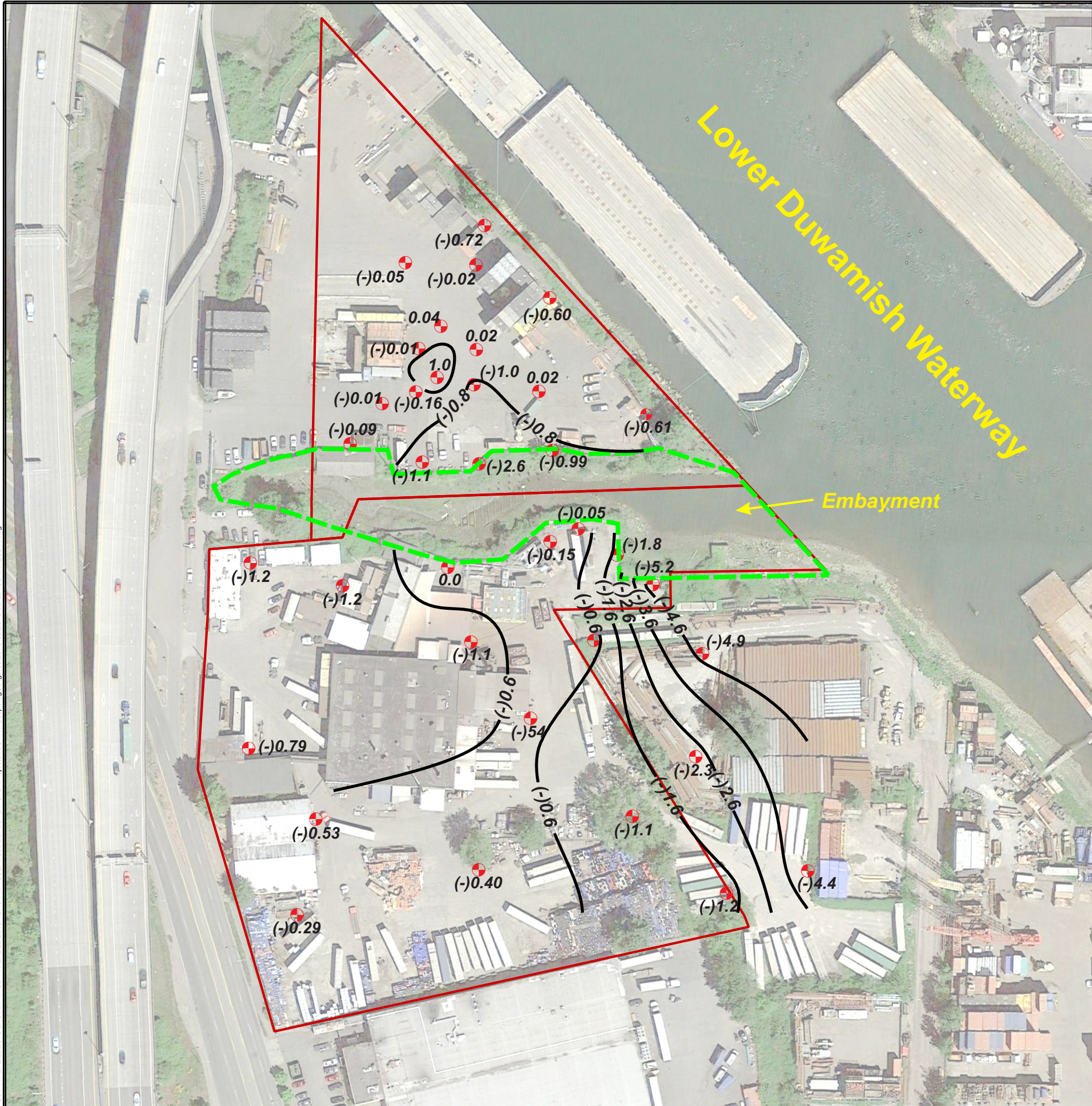

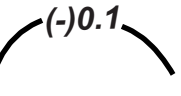



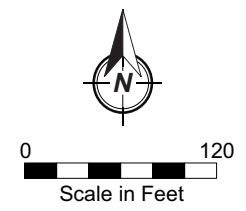
PLOT TIME: 2/23/2018 8:40 AM MOD TIME: 2/23/2018 12:10 PM USER: Lee Barras DWG: D:\Projects\ICS-NW Cooperage\Figures\2018-02\2018-02-23 ICS MWZCDR.dwg



-  Monitoring Well
- $(-)$ 4.6 Water Level Change (feet)
-  Contour Equal Water Level Change
-  Property Boundary

Water level measurements were made on February 6, 2018 during predicted tides of +0.1 feet NAVD88 (2.5 feet MLLW) and +9.4 feet NAVD88 (+11.8 feet MLLW).

Feb 18 Flow Directions.cdr



ICS/NW Cooperage Site  
Seattle, Washington

Changes in Well Water Levels  
in Water Table/Upper Zone - February 6, 2018



**FIGURE**  
4-21a




March 2018



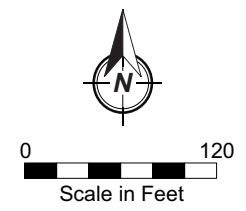
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Feb 18 Flow Directions.cdr

-  Monitoring Well
-  (-)4.6 Water Level Change (feet)
-  Property Boundary

Water level measurements were made on February 6, 2018 during predicted tides of +0.1 feet NAVD88 (2.5 feet MLLW) and +9.4 feet NAVD88 (+11.8 feet MLLW).



ICS/NW Cooperage Site  
Seattle, Washington

Changes in Well Water Levels  
in Lower Zone - February 6, 2018



FIGURE  
4-21b

March 2018



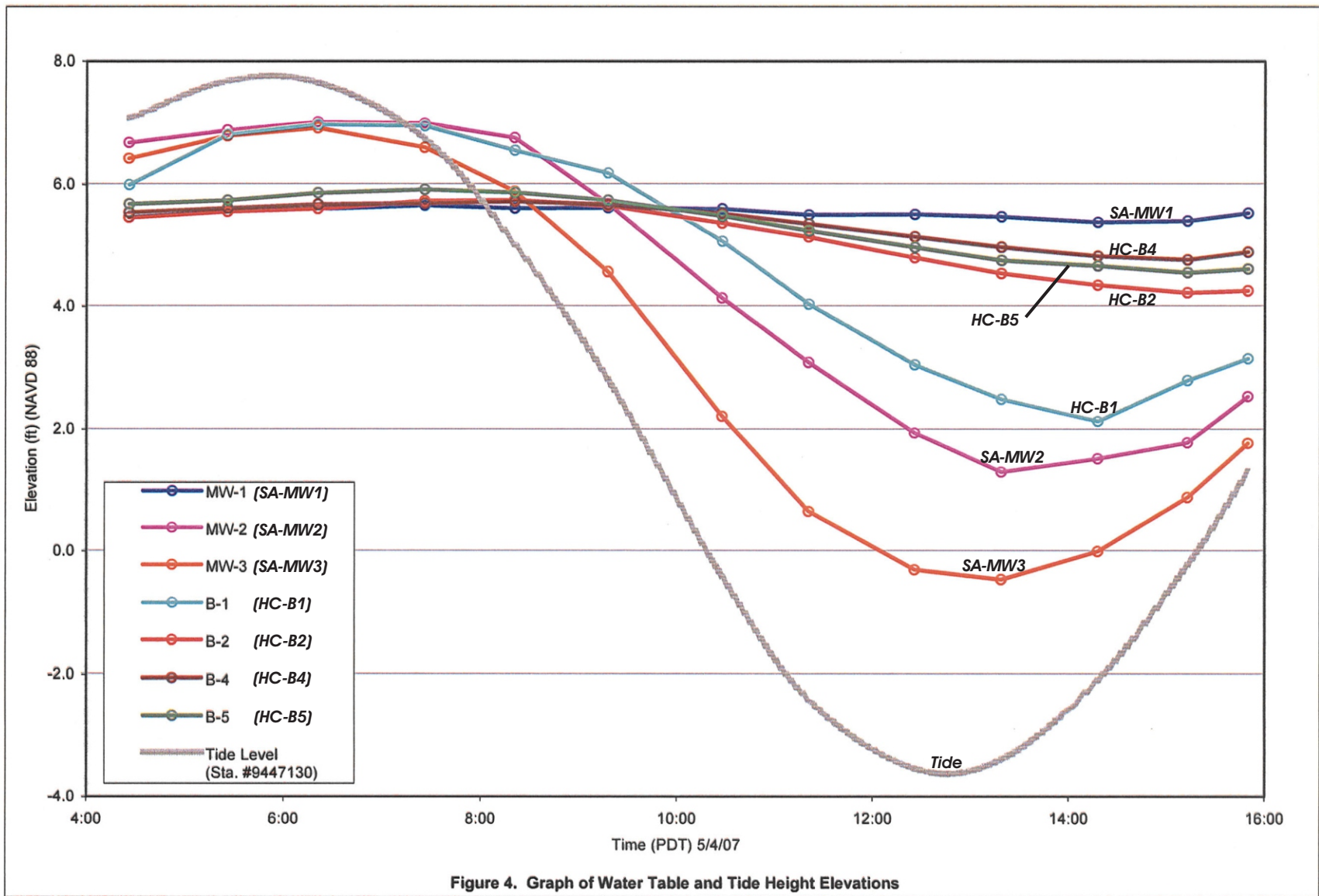


Figure 4. Graph of Water Table and Tide Height Elevations

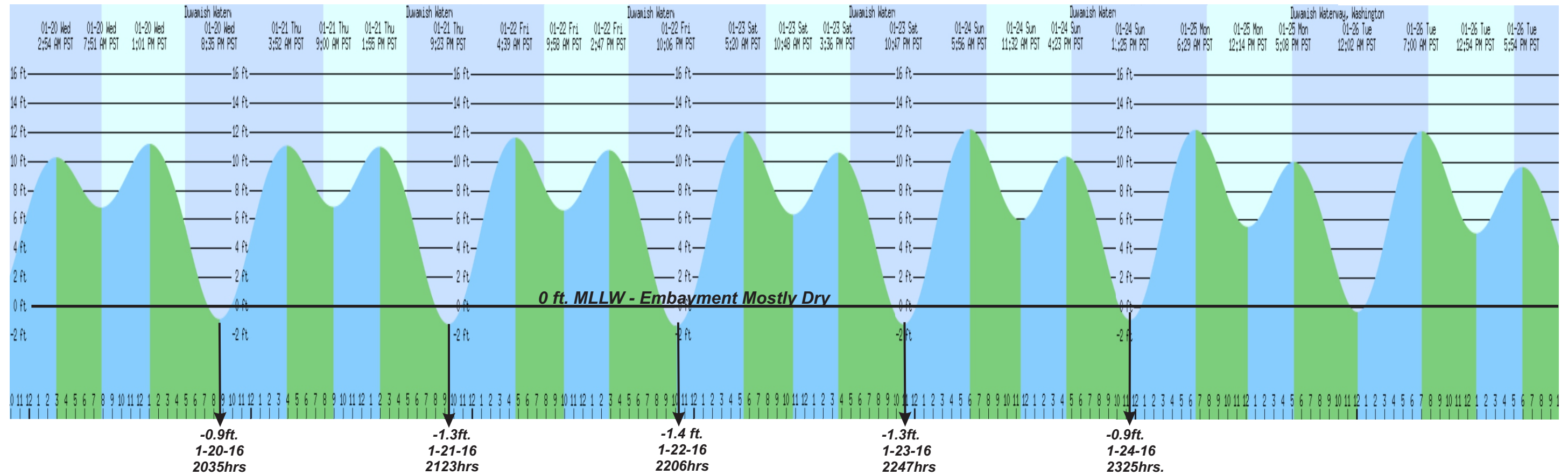
After Figure 4 (SAIC 2007b)

ICS/NW Cooperage Site  
Seattle, Washington

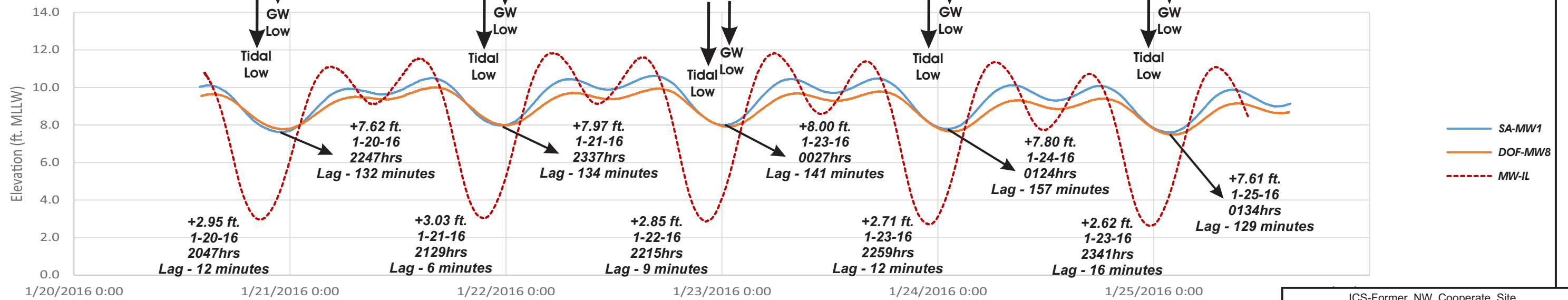
**Water Level Fluctuations  
May 2007**

SUM-008-00 **FIGURE 4-22** Mar. 2018  
Dalton, Olmsted & Fuglevand, Inc.

# Duwamish River Tides



## Well Water Level Fluctuation



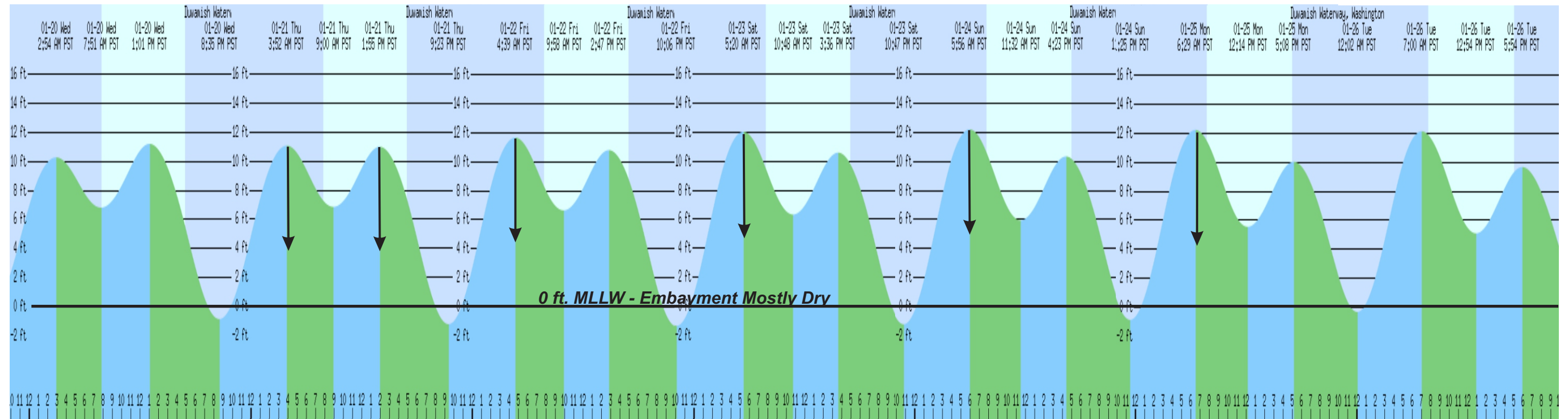
ICS-Former NW Cooperate Site  
Seattle, Washington

### Comparison Water Level Fluctuations Low Tides

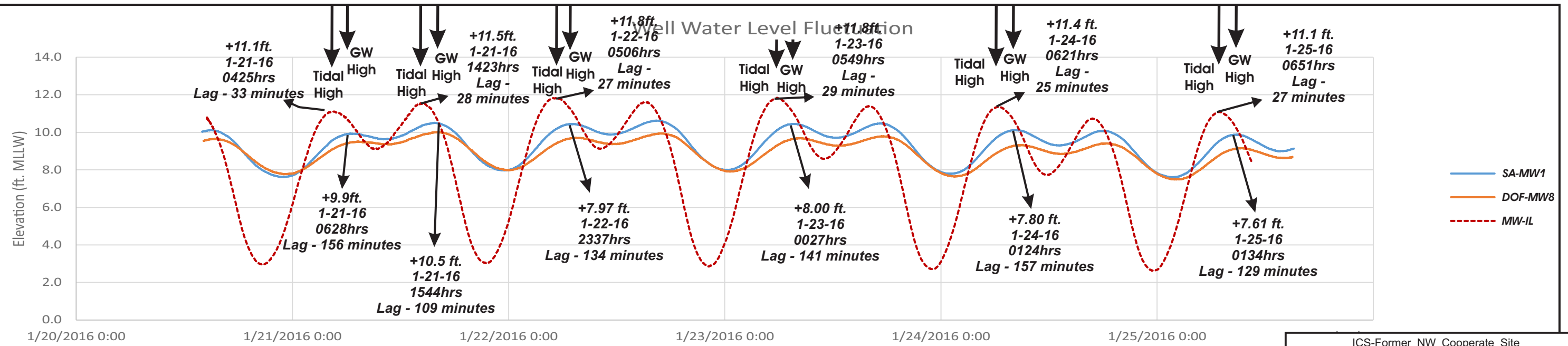
SUM-008-00 **FIGURE 4-23a** Mar. 2018  
Dalton, Olmsted & Fuglevand, Inc.



# Duwamish River Tides

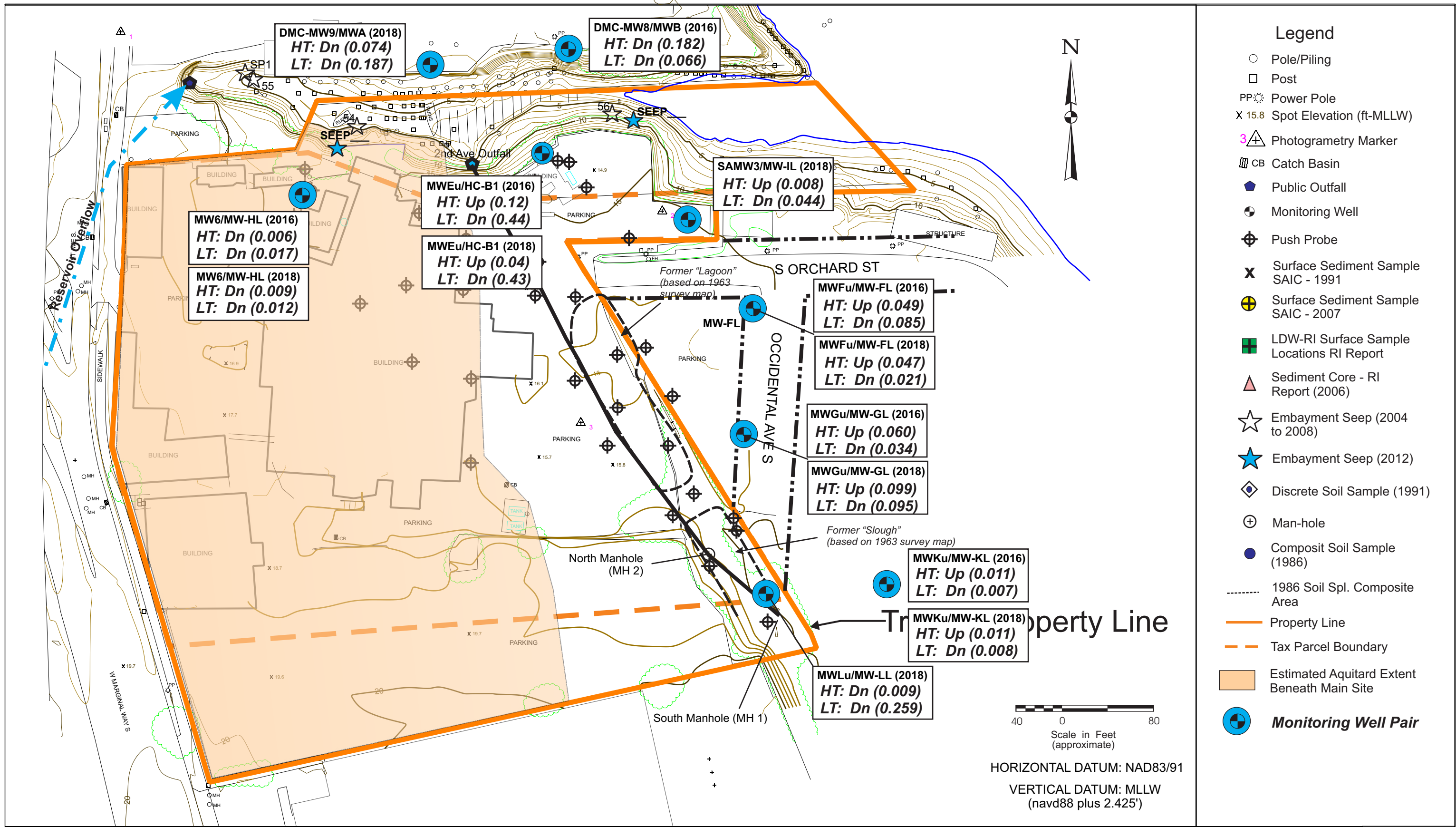


**+11.0ft. 1-21-16 0352hrs**    
**+10.9ft. 1-21-16 1355hrs**    
**+11.6ft. 1-22-16 0439hrs**    
**+12.0ft. 1-23-16 0520hrs**    
**+12.2ft. 1-24-16 0556hrs**    
**+12.2ft. 1-25-16 0629hrs.**



ICS-Former NW Cooperate Site  
 Seattle, Washington  
**Comparison Water Level Fluctuations  
 High Tides**  
 SUM-008-00 **FIGURE 4-23b** Mar. 2018  
 Dalton, Olmsted & Fuglevand, Inc.





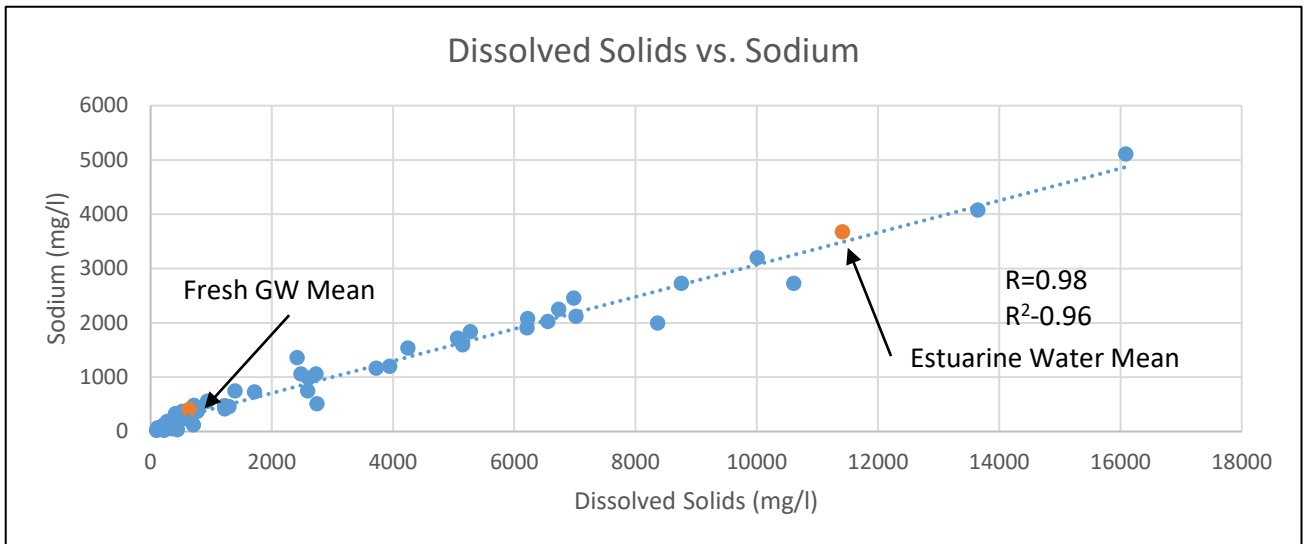
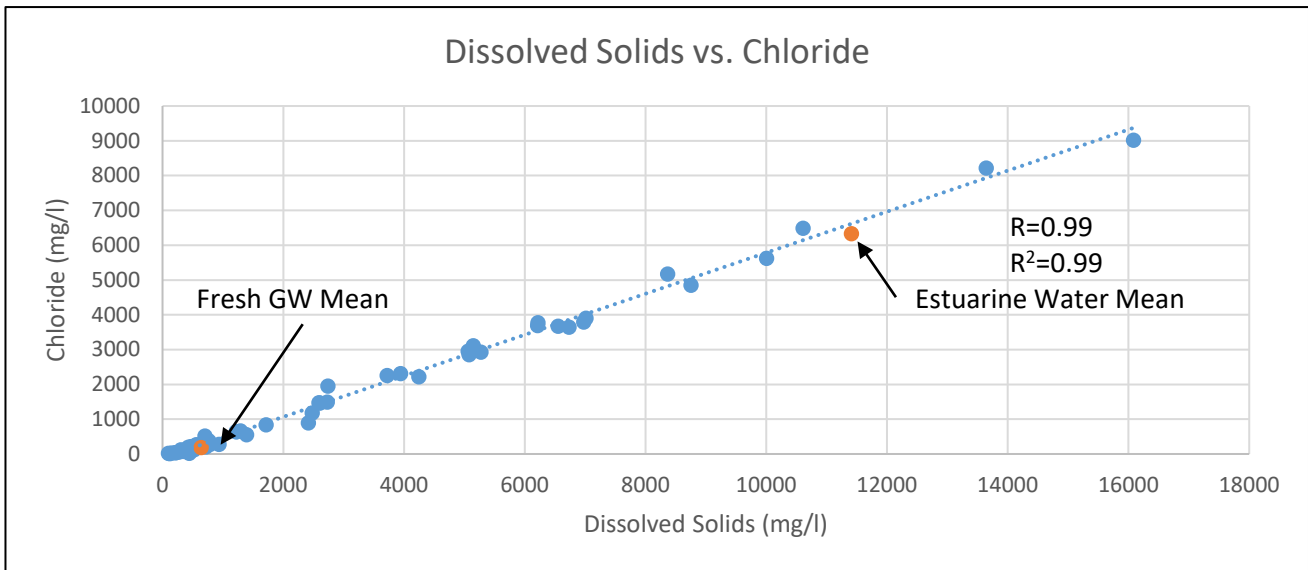
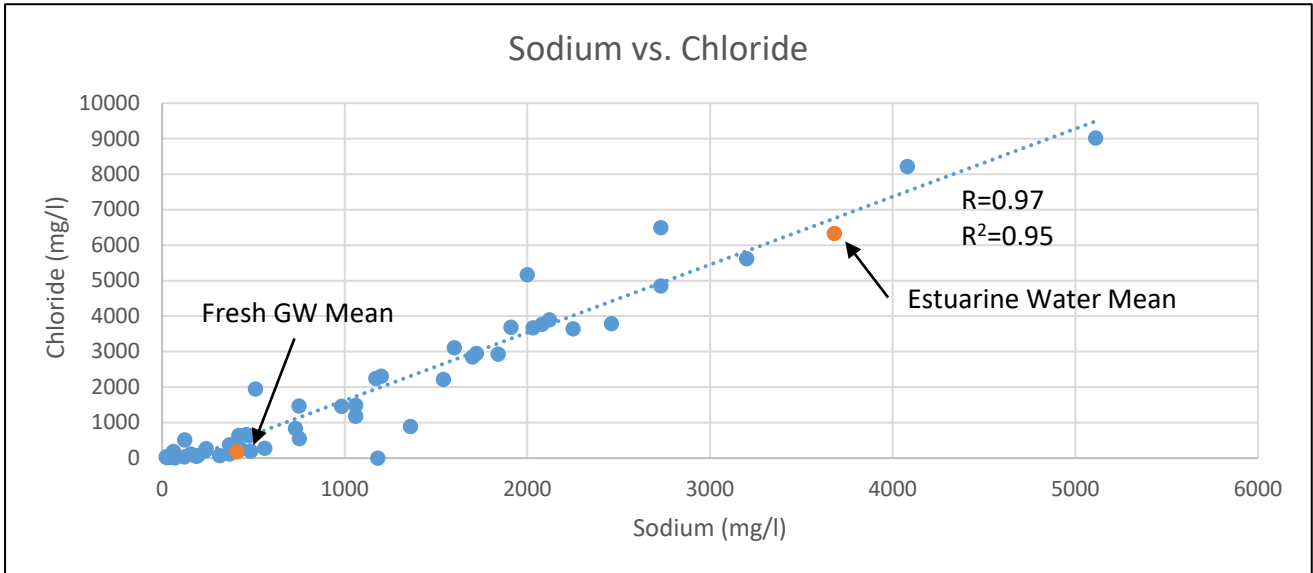
**Notes:**  
 1) Property Survey by Continental Survey Co. (12-15-09)  
 2) Topography by David C. Smith Associates (flown 3-18-10 @ 1412 PDT)

Ref: Vertical Gradients rev.cdr

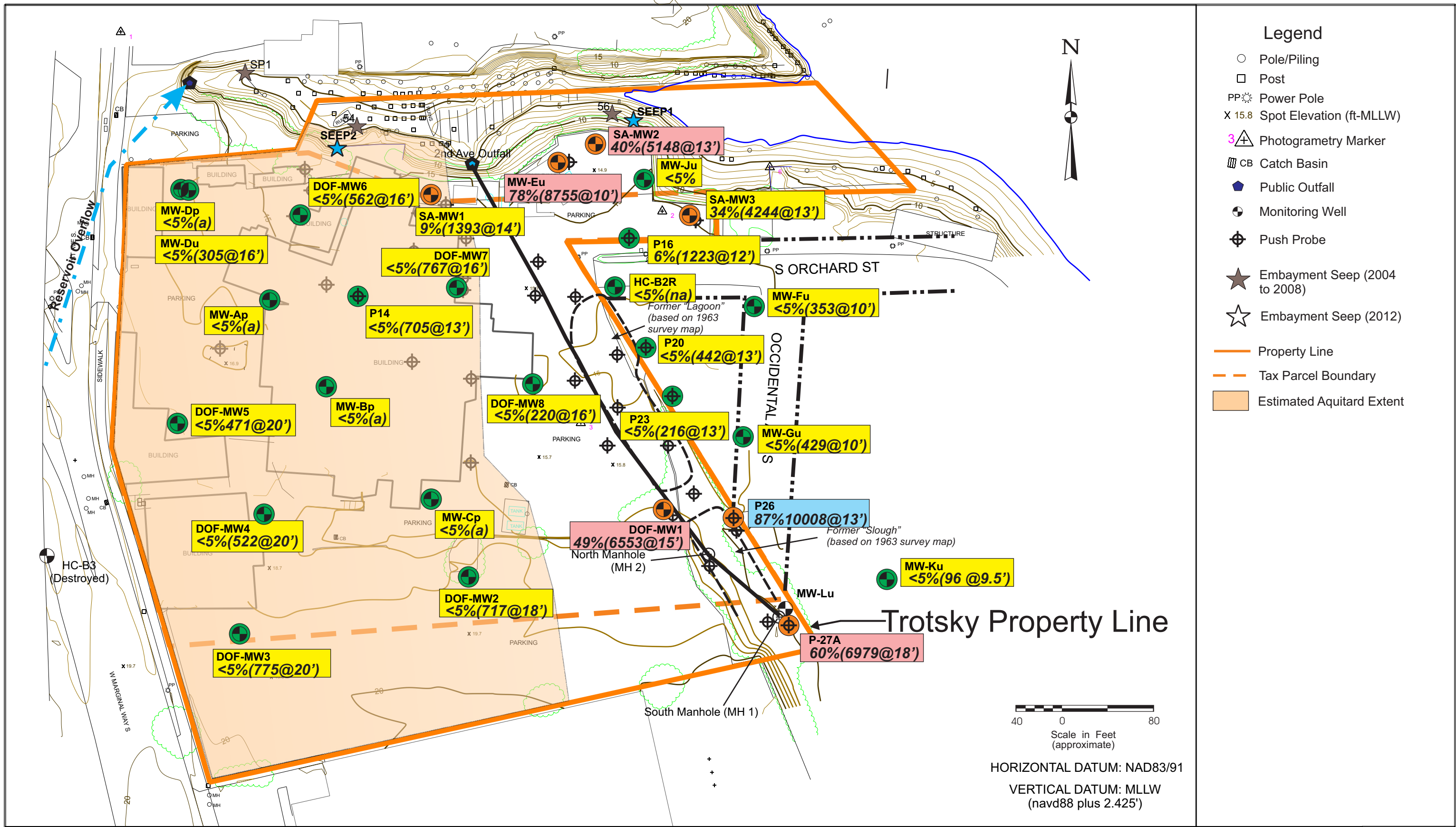
**HT: High Tide (April 2016 +10.8'; February 2018 +11.8' MLLW)**  
**LT: Low Tide (April 2016 -1.3'; February 2018 +2.5' MLLW)**  
**Up: Upward Gradient**  
**Dn: Downward Gradient**  
**(0.010) Gradient Magnitude**

<b>ICS/NW Cooprage Site</b>		<b>FIGURE 4-24</b>
<b>Vertical Gradients</b>		
SUM-008-00 (ICS)	Mar. 2018	
<i>Dalton, Olmsted &amp; Fuglevand, Inc.</i>		









**Notes:** (a) Estuarine Water Content Estimated to be Less Than 5% Based on Electrical Conductivity Measurements (<1,000 uS/cm)

<5%(220@16') - % Estuarine Water (Dissolved Solids in mg/l@ Mid-point Spl. Depth in feet)

Ref: Mixing Ratios rev.cdr

- Estuarine Water Content Less Than 5%
- Estuarine Water Content Equal to or Greater Than 5%
- Dissolved Solids <5,000 mg/l
- Dissolved Solids 5,000 to 10,000 mg/l
- Dissolved Solids > 10,000 mg/l

**ICS/NW Cooprage Site**

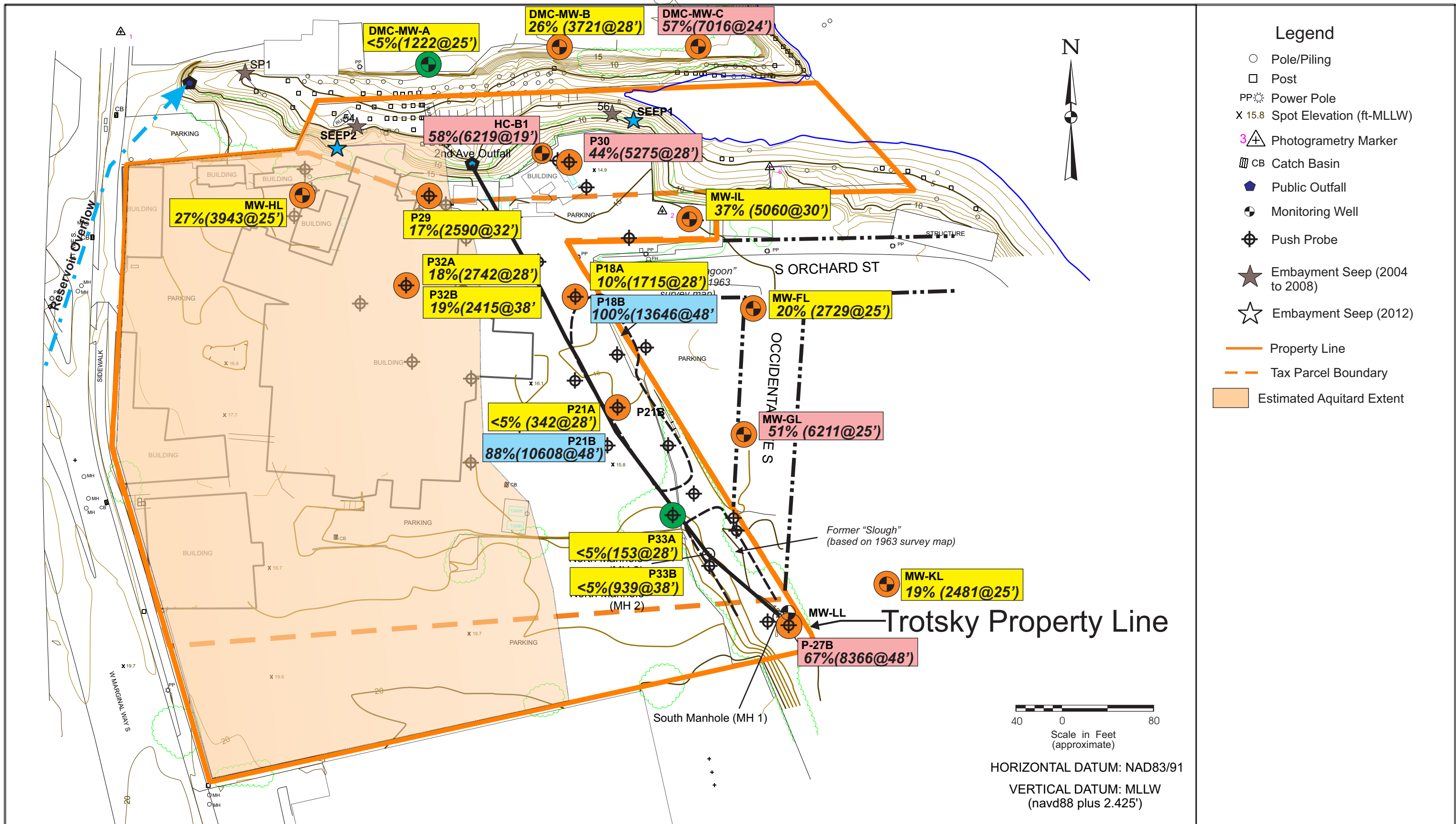
**Estuarine Water Contents**  
**Water Table/Upper Zone Groundwater**

SUM-008-00 (ICS) Mar. 2018

Dalton, Olmsted & Fuglevand, Inc.

**FIGURE**  
**4-26a**





- Legend**
- Pole/Piling
  - Post
  - PP Power Pole
  - X 15.8 Spot Elevation (ft-MLLW)
  - 3△ Photogrammetry Marker
  - ▨ CB Catch Basin
  - ◆ Public Outfall
  - ⊕ Monitoring Well
  - ⊕ Push Probe
  - ★ Embayment Seep (2004 to 2008)
  - ☆ Embayment Seep (2012)
  - Property Line
  - - - Tax Parcel Boundary
  - Estimated Aquitard Extent

40 0 80  
Scale in Feet (approximate)

HORIZONTAL DATUM: NAD83/91  
VERTICAL DATUM: MLLW (navd88 plus 2.425')

**Notes:**

<5%(220@16') - % Estuarine Water (Dissolved Solids in mg/l@ Mid-point Spl. Depth in feet)

- Estuarine Water Content Less Than 5%
- Estuarine Water Content Equal to or Greater Than 5%
- Dissolved Solids <5,000 mg/l
- Dissolved Solids 5,000 to 10,000 mg/l
- Dissolved Solids > 10,000 mg/l

**ICS/NW Cooperage Site**

**Estuarine Water Contents Lower Zone Groundwater**

SUM-008-00 (ICS) Mar. 2018

Dalton, Olmsted & Fuglevand, Inc.

**FIGURE 4-26b**

Ref: Mixing Ratios rev.cdr



