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**TO: Mr. Brian Abel, PE**

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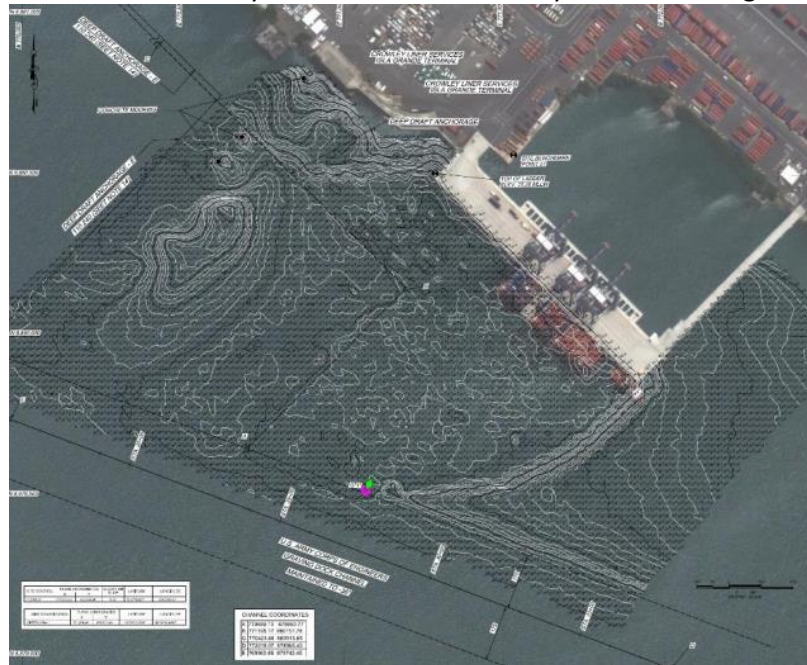
**PROJECT:** Project Conditions Hydrographic (Bathymetric) Survey for Crowley Terminal at San Juan Bay, Municipality of San Juan, Puerto Rico

**PROJECT: JEB 5216**

**DATE:** 11/22/2024

## I. Introduction

Javier E. Bidot & Associates, PSC, (JEBA) has been retained by Crowley to conduct a hydrographic survey by multibeam for the Crowley Terminal at San Juan Bay as shown on figure 1, below.



**Figure 1. Hydrographic Survey Limits and Extension.**

The present document constitutes the field survey report which intends to elaborate on the results of the hydrographic survey efforts pursuant to the technical requirements of this task order.

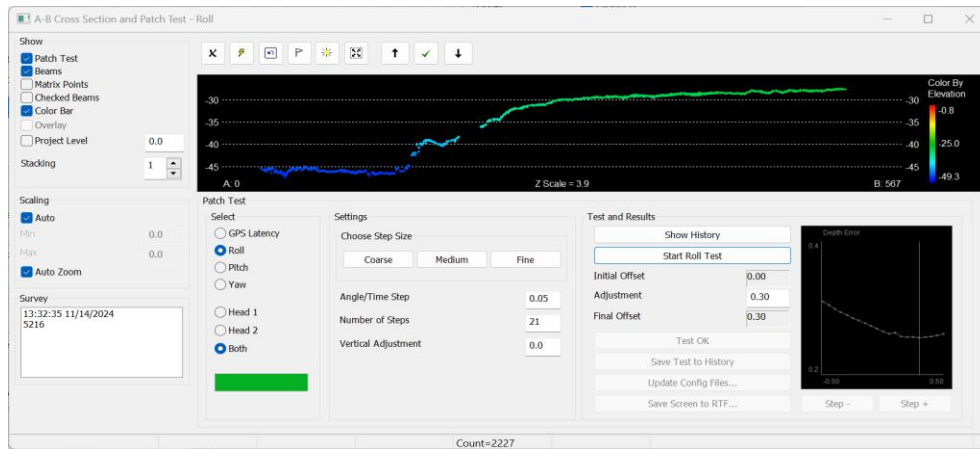
## I. Scopes of Services

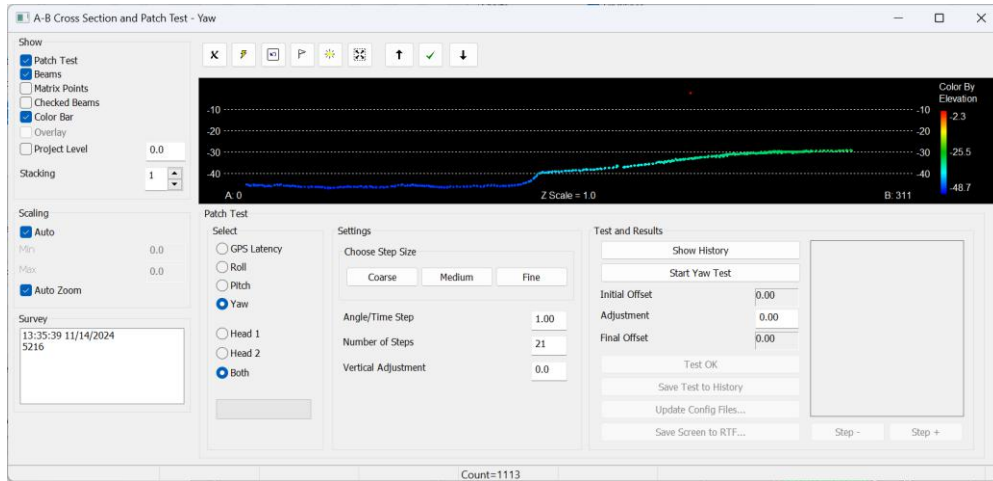
RFP calls for the hydrographic survey (bathymetric) survey of Crowley Terminal at San Juan Bay. Proposed survey limits were provided by Crowley prior mobilization. Hydrographic data was captured by multibeam echosounder parallel to the existing bulkhead. An XYZ file, including final elevations sorted at 10 feet grid is herein included on the present submittal.

## II. Field Survey

Field data collection was conducted on November 14th, 2024, and was classified as “Condition Surveys”. A Patch Test was executed as our Quality Control (QC) area located near Crowley Terminal. Calibration results and values are shown on figures 1 and 2, below. The purpose of the Patch Test is to ensure the accuracy of Sonar and GPS systems by reducing systematic errors created by the positioning and mounting angle of the different sensors. Real-time water levels were monitored using RTK GPS and recorded throughout the survey, with data being logged in the HYPACK hydrographic survey software.

***Figure 2: Roll Values of Patch Test Performed***





**Figure 3: Yaw Values of Patch Test Performed**

The survey vessel utilized was the "Surveyor 5," equipped with a PING® 3DSS-iDX-Pro Sonar (see Figure 4). For real-time corrections in vessel position, heave, pitch, and roll, a SBG Equinox motion sensor (see figure 5) was employed. Sound velocity profiles were logged and recorded using a AML-3 Oceanographic Sound Velocity Profiler, all managed through Hypack, Inc. HYPACK hydrographic surveying software played a dual role in both collecting and processing the Multibeam data. Acquired data underwent scrutiny and comparison against a dataset collected by the Jacksonville District U.S. Army Corps of Engineers on July 2nd, 2024, titled "usace\_SJ\_01\_SJH\_20240609\_CS\_2024\_170\_01\_HF " available on Ehydro ([www.arcgis.com](http://www.arcgis.com)). Tide readings, date and time for sounding lines conducted are fully documented on the field notes here in included on the present submittal.

### SONAR SPECIFICATIONS

Operating Frequency	450 kHz
Horizontal Beamwidth (2 way)	0.4°
Vertical Beamwidth (selectable)	15° - 125°
Mech. Transducer Tilt (fixed)	20°
Electronic Transmit Tilt	-45° to 45°
Max. Ping Rep. Rate	~30 Hz



**Figure 4: DSP PING Specifications**



### III. Data Processing and Mapping

The hydrographic survey was referred to Mean Lower Low Datum (MLLW) datum. Targets designation and positions were determined by interpretation of sonar imagery. An XYZ file, including final elevations sorted at a 10 feet grid is herein included on the present submittal. A Digital Terrain Model at 1' contour interval was processed on Civil3D and is herein included on the present deliverables.

### IV. Findings

Figures correspond to designated side scan target images. Each one depicts their respective location and coverage area for each target. All designated targets were classified as: possible rocks, possible shipwreck, possible tires and unknown object.

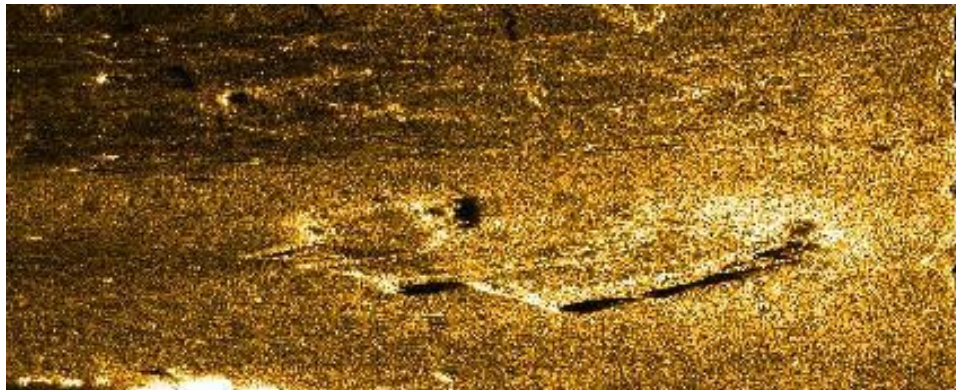
Anomalies and acoustic shadows may indicate submerged obstructions. Diving inspection is recommended for all designated targets. Please see attached hydrographic drawing for depth and target locations. Raw imagery and associated sidescan files and this document are hereby made part of each other by reference and not valid if separated from each other.



**Figure 5: SBG Equinox (IMU) Technical Specifications**

Name	Date	11/14/2024
<b>Target 1</b>	Time	08:18:11
Survey File	Event	0
<b>0006_0812</b>	X	770578.8
Capture File	Y	880639.0
<b>Target 1.JPG</b>	WGS84 Latitude	18 27 4.3569 N
	WGS84 Longitude	066 06 11.5166 W
	Heading	304.0
	Fish Altitude	11.98
	Range to Target	76.1
	Height Above Bottom	0.0
	Length	77.4
	Width	83.8

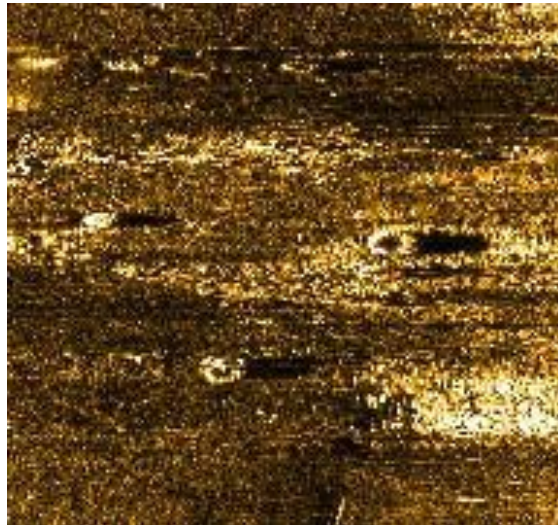
Notes	Unknown Object
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Name	Date	11/14/2024
<b>Target 2</b>	Time	<b>08:17:51</b>
Survey File	Event	<b>0</b>
<b>0006_0812</b>	X	<b>770797.8</b>
Capture File	Y	<b>880692.8</b>
<b>Target 2.JPG</b>	WGS84 Latitude	<b>18 27 4.8863 N</b>
	WGS84 Longitude	<b>066 06 9.2406 W</b>
	Heading	<b>314.0</b>
	Fish Altitude	<b>11.34</b>
	Range to Target	<b>112.2</b>
	Height Above Bottom	<b>0.0</b>
	Length	<b>0.0</b>
	Width	<b>0.0</b>

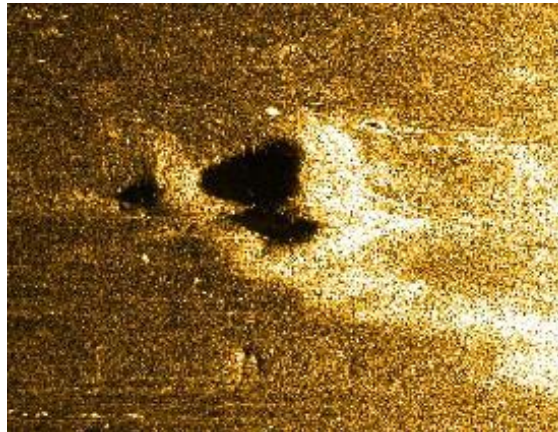
Notes	<b>Possible Tires</b>
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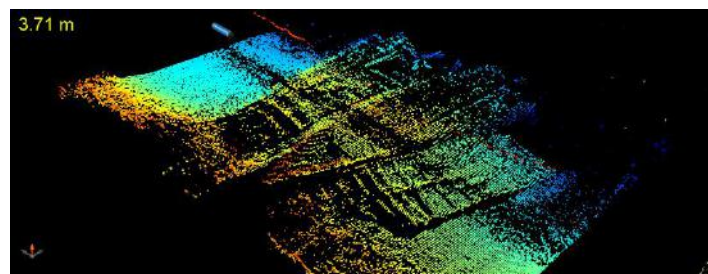
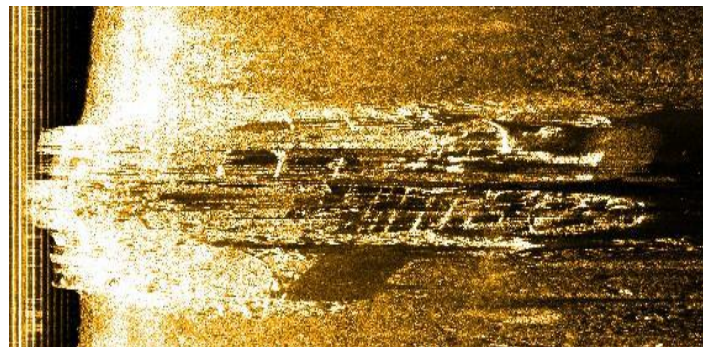
Name	Date	11/14/2024
<b>Target 3</b>	Time	<b>09:15:41</b>
Survey File	Event	<b>0</b>
<b>0012_0911</b>	X	<b>771158.4</b>
Capture File	Y	<b>879529.5</b>
<b>Target 3.JPG</b>	WGS84 Latitude	<b>18 26 53.3475 N</b>
	WGS84 Longitude	<b>066 06 5.5167 W</b>
	Heading	<b>319.7</b>
	Fish Altitude	<b>12.77</b>
	Range to Target	<b>115.8</b>
	Height Above Bottom	<b>0.0</b>
	Length	<b>0.0</b>
	Width	<b>0.0</b>

Notes	<b>Possible G"1" Anchor</b>
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Name	Date	11/14/2024
<b>Target 4</b>	Time	<b>07:49:23</b>
Survey File	Event	<b>0</b>
<b>0002_0749</b>	X	<b>770483.1</b>
Capture File	Y	<b>881083.8</b>
<b>Target 4.JPG</b>	WGS84 Latitude	<b>18 27 8.7681 N</b>
	WGS84 Longitude	<b>066 06 12.5023 W</b>
	Heading	<b>131.6</b>
	Fish Altitude	<b>1.52</b>
	Range to Target	<b>48.7</b>
	Height Above Bottom	<b>0.0</b>
	Length	<b>78.0</b>
	Width	<b>80.9</b>

Notes	<b>Possible Shipwreck</b>
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Name	Date	11/14/2024
<b>Target 5</b>	Time	<b>12:06:57</b>
Survey File	Event	<b>0</b>
<b>0006_1203</b>	X	<b>772684.7</b>
Capture File	Y	<b>879978.0</b>
<b>Target 5.JPG</b>	WGS84 Latitude	<b>18 26 57.7661 N</b>
	WGS84 Longitude	<b>066 05 49.6537 W</b>
	Heading	<b>32.2</b>
	Fish Altitude	<b>3.96</b>
	Range to Target	<b>133.1</b>
	Height Above Bottom	<b>0.0</b>
	Length	<b>0.0</b>
	Width	<b>0.0</b>

Notes	<b>Possible Seaplane Ramp</b>
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