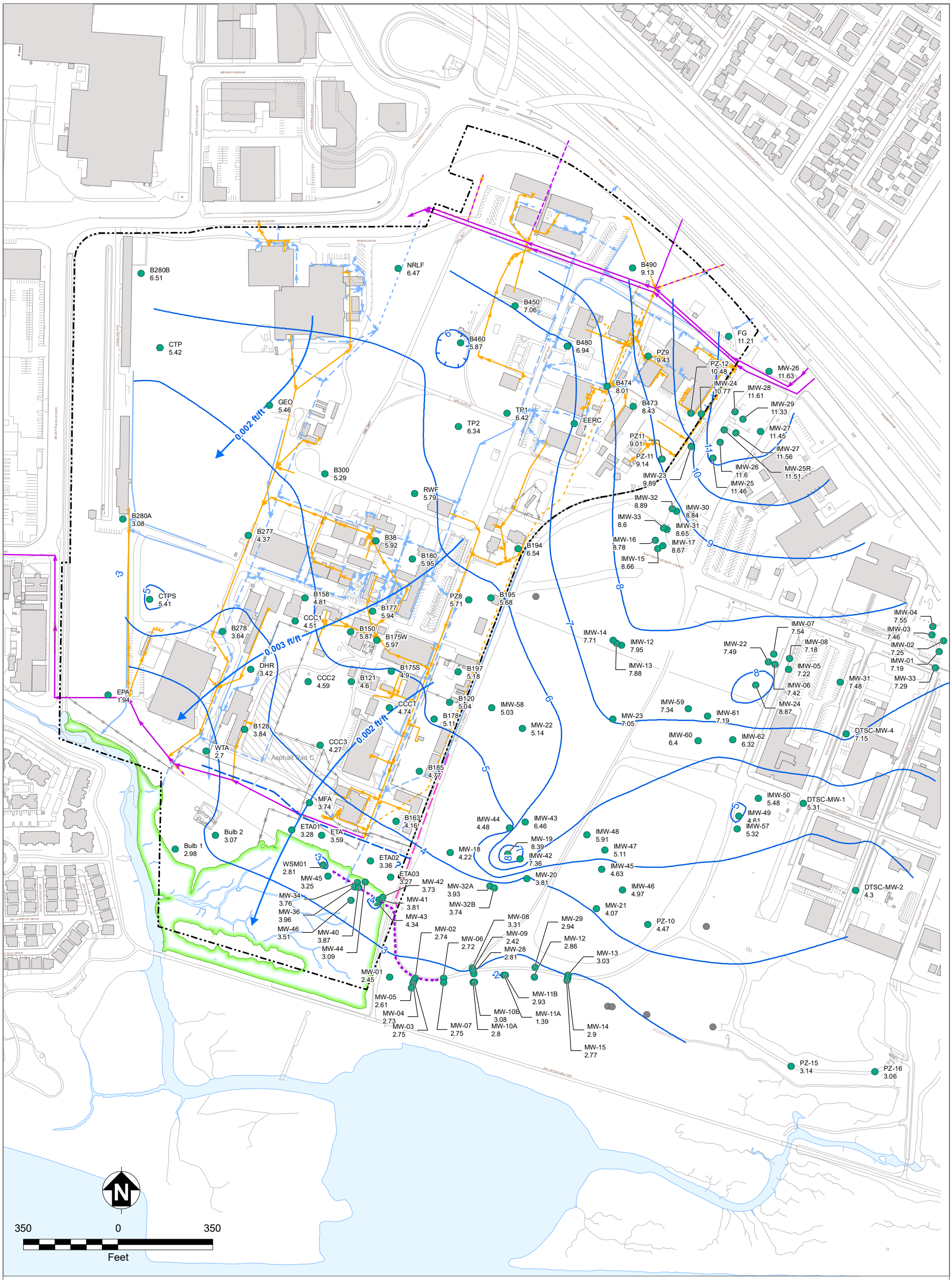
FIGURE 19
SHALLOW GROUNDWATER ELEVATION CONTOURS, APRIL 2, 2018

2020 Groundwater Sampling Results



Piezometer Groundwater Elevation Measured in August 2018

Piezometer Groundwater Elevation Not Measured in August 2018

Estimated August 2018 Groundwater Contour

Estimated Horizontal Groundwater Gradient Direction (Value)

Existing Building

Asphalt/Concrete Pad

Surface Water

Marsh Boundary

Richmond Field Station Site Boundary

Roads and Other Landscape Features

Fenceline

BAPB Wall

Former Seawall (Approximate)

Slurry Wall

Sanitary Sewer Lines:

Existing City of Richmond Sewer

Abandoned City of Richmond Sewer

Existing RFS Sewer

Abandoned RFS Sewer

Storm Drain Lines:

Open Swale

Underground Culvert

Gutters

Underground Culvert, Abandoned (Grouted at Manholes)

Piezometer ID
MW-10A
5.27
Groundwater Elevation (FT NGVD29)

Note:
All data points surveyed to NGVD29.
Mean sea level = NGVD29 elevation (in feet) – 0.58 feet and mean sea level datum representative of Stege Marsh is derived from NOAA Richmond Inner Harbor tide gauge.

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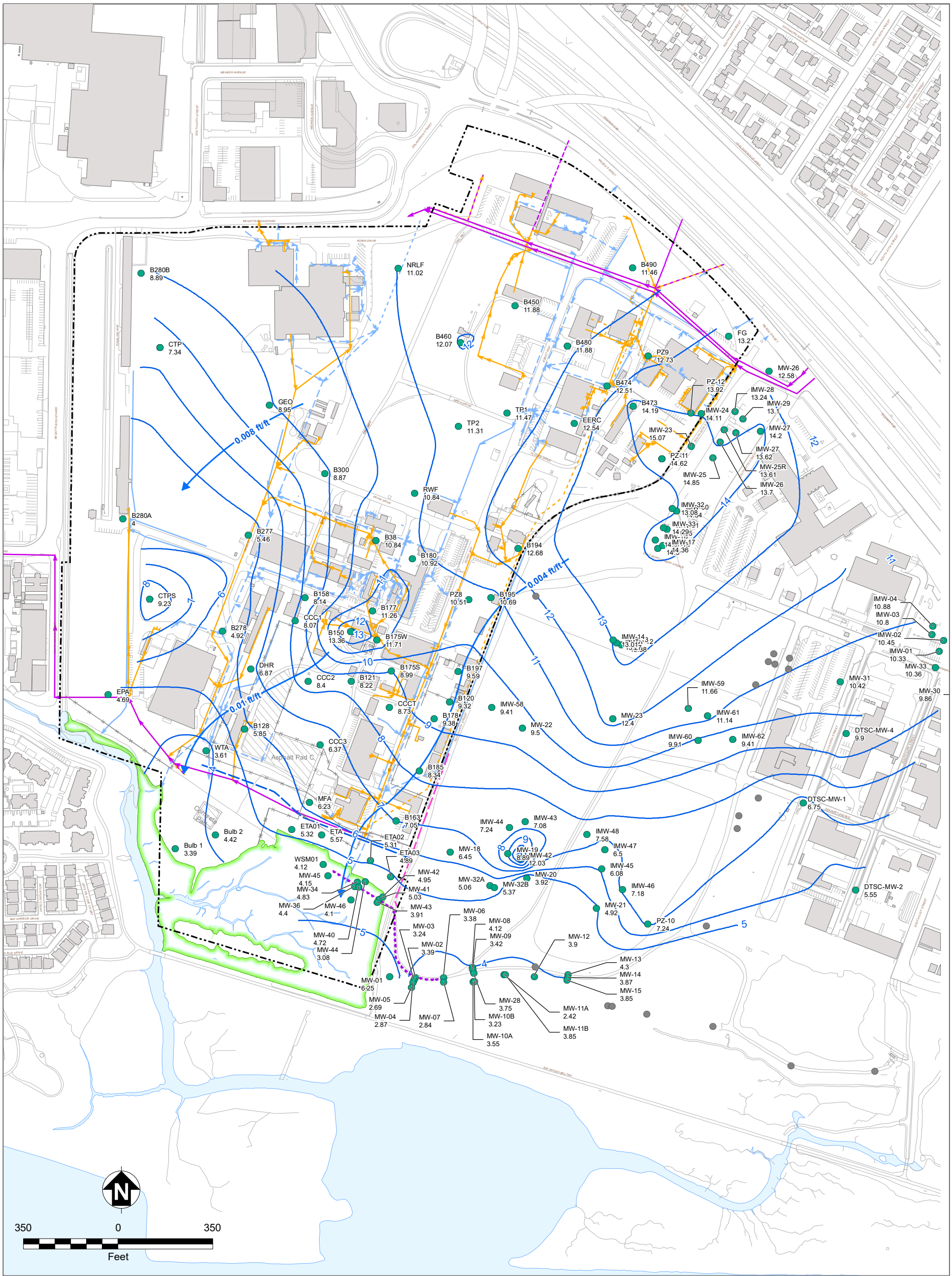
FIGURE 20
SHALLOW GROUNDWATER ELEVATION CONTOURS, AUGUST 13, 2018

2020 Groundwater Sampling Results

7/23/2019 C:\misc_GIS\Richmond_Field_Station\Projects\GW Technical Memo 2019\20_Shallow_GW_Elevation_Contours 2018 August.mxd TtEMI-OAK michelle.handley.



- Piezometer Groundwater Elevation Measured in April 2019
- Piezometer Groundwater Elevation Not Measured in April 2019
- Estimated April 2019 Groundwater Contour
- Estimated Horizontal Groundwater Gradient Direction (Value)
- Existing Building
- Asphalt/Concrete Pad
- Surface Water
- Marsh Boundary
- Richmond Field Station Site Boundary
- Roads and Other Landscape Features
- Fenceline
- BAPB Wall
- Former Seawall (Approximate)
- Slurry Wall

Sanitary Sewer Lines:
- Existing City of Richmond Sewer
- Abandoned City of Richmond Sewer
- Existing RFS Sewer
- Abandoned RFS Sewer

Storm Drain Lines:
- Open Swale
- Underground Culvert
- Gutters
- Underground Culvert, Abandoned (Grouted at Manholes)

Piezometer ID
MW-10A
5.27
Groundwater Elevation (FT NGVD29)

Note:
All data points surveyed to NGVD29.
Mean sea level = NGVD29 elevation (in feet) – 0.58 feet and mean sea level datum representative of Stege Marsh is derived from NOAA Richmond Inner Harbor tide gauge.

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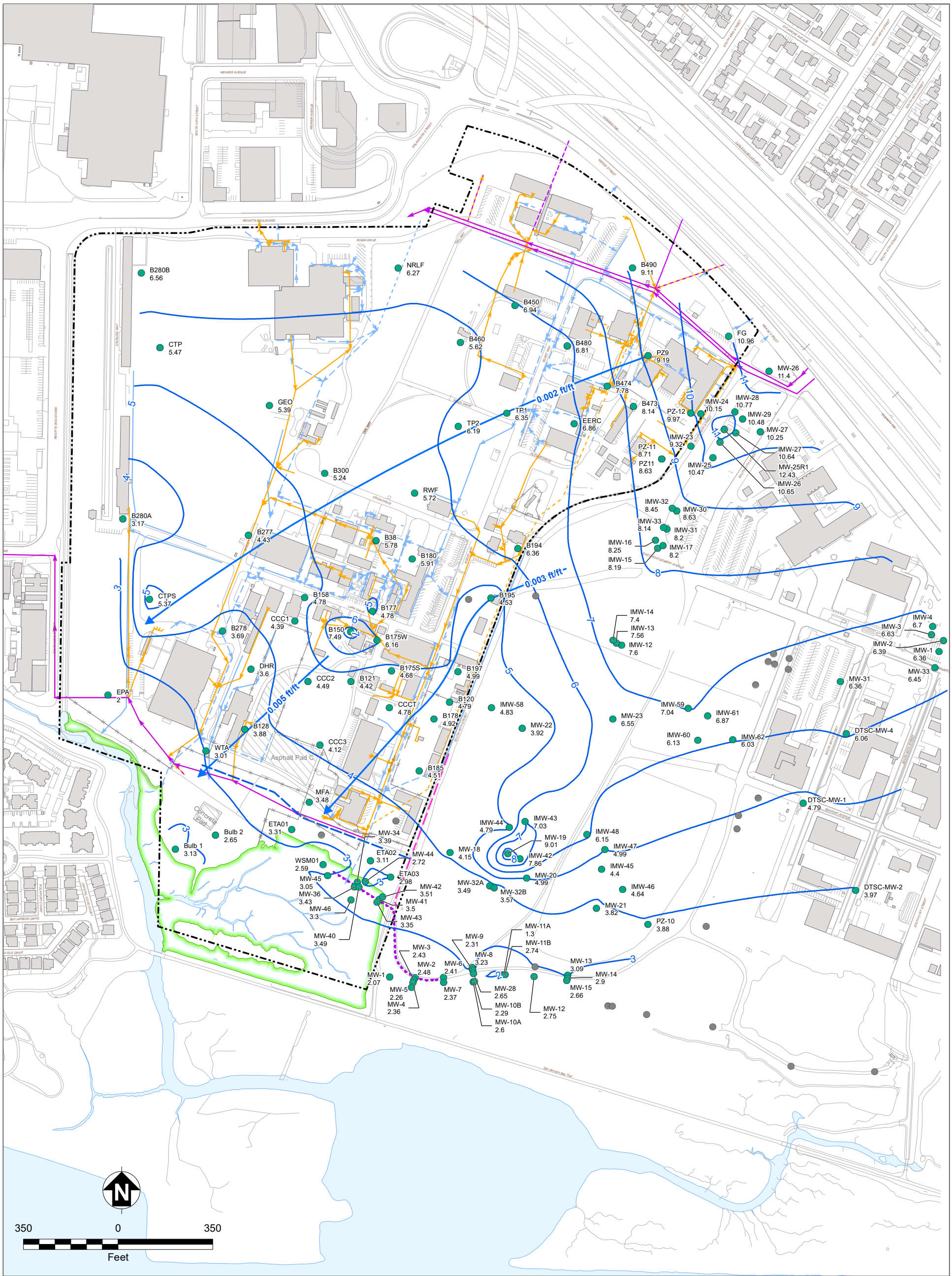
FIGURE 21
SHALLOW GROUNDWATER ELEVATION CONTOURS, APRIL 1, 2019

2020 Groundwater Sampling Results

7/24/2019 C:\misc_GIS\Richmond_Field_Station\Projects\GW Technical Memo 2019\21_Shallow_GW_Elevation_Contours 2019 April.mxd TtEMI-OAK michelle.handley.



- Piezometer Groundwater Elevation Measured in October 2019
- Piezometer Groundwater Elevation Not Measured in October 2019
- Estimated October 2019 Groundwater Contour
- Estimated Horizontal Groundwater Gradient Direction (Value)
- Existing Building
- Asphalt/Concrete Pad
- Surface Water
- Marsh Boundary
- Richmond Field Station Site Boundary
- Roads and Other Landscape Features
- Fenceline
- BAPB Wall
- Former Seawall (Approximate)
- Slurry Wall

Sanitary Sewer Lines:
- Existing City of Richmond Sewer
- Abandoned City of Richmond Sewer
- Existing RFS Sewer
- Abandoned RFS Sewer

Storm Drain Lines:
- Open Swale
- Underground Culvert
- Gutters
- Underground Culvert, Abandoned (Grouted at Manholes)

MW-10A
5.27
Piezometer ID
Groundwater Elevation (FT NGVD29)

Note:
All data points surveyed to NGVD29.
Mean sea level = NGVD29 elevation (in feet) – 0.58 feet and mean sea level datum representative of Stege Marsh is derived from NOAA Richmond Inner Harbor tide gauge.

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FIGURE 22
SHALLOW GROUNDWATER ELEVATION CONTOURS, OCTOBER 1, 2019

2020 Groundwater Sampling Results

ATTACHMENT 2

PIEZOMETER REPAIR PHOTOGRAPHS

Photograph 1 Piezometer PZ-8		
Photograph 2 Piezometer PZ-8		
Photograph 3 Piezometer B280A		

ATTACHMENT 1

GROUNDWATER LEVEL CONTOUR MAPS

ATTACHMENT 2

PIEZOMETER REPAIR PHOTOGRAPHS

Photograph 1 Piezometer PZ-8		
Photograph 2 Piezometer PZ-8		
Photograph 3 Piezometer B280A