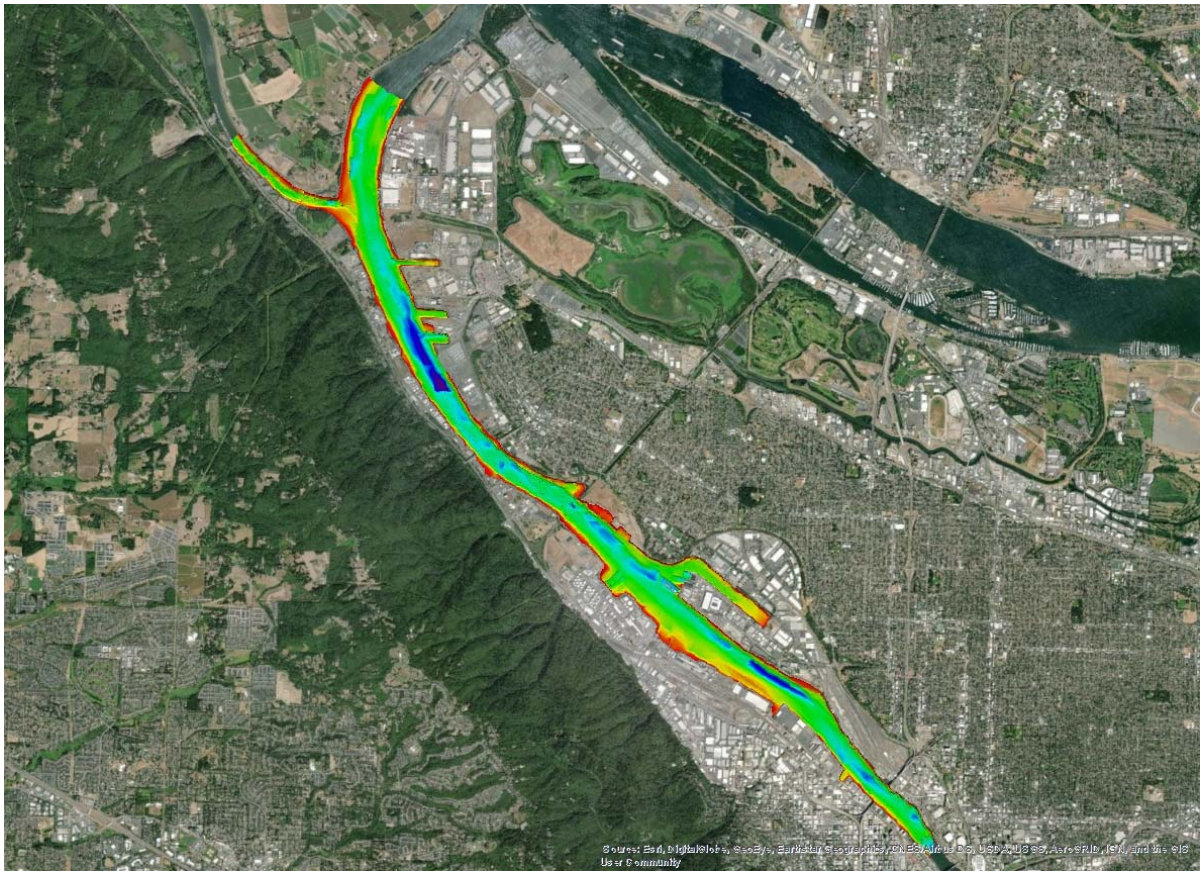
Willamette River, Oregon
River Mile 1.9 to 11.8
Hydrographic Survey Report

July 2018



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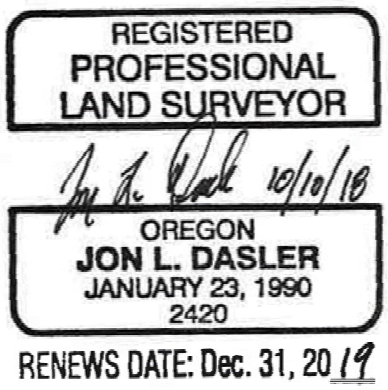

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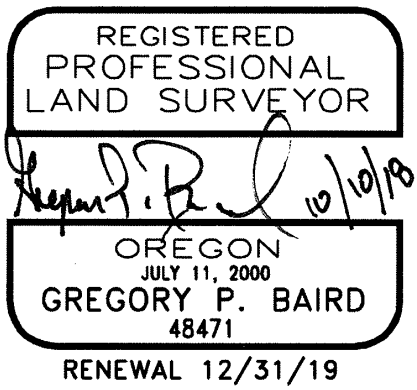

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Acronyms and Abbreviations

.e00	Workstation Interchange Format
AML	Applied Microsystems Oceanographic
ASCII	American Standard Code for Information Interchange
CRD	Columbia River Datum
DEA	David Evans and Associates, Inc.
DEM	digital elevation model
EPIRB	Emergency Position Indicator Radio Beacon
FTP	File Transfer Protocol
GMT	Greenwich Mean Time
GNSS	Global Navigation Satellite System
HIPS	Hydrographic Information Processing System
HVF	HIPS vessel file
IMU	Inertial Motion Unit
kHz	kilohertz
LWG	Lower Willamette Group
NAD27	North American Datum of 1927
NAD83	North American Datum of 1983, 2011 realization, Epoch 2010.00
NAVD88	North American Vertical Datum of 1988, Geoid 12b
NGS	National Geodetic Survey
NMEA	National Marine Electronics Association
NOAA	National Oceanic and Atmospheric Administration
NSRS	National Spatial Reference System
NTRIP	Networked Transport of RTCM via Internet Protocol
OCS	Office of Coast Survey
POS/MV	Position and Orientation System for Marine Vessels
PPS	Pulse Per Second
PWC	Personal Watercraft
RM	River Mile
RMS	root mean square
RTCM	Radio Technical Commission for Maritime Services
RTK	Real-Time Kinematic
SPCS	State Plane Coordinate System
S/V	Survey Vessel
SVP&T	Sound Speed, Pressure and Temperature
TIN	triangulated irregular network
USACE	United States Army Corps of Engineers
USCG	United States Coast Guard
UTC	Coordinated Universal Time
UTM	Universal Transverse Mercator
ZDA	Global Positioning System Timing Message

1.0 INTRODUCTION

David Evans and Associates Inc. (DEA) conducted a precision multibeam and single-beam bathymetric survey of the Portland Harbor, from Willamette River Mile (RM) 1.9 to RM 11.8 and extending down the Multnomah Channel to the Sauvie Island Bridge. The survey occurred between March 6, 2018 and June 15, 2018. The purpose of the survey was to develop a full coverage, bank to bank to the extent practicable, accurate site-wide base map of riverbed elevations in the portion of the Lower Willamette River that includes the Portland Harbor Superfund Site. The work was conducted for AECOM/Geosyntec on behalf of the Pre-Remedial Design AOC Group to support the Pre-Remedial Design and Baseline Sampling studies. Survey data results were used to develop updated map products and a terrain model difference analysis against the prior surveys of the Portland Harbor. The data collection and processing methods followed the procedures used by DEA for similar surveys of the Portland Harbor. This hydrographic survey report covers staff, equipment, datums, methodology, and quality procedures employed to satisfy the bathymetric component of the site characterization.

2.0 DATUMS AND SURVEY CONTROL

To provide surveys relative to the current datums used in the National Spatial Reference System (NSRS) and provide a baseline data set for future surveys, this survey used current realizations of horizontal and vertical datums that supersede previous datums.

The horizontal datum used for this survey is the North American Datum of 1983, 2011 realization, EPOCH:2010.00 (NAD83 [2011]) projected to the State Plane Coordinate System (SPCS) – Oregon North Zone, with units in International Feet. Time stamps used for all data records are based on Coordinated Universal Time (UTC), which is equivalent to Greenwich Mean Time (GMT).

The vertical datum for this survey is the North American Vertical Datum of 1988 (NAVD88) using the National Geodetic Survey (NGS) separation model Geoid 2012b, which converts NAD83 (2011) ellipsoid heights obtained from Global Navigation Satellite System (GNSS) receivers to NAVD88 orthometric heights. Prior surveys used separation models Geoid 2003 and Geoid 2009 applied to NAD83/91 ellipsoid heights to obtain NAVD88 orthometric heights. Geoid 2003 and Geoid 2009 separation are essentially the same model over the Portland Harbor area. These models have been superseded by a more accurate separation model, Geoid 12b, to be used with the current NAD83 (2011) ellipsoid elevations.

The primary control for the survey was "DEMSI-BASE," a permanently operating GNSS reference station at DEA's Marine Services office in Vancouver, Washington. The reference station was one of the primary stations used to control the 2009 survey of the Portland Harbor conducted by DEA for the National Oceanic and Atmospheric Administration (NOAA), Office of Coast Survey (OCS).

A control survey was conducted on control monuments RAINDEER and DEA 2100, used for prior Portland Harbor mapping efforts by DEA. The purpose of this control survey was to determine the difference between the horizontal and vertical datums used during previous Portland Harbor surveys using NAD83/91 and NAVD88 Geoid 2009; and the 2018 survey using NAD83 (2011)

and NAVD88 Geoid 12b. During the control survey, two temporary control points, designated as PH1 and PH2, were set for field position checks for hydrographic surveys and sediment sampling operations (Figure 1). Control point PH2 was for horizontal position only to be used for position checks by sediment sampling vessels. The point "DEMSI-CHECK" is an established check point at DEA's Marine Services office established for conducting position checks using DEMSI-BASE. Field notes for the control survey are included in Appendix B. Results of the control survey are shown in Table 1.

Table 1. Portland Harbor 2018 Control Survey Results

	NAD83 (2011)		NAVD88 (Geoid12b)	NAD83/91		NAVD88 (Geoid09)
Control Point	**Northing (Int. Ft.)**	**Easting (Int. Ft.)**	**Elevation (Int. Ft.)**	**Northing (Int. Ft.)**	**Easting (Int. Ft.)**	**Elevation (Int. Ft.)**
DEMSI-BASE	718172.703	7654431.050	73.579			
DEMSI-CHECK	718170.734	7654419.836	71.670	N/A	N/A	N/A
RAINDEER	722443.238	7614886.644	35.436	722442.340	7614886.290	35.530
DEA 2100	678400.007	7645190.810	159.514	678399.547	7645190.577	159.600
PH1	698702.464	7637426.371	33.379	N/A	N/A	N/A
PH2	700967.870	7634507.670	N/A	N/A	N/A	N/A

The difference in horizontal and vertical datums for points RAINDEER and DEA 2100 are shown in Table 2.

Table 2. Control Datum Differences

	NAD83 (2011)-NAD83/91		NAVD88 Geoid12b-NAVD88 Geoid09
Control Point	**Δ Northing (Ft.)**	**Δ Easting (Ft.)**	**Δ Elevation (Ft.)**
RAINDEER	0.898	0.354	-0.094
DEA 2100	0.460	0.233	-0.086

Figure 1 illustrates the location of the control monuments relative to the Portland Harbor.

Figure 1. Portland Harbor 2018 Survey Control

3.0 BATHYMETRIC SURVEYS

3.1 Survey Area and Coverage

The hydrographic survey covered Portland Harbor from RM 1.9 to RM 11.8 and extended down the Multnomah Channel to the Sauvie Island Bridge (Figure 2). The overall footprint of the 2018 survey resultant model shown in Figure 2 covers 2,269.4 acres, of which 2,231.7 acres were filled with multibeam sonar coverage (98.3%) and traversed 32.5 nautical miles of shoreline.

Although sonar signals to the side of the vessel can map under surface obstructions to a limited extent, there are areas without multibeam full coverage. Some of these areas are within the survey footprint while others are outside the survey footprint but within the target survey area. Coverage gaps are the result of the following:

- Bridge Piers, Marine Terminals, and other fixed structures which occupy the target survey area that fully block sonar signals;
- Oil booms, low catwalks, docks, mooring lines and low hanging cables that restrict vessel access;
- Ships and barges at berth or moored in the survey area;
- Exposed and slightly submerged piling that restrict vessel access; and
- Shallow water with long gradual slopes that restrict vessel access and limit acceptable sonar range.

Large data gaps were surveyed where practicable with personal watercraft using single beam sonar to collect data along survey lines. These areas were then filled through interpolation methods between survey lines. All data in the resultant model were acquired by acoustic methods (multibeam or single beam). No supplemental lidar was used.

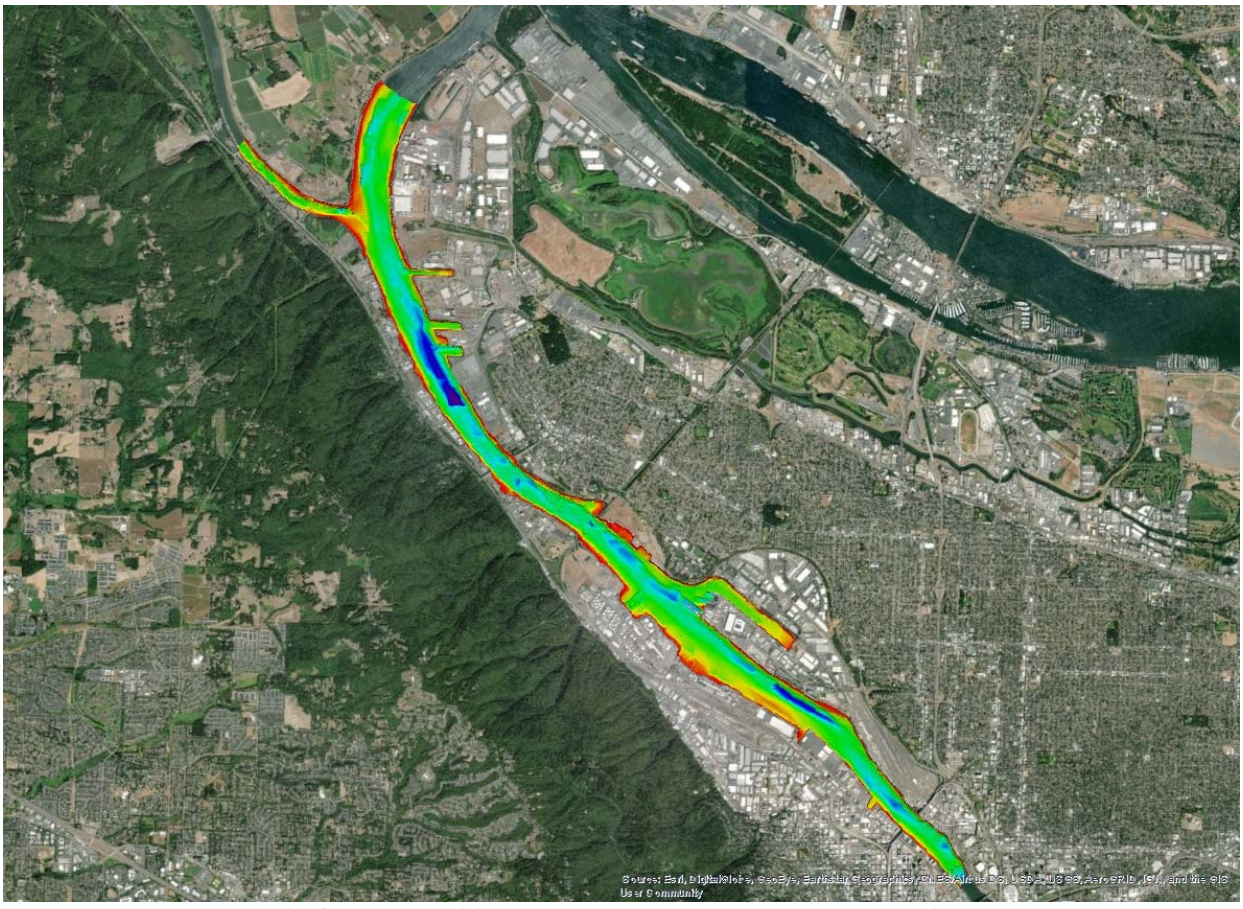


Figure 2. Overview of Survey Area with Hillshade Image of Coverage

3.2 Vessels and Equipment

3.2.1 Survey Vessels

The primary vessel for this survey was the *William R. Broughton* (Figure 3). The *Broughton* is a modified Duckworth Offshore 24-foot aluminum hull vessel with twin 115-horsepower engines. The vessel is designed for safe and efficient hydrographic survey operations and equipped with dual VHF radios, radar, chart plotter, emersions suites, an Emergency Position Indicator Radio Beacon (EPIRB), and emergency offshore life raft. The vessel is inspected annually by a Marine Surveyor and meets all United States Coast Guard (USCG) requirements for a vessel of its class. For hydrographic operations, the vessel is equipped with an integrated navigation and data acquisition system, mounts for an integrated GNSS and inertial positioning and motion reference system, and custom mounts for the Reson SeaBat sonar heads (mounted port and starboard).

Figure 3. Survey Vessel Broughton

The secondary vessel for this survey was the *River Hawk* (Figure 4). The *River Hawk* is a modified 19-foot aluminum hull shallow water vessel with a 105-horsepower primary engine with water jet propulsion, and a 15-horsepower secondary engine. The vessel is designed for safe and efficient hydrographic survey operations and equipped with a VHF radio, chart plotter, emersions suites, and emergency offshore life raft. The vessel is inspected annually by a Marine Surveyor and meets all USCG requirements for a vessel of its class. For hydrographic operations, the vessel is equipped with an integrated navigation and data acquisition system, mounts for an integrated GNSS and inertial positioning and motion reference system, and a custom mount for the Reson SeaBat sonar head. The *River Hawk* was used to extend coverage in tight areas behind wharfs and piers.

Figure 4. Survey Vessel River Hawk

Supplemental soundings in shallow, tight areas were acquired using DEA's custom outfitted Personal Watercraft (PWC) (Figure 5). DEA's SeaDoo GTX 4-stoke PWCs are outfitted with Vartech submersible monitors, ATOM 12 Volt personal computers, Trimble SPS855 survey grade GNSS receivers, and Teledyne ODOM CV100 survey grade echosounders.

All survey vessels used during this survey are owned by DEA and operated by DEA staff.

Figure 5. PWC Survey Vessels

3.2.2 Echosounder Systems

The *Broughton* was outfitted with dual Teledyne Reson SeaBat T50-P precision multibeam sonars, mounted on either side of the survey vessel, and have an integrated Applied Microsystems Oceanographic (AML) Micro SV Xchange surface sound speed sensor. These sonars are capable of operating at frequencies between 200 and 400 kilohertz (kHz). For this survey, the sonars were

operated at a frequency of 350 kHz and recorded 512 soundings per sonar with each sonar ping over a nominal swath angle of 140 degrees (70 degrees to each side of the sonar). To maximize swath coverage and extend coverage up slope along the shoreline, the sonar heads were tilted 15 degrees outboard while maintaining quality data. During shoreline runs, the swath was opened when mapping up slopes to maximize coverage. Using a wider swath angle on upslope looking beams has a high confidence level on steep slopes due to the high angle of incidence with the slope as opposed to a low angle of incidence at using the same beam angle on a flat riverbed.

The *River Hawk* was outfitted with a Teledyne Reson 7101 precision multibeam sonar and has an integrated AML Micro SV Xchange surface sound speed sensor. This sonar operates at 240 kHz, and logs 511 soundings with each sonar ping. The sonar has a maximum swath angle up to 210 degrees (105 degrees to each side of the sonar) and can be steered to map upslope from the sonar head to maximize shoreline coverage.

The PWCs were outfitted with a Teledyne ODOM CV100 single frequency 200 kHz survey grade echosounder, and Teledyne ODOM SMSW200-4a 4-degree single-beam transducer.

3.2.3 Position, Heading and Motion Reference Systems

The *Broughton* and *River Hawk* were outfitted with a Position and Orientation System for Marine Vessels (POS/MV) 320 version 5 with GNSS and inertial reference system, which was used to measure attitude, heading, heave, and position. The system was comprised of an Inertial Motion Unit (IMU), dual frequency (L1/L2) GNSS antennas, and a data processor. A secondary Trimble SPS-855 RTK GNSS dual frequency (L1/L2) receiver was used to acquire height data relative to the vessel reference point at the water line. These data were used to reduce soundings to NAVD88 elevations. The height data was acquired at a frequency of once per second to account for changes in water levels and settlement and squat of the vessel in the water when running at different speeds. Processing of this data is discussed in Section 5.1 *Multibeam Data Processing*. The POS/MV primary GNSS receiver and Trimble SPS-855 were provided Real-Time Kinematic (RTK) GNSS correctors from the reference station DEMSI-BASE through a cellular connection using a Networked Transport of Radio Technical Commission for Maritime Services (RTCM) via Internet Protocol (NTRIP).

The Reson processor and Hypack acquisition computers provided a Pulse Per Second (PPS) and National Marine Electronics Association (NMEA) Global Positioning System Timing Message (ZDA) to achieve precise synchronization of sonar measurements with position and attitude data from the POS/MV.

The POS/MV 320 is a 6-degree of freedom motion unit, with a stated accuracy of 0.05 meters or 5% for heave and 0.02 degrees for roll, pitch, and heading. Real-time displays of the vessel motion accuracy were monitored throughout the survey with the POS/MV-View controller program. System settings were configured to monitor the vessel motion if accuracy degraded to greater than 0.05 degrees root mean square (RMS). During the survey the vessel motion accuracy never exceeded 0.05 degrees.

3.2.4 Sound Speed Measurements

An AML Micro SV sensor mounted on the starboard Reson T50-P and 7101 sonar head was used to input sound speed directly into the Reson processor. Speeds from the sensor were used in real-time during acquisition for beam-forming on the T50-P's flat array and beam-forming and steering the 7101 curved array. An AML Smart X Sound Speed, Pressure and Temperature (SVP&T) sensor was used as the primary water column sound speed sensor for all survey vessels.

4.0 EQUIPMENT CALIBRATION AND SYSTEM VALIDATION

4.1 Vessel Baseline Survey

A baseline survey of the *Broughton* and *River Hawk* was performed prior to survey operations. No changes to sensor mounting points occurred following the vessel survey. The sensor offset values calculated during the baseline survey were used for the surveys under this project. Measurements from the baseline survey were entered into the CARIS Hydrographic Information Processing System (HIPS) vessel file (HVF).

4.2 Draft Measurement and Bar Check Comparison (Static Draft Check)

A multibeam bar check was performed before and after survey operations. This was done to confirm the draft of the multibeam transducer. The bar check was accomplished by lowering a flat plate below the sonar head to a known distance from the water surface. A sound speed cast was observed and applied to the processed multibeam data. The waterline was obtained by averaging the reading of draft marks labeled on either side of the vessel. Processed data from the multibeam bar checks are listed in Tables 3 and 4. All bar check observations meet project requirements as specified in the Bathymetric Survey Field Sampling Plan.

Table 3. Broughton Bar Check Results Multibeam (Feet)

Date	3/13/2018	3/13/2018	3/20/2018	3/20/2018	6/13/2018	6/13/2018
Time (UTC)	1917	1931	2227	2223	2108	2110
Vessel	Broughton	Broughton	Broughton	Broughton	Broughton	Broughton
Sonar	Starboard T50P	Port T50P	Starboard T50P	Port T50P	Starboard T50P	Port T50P
Bar Depth	9.843	9.843	9.843	9.843	6.562	6.562
Average Processed WL Corrected Depth:	9.701	9.710	9.736	9.806	6.611	6.594
Delta	**0.142**	**0.133**	**0.107**	**0.037**	**-0.049**	**-0.032**

Table 4. River Hawk Bar Check Results Multibeam (Feet)

Date	4/10/2018	4/14/2018
Time (UTC)	1556	0005
Vessel	River Hawk	River Hawk
Sonar	Starboard 7101	Starboard 7101
Bar Depth	6.562	6.562
Average Processed WL Corrected Depth:	6.507	6.568
Delta	**0.055**	**-0.006**

A single-beam check was performed before and after survey operations. Because a tradition bar check is difficult to perform on the PWCs, single-beam data was recorded over an RTK GNSS point observed in shallow water on the river bed using the Trimble R10 GNSS rover and fixed height survey rod. These values were compared and are shown in Table 5. All observations meet project requirements as specified in the Bathymetric Survey Field Sampling Plan.

Table 5. Single-beam Check Results (Feet)

Date	6/14/2018	6/14/2018	6/15/2018	6/15/2018	6/15/2018	6/15/2018
Time (UTC)	1658	1642	1625	1604	2348	0005
Vessel	PWC NX	PWC NM	PWC NX	PWC NM	PWC NX	PWC NM
Sonar	ODOM CV100	ODOM CV100	ODOM CV100	ODOM CV100	ODOM CV100	ODOM CV100
R10 RTK Elevation	9.24	9.14	8.40	8.74	6.19	6.10
Single-beam Processed Depth	9.20	9.10	8.50	8.70	6.10	6.10
Delta	**0.04**	**0.04**	**-0.10**	**0.04**	**0.09**	**0.00**

4.3 Independent Verification of Sonar Data

An independent measurement of the river bed elevation was conducted to verify accuracies of acoustic measurements. A lead line depth was observed to obtain an independent seafloor elevation and compare to a fully processed multibeam seafloor elevation. The results from the individual lead lines are show in Table 6. All independent depth observation comparisons meet project requirements as specified in the Bathymetric Survey Field Sampling Plan.

Table 6. Lead Line Results (Feet)

Date	3/13/2018	3/13/2018	4/11/2018
Vessel	Broughton	Broughton	River Hawk
Sonar	T50P Starboard	T50P Port	7101
Lead Line Measurement	10.540	10.700	11.740
RTK Water Surface Elevation	10.530	10.604	14.960
Riverbed Elevation (NAVD88)	-0.010	-0.096	3.220
Processed Sonar Elevation (NAVD88)	0.071	-0.079	3.177
Delta	**-0.081**	**-0.017**	**0.043**

Gridded data from the 2018 survey was compared to gridded data from the 2009 multibeam survey. The comparison was made in Multnomah Channel on cutoff bridge piers from the old Sauvie Island bridge. The comparison was within 0.00 feet on one pier and 0.08 feet on another pier, well within accuracy requirements for the project. Figure 6 shows the location and results of the comparison.

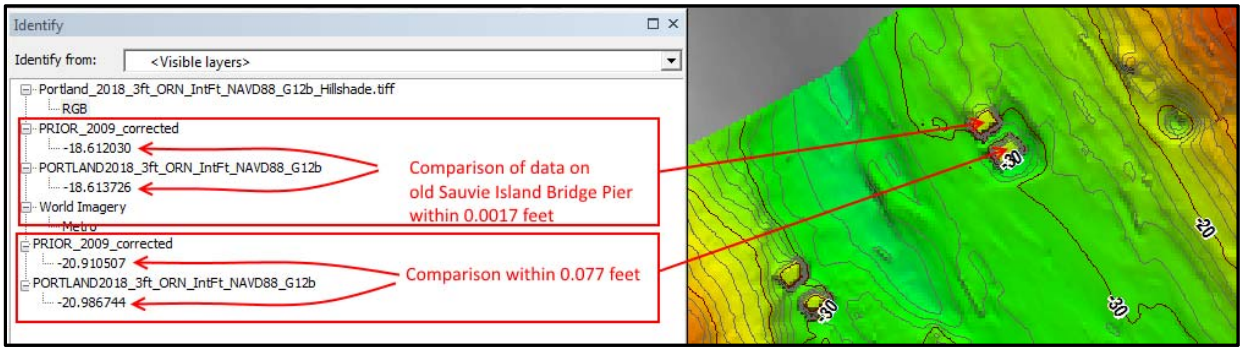


Figure 6. Comparison to 2009 Survey on Old Cutoff Bridge Piers in Multnomah Channel

4.4 Patch Test and Timing Latency

Multibeam patch tests were conducted to measure alignment offsets between the IMU sensor and the sonar transducers and to determine time delays between the time-tagged sensor data. A precise timing latency test was performed by running a single line over a flat bottom with induced vessel motion. Roll alignment was determined by evaluating the reciprocal lines run over a flat bottom. The pitch tests consisted of sets of reciprocal lines located on a steep slope or over a submerged feature. The yaw error was determined by running parallel lines over the same area as the pitch tests. All lines were run at approximately 3 to 6 knots. Patch tests were run at the beginning and end of the mapping effort for each vessel or when there were changes made to equipment or sonar mounting. There were no changes to software and no sensor failures during the project that required additional patch tests. Tests were conducted near the project site in deep water and over a steep bank on the north end of the project.

4.5 Vessel Position Checks

Prior to deploying the survey vessels, the DEA crew performed a static position check by either detaching the vessel RTK GNSS antenna and placing it on a fixed height survey rod over a known survey monument or by connecting the vessel RTK GNSS system to the DEMSI-CHECK GNSS antenna. This process verifies correctors are being obtained and validates the geodetic parameters that are entered in the Hypack geodesy software. Position check deltas are shown in Table 7.

Table 7. Vessel Position Check Results (Feet)

Date	Time (UTC)	Vessel	Check in Point	Δ Northing	Δ Easting	Δ Elevation
3/13/2018	1650	Broughton	DEMSI-CHECK	0.009	-0.003	-0.051
3/21/2018	1720	Broughton	DEMSI-CHECK	0.016	-0.010	-0.044
4/10/2018	1515	River Hawk	PH1	-0.010	-0.030	0.007
4/14/2018	0023	River Hawk	PH1	0.015	0.016	0.043
6/13/2018	1719	Broughton	DEMSI-CHECK	0.023	-0.001	-0.043
6/14/2018	1516	PWC NX	PH1	-0.020	0.009	-0.035
6/14/2018	1525	PWC NM	PH1	0.013	-0.051	-0.037

Date	Time (UTC)	Vessel	Check in Point	Δ Northing	Δ Easting	Δ Elevation
6/14/2018	2256	PWC NX	PH1	-0.010	-0.035	0.045
6/14/2018	2357	PWC NM	PH1	-0.012	-0.060	-0.048
6/15/2018	1522	PWC NX	PH1	-0.006	-0.008	-0.025
6/15/2018	1517	PWC NM	PH1	0.015	-0.030	-0.017
6/15/2018	0030	PWC NX	PH1	-0.002	0.000	0.010
6/15/2018	0027	PWC NM	PH1	-0.010	-0.029	0.042

All position check observations meet project requirements as specified in the Bathymetric Survey Field Sampling Plan.

4.6 Sound Speed Sensor Calibration

DEA submits sound speed sensors for factory calibration annually. Appendix C contains factory documentation of recent calibrations for the sensors used for this survey. In addition, a comparison is made to other sensors periodically during the survey to validate that the sensors are operating within design parameters.

5.0 DATA PROCESSING

5.1 Multibeam Data Processing

Processing of multibeam data was conducted utilizing CARIS HIPS version 9.1.10. The Trimble SPS-855 height data was reviewed in Hypack for data fliers (spikes) and a 30-second smoothing algorithm was applied to remove wave-induced motion, which is corrected in the heave records applied in CARIS. After editing and smoothing, height values were exported and applied to the multibeam data using the CARIS Generic Data Parser tool to convert soundings to NAVD88 elevations. Sound speed profiles were used to correct slant range measurements and to compensate for any ray path bending. Patch test data were analyzed, and alignment corrections were applied during processing. Quality and swath filters were applied. These data were flagged as rejected and could be reaccepted during follow-on evaluation. Using the CARIS subset editor, sounding data were reviewed for quality and data flyers. Sounding data, including sonar beams reflecting from sediment in the water column, returns from aquatic life, or noise due to aeration in the water column, were carefully reviewed before being flagged as rejected.

Gridded data sets were generated over the survey area using CARIS HIPS. To be consistent with prior surveys and take advantage of the high resolution multibeam bathymetric data, a uniform 1-meter grid was created over the entire survey area from the underlying denser data set by assigning values to grid nodes using a swath-angle weighted algorithm.

5.2 Single-beam Data Processing

Processing of the single-beam data was conducted utilizing Hypack 2017A single-beam editor. GNSS height data was applied to adjust all depth measurements to NAVD88 elevations. The average sound velocity of the water column, entered in to the Teledyne ODOM CV100 echosounder during data acquisition, was verified from the records of the sound speed profiler. Sounding and position data was reviewed and edited for data flyers.

After the data was reviewed and edited, it was decimated to a density of approximately 0.5 feet in distance along the survey track line and exported from Hypack as an American Standard Code for

Information Interchange (ASCII) point file, containing the Easting, Northing, and Elevation. Data integration and merging are discussed in Section 6.

5.3 Cross-Line Sonar Beam Analysis – Accuracy Check

A cross-line analysis of individual sonar beams was conducted to evaluate whether each sonar beam used met accuracy requirements for the project. Each multibeam sonar recorded 512 beams for each sonar ping spaced equal angular (even angle increments) covering a 70-degree swath to either side of nadir (vertical below the sonar). The swath width was filtered to 65 degrees to each side of nadir for a 130-degree swath width. As the sonar was roll stabilized, beams adjusted as the vessel rolled to maintain orientation with the river bed; beam selection for the 65-degree filter varied with vessel roll. The analysis was conducted to prove each of the sonar beams within the 130-degree swath met accuracy requirements for the survey and involved running survey lines that cross orthogonal to the primary survey line pattern and comparing the soundings from individual sonar beams in the cross-line data to a finalized 1-meter grid from the main scheme lines. The United States Army Corps of Engineers (USACE) Hydrographic Survey Manual references typical repeatability (precision) requirements for maintenance dredging in water at depths 15-75 feet (the depth range for this survey) is 0.3 feet with a standard deviation at a 95% confidence level of +/- 0.8 feet. Requirements in the Scope of Work called for the survey to meet plus or minus 0.30 feet at a 95% confidence level.

Figure 7 depicts the results of this cross-line beam analysis for the dual sonars on the *Broughton* to document that all beams used from both sonars in the 130-degree swath (65 degrees per side) meet project requirements.

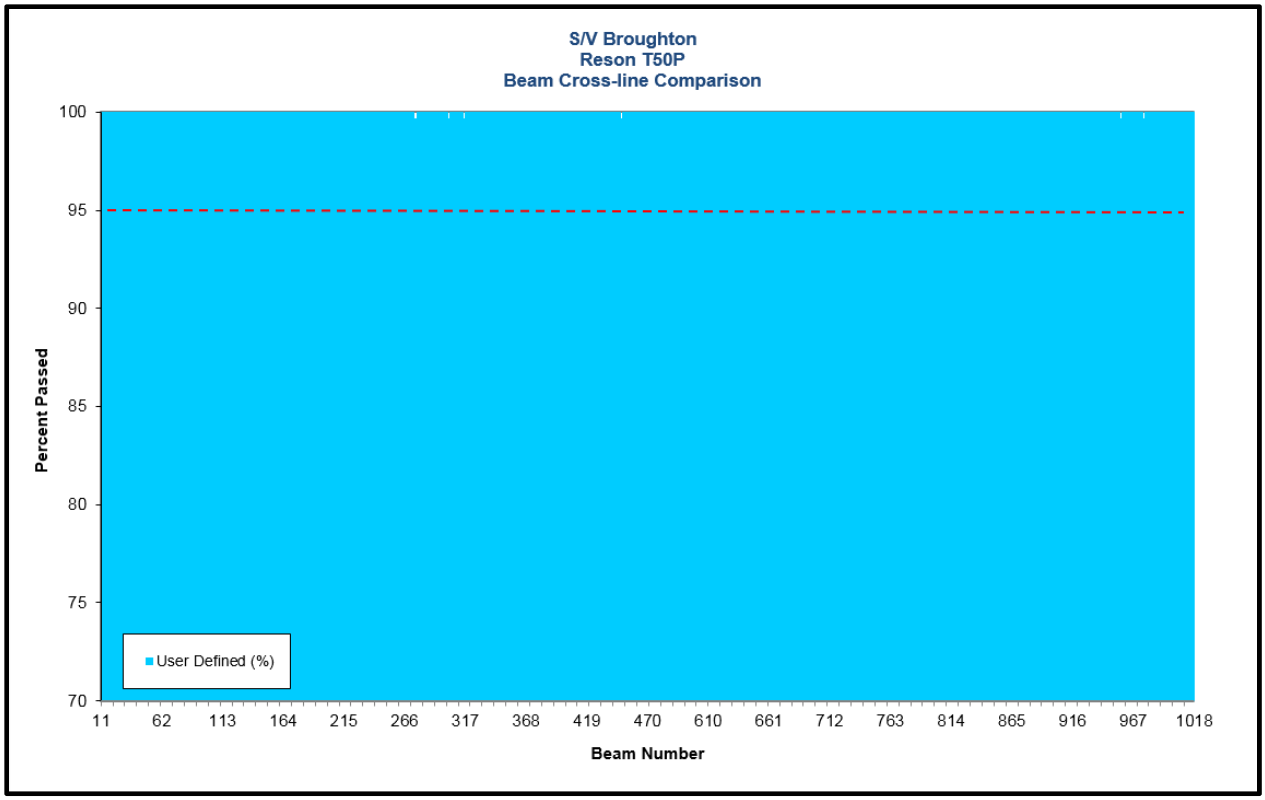


Figure 7. Histogram of *Broughton* Cross-Line Beam Analysis

For the cross-line beam analysis for the *River Hawk*, cross-line data was compared to gridded data from the *Broughton.* Figure 8 depicts the results of this cross-line beam analysis to document that all beams used in the 130-degree swath (65 degrees per side) meet project requirements.

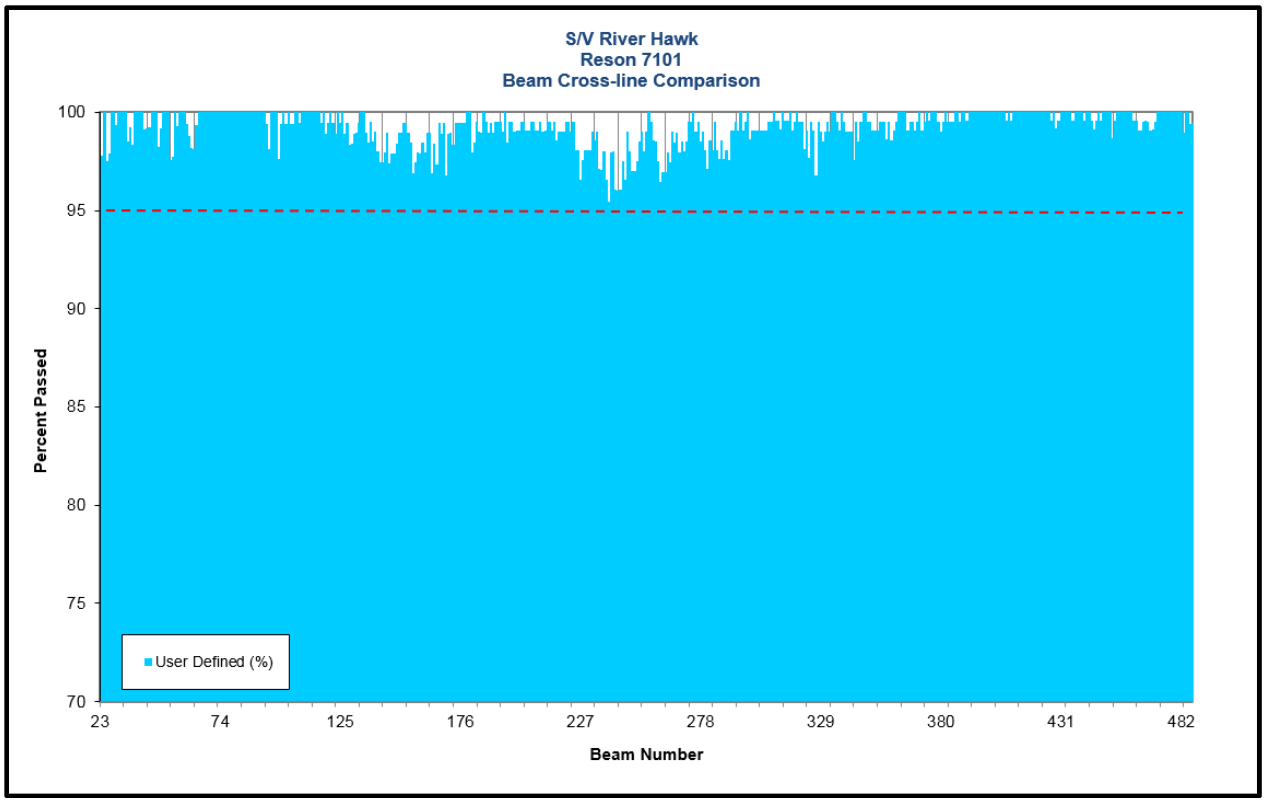


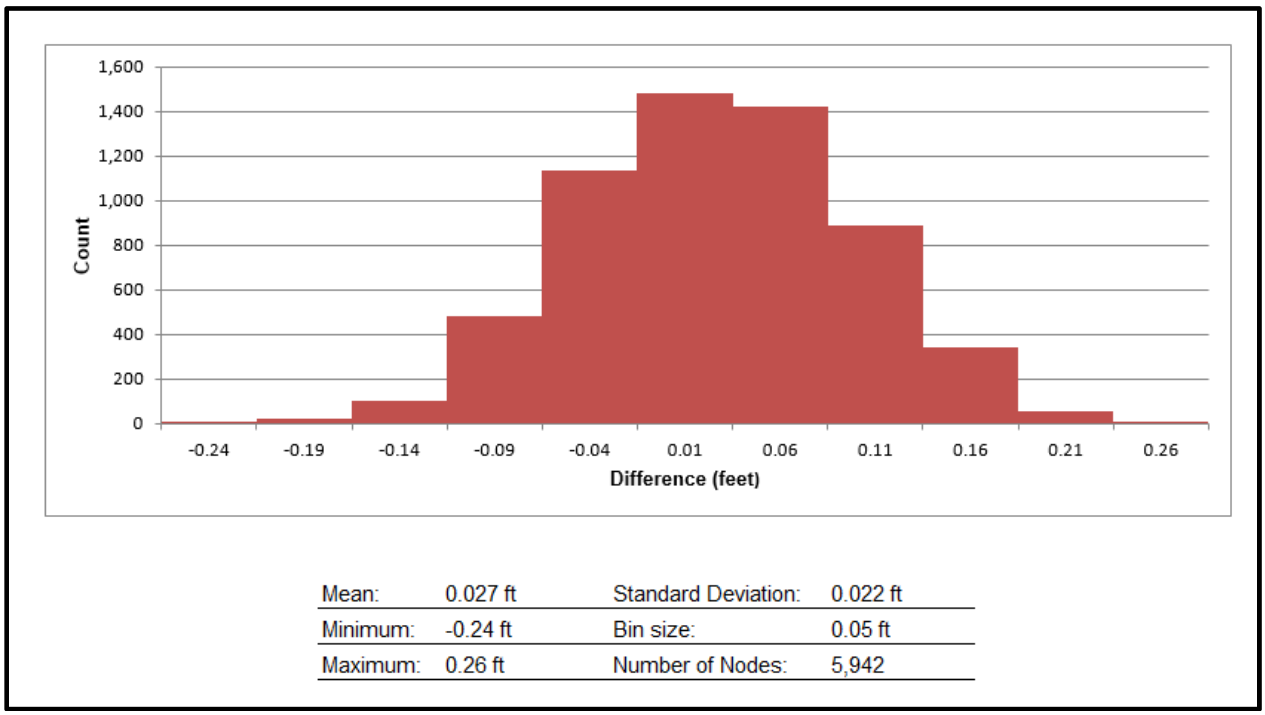
Figure 8. Histogram of *River Hawk* Cross-Line Beam Analysis

5.4 Cross-Line Difference Analysis – Precision Check

To assess the precision of the multibeam survey, cross-line data were gridded at a 1-meter resolution, consistent with the resolution grid from the main survey lines. A difference analysis was conducted between the surfaces to verify the precision of the survey met project requirements.

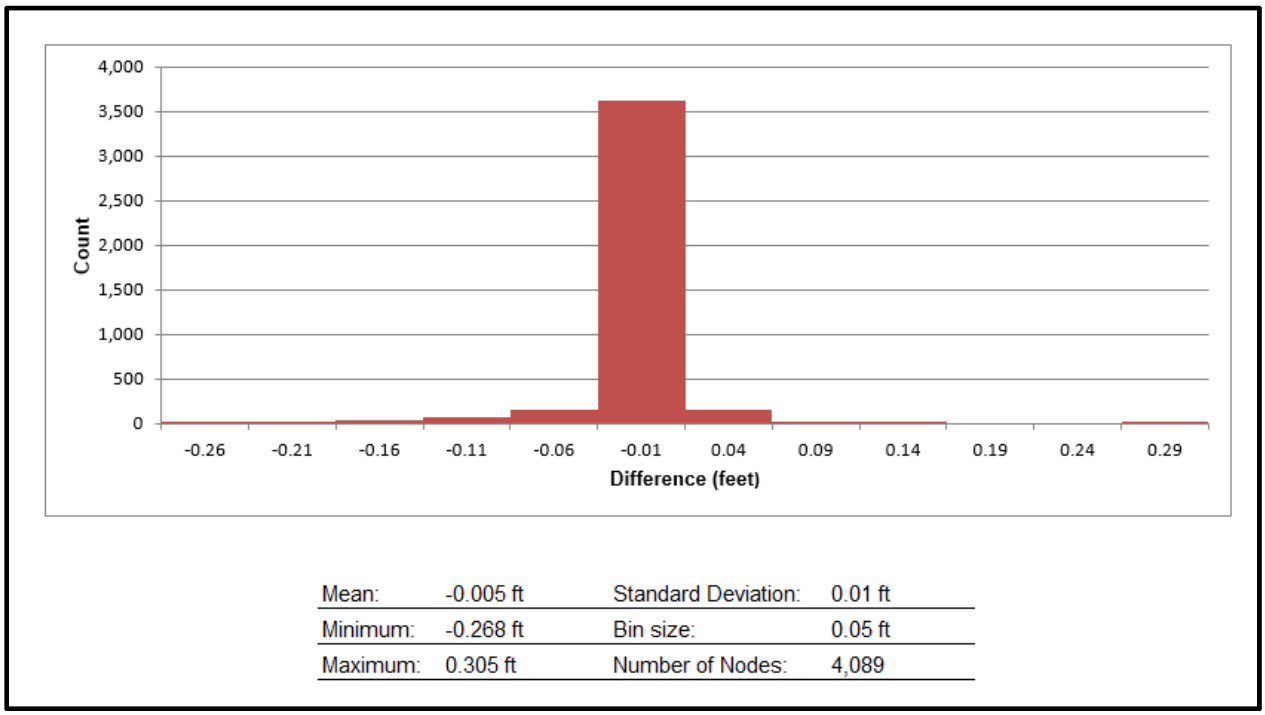
Figure 9 presents the full results of the analysis for the *Broughton* and documents that the survey meets project requirements for repeatability or mean difference (0.03 feet versus required 0.3 feet) and standard deviation at a 95% confidence level (+/- 0.02 feet vs +/- 0.3 feet).

Figure 10 presents the full results of the analysis for the *River Hawk* cross-line compared to the *Broughton* main line and documents that the survey meets project requirements for repeatability or mean difference (0.01 feet vs required 0.3 feet) and standard deviation at a 95% confidence level (+/- 0.01 feet vs +/- 0.3 feet).



Mean:	0.027 ft	Standard Deviation:	0.022 ft
Minimum:	-0.24 ft	Bin size:	0.05 ft
Maximum:	0.26 ft	Number of Nodes:	5,942

Figure 9. *Broughton* Cross-line versus Main Line Difference



Mean:	-0.005 ft	Standard Deviation:	0.01 ft
Minimum:	-0.268 ft	Bin size:	0.05 ft
Maximum:	0.305 ft	Number of Nodes:	4,089

Figure 10. *River Hawk* Cross-line versus *Broughton* Main Line Difference

6.0 DATA INTEGRATION AND MAPPING

The single-beam data was imported as XYZ point features into ESRI ArcGIS version 10.3.1. The multibeam gridded data was also imported in this manner, at a 1-meter resolution. The multibeam gridded data was also imported as a geotif raster. A statistical comparison was performed between overlapping single-beam points and the multibeam digital elevation model (DEM), with a mean difference of 0.13 feet and the standard deviation of the difference being 0.50 feet. Regions with larger differences between the single-beam and multibeam values were along the sloped banks, where accuracy in single-beam measurements is typically decreased and data from the multibeam is a grid node value from surrounding soundings.

To ensure that the most accurate data was used to generate the combined DEM, single-beam data points were removed from areas where there was overlapping multibeam coverage (Figure 11).

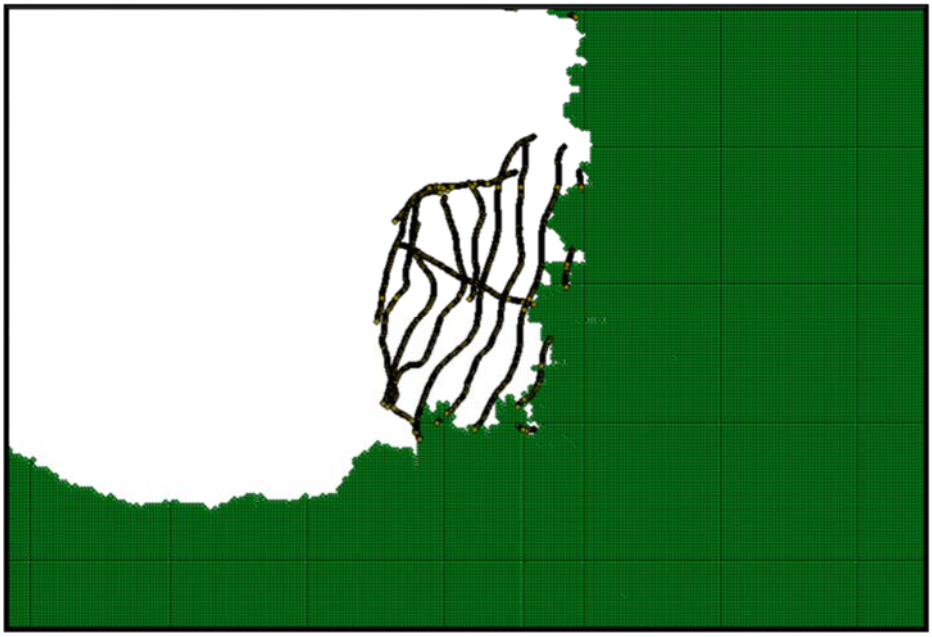


Figure 11. Multibeam 1-meter Grid (green) and Single-Beam Data (black) Point Data

A triangulated irregular network (TIN) was generated from the combined multibeam and single-beam point data (Figure 12), and the TIN was then converted to a raster using linear interpolation and a 1-meter cell size. The red line is the extent of the multibeam coverage and was used as a soft break line with data outside of this line not used when generating the TIN.

Contour lines, 2-foot minor and 10-foot major, were generated from the TIN surface. The raster was then exported in geotif format and imported into CARIS HIPS for the generation of hillshade imagery using a vertical exaggeration factor of two, a sun elevation angle of 55 degrees, and a sun azimuth of 0 degrees. For this survey, the entire reach of the survey is one data set and image. Due to the change in direction of the Willamette River, the sun elevation angle is higher than the normal 45 degrees to minimize shadowing of features and along steep banks as the river changes course. Prior surveys were modeled by map sheet with each having independent illumination angle and direction.

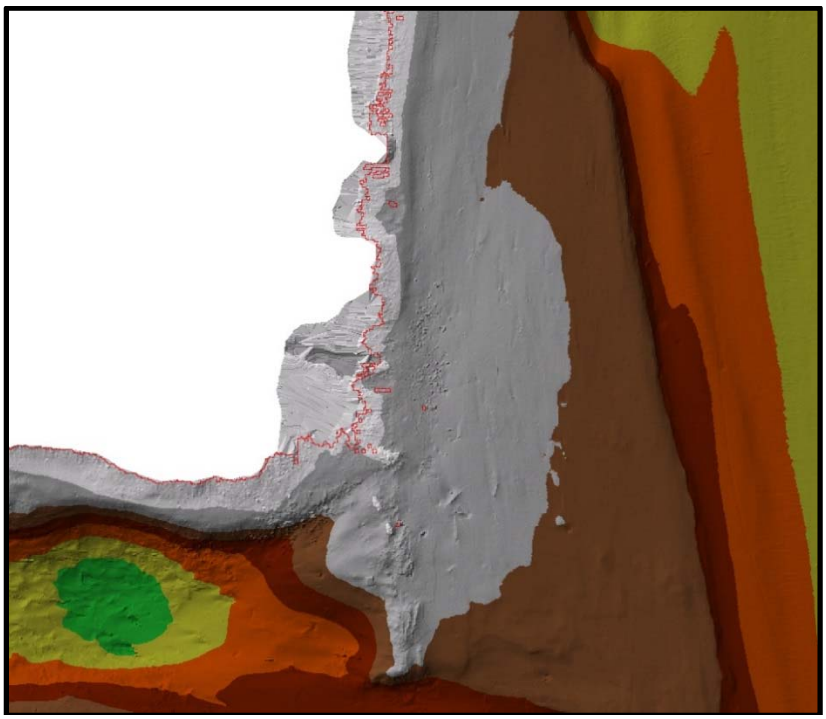


Figure 12. TIN Generated from the Combined Multibeam and Single-beam Point Data

Output files provided to client group include**:** a raster digital elevation model of the 2018 combined survey; contours with 2-foot minor and 10-foot major intervals; hill shaded relief maps color-coded by depth of the 2018 survey; and an ASCII file of all data points used in the combined TIN model. Data files are listed in Appendix A, Digital Data Catalog.

7.0 COMPARISON TO 2004 SURVEY

7.1 2004 Survey

In March of 2004 a multibeam survey was collected by DEA for the Lower Willamette Group (LWG) which spanned RM 0 to RM 15.6. The data were provided in NAD83/91, Oregon North Zone, with units in International Feet, using a vertical datum of NAVD88 Geoid 03, and provided in .e00 format. The interchange files were converted in ArcGIS to ArcGrid format, and the individual grids from each survey sheet were merged using the "Raster to New Mosaic" tool. Data was adjusted -0.09 feet vertically to account for changes in the NAVD88 geoid model and using older ellipsoid heights relative to current, more accurate, models (see Datums and Survey Control, as well as Table 2).

7.2 Methods for Comparison

To compare the 2018 survey to the 2004 multibeam survey, the "Surface Difference" tool was used in QPS Fledermaus v.7.7.8, using the previous data as the reference data set and the 2018 data as the comparison data set (i.e., 2018-Previous Survey). A scalar surface was generated containing X, Y, and the difference value. The surface was exported to floating point geotif format in NAD83 (2011). Oregon North Zone, with units in International Feet.

7.3 Difference Results

Difference maps are available in the ESRI ArcGIS Database provided with this report. There is evidence of significant and extensive shoaling (> 10 ft) between RM 8.6 and RM 9.9 (Figure 13). This shoal area is adjacent to a deep hole to the east and is likely formed from back eddies depositing material as the current moves around the river bend and widens.

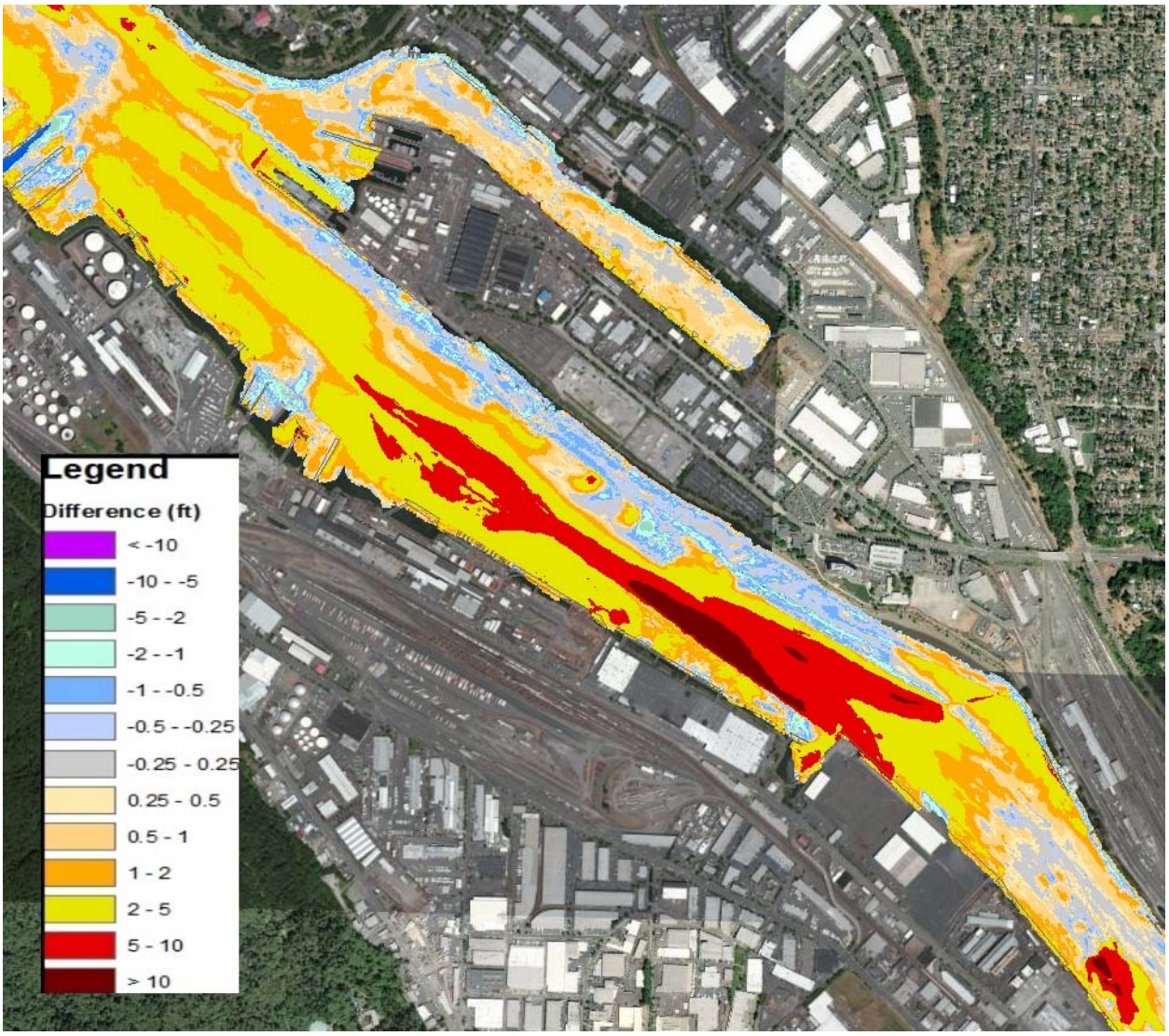


Figure 13. RM 8.6 and RM 9.9 Surface Difference between the 2018 and 2004 Surveys

There are also two smaller areas of significant shoaling between RM 10.5 and RM 10.6 and RM 10.9 and RM 11.0 (Figure 14). These areas indicate a difference of up to 20 feet from the 2004 survey and 25 feet from the 1990 survey. These areas of significant infill are likely from sediment migration into deeper holes likely formed from past dredging events.

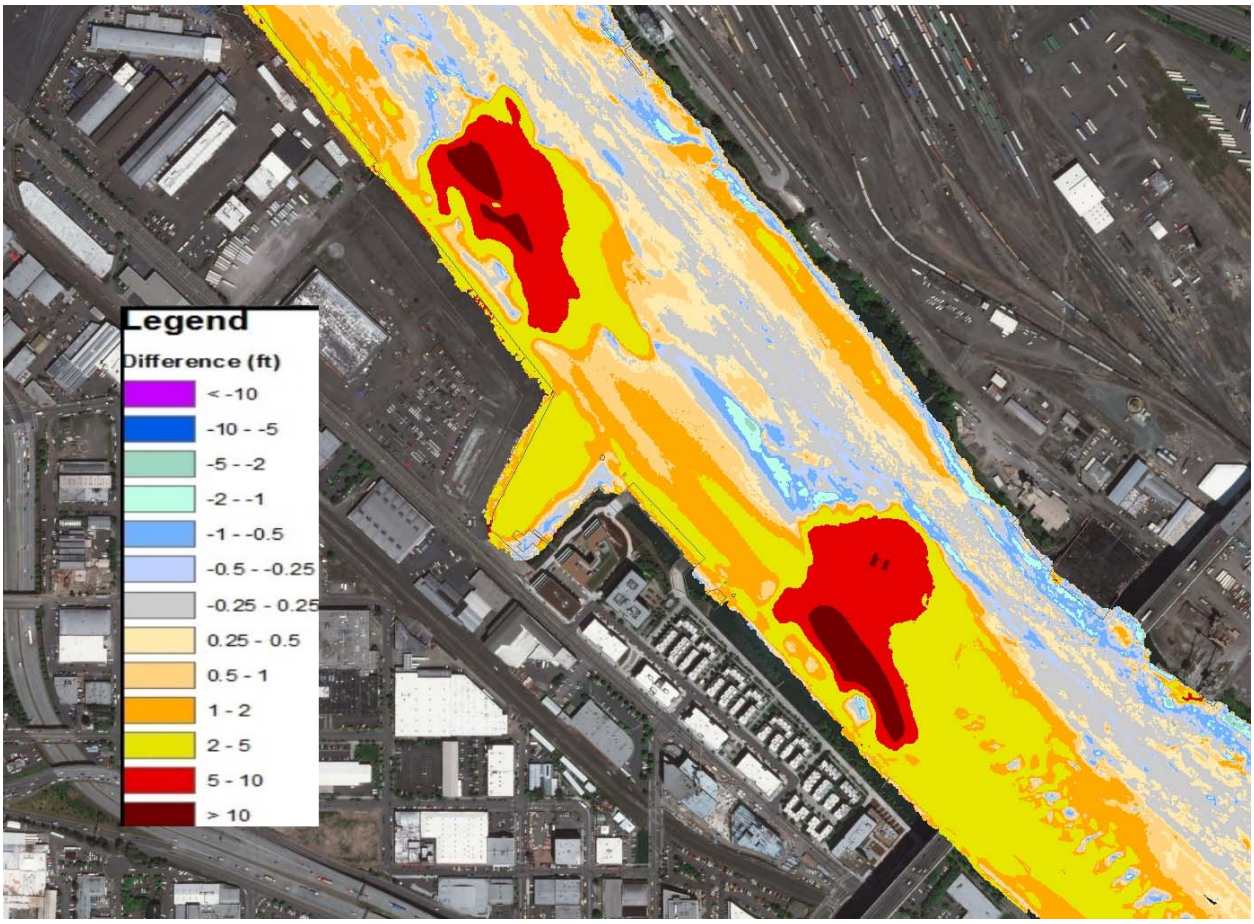


Figure 14. RM 10.5 and RM 11.0 Surface Difference between the 2018 and 2004 Surveys

Smaller areas where accretion has occurred roughly every half-mile are present between RM 4 and RM 8 (Figure 15). Some of these areas of infill are due to sediment migration into deeper holes likely from past dredging events. Other areas are found adjacent to small areas where erosion has occurred (on the scale of 3-5 feet) and are likely due to eddies as the current moves around the river bends in these areas. Evidence of dredging is also present in several small areas (RMs 3.7, 5, and 7.6, for example).

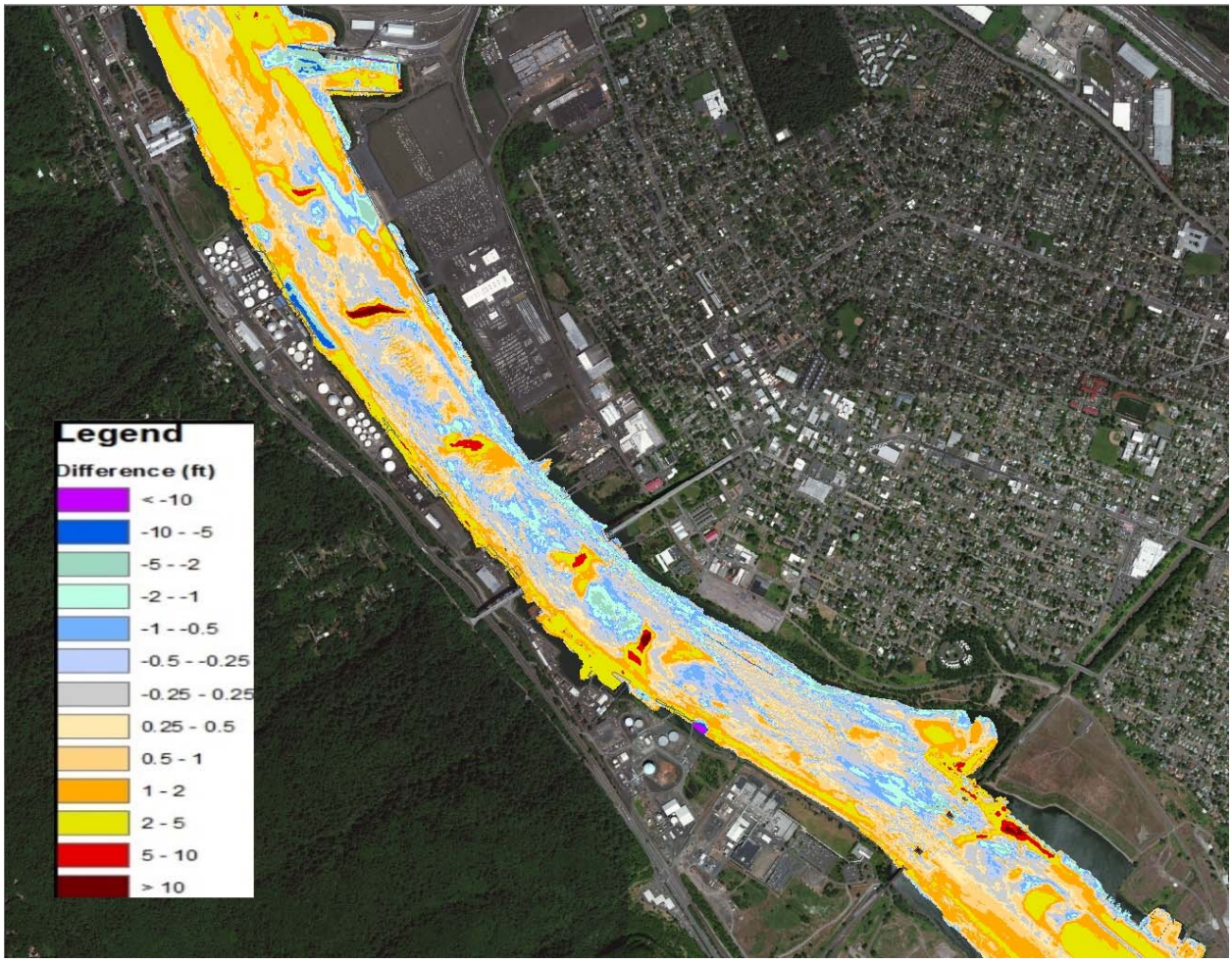


Figure 15. RM 4 to RM 8 Surface Difference between the 2018 and 2004 Surveys

8.0 DELIVERABLES

Deliverables were transmitted via a File Transfer Protocol (FTP) to the project client and included an ESRI ArcGIS digital database, project report, and map products.

8.1 Hydrographic Survey Report

A Hydrographic Survey Report documenting survey operations (this report) includes the following:

- A description of the navigation system, including a statement of its estimated accuracy for the survey area;
- A description of survey instrumentation;
- A description of the survey vessel, including its size, sensor configuration, instrument set-backs, and navigation antennae locations;
- A description of survey procedures;
- Survey Logs documenting the survey;

- Documentation that the survey meets the required accuracy and guidance as set by the USACE Manual EM 110-2-1003, November 30, 2013;
- Analysis of cross-lines and uncertainty;
- Data processing and integration;
- 2004 survey differencing; and
- Description of deliverables.

8.2 Map Products

Map products documenting the survey consisting of the following:

- Basemap of the Willamette River from aerial imagery;
- Basemap data consisting of shoreline, dock features, and USACE navigation channel;
- Title block, legend, notes, coordinate graticules, north arrow, and scale bar;
- Contours with 2-foot minor and 10-foot major intervals; and
- Hill shaded relief maps color-coded by depth of the surveyed area.

8.3 ESRI ArcGIS Database

An ESRI ArcGIS project file for the project was compiled and consists of the following:

- Basemap of the Willamette River from aerial imagery;
- Basemap data consisting of shoreline (river edge), docks and structures, river miles, and USACE navigation channel;
- Raster digital elevation model of the 2018 survey;
- Contours with 2-foot minor and 10-foot major intervals;
- Hill shaded relief maps color-coded by depth of the 2018 survey;
- Infrastructure, including streets and railroads;
- Map sheet layout polygons;
- Raster digital elevation model of the 2004 survey; and
- Difference surface comparing the 2018 survey to the 2004 survey.

8.4 Specific Deliverables

Specific deliverables consist of the following:

1. Map products are provided as PDF files suitable for printing.
2. Digital data, including:
    - Electronic versions of ESRI ArcGIS compatible files;
    - Metadata that conforms to the National Geospatial Data Policy; and
    - Report in PDF format.

APPENDIX A
DIGITAL DATA CATALOG

2018 Portland Harbor Digital Data Catalog		
File	**Description**	
Portland_Harbor_2018_v10.3.mxd	ArcGIS 10.3+ compatible MXD document	
Portland2018.gdb	ArcGIS File Geodatabase	
Files Within Portland2018.gdb	**File Type**	**Description**
DIFFERENCE_2018_2004	Raster Dataset	2018 and 2004 Survey Difference
INFRASTRUCTURE_DocksandStructures	Feature Class	Basemap feature of Willamette River Docks and Shoreline Structures
INFRASTRUCTURE_NAVIGATION_CHANNEL	Feature Class	Basemap feature of Willamette River Navigation Channel
INFRASTRUCTURE_Railroads	Feature Class	Basemap feature of Willamette River Railroads
INFRASTRUCTURE_RiverEdge	Feature Class	Basemap feature of Willamette River Edge
INFRASTRUCURE_Rivermiles	Feature Class	Basemap feature of Willamette River Mile Markers
INFRASTRUCTURE_RM_Tenths_line	Feature Class	Basemap feature of Willamette River Tenth Mile Markers
INFRASTRUCTURE_Streets	Feature Class	Basemap feature of Willamette River Streets
Match_Line	Feature Class	Feature Used for Sheet Matching
PORTLAND2018_10ftContours	Feature Class	2018 10-ft Major Contour Lines
PORTLAND2018_2ftContours	Feature Class	2018 2-ft Minor Contour Lines
PORTLAND2018_Survey	Raster Dataset	2018 Multibeam and Single Beam Combined Surface Digital Elevation Model
PORTLAND2018_Survey_Hillshade	Raster Dataset	2018 Sun-Illuminated Hillshade Imagery
PRIOR_2004_corrected	Raster Dataset	2004 Multibeam Survey
SHEET_1	Feature Class	Sheet 1 Boundary
SHEET_2	Feature Class	Sheet 2 Boundary
SHEET_3	Feature Class	Sheet 3 Boundary
SHEET_4	Feature Class	Sheet 4 Boundary
SHEET_5	Feature Class	Sheet 5 Boundary
SHEET_6	Feature Class	Sheet 6 Boundary

APPENDIX B
CONTROL FIELD NOTES AND SURVEY LOGS

NOTE: This form intended for field use. Unsolicited data submitted to NGS must be converted to bluebook format.

--> Click here to clear the sample data <--

GPS STATION OBSERVATION LOG
April 16, 2003

Station Designation: (check applicable: __ FBN __ CBN __ PAC __ SAC __ BM)
2100

Station PID, if any:

Date (UTC): 06-Mar-18

General Location: DEA Office 2100 SW River Parkway, Portland

Airport ID, if any:

Station 4-Character ID:

Day of Year: 065

Project Name: Portland Harbor - AETR00000034

Project Number: GPS-

Station Serial # (SSN):

Session ID:(A,B,C etc)

NAD83 Latitude: o ' "

NAD83 Longitude: o ' "

NAD83 Ellipsoidal Height: meters

NAVD88 Orthometric Ht.: meters

GEOID99 Geoid Height: meters

Agency Full Name: David Evans and Associates, Inc.

Operator Full Name: David T. Moehl

Phone #: ( ) (360) 314-3200

e-mail address: dtm@deainc.com

Observation Session Times (UTC):
Sched. Start _____ Stop _____
Actual Start 18:55 Stop 23:00

Epoch Interval= 1 Seconds

Elevation Mask = 10 Degrees

Receiver Brand & Model: Trimble SPS855

P/N: 69855-60
S/N: 5506R0075
Firmware Version: 5.30

❒ CamCorder Battery, ❒ 12V DC, ❒ 110V AC, ❒ Other

Antenna Code*, Brand & Model: Trimble Zephyr 3 Base

P/N: 115000-10
S/N: 3121179869
Cable Length, meters: 10

Vehicle is Parked n/a meters ____(direction) from antenna.

Antenna plumb before session?	(Y / N)	Circle
Antenna plumb after session?	(Y / N)	Yes or No
Antenna oriented to true North?	(Y / N)	-If no,
Weather observed at antenna ht.	(Y / N)	explain
Antenna ground plane used?	(Y / N)	"
Antenna radome used?	(Y / N)	If yes,
Eccentric occupation (>0.5 mm)?	(Y / N)	describe.
Any obstructions above 10°?	(Y / N)	Use
Radio interference source nearby	(Y / N)	Vis. form

Tripod or Antenna Mount: Check one:
❒ Fixed-Leg Tripod, ❒ Collapsible-leg tripod ❒ Fixed Mount
Brand & Model: Bolt
P/N:
S/N:
Last Adjustment date:

Psychrometer (if used) Brand & Model:
P/N:
S/N:
Last Calibration or check Date:

**** ANTENNA HEIGHT ****

	Before Session Begins: Meters	Feet	After Session Ends: Meters	Feet
A= Datum point to Top of Tripod (Tripod Height)	0.000		0.000	
B= Additional offset to ARP if any (Tribrach/Spacer)	0.000		0.000	
H= Antenna Height **= A + B** = Datum Point to Antenna Reference Point (ARP)	0.000	0.00	0.000	0.00

Meters = Feet x (0.3048)
Height Entered Into Receiver = 0.000 meters.

Note &/or sketch **ANY** unusual conditions. Be **Very Explicit** as to where and how Measured!

Barometer (if used) Brand & Model:
S/N:

Weather Data	Weather Codes	Time (UTC)	Dry-Bulb Temp Fahrenheit	Dry-Bulb Temp Celsius	WetBulb Temp Fahrenheit	WetBulb Temp Celsius	Rel. % Humidity	Atm. Pressure inches Hg	Atm. Pressure millibar
Before	00000	18:55							
Middle									
After	00000	23:00							

Remarks, Comments on Problems, Sketches, Pencil Rubbing, etc:

Calculate

5/8" bolt found on the southeast corner of the VAC screen wall on DEA office roof at 2100 SW River Parkway, Portland, OR. The geodetic antenna was screwed tight to the top of the double nut on the 5/8" bolt. The antenna height = zero to the antenna reference point (bottom of antenna mount).

Weather codes are required. Weather data are optional but encouraged. *Antenna code comes from ant_info file furnished by project coordinator.

Data File Name(s): 00750650.T02
(Standard NGS Format = aaaaddds.xxx)
where aaaa=4-Character ID, ddd=Day of Year, s=Session ID, xxx=file dependant extension

Updated Station Description:	❒ Attached	❒ Submitted earlier
Visibility Obstruction Form:	❒ Attached	❒ Submitted earlier
Photographs of Station:	❒ Attached	❒ Submitted earlier
Pencil Rubbing of Mark:	❒ Attached	

LOG CHECKED BY: Jon Dasler

Table of Weather Codes	CODE	PROBLEM	VISIBILITY	TEMPERATURE	CLOUD COVER	WIND
	0	did not occur	Good, over 15 miles	Normal, 32° F- 80° F	Clear, below 20%	Calm, under 5mph (8km/h)
	1	did occur	Fair, 7-15 miles	Hot, over 80°F (27 C)	Cloudy, 20% to 70%	Moderate, 5 to 15 mph
	2	- not used -	Poor, under 7 miles	Cold, below 32° F (0 C)	Overcast, over 70%	Strong, over15 mph (24km/h)
Examples:	00000 = No problem, good visibility, normal temp, clear, calm wind			12121 = Problems, poor visibility, hot, overcast, moderate wind		

Photo of Monument 2100

Photo of Monument 2100

GNSS Setup on RAINDEER

NOTE: This form intended for field use. Unsolicited data submitted to NGS must be converted to bluebook format.

--> Click here to clear the sample data <--

GPS STATION OBSERVATION LOG
April 16, 2003

Station Designation: (check applicable: __ FBN __ CBN __ PAC __ SAC __ BM) 2100		Station PID, if any:	Date (UTC): 06-Mar-18
General Location: DEA Office 2100 SW River Parkway, Portland	Airport ID, if any:	Station 4-Character ID:	Day of Year: 065
Project Name: Portland Harbor - AETR00000034	Project Number: GPS-	Station Serial # (SSN):	Session ID:(A,B,C etc)

NAD83 Latitude o ' "	NAD83 Longitude o ' "	NAD83 Ellipsoidal Height meters NAVD88 Orthometric Ht. meters GEOID99 Geoid Height meters
Observation Session Times (UTC): Sched. Start _____ Stop _____ Actual Start 18:55 Stop 23:00	Epoch Interval= 1 Seconds Elevation Mask = 10 Degrees	Agency Full Name: David Evans and Associates, Inc. Operator Full Name: David T. Moehl Phone #: ( ) (360) 314-3200 e-mail address: dtm@deainc.com

Receiver Brand & Model: Trimble SPS855
P/N: 69855-60
S/N: 5506R0075
Firmware Version: 5.30
❒ CamCorder Battery, ❒ 12V DC, ❒ 110V AC, ❒ Other

Antenna Code*, Brand & Model: Trimble Zephyr 3 Base
P/N: 115000-10
S/N: 3121179869
Cable Length, meters: 10
Vehicle is Parked n/a meters ____(direction) from antenna.

Antenna plumb before session?	(Y / N)	Circle
Antenna plumb after session?	(Y / N)	Yes or No
Antenna oriented to true North?	(Y / N)	-If no,
Weather observed at antenna ht.	(Y / N)	explain
Antenna ground plane used?	(Y / N)	"
Antenna radome used?	(Y / N)	If yes,
Eccentric occupation (>0.5 mm)?	(Y / N)	describe.
Any obstructions above 10°?	(Y / N)	Use
Radio interference source nearby	(Y / N)	Vis. form

Tripod or Antenna Mount: Check one:
❒ Fixed-Leg Tripod, ❒ Collapsible-leg tripod ❒ Fixed Mount
Brand & Model: Bolt
P/N:
S/N:
Last Adjustment date:

Psychrometer (if used) Brand & Model:
P/N:
S/N:
Last Calibration or check Date:

**** ANTENNA HEIGHT ****

	Before Session Begins: Meters	Feet	After Session Ends: Meters	Feet
A= Datum point to Top of Tripod (Tripod Height)	0.000		0.000	
B= Additional offset to ARP if any (Tribrach/Spacer)	0.000		0.000	
H= Antenna Height **= A + B** = Datum Point to Antenna Reference Point (ARP)	1.997	6.55	1.997	6.55

Meters = Feet x (0.3048)
Height Entered Into Receiver = 0.000 meters.
Note &/or sketch **ANY** unusual conditions. Be **Very Explicit** as to where and how Measured!

Barometer (if used) Brand & Model:
S/N:

Weather Data	Weather Codes	Time (UTC)	Dry-Bulb Temp Fahrenheit	Dry-Bulb Temp Celsius	WetBulb Temp Fahrenheit	WetBulb Temp Celsius	Rel. % Humidity	Atm. Pressure inches Hg	Atm. Pressure millibar
Before	00000	18:55							
Middle									
After	00000	23:00							

Remarks, Comments on Problems, Sketches, Pencil Rubbing, etc:

Calculate

5/8" bolt found on the southeast corner of the VAC screen wall on DEA office roof at 2100 SW River Parkway, Portland, OR. The geodetic antenna was screwed tight to the top of the double nut on the 5/8" bolt. The antenna height = zero to the antenna reference point (bottom of antenna mount).

Weather codes are required. Weather data are optional but encouraged. *Antenna code comes from ant_info file furnished by project coordinator.

Data File Name(s): 00750650.T02
(Standard NGS Format = aaaaddds.xxx)
where aaaa=4-Character ID, ddd=Day of Year, s=Session ID, xxx=file dependant extension

Updated Station Description:	❒ Attached	❒ Submitted earlier
Visibility Obstruction Form:	❒ Attached	❒ Submitted earlier
Photographs of Station:	❒ Attached	❒ Submitted earlier
Pencil Rubbing of Mark:	❒ Attached	

LOG CHECKED BY: Jon Dasler

Table of Weather Codes	CODE	PROBLEM	VISIBILITY	TEMPERATURE	CLOUD COVER	WIND
	0	did not occur	Good, over 15 miles	Normal, 32° F- 80° F	Clear, below 20%	Calm, under 5mph (8km/h)
	1	did occur	Fair, 7-15 miles	Hot, over 80°F (27 C)	Cloudy, 20% to 70%	Moderate, 5 to 15 mph
	2	- not used -	Poor, under 7 miles	Cold, below 32° F (0 C)	Overcast, over 70%	Strong, over15 mph (24km/h)
Examples:	00000 = No problem, good visibility, normal temp, clear, calm wind			12121 = Problems, poor visibility, hot, overcast, moderate wind		

Photo of Monument RAINDEER

Photo of Monument RAINDEER

GNSS Setup on RAINDEER

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--> Click here to clear the sample data <--

GPS STATION OBSERVATION LOG
April 16, 2003

Station Designation: (check applicable: __ FBN __ CBN __ PAC __ SAC __ BM) 2100		Station PID, if any:	Date (UTC): 06-Mar-18
General Location: DEA Office 2100 SW River Parkway, Portland	Airport ID, if any:	Station 4-Character ID:	Day of Year: 065
Project Name: Portland Harbor - AETR00000034	Project Number: GPS-	Station Serial # (SSN):	Session ID:(A,B,C etc)

NAD83 Latitude o ‘ “	NAD83 Longitude o ‘ “	NAD83 Ellipsoidal Height meters NAVD88 Orthometric Ht. meters GEOID99 Geoid Height meters	Agency Full Name: David Evans and Associates, Inc. Operator Full Name: David T. Moehl Phone #: ( ) (360) 314-3200 e-mail address: dtm@deainc.com

Observation Session Times (UTC):
Sched. Start _____ Stop _____
Actual Start 18:55 Stop 23:00

Epoch Interval= 1 Seconds
Elevation Mask = 10 Degrees

Receiver Brand & Model: Trimble SPS855
P/N: 69855-60
S/N: 5506R0075
Firmware Version: 5.30
❒ CamCorder Battery, ❒ 12V DC, ❒ 110V AC, ❒ Other

Antenna Code*, Brand & Model: Trimble Zephyr 3 Base
P/N: 115000-10
S/N: 3121179869
Cable Length, meters: 10
Vehicle is Parked n/a meters ____(direction) from antenna.

Antenna plumb before session?	(Y / N)	Circle
Antenna plumb after session?	(Y / N)	Yes or No
Antenna oriented to true North?	(Y / N)	-If no,
Weather observed at antenna ht.	(Y / N)	explain
Antenna ground plane used?	(Y / N)	“
Antenna radome used?	(Y / N)	If yes,
Eccentric occupation (>0.5 mm)?	(Y / N)	describe.
Any obstructions above 10°?	(Y / N)	Use
Radio interference source nearby	(Y / N)	Vis. form

Tripod or Antenna Mount: Check one:
❒ Fixed-Leg Tripod, ❒ Collapsible-leg tripod ❒ Fixed Mount
Brand & Model: Bolt
P/N:
S/N:
Last Adjustment date:

Psychrometer (if used) Brand & Model:
P/N:
S/N:
Last Calibration or check Date:

**** ANTENNA HEIGHT ****

	Before Session Begins: Meters	Feet	After Session Ends: Meters	Feet
A= Datum point to Top of Tripod (Tripod Height)	0.000		0.000	
B= Additional offset to ARP if any (Tribrach/Spacer)	0.000		0.000	
H= Antenna Height **= A + B** = Datum Point to Antenna Reference Point (ARP)	2.000	6.56	2.000	6.56

Meters = Feet x (0.3048)
Height Entered Into Receiver = 0.000 meters.
Note &/or sketch **ANY** unusual conditions. Be **Very Explicit** as to where and how Measured!

Barometer (if used) Brand & Model:
S/N:

Weather Data	Weather Codes	Time (UTC)	Dry-Bulb Temp Fahrenheit	Dry-Bulb Temp Celsius	WetBulb Temp Fahrenheit	WetBulb Temp Celsius	Rel. % Humidity	Atm. Pressure inches Hg	Atm. Pressure millibar
Before	00000	18:55							
Middle									
After	00000	23:00							

Remarks, Comments on Problems, Sketches, Pencil Rubbing, etc:

Calculate

5/8" bolt found on the southeast corner of the VAC screen wall on DEA office roof at 2100 SW River Parkway, Portland, OR. The geodetic antenna was screwed tight to the top of the double nut on the 5/8" bolt. The antenna height = zero to the antenna reference point (bottom of antenna mount).

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(Standard NGS Format = aaaaddds.xxx)
where aaaa=4-Character ID, ddd=Day of Year, s=Session ID, xxx=file dependant extension

Updated Station Description:	❒ Attached	❒ Submitted earlier
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Photographs of Station:	❒ Attached	❒ Submitted earlier
Pencil Rubbing of Mark:	❒ Attached	

LOG CHECKED BY: Jon Dasler

Table of Weather Codes	CODE	PROBLEM	VISIBILITY	TEMPERATURE	CLOUD COVER	WIND
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	1	did occur	Fair, 7-15 miles	Hot, over 80°F (27 C)	Cloudy, 20% to 70%	Moderate, 5 to 15 mph
	2	- not used -	Poor, under 7 miles	Cold, below 32° F (0 C)	Overcast, over 70%	Strong, over15 mph (24km/h)

Examples: 00000 = No problem, good visibility, normal temp, clear, calm wind 12121 = Problems, poor visibility, hot, overcast, moderate wind

Sketch of Monument PH1

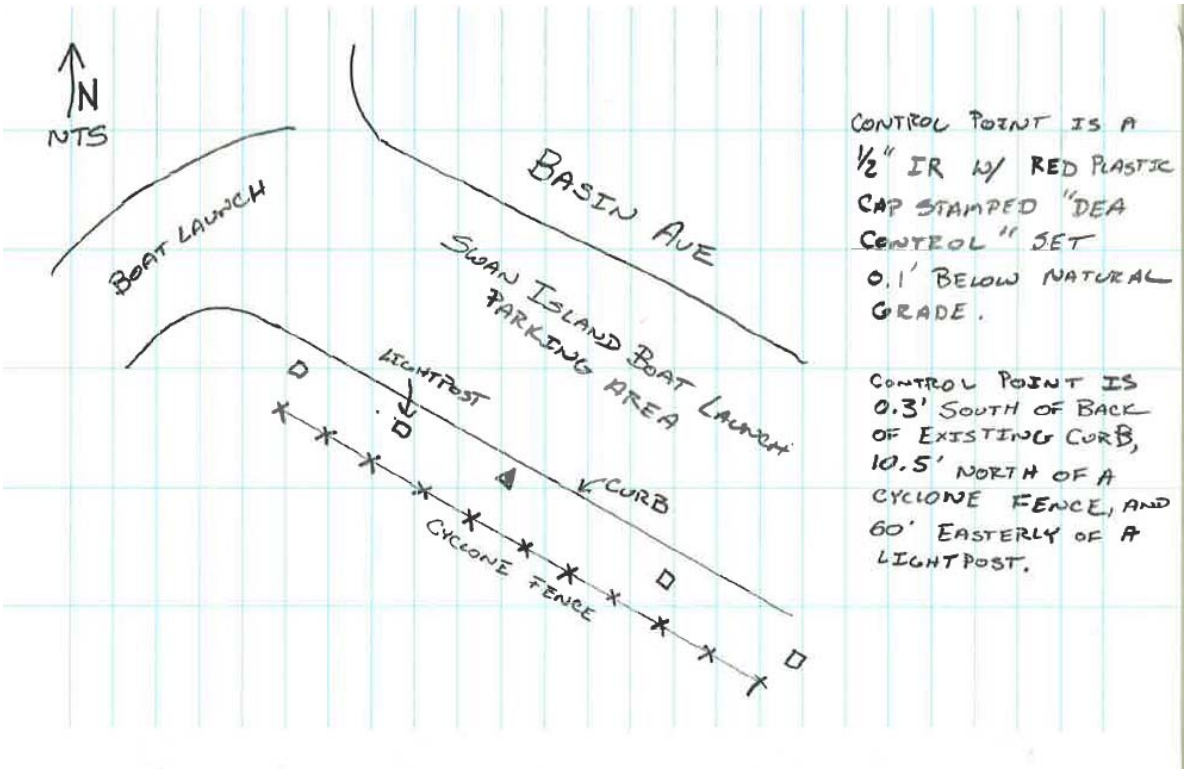

Photo of Monument PH1

GNSS Setup on PH1

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2801 SE Columbia Way, Suite 130
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Phone: (360)314-3200
Fax: (360)314-3250

Survey Information

Local Date	03/13/2018 (JD 72)	**Hydrographer**	DTM, JXMD
Contract		**Registry Number**	
Task Order		**Job Number**	AETR00000034
Contractor	David Evans and Associates, Inc. Marine Services		
Locality	Portland, Oregon		
Sub-Locality	Willamette River River Mile 1.9-11.8		
Operations	Multibeam Survey		
Comments	Portland Harbor Superfund		

Horizontal Control

Horizontal Datum	NAD83 (2011)	**Units**	International Feet
Coordinate System	State Plane, Oregon North		
Primary System	Applanix POS/MV V5	**PCS SN**	5602
IMU SN	1058	**Antenna 1 SN**	8569
Firmware Version	9.29	**Antenna 2 SN**	8568
Secondary System	Trimble SPS855	**Receiver SN**	0075
Firmware Version	5.30	**Antenna SN**	1441039513
Beacon Receiver	Intuicom RTK Bridge X	**Receiver SN**	X151065
Firmware Version	2.0.0	**Antenna SN**	n/a
Beacon Station 1	DEA Marine Services Roof	**Station ID**	DEMSI
Beacon Station 2	n/a	**Station ID**	n/a
Cable Counter	n/a	**Serial Number**	n/a

Vertical Control

Gauge/Base Location	n/a		
Additional Information	RTK elevations		
Vertical Datum	NAVD88 - Geoid12a	**Units**	Feet

Vessel and Crew

Survey Vessel	Broughton	**Survey Vessel**	Broughton
Vessel Crew	n/a	**Vessel Crew**	n/a
Survey Crew	DTM, JXMD	**Survey Crew**	DTM, JXMD
Towing Point	n/a	**Towing Point**	n/a

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Sonar Equipment

Model	Dual Reson T50P - Master	**Topside SN**	95772016142
Transmit SN	5015069	**Receive SN**	2714149
Model	n/a	**Topside SN**	n/a
		Towfish SN	n/a
Primary SVP	AML Smart SVP	**Body SN**	5588
		Velocity Tip SN	5498
Surface SVP	AML SV SmartX	**Body SN**	1322
		Velocity Tip SN	n/a
Secondary SVP	AML Smart SVP	**Serial Number**	5643/2028
Other	TSlave Trans/Recv	**Serial number**	5015057/2714140
Other	Slave Topside	**Serial number**	95772016148

Acquisition Software

Line Planning	Hypack	**Version**	17.1.10.0
Primary Navigation	Hypack Survey	**Version**	17.1.10.0
Multibeam Acquisition	Hysweep	**Version**	14.0.9.0
Multibeam Processor	SeaBat Controller	**Version**	FP4 V6.0.0.11
Sidescan Acquisition	n/a	**Version**	n/a
Sidescan Processor	n/a	**Version**	n/a
POS/MV Controller	POS View	**Version**	9.21
MVP Acquisition	n/a	**Version**	n/a
SVP Acquisition	MVP Controller	**Version**	2.45
SVP Processing	MVP Controller	**Version**	2.45
SVP Conversion	SVP Convert	**Version**	2.0.4
Other	SeaBatUI 4.0.0.0		
Other	7k Center 6.3.0.8		
Other	Caris Onboard 1.4.0		

Start of Day Checklist

Drafts		**Start logging POSPac time**	
Check that MVP fish and block secured		**Survey area arrival time**	
Check for SSS cable fatigue		**SV comparison - MVP vs.surface probe**	
Check safety equipment		**Receiving differential corrections**	
Check weather forecast		**SSS offsets**	
Create/set data directories - Hypack PC		**Set SSS cable out**	
ISIS PC		**Set SSS and MBES settings**	
MVP PC		**Update system status in LineLog**	
Notes PC		**Complete roll lines**	
Dock departure time			

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Date/Time (UTC)	*Code*	*Comments*
03/13/2018 16:48	System Status	System status record modified

Weather	**Sea state**		**Wind speed**	
	Comments			
Echo Sounder Settings	**Range**		**Gain**	
	Power		**Spreading**	
	Absorption		**Ping rate**	
	Pulse width		**Operator**	
	Type and Frequency	Multibeam High (400kHz)		
Sidescan Sonar Settings	No sidescan			

03/13/2018 16:48	Custom entry	---NAD83(2011) Oregon North, International Feet, NAVD88, Geoid12A
03/13/2018 16:49	Custom entry	---DEMSI roof position check, -0.2024 in Hypack
03/13/2018 16:49	Position check	Position Check File= 2018BR0721650.HSX, Primary E,N= 7654419.84 m,718170.73 m, Secondary E,N= 7654419.84 m,718170.73 m, Known Separation= 0.000 m, Calc Separation= 0.000 m, Difference= 0.000 m, Comments= 71.67 known elevation: 71.73 observed delta 0.06' elevation
03/13/2018 16:52	Custom entry	---Survey Offsets; -8.201 in hypack, MBoffset, 4.690, -1.620, 1.570; -4.670, -1.600, 1.620;
03/13/2018 17:04	System Status	System status record modified

Weather	**Sea state**		**Wind speed**	
	Comments			
Echo Sounder Settings	**Range**		**Gain**	
	Power		**Spreading**	
	Absorption		**Ping rate**	
	Pulse width		**Operator**	
	Type and Frequency	Multibeam High (400kHz)		
Sidescan Sonar Settings	No sidescan			

03/13/2018 18:17	Custom entry	Launch Broughton for MOB testing and transit to Fred's Marina
03/13/2018 18:18	Custom entry	Start logging Vessel_Rover: 0720.TO2
03/13/2018 18:26	POSPac file	POSPac file started
03/13/2018 18:27	Draft	Draft P= 0.560m, S= 0.480m, Avg= 0.520m, Comments=
03/13/2018 18:37	Custom entry	Deploy Sonars
03/13/2018 18:38	Custom entry	---Dual Head T50-P Tilted ~15 degrees; 512 beams, 350kHz; EA
03/13/2018 18:52	SVP check cast	SV Check Cast File 1= AML_20180313_0001, Max Depth= 0.0 m, Avg SV= 0.0 m/s, SV Check Cast File 2= AML2_20180313_0001, Max Depth= 0.0 m, Avg SV= 0.0 m/s, Surface SV= 1430.6 m/s, Difference= 0.0 m/s, Comments= Cast data will be evaluated in the office, both sensors appear to be reading similar values of ~1430.6m/s. Sensors were strapped tegether during cast and zeroed out before recording.
03/13/2018 19:04	Custom entry	---Tide Float - LL Check starboard head / port head; RTK observation #100
03/13/2018 19:05	Main scheme line	SOL file= 2018BR0721905.HSX, Line Number= , Azimuth= , Comments= starboad LL measure = -10.7 ft RTK Point #100 elev = 10.604
03/13/2018 19:08	Main scheme line	SOL file= 2018BR0721908.HSX, Line Number= , Azimuth= , Comments= Port side LL = -10.54, RKT Pt#101 = 10.53
03/13/2018 19:12	Main scheme line	SOL file= 2018BR0721912.HSX, Line Number= , Azimuth= , Comments= No TID 1 in last line, logged new line with same values as previous
03/13/2018 19:14	Custom entry	RTK 30-sec point = #102 elevation = 10.601
03/13/2018 19:17	Bar check	Bar check, bar at 3.000 m, SV at head = 1430.60 m/s, Draft P= 0.560 m, S= 0.480 m, Draft Corr= 0.419 m, Raw Sonar= 2.100 m, Corrected Sonar= 2.939 m, Difference= -0.061 m, Comments=Top of plate measure = 0.38ft; 0.116m
03/13/2018 19:31	Bar check	Bar check, bar at 3.000 m, SV at head = 1430.60 m/s, Draft P= 0.560 m, S= 0.560 m, Draft Corr= 0.435 m, Raw Sonar= 1.950 m, Corrected Sonar= 2.945 m, Difference= -0.055 m, Comments= Top of plate = 0.85 ft, 0.260m
03/13/2018 19:41	System Status	System status record modified

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Date/Time (UTC)	Code	Comments

Weather	**Sea state**	Calm	**Wind speed**	0-5kts
	Comments	Overcast, rainy		
Echo Sounder Settings	**Range**	40	**Gain**	21
	Power	220	**Spreading**	30
	Absorption	70	**Ping rate**	25
	Pulse width	500	**Operator**	JXMD
	Type and Frequency	Multibeam High (400kHz)		
Sidescan Sonar Settings	No sidescan			

03/13/2018 20:02	System Status	System status record modified

Weather	**Sea state**	Calm	**Wind speed**	0-5kts
	Comments	Overcast, rainy		
Echo Sounder Settings	**Range**	40	**Gain**	21
	Power	220	**Spreading**	30
	Absorption	70	**Ping rate**	25
	Pulse width	500	**Operator**	JXMD
	Type and Frequency	Multibeam High (400kHz)		
Sidescan Sonar Settings	No sidescan			

03/13/2018 20:02	Test line	SOL file= 2018BR0722002.HSX, Line Number= , Azimuth= , Comments= Test line - REJECT
03/13/2018 20:14	Custom entry	Underway for testing
03/13/2018 20:18	Custom entry	Test1: 120 degrees, 45/45
03/13/2018 20:24	Main scheme line	SOL file= 2018BR0722024.HSX, Line Number= , Azimuth= , Comments= 120 degrees 45-45
03/13/2018 20:25	Main scheme line	SOL file= 2018BR0722025.HSX, Line Number= , Azimuth= , Comments= 120 degrees 45-45
03/13/2018 20:26	Main scheme line	SOL file= 2018BR0722026.HSX, Line Number= , Azimuth= , Comments= 120 degrees 45-45
03/13/2018 20:28	Main scheme line	SOL file= 2018BR0722028.HSX, Line Number= , Azimuth= , Comments= 120 degrees 45-45
03/13/2018 20:29	Main scheme line	SOL file= 2018BR0722029.HSX, Line Number= , Azimuth= , Comments= 120 degrees 45-45
03/13/2018 20:34	System Status	System status record modified

Weather	**Sea state**	Calm	**Wind speed**	0-5kts
	Comments	Overcast, rainy		
Echo Sounder Settings	**Range**	40	**Gain**	21
	Power	220	**Spreading**	30
	Absorption	70	**Ping rate**	25
	Pulse width	500	**Operator**	JXMD
	Type and Frequency	Multibeam High (400kHz)		
Sidescan Sonar Settings	No sidescan			

03/13/2018 20:34	Custom entry	Test2 Variable swath angles
03/13/2018 20:35	Main scheme line	SOL file= 2018BR0722035.HSX, Line Number= , Azimuth= , Comments= 120 degrees 55-55
03/13/2018 20:37	Main scheme line	SOL file= 2018BR0722037.HSX, Line Number= , Azimuth= , Comments= 120 degrees 55-55
03/13/2018 20:38	Main scheme line	SOL file= 2018BR0722038.HSX, Line Number= , Azimuth= , Comments= 120 degrees 60-60
03/13/2018 20:40	Main scheme line	SOL file= 2018BR0722040.HSX, Line Number= , Azimuth= , Comments= 120 degrees 60-60
03/13/2018 20:41	Main scheme line	SOL file= 2018BR0722041.HSX, Line Number= , Azimuth= , Comments= 120 degrees 70-70
03/13/2018 20:43	Main scheme line	SOL file= 2018BR0722043.HSX, Line Number= , Azimuth= , Comments= 120 degrees 70-70
03/13/2018 20:45	Main scheme line	SOL file= 2018BR0722045.HSX, Line Number= , Azimuth= , Comments= 120 degrees 90-90 slower speed 6.8kts vs 8.0 kts
03/13/2018 20:47	Main scheme line	SOL file= 2018BR0722047.HSX, Line Number= , Azimuth= , Comments= 120 degrees 90-90 5.0kts
03/13/2018 20:48	Custom entry	Test3 Shoreline Opened up
03/13/2018 20:49	System Status	System status record modified

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Date/Time (UTC)	*Code*	*Comments*

Weather	**Sea state**	Calm	**Wind speed**	0-5kts
	Comments	Overcast, rainy		
Echo Sounder Settings	**Range**	40	**Gain**	21
	Power	220	**Spreading**	30
	Absorption	70	**Ping rate**	25
	Pulse width	500	**Operator**	JXMD
	Type and Frequency	Multibeam High (400kHz)		
Sidescan Sonar Settings	No sidescan			

03/13/2018 20:49	Main scheme line	SOL file= 2018BR0722049.HSX, Line Number= , Azimuth= , Comments= 150 degrees 90-90
03/13/2018 20:52	Main scheme line	SOL file= 2018BR0722052.HSX, Line Number= , Azimuth= , Comments= 150 degrees 90-90
03/13/2018 20:54	Main scheme line	SOL file= 2018BR0722054.HSX, Line Number= , Azimuth= , Comments= 140 degrees 90-90
03/13/2018 20:57	Main scheme line	SOL file= 2018BR0722057.HSX, Line Number= , Azimuth= , Comments= 140 degrees 90-90
03/13/2018 20:59	Custom entry	Pull Sonars and transit to Fred's Marina
03/13/2018 21:00	SVP cast	SVP002
03/13/2018 21:03	Custom entry	---Finished with testing, pulling sonar heads, transiting to Fred's Marina
03/13/2018 21:06	System Status	System status record modified

Weather	**Sea state**	Calm	**Wind speed**	0-5kts
	Comments	Overcast, rainy		
Echo Sounder Settings	**Range**	40	**Gain**	21
	Power	220	**Spreading**	30
	Absorption	70	**Ping rate**	25
	Pulse width	500	**Operator**	JXMD
	Type and Frequency	Multibeam High (400kHz)		
Sidescan Sonar Settings	No sidescan			

03/13/2018 21:24	System Status	System status record modified

Weather	**Sea state**	Calm	**Wind speed**	0-5kts
	Comments	Overcast, rainy		
Echo Sounder Settings	**Range**	40	**Gain**	21
	Power	220	**Spreading**	30
	Absorption	70	**Ping rate**	25
	Pulse width	500	**Operator**	JXMD
	Type and Frequency	Multibeam High (400kHz)		
Sidescan Sonar Settings	No sidescan			

03/13/2018 21:27	Custom entry	Pulling into Mutnoma channel to moor up, talk with Marina director and drive back to Vancouver office

- Hydrographic Survey Log - Broughton - March 14, 2018

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2801 SE Columbia Way, Suite 130
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Survey Information

Local Date	03/14/2018 (JD 73)	**Hydrographer**	DTM, JXMD
Contract		**Registry Number**	
Task Order		**Job Number**	AETR00000034
Contractor	David Evans and Associates, Inc. Marine Services		
Locality	Portland, Oregon		
Sub-Locality	Willamette River River Mile 1.9-11.8		
Operations	Multibeam Survey		
Comments	Portland Harbor Superfund		

Horizontal Control

Horizontal Datum	NAD83 (2011)	**Units**	International Feet
Coordinate System	State Plane, Oregon North		
Primary System	Applanix POS/MV V5	**PCS SN**	5602
IMU SN	1058	**Antenna 1 SN**	8569
Firmware Version	9.29	**Antenna 2 SN**	8568
Secondary System	Trimble SPS855	**Receiver SN**	0075
Firmware Version	5.30	**Antenna SN**	1441039513
Beacon Receiver	Intuicom RTK Bridge X	**Receiver SN**	X151065
Firmware Version	2.0.0	**Antenna SN**	n/a
Beacon Station 1	DEA Marine Services Roof	**Station ID**	DEMSI
Beacon Station 2	n/a	**Station ID**	n/a
Cable Counter	n/a	**Serial Number**	n/a

Vertical Control

Gauge/Base Location	n/a		
Additional Information	RTK elevations		
Vertical Datum	NAVD88 - Geoid12a	**Units**	Feet

Vessel and Crew

Survey Vessel	Broughton	**Survey Vessel**	Broughton
Vessel Crew	n/a	**Vessel Crew**	n/a
Survey Crew	DTM, JXMD	**Survey Crew**	DTM, JXMD
Towing Point	n/a	**Towing Point**	n/a

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Sonar Equipment

Model	Dual Reson T50P - Master	**Topside SN**	95772016142
Transmit SN	5015069	**Receive SN**	2714149
Model	n/a	**Topside SN**	n/a
		Towfish SN	n/a
Primary SVP	AML Smart SVP	**Body SN**	5588
		Velocity Tip SN	5498
Surface SVP	AML SV SmartX	**Body SN**	1322
		Velocity Tip SN	n/a
Secondary SVP	AML Smart SVP	**Serial Number**	5643/2028
Other	TSlave Trans/Recv	**Serial number**	5015057/2714140
Other	Slave Topside	**Serial number**	95772016148

Acquisition Software

Line Planning	Hypack	**Version**	17.1.10.0
Primary Navigation	Hypack Survey	**Version**	17.1.10.0
Multibeam Acquisition	Hysweep	**Version**	14.0.9.0
Multibeam Processor	SeaBat Controller	**Version**	FP4 V6.0.0.11
Sidescan Acquisition	n/a	**Version**	n/a
Sidescan Processor	n/a	**Version**	n/a
POS/MV Controller	POS View	**Version**	9.21
MVP Acquisition	n/a	**Version**	n/a
SVP Acquisition	MVP Controller	**Version**	2.45
SVP Processing	MVP Controller	**Version**	2.45
SVP Conversion	SVP Convert	**Version**	2.0.4
Other	SeaBatUI 4.0.0.0		
Other	7k Center 6.3.0.8		
Other	Caris Onboard 1.4.0		

Start of Day Checklist

Drafts		**Start logging POSPac time**	
Check that MVP fish and block secured		**Survey area arrival time**	
Check for SSS cable fatigue		**SV comparison - MVP vs.surface probe**	
Check safety equipment		**Receiving differential corrections**	
Check weather forecast		**SSS offsets**	
Create/set data directories - Hypack PC		**Set SSS cable out**	
ISIS PC		**Set SSS and MBES settings**	
MVP PC		**Update system status in LineLog**	
Notes PC		**Complete roll lines**	
Dock departure time			

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Date/Time (UTC)	*Code*	*Comments*
03/14/2018 16:30	System Status	System status record modified

Weather	**Sea state**	Calm	**Wind speed**	0-5kts
	Comments	Overcast, rainy		
Echo Sounder Settings	**Range**	40	**Gain**	21
	Power	220	**Spreading**	30
	Absorption	70	**Ping rate**	25
	Pulse width	500	**Operator**	JXMD
	Type and Frequency	Multibeam High (400kHz)		
Sidescan Sonar Settings	No sidescan			

03/14/2018 16:32	Custom entry	Left DEA office at 0730 local time to travel to Fred's Marina
03/14/2018 16:33	Custom entry	Safety meeting at Fred's Marina from 0800-0930 local time
03/14/2018 16:34	Custom entry	---Survey Offsets; -8.201 in hypack, MBoffset, 4.690, -1.620, 1.570; -4.670, -1.600, 1.620;
03/14/2018 16:35	Custom entry	Start logging vessel rover: 0730.TO2
03/14/2018 16:36	POSPac file	POSPac file started: POSPAC_BR_20180314
03/14/2018 16:42	Custom entry	---Dual Head T50-P Tilted ~15 degrees; 512 beams, 350kHz; EA; 120 degrees
03/14/2018 17:09	Custom entry	Underway
03/14/2018 17:23	Custom entry	Deploy sonars
03/14/2018 17:30	SVP cast	AML_20180314_0001 1442m\s on cast and at sonar head
03/14/2018 17:31	System Status	System status record modified

Weather	**Sea state**	Calm	**Wind speed**	0-5kts
	Comments	Overcast, rainy		
Echo Sounder Settings	**Range**	40	**Gain**	21
	Power	220	**Spreading**	30
	Absorption	70	**Ping rate**	25
	Pulse width	500	**Operator**	JXMD
	Type and Frequency	Multibeam High (400kHz)		
Sidescan Sonar Settings	No sidescan			

03/14/2018 17:34	Main scheme line	SOL file= 2018BR0731734.HSX, Line Number= , Azimuth= , Comments= 60/60
03/14/2018 17:43	Main scheme line	SOL file= 2018BR0731743.HSX, Line Number= , Azimuth= , Comments= 60/60
03/14/2018 18:07	Main scheme line	SOL file= 2018BR0731807.HSX, Line Number= , Azimuth= , Comments=60/60
03/14/2018 18:19	Main scheme line	SOL file= 2018BR0731819.HSX, Line Number= , Azimuth= , Comments= 60/60
03/14/2018 18:31	Main scheme line	SOL file= 2018BR0731831.HSX, Line Number= , Azimuth= , Comments= 60/60
03/14/2018 18:35	System Status	System status record modified

Weather	**Sea state**	Calm	**Wind speed**	0-5kts
	Comments	Overcast, rainy		
Echo Sounder Settings	**Range**	40	**Gain**	21
	Power	220	**Spreading**	30
	Absorption	70	**Ping rate**	25
	Pulse width	500	**Operator**	JXMD
	Type and Frequency	Multibeam High (400kHz)		
Sidescan Sonar Settings	No sidescan			

03/14/2018 18:42	Main scheme line	SOL file= 2018BR0731842.HSX, Line Number= , Azimuth= , Comments= 60/60
03/14/2018 18:54	Custom entry	Hysweep crash at end of line
03/14/2018 18:55	SVP cast	AML_20180314_0002
03/14/2018 18:57	Draft	Draft P= 0.560m, S= 0.490m, Avg= 0.525m, Comments=
03/14/2018 18:58	Main scheme line	SOL file= 2018BR0731858.HSX, Line Number= , Azimuth= , Comments= 65/65
03/14/2018 19:10	Main scheme line	SOL file= 2018BR0731910.HSX, Line Number= , Azimuth= , Comments= 65/65
03/14/2018 19:20	Main scheme line	SOL file= 2018BR0731920.HSX, Line Number= , Azimuth= , Comments= 65/65
03/14/2018 19:26	Main scheme line	SOL file= 2018BR0731926.HSX, Line Number= , Azimuth= , Comments= 65/65
03/14/2018 19:31	Main scheme line	SOL file= 2018BR0731931.HSX, Line Number= , Azimuth= , Comments= 65/65

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Date/Time (UTC)	*Code*	*Comments*
03/14/2018 19:34	Main scheme line	SOL file= 2018BR0731934.HSX, Line Number= , Azimuth= , Comments= 65/65
03/14/2018 19:36	System Status	System status record modified

Weather	**Sea state**	Calm	**Wind speed**	0-5kts
	Comments	Partly Cloudy		
Echo Sounder Settings	**Range**	40	**Gain**	23
	Power	218	**Spreading**	30
	Absorption	70	**Ping rate**	25
	Pulse width	500	**Operator**	JXMD
	Type and Frequency	Multibeam High (400kHz)		
Sidescan Sonar Settings	No sidescan			

03/14/2018 19:48	Main scheme line	SOL file= 2018BR0731948.HSX, Line Number= , Azimuth= , Comments= 65/65
03/14/2018 20:02	Main scheme line	SOL file= 2018BR0732002.HSX, Line Number= , Azimuth= , Comments= 65/65
03/14/2018 20:17	Main scheme line	SOL file= 2018BR0732017.HSX, Line Number= , Azimuth= , Comments= 65/65
03/14/2018 20:18	Main scheme line	SOL file= 2018BR0732018.HSX, Line Number= , Azimuth= , Comments= 65/65
03/14/2018 20:28	Main scheme line	SOL file= 2018BR0732028.HSX, Line Number= , Azimuth= , Comments= 65/65
03/14/2018 20:38	System Status	System status record modified

Weather	**Sea state**	Calm	**Wind speed**	0-5kts
	Comments	Partly Cloudy		
Echo Sounder Settings	**Range**	40	**Gain**	23
	Power	218	**Spreading**	30
	Absorption	70	**Ping rate**	25
	Pulse width	500	**Operator**	JXMD
	Type and Frequency	Multibeam High (400kHz)		
Sidescan Sonar Settings	No sidescan			

03/14/2018 20:42	Main scheme line	SOL file= 2018BR0732042.HSX, Line Number= , Azimuth= , Comments= 65/65
03/14/2018 20:48	Main scheme line	SOL file= 2018BR0732049.HSX, Line Number= , Azimuth= , Comments= 65/65
03/14/2018 20:57	Main scheme line	SOL file= 2018BR0732056.HSX, Line Number= , Azimuth= , Comments= 65/65
03/14/2018 21:04	SVP cast	AML_20180314_0003
03/14/2018 21:05	Custom entry	Bathroom break
03/14/2018 21:11	Main scheme line	SOL file= 2018BR0732111.HSX, Line Number= , Azimuth= , Comments= 65/65
03/14/2018 21:18	SVP cast	AML_20180314_0004
03/14/2018 21:20	Main scheme line	SOL file= 2018BR0732120.HSX, Line Number= , Azimuth= , Comments= 75/75
03/14/2018 21:37	Main scheme line	SOL file= 2018BR0732135.HSX, Line Number= , Azimuth= , Comments= 90/90 85 degrees stbd
03/14/2018 21:48	System Status	System status record modified

Weather	**Sea state**	Calm	**Wind speed**	0-5kts
	Comments	Partly Cloudy		
Echo Sounder Settings	**Range**	40	**Gain**	23
	Power	218	**Spreading**	30
	Absorption	70	**Ping rate**	25
	Pulse width	500	**Operator**	JXMD
	Type and Frequency	Multibeam High (400kHz)		
Sidescan Sonar Settings	No sidescan			

03/14/2018 21:48	Custom entry	Bumped head - will conduct patch test
03/14/2018 21:50	Patch line	SOL file= 2018BR0732150.HSX, Line Number= 1, Azimuth= up, Comments= 90/90
03/14/2018 21:52	Patch line	SOL file= 2018BR0732152.HSX, Line Number= 1, Azimuth= down, Comments= 90/90
03/14/2018 21:55	Patch line	SOL file= 2018BR0732155.HSX, Line Number= 2, Azimuth= up, Comments= 90/90
03/14/2018 21:57	Patch line	SOL file= 2018BR0732157.HSX, Line Number= 2, Azimuth= down, Comments= 90/90
03/14/2018 21:59	Patch line	SOL file= 2018BR0732159.HSX, Line Number= 3, Azimuth= up, Comments= 90/90
03/14/2018 22:00	Patch line	SOL file= 2018BR0732200_0001.HSX, Line Number= , Azimuth= , Comments= REJECT
03/14/2018 22:01	Patch line	SOL file= 2018BR0732201.HSX, Line Number= 3, Azimuth= down, Comments= 90/90

- Hydrographic Survey Log - Broughton - March 14, 2018

Date/Time (UTC)	*Code*	*Comments*
03/14/2018 22:07	Main scheme line	SOL file= 2018BR0732205.HSX, Line Number= , Azimuth= , Comments= 90/90 85 degrees stbd
03/14/2018 22:14	Main scheme line	SOL file= 2018BR0732214.HSX, Line Number= , Azimuth= , Comments= 90/90 85 deg stbd
03/14/2018 22:22	Main scheme line	SOL file= 2018BR0732222.HSX, Line Number= , Azimuth= , Comments= 90/90 85deg port
03/14/2018 22:31	Main scheme line	SOL file= 2018BR0732229.HSX, Line Number= , Azimuth= , Comments= 65/65 120 degrees
03/14/2018 22:45	SVP cast	AML_20180314_0005
03/14/2018 22:48	Main scheme line	SOL file= 2018BR0732247.HSX, Line Number= , Azimuth= , Comments= 65/65
03/14/2018 22:48	System Status	System status record modified

Weather	**Sea state**	Calm	**Wind speed**	0-5kts
	Comments	Partly Cloudy		
Echo Sounder Settings	**Range**	40	**Gain**	23
	Power	218	**Spreading**	30
	Absorption	70	**Ping rate**	25
	Pulse width	500	**Operator**	JXMD
	Type and Frequency	Multibeam High (400kHz)		
Sidescan Sonar Settings	No sidescan			

03/14/2018 23:02	Main scheme line	SOL file= 2018BR0732302.HSX, Line Number= , Azimuth= , Comments= 65/65
03/14/2018 23:18	Main scheme line	SOL file= 2018BR0732318.HSX, Line Number= , Azimuth= , Comments= 65/65
03/14/2018 23:32	Main scheme line	SOL file= 2018BR0732332.HSX, Line Number= , Azimuth= , Comments= 65/65
03/14/2018 23:48	System Status	System status record modified

Weather	**Sea state**	Calm	**Wind speed**	0-5kts
	Comments	Partly Cloudy		
Echo Sounder Settings	**Range**	40	**Gain**	23
	Power	218	**Spreading**	30
	Absorption	70	**Ping rate**	25
	Pulse width	500	**Operator**	JXMD
	Type and Frequency	Multibeam High (400kHz)		
Sidescan Sonar Settings	No sidescan			

03/14/2018 23:50	Main scheme line	SOL file= 2018BR0732350.HSX, Line Number= , Azimuth= , Comments= 65/65
03/15/2018 00:04	Main scheme line	SOL file= 2018BR0740004.HSX, Line Number= , Azimuth= , Comments= 65/65
03/15/2018 00:20	Main scheme line	SOL file= 2018BR0740020.HSX, Line Number= , Azimuth= , Comments= 65/65
03/15/2018 00:39	Cross line	SOL file= 2018BR0740039.HSX, Line Number= , Azimuth= , Comments= XL 65/65
03/15/2018 00:42	Cross line	SOL file= 2018BR0740042.HSX, Line Number= , Azimuth= , Comments= XL 65/65
03/15/2018 00:44	SVP cast	AML_20180314_0006
03/15/2018 00:49	System Status	System status record modified

Weather	**Sea state**	Calm	**Wind speed**	0-5kts
	Comments	Partly Cloudy		
Echo Sounder Settings	**Range**	40	**Gain**	23
	Power	218	**Spreading**	30
	Absorption	70	**Ping rate**	25
	Pulse width	500	**Operator**	JXMD
	Type and Frequency	Multibeam High (400kHz)		
Sidescan Sonar Settings	No sidescan			

03/15/2018 00:50	Custom entry	Pull sonar heads, return to marina
03/15/2018 01:04	Custom entry	Arrive at dock
03/15/2018 01:05	POSPac file	POSPac file ended
03/15/2018 01:07	Custom entry	Data backup stararted

- Hydrographic Survey Log - Broughton - March 16, 2018

David Evans and Associates, Inc.
2801 SE Columbia Way, Suite 130
Vancouver, WA 98661
Phone: (360)314-3200
Fax: (360)314-3250

Survey Information

Local Date	03/16/2018 (JD 75)	**Hydrographer**	DTM, JXMD
Contract		**Registry Number**	
Task Order		**Job Number**	AETR00000034
Contractor	David Evans and Associates, Inc. Marine Services		
Locality	Portland, Oregon		
Sub-Locality	Willamette River River Mile 1.9-11.8		
Operations	Multibeam Survey		
Comments	Portland Harbor Superfund		

Horizontal Control

Horizontal Datum	NAD83 (2011)	**Units**	International Feet
Coordinate System	State Plane, Oregon North		
Primary System	Applanix POS/MV V5	**PCS SN**	5602
IMU SN	1058	**Antenna 1 SN**	8569
Firmware Version	9.29	**Antenna 2 SN**	8568
Secondary System	Trimble SPS855	**Receiver SN**	0075
Firmware Version	5.30	**Antenna SN**	1441039513
Beacon Receiver	Intuicom RTK Bridge X	**Receiver SN**	X151065
Firmware Version	2.0.0	**Antenna SN**	n/a
Beacon Station 1	DEA Marine Services Roof	**Station ID**	DEMSI
Beacon Station 2	n/a	**Station ID**	n/a
Cable Counter	n/a	**Serial Number**	n/a

Vertical Control

Gauge/Base Location	n/a		
Additional Information	RTK elevations		
Vertical Datum	NAVD88 - Geoid12a	**Units**	Feet

Vessel and Crew

Survey Vessel	Broughton	**Survey Vessel**	Broughton
Vessel Crew	n/a	**Vessel Crew**	n/a
Survey Crew	DTM, JXMD	**Survey Crew**	DTM, JXMD
Towing Point	n/a	**Towing Point**	n/a

- Hydrographic Survey Log - Broughton - March 16, 2018

Sonar Equipment

Model	Dual Reson T50P - Master	**Topside SN**	95772016142
Transmit SN	5015069	**Receive SN**	2714149
Model	n/a	**Topside SN**	n/a
		Towfish SN	n/a
Primary SVP	AML Smart SVP	**Body SN**	5588
		Velocity Tip SN	5498
Surface SVP	AML SV SmartX	**Body SN**	1322
		Velocity Tip SN	n/a
Secondary SVP	AML Smart SVP	**Serial Number**	5643/2028
Other	TSlave Trans/Recv	**Serial number**	5015057/2714140
Other	Slave Topside	**Serial number**	95772016148

Acquisition Software

Line Planning	Hypack	**Version**	17.1.10.0
Primary Navigation	Hypack Survey	**Version**	17.1.10.0
Multibeam Acquisition	Hysweep	**Version**	14.0.9.0
Multibeam Processor	SeaBat Controller	**Version**	FP4 V6.0.0.11
Sidescan Acquisition	n/a	**Version**	n/a
Sidescan Processor	n/a	**Version**	n/a
POS/MV Controller	POS View	**Version**	9.21
MVP Acquisition	n/a	**Version**	n/a
SVP Acquisition	MVP Controller	**Version**	2.45
SVP Processing	MVP Controller	**Version**	2.45
SVP Conversion	SVP Convert	**Version**	2.0.4
Other	SeaBatUI 4.0.0.0		
Other	7k Center 6.3.0.8		
Other	Caris Onboard 1.4.0		

Start of Day Checklist

Drafts		**Start logging POSPac time**	
Check that MVP fish and block secured		**Survey area arrival time**	
Check for SSS cable fatigue		**SV comparison - MVP vs.surface probe**	
Check safety equipment		**Receiving differential corrections**	
Check weather forecast		**SSS offsets**	
Create/set data directories - Hypack PC		**Set SSS cable out**	
ISIS PC		**Set SSS and MBES settings**	
MVP PC		**Update system status in LineLog**	
Notes PC		**Complete roll lines**	
Dock departure time			

- Hydrographic Survey Log - Broughton - March 16, 2018

Date/Time (UTC)	*Code*	*Comments*
03/16/2018 14:32	System Status	System status record modified

Weather	**Sea state**	Calm	**Wind speed**	0-5kts
	Comments	Partly Cloudy		
Echo Sounder Settings	**Range**	40	**Gain**	23
	Power	218	**Spreading**	30
	Absorption	70	**Ping rate**	25
	Pulse width	500	**Operator**	JXMD
	Type and Frequency	Multibeam High (400kHz)		
Sidescan Sonar Settings	No sidescan			

03/16/2018 14:33	Custom entry	Launched BR from Vancouver, transit to Fred's Marina
03/16/2018 14:33	Custom entry	Logging Trimble Rover File: 00750750.t02
03/16/2018 14:35	Custom entry	Logging POSPAC file: POSPAC_BR_20180316
03/16/2018 15:29	Draft	Draft P= 0.550m, S= 0.500m, Avg= 0.525m, Comments=
03/16/2018 15:30	Custom entry	Safety meeting conducted at Freds marina @ 0800
03/16/2018 15:30	Custom entry	Arrived at Vigourous hole, 1530, deploy dual mbes
03/16/2018 15:35	SVP cast	AML_20180316_0001 1444m/s on cast and head
03/16/2018 15:40	Patch line	SOL file= 2018BR0751539.HSX, Line Number= 1, Azimuth= , Comments=
03/16/2018 15:41	Patch line	SOL file= 2018BR0751541.HSX, Line Number= 1, Azimuth=350 , Comments=
03/16/2018 15:47	Patch line	SOL file= 2018BR0751547.HSX, Line Number= 2, Azimuth=350 , Comments=
03/16/2018 15:50	Patch line	SOL file= 2018BR0751549.HSX, Line Number= 2, Azimuth= , Comments=
03/16/2018 15:51	Patch line	SOL file= 2018BR0751551.HSX, Line Number= 3, Azimuth=350 , Comments=
03/16/2018 15:53	Patch line	SOL file= 2018BR0751553.HSX, Line Number= 3, Azimuth= 170, Comments=
03/16/2018 15:54	Custom entry	End patch test; picking up MS from T4 to the south
03/16/2018 15:59	Main scheme line	SOL file= 2018BR0751559.HSX, Line Number= , Azimuth= , Comments= 65/65
03/16/2018 16:14	Main scheme line	SOL file= 2018BR0751614.HSX, Line Number= , Azimuth= , Comments= 65/65
03/16/2018 16:29	Main scheme line	SOL file= 2018BR0751629.HSX, Line Number= , Azimuth= , Comments= 65/65
03/16/2018 16:36	System Status	System status record modified

Weather	**Sea state**	Calm	**Wind speed**	0-5kts
	Comments	Partly Cloudy		
Echo Sounder Settings	**Range**	40	**Gain**	23
	Power	218	**Spreading**	30
	Absorption	70	**Ping rate**	25
	Pulse width	500	**Operator**	JXMD
	Type and Frequency	Multibeam High (400kHz)		
Sidescan Sonar Settings	No sidescan			

03/16/2018 16:44	Main scheme line	SOL file= 2018BR0751644.HSX, Line Number= , Azimuth= , Comments= 65/65
03/16/2018 17:02	Main scheme line	SOL file= 2018BR0751702.HSX, Line Number= , Azimuth= , Comments= 65/90
03/16/2018 17:06	Main scheme line	SOL file= 2018BR0751706.HSX, Line Number= , Azimuth= , Comments= 65/65
03/16/2018 17:22	SVP cast	AML_20180316_0002
03/16/2018 17:24	Main scheme line	SOL file= 2018BR0751724.HSX, Line Number= , Azimuth= , Comments= 65/90
03/16/2018 17:38	System Status	System status record modified

Weather	**Sea state**	Calm	**Wind speed**	0-5kts
	Comments	Partly Cloudy		
Echo Sounder Settings	**Range**	40	**Gain**	23
	Power	218	**Spreading**	30
	Absorption	70	**Ping rate**	25
	Pulse width	500	**Operator**	JXMD
	Type and Frequency	Multibeam High (400kHz)		
Sidescan Sonar Settings	No sidescan			

03/16/2018 17:38	Main scheme line	SOL file= 2018BR0751738.HSX, Line Number= , Azimuth= , Comments= 65/65

- Hydrographic Survey Log - Broughton - March 16, 2018

Date/Time (UTC)	*Code*	*Comments*
03/16/2018 17:41	Main scheme line	SOL file= 2018BR0751741.HSX, Line Number= , Azimuth= , Comments= 65/65
03/16/2018 17:59	Main scheme line	SOL file= 2018BR0751756.HSX, Line Number= , Azimuth= , Comments= 90/65
03/16/2018 18:07	Main scheme line	SOL file= 2018BR0751807.HSX, Line Number= , Azimuth= , Comments= 65/65
03/16/2018 18:13	Main scheme line	SOL file= 2018BR0751813.HSX, Line Number= , Azimuth= , Comments= 65/90
03/16/2018 18:15	Main scheme line	SOL file= 2018BR0751815.HSX, Line Number= , Azimuth= , Comments= 65/90
03/16/2018 18:39	System Status	System status record modified

Weather	**Sea state**	Calm	**Wind speed**	0-5kts
	Comments	Partly Cloudy		
Echo Sounder Settings	**Range**	40	**Gain**	23
	Power	218	**Spreading**	30
	Absorption	70	**Ping rate**	25
	Pulse width	500	**Operator**	JXMD
	Type and Frequency	Multibeam High (400kHz)		
Sidescan Sonar Settings	No sidescan			

03/16/2018 18:39	Custom entry	short break at St Johns boat ramp
03/16/2018 18:52	Main scheme line	SOL file= 2018BR0751852.HSX, Line Number= , Azimuth= , Comments= 65/65
03/16/2018 19:10	SVP cast	AML_20180316_0003
03/16/2018 19:12	Main scheme line	SOL file= 2018BR0751912.HSX, Line Number= , Azimuth= , Comments= 65/65
03/16/2018 19:28	Main scheme line	SOL file= 2018BR0751928.HSX, Line Number= , Azimuth= , Comments= 65/65
03/16/2018 19:45	System Status	System status record modified

Weather	**Sea state**	Calm	**Wind speed**	0-5kts
	Comments	Partly Cloudy		
Echo Sounder Settings	**Range**	40	**Gain**	23
	Power	218	**Spreading**	30
	Absorption	70	**Ping rate**	25
	Pulse width	500	**Operator**	JXMD
	Type and Frequency	Multibeam High (400kHz)		
Sidescan Sonar Settings	No sidescan			

03/16/2018 19:46	Main scheme line	SOL file= 2018BR0751946.HSX, Line Number= , Azimuth= , Comments= 65/65
03/16/2018 20:04	Main scheme line	SOL file= 2018BR0752004.HSX, Line Number= , Azimuth= , Comments= 90/65
03/16/2018 20:11	Main scheme line	SOL file= 2018BR0752011.HSX, Line Number= , Azimuth= , Comments= 65/90
03/16/2018 20:20	Main scheme line	SOL file= 2018BR0752020.HSX, Line Number= , Azimuth= , Comments= 65/65
03/16/2018 20:39	Main scheme line	SOL file= 2018BR0752039.HSX, Line Number= , Azimuth= , Comments= 65/65
03/16/2018 20:46	System Status	System status record modified

Weather	**Sea state**	Calm	**Wind speed**	0-5kts
	Comments	Partly Cloudy		
Echo Sounder Settings	**Range**	40	**Gain**	23
	Power	218	**Spreading**	30
	Absorption	70	**Ping rate**	25
	Pulse width	500	**Operator**	JXMD
	Type and Frequency	Multibeam High (400kHz)		
Sidescan Sonar Settings	No sidescan			

03/16/2018 20:57	Main scheme line	SOL file= 2018BR0752056.HSX, Line Number= , Azimuth= , Comments= 65/90 open to stbd
03/16/2018 20:59	Custom entry	Boom to stbd
03/16/2018 21:10	Main scheme line	SOL file= 2018BR0752110.HSX, Line Number= , Azimuth= , Comments= 90/65
03/16/2018 21:17	Main scheme line	SOL file= 2018BR0752117.HSX, Line Number= , Azimuth= , Comments= 65/90
03/16/2018 21:30	SVP cast	AML_20180316_0004
03/16/2018 21:32	Main scheme line	SOL file= 2018BR0752132.HSX, Line Number= , Azimuth= , Comments= 65/65
03/16/2018 21:46	Main scheme line	SOL file= 2018BR0752146.HSX, Line Number= , Azimuth= , Comments= 65/65
03/16/2018 21:51	System Status	System status record modified

- Hydrographic Survey Log - Broughton - March 16, 2018

Date/Time (UTC)	Code	Comments

Weather	**Sea state**	Calm	**Wind speed**	0-5kts
	Comments	Partly Cloudy		
Echo Sounder Settings	**Range**	40	**Gain**	23
	Power	218	**Spreading**	30
	Absorption	70	**Ping rate**	25
	Pulse width	500	**Operator**	JXMD
	Type and Frequency	Multibeam High (400kHz)		
Sidescan Sonar Settings	No sidescan			

03/16/2018 22:01	Main scheme line	SOL file= 2018BR0752201.HSX, Line Number= , Azimuth= , Comments= 65/65
03/16/2018 22:08	Main scheme line	SOL file= 2018BR0752208.HSX, Line Number= , Azimuth= , Comments= 65/65
03/16/2018 22:13	Main scheme line	SOL file= 2018BR0752213.HSX, Line Number= , Azimuth= , Comments= 65/90
03/16/2018 22:29	Main scheme line	SOL file= 2018BR0752229.HSX, Line Number= , Azimuth= , Comments= 65/65
03/16/2018 22:53	System Status	System status record modified

Weather	**Sea state**	Calm	**Wind speed**	0-5kts
	Comments	Partly Cloudy		
Echo Sounder Settings	**Range**	40	**Gain**	23
	Power	218	**Spreading**	30
	Absorption	70	**Ping rate**	25
	Pulse width	500	**Operator**	JXMD
	Type and Frequency	Multibeam High (400kHz)		
Sidescan Sonar Settings	No sidescan			

03/16/2018 22:53	Custom entry	break at st johns pier @ 22:35
03/16/2018 22:53	Custom entry	T410-411
03/16/2018 22:54	SVP cast	AML_20180316_0005
03/16/2018 22:56	Main scheme line	SOL file= 2018BR0752256.HSX, Line Number= , Azimuth= , Comments= 65/65
03/16/2018 22:59	Main scheme line	SOL file= 2018BR0752258.HSX, Line Number= , Azimuth= , Comments= 65/65
03/16/2018 23:11	Main scheme line	SOL file= 2018BR0752310.HSX, Line Number= , Azimuth= , Comments= 90/65
03/16/2018 23:11	Main scheme line	SOL file= 2018BR0752302.HSX, Line Number= , Azimuth= , Comments= 65/90
03/16/2018 23:11	Custom entry	Hysweep Crash!
03/16/2018 23:13	Main scheme line	SOL file= 2018BR0752313.HSX, Line Number= , Azimuth= , Comments= 90/65
03/16/2018 23:26	Main scheme line	SOL file= 2018BR0752323.HSX, Line Number= , Azimuth= , Comments= 65/90
03/16/2018 23:31	Main scheme line	SOL file= 2018BR0752331.HSX, Line Number= , Azimuth= , Comments= 90/65
03/16/2018 23:37	SVP cast	AML_20180316_0006
03/16/2018 23:40	Main scheme line	SOL file= 2018BR0752339.HSX, Line Number= , Azimuth= , Comments= 65/65
03/16/2018 23:40	Custom entry	Hypack Crash! Lost Matrix
03/16/2018 23:41	Main scheme line	SOL file= 2018BR0752341.HSX, Line Number= , Azimuth= , Comments= 65/65
03/16/2018 23:51	Main scheme line	SOL file= 2018BR0752351.HSX, Line Number= , Azimuth= , Comments= 65/90
03/17/2018 00:01	System Status	System status record modified

Weather	**Sea state**	Calm	**Wind speed**	0-5kts
	Comments	Partly Cloudy		
Echo Sounder Settings	**Range**	40	**Gain**	23
	Power	218	**Spreading**	30
	Absorption	70	**Ping rate**	25
	Pulse width	500	**Operator**	JXMD
	Type and Frequency	Multibeam High (400kHz)		
Sidescan Sonar Settings	No sidescan			

03/17/2018 00:04	Main scheme line	SOL file= 2018BR0760004.HSX, Line Number= , Azimuth= , Comments= 65/65
03/17/2018 00:08	Main scheme line	SOL file= 2018BR0760008.HSX, Line Number= , Azimuth= , Comments= 65/65
03/17/2018 00:14	Main scheme line	SOL file= 2018BR0760014.HSX, Line Number= , Azimuth= , Comments= 65/90
03/17/2018 00:22	Main scheme line	SOL file= 2018BR0760022.HSX, Line Number= , Azimuth= , Comments= small strike

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Date/Time (UTC)	*Code*	*Comments*
03/17/2018 00:25	SVP cast	AML_20180316_0007
03/17/2018 01:02	System Status	System status record modified

Weather	**Sea state**	Calm	**Wind speed**	0-5kts
	Comments	Partly Cloudy		
Echo Sounder Settings	**Range**	40	**Gain**	23
	Power	218	**Spreading**	30
	Absorption	70	**Ping rate**	25
	Pulse width	500	**Operator**	JXMD
	Type and Frequency	Multibeam High (400kHz)		
Sidescan Sonar Settings	No sidescan			

- Hydrographic Survey Log - Broughton - March 17, 2018

David Evans and Associates, Inc.
2801 SE Columbia Way, Suite 130
Vancouver, WA 98661
Phone: (360)314-3200
Fax: (360)314-3250

Survey Information

Local Date	03/17/2018 (JD 76)	**Hydrographer**	DTM, JXMD
Contract		**Registry Number**	
Task Order		**Job Number**	AETR00000034
Contractor	David Evans and Associates, Inc. Marine Services		
Locality	Portland, Oregon		
Sub-Locality	Willamette River River Mile 1.9-11.8		
Operations	Multibeam Survey		
Comments	Portland Harbor Superfund		

Horizontal Control

Horizontal Datum	NAD83 (2011)	**Units**	International Feet
Coordinate System	State Plane, Oregon North		
Primary System	Applanix POS/MV V5	**PCS SN**	5602
IMU SN	1058	**Antenna 1 SN**	8569
Firmware Version	9.29	**Antenna 2 SN**	8568
Secondary System	Trimble SPS855	**Receiver SN**	0075
Firmware Version	5.30	**Antenna SN**	1441039513
Beacon Receiver	Intuicom RTK Bridge X	**Receiver SN**	X151065
Firmware Version	2.0.0	**Antenna SN**	n/a
Beacon Station 1	DEA Marine Services Roof	**Station ID**	DEMSI
Beacon Station 2	n/a	**Station ID**	n/a
Cable Counter	n/a	**Serial Number**	n/a

Vertical Control

Gauge/Base Location	n/a		
Additional Information	RTK elevations		
Vertical Datum	NAVD88 - Geoid12a	**Units**	Feet

Vessel and Crew

Survey Vessel	Broughton	**Survey Vessel**	Broughton
Vessel Crew	n/a	**Vessel Crew**	n/a
Survey Crew	DTM, JXMD	**Survey Crew**	DTM, JXMD
Towing Point	n/a	**Towing Point**	n/a

- Hydrographic Survey Log - Broughton - March 17, 2018

Sonar Equipment

Model	Dual Reson T50P - Master	**Topside SN**	95772016142
Transmit SN	5015069	**Receive SN**	2714149
Model	n/a	**Topside SN**	n/a
		Towfish SN	n/a
Primary SVP	AML Smart SVP	**Body SN**	5588
		Velocity Tip SN	5498
Surface SVP	AML SV SmartX	**Body SN**	1322
		Velocity Tip SN	n/a
Secondary SVP	AML Smart SVP	**Serial Number**	5643/2028
Other	TSlave Trans/Recv	**Serial number**	5015057/2714140
Other	Slave Topside	**Serial number**	95772016148

Acquisition Software

Line Planning	Hypack	**Version**	17.1.10.0
Primary Navigation	Hypack Survey	**Version**	17.1.10.0
Multibeam Acquisition	Hysweep	**Version**	14.0.9.0
Multibeam Processor	SeaBat Controller	**Version**	FP4 V6.0.0.11
Sidescan Acquisition	n/a	**Version**	n/a
Sidescan Processor	n/a	**Version**	n/a
POS/MV Controller	POS View	**Version**	9.21
MVP Acquisition	n/a	**Version**	n/a
SVP Acquisition	MVP Controller	**Version**	2.45
SVP Processing	MVP Controller	**Version**	2.45
SVP Conversion	SVP Convert	**Version**	2.0.4
Other	SeaBatUI 4.0.0.0		
Other	7k Center 6.3.0.8		
Other	Caris Onboard 1.4.0		

Start of Day Checklist

Drafts		**Start logging POSPac time**	
Check that MVP fish and block secured		**Survey area arrival time**	
Check for SSS cable fatigue		**SV comparison - MVP vs.surface probe**	
Check safety equipment		**Receiving differential corrections**	
Check weather forecast		**SSS offsets**	
Create/set data directories - Hypack PC		**Set SSS cable out**	
ISIS PC		**Set SSS and MBES settings**	
MVP PC		**Update system status in LineLog**	
Notes PC		**Complete roll lines**	
Dock departure time			

- Hydrographic Survey Log - Broughton - March 17, 2018

Date/Time (UTC)	*Code*	*Comments*
03/17/2018 15:01	System Status	System status record modified

Weather	**Sea state**	Calm	**Wind speed**	0-5kts
	Comments	Partly Cloudy		
Echo Sounder Settings	**Range**	40	**Gain**	23
	Power	218	**Spreading**	30
	Absorption	70	**Ping rate**	25
	Pulse width	500	**Operator**	JXMD
	Type and Frequency	Multibeam High (400kHz)		
Sidescan Sonar Settings	No sidescan			

03/17/2018 15:01	Custom entry	---Safety meeting complete, Freds Marina
03/17/2018 15:02	Custom entry	Logging Trimble rover file: 00750760.t02
03/17/2018 15:03	Custom entry	Logging POSMV File: POSPAC_BR_20180317
03/17/2018 15:06	Draft	Draft P= 0.540m, S= 0.500m, Avg= 0.520m, Comments=
03/17/2018 15:14	Custom entry	Underway
03/17/2018 15:28	Custom entry	Patching Stbd Head (steered 15deg port)
03/17/2018 15:28	Patch line	SOL file= 2018BR0761528.HSX, Line Number= , Azimuth= , Comments= stbd1
03/17/2018 15:30	Patch line	SOL file= 2018BR0761530.HSX, Line Number= , Azimuth= , Comments= stbd1
03/17/2018 15:35	Patch line	SOL file= 2018BR0761534.HSX, Line Number= , Azimuth= , Comments= stbd2
03/17/2018 15:37	Patch line	SOL file= 2018BR0761537.HSX, Line Number= , Azimuth= , Comments= stbd2
03/17/2018 15:39	Patch line	SOL file= 2018BR0761539.HSX, Line Number= , Azimuth= , Comments= stbd3
03/17/2018 15:42	Patch line	SOL file= 2018BR0761541.HSX, Line Number= , Azimuth= , Comments= stbd3
03/17/2018 15:45	Custom entry	Patching Port Sonar (Steered 15deg stbd)
03/17/2018 15:45	Patch line	SOL file= 2018BR0761545.HSX, Line Number= , Azimuth= , Comments= port1 for pitch/roll
03/17/2018 15:47	Patch line	SOL file= 2018BR0761547.HSX, Line Number= , Azimuth= , Comments= port1 for pitch/roll
03/17/2018 15:49	SVP cast	AML_20180317_0001
03/17/2018 15:53	Main scheme line	SOL file= 2018BR0761553.HSX, Line Number= , Azimuth= , Comments= 65/65
03/17/2018 16:13	SVP cast	AML_20180317_0002
03/17/2018 16:14	Custom entry	Pull sonars
03/17/2018 16:31	Custom entry	Deploy sonars South of Swan Island
03/17/2018 16:34	SVP cast	AML_20180317_0003
03/17/2018 16:35	System Status	System status record modified

Weather	**Sea state**	Calm	**Wind speed**	0-5kts
	Comments	Partly Cloudy		
Echo Sounder Settings	**Range**	40	**Gain**	23
	Power	218	**Spreading**	30
	Absorption	70	**Ping rate**	25
	Pulse width	500	**Operator**	JXMD
	Type and Frequency	Multibeam High (400kHz)		
Sidescan Sonar Settings	No sidescan			

03/17/2018 16:38	Main scheme line	SOL file= 2018BR0761638.HSX, Line Number= , Azimuth= , Comments= 65/65
03/17/2018 16:55	Main scheme line	SOL file= 2018BR0761655.HSX, Line Number= , Azimuth= , Comments= 65/65
03/17/2018 17:09	Main scheme line	SOL file= 2018BR0761709.HSX, Line Number= , Azimuth= , Comments= 65/65
03/17/2018 17:16	Custom entry	Boom to port
03/17/2018 17:25	Main scheme line	SOL file= 2018BR0761725.HSX, Line Number= , Azimuth= , Comments= 65/65
03/17/2018 17:38	System Status	System status record modified

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Date/Time (UTC)	Code	Comments

Weather	**Sea state**	Calm	**Wind speed**	0-5kts
	Comments	Partly Cloudy		
Echo Sounder Settings	**Range**	40	**Gain**	23
	Power	218	**Spreading**	30
	Absorption	70	**Ping rate**	25
	Pulse width	500	**Operator**	JXMD
	Type and Frequency	Multibeam High (400kHz)		
Sidescan Sonar Settings	No sidescan			

03/17/2018 17:38	Main scheme line	SOL file= 2018BR0761738.HSX, Line Number= , Azimuth= , Comments= 65/90
03/17/2018 17:55	Main scheme line	SOL file= 2018BR0761753.HSX, Line Number= , Azimuth= , Comments= 65/65
03/17/2018 17:59	Main scheme line	SOL file= 2018BR0761758.HSX, Line Number= , Azimuth= , Comments= 65/65
03/17/2018 18:17	SVP cast	AML_20180317_0004
03/17/2018 18:18	Main scheme line	SOL file= 2018BR0761818.HSX, Line Number= , Azimuth= , Comments= 65/65
03/17/2018 18:34	Cross line	SOL file= 2018BR0761834.HSX, Line Number= , Azimuth= , Comments= XL 65/65
03/17/2018 18:36	Main scheme line	SOL file= 2018BR0761836.HSX, Line Number= , Azimuth= , Comments= 65/65
03/17/2018 18:36	Main scheme line	SOL file= 2018BR0761836_0001.HSX, Line Number= , Azimuth= , Comments= 65/65
03/17/2018 18:38	System Status	System status record modified

Weather	**Sea state**	Calm	**Wind speed**	0-5kts
	Comments	Partly Cloudy		
Echo Sounder Settings	**Range**	40	**Gain**	23
	Power	218	**Spreading**	30
	Absorption	70	**Ping rate**	25
	Pulse width	500	**Operator**	JXMD
	Type and Frequency	Multibeam High (400kHz)		
Sidescan Sonar Settings	No sidescan			

03/17/2018 18:53	Custom entry	Swan Island boat ramp for break
03/17/2018 19:07	SVP cast	AML_20180317_0005
03/17/2018 19:08	Main scheme line	SOL file= 2018BR0761908.HSX, Line Number= , Azimuth= , Comments= 65/65
03/17/2018 19:16	SVP cast	AML_20180317_0006
03/17/2018 19:18	Main scheme line	SOL file= 2018BR0761918.HSX, Line Number= , Azimuth= , Comments= 65/65
03/17/2018 19:29	Main scheme line	SOL file= 2018BR0761929.HSX, Line Number= , Azimuth= , Comments= 65/65
03/17/2018 19:39	System Status	System status record modified

Weather	**Sea state**	Calm	**Wind speed**	0-5kts
	Comments	Partly Cloudy		
Echo Sounder Settings	**Range**	40	**Gain**	23
	Power	218	**Spreading**	30
	Absorption	70	**Ping rate**	25
	Pulse width	500	**Operator**	JXMD
	Type and Frequency	Multibeam High (400kHz)		
Sidescan Sonar Settings	No sidescan			

03/17/2018 19:48	Main scheme line	SOL file= 2018BR0761948.HSX, Line Number= , Azimuth= , Comments= 65/65
03/17/2018 20:07	SVP cast	AML_20180317_0007
03/17/2018 20:09	Main scheme line	SOL file= 2018BR0762009.HSX, Line Number= , Azimuth= , Comments= 65/65
03/17/2018 20:12	Main scheme line	SOL file= 2018BR0762012.HSX, Line Number= , Azimuth= , Comments= 65/65
03/17/2018 20:16	Main scheme line	SOL file= 2018BR0762016.HSX, Line Number= , Azimuth= , Comments= 65/65
03/17/2018 20:19	Main scheme line	SOL file= 2018BR0762019.HSX, Line Number= , Azimuth= , Comments= 65/65
03/17/2018 20:21	Main scheme line	SOL file= 2018BR0762021.HSX, Line Number= , Azimuth= , Comments= 65/65
03/17/2018 20:25	Main scheme line	SOL file= 2018BR0762025.HSX, Line Number= , Azimuth= , Comments= 65/90
03/17/2018 20:34	Main scheme line	SOL file= 2018BR0762034.HSX, Line Number= , Azimuth= , Comments= 65/90
03/17/2018 20:38	Main scheme line	SOL file= 2018BR0762037.HSX, Line Number= , Azimuth= , Comments= 65/65

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Date/Time (UTC)	*Code*	*Comments*
03/17/2018 20:40	System Status	System status record modified

Weather	**Sea state**	Calm	**Wind speed**	0-5kts
	Comments	Partly Cloudy		
Echo Sounder Settings	**Range**	40	**Gain**	23
	Power	218	**Spreading**	30
	Absorption	70	**Ping rate**	25
	Pulse width	500	**Operator**	JXMD
	Type and Frequency	Multibeam High (400kHz)		
Sidescan Sonar Settings	No sidescan			

03/17/2018 20:40	Main scheme line	SOL file= 2018BR0762040.HSX, Line Number= , Azimuth= , Comments= 65/65
03/17/2018 20:44	Main scheme line	SOL file= 2018BR0762044.HSX, Line Number= , Azimuth= , Comments= 65/90
03/17/2018 20:50	Main scheme line	SOL file= 2018BR0762050.HSX, Line Number= , Azimuth= , Comments= 65/90
03/17/2018 20:51	Custom entry	Ship was here
03/17/2018 20:55	Main scheme line	SOL file= 2018BR0762055.HSX, Line Number= , Azimuth= , Comments= 65/90
03/17/2018 20:57	Custom entry	Barge was here
03/17/2018 21:02	Main scheme line	SOL file= 2018BR0762102.HSX, Line Number= , Azimuth= , Comments= 65/65
03/17/2018 21:03	Main scheme line	SOL file= 2018BR0762103.HSX, Line Number= , Azimuth= , Comments= 65/90
03/17/2018 21:06	Main scheme line	SOL file= 2018BR0762106.HSX, Line Number= , Azimuth= , Comments= 65/65
03/17/2018 21:08	Main scheme line	SOL file= 2018BR0762108.HSX, Line Number= , Azimuth= , Comments= 65/90
03/17/2018 21:10	SVP cast	AML_20180317_0008
03/17/2018 21:12	Main scheme line	SOL file= 2018BR0762112.HSX, Line Number= , Azimuth= , Comments= 65/65
03/17/2018 21:27	Main scheme line	SOL file= 2018BR0762127.HSX, Line Number= , Azimuth= , Comments= 65/65
03/17/2018 21:43	System Status	System status record modified

Weather	**Sea state**	Calm	**Wind speed**	0-5kts
	Comments	Partly Cloudy		
Echo Sounder Settings	**Range**	40	**Gain**	23
	Power	218	**Spreading**	30
	Absorption	70	**Ping rate**	25
	Pulse width	500	**Operator**	JXMD
	Type and Frequency	Multibeam High (400kHz)		
Sidescan Sonar Settings	No sidescan			

03/17/2018 21:43	Main scheme line	SOL file= 2018BR0762143.HSX, Line Number= , Azimuth= , Comments= 65/90
03/17/2018 21:49	Main scheme line	SOL file= 2018BR0762149.HSX, Line Number= , Azimuth= , Comments= 90/65
03/17/2018 21:56	Main scheme line	SOL file= 2018BR0762156.HSX, Line Number= , Azimuth= , Comments= 65/90
03/17/2018 22:00	Main scheme line	SOL file= 2018BR0762200.HSX, Line Number= , Azimuth= , Comments= 65/90
03/17/2018 22:03	Main scheme line	SOL file= 2018BR0762203.HSX, Line Number= , Azimuth= , Comments= 65/90
03/17/2018 22:08	Main scheme line	SOL file= 2018BR0762208.HSX, Line Number= , Azimuth= , Comments= 65/65
03/17/2018 22:10	Main scheme line	SOL file= 2018BR0762210.HSX, Line Number= , Azimuth= , Comments= 65/90
03/17/2018 22:11	Main scheme line	SOL file= 2018BR0762211.HSX, Line Number= , Azimuth= , Comments= 65/90
03/17/2018 22:15	Main scheme line	SOL file= 2018BR0762215.HSX, Line Number= , Azimuth= , Comments= 65/65
03/17/2018 22:21	Main scheme line	SOL file= 2018BR0762221.HSX, Line Number= , Azimuth= , Comments= 65/65
03/17/2018 22:25	Main scheme line	SOL file= 2018BR0762225.HSX, Line Number= , Azimuth= , Comments= 65/65
03/17/2018 22:32	Main scheme line	SOL file= 2018BR0762232.HSX, Line Number= , Azimuth= , Comments= 90/65
03/17/2018 22:36	Main scheme line	SOL file= 2018BR0762236.HSX, Line Number= , Azimuth= , Comments= 90/65
03/17/2018 22:38	Main scheme line	SOL file= 2018BR0762238.HSX, Line Number= , Azimuth= , Comments= 65/90
03/17/2018 22:40	Main scheme line	SOL file= 2018BR0762240.HSX, Line Number= , Azimuth= , Comments= 65/90
03/17/2018 22:44	System Status	System status record modified

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Date/Time (UTC)	*Code*	*Comments*
		Weather — **Sea state**: Calm; **Wind speed**: 0-5kts; **Comments**: Partly Cloudy **Echo Sounder Settings** — **Range**: 40; **Gain**: 23; **Power**: 218; **Spreading**: 30; **Absorption**: 70; **Ping rate**: 25; **Pulse width**: 500; **Operator**: JXMD; **Type and Frequency**: Multibeam High (400kHz) **Sidescan Sonar Settings**: No sidescan
03/17/2018 22:46	Main scheme line	SOL file= 2018BR0762246.HSX, Line Number= , Azimuth= , Comments= 65/65
03/17/2018 22:51	Main scheme line	SOL file= 2018BR0762251.HSX, Line Number= , Azimuth= , Comments= 90/65
03/17/2018 22:59	SVP cast	AML_20180317_0009
03/17/2018 23:04	Main scheme line	SOL file= 2018BR0762304.HSX, Line Number= , Azimuth= , Comments= 65/65
03/17/2018 23:17	Main scheme line	SOL file= 2018BR0762317.HSX, Line Number= , Azimuth= , Comments= 65/65
03/17/2018 23:27	Main scheme line	SOL file= 2018BR0762327.HSX, Line Number= , Azimuth= , Comments= 65/65
03/17/2018 23:40	SVP cast	AML_20180317_0010
03/17/2018 23:42	Main scheme line	SOL file= 2018BR0762342.HSX, Line Number= , Azimuth= , Comments= 65/65
03/17/2018 23:44	System Status	System status record modified
		Weather — **Sea state**: Calm; **Wind speed**: 0-5kts; **Comments**: Partly Cloudy **Echo Sounder Settings** — **Range**: 40; **Gain**: 23; **Power**: 218; **Spreading**: 30; **Absorption**: 70; **Ping rate**: 25; **Pulse width**: 500; **Operator**: JXMD; **Type and Frequency**: Multibeam High (400kHz) **Sidescan Sonar Settings**: No sidescan
03/17/2018 23:59	Custom entry	Pick MBES - transit for Freds Marina
03/18/2018 00:13	Custom entry	ARRIVE AT FREDS

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David Evans and Associates, Inc.
2801 SE Columbia Way, Suite 130
Vancouver, WA 98661
Phone: (360)314-3200
Fax: (360)314-3250

Survey Information

Local Date	03/18/2018 (JD 77)	**Hydrographer**	DTM, JXMD
Contract		**Registry Number**	
Task Order		**Job Number**	AETR00000034
Contractor	David Evans and Associates, Inc. Marine Services		
Locality	Portland, Oregon		
Sub-Locality	Willamette River River Mile 1.9-11.8		
Operations	Multibeam Survey		
Comments	Portland Harbor Superfund		

Horizontal Control

Horizontal Datum	NAD83 (2011)	**Units**	International Feet
Coordinate System	State Plane, Oregon North		
Primary System	Applanix POS/MV V5	**PCS SN**	5602
IMU SN	1058	**Antenna 1 SN**	8569
Firmware Version	9.29	**Antenna 2 SN**	8568
Secondary System	Trimble SPS855	**Receiver SN**	0075
Firmware Version	5.30	**Antenna SN**	1441039513
Beacon Receiver	Intuicom RTK Bridge X	**Receiver SN**	X151065
Firmware Version	2.0.0	**Antenna SN**	n/a
Beacon Station 1	DEA Marine Services Roof	**Station ID**	DEMSI
Beacon Station 2	n/a	**Station ID**	n/a
Cable Counter	n/a	**Serial Number**	n/a

Vertical Control

Gauge/Base Location	n/a		
Additional Information	RTK elevations		
Vertical Datum	NAVD88 - Geoid12a	**Units**	Feet

Vessel and Crew

Survey Vessel	Broughton	**Survey Vessel**	Broughton
Vessel Crew	n/a	**Vessel Crew**	n/a
Survey Crew	DTM, JXMD	**Survey Crew**	DTM, JXMD
Towing Point	n/a	**Towing Point**	n/a

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Sonar Equipment

Model	Dual Reson T50P - Master	**Topside SN**	95772016142
Transmit SN	5015069	**Receive SN**	2714149
Model	n/a	**Topside SN**	n/a
		Towfish SN	n/a
Primary SVP	AML Smart SVP	**Body SN**	5588
		Velocity Tip SN	5498
Surface SVP	AML SV SmartX	**Body SN**	1322
		Velocity Tip SN	n/a
Secondary SVP	AML Smart SVP	**Serial Number**	5643/2028
Other	TSlave Trans/Recv	**Serial number**	5015057/2714140
Other	Slave Topside	**Serial number**	95772016148

Acquisition Software

Line Planning	Hypack	**Version**	17.1.10.0
Primary Navigation	Hypack Survey	**Version**	17.1.10.0
Multibeam Acquisition	Hysweep	**Version**	14.0.9.0
Multibeam Processor	SeaBat Controller	**Version**	FP4 V6.0.0.11
Sidescan Acquisition	n/a	**Version**	n/a
Sidescan Processor	n/a	**Version**	n/a
POS/MV Controller	POS View	**Version**	9.21
MVP Acquisition	n/a	**Version**	n/a
SVP Acquisition	MVP Controller	**Version**	2.45
SVP Processing	MVP Controller	**Version**	2.45
SVP Conversion	SVP Convert	**Version**	2.0.4
Other	SeaBatUI 4.0.0.0		
Other	7k Center 6.3.0.8		
Other	Caris Onboard 1.4.0		

Start of Day Checklist

Drafts		**Start logging POSPac time**	
Check that MVP fish and block secured		**Survey area arrival time**	
Check for SSS cable fatigue		**SV comparison - MVP vs.surface probe**	
Check safety equipment		**Receiving differential corrections**	
Check weather forecast		**SSS offsets**	
Create/set data directories - Hypack PC		**Set SSS cable out**	
ISIS PC		**Set SSS and MBES settings**	
MVP PC		**Update system status in LineLog**	
Notes PC		**Complete roll lines**	
Dock departure time			

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Date/Time (UTC)	*Code*	*Comments*
03/18/2018 15:45	System Status	System status record modified

Weather	**Sea state**	Calm	**Wind speed**	0-5kts
	Comments	Partly Cloudy		
Echo Sounder Settings	**Range**	40	**Gain**	23
	Power	218	**Spreading**	30
	Absorption	70	**Ping rate**	25
	Pulse width	500	**Operator**	JXMD
	Type and Frequency	Multibeam High (400kHz)		
Sidescan Sonar Settings	No sidescan			

03/18/2018 15:45	Custom entry	Arrived at boar at 0800 local time to fix generater
03/18/2018 15:45	Custom entry	Generator fixed
03/18/2018 15:46	Custom entry	Start logging vessel rover: 0770.TO2
03/18/2018 15:47	POSPac file	POSPac file started.
03/18/2018 15:47	Custom entry	Underway
03/18/2018 16:11	Draft	Draft P= 0.550m, S= 0.460m, Avg= 0.505m, Comments=
03/18/2018 16:11	Custom entry	Deploy sonars
03/18/2018 16:14	SVP cast	AML_20180318_0001
03/18/2018 16:18	Main scheme line	SOL file= 2018BR0771617.HSX, Line Number= , Azimuth= , Comments= 65/65
03/18/2018 16:30	Main scheme line	SOL file= 2018BR0771630.HSX, Line Number= , Azimuth= , Comments= 65/65
03/18/2018 16:35	Main scheme line	SOL file= 2018BR0771635.HSX, Line Number= , Azimuth= , Comments= 65/65
03/18/2018 16:41	Main scheme line	SOL file= 2018BR0771641.HSX, Line Number= , Azimuth= , Comments= 65/90
03/18/2018 16:49	System Status	System status record modified

Weather	**Sea state**	Calm	**Wind speed**	0-5kts
	Comments	Partly Cloudy		
Echo Sounder Settings	**Range**	40	**Gain**	23
	Power	218	**Spreading**	30
	Absorption	70	**Ping rate**	25
	Pulse width	500	**Operator**	JXMD
	Type and Frequency	Multibeam High (400kHz)		
Sidescan Sonar Settings	No sidescan			

03/18/2018 16:57	Main scheme line	SOL file= 2018BR0771657.HSX, Line Number= , Azimuth= , Comments= 65/65
03/18/2018 17:10	SVP cast	AML_20180318_0002
03/18/2018 17:12	Main scheme line	SOL file= 2018BR0771712.HSX, Line Number= , Azimuth= , Comments= 65/65
03/18/2018 17:23	Main scheme line	SOL file= 2018BR0771723.HSX, Line Number= , Azimuth= , Comments= 65/65
03/18/2018 17:30	Custom entry	boom to stbd
03/18/2018 17:31	Custom entry	Ships at T2
03/18/2018 17:35	Main scheme line	SOL file= 2018BR0771735.HSX, Line Number= , Azimuth= , Comments= 65/65
03/18/2018 17:46	Main scheme line	SOL file= 2018BR0771746.HSX, Line Number= , Azimuth= , Comments= 65/65
03/18/2018 17:49	System Status	System status record modified

Weather	**Sea state**	Calm	**Wind speed**	0-5kts
	Comments	Partly Cloudy		
Echo Sounder Settings	**Range**	40	**Gain**	23
	Power	218	**Spreading**	30
	Absorption	70	**Ping rate**	25
	Pulse width	500	**Operator**	JXMD
	Type and Frequency	Multibeam High (400kHz)		
Sidescan Sonar Settings	No sidescan			

03/18/2018 18:01	Main scheme line	SOL file= 2018BR0771800.HSX, Line Number= , Azimuth= , Comments= 65/65
03/18/2018 18:08	Main scheme line	SOL file= 2018BR0771808.HSX, Line Number= , Azimuth= , Comments= 65/65
03/18/2018 18:11	Main scheme line	SOL file= 2018BR0771811.HSX, Line Number= , Azimuth= , Comments= 65/65

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Date/Time (UTC)	*Code*	*Comments*
03/18/2018 18:14	Main scheme line	SOL file= 2018BR0771815.HSX, Line Number= , Azimuth= , Comments= 65/90
03/18/2018 18:20	Main scheme line	SOL file= 2018BR0771820.HSX, Line Number= , Azimuth= , Comments= 65/90
03/18/2018 18:25	SVP cast	AML_20180318_00033
03/18/2018 18:27	Main scheme line	SOL file= 2018BR0771827.HSX, Line Number= , Azimuth= , Comments= 90/65
03/18/2018 18:36	Main scheme line	SOL file= 2018BR0771836.HSX, Line Number= , Azimuth= , Comments= 65/90
03/18/2018 18:43	Main scheme line	SOL file= 2018BR0771843.HSX, Line Number= , Azimuth= , Comments= 65/90
03/18/2018 18:49	System Status	System status record modified

Weather	**Sea state**	Calm	**Wind speed**	0-5kts
	Comments	Partly Cloudy		
Echo Sounder Settings	**Range**	40	**Gain**	23
	Power	218	**Spreading**	30
	Absorption	70	**Ping rate**	25
	Pulse width	500	**Operator**	JXMD
	Type and Frequency	Multibeam High (400kHz)		
Sidescan Sonar Settings	No sidescan			

03/18/2018 18:50	Main scheme line	SOL file= 2018BR0771850.HSX, Line Number= , Azimuth= , Comments= 65/65
03/18/2018 19:10	SVP cast	AML_20180318_0004
03/18/2018 19:11	Main scheme line	SOL file= 2018BR0771911.HSX, Line Number= , Azimuth= , Comments= 65/65
03/18/2018 19:32	Main scheme line	SOL file= 2018BR0771932.HSX, Line Number= , Azimuth= , Comments= 65/65
03/18/2018 19:42	SVP cast	AML_20180318_0005
03/18/2018 19:45	Main scheme line	SOL file= 2018BR0771945.HSX, Line Number= , Azimuth= , Comments= 65/65
03/18/2018 19:49	System Status	System status record modified

Weather	**Sea state**	Calm	**Wind speed**	0-5kts
	Comments	Partly Cloudy		
Echo Sounder Settings	**Range**	40	**Gain**	23
	Power	218	**Spreading**	30
	Absorption	70	**Ping rate**	25
	Pulse width	500	**Operator**	JXMD
	Type and Frequency	Multibeam High (400kHz)		
Sidescan Sonar Settings	No sidescan			

03/18/2018 19:58	Main scheme line	SOL file= 2018BR0771958.HSX, Line Number= , Azimuth= , Comments= 65/65
03/18/2018 19:59	Main scheme line	SOL file= 2018BR0771959.HSX, Line Number= , Azimuth= , Comments= 65/65
03/18/2018 20:01	Custom entry	Use last 2 lines as XLs if needed
03/18/2018 20:03	Main scheme line	SOL file= 2018BR0772003.HSX, Line Number= , Azimuth= , Comments= 65/90
03/18/2018 20:08	Custom entry	Ships to stbd
03/18/2018 20:11	Main scheme line	SOL file= 2018BR0772011.HSX, Line Number= , Azimuth= , Comments= 65/90
03/18/2018 20:14	Main scheme line	SOL file= 2018BR0772014.HSX, Line Number= , Azimuth= , Comments= 65/90
03/18/2018 20:20	Custom entry	boom to stbd
03/18/2018 20:29	Custom entry	barges to stbd
03/18/2018 20:36	Main scheme line	SOL file= 2018BR0772036.HSX, Line Number= , Azimuth= , Comments= 90/65
03/18/2018 20:41	Main scheme line	SOL file= 2018BR0772041.HSX, Line Number= , Azimuth= , Comments= 65/65
03/18/2018 20:50	System Status	System status record modified

Weather	**Sea state**	Calm	**Wind speed**	0-5kts
	Comments	Partly Cloudy		
Echo Sounder Settings	**Range**	40	**Gain**	23
	Power	218	**Spreading**	30
	Absorption	70	**Ping rate**	25
	Pulse width	500	**Operator**	JXMD
	Type and Frequency	Multibeam High (400kHz)		
Sidescan Sonar Settings	No sidescan			

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Date/Time (UTC)	*Code*	*Comments*
03/18/2018 21:18	Main scheme line	SOL file= 2018BR0772118.HSX, Line Number= , Azimuth= , Comments= 65/90
03/18/2018 21:25	SVP cast	AML_20180318_0006 forgot to stop logging for a while, use first part of cast data
03/18/2018 21:26	Main scheme line	SOL file= 2018BR0772126.HSX, Line Number= , Azimuth= , Comments= 65/65
03/18/2018 21:29	Main scheme line	SOL file= 2018BR0772129.HSX, Line Number= , Azimuth= , Comments= 65/65
03/18/2018 21:31	Main scheme line	SOL file= 2018BR0772131.HSX, Line Number= , Azimuth= , Comments= 65/65
03/18/2018 21:33	Main scheme line	SOL file= 2018BR0772133.HSX, Line Number= , Azimuth= , Comments= 65/65
03/18/2018 21:36	Main scheme line	SOL file= 2018BR0772136.HSX, Line Number= , Azimuth= , Comments= 65/90
03/18/2018 21:51	System Status	System status record modified

Weather	**Sea state**	Calm	**Wind speed**	0-5kts
	Comments	Partly Cloudy		
Echo Sounder Settings	**Range**	40	**Gain**	23
	Power	218	**Spreading**	30
	Absorption	70	**Ping rate**	25
	Pulse width	500	**Operator**	JXMD
	Type and Frequency	Multibeam High (400kHz)		
Sidescan Sonar Settings	No sidescan			

03/18/2018 21:57	SVP cast	AML_20180318_0007
03/18/2018 22:03	Cross line	SOL file= 2018BR0772203.HSX, Line Number= , Azimuth= , Comments= 65/65
03/18/2018 22:06	Cross line	SOL file= 2018BR0772206.HSX, Line Number= , Azimuth= , Comments= 65/65
03/18/2018 22:10	Custom entry	Transit to Swan Island
03/18/2018 22:24	Main scheme line	SOL file= 2018BR0772224.HSX, Line Number= , Azimuth= , Comments= 65/65
03/18/2018 22:29	Custom entry	booms to stbd
03/18/2018 22:40	Main scheme line	SOL file= 2018BR0772240.HSX, Line Number= , Azimuth= , Comments= 65/65
03/18/2018 22:42	SVP cast	AML_20180318_0008
03/18/2018 22:43	Main scheme line	SOL file= 2018BR0772243.HSX, Line Number= , Azimuth= , Comments= 65/65
03/18/2018 22:46	Main scheme line	SOL file= 2018BR0772246.HSX, Line Number= , Azimuth= , Comments= 65/65
03/18/2018 22:49	Main scheme line	SOL file= 2018BR0772249.HSX, Line Number= , Azimuth= , Comments= 65/65
03/18/2018 22:52	System Status	System status record modified

Weather	**Sea state**	Calm	**Wind speed**	0-5kts
	Comments	Partly Cloudy		
Echo Sounder Settings	**Range**	40	**Gain**	23
	Power	218	**Spreading**	30
	Absorption	70	**Ping rate**	25
	Pulse width	500	**Operator**	JXMD
	Type and Frequency	Multibeam High (400kHz)		
Sidescan Sonar Settings	No sidescan			

03/18/2018 22:52	Main scheme line	SOL file= 2018BR0772252.HSX, Line Number= , Azimuth= , Comments= 65/65
03/18/2018 22:55	Main scheme line	SOL file= 2018BR0772255.HSX, Line Number= , Azimuth= , Comments= 65/90
03/18/2018 23:00	Main scheme line	SOL file= 2018BR0772300.HSX, Line Number= , Azimuth= , Comments= 65/90
03/18/2018 23:04	Main scheme line	SOL file= 2018BR0772304.HSX, Line Number= , Azimuth= , Comments= 65/90
03/18/2018 23:07	Main scheme line	SOL file= 2018BR0772307.HSX, Line Number= , Azimuth= , Comments= 65/65
03/18/2018 23:09	Custom entry	ships to stbd
03/18/2018 23:21	Main scheme line	SOL file= 2018BR0772320.HSX, Line Number= , Azimuth= , Comments= 65/65
03/18/2018 23:24	SVP cast	AML_20180318_0009
03/18/2018 23:27	Main scheme line	SOL file= 2018BR0772327.HSX, Line Number= , Azimuth= , Comments= 65/90
03/18/2018 23:40	Main scheme line	SOL file= 2018BR0772340.HSX, Line Number= , Azimuth= , Comments= 65/90
03/18/2018 23:59	System Status	System status record modified

- Hydrographic Survey Log - Broughton - March 18, 2018

Date/Time (UTC)	*Code*	*Comments*

Weather	**Sea state**	Calm	**Wind speed**	0-5kts
	Comments	Partly Cloudy		
Echo Sounder Settings	**Range**	40	**Gain**	23
	Power	218	**Spreading**	30
	Absorption	70	**Ping rate**	25
	Pulse width	500	**Operator**	JXMD
	Type and Frequency	Multibeam High (400kHz)		
Sidescan Sonar Settings	No sidescan			

03/18/2018 23:59	Main scheme line	SOL file= 2018BR0772359.HSX, Line Number= , Azimuth= , Comments= 65/65
03/19/2018 00:00	SVP cast	AML_20180318_0010
03/19/2018 00:01	Main scheme line	SOL file= 2018BR0780001.HSX, Line Number= , Azimuth= , Comments= 65/65
03/19/2018 00:05	Custom entry	Sturgen under ship?
03/19/2018 00:07	Main scheme line	SOL file= 2018BR0780007.HSX, Line Number= , Azimuth= , Comments= 65/65
03/19/2018 00:10	Main scheme line	SOL file= 2018BR0780010.HSX, Line Number= , Azimuth= , Comments= 65/65
03/19/2018 00:13	Main scheme line	SOL file= 2018BR0780013.HSX, Line Number= , Azimuth= , Comments= 65/65
03/19/2018 00:15	Main scheme line	SOL file= 2018BR0780015.HSX, Line Number= , Azimuth= , Comments= 65/65
03/19/2018 00:18	Main scheme line	SOL file= 2018BR0780018.HSX, Line Number= , Azimuth= , Comments= 65/65
03/19/2018 00:18	Custom entry	Vigor Dry Dock
03/19/2018 00:20	Main scheme line	SOL file= 2018BR0780020.HSX, Line Number= , Azimuth= , Comments= 65/90
03/19/2018 00:24	Main scheme line	SOL file= 2018BR0780023.HSX, Line Number= , Azimuth= , Comments= 90/65
03/19/2018 00:28	Custom entry	Pick up sonars
03/19/2018 00:37	Custom entry	Return to marina
03/19/2018 00:37	Custom entry	Stop logging vessel rover
03/19/2018 00:53	Custom entry	Arrive at marina, stop logging POSPAC

- Hydrographic Survey Log - Broughton - March 20, 2018

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Survey Information

Local Date	03/20/2018 (JD 79)	**Hydrographer**	DTM, JXMD
Contract		**Registry Number**	
Task Order		**Job Number**	AETR00000034
Contractor	David Evans and Associates, Inc. Marine Services		
Locality	Portland, Oregon		
Sub-Locality	Willamette River River Mile 1.9-11.8		
Operations	Multibeam Survey		
Comments	Portland Harbor Superfund		

Horizontal Control

Horizontal Datum	NAD83 (2011)	**Units**	International Feet
Coordinate System	State Plane, Oregon North		
Primary System	Applanix POS/MV V5	**PCS SN**	5602
IMU SN	1058	**Antenna 1 SN**	8569
Firmware Version	9.29	**Antenna 2 SN**	8568
Secondary System	Trimble SPS855	**Receiver SN**	0075
Firmware Version	5.30	**Antenna SN**	1441039513
Beacon Receiver	Intuicom RTK Bridge X	**Receiver SN**	X151065
Firmware Version	2.0.0	**Antenna SN**	n/a
Beacon Station 1	DEA Marine Services Roof	**Station ID**	DEMSI
Beacon Station 2	n/a	**Station ID**	n/a
Cable Counter	n/a	**Serial Number**	n/a

Vertical Control

Gauge/Base Location	n/a		
Additional Information	RTK elevations		
Vertical Datum	NAVD88 - Geoid12a	**Units**	Feet

Vessel and Crew

Survey Vessel	Broughton	**Survey Vessel**	Broughton
Vessel Crew	n/a	**Vessel Crew**	n/a
Survey Crew	DTM, JXMD	**Survey Crew**	DTM, JXMD
Towing Point	n/a	**Towing Point**	n/a

- Hydrographic Survey Log - Broughton - March 20, 2018

Sonar Equipment

Model	Dual Reson T50P - Master	**Topside SN**	95772016142
Transmit SN	5015069	**Receive SN**	2714149
Model	n/a	**Topside SN**	n/a
		Towfish SN	n/a
Primary SVP	AML Smart SVP	**Body SN**	5588
		Velocity Tip SN	5498
Surface SVP	AML SV SmartX	**Body SN**	1322
		Velocity Tip SN	n/a
Secondary SVP	AML Smart SVP	**Serial Number**	5643/2028
Other	TSlave Trans/Recv	**Serial number**	5015057/2714140
Other	Slave Topside	**Serial number**	95772016148

Acquisition Software

Line Planning	Hypack	**Version**	17.1.10.0
Primary Navigation	Hypack Survey	**Version**	17.1.10.0
Multibeam Acquisition	Hysweep	**Version**	14.0.9.0
Multibeam Processor	SeaBat Controller	**Version**	FP4 V6.0.0.11
Sidescan Acquisition	n/a	**Version**	n/a
Sidescan Processor	n/a	**Version**	n/a
POS/MV Controller	POS View	**Version**	9.21
MVP Acquisition	n/a	**Version**	n/a
SVP Acquisition	MVP Controller	**Version**	2.45
SVP Processing	MVP Controller	**Version**	2.45
SVP Conversion	SVP Convert	**Version**	2.0.4
Other	SeaBatUI 4.0.0.0		
Other	7k Center 6.3.0.8		
Other	Caris Onboard 1.4.0		

Start of Day Checklist

Drafts		**Start logging POSPac time**	
Check that MVP fish and block secured		**Survey area arrival time**	
Check for SSS cable fatigue		**SV comparison - MVP vs.surface probe**	
Check safety equipment		**Receiving differential corrections**	
Check weather forecast		**SSS offsets**	
Create/set data directories - Hypack PC		**Set SSS cable out**	
ISIS PC		**Set SSS and MBES settings**	
MVP PC		**Update system status in LineLog**	
Notes PC		**Complete roll lines**	
Dock departure time			

- Hydrographic Survey Log - Broughton - March 20, 2018

Date/Time (UTC)	*Code*	*Comments*
03/20/2018 16:26	System Status	System status record modified

Weather	**Sea state**	Calm	**Wind speed**	0-5kts
	Comments	Partly Cloudy		
Echo Sounder Settings	**Range**	40	**Gain**	23
	Power	218	**Spreading**	30
	Absorption	70	**Ping rate**	25
	Pulse width	500	**Operator**	JXMD
	Type and Frequency	Multibeam High (400kHz)		
Sidescan Sonar Settings	No sidescan			

03/20/2018 16:26	Custom entry	Completed Safety Tailgate meeting with Julee onboard
03/20/2018 16:27	Custom entry	Start logging vessel rover: 0790.TO2
03/20/2018 16:47	Draft	Draft P= 0.530m, S= 0.500m, Avg= 0.515m, Comments=
03/20/2018 16:49	Custom entry	Deploy sonars in Mulnomah Channel
03/20/2018 16:51	SVP cast	AML_20180320_0001
03/20/2018 16:53	Main scheme line	SOL file= 2018BR0791653.HSX, Line Number= , Azimuth= , Comments= 65/65
03/20/2018 17:06	Main scheme line	SOL file= 2018BR0791706.HSX, Line Number= , Azimuth= , Comments= 65/90
03/20/2018 17:20	Main scheme line	SOL file= 2018BR0791720.HSX, Line Number= , Azimuth= , Comments= 65/65
03/20/2018 17:24	Main scheme line	SOL file= 2018BR0791724.HSX, Line Number= , Azimuth= , Comments= 65/65
03/20/2018 17:32	System Status	System status record modified

Weather	**Sea state**	Calm	**Wind speed**	0-5kts
	Comments	Partly Cloudy		
Echo Sounder Settings	**Range**	40	**Gain**	23
	Power	218	**Spreading**	30
	Absorption	70	**Ping rate**	25
	Pulse width	500	**Operator**	JXMD
	Type and Frequency	Multibeam High (400kHz)		
Sidescan Sonar Settings	No sidescan			

03/20/2018 17:34	Main scheme line	SOL file= 2018BR0791734.HSX, Line Number= , Azimuth= , Comments= 90/65
03/20/2018 17:53	Main scheme line	SOL file= 2018BR0791753.HSX, Line Number= , Azimuth= , Comments= 65/65
03/20/2018 18:08	Main scheme line	SOL file= 2018BR0791808.HSX, Line Number= , Azimuth= , Comments= 65/90
03/20/2018 18:20	SVP cast	AML_20180320_0002
03/20/2018 18:21	Main scheme line	SOL file= 2018BR0791821.HSX, Line Number= , Azimuth= , Comments= 65/65
03/20/2018 18:33	System Status	System status record modified

Weather	**Sea state**	Calm	**Wind speed**	0-5kts
	Comments	Partly Cloudy		
Echo Sounder Settings	**Range**	40	**Gain**	23
	Power	218	**Spreading**	30
	Absorption	70	**Ping rate**	25
	Pulse width	500	**Operator**	JXMD
	Type and Frequency	Multibeam High (400kHz)		
Sidescan Sonar Settings	No sidescan			

03/20/2018 18:40	Main scheme line	SOL file= 2018BR0791840.HSX, Line Number= , Azimuth= , Comments= 65/65
03/20/2018 18:55	Main scheme line	SOL file= 2018BR0791855.HSX, Line Number= , Azimuth= , Comments= 65/65
03/20/2018 19:11	SVP cast	AML_20180320_0003
03/20/2018 19:13	Main scheme line	SOL file= 2018BR0791913.HSX, Line Number= , Azimuth= , Comments= 65/65
03/20/2018 19:30	Main scheme line	SOL file= 2018BR0791930.HSX, Line Number= , Azimuth= , Comments= 65/65
03/20/2018 19:46	System Status	System status record modified

- Hydrographic Survey Log - Broughton - March 20, 2018

Date/Time (UTC)	Code	Comments
	Weather	Sea state: Calm; Wind speed: 0-5kts; Comments: Partly Cloudy
	Echo Sounder Settings	Range: 40; Gain: 23; Power: 218; Spreading: 30; Absorption: 70; Ping rate: 25; Pulse width: 500; Operator: JXMD; Type and Frequency: Multibeam High (400kHz)
	Sidescan Sonar Settings	No sidescan
03/20/2018 19:46	Main scheme line	SOL file= 2018BR0791946.HSX, Line Number= , Azimuth= , Comments= 65/90
03/20/2018 19:50	Main scheme line	SOL file= 2018BR0791950.HSX, Line Number= , Azimuth= , Comments= 65/65
03/20/2018 19:51	Main scheme line	SOL file= 2018BR0791951.HSX, Line Number= , Azimuth= , Comments= 65/90
03/20/2018 19:54	Main scheme line	SOL file= 2018BR0791954.HSX, Line Number= , Azimuth= , Comments= 65/90
03/20/2018 20:01	Main scheme line	SOL file= 2018BR0792001.HSX, Line Number= , Azimuth= , Comments= 65/65
03/20/2018 20:02	Main scheme line	SOL file= 2018BR0792002.HSX, Line Number= , Azimuth= , Comments= 65/65
03/20/2018 20:08	SVP cast	AML_20180320_0004
03/20/2018 20:09	Main scheme line	SOL file= 2018BR0792009.HSX, Line Number= , Azimuth= , Comments= 65/65
03/20/2018 20:16	Main scheme line	SOL file= 2018BR0792016.HSX, Line Number= , Azimuth= , Comments= 65/90
03/20/2018 20:32	SVP cast	AML_20180320_0005
03/20/2018 20:34	Main scheme line	SOL file= 2018BR0792034.HSX, Line Number= , Azimuth= , Comments= 65/90
03/20/2018 20:51	System Status	System status record modified
	Weather	Sea state: Calm; Wind speed: 0-5kts; Comments: Partly Cloudy
	Echo Sounder Settings	Range: 40; Gain: 23; Power: 218; Spreading: 30; Absorption: 70; Ping rate: 25; Pulse width: 500; Operator: JXMD; Type and Frequency: Multibeam High (400kHz)
	Sidescan Sonar Settings	No sidescan
03/20/2018 20:51	Main scheme line	SOL file= 2018BR0792051.HSX, Line Number= , Azimuth= , Comments= 65/65
03/20/2018 20:57	SVP cast	AML_20180320_0006
03/20/2018 21:01	Main scheme line	SOL file= 2018BR0792101.HSX, Line Number= , Azimuth= , Comments= 65/90
03/20/2018 21:09	Main scheme line	SOL file= 2018BR0792109.HSX, Line Number= , Azimuth= , Comments= 65/65
03/20/2018 21:11	Main scheme line	SOL file= 2018BR0792111.HSX, Line Number= , Azimuth= , Comments= 65/90
03/20/2018 21:26	Main scheme line	SOL file= 2018BR0792126.HSX, Line Number= , Azimuth= , Comments= 65/65
03/20/2018 21:28	Main scheme line	SOL file= 2018BR0792128.HSX, Line Number= , Azimuth= , Comments= 65/65
03/20/2018 21:35	SVP cast	AML_20180320_0007
03/20/2018 21:37	Main scheme line	SOL file= 2018BR0792136.HSX, Line Number= , Azimuth= , Comments= 65/65
03/20/2018 21:39	Main scheme line	SOL file= 2018BR0792139.HSX, Line Number= , Azimuth= , Comments= 65/65
03/20/2018 21:44	Main scheme line	SOL file= 2018BR0792144.HSX, Line Number= , Azimuth= , Comments= 65/65
03/20/2018 21:46	Main scheme line	SOL file= 2018BR0792146.HSX, Line Number= , Azimuth= , Comments= 65/65
03/20/2018 21:48	Main scheme line	SOL file= 2018BR0792148.HSX, Line Number= , Azimuth= , Comments= 65/65
03/20/2018 21:51	System Status	System status record modified
	Weather	Sea state: Calm; Wind speed: 0-5kts; Comments: Partly Cloudy
	Echo Sounder Settings	Range: 40; Gain: 23; Power: 218; Spreading: 30; Absorption: 70; Ping rate: 25; Pulse width: 500; Operator: JXMD; Type and Frequency: Multibeam High (400kHz)
	Sidescan Sonar Settings	No sidescan

- Hydrographic Survey Log - Broughton - March 20, 2018

Date/Time (UTC)	*Code*	*Comments*
03/20/2018 21:51	Main scheme line	SOL file= 2018BR0792151.HSX, Line Number= , Azimuth= , Comments= 65/90
03/20/2018 21:59	Main scheme line	SOL file= 2018BR0792159.HSX, Line Number= , Azimuth= , Comments= 65/65
03/20/2018 22:00	Main scheme line	SOL file= 2018BR0792200.HSX, Line Number= , Azimuth= , Comments= 65/65
03/20/2018 22:05	Main scheme line	SOL file= 2018BR0792205.HSX, Line Number= , Azimuth= , Comments= 65/90
03/20/2018 22:14	SVP cast	AML_20180320_0008
03/20/2018 22:23	Bar check	Bar check, bar at 3.000 m, SV at head = 1442.00 m/s, Draft P= 0.53 m, S= 0.50 m, Draft Corr= 0.000 m, Raw Sonar= 0.000 m, Corrected Sonar= 0.000 m, Difference= -2.300 m, Comments= Port Sonar Bar Check. Top of tilt to WL 0.67ft (0.2m)
03/20/2018 22:27	Bar check	Bar check, bar at 3.000 m, SV at head = 1442.00 m/s, Draft P= 0.560 m, S= 0.500 m, Draft Corr= 0.000 m, Raw Sonar= 0.000 m, Corrected Sonar= 0.530 m, Difference= -1.470 m, Comments= Starboard Sonar Bar Check, WL to top of tilt mount 0.5ft (0.15m)
03/20/2018 22:37	Custom entry	Recover MBES
03/20/2018 22:37	Custom entry	Transit for Vancouver boat launch

- Hydrographic Survey Log - Broughton - March 21, 2018

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Survey Information

Local Date	03/21/2018 (JD 80)	**Hydrographer**	DTM, JXMD
Contract		**Registry Number**	
Task Order		**Job Number**	AETR00000034
Contractor	David Evans and Associates, Inc. Marine Services		
Locality	Portland, Oregon		
Sub-Locality	Willamette River River Mile 1.9-11.8		
Operations	Multibeam Survey		
Comments	Portland Harbor Superfund		

Horizontal Control

Horizontal Datum	NAD83 (2011)	**Units**	International Feet
Coordinate System	State Plane, Oregon North		
Primary System	Applanix POS/MV V5	**PCS SN**	5602
IMU SN	1058	**Antenna 1 SN**	8569
Firmware Version	9.29	**Antenna 2 SN**	8568
Secondary System	Trimble SPS855	**Receiver SN**	0075
Firmware Version	5.30	**Antenna SN**	1441039513
Beacon Receiver	Intuicom RTK Bridge X	**Receiver SN**	X151065
Firmware Version	2.0.0	**Antenna SN**	n/a
Beacon Station 1	DEA Marine Services Roof	**Station ID**	DEMSI
Beacon Station 2	n/a	**Station ID**	n/a
Cable Counter	n/a	**Serial Number**	n/a

Vertical Control

Gauge/Base Location	n/a		
Additional Information	RTK elevations		
Vertical Datum	NAVD88 - Geoid12a	**Units**	Feet

Vessel and Crew

Survey Vessel	Broughton	**Survey Vessel**	Broughton
Vessel Crew	n/a	**Vessel Crew**	n/a
Survey Crew	DTM, JXMD	**Survey Crew**	DTM, JXMD
Towing Point	n/a	**Towing Point**	n/a

- Hydrographic Survey Log - Broughton - March 21, 2018

Sonar Equipment

Model	Dual Reson T50P - Master	**Topside SN**	95772016142
Transmit SN	5015069	**Receive SN**	2714149
Model	n/a	**Topside SN**	n/a
		Towfish SN	n/a
Primary SVP	AML Smart SVP	**Body SN**	5588
		Velocity Tip SN	5498
Surface SVP	AML SV SmartX	**Body SN**	1322
		Velocity Tip SN	n/a
Secondary SVP	AML Smart SVP	**Serial Number**	5643/2028
Other	TSlave Trans/Recv	**Serial number**	5015057/2714140
Other	Slave Topside	**Serial number**	95772016148

Acquisition Software

Line Planning	Hypack	**Version**	17.1.10.0
Primary Navigation	Hypack Survey	**Version**	17.1.10.0
Multibeam Acquisition	Hysweep	**Version**	14.0.9.0
Multibeam Processor	SeaBat Controller	**Version**	FP4 V6.0.0.11
Sidescan Acquisition	n/a	**Version**	n/a
Sidescan Processor	n/a	**Version**	n/a
POS/MV Controller	POS View	**Version**	9.21
MVP Acquisition	n/a	**Version**	n/a
SVP Acquisition	MVP Controller	**Version**	2.45
SVP Processing	MVP Controller	**Version**	2.45
SVP Conversion	SVP Convert	**Version**	2.0.4
Other	SeaBatUI 4.0.0.0		
Other	7k Center 6.3.0.8		
Other	Caris Onboard 1.4.0		

Start of Day Checklist

Drafts		**Start logging POSPac time**	
Check that MVP fish and block secured		**Survey area arrival time**	
Check for SSS cable fatigue		**SV comparison - MVP vs.surface probe**	
Check safety equipment		**Receiving differential corrections**	
Check weather forecast		**SSS offsets**	
Create/set data directories - Hypack PC		**Set SSS cable out**	
ISIS PC		**Set SSS and MBES settings**	
MVP PC		**Update system status in LineLog**	
Notes PC		**Complete roll lines**	
Dock departure time			

- Hydrographic Survey Log - Broughton - March 21, 2018

Date/Time (UTC)	*Code*	*Comments*
03/21/2018 17:08	System Status	System status record modified

Weather	**Sea state**	Calm	**Wind speed**	0-5kts
	Comments	Partly Cloudy		
Echo Sounder Settings	**Range**	40	**Gain**	23
	Power	218	**Spreading**	30
	Absorption	70	**Ping rate**	25
	Pulse width	500	**Operator**	JXMD
	Type and Frequency	Multibeam High (400kHz)		
Sidescan Sonar Settings	No sidescan			

03/21/2018 17:09	Custom entry	Closing Position Check for Broughton on DEMSI Roof
03/21/2018 17:09	Custom entry	NAD83(2011) Oregon North, International Feet, NAVD88 Geoid 12B
03/21/2018 17:10	Custom entry	Hypack RTK height (ARP top APC) = -0.2024ft
03/21/2018 17:22	Position check	Position Check File= 2018BR0801722.HSX, Primary E,N= 7654419.84 m,718170.73 m, Secondary E,N= 7654419.84 m,718170.73 m, Known Separation= 0.000 m, Calc Separation= 0.000 m, Difference= 0.000 m, Comments= Primary Z = 71.67, Secondary Z = 71.72 Values are in feet not meters

- Hydrographic Survey Log - River Hawk - April 10, 2018

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Survey Information

Local Date	04/09/2018 (JD 99)	**Hydrographer**	JXMD/DTM
Contract		**Registry Number**	
Task Order		**Job Number**	AETR00000034
Contractor	David Evans and Associates, Inc. Marine Services		
Locality	Portland, Oregon		
Sub-Locality	Willamette River Mile 1.9-11.8		
Operations	Multibeam Survey		
Comments	Portland Harbor Superfund		

Horizontal Control

Horizontal Datum	NAD83 (2011)	**Units**	International Feet
Coordinate System	State Plane, Oregon North		
Primary System	Applanix POS MV V5	**PCS SN**	7113
IMU SN	3743	**Antenna 1 SN**	8445
Firmware Version	9.29	**Antenna 2 SN**	8451
Secondary System	Trimble SPS855	**Receiver SN**	0075
Firmware Version	5.30	**Antenna SN**	9485
Beacon Receiver	Intuicom RTK Bridge	**Receiver SN**	X151065
Firmware Version	2.0.0	**Antenna SN**	n/a
Beacon Station 1	DEA Marine Services	**Station ID**	DEMSI
Beacon Station 2	n/a	**Station ID**	n/a
Cable Counter	n/a	**Serial Number**	n/a

Vertical Control

Gauge/Base Location	n/a		
Additional Information	RTK Elevations		
Vertical Datum	NAVD88 Geoid 12a	**Units**	Feet

Vessel and Crew

Survey Vessel	Riverhawk	**Survey Vessel**	Riverhawk
Vessel Crew	n/a	**Vessel Crew**	n/a
Survey Crew	JXMD, DTM	**Survey Crew**	JXMD, DTM
Towing Point	n/a	**Towing Point**	n/a

- Hydrographic Survey Log - River Hawk - April 10, 2018

Sonar Equipment

Model	Reson 7101	**Topside SN**	5110128
Transmit SN	n/a	**Receive SN**	n/a
Model	n/a	**Topside SN**	n/a
		Towfish SN	n/a
Primary SVP	AML Smart SVP	**Body SN**	5588
		Velocity Tip SN	5498
Surface SVP	AML SmartX	**Body SN**	
		Velocity Tip SN	
Secondary SVP	n/a	**Serial Number**	n/a
Other	n/a	**Serial number**	n/a
Other	n/a	**Serial number**	n/a

Acquisition Software

Line Planning	Hypack	**Version**	16.1.8.0
Primary Navigation	Hypack Survey	**Version**	16.1.9.0
Multibeam Acquisition	Hysweep	**Version**	16.1.21.0
Multibeam Processor	SeaBat Controller	**Version**	3.7.0.14
Sidescan Acquisition	n/a	**Version**	n/a
Sidescan Processor	n/a	**Version**	n/a
POS/MV Controller	POS View	**Version**	9.21
MVP Acquisition	n/a	**Version**	n/a
SVP Acquisition	MVP Controller	**Version**	2.4.5
SVP Processing	MVP Controller	**Version**	2.4.5
SVP Conversion	SVP Convert	**Version**	2.0.4
Other	SeaBatUI 4.5.10.7		
Other	7k Center 4.5.10.6		
Other	n/a		

Start of Day Checklist

Drafts		**Start logging POSPac time**	
Check that MVP fish and block secured		**Survey area arrival time**	
Check for SSS cable fatigue		**SV comparison - MVP vs.surface probe**	
Check safety equipment		**Receiving differential corrections**	
Check weather forecast		**SSS offsets**	
Create/set data directories - Hypack PC		**Set SSS cable out**	
ISIS PC		**Set SSS and MBES settings**	
MVP PC		**Update system status in LineLog**	
Notes PC		**Complete roll lines**	
Dock departure time			

- Hydrographic Survey Log - River Hawk - April 10, 2018

Date/Time (UTC)	Code	Comments
04/09/2018 23:59	System Status	System status record modified

Weather	Sea state		Wind speed	
	Comments			
Echo Sounder Settings	Range		Gain	
	Power		Spreading	
	Absorption		Ping rate	
	Pulse width		Operator	
	Type and Frequency	Multibeam High (400kHz)		
Sidescan Sonar Settings	No sidescan			

04/10/2018 14:55	Custom entry	Position Check Riverhawk on Pt. PH1 with Zephyr Model 3 Rover Antenna and 2m fixed-height rod. MU to APC = 6.764ft. Geodesy: SPCS NAD83 (2011) Oregon North Zone, International Feet, NAVD88 Geoid 12A
04/10/2018 15:14	Position check	Position Check File= 20181001515.HSX, Primary E,N= 7637426.37 m,698702.46 m, Secondary E,N= 7637426.40 m,698702.46 m, Known Separation= 0.000 m, Calc Separation= 0.030 m, Difference= 0.030 m, Comments= Primary Z = 33.38, CHK Z = 33.37
04/10/2018 15:16	Custom entry	Holding Hypack RTK offset to VRP for survey: Hypack RTK height = -7.092 ft
04/10/2018 15:19	Custom entry	MBES vertical offset = 0.23m / 0.755ft down from VRP
04/10/2018 15:20	Custom entry	Safety Meeting Complete with Gravity at Swan Island Boat Ramp
04/10/2018 15:35	Custom entry	Startin Logging Vessel Rover: 1000.T02
04/10/2018 15:45	POSPac file	Start Logging POSPAC
04/10/2018 15:53	Draft	Draft P= 0.560m, S= 0.600m, Avg= 0.580m, Comments=
04/10/2018 15:54	Bar check	Bar check, bar at 2.000 m, SV at head = 1450.40 m/s, Draft P= 0.560 m, S= 0.600 m, Draft Corr= 0.000 m, Raw Sonar= 1.560 m, Corrected Sonar= 2.140 m, Difference= 0.140 m, Comments= Need Draft Correction
04/10/2018 15:58	Custom entry	Underway
04/10/2018 16:02	SVP cast	AML_20180410_0001 AML:1451m/s, Reson: 1450.7m/s
04/10/2018 16:17	SVP cast	AML_20180410_0002
04/10/2018 16:19	Custom entry	Patch Test
04/10/2018 16:19	Patch line	SOL file= 20181001619.HSX, Line Number= , Azimuth= , Comments= 90/90
04/10/2018 16:21	Patch line	SOL file= 20181001621.HSX, Line Number= , Azimuth= , Comments= 90/90
04/10/2018 16:26	Patch line	SOL file= 20181001625.HSX, Line Number= , Azimuth= , Comments= 90/90
04/10/2018 16:28	Patch line	SOL file= 20181001628.HSX, Line Number= , Azimuth= , Comments= 90/90
04/10/2018 16:31	Patch line	SOL file= 20181001630.HSX, Line Number= , Azimuth= , Comments= 90/90
04/10/2018 16:32	Patch line	SOL file= 20181001632.HSX, Line Number= , Azimuth= , Comments= 90/90 - broken pile on line
04/10/2018 16:41	Custom entry	Begin survey on south side of RR Bridge
04/10/2018 16:42	Main scheme line	SOL file= 20181001642.HSX, Line Number= , Azimuth= , Comments= 60/60
04/10/2018 16:54	Main scheme line	SOL file= 20181001653.HSX, Line Number= , Azimuth= , Comments= 60/60
04/10/2018 17:02	Main scheme line	SOL file= 20181001702.HSX, Line Number= , Azimuth= , Comments= 60/60
04/10/2018 17:06	Main scheme line	SOL file= 20181001706.HSX, Line Number= , Azimuth= , Comments= 60/60
04/10/2018 17:10	Main scheme line	SOL file= 20181001710.HSX, Line Number= , Azimuth= , Comments= 60/60
04/10/2018 17:14	Main scheme line	SOL file= 20181001714.HSX, Line Number= , Azimuth= , Comments= 60/60
04/10/2018 17:19	Custom entry	Bumped object, likely did not hit sonar at EOL
04/10/2018 17:22	Main scheme line	SOL file= 20181001721.HSX, Line Number= , Azimuth= , Comments= 60/60
04/10/2018 17:27	Main scheme line	SOL file= 20181001726.HSX, Line Number= , Azimuth= , Comments= 60/60
04/10/2018 17:33	SVP cast	AML_20180410_0003
04/10/2018 17:33	Main scheme line	SOL file= 20181001733.HSX, Line Number= , Azimuth= , Comments= 60/60
04/10/2018 17:35	Main scheme line	SOL file= 20181001735.HSX, Line Number= , Azimuth= , Comments= 60/60
04/10/2018 17:40	SVP cast	AML_20180410_0004
04/10/2018 17:42	Main scheme line	SOL file= 20181001742.HSX, Line Number= , Azimuth= , Comments= 65/65
04/10/2018 17:45	Main scheme line	SOL file= 20181001745.HSX, Line Number= , Azimuth= , Comments= 65/65
04/10/2018 17:50	Main scheme line	SOL file= 20181001750.HSX, Line Number= , Azimuth= , Comments= 65/65

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Date/Time (UTC)	*Code*	*Comments*
04/10/2018 17:54	Main scheme line	SOL file= 20181001754.HSX, Line Number= , Azimuth= , Comments= 65/65
04/10/2018 17:57	Main scheme line	SOL file= 20181001757.HSX, Line Number= , Azimuth= , Comments= 65/65
04/10/2018 18:00	Main scheme line	SOL file= 20181001800.HSX, Line Number= , Azimuth= , Comments= 65/65
04/10/2018 18:02	Main scheme line	SOL file= 20181001802.HSX, Line Number= , Azimuth= , Comments= 65/90
04/10/2018 18:12	Main scheme line	SOL file= 20181001811.HSX, Line Number= , Azimuth= , Comments= 65/90
04/10/2018 18:16	Main scheme line	SOL file= 20181001816.HSX, Line Number= , Azimuth= , Comments= 65/90
04/10/2018 18:21	Main scheme line	SOL file= 20181001821.HSX, Line Number= , Azimuth= , Comments= 90/65
04/10/2018 18:24	Main scheme line	SOL file= 20181001823.HSX, Line Number= , Azimuth= , Comments= 65/90
04/10/2018 18:34	Main scheme line	SOL file= 20181001834.HSX, Line Number= , Azimuth= , Comments= 65/90
04/10/2018 18:54	Custom entry	Bathroom break at St. Johns
04/10/2018 19:03	System Status	System status record modified

Weather	**Sea state**	calm	**Wind speed**	5-10kts
	Comments			
Echo Sounder Settings	**Range**	40	**Gain**	
	Power		**Spreading**	
	Absorption		**Ping rate**	
	Pulse width		**Operator**	
	Type and Frequency	Multibeam High (400kHz)		
Sidescan Sonar Settings	No sidescan			

04/10/2018 19:04	System Status	System status record modified		

Weather	**Sea state**	calm	**Wind speed**	5-10kts
	Comments			
Echo Sounder Settings	**Range**	40	**Gain**	24
	Power	210	**Spreading**	30
	Absorption	70	**Ping rate**	25
	Pulse width	33	**Operator**	JXMD
	Type and Frequency	Multibeam Low (200kHz)		
Sidescan Sonar Settings	No sidescan			

04/10/2018 19:08	SVP cast	AML_20180410_0005
04/10/2018 19:09	Main scheme line	SOL file= 20181001909.HSX, Line Number= , Azimuth= , Comments= 65/65
04/10/2018 19:17	Main scheme line	SOL file= 20181001917.HSX, Line Number= , Azimuth= , Comments= 65/65
04/10/2018 19:22	Main scheme line	SOL file= 20181001921.HSX, Line Number= , Azimuth= , Comments= 65/65
04/10/2018 19:24	Main scheme line	SOL file= 20181001924.HSX, Line Number= , Azimuth= , Comments= 65/90
04/10/2018 19:26	Main scheme line	SOL file= 20181001926.HSX, Line Number= , Azimuth= , Comments= 65/90
04/10/2018 19:33	Main scheme line	SOL file= 20181001933.HSX, Line Number= , Azimuth= , Comments= 65/90
04/10/2018 19:37	Custom entry	Foul area
04/10/2018 19:41	Main scheme line	SOL file= 20181001939.HSX, Line Number= , Azimuth= , Comments= 65/90
04/10/2018 19:42	Main scheme line	SOL file= 20181001941.HSX, Line Number= , Azimuth= , Comments= 65/90
04/10/2018 19:46	Main scheme line	SOL file= 20181001946.HSX, Line Number= , Azimuth= , Comments= 90/65
04/10/2018 19:50	Main scheme line	SOL file= 20181001950.HSX, Line Number= , Azimuth= , Comments= 65/90
04/10/2018 19:59	Main scheme line	SOL file= 20181001959.HSX, Line Number= , Azimuth= , Comments= 90/65
04/10/2018 20:04	System Status	System status record modified

Weather	**Sea state**	calm	**Wind speed**	5-10kts
	Comments			
Echo Sounder Settings	**Range**	40	**Gain**	24
	Power	210	**Spreading**	30
	Absorption	70	**Ping rate**	25
	Pulse width	33	**Operator**	JXMD
	Type and Frequency	Multibeam Low (200kHz)		
Sidescan Sonar Settings	No sidescan			

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Date/Time (UTC)	*Code*	*Comments*
04/10/2018 20:04	Main scheme line	SOL file= 20181002004.HSX, Line Number= , Azimuth= , Comments= 65/90
04/10/2018 20:15	Main scheme line	SOL file= 20181002015.HSX, Line Number= , Azimuth= , Comments= 65/65
04/10/2018 20:17	SVP cast	AML_20180410_0006
04/10/2018 20:18	Main scheme line	SOL file= 20181002018.HSX, Line Number= , Azimuth= , Comments= 65/65
04/10/2018 20:28	Main scheme line	SOL file= 20181002028.HSX, Line Number= , Azimuth= , Comments= 65/90
04/10/2018 20:35	Main scheme line	SOL file= 20181002034.HSX, Line Number= , Azimuth= , Comments= 65/90
04/10/2018 20:40	Custom entry	Ship at T4
04/10/2018 20:43	Main scheme line	SOL file= 20181002043.HSX, Line Number= , Azimuth= , Comments= 65/90
04/10/2018 20:49	Main scheme line	SOL file= 20181002049.HSX, Line Number= , Azimuth= , Comments= 65/90
04/10/2018 20:55	Main scheme line	SOL file= 20181002055.HSX, Line Number= , Azimuth= , Comments= 65/65
04/10/2018 20:57	Main scheme line	SOL file= 20181002057.HSX, Line Number= , Azimuth= , Comments= 65/90
04/10/2018 21:06	System Status	System status record modified

Weather	**Sea state**	calm	**Wind speed**	5-10kts
	Comments			
Echo Sounder Settings	**Range**	40	**Gain**	24
	Power	210	**Spreading**	30
	Absorption	70	**Ping rate**	25
	Pulse width	33	**Operator**	JXMD
	Type and Frequency	Multibeam Low (200kHz)		
Sidescan Sonar Settings	No sidescan			

04/10/2018 21:07	SVP cast	AML_20180410_0007
04/10/2018 21:13	Main scheme line	SOL file= 20181002112.HSX, Line Number= , Azimuth= , Comments= 65/90
04/10/2018 21:24	Main scheme line	SOL file= 20181002124.HSX, Line Number= , Azimuth= , Comments= 65/90
04/10/2018 21:38	Main scheme line	SOL file= 20181002137.HSX, Line Number= , Azimuth= , Comments= 90/65
04/10/2018 21:48	Main scheme line	SOL file= 20181002145.HSX, Line Number= , Azimuth= , Comments= 65/90
04/10/2018 21:53	Main scheme line	SOL file= 20181002153.HSX, Line Number= , Azimuth= , Comments= 65/90
04/10/2018 21:56	Main scheme line	SOL file= 20181002155.HSX, Line Number= , Azimuth= , Comments= 90/65
04/10/2018 21:56	Main scheme line	SOL file= 20181002156.HSX, Line Number= , Azimuth= , Comments= 90/65
04/10/2018 21:58	Main scheme line	SOL file= 20181002158.HSX, Line Number= , Azimuth= , Comments= 65/90
04/10/2018 22:01	Main scheme line	SOL file= 20181002201.HSX, Line Number= , Azimuth= , Comments= 65/65
04/10/2018 22:05	SVP cast	AML_20180410_0008
04/10/2018 22:08	System Status	System status record modified

Weather	**Sea state**	calm	**Wind speed**	5-10kts
	Comments			
Echo Sounder Settings	**Range**	40	**Gain**	24
	Power	210	**Spreading**	30
	Absorption	70	**Ping rate**	25
	Pulse width	33	**Operator**	JXMD
	Type and Frequency	Multibeam Low (200kHz)		
Sidescan Sonar Settings	No sidescan			

04/10/2018 22:11	Main scheme line	SOL file= 20181002211.HSX, Line Number= , Azimuth= , Comments= 65/65
04/10/2018 22:15	Main scheme line	SOL file= 20181002215.HSX, Line Number= , Azimuth= , Comments= 65/65
04/10/2018 22:19	Main scheme line	SOL file= 20181002219.HSX, Line Number= , Azimuth= , Comments= 65/65
04/10/2018 22:22	Main scheme line	SOL file= 20181002222.HSX, Line Number= , Azimuth= , Comments= 65/90
04/10/2018 22:25	Main scheme line	SOL file= 20181002225.HSX, Line Number= , Azimuth= , Comments= 90/65
04/10/2018 22:32	Main scheme line	SOL file= 20181002232.HSX, Line Number= , Azimuth= , Comments= 65/90
04/10/2018 22:37	Main scheme line	SOL file= 20181002235.HSX, Line Number= , Azimuth= , Comments= 90/65
04/10/2018 22:41	Main scheme line	SOL file= 20181002241.HSX, Line Number= , Azimuth= , Comments= 65/65
04/10/2018 22:48	Main scheme line	SOL file= 20181002247.HSX, Line Number= , Azimuth= , Comments= 90/65
04/10/2018 22:53	Main scheme line	SOL file= 20181002253.HSX, Line Number= , Azimuth= , Comments= 65/90

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Date/Time (UTC)	*Code*	*Comments*
04/10/2018 23:01	SVP cast	AML_20180410_0009
04/10/2018 23:02	Custom entry	Heading into Schnitzer
04/10/2018 23:07	Main scheme line	SOL file= 20181002307.HSX, Line Number= , Azimuth= , Comments= 65/90
04/10/2018 23:10	System Status	System status record modified

Weather	**Sea state**	calm	**Wind speed**	5-10kts
	Comments			
Echo Sounder Settings	**Range**	40	**Gain**	24
	Power	210	**Spreading**	30
	Absorption	70	**Ping rate**	25
	Pulse width	33	**Operator**	JXMD
	Type and Frequency	Multibeam Low (200kHz)		
Sidescan Sonar Settings	No sidescan			

04/10/2018 23:10	Main scheme line	SOL file= 20181002310.HSX, Line Number= , Azimuth= , Comments= 65/90
04/10/2018 23:12	Main scheme line	SOL file= 20181002311.HSX, Line Number= , Azimuth= , Comments= 90/65
04/10/2018 23:15	Main scheme line	SOL file= 20181002315.HSX, Line Number= , Azimuth= , Comments= 65/90
04/10/2018 23:31	Custom entry	Hysweep crashed
04/10/2018 23:32	Main scheme line	SOL file= 20181002332.HSX, Line Number= , Azimuth= , Comments= 65/90
04/10/2018 23:43	SVP cast	AML_20180410_0010
04/10/2018 23:50	Main scheme line	SOL file= 20181002350.HSX, Line Number= , Azimuth= , Comments= 65/90
04/10/2018 23:51	Custom entry	Line in water
04/10/2018 23:52	Main scheme line	SOL file= 20181002352.HSX, Line Number= , Azimuth= , Comments= 90/65
04/10/2018 23:55	Main scheme line	SOL file= 20181002355.HSX, Line Number= , Azimuth= , Comments= 65/90
04/10/2018 23:58	Main scheme line	SOL file= 20181002358.HSX, Line Number= , Azimuth= , Comments= 65/90
04/11/2018 00:00	Custom entry	Not getting any extra coverage under barge, end line
04/11/2018 00:01	Main scheme line	SOL file= 20181010001.HSX, Line Number= , Azimuth= , Comments= 65/90
04/11/2018 00:03	Main scheme line	SOL file= 20181010003.HSX, Line Number= , Azimuth= , Comments= 65/65
04/11/2018 00:05	Main scheme line	SOL file= 20181010005.HSX, Line Number= , Azimuth= , Comments= 65/90
04/11/2018 00:09	Main scheme line	SOL file= 20181010009.HSX, Line Number= , Azimuth= , Comments= 65/90
04/11/2018 00:15	Main scheme line	SOL file= 20181010015.HSX, Line Number= , Azimuth= , Comments= 65/65
04/11/2018 00:17	Custom entry	cables under water from pier
04/11/2018 00:20	Main scheme line	SOL file= 20181010020.HSX, Line Number= , Azimuth= , Comments= 65/90
04/11/2018 00:25	Main scheme line	SOL file= 20181010025.HSX, Line Number= , Azimuth= , Comments= 65/65
04/11/2018 00:27	SVP cast	AML_20180410_0011
04/11/2018 00:28	Custom entry	Return to Swan Island

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David Evans and Associates, Inc.
2801 SE Columbia Way, Suite 130
Vancouver, WA 98661
Phone: (360)314-3200
Fax: (360)314-3250

Survey Information

Local Date	04/11/2018 (JD 101)	**Hydrographer**	JXMD/DTM
Contract		**Registry Number**	
Task Order		**Job Number**	AETR00000034
Contractor	David Evans and Associates, Inc. Marine Services		
Locality	Portland, Oregon		
Sub-Locality	Willamette River Mile 1.9-11.8		
Operations	Multibeam Survey		
Comments	Portland Harbor Superfund		

Horizontal Control

Horizontal Datum	NAD83 (2011)	**Units**	International Feet
Coordinate System	State Plane, Oregon North		
Primary System	Applanix POS MV V5	**PCS SN**	7113
IMU SN	3743	**Antenna 1 SN**	8445
Firmware Version	9.29	**Antenna 2 SN**	8451
Secondary System	Trimble SPS855	**Receiver SN**	0075
Firmware Version	5.30	**Antenna SN**	9485
Beacon Receiver	Intuicom RTK Bridge	**Receiver SN**	X151065
Firmware Version	2.0.0	**Antenna SN**	n/a
Beacon Station 1	DEA Marine Services	**Station ID**	DEMSI
Beacon Station 2	n/a	**Station ID**	n/a
Cable Counter	n/a	**Serial Number**	n/a

Vertical Control

Gauge/Base Location	n/a		
Additional Information	RTK Elevations		
Vertical Datum	NAVD88 Geoid 12a	**Units**	Feet

Vessel and Crew

Survey Vessel	Riverhawk	**Survey Vessel**	Riverhawk
Vessel Crew	n/a	**Vessel Crew**	n/a
Survey Crew	JXMD, DTM	**Survey Crew**	JXMD, DTM
Towing Point	n/a	**Towing Point**	n/a

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Sonar Equipment

Model	Reson 7101	**Topside SN**	5110128
Transmit SN	n/a	**Receive SN**	n/a
Model	n/a	**Topside SN**	n/a
		Towfish SN	n/a
Primary SVP	AML Smart SVP	**Body SN**	5588
		Velocity Tip SN	5498
Surface SVP	AML SmartX	**Body SN**	
		Velocity Tip SN	
Secondary SVP	n/a	**Serial Number**	n/a
Other	n/a	**Serial number**	n/a
Other	n/a	**Serial number**	n/a

Acquisition Software

Line Planning	Hypack	**Version**	16.1.8.0
Primary Navigation	Hypack Survey	**Version**	16.1.9.0
Multibeam Acquisition	Hysweep	**Version**	16.1.21.0
Multibeam Processor	SeaBat Controller	**Version**	3.7.0.14
Sidescan Acquisition	n/a	**Version**	n/a
Sidescan Processor	n/a	**Version**	n/a
POS/MV Controller	POS View	**Version**	9.21
MVP Acquisition	n/a	**Version**	n/a
SVP Acquisition	MVP Controller	**Version**	2.4.5
SVP Processing	MVP Controller	**Version**	2.4.5
SVP Conversion	SVP Convert	**Version**	2.0.4
Other	SeaBatUI 4.5.10.7		
Other	7k Center 4.5.10.6		
Other	n/a		

Start of Day Checklist

Drafts		**Start logging POSPac time**	
Check that MVP fish and block secured		**Survey area arrival time**	
Check for SSS cable fatigue		**SV comparison - MVP vs.surface probe**	
Check safety equipment		**Receiving differential corrections**	
Check weather forecast		**SSS offsets**	
Create/set data directories - Hypack PC		**Set SSS cable out**	
ISIS PC		**Set SSS and MBES settings**	
MVP PC		**Update system status in LineLog**	
Notes PC		**Complete roll lines**	
Dock departure time			

- Hydrographic Survey Log - River Hawk - April 11, 2018

Date/Time (UTC)	*Code*	*Comments*
04/11/2018 15:14	System Status	System status record modified

Weather	**Sea state**	calm	**Wind speed**	5-10kts
	Comments			
Echo Sounder Settings	**Range**	40	**Gain**	24
	Power	210	**Spreading**	30
	Absorption	70	**Ping rate**	25
	Pulse width	33	**Operator**	JXMD
	Type and Frequency	Multibeam Low (200kHz)		
Sidescan Sonar Settings	No sidescan			

04/11/2018 15:14	Custom entry	Completed Safety Meeting at Swan Island
04/11/2018 15:15	Custom entry	Start logging vessel rover: 1010.T02
04/11/2018 15:16	POSPac file	Start logging POSPAC
04/11/2018 15:25	Custom entry	Deploy sonar
04/11/2018 15:31	MB vs. LL check	Port LL= 0.00 m, Star LL= 11.74 ft, Port MB= 0.00 m, Star MB= 0.00 m, Avg draft= 0.00 m, Draft OS= 0.00 m, Comments= LL depth = 11.74 ft. Beam 273, water Elevation = 14.96ft (avg of pt 200 and 201 from R10 RTK shots), hypack line 1531
04/11/2018 15:36	Draft	Draft P= 1.800m, S= 1.620m, Avg= 1.710m, Comments= drafts measured in feet
04/11/2018 15:37	MB vs. LL check	Port LL= 0.00 m, Star LL= 0.00 m, Port MB= 0.00 m, Star MB= 0.00 m, Avg draft= 0.00 m, Draft OS= 0.00 m, Comments= Also logged line 1537 while dave was in lead line position
04/11/2018 15:39	Custom entry	Previous 2 S7K lead line files were logged in 20180410 folder
04/11/2018 15:40	Custom entry	Underway
04/11/2018 15:56	Patch line	SOL file= 20181011556.HSX, Line Number= , Azimuth= , Comments= ROLL 90/90
04/11/2018 15:57	Patch line	SOL file= 20181011556.HSX, Line Number= , Azimuth= , Comments= ROLL 90/90
04/11/2018 15:59	SVP cast	AML_20180411_0001 1447 in AML and Reson
04/11/2018 16:04	Main scheme line	SOL file= 20181011603.HSX, Line Number= , Azimuth= , Comments= 65/90
04/11/2018 16:09	Main scheme line	SOL file= 20181011609.HSX, Line Number= , Azimuth= , Comments= 65/65
04/11/2018 16:11	Main scheme line	SOL file= 20181011611.HSX, Line Number= , Azimuth= , Comments= 65/90
04/11/2018 16:18	System Status	System status record modified

Weather	**Sea state**	calm	**Wind speed**	5-10kts
	Comments			
Echo Sounder Settings	**Range**	40	**Gain**	24
	Power	210	**Spreading**	30
	Absorption	70	**Ping rate**	25
	Pulse width	33	**Operator**	JXMD
	Type and Frequency	Multibeam Low (200kHz)		
Sidescan Sonar Settings	No sidescan			

04/11/2018 16:18	Main scheme line	SOL file= 20181011618.HSX, Line Number= , Azimuth= , Comments= 65/65
04/11/2018 16:25	Main scheme line	SOL file= 20181011623.HSX, Line Number= , Azimuth= , Comments= 65/90
04/11/2018 16:30	Main scheme line	SOL file= 20181011630.HSX, Line Number= , Azimuth= , Comments= 65/65
04/11/2018 16:33	Main scheme line	SOL file= 20181011632.HSX, Line Number= , Azimuth= , Comments= 65/90
04/11/2018 16:37	Main scheme line	SOL file= 20181011637.HSX, Line Number= , Azimuth= , Comments= 65/90
04/11/2018 16:42	Main scheme line	SOL file= 20181011642_0001.HSX, Line Number= , Azimuth= , Comments= 65/90 false start
04/11/2018 16:49	Main scheme line	SOL file= 20181011649.HSX, Line Number= , Azimuth= , Comments= 65/90
04/11/2018 16:56	Main scheme line	SOL file= 20181011656.HSX, Line Number= , Azimuth= , Comments= 65/90
04/11/2018 17:00	Main scheme line	SOL file= 20181011700.HSX, Line Number= , Azimuth= , Comments= 65/90
04/11/2018 17:05	Main scheme line	SOL file= 20181011705.HSX, Line Number= , Azimuth= , Comments= 90/65
04/11/2018 17:10	Main scheme line	SOL file= 20181011710.HSX, Line Number= , Azimuth= , Comments= 90/65
04/11/2018 17:19	System Status	System status record modified

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Date/Time (UTC)	Code	Comments

Weather	**Sea state**	calm	**Wind speed**	5-10kts
	Comments			
Echo Sounder Settings	**Range**	40	**Gain**	24
	Power	210	**Spreading**	30
	Absorption	70	**Ping rate**	25
	Pulse width	33	**Operator**	JXMD
	Type and Frequency	Multibeam Low (200kHz)		
Sidescan Sonar Settings	No sidescan			

04/11/2018 17:19	Main scheme line	SOL file= 20181011718.HSX, Line Number= , Azimuth= , Comments= 65/90
04/11/2018 17:32	Main scheme line	SOL file= 20181011731.HSX, Line Number= , Azimuth= , Comments= 90/65
04/11/2018 17:48	Main scheme line	SOL file= 20181011748.HSX, Line Number= , Azimuth= , Comments= 90/65
04/11/2018 17:54	SVP cast	AML_20180411_0002
04/11/2018 17:56	Main scheme line	SOL file= 20181011756.HSX, Line Number= , Azimuth= , Comments= 65/90
04/11/2018 18:01	Main scheme line	SOL file= 20181011801.HSX, Line Number= , Azimuth= , Comments= 65/65
04/11/2018 18:02	Main scheme line	SOL file= 20181011802.HSX, Line Number= , Azimuth= , Comments= 65/65
04/11/2018 18:08	Main scheme line	SOL file= 20181011808.HSX, Line Number= , Azimuth= , Comments= 65/90
04/11/2018 18:16	Main scheme line	SOL file= 20181011816.HSX, Line Number= , Azimuth= , Comments= 90/65
04/11/2018 18:21	Main scheme line	SOL file= 20181011821.HSX, Line Number= , Azimuth= , Comments= 65/90
04/11/2018 18:25	Main scheme line	SOL file= 20181011825.HSX, Line Number= , Azimuth= , Comments= 90/65
04/11/2018 18:28	Main scheme line	SOL file= 20181011827.HSX, Line Number= , Azimuth= , Comments= 65/90
04/11/2018 18:31	Custom entry	Bathroom break at St. Johns
04/11/2018 18:49	Main scheme line	SOL file= 20181011848.HSX, Line Number= , Azimuth= , Comments= 65/90
04/11/2018 18:57	Main scheme line	SOL file= 20181011857.HSX, Line Number= , Azimuth= , Comments= 90/65
04/11/2018 19:06	Main scheme line	SOL file= 20181011906.HSX, Line Number= , Azimuth= , Comments= 90/65
04/11/2018 19:14	SVP cast	AML_20180411_0003
04/11/2018 19:17	Custom entry	Patch Test
04/11/2018 19:19	Patch line	SOL file= 20181011919.HSX, Line Number= , Azimuth= , Comments= 90/90
04/11/2018 19:22	Patch line	SOL file= 20181011922.HSX, Line Number= , Azimuth= , Comments= 90/90
04/11/2018 19:26	Patch line	SOL file= 20181011926.HSX, Line Number= , Azimuth= , Comments= 90/90
04/11/2018 19:29	Patch line	SOL file= 20181011929.HSX, Line Number= , Azimuth= , Comments= 90/90
04/11/2018 19:32	Patch line	SOL file= 20181011932.HSX, Line Number= , Azimuth= , Comments= 90/90
04/11/2018 19:34	Patch line	SOL file= 20181011934.HSX, Line Number= , Azimuth= , Comments= 90/90
04/11/2018 19:36	SVP cast	AML_20180411_0004
04/11/2018 19:40	Main scheme line	SOL file= 20181011940.HSX, Line Number= , Azimuth= , Comments= 90/650
04/11/2018 19:53	Main scheme line	SOL file= 20181011953.HSX, Line Number= , Azimuth= , Comments= 65/90
04/11/2018 20:01	Main scheme line	SOL file= 20181012000.HSX, Line Number= , Azimuth= , Comments= 90/65
04/11/2018 20:05	Main scheme line	SOL file= 20181012004.HSX, Line Number= , Azimuth= , Comments= 65/90
04/11/2018 20:10	Main scheme line	SOL file= 20181012010.HSX, Line Number= , Azimuth= , Comments= 65/90
04/11/2018 20:13	Main scheme line	SOL file= 20181012013.HSX, Line Number= , Azimuth= , Comments= 90/65
04/11/2018 20:22	Main scheme line	SOL file= 20181012022.HSX, Line Number= , Azimuth= , Comments= 65/90
04/11/2018 20:31	Main scheme line	SOL file= 20181012031.HSX, Line Number= , Azimuth= , Comments= 90/65
04/11/2018 20:41	Main scheme line	SOL file= 20181012041.HSX, Line Number= , Azimuth= , Comments= 65/90
04/11/2018 20:50	SVP cast	AML_20180411_0005
04/11/2018 20:56	Custom entry	Transit to where we left off yesterday
04/11/2018 21:03	Main scheme line	SOL file= 20181012103.HSX, Line Number= , Azimuth= , Comments= 65/90
04/11/2018 21:07	Main scheme line	SOL file= 20181012107.HSX, Line Number= , Azimuth= , Comments= 65/65
04/11/2018 21:11	Main scheme line	SOL file= 20181012111.HSX, Line Number= , Azimuth= , Comments= 65/90
04/11/2018 21:17	SVP cast	AML_20180411_0006
04/11/2018 21:19	Main scheme line	SOL file= 20181012119.HSX, Line Number= , Azimuth= , Comments= 65/65

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Date/Time (UTC)	*Code*	*Comments*
04/11/2018 21:21	Main scheme line	SOL file= 20181012121.HSX, Line Number= , Azimuth= , Comments= 65/90
04/11/2018 21:31	Main scheme line	SOL file= 20181012131.HSX, Line Number= , Azimuth= , Comments= 90/65
04/11/2018 21:40	Main scheme line	SOL file= 20181012139.HSX, Line Number= , Azimuth= , Comments= 65/90
04/11/2018 21:48	Main scheme line	SOL file= 20181012147.HSX, Line Number= , Azimuth= , Comments= 65/90
04/11/2018 22:20	SVP cast	AML_20180411_0007
04/11/2018 22:24	Main scheme line	SOL file= 20181012224.HSX, Line Number= , Azimuth= , Comments= 65-90
04/11/2018 22:30	Main scheme line	SOL file= 20181012230.HSX, Line Number= , Azimuth= , Comments= 90/65
04/11/2018 22:38	Main scheme line	SOL file= 20181012237.HSX, Line Number= , Azimuth= , Comments= 65/90
04/11/2018 22:41	Main scheme line	SOL file= 20181012241.HSX, Line Number= , Azimuth= , Comments= 65/90
04/11/2018 22:58	SVP cast	AML_20180411_0008
04/11/2018 22:59	Main scheme line	SOL file= 20181012259.HSX, Line Number= , Azimuth= , Comments= 90/65
04/11/2018 23:17	Main scheme line	SOL file= 20181012316.HSX, Line Number= , Azimuth= , Comments= 90/65
04/11/2018 23:48	Custom entry	Got fuel at Fred's Marina
04/11/2018 23:50	Main scheme line	SOL file= 20181012349.HSX, Line Number= , Azimuth= , Comments= 65/90
04/11/2018 23:59	Main scheme line	SOL file= 20181012358.HSX, Line Number= , Azimuth= , Comments= 65/90
04/12/2018 00:14	Main scheme line	SOL file= 20181020014.HSX, Line Number= , Azimuth= , Comments= 90/65
04/12/2018 00:18	Main scheme line	SOL file= 20181020018.HSX, Line Number= , Azimuth= , Comments= 65/90
04/12/2018 00:25	SVP cast	AML_20180411_0009
04/12/2018 00:26	Custom entry	Pull sonar
04/12/2018 00:29	Custom entry	Return to Swan Island

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David Evans and Associates, Inc.
2801 SE Columbia Way, Suite 130
Vancouver, WA 98661
Phone: (360)314-3200
Fax: (360)314-3250

Survey Information

Local Date	04/12/2018 (JD 102)	**Hydrographer**	JXMD/DTM
Contract		**Registry Number**	
Task Order		**Job Number**	AETR00000034
Contractor	David Evans and Associates, Inc. Marine Services		
Locality	Portland, Oregon		
Sub-Locality	Willamette River Mile 1.9-11.8		
Operations	Multibeam Survey		
Comments	Portland Harbor Superfund		

Horizontal Control

Horizontal Datum	NAD83 (2011)	**Units**	International Feet
Coordinate System	State Plane, Oregon North		
Primary System	Applanix POS MV V5	**PCS SN**	7113
IMU SN	3743	**Antenna 1 SN**	8445
Firmware Version	9.29	**Antenna 2 SN**	8451
Secondary System	Trimble SPS855	**Receiver SN**	0075
Firmware Version	5.30	**Antenna SN**	9485
Beacon Receiver	Intuicom RTK Bridge	**Receiver SN**	X151065
Firmware Version	2.0.0	**Antenna SN**	n/a
Beacon Station 1	DEA Marine Services	**Station ID**	DEMSI
Beacon Station 2	n/a	**Station ID**	n/a
Cable Counter	n/a	**Serial Number**	n/a

Vertical Control

Gauge/Base Location	n/a		
Additional Information	RTK Elevations		
Vertical Datum	NAVD88 Geoid 12a	**Units**	Feet

Vessel and Crew

Survey Vessel	Riverhawk	**Survey Vessel**	Riverhawk
Vessel Crew	n/a	**Vessel Crew**	n/a
Survey Crew	JXMD, DTM	**Survey Crew**	JXMD, DTM
Towing Point	n/a	**Towing Point**	n/a

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Sonar Equipment

Model	Reson 7101	**Topside SN**	5110128
Transmit SN	n/a	**Receive SN**	n/a
Model	n/a	**Topside SN**	n/a
		Towfish SN	n/a
Primary SVP	AML Smart SVP	**Body SN**	5588
		Velocity Tip SN	5498
Surface SVP	AML SmartX	**Body SN**	
		Velocity Tip SN	
Secondary SVP	n/a	**Serial Number**	n/a
Other	n/a	**Serial number**	n/a
Other	n/a	**Serial number**	n/a

Acquisition Software

Line Planning	Hypack	**Version**	16.1.8.0
Primary Navigation	Hypack Survey	**Version**	16.1.9.0
Multibeam Acquisition	Hysweep	**Version**	16.1.21.0
Multibeam Processor	SeaBat Controller	**Version**	3.7.0.14
Sidescan Acquisition	n/a	**Version**	n/a
Sidescan Processor	n/a	**Version**	n/a
POS/MV Controller	POS View	**Version**	9.21
MVP Acquisition	n/a	**Version**	n/a
SVP Acquisition	MVP Controller	**Version**	2.4.5
SVP Processing	MVP Controller	**Version**	2.4.5
SVP Conversion	SVP Convert	**Version**	2.0.4
Other	SeaBatUI 4.5.10.7		
Other	7k Center 4.5.10.6		
Other	n/a		

Start of Day Checklist

Drafts		**Start logging POSPac time**	
Check that MVP fish and block secured		**Survey area arrival time**	
Check for SSS cable fatigue		**SV comparison - MVP vs.surface probe**	
Check safety equipment		**Receiving differential corrections**	
Check weather forecast		**SSS offsets**	
Create/set data directories - Hypack PC		**Set SSS cable out**	
ISIS PC		**Set SSS and MBES settings**	
MVP PC		**Update system status in LineLog**	
Notes PC		**Complete roll lines**	
Dock departure time			

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Date/Time (UTC)	*Code*	*Comments*
04/12/2018 15:26	System Status	System status record modified

Weather	**Sea state**	calm	**Wind speed**	5-10kts
	Comments			
Echo Sounder Settings	**Range**	40	**Gain**	24
	Power	210	**Spreading**	30
	Absorption	70	**Ping rate**	25
	Pulse width	33	**Operator**	DTM
	Type and Frequency	Multibeam Low (200kHz)		
Sidescan Sonar Settings	No sidescan			

04/12/2018 15:26	Custom entry	***Saftety meeting complete at Swan Island boat ramp
04/12/2018 15:27	Custom entry	Logging Trimble Rover 00751020.t02
04/12/2018 15:28	Custom entry	Logging POSPAC File RH_201804121
04/12/2018 15:30	Draft	Draft P= 1.850m, S= 1.640m, Avg= 1.745m, Comments=
04/12/2018 15:41	Main scheme line	SOL file= 20181021541.HSX, Line Number= , Azimuth= , Comments= 65/90
04/12/2018 15:42	End line	
04/12/2018 15:50	Patch line	SOL file= 20181021549.HSX, Line Number= , Azimuth= , Comments= ROLL
04/12/2018 15:52	Patch line	SOL file= 20181021552.HSX, Line Number= , Azimuth= , Comments= ROLL
04/12/2018 15:57	SVP cast	AML_20180412_0001
04/12/2018 15:59	Main scheme line	SOL file= 20181021559.HSX, Line Number= , Azimuth= , Comments= 65/90
04/12/2018 16:03	Main scheme line	SOL file= 20181021603.HSX, Line Number= , Azimuth= , Comments= 90/65
04/12/2018 16:07	Main scheme line	SOL file= 20181021605.HSX, Line Number= , Azimuth= , Comments= 65/90
04/12/2018 16:09	Main scheme line	SOL file= 20181021609.HSX, Line Number= , Azimuth= , Comments= 65/90
04/12/2018 16:17	Main scheme line	SOL file= 20181021614.HSX, Line Number= , Azimuth= , Comments= 90/65
04/12/2018 16:21	Main scheme line	SOL file= 20181021621.HSX, Line Number= , Azimuth= , Comments= 65/90
04/12/2018 16:24	Main scheme line	SOL file= 20181021624.HSX, Line Number= , Azimuth= , Comments= 65/65
04/12/2018 16:26	System Status	System status record modified

Weather	**Sea state**	calm	**Wind speed**	5-10kts
	Comments			
Echo Sounder Settings	**Range**	40	**Gain**	24
	Power	210	**Spreading**	30
	Absorption	70	**Ping rate**	25
	Pulse width	33	**Operator**	DTM
	Type and Frequency	Multibeam Low (200kHz)		
Sidescan Sonar Settings	No sidescan			

04/12/2018 16:26	Main scheme line	SOL file= 20181021626.HSX, Line Number= , Azimuth= , Comments= 65/90
04/12/2018 16:28	Main scheme line	SOL file= 20181021628.HSX, Line Number= , Azimuth= , Comments= 65/90
04/12/2018 16:32	Main scheme line	SOL file= 20181021632.HSX, Line Number= , Azimuth= , Comments= 65/90+
04/12/2018 16:35	Main scheme line	SOL file= 20181021635.HSX, Line Number= , Azimuth= , Comments= 65/90+
04/12/2018 16:39	Main scheme line	SOL file= 20181021639.HSX, Line Number= , Azimuth= , Comments= 90/65
04/12/2018 16:43	Main scheme line	SOL file= 20181021643.HSX, Line Number= , Azimuth= , Comments= 65/90+
04/12/2018 16:49	Main scheme line	SOL file= 20181021649.HSX, Line Number= , Azimuth= , Comments= 65/90
04/12/2018 16:53	Main scheme line	SOL file= 20181021653.HSX, Line Number= , Azimuth= , Comments= 65/90+
04/12/2018 16:56	Main scheme line	SOL file= 20181021656.HSX, Line Number= , Azimuth= , Comments= 65/65
04/12/2018 16:57	Main scheme line	SOL file= 20181021657.HSX, Line Number= , Azimuth= , Comments= 65/65
04/12/2018 16:58	Main scheme line	SOL file= 20181021658.HSX, Line Number= , Azimuth= , Comments= 65/65
04/12/2018 17:00	Main scheme line	SOL file= 20181021700.HSX, Line Number= , Azimuth= , Comments= 65/65
04/12/2018 17:01	Main scheme line	SOL file= 20181021701.HSX, Line Number= , Azimuth= , Comments= 65/90
04/12/2018 17:06	Main scheme line	SOL file= 20181021706.HSX, Line Number= , Azimuth= , Comments= 65/90+
04/12/2018 17:08	Main scheme line	SOL file= 20181021708.HSX, Line Number= , Azimuth= , Comments= 65/65
04/12/2018 17:10	Main scheme line	SOL file= 20181021710.HSX, Line Number= , Azimuth= , Comments= 65/65

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Date/Time (UTC)	*Code*	*Comments*
04/12/2018 17:12	Main scheme line	SOL file= 20181021712.HSX, Line Number= , Azimuth= , Comments= 65/65
04/12/2018 17:14	Main scheme line	SOL file= 20181021714.HSX, Line Number= , Azimuth= , Comments= 65/65
04/12/2018 17:24	Main scheme line	SOL file= 20181021719.HSX, Line Number= , Azimuth= , Comments= 90/65
04/12/2018 17:25	Main scheme line	SOL file= 20181021725.HSX, Line Number= , Azimuth= , Comments= 65/90+
04/12/2018 17:26	System Status	System status record modified

Weather	**Sea state**	calm	**Wind speed**	5-10kts
	Comments			
Echo Sounder Settings	**Range**	40	**Gain**	24
	Power	210	**Spreading**	30
	Absorption	70	**Ping rate**	25
	Pulse width	33	**Operator**	DTM
	Type and Frequency	Multibeam Low (200kHz)		
Sidescan Sonar Settings	No sidescan			

04/12/2018 17:30	Main scheme line	SOL file= 20181021730.HSX, Line Number= , Azimuth= , Comments= 65/90+
04/12/2018 17:32	Main scheme line	SOL file= 20181021732.HSX, Line Number= , Azimuth= , Comments= 65/65
04/12/2018 17:33	Main scheme line	SOL file= 20181021733.HSX, Line Number= , Azimuth= , Comments= 65/65
04/12/2018 17:35	Main scheme line	SOL file= 20181021735.HSX, Line Number= , Azimuth= , Comments= 65/90+
04/12/2018 17:42	Main scheme line	SOL file= 20181021742.HSX, Line Number= , Azimuth= , Comments= 65/90+
04/12/2018 17:47	SVP cast	AML_20180412_0002
04/12/2018 17:52	Main scheme line	SOL file= 20181021752.HSX, Line Number= , Azimuth= , Comments= 65/90
04/12/2018 17:57	Main scheme line	SOL file= 20181021757.HSX, Line Number= , Azimuth= , Comments= 65/90+
04/12/2018 18:00	Main scheme line	SOL file= 20181021800.HSX, Line Number= , Azimuth= , Comments= 90/65
04/12/2018 18:04	Main scheme line	SOL file= 20181021804.HSX, Line Number= , Azimuth= , Comments= 65/90+
04/12/2018 18:09	Main scheme line	SOL file= 20181021809.HSX, Line Number= , Azimuth= , Comments= 65/90+
04/12/2018 18:11	Main scheme line	SOL file= 20181021811.HSX, Line Number= , Azimuth= , Comments= 65/90+
04/12/2018 18:15	Main scheme line	SOL file= 20181021815.HSX, Line Number= , Azimuth= , Comments= 65/90+
04/12/2018 18:24	Main scheme line	SOL file= 20181021824.HSX, Line Number= , Azimuth= , Comments= 65/90+
04/12/2018 18:28	System Status	System status record modified

Weather	**Sea state**	calm	**Wind speed**	5-10kts
	Comments			
Echo Sounder Settings	**Range**	40	**Gain**	24
	Power	210	**Spreading**	30
	Absorption	70	**Ping rate**	25
	Pulse width	33	**Operator**	DTM
	Type and Frequency	Multibeam Low (200kHz)		
Sidescan Sonar Settings	No sidescan			

04/12/2018 18:28	Main scheme line	SOL file= 20181021828.HSX, Line Number= , Azimuth= , Comments= 65/90+
04/12/2018 18:32	Main scheme line	SOL file= 20181021832.HSX, Line Number= , Azimuth= , Comments= 65/90+
04/12/2018 18:34	Main scheme line	SOL file= 20181021834.HSX, Line Number= , Azimuth= , Comments= 65/65
04/12/2018 18:38	Main scheme line	SOL file= 20181021836.HSX, Line Number= , Azimuth= , Comments=65/90+
04/12/2018 18:39	Main scheme line	SOL file= 20181021839.HSX, Line Number= , Azimuth= , Comments= 65/65
04/12/2018 18:39	Main scheme line	SOL file= 20181021839.HSX, Line Number= , Azimuth= , Comments= 0001 65/65
04/12/2018 18:42	Main scheme line	SOL file= 20181021842.HSX, Line Number= , Azimuth= , Comments= 65/90+
04/12/2018 18:42	SVP cast	AML0003
04/12/2018 18:44	SVP cast	AML0004
04/12/2018 18:51	Main scheme line	SOL file= 20181021851.HSX, Line Number= , Azimuth= , Comments= 65/90+
04/12/2018 19:03	SVP cast	AML0005
04/12/2018 19:10	Main scheme line	SOL file= 20181021909.HSX, Line Number= , Azimuth= , Comments= 65/90+
04/12/2018 19:14	Main scheme line	SOL file= 20181021914.HSX, Line Number= , Azimuth= , Comments= 65/90+
04/12/2018 19:19	Main scheme line	SOL file= 20181021919.HSX, Line Number= , Azimuth= , Comments= 65/65

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Date/Time (UTC)	*Code*	*Comments*
04/12/2018 19:20	Main scheme line	SOL file= 20181021920.HSX, Line Number= , Azimuth= , Comments= 65/90+
04/12/2018 19:28	System Status	System status record modified

Weather	**Sea state**	calm	**Wind speed**	5-10kts	
	Comments				
Echo Sounder Settings	**Range**	40	**Gain**	24	
	Power	210	**Spreading**	30	
	Absorption	70	**Ping rate**	25	
	Pulse width	33	**Operator**	DTM	
	Type and Frequency	Multibeam Low (200kHz)			
Sidescan Sonar Settings	No sidescan				

04/12/2018 19:45	SVP cast	AML_0006
04/12/2018 19:57	Main scheme line	SOL file= 20181021948.HSX, Line Number= , Azimuth= , Comments= 65/90+
04/12/2018 19:57	Main scheme line	SOL file= 20181021957.HSX, Line Number= , Azimuth= , Comments= 65/90+
04/12/2018 20:10	Main scheme line	SOL file= 20181022010.HSX, Line Number= , Azimuth= , Comments= 65/90+
04/12/2018 20:28	System Status	System status record modified

Weather	**Sea state**	calm	**Wind speed**	5-10kts	
	Comments				
Echo Sounder Settings	**Range**	40	**Gain**	24	
	Power	210	**Spreading**	30	
	Absorption	70	**Ping rate**	25	
	Pulse width	33	**Operator**	DTM	
	Type and Frequency	Multibeam Low (200kHz)			
Sidescan Sonar Settings	No sidescan				

04/12/2018 20:35	Main scheme line	SOL file= 20181022035.HSX, Line Number= , Azimuth= , Comments= 65/90+
04/12/2018 20:49	Main scheme line	SOL file= 20181022046.HSX, Line Number= , Azimuth= , Comments= 65/65
04/12/2018 20:49	Main scheme line	SOL file= 20181022049.HSX, Line Number= , Azimuth= , Comments= 65/65
04/12/2018 20:56	Main scheme line	SOL file= 20181022053.HSX, Line Number= , Azimuth= , Comments= 65/90+
04/12/2018 20:57	Main scheme line	SOL file= 20181022057.HSX, Line Number= , Azimuth= , Comments= 65/90+
04/12/2018 21:07	SVP cast	AML_0007
04/12/2018 21:10	Main scheme line	SOL file= 20181022110.HSX, Line Number= , Azimuth= , Comments= 65/90+
04/12/2018 21:12	Main scheme line	SOL file= 20181022112.HSX, Line Number= , Azimuth= , Comments= 65/90+
04/12/2018 21:15	Main scheme line	SOL file= 20181022115.HSX, Line Number= , Azimuth= , Comments= 65/90+
04/12/2018 21:16	Main scheme line	SOL file= 20181022116.HSX, Line Number= , Azimuth= , Comments= 65/90+
04/12/2018 21:20	Main scheme line	SOL file= 20181022120.HSX, Line Number= , Azimuth= , Comments= 65/90+
04/12/2018 21:28	System Status	System status record modified

Weather	**Sea state**	calm	**Wind speed**	5-10kts	
	Comments				
Echo Sounder Settings	**Range**	40	**Gain**	24	
	Power	210	**Spreading**	30	
	Absorption	70	**Ping rate**	25	
	Pulse width	33	**Operator**	DTM	
	Type and Frequency	Multibeam Low (200kHz)			
Sidescan Sonar Settings	No sidescan				

04/12/2018 21:54	Main scheme line	SOL file= 20181022154.HSX, Line Number= , Azimuth= , Comments= 90/65
04/12/2018 22:02	Main scheme line	SOL file= 20181022202.HSX, Line Number= , Azimuth= , Comments= 65/90+
04/12/2018 22:17	SVP cast	AML_0008
04/12/2018 22:20	Main scheme line	SOL file= 20181022220.HSX, Line Number= , Azimuth= , Comments= 65/90+
04/12/2018 22:31	System Status	System status record modified

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Date/Time (UTC)	Code	Comments
	Weather: Sea state: calm; Wind speed: 5-10kts; Comments:	
	Echo Sounder Settings: Range: 40; Gain: 24; Power: 210; Spreading: 30; Absorption: 70; Ping rate: 25; Pulse width: 33; Operator: DTM; Type and Frequency: Multibeam Low (200kHz)	
	Sidescan Sonar Settings: No sidescan	
04/12/2018 22:31	Main scheme line	SOL file= 20181022231.HSX, Line Number= , Azimuth= , Comments= 65/65
04/12/2018 22:32	Main scheme line	SOL file= 20181022232.HSX, Line Number= , Azimuth= , Comments= 65/90
04/12/2018 22:39	Main scheme line	SOL file= 20181022239.HSX, Line Number= , Azimuth= , Comments= 65/90
04/12/2018 22:44	Main scheme line	SOL file= 20181022244.HSX, Line Number= , Azimuth= , Comments= 90/65
04/12/2018 22:48	Main scheme line	SOL file= 20181022248.HSX, Line Number= , Azimuth= , Comments= 65/65
04/12/2018 22:52	SVP cast	AML_0009
04/12/2018 22:54	Main scheme line	SOL file= 20181022254.HSX, Line Number= , Azimuth= , Comments= 65/90
04/12/2018 23:01	Main scheme line	SOL file= 20181022301.HSX, Line Number= , Azimuth= , Comments= 65/65
04/12/2018 23:06	Main scheme line	SOL file= 20181022306.HSX, Line Number= , Azimuth= , Comments= 65/90
04/12/2018 23:14	Main scheme line	SOL file= 20181022314.HSX, Line Number= , Azimuth= , Comments= 65/90
04/12/2018 23:17	Main scheme line	SOL file= 20181022317.HSX, Line Number= , Azimuth= , Comments= 65/90
04/12/2018 23:24	SVP cast	AML_0010
04/12/2018 23:27	Main scheme line	SOL file= 20181022327.HSX, Line Number= , Azimuth= , Comments= 65/90
04/12/2018 23:31	System Status	System status record modified
	Weather: Sea state: calm; Wind speed: 5-10kts; Comments:	
	Echo Sounder Settings: Range: 40; Gain: 24; Power: 210; Spreading: 30; Absorption: 70; Ping rate: 25; Pulse width: 33; Operator: DTM; Type and Frequency: Multibeam Low (200kHz)	
	Sidescan Sonar Settings: No sidescan	
04/12/2018 23:46	SVP cast	AML_0011
04/12/2018 23:47	Main scheme line	SOL file= 20181022347.HSX, Line Number= , Azimuth= , Comments= 65/90
04/12/2018 23:50	Main scheme line	SOL file= 20181022350.HSX, Line Number= , Azimuth= , Comments= 65/90
04/12/2018 23:52	Main scheme line	SOL file= 20181022352.HSX, Line Number= , Azimuth= , Comments= 65/90
04/12/2018 23:59	Main scheme line	SOL file= 20181022359.HSX, Line Number= , Azimuth= , Comments= 65/90
04/13/2018 00:01	Main scheme line	SOL file= 20181030001.HSX, Line Number= , Azimuth= , Comments= 65/65
04/13/2018 00:11	Main scheme line	SOL file= 20181030011.HSX, Line Number= , Azimuth= , Comments= 65/65
04/13/2018 00:13	Main scheme line	SOL file= 20181030013.HSX, Line Number= , Azimuth= , Comments= 65/65
04/13/2018 00:17	Main scheme line	SOL file= 20181030017.HSX, Line Number= , Azimuth= , Comments= 90/65
04/13/2018 00:29	Main scheme line	SOL file= 20181030029.HSX, Line Number= , Azimuth= , Comments= 65/90
04/13/2018 00:34	System Status	System status record modified
	Weather: Sea state: calm; Wind speed: 5-10kts; Comments:	
	Echo Sounder Settings: Range: 40; Gain: 24; Power: 210; Spreading: 30; Absorption: 70; Ping rate: 25; Pulse width: 33; Operator: DTM; Type and Frequency: Multibeam Low (200kHz)	
	Sidescan Sonar Settings: No sidescan	
04/13/2018 00:36	Custom entry	***End survey, transit to swan island boat ramp

- Hydrographic Survey Log - River Hawk - April 13, 2018

David Evans and Associates, Inc.
2801 SE Columbia Way, Suite 130
Vancouver, WA 98661
Phone: (360)314-3200
Fax: (360)314-3250

Survey Information

Local Date	04/13/2018 (JD 103)	**Hydrographer**	JXMD/DTM
Contract		**Registry Number**	
Task Order		**Job Number**	AETR00000034
Contractor	David Evans and Associates, Inc. Marine Services		
Locality	Portland, Oregon		
Sub-Locality	Willamette River Mile 1.9-11.8		
Operations	Multibeam Survey		
Comments	Portland Harbor Superfund		

Horizontal Control

Horizontal Datum	NAD83 (2011)	**Units**	International Feet
Coordinate System	State Plane, Oregon North		
Primary System	Applanix POS MV V5	**PCS SN**	7113
IMU SN	3743	**Antenna 1 SN**	8445
Firmware Version	9.29	**Antenna 2 SN**	8451
Secondary System	Trimble SPS855	**Receiver SN**	0075
Firmware Version	5.30	**Antenna SN**	9485
Beacon Receiver	Intuicom RTK Bridge	**Receiver SN**	X151065
Firmware Version	2.0.0	**Antenna SN**	n/a
Beacon Station 1	DEA Marine Services	**Station ID**	DEMSI
Beacon Station 2	n/a	**Station ID**	n/a
Cable Counter	n/a	**Serial Number**	n/a

Vertical Control

Gauge/Base Location	n/a		
Additional Information	RTK Elevations		
Vertical Datum	NAVD88 Geoid 12a	**Units**	Feet

Vessel and Crew

Survey Vessel	Riverhawk	**Survey Vessel**	Riverhawk
Vessel Crew	n/a	**Vessel Crew**	n/a
Survey Crew	JXMD, DTM	**Survey Crew**	JXMD, DTM
Towing Point	n/a	**Towing Point**	n/a

- Hydrographic Survey Log - River Hawk - April 13, 2018

Sonar Equipment

Model	Reson 7101	**Topside SN**	5110128
Transmit SN	n/a	**Receive SN**	n/a
Model	n/a	**Topside SN**	n/a
		Towfish SN	n/a
Primary SVP	AML Smart SVP	**Body SN**	5588
		Velocity Tip SN	5498
Surface SVP	AML SmartX	**Body SN**	
		Velocity Tip SN	
Secondary SVP	n/a	**Serial Number**	n/a
Other	n/a	**Serial number**	n/a
Other	n/a	**Serial number**	n/a

Acquisition Software

Line Planning	Hypack	**Version**	16.1.8.0
Primary Navigation	Hypack Survey	**Version**	16.1.9.0
Multibeam Acquisition	Hysweep	**Version**	16.1.21.0
Multibeam Processor	SeaBat Controller	**Version**	3.7.0.14
Sidescan Acquisition	n/a	**Version**	n/a
Sidescan Processor	n/a	**Version**	n/a
POS/MV Controller	POS View	**Version**	9.21
MVP Acquisition	n/a	**Version**	n/a
SVP Acquisition	MVP Controller	**Version**	2.4.5
SVP Processing	MVP Controller	**Version**	2.4.5
SVP Conversion	SVP Convert	**Version**	2.0.4
Other	SeaBatUI 4.5.10.7		
Other	7k Center 4.5.10.6		
Other	n/a		

Start of Day Checklist

Drafts		**Start logging POSPac time**	
Check that MVP fish and block secured		**Survey area arrival time**	
Check for SSS cable fatigue		**SV comparison - MVP vs.surface probe**	
Check safety equipment		**Receiving differential corrections**	
Check weather forecast		**SSS offsets**	
Create/set data directories - Hypack PC		**Set SSS cable out**	
ISIS PC		**Set SSS and MBES settings**	
MVP PC		**Update system status in LineLog**	
Notes PC		**Complete roll lines**	
Dock departure time			

- Hydrographic Survey Log - River Hawk - April 13, 2018

Date/Time (UTC)	*Code*	*Comments*
04/13/2018 15:25	System Status	System status record modified

Weather	**Sea state**	calm	**Wind speed**	5-10kts
	Comments			
Echo Sounder Settings	**Range**	40	**Gain**	24
	Power	210	**Spreading**	30
	Absorption	70	**Ping rate**	25
	Pulse width	33	**Operator**	DTM
	Type and Frequency	Multibeam Low (200kHz)		
Sidescan Sonar Settings	No sidescan			

04/13/2018 15:25	Custom entry	***Safety tailgate completed
04/13/2018 15:26	Custom entry	Logging POSPAC POSPAC_RH_20180413
04/13/2018 15:26	Custom entry	Logging vessel rover 00751030.t02
04/13/2018 15:36	Custom entry	Underway from swan island boat launch
04/13/2018 15:37	Patch line	SOL file= 20181031537.HSX, Line Number= , Azimuth= , Comments= ROLL
04/13/2018 15:37	Patch line	SOL file= 20181031537.HSX, Line Number= , Azimuth= , Comments= ROLL
04/13/2018 15:39	Draft	Draft P= 1.780m, S= 1.800m, Avg= 1.790m, Comments=
04/13/2018 15:41	SVP cast	AML_0001
04/13/2018 15:44	Main scheme line	SOL file= 20181031544.HSX, Line Number= , Azimuth= , Comments= 65/90+
04/13/2018 15:47	Main scheme line	SOL file= 20181031547.HSX, Line Number= , Azimuth= , Comments= 90/65
04/13/2018 15:49	Main scheme line	SOL file= 20181031549.HSX, Line Number= , Azimuth= , Comments= 65/90+
04/13/2018 15:53	Main scheme line	SOL file= 20181031553.HSX, Line Number= , Azimuth= , Comments= 90/65
04/13/2018 15:55	Main scheme line	SOL file= 20181031555.HSX, Line Number= , Azimuth= , Comments= 65/90+
04/13/2018 16:04	Main scheme line	SOL file= 20181031604.HSX, Line Number= , Azimuth= , Comments= 65/90
04/13/2018 16:09	Main scheme line	SOL file= 20181031609.HSX, Line Number= , Azimuth= , Comments= 65/90+
04/13/2018 16:12	Main scheme line	SOL file= 20181031612.HSX, Line Number= , Azimuth= , Comments= 65/90+
04/13/2018 16:17	Main scheme line	SOL file= 20181031617.HSX, Line Number= , Azimuth= , Comments= 65/90+
04/13/2018 16:19	Main scheme line	SOL file= 20181031619.HSX, Line Number= , Azimuth= , Comments= 65/90+
04/13/2018 16:25	System Status	System status record modified

Weather	**Sea state**	calm	**Wind speed**	5-10kts
	Comments			
Echo Sounder Settings	**Range**	40	**Gain**	24
	Power	210	**Spreading**	30
	Absorption	70	**Ping rate**	25
	Pulse width	33	**Operator**	DTM
	Type and Frequency	Multibeam Low (200kHz)		
Sidescan Sonar Settings	No sidescan			

04/13/2018 16:25	Main scheme line	SOL file= 20181031625.HSX, Line Number= , Azimuth= , Comments= 65/90+
04/13/2018 16:41	Main scheme line	SOL file= 20181031641.HSX, Line Number= , Azimuth= , Comments= 65/90
04/13/2018 16:47	Main scheme line	SOL file= 20181031647.HSX, Line Number= , Azimuth= , Comments= 65/90+
04/13/2018 16:51	Main scheme line	SOL file= 20181031651.HSX, Line Number= , Azimuth= , Comments= 90/65
04/13/2018 16:54	Main scheme line	SOL file= 20181031654.HSX, Line Number= , Azimuth= , Comments= 65/65
04/13/2018 16:58	Main scheme line	SOL file= 20181031658.HSX, Line Number= , Azimuth= , Comments= 65/90
04/13/2018 17:04	Main scheme line	SOL file= 20181031704.HSX, Line Number= , Azimuth= , Comments= 65/90
04/13/2018 17:07	SVP cast	AML_0002
04/13/2018 17:09	Main scheme line	SOL file= 20181031709.HSX, Line Number= , Azimuth= , Comments= 65/90+
04/13/2018 17:11	Main scheme line	SOL file= 20181031711.HSX, Line Number= , Azimuth= , Comments= 90/65
04/13/2018 17:16	Main scheme line	SOL file= 20181031716.HSX, Line Number= , Azimuth= , Comments= 65/90+
04/13/2018 17:18	Main scheme line	SOL file= 20181031718.HSX, Line Number= , Azimuth= , Comments= 65/90+
04/13/2018 17:21	Main scheme line	SOL file= 20181031721.HSX, Line Number= , Azimuth= , Comments= 65/90+
04/13/2018 17:27	System Status	System status record modified

- Hydrographic Survey Log - River Hawk - April 13, 2018

Date/Time (UTC)	Code	Comments
	Weather / Sea state	calm / Wind speed: 5-10kts
	Weather / Comments	
	Echo Sounder Settings / Range	40 / Gain: 24
	Echo Sounder Settings / Power	210 / Spreading: 30
	Echo Sounder Settings / Absorption	70 / Ping rate: 25
	Echo Sounder Settings / Pulse width	33 / Operator: DTM
	Echo Sounder Settings / Type and Frequency	Multibeam Low (200kHz)
	Sidescan Sonar Settings	No sidescan
04/13/2018 17:30	SVP cast	AML_0003
04/13/2018 17:32	Main scheme line	SOL file= 20181031732.HSX, Line Number= , Azimuth= , Comments= 65/90
04/13/2018 17:43	Main scheme line	SOL file= 20181031743.HSX, Line Number= , Azimuth= , Comments= 90/65
04/13/2018 18:19	Main scheme line	SOL file= 20181031819.HSX, Line Number= , Azimuth= , Comments= 90/65 - may have missed a few lines before this
04/13/2018 18:22	Main scheme line	SOL file= 20181031822.HSX, Line Number= , Azimuth= , Comments= 65/90
04/13/2018 18:28	System Status	System status record modified
	Weather / Sea state	calm / Wind speed: 5-10kts
	Weather / Comments	
	Echo Sounder Settings / Range	40 / Gain: 24
	Echo Sounder Settings / Power	210 / Spreading: 30
	Echo Sounder Settings / Absorption	70 / Ping rate: 25
	Echo Sounder Settings / Pulse width	33 / Operator: DTM
	Echo Sounder Settings / Type and Frequency	Multibeam Low (200kHz)
	Sidescan Sonar Settings	No sidescan
04/13/2018 18:28	Main scheme line	SOL file= 20181031828.HSX, Line Number= , Azimuth= , Comments= 90/65
04/13/2018 18:31	Main scheme line	SOL file= 20181031831.HSX, Line Number= , Azimuth= , Comments= 65/90
04/13/2018 18:37	Main scheme line	SOL file= 20181031837.HSX, Line Number= , Azimuth= , Comments= 90/65
04/13/2018 18:41	Main scheme line	SOL file= 20181031841.HSX, Line Number= , Azimuth= , Comments= 65/90+
04/13/2018 18:50	Main scheme line	SOL file= 20181031850.HSX, Line Number= , Azimuth= , Comments= 65/90+
04/13/2018 18:55	Main scheme line	SOL file= 20181031855.HSX, Line Number= , Azimuth= , Comments= 65/90+
04/13/2018 18:59	Main scheme line	SOL file= 20181031859.HSX, Line Number= , Azimuth= , Comments= 65/65
04/13/2018 19:00	Main scheme line	SOL file= 20181031900.HSX, Line Number= , Azimuth= , Comments= 65/90
04/13/2018 19:04	Main scheme line	SOL file= 20181031904.HSX, Line Number= , Azimuth= , Comments= 65/90
04/13/2018 19:06	Main scheme line	SOL file= 20181031906.HSX, Line Number= , Azimuth= , Comments= 65/90
04/13/2018 19:08	Main scheme line	SOL file= 20181031908.HSX, Line Number= , Azimuth= , Comments= 65/90
04/13/2018 19:12	Main scheme line	SOL file= 20181031912.HSX, Line Number= , Azimuth= , Comments= 65/90
04/13/2018 19:14	Main scheme line	SOL file= 20181031914.HSX, Line Number= , Azimuth= , Comments= 65/90
04/13/2018 19:17	Main scheme line	SOL file= 20181031917.HSX, Line Number= , Azimuth= , Comments= 65/90+
04/13/2018 19:22	Main scheme line	SOL file= 20181031922.HSX, Line Number= , Azimuth= , Comments= 90/65
04/13/2018 19:25	Main scheme line	SOL file= 20181031925.HSX, Line Number= , Azimuth= , Comments= 65/90+
04/13/2018 19:30	System Status	System status record modified
	Weather / Sea state	calm / Wind speed: 5-10kts
	Weather / Comments	
	Echo Sounder Settings / Range	40 / Gain: 24
	Echo Sounder Settings / Power	210 / Spreading: 30
	Echo Sounder Settings / Absorption	70 / Ping rate: 25
	Echo Sounder Settings / Pulse width	33 / Operator: DTM
	Echo Sounder Settings / Type and Frequency	Multibeam Low (200kHz)
	Sidescan Sonar Settings	No sidescan
04/13/2018 19:30	Main scheme line	SOL file= 20181031930.HSX, Line Number= , Azimuth= , Comments= 65/65
04/13/2018 19:31	Main scheme line	SOL file= 20181031931.HSX, Line Number= , Azimuth= , Comments= 65/65

- Hydrographic Survey Log - River Hawk - April 13, 2018

Date/Time (UTC)	*Code*	*Comments*
04/13/2018 19:33	Main scheme line	SOL file= 20181031933.HSX, Line Number= , Azimuth= , Comments= 65/65
04/13/2018 19:35	Main scheme line	SOL file= 20181031935.HSX, Line Number= , Azimuth= , Comments= 65/65
04/13/2018 19:37	SVP cast	AML_0004
04/13/2018 19:41	Main scheme line	SOL file= 20181031941.HSX, Line Number= , Azimuth= , Comments= 65/90
04/13/2018 20:06	Main scheme line	SOL file= 20181032006.HSX, Line Number= , Azimuth= , Comments= 65/90+
04/13/2018 20:11	Main scheme line	SOL file= 20181032011.HSX, Line Number= , Azimuth= , Comments= 65/90+
04/13/2018 20:20	Main scheme line	SOL file= 20181032020.HSX, Line Number= , Azimuth= , Comments= 65/90+
04/13/2018 20:24	Main scheme line	SOL file= 20181032024.HSX, Line Number= , Azimuth= , Comments= 65/65
04/13/2018 20:27	SVP cast	AML_0005
04/13/2018 20:29	Main scheme line	SOL file= 20181032029.HSX, Line Number= , Azimuth= , Comments= 65/90+
04/13/2018 20:31	System Status	System status record modified

Weather	**Sea state**	calm	**Wind speed**	5-10kts
	Comments			
Echo Sounder Settings	**Range**	40	**Gain**	24
	Power	210	**Spreading**	30
	Absorption	70	**Ping rate**	25
	Pulse width	33	**Operator**	DTM
	Type and Frequency	Multibeam Low (200kHz)		
Sidescan Sonar Settings	No sidescan			

04/13/2018 20:31	Main scheme line	SOL file= 20181032031.HSX, Line Number= , Azimuth= , Comments= 65/90
04/13/2018 20:39	Main scheme line	SOL file= 20181032039.HSX, Line Number= , Azimuth= , Comments= 65/90+
04/13/2018 20:42	Main scheme line	SOL file= 20181032042.HSX, Line Number= , Azimuth= , Comments= 65/90+
04/13/2018 20:49	Main scheme line	SOL file= 20181032049.HSX, Line Number= , Azimuth= , Comments= 65/90
04/13/2018 20:52	Main scheme line	SOL file= 20181032052.HSX, Line Number= , Azimuth= , Comments= 65/90
04/13/2018 20:57	Main scheme line	SOL file= 20181032057.HSX, Line Number= , Azimuth= , Comments= 6+5/90
04/13/2018 21:01	Main scheme line	SOL file= 20181032101.HSX, Line Number= , Azimuth= , Comments= 65/90
04/13/2018 21:03	Main scheme line	SOL file= 20181032103.HSX, Line Number= , Azimuth= , Comments= 65/90
04/13/2018 21:09	SVP cast	AML_0006
04/13/2018 21:21	Main scheme line	SOL file= 20181032120.HSX, Line Number= , Azimuth= , Comments= 65/90?
04/13/2018 21:26	Main scheme line	SOL file= 20181032126.HSX, Line Number= , Azimuth= , Comments= 65/90
04/13/2018 21:31	Main scheme line	SOL file= 20181032131.HSX, Line Number= , Azimuth= , Comments= 65/90+
04/13/2018 21:54	SVP cast	AML_0007
04/13/2018 22:17	Custom entry	fueled at freds marina, heading to patch on old sauvie island bridge footing, then resuming mainscheme at Willamette River and Multnomah Channel intersection
04/13/2018 22:21	Patch line	SOL file= 20181032221.HSX, Line Number= 1, Azimuth= 0, Comments=Pitch
04/13/2018 22:22	Patch line	SOL file= 20181032222.HSX, Line Number= 1, Azimuth= 180, Comments=Pitch
04/13/2018 22:25	Patch line	SOL file= 20181032225.HSX, Line Number= 2, Azimuth= 0, Comments= Yaw
04/13/2018 22:26	Patch line	SOL file= 20181032226.HSX, Line Number= 2, Azimuth= 180, Comments= Yaw
04/13/2018 22:29	Patch line	SOL file= 20181032229.HSX, Line Number= 3, Azimuth= 0, Comments= Yaw
04/13/2018 22:30	Patch line	SOL file= 20181032230.HSX, Line Number= 3, Azimuth= 180, Comments= yaw
04/13/2018 22:31	SVP cast	AML_0008
04/13/2018 22:57	Main scheme line	SOL file= 20181032249.HSX, Line Number= , Azimuth= , Comments= 55/90
04/13/2018 23:10	Main scheme line	SOL file= 20181032310.HSX, Line Number= , Azimuth= , Comments= 90/65
04/13/2018 23:12	Main scheme line	SOL file= 20181032312.HSX, Line Number= , Azimuth= , Comments= 65/65
04/13/2018 23:16	Main scheme line	SOL file= 20181032316.HSX, Line Number= , Azimuth= , Comments= 90/60
04/13/2018 23:34	SVP cast	AML_0009
04/13/2018 23:34	Custom entry	Pull sonar, return to Swan Island
04/14/2018 00:05	Bar check	Bar check, bar at 2.000 m, SV at head = 4759.50 m/s, Draft P= 0.550 m, S= 0.540 m, Draft Corr= 0.350 m, Raw Sonar= 1.590 m, Corrected Sonar= 1.940 m, Difference= -0.060 m, Comments=

- Hydrographic Survey Log - River Hawk - April 13, 2018

Date/Time (UTC)	*Code*	*Comments*
04/14/2018 00:17	Custom entry	Position check Riverhawk on Pt. PH1 with 2m fixed height rod and Zephyr 3 Rover antenna. Changed Hypack RTK height to -6.764ft.
04/14/2018 00:19	Position check	Position Check File= 20181040023.HSX, Primary E,N= 7637426.37 m,698702.46 m, Secondary E,N= 7637426.36 m,698702.44 m, Known Separation= 0.000 m, Calc Separation= 0.022 m, Difference= 0.022 m, Comments= Z Primary = 33.38 ft, Z CHK = 33.34 ft
04/14/2018 00:25	Custom entry	End of survey, break down gear

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Portland Harbor
Bathymetric Survey

Jet Ski Operations

June 2018

Book 1 of 1

"Data Acquisition Field Notes"

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CONTENTS

6/13/18
JXMO, DMPR

AETR00000094
Portland Harbor Bathymetric Survey
Jetski Operations June, 2018

NAD83(2011) Oregon North, Int Ft.
NAVD88 Geoid 12B

Jetski NX – Pilot JXMO
Jetski NM – Pilot DMPR

6/13/18
JXMO, DMPR

2112 Check Jetski NX into DEMSI ROOF w/ Zephyr 3 Rover mu to APC = 0.2024 ft

NAD83 (2011) Oregon North, International Ft.
NAVD88 Geoid 12B

Known: N: 718170.73 Ift.
E: 7654419.84 Ift.
Z: 71.67 Ift.

CHK N: 718170.71 Ift.
E: 7654419.84 Ift.
Z: 71.73 Ift.

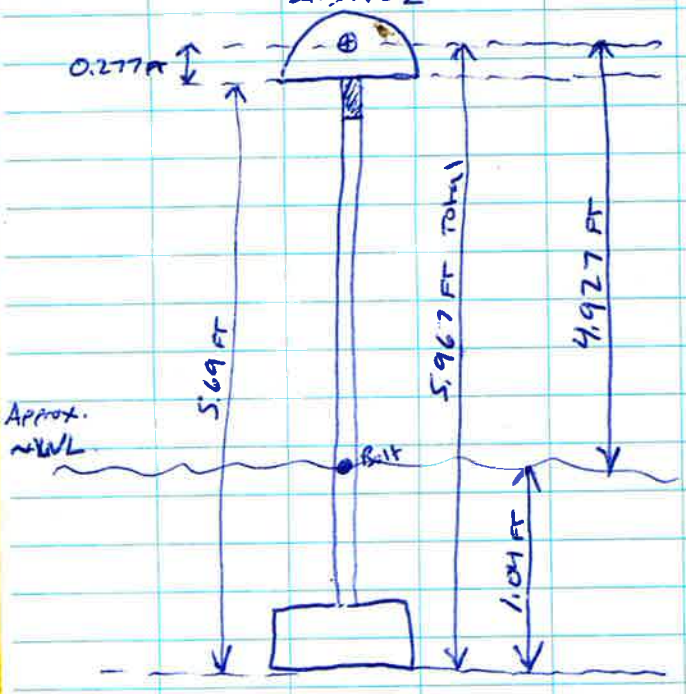
2149 Check Jetski NM into DEMSI ROOF w/ Zephyr model 3 Rover mu to APC = 0.2024 ft

CHK N: 718170.72 Ift.
E: 7654419.84 Ift
Z: 71.73 Ift

NX Jetski Setup

6/14/18
JXMD, DMPR

Zephyr mod 2

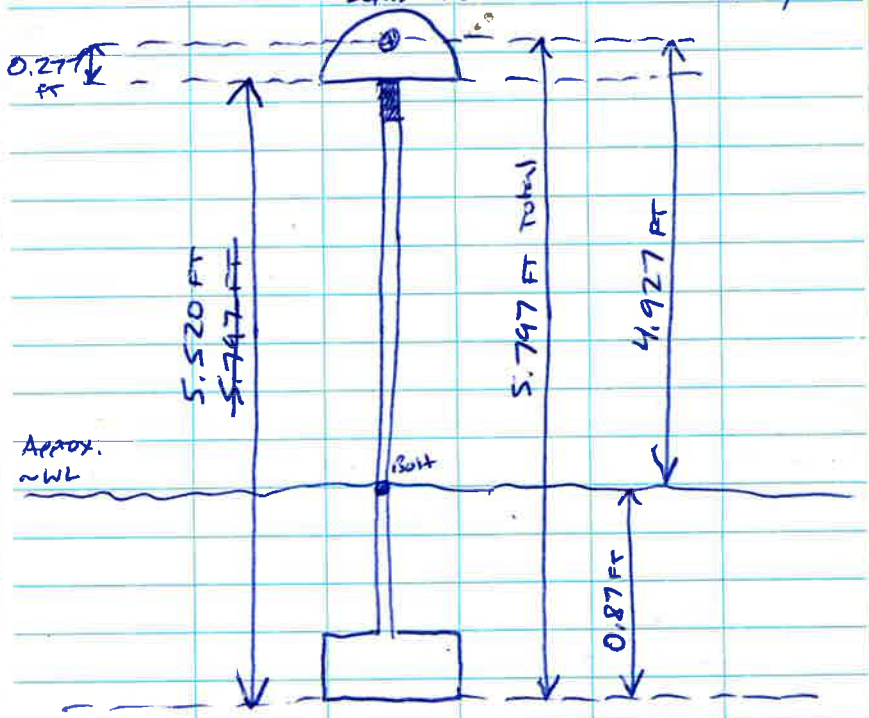


Hypack RTK Height = -4.927 FT
ODom Draft = 1.04 FT (1.0 FT in software)
ODom Index = 0.3 FT

NM Jetski Setup

6/14/18
JXMD, DMPR

Zephyr mod 2



Hypack RTK Height = -4.927 FT
ODom Draft = 0.87 FT (0.9 FT in software)
ODom Index = 0.3 FT

NX: 6/14/18 JXM, DMR

1516 Check into Swan Island PH1 (DEA Red Cap) w/ Zephyr mod 2 and NX GPS pole.
mm to APC = -4.927 FT

known: N: 698702.46 IFT.
E: 7637426.37 IFT
Z: 33.38 IFT.

CHK N 698702.50 IFT.
E: 7637426.36 IFT
Z 33.41 IFT

NM:

1525 Check into Swan Island PH1 (DEA Red Cap) w/ Zephyr mod 2 and NM GPS pole.
mm to APC = -4.927 FT

CHK: N: 698702.46 IFT
E: 7637426.41 IFT
Z: 33.41 IFT

6/14/18 JXM, DMR

~~AML~~

1605 AML001 @ Swan Island Boat ramp
1477 m/s, 4846 FT/S

Hypack Line 1642 RTK/Bar check NM;
@ Swan Island

Rod measurement to bottom From WL
= 3.55 FT

RTK shot on bottom w/ 2m fixed height rod
Pt. 103 (UW)

RTK shot on WL
Pt. 104 (WL)

Hypack Line 1658 RTK Bar check NX!
rod to bottom From WL = 3.3 FT
RTK shot on bottom Pt. 105 (accidentally recorded WL)
RTK shot on WL Pt. 106

1659 NX Latency
1703 NM Latency

6/14/18
DXMB, DMBR

1837 AMLC02 @ Fire Station
1474 m/s, 4836 FT/S
entered in ODOM

2103 AMLC003 @ St. Johns Boat ramp
1477 m/s, 4846 FT/S

Hypack Line
2256 Position check NX on PH1
w/ NX GPS pole and Zephyr mod 2
mm to ARC = -4.927 FT

Known: N: 698702.46 IFT
E: 7637426.37 IFT
Z: 33.41 IFT.

CHK N: 698702.47 IFT.
E: 7637426.40
Z: 33.37 IFT

Hypack Line
2357 Closing POS check for HM logged on NX
Hypack project - mouse/keyboard won't
work for HM.
CHK: N: 698702.50 IFT
PH-1 E: 7637426.42 IFT
Z: 33.40 IFT.

6/14/18
DXMB, DMBR

876-FZH
N. River OR 447 ACL

Re-check RIO into PH-1 w/ 2m
fixed height rod 3 min obs
Pt 107

Hydrack Line

6/15/18

1517 Check Jetski NM into PH1 JXMO, DMPR
(DEA Red Cap @ Swan Island)
w/ Zephyr mod 2 and GPS pole
mm to APC = -4.927 FT

Known: N: 698702.46 IFT
E: 7637426.37 IFT
Z: 33.41 FT

Chk: N: 698702.44 IFT
E: 7637426.40 IFT
Z: 33.40 IFT

Hydrack Line

1522 Check Jetski: HX into PH1
w/ Zephyr mod 2 and GPS pole
mm to APC = -4.927 FT

Chk: N: 698702.48 IFT
E: 7637426.39 IFT
Z: 33.40 IFT.

✱ (moved antenna off monument
at last second before ending logging)

6/15/18 JXMO DMPR

1525 Check R10 Rover into PH1
w/ 2m fixed height rod

Pt. 108 3 min obs ~~PH1 chk~~ ~~PH1 check~~
N: 698702.449 IFT
E: 7637426.381 IFT
Z: 33.362 IFT.

1555 AMLOG1 @ Swan Island Boat Ramp
1478 m/s, 4849 FT/S

Hydrack Line

1604 Bar check / RTK check shot for NM
@ Boat ramp

rod measurement bottom to WL = 3.8FT

RTK Pt. 109 3 sec obs on bottom (WL)
elevation: 8740 IFT.
Hydrack processed depth = 8.70 FT

1611 NM Latency

1615 RTK WL shot: Pt 110 (WL) 3 sec obs

6/15/18
JXMO, DMAR

Hypack Line

1625 Burcheck/RTK check shot for NX
@ boat ramp

Rod measurement WL to bottom = 3.8 FT

RTK shot on bottom
Pt. 111 (UW) 3 sec obs
elevation 8.40 FT
Hypack processed depth = 8.5

1625_0001 Latency

AML 002 @ multinomah channel
(outside)
1474 m/s, 4836 FT/S

2008 AML 0003
1475 m/s, 4837 ft/s

6/15/18
JXMO, DMAR

Hypack Line

2348 closing Burcheck/RTK shot for NX

- Rod from WL to bottom = 4.05 FT
- Pt. 112 RTK shot on bottom (UW)
  3 sec obs, elevation = 6.189 FT
- Pt. 113 (WL) 3 sec obs
- Processed Hypack elevation = 6.1

0005 closing Burcheck/RTK shot for NX
rod from WL to bottom = 4.04 FT
- Pt. 114 RTK shot on bottom (UW)
  3 sec obs, elevation = 6.104 FT
- Pt. 115 (WL) 3 sec obs
- Processed Hypack depth = 6.1 FT

0023 closing RTK Rover check on
PH1 w/ RID & 2m fixed height
rod.
Pt. 116 PH1 CHK 3 sec obs

CHK: N. 698702.450 IFT.
E. 7637426.394 IFT.
Z: 33.348 IFT.

6/15/18
JXMD, DMPR

Hyundai Line

0027 Closing position check for NM on PH1 w/ Zephyr mod 2 and GPS pole
mm to APC = -4.927 FT

CHK: N: 678702.49 IFT.
E: 7637426.40 IFT
Z: 33.30 IFT

Hyundai Line

0030 Closing position check for NX on PH1 w/ zephyr mod 2 and GPS Pole
mm to APC = -4.927 FT

CHK: N: 678702.45 IFT
E: 7637426.37 IFT
Z: 33.36

APPENDIX C
SOUND SPEED INSTRUMENT CALIBRATIONS

AML OCEANOGRAPHIC
Xchange your old ideas

Certificate of Calibration

Customer:	David Evans & Associates
Asset Serial Number:	201322
Asset Product Type:	SV•Xchange™ Calibrated Sensor
Calibration Type:	Sound Velocity
Calibration Range:	1375 to 1625 m/s
Calibration RMS Error:	.007
Calibration ID:	201322 999999 201322 111217 083045
Installed On:	

Coefficient A:	0.000000E+0	Coefficient H:	1.946505E-7
Coefficient B:	0.000000E+0	Coefficient I:	0.000000E+0
Coefficient C:	1.096535E-6	Coefficient J:	0.000000E+0
Coefficient D:	1.945817E-7	Coefficient K:	0.000000E+0
Coefficient E:	-1.726059E-5	Coefficient L:	0.000000E+0
Coefficient F:	1.950877E-7	Coefficient M:	0.000000E+0
Coefficient G:	9.067530E-7	Coefficient N:	0.000000E+0

Calibration Date (dd/mm/yyyy): 11/12/2017

Certified By:

AML Oceanographic

Robert Haydock
President, AML Oceanographic

AML Oceanographic certifies that the asset described above has been calibrated or recalibrated with equipment referenced to traceable standards. Please note that Xchange™ sensor-heads may be installed on assets other than the one listed above; this calibration certificate will still be valid when used on other such assets. If this instrument or sensor has been recalibrated, please be sure to update your records. Please also ensure that you update the instrument's coefficient values in any post-processing software that you use, if necessary. Older generation instruments may require configuration files, which are available for download at our Customer Centre at www.AMLoceanographic.com/support

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AML OCEANOGRAPHIC
Xchange your old ideas

Certificate of Calibration

Asset Serial Number:	200790
Calibration Type:	SVX (External)
Certification Date:	November 01, 2017
Calibration Range:	1414.0 to 1509 m/s
Sensor Range:	1375 to 1625 m/s
Residual (RMSE):	0.001 m/s
Standards:	Hart 1560\3611

Coefficients

Coefficient A:	0.000000E+0	**Coefficient H:**	1.943771E-7
Coefficient B:	0.000000E+0	**Coefficient I:**	0.000000E+0
Coefficient C:	1.344487E-6	**Coefficient J:**	0.000000E+0
Coefficient D:	1.944158E-7	**Coefficient K:**	0.000000E+0
Coefficient E:	-1.753245E-5	**Coefficient L:**	0.000000E+0
Coefficient F:	1.951569E-7	**Coefficient M:**	0.000000E+0
Coefficient G:	1.524958E-6	**Coefficient N:**	0.000000E+0

Robert Haydock
President, AML Oceanographic

AML OCEANOGRAPHIC
Xchange your old ideas

Certificate of Calibration

Customer:	David Evans & Associates
Asset Serial Number:	205498
Asset Product Type:	SV•Xchange™ Calibrated Sensor
Calibration Type:	Sound Velocity
Calibration Range:	1375 to 1625 m/s
Calibration RMS Error:	.007
Calibration ID:	205498 999999 205498 111217 083102
Installed On:	

Coefficient A:	0.000000E+0	Coefficient H:	1.948611E-7
Coefficient B:	0.000000E+0	Coefficient I:	0.000000E+0
Coefficient C:	6.625208E-8	Coefficient J:	0.000000E+0
Coefficient D:	1.948796E-7	Coefficient K:	0.000000E+0
Coefficient E:	-1.845667E-5	Coefficient L:	0.000000E+0
Coefficient F:	1.955201E-7	Coefficient M:	0.000000E+0
Coefficient G:	1.661846E-7	Coefficient N:	0.000000E+0

Calibration Date (dd/mm/yyyy): 11/12/2017

Certified By:

AML Oceanographic

Robert Haydock
President, AML Oceanographic

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Certificate of Calibration

Asset Serial Number:	305690
Calibration Type:	Pressure
Certification Date:	April 09, 2018
Calibration Range:	0 to 100 dBar
Sensor Range:	0 to 100 dBar
Residual (RMSE):	0.008 dBar
Standards:	Paro 785

Coefficients

Coefficient A:	-1.205655E+1	Coefficient H:	0.000000E+0
Coefficient B:	0.000000E+0	Coefficient I:	3.607802E-10
Coefficient C:	0.000000E+0	Coefficient J:	0.000000E+0
Coefficient D:	0.000000E+0	Coefficient K:	0.000000E+0
Coefficient E:	1.892618E-3	Coefficient L:	0.000000E+0
Coefficient F:	0.000000E+0	Coefficient M:	-2.915412E-15
Coefficient G:	0.000000E+0	Coefficient N:	0.000000E+0

Robert Haydock
President, AML Oceanographic

AML Oceanographic certifies that the asset described above has been calibrated or recalibrated with equipment referenced to traceable standards. If this instrument or sensor has been re-calibrated, please be sure to update your records. Please also ensure that you update the instrument's coefficient values in any post-processing software that you use, if necessary.

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Certificate of Calibration

Customer:	David Evans & Associates
Asset Serial Number:	400219
Asset Product Type:	T•Xchange™ Calibrated Sensor, -2 to 32 C Range
Calibration Type:	Temperature
Calibration Range:	-2 to +32 ºC
Calibration RMS Error:	.0005
Calibration ID:	400219 999999 888888 111217 164335
Installed On:	005643

Coefficient A:	-9.699692E+0	Coefficient H:	0.000000E+0
Coefficient B:	1.475409E-3	Coefficient I:	0.000000E+0
Coefficient C:	-2.999243E-8	Coefficient J:	0.000000E+0
Coefficient D:	8.965910E-13	Coefficient K:	0.000000E+0
Coefficient E:	-1.734628E-17	Coefficient L:	0.000000E+0
Coefficient F:	2.053657E-22	Coefficient M:	0.000000E+0
Coefficient G:	-9.893937E-28	Coefficient N:	0.000000E+0

Calibration Date (dd/mm/yyyy): 11/12/2017

Certified By:

Robert Haydock

President, AML Oceanographic

AML Oceanographic certifies that the asset described above has been calibrated or recalibrated with equipment referenced to traceable standards. Please note that Xchange™ sensor-heads may be installed on assets other than the one listed above; this calibration certificate will still be valid when used on other such assets. If this instrument or sensor has been recalibrated, please be sure to update your records. Please also ensure that you update the instrument's coefficient values in any post-processing software that you use, if necessary. Older generation instruments may require configuration files, which are available for download at our Customer Centre at www.AMLoceanographic.com/support

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APPENDIX D
SAFETY AND ENVIRONMENTAL MEETING REPORTS

Safety and Environmental Meeting Report

(Meeting to be held first workday of each week)

Date: 3/6/2018

Project Title: Portland Harbor Bathymetric Survey Contract No. _____

DEA Project No: AETR00000034 Task Order No. _____

Strength of Organization: 2 Number of attendants: 2 Mtg. Duration: 10 Minutes

Names of Attendees: Jon Dasler, Dave Moehl

Safety Subjects Discussed

Practice defensive driving
No cell phone use
Slips, trips and falls on site (safe footing).

Environmental Subjects discussed

keep vehicle in tracks on top of levee

Signatures of Attendees:

Leader Signature			
Title			

Safety and Environmental Meeting Report

(Meeting to be held first workday of each week)

Date: 3/13/18

Project Title: Portland Harbor Survey Contract No. _____

DEA Project No: AETR00000034 Task Order No. _____

Strength of Organization: _____ Number of attendants: 3 Mtg. Duration: 30

Names of Attendees:

Jason Dorfman
David Moehl
Ben Colello

Safety Subjects Discussed	
✓	Truck and trailer lights functional
✓	Tow hitch and safety chains secure
✓	Trailer brakes functional
N/A	Trailer straps secure
✓	Gear secured for transport
✓	Boat plug secured
✓	Navigation lights operational
✓	Radar, chart plotter, and depth sounder operational
✓	Fuel levels inspected (including spare fuel for generator)
✓	Engine and generator fluids inspected
✓	Sufficient number and type of fire extinguishers
✓	First-Aid and trauma kits
✓	AED
✓	Blood-borne pathogens kit
✓	Signal flares
✓	Sound producing device
✓	Spot lights
✓	Sufficient number of survival suits if required
✓	Sufficient number and type of PFDs with lights and whistles
✓	Life raft if required
✓	Life ring or life sling
✓	Anchor with adequate rode ready and accessible
✓	Boat hook
✓	Manual bilge pump or bailing device
✓	Adequate number of oars or working alternate propulsion
✓	Adequate number of lines for moorage and/or towing
✓	EPIRB tested and operational
✓	VHF Radio operational
✓	Cell phone
✓	Food, water, and dry clothing
✓	Weather forecast reviewed
✓	Staff roles and responsibilities reviewed
✓	Launching and recovering safety concerns reviewed

- ✓ Underway safety concerns reviewed
- ✓ Emergency procedures reviewed (MOB, Fire, Collision, Heat/Cold…)
- ✓ Job/site-specific safety concerns reviewed
- ✓ Safety meeting form signed and vessel logbook completed

Environmental Subjects discussed

- ✓ Fueling
- ✓ Absorbent pads
- ✓ MARPOL signage posted
- ✓ Waste Management
- ✓ Marine mammals

Signatures of Attendees:

Leader Signature

Field Safety Manager

Title

Safety and Environmental Meeting Report

(Meeting to be held first workday of each week)

Date: 3/14/18

Project Title: Portland Harbor Survey Contract No. _____

DEA Project No: AETR00000034 Task Order No. _____

Strength of Organization: _____ Number of attendants: 3 Mtg. Duration: 15

Names of Attendees:

Jason Dorfman
David Moehl
Ben Colello

Safety Subjects Discussed	
✓	Truck and trailer lights functional
✓	Tow hitch and safety chains secure
✓	Trailer brakes functional
✓	Trailer straps secure — Tire pressure ok
✓	Gear secured for transport
✓	Defensive driving
✓	Cell phone use
✓	Safe launching and trailering of vessel
✓	Boat plug secured
✓	Navigation lights operational
✓	Radar, chart plotter, and depth sounder operational
✓	Fuel levels inspected (including spare fuel for generator)
✓	Engine and generator fluids inspected
✓	Sufficient number and type of fire extinguishers
✓	First-Aid and trauma kits
✓	AED
✓	Blood-borne pathogens kit
✓	Signal flares
✓	Sound producing device
✓	Spot light
✓ N/A	Hard hats if required
✓	Protective Gloves
✓	Sufficient number of survival suits if required
✓	Sufficient number and type of PFDs with lights and whistles
✓	Life raft if required
✓	Life ring or life sling with 90ft of line attached
✓	Anchor with adequate rode ready and accessible
✓	Boat hook
✓	Manual bilge pump or bailing device
✓	Adequate number of oars or working alternate propulsion
✓	Adequate number of lines for moorage and/or towing
✓	EPIRB tested and operational
✓	VHF Radio operational

- [x] Satellite phone if required N/A
- [x] Cell phone
- [x] Food, water, and dry clothing
- [x] Weather forecast reviewed
- [x] Staff roles and responsibilities reviewed
- [x] Launching and recovering safety concerns reviewed
- [x] Underway safety concerns reviewed
- [x] Emergency procedures reviewed (MOB, Fire, Collision, Heat/Cold…)
- [x] Job/site-specific safety concerns reviewed
- [x] Safety meeting form signed and vessel logbook completed

Environmental Subjects discussed

- [x] Fueling
- [x] Absorbent pads
- [x] MARPOL signage posted
- [x] Waste Management
- [x] Marine mammals

Signatures of Attendees:

Leader Signature			
Field Safety Manager			
Title			

AECOM

WORKER SIGN ON

NAME (Please Print)	TIME	SIGNATURE
I participated in the development and understand the content of this Task Hazard Assessment.		
JASON DOIEMAN	0800	
DAVID MOEHL	0800	

Task Hazard Assessment Follow-Up/Review

Initials/Time	Initials/Time	Initials/Time

Instructions:
Identify basic steps of the task and associated hazards. Calculate the initial risk rating. Identify control measure to eliminate or reduce the hazard's risk and calculate the residual risk rating. If the risk rating (after controls are implemented) cannot be reduced to 4 or lower, additional approvals are needed before the activity can begin.

Employees shall monitor the activities for compliance with this document. Workers should **STOP WORK** on a task if conditions change from the planned and agreed approach to the work.

This document should be updated to reflect new conditions or changes in task methods.

VISITOR SIGN ON

I have read and understand the content of this Task Hazard Assessment.

Emergency Meeting / Assembly Area

Emergency Contact #

Method of Communication

Risk Rating Matrix

Probability	Severity				
	5 - Catastrophic	4 – Critical	3 – Major	2 – Moderate	1 - Minor
5 – Frequent	25	20	15	10	5
4 – Probable	20	16	12	8	4
3 – Occasional	15	12	9	6	3
2 – Remote	10	8	6	4	2
1 - Improbable	5	4	3	2	1

Risk Rating (Probability x Severity)	Risk Acceptance Authority
1 to 4 (Low)	Risk is tolerable, manage at local level
5 to 9 (Medium)	Risk requires approval by Operations Lead/Supervisor & SH&E Manager
10 to 25 (High)	Risk requires the approval of the Operations Manager & SH&E Director

Severity – Potential Consequences				
	People	Property Damage	Environmental Impact	Public Image/Reputation
Catastrophic	Fatality, Multiple Major Incidents	>$1M USD, Structural collapse	Offsite impact requiring remediation	Government intervention
Critical	Permanent impairment, Long term injury/illness	>$250K to $1M USD	Onsite impact requiring remediation	Media intervention
Major	Lost/Restricted Work	> $10K to $250K USD	Release at/above reportable limit	Owner intervention
Moderate	Medical Treatment	> $1K to $10K USD	Release below reportable limit	Community or local attention
Minor	First Aid	</=$1K USD	Small chemical release contained onsite	Individual complaint

Probability		
Frequent	Expected to occur during task/activity	9/10
Probable	Likely to occur during task/activity	1/10
Occasional	May occur during the task/activity	1/100
Remote	Unlikely to occur during task/activity	1/1,000
Improbable	Highly unlikely to occur, but possible during task/activity	1/10,000

AECOM

Americas

Task Hazard Assessment

S3AM-209-FM6

Date: 3/18/18	**Project Name / Location:** Portland Harbor Bathymetric Survey, Portland, OR
Permit / Job Number:	**Project Number:**
Description of Task: Multibeam Sonar Operations in Portland Harbor	

Do you have a pre-job hazard assessment (JHA) specific to this task in your hands?

- ☑ **Yes** – review the steps, hazards, and precautions. Attach and reference JHA in the form below. Add any additional steps, hazards, and precautions to this form otherwise unidentified on JHA.
- ○ **No** – list all steps, hazards, and precautions associated with the task in the form below.

Basic Task Steps (explain in order how the task will be carried out)	**Hazards** (identify all hazards & potential hazards of each step)	**Risk** (before)	**Control Measures / Precautions** (describe how that hazard will be controlled)	**Risk** (after)	**Revised?** (yes – record time)
			Highest Risk Index		

The Task Hazard Assessment is to be completed at the worksite by the individual(s) who is intended to conduct the task immediately prior to initiating the associated task. Number and attach additional pages if necessary.

Worker/Visitor acknowledgement and review of this content on back of this document. Originator to also sign Worker acknowledgement section.

Originator Jason Dorfman (Print Name) — (Signature)

Supervisor DAVID MOEHL (Print Name) — (Signature)

Risk Matrix on Reverse

THIS FORM IS TO BE KEPT ON JOB SITE.

AECOM

WORKER SIGN ON

NAME (Please Print)	TIME	SIGNATURE
I participated in the development and understand the content of this Task Hazard Assessment.		
Jason Dorfman	0915	
Lizbe Trump	0915	
David Morin	0915	

Task Hazard Assessment Follow-Up/Review

Initials/Time	Initials/Time	Initials/Time

Instructions:
Identify basic steps of the task and associated hazards. Calculate the initial risk rating. Identify control measure to eliminate or reduce the hazard's risk and calculate the residual risk rating. If the risk rating (after controls are implemented) cannot be reduced to 4 or lower, additional approvals are needed before the activity can begin.

Employees shall monitor the activities for compliance with this document. Workers should **STOP WORK** on a task if conditions change from the planned and agreed approach to the work.

This document should be updated to reflect new conditions or changes in task methods.

VISITOR SIGN ON

I have read and understand the content of this Task Hazard Assessment.

Emergency Meeting / Assembly Area

Emergency Contact #

Method of Communication

Risk Rating Matrix

Probability	Severity				
	5 - Catastrophic	4 – Critical	3 – Major	2 – Moderate	1 - Minor
5 – Frequent	25	20	15	10	5
4 – Probable	20	16	12	8	4
3 – Occasional	15	12	9	6	3
2 – Remote	10	8	6	4	2
1 - Improbable	5	4	3	2	1

Risk Rating (Probability x Severity)	Risk Acceptance Authority
1 to 4 (Low)	Risk is tolerable, manage at local level
5 to 9 (Medium)	Risk requires approval by Operations Lead/Supervisor & SH&E Manager
10 to 25 (High)	Risk requires the approval of the Operations Manager & SH&E Director

Severity – Potential Consequences				
	People	Property Damage	Environmental Impact	Public Image/Reputation
Catastrophic	Fatality, Multiple Major Incidents	>$1M USD, Structural collapse	Offsite impact requiring remediation	Government intervention
Critical	Permanent impairment, Long term injury/illness	>$250K to $1M USD	Onsite impact requiring remediation	Media intervention
Major	Lost/Restricted Work	> $10K to $250K USD	Release at/above reportable limit	Owner intervention
Moderate	Medical Treatment	> $1K to $10K USD	Release below reportable limit	Community or local attention
Minor	First Aid	</=$1K USD	Small chemical release contained onsite	Individual complaint

Probability		
Frequent	Expected to occur during task/activity	9/10
Probable	Likely to occur during task/activity	1/10
Occasional	May occur during the task/activity	1/100
Remote	Unlikely to occur during task/activity	1/1,000
Improbable	Highly unlikely to occur, but possible during task/activity	1/10,000

AECOM

Americas

Task Hazard Assessment

S3AM-209-FM6

Date: 3/20/18	**Project Name / Location:** Portland Harbor Bathymetric Survey, Portland, OR		
Permit / Job Number:		**Project Number:**	
Description of Task: Multibeam Sonar Operations in Portland Harbor			

Do you have a pre-job hazard assessment (JHA) specific to this task in your hands?

- ✓ **Yes** – review the steps, hazards, and precautions. Attach and reference JHA in the form below. Add any additional steps, hazards, and precautions to this form otherwise unidentified on JHA.
- ○ **No** – list all steps, hazards, and precautions associated with the task in the form below.

Basic Task Steps (explain in order how the task will be carried out)	**Hazards** (identify all hazards & potential hazards of each step)	**Risk** (before)	**Control Measures / Precautions** (describe how that hazard will be controlled)	**Risk** (after)	**Revised?** (yes – record time)
			Highest Risk Index		

The Task Hazard Assessment is to be completed at the worksite by the individual(s) who is intended to conduct the task immediately prior to initiating the associated task. Number and attach additional pages if necessary.

Worker/Visitor acknowledgement and review of this content on back of this document. Originator to also sign Worker acknowledgement section.

Originator Jason Dorfman
Print Name

Supervisor DAVID MOEHL
Print Name

Signature

Signature

Risk Matrix on Reverse

THIS FORM IS TO BE KEPT ON JOB SITE.

Safety and Environmental Meeting Report

(Meeting to be held first workday of each week)

Date: 3/20/18

Project Title: Portland Harbor Survey Contract No. _____

DEA Project No: AETR00000034 Task Order No. _____

Strength of Organization: _____ Number of attendants: 3 Mtg. Duration: 15

Names of Attendees:

Jason Dorfman
David Moehl
Ben Colello

Safety Subjects Discussed

- ✓ Truck and trailer lights functional
- ✓ Tow hitch and safety chains secure
- ✓ Trailer brakes functional
- ✓ Trailer straps secure
- ✓ Gear secured for transport
- ✓ Defensive driving
- ✓ Cell phone use
- ✓ Safe launching and trailering of vessel
- ✓ PFDs

Environmental Subjects discussed

- ✓ Fueling
- ✓ Absorbent pads

Signatures of Attendees:

Leader Signature

Field Safety Manager

Title

Safety and Environmental Meeting Report

(Meeting to be held first workday of each week)

Date: 6/14/18

Project Title: Portland Harbor Bathymetric Survey Contract No. _____

DEA Project No: AETR00000034 Task Order No. _____

Strength of Organization: _____ Number of attendants: 3 Mtg. Duration: 15 min

Names of Attendees:

Jason Dorfman
Dan Prince
Jason Silvertooth

Safety Subjects Discussed

- Truck + Trailer - lights, straps, ect.
- On vessel signals
- Fuel
- Fire extng.
- First aid kit.
- Flares
- Horn
- Rubber gloves
- Dry suits
- Tow lines
- Radios/communications
- Duration of time on water
- All stop authority
- Launching and Recovering
- Floating objects
- AED
- PFDs
- Emergency Procedures
- Dry suits
- Tripping hazards

Environmental Subjects discussed

- Staying out of water
- Absorbent Pads
- Marine Mammals
- Current
- Sub. piling
- Vessel traffic
- Pinch points
- ~~Duration~~
- Fueling
- waste management
- Avoid contamination

Signatures of Attendees:

Leader Signature

Field Safety Manager
Title

Jason Smith

Safety and Environmental Meeting Report

(Meeting to be held first workday of each week)

Date: 6/15/18

Project Title: Portland Harbor Bathymetric Survey Contract No. _____

DEA Project No: AETR00000034 Task Order No. _____

Strength of Organization: _____ Number of attendants: 3 Mtg. Duration: 15 min

Names of Attendees:

Jason Dorfman
Daniel Prince
Libby Miner

Safety Subjects Discussed

- Truck and trailer lights, straps, chains
- Gear secured
- Boat plugs
- Fuel levels
- Navigation systems / depth sounders
- PFDs
- Fire extinguishers
- First Aid and Trauma kit
- Flares
- Horn
- Gloves
- Towing lines
- VHF Radio / communication / cell phone
- Food, water, dry clothing
- weather Forecast
- launching recovering
- Pinch points
- Fast current
- submersed / Floating objects
- Heads up / vessel traffic
- stop work Authority
- emergency procedures
- Time on water
- Dry suits
- tripping Hazards

Environmental Subjects discussed

Fueling
marine mammals
waste management
Avoid contamination

Signatures of Attendees:

Leader Signature			
Field Safety Manager			
Title			

FLOAT PLAN

Complete this plan and leave it with a reliable DEA person who is responsible for notifying the U.S. Coast Guard, or other rescue organization, should you not return as scheduled.

Name and telephone number of person reporting: Jason DorFman (303) 921-0821			
Description of boat: Jetskis (2)	Color: White	Trim: Red	Type: FBRGlass Jetski
Registration Number: VN8085NX/WA3488NM	Make: Sea-doo	Length: 10'	Name: Jetski HM/HX
Other Information: survey gear (monitors, antennas, transducers ... etc)			
Number of Persons Aboard = 2		Ship Captain: Jason DorFman/Daniel Prince	
Name Age Address & Phone	Jason DorFman (303) 921-0821	1415 NW 10th CT Vancouver, WA 98685	31
Name Age Address & Phone	Daniel Prince (703) 409-6037	3024 E. Burnside St, Portland, OR	33
Name Age Address & Phone			
Name Age Address & Phone			
Engine Type: Jet	No. of Engines: 1 Per Jetski	H.P.: 1493 cc	Fuel Capacity: 15.3 gal
Radio: (YES) / NO	Type: VHF	Frequencies: 16	
Trip Expectations: Survey Portland Harbor	Leave at (time): 0800	From: Swan Island Boat Ramp	Going To: Portland Harbor
Expect to Return by (time): 1800		And in no Event Later Than: 1900	
Other Pertinent Information	Trailer License	Type	Automobile License
Color and Make of Auto: white F250 Ford (DEA)		Where Parked: Swan Island Boat Ramp	
If not returned by (time): 2000	Call the Coast Guard or (local authority). USCG Station Portland Phone Numbers: (503) 240-9365		

Figure A

FLOAT PLAN

Complete this plan and leave it with a reliable DEA person who is responsible for notifying the U.S. Coast Guard, or other rescue organization, should you not return as scheduled.

Name and telephone number of person reporting: Jason Dorfman (303) 921-0821			
Description of boat: Jetskis (2)	Color: white	Trim: Red	Type: Fiberglass Jetski
Registration Number: WH8085NX/WH3488HM	Make: Seadoo	Length: 10'	Name: Jetski NX/HM
Other Information: Survey gear (monitors, antennas, transducers ... etc)			
Number of Persons Aboard = 2 total		Ship Captain: Jason Dorfman / Daniel Prince	
Name Age Address & Phone	Jason Dorfman (303) 921-0821	14615 NW 10th CT Vancouver, WA 98685	31
Name Age Address & Phone	Daniel Prince (703) 409-6037	3024 E Burnside St. Portland OR 97214	33
Name Age Address & Phone			
Name Age Address & Phone			
Engine Type: Jet	No. of Engines: 1 Per Jetski	H.P.: 1493 cc	Fuel Capacity: 15.3 Gal
Radio (YES) / NO	Type: VHF Handheld	Frequencies: 16	
Trip Expectations: Survey Portland Harbor	Leave at (time): 0800	From: Swan Island Boat Ramp	Going To: Portland Harbor
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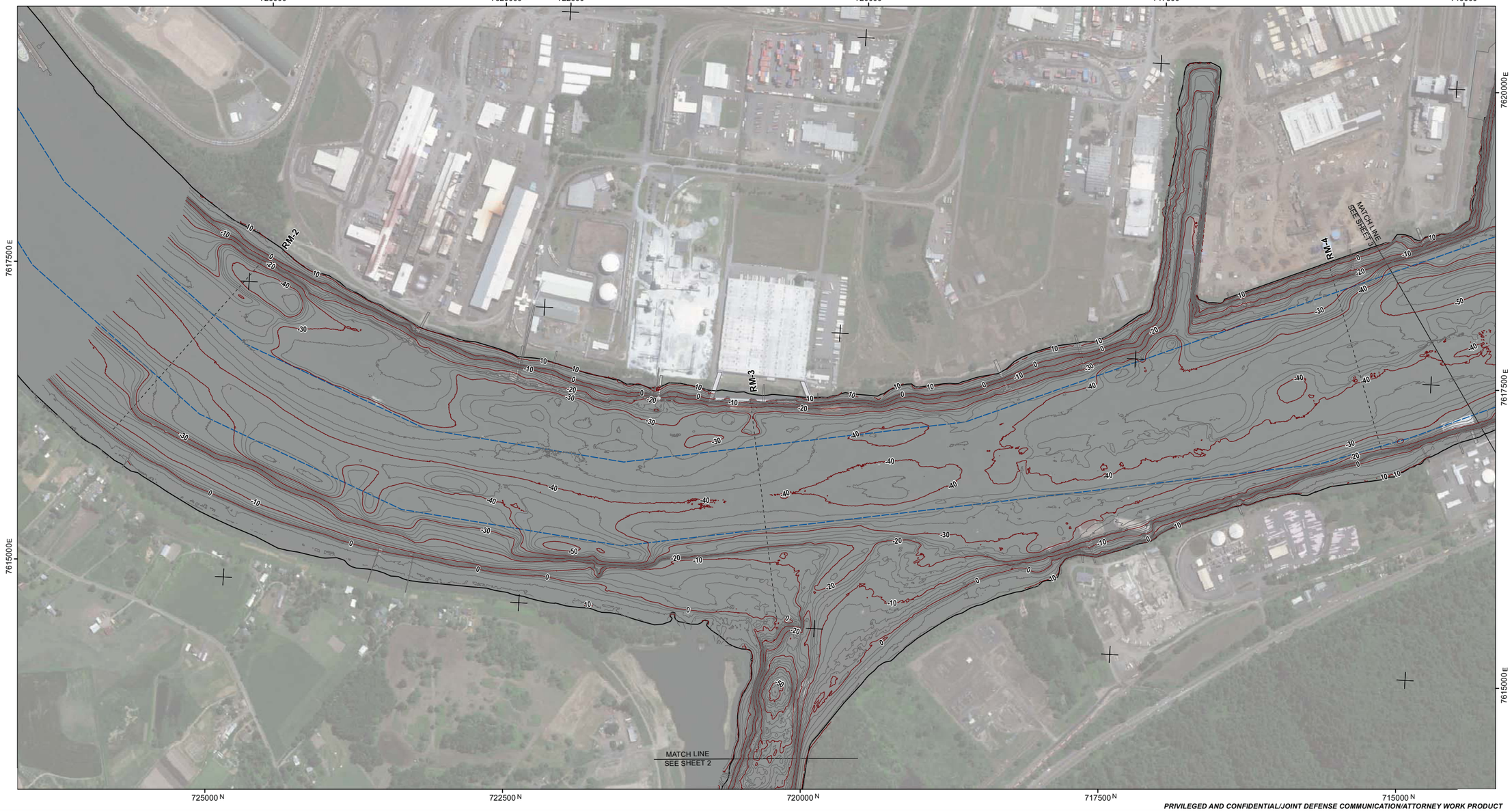
Color and Make of Auto: White Ford F250 (DEA)		Where Parked: Swan Island Boat Ramp	
If not returned by (time): 2000	Call the Coast Guard or (local authority). USCG Station Portland Phone Numbers: (503) 240-9365		

Figure A

APPENDIX E
CONTOUR AND HILLSHADE MAPS



PRIVILEGED AND CONFIDENTIAL/JOINT DEFENSE COMMUNICATION/ATTORNEY WORK PRODUCT

LEGEND

- RM-10 – – RIVER MILE
- DOCKS AND STRUCTURES
- NAVIGATION CHANNEL
- RIVER EDGE
- 2 FOOT CONTOUR INTERVAL
- 10 FOOT CONTOUR INTERVAL
- OREGON NORTH GRATICULE

N E S W

0 200 400 800 1,200
UNITS IN FEET

THIS HYDROGRAPHIC SURVEY WAS COMPLETED UNDER THE DIRECTION OF A NATIONAL SOCIETY OF PROFESSIONAL SURVEYORS/THE HYDROGRAPHIC SOCIETY OF AMERICA, CERTIFIED HYDROGRAPHER

GREGORY P. BAIRD
NSPS/THSOA CERTIFIED HYDROGRAPHER (201)

NOTES:
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4. Units: International Feet

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	-10.0'	-15.2'
8	10.0'	4.75'
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	-10.0'	-15.25'
10	10.0'	4.71'
	0.0'	-5.29'
	-10.0'	-15.29'
12	10.0'	4.66'
	0.0'	-5.34'
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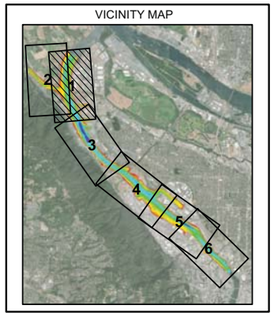
VICINITY MAP



BATHYMETRIC CONTOURS
RIVER MILE 1.9 TO 4.2
2018 PORTLAND HARBOR BATHYMETRIC SURVEY
WILLAMETTE RIVER, OREGON

AECOM

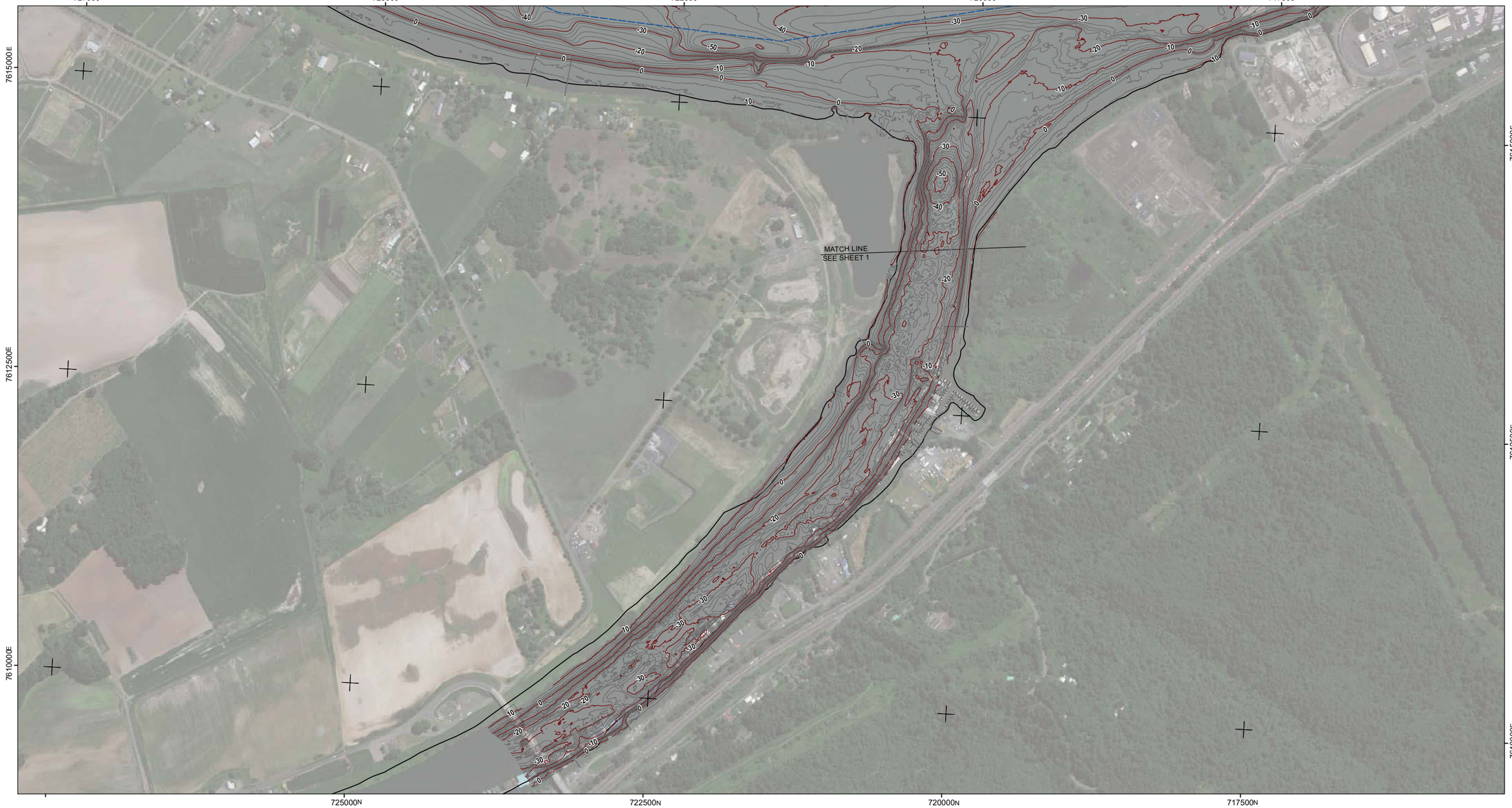
Geosyntec consultants

DAVID EVANS AND ASSOCIATES INC. MARINE SERVICES

REGISTERED PROFESSIONAL LAND SURVEYOR
OREGON
JON L. DASLER
JANUARY 23, 1990
2420
7-17-18
RENEWS DATE: Dec. 31, 2019

DATE:	7/17/2018
DESIGN:	JTM
DRAWN:	KXKT
CHECKED:	JLD
REVISION NUMBER:	0
SCALE:	
CONTRACT NUMBER:	AETR00000034
FILE:	Portland_Harbor_Bathymetry_B1

SHEET
B1
OF B6



PRIVILEGED AND CONFIDENTIAL/JOINT DEFENSE COMMUNICATION/ATTORNEY WORK PRODUCT

LEGEND

- RM-10 – – RIVER MILE
- DOCKS AND STRUCTURES
- NAVIGATION CHANNEL
- RIVER EDGE
- 2 FOOT CONTOUR INTERVAL
- 10 FOOT CONTOUR INTERVAL
- OREGON NORTH GRATICULE

0 200 400 800 1,200
UNITS IN FEET

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GREGORY P. BAIRD
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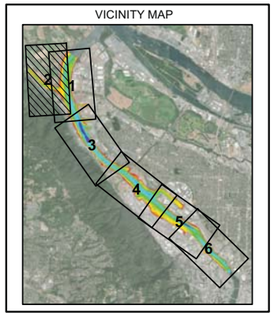
VICINITY MAP



AECOM
Geosyntec consultants

BATHYMETRIC CONTOURS
MULTNOMAH CHANNEL
2018 PORTLAND HARBOR BATHYMETRIC SURVEY
WILLAMETTE RIVER, OREGON

DAVID EVANS AND ASSOCIATES INC. MARINE SERVICES

REGISTERED PROFESSIONAL LAND SURVEYOR
OREGON
JON L. DASLER
JANUARY 23, 1990
2420
RENEWS DATE: Dec. 31, 2019

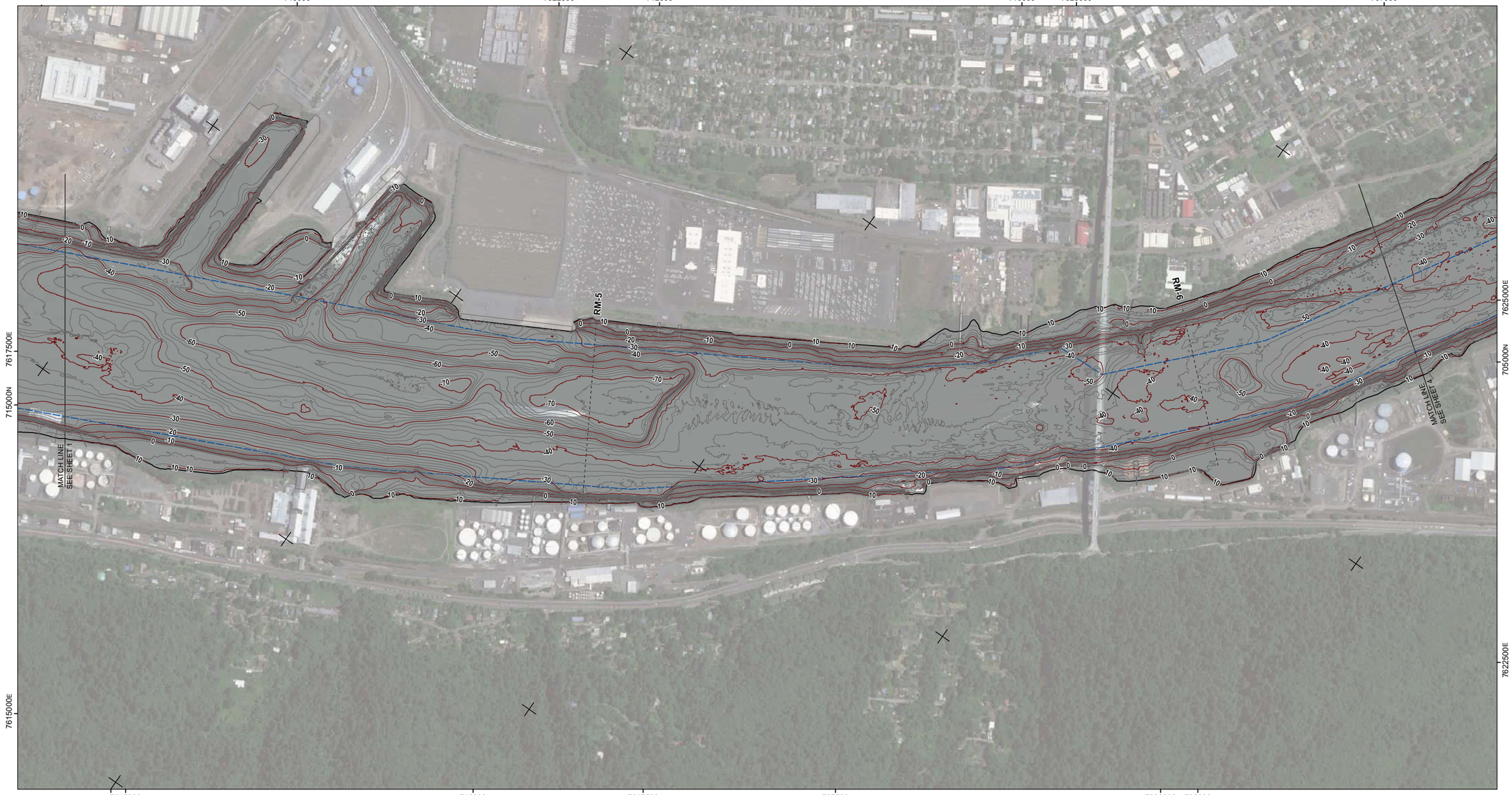
DATE: 7/17/2018
DESIGN: JTM
DRAWN: KKKT
CHECKED: JLD
REVISION NUMBER: 0

SCALE:

CONTRACT NUMBER:
AETR00000034

FILE:
Portland_Harbor_Bathymetry_B2

SHEET
B2
OF B6



PRIVILEGED AND CONFIDENTIAL/JOINT DEFENSE COMMUNICATION/ATTORNEY WORK PRODUCT

LEGEND

- RM-10 – – RIVER MILE
- DOCKS AND STRUCTURES
- NAVIGATION CHANNEL
- RIVER EDGE
- 2 FOOT CONTOUR INTERVAL
- 10 FOOT CONTOUR INTERVAL
- OREGON NORTH GRATICULE

N W E S

0 200 400 800 1,200
UNITS IN FEET

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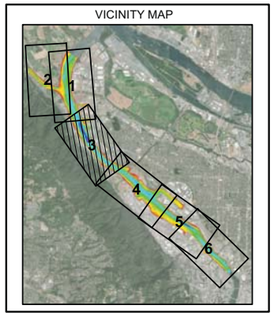
VICINITY MAP



AECOM

Geosyntec consultants

BATHYMETRIC CONTOURS
RIVER MILE 4.1 TO 6.5
2018 PORTLAND HARBOR BATHYMETRIC SURVEY
WILLAMETTE RIVER, OREGON

DAVID EVANS AND ASSOCIATES INC. MARINE SERVICES

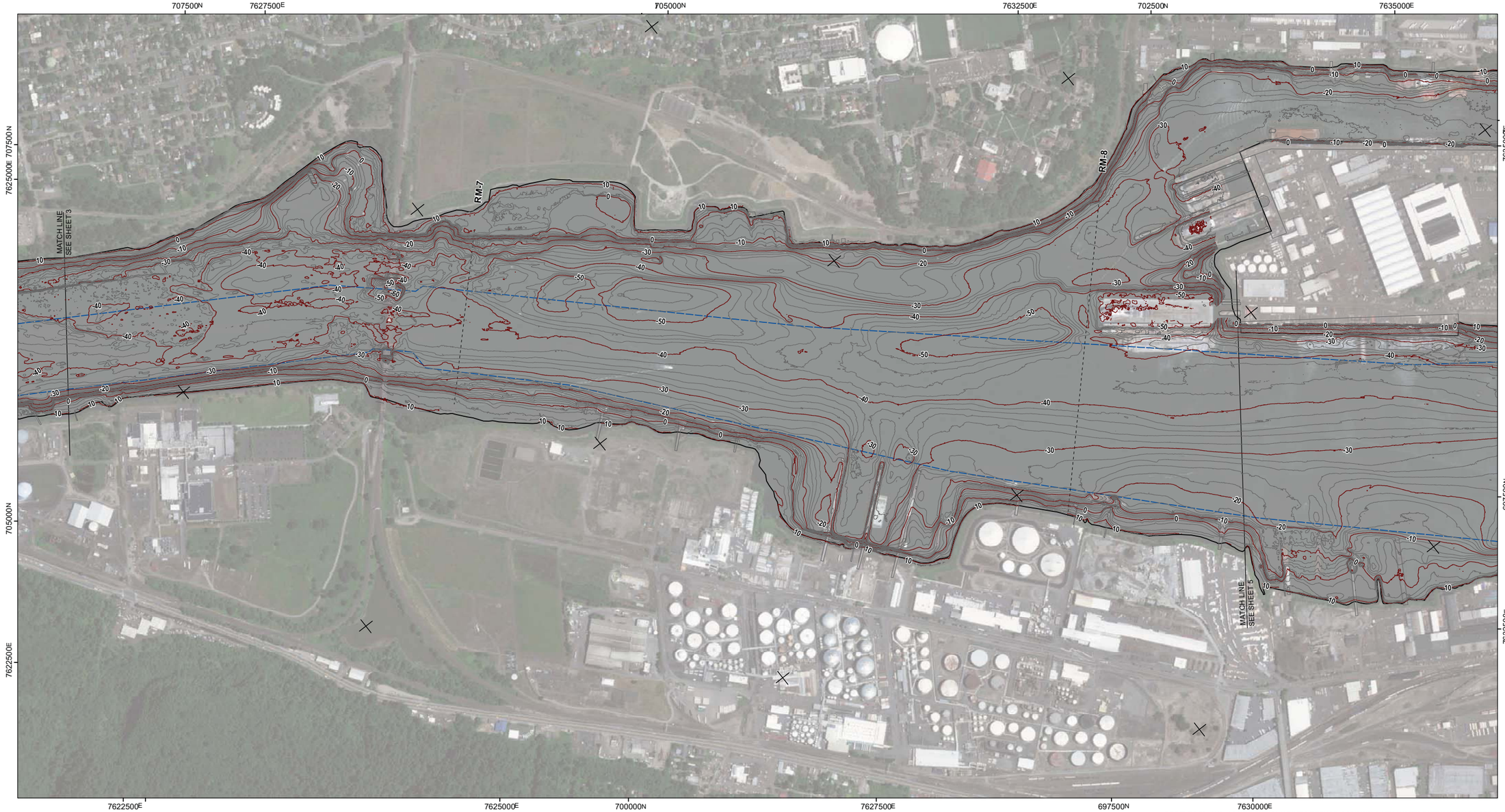
REGISTERED PROFESSIONAL LAND SURVEYOR
OREGON
JON L. DASLER
JANUARY 23, 1990
2429
RENEWS DATE: Dec. 31, 2019

DATE:	7/17/2018
DESIGN:	JTM
DRAWN:	KXKT
CHECKED:	JLD
REVISION NUMBER:	0
SCALE:	

CONTRACT NUMBER:
AETR00000034

FILE:
Portland_Harbor_Bathymetry_B3

SHEET
B3
OF B6



PRIVILEGED AND CONFIDENTIAL/JOINT DEFENSE COMMUNICATION/ATTORNEY WORK PRODUCT

LEGEND

- RM-10 – – RIVER MILE
- DOCKS AND STRUCTURES
- NAVIGATION CHANNEL
- RIVER EDGE
- 2 FOOT CONTOUR INTERVAL
- 10 FOOT CONTOUR INTERVAL
- OREGON NORTH GRATICULE

0 200 400 800 1,200
UNITS IN FEET

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GREGORY P. BAIRD
NSPS/THSOA CERTIFIED HYDROGRAPHER (201)

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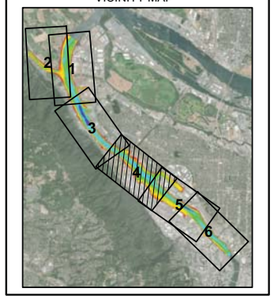
VICINITY MAP



BATHYMETRIC CONTOURS
RIVER MILE 6.3 TO 8.8
2018 PORTLAND HARBOR BATHYMETRIC SURVEY
WILLAMETTE RIVER, OREGON

AECOM
Geosyntec consultants
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OREGON
JON L. DASLER
JANUARY 23, 1990
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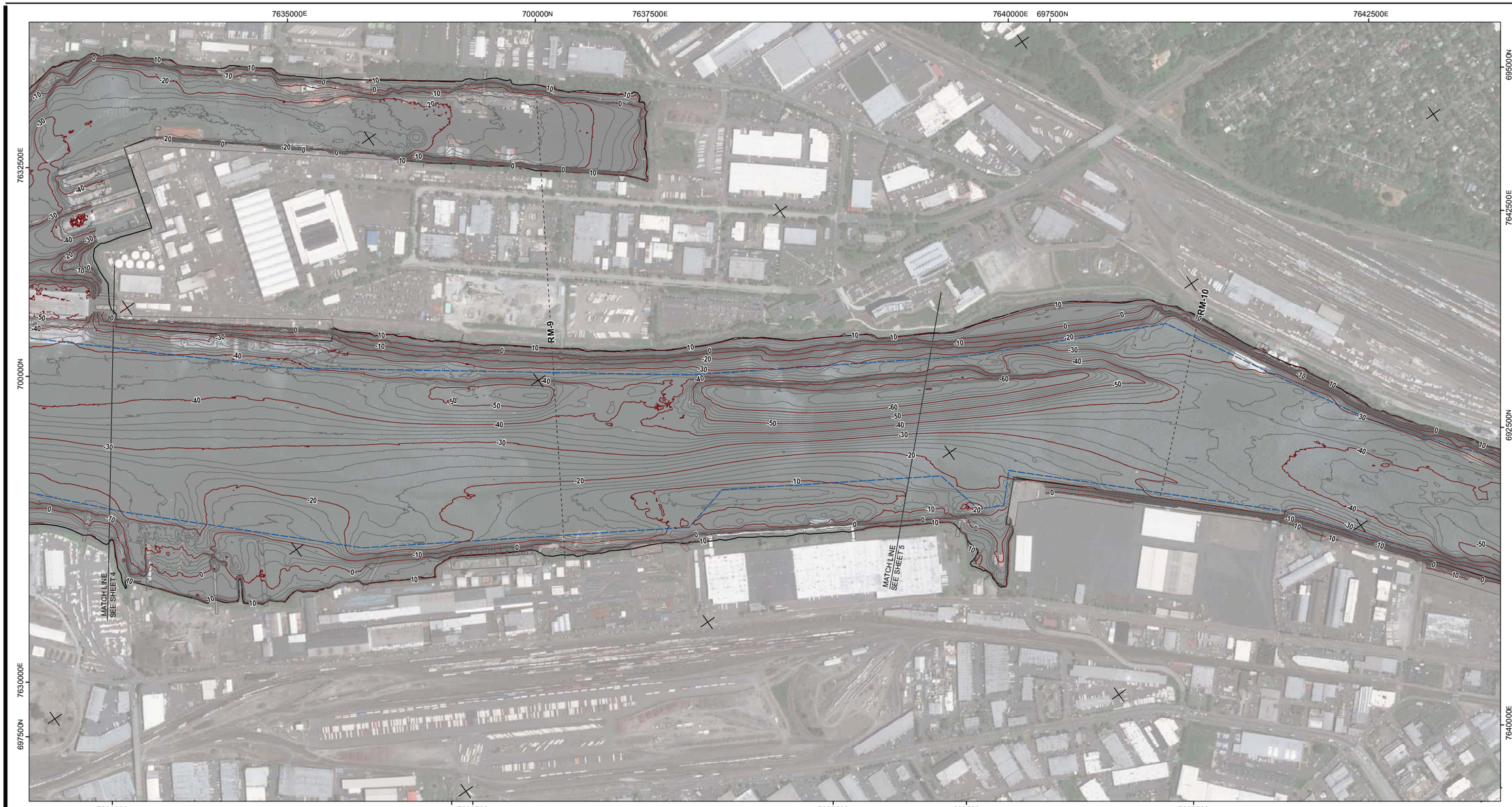
CHECKED: JLD
REVISION NUMBER: 0

SCALE:

CONTRACT NUMBER:
AETR00000034

FILE:
Portland_Harbor_Bathymetry_B4

SHEET
B4
OF B6



PRIVILEGED AND CONFIDENTIAL/JOINT DEFENSE COMMUNICATION/ATTORNEY WORK PRODUCT

LEGEND

- RM-10 – – RIVER MILE
- DOCKS AND STRUCTURES
- NAVIGATION CHANNEL
- RIVER EDGE
- 2 FOOT CONTOUR INTERVAL
- 10 FOOT CONTOUR INTERVAL
- OREGON NORTH GRATICULE

0 200 400 800 1,200
UNITS IN FEET

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GREGORY P. BAIRD
NSPS/THSOA CERTIFIED HYDROGRAPHER (201)

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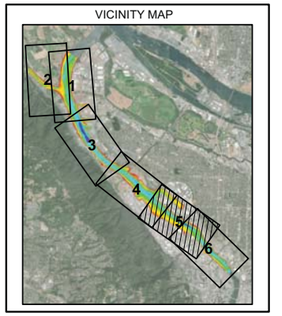
	-10.0'	-15.34'

VICINITY MAP



BATHYMETRIC CONTOURS
RIVER MILE 8.2 TO 10.5
2018 PORTLAND HARBOR BATHYMETRIC SURVEY
WILLAMETTE RIVER, OREGON

AECOM
Geosyntec consultants
DAVID EVANS AND ASSOCIATES INC. MARINE SERVICES

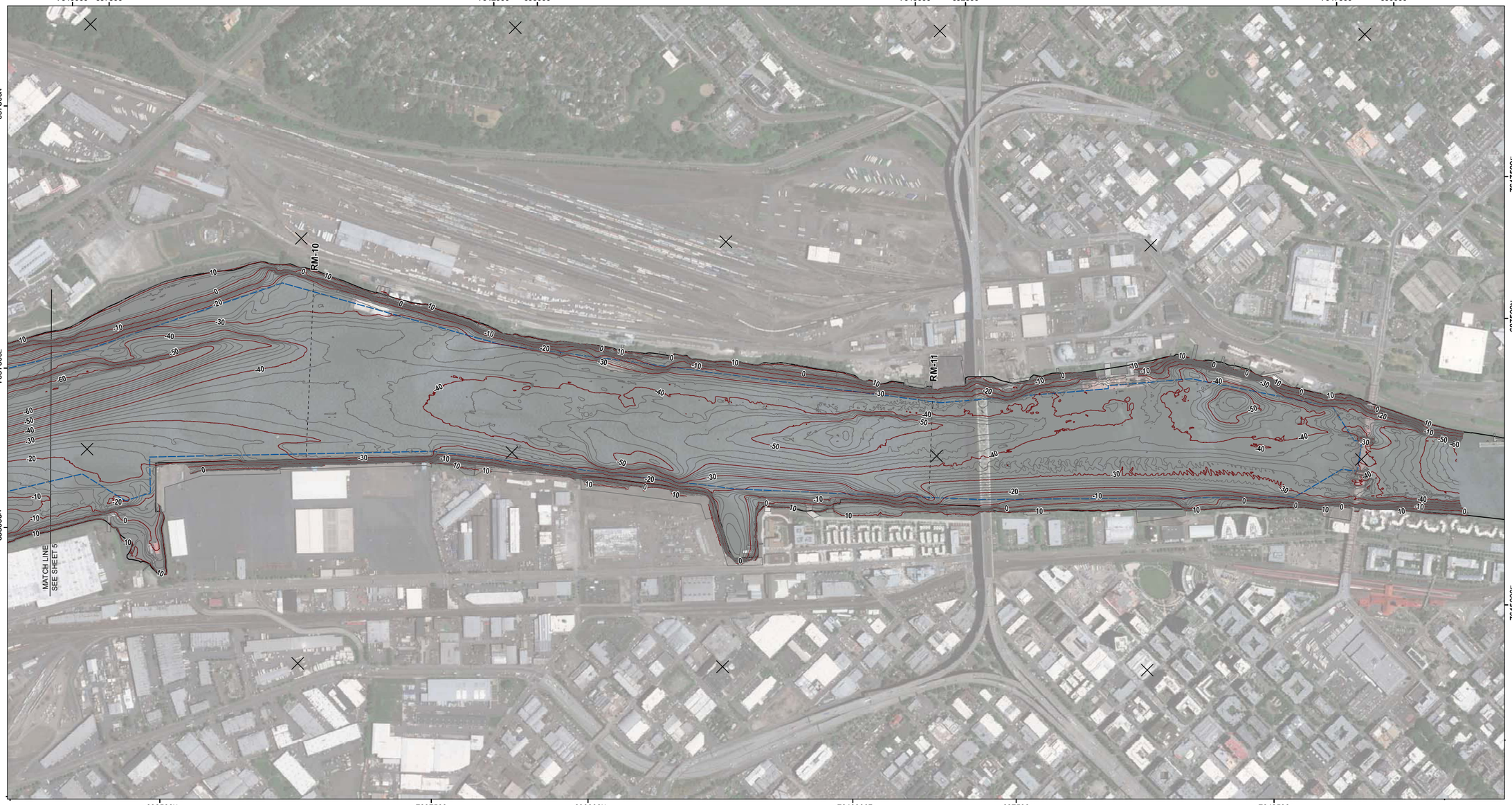
REGISTERED PROFESSIONAL LAND SURVEYOR
OREGON
JON L. DASLER
JANUARY 23, 1990
2420
RENEWS DATE: Dec. 31, 2019

DATE: 7/17/2018
DESIGN: JTM
DRAWN: KXKT
CHECKED: JLD
REVISION NUMBER: 0
SCALE:

CONTRACT NUMBER: AETR00000034

FILE: Portland_Harbor_Bathymetry_B5

SHEET
B5
OF B6



PRIVILEGED AND CONFIDENTIAL/JOINT DEFENSE COMMUNICATION/ATTORNEY WORK PRODUCT

LEGEND

- RM-10 – – RIVER MILE
- DOCKS AND STRUCTURES
- NAVIGATION CHANNEL
- RIVER EDGE
- 2 FOOT CONTOUR INTERVAL
- 10 FOOT CONTOUR INTERVAL
- OREGON NORTH GRATICULE

N W E S

0 200 400 800 1,200
UNITS IN FEET

THIS HYDROGRAPHIC SURVEY WAS COMPLETED UNDER THE DIRECTION OF A NATIONAL SOCIETY OF PROFESSIONAL SURVEYORS/THE HYDROGRAPHIC SOCIETY OF AMERICA, CERTIFIED HYDROGRAPHER

GREGORY P. BAIRD
NSPS/THSOA CERTIFIED HYDROGRAPHER (201)

NOTES:
1. This drawing presents the results of a bathymetric survey conducted by David Evans and Associates, Inc. (DEA).The survey was primarily conducted with a multibeam sonar with single beam survey data used in some areas to fill nearshore data gaps.

2. Dates of Survey: March 14, 16-18, 20; April 10-13; and June 14-15; 2018.

3. Horizontal Datum: North American Datum of 1983, 2011 realization, Epoch 2010.0 (NAD83), State Plane Coordinate System (SPCS), Oregon North Zone.

4. Units: International Feet

5. Vertical Datum: North American Vertical Datum of 1988, Geoid12b (NAVD88). See Vertical Datum Conversion Table for conversion to Columbia River Datum (CRD).

6. The 2-foot NAVD88 elevation contours were generated in ESRI ArcGIS software from a Triangular Irregular Network (TIN) based on a 1-meter grid of multibeam data, and single beam data. The TIN modeled across nearshore minor data gaps and integrated single beam data.

7. Horizonal positions were acquired with an Applanix POS/MV inertial positioning and motion reference system with integrated real-time kinematic(RTK) GNSS positioning for the multibeam survey and Trimble GNSS RTK positioning for the single beam survey.

8. Depths were acquired with dual Teledyne Reson T50-P multibeam sonars for the main survey area, Teledyne Reson 7101 for nearshore multibeam, and Teledyne ODOM CV100 single beam echosounder in areas not accessible by the multibeam survey vessels.

9. Depths were reduced to NAVD88 elevations using the GNSS ellipsoid height data and the National Geodetic Survey separation model Geoid12b.

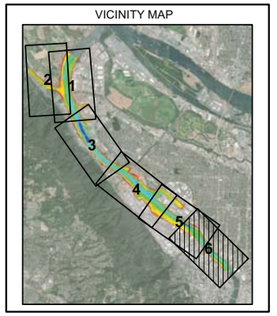
10. Aerial imagery from ArcGIS on-line database. Background line work from Geosyntec. Navigation channel provided by Portland District USACE.

11. This map is not intended for navigation.

VERTICAL DATUM CONVERSION TABLE

River Mile	NAVD88 Elevation	CRD Elevation
2	10.0'	4.92'
	0.0'	-5.03'
	-10.0'	-15.03'
4	10.0'	4.86'
	0.0'	-5.14'
	-10.0'	-15.14'
6	10.0'	4.8'
	0.0'	-5.2'
	-10.0'	-15.2'
8	10.0'	4.75'
	0.0'	-5.25'
	-10.0'	-15.25'
10	10.0'	4.71'
	0.0'	-5.29'
	-10.0'	-15.29'
12	10.0'	4.66'
	0.0'	-5.34'
	-10.0'	-15.34'

VICINITY MAP



AECOM

Geosyntec consultants

BATHYMETRIC CONTOURS
RIVER MILE 9.6 TO 11.8 2018 PORTLAND HARBOR BATHYMETRIC SURVEY
WILLAMETTE RIVER, OREGON

DAVID EVANS AND ASSOCIATES INC. MARINE SERVICES

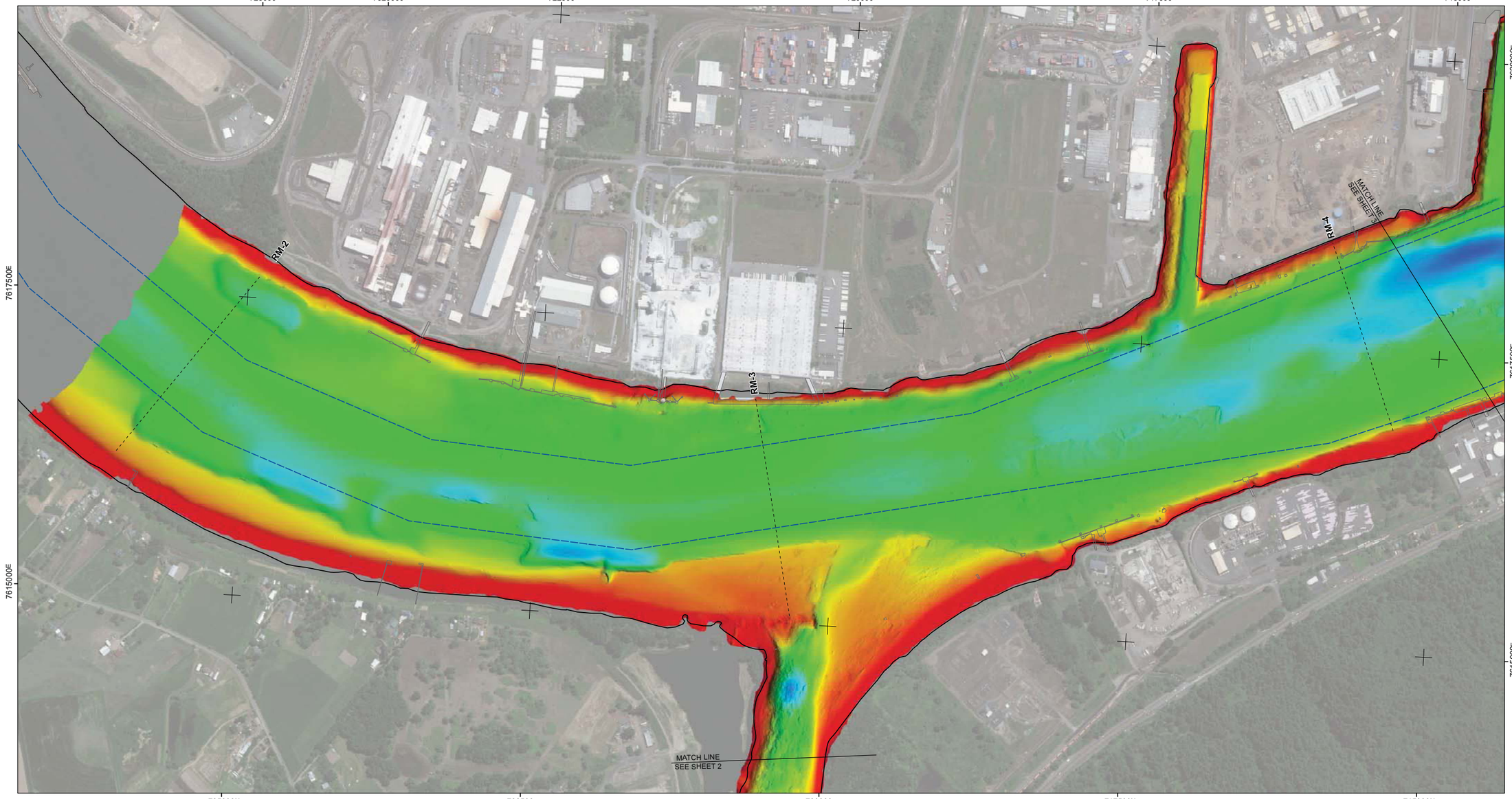
REGISTERED PROFESSIONAL LAND SURVEYOR
OREGON
JON L. DASLER
JANUARY 23, 1990
2420
RENEWS DATE: Dec. 31, 2019

DATE:	7/17/2018
DESIGN:	JTM
DRAWN:	KXKT
CHECKED:	JLD
REVISION NUMBER:	0
SCALE:	- - -

CONTRACT NUMBER:
AETR00000034

FILE:
Portland_Harbor_Bathymetry_B6

SHEET
B6
OF B6



PRIVILEGED AND CONFIDENTIAL/JOINT DEFENSE COMMUNICATION/ATTORNEY WORK PRODUCT

LEGEND

- RM-10 - - RIVER MILE
- DOCKS AND STRUCTURES
- NAVIGATION CHANNEL
- RIVER EDGE
- OREGON NORTH GRATICULE

0 200 400 800 1,200
UNITS IN FEET

ELEVATION IN FEET (NAVD88)

10 0 -10 -20 -30 -40 -50 -60 -70

HILLSHADE IMAGE ILLUMINATION BASED ON SUN AZIMUTH FROM 0° AT AN ELEVATION OF 55°.

THIS HYDROGRAPHIC SURVEY WAS COMPLETED UNDER THE DIRECTION OF A NATIONAL SOCIETY OF PROFESSIONAL SURVEYORS/THE HYDROGRAPHIC SOCIETY OF AMERICA, CERTIFIED HYDROGRAPHER

GREGORY P. BAIRD
NSPS/THSOA CERTIFIED HYDROGRAPHER (201)

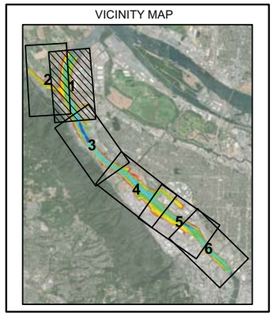
NOTES:

1. This drawing presents the results of a bathymetric survey conducted by David Evans and Associates, Inc. (DEA). The survey was primarily conducted with a multibeam sonar with single beam survey data used in some areas to fill nearshore data gaps.
2. Dates of Survey: March 14, 16-18, 20; April 10-13; and June 14-15; 2018.
3. Horizontal Datum: North American Datum of 1983, 2011 realization, Epoch 2010.0 (NAD83), State Plane Coordinate System (SPCS), Oregon North Zone.
4. Units: International Feet
5. Vertical Datum: North American Vertical Datum of 1988, Geoid12b (NAVD88). See Vertical Datum Conversion Table for conversion to Columbia River Datum (CRD).
6. The sun-illuminated image was generated in Caris HIPS software from a 1-meter grid generated in ESRI ArcGIS software from a Triangular Irregular Network (TIN) based on multibeam and single beam data. The TIN modeled across nearshore minor data gaps and integrated single beam data. Illumination angles and color scale are shown in the legend.
7. Horizonal positions were acquired with an Applanix POS/MV inertial positioning and motion reference system with integrated real-time kinematic(RTK) GNSS positioning for the multibeam survey and Trimble GNSS RTK positioning for the single beam survey.
8. Depths were acquired with dual Teledyne Reson T50-P multibeam sonars for the main survey area, Teledyne Reson 7101 for nearshore multibeam, and Teledyne ODOM CV100 single beam echosounder in areas not accessible by the multibeam survey vessels.
9. Depths were reduced to NAVD88 elevations using the GNSS ellipsoid height data and the National Geodetic Survey separation model Geoid12b.
10. Aerial imagery from ArcGIS on-line database. Background line work from Geosyntec. Navigation channel provided by Portland District USACE.

VERTICAL DATUM CONVERSION TABLE

River Mile	NAVD88 Elevation	CRD Elevation
2	10.0'	4.92'
	0.0'	-5.03'
	-10.0'	-15.03'
4	10.0'	4.86'
	0.0'	-5.14'
	-10.0'	-15.14'
6	10.0'	4.8'
	0.0'	-5.2'
	-10.0'	-15.2'
8	10.0'	4.75'
	0.0'	-5.25'
	-10.0'	-15.25'
10	10.0'	4.71'
	0.0'	-5.29'
	-10.0'	-15.29'
12	10.0'	4.66'
	0.0'	-5.34'
	-10.0'	-15.34'

VICINITY MAP



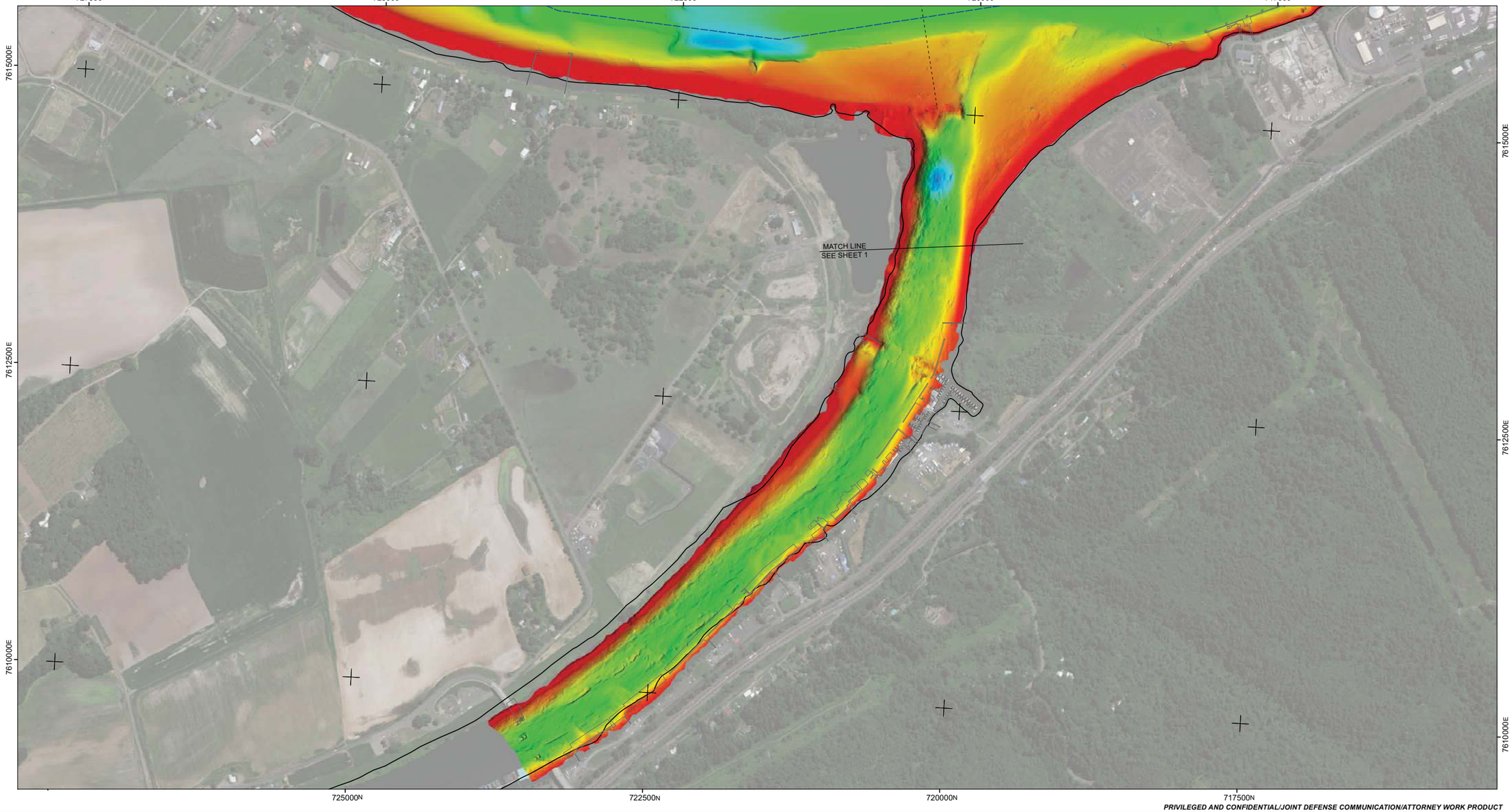
SUN-ILLUMINATED HILLSHADE IMAGE
RIVER MILE 1.9 TO 4.2
2018 PORTLAND HARBOR BATHYMETRIC SURVEY
WILLAMETTE RIVER, OREGON

AECOM
Geosyntec consultants
DAVID EVANS AND ASSOCIATES INC. MARINE SERVICES

REGISTERED PROFESSIONAL LAND SURVEYOR
OREGON
JON L. DASLER
JANUARY 23, 1990
2420
RENEWS DATE: Dec. 31, 2019

DATE: 7/19/2018
DESIGN: JTM
DRAWN: KXKT
CHECKED: JLD
REVISION NUMBER: 0
SCALE:
CONTRACT NUMBER: AETR00000034
FILE: Portland_Harbor_Hillshade_S1

SHEET
S1
OF S6



PRIVILEGED AND CONFIDENTIAL/JOINT DEFENSE COMMUNICATION/ATTORNEY WORK PRODUCT

LEGEND

- RM-10 - - RIVER MILE
- DOCKS AND STRUCTURES
- NAVIGATION CHANNEL
- RIVER EDGE
- OREGON NORTH GRATICULE

0 200 400 800 1,200
UNITS IN FEET

HILLSHADE IMAGE ILLUMINATION BASED ON SUN AZIMUTH FROM 0° AT AN ELEVATION OF 55°.

ELEVATION IN FEET (NAVD88)

10 0 -10 -20 -30 -40 -50 -60 -70

THIS HYDROGRAPHIC SURVEY WAS COMPLETED UNDER THE DIRECTION OF A NATIONAL SOCIETY OF PROFESSIONAL SURVEYORS/THE HYDROGRAPHIC SOCIETY OF AMERICA, CERTIFIED HYDROGRAPHER

GREGORY P. BAIRD
NSPS/THSOA CERTIFIED
HYDROGRAPHER (201)

NOTES:

1. This drawing presents the results of a bathymetric survey conducted by David Evans and Associates, Inc. (DEA). The survey was primarily conducted with a multibeam sonar with single beam survey data used in some areas to fill nearshore data gaps.

2. Dates of Survey: March 14, 16-18, 20; April 10-13; and June 14-15; 2018.

3. Horizontal Datum: North American Datum of 1983, 2011 realization, Epoch 2010.0 (NAD83), State Plane Coordinate System (SPCS), Oregon North Zone.

4. Units: International Feet

5. Vertical Datum: North American Vertical Datum of 1988, Geoid12b (NAVD88). See Vertical Datum Conversion Table for conversion to Columbia River Datum (CRD).

6. The sun-illuminated image was generated in Caris HIPS software from a 1-meter grid generated in ESRI ArcGIS software from a Triangular Irregular Network (TIN) based on multibeam and single beam data. The TIN modeled across nearshore minor data gaps and integrated single beam data. Illumination angles and color scale are shown in the legend.

7.Horizonal positions were acquired with an Applanix POS/MV inertial positioning and motion reference system with integrated real-time kinematic(RTK) GNSS positioning for the multibeam survey and Trimble GNSS RTK positioning for the single beam survey.

8. Depths were acquired with dual Teledyne Reson T50-P multibeam sonars for the main survey area, Teledyne Reson 7101 for nearshore multibeam, and Teledyne ODOM CV100 single beam echosounder in areas not accessible by the multibeam survey vessels.

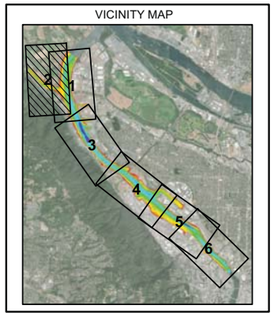
9. Depths were reduced to NAVD88 elevations using the GNSS ellipsoid height data and the National Geodetic Survey separation model Geoid12b.

10. Aerial imagery from ArcGIS on-line database. Background line work from Geosyntec. Navigation channel provided by Portland District USACE.

VERTICAL DATUM CONVERSION TABLE

River Mile	NAVD88 Elevation	CRD Elevation
2	10.0'	4.92'
	0.0'	-5.03'
	-10.0'	-15.03'
4	10.0'	4.86'
	0.0'	-5.14'
	-10.0'	-15.14'
6	10.0'	4.8'
	0.0'	-5.2'
	-10.0'	-15.2'
8	10.0'	4.75'
	0.0'	-5.25'
	-10.0'	-15.25'
10	10.0'	4.71'
	0.0'	-5.29'
	-10.0'	-15.29'
12	10.0'	4.66'
	0.0'	-5.34'
	-10.0'	-15.34'

VICINITY MAP



SUN-ILLUMINATED HILLSHADE IMAGE

MULTNOMAH CHANNEL 2018 PORTLAND HARBOR BATHYMETRIC SURVEY

WILLAMETTE RIVER, OREGON

AECOM

Geosyntec consultants

DAVID EVANS AND ASSOCIATES INC. MARINE SERVICES

REGISTERED PROFESSIONAL LAND SURVEYOR
OREGON
JON L. DASLER
JANUARY 23, 1990
2420
RENEWS DATE: Dec. 31, 2019

DATE:	7/19/2018
DESIGN:	JTM
DRAWN:	KXKT
CHECKED:	JLD
REVISION NUMBER:	0

SCALE:

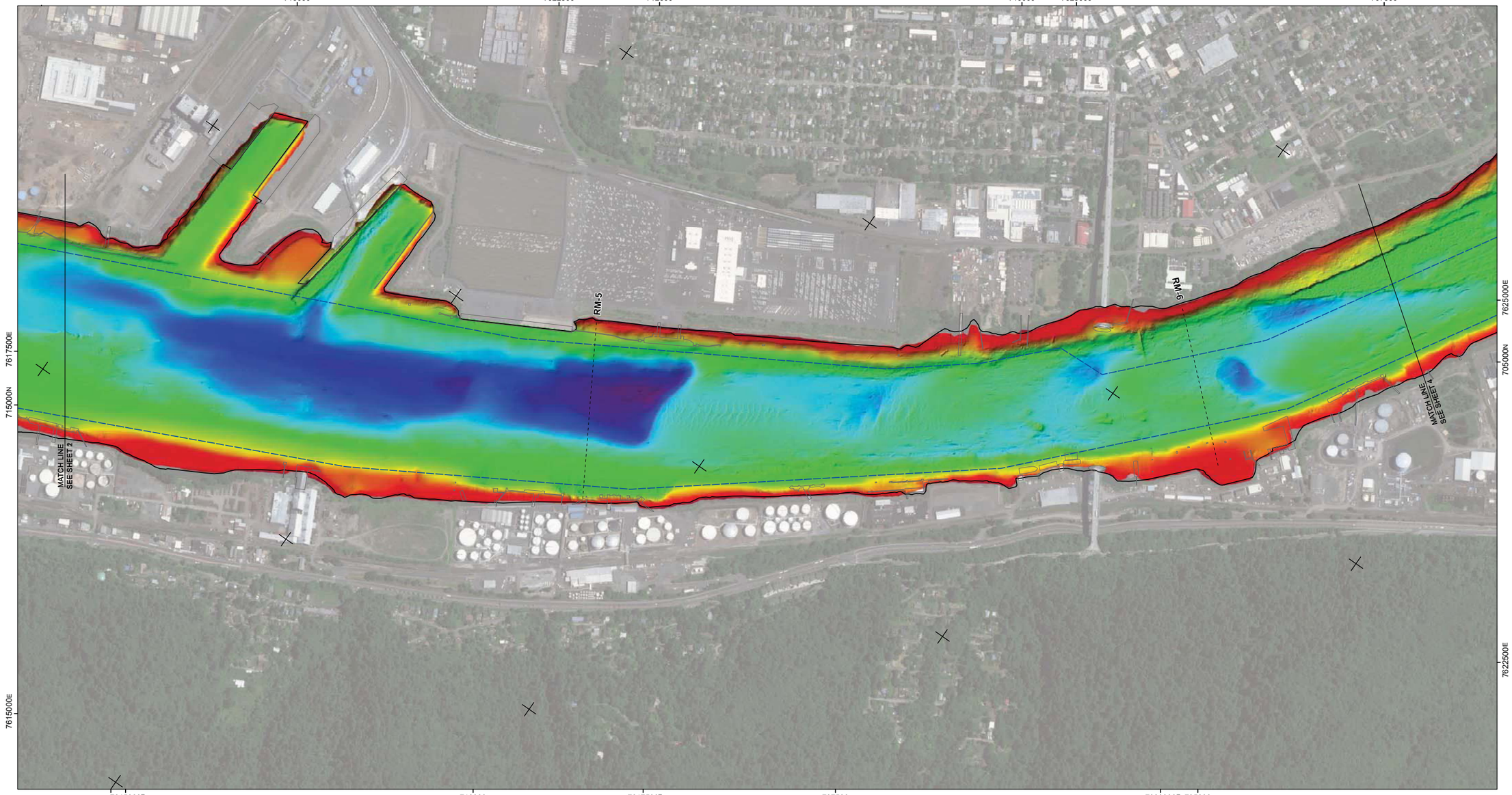
CONTRACT NUMBER: AETR00000034

FILE: Portland_Harbor_Hillshade_S2

SHEET

S2

OF S6



PRIVILEGED AND CONFIDENTIAL/JOINT DEFENSE COMMUNICATION/ATTORNEY WORK PRODUCT

LEGEND

- RM-10 - - RIVER MILE
- DOCKS AND STRUCTURES
- NAVIGATION CHANNEL
- RIVER EDGE
- OREGON NORTH GRATICULE

0 200 400 800 1,200
UNITS IN FEET

HILLSHADE IMAGE ILLUMINATION BASED ON SUN AZIMUTH FROM 0° AT AN ELEVATION OF 55°.

ELEVATION IN FEET (NAVD88)

10
0
-10
-20
-30
-40
-50
-60
-70

THIS HYDROGRAPHIC SURVEY WAS COMPLETED UNDER THE DIRECTION OF A NATIONAL SOCIETY OF PROFESSIONAL SURVEYORS/THE HYDROGRAPHIC SOCIETY OF AMERICA, CERTIFIED HYDROGRAPHER

GREGORY P. BAIRD
NSPS/THSOA CERTIFIED HYDROGRAPHER (201)

NOTES:

1. This drawing presents the results of a bathymetric survey conducted by David Evans and Associates, Inc. (DEA). The survey was primarily conducted with a multibeam sonar with single beam survey data used in some areas to fill nearshore data gaps.

2. Dates of Survey: March 14, 16-18, 20; April 10-13; and June 14-15; 2018.

3. Horizontal Datum: North American Datum of 1983, 2011 realization, Epoch 2010.0 (NAD83), State Plane Coordinate System (SPCS), Oregon North Zone.

4. Units: International Feet

5. Vertical Datum: North American Vertical Datum of 1988, Geoid12b (NAVD88). See Vertical Datum Conversion Table for conversion to Columbia River Datum (CRD).

6. The sun-illuminated image was generated in Caris HIPS software from a 1-meter grid generated in ESRI ArcGIS software from a Triangular Irregular Network (TIN) based on multibeam and single beam data. The TIN modeled across nearshore minor data gaps and integrated single beam data. Illumination angles and color scale are shown in the legend.

7.Horizonal positions were acquired with an Applanix POS/MV inertial positioning and motion reference system with integrated real-time kinematic(RTK) GNSS positioning for the multibeam survey and Trimble GNSS RTK positioning for the single beam survey.

8. Depths were acquired with dual Teledyne Reson T50-P multibeam sonars for the main survey area, Teledyne Reson 7101 for nearshore multibeam, and Teledyne ODOM CV100 single beam echosounder in areas not accessible by the multibeam survey vessels.

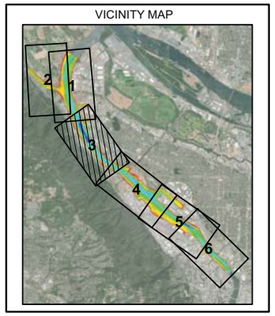
9. Depths were reduced to NAVD88 elevations using the GNSS ellipsoid height data and the National Geodetic Survey separation model Geoid12b.

10. Aerial imagery from ArcGIS on-line database. Background line work from Geosyntec. Navigation channel provided by Portland District USACE.

VERTICAL DATUM CONVERSION TABLE

River Mile	NAVD88 Elevation	CRD Elevation
2	10.0'	4.92'
	0.0'	-5.03'
	-10.0'	-15.03'
4	10.0'	4.86'
	0.0'	-5.14'
	-10.0'	-15.14'
6	10.0'	4.8'
	0.0'	-5.2'
	-10.0'	-15.2'
8	10.0'	4.75'
	0.0'	-5.25'
	-10.0'	-15.25'
10	10.0'	4.71'
	0.0'	-5.29'
	-10.0'	-15.29'
12	10.0'	4.66'
	0.0'	-5.34'
	-10.0'	-15.34'

VICINITY MAP



AECOM

Geosyntec consultants

SUN-ILLUMINATED HILLSHADE IMAGE
RIVER MILE 4.1 TO 6.5
2018 PORTLAND HARBOR BATHYMETRIC SURVEY

WILLAMETTE RIVER, OREGON

DAVID EVANS AND ASSOCIATES INC. MARINE SERVICES

REGISTERED PROFESSIONAL LAND SURVEYOR
OREGON
JON L. DASLER
JANUARY 23, 1990
2420
RENEWS DATE: Dec. 31, 2019

DATE:	7/19/2018
DESIGN:	JTM
DRAWN:	KXKT
CHECKED:	JLD
REVISION NUMBER:	0
SCALE:	

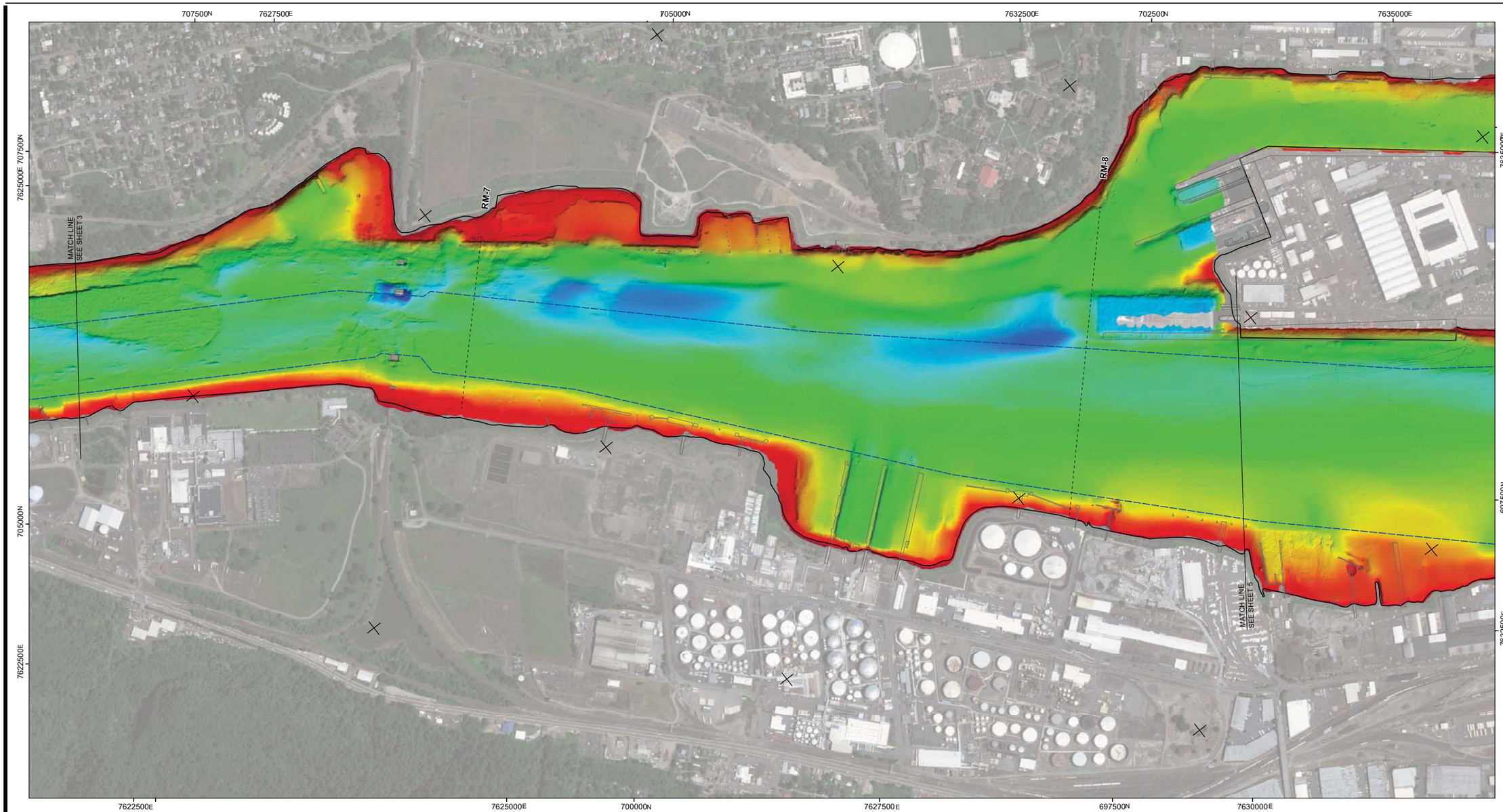
CONTRACT NUMBER: AETR00000034

FILE: Portland_Harbor_Hillshade_S3

SHEET

S3

OF S6



PRIVILEGED AND CONFIDENTIAL/JOINT DEFENSE COMMUNICATION/ATTORNEY WORK PRODUCT

LEGEND

- RM-10 - - RIVER MILE
- DOCKS AND STRUCTURES
- NAVIGATION CHANNEL
- RIVER EDGE
- OREGON NORTH GRATICULE

0 200 400 800 1,200
UNITS IN FEET

HILLSHADE IMAGE ILLUMINATION BASED ON
SUN AZIMUTH FROM 0° AT AN ELEVATION OF 55°.

ELEVATION IN FEET
(NAVD88)

10
0
-10
-20
-30
-40
-50
-60
-70

THIS HYDROGRAPHIC SURVEY WAS COMPLETED UNDER THE DIRECTION OF A NATIONAL SOCIETY OF PROFESSIONAL SURVEYORS/THE HYDROGRAPHIC SOCIETY OF AMERICA, CERTIFIED HYDROGRAPHER

GREGORY P. BAIRD
NSPS/THSOA CERTIFIED
HYDROGRAPHER (201)

NOTES:

1. This drawing presents the results of a bathymetric survey conducted by David Evans and Associates, Inc. (DEA). The survey was primarily conducted with a multibeam sonar with single beam survey data used in some areas to fill nearshore data gaps.

2. Dates of Survey: March 14, 16-18, 20; April 10-13; and June 14-15; 2018.

3. Horizontal Datum: North American Datum of 1983, 2011 realization, Epoch 2010.0 (NAD83), State Plane Coordinate System (SPCS), Oregon North Zone.

4. Units: International Feet

5. Vertical Datum: North American Vertical Datum of 1988, Geoid12b (NAVD88). See Vertical Datum Conversion Table for conversion to Columbia River Datum (CRD).

6. The sun-illuminated image was generated in Caris HIPS software from a 1-meter grid generated in ESRI ArcGIS software from a Triangular Irregular Network (TIN) based on multibeam and single beam data. The TIN modeled across nearshore minor data gaps and integrated single beam data. Illumination angles and color scale are shown in the legend.

7.Horizonal positions were acquired with an Applanix POS/MV inertial positioning and motion reference system with integrated real-time kinematic(RTK) GNSS positioning for the multibeam survey and Trimble GNSS RTK positioning for the single beam survey.

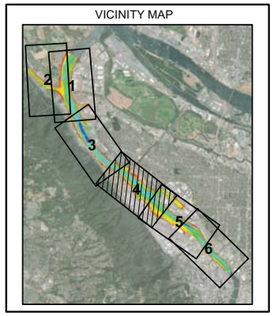
8. Depths were acquired with dual Teledyne Reson T50-P multibeam sonars for the main survey area, Teledyne Reson 7101 for nearshore multibeam, and Teledyne ODOM CV100 single beam echosounder in areas not accessible by the multibeam survey vessels.

9. Depths were reduced to NAVD88 elevations using the GNSS ellipsoid height data and the National Geodetic Survey separation model Geoid12b.

10. Aerial imagery from ArcGIS on-line database. Background line work from Geosyntec. Navigation channel provided by Portland District USACE.

VERTICAL DATUM CONVERSION TABLE		
River Mile	NAVD88 Elevation	CRD Elevation
2	10.0'	4.92'
	0.0'	-5.03'
	-10.0'	-15.03'
4	10.0'	4.86'
	0.0'	-5.14'
	-10.0'	-15.14'
6	10.0'	4.8'
	0.0'	-5.2'
	-10.0'	-15.2'
8	10.0'	4.75'
	0.0'	-5.25'
	-10.0'	-15.25'
10	10.0'	4.71'
	0.0'	-5.29'
	-10.0'	-15.29'
12	10.0'	4.66'
	0.0'	-5.34'
	-10.0'	-15.34'

VICINITY MAP



AECOM
Geosyntec consultants

SUN-ILLUMINATED HILLSHADE IMAGE
RIVER MILE 6.3 TO 8.8
2018 PORTLAND HARBOR BATHYMETRIC SURVEY
WILLAMETTE RIVER, OREGON

DAVID EVANS AND ASSOCIATES INC. MARINE SERVICES

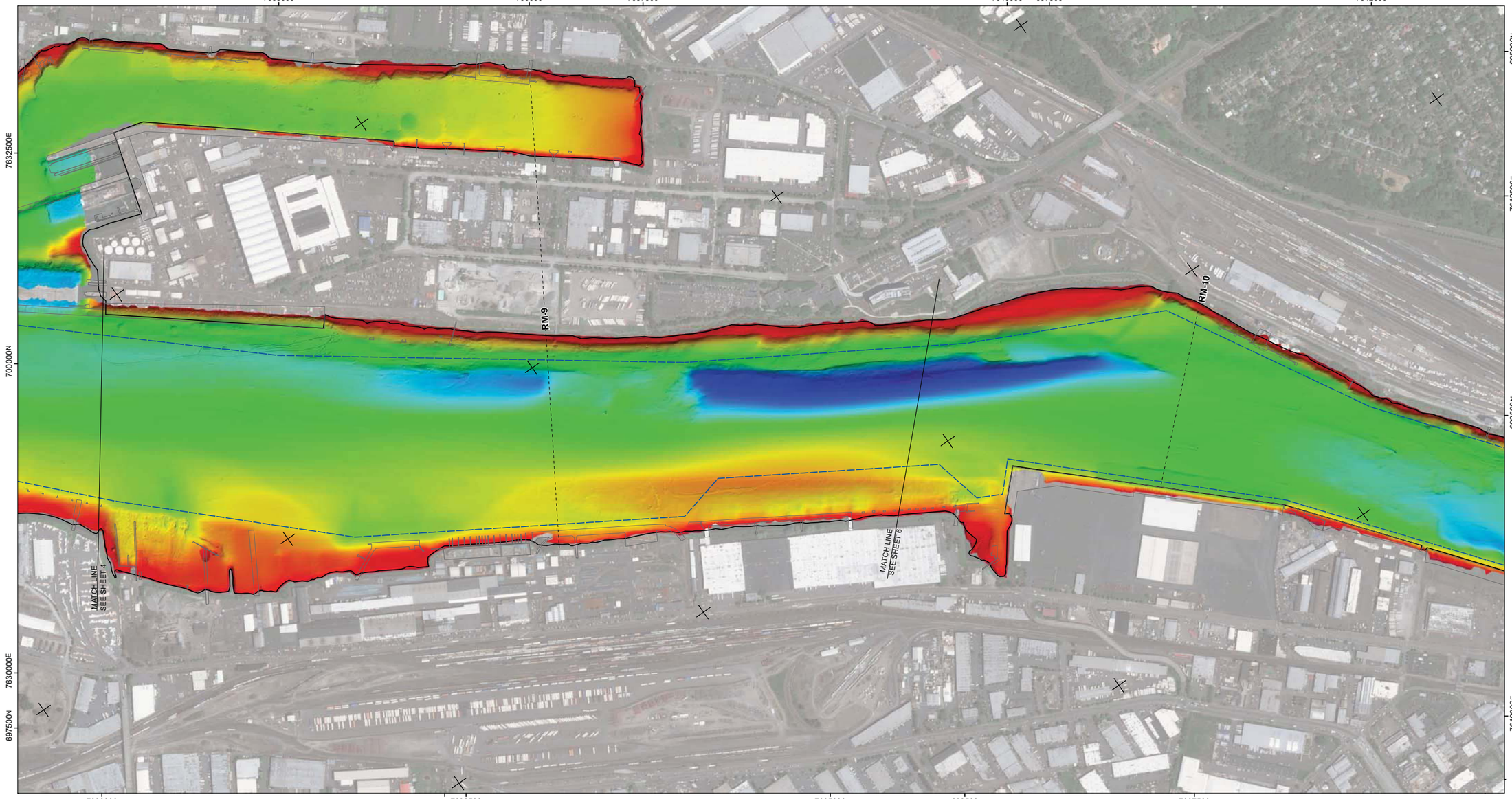
REGISTERED PROFESSIONAL LAND SURVEYOR
OREGON
JON L. DASLER
JANUARY 23, 1990
2420
RENEWS DATE: Dec. 31, 2019

DATE:	7/19/2018
DESIGN:	JTM
DRAWN:	KXKT
CHECKED:	JLD
REVISION NUMBER:	0
SCALE:	

CONTRACT NUMBER:
AETR00000034

FILE:
Portland_Harbor_Hillshade_S4

SHEET
S4
OF S6



PRIVILEGED AND CONFIDENTIAL/JOINT DEFENSE COMMUNICATION/ATTORNEY WORK PRODUCT

LEGEND

- RM-10 - - RIVER MILE
- DOCKS AND STRUCTURES
- NAVIGATION CHANNEL
- RIVER EDGE
- OREGON NORTH GRATICULE

0 200 400 800 1,200
UNITS IN FEET

HILLSHADE IMAGE ILLUMINATION BASED ON SUN AZIMUTH FROM 0° AT AN ELEVATION OF 55°.

ELEVATION IN FEET (NAVD88)

10 0 -10 -20 -30 -40 -50 -60 -70

THIS HYDROGRAPHIC SURVEY WAS COMPLETED UNDER THE DIRECTION OF A NATIONAL SOCIETY OF PROFESSIONAL SURVEYORS/THE HYDROGRAPHIC SOCIETY OF AMERICA, CERTIFIED HYDROGRAPHER

GREGORY P. BAIRD
NSPS/THSOA CERTIFIED HYDROGRAPHER (201)

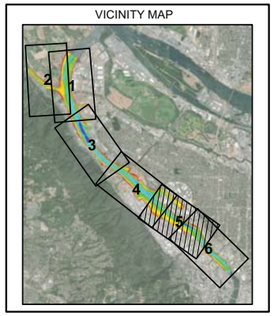
NOTES:

1. This drawing presents the results of a bathymetric survey conducted by David Evans and Associates, Inc. (DEA). The survey was primarily conducted with a multibeam sonar with single beam survey data used in some areas to fill nearshore data gaps.
2. Dates of Survey: March 14, 16-18, 20; April 10-13; and June 14-15; 2018.
3. Horizontal Datum: North American Datum of 1983, 2011 realization, Epoch 2010.0 (NAD83), State Plane Coordinate System (SPCS), Oregon North Zone.
4. Units: International Feet
5. Vertical Datum: North American Vertical Datum of 1988, Geoid12b (NAVD88). See Vertical Datum Conversion Table for conversion to Columbia River Datum (CRD).
6. The sun-illuminated image was generated in Caris HIPS software from a 1-meter grid generated in ESRI ArcGIS software from a Triangular Irregular Network (TIN) based on multibeam and single beam data. The TIN modeled across nearshore minor data gaps and integrated single beam data. Illumination angles and color scale are shown in the legend.
7. Horizonal positions were acquired with an Applanix POS/MV inertial positioning and motion reference system with integrated real-time kinematic(RTK) GNSS positioning for the multibeam survey and Trimble GNSS RTK positioning for the single beam survey.
8. Depths were acquired with dual Teledyne Reson T50-P multibeam sonars for the main survey area, Teledyne Reson 7101 for nearshore multibeam, and Teledyne ODOM CV100 single beam echosounder in areas not accessible by the multibeam survey vessels.
9. Depths were reduced to NAVD88 elevations using the GNSS ellipsoid height data and the National Geodetic Survey separation model Geoid12b.
10. Aerial imagery from ArcGIS on-line database. Background line work from Geosyntec. Navigation channel provided by Portland District USACE.

VERTICAL DATUM CONVERSION TABLE

River Mile	NAVD88 Elevation	CRD Elevation
2	10.0'	4.92'
	0.0'	-5.03'
	-10.0'	-15.03'
4	10.0'	4.86'
	0.0'	-5.14'
	-10.0'	-15.14'
6	10.0'	4.8'
	0.0'	-5.2'
	-10.0'	-15.2'
8	10.0'	4.75'
	0.0'	-5.25'
	-10.0'	-15.25'
10	10.0'	4.71'
	0.0'	-5.29'
	-10.0'	-15.29'
12	10.0'	4.66'
	0.0'	-5.34'
	-10.0'	-15.34'

VICINITY MAP



SUN-ILLUMINATED HILLSHADE IMAGE
RIVER MILE 8.2 TO 10.5
2018 PORTLAND HARBOR BATHYMETRIC SURVEY
WILLAMETTE RIVER, OREGON

AECOM
Geosyntec consultants
DAVID EVANS AND ASSOCIATES INC. MARINE SERVICES

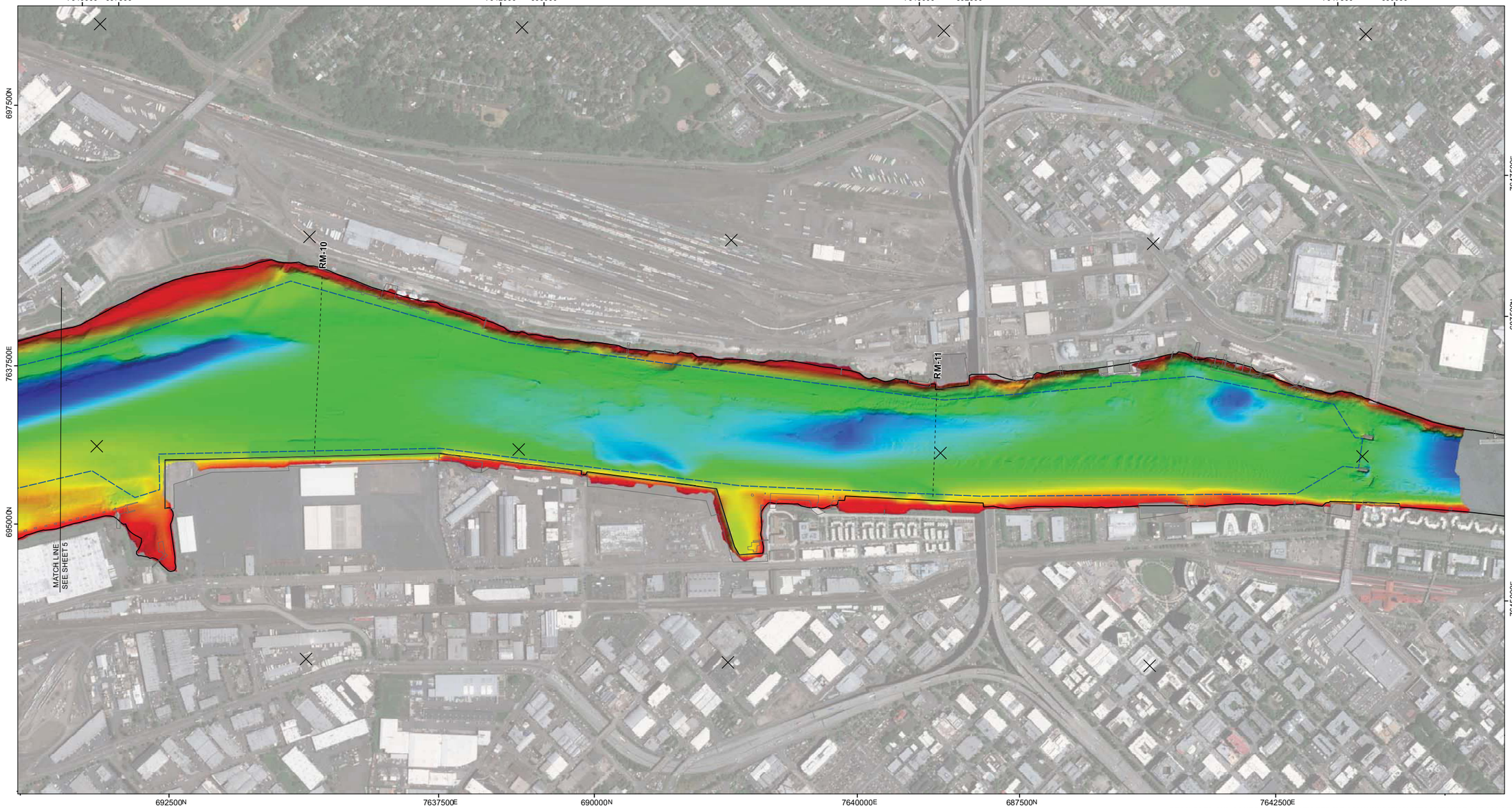
REGISTERED PROFESSIONAL LAND SURVEYOR
OREGON
JON L. DASLER
JANUARY 23, 1990
2420
RENEWS DATE: Dec. 31, 2019

DATE:	7/19/2018
DESIGN:	JTM
DRAWN:	KXKT
CHECKED:	JLD
REVISION NUMBER:	0
SCALE:	

CONTRACT NUMBER: AETR00000034

FILE: Portland_Harbor_Hillshade_S5

SHEET
S5
OF S6



PRIVILEGED AND CONFIDENTIAL/JOINT DEFENSE COMMUNICATION/ATTORNEY WORK PRODUCT

LEGEND

- RM-10 - - RIVER MILE
- DOCKS AND STRUCTURES
- NAVIGATION CHANNEL
- RIVER EDGE
- OREGON NORTH GRATICULE

0 200 400 800 1,200
UNITS IN FEET

HILLSHADE IMAGE ILLUMINATION BASED ON SUN AZIMUTH FROM 0° AT AN ELEVATION OF 55°.

ELEVATION IN FEET (NAVD88)

10 0 -10 -20 -30 -40 -50 -60 -70

THIS HYDROGRAPHIC SURVEY WAS COMPLETED UNDER THE DIRECTION OF A NATIONAL SOCIETY OF PROFESSIONAL SURVEYORS/THE HYDROGRAPHIC SOCIETY OF AMERICA, CERTIFIED HYDROGRAPHER

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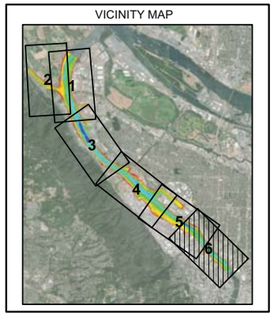

SUN-ILLUMINATED HILLSHADE IMAGE
RIVER MILE 9.6 TO 11.8
2018 PORTLAND HARBOR BATHYMETRIC SURVEY
WILLAMETTE RIVER, OREGON

AECOM
Geosyntec consultants

DAVID EVANS AND ASSOCIATES INC. MARINE SERVICES

REGISTERED PROFESSIONAL LAND SURVEYOR
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FILE: Portland_Harbor_Hillshade_S6

SHEET
S6
OF S6