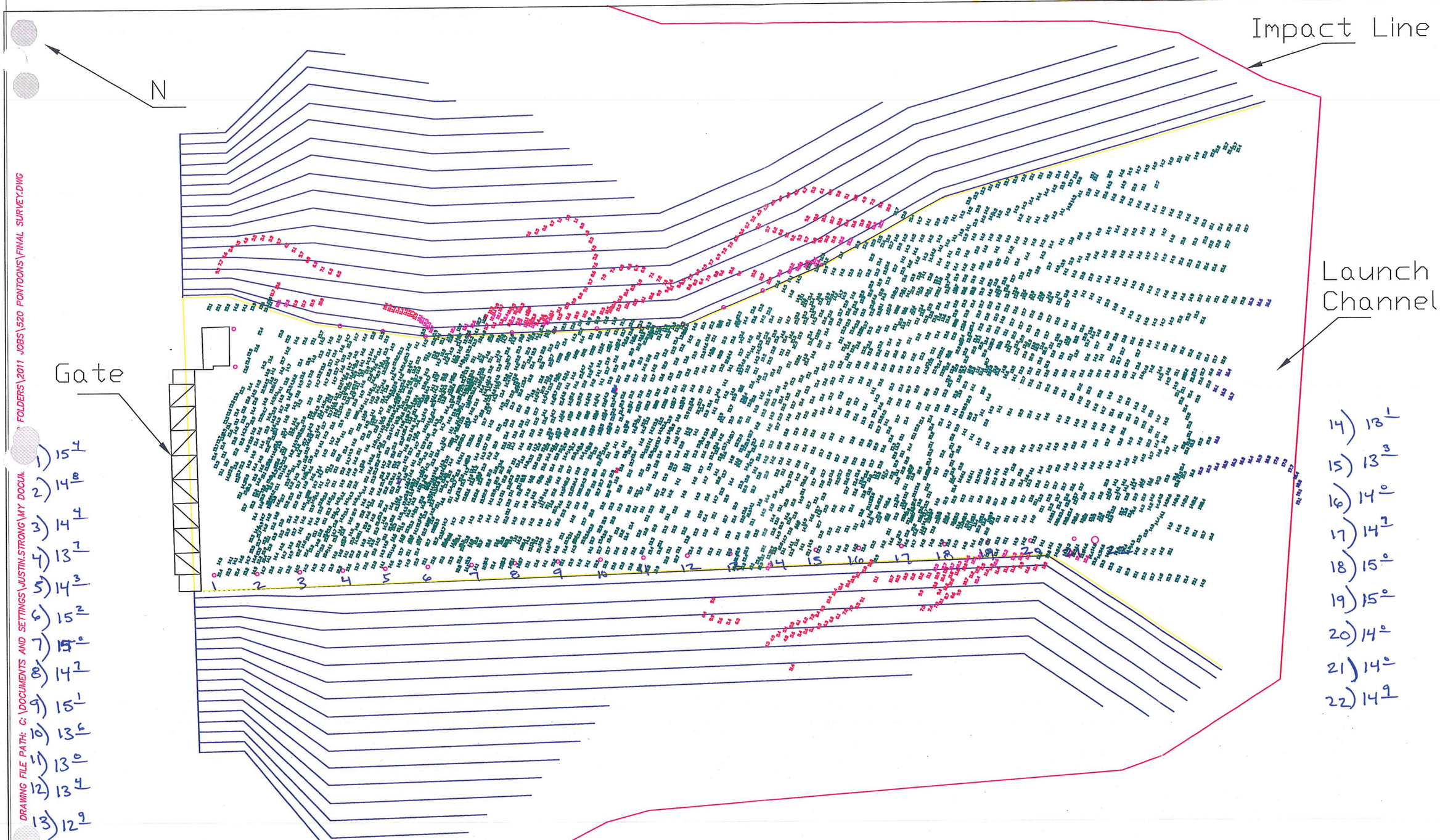
Appendix I – Launch Channel Dredging Cut Volumes and Disposal Locations

Initial Dredge

DECEMBER 28TH



DRAWING FILE PATH: C:\DOCUMENTS AND SETTINGS\JUSTIN.STRONG\MY DOCUMENTS\FOLDERS\2011 JOBS\520 PONTOONS\FINAL SURVEY.DWG

REV.	DATE	BY	DESCRIPTION	CHK'D
1	12/28/11		Final Survey	

Kiewit

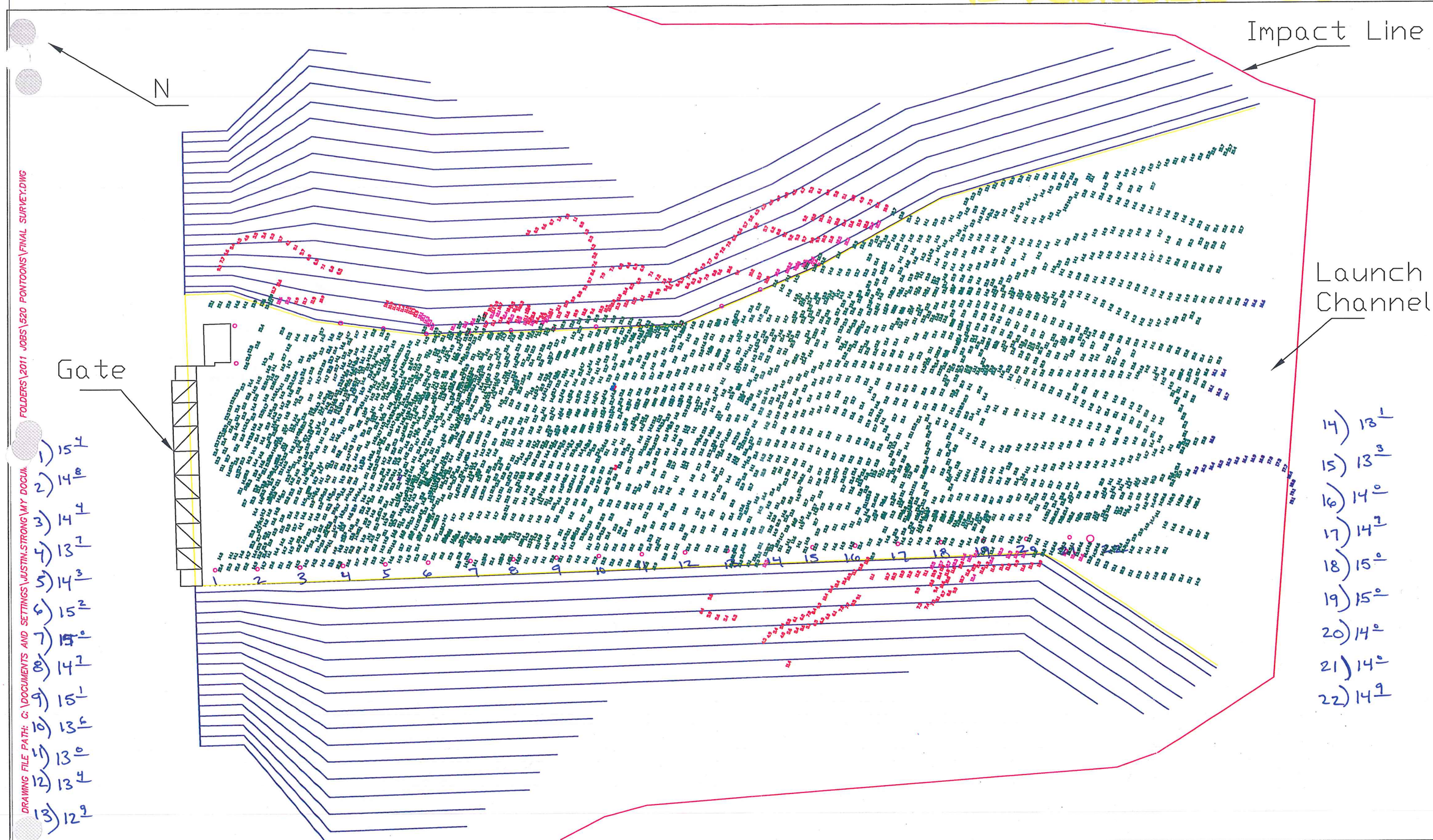
DESIGNED BY X.X.X
DRAWN BY X.X.X.
CHECKED BY X.X.X

SCALE AS NOTED
IF SHEET IS LESS THAN 22"x34" IT IS A REDUCED PRINT SCALE REDUCED ACCORDINGLY
DATE 12-28-11

Think! SAFETY BEGINS WITH ME

PROJECT TITLE: SR520 PONTOONS
PROJECT LOCATION: ABERDEEN, WA
JOB NO.
PROJECT TASK: Final Dredge Survey
DRAWING NO.
DRAWING SUBJECT
SHEET NO. 1 OF 1

DECEMBER 28TH



DRAWING FILE PATH: G:\DOCUMENTS AND SETTINGS\JUSTIN.STRONG\MY DOCUMENTS\JOBS\520 PONTOONS\FINAL SURVEY.DWG

REV.	DATE	BY	DESCRIPTION	CHK'D
1	12/28/11		Final Survey	

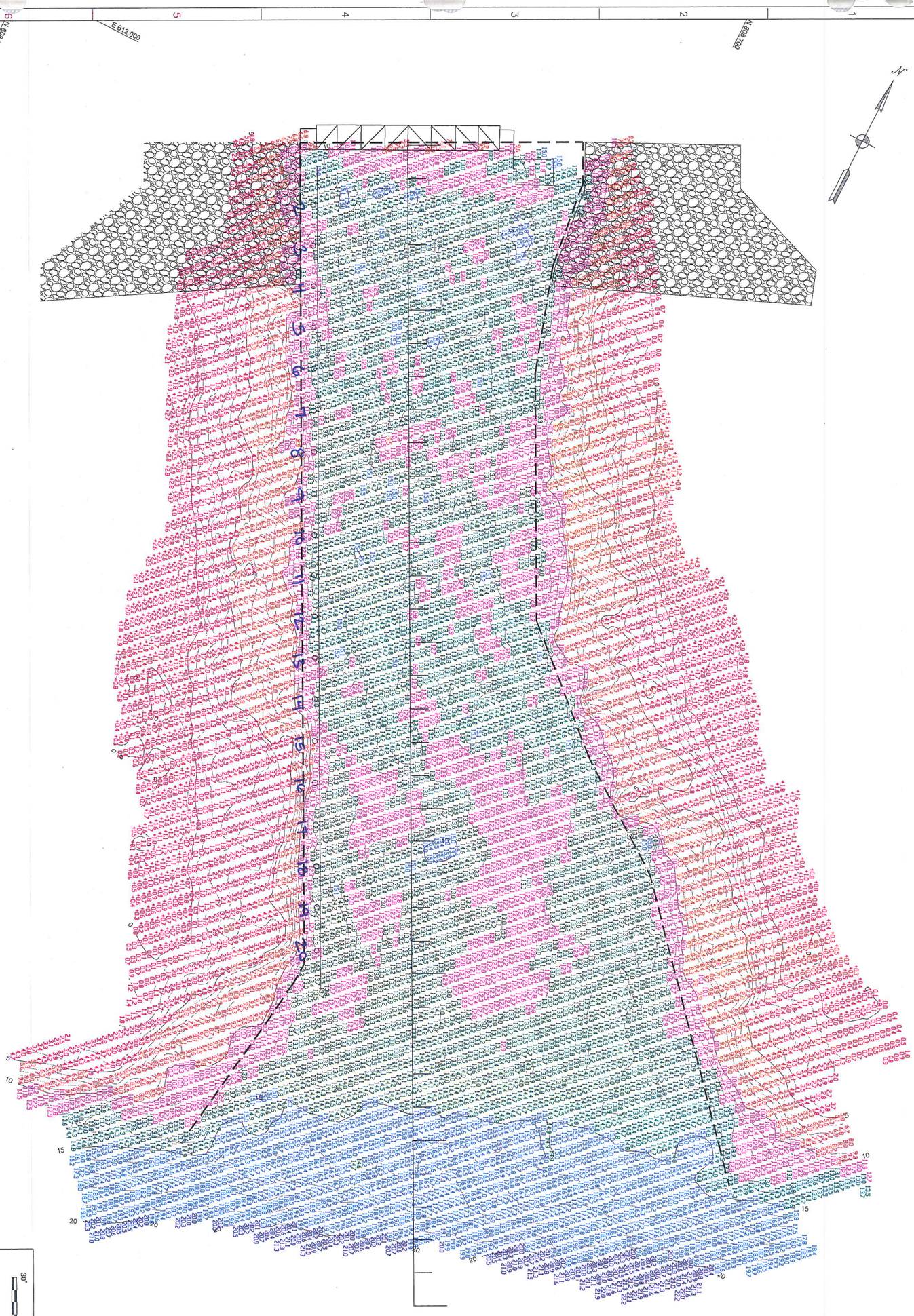
Kiewit

DESIGNED BY X.X.X
DRAWN BY X.X.X.
CHECKED BY X.X.X

SCALE AS NOTED
IF SHEET IS LESS THAN 22"x34" IT IS A REDUCED PRINT SCALE REDUCED ACCORDINGLY
DATE 12-28-11

Think! SAFETY BEGINS WITH ME

PROJECT TITLE: SR520 PONTOONS
PROJECT LOCATION: ABERDEEN, WA
JOB NO.
PROJECT TASK: Final Dredge Survey
DRAWING NO.
DRAWING SUBJECT
SHEET NO. 1 OF 1



IF SHEET IS OTHER THAN 22"X34" IT IS A REDUCED PRINT, SCALE ACCORDINGLY

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3)	13.0
4)	12.5
5)	12.5
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7)	13.1
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9)	13.7
10)	13.4
11)	13.7
12)	14.1
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14)	13.0
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16)	11.5
17)	13.0
18)	13.0
19)	14.2
20)	12.7
21)	13.7
22)	N/A

SHEET NUMBER S-2

SHEET 2 OF 2

SR 520 Pontoon Construction
Design-Build Project
ABERDEEN, WASHINGTON

CONDITION HYDROGRAPHIC SURVEY

FEBRUARY 2, 2012

SURVEY DATE: February 2, 2012
DRAWING DATE: February 3, 2012
DESIGNER:
CHECKED BY:
CONTRACTOR: Kiewit-General Contract #: 323-14285
DRAWING: GNRL_120202_Aberdeen_Pile_Drive

Color Legend

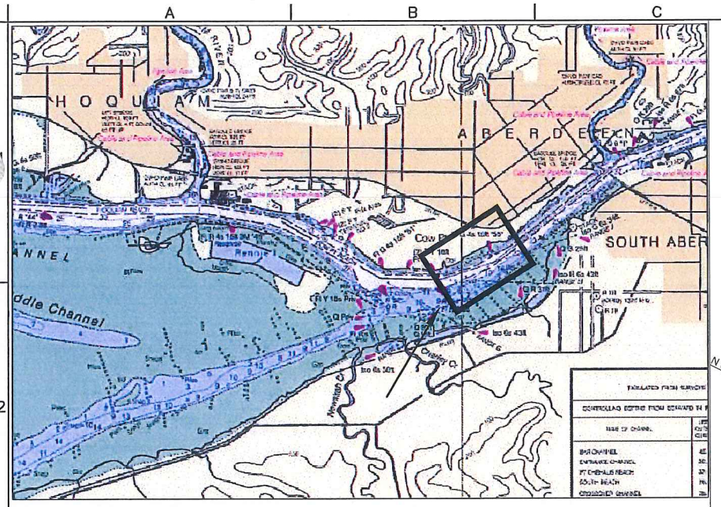
- < 5 MLLW
- 5 to 10 MLLW
- 10 to 13 MLLW
- 13 to 15 MLLW
- 15 to 20 MLLW
- > 20 MLLW

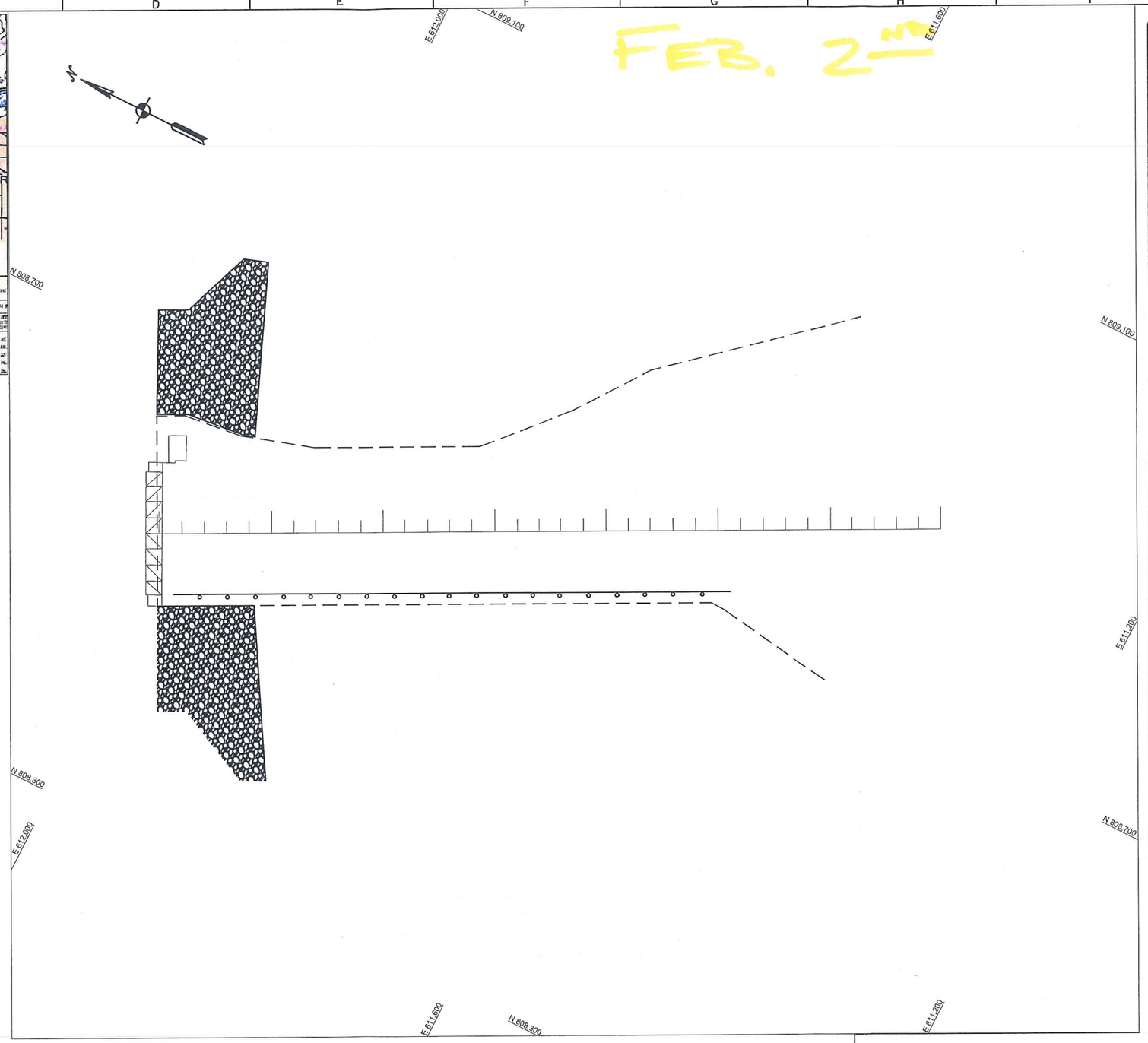
eTrac Engineering, LLC
www.etracengineering.com

637 LINDARO STREET
SUITE 100
SAN RAFAEL, CA 94901
415-462-0421

eTracEngineering.com

FEB. 2nd





NOTES:

1. Multi beam bathymetric survey conducted by eTrac Engineering, LLC
2. Survey Dates : February 2, 2012
3. Vertical datum is Mean Low Lower Water referenced to USACE tide board located on west end of terminal 4.
4. Horizontal Control "WSRN Corrections network".
5. Horizontal datum is NAD 83 projection to State Plane Coordinate System Washington State, South Zone (4602).
6. Grid Units - U.S. Feet
7. Soundings represented in U.S. Survey Feet
8. Bathymetric data is valid only within the time in which it was collected
9. Standard field calibration procedures were performed.

EQUIPMENT

1. Survey Vessel - "Especial"
2. POSMV Wavemaster - Position, Heave, Pitch and Roll
3. R2Sonic 2024 - Multi beam Echo Sounder (200 KHz)
4. Odom Digibar - Velocity Profiler
5. Qinsy v.8.0 - Acquisition Software

SR 520 Pontoon Construction Design-Build Project

50' 0 50' 100' 150'
SCALE : 1" = 50'

IF SHEET IS OTHER THAN 22"X34" IT IS A REDUCED PRINT, SCALE ACCORDINGLY

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SAN RAFAEL, CA 94901
415-462-0421
eTracEngineering.com

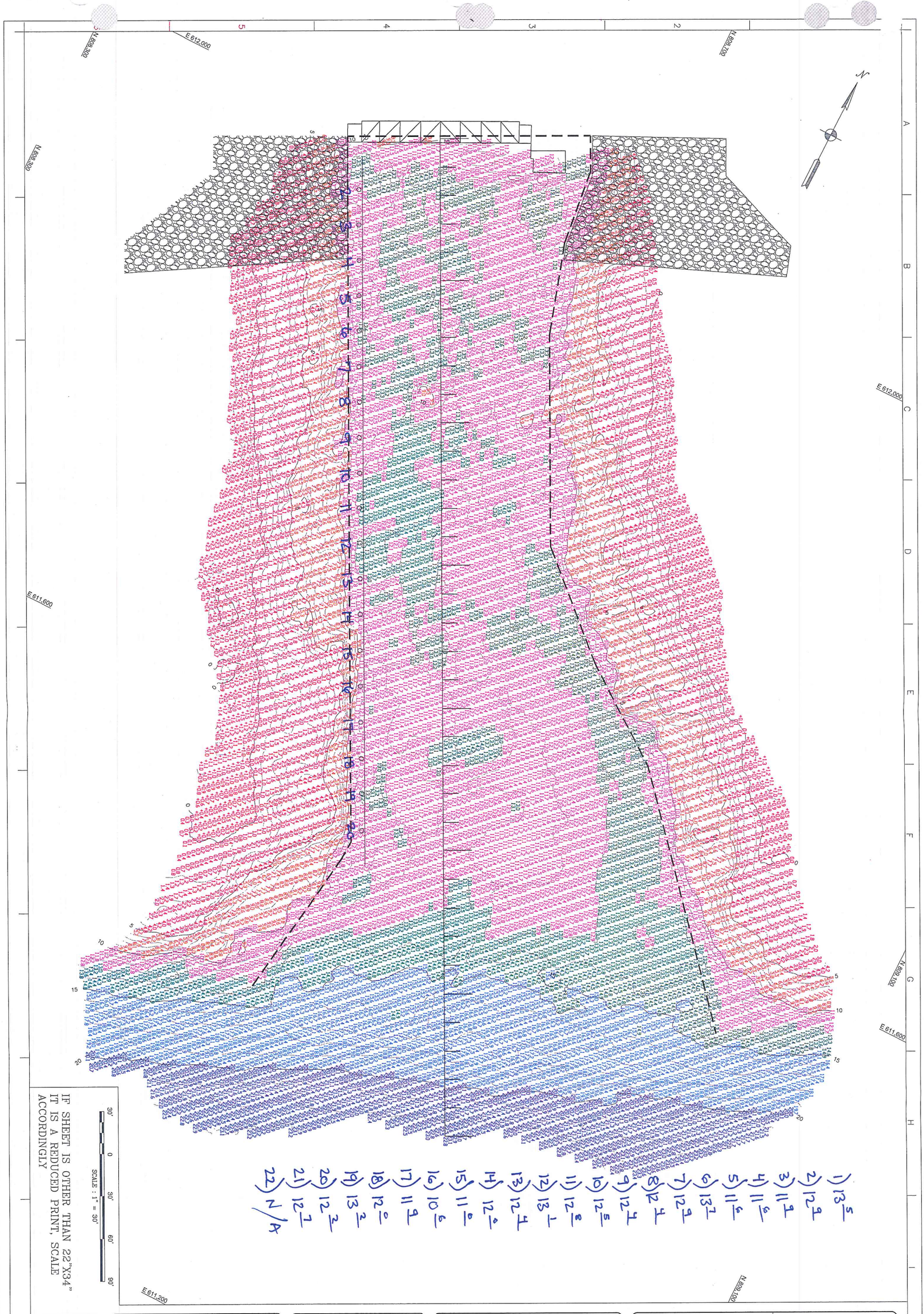
eTrac Engineering, LLC
www.etracengineering.com

Color Legend

SURVEY DATE: February 2, 2012
DRAWING DATE: February 3, 2012
DESIGNER: SBM CHECKED BY:
CONTRACTOR: Kiewit-General Contract #: 323-14285
DRAWING: GNRL_120202_Aberdeen_Pile_Drive

SR 520 Pontoon Construction
Design-Build Project
ABERDEEN, WASHINGTON
CONDITIONAL HYDROGRAPHIC SURVEY
FEBRUARY 2, 2012

SHEET NUMBER
S-1
SHEET 1 OF 2



IF SHEET IS OTHER THAN 22"X34" IT IS A REDUCED PRINT, SCALE ACCORDINGLY

SHEET NUMBER S-2 SHEET 2 OF 2

SR 520 Pontoon Construction Design-Build Project
ABERDEEN, WASHINGTON

CONDITION HYDROGRAPHIC SURVEY

May 4, 2012

SURVEY DATE: May 4, 2012
DRAWING DATE: May 4, 2012
DESIGNER:
CHECKED BY:
CONTRACTOR: Kiewit-General Contract #: 323-14285
DRAWING: GNRL_120504_Aberdeen_Pile_Drive

Color Legend
- < 5 MLLW
- 5 to 10 MLLW
- 10 to 13 MLLW
- 13 to 15 MLLW
- 15 to 20 MLLW
- > 20 MLLW

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SUITE 100
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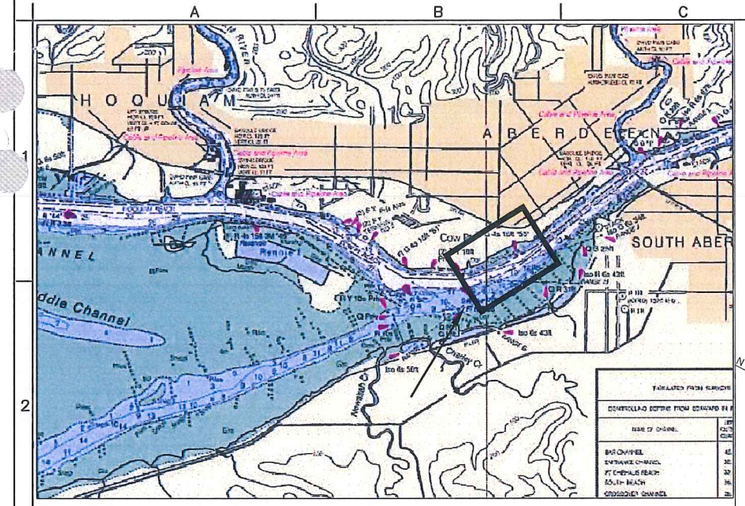
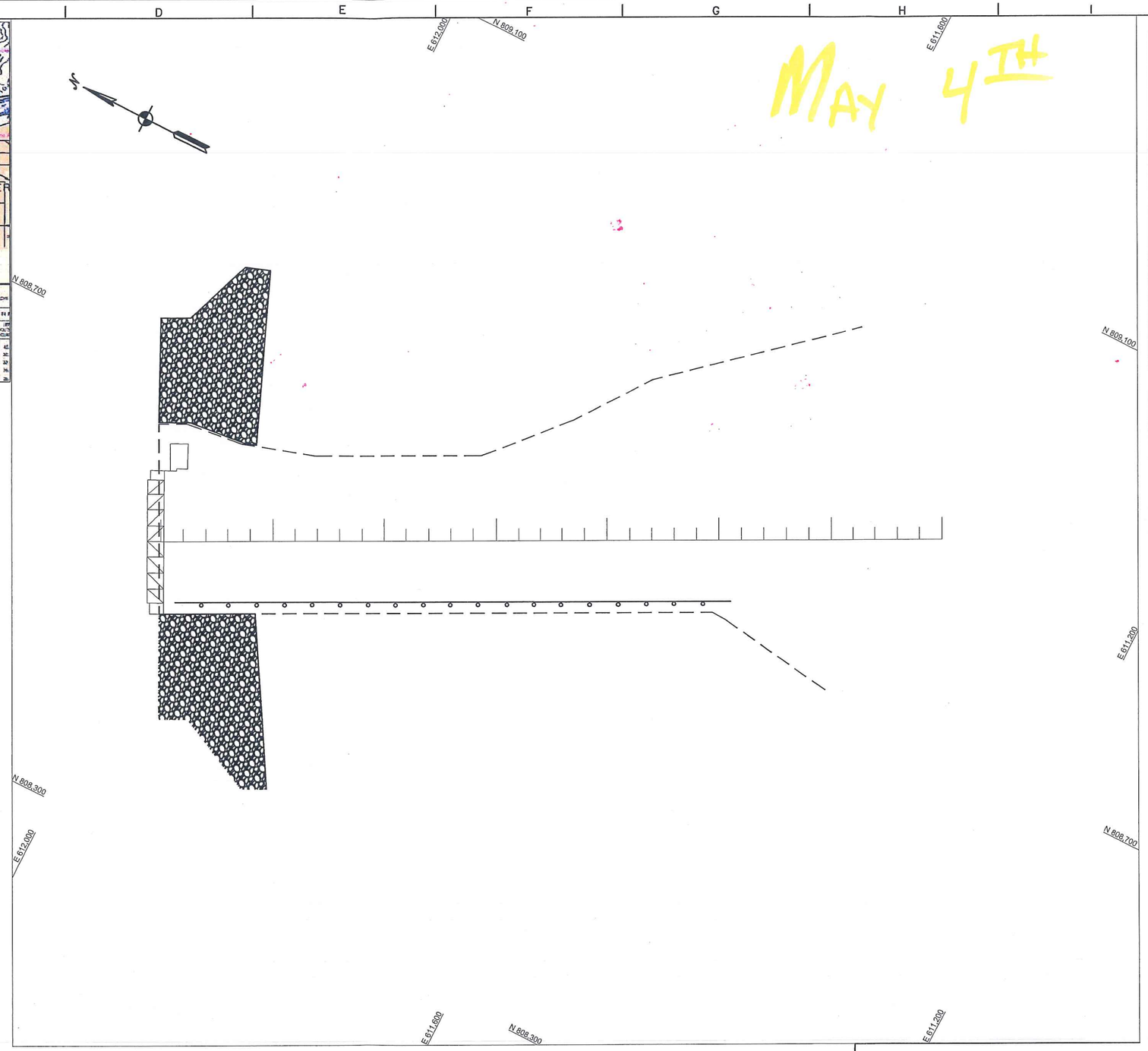
eTracEngineering.com





MAY 4TH

NOTES:

1. Multi beam bathymetric survey conducted by eTrac Engineering, LLC
2. Survey Dates : May 4, 2012
3. Vertical datum is Mean Low Lower Water referenced to USACE tide board located on west end of terminal 4.
4. Horizontal Control "WSRN Corrections network".
5. Horizontal datum is NAD 83 projection to State Plane Coordinate System Washington State, South Zone (4602).
6. Grid Units - U.S. Feet
7. Soundings represented in U.S. Survey Feet
8. Bathymetric data is valid only within the time in which it was collected
9. Standard field calibration procedures were performed.

EQUIPMENT

1. Survey Vessel - "Especial"
2. POSMV 320 - Position, Heave, Pitch and Roll
3. R2Sonic 2022 - Multi beam Echo Sounder (200 KHz)
4. Valeport - Velocity Profiler
5. Qinsy v.8.0 - Acquisition Software

SR 520 Pontoon Construction Design-Build Project

50' 0 50' 100' 150'
SCALE : 1" = 50'

IF SHEET IS OTHER THAN 22"X34" IT IS A REDUCED PRINT, SCALE ACCORDINGLY

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SUITE 100
SAN RAFAEL, CA 94901
415-462-0421
eTracEngineering.com

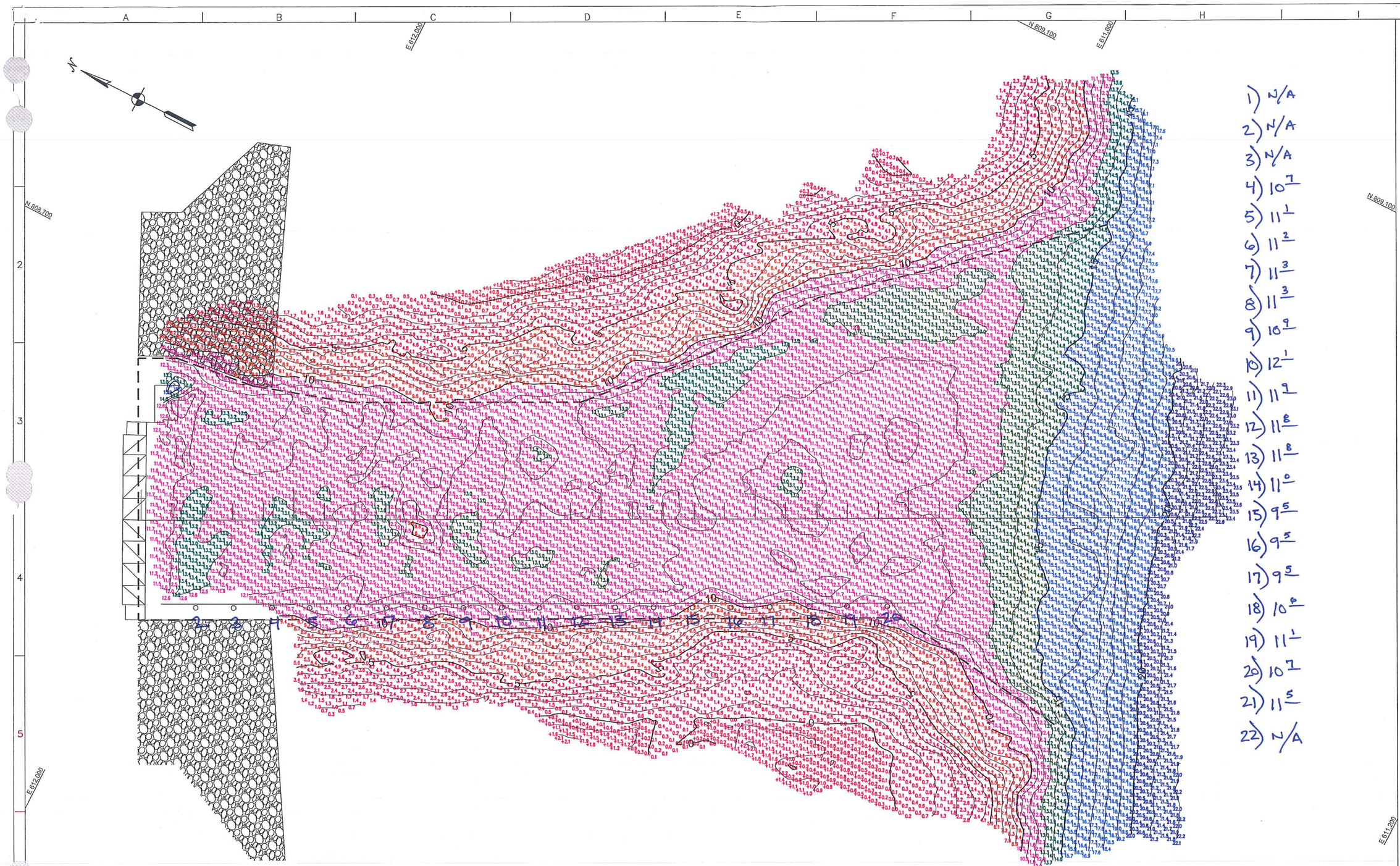
eTrac Engineering, LLC
www.etracengineering.com

Color Legend

SURVEY DATE: May 4, 2012
DRAWING DATE: May 4, 2012
DESIGNER: SBM CHECKED BY:
CONTRACTOR: Kiewit-General Contract #: 323-14285
DRAWING: GNRL_120504_Aberdeen_PFile_Drive

SR 520 Pontoon Construction
Design-Build Project
ABERDEEN, WASHINGTON
CONDITIONAL HYDROGRAPHIC SURVEY
May 4, 2012

SHEET NUMBER
S-1
SHEET 1 OF 2



5'x5' SOUNDINGS GENERATED BY INTERPOLATION BETWEEN SINGLEBEAM SURVEY LINES

30' 0 30' 60' 90'

SCALE : 1" = 30'

IF SHEET IS OTHER THAN 22"X34" IT IS A REDUCED PRINT, SCALE ACCORDINGLY

637 LINDARO STREET
SUITE 100
SAN RAFAEL, CA 94901
415-462-0421
eTracEngineering.com

eTrac Engineering, Inc.

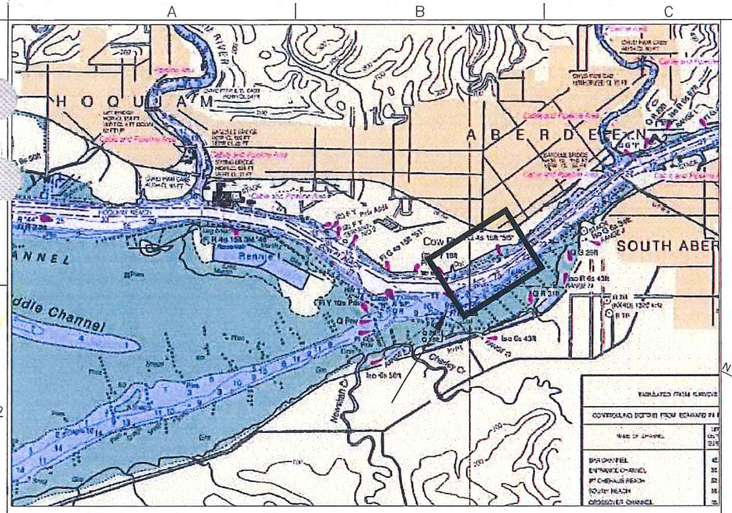
Color Legend

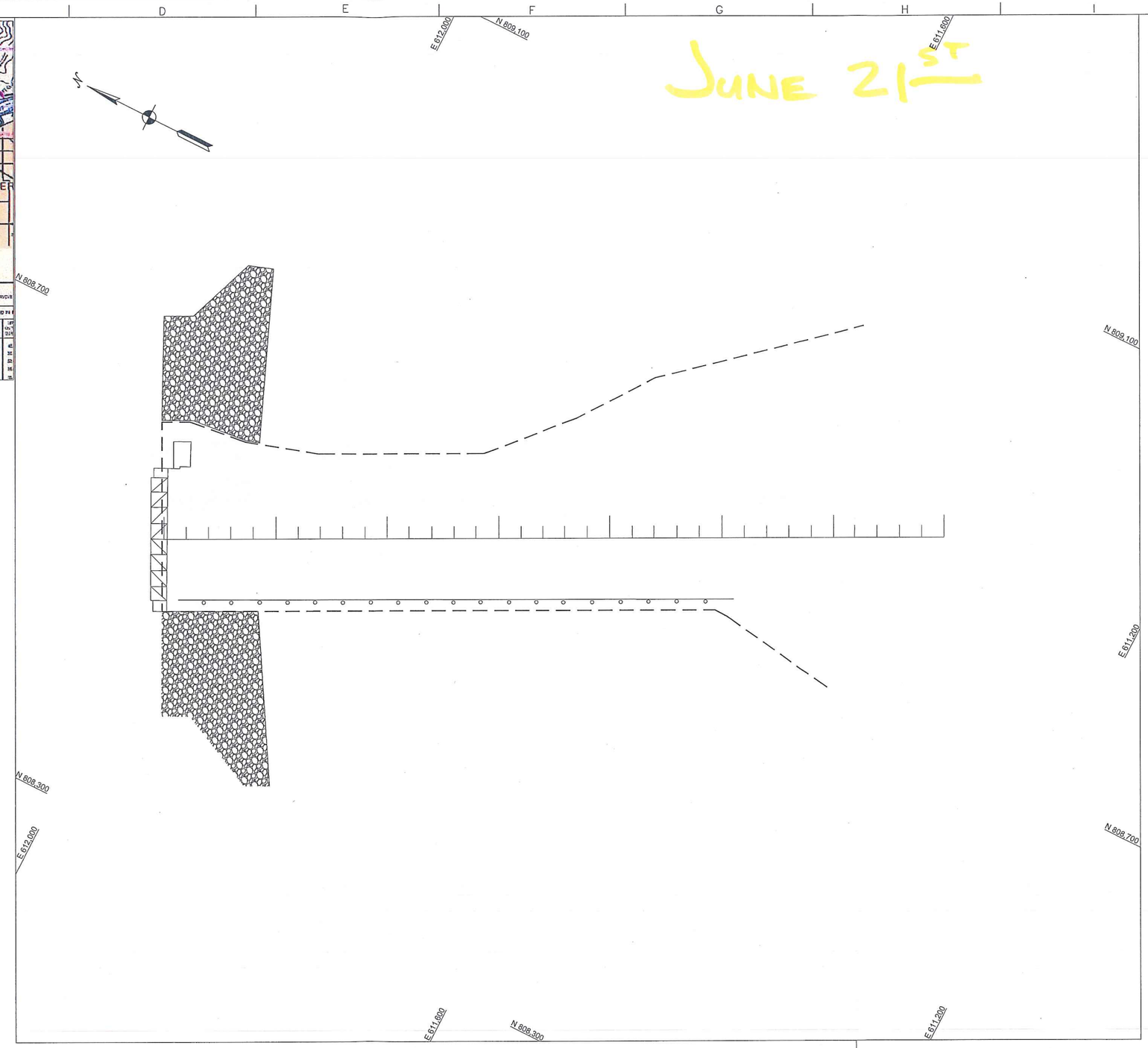
< 5 MLLW	5 to 10 MLLW	10 to 13 MLLW	13 to 15 MLLW	15 to 20 MLLW	> 20 MLLW

SURVEY DATE: June 21, 2012
DRAWING DATE: June 22, 2012
DESIGNER: JDM
CHECKED BY:
CONTRACTOR: Kiewit-General
Contract #: 323-1426S
DRAWING: GNRL_120621_Aberdeen_Pile_Drive

SR 520 Pontoon Construction
Design-Build Project
ABERDEEN, WASHINGTON
CONDITION HYDROGRAPHIC SURVEY
June 21, 2012

SHEET NUMBER
S-3
SHEET 3 OF 3





JUNE 21ST

NOTES:

1. Singlebeam bathymetric survey conducted by eTrac Engineering, Inc
2. Survey Dates : June 21, 2012
3. Vertical datum is Mean Lower Low Water referenced to USACE tide board located on west end of terminal 4.
4. Horizontal Control "WSRN Corrections network".
5. Horizontal datum is NAD 83 projection to State Plane Coordinate System Washington State, South Zone (4602).
6. Grid Units - U.S. Feet
7. Soundings represented in U.S. Survey Feet
8. Bathymetric data is valid only within the time in which it was collected
9. Standard field calibration procedures were performed.

EQUIPMENT

1. "Especial" - Survey Vessel
2. Trimble SPS461 - Position
3. Odom 3 Degree Transducer with CV300 - Singlebeam Echo Sounder (200 KHz)
4. AML Minos X - Sound Velocity Profiler
5. Hypack 2011 - Acquisition Software

SR 520 Pontoon Construction Design-Build Project

50' 0 50' 100' 150'
SCALE : 1" = 50'

IF SHEET IS OTHER THAN 22"X34" IT IS A REDUCED PRINT, SCALE ACCORDINGLY

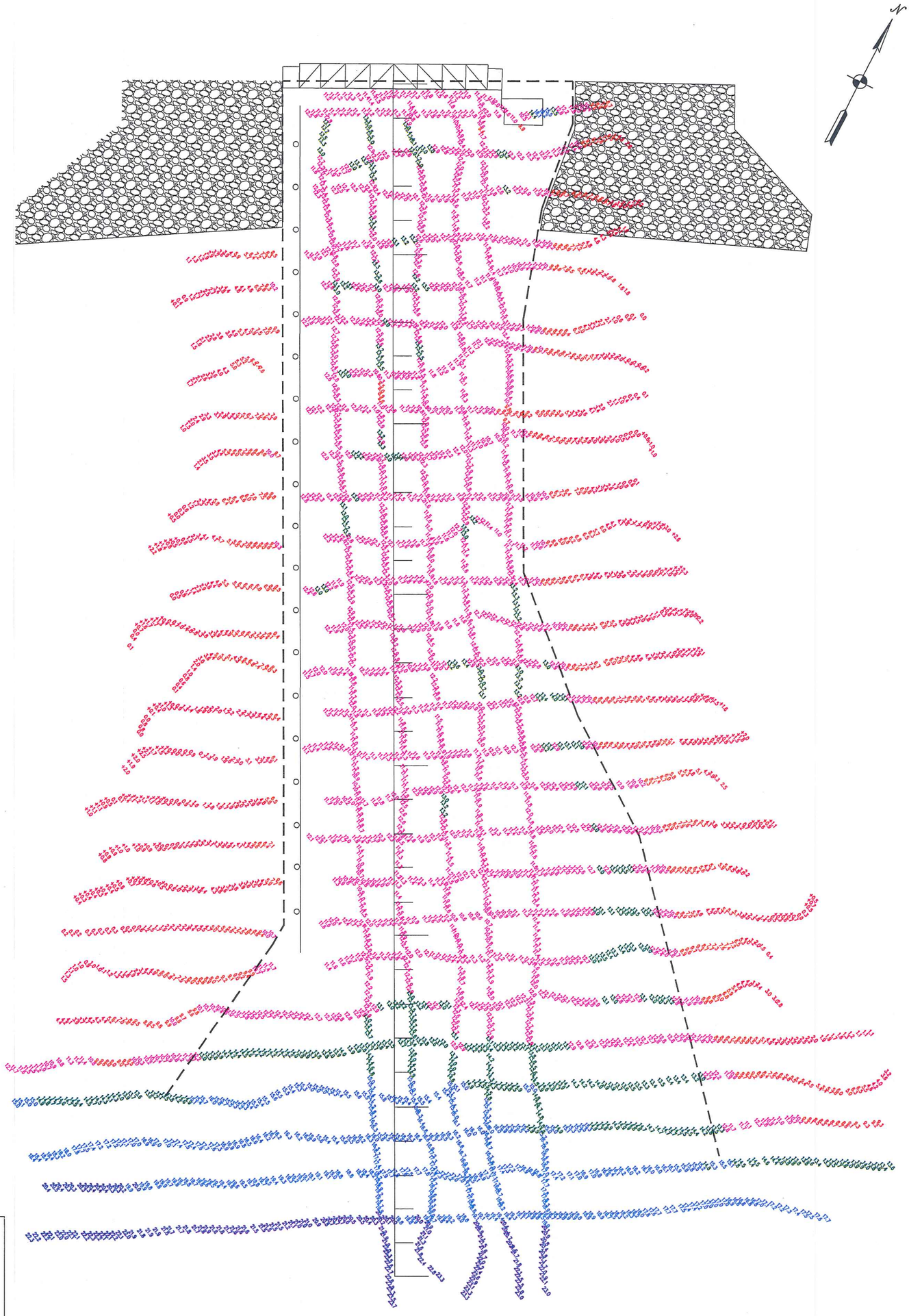
637 LINDARO STREET
SUITE 100
SAN RAFAEL, CA 94901
415-462-0421
eTracEngineering.com

eTrac Engineering, Inc.

SURVEY DATE: JUNE 21, 2012
DRAWING DATE: JUNE 22, 2012
DESIGNER: JDM CHECKED BY:
CONTRACTOR: Hewitt-General Contract #: 323-14285
DRAWING: GNRL_120621_Aberdeen_Pile_Drive

SR 520 Pontoon Construction
Design-Build Project
ABERDEEN, WASHINGTON
CONDITIONAL HYDROGRAPHIC SURVEY
JUNE 21, 2012

SHEET NUMBER
S-1
SHEET 1 OF 3



IF SHEET IS OTHER THAN 22"X34"
IT IS A REDUCED PRINT, SCALE
ACCORDINGLY

SHEET NUMBER
S-2
SHEET 2 OF 3

SR 520 Pontoon Construction
Design-Build Project
ABERDEEN, WASHINGTON

CONDITION HYDROGRAPHIC SURVEY

June 21, 2012

SURVEY DATE: June 21, 2012
DRAWING DATE: June 22, 2012
DESIGNER:
CHECKED BY:
CONTRACTOR: Kiewit-General
Contract #: 323-14285
DRAWING: GNRL_120621_Aberdeen_Pile_Drive

Color Legend

< 5 MLLW	13 to 15 MLLW
5 to 10 MLLW	15 to 20 MLLW
10 to 13 MLLW	> 20 MLLW

eTrac Engineering, Inc.
637 LINDARO STREET
SUITE 100
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415-462-0421
eTracEngineering.com

1.1.3 Launch Channel Dredging

The footprint of the launch channel dredging and construction is shown in Figure 1.4. The bottom of the launch channel will be approximately 138 feet wide, approximately 430 feet long, and approximately 13 feet below MLLW; plus 2 feet over dredge (i.e., an additional 2 feet of sediment removal). The bottom of the launch channel widens at the navigational channel to a width of 310 feet. Additional width will be needed for side slopes of 3:1. At 3:1, the two resulting side-slope areas (in plan view) measure approximately 100 feet wide at the shoreline and taper to 60 feet wide at the navigation channel. Initially upland excavation will commence in the area where the gate will be located, approximately 150 feet from the shoreline. This area of excavation will remain isolated from the water until later controlled connection is established with the waterward portion of the launch channel.

The waterward portion of the launch channel will be dredged separately from the landward launch channel excavation. The overall waterward footprint will be approximately 125,000 SF and will require the excavation of approximately 87,000 cubic yards of sediment, as shown in the project Joint Aquatic Resources Permit Application (JARPA). The launch channel sediment DMMP suitability determination for open-water disposal includes a dredge volume of up to 95,900 cubic yards of substrate (DMMO 2010). The suitability determination dredge volume includes the 2 feet of over-dredge, and includes the larger channel width to the project Area Impact Line (DMMO 2010).

The sediments in the Aberdeen Log Yard site launch channel have been characterized according to the DMMP procedures and have been approved for unconfined open-water disposal (DMMO 2010). The sediments will be barged to and disposed of at the approved Point Chehalis and/or South Jetty dispersive open-water disposal site(s) located near the mouth of Grays Harbor. The disposal sites are managed by the WDNR. Disposal at the open-water disposal sites will be conducted in accordance with procedures approved by the WDNR under the Site Use Authorization process.

Maintenance dredging will occur up to five times, in advance of each pontoon launching event, and may remove 2 to 5 feet of naturally deposited sediment. This is an approximate dredged material volume range of 13,000 CY to 25,000 CY, per dredge event if sediment deposition is heavy between launch events. Maintenance dredging will be confined to the existing launch channel dredge footprint, as evaluated and approved by the DMMO agencies. The additional maintenance dredging events are included in the DMMP suitability determination for open-water disposal (DMMO 2010).

1st Maintenance Dredge

Date: May 19, 2013
To: Bradley Morlock, Drew Carter, Kiewit General
From: David Hericks, HydroGraphix LLC
Subject: SR520 Pontoon Construction, Launch Channel 16 May 2013 Post-dredge survey volumes.

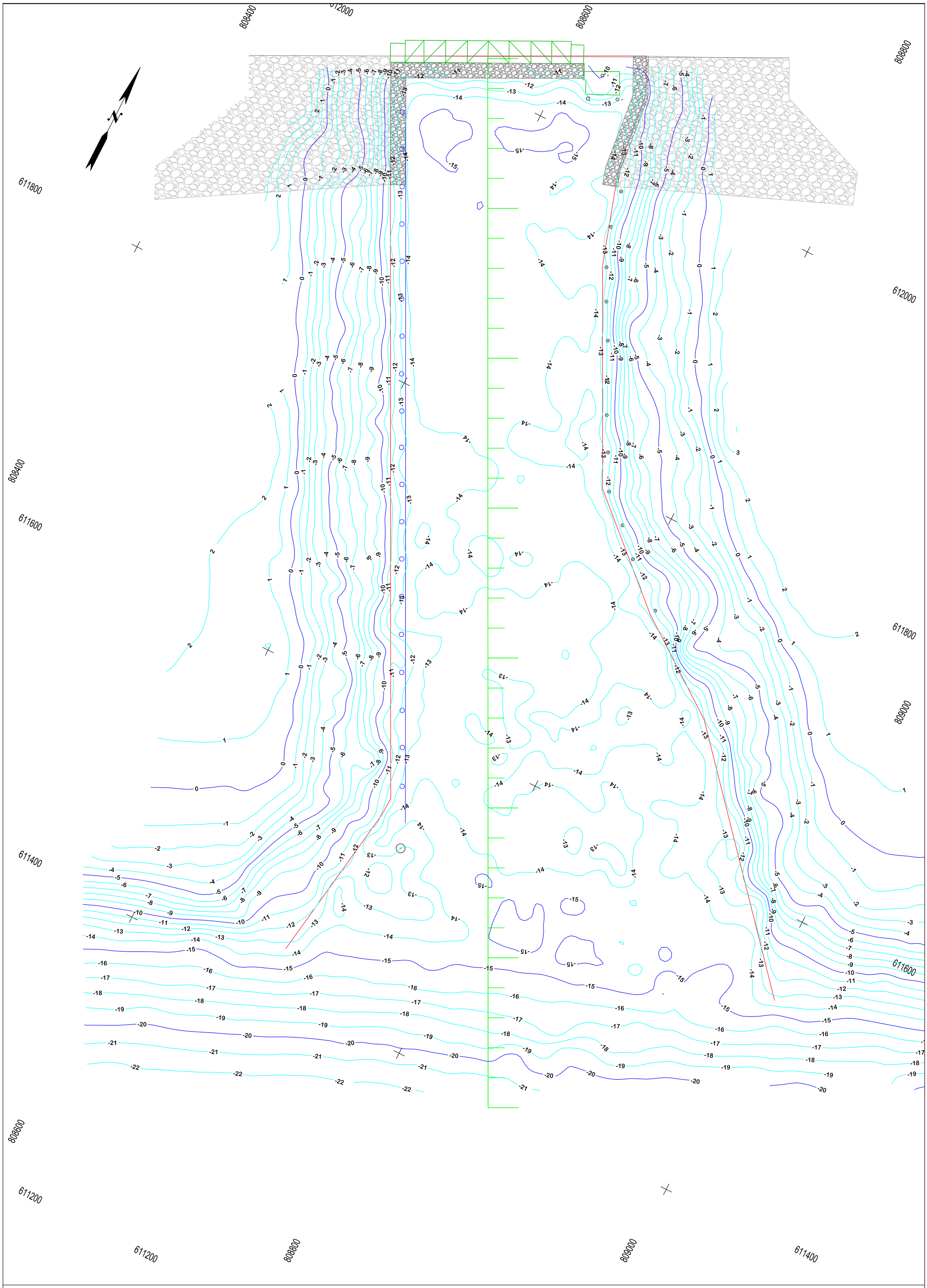
The computed volume of material removed between the 25 March pre-dredge survey and the 16 May post-dredge survey has been determined using surface subtraction methods in AutoCAD Civil 3D 2012 and in Golden Software "Surfer" surface and volume analysis software.

The total volumes for "cut" material between the 25 March pre-dredge and the 16 May Post-Dredge survey were 19,561 cu yds (AutoCAD Civil3D) and 19,629 cu yds (Surfer) .

This actual dredged volume compares well with previously computed "design" volume of 19281 cu yds. to achieve a design depth of -13 MLLW and 5:1 side slope>

If you have any further questions please feel free to contact me.

David B Hericks
Oceanographer/Hydrographer
HydroGraphix LLC
10516 NE 135th Lane
Kirkland, WA 98034
206.601.0187
hydrographix@earthlink.net



NOTES:

Scale 1:360
15 0 30 60 90
(feet)

Survey Datum	
Datum	Description
Ellipsoid	WGS84 NAD83/91
Projection	WA SPCS South(4602)
Horiz.Units	US Survey feet
Vert. Datum	Project MLLW (NGVD+4.78')
Vert.Corr	MLLW = NAVD88+1.506
Vert. Units	US Survey feet

Sheet 1 of 2

File No.

HydroGraphiX
10516 NE 135th Ln
Kirkland, WA 98034
206.601.0187
hydrographix@earthlink.net

SR 520 Pontoon Construction

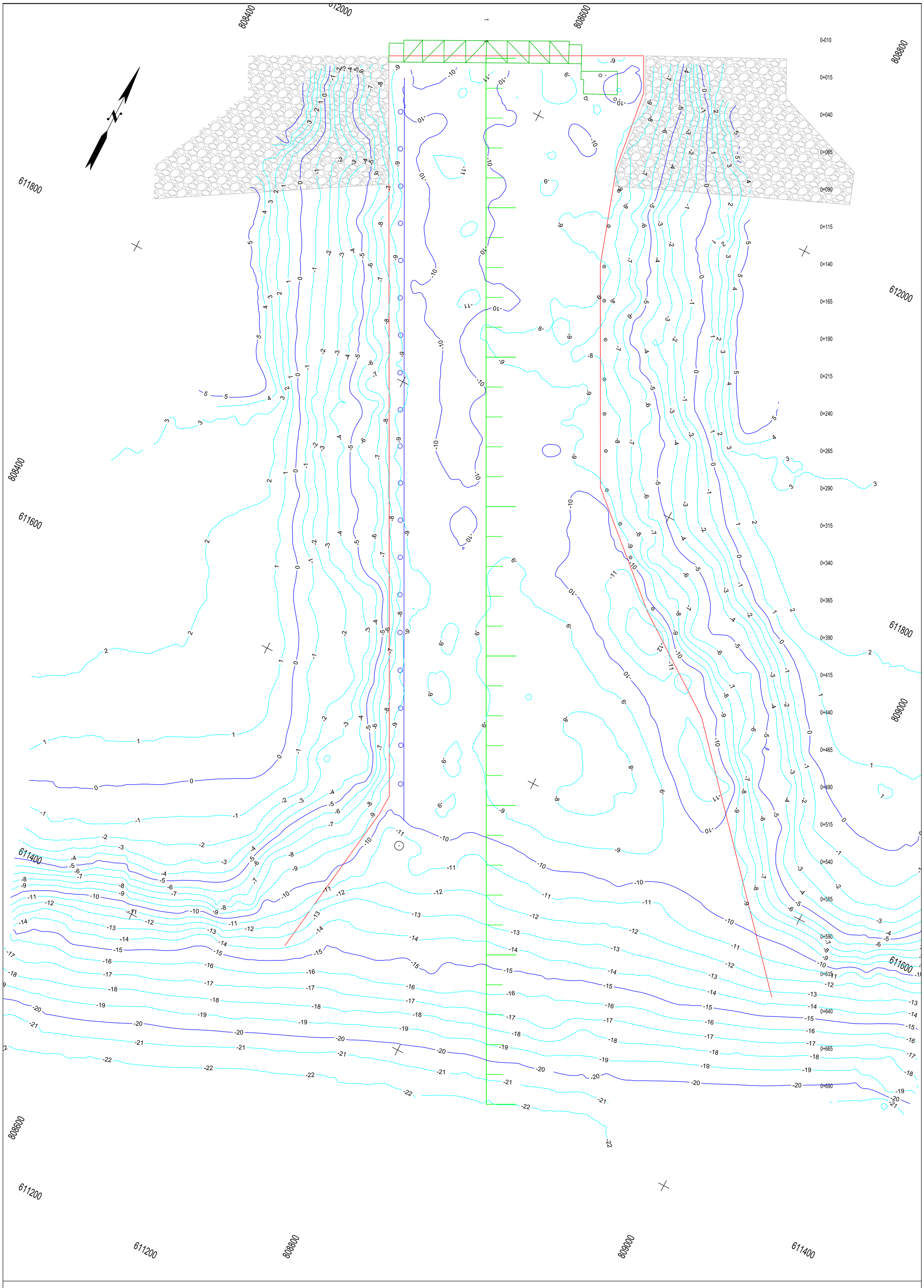
KIEWIT INFRASTRUCTURE WEST CO.
1301 West Heron St Aberdeen, WA 98520

Post-Dredge Survey Contours
May 16, 2013

Surveyor: D. Hericks 05/16/13
Drawn DBH 5/19/13
Checked

Approved _____ Date ____
Title _____ Job Class ___

C:\Users\dbhericks\Documents\0PROJECTS\SR520 -Aberdeen\Acad\KiewitPostDredgeWorking19MAY13.dwg



NOTES:

Scale 1:360

15 0 30 60 90

(feet)

Survey Datum	
Datum	Description
Ellipsoid	WGS84 NAD83/91
Projection	WA SPCS South(4602)
Horiz.Units	US Survey feet
Vert. Datum	Project MLLW (NGVD+4.78')
Vert.Corr	MLLW = NAVD88+1.506
Vert. Units	US Survey feet

Sheet of 2

File No. 25MAR13PreDredge.DWG

HydroGraphiX
10516 NE 135th Ln
Kirkland, WA 98034
206.601.0187
hydrographix@earthlink.net

SR 520 Pontoon Construction

KIEWIT INFRASTRUCTURE WEST CO.

1301 West Heron St Aberdeen, WA 98520

Pre-Dredge Survey Contours
March 25, 2013

Surveyor:	D. Hericks	03/25/13
Drawn	DBH	3/29/13
Checked		

Approved _____ Date ____

Title _____ Job Class ___

2nd Maintenance Dredge

TETRA TECH

MEMO

To:	Michael Schmidt, Kiewit General
Cc:	
From:	David Hericks, Tetra Tech, Inc
Date:	31 March, 2014
Subject:	SR520 Pontoon Construction, Launch Channel 22 March 2014 Post-dredge Survey Volumes

Tetra Tech conducted a pre-dredge survey on 13 March, 2014 and a post-dredge survey on 22 March, 2014. Table 1 contains the computed volumes between the 13 March, 2014 pre-dredge survey for both the design channel and the 22 March, 2013 Post-dredge survey. The surveys were conducted with a dual-head Reson 7125 multibeam echosounder system with real-time kinematic (RTK) GPS positioning (+/-<0.1m accuracy).

Volumes were determined using surface volume methods in AutoCAD Civil 3D. The design channel surface is one derived by HydroGraphix, based on the 2D AutoCAD file "Dredge Area 1.DWG" provided by Kiewit in WA State Plane South Zone horizontal coordinates. The State Plane coordinates of the dredge footprint in the drawing were checked against the published project coordinates in the "SR520 Pontoon Construction Project HCS and Launch Channel Drawings BH15A March4, 2011". Coordinate conversion was performed using the WSDOT Worksheet for converting State Plane coordinates to Project Datum "ALY Combined Factor Calculations.pdf". Corrections to MLLW project vertical datum were derived from on-site measured water surface elevations referenced to casting basin control point "30002" and RTK elevations in project datum at US Army Corps monument "Trust".

TABLE 1.

13 March 2014 Pre-Dredge Survey **22 March 2014 Post-Dredge Survey**	**Pre-Dredge Survey to Design Channel Volume**	**Pre-Dredge Survey to Post Dredge Survey Volume**
Launch Channel Volume	**Design Volume**	**Dredged Volume**
Channel Footprint to -13 MLLW	11276	10245
West Slope above 5:1 Design Slope	2800	-88
East Slope above 5:1 Design Slope	2068	325
Total Dredged Volume to -13 MLLW Channel Design	**16145**	**10482**
Over Dredge Volume		
Channel Footprint Over Dredge -13 to -15 MLLW	7910	5645
Side Slope Over Dredge (below 5:1 Design Slope)	0	362
Channel Footprint Super Grade (below -15 MLLW)	0	1002
Total Over Dredge Volume	**7910**	**7008**
Total Volume Change **Pre-Dredge vs. Design / Pre-Dredge vs. Post Dredge**	**24055**	**17490**

Tetra Tech Marine Mapping Group

19803 North Creek Parkway, Bothell, WA 98011
Tel 425.482.7600 Fax 425.482.7652 www.tetratech.com

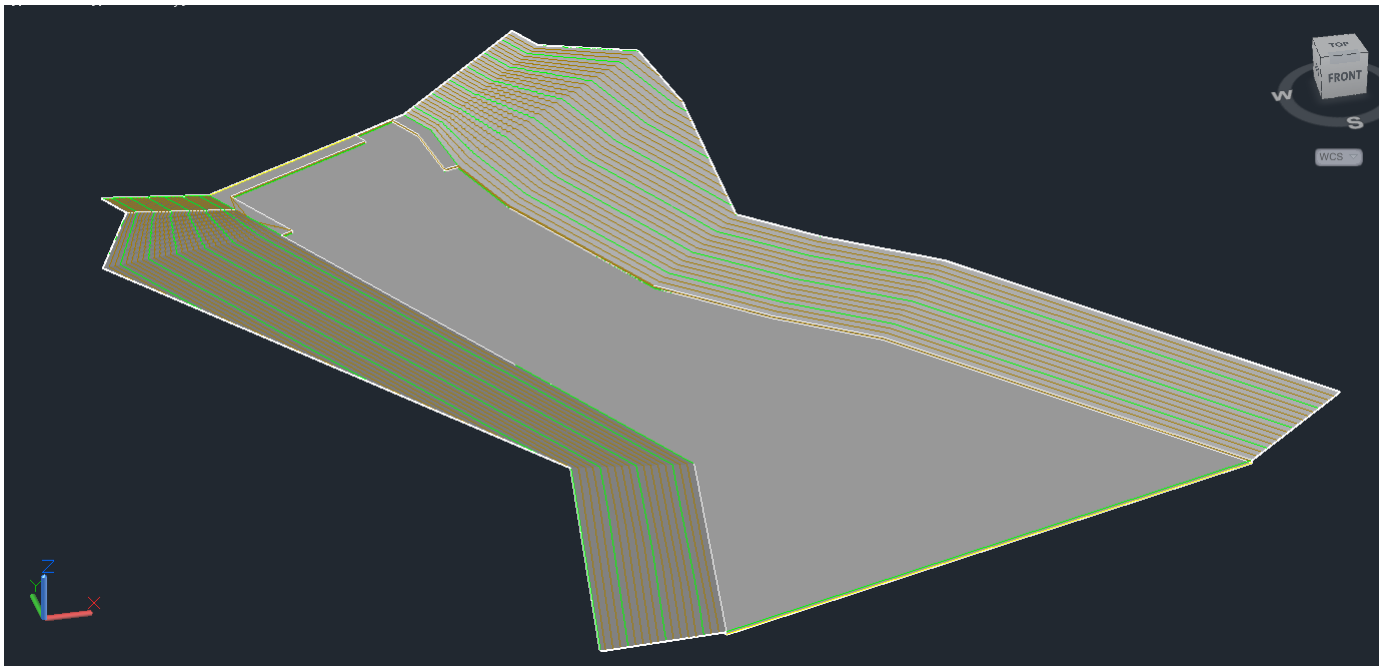


Figure 1. Design Channel Surface

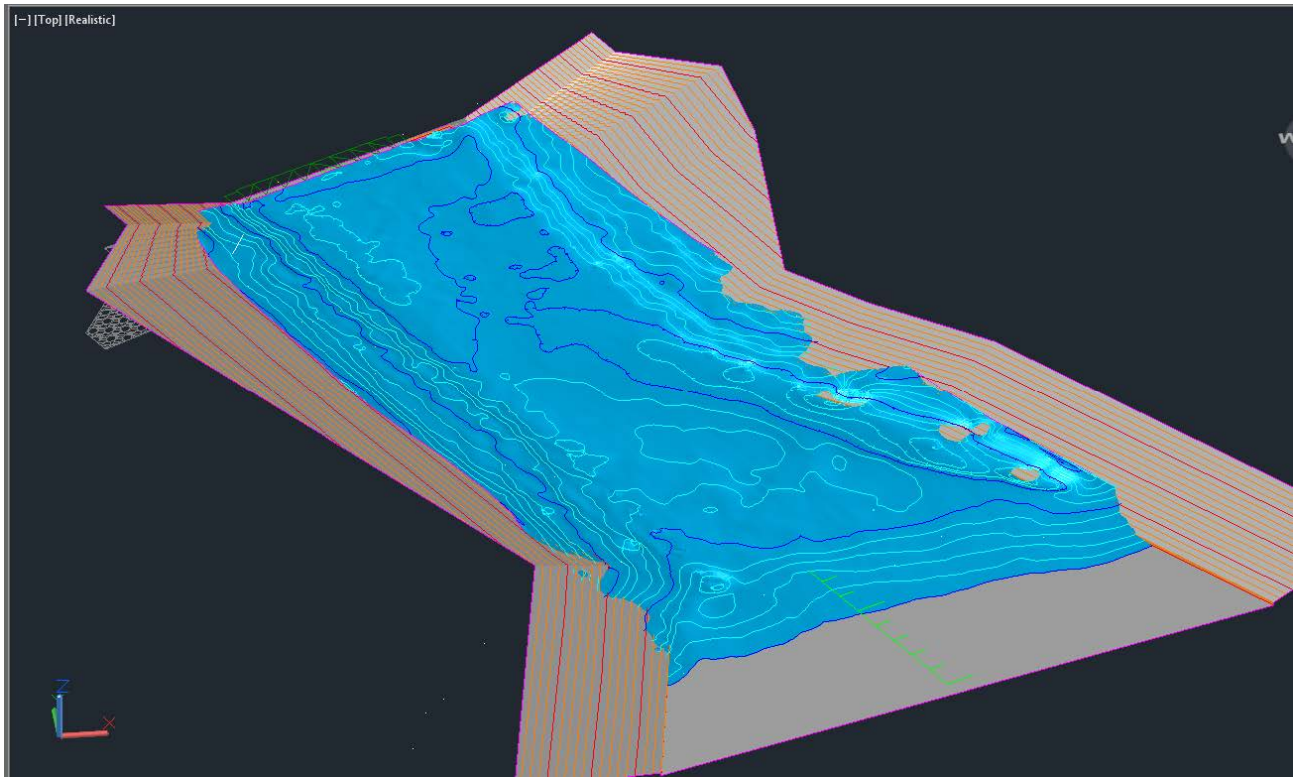


Figure 2 Design Channel Surface (Grey -13MLLW) with 13 Mar Pre-Dredge Survey Surface (Blue)

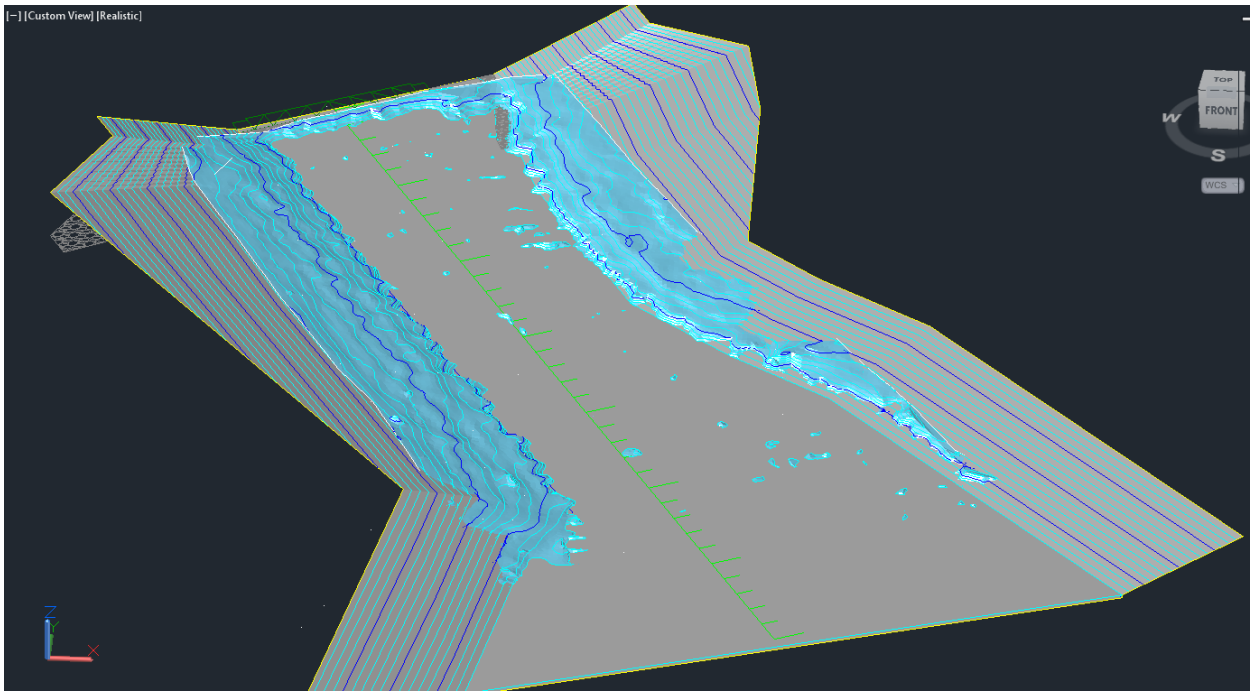


Figure 3 Design Channel Surface (Grey Bottom -13MLLW) with Post-Dredge Survey Surface (Blue)

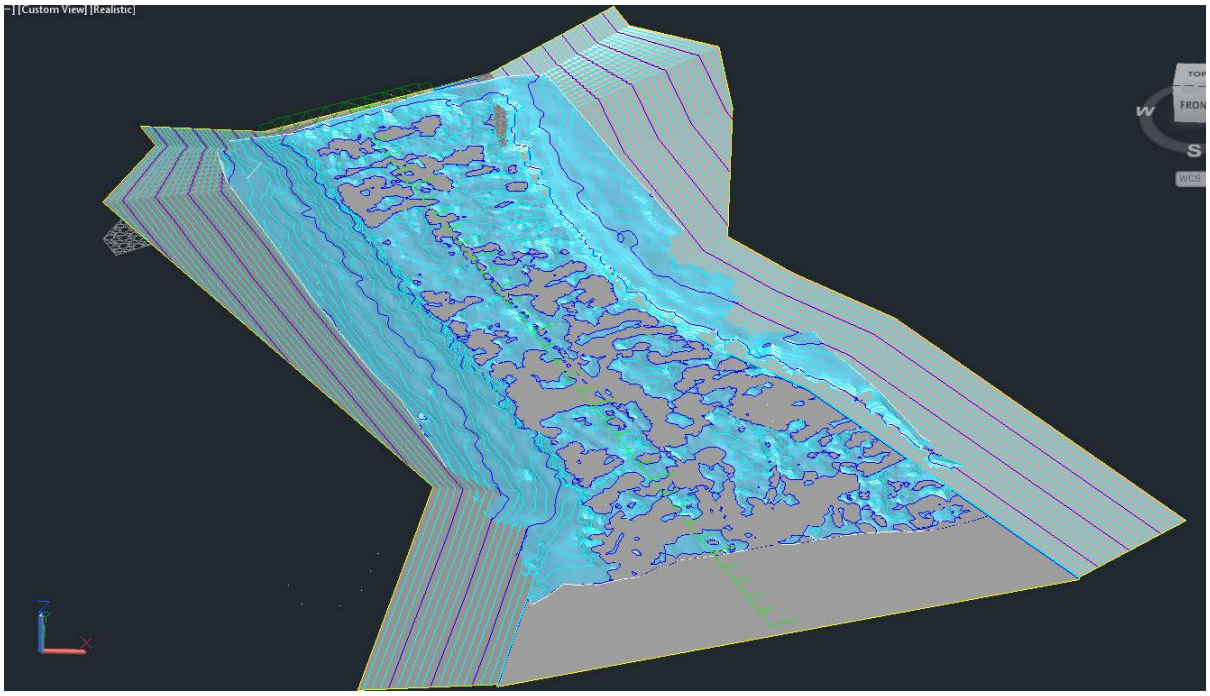


Figure 4 Design Over-dredge Surface (Grey Bottom -15MLLW) with Post-Dredge Survey Surface (Blue)

Two final drawing “C- size” plots of post-dredge elevations and spot elevations are included with this submittal. Additionally there is an “XYZ” file of the 2 x 2 foot grided survey surface. Survey coordinate system for XYZ file is Washington State Plane South Zone, NAD83/91, feet. Vertical datum is SR520 Pontoon construction MLLW “Project datum” , which is equivalent to NAVD88 +1.506 feet and City of Aberdeen vertical datum: NGVD29+4.78 feet.

If you have any questions please feel free to call me.

David B Hericks | **Senior Oceanographer / Hydrographer**
Tetra Tech Inc. | Marine Mapping Group
19803 North Creek Parkway, Bothell, WA 98011
Direct: 425.482.7625 | Fax: 425.482.7652 | Cell: 206.601.0187
David.Hericks@tetratech.com

TETRA TECH

MEMO

To:	Matthew DiCrescentis, Kiewit-General a Joint Venture
Cc:	
From:	David Hericks / Kyle Enright, Tetra Tech, Inc
Date:	4 March 2015
Subject:	SR520 Pontoon Construction, Launch Channel 25 February 2015 Post-dredge Survey Volumes

Tetra Tech conducted a pre-dredge hydrographic survey of the SR520 pontoon project launch channel on 18 February, 2015 and a post-dredge survey on 25 February 2015. The survey provided 100% multibeam coverage of the launch channel and was conducted with RESON SeaBat 7125 SV1 multibeam echosounder system, POS-MV inertial-aided motion reference system and real-time kinematic (RTK) GPS positioning (+/-<0.05m 3D accuracy).

Survey data were processed and output as a 2-foot by 2-foot gridded XYZ data file. Volumes were determined using two separate surface volume methods in AutoCAD Civil 3D. The primary method compares the pre and post-dredge surveys independently with the design channel surface, allowing the determination of volume from different vertical and horizontal positions of the dredge prism. The second method uses a direct comparison of pre-and post-dredge survey surfaces to determine the net volume change of the desired survey area within discrete horizontal boundaries.

Survey control are Washington State Plane, South zone horizontal coordinates referenced to the 2D launch channel base map provided by Kiewit in an AutoCAD file "*Dredge Area 1.dwg*". For quality control, the state plane coordinates of the dredge footprint outline in the attached drawings were converted from WSDOT project horizontal datum and checked against the published project coordinates in the Kiewit document "SR520 Pontoon Construction Project HCS and Launch Channel Drawings BH15A March4, 2011". Coordinate conversion was performed using the WSDOT worksheet for converting State Plane coordinates to Project Datum "ALY Combined Factor Calculations.pdf". Corrections to mean-lower-low-water (MLLW) project vertical datum were derived from on-site measured water surface elevations referenced to casting basin control point "30002" and RTK elevations in WSDOT MLLW project datum for the US Army Corps monument "Trust".

Tetra Tech Marine Mapping Group

19803 North Creek Parkway, Bothell, WA 98011
Tel 425.482.7600 Fax 425.482.7652 www.tetratech.com

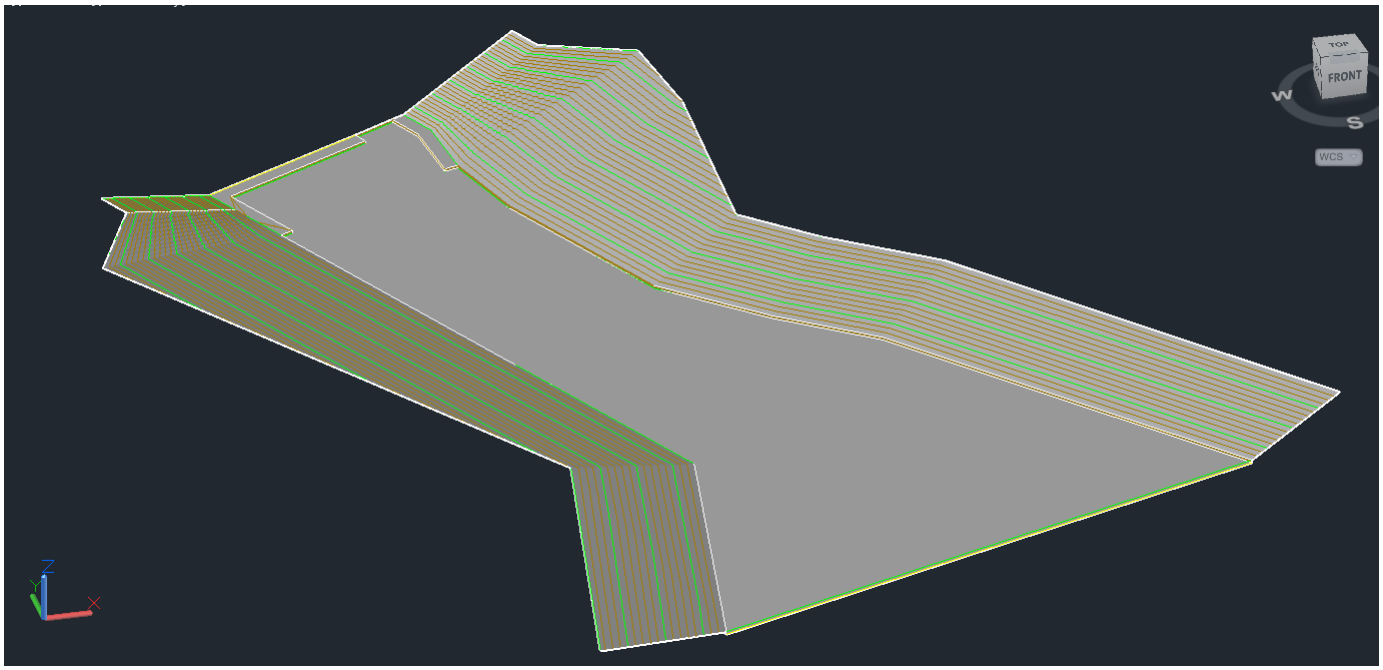


Figure 1. Design Channel Surface

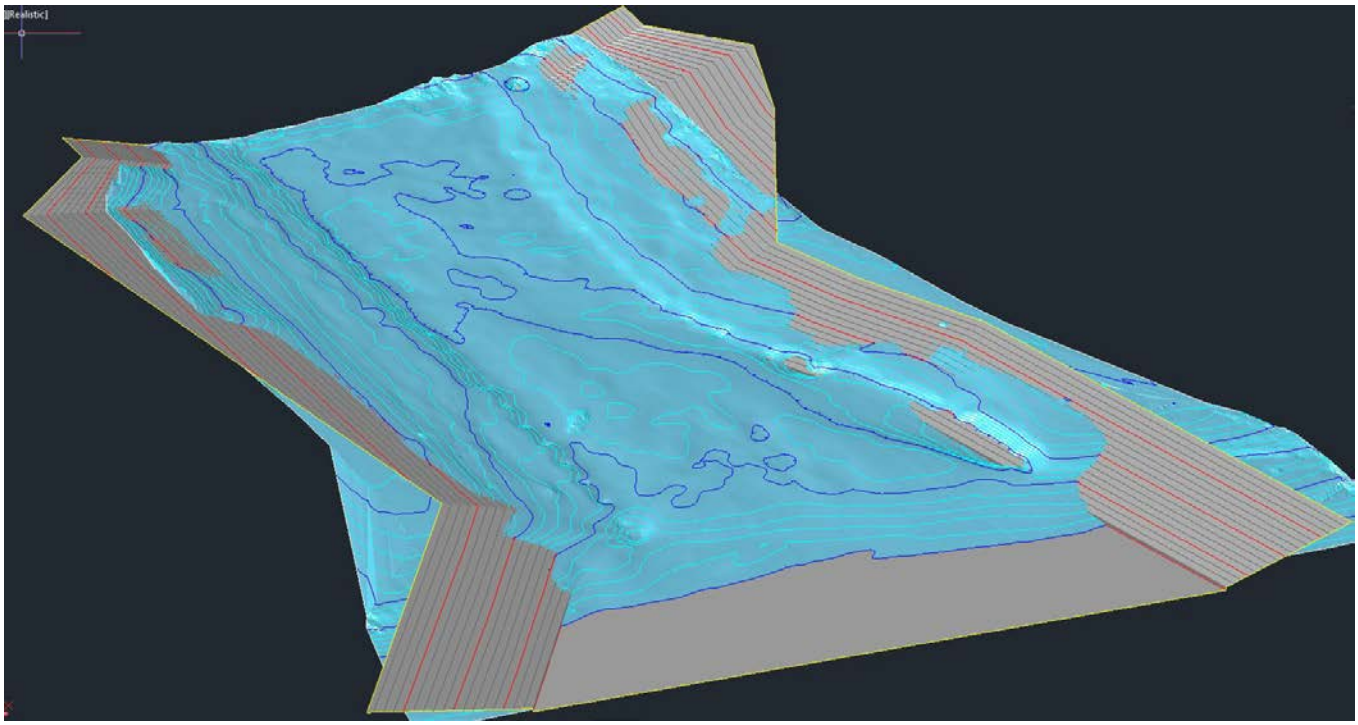


Figure 2 Design Channel Surface (gray) with bottom at -15 MLLW and 8 Feb Pre-Dredge Survey Surface (Blue)

Figure 2 shows the channel surface condition at the time of the survey on 18 February. The shoalest sediment in the channel were found in two “high-spots” rising above -9 feet MLLW (gray) and a large piece of submerged debris, with a top elevation of approximately -6 feet MLLW as depicted in Figure 3.

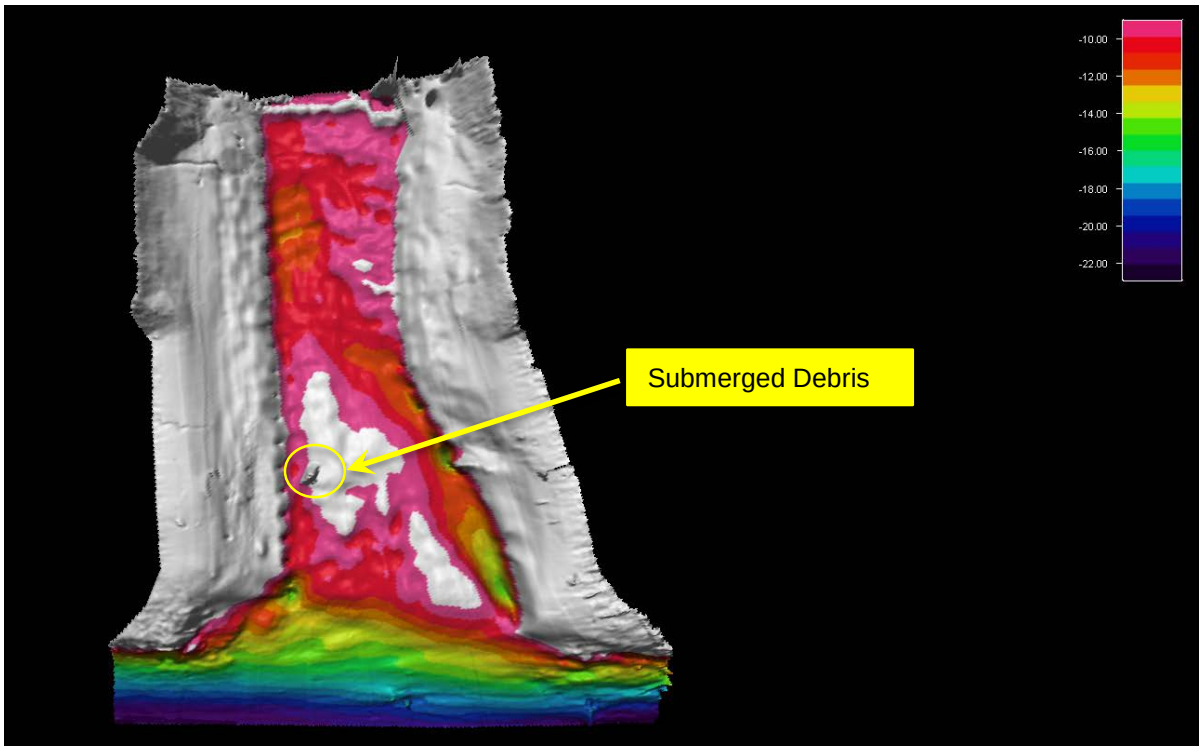


Figure 3.Overview of launch channel pre-dredge surface with elevations above -9 MLLW shown in gray.

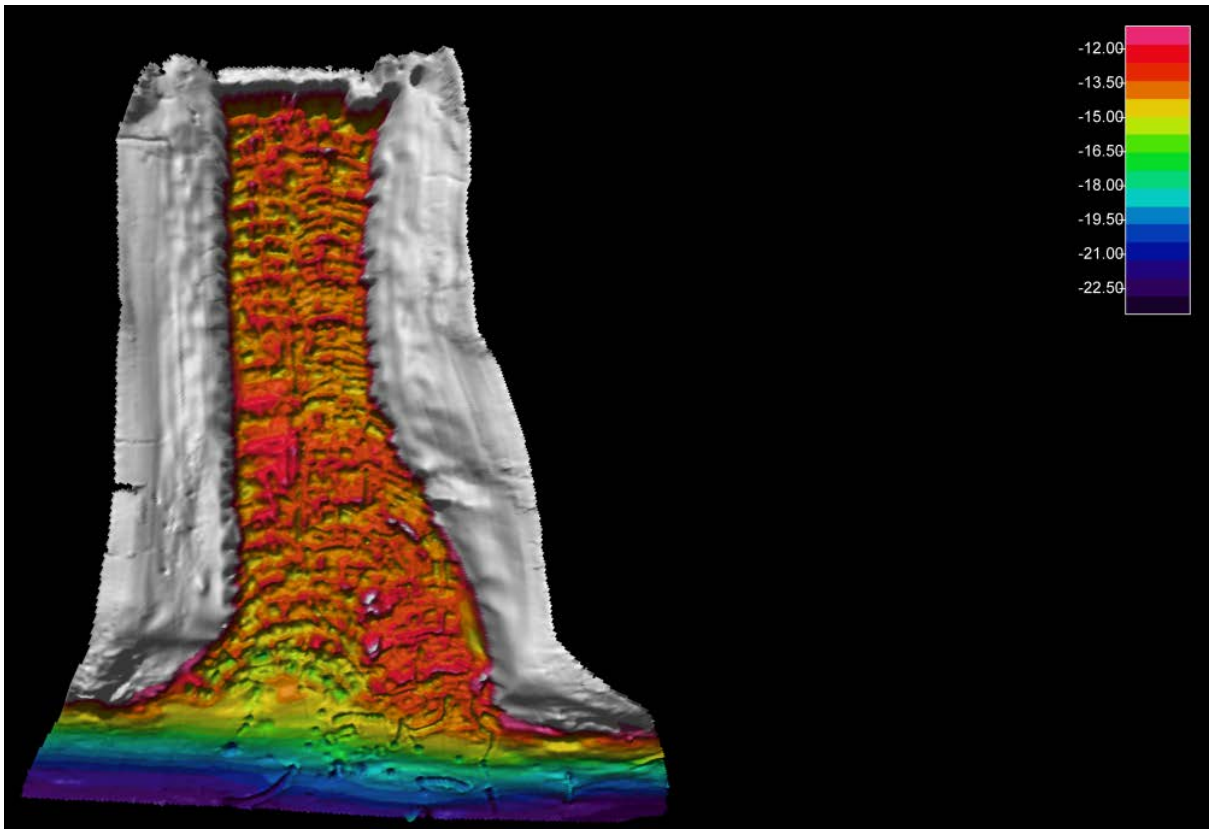


Figure 4. Overview of launch channel post-dredge surface with elevations above -11 MLLW shown in gray.

Figure 4 shows the channel surface condition at the time of the post-dredge survey on 25 February. The shoalest sediment after dredging in the channel were found in five “high-spots” rising above -11 feet MLLW as shown in gray in Figure 4. The post-dredge surface with a green bottom design depth of -14 MLLW is shown in Figure 5 and with post-dredge surface with a bottom design depth of -15 feet is shown in red in Figure 6. In one area at the southern entrance to the channel, some of the dredge cut exceeded the -15 feet MLLW over-dredge limit. Approximately 52 cubic yards (cu. yd.) of material were removed from below the -15 MLLW contour.

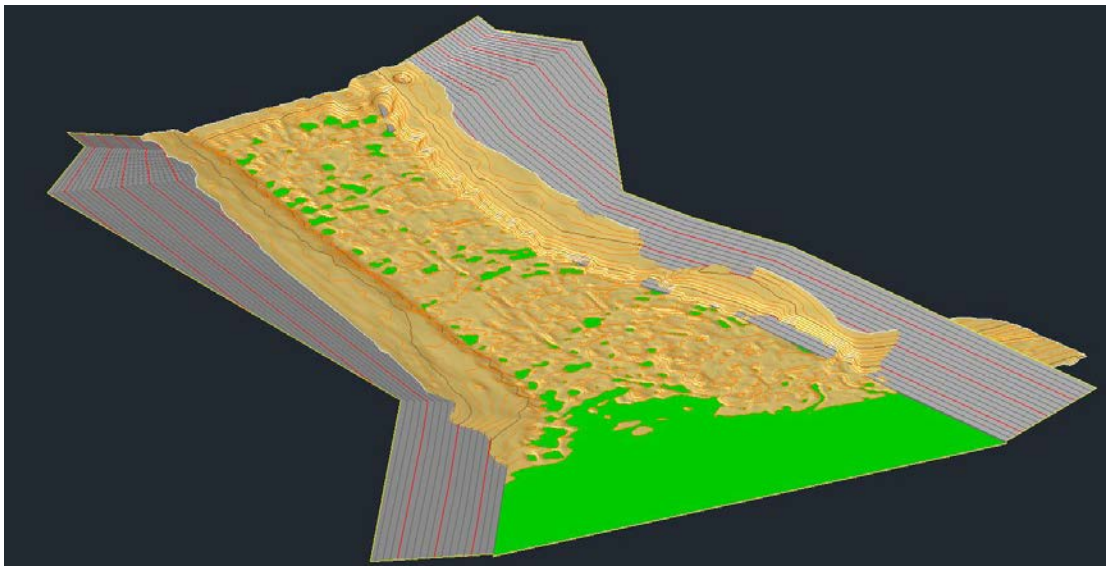


Figure 5. Post-Dredge Survey Surface with a -14 MLLW design footprint in green.

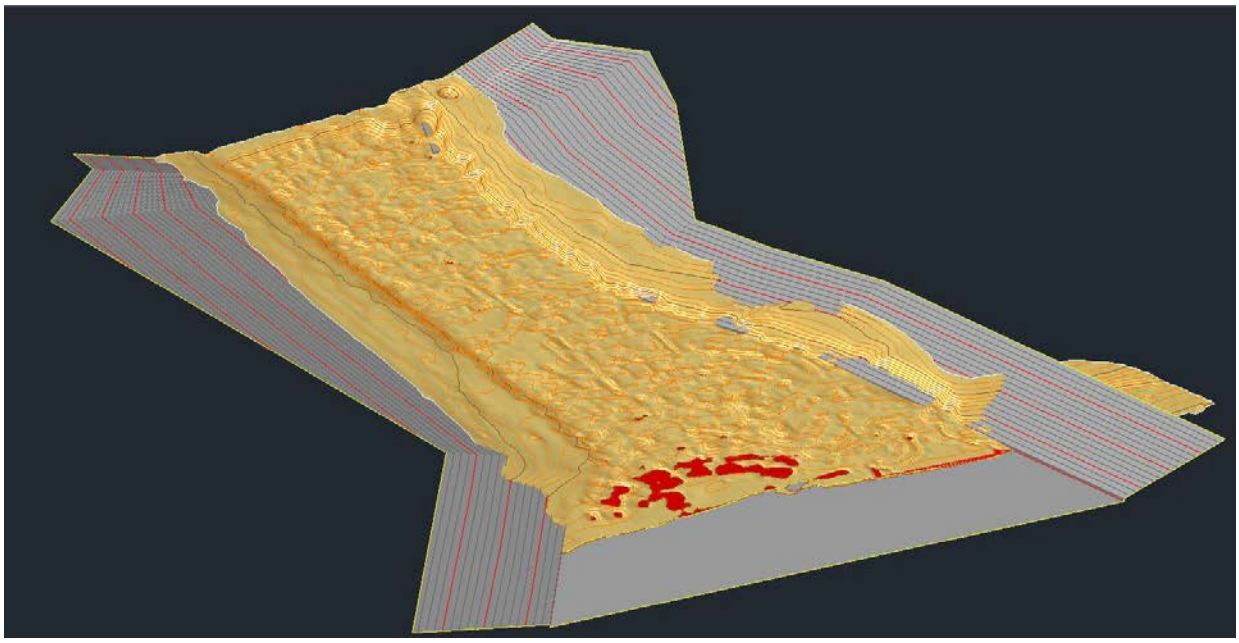


Figure 6. Post-Dredge Survey Surface with a -15 MLLW design footprint in red.

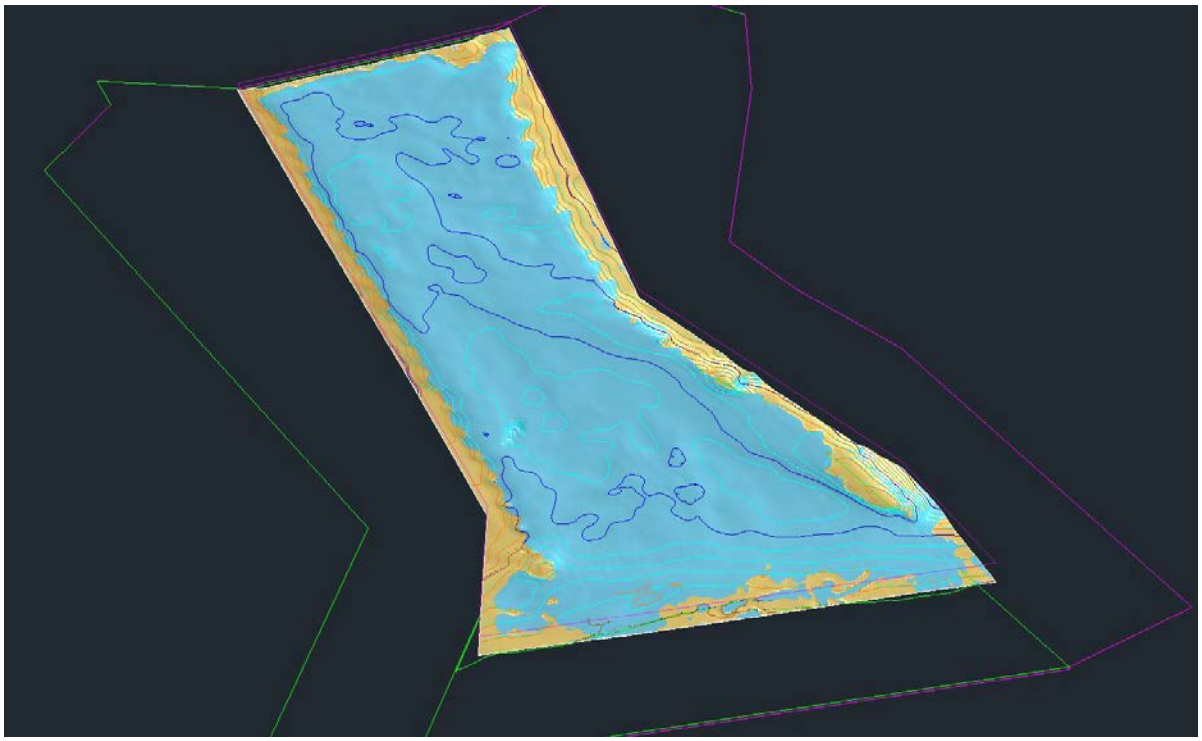


Figure 7. Pre-dredge (blue) and post-dredge (tan) surface overlay with clipped boundary used for volume computations.

An overlay of pre and post-dredge surfaces with the common boundary used for volume computations is shown in Figure 7. The tan-colored areas on the side slopes in the figure were found to be higher during the post-dredge survey as has been observed in all previous post-dredge surveys to some degree. Approximately 10,000-11,000 cu.yds. of sediment have accumulated each year during this project, which averages to approximately 30 cu. yd. per day. Between the pre and post dredge surveys approximately 37 cu. yds. of material accumulated on the western side-slope, which is likely to be attributable to natural deposition.

Table 1 presents the results of the dredge volume computations broken down into discrete portions of the launch channel as requested by Kiewit-General. The agreement between the 2 volume computation methods was very good. This is largely a result of trimming both survey surfaces to identical boundaries outside of, but close to the actual dredge work area. The exclusion of the side-slope areas higher than approximately -5 MLLW decreased the uncertainty resulting from the accumulation of loose sediment on the side slopes during dredging and the decreased accuracy of the “side-shot” multibeam survey soundings in those areas.

It should be noted that there was no effort to quantify over-dredge volumes on the side-slopes below the design slopes. Per instruction from Kiewit-General in 2013 during preparation of the channel template, there was to be no dredging of the side slopes. Tetra Tech has no role in determining what volumes or portions of volumes are payable or not. If there are questions by the dredger or Kiewit-General on clarification of the survey effort or volume computations we will be happy to assist within the scope of our contract.

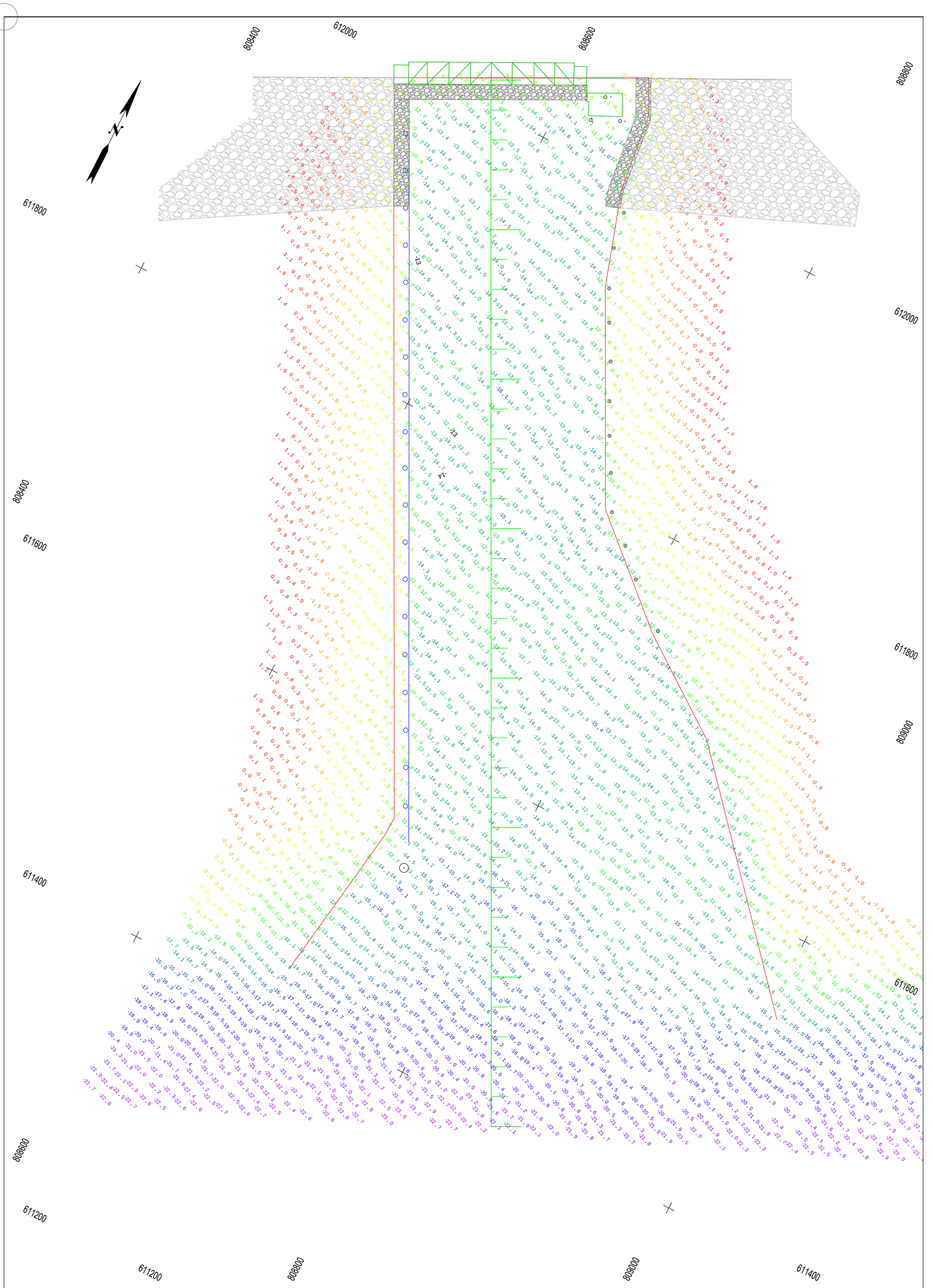
Table 1. Launch Channel Volumes from 18 & 25 February 2015 pre- and post-dredge surveys.		
	Bounded Volume Surface Method 0 to -17 MLLW (Cu. Yds.)	**Pre-dredge and Post-dredge vs. Design Channel Volume Method (Cu. Yds.)**
Launch Channel Footprint Volume	**(Cross check)**	**Values to Use**
Net Volume Change in Channel Footprint Pre to Post dredge -14 MLLW limit	-10652	-10656
Over-dredge and Total Footprint Volume		
Net Volume Change -14 to -15 MLLW Channel Footprint (Over-dredge)	N/A	-248
Net Volume Change -15 to -17 MLLW Channel Footprint (Super-dredge)	N/A	-52
Net Volume Change Pre-dredge to Post-dredge in footprint (0 to -17 MLLW)	**-10952**	**-10956**
Side-Slope Volume		
Net Volume Change on West Slope above 5:1 Design Slope (+ accumulation)	+37	+37
Net Volume Change on East Slope above 5:1 Design Slope (- dredged/cut)	-41	-41
Total Volume Change – Pre-dredge vs. Post-dredge Surveys	**-10956**	**-10960**
* These are volume computation based on the conditions at the time of the surveys only. Payment or non-payment for dredged or accumulated sediment volumes in different areas are contractual matter between Kiewit-General and the dredger.		

Attached data deliverables:

Two final drawing "C- size" plots of elevation contours and spot elevations are included with this submittal. Additionally there is an Easting-Northing Elevation "ENZ" text file containing data points of a 2 x 2 foot gridded survey surface. Survey coordinate system for ENZ file is Washington State Plane South Zone, NAD83/91, US Survey feet. Vertical datum is SR520 Pontoon construction MLLW "Project datum" in US survey feet, which is equivalent to NAVD88 +1.506 feet and City of Aberdeen vertical datum: NGVD29+4.78 feet.

If you have any questions please feel free to call me.

David B Hericks | Senior Oceanographer / Hydrographer
Tetra Tech Inc. | Marine Mapping Group
19803 North Creek Parkway, Bothell, WA 98011
Direct: 425.482.7625 | Fax: 425.482.7652 | Cell: 206.601.0187
David.Hericks@tetratech.com



NOTES:

Scale 1:360

(feet)

Survey Datum	
Datum	Description
Ellipsoid	WGS84 NAD83/91
Projection	WA SPCS South(4602)
Horiz.Units	US Survey feet
Vert. Datum	Project MLLW (NGVD+4.78')
Vert.Corr	MLLW = NAVD88+1.506
Vert. Units	US Survey feet

Sheet of

File No.

TETRA TECH

19803 North Creek Parkway
Bothell, WA 98011

SR 520 Pontoon Construction

KIEWIT INFRASTRUCTURE WEST CO.

1301 West Heron St Aberdeen, WA 98520

Feb. 2015 Post-Dredge Survey Soundings
Feb. 25, 2015

Surveyor:	K. Enright	02/25/15
Drawn	KSE	03/02/15
Checked	D. Hericks	

Approved _____ Date ____

Title _____ Job Class ____

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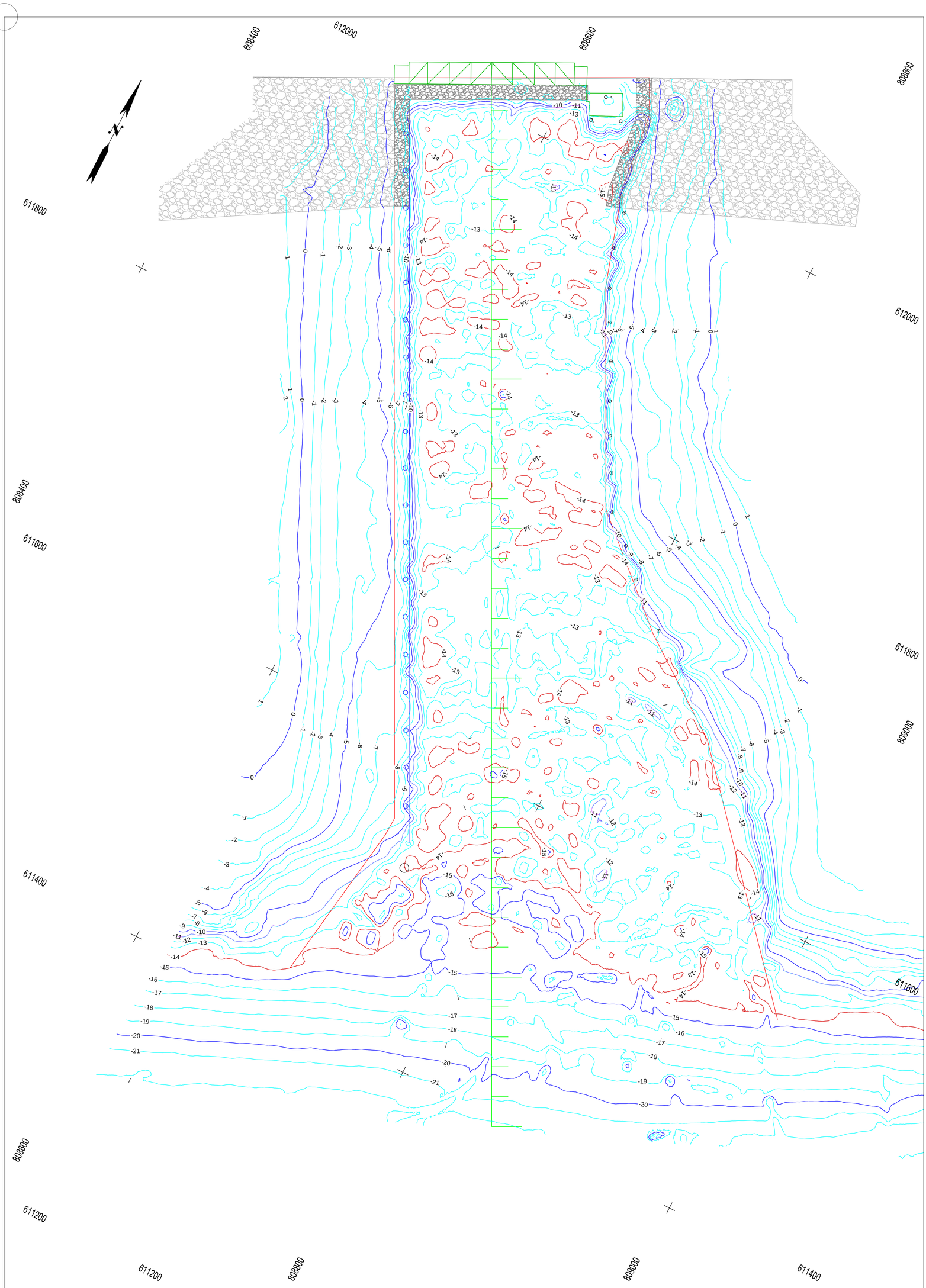

NOTES:

-11 foot Contour is Displayed in Purple
-14 foot Contour is Displayed in Red

Scale 1:360

15 0 30 60 90
(feet)

Survey Datum	
Datum	Description
Ellipsoid	WGS84 NAD83/91
Projection	WA SPCS South(4602)
Horiz.Units	US Survey feet
Vert. Datum	Project MLLW (NGVD+4.78')
Vert.Corr	MLLW = NAVD88+1.506
Vert. Units	US Survey feet

Sheet of

File No.

TETRA TECH

19803 North Creek Parkway
Bothell, WA 98011

SR 520 Pontoon Construction

KIEWIT INFRASTRUCTURE WEST CO.

1301 West Heron St Aberdeen, WA 98520

Feb. 2015 Post-Dredge Survey Contours
Feb. 25, 2015

Surveyor:	K. Enright	02/25/15
Drawn	KSE	03/02/15
Checked	D. Hericks	

Approved _____ Date ____

Title _____ Job Class ____

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Disposal Site Information

MONTHLY DISPOSAL STATEMENT

WASHINGTON STATE DEPARTMENT OF Natural Resources

Month/Day/Year - to - Month/Day/Year Oct. 22, 2011 - Oct. 31, 2011

Site Pt. Chehalis

Grantee's Name Kiewit-General, AJV **Permit Number** 20-507049

Contractor name/Contact no (for field preferred) Kiewit-General 360-500-4400

Date of Disposal	Vessel/Barge Name	Cubic Yards
10/22/2011	Pt. BASALT	1364
10/22/2011	Pt. VASHON	1334
10/23/2011	Pt. BASALT	1397
10/23/2011	Pt. VASHON	1247
10/24/2011	Pt. BASALT	1359
10/25/2011	Pt. BASALT	1416
10/25/2011	Pt. VASHON	1452
10/26/2011	Pt. BASALT	1281
10/26/2011	Pt. VASHON	1470
10/27/2011	Pt. BASALT	1337
10/27/2011	Pt. VASHON	1324

Clarify/Elaborate how cubic yards (CY) of volume disposed were measured:

Barge drafts were taken pre and post loading of the scow to determine total tons on the barge. a 1 C.F. sample of the material was weighed to calculate the total CY on each scow.

TOTAL VOLUME SEE NEXT PAGE

Permittee Signature

MONTHLY DISPOSAL STATEMENT

WASHINGTON STATE DEPARTMENT OF Natural Resources

Month/Day/Year - to - Month/Day/Year Oct. 22, 2011 - Oct. 31, 2011

Site Pt. Chehalis

Grantee's Name Kiewit-General, AJV **Permit Number** 20-507049

Contractor name/Contact no (for field preferred) Kiewit-General 360-500-4400

Date of Disposal	Vessel/Barge Name	Cubic Yards
10/27/2011	Pt. BASALT	1323
10/27/2011	Pt. VASHON	1301
10/27/2011	Pt. BASALT	1209
10/28/2011	Pt. VASHON	1249
10/28/2011	Pt. BASALT	1305
10/28/2011	Pt. VASHON	1315
10/28/2011	Pt. BASALT	1334
10/29/2011	Pt. VASHON	1470
10/31/2011	Pt.	1295
10/31/2011	Pt. VASHON	1275

Clarify/Elaborate how cubic yards (CY) of volume disposed were measured:

Barge drafts were taken pre and post loading of the scow to determine total tons on the barge. a 1 C.F. sample of the material was weighed to calculate the total CY on each scow.

TOTAL VOLUME 28,057

Permittee Signature

PAGE 2 OF 2

Last Updated 12/8/2009

MONTHLY DISPOSAL STATEMENT

WASHINGTON STATE DEPARTMENT OF Natural Resources

Month/Day/Year - to - Month/Day/Year Nov 1, 2011 - Nov. 30, 2011

Site Pt. Chehalis Disposal Site

Grantee's Name WSDOT **Permit Number** 20-507049

Contractor name/Contact no (for field preferred) Kiewit/General 360-500-4400
360-340-5858

Date of Disposal	Vessel/Barge Name	Cubic Yards
11/1/11 #23	Pt. VASHON	1359
11/1/11 #24	Pt. BASALT	1476
11/2/11 #25	Pt. VASHON	1318
11/2/11 #26	Pt. BASALT	1318
11/2/11 #27	Pt. VASHON	1281
11/2/11 #28	Pt. BASALT	1278
11/3/11 #29	Pt. VASHON	625
11/21/11 #30	Pt. BASALT	1495
11/21/11 #31	Pt. VASHON	1610
11/21/11 #32	Pt. BASALT	1340
11/22/11 #33	Pt. BASALT	1435

Clarify/Elaborate how cubic yards (CY) of volume disposed were measured:
Barge drafts were taken pre and post loading of the scow to determine total tons on the barge. a 1 C.F. sample of the material was weighed to calculate the total CY on each scow.

Justin Strong DREDGE SUPT. **TOTAL VOLUME** 14,535 (Pg 1)
Permittee Signature

Last Updated 12/8/2009

PG 1/2

MONTHLY DISPOSAL STATEMENT

WASHINGTON STATE DEPARTMENT OF Natural Resources

Month/Day/Year - to - Month/Day/Year Nov 1, 2011 - Nov. 30, 2011

Site Pt. Chehalis Disposal Site

Grantee's Name WSDOT **Permit Number** 20-507049

Contractor name/Contact no (for field preferred) Kiewit/General 360-500-4400

Date of Disposal	Vessel/Barge Name	Cubic Yards
11/28/11 #34	Pt. VASHON	1505
11/29/11 #35	Pt. BASALT	1478
11/29/11 #36	Pt. VASHON	1516
11/29/11 #37	Pt. BASALT	1494
11/30/11 #38	Pt. VASHON	1447
11/30/11 #39	Pt. BASALT	1585
11/30/11 #40	Pt. VASHON	1798

Clarify/Elaborate how cubic yards (CY) of volume disposed were measured:

Barge drafts were taken pre and post loading of the scow to determine total tons on the barge. a 1 C.F. sample of the material was weighed to calculate the total CY on each scow.

Justin Strong / DRUDGE Supt

Permittee Signature

TOTAL VOLUME 10,823 (Pg 2)

25,358 TOTAL

Last Updated 12/8/2009

PG 2/2

MONTHLY DISPOSAL STATEMENT

WASHINGTON STATE DEPARTMENT OF Natural Resources

Month/Day/Year - to - Month/Day/Year DEC 1, 2011 → DEC 31, 2011

Site Pt. Chehalis Disposal Site

Grantee's Name WSDOT **Permit Number** 20-507049

Contractor name/Contact no (for field preferred) Kiewit/General 360-500-4400

Date of Disposal	Vessel/Barge Name	Cubic Yards
12/1/11 #41	Pt. Basalt	1548
12/2/11 #42	Pt. Basalt	1868
12/2/11 #43	Pt. Basalt	1642
12/3/11 #44	Pt. Vashon	1631
12/3/11 #45	Pt. Basalt	1841
12/4/11 #46	Pt. Vashon	922
12/7/11 #47	Pt. Basalt	113

Clarify/Elaborate how cubic yards (CY) of volume disposed were measured:

Barge drafts were taken pre and post loading of the scow to determine total tons on the barge. a 1 C.F. sample of the material was weighed to calculate the total CY on each scow.

Justin Strong Dmly Supt. **TOTAL VOLUME** 9,565 CY.

Permittee Signature

Last Updated 12/8/2009

B 1/1

MONTHLY DISPOSAL STATEMENT

WASHINGTON STATE DEPARTMENT OF Natural Resources

Month/Day/Year - to - Month/Day/Year 4/12/13 - 5/12/13

Site PT. CHEHALIS

Grantee's Name ~~[illegible]~~ KIEWIT-GENERAL, ASV **Permit Number** 20-507049

Contractor name/Contact no (for field preferred) KIEWIT-GENERAL ASV. / NORMA HERNANDEZ 360-500-4389

Date of Disposal	Vessel/Barge Name	Cubic Yards
4/12/13	PT VASHON (1)	1500 CY
4/12/13	PT BASALT (2)	1531 CY
4/13/13	PT VASHON (3)	1487 CY
4/13/13	PT BASALT (4)	1537 CY
4/14/13	PT VASHON (5)	1339 CY
4/14/13	PT BASALT (6)	1530 CY
4/15/13	PT VASHON (7)	1331 CY
4/15/13	PT BASALT (8)	1361 CY
4/16/13	PT VASHON (9)	1317 CY
4/16/13	PT BASALT (10)	1309 CY
4/16/13	PT VASHON (11)	1251 CY

Clarify/Elaborate how cubic yards (CY) of volume disposed were measured:

(SEE PAGE 2)

Norma Hernandez

Permittee Signature

TOTAL VOLUME 15,493 CY

MONTHLY DISPOSAL STATEMENT

WASHINGTON STATE DEPARTMENT OF Natural Resources

Month/Day/Year - to - Month/Day/Year 4/12/13 - 5/12/13

Site PT CHEHALIS

Grantee's Name ~~WSDOT~~ KIEWIT-GENERAL, AJV Permit Number 20-507049

Contractor name/Contact no (for field preferred) KIEWIT-GENERAL, a JV / NORMA HERNANDEZ 360-500-4389

Date of Disposal	Vessel/Barge Name	Cubic Yards
4/17/13	PT BASALT (12)	1345 CY
4/17/13	PT VASHON (13)	1349 CY
4/18/13	PT BASALT (14)	1364 CY
4/19/13	PT VASHON (15)	1344 CY
4/19/13	PT BASALT (16)	1342 CY
4/20/13	PT VASHON (17)	1202 CY

Clarify/Elaborate how cubic yards (CY) of volume disposed were measured:

BARGE DRAFTS WERE TAKEN PRE & POST LOADING OF SCOW TO DETERMINE TOTAL TONS OF MATERIAL ON BARGE THEN A 1 C.F. SAMPLE OF THE MATERIAL WAS WEIGHED TO CALCULATE THE TOTAL CY ON EACH SCOW.

Norma [signature]
Permittee Signature

TOTAL VOLUME 7946

23,439 CY

Last Updated 12/8/2009

MONTHLY DISPOSAL STATEMENT

WASHINGTON STATE DEPARTMENT OF Natural Resources

Month/Day/Year - to - Month/Day/Year: 3/17/14 - to - 3/21/14

Site: PT CHEHALIS

Grantee Name: Kiewit-General, A JV **DNR SUA #:** 20-507049

Contractor name/Contact number: Brusco Tug and Barge/(360)532-3352

Barge Load	Date	Vessel/Barge Name	Cubic Yards
1	3/17/14	Liberty	1639
2	3/18/14	Lummi Island	1665
3	3/18/14	Lummi Island	1491
4	3/18/14	Lummi Island	1664
5	3/19/14	Lummi Island	1610
6	3/19/14	Lummi Island	1421
7	3/19/14	Lummi Island	1569
8	3/20/14	Lummi Island	1547
9	3/20/14	Lummi Island	1274
10	3/20/14	Lummi Island	1468
11	3/21/14	Lummi Island	1022

Clarify/Elaborate how cubic yards (CY) of volume disposed were measured:

Barge displacement with unit weight of 1.34t/CY on loads 1-5 and 1.42t/CY on loads 6-11.

KIEWIT SUPERINTENDENT

Authorized Representative Signature and Title

TOTAL VOLUME 16370 (for reporting period)

MONTHLY DISPOSAL STATEMENT

WASHINGTON STATE DEPARTMENT OF Natural Resources

Month/Day/Year - to - Month/Day/Year 2/21/2015 - to - 2/24/2015

Site Pt. Chehalis

Grantee's Name Kiewit-General, AJV **Permit Number** 20-507049

Contractor name/Contact no (for field preferred) Brusco tug and barge/(360)532-3352

Date of Disposal	Vessel/Barge Name	Cubic Yards
#1.....2/21/2015	Freedom	2,323
#2.....2/22/2015	Freedom	2,813
#3.....2/22/2015	Freedom	2,539
#4.....2/22/2015	Freedom	2,725
#5.....2/23/2015	Freedom	2,532
#6.....2/24/2015	Freedom	403

Clarify/Elaborate how cubic yards (CY) of volume disposed were measured:

Barge displacement with unit weight o 1.42 tons/CY

TOTAL VOLUME 13,335 Cubic Yards

Permittee Signature

MATT DiCRESCENTIS
SUPERINTEDENT, KIEWIT-GENERAL

Last Updated 12/8/2009