

HISTORIC AREA REMEDIATION SITE (HARS) HEMPSTEAD REEF FIRE ISLAND REEF

FALL 2011

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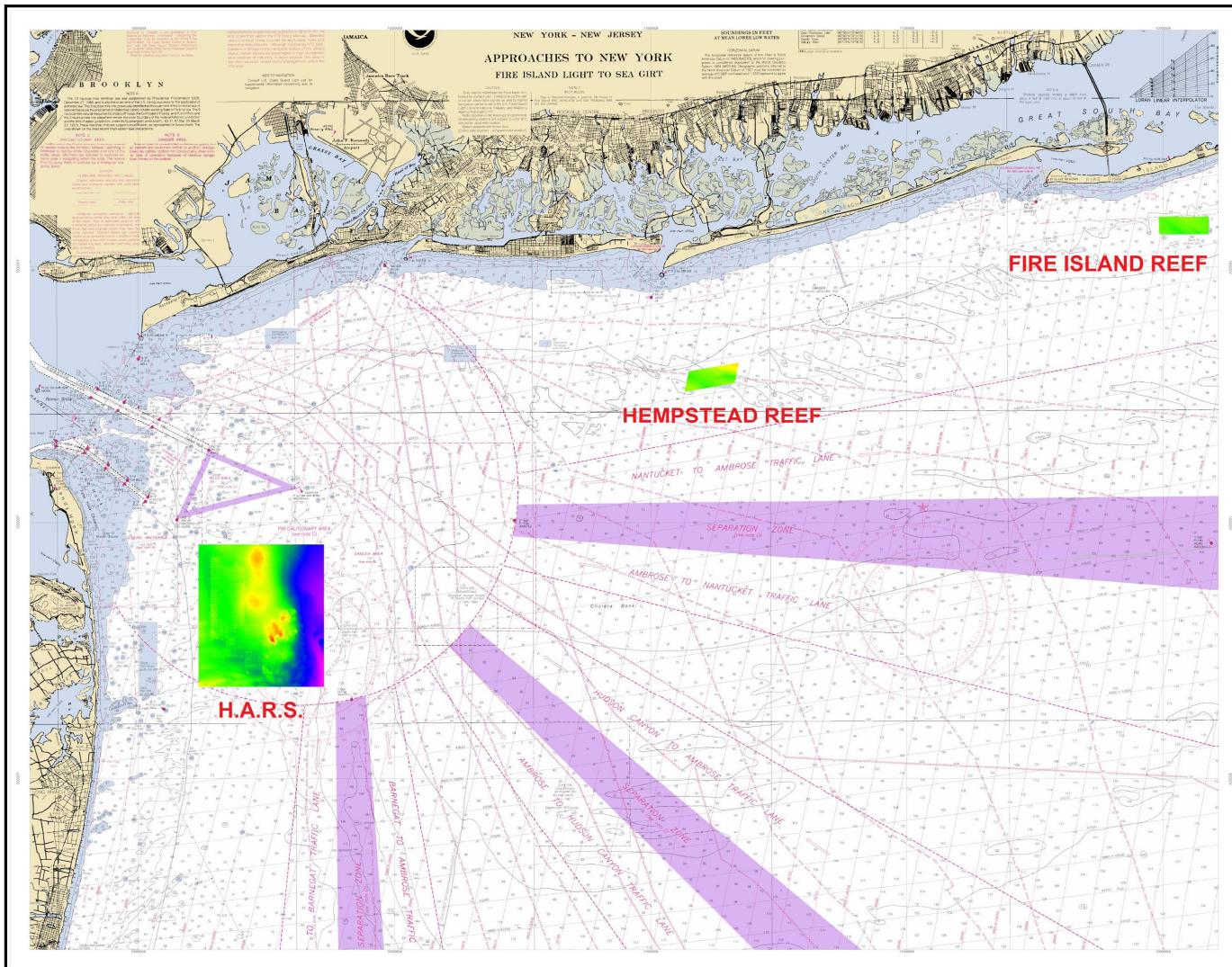
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1.0 Introduction

As part of Rogers Surveying's Indefinite Delivery Contract with The United States Army Corps of Engineers. Rogers Surveying was tasked with surveying the HARS (Historic Area Remediation Site), Hempstead and Fire Island Reefs. The HARS, which was re-designated as a remediation site in September 1977 was formerly known as the Mud Dump Site (MDS), and was used for the deposit of sediments dredged from the New York / New Jersey Harbor Estuary. The remediation consists of placing a one-meter "cap" layer of uncontaminated dredged material on top of the existing surface sediments within the nine Priority Remediation Areas (PRA's) of the HARS. The Reefs at Hempstead, and Fire Island are planned for rock placement during 2011 and 2012. The surveys are to serve as a baseline surveys.

Figure 1.0-1
Task Order 004



2.0 Objective

HARS - The primary objective of this task order is to obtain current high-accuracy multibeam bathymetry of the HARS site, the survey is to be used in the monitoring and planning of dredge placement. The site limits being bounded by North latitude of $40^{\circ} 25.757'$, a South latitude of $40^{\circ} 21.189'$ and East longitude of $73^{\circ} 48.798'$, a West longitude of $73^{\circ} 54.075'$. The total survey coverage area being approximately 24.6 square miles. (Figure 2.0-1).

Hempstead Reef - The primary objective of this task order is to obtain current high-accuracy multibeam bathymetry of the Reef site, the survey is to be used as a baseline survey. The site limits being bounded by North latitude of $40^{\circ} 31.5'$, a West longitude of $73^{\circ} 31.369999'$, North latitude of $40^{\circ} 31.25'$, a West longitude of $73^{\circ} 33.350001'$, North latitude of $40^{\circ} 31.92'$, a West longitude of $73^{\circ} 31.550001'$, North latitude of $40^{\circ} 30.67'$, a West longitude of $73^{\circ} 33.519999'$. The total survey coverage area being approximately 1.2 square miles. (Figure 2.0-2)

Fire Island Reef - The primary objective of this task order is to obtain current high-accuracy multibeam bathymetry of the Reef site, the survey is to be used as a baseline survey. The site limits being bounded by North latitude of $40^{\circ} 36.1'$, a South latitude of $40^{\circ} 35.60'$ and East longitude of $73^{\circ} 11.500'$, a West longitude of $73^{\circ} 13.500'$. The total survey coverage area being approximately 1.2 square miles. (Figure 2.0-3).

3.0 Procedure

The survey data was collected utilizing multibeam technology, and collected in accordance with The U.S. Army Corps of Engineers Manual 1110-2-1003. All survey data was collected with the survey vessel "Red Rogers" (Table 3.0-1). The "Red Rogers" is a 36' long catamaran with a beam of 12' that has berthing for 2. Survey operations were run when fuel, weather and crew staffing permitted. The vessel is equipped with a *RESON* 7101 multibeam sonar. Vessel motion corrections are supplied by an *APPLANIX* 320 (POS/MV), Differential GPS corrections are supplied by a *TRIMBLE* Pro-Beacon receiver, and when available RTK corrections provided to the POS/MV with the addition of a USB cellular modem. Speed of sound profiles are recorded thru the water column with a *SEABIRD* SBE19 Plus CTD profiler V2 (Table 3.0-1).

A seabed mounted water pressure gauge was installed at latitude N $40^{\circ} 22' 38.9677"$ and longitude W $73^{\circ} 50' 54.9287"$. It was anchored in approximately 40' of water (Figures 3.0-1 and 3.0-2). An acoustic release system was incorporated for retrieval of the tide gauge. The gauge was preset to record data for 60 seconds every 5 minutes. The Real Time Kinematic GPS, which augmented the POS/MV position also provided real time water levels. The RTK and VRS corrections were provided via a cellular Internet GPS Network operated by Keystone Precision of PA.

Figure 2.0-1
Historic Area Restoration Site (HARS).

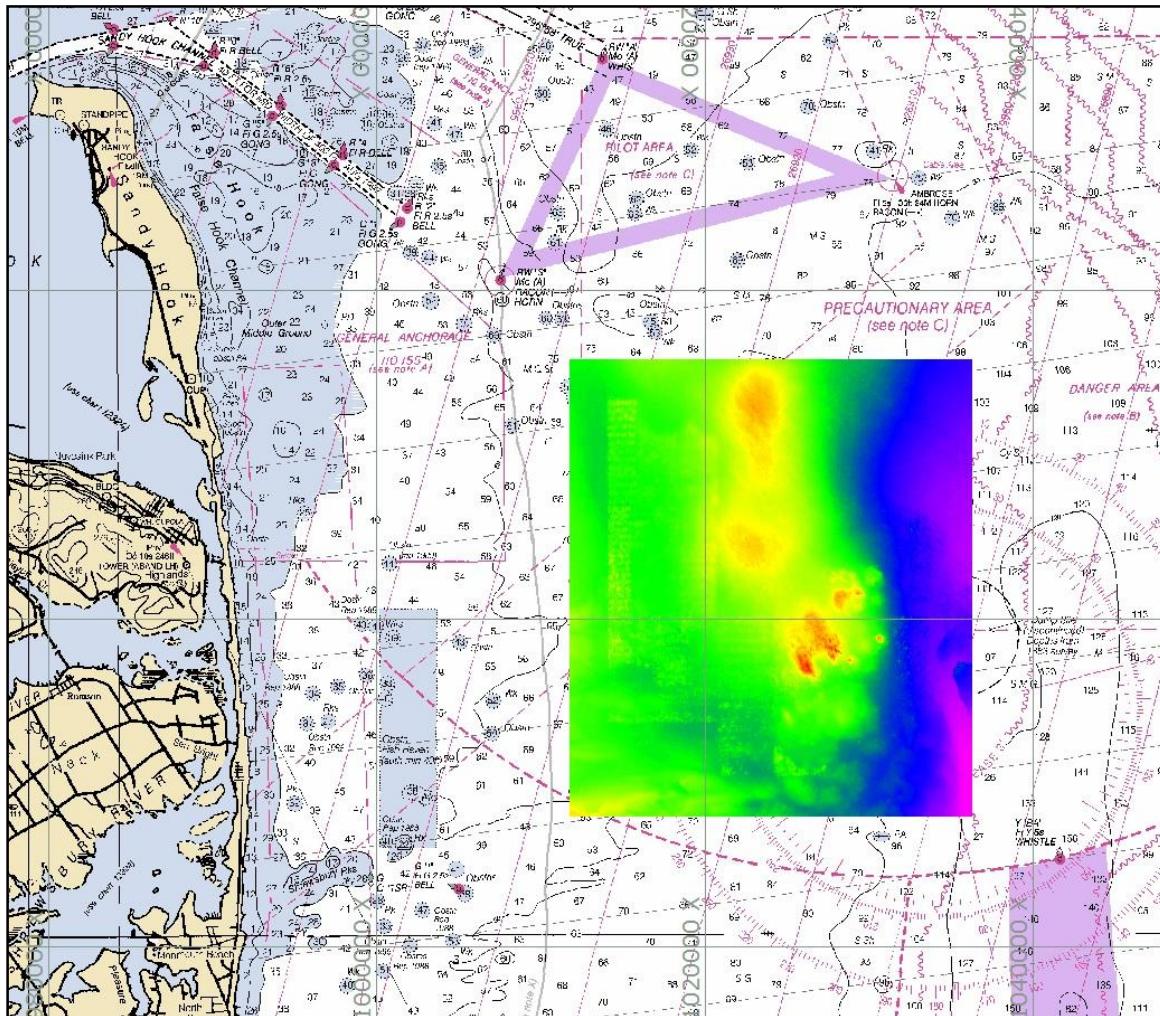


Figure 2.0-2
Hempstead Reef

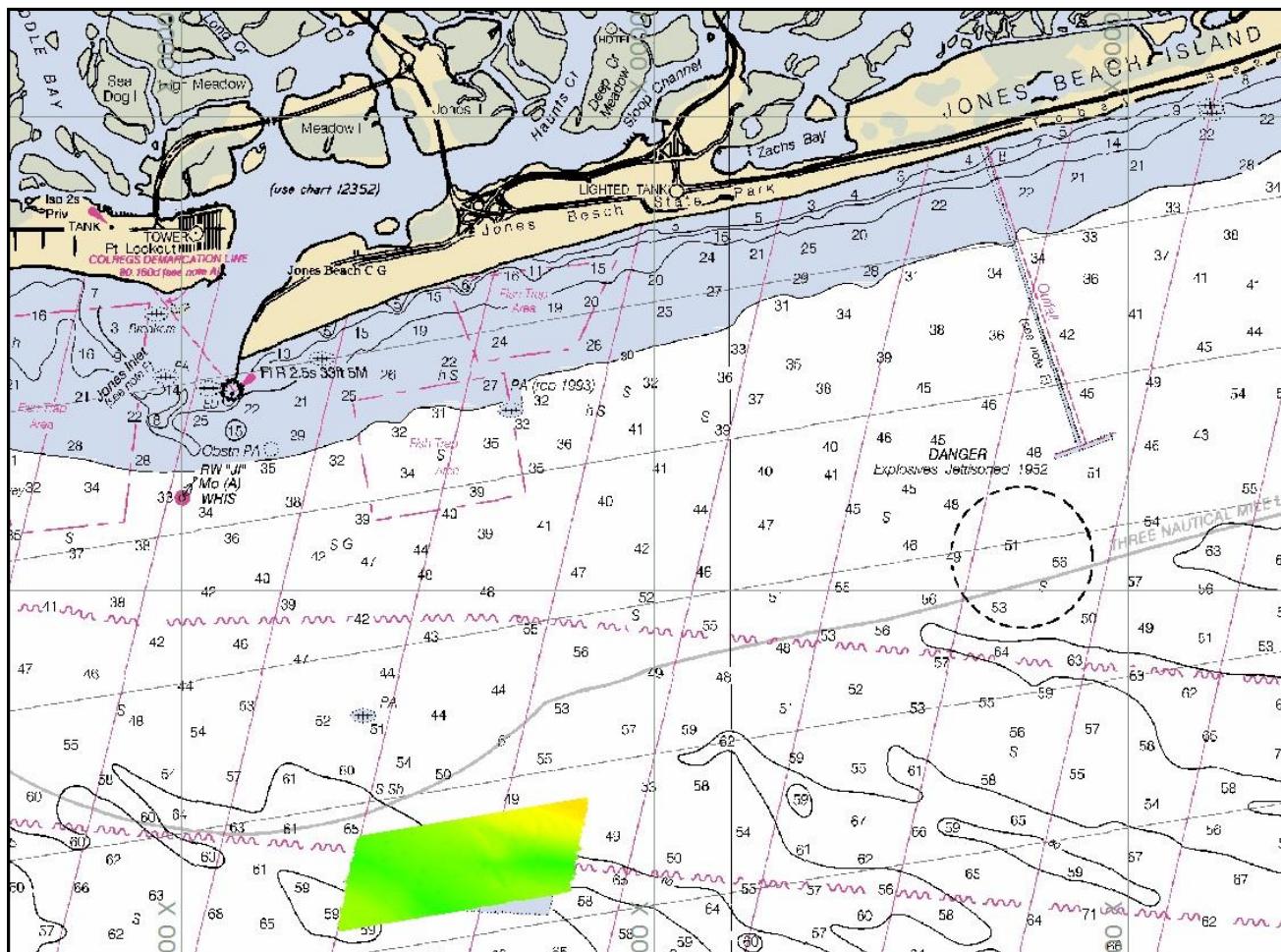


Figure 2.0-3
Fire Island Reef

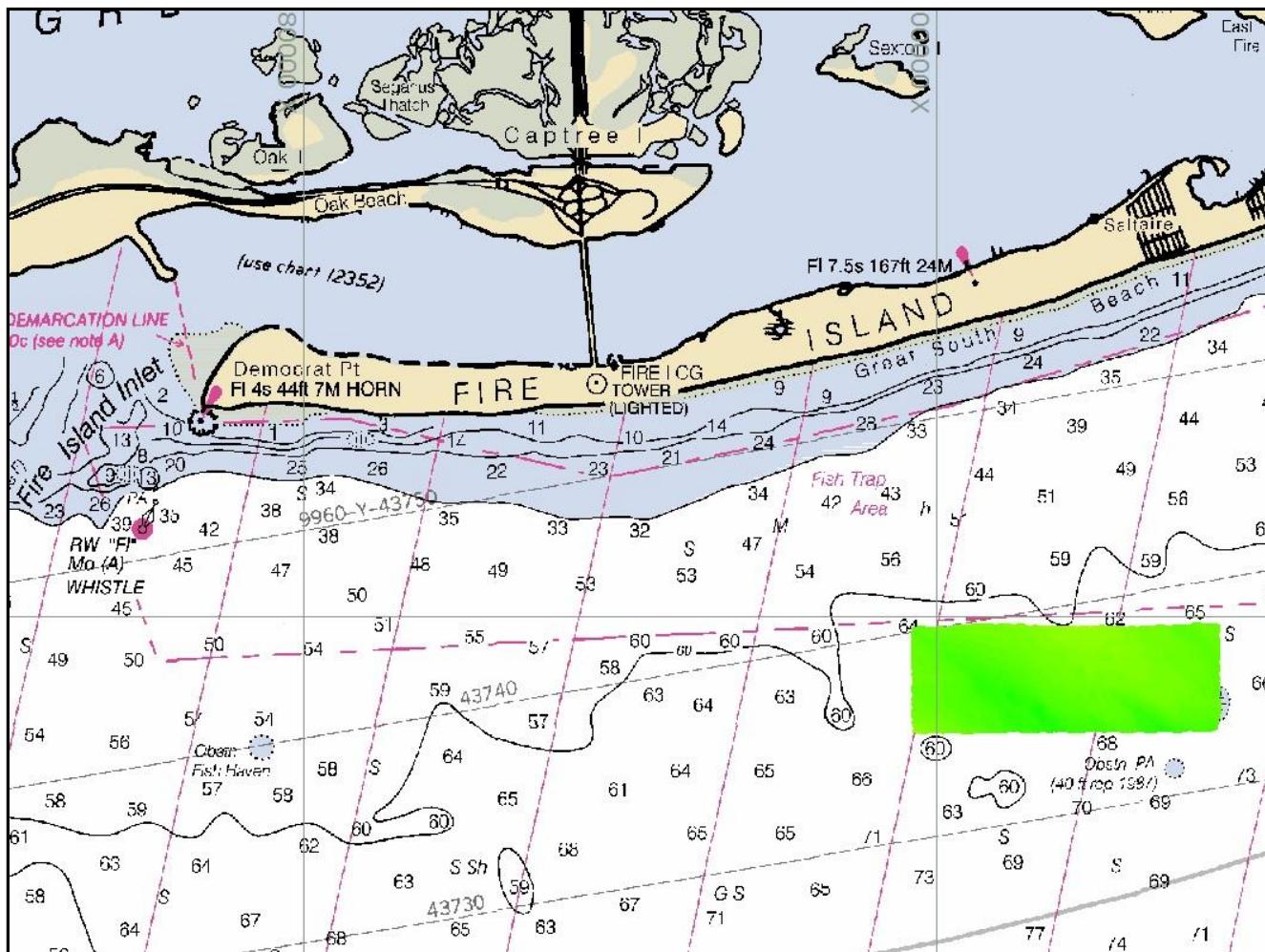


Table 2.0-1

Summary of survey operations on board survey vessel Red Rogers for the Fall 2011 multibeam survey at the HARS.

DATE	Operations
08/05/11	Mobilization to HARS. Deployed submersible tide recorder. Commenced multibeam survey of HARS.
08/10/11	Continued Survey from 08/05/11.
08/11/11	Continued Survey from 08/10/11.
08/12/11	Continued Survey from 08/11/11.
08/16/11	Continued Survey from 08/12/11.
08/17/11	Continued Survey from 08/16/11.
08/18/11	Continued Survey from 08/17/11.
08/19/11	Continued Survey from 08/18/11.
08/23/11	Continued Survey from 08/19/11.
08/24/11	Continued Survey from 08/23/11.
09/12/11	Continued Survey from 08/24/11. Retrieved submersible tide recorder to change batteries.
09/13/11	Continued Survey from 09/12/11.
09/14/11	Continued Survey from 09/13/11.
09/21/11	Continued Survey from 09/14/11. Survey completed. Demobilize.

Table 2.0-2

Summary of survey operations on board survey vessel Red Rogers and William A. Rogers for the Fall 2011 multibeam survey at the Fire Island Reef

DATE	Operations
11/07/11	Mobilization to Reef.
11/07/11	Deployed submersible tide recorder.
11/07/11	Commenced multibeam survey of Reef.
11/08/11	Attempt to retrieve tidal sensor. Sensor failed to surface.
11/10/11	Survey vessel <i>WILLIAM A ROGERS</i> performs sidescan sonar survey in attempt to locate tidal sensor.
11/11/11	Survey vessel <i>WILLIAM A ROGERS</i> deploys diver to recover located tidal sensor.
11/11/11	Survey complete. Demobilize.

Table 2.0-3

Summary of survey operations on board survey vessel Red Rogers for the Fall 2011 multibeam survey at the Hempstead Reef

DATE	Operations
11/08/11	Mobilization to Reef.
11/08/11	Commenced multibeam survey of Reef
11/08/11	Survey complete. Demobilize

Table 3.0-1

Equipment used during the Fall 2011 multibeam survey at the HARS, Fire-Island Reef and Hempstead Reef.

System	Model	*Accuracy
Multibeam	Reson Seabat 7101 (150/210 deg) 240 kHz, beam width 1.5 degree along and across track, 101 horizontal beams.	4 cm Nadir, 5 cm 45 degrees, 1.25 range resolution.
Position		
Differential GPS	Trimble Pro Beacon	3-5 meters DGPS USCG, 3 meters DGPS WAAS
Inertial Navigation System	TSS POS M/V 320 Motion (HPR) & Heading	Roll Pitch 0.02 (1 sigma DGPS, 2 sigma RTK) Heave 5cm or 5% 20 seconds or less Heading 0.02 (1 sigma) Position 0.5 - 2m (DGPS), 0.02 - 0.10 (RTK) Velocity 0.03 m/s horizontal
Data Acquisition and Navigation	Hypack 2009a Hysweep Survey Running on a Super Logic computer, with dual Aptec Raid removable disk drives .	
Sound Velocity	SeaBird SBE 19plusV2	
Tide Gauges		
Submersible Pressure Gauge	Valeport MiniTide (Deployed at HARS)	Range -5 to +35 deg (C). +/-0.01 deg (C)

Survey Vessel	
M/V Red Rogers	LOA= 36', Beam= 10', Draft= 2.5, Max Speed 25kts
Propulsion	Twin Volvo KAD 44P-C Turbo Diesel Engines with DPE Stern Drives
Power	Onan 6.5 kilowatt Generator with UPS & DC power supplies

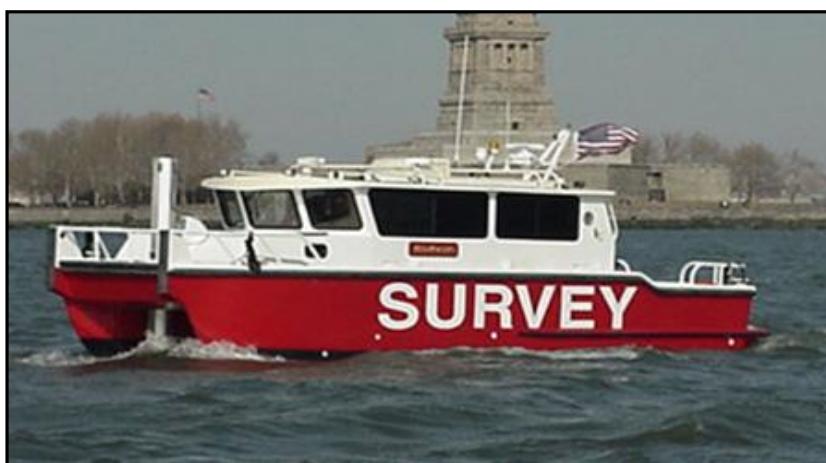
R/V *Red Rogers*

Figure 3.0-1
Attaching Acoustic Release Buoy to Submersible Tide Gauge



Figure 3.0-2
Final multibeam coverage of the HARS, with submersible Tide Gauge location.

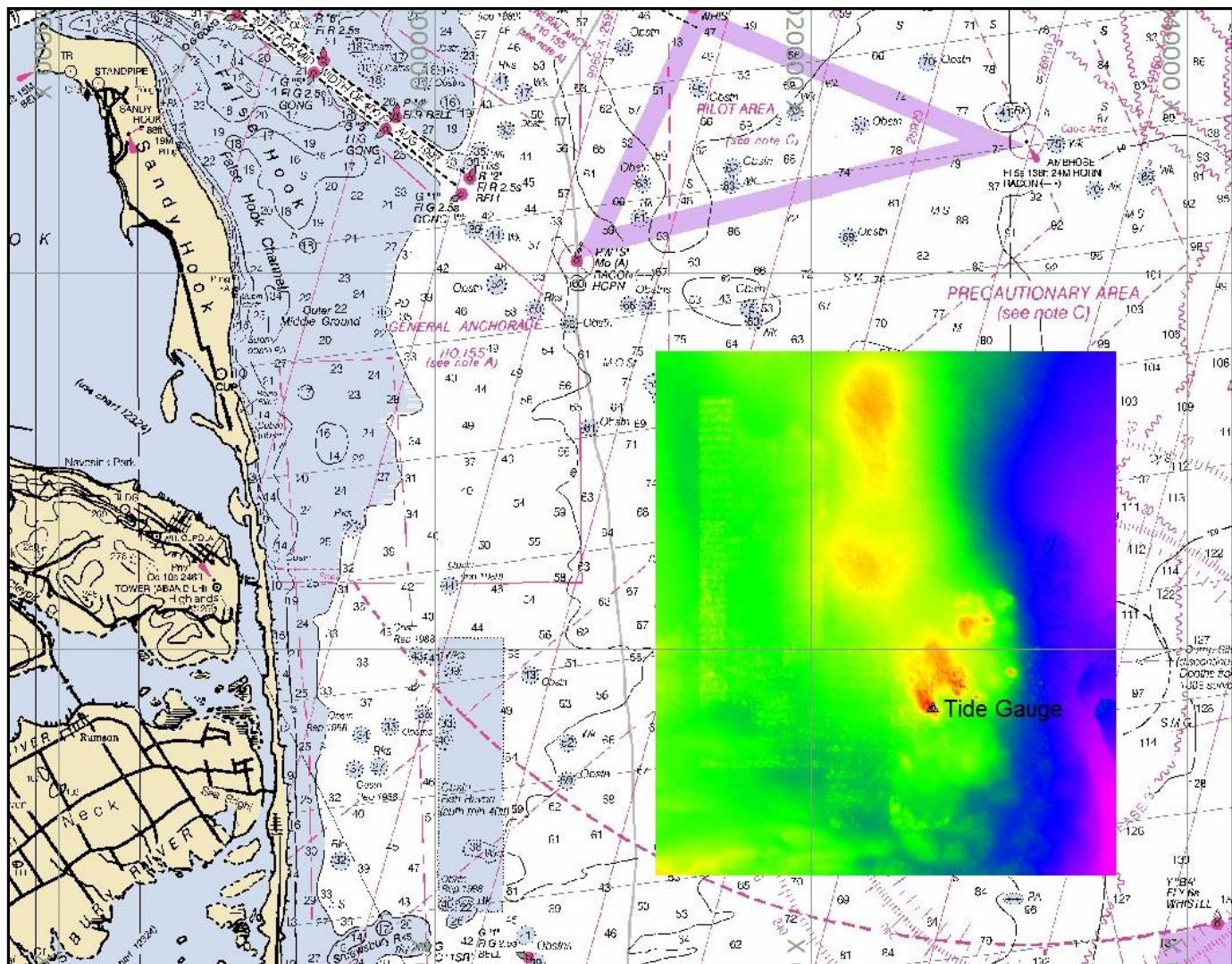


Figure 3.0-3

Final multibeam coverage of the Fire Island Reef, with submersible Tide Gauge location.

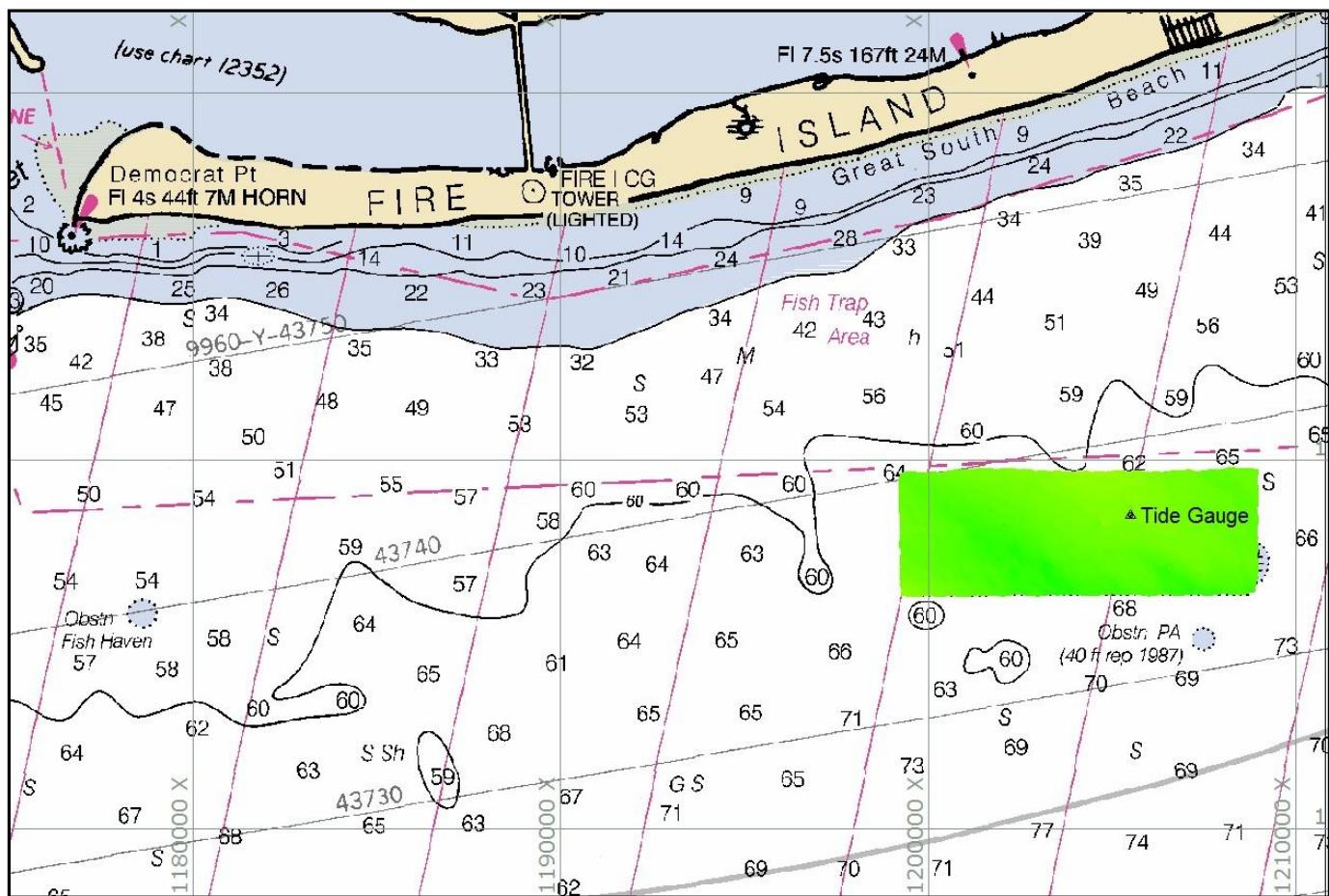


Figure 3.0-4

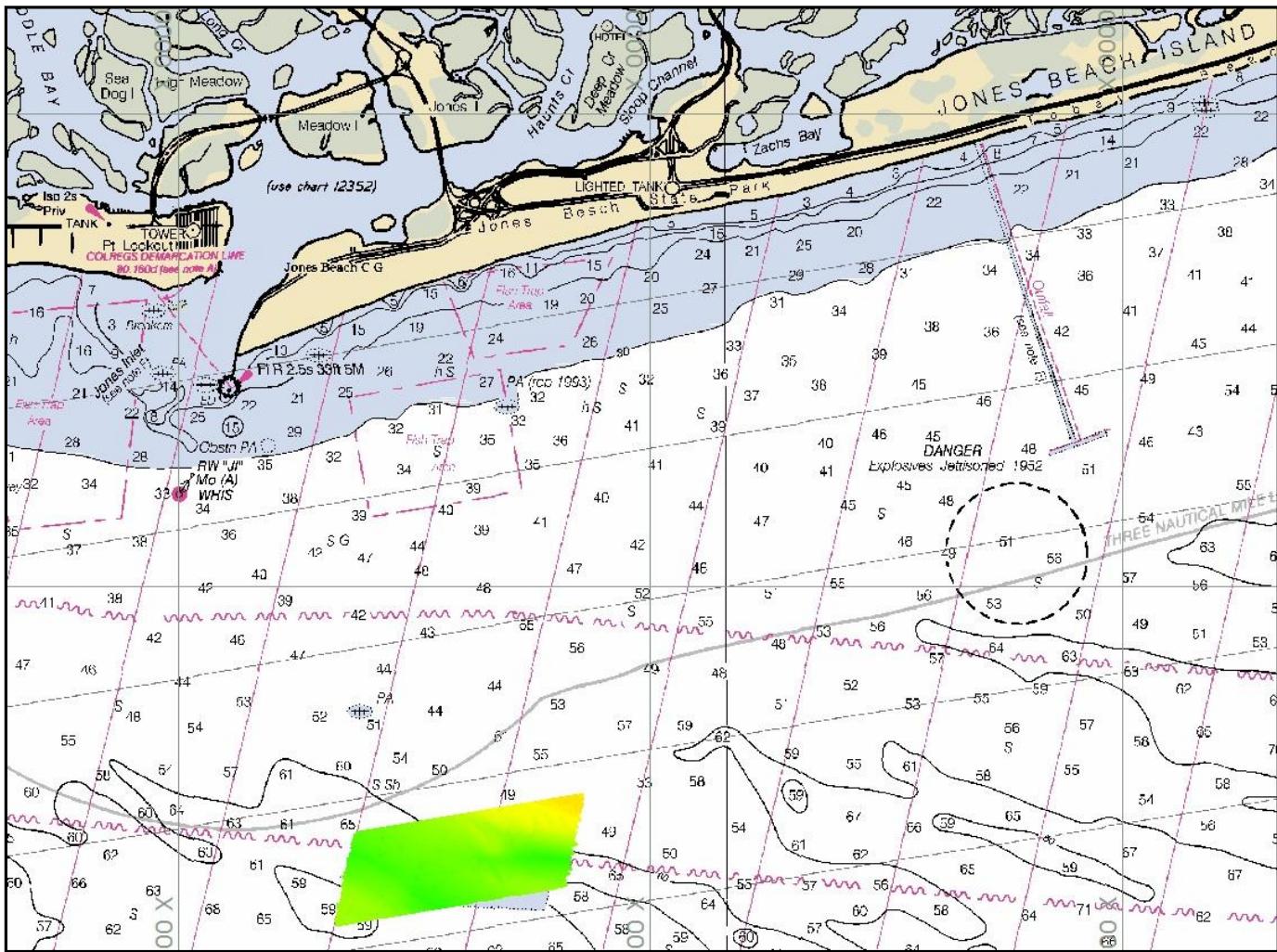


Figure 3.1-1

Portion of NGS Data Sheet for survey control disk KV0233 used at Elizabeth Marina.

KV0233	DESIGNATION -	PBM 65 33 USE	
KV0233	PID -	KV0233	
KV0233	STATE/COUNTY-	NJ/UNION	
KV0233	USGS QUAD -	ELIZABETH (1995)	
KV0233			
KV0233	*CURRENT SURVEY CONTROL		
KV0233			
KV0233*	NAD 83(1986) -	40 39 07. (N) 074 11 11. (W)	SCALED
KV0233*	NAVD 88 -	7.441 (meters) 24.41 (feet)	ADJUSTED
KV0233			
KV0233	GEOID HEIGHT-	-32.35 (meters)	GEOID09
KV0233	DYNAMIC HT -	7.438 (meters)	COMP
KV0233	MODELED GRAV -	980,222.8 (mgal)	NAVD 88
KV0233			
KV0233	VERT ORDER -	FIRST CLASS II	

Figure 4.0-1

Sandy Hook Tidal Station information, used during the Fall 2011 multibeam survey at the HARS, Hempstead and Fire Island Reefs.

Sandy Hook, NJ		Station ID: 8531680	
Station Information			
<i>Latitude:</i> 40° 28.0' N	<i>Mean Range:</i> 4.70 ft.	 <small>Click image for larger image.</small>	
<i>Longitude:</i> 74° 0.6' W	<i>Diurnal Range:</i> 5.22 ft.		
<i>Established:</i> Jan 7 1910			
<i>Present Installation:</i> Sep 26 1989			
<i>NOAA Chart #:</i> 12327			
<i>Time Meridian:</i> 75			
<i>Minimum Water Level:</i> -4.71 ft. below MLLW (02/02/1976)	<i>Maximum Water Level:</i> 4.86 ft. above MHHW (09/12/1960)		
Data Types Available:		Station and Bench Mark Drawing	Station Location Chartlet
Primary Water Level Backup Water Level Wind Air Temperature Water Temperature Barometric Pressure Barometric Pressure Conductivity	Click HERE for Drawing (Not for navigational use)		Click HERE for Map (Not for navigational use)

3.1 Data Acquisition

The survey vessel *Red Rogers* is permanently berthed in Elizabeth, New Jersey. The voyage from the vessels homeport to the HARS is approximately 1.5 hours, Fire Island Reef is approximately 4 hours. Hempstead Reef is approximately halfway way between marina and Fire Island Reef. Prior to multibeam survey operations a float test was performed to confirm that the RTK GPS tide reading from the POS M/V on the survey vessel agreed with the tide board at the dock at Elizabeth Marina, which had previously been referenced to National Geodetic Survey (NGS) disk KV0233 (Figure 3.1-1). This having been done the survey vessel transited to the HARS for commencement of multibeam data collection at the HARS site.

Once at the HARS or the Long Island Reefs the initial task was to lower the multibeam transducer head and perform a sound velocity profile (SVP). The information from the SVP was used to provide the Reson 7101 multibeam processor with a sound velocity surface value used for beam steerage. In addition the sound velocity profile was used in the Hypack data acquisition and processing software to correct for speed of sound through the water column to be applied to the multibeam data.

Having performed and applied the SVP correction, multibeam data collection began. Survey lines were run in a general North-South direction with cross check lines (see Sections 4.1 and 4.2) being run in an East-West direction for the HARS location, while for the two Reef locations survey lines were run in an East-West direction, with the cross check lines being run in a North-South direction.

Constant monitoring of the Reson 7101 screen and adjustment of range, transmit/ receive power settings were made if required to accurately map and encompass the swath width needed. The swath width was set to 60 deg. either side of nadir (center beam of multibeam) and lines were run to provide a 60% swath data coverage. In addition to monitoring the Reson 7101, it was also necessary to monitor the Hypack navigation software, which provided quality information on GPS and inertial navigation sensors, motion reference unit sensor and the multibeam data from the Reson 7101.

3.2 Sound Velocity Profiles

Sound velocity profiles were taken during the course of the survey using a SeaBird SBE 19plus Version 2 CTD. Casts were obtained before, during and after each survey period. During survey operations casts were taken not less than three hours apart and at opposite ends of the days survey area, to account for any spatial water column speed of sound changes. The SeaBird SBE 19plus was last calibrated by the manufacturer on 05/25/07 and is periodically checked against our Odom Digibar Pro velocity profiler. For HARS a total of 66 SVP casts were taken over the course of the multibeam survey (Table 3.2-0). Plots of all SVP casts are shown in Figures 3.2-1 to 3.2-65.

Table 3.2-1
Sound Velocity Profiles (SVP's) taken during the Fall 2011 multibeam survey at the HARS

Date	Time (UTC)	CTD File #	NAD83 Y LI (Feet)		Latitude	Longitude	Water Depth
			Easting	Northing			Feet
08/05/11	12:21	cnv_1221	1035501.65	96002.99	40.43003153	73.81590871	97.4
08/05/11	14:26	cnv_1426	1034145.53	86487.84	40.40392180	73.82084965	109.6
08/05/11	16:41	cnv_1641	1032337.45	96001.66	40.43004556	73.82727421	94.5
08/05/11	18:55	cnv_1855	1029848.27	86373.62	40.40363137	73.83627973	90.9
08/05/11	20:43	cnv_2043	1028892.39	95701.29	40.42923908	73.83965051	83.3
08/10/11	11:32	cnv_1132	1028912.53	95822.08	40.42957052	73.83957736	80.1
08/10/11	13:30	cnv_1330	1026965.33	86255.41	40.40332123	73.84663163	64.6
08/10/11	15:38	cnv_1538	1026129.32	95881.15	40.42974622	73.84957395	68.6
08/10/11	17:40	cnv_1740	1024518.57	86397.19	40.40372183	73.85541581	54.1
08/10/11	18:59	cnv_1859	1024992.33	95395.27	40.42841786	73.85366080	62.3
08/11/11	11:54	cnv_1154	1036081.03	86295.84	40.40338372	73.81390171	110.6
08/11/11	13:58	cnv_1358	1034339.71	77018.50	40.37792899	73.82022223	106.3
08/11/11	16:20	cnv_1620	1032054.45	86674.31	40.40444513	73.82835636	97.4
08/11/11	18:06	cnv_1806	1030531.65	86716.81	40.40456984	73.83382373	92.2
08/11/11	20:00	cnv_2000	1028896.15	86751.26	40.40467277	73.83969582	84.0
08/11/11	21:56	cnv_2156	1027838.77	86280.41	40.40338560	73.84349542	75.5
08/12/11	13:10	cnv_1310	1027811.40	86183.24	40.40311903	73.84359430	74.1
08/12/11	17:11	cnv_1711	1024564.04	76913.74	40.37769113	73.85530879	63.6
08/12/11	19:16	cnv_1916	1023971.60	86139.92	40.40301811	73.85738120	54.5
08/12/11	20:57	cnv_2057	1030598.19	79090.79	40.38363736	73.83363682	73.2
08/12/11	15:19	cnv_1519	1027311.79	77106.72	40.37820796	73.84544562	58.1
08/16/11	16:25	cnv_1625	1031980.64	77465.58	40.37916912	73.82868604	91.2
08/16/11	18:39	cnv_1839	1029869.20	67902.20	40.35293033	73.83632850	86.0
08/16/11	20:43	cnv_2043	1028758.98	77374.76	40.37893655	73.84024974	59.1
08/16/11	11:58	cnv_1158	1036106.46	77394.85	40.37895187	73.81387830	102.0
08/16/11	14:14	cnv_1414	1033978.56	67800.91	40.35263029	73.82158582	110.9
08/16/11	22:06	cnv_2206	1027570.01	77077.04	40.37812524	73.84451904	63.3
08/17/11	12:43	cnv_1243	1024016.71	77217.40	40.37852710	73.85727143	69.2
08/17/11	16:23	cnv_1623	1025158.69	77124.73	40.37826755	73.85317327	71.5
08/17/11	18:39	cnv_1839	1029746.75	68986.74	40.35590784	73.83676057	88.9
08/17/11	14:48	cnv_1448	1025007.74	67670.89	40.35231904	73.85377169	76.8
08/17/11	20:35	cnv_2035	1022777.99	67822.65	40.35274551	73.86177058	74.5
08/17/11	20:39	cnv_2039	1022420.99	77146.31	40.37833896	73.86299912	67.9

08/18/11	11:58	cnv_1158	1022749.01	77381.78	40.37898387	73.86182046	72.8
08/18/11	14:07	cnv_1407	1020951.35	67843.66	40.35281091	73.86832402	72.5
08/18/11	18:30	cnv_1830	1018011.48	67456.11	40.35175880	73.87887350	66.3
08/18/11	16:21	cnv_1621	1019525.37	77424.23	40.37911378	73.87339041	77.8
08/18/11	20:40	cnv_2040	1018039.00	77080.33	40.37817559	73.87872697	72.5
08/19/11	11:41	cnv_1141	1015901.35	76857.91	40.37757295	73.88640029	77.1
08/19/11	13:49	cnv_1349	1015166.48	67760.29	40.35260406	73.88907915	62.7
08/19/11	16:04	cnv_1604	1012276.29	77390.08	40.37904583	73.89940877	65.0
08/19/11	17:56	cnv_1756	1013451.15	77324.57	40.37886223	73.89519228	71.5
08/19/11	18:53	cnv_1853	1013713.27	76472.65	40.37652299	73.89425518	73.8
08/19/11	20:39	cnv_2039	1011701.76	86619.53	40.40438093	73.90143359	68.2
08/23/11	11:32	cnv_1132	1012887.08	86233.49	40.40331757	73.89717928	71.5
08/23/11	13:05	cnv_1305	1013598.92	77087.48	40.37821098	73.89466293	70.2
08/23/11	14:33	cnv_1433	1014868.83	86580.56	40.40426361	73.89006230	69.9
08/23/11	15:54	cnv_1554	1015900.27	86533.35	40.40413042	73.88635912	73.5
08/23/11	16:32	cnv_1632	1016094.56	86594.56	40.40429773	73.88566123	75.8
08/23/11	17:47	cnv_1747	1016972.65	86586.05	40.40427119	73.88250847	75.5
08/23/11	19:25	cnv_1925	1017896.39	77077.82	40.37816924	73.87923882	72.5
08/23/11	21:26	cnv_2126	1019263.43	77136.40	40.37832475	73.87433205	76.8
08/24/11	11:33	cnv_1133	1019481.33	86692.83	40.40455469	73.87350044	61.7
08/24/11	13:56	cnv_1356	1024034.47	77151.34	40.37834569	73.85720808	67.6
08/24/11	15:46	cnv_1546	1022883.92	77355.03	40.37890986	73.86133640	71.2
08/24/11	12:32	cnv_1232	1019943.75	77075.56	40.37815506	73.87189062	74.1
08/24/11	17:39	cnv_1739	1022472.73	86404.45	40.40375077	73.86276134	55.1
09/12/11	13:07	cnv_1307	1021098.62	76913.91	40.37770664	73.86774652	76.4
09/12/11	14:20	cnv_1420	1021434.28	76965.26	40.37784619	73.86654152	74.5
09/12/11	15:48	cnv_1548	1020395.00	85993.89	40.40263255	73.87022360	55.8
09/12/11	16:48	cnv_1648	1023752.30	95935.28	40.42990568	73.85811162	58.1
09/12/11	20:12	cnv_2012	1022029.08	95617.40	40.42904065	73.86430302	62.0
09/12/11	19:04	cnv_1904	1022480.71	86231.32	40.40327552	73.86273365	51.5
09/13/11	14:27	cnv_1427	1021687.34	95725.57	40.42933900	73.86552990	64.0
09/13/11	15:52	cnv_1552	1021112.06	95928.09	40.42989729	73.86759513	65.3
09/13/11	17:19	cnv_1719	1020168.64	86383.71	40.40370346	73.87103427	57.7
09/13/11	18:51	cnv_1851	1020262.65	86635.02	40.40439287	73.87069540	57.1
09/14/11	17:51	cnv_1751	1016019.59	86352.73	40.40363422	73.88593155	74.1
09/14/11	11:51	cnv_1151	1011777.52	95930.21	40.42993693	73.90112384	76.1
09/14/11	15:08	cnv_1508	1013809.30	95962.67	40.43001951	73.89382573	73.8
09/14/11	13:14	cnv_1314	1012686.36	95940.88	40.42996337	73.89785932	76.8
09/14/11	16:21	cnv_1621	1015108.81	95971.38	40.43003898	73.88915798	65.3

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09/14/11	19:37	cnv_1937	1016287.86	95696.63	40.42928067	73.88492423	62.0
09/21/11	11:26	cnv_1126	1017257.77	95908.56	40.42985884	73.88143943	62.7
09/21/11	13:23	cnv_1323	1018474.84	95877.45	40.42976884	73.87706800	62.7
09/21/11	14:47	cnv_1447	1019101.60	95901.96	40.42983368	73.87481662	64.6
09/21/11	12:26	cnv_1226	1017820.28	86323.34	40.40354693	73.87946633	70.9
09/21/11	15:34	cnv_1534	1017969.23	93451.03	40.42311066	73.87889613	62.7

Table 3.2-2
Sound Velocity Profiles (SVP's) taken during the Fall 2011 multibeam survey at Fire-Island Reef

Date	Time (UTC)	CTD File #	NAD83 YLI (Feet)		Latitude	Longitude	Water Depth
			Easting	Northing			Feet
11/07/11	11:39	110711_1139	1198030	159768	40.60262308	73.23012567	43
11/07/11	15:36	110711_1536	1208914	156522	40.59344550	73.19104149	63
11/07/11	17:28	110711_1728	1199251	157261	40.59571377	73.22581026	61
11/07/11	19:27	110711_1927	1199403	158558	40.59926978	73.22522071	63
11/07/11	21:29	110711_2129	1199630	158274	40.59848593	73.22441442	65
11/08/11	12:00	110811_1200	1199179	156238	40.59290717	73.22610240	62

Table 3.2-3
Sound Velocity Profiles (SVP's) taken during the Fall 2011 multibeam survey at Hempstead Reef

Date	Time (UTC)	CTD File #	NAD83 YLI (Feet)		Latitude	Longitude	Water Depth
			Easting	Northing			Feet
11/08/11	15:38	110811_1538	1107511	129542	40.52138225	73.55665015	62
11/08/11	17:29	110811_1729	1107037	128517	40.51857614	73.55837399	65
11/08/11	19:26	110811_1926	1106934	127448	40.51564166	73.55876360	60
11/08/11	21:13	110811_2113	1106712	126323	40.51255662	73.55958198	60
11/08/11	22:20	110811_2220	1112555	128736	40.51909729	73.53852380	63

Figure 3.2-1
SVP 080511_1221 taken during the Fall 2011 multibeam survey at the HARS.

1527.72	0.64
1527.77	1.36
1527.79	2.05
1527.79	2.75
1527.80	3.46
1527.80	4.17
1527.80	4.89
1527.79	5.60
1527.77	6.31
1527.72	7.00
1527.61	7.68
1527.35	8.38
1526.87	9.09
1524.99	9.84
1522.11	10.59
1520.01	11.34
1517.78	12.09
1515.81	12.85
1514.57	13.60
1513.53	14.36
1512.60	15.10
1511.25	15.86
1508.64	16.62
1506.05	17.35
1504.41	18.08
1503.36	18.82
1502.65	19.56
1501.92	20.28
1501.20	21.04
1500.70	21.80
1500.36	22.54
1499.94	23.26
1499.45	23.97
1498.76	24.63
1498.20	25.23
1497.80	25.76
1497.30	26.33
1496.79	26.94
1496.39	27.59
1496.17	28.25
1496.09	28.92
1496.09	29.52
1496.09	29.65

CTD PROFILE # 080511_1221

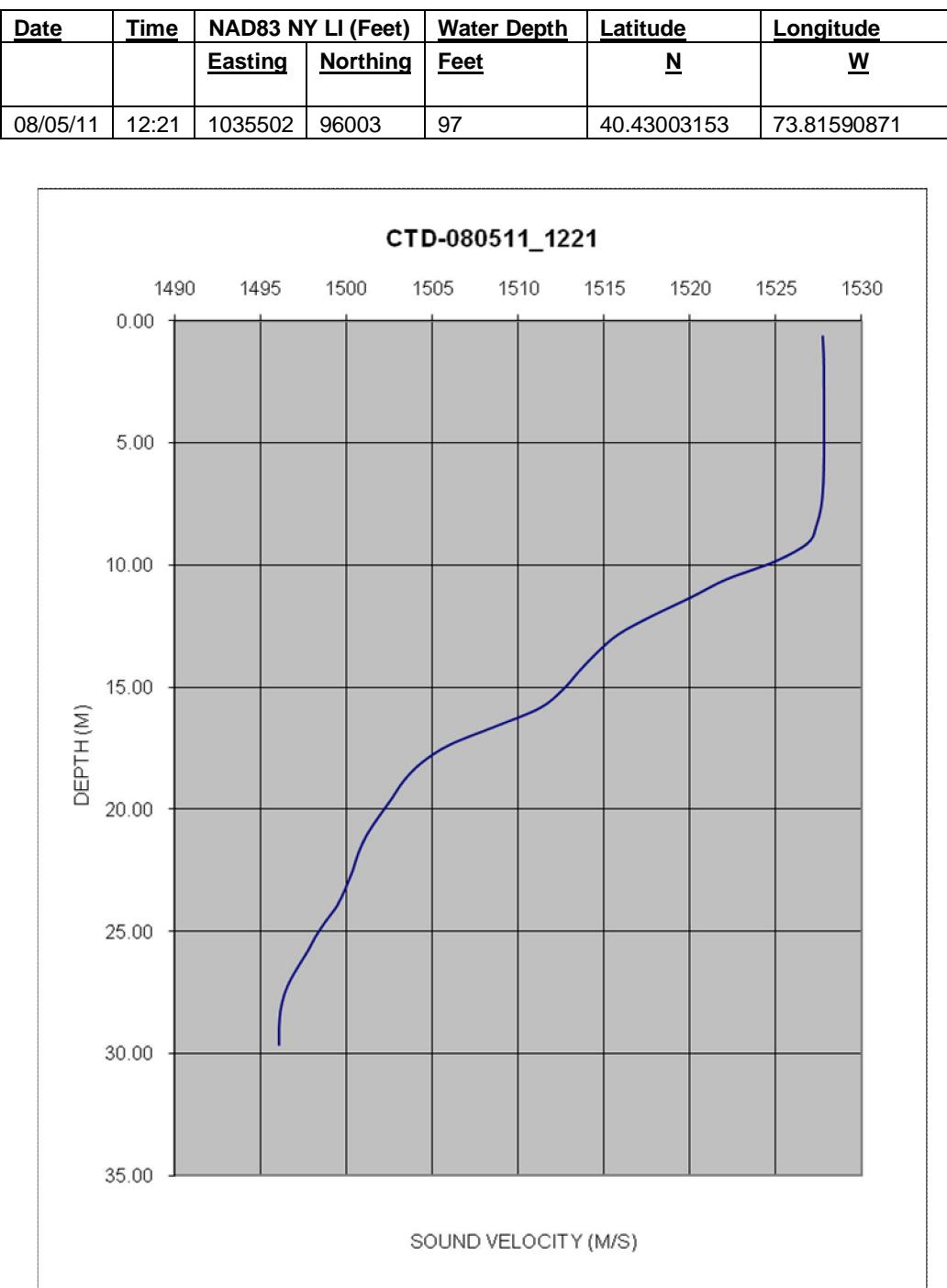


Figure 3.2-2
SVP 080511_1426 taken during the Fall 2011 multibeam survey at the HARS.

1527.29	0.19
1527.22	0.58
1527.21	0.98
1527.20	1.37
1527.11	1.89
1526.97	2.53
1526.88	3.18
1526.86	3.91
1526.90	4.60
1526.97	5.33
1526.85	6.07
1526.87	6.77
1527.09	7.46
1527.08	8.16
1526.43	8.86
1523.69	9.58
1520.73	10.31
1517.72	11.04
1515.31	11.75
1513.66	12.47
1511.57	13.17
1509.83	13.88
1508.70	14.60
1507.37	15.31
1505.84	16.02
1504.50	16.75
1503.62	17.48
1503.06	18.21
1502.45	18.94
1501.75	19.66
1501.18	20.38
1500.74	21.09
1500.24	21.82
1499.67	22.54
1499.14	23.24
1498.51	23.96
1497.69	24.69
1496.81	25.42
1496.23	26.16
1495.92	26.89
1495.71	27.61
1495.46	28.34
1495.24	29.07
1495.07	29.81
1494.90	30.56
1494.66	31.31
1494.43	32.05
1494.25	32.76
1494.23	33.32
1494.39	33.39

CTD PROFILE # 080511_1426



Figure 3.2-3

SVP 080511_1641 taken during the Fall 2011 multibeam survey at the HARS.

1527.65	0.72
1527.61	1.49
1527.57	2.23
1527.43	2.95
1527.17	3.64
1526.95	4.30
1526.86	4.93
1526.79	5.52
1526.72	6.13
1526.67	6.73
1526.57	7.31
1526.48	7.89
1526.37	8.48
1526.17	9.07
1525.73	9.67
1525.13	10.28
1524.17	10.89
1522.93	11.51
1520.89	12.14
1518.25	12.76
1515.32	13.39
1513.14	14.02
1511.69	14.66
1510.47	15.32
1507.90	15.98
1505.43	16.64
1504.01	17.30
1503.18	17.96
1502.54	18.62
1502.00	19.28
1501.69	19.93
1501.48	20.58
1501.17	21.23
1500.91	21.88
1500.64	22.52
1500.06	23.16
1499.20	23.79
1498.32	24.43
1497.78	25.08
1497.33	25.73
1496.70	26.39
1496.24	27.06
1496.03	27.74
1495.92	28.40
1495.89	28.66
1495.92	28.72

CTD PROFILE # 080511 1641

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
08/05/11	16:41	1032337	96002	94	40.43004556 73.82727421

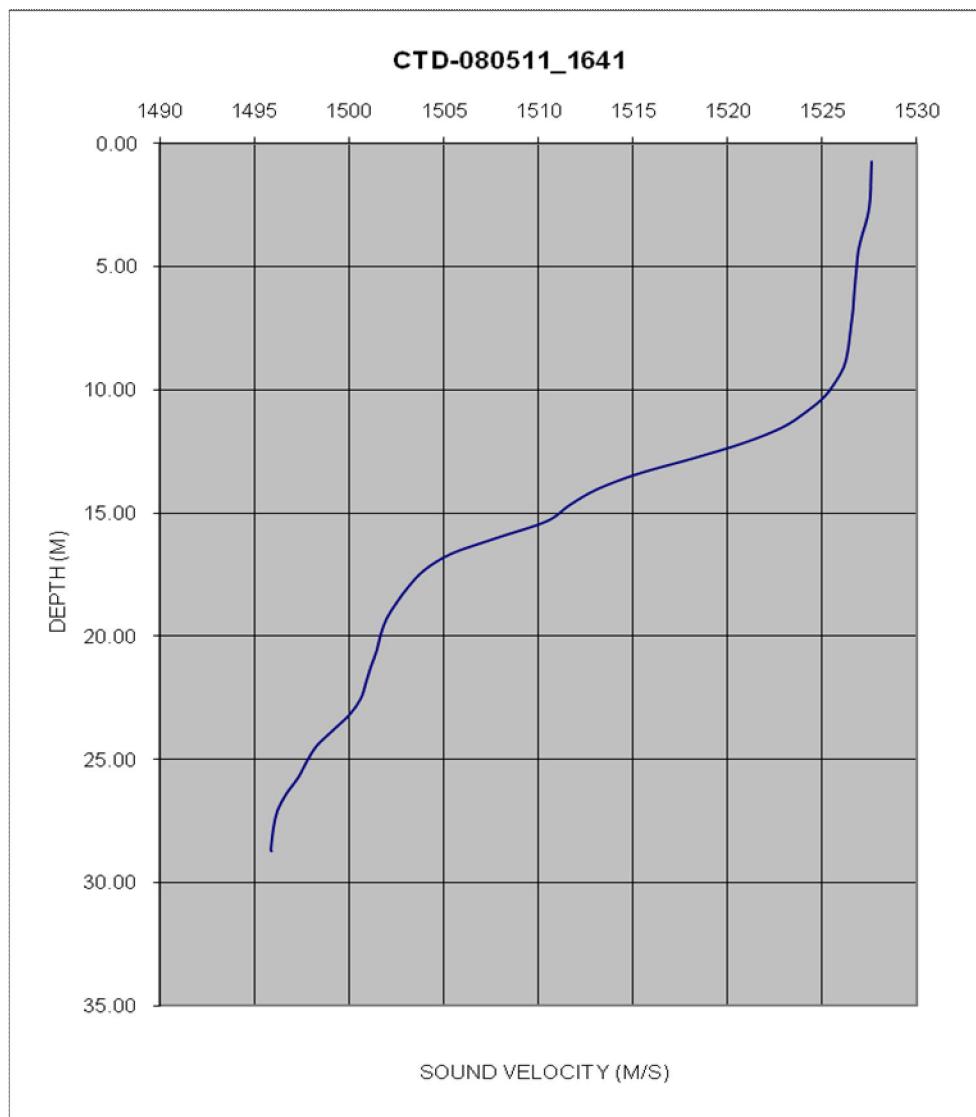


Figure 3.2-4
SVP 080511_1855 taken during the Fall 2011 multibeam survey at the HARS.

1528.07	0.23
1528.04	0.95
1528.02	1.63
1527.98	2.26
1527.90	2.87
1527.77	3.45
1527.59	4.02
1527.48	4.58
1527.32	5.13
1527.18	5.69
1527.11	6.24
1527.04	6.81
1526.97	7.38
1526.78	7.96
1526.34	8.55
1525.68	9.13
1524.63	9.74
1523.13	10.35
1520.63	10.96
1517.73	11.57
1515.58	12.18
1513.85	12.78
1512.43	13.39
1511.22	14.00
1509.81	14.62
1507.15	15.26
1504.86	15.90
1503.59	16.54
1502.94	17.19
1502.64	17.86
1502.43	18.52
1502.22	19.18
1502.09	19.85
1501.96	20.50
1501.64	21.15
1501.07	21.80
1500.59	22.45
1500.25	23.10
1499.95	23.75
1499.33	24.39
1498.48	25.04
1497.89	25.69
1497.48	26.35
1497.11	27.01
1496.97	27.54
1497.33	27.63

CTD PROFILE # 080511 1855

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude	
		Easting	Northing	Feet		
				N	W	
08/05/11	18:55	1029848	86374	91	40.40363137	73.83627973

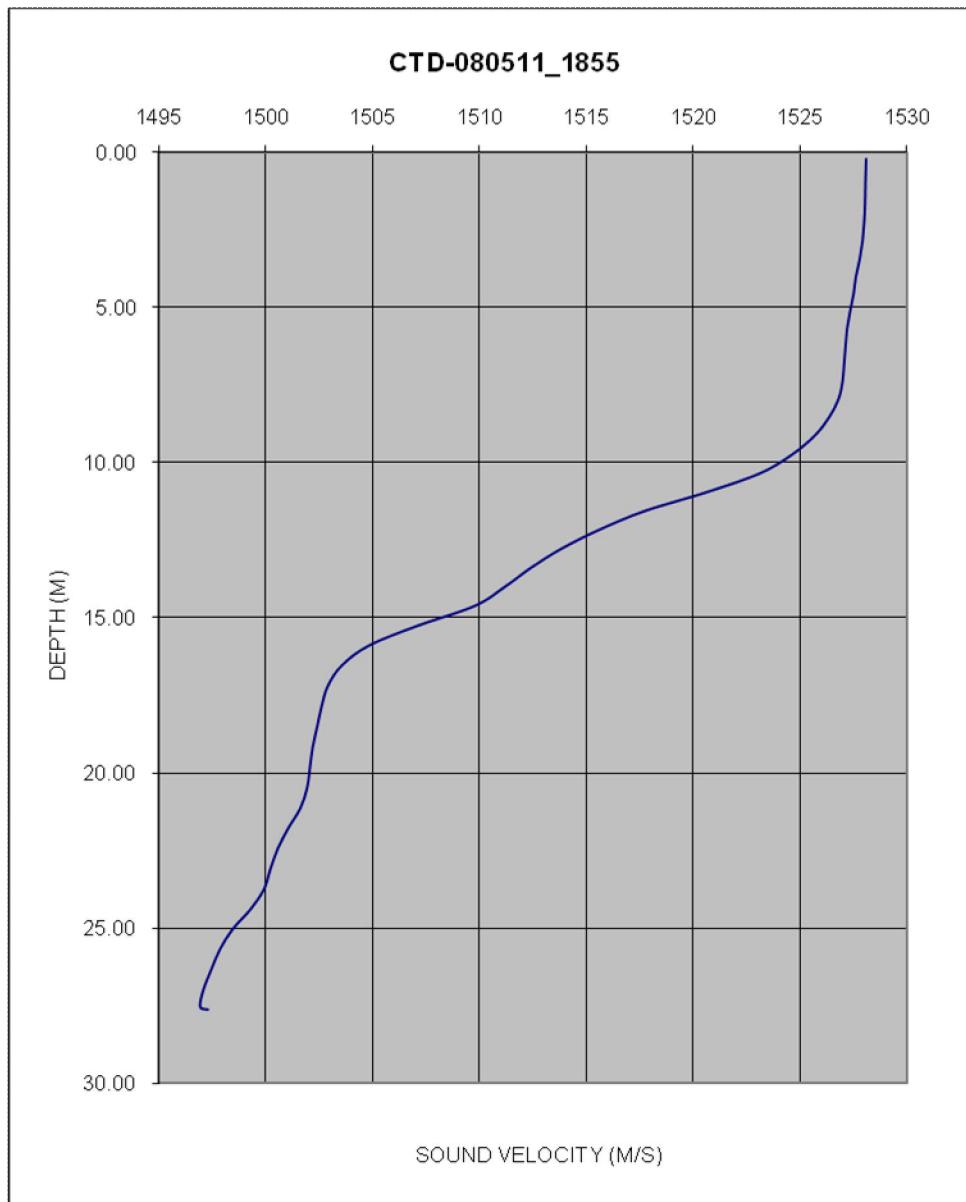


Figure 3.2-5
SVP 080511_2043 taken during the Fall 2011 multibeam survey at the HARS.

1527.76	0.46
1527.73	1.13
1527.74	1.86
1527.75	2.56
1527.75	3.22
1527.66	3.88
1527.49	4.54
1527.23	5.20
1526.51	5.84
1525.49	6.47
1524.53	7.11
1523.02	7.75
1521.32	8.40
1519.39	9.07
1517.52	9.73
1515.54	10.38
1514.05	11.03
1513.16	11.68
1512.66	12.34
1512.12	13.01
1511.06	13.68
1509.61	14.34
1508.39	15.01
1507.31	15.67
1506.61	16.33
1506.10	17.00
1505.49	17.65
1504.87	18.31
1504.44	18.97
1504.24	19.62
1504.11	20.28
1503.90	20.93
1503.26	21.58
1501.65	22.25
1500.22	22.93
1499.56	23.61
1499.31	24.31
1499.19	25.01
1499.32	25.39
1499.73	25.43

CTD PROFILE # 080511 2043

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
08/05/11	20:43	990062	125798	84	40.51195917 73.97909951

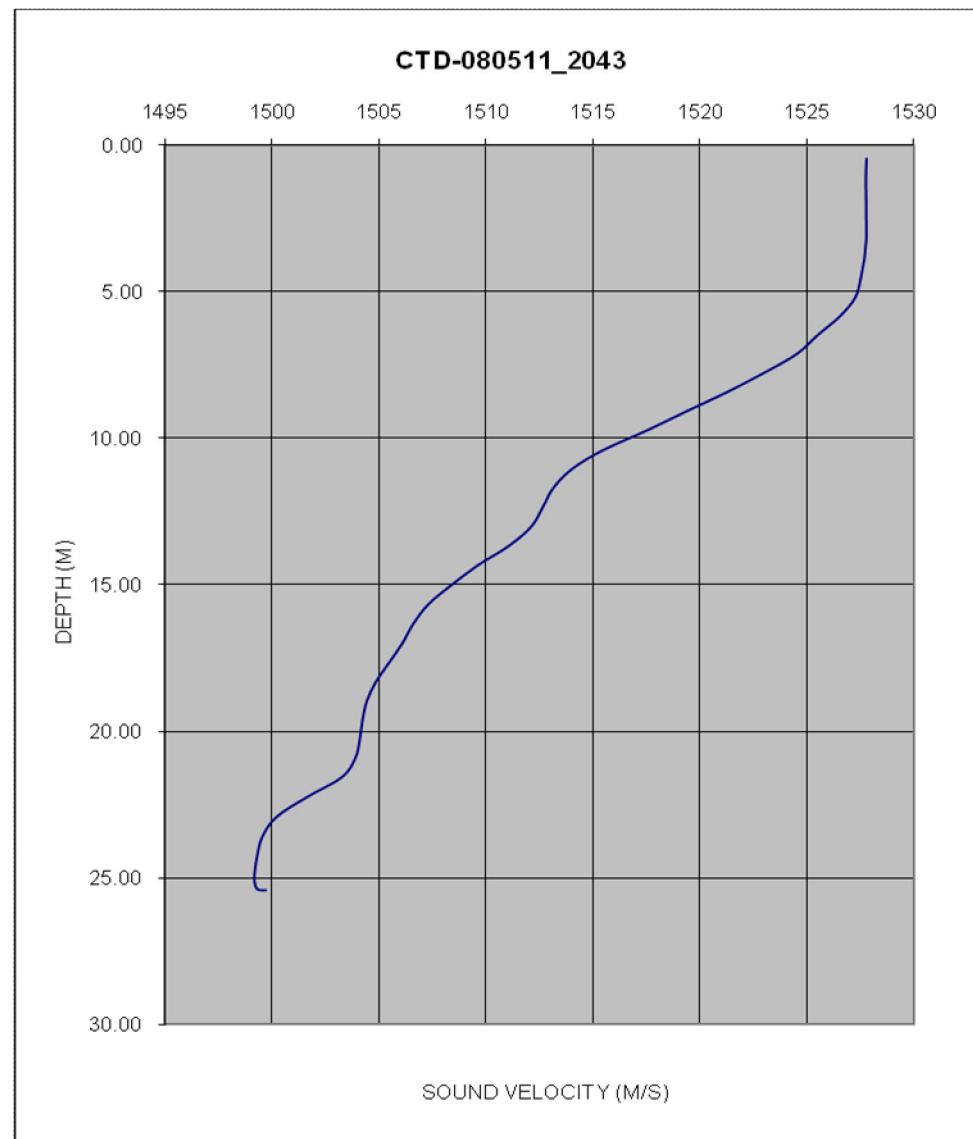


Figure 3.2-6
SVP 071011_1132 taken during the Fall 2011 multibeam survey at the HARS

1523.51 0.69

1523.53 1.39

1523.43 2.09

CTD PROFILE # 071011_1132

1523.29 2.78

1523.16 3.47

1523.03 4.12

<u>Date</u>	<u>Time</u>	<u>NAD83 NY LI (Feet)</u>	<u>Water Depth</u>	<u>Latitude</u>	<u>Longitude</u>
		<u>Easting</u>	<u>Northing</u>	<u>Feet</u>	<u>N</u>
08/10/11	11:32	1028913	95822	80	40.42957052 73.83957736

1522.97 4.84

1523.13 5.62

1523.16 6.40

1523.02 7.15

1523.16 7.92

1523.28 8.68

1521.70 9.43

1519.28 10.15

1517.26 10.84

1515.22 11.52

1513.15 12.23

1510.83 12.95

1508.52 13.65

1507.04 14.35

1506.47 15.06

1505.96 15.78

1504.94 16.49

1503.94 17.18

1502.88 17.86

1502.23 18.55

1501.94 19.25

1501.72 19.95

1501.00 20.66

1499.06 21.36

1496.90 22.07

1495.71 22.78

1495.25 23.52

1495.19 24.17

1495.53 24.36

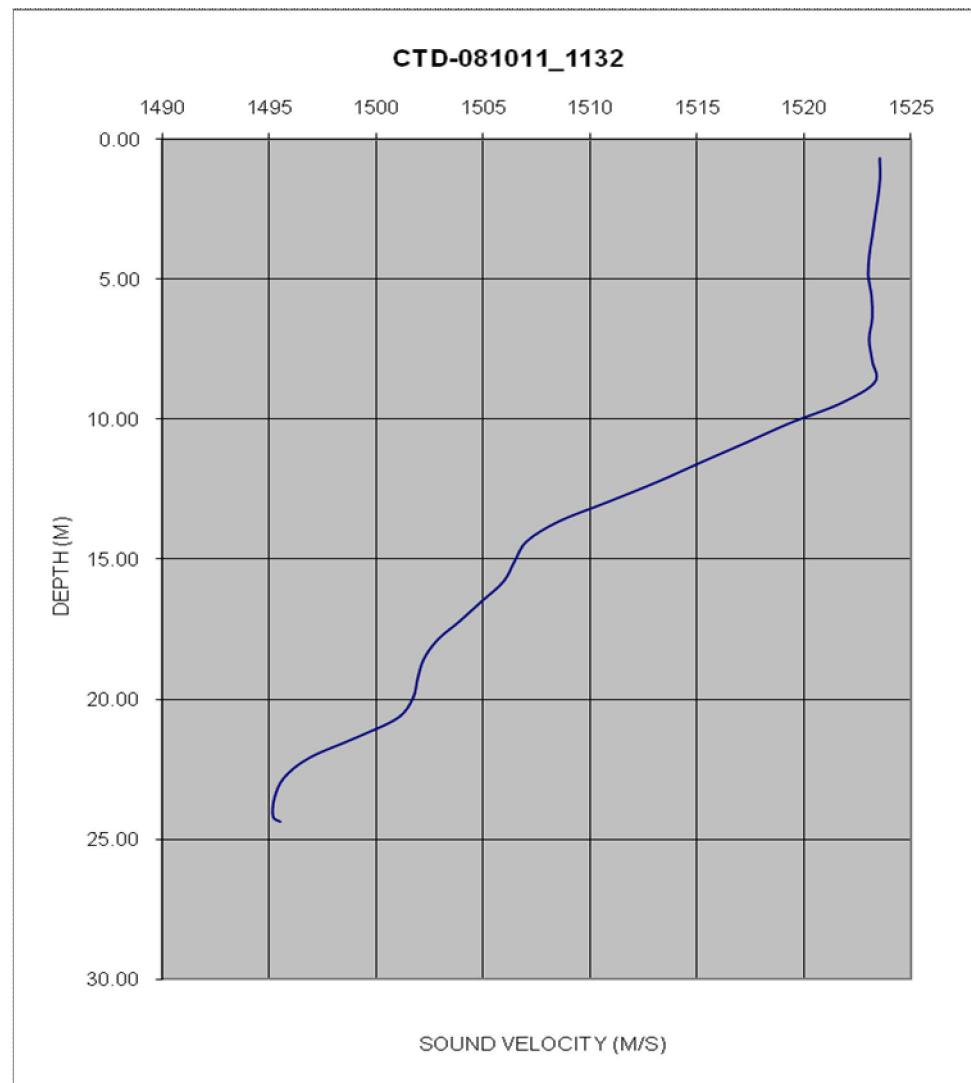


Figure 3.2-7
SVP 071011_1330 taken during the Fall 2011 multibeam survey at the HARS

1523.18	0.07
1522.84	0.84
1522.71	1.62
1522.66	2.42
1522.60	3.18
1522.59	3.87
1522.84	4.51
1523.15	5.14
1523.81	5.76
1524.65	6.37
1525.80	6.98
1526.62	7.59
1526.65	8.22
1526.23	8.85
1525.77	9.49
1525.31	10.13
1524.18	10.78
1522.32	11.42
1519.89	12.06
1515.89	12.69
1511.27	13.32
1508.30	13.96
1506.65	14.59
1505.67	15.22
1505.07	15.83
1504.69	16.43
1504.36	17.05
1504.04	17.67
1503.75	18.32
1503.58	18.97
1503.77	19.31
1503.89	19.46
1503.52	19.56

CTD PROFILE # 071011_1330

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
08/10/11	13:30	1026965	86255	64	40.40332123
					73.84663163

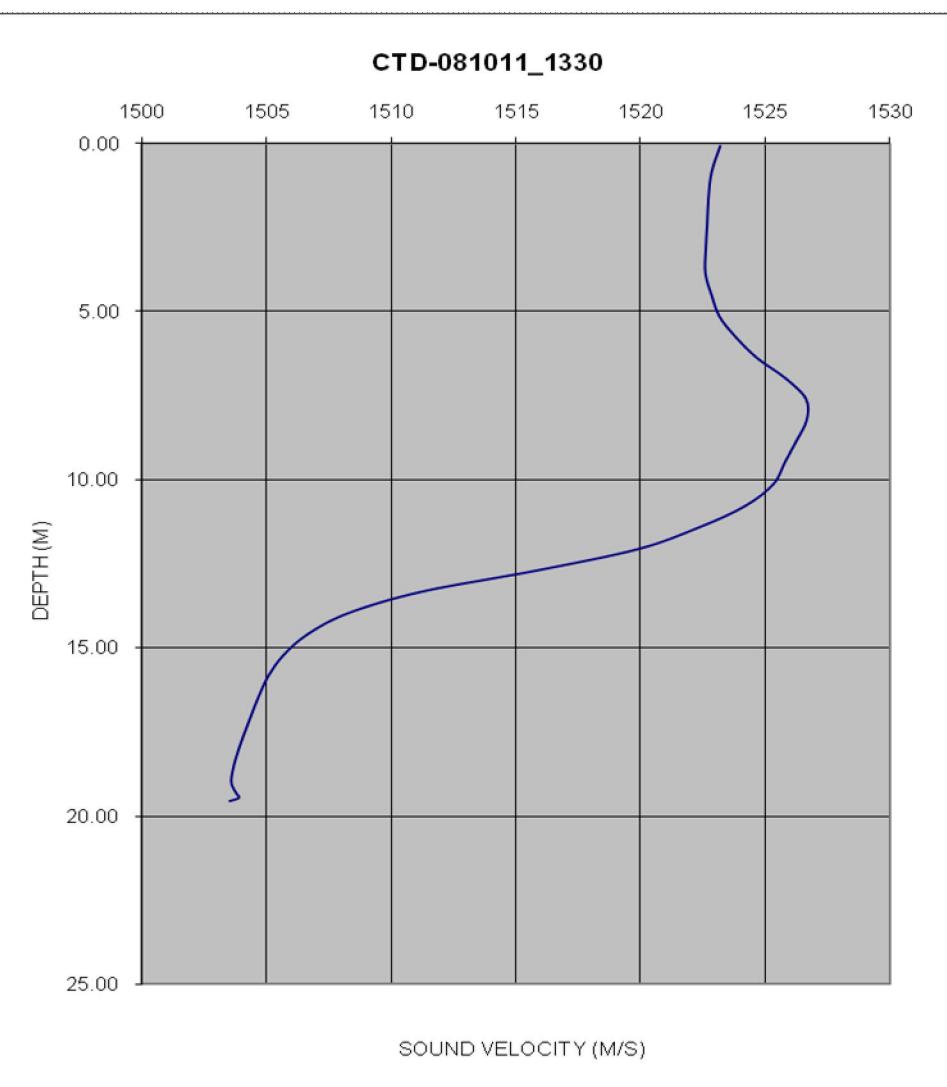


Figure 3.2-8
SVP 071011_1538 taken during the Fall 2011 multibeam survey at the HARS

1524.38 0.18

1524.23 0.88

1524.06 1.54

CTD PROFILE # 071011_1538

1523.76 2.17

1523.42 2.75

1523.08 3.31

<u>Date</u>	<u>Time</u>	<u>NAD83 NY LI (Feet)</u>		<u>Water Depth</u>	<u>Latitude</u>	<u>Longitude</u>
		<u>Easting</u>	<u>Northing</u>	<u>Feet</u>	<u>N</u>	<u>W</u>
08/10/11	15:38	1026129	95881	68	40.42974622	73.84957395

1522.89 3.85

1522.72 4.39

1522.53 4.94

1522.36 5.51

1522.25 6.08

1521.98 6.66

1521.67 7.26

1521.44 7.85

1521.21 8.45

1521.16 9.07

1520.87 9.68

1519.74 10.27

1519.00 10.86

1518.71 11.44

1517.07 12.02

1513.88 12.61

1511.56 13.22

1510.50 13.84

1510.01 14.47

1509.52 15.11

1509.02 15.75

1507.71 16.40

1506.17 17.05

1504.98 17.70

1504.21 18.36

1503.64 19.02

1502.96 19.67

1502.37 20.33

1502.25 20.70

1502.73 20.77

1503.22 20.83

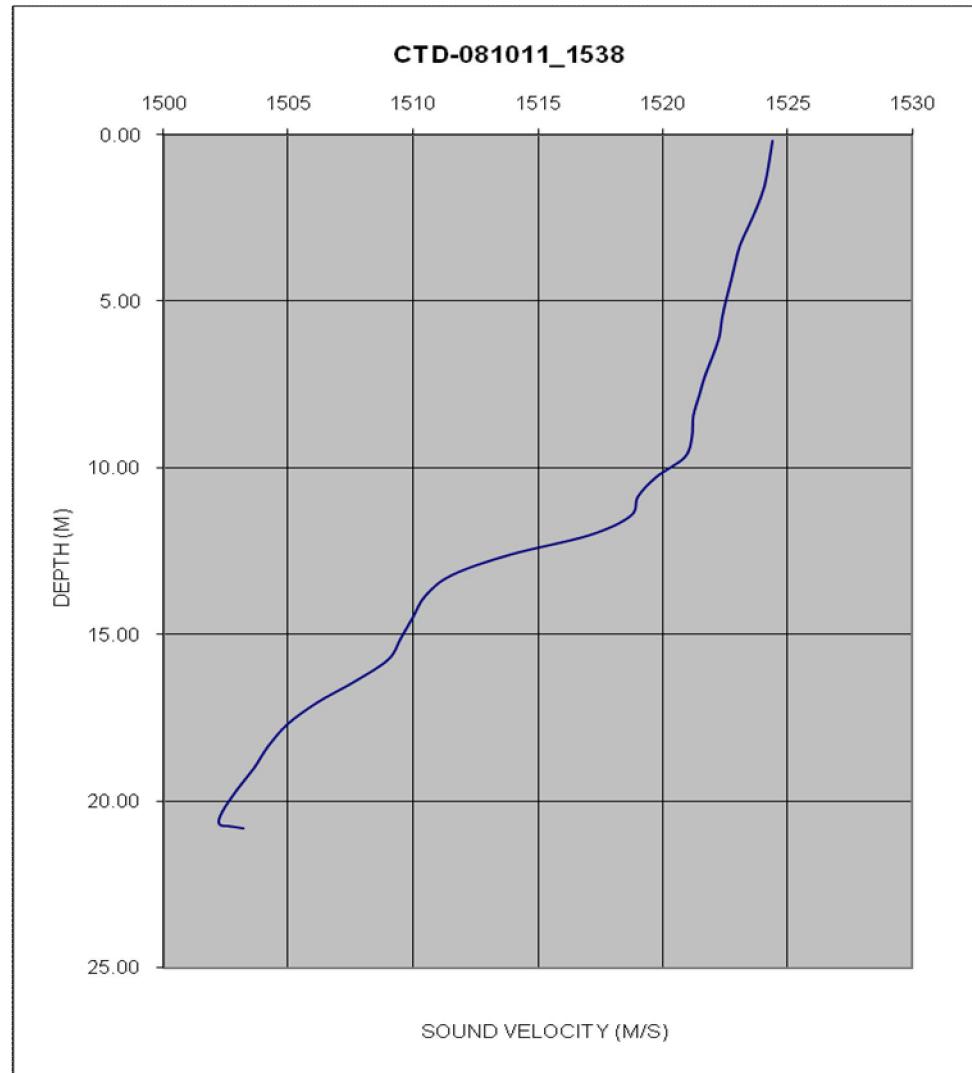


Figure 3.2-9
SVP 071011_1740 taken during the Fall 2011 multibeam survey at the HARS

1525.11	0.04
1524.94	0.79
1524.80	1.46
1524.61	2.10
1524.48	2.66
1524.38	3.19
1524.41	3.75
1524.50	4.31
1524.53	4.88
1524.53	5.46
1524.49	6.04
1524.64	6.62
1525.18	7.23
1526.84	7.89
1527.72	8.53
1527.95	9.16
1527.89	9.79
1527.58	10.42
1527.14	11.06
1526.63	11.70
1525.28	12.34
1522.28	13.00
1518.67	13.66
1512.80	14.32
1507.87	14.99
1505.75	15.66
1505.03	16.27
1505.36	16.43
1506.34	16.48
1507.11	16.49

CTD PROFILE # 071011_1740

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
08/10/11	17:40	1024368	86414	54	40.40376864 73.85595992

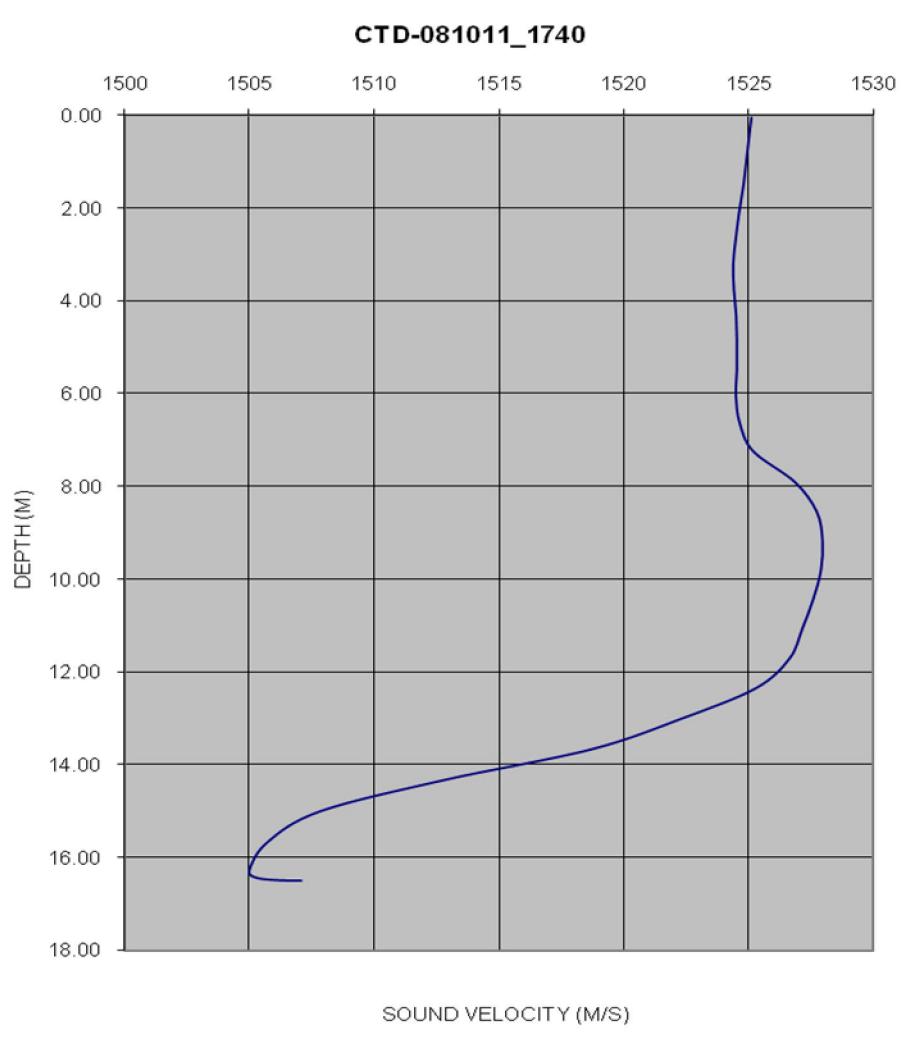


Figure 3.2-10
SVP 071011_1859 taken during the Fall 2011 multibeam survey at the HARS

1525.73	0.55
1525.47	1.36
1525.12	2.17
1524.65	2.98
1524.11	3.80
1523.62	4.59
1523.34	5.33
1523.23	6.03
1523.22	6.72
1523.22	7.39
1523.29	8.04
1523.77	8.69
1524.05	9.33
1523.60	9.95
1523.79	10.56
1524.63	11.18
1524.88	11.79
1522.50	12.40
1519.17	13.01
1515.71	13.64
1511.76	14.27
1509.07	14.93
1507.50	15.60
1506.13	16.27
1504.39	16.95
1503.33	17.62
1502.68	18.30
1502.19	18.84
1502.56	18.92

CTD PROFILE # 071011_1859

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
08/10/11	18:59	1024922	95381	62	40.42837900 73.85391350

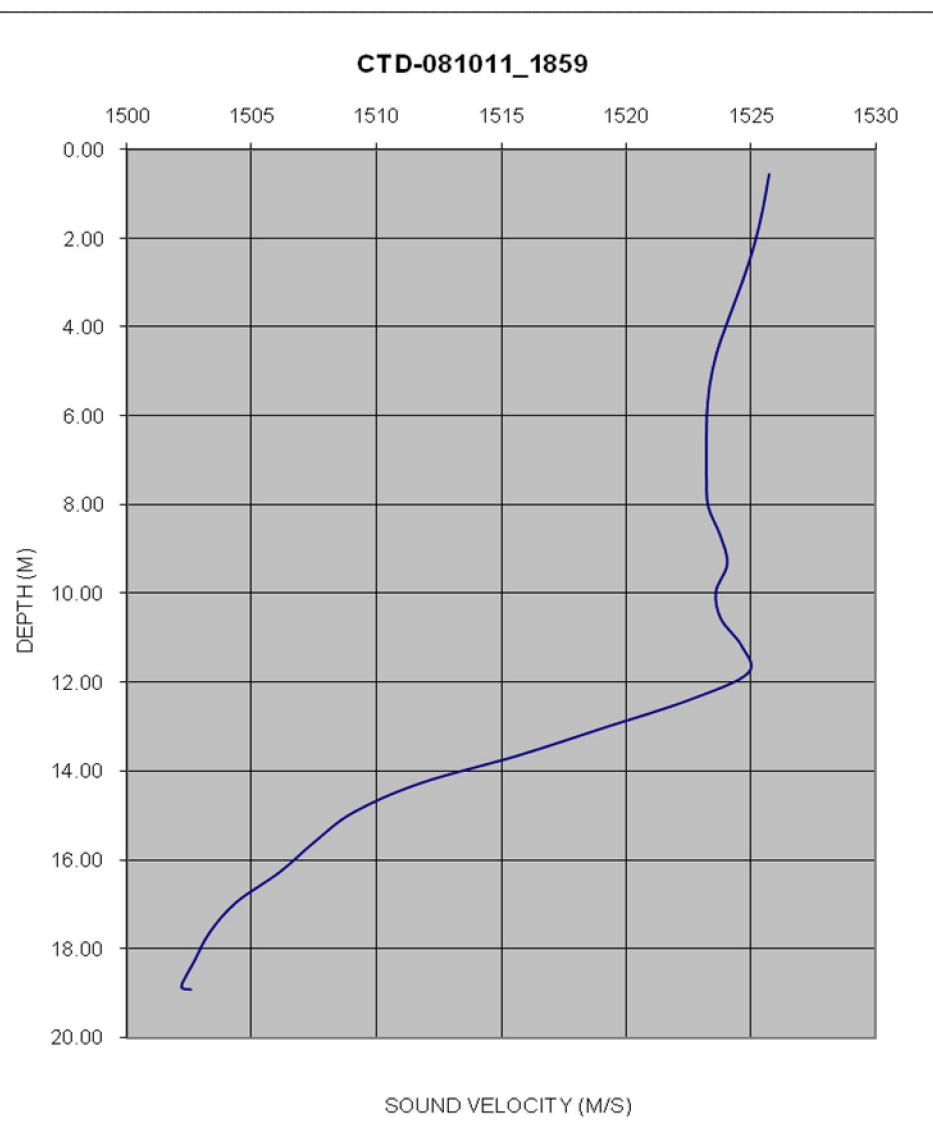


Figure 3.2-11
SVP 081111_1154 taken during the Fall 2011 multibeam survey at the HARS

1523.21	0.56
1523.21	1.25
1523.26	1.90
1523.37	2.56
1523.49	3.19
1523.72	3.81
1524.23	4.43
1525.18	5.05
1526.52	5.67
1527.08	6.30
1526.87	6.92
1526.36	7.55
1525.66	8.19
1524.47	8.84
1523.31	9.49
1522.23	10.14
1520.66	10.81
1518.11	11.49
1515.90	12.15
1513.85	12.81
1512.36	13.47
1511.08	14.13
1509.64	14.79
1507.67	15.46
1505.70	16.13
1504.44	16.77
1503.56	17.44
1502.93	18.12
1502.46	18.79
1501.84	19.46
1501.03	20.15
1500.37	20.82
1499.75	21.50
1498.63	22.17
1497.53	22.85
1496.82	23.52
1495.73	24.19
1494.33	24.88
1493.42	25.56
1492.98	26.25
1492.75	26.93
1492.54	27.62
1492.37	28.30
1492.24	28.98
1491.98	29.65
1491.67	30.33
1491.40	31.00
1491.23	31.67
1491.11	32.33
1491.05	33.00
1491.00	33.68
1491.05	34.26
1491.43	34.37
1491.96	34.37

CTD PROFILE # 081111_1154

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
08/11/11	11:54	1036081	86296	113	40.40338372
					73.81390169

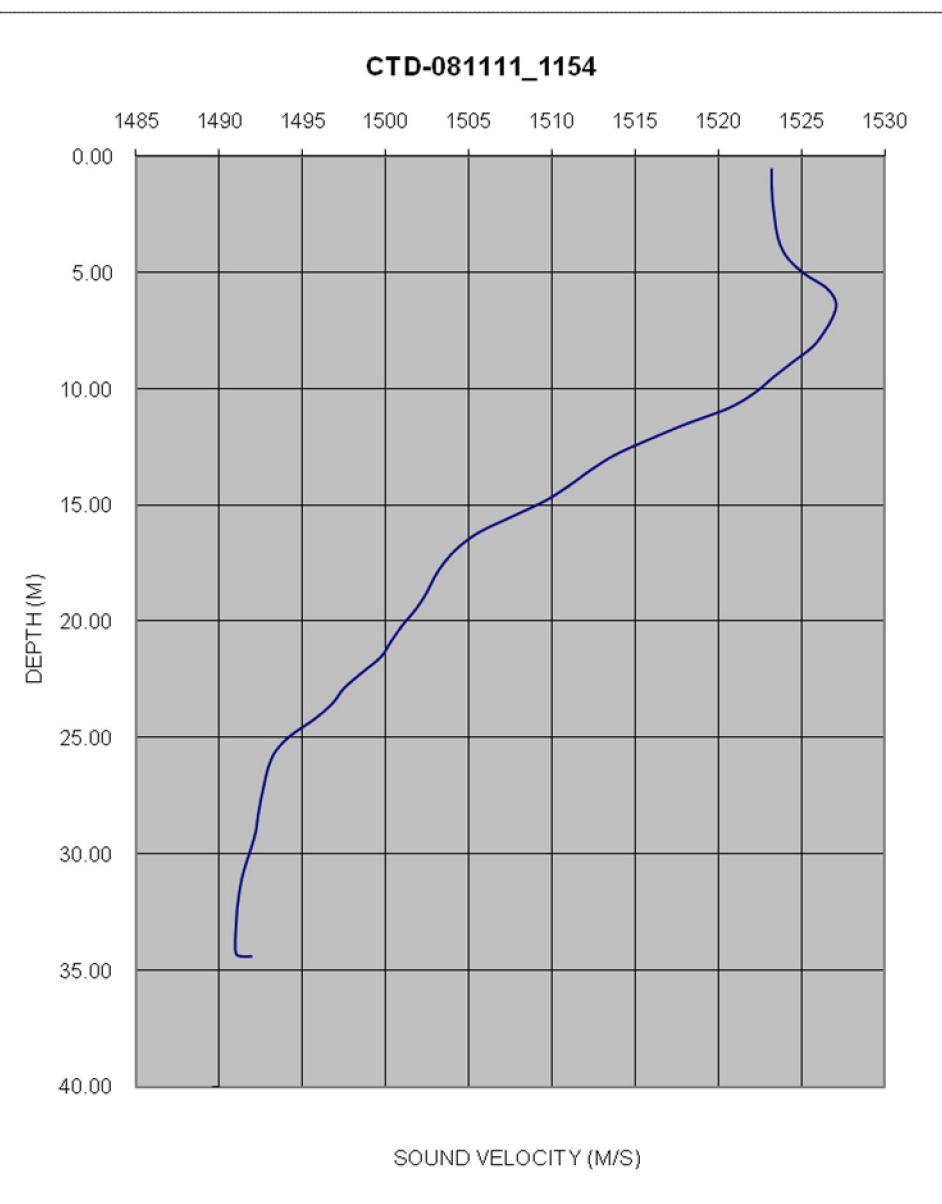


Figure 3.2-12
SVP 081111_1358 taken during the Fall 2011 multibeam survey at the HARS

1524.41	0.08
1524.31	0.71
1524.29	1.34
1524.28	1.95
1524.30	2.56
1524.33	3.17
1524.35	3.79
1524.47	4.39
1525.67	5.00
1526.45	5.62
1526.76	6.22
1527.00	6.83
1527.00	7.45
1526.91	8.08
1526.81	8.72
1526.63	9.37
1526.30	10.01
1525.67	10.66
1524.62	11.33
1522.77	11.98
1519.85	12.66
1517.44	13.34
1514.75	14.02
1513.21	14.69
1512.58	15.37
1511.87	16.05
1510.29	16.71
1507.99	17.37
1505.09	18.03
1502.58	18.71
1500.50	19.37
1498.85	20.03
1497.69	20.70
1496.64	21.38
1495.90	22.06
1495.34	22.73
1494.69	23.41
1494.09	24.08
1493.75	24.76
1493.60	25.44
1493.48	26.12
1493.34	26.82
1493.17	27.51
1492.92	28.20
1492.38	28.90
1491.63	29.59
1490.98	30.28
1490.50	30.96
1490.06	31.65
1489.86	32.27
1489.79	32.45

CTD PROFILE # 081111_1358

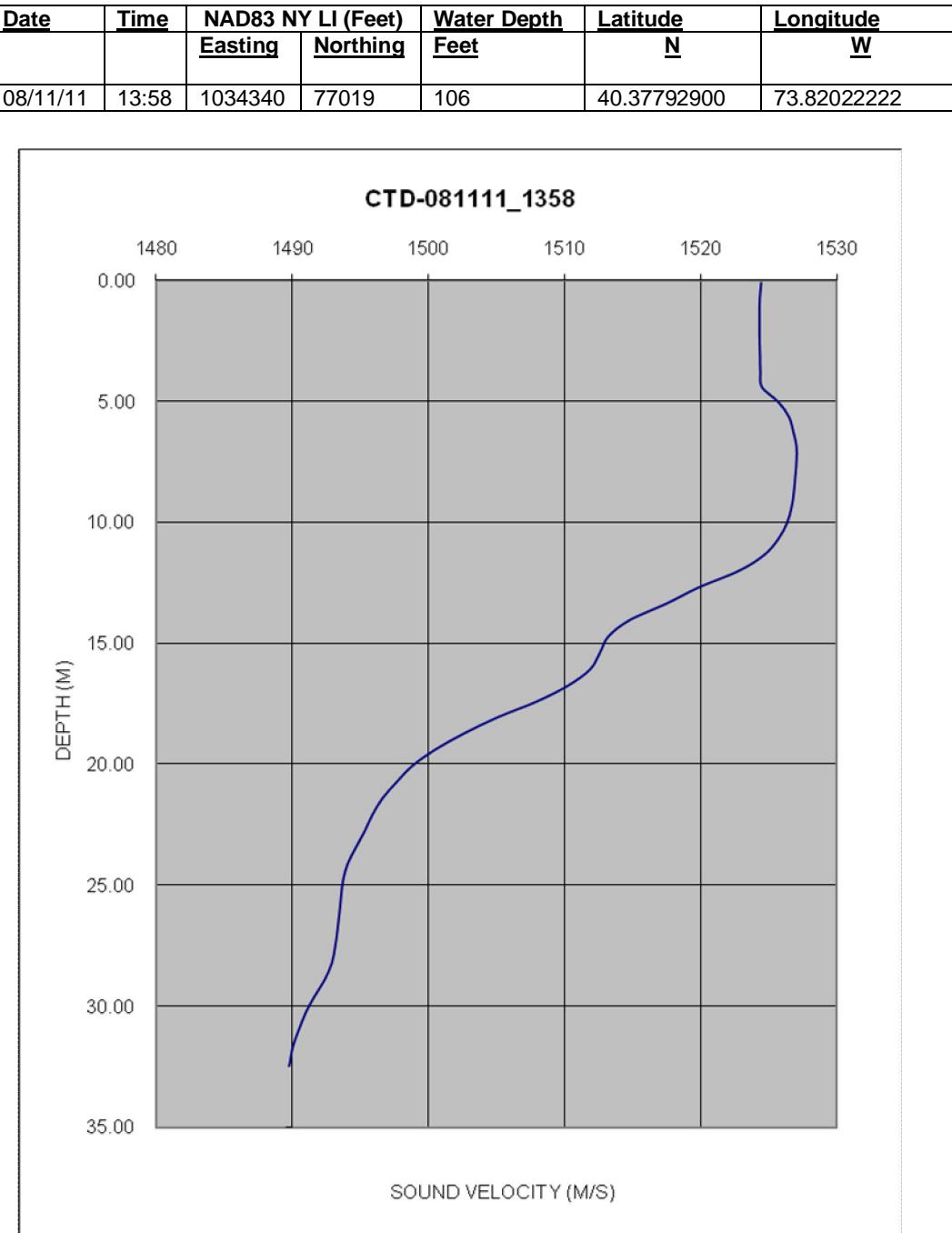


Figure 3.2-13
SVP 081111_1620 taken during the Fall 2011 multibeam survey at the HARS

1524.96	0.22
1524.97	1.01
1524.99	1.76
1524.88	2.45
1524.77	3.08
1524.70	3.72
1524.77	4.35
1525.00	4.98
1525.64	5.60
1526.34	6.23
1526.84	6.86
1527.03	7.51
1526.93	8.15
1526.79	8.79
1526.65	9.44
1526.41	10.11
1525.84	10.77
1525.07	11.44
1523.13	12.11
1519.08	12.77
1515.82	13.43
1513.78	14.09
1511.08	14.76
1508.45	15.44
1506.90	16.12
1506.20	16.80
1505.93	17.48
1505.73	18.16
1505.23	18.84
1503.85	19.53
1500.39	20.22
1497.69	20.90
1496.35	21.59
1495.65	22.26
1495.20	22.93
1494.76	23.61
1494.34	24.30
1494.08	24.99
1493.94	25.68
1493.85	26.37
1493.78	27.05
1493.71	27.74
1493.65	28.42
1493.55	29.09
1493.49	29.69
1493.83	29.85

CTD PROFILE # 081111_1620

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
08/11/11	16:20	1032054	86674	98	40.40444514 73.82835636

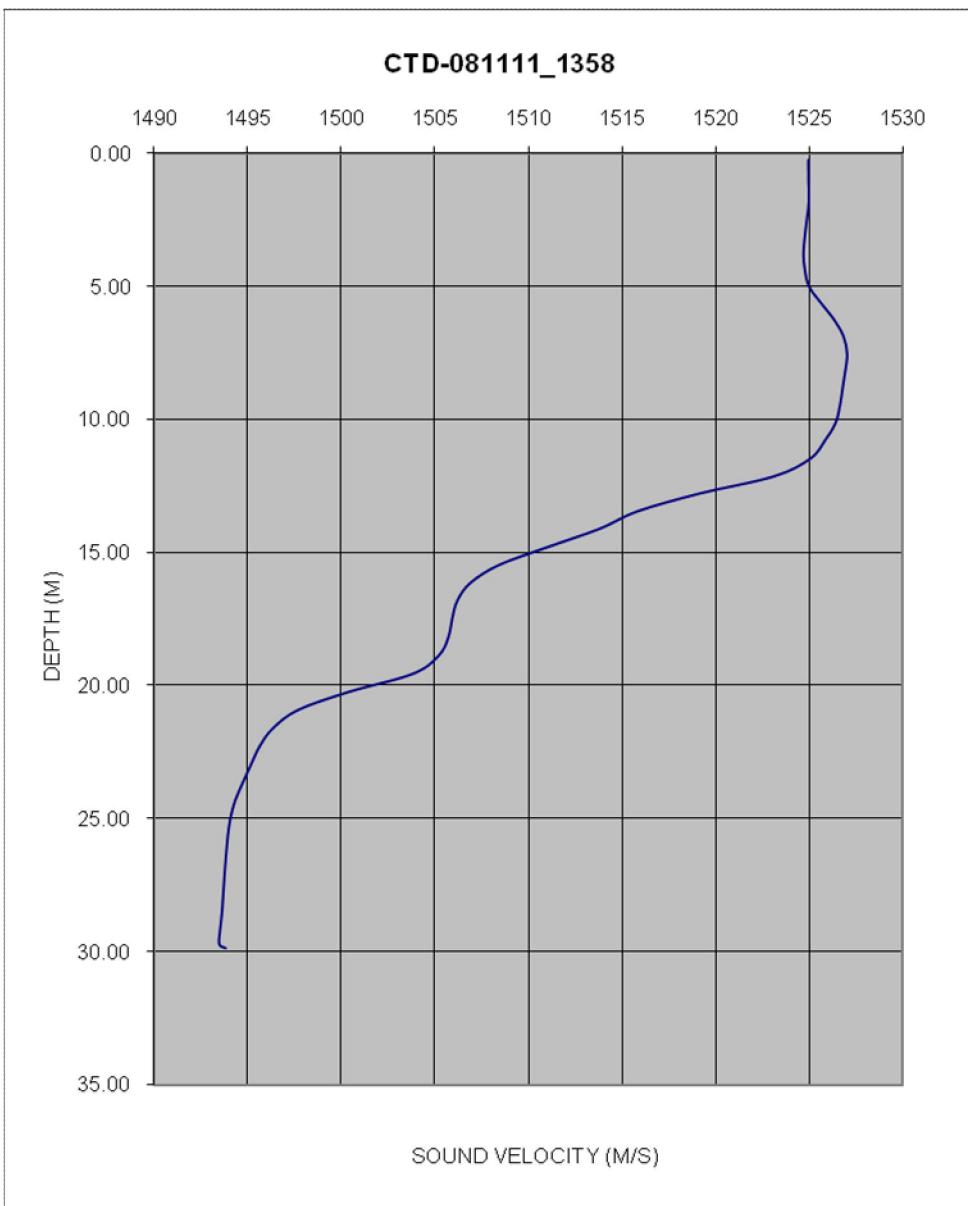


Figure 3.2-14
SVP 081111_1806 taken during the Fall 2011 multibeam survey at the HARS

1526.15	0.49
1525.82	1.26
1525.40	2.01
1525.03	2.73
1524.99	3.40
1525.21	4.04
1525.58	4.69
1526.21	5.34
1526.73	5.99
1526.96	6.65
1526.93	7.32
1526.75	7.99
1526.46	8.68
1526.10	9.35
1525.76	10.03
1525.19	10.72
1523.58	11.41
1521.09	12.08
1518.19	12.75
1515.65	13.41
1514.12	14.06
1513.44	14.73
1512.15	15.38
1509.86	16.05
1507.43	16.71
1505.73	17.38
1504.91	18.06
1504.34	18.75
1502.88	19.45
1499.65	20.13
1497.00	20.82
1495.92	21.51
1495.42	22.21
1495.14	22.91
1494.94	23.61
1494.84	24.31
1494.76	25.01
1494.70	25.70
1494.63	26.37
1494.53	27.04
1494.29	27.71
1494.03	28.07

CTD PROFILE # 081111_1806

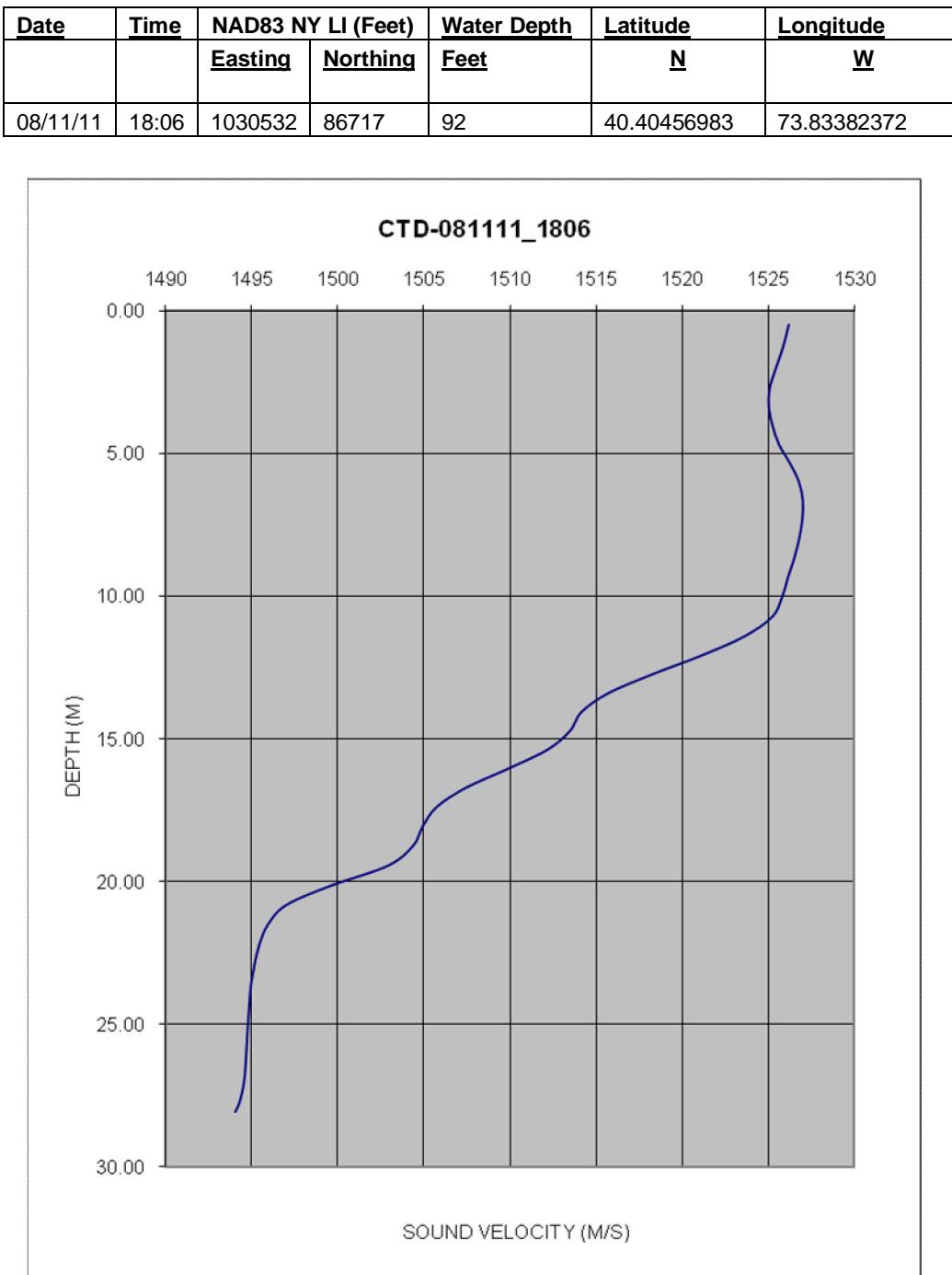


Figure 3.2-15
SVP 081111_2000 taken during the Fall 2011 multibeam survey at the HARS

1527.27	0.02
1526.85	0.82
1526.54	1.67
1526.12	2.52
1525.71	3.28
1525.48	3.97
1525.81	4.66
1525.97	5.31
1526.05	5.95
1526.11	6.58
1526.27	7.22
1526.62	7.88
1526.94	8.54
1527.04	9.21
1526.96	9.89
1526.68	10.57
1526.31	11.24
1525.91	11.92
1525.19	12.59
1521.65	13.25
1516.69	13.91
1512.27	14.58
1508.52	15.26
1506.34	15.94
1505.49	16.64
1505.05	17.33
1504.56	18.03
1503.66	18.73
1501.98	19.43
1499.62	20.11
1497.62	20.80
1496.31	21.49
1495.53	22.18
1495.19	22.87
1495.02	23.57
1494.86	24.26
1494.75	24.96
1494.83	25.56

CTD PROFILE # 081111 2000

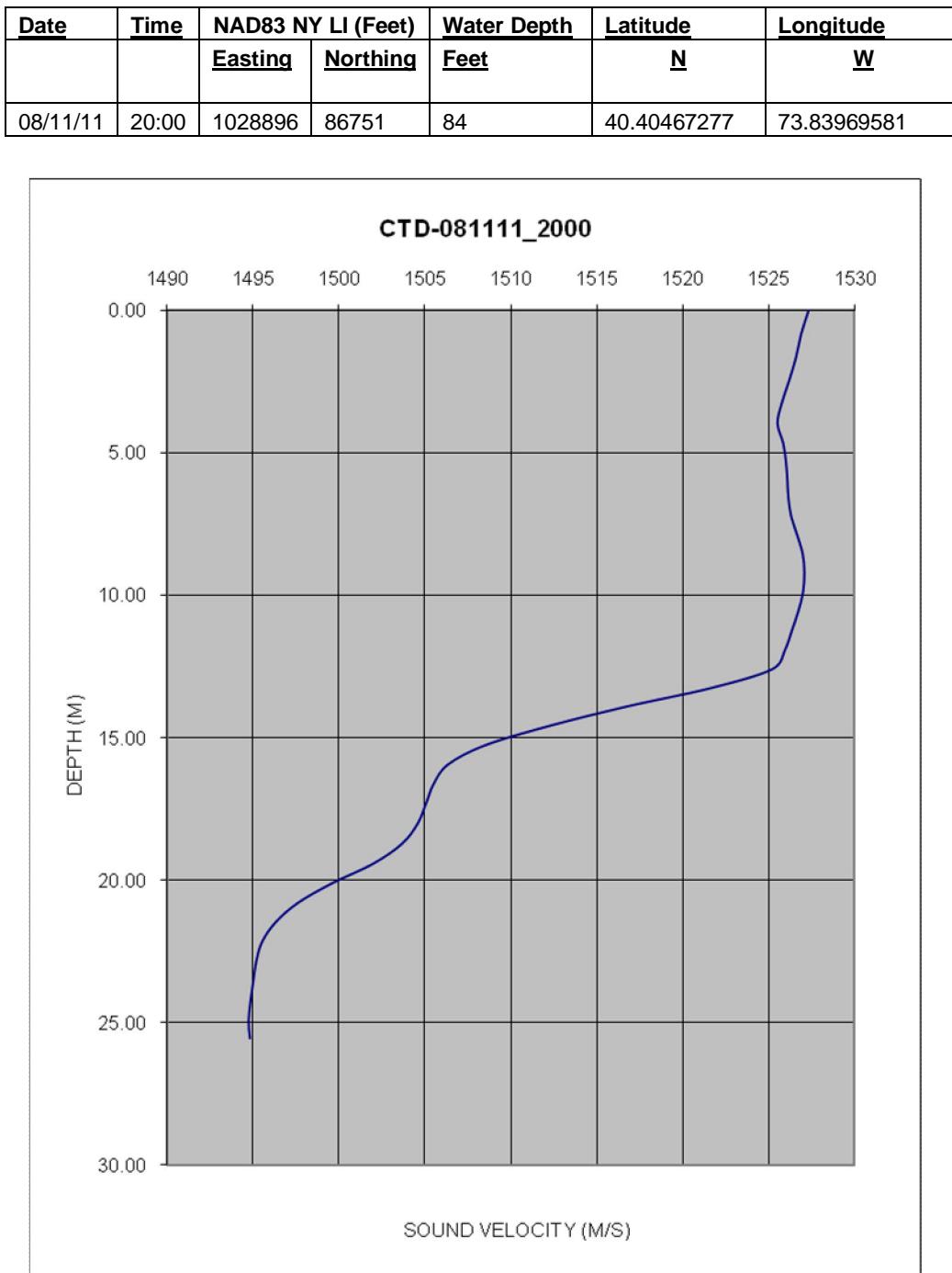


Figure 3.2-16
SVP 081111_2156 taken during the Fall 2011 multibeam survey at the HARS

1527.11	0.17
1526.97	0.86
1526.93	1.57
1526.92	2.26
1526.89	2.91
1526.79	3.51
1526.64	4.08
1526.49	4.64
1526.38	5.21
1526.35	5.80
1526.31	6.37
1526.43	6.95
1526.52	7.53
1526.70	8.13
1526.90	8.74
1526.92	9.34
1526.80	9.95
1526.48	10.57
1526.05	11.19
1525.50	11.81
1523.93	12.44
1520.66	13.08
1517.55	13.72
1514.18	14.37
1511.73	15.01
1510.49	15.66
1509.67	16.32
1508.60	16.97
1507.05	17.63
1505.26	18.28
1502.15	18.94
1499.31	19.59
1497.71	20.26
1496.53	20.94
1495.86	21.62
1495.57	22.31
1495.49	23.00
1495.90	23.30
1496.82	23.35
1497.21	23.42

CTD PROFILE # 081111 2156

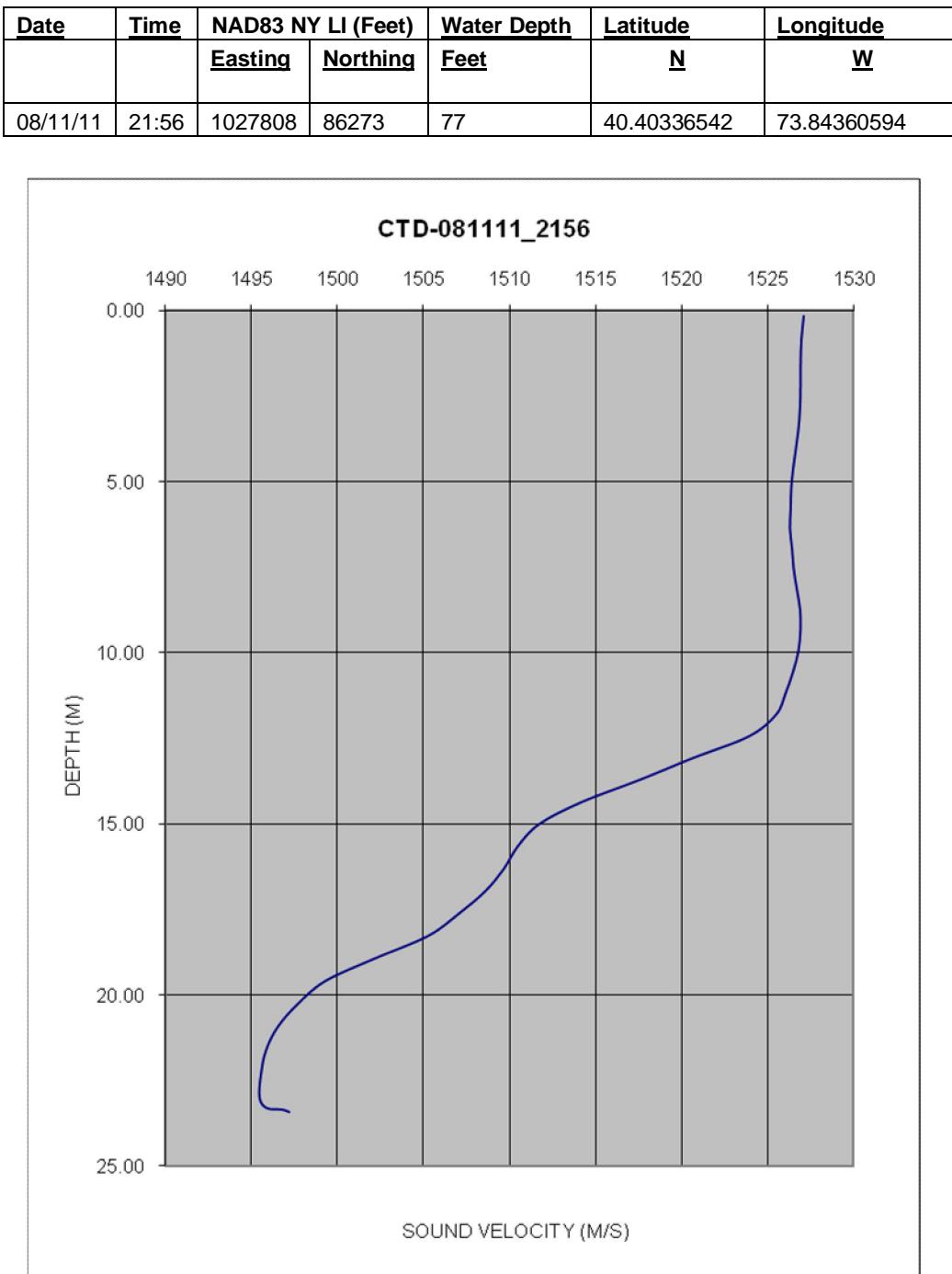


Figure 3.2-17
SVP 081211_1310 taken during the Fall 2011 multibeam survey at the HARS

1526.22 0.10

1526.35 0.86

1526.39 1.58

CTD PROFILE # 081211 1310

1526.42 2.26

1526.45 2.90

1526.49 3.49

<u>Date</u>	<u>Time</u>	<u>NAD83 NY LI (Feet)</u>	<u>Water Depth</u>	<u>Latitude</u>	<u>Longitude</u>	
		<u>Easting</u>	<u>Northing</u>	<u>Feet</u>	<u>N</u>	<u>W</u>
08/12/11	13:10	1027811	86183	74	40.40311903	73.84359430

1526.53 4.05

1526.56 4.65

1526.58 5.26

1526.62 5.87

1526.66 6.47

1526.74 7.07

1526.91 7.68

1527.02 8.28

1527.05 8.91

1527.00 9.54

1526.89 10.17

1526.75 10.80

1526.58 11.43

1525.46 12.09

1520.14 12.75

1515.01 13.41

1511.72 14.05

1510.23 14.71

1509.57 15.35

1508.93 16.01

1507.79 16.68

1506.37 17.32

1504.23 17.98

1502.43 18.63

1499.96 19.29

1497.03 19.95

1495.70 20.61

1495.33 21.28

1495.23 21.95

1495.22 22.47

1495.23 22.55

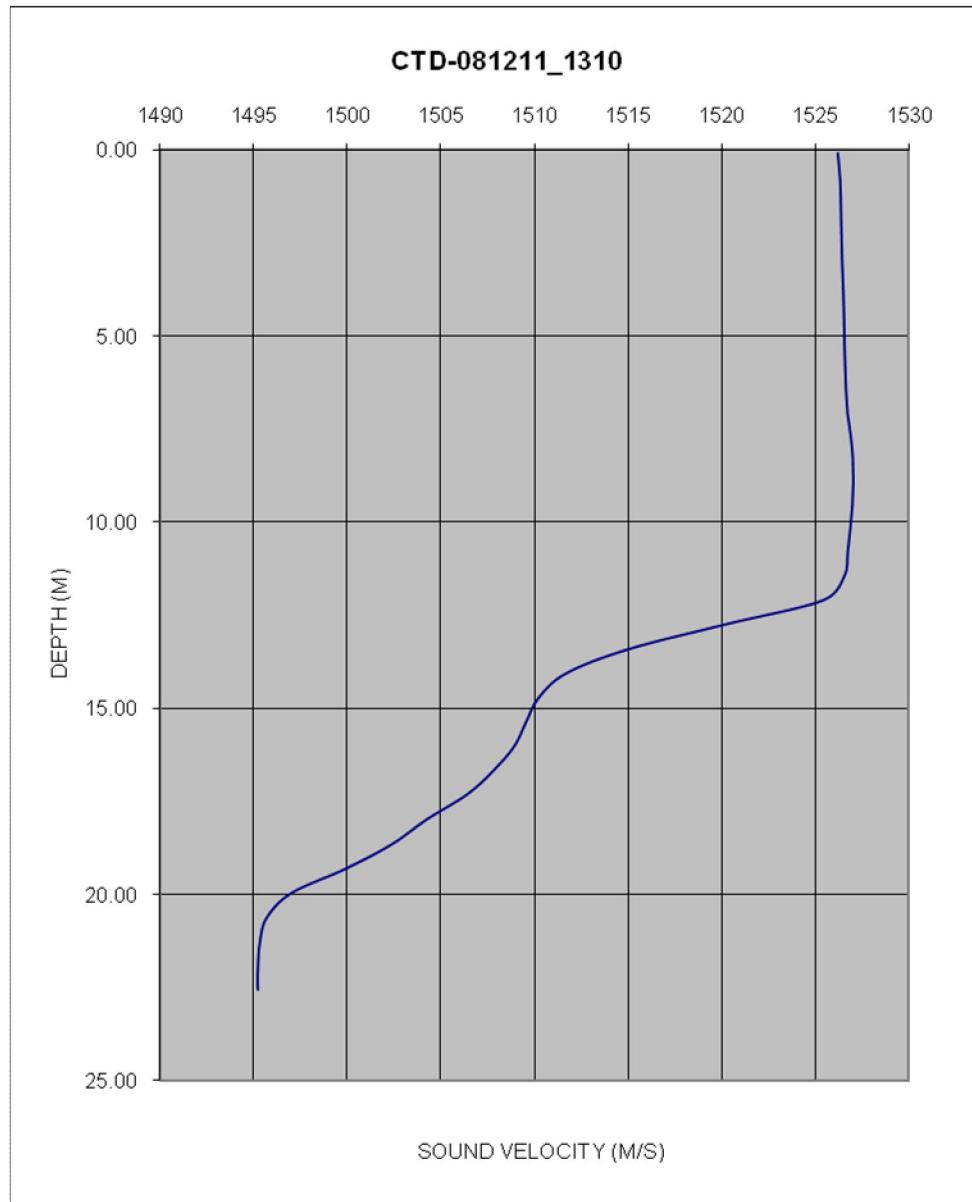


Figure 3.2-18
SVP 081211_1519 taken during the Fall 2011 multibeam survey at the HARS

1527.82	0.30
1527.77	0.99
1527.74	1.64
1527.73	2.23
1527.71	2.78
1527.70	3.33
1527.70	3.90
1527.69	4.47
1527.67	5.04
1527.64	5.62
1527.60	6.22
1527.57	6.81
1527.50	7.40
1527.29	7.99
1526.95	8.60
1526.55	9.21
1526.11	9.81
1524.97	10.42
1523.37	11.05
1521.34	11.70
1519.62	12.34
1516.36	12.99
1513.31	13.64
1510.86	14.28
1508.84	14.93
1507.06	15.57
1505.06	16.21
1503.26	16.86
1502.44	17.44
1502.72	17.61

CTD PROFILE # 081211 1519

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
08/12/11	15:19	1027320	77136	58	40.37828828 73.84541598

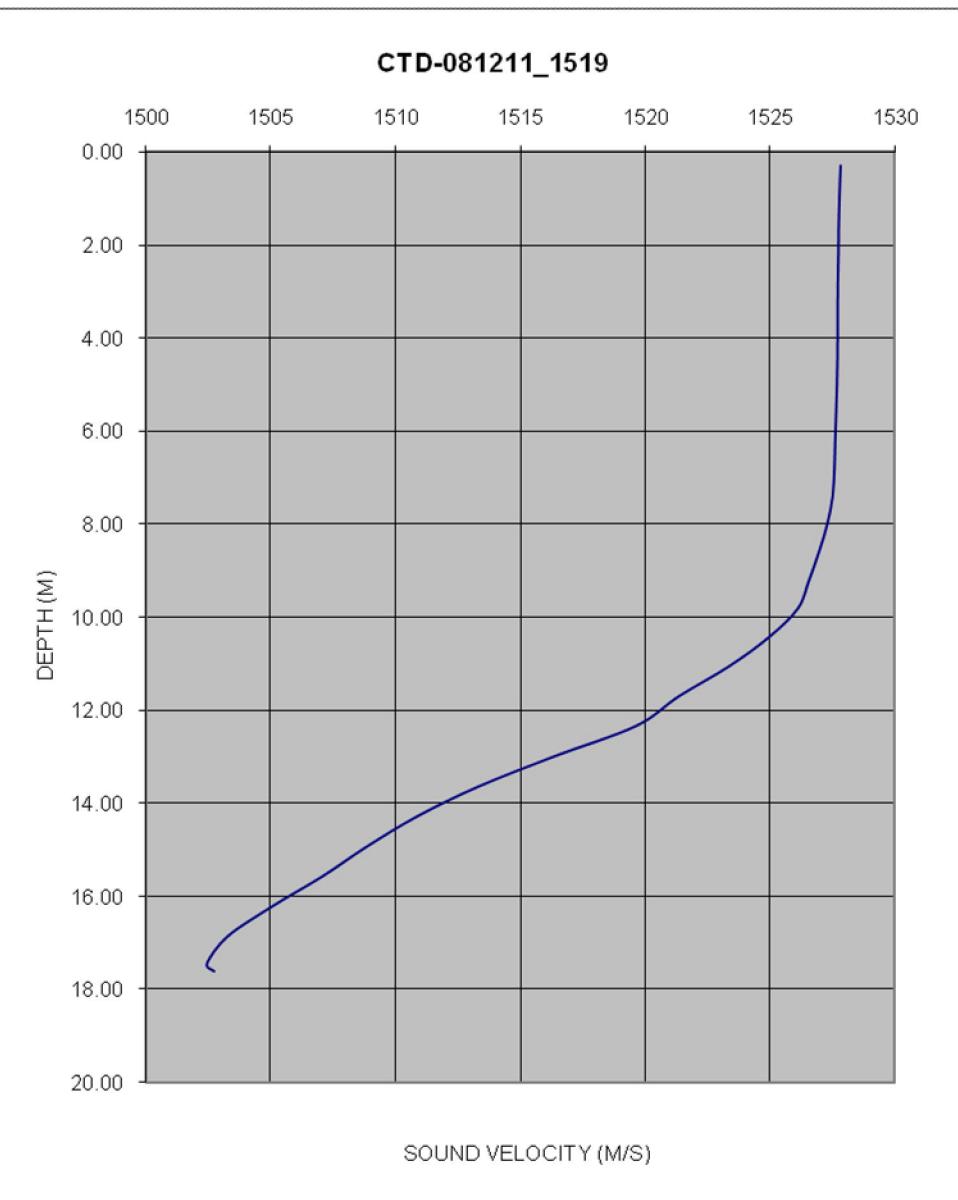


Figure 3.2-19
SVP 081211_1711 taken during the Fall 2011 multibeam survey at the HARS

1528.00	0.29
1527.81	0.99
1527.63	1.69
1527.49	2.36
1527.40	2.99
1527.35	3.63
1527.29	4.24
1527.21	4.82
1526.97	5.41
1526.66	6.03
1526.34	6.66
1525.73	7.30
1525.20	7.93
1523.29	8.57
1519.89	9.22
1517.60	9.87
1516.54	10.53
1516.19	11.18
1516.10	11.84
1516.10	12.50
1515.57	13.16
1513.67	13.81
1512.00	14.47
1510.44	15.13
1508.81	15.79
1506.69	16.47
1504.36	17.14
1502.93	17.82
1502.22	18.50
1501.49	19.14
1501.48	19.35

CTD PROFILE # 081211_1711

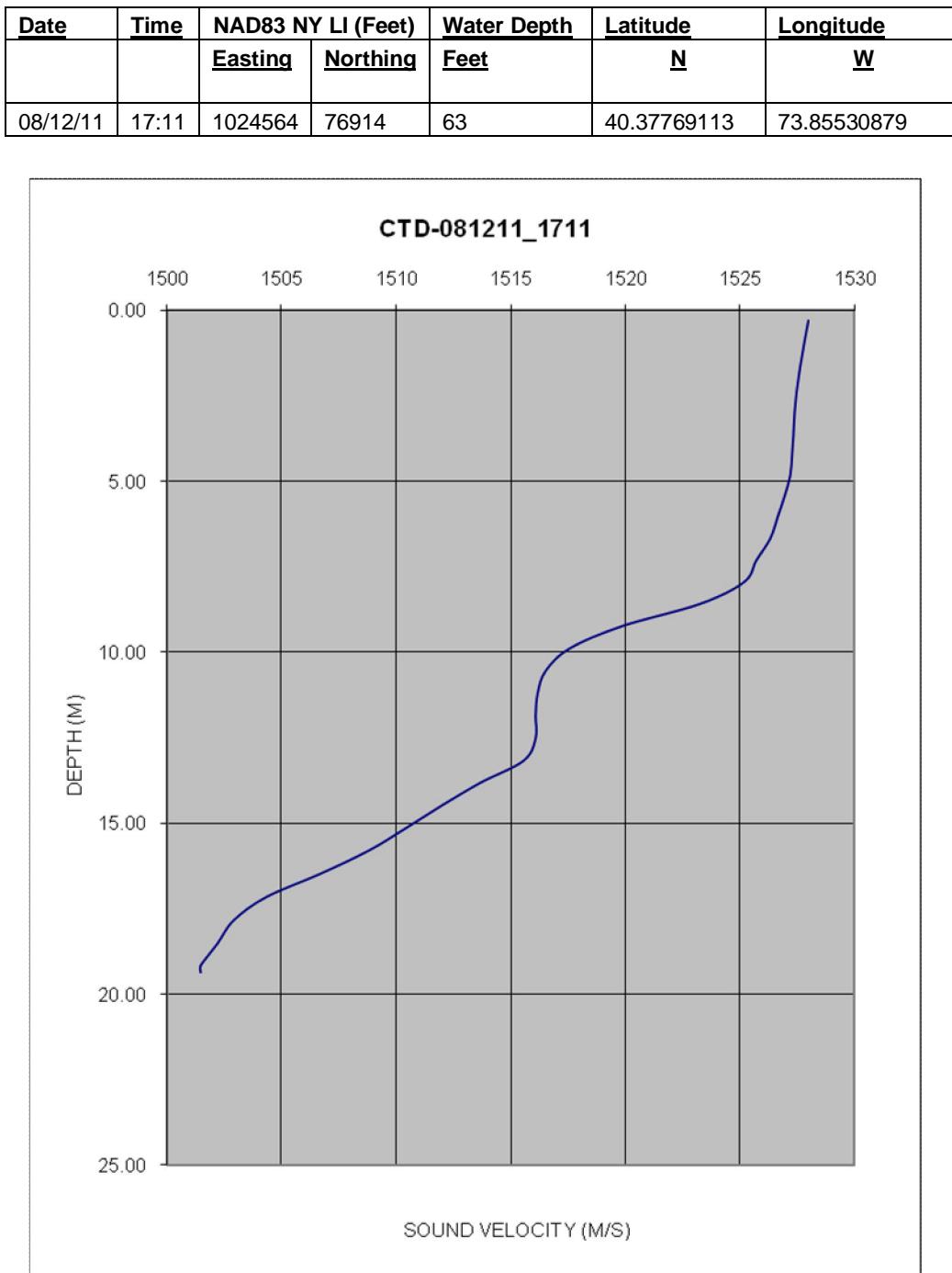


Figure 3.2-20
SVP 081211_1916 taken during the Fall 2011 multibeam survey at the HARS

1527.59	0.35
1527.47	1.06
1527.39	1.81
1527.04	2.61
1526.89	3.40
1526.82	4.17
1526.60	4.87
1526.17	5.54
1525.74	6.22
1525.35	6.89
1524.86	7.56
1524.11	8.21
1523.45	8.87
1523.17	9.51
1523.06	10.16
1522.97	10.82
1522.20	11.49
1520.11	12.13
1517.17	12.75
1514.68	13.37
1512.90	13.98
1510.11	14.58
1507.24	15.20
1505.68	15.80
1505.09	16.38
1504.91	16.60

CTD PROFILE # 081211 1916

<u>Date</u>	<u>Time</u>	<u>NAD83 NY LI (Feet)</u>	<u>Water Depth</u>	<u>Latitude</u>	<u>Longitude</u>
		<u>Easting</u>	<u>Northing</u>	<u>Feet</u>	<u>N</u>
08/12/11	19:16	1023972	86140	54	40.40301811 73.85738120

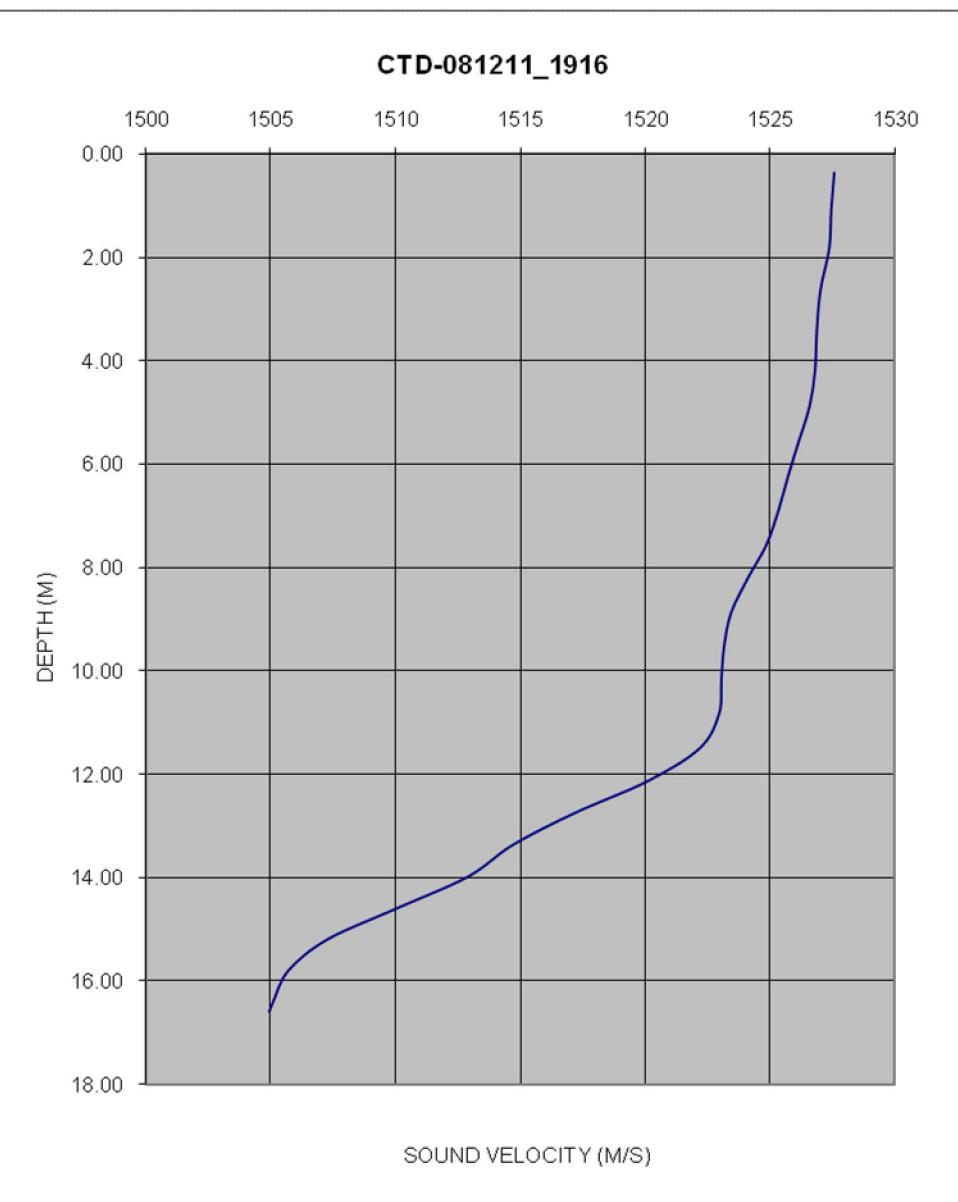


Figure 3.2-21
SVP 081211_2057 taken during the Fall 2011 multibeam survey at the HARS

1529.76	0.02
1529.69	0.67
1529.77	1.33
1529.70	1.96
1529.39	2.56
1529.05	3.17
1528.63	3.81
1528.25	4.48
1527.97	5.15
1527.76	5.82
1527.60	6.48
1527.51	7.13
1527.47	7.79
1527.41	8.45
1527.27	9.11
1526.94	9.77
1525.57	10.44
1522.08	11.11
1517.56	11.77
1513.54	12.46
1510.34	13.15
1508.09	13.84
1506.35	14.53
1505.33	15.23
1504.84	15.90
1504.62	16.57
1504.50	17.24
1504.39	17.92
1503.88	18.61
1502.92	19.30
1501.81	19.98
1501.00	20.65
1500.37	21.31
1499.85	21.97
1499.80	22.28

CTD PROFILE # 081211 2057

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
08/12/11	20:57	1030598	79091	73	40.38363736 73.83363682

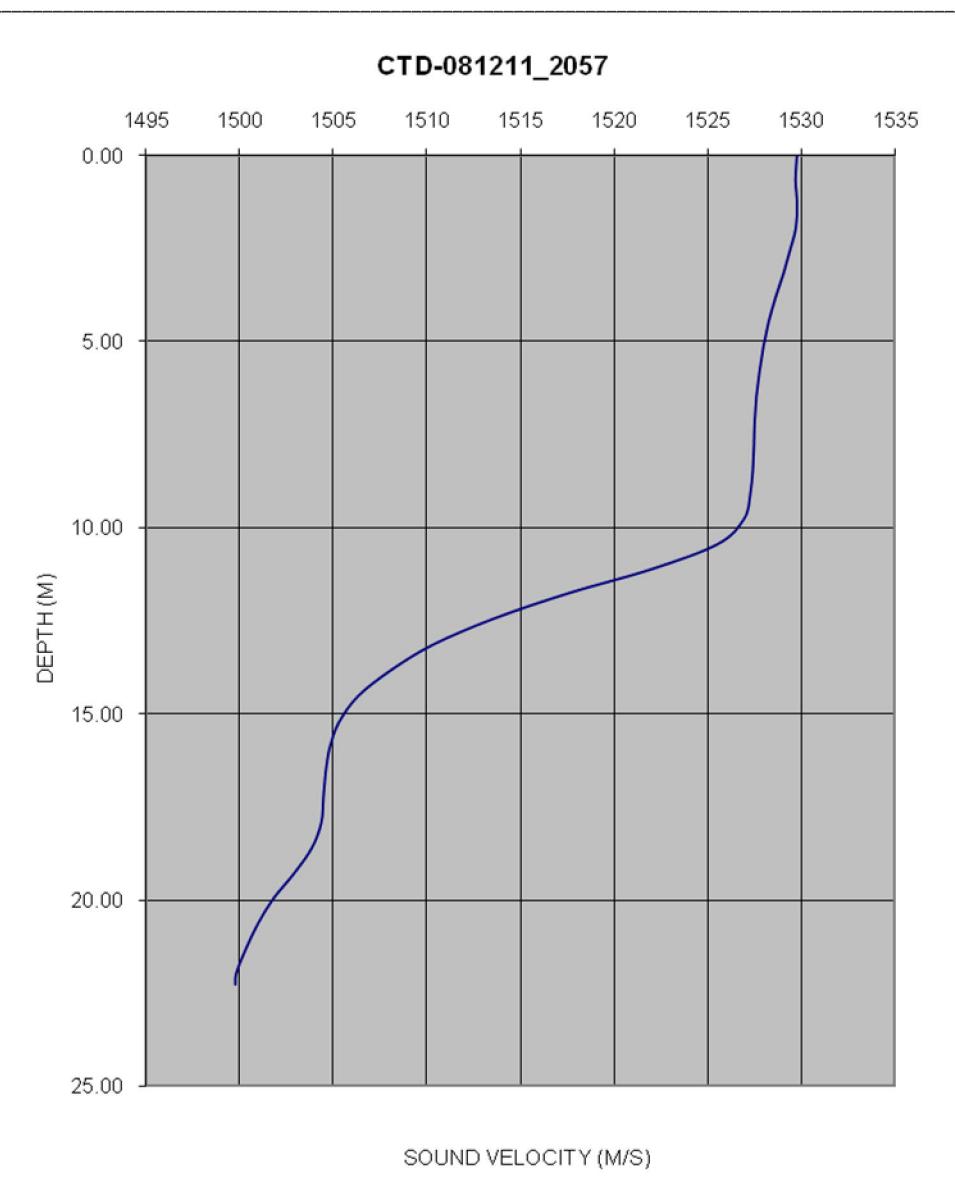


Figure 3.2-22
SVP 081611_1158 taken during the Fall 2011 multibeam survey at the HARS

1520.80	0.58
1520.78	1.42
1520.78	2.19
1520.78	2.89
1520.72	3.50
1520.65	4.09
1520.49	4.65
1520.25	5.23
1519.94	5.78
1519.63	6.34
1519.26	6.91
1518.41	7.48
1517.25	8.05
1516.29	8.63
1515.58	9.21
1515.00	9.80
1514.60	10.40
1513.00	11.01
1511.16	11.62
1509.38	12.23
1507.78	12.85
1506.45	13.46
1505.39	14.07
1504.76	14.70
1504.41	15.33
1504.17	15.98
1503.78	16.64
1503.23	17.30
1502.76	17.96
1502.41	18.63
1502.01	19.29
1501.61	19.96
1501.26	20.63
1500.83	21.30
1500.41	21.96
1500.07	22.65
1499.74	23.35
1499.49	24.03
1499.27	24.70
1499.05	25.38
1498.72	26.04
1498.42	26.70
1498.25	27.38
1498.18	28.09
1498.14	28.79
1498.12	29.47
1498.10	30.16
1498.10	30.83
1498.25	31.11

CTD PROFILE # 081611_1158

Date	Time	NAD83 NY LI (Feet)		Water Depth	Latitude	Longitude
		Easting	Northing	Feet	N	W
08/16/11	11:58	1036087	77318	102	40.37874105	73.81394874

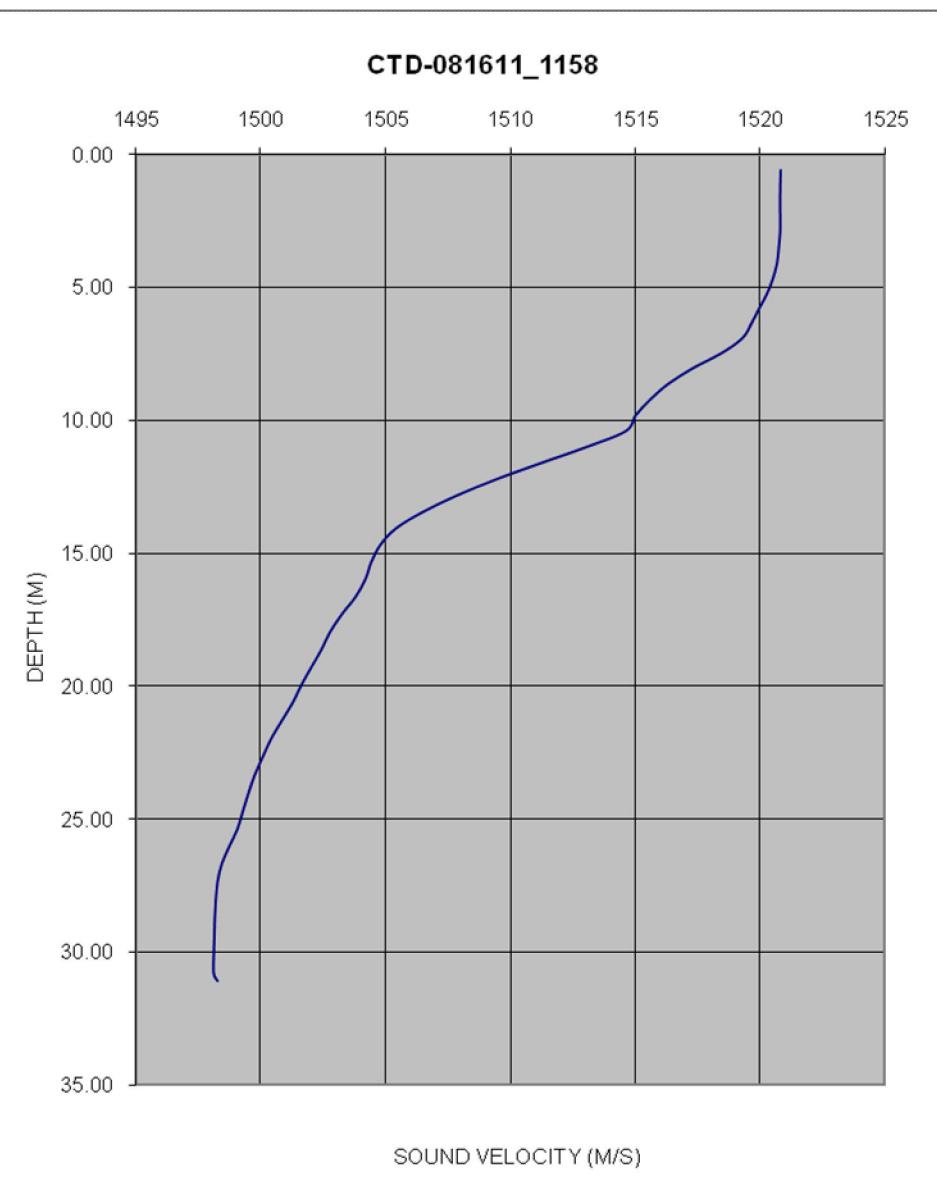


Figure 3.2-23
SVP 081611_1414 taken during the Fall 2011 multibeam survey at the HARS

1521.12	0.73
1521.10	1.49
1521.11	2.24
1521.12	3.04
1521.14	3.82
1521.17	4.57
1521.21	5.29
1521.18	5.98
1520.84	6.65
1520.35	7.32
1519.58	7.98
1518.20	8.63
1517.28	9.29
1516.99	9.96
1516.75	10.63
1516.12	11.32
1514.92	12.00
1513.63	12.69
1511.94	13.38
1509.95	14.10
1508.47	14.82
1507.22	15.52
1506.03	16.25
1505.10	16.97
1504.33	17.71
1503.67	18.45
1503.11	19.19
1502.76	19.95
1502.47	20.71
1501.97	21.47
1501.32	22.22
1500.67	22.98
1500.14	23.73
1499.55	24.48
1498.83	25.22
1498.40	25.98
1498.23	26.73
1498.17	27.49
1498.15	28.24
1498.15	28.98
1498.14	29.72
1498.14	30.46
1498.13	31.19
1498.01	31.90
1497.79	32.61
1497.49	33.29
1497.38	33.78
1497.62	33.81

CTD PROFILE # 081611 1414

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
08/16/11	14:14	1033636	67799	111	40.35262695 73.82281485

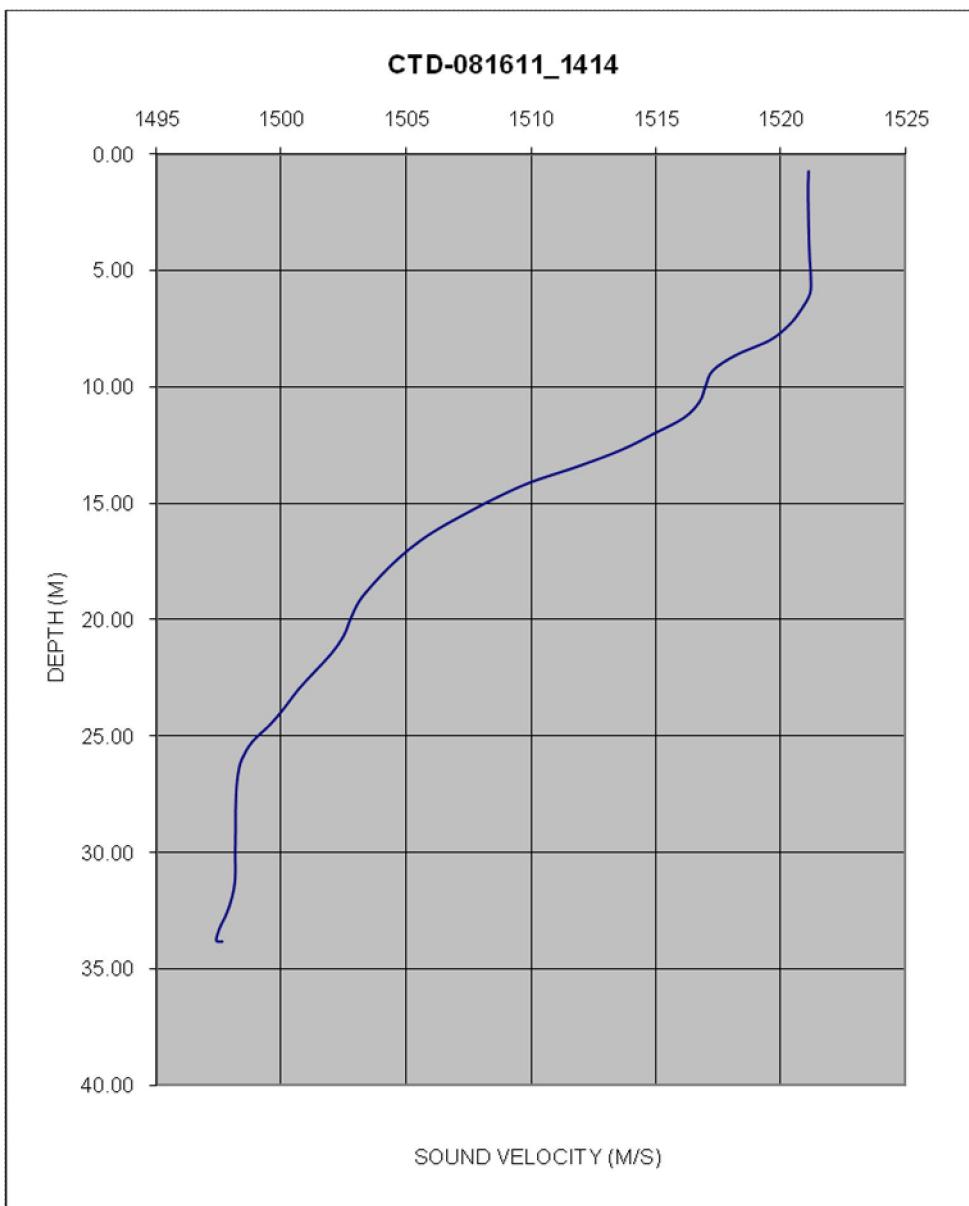


Figure 3.2-24
SVP 081611_1625 taken during the Fall 2011 multibeam survey at the HARS

1520.83	0.59
1520.78	1.22
1520.77	1.92
1520.78	2.64
1520.79	3.33
1520.80	4.01
1520.79	4.68
1520.74	5.34
1520.65	5.99
1520.48	6.65
1519.93	7.30
1518.92	7.98
1517.89	8.65
1516.69	9.32
1515.66	10.02
1514.91	10.76
1513.75	11.46
1512.59	12.16
1511.74	12.84
1510.70	13.55
1509.67	14.14
1508.99	14.71
1508.27	15.38
1507.18	16.12
1505.75	16.82
1504.59	17.55
1503.47	18.27
1502.54	18.99
1502.10	19.71
1501.95	20.42
1501.88	21.17
1501.84	21.87
1501.73	22.59
1501.60	23.28
1501.42	23.98
1501.27	24.68
1501.21	25.38
1501.18	26.08
1501.11	26.77
1501.07	27.43
1501.20	27.78

CTD PROFILE # 081611_1625

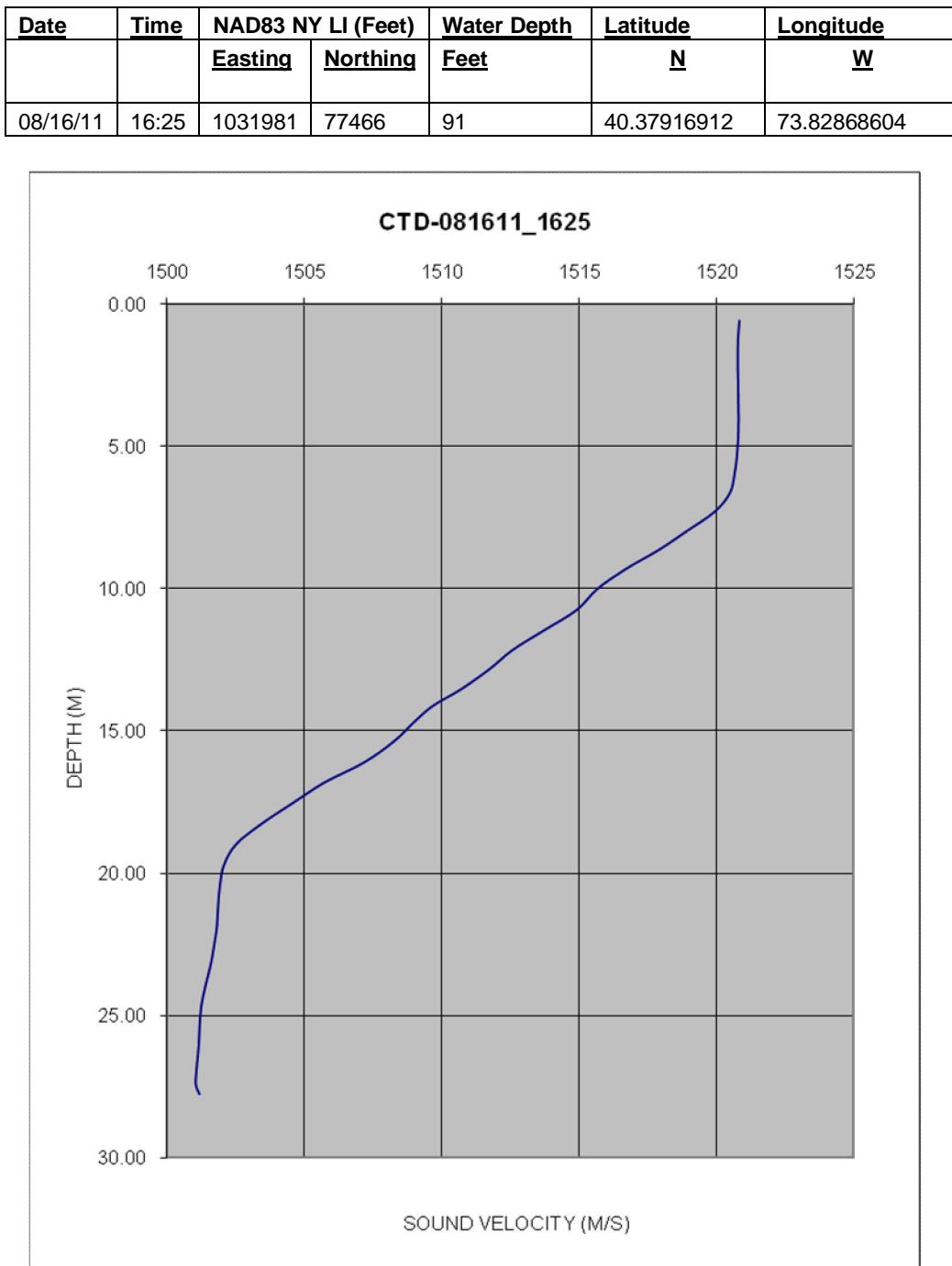


Figure 3.2-25
SVP 081611_1839 taken during the Fall 2011 multibeam survey at the HARS

1521.89 0.42

1521.59 1.21

1521.07 2.03

CTD PROFILE # 081611 1839

1520.56 2.86

1520.15 3.69

1519.92 4.53

<u>Date</u>	<u>Time</u>	<u>NAD83 NY LI (Feet)</u>	<u>Water Depth</u>	<u>Latitude</u>	<u>Longitude</u>
		<u>Easting</u>	<u>Northing</u>	<u>Feet</u>	<u>N</u>
08/16/11	18:39	1029869	67902	86	40.35293033 73.83632850

1519.82 5.36

1519.70 6.16

1518.67 6.91

1517.69 7.62

1517.06 8.33

1516.29 9.01

1514.82 9.69

1512.89 10.36

1511.40 11.05

1510.29 11.76

1508.86 12.48

1507.76 13.20

1506.84 13.90

1505.26 14.59

1504.22 15.27

1503.76 15.96

1503.45 16.65

1503.30 17.35

1503.28 18.06

1503.13 18.78

1502.64 19.50

1502.03 20.21

1501.52 20.93

1501.23 21.63

1501.09 22.33

1501.00 23.03

1500.91 23.73

1500.85 24.43

1500.82 25.12

1500.81 25.82

1500.96 26.20

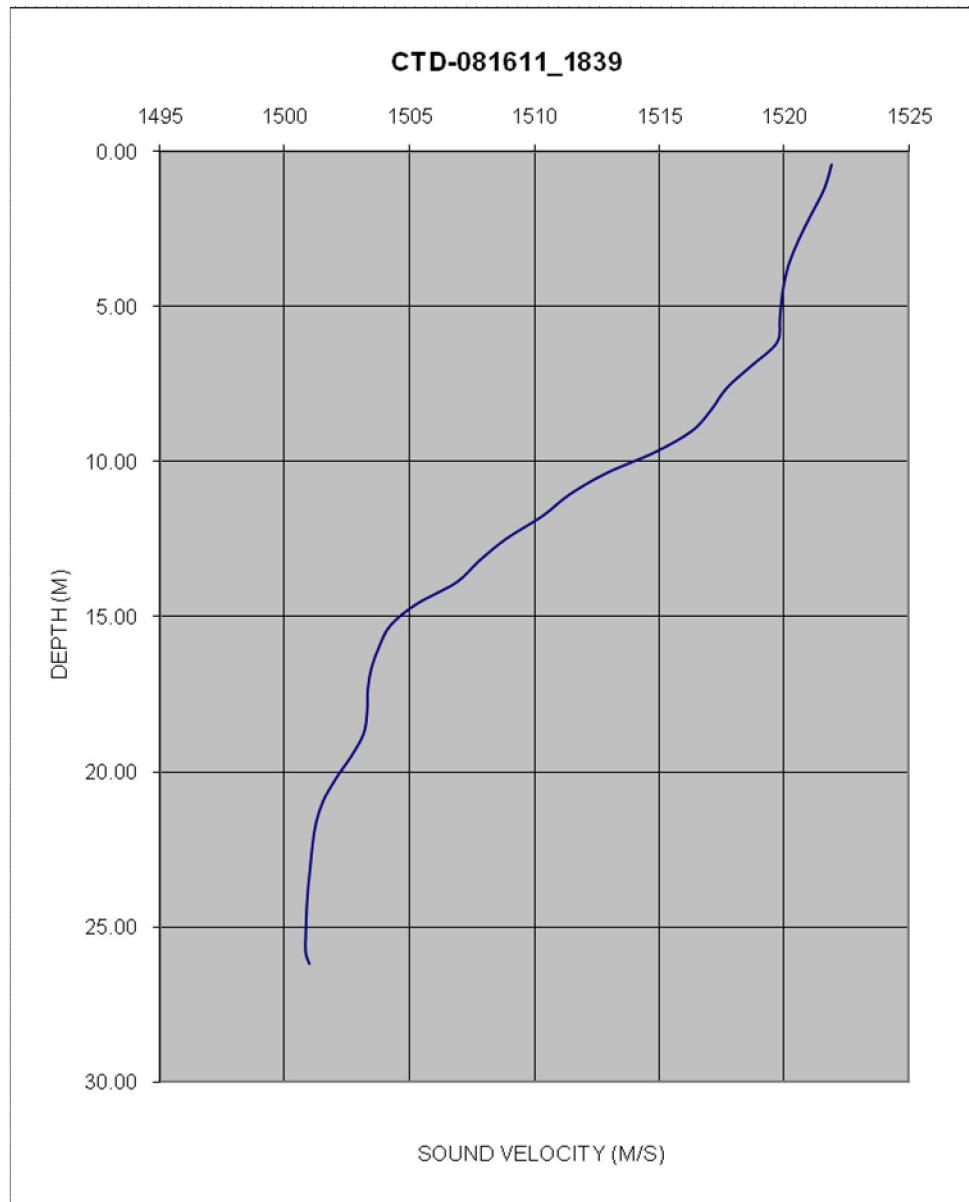


Figure 3.2-26
SVP 081611_2043 taken during the Fall 2011 multibeam survey at the HARS

1521.68	0.15
1521.68	0.82
1521.68	1.48
1521.71	2.12
1521.58	2.76
1521.36	3.39
1521.11	4.04
1520.70	4.71
1520.03	5.34
1518.67	5.92
1517.62	6.49
1517.06	7.07
1516.91	7.64
1516.97	8.22
1517.09	8.80
1517.18	9.37
1516.97	9.93
1516.42	10.50
1515.03	11.08
1513.24	11.67
1511.03	12.28
1509.41	12.90
1508.60	13.52
1508.24	14.16
1507.97	14.81
1507.45	15.47
1506.41	16.13
1505.62	16.80
1505.22	17.48
1505.04	17.94
1504.97	18.01

CTD PROFILE # 081611_2043

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
08/16/11	20:43	1028759	77375	59	40.37893655 73.84024974

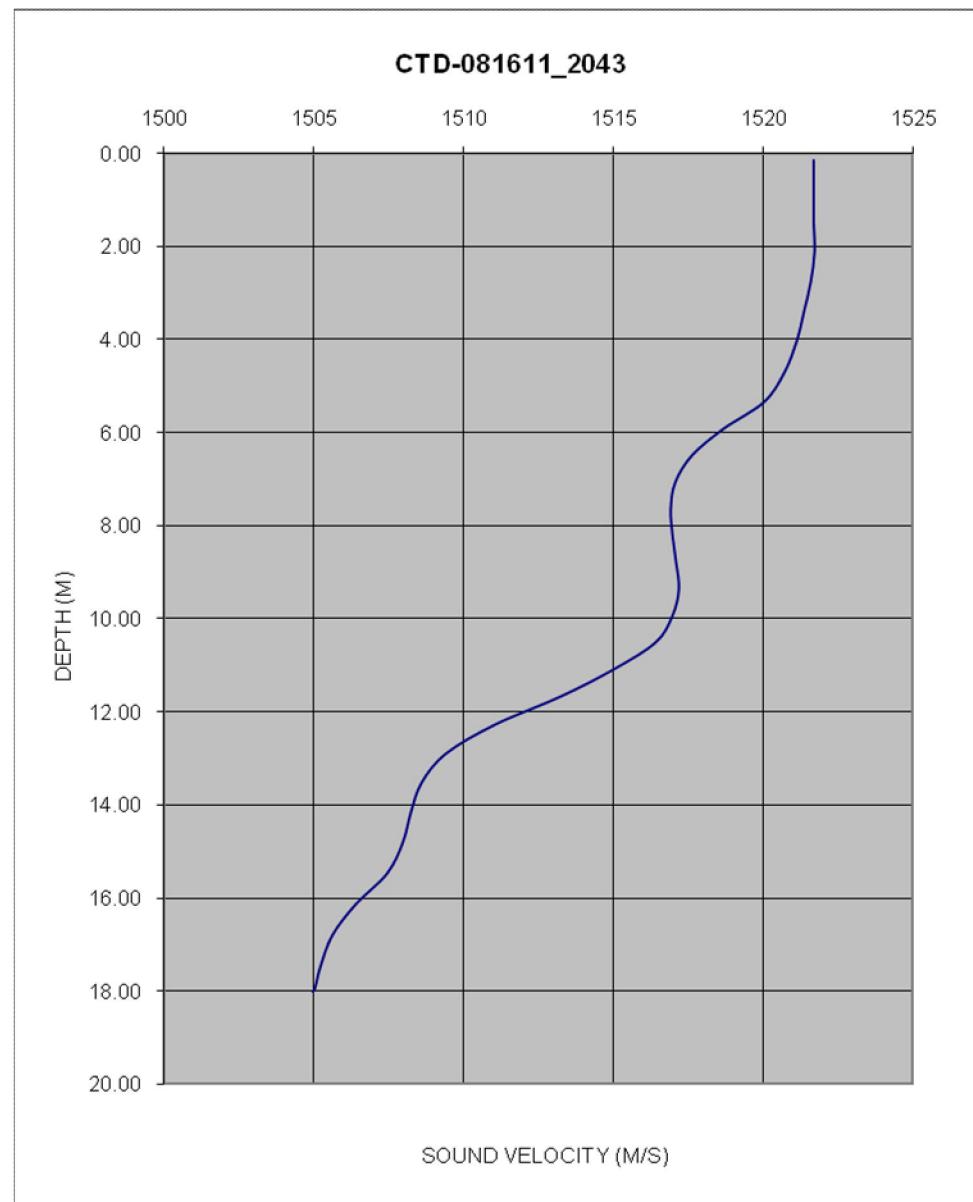


Figure 3.2-27
SVP 081611_2206 taken during the Fall 2011 multibeam survey at the HARS

1521.79	0.39
1521.67	1.13
1521.56	1.82
1521.49	2.50
1521.48	3.17
1521.55	3.83
1521.46	4.48
1521.07	5.14
1520.47	5.78
1519.85	6.41
1519.18	7.03
1518.00	7.64
1517.69	8.25
1518.09	8.87
1518.01	9.49
1516.70	10.12
1514.28	10.76
1511.56	11.43
1509.54	12.10
1508.14	12.78
1507.20	13.47
1506.60	14.17
1506.19	14.87
1505.79	15.56
1505.32	16.24
1504.91	16.92
1504.68	17.59
1504.56	18.25
1504.36	18.90
1504.38	19.19
1504.78	19.22
1505.05	19.26

CTD PROFILE # 081611 2206

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
08/16/11	22:06	1028296	77076	63	40.37811881 73.84191338

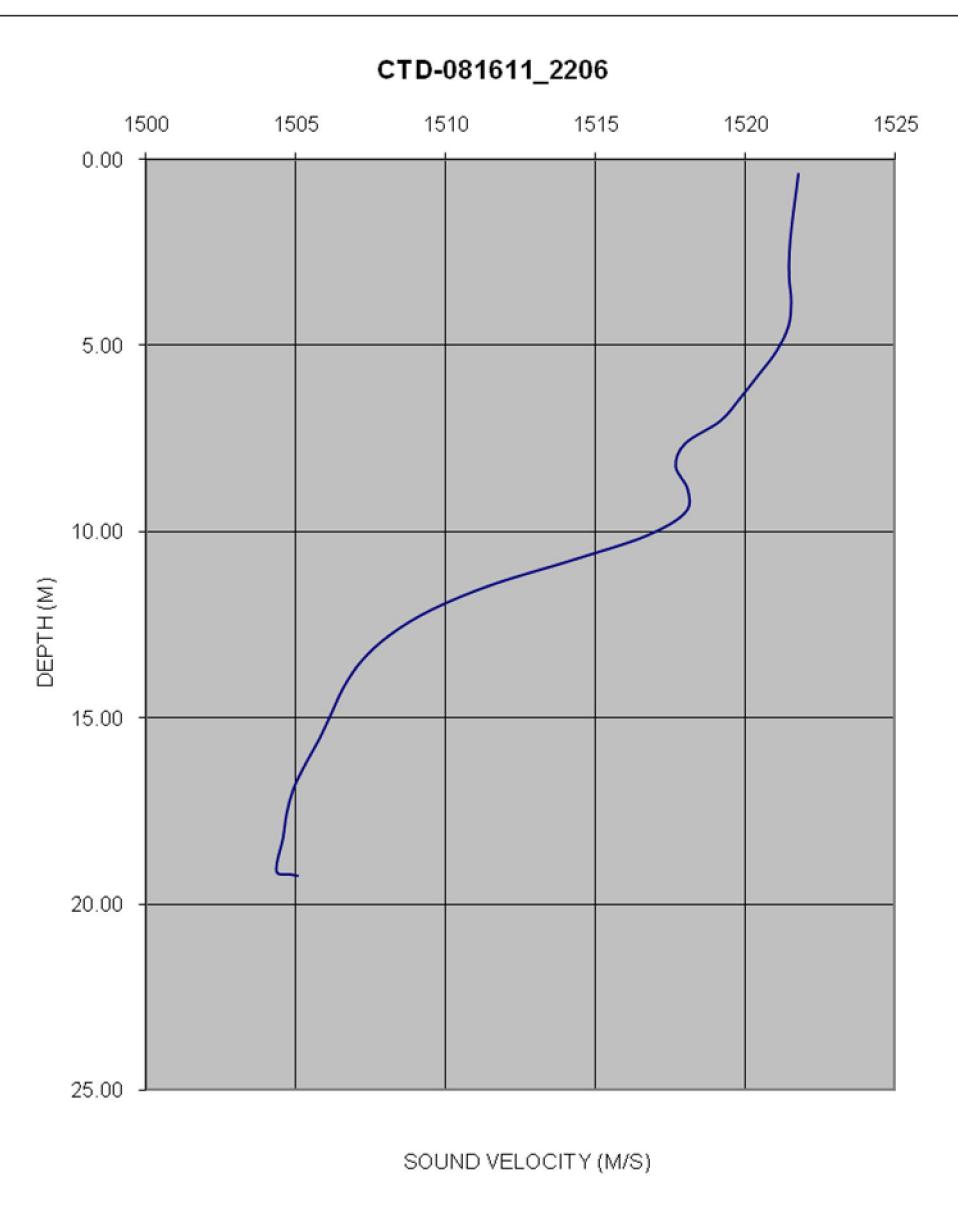


Figure 3.2-28
SVP 081711_1243 taken during the Fall 2011 multibeam survey at the HARS

1519.79	0.51
1519.88	1.23
1520.02	1.85
1520.49	2.46
1521.00	3.10
1521.45	3.75
1521.99	4.39
1522.64	5.04
1523.46	5.69
1524.25	6.33
1524.74	6.97
1524.64	7.61
1523.68	8.25
1521.82	8.89
1519.87	9.53
1516.17	10.18
1513.98	10.83
1513.12	11.47
1511.68	12.12
1509.49	12.79
1508.07	13.46
1507.29	14.13
1506.68	14.80
1506.02	15.47
1505.41	16.14
1505.02	16.80
1504.82	17.47
1504.74	18.13
1504.69	18.79
1504.66	19.43
1504.64	20.07
1504.63	20.64
1504.72	21.02
1504.75	21.05

CTD PROFILE # 081711_1243

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
08/17/11	12:43	1024017	77217	69	40.37852710 73.85727143

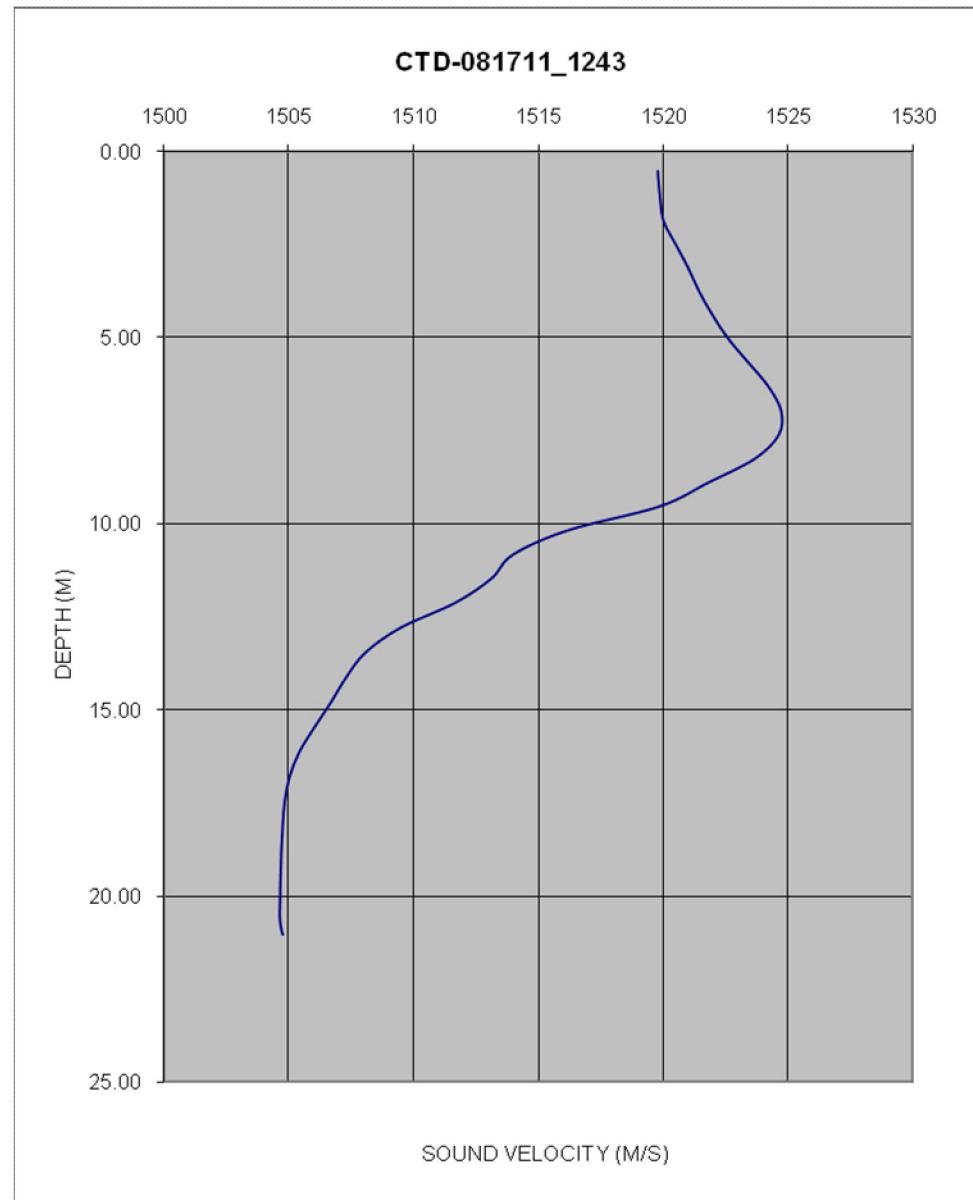


Figure 3.2-29
SVP 081711_1448 taken during the Fall 2011 multibeam survey at the HARS

1521.62 0.33

1522.57 1.09

1523.55 1.85

CTD PROFILE # 081711_1448

1524.19 2.56

1524.48 3.23

1524.66 3.87

<u>Date</u>	<u>Time</u>	<u>NAD83 NY LI (Feet)</u>	<u>Water Depth</u>	<u>Latitude</u>	<u>Longitude</u>
		<u>Easting</u>	<u>Northing</u>	<u>Feet</u>	<u>N</u>
08/17/11	14:48	1025155	67704	77	40.35240923 73.85324316

1524.79 4.51

1524.91 5.15

1525.08 5.79

1525.37 6.44

1525.60 7.09

1525.74 7.74

1525.80 8.40

1525.89 9.05

1525.01 9.69

1522.69 10.34

1520.48 11.00

1517.69 11.66

1515.76 12.32

1515.07 12.97

1514.96 13.63

1514.69 14.29

1513.68 14.94

1511.54 15.60

1509.44 16.27

1507.56 16.93

1506.43 17.58

1505.64 18.23

1504.81 18.88

1504.24 19.52

1503.97 20.17

1503.85 20.83

1503.75 21.48

1503.66 22.13

1503.58 22.79

1503.62 23.29

1504.03 23.36

1504.51 23.39

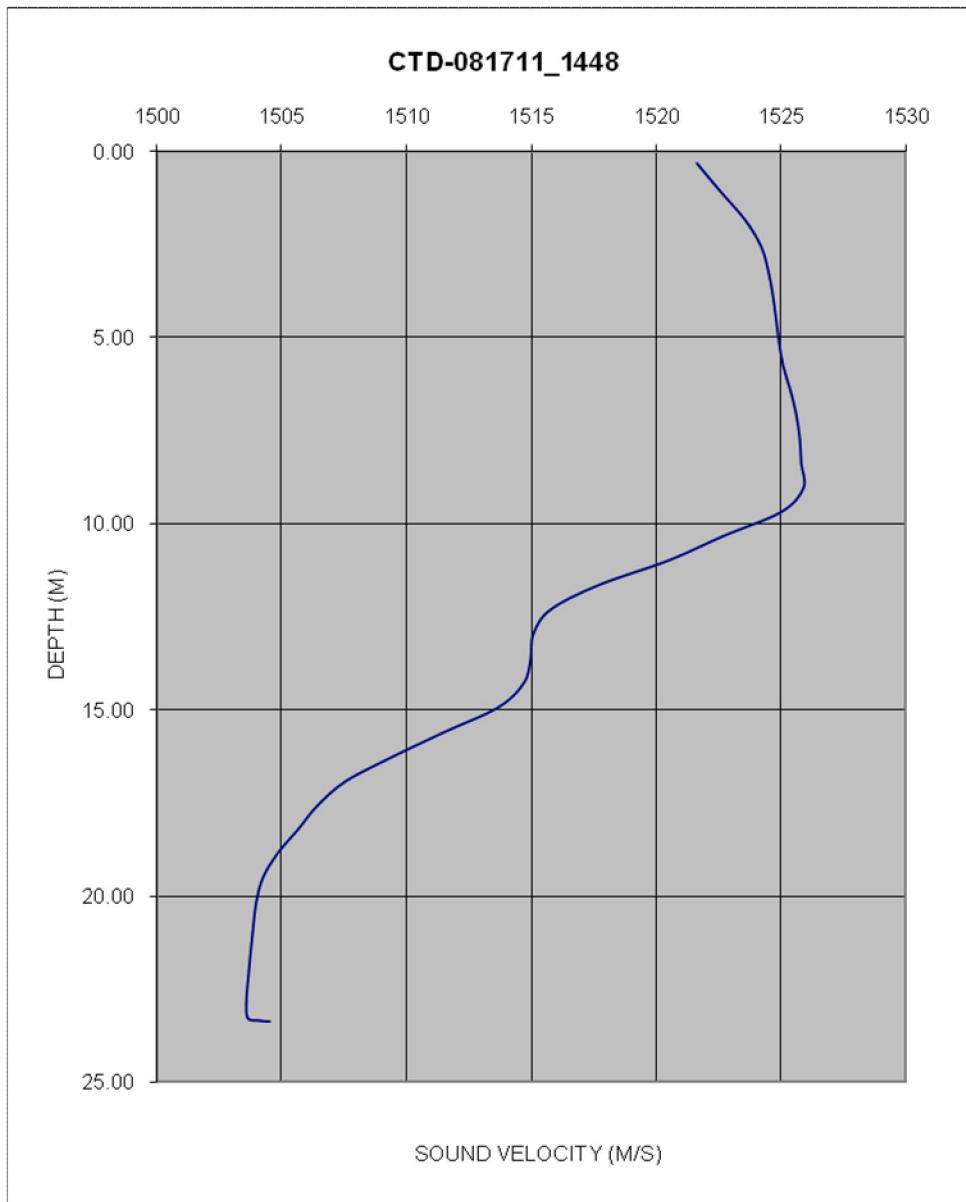


Figure 3.2-30
SVP 081711_1623 taken during the Fall 2011 multibeam survey at the HARS

1521.59	0.50
1521.14	1.24
1522.15	1.97
1523.45	2.68
1524.36	3.38
1524.64	4.08
1524.48	4.77
1524.15	5.46
1523.68	6.16
1522.92	6.85
1521.75	7.54
1520.46	8.24
1519.68	8.94
1519.04	9.68
1516.48	10.40
1513.60	11.12
1511.76	11.82
1510.24	12.52
1509.09	13.23
1508.50	13.93
1508.05	14.62
1507.63	15.30
1507.22	15.98
1506.68	16.64
1506.13	17.32
1505.77	17.99
1505.57	18.69
1505.42	19.37
1505.30	20.07
1505.21	20.79
1505.19	21.48
1505.35	21.77

CTD PROFILE # 081711_1623

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
08/17/11	16:23	1025159	77125	72	40.37826755 73.85317327

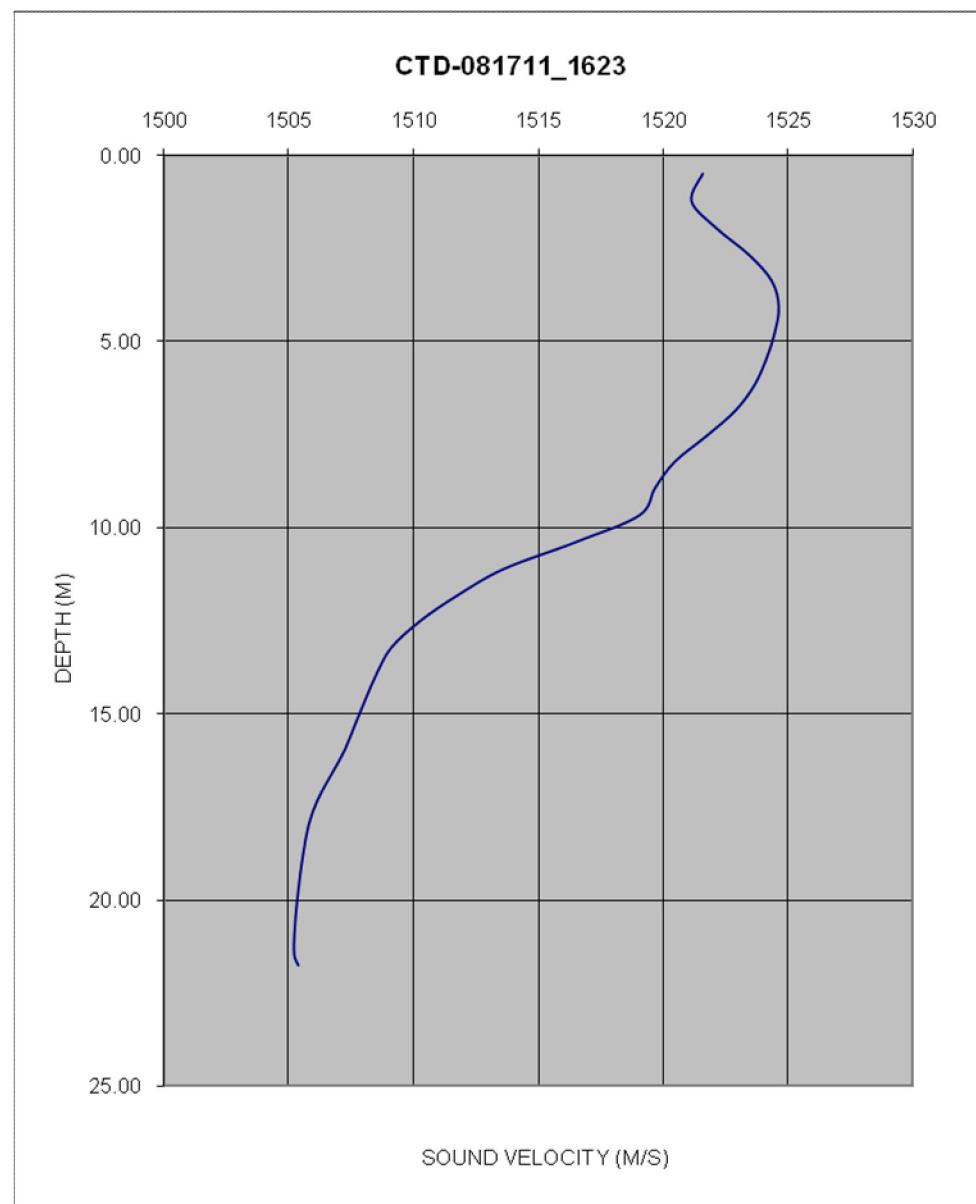


Figure 3.2-31
SVP 081711_1839 taken during the Fall 2011 multibeam survey at the HARS

1526.70	0.58
1526.10	1.38
1525.78	2.21
1525.68	3.06
1525.59	3.91
1525.49	4.75
1525.46	5.56
1525.54	6.29
1525.64	7.02
1524.29	7.71
1522.24	8.39
1520.39	9.05
1519.51	9.72
1519.22	10.42
1518.85	11.12
1517.22	11.82
1515.13	12.50
1513.11	13.19
1511.58	13.88
1510.50	14.56
1509.48	15.26
1508.28	15.94
1507.32	16.62
1506.56	17.30
1505.95	17.98
1505.43	18.66
1505.01	19.35
1504.64	20.04
1504.41	20.72
1504.28	21.41
1504.18	22.10
1504.12	22.79
1504.08	23.47
1504.05	24.14
1504.00	24.82
1503.95	25.53
1503.89	26.22
1503.74	26.86
1503.56	27.05

CTD PROFILE # 081711_1839

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
08/17/11	18:39	1029747	68987	72	40.35590783 73.83676058

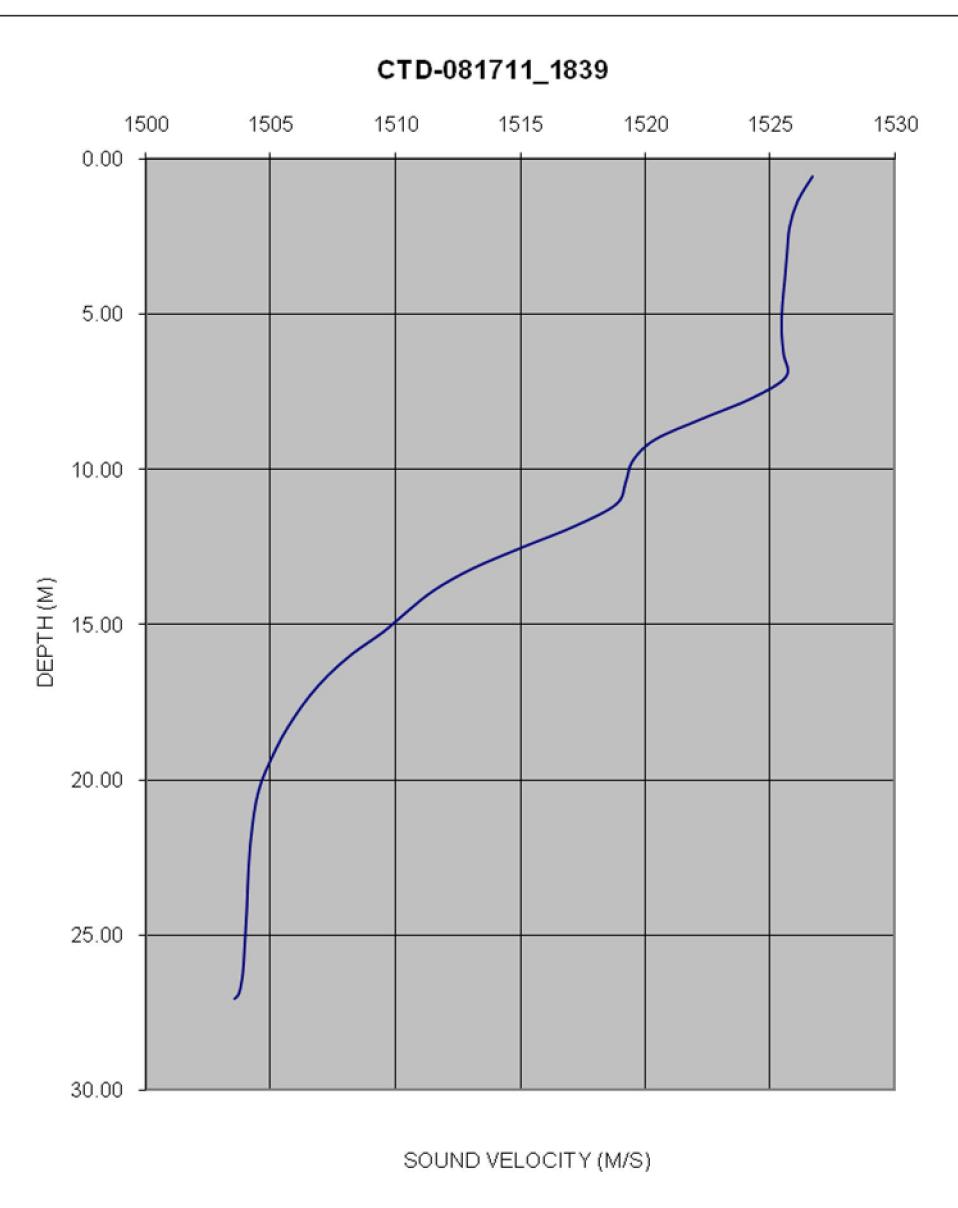


Figure 3.2-32
SVP 081711_2035 taken during the Fall 2011 multibeam survey at the HARS

1525.06	0.33
1524.85	1.08
1524.62	1.83
1524.42	2.57
1524.19	3.30
1523.90	3.99
1523.05	4.67
1521.52	5.34
1520.27	6.02
1519.17	6.68
1518.16	7.35
1517.68	8.01
1517.48	8.67
1517.43	9.34
1517.46	10.01
1517.47	10.68
1517.36	11.34
1516.68	12.01
1515.13	12.69
1513.49	13.36
1512.11	14.04
1510.84	14.71
1509.92	15.39
1509.42	16.07
1509.08	16.76
1508.73	17.44
1508.44	18.12
1507.87	18.80
1507.18	19.48
1506.76	20.17
1506.46	20.85
1506.21	21.54
1506.03	22.25
1506.08	22.62

CTD PROFILE # 081711 2035

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
08/17/11	20:35	1022654	67896	74	40.35294739 73.86221502

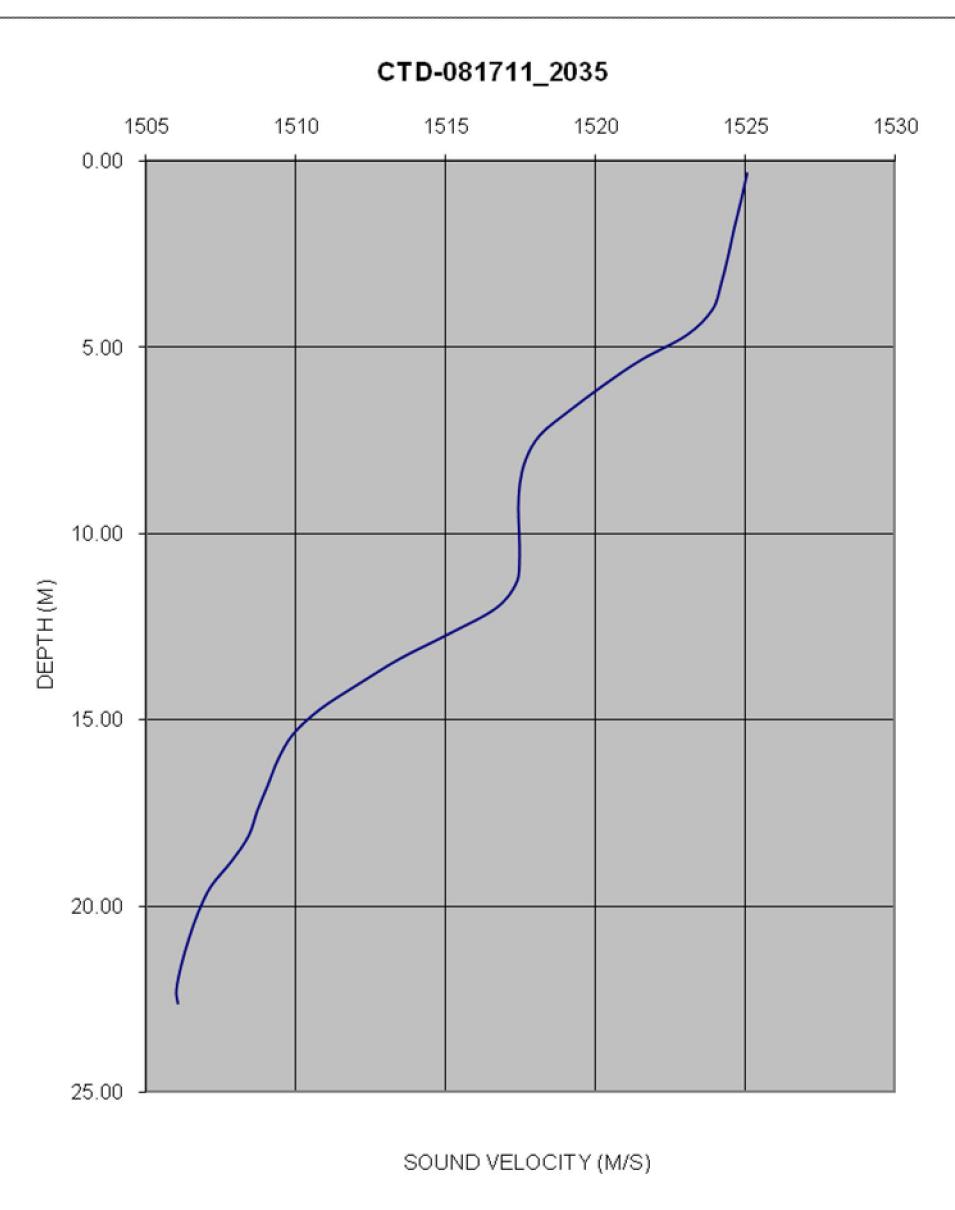


Figure 3.2-33
SVP 081711_2059 taken during the Fall 2011 multibeam survey at the HARS

1523.54	0.00
1523.49	0.78
1523.45	1.48
1523.26	2.14
1522.63	2.76
1521.47	3.35
1520.85	3.93
1520.67	4.50
1520.41	5.06
1519.96	5.62
1519.49	6.19
1519.22	6.75
1518.94	7.33
1518.86	7.93
1518.57	8.54
1517.63	9.14
1516.21	9.73
1515.06	10.34
1514.31	10.97
1513.46	11.60
1512.08	12.25
1510.94	12.90
1509.90	13.55
1509.10	14.20
1508.64	14.84
1508.28	15.50
1507.92	16.14
1507.66	16.79
1507.38	17.45
1507.18	18.09
1507.05	18.76
1506.93	19.43
1506.84	20.12
1506.97	20.45
1507.35	20.50
1507.55	20.57

CTD PROFILE # 081711 2059

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
08/17/11	20:59	1023452	77221	67	40.37853948 73.85929824

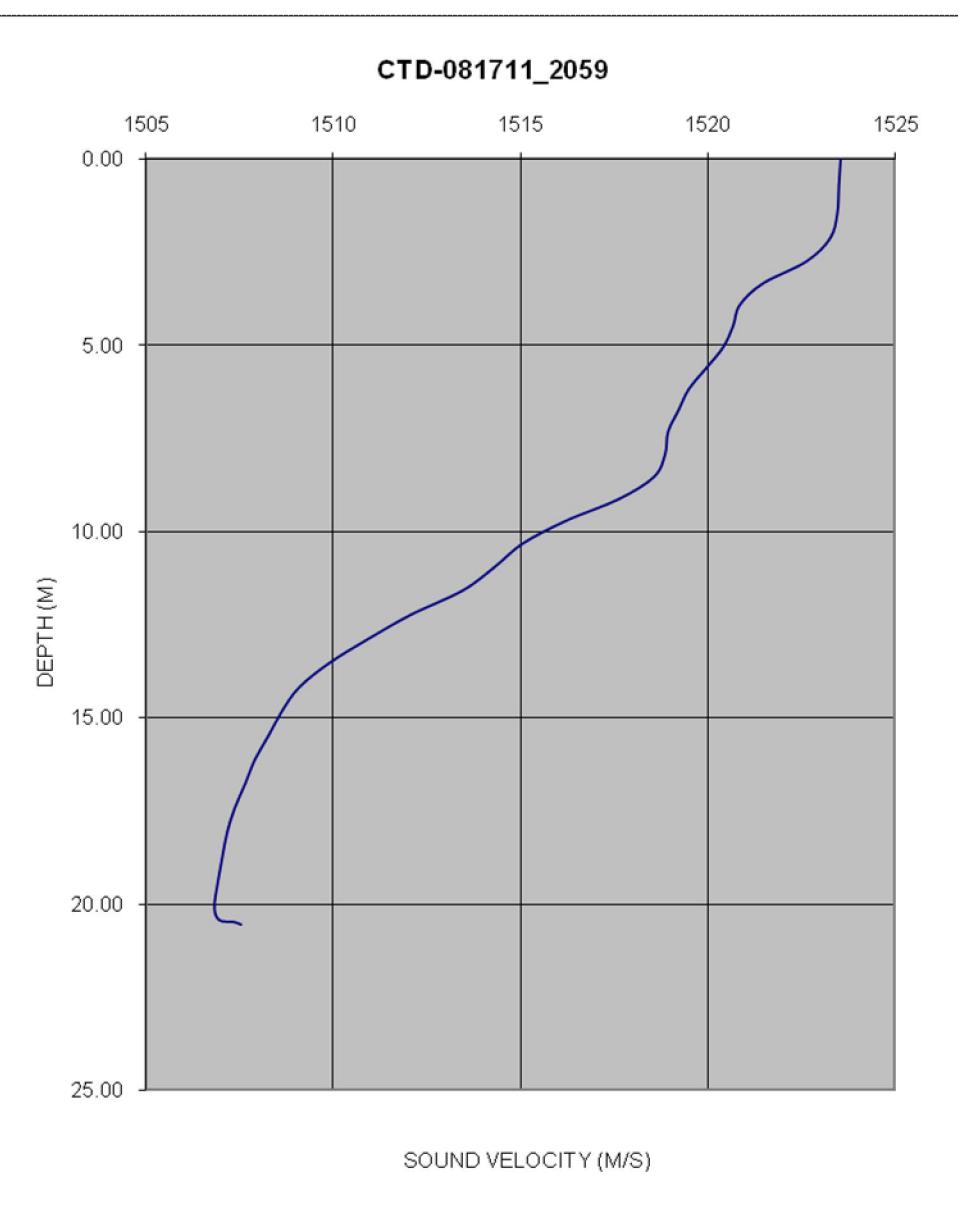


Figure 3.2-34
SVP 081811_1158 taken during the Fall 2011 multibeam survey at the HARS

1518.40 0.52

1519.25 1.26

1519.60 1.94

1519.78 2.62

1519.87 3.26

1519.91 3.86

1519.95 4.45

1520.00 5.04

1520.05 5.63

1520.10 6.22

1520.31 6.82

1520.64 7.43

1521.12 8.05

1521.33 8.68

1521.01 9.31

1520.35 9.95

1519.30 10.58

1518.20 11.21

1516.00 11.82

1513.88 12.42

1512.83 13.02

1511.95 13.64

1511.23 14.26

1510.50 14.89

1509.26 15.53

1507.78 16.16

1506.89 16.79

1506.39 17.42

1505.91 18.07

1505.29 18.72

1504.69 19.39

1504.07 20.04

1503.70 20.70

1503.51 21.36

1503.50 21.93

1503.75 22.05

1504.22 22.09

CTD PROFILE # 081811 1158

<u>Date</u>	<u>Time</u>	<u>NAD83 NY LI (Feet)</u>	<u>Water Depth</u>	<u>Latitude</u>	<u>Longitude</u>	
		<u>Easting</u>	<u>Northing</u>	<u>Feet</u>	<u>N</u>	<u>W</u>
08/18/11	11:58	1022749	77382	72	40.37898387	73.86182046

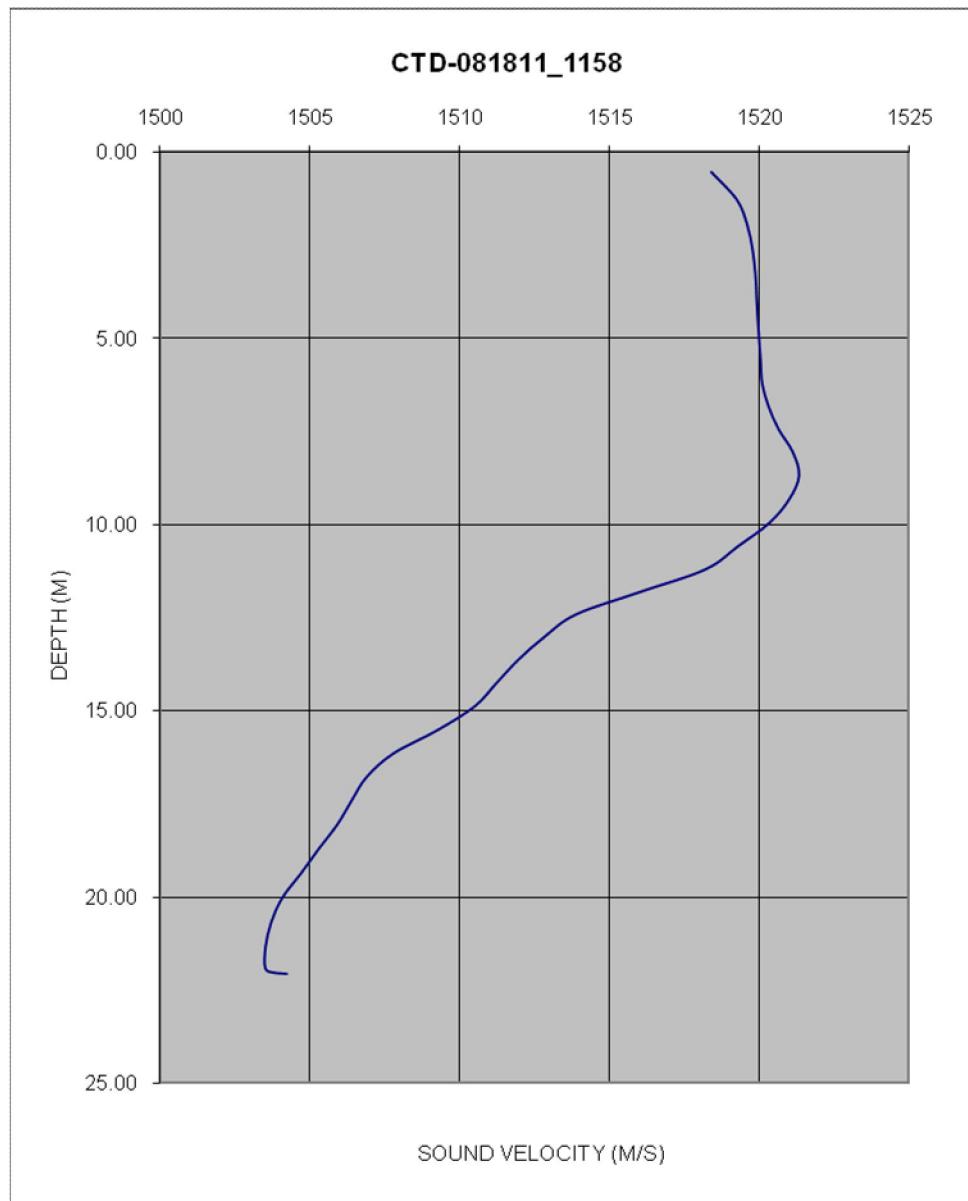


Figure 3.2-35
SVP 081811_1407 taken during the Fall 2011 multibeam survey at the HARS

1520.58	0.35
1520.46	1.01
1520.42	1.73
1520.39	2.44
1520.37	3.16
1520.36	3.85
1520.37	4.53
1520.37	5.20
1520.36	5.88
1520.36	6.55
1520.40	7.23
1520.50	7.90
1520.65	8.56
1520.90	9.22
1520.99	9.90
1520.53	10.59
1519.73	11.31
1518.27	12.02
1516.17	12.71
1512.82	13.40
1509.34	14.11
1507.24	14.81
1506.48	15.52
1506.18	16.23
1506.06	16.93
1505.97	17.64
1505.84	18.34
1505.48	19.06
1504.85	19.80
1504.40	20.54
1504.23	21.29
1504.23	21.95
1504.45	22.13

CTD PROFILE # 081811_1407

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
08/18/11	14:07	1020951	67844	73	40.35281091 73.86832402

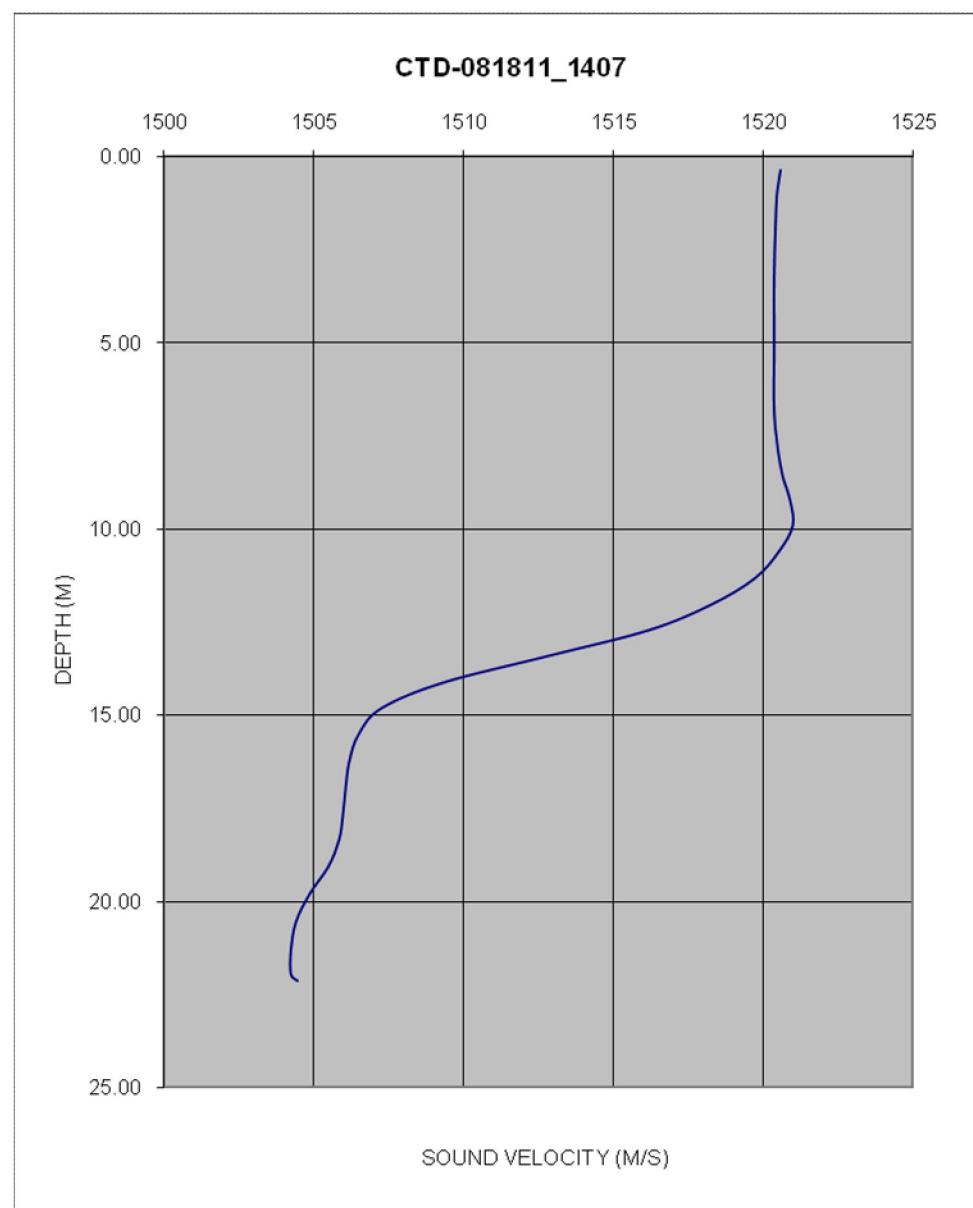


Figure 3.2-36
SVP 081811_1621 taken during the Fall 2011 multibeam survey at the HARS

1518.08	0.31
1518.00	1.00
1518.68	1.73
1519.49	2.40
1519.67	3.08
1519.70	3.73
1519.73	4.41
1519.80	5.09
1520.11	5.77
1520.96	6.45
1521.12	7.14
1519.94	7.82
1517.64	8.52
1513.99	9.21
1510.64	9.91
1508.95	10.59
1508.16	11.26
1507.48	11.94
1506.80	12.63
1506.39	13.31
1506.10	14.00
1505.85	14.70
1505.69	15.40
1505.53	16.09
1505.38	16.78
1505.20	17.45
1505.11	18.14
1505.08	18.82
1504.92	19.50
1504.58	20.17
1504.25	20.85
1504.05	21.52
1503.97	22.19
1503.93	22.86
1503.96	23.46
1504.17	23.60

CTD PROFILE # 081811_1621

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
08/18/11	16:21	1019337	77310	77	40.37880097 73.87406710

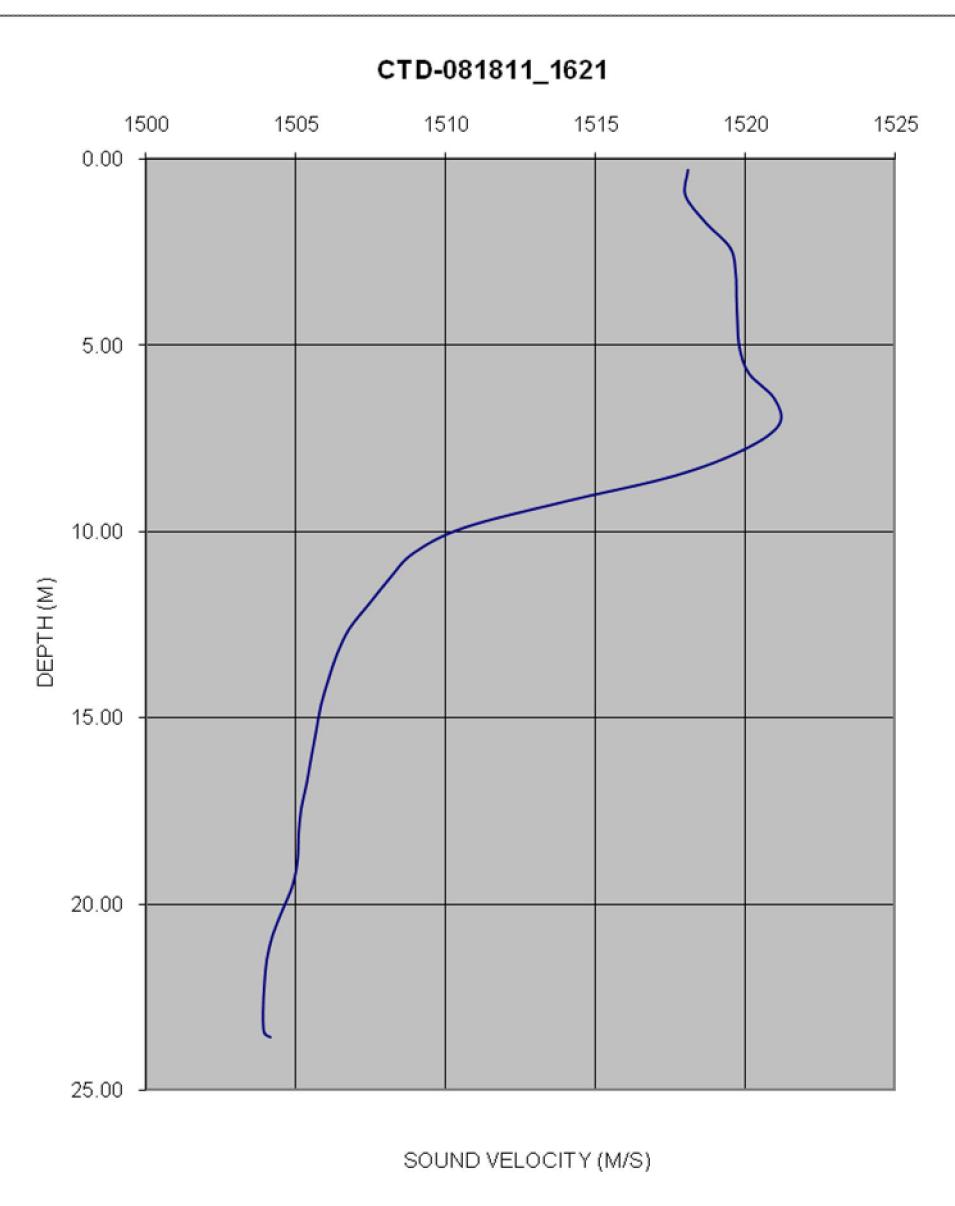


Figure 3.2-37
SVP 081811_1830 taken during the Fall 2011 multibeam survey at the HARS

1520.61	0.70
1521.04	1.51
1520.80	2.23
1520.59	2.90
1520.54	3.55
1520.54	4.17
1520.51	4.81
1520.64	5.44
1520.90	6.02
1520.43	6.59
1519.45	7.16
1517.88	7.72
1514.34	8.30
1511.60	8.88
1509.99	9.47
1508.97	10.06
1508.45	10.66
1508.18	11.26
1508.01	11.87
1507.85	12.50
1507.62	13.14
1507.39	13.80
1507.15	14.45
1506.92	15.11
1506.73	15.79
1506.60	16.47
1506.48	17.14
1506.37	17.80
1506.24	18.48
1506.04	19.15
1505.86	19.81
1505.95	20.15

CTD PROFILE # 081811_1830

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
08/18/11	18:30	1018011	67456	66	40.35175880 73.87887350

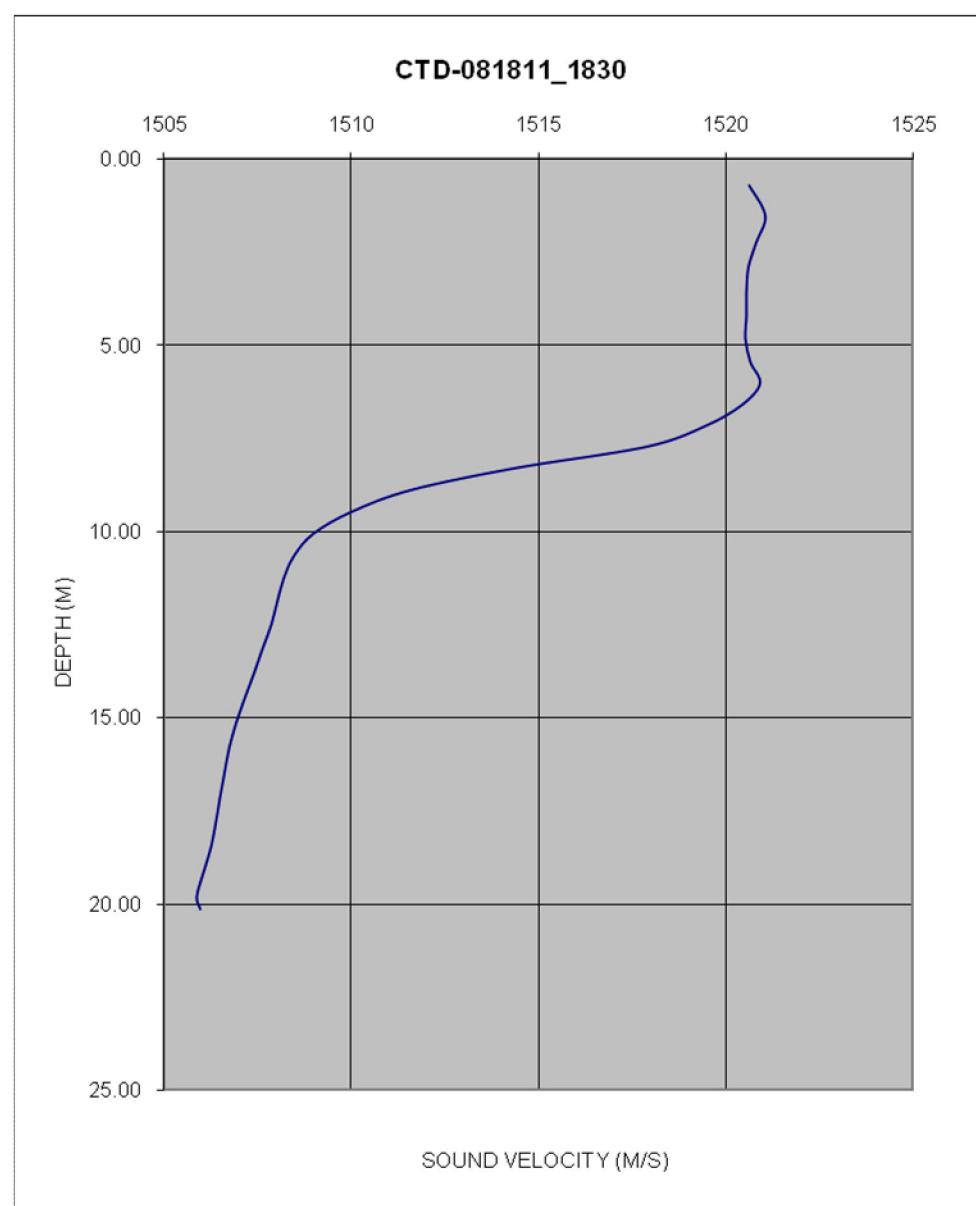


Figure 3.2-37
SVP 081811_2040 taken during the Fall 2011 multibeam survey at the HARS

1520.40	0.65
1520.23	1.37
1520.22	2.11
1520.24	2.80
1520.05	3.46
1519.87	4.08
1519.82	4.70
1520.62	5.34
1520.88	5.98
1519.78	6.61
1517.90	7.24
1516.03	7.88
1514.75	8.53
1513.63	9.18
1512.62	9.83
1511.71	10.48
1510.67	11.14
1509.72	11.79
1508.97	12.44
1508.54	13.10
1508.33	13.75
1508.15	14.42
1508.01	15.07
1507.85	15.73
1507.77	16.39
1507.62	17.04
1507.08	17.70
1506.38	18.37
1505.89	19.03
1505.42	19.69
1504.82	20.36
1504.40	21.04
1504.25	21.67
1504.47	21.85
1504.95	21.86
1505.18	21.88
1505.36	21.89
1505.55	21.90
1505.74	21.92
1506.13	21.95
1506.38	21.98

CTD PROFILE # 081811_2040

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
08/18/11	20:40	1017982	77106	72	40.37824626 73.87893142

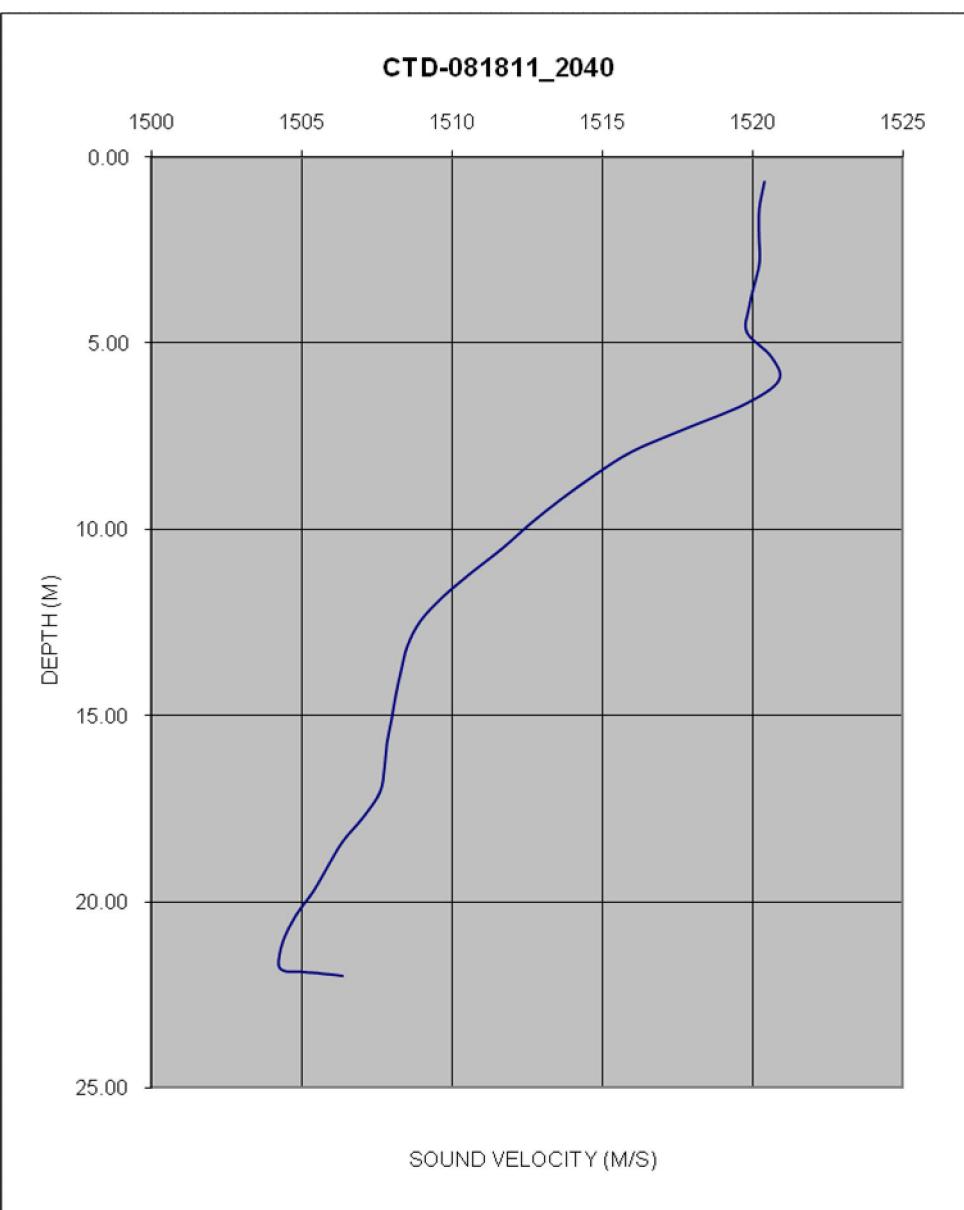


Figure 3.2-38
SVP 081911_1141 taken during the Fall 2011 multibeam survey at the HARS

1520.97	0.13
1520.98	0.80
1520.99	1.47
1521.01	2.10
1521.01	2.75
1521.00	3.38
1521.01	3.99
1521.01	4.61
1521.01	5.23
1521.04	5.85
1520.91	6.47
1519.16	7.09
1516.89	7.73
1515.63	8.39
1514.22	9.06
1512.19	9.72
1510.44	10.38
1509.32	11.02
1508.43	11.66
1507.89	12.30
1507.65	12.95
1507.52	13.62
1507.33	14.30
1507.12	14.99
1506.86	15.67
1506.28	16.35
1505.77	17.00
1505.25	17.65
1504.84	18.32
1504.63	18.99
1504.42	19.64
1504.19	20.31
1503.99	20.97
1503.87	21.66
1503.81	22.33
1503.78	23.00
1503.89	23.40
1504.22	23.43

CTD PROFILE # 081911_1141

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
08/19/11	11:41	1015901	76858	77	40.37757295 73.88640029

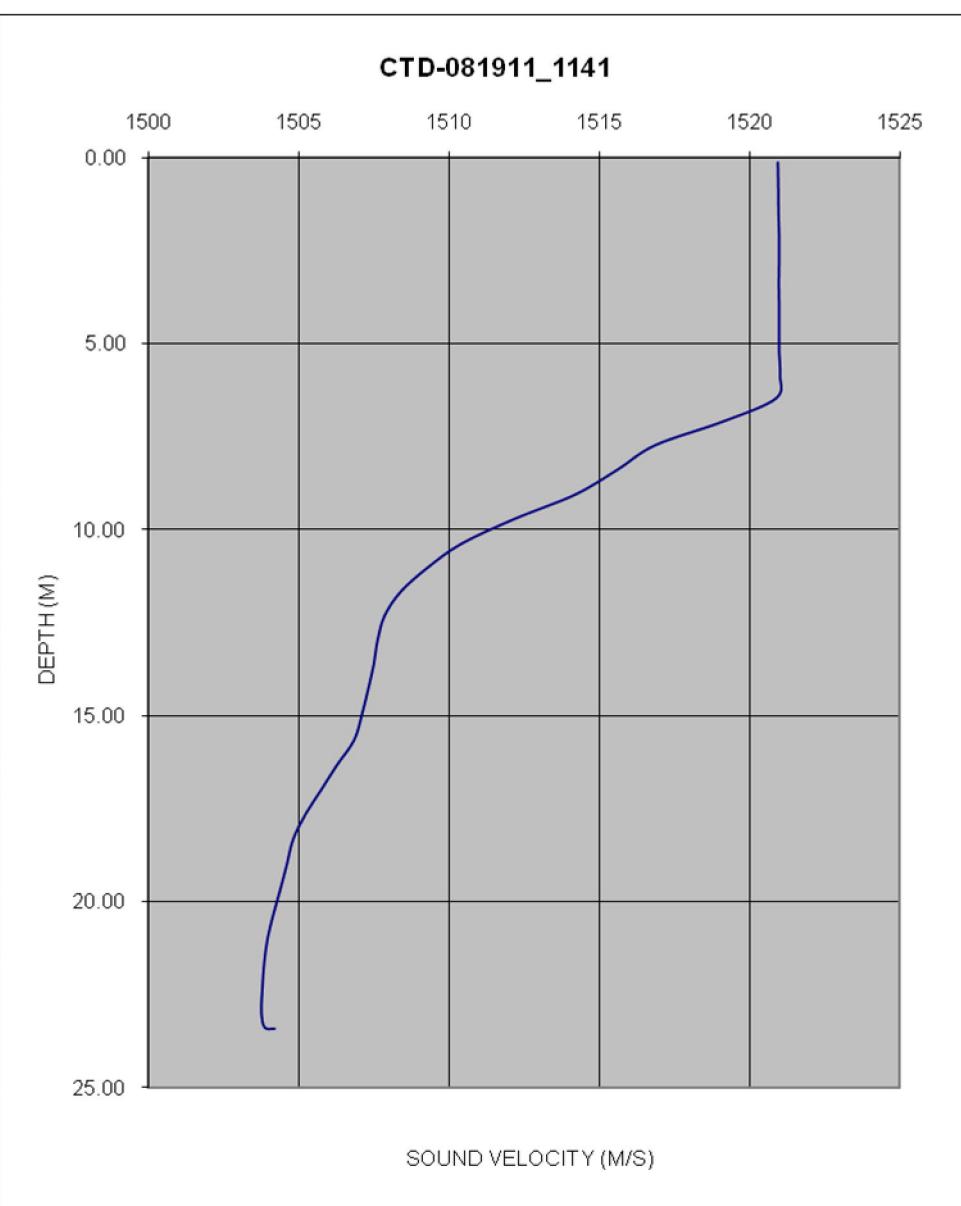


Figure 3.2-39
SVP 081911_1349 taken during the Fall 2011 multibeam survey at the HARS

1521.75	0.65
1521.71	1.40
1521.68	2.08
1521.69	2.71
1522.00	3.27
1522.19	3.84
1522.26	4.41
1522.15	4.98
1521.88	5.54
1521.55	6.11
1521.07	6.68
1520.37	7.25
1519.64	7.83
1518.31	8.42
1515.99	9.00
1513.93	9.58
1512.57	10.16
1511.71	10.74
1510.76	11.32
1509.80	11.91
1508.96	12.52
1508.08	13.15
1507.27	13.78
1506.81	14.41
1506.46	15.05
1506.04	15.69
1505.66	16.33
1505.34	16.97
1505.01	17.59
1504.67	18.21
1504.39	18.81
1504.28	19.06
1504.26	19.09
1504.24	19.09
1504.23	19.10

CTD PROFILE # 081911_1349

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
08/19/11	13:49	1015166	67760	63	40.35260406 73.88907915

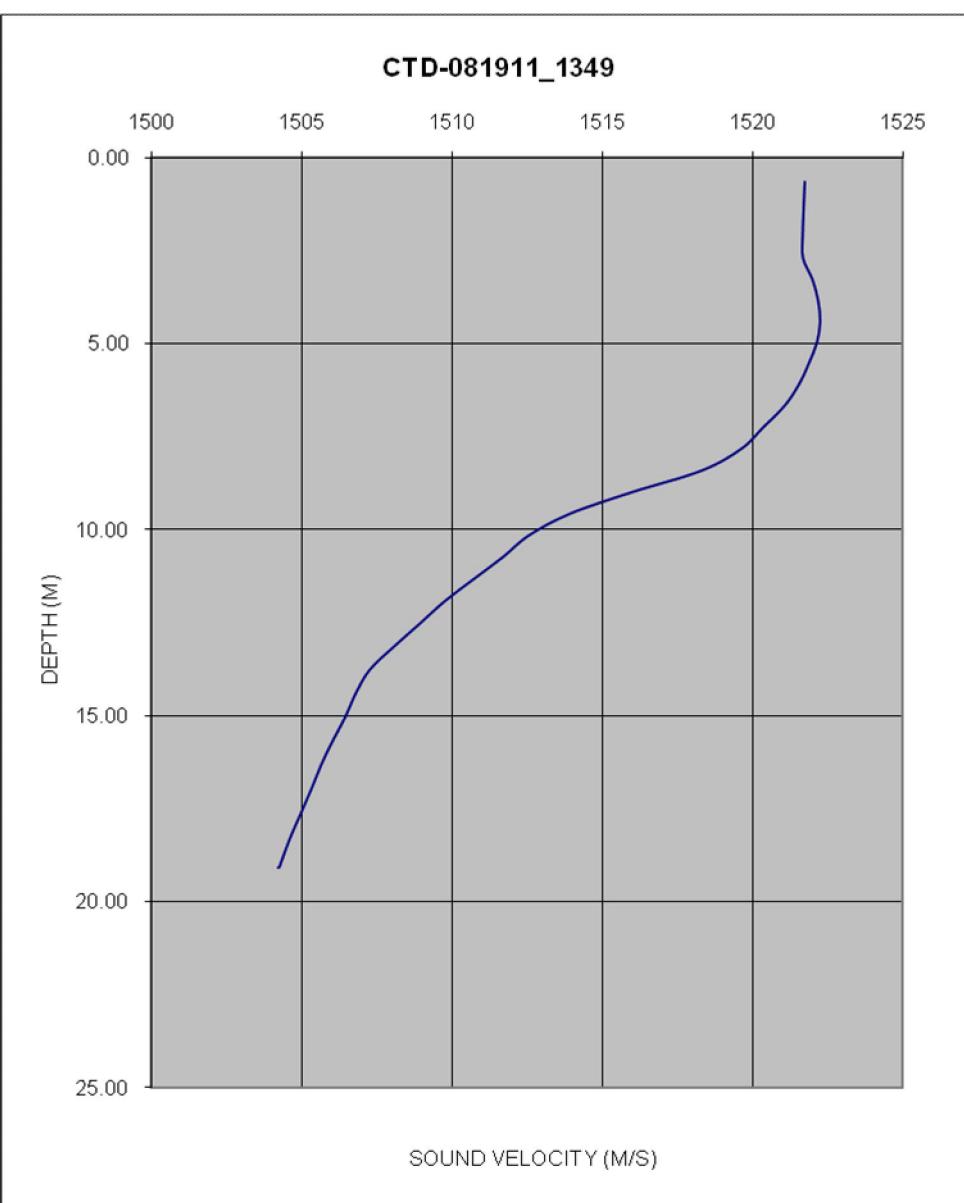


Figure 3.2-40
SVP 081911_1604 taken during the Fall 2011 multibeam survey at the HARS

1519.52	0.23
1519.56	0.94
1520.17	1.69
1520.78	2.43
1521.11	3.18
1521.34	3.92
1521.36	4.64
1521.32	5.31
1521.36	5.98
1521.27	6.65
1520.81	7.30
1519.12	7.94
1515.96	8.59
1511.91	9.27
1509.89	9.92
1508.98	10.58
1508.45	11.23
1508.10	11.89
1507.85	12.54
1507.60	13.18
1507.38	13.81
1507.16	14.43
1507.00	15.03
1506.86	15.65
1506.62	16.25
1506.28	16.86
1506.05	17.46
1505.70	18.04
1505.34	18.61
1505.10	19.21
1504.94	19.79
1504.93	20.26
1505.13	20.33

CTD PROFILE # 081911_1604

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
08/19/11	16:04	1012276	77390	67	40.37904583 73.89940877

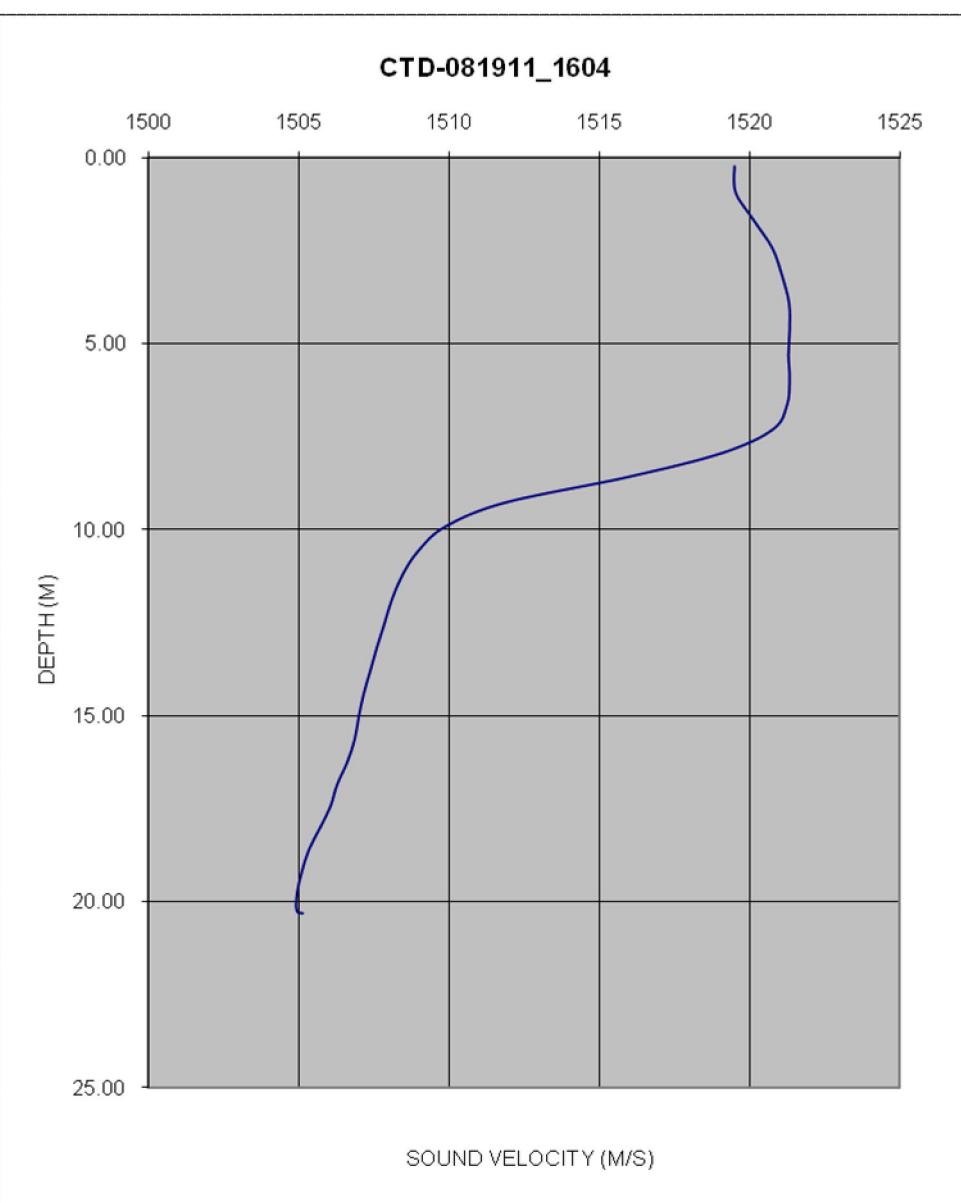


Figure 3.2-41
SVP 081911_1756 taken during the Fall 2011 multibeam survey at the HARS

1522.33	0.05
1522.05	0.70
1521.67	1.42
1521.39	2.16
1521.28	2.91
1521.22	3.65
1521.29	4.37
1521.34	5.03
1521.32	5.66
1520.96	6.31
1520.02	6.99
1517.44	7.66
1514.45	8.32
1512.55	8.97
1511.01	9.59
1509.50	10.21
1508.76	10.83
1508.53	11.45
1508.45	12.08
1508.39	12.70
1508.17	13.32
1507.83	13.93
1507.54	14.53
1507.41	15.11
1507.30	15.69
1507.18	16.28
1507.08	16.87
1507.02	17.46
1506.99	18.03
1506.91	18.61
1506.52	19.18
1505.79	19.75
1505.04	20.31
1504.64	20.87
1504.49	21.44
1504.65	21.72
1505.00	21.73

CTD PROFILE # 081911_1756

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
08/19/11	17:56	1013451	77325	71	40.37886223 73.89519228

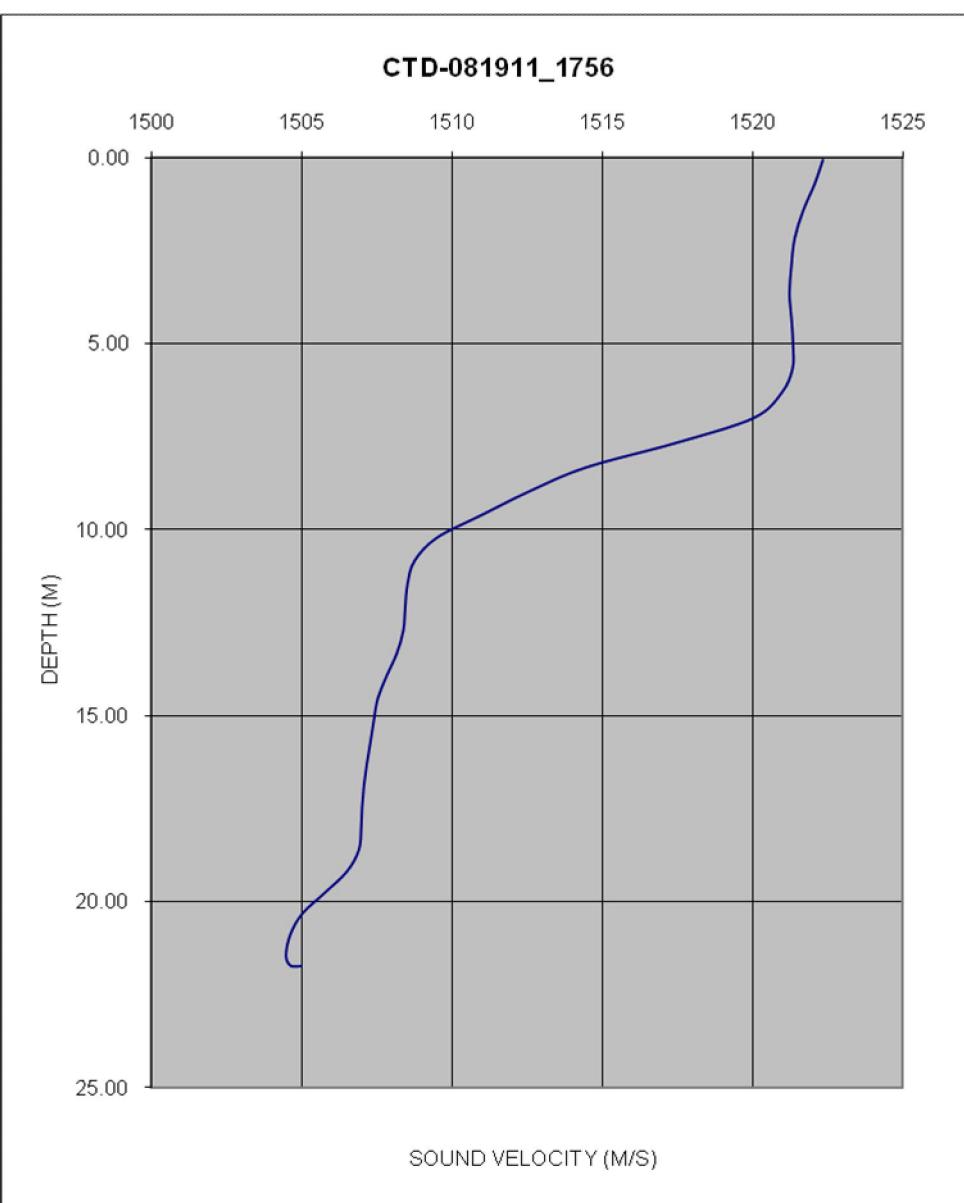


Figure 3.2-42
SVP 081911_1853 taken during the Fall 2011 multibeam survey at the HARS

1522.50	0.36
1522.42	1.02
1522.27	1.68
1522.08	2.31
1521.84	2.93
1521.48	3.56
1521.29	4.16
1521.27	4.72
1521.39	5.31
1521.37	5.97
1521.09	6.64
1520.44	7.31
1518.75	7.97
1517.15	8.61
1515.15	9.26
1512.77	9.92
1511.45	10.57
1510.65	11.24
1509.73	11.91
1509.08	12.58
1508.62	13.26
1508.35	13.92
1508.23	14.60
1508.02	15.28
1507.70	15.96
1507.42	16.63
1507.31	17.29
1507.25	17.95
1507.19	18.61
1507.14	19.26
1507.06	19.94
1506.90	20.60
1506.43	21.25
1505.74	21.91
1505.21	22.43
1505.26	22.51

CTD PROFILE # 081911_1853

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
08/19/11	18:53	1013713	76473	74	40.37652299 73.89425518

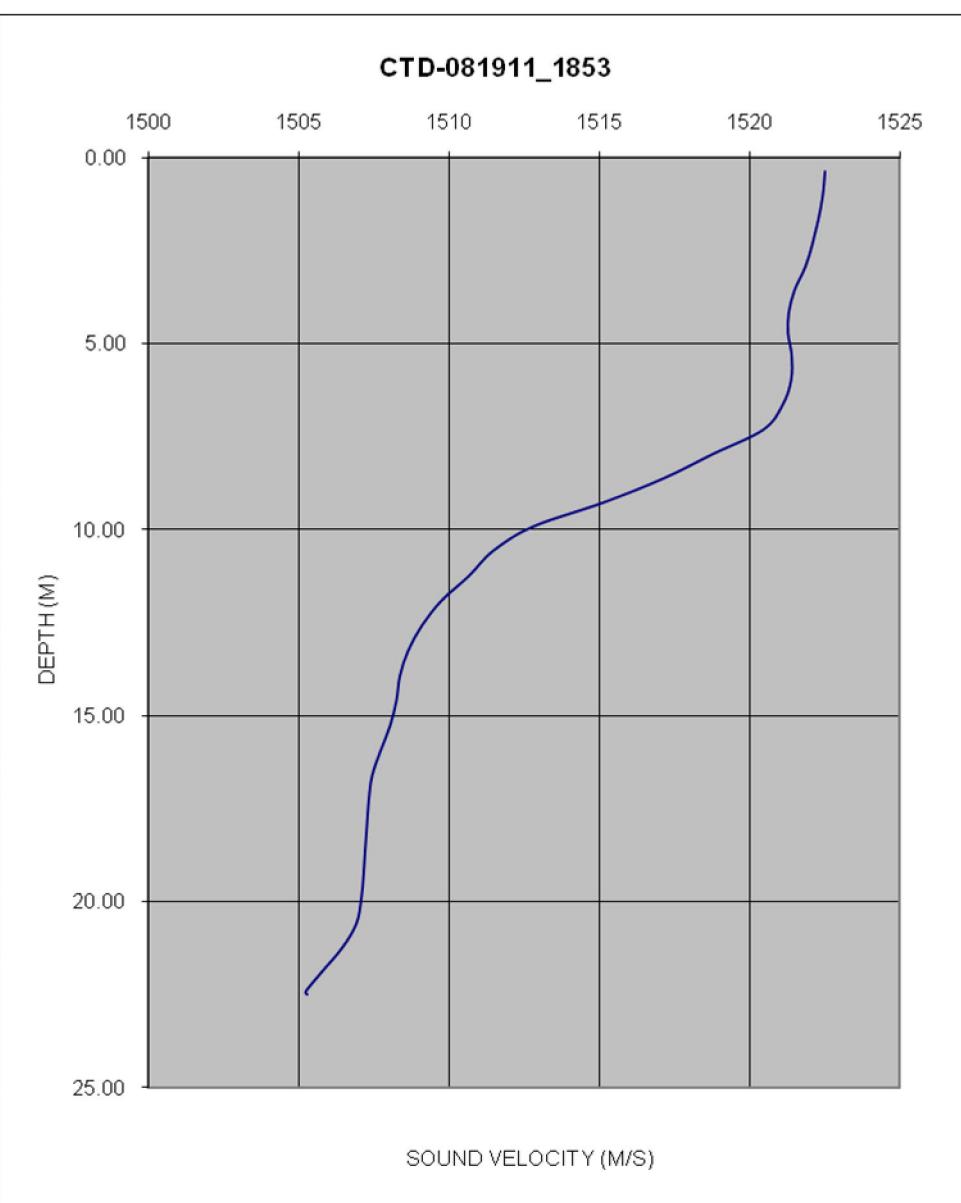


Figure 3.2-43
SVP 081911_2039 taken during the Fall 2011 multibeam survey at the HARS

1522.54	0.10
1522.01	0.88
1521.76	1.73
1521.59	2.50
1521.36	3.19
1521.04	3.83
1520.73	4.44
1520.38	5.04
1520.08	5.66
1519.75	6.28
1519.25	6.91
1518.49	7.55
1517.59	8.19
1515.79	8.84
1513.99	9.48
1512.60	10.13
1511.62	10.78
1510.95	11.43
1510.36	12.08
1509.77	12.73
1508.81	13.37
1507.97	14.02
1507.46	14.68
1507.21	15.34
1507.11	15.99
1507.06	16.65
1506.91	17.30
1506.64	17.97
1506.43	18.62
1506.26	19.28
1506.08	19.94
1506.00	20.56
1506.23	20.72
1506.68	20.75
1507.02	20.78

CTD PROFILE # 081911_2039

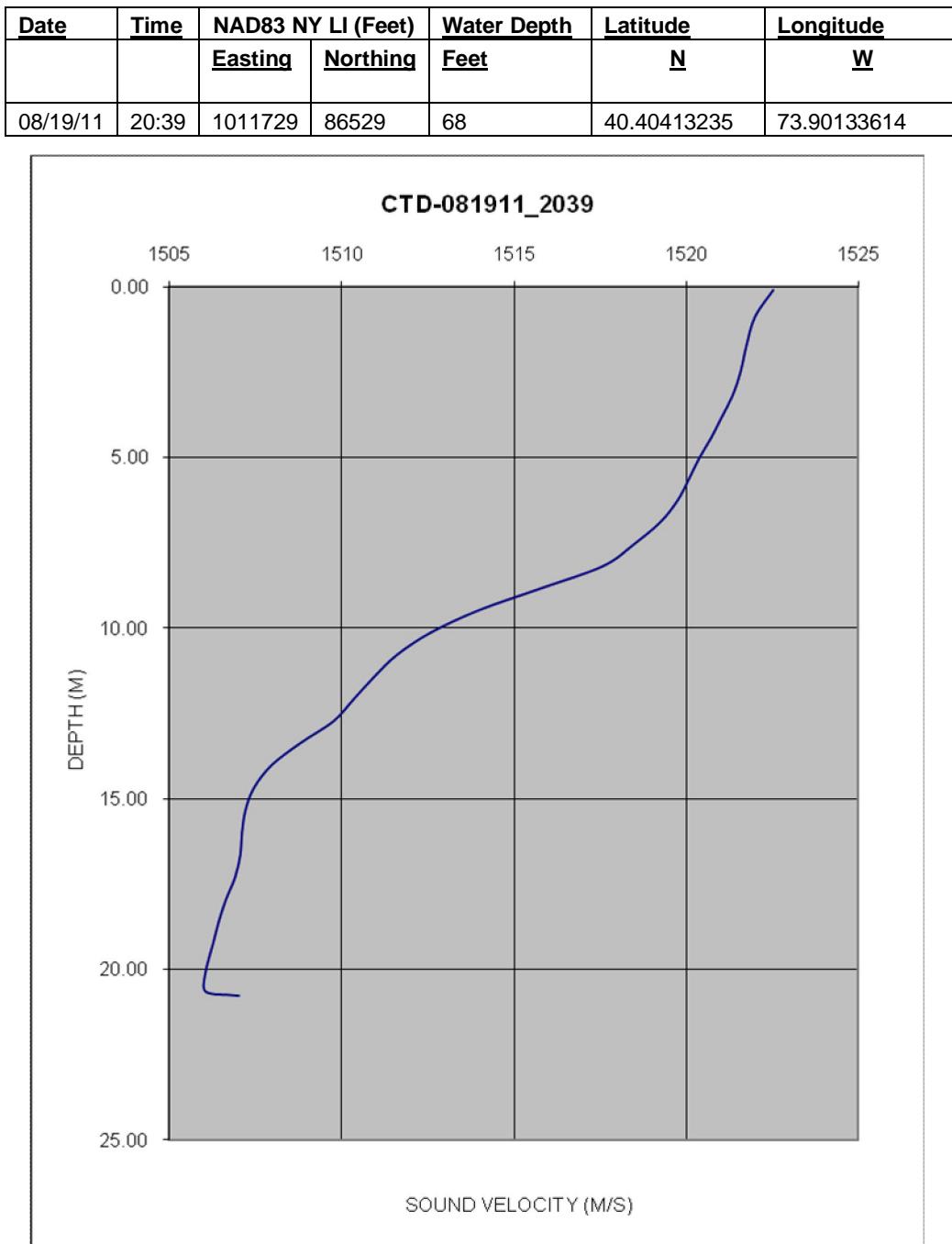


Figure 3.2-44
SVP 082311_1132 taken during the Fall 2011 multibeam survey at the HARS

1517.87	0.98
1517.90	1.62
1517.91	2.18
1517.92	2.76
1518.01	3.38
1518.70	4.03
1519.49	4.66
1519.65	5.29
1519.73	5.93
1519.89	6.60
1520.00	7.30
1519.14	7.95
1518.21	8.60
1517.13	9.22
1515.49	9.86
1513.73	10.53
1512.04	11.18
1510.59	11.79
1509.16	12.43
1508.05	13.08
1507.28	13.75
1506.40	14.39
1505.49	15.00
1504.83	15.61
1504.32	16.21
1503.75	16.82
1503.29	17.40
1502.74	17.99
1501.84	18.58
1500.85	19.19
1500.29	19.79
1500.03	20.38
1499.83	20.95
1499.59	21.51
1500.06	21.76

CTD PROFILE # 082311_1132

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
08/23/11	11:32	1012887	1012887	71	40.40331757 73.89717928

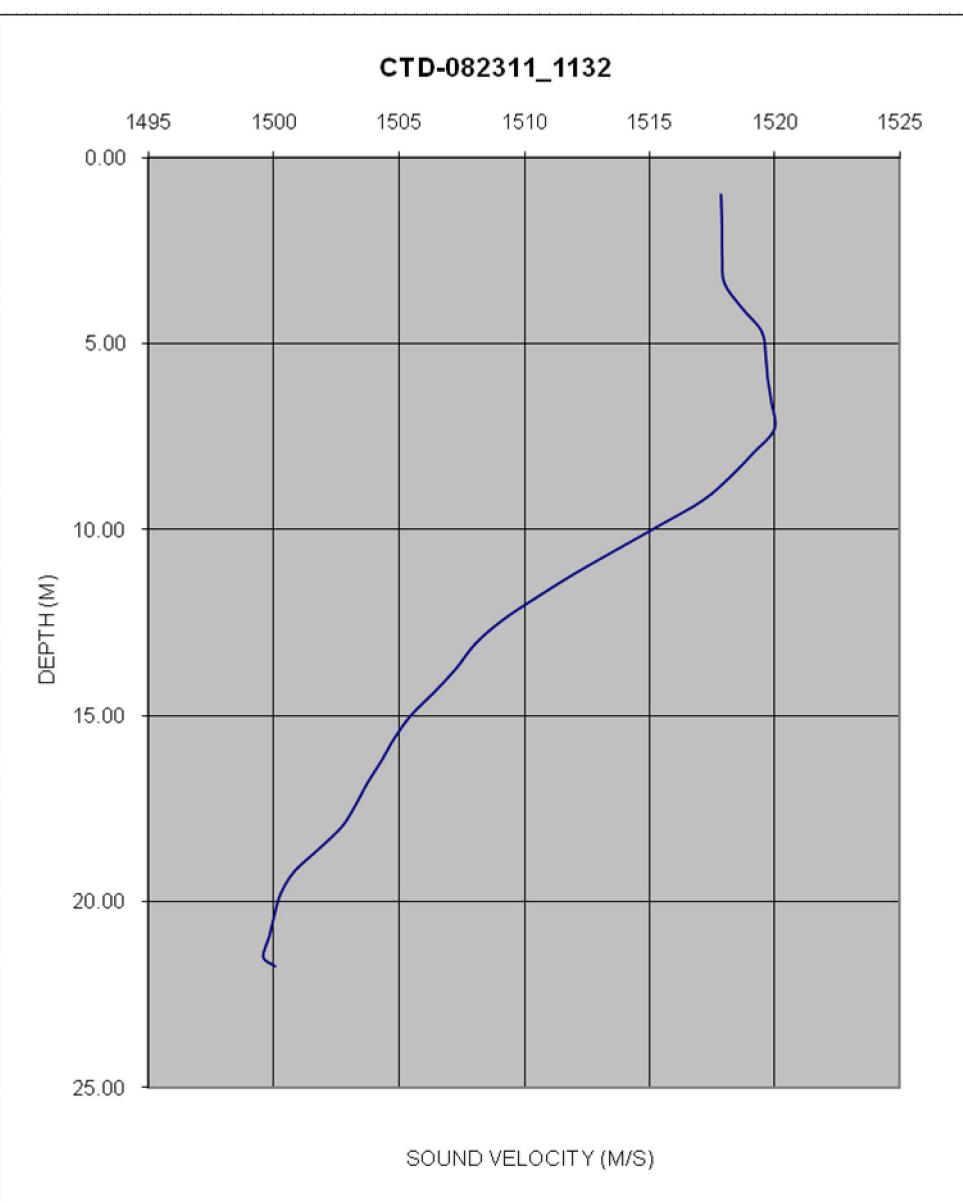


Figure 3.2-45
SVP 082311_1305 taken during the Fall 2011 multibeam survey at the HARS

1520.05	0.10
1520.05	0.73
1520.06	1.46
1520.12	2.20
1520.23	2.91
1520.44	3.58
1521.11	4.24
1521.60	4.90
1521.92	5.58
1522.07	6.25
1522.04	6.93
1521.74	7.63
1521.00	8.32
1520.51	8.99
1520.09	9.67
1518.10	10.33
1515.31	10.99
1513.04	11.64
1511.32	12.30
1509.74	12.94
1508.58	13.58
1507.95	14.22
1507.57	14.88
1506.85	15.52
1505.49	16.16
1503.99	16.80
1502.09	17.43
1500.00	18.10
1498.44	18.75
1497.73	19.41
1497.49	20.07
1497.39	20.74
1497.40	21.28
1497.76	21.37

CTD PROFILE # 082311_1305

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
08/23/11	13:05	1013599	77087	70	40.37821098 73.89466293

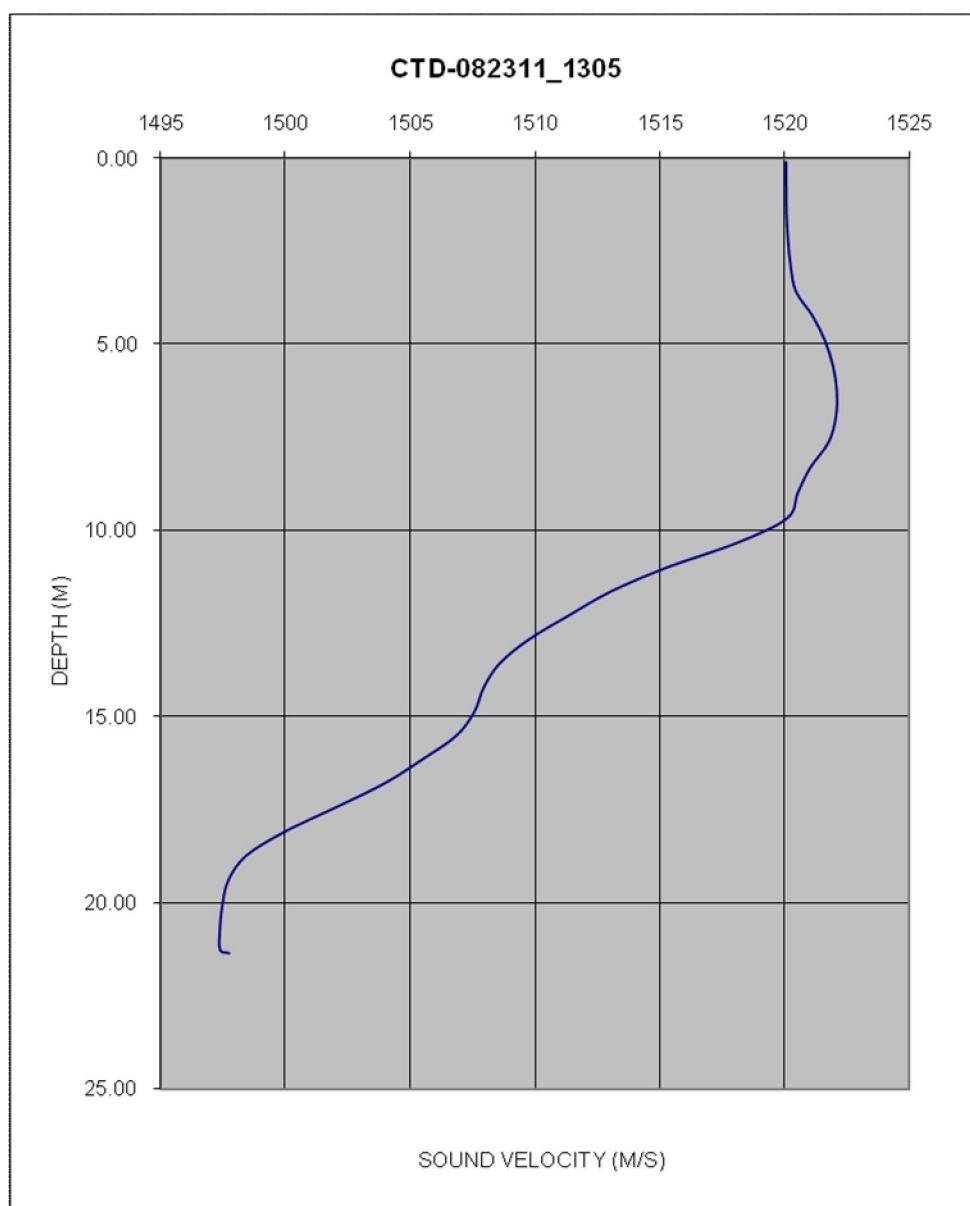


Figure 3.2-46
SVP 082311_1433 taken during the Fall 2011 multibeam survey at the HARS

1518.27	0.07
1518.20	0.61
1518.22	1.22
1518.25	1.86
1518.38	2.52
1518.72	3.16
1519.09	3.79
1519.52	4.43
1520.14	5.09
1520.66	5.75
1520.71	6.43
1520.57	7.09
1520.39	7.76
1520.31	8.43
1519.78	9.10
1518.05	9.75
1515.65	10.40
1513.29	11.06
1511.53	11.72
1510.12	12.38
1509.13	13.03
1508.33	13.70
1507.71	14.34
1507.02	14.97
1505.84	15.61
1504.88	16.26
1504.19	16.90
1502.44	17.53
1500.76	18.16
1499.88	18.81
1499.45	19.47
1499.27	20.13
1499.22	20.79
1499.48	21.10
1500.04	21.14
1500.50	21.16

CTD PROFILE # 082311_1433

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
08/23/11	14:33	1014869	86581	69	40.40426361 73.89006230

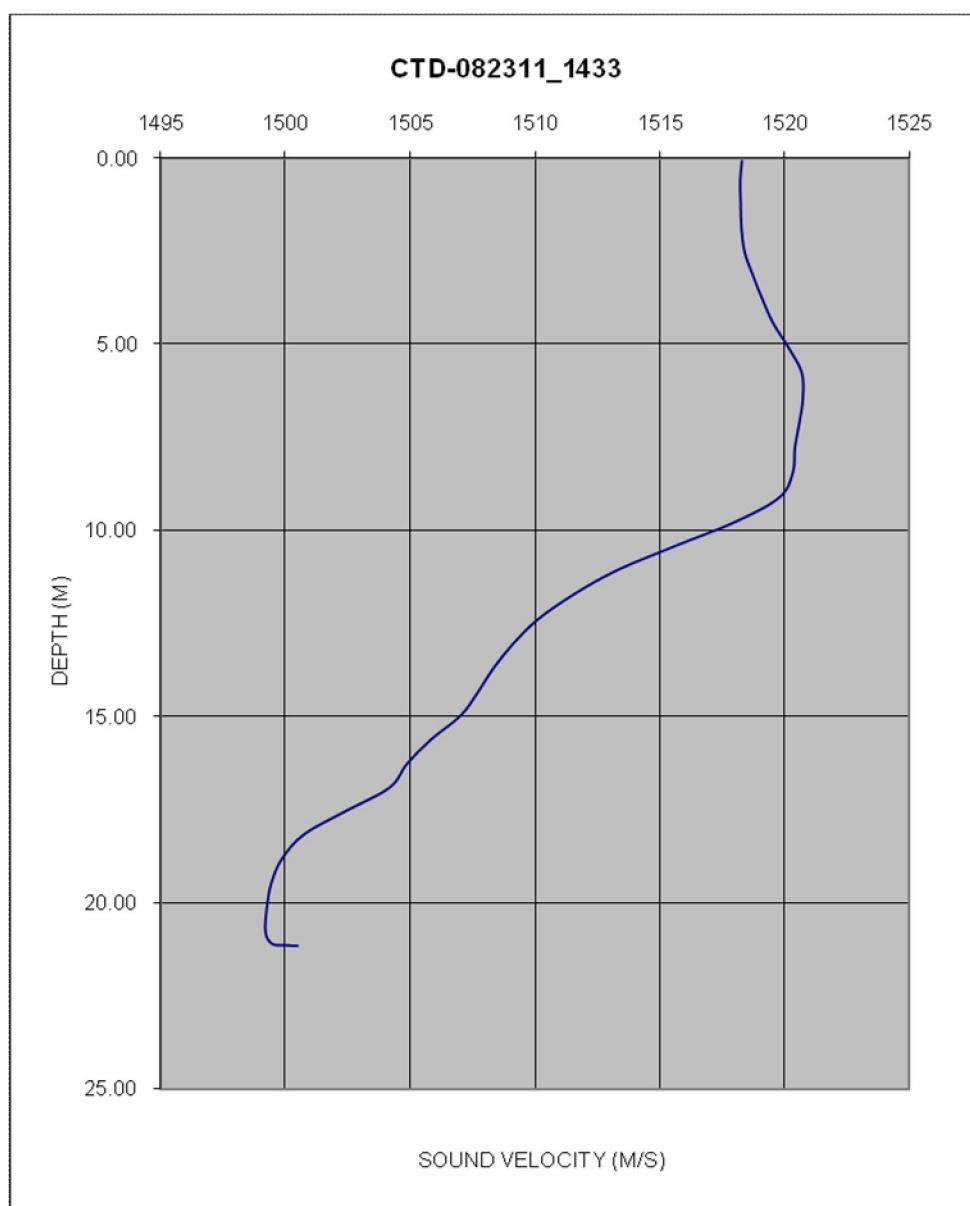


Figure 3.2-47
SVP 082311_1554 taken during the Fall 2011 multibeam survey at the HARS

1519.53	0.40
1519.10	1.16
1519.20	1.94
1519.46	2.69
1519.75	3.43
1520.12	4.16
1520.71	4.90
1521.49	5.68
1521.73	6.41
1521.67	7.11
1521.47	7.82
1521.15	8.53
1520.46	9.21
1519.32	9.92
1517.27	10.61
1514.23	11.25
1511.27	11.92
1509.84	12.57
1509.08	13.24
1508.41	13.92
1507.83	14.58
1507.13	15.22
1506.19	15.88
1504.35	16.53
1502.30	17.18
1500.85	17.82
1500.05	18.47
1499.48	19.12
1498.95	19.77
1498.53	20.43
1498.30	21.08
1498.19	21.72
1498.24	22.30
1498.53	22.43

CTD PROFILE # 082311_1554

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
08/23/11	15:54	1015900	86533	74	40.40413042 73.88635912

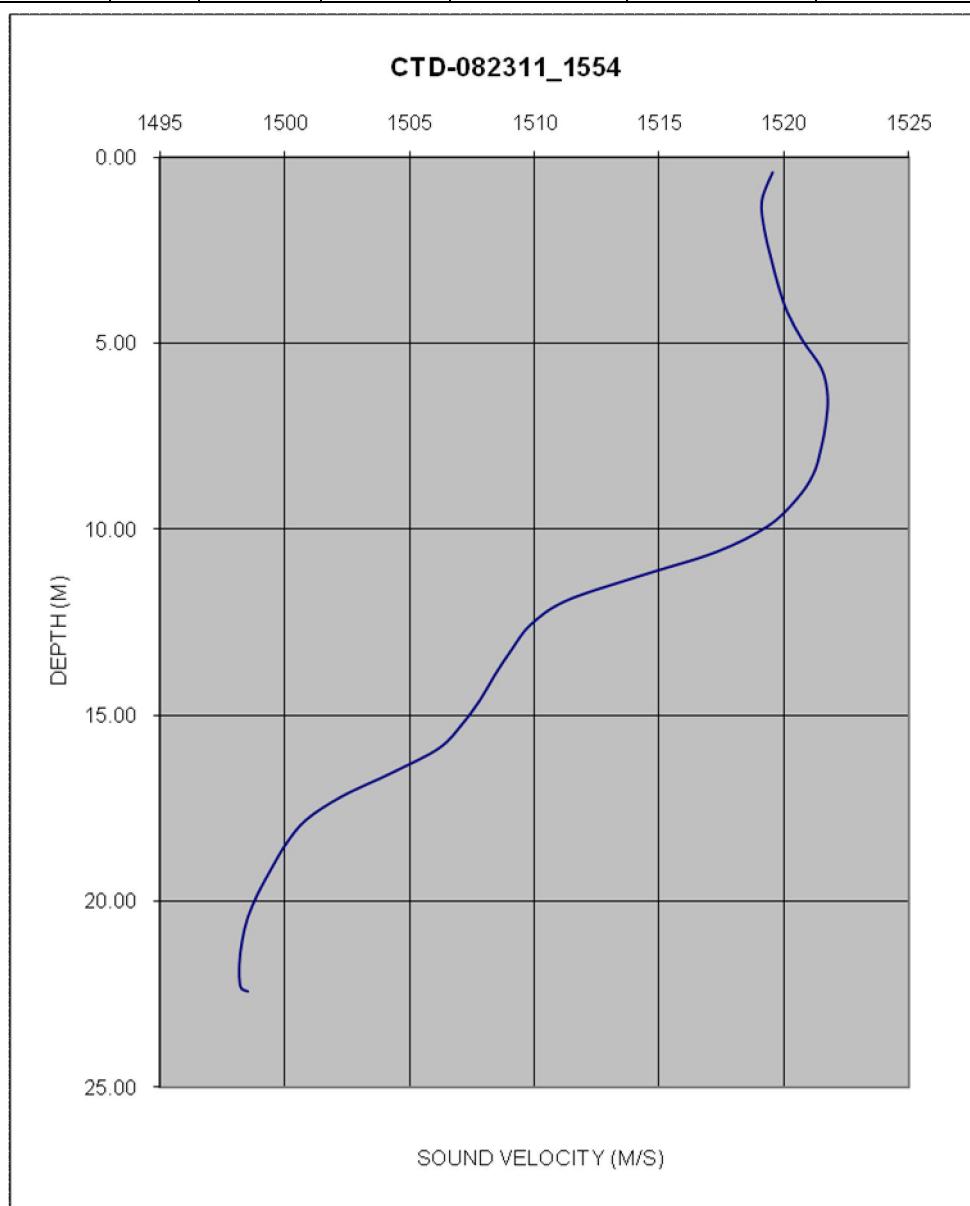


Figure 3.2-48
SVP 082311_1632 taken during the Fall 2011 multibeam survey at the HARS

1519.61	0.30
1519.27	1.07
1519.38	1.87
1519.87	2.62
1520.06	3.30
1520.45	3.97
1520.84	4.62
1521.45	5.28
1521.86	5.94
1521.97	6.58
1521.79	7.21
1521.35	7.83
1520.51	8.49
1519.34	9.16
1518.94	9.83
1517.19	10.50
1514.19	11.17
1511.12	11.82
1509.43	12.49
1508.55	13.18
1507.95	13.85
1507.38	14.52
1506.68	15.17
1505.98	15.78
1505.25	16.38
1503.93	16.98
1502.00	17.63
1500.74	18.30
1499.94	18.96
1499.24	19.64
1498.72	20.33
1498.41	21.01
1498.23	21.70
1498.10	22.37
1498.03	22.98
1497.99	23.10

CTD PROFILE # 082311_1632

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
08/23/11	16:32	1016095	86595	76	40.40429773 73.88566123

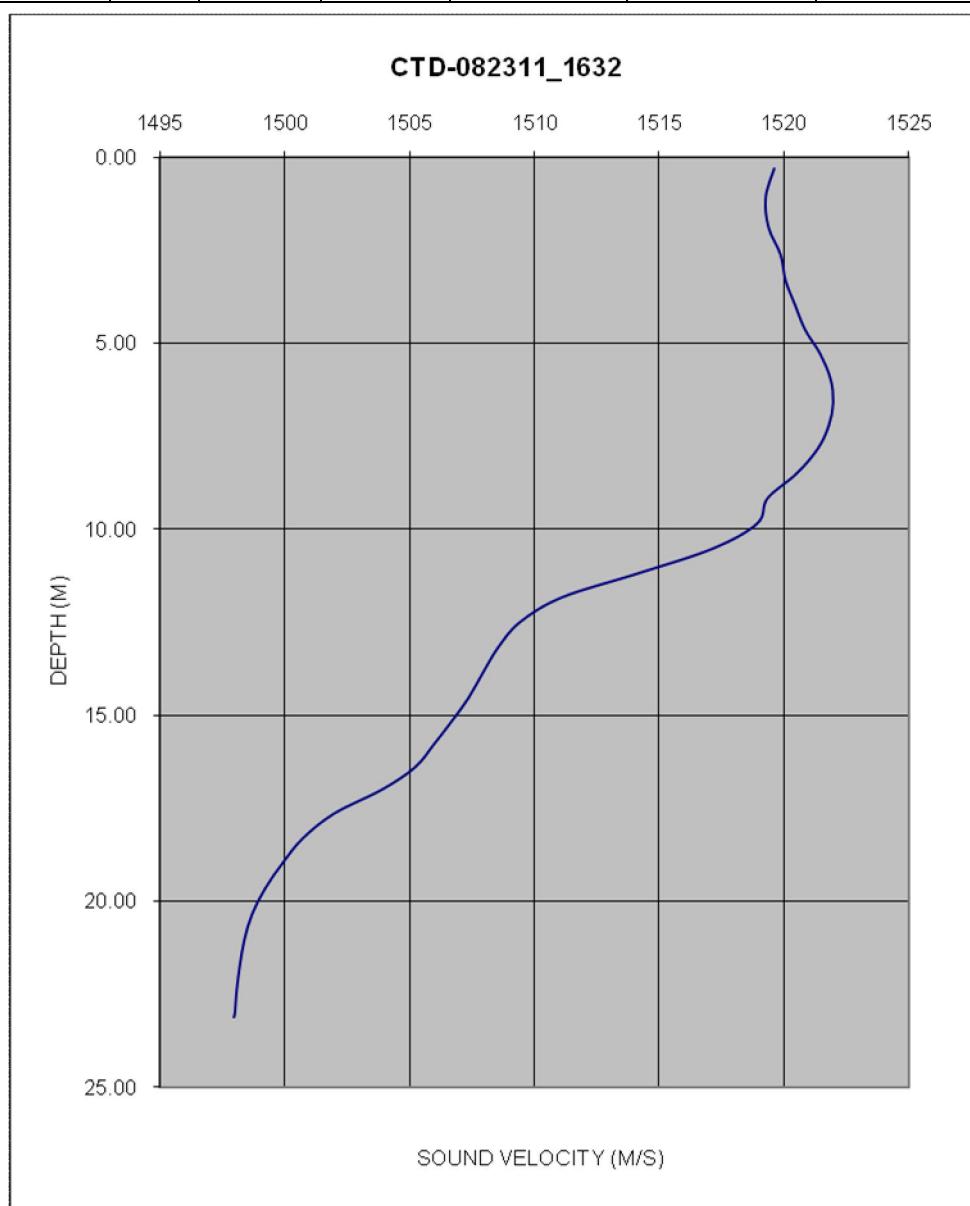


Figure 3.2-49
SVP 082311_1747 taken during the Fall 2011 multibeam survey at the HARS

1519.72	0.09
1519.65	0.67
1519.60	1.28
1519.83	1.88
1520.17	2.48
1520.61	3.08
1520.85	3.68
1521.17	4.28
1521.60	4.92
1522.03	5.57
1522.28	6.19
1522.38	6.78
1522.46	7.37
1522.52	7.93
1522.42	8.51
1521.53	9.11
1520.97	9.68
1518.98	10.24
1515.16	10.81
1511.94	11.39
1510.24	11.98
1509.43	12.59
1508.83	13.21
1508.24	13.81
1507.77	14.41
1507.32	14.99
1506.71	15.56
1505.72	16.11
1504.73	16.65
1503.85	17.19
1503.07	17.71
1502.65	18.20
1502.34	18.69
1501.99	19.16
1501.51	19.67
1500.51	20.22
1499.44	20.79
1498.89	21.39
1498.62	21.99
1498.40	22.61
1498.49	22.98

CTD PROFILE # 082311_1747

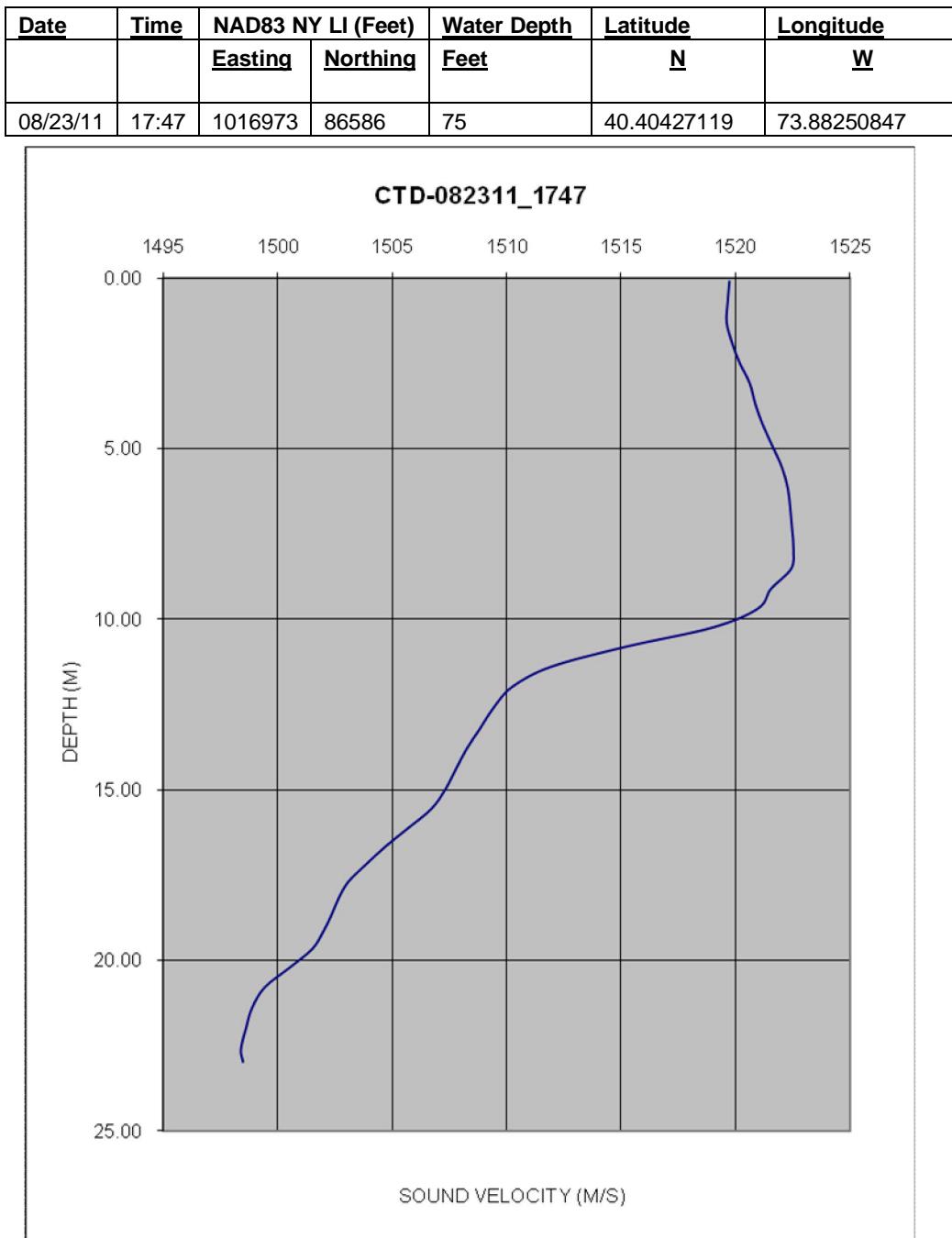


Figure 3.2-50
SVP 082311_1925 taken during the Fall 2011 multibeam survey at the HARS

1525.56	0.28
1525.46	0.80
1525.41	1.41
1525.41	2.06
1525.40	2.72
1525.38	3.37
1525.35	4.02
1525.27	4.67
1525.17	5.33
1525.11	5.99
1525.03	6.64
1524.97	7.31
1524.92	7.96
1525.03	8.63
1524.75	9.28
1522.43	9.93
1516.92	10.60
1511.93	11.27
1509.20	11.94
1507.99	12.61
1507.45	13.27
1507.16	13.92
1506.81	14.58
1506.45	15.26
1506.19	15.96
1505.97	16.65
1505.77	17.33
1505.30	18.02
1503.84	18.70
1501.54	19.36
1499.47	20.03
1498.27	20.60
1497.53	21.15
1496.83	21.76
1496.68	22.06
1497.12	22.10

CTD PROFILE # 082311 1925

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
08/23/11	19:25	1017896	77078	73	40.37816924 73.87923882

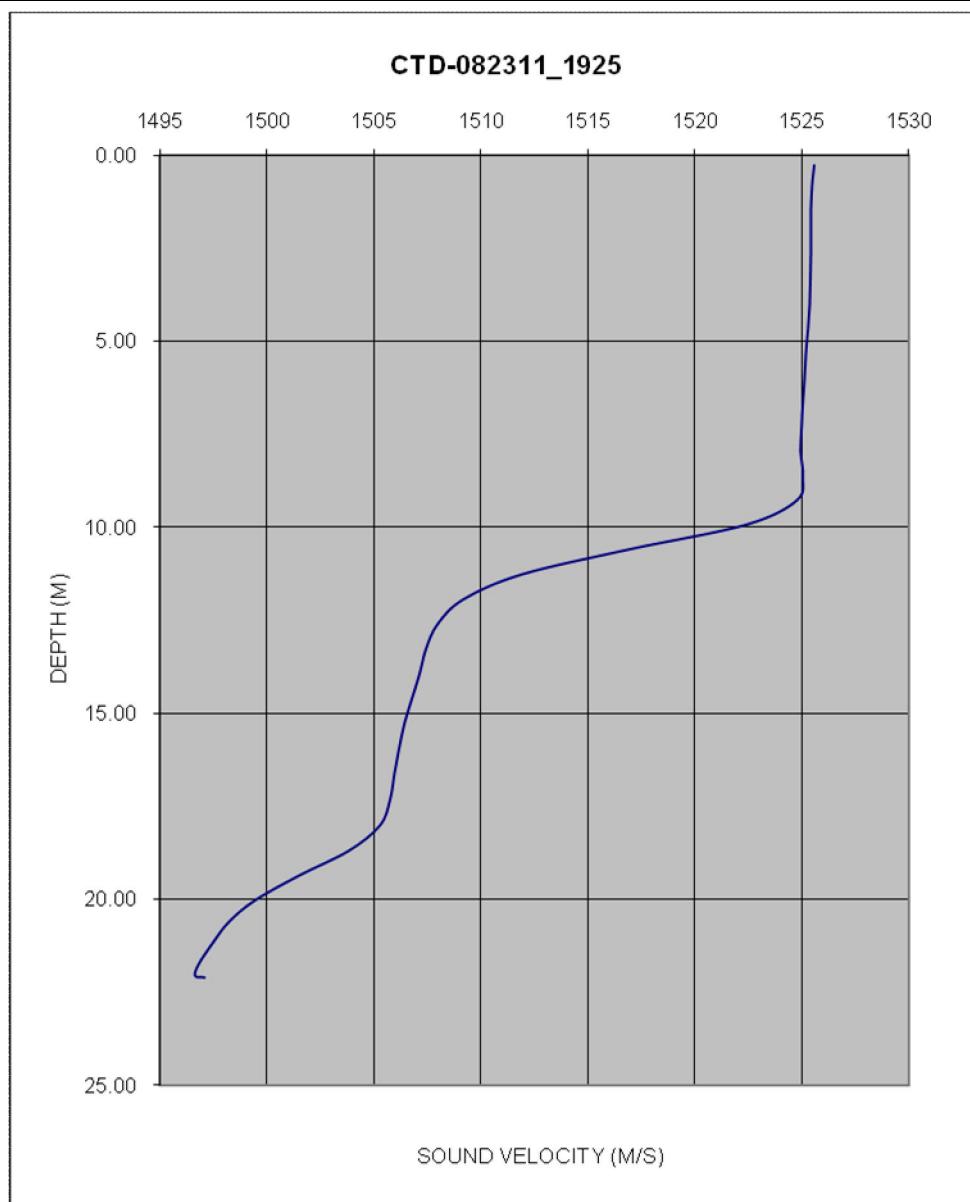


Figure 3.2-51
SVP 082311_2126 taken during the Fall 2011 multibeam survey at the HARS

1526.81 0.02

1526.64 0.70

1526.57 1.40

CTD PROFILE # 082311 2126

1526.53 2.08

1526.44 2.73

1526.32 3.37

<u>Date</u>	<u>Time</u>	<u>NAD83 NY LI (Feet)</u>	<u>Water Depth</u>	<u>Latitude</u>	<u>Longitude</u>
		<u>Easting</u>	<u>Northing</u>	<u>Feet</u>	<u>N</u>
08/23/11	21:26	1019263	77136	77	40.37832475 73.87433205

1526.26 4.07

1526.22 4.73

1526.10 5.38

1525.94 6.04

1525.67 6.70

1525.34 7.36

1524.49 8.01

1521.67 8.67

1517.37 9.33

1514.36 10.00

1511.89 10.67

1510.15 11.36

1509.13 12.02

1508.28 12.70

1507.36 13.37

1506.67 14.05

1506.25 14.73

1506.01 15.39

1505.85 16.05

1505.61 16.73

1505.17 17.40

1504.32 18.07

1502.65 18.75

1500.62 19.41

1498.77 20.09

1497.88 20.76

1497.40 21.44

1496.75 22.11

1496.09 22.78

1495.75 23.31

1496.09 23.39

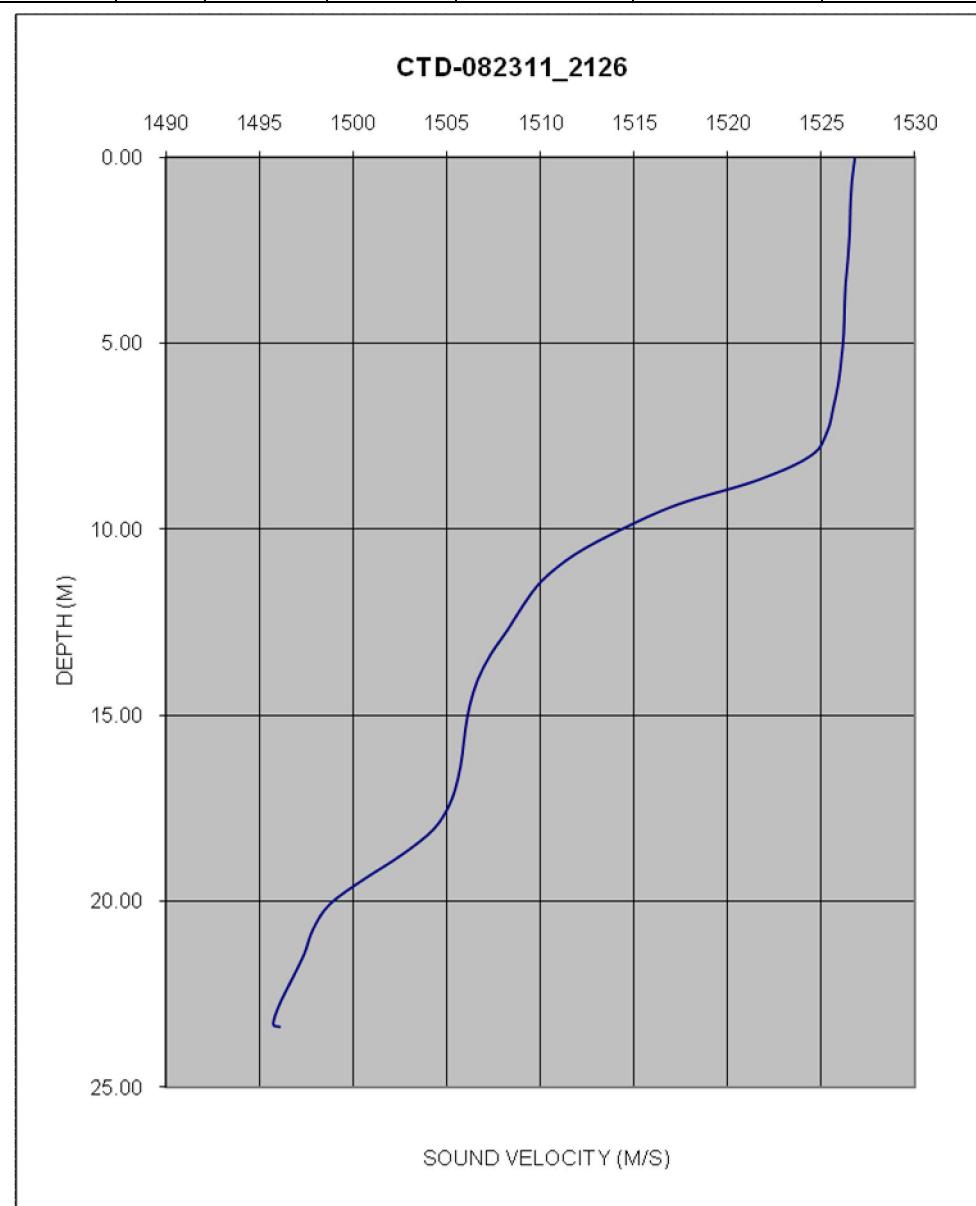


Figure 3.2-52
SVP 082411_1133 taken during the Fall 2011 multibeam survey at the HARS

1516.07 0.43

1516.14 0.98

1516.28 1.58

CTD PROFILE # 082411 1133

1517.43 2.20

1519.52 2.82

1521.58 3.43

<u>Date</u>	<u>Time</u>	<u>NAD83 NY LI (Feet)</u>	<u>Water Depth</u>	<u>Latitude</u>	<u>Longitude</u>
		<u>Easting</u>	<u>Northing</u>	<u>Feet</u>	<u>N</u>
08/24/11	11:33	1019481	86693	62	40.40455469 73.87350044

1522.71 4.01

1523.21 4.58

1523.38 5.11

1523.46 5.61

1523.38 6.11

1523.02 6.62

1521.69 7.15

1518.85 7.68

1516.61 8.15

1514.64 8.60

1512.63 9.05

1511.10 9.57

1510.03 10.15

1509.42 10.72

1509.01 11.28

1508.01 11.85

1506.76 12.39

1506.00 12.91

1505.35 13.44

1504.81 13.98

1504.35 14.54

1503.93 15.10

1503.35 15.68

1502.63 16.28

1501.42 16.88

1500.04 17.49

1499.32 18.09

1499.10 18.64

1499.25 18.78

1499.63 18.80

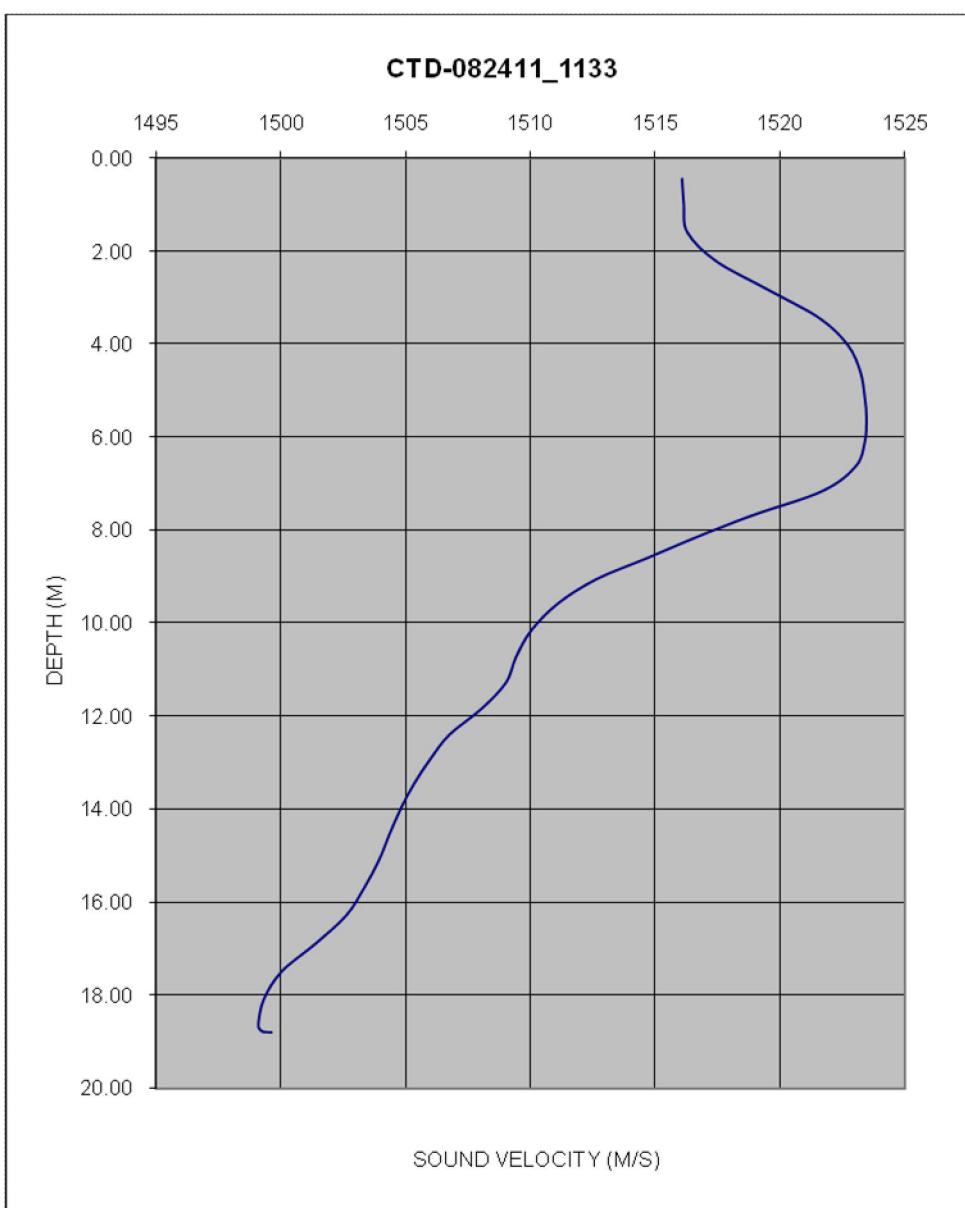


Figure 3.2-53
SVP 082411_1232 taken during the Fall 2011 multibeam survey at the HARS

1520.34	0.43
1521.45	1.04
1523.06	1.65
1524.03	2.23
1524.56	2.78
1524.77	3.34
1524.85	3.90
1524.88	4.49
1524.89	5.10
1524.89	5.72
1524.89	6.34
1524.86	6.93
1524.69	7.55
1523.99	8.22
1522.17	8.90
1518.06	9.58
1513.53	10.26
1510.78	10.94
1508.97	11.61
1507.87	12.27
1507.14	12.95
1506.54	13.63
1505.98	14.31
1505.33	15.00
1504.60	15.66
1503.56	16.31
1502.63	16.95
1501.53	17.58
1500.42	18.22
1499.59	18.86
1499.20	19.50
1498.89	20.13
1498.41	20.77
1497.56	21.43
1496.21	22.08
1494.48	22.57
1494.31	22.63

CTD PROFILE # 082411_1232

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
08/24/11	12:32	1020207	77161	74	40.37838851 73.87094532

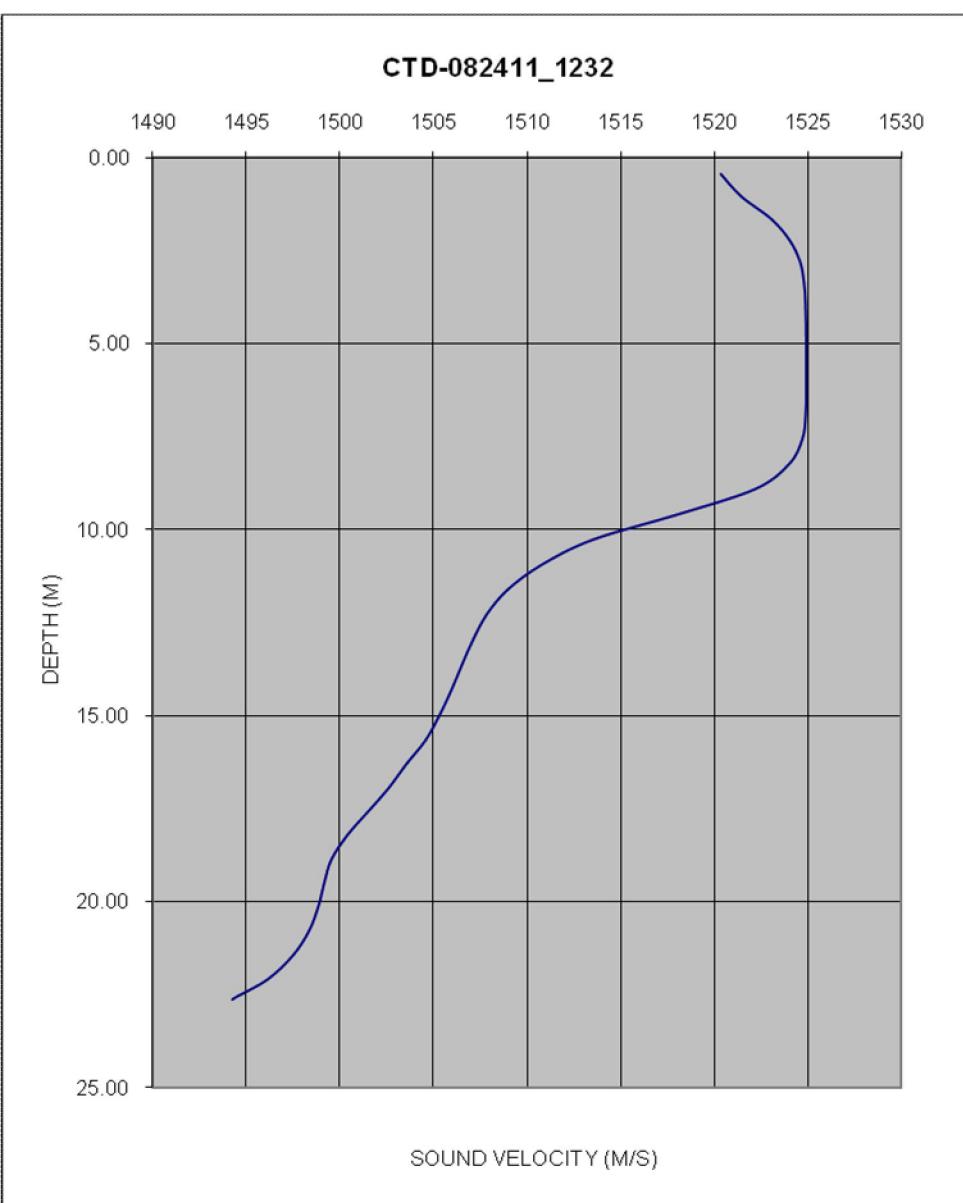


Figure 3.2-54
SVP 082411_1356 taken during the Fall 2011 multibeam survey at the HARS

1521.82	0.46
1522.65	1.02
1523.75	1.54
1524.32	2.03
1524.64	2.58
1524.82	3.19
1524.87	3.78
1524.88	4.37
1524.88	4.98
1524.87	5.59
1524.82	6.22
1524.61	6.89
1523.82	7.54
1522.38	8.17
1519.80	8.80
1516.52	9.44
1514.52	10.09
1513.14	10.75
1511.68	11.41
1510.48	12.04
1509.60	12.69
1508.66	13.36
1507.67	14.03
1506.57	14.65
1505.76	15.22
1505.27	15.80
1504.94	16.42
1504.60	17.08
1504.02	17.70
1503.27	18.30
1502.73	18.88
1502.35	19.49
1501.88	20.13
1501.64	20.55
1501.95	20.60

CTD PROFILE # 082411_1356

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
08/24/11	13:56	1024034	77151	68	40.37834569 73.85720808

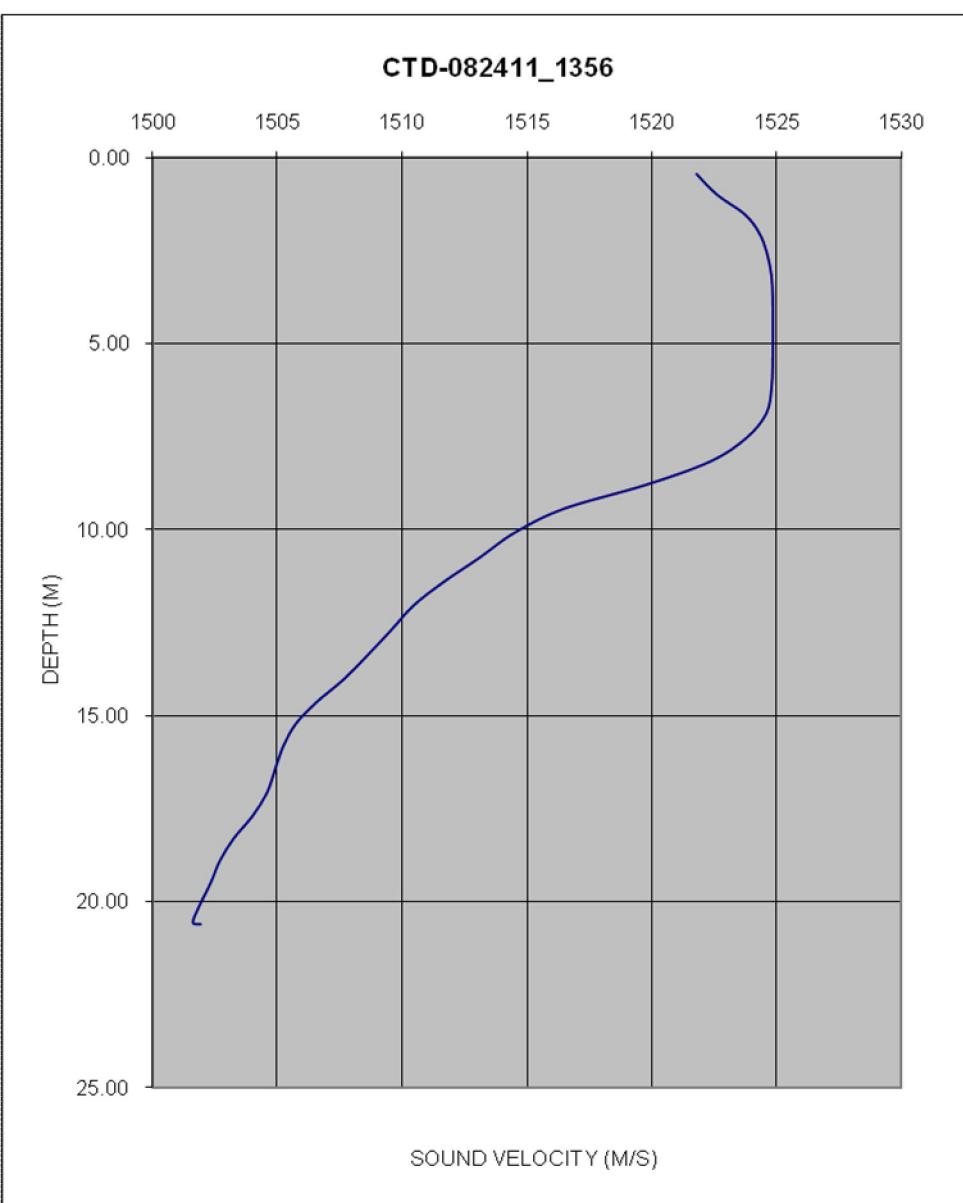


Figure 3.2-55
SVP 082411_1546 taken during the Fall 2011 multibeam survey at the HARS

1522.53	0.05
1522.23	0.53
1522.74	1.19
1524.19	1.88
1524.78	2.56
1525.05	3.17
1525.14	3.74
1525.17	4.25
1525.17	4.74
1525.15	5.36
1525.09	6.02
1524.65	6.67
1523.81	7.25
1522.95	7.82
1521.84	8.37
1520.35	8.95
1517.71	9.57
1514.51	10.17
1511.83	10.81
1510.42	11.40
1509.72	12.03
1509.01	12.68
1508.12	13.33
1507.00	13.96
1506.03	14.57
1505.48	15.18
1505.16	15.81
1504.95	16.45
1504.34	17.09
1503.30	17.73
1502.42	18.36
1501.43	18.98
1499.99	19.60
1498.02	20.24
1496.07	20.91
1495.08	21.51
1495.19	21.67

CTD PROFILE # 082411 1546

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
08/24/11	15:46	1022884	77355	71	40.37890986 73.86133640

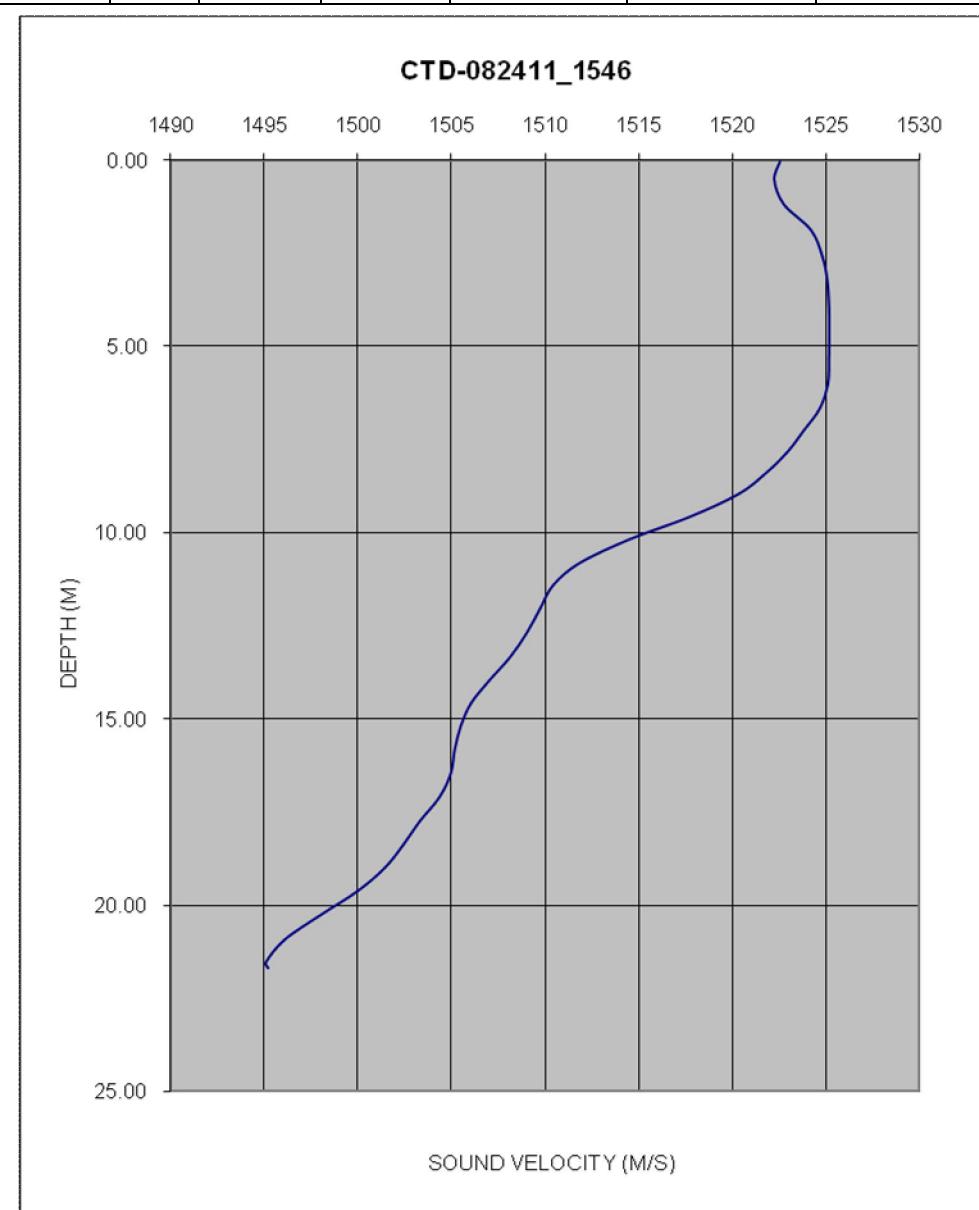


Figure 3.2-56
SVP 082411_1739 taken during the Fall 2011 multibeam survey at the HARS

1521.55	0.29
1521.50	0.85
1522.15	1.43
1522.77	2.05
1523.00	2.69
1523.18	3.33
1523.36	3.96
1523.49	4.54
1523.53	5.16
1523.66	5.77
1523.68	6.36
1523.68	6.95
1523.68	7.48
1523.69	8.07
1523.70	8.67
1523.90	9.26
1523.26	9.79
1521.46	10.32
1520.28	10.90
1519.38	11.49
1518.15	12.14
1515.67	12.80
1513.00	13.44
1511.64	14.09
1509.85	14.74
1507.14	15.40
1504.88	16.04
1503.69	16.62
1503.60	16.80

CTD PROFILE # 082411_1739

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
08/24/11	17:39	1023960	90542	55	40.41510113 73.85739712

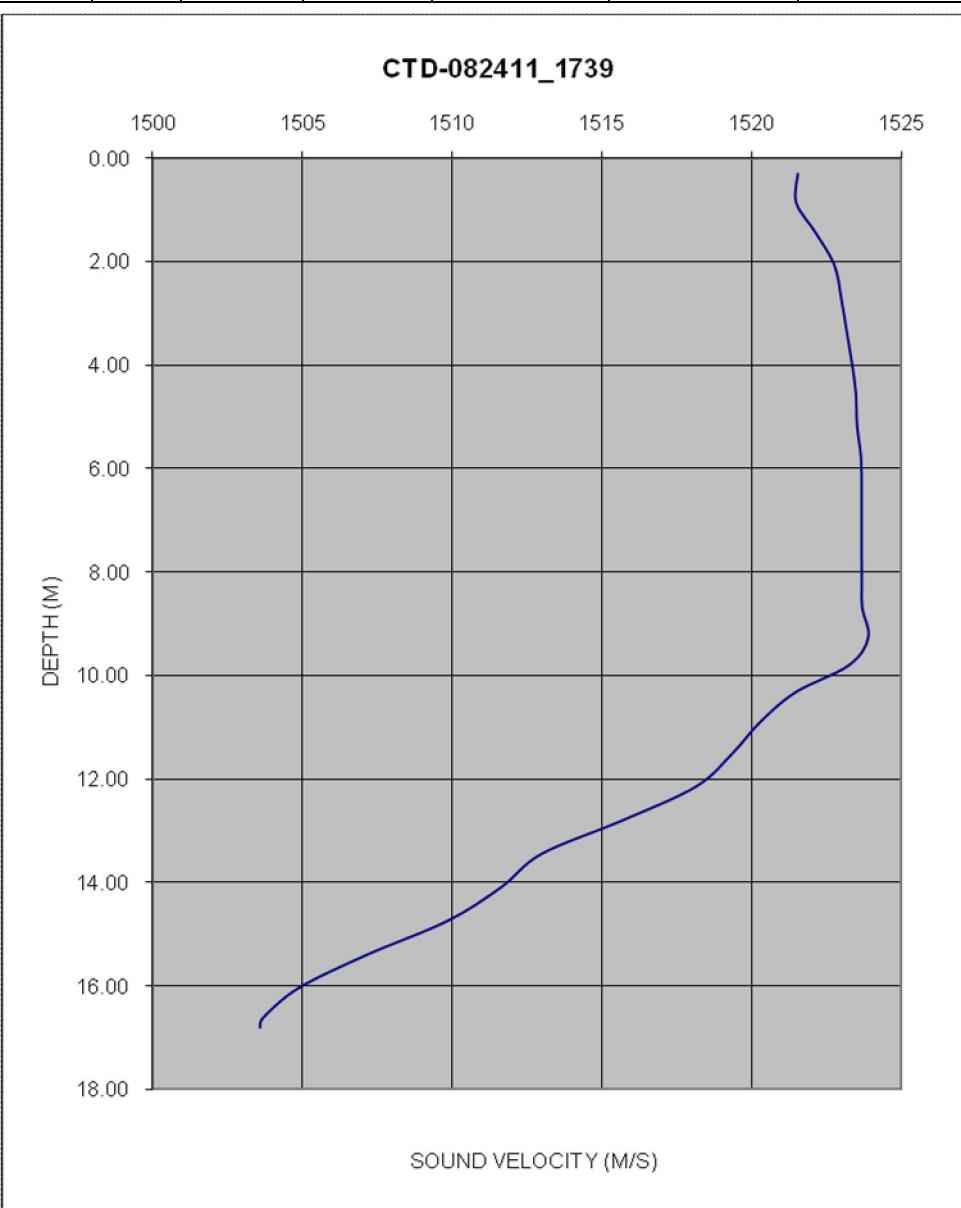


Figure 3.2-57
SVP 091211_1307 taken during the Fall 2011 multibeam survey at the HARS

1515.33	0.45
1515.75	0.98
1516.49	1.55
1516.94	2.19
1517.25	2.88
1517.46	3.54
1517.72	4.09
1517.83	4.59
1517.88	5.11
1517.80	5.69
1517.64	6.25
1517.60	6.76
1517.73	7.24
1517.83	7.73
1517.93	8.16
1518.02	8.60
1518.07	9.07
1518.07	9.54
1518.08	10.05
1518.09	10.56
1518.07	11.06
1518.04	11.57
1518.02	12.03
1518.03	12.48
1518.08	13.00
1518.12	13.60
1518.13	14.18
1518.13	14.76
1518.06	15.37
1517.92	16.01
1517.81	16.61
1517.74	17.19
1517.68	17.80
1517.54	18.40
1517.06	19.01
1516.40	19.59
1515.86	20.14
1515.41	20.75
1515.17	21.34
1514.93	21.90
1514.68	22.49
1514.33	23.04
1514.12	23.25

CTD PROFILE # 091211 1307

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
09/12/11	13:07	1020837	77135	76	40.37831457 73.86868431

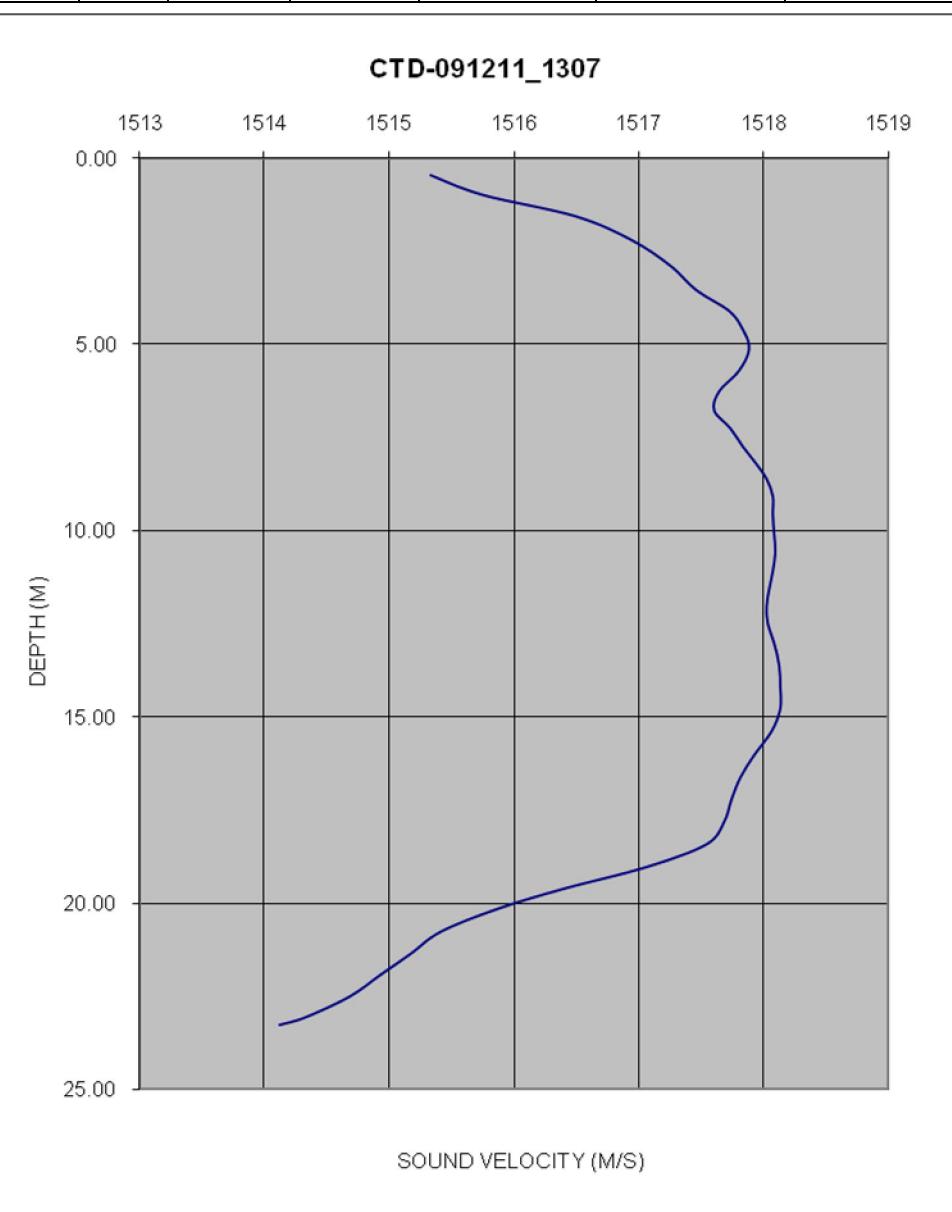


Figure 3.2-58
SVP 091211_1420 taken during the Fall 2011 multibeam survey at the HARS

1515.28	0.20
1516.37	0.80
1516.77	1.47
1517.21	2.18
1517.65	2.85
1517.86	3.48
1517.92	4.09
1517.95	4.70
1517.89	5.36
1517.83	6.03
1517.64	6.70
1517.57	7.40
1517.72	8.08
1517.84	8.78
1517.91	9.47
1517.96	10.12
1518.03	10.79
1518.07	11.49
1518.05	12.19
1518.01	12.89
1517.99	13.57
1518.00	14.26
1518.02	14.94
1518.03	15.54
1518.06	16.07
1518.08	16.49
1518.10	16.87
1518.12	17.30
1517.98	17.80
1517.63	18.31
1517.26	18.83
1516.88	19.38
1516.35	19.89
1516.00	20.29
1515.73	20.80
1515.48	21.39
1514.91	22.02
1514.34	22.53
1514.11	22.58

CTD PROFILE # 091211 1420

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
09/12/11	14:20	1021602	77124	74	40.37828120 73.86593868

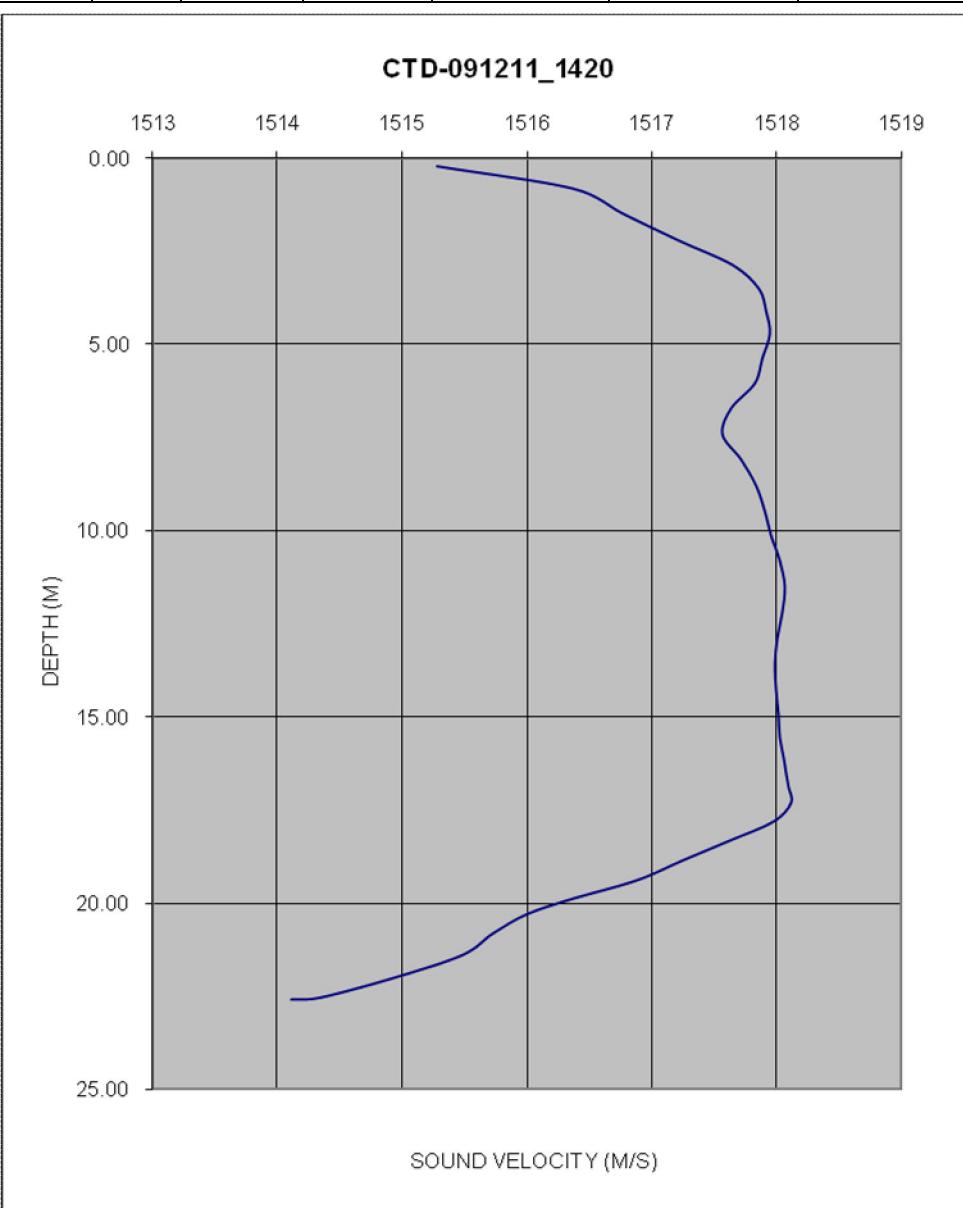


Figure 3.2-59
SVP 091211_1548 taken during the Fall 2011 multibeam survey at the HARS

1512.33	0.34
1514.43	0.90
1515.86	1.54
1516.18	2.20
1516.51	2.90
1516.29	3.61
1516.46	4.33
1516.81	5.01
1517.22	5.68
1517.44	6.35
1517.47	7.00
1517.54	7.67
1517.66	8.35
1517.77	9.03
1517.83	9.69
1517.93	10.36
1518.08	11.01
1518.09	11.69
1517.93	12.36
1517.57	13.03
1517.17	13.69
1516.76	14.37
1516.49	15.03
1516.37	15.68
1516.30	16.31
1516.32	16.58
1516.44	16.61
1516.55	16.62
1516.59	16.66
1516.66	16.68

CTD PROFILE # 091211 1548

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
09/12/11	15:48	1024025	86398	55	40.40372626 73.85718796

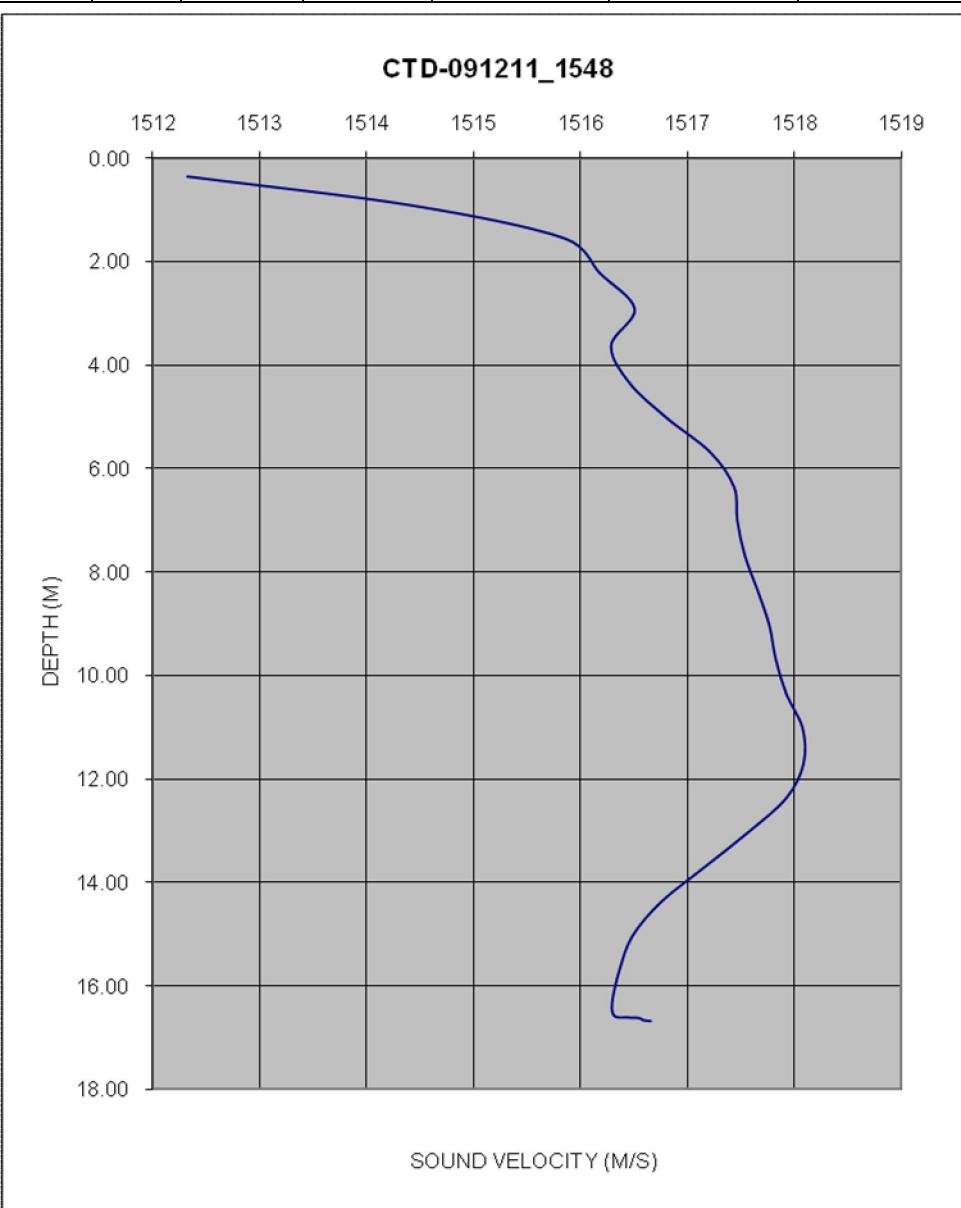


Figure 3.2-60
SVP 091211_1648 taken during the Fall 2011 multibeam survey at the HARS

1508.70	0.09
1511.94	0.56
1514.48	1.07
1515.25	1.60
1515.82	2.14
1516.41	2.69
1516.92	3.23
1516.75	3.77
1516.66	4.29
1516.68	4.79
1516.76	5.28
1516.89	5.78
1517.16	6.32
1517.35	6.86
1517.24	7.40
1517.21	7.95
1517.25	8.52
1517.52	9.05
1517.73	9.56
1517.81	10.03
1517.82	10.56
1517.86	11.08
1517.89	11.62
1517.92	12.17
1517.93	12.72
1517.90	13.28
1517.90	13.82
1517.93	14.36
1517.96	14.90
1517.96	15.43
1517.78	15.96
1517.53	16.47
1517.38	16.99
1517.34	17.45
1517.39	17.56
1517.44	17.59
1517.34	17.62

CTD PROFILE # 091211_1648

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
09/12/11	16:48	1023670	95853	58	40.42968020 73.85840771

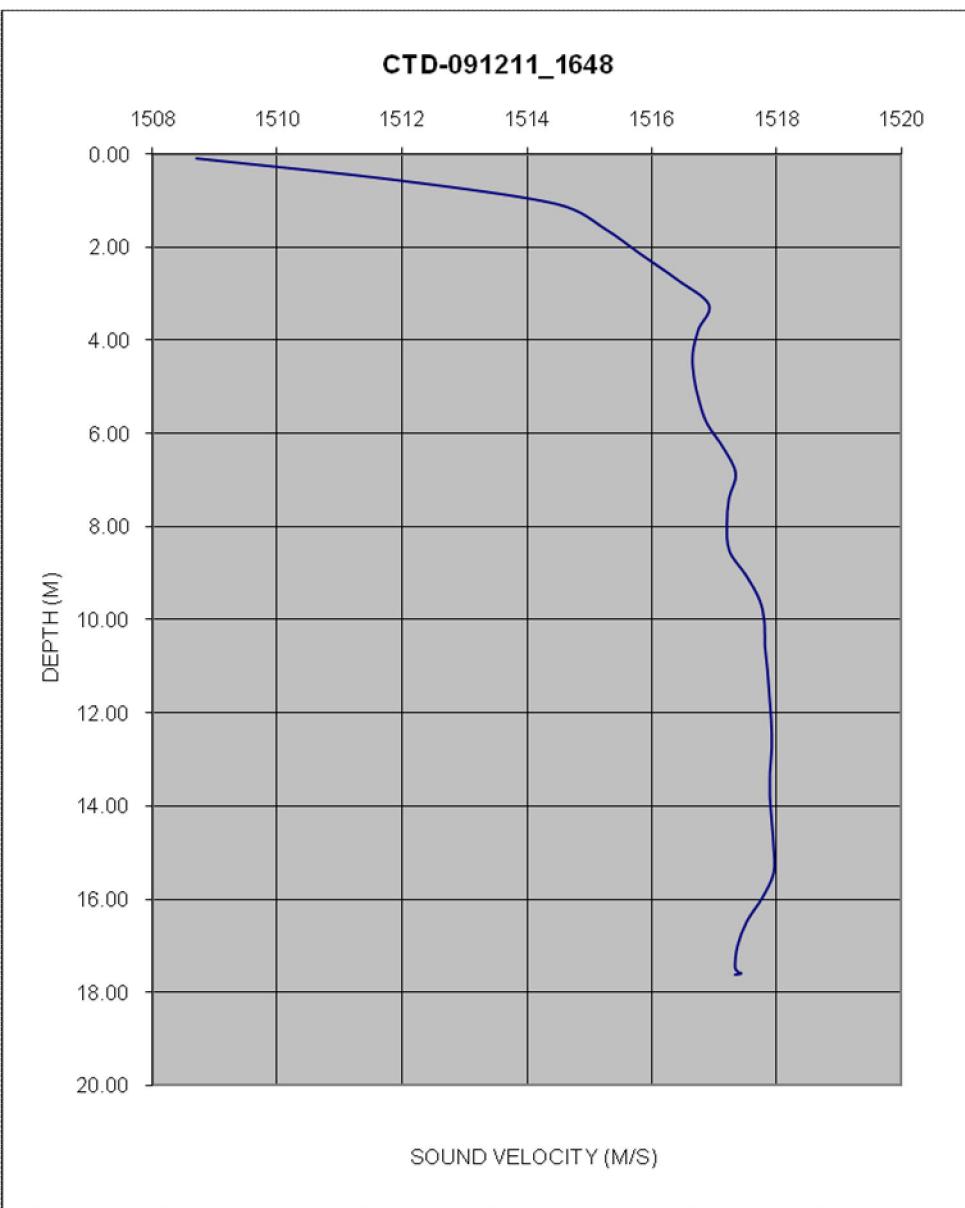


Figure 3.2-61
SVP 091211_1904 taken during the Fall 2011 multibeam survey at the HARS

CTD PROFILE # 091211 1904

1505.36	0.61
1505.17	0.87
1505.87	1.13
1506.36	1.42
1504.87	1.61
1505.81	1.70
1508.28	1.86
1510.81	2.26
1511.45	2.73
1512.49	3.22
1513.98	3.72
1515.71	4.22
1516.47	4.75
1516.59	5.30
1516.51	5.80
1516.53	6.30
1516.61	6.74
1516.80	7.15
1516.97	7.58
1517.17	8.05
1517.48	8.55
1517.56	9.05
1517.57	9.58
1517.60	10.10
1517.64	10.64
1517.73	11.26
1517.86	11.94
1517.88	12.64
1517.90	13.33
1517.68	14.02
1517.40	14.70
1517.26	15.37
1517.25	15.68

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
09/12/11	19:04	1022355	86635	51	40.40438410 73.86318275

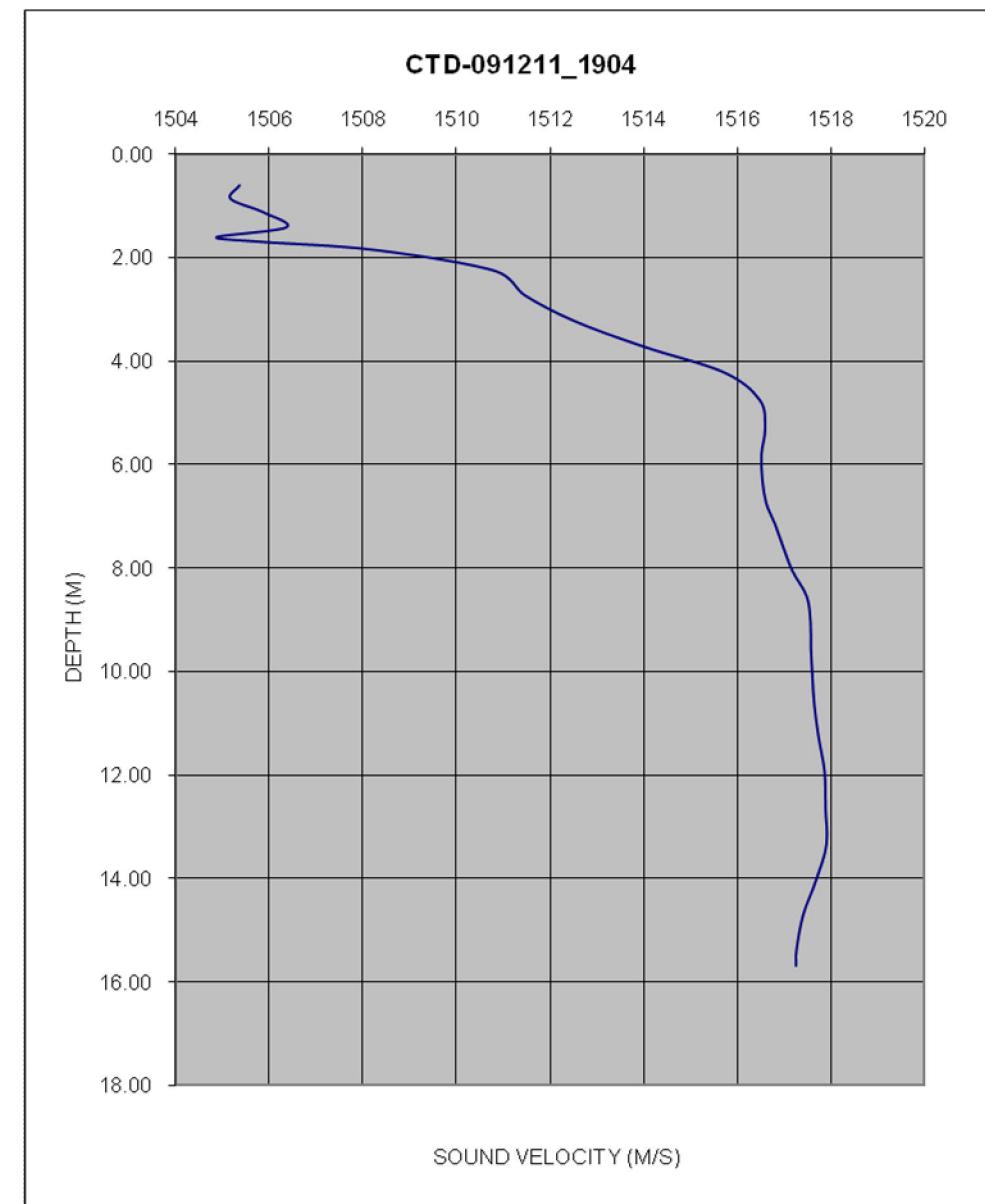


Figure 3.2-62
SVP 091211_2012 taken during the Fall 2011 multibeam survey at the HARS

1507.80	0.57
1511.22	1.32
1512.43	2.10
1513.77	2.89
1515.36	3.63
1516.47	4.30
1516.78	4.97
1516.93	5.68
1516.97	6.36
1516.99	7.02
1517.02	7.70
1517.13	8.39
1517.24	9.05
1517.35	9.70
1517.32	10.29
1517.27	10.99
1517.27	11.66
1517.32	12.35
1517.51	13.06
1517.58	13.65
1517.74	14.13
1517.98	14.62
1518.11	15.10
1517.98	15.59
1517.72	16.08
1517.58	16.55
1517.51	17.04
1517.47	17.54
1517.43	18.08
1517.43	18.65
1517.49	18.86

CTD PROFILE # 091211 2012

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
09/12/11	20:12	1021907	95917	62	40.42986352 73.86473985

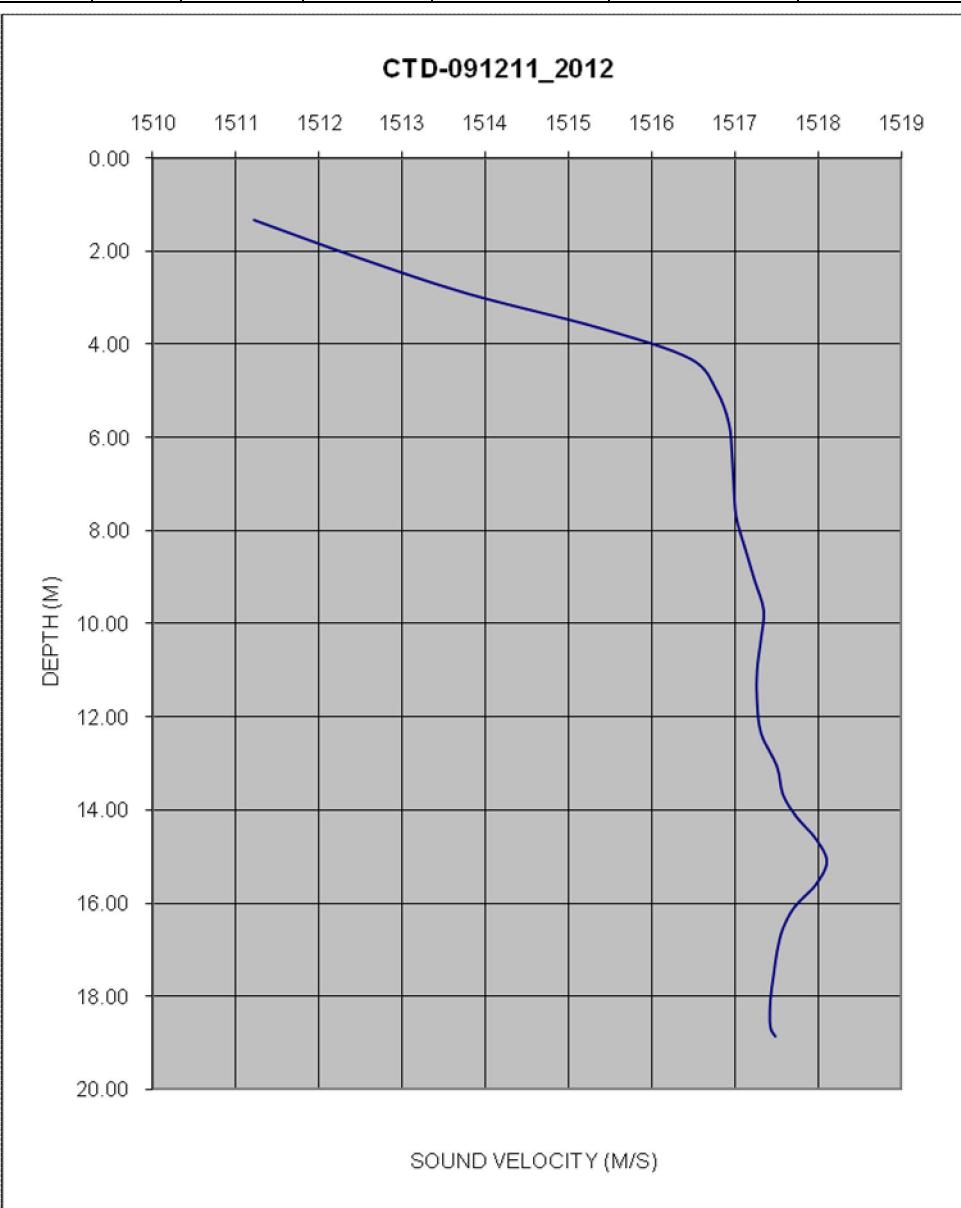


Figure 3.2-63
SVP 091311_1427 taken during the Fall 2011 multibeam survey at the HARS

1516.78	0.27
1516.77	0.77
1516.79	1.30
1516.80	1.80
1516.89	2.39
1517.21	3.06
1517.38	3.75
1517.36	4.42
1517.29	5.02
1517.28	5.60
1517.31	6.17
1517.33	6.75
1517.36	7.30
1517.38	7.84
1517.40	8.46
1517.41	9.08
1517.43	9.74
1517.45	10.44
1517.46	11.09
1517.47	11.64
1517.48	12.20
1517.48	12.90
1517.47	13.63
1517.44	14.36
1517.40	15.10
1517.35	15.81
1517.25	16.50
1517.16	17.26
1517.01	18.01
1516.85	18.76
1516.78	19.34
1516.81	19.41

CTD PROFILE # 091311_1427

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
09/13/11	14:27	1021687	95726	64	40.42933900 73.86552990

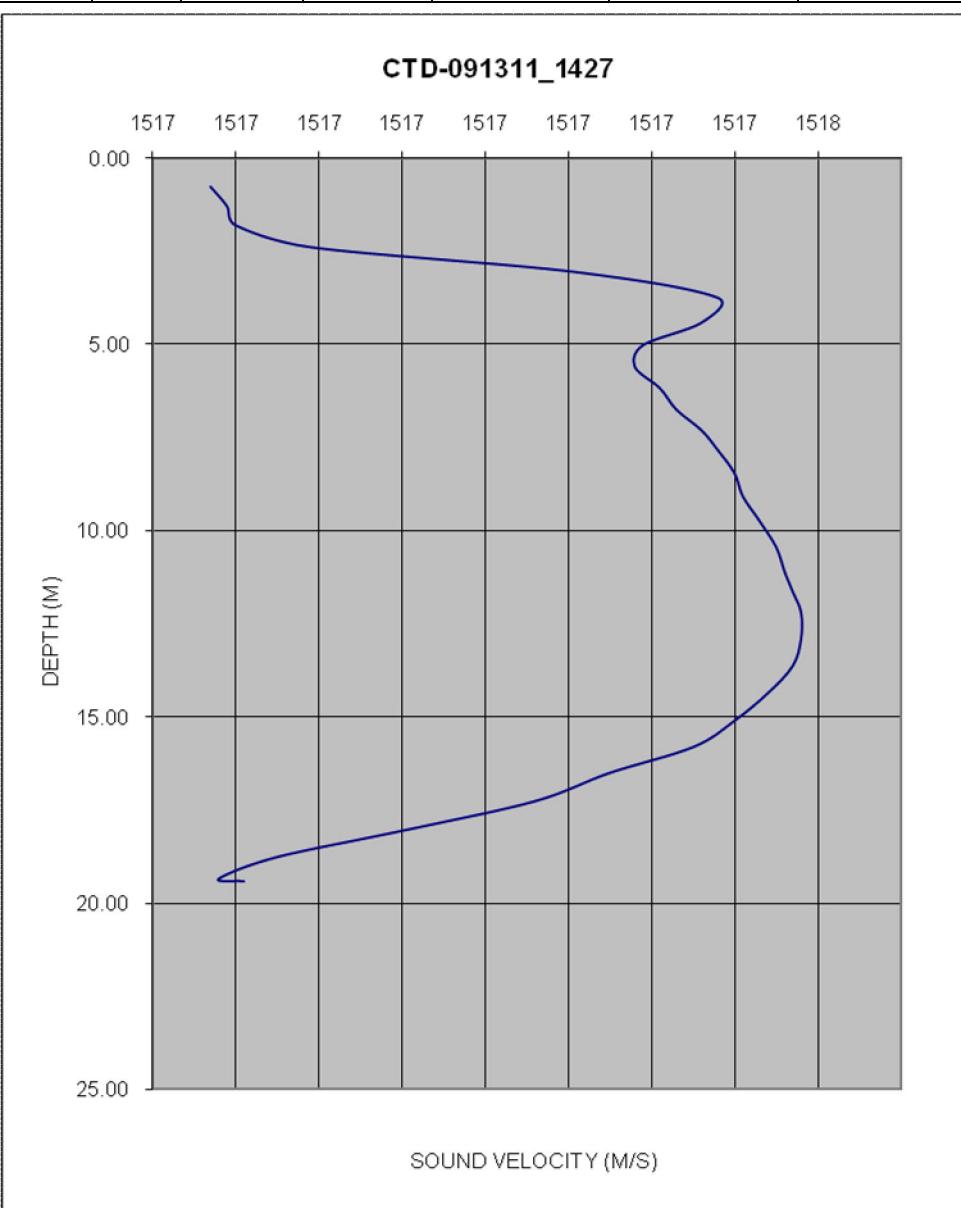


Figure 3.2-64
SVP 091311_1552 taken during the Fall 2011 multibeam survey at the HARS

1516.85	0.25
1517.69	0.96
1517.56	1.59
1517.46	2.14
1517.22	2.76
1517.25	3.44
1517.52	4.09
1517.54	4.72
1517.55	5.35
1517.54	6.03
1517.45	6.75
1517.38	7.43
1517.41	8.08
1517.36	8.70
1517.32	9.32
1517.31	9.94
1517.32	10.53
1517.33	11.09
1517.35	11.65
1517.36	12.22
1517.38	12.80
1517.37	13.44
1517.37	14.13
1517.37	14.84
1517.38	15.56
1517.38	16.29
1517.31	17.02
1516.11	17.75
1514.77	18.46
1514.17	19.17
1514.02	19.77
1514.16	19.94

CTD PROFILE # 091311_1552

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
09/13/11	15:52	1021112	95928	65	40.42989729 73.86759513

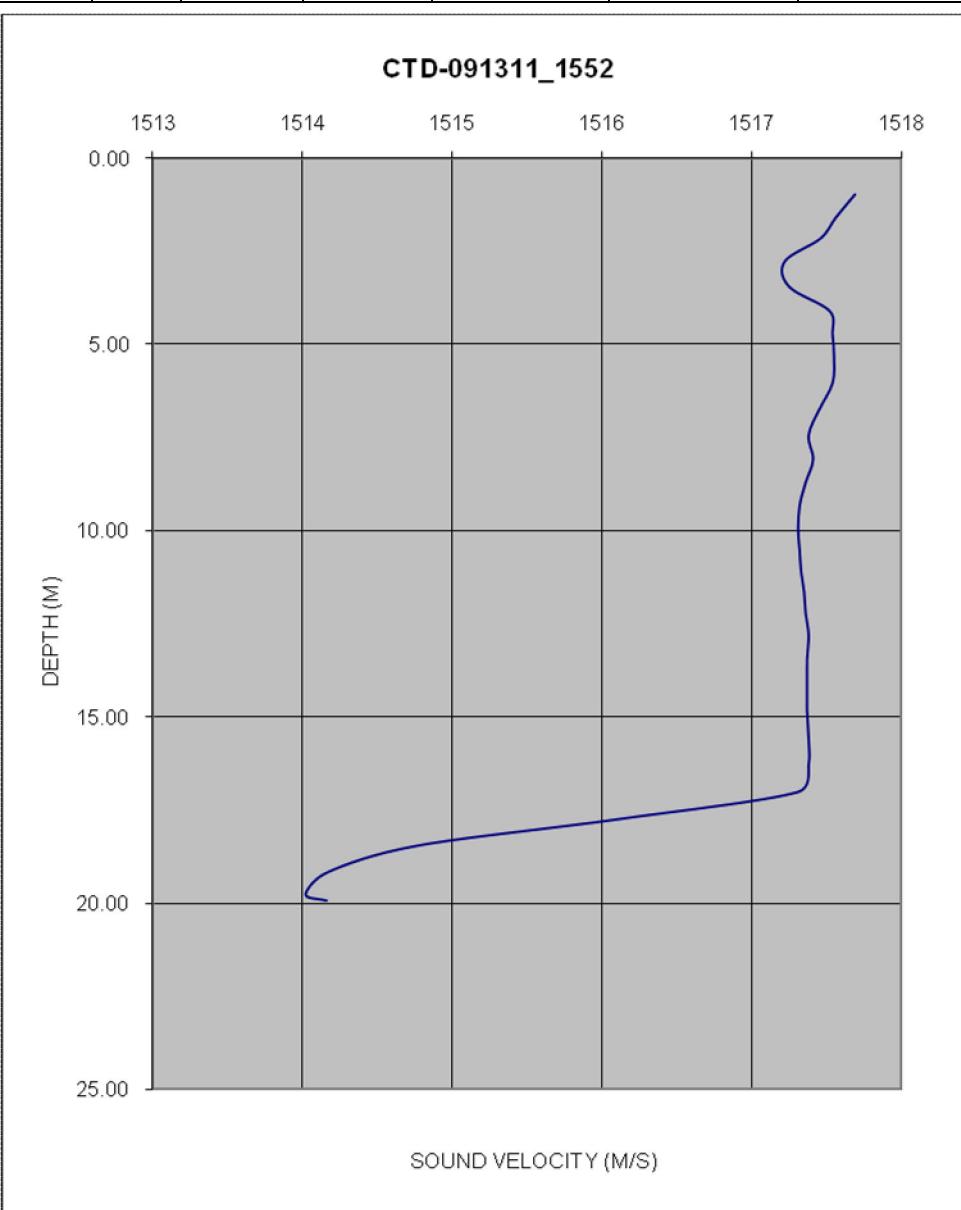


Figure 3.2-65
SVP 091311_1719 taken during the Fall 2011 multibeam survey at the HARS

1514.78	0.53
1516.52	1.13
1515.78	1.77
1515.53	2.38
1515.89	3.02
1515.91	3.69
1516.32	4.35
1517.03	5.02
1517.29	5.66
1517.40	6.32
1517.28	6.99
1517.32	7.65
1517.33	8.31
1517.25	8.96
1517.24	9.61
1517.29	10.27
1517.28	10.94
1517.25	11.60
1517.24	12.27
1517.12	12.95
1517.10	13.62
1517.08	14.30
1517.07	14.98
1517.07	15.65
1517.14	16.33
1517.20	17.02
1517.21	17.46
1517.20	17.49
1517.22	17.51
1517.23	17.55

CTD PROFILE # 091311_1719

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
09/13/11	17:19	1020169	86384	58	40.40370346 73.87103427

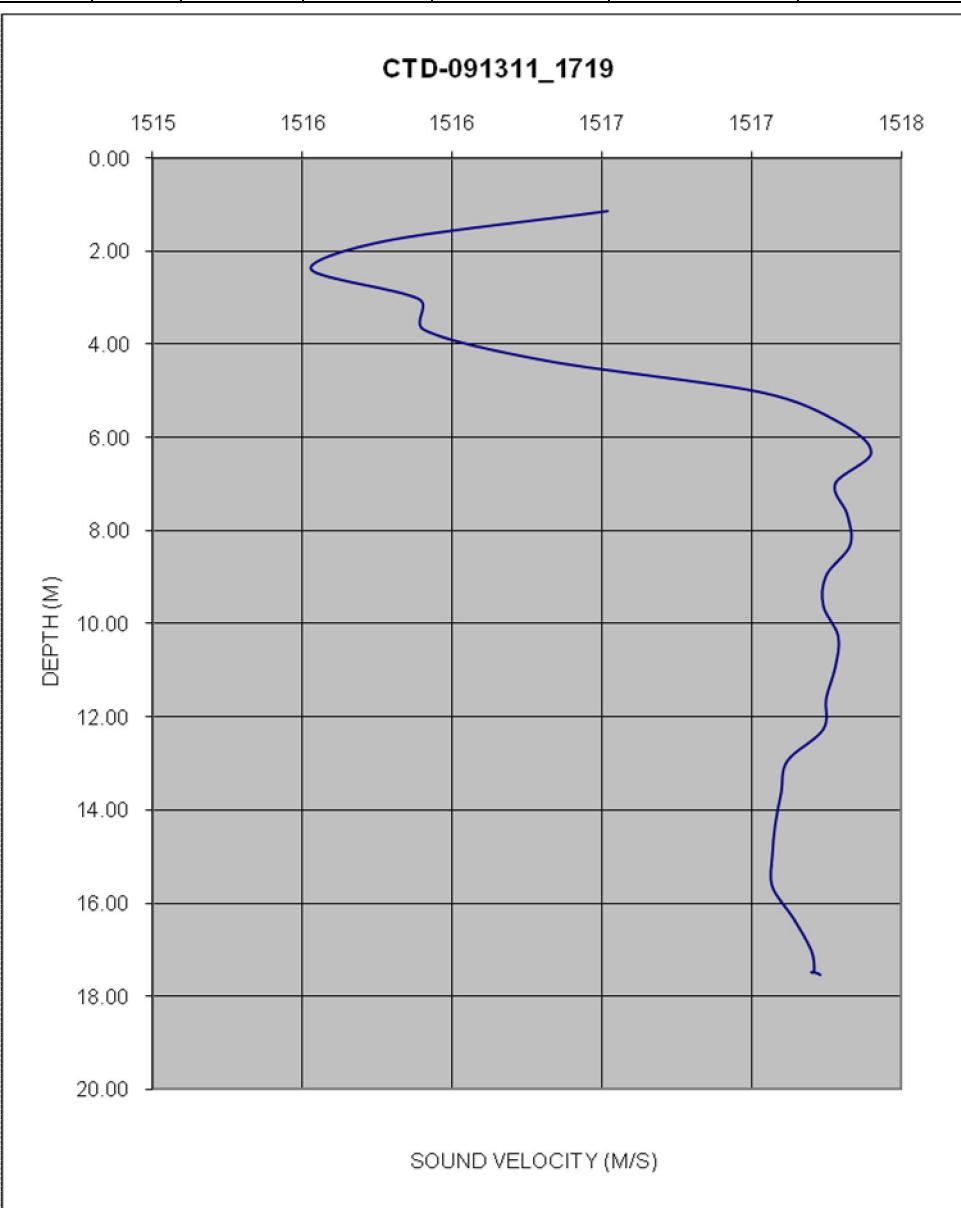


Figure 3.2-66
SVP 091311_1851 taken during the Fall 2011 multibeam survey at the HARS

1511.97 0.28

1511.86 0.77

1511.89 1.35

CTD PROFILE # 091311 1851

1512.76 1.99

1513.74 2.57

1513.66 3.08

<u>Date</u>	<u>Time</u>	<u>NAD83 NY LI (Feet)</u>		<u>Water Depth</u>	<u>Latitude</u>	<u>Longitude</u>
		<u>Easting</u>	<u>Northing</u>	<u>Feet</u>	<u>N</u>	<u>W</u>
09/13/11	18:51	1020059	86707	57	40.40459128	73.87142622

1514.18 3.59

1514.65 4.16

1514.95 4.76

1515.44 5.38

1516.14 6.00

1516.72 6.61

1517.15 7.21

1517.22 7.81

1517.22 8.42

1517.35 9.07

1517.51 9.70

1517.60 10.36

1517.68 11.02

1517.72 11.66

1517.69 12.32

1517.55 12.98

1517.46 13.64

1517.38 14.31

1517.38 14.97

1517.29 15.65

1517.14 16.33

1517.06 16.99

1517.12 17.29

1517.25 17.33

1517.40 17.36

1517.47 17.39

1517.51 17.41

1517.53 17.43

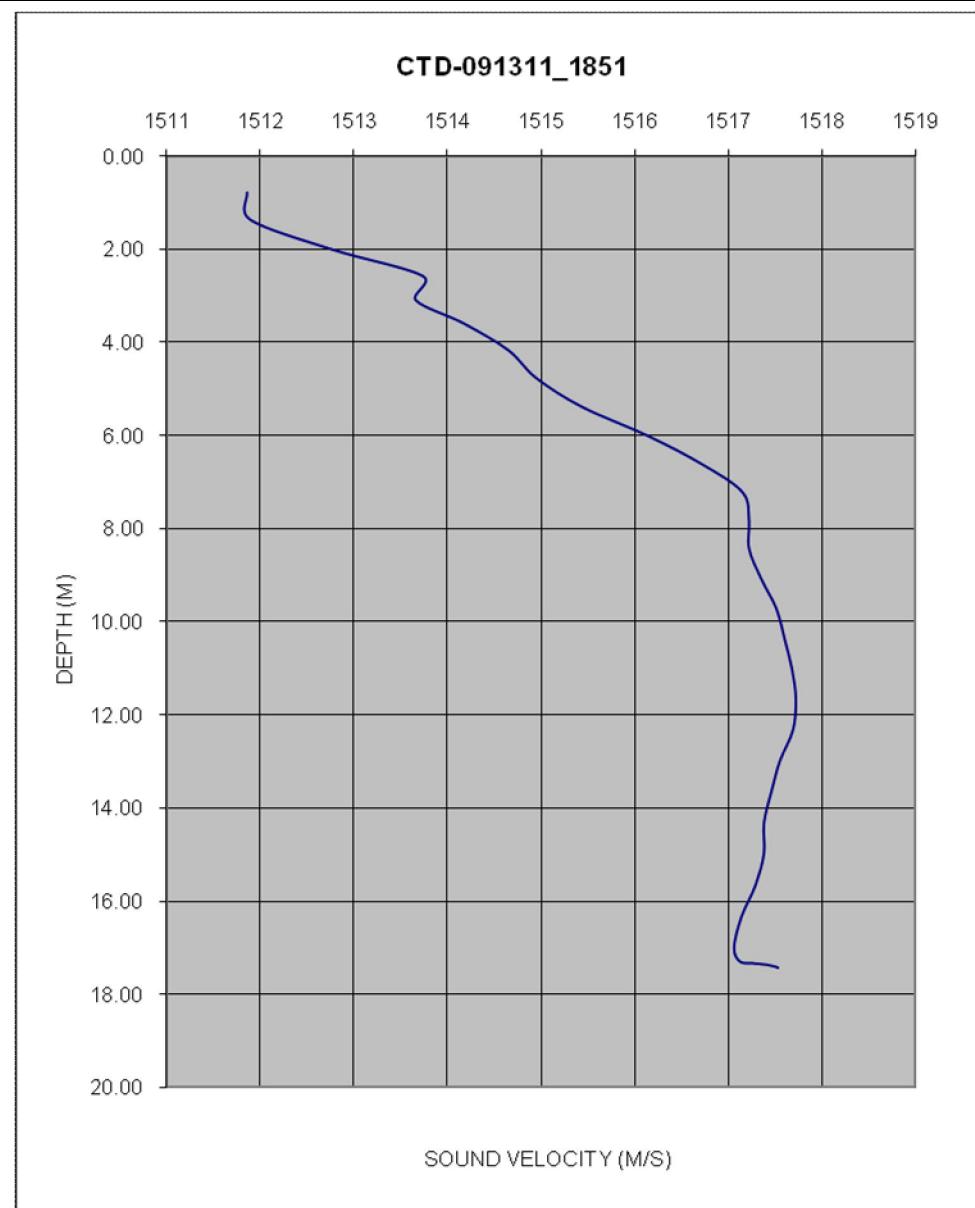


Figure 3.2-67
SVP 091411_1151 taken during the Fall 2011 multibeam survey at the HARS

1505.83	0.31
1511.08	0.94
1513.70	1.57
1516.03	2.25
1516.61	2.90
1516.71	3.55
1516.82	4.10
1516.79	4.49
1516.80	4.77
1516.83	5.18
1516.84	5.72
1516.87	6.22
1516.96	6.60
1516.92	6.78
1517.02	6.90
1517.10	7.22
1517.05	7.65
1517.01	8.08
1517.02	8.50
1517.05	8.85
1517.07	9.15
1517.07	9.42
1517.04	9.69
1516.97	10.16
1516.90	10.67
1516.90	11.15
1516.91	11.59
1516.92	11.98
1516.93	12.42
1516.83	12.82
1516.71	13.26
1516.53	13.75
1516.35	14.23
1516.19	14.73
1516.09	15.28
1516.03	15.86
1515.92	16.48
1515.83	17.15
1515.78	17.76
1515.73	18.40
1515.59	19.01
1515.44	19.64
1515.36	20.30
1515.31	20.97
1515.23	21.60
1515.13	22.26
1515.05	22.90
1515.00	23.21

CTD PROFILE # 091411_1151

Date	Time	NAD83 NY LI (Feet)		Water Depth	Latitude	Longitude
		Easting	Northing	Feet	N	W
09/14/11	11:51	1011817	95836	76	40.42967822	73.90098240

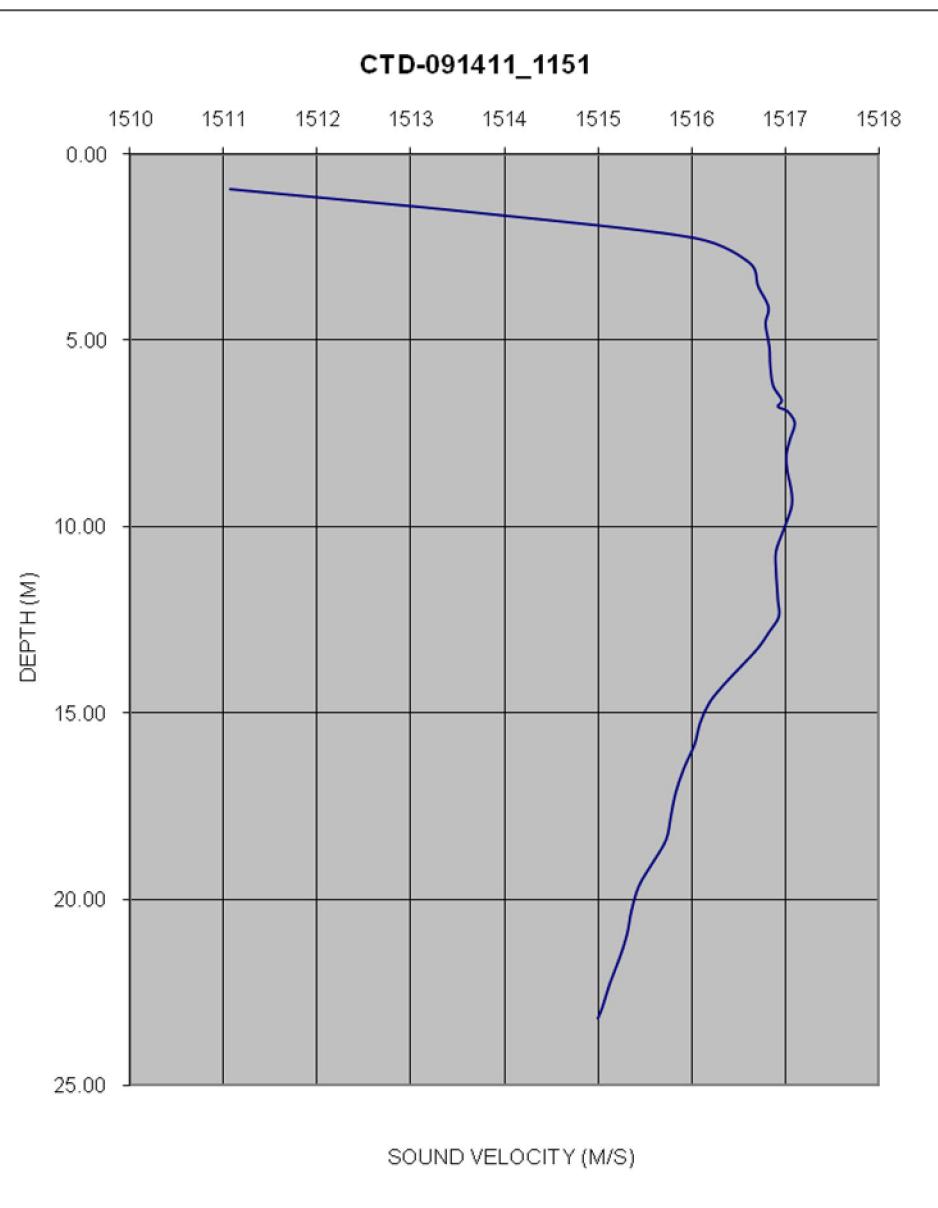


Figure 3.2-68
SVP 091411_1314 taken during the Fall 2011 multibeam survey at the HARS

1508.69	0.19
1513.52	0.82
1515.56	1.46
1516.42	2.11
1516.62	2.80
1516.81	3.48
1516.85	4.15
1516.86	4.83
1516.91	5.52
1516.99	6.19
1517.11	6.81
1517.11	7.40
1517.01	7.98
1517.00	8.59
1516.99	9.24
1516.98	9.89
1516.96	10.55
1516.93	11.21
1516.85	11.85
1516.77	12.49
1516.69	13.13
1516.60	13.79
1516.51	14.44
1516.39	15.11
1516.20	15.78
1516.01	16.34
1515.78	16.89
1515.57	17.50
1515.44	18.21
1515.32	18.98
1515.23	19.77
1515.10	20.53
1514.89	21.22
1514.75	21.87
1514.69	22.57
1514.69	23.20
1514.75	23.37

CTD PROFILE # 091411 1314

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
09/14/11	13:14	1012784	95812	77	40.42960929 73.89750915

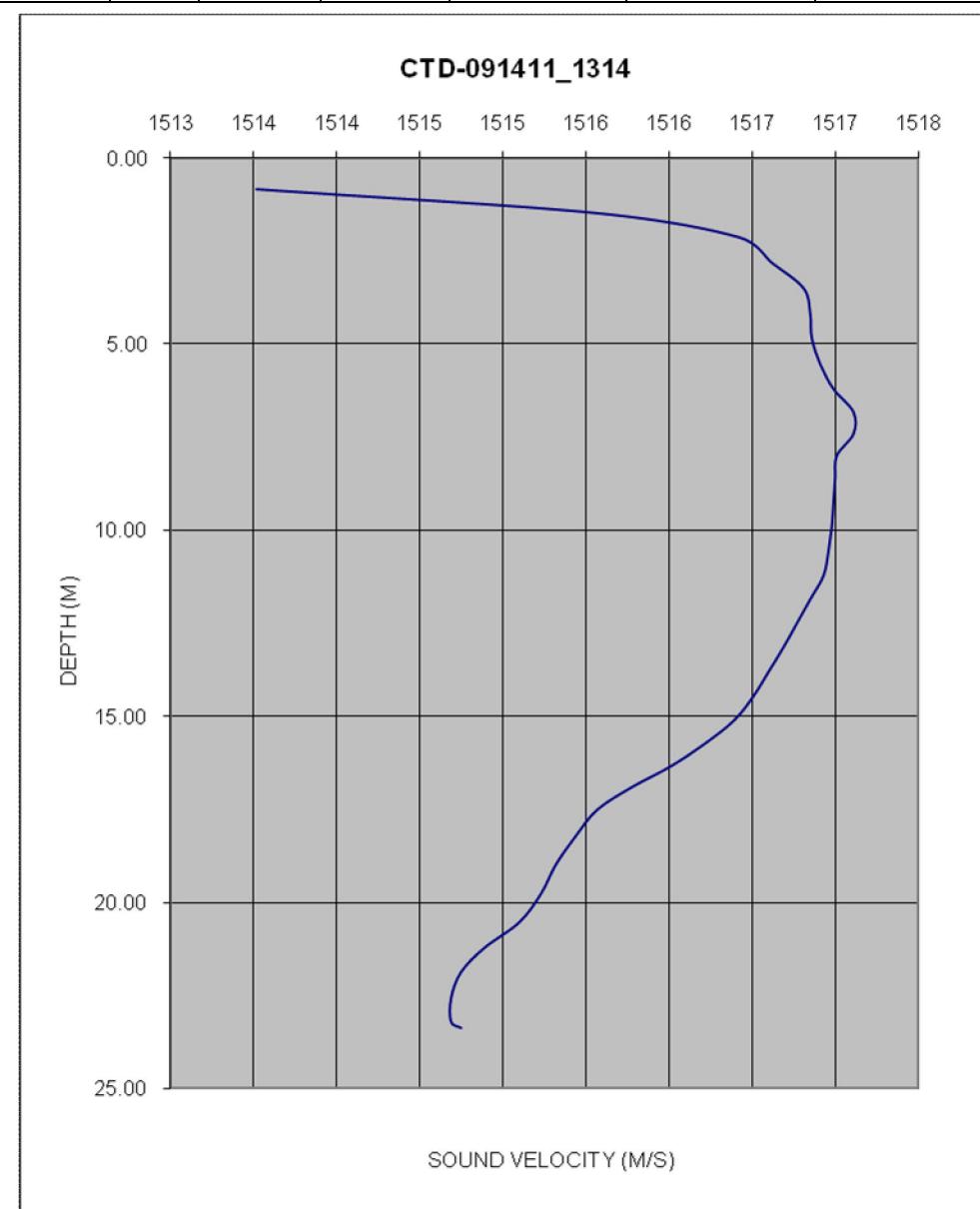


Figure 3.2-69
SVP 091411_1508 taken during the Fall 2011 multibeam survey at the HARS

1510.56	0.58
1514.41	1.21
1515.18	1.85
1515.24	2.49
1516.13	3.11
1516.67	3.73
1516.78	4.34
1516.89	4.94
1516.85	5.56
1516.87	6.17
1516.88	6.78
1516.85	7.44
1516.92	8.11
1517.10	8.78
1517.08	9.43
1517.03	10.05
1516.98	10.70
1516.88	11.36
1516.71	12.00
1516.67	12.61
1516.66	13.20
1516.59	13.79
1516.50	14.37
1516.33	14.93
1516.10	15.50
1515.84	16.10
1515.61	16.72
1515.49	17.33
1515.39	17.94
1515.28	18.54
1515.18	19.13
1515.11	19.72
1515.05	20.36
1515.01	21.02
1514.96	21.68
1514.90	22.31
1514.95	22.55

CTD PROFILE # 091411 1508

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
09/14/11	15:08	1014218	95860	74	40.42973632 73.89235818

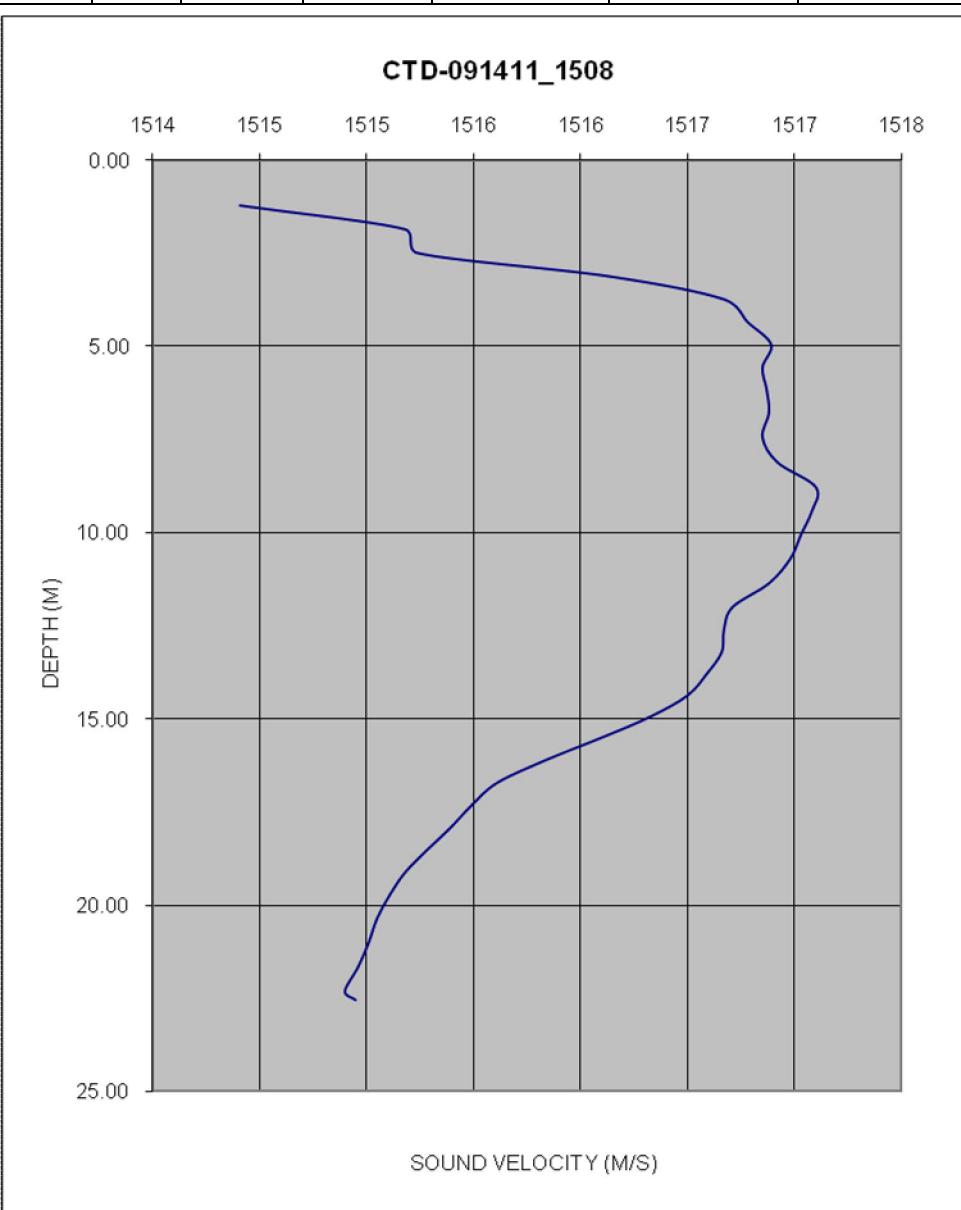


Figure 3.2-70
SVP 091411_1621 taken during the Fall 2011 multibeam survey at the HARS

CTD PROFILE # 091411 1621

1513.93	0.63					
1515.44	1.38	<u>Date</u>	<u>Time</u>	<u>NAD83 NY LI (Feet)</u>	<u>Water Depth</u>	<u>Latitude</u>
1515.75	2.14			<u>Easting</u>	<u>Northing</u>	<u>Longitude</u>
1516.08	2.89				<u>Feet</u>	<u>N</u>
1516.65	3.60	09/14/11	16:21	1015242	95860	73.88868009

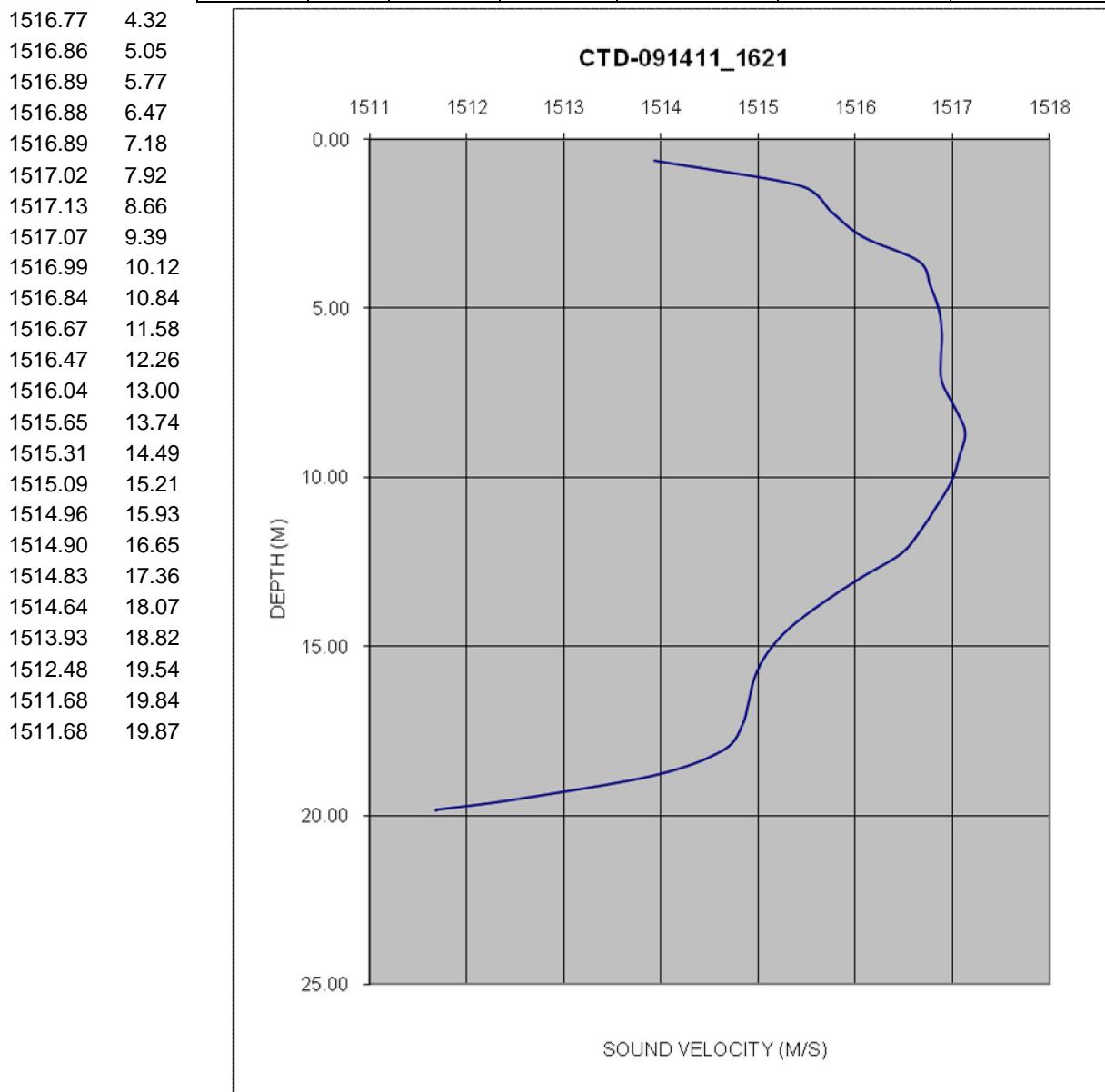


Figure 3.2-71
SVP 091411_1751 taken during the Fall 2011 multibeam survey at the HARS

CTD PROFILE # 091411 1751

1512.15	0.62
1512.53	1.13
1513.60	1.79
1514.88	2.49
1516.72	3.16
1516.95	3.76
1516.84	4.29
1516.79	4.75
1516.94	5.20
1517.04	5.63
1517.06	6.06
1517.10	6.50
1517.11	7.01
1517.00	7.63
1516.94	8.29
1516.93	9.04
1516.94	9.75
1517.01	10.43
1517.15	11.10
1517.25	11.78
1517.30	12.45
1517.34	13.13
1517.38	13.81
1517.32	14.47
1516.97	15.11
1516.21	15.77
1515.21	16.48
1514.57	17.22
1514.34	17.94
1514.17	18.62
1513.96	19.35
1513.71	20.10
1513.39	20.83
1513.11	21.53
1512.98	22.23
1513.06	22.52

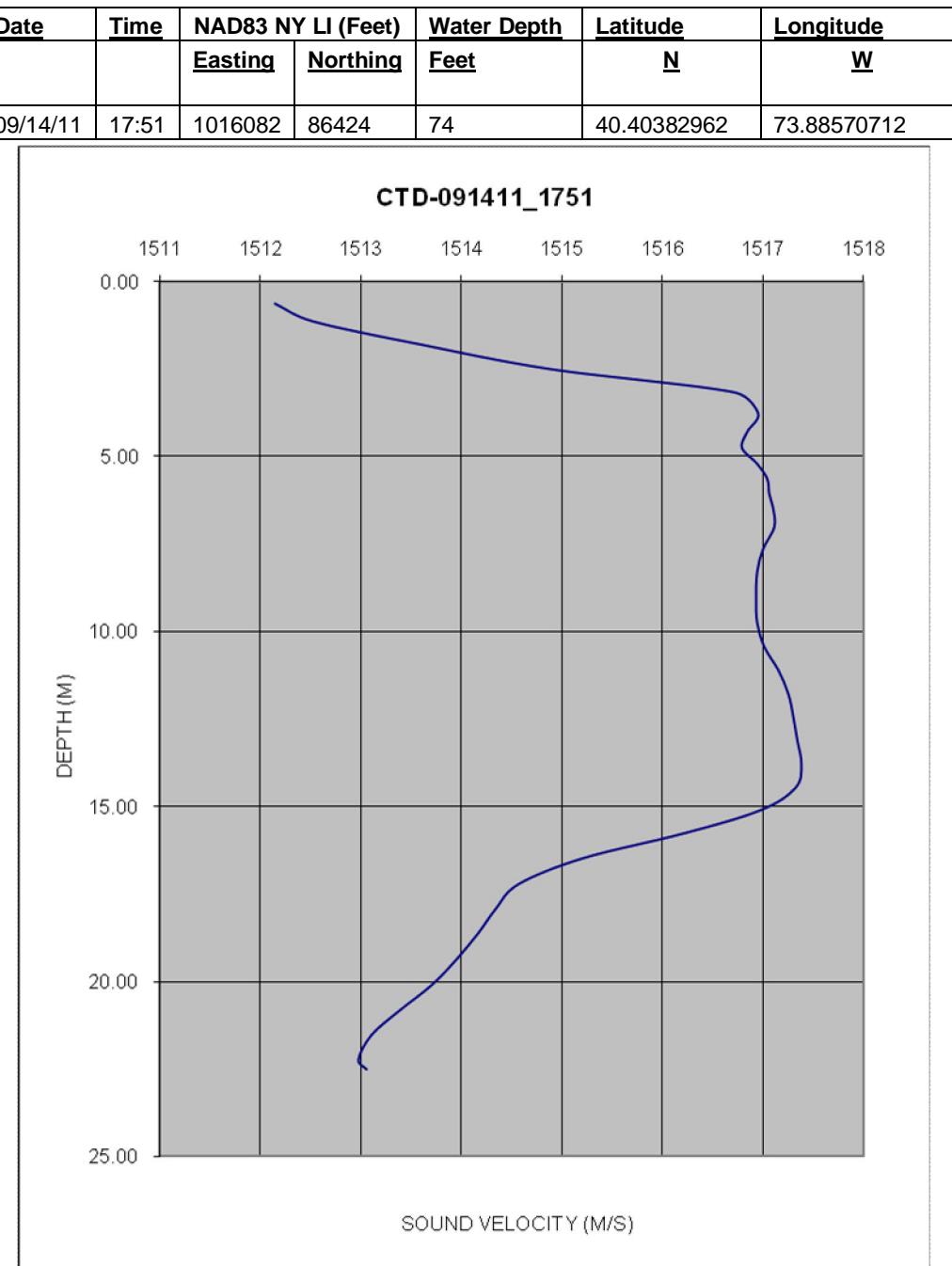


Figure 3.2-71
SVP 091411_1937 taken during the Fall 2011 multibeam survey at the HARS

CTD PROFILE # 091411 1937

1510.36	0.19
1510.34	0.84
1510.42	1.55
1511.20	2.25
1512.48	2.92
1513.16	3.57
1513.69	4.24
1513.86	4.92
1514.00	5.59
1514.73	6.23
1515.43	6.84
1516.09	7.45
1516.86	8.12
1517.52	8.81
1517.20	9.52
1516.69	10.24
1516.34	10.94
1516.09	11.64
1515.94	12.36
1515.70	13.07
1515.40	13.73
1515.19	14.39
1515.01	15.03
1514.84	15.62
1514.39	16.24
1513.25	16.85
1510.99	17.47
1508.48	18.13
1507.47	18.72
1507.46	18.86

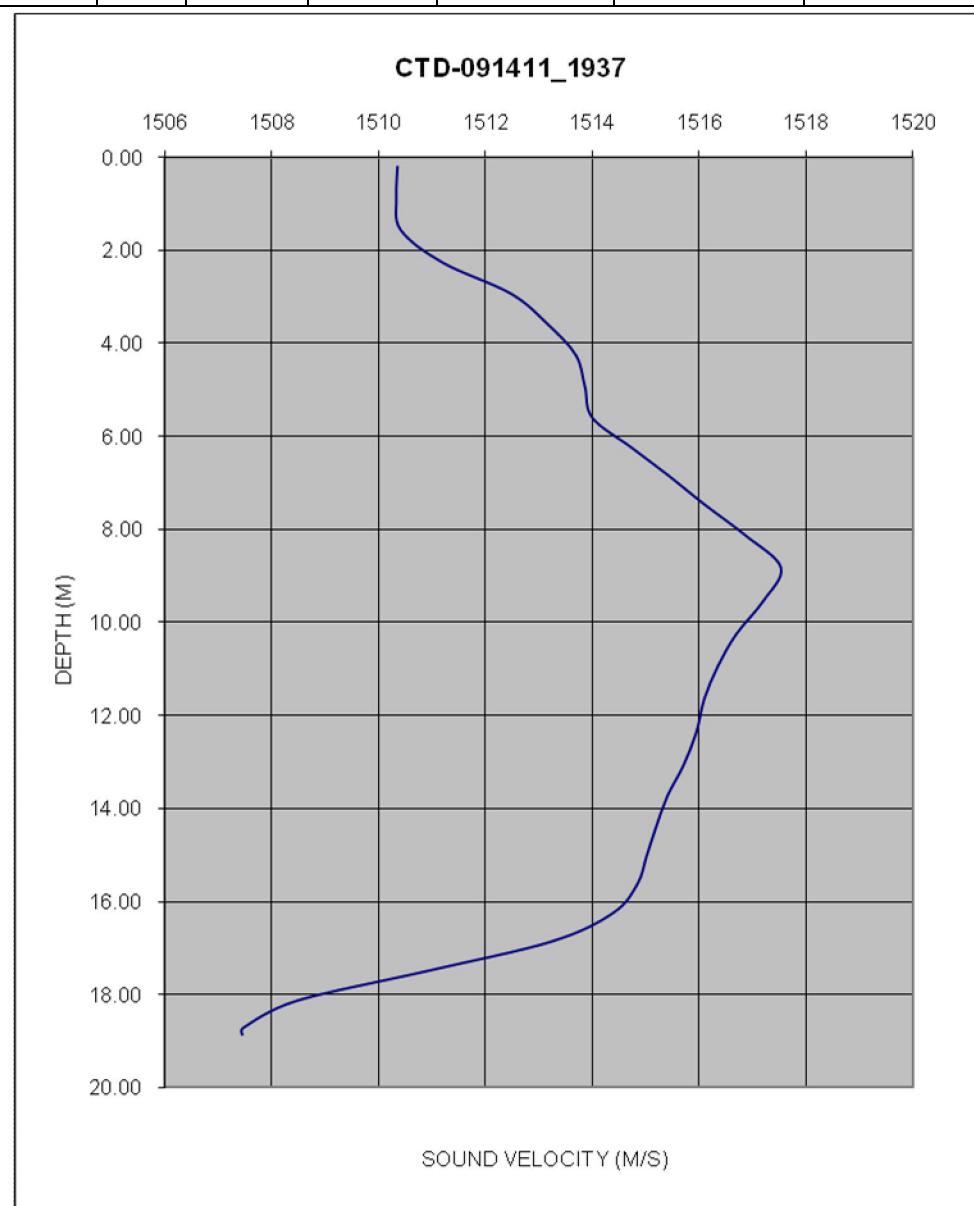


Figure 3.2-72
SVP 092111_1126 taken during the Fall 2011 multibeam survey at the HARS

1503.66	0.36
1505.63	0.87
1506.66	1.43
1507.17	2.05
1507.74	2.70
1508.18	3.39
1508.35	4.09
1508.59	4.75
1508.77	5.38
1509.29	6.01
1510.29	6.59
1511.54	7.13
1512.22	7.70
1512.57	8.33
1512.73	8.95
1513.07	9.68
1513.09	10.40
1513.03	11.10
1512.77	11.76
1512.56	12.40
1512.54	13.01
1512.60	13.65
1512.59	14.18
1512.56	14.58
1512.35	15.09
1511.68	15.67
1511.01	16.21
1510.79	16.81
1510.97	17.43
1511.25	18.04
1511.45	18.66
1511.53	19.02
1511.57	19.09
1511.62	19.14
1511.64	19.18
1511.65	19.21

CTD PROFILE # 092111 1126

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
09/21/11	11:26	1017258	95909	63	40.42985884 73.88143943

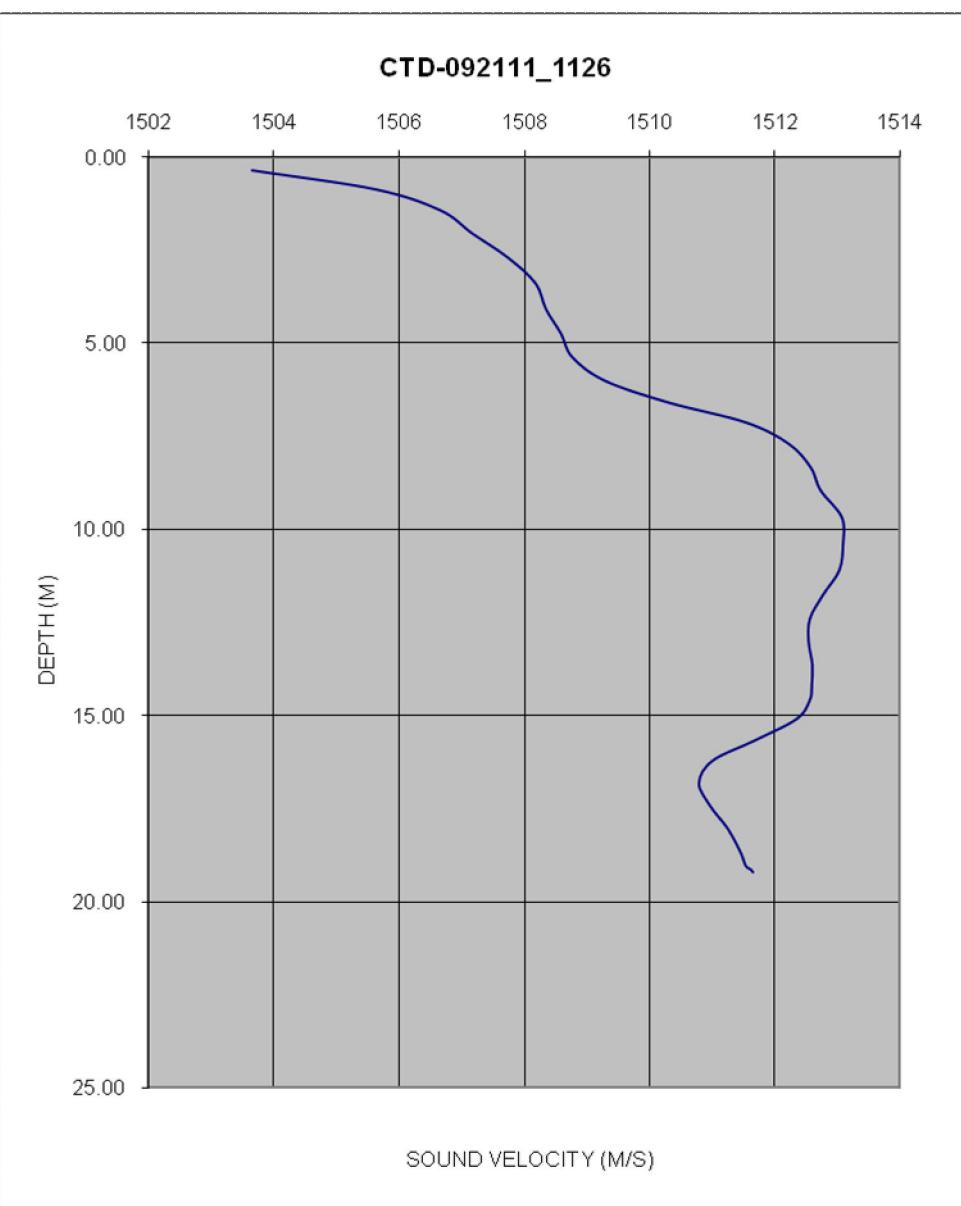


Figure 3.2-73
SVP 092111_1226 taken during the Fall 2011 multibeam survey at the HARS

1505.09	0.16
1506.12	0.76
1506.71	1.37
1507.83	1.98
1508.58	2.58
1508.88	3.18
1509.11	3.77
1509.60	4.41
1510.30	5.05
1511.39	5.68
1512.42	6.30
1512.95	6.93
1513.14	7.52
1512.97	8.13
1512.88	8.74
1512.98	9.38
1513.03	10.02
1513.04	10.66
1513.07	11.30
1513.02	11.94
1512.91	12.57
1512.85	13.23
1512.71	13.88
1513.37	14.53
1514.00	15.19
1514.16	15.82
1513.95	16.44
1513.55	17.06
1513.32	17.67
1513.30	18.29
1513.20	18.91
1513.08	19.52
1512.98	20.13
1512.91	20.73
1512.88	21.33
1512.89	21.57

CTD PROFILE # 092111 1226

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
09/21/11	12:26	1017291	95716	71	40.42933080 73.88131964

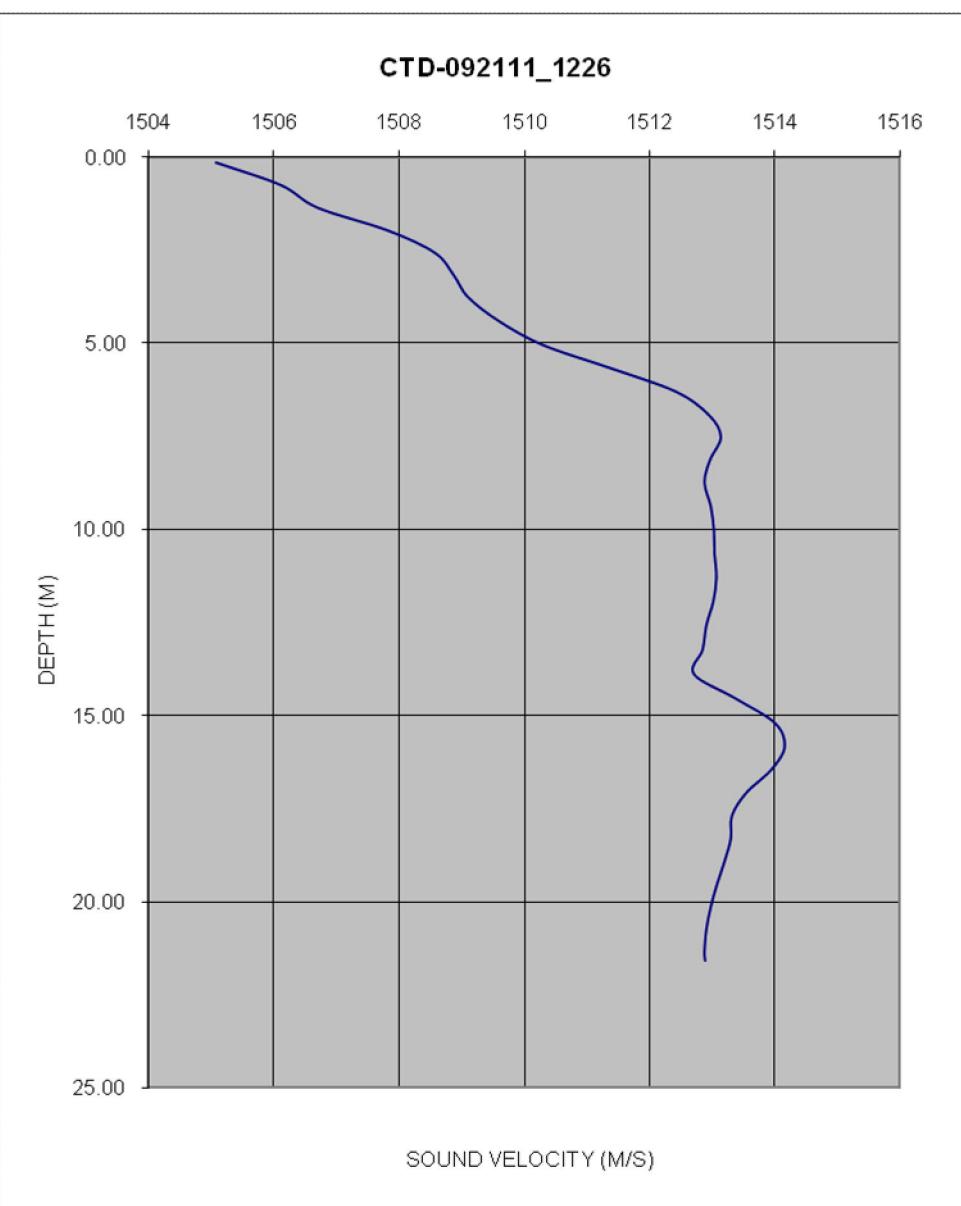


Figure 3.2-74
SVP 092111_1323 taken during the Fall 2011 multibeam survey at the HARS

1503.19	0.18
1502.95	0.57
1503.03	0.99
1503.32	1.43
1503.84	1.89
1504.64	2.30
1506.02	2.75
1506.75	3.24
1507.25	3.71
1507.81	4.17
1508.63	4.60
1509.58	5.04
1511.12	5.53
1512.35	6.07
1512.60	6.58
1512.87	7.08
1512.95	7.57
1512.99	8.08
1513.03	8.60
1513.04	9.12
1513.08	9.60
1513.02	10.06
1512.98	10.54
1513.11	11.03
1513.55	11.51
1513.68	12.02
1513.76	12.63
1513.84	13.25
1513.75	13.86
1513.84	14.45
1513.81	15.02
1513.09	15.59
1512.35	16.16
1511.80	16.71
1511.54	17.26
1511.58	17.81
1511.72	18.35
1511.73	18.88
1511.73	19.06

CTD PROFILE # 092111 1323

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
09/21/11	13:23	1018475	95877	63	40.42976884 73.87706800

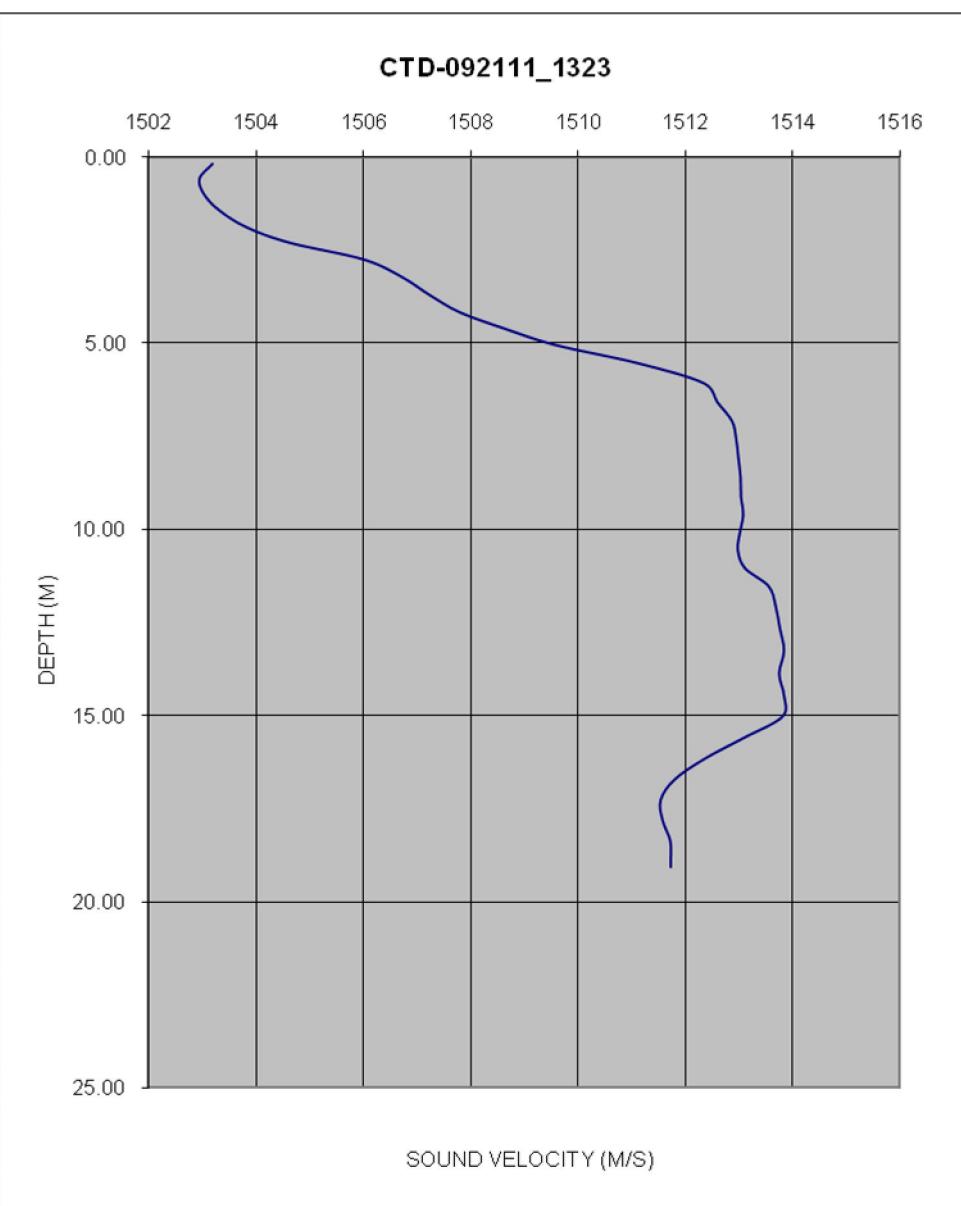


Figure 3.2-75
SVP 092111_1447 taken during the Fall 2011 multibeam survey at the HARS

1503.04	0.30
1503.34	0.73
1504.11	1.30
1505.63	1.86
1506.64	2.36
1507.83	2.97
1509.42	3.66
1511.63	4.36
1512.55	5.03
1512.69	5.72
1512.89	6.44
1512.99	7.12
1513.08	7.78
1513.13	8.46
1513.11	9.15
1513.10	9.82
1513.07	10.51
1513.36	11.18
1513.74	11.84
1513.45	12.50
1513.18	13.15
1513.12	13.80
1513.07	14.43
1512.94	15.06
1513.01	15.66
1513.15	16.24
1512.92	16.89
1512.46	17.53
1511.97	18.19
1511.74	18.86
1511.75	19.50
1511.77	19.68
1511.87	19.70

CTD PROFILE # 092111_1447

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
09/21/11	14:47	1019102	95902	65	40.42983368 73.87481662

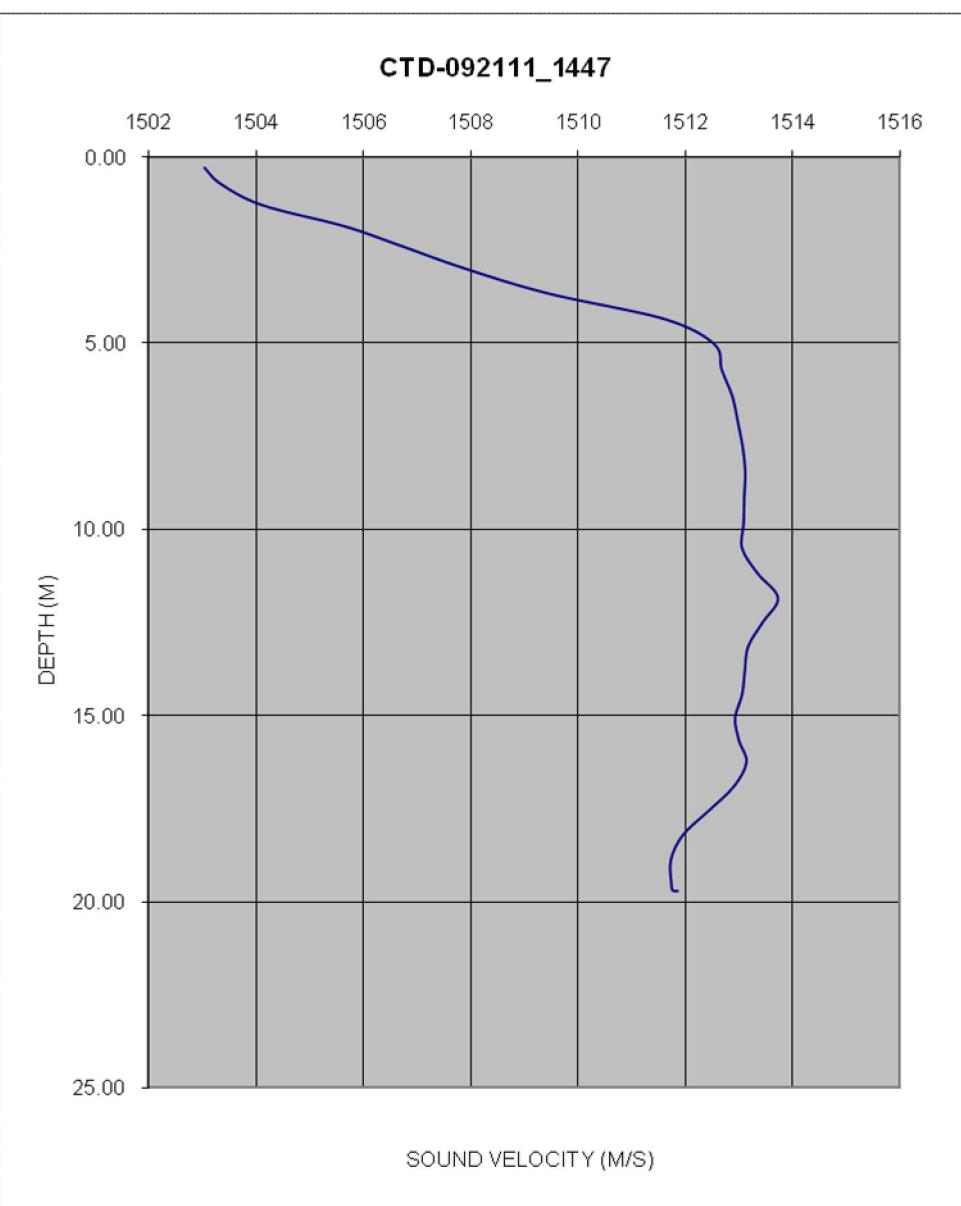


Figure 3.2-76
SVP 092111_1534 taken during the Fall 2011 multibeam survey at the HARS

1503.51	0.04
1503.48	0.44
1503.54	0.85
1503.60	1.24
1504.44	1.68
1506.07	2.19
1507.26	2.73
1508.50	3.26
1509.74	3.80
1511.26	4.39
1512.45	5.00
1512.88	5.59
1512.94	6.17
1513.01	6.75
1513.03	7.36
1513.05	7.99
1513.07	8.70
1513.13	9.43
1513.24	10.13
1513.31	10.79
1513.15	11.45
1512.97	12.09
1512.79	12.74
1512.65	13.40
1513.33	14.08
1513.57	14.76
1513.25	15.40
1512.90	16.01
1512.72	16.61
1512.68	17.21
1512.69	17.81
1512.64	18.38
1512.47	18.95
1512.28	19.51
1512.11	20.10
1511.93	20.72
1511.85	21.17
1511.87	21.22

CTD PROFILE # 092111 1534

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
09/21/11	15:34	1017703	93586	70	40.42348214 73.87985166

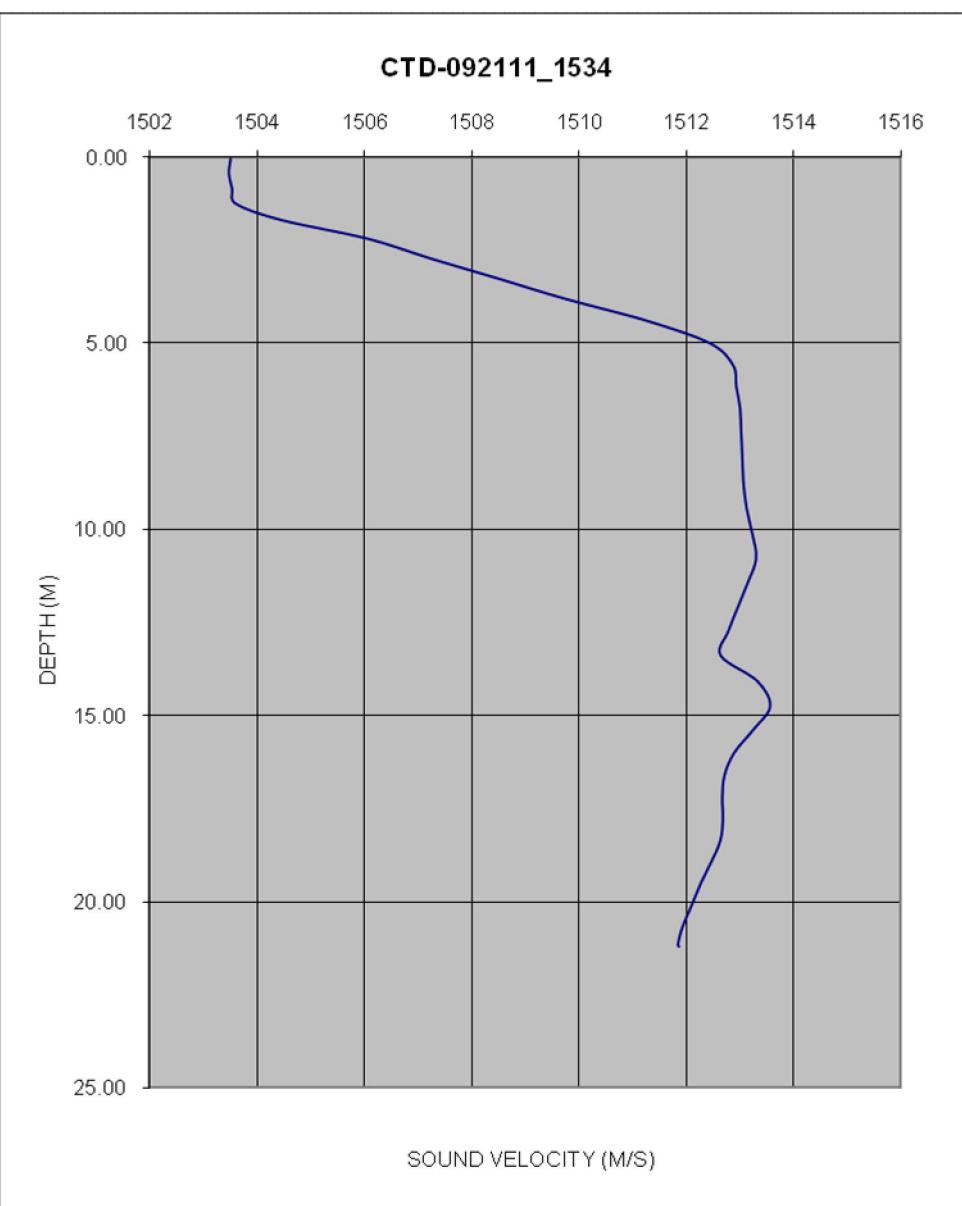


Figure 3.2-77
SVP 110711_1139 taken during the Fall 2011 multibeam survey at Fire-Island Reef

1472.78	0.21
1474.10	0.77
1474.70	1.38
1475.02	2.01
1475.19	2.63
1475.39	3.24
1475.64	3.84
1475.77	4.43
1475.88	5.03
1476.05	5.67
1476.48	6.33
1476.74	7.00
1476.85	7.68
1477.07	8.35
1477.64	9.01
1478.14	9.68
1478.80	10.37
1479.28	11.02
1479.64	11.62
1479.84	12.17
1479.90	12.71
1479.83	12.99
1479.77	13.01

CTD PROFILE # 110711 1139

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
11/07/11	11:39	1198030	159768	43	40.60262308 73.23012567

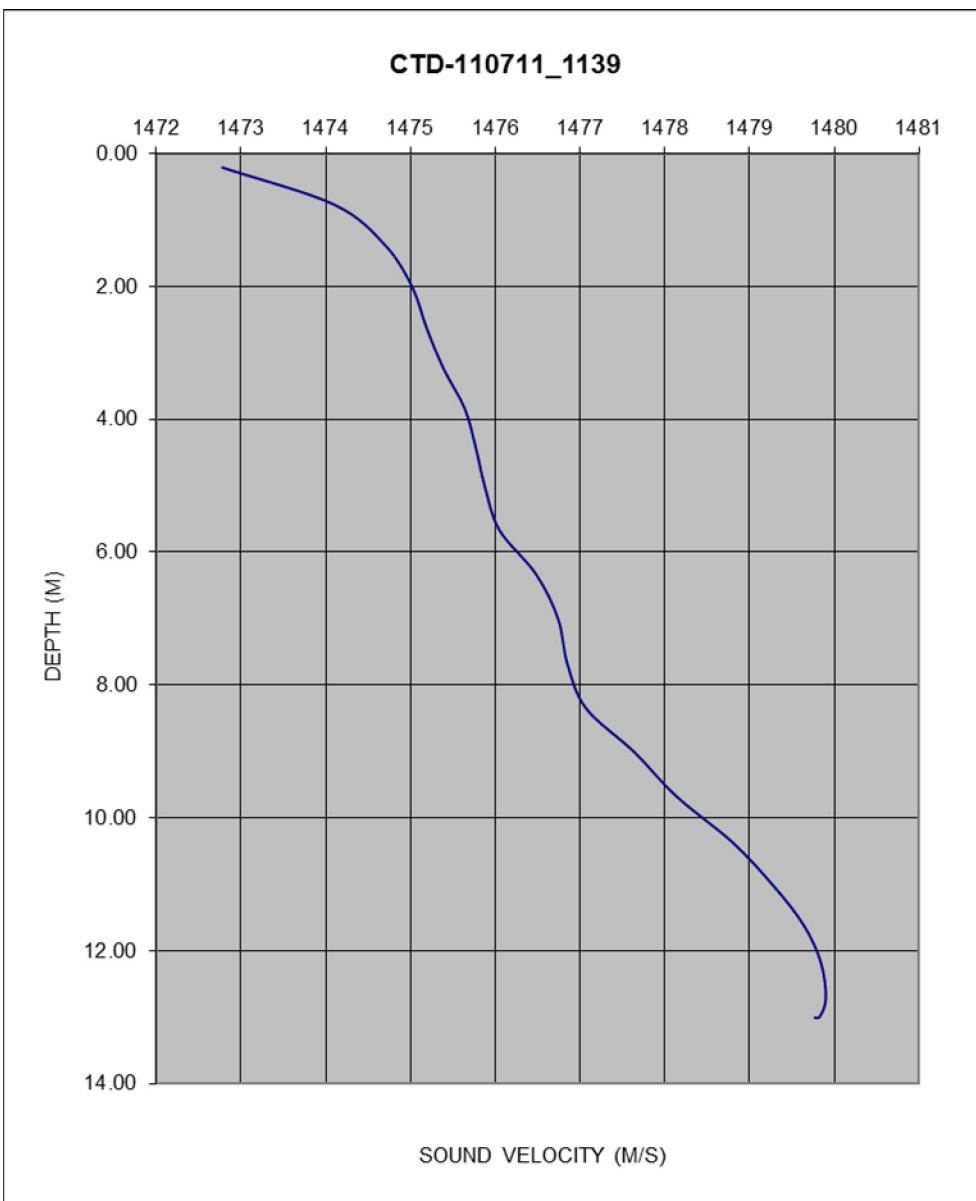


Figure 3.2-78
SVP 110711_1536 taken during the Fall 2011 multibeam survey at Fire-Island Reef

1495.55	0.03
1494.97	0.62
1494.69	1.31
1494.60	2.02
1494.58	2.72
1494.57	3.40
1494.57	4.07
1494.57	4.71
1494.59	5.34
1494.59	5.95
1494.60	6.55
1494.61	7.15
1494.62	7.76
1494.63	8.38
1494.64	9.00
1494.65	9.62
1494.66	10.24
1494.67	10.86
1494.67	11.48
1494.68	12.11
1494.70	12.75
1494.71	13.42
1494.72	14.09
1494.73	14.75
1494.74	15.40
1494.75	16.05
1494.76	16.71
1494.77	17.35
1494.78	17.99
1494.79	18.61
1494.80	19.15
1494.83	19.29
1494.87	19.31

CTD PROFILE # 110711_1536

Date	Time	NAD83 NY LI (Feet)		Water Depth	Latitude	Longitude
		Easting	Northing	Feet	N	W
11/07/11	15:36	1208914	156522	63	40.59344550	73.19104149

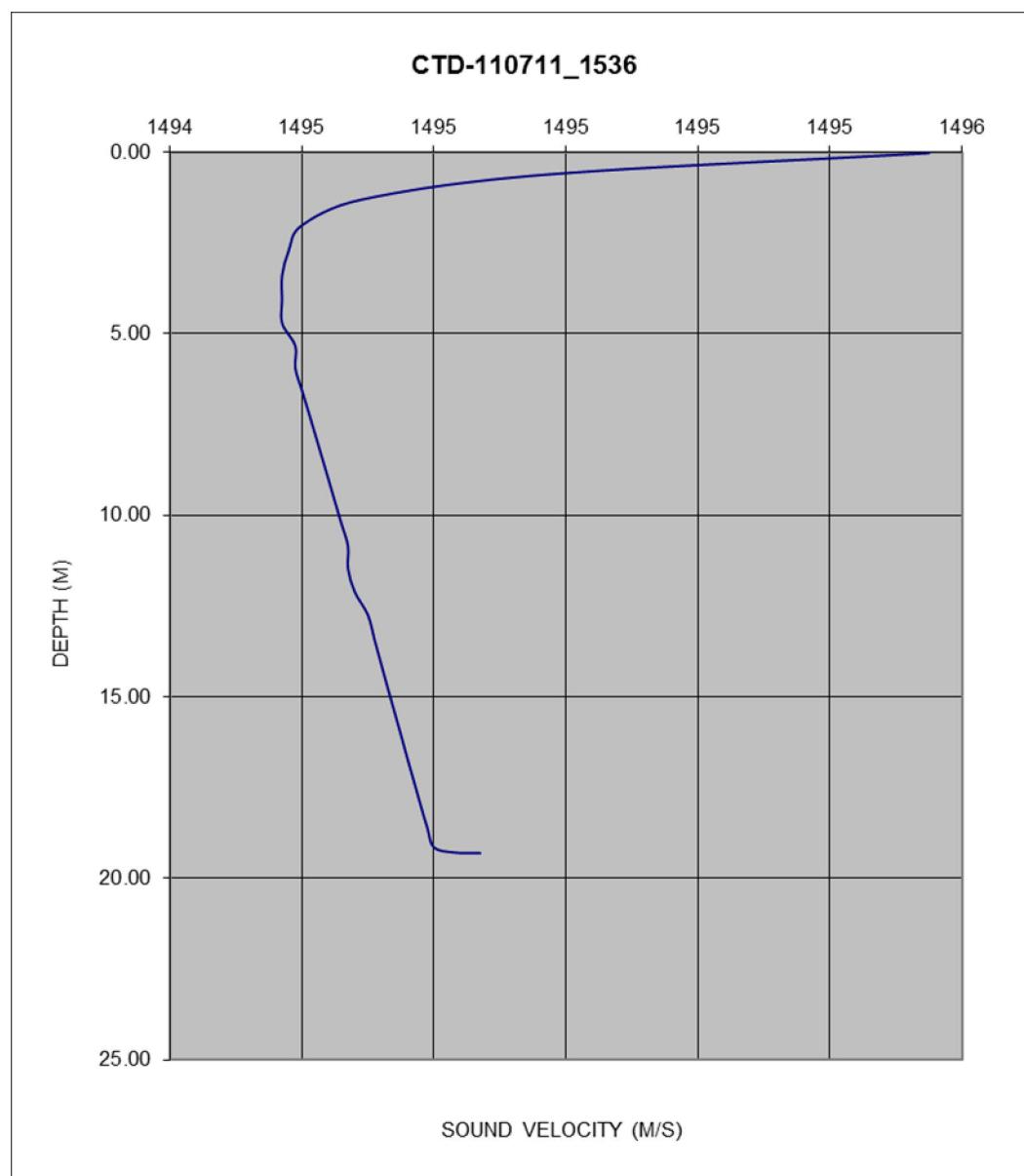


Figure 3.2-79
SVP 110711_1728 taken during the Fall 2011 multibeam survey at Fire-Island Reef

1495.84	0.07
1495.08	0.66
1494.71	1.30
1494.54	2.03
1494.48	2.74
1494.46	3.48
1494.45	4.23
1494.45	4.91
1494.47	5.55
1494.48	6.16
1494.48	6.74
1494.49	7.32
1494.52	7.91
1494.54	8.50
1494.56	9.10
1494.54	9.73
1494.50	10.39
1494.49	11.05
1494.49	11.71
1494.51	12.38
1494.52	13.05
1494.53	13.72
1494.55	14.41
1494.57	15.09
1494.60	15.76
1494.63	16.42
1494.64	17.07
1494.66	17.70
1494.67	18.32
1494.72	18.60

CTD PROFILE # 110711_1728

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	W
11/07/11	17:28	1199251	157261	61	40.59571377 73.22581026

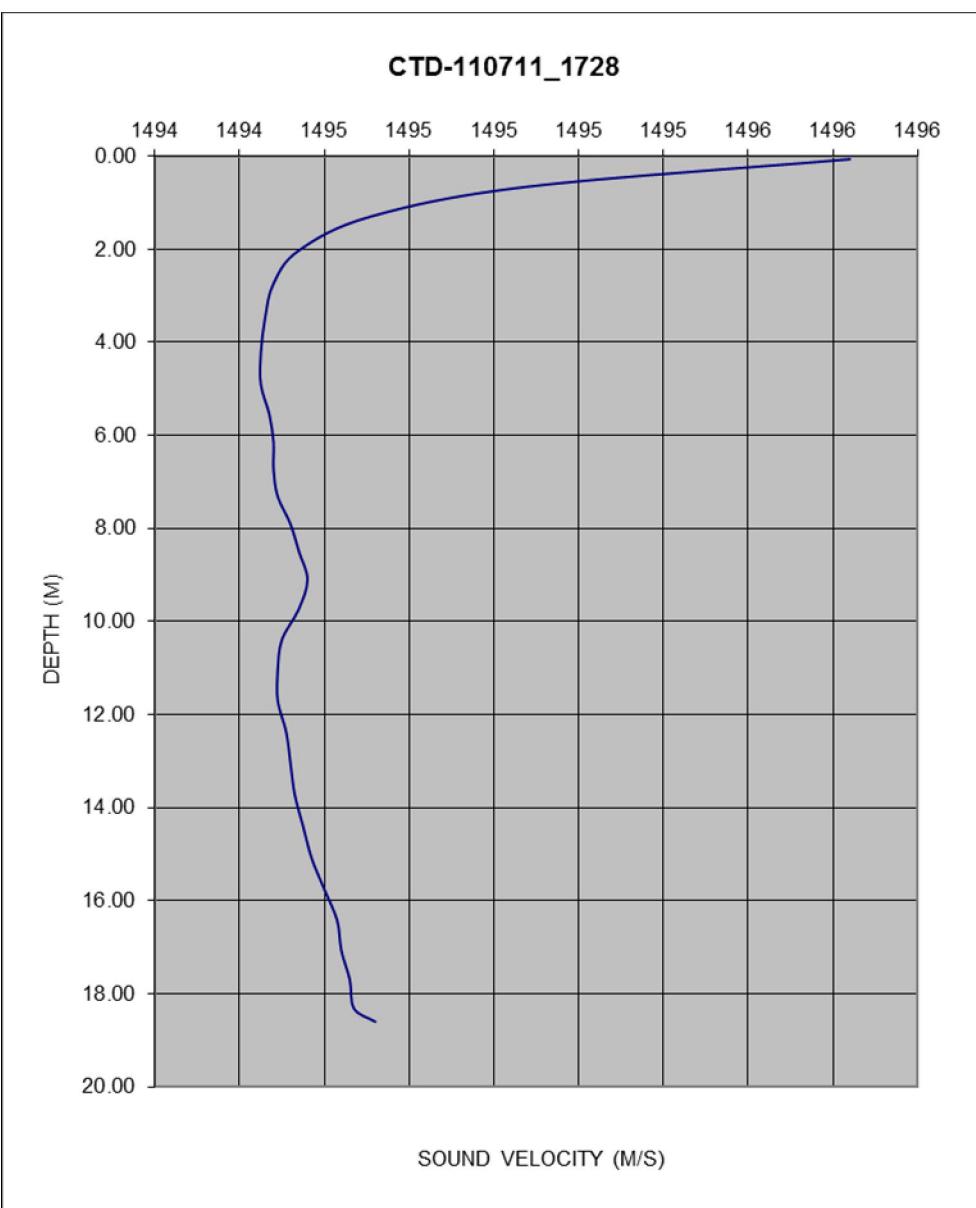


Figure 3.2-80
SVP 110711_1927 taken during the Fall 2011 multibeam survey at Fire-Island Reef

1495.25	0.28
1494.75	1.01
1494.58	1.71
1494.53	2.37
1494.50	3.01
1494.48	3.63
1494.46	4.22
1494.44	4.81
1494.42	5.39
1494.42	5.97
1494.43	6.55
1494.44	7.15
1494.44	7.74
1494.45	8.34
1494.45	8.94
1494.44	9.57
1494.45	10.20
1494.46	10.85
1494.47	11.49
1494.48	12.13
1494.49	12.79
1494.51	13.46
1494.55	14.13
1494.57	14.81
1494.60	15.49
1494.64	16.19
1494.67	16.90
1494.70	17.60
1494.73	18.29
1494.74	18.92
1494.81	19.13

CTD PROFILE # 110711 1927

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
11/07/11	19:27	1199403	158558	63	40.59926978 73.22522071

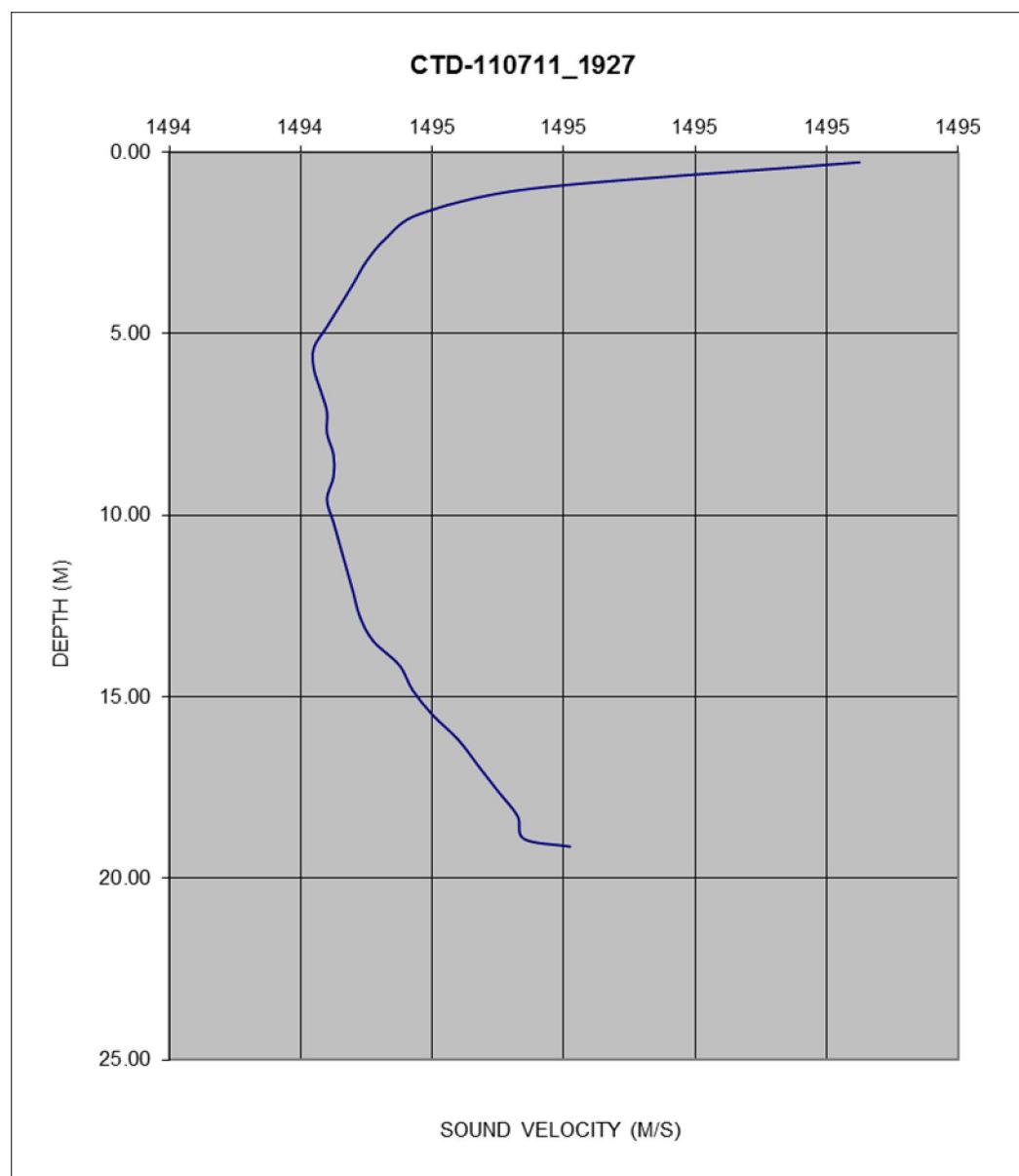


Figure 3.2-81
SVP 110711_2129 taken during the Fall 2011 multibeam survey at Fire-Island Reef

1494.50	0.15
1494.36	0.80
1494.30	1.54
1494.30	2.21
1494.29	2.88
1494.29	3.55
1494.30	4.23
1494.31	4.92
1494.32	5.59
1494.33	6.25
1494.35	6.91
1494.36	7.56
1494.37	8.20
1494.38	8.86
1494.43	9.51
1494.47	10.15
1494.51	10.81
1494.54	11.48
1494.56	12.15
1494.59	12.83
1494.63	13.51
1494.67	14.21
1494.70	14.87
1494.74	15.52
1494.82	16.18
1494.88	16.83
1494.91	17.49
1494.93	18.17
1494.94	18.81
1494.95	19.45
1494.99	19.75

CTD PROFILE # 110711 2129

Date	Time	NAD83 NY LI (Feet)		Water Depth	Latitude	Longitude
		Easting	Northing	Feet	N	W
11/07/11	21:29	1199630	158274	65	40.59848593	73.22441442

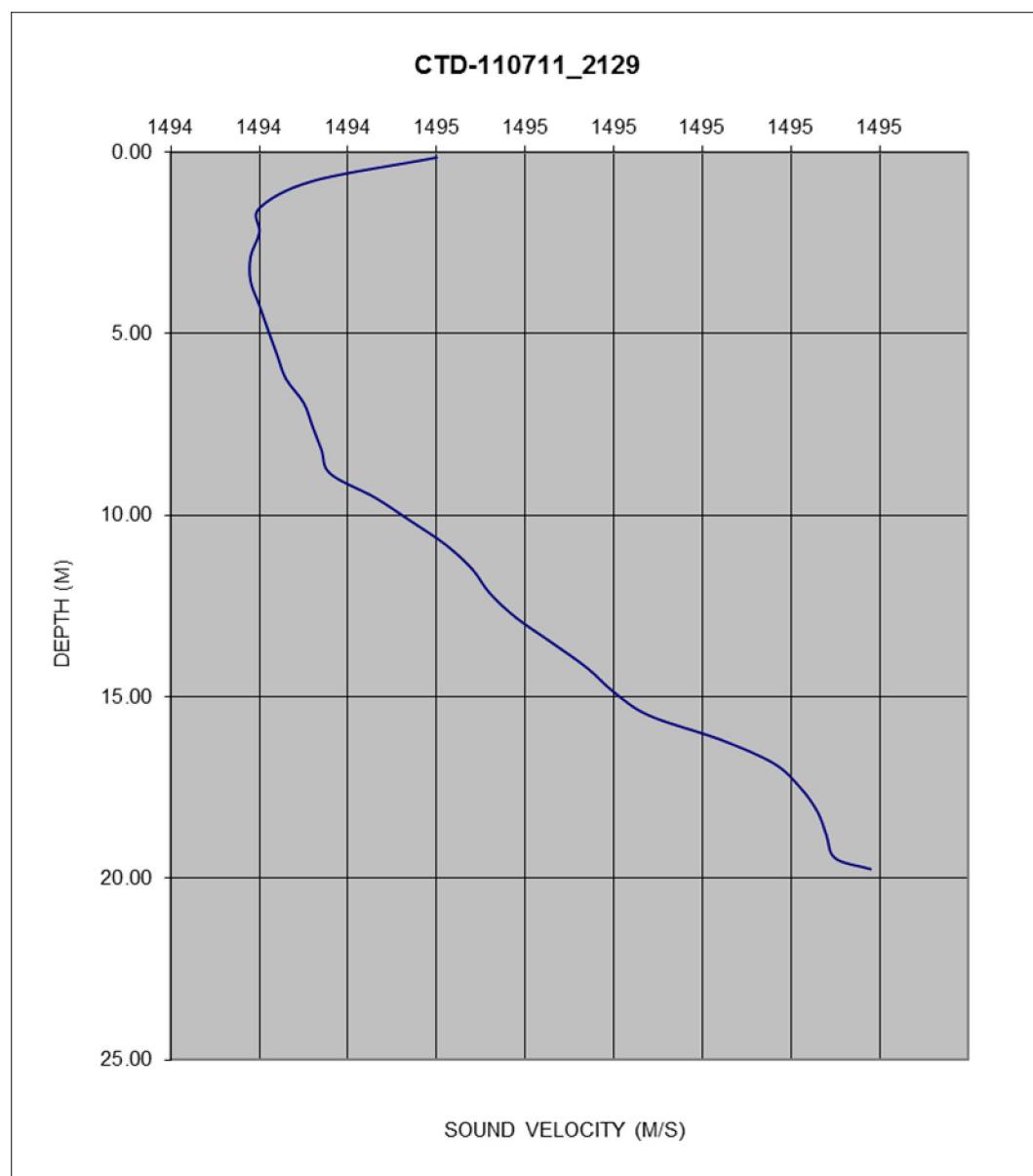


Figure 3.2-82
SVP 110811_1200 taken during the Fall 2011 multibeam survey at Fire-Island Reef

1492.96	0.09
1493.02	0.69
1493.08	1.41
1493.13	2.15
1493.15	2.89
1493.20	3.64
1493.24	4.40
1493.24	5.15
1493.32	5.88
1493.44	6.60
1493.61	7.33
1493.80	8.05
1494.04	8.73
1494.26	9.42
1494.45	10.09
1494.62	10.79
1494.77	11.50
1494.93	12.21
1495.06	12.88
1495.17	13.54
1495.26	14.25
1495.34	14.98
1495.42	15.71
1495.47	16.42
1495.52	17.13
1495.56	17.85
1495.59	18.54
1495.58	18.79

CTD PROFILE # 110811_1200

<u>Date</u>	<u>Time</u>	<u>NAD83 NY LI (Feet)</u>		<u>Water Depth</u>	<u>Latitude</u>	<u>Longitude</u>
		<u>Easting</u>	<u>Northing</u>	<u>Feet</u>	<u>N</u>	<u>W</u>
11/08/11	12:00	1199179	156238	62	40.59290717	73.22610240

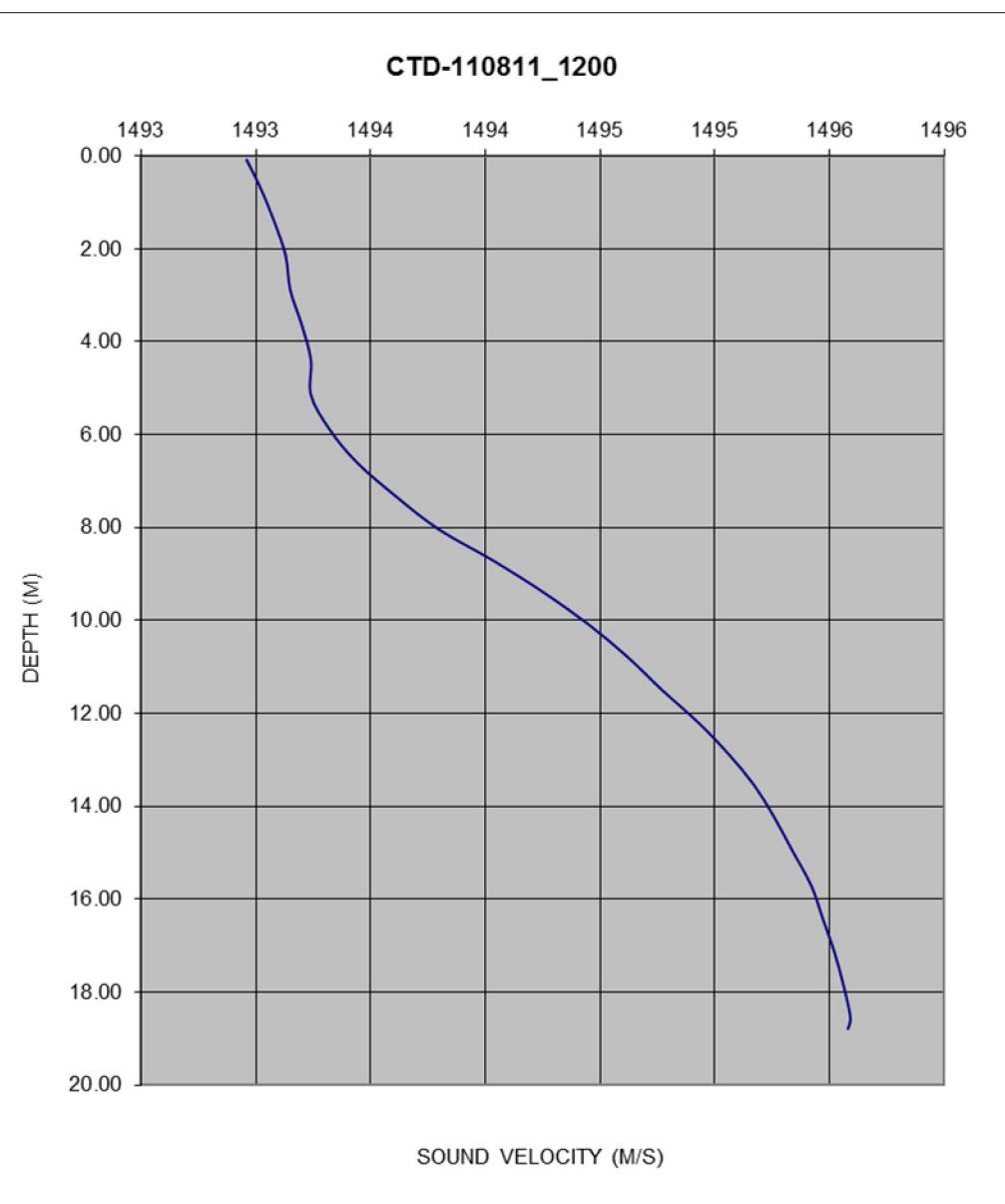


Figure 3.2-83
SVP 110811_1538 taken during the Fall 2011 multibeam survey at Hempstead Reef

1496.71	0.46
1496.33	1.09
1496.13	1.78
1496.02	2.44
1496.00	3.05
1496.03	3.70
1496.07	4.39
1496.13	5.05
1496.22	5.70
1496.36	6.35
1496.51	7.01
1496.74	7.70
1496.98	8.38
1497.15	9.04
1497.22	9.67
1497.29	10.28
1497.41	10.90
1497.66	11.45
1497.83	11.86
1497.95	12.47
1498.06	13.10
1498.14	13.78
1498.19	14.48
1498.22	15.17
1498.24	15.86
1498.28	16.55
1498.30	17.25
1498.31	17.94
1498.31	18.60
1498.32	19.02
1498.32	19.05

CTD PROFILE # 110811_1538

Date	Time	NAD83 NY LI (Feet)		Water Depth	Latitude	Longitude
		Easting	Northing	Feet	N	W
11/08/11	15:38	1107511	129542	62	40.52138225	73.55665015

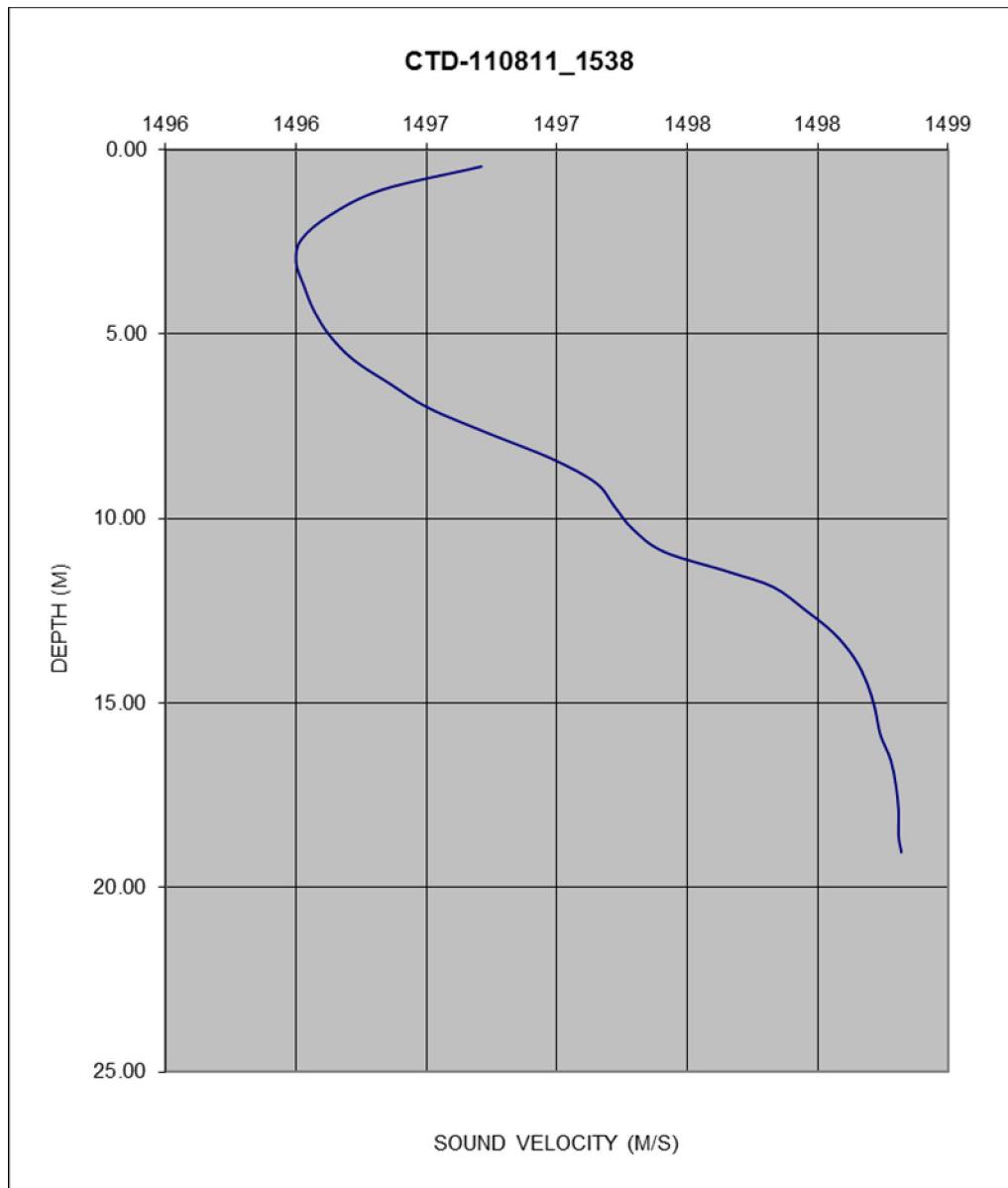


Figure 3.2-84
SVP 110811_1729 taken during the Fall 2011 multibeam survey at Hempstead Reef

1498.83	0.42
1497.15	1.24
1496.27	2.08
1495.91	2.86
1495.77	3.64
1495.73	4.44
1495.89	5.24
1496.19	6.04
1496.70	6.82
1497.32	7.62
1497.68	8.44
1497.92	9.24
1498.05	9.98
1498.12	10.66
1498.15	11.30
1498.18	11.93
1498.22	12.55
1498.26	13.16
1498.28	13.79
1498.29	14.44
1498.30	15.11
1498.33	15.78
1498.38	16.46
1498.41	17.13
1498.43	17.84
1498.46	18.54
1498.48	19.26
1498.51	19.69
1498.58	19.75
1498.66	19.79
1498.72	19.82

CTD PROFILE # 110811_1729

Date	Time	NAD83 NY LI (Feet)		Water Depth	Latitude	Longitude
		Easting	Northing	Feet	N	W
11/08/11	17:29	1107037	128517	65	40.51857614	73.55837399

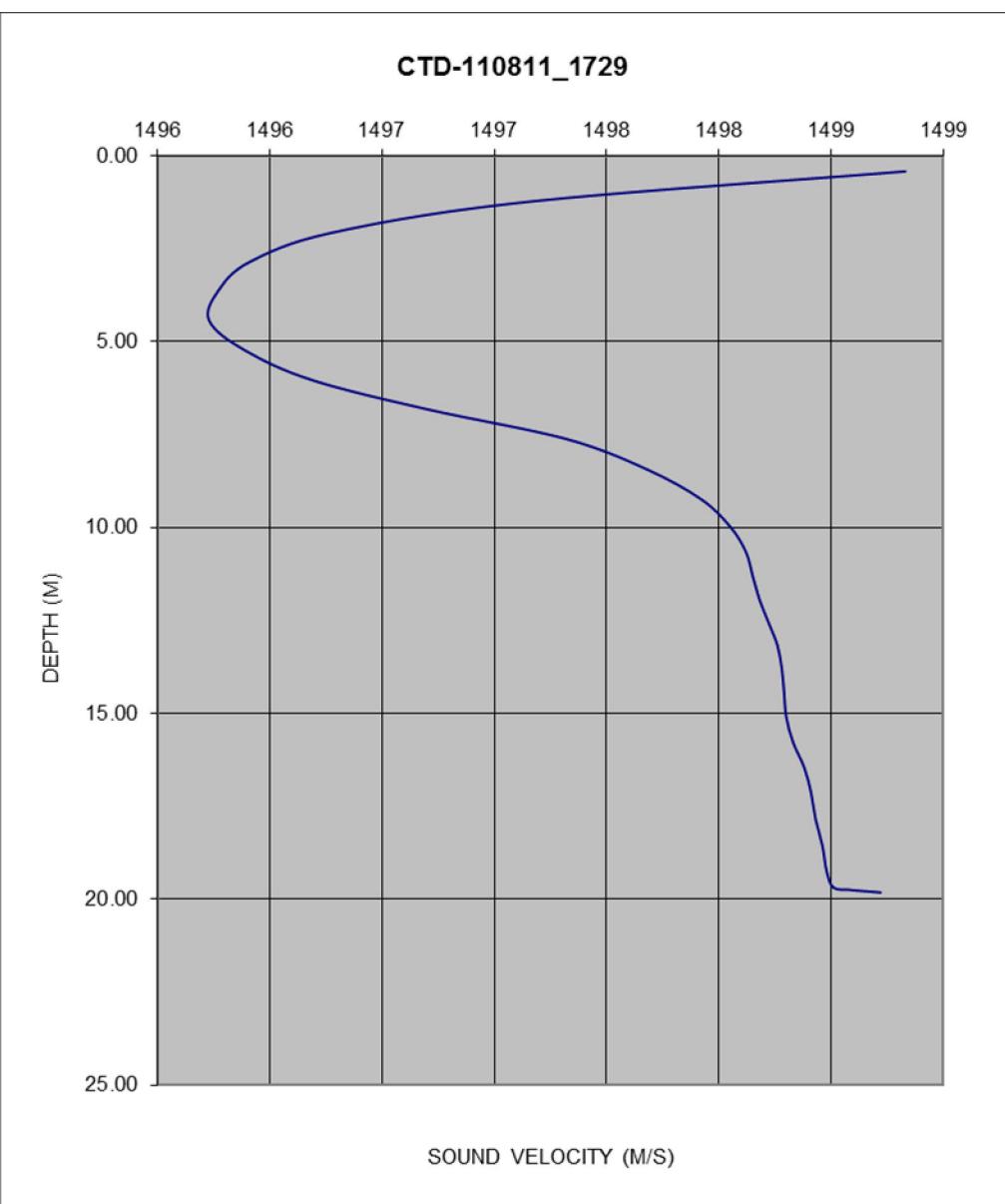


Figure 3.2-85
SVP 110811_1926 taken during the Fall 2011 multibeam survey at Hempstead Reef

1499.34	0.16
1497.96	0.73
1496.78	1.40
1496.17	2.12
1495.94	2.89
1495.88	3.68
1496.06	4.45
1496.48	5.22
1496.97	5.94
1497.52	6.62
1497.85	7.24
1498.04	7.76
1498.10	8.21
1498.15	8.67
1498.22	9.19
1498.25	9.77
1498.23	10.36
1498.21	11.01
1498.20	11.65
1498.22	12.30
1498.26	12.93
1498.31	13.56
1498.34	14.19
1498.37	14.84
1498.40	15.48
1498.43	16.12
1498.48	16.77
1498.52	17.44
1498.54	18.11
1498.59	18.41
1498.69	18.44

CTD PROFILE # 110811_1926

Date	Time	NAD83 NY LI (Feet)		Water Depth	Latitude	Longitude
		Easting	Northing	Feet	N	W
11/08/11	19:26	1106934	127448	60	40.51564166	73.55876360

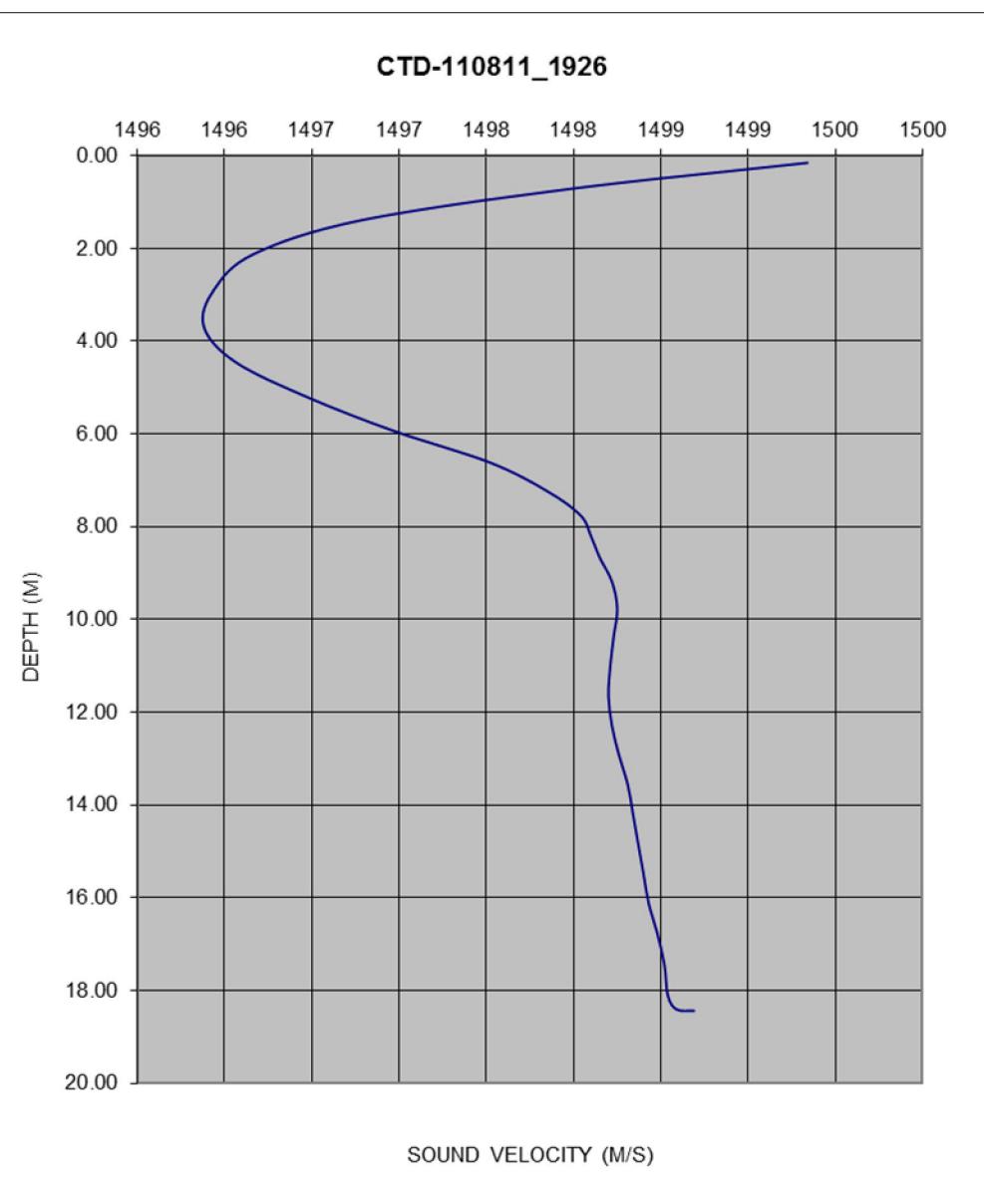


Figure 3.2-86
SVP 110811_2113 taken during the Fall 2011 multibeam survey at Hempstead Reef

1498.24	0.14
1497.88	0.81
1497.20	1.56
1496.53	2.34
1496.25	3.10
1496.42	3.76
1496.87	4.42
1497.47	5.13
1497.79	5.80
1498.00	6.48
1498.13	7.19
1498.22	7.89
1498.27	8.59
1498.30	9.29
1498.32	10.00
1498.34	10.72
1498.40	11.39
1498.45	12.01
1498.48	12.68
1498.50	13.37
1498.51	14.05
1498.51	14.74
1498.50	15.41
1498.49	16.08
1498.49	16.73
1498.50	17.39
1498.52	18.02
1498.57	18.19

CTD PROFILE # 110811_2113

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Foot	
11/08/11	21:13	1106712	126323	60	40.51255662 73.55958198

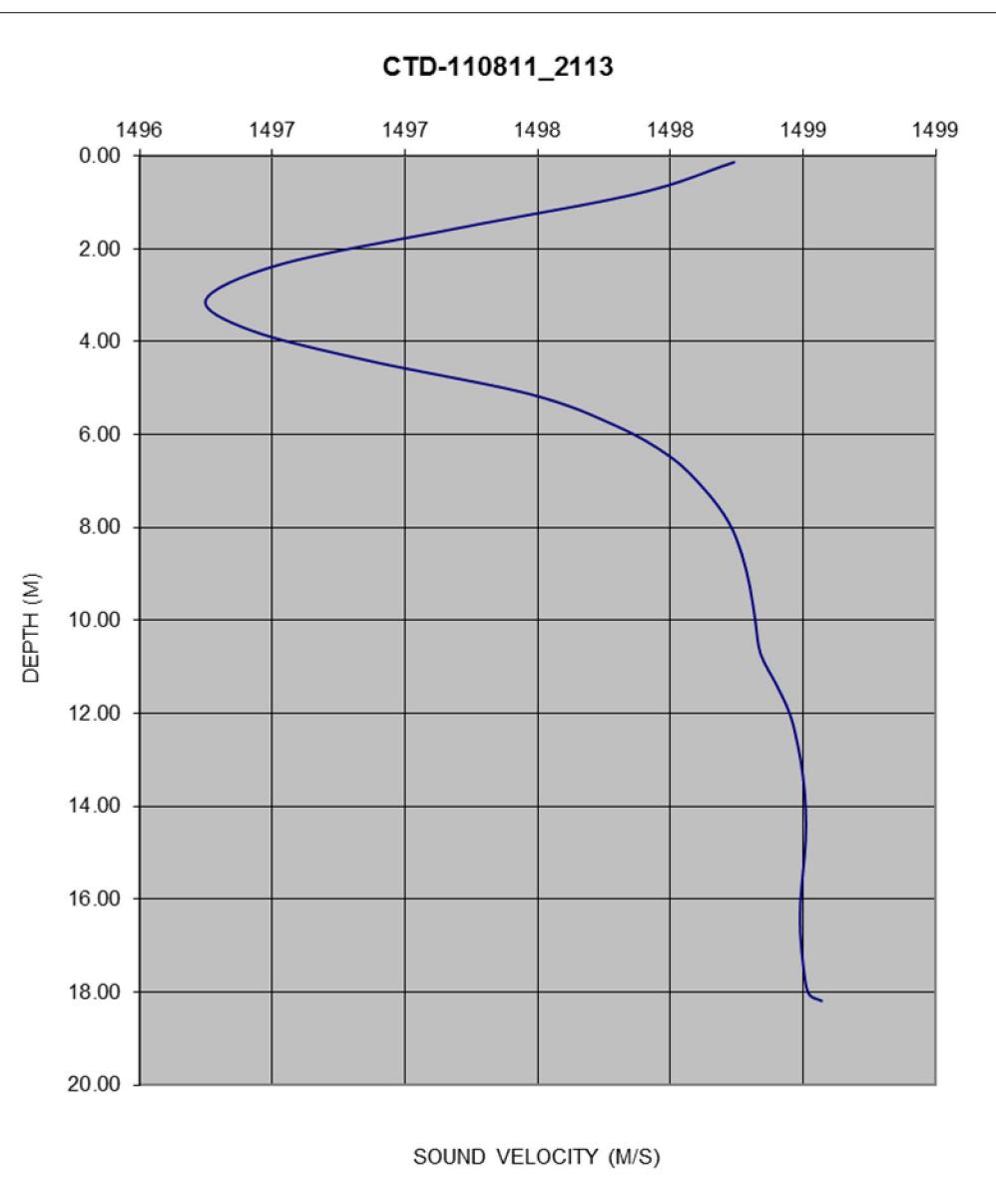
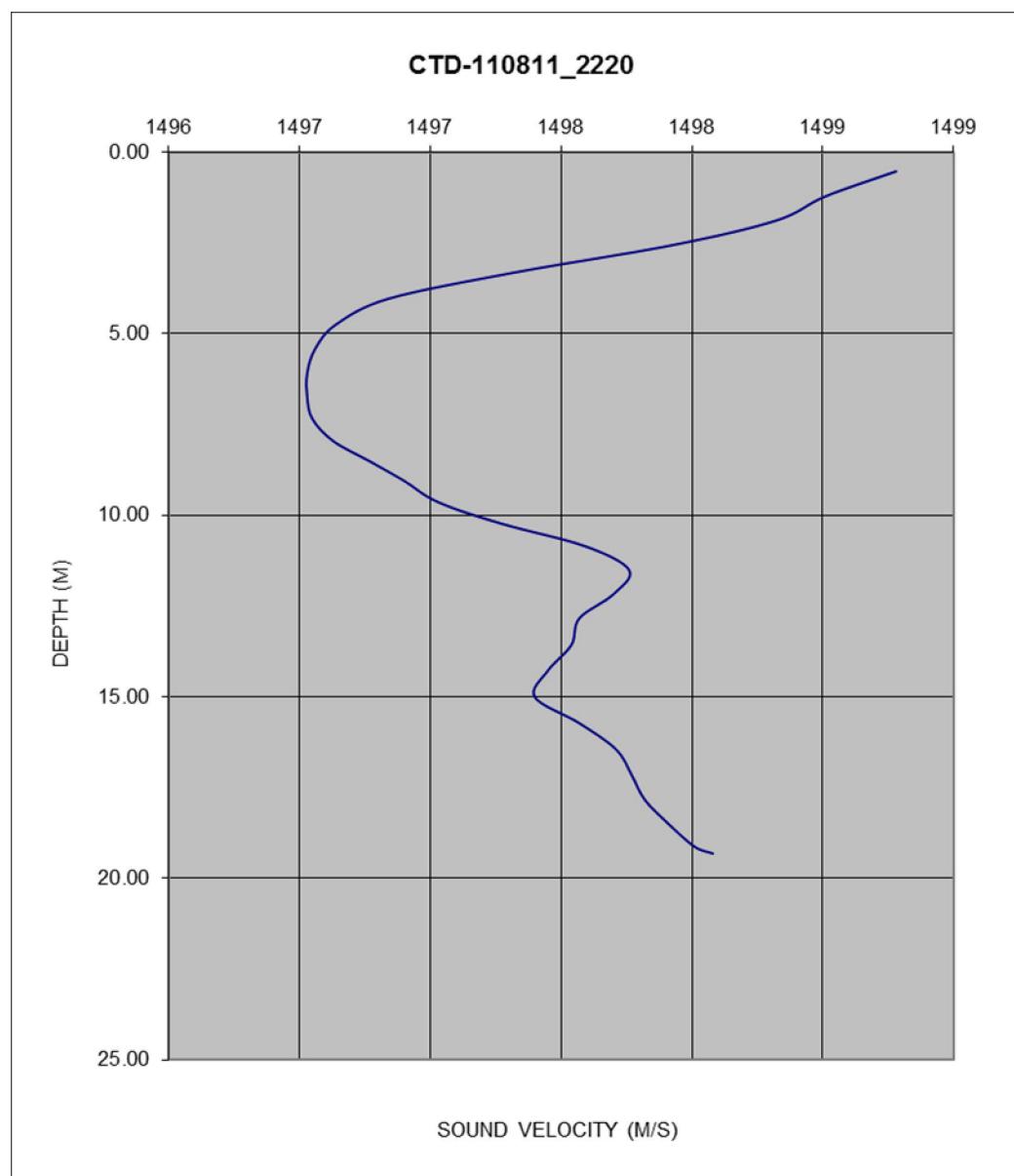


Figure 3.2-87
SVP 110811_2220 taken during the Fall 2011 multibeam survey at Hempstead Reef

1498.78	0.53
1498.51	1.22
1498.32	1.89
1497.92	2.57
1497.32	3.32
1496.84	4.04
1496.64	4.75
1496.56	5.43
1496.53	6.10
1496.53	6.74
1496.55	7.35
1496.63	7.96
1496.77	8.52
1496.90	9.05
1497.03	9.64
1497.27	10.23
1497.59	10.85
1497.76	11.51
1497.70	12.18
1497.57	12.84
1497.54	13.57
1497.45	14.28
1497.40	15.01
1497.57	15.73
1497.71	16.45
1497.77	17.16
1497.82	17.84
1497.91	18.50
1498.01	19.13
1498.08	19.32

CTD PROFILE # 110811 2220

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
11/08/11	22:20	1112555	128736	63	40.51909729 73.53852380



3.3 Survey Line Report

Multibeam survey lines were run in a North-South direction at the HARS location, and East-West at both Reef locations, primarily to best facilitate vessel operation under wave and current conditions at the time of the survey. Table 3.3-1 to 3.3-3 lists survey line start times, location and cardinal direction run.

Table 3.3-1

Multibeam Survey Lines run during the Fall 2011 multibeam survey at the HARS

File Name	Date	Time (UTC)	Latitude	Longitude	Direction
000_1231	8/5/2011	12:31	N40.42964897	W073.8133211	South
000_1247	8/5/2011	12:47	N40.40378763	W073.81473346	North
000_1303	8/5/2011	13:03	N40.42953843	W073.81507981	South
000_1319	8/5/2011	13:19	N40.40376557	W073.81686058	North
000_1336	8/5/2011	13:36	N40.42957991	W073.81707435	South
000_1352	8/5/2011	13:52	N40.40373813	W073.81901818	North
000_1409	8/5/2011	14:09	N40.42967338	W073.81927909	South
000_1436	8/5/2011	14:36	N40.40376841	W073.82142466	East (Cross-Line)
000_1452	8/5/2011	14:52	N40.42969104	W073.82115945	South
000_1509	8/5/2011	15:09	N40.40361568	W073.82319691	North
000_1524	8/5/2011	15:24	N40.42952368	W073.82270298	North
000_1526	8/5/2011	15:26	N40.42885462	W073.82379119	East (Cross-Line)
000_1533	8/5/2011	15:33	N40.42863458	W073.81457466	West (Cross-Line)
000_1535	8/5/2011	15:35	N40.42878735	W073.82212567	West (Cross-Line)
00A1535	8/5/2011	15:35	N40.42879493	W073.82286218	West (Cross-Line)
000_1537	8/5/2011	15:37	N40.42957612	W073.82376282	South
000_1553	8/5/2011	15:53	N40.40371437	W073.82584172	North
000_1609	8/5/2011	16:09	N40.42969819	W073.82562965	South
000_1625	8/5/2011	16:25	N40.40373071	W073.82839811	North
000_1647	8/5/2011	16:47	N40.42968073	W073.8279796	South
000_1704	8/5/2011	17:04	N40.40370513	W073.83060459	North
000_1720	8/5/2011	17:20	N40.42972478	W073.82995624	South
000_1738	8/5/2011	17:38	N40.40373717	W073.83302451	North
000_1754	8/5/2011	17:54	N40.4296724	W073.83223534	South
000_1812	8/5/2011	18:12	N40.40373781	W073.83530679	North
000_1828	8/5/2011	18:28	N40.42895504	W073.833877	East (Cross-Line)
000_1838	8/5/2011	18:38	N40.42972057	W073.83411135	South
000_1858	8/5/2011	18:58	N40.4036963	W073.83698964	North

000_1915	8/5/2011	19:15	N40.42986232	W073.8362686	South
000_1939	8/5/2011	19:39	N40.40365653	W073.83888594	North
000_1956	8/5/2011	19:56	N40.42976953	W073.83784102	South
000_2020	8/5/2011	20:20	N40.40369175	W073.840715	North
000_2038	8/5/2011	20:38	N40.42877206	W073.83928286	East (Cross-Line)
000_1139	8/10/2011	11:39	N40.42954352	W073.83936123	South
000_1154	8/10/2011	11:54	N40.4036503	W073.84232955	North
000_1210	8/10/2011	12:10	N40.42981403	W073.84081439	West (Cross-Line)
000_1226	8/10/2011	12:26	N40.40359564	W073.84426262	North
000_1242	8/10/2011	12:42	N40.42976014	W073.84269708	South
000_1258	8/10/2011	12:58	N40.40366298	W073.8459443	North
000_1315	8/10/2011	13:15	N40.42969504	W073.84440085	South
000A1336	8/10/2011	13:36	N40.4036833	W073.8474399	North
000_1353	8/10/2011	13:53	N40.42968984	W073.84575535	West (Cross-Line)
000_1408	8/10/2011	14:08	N40.40384308	W073.84879041	North
000_1425	8/10/2011	14:25	N40.42886584	W073.84739567	East (Cross-Line)
000_1430	8/10/2011	14:30	N40.4263383	W073.84083528	South
000_1434	8/10/2011	14:34	N40.42956087	W073.84705895	West (Cross-Line)
000_1449	8/10/2011	14:49	N40.40362986	W073.8499387	North
000_1506	8/10/2011	15:06	N40.42961816	W073.84861244	South
000_1521	8/10/2011	15:21	N40.40361774	W073.85117169	North
000_1544	8/10/2011	15:44	N40.42956413	W073.84978233	West (Cross-Line)
000_1558	8/10/2011	15:58	N40.4036015	W073.85258111	North
000_1615	8/10/2011	16:15	N40.42980667	W073.85126371	South
000_1629	8/10/2011	16:29	N40.40369376	W073.85378187	North
000_1645	8/10/2011	16:45	N40.42975182	W073.85259296	South
000_1700	8/10/2011	17:00	N40.4037612	W073.85492386	North
000_1717	8/10/2011	17:17	N40.42877922	W073.85410994	East (Cross-Line)
000_1725	8/10/2011	17:25	N40.42950738	W073.85372193	South
000_1742	8/10/2011	17:42	N40.40377218	W073.85595467	North
000_1804	8/10/2011	18:04	N40.42964569	W073.85485803	West (Cross-Line)
000_1819	8/10/2011	18:19	N40.40360982	W073.8569982	North
000_1837	8/10/2011	18:37	N40.42971265	W073.85622491	South
000_1848	8/10/2011	18:48	N40.42005291	W073.85722156	North
000_1856	8/10/2011	18:56	N40.42868852	W073.85735277	East (Cross-Line)
000A1201	8/11/2011	12:01	N40.40441908	W073.8136411	South
000_1216	8/11/2011	12:16	N40.37812432	W073.81428409	North
000_1233	8/11/2011	12:33	N40.40442519	W073.81511332	West (Cross-Line)
000_1250	8/11/2011	12:50	N40.37807381	W073.81670044	North

000_1308	8/11/2011	13:08	N40.40451056	W073.81769875	South
000_1324	8/11/2011	13:24	N40.37806638	W073.81940569	North
000_1342	8/11/2011	13:42	N40.40448722	W073.81998363	West (Cross-Line)
000_1402	8/11/2011	14:02	N40.37786231	W073.82166239	North
000_1422	8/11/2011	14:22	N40.40442352	W073.8223697	West (Cross-Line)
000_1439	8/11/2011	14:39	N40.3781522	W073.82377914	North
000_1500	8/11/2011	15:00	N40.40331074	W073.82460279	East (Cross-Line)
000_1510	8/11/2011	15:10	N40.40449025	W073.82487561	South
000_1528	8/11/2011	15:28	N40.37817041	W073.82580004	North
000_1546	8/11/2011	15:46	N40.40450394	W073.82679198	South
000_1603	8/11/2011	16:03	N40.37822295	W073.82773292	North
000_1624	8/11/2011	16:24	N40.40452109	W073.82849483	West (Cross-Line)
000_1640	8/11/2011	16:40	N40.37825392	W073.82991732	North
000_1657	8/11/2011	16:57	N40.40447825	W073.83095789	South
000_1714	8/11/2011	17:14	N40.37831198	W073.83176889	North
000_1731	8/11/2011	17:31	N40.404406	W073.83284217	West (Cross-Line)
000_1747	8/11/2011	17:47	N40.37812689	W073.83342904	North
000_1810	8/11/2011	18:10	N40.40362209	W073.83474531	East (Cross-Line)
000_1820	8/11/2011	18:20	N40.40447691	W073.8343651	West (Cross-Line)
00A1837	8/11/2011	18:37	N40.37820131	W073.83459258	North
000_1854	8/11/2011	18:54	N40.40450866	W073.83672241	South
000_1911	8/11/2011	19:11	N40.37822252	W073.83638998	North
000_1927	8/11/2011	19:27	N40.40432604	W073.83884252	South
000_1943	8/11/2011	19:43	N40.37820985	W073.83736383	North
000_2003	8/11/2011	20:03	N40.40437225	W073.84066085	South
00A2020	8/11/2011	20:20	N40.37822263	W073.83877205	North
000_2036	8/11/2011	20:36	N40.4043726	W073.84232697	South
000_2054	8/11/2011	20:54	N40.37844248	W073.84023074	North
000_2112	8/11/2011	21:12	N40.40360493	W073.84380078	East (Cross-Line)
000_2120	8/11/2011	21:20	N40.40434819	W073.8436323	West (Cross-Line)
000_2137	8/11/2011	21:37	N40.37831185	W073.84147397	North
000_2154	8/11/2011	21:54	N40.40348705	W073.84528884	East (Cross-Line)
000_1320	8/12/2011	13:20	N40.40454829	W073.84526463	South
018_1339	8/12/2011	13:39	N40.37829895	W073.84247444	North
002_1357	8/12/2011	13:57	N40.40441576	W073.84699956	South
018_1414	8/12/2011	14:14	N40.37828153	W073.84363181	North
00A1430	8/12/2011	14:30	N40.40433172	W073.84859343	South
000_1446	8/12/2011	14:46	N40.37830328	W073.8447289	North
000_1502	8/12/2011	15:02	N40.40444242	W073.84972009	South

000_1521	8/12/2011	15:21	N40.37829124	W073.84541735	West (Cross-Line)
000_1539	8/12/2011	15:39	N40.40437359	W073.85101185	South
000_1555	8/12/2011	15:55	N40.37831273	W073.84666784	North
000_1613	8/12/2011	16:13	N40.40378564	W073.85215168	East (Cross-Line)
000_1621	8/12/2011	16:21	N40.40432302	W073.85670246	West (Cross-Line)
000_1637	8/12/2011	16:37	N40.37829866	W073.85635858	North
000_1653	8/12/2011	16:53	N40.4043936	W073.85604983	South
00A_1714	8/12/2011	17:14	N40.3783486	W073.85520142	North
00A_1731	8/12/2011	17:31	N40.40439974	W073.85473658	South
00A_1747	8/12/2011	17:47	N40.3783008	W073.85381127	North
000_1805	8/12/2011	18:05	N40.404307	W073.85370124	South
000_1822	8/12/2011	18:22	N40.37838947	W073.8525622	North
000_1839	8/12/2011	18:39	N40.40434469	W073.85246082	South
000_1855	8/12/2011	18:55	N40.37830301	W073.85138103	North
000_1912	8/12/2011	19:12	N40.40305213	W073.85153765	West (Cross-Line)
000_1921	8/12/2011	19:21	N40.40035457	W073.85198649	South
000_1934	8/12/2011	19:34	N40.37833283	W073.8502706	North
000_1950	8/12/2011	19:50	N40.39359285	W073.84979712	East (Cross-Line)
000_1959	8/12/2011	19:59	N40.3783285	W073.84942014	North
000_2009	8/12/2011	20:09	N40.39173398	W073.8490657	South
000_2018	8/12/2011	20:18	N40.37838541	W073.84864347	North
000_2026	8/12/2011	20:26	N40.39028404	W073.84775977	South
000_2034	8/12/2011	20:34	N40.37829971	W073.84772514	North
000_2040	8/12/2011	20:40	N40.38413509	W073.84707184	South
000_2044	8/12/2011	20:44	N40.38029592	W073.84676364	North
000_2139	8/12/2011	21:39	N40.40102109	W073.84546275	North
002_1211	8/16/2011	12:11	N40.3787399	W073.8139414	East (Cross-Line)
018_1228	8/16/2011	12:28	N40.3527096	W073.81509394	West (Cross-Line)
000_1245	8/16/2011	12:45	N40.37890566	W073.8155313	South
000_1302	8/16/2011	13:02	N40.35262315	W073.81753345	North
00A1320	8/16/2011	13:20	N40.37884849	W073.81788243	South
000_1337	8/16/2011	13:37	N40.35275006	W073.81982297	West (Cross-Line)
000_1356	8/16/2011	13:56	N40.37891639	W073.82006351	West (Cross-Line)
000_1417	8/16/2011	14:17	N40.3526312	W073.82281836	North
000_1435	8/16/2011	14:35	N40.37888074	W073.82254251	South
000_1451	8/16/2011	14:51	N40.35260131	W073.82502044	North
00A1510	8/16/2011	15:10	N40.37791636	W073.82490397	East (Cross-Line)
00A1521	8/16/2011	15:21	N40.37888737	W073.8250093	South
000_1536	8/16/2011	15:36	N40.35259757	W073.82699404	North

00A1553	8/16/2011	15:53	N40.37885857	W073.8271529	South
000_1608	8/16/2011	16:08	N40.35279055	W073.82940057	North
002_1630	8/16/2011	16:30	N40.37883587	W073.82945185	East (Cross-Line)
000_1646	8/16/2011	16:46	N40.35278632	W073.83139967	North
00A1704	8/16/2011	17:04	N40.37878377	W073.83124679	South
00A1720	8/16/2011	17:20	N40.352761	W073.83303255	West (Cross-Line)
00A1738	8/16/2011	17:38	N40.37882368	W073.83302919	South
000_1755	8/16/2011	17:55	N40.35272988	W073.83529056	North
000_1813	8/16/2011	18:13	N40.37816392	W073.83471163	East (Cross-Line)
00A1821	8/16/2011	18:21	N40.37884823	W073.83475698	South
000_1842	8/16/2011	18:42	N40.35267878	W073.83707192	North
000_1859	8/16/2011	18:59	N40.37877013	W073.83653499	South
00A1915	8/16/2011	19:15	N40.3528351	W073.83911182	North
000_1932	8/16/2011	19:32	N40.3788658	W073.83802292	South
000_1948	8/16/2011	19:48	N40.3528015	W073.84110504	North
000_2006	8/16/2011	20:06	N40.37897274	W073.83944513	South
000_2021	8/16/2011	20:21	N40.35285808	W073.84234923	West (Cross-Line)
000_2048	8/16/2011	20:48	N40.37879208	W073.84066715	South
000_2101	8/16/2011	21:04	N40.35278775	W073.84435186	North
000_2123	8/16/2011	21:23	N40.37814988	W073.84217169	East (Cross-Line)
000_2129	8/16/2011	21:29	N40.37839631	W073.83756475	West (Cross-Line)
000_2130	8/16/2011	21:30	N40.37876802	W073.84190823	West (Cross-Line)
000_2146	8/16/2011	21:46	N40.35281466	W073.84615007	North
000_2204	8/16/2011	22:04	N40.37807853	W073.84387664	East (Cross-Line)
000_1316	8/17/2011	13:16	N40.37871353	W073.85727517	South
000_1332	8/17/2011	13:32	N40.3528207	W073.85659961	North
000_1355	8/17/2011	13:55	N40.37880357	W073.85619805	East (Cross-Line)
000_1411	8/17/2011	14:11	N40.35250103	W073.8550557	North
000_1431	8/17/2011	14:31	N40.37886719	W073.8546057	South
000_1453	8/17/2011	14:53	N40.35241546	W073.85324071	North
00B_1510	8/17/2011	15:10	N40.37883285	W073.85323533	East (Cross-Line)
00A_1526	8/17/2011	15:26	N40.35270774	W073.85155713	East (Cross-Line)
000_1543	8/17/2011	15:43	N40.37877872	W073.85192211	South
000_1602	8/17/2011	16:02	N40.35285168	W073.84954311	North
000_1619	8/17/2011	16:19	N40.37818743	W073.85072748	West (Cross-Line)
000_1630	8/17/2011	16:30	N40.37875223	W073.85069101	South
00A_1646	8/17/2011	16:46	N40.35285617	W073.8477552	North
000_1702	8/17/2011	17:02	N40.37872635	W073.84978875	South
000_1719	8/17/2011	17:19	N40.35520606	W073.84669007	North

000_1734	8/17/2011	17:34	N40.37875189	W073.84899049	South
000_1748	8/17/2011	17:48	N40.36536361	W073.84521756	North
000_1756	8/17/2011	17:56	N40.37891028	W073.84849441	South
00A_1805	8/17/2011	18:05	N40.36855976	W073.84443054	North
00A_1812	8/17/2011	18:12	N40.37876216	W073.84726058	East (Cross-Line)
000_1815	8/17/2011	18:15	N40.37634872	W073.84436548	North
000_1818	8/17/2011	18:18	N40.37889826	W073.84535118	South
000_1820	8/17/2011	18:20	N40.37784874	W073.84380093	North
00B_1821	8/17/2011	18:21	N40.37880079	W073.84380407	South
000_1822	8/17/2011	18:22	N40.37763281	W073.84300548	West (Cross-Line)
000_1828	8/17/2011	18:28	N40.37702285	W073.84704789	South
000_1838	8/17/2011	18:38	N40.3561414	W073.83675561	South
000_1853	8/17/2011	18:53	N40.35295967	W073.85740825	North
000_1909	8/17/2011	19:09	N40.37883503	W073.85797511	South
00A_1927	8/17/2011	19:27	N40.35287283	W073.85909714	North
000_1942	8/17/2011	19:42	N40.37896891	W073.85946517	South
000_2000	8/17/2011	20:00	N40.35274182	W073.86060116	West (Cross-Line)
000_2016	8/17/2011	20:16	N40.37896283	W073.86092523	South
00A_2037	8/17/2011	20:37	N40.35294919	W073.86221671	West (Cross-Line)
000_2053	8/17/2011	20:53	N40.37815475	W073.86220597	East (Cross-Line)
000_2057	8/17/2011	20:57	N40.37848241	W073.85894817	West (Cross-Line)
000_1206	8/18/2011	12:06	N40.37893406	W073.86209617	South
000_1223	8/18/2011	12:23	N40.3527496	W073.86413948	North
000_1241	8/18/2011	12:41	N40.37890607	W073.86395964	South
000_1257	8/18/2011	12:57	N40.35275403	W073.86584787	North
00A_1315	8/18/2011	13:15	N40.37890194	W073.86565447	South
000_1331	8/18/2011	13:31	N40.35277396	W073.86731758	West (Cross-Line)
000_1350	8/18/2011	13:50	N40.37879714	W073.86720111	South
00A_1411	8/18/2011	14:11	N40.35280359	W073.86910098	North
000_1428	8/18/2011	14:28	N40.37873358	W073.86905305	South
000_1444	8/18/2011	14:44	N40.35281255	W073.87038853	North
00A_1502	8/18/2011	15:02	N40.3781571	W073.87054512	East (Cross-Line)
000_1512	8/18/2011	15:12	N40.37891118	W073.87041534	West (Cross-Line)
000_1529	8/18/2011	15:29	N40.35294889	W073.87208622	North
000_1547	8/18/2011	15:47	N40.37883157	W073.87238551	South
000_1604	8/18/2011	16:04	N40.352887	W073.87333953	West (Cross-Line)
00A_1624	8/18/2011	16:24	N40.3787996	W073.87406721	South
000_1641	8/18/2011	16:41	N40.35291019	W073.87518496	North
00A_1657	8/18/2011	16:57	N40.37896338	W073.8758787	South

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00B_1714	8/18/2011	17:14	N40.35292417	W073.8767272	North
000_1730	8/18/2011	17:30	N40.37885783	W073.87733037	South
00B_1747	8/18/2011	17:47	N40.35286094	W073.87786832	West (Cross-Line)
000_1803	8/18/2011	18:03	N40.37825975	W073.87910434	East (Cross-Line)
000_1811	8/18/2011	18:11	N40.37866268	W073.87946085	South
00A_1835	8/18/2011	18:35	N40.35290282	W073.87949031	North
000_1835	8/18/2011	18:35	N40.35290847	W073.87948385	North
000_1851	8/18/2011	18:51	N40.37877792	W073.88108818	South
00A_1909	8/18/2011	19:09	N40.35280543	W073.88088023	North
000_1924	8/18/2011	19:24	N40.37889568	W073.88263321	South
00A_1943	8/18/2011	19:43	N40.35286908	W073.88249923	North
000_1958	8/18/2011	19:58	N40.3789055	W073.88430147	South
00A_2018	8/18/2011	20:18	N40.35290879	W073.88367687	West (Cross-Line)
000_2033	8/18/2011	20:33	N40.37891127	W073.88597359	South
00A_2034	8/18/2011	20:34	N40.37867032	W073.88597593	South
00B_2034	8/18/2011	20:34	N40.37833079	W073.88570748	East (Cross-Line)
000_1150	8/19/2011	11:50	N40.37884965	W073.88607258	South
000_1207	8/19/2011	12:07	N40.35290986	W073.88526725	North
00A_1223	8/19/2011	12:23	N40.378869	W073.88762132	South
000_1240	8/19/2011	12:40	N40.3529345	W073.88690944	North
00A1_1257	8/19/2011	12:57	N40.37881438	W073.88945047	South
000_1314	8/19/2011	13:14	N40.35285487	W073.88840894	North
000_1330	8/19/2011	13:30	N40.37879526	W073.89118971	South
00A_1353	8/19/2011	13:53	N40.35292821	W073.88988125	North
00A_1409	8/19/2011	14:10	N40.37878096	W073.8929192	South
00A_1428	8/19/2011	14:28	N40.35289774	W073.89095918	North
00A_1446	8/19/2011	14:46	N40.37803675	W073.89461465	East (Cross-Line)
000_1454	8/19/2011	14:54	N40.3779675	W073.89133113	West (Cross-Line)
000_1458	8/19/2011	14:58	N40.37875121	W073.90072053	West (Cross-Line)
000_1514	8/19/2011	15:14	N40.35289454	W073.90057065	North
000_1531	8/19/2011	15:31	N40.37887251	W073.90010791	South
000_1548	8/19/2011	15:48	N40.35286788	W073.89943862	North
000_1610	8/19/2011	16:10	N40.37884717	W073.89874308	South
000_1628	8/19/2011	16:28	N40.35281156	W073.89844763	North
00A_1645	8/19/2011	16:45	N40.37878048	W073.89756539	South
000_1703	8/19/2011	17:03	N40.3528594	W073.89721787	North
00B_1720	8/19/2011	17:20	N40.37887304	W073.89606598	South
000_1739	8/19/2011	17:39	N40.35288001	W073.89619378	North
000_1801	8/19/2011	18:01	N40.37879893	W073.89467263	South

00A_1803	8/19/2011	18:03	N40.37802518	W073.89430636	West (Cross-Line)
00A_1815	8/19/2011	18:15	N40.36057215	W073.89418694	South
00B_1820	8/19/2011	18:20	N40.35285916	W073.8949855	North
000_1825	8/19/2011	18:25	N40.35908156	W073.89332901	South
000_1830	8/19/2011	18:30	N40.35285172	W073.89365634	North
000_1833	8/19/2011	18:33	N40.3578803	W073.89200556	South
00B_1837	8/19/2011	18:37	N40.35290232	W073.89251061	North
000_1840	8/19/2011	18:40	N40.35629347	W073.89111579	South
000_1843	8/19/2011	18:43	N40.35289759	W073.89161092	North
000_1900	8/19/2011	19:00	N40.37838854	W073.90074924	North
00B_1915	8/19/2011	19:15	N40.40435914	W073.90060748	South
00A_1939	8/19/2011	19:39	N40.37826736	W073.89993908	East (Cross-Line)
000_1955	8/19/2011	19:55	N40.40445201	W073.89924802	South
000_2017	8/19/2011	20:17	N40.37827244	W073.89848438	North
00A_2036	8/19/2011	20:36	N40.40362499	W073.89764451	West (Cross-Line)
000_2038	8/19/2011	20:38	N40.40363253	W073.90131292	North
00A_1247	8/23/2011	12:47	N40.40421311	W073.89418018	South
000_1324	8/23/2011	13:24	N40.40416477	W073.89329617	North
00A_1436	8/23/2011	14:36	N40.40334016	W073.88993404	West (Cross-Line)
00A_1613	8/23/2011	16:13	N40.37838324	W073.88620958	North
000_1140	8/23/2011	11:40	N40.40440818	W073.89691903	West (Cross-Line)
000_1156	8/23/2011	11:56	N40.37826441	W073.89681278	North
000_1213	8/23/2011	12:13	N40.40439561	W073.89600755	South
000_1229	8/23/2011	12:29	N40.37825099	W073.89525877	North
000_1307	8/23/2011	13:07	N40.37829332	W073.89412664	North
000_1325	8/23/2011	13:25	N40.4043068	W073.89264718	South
000_1340	8/23/2011	13:40	N40.37828269	W073.8925971	North
000_1359	8/23/2011	13:59	N40.40434492	W073.89128754	South
000_1415	8/23/2011	14:15	N40.37824998	W073.8909159	North
000_1436	8/23/2011	14:36	N40.40334016	W073.88993405	West (Cross-Line)
000_1443	8/23/2011	14:43	N40.4041795	W073.89021321	East (Cross-Line)
000_1459	8/23/2011	14:59	N40.37829052	W073.88922388	North
000_1518	8/23/2011	15:18	N40.40428679	W073.88848578	East (Cross-Line)
000_1534	8/23/2011	15:34	N40.37831132	W073.88807085	North
000_1557	8/23/2011	15:57	N40.40419456	W073.88645077	South
000_1635	8/23/2011	16:35	N40.40426659	W073.88498395	South
00A_1833	8/23/2011	18:33	N40.40427945	W073.88017665	South
000_1652	8/23/2011	16:52	N40.37828914	W073.88443709	North
000_1711	8/23/2011	17:11	N40.4043199	W073.88331781	South

000_1727	8/23/2011	17:27	N40.37817637	W073.88291159	North
000_1749	8/23/2011	17:49	N40.40342585	W073.88192727	West (Cross-Line)
000_1758	8/23/2011	17:58	N40.40426763	W073.88201801	North
000_1814	8/23/2011	18:14	N40.37827745	W073.88134404	North
000_1850	8/23/2011	18:50	N40.37829872	W073.88016553	North
000_1907	8/23/2011	19:07	N40.40427279	W073.87867685	South
000_1929	8/23/2011	19:29	N40.37840541	W073.87856368	North
000_1946	8/23/2011	19:46	N40.40447127	W073.87707091	South
00A_2006	8/23/2011	20:06	N40.37828524	W073.87708836	North
000_2025	8/23/2011	20:25	N40.4043271	W073.87553647	South
000_2043	8/23/2011	20:43	N40.37839409	W073.87533797	North
000_2100	8/23/2011	21:00	N40.4035292	W073.87418743	West (Cross-Line)
000_2108	8/23/2011	21:08	N40.40419119	W073.87421958	South
00A_1140	8/24/2011	11:40	N40.40437577	W073.87335757	South
00A_1337	8/24/2011	13:37	N40.40434233	W073.85748673	South
00A_1359	8/24/2011	13:59	N40.37839455	W073.857597	North
00A_1434	8/24/2011	14:34	N40.3783639	W073.85907685	North
00A_1451	8/24/2011	14:51	N40.40428929	W073.85964639	South
00A_1608	8/24/2011	16:08	N40.40425468	W073.86227721	South
00B_1526	8/24/2011	15:26	N40.40430759	W073.86091865	South
00B_1553	8/24/2011	15:53	N40.37825314	W073.86190421	East (Cross-Line)
00C_1510	8/24/2011	15:10	N40.37836342	W073.86062951	North
000_1158	8/24/2011	11:58	N40.37839088	W073.87285632	North
000_1214	8/24/2011	12:14	N40.40431666	W073.87208222	South
000_1235	8/24/2011	12:35	N40.37838872	W073.8709464	North
000_1251	8/24/2011	12:51	N40.40437715	W073.87071648	South
000_1311	8/24/2011	13:11	N40.37821472	W073.86953135	North
000_1328	8/24/2011	13:28	N40.40361062	W073.86955405	West (Cross-Line)
000_1416	8/24/2011	14:16	N40.40431025	W073.85836685	South
000_1626	8/24/2011	16:26	N40.38426606	W073.86267559	South
000_1631	8/24/2011	16:31	N40.37848857	W073.86345142	North
000_1655	8/24/2011	16:55	N40.40433254	W073.86315853	West (Cross-Line)
000_1716	8/24/2011	17:16	N40.37845345	W073.86518132	North
000_1736	8/24/2011	17:36	N40.40367571	W073.86429903	East (Cross-Line)
00A_1316	9/12/2011	13:16	N40.37832124	W073.86868624	North
000_1318	9/12/2011	13:18	N40.37846631	W073.8686868	North
000_1335	9/12/2011	13:35	N40.40432088	W073.86872723	South
00A_1349	9/12/2011	13:49	N40.37835354	W073.86715473	North
000_1406	9/12/2011	14:06	N40.40430045	W073.86755363	South

000_1424	9/12/2011	14:24	N40.3782821	W073.86593954	North
000_1442	9/12/2011	14:42	N40.40429946	W073.86610831	South
000_1455	9/12/2011	14:55	N40.38419384	W073.86509873	North
00A_1509	9/12/2011	15:09	N40.40428141	W073.86494408	South
000_1517	9/12/2011	15:17	N40.39244903	W073.8642461	North
000_1525	9/12/2011	15:25	N40.40416425	W073.86390639	South
00A_1531	9/12/2011	15:31	N40.39492101	W073.86276237	East (Cross-Line)
000_1532	9/12/2011	15:32	N40.39607426	W073.85981901	North
00A_1534	9/12/2011	15:34	N40.3965353	W073.86335745	North
000_1540	9/12/2011	15:40	N40.40348242	W073.86328693	West (Cross-Line)
00A_1555	9/12/2011	15:55	N40.40372783	W073.8571895	North
000_1614	9/12/2011	16:14	N40.42969262	W073.85755377	South
00A_1628	9/12/2011	16:28	N40.403644	W073.85835143	North
00A_1653	9/12/2011	16:53	N40.42968069	W073.85840693	South
000_1709	9/12/2011	17:09	N40.40362476	W073.85957393	North
000_1733	9/12/2011	17:33	N40.42970014	W073.85994251	South
000_1750	9/12/2011	17:50	N40.40375154	W073.86086951	North
00A_1813	9/12/2011	18:13	N40.42961629	W073.86087467	West (Cross-Line)
00B_1828	9/12/2011	18:28	N40.40370533	W073.86187878	North
000_1849	9/12/2011	18:49	N40.4297196	W073.86213378	South
00B1909	9/12/2011	19:09	N40.40438319	W073.86318207	East (Cross-Line)
000_1916	9/12/2011	19:16	N40.40365967	W073.86315778	North
000_1937	9/12/2011	19:37	N40.42975111	W073.86313654	South
000_1952	9/12/2011	19:52	N40.40362027	W073.8643047	North
000_2022	9/12/2011	20:22	N40.42986332	W073.86473973	South
000_2039	9/12/2011	20:39	N40.40420335	W073.86577671	West (Cross-Line)
000_1440	9/13/2011	14:40	N40.42964048	W073.86537416	South
000_1457	9/13/2011	14:57	N40.40365909	W073.8666505	North
000_1514	9/13/2011	15:14	N40.42972131	W073.86679734	South
00B1521	9/13/2011	15:21	N40.4209151	W073.86555951	South
000_1533	9/13/2011	15:33	N40.4036829	W073.86775471	North
00B1555	9/13/2011	15:55	N40.42970016	W073.86805445	South
000_1611	9/13/2011	16:11	N40.40376743	W073.8691758	North
00B1628	9/13/2011	16:28	N40.42982336	W073.86972686	South
00B1645	9/13/2011	16:45	N40.40378764	W073.87042084	North
000_1701	9/13/2011	17:01	N40.42981224	W073.87098563	South
00B1731	9/13/2011	17:31	N40.40363672	W073.87132699	North
00A1748	9/13/2011	17:48	N40.42973942	W073.87222954	South
00A1749	9/13/2011	17:49	N40.42896385	W073.87234032	East (Cross-Line)

000_1757	9/13/2011	17:57	N40.42968226	W073.87218153	South
00B1813	9/13/2011	18:13	N40.40376791	W073.8727815	North
00A1830	9/13/2011	18:30	N40.42952602	W073.87363378	South
000_1847	9/13/2011	18:47	N40.40433105	W073.87416899	East (Cross-Line)
00B1201	9/14/2011	12:01	N40.42967442	W073.90098397	South
000_1219	9/14/2011	12:19	N40.40361876	W073.90042116	North
000_1237	9/14/2011	12:37	N40.42977964	W073.89932068	South
000_1255	9/14/2011	12:55	N40.40373953	W073.89879989	North
00A1318	9/14/2011	13:18	N40.42960743	W073.89750959	South
00A1335	9/14/2011	13:35	N40.40366721	W073.89729328	North
000_1351	9/14/2011	13:51	N40.42975303	W073.89592198	South
000_1409	9/14/2011	14:09	N40.40363571	W073.89547177	North
000_1426	9/14/2011	14:26	N40.42973562	W073.89419811	South
00A1443	9/14/2011	14:43	N40.40366443	W073.89363445	North
000_1501	9/14/2011	15:01	N40.42884941	W073.89249368	West (Cross-Line)
000_1513	9/14/2011	15:13	N40.4297327	W073.89235722	South
000_1530	9/14/2011	15:30	N40.40372652	W073.89181388	North
00A1546	9/14/2011	15:46	N40.42978277	W073.89059102	East (Cross-Line)
00A1603	9/14/2011	16:03	N40.40385557	W073.89022221	North
00A1629	9/14/2011	16:29	N40.42973152	W073.88868152	South
00C1645	9/14/2011	16:45	N40.40371444	W073.88873129	North
00A1701	9/14/2011	17:01	N40.42973625	W073.88732717	South
000_1718	9/14/2011	17:18	N40.40376713	W073.88702518	North
00A1733	9/14/2011	17:33	N40.42982469	W073.88583201	East (Cross-Line)
00A1755	9/14/2011	17:55	N40.40382991	W073.88570708	North
00C1813	9/14/2011	18:13	N40.42902996	W073.88434307	West (Cross-Line)
00A1822	9/14/2011	18:22	N40.42973021	W073.88433002	South
00A1840	9/14/2011	18:40	N40.4037958	W073.88400536	North
00A1855	9/14/2011	18:55	N40.42967815	W073.88259348	South
000_1914	9/14/2011	19:14	N40.40380059	W073.88226003	North
00A1932	9/14/2011	19:32	N40.42913216	W073.88129044	West (Cross-Line)
000_1133	9/21/2011	11:33	N40.42968564	W073.88080125	South
000_1152	9/21/2011	11:52	N40.40368339	W073.88052048	North
000_1209	9/21/2011	12:09	N40.42965817	W073.87966322	South
00A_1229	9/21/2011	12:29	N40.40375338	W073.87864259	North
00B1247	9/21/2011	12:47	N40.42967938	W073.87832235	South
00A1302	9/21/2011	13:02	N40.40374123	W073.87714096	North
00A1328	9/21/2011	13:28	N40.4295616	W073.87658089	South
000_1345	9/21/2011	13:45	N40.40370211	W073.87544953	North

000_1408	9/21/2011	14:08	N40.42969715	W073.87568641	South
000A1424	9/21/2011	14:24	N40.40373482	W073.87400644	North
000_1450	9/21/2011	14:50	N40.42907692	W073.87359338	West (Cross-Line)
000A1455	9/21/2011	14:55	N40.42871513	W073.8819478	West (Cross-Line)
000_1456	9/21/2011	14:56	N40.42913146	W073.88142198	North
000A1500	9/21/2011	15:00	N40.42956505	W073.87444206	East (Cross-Line)
000A1517	9/21/2011	15:17	N40.41167396	W073.88966162	North
000C1521	9/21/2011	15:21	N40.41665538	W073.88142465	East (Cross-Line)
000A1525	9/21/2011	15:25	N40.41794634	W073.87315352	North
000A1532	9/21/2011	15:32	N40.42339865	W073.87949849	West (Cross-Line)

Table 3.3-2

Multibeam Survey Lines run during the Fall 2011 multibeam survey at Fire-Island Reef

File Name	Date	Time (UTC)	Latitude	Longitude	Direction
000A1544	11/7/2011	15:44	N40-35.606779	W73-11.462527	West
000B_1603	11/7/2011	16:03	N40-35.627781	W73-13.526184	East
000_1623	11/7/2011	16:23	N40-35.664773	W73-11.448860	West
000_1648	11/7/2011	16:48	N40-35.687398	W73-13.562522	East
000_1705	11/7/2011	17:05	N40-35.718023	W73-11.439814	West
000C1731	11/7/2011	17:31	N40-35.747695	W73-13.551383	East
000B1748	11/7/2011	17:48	N40-35.782610	W73-11.444852	West
000A1810	11/7/2011	18:10	N40-35.806345	W73-13.556198	East
000C1828	11/7/2011	18:28	N40-35.846819	W73-11.449180	West
000A1849	11/7/2011	18:49	N40-35.871513	W73-13.548551	East
000A1907	11/7/2011	19:07	N40-35.907862	W73-11.444282	West
000A1929	11/7/2011	19:29	N40-35.928120	W73-13.485435	South (Cross-Line)
000_1938	11/7/2011	19:38	N40-35.937857	W73-13.552203	East
000A1955	11/7/2011	19:55	N40-35.966376	W73-11.445338	West
000_2014	11/7/2011	20:14	N40-36.000957	W73-13.556191	East
000A2032	11/7/2011	20:32	N40-36.033247	W73-11.438448	West
000_2050	11/7/2011	20:50	N40-36.066509	W73-13.555356	East
000_2106	11/7/2011	21:06	N40-36.111311	W73-11.441404	West
000A2123	11/7/2011	21:23	N40-36.145102	W73-13.508994	South (Cross-Line)
000_1212	11/8/2011	12:12	N40-35.580937	W73-13.551401	East

Table 3.3-3
Multibeam Survey Lines run during the Fall 2011 multibeam survey at Hempstead Reef

File Name	Date	Time (UTC)	Latitude	Longitude	Direction
000A1548	11/8/2011	15:48	N40-31.280473	W73-33.393110	East
000C1603	11/8/2011	16:03	N40-31.517642	W73-31.298413	West
000A1619	11/8/2011	16:19	N40-31.220970	W73-33.425397	East
000_1636	11/8/2011	16:36	N40-31.462310	W73-31.318433	West
000A1652	11/8/2011	16:52	N40-31.149097	W73-33.437948	East
000A1709	11/8/2011	17:09	N40-31.414519	W73-31.332591	West
000_1732	11/8/2011	17:32	N40-31.090866	W73-33.474822	East
000C1748	11/8/2011	17:48	N40-31.370558	W73-31.334340	West
000B1805	11/8/2011	18:05	N40-31.020157	W73-33.490552	East
000B1822	11/8/2011	18:22	N40-31.325061	W73-31.366943	West
000B1840	11/8/2011	18:40	N40-30.956506	W73-33.458627	North (Cross-Line)
000_1848	11/8/2011	18:48	N40-30.988280	W73-33.494885	East
000B1907	11/8/2011	19:07	N40-31.247328	W73-31.385338	West
000B1929	11/8/2011	19:29	N40-30.924253	W73-33.518732	East
000A1948	11/8/2011	19:48	N40-31.204794	W73-31.376880	West
000_2005	11/8/2011	20:05	N40-30.857918	W73-33.527950	East
000A2022	11/8/2011	20:22	N40-31.144748	W73-31.403970	West
000A2039	11/8/2011	20:39	N40-30.802714	W73-33.540617	East
000_2056	11/8/2011	20:56	N40-31.080113	W73-31.428815	West
000_2115	11/8/2011	21:15	N40-30.744046	W73-33.561921	East
000_2134	11/8/2011	21:34	N40-31.004293	W73-31.458255	West
000_2151	11/8/2011	21:51	N40-30.689037	W73-33.579130	East
000_2153	11/8/2011	21:53	N40-30.653036	W73-33.583235	East
000_2159	11/8/2011	21:59	N40-30.747579	W73-32.719172	East
000_2208	11/8/2011	22:08	N40-30.924043	W73-31.471083	West
000_2215	11/8/2011	22:15	N40-30.792829	W73-32.210374	North (Cross-Line)

4.0 Tidal Corrections (HARS)

For the Fall 2011 bathymetry survey at HARS a “Valeport Mini” submersible tide gauge was deployed prior to collection of multibeam data at the HARS. This gauge which measures pressure was located on the sea floor attached to an anchor with an additional attachment to an acoustic release buoy (see Figure 3.0-1).

Real Time Kinematic GPS (RTK) option of the POS/MV on board the survey vessel was used to provide real time water level elevations. This system was referenced to NAVD88 during data collection. After 90% of the field survey was complete at the HARS, the acoustic release of tidal sensor was activated and the sensor was brought to the surface. The sensor has a limited power supply due to battery capacity. It was decided to change the batteries and download the recorded tidal data. The sensors data was downloaded and reviewed. The sensors had recorded at the specified 6 minute intervals with an apparent malfunction of the sensors pressure portion. The downloaded data was determined by the manufacturer to be useless and un-recoverable. Due to redundancy in recording water levels with the RTK GPS option of the POS/MV, a decision was made at that time to continue with the survey at HARS, relying on RTK GPS water levels and recorded NOAA water levels at Sandy Hook.

As with previous surveys at the HARS site, tide data from NOAA’s reference tide station at Sandy Hook (Figure 4.0-1) was downloaded from N.O.A.A.’s web site. This NAVD88 tide data was then referenced to MLW as per the USACOE SOW, (0’ MLW is 1.73’ below 0’ NGVD29 and 2.84’ below NAVD88). Historic range and time correctors (used since 2006) of 0.94 and -30 minutes were then used to correct the Sandy Hook NOAA tide data for the HARS survey area.

4.0.1 Tidal Corrections (Fire Island Reef)

For the Fall 2011 bathymetry survey at Fire Island and Hempstead Reefs the *Valeport Mini* submersible tide gauge was replaced with the more robust *Valeport WLR*. The gauge was deployed prior to collection of multibeam data at the reefs. It was decided to begin with Fire Island Reef and then move on to Hempstead Reef. This gauge which measures pressure was located on the sea floor (see Figure 3.0-3), attached to an anchor with an additional attachment to an acoustic release buoy (see Figure 3.0-1). Real Time Kinematic GPS (RTK) option of the POS/MV on board the survey vessel was used to provide real time water level elevations. This system was referenced to NAVD88 during data collection. The Fire Island Reef survey area was within cellular coverage and RTK GPS was constant for the entire survey. Using RTK GPS the water level was measured at the seabed tidal sensor for a length of time while sea conditions were relatively calm. This calibration or water level was then used to derive a fixed offset from sensors water level to NAVD 88. NOAA’s *VDATUM* program was then used to determine mean low water (MLW) at the Fire Island Site, which was determined to be 2.23’ below 0’ NAVD88.

4.0.2 Tidal Corrections (Hempstead Reef)

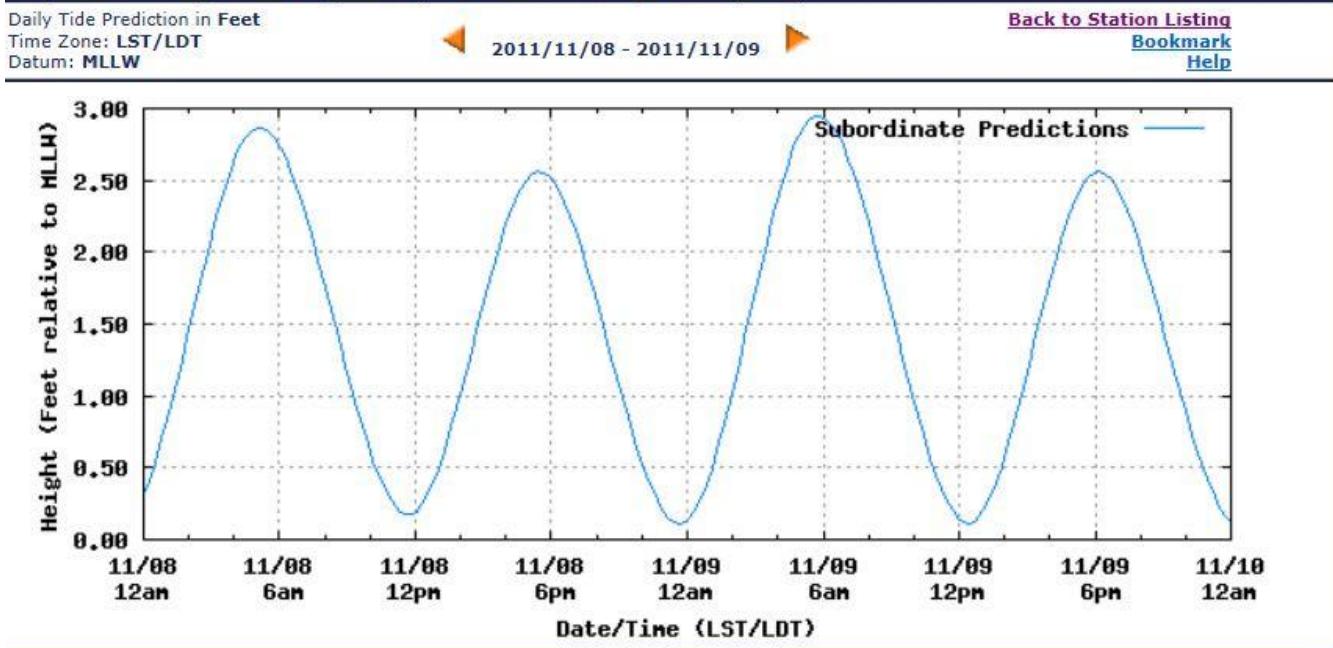
Once the survey data for Fire Island Reef was collected it was planned to recover the seabed tidal sensor and move it to the Hempstead Reef site. It was intended to use the same procedure for determining mean low water at the Hempstead Reef as was used for the Fire Island Reef survey. Unfortunately, the acoustic release for the seabed tidal sensor failed and the sensor remained on the sea floor collecting data. Being that the weather window at the time was very small it was decided to mobilize the survey vessel to the Hempstead Reef as soon as possible, and attempt to recover the tide sensor and its data at a later date. The multibeam survey was conducted at the Hempstead Reef site; however cellular phone coverage at that location was not available, negating the ability to record RTK GPS water levels. The following procedure was utilized to determine the MLW tide at Hempstead Reef; From NOAA's web site <http://tidesandcurrents.noaa.gov/>, the predicted tide option was selected to determine the time offsets from Sandy Hook (Fort Hancock Station) to the two locations closest to Fire-Island Reef and Hempstead Reef. These were "Democrat Point, Fire Island" and "Jones Inlet, Point Lookout". Figure 4.0.2-1 show plots for these two locations. It shows High Tide at Fire Island to be 39 minutes earlier than Sandy Hook, and Low Tide to be 27 minutes earlier. It shows High Tide at Jones Inlet to be 20 minutes earlier than Sandy Hook, and Low Tide to be 25 minutes earlier. From this it was decided to use the difference in these time offsets to establish the time offsets between Fire Island and Jones Inlet, which were then applied to the seafloor tide gauge data recorded at Fire-Island Reef. The time offsets used were as follows; High Tide at Hempstead Reef to be 19 minutes later than Fire-Island Reef, and Low Tide at Hempstead Reef to be 2 minutes later. These times were pro-rated through the tide cycle, as they were applied to the tide data from Fire-Island Reef. In addition to applying a time offset from Fire-Island Reef to Hempstead Reef, a Range offset was also applied. In order to determine the Range difference between the two Reef sites, it was decided to utilize NOAA's VDatum software. Figures 4.0.2-2 and 4.0.2-3 show plots of the MHW and MLW determinations at the two reefs. From this information the Range in tide at Fire-Island Reef was found to be 3.87' and the Range at Hempstead Reef was found to be 4.24'. Subsequently it was decided to use the difference in Range between Fire-Island Reef and Hempstead Reef, such that a Range multiplier offset of 1.1 was applied to the tide data recorded at Fire-Island Reef. The Time and Range offsets were applied to the NAVD88 tide data from the seafloor tide gauge at Fire-Island Reef to establish the NAVD88 tide at Hempstead Reef and then NOAA's VDatum program was used to determine mean low water (MLW) at the Site, which was determined to be 2.41' below 0' NAVD88.

Figure 4.0.2-1

Tide Prediction Plots from NOAA's Tides and Currents web site, showing Time Offsets.

Democrat Point, Fire Island Inlet, NY StationId: 8515228

Referenced to Station: SANDY HOOK (Fort Hancock) (8531680)
 Height offset in feet (low: *0.55 high: * 0.56) Time offset in mins (low: -27 high: -39)

**Jones Inlet (Point Lookout), NY StationId: 8516385**

Referenced to Station: SANDY HOOK (Fort Hancock) (8531680)
 Height offset in feet (low: *0.75 high: * 0.77) Time offset in mins (low: -25 high: -20)

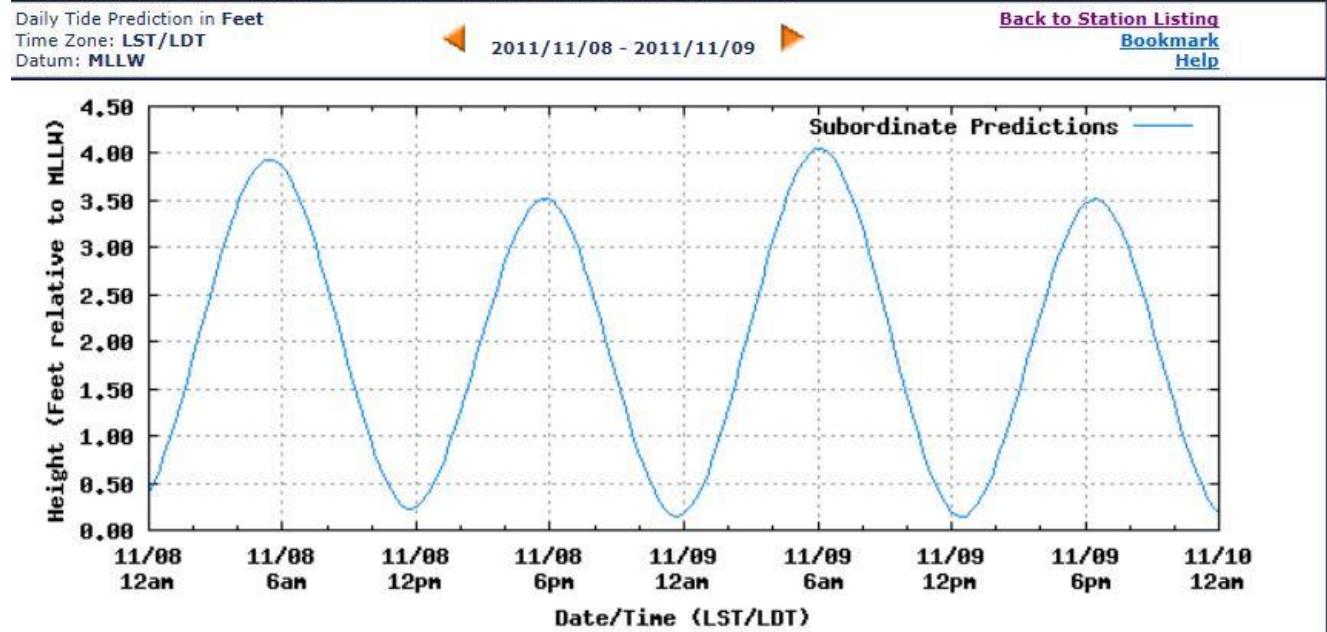


Figure 4.0.2-2
NOAA's VDatum MLW and MHW determination for Fire-Island Reef.

The figure consists of two side-by-side screenshots of the "Vertical Datums Transformation Tool 2.3.3".

Screenshot 1 (Top): Conversion from NAVD 88 to Mean Low Water (MLW)

- Datum Information:**
 - Horizontal Datum: NAD 83 (NSRS2007/CORS96/HARN), WGS84, ITRF
 - Input Vertical Datum: NAVD 88
 - Output Vertical Datum: MLW - Mean Low Water
 - Geoid: (required) [dropdown]
 - Height Units: meter (radio button selected)
 - Height/Sounding: Height (radio button selected)
- Point Conversion:**

Input	Output
Latitude: 40 35 51.81	40.597725
Longitude: 73 12 27.44	-73.207622
Height: 0	2.2331
- File Conversion:**
 - File(s) Format: With ID Key (GIS data) (checkbox checked)
 - Output File or Folder: [dropdown]
 - Save output data as in geographic coor. system (checkbox checked)
 - Convert button

Screenshot 2 (Bottom): Conversion from NAVD 88 to Mean High Water (MHW)

- Datum Information:**
 - Horizontal Datum: NAD 83 (NSRS2007/CORS96/HARN), WGS84, ITRF
 - Input Vertical Datum: NAVD 88
 - Output Vertical Datum: MHW - Mean High Water
 - Geoid: (required) [dropdown]
 - Height Units: meter (radio button selected)
 - Height/Sounding: Height (radio button selected)
- Point Conversion:**

Input	Output
Latitude: 40 35 51.81	40.597725
Longitude: 73 12 27.44	-73.207622
Height: 0	-1.6430
- File Conversion:**
 - File(s) Format: With ID Key (GIS data) (checkbox checked)
 - Output File or Folder: [dropdown]
 - Save output data as in geographic coor. system (checkbox checked)
 - Convert button

Figure 4.0.2-3
NOAA's VDatum MLW and MHW determination for Hempstead Reef.

Vertical Datums Transformation Tool 2.3.3			
Choose an Area:	New Jersey/New York/Connecticut - Northern NJ, NY Harbor, western Long Island Sound, Version 02		
Tidal Transf. Grid Folder:	C:\VDatum\NYNJ_hbr02_8301_03		
Datum Information			
Horizontal Datum:	NAD 83 (NSRS2007/CORS96/HARN), WGS84, ITRF		
Input Vertical Datum:	NAVD 88		
Output Vertical Datum:	MLW - Mean Low Water		
Geoid: (required)			
Height Units:	Height/Sounding:		
<input type="radio"/> meter	<input checked="" type="radio"/> Height		
<input checked="" type="radio"/> feet	<input type="radio"/> Sounding		
Coordinate System			
<input checked="" type="radio"/> Geographic (Latitude, Longitude)			
<input type="radio"/> UTM - Zone :	North Hemisphere		
Point Conversion			
Latitude:	40 31 8.51	Input	Output
Longitude:	73 32 25.61	Convert	40.519031
Height:	0	Reset	-73.540447
File Conversion			
File(s) Format	<input checked="" type="checkbox"/> With ID Key (GIS data) <input checked="" type="radio"/> Latitude Longitude <input type="checkbox"/> Longitude Latitude		
Input File(s):	<input type="button" value="..."/>		
Output File or Folder:	<input type="button" value="..."/>		
<input checked="" type="checkbox"/> Save output data as in geographic coor. system <input type="button" value="Convert"/>			
Vertical Datums Transformation Tool 2.3.3			
Choose an Area:	New Jersey/New York/Connecticut - Northern NJ, NY Harbor, western Long Island Sound, Version 02		
Tidal Transf. Grid Folder:	C:\VDatum\NYNJ_hbr02_8301_03		
Datum Information			
Horizontal Datum:	NAD 83 (NSRS2007/CORS96/HARN), WGS84, ITRF		
Input Vertical Datum:	NAVD 88		
Output Vertical Datum:	MHW - Mean High Water		
Geoid: (required)			
Height Units:	Height/Sounding:		
<input type="radio"/> meter	<input checked="" type="radio"/> Height		
<input checked="" type="radio"/> feet	<input type="radio"/> Sounding		
Coordinate System			
<input checked="" type="radio"/> Geographic (Latitude, Longitude)			
<input type="radio"/> UTM - Zone :	North Hemisphere		
Point Conversion			
Latitude:	40 31 8.51	Input	Output
Longitude:	73 32 25.61	Convert	40.519031
Height:	0	Reset	-73.540447
File Conversion			
File(s) Format	<input checked="" type="checkbox"/> With ID Key (GIS data) <input checked="" type="radio"/> Latitude Longitude <input type="checkbox"/> Longitude Latitude		
Input File(s):	<input type="button" value="..."/>		
Output File or Folder:	<input type="button" value="..."/>		
<input checked="" type="checkbox"/> Save output data as in geographic coor. system <input type="button" value="Convert"/>			

4.1 Cross-Track Analysis

Cross-track analysis was performed to provide a quality check on the accuracy of the multibeam data. Cross-track lines are run perpendicular to the main direction of survey lines to produce areas of overlapping data that can be analyzed and errors quantified to provide an indication of the overall quality of data.

For the Fall 2011 survey the main body of survey lines were run in a North-South direction at the HARS location, and East-West at both Reef locations, and for every ten (10) main body lines, cross-track line were run in East-West, and North-South directions respectively. This yielded a total of thirty nine (39) cross-track lines for the HARS, and two (2) cross-track lines for each of the reef locations, which were then analyzed utilizing the Beam Angle Test module within the Hypack Processing software. The Beam Angle Test compares multibeam check lines to a reference surface and estimates the depth accuracy of the multibeam data at different angle limits. The estimated accuracy can be used to determine if the multibeam data meets survey specifications. In this case the reference surface used was the final 10x10 xyz of the processed main body multibeam data. Results from this analysis are in Section 4.1.

4.2 Cross-Track Analysis Results

Tables 4.1-1 to 4.1-3 show the results from the Hypack Beam Analysis for each crossing. The analysis software generates; Max Outlier, Mean Difference, Standard Deviation and 95% Confidence for the beam angle limits specified. For the HARS location the averages for all crossings show that the 95% confidence is less than 0.8', while the mean difference for all crossings averages out to less than 0.1', the standard deviation for all crossings averages out to less than 0.4', and the maximum outlier is 17.6'. For the Fire-Island Reef location the averages for all crossings show that the 95% confidence is less than 0.6', while the mean difference for all crossings averages out to less than 0.24', the standard deviation for all crossings averages out to less than 0.31', and the maximum outlier is 1.6'. For the Hempstead Reef location the averages for all crossings show that the 95% confidence is less than 0.41', while the mean difference for all crossings averages out to less than 0.08', the standard deviation for all crossings averages out to less than 0.21', and the maximum outlier is 3.5'. Figures 4.1-1 to 4.1-3 show screen captures of the summary plots for the errors at +/- 20 deg. for each crossing.

Table 4.1-1
Summary of Beam Analysis Results for all crossings during HARS Fall 2011 survey

Crossing	Beam Angle	Max. Outlier	Mean Diff.	Std Dev.	95%	Crossing	Beam Angle	Max. Outlier	Mean Diff.	Std Dev.	95%	Crossing	Beam Angle	Max. Outlier	Mean Diff.	Std Dev.	95%
0805_1828	+/-20	2.30	0.35	0.36	0.70	0805_2037	+/-20	1.64	0.03	0.19	0.38	0810_1425	+/-20	2.49	0.00	0.24	0.47
	+/-25	2.23	0.32	0.32	0.62		+/-25	1.51	0.07	0.22	0.43		+/-25	2.07	0.02	0.23	0.46
	+/-30	3.02	0.30	0.29	0.57		+/-30	1.50	0.09	0.22	0.43		+/-30	2.10	0.03	0.24	0.47
	+/-35	3.18	0.37	0.33	0.65		+/-35	1.28	0.06	0.21	0.41		+/-35	1.80	0.03	0.25	0.49
	+/-40	2.27	0.32	0.32	0.63		+/-40	1.31	0.05	0.21	0.42		+/-40	1.64	0.07	0.24	0.47
	+/-45	2.30	0.29	0.33	0.65		+/-45	1.64	0.03	0.22	0.43		+/-45	1.84	0.07	0.24	0.47
	+/-50	1.81	0.31	0.34	0.66		+/-50	1.81	0.01	0.24	0.48		+/-50	2.40	0.12	0.25	0.48
	+/-55	2.96	0.30	0.35	0.69		+/-55	1.91	0.02	0.24	0.47		+/-55	2.43	0.20	0.27	0.52
	+/-60	2.36	0.33	0.38	0.75		+/-60	1.96	0.04	0.25	0.49		+/-60	2.89	0.29	0.31	0.60
0810_1717	+/-20	1.21	0.08	0.20	0.39	0810_1856	+/-20	1.74	0.02	0.18	0.36	0811_1500	+/-20	4.14	0.19	0.43	0.84
	+/-25	1.34	0.07	0.18	0.36		+/-25	1.51	0.01	0.19	0.37		+/-25	3.84	0.18	0.37	0.73
	+/-30	1.51	0.09	0.19	0.38		+/-30	1.64	0.02	0.18	0.35		+/-30	5.70	0.18	0.40	0.78
	+/-35	1.25	0.06	0.20	0.39		+/-35	2.04	0.03	0.19	0.37		+/-35	4.49	0.21	0.44	0.86
	+/-40	1.34	0.05	0.19	0.37		+/-40	1.38	0.02	0.18	0.35		+/-40	3.25	0.20	0.37	0.73
	+/-45	1.64	0.02	0.20	0.39		+/-45	1.74	0.04	0.19	0.37		+/-45	5.31	0.18	0.39	0.76
	+/-50	1.84	0.00	0.20	0.40		+/-50	1.77	0.03	0.19	0.37		+/-50	6.10	0.19	0.40	0.78
	+/-55	1.81	-0.02	0.21	0.42		+/-55	1.80	0.03	0.20	0.40		+/-55	10.67	0.18	0.43	0.85
	+/-60	2.03	-0.02	0.22	0.44		+/-60	2.20	0.03	0.21	0.40		+/-60	17.59	0.29	0.47	0.92
0811_1810	+/-20	4.49	0.00	0.42	0.81	0811_2112	+/-20	3.15	0.04	0.26	0.51	0811_2154	+/-20	1.21	0.08	0.24	0.47
	+/-25	4.52	0.02	0.38	0.74		+/-25	3.41	0.04	0.22	0.44		+/-25	1.19	0.08	0.25	0.49
	+/-30	4.39	0.03	0.34	0.67		+/-30	1.97	0.05	0.21	0.41		+/-30	1.28	0.09	0.26	0.51
	+/-35	4.43	0.06	0.37	0.73		+/-35	2.00	0.04	0.22	0.43		+/-35	1.54	0.08	0.26	0.52
	+/-40	3.87	0.01	0.36	0.71		+/-40	2.43	0.03	0.23	0.44		+/-40	1.67	0.08	0.28	0.55
	+/-45	3.78	0.01	0.35	0.68		+/-45	2.30	0.00	0.24	0.46		+/-45	1.51	0.03	0.28	0.54
	+/-50	4.01	-0.02	0.37	0.73		+/-50	2.10	-0.03	0.26	0.50		+/-50	1.41	0.01	0.26	0.51
	+/-55	4.66	-0.01	0.38	0.75		+/-55	2.30	-0.07	0.26	0.51		+/-55	1.35	-0.03	0.27	0.52
	+/-60	5.38	0.04	0.46	0.91		+/-60	2.00	-0.12	0.28	0.54		+/-60	1.68	-0.06	0.28	0.55

0812_1613	+/-20	1.54	0.11	0.21	0.40	0812_1912	+/-20	1.61	0.01	0.19	0.38	0816_1510	+/-20	5.15	-0.03	0.64	1.25
	+/-25	1.47	0.10	0.22	0.42		+/-25	1.57	-0.01	0.18	0.36		+/-25	4.92	0.03	0.60	1.18
	+/-30	1.84	0.11	0.21	0.41		+/-30	2.00	-0.02	0.18	0.36		+/-30	4.85	0.00	0.61	1.19
	+/-35	1.94	0.11	0.20	0.39		+/-35	1.74	0.00	0.17	0.34		+/-35	5.84	0.03	0.59	1.15
	+/-40	1.51	0.10	0.20	0.39		+/-40	1.54	-0.02	0.17	0.34		+/-40	5.25	-0.01	0.59	1.16
	+/-45	1.54	0.09	0.21	0.41		+/-45	1.48	-0.02	0.19	0.37		+/-45	5.06	-0.01	0.63	1.24
	+/-50	1.81	0.07	0.21	0.42		+/-50	1.71	-0.03	0.18	0.35		+/-50	5.31	0.00	0.64	1.26
	+/-55	2.03	0.07	0.25	0.49		+/-55	1.90	-0.05	0.20	0.40		+/-55	6.93	0.02	0.69	1.35
	+/-60	4.89	0.07	0.29	0.57		+/-60	2.17	-0.04	0.21	0.41		+/-60	7.54	0.08	0.75	1.48

0816_1813	+/-20	3.67	0.08	0.34	0.66	0816_2123	+/-20	2.99	0.00	0.34	0.67	0816_2204	+/-20	1.67	-0.08	0.21	0.40
	+/-25	4.13	0.08	0.32	0.63		+/-25	2.95	-0.04	0.31	0.60		+/-25	1.64	-0.05	0.23	0.45
	+/-30	4.10	0.09	0.38	0.75		+/-30	3.74	-0.03	0.30	0.58		+/-30	1.91	-0.11	0.27	0.53
	+/-35	4.04	0.12	0.37	0.72		+/-35	3.81	-0.04	0.34	0.67		+/-35	3.05	-0.03	0.33	0.65
	+/-40	3.05	0.13	0.33	0.64		+/-40	2.89	-0.04	0.28	0.54		+/-40	3.91	-0.07	0.40	0.79
	+/-45	2.62	0.11	0.30	0.58		+/-45	2.66	-0.04	0.25	0.49		+/-45	3.81	-0.11	0.56	1.10
	+/-50	2.53	0.09	0.39	0.77		+/-50	2.82	-0.05	0.26	0.51		+/-50	3.84	-0.04	0.52	1.01
	+/-55	3.08	0.16	0.38	0.75		+/-55	3.55	-0.07	0.30	0.59		+/-55	3.61	-0.03	0.50	0.97
	+/-60	2.85	0.19	0.45	0.89		+/-60	2.26	-0.06	0.29	0.56		+/-60	3.81	0.05	0.68	1.33

0817_1619	+/-20	3.09	-0.02	0.56	1.10	0817_1822	+/-20	4.47	0.06	0.65	1.26	0817_2053	+/-20	3.84	0.09	0.28	0.54
	+/-25	4.53	0.00	0.55	1.08		+/-25	4.93	0.02	0.61	1.20		+/-25	3.51	0.08	0.32	0.63
	+/-30	4.95	0.03	0.56	1.10		+/-30	4.33	0.05	0.59	1.15		+/-30	3.84	0.05	0.36	0.70
	+/-35	4.00	-0.03	0.54	1.07		+/-35	5.12	0.06	0.62	1.21		+/-35	3.64	0.09	0.43	0.85
	+/-40	4.23	0.03	0.56	1.09		+/-40	5.38	0.03	0.63	1.24		+/-40	5.45	0.10	0.50	0.98
	+/-45	3.87	-0.02	0.55	1.08		+/-45	5.05	0.07	0.57	1.11		+/-45	5.12	0.07	0.47	0.92
	+/-50	3.48	0.08	0.52	1.01		+/-50	4.43	0.08	0.54	1.07		+/-50	3.88	0.03	0.36	0.70
	+/-55	3.97	0.18	0.57	1.12		+/-55	4.00	0.09	0.59	1.15		+/-55	2.33	-0.01	0.38	0.74
	+/-60	5.06	0.26	0.64	1.25		+/-60	4.33	0.13	0.60	1.18		+/-60	2.16	0.00	0.41	0.80

0818_1502	+/-20	1.81	-0.03	0.22	0.44	0818_1803	+/-20	4.00	0.01	0.62	1.22	0818_2034	+/-20	0.99	-0.11	0.45	0.87
	+/-25	1.84	-0.05	0.24	0.47		+/-25	5.97	0.02	0.65	1.27		+/-25	1.09	-0.38	0.40	0.78
	+/-30	2.04	-0.06	0.24	0.46		+/-30	6.49	-0.01	0.60	1.18		+/-30	0.86	-0.11	0.38	0.75
	+/-35	1.78	-0.05	0.24	0.48		+/-35	5.71	-0.01	0.61	1.20		+/-35	0.86	0.00	0.43	0.84
	+/-40	2.30	-0.07	0.24	0.47		+/-40	6.30	-0.04	0.59	1.15		+/-40	0.96	-0.25	0.44	0.86
	+/-45	2.36	-0.12	0.23	0.46		+/-45	5.41	-0.04	0.55	1.08		+/-45	1.34	-0.26	0.53	1.03
	+/-50	1.51	-0.15	0.23	0.45		+/-50	4.62	-0.05	0.59	1.16		+/-50	1.81	-0.22	0.42	0.83
	+/-55	1.70	-0.18	0.25	0.49		+/-55	5.15	-0.04	0.63	1.24		+/-55	0.88	-0.06	0.33	0.65
	+/-60	3.74	-0.19	0.29	0.57		+/-60	4.43	0.02	0.64	1.25		+/-60	0.95	-0.19	0.39	0.76

0819_1446	+/-20	6.62	-0.01	0.61	1.19	0819_1803	+/-20	1.02	0.03	0.20	0.39	0819_2036	+/-20	0.99	0.08	0.19	0.38
	+/-25	6.56	-0.06	0.52	1.02		+/-25	1.02	0.02	0.19	0.37		+/-25	1.01	0.09	0.18	0.36
	+/-30	6.43	-0.03	0.58	1.14		+/-30	1.15	0.02	0.19	0.37		+/-30	0.98	0.08	0.19	0.37
	+/-35	5.35	-0.02	0.55	1.08		+/-35	1.15	0.03	0.21	0.42		+/-35	1.31	0.08	0.19	0.37
	+/-40	5.91	-0.10	0.42	0.83		+/-40	1.05	0.04	0.19	0.37		+/-40	0.95	0.07	0.18	0.35
	+/-45	6.33	-0.10	0.57	1.11		+/-45	1.24	0.05	0.20	0.38		+/-45	0.86	0.07	0.17	0.34
	+/-50	7.35	-0.06	0.65	1.28		+/-50	1.38	0.07	0.21	0.41		+/-50	0.98	0.04	0.19	0.37
	+/-55	5.41	-0.18	0.55	1.08		+/-55	1.44	0.10	0.25	0.48		+/-55	0.86	0.05	0.20	0.40
	+/-60	4.66	-0.31	0.55	1.08		+/-60	1.57	0.20	0.28	0.54		+/-60	0.92	0.06	0.24	0.47

0823_1436	+/-20	6.96	0.00	0.72	1.41	0823_1749	+/-20	4.95	0.04	0.56	1.10	0823_2100	+/-20	2.69	-0.11	0.36	0.70
	+/-25	6.99	-0.02	0.70	1.37		+/-25	5.18	0.02	0.69	1.35		+/-25	2.82	-0.10	0.37	0.72
	+/-30	7.71	0.04	0.70	1.37		+/-30	4.93	-0.02	0.61	1.19		+/-30	2.92	-0.14	0.37	0.73
	+/-35	7.12	0.07	0.68	1.33		+/-35	5.44	0.03	0.58	1.13		+/-35	3.15	-0.16	0.36	0.71
	+/-40	6.43	0.04	0.75	1.48		+/-40	5.45	0.02	0.61	1.20		+/-40	5.42	-0.17	0.42	0.83
	+/-45	6.73	-0.02	0.66	1.28		+/-45	6.53	-0.03	0.62	1.21		+/-45	4.50	-0.16	0.45	0.88
	+/-50	6.79	-0.05	0.70	1.37		+/-50	6.17	0.01	0.63	1.24		+/-50	3.09	-0.19	0.44	0.86
	+/-55	6.69	-0.06	0.72	1.42		+/-55	6.27	0.01	0.69	1.35		+/-55	3.32	-0.25	0.52	1.02
	+/-60	7.15	-0.06	0.78	1.53		+/-60	6.95	-0.05	0.82	1.60		+/-60	2.86	-0.27	0.53	1.04

0824_1328	+/-20	1.44	0.03	0.19	0.36	0824_1655	+/-20	4.69	0.02	0.29	0.56	0824_1736	+/-20	1.15	0.13	0.22	0.43
	+/-25	1.44	0.03	0.19	0.36		+/-25	4.43	0.03	0.30	0.59		+/-25	1.05	0.07	0.18	0.36
	+/-30	1.25	0.01	0.18	0.36		+/-30	6.03	0.01	0.30	0.58		+/-30	0.98	0.11	0.20	0.39
	+/-35	0.98	0.01	0.18	0.35		+/-35	5.48	0.03	0.29	0.58		+/-35	1.08	0.08	0.23	0.44
	+/-40	0.96	-0.01	0.17	0.33		+/-40	5.09	0.02	0.33	0.64		+/-40	1.18	0.07	0.20	0.39
	+/-45	0.79	-0.03	0.17	0.33		+/-45	4.53	0.00	0.29	0.58		+/-45	1.14	0.07	0.18	0.36
	+/-50	0.95	-0.06	0.18	0.36		+/-50	4.79	0.02	0.33	0.65		+/-50	1.32	0.04	0.25	0.50
	+/-55	1.48	-0.10	0.20	0.40		+/-55	5.15	0.04	0.36	0.70		+/-55	1.15	0.08	0.29	0.57
	+/-60	1.55	-0.14	0.22	0.43		+/-60	6.89	0.05	0.39	0.76		+/-60	1.21	0.09	0.31	0.60

0912_1540	+/-20	1.57	-0.02	0.23	0.45	0912_1909	+/-20	1.31	0.03	0.24	0.47	0912_2039	+/-20	2.00	0.06	0.25	0.49
	+/-25	1.57	-0.04	0.24	0.46		+/-25	1.48	0.02	0.25	0.48		+/-25	1.61	0.04	0.27	0.52
	+/-30	1.70	-0.03	0.22	0.42		+/-30	1.38	0.02	0.25	0.50		+/-30	2.17	0.06	0.28	0.54
	+/-35	1.31	-0.04	0.21	0.40		+/-35	1.80	-0.03	0.23	0.46		+/-35	1.74	0.06	0.28	0.54
	+/-40	1.57	-0.04	0.20	0.40		+/-40	2.40	-0.05	0.23	0.45		+/-40	1.94	0.03	0.23	0.45
	+/-45	1.51	-0.03	0.20	0.38		+/-45	1.57	-0.11	0.26	0.51		+/-45	2.07	0.02	0.24	0.47
	+/-50	1.74	-0.02	0.20	0.40		+/-50	3.38	-0.17	0.29	0.56		+/-50	2.04	-0.01	0.26	0.51
	+/-55	1.96	-0.01	0.25	0.49		+/-55	2.76	-0.27	0.35	0.69		+/-55	2.95	-0.02	0.26	0.52
	+/-60	1.77	-0.01	0.29	0.57		+/-60	2.79	-0.41	0.41	0.80		+/-60	2.10	-0.05	0.27	0.54

0913_1749	+/-20	1.83	0.04	0.23	0.45	0913_1847	+/-20	1.28	0.12	0.24	0.48	0914_1501	+/-20	1.38	0.00	0.25	0.50
	+/-25	1.83	0.01	0.22	0.44		+/-25	1.42	0.12	0.25	0.48		+/-25	2.00	-0.03	0.27	0.53
	+/-30	1.38	0.00	0.21	0.41		+/-30	1.25	0.10	0.22	0.44		+/-30	1.54	-0.01	0.28	0.56
	+/-35	1.77	-0.02	0.21	0.41		+/-35	1.57	0.04	0.21	0.41		+/-35	1.21	-0.01	0.29	0.56
	+/-40	1.41	-0.07	0.20	0.39		+/-40	1.41	0.02	0.21	0.42		+/-40	1.35	-0.04	0.30	0.60
	+/-45	1.48	-0.12	0.22	0.43		+/-45	1.38	-0.01	0.21	0.41		+/-45	1.64	-0.08	0.32	0.63
	+/-50	1.61	-0.17	0.23	0.45		+/-50	0.96	-0.06	0.23	0.46		+/-50	1.74	-0.10	0.33	0.65
	+/-55	1.80	-0.28	0.23	0.45		+/-55	2.04	-0.13	0.24	0.48		+/-55	2.17	-0.15	0.40	0.78
	+/-60	2.43	-0.33	0.26	0.51		+/-60	2.17	-0.17	0.26	0.51		+/-60	2.10	-0.18	0.47	0.91

0914_1813	+/-20	2.07	0.19	0.29	0.56	0914_1932	+/-20	1.05	-0.05	0.25	0.49	0921_1450	+/-20	1.38	0.08	0.23	0.44
	+/-25	1.74	0.19	0.32	0.62		+/-25	1.18	-0.05	0.24	0.47		+/-25	1.70	0.08	0.26	0.50
	+/-30	2.23	0.18	0.34	0.66		+/-30	1.28	-0.08	0.27	0.53		+/-30	2.07	0.07	0.25	0.50
	+/-35	2.03	0.21	0.33	0.65		+/-35	1.32	-0.10	0.26	0.51		+/-35	1.83	0.05	0.27	0.54
	+/-40	1.80	0.21	0.34	0.67		+/-40	1.08	-0.09	0.29	0.57		+/-40	2.19	0.05	0.30	0.59
	+/-45	2.69	0.21	0.39	0.76		+/-45	2.00	-0.11	0.30	0.58		+/-45	2.85	0.06	0.34	0.67
	+/-50	3.35	0.15	0.41	0.80		+/-50	1.83	-0.13	0.37	0.72		+/-50	2.98	0.04	0.37	0.72
	+/-55	2.86	0.09	0.43	0.85		+/-55	1.91	-0.02	0.45	0.88		+/-55	3.38	0.05	0.44	0.87
	+/-60	3.80	0.13	0.53	1.04		+/-60	2.75	0.17	0.56	1.10		+/-60	4.79	0.09	0.51	1.01

Summary of averages for all crossings HARS Fall 2011 survey.

Beam	Max.	Mean	Std	95%
Angle	Outlier	Diff.	Dev.	
+/-20	6.96	0.05	0.26	0.50
+/-25	6.99	0.04	0.27	0.52
+/-30	7.71	0.03	0.27	0.52
+/-35	7.12	0.02	0.26	0.52
+/-40	6.43	0.00	0.27	0.52
+/-45	6.73	-0.02	0.28	0.55
+/-50	7.35	-0.05	0.31	0.60
+/-55	10.67	-0.07	0.34	0.68
+/-60	17.59	-0.07	0.40	0.78

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Table 4.1-2

Summary of Beam Analysis Results for all crossings during Fire Island Reef Fall 2011 survey

Crossing	Beam Angle	Max. Outlier	Mean Diff.	Std Dev.	95%	Crossing	Beam Angle	Max. Outlier	Mean Diff.	Std Dev.	95%
1107_1929	+/-20	1.28	0.22	0.25	0.50	1107_2123	+/-20	1.08	0.23	0.19	0.38
	+/-25	1.41	0.25	0.26	0.50		+/-25	1.08	0.23	0.19	0.38
	+/-30	1.25	0.21	0.25	0.49		+/-30	1.08	0.23	0.20	0.38
	+/-35	1.15	0.18	0.23	0.45		+/-35	1.22	0.20	0.18	0.36
	+/-40	1.11	0.16	0.22	0.44		+/-40	1.08	0.18	0.21	0.41
	+/-45	1.15	0.14	0.24	0.47		+/-45	1.34	0.18	0.22	0.43
	+/-50	1.35	0.12	0.26	0.50		+/-50	1.31	0.15	0.24	0.47
	+/-55	1.38	0.09	0.28	0.56		+/-55	1.28	0.11	0.26	0.51
	+/-60	1.64	0.11	0.31	0.60		+/-60	1.57	0.10	0.30	0.58

Summary of averages for all crossings Fire Island Reef Fall 2011 survey

Beam Angle	Max. Outlier	Mean Diff.	Std Dev.	95%
+/-20	1.28	0.23	0.22	0.44
+/-25	1.41	0.24	0.23	0.44
+/-30	1.25	0.22	0.23	0.44
+/-35	1.22	0.19	0.21	0.41
+/-40	1.11	0.17	0.22	0.43
+/-45	1.34	0.16	0.23	0.45
+/-50	1.35	0.14	0.25	0.49
+/-55	1.38	0.10	0.27	0.54
+/-60	1.64	0.11	0.31	0.59

Table 4.1-3

Summary of Beam Analysis Results for all crossings during Hempstead Reef Fall 2011 survey

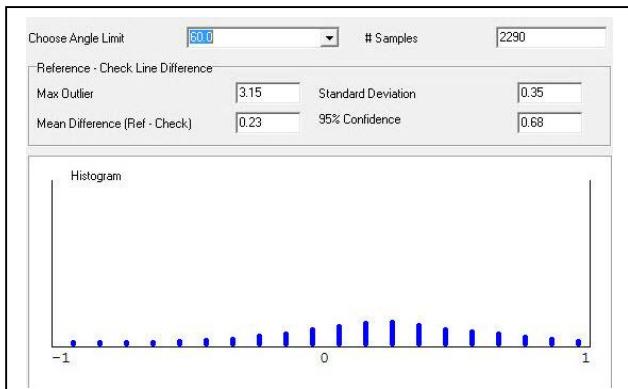
Crossing	Beam Angle	Max. Outlier	Mean Diff.	Std Dev.	95%	Crossing	Beam Angle	Max. Outlier	Mean Diff.	Std Dev.	95%
1108_1840	+/-20	0.79	-0.08	0.16	0.31	1108_2215	+/-20	0.88	0.01	0.16	0.31
	+/-25	1.25	-0.09	0.17	0.33		+/-25	0.85	0.00	0.15	0.30
	+/-30	1.11	-0.10	0.16	0.32		+/-30	0.95	0.00	0.15	0.29
	+/-35	0.98	-0.12	0.15	0.28		+/-35	1.05	0.00	0.15	0.30
	+/-40	0.95	-0.14	0.15	0.29		+/-40	1.44	0.01	0.15	0.30
	+/-45	0.96	-0.16	0.15	0.29		+/-45	2.69	0.04	0.18	0.36
	+/-50	1.25	-0.19	0.16	0.31		+/-50	3.51	0.04	0.26	0.50
	+/-55	1.21	-0.23	0.17	0.33		+/-55	2.69	0.08	0.25	0.49
	+/-60	1.18	-0.26	0.17	0.34		+/-60	2.69	0.16	0.24	0.47

Summary of averages for all crossings Hempstead Reef Fall 2011 survey

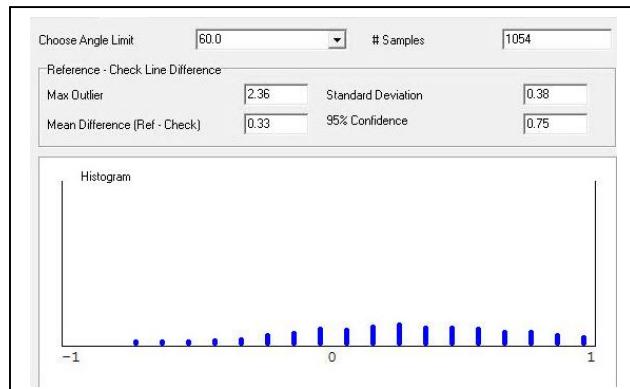
Beam Angle	Max. Outlier	Mean Diff.	Std Dev.	95%
+/-20	0.88	-0.04	0.16	0.31
+/-25	1.25	-0.05	0.16	0.32
+/-30	1.11	-0.05	0.16	0.31
+/-35	1.05	-0.06	0.15	0.29
+/-40	1.44	-0.07	0.15	0.30
+/-45	2.69	-0.06	0.17	0.33
+/-50	3.51	-0.08	0.21	0.41
+/-55	2.69	-0.08	0.21	0.41
+/-60	2.69	-0.05	0.21	0.41

Figure 4.1-1

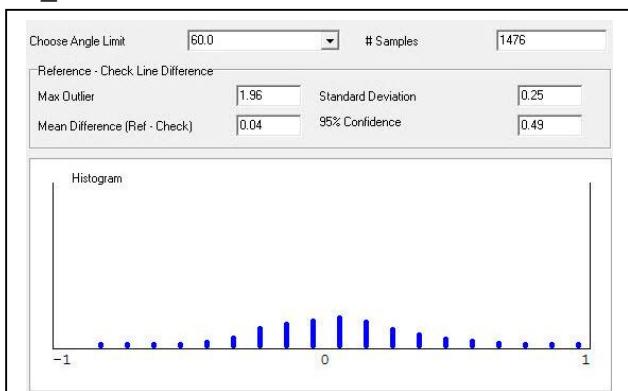
Plots of +/- 20 Deg. Beam Analysis Results for crossings 08/05 to 9/21 during HARS Fall 2011 survey.



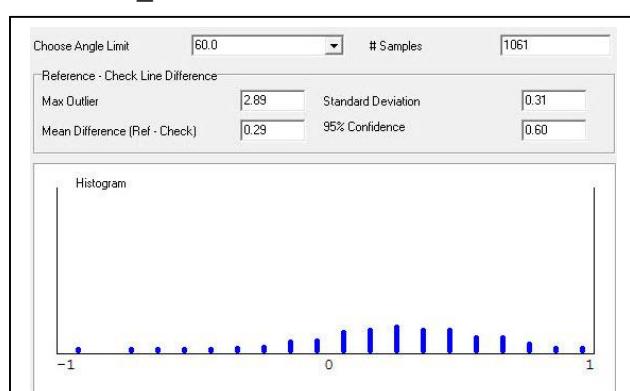
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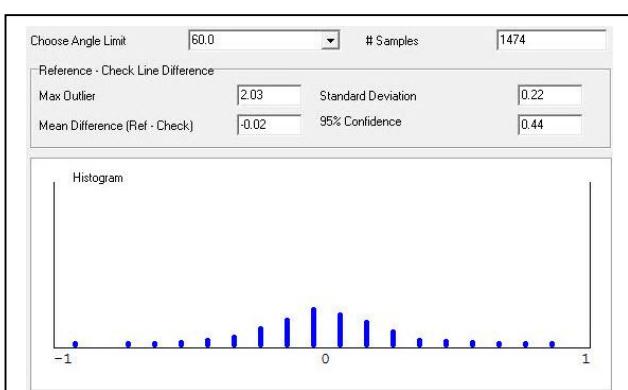
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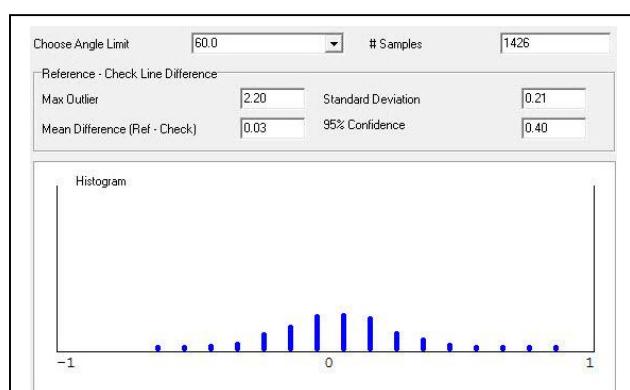
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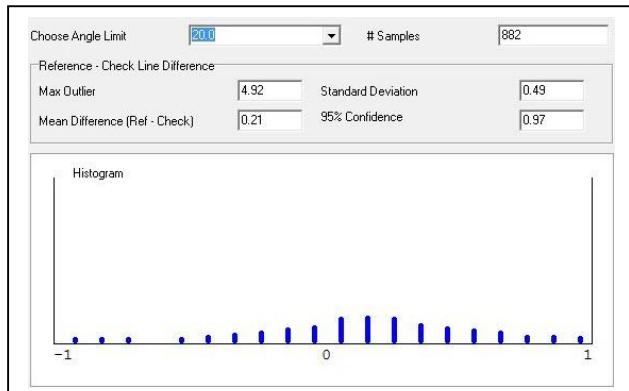
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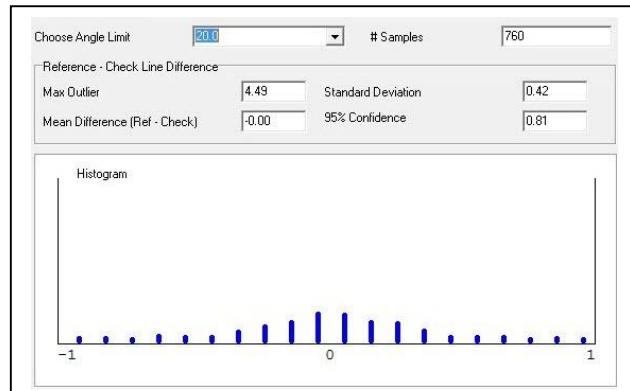
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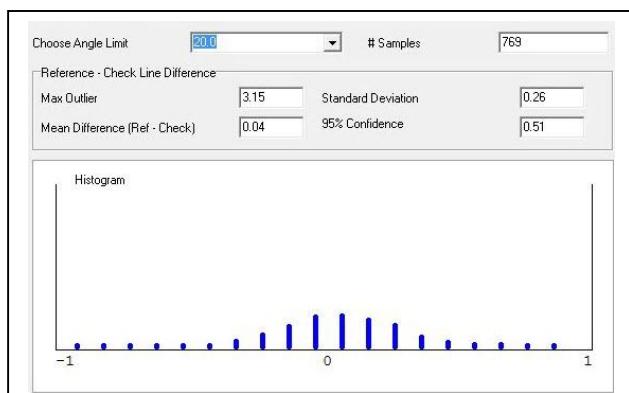
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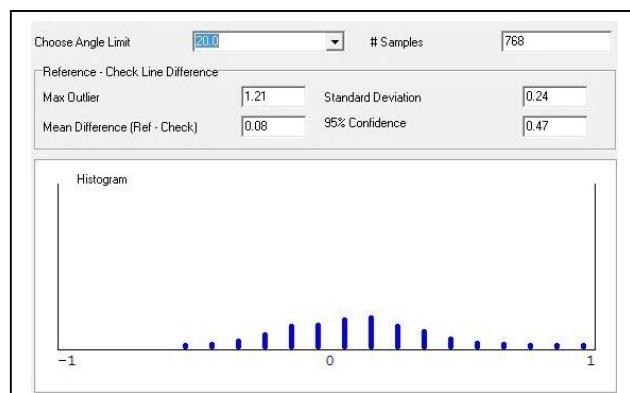
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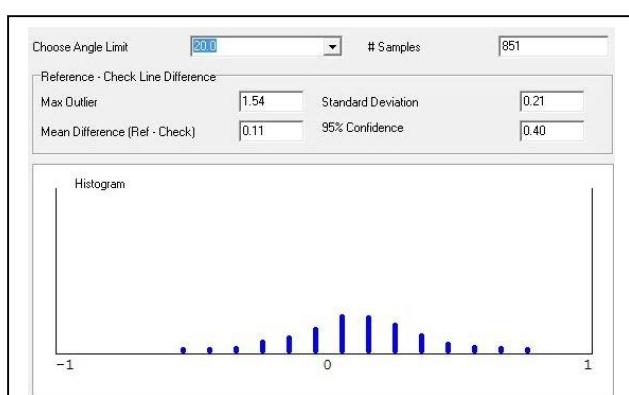
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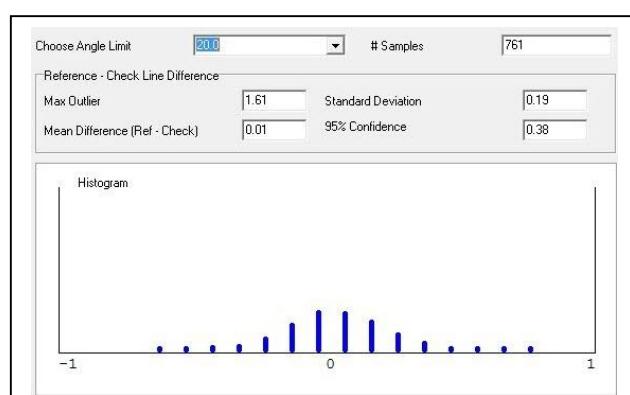
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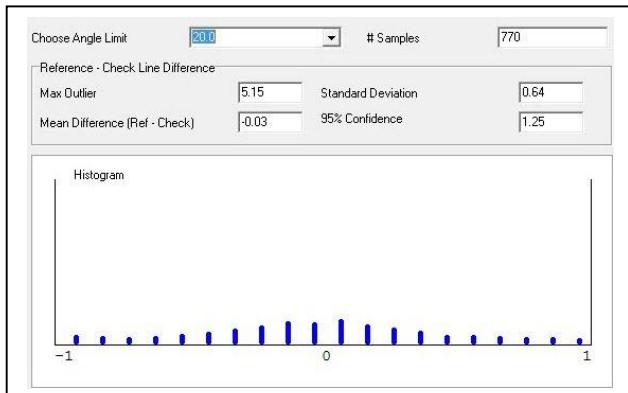
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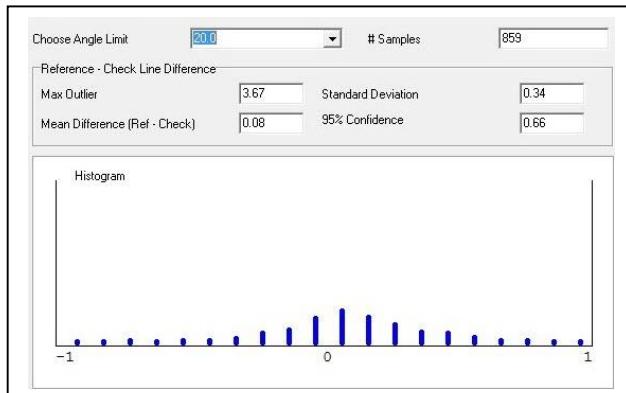
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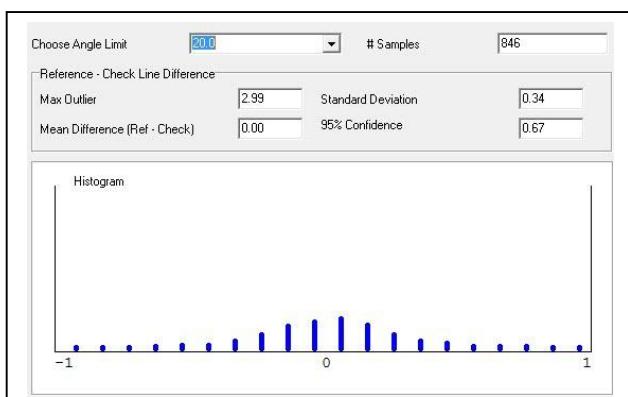
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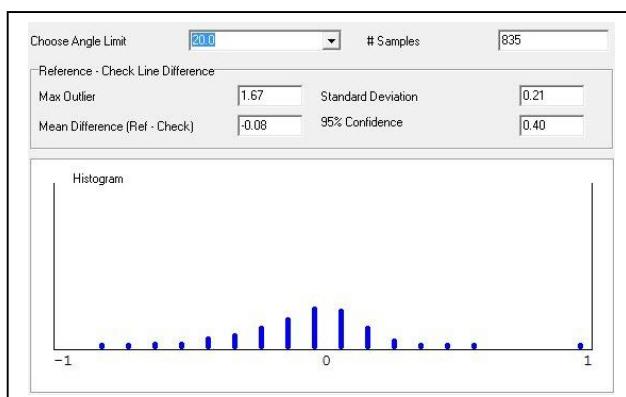
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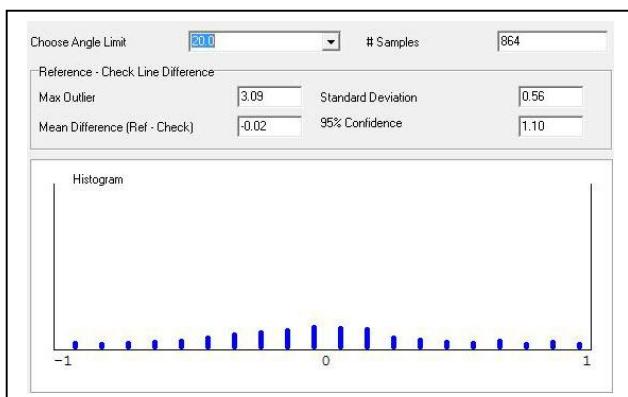
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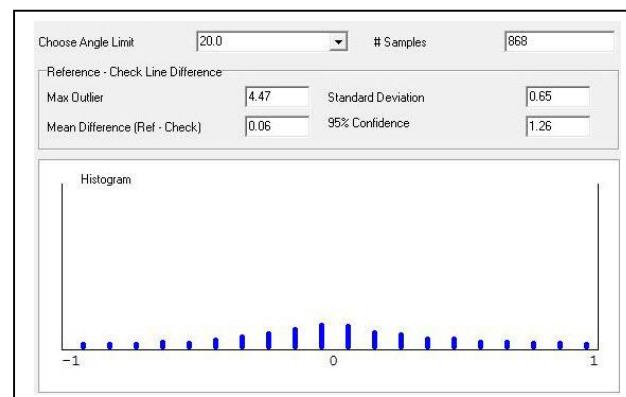
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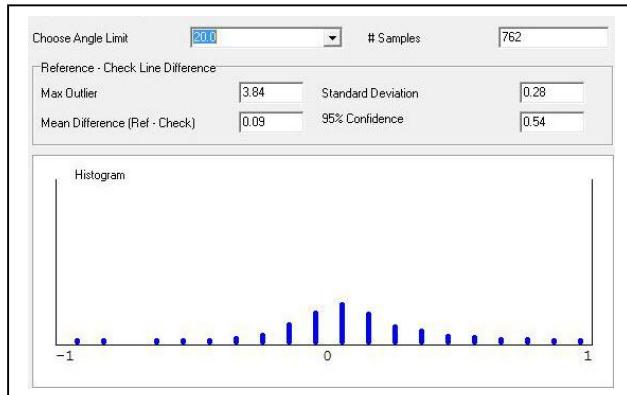
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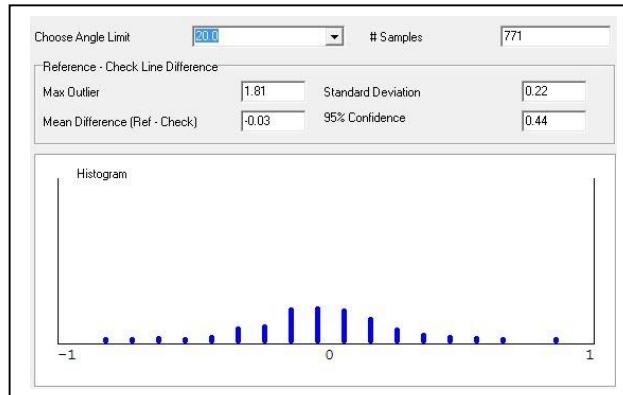
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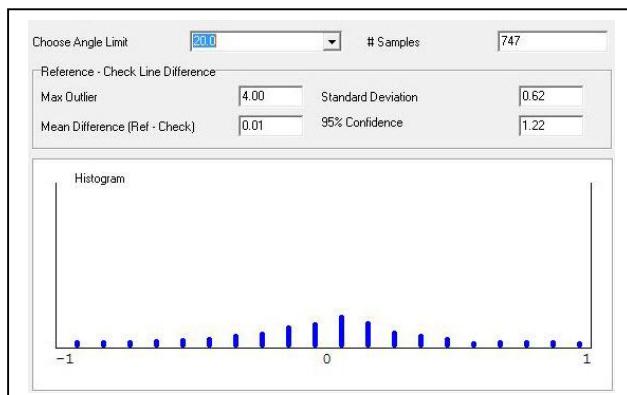
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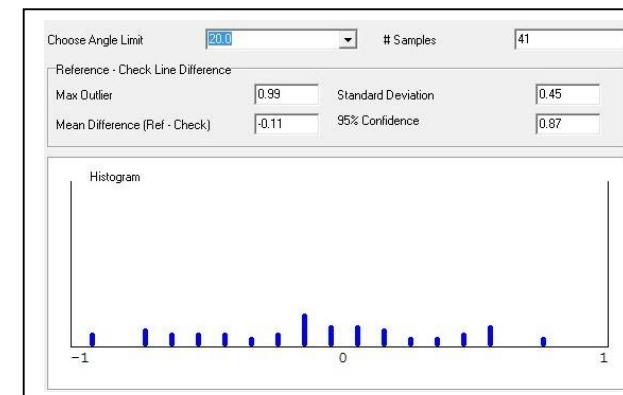
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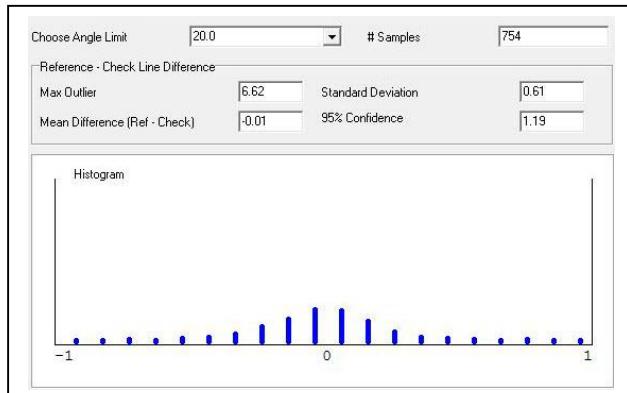
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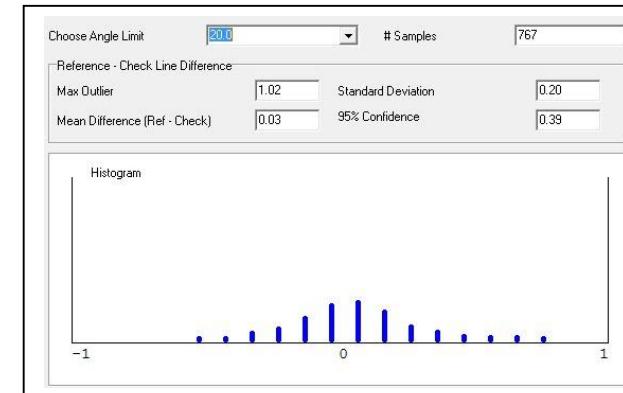
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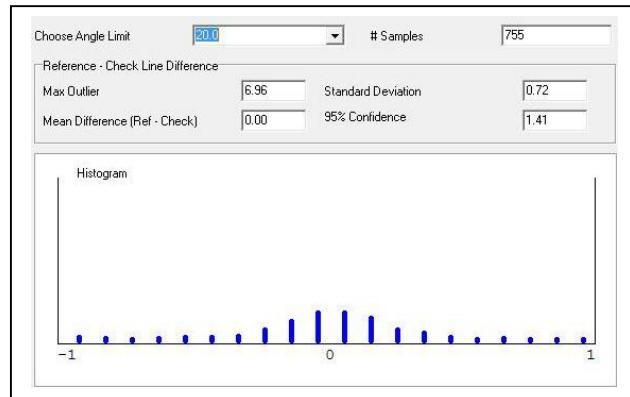
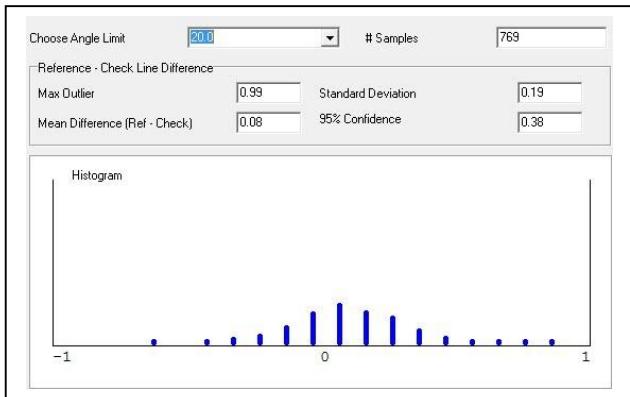
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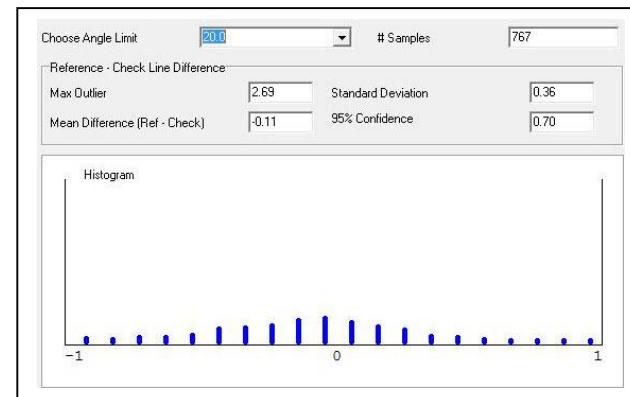
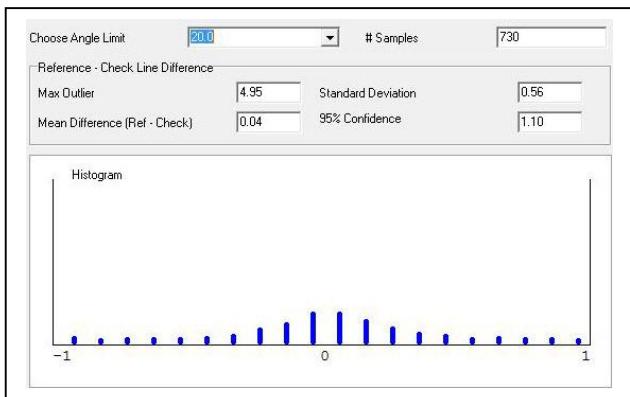


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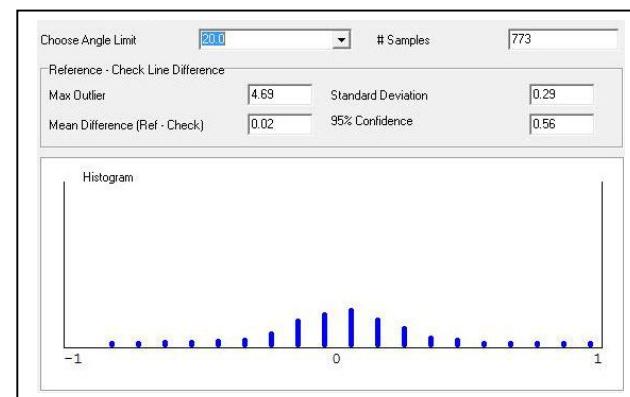
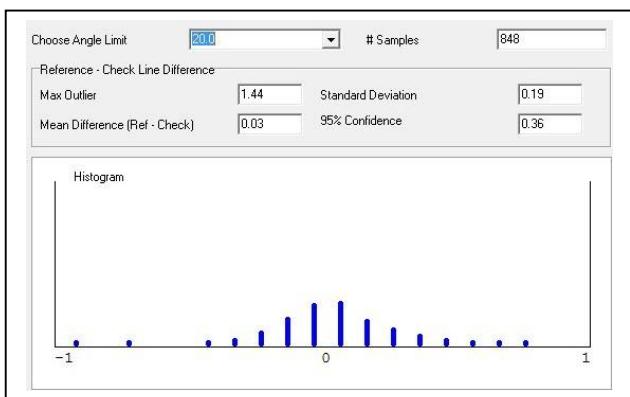
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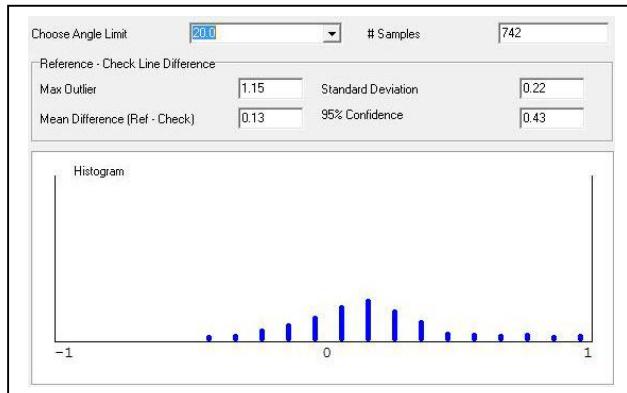
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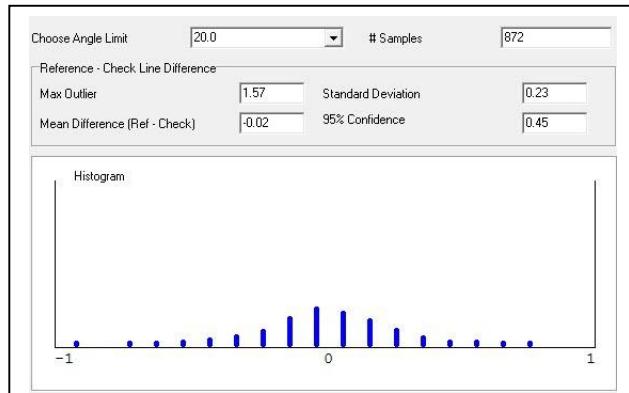


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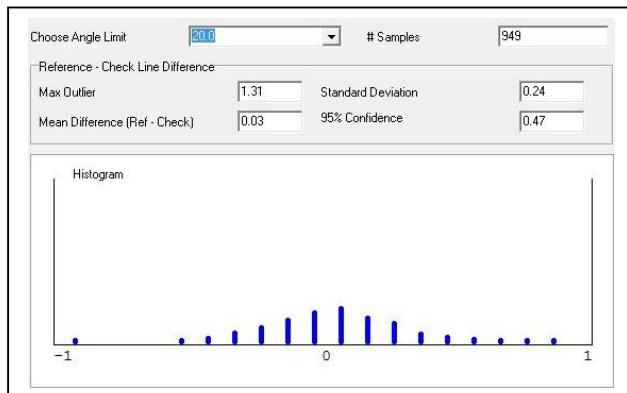
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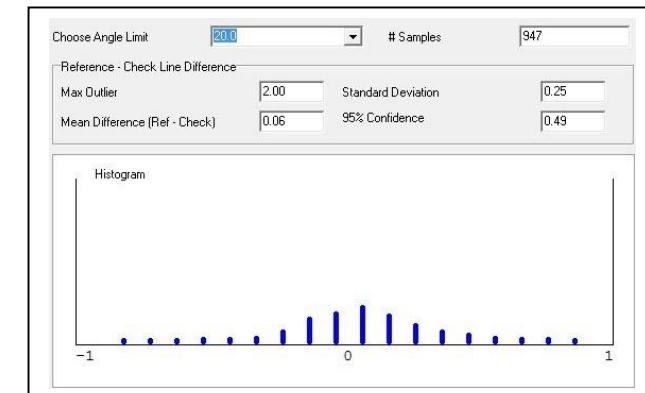
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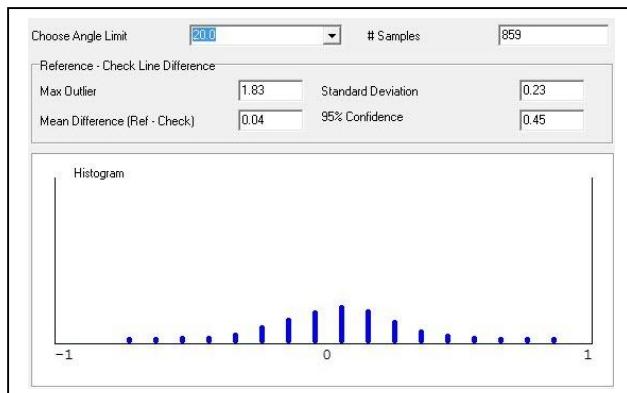
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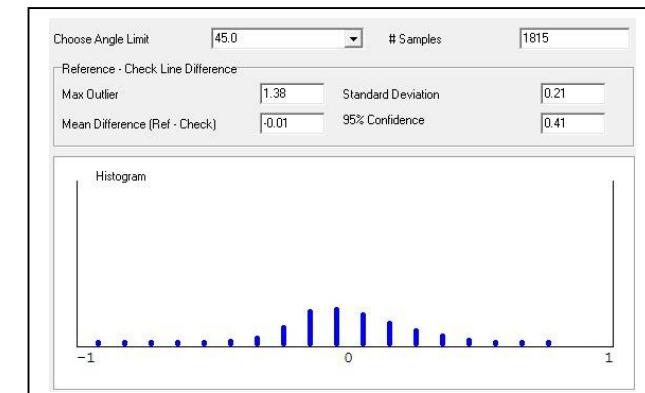
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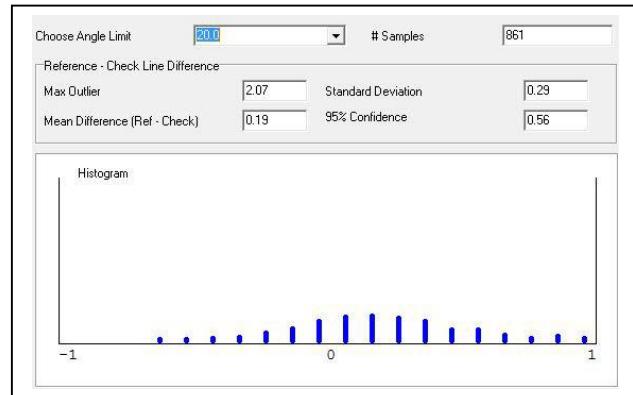
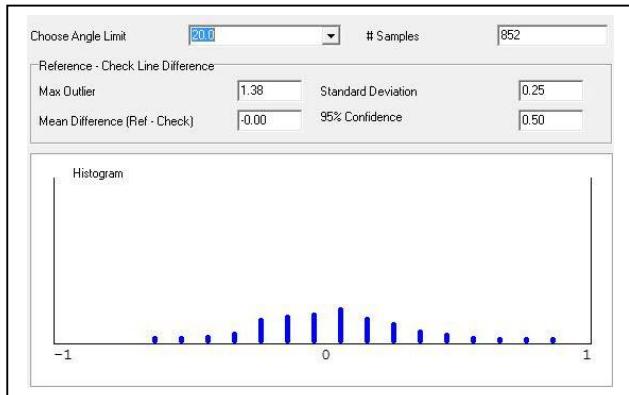
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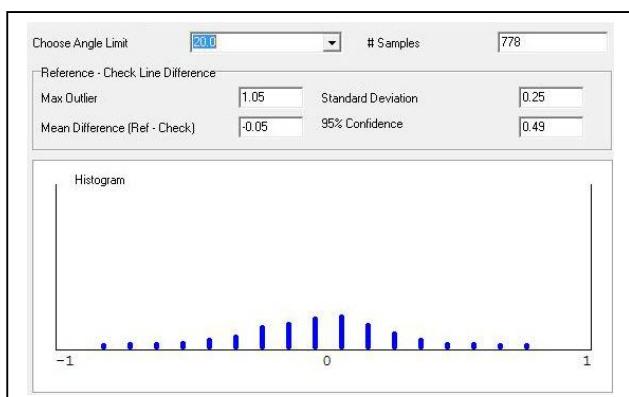
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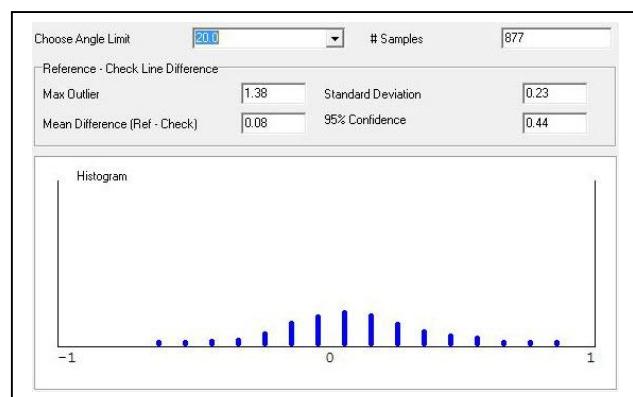
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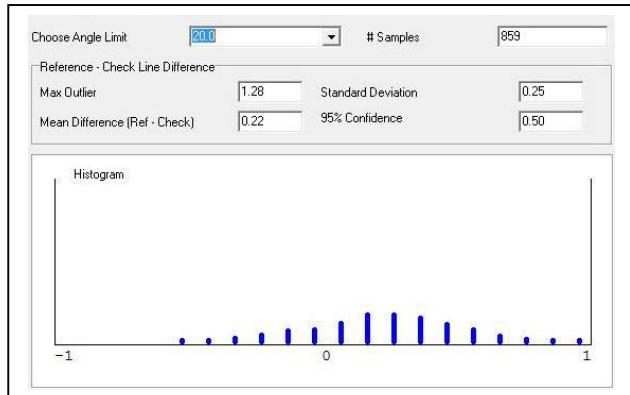


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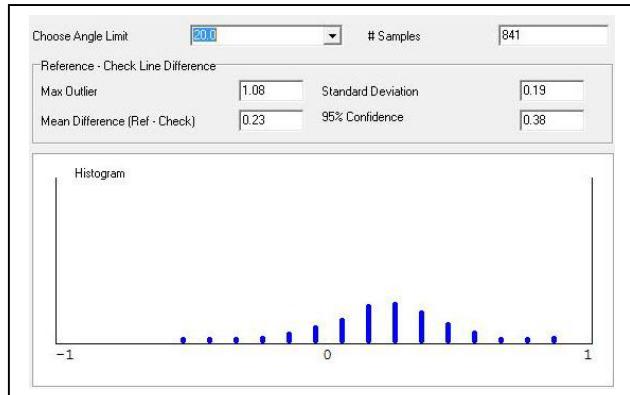
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Figure 4.1-2

Plots of +/- 20 Deg. Beam Analysis Results for crossings 08/05 to 9/21 during Fire Island Reef Fall 2011 survey.



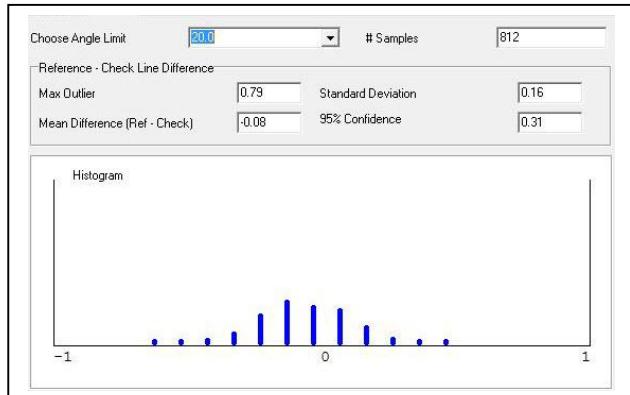
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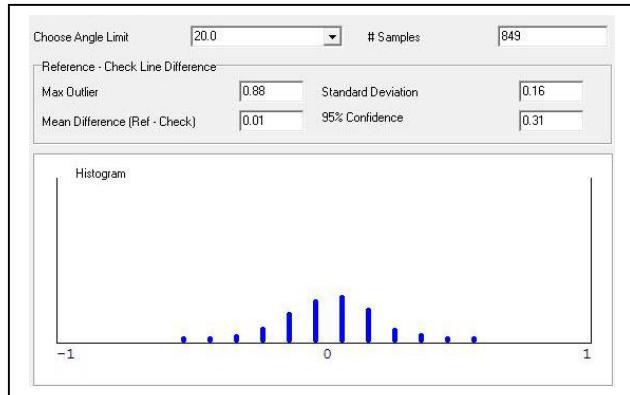
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Figure 4.1-3

Plots of +/- 20 Deg. Beam Analysis Results for crossings 08/05 to 9/21 during Hempstead Reef Fall 2011 survey.



11/08_1840



11/08_2215

HISTORIC AREA REMEDIATION SITE (HARS) HEMPSTEAD REEF FIRE ISLAND REEF

FALL 2011

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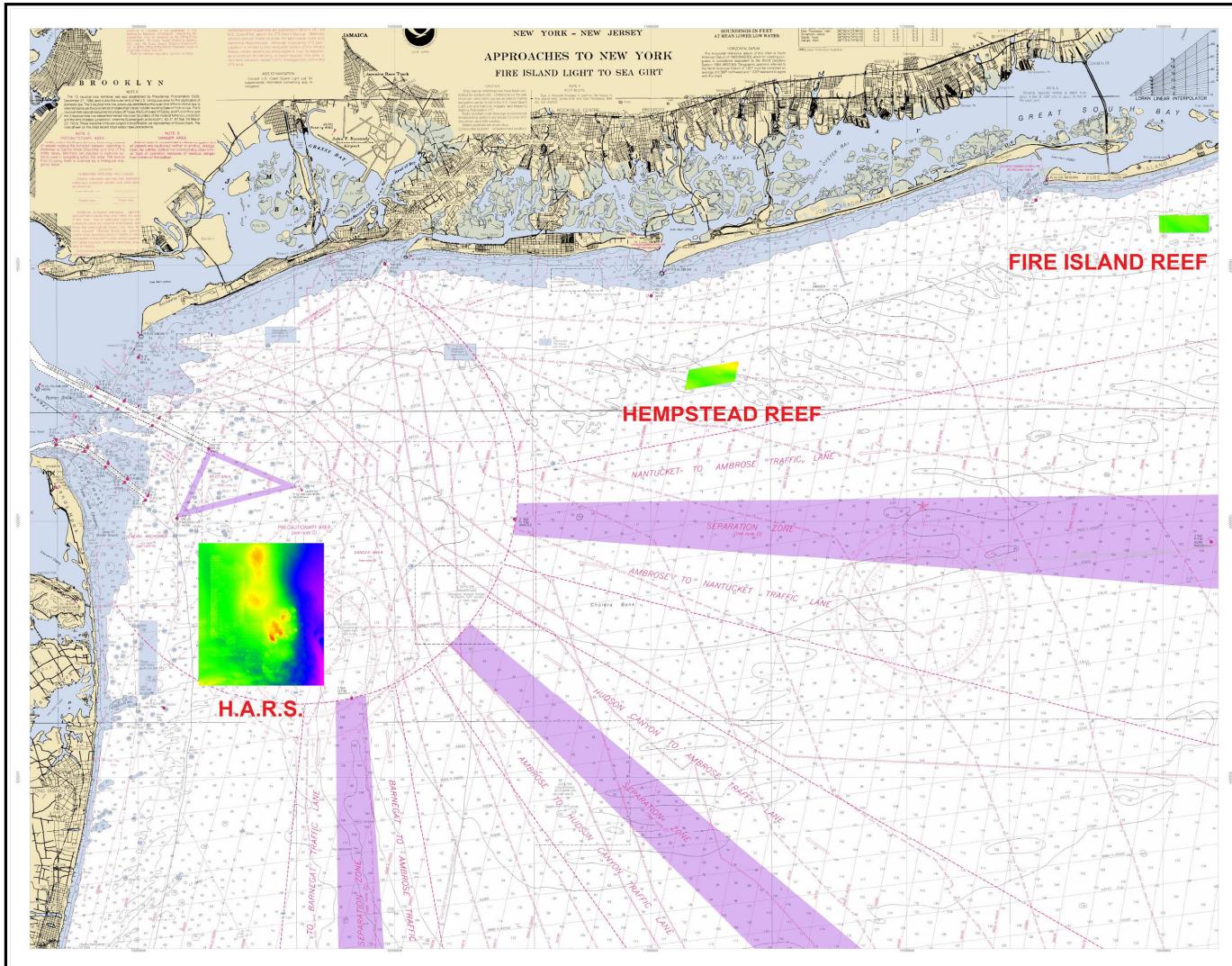
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1.0 Introduction

As part of Rogers Surveying's Indefinite Delivery Contract with The United States Army Corps of Engineers. Rogers Surveying was tasked with surveying the HARS (Historic Area Remediation Site), Hempstead and Fire Island Reefs. The HARS, which was re-designated as a remediation site in September 1977 was formerly known as the Mud Dump Site (MDS), and was used for the deposit of sediments dredged from the New York / New Jersey Harbor Estuary. The remediation consists of placing a one-meter "cap" layer of uncontaminated dredged material on top of the existing surface sediments within the nine Priority Remediation Areas (PRA's) of the HARS. The Reefs at Hempstead, and Fire Island are planned for rock placement during 2011 and 2012. The surveys are to serve as a baseline surveys.

Figure 1.0-1
Task Order 004



2.0 Objective

HARS - The primary objective of this task order is to obtain current high-accuracy multibeam bathymetry of the HARS site, the survey is to be used in the monitoring and planning of dredge placement. The site limits being bounded by North latitude of $40^{\circ} 25.757'$, a South latitude of $40^{\circ} 21.189'$ and East longitude of $73^{\circ} 48.798'$, a West longitude of $73^{\circ} 54.075'$. The total survey coverage area being approximately 24.6 square miles. (Figure 2.0-1).

Hempstead Reef - The primary objective of this task order is to obtain current high-accuracy multibeam bathymetry of the Reef site, the survey is to be used as a baseline survey. The site limits being bounded by North latitude of $40^{\circ} 31.5'$, a West longitude of $73^{\circ} 31.369999'$, North latitude of $40^{\circ} 31.25'$, a West longitude of $73^{\circ} 33.350001'$, North latitude of $40^{\circ} 31.92'$, a West longitude of $73^{\circ} 31.550001'$, North latitude of $40^{\circ} 30.67'$, a West longitude of $73^{\circ} 33.519999'$. The total survey coverage area being approximately 1.2 square miles. (Figure 2.0-2)

Fire Island Reef - The primary objective of this task order is to obtain current high-accuracy multibeam bathymetry of the Reef site, the survey is to be used as a baseline survey. The site limits being bounded by North latitude of $40^{\circ} 36.1'$, a South latitude of $40^{\circ} 35.60'$ and East longitude of $73^{\circ} 11.500'$, a West longitude of $73^{\circ} 13.500'$. The total survey coverage area being approximately 1.2 square miles. (Figure 2.0-3).

3.0 Procedure

The survey data was collected utilizing multibeam technology, and collected in accordance with The U.S. Army Corps of Engineers Manual 1110-2-1003. All survey data was collected with the survey vessel "Red Rogers" (Table 3.0-1). The "Red Rogers" is a 36' long catamaran with a beam of 12' that has berthing for 2. Survey operations were run when fuel, weather and crew staffing permitted. The vessel is equipped with a *RESON* 7101 multibeam sonar. Vessel motion corrections are supplied by an *APPLANIX* 320 (POS/MV), Differential GPS corrections are supplied by a *TRIMBLE* Pro-Beacon receiver, and when available RTK corrections provided to the POS/MV with the addition of a USB cellular modem. Speed of sound profiles are recorded thru the water column with a *SEABIRD* SBE19 Plus CTD profiler V2 (Table 3.0-1).

A seabed mounted water pressure gauge was installed at latitude N $40^{\circ} 22' 38.9677"$ and longitude W $73^{\circ} 50' 54.9287"$. It was anchored in approximately 40' of water (Figures 3.0-1 and 3.0-2). An acoustic release system was incorporated for retrieval of the tide gauge. The gauge was preset to record data for 60 seconds every 5 minutes. The Real Time Kinematic GPS, which augmented the POS/MV position also provided real time water levels. The RTK and VRS corrections were provided via a cellular Internet GPS Network operated by Keystone Precision of PA.

Figure 2.0-1
Historic Area Restoration Site (HARS).

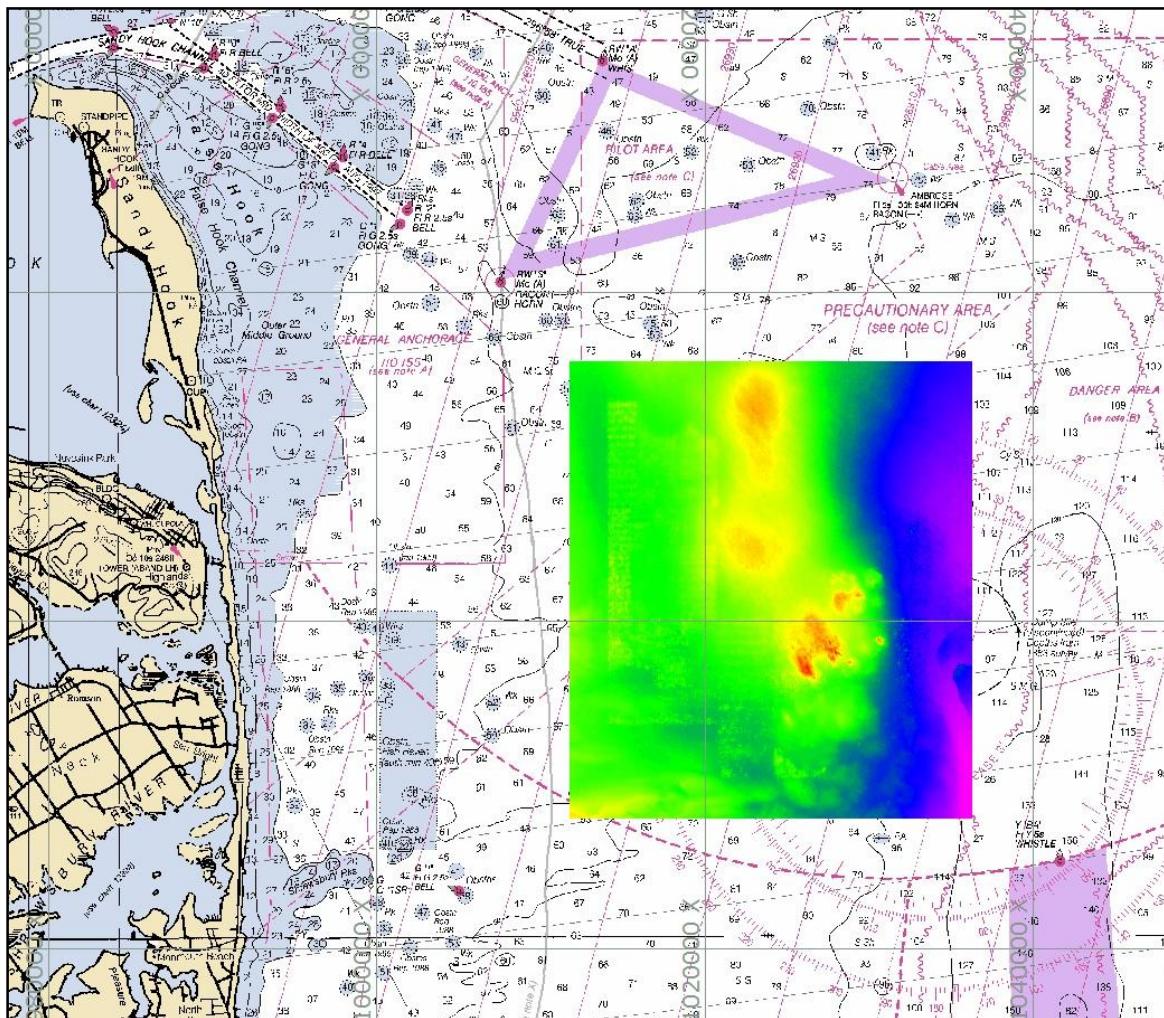


Figure 2.0-2
Hempstead Reef

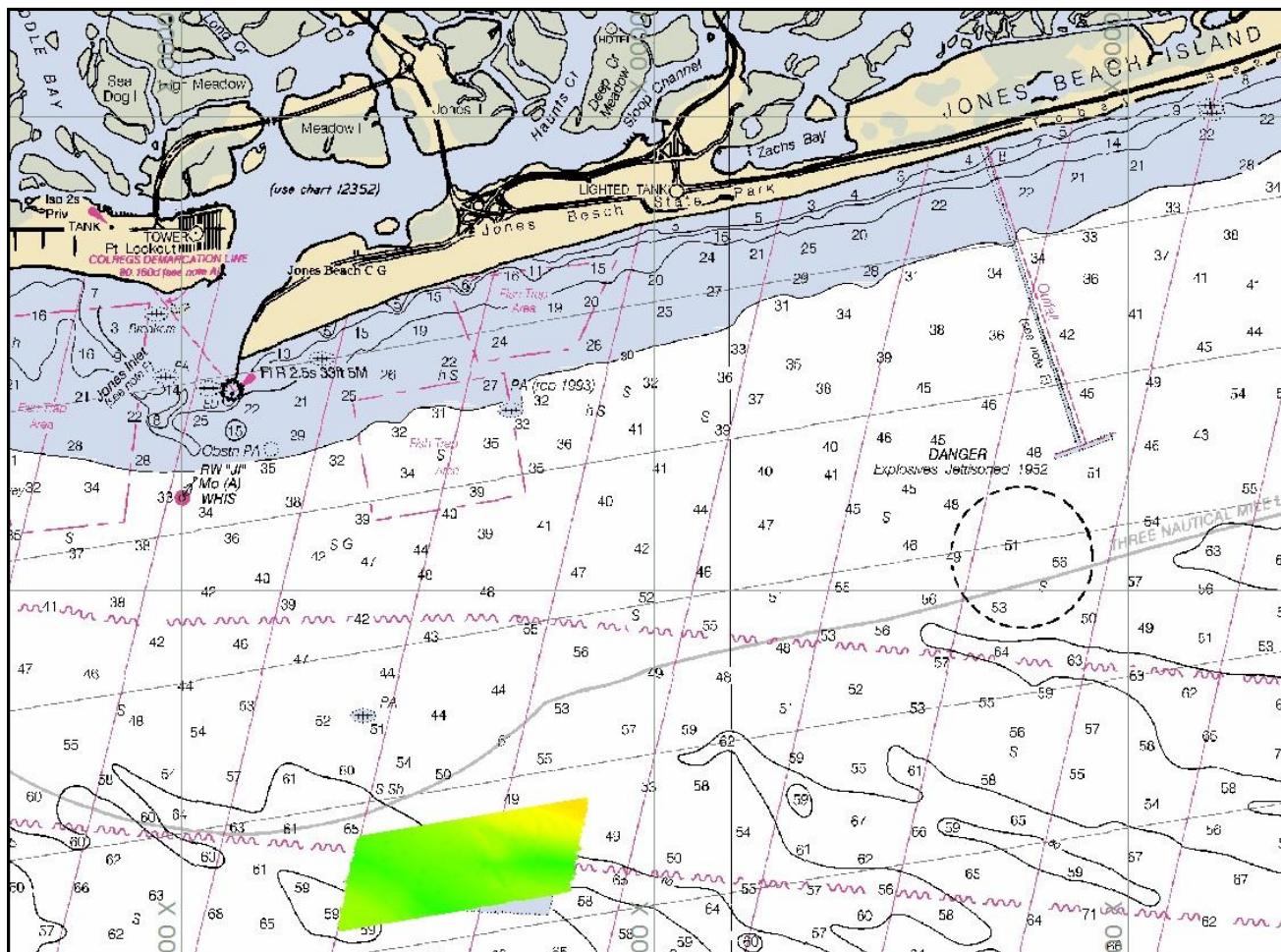


Figure 2.0-3

Fire Island Reef

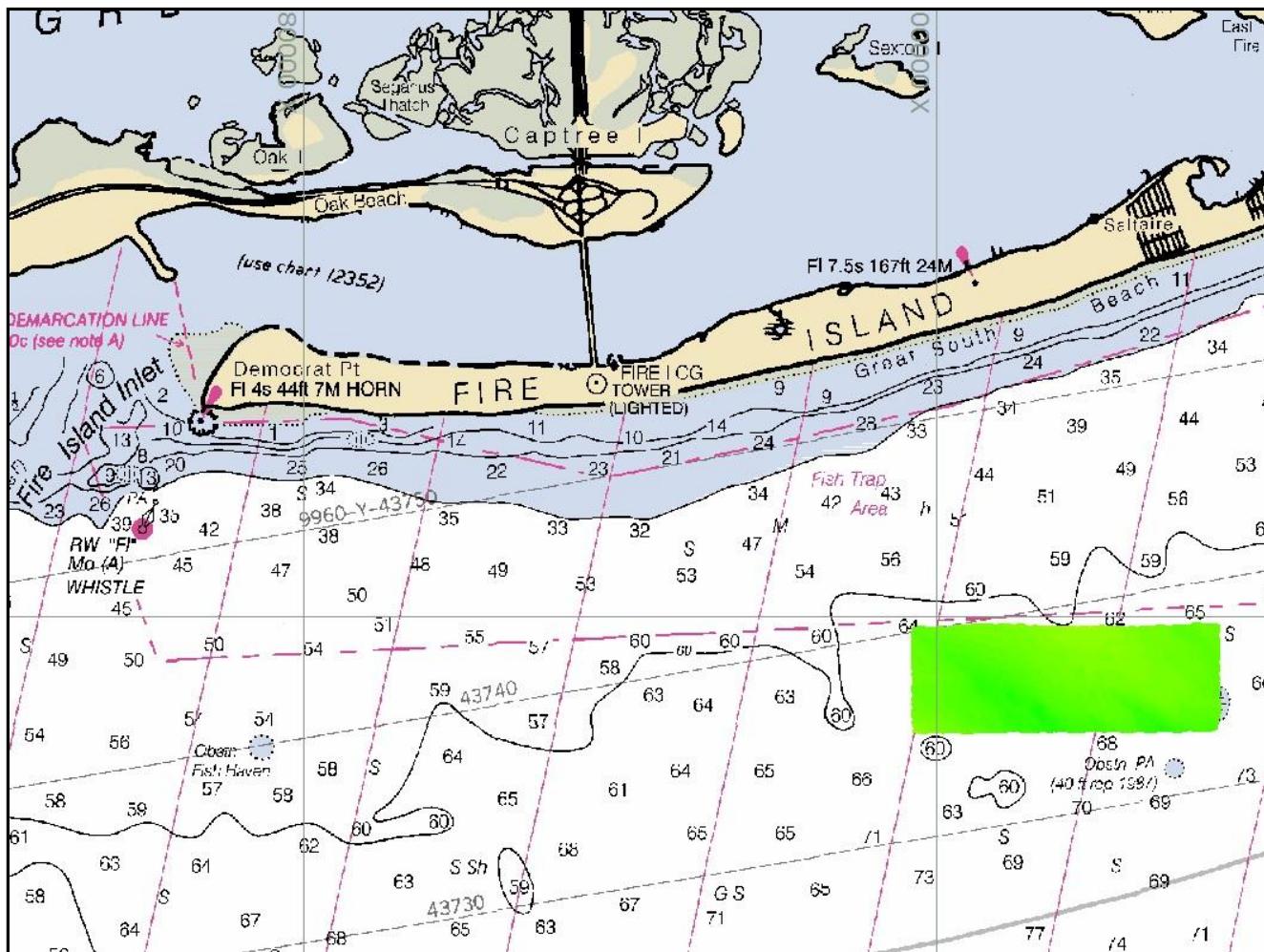


Table 2.0-1

Summary of survey operations on board survey vessel Red Rogers for the Fall 2011 multibeam survey at the HARS.

DATE	Operations
08/05/11	Mobilization to HARS. Deployed submersible tide recorder. Commenced multibeam survey of HARS.
08/10/11	Continued Survey from 08/05/11.
08/11/11	Continued Survey from 08/10/11.
08/12/11	Continued Survey from 08/11/11.
08/16/11	Continued Survey from 08/12/11.
08/17/11	Continued Survey from 08/16/11.
08/18/11	Continued Survey from 08/17/11.
08/19/11	Continued Survey from 08/18/11.
08/23/11	Continued Survey from 08/19/11.
08/24/11	Continued Survey from 08/23/11.
09/12/11	Continued Survey from 08/24/11. Retrieved submersible tide recorder to change batteries.
09/13/11	Continued Survey from 09/12/11.
09/14/11	Continued Survey from 09/13/11.
09/21/11	Continued Survey from 09/14/11. Survey completed. Demobilize.

Table 2.0-2

Summary of survey operations on board survey vessel Red Rogers and William A. Rogers for the Fall 2011 multibeam survey at the Fire Island Reef

DATE	Operations
11/07/11	Mobilization to Reef.
11/07/11	Deployed submersible tide recorder.
11/07/11	Commenced multibeam survey of Reef.
11/08/11	Attempt to retrieve tidal sensor. Sensor failed to surface.
11/10/11	Survey vessel <i>WILLIAM A ROGERS</i> performs sidescan sonar survey in attempt to locate tidal sensor.
11/11/11	Survey vessel <i>WILLIAM A ROGERS</i> deploys diver to recover located tidal sensor.
11/11/11	Survey complete. Demobilize.

Table 2.0-3

Summary of survey operations on board survey vessel Red Rogers for the Fall 2011 multibeam survey at the Hempstead Reef

DATE	Operations
11/08/11	Mobilization to Reef.
11/08/11	Commenced multibeam survey of Reef
11/08/11	Survey complete. Demobilize

Table 3.0-1

Equipment used during the Fall 2011 multibeam survey at the HARS, Fire-Island Reef and Hempstead Reef.

System	Model	*Accuracy
Multibeam	Reson Seabat 7101 (150/210 deg) 240 kHz, beam width 1.5 degree along and across track, 101 horizontal beams.	4 cm Nadir, 5 cm 45 degrees, 1.25 range resolution.
Position		
Differential GPS	Trimble Pro Beacon	3-5 meters DGPS USCG, 3 meters DGPS WAAS
Inertial Navigation System	TSS POS M/V 320 Motion (HPR) & Heading	Roll Pitch 0.02 (1 sigma DGPS, 2 sigma RTK) Heave 5cm or 5% 20 seconds or less Heading 0.02 (1 sigma) Position 0.5 - 2m (DGPS), 0.02 - 0.10 (RTK) Velocity 0.03 m/s horizontal
Data Acquisition and Navigation	Hypack 2009a Hysweep Survey Running on a Super Logic computer, with dual Aptec Raid removable disk drives .	
Sound Velocity	SeaBird SBE 19plusV2	
Tide Gauges		
Submersible Pressure Gauge	Valeport MiniTide (Deployed at HARS)	Range -5 to +35 deg (C). +/-0.01 deg (C)

Survey Vessel	
M/V Red Rogers	LOA= 36', Beam= 10', Draft= 2.5, Max Speed 25kts
Propulsion	Twin Volvo KAD 44P-C Turbo Diesel Engines with DPE Stern Drives
Power	Onan 6.5 kilowatt Generator with UPS & DC power supplies

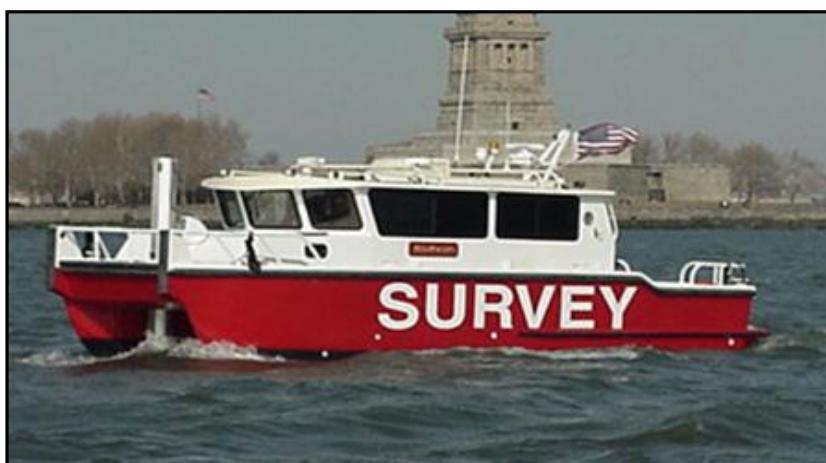
R/V *Red Rogers*

Figure 3.0-1
Attaching Acoustic Release Buoy to Submersible Tide Gauge

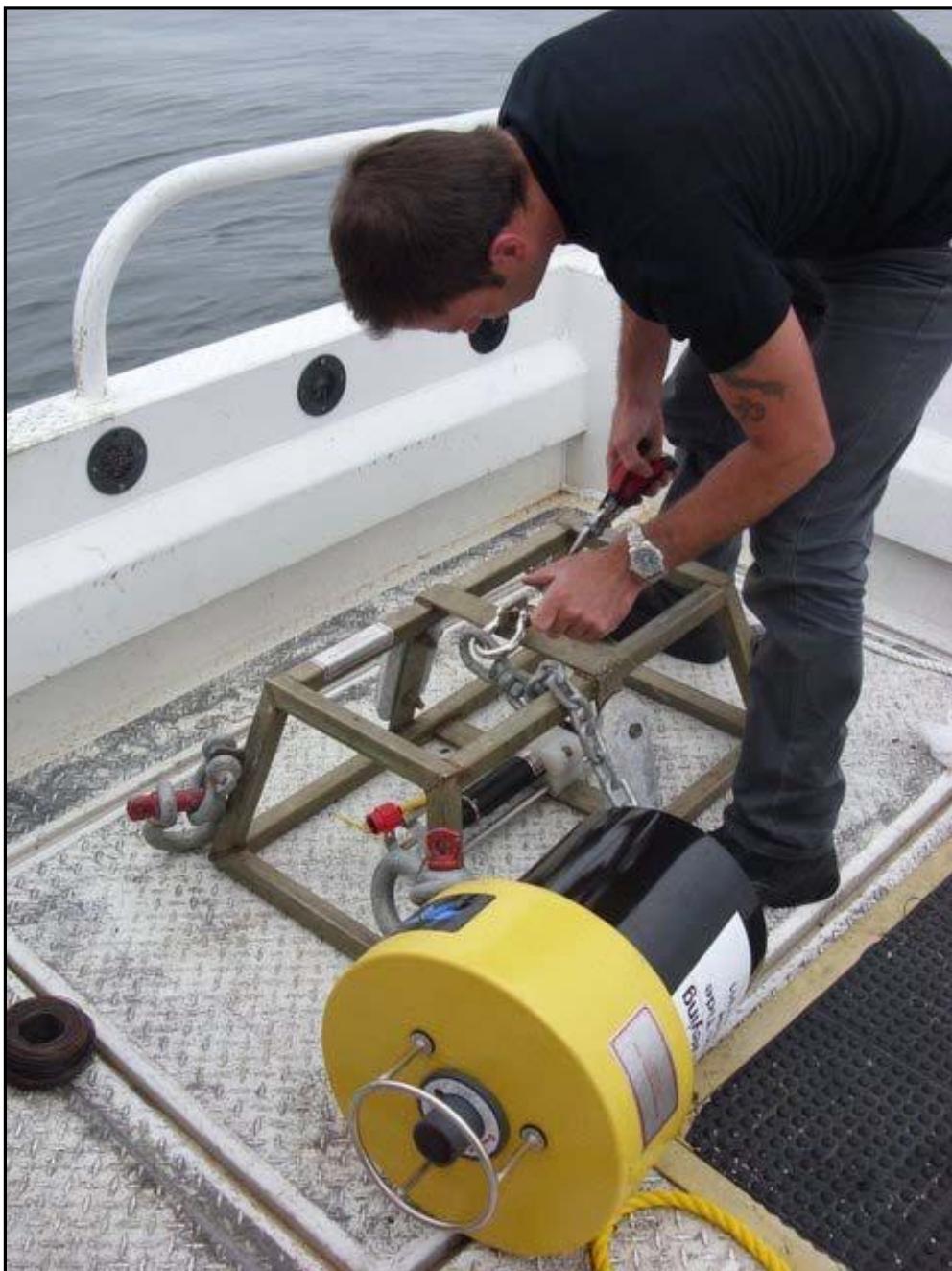


Figure 3.0-2

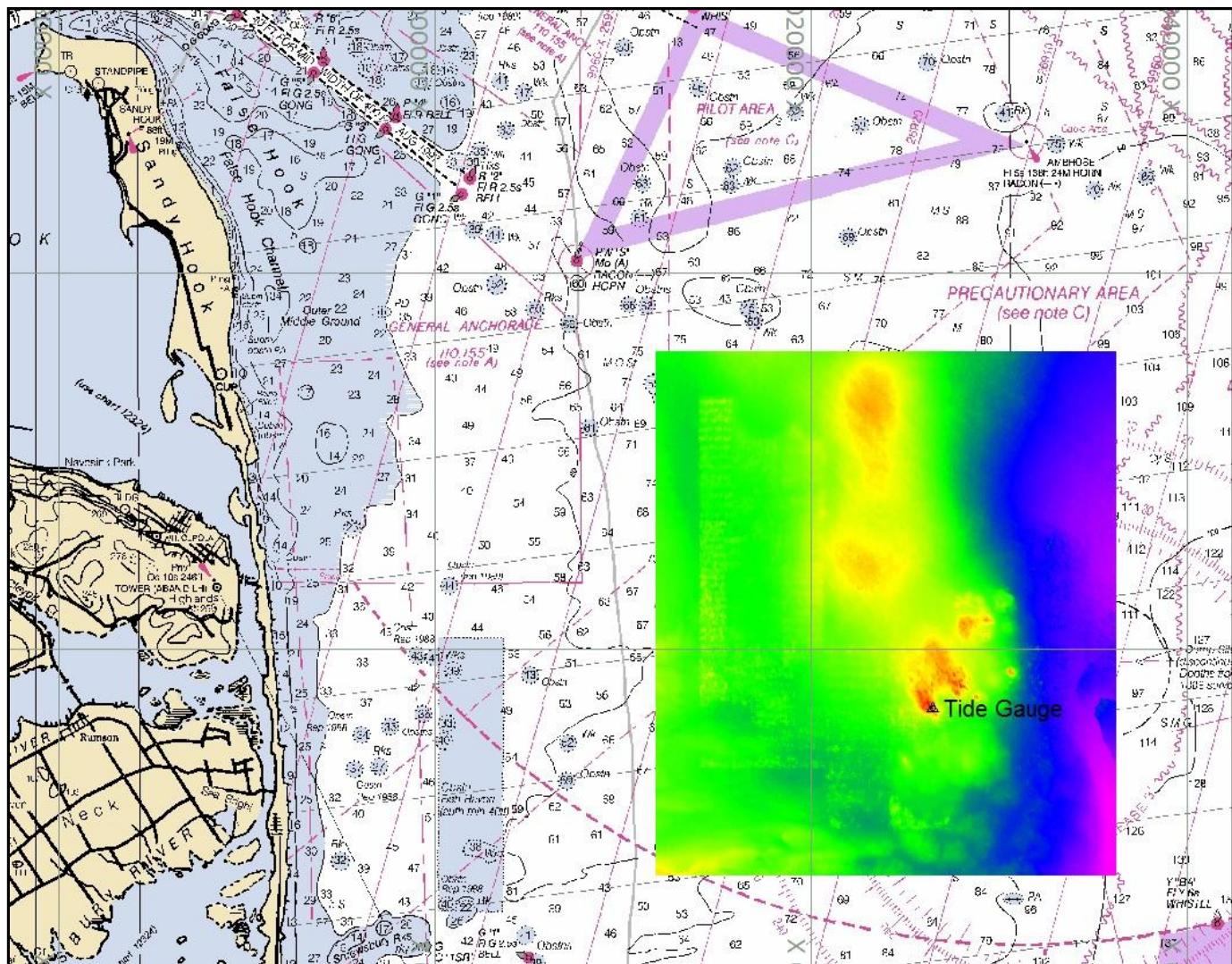


Figure 3.0-3

Final multibeam coverage of the Fire Island Reef, with submersible Tide Gauge location.

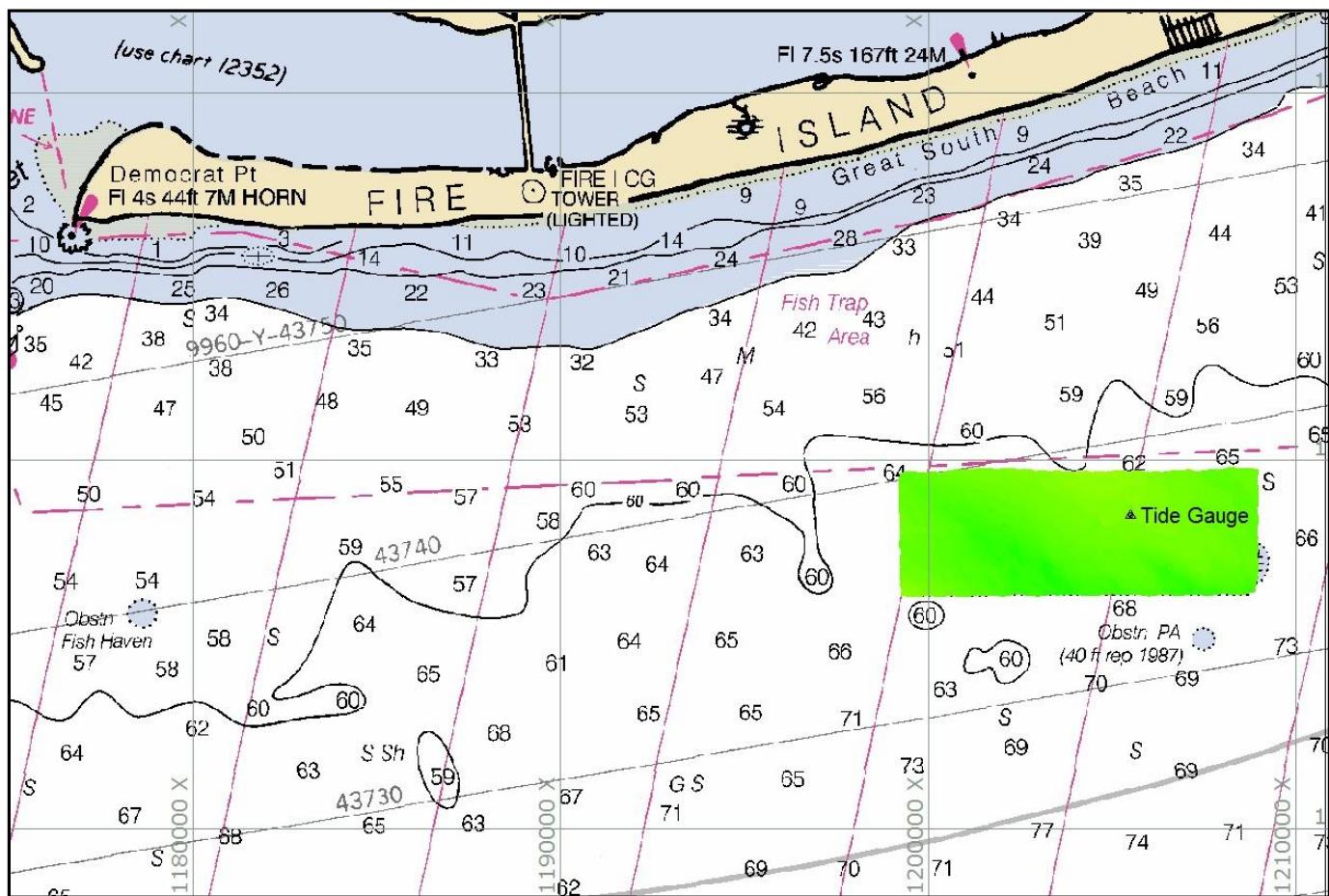


Figure 3.0-4
Final multibeam coverage of the Hempstead Reef.

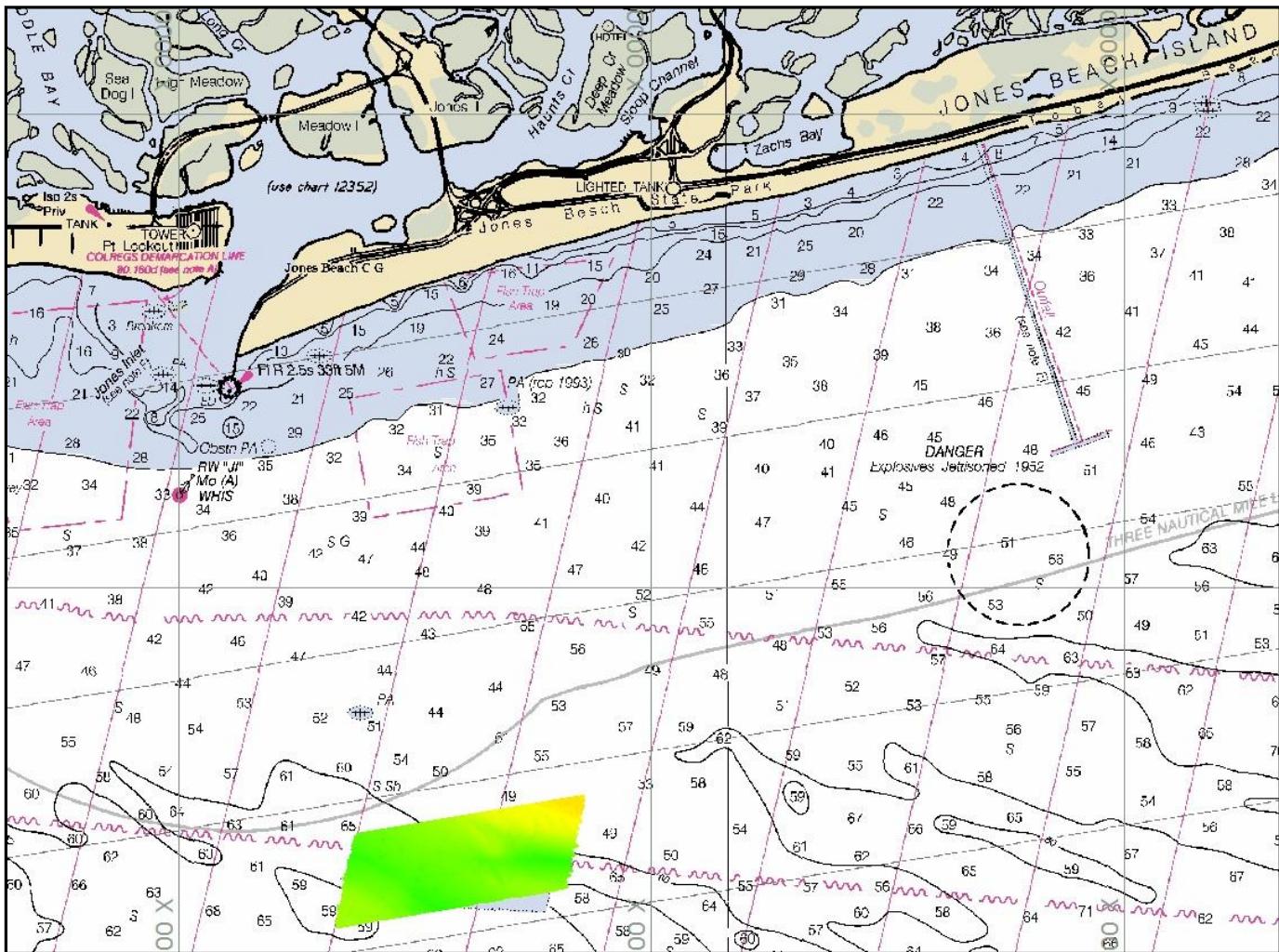


Figure 3.1-1

Portion of NGS Data Sheet for survey control disk KV0233 used at Elizabeth Marina.

KV0233	DESIGNATION -	PBM 65 33 USE	
KV0233	PID -	KV0233	
KV0233	STATE/COUNTY-	NJ/UNION	
KV0233	USGS QUAD -	ELIZABETH (1995)	
KV0233			
KV0233	*CURRENT SURVEY CONTROL		
KV0233			
KV0233*	NAD 83(1986) -	40 39 07. (N) 074 11 11. (W)	SCALED
KV0233*	NAVD 88 -	7.441 (meters) 24.41 (feet)	ADJUSTED
KV0233			
KV0233	GEOID HEIGHT-	-32.35 (meters)	GEOID09
KV0233	DYNAMIC HT -	7.438 (meters)	COMP
KV0233	MODELED GRAV -	980,222.8 (mgal)	NAVD 88
KV0233			
KV0233	VERT ORDER -	FIRST CLASS II	

Figure 4.0-1

Sandy Hook Tidal Station information, used during the Fall 2011 multibeam survey at the HARS, Hempstead and Fire Island Reefs.

Sandy Hook, NJ		Station ID: 8531680	
Station Information			
<i>Latitude:</i> 40° 28.0' N	<i>Mean Range:</i> 4.70 ft.	 <small>Click image for larger image.</small>	
<i>Longitude:</i> 74° 0.6' W	<i>Diurnal Range:</i> 5.22 ft.		
<i>Established:</i> Jan 7 1910			
<i>Present Installation:</i> Sep 26 1989			
<i>NOAA Chart #:</i> 12327			
<i>Time Meridian:</i> 75			
<i>Minimum Water Level:</i> -4.71 ft. below MLLW (02/02/1976)	<i>Maximum Water Level:</i> 4.86 ft. above MHHW (09/12/1960)		
Data Types Available:		Station and Bench Mark Drawing	Station Location Chartlet
Primary Water Level Backup Water Level Wind Air Temperature Water Temperature Barometric Pressure Barometric Pressure Conductivity	Click HERE for Drawing (Not for navigational use)		Click HERE for Map (Not for navigational use)

3.1 Data Acquisition

The survey vessel *Red Rogers* is permanently berthed in Elizabeth, New Jersey. The voyage from the vessels homeport to the HARS is approximately 1.5 hours, Fire Island Reef is approximately 4 hours. Hempstead Reef is approximately halfway way between marina and Fire Island Reef. Prior to multibeam survey operations a float test was performed to confirm that the RTK GPS tide reading from the POS M/V on the survey vessel agreed with the tide board at the dock at Elizabeth Marina, which had previously been referenced to National Geodetic Survey (NGS) disk KV0233 (Figure 3.1-1). This having been done the survey vessel transited to the HARS for commencement of multibeam data collection at the HARS site.

Once at the HARS or the Long Island Reefs the initial task was to lower the multibeam transducer head and perform a sound velocity profile (SVP). The information from the SVP was used to provide the Reson 7101 multibeam processor with a sound velocity surface value used for beam steerage. In addition the sound velocity profile was used in the Hypack data acquisition and processing software to correct for speed of sound through the water column to be applied to the multibeam data.

Having performed and applied the SVP correction, multibeam data collection began. Survey lines were run in a general North-South direction with cross check lines (see Sections 4.1 and 4.2) being run in an East-West direction for the HARS location, while for the two Reef locations survey lines were run in an East-West direction, with the cross check lines being run in a North-South direction.

Constant monitoring of the Reson 7101 screen and adjustment of range, transmit/ receive power settings were made if required to accurately map and encompass the swath width needed. The swath width was set to 60 deg. either side of nadir (center beam of multibeam) and lines were run to provide a 60% swath data coverage. In addition to monitoring the Reson 7101, it was also necessary to monitor the Hypack navigation software, which provided quality information on GPS and inertial navigation sensors, motion reference unit sensor and the multibeam data from the Reson 7101.

3.2 Sound Velocity Profiles

Sound velocity profiles were taken during the course of the survey using a SeaBird SBE 19plus Version 2 CTD. Casts were obtained before, during and after each survey period. During survey operations casts were taken not less than three hours apart and at opposite ends of the days survey area, to account for any spatial water column speed of sound changes. The SeaBird SBE 19plus was last calibrated by the manufacturer on 05/25/07 and is periodically checked against our Odom Digibar Pro velocity profiler. For HARS a total of 66 SVP casts were taken over the course of the multibeam survey (Table 3.2-0). Plots of all SVP casts are shown in Figures 3.2-1 to 3.2-65.

Table 3.2-1
Sound Velocity Profiles (SVP's) taken during the Fall 2011 multibeam survey at the HARS

Date	Time (UTC)	CTD File #	NAD83 Y LI (Feet)		Latitude	Longitude	Water Depth
			Easting	Northing			Feet
08/05/11	12:21	cnv_1221	1035501.65	96002.99	40.43003153	73.81590871	97.4
08/05/11	14:26	cnv_1426	1034145.53	86487.84	40.40392180	73.82084965	109.6
08/05/11	16:41	cnv_1641	1032337.45	96001.66	40.43004556	73.82727421	94.5
08/05/11	18:55	cnv_1855	1029848.27	86373.62	40.40363137	73.83627973	90.9
08/05/11	20:43	cnv_2043	1028892.39	95701.29	40.42923908	73.83965051	83.3
08/10/11	11:32	cnv_1132	1028912.53	95822.08	40.42957052	73.83957736	80.1
08/10/11	13:30	cnv_1330	1026965.33	86255.41	40.40332123	73.84663163	64.6
08/10/11	15:38	cnv_1538	1026129.32	95881.15	40.42974622	73.84957395	68.6
08/10/11	17:40	cnv_1740	1024518.57	86397.19	40.40372183	73.85541581	54.1
08/10/11	18:59	cnv_1859	1024992.33	95395.27	40.42841786	73.85366080	62.3
08/11/11	11:54	cnv_1154	1036081.03	86295.84	40.40338372	73.81390171	110.6
08/11/11	13:58	cnv_1358	1034339.71	77018.50	40.37792899	73.82022223	106.3
08/11/11	16:20	cnv_1620	1032054.45	86674.31	40.40444513	73.82835636	97.4
08/11/11	18:06	cnv_1806	1030531.65	86716.81	40.40456984	73.83382373	92.2
08/11/11	20:00	cnv_2000	1028896.15	86751.26	40.40467277	73.83969582	84.0
08/11/11	21:56	cnv_2156	1027838.77	86280.41	40.40338560	73.84349542	75.5
08/12/11	13:10	cnv_1310	1027811.40	86183.24	40.40311903	73.84359430	74.1
08/12/11	17:11	cnv_1711	1024564.04	76913.74	40.37769113	73.85530879	63.6
08/12/11	19:16	cnv_1916	1023971.60	86139.92	40.40301811	73.85738120	54.5
08/12/11	20:57	cnv_2057	1030598.19	79090.79	40.38363736	73.83363682	73.2
08/12/11	15:19	cnv_1519	1027311.79	77106.72	40.37820796	73.84544562	58.1
08/16/11	16:25	cnv_1625	1031980.64	77465.58	40.37916912	73.82868604	91.2
08/16/11	18:39	cnv_1839	1029869.20	67902.20	40.35293033	73.83632850	86.0
08/16/11	20:43	cnv_2043	1028758.98	77374.76	40.37893655	73.84024974	59.1
08/16/11	11:58	cnv_1158	1036106.46	77394.85	40.37895187	73.81387830	102.0
08/16/11	14:14	cnv_1414	1033978.56	67800.91	40.35263029	73.82158582	110.9
08/16/11	22:06	cnv_2206	1027570.01	77077.04	40.37812524	73.84451904	63.3
08/17/11	12:43	cnv_1243	1024016.71	77217.40	40.37852710	73.85727143	69.2
08/17/11	16:23	cnv_1623	1025158.69	77124.73	40.37826755	73.85317327	71.5
08/17/11	18:39	cnv_1839	1029746.75	68986.74	40.35590784	73.83676057	88.9
08/17/11	14:48	cnv_1448	1025007.74	67670.89	40.35231904	73.85377169	76.8
08/17/11	20:35	cnv_2035	1022777.99	67822.65	40.35274551	73.86177058	74.5
08/17/11	20:39	cnv_2039	1022420.99	77146.31	40.37833896	73.86299912	67.9

08/18/11	11:58	cnv_1158	1022749.01	77381.78	40.37898387	73.86182046	72.8
08/18/11	14:07	cnv_1407	1020951.35	67843.66	40.35281091	73.86832402	72.5
08/18/11	18:30	cnv_1830	1018011.48	67456.11	40.35175880	73.87887350	66.3
08/18/11	16:21	cnv_1621	1019525.37	77424.23	40.37911378	73.87339041	77.8
08/18/11	20:40	cnv_2040	1018039.00	77080.33	40.37817559	73.87872697	72.5
08/19/11	11:41	cnv_1141	1015901.35	76857.91	40.37757295	73.88640029	77.1
08/19/11	13:49	cnv_1349	1015166.48	67760.29	40.35260406	73.88907915	62.7
08/19/11	16:04	cnv_1604	1012276.29	77390.08	40.37904583	73.89940877	65.0
08/19/11	17:56	cnv_1756	1013451.15	77324.57	40.37886223	73.89519228	71.5
08/19/11	18:53	cnv_1853	1013713.27	76472.65	40.37652299	73.89425518	73.8
08/19/11	20:39	cnv_2039	1011701.76	86619.53	40.40438093	73.90143359	68.2
08/23/11	11:32	cnv_1132	1012887.08	86233.49	40.40331757	73.89717928	71.5
08/23/11	13:05	cnv_1305	1013598.92	77087.48	40.37821098	73.89466293	70.2
08/23/11	14:33	cnv_1433	1014868.83	86580.56	40.40426361	73.89006230	69.9
08/23/11	15:54	cnv_1554	1015900.27	86533.35	40.40413042	73.88635912	73.5
08/23/11	16:32	cnv_1632	1016094.56	86594.56	40.40429773	73.88566123	75.8
08/23/11	17:47	cnv_1747	1016972.65	86586.05	40.40427119	73.88250847	75.5
08/23/11	19:25	cnv_1925	1017896.39	77077.82	40.37816924	73.87923882	72.5
08/23/11	21:26	cnv_2126	1019263.43	77136.40	40.37832475	73.87433205	76.8
08/24/11	11:33	cnv_1133	1019481.33	86692.83	40.40455469	73.87350044	61.7
08/24/11	13:56	cnv_1356	1024034.47	77151.34	40.37834569	73.85720808	67.6
08/24/11	15:46	cnv_1546	1022883.92	77355.03	40.37890986	73.86133640	71.2
08/24/11	12:32	cnv_1232	1019943.75	77075.56	40.37815506	73.87189062	74.1
08/24/11	17:39	cnv_1739	1022472.73	86404.45	40.40375077	73.86276134	55.1
09/12/11	13:07	cnv_1307	1021098.62	76913.91	40.37770664	73.86774652	76.4
09/12/11	14:20	cnv_1420	1021434.28	76965.26	40.37784619	73.86654152	74.5
09/12/11	15:48	cnv_1548	1020395.00	85993.89	40.40263255	73.87022360	55.8
09/12/11	16:48	cnv_1648	1023752.30	95935.28	40.42990568	73.85811162	58.1
09/12/11	20:12	cnv_2012	1022029.08	95617.40	40.42904065	73.86430302	62.0
09/12/11	19:04	cnv_1904	1022480.71	86231.32	40.40327552	73.86273365	51.5
09/13/11	14:27	cnv_1427	1021687.34	95725.57	40.42933900	73.86552990	64.0
09/13/11	15:52	cnv_1552	1021112.06	95928.09	40.42989729	73.86759513	65.3
09/13/11	17:19	cnv_1719	1020168.64	86383.71	40.40370346	73.87103427	57.7
09/13/11	18:51	cnv_1851	1020262.65	86635.02	40.40439287	73.87069540	57.1
09/14/11	17:51	cnv_1751	1016019.59	86352.73	40.40363422	73.88593155	74.1
09/14/11	11:51	cnv_1151	1011777.52	95930.21	40.42993693	73.90112384	76.1
09/14/11	15:08	cnv_1508	1013809.30	95962.67	40.43001951	73.89382573	73.8
09/14/11	13:14	cnv_1314	1012686.36	95940.88	40.42996337	73.89785932	76.8
09/14/11	16:21	cnv_1621	1015108.81	95971.38	40.43003898	73.88915798	65.3

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09/14/11	19:37	cnv_1937	1016287.86	95696.63	40.42928067	73.88492423	62.0
09/21/11	11:26	cnv_1126	1017257.77	95908.56	40.42985884	73.88143943	62.7
09/21/11	13:23	cnv_1323	1018474.84	95877.45	40.42976884	73.87706800	62.7
09/21/11	14:47	cnv_1447	1019101.60	95901.96	40.42983368	73.87481662	64.6
09/21/11	12:26	cnv_1226	1017820.28	86323.34	40.40354693	73.87946633	70.9
09/21/11	15:34	cnv_1534	1017969.23	93451.03	40.42311066	73.87889613	62.7

Table 3.2-2
Sound Velocity Profiles (SVP's) taken during the Fall 2011 multibeam survey at Fire-Island Reef

Date	Time (UTC)	CTD File #	NAD83 YLI (Feet)		Latitude	Longitude	Water Depth
			Easting	Northing			Feet
11/07/11	11:39	110711_1139	1198030	159768	40.60262308	73.23012567	43
11/07/11	15:36	110711_1536	1208914	156522	40.59344550	73.19104149	63
11/07/11	17:28	110711_1728	1199251	157261	40.59571377	73.22581026	61
11/07/11	19:27	110711_1927	1199403	158558	40.59926978	73.22522071	63
11/07/11	21:29	110711_2129	1199630	158274	40.59848593	73.22441442	65
11/08/11	12:00	110811_1200	1199179	156238	40.59290717	73.22610240	62

Table 3.2-3
Sound Velocity Profiles (SVP's) taken during the Fall 2011 multibeam survey at Hempstead Reef

Date	Time (UTC)	CTD File #	NAD83 YLI (Feet)		Latitude	Longitude	Water Depth
			Easting	Northing			Feet
11/08/11	15:38	110811_1538	1107511	129542	40.52138225	73.55665015	62
11/08/11	17:29	110811_1729	1107037	128517	40.51857614	73.55837399	65
11/08/11	19:26	110811_1926	1106934	127448	40.51564166	73.55876360	60
11/08/11	21:13	110811_2113	1106712	126323	40.51255662	73.55958198	60
11/08/11	22:20	110811_2220	1112555	128736	40.51909729	73.53852380	63

Figure 3.2-1
SVP 080511_1221 taken during the Fall 2011 multibeam survey at the HARS.

1527.72	0.64
1527.77	1.36
1527.79	2.05
1527.79	2.75
1527.80	3.46
1527.80	4.17
1527.80	4.89
1527.79	5.60
1527.77	6.31
1527.72	7.00
1527.61	7.68
1527.35	8.38
1526.87	9.09
1524.99	9.84
1522.11	10.59
1520.01	11.34
1517.78	12.09
1515.81	12.85
1514.57	13.60
1513.53	14.36
1512.60	15.10
1511.25	15.86
1508.64	16.62
1506.05	17.35
1504.41	18.08
1503.36	18.82
1502.65	19.56
1501.92	20.28
1501.20	21.04
1500.70	21.80
1500.36	22.54
1499.94	23.26
1499.45	23.97
1498.76	24.63
1498.20	25.23
1497.80	25.76
1497.30	26.33
1496.79	26.94
1496.39	27.59
1496.17	28.25
1496.09	28.92
1496.09	29.52
1496.09	29.65

CTD PROFILE # 080511_1221

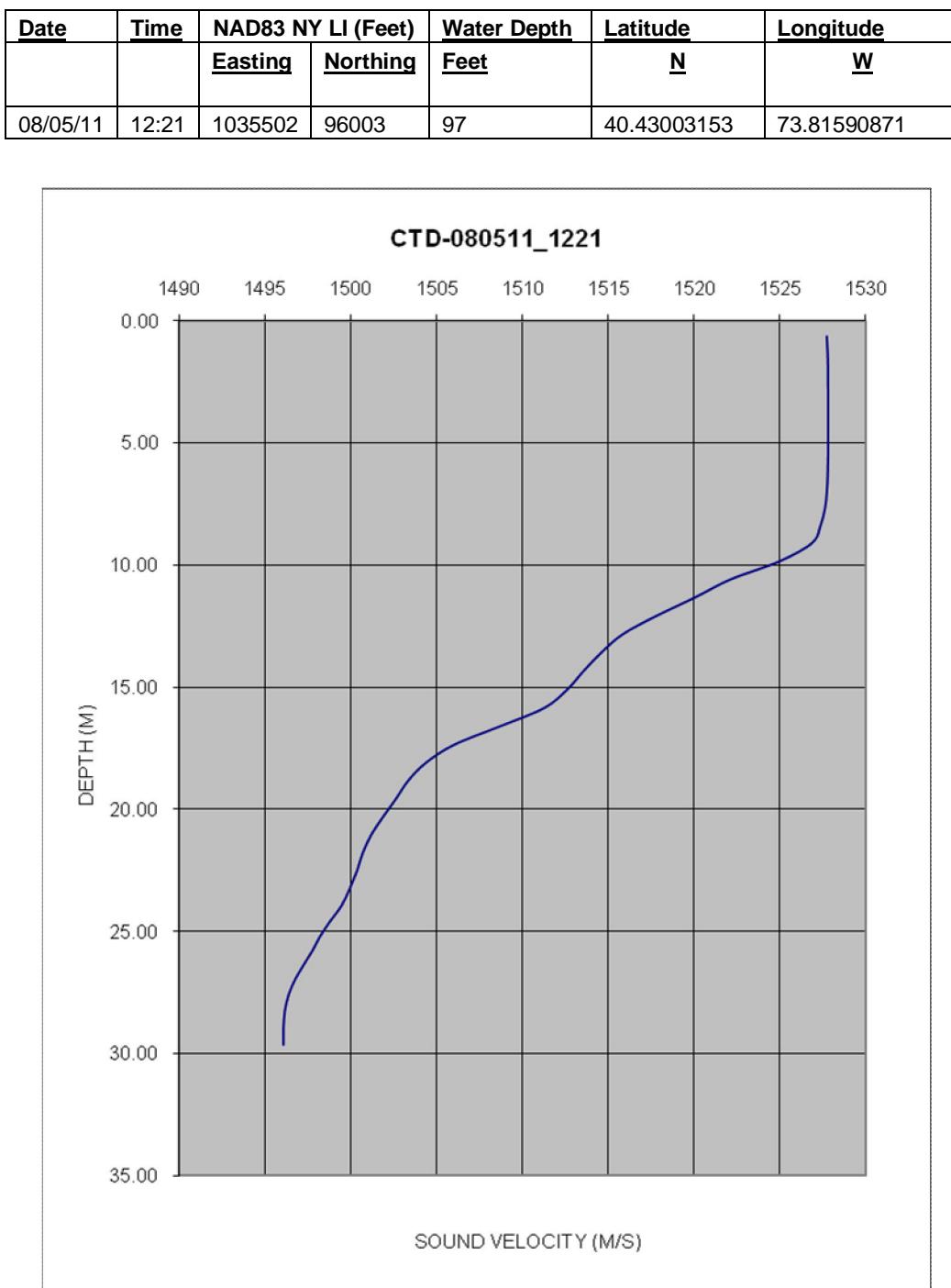


Figure 3.2-2
SVP 080511_1426 taken during the Fall 2011 multibeam survey at the HARS.

1527.29	0.19
1527.22	0.58
1527.21	0.98
1527.20	1.37
1527.11	1.89
1526.97	2.53
1526.88	3.18
1526.86	3.91
1526.90	4.60
1526.97	5.33
1526.85	6.07
1526.87	6.77
1527.09	7.46
1527.08	8.16
1526.43	8.86
1523.69	9.58
1520.73	10.31
1517.72	11.04
1515.31	11.75
1513.66	12.47
1511.57	13.17
1509.83	13.88
1508.70	14.60
1507.37	15.31
1505.84	16.02
1504.50	16.75
1503.62	17.48
1503.06	18.21
1502.45	18.94
1501.75	19.66
1501.18	20.38
1500.74	21.09
1500.24	21.82
1499.67	22.54
1499.14	23.24
1498.51	23.96
1497.69	24.69
1496.81	25.42
1496.23	26.16
1495.92	26.89
1495.71	27.61
1495.46	28.34
1495.24	29.07
1495.07	29.81
1494.90	30.56
1494.66	31.31
1494.43	32.05
1494.25	32.76
1494.23	33.32
1494.39	33.39

CTD PROFILE # 080511_1426



Figure 3.2-3

SVP 080511_1641 taken during the Fall 2011 multibeam survey at the HARS.

1527.65	0.72
1527.61	1.49
1527.57	2.23
1527.43	2.95
1527.17	3.64
1526.95	4.30
1526.86	4.93
1526.79	5.52
1526.72	6.13
1526.67	6.73
1526.57	7.31
1526.48	7.89
1526.37	8.48
1526.17	9.07
1525.73	9.67
1525.13	10.28
1524.17	10.89
1522.93	11.51
1520.89	12.14
1518.25	12.76
1515.32	13.39
1513.14	14.02
1511.69	14.66
1510.47	15.32
1507.90	15.98
1505.43	16.64
1504.01	17.30
1503.18	17.96
1502.54	18.62
1502.00	19.28
1501.69	19.93
1501.48	20.58
1501.17	21.23
1500.91	21.88
1500.64	22.52
1500.06	23.16
1499.20	23.79
1498.32	24.43
1497.78	25.08
1497.33	25.73
1496.70	26.39
1496.24	27.06
1496.03	27.74
1495.92	28.40
1495.89	28.66
1495.92	28.72

CTD PROFILE # 080511 1641

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
08/05/11	16:41	1032337	96002	94	40.43004556 73.82727421

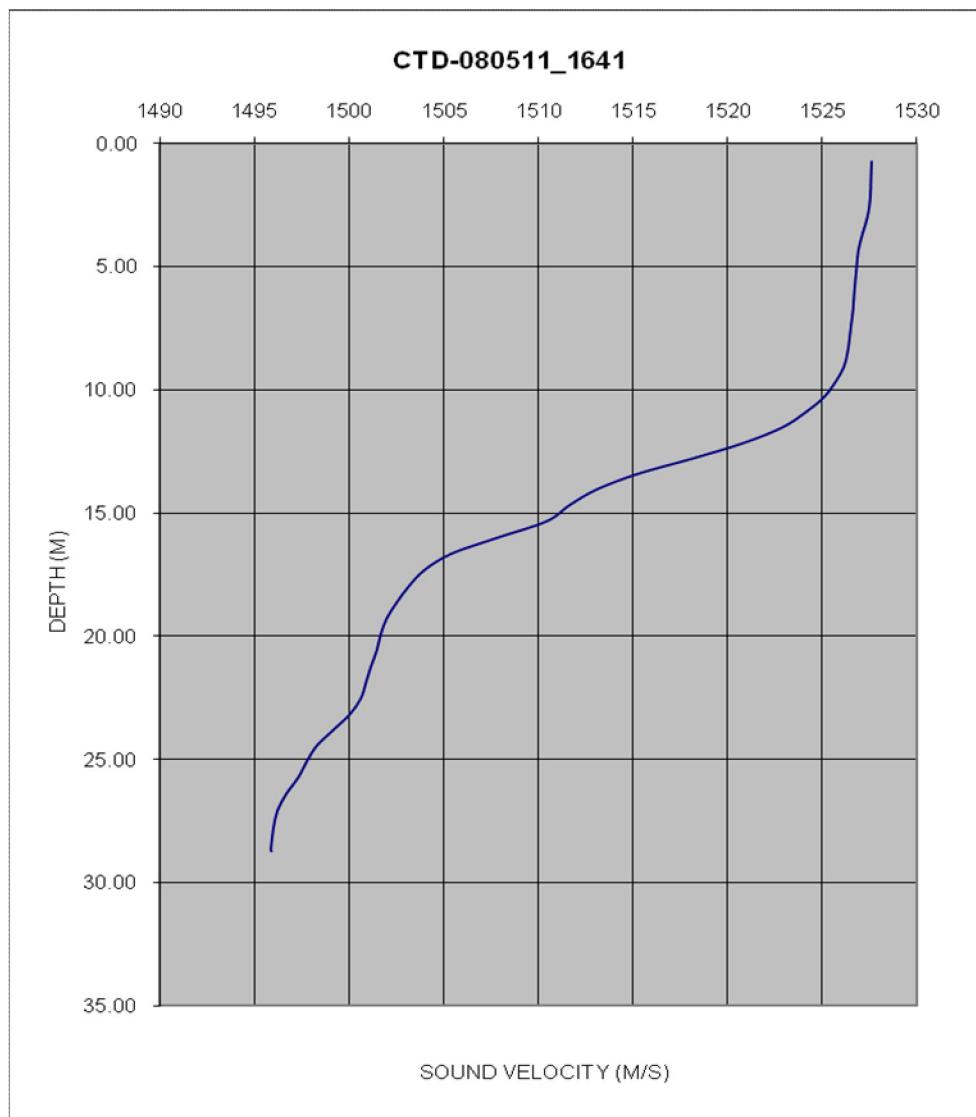


Figure 3.2-4
SVP 080511_1855 taken during the Fall 2011 multibeam survey at the HARS.

1528.07	0.23
1528.04	0.95
1528.02	1.63
1527.98	2.26
1527.90	2.87
1527.77	3.45
1527.59	4.02
1527.48	4.58
1527.32	5.13
1527.18	5.69
1527.11	6.24
1527.04	6.81
1526.97	7.38
1526.78	7.96
1526.34	8.55
1525.68	9.13
1524.63	9.74
1523.13	10.35
1520.63	10.96
1517.73	11.57
1515.58	12.18
1513.85	12.78
1512.43	13.39
1511.22	14.00
1509.81	14.62
1507.15	15.26
1504.86	15.90
1503.59	16.54
1502.94	17.19
1502.64	17.86
1502.43	18.52
1502.22	19.18
1502.09	19.85
1501.96	20.50
1501.64	21.15
1501.07	21.80
1500.59	22.45
1500.25	23.10
1499.95	23.75
1499.33	24.39
1498.48	25.04
1497.89	25.69
1497.48	26.35
1497.11	27.01
1496.97	27.54
1497.33	27.63

CTD PROFILE # 080511 1855

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
08/05/11	18:55	1029848	86374	91	40.40363137
					73.83627973

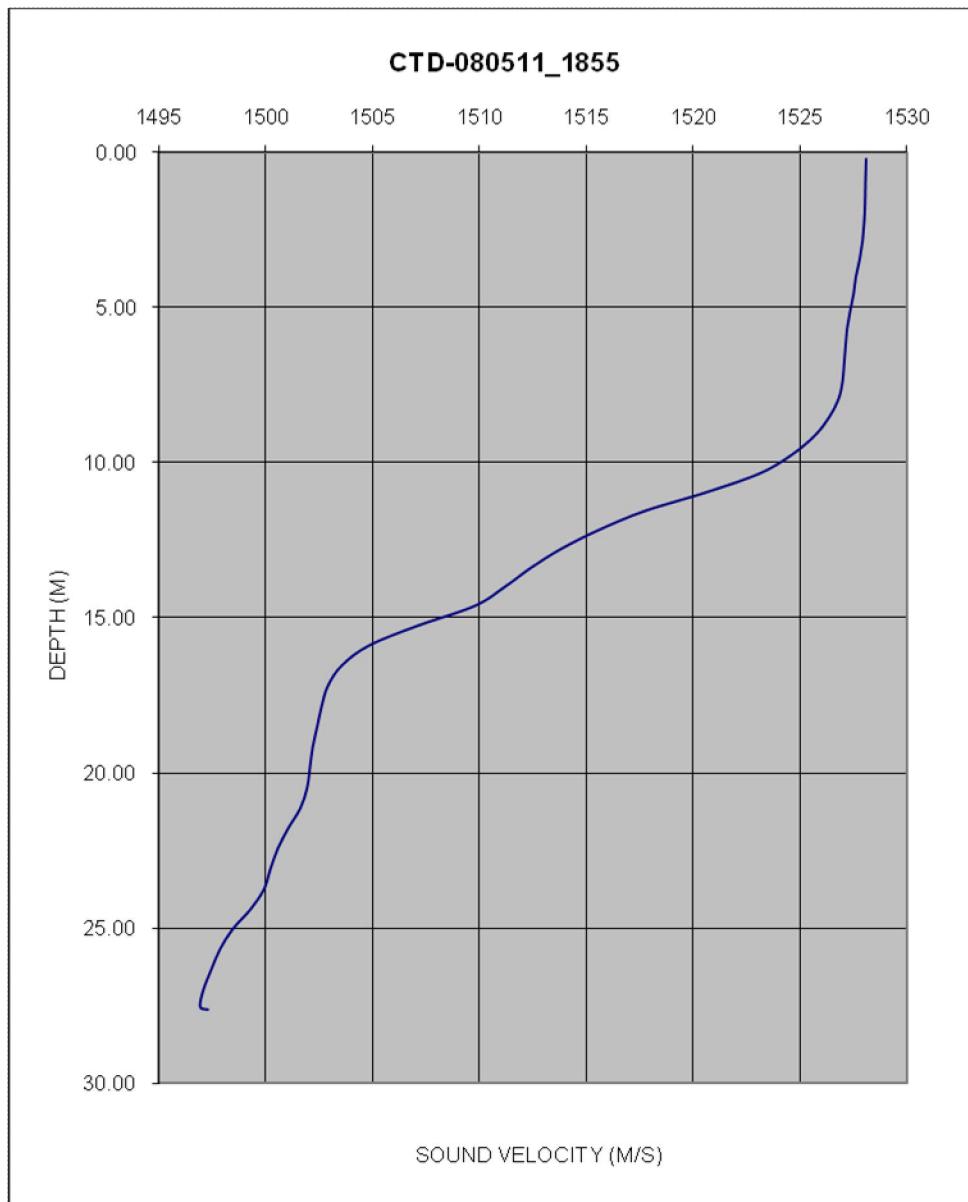


Figure 3.2-5
SVP 080511_2043 taken during the Fall 2011 multibeam survey at the HARS.

1527.76	0.46
1527.73	1.13
1527.74	1.86
1527.75	2.56
1527.75	3.22
1527.66	3.88
1527.49	4.54
1527.23	5.20
1526.51	5.84
1525.49	6.47
1524.53	7.11
1523.02	7.75
1521.32	8.40
1519.39	9.07
1517.52	9.73
1515.54	10.38
1514.05	11.03
1513.16	11.68
1512.66	12.34
1512.12	13.01
1511.06	13.68
1509.61	14.34
1508.39	15.01
1507.31	15.67
1506.61	16.33
1506.10	17.00
1505.49	17.65
1504.87	18.31
1504.44	18.97
1504.24	19.62
1504.11	20.28
1503.90	20.93
1503.26	21.58
1501.65	22.25
1500.22	22.93
1499.56	23.61
1499.31	24.31
1499.19	25.01
1499.32	25.39
1499.73	25.43

CTD PROFILE # 080511 2043

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
08/05/11	20:43	990062	125798	84	40.51195917 73.97909951

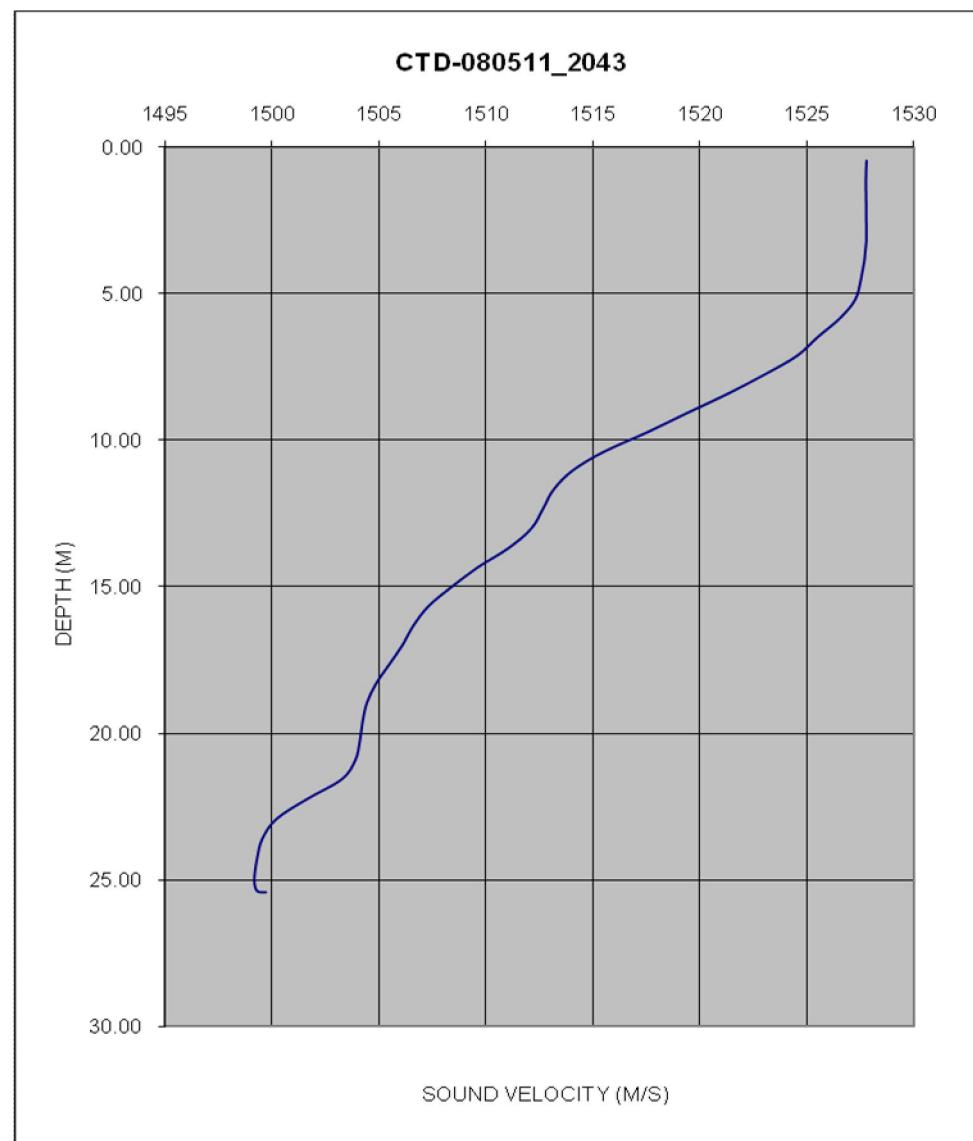


Figure 3.2-6
SVP 071011_1132 taken during the Fall 2011 multibeam survey at the HARS

1523.51 0.69

1523.53 1.39

1523.43 2.09

CTD PROFILE # 071011_1132

1523.29 2.78

1523.16 3.47

1523.03 4.12

<u>Date</u>	<u>Time</u>	<u>NAD83 NY LI (Feet)</u>	<u>Water Depth</u>	<u>Latitude</u>	<u>Longitude</u>
		<u>Easting</u>	<u>Northing</u>	<u>Feet</u>	<u>N</u>
08/10/11	11:32	1028913	95822	80	40.42957052 73.83957736

1522.97 4.84

1523.13 5.62

1523.16 6.40

1523.02 7.15

1523.16 7.92

1523.28 8.68

1521.70 9.43

1519.28 10.15

1517.26 10.84

1515.22 11.52

1513.15 12.23

1510.83 12.95

1508.52 13.65

1507.04 14.35

1506.47 15.06

1505.96 15.78

1504.94 16.49

1503.94 17.18

1502.88 17.86

1502.23 18.55

1501.94 19.25

1501.72 19.95

1501.00 20.66

1499.06 21.36

1496.90 22.07

1495.71 22.78

1495.25 23.52

1495.19 24.17

1495.53 24.36

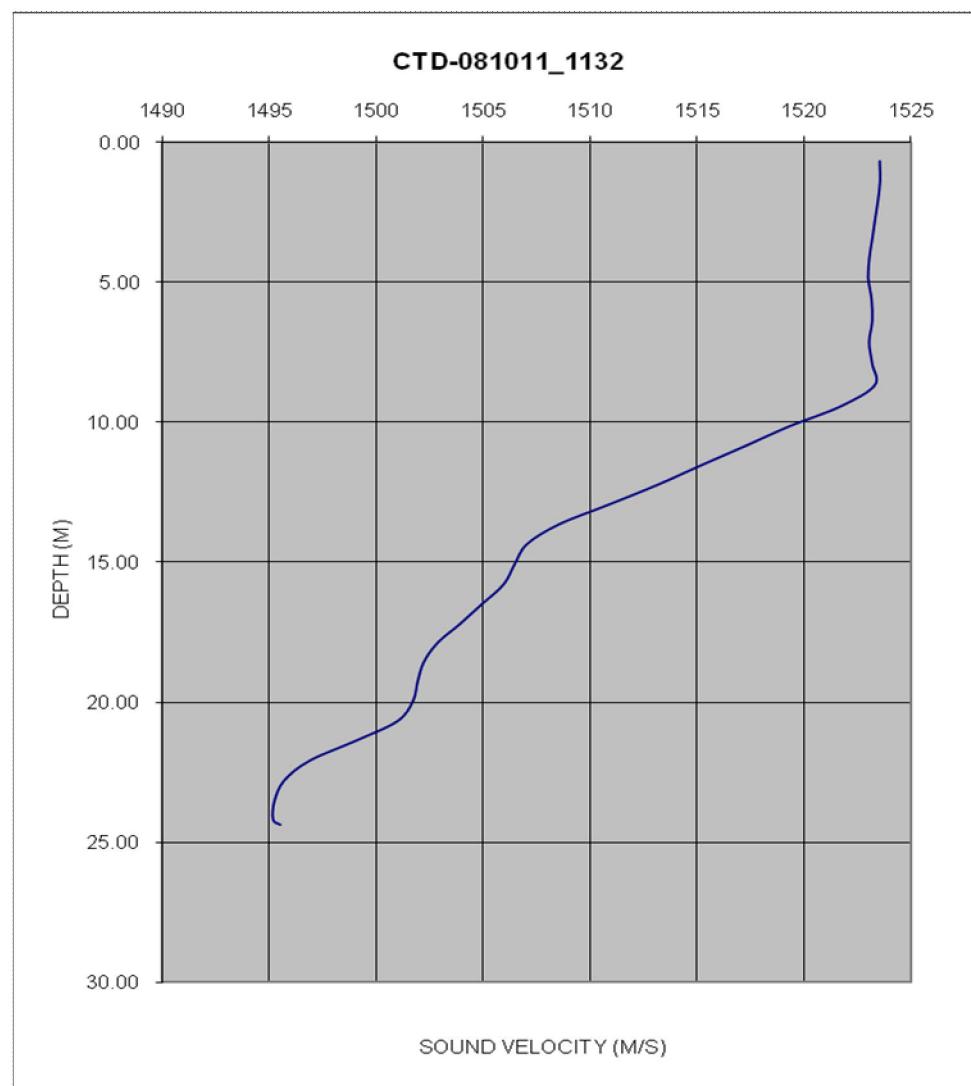


Figure 3.2-7
SVP 071011_1330 taken during the Fall 2011 multibeam survey at the HARS

1523.18	0.07
1522.84	0.84
1522.71	1.62
1522.66	2.42
1522.60	3.18
1522.59	3.87
1522.84	4.51
1523.15	5.14
1523.81	5.76
1524.65	6.37
1525.80	6.98
1526.62	7.59
1526.65	8.22
1526.23	8.85
1525.77	9.49
1525.31	10.13
1524.18	10.78
1522.32	11.42
1519.89	12.06
1515.89	12.69
1511.27	13.32
1508.30	13.96
1506.65	14.59
1505.67	15.22
1505.07	15.83
1504.69	16.43
1504.36	17.05
1504.04	17.67
1503.75	18.32
1503.58	18.97
1503.77	19.31
1503.89	19.46
1503.52	19.56

CTD PROFILE # 071011_1330

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
08/10/11	13:30	1026965	86255	64	40.40332123
					73.84663163

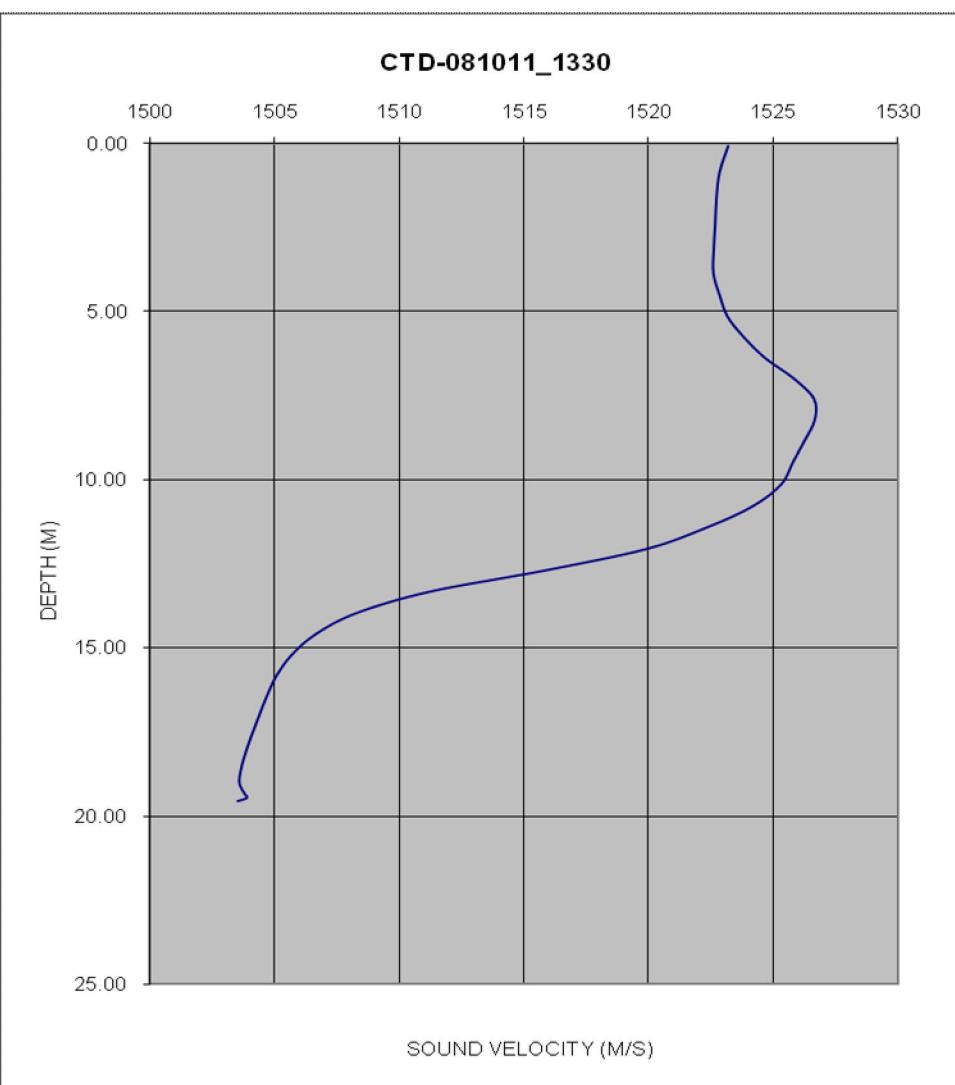


Figure 3.2-8
SVP 071011_1538 taken during the Fall 2011 multibeam survey at the HARS

1524.38 0.18

1524.23 0.88

1524.06 1.54

CTD PROFILE # 071011_1538

1523.76 2.17

1523.42 2.75

1523.08 3.31

<u>Date</u>	<u>Time</u>	<u>NAD83 NY LI (Feet)</u>		<u>Water Depth</u>	<u>Latitude</u>	<u>Longitude</u>
		<u>Easting</u>	<u>Northing</u>	<u>Feet</u>	<u>N</u>	<u>W</u>
08/10/11	15:38	1026129	95881	68	40.42974622	73.84957395

1522.89 3.85

1522.72 4.39

1522.53 4.94

1522.36 5.51

1522.25 6.08

1521.98 6.66

1521.67 7.26

1521.44 7.85

1521.21 8.45

1521.16 9.07

1520.87 9.68

1519.74 10.27

1519.00 10.86

1518.71 11.44

1517.07 12.02

1513.88 12.61

1511.56 13.22

1510.50 13.84

1510.01 14.47

1509.52 15.11

1509.02 15.75

1507.71 16.40

1506.17 17.05

1504.98 17.70

1504.21 18.36

1503.64 19.02

1502.96 19.67

1502.37 20.33

1502.25 20.70

1502.73 20.77

1503.22 20.83

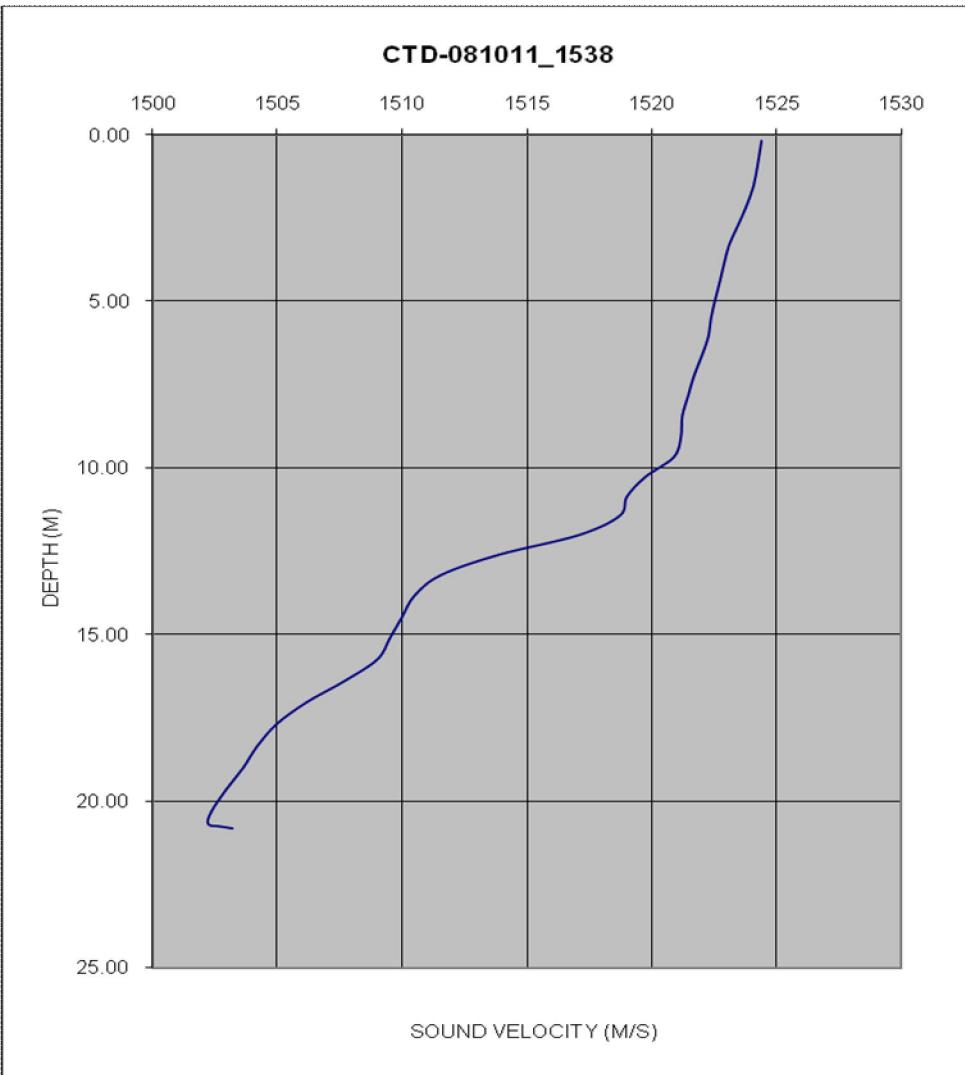


Figure 3.2-9
SVP 071011_1740 taken during the Fall 2011 multibeam survey at the HARS

1525.11	0.04
1524.94	0.79
1524.80	1.46
1524.61	2.10
1524.48	2.66
1524.38	3.19
1524.41	3.75
1524.50	4.31
1524.53	4.88
1524.53	5.46
1524.49	6.04
1524.64	6.62
1525.18	7.23
1526.84	7.89
1527.72	8.53
1527.95	9.16
1527.89	9.79
1527.58	10.42
1527.14	11.06
1526.63	11.70
1525.28	12.34
1522.28	13.00
1518.67	13.66
1512.80	14.32
1507.87	14.99
1505.75	15.66
1505.03	16.27
1505.36	16.43
1506.34	16.48
1507.11	16.49

CTD PROFILE # 071011_1740

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
08/10/11	17:40	1024368	86414	54	40.40376864 73.85595992

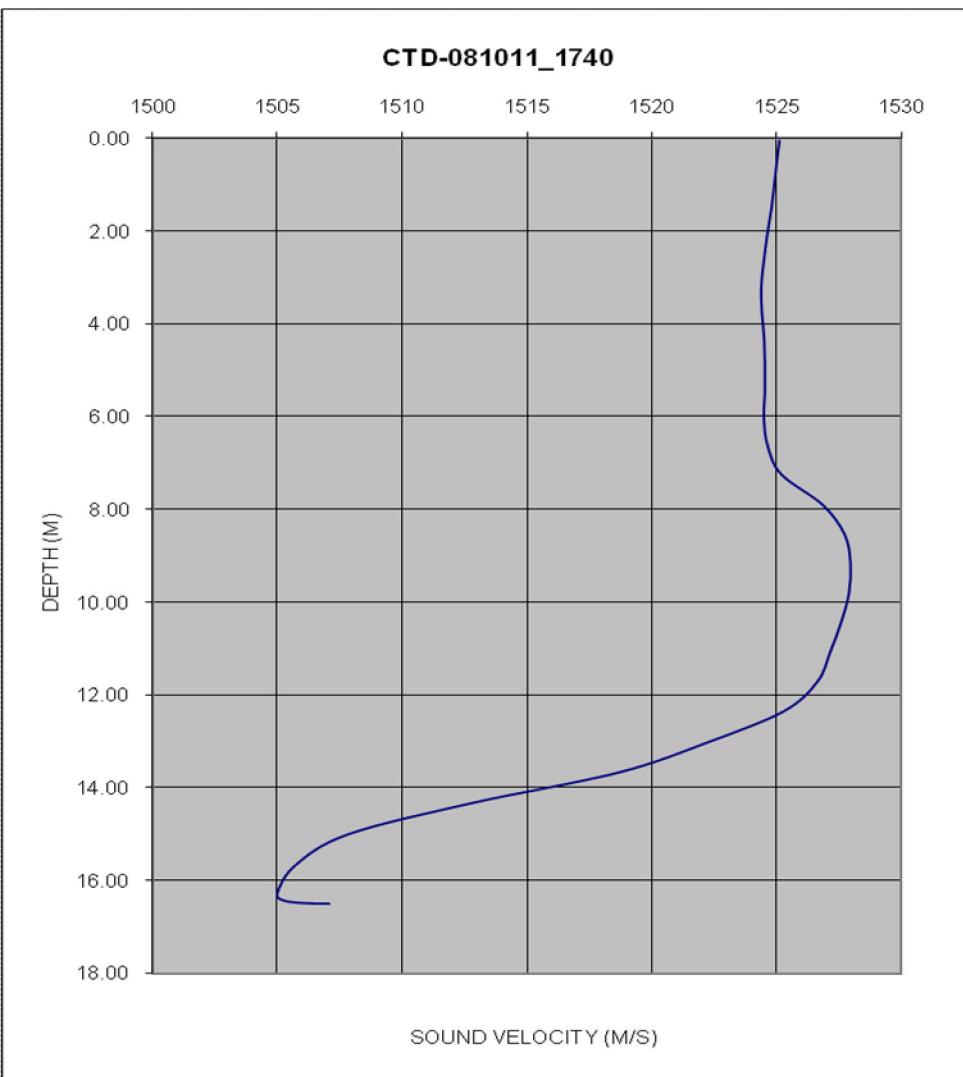


Figure 3.2-10
SVP 071011_1859 taken during the Fall 2011 multibeam survey at the HARS

1525.73	0.55
1525.47	1.36
1525.12	2.17
1524.65	2.98
1524.11	3.80
1523.62	4.59
1523.34	5.33
1523.23	6.03
1523.22	6.72
1523.22	7.39
1523.29	8.04
1523.77	8.69
1524.05	9.33
1523.60	9.95
1523.79	10.56
1524.63	11.18
1524.88	11.79
1522.50	12.40
1519.17	13.01
1515.71	13.64
1511.76	14.27
1509.07	14.93
1507.50	15.60
1506.13	16.27
1504.39	16.95
1503.33	17.62
1502.68	18.30
1502.19	18.84
1502.56	18.92

CTD PROFILE # 071011_1859

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
08/10/11	18:59	1024922	95381	62	40.42837900 73.85391350

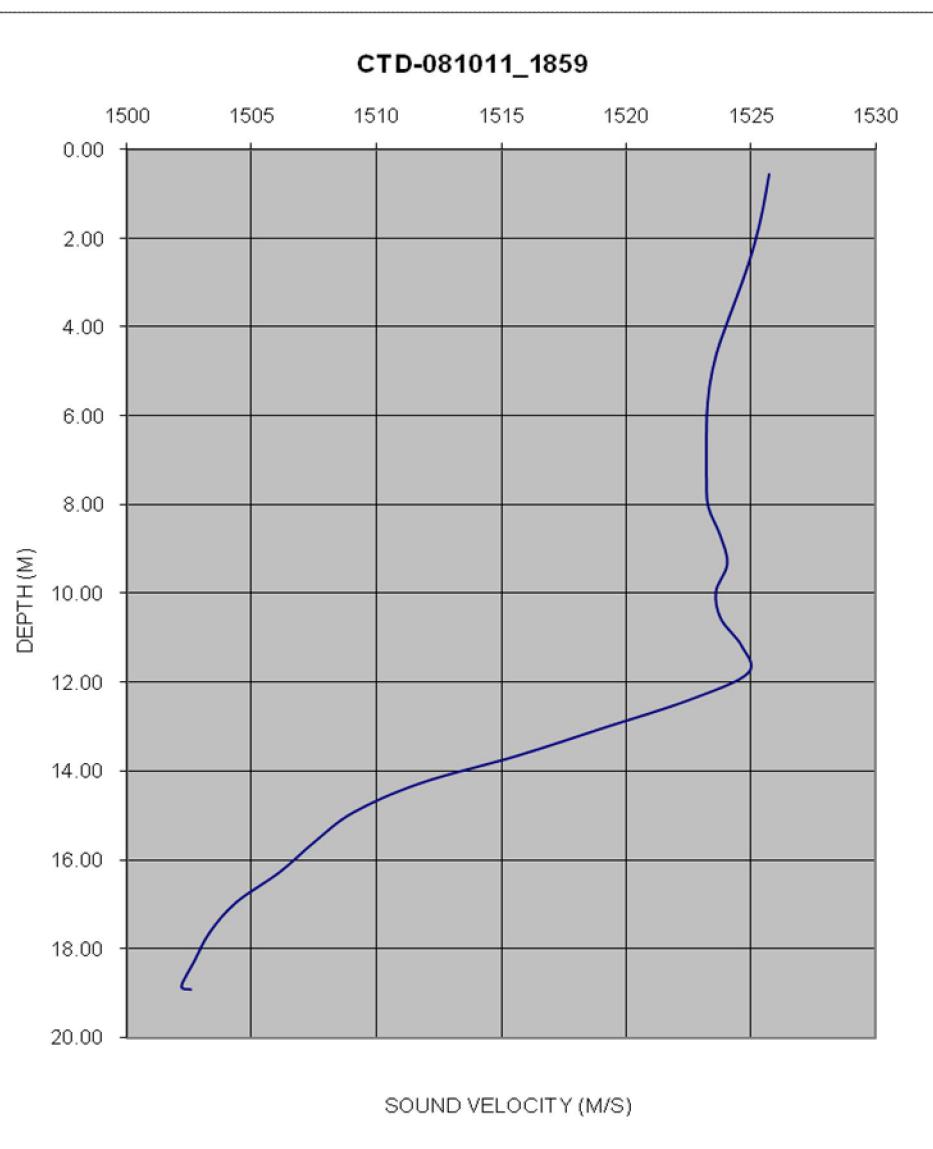


Figure 3.2-11
SVP 081111_1154 taken during the Fall 2011 multibeam survey at the HARS

1523.21	0.56
1523.21	1.25
1523.26	1.90
1523.37	2.56
1523.49	3.19
1523.72	3.81
1524.23	4.43
1525.18	5.05
1526.52	5.67
1527.08	6.30
1526.87	6.92
1526.36	7.55
1525.66	8.19
1524.47	8.84
1523.31	9.49
1522.23	10.14
1520.66	10.81
1518.11	11.49
1515.90	12.15
1513.85	12.81
1512.36	13.47
1511.08	14.13
1509.64	14.79
1507.67	15.46
1505.70	16.13
1504.44	16.77
1503.56	17.44
1502.93	18.12
1502.46	18.79
1501.84	19.46
1501.03	20.15
1500.37	20.82
1499.75	21.50
1498.63	22.17
1497.53	22.85
1496.82	23.52
1495.73	24.19
1494.33	24.88
1493.42	25.56
1492.98	26.25
1492.75	26.93
1492.54	27.62
1492.37	28.30
1492.24	28.98
1491.98	29.65
1491.67	30.33
1491.40	31.00
1491.23	31.67
1491.11	32.33
1491.05	33.00
1491.00	33.68
1491.05	34.26
1491.43	34.37
1491.96	34.37

CTD PROFILE # 081111_1154

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
08/11/11	11:54	1036081	86296	113	40.40338372
					73.81390169

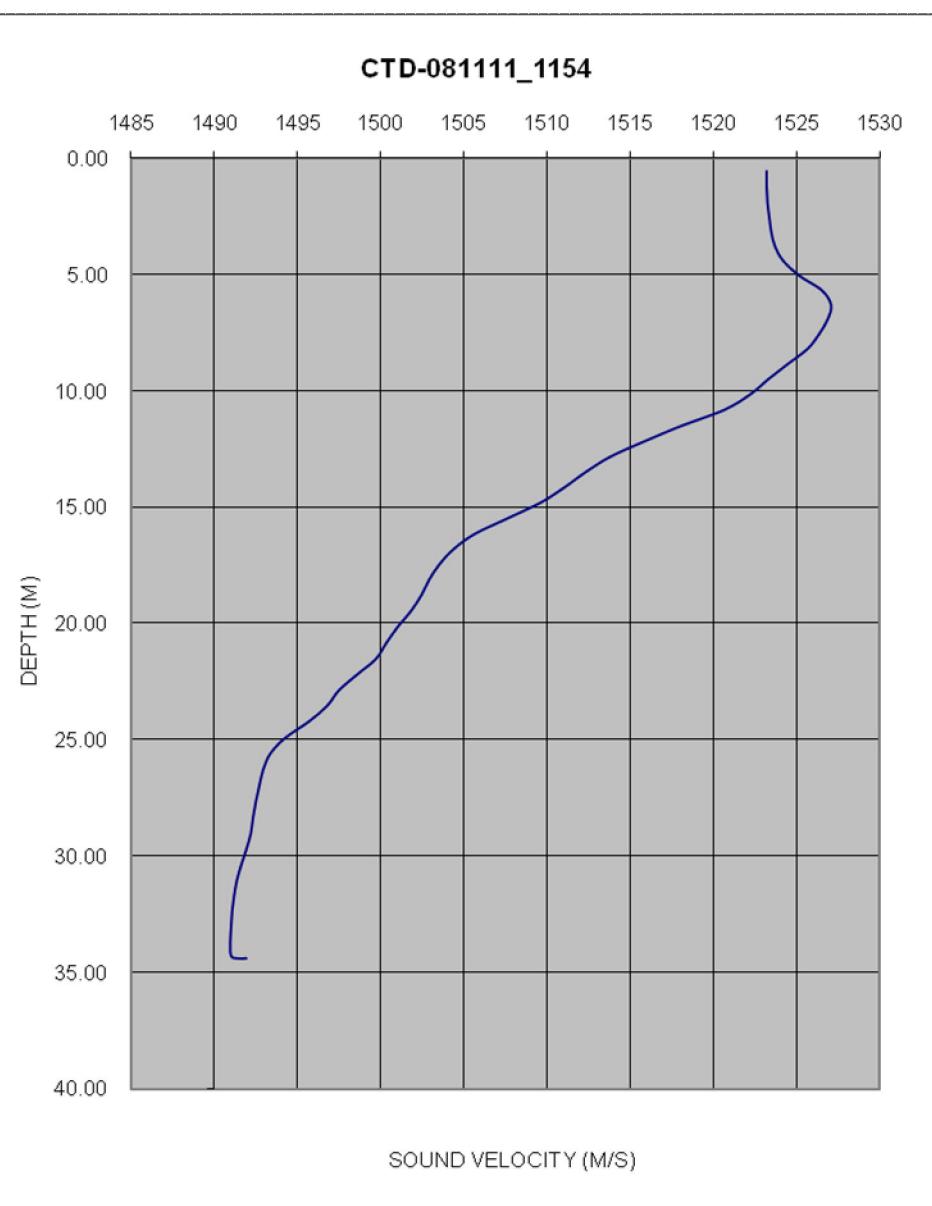


Figure 3.2-12
SVP 081111_1358 taken during the Fall 2011 multibeam survey at the HARS

1524.41	0.08
1524.31	0.71
1524.29	1.34
1524.28	1.95
1524.30	2.56
1524.33	3.17
1524.35	3.79
1524.47	4.39
1525.67	5.00
1526.45	5.62
1526.76	6.22
1527.00	6.83
1527.00	7.45
1526.91	8.08
1526.81	8.72
1526.63	9.37
1526.30	10.01
1525.67	10.66
1524.62	11.33
1522.77	11.98
1519.85	12.66
1517.44	13.34
1514.75	14.02
1513.21	14.69
1512.58	15.37
1511.87	16.05
1510.29	16.71
1507.99	17.37
1505.09	18.03
1502.58	18.71
1500.50	19.37
1498.85	20.03
1497.69	20.70
1496.64	21.38
1495.90	22.06
1495.34	22.73
1494.69	23.41
1494.09	24.08
1493.75	24.76
1493.60	25.44
1493.48	26.12
1493.34	26.82
1493.17	27.51
1492.92	28.20
1492.38	28.90
1491.63	29.59
1490.98	30.28
1490.50	30.96
1490.06	31.65
1489.86	32.27
1489.79	32.45

CTD PROFILE # 081111_1358

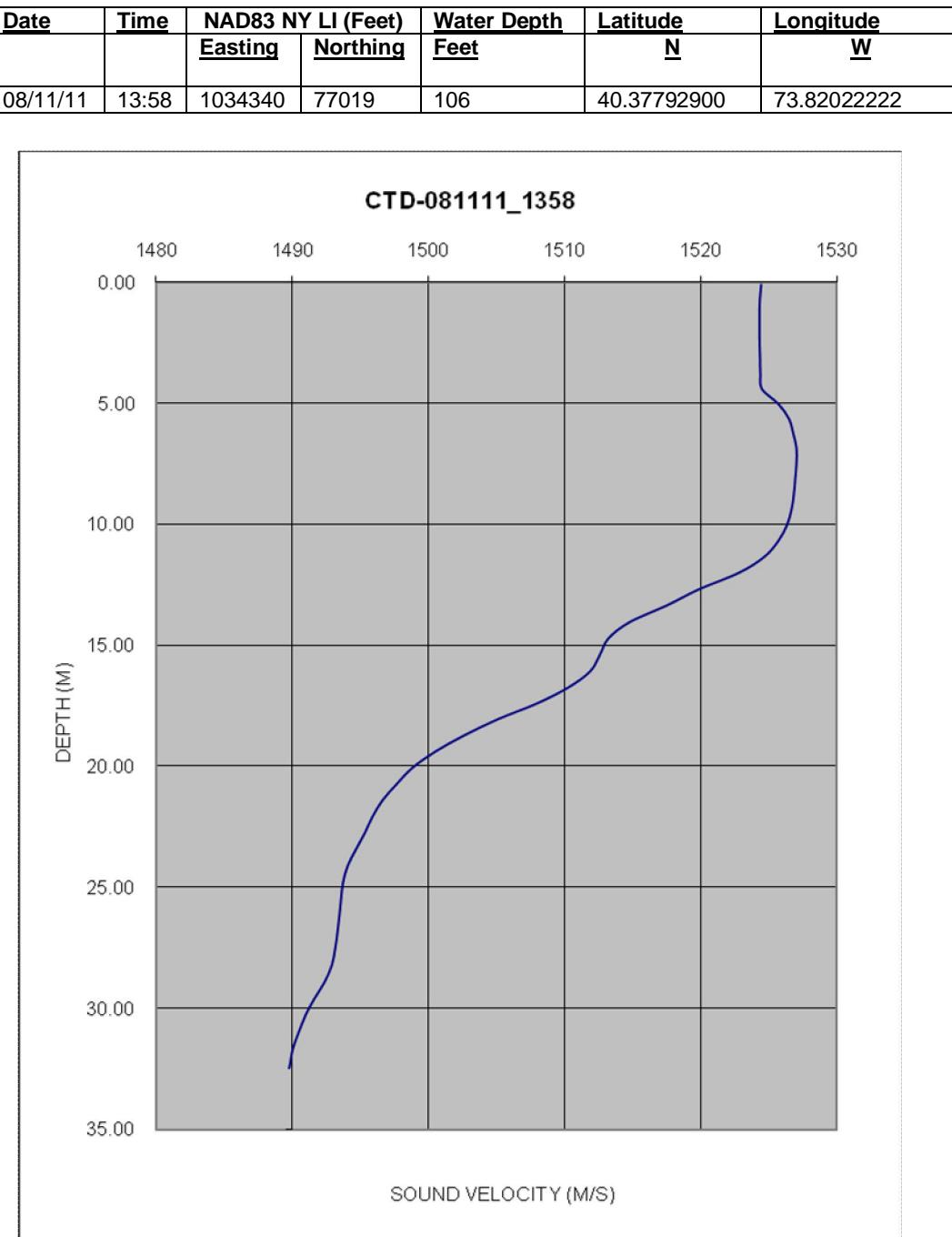


Figure 3.2-13
SVP 081111_1620 taken during the Fall 2011 multibeam survey at the HARS

1524.96	0.22
1524.97	1.01
1524.99	1.76
1524.88	2.45
1524.77	3.08
1524.70	3.72
1524.77	4.35
1525.00	4.98
1525.64	5.60
1526.34	6.23
1526.84	6.86
1527.03	7.51
1526.93	8.15
1526.79	8.79
1526.65	9.44
1526.41	10.11
1525.84	10.77
1525.07	11.44
1523.13	12.11
1519.08	12.77
1515.82	13.43
1513.78	14.09
1511.08	14.76
1508.45	15.44
1506.90	16.12
1506.20	16.80
1505.93	17.48
1505.73	18.16
1505.23	18.84
1503.85	19.53
1500.39	20.22
1497.69	20.90
1496.35	21.59
1495.65	22.26
1495.20	22.93
1494.76	23.61
1494.34	24.30
1494.08	24.99
1493.94	25.68
1493.85	26.37
1493.78	27.05
1493.71	27.74
1493.65	28.42
1493.55	29.09
1493.49	29.69
1493.83	29.85

CTD PROFILE # 081111_1620

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
08/11/11	16:20	1032054	86674	98	40.40444514 73.82835636

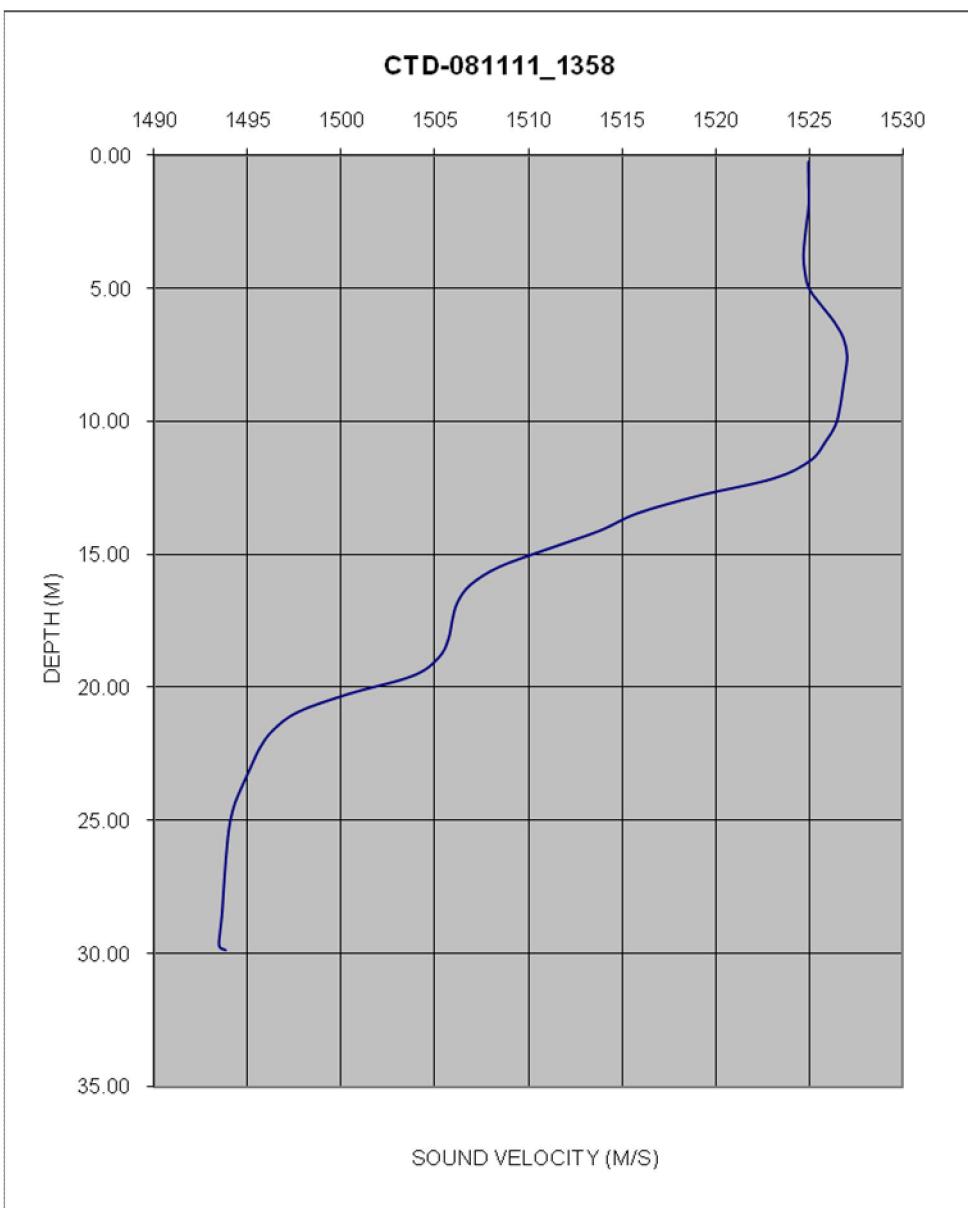


Figure 3.2-14
SVP 081111_1806 taken during the Fall 2011 multibeam survey at the HARS

1526.15	0.49
1525.82	1.26
1525.40	2.01
1525.03	2.73
1524.99	3.40
1525.21	4.04
1525.58	4.69
1526.21	5.34
1526.73	5.99
1526.96	6.65
1526.93	7.32
1526.75	7.99
1526.46	8.68
1526.10	9.35
1525.76	10.03
1525.19	10.72
1523.58	11.41
1521.09	12.08
1518.19	12.75
1515.65	13.41
1514.12	14.06
1513.44	14.73
1512.15	15.38
1509.86	16.05
1507.43	16.71
1505.73	17.38
1504.91	18.06
1504.34	18.75
1502.88	19.45
1499.65	20.13
1497.00	20.82
1495.92	21.51
1495.42	22.21
1495.14	22.91
1494.94	23.61
1494.84	24.31
1494.76	25.01
1494.70	25.70
1494.63	26.37
1494.53	27.04
1494.29	27.71
1494.03	28.07

CTD PROFILE # 081111_1806

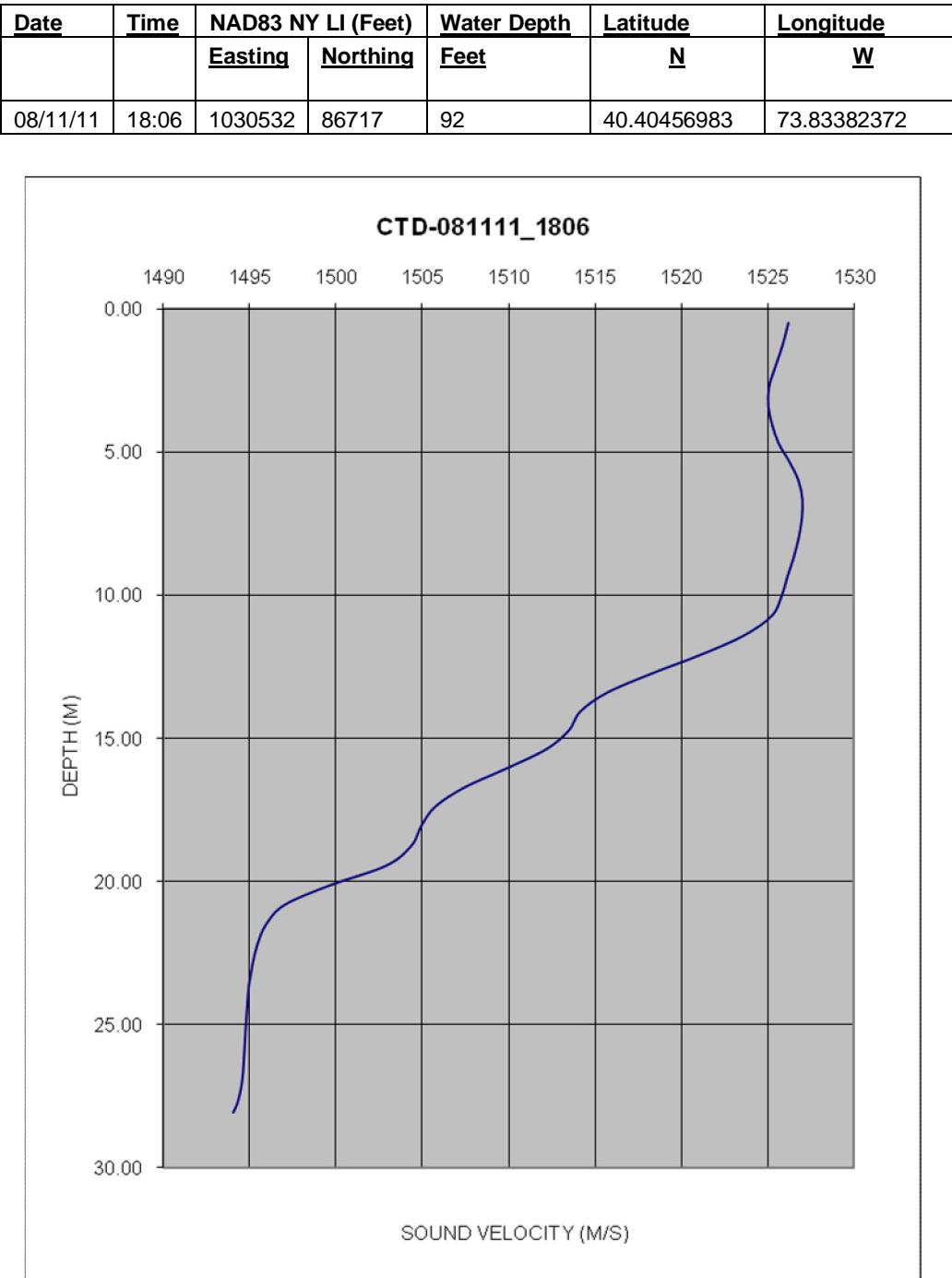


Figure 3.2-15
SVP 081111_2000 taken during the Fall 2011 multibeam survey at the HARS

1527.27	0.02
1526.85	0.82
1526.54	1.67
1526.12	2.52
1525.71	3.28
1525.48	3.97
1525.81	4.66
1525.97	5.31
1526.05	5.95
1526.11	6.58
1526.27	7.22
1526.62	7.88
1526.94	8.54
1527.04	9.21
1526.96	9.89
1526.68	10.57
1526.31	11.24
1525.91	11.92
1525.19	12.59
1521.65	13.25
1516.69	13.91
1512.27	14.58
1508.52	15.26
1506.34	15.94
1505.49	16.64
1505.05	17.33
1504.56	18.03
1503.66	18.73
1501.98	19.43
1499.62	20.11
1497.62	20.80
1496.31	21.49
1495.53	22.18
1495.19	22.87
1495.02	23.57
1494.86	24.26
1494.75	24.96
1494.83	25.56

CTD PROFILE # 081111 2000

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
08/11/11	20:00	1028896	86751	84	40.40467277 73.83969581

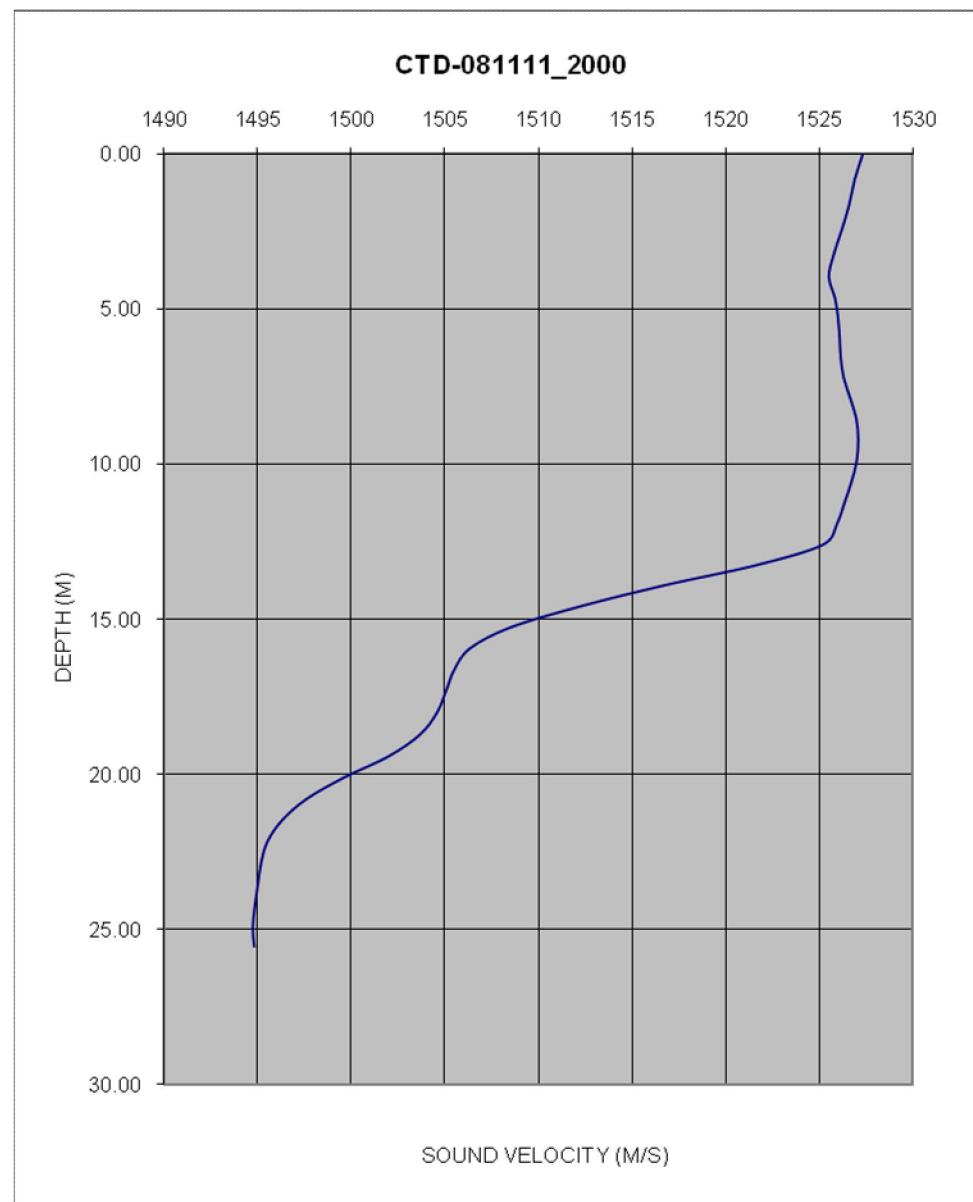


Figure 3.2-16
SVP 081111_2156 taken during the Fall 2011 multibeam survey at the HARS

1527.11	0.17
1526.97	0.86
1526.93	1.57
1526.92	2.26
1526.89	2.91
1526.79	3.51
1526.64	4.08
1526.49	4.64
1526.38	5.21
1526.35	5.80
1526.31	6.37
1526.43	6.95
1526.52	7.53
1526.70	8.13
1526.90	8.74
1526.92	9.34
1526.80	9.95
1526.48	10.57
1526.05	11.19
1525.50	11.81
1523.93	12.44
1520.66	13.08
1517.55	13.72
1514.18	14.37
1511.73	15.01
1510.49	15.66
1509.67	16.32
1508.60	16.97
1507.05	17.63
1505.26	18.28
1502.15	18.94
1499.31	19.59
1497.71	20.26
1496.53	20.94
1495.86	21.62
1495.57	22.31
1495.49	23.00
1495.90	23.30
1496.82	23.35
1497.21	23.42

CTD PROFILE # 081111 2156

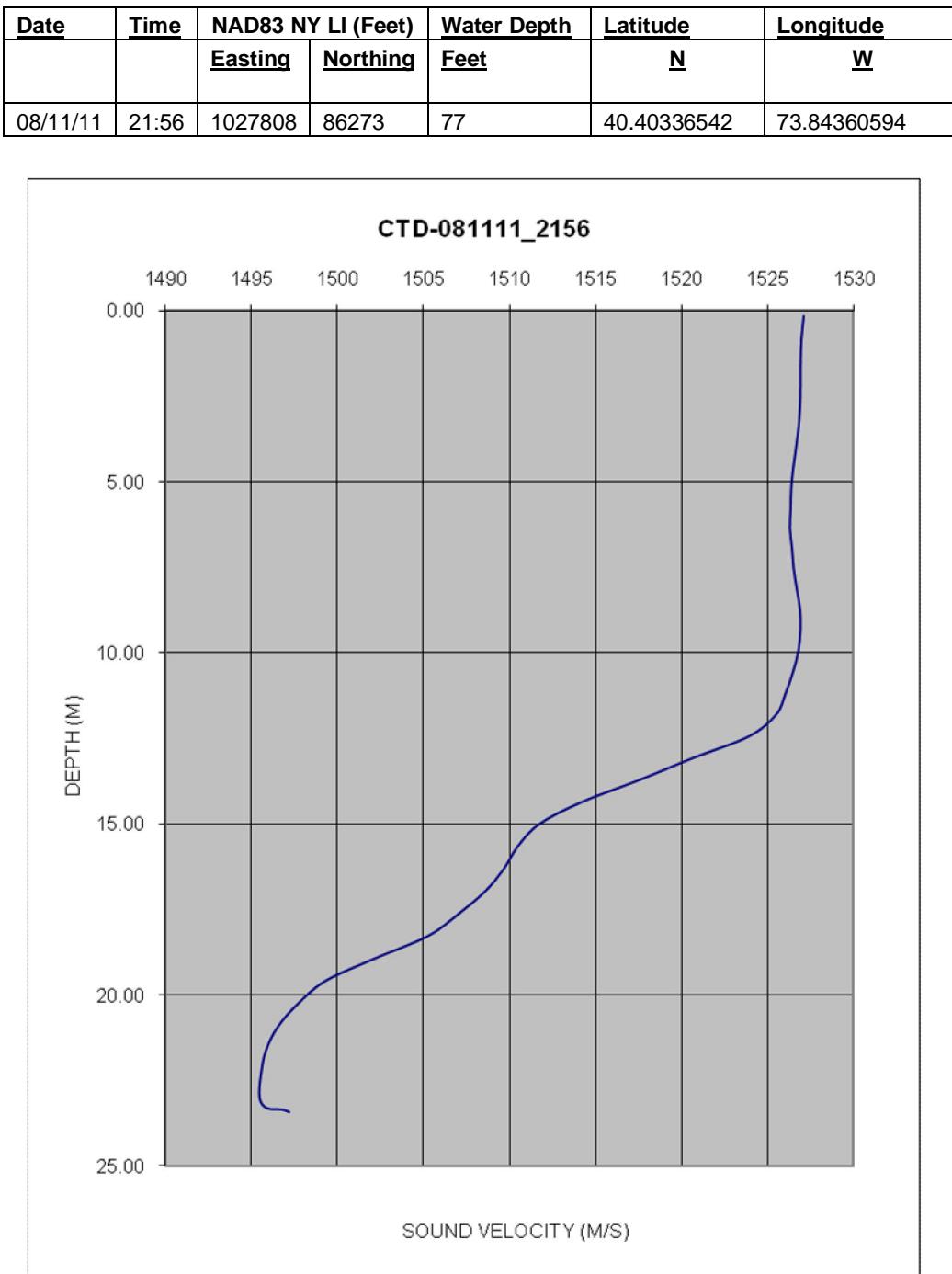


Figure 3.2-17
SVP 081211_1310 taken during the Fall 2011 multibeam survey at the HARS

1526.22 0.10

1526.35 0.86

1526.39 1.58

CTD PROFILE # 081211 1310

1526.42 2.26

1526.45 2.90

1526.49 3.49

1526.53 4.05

1526.56 4.65

1526.58 5.26

1526.62 5.87

1526.66 6.47

1526.74 7.07

1526.91 7.68

1527.02 8.28

1527.05 8.91

1527.00 9.54

1526.89 10.17

1526.75 10.80

1526.58 11.43

1525.46 12.09

1520.14 12.75

1515.01 13.41

1511.72 14.05

1510.23 14.71

1509.57 15.35

1508.93 16.01

1507.79 16.68

1506.37 17.32

1504.23 17.98

1502.43 18.63

1499.96 19.29

1497.03 19.95

1495.70 20.61

1495.33 21.28

1495.23 21.95

1495.22 22.47

1495.23 22.55

<u>Date</u>	<u>Time</u>	<u>NAD83 NY LI (Feet)</u>		<u>Water Depth</u>	<u>Latitude</u>	<u>Longitude</u>
		<u>Easting</u>	<u>Northing</u>	<u>Feet</u>	<u>N</u>	<u>W</u>
08/12/11	13:10	1027811	86183	74	40.40311903	73.84359430

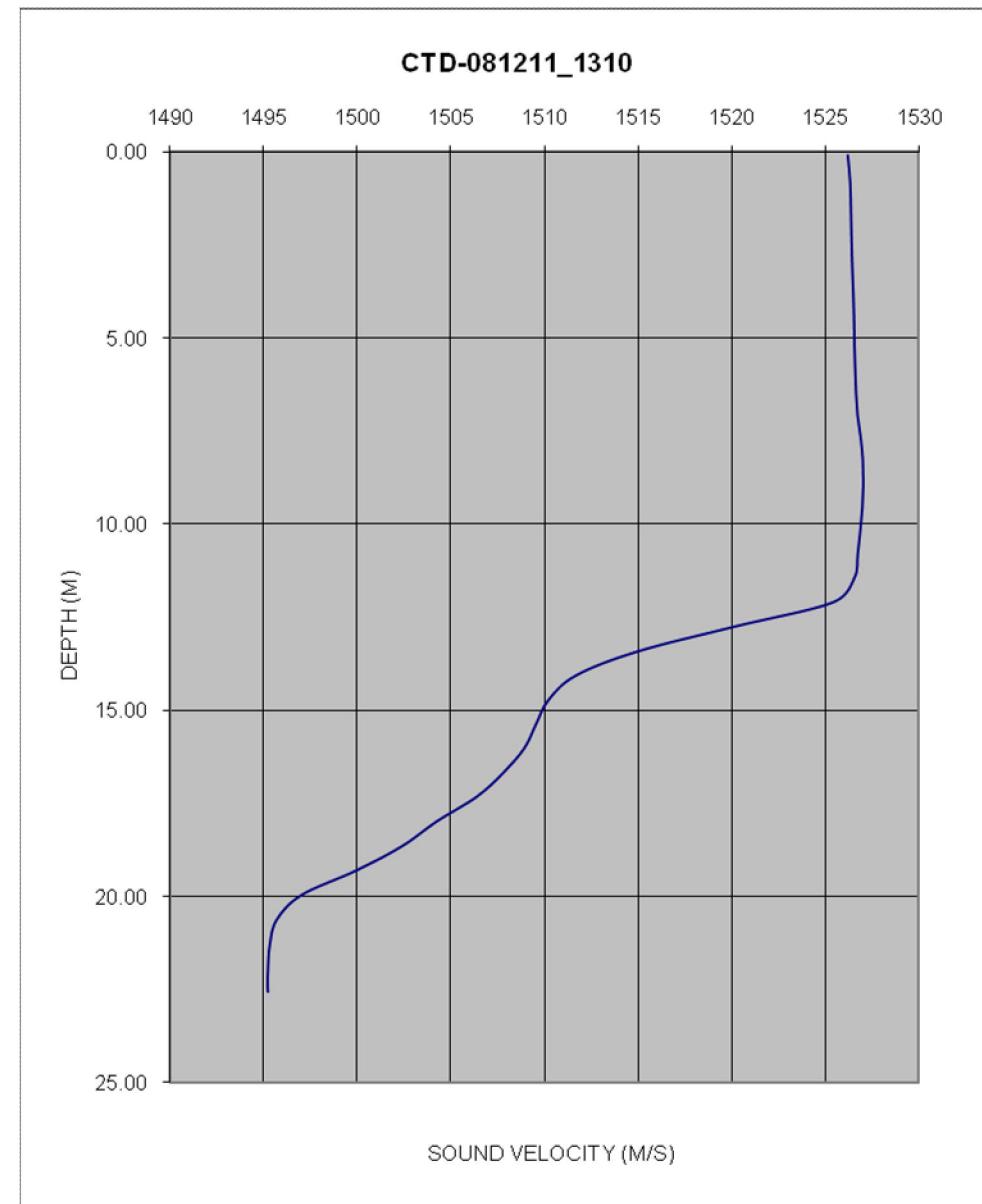


Figure 3.2-18
SVP 081211_1519 taken during the Fall 2011 multibeam survey at the HARS

1527.82	0.30
1527.77	0.99
1527.74	1.64
1527.73	2.23
1527.71	2.78
1527.70	3.33
1527.70	3.90
1527.69	4.47
1527.67	5.04
1527.64	5.62
1527.60	6.22
1527.57	6.81
1527.50	7.40
1527.29	7.99
1526.95	8.60
1526.55	9.21
1526.11	9.81
1524.97	10.42
1523.37	11.05
1521.34	11.70
1519.62	12.34
1516.36	12.99
1513.31	13.64
1510.86	14.28
1508.84	14.93
1507.06	15.57
1505.06	16.21
1503.26	16.86
1502.44	17.44
1502.72	17.61

CTD PROFILE # 081211 1519

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
08/12/11	15:19	1027320	77136	58	40.37828828 73.84541598

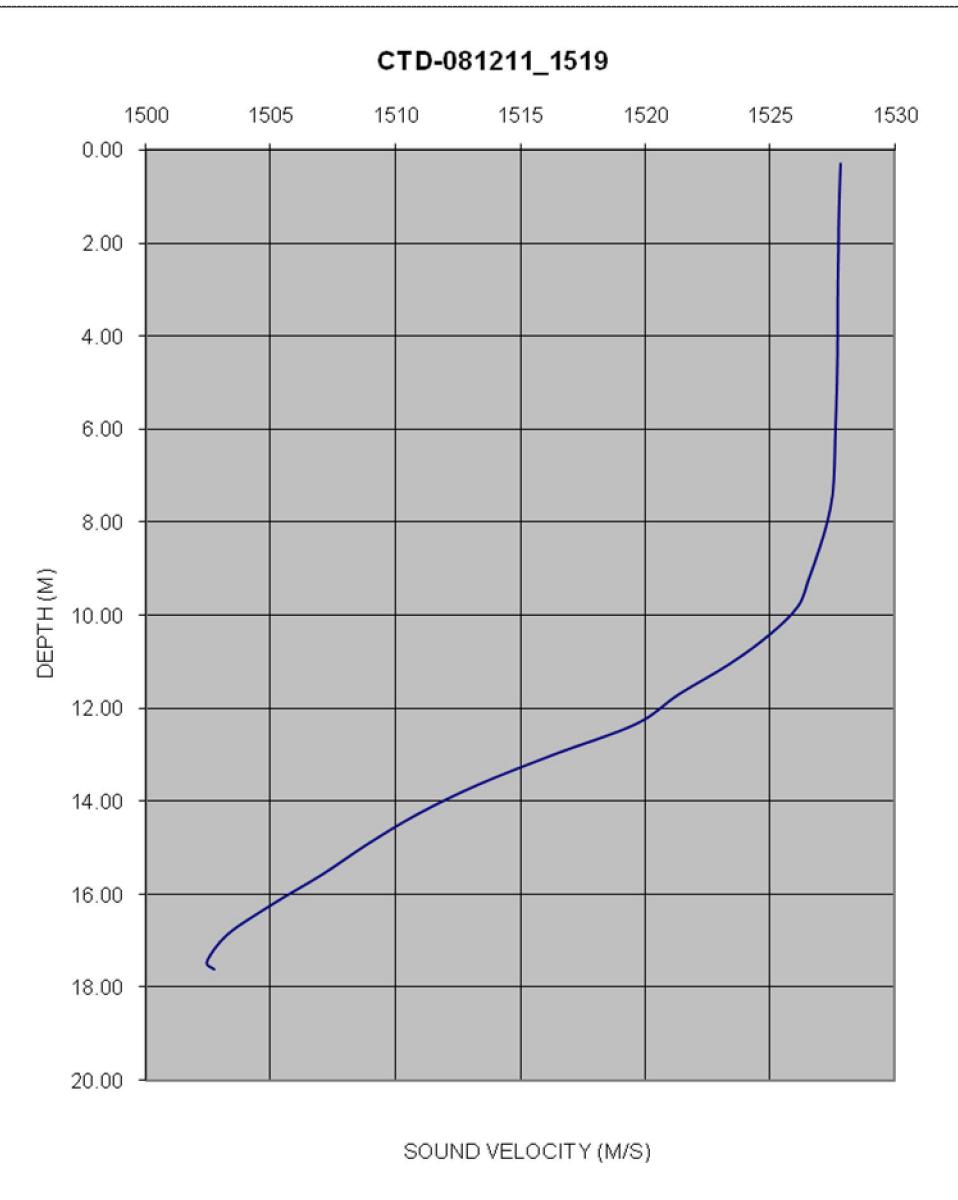


Figure 3.2-19
SVP 081211_1711 taken during the Fall 2011 multibeam survey at the HARS

1528.00	0.29
1527.81	0.99
1527.63	1.69
1527.49	2.36
1527.40	2.99
1527.35	3.63
1527.29	4.24
1527.21	4.82
1526.97	5.41
1526.66	6.03
1526.34	6.66
1525.73	7.30
1525.20	7.93
1523.29	8.57
1519.89	9.22
1517.60	9.87
1516.54	10.53
1516.19	11.18
1516.10	11.84
1516.10	12.50
1515.57	13.16
1513.67	13.81
1512.00	14.47
1510.44	15.13
1508.81	15.79
1506.69	16.47
1504.36	17.14
1502.93	17.82
1502.22	18.50
1501.49	19.14
1501.48	19.35

CTD PROFILE # 081211_1711

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
08/12/11	17:11	1024564	76914	63	40.37769113 73.85530879

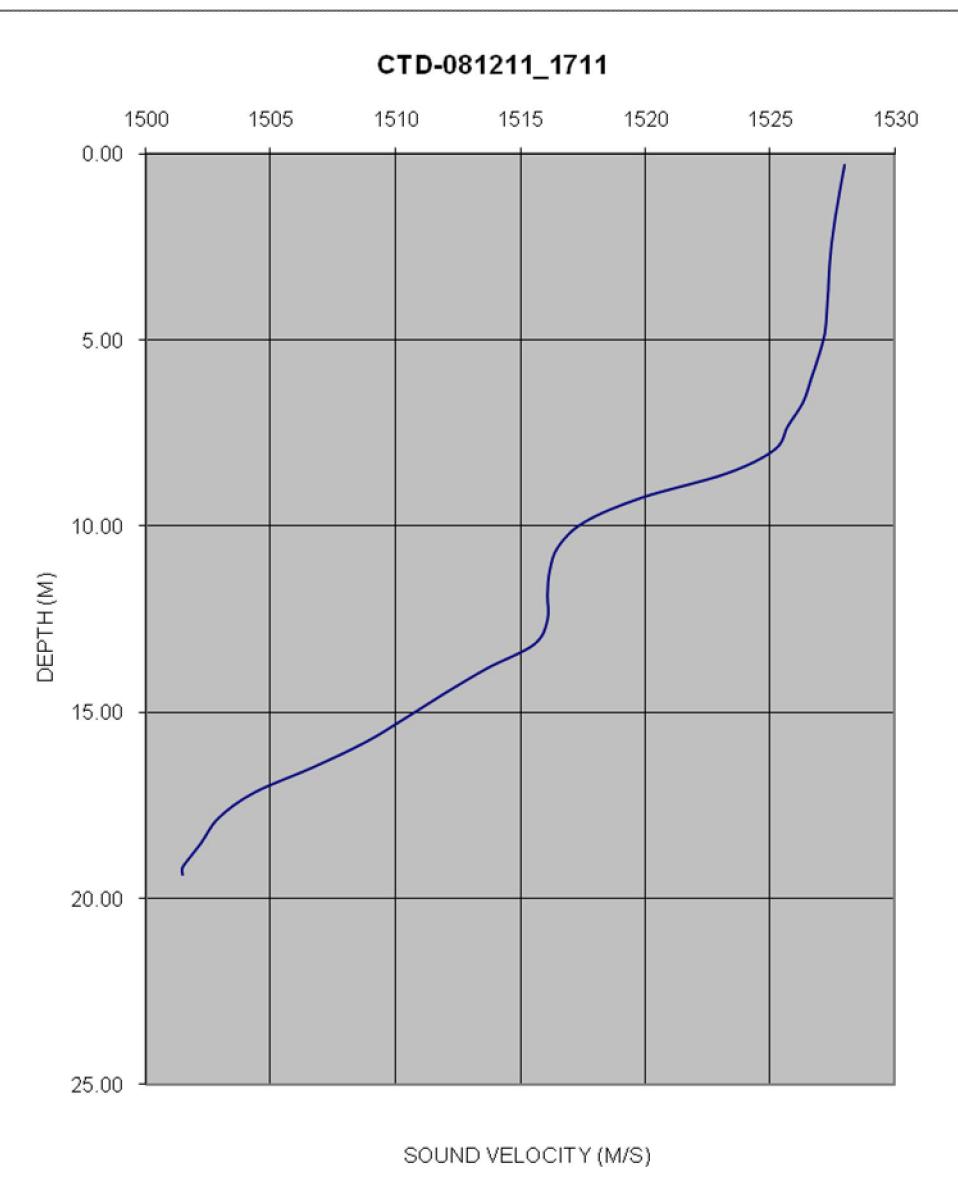


Figure 3.2-20
SVP 081211_1916 taken during the Fall 2011 multibeam survey at the HARS

1527.59	0.35
1527.47	1.06
1527.39	1.81
1527.04	2.61
1526.89	3.40
1526.82	4.17
1526.60	4.87
1526.17	5.54
1525.74	6.22
1525.35	6.89
1524.86	7.56
1524.11	8.21
1523.45	8.87
1523.17	9.51
1523.06	10.16
1522.97	10.82
1522.20	11.49
1520.11	12.13
1517.17	12.75
1514.68	13.37
1512.90	13.98
1510.11	14.58
1507.24	15.20
1505.68	15.80
1505.09	16.38
1504.91	16.60

CTD PROFILE # 081211 1916

<u>Date</u>	<u>Time</u>	<u>NAD83 NY LI (Feet)</u>	<u>Water Depth</u>	<u>Latitude</u>	<u>Longitude</u>
		<u>Easting</u>	<u>Northing</u>	<u>Feet</u>	<u>N</u>
08/12/11	19:16	1023972	86140	54	40.40301811 73.85738120

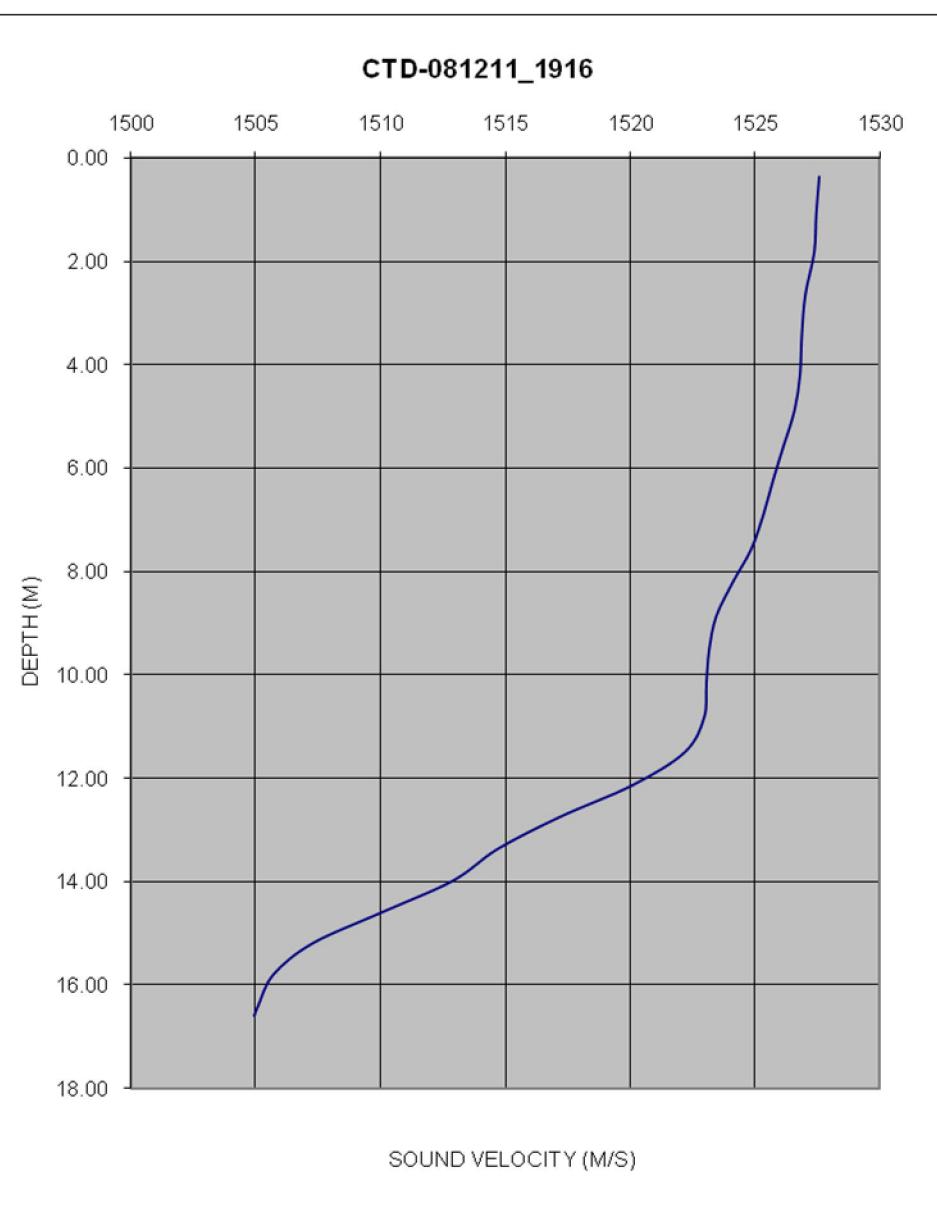


Figure 3.2-21
SVP 081211_2057 taken during the Fall 2011 multibeam survey at the HARS

1529.76	0.02
1529.69	0.67
1529.77	1.33
1529.70	1.96
1529.39	2.56
1529.05	3.17
1528.63	3.81
1528.25	4.48
1527.97	5.15
1527.76	5.82
1527.60	6.48
1527.51	7.13
1527.47	7.79
1527.41	8.45
1527.27	9.11
1526.94	9.77
1525.57	10.44
1522.08	11.11
1517.56	11.77
1513.54	12.46
1510.34	13.15
1508.09	13.84
1506.35	14.53
1505.33	15.23
1504.84	15.90
1504.62	16.57
1504.50	17.24
1504.39	17.92
1503.88	18.61
1502.92	19.30
1501.81	19.98
1501.00	20.65
1500.37	21.31
1499.85	21.97
1499.80	22.28

CTD PROFILE # 081211 2057

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
08/12/11	20:57	1030598	79091	73	40.38363736 73.83363682

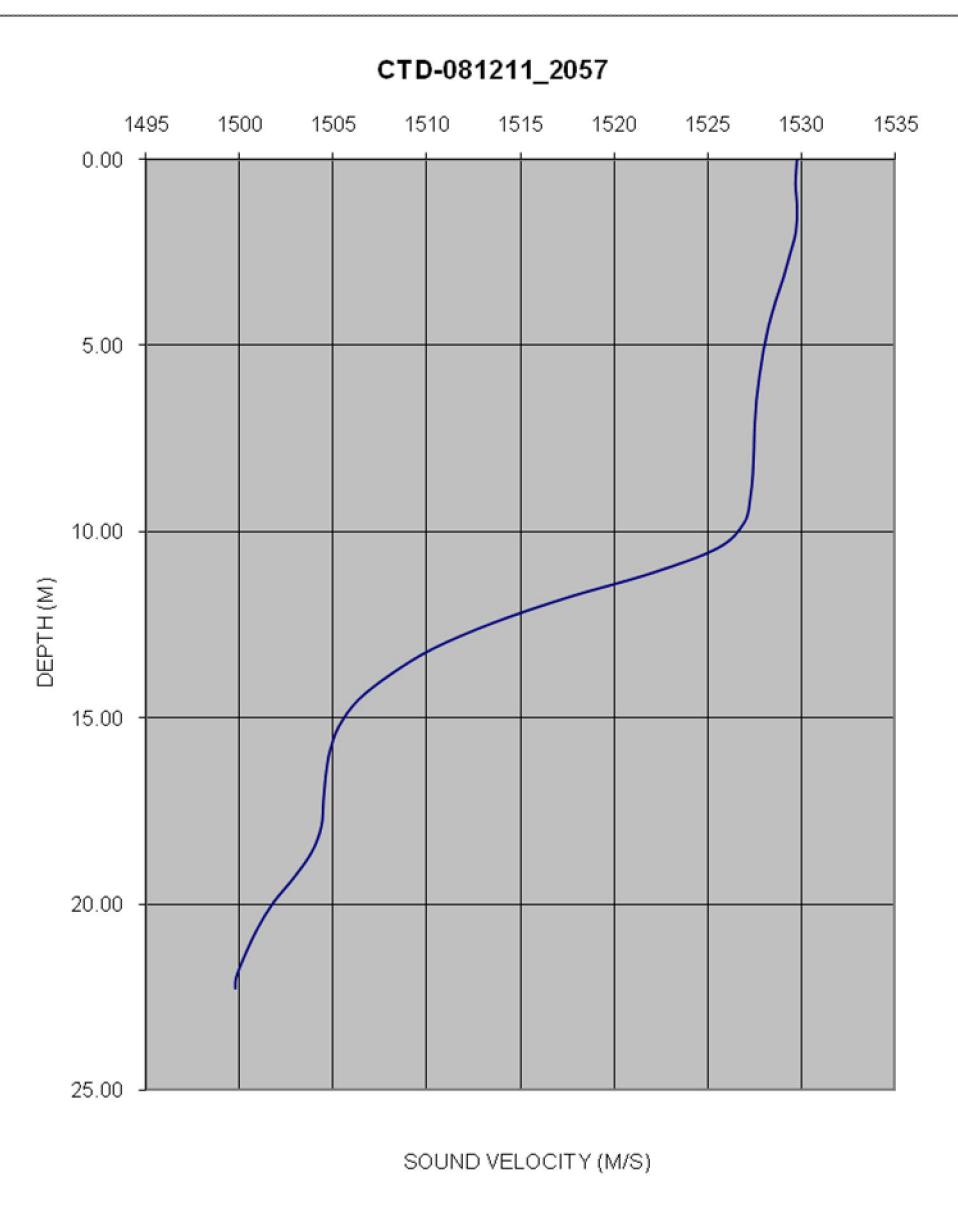


Figure 3.2-22
SVP 081611_1158 taken during the Fall 2011 multibeam survey at the HARS

1520.80	0.58
1520.78	1.42
1520.78	2.19
1520.78	2.89
1520.72	3.50
1520.65	4.09
1520.49	4.65
1520.25	5.23
1519.94	5.78
1519.63	6.34
1519.26	6.91
1518.41	7.48
1517.25	8.05
1516.29	8.63
1515.58	9.21
1515.00	9.80
1514.60	10.40
1513.00	11.01
1511.16	11.62
1509.38	12.23
1507.78	12.85
1506.45	13.46
1505.39	14.07
1504.76	14.70
1504.41	15.33
1504.17	15.98
1503.78	16.64
1503.23	17.30
1502.76	17.96
1502.41	18.63
1502.01	19.29
1501.61	19.96
1501.26	20.63
1500.83	21.30
1500.41	21.96
1500.07	22.65
1499.74	23.35
1499.49	24.03
1499.27	24.70
1499.05	25.38
1498.72	26.04
1498.42	26.70
1498.25	27.38
1498.18	28.09
1498.14	28.79
1498.12	29.47
1498.10	30.16
1498.10	30.83
1498.25	31.11

CTD PROFILE # 081611_1158

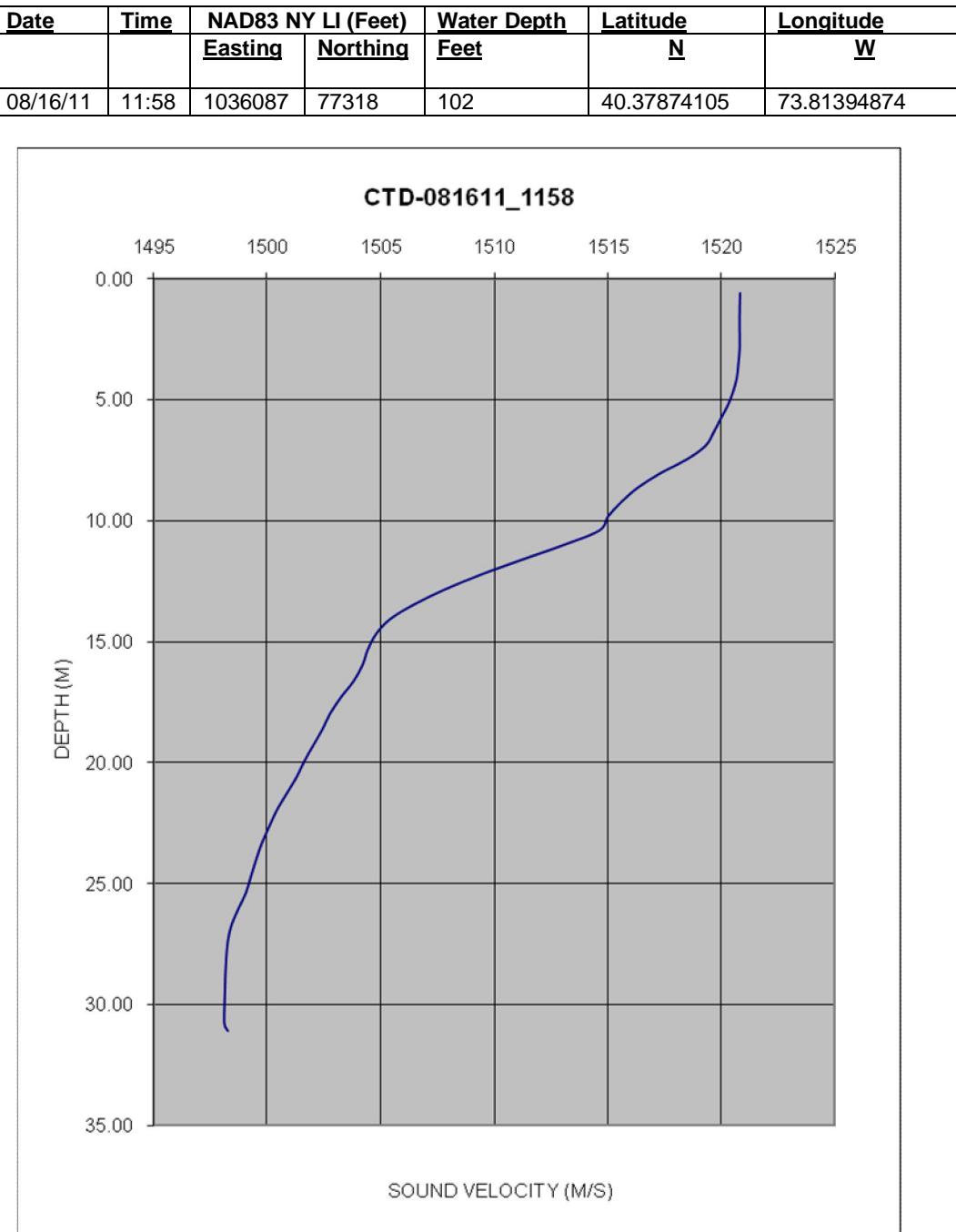


Figure 3.2-23
SVP 081611_1414 taken during the Fall 2011 multibeam survey at the HARS

1521.12	0.73
1521.10	1.49
1521.11	2.24
1521.12	3.04
1521.14	3.82
1521.17	4.57
1521.21	5.29
1521.18	5.98
1520.84	6.65
1520.35	7.32
1519.58	7.98
1518.20	8.63
1517.28	9.29
1516.99	9.96
1516.75	10.63
1516.12	11.32
1514.92	12.00
1513.63	12.69
1511.94	13.38
1509.95	14.10
1508.47	14.82
1507.22	15.52
1506.03	16.25
1505.10	16.97
1504.33	17.71
1503.67	18.45
1503.11	19.19
1502.76	19.95
1502.47	20.71
1501.97	21.47
1501.32	22.22
1500.67	22.98
1500.14	23.73
1499.55	24.48
1498.83	25.22
1498.40	25.98
1498.23	26.73
1498.17	27.49
1498.15	28.24
1498.15	28.98
1498.14	29.72
1498.14	30.46
1498.13	31.19
1498.01	31.90
1497.79	32.61
1497.49	33.29
1497.38	33.78
1497.62	33.81

CTD PROFILE # 081611 1414

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
08/16/11	14:14	1033636	67799	111	40.35262695 73.82281485

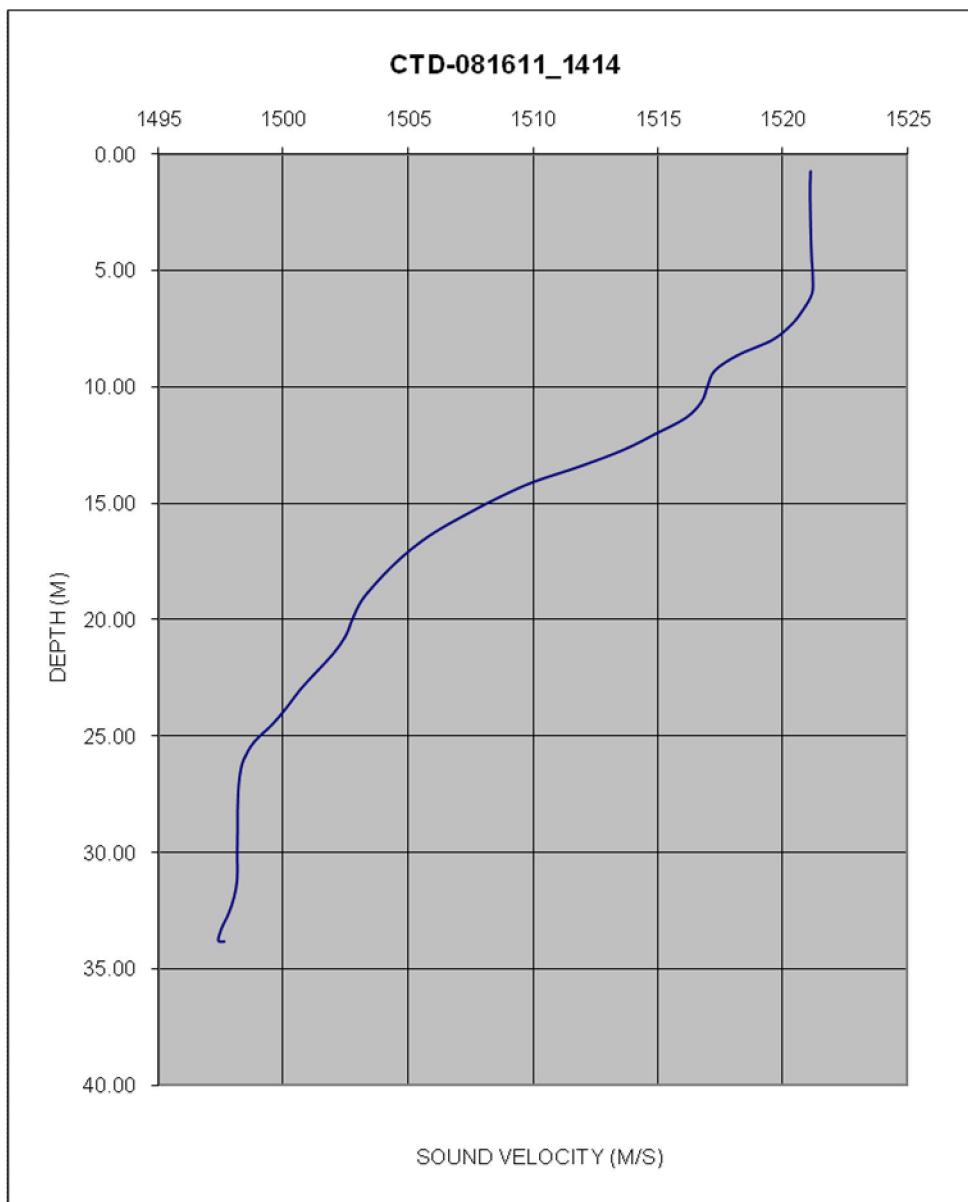


Figure 3.2-24
SVP 081611_1625 taken during the Fall 2011 multibeam survey at the HARS

1520.83	0.59
1520.78	1.22
1520.77	1.92
1520.78	2.64
1520.79	3.33
1520.80	4.01
1520.79	4.68
1520.74	5.34
1520.65	5.99
1520.48	6.65
1519.93	7.30
1518.92	7.98
1517.89	8.65
1516.69	9.32
1515.66	10.02
1514.91	10.76
1513.75	11.46
1512.59	12.16
1511.74	12.84
1510.70	13.55
1509.67	14.14
1508.99	14.71
1508.27	15.38
1507.18	16.12
1505.75	16.82
1504.59	17.55
1503.47	18.27
1502.54	18.99
1502.10	19.71
1501.95	20.42
1501.88	21.17
1501.84	21.87
1501.73	22.59
1501.60	23.28
1501.42	23.98
1501.27	24.68
1501.21	25.38
1501.18	26.08
1501.11	26.77
1501.07	27.43
1501.20	27.78

CTD PROFILE # 081611_1625

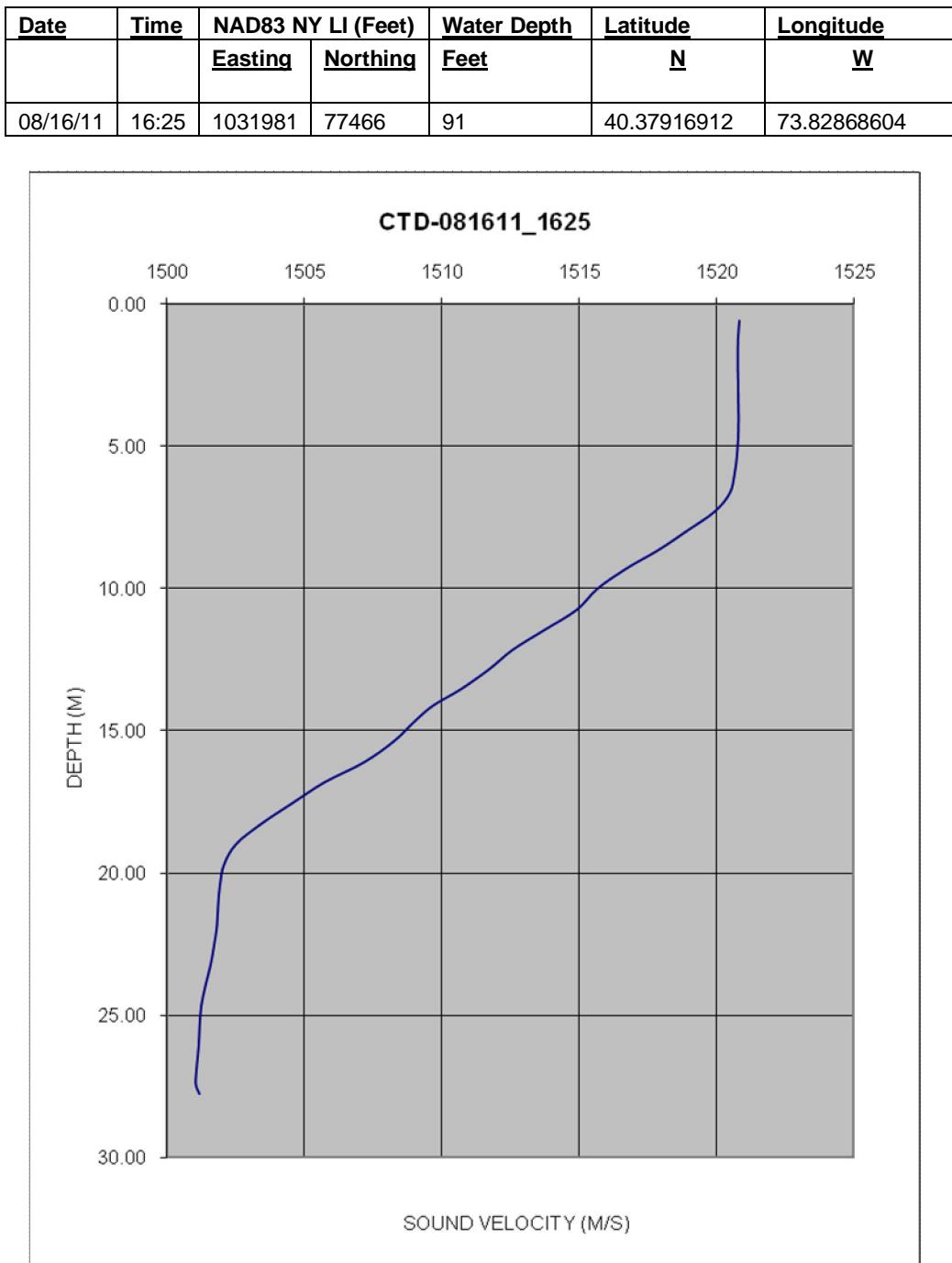


Figure 3.2-25
SVP 081611_1839 taken during the Fall 2011 multibeam survey at the HARS

1521.89 0.42

CTD PROFILE # 081611 1839

1521.59 1.21

1521.07 2.03

<u>Date</u>	<u>Time</u>	<u>NAD83 NY LI (Feet)</u>	<u>Water Depth</u>	<u>Latitude</u>	<u>Longitude</u>			
		<u>Easting</u>	<u>Northing</u>	<u>Feet</u>	<u>N</u>			
1520.56	2.86							
1520.15	3.69							
1519.92	4.53	08/16/11	18:39	1029869	67902	86	40.35293033	73.83632850

1519.82 5.36

1519.70 6.16

1518.67 6.91

1517.69 7.62

1517.06 8.33

1516.29 9.01

1514.82 9.69

1512.89 10.36

1511.40 11.05

1510.29 11.76

1508.86 12.48

1507.76 13.20

1506.84 13.90

1505.26 14.59

1504.22 15.27

1503.76 15.96

1503.45 16.65

1503.30 17.35

1503.28 18.06

1503.13 18.78

1502.64 19.50

1502.03 20.21

1501.52 20.93

1501.23 21.63

1501.09 22.33

1501.00 23.03

1500.91 23.73

1500.85 24.43

1500.82 25.12

1500.81 25.82

1500.96 26.20

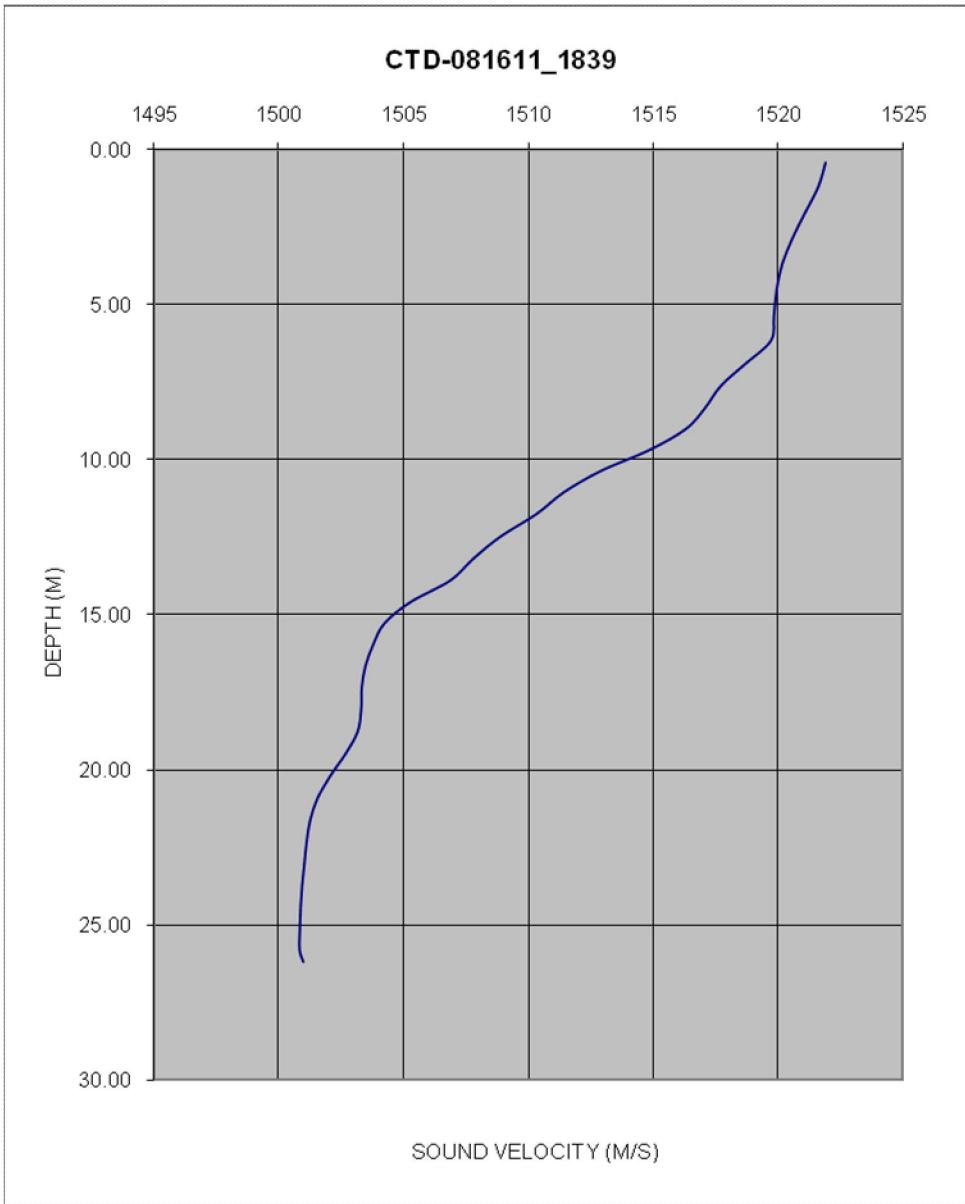


Figure 3.2-26
SVP 081611_2043 taken during the Fall 2011 multibeam survey at the HARS

1521.68	0.15
1521.68	0.82
1521.68	1.48
1521.71	2.12
1521.58	2.76
1521.36	3.39
1521.11	4.04
1520.70	4.71
1520.03	5.34
1518.67	5.92
1517.62	6.49
1517.06	7.07
1516.91	7.64
1516.97	8.22
1517.09	8.80
1517.18	9.37
1516.97	9.93
1516.42	10.50
1515.03	11.08
1513.24	11.67
1511.03	12.28
1509.41	12.90
1508.60	13.52
1508.24	14.16
1507.97	14.81
1507.45	15.47
1506.41	16.13
1505.62	16.80
1505.22	17.48
1505.04	17.94
1504.97	18.01

CTD PROFILE # 081611_2043

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
08/16/11	20:43	1028759	77375	59	40.37893655 73.84024974

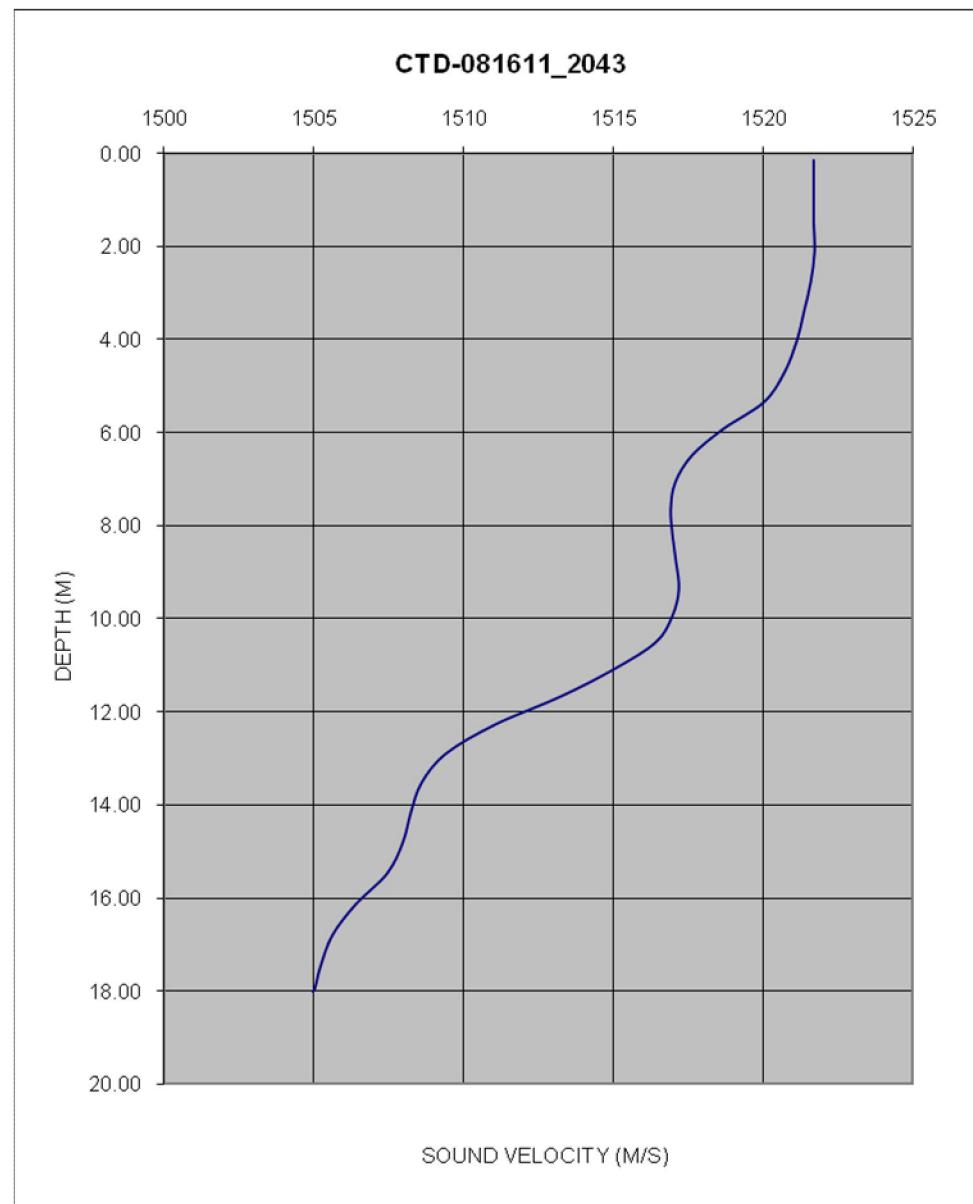


Figure 3.2-27
SVP 081611_2206 taken during the Fall 2011 multibeam survey at the HARS

1521.79	0.39
1521.67	1.13
1521.56	1.82
1521.49	2.50
1521.48	3.17
1521.55	3.83
1521.46	4.48
1521.07	5.14
1520.47	5.78
1519.85	6.41
1519.18	7.03
1518.00	7.64
1517.69	8.25
1518.09	8.87
1518.01	9.49
1516.70	10.12
1514.28	10.76
1511.56	11.43
1509.54	12.10
1508.14	12.78
1507.20	13.47
1506.60	14.17
1506.19	14.87
1505.79	15.56
1505.32	16.24
1504.91	16.92
1504.68	17.59
1504.56	18.25
1504.36	18.90
1504.38	19.19
1504.78	19.22
1505.05	19.26

CTD PROFILE # 081611 2206

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
08/16/11	22:06	1028296	77076	63	40.37811881 73.84191338

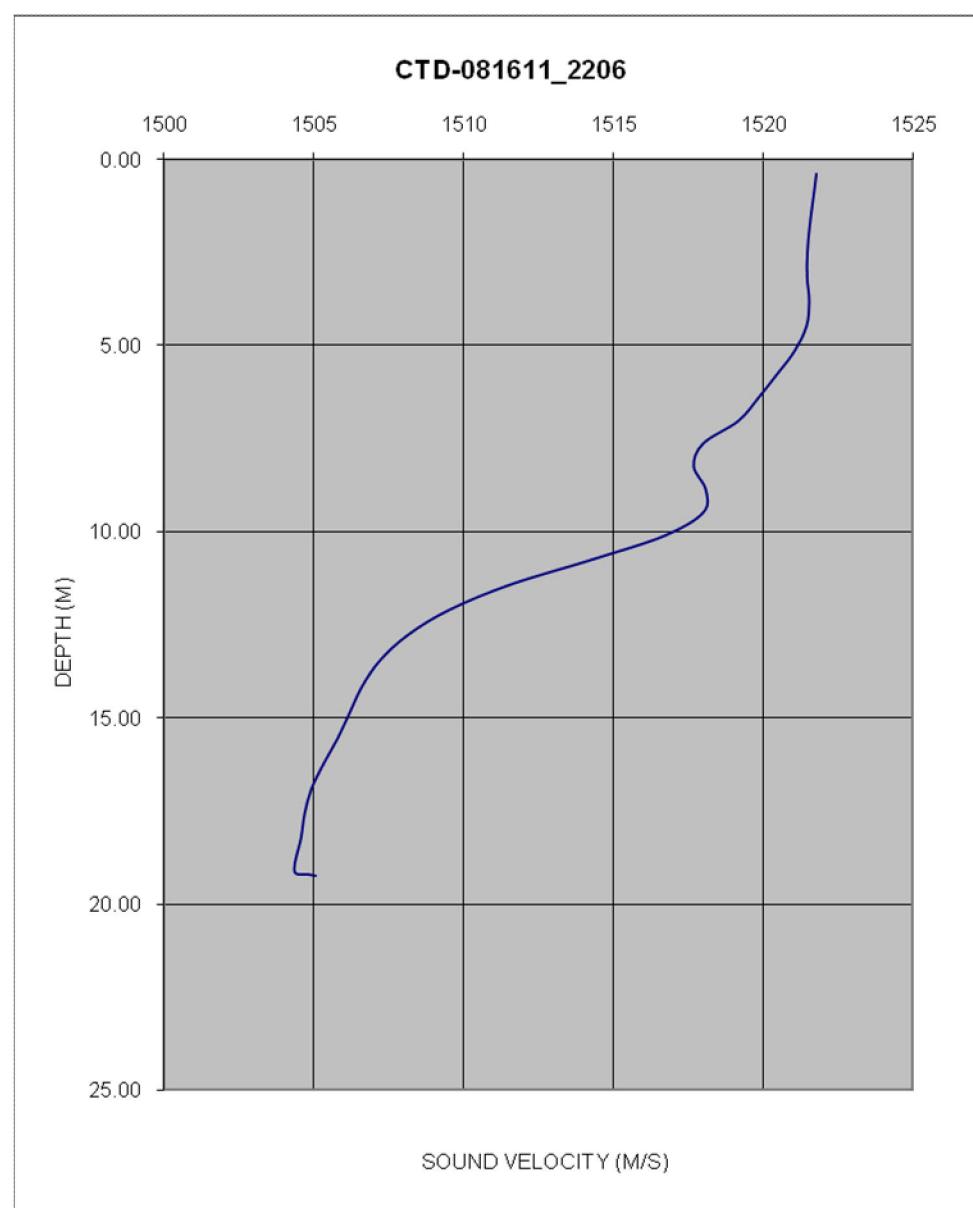


Figure 3.2-28
SVP 081711_1243 taken during the Fall 2011 multibeam survey at the HARS

1519.79	0.51
1519.88	1.23
1520.02	1.85
1520.49	2.46
1521.00	3.10
1521.45	3.75
1521.99	4.39
1522.64	5.04
1523.46	5.69
1524.25	6.33
1524.74	6.97
1524.64	7.61
1523.68	8.25
1521.82	8.89
1519.87	9.53
1516.17	10.18
1513.98	10.83
1513.12	11.47
1511.68	12.12
1509.49	12.79
1508.07	13.46
1507.29	14.13
1506.68	14.80
1506.02	15.47
1505.41	16.14
1505.02	16.80
1504.82	17.47
1504.74	18.13
1504.69	18.79
1504.66	19.43
1504.64	20.07
1504.63	20.64
1504.72	21.02
1504.75	21.05

CTD PROFILE # 081711_1243

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
08/17/11	12:43	1024017	77217	69	40.37852710 73.85727143

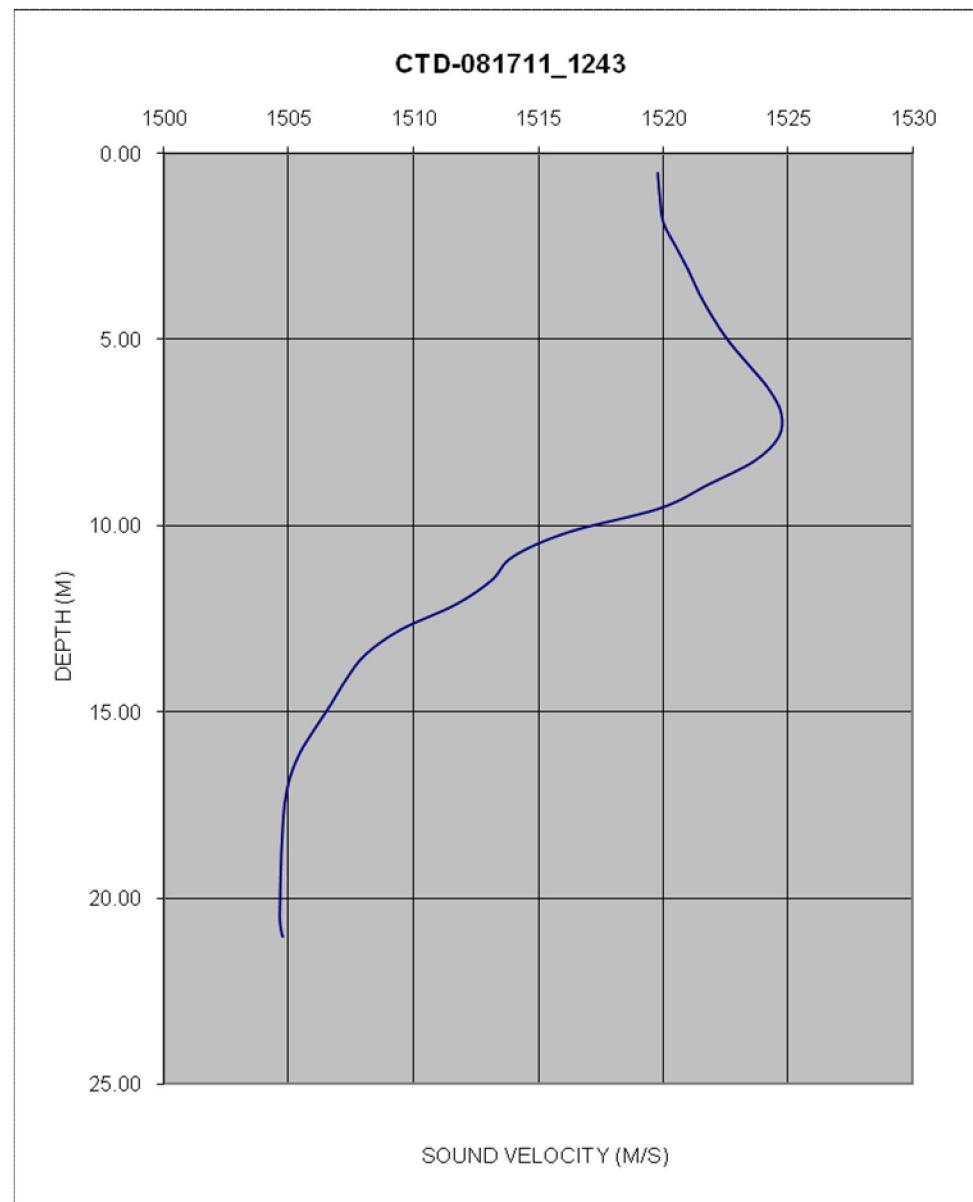


Figure 3.2-29
SVP 081711_1448 taken during the Fall 2011 multibeam survey at the HARS

1521.62 0.33

1522.57 1.09

1523.55 1.85

CTD PROFILE # 081711_1448

1524.19 2.56

1524.48 3.23

1524.66 3.87

<u>Date</u>	<u>Time</u>	<u>NAD83 NY LI (Feet)</u>	<u>Water Depth</u>	<u>Latitude</u>	<u>Longitude</u>
		<u>Easting</u>	<u>Northing</u>	<u>Feet</u>	<u>N</u>
08/17/11	14:48	1025155	67704	77	40.35240923 73.85324316

1524.79 4.51

1524.91 5.15

1525.08 5.79

1525.37 6.44

1525.60 7.09

1525.74 7.74

1525.80 8.40

1525.89 9.05

1525.01 9.69

1522.69 10.34

1520.48 11.00

1517.69 11.66

1515.76 12.32

1515.07 12.97

1514.96 13.63

1514.69 14.29

1513.68 14.94

1511.54 15.60

1509.44 16.27

1507.56 16.93

1506.43 17.58

1505.64 18.23

1504.81 18.88

1504.24 19.52

1503.97 20.17

1503.85 20.83

1503.75 21.48

1503.66 22.13

1503.58 22.79

1503.62 23.29

1504.03 23.36

1504.51 23.39

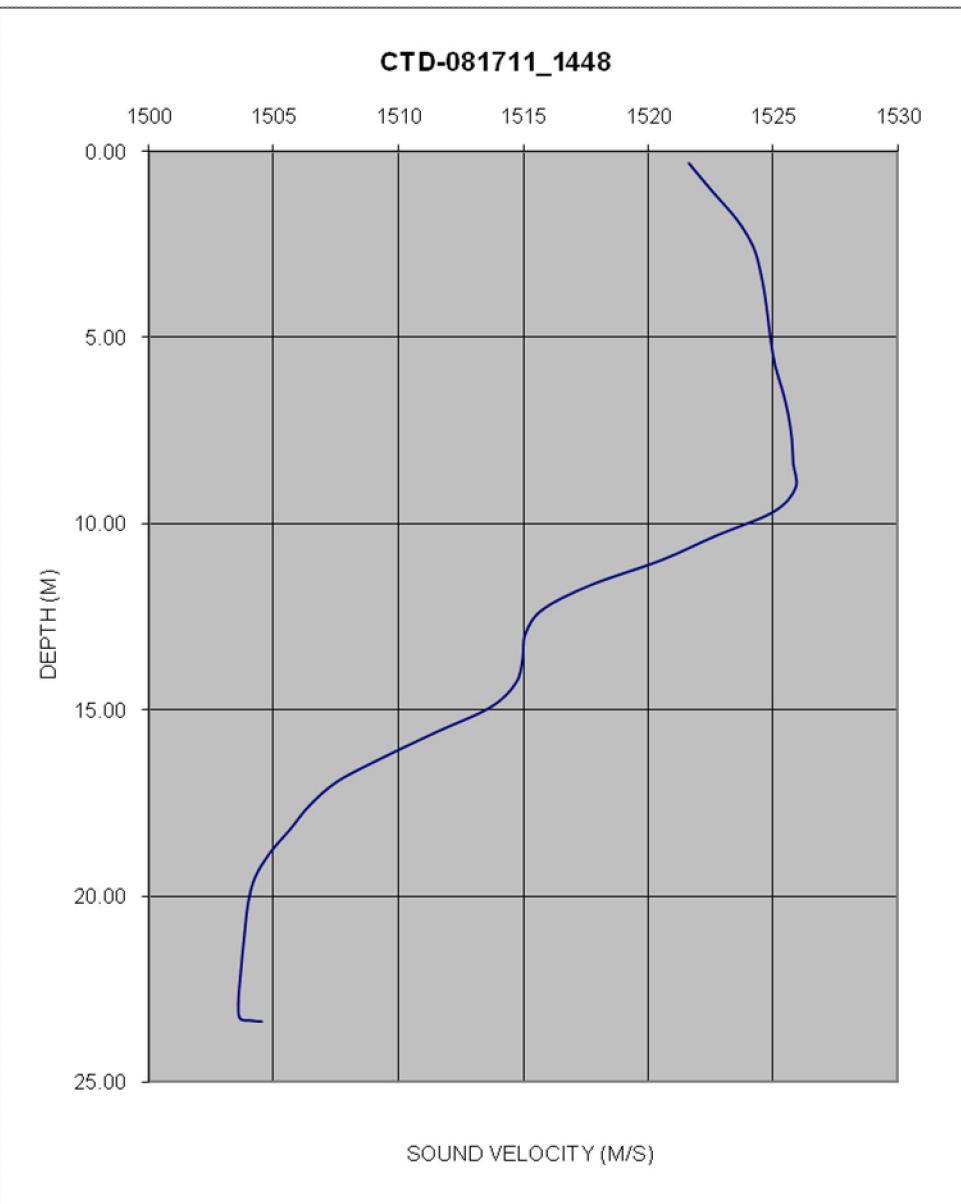


Figure 3.2-30
SVP 081711_1623 taken during the Fall 2011 multibeam survey at the HARS

1521.59	0.50
1521.14	1.24
1522.15	1.97
1523.45	2.68
1524.36	3.38
1524.64	4.08
1524.48	4.77
1524.15	5.46
1523.68	6.16
1522.92	6.85
1521.75	7.54
1520.46	8.24
1519.68	8.94
1519.04	9.68
1516.48	10.40
1513.60	11.12
1511.76	11.82
1510.24	12.52
1509.09	13.23
1508.50	13.93
1508.05	14.62
1507.63	15.30
1507.22	15.98
1506.68	16.64
1506.13	17.32
1505.77	17.99
1505.57	18.69
1505.42	19.37
1505.30	20.07
1505.21	20.79
1505.19	21.48
1505.35	21.77

CTD PROFILE # 081711_1623

<u>Date</u>	<u>Time</u>	<u>NAD83 NY LI (Feet)</u>	<u>Water Depth</u>	<u>Latitude</u>	<u>Longitude</u>
		<u>Easting</u>	<u>Northing</u>	<u>Feet</u>	<u>N</u>
08/17/11	16:23	1025159	77125	72	40.37826755 73.85317327

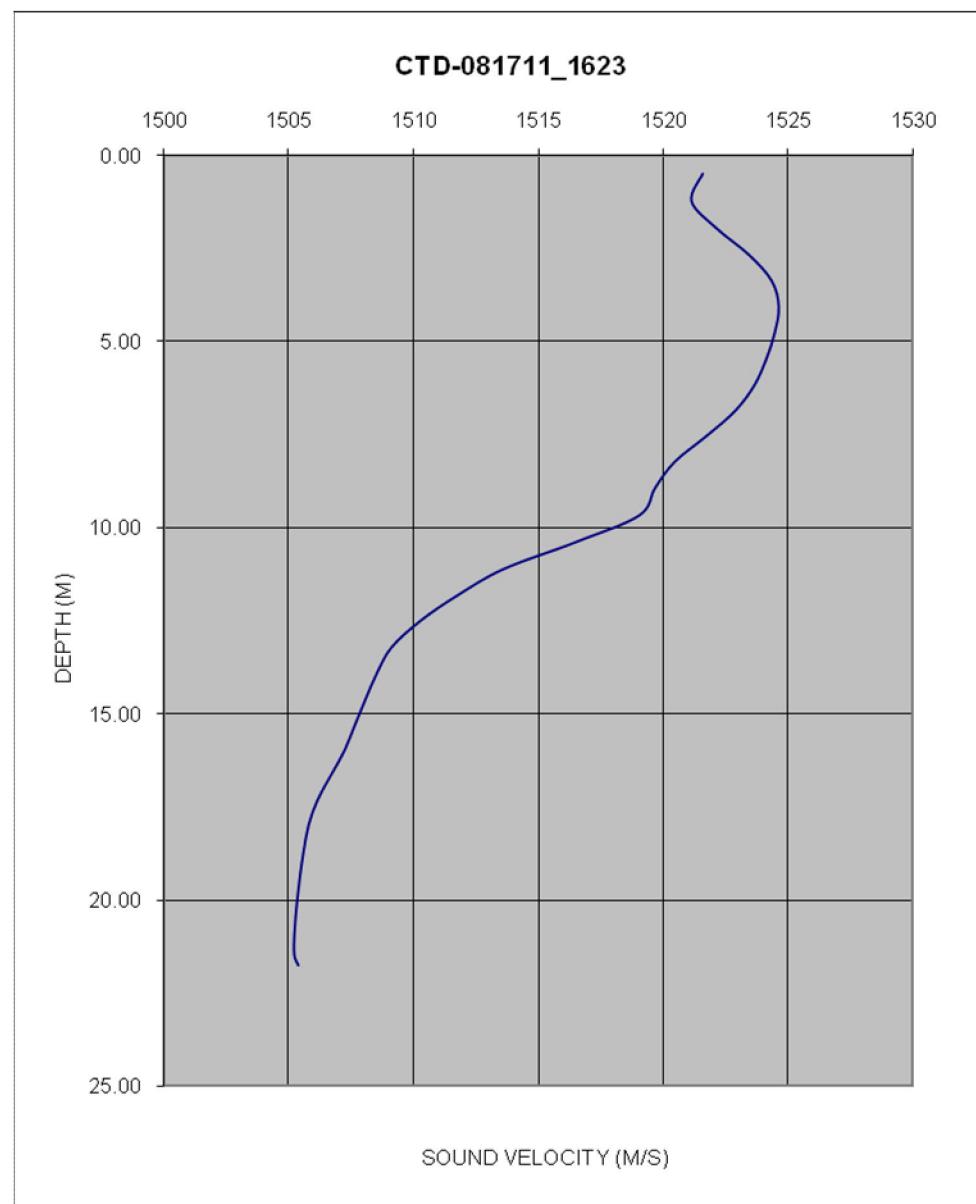


Figure 3.2-31
SVP 081711_1839 taken during the Fall 2011 multibeam survey at the HARS

1526.70	0.58
1526.10	1.38
1525.78	2.21
1525.68	3.06
1525.59	3.91
1525.49	4.75
1525.46	5.56
1525.54	6.29
1525.64	7.02
1524.29	7.71
1522.24	8.39
1520.39	9.05
1519.51	9.72
1519.22	10.42
1518.85	11.12
1517.22	11.82
1515.13	12.50
1513.11	13.19
1511.58	13.88
1510.50	14.56
1509.48	15.26
1508.28	15.94
1507.32	16.62
1506.56	17.30
1505.95	17.98
1505.43	18.66
1505.01	19.35
1504.64	20.04
1504.41	20.72
1504.28	21.41
1504.18	22.10
1504.12	22.79
1504.08	23.47
1504.05	24.14
1504.00	24.82
1503.95	25.53
1503.89	26.22
1503.74	26.86
1503.56	27.05

CTD PROFILE # 081711 1839

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
08/17/11	18:39	1029747	68987	72	40.35590783 73.83676058

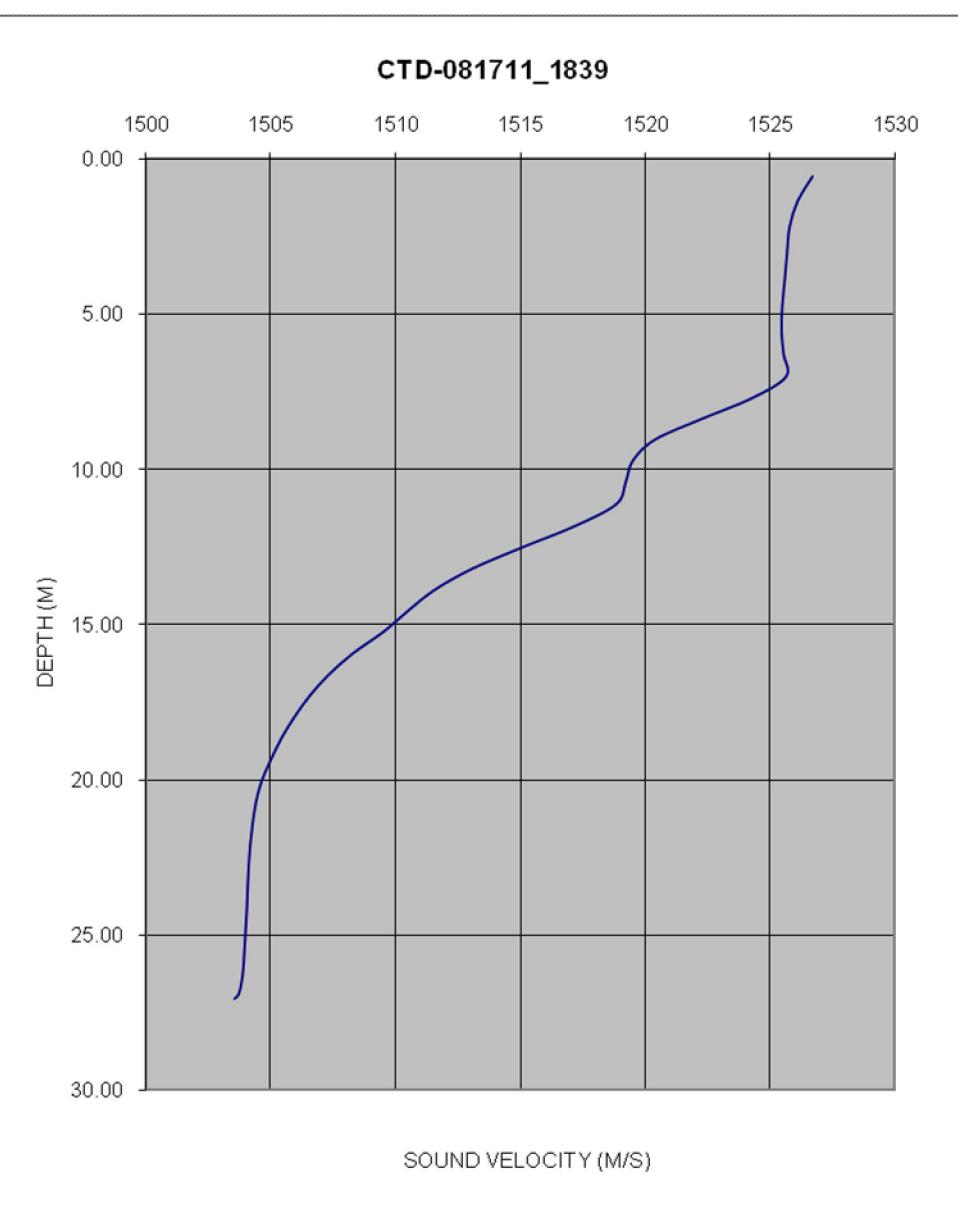


Figure 3.2-32
SVP 081711_2035 taken during the Fall 2011 multibeam survey at the HARS

1525.06	0.33
1524.85	1.08
1524.62	1.83
1524.42	2.57
1524.19	3.30
1523.90	3.99
1523.05	4.67
1521.52	5.34
1520.27	6.02
1519.17	6.68
1518.16	7.35
1517.68	8.01
1517.48	8.67
1517.43	9.34
1517.46	10.01
1517.47	10.68
1517.36	11.34
1516.68	12.01
1515.13	12.69
1513.49	13.36
1512.11	14.04
1510.84	14.71
1509.92	15.39
1509.42	16.07
1509.08	16.76
1508.73	17.44
1508.44	18.12
1507.87	18.80
1507.18	19.48
1506.76	20.17
1506.46	20.85
1506.21	21.54
1506.03	22.25
1506.08	22.62

CTD PROFILE # 081711 2035

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
08/17/11	20:35	1022654	67896	74	40.35294739 73.86221502

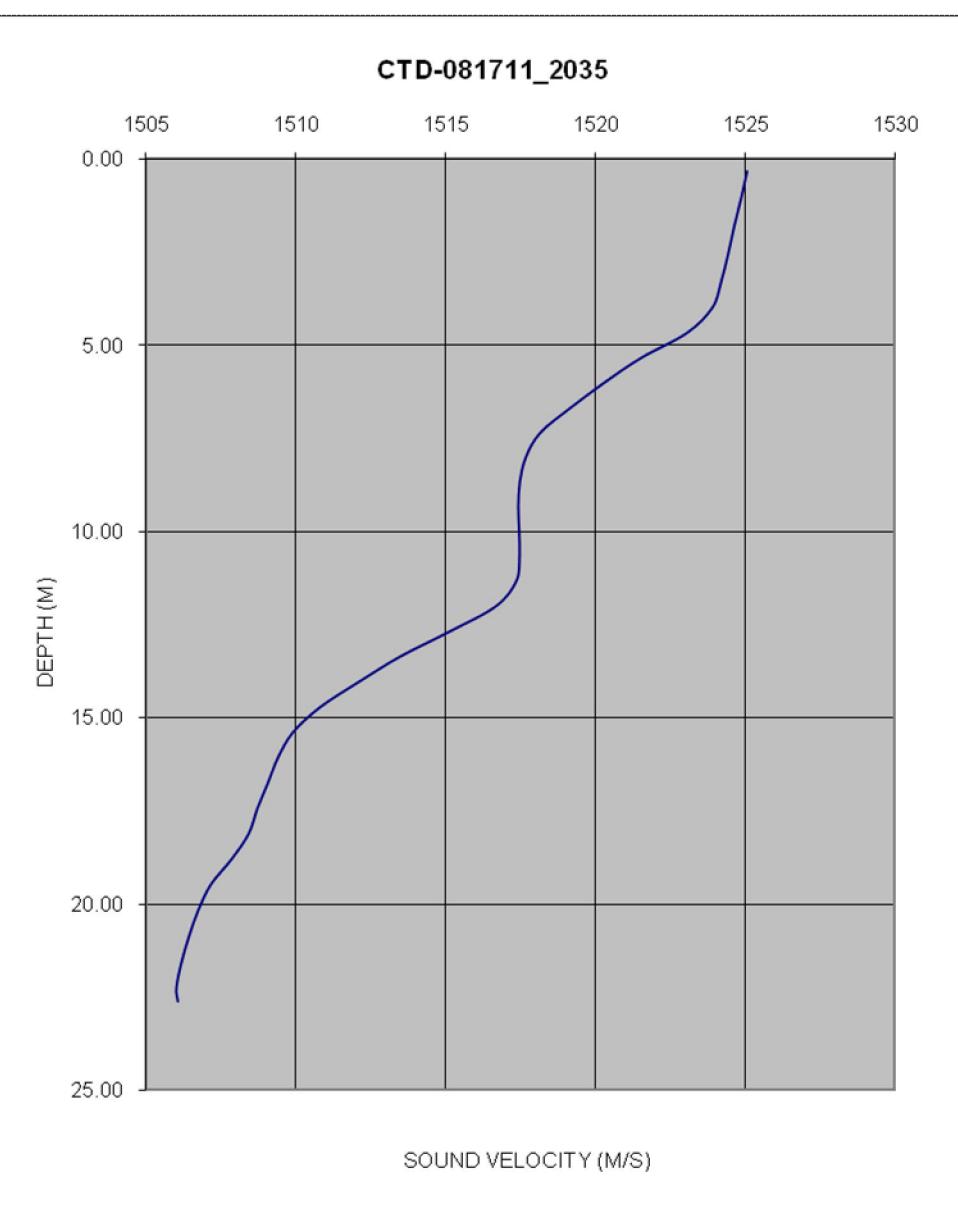


Figure 3.2-33
SVP 081711_2059 taken during the Fall 2011 multibeam survey at the HARS

1523.54	0.00
1523.49	0.78
1523.45	1.48
1523.26	2.14
1522.63	2.76
1521.47	3.35
1520.85	3.93
1520.67	4.50
1520.41	5.06
1519.96	5.62
1519.49	6.19
1519.22	6.75
1518.94	7.33
1518.86	7.93
1518.57	8.54
1517.63	9.14
1516.21	9.73
1515.06	10.34
1514.31	10.97
1513.46	11.60
1512.08	12.25
1510.94	12.90
1509.90	13.55
1509.10	14.20
1508.64	14.84
1508.28	15.50
1507.92	16.14
1507.66	16.79
1507.38	17.45
1507.18	18.09
1507.05	18.76
1506.93	19.43
1506.84	20.12
1506.97	20.45
1507.35	20.50
1507.55	20.57

CTD PROFILE # 081711 2059

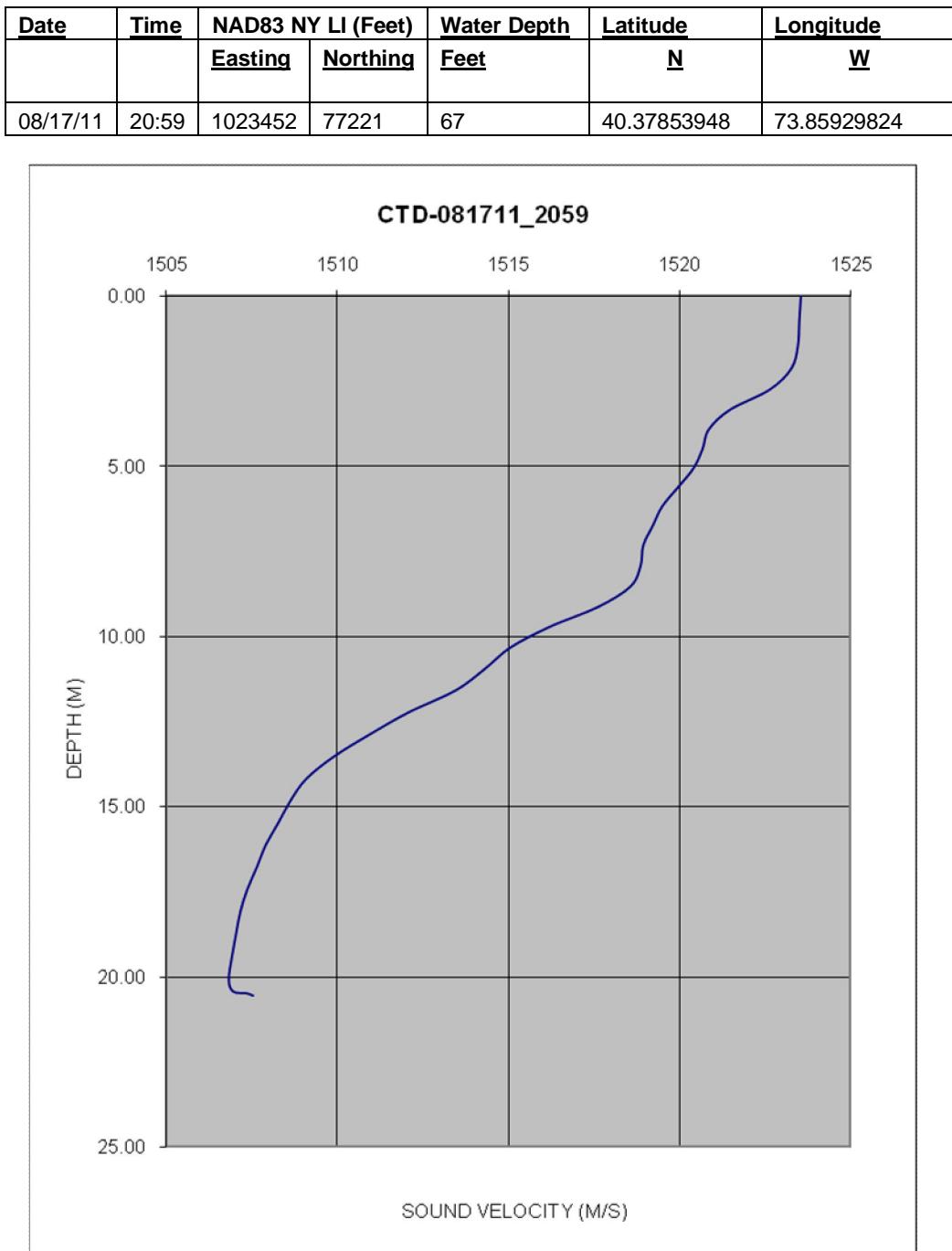


Figure 3.2-34
SVP 081811_1158 taken during the Fall 2011 multibeam survey at the HARS

1518.40 0.52

1519.25 1.26

1519.60 1.94

1519.78 2.62

1519.87 3.26

1519.91 3.86

1519.95 4.45

1520.00 5.04

1520.05 5.63

1520.10 6.22

1520.31 6.82

1520.64 7.43

1521.12 8.05

1521.33 8.68

1521.01 9.31

1520.35 9.95

1519.30 10.58

1518.20 11.21

1516.00 11.82

1513.88 12.42

1512.83 13.02

1511.95 13.64

1511.23 14.26

1510.50 14.89

1509.26 15.53

1507.78 16.16

1506.89 16.79

1506.39 17.42

1505.91 18.07

1505.29 18.72

1504.69 19.39

1504.07 20.04

1503.70 20.70

1503.51 21.36

1503.50 21.93

1503.75 22.05

1504.22 22.09

CTD PROFILE # 081811 1158

<u>Date</u>	<u>Time</u>	<u>NAD83 NY LI (Feet)</u>	<u>Water Depth</u>	<u>Latitude</u>	<u>Longitude</u>	
		<u>Easting</u>	<u>Northing</u>	<u>Feet</u>	<u>N</u>	<u>W</u>
08/18/11	11:58	1022749	77382	72	40.37898387	73.86182046

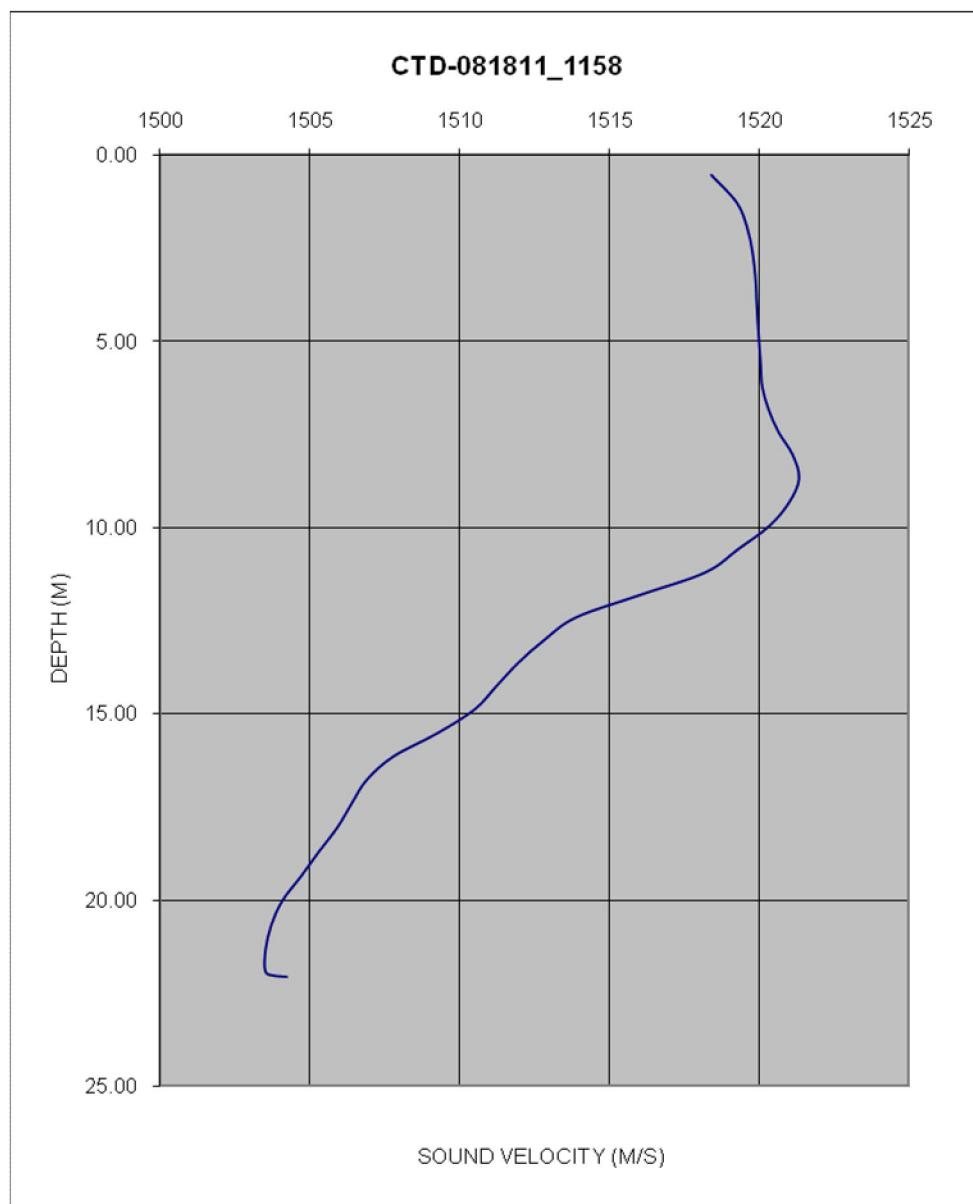


Figure 3.2-35
SVP 081811_1407 taken during the Fall 2011 multibeam survey at the HARS

1520.58	0.35
1520.46	1.01
1520.42	1.73
1520.39	2.44
1520.37	3.16
1520.36	3.85
1520.37	4.53
1520.37	5.20
1520.36	5.88
1520.36	6.55
1520.40	7.23
1520.50	7.90
1520.65	8.56
1520.90	9.22
1520.99	9.90
1520.53	10.59
1519.73	11.31
1518.27	12.02
1516.17	12.71
1512.82	13.40
1509.34	14.11
1507.24	14.81
1506.48	15.52
1506.18	16.23
1506.06	16.93
1505.97	17.64
1505.84	18.34
1505.48	19.06
1504.85	19.80
1504.40	20.54
1504.23	21.29
1504.23	21.95
1504.45	22.13

CTD PROFILE # 081811_1407

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
08/18/11	14:07	1020951	67844	73	40.35281091 73.86832402

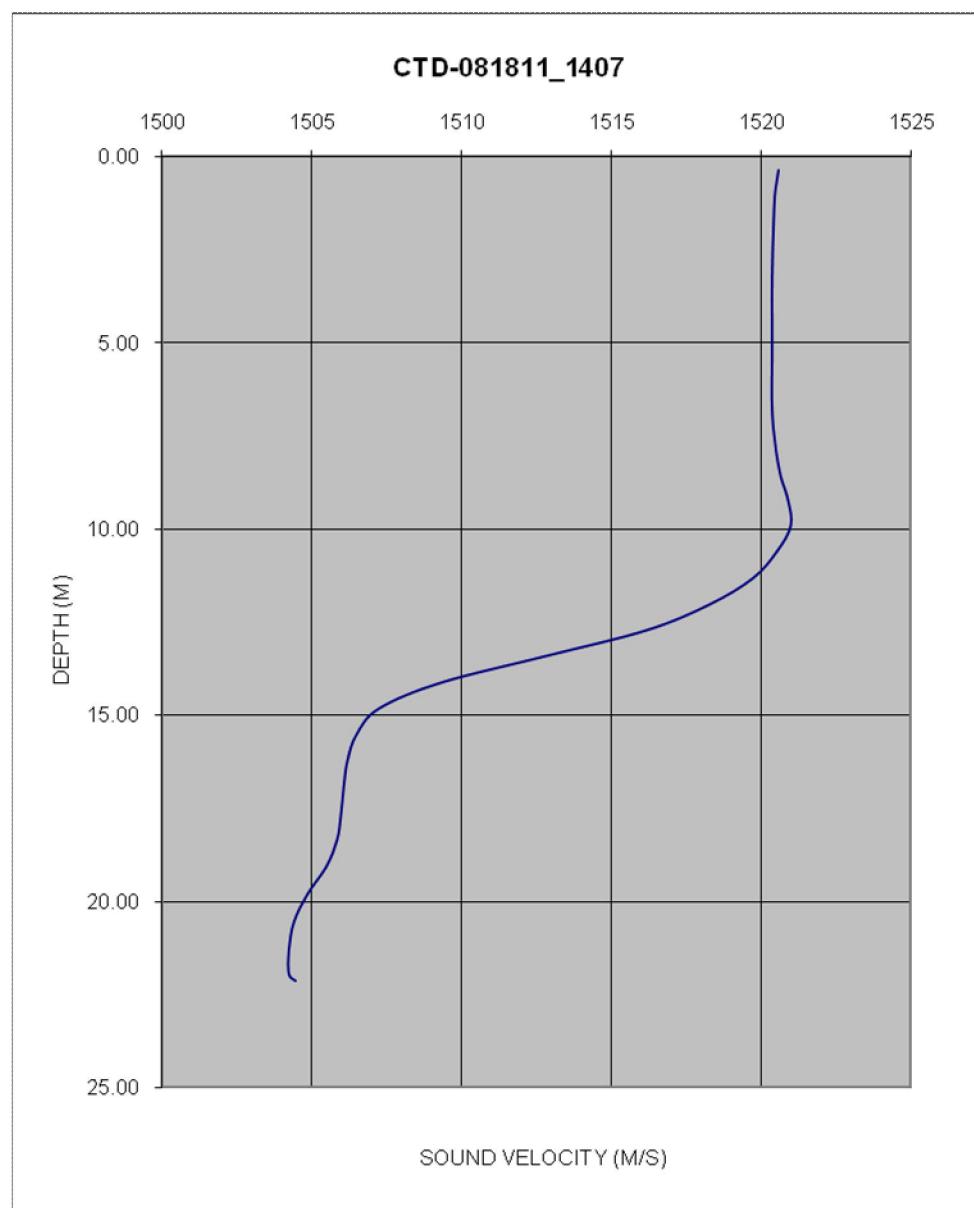


Figure 3.2-36
SVP 081811_1621 taken during the Fall 2011 multibeam survey at the HARS

1518.08	0.31
1518.00	1.00
1518.68	1.73
1519.49	2.40
1519.67	3.08
1519.70	3.73
1519.73	4.41
1519.80	5.09
1520.11	5.77
1520.96	6.45
1521.12	7.14
1519.94	7.82
1517.64	8.52
1513.99	9.21
1510.64	9.91
1508.95	10.59
1508.16	11.26
1507.48	11.94
1506.80	12.63
1506.39	13.31
1506.10	14.00
1505.85	14.70
1505.69	15.40
1505.53	16.09
1505.38	16.78
1505.20	17.45
1505.11	18.14
1505.08	18.82
1504.92	19.50
1504.58	20.17
1504.25	20.85
1504.05	21.52
1503.97	22.19
1503.93	22.86
1503.96	23.46
1504.17	23.60

CTD PROFILE # 081811_1621

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
08/18/11	16:21	1019337	77310	77	40.37880097 73.87406710

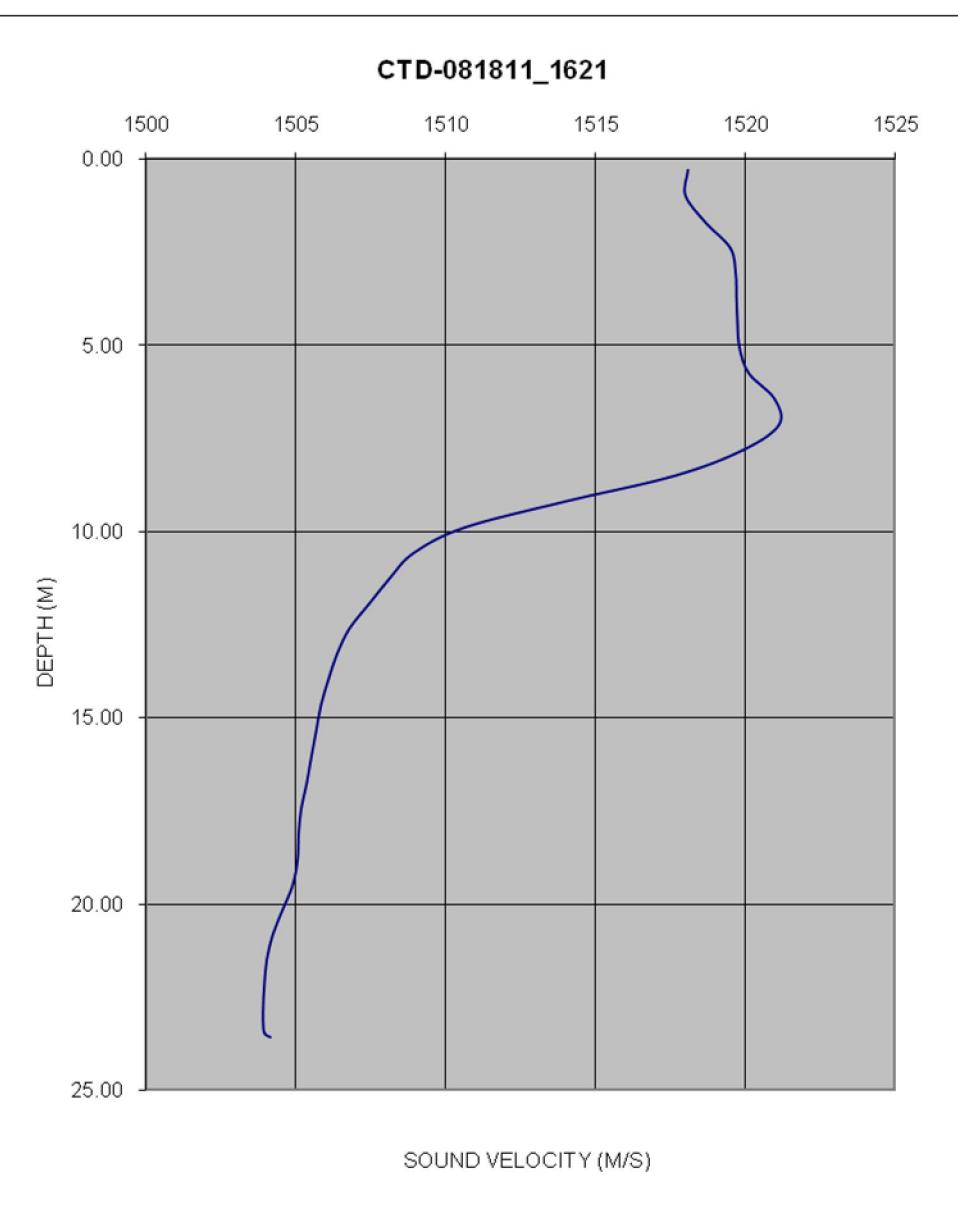


Figure 3.2-37
SVP 081811_1830 taken during the Fall 2011 multibeam survey at the HARS

1520.61	0.70
1521.04	1.51
1520.80	2.23
1520.59	2.90
1520.54	3.55
1520.54	4.17
1520.51	4.81
1520.64	5.44
1520.90	6.02
1520.43	6.59
1519.45	7.16
1517.88	7.72
1514.34	8.30
1511.60	8.88
1509.99	9.47
1508.97	10.06
1508.45	10.66
1508.18	11.26
1508.01	11.87
1507.85	12.50
1507.62	13.14
1507.39	13.80
1507.15	14.45
1506.92	15.11
1506.73	15.79
1506.60	16.47
1506.48	17.14
1506.37	17.80
1506.24	18.48
1506.04	19.15
1505.86	19.81
1505.95	20.15

CTD PROFILE # 081811_1830

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
08/18/11	18:30	1018011	67456	66	40.35175880 73.87887350

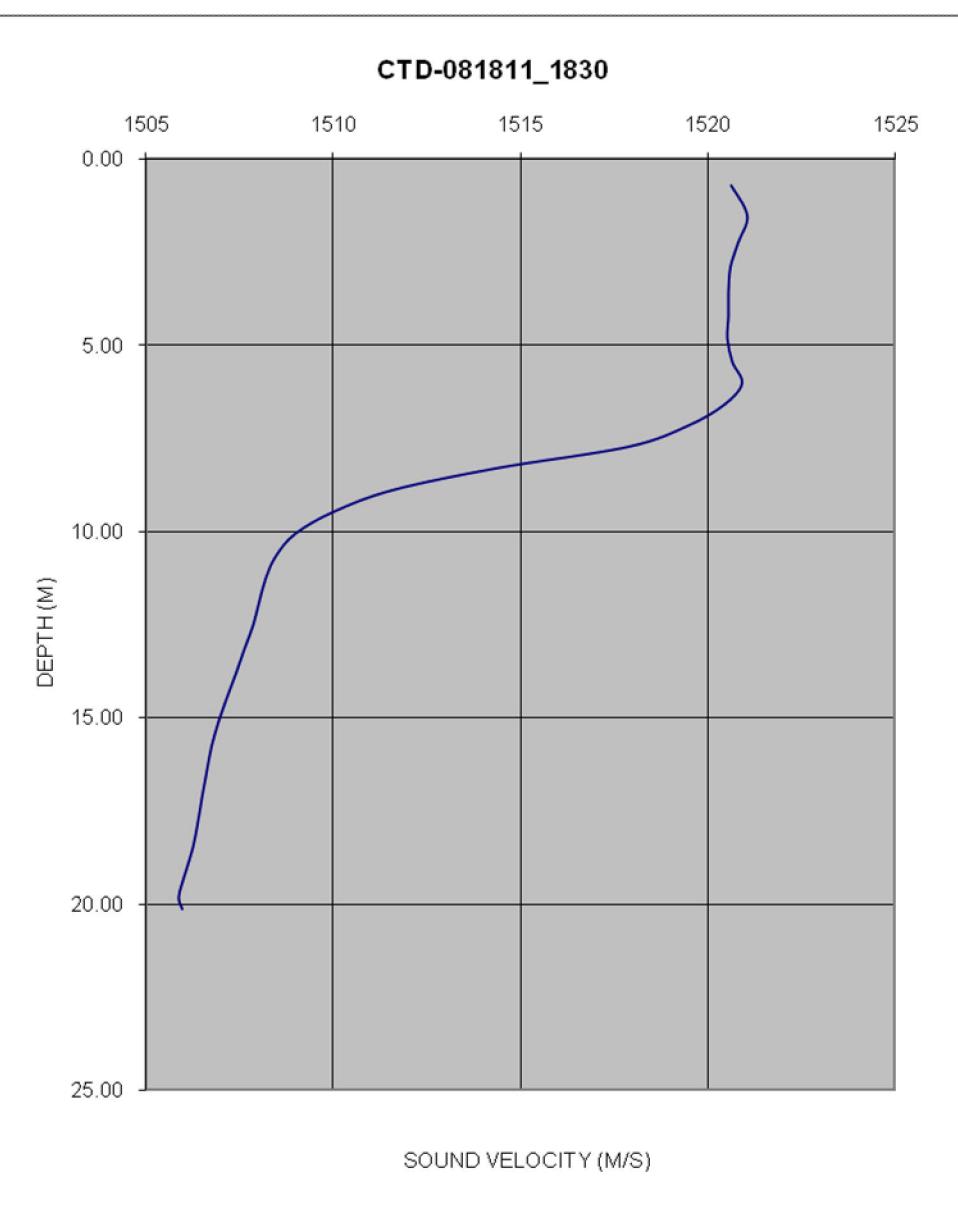


Figure 3.2-37
SVP 081811_2040 taken during the Fall 2011 multibeam survey at the HARS

1520.40	0.65
1520.23	1.37
1520.22	2.11
1520.24	2.80
1520.05	3.46
1519.87	4.08
1519.82	4.70
1520.62	5.34
1520.88	5.98
1519.78	6.61
1517.90	7.24
1516.03	7.88
1514.75	8.53
1513.63	9.18
1512.62	9.83
1511.71	10.48
1510.67	11.14
1509.72	11.79
1508.97	12.44
1508.54	13.10
1508.33	13.75
1508.15	14.42
1508.01	15.07
1507.85	15.73
1507.77	16.39
1507.62	17.04
1507.08	17.70
1506.38	18.37
1505.89	19.03
1505.42	19.69
1504.82	20.36
1504.40	21.04
1504.25	21.67
1504.47	21.85
1504.95	21.86
1505.18	21.88
1505.36	21.89
1505.55	21.90
1505.74	21.92
1506.13	21.95
1506.38	21.98

CTD PROFILE # 081811_2040

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
08/18/11	20:40	1017982	77106	72	40.37824626 73.87893142

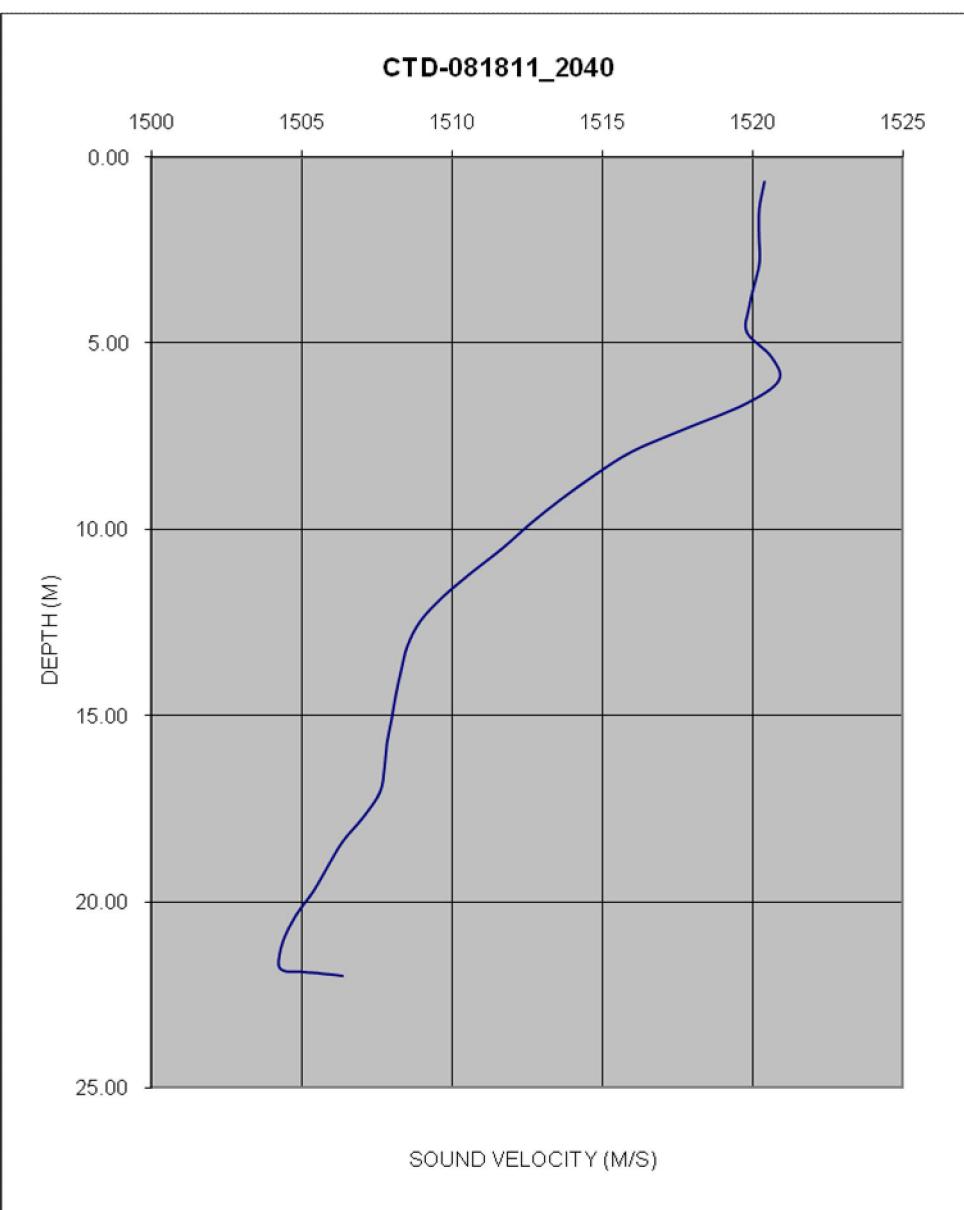


Figure 3.2-38
SVP 081911_1141 taken during the Fall 2011 multibeam survey at the HARS

1520.97	0.13
1520.98	0.80
1520.99	1.47
1521.01	2.10
1521.01	2.75
1521.00	3.38
1521.01	3.99
1521.01	4.61
1521.01	5.23
1521.04	5.85
1520.91	6.47
1519.16	7.09
1516.89	7.73
1515.63	8.39
1514.22	9.06
1512.19	9.72
1510.44	10.38
1509.32	11.02
1508.43	11.66
1507.89	12.30
1507.65	12.95
1507.52	13.62
1507.33	14.30
1507.12	14.99
1506.86	15.67
1506.28	16.35
1505.77	17.00
1505.25	17.65
1504.84	18.32
1504.63	18.99
1504.42	19.64
1504.19	20.31
1503.99	20.97
1503.87	21.66
1503.81	22.33
1503.78	23.00
1503.89	23.40
1504.22	23.43

CTD PROFILE # 081911_1141

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
08/19/11	11:41	1015901	76858	77	40.37757295 73.88640029

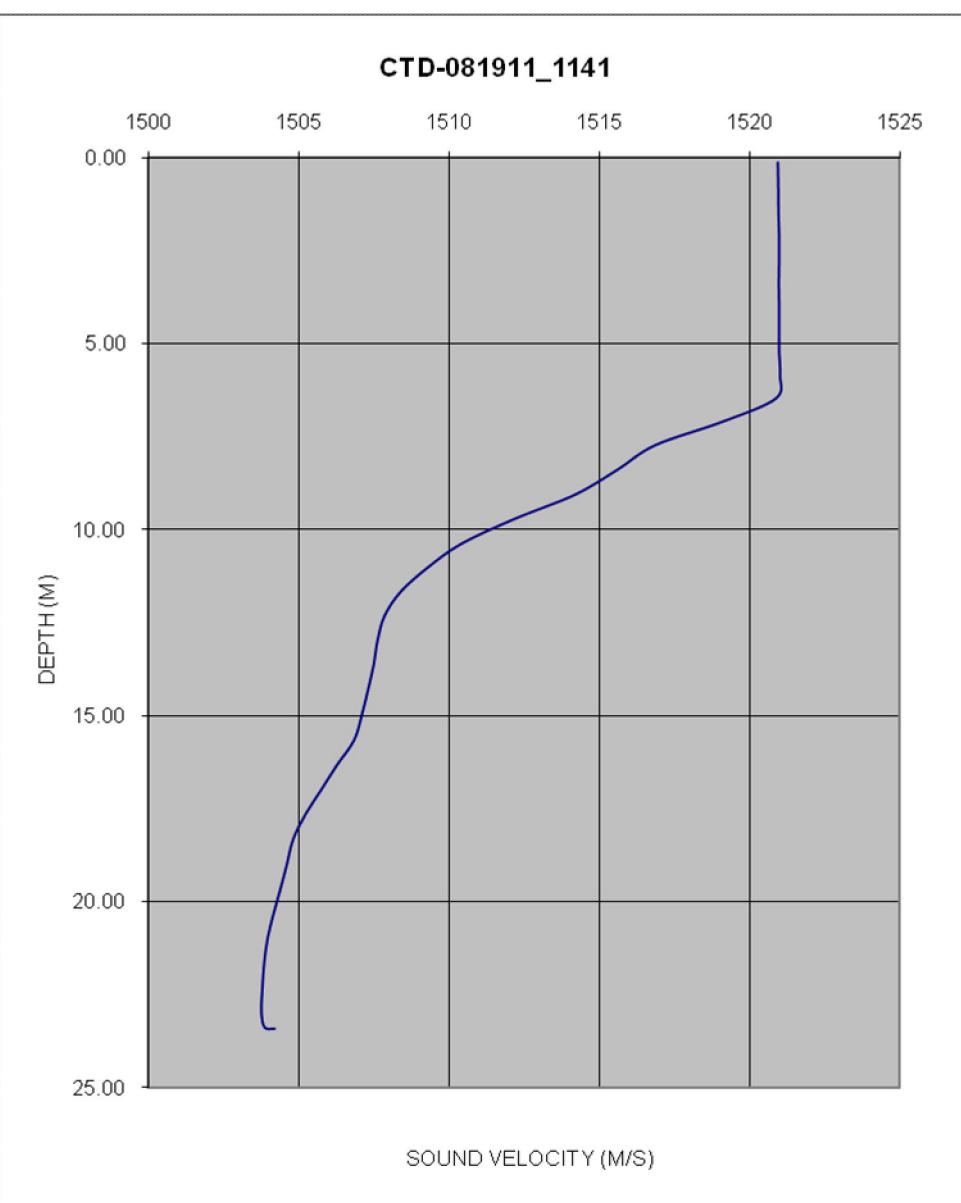


Figure 3.2-39
SVP 081911_1349 taken during the Fall 2011 multibeam survey at the HARS

1521.75	0.65
1521.71	1.40
1521.68	2.08
1521.69	2.71
1522.00	3.27
1522.19	3.84
1522.26	4.41
1522.15	4.98
1521.88	5.54
1521.55	6.11
1521.07	6.68
1520.37	7.25
1519.64	7.83
1518.31	8.42
1515.99	9.00
1513.93	9.58
1512.57	10.16
1511.71	10.74
1510.76	11.32
1509.80	11.91
1508.96	12.52
1508.08	13.15
1507.27	13.78
1506.81	14.41
1506.46	15.05
1506.04	15.69
1505.66	16.33
1505.34	16.97
1505.01	17.59
1504.67	18.21
1504.39	18.81
1504.28	19.06
1504.26	19.09
1504.24	19.09
1504.23	19.10

CTD PROFILE # 081911_1349

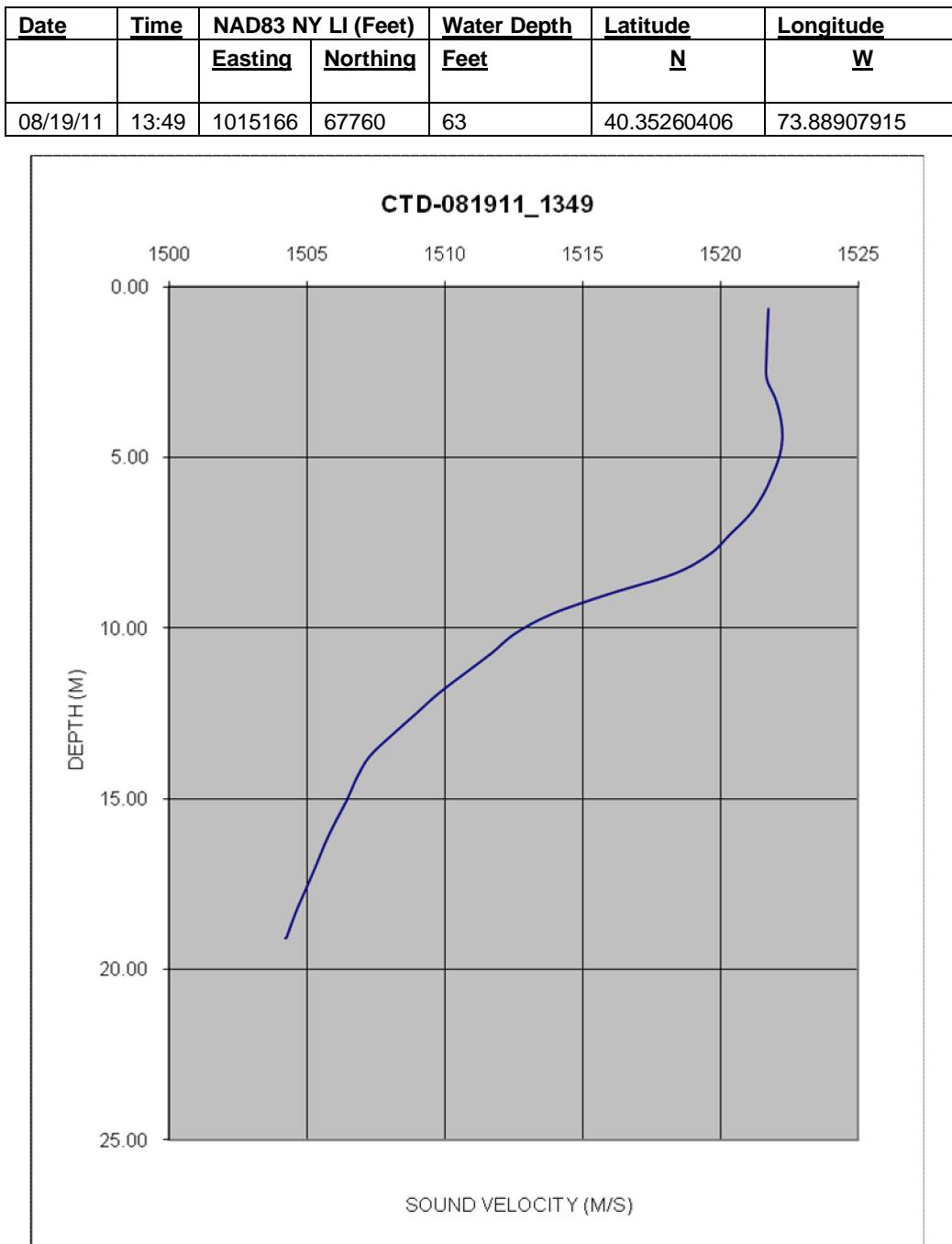


Figure 3.2-40
SVP 081911_1604 taken during the Fall 2011 multibeam survey at the HARS

1519.52	0.23
1519.56	0.94
1520.17	1.69
1520.78	2.43
1521.11	3.18
1521.34	3.92
1521.36	4.64
1521.32	5.31
1521.36	5.98
1521.27	6.65
1520.81	7.30
1519.12	7.94
1515.96	8.59
1511.91	9.27
1509.89	9.92
1508.98	10.58
1508.45	11.23
1508.10	11.89
1507.85	12.54
1507.60	13.18
1507.38	13.81
1507.16	14.43
1507.00	15.03
1506.86	15.65
1506.62	16.25
1506.28	16.86
1506.05	17.46
1505.70	18.04
1505.34	18.61
1505.10	19.21
1504.94	19.79
1504.93	20.26
1505.13	20.33

CTD PROFILE # 081911_1604

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
08/19/11	16:04	1012276	77390	67	40.37904583 73.89940877

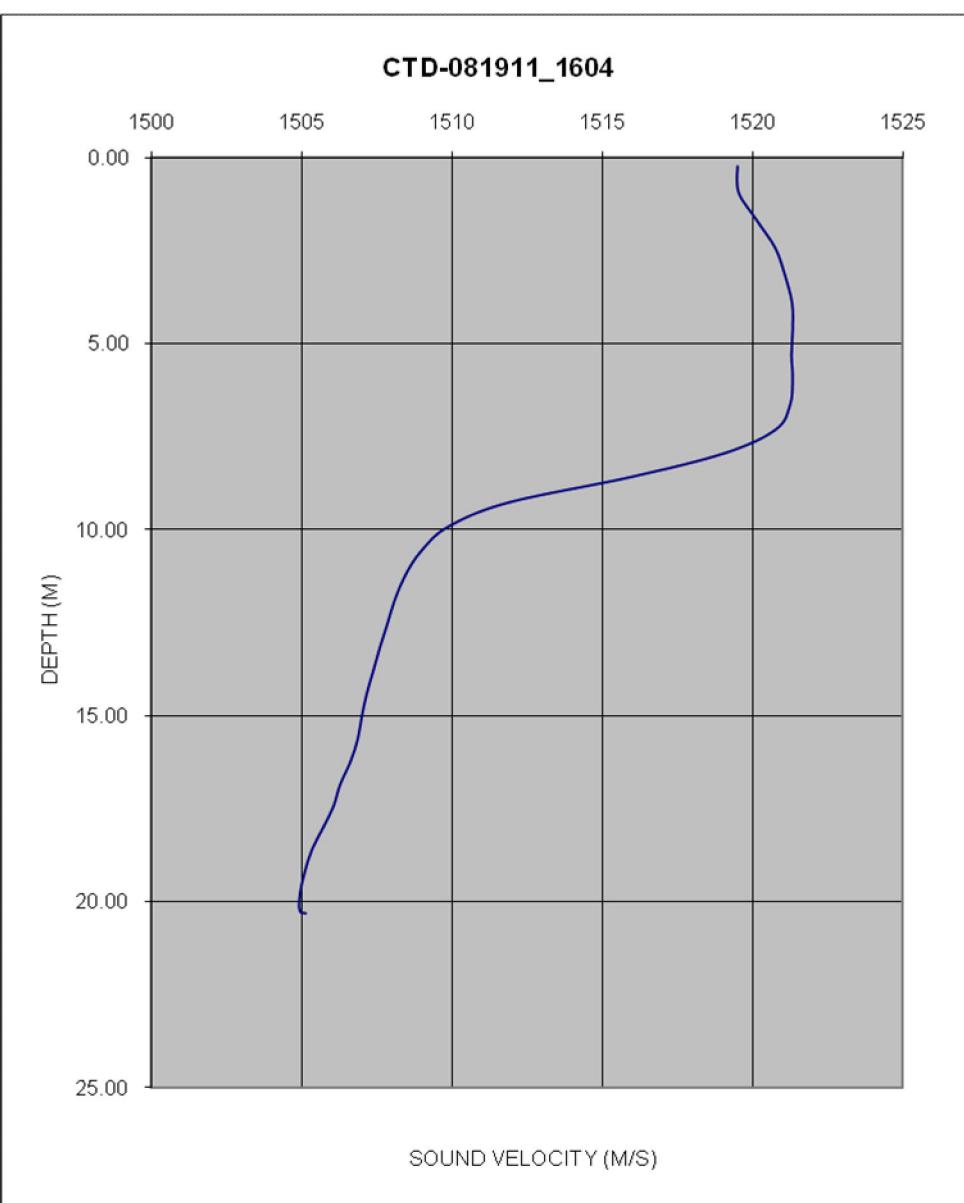


Figure 3.2-41
SVP 081911_1756 taken during the Fall 2011 multibeam survey at the HARS

1522.33	0.05
1522.05	0.70
1521.67	1.42
1521.39	2.16
1521.28	2.91
1521.22	3.65
1521.29	4.37
1521.34	5.03
1521.32	5.66
1520.96	6.31
1520.02	6.99
1517.44	7.66
1514.45	8.32
1512.55	8.97
1511.01	9.59
1509.50	10.21
1508.76	10.83
1508.53	11.45
1508.45	12.08
1508.39	12.70
1508.17	13.32
1507.83	13.93
1507.54	14.53
1507.41	15.11
1507.30	15.69
1507.18	16.28
1507.08	16.87
1507.02	17.46
1506.99	18.03
1506.91	18.61
1506.52	19.18
1505.79	19.75
1505.04	20.31
1504.64	20.87
1504.49	21.44
1504.65	21.72
1505.00	21.73

CTD PROFILE # 081911_1756

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
08/19/11	17:56	1013451	77325	71	40.37886223 73.89519228

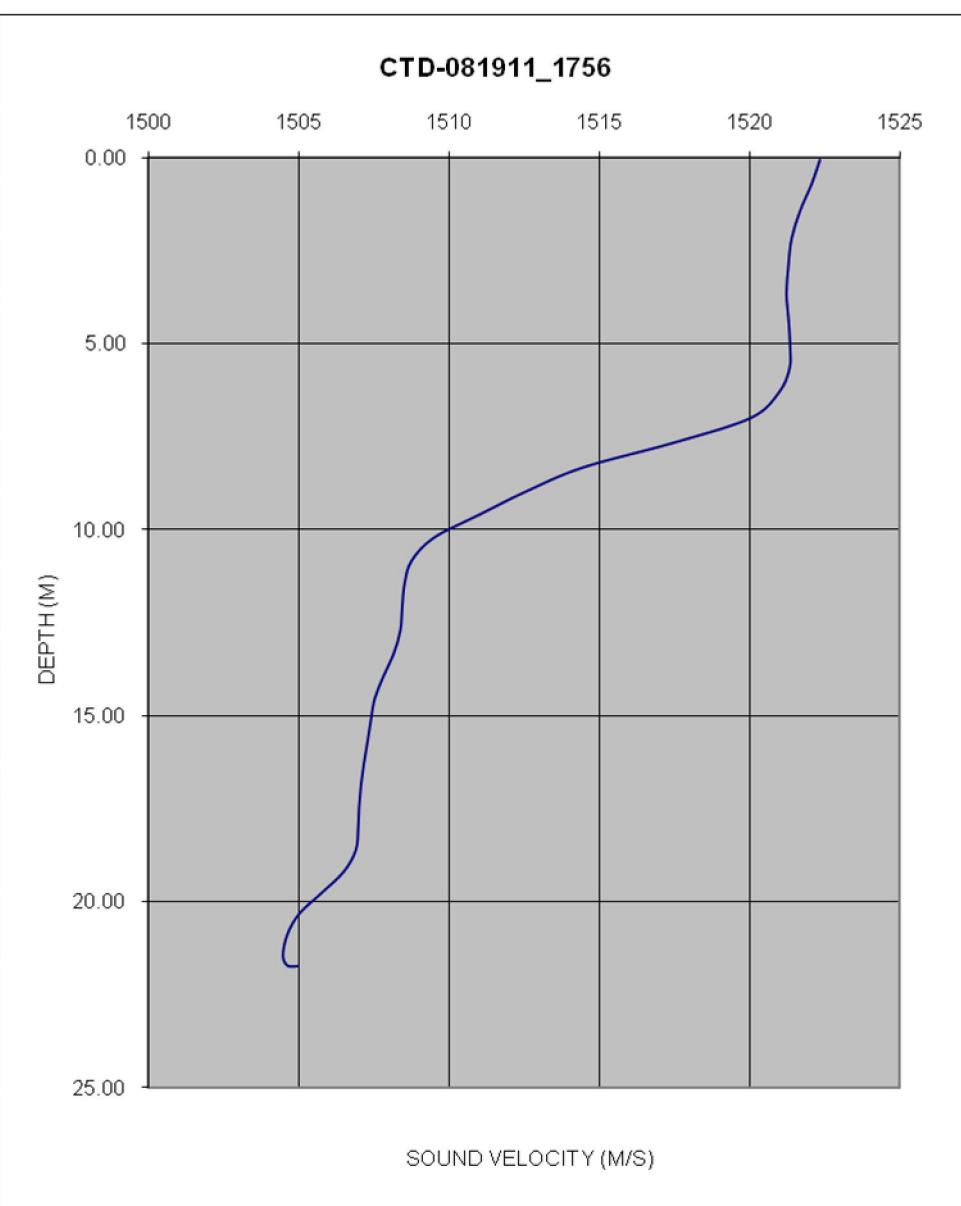


Figure 3.2-42
SVP 081911_1853 taken during the Fall 2011 multibeam survey at the HARS

1522.50	0.36
1522.42	1.02
1522.27	1.68
1522.08	2.31
1521.84	2.93
1521.48	3.56
1521.29	4.16
1521.27	4.72
1521.39	5.31
1521.37	5.97
1521.09	6.64
1520.44	7.31
1518.75	7.97
1517.15	8.61
1515.15	9.26
1512.77	9.92
1511.45	10.57
1510.65	11.24
1509.73	11.91
1509.08	12.58
1508.62	13.26
1508.35	13.92
1508.23	14.60
1508.02	15.28
1507.70	15.96
1507.42	16.63
1507.31	17.29
1507.25	17.95
1507.19	18.61
1507.14	19.26
1507.06	19.94
1506.90	20.60
1506.43	21.25
1505.74	21.91
1505.21	22.43
1505.26	22.51

CTD PROFILE # 081911_1853

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
08/19/11	18:53	1013713	76473	74	40.37652299 73.89425518

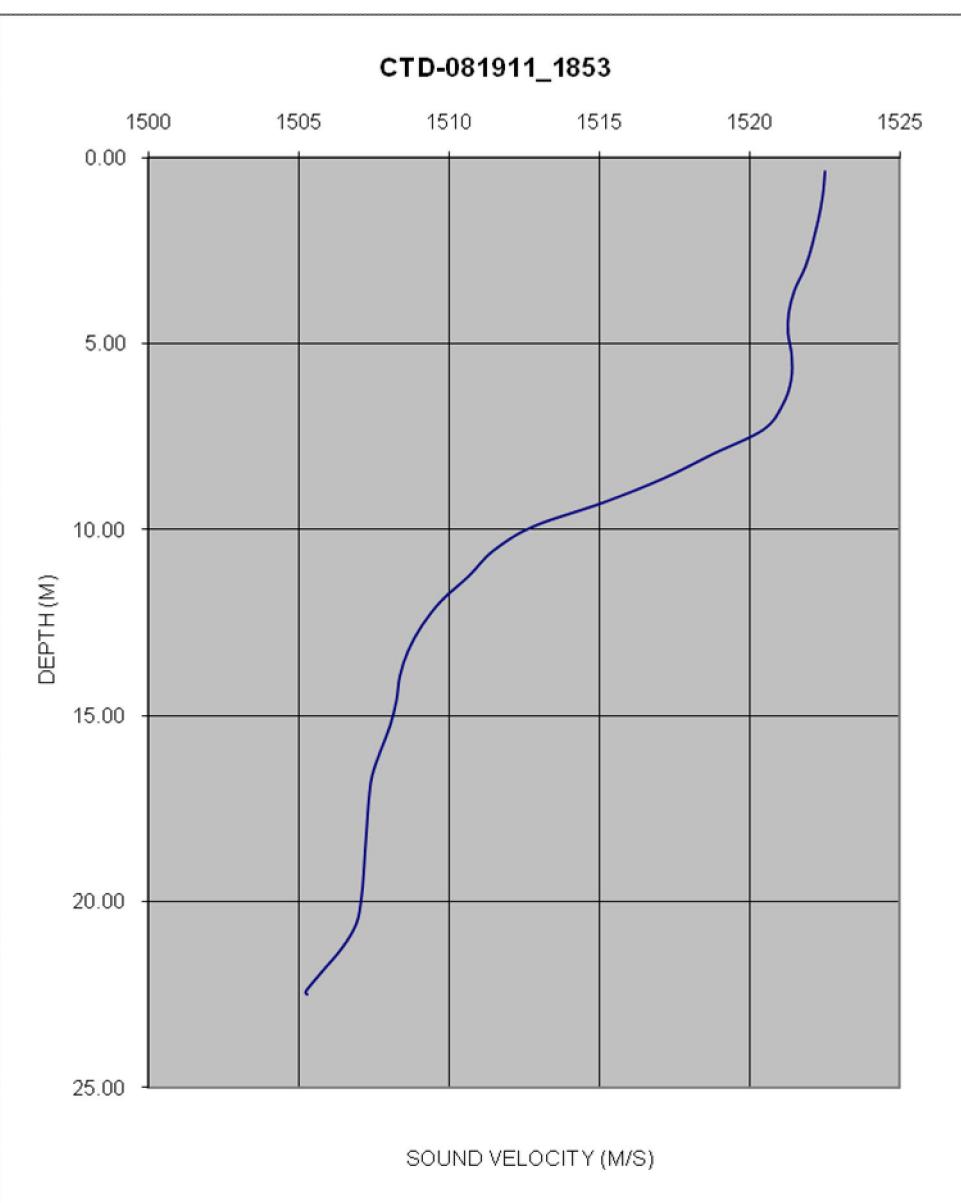


Figure 3.2-43
SVP 081911_2039 taken during the Fall 2011 multibeam survey at the HARS

1522.54	0.10
1522.01	0.88
1521.76	1.73
1521.59	2.50
1521.36	3.19
1521.04	3.83
1520.73	4.44
1520.38	5.04
1520.08	5.66
1519.75	6.28
1519.25	6.91
1518.49	7.55
1517.59	8.19
1515.79	8.84
1513.99	9.48
1512.60	10.13
1511.62	10.78
1510.95	11.43
1510.36	12.08
1509.77	12.73
1508.81	13.37
1507.97	14.02
1507.46	14.68
1507.21	15.34
1507.11	15.99
1507.06	16.65
1506.91	17.30
1506.64	17.97
1506.43	18.62
1506.26	19.28
1506.08	19.94
1506.00	20.56
1506.23	20.72
1506.68	20.75
1507.02	20.78

CTD PROFILE # 081911 2039

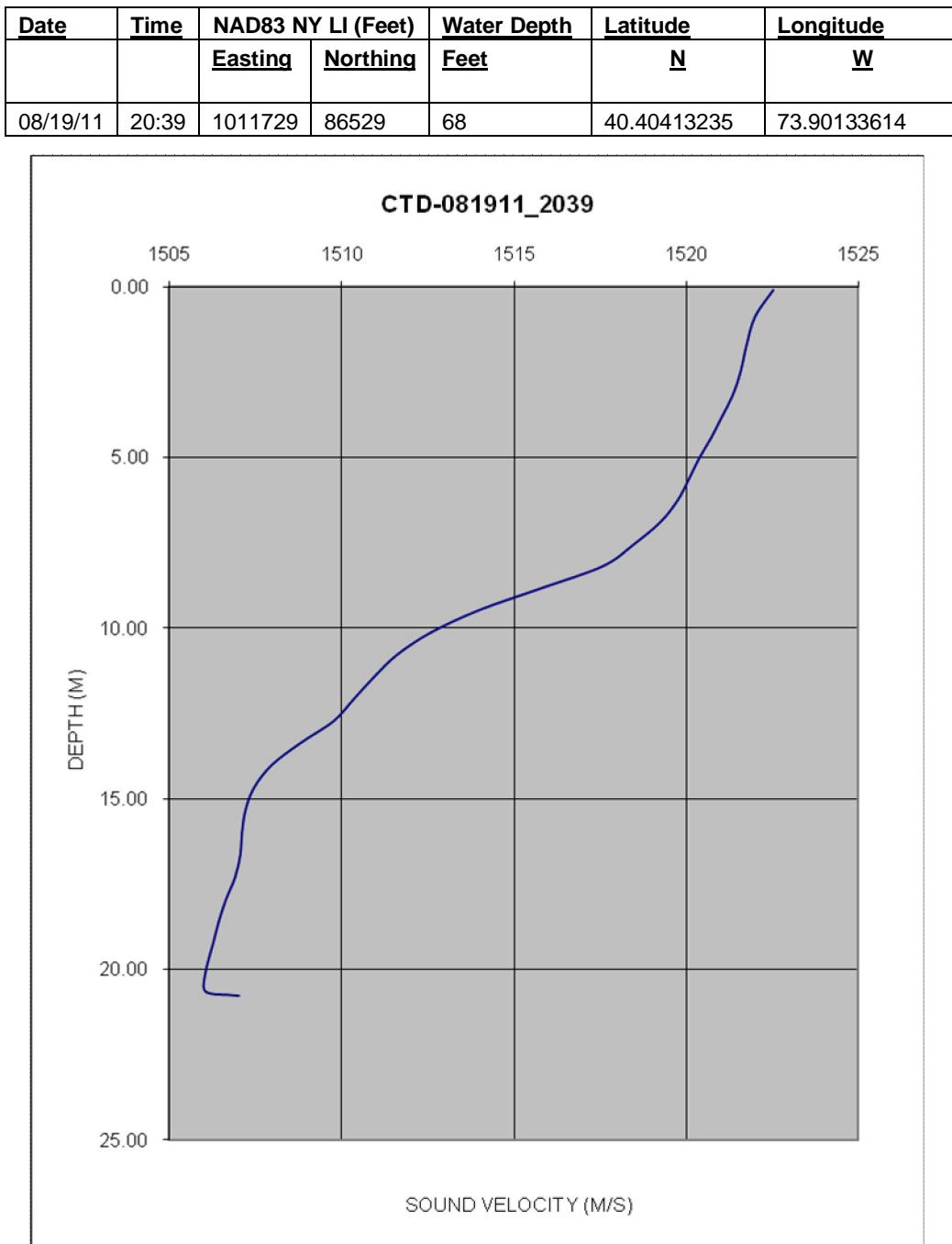


Figure 3.2-44
SVP 082311_1132 taken during the Fall 2011 multibeam survey at the HARS

1517.87	0.98
1517.90	1.62
1517.91	2.18
1517.92	2.76
1518.01	3.38
1518.70	4.03
1519.49	4.66
1519.65	5.29
1519.73	5.93
1519.89	6.60
1520.00	7.30
1519.14	7.95
1518.21	8.60
1517.13	9.22
1515.49	9.86
1513.73	10.53
1512.04	11.18
1510.59	11.79
1509.16	12.43
1508.05	13.08
1507.28	13.75
1506.40	14.39
1505.49	15.00
1504.83	15.61
1504.32	16.21
1503.75	16.82
1503.29	17.40
1502.74	17.99
1501.84	18.58
1500.85	19.19
1500.29	19.79
1500.03	20.38
1499.83	20.95
1499.59	21.51
1500.06	21.76

CTD PROFILE # 082311_1132

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
08/23/11	11:32	1012887	1012887	71	40.40331757 73.89717928

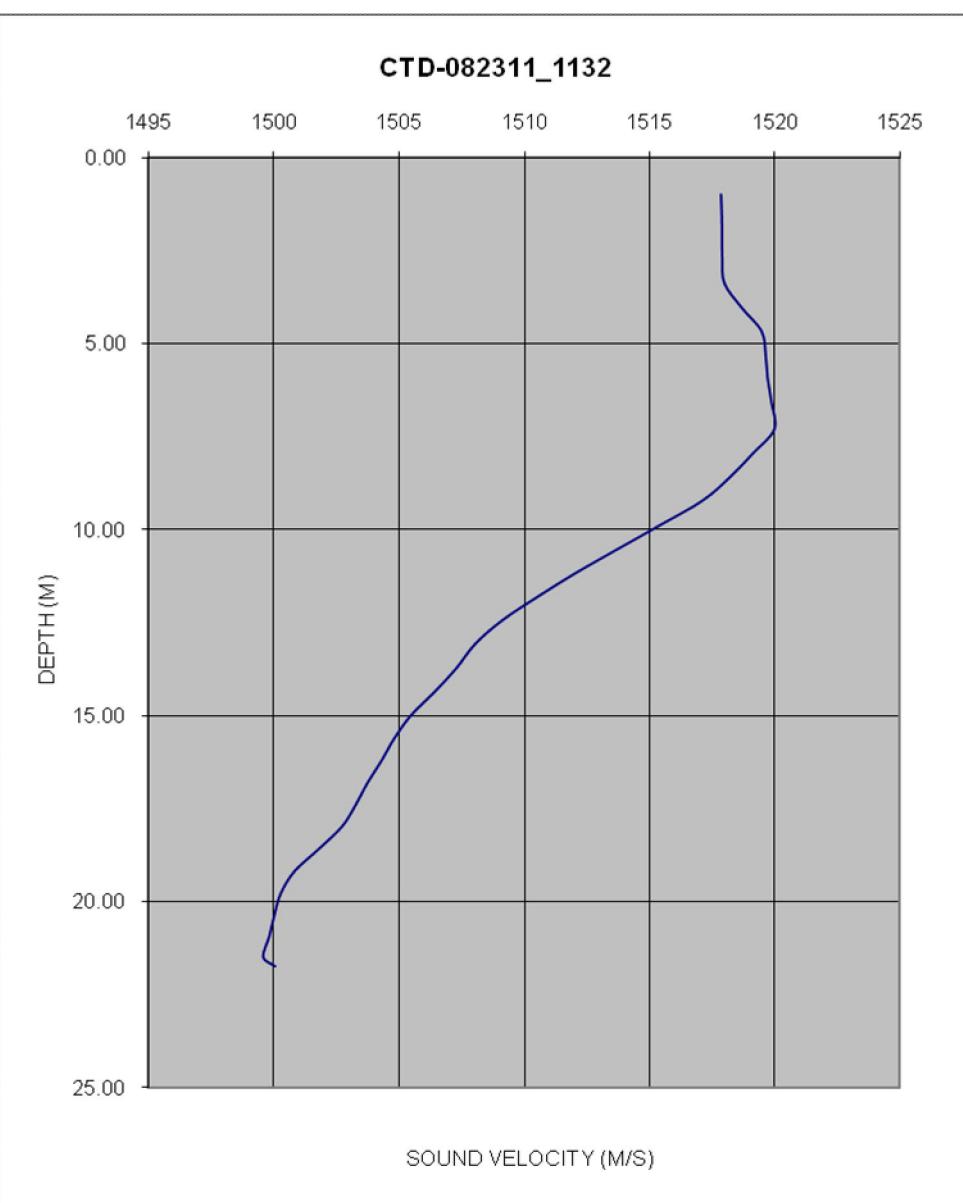


Figure 3.2-45
SVP 082311_1305 taken during the Fall 2011 multibeam survey at the HARS

1520.05	0.10
1520.05	0.73
1520.06	1.46
1520.12	2.20
1520.23	2.91
1520.44	3.58
1521.11	4.24
1521.60	4.90
1521.92	5.58
1522.07	6.25
1522.04	6.93
1521.74	7.63
1521.00	8.32
1520.51	8.99
1520.09	9.67
1518.10	10.33
1515.31	10.99
1513.04	11.64
1511.32	12.30
1509.74	12.94
1508.58	13.58
1507.95	14.22
1507.57	14.88
1506.85	15.52
1505.49	16.16
1503.99	16.80
1502.09	17.43
1500.00	18.10
1498.44	18.75
1497.73	19.41
1497.49	20.07
1497.39	20.74
1497.40	21.28
1497.76	21.37

CTD PROFILE # 082311_1305

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
08/23/11	13:05	1013599	77087	70	40.37821098 73.89466293

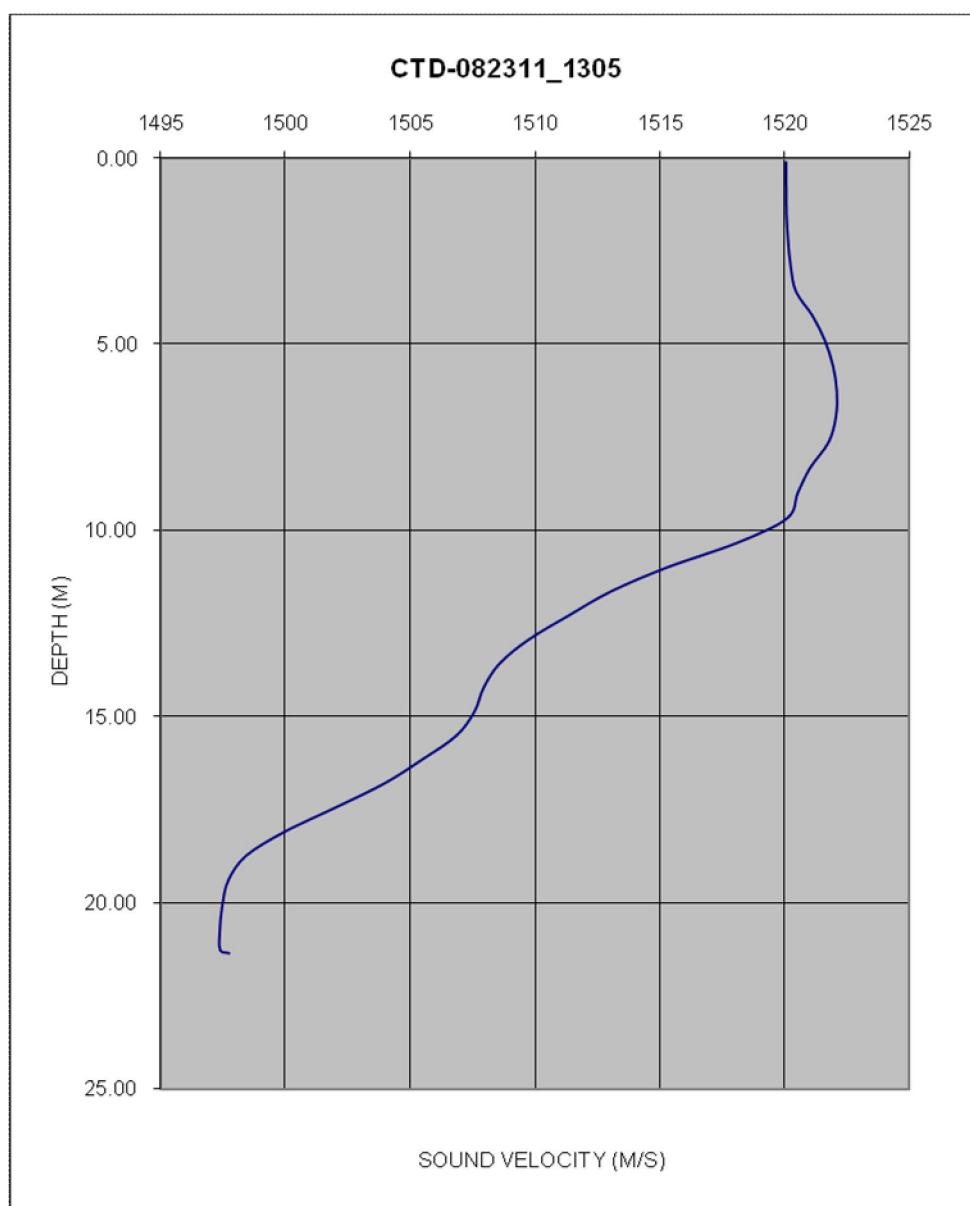


Figure 3.2-46
SVP 082311_1433 taken during the Fall 2011 multibeam survey at the HARS

1518.27	0.07
1518.20	0.61
1518.22	1.22
1518.25	1.86
1518.38	2.52
1518.72	3.16
1519.09	3.79
1519.52	4.43
1520.14	5.09
1520.66	5.75
1520.71	6.43
1520.57	7.09
1520.39	7.76
1520.31	8.43
1519.78	9.10
1518.05	9.75
1515.65	10.40
1513.29	11.06
1511.53	11.72
1510.12	12.38
1509.13	13.03
1508.33	13.70
1507.71	14.34
1507.02	14.97
1505.84	15.61
1504.88	16.26
1504.19	16.90
1502.44	17.53
1500.76	18.16
1499.88	18.81
1499.45	19.47
1499.27	20.13
1499.22	20.79
1499.48	21.10
1500.04	21.14
1500.50	21.16

CTD PROFILE # 082311_1433

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
08/23/11	14:33	1014869	86581	69	40.40426361 73.89006230

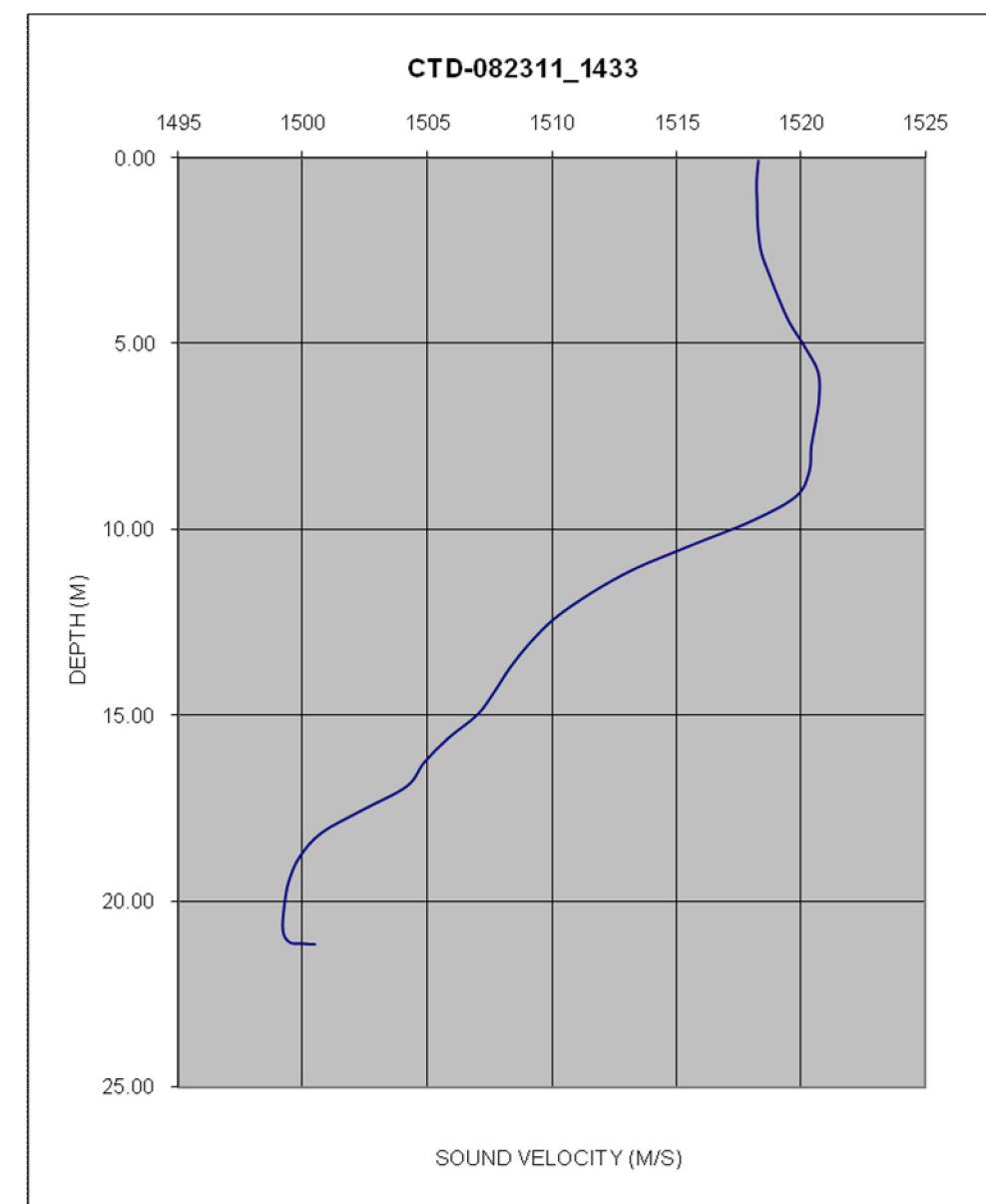


Figure 3.2-47
SVP 082311_1554 taken during the Fall 2011 multibeam survey at the HARS

1519.53	0.40
1519.10	1.16
1519.20	1.94
1519.46	2.69
1519.75	3.43
1520.12	4.16
1520.71	4.90
1521.49	5.68
1521.73	6.41
1521.67	7.11
1521.47	7.82
1521.15	8.53
1520.46	9.21
1519.32	9.92
1517.27	10.61
1514.23	11.25
1511.27	11.92
1509.84	12.57
1509.08	13.24
1508.41	13.92
1507.83	14.58
1507.13	15.22
1506.19	15.88
1504.35	16.53
1502.30	17.18
1500.85	17.82
1500.05	18.47
1499.48	19.12
1498.95	19.77
1498.53	20.43
1498.30	21.08
1498.19	21.72
1498.24	22.30
1498.53	22.43

CTD PROFILE # 082311_1554

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
08/23/11	15:54	1015900	86533	74	40.40413042 73.88635912

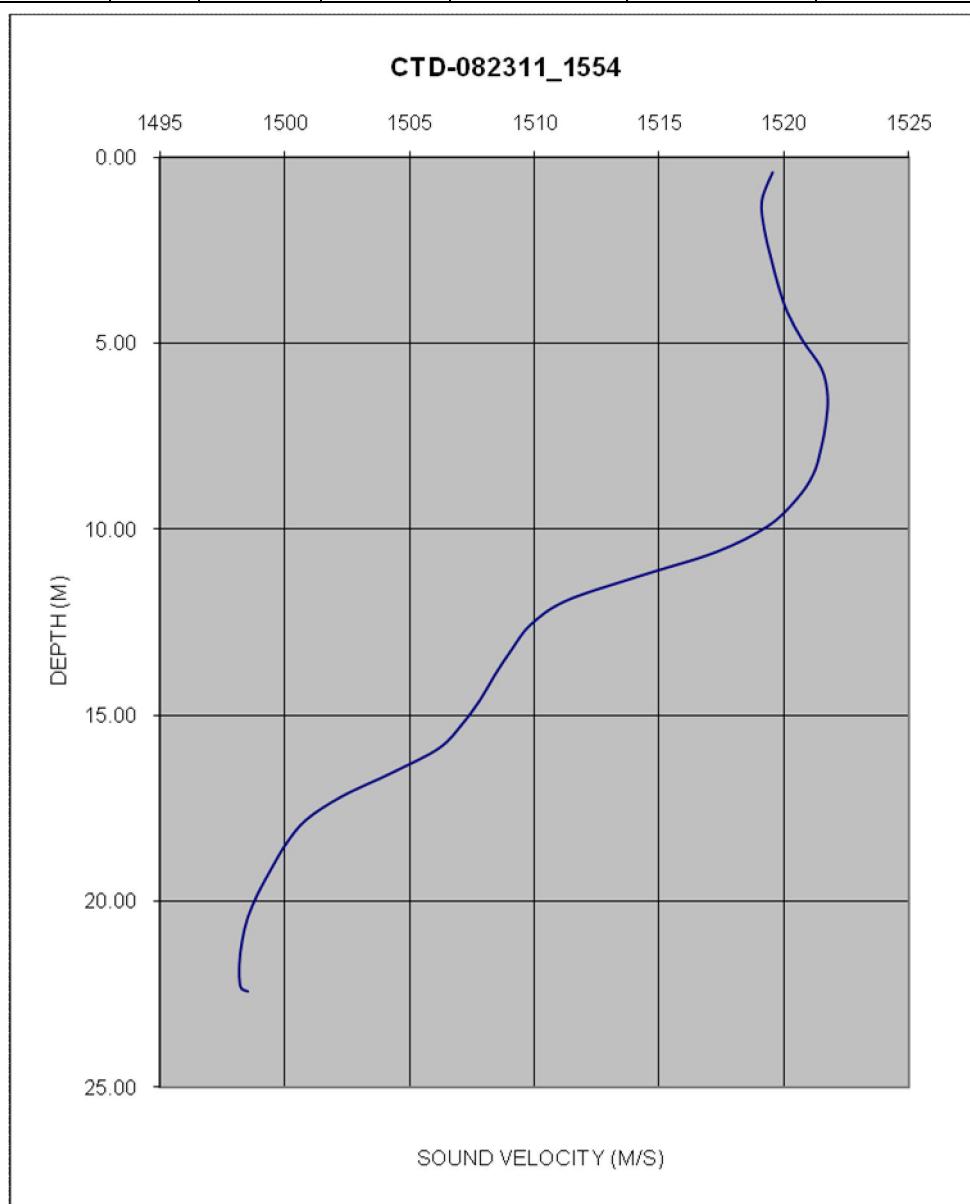


Figure 3.2-48
SVP 082311_1632 taken during the Fall 2011 multibeam survey at the HARS

1519.61	0.30
1519.27	1.07
1519.38	1.87
1519.87	2.62
1520.06	3.30
1520.45	3.97
1520.84	4.62
1521.45	5.28
1521.86	5.94
1521.97	6.58
1521.79	7.21
1521.35	7.83
1520.51	8.49
1519.34	9.16
1518.94	9.83
1517.19	10.50
1514.19	11.17
1511.12	11.82
1509.43	12.49
1508.55	13.18
1507.95	13.85
1507.38	14.52
1506.68	15.17
1505.98	15.78
1505.25	16.38
1503.93	16.98
1502.00	17.63
1500.74	18.30
1499.94	18.96
1499.24	19.64
1498.72	20.33
1498.41	21.01
1498.23	21.70
1498.10	22.37
1498.03	22.98
1497.99	23.10

CTD PROFILE # 082311_1632

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
08/23/11	16:32	1016095	86595	76	40.40429773 73.88566123

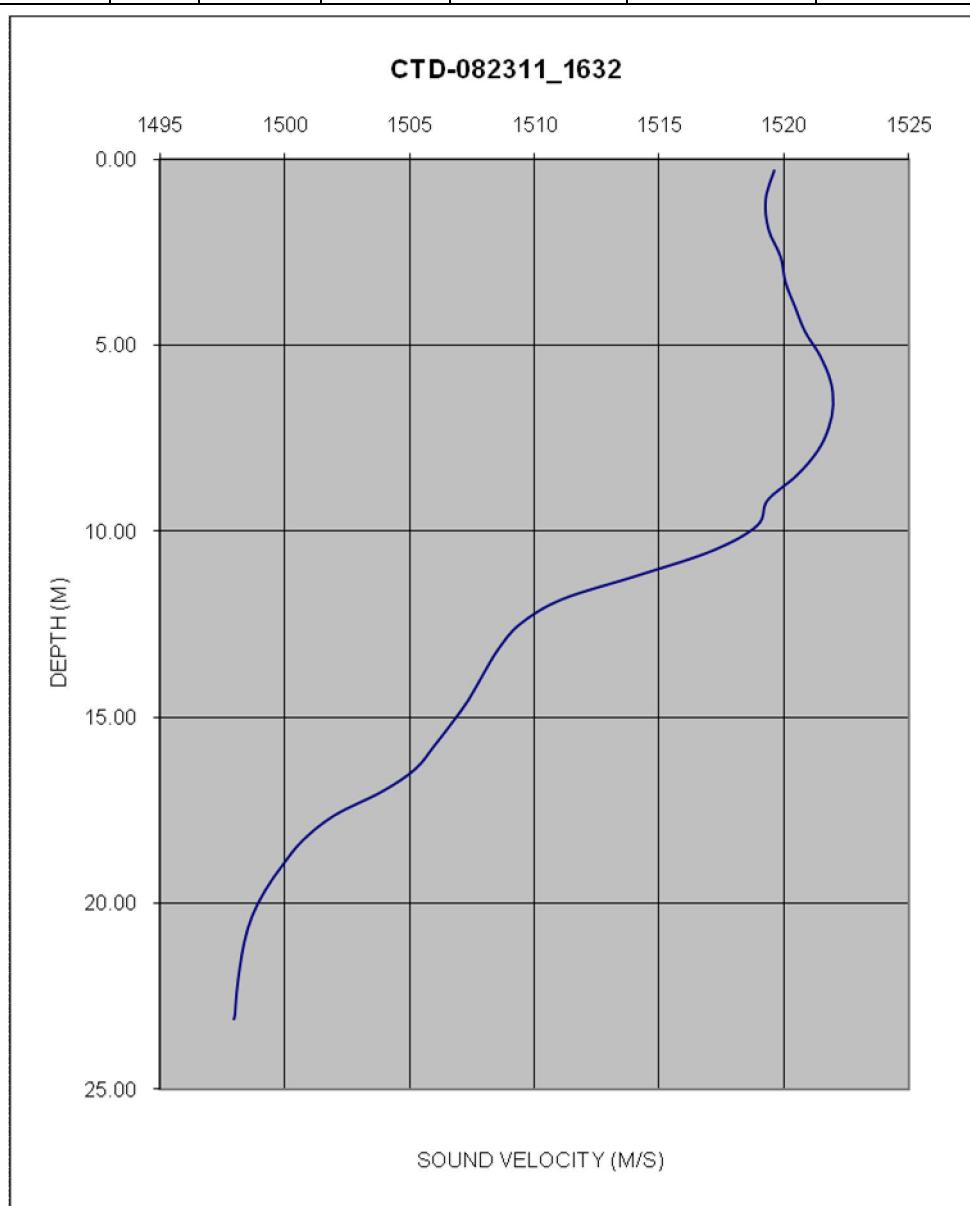


Figure 3.2-49
SVP 082311_1747 taken during the Fall 2011 multibeam survey at the HARS

1519.72	0.09
1519.65	0.67
1519.60	1.28
1519.83	1.88
1520.17	2.48
1520.61	3.08
1520.85	3.68
1521.17	4.28
1521.60	4.92
1522.03	5.57
1522.28	6.19
1522.38	6.78
1522.46	7.37
1522.52	7.93
1522.42	8.51
1521.53	9.11
1520.97	9.68
1518.98	10.24
1515.16	10.81
1511.94	11.39
1510.24	11.98
1509.43	12.59
1508.83	13.21
1508.24	13.81
1507.77	14.41
1507.32	14.99
1506.71	15.56
1505.72	16.11
1504.73	16.65
1503.85	17.19
1503.07	17.71
1502.65	18.20
1502.34	18.69
1501.99	19.16
1501.51	19.67
1500.51	20.22
1499.44	20.79
1498.89	21.39
1498.62	21.99
1498.40	22.61
1498.49	22.98

CTD PROFILE # 082311_1747

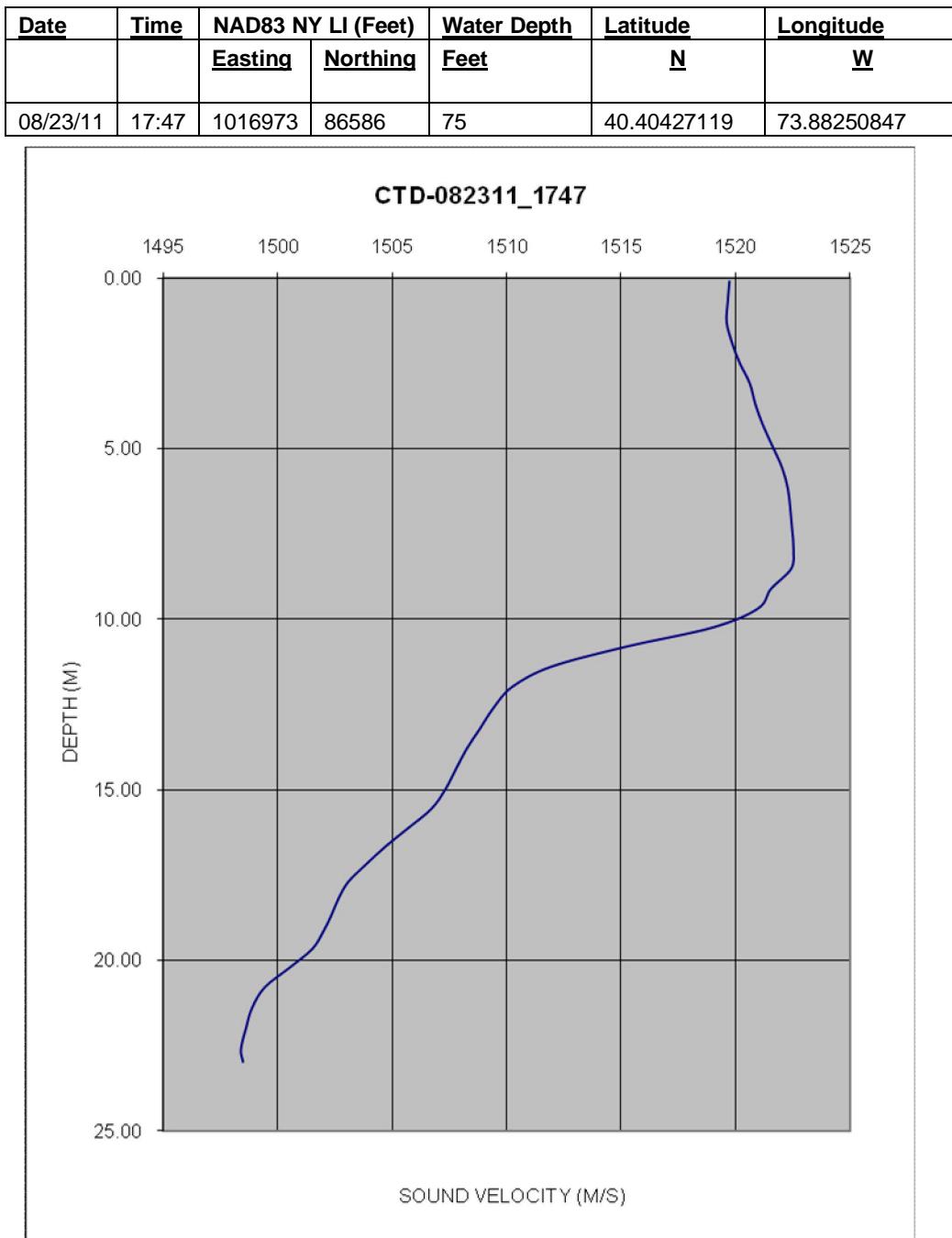


Figure 3.2-50
SVP 082311_1925 taken during the Fall 2011 multibeam survey at the HARS

1525.56	0.28
1525.46	0.80
1525.41	1.41
1525.41	2.06
1525.40	2.72
1525.38	3.37
1525.35	4.02
1525.27	4.67
1525.17	5.33
1525.11	5.99
1525.03	6.64
1524.97	7.31
1524.92	7.96
1525.03	8.63
1524.75	9.28
1522.43	9.93
1516.92	10.60
1511.93	11.27
1509.20	11.94
1507.99	12.61
1507.45	13.27
1507.16	13.92
1506.81	14.58
1506.45	15.26
1506.19	15.96
1505.97	16.65
1505.77	17.33
1505.30	18.02
1503.84	18.70
1501.54	19.36
1499.47	20.03
1498.27	20.60
1497.53	21.15
1496.83	21.76
1496.68	22.06
1497.12	22.10

CTD PROFILE # 082311 1925

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
08/23/11	19:25	1017896	77078	73	40.37816924 73.87923882

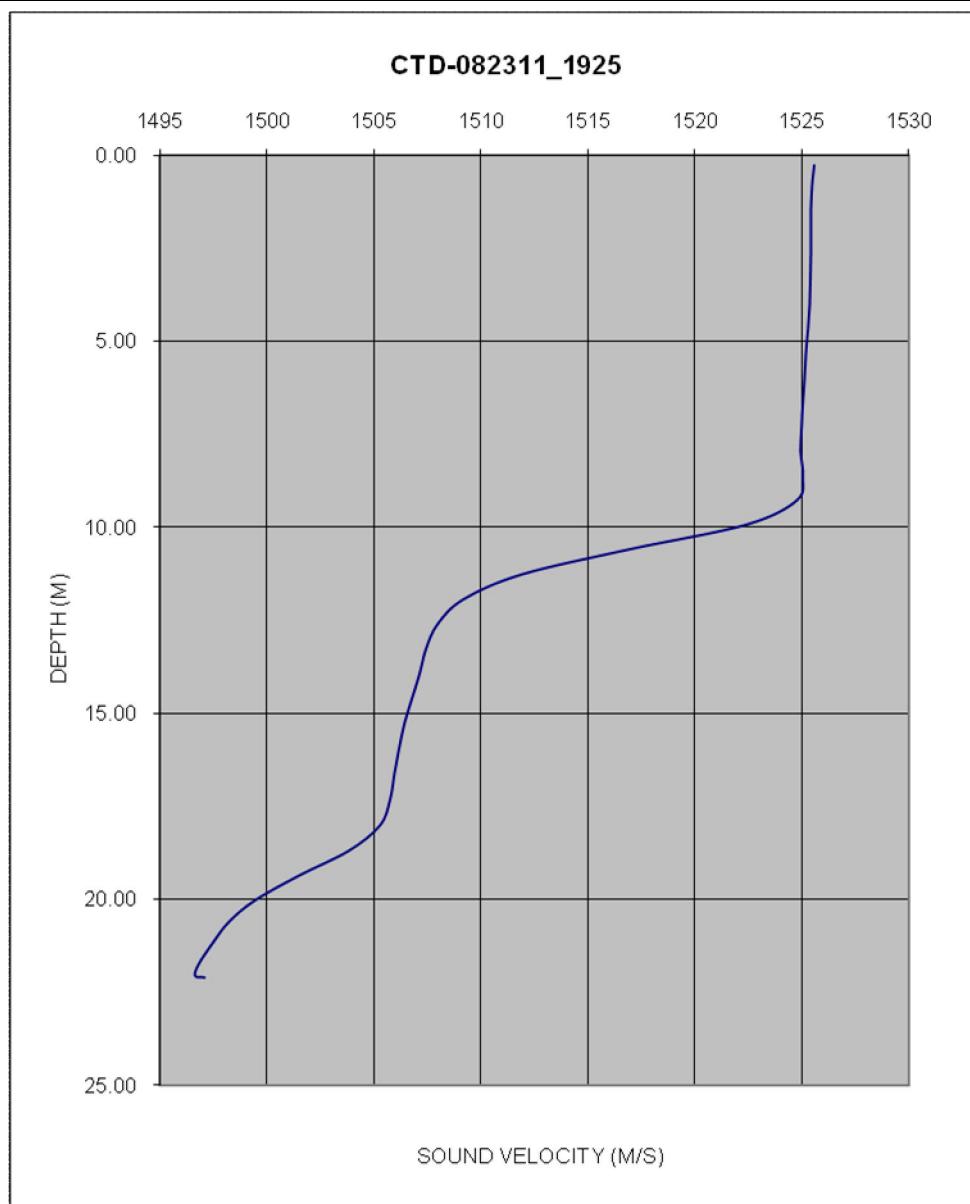


Figure 3.2-51
SVP 082311_2126 taken during the Fall 2011 multibeam survey at the HARS

1526.81	0.02
1526.64	0.70
1526.57	1.40
1526.53	2.08
1526.44	2.73
1526.32	3.37
1526.26	4.07
1526.22	4.73
1526.10	5.38
1525.94	6.04
1525.67	6.70
1525.34	7.36
1524.49	8.01
1521.67	8.67
1517.37	9.33
1514.36	10.00
1511.89	10.67
1510.15	11.36
1509.13	12.02
1508.28	12.70
1507.36	13.37
1506.67	14.05
1506.25	14.73
1506.01	15.39
1505.85	16.05
1505.61	16.73
1505.17	17.40
1504.32	18.07
1502.65	18.75
1500.62	19.41
1498.77	20.09
1497.88	20.76
1497.40	21.44
1496.75	22.11
1496.09	22.78
1495.75	23.31
1496.09	23.39

CTD PROFILE # 082311 2126

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
08/23/11	21:26	1019263	77136	77	40.37832475 73.87433205

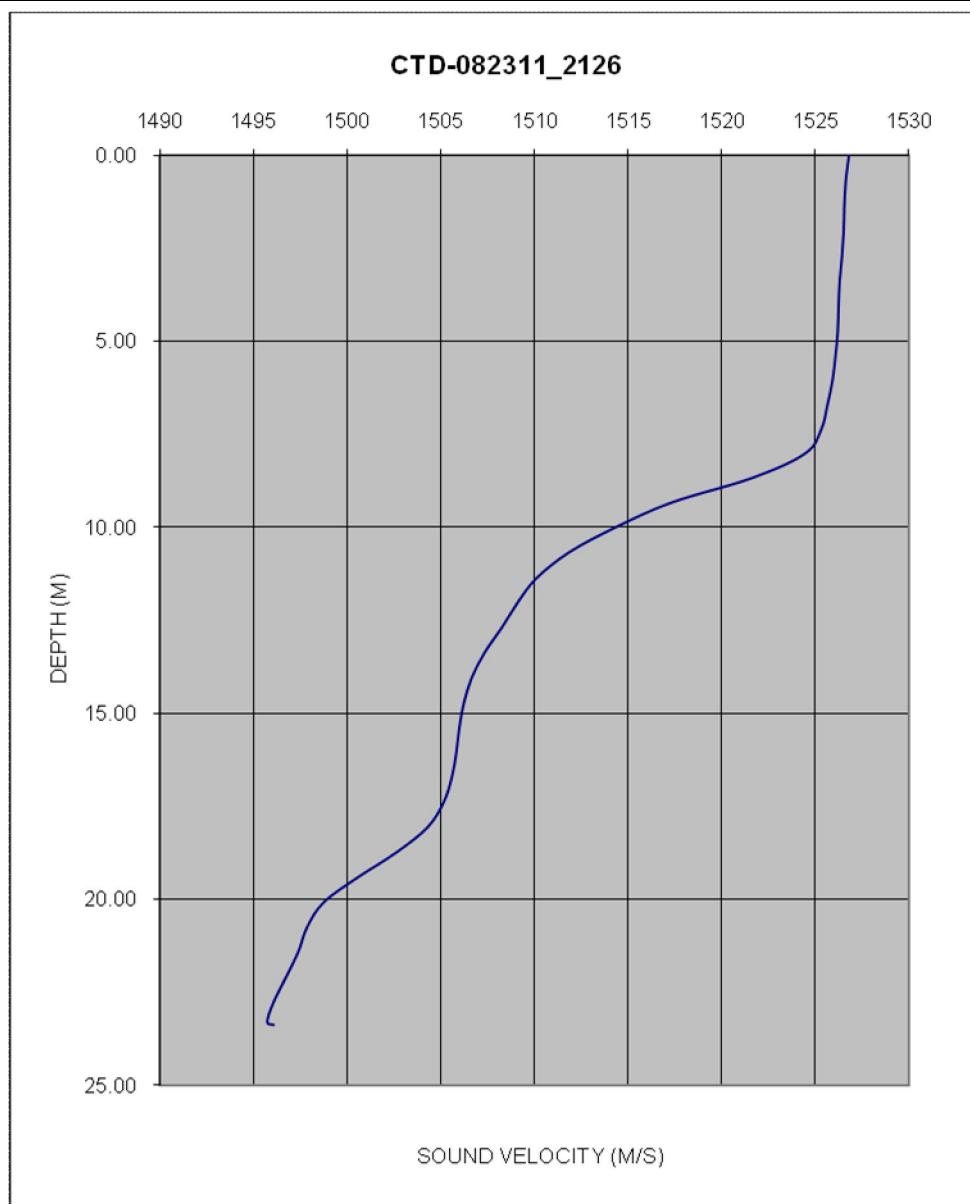


Figure 3.2-52
SVP 082411_1133 taken during the Fall 2011 multibeam survey at the HARS

1516.07 0.43

1516.14 0.98

1516.28 1.58

CTD PROFILE # 082411 1133

1517.43 2.20

1519.52 2.82

1521.58 3.43

<u>Date</u>	<u>Time</u>	<u>NAD83 NY LI (Feet)</u>	<u>Water Depth</u>	<u>Latitude</u>	<u>Longitude</u>
		<u>Easting</u>	<u>Northing</u>	<u>Feet</u>	<u>N</u>
08/24/11	11:33	1019481	86693	62	40.40455469 73.87350044

1522.71 4.01

1523.21 4.58

1523.38 5.11

1523.46 5.61

1523.38 6.11

1523.02 6.62

1521.69 7.15

1518.85 7.68

1516.61 8.15

1514.64 8.60

1512.63 9.05

1511.10 9.57

1510.03 10.15

1509.42 10.72

1509.01 11.28

1508.01 11.85

1506.76 12.39

1506.00 12.91

1505.35 13.44

1504.81 13.98

1504.35 14.54

1503.93 15.10

1503.35 15.68

1502.63 16.28

1501.42 16.88

1500.04 17.49

1499.32 18.09

1499.10 18.64

1499.25 18.78

1499.63 18.80

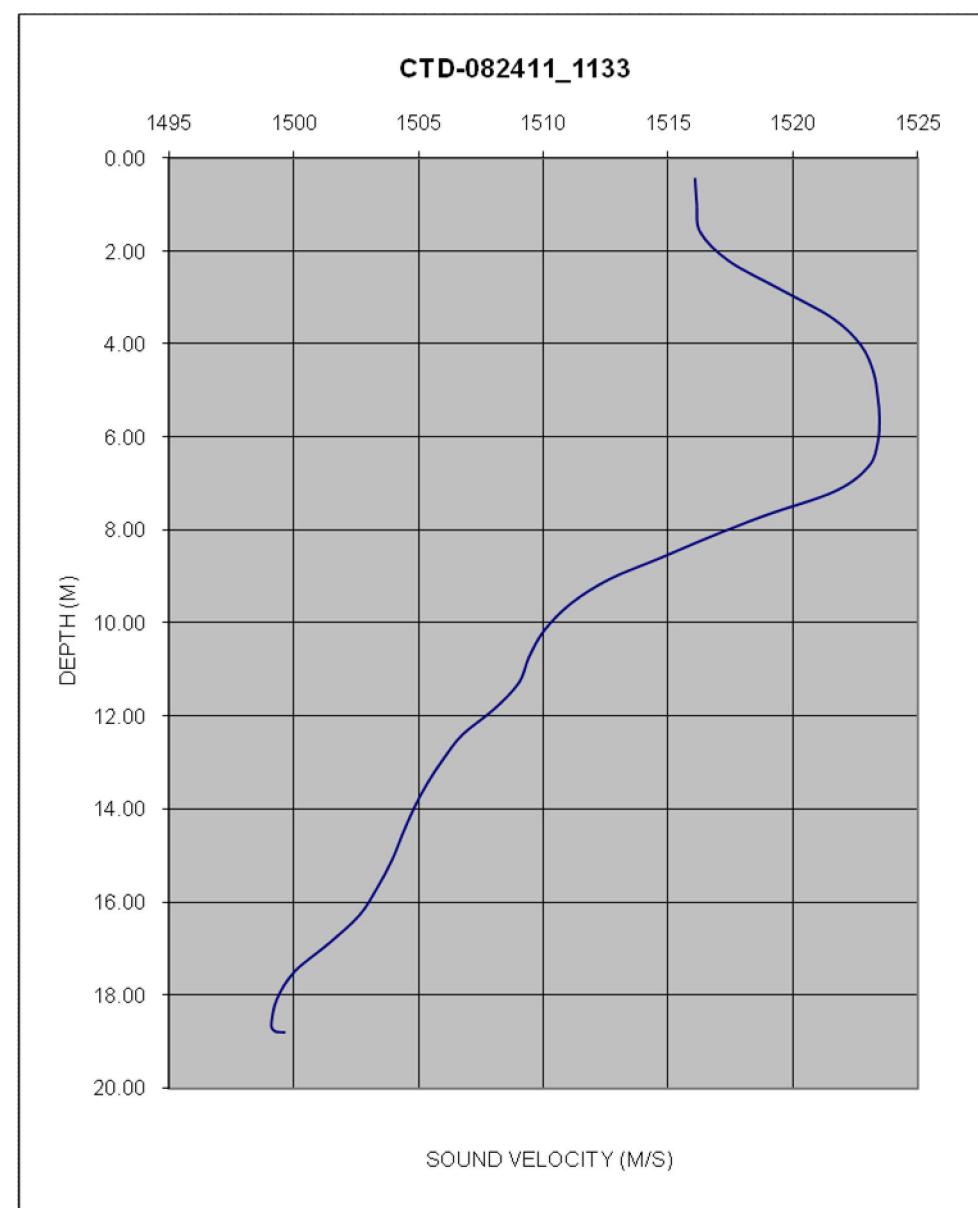


Figure 3.2-53
SVP 082411_1232 taken during the Fall 2011 multibeam survey at the HARS

1520.34	0.43
1521.45	1.04
1523.06	1.65
1524.03	2.23
1524.56	2.78
1524.77	3.34
1524.85	3.90
1524.88	4.49
1524.89	5.10
1524.89	5.72
1524.89	6.34
1524.86	6.93
1524.69	7.55
1523.99	8.22
1522.17	8.90
1518.06	9.58
1513.53	10.26
1510.78	10.94
1508.97	11.61
1507.87	12.27
1507.14	12.95
1506.54	13.63
1505.98	14.31
1505.33	15.00
1504.60	15.66
1503.56	16.31
1502.63	16.95
1501.53	17.58
1500.42	18.22
1499.59	18.86
1499.20	19.50
1498.89	20.13
1498.41	20.77
1497.56	21.43
1496.21	22.08
1494.48	22.57
1494.31	22.63

CTD PROFILE # 082411_1232

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
08/24/11	12:32	1020207	77161	74	40.37838851 73.87094532

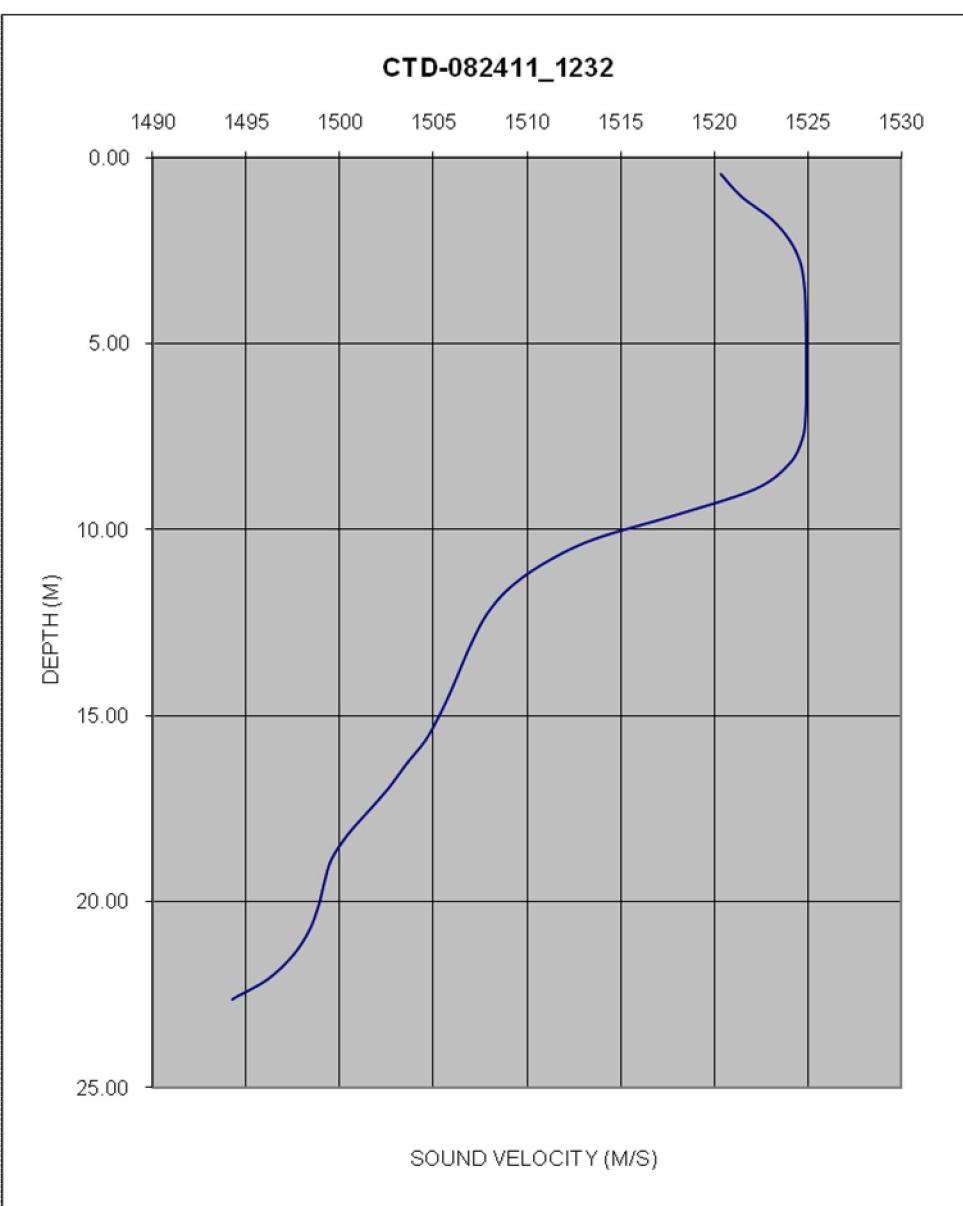


Figure 3.2-54
SVP 082411_1356 taken during the Fall 2011 multibeam survey at the HARS

1521.82	0.46
1522.65	1.02
1523.75	1.54
1524.32	2.03
1524.64	2.58
1524.82	3.19
1524.87	3.78
1524.88	4.37
1524.88	4.98
1524.87	5.59
1524.82	6.22
1524.61	6.89
1523.82	7.54
1522.38	8.17
1519.80	8.80
1516.52	9.44
1514.52	10.09
1513.14	10.75
1511.68	11.41
1510.48	12.04
1509.60	12.69
1508.66	13.36
1507.67	14.03
1506.57	14.65
1505.76	15.22
1505.27	15.80
1504.94	16.42
1504.60	17.08
1504.02	17.70
1503.27	18.30
1502.73	18.88
1502.35	19.49
1501.88	20.13
1501.64	20.55
1501.95	20.60

CTD PROFILE # 082411_1356

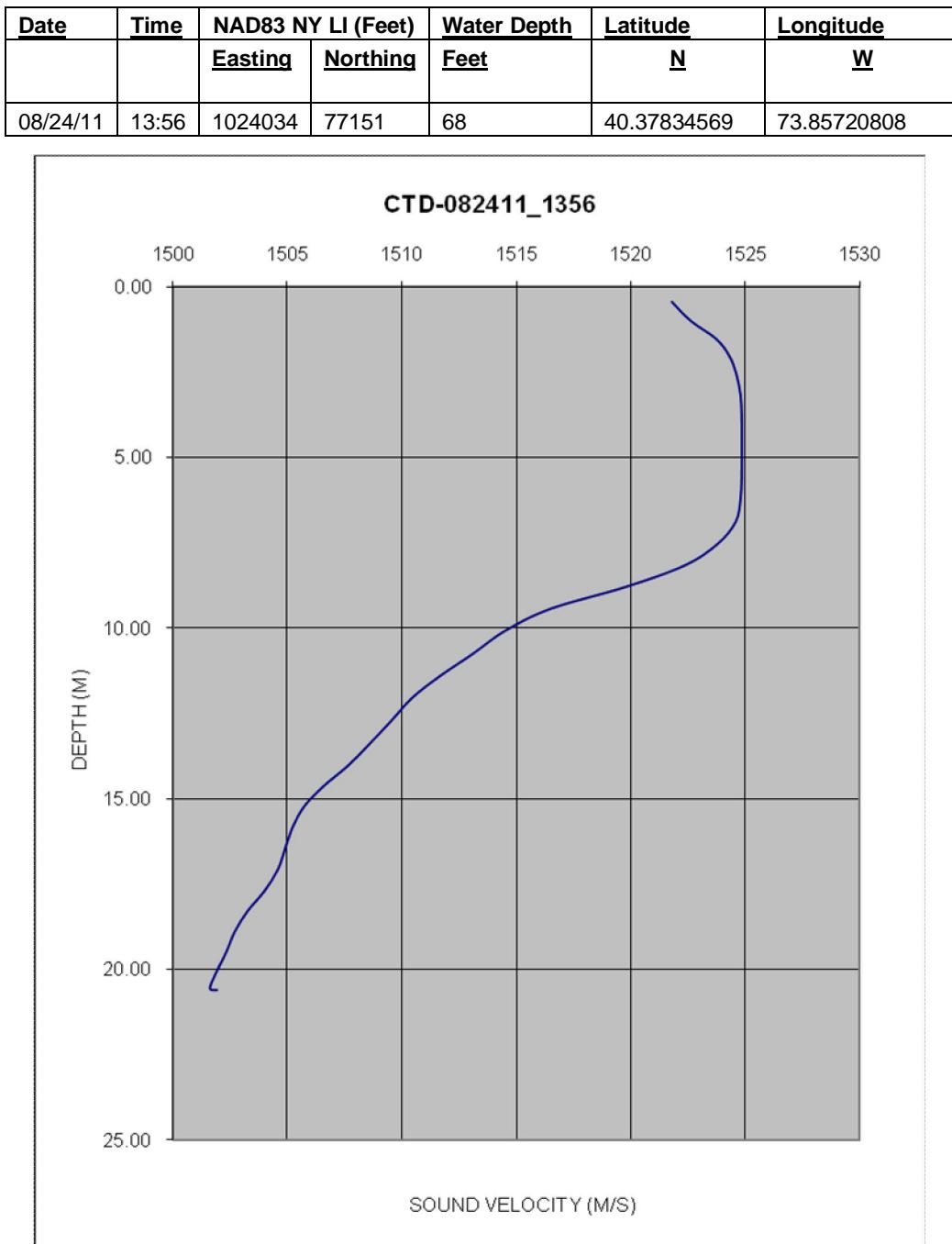


Figure 3.2-55
SVP 082411_1546 taken during the Fall 2011 multibeam survey at the HARS

1522.53	0.05
1522.23	0.53
1522.74	1.19
1524.19	1.88
1524.78	2.56
1525.05	3.17
1525.14	3.74
1525.17	4.25
1525.17	4.74
1525.15	5.36
1525.09	6.02
1524.65	6.67
1523.81	7.25
1522.95	7.82
1521.84	8.37
1520.35	8.95
1517.71	9.57
1514.51	10.17
1511.83	10.81
1510.42	11.40
1509.72	12.03
1509.01	12.68
1508.12	13.33
1507.00	13.96
1506.03	14.57
1505.48	15.18
1505.16	15.81
1504.95	16.45
1504.34	17.09
1503.30	17.73
1502.42	18.36
1501.43	18.98
1499.99	19.60
1498.02	20.24
1496.07	20.91
1495.08	21.51
1495.19	21.67

CTD PROFILE # 082411 1546

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
08/24/11	15:46	1022884	77355	71	40.37890986 73.86133640

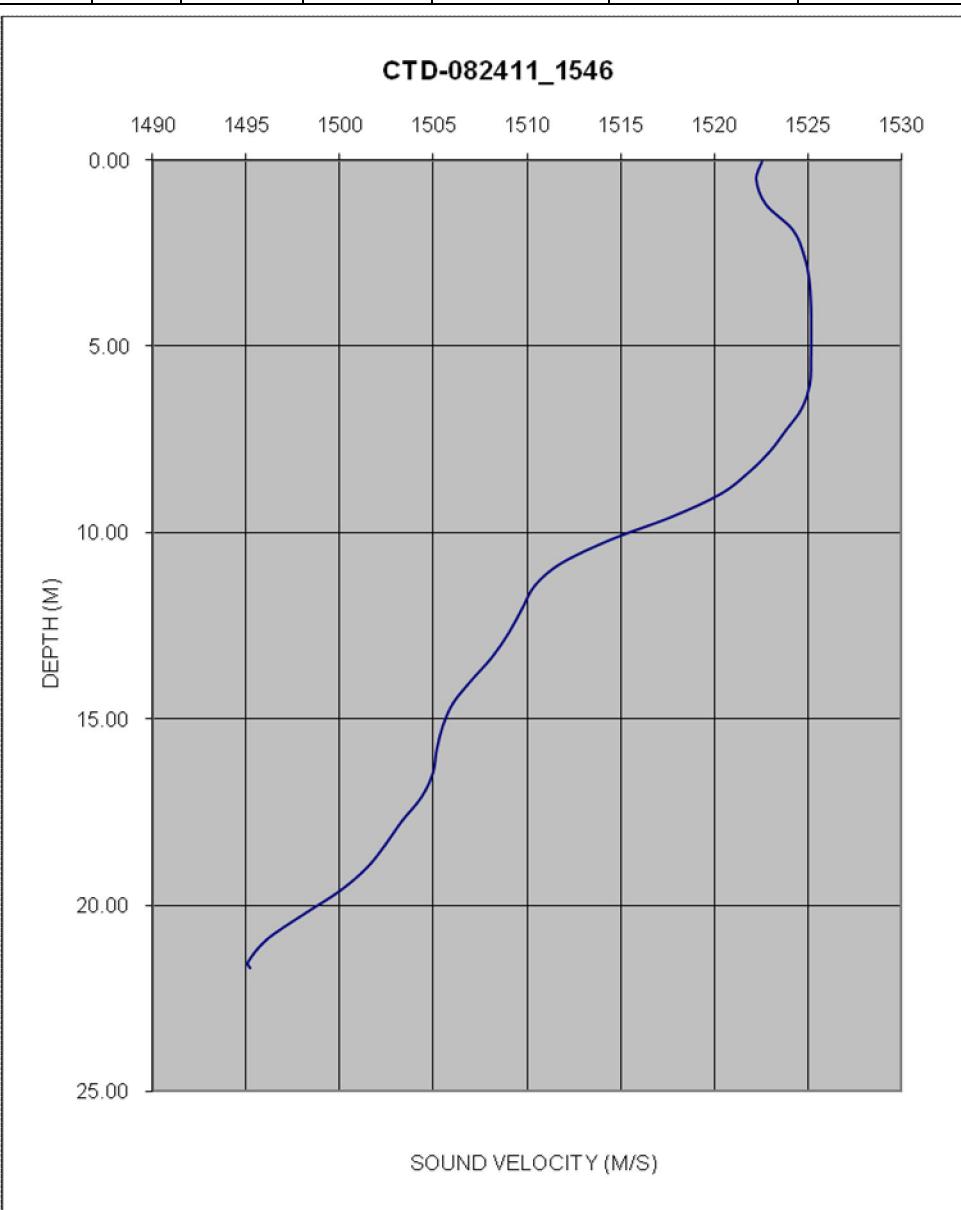


Figure 3.2-56
SVP 082411_1739 taken during the Fall 2011 multibeam survey at the HARS

1521.55	0.29
1521.50	0.85
1522.15	1.43
1522.77	2.05
1523.00	2.69
1523.18	3.33
1523.36	3.96
1523.49	4.54
1523.53	5.16
1523.66	5.77
1523.68	6.36
1523.68	6.95
1523.68	7.48
1523.69	8.07
1523.70	8.67
1523.90	9.26
1523.26	9.79
1521.46	10.32
1520.28	10.90
1519.38	11.49
1518.15	12.14
1515.67	12.80
1513.00	13.44
1511.64	14.09
1509.85	14.74
1507.14	15.40
1504.88	16.04
1503.69	16.62
1503.60	16.80

CTD PROFILE # 082411_1739

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
08/24/11	17:39	1023960	90542	55	40.41510113 73.85739712

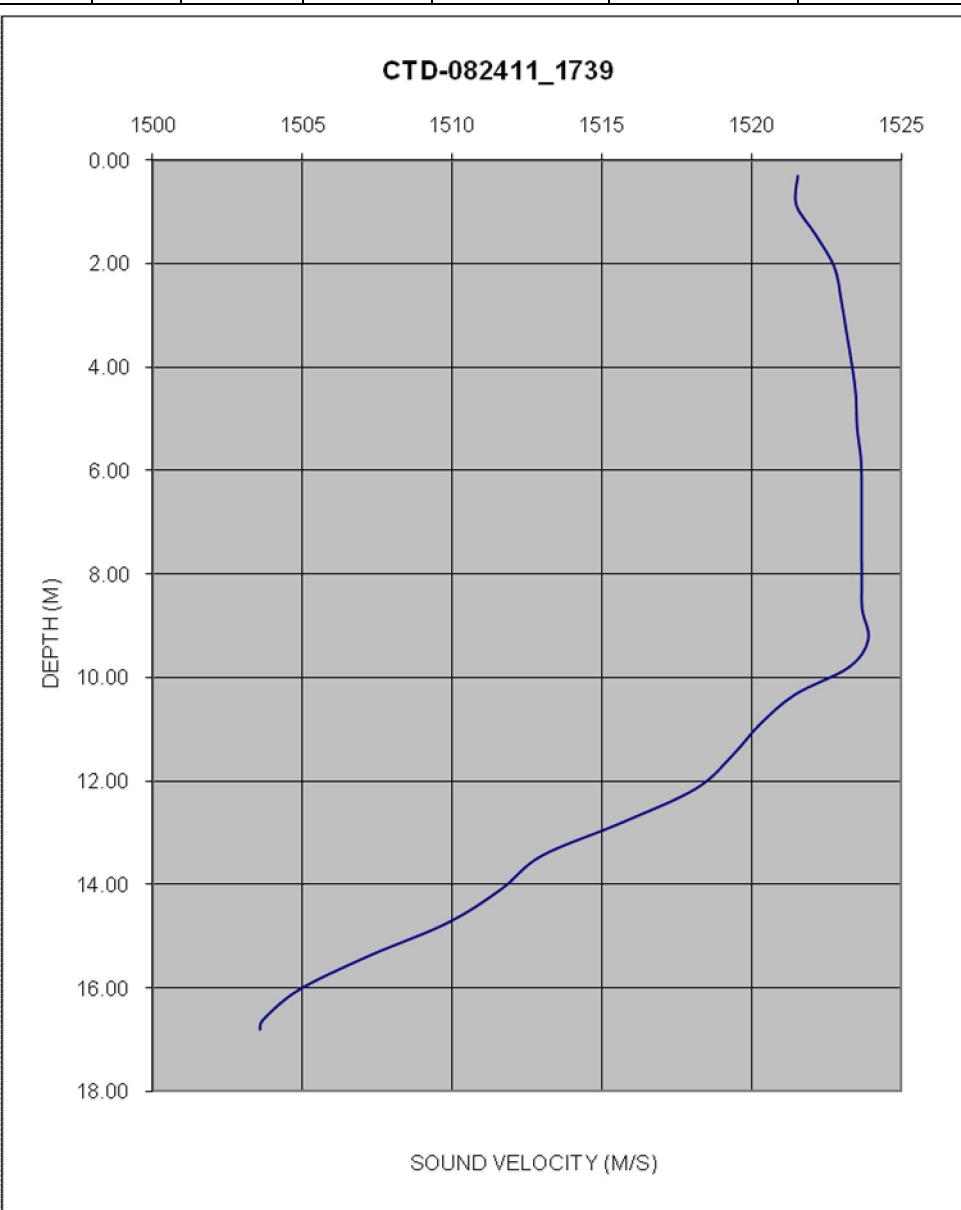


Figure 3.2-57
SVP 091211_1307 taken during the Fall 2011 multibeam survey at the HARS

1515.33	0.45
1515.75	0.98
1516.49	1.55
1516.94	2.19
1517.25	2.88
1517.46	3.54
1517.72	4.09
1517.83	4.59
1517.88	5.11
1517.80	5.69
1517.64	6.25
1517.60	6.76
1517.73	7.24
1517.83	7.73
1517.93	8.16
1518.02	8.60
1518.07	9.07
1518.07	9.54
1518.08	10.05
1518.09	10.56
1518.07	11.06
1518.04	11.57
1518.02	12.03
1518.03	12.48
1518.08	13.00
1518.12	13.60
1518.13	14.18
1518.13	14.76
1518.06	15.37
1517.92	16.01
1517.81	16.61
1517.74	17.19
1517.68	17.80
1517.54	18.40
1517.06	19.01
1516.40	19.59
1515.86	20.14
1515.41	20.75
1515.17	21.34
1514.93	21.90
1514.68	22.49
1514.33	23.04
1514.12	23.25

CTD PROFILE # 091211 1307

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
09/12/11	13:07	1020837	77135	76	40.37831457 73.86868431

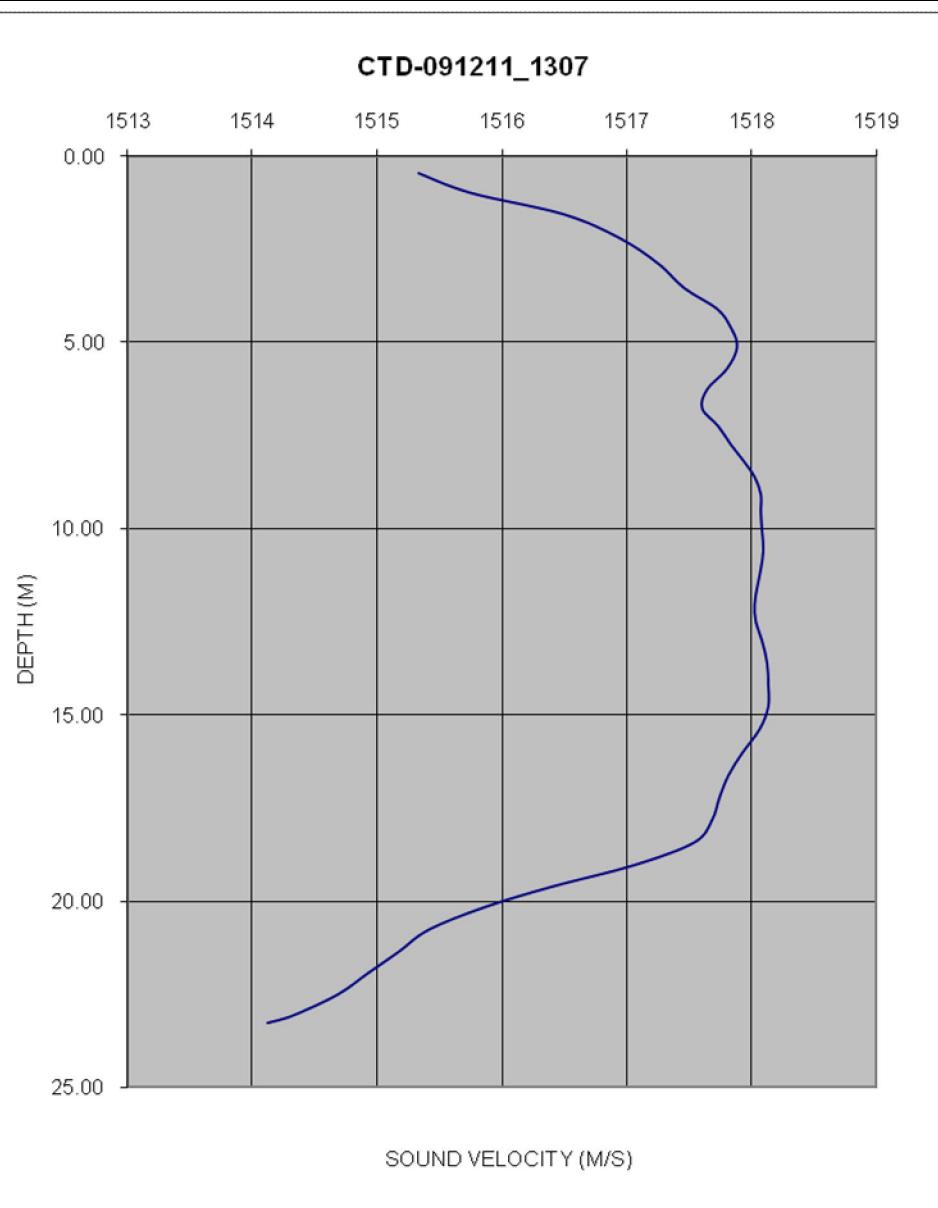


Figure 3.2-58
SVP 091211_1420 taken during the Fall 2011 multibeam survey at the HARS

1515.28	0.20
1516.37	0.80
1516.77	1.47
1517.21	2.18
1517.65	2.85
1517.86	3.48
1517.92	4.09
1517.95	4.70
1517.89	5.36
1517.83	6.03
1517.64	6.70
1517.57	7.40
1517.72	8.08
1517.84	8.78
1517.91	9.47
1517.96	10.12
1518.03	10.79
1518.07	11.49
1518.05	12.19
1518.01	12.89
1517.99	13.57
1518.00	14.26
1518.02	14.94
1518.03	15.54
1518.06	16.07
1518.08	16.49
1518.10	16.87
1518.12	17.30
1517.98	17.80
1517.63	18.31
1517.26	18.83
1516.88	19.38
1516.35	19.89
1516.00	20.29
1515.73	20.80
1515.48	21.39
1514.91	22.02
1514.34	22.53
1514.11	22.58

CTD PROFILE # 091211 1420

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
09/12/11	14:20	1021602	77124	74	40.37828120 73.86593868

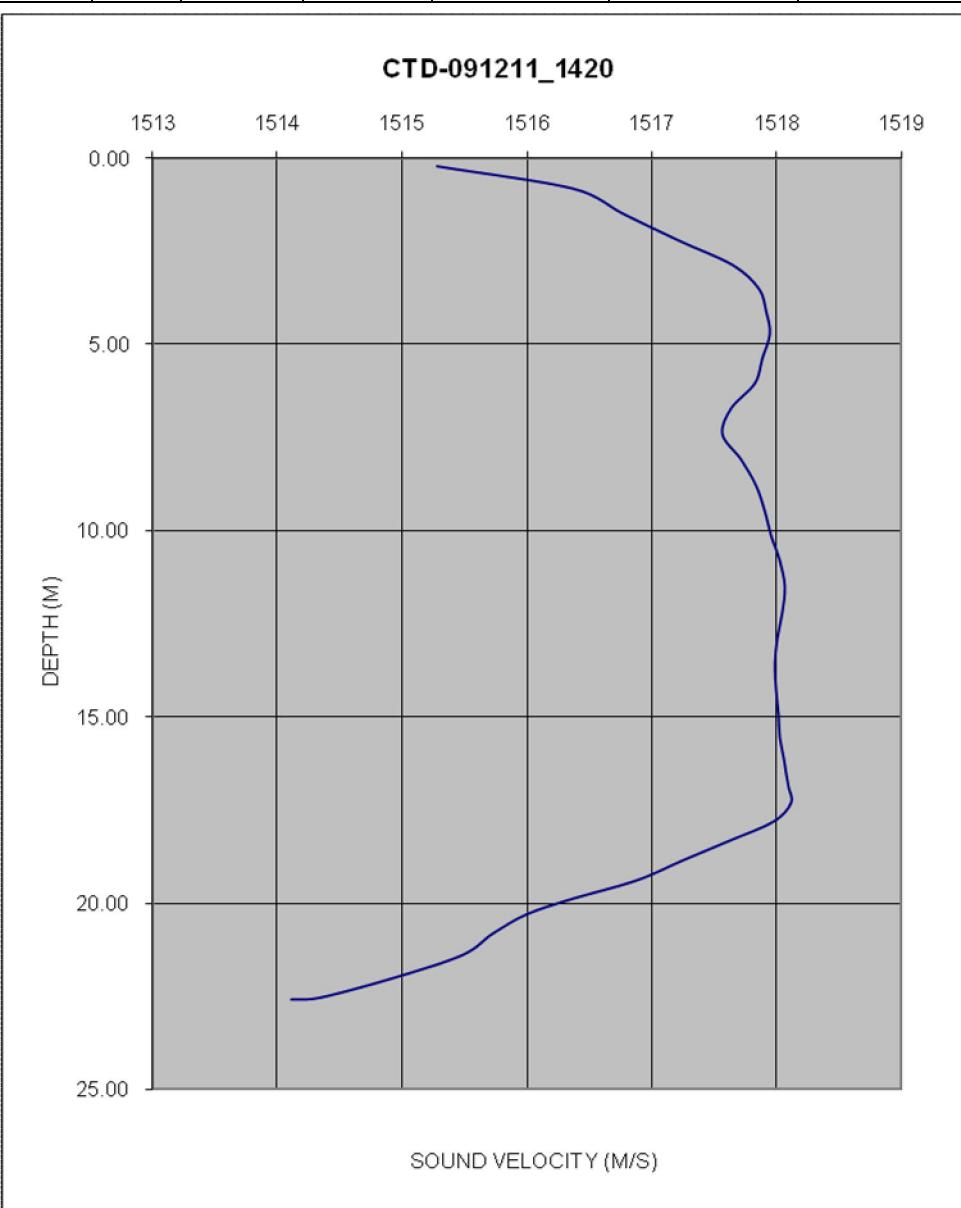


Figure 3.2-59
SVP 091211_1548 taken during the Fall 2011 multibeam survey at the HARS

1512.33	0.34
1514.43	0.90
1515.86	1.54
1516.18	2.20
1516.51	2.90
1516.29	3.61
1516.46	4.33
1516.81	5.01
1517.22	5.68
1517.44	6.35
1517.47	7.00
1517.54	7.67
1517.66	8.35
1517.77	9.03
1517.83	9.69
1517.93	10.36
1518.08	11.01
1518.09	11.69
1517.93	12.36
1517.57	13.03
1517.17	13.69
1516.76	14.37
1516.49	15.03
1516.37	15.68
1516.30	16.31
1516.32	16.58
1516.44	16.61
1516.55	16.62
1516.59	16.66
1516.66	16.68

CTD PROFILE # 091211 1548

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
09/12/11	15:48	1024025	86398	55	40.40372626 73.85718796

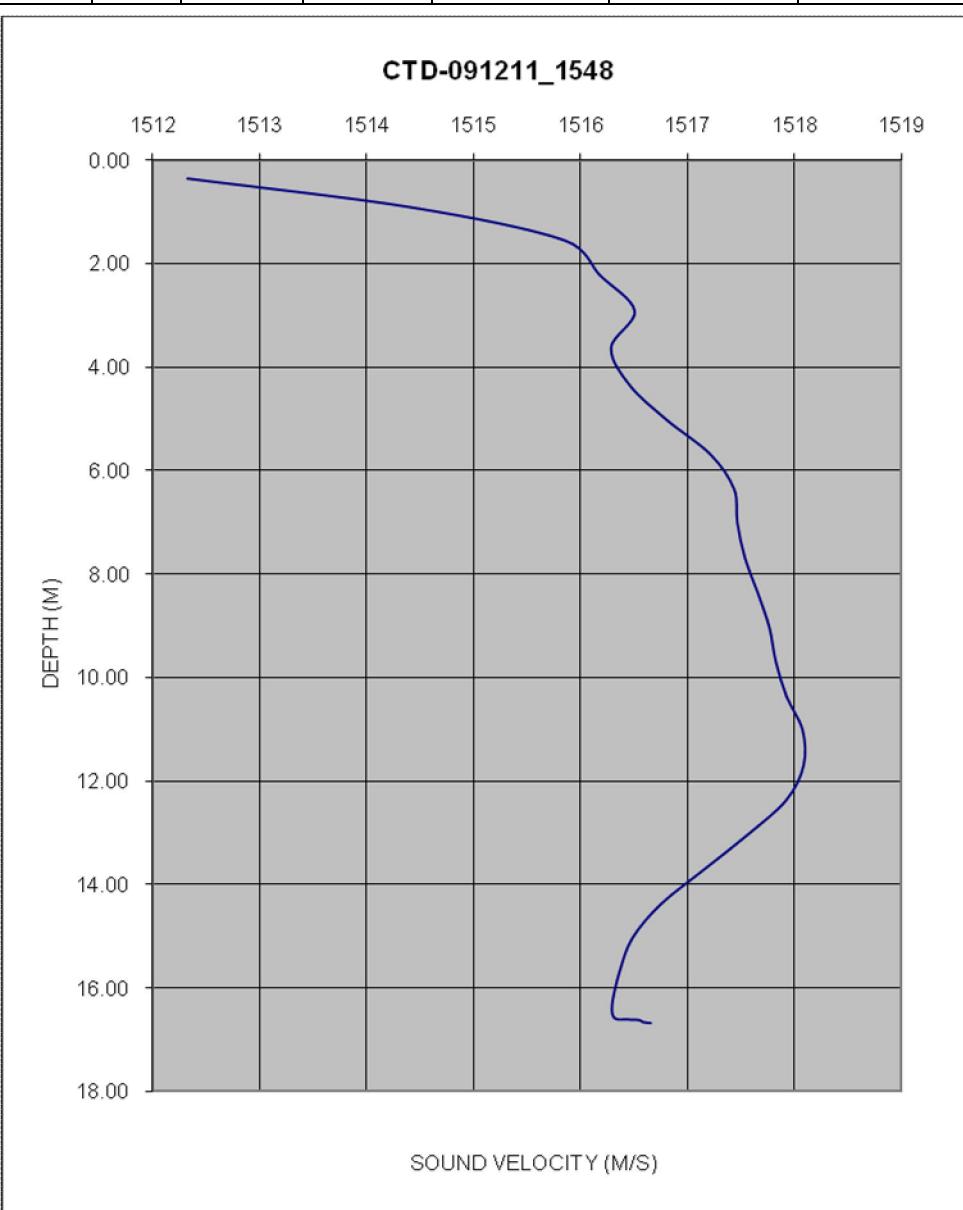


Figure 3.2-60
SVP 091211_1648 taken during the Fall 2011 multibeam survey at the HARS

1508.70	0.09
1511.94	0.56
1514.48	1.07
1515.25	1.60
1515.82	2.14
1516.41	2.69
1516.92	3.23
1516.75	3.77
1516.66	4.29
1516.68	4.79
1516.76	5.28
1516.89	5.78
1517.16	6.32
1517.35	6.86
1517.24	7.40
1517.21	7.95
1517.25	8.52
1517.52	9.05
1517.73	9.56
1517.81	10.03
1517.82	10.56
1517.86	11.08
1517.89	11.62
1517.92	12.17
1517.93	12.72
1517.90	13.28
1517.90	13.82
1517.93	14.36
1517.96	14.90
1517.96	15.43
1517.78	15.96
1517.53	16.47
1517.38	16.99
1517.34	17.45
1517.39	17.56
1517.44	17.59
1517.34	17.62

CTD PROFILE # 091211 1648

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
09/12/11	16:48	1023670	95853	58	40.42968020 73.85840771

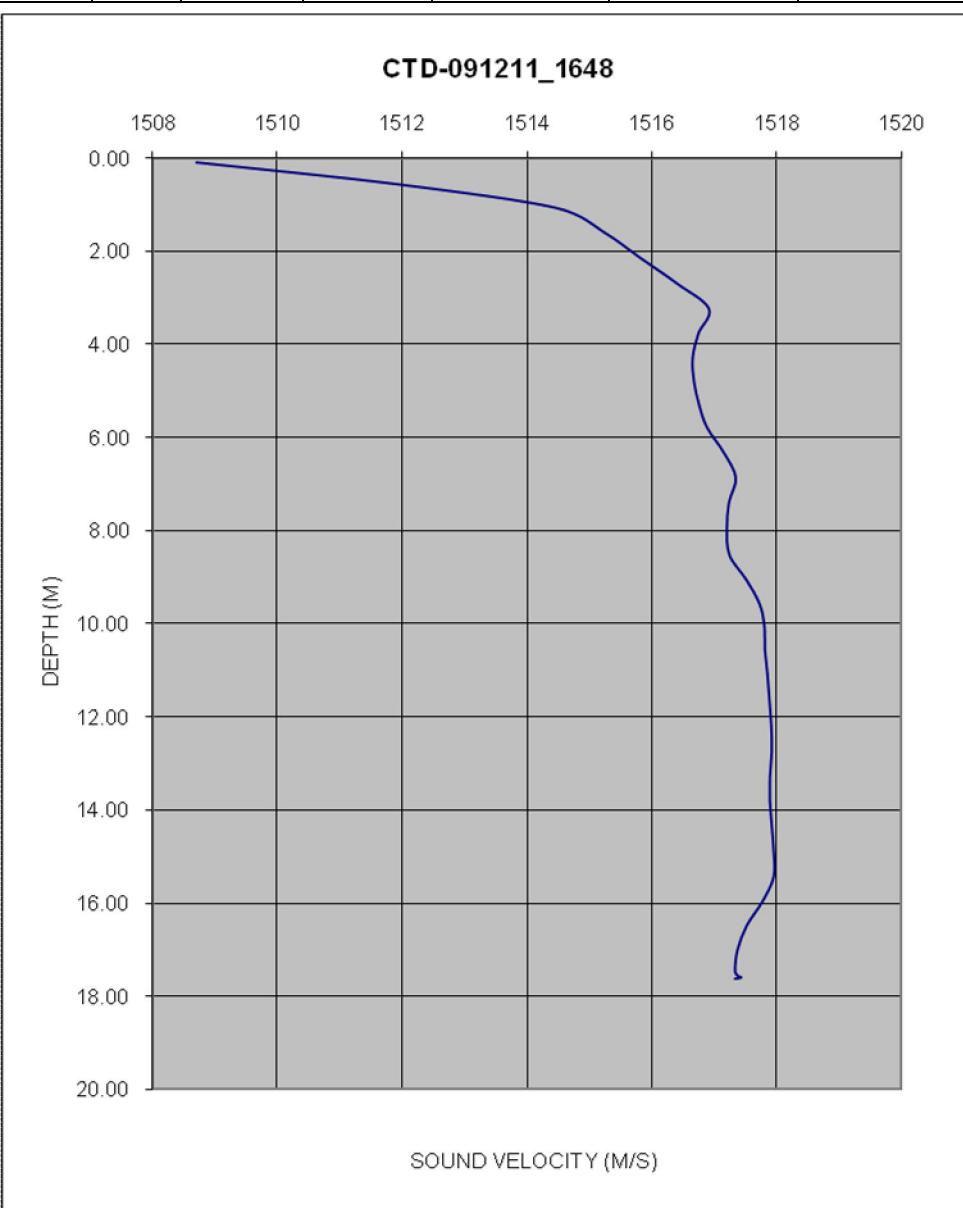


Figure 3.2-61
SVP 091211_1904 taken during the Fall 2011 multibeam survey at the HARS

CTD PROFILE # 091211 1904

1505.36	0.61
1505.17	0.87
1505.87	1.13
1506.36	1.42
1504.87	1.61
1505.81	1.70
1508.28	1.86
1510.81	2.26
1511.45	2.73
1512.49	3.22
1513.98	3.72
1515.71	4.22
1516.47	4.75
1516.59	5.30
1516.51	5.80
1516.53	6.30
1516.61	6.74
1516.80	7.15
1516.97	7.58
1517.17	8.05
1517.48	8.55
1517.56	9.05
1517.57	9.58
1517.60	10.10
1517.64	10.64
1517.73	11.26
1517.86	11.94
1517.88	12.64
1517.90	13.33
1517.68	14.02
1517.40	14.70
1517.26	15.37
1517.25	15.68

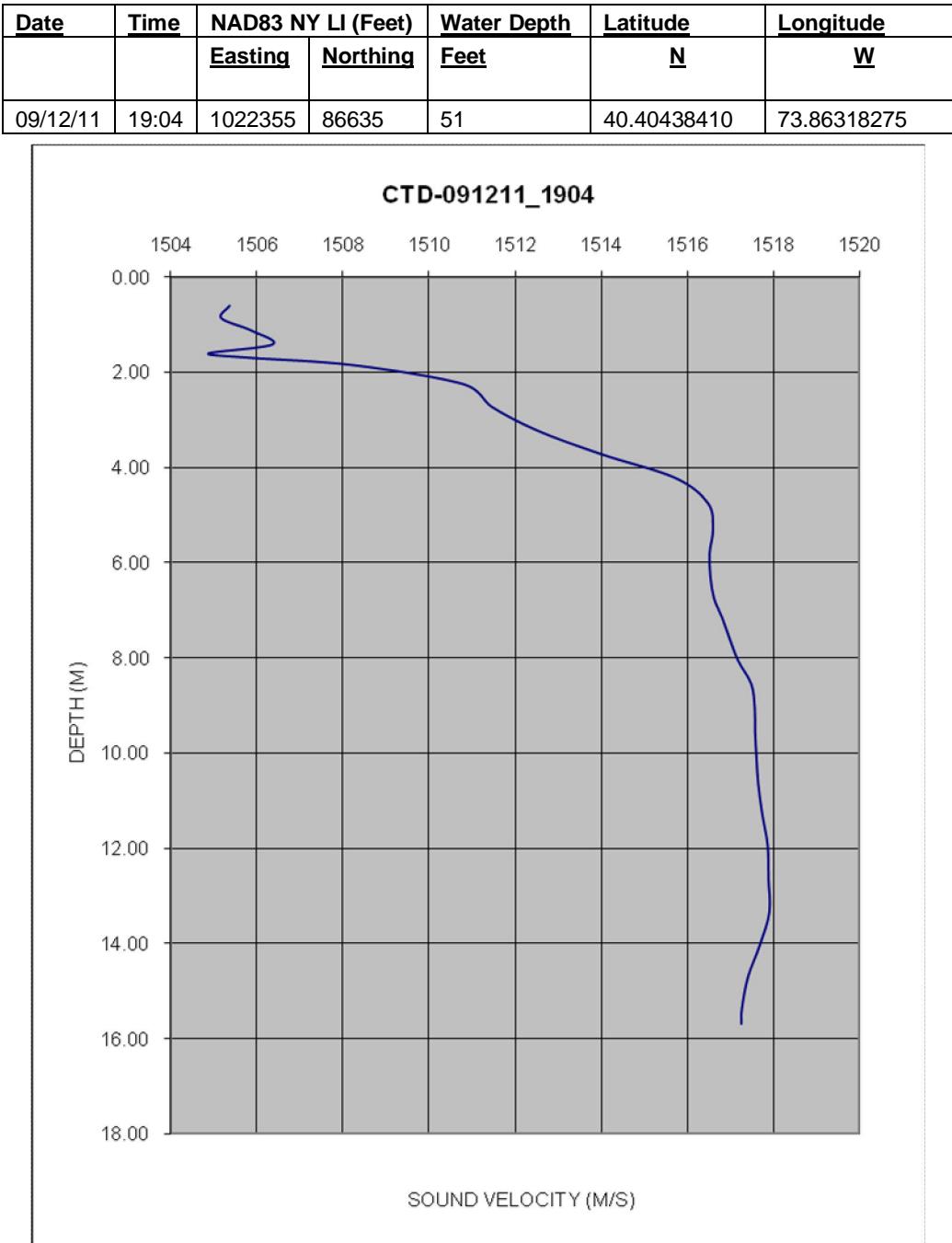


Figure 3.2-62
SVP 091211_2012 taken during the Fall 2011 multibeam survey at the HARS

1507.80	0.57
1511.22	1.32
1512.43	2.10
1513.77	2.89
1515.36	3.63
1516.47	4.30
1516.78	4.97
1516.93	5.68
1516.97	6.36
1516.99	7.02
1517.02	7.70
1517.13	8.39
1517.24	9.05
1517.35	9.70
1517.32	10.29
1517.27	10.99
1517.27	11.66
1517.32	12.35
1517.51	13.06
1517.58	13.65
1517.74	14.13
1517.98	14.62
1518.11	15.10
1517.98	15.59
1517.72	16.08
1517.58	16.55
1517.51	17.04
1517.47	17.54
1517.43	18.08
1517.43	18.65
1517.49	18.86

CTD PROFILE # 091211 2012

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
09/12/11	20:12	1021907	95917	62	40.42986352 73.86473985

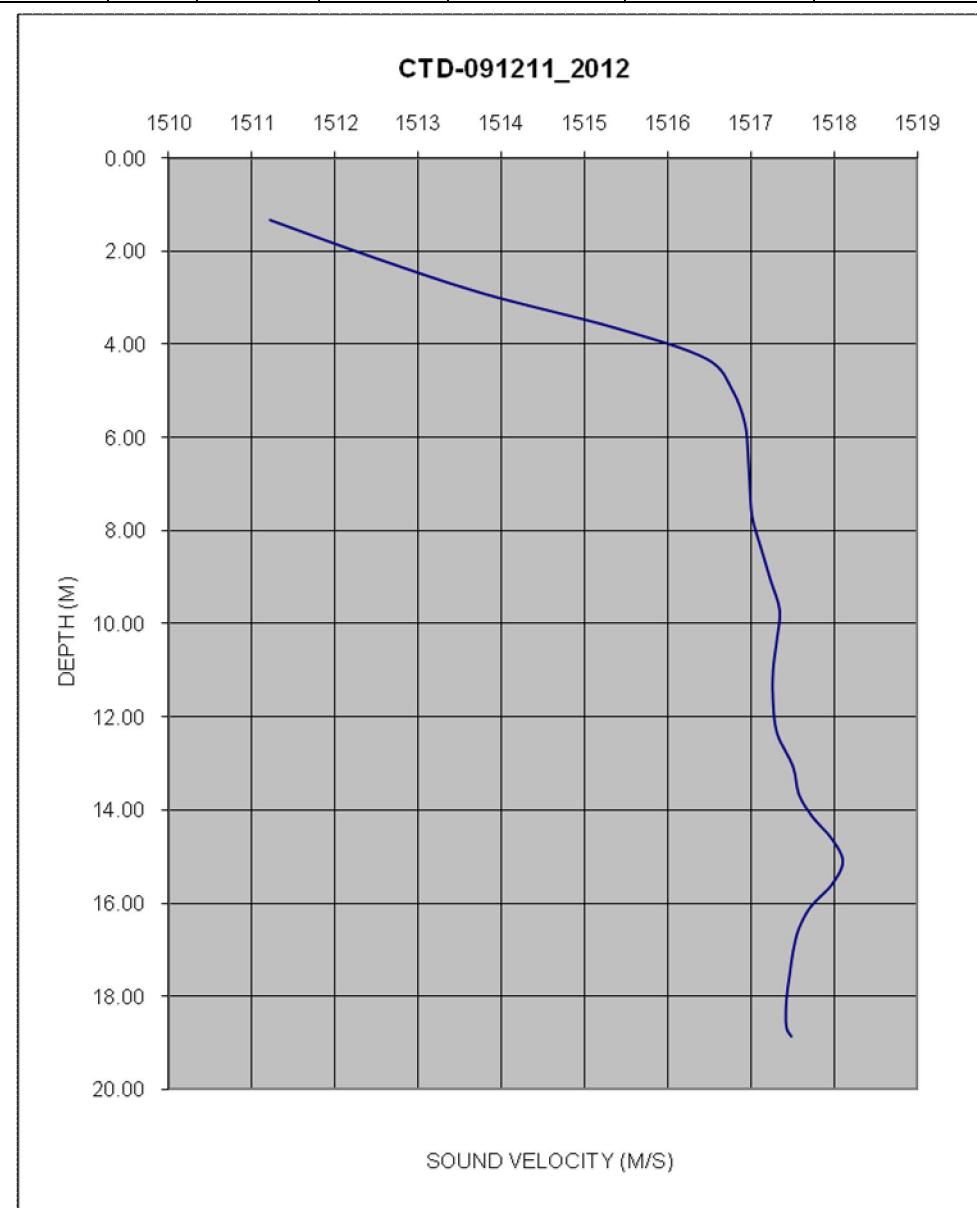


Figure 3.2-63
SVP 091311_1427 taken during the Fall 2011 multibeam survey at the HARS

1516.78	0.27
1516.77	0.77
1516.79	1.30
1516.80	1.80
1516.89	2.39
1517.21	3.06
1517.38	3.75
1517.36	4.42
1517.29	5.02
1517.28	5.60
1517.31	6.17
1517.33	6.75
1517.36	7.30
1517.38	7.84
1517.40	8.46
1517.41	9.08
1517.43	9.74
1517.45	10.44
1517.46	11.09
1517.47	11.64
1517.48	12.20
1517.48	12.90
1517.47	13.63
1517.44	14.36
1517.40	15.10
1517.35	15.81
1517.25	16.50
1517.16	17.26
1517.01	18.01
1516.85	18.76
1516.78	19.34
1516.81	19.41

CTD PROFILE # 091311_1427

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
09/13/11	14:27	1021687	95726	64	40.42933900 73.86552990

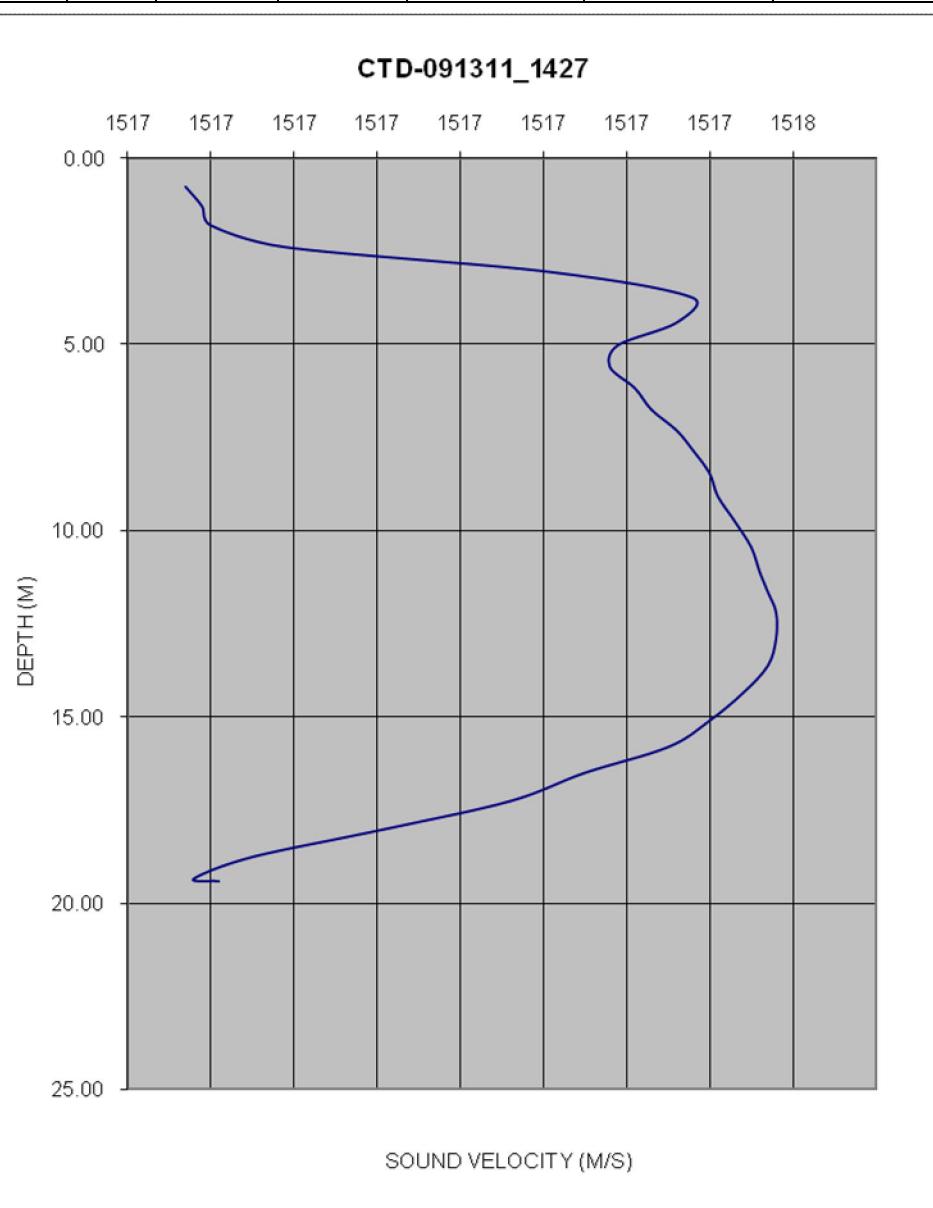


Figure 3.2-64
SVP 091311_1552 taken during the Fall 2011 multibeam survey at the HARS

1516.85	0.25
1517.69	0.96
1517.56	1.59
1517.46	2.14
1517.22	2.76
1517.25	3.44
1517.52	4.09
1517.54	4.72
1517.55	5.35
1517.54	6.03
1517.45	6.75
1517.38	7.43
1517.41	8.08
1517.36	8.70
1517.32	9.32
1517.31	9.94
1517.32	10.53
1517.33	11.09
1517.35	11.65
1517.36	12.22
1517.38	12.80
1517.37	13.44
1517.37	14.13
1517.37	14.84
1517.38	15.56
1517.38	16.29
1517.31	17.02
1516.11	17.75
1514.77	18.46
1514.17	19.17
1514.02	19.77
1514.16	19.94

CTD PROFILE # 091311_1552

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
09/13/11	15:52	1021112	95928	65	40.42989729 73.86759513

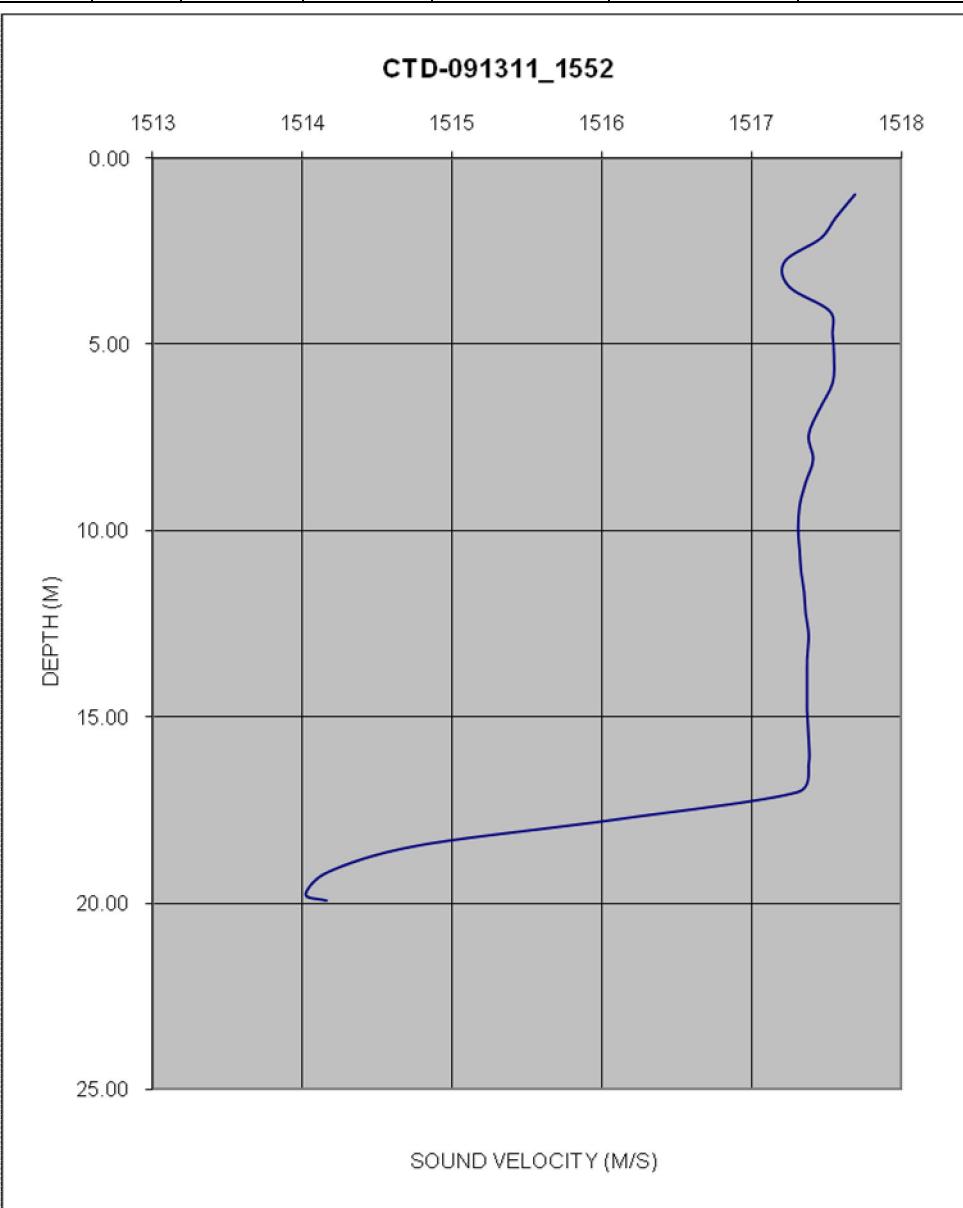


Figure 3.2-65
SVP 091311_1719 taken during the Fall 2011 multibeam survey at the HARS

1514.78 0.53

1516.52 1.13

1515.78 1.77

CTD PROFILE # 091311 1719

1515.53 2.38

1515.89 3.02

1515.91 3.69

<u>Date</u>	<u>Time</u>	<u>NAD83 NY LI (Feet)</u>	<u>Water Depth</u>	<u>Latitude</u>	<u>Longitude</u>
		<u>Easting</u>	<u>Northing</u>	<u>Feet</u>	<u>N</u>
09/13/11	17:19	1020169	86384	58	40.40370346 73.87103427

1516.32 4.35

1517.03 5.02

1517.29 5.66

1517.40 6.32

1517.28 6.99

1517.32 7.65

1517.33 8.31

1517.25 8.96

1517.24 9.61

1517.29 10.27

1517.28 10.94

1517.25 11.60

1517.24 12.27

1517.12 12.95

1517.10 13.62

1517.08 14.30

1517.07 14.98

1517.07 15.65

1517.14 16.33

1517.20 17.02

1517.21 17.46

1517.20 17.49

1517.22 17.51

1517.23 17.55

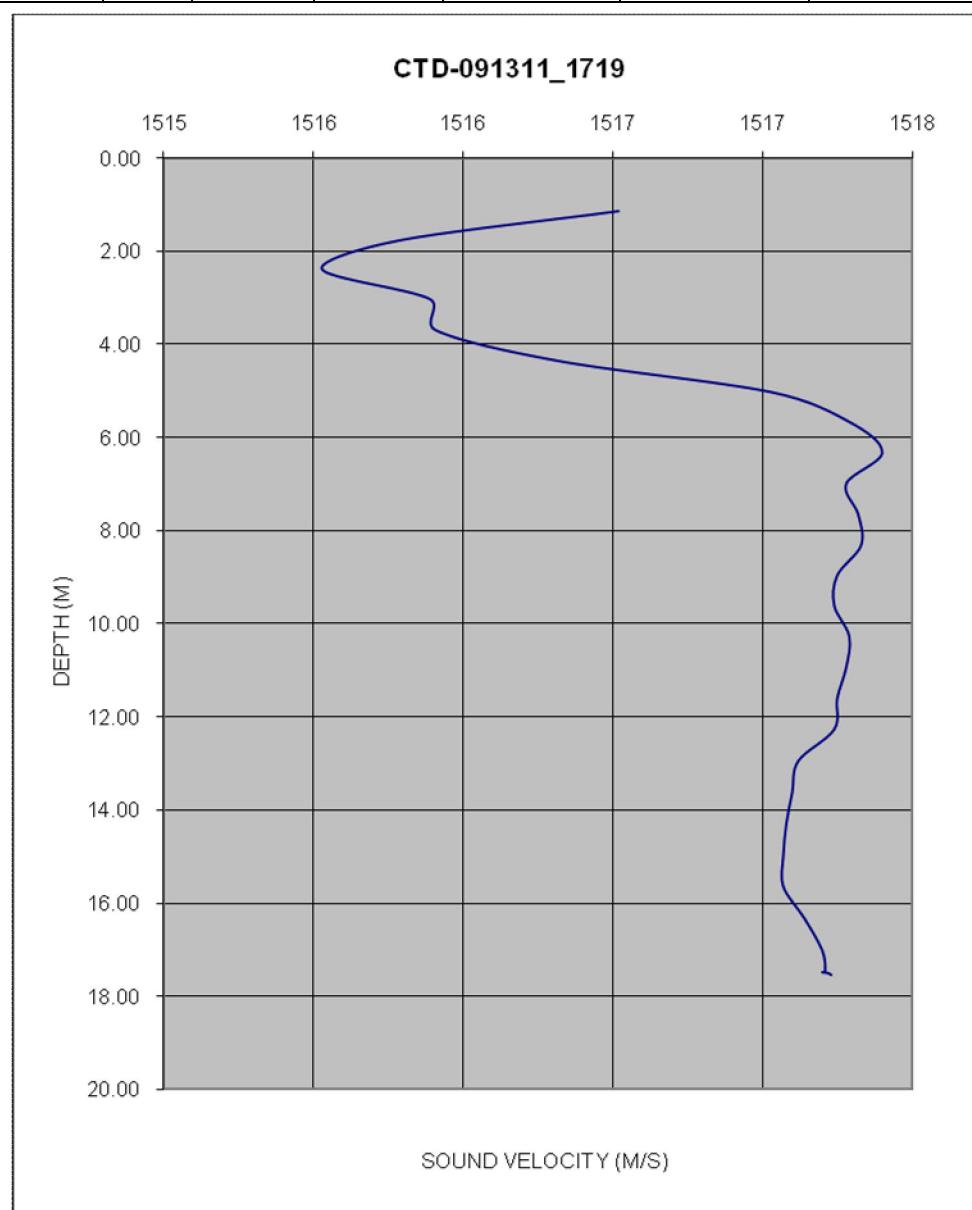


Figure 3.2-66
SVP 091311_1851 taken during the Fall 2011 multibeam survey at the HARS

1511.97 0.28

1511.86 0.77

1511.89 1.35

CTD PROFILE # 091311 1851

1512.76 1.99

1513.74 2.57

1513.66 3.08

<u>Date</u>	<u>Time</u>	<u>NAD83 NY LI (Feet)</u>	<u>Water Depth</u>	<u>Latitude</u>	<u>Longitude</u>
		<u>Easting</u>	<u>Northing</u>	<u>Feet</u>	<u>N</u>
09/13/11	18:51	1020059	86707	57	40.40459128 73.87142622

1514.18 3.59

1514.65 4.16

1514.95 4.76

1515.44 5.38

1516.14 6.00

1516.72 6.61

1517.15 7.21

1517.22 7.81

1517.22 8.42

1517.35 9.07

1517.51 9.70

1517.60 10.36

1517.68 11.02

1517.72 11.66

1517.69 12.32

1517.55 12.98

1517.46 13.64

1517.38 14.31

1517.38 14.97

1517.29 15.65

1517.14 16.33

1517.06 16.99

1517.12 17.29

1517.25 17.33

1517.40 17.36

1517.47 17.39

1517.51 17.41

1517.53 17.43

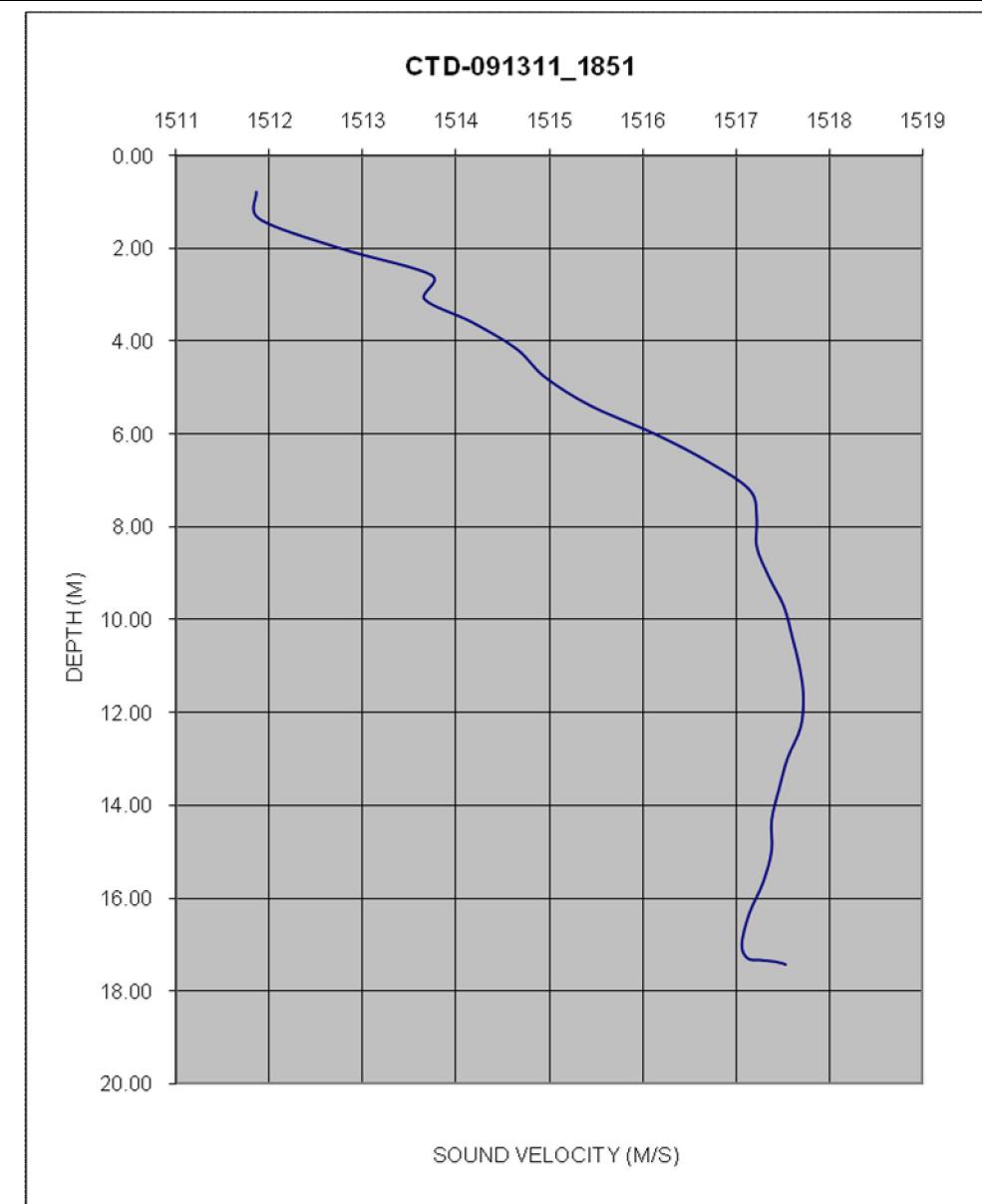


Figure 3.2-67
SVP 091411_1151 taken during the Fall 2011 multibeam survey at the HARS

1505.83	0.31
1511.08	0.94
1513.70	1.57
1516.03	2.25
1516.61	2.90
1516.71	3.55
1516.82	4.10
1516.79	4.49
1516.80	4.77
1516.83	5.18
1516.84	5.72
1516.87	6.22
1516.96	6.60
1516.92	6.78
1517.02	6.90
1517.10	7.22
1517.05	7.65
1517.01	8.08
1517.02	8.50
1517.05	8.85
1517.07	9.15
1517.07	9.42
1517.04	9.69
1516.97	10.16
1516.90	10.67
1516.90	11.15
1516.91	11.59
1516.92	11.98
1516.93	12.42
1516.83	12.82
1516.71	13.26
1516.53	13.75
1516.35	14.23
1516.19	14.73
1516.09	15.28
1516.03	15.86
1515.92	16.48
1515.83	17.15
1515.78	17.76
1515.73	18.40
1515.59	19.01
1515.44	19.64
1515.36	20.30
1515.31	20.97
1515.23	21.60
1515.13	22.26
1515.05	22.90
1515.00	23.21

CTD PROFILE # 091411_1151

Date	Time	NAD83 NY LI (Feet)		Water Depth	Latitude	Longitude
		Easting	Northing	Feet	N	W
09/14/11	11:51	1011817	95836	76	40.42967822	73.90098240

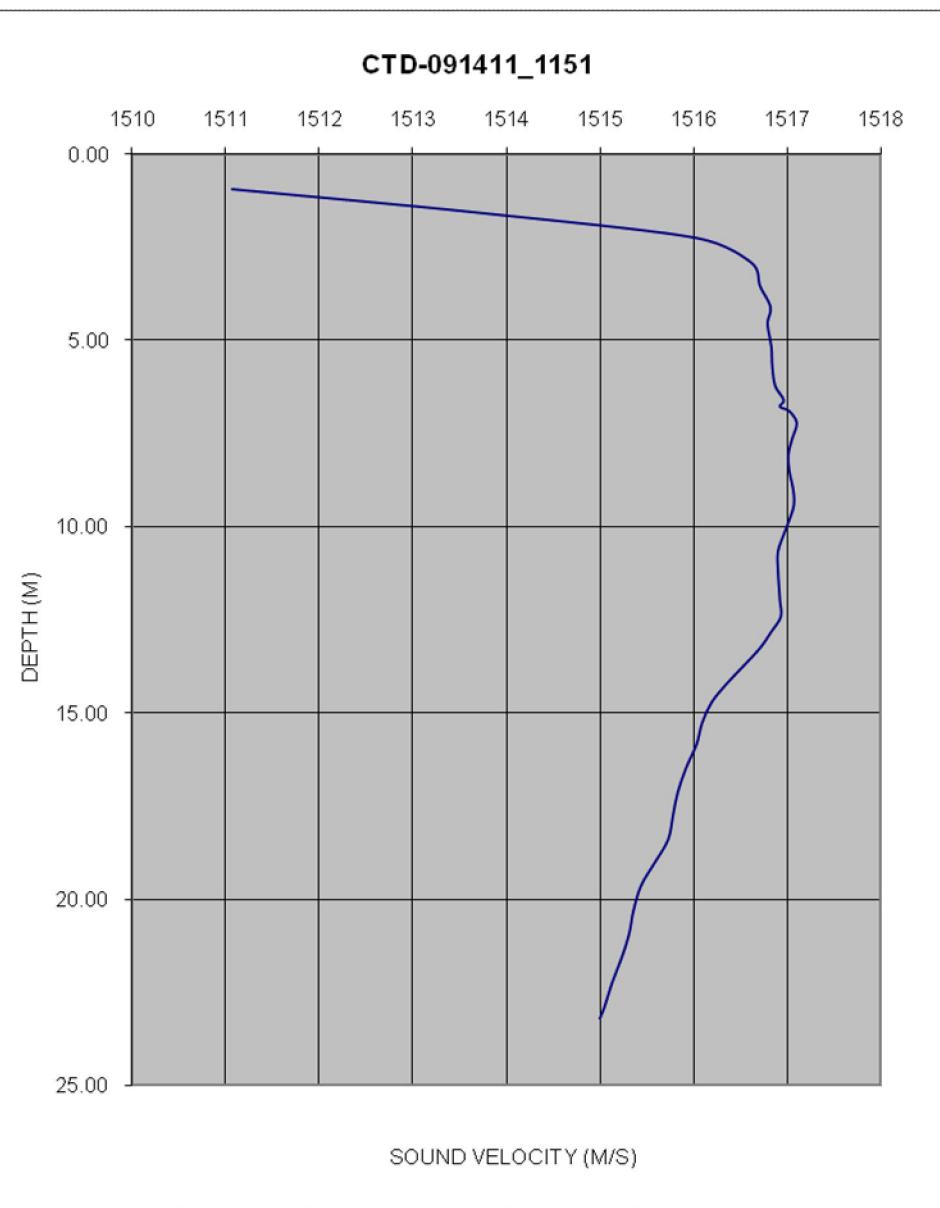


Figure 3.2-68
SVP 091411_1314 taken during the Fall 2011 multibeam survey at the HARS

1508.69	0.19
1513.52	0.82
1515.56	1.46
1516.42	2.11
1516.62	2.80
1516.81	3.48
1516.85	4.15
1516.86	4.83
1516.91	5.52
1516.99	6.19
1517.11	6.81
1517.11	7.40
1517.01	7.98
1517.00	8.59
1516.99	9.24
1516.98	9.89
1516.96	10.55
1516.93	11.21
1516.85	11.85
1516.77	12.49
1516.69	13.13
1516.60	13.79
1516.51	14.44
1516.39	15.11
1516.20	15.78
1516.01	16.34
1515.78	16.89
1515.57	17.50
1515.44	18.21
1515.32	18.98
1515.23	19.77
1515.10	20.53
1514.89	21.22
1514.75	21.87
1514.69	22.57
1514.69	23.20
1514.75	23.37

CTD PROFILE # 091411 1314

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
09/14/11	13:14	1012784	95812	77	40.42960929 73.89750915

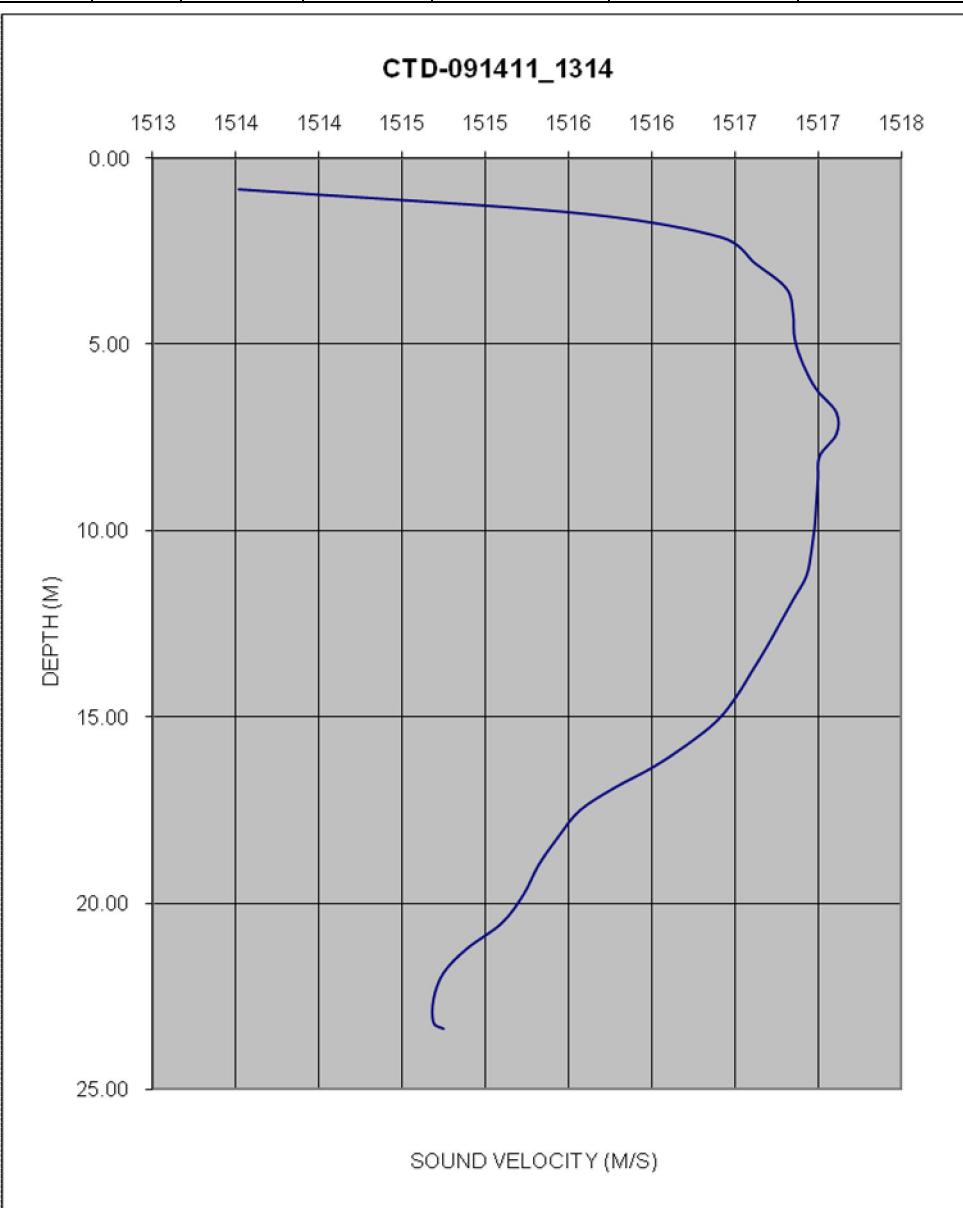


Figure 3.2-69
SVP 091411_1508 taken during the Fall 2011 multibeam survey at the HARS

1510.56	0.58
1514.41	1.21
1515.18	1.85
1515.24	2.49
1516.13	3.11
1516.67	3.73
1516.78	4.34
1516.89	4.94
1516.85	5.56
1516.87	6.17
1516.88	6.78
1516.85	7.44
1516.92	8.11
1517.10	8.78
1517.08	9.43
1517.03	10.05
1516.98	10.70
1516.88	11.36
1516.71	12.00
1516.67	12.61
1516.66	13.20
1516.59	13.79
1516.50	14.37
1516.33	14.93
1516.10	15.50
1515.84	16.10
1515.61	16.72
1515.49	17.33
1515.39	17.94
1515.28	18.54
1515.18	19.13
1515.11	19.72
1515.05	20.36
1515.01	21.02
1514.96	21.68
1514.90	22.31
1514.95	22.55

CTD PROFILE # 091411 1508

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
09/14/11	15:08	1014218	95860	74	40.42973632 73.89235818

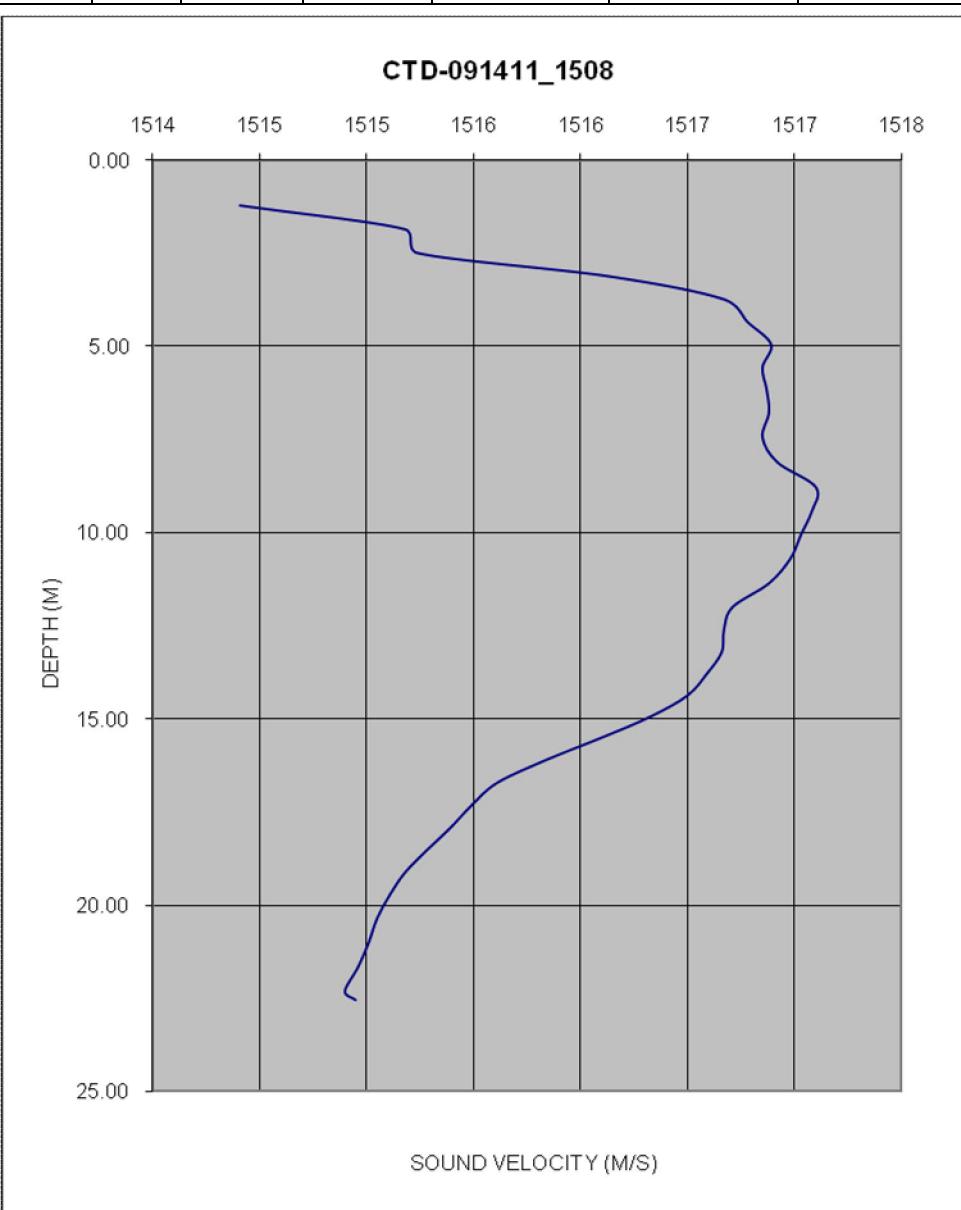


Figure 3.2-70
SVP 091411_1621 taken during the Fall 2011 multibeam survey at the HARS

CTD PROFILE # 091411 1621

1513.93	0.63
1515.44	1.38
1515.75	2.14
1516.08	2.89
1516.65	3.60
1516.77	4.32
1516.86	5.05
1516.89	5.77
1516.88	6.47
1516.89	7.18
1517.02	7.92
1517.13	8.66
1517.07	9.39
1516.99	10.12
1516.84	10.84
1516.67	11.58
1516.47	12.26
1516.04	13.00
1515.65	13.74
1515.31	14.49
1515.09	15.21
1514.96	15.93
1514.90	16.65
1514.83	17.36
1514.64	18.07
1513.93	18.82
1512.48	19.54
1511.68	19.84
1511.68	19.87

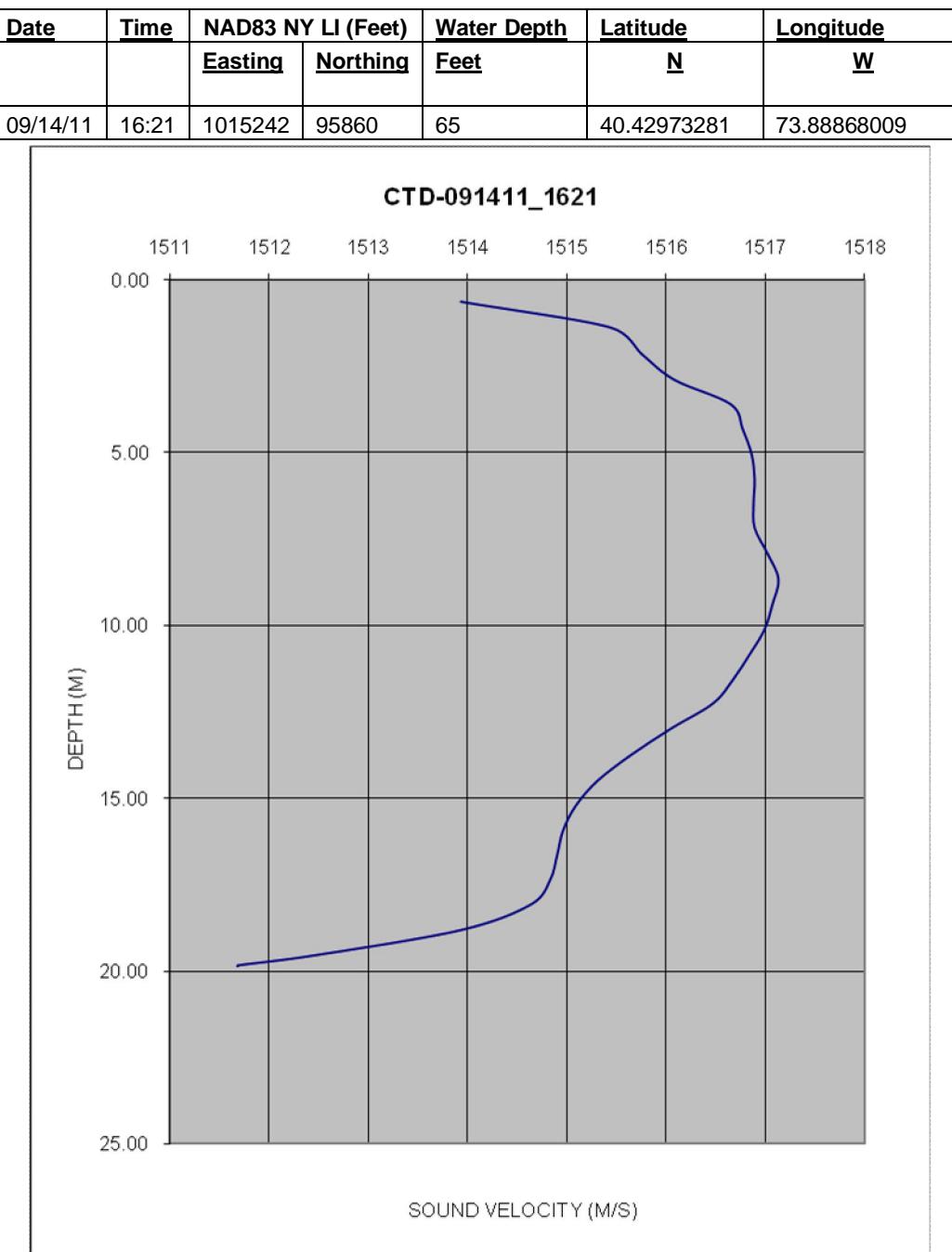


Figure 3.2-71
SVP 091411_1751 taken during the Fall 2011 multibeam survey at the HARS

CTD PROFILE # 091411 1751

1512.15	0.62
1512.53	1.13
1513.60	1.79
1514.88	2.49
1516.72	3.16
1516.95	3.76
1516.84	4.29
1516.79	4.75
1516.94	5.20
1517.04	5.63
1517.06	6.06
1517.10	6.50
1517.11	7.01
1517.00	7.63
1516.94	8.29
1516.93	9.04
1516.94	9.75
1517.01	10.43
1517.15	11.10
1517.25	11.78
1517.30	12.45
1517.34	13.13
1517.38	13.81
1517.32	14.47
1516.97	15.11
1516.21	15.77
1515.21	16.48
1514.57	17.22
1514.34	17.94
1514.17	18.62
1513.96	19.35
1513.71	20.10
1513.39	20.83
1513.11	21.53
1512.98	22.23
1513.06	22.52

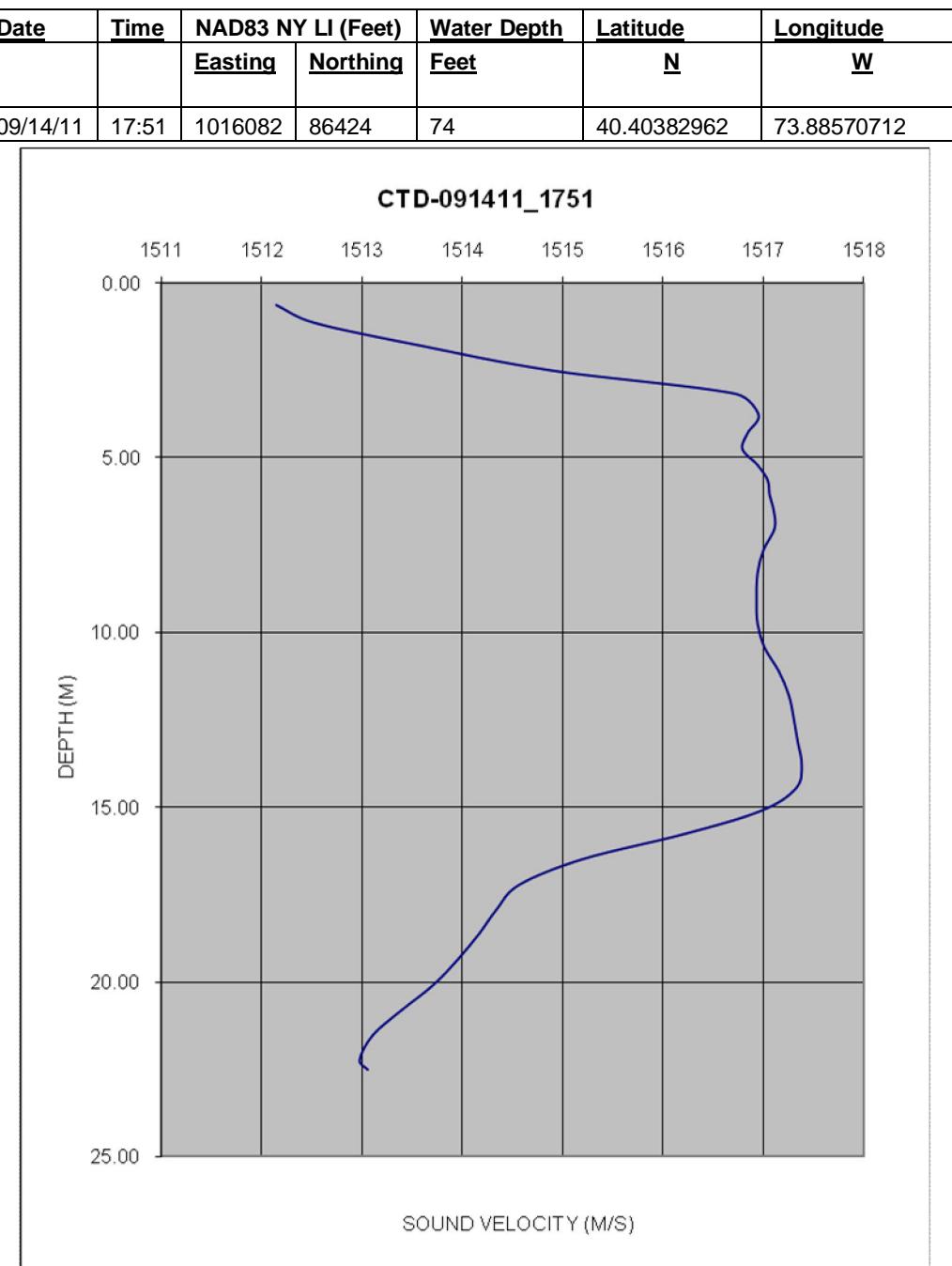


Figure 3.2-71
SVP 091411_1937 taken during the Fall 2011 multibeam survey at the HARS

CTD PROFILE # 091411 1937

1510.36	0.19
1510.34	0.84
1510.42	1.55
1511.20	2.25
1512.48	2.92
1513.16	3.57
1513.69	4.24
1513.86	4.92
1514.00	5.59
1514.73	6.23
1515.43	6.84
1516.09	7.45
1516.86	8.12
1517.52	8.81
1517.20	9.52
1516.69	10.24
1516.34	10.94
1516.09	11.64
1515.94	12.36
1515.70	13.07
1515.40	13.73
1515.19	14.39
1515.01	15.03
1514.84	15.62
1514.39	16.24
1513.25	16.85
1510.99	17.47
1508.48	18.13
1507.47	18.72
1507.46	18.86

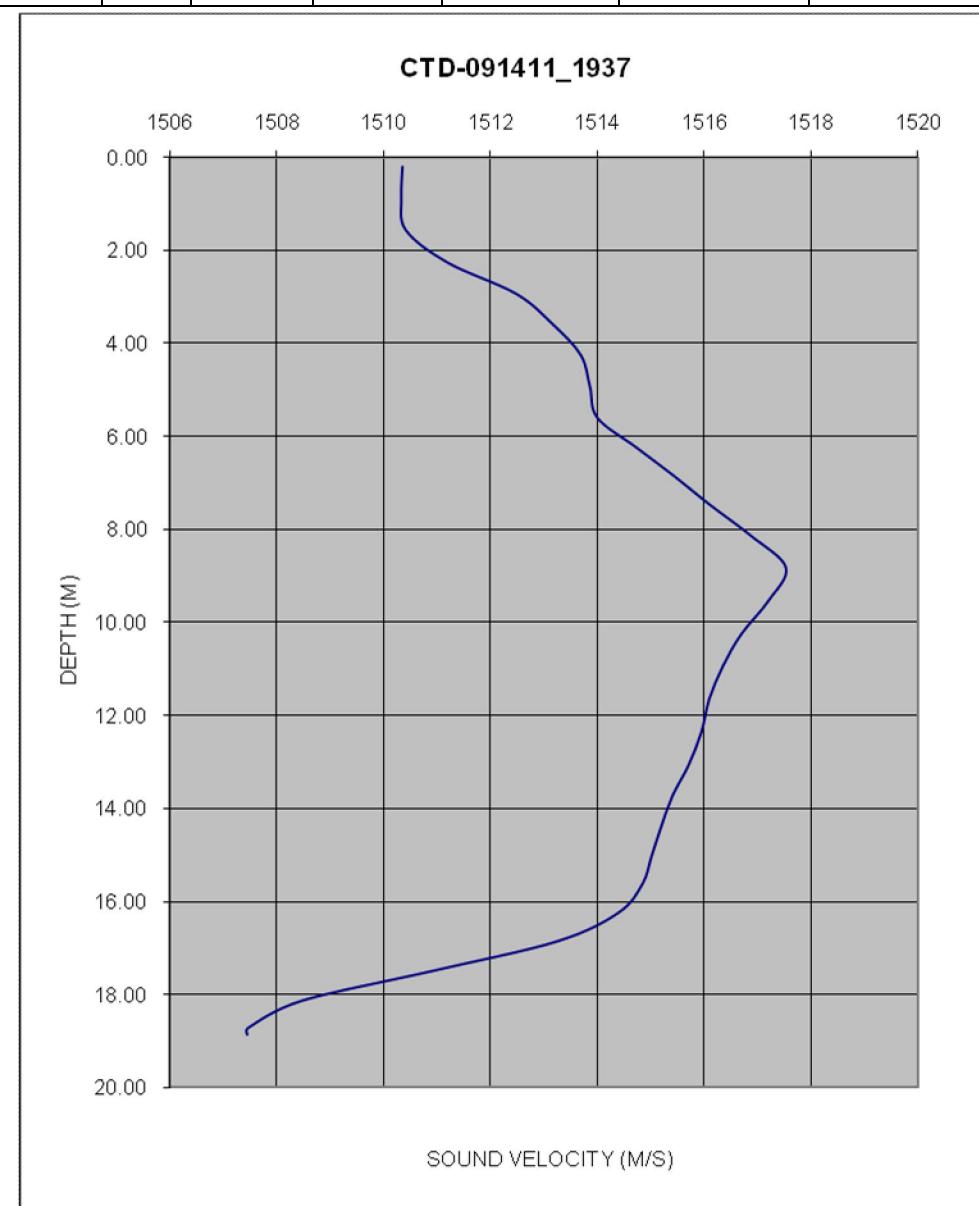


Figure 3.2-72
SVP 092111_1126 taken during the Fall 2011 multibeam survey at the HARS

1503.66	0.36
1505.63	0.87
1506.66	1.43
1507.17	2.05
1507.74	2.70
1508.18	3.39
1508.35	4.09
1508.59	4.75
1508.77	5.38
1509.29	6.01
1510.29	6.59
1511.54	7.13
1512.22	7.70
1512.57	8.33
1512.73	8.95
1513.07	9.68
1513.09	10.40
1513.03	11.10
1512.77	11.76
1512.56	12.40
1512.54	13.01
1512.60	13.65
1512.59	14.18
1512.56	14.58
1512.35	15.09
1511.68	15.67
1511.01	16.21
1510.79	16.81
1510.97	17.43
1511.25	18.04
1511.45	18.66
1511.53	19.02
1511.57	19.09
1511.62	19.14
1511.64	19.18
1511.65	19.21

CTD PROFILE # 092111 1126

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
09/21/11	11:26	1017258	95909	63	40.42985884 73.88143943

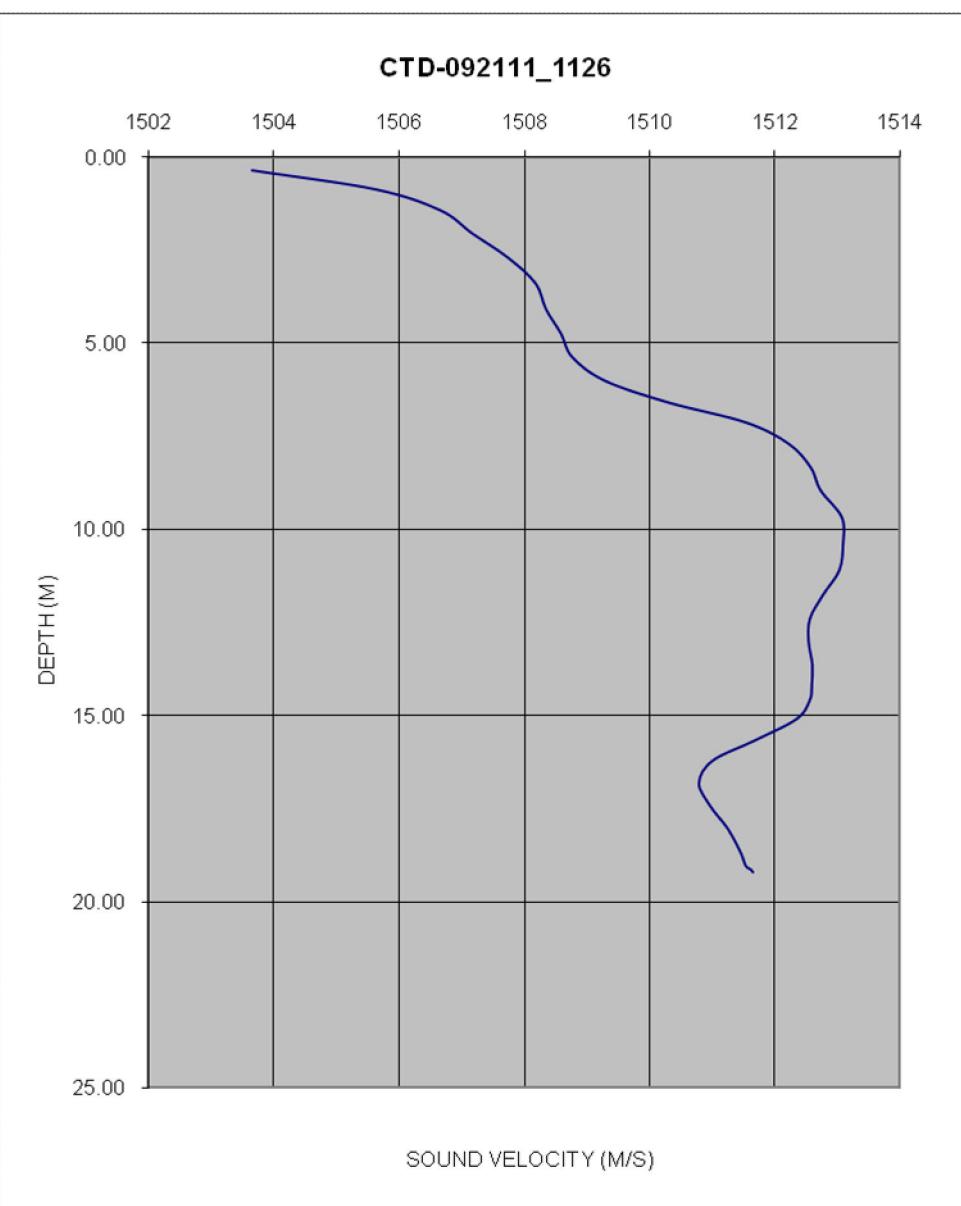


Figure 3.2-73
SVP 092111_1226 taken during the Fall 2011 multibeam survey at the HARS

1505.09	0.16
1506.12	0.76
1506.71	1.37
1507.83	1.98
1508.58	2.58
1508.88	3.18
1509.11	3.77
1509.60	4.41
1510.30	5.05
1511.39	5.68
1512.42	6.30
1512.95	6.93
1513.14	7.52
1512.97	8.13
1512.88	8.74
1512.98	9.38
1513.03	10.02
1513.04	10.66
1513.07	11.30
1513.02	11.94
1512.91	12.57
1512.85	13.23
1512.71	13.88
1513.37	14.53
1514.00	15.19
1514.16	15.82
1513.95	16.44
1513.55	17.06
1513.32	17.67
1513.30	18.29
1513.20	18.91
1513.08	19.52
1512.98	20.13
1512.91	20.73
1512.88	21.33
1512.89	21.57

CTD PROFILE # 092111 1226

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
09/21/11	12:26	1017291	95716	71	40.42933080 73.88131964

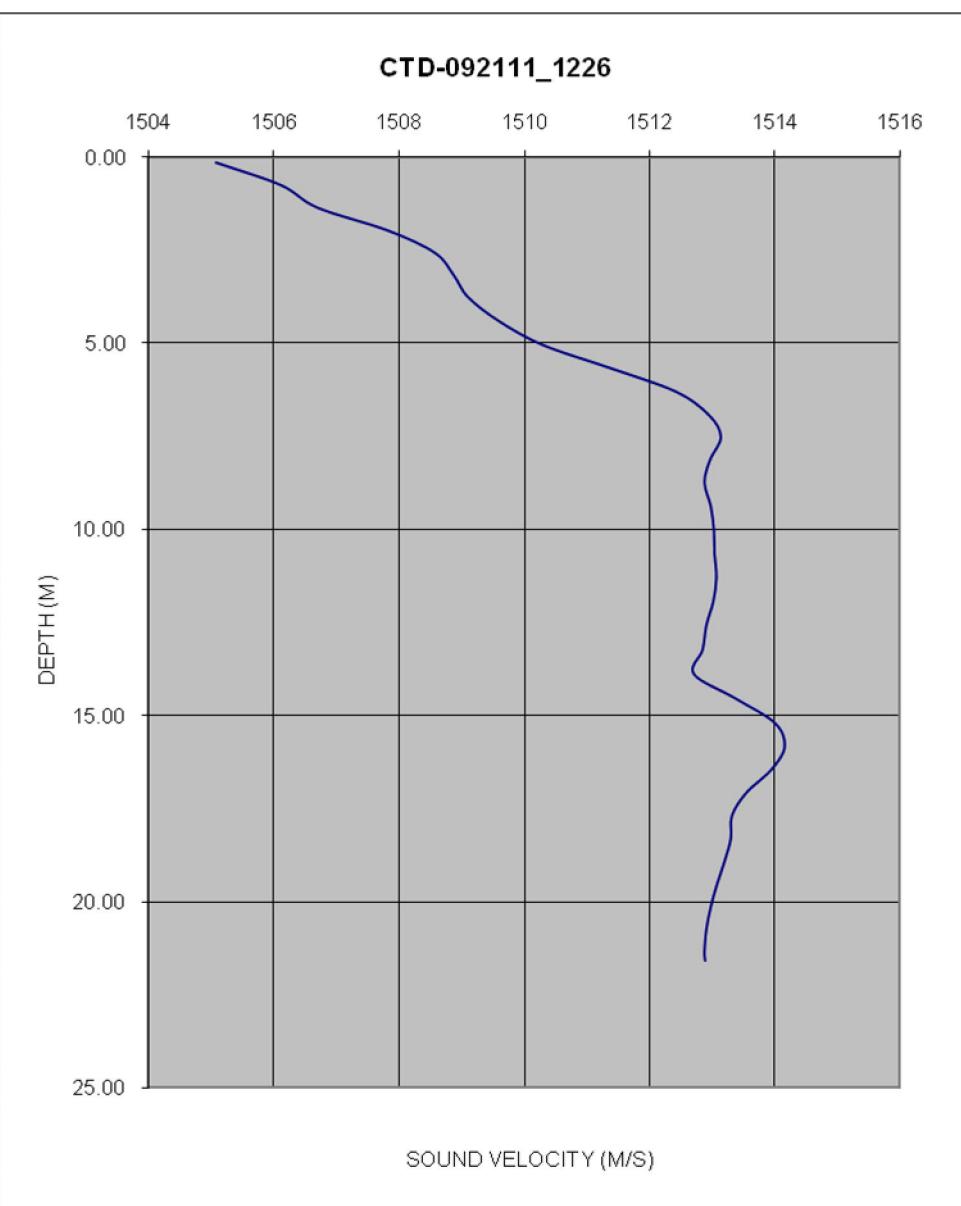


Figure 3.2-74
SVP 092111_1323 taken during the Fall 2011 multibeam survey at the HARS

1503.19	0.18
1502.95	0.57
1503.03	0.99
1503.32	1.43
1503.84	1.89
1504.64	2.30
1506.02	2.75
1506.75	3.24
1507.25	3.71
1507.81	4.17
1508.63	4.60
1509.58	5.04
1511.12	5.53
1512.35	6.07
1512.60	6.58
1512.87	7.08
1512.95	7.57
1512.99	8.08
1513.03	8.60
1513.04	9.12
1513.08	9.60
1513.02	10.06
1512.98	10.54
1513.11	11.03
1513.55	11.51
1513.68	12.02
1513.76	12.63
1513.84	13.25
1513.75	13.86
1513.84	14.45
1513.81	15.02
1513.09	15.59
1512.35	16.16
1511.80	16.71
1511.54	17.26
1511.58	17.81
1511.72	18.35
1511.73	18.88
1511.73	19.06

CTD PROFILE # 092111 1323

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
09/21/11	13:23	1018475	95877	63	40.42976884 73.87706800

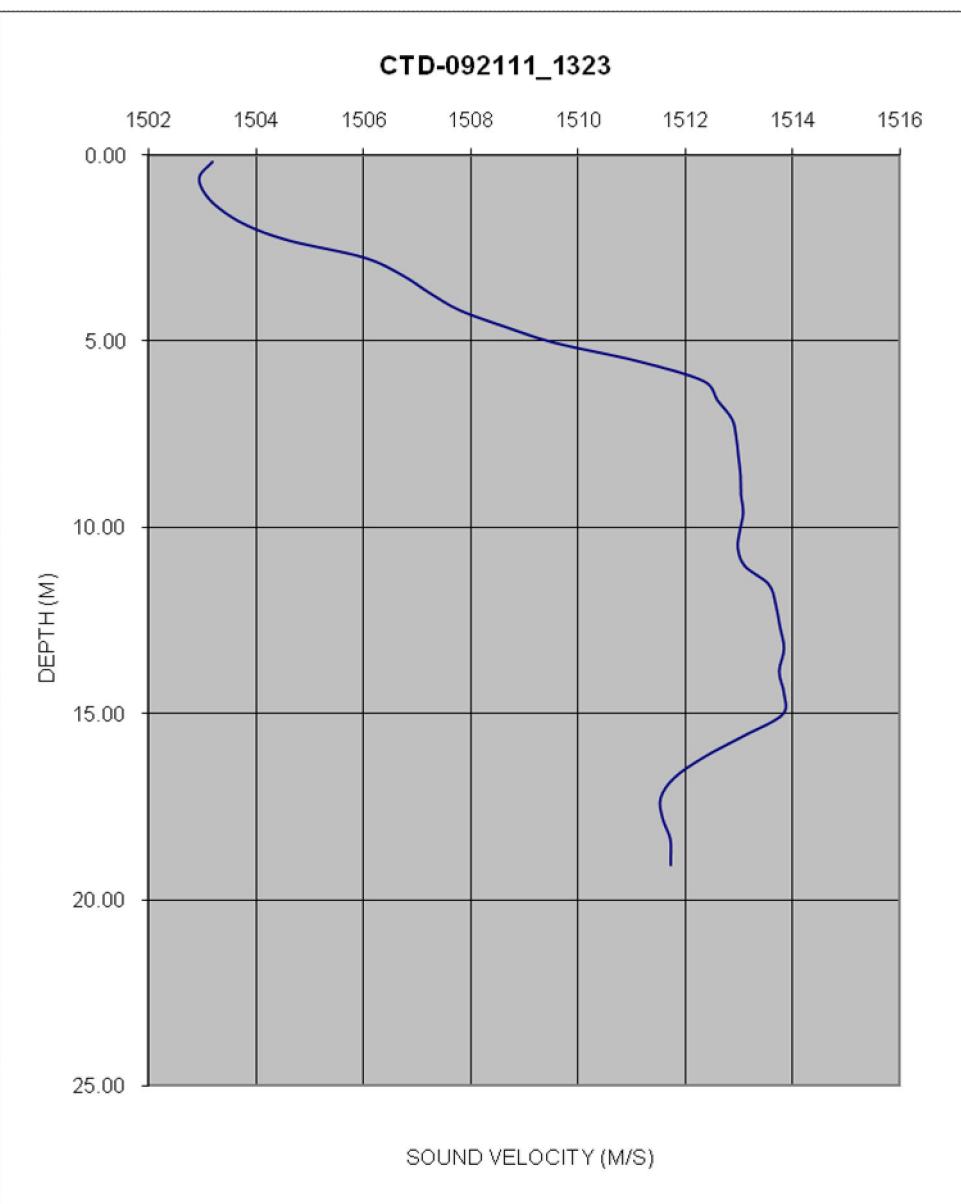


Figure 3.2-75
SVP 092111_1447 taken during the Fall 2011 multibeam survey at the HARS

1503.04	0.30
1503.34	0.73
1504.11	1.30
1505.63	1.86
1506.64	2.36
1507.83	2.97
1509.42	3.66
1511.63	4.36
1512.55	5.03
1512.69	5.72
1512.89	6.44
1512.99	7.12
1513.08	7.78
1513.13	8.46
1513.11	9.15
1513.10	9.82
1513.07	10.51
1513.36	11.18
1513.74	11.84
1513.45	12.50
1513.18	13.15
1513.12	13.80
1513.07	14.43
1512.94	15.06
1513.01	15.66
1513.15	16.24
1512.92	16.89
1512.46	17.53
1511.97	18.19
1511.74	18.86
1511.75	19.50
1511.77	19.68
1511.87	19.70

CTD PROFILE # 092111_1447

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
09/21/11	14:47	1019102	95902	65	40.42983368 73.87481662

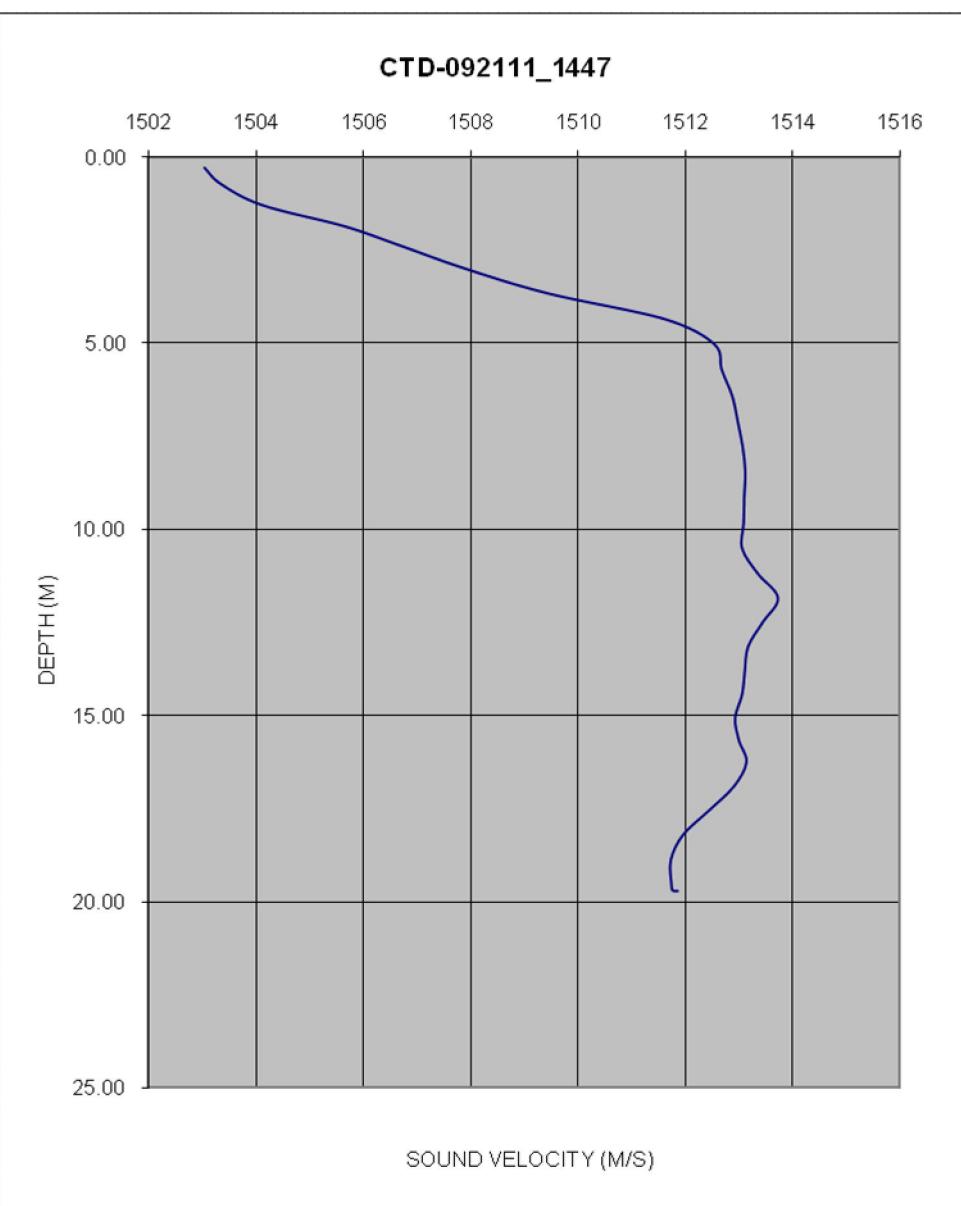


Figure 3.2-76
SVP 092111_1534 taken during the Fall 2011 multibeam survey at the HARS

1503.51	0.04
1503.48	0.44
1503.54	0.85
1503.60	1.24
1504.44	1.68
1506.07	2.19
1507.26	2.73
1508.50	3.26
1509.74	3.80
1511.26	4.39
1512.45	5.00
1512.88	5.59
1512.94	6.17
1513.01	6.75
1513.03	7.36
1513.05	7.99
1513.07	8.70
1513.13	9.43
1513.24	10.13
1513.31	10.79
1513.15	11.45
1512.97	12.09
1512.79	12.74
1512.65	13.40
1513.33	14.08
1513.57	14.76
1513.25	15.40
1512.90	16.01
1512.72	16.61
1512.68	17.21
1512.69	17.81
1512.64	18.38
1512.47	18.95
1512.28	19.51
1512.11	20.10
1511.93	20.72
1511.85	21.17
1511.87	21.22

CTD PROFILE # 092111 1534

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
09/21/11	15:34	1017703	93586	70	40.42348214 73.87985166

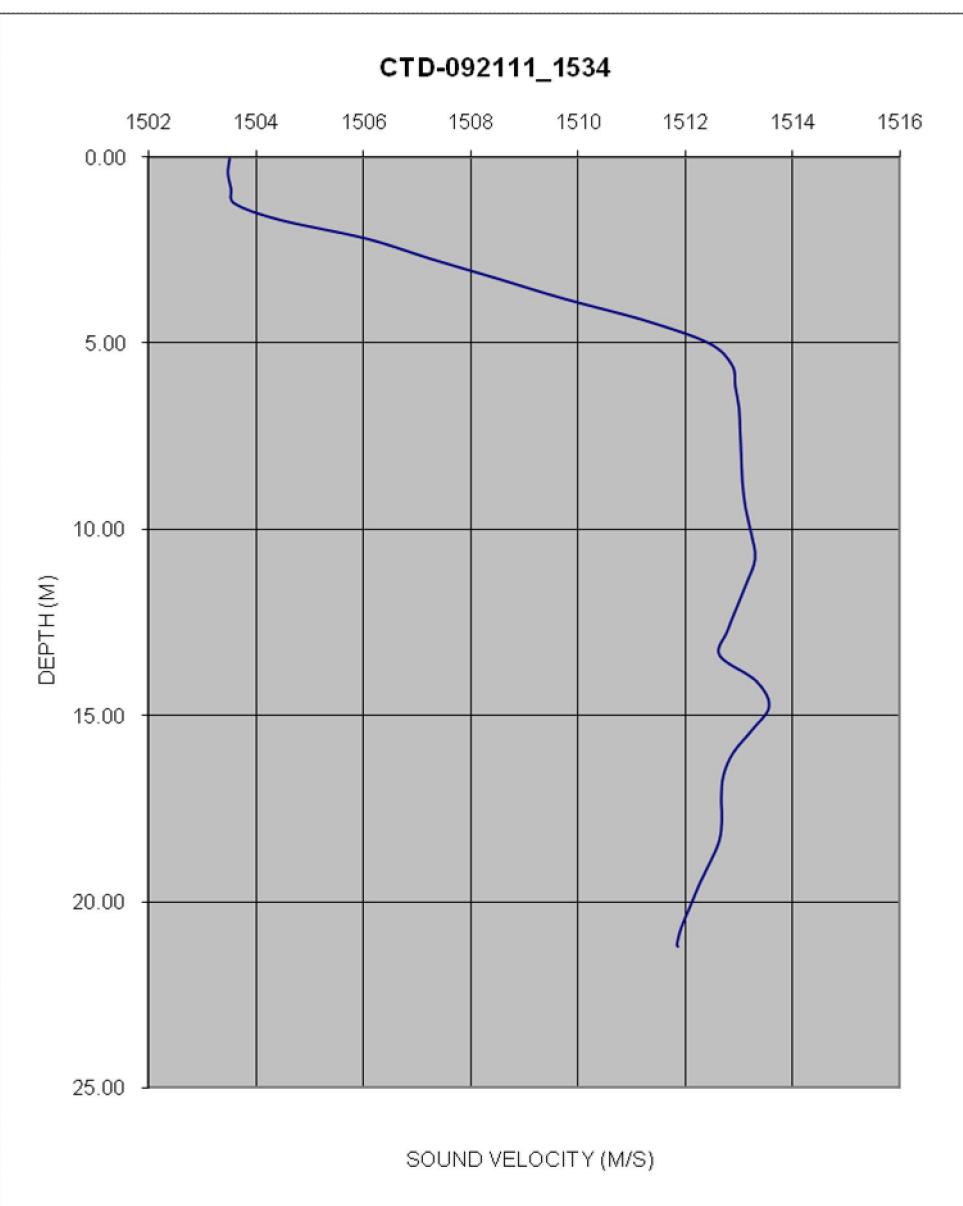


Figure 3.2-77
SVP 110711_1139 taken during the Fall 2011 multibeam survey at Fire-Island Reef

1472.78	0.21
1474.10	0.77
1474.70	1.38
1475.02	2.01
1475.19	2.63
1475.39	3.24
1475.64	3.84
1475.77	4.43
1475.88	5.03
1476.05	5.67
1476.48	6.33
1476.74	7.00
1476.85	7.68
1477.07	8.35
1477.64	9.01
1478.14	9.68
1478.80	10.37
1479.28	11.02
1479.64	11.62
1479.84	12.17
1479.90	12.71
1479.83	12.99
1479.77	13.01

CTD PROFILE # 110711 1139

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
11/07/11	11:39	1198030	159768	43	40.60262308 73.23012567

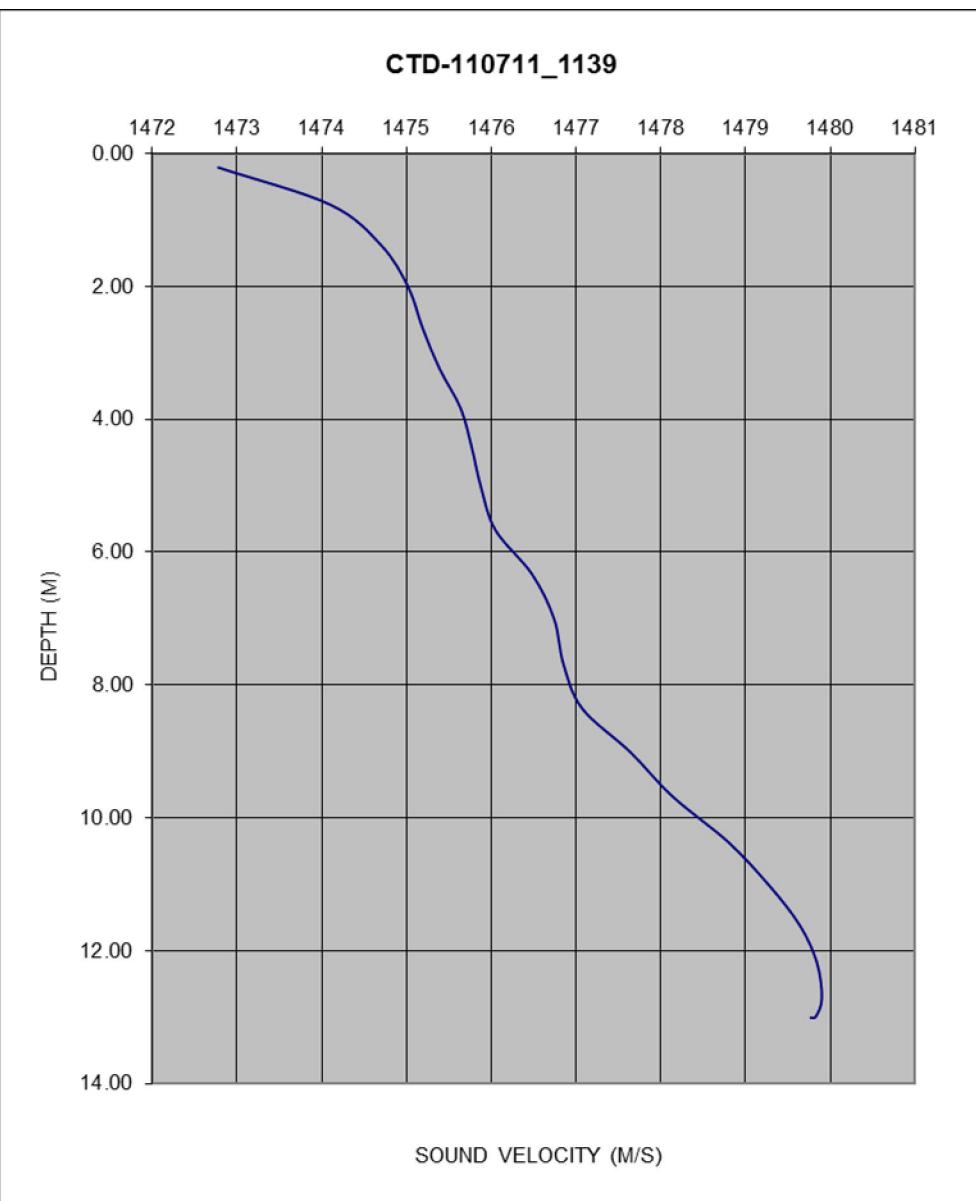


Figure 3.2-78
SVP 110711_1536 taken during the Fall 2011 multibeam survey at Fire-Island Reef

1495.55	0.03
1494.97	0.62
1494.69	1.31
1494.60	2.02
1494.58	2.72
1494.57	3.40
1494.57	4.07
1494.57	4.71
1494.59	5.34
1494.59	5.95
1494.60	6.55
1494.61	7.15
1494.62	7.76
1494.63	8.38
1494.64	9.00
1494.65	9.62
1494.66	10.24
1494.67	10.86
1494.67	11.48
1494.68	12.11
1494.70	12.75
1494.71	13.42
1494.72	14.09
1494.73	14.75
1494.74	15.40
1494.75	16.05
1494.76	16.71
1494.77	17.35
1494.78	17.99
1494.79	18.61
1494.80	19.15
1494.83	19.29
1494.87	19.31

CTD PROFILE # 110711 1536

Date	Time	NAD83 NY LI (Feet)		Water Depth	Latitude	Longitude
		Easting	Northing	Feet	N	W
11/07/11	15:36	1208914	156522	63	40.59344550	73.19104149

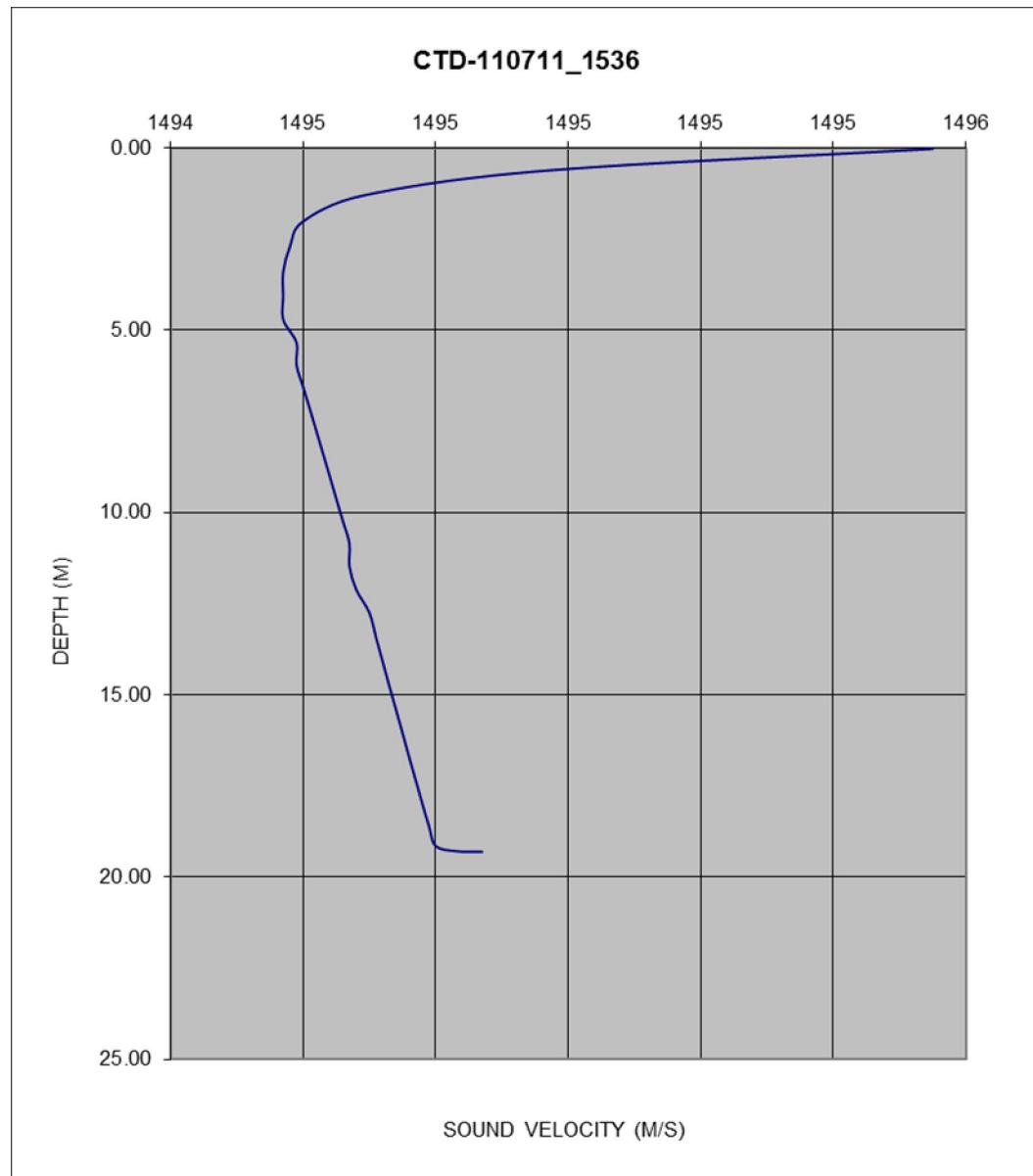


Figure 3.2-79
SVP 110711_1728 taken during the Fall 2011 multibeam survey at Fire-Island Reef

1495.84	0.07
1495.08	0.66
1494.71	1.30
1494.54	2.03
1494.48	2.74
1494.46	3.48
1494.45	4.23
1494.45	4.91
1494.47	5.55
1494.48	6.16
1494.48	6.74
1494.49	7.32
1494.52	7.91
1494.54	8.50
1494.56	9.10
1494.54	9.73
1494.50	10.39
1494.49	11.05
1494.49	11.71
1494.51	12.38
1494.52	13.05
1494.53	13.72
1494.55	14.41
1494.57	15.09
1494.60	15.76
1494.63	16.42
1494.64	17.07
1494.66	17.70
1494.67	18.32
1494.72	18.60

CTD PROFILE # 110711_1728

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	W
11/07/11	17:28	1199251	157261	61	40.59571377 73.22581026

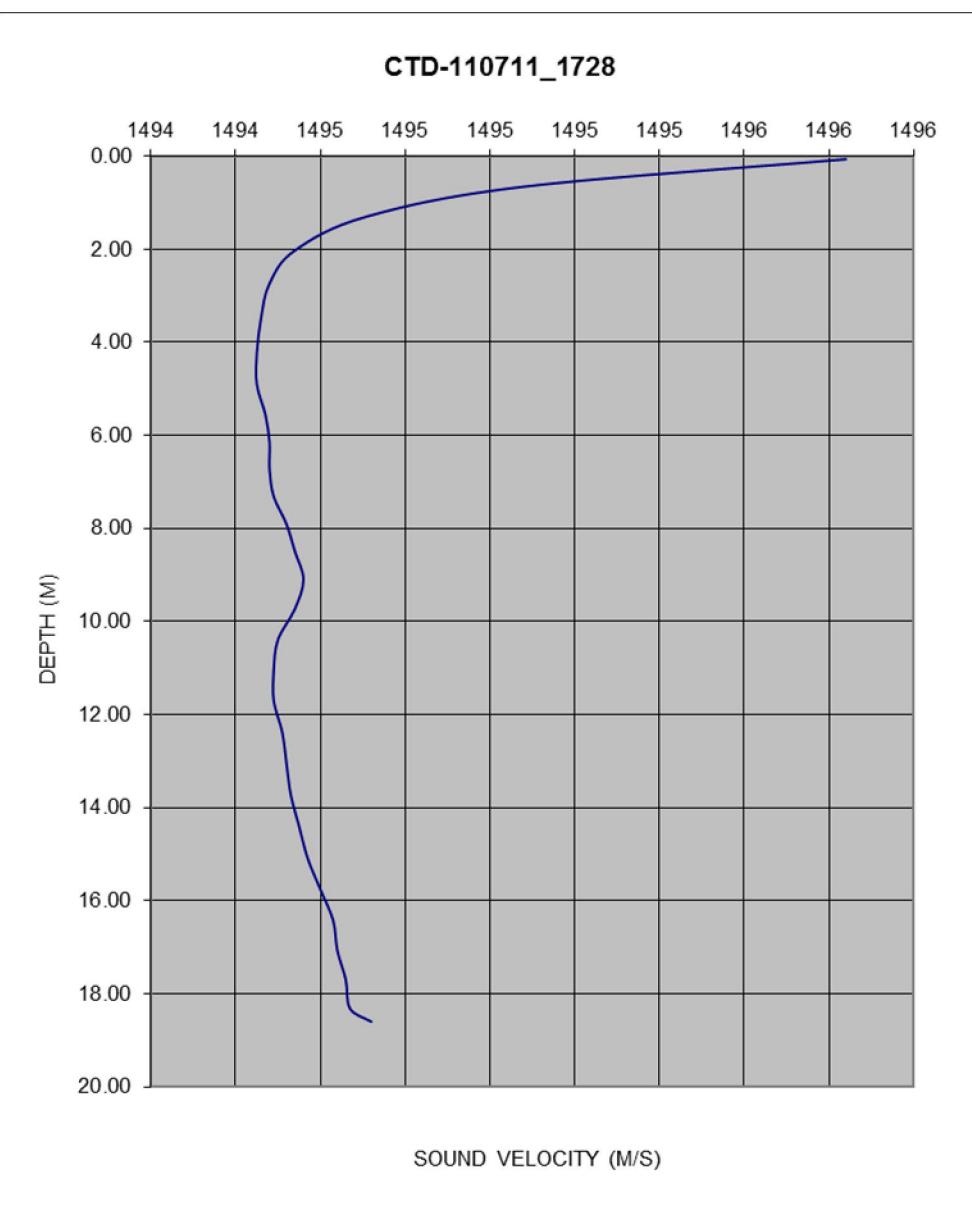


Figure 3.2-80
SVP 110711_1927 taken during the Fall 2011 multibeam survey at Fire-Island Reef

1495.25	0.28
1494.75	1.01
1494.58	1.71
1494.53	2.37
1494.50	3.01
1494.48	3.63
1494.46	4.22
1494.44	4.81
1494.42	5.39
1494.42	5.97
1494.43	6.55
1494.44	7.15
1494.44	7.74
1494.45	8.34
1494.45	8.94
1494.44	9.57
1494.45	10.20
1494.46	10.85
1494.47	11.49
1494.48	12.13
1494.49	12.79
1494.51	13.46
1494.55	14.13
1494.57	14.81
1494.60	15.49
1494.64	16.19
1494.67	16.90
1494.70	17.60
1494.73	18.29
1494.74	18.92
1494.81	19.13

CTD PROFILE # 110711 1927

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
11/07/11	19:27	1199403	158558	63	40.59926978 73.22522071

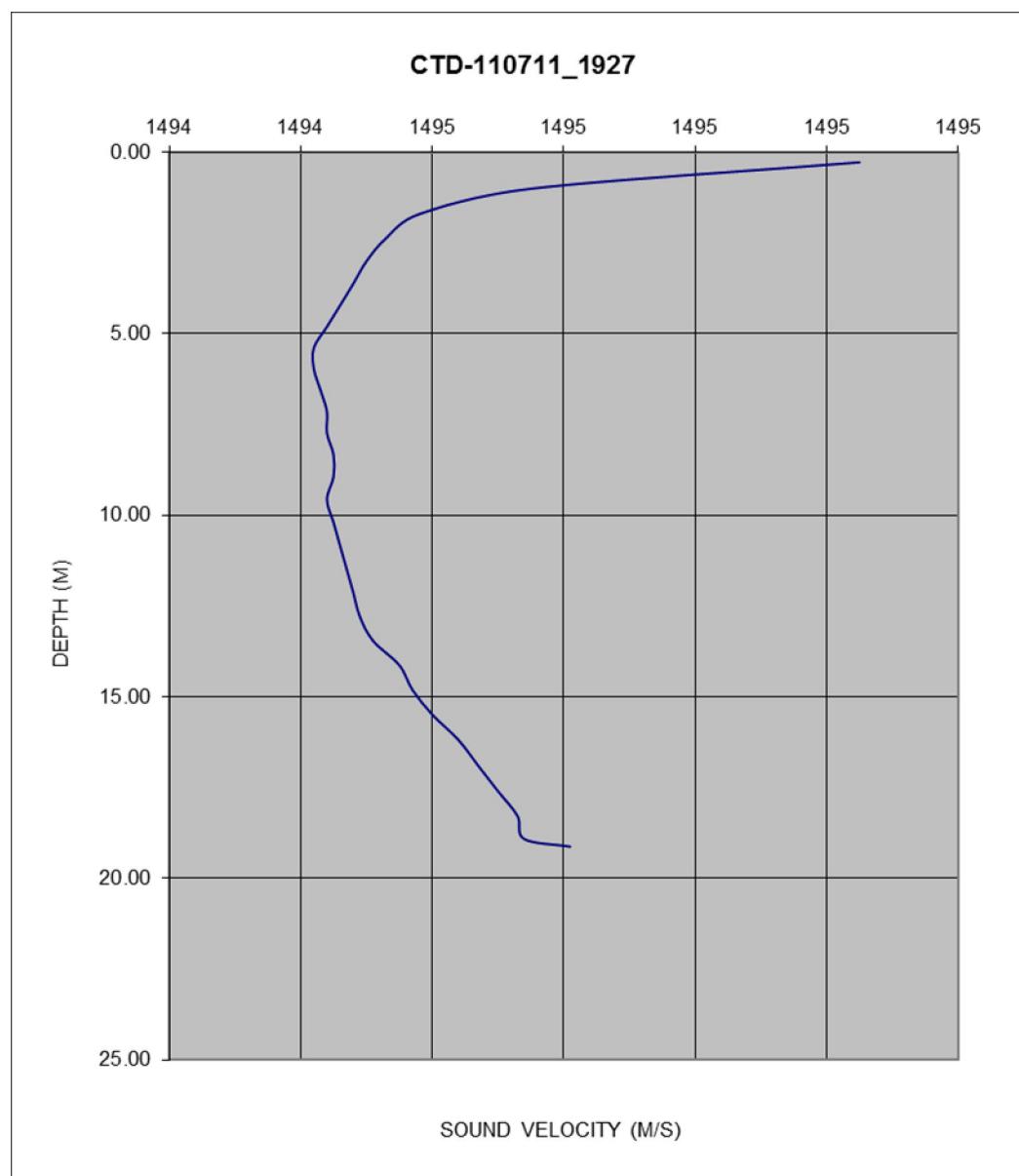


Figure 3.2-81
SVP 110711_2129 taken during the Fall 2011 multibeam survey at Fire-Island Reef

1494.50	0.15
1494.36	0.80
1494.30	1.54
1494.30	2.21
1494.29	2.88
1494.29	3.55
1494.30	4.23
1494.31	4.92
1494.32	5.59
1494.33	6.25
1494.35	6.91
1494.36	7.56
1494.37	8.20
1494.38	8.86
1494.43	9.51
1494.47	10.15
1494.51	10.81
1494.54	11.48
1494.56	12.15
1494.59	12.83
1494.63	13.51
1494.67	14.21
1494.70	14.87
1494.74	15.52
1494.82	16.18
1494.88	16.83
1494.91	17.49
1494.93	18.17
1494.94	18.81
1494.95	19.45
1494.99	19.75

CTD PROFILE # 110711 2129

<u>Date</u>	<u>Time</u>	<u>NAD83 NY LI (Feet)</u>		<u>Water Depth</u>	<u>Latitude</u>	<u>Longitude</u>
		<u>Easting</u>	<u>Northing</u>	<u>Feet</u>	<u>N</u>	<u>W</u>
11/07/11	21:29	1199630	158274	65	40.59848593	73.22441442

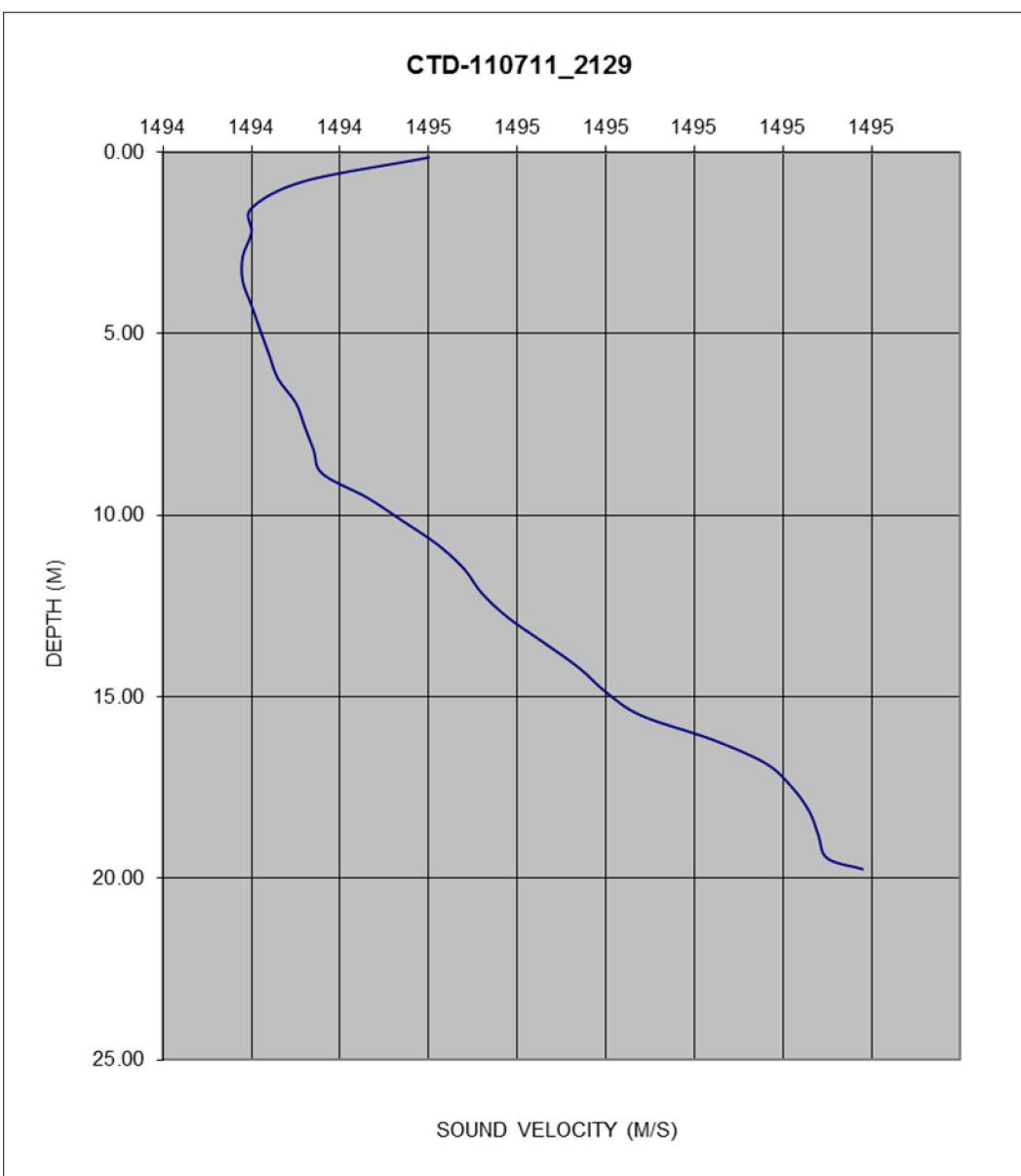


Figure 3.2-82
SVP 110811_1200 taken during the Fall 2011 multibeam survey at Fire-Island Reef

1492.96	0.09
1493.02	0.69
1493.08	1.41
1493.13	2.15
1493.15	2.89
1493.20	3.64
1493.24	4.40
1493.24	5.15
1493.32	5.88
1493.44	6.60
1493.61	7.33
1493.80	8.05
1494.04	8.73
1494.26	9.42
1494.45	10.09
1494.62	10.79
1494.77	11.50
1494.93	12.21
1495.06	12.88
1495.17	13.54
1495.26	14.25
1495.34	14.98
1495.42	15.71
1495.47	16.42
1495.52	17.13
1495.56	17.85
1495.59	18.54
1495.58	18.79

CTD PROFILE # 110811_1200

<u>Date</u>	<u>Time</u>	<u>NAD83 NY LI (Feet)</u>		<u>Water Depth</u>	<u>Latitude</u>	<u>Longitude</u>
		<u>Easting</u>	<u>Northing</u>	<u>Feet</u>	<u>N</u>	<u>W</u>
11/08/11	12:00	1199179	156238	62	40.59290717	73.22610240

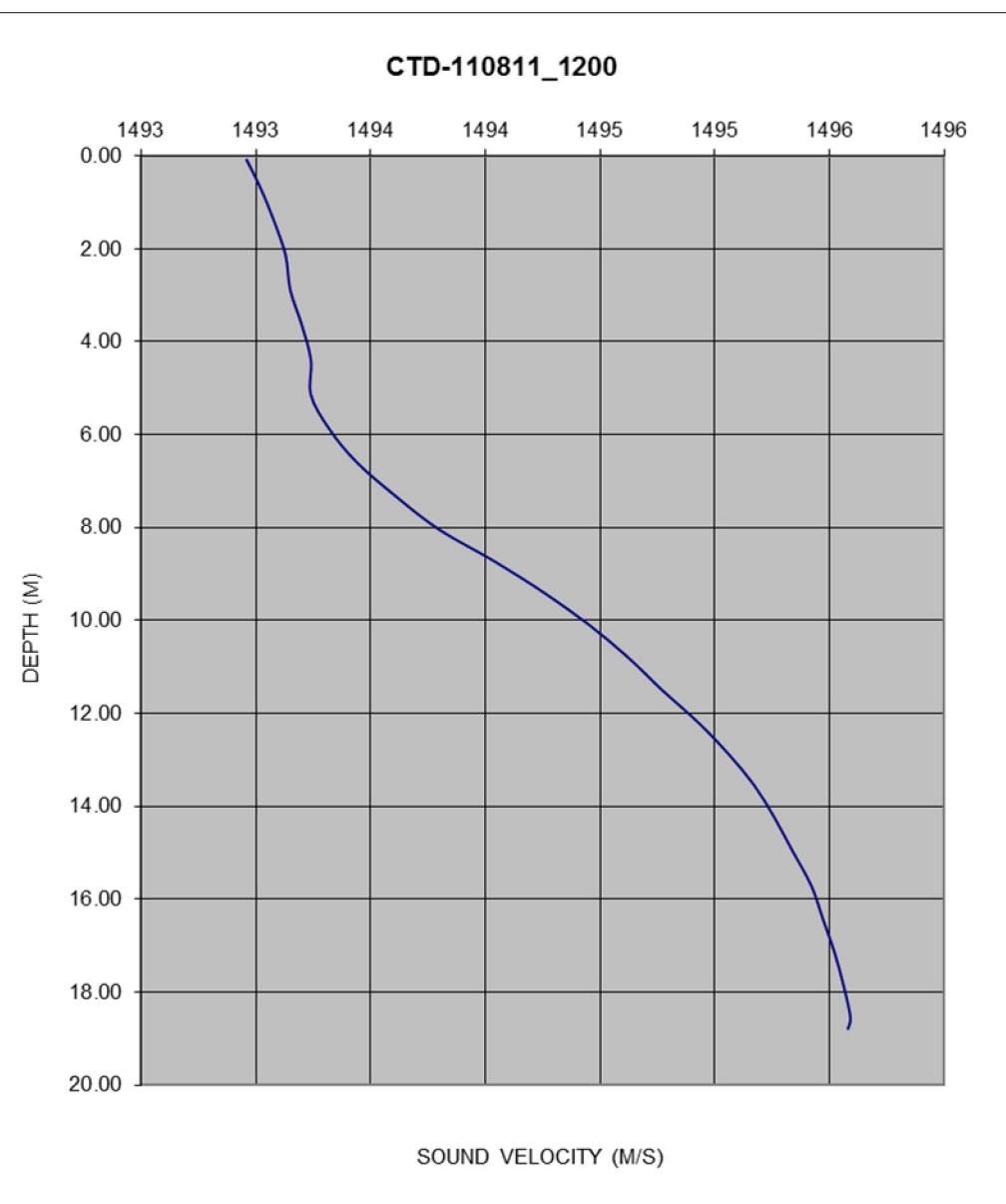


Figure 3.2-83
SVP 110811_1538 taken during the Fall 2011 multibeam survey at Hempstead Reef

1496.71	0.46
1496.33	1.09
1496.13	1.78
1496.02	2.44
1496.00	3.05
1496.03	3.70
1496.07	4.39
1496.13	5.05
1496.22	5.70
1496.36	6.35
1496.51	7.01
1496.74	7.70
1496.98	8.38
1497.15	9.04
1497.22	9.67
1497.29	10.28
1497.41	10.90
1497.66	11.45
1497.83	11.86
1497.95	12.47
1498.06	13.10
1498.14	13.78
1498.19	14.48
1498.22	15.17
1498.24	15.86
1498.28	16.55
1498.30	17.25
1498.31	17.94
1498.31	18.60
1498.32	19.02
1498.32	19.05

CTD PROFILE # 110811_1538

Date	Time	NAD83 NY LI (Feet)		Water Depth	Latitude	Longitude
		Easting	Northing	Feet	N	W
11/08/11	15:38	1107511	129542	62	40.52138225	73.55665015

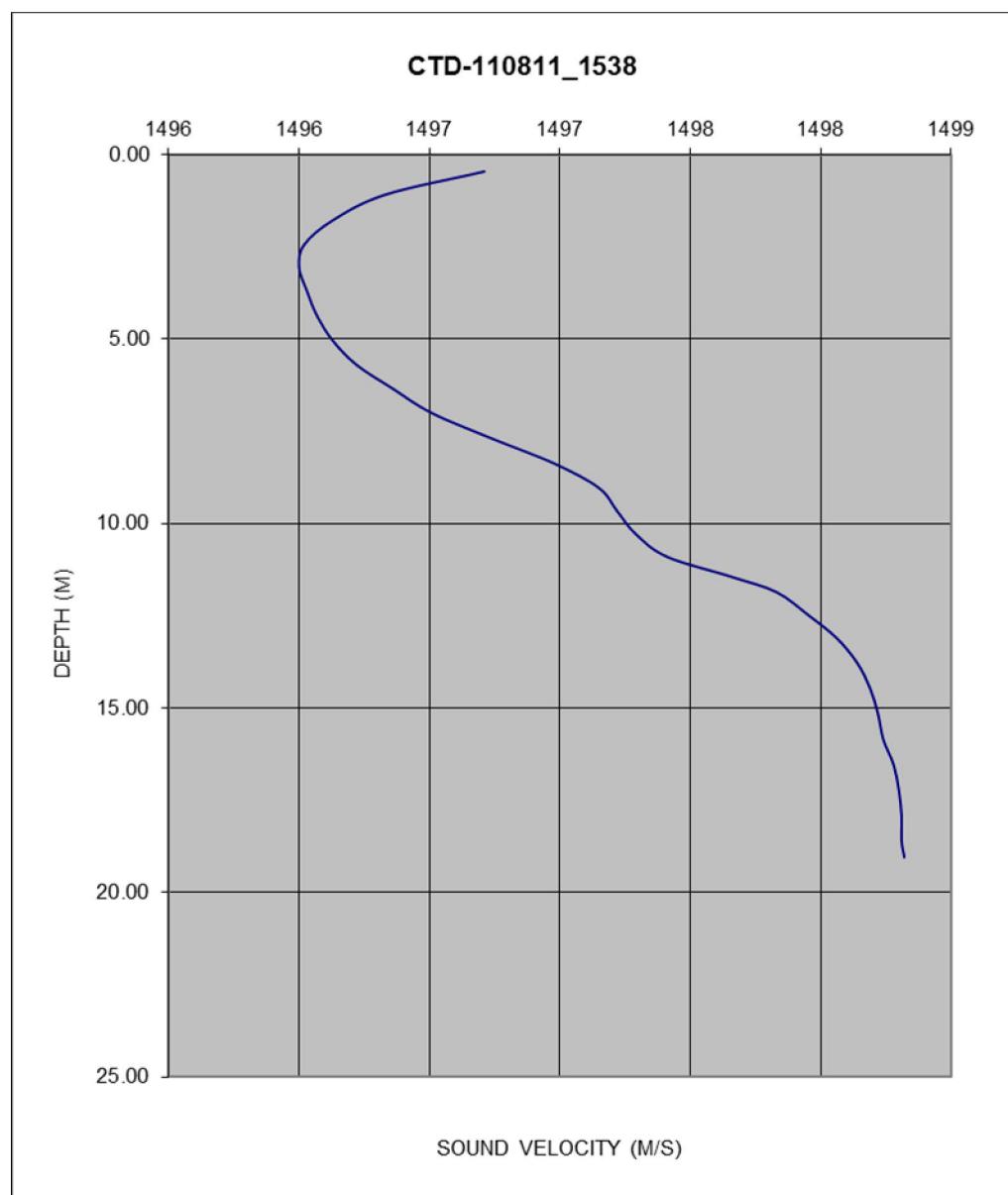


Figure 3.2-84
SVP 110811_1729 taken during the Fall 2011 multibeam survey at Hempstead Reef

1498.83	0.42
1497.15	1.24
1496.27	2.08
1495.91	2.86
1495.77	3.64
1495.73	4.44
1495.89	5.24
1496.19	6.04
1496.70	6.82
1497.32	7.62
1497.68	8.44
1497.92	9.24
1498.05	9.98
1498.12	10.66
1498.15	11.30
1498.18	11.93
1498.22	12.55
1498.26	13.16
1498.28	13.79
1498.29	14.44
1498.30	15.11
1498.33	15.78
1498.38	16.46
1498.41	17.13
1498.43	17.84
1498.46	18.54
1498.48	19.26
1498.51	19.69
1498.58	19.75
1498.66	19.79
1498.72	19.82

CTD PROFILE # 110811_1729

Date	Time	NAD83 NY LI (Feet)		Water Depth	Latitude	Longitude
		Easting	Northing	Feet	N	W
11/08/11	17:29	1107037	128517	65	40.51857614	73.55837399

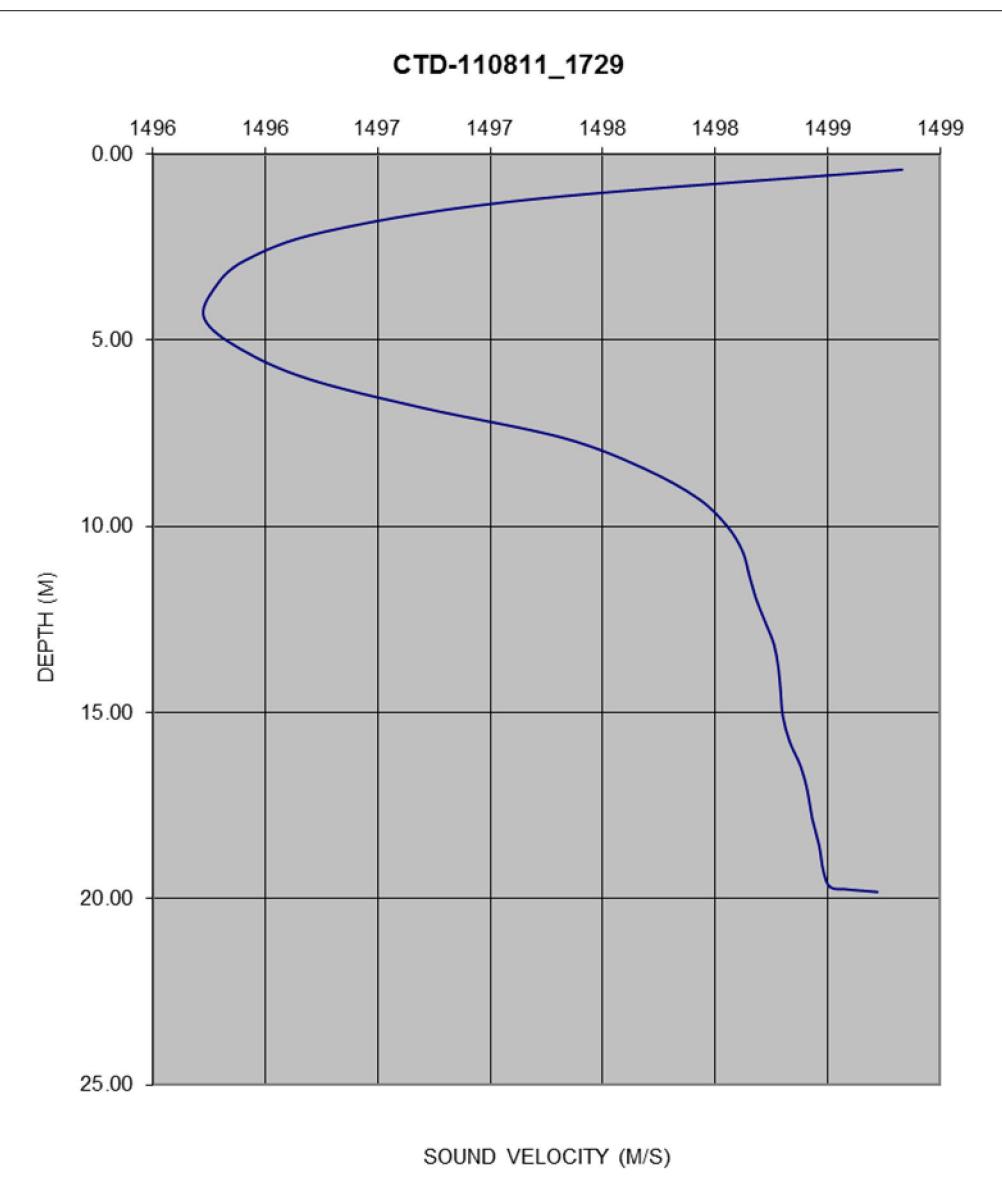


Figure 3.2-85
SVP 110811_1926 taken during the Fall 2011 multibeam survey at Hempstead Reef

1499.34	0.16
1497.96	0.73
1496.78	1.40
1496.17	2.12
1495.94	2.89
1495.88	3.68
1496.06	4.45
1496.48	5.22
1496.97	5.94
1497.52	6.62
1497.85	7.24
1498.04	7.76
1498.10	8.21
1498.15	8.67
1498.22	9.19
1498.25	9.77
1498.23	10.36
1498.21	11.01
1498.20	11.65
1498.22	12.30
1498.26	12.93
1498.31	13.56
1498.34	14.19
1498.37	14.84
1498.40	15.48
1498.43	16.12
1498.48	16.77
1498.52	17.44
1498.54	18.11
1498.59	18.41
1498.69	18.44

CTD PROFILE # 110811_1926

Date	Time	NAD83 NY LI (Feet)		Water Depth	Latitude	Longitude
		Easting	Northing	Feet	N	W
11/08/11	19:26	1106934	127448	60	40.51564166	73.55876360

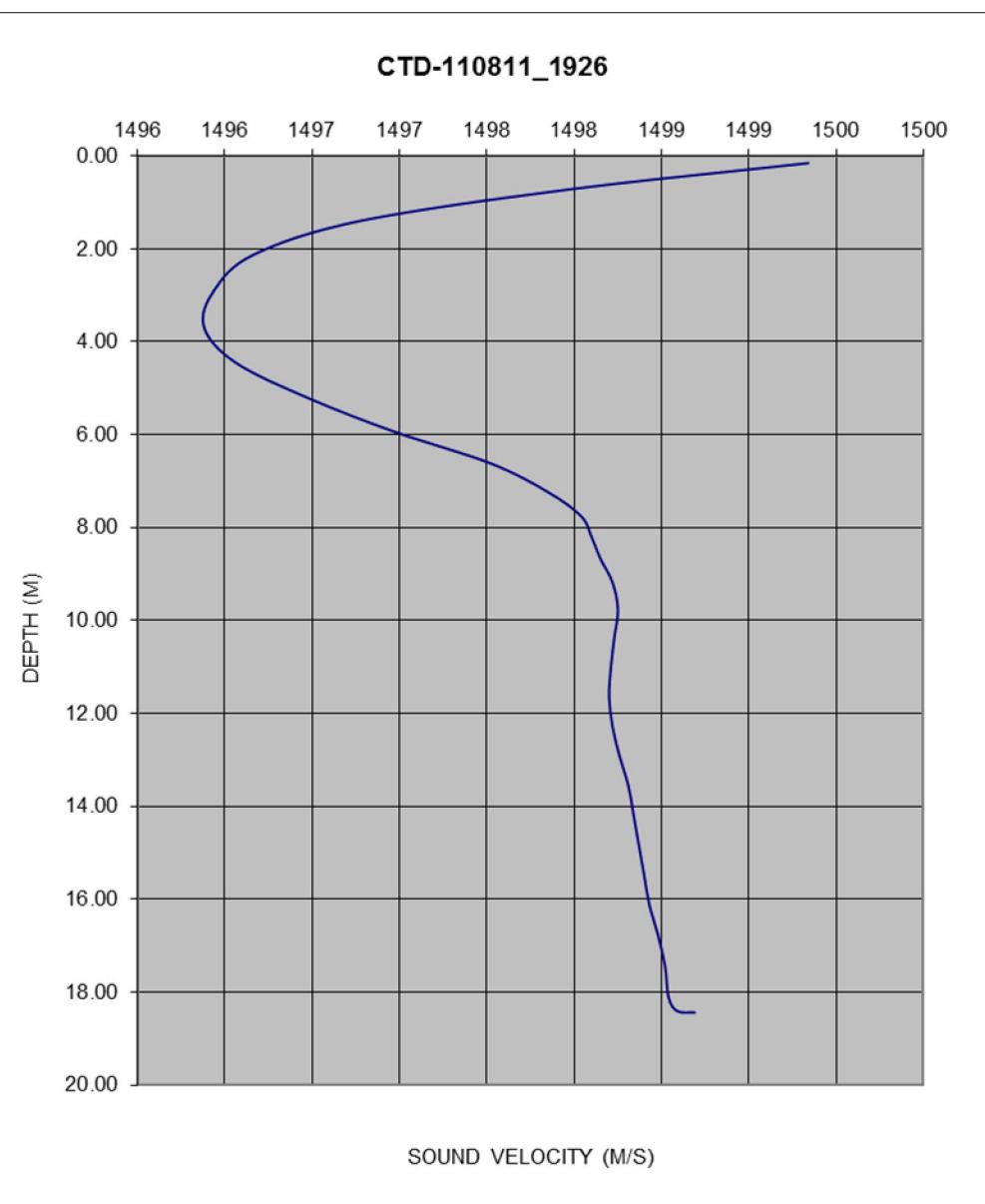


Figure 3.2-86
SVP 110811_2113 taken during the Fall 2011 multibeam survey at Hempstead Reef

1498.24	0.14
1497.88	0.81
1497.20	1.56
1496.53	2.34
1496.25	3.10
1496.42	3.76
1496.87	4.42
1497.47	5.13
1497.79	5.80
1498.00	6.48
1498.13	7.19
1498.22	7.89
1498.27	8.59
1498.30	9.29
1498.32	10.00
1498.34	10.72
1498.40	11.39
1498.45	12.01
1498.48	12.68
1498.50	13.37
1498.51	14.05
1498.51	14.74
1498.50	15.41
1498.49	16.08
1498.49	16.73
1498.50	17.39
1498.52	18.02
1498.57	18.19

CTD PROFILE # 110811_2113

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Foot	
11/08/11	21:13	1106712	126323	60	40.51255662 73.55958198

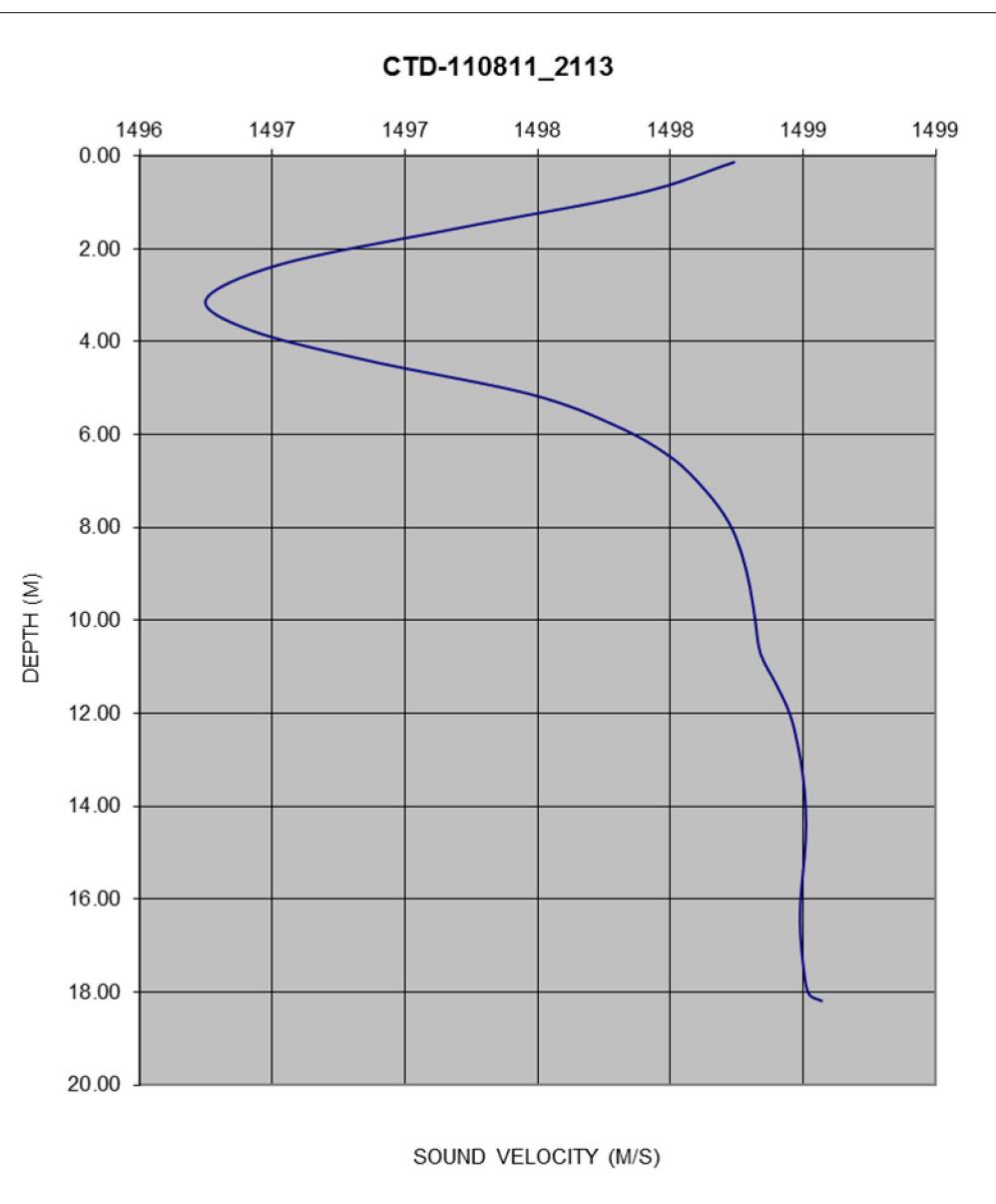
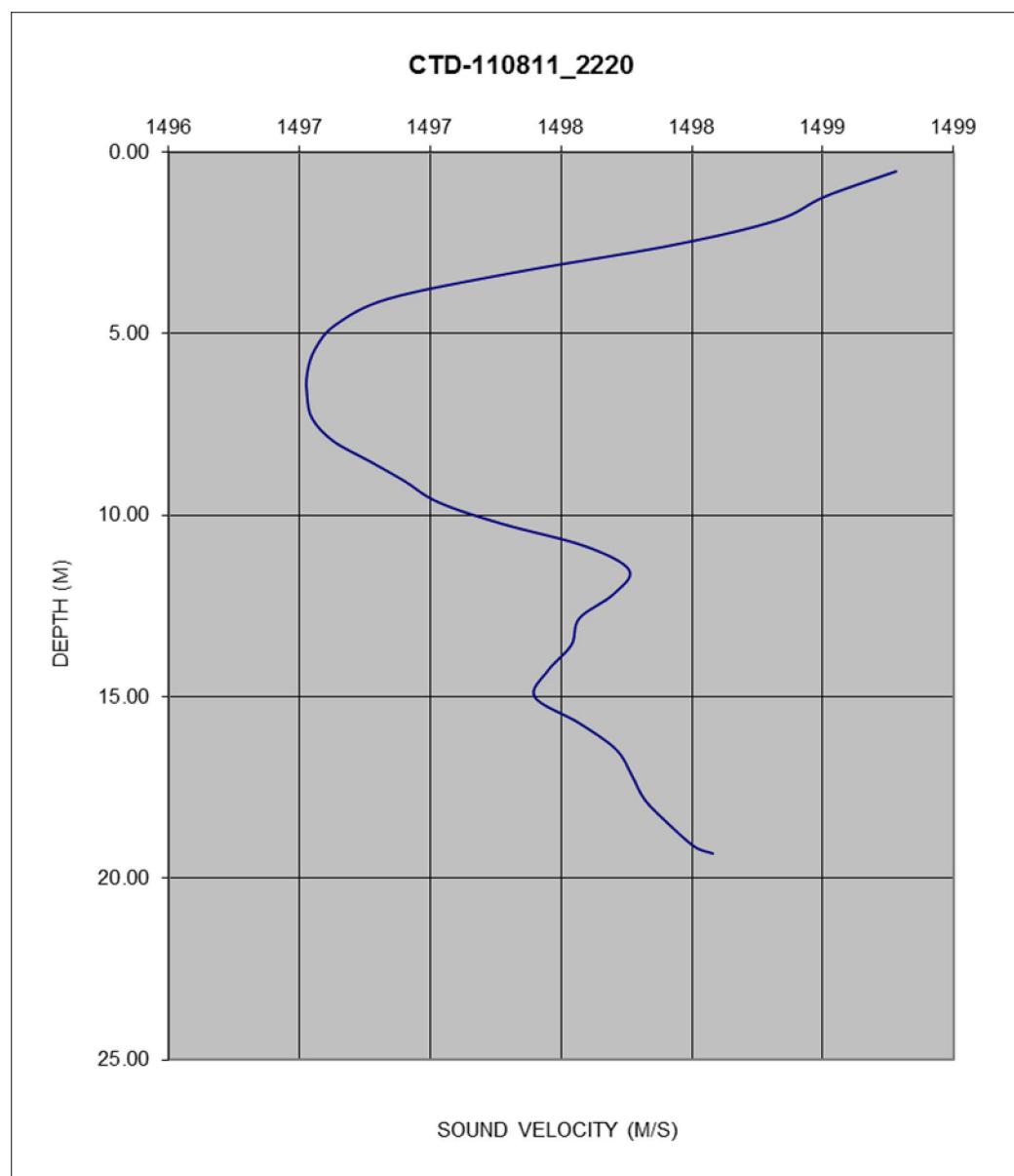


Figure 3.2-87
SVP 110811_2220 taken during the Fall 2011 multibeam survey at Hempstead Reef

1498.78	0.53
1498.51	1.22
1498.32	1.89
1497.92	2.57
1497.32	3.32
1496.84	4.04
1496.64	4.75
1496.56	5.43
1496.53	6.10
1496.53	6.74
1496.55	7.35
1496.63	7.96
1496.77	8.52
1496.90	9.05
1497.03	9.64
1497.27	10.23
1497.59	10.85
1497.76	11.51
1497.70	12.18
1497.57	12.84
1497.54	13.57
1497.45	14.28
1497.40	15.01
1497.57	15.73
1497.71	16.45
1497.77	17.16
1497.82	17.84
1497.91	18.50
1498.01	19.13
1498.08	19.32

CTD PROFILE # 110811 2220

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
11/08/11	22:20	1112555	128736	63	40.51909729 73.53852380



3.3 Survey Line Report

Multibeam survey lines were run in a North-South direction at the HARS location, and East-West at both Reef locations, primarily to best facilitate vessel operation under wave and current conditions at the time of the survey. Table 3.3-1 to 3.3-3 lists survey line start times, location and cardinal direction run.

Table 3.3-1
Multibeam Survey Lines run during the Fall 2011 multibeam survey at the HARS

File Name	Date	Time (UTC)	Latitude	Longitude	Direction
000_1231	8/5/2011	12:31	N40.42964897	W073.8133211	South
000_1247	8/5/2011	12:47	N40.40378763	W073.81473346	North
000_1303	8/5/2011	13:03	N40.42953843	W073.81507981	South
000_1319	8/5/2011	13:19	N40.40376557	W073.81686058	North
000_1336	8/5/2011	13:36	N40.42957991	W073.81707435	South
000_1352	8/5/2011	13:52	N40.40373813	W073.81901818	North
000_1409	8/5/2011	14:09	N40.42967338	W073.81927909	South
000_1436	8/5/2011	14:36	N40.40376841	W073.82142466	East (Cross-Line)
000_1452	8/5/2011	14:52	N40.42969104	W073.82115945	South
000_1509	8/5/2011	15:09	N40.40361568	W073.82319691	North
000_1524	8/5/2011	15:24	N40.42952368	W073.82270298	North
000_1526	8/5/2011	15:26	N40.42885462	W073.82379119	East (Cross-Line)
000_1533	8/5/2011	15:33	N40.42863458	W073.81457466	West (Cross-Line)
000_1535	8/5/2011	15:35	N40.42878735	W073.82212567	West (Cross-Line)
00A1535	8/5/2011	15:35	N40.42879493	W073.82286218	West (Cross-Line)
000_1537	8/5/2011	15:37	N40.42957612	W073.82376282	South
000_1553	8/5/2011	15:53	N40.40371437	W073.82584172	North
000_1609	8/5/2011	16:09	N40.42969819	W073.82562965	South
000_1625	8/5/2011	16:25	N40.40373071	W073.82839811	North
000_1647	8/5/2011	16:47	N40.42968073	W073.8279796	South
000_1704	8/5/2011	17:04	N40.40370513	W073.83060459	North
000_1720	8/5/2011	17:20	N40.42972478	W073.82995624	South
000_1738	8/5/2011	17:38	N40.40373717	W073.83302451	North
000_1754	8/5/2011	17:54	N40.4296724	W073.83223534	South
000_1812	8/5/2011	18:12	N40.40373781	W073.83530679	North
000_1828	8/5/2011	18:28	N40.42895504	W073.833877	East (Cross-Line)
000_1838	8/5/2011	18:38	N40.42972057	W073.83411135	South
000_1858	8/5/2011	18:58	N40.4036963	W073.83698964	North

000_1915	8/5/2011	19:15	N40.42986232	W073.8362686	South
000_1939	8/5/2011	19:39	N40.40365653	W073.83888594	North
000_1956	8/5/2011	19:56	N40.42976953	W073.83784102	South
000_2020	8/5/2011	20:20	N40.40369175	W073.840715	North
000_2038	8/5/2011	20:38	N40.42877206	W073.83928286	East (Cross-Line)
000_1139	8/10/2011	11:39	N40.42954352	W073.83936123	South
000_1154	8/10/2011	11:54	N40.4036503	W073.84232955	North
000_1210	8/10/2011	12:10	N40.42981403	W073.84081439	West (Cross-Line)
000_1226	8/10/2011	12:26	N40.40359564	W073.84426262	North
000_1242	8/10/2011	12:42	N40.42976014	W073.84269708	South
000_1258	8/10/2011	12:58	N40.40366298	W073.8459443	North
000_1315	8/10/2011	13:15	N40.42969504	W073.84440085	South
000A1336	8/10/2011	13:36	N40.4036833	W073.8474399	North
000_1353	8/10/2011	13:53	N40.42968984	W073.84575535	West (Cross-Line)
000_1408	8/10/2011	14:08	N40.40384308	W073.84879041	North
000_1425	8/10/2011	14:25	N40.42886584	W073.84739567	East (Cross-Line)
000_1430	8/10/2011	14:30	N40.4263383	W073.84083528	South
000_1434	8/10/2011	14:34	N40.42956087	W073.84705895	West (Cross-Line)
000_1449	8/10/2011	14:49	N40.40362986	W073.8499387	North
000_1506	8/10/2011	15:06	N40.42961816	W073.84861244	South
000_1521	8/10/2011	15:21	N40.40361774	W073.85117169	North
000_1544	8/10/2011	15:44	N40.42956413	W073.84978233	West (Cross-Line)
000_1558	8/10/2011	15:58	N40.4036015	W073.85258111	North
000_1615	8/10/2011	16:15	N40.42980667	W073.85126371	South
000_1629	8/10/2011	16:29	N40.40369376	W073.85378187	North
000_1645	8/10/2011	16:45	N40.42975182	W073.85259296	South
000_1700	8/10/2011	17:00	N40.4037612	W073.85492386	North
000_1717	8/10/2011	17:17	N40.42877922	W073.85410994	East (Cross-Line)
000_1725	8/10/2011	17:25	N40.42950738	W073.85372193	South
000_1742	8/10/2011	17:42	N40.40377218	W073.85595467	North
000_1804	8/10/2011	18:04	N40.42964569	W073.85485803	West (Cross-Line)
000_1819	8/10/2011	18:19	N40.40360982	W073.8569982	North
000_1837	8/10/2011	18:37	N40.42971265	W073.85622491	South
000_1848	8/10/2011	18:48	N40.42005291	W073.85722156	North
000_1856	8/10/2011	18:56	N40.42868852	W073.85735277	East (Cross-Line)
000A1201	8/11/2011	12:01	N40.40441908	W073.8136411	South
000_1216	8/11/2011	12:16	N40.37812432	W073.81428409	North
000_1233	8/11/2011	12:33	N40.40442519	W073.81511332	West (Cross-Line)
000_1250	8/11/2011	12:50	N40.37807381	W073.81670044	North

000_1308	8/11/2011	13:08	N40.40451056	W073.81769875	South
000_1324	8/11/2011	13:24	N40.37806638	W073.81940569	North
000_1342	8/11/2011	13:42	N40.40448722	W073.81998363	West (Cross-Line)
000_1402	8/11/2011	14:02	N40.37786231	W073.82166239	North
000_1422	8/11/2011	14:22	N40.40442352	W073.8223697	West (Cross-Line)
000_1439	8/11/2011	14:39	N40.3781522	W073.82377914	North
000_1500	8/11/2011	15:00	N40.40331074	W073.82460279	East (Cross-Line)
000_1510	8/11/2011	15:10	N40.40449025	W073.82487561	South
000_1528	8/11/2011	15:28	N40.37817041	W073.82580004	North
000_1546	8/11/2011	15:46	N40.40450394	W073.82679198	South
000_1603	8/11/2011	16:03	N40.37822295	W073.82773292	North
000_1624	8/11/2011	16:24	N40.40452109	W073.82849483	West (Cross-Line)
000_1640	8/11/2011	16:40	N40.37825392	W073.82991732	North
000_1657	8/11/2011	16:57	N40.40447825	W073.83095789	South
000_1714	8/11/2011	17:14	N40.37831198	W073.83176889	North
000_1731	8/11/2011	17:31	N40.404406	W073.83284217	West (Cross-Line)
000_1747	8/11/2011	17:47	N40.37812689	W073.83342904	North
000_1810	8/11/2011	18:10	N40.40362209	W073.83474531	East (Cross-Line)
000_1820	8/11/2011	18:20	N40.40447691	W073.8343651	West (Cross-Line)
00A1837	8/11/2011	18:37	N40.37820131	W073.83459258	North
000_1854	8/11/2011	18:54	N40.40450866	W073.83672241	South
000_1911	8/11/2011	19:11	N40.37822252	W073.83638998	North
000_1927	8/11/2011	19:27	N40.40432604	W073.83884252	South
000_1943	8/11/2011	19:43	N40.37820985	W073.83736383	North
000_2003	8/11/2011	20:03	N40.40437225	W073.84066085	South
00A2020	8/11/2011	20:20	N40.37822263	W073.83877205	North
000_2036	8/11/2011	20:36	N40.4043726	W073.84232697	South
000_2054	8/11/2011	20:54	N40.37844248	W073.84023074	North
000_2112	8/11/2011	21:12	N40.40360493	W073.84380078	East (Cross-Line)
000_2120	8/11/2011	21:20	N40.40434819	W073.8436323	West (Cross-Line)
000_2137	8/11/2011	21:37	N40.37831185	W073.84147397	North
000_2154	8/11/2011	21:54	N40.40348705	W073.84528884	East (Cross-Line)
000_1320	8/12/2011	13:20	N40.40454829	W073.84526463	South
018_1339	8/12/2011	13:39	N40.37829895	W073.84247444	North
002_1357	8/12/2011	13:57	N40.40441576	W073.84699956	South
018_1414	8/12/2011	14:14	N40.37828153	W073.84363181	North
00A1430	8/12/2011	14:30	N40.40433172	W073.84859343	South
000_1446	8/12/2011	14:46	N40.37830328	W073.8447289	North
000_1502	8/12/2011	15:02	N40.40444242	W073.84972009	South

000_1521	8/12/2011	15:21	N40.37829124	W073.84541735	West (Cross-Line)
000_1539	8/12/2011	15:39	N40.40437359	W073.85101185	South
000_1555	8/12/2011	15:55	N40.37831273	W073.84666784	North
000_1613	8/12/2011	16:13	N40.40378564	W073.85215168	East (Cross-Line)
000_1621	8/12/2011	16:21	N40.40432302	W073.85670246	West (Cross-Line)
000_1637	8/12/2011	16:37	N40.37829866	W073.85635858	North
000_1653	8/12/2011	16:53	N40.4043936	W073.85604983	South
00A_1714	8/12/2011	17:14	N40.3783486	W073.85520142	North
00A_1731	8/12/2011	17:31	N40.40439974	W073.85473658	South
00A_1747	8/12/2011	17:47	N40.3783008	W073.85381127	North
000_1805	8/12/2011	18:05	N40.404307	W073.85370124	South
000_1822	8/12/2011	18:22	N40.37838947	W073.8525622	North
000_1839	8/12/2011	18:39	N40.40434469	W073.85246082	South
000_1855	8/12/2011	18:55	N40.37830301	W073.85138103	North
000_1912	8/12/2011	19:12	N40.40305213	W073.85153765	West (Cross-Line)
000_1921	8/12/2011	19:21	N40.40035457	W073.85198649	South
000_1934	8/12/2011	19:34	N40.37833283	W073.8502706	North
000_1950	8/12/2011	19:50	N40.39359285	W073.84979712	East (Cross-Line)
000_1959	8/12/2011	19:59	N40.3783285	W073.84942014	North
000_2009	8/12/2011	20:09	N40.39173398	W073.8490657	South
000_2018	8/12/2011	20:18	N40.37838541	W073.84864347	North
000_2026	8/12/2011	20:26	N40.39028404	W073.84775977	South
000_2034	8/12/2011	20:34	N40.37829971	W073.84772514	North
000_2040	8/12/2011	20:40	N40.38413509	W073.84707184	South
000_2044	8/12/2011	20:44	N40.38029592	W073.84676364	North
000_2139	8/12/2011	21:39	N40.40102109	W073.84546275	North
002_1211	8/16/2011	12:11	N40.3787399	W073.8139414	East (Cross-Line)
018_1228	8/16/2011	12:28	N40.3527096	W073.81509394	West (Cross-Line)
000_1245	8/16/2011	12:45	N40.37890566	W073.8155313	South
000_1302	8/16/2011	13:02	N40.35262315	W073.81753345	North
00A1320	8/16/2011	13:20	N40.37884849	W073.81788243	South
000_1337	8/16/2011	13:37	N40.35275006	W073.81982297	West (Cross-Line)
000_1356	8/16/2011	13:56	N40.37891639	W073.82006351	West (Cross-Line)
000_1417	8/16/2011	14:17	N40.3526312	W073.82281836	North
000_1435	8/16/2011	14:35	N40.37888074	W073.82254251	South
000_1451	8/16/2011	14:51	N40.35260131	W073.82502044	North
00A1510	8/16/2011	15:10	N40.37791636	W073.82490397	East (Cross-Line)
00A1521	8/16/2011	15:21	N40.37888737	W073.8250093	South
000_1536	8/16/2011	15:36	N40.35259757	W073.82699404	North

00A1553	8/16/2011	15:53	N40.37885857	W073.8271529	South
000_1608	8/16/2011	16:08	N40.35279055	W073.82940057	North
002_1630	8/16/2011	16:30	N40.37883587	W073.82945185	East (Cross-Line)
000_1646	8/16/2011	16:46	N40.35278632	W073.83139967	North
00A1704	8/16/2011	17:04	N40.37878377	W073.83124679	South
00A1720	8/16/2011	17:20	N40.352761	W073.83303255	West (Cross-Line)
00A1738	8/16/2011	17:38	N40.37882368	W073.83302919	South
000_1755	8/16/2011	17:55	N40.35272988	W073.83529056	North
000_1813	8/16/2011	18:13	N40.37816392	W073.83471163	East (Cross-Line)
00A1821	8/16/2011	18:21	N40.37884823	W073.83475698	South
000_1842	8/16/2011	18:42	N40.35267878	W073.83707192	North
000_1859	8/16/2011	18:59	N40.37877013	W073.83653499	South
00A1915	8/16/2011	19:15	N40.3528351	W073.83911182	North
000_1932	8/16/2011	19:32	N40.3788658	W073.83802292	South
000_1948	8/16/2011	19:48	N40.3528015	W073.84110504	North
000_2006	8/16/2011	20:06	N40.37897274	W073.83944513	South
000_2021	8/16/2011	20:21	N40.35285808	W073.84234923	West (Cross-Line)
000_2048	8/16/2011	20:48	N40.37879208	W073.84066715	South
000_2101	8/16/2011	21:04	N40.35278775	W073.84435186	North
000_2123	8/16/2011	21:23	N40.37814988	W073.84217169	East (Cross-Line)
000_2129	8/16/2011	21:29	N40.37839631	W073.83756475	West (Cross-Line)
000_2130	8/16/2011	21:30	N40.37876802	W073.84190823	West (Cross-Line)
000_2146	8/16/2011	21:46	N40.35281466	W073.84615007	North
000_2204	8/16/2011	22:04	N40.37807853	W073.84387664	East (Cross-Line)
000_1316	8/17/2011	13:16	N40.37871353	W073.85727517	South
000_1332	8/17/2011	13:32	N40.3528207	W073.85659961	North
000_1355	8/17/2011	13:55	N40.37880357	W073.85619805	East (Cross-Line)
000_1411	8/17/2011	14:11	N40.35250103	W073.8550557	North
000_1431	8/17/2011	14:31	N40.37886719	W073.8546057	South
000_1453	8/17/2011	14:53	N40.35241546	W073.85324071	North
00B_1510	8/17/2011	15:10	N40.37883285	W073.85323533	East (Cross-Line)
00A_1526	8/17/2011	15:26	N40.35270774	W073.85155713	East (Cross-Line)
000_1543	8/17/2011	15:43	N40.37877872	W073.85192211	South
000_1602	8/17/2011	16:02	N40.35285168	W073.84954311	North
000_1619	8/17/2011	16:19	N40.37818743	W073.85072748	West (Cross-Line)
000_1630	8/17/2011	16:30	N40.37875223	W073.85069101	South
00A_1646	8/17/2011	16:46	N40.35285617	W073.8477552	North
000_1702	8/17/2011	17:02	N40.37872635	W073.84978875	South
000_1719	8/17/2011	17:19	N40.35520606	W073.84669007	North

000_1734	8/17/2011	17:34	N40.37875189	W073.84899049	South
000_1748	8/17/2011	17:48	N40.36536361	W073.84521756	North
000_1756	8/17/2011	17:56	N40.37891028	W073.84849441	South
00A_1805	8/17/2011	18:05	N40.36855976	W073.84443054	North
00A_1812	8/17/2011	18:12	N40.37876216	W073.84726058	East (Cross-Line)
000_1815	8/17/2011	18:15	N40.37634872	W073.84436548	North
000_1818	8/17/2011	18:18	N40.37889826	W073.84535118	South
000_1820	8/17/2011	18:20	N40.37784874	W073.84380093	North
00B_1821	8/17/2011	18:21	N40.37880079	W073.84380407	South
000_1822	8/17/2011	18:22	N40.37763281	W073.84300548	West (Cross-Line)
000_1828	8/17/2011	18:28	N40.37702285	W073.84704789	South
000_1838	8/17/2011	18:38	N40.3561414	W073.83675561	South
000_1853	8/17/2011	18:53	N40.35295967	W073.85740825	North
000_1909	8/17/2011	19:09	N40.37883503	W073.85797511	South
00A_1927	8/17/2011	19:27	N40.35287283	W073.85909714	North
000_1942	8/17/2011	19:42	N40.37896891	W073.85946517	South
000_2000	8/17/2011	20:00	N40.35274182	W073.86060116	West (Cross-Line)
000_2016	8/17/2011	20:16	N40.37896283	W073.86092523	South
00A_2037	8/17/2011	20:37	N40.35294919	W073.86221671	West (Cross-Line)
000_2053	8/17/2011	20:53	N40.37815475	W073.86220597	East (Cross-Line)
000_2057	8/17/2011	20:57	N40.37848241	W073.85894817	West (Cross-Line)
000_1206	8/18/2011	12:06	N40.37893406	W073.86209617	South
000_1223	8/18/2011	12:23	N40.3527496	W073.86413948	North
000_1241	8/18/2011	12:41	N40.37890607	W073.86395964	South
000_1257	8/18/2011	12:57	N40.35275403	W073.86584787	North
00A_1315	8/18/2011	13:15	N40.37890194	W073.86565447	South
000_1331	8/18/2011	13:31	N40.35277396	W073.86731758	West (Cross-Line)
000_1350	8/18/2011	13:50	N40.37879714	W073.86720111	South
00A_1411	8/18/2011	14:11	N40.35280359	W073.86910098	North
000_1428	8/18/2011	14:28	N40.37873358	W073.86905305	South
000_1444	8/18/2011	14:44	N40.35281255	W073.87038853	North
00A_1502	8/18/2011	15:02	N40.3781571	W073.87054512	East (Cross-Line)
000_1512	8/18/2011	15:12	N40.37891118	W073.87041534	West (Cross-Line)
000_1529	8/18/2011	15:29	N40.35294889	W073.87208622	North
000_1547	8/18/2011	15:47	N40.37883157	W073.87238551	South
000_1604	8/18/2011	16:04	N40.352887	W073.87333953	West (Cross-Line)
00A_1624	8/18/2011	16:24	N40.3787996	W073.87406721	South
000_1641	8/18/2011	16:41	N40.35291019	W073.87518496	North
00A_1657	8/18/2011	16:57	N40.37896338	W073.8758787	South

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00B_1714	8/18/2011	17:14	N40.35292417	W073.8767272	North
000_1730	8/18/2011	17:30	N40.37885783	W073.87733037	South
00B_1747	8/18/2011	17:47	N40.35286094	W073.87786832	West (Cross-Line)
000_1803	8/18/2011	18:03	N40.37825975	W073.87910434	East (Cross-Line)
000_1811	8/18/2011	18:11	N40.37866268	W073.87946085	South
00A_1835	8/18/2011	18:35	N40.35290282	W073.87949031	North
000_1835	8/18/2011	18:35	N40.35290847	W073.87948385	North
000_1851	8/18/2011	18:51	N40.37877792	W073.88108818	South
00A_1909	8/18/2011	19:09	N40.35280543	W073.88088023	North
000_1924	8/18/2011	19:24	N40.37889568	W073.88263321	South
00A_1943	8/18/2011	19:43	N40.35286908	W073.88249923	North
000_1958	8/18/2011	19:58	N40.3789055	W073.88430147	South
00A_2018	8/18/2011	20:18	N40.35290879	W073.88367687	West (Cross-Line)
000_2033	8/18/2011	20:33	N40.37891127	W073.88597359	South
00A_2034	8/18/2011	20:34	N40.37867032	W073.88597593	South
00B_2034	8/18/2011	20:34	N40.37833079	W073.88570748	East (Cross-Line)
000_1150	8/19/2011	11:50	N40.37884965	W073.88607258	South
000_1207	8/19/2011	12:07	N40.35290986	W073.88526725	North
00A_1223	8/19/2011	12:23	N40.378869	W073.88762132	South
000_1240	8/19/2011	12:40	N40.3529345	W073.88690944	North
00A1_1257	8/19/2011	12:57	N40.37881438	W073.88945047	South
000_1314	8/19/2011	13:14	N40.35285487	W073.88840894	North
000_1330	8/19/2011	13:30	N40.37879526	W073.89118971	South
00A_1353	8/19/2011	13:53	N40.35292821	W073.88988125	North
00A_1409	8/19/2011	14:10	N40.37878096	W073.8929192	South
00A_1428	8/19/2011	14:28	N40.35289774	W073.89095918	North
00A_1446	8/19/2011	14:46	N40.37803675	W073.89461465	East (Cross-Line)
000_1454	8/19/2011	14:54	N40.3779675	W073.89133113	West (Cross-Line)
000_1458	8/19/2011	14:58	N40.37875121	W073.90072053	West (Cross-Line)
000_1514	8/19/2011	15:14	N40.35289454	W073.90057065	North
000_1531	8/19/2011	15:31	N40.37887251	W073.90010791	South
000_1548	8/19/2011	15:48	N40.35286788	W073.89943862	North
000_1610	8/19/2011	16:10	N40.37884717	W073.89874308	South
000_1628	8/19/2011	16:28	N40.35281156	W073.89844763	North
00A_1645	8/19/2011	16:45	N40.37878048	W073.89756539	South
000_1703	8/19/2011	17:03	N40.3528594	W073.89721787	North
00B_1720	8/19/2011	17:20	N40.37887304	W073.89606598	South
000_1739	8/19/2011	17:39	N40.35288001	W073.89619378	North
000_1801	8/19/2011	18:01	N40.37879893	W073.89467263	South

00A_1803	8/19/2011	18:03	N40.37802518	W073.89430636	West (Cross-Line)
00A_1815	8/19/2011	18:15	N40.36057215	W073.89418694	South
00B_1820	8/19/2011	18:20	N40.35285916	W073.8949855	North
000_1825	8/19/2011	18:25	N40.35908156	W073.89332901	South
000_1830	8/19/2011	18:30	N40.35285172	W073.89365634	North
000_1833	8/19/2011	18:33	N40.3578803	W073.89200556	South
00B_1837	8/19/2011	18:37	N40.35290232	W073.89251061	North
000_1840	8/19/2011	18:40	N40.35629347	W073.89111579	South
000_1843	8/19/2011	18:43	N40.35289759	W073.89161092	North
000_1900	8/19/2011	19:00	N40.37838854	W073.90074924	North
00B_1915	8/19/2011	19:15	N40.40435914	W073.90060748	South
00A_1939	8/19/2011	19:39	N40.37826736	W073.89993908	East (Cross-Line)
000_1955	8/19/2011	19:55	N40.40445201	W073.89924802	South
000_2017	8/19/2011	20:17	N40.37827244	W073.89848438	North
00A_2036	8/19/2011	20:36	N40.40362499	W073.89764451	West (Cross-Line)
000_2038	8/19/2011	20:38	N40.40363253	W073.90131292	North
00A_1247	8/23/2011	12:47	N40.40421311	W073.89418018	South
000_1324	8/23/2011	13:24	N40.40416477	W073.89329617	North
00A_1436	8/23/2011	14:36	N40.40334016	W073.88993404	West (Cross-Line)
00A_1613	8/23/2011	16:13	N40.37838324	W073.88620958	North
000_1140	8/23/2011	11:40	N40.40440818	W073.89691903	West (Cross-Line)
000_1156	8/23/2011	11:56	N40.37826441	W073.89681278	North
000_1213	8/23/2011	12:13	N40.40439561	W073.89600755	South
000_1229	8/23/2011	12:29	N40.37825099	W073.89525877	North
000_1307	8/23/2011	13:07	N40.37829332	W073.89412664	North
000_1325	8/23/2011	13:25	N40.4043068	W073.89264718	South
000_1340	8/23/2011	13:40	N40.37828269	W073.8925971	North
000_1359	8/23/2011	13:59	N40.40434492	W073.89128754	South
000_1415	8/23/2011	14:15	N40.37824998	W073.8909159	North
000_1436	8/23/2011	14:36	N40.40334016	W073.88993405	West (Cross-Line)
000_1443	8/23/2011	14:43	N40.4041795	W073.89021321	East (Cross-Line)
000_1459	8/23/2011	14:59	N40.37829052	W073.88922388	North
000_1518	8/23/2011	15:18	N40.40428679	W073.88848578	East (Cross-Line)
000_1534	8/23/2011	15:34	N40.37831132	W073.88807085	North
000_1557	8/23/2011	15:57	N40.40419456	W073.88645077	South
000_1635	8/23/2011	16:35	N40.40426659	W073.88498395	South
00A_1833	8/23/2011	18:33	N40.40427945	W073.88017665	South
000_1652	8/23/2011	16:52	N40.37828914	W073.88443709	North
000_1711	8/23/2011	17:11	N40.4043199	W073.88331781	South

000_1727	8/23/2011	17:27	N40.37817637	W073.88291159	North
000_1749	8/23/2011	17:49	N40.40342585	W073.88192727	West (Cross-Line)
000_1758	8/23/2011	17:58	N40.40426763	W073.88201801	North
000_1814	8/23/2011	18:14	N40.37827745	W073.88134404	North
000_1850	8/23/2011	18:50	N40.37829872	W073.88016553	North
000_1907	8/23/2011	19:07	N40.40427279	W073.87867685	South
000_1929	8/23/2011	19:29	N40.37840541	W073.87856368	North
000_1946	8/23/2011	19:46	N40.40447127	W073.87707091	South
00A_2006	8/23/2011	20:06	N40.37828524	W073.87708836	North
000_2025	8/23/2011	20:25	N40.4043271	W073.87553647	South
000_2043	8/23/2011	20:43	N40.37839409	W073.87533797	North
000_2100	8/23/2011	21:00	N40.4035292	W073.87418743	West (Cross-Line)
000_2108	8/23/2011	21:08	N40.40419119	W073.87421958	South
00A_1140	8/24/2011	11:40	N40.40437577	W073.87335757	South
00A_1337	8/24/2011	13:37	N40.40434233	W073.85748673	South
00A_1359	8/24/2011	13:59	N40.37839455	W073.857597	North
00A_1434	8/24/2011	14:34	N40.3783639	W073.85907685	North
00A_1451	8/24/2011	14:51	N40.40428929	W073.85964639	South
00A_1608	8/24/2011	16:08	N40.40425468	W073.86227721	South
00B_1526	8/24/2011	15:26	N40.40430759	W073.86091865	South
00B_1553	8/24/2011	15:53	N40.37825314	W073.86190421	East (Cross-Line)
00C_1510	8/24/2011	15:10	N40.37836342	W073.86062951	North
000_1158	8/24/2011	11:58	N40.37839088	W073.87285632	North
000_1214	8/24/2011	12:14	N40.40431666	W073.87208222	South
000_1235	8/24/2011	12:35	N40.37838872	W073.8709464	North
000_1251	8/24/2011	12:51	N40.40437715	W073.87071648	South
000_1311	8/24/2011	13:11	N40.37821472	W073.86953135	North
000_1328	8/24/2011	13:28	N40.40361062	W073.86955405	West (Cross-Line)
000_1416	8/24/2011	14:16	N40.40431025	W073.85836685	South
000_1626	8/24/2011	16:26	N40.38426606	W073.86267559	South
000_1631	8/24/2011	16:31	N40.37848857	W073.86345142	North
000_1655	8/24/2011	16:55	N40.40433254	W073.86315853	West (Cross-Line)
000_1716	8/24/2011	17:16	N40.37845345	W073.86518132	North
000_1736	8/24/2011	17:36	N40.40367571	W073.86429903	East (Cross-Line)
00A_1316	9/12/2011	13:16	N40.37832124	W073.86868624	North
000_1318	9/12/2011	13:18	N40.37846631	W073.8686868	North
000_1335	9/12/2011	13:35	N40.40432088	W073.86872723	South
00A_1349	9/12/2011	13:49	N40.37835354	W073.86715473	North
000_1406	9/12/2011	14:06	N40.40430045	W073.86755363	South

000_1424	9/12/2011	14:24	N40.3782821	W073.86593954	North
000_1442	9/12/2011	14:42	N40.40429946	W073.86610831	South
000_1455	9/12/2011	14:55	N40.38419384	W073.86509873	North
00A_1509	9/12/2011	15:09	N40.40428141	W073.86494408	South
000_1517	9/12/2011	15:17	N40.39244903	W073.8642461	North
000_1525	9/12/2011	15:25	N40.40416425	W073.86390639	South
00A_1531	9/12/2011	15:31	N40.39492101	W073.86276237	East (Cross-Line)
000_1532	9/12/2011	15:32	N40.39607426	W073.85981901	North
00A_1534	9/12/2011	15:34	N40.3965353	W073.86335745	North
000_1540	9/12/2011	15:40	N40.40348242	W073.86328693	West (Cross-Line)
00A_1555	9/12/2011	15:55	N40.40372783	W073.8571895	North
000_1614	9/12/2011	16:14	N40.42969262	W073.85755377	South
00A_1628	9/12/2011	16:28	N40.403644	W073.85835143	North
00A_1653	9/12/2011	16:53	N40.42968069	W073.85840693	South
000_1709	9/12/2011	17:09	N40.40362476	W073.85957393	North
000_1733	9/12/2011	17:33	N40.42970014	W073.85994251	South
000_1750	9/12/2011	17:50	N40.40375154	W073.86086951	North
00A_1813	9/12/2011	18:13	N40.42961629	W073.86087467	West (Cross-Line)
00B_1828	9/12/2011	18:28	N40.40370533	W073.86187878	North
000_1849	9/12/2011	18:49	N40.4297196	W073.86213378	South
00B1909	9/12/2011	19:09	N40.40438319	W073.86318207	East (Cross-Line)
000_1916	9/12/2011	19:16	N40.40365967	W073.86315778	North
000_1937	9/12/2011	19:37	N40.42975111	W073.86313654	South
000_1952	9/12/2011	19:52	N40.40362027	W073.8643047	North
000_2022	9/12/2011	20:22	N40.42986332	W073.86473973	South
000_2039	9/12/2011	20:39	N40.40420335	W073.86577671	West (Cross-Line)
000_1440	9/13/2011	14:40	N40.42964048	W073.86537416	South
000_1457	9/13/2011	14:57	N40.40365909	W073.8666505	North
000_1514	9/13/2011	15:14	N40.42972131	W073.86679734	South
00B1521	9/13/2011	15:21	N40.4209151	W073.86555951	South
000_1533	9/13/2011	15:33	N40.4036829	W073.86775471	North
00B1555	9/13/2011	15:55	N40.42970016	W073.86805445	South
000_1611	9/13/2011	16:11	N40.40376743	W073.8691758	North
00B1628	9/13/2011	16:28	N40.42982336	W073.86972686	South
00B1645	9/13/2011	16:45	N40.40378764	W073.87042084	North
000_1701	9/13/2011	17:01	N40.42981224	W073.87098563	South
00B1731	9/13/2011	17:31	N40.40363672	W073.87132699	North
00A1748	9/13/2011	17:48	N40.42973942	W073.87222954	South
00A1749	9/13/2011	17:49	N40.42896385	W073.87234032	East (Cross-Line)

000_1757	9/13/2011	17:57	N40.42968226	W073.87218153	South
00B1813	9/13/2011	18:13	N40.40376791	W073.8727815	North
00A1830	9/13/2011	18:30	N40.42952602	W073.87363378	South
000_1847	9/13/2011	18:47	N40.40433105	W073.87416899	East (Cross-Line)
00B1201	9/14/2011	12:01	N40.42967442	W073.90098397	South
000_1219	9/14/2011	12:19	N40.40361876	W073.90042116	North
000_1237	9/14/2011	12:37	N40.42977964	W073.89932068	South
000_1255	9/14/2011	12:55	N40.40373953	W073.89879989	North
00A1318	9/14/2011	13:18	N40.42960743	W073.89750959	South
00A1335	9/14/2011	13:35	N40.40366721	W073.89729328	North
000_1351	9/14/2011	13:51	N40.42975303	W073.89592198	South
000_1409	9/14/2011	14:09	N40.40363571	W073.89547177	North
000_1426	9/14/2011	14:26	N40.42973562	W073.89419811	South
00A1443	9/14/2011	14:43	N40.40366443	W073.89363445	North
000_1501	9/14/2011	15:01	N40.42884941	W073.89249368	West (Cross-Line)
000_1513	9/14/2011	15:13	N40.4297327	W073.89235722	South
000_1530	9/14/2011	15:30	N40.40372652	W073.89181388	North
00A1546	9/14/2011	15:46	N40.42978277	W073.89059102	East (Cross-Line)
00A1603	9/14/2011	16:03	N40.40385557	W073.89022221	North
00A1629	9/14/2011	16:29	N40.42973152	W073.88868152	South
00C1645	9/14/2011	16:45	N40.40371444	W073.88873129	North
00A1701	9/14/2011	17:01	N40.42973625	W073.88732717	South
000_1718	9/14/2011	17:18	N40.40376713	W073.88702518	North
00A1733	9/14/2011	17:33	N40.42982469	W073.88583201	East (Cross-Line)
00A1755	9/14/2011	17:55	N40.40382991	W073.88570708	North
00C1813	9/14/2011	18:13	N40.42902996	W073.88434307	West (Cross-Line)
00A1822	9/14/2011	18:22	N40.42973021	W073.88433002	South
00A1840	9/14/2011	18:40	N40.4037958	W073.88400536	North
00A1855	9/14/2011	18:55	N40.42967815	W073.88259348	South
000_1914	9/14/2011	19:14	N40.40380059	W073.88226003	North
00A1932	9/14/2011	19:32	N40.42913216	W073.88129044	West (Cross-Line)
000_1133	9/21/2011	11:33	N40.42968564	W073.88080125	South
000_1152	9/21/2011	11:52	N40.40368339	W073.88052048	North
000_1209	9/21/2011	12:09	N40.42965817	W073.87966322	South
00A_1229	9/21/2011	12:29	N40.40375338	W073.87864259	North
00B1247	9/21/2011	12:47	N40.42967938	W073.87832235	South
00A1302	9/21/2011	13:02	N40.40374123	W073.87714096	North
00A1328	9/21/2011	13:28	N40.4295616	W073.87658089	South
000_1345	9/21/2011	13:45	N40.40370211	W073.87544953	North

000_1408	9/21/2011	14:08	N40.42969715	W073.87568641	South
000A1424	9/21/2011	14:24	N40.40373482	W073.87400644	North
000_1450	9/21/2011	14:50	N40.42907692	W073.87359338	West (Cross-Line)
000A1455	9/21/2011	14:55	N40.42871513	W073.8819478	West (Cross-Line)
000_1456	9/21/2011	14:56	N40.42913146	W073.88142198	North
000A1500	9/21/2011	15:00	N40.42956505	W073.87444206	East (Cross-Line)
000A1517	9/21/2011	15:17	N40.41167396	W073.88966162	North
000C1521	9/21/2011	15:21	N40.41665538	W073.88142465	East (Cross-Line)
000A1525	9/21/2011	15:25	N40.41794634	W073.87315352	North
000A1532	9/21/2011	15:32	N40.42339865	W073.87949849	West (Cross-Line)

Table 3.3-2

Multibeam Survey Lines run during the Fall 2011 multibeam survey at Fire-Island Reef

File Name	Date	Time (UTC)	Latitude	Longitude	Direction
000A1544	11/7/2011	15:44	N40-35.606779	W73-11.462527	West
000B_1603	11/7/2011	16:03	N40-35.627781	W73-13.526184	East
000_1623	11/7/2011	16:23	N40-35.664773	W73-11.448860	West
000_1648	11/7/2011	16:48	N40-35.687398	W73-13.562522	East
000_1705	11/7/2011	17:05	N40-35.718023	W73-11.439814	West
000C1731	11/7/2011	17:31	N40-35.747695	W73-13.551383	East
000B1748	11/7/2011	17:48	N40-35.782610	W73-11.444852	West
000A1810	11/7/2011	18:10	N40-35.806345	W73-13.556198	East
000C1828	11/7/2011	18:28	N40-35.846819	W73-11.449180	West
000A1849	11/7/2011	18:49	N40-35.871513	W73-13.548551	East
000A1907	11/7/2011	19:07	N40-35.907862	W73-11.444282	West
000A1929	11/7/2011	19:29	N40-35.928120	W73-13.485435	South (Cross-Line)
000_1938	11/7/2011	19:38	N40-35.937857	W73-13.552203	East
000A1955	11/7/2011	19:55	N40-35.966376	W73-11.445338	West
000_2014	11/7/2011	20:14	N40-36.000957	W73-13.556191	East
000A2032	11/7/2011	20:32	N40-36.033247	W73-11.438448	West
000_2050	11/7/2011	20:50	N40-36.066509	W73-13.555356	East
000_2106	11/7/2011	21:06	N40-36.111311	W73-11.441404	West
000A2123	11/7/2011	21:23	N40-36.145102	W73-13.508994	South (Cross-Line)
000_1212	11/8/2011	12:12	N40-35.580937	W73-13.551401	East

Table 3.3-3
Multibeam Survey Lines run during the Fall 2011 multibeam survey at Hempstead Reef

File Name	Date	Time (UTC)	Latitude	Longitude	Direction
000A1548	11/8/2011	15:48	N40-31.280473	W73-33.393110	East
000C1603	11/8/2011	16:03	N40-31.517642	W73-31.298413	West
000A1619	11/8/2011	16:19	N40-31.220970	W73-33.425397	East
000_1636	11/8/2011	16:36	N40-31.462310	W73-31.318433	West
000A1652	11/8/2011	16:52	N40-31.149097	W73-33.437948	East
000A1709	11/8/2011	17:09	N40-31.414519	W73-31.332591	West
000_1732	11/8/2011	17:32	N40-31.090866	W73-33.474822	East
000C1748	11/8/2011	17:48	N40-31.370558	W73-31.334340	West
000B1805	11/8/2011	18:05	N40-31.020157	W73-33.490552	East
000B1822	11/8/2011	18:22	N40-31.325061	W73-31.366943	West
000B1840	11/8/2011	18:40	N40-30.956506	W73-33.458627	North (Cross-Line)
000_1848	11/8/2011	18:48	N40-30.988280	W73-33.494885	East
000B1907	11/8/2011	19:07	N40-31.247328	W73-31.385338	West
000B1929	11/8/2011	19:29	N40-30.924253	W73-33.518732	East
000A1948	11/8/2011	19:48	N40-31.204794	W73-31.376880	West
000_2005	11/8/2011	20:05	N40-30.857918	W73-33.527950	East
000A2022	11/8/2011	20:22	N40-31.144748	W73-31.403970	West
000A2039	11/8/2011	20:39	N40-30.802714	W73-33.540617	East
000_2056	11/8/2011	20:56	N40-31.080113	W73-31.428815	West
000_2115	11/8/2011	21:15	N40-30.744046	W73-33.561921	East
000_2134	11/8/2011	21:34	N40-31.004293	W73-31.458255	West
000_2151	11/8/2011	21:51	N40-30.689037	W73-33.579130	East
000_2153	11/8/2011	21:53	N40-30.653036	W73-33.583235	East
000_2159	11/8/2011	21:59	N40-30.747579	W73-32.719172	East
000_2208	11/8/2011	22:08	N40-30.924043	W73-31.471083	West
000_2215	11/8/2011	22:15	N40-30.792829	W73-32.210374	North (Cross-Line)

4.0 Tidal Corrections (HARS)

For the Fall 2011 bathymetry survey at HARS a “Valeport Mini” submersible tide gauge was deployed prior to collection of multibeam data at the HARS. This gauge which measures pressure was located on the sea floor attached to an anchor with an additional attachment to an acoustic release buoy (see Figure 3.0-1).

Real Time Kinematic GPS (RTK) option of the POS/MV on board the survey vessel was used to provide real time water level elevations. This system was referenced to NAVD88 during data collection. After 90% of the field survey was complete at the HARS, the acoustic release of tidal sensor was activated and the sensor was brought to the surface. The sensor has a limited power supply due to battery capacity. It was decided to change the batteries and download the recorded tidal data. The sensors data was downloaded and reviewed. The sensors had recorded at the specified 6 minute intervals with an apparent malfunction of the sensors pressure portion. The downloaded data was determined by the manufacturer to be useless and un-recoverable. Due to redundancy in recording water levels with the RTK GPS option of the POS/MV, a decision was made at that time to continue with the survey at HARS, relying on RTK GPS water levels and recorded NOAA water levels at Sandy Hook.

As with previous surveys at the HARS site, tide data from NOAA’s reference tide station at Sandy Hook (Figure 4.0-1) was downloaded from N.O.A.A.’s web site. This NAVD88 tide data was then referenced to MLW as per the USACOE SOW, (0’ MLW is 1.73’ below 0’ NGVD29 and 2.84’ below NAVD88). Historic range and time correctors (used since 2006) of 0.94 and -30 minutes were then used to correct the Sandy Hook NOAA tide data for the HARS survey area.

4.0.1 Tidal Corrections (Fire Island Reef)

For the Fall 2011 bathymetry survey at Fire Island and Hempstead Reefs the *Valeport Mini* submersible tide gauge was replaced with the more robust *Valeport WLR*. The gauge was deployed prior to collection of multibeam data at the reefs. It was decided to begin with Fire Island Reef and then move on to Hempstead Reef. This gauge which measures pressure was located on the sea floor (see Figure 3.0-3), attached to an anchor with an additional attachment to an acoustic release buoy (see Figure 3.0-1). Real Time Kinematic GPS (RTK) option of the POS/MV on board the survey vessel was used to provide real time water level elevations. This system was referenced to NAVD88 during data collection. The Fire Island Reef survey area was within cellular coverage and RTK GPS was constant for the entire survey. Using RTK GPS the water level was measured at the seabed tidal sensor for a length of time while sea conditions were relatively calm. This calibration or water level was then used to derive a fixed offset from sensors water level to NAVD 88. NOAA’s *VDATUM* program was then used to determine mean low water (MLW) at the Fire Island Site, which was determined to be 2.23’ below 0’ NAVD88.

4.0.2 Tidal Corrections (Hempstead Reef)

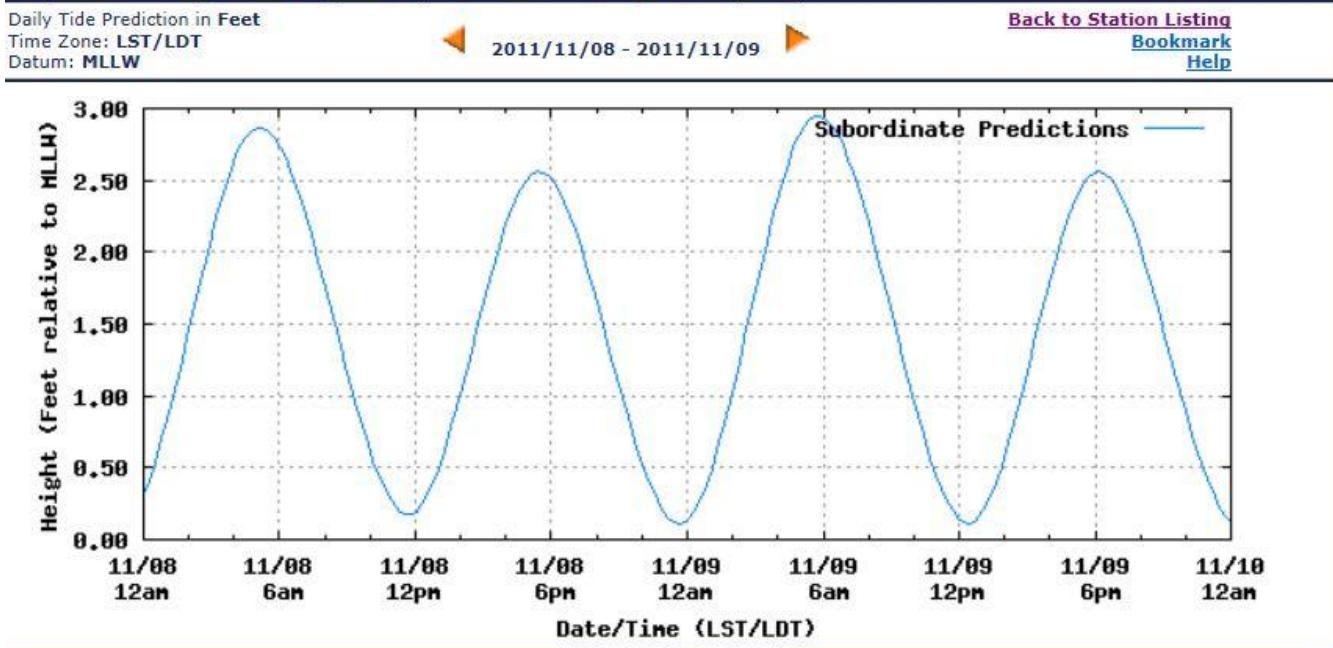
Once the survey data for Fire Island Reef was collected it was planned to recover the seabed tidal sensor and move it to the Hempstead Reef site. It was intended to use the same procedure for determining mean low water at the Hempstead Reef as was used for the Fire Island Reef survey. Unfortunately, the acoustic release for the seabed tidal sensor failed and the sensor remained on the sea floor collecting data. Being that the weather window at the time was very small it was decided to mobilize the survey vessel to the Hempstead Reef as soon as possible, and attempt to recover the tide sensor and its data at a later date. The multibeam survey was conducted at the Hempstead Reef site; however cellular phone coverage at that location was not available, negating the ability to record RTK GPS water levels. The following procedure was utilized to determine the MLW tide at Hempstead Reef; From NOAA's web site <http://tidesandcurrents.noaa.gov/>, the predicted tide option was selected to determine the time offsets from Sandy Hook (Fort Hancock Station) to the two locations closest to Fire-Island Reef and Hempstead Reef. These were "Democrat Point, Fire Island" and "Jones Inlet, Point Lookout". Figure 4.0.2-1 show plots for these two locations. It shows High Tide at Fire Island to be 39 minutes earlier than Sandy Hook, and Low Tide to be 27 minutes earlier. It shows High Tide at Jones Inlet to be 20 minutes earlier than Sandy Hook, and Low Tide to be 25 minutes earlier. From this it was decided to use the difference in these time offsets to establish the time offsets between Fire Island and Jones Inlet, which were then applied to the seafloor tide gauge data recorded at Fire-Island Reef. The time offsets used were as follows; High Tide at Hempstead Reef to be 19 minutes later than Fire-Island Reef, and Low Tide at Hempstead Reef to be 2 minutes later. These times were pro-rated through the tide cycle, as they were applied to the tide data from Fire-Island Reef. In addition to applying a time offset from Fire-Island Reef to Hempstead Reef, a Range offset was also applied. In order to determine the Range difference between the two Reef sites, it was decided to utilize NOAA's VDatum software. Figures 4.0.2-2 and 4.0.2-3 show plots of the MHW and MLW determinations at the two reefs. From this information the Range in tide at Fire-Island Reef was found to be 3.87' and the Range at Hempstead Reef was found to be 4.24'. Subsequently it was decided to use the difference in Range between Fire-Island Reef and Hempstead Reef, such that a Range multiplier offset of 1.1 was applied to the tide data recorded at Fire-Island Reef. The Time and Range offsets were applied to the NAVD88 tide data from the seafloor tide gauge at Fire-Island Reef to establish the NAVD88 tide at Hempstead Reef and then NOAA's VDatum program was used to determine mean low water (MLW) at the Site, which was determined to be 2.41' below 0' NAVD88.

Figure 4.0.2-1

Tide Prediction Plots from NOAA's Tides and Currents web site, showing Time Offsets.

Democrat Point, Fire Island Inlet, NY StationId: 8515228

Referenced to Station: SANDY HOOK (Fort Hancock) (8531680)
 Height offset in feet (low: *0.55 high: * 0.56) Time offset in mins (low: -27 high: -39)

**Jones Inlet (Point Lookout), NY StationId: 8516385**

Referenced to Station: SANDY HOOK (Fort Hancock) (8531680)
 Height offset in feet (low: *0.75 high: * 0.77) Time offset in mins (low: -25 high: -20)

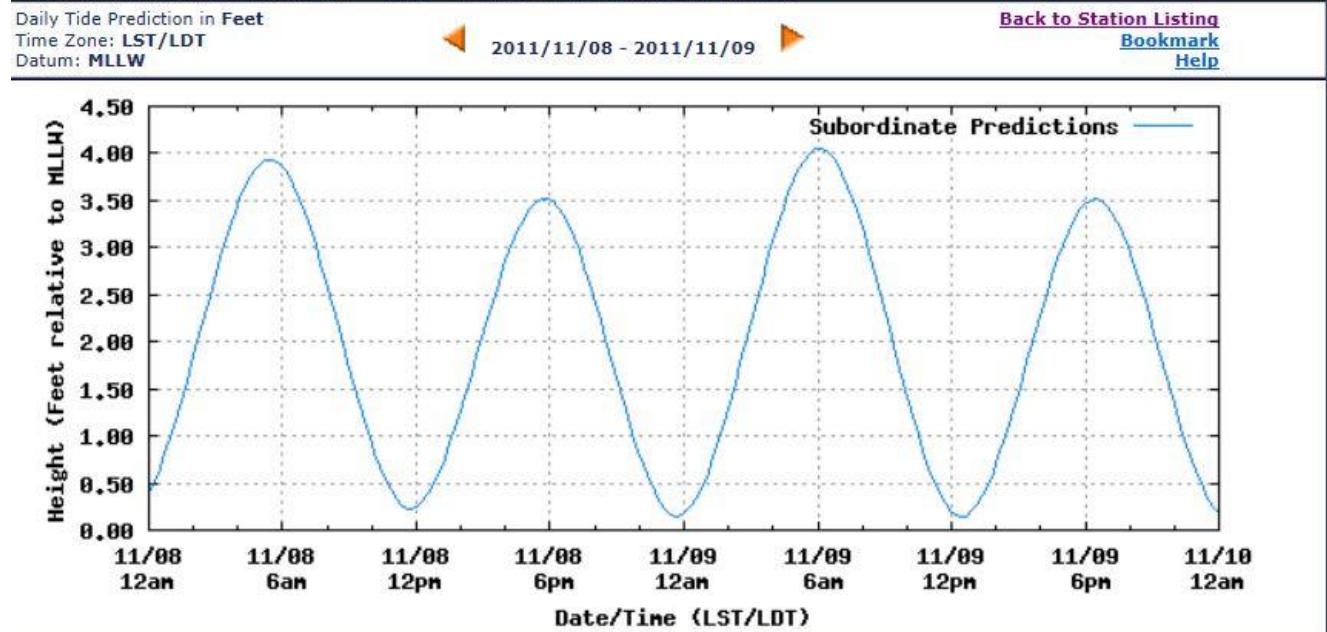


Figure 4.0.2-2
NOAA's VDatum MLW and MHW determination for Fire-Island Reef.

The figure consists of two side-by-side screenshots of the "Vertical Datums Transformation Tool 2.3.3".

Screenshot 1 (Top): Conversion from NAVD 88 to Mean Low Water (MLW)

- Datum Information:**
 - Horizontal Datum: NAD 83 (NSRS2007/CORS96/HARN), WGS84, ITRF
 - Input Vertical Datum: NAVD 88
 - Output Vertical Datum: MLW - Mean Low Water
 - Geoid: (required) [dropdown]
 - Height Units: meter (radio button selected)
 - Height/Sounding: Height (radio button selected)
- Point Conversion:**

Input	Output
Latitude: 40 35 51.81	40.597725
Longitude: 73 12 27.44	-73.207622
Height: 0	2.2331
- File Conversion:**
 - File(s) Format: With ID Key (GIS data) (checkbox checked)
 - Output File or Folder: [dropdown]
 - Save output data as in geographic coor. system (checkbox checked)
 - Convert button

Screenshot 2 (Bottom): Conversion from NAVD 88 to Mean High Water (MHW)

- Datum Information:**
 - Horizontal Datum: NAD 83 (NSRS2007/CORS96/HARN), WGS84, ITRF
 - Input Vertical Datum: NAVD 88
 - Output Vertical Datum: MHW - Mean High Water
 - Geoid: (required) [dropdown]
 - Height Units: meter (radio button selected)
 - Height/Sounding: Height (radio button selected)
- Point Conversion:**

Input	Output
Latitude: 40 35 51.81	40.597725
Longitude: 73 12 27.44	-73.207622
Height: 0	-1.6430
- File Conversion:**
 - File(s) Format: With ID Key (GIS data) (checkbox checked)
 - Output File or Folder: [dropdown]
 - Save output data as in geographic coor. system (checkbox checked)
 - Convert button

Figure 4.0.2-3
NOAA's VDatum MLW and MHW determination for Hempstead Reef.

Vertical Datums Transformation Tool 2.3.3			
Choose an Area:	New Jersey/New York/Connecticut - Northern NJ, NY Harbor, western Long Island Sound, Version 02		
Tidal Transf. Grid Folder:	C:\VDatum\NYNJ_hbr02_8301_03		
Datum Information			
Horizontal Datum:	NAD 83 (NSRS2007/CORS96/HARN), WGS84, ITRF		
Input Vertical Datum:	NAVD 88		
Output Vertical Datum:	MLW - Mean Low Water		
Geoid: (required)			
Height Units:	Height/Sounding:		
<input type="radio"/> meter	<input checked="" type="radio"/> Height		
<input checked="" type="radio"/> feet	<input type="radio"/> Sounding		
Coordinate System			
<input checked="" type="radio"/> Geographic (Latitude, Longitude)			
<input type="radio"/> UTM - Zone :	North Hemisphere		
Point Conversion			
Latitude:	40 31 8.51	Input	Output
Longitude:	73 32 25.61	Convert	40.519031
Height:	0	Reset	-73.540447
File Conversion			
File(s) Format	<input checked="" type="checkbox"/> With ID Key (GIS data) <input checked="" type="radio"/> Latitude Longitude <input type="checkbox"/> Longitude Latitude		
Input File(s):	<input type="button" value="..."/>		
Output File or Folder:	<input type="button" value="..."/>		
<input checked="" type="checkbox"/> Save output data as in geographic coor. system <input type="button" value="Convert"/>			
Vertical Datums Transformation Tool 2.3.3			
Choose an Area:	New Jersey/New York/Connecticut - Northern NJ, NY Harbor, western Long Island Sound, Version 02		
Tidal Transf. Grid Folder:	C:\VDatum\NYNJ_hbr02_8301_03		
Datum Information			
Horizontal Datum:	NAD 83 (NSRS2007/CORS96/HARN), WGS84, ITRF		
Input Vertical Datum:	NAVD 88		
Output Vertical Datum:	MHW - Mean High Water		
Geoid: (required)			
Height Units:	Height/Sounding:		
<input type="radio"/> meter	<input checked="" type="radio"/> Height		
<input checked="" type="radio"/> feet	<input type="radio"/> Sounding		
Coordinate System			
<input checked="" type="radio"/> Geographic (Latitude, Longitude)			
<input type="radio"/> UTM - Zone :	North Hemisphere		
Point Conversion			
Latitude:	40 31 8.51	Input	Output
Longitude:	73 32 25.61	Convert	40.519031
Height:	0	Reset	-73.540447
File Conversion			
File(s) Format	<input checked="" type="checkbox"/> With ID Key (GIS data) <input checked="" type="radio"/> Latitude Longitude <input type="checkbox"/> Longitude Latitude		
Input File(s):	<input type="button" value="..."/>		
Output File or Folder:	<input type="button" value="..."/>		
<input checked="" type="checkbox"/> Save output data as in geographic coor. system <input type="button" value="Convert"/>			

4.1 Cross-Track Analysis

Cross-track analysis was performed to provide a quality check on the accuracy of the multibeam data. Cross-track lines are run perpendicular to the main direction of survey lines to produce areas of overlapping data that can be analyzed and errors quantified to provide an indication of the overall quality of data.

For the Fall 2011 survey the main body of survey lines were run in a North-South direction at the HARS location, and East-West at both Reef locations, and for every ten (10) main body lines, cross-track line were run in East-West, and North-South directions respectively. This yielded a total of thirty nine (39) cross-track lines for the HARS, and two (2) cross-track lines for each of the reef locations, which were then analyzed utilizing the Beam Angle Test module within the Hypack Processing software. The Beam Angle Test compares multibeam check lines to a reference surface and estimates the depth accuracy of the multibeam data at different angle limits. The estimated accuracy can be used to determine if the multibeam data meets survey specifications. In this case the reference surface used was the final 10x10 xyz of the processed main body multibeam data. Results from this analysis are in Section 4.1.

4.2 Cross-Track Analysis Results

Tables 4.1-1 to 4.1-3 show the results from the Hypack Beam Analysis for each crossing. The analysis software generates; Max Outlier, Mean Difference, Standard Deviation and 95% Confidence for the beam angle limits specified. For the HARS location the averages for all crossings show that the 95% confidence is less than 0.8', while the mean difference for all crossings averages out to less than 0.1', the standard deviation for all crossings averages out to less than 0.4', and the maximum outlier is 17.6'. For the Fire-Island Reef location the averages for all crossings show that the 95% confidence is less than 0.6', while the mean difference for all crossings averages out to less than 0.24', the standard deviation for all crossings averages out to less than 0.31', and the maximum outlier is 1.6'. For the Hempstead Reef location the averages for all crossings show that the 95% confidence is less than 0.41', while the mean difference for all crossings averages out to less than 0.08', the standard deviation for all crossings averages out to less than 0.21', and the maximum outlier is 3.5'. Figures 4.1-1 to 4.1-3 show screen captures of the summary plots for the errors at +/- 20 deg. for each crossing.

Table 4.1-1
Summary of Beam Analysis Results for all crossings during HARS Fall 2011 survey

Crossing	Beam Angle	Max. Outlier	Mean Diff.	Std Dev.	95%	Crossing	Beam Angle	Max. Outlier	Mean Diff.	Std Dev.	95%	Crossing	Beam Angle	Max. Outlier	Mean Diff.	Std Dev.	95%
0805_1828	+/-20	2.30	0.35	0.36	0.70	0805_2037	+/-20	1.64	0.03	0.19	0.38	0810_1425	+/-20	2.49	0.00	0.24	0.47
	+/-25	2.23	0.32	0.32	0.62		+/-25	1.51	0.07	0.22	0.43		+/-25	2.07	0.02	0.23	0.46
	+/-30	3.02	0.30	0.29	0.57		+/-30	1.50	0.09	0.22	0.43		+/-30	2.10	0.03	0.24	0.47
	+/-35	3.18	0.37	0.33	0.65		+/-35	1.28	0.06	0.21	0.41		+/-35	1.80	0.03	0.25	0.49
	+/-40	2.27	0.32	0.32	0.63		+/-40	1.31	0.05	0.21	0.42		+/-40	1.64	0.07	0.24	0.47
	+/-45	2.30	0.29	0.33	0.65		+/-45	1.64	0.03	0.22	0.43		+/-45	1.84	0.07	0.24	0.47
	+/-50	1.81	0.31	0.34	0.66		+/-50	1.81	0.01	0.24	0.48		+/-50	2.40	0.12	0.25	0.48
	+/-55	2.96	0.30	0.35	0.69		+/-55	1.91	0.02	0.24	0.47		+/-55	2.43	0.20	0.27	0.52
	+/-60	2.36	0.33	0.38	0.75		+/-60	1.96	0.04	0.25	0.49		+/-60	2.89	0.29	0.31	0.60
0810_1717	+/-20	1.21	0.08	0.20	0.39	0810_1856	+/-20	1.74	0.02	0.18	0.36	0811_1500	+/-20	4.14	0.19	0.43	0.84
	+/-25	1.34	0.07	0.18	0.36		+/-25	1.51	0.01	0.19	0.37		+/-25	3.84	0.18	0.37	0.73
	+/-30	1.51	0.09	0.19	0.38		+/-30	1.64	0.02	0.18	0.35		+/-30	5.70	0.18	0.40	0.78
	+/-35	1.25	0.06	0.20	0.39		+/-35	2.04	0.03	0.19	0.37		+/-35	4.49	0.21	0.44	0.86
	+/-40	1.34	0.05	0.19	0.37		+/-40	1.38	0.02	0.18	0.35		+/-40	3.25	0.20	0.37	0.73
	+/-45	1.64	0.02	0.20	0.39		+/-45	1.74	0.04	0.19	0.37		+/-45	5.31	0.18	0.39	0.76
	+/-50	1.84	0.00	0.20	0.40		+/-50	1.77	0.03	0.19	0.37		+/-50	6.10	0.19	0.40	0.78
	+/-55	1.81	-0.02	0.21	0.42		+/-55	1.80	0.03	0.20	0.40		+/-55	10.67	0.18	0.43	0.85
	+/-60	2.03	-0.02	0.22	0.44		+/-60	2.20	0.03	0.21	0.40		+/-60	17.59	0.29	0.47	0.92
0811_1810	+/-20	4.49	0.00	0.42	0.81	0811_2112	+/-20	3.15	0.04	0.26	0.51	0811_2154	+/-20	1.21	0.08	0.24	0.47
	+/-25	4.52	0.02	0.38	0.74		+/-25	3.41	0.04	0.22	0.44		+/-25	1.19	0.08	0.25	0.49
	+/-30	4.39	0.03	0.34	0.67		+/-30	1.97	0.05	0.21	0.41		+/-30	1.28	0.09	0.26	0.51
	+/-35	4.43	0.06	0.37	0.73		+/-35	2.00	0.04	0.22	0.43		+/-35	1.54	0.08	0.26	0.52
	+/-40	3.87	0.01	0.36	0.71		+/-40	2.43	0.03	0.23	0.44		+/-40	1.67	0.08	0.28	0.55
	+/-45	3.78	0.01	0.35	0.68		+/-45	2.30	0.00	0.24	0.46		+/-45	1.51	0.03	0.28	0.54
	+/-50	4.01	-0.02	0.37	0.73		+/-50	2.10	-0.03	0.26	0.50		+/-50	1.41	0.01	0.26	0.51
	+/-55	4.66	-0.01	0.38	0.75		+/-55	2.30	-0.07	0.26	0.51		+/-55	1.35	-0.03	0.27	0.52
	+/-60	5.38	0.04	0.46	0.91		+/-60	2.00	-0.12	0.28	0.54		+/-60	1.68	-0.06	0.28	0.55

0812_1613	+/-20	1.54	0.11	0.21	0.40	0812_1912	+/-20	1.61	0.01	0.19	0.38	0816_1510	+/-20	5.15	-0.03	0.64	1.25
	+/-25	1.47	0.10	0.22	0.42		+/-25	1.57	-0.01	0.18	0.36		+/-25	4.92	0.03	0.60	1.18
	+/-30	1.84	0.11	0.21	0.41		+/-30	2.00	-0.02	0.18	0.36		+/-30	4.85	0.00	0.61	1.19
	+/-35	1.94	0.11	0.20	0.39		+/-35	1.74	0.00	0.17	0.34		+/-35	5.84	0.03	0.59	1.15
	+/-40	1.51	0.10	0.20	0.39		+/-40	1.54	-0.02	0.17	0.34		+/-40	5.25	-0.01	0.59	1.16
	+/-45	1.54	0.09	0.21	0.41		+/-45	1.48	-0.02	0.19	0.37		+/-45	5.06	-0.01	0.63	1.24
	+/-50	1.81	0.07	0.21	0.42		+/-50	1.71	-0.03	0.18	0.35		+/-50	5.31	0.00	0.64	1.26
	+/-55	2.03	0.07	0.25	0.49		+/-55	1.90	-0.05	0.20	0.40		+/-55	6.93	0.02	0.69	1.35
	+/-60	4.89	0.07	0.29	0.57		+/-60	2.17	-0.04	0.21	0.41		+/-60	7.54	0.08	0.75	1.48

0816_1813	+/-20	3.67	0.08	0.34	0.66	0816_2123	+/-20	2.99	0.00	0.34	0.67	0816_2204	+/-20	1.67	-0.08	0.21	0.40
	+/-25	4.13	0.08	0.32	0.63		+/-25	2.95	-0.04	0.31	0.60		+/-25	1.64	-0.05	0.23	0.45
	+/-30	4.10	0.09	0.38	0.75		+/-30	3.74	-0.03	0.30	0.58		+/-30	1.91	-0.11	0.27	0.53
	+/-35	4.04	0.12	0.37	0.72		+/-35	3.81	-0.04	0.34	0.67		+/-35	3.05	-0.03	0.33	0.65
	+/-40	3.05	0.13	0.33	0.64		+/-40	2.89	-0.04	0.28	0.54		+/-40	3.91	-0.07	0.40	0.79
	+/-45	2.62	0.11	0.30	0.58		+/-45	2.66	-0.04	0.25	0.49		+/-45	3.81	-0.11	0.56	1.10
	+/-50	2.53	0.09	0.39	0.77		+/-50	2.82	-0.05	0.26	0.51		+/-50	3.84	-0.04	0.52	1.01
	+/-55	3.08	0.16	0.38	0.75		+/-55	3.55	-0.07	0.30	0.59		+/-55	3.61	-0.03	0.50	0.97
	+/-60	2.85	0.19	0.45	0.89		+/-60	2.26	-0.06	0.29	0.56		+/-60	3.81	0.05	0.68	1.33

0817_1619	+/-20	3.09	-0.02	0.56	1.10	0817_1822	+/-20	4.47	0.06	0.65	1.26	0817_2053	+/-20	3.84	0.09	0.28	0.54
	+/-25	4.53	0.00	0.55	1.08		+/-25	4.93	0.02	0.61	1.20		+/-25	3.51	0.08	0.32	0.63
	+/-30	4.95	0.03	0.56	1.10		+/-30	4.33	0.05	0.59	1.15		+/-30	3.84	0.05	0.36	0.70
	+/-35	4.00	-0.03	0.54	1.07		+/-35	5.12	0.06	0.62	1.21		+/-35	3.64	0.09	0.43	0.85
	+/-40	4.23	0.03	0.56	1.09		+/-40	5.38	0.03	0.63	1.24		+/-40	5.45	0.10	0.50	0.98
	+/-45	3.87	-0.02	0.55	1.08		+/-45	5.05	0.07	0.57	1.11		+/-45	5.12	0.07	0.47	0.92
	+/-50	3.48	0.08	0.52	1.01		+/-50	4.43	0.08	0.54	1.07		+/-50	3.88	0.03	0.36	0.70
	+/-55	3.97	0.18	0.57	1.12		+/-55	4.00	0.09	0.59	1.15		+/-55	2.33	-0.01	0.38	0.74
	+/-60	5.06	0.26	0.64	1.25		+/-60	4.33	0.13	0.60	1.18		+/-60	2.16	0.00	0.41	0.80

0818_1502	+/-20	1.81	-0.03	0.22	0.44	0818_1803	+/-20	4.00	0.01	0.62	1.22	0818_2034	+/-20	0.99	-0.11	0.45	0.87
	+/-25	1.84	-0.05	0.24	0.47		+/-25	5.97	0.02	0.65	1.27		+/-25	1.09	-0.38	0.40	0.78
	+/-30	2.04	-0.06	0.24	0.46		+/-30	6.49	-0.01	0.60	1.18		+/-30	0.86	-0.11	0.38	0.75
	+/-35	1.78	-0.05	0.24	0.48		+/-35	5.71	-0.01	0.61	1.20		+/-35	0.86	0.00	0.43	0.84
	+/-40	2.30	-0.07	0.24	0.47		+/-40	6.30	-0.04	0.59	1.15		+/-40	0.96	-0.25	0.44	0.86
	+/-45	2.36	-0.12	0.23	0.46		+/-45	5.41	-0.04	0.55	1.08		+/-45	1.34	-0.26	0.53	1.03
	+/-50	1.51	-0.15	0.23	0.45		+/-50	4.62	-0.05	0.59	1.16		+/-50	1.81	-0.22	0.42	0.83
	+/-55	1.70	-0.18	0.25	0.49		+/-55	5.15	-0.04	0.63	1.24		+/-55	0.88	-0.06	0.33	0.65
	+/-60	3.74	-0.19	0.29	0.57		+/-60	4.43	0.02	0.64	1.25		+/-60	0.95	-0.19	0.39	0.76

0819_1446	+/-20	6.62	-0.01	0.61	1.19	0819_1803	+/-20	1.02	0.03	0.20	0.39	0819_2036	+/-20	0.99	0.08	0.19	0.38
	+/-25	6.56	-0.06	0.52	1.02		+/-25	1.02	0.02	0.19	0.37		+/-25	1.01	0.09	0.18	0.36
	+/-30	6.43	-0.03	0.58	1.14		+/-30	1.15	0.02	0.19	0.37		+/-30	0.98	0.08	0.19	0.37
	+/-35	5.35	-0.02	0.55	1.08		+/-35	1.15	0.03	0.21	0.42		+/-35	1.31	0.08	0.19	0.37
	+/-40	5.91	-0.10	0.42	0.83		+/-40	1.05	0.04	0.19	0.37		+/-40	0.95	0.07	0.18	0.35
	+/-45	6.33	-0.10	0.57	1.11		+/-45	1.24	0.05	0.20	0.38		+/-45	0.86	0.07	0.17	0.34
	+/-50	7.35	-0.06	0.65	1.28		+/-50	1.38	0.07	0.21	0.41		+/-50	0.98	0.04	0.19	0.37
	+/-55	5.41	-0.18	0.55	1.08		+/-55	1.44	0.10	0.25	0.48		+/-55	0.86	0.05	0.20	0.40
	+/-60	4.66	-0.31	0.55	1.08		+/-60	1.57	0.20	0.28	0.54		+/-60	0.92	0.06	0.24	0.47

0823_1436	+/-20	6.96	0.00	0.72	1.41	0823_1749	+/-20	4.95	0.04	0.56	1.10	0823_2100	+/-20	2.69	-0.11	0.36	0.70
	+/-25	6.99	-0.02	0.70	1.37		+/-25	5.18	0.02	0.69	1.35		+/-25	2.82	-0.10	0.37	0.72
	+/-30	7.71	0.04	0.70	1.37		+/-30	4.93	-0.02	0.61	1.19		+/-30	2.92	-0.14	0.37	0.73
	+/-35	7.12	0.07	0.68	1.33		+/-35	5.44	0.03	0.58	1.13		+/-35	3.15	-0.16	0.36	0.71
	+/-40	6.43	0.04	0.75	1.48		+/-40	5.45	0.02	0.61	1.20		+/-40	5.42	-0.17	0.42	0.83
	+/-45	6.73	-0.02	0.66	1.28		+/-45	6.53	-0.03	0.62	1.21		+/-45	4.50	-0.16	0.45	0.88
	+/-50	6.79	-0.05	0.70	1.37		+/-50	6.17	0.01	0.63	1.24		+/-50	3.09	-0.19	0.44	0.86
	+/-55	6.69	-0.06	0.72	1.42		+/-55	6.27	0.01	0.69	1.35		+/-55	3.32	-0.25	0.52	1.02
	+/-60	7.15	-0.06	0.78	1.53		+/-60	6.95	-0.05	0.82	1.60		+/-60	2.86	-0.27	0.53	1.04

0824_1328	+/-20	1.44	0.03	0.19	0.36	0824_1655	+/-20	4.69	0.02	0.29	0.56	0824_1736	+/-20	1.15	0.13	0.22	0.43
	+/-25	1.44	0.03	0.19	0.36		+/-25	4.43	0.03	0.30	0.59		+/-25	1.05	0.07	0.18	0.36
	+/-30	1.25	0.01	0.18	0.36		+/-30	6.03	0.01	0.30	0.58		+/-30	0.98	0.11	0.20	0.39
	+/-35	0.98	0.01	0.18	0.35		+/-35	5.48	0.03	0.29	0.58		+/-35	1.08	0.08	0.23	0.44
	+/-40	0.96	-0.01	0.17	0.33		+/-40	5.09	0.02	0.33	0.64		+/-40	1.18	0.07	0.20	0.39
	+/-45	0.79	-0.03	0.17	0.33		+/-45	4.53	0.00	0.29	0.58		+/-45	1.14	0.07	0.18	0.36
	+/-50	0.95	-0.06	0.18	0.36		+/-50	4.79	0.02	0.33	0.65		+/-50	1.32	0.04	0.25	0.50
	+/-55	1.48	-0.10	0.20	0.40		+/-55	5.15	0.04	0.36	0.70		+/-55	1.15	0.08	0.29	0.57
	+/-60	1.55	-0.14	0.22	0.43		+/-60	6.89	0.05	0.39	0.76		+/-60	1.21	0.09	0.31	0.60

0912_1540	+/-20	1.57	-0.02	0.23	0.45	0912_1909	+/-20	1.31	0.03	0.24	0.47	0912_2039	+/-20	2.00	0.06	0.25	0.49
	+/-25	1.57	-0.04	0.24	0.46		+/-25	1.48	0.02	0.25	0.48		+/-25	1.61	0.04	0.27	0.52
	+/-30	1.70	-0.03	0.22	0.42		+/-30	1.38	0.02	0.25	0.50		+/-30	2.17	0.06	0.28	0.54
	+/-35	1.31	-0.04	0.21	0.40		+/-35	1.80	-0.03	0.23	0.46		+/-35	1.74	0.06	0.28	0.54
	+/-40	1.57	-0.04	0.20	0.40		+/-40	2.40	-0.05	0.23	0.45		+/-40	1.94	0.03	0.23	0.45
	+/-45	1.51	-0.03	0.20	0.38		+/-45	1.57	-0.11	0.26	0.51		+/-45	2.07	0.02	0.24	0.47
	+/-50	1.74	-0.02	0.20	0.40		+/-50	3.38	-0.17	0.29	0.56		+/-50	2.04	-0.01	0.26	0.51
	+/-55	1.96	-0.01	0.25	0.49		+/-55	2.76	-0.27	0.35	0.69		+/-55	2.95	-0.02	0.26	0.52
	+/-60	1.77	-0.01	0.29	0.57		+/-60	2.79	-0.41	0.41	0.80		+/-60	2.10	-0.05	0.27	0.54

0913_1749	+/-20	1.83	0.04	0.23	0.45	0913_1847	+/-20	1.28	0.12	0.24	0.48	0914_1501	+/-20	1.38	0.00	0.25	0.50
	+/-25	1.83	0.01	0.22	0.44		+/-25	1.42	0.12	0.25	0.48		+/-25	2.00	-0.03	0.27	0.53
	+/-30	1.38	0.00	0.21	0.41		+/-30	1.25	0.10	0.22	0.44		+/-30	1.54	-0.01	0.28	0.56
	+/-35	1.77	-0.02	0.21	0.41		+/-35	1.57	0.04	0.21	0.41		+/-35	1.21	-0.01	0.29	0.56
	+/-40	1.41	-0.07	0.20	0.39		+/-40	1.41	0.02	0.21	0.42		+/-40	1.35	-0.04	0.30	0.60
	+/-45	1.48	-0.12	0.22	0.43		+/-45	1.38	-0.01	0.21	0.41		+/-45	1.64	-0.08	0.32	0.63
	+/-50	1.61	-0.17	0.23	0.45		+/-50	0.96	-0.06	0.23	0.46		+/-50	1.74	-0.10	0.33	0.65
	+/-55	1.80	-0.28	0.23	0.45		+/-55	2.04	-0.13	0.24	0.48		+/-55	2.17	-0.15	0.40	0.78
	+/-60	2.43	-0.33	0.26	0.51		+/-60	2.17	-0.17	0.26	0.51		+/-60	2.10	-0.18	0.47	0.91

0914_1813	+/-20	2.07	0.19	0.29	0.56	0914_1932	+/-20	1.05	-0.05	0.25	0.49	0921_1450	+/-20	1.38	0.08	0.23	0.44
	+/-25	1.74	0.19	0.32	0.62		+/-25	1.18	-0.05	0.24	0.47		+/-25	1.70	0.08	0.26	0.50
	+/-30	2.23	0.18	0.34	0.66		+/-30	1.28	-0.08	0.27	0.53		+/-30	2.07	0.07	0.25	0.50
	+/-35	2.03	0.21	0.33	0.65		+/-35	1.32	-0.10	0.26	0.51		+/-35	1.83	0.05	0.27	0.54
	+/-40	1.80	0.21	0.34	0.67		+/-40	1.08	-0.09	0.29	0.57		+/-40	2.19	0.05	0.30	0.59
	+/-45	2.69	0.21	0.39	0.76		+/-45	2.00	-0.11	0.30	0.58		+/-45	2.85	0.06	0.34	0.67
	+/-50	3.35	0.15	0.41	0.80		+/-50	1.83	-0.13	0.37	0.72		+/-50	2.98	0.04	0.37	0.72
	+/-55	2.86	0.09	0.43	0.85		+/-55	1.91	-0.02	0.45	0.88		+/-55	3.38	0.05	0.44	0.87
	+/-60	3.80	0.13	0.53	1.04		+/-60	2.75	0.17	0.56	1.10		+/-60	4.79	0.09	0.51	1.01

Summary of averages for all crossings HARS Fall 2011 survey.

Beam	Max.	Mean	Std	95%
Angle	Outlier	Diff.	Dev.	
+/-20	6.96	0.05	0.26	0.50
+/-25	6.99	0.04	0.27	0.52
+/-30	7.71	0.03	0.27	0.52
+/-35	7.12	0.02	0.26	0.52
+/-40	6.43	0.00	0.27	0.52
+/-45	6.73	-0.02	0.28	0.55
+/-50	7.35	-0.05	0.31	0.60
+/-55	10.67	-0.07	0.34	0.68
+/-60	17.59	-0.07	0.40	0.78

Rogers Surveying • 1632 Richmond Terrace • Staten Island, N.Y. 10310
 Boundary • Aerial • Topographic • Construction • Hydrographic

Table 4.1-2

Summary of Beam Analysis Results for all crossings during Fire Island Reef Fall 2011 survey

Crossing	Beam Angle	Max. Outlier	Mean Diff.	Std Dev.	95%	Crossing	Beam Angle	Max. Outlier	Mean Diff.	Std Dev.	95%
1107_1929	+/-20	1.28	0.22	0.25	0.50	1107_2123	+/-20	1.08	0.23	0.19	0.38
	+/-25	1.41	0.25	0.26	0.50		+/-25	1.08	0.23	0.19	0.38
	+/-30	1.25	0.21	0.25	0.49		+/-30	1.08	0.23	0.20	0.38
	+/-35	1.15	0.18	0.23	0.45		+/-35	1.22	0.20	0.18	0.36
	+/-40	1.11	0.16	0.22	0.44		+/-40	1.08	0.18	0.21	0.41
	+/-45	1.15	0.14	0.24	0.47		+/-45	1.34	0.18	0.22	0.43
	+/-50	1.35	0.12	0.26	0.50		+/-50	1.31	0.15	0.24	0.47
	+/-55	1.38	0.09	0.28	0.56		+/-55	1.28	0.11	0.26	0.51
	+/-60	1.64	0.11	0.31	0.60		+/-60	1.57	0.10	0.30	0.58

Summary of averages for all crossings Fire Island Reef Fall 2011 survey

Beam Angle	Max. Outlier	Mean Diff.	Std Dev.	95%
+/-20	1.28	0.23	0.22	0.44
+/-25	1.41	0.24	0.23	0.44
+/-30	1.25	0.22	0.23	0.44
+/-35	1.22	0.19	0.21	0.41
+/-40	1.11	0.17	0.22	0.43
+/-45	1.34	0.16	0.23	0.45
+/-50	1.35	0.14	0.25	0.49
+/-55	1.38	0.10	0.27	0.54
+/-60	1.64	0.11	0.31	0.59

Table 4.1-3

Summary of Beam Analysis Results for all crossings during Hempstead Reef Fall 2011 survey

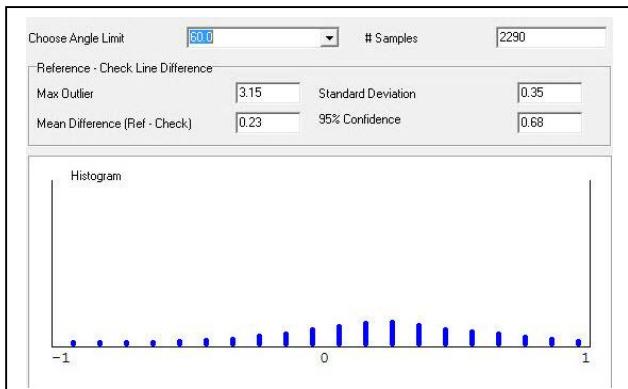
Crossing	Beam Angle	Max. Outlier	Mean Diff.	Std Dev.	95%	Crossing	Beam Angle	Max. Outlier	Mean Diff.	Std Dev.	95%
1108_1840	+/-20	0.79	-0.08	0.16	0.31	1108_2215	+/-20	0.88	0.01	0.16	0.31
	+/-25	1.25	-0.09	0.17	0.33		+/-25	0.85	0.00	0.15	0.30
	+/-30	1.11	-0.10	0.16	0.32		+/-30	0.95	0.00	0.15	0.29
	+/-35	0.98	-0.12	0.15	0.28		+/-35	1.05	0.00	0.15	0.30
	+/-40	0.95	-0.14	0.15	0.29		+/-40	1.44	0.01	0.15	0.30
	+/-45	0.96	-0.16	0.15	0.29		+/-45	2.69	0.04	0.18	0.36
	+/-50	1.25	-0.19	0.16	0.31		+/-50	3.51	0.04	0.26	0.50
	+/-55	1.21	-0.23	0.17	0.33		+/-55	2.69	0.08	0.25	0.49
	+/-60	1.18	-0.26	0.17	0.34		+/-60	2.69	0.16	0.24	0.47

Summary of averages for all crossings Hempstead Reef Fall 2011 survey

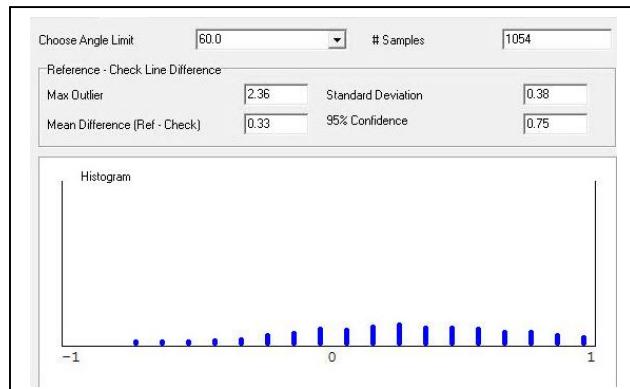
Beam Angle	Max. Outlier	Mean Diff.	Std Dev.	95%
+/-20	0.88	-0.04	0.16	0.31
+/-25	1.25	-0.05	0.16	0.32
+/-30	1.11	-0.05	0.16	0.31
+/-35	1.05	-0.06	0.15	0.29
+/-40	1.44	-0.07	0.15	0.30
+/-45	2.69	-0.06	0.17	0.33
+/-50	3.51	-0.08	0.21	0.41
+/-55	2.69	-0.08	0.21	0.41
+/-60	2.69	-0.05	0.21	0.41

Figure 4.1-1

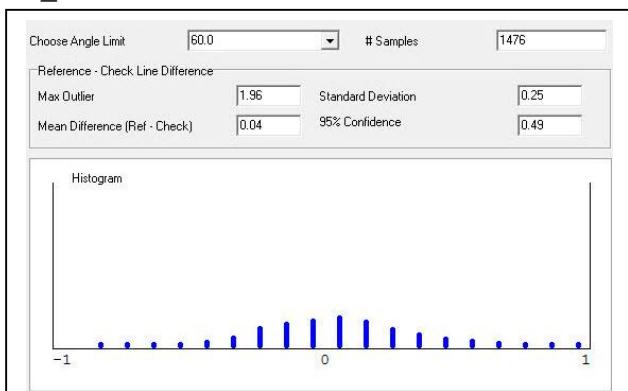
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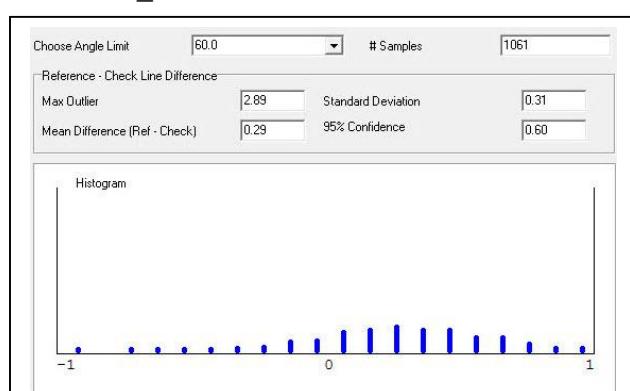
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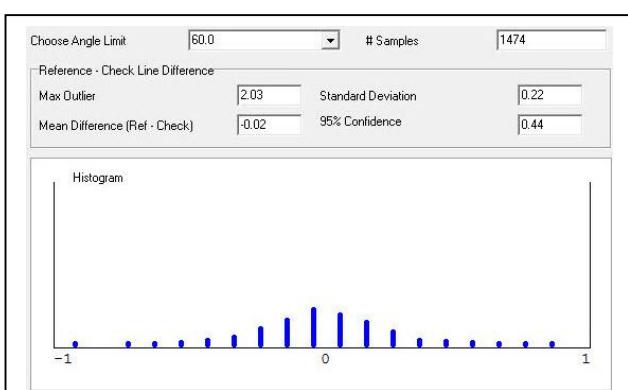
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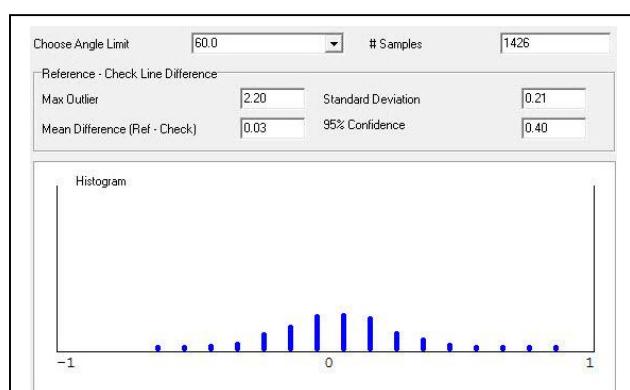
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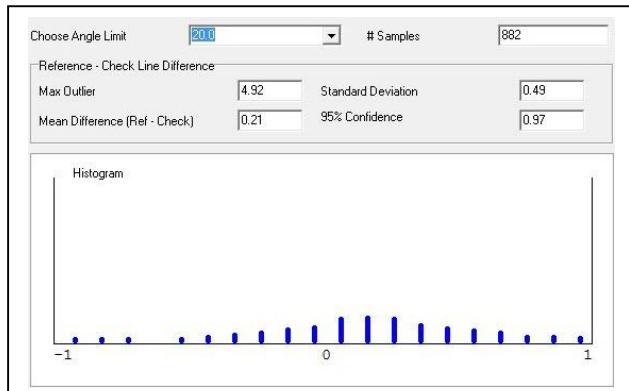
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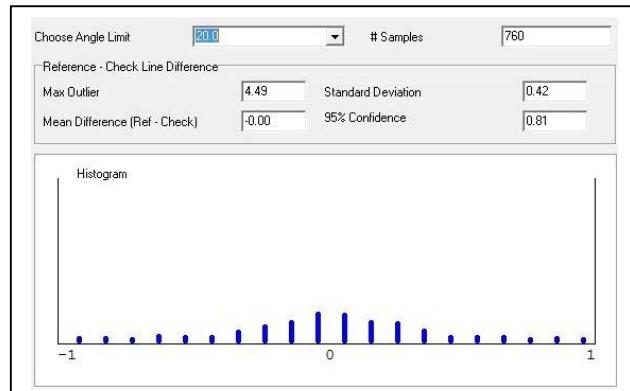
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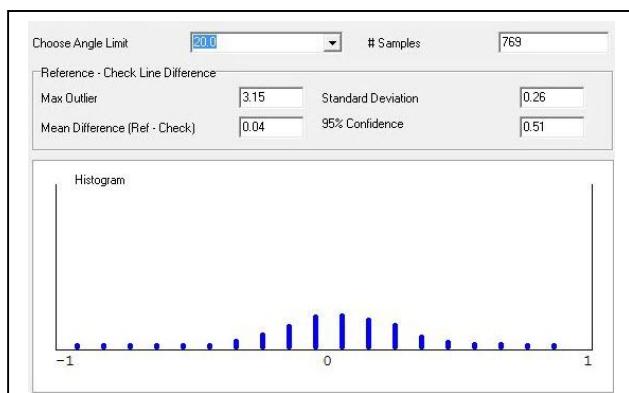
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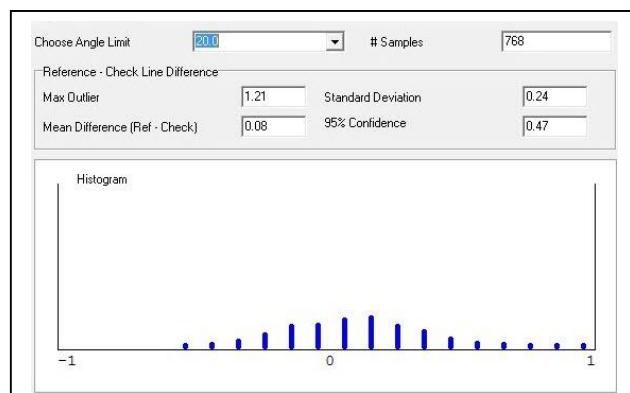
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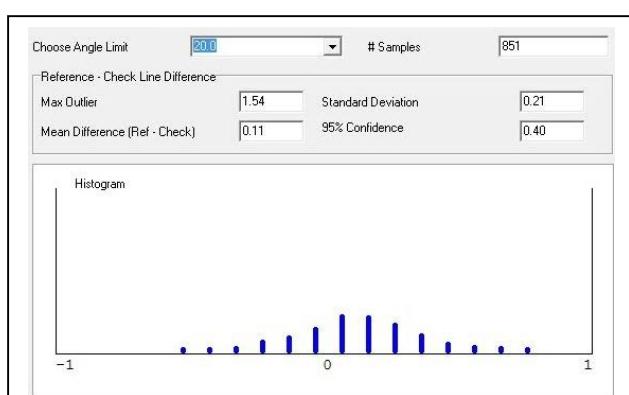
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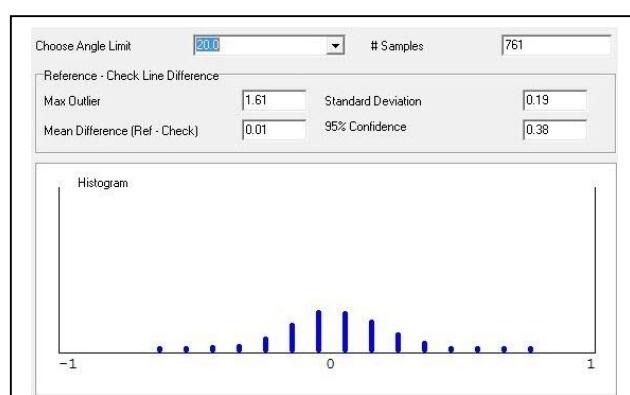
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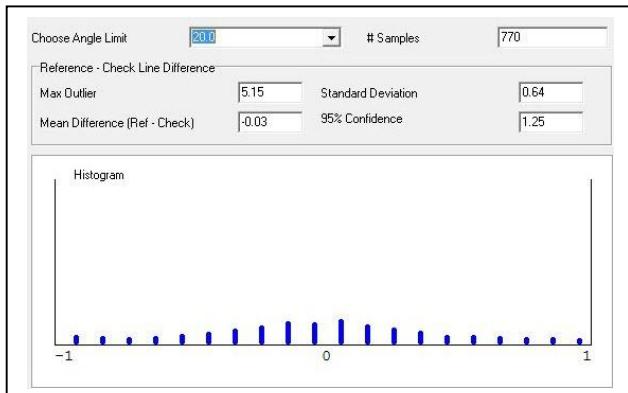
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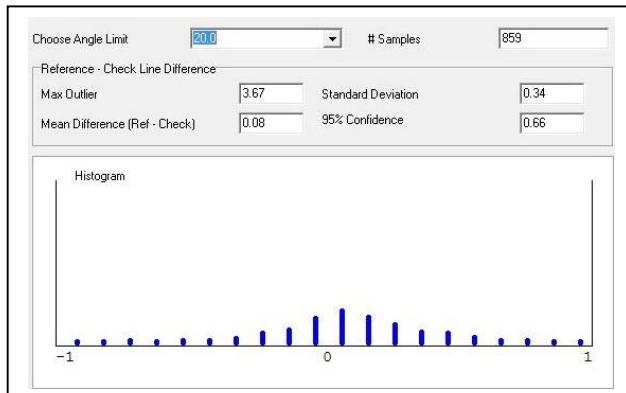
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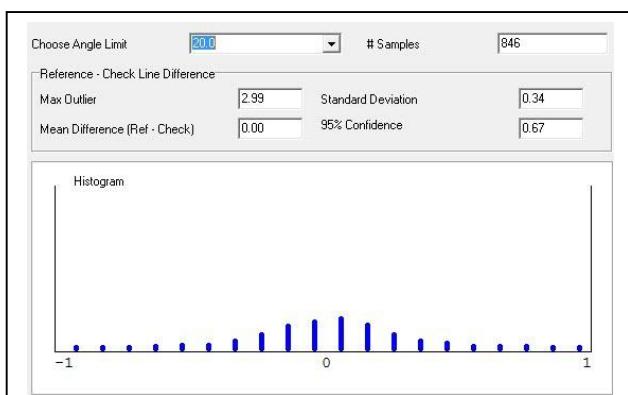
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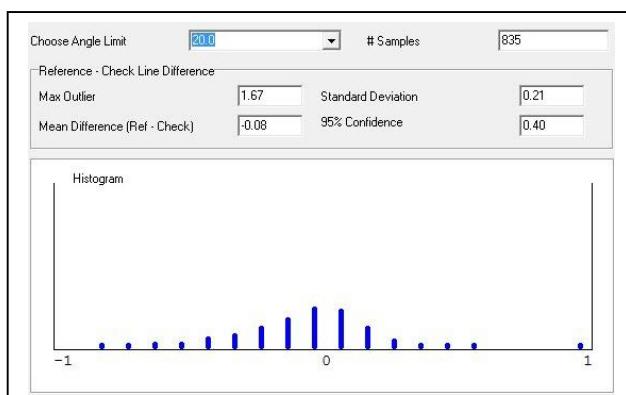
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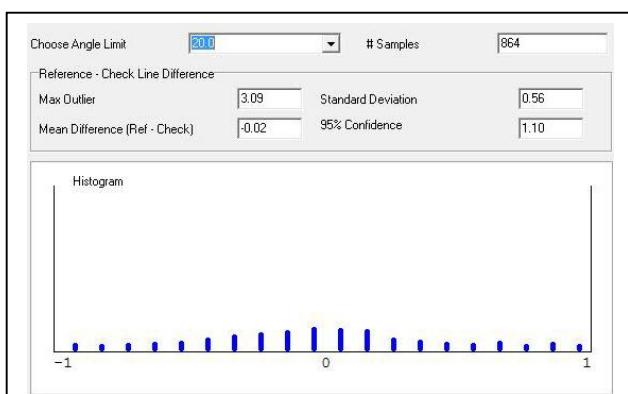
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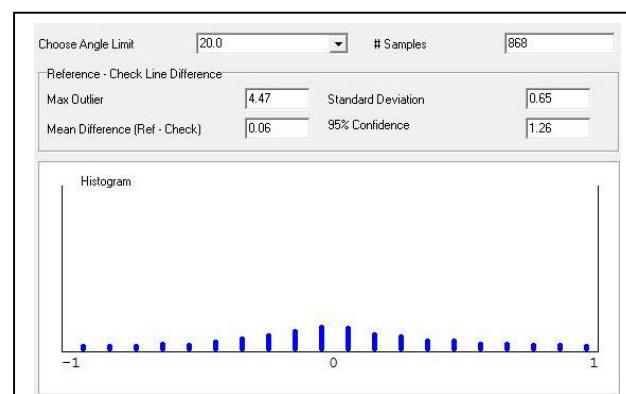
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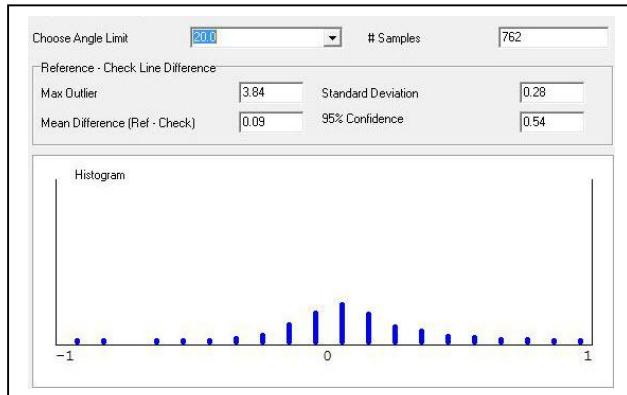
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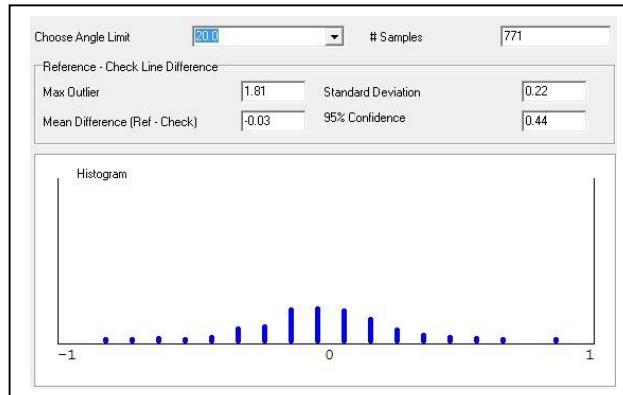
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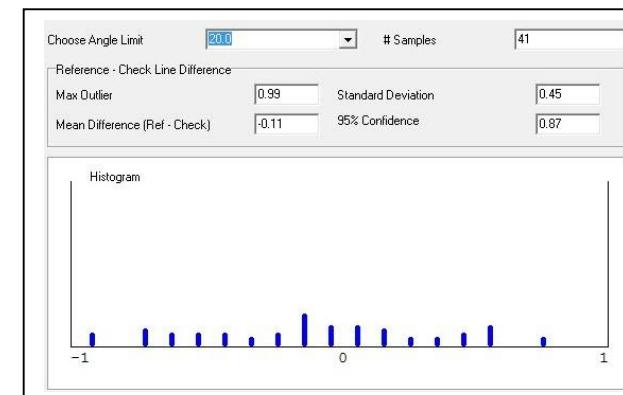
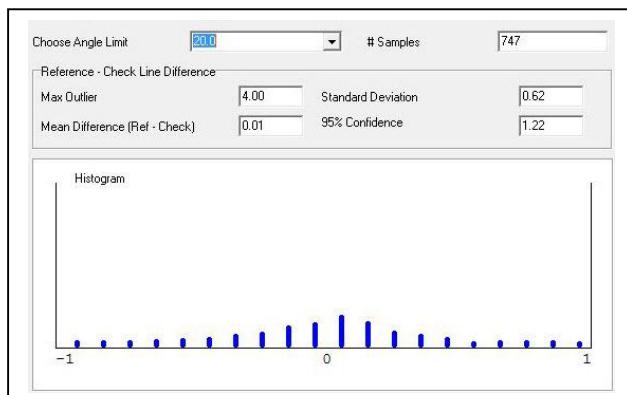
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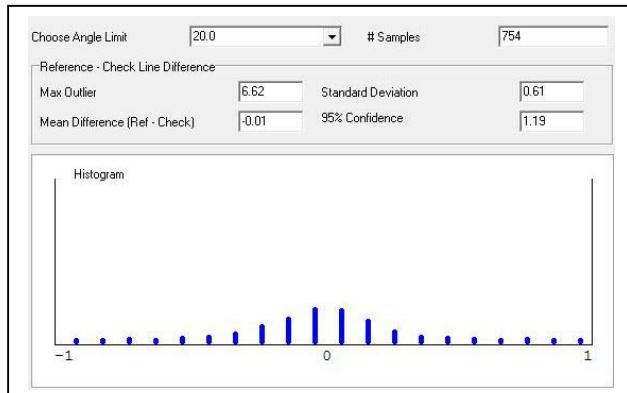
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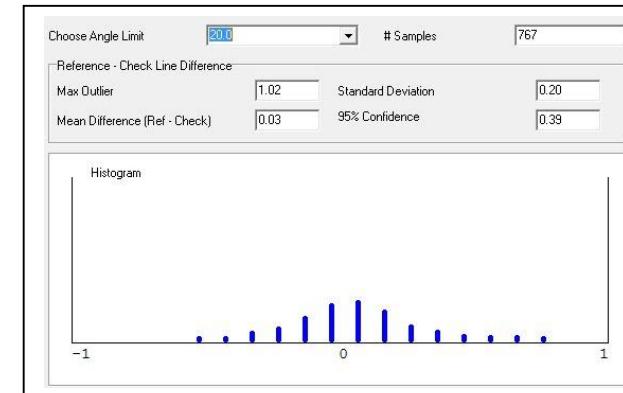
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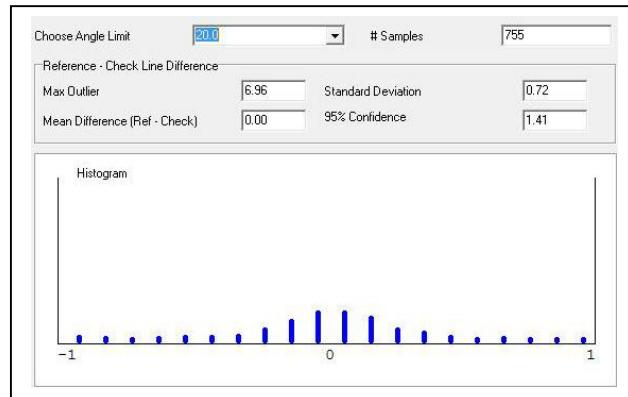
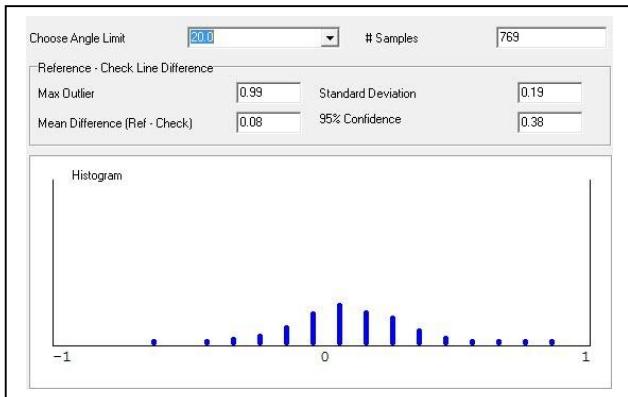


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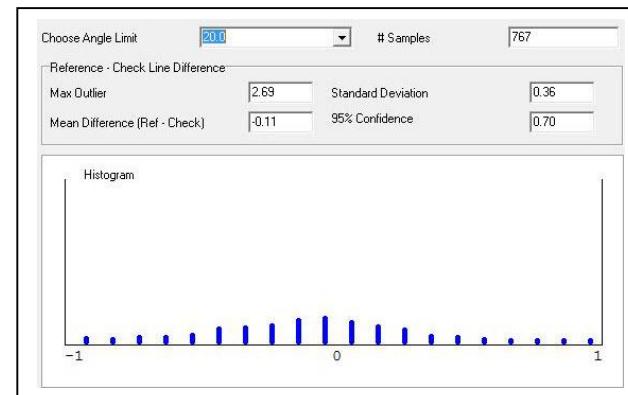
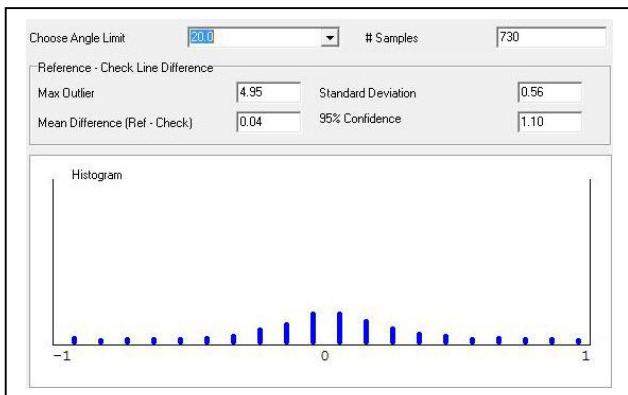
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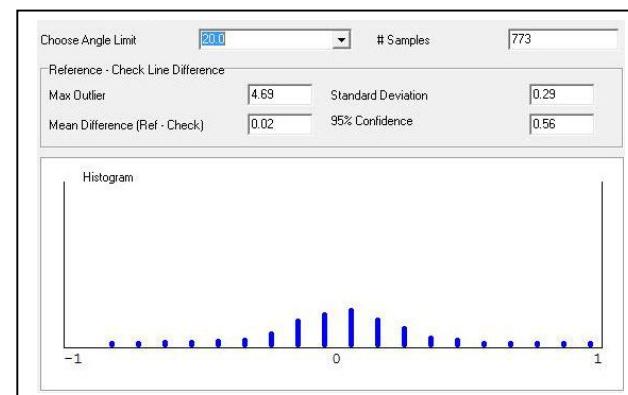
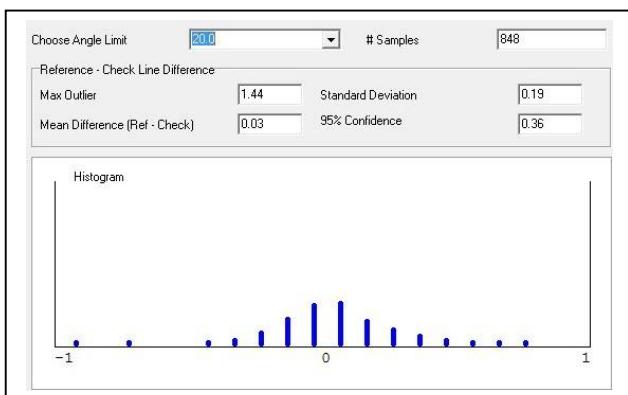
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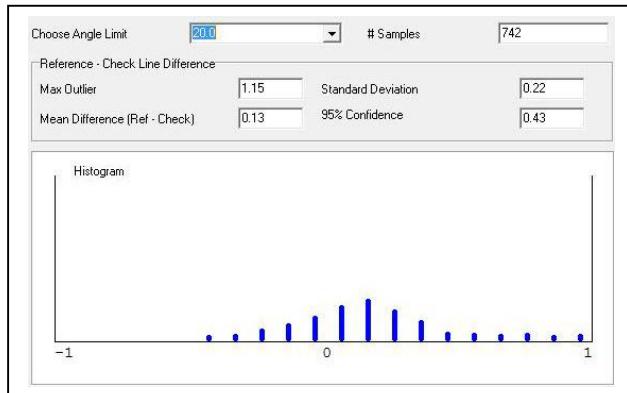
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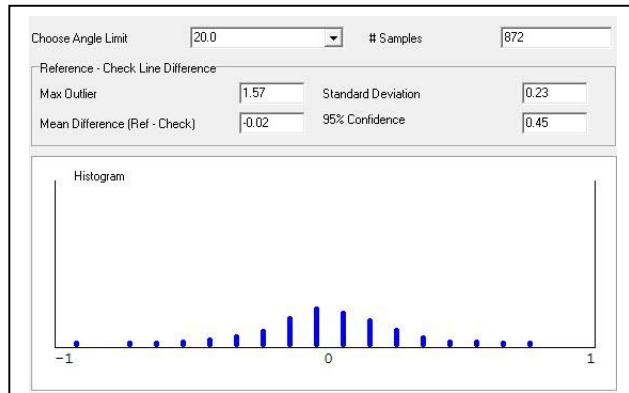


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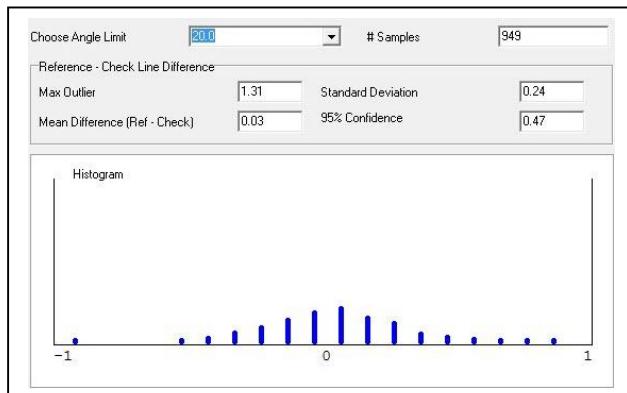
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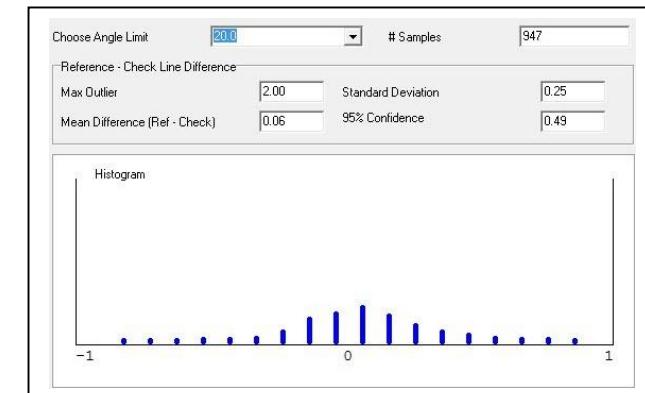
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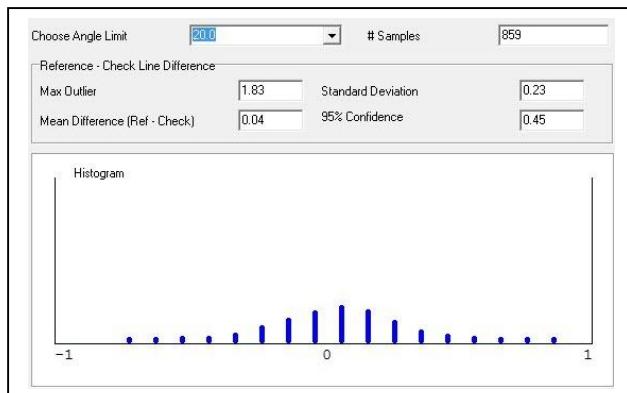
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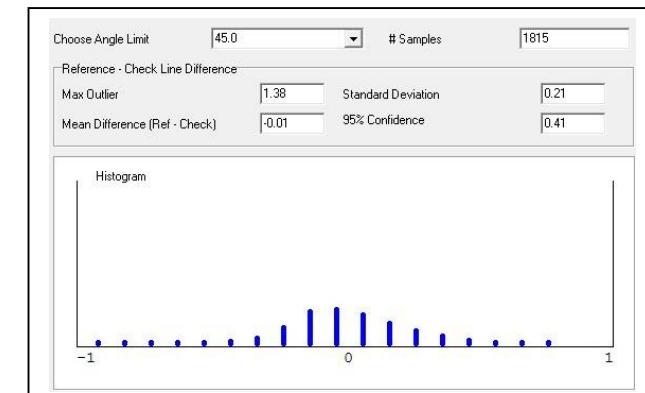
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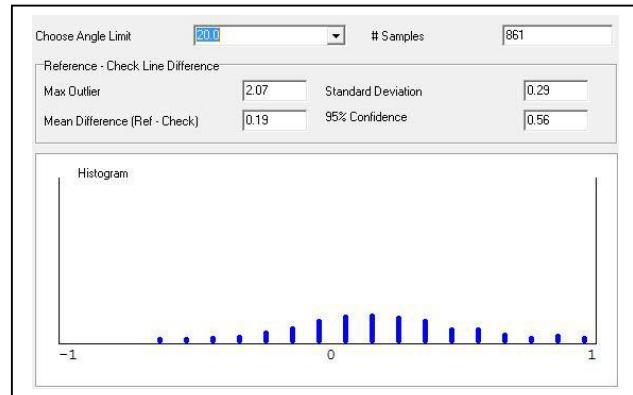
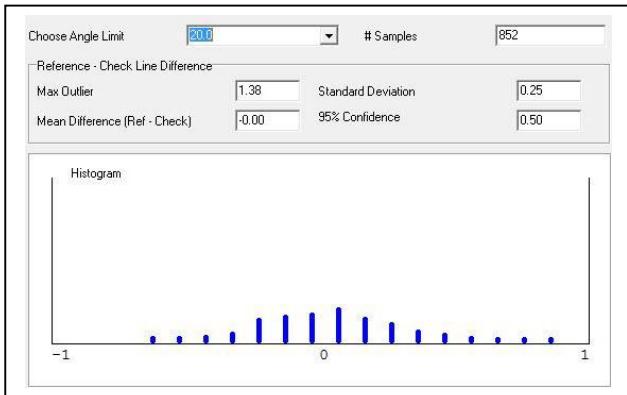
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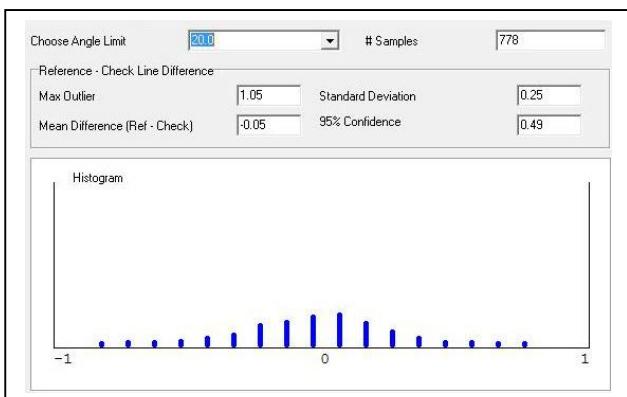
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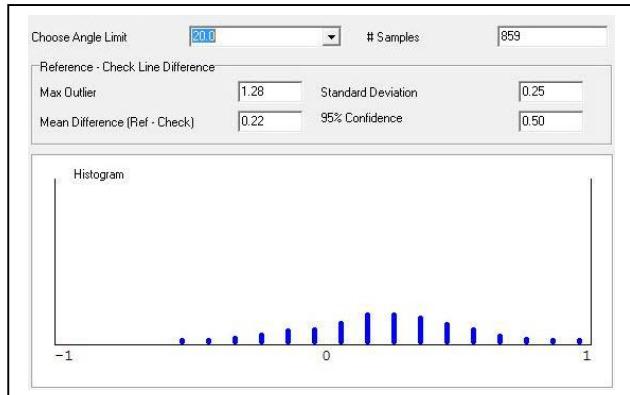


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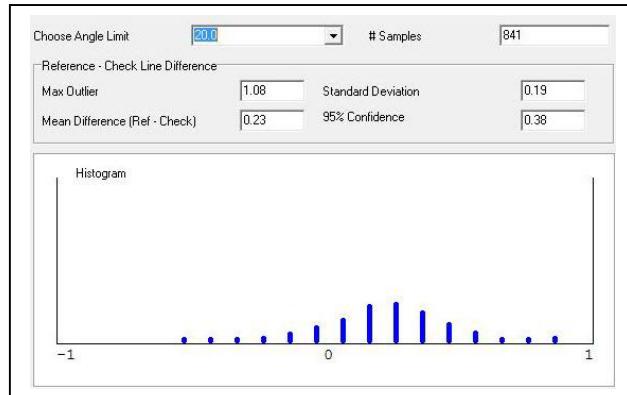
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Figure 4.1-2

Plots of +/- 20 Deg. Beam Analysis Results for crossings 08/05 to 9/21 during Fire Island Reef Fall 2011 survey.



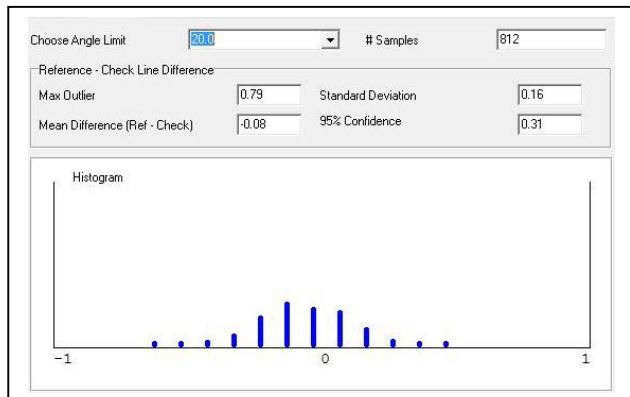
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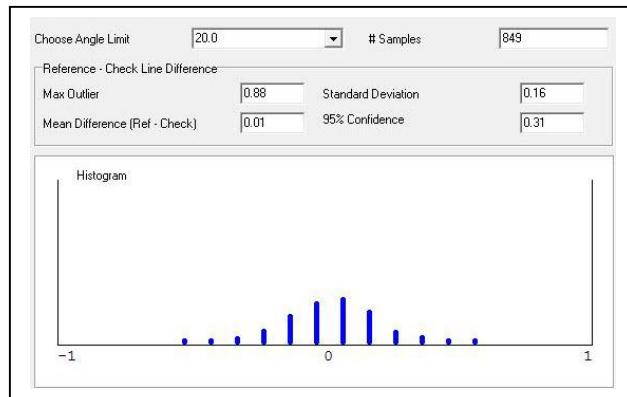
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Figure 4.1-3

Plots of +/- 20 Deg. Beam Analysis Results for crossings 08/05 to 9/21 during Hempstead Reef Fall 2011 survey.



11/08_1840



11/08_2215

HISTORIC AREA REMEDIATION SITE (HARS) HEMPSTEAD REEF FIRE ISLAND REEF

FALL 2011

Prepared for:

United States Army Corps of Engineers
26 Federal Plaza
New York, New York 10278

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Staten Island, New York 10310



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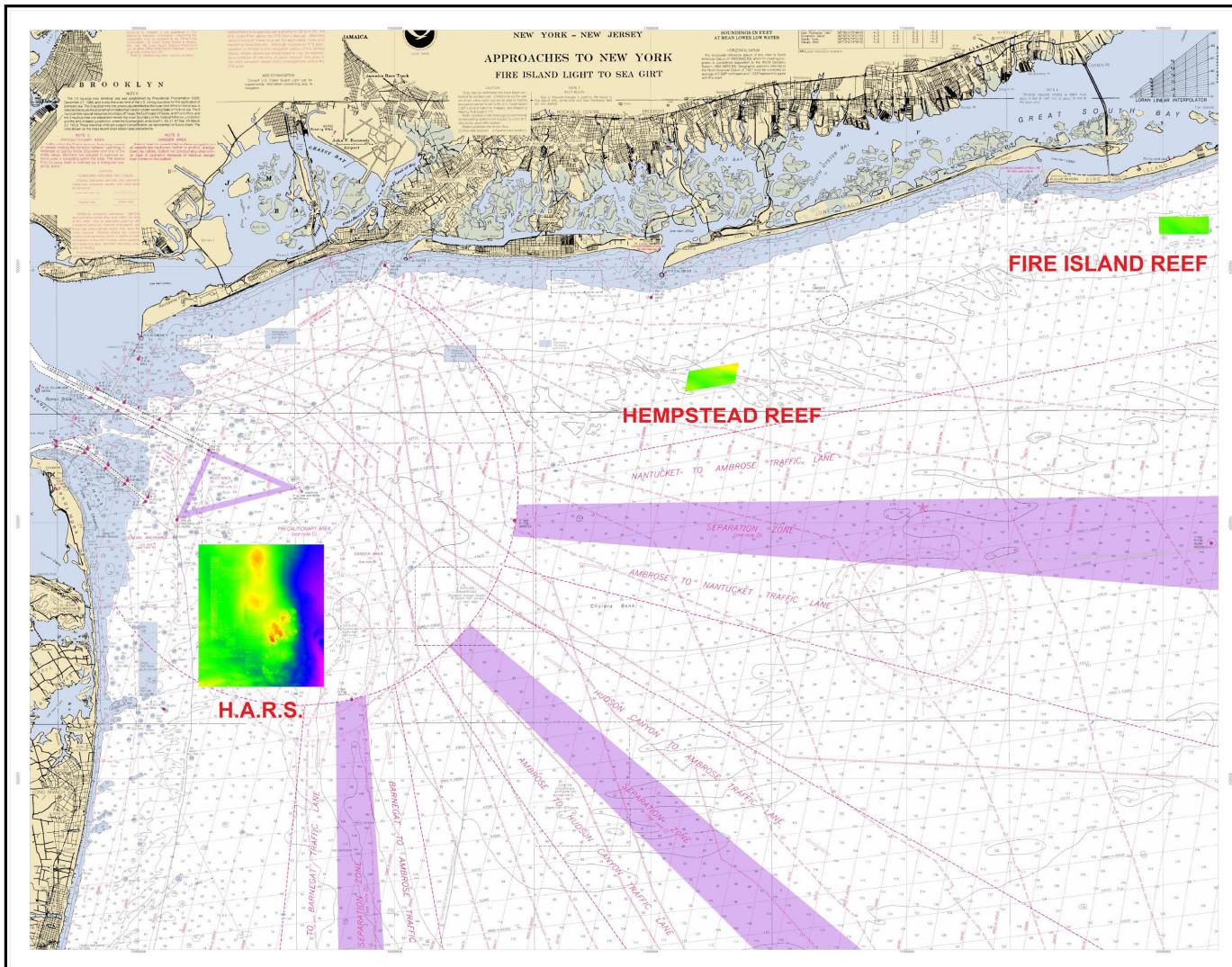
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1.0 Introduction

As part of Rogers Surveying's Indefinite Delivery Contract with The United States Army Corps of Engineers. Rogers Surveying was tasked with surveying the HARS (Historic Area Remediation Site), Hempstead and Fire Island Reefs. The HARS, which was re-designated as a remediation site in September 1977 was formerly known as the Mud Dump Site (MDS), and was used for the deposit of sediments dredged from the New York / New Jersey Harbor Estuary. The remediation consists of placing a one-meter "cap" layer of uncontaminated dredged material on top of the existing surface sediments within the nine Priority Remediation Areas (PRA's) of the HARS. The Reefs at Hempstead, and Fire Island are planned for rock placement during 2011 and 2012. The surveys are to serve as a baseline surveys.

Figure 1.0-1
Task Order 004



2.0 Objective

HARS - The primary objective of this task order is to obtain current high-accuracy multibeam bathymetry of the HARS site, the survey is to be used in the monitoring and planning of dredge placement. The site limits being bounded by North latitude of $40^{\circ} 25.757'$, a South latitude of $40^{\circ} 21.189'$ and East longitude of $73^{\circ} 48.798'$, a West longitude of $73^{\circ} 54.075'$. The total survey coverage area being approximately 24.6 square miles. (Figure 2.0-1).

Hempstead Reef - The primary objective of this task order is to obtain current high-accuracy multibeam bathymetry of the Reef site, the survey is to be used as a baseline survey. The site limits being bounded by North latitude of $40^{\circ} 31.5'$, a West longitude of $73^{\circ} 31.369999'$, North latitude of $40^{\circ} 31.25'$, a West longitude of $73^{\circ} 33.350001'$, North latitude of $40^{\circ} 31.92'$, a West longitude of $73^{\circ} 31.550001'$, North latitude of $40^{\circ} 30.67'$, a West longitude of $73^{\circ} 33.519999'$. The total survey coverage area being approximately 1.2 square miles. (Figure 2.0-2)

Fire Island Reef - The primary objective of this task order is to obtain current high-accuracy multibeam bathymetry of the Reef site, the survey is to be used as a baseline survey. The site limits being bounded by North latitude of $40^{\circ} 36.1'$, a South latitude of $40^{\circ} 35.60'$ and East longitude of $73^{\circ} 11.500'$, a West longitude of $73^{\circ} 13.500'$. The total survey coverage area being approximately 1.2 square miles. (Figure 2.0-3).

3.0 Procedure

The survey data was collected utilizing multibeam technology, and collected in accordance with The U.S. Army Corps of Engineers Manual 1110-2-1003. All survey data was collected with the survey vessel "Red Rogers" (Table 3.0-1). The "Red Rogers" is a 36' long catamaran with a beam of 12' that has berthing for 2. Survey operations were run when fuel, weather and crew staffing permitted. The vessel is equipped with a *RESON* 7101 multibeam sonar. Vessel motion corrections are supplied by an *APPLANIX* 320 (POS/MV), Differential GPS corrections are supplied by a *TRIMBLE* Pro-Beacon receiver, and when available RTK corrections provided to the POS/MV with the addition of a USB cellular modem. Speed of sound profiles are recorded thru the water column with a *SEABIRD* SBE19 Plus CTD profiler V2 (Table 3.0-1).

A seabed mounted water pressure gauge was installed at latitude N $40^{\circ} 22' 38.9677"$ and longitude W $73^{\circ} 50' 54.9287"$. It was anchored in approximately 40' of water (Figures 3.0-1 and 3.0-2). An acoustic release system was incorporated for retrieval of the tide gauge. The gauge was preset to record data for 60 seconds every 5 minutes. The Real Time Kinematic GPS, which augmented the POS/MV position also provided real time water levels. The RTK and VRS corrections were provided via a cellular Internet GPS Network operated by Keystone Precision of PA.

Figure 2.0-1
Historic Area Restoration Site (HARS).

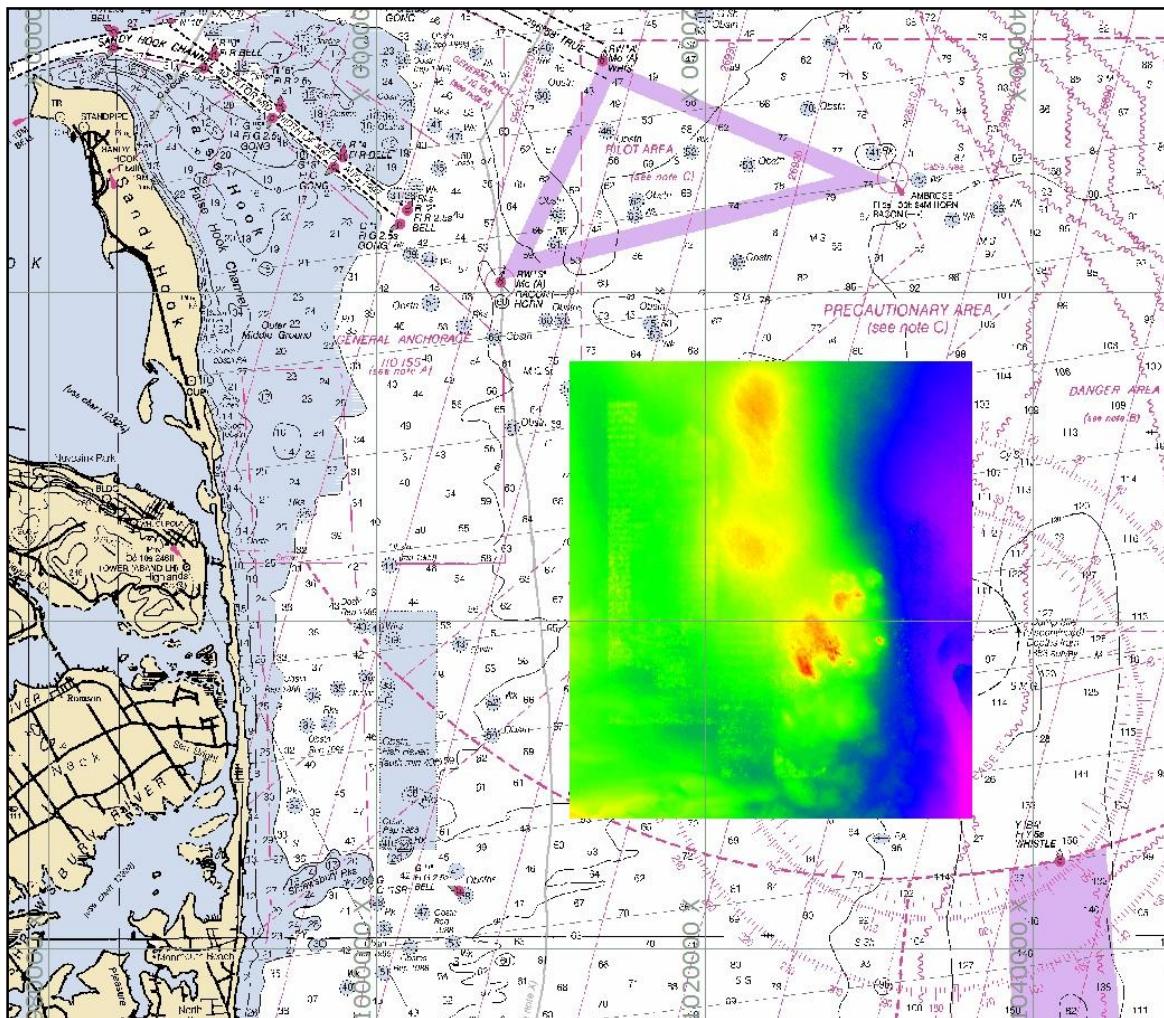


Figure 2.0-2
Hempstead Reef

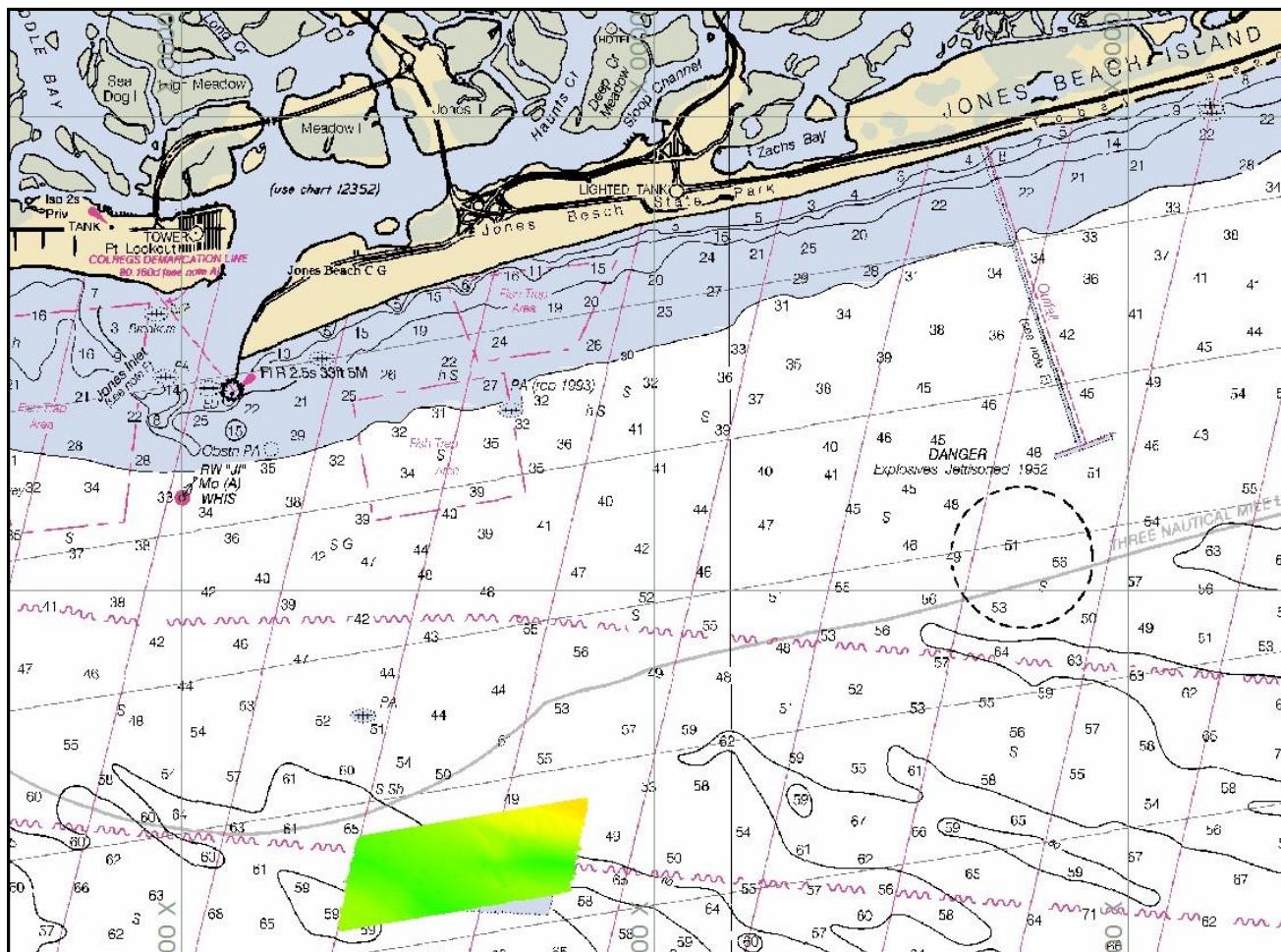


Figure 2.0-3

Fire Island Reef

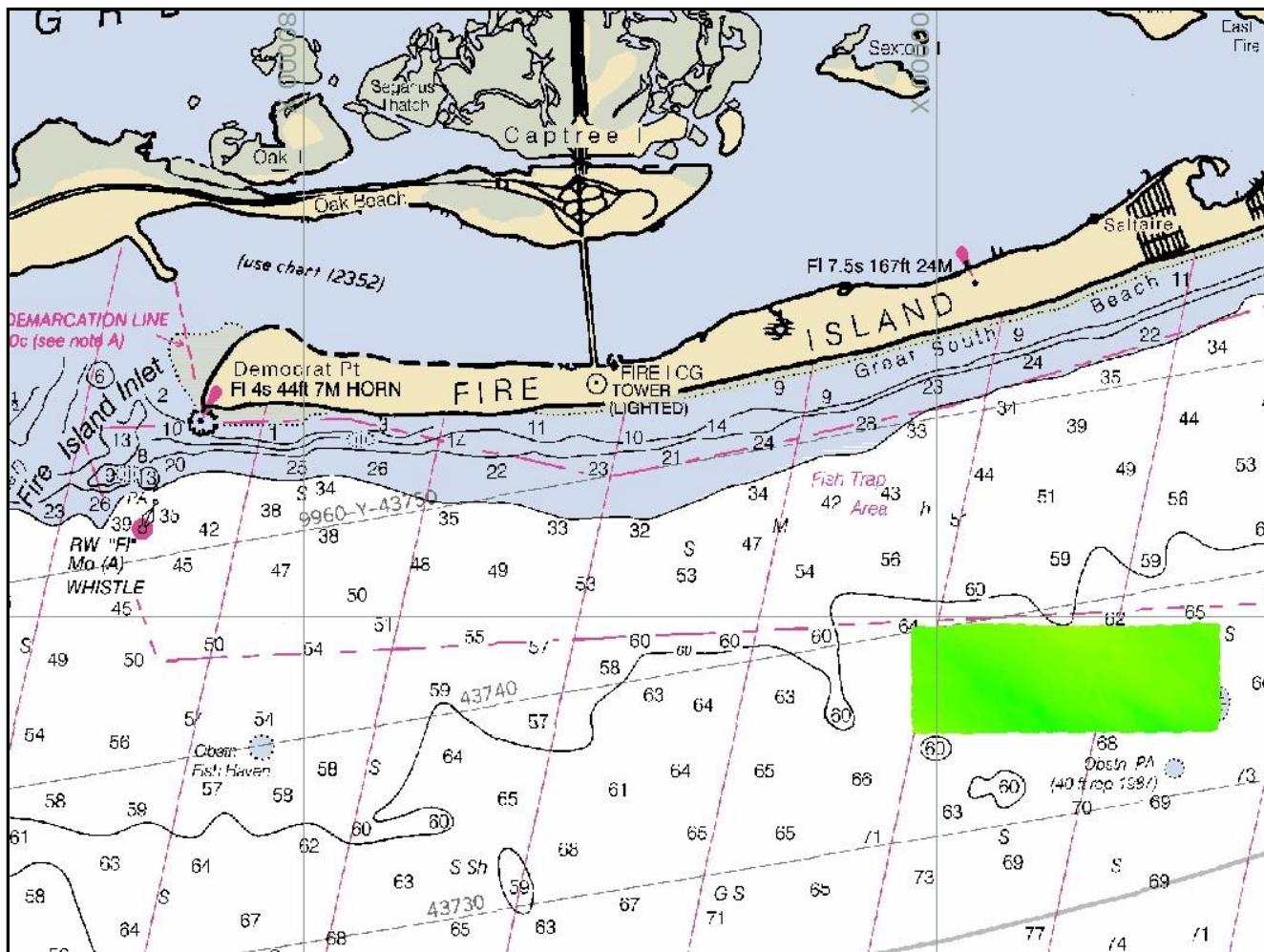


Table 2.0-1

Summary of survey operations on board survey vessel Red Rogers for the Fall 2011 multibeam survey at the HARS.

DATE	Operations
08/05/11	Mobilization to HARS. Deployed submersible tide recorder. Commenced multibeam survey of HARS.
08/10/11	Continued Survey from 08/05/11.
08/11/11	Continued Survey from 08/10/11.
08/12/11	Continued Survey from 08/11/11.
08/16/11	Continued Survey from 08/12/11.
08/17/11	Continued Survey from 08/16/11.
08/18/11	Continued Survey from 08/17/11.
08/19/11	Continued Survey from 08/18/11.
08/23/11	Continued Survey from 08/19/11.
08/24/11	Continued Survey from 08/23/11.
09/12/11	Continued Survey from 08/24/11. Retrieved submersible tide recorder to change batteries.
09/13/11	Continued Survey from 09/12/11.
09/14/11	Continued Survey from 09/13/11.
09/21/11	Continued Survey from 09/14/11. Survey completed. Demobilize.

Table 2.0-2

Summary of survey operations on board survey vessel Red Rogers and William A. Rogers for the Fall 2011 multibeam survey at the Fire Island Reef

DATE	Operations
11/07/11	Mobilization to Reef.
11/07/11	Deployed submersible tide recorder.
11/07/11	Commenced multibeam survey of Reef.
11/08/11	Attempt to retrieve tidal sensor. Sensor failed to surface.
11/10/11	Survey vessel <i>WILLIAM A ROGERS</i> performs sidescan sonar survey in attempt to locate tidal sensor.
11/11/11	Survey vessel <i>WILLIAM A ROGERS</i> deploys diver to recover located tidal sensor.
11/11/11	Survey complete. Demobilize.

Table 2.0-3

Summary of survey operations on board survey vessel Red Rogers for the Fall 2011 multibeam survey at the Hempstead Reef

DATE	Operations
11/08/11	Mobilization to Reef.
11/08/11	Commenced multibeam survey of Reef
11/08/11	Survey complete. Demobilize

Table 3.0-1

Equipment used during the Fall 2011 multibeam survey at the HARS, Fire-Island Reef and Hempstead Reef.

System	Model	*Accuracy
Multibeam	Reson Seabat 7101 (150/210 deg) 240 kHz, beam width 1.5 degree along and across track, 101 horizontal beams.	4 cm Nadir, 5 cm 45 degrees, 1.25 range resolution.
Position		
Differential GPS	Trimble Pro Beacon	3-5 meters DGPS USCG, 3 meters DGPS WAAS
Inertial Navigation System	TSS POS M/V 320 Motion (HPR) & Heading	Roll Pitch 0.02 (1 sigma DGPS, 2 sigma RTK) Heave 5cm or 5% 20 seconds or less Heading 0.02 (1 sigma) Position 0.5 - 2m (DGPS), 0.02 - 0.10 (RTK) Velocity 0.03 m/s horizontal
Data Acquisition and Navigation	Hypack 2009a Hysweep Survey Running on a Super Logic computer, with dual Aptec Raid removable disk drives .	
Sound Velocity	SeaBird SBE 19plusV2	
Tide Gauges		
Submersible Pressure Gauge	Valeport MiniTide (Deployed at HARS)	Range -5 to +35 deg (C). +/-0.01 deg (C)

Survey Vessel	
M/V Red Rogers	LOA= 36', Beam= 10', Draft= 2.5, Max Speed 25kts
Propulsion	Twin Volvo KAD 44P-C Turbo Diesel Engines with DPE Stern Drives
Power	Onan 6.5 kilowatt Generator with UPS & DC power supplies

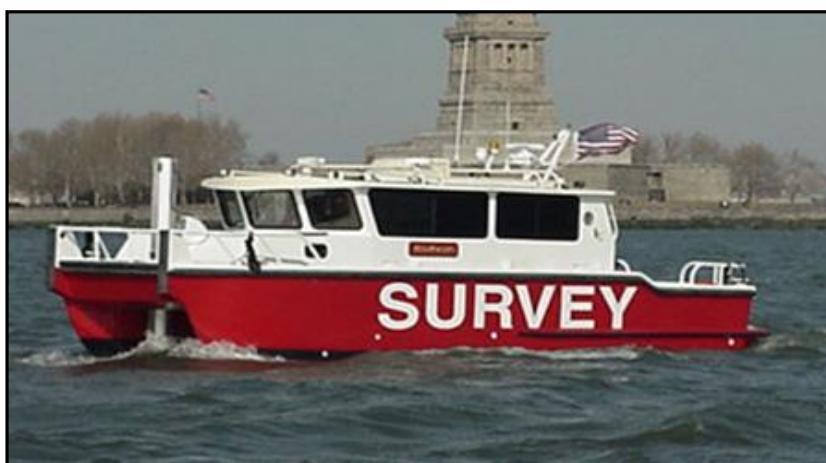
R/V *Red Rogers*

Figure 3.0-1
Attaching Acoustic Release Buoy to Submersible Tide Gauge



Figure 3.0-2

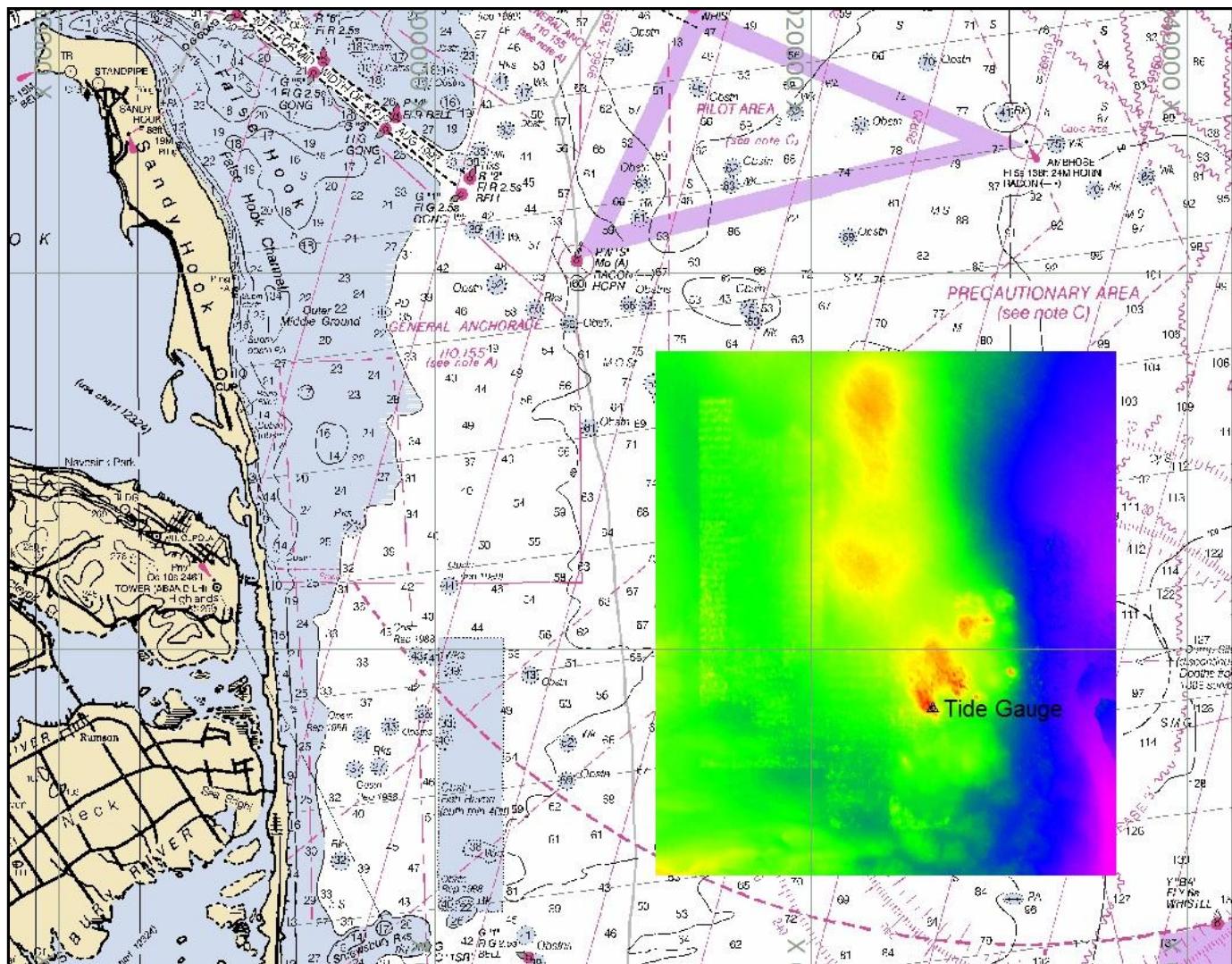


Figure 3.0-3

Final multibeam coverage of the Fire Island Reef, with submersible Tide Gauge location.

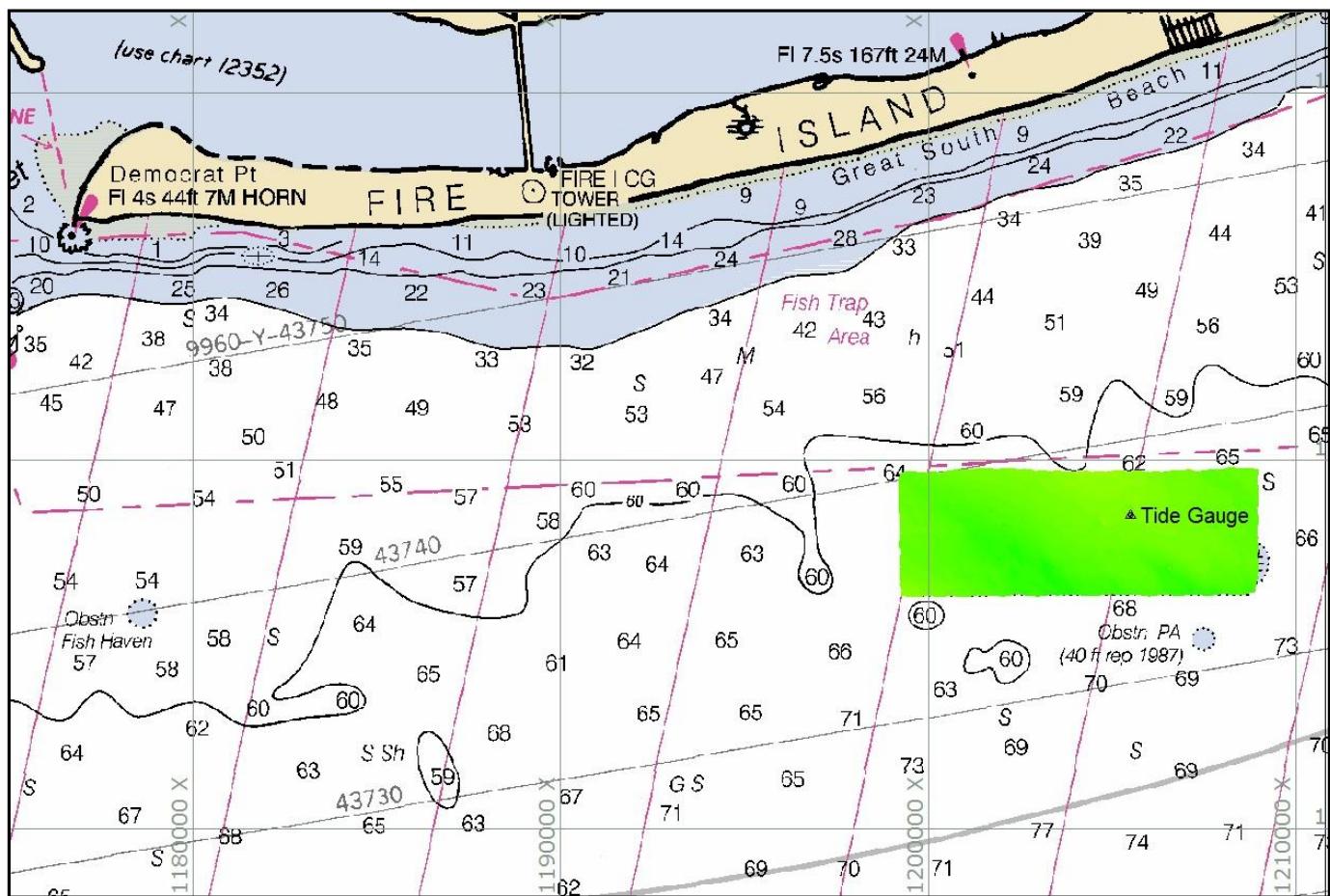


Figure 3.0-4

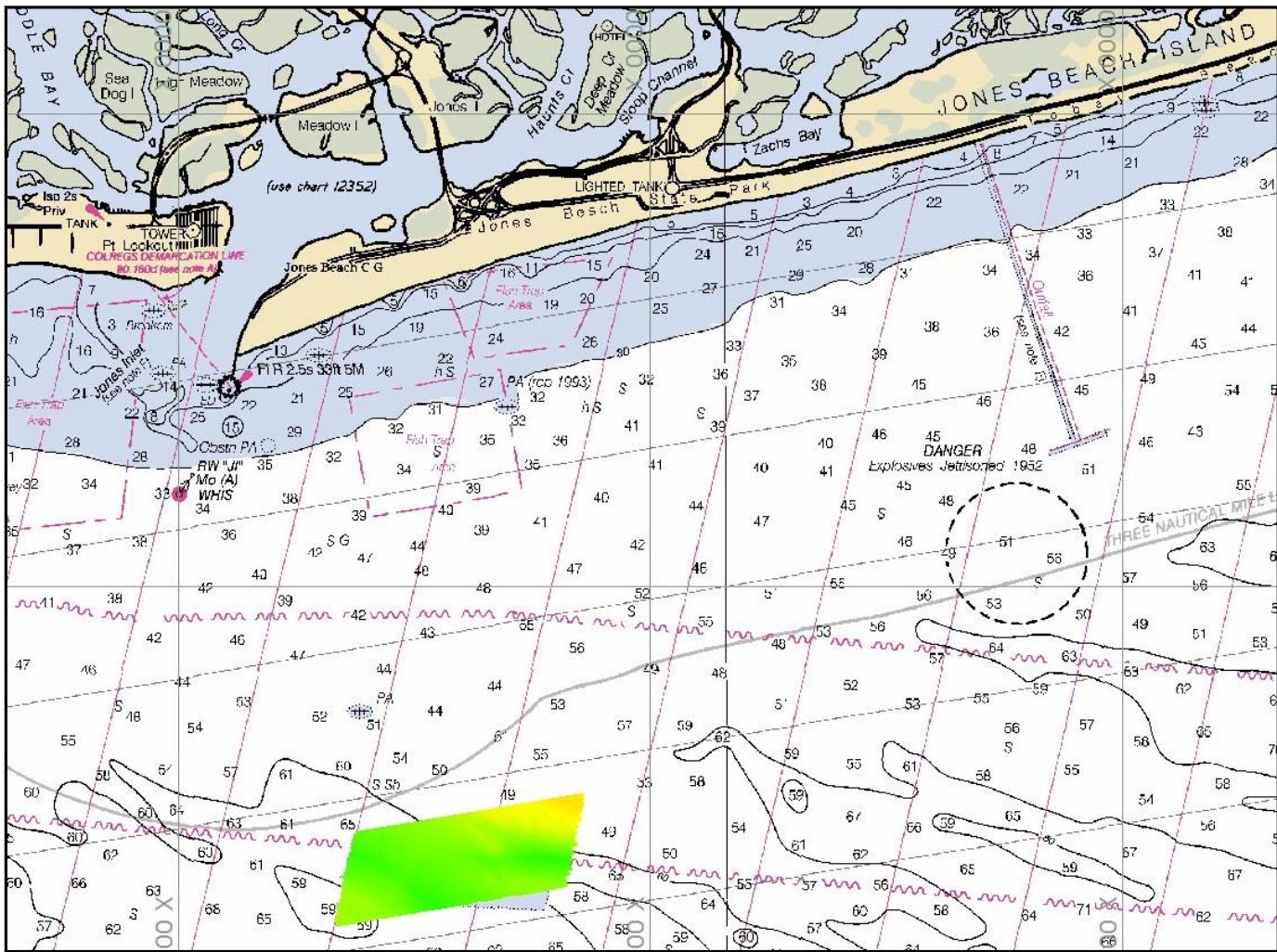


Figure 3.1-1

Portion of NGS Data Sheet for survey control disk KV0233 used at Elizabeth Marina.

KV0233	DESIGNATION -	PBM 65 33 USE	
KV0233	PID -	KV0233	
KV0233	STATE/COUNTY-	NJ/UNION	
KV0233	USGS QUAD -	ELIZABETH (1995)	
KV0233			
KV0233	*CURRENT SURVEY CONTROL		
KV0233			
KV0233*	NAD 83(1986) -	40 39 07. (N) 074 11 11. (W)	SCALED
KV0233*	NAVD 88 -	7.441 (meters) 24.41 (feet)	ADJUSTED
KV0233			
KV0233	GEOID HEIGHT-	-32.35 (meters)	GEOID09
KV0233	DYNAMIC HT -	7.438 (meters)	COMP
KV0233	MODELED GRAV -	980,222.8 (mgal)	NAVD 88
KV0233			
KV0233	VERT ORDER -	FIRST CLASS II	

Figure 4.0-1

Sandy Hook Tidal Station information, used during the Fall 2011 multibeam survey at the HARS, Hempstead and Fire Island Reefs.

Sandy Hook, NJ		Station ID: 8531680	
Station Information			
<i>Latitude:</i> 40° 28.0' N	<i>Mean Range:</i> 4.70 ft.	 <small>Click image for larger image.</small>	
<i>Longitude:</i> 74° 0.6' W	<i>Diurnal Range:</i> 5.22 ft.		
<i>Established:</i> Jan 7 1910			
<i>Present Installation:</i> Sep 26 1989			
<i>NOAA Chart #:</i> 12327			
<i>Time Meridian:</i> 75			
<i>Minimum Water Level:</i> -4.71 ft. below MLLW (02/02/1976)	<i>Maximum Water Level:</i> 4.86 ft. above MHHW (09/12/1960)		
Data Types Available:		Station and Bench Mark Drawing	Station Location Chartlet
Primary Water Level Backup Water Level Wind Air Temperature Water Temperature Barometric Pressure Barometric Pressure Conductivity	Click HERE for Drawing <small>(Not for navigational use)</small>		Click HERE for Map <small>(Not for navigational use)</small>

3.1 Data Acquisition

The survey vessel *Red Rogers* is permanently berthed in Elizabeth, New Jersey. The voyage from the vessels homeport to the HARS is approximately 1.5 hours, Fire Island Reef is approximately 4 hours. Hempstead Reef is approximately halfway way between marina and Fire Island Reef. Prior to multibeam survey operations a float test was performed to confirm that the RTK GPS tide reading from the POS M/V on the survey vessel agreed with the tide board at the dock at Elizabeth Marina, which had previously been referenced to National Geodetic Survey (NGS) disk KV0233 (Figure 3.1-1). This having been done the survey vessel transited to the HARS for commencement of multibeam data collection at the HARS site.

Once at the HARS or the Long Island Reefs the initial task was to lower the multibeam transducer head and perform a sound velocity profile (SVP). The information from the SVP was used to provide the Reson 7101 multibeam processor with a sound velocity surface value used for beam steerage. In addition the sound velocity profile was used in the Hypack data acquisition and processing software to correct for speed of sound through the water column to be applied to the multibeam data.

Having performed and applied the SVP correction, multibeam data collection began. Survey lines were run in a general North-South direction with cross check lines (see Sections 4.1 and 4.2) being run in an East-West direction for the HARS location, while for the two Reef locations survey lines were run in an East-West direction, with the cross check lines being run in a North-South direction.

Constant monitoring of the Reson 7101 screen and adjustment of range, transmit/ receive power settings were made if required to accurately map and encompass the swath width needed. The swath width was set to 60 deg. either side of nadir (center beam of multibeam) and lines were run to provide a 60% swath data coverage. In addition to monitoring the Reson 7101, it was also necessary to monitor the Hypack navigation software, which provided quality information on GPS and inertial navigation sensors, motion reference unit sensor and the multibeam data from the Reson 7101.

3.2 Sound Velocity Profiles

Sound velocity profiles were taken during the course of the survey using a SeaBird SBE 19plus Version 2 CTD. Casts were obtained before, during and after each survey period. During survey operations casts were taken not less than three hours apart and at opposite ends of the days survey area, to account for any spatial water column speed of sound changes. The SeaBird SBE 19plus was last calibrated by the manufacturer on 05/25/07 and is periodically checked against our Odom Digibar Pro velocity profiler. For HARS a total of 66 SVP casts were taken over the course of the multibeam survey (Table 3.2-0). Plots of all SVP casts are shown in Figures 3.2-1 to 3.2-65.

Table 3.2-1
Sound Velocity Profiles (SVP's) taken during the Fall 2011 multibeam survey at the HARS

Date	Time (UTC)	CTD File #	NAD83 Y LI (Feet)		Latitude	Longitude	Water Depth
			Easting	Northing			Feet
08/05/11	12:21	cnv_1221	1035501.65	96002.99	40.43003153	73.81590871	97.4
08/05/11	14:26	cnv_1426	1034145.53	86487.84	40.40392180	73.82084965	109.6
08/05/11	16:41	cnv_1641	1032337.45	96001.66	40.43004556	73.82727421	94.5
08/05/11	18:55	cnv_1855	1029848.27	86373.62	40.40363137	73.83627973	90.9
08/05/11	20:43	cnv_2043	1028892.39	95701.29	40.42923908	73.83965051	83.3
08/10/11	11:32	cnv_1132	1028912.53	95822.08	40.42957052	73.83957736	80.1
08/10/11	13:30	cnv_1330	1026965.33	86255.41	40.40332123	73.84663163	64.6
08/10/11	15:38	cnv_1538	1026129.32	95881.15	40.42974622	73.84957395	68.6
08/10/11	17:40	cnv_1740	1024518.57	86397.19	40.40372183	73.85541581	54.1
08/10/11	18:59	cnv_1859	1024992.33	95395.27	40.42841786	73.85366080	62.3
08/11/11	11:54	cnv_1154	1036081.03	86295.84	40.40338372	73.81390171	110.6
08/11/11	13:58	cnv_1358	1034339.71	77018.50	40.37792899	73.82022223	106.3
08/11/11	16:20	cnv_1620	1032054.45	86674.31	40.40444513	73.82835636	97.4
08/11/11	18:06	cnv_1806	1030531.65	86716.81	40.40456984	73.83382373	92.2
08/11/11	20:00	cnv_2000	1028896.15	86751.26	40.40467277	73.83969582	84.0
08/11/11	21:56	cnv_2156	1027838.77	86280.41	40.40338560	73.84349542	75.5
08/12/11	13:10	cnv_1310	1027811.40	86183.24	40.40311903	73.84359430	74.1
08/12/11	17:11	cnv_1711	1024564.04	76913.74	40.37769113	73.85530879	63.6
08/12/11	19:16	cnv_1916	1023971.60	86139.92	40.40301811	73.85738120	54.5
08/12/11	20:57	cnv_2057	1030598.19	79090.79	40.38363736	73.83363682	73.2
08/12/11	15:19	cnv_1519	1027311.79	77106.72	40.37820796	73.84544562	58.1
08/16/11	16:25	cnv_1625	1031980.64	77465.58	40.37916912	73.82868604	91.2
08/16/11	18:39	cnv_1839	1029869.20	67902.20	40.35293033	73.83632850	86.0
08/16/11	20:43	cnv_2043	1028758.98	77374.76	40.37893655	73.84024974	59.1
08/16/11	11:58	cnv_1158	1036106.46	77394.85	40.37895187	73.81387830	102.0
08/16/11	14:14	cnv_1414	1033978.56	67800.91	40.35263029	73.82158582	110.9
08/16/11	22:06	cnv_2206	1027570.01	77077.04	40.37812524	73.84451904	63.3
08/17/11	12:43	cnv_1243	1024016.71	77217.40	40.37852710	73.85727143	69.2
08/17/11	16:23	cnv_1623	1025158.69	77124.73	40.37826755	73.85317327	71.5
08/17/11	18:39	cnv_1839	1029746.75	68986.74	40.35590784	73.83676057	88.9
08/17/11	14:48	cnv_1448	1025007.74	67670.89	40.35231904	73.85377169	76.8
08/17/11	20:35	cnv_2035	1022777.99	67822.65	40.35274551	73.86177058	74.5
08/17/11	20:39	cnv_2039	1022420.99	77146.31	40.37833896	73.86299912	67.9

08/18/11	11:58	cnv_1158	1022749.01	77381.78	40.37898387	73.86182046	72.8
08/18/11	14:07	cnv_1407	1020951.35	67843.66	40.35281091	73.86832402	72.5
08/18/11	18:30	cnv_1830	1018011.48	67456.11	40.35175880	73.87887350	66.3
08/18/11	16:21	cnv_1621	1019525.37	77424.23	40.37911378	73.87339041	77.8
08/18/11	20:40	cnv_2040	1018039.00	77080.33	40.37817559	73.87872697	72.5
08/19/11	11:41	cnv_1141	1015901.35	76857.91	40.37757295	73.88640029	77.1
08/19/11	13:49	cnv_1349	1015166.48	67760.29	40.35260406	73.88907915	62.7
08/19/11	16:04	cnv_1604	1012276.29	77390.08	40.37904583	73.89940877	65.0
08/19/11	17:56	cnv_1756	1013451.15	77324.57	40.37886223	73.89519228	71.5
08/19/11	18:53	cnv_1853	1013713.27	76472.65	40.37652299	73.89425518	73.8
08/19/11	20:39	cnv_2039	1011701.76	86619.53	40.40438093	73.90143359	68.2
08/23/11	11:32	cnv_1132	1012887.08	86233.49	40.40331757	73.89717928	71.5
08/23/11	13:05	cnv_1305	1013598.92	77087.48	40.37821098	73.89466293	70.2
08/23/11	14:33	cnv_1433	1014868.83	86580.56	40.40426361	73.89006230	69.9
08/23/11	15:54	cnv_1554	1015900.27	86533.35	40.40413042	73.88635912	73.5
08/23/11	16:32	cnv_1632	1016094.56	86594.56	40.40429773	73.88566123	75.8
08/23/11	17:47	cnv_1747	1016972.65	86586.05	40.40427119	73.88250847	75.5
08/23/11	19:25	cnv_1925	1017896.39	77077.82	40.37816924	73.87923882	72.5
08/23/11	21:26	cnv_2126	1019263.43	77136.40	40.37832475	73.87433205	76.8
08/24/11	11:33	cnv_1133	1019481.33	86692.83	40.40455469	73.87350044	61.7
08/24/11	13:56	cnv_1356	1024034.47	77151.34	40.37834569	73.85720808	67.6
08/24/11	15:46	cnv_1546	1022883.92	77355.03	40.37890986	73.86133640	71.2
08/24/11	12:32	cnv_1232	1019943.75	77075.56	40.37815506	73.87189062	74.1
08/24/11	17:39	cnv_1739	1022472.73	86404.45	40.40375077	73.86276134	55.1
09/12/11	13:07	cnv_1307	1021098.62	76913.91	40.37770664	73.86774652	76.4
09/12/11	14:20	cnv_1420	1021434.28	76965.26	40.37784619	73.86654152	74.5
09/12/11	15:48	cnv_1548	1020395.00	85993.89	40.40263255	73.87022360	55.8
09/12/11	16:48	cnv_1648	1023752.30	95935.28	40.42990568	73.85811162	58.1
09/12/11	20:12	cnv_2012	1022029.08	95617.40	40.42904065	73.86430302	62.0
09/12/11	19:04	cnv_1904	1022480.71	86231.32	40.40327552	73.86273365	51.5
09/13/11	14:27	cnv_1427	1021687.34	95725.57	40.42933900	73.86552990	64.0
09/13/11	15:52	cnv_1552	1021112.06	95928.09	40.42989729	73.86759513	65.3
09/13/11	17:19	cnv_1719	1020168.64	86383.71	40.40370346	73.87103427	57.7
09/13/11	18:51	cnv_1851	1020262.65	86635.02	40.40439287	73.87069540	57.1
09/14/11	17:51	cnv_1751	1016019.59	86352.73	40.40363422	73.88593155	74.1
09/14/11	11:51	cnv_1151	1011777.52	95930.21	40.42993693	73.90112384	76.1
09/14/11	15:08	cnv_1508	1013809.30	95962.67	40.43001951	73.89382573	73.8
09/14/11	13:14	cnv_1314	1012686.36	95940.88	40.42996337	73.89785932	76.8
09/14/11	16:21	cnv_1621	1015108.81	95971.38	40.43003898	73.88915798	65.3

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09/14/11	19:37	cnv_1937	1016287.86	95696.63	40.42928067	73.88492423	62.0
09/21/11	11:26	cnv_1126	1017257.77	95908.56	40.42985884	73.88143943	62.7
09/21/11	13:23	cnv_1323	1018474.84	95877.45	40.42976884	73.87706800	62.7
09/21/11	14:47	cnv_1447	1019101.60	95901.96	40.42983368	73.87481662	64.6
09/21/11	12:26	cnv_1226	1017820.28	86323.34	40.40354693	73.87946633	70.9
09/21/11	15:34	cnv_1534	1017969.23	93451.03	40.42311066	73.87889613	62.7

Table 3.2-2
Sound Velocity Profiles (SVP's) taken during the Fall 2011 multibeam survey at Fire-Island Reef

Date	Time (UTC)	CTD File #	NAD83 YLI (Feet)		Latitude	Longitude	Water Depth
			Easting	Northing			Feet
11/07/11	11:39	110711_1139	1198030	159768	40.60262308	73.23012567	43
11/07/11	15:36	110711_1536	1208914	156522	40.59344550	73.19104149	63
11/07/11	17:28	110711_1728	1199251	157261	40.59571377	73.22581026	61
11/07/11	19:27	110711_1927	1199403	158558	40.59926978	73.22522071	63
11/07/11	21:29	110711_2129	1199630	158274	40.59848593	73.22441442	65
11/08/11	12:00	110811_1200	1199179	156238	40.59290717	73.22610240	62

Table 3.2-3
Sound Velocity Profiles (SVP's) taken during the Fall 2011 multibeam survey at Hempstead Reef

Date	Time (UTC)	CTD File #	NAD83 YLI (Feet)		Latitude	Longitude	Water Depth
			Easting	Northing			Feet
11/08/11	15:38	110811_1538	1107511	129542	40.52138225	73.55665015	62
11/08/11	17:29	110811_1729	1107037	128517	40.51857614	73.55837399	65
11/08/11	19:26	110811_1926	1106934	127448	40.51564166	73.55876360	60
11/08/11	21:13	110811_2113	1106712	126323	40.51255662	73.55958198	60
11/08/11	22:20	110811_2220	1112555	128736	40.51909729	73.53852380	63

Figure 3.2-1
SVP 080511_1221 taken during the Fall 2011 multibeam survey at the HARS.

1527.72	0.64
1527.77	1.36
1527.79	2.05
1527.79	2.75
1527.80	3.46
1527.80	4.17
1527.80	4.89
1527.79	5.60
1527.77	6.31
1527.72	7.00
1527.61	7.68
1527.35	8.38
1526.87	9.09
1524.99	9.84
1522.11	10.59
1520.01	11.34
1517.78	12.09
1515.81	12.85
1514.57	13.60
1513.53	14.36
1512.60	15.10
1511.25	15.86
1508.64	16.62
1506.05	17.35
1504.41	18.08
1503.36	18.82
1502.65	19.56
1501.92	20.28
1501.20	21.04
1500.70	21.80
1500.36	22.54
1499.94	23.26
1499.45	23.97
1498.76	24.63
1498.20	25.23
1497.80	25.76
1497.30	26.33
1496.79	26.94
1496.39	27.59
1496.17	28.25
1496.09	28.92
1496.09	29.52
1496.09	29.65

CTD PROFILE # 080511_1221

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
08/05/11	12:21	1035502	96003	97	40.43003153 73.81590871

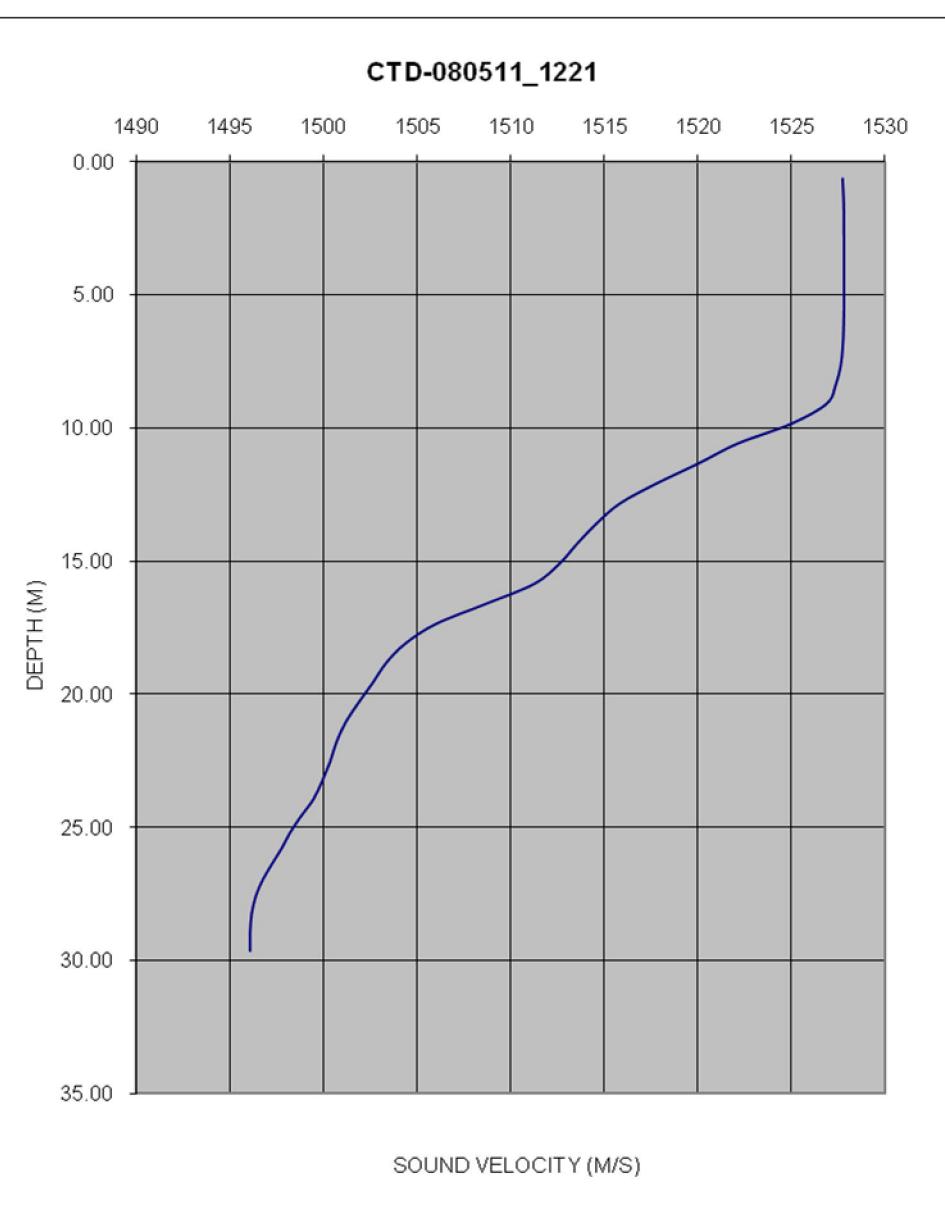


Figure 3.2-2
SVP 080511_1426 taken during the Fall 2011 multibeam survey at the HARS.

1527.29	0.19
1527.22	0.58
1527.21	0.98
1527.20	1.37
1527.11	1.89
1526.97	2.53
1526.88	3.18
1526.86	3.91
1526.90	4.60
1526.97	5.33
1526.85	6.07
1526.87	6.77
1527.09	7.46
1527.08	8.16
1526.43	8.86
1523.69	9.58
1520.73	10.31
1517.72	11.04
1515.31	11.75
1513.66	12.47
1511.57	13.17
1509.83	13.88
1508.70	14.60
1507.37	15.31
1505.84	16.02
1504.50	16.75
1503.62	17.48
1503.06	18.21
1502.45	18.94
1501.75	19.66
1501.18	20.38
1500.74	21.09
1500.24	21.82
1499.67	22.54
1499.14	23.24
1498.51	23.96
1497.69	24.69
1496.81	25.42
1496.23	26.16
1495.92	26.89
1495.71	27.61
1495.46	28.34
1495.24	29.07
1495.07	29.81
1494.90	30.56
1494.66	31.31
1494.43	32.05
1494.25	32.76
1494.23	33.32
1494.39	33.39

CTD PROFILE # 080511_1426

<u>Date</u>	<u>Time</u>	<u>NAD83 NY LI (Feet)</u>		<u>Water Depth</u>	<u>Latitude</u>	<u>Longitude</u>
		<u>Easting</u>	<u>Northing</u>			
08/05/11	14:26	1034146	86488	110	40.40392180	73.82084965

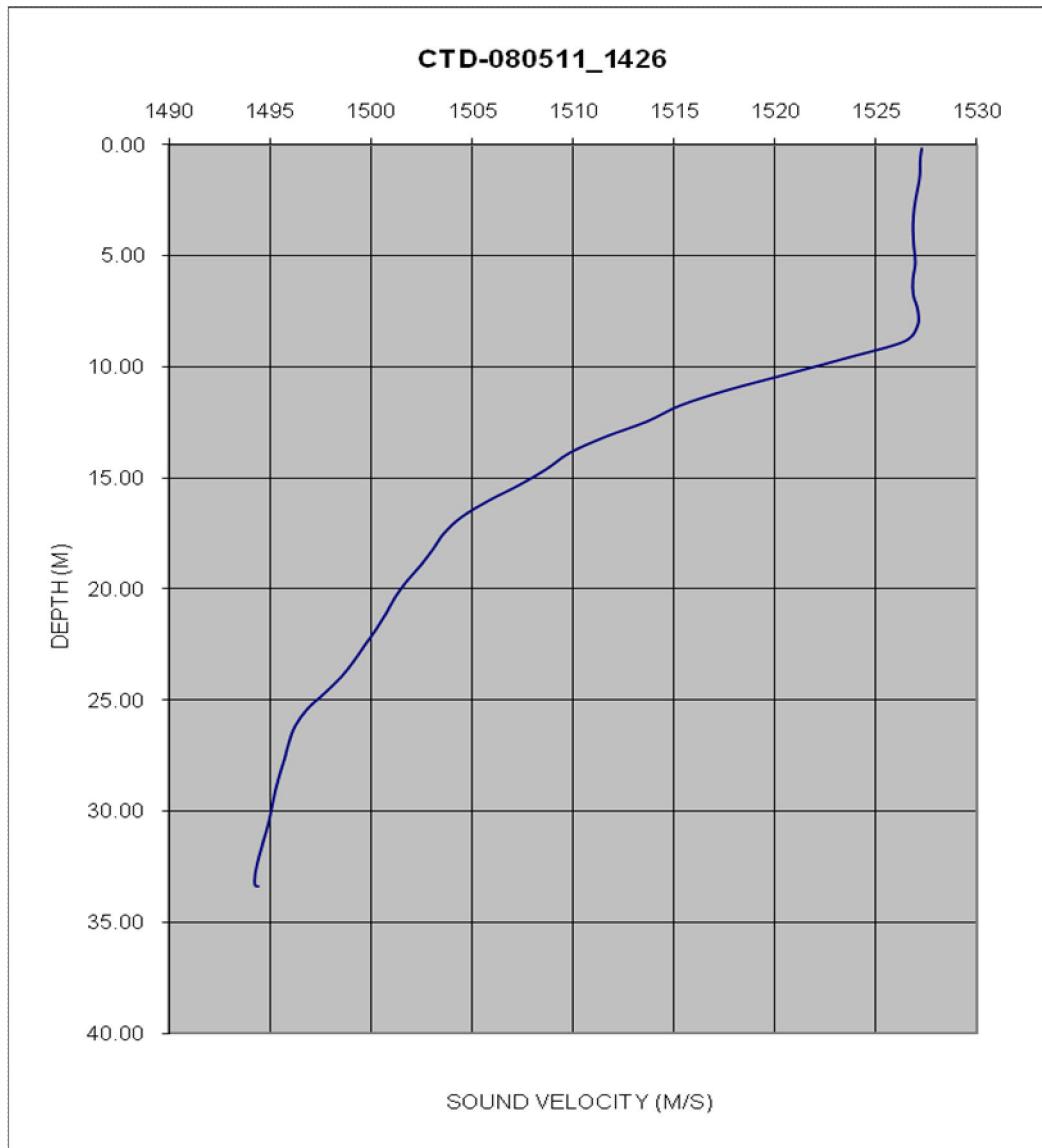


Figure 3.2-3

SVP 080511_1641 taken during the Fall 2011 multibeam survey at the HARS.

1527.65	0.72
1527.61	1.49
1527.57	2.23
1527.43	2.95
1527.17	3.64
1526.95	4.30
1526.86	4.93
1526.79	5.52
1526.72	6.13
1526.67	6.73
1526.57	7.31
1526.48	7.89
1526.37	8.48
1526.17	9.07
1525.73	9.67
1525.13	10.28
1524.17	10.89
1522.93	11.51
1520.89	12.14
1518.25	12.76
1515.32	13.39
1513.14	14.02
1511.69	14.66
1510.47	15.32
1507.90	15.98
1505.43	16.64
1504.01	17.30
1503.18	17.96
1502.54	18.62
1502.00	19.28
1501.69	19.93
1501.48	20.58
1501.17	21.23
1500.91	21.88
1500.64	22.52
1500.06	23.16
1499.20	23.79
1498.32	24.43
1497.78	25.08
1497.33	25.73
1496.70	26.39
1496.24	27.06
1496.03	27.74
1495.92	28.40
1495.89	28.66
1495.92	28.72

CTD PROFILE # 080511 1641

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
08/05/11	16:41	1032337	96002	94	40.43004556 73.82727421

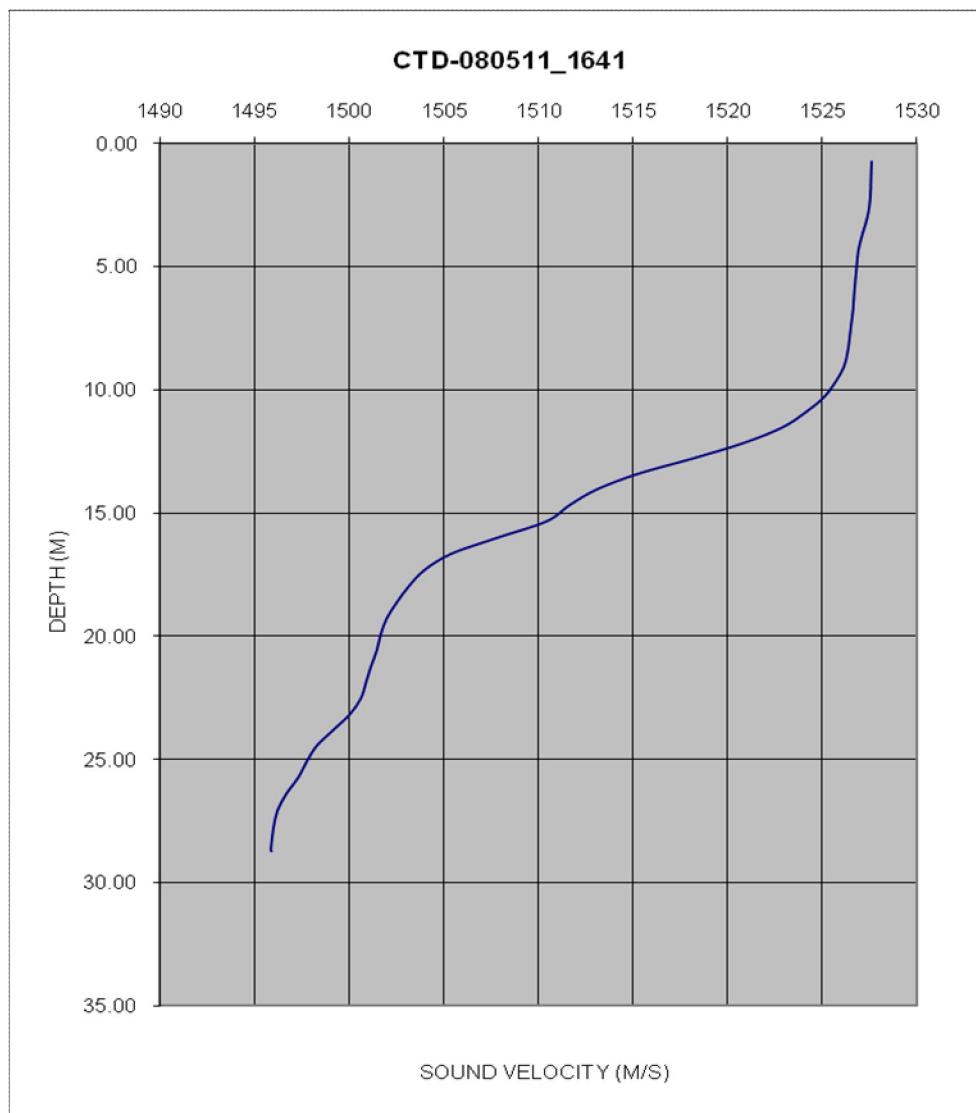


Figure 3.2-4
SVP 080511_1855 taken during the Fall 2011 multibeam survey at the HARS.

1528.07	0.23
1528.04	0.95
1528.02	1.63
1527.98	2.26
1527.90	2.87
1527.77	3.45
1527.59	4.02
1527.48	4.58
1527.32	5.13
1527.18	5.69
1527.11	6.24
1527.04	6.81
1526.97	7.38
1526.78	7.96
1526.34	8.55
1525.68	9.13
1524.63	9.74
1523.13	10.35
1520.63	10.96
1517.73	11.57
1515.58	12.18
1513.85	12.78
1512.43	13.39
1511.22	14.00
1509.81	14.62
1507.15	15.26
1504.86	15.90
1503.59	16.54
1502.94	17.19
1502.64	17.86
1502.43	18.52
1502.22	19.18
1502.09	19.85
1501.96	20.50
1501.64	21.15
1501.07	21.80
1500.59	22.45
1500.25	23.10
1499.95	23.75
1499.33	24.39
1498.48	25.04
1497.89	25.69
1497.48	26.35
1497.11	27.01
1496.97	27.54
1497.33	27.63

CTD PROFILE # 080511 1855

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
08/05/11	18:55	1029848	86374	91	40.40363137
					73.83627973

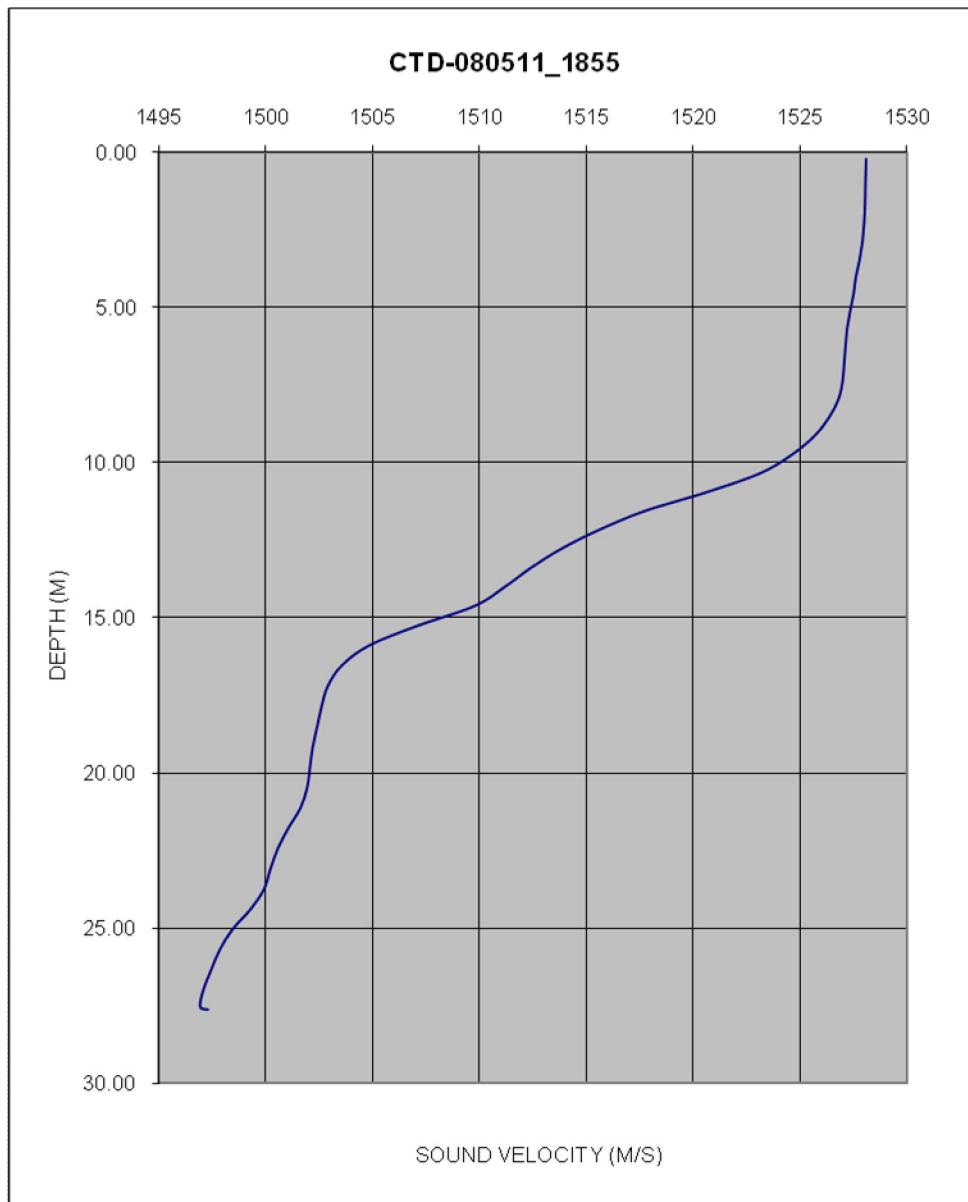


Figure 3.2-5
SVP 080511_2043 taken during the Fall 2011 multibeam survey at the HARS.

1527.76	0.46
1527.73	1.13
1527.74	1.86
1527.75	2.56
1527.75	3.22
1527.66	3.88
1527.49	4.54
1527.23	5.20
1526.51	5.84
1525.49	6.47
1524.53	7.11
1523.02	7.75
1521.32	8.40
1519.39	9.07
1517.52	9.73
1515.54	10.38
1514.05	11.03
1513.16	11.68
1512.66	12.34
1512.12	13.01
1511.06	13.68
1509.61	14.34
1508.39	15.01
1507.31	15.67
1506.61	16.33
1506.10	17.00
1505.49	17.65
1504.87	18.31
1504.44	18.97
1504.24	19.62
1504.11	20.28
1503.90	20.93
1503.26	21.58
1501.65	22.25
1500.22	22.93
1499.56	23.61
1499.31	24.31
1499.19	25.01
1499.32	25.39
1499.73	25.43

CTD PROFILE # 080511 2043

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
08/05/11	20:43	990062	125798	84	40.51195917 73.97909951

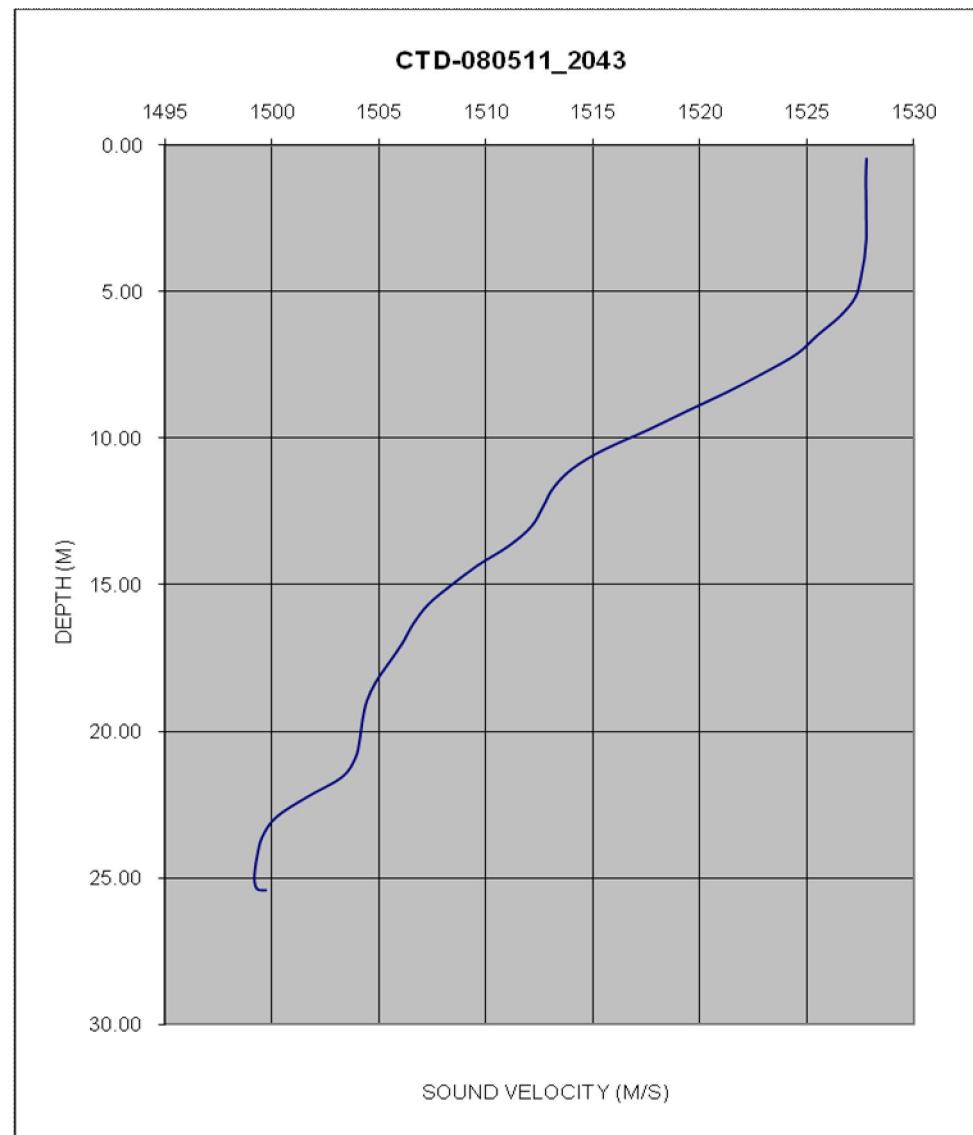


Figure 3.2-6
SVP 071011_1132 taken during the Fall 2011 multibeam survey at the HARS

1523.51 0.69

1523.53 1.39

1523.43 2.09

CTD PROFILE # 071011_1132

1523.29 2.78

1523.16 3.47

1523.03 4.12

1522.97 4.84

1523.13 5.62

1523.16 6.40

1523.02 7.15

1523.16 7.92

1523.28 8.68

1521.70 9.43

1519.28 10.15

1517.26 10.84

1515.22 11.52

1513.15 12.23

1510.83 12.95

1508.52 13.65

1507.04 14.35

1506.47 15.06

1505.96 15.78

1504.94 16.49

1503.94 17.18

1502.88 17.86

1502.23 18.55

1501.94 19.25

1501.72 19.95

1501.00 20.66

1499.06 21.36

1496.90 22.07

1495.71 22.78

1495.25 23.52

1495.19 24.17

1495.53 24.36

<u>Date</u>	<u>Time</u>	<u>NAD83 NY LI (Feet)</u>	<u>Water Depth</u>	<u>Latitude</u>	<u>Longitude</u>
		<u>Easting</u>	<u>Northing</u>	<u>Feet</u>	<u>N</u>
08/10/11	11:32	1028913	95822	80	40.42957052 73.83957736

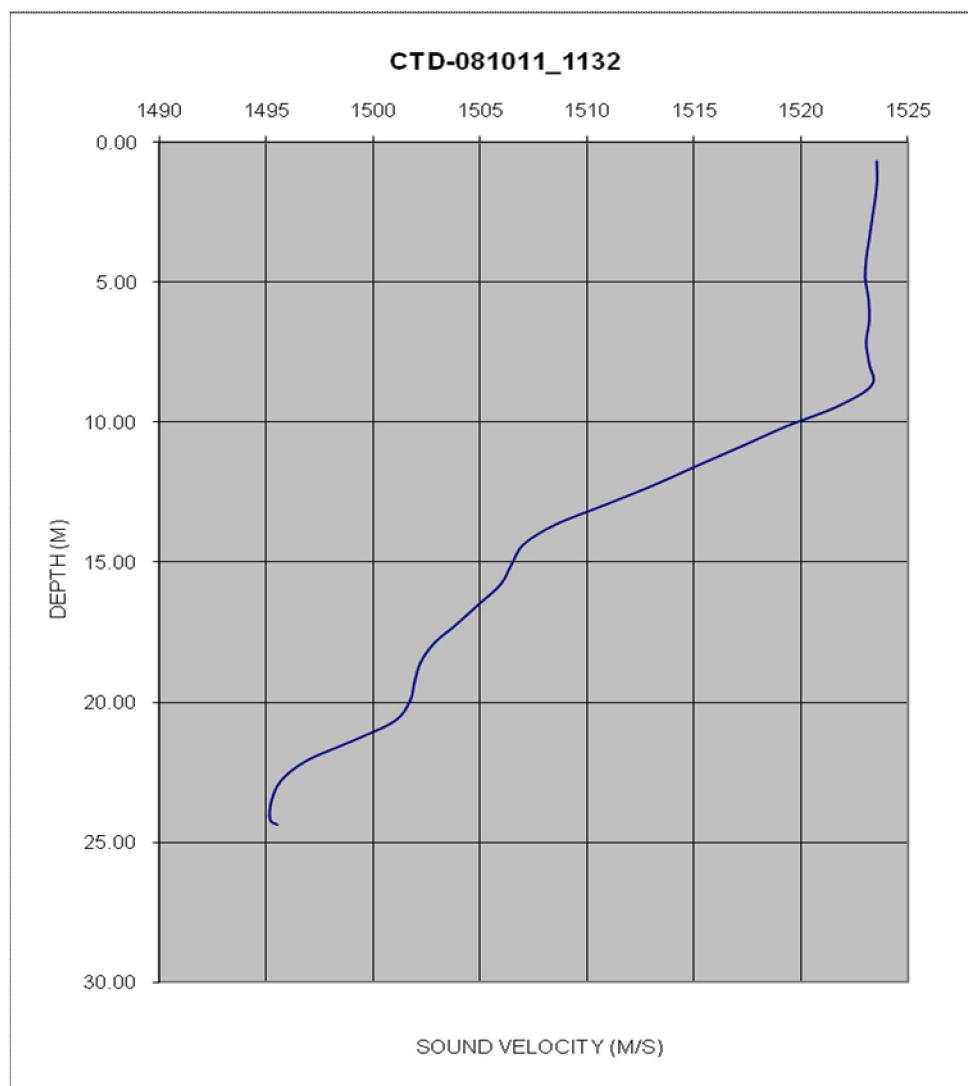


Figure 3.2-7
SVP 071011_1330 taken during the Fall 2011 multibeam survey at the HARS

1523.18	0.07
1522.84	0.84
1522.71	1.62
1522.66	2.42
1522.60	3.18
1522.59	3.87
1522.84	4.51
1523.15	5.14
1523.81	5.76
1524.65	6.37
1525.80	6.98
1526.62	7.59
1526.65	8.22
1526.23	8.85
1525.77	9.49
1525.31	10.13
1524.18	10.78
1522.32	11.42
1519.89	12.06
1515.89	12.69
1511.27	13.32
1508.30	13.96
1506.65	14.59
1505.67	15.22
1505.07	15.83
1504.69	16.43
1504.36	17.05
1504.04	17.67
1503.75	18.32
1503.58	18.97
1503.77	19.31
1503.89	19.46
1503.52	19.56

CTD PROFILE # 071011_1330

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
08/10/11	13:30	1026965	86255	64	40.40332123
					73.84663163

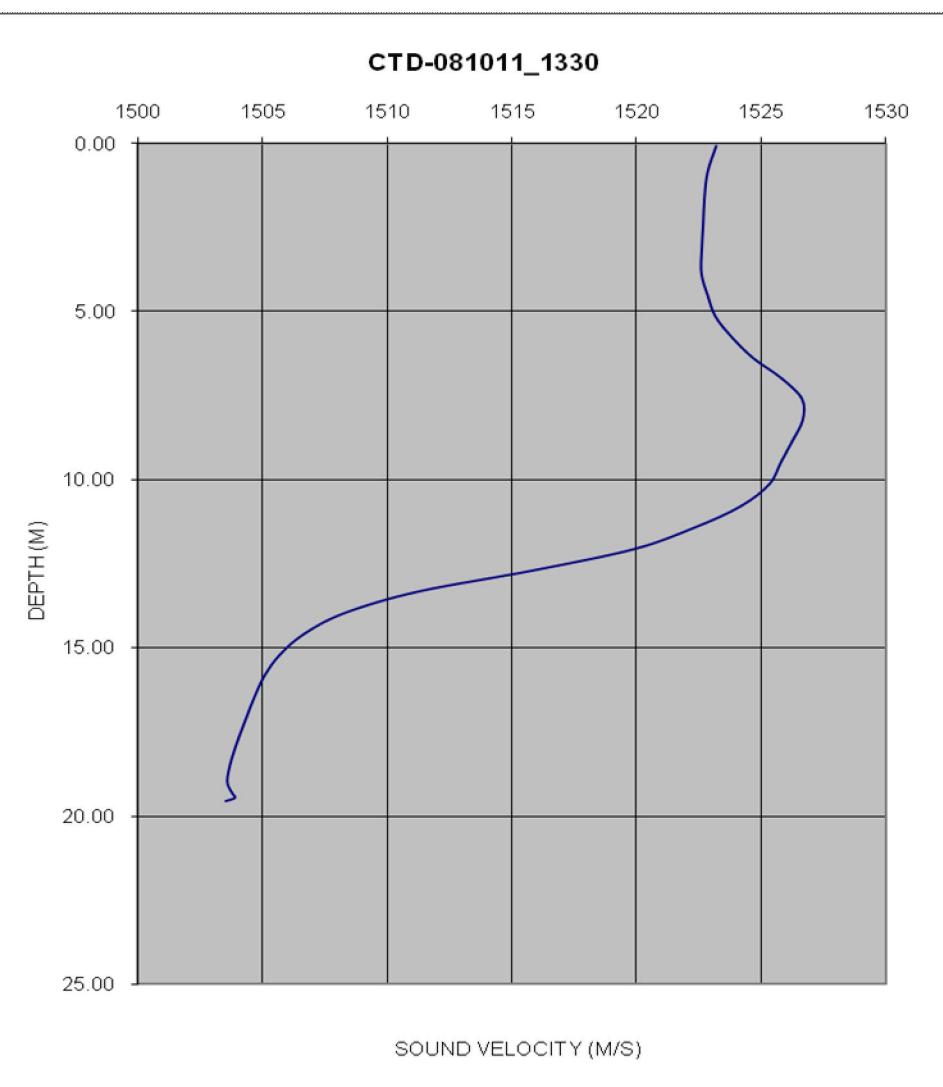


Figure 3.2-8
SVP 071011_1538 taken during the Fall 2011 multibeam survey at the HARS

1524.38 0.18

1524.23 0.88

1524.06 1.54

CTD PROFILE # 071011_1538

1523.76 2.17

1523.42 2.75

1523.08 3.31

<u>Date</u>	<u>Time</u>	<u>NAD83 NY LI (Feet)</u>		<u>Water Depth</u>	<u>Latitude</u>	<u>Longitude</u>
		<u>Easting</u>	<u>Northing</u>	<u>Feet</u>	<u>N</u>	<u>W</u>
08/10/11	15:38	1026129	95881	68	40.42974622	73.84957395

1522.89 3.85

1522.72 4.39

1522.53 4.94

1522.36 5.51

1522.25 6.08

1521.98 6.66

1521.67 7.26

1521.44 7.85

1521.21 8.45

1521.16 9.07

1520.87 9.68

1519.74 10.27

1519.00 10.86

1518.71 11.44

1517.07 12.02

1513.88 12.61

1511.56 13.22

1510.50 13.84

1510.01 14.47

1509.52 15.11

1509.02 15.75

1507.71 16.40

1506.17 17.05

1504.98 17.70

1504.21 18.36

1503.64 19.02

1502.96 19.67

1502.37 20.33

1502.25 20.70

1502.73 20.77

1503.22 20.83

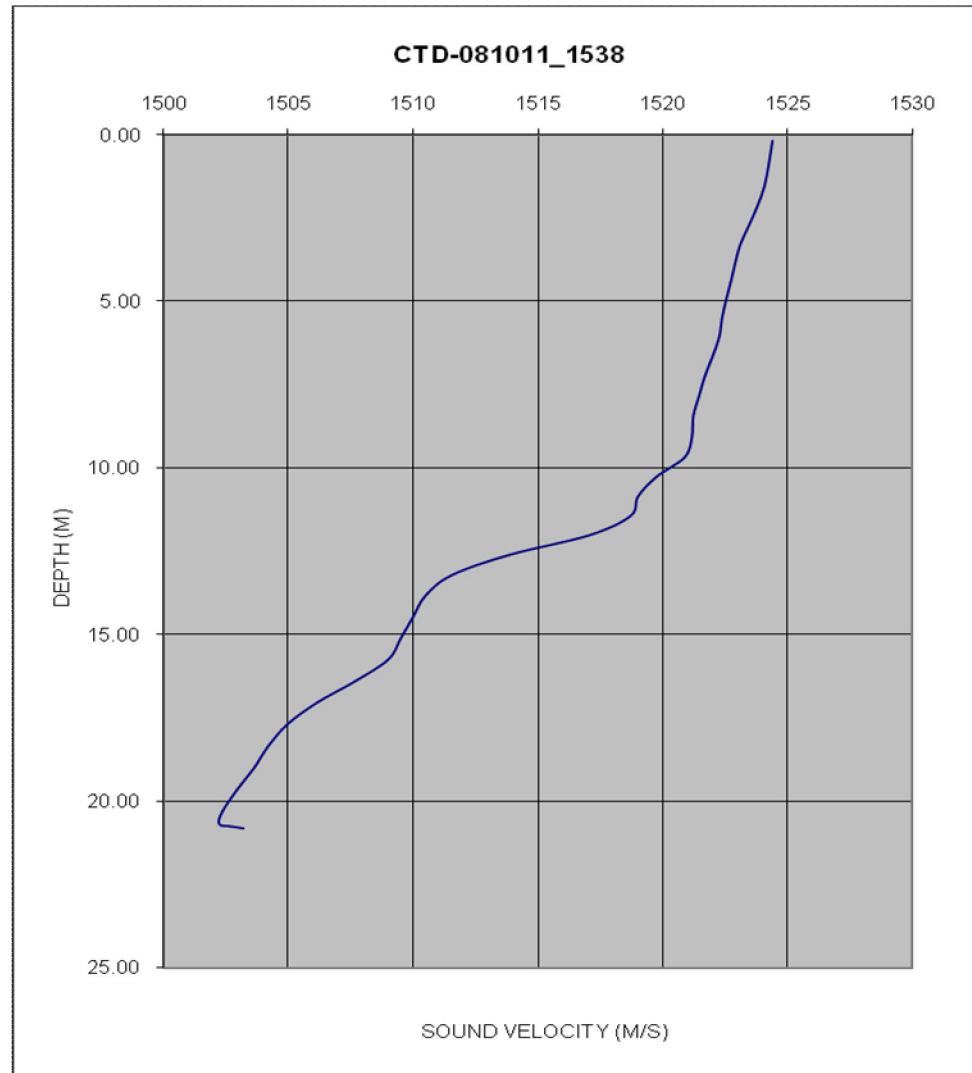


Figure 3.2-9
SVP 071011_1740 taken during the Fall 2011 multibeam survey at the HARS

1525.11	0.04
1524.94	0.79
1524.80	1.46
1524.61	2.10
1524.48	2.66
1524.38	3.19
1524.41	3.75
1524.50	4.31
1524.53	4.88
1524.53	5.46
1524.49	6.04
1524.64	6.62
1525.18	7.23
1526.84	7.89
1527.72	8.53
1527.95	9.16
1527.89	9.79
1527.58	10.42
1527.14	11.06
1526.63	11.70
1525.28	12.34
1522.28	13.00
1518.67	13.66
1512.80	14.32
1507.87	14.99
1505.75	15.66
1505.03	16.27
1505.36	16.43
1506.34	16.48
1507.11	16.49

CTD PROFILE # 071011_1740

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
08/10/11	17:40	1024368	86414	54	40.40376864
					73.85595992

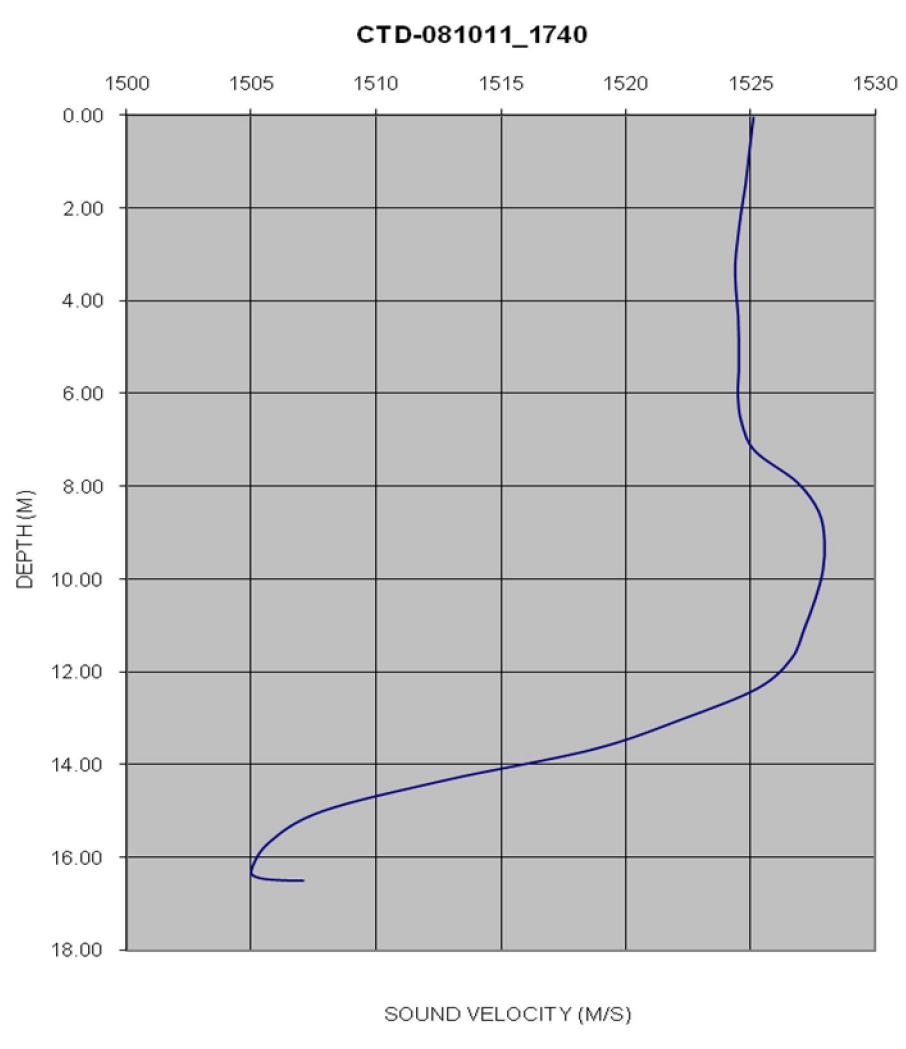


Figure 3.2-10
SVP 071011_1859 taken during the Fall 2011 multibeam survey at the HARS

1525.73	0.55
1525.47	1.36
1525.12	2.17
1524.65	2.98
1524.11	3.80
1523.62	4.59
1523.34	5.33
1523.23	6.03
1523.22	6.72
1523.22	7.39
1523.29	8.04
1523.77	8.69
1524.05	9.33
1523.60	9.95
1523.79	10.56
1524.63	11.18
1524.88	11.79
1522.50	12.40
1519.17	13.01
1515.71	13.64
1511.76	14.27
1509.07	14.93
1507.50	15.60
1506.13	16.27
1504.39	16.95
1503.33	17.62
1502.68	18.30
1502.19	18.84
1502.56	18.92

CTD PROFILE # 071011_1859

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
08/10/11	18:59	1024922	95381	62	40.42837900 73.85391350

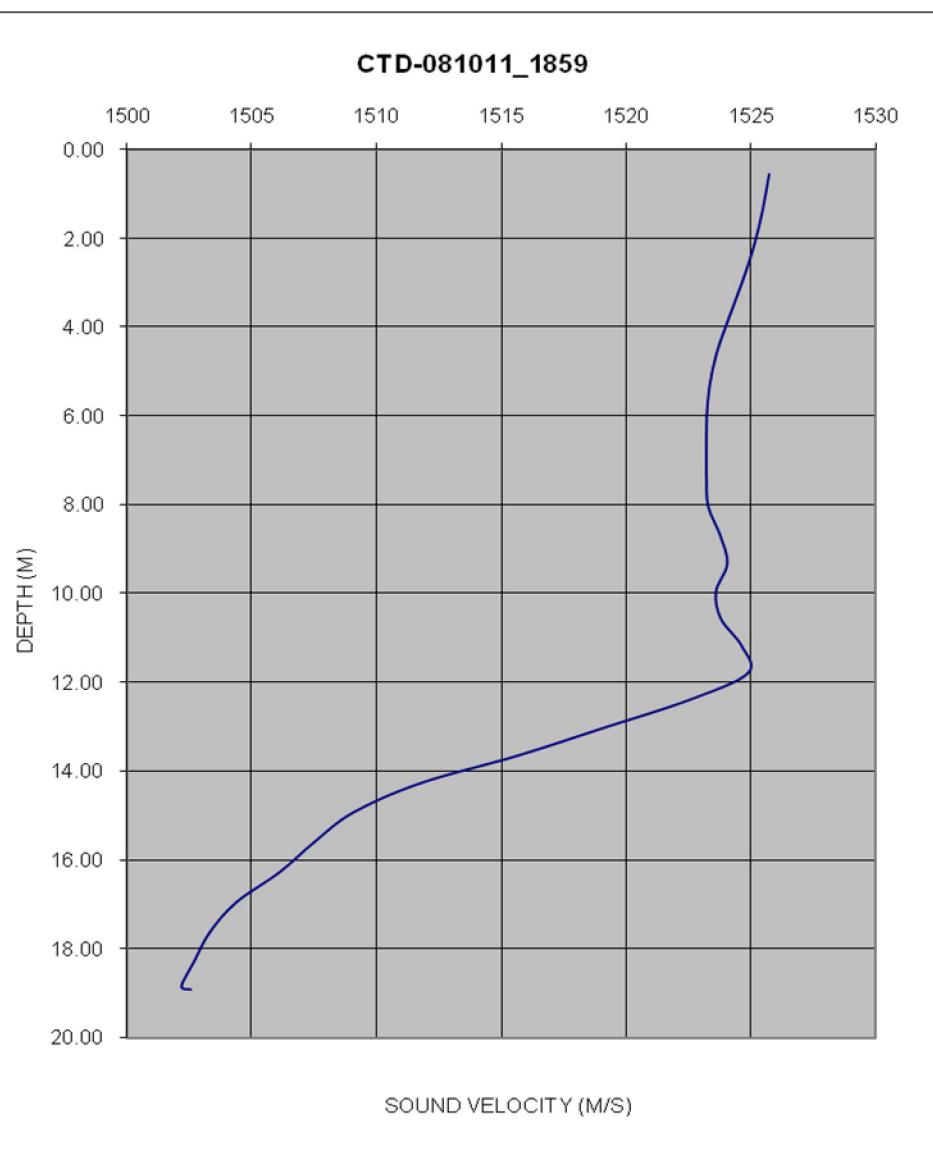


Figure 3.2-11
SVP 081111_1154 taken during the Fall 2011 multibeam survey at the HARS

1523.21	0.56
1523.21	1.25
1523.26	1.90
1523.37	2.56
1523.49	3.19
1523.72	3.81
1524.23	4.43
1525.18	5.05
1526.52	5.67
1527.08	6.30
1526.87	6.92
1526.36	7.55
1525.66	8.19
1524.47	8.84
1523.31	9.49
1522.23	10.14
1520.66	10.81
1518.11	11.49
1515.90	12.15
1513.85	12.81
1512.36	13.47
1511.08	14.13
1509.64	14.79
1507.67	15.46
1505.70	16.13
1504.44	16.77
1503.56	17.44
1502.93	18.12
1502.46	18.79
1501.84	19.46
1501.03	20.15
1500.37	20.82
1499.75	21.50
1498.63	22.17
1497.53	22.85
1496.82	23.52
1495.73	24.19
1494.33	24.88
1493.42	25.56
1492.98	26.25
1492.75	26.93
1492.54	27.62
1492.37	28.30
1492.24	28.98
1491.98	29.65
1491.67	30.33
1491.40	31.00
1491.23	31.67
1491.11	32.33
1491.05	33.00
1491.00	33.68
1491.05	34.26
1491.43	34.37
1491.96	34.37

CTD PROFILE # 081111_1154

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
08/11/11	11:54	1036081	86296	113	40.40338372 73.81390169

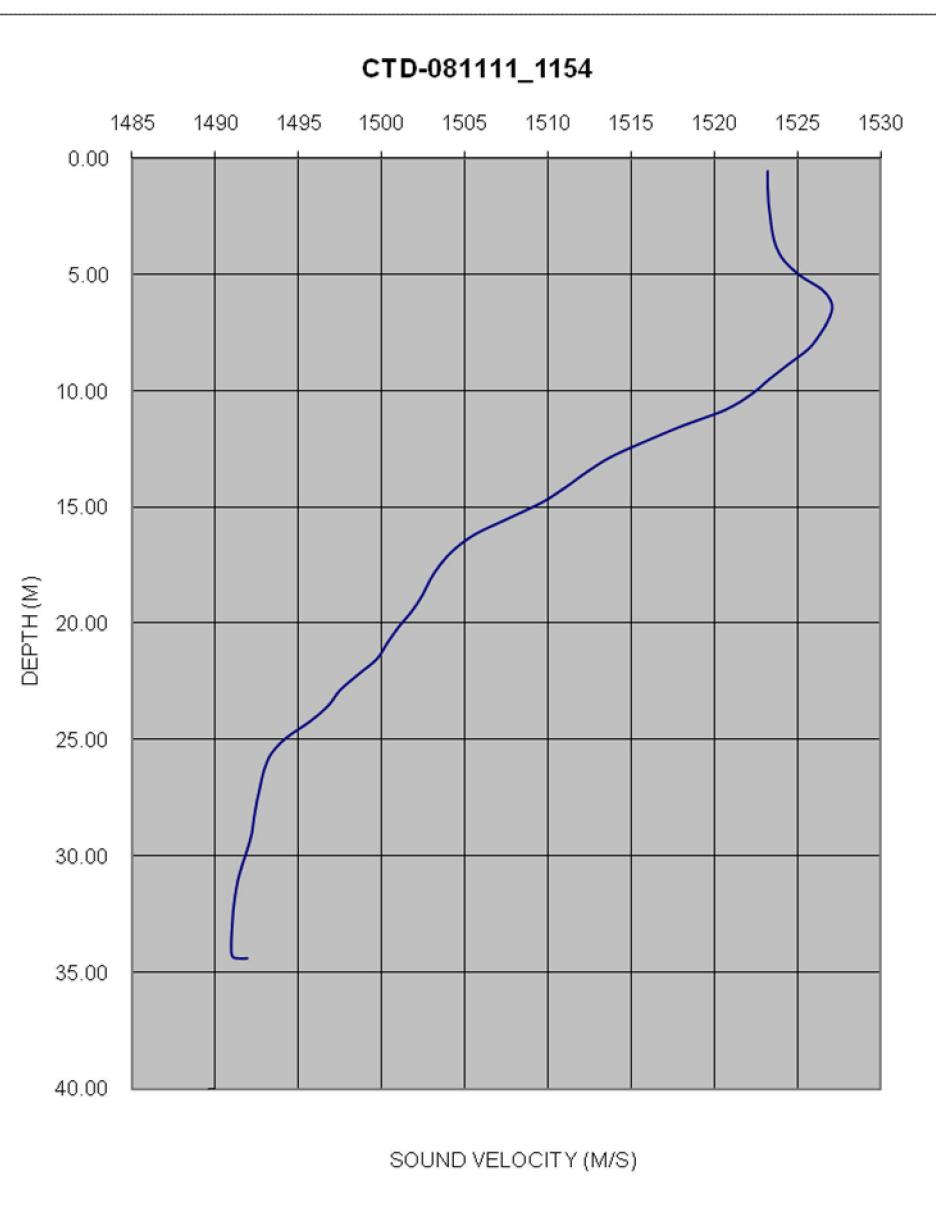


Figure 3.2-12
SVP 081111_1358 taken during the Fall 2011 multibeam survey at the HARS

1524.41	0.08
1524.31	0.71
1524.29	1.34
1524.28	1.95
1524.30	2.56
1524.33	3.17
1524.35	3.79
1524.47	4.39
1525.67	5.00
1526.45	5.62
1526.76	6.22
1527.00	6.83
1527.00	7.45
1526.91	8.08
1526.81	8.72
1526.63	9.37
1526.30	10.01
1525.67	10.66
1524.62	11.33
1522.77	11.98
1519.85	12.66
1517.44	13.34
1514.75	14.02
1513.21	14.69
1512.58	15.37
1511.87	16.05
1510.29	16.71
1507.99	17.37
1505.09	18.03
1502.58	18.71
1500.50	19.37
1498.85	20.03
1497.69	20.70
1496.64	21.38
1495.90	22.06
1495.34	22.73
1494.69	23.41
1494.09	24.08
1493.75	24.76
1493.60	25.44
1493.48	26.12
1493.34	26.82
1493.17	27.51
1492.92	28.20
1492.38	28.90
1491.63	29.59
1490.98	30.28
1490.50	30.96
1490.06	31.65
1489.86	32.27
1489.79	32.45

CTD PROFILE # 081111_1358

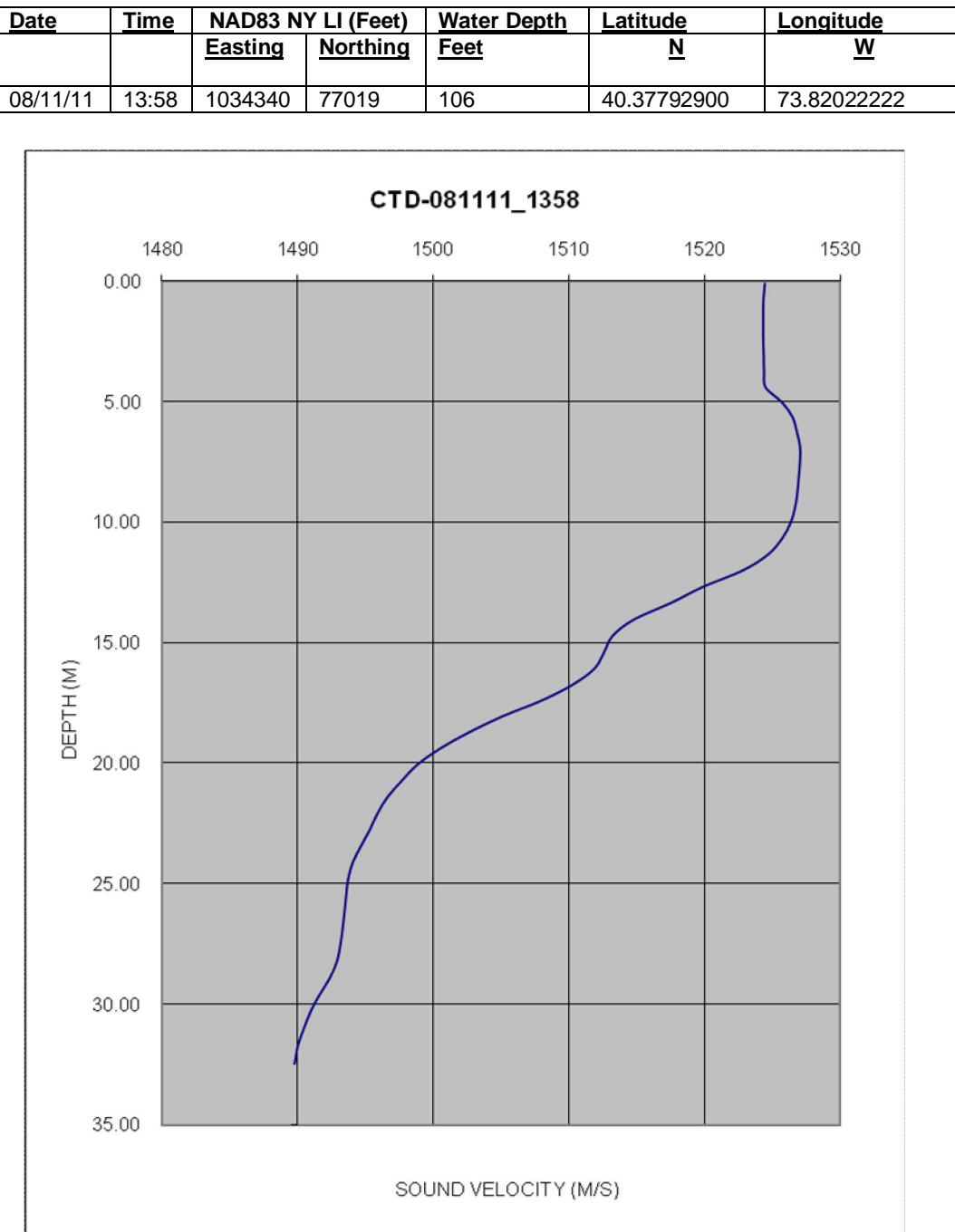


Figure 3.2-13
SVP 081111_1620 taken during the Fall 2011 multibeam survey at the HARS

1524.96	0.22
1524.97	1.01
1524.99	1.76
1524.88	2.45
1524.77	3.08
1524.70	3.72
1524.77	4.35
1525.00	4.98
1525.64	5.60
1526.34	6.23
1526.84	6.86
1527.03	7.51
1526.93	8.15
1526.79	8.79
1526.65	9.44
1526.41	10.11
1525.84	10.77
1525.07	11.44
1523.13	12.11
1519.08	12.77
1515.82	13.43
1513.78	14.09
1511.08	14.76
1508.45	15.44
1506.90	16.12
1506.20	16.80
1505.93	17.48
1505.73	18.16
1505.23	18.84
1503.85	19.53
1500.39	20.22
1497.69	20.90
1496.35	21.59
1495.65	22.26
1495.20	22.93
1494.76	23.61
1494.34	24.30
1494.08	24.99
1493.94	25.68
1493.85	26.37
1493.78	27.05
1493.71	27.74
1493.65	28.42
1493.55	29.09
1493.49	29.69
1493.83	29.85

CTD PROFILE # 081111_1620

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
08/11/11	16:20	1032054	86674	98	40.40444514 73.82835636

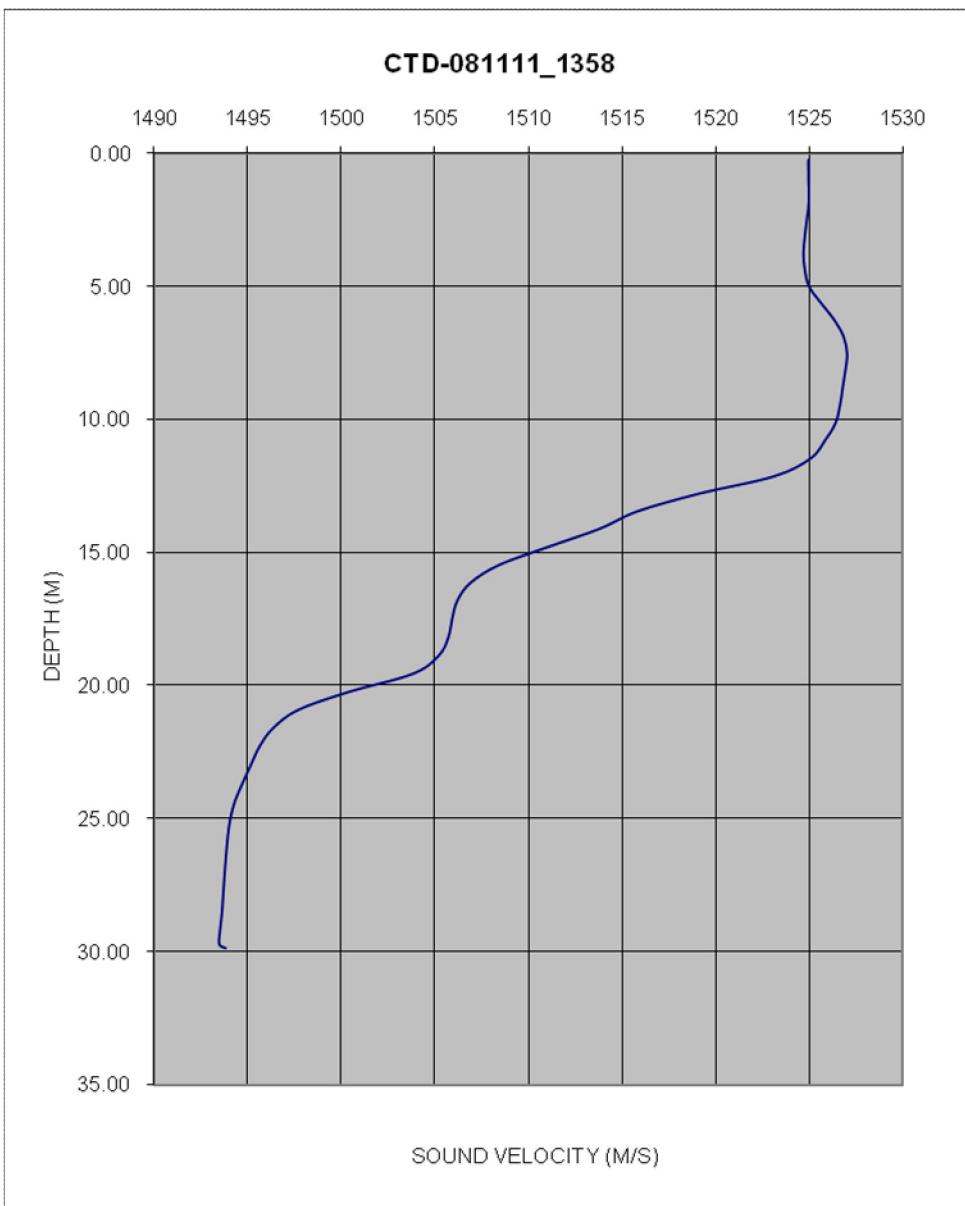


Figure 3.2-14
SVP 081111_1806 taken during the Fall 2011 multibeam survey at the HARS

1526.15	0.49
1525.82	1.26
1525.40	2.01
1525.03	2.73
1524.99	3.40
1525.21	4.04
1525.58	4.69
1526.21	5.34
1526.73	5.99
1526.96	6.65
1526.93	7.32
1526.75	7.99
1526.46	8.68
1526.10	9.35
1525.76	10.03
1525.19	10.72
1523.58	11.41
1521.09	12.08
1518.19	12.75
1515.65	13.41
1514.12	14.06
1513.44	14.73
1512.15	15.38
1509.86	16.05
1507.43	16.71
1505.73	17.38
1504.91	18.06
1504.34	18.75
1502.88	19.45
1499.65	20.13
1497.00	20.82
1495.92	21.51
1495.42	22.21
1495.14	22.91
1494.94	23.61
1494.84	24.31
1494.76	25.01
1494.70	25.70
1494.63	26.37
1494.53	27.04
1494.29	27.71
1494.03	28.07

CTD PROFILE # 081111 1806

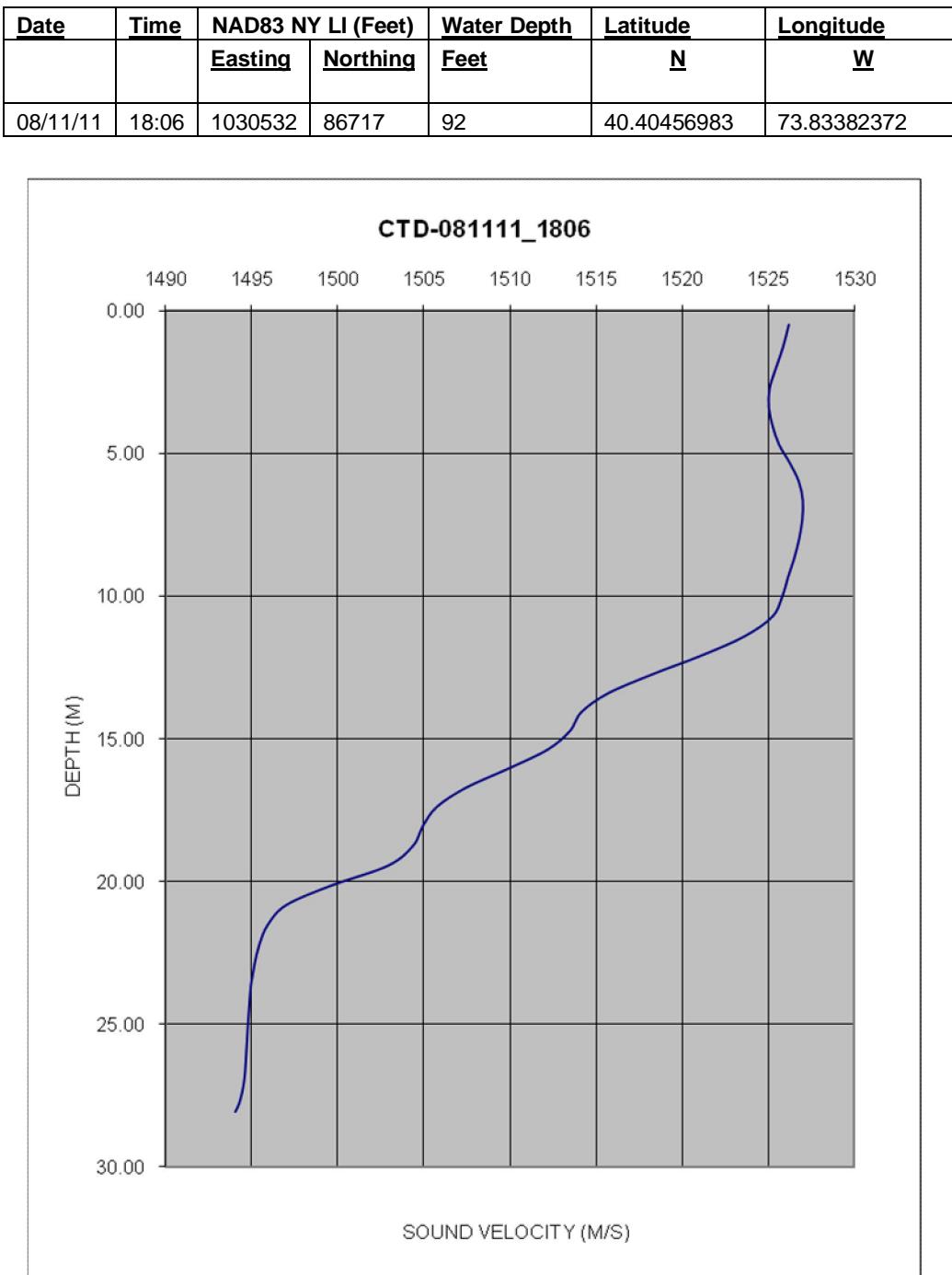


Figure 3.2-15
SVP 081111_2000 taken during the Fall 2011 multibeam survey at the HARS

1527.27	0.02
1526.85	0.82
1526.54	1.67
1526.12	2.52
1525.71	3.28
1525.48	3.97
1525.81	4.66
1525.97	5.31
1526.05	5.95
1526.11	6.58
1526.27	7.22
1526.62	7.88
1526.94	8.54
1527.04	9.21
1526.96	9.89
1526.68	10.57
1526.31	11.24
1525.91	11.92
1525.19	12.59
1521.65	13.25
1516.69	13.91
1512.27	14.58
1508.52	15.26
1506.34	15.94
1505.49	16.64
1505.05	17.33
1504.56	18.03
1503.66	18.73
1501.98	19.43
1499.62	20.11
1497.62	20.80
1496.31	21.49
1495.53	22.18
1495.19	22.87
1495.02	23.57
1494.86	24.26
1494.75	24.96
1494.83	25.56

CTD PROFILE # 081111 2000

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
08/11/11	20:00	1028896	86751	84	40.40467277 73.83969581

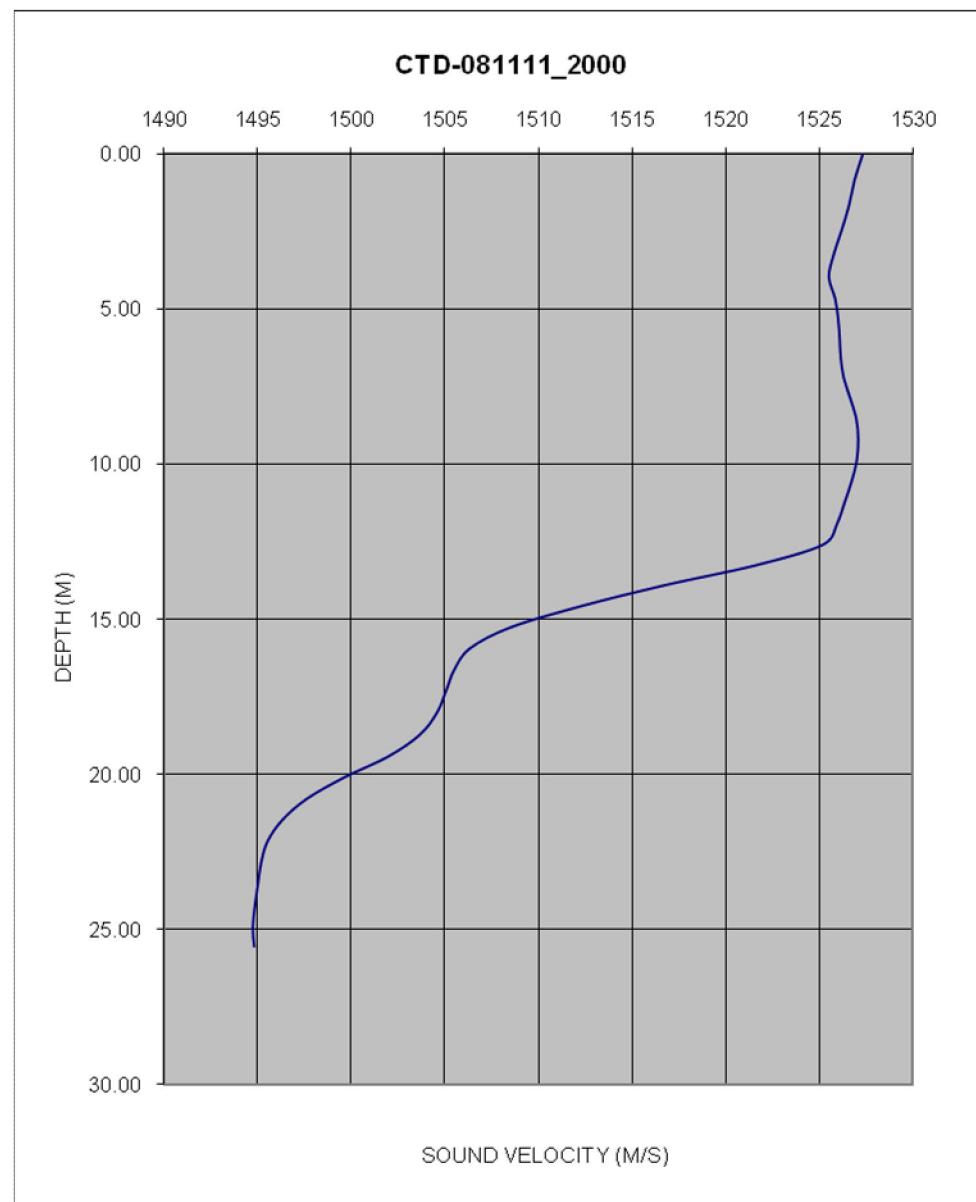


Figure 3.2-16
SVP 081111_2156 taken during the Fall 2011 multibeam survey at the HARS

1527.11	0.17
1526.97	0.86
1526.93	1.57
1526.92	2.26
1526.89	2.91
1526.79	3.51
1526.64	4.08
1526.49	4.64
1526.38	5.21
1526.35	5.80
1526.31	6.37
1526.43	6.95
1526.52	7.53
1526.70	8.13
1526.90	8.74
1526.92	9.34
1526.80	9.95
1526.48	10.57
1526.05	11.19
1525.50	11.81
1523.93	12.44
1520.66	13.08
1517.55	13.72
1514.18	14.37
1511.73	15.01
1510.49	15.66
1509.67	16.32
1508.60	16.97
1507.05	17.63
1505.26	18.28
1502.15	18.94
1499.31	19.59
1497.71	20.26
1496.53	20.94
1495.86	21.62
1495.57	22.31
1495.49	23.00
1495.90	23.30
1496.82	23.35
1497.21	23.42

CTD PROFILE # 081111 2156

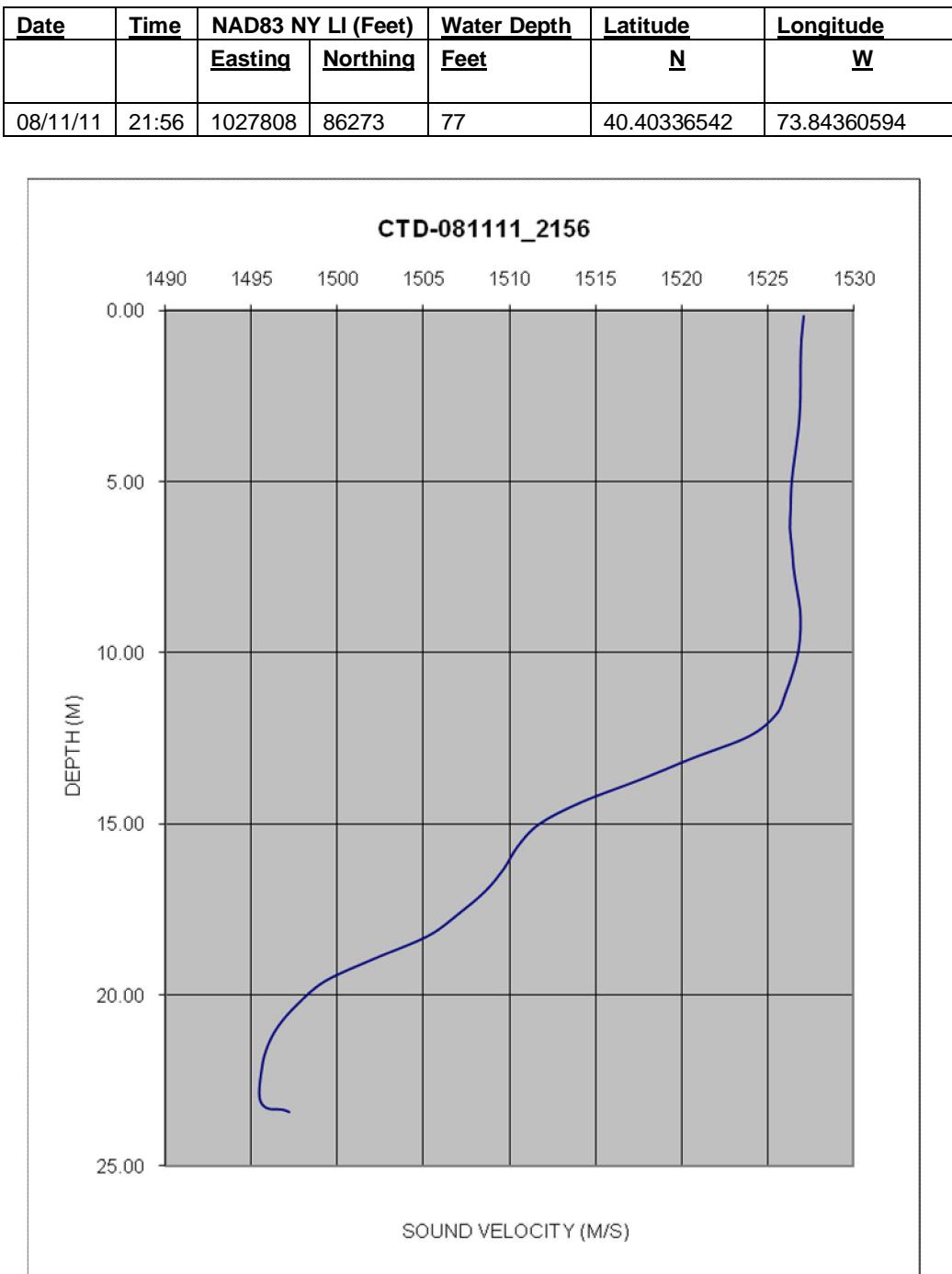


Figure 3.2-17
SVP 081211_1310 taken during the Fall 2011 multibeam survey at the HARS

1526.22 0.10

1526.35 0.86

1526.39 1.58

CTD PROFILE # 081211 1310

1526.42 2.26

1526.45 2.90

1526.49 3.49

<u>Date</u>	<u>Time</u>	<u>NAD83 NY LI (Feet)</u>	<u>Water Depth</u>	<u>Latitude</u>	<u>Longitude</u>	
		<u>Easting</u>	<u>Northing</u>	<u>Feet</u>	<u>N</u>	<u>W</u>
08/12/11	13:10	1027811	86183	74	40.40311903	73.84359430

1526.53 4.05

1526.56 4.65

1526.58 5.26

1526.62 5.87

1526.66 6.47

1526.74 7.07

1526.91 7.68

1527.02 8.28

1527.05 8.91

1527.00 9.54

1526.89 10.17

1526.75 10.80

1526.58 11.43

1525.46 12.09

1520.14 12.75

1515.01 13.41

1511.72 14.05

1510.23 14.71

1509.57 15.35

1508.93 16.01

1507.79 16.68

1506.37 17.32

1504.23 17.98

1502.43 18.63

1499.96 19.29

1497.03 19.95

1495.70 20.61

1495.33 21.28

1495.23 21.95

1495.22 22.47

1495.23 22.55

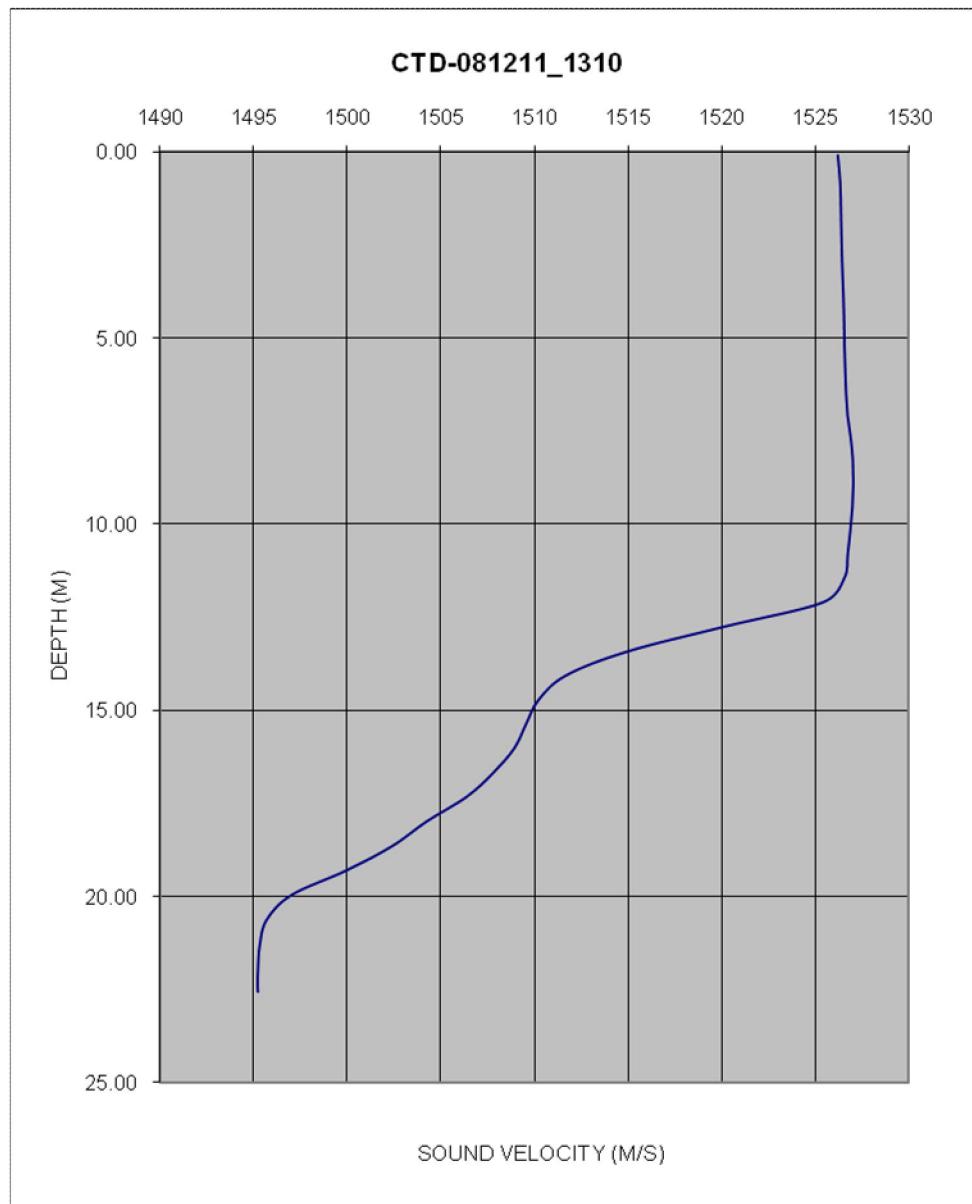


Figure 3.2-18
SVP 081211_1519 taken during the Fall 2011 multibeam survey at the HARS

1527.82	0.30
1527.77	0.99
1527.74	1.64
1527.73	2.23
1527.71	2.78
1527.70	3.33
1527.70	3.90
1527.69	4.47
1527.67	5.04
1527.64	5.62
1527.60	6.22
1527.57	6.81
1527.50	7.40
1527.29	7.99
1526.95	8.60
1526.55	9.21
1526.11	9.81
1524.97	10.42
1523.37	11.05
1521.34	11.70
1519.62	12.34
1516.36	12.99
1513.31	13.64
1510.86	14.28
1508.84	14.93
1507.06	15.57
1505.06	16.21
1503.26	16.86
1502.44	17.44
1502.72	17.61

CTD PROFILE # 081211 1519

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
08/12/11	15:19	1027320	77136	58	40.37828828 73.84541598

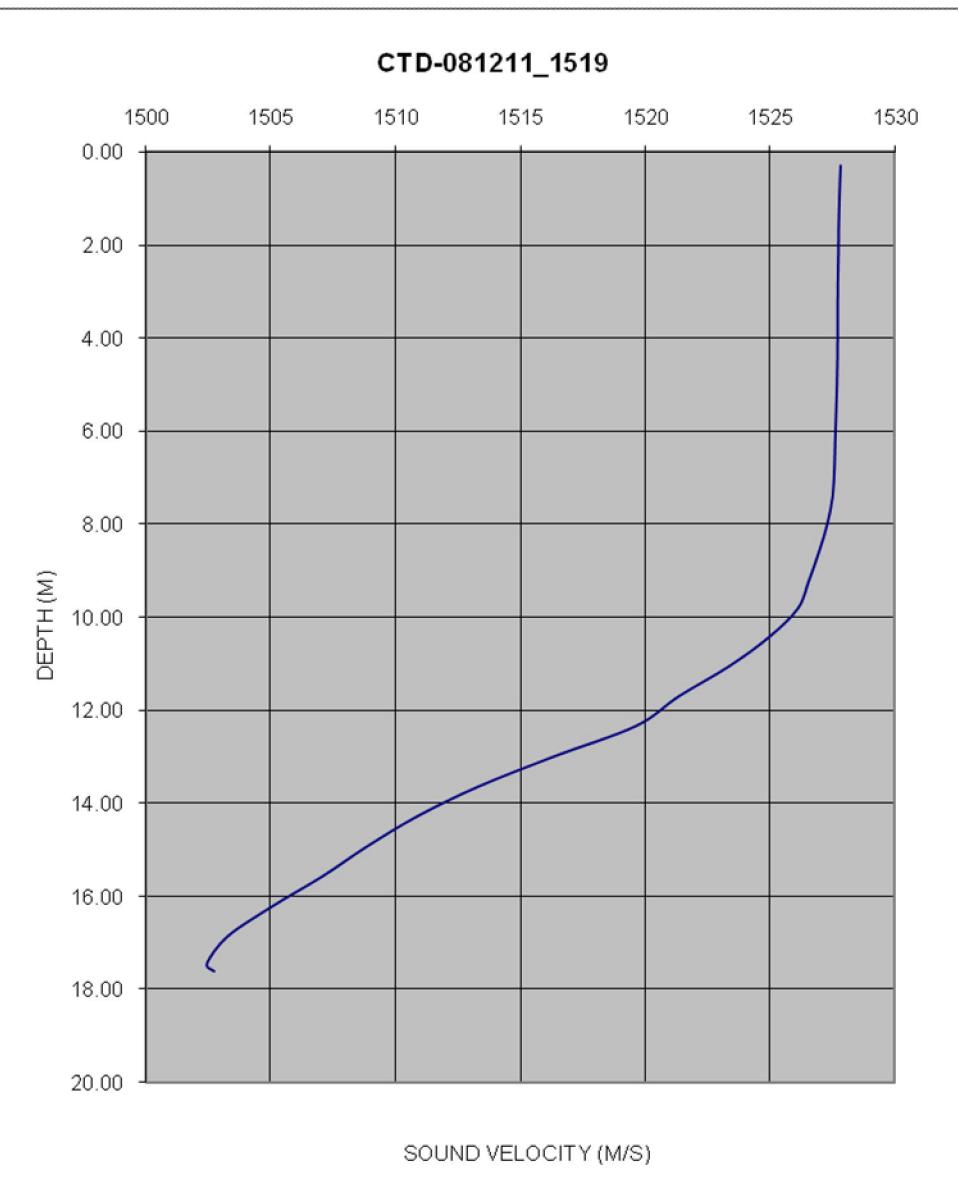


Figure 3.2-19
SVP 081211_1711 taken during the Fall 2011 multibeam survey at the HARS

1528.00	0.29
1527.81	0.99
1527.63	1.69
1527.49	2.36
1527.40	2.99
1527.35	3.63
1527.29	4.24
1527.21	4.82
1526.97	5.41
1526.66	6.03
1526.34	6.66
1525.73	7.30
1525.20	7.93
1523.29	8.57
1519.89	9.22
1517.60	9.87
1516.54	10.53
1516.19	11.18
1516.10	11.84
1516.10	12.50
1515.57	13.16
1513.67	13.81
1512.00	14.47
1510.44	15.13
1508.81	15.79
1506.69	16.47
1504.36	17.14
1502.93	17.82
1502.22	18.50
1501.49	19.14
1501.48	19.35

CTD PROFILE # 081211_1711

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
08/12/11	17:11	1024564	76914	63	40.37769113 73.85530879

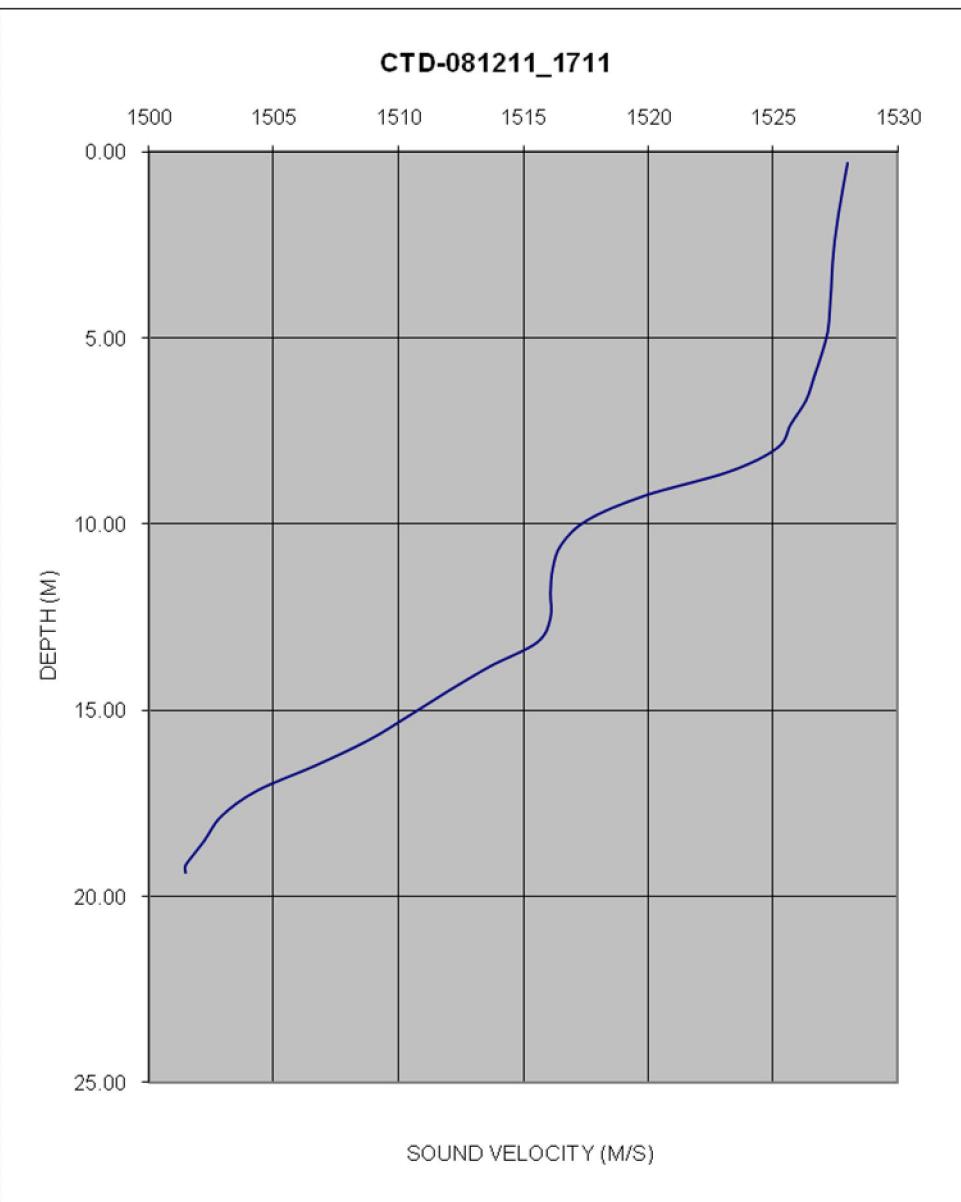


Figure 3.2-20
SVP 081211_1916 taken during the Fall 2011 multibeam survey at the HARS

1527.59	0.35
1527.47	1.06
1527.39	1.81
1527.04	2.61
1526.89	3.40
1526.82	4.17
1526.60	4.87
1526.17	5.54
1525.74	6.22
1525.35	6.89
1524.86	7.56
1524.11	8.21
1523.45	8.87
1523.17	9.51
1523.06	10.16
1522.97	10.82
1522.20	11.49
1520.11	12.13
1517.17	12.75
1514.68	13.37
1512.90	13.98
1510.11	14.58
1507.24	15.20
1505.68	15.80
1505.09	16.38
1504.91	16.60

CTD PROFILE # 081211 1916

<u>Date</u>	<u>Time</u>	<u>NAD83 NY LI (Feet)</u>	<u>Water Depth</u>	<u>Latitude</u>	<u>Longitude</u>
		<u>Easting</u>	<u>Northing</u>	<u>Feet</u>	<u>N</u>
08/12/11	19:16	1023972	86140	54	40.40301811 73.85738120

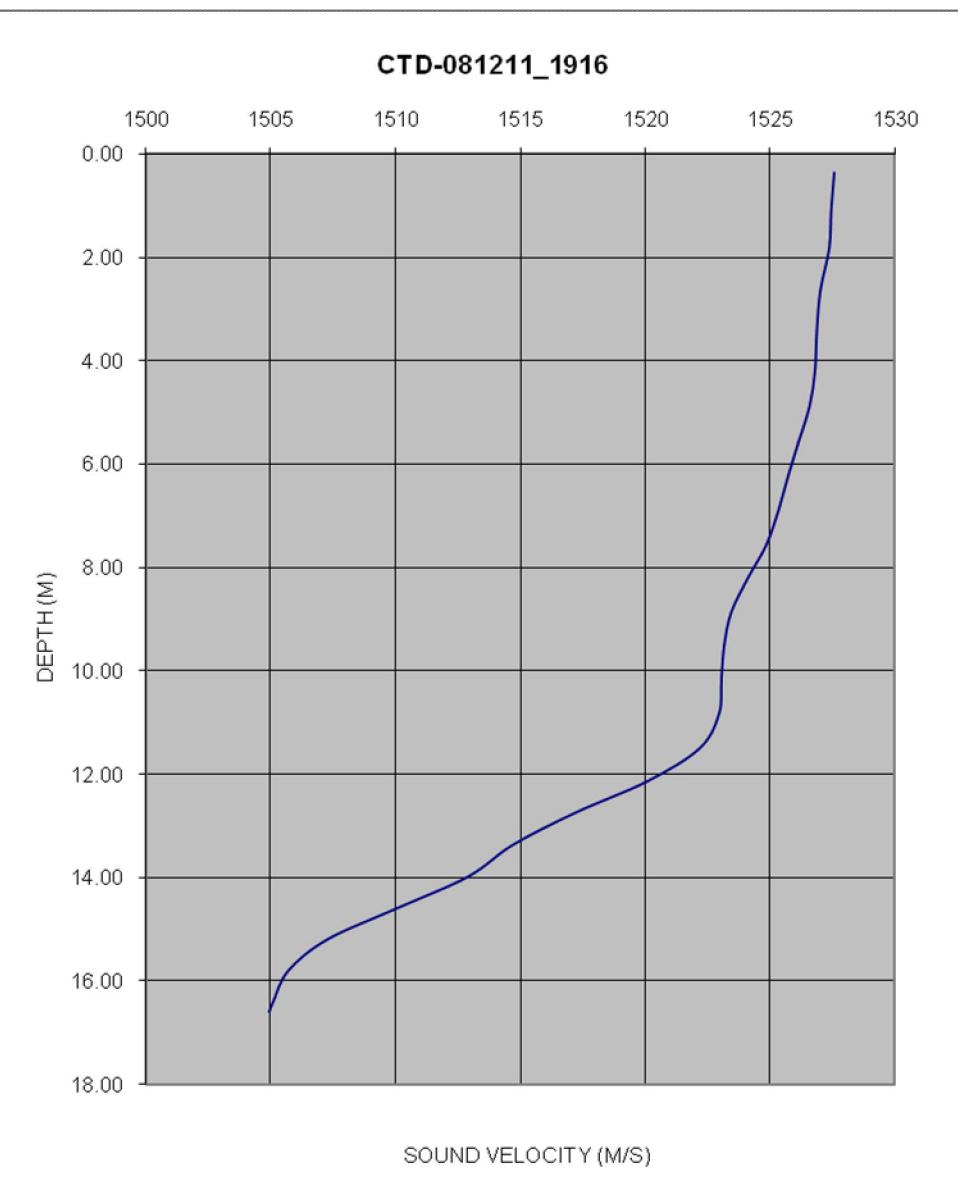


Figure 3.2-21
SVP 081211_2057 taken during the Fall 2011 multibeam survey at the HARS

1529.76	0.02
1529.69	0.67
1529.77	1.33
1529.70	1.96
1529.39	2.56
1529.05	3.17
1528.63	3.81
1528.25	4.48
1527.97	5.15
1527.76	5.82
1527.60	6.48
1527.51	7.13
1527.47	7.79
1527.41	8.45
1527.27	9.11
1526.94	9.77
1525.57	10.44
1522.08	11.11
1517.56	11.77
1513.54	12.46
1510.34	13.15
1508.09	13.84
1506.35	14.53
1505.33	15.23
1504.84	15.90
1504.62	16.57
1504.50	17.24
1504.39	17.92
1503.88	18.61
1502.92	19.30
1501.81	19.98
1501.00	20.65
1500.37	21.31
1499.85	21.97
1499.80	22.28

CTD PROFILE # 081211 2057

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
08/12/11	20:57	1030598	79091	73	40.38363736 73.83363682

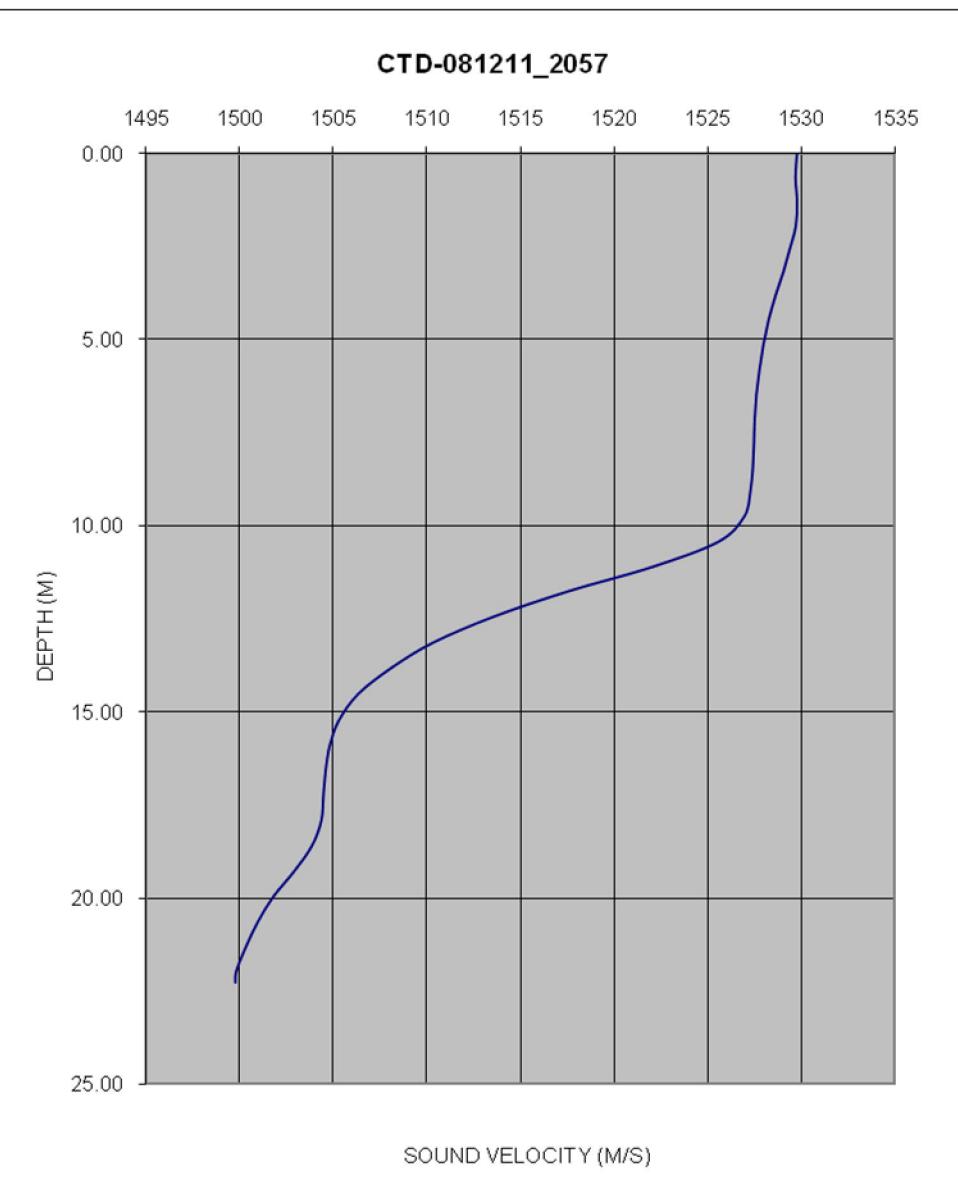


Figure 3.2-22
SVP 081611_1158 taken during the Fall 2011 multibeam survey at the HARS

1520.80	0.58
1520.78	1.42
1520.78	2.19
1520.78	2.89
1520.72	3.50
1520.65	4.09
1520.49	4.65
1520.25	5.23
1519.94	5.78
1519.63	6.34
1519.26	6.91
1518.41	7.48
1517.25	8.05
1516.29	8.63
1515.58	9.21
1515.00	9.80
1514.60	10.40
1513.00	11.01
1511.16	11.62
1509.38	12.23
1507.78	12.85
1506.45	13.46
1505.39	14.07
1504.76	14.70
1504.41	15.33
1504.17	15.98
1503.78	16.64
1503.23	17.30
1502.76	17.96
1502.41	18.63
1502.01	19.29
1501.61	19.96
1501.26	20.63
1500.83	21.30
1500.41	21.96
1500.07	22.65
1499.74	23.35
1499.49	24.03
1499.27	24.70
1499.05	25.38
1498.72	26.04
1498.42	26.70
1498.25	27.38
1498.18	28.09
1498.14	28.79
1498.12	29.47
1498.10	30.16
1498.10	30.83
1498.25	31.11

CTD PROFILE # 081611_1158

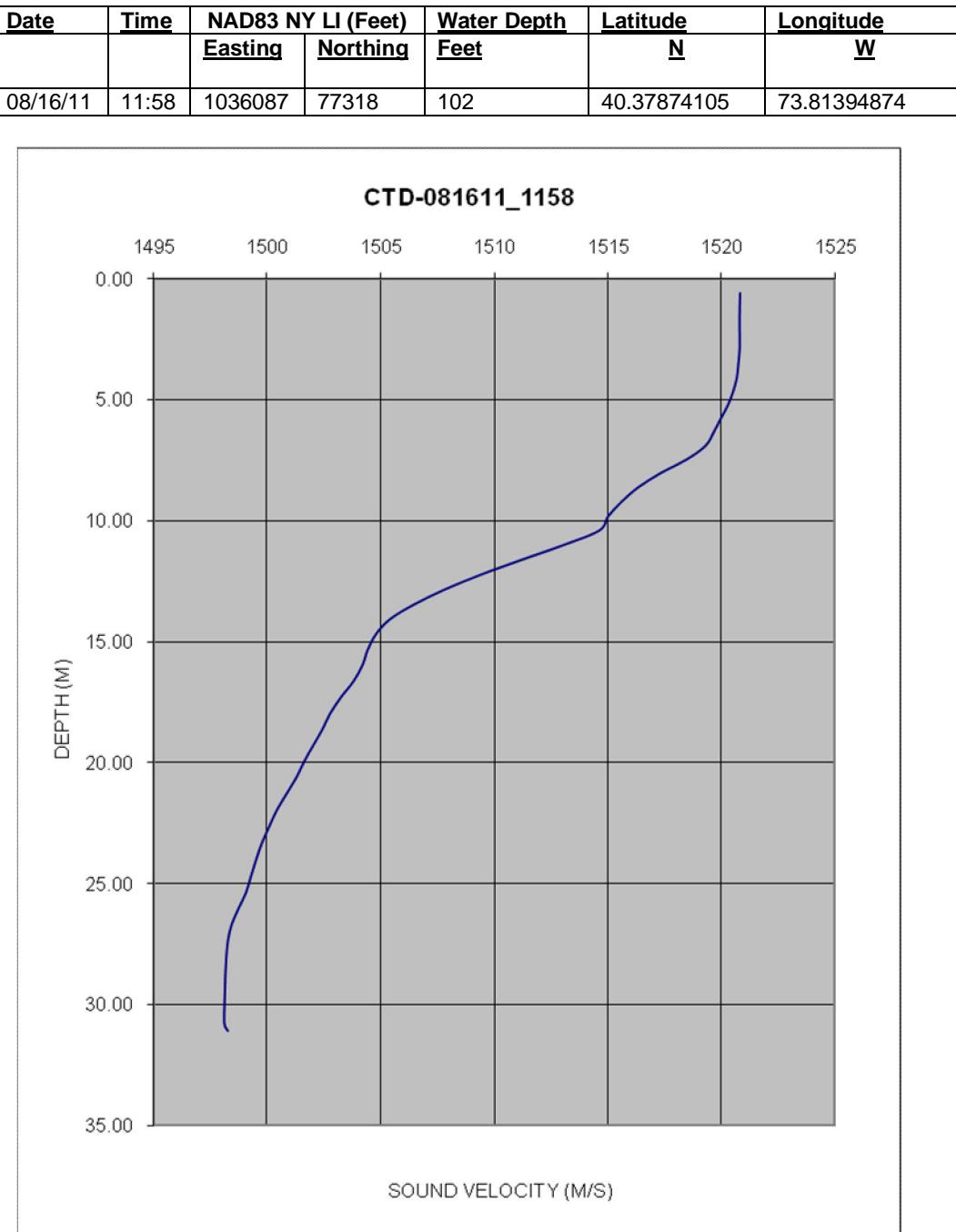


Figure 3.2-23
SVP 081611_1414 taken during the Fall 2011 multibeam survey at the HARS

1521.12	0.73
1521.10	1.49
1521.11	2.24
1521.12	3.04
1521.14	3.82
1521.17	4.57
1521.21	5.29
1521.18	5.98
1520.84	6.65
1520.35	7.32
1519.58	7.98
1518.20	8.63
1517.28	9.29
1516.99	9.96
1516.75	10.63
1516.12	11.32
1514.92	12.00
1513.63	12.69
1511.94	13.38
1509.95	14.10
1508.47	14.82
1507.22	15.52
1506.03	16.25
1505.10	16.97
1504.33	17.71
1503.67	18.45
1503.11	19.19
1502.76	19.95
1502.47	20.71
1501.97	21.47
1501.32	22.22
1500.67	22.98
1500.14	23.73
1499.55	24.48
1498.83	25.22
1498.40	25.98
1498.23	26.73
1498.17	27.49
1498.15	28.24
1498.15	28.98
1498.14	29.72
1498.14	30.46
1498.13	31.19
1498.01	31.90
1497.79	32.61
1497.49	33.29
1497.38	33.78
1497.62	33.81

CTD PROFILE # 081611 1414

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
08/16/11	14:14	1033636	67799	111	40.35262695 73.82281485

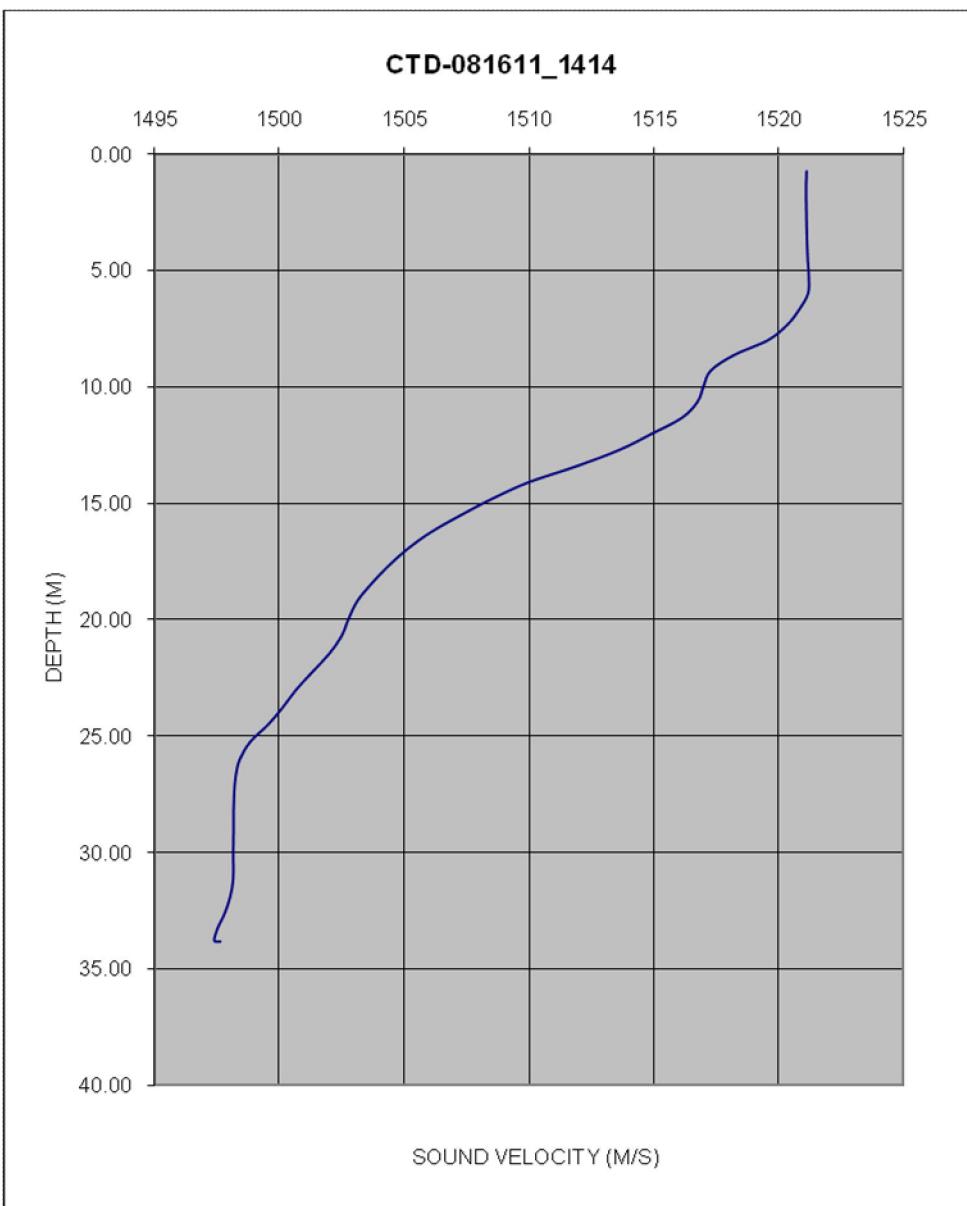


Figure 3.2-24
SVP 081611_1625 taken during the Fall 2011 multibeam survey at the HARS

1520.83	0.59
1520.78	1.22
1520.77	1.92
1520.78	2.64
1520.79	3.33
1520.80	4.01
1520.79	4.68
1520.74	5.34
1520.65	5.99
1520.48	6.65
1519.93	7.30
1518.92	7.98
1517.89	8.65
1516.69	9.32
1515.66	10.02
1514.91	10.76
1513.75	11.46
1512.59	12.16
1511.74	12.84
1510.70	13.55
1509.67	14.14
1508.99	14.71
1508.27	15.38
1507.18	16.12
1505.75	16.82
1504.59	17.55
1503.47	18.27
1502.54	18.99
1502.10	19.71
1501.95	20.42
1501.88	21.17
1501.84	21.87
1501.73	22.59
1501.60	23.28
1501.42	23.98
1501.27	24.68
1501.21	25.38
1501.18	26.08
1501.11	26.77
1501.07	27.43
1501.20	27.78

CTD PROFILE # 081611_1625

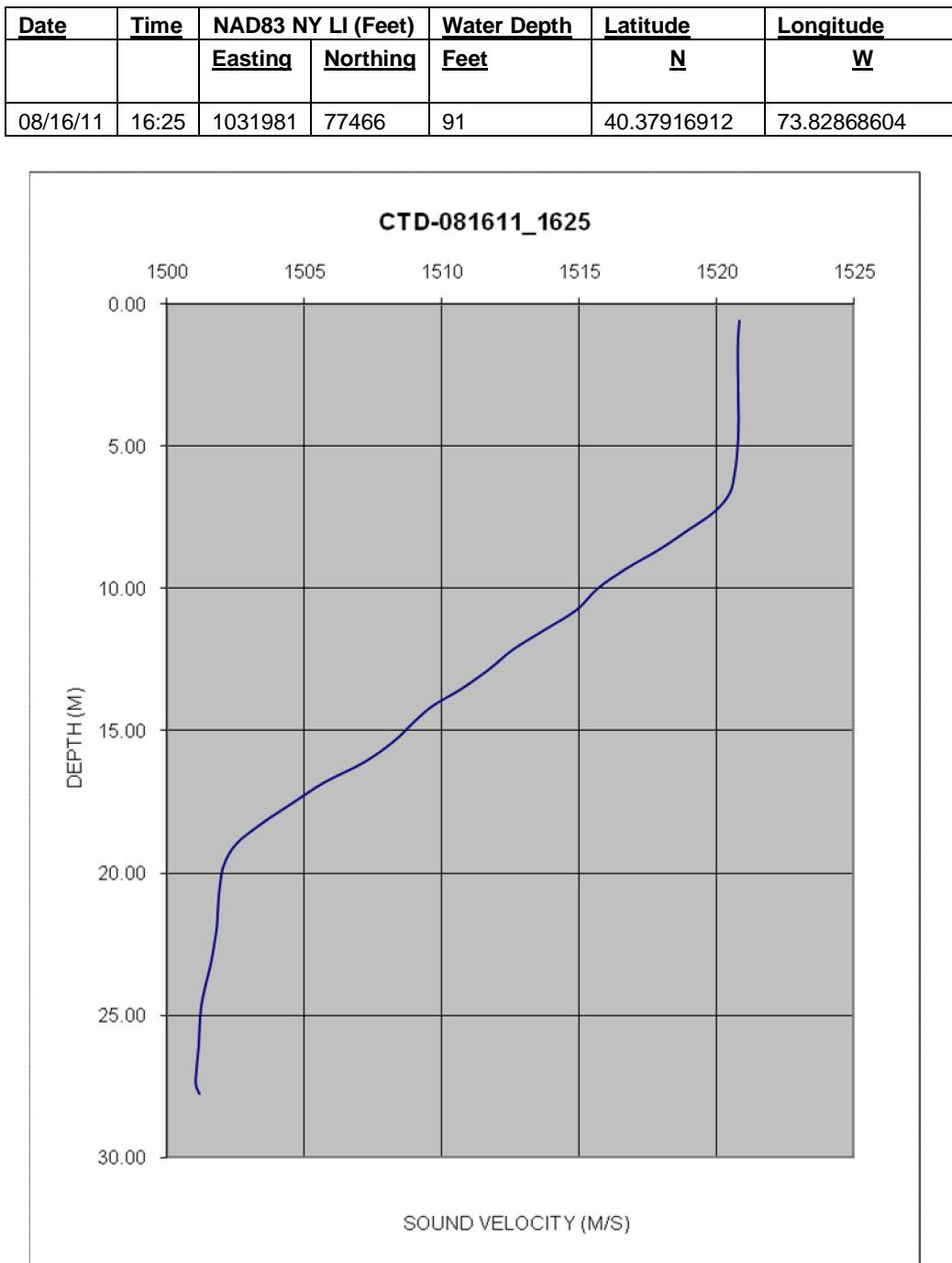


Figure 3.2-25
SVP 081611_1839 taken during the Fall 2011 multibeam survey at the HARS

1521.89 0.42

CTD PROFILE # 081611 1839

1521.59 1.21

1521.07 2.03

<u>Date</u>	<u>Time</u>	<u>NAD83 NY LI (Feet)</u>	<u>Water Depth</u>	<u>Latitude</u>	<u>Longitude</u>			
		<u>Easting</u>	<u>Northing</u>	<u>Feet</u>	<u>N</u>			
1520.56	2.86							
1520.15	3.69							
1519.92	4.53	08/16/11	18:39	1029869	67902	86	40.35293033	73.83632850

1519.82 5.36

1519.70 6.16

1518.67 6.91

1517.69 7.62

1517.06 8.33

1516.29 9.01

1514.82 9.69

1512.89 10.36

1511.40 11.05

1510.29 11.76

1508.86 12.48

1507.76 13.20

1506.84 13.90

1505.26 14.59

1504.22 15.27

1503.76 15.96

1503.45 16.65

1503.30 17.35

1503.28 18.06

1503.13 18.78

1502.64 19.50

1502.03 20.21

1501.52 20.93

1501.23 21.63

1501.09 22.33

1501.00 23.03

1500.91 23.73

1500.85 24.43

1500.82 25.12

1500.81 25.82

1500.96 26.20

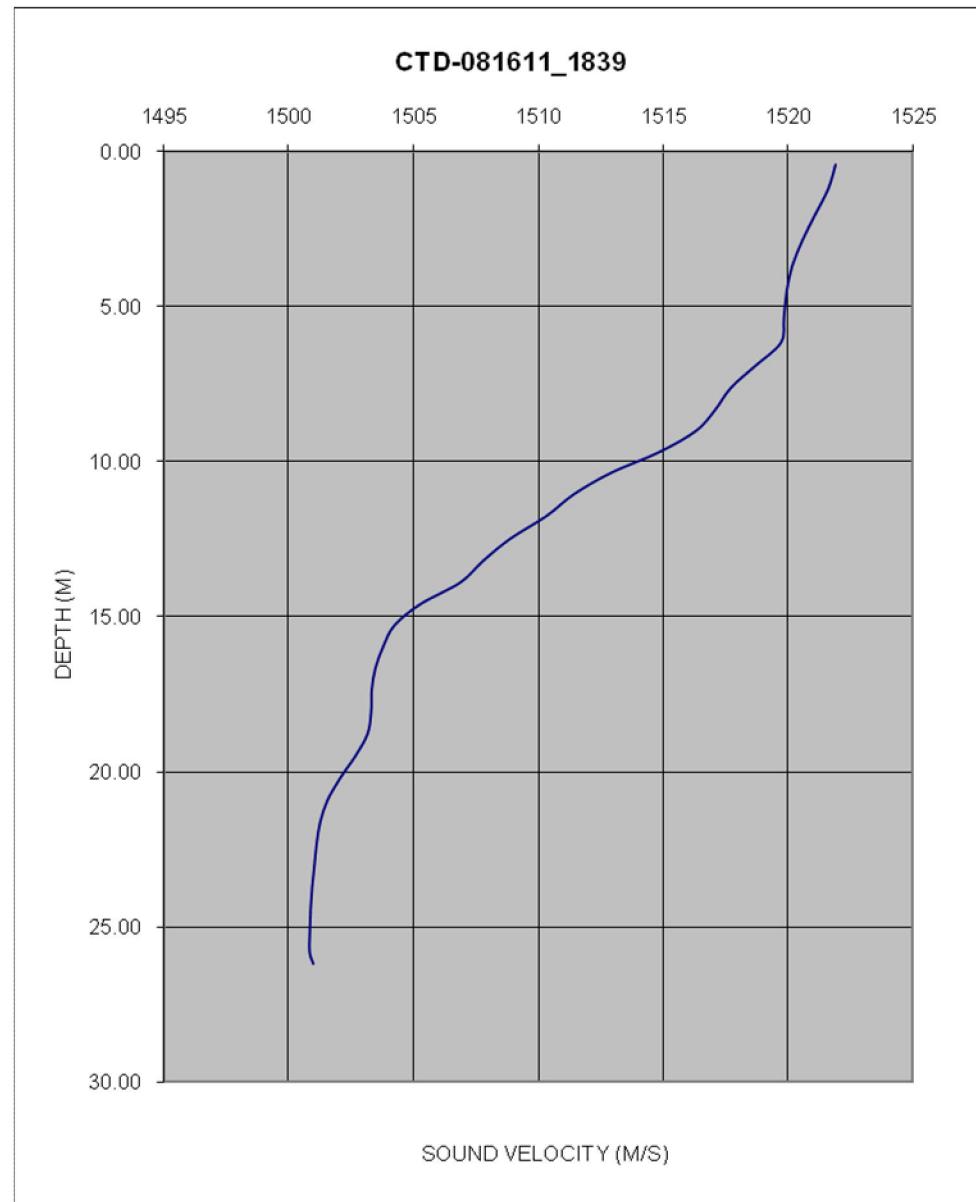


Figure 3.2-26
SVP 081611_2043 taken during the Fall 2011 multibeam survey at the HARS

1521.68	0.15
1521.68	0.82
1521.68	1.48
1521.71	2.12
1521.58	2.76
1521.36	3.39
1521.11	4.04
1520.70	4.71
1520.03	5.34
1518.67	5.92
1517.62	6.49
1517.06	7.07
1516.91	7.64
1516.97	8.22
1517.09	8.80
1517.18	9.37
1516.97	9.93
1516.42	10.50
1515.03	11.08
1513.24	11.67
1511.03	12.28
1509.41	12.90
1508.60	13.52
1508.24	14.16
1507.97	14.81
1507.45	15.47
1506.41	16.13
1505.62	16.80
1505.22	17.48
1505.04	17.94
1504.97	18.01

CTD PROFILE # 081611_2043

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
08/16/11	20:43	1028759	77375	59	40.37893655 73.84024974

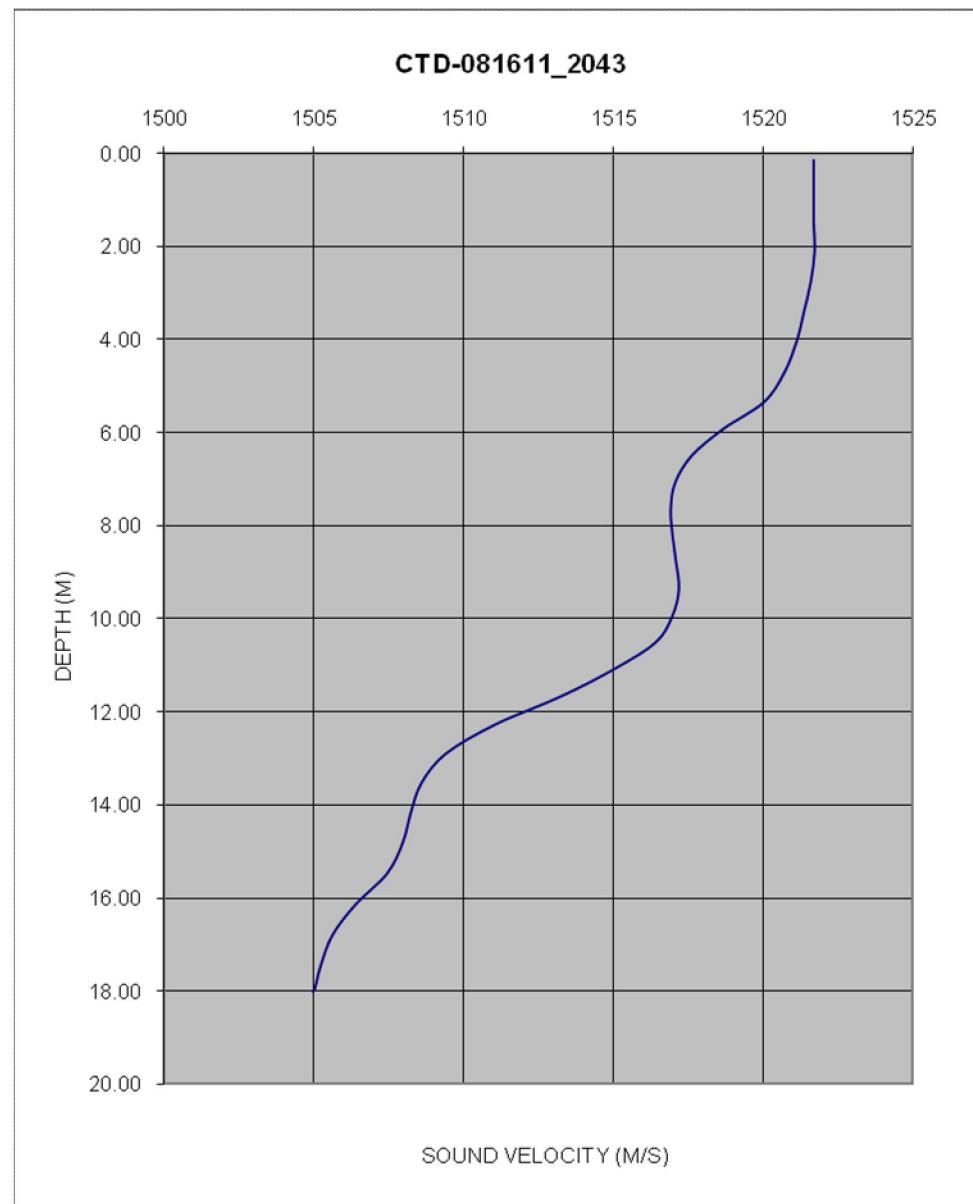


Figure 3.2-27
SVP 081611_2206 taken during the Fall 2011 multibeam survey at the HARS

1521.79	0.39
1521.67	1.13
1521.56	1.82
1521.49	2.50
1521.48	3.17
1521.55	3.83
1521.46	4.48
1521.07	5.14
1520.47	5.78
1519.85	6.41
1519.18	7.03
1518.00	7.64
1517.69	8.25
1518.09	8.87
1518.01	9.49
1516.70	10.12
1514.28	10.76
1511.56	11.43
1509.54	12.10
1508.14	12.78
1507.20	13.47
1506.60	14.17
1506.19	14.87
1505.79	15.56
1505.32	16.24
1504.91	16.92
1504.68	17.59
1504.56	18.25
1504.36	18.90
1504.38	19.19
1504.78	19.22
1505.05	19.26

CTD PROFILE # 081611 2206

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
08/16/11	22:06	1028296	77076	63	40.37811881 73.84191338

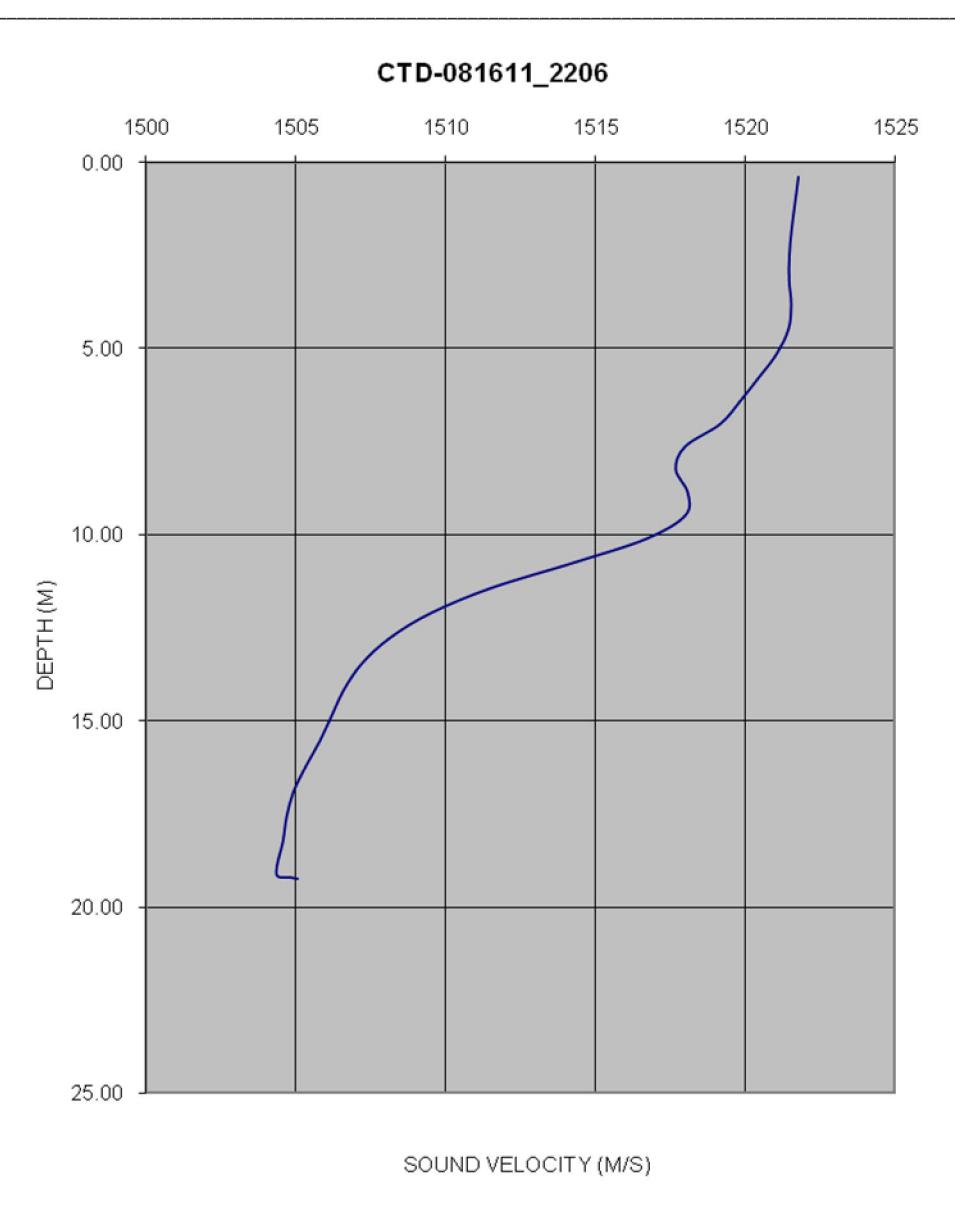


Figure 3.2-28
SVP 081711_1243 taken during the Fall 2011 multibeam survey at the HARS

1519.79	0.51
1519.88	1.23
1520.02	1.85
1520.49	2.46
1521.00	3.10
1521.45	3.75
1521.99	4.39
1522.64	5.04
1523.46	5.69
1524.25	6.33
1524.74	6.97
1524.64	7.61
1523.68	8.25
1521.82	8.89
1519.87	9.53
1516.17	10.18
1513.98	10.83
1513.12	11.47
1511.68	12.12
1509.49	12.79
1508.07	13.46
1507.29	14.13
1506.68	14.80
1506.02	15.47
1505.41	16.14
1505.02	16.80
1504.82	17.47
1504.74	18.13
1504.69	18.79
1504.66	19.43
1504.64	20.07
1504.63	20.64
1504.72	21.02
1504.75	21.05

CTD PROFILE # 081711_1243

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
08/17/11	12:43	1024017	77217	69	40.37852710 73.85727143

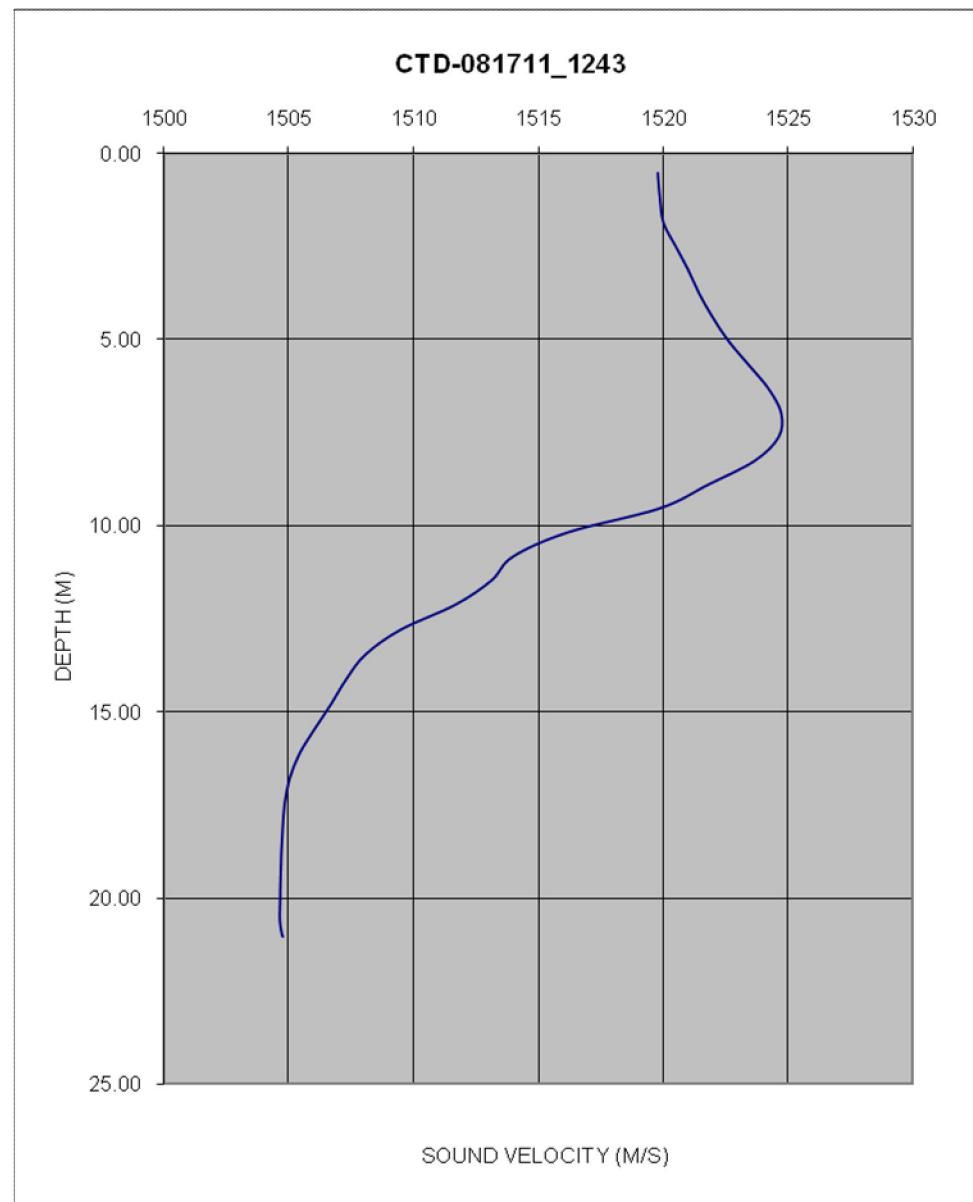


Figure 3.2-29
SVP 081711_1448 taken during the Fall 2011 multibeam survey at the HARS

1521.62 0.33

1522.57 1.09

1523.55 1.85

CTD PROFILE # 081711_1448

1524.19 2.56

1524.48 3.23

1524.66 3.87

<u>Date</u>	<u>Time</u>	<u>NAD83 NY LI (Feet)</u>	<u>Water Depth</u>	<u>Latitude</u>	<u>Longitude</u>
		<u>Easting</u>	<u>Northing</u>	<u>Feet</u>	<u>N</u>
08/17/11	14:48	1025155	67704	77	40.35240923 73.85324316

1524.79 4.51

1524.91 5.15

1525.08 5.79

1525.37 6.44

1525.60 7.09

1525.74 7.74

1525.80 8.40

1525.89 9.05

1525.01 9.69

1522.69 10.34

1520.48 11.00

1517.69 11.66

1515.76 12.32

1515.07 12.97

1514.96 13.63

1514.69 14.29

1513.68 14.94

1511.54 15.60

1509.44 16.27

1507.56 16.93

1506.43 17.58

1505.64 18.23

1504.81 18.88

1504.24 19.52

1503.97 20.17

1503.85 20.83

1503.75 21.48

1503.66 22.13

1503.58 22.79

1503.62 23.29

1504.03 23.36

1504.51 23.39

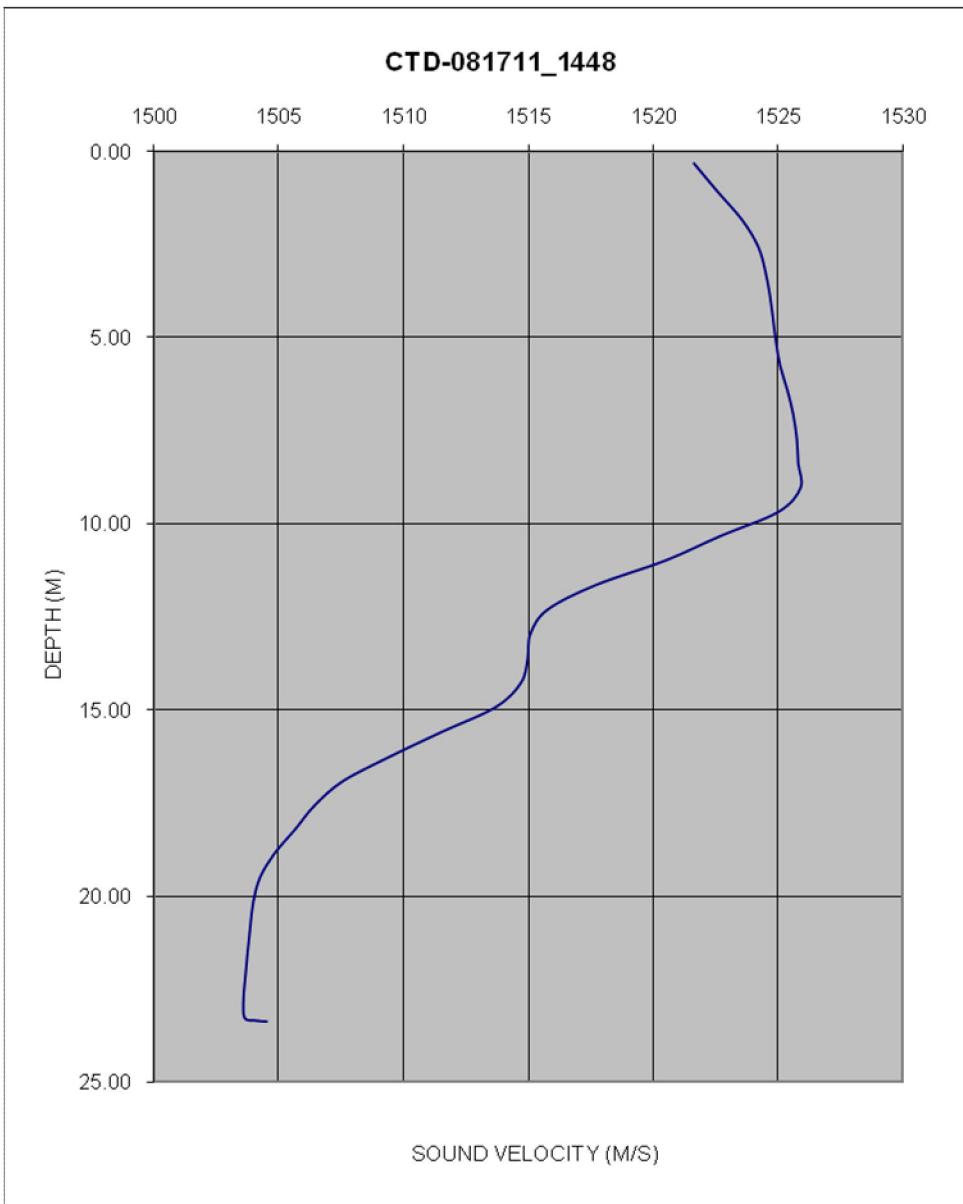


Figure 3.2-30
SVP 081711_1623 taken during the Fall 2011 multibeam survey at the HARS

1521.59	0.50
1521.14	1.24
1522.15	1.97
1523.45	2.68
1524.36	3.38
1524.64	4.08
1524.48	4.77
1524.15	5.46
1523.68	6.16
1522.92	6.85
1521.75	7.54
1520.46	8.24
1519.68	8.94
1519.04	9.68
1516.48	10.40
1513.60	11.12
1511.76	11.82
1510.24	12.52
1509.09	13.23
1508.50	13.93
1508.05	14.62
1507.63	15.30
1507.22	15.98
1506.68	16.64
1506.13	17.32
1505.77	17.99
1505.57	18.69
1505.42	19.37
1505.30	20.07
1505.21	20.79
1505.19	21.48
1505.35	21.77

CTD PROFILE # 081711_1623

<u>Date</u>	<u>Time</u>	<u>NAD83 NY LI (Feet)</u>	<u>Water Depth</u>	<u>Latitude</u>	<u>Longitude</u>
		<u>Easting</u>	<u>Northing</u>	<u>Feet</u>	<u>N</u>
08/17/11	16:23	1025159	77125	72	40.37826755
					73.85317327

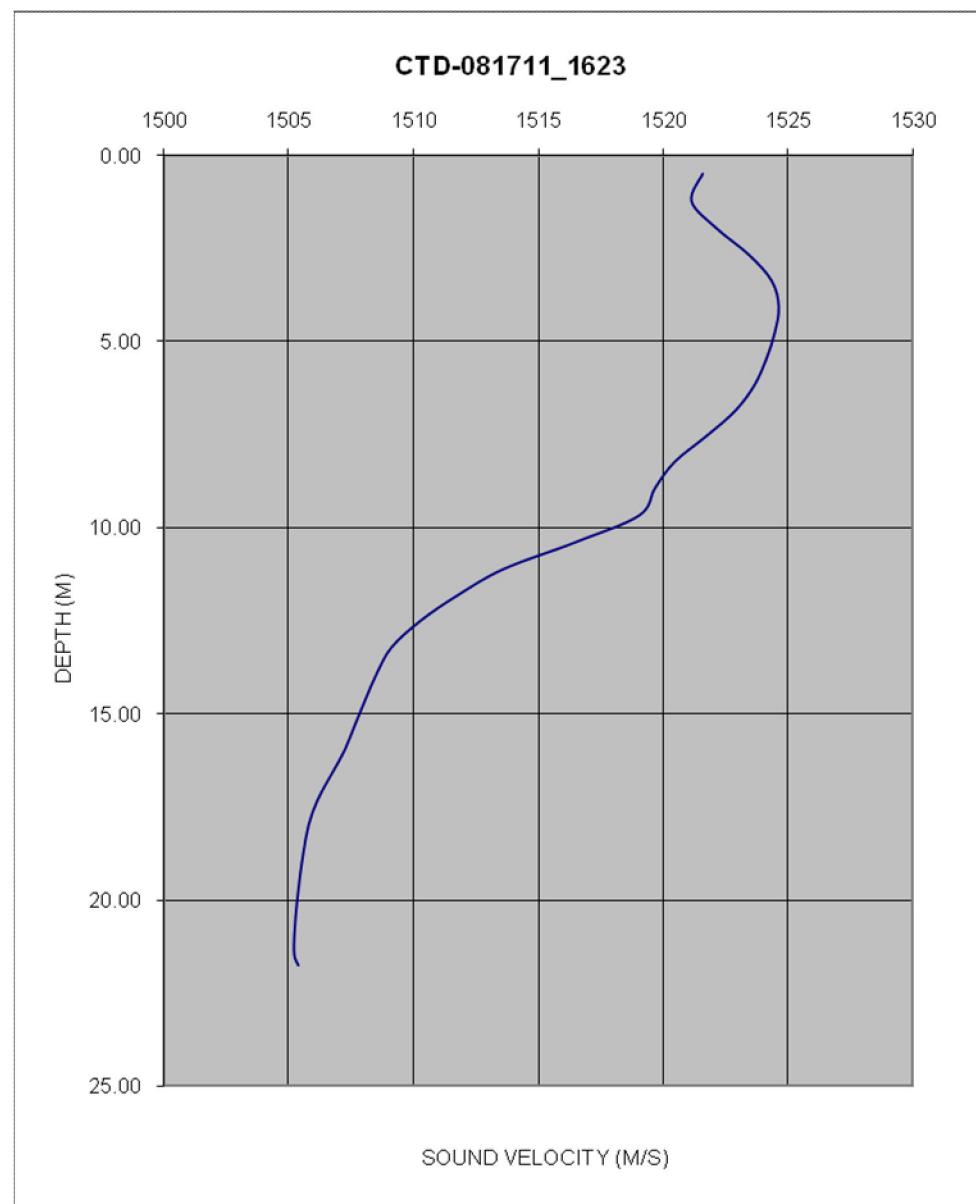


Figure 3.2-31
SVP 081711_1839 taken during the Fall 2011 multibeam survey at the HARS

1526.70	0.58
1526.10	1.38
1525.78	2.21
1525.68	3.06
1525.59	3.91
1525.49	4.75
1525.46	5.56
1525.54	6.29
1525.64	7.02
1524.29	7.71
1522.24	8.39
1520.39	9.05
1519.51	9.72
1519.22	10.42
1518.85	11.12
1517.22	11.82
1515.13	12.50
1513.11	13.19
1511.58	13.88
1510.50	14.56
1509.48	15.26
1508.28	15.94
1507.32	16.62
1506.56	17.30
1505.95	17.98
1505.43	18.66
1505.01	19.35
1504.64	20.04
1504.41	20.72
1504.28	21.41
1504.18	22.10
1504.12	22.79
1504.08	23.47
1504.05	24.14
1504.00	24.82
1503.95	25.53
1503.89	26.22
1503.74	26.86
1503.56	27.05

CTD PROFILE # 081711_1839

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
08/17/11	18:39	1029747	68987	72	40.35590783 73.83676058

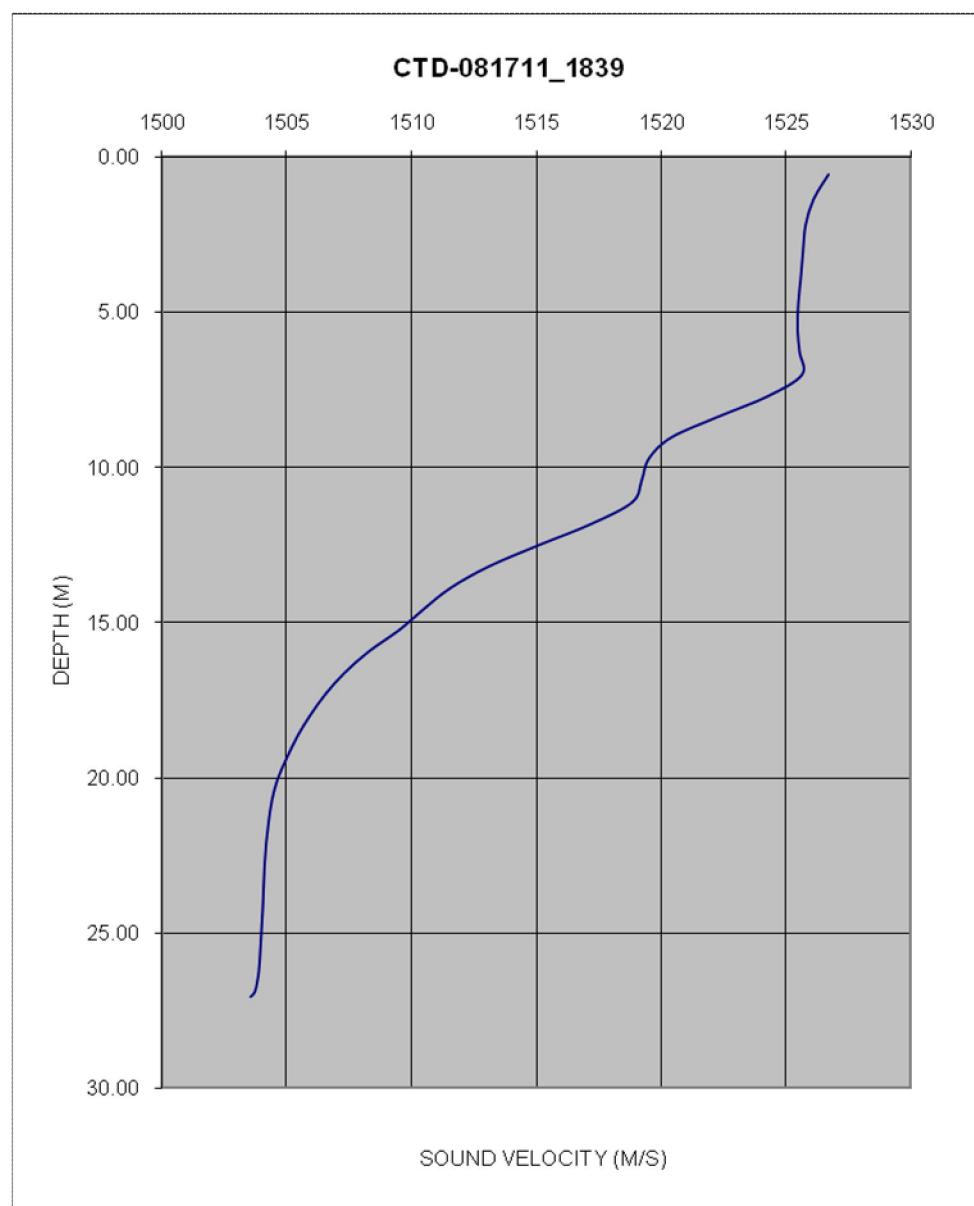


Figure 3.2-32
SVP 081711_2035 taken during the Fall 2011 multibeam survey at the HARS

1525.06	0.33
1524.85	1.08
1524.62	1.83
1524.42	2.57
1524.19	3.30
1523.90	3.99
1523.05	4.67
1521.52	5.34
1520.27	6.02
1519.17	6.68
1518.16	7.35
1517.68	8.01
1517.48	8.67
1517.43	9.34
1517.46	10.01
1517.47	10.68
1517.36	11.34
1516.68	12.01
1515.13	12.69
1513.49	13.36
1512.11	14.04
1510.84	14.71
1509.92	15.39
1509.42	16.07
1509.08	16.76
1508.73	17.44
1508.44	18.12
1507.87	18.80
1507.18	19.48
1506.76	20.17
1506.46	20.85
1506.21	21.54
1506.03	22.25
1506.08	22.62

CTD PROFILE # 081711 2035

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
08/17/11	20:35	1022654	67896	74	40.35294739 73.86221502

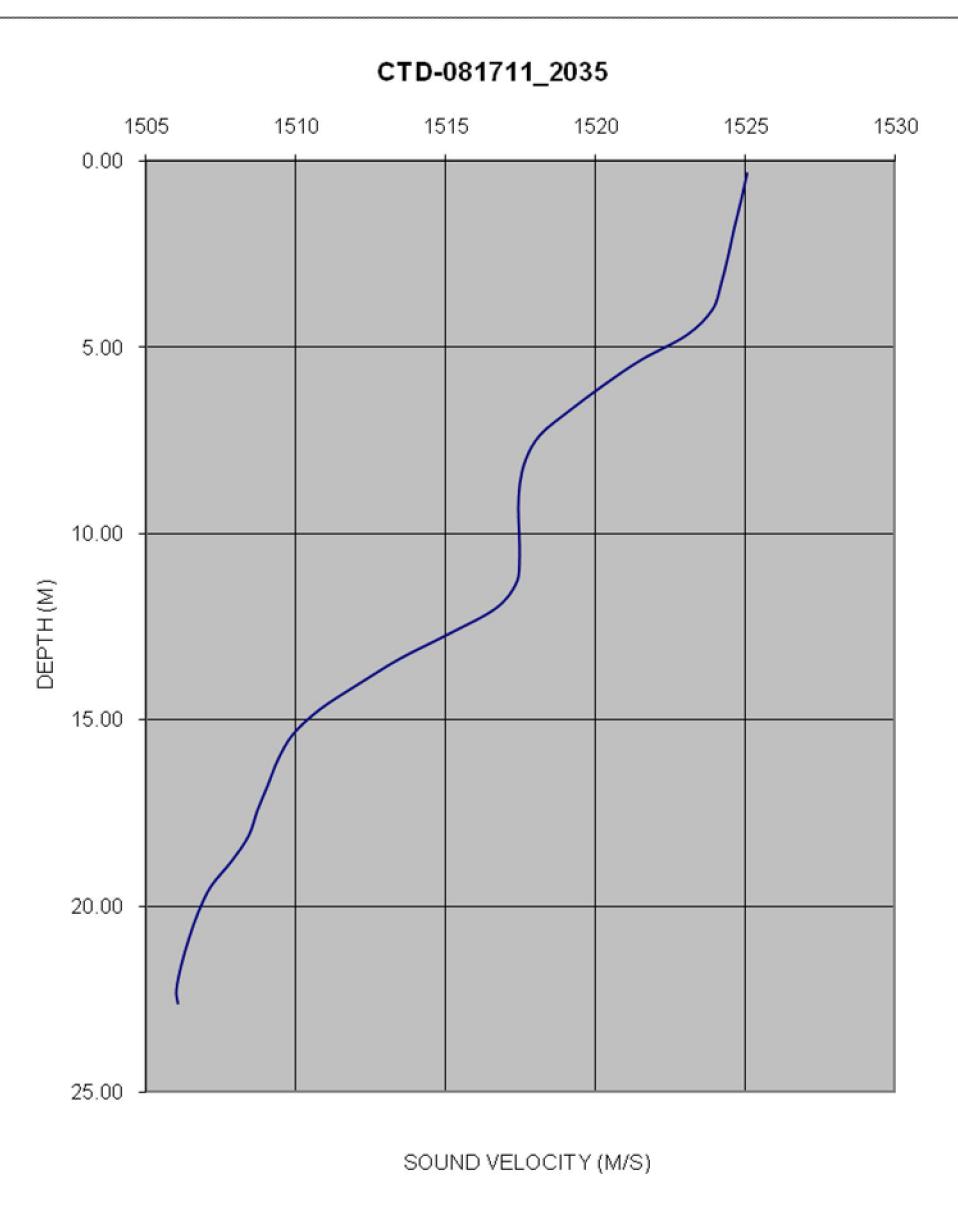


Figure 3.2-33
SVP 081711_2059 taken during the Fall 2011 multibeam survey at the HARS

1523.54	0.00
1523.49	0.78
1523.45	1.48
1523.26	2.14
1522.63	2.76
1521.47	3.35
1520.85	3.93
1520.67	4.50
1520.41	5.06
1519.96	5.62
1519.49	6.19
1519.22	6.75
1518.94	7.33
1518.86	7.93
1518.57	8.54
1517.63	9.14
1516.21	9.73
1515.06	10.34
1514.31	10.97
1513.46	11.60
1512.08	12.25
1510.94	12.90
1509.90	13.55
1509.10	14.20
1508.64	14.84
1508.28	15.50
1507.92	16.14
1507.66	16.79
1507.38	17.45
1507.18	18.09
1507.05	18.76
1506.93	19.43
1506.84	20.12
1506.97	20.45
1507.35	20.50
1507.55	20.57

CTD PROFILE # 081711 2059

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
08/17/11	20:59	1023452	77221	67	40.37853948 73.85929824

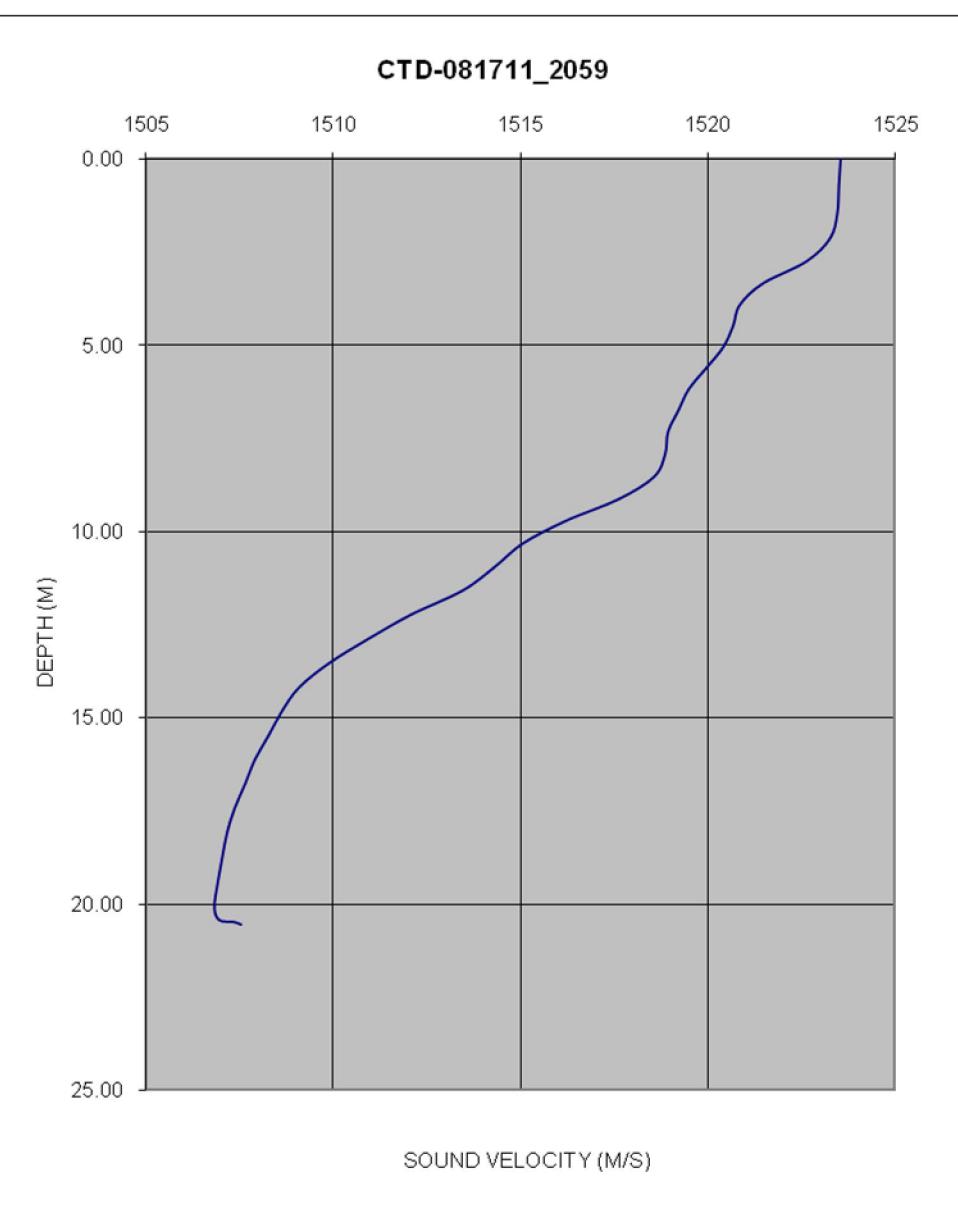


Figure 3.2-34
SVP 081811_1158 taken during the Fall 2011 multibeam survey at the HARS

1518.40 0.52

1519.25 1.26

1519.60 1.94

CTD PROFILE # 081811 1158

1519.78 2.62

1519.87 3.26

1519.91 3.86

<u>Date</u>	<u>Time</u>	<u>NAD83 NY LI (Feet)</u>	<u>Water Depth</u>	<u>Latitude</u>	<u>Longitude</u>	
		<u>Easting</u>	<u>Northing</u>	<u>Feet</u>	<u>N</u>	<u>W</u>
08/18/11	11:58	1022749	77382	72	40.37898387	73.86182046

1519.95 4.45

1520.00 5.04

1520.05 5.63

1520.10 6.22

1520.31 6.82

1520.64 7.43

1521.12 8.05

1521.33 8.68

1521.01 9.31

1520.35 9.95

1519.30 10.58

1518.20 11.21

1516.00 11.82

1513.88 12.42

1512.83 13.02

1511.95 13.64

1511.23 14.26

1510.50 14.89

1509.26 15.53

1507.78 16.16

1506.89 16.79

1506.39 17.42

1505.91 18.07

1505.29 18.72

1504.69 19.39

1504.07 20.04

1503.70 20.70

1503.51 21.36

1503.50 21.93

1503.75 22.05

1504.22 22.09

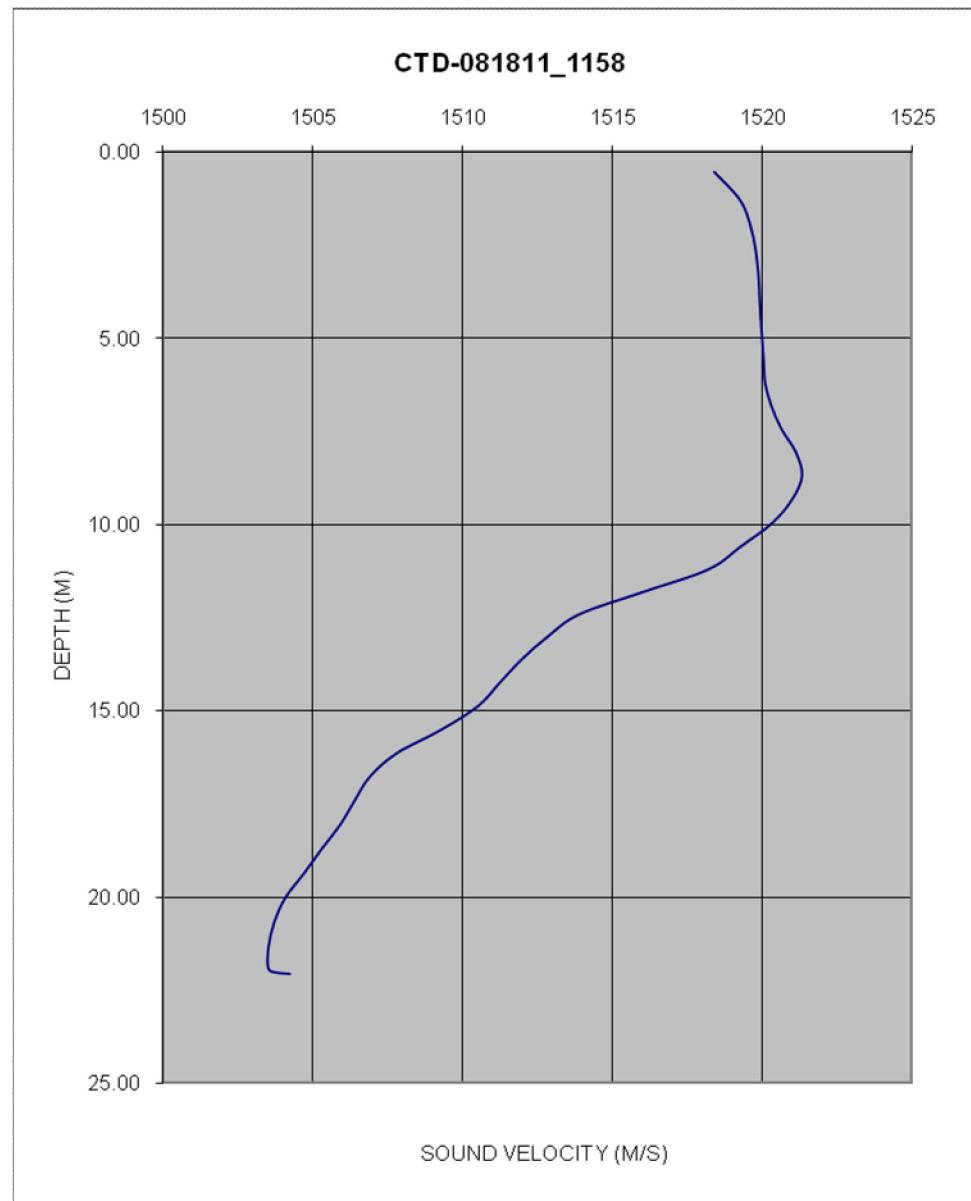


Figure 3.2-35
SVP 081811_1407 taken during the Fall 2011 multibeam survey at the HARS

1520.58	0.35
1520.46	1.01
1520.42	1.73
1520.39	2.44
1520.37	3.16
1520.36	3.85
1520.37	4.53
1520.37	5.20
1520.36	5.88
1520.36	6.55
1520.40	7.23
1520.50	7.90
1520.65	8.56
1520.90	9.22
1520.99	9.90
1520.53	10.59
1519.73	11.31
1518.27	12.02
1516.17	12.71
1512.82	13.40
1509.34	14.11
1507.24	14.81
1506.48	15.52
1506.18	16.23
1506.06	16.93
1505.97	17.64
1505.84	18.34
1505.48	19.06
1504.85	19.80
1504.40	20.54
1504.23	21.29
1504.23	21.95
1504.45	22.13

CTD PROFILE # 081811_1407

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
08/18/11	14:07	1020951	67844	73	40.35281091 73.86832402

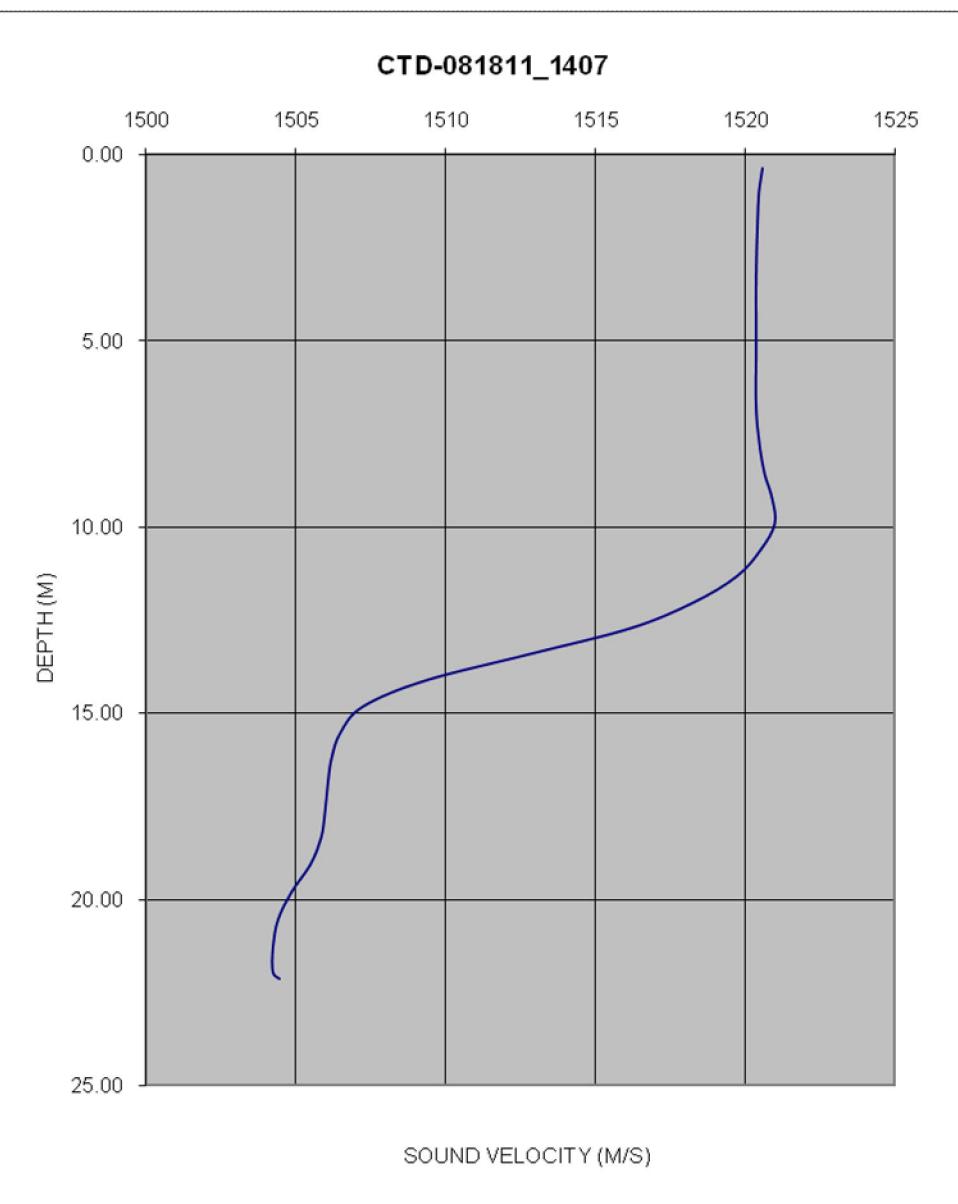


Figure 3.2-36
SVP 081811_1621 taken during the Fall 2011 multibeam survey at the HARS

1518.08	0.31
1518.00	1.00
1518.68	1.73
1519.49	2.40
1519.67	3.08
1519.70	3.73
1519.73	4.41
1519.80	5.09
1520.11	5.77
1520.96	6.45
1521.12	7.14
1519.94	7.82
1517.64	8.52
1513.99	9.21
1510.64	9.91
1508.95	10.59
1508.16	11.26
1507.48	11.94
1506.80	12.63
1506.39	13.31
1506.10	14.00
1505.85	14.70
1505.69	15.40
1505.53	16.09
1505.38	16.78
1505.20	17.45
1505.11	18.14
1505.08	18.82
1504.92	19.50
1504.58	20.17
1504.25	20.85
1504.05	21.52
1503.97	22.19
1503.93	22.86
1503.96	23.46
1504.17	23.60

CTD PROFILE # 081811_1621

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
08/18/11	16:21	1019337	77310	77	40.37880097 73.87406710

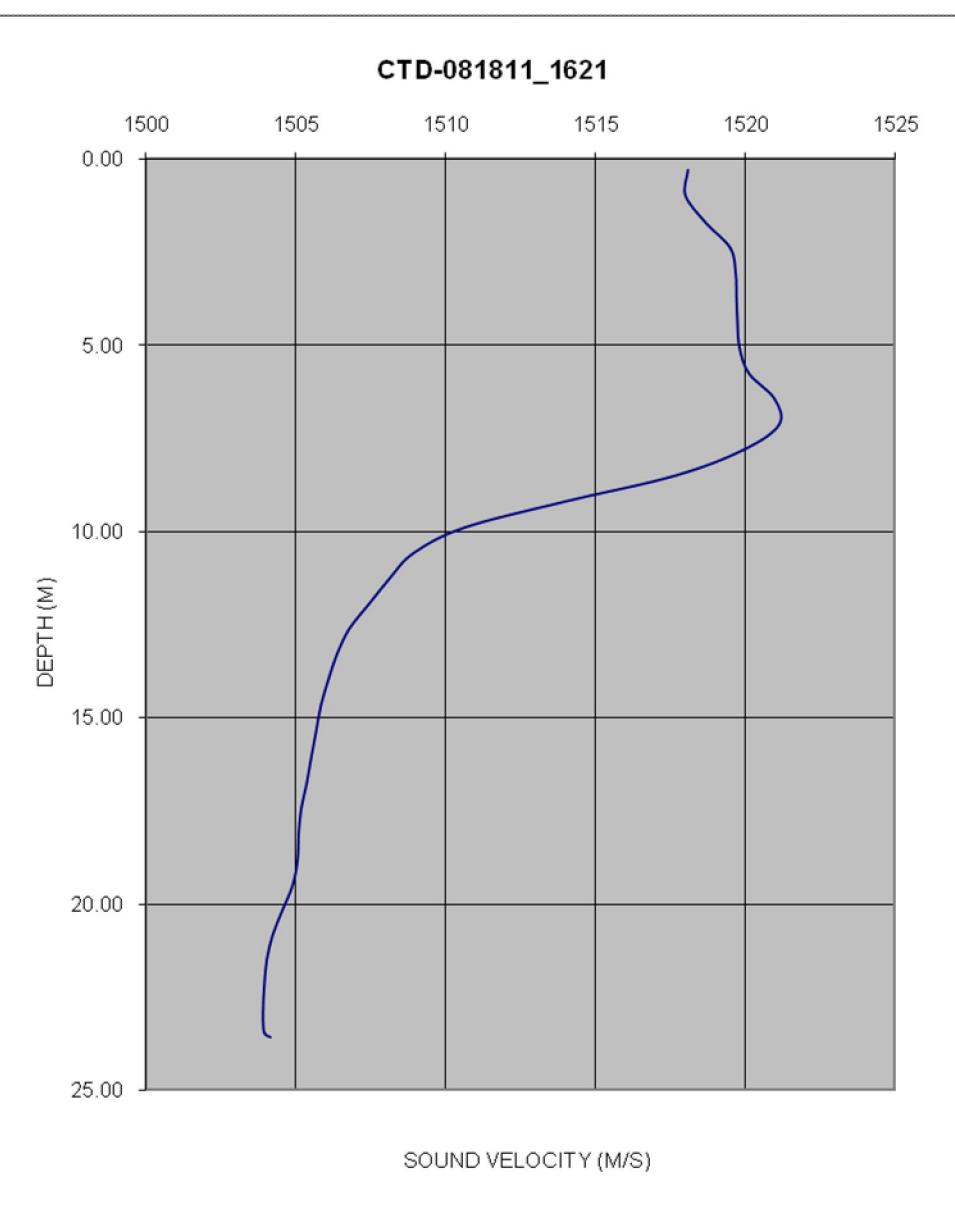


Figure 3.2-37
SVP 081811_1830 taken during the Fall 2011 multibeam survey at the HARS

1520.61	0.70
1521.04	1.51
1520.80	2.23
1520.59	2.90
1520.54	3.55
1520.54	4.17
1520.51	4.81
1520.64	5.44
1520.90	6.02
1520.43	6.59
1519.45	7.16
1517.88	7.72
1514.34	8.30
1511.60	8.88
1509.99	9.47
1508.97	10.06
1508.45	10.66
1508.18	11.26
1508.01	11.87
1507.85	12.50
1507.62	13.14
1507.39	13.80
1507.15	14.45
1506.92	15.11
1506.73	15.79
1506.60	16.47
1506.48	17.14
1506.37	17.80
1506.24	18.48
1506.04	19.15
1505.86	19.81
1505.95	20.15

CTD PROFILE # 081811_1830

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
08/18/11	18:30	1018011	67456	66	40.35175880 73.87887350

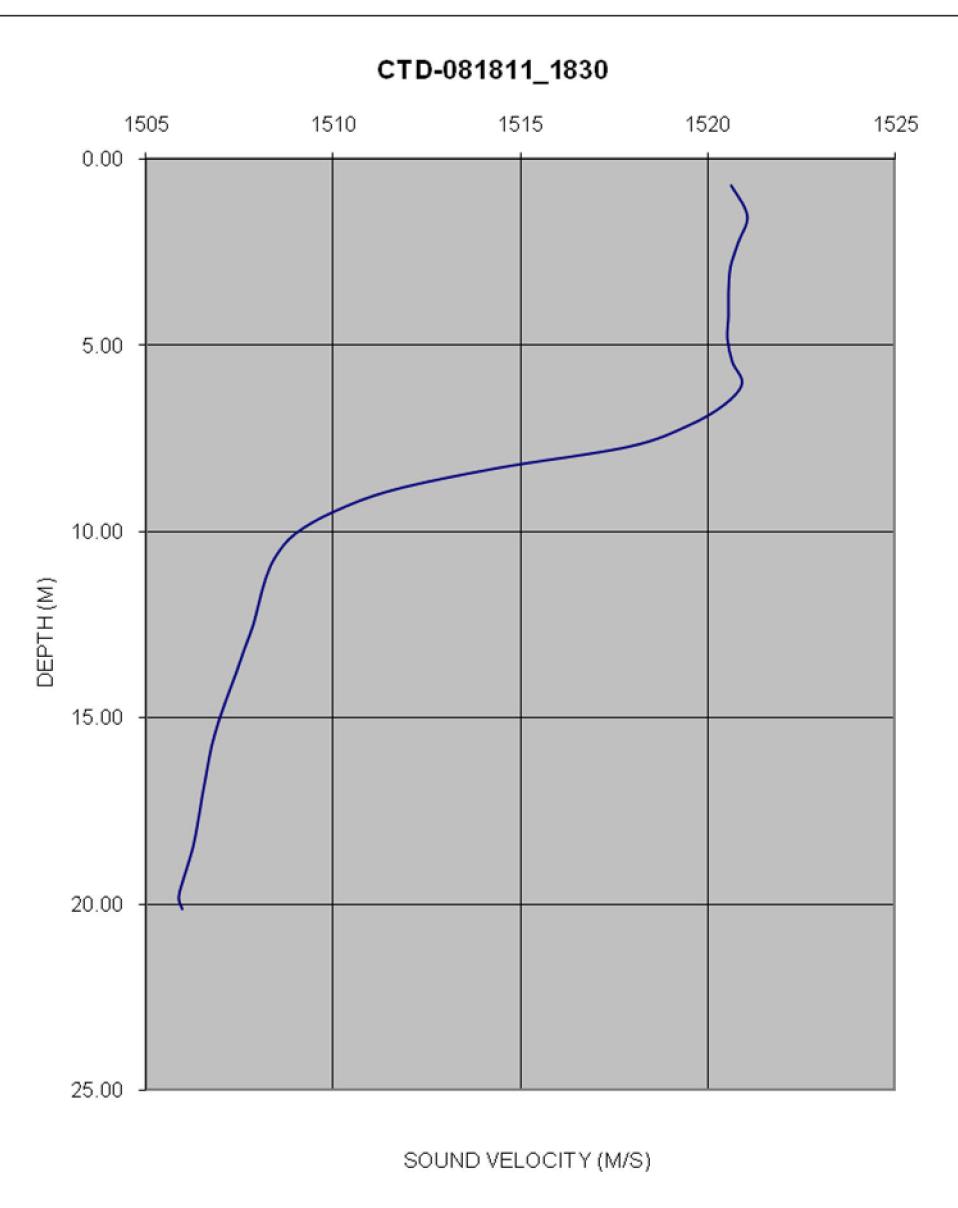


Figure 3.2-37
SVP 081811_2040 taken during the Fall 2011 multibeam survey at the HARS

1520.40	0.65
1520.23	1.37
1520.22	2.11
1520.24	2.80
1520.05	3.46
1519.87	4.08
1519.82	4.70
1520.62	5.34
1520.88	5.98
1519.78	6.61
1517.90	7.24
1516.03	7.88
1514.75	8.53
1513.63	9.18
1512.62	9.83
1511.71	10.48
1510.67	11.14
1509.72	11.79
1508.97	12.44
1508.54	13.10
1508.33	13.75
1508.15	14.42
1508.01	15.07
1507.85	15.73
1507.77	16.39
1507.62	17.04
1507.08	17.70
1506.38	18.37
1505.89	19.03
1505.42	19.69
1504.82	20.36
1504.40	21.04
1504.25	21.67
1504.47	21.85
1504.95	21.86
1505.18	21.88
1505.36	21.89
1505.55	21.90
1505.74	21.92
1506.13	21.95
1506.38	21.98

CTD PROFILE # 081811 2040

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
08/18/11	20:40	1017982	77106	72	40.37824626 73.87893142

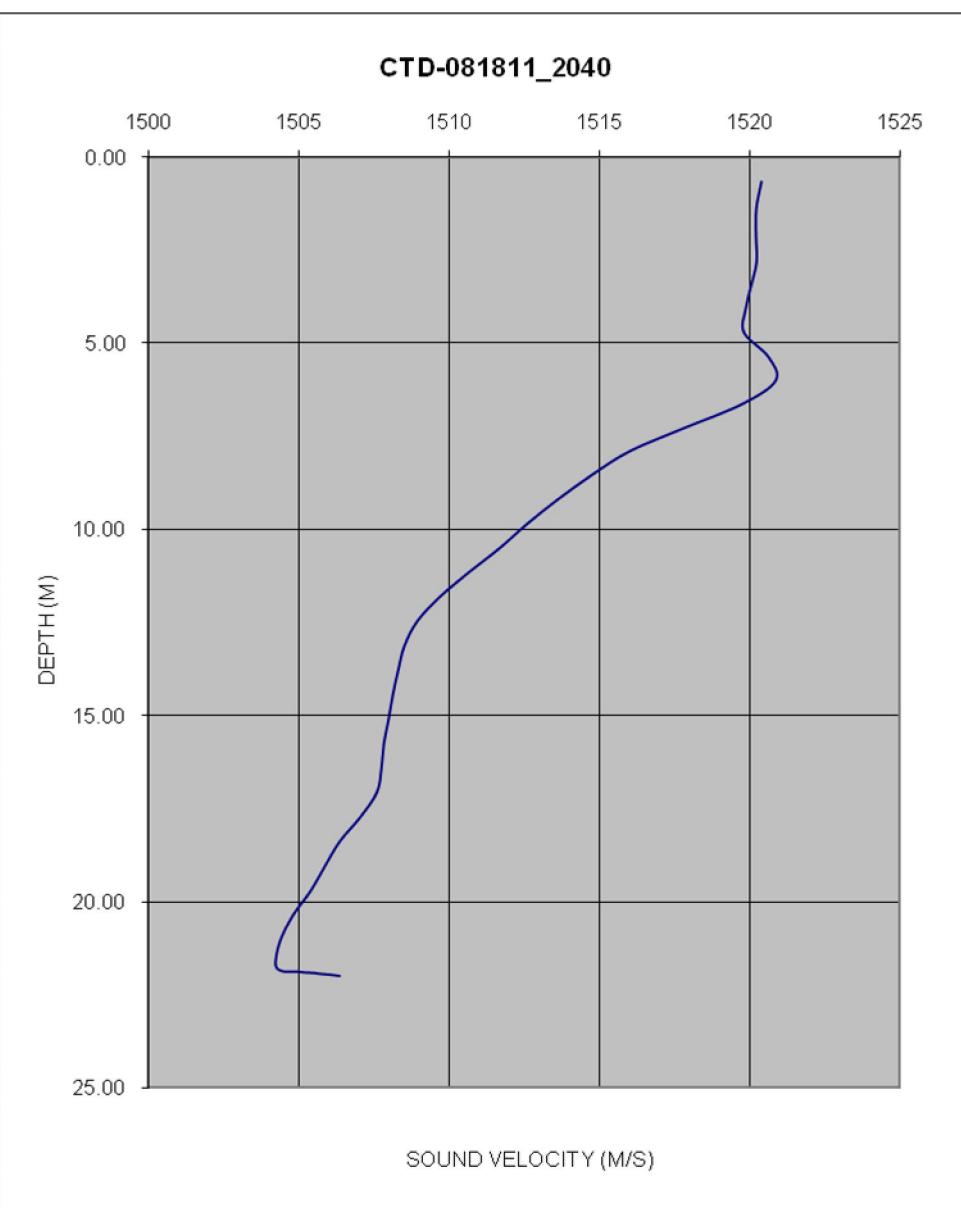


Figure 3.2-38
SVP 081911_1141 taken during the Fall 2011 multibeam survey at the HARS

1520.97	0.13
1520.98	0.80
1520.99	1.47
1521.01	2.10
1521.01	2.75
1521.00	3.38
1521.01	3.99
1521.01	4.61
1521.01	5.23
1521.04	5.85
1520.91	6.47
1519.16	7.09
1516.89	7.73
1515.63	8.39
1514.22	9.06
1512.19	9.72
1510.44	10.38
1509.32	11.02
1508.43	11.66
1507.89	12.30
1507.65	12.95
1507.52	13.62
1507.33	14.30
1507.12	14.99
1506.86	15.67
1506.28	16.35
1505.77	17.00
1505.25	17.65
1504.84	18.32
1504.63	18.99
1504.42	19.64
1504.19	20.31
1503.99	20.97
1503.87	21.66
1503.81	22.33
1503.78	23.00
1503.89	23.40
1504.22	23.43

CTD PROFILE # 081911_1141

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
08/19/11	11:41	1015901	76858	77	40.37757295 73.88640029

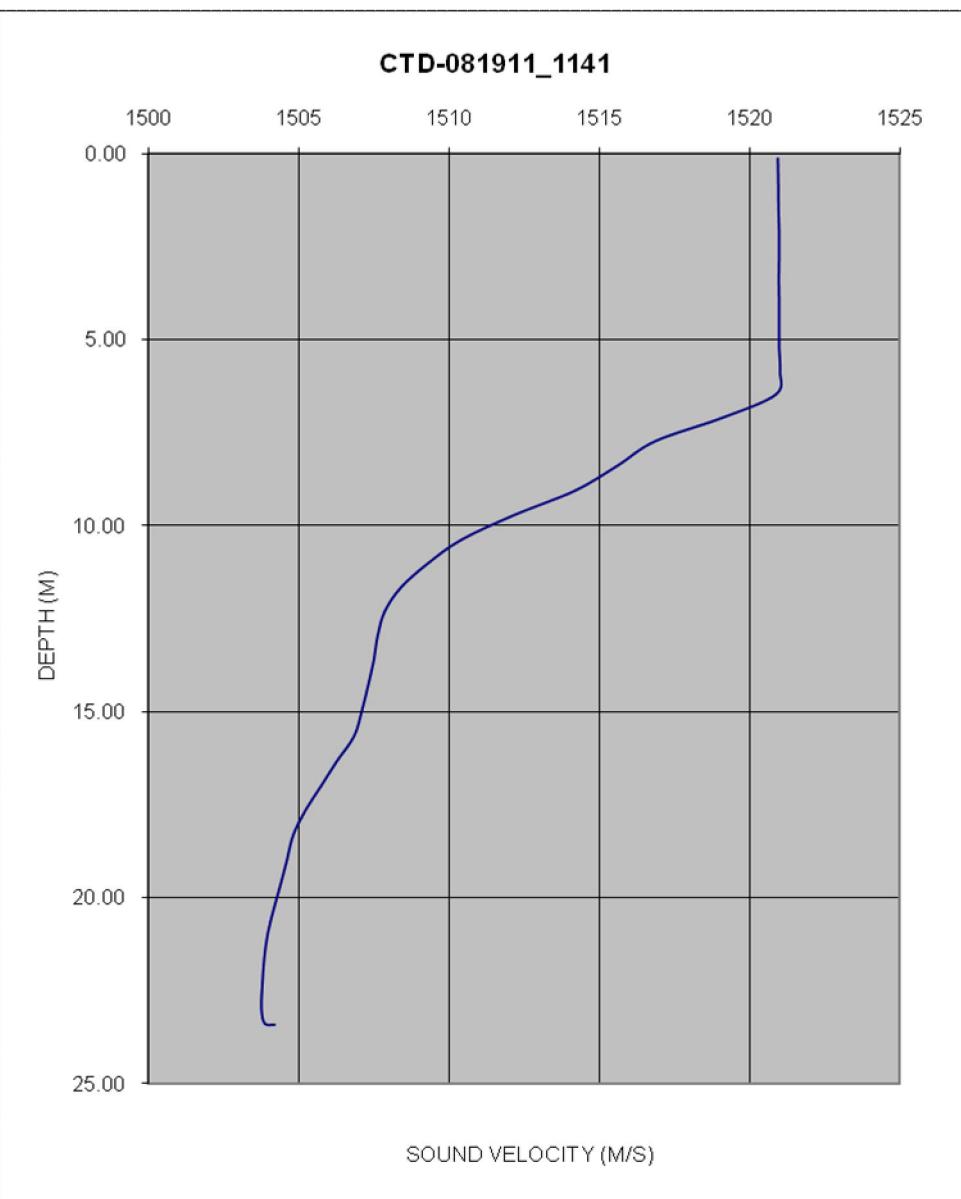


Figure 3.2-39
SVP 081911_1349 taken during the Fall 2011 multibeam survey at the HARS

1521.75	0.65
1521.71	1.40
1521.68	2.08
1521.69	2.71
1522.00	3.27
1522.19	3.84
1522.26	4.41
1522.15	4.98
1521.88	5.54
1521.55	6.11
1521.07	6.68
1520.37	7.25
1519.64	7.83
1518.31	8.42
1515.99	9.00
1513.93	9.58
1512.57	10.16
1511.71	10.74
1510.76	11.32
1509.80	11.91
1508.96	12.52
1508.08	13.15
1507.27	13.78
1506.81	14.41
1506.46	15.05
1506.04	15.69
1505.66	16.33
1505.34	16.97
1505.01	17.59
1504.67	18.21
1504.39	18.81
1504.28	19.06
1504.26	19.09
1504.24	19.09
1504.23	19.10

CTD PROFILE # 081911_1349

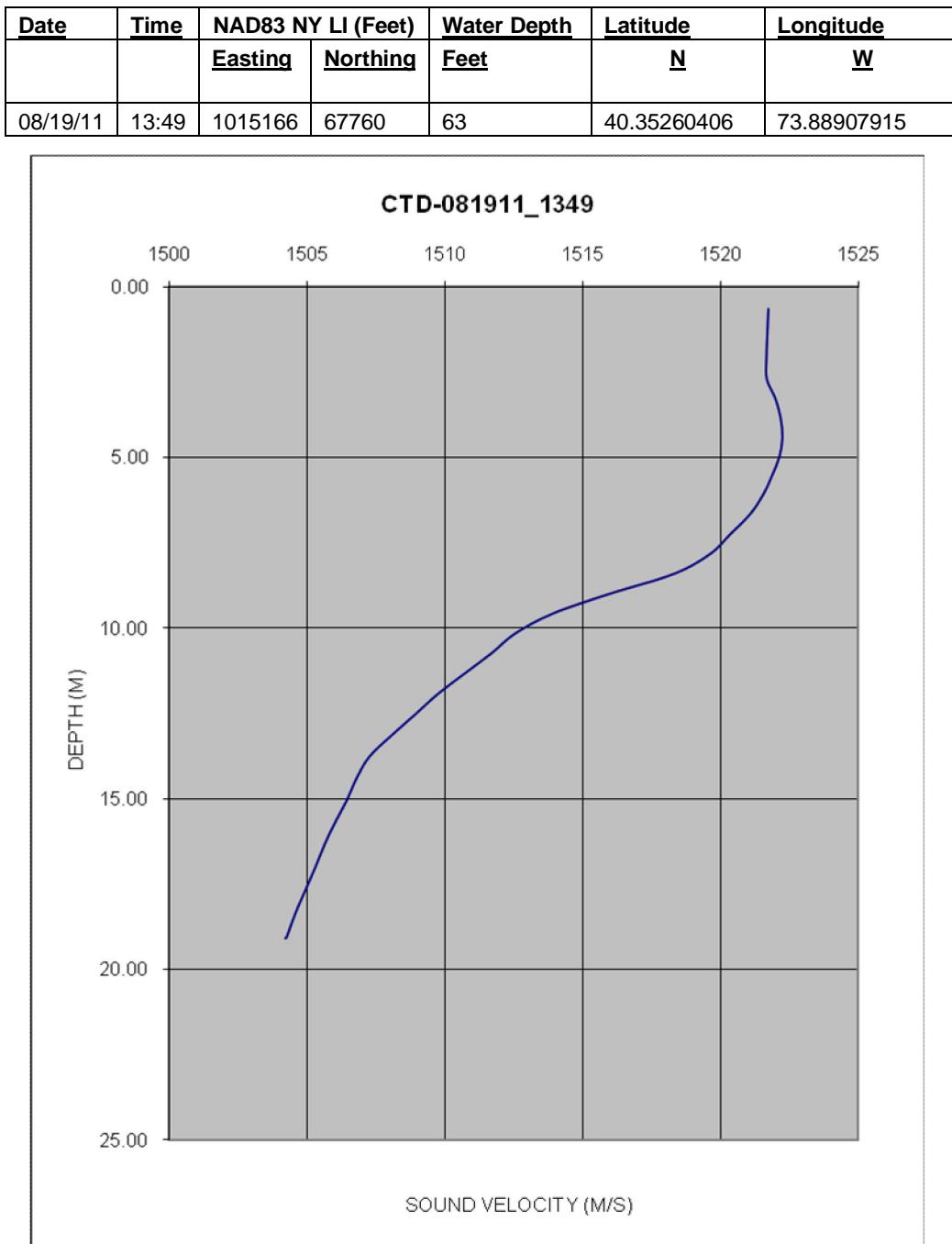


Figure 3.2-40
SVP 081911_1604 taken during the Fall 2011 multibeam survey at the HARS

1519.52	0.23
1519.56	0.94
1520.17	1.69
1520.78	2.43
1521.11	3.18
1521.34	3.92
1521.36	4.64
1521.32	5.31
1521.36	5.98
1521.27	6.65
1520.81	7.30
1519.12	7.94
1515.96	8.59
1511.91	9.27
1509.89	9.92
1508.98	10.58
1508.45	11.23
1508.10	11.89
1507.85	12.54
1507.60	13.18
1507.38	13.81
1507.16	14.43
1507.00	15.03
1506.86	15.65
1506.62	16.25
1506.28	16.86
1506.05	17.46
1505.70	18.04
1505.34	18.61
1505.10	19.21
1504.94	19.79
1504.93	20.26
1505.13	20.33

CTD PROFILE # 081911_1604

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
08/19/11	16:04	1012276	77390	67	40.37904583 73.89940877

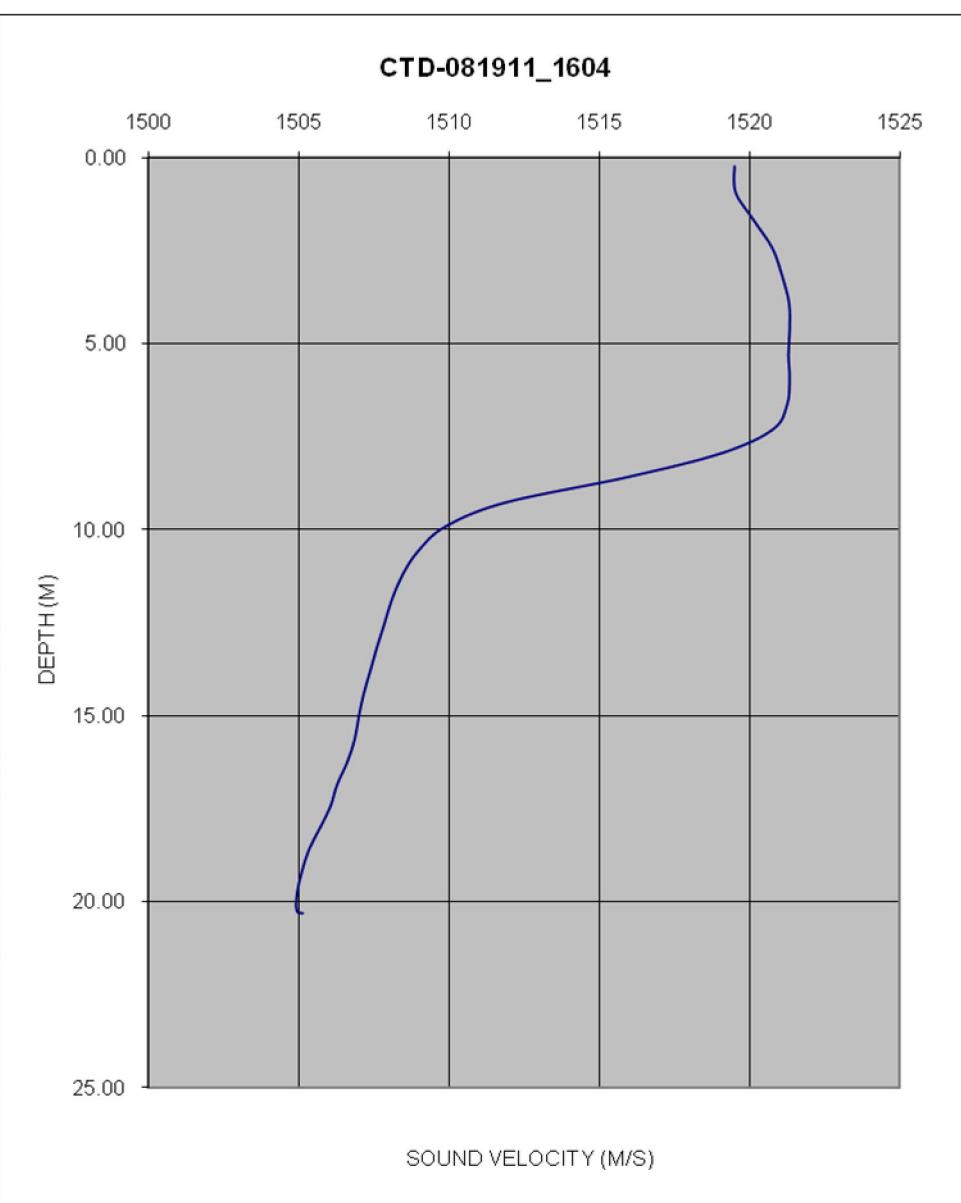


Figure 3.2-41
SVP 081911_1756 taken during the Fall 2011 multibeam survey at the HARS

1522.33	0.05
1522.05	0.70
1521.67	1.42
1521.39	2.16
1521.28	2.91
1521.22	3.65
1521.29	4.37
1521.34	5.03
1521.32	5.66
1520.96	6.31
1520.02	6.99
1517.44	7.66
1514.45	8.32
1512.55	8.97
1511.01	9.59
1509.50	10.21
1508.76	10.83
1508.53	11.45
1508.45	12.08
1508.39	12.70
1508.17	13.32
1507.83	13.93
1507.54	14.53
1507.41	15.11
1507.30	15.69
1507.18	16.28
1507.08	16.87
1507.02	17.46
1506.99	18.03
1506.91	18.61
1506.52	19.18
1505.79	19.75
1505.04	20.31
1504.64	20.87
1504.49	21.44
1504.65	21.72
1505.00	21.73

CTD PROFILE # 081911_1756

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
08/19/11	17:56	1013451	77325	71	40.37886223 73.89519228

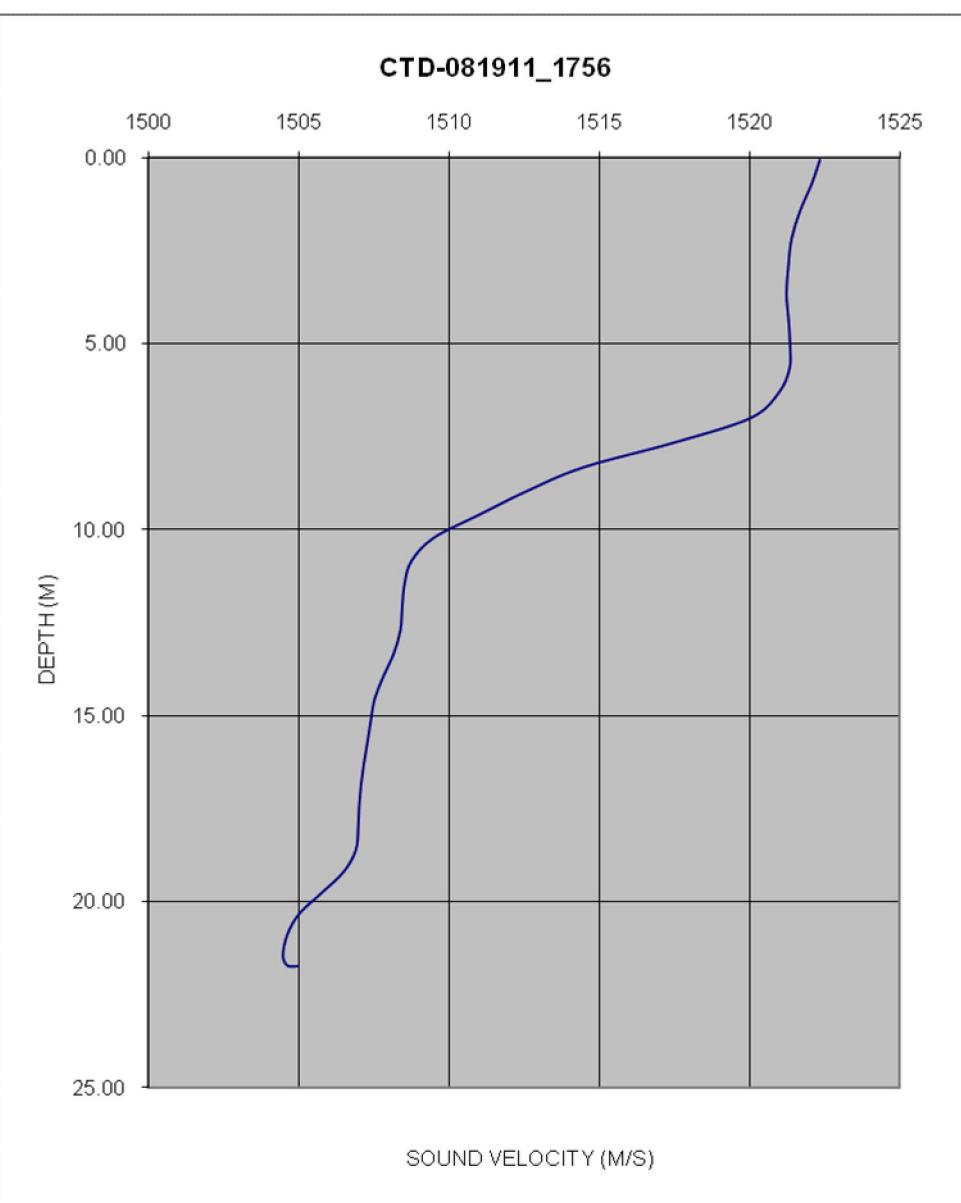


Figure 3.2-42
SVP 081911_1853 taken during the Fall 2011 multibeam survey at the HARS

1522.50	0.36
1522.42	1.02
1522.27	1.68
1522.08	2.31
1521.84	2.93
1521.48	3.56
1521.29	4.16
1521.27	4.72
1521.39	5.31
1521.37	5.97
1521.09	6.64
1520.44	7.31
1518.75	7.97
1517.15	8.61
1515.15	9.26
1512.77	9.92
1511.45	10.57
1510.65	11.24
1509.73	11.91
1509.08	12.58
1508.62	13.26
1508.35	13.92
1508.23	14.60
1508.02	15.28
1507.70	15.96
1507.42	16.63
1507.31	17.29
1507.25	17.95
1507.19	18.61
1507.14	19.26
1507.06	19.94
1506.90	20.60
1506.43	21.25
1505.74	21.91
1505.21	22.43
1505.26	22.51

CTD PROFILE # 081911_1853

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
08/19/11	18:53	1013713	76473	74	40.37652299 73.89425518

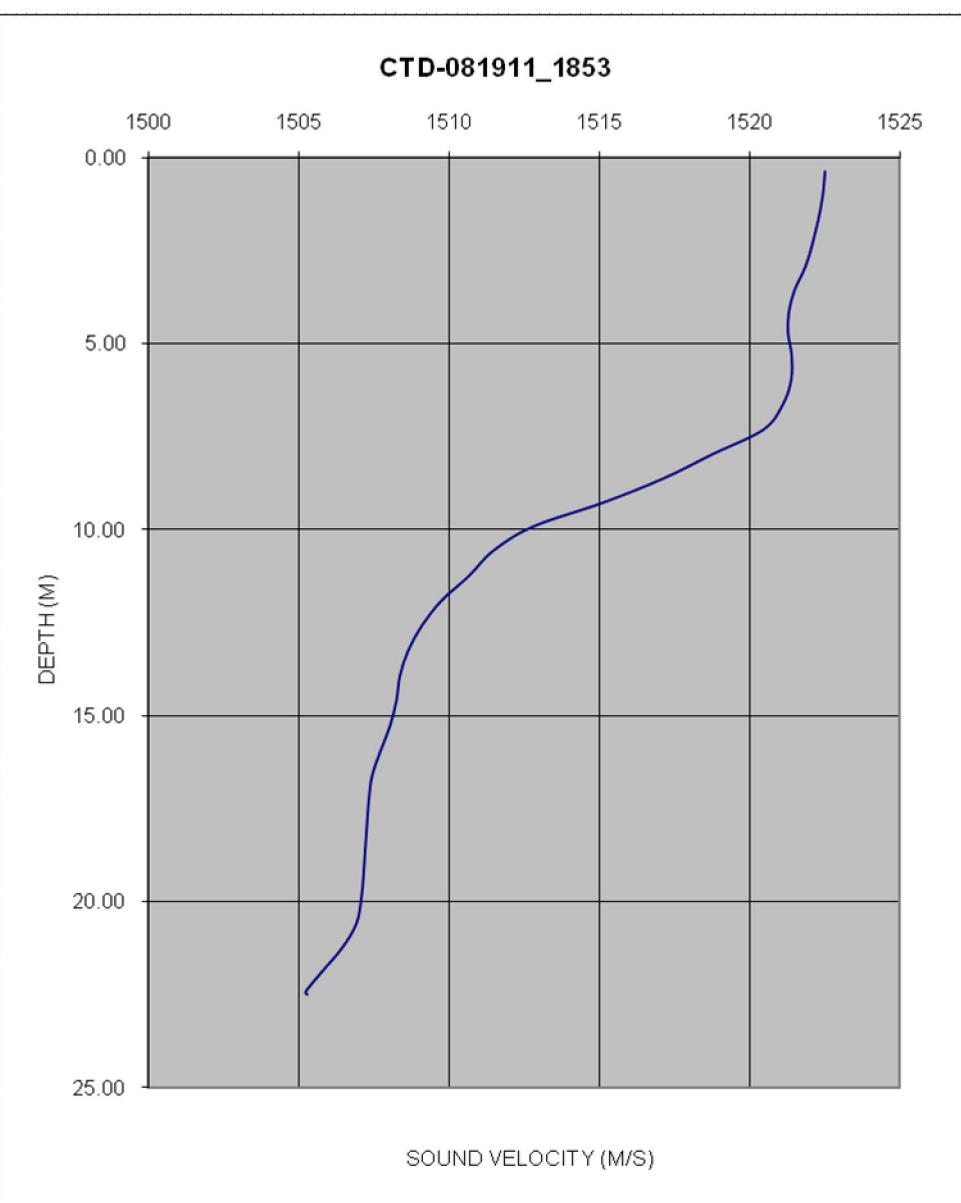


Figure 3.2-43
SVP 081911_2039 taken during the Fall 2011 multibeam survey at the HARS

1522.54	0.10
1522.01	0.88
1521.76	1.73
1521.59	2.50
1521.36	3.19
1521.04	3.83
1520.73	4.44
1520.38	5.04
1520.08	5.66
1519.75	6.28
1519.25	6.91
1518.49	7.55
1517.59	8.19
1515.79	8.84
1513.99	9.48
1512.60	10.13
1511.62	10.78
1510.95	11.43
1510.36	12.08
1509.77	12.73
1508.81	13.37
1507.97	14.02
1507.46	14.68
1507.21	15.34
1507.11	15.99
1507.06	16.65
1506.91	17.30
1506.64	17.97
1506.43	18.62
1506.26	19.28
1506.08	19.94
1506.00	20.56
1506.23	20.72
1506.68	20.75
1507.02	20.78

CTD PROFILE # 081911 2039

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
08/19/11	20:39	1011729	86529	68	40.40413235 73.90133614

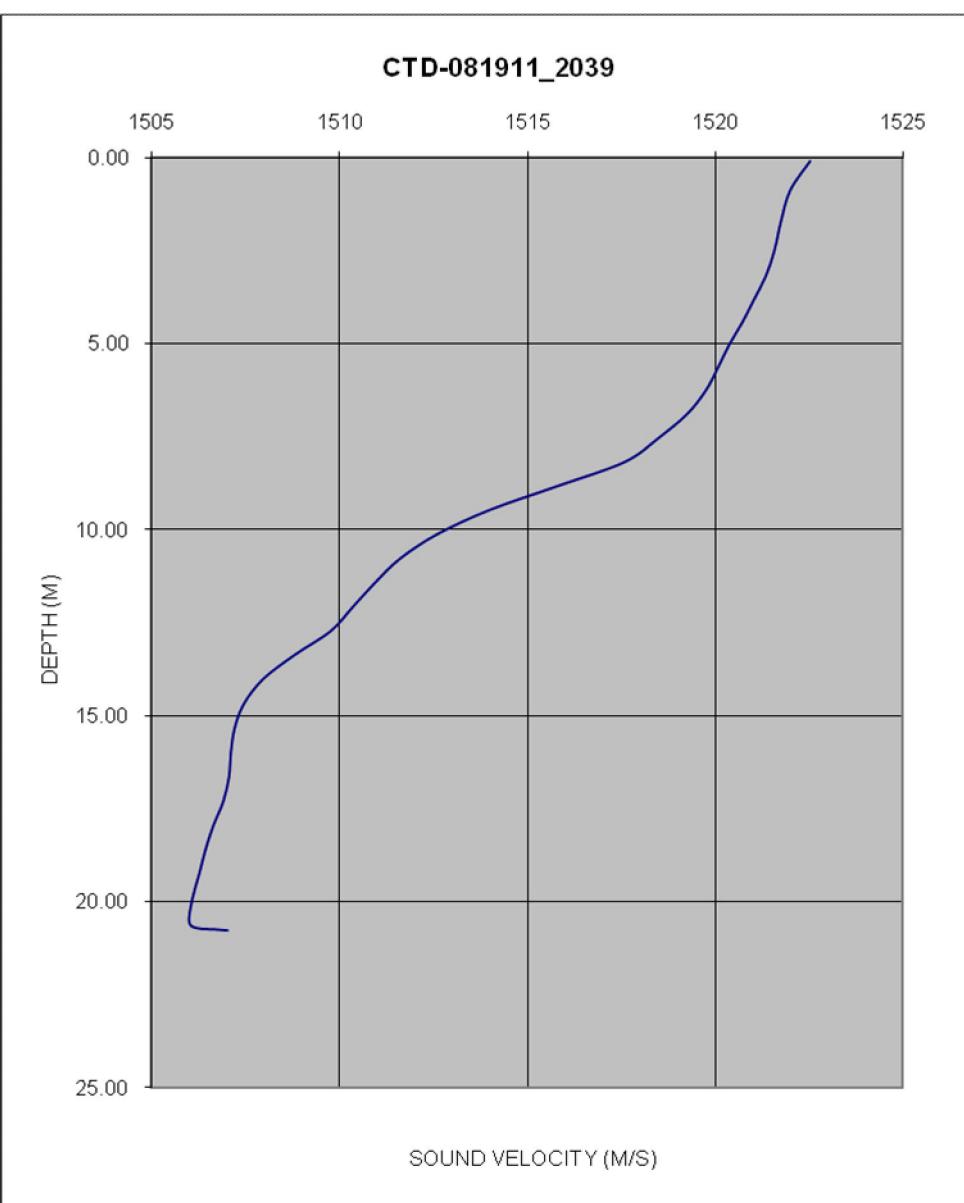


Figure 3.2-44
SVP 082311_1132 taken during the Fall 2011 multibeam survey at the HARS

1517.87	0.98
1517.90	1.62
1517.91	2.18
1517.92	2.76
1518.01	3.38
1518.70	4.03
1519.49	4.66
1519.65	5.29
1519.73	5.93
1519.89	6.60
1520.00	7.30
1519.14	7.95
1518.21	8.60
1517.13	9.22
1515.49	9.86
1513.73	10.53
1512.04	11.18
1510.59	11.79
1509.16	12.43
1508.05	13.08
1507.28	13.75
1506.40	14.39
1505.49	15.00
1504.83	15.61
1504.32	16.21
1503.75	16.82
1503.29	17.40
1502.74	17.99
1501.84	18.58
1500.85	19.19
1500.29	19.79
1500.03	20.38
1499.83	20.95
1499.59	21.51
1500.06	21.76

CTD PROFILE # 082311_1132

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
08/23/11	11:32	1012887	1012887	71	40.40331757 73.89717928

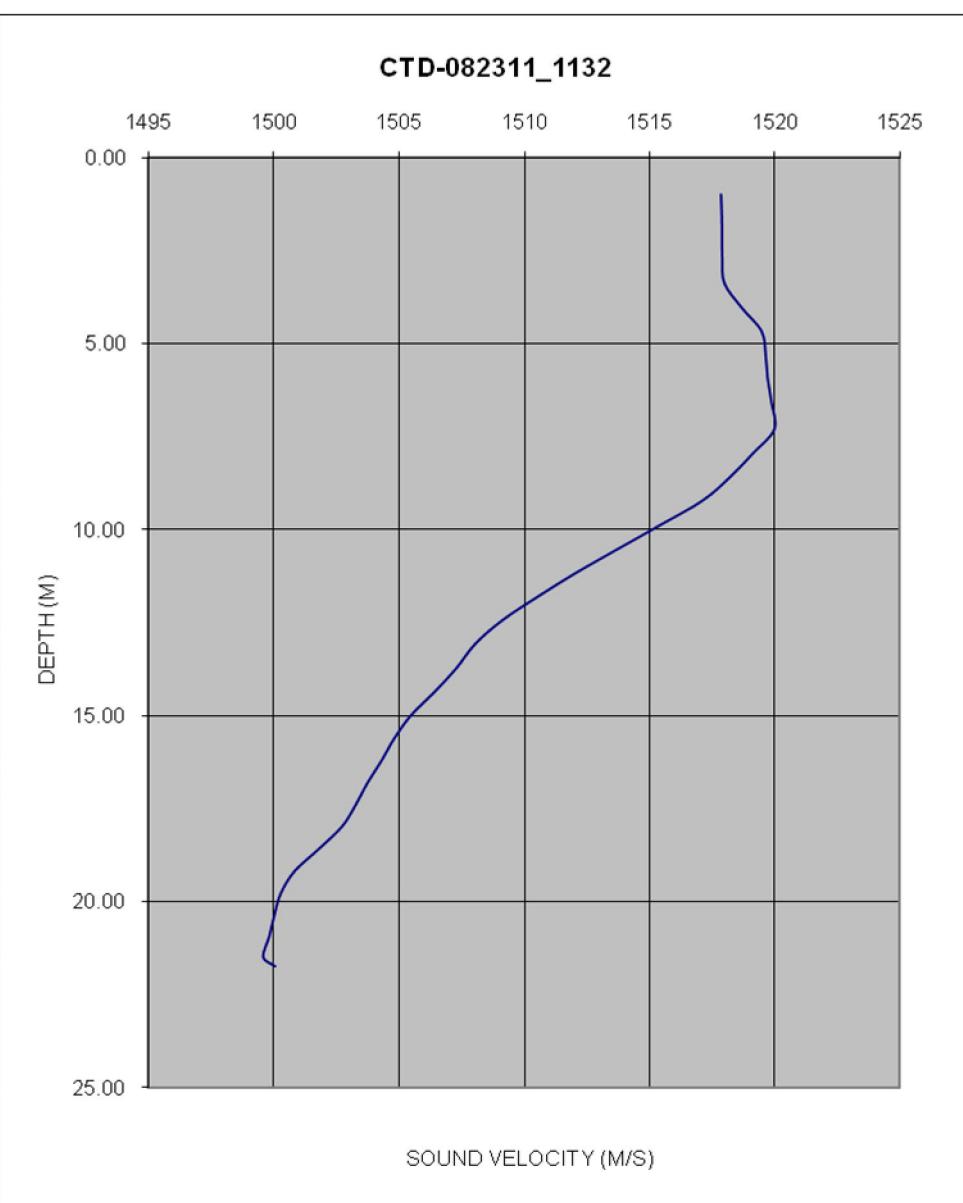


Figure 3.2-45
SVP 082311_1305 taken during the Fall 2011 multibeam survey at the HARS

1520.05	0.10
1520.05	0.73
1520.06	1.46
1520.12	2.20
1520.23	2.91
1520.44	3.58
1521.11	4.24
1521.60	4.90
1521.92	5.58
1522.07	6.25
1522.04	6.93
1521.74	7.63
1521.00	8.32
1520.51	8.99
1520.09	9.67
1518.10	10.33
1515.31	10.99
1513.04	11.64
1511.32	12.30
1509.74	12.94
1508.58	13.58
1507.95	14.22
1507.57	14.88
1506.85	15.52
1505.49	16.16
1503.99	16.80
1502.09	17.43
1500.00	18.10
1498.44	18.75
1497.73	19.41
1497.49	20.07
1497.39	20.74
1497.40	21.28
1497.76	21.37

CTD PROFILE # 082311_1305

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
08/23/11	13:05	1013599	77087	70	40.37821098 73.89466293

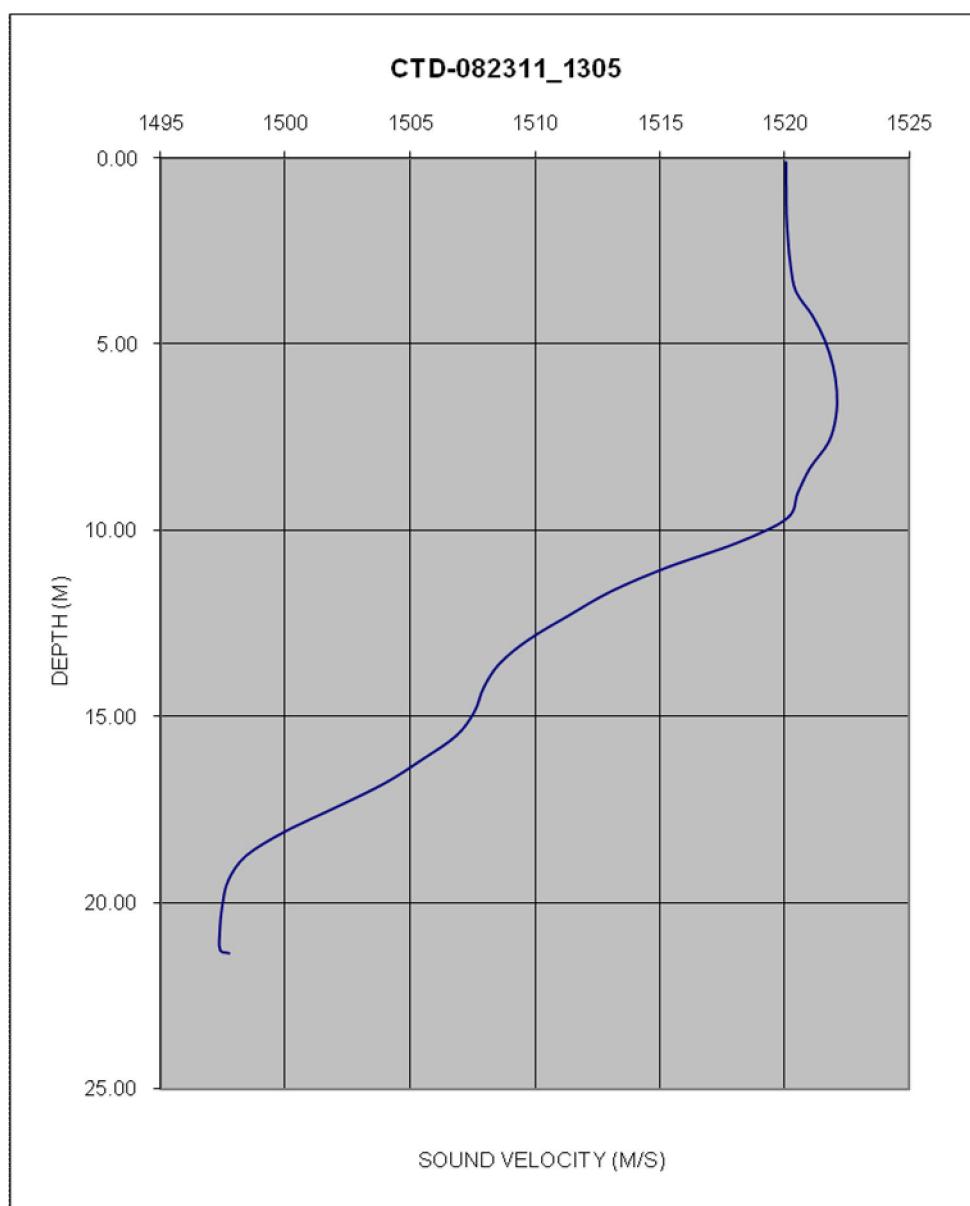


Figure 3.2-46
SVP 082311_1433 taken during the Fall 2011 multibeam survey at the HARS

1518.27	0.07
1518.20	0.61
1518.22	1.22
1518.25	1.86
1518.38	2.52
1518.72	3.16
1519.09	3.79
1519.52	4.43
1520.14	5.09
1520.66	5.75
1520.71	6.43
1520.57	7.09
1520.39	7.76
1520.31	8.43
1519.78	9.10
1518.05	9.75
1515.65	10.40
1513.29	11.06
1511.53	11.72
1510.12	12.38
1509.13	13.03
1508.33	13.70
1507.71	14.34
1507.02	14.97
1505.84	15.61
1504.88	16.26
1504.19	16.90
1502.44	17.53
1500.76	18.16
1499.88	18.81
1499.45	19.47
1499.27	20.13
1499.22	20.79
1499.48	21.10
1500.04	21.14
1500.50	21.16

CTD PROFILE # 082311_1433

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
08/23/11	14:33	1014869	86581	69	40.40426361 73.89006230

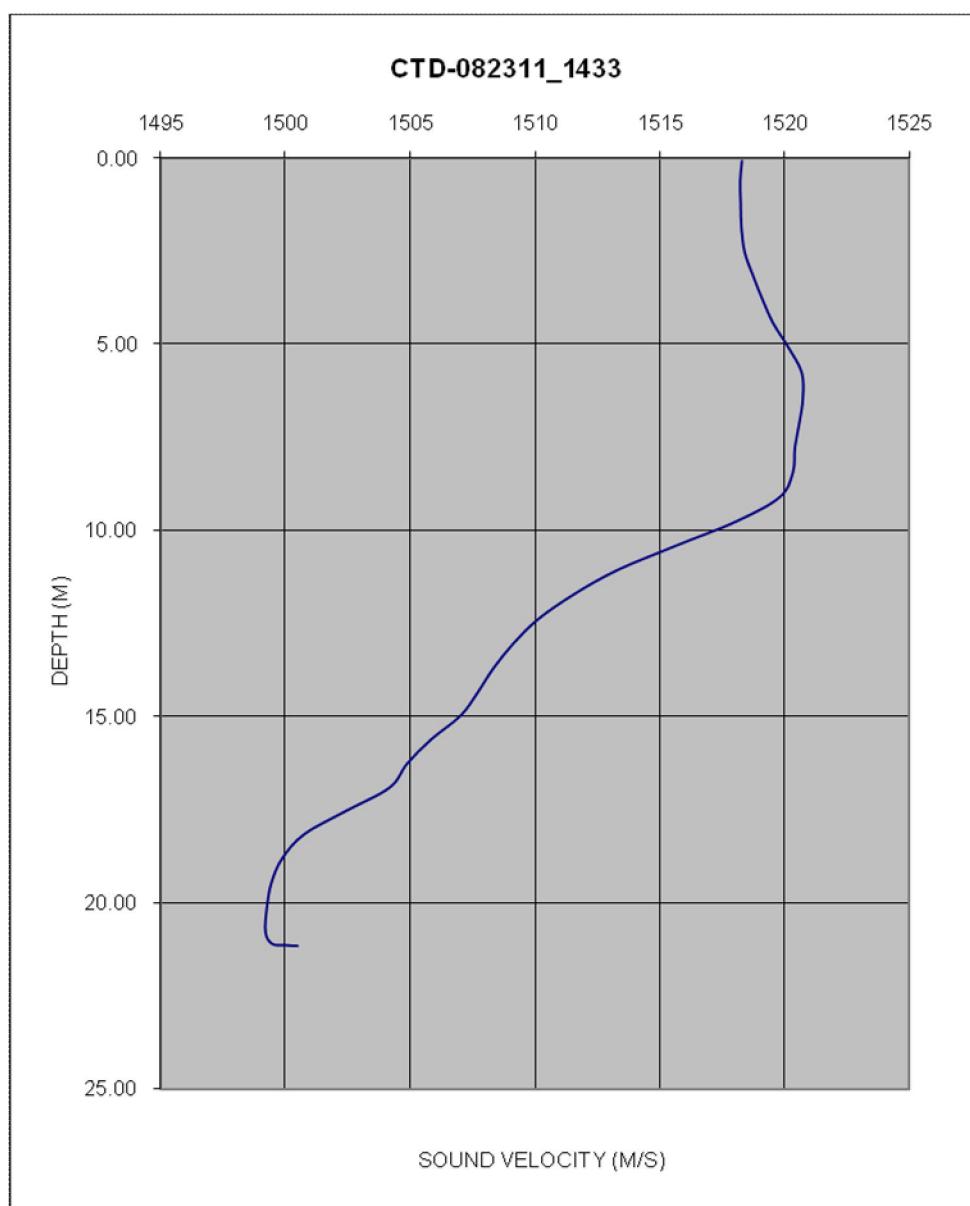


Figure 3.2-47
SVP 082311_1554 taken during the Fall 2011 multibeam survey at the HARS

1519.53	0.40
1519.10	1.16
1519.20	1.94
1519.46	2.69
1519.75	3.43
1520.12	4.16
1520.71	4.90
1521.49	5.68
1521.73	6.41
1521.67	7.11
1521.47	7.82
1521.15	8.53
1520.46	9.21
1519.32	9.92
1517.27	10.61
1514.23	11.25
1511.27	11.92
1509.84	12.57
1509.08	13.24
1508.41	13.92
1507.83	14.58
1507.13	15.22
1506.19	15.88
1504.35	16.53
1502.30	17.18
1500.85	17.82
1500.05	18.47
1499.48	19.12
1498.95	19.77
1498.53	20.43
1498.30	21.08
1498.19	21.72
1498.24	22.30
1498.53	22.43

CTD PROFILE # 082311_1554

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
08/23/11	15:54	1015900	86533	74	40.40413042 73.88635912

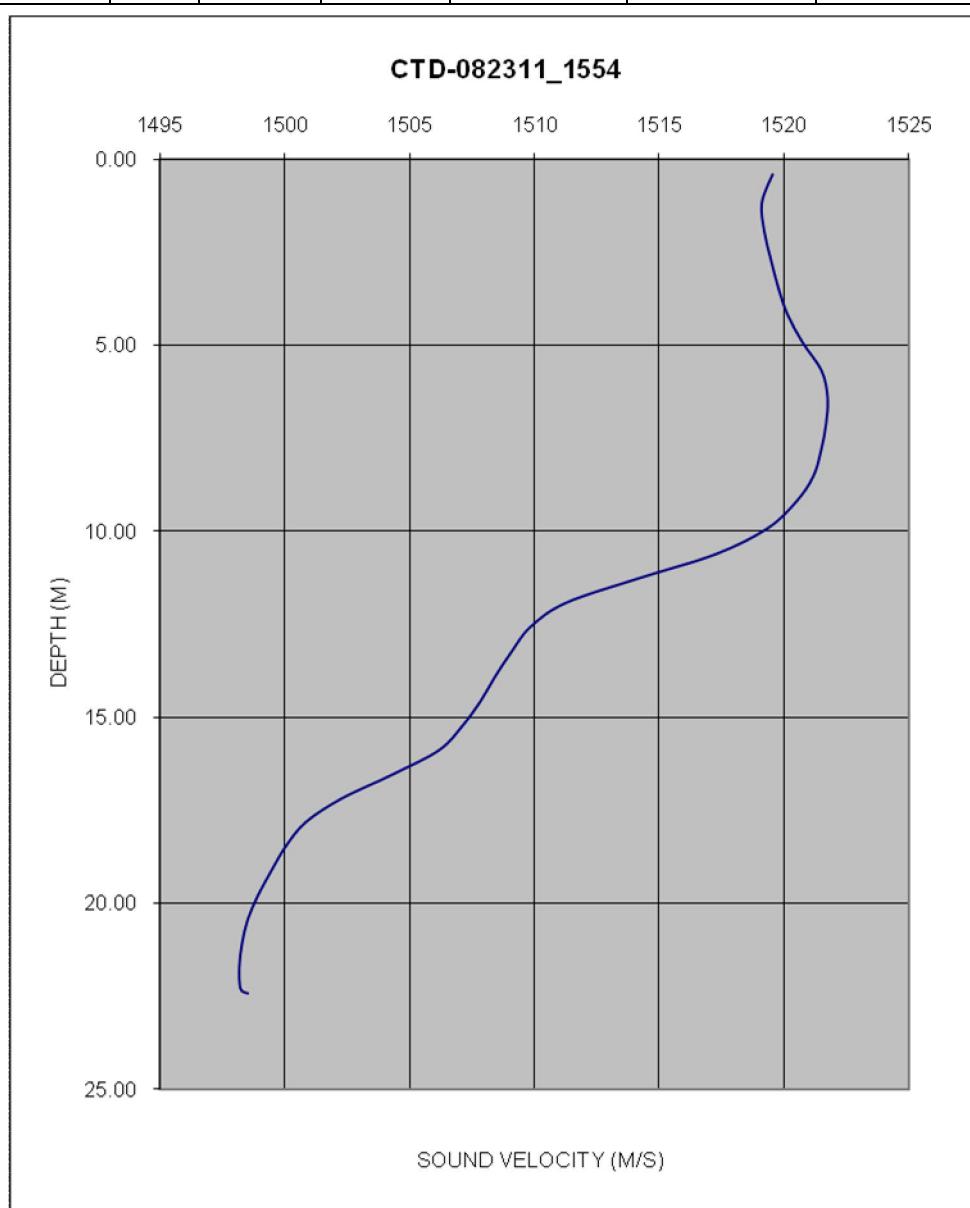


Figure 3.2-48
SVP 082311_1632 taken during the Fall 2011 multibeam survey at the HARS

1519.61	0.30
1519.27	1.07
1519.38	1.87
1519.87	2.62
1520.06	3.30
1520.45	3.97
1520.84	4.62
1521.45	5.28
1521.86	5.94
1521.97	6.58
1521.79	7.21
1521.35	7.83
1520.51	8.49
1519.34	9.16
1518.94	9.83
1517.19	10.50
1514.19	11.17
1511.12	11.82
1509.43	12.49
1508.55	13.18
1507.95	13.85
1507.38	14.52
1506.68	15.17
1505.98	15.78
1505.25	16.38
1503.93	16.98
1502.00	17.63
1500.74	18.30
1499.94	18.96
1499.24	19.64
1498.72	20.33
1498.41	21.01
1498.23	21.70
1498.10	22.37
1498.03	22.98
1497.99	23.10

CTD PROFILE # 082311_1632

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
08/23/11	16:32	1016095	86595	76	40.40429773 73.88566123

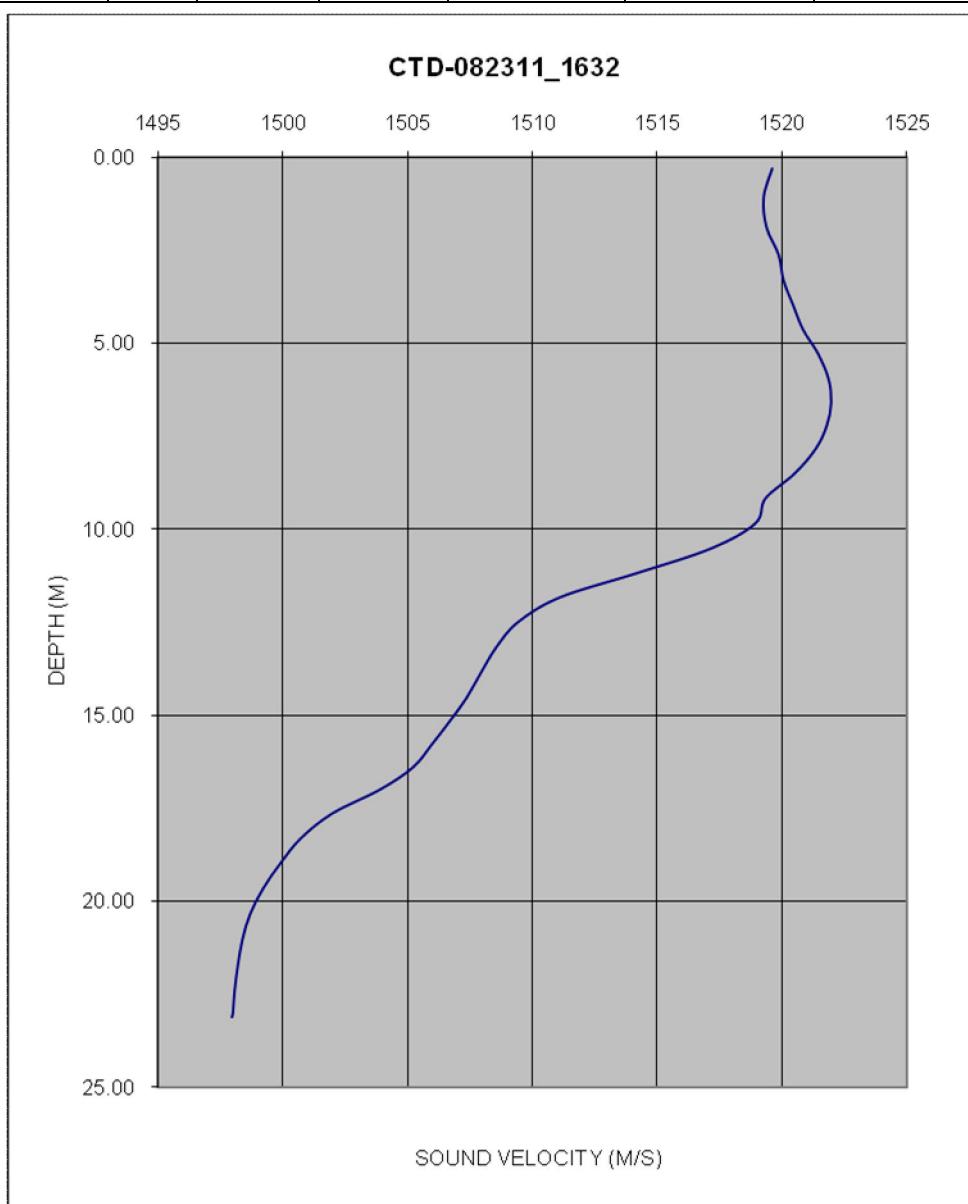


Figure 3.2-49
SVP 082311_1747 taken during the Fall 2011 multibeam survey at the HARS

1519.72	0.09
1519.65	0.67
1519.60	1.28
1519.83	1.88
1520.17	2.48
1520.61	3.08
1520.85	3.68
1521.17	4.28
1521.60	4.92
1522.03	5.57
1522.28	6.19
1522.38	6.78
1522.46	7.37
1522.52	7.93
1522.42	8.51
1521.53	9.11
1520.97	9.68
1518.98	10.24
1515.16	10.81
1511.94	11.39
1510.24	11.98
1509.43	12.59
1508.83	13.21
1508.24	13.81
1507.77	14.41
1507.32	14.99
1506.71	15.56
1505.72	16.11
1504.73	16.65
1503.85	17.19
1503.07	17.71
1502.65	18.20
1502.34	18.69
1501.99	19.16
1501.51	19.67
1500.51	20.22
1499.44	20.79
1498.89	21.39
1498.62	21.99
1498.40	22.61
1498.49	22.98

CTD PROFILE # 082311_1747

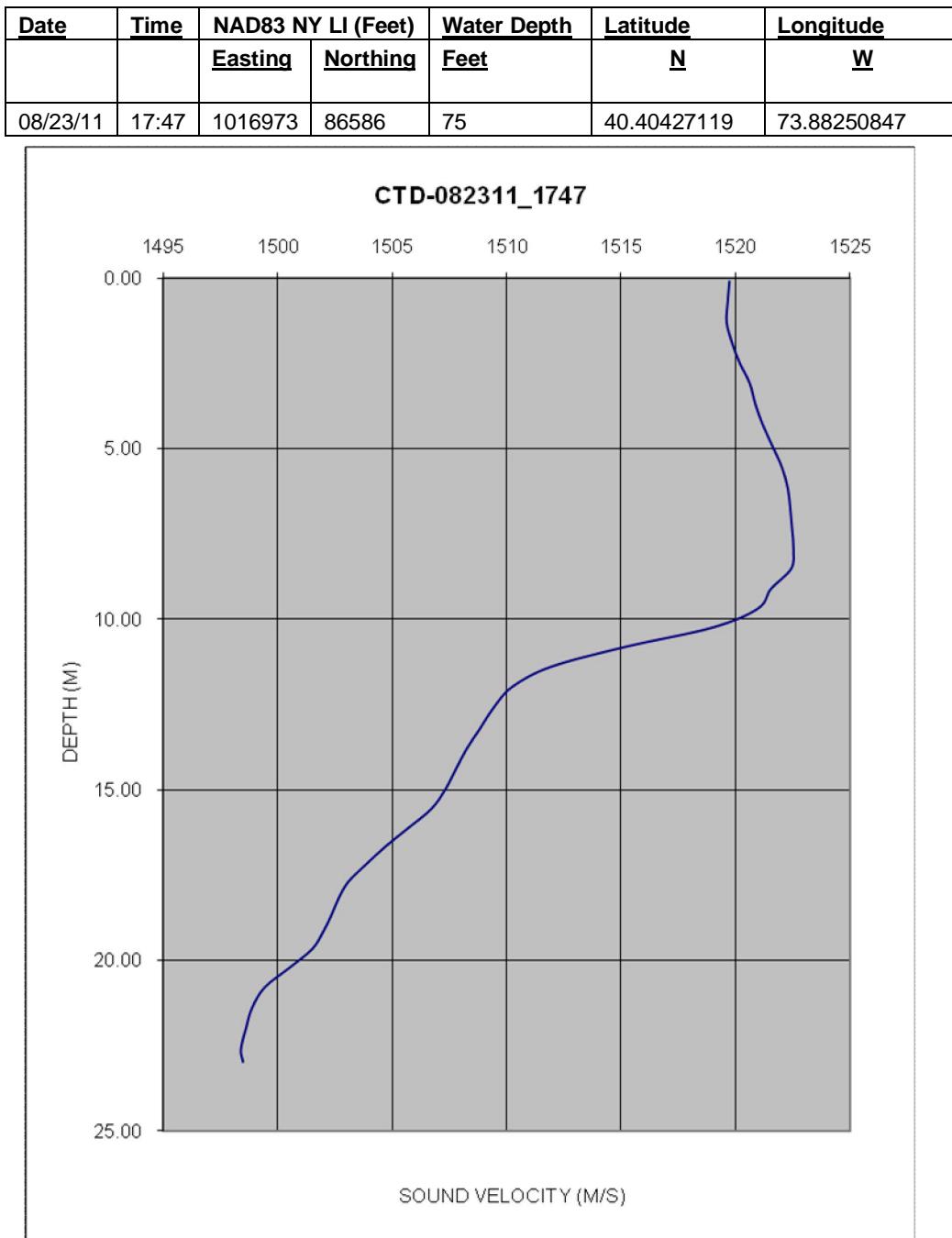


Figure 3.2-50
SVP 082311_1925 taken during the Fall 2011 multibeam survey at the HARS

1525.56	0.28
1525.46	0.80
1525.41	1.41
1525.41	2.06
1525.40	2.72
1525.38	3.37
1525.35	4.02
1525.27	4.67
1525.17	5.33
1525.11	5.99
1525.03	6.64
1524.97	7.31
1524.92	7.96
1525.03	8.63
1524.75	9.28
1522.43	9.93
1516.92	10.60
1511.93	11.27
1509.20	11.94
1507.99	12.61
1507.45	13.27
1507.16	13.92
1506.81	14.58
1506.45	15.26
1506.19	15.96
1505.97	16.65
1505.77	17.33
1505.30	18.02
1503.84	18.70
1501.54	19.36
1499.47	20.03
1498.27	20.60
1497.53	21.15
1496.83	21.76
1496.68	22.06
1497.12	22.10

CTD PROFILE # 082311 1925

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
08/23/11	19:25	1017896	77078	73	40.37816924 73.87923882

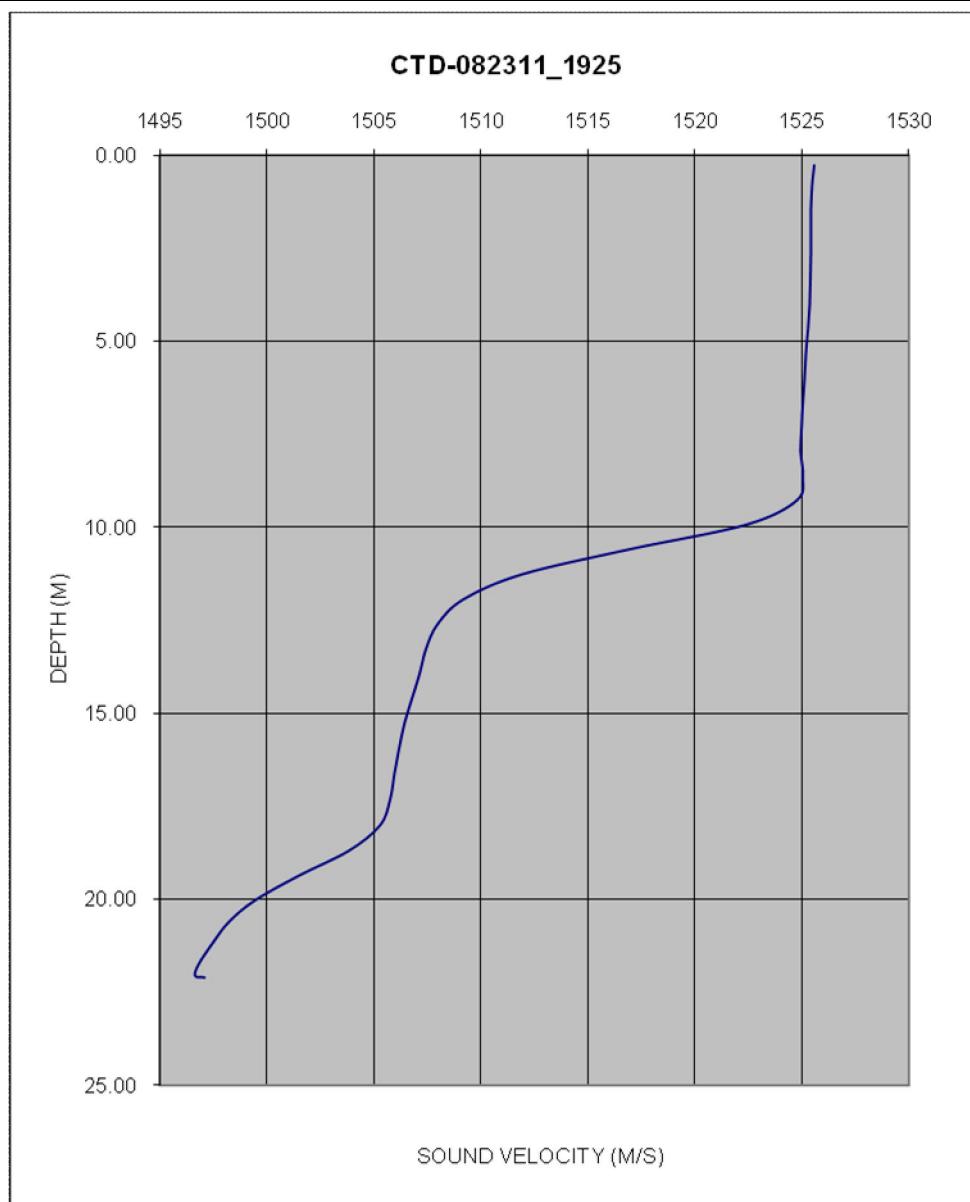


Figure 3.2-51
SVP 082311_2126 taken during the Fall 2011 multibeam survey at the HARS

1526.81	0.02
1526.64	0.70
1526.57	1.40
1526.53	2.08
1526.44	2.73
1526.32	3.37
1526.26	4.07
1526.22	4.73
1526.10	5.38
1525.94	6.04
1525.67	6.70
1525.34	7.36
1524.49	8.01
1521.67	8.67
1517.37	9.33
1514.36	10.00
1511.89	10.67
1510.15	11.36
1509.13	12.02
1508.28	12.70
1507.36	13.37
1506.67	14.05
1506.25	14.73
1506.01	15.39
1505.85	16.05
1505.61	16.73
1505.17	17.40
1504.32	18.07
1502.65	18.75
1500.62	19.41
1498.77	20.09
1497.88	20.76
1497.40	21.44
1496.75	22.11
1496.09	22.78
1495.75	23.31
1496.09	23.39

CTD PROFILE # 082311 2126

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
08/23/11	21:26	1019263	77136	77	40.37832475 73.87433205

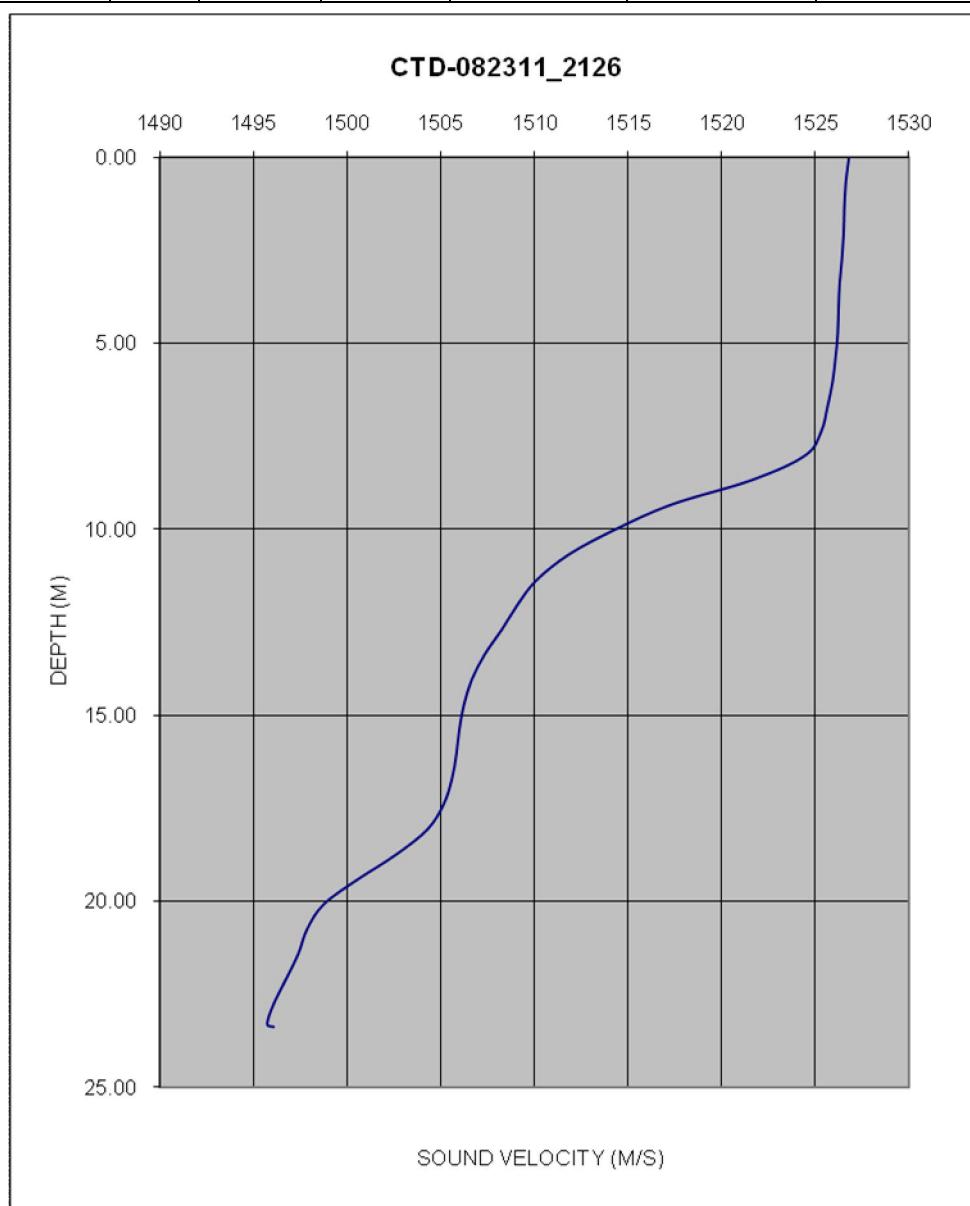


Figure 3.2-52
SVP 082411_1133 taken during the Fall 2011 multibeam survey at the HARS

1516.07 0.43

1516.14 0.98

1516.28 1.58

CTD PROFILE # 082411 1133

1517.43 2.20

1519.52 2.82

1521.58 3.43

<u>Date</u>	<u>Time</u>	<u>NAD83 NY LI (Feet)</u>	<u>Water Depth</u>	<u>Latitude</u>	<u>Longitude</u>
		<u>Easting</u>	<u>Northing</u>	<u>Feet</u>	<u>N</u>
08/24/11	11:33	1019481	86693	62	40.40455469 73.87350044

1522.71 4.01

1523.21 4.58

1523.38 5.11

1523.46 5.61

1523.38 6.11

1523.02 6.62

1521.69 7.15

1518.85 7.68

1516.61 8.15

1514.64 8.60

1512.63 9.05

1511.10 9.57

1510.03 10.15

1509.42 10.72

1509.01 11.28

1508.01 11.85

1506.76 12.39

1506.00 12.91

1505.35 13.44

1504.81 13.98

1504.35 14.54

1503.93 15.10

1503.35 15.68

1502.63 16.28

1501.42 16.88

1500.04 17.49

1499.32 18.09

1499.10 18.64

1499.25 18.78

1499.63 18.80

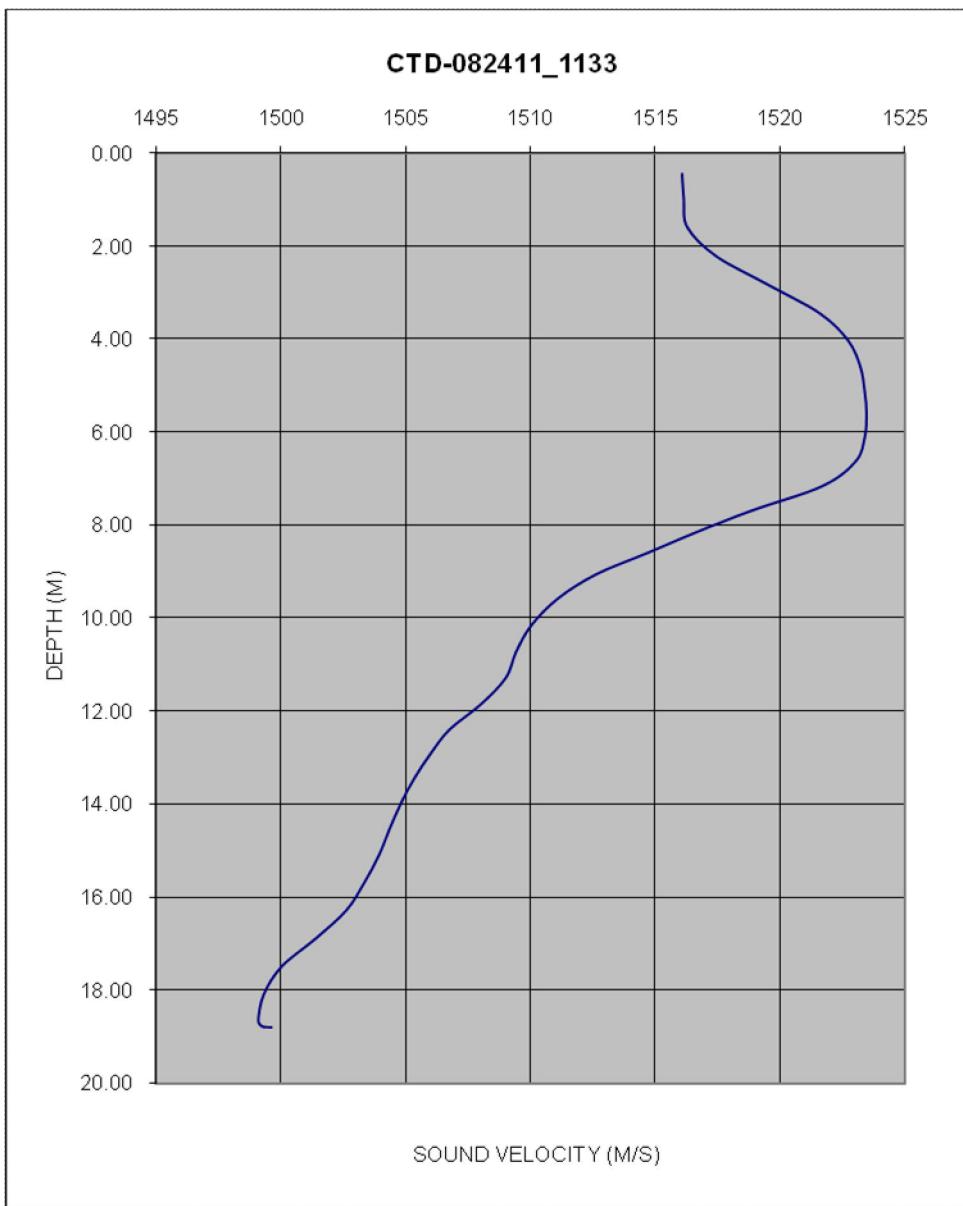


Figure 3.2-53
SVP 082411_1232 taken during the Fall 2011 multibeam survey at the HARS

1520.34	0.43
1521.45	1.04
1523.06	1.65
1524.03	2.23
1524.56	2.78
1524.77	3.34
1524.85	3.90
1524.88	4.49
1524.89	5.10
1524.89	5.72
1524.89	6.34
1524.86	6.93
1524.69	7.55
1523.99	8.22
1522.17	8.90
1518.06	9.58
1513.53	10.26
1510.78	10.94
1508.97	11.61
1507.87	12.27
1507.14	12.95
1506.54	13.63
1505.98	14.31
1505.33	15.00
1504.60	15.66
1503.56	16.31
1502.63	16.95
1501.53	17.58
1500.42	18.22
1499.59	18.86
1499.20	19.50
1498.89	20.13
1498.41	20.77
1497.56	21.43
1496.21	22.08
1494.48	22.57
1494.31	22.63

CTD PROFILE # 082411_1232

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
08/24/11	12:32	1020207	77161	74	40.37838851 73.87094532

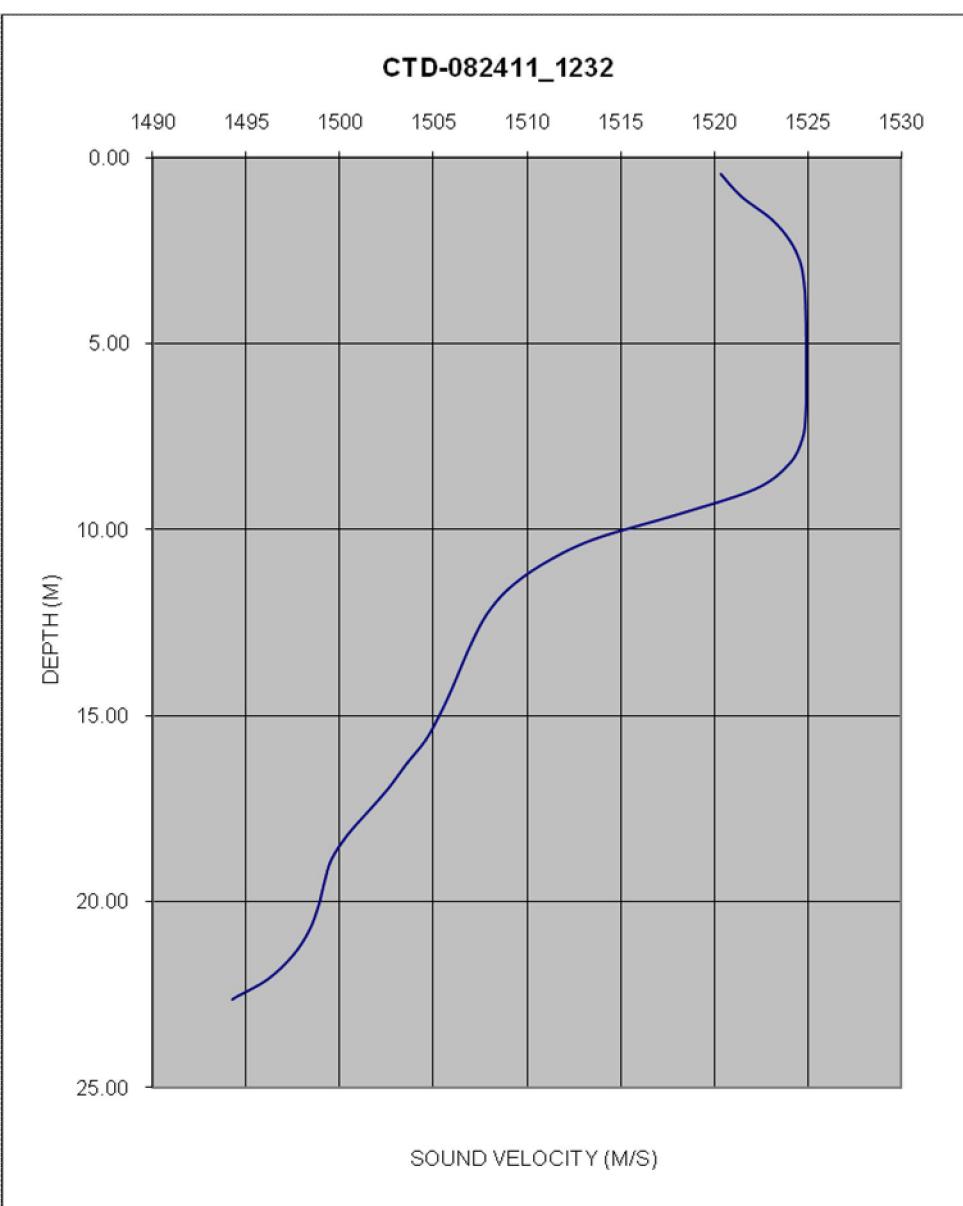


Figure 3.2-54
SVP 082411_1356 taken during the Fall 2011 multibeam survey at the HARS

1521.82	0.46
1522.65	1.02
1523.75	1.54
1524.32	2.03
1524.64	2.58
1524.82	3.19
1524.87	3.78
1524.88	4.37
1524.88	4.98
1524.87	5.59
1524.82	6.22
1524.61	6.89
1523.82	7.54
1522.38	8.17
1519.80	8.80
1516.52	9.44
1514.52	10.09
1513.14	10.75
1511.68	11.41
1510.48	12.04
1509.60	12.69
1508.66	13.36
1507.67	14.03
1506.57	14.65
1505.76	15.22
1505.27	15.80
1504.94	16.42
1504.60	17.08
1504.02	17.70
1503.27	18.30
1502.73	18.88
1502.35	19.49
1501.88	20.13
1501.64	20.55
1501.95	20.60

CTD PROFILE # 082411_1356

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
08/24/11	13:56	1024034	77151	68	40.37834569 73.85720808

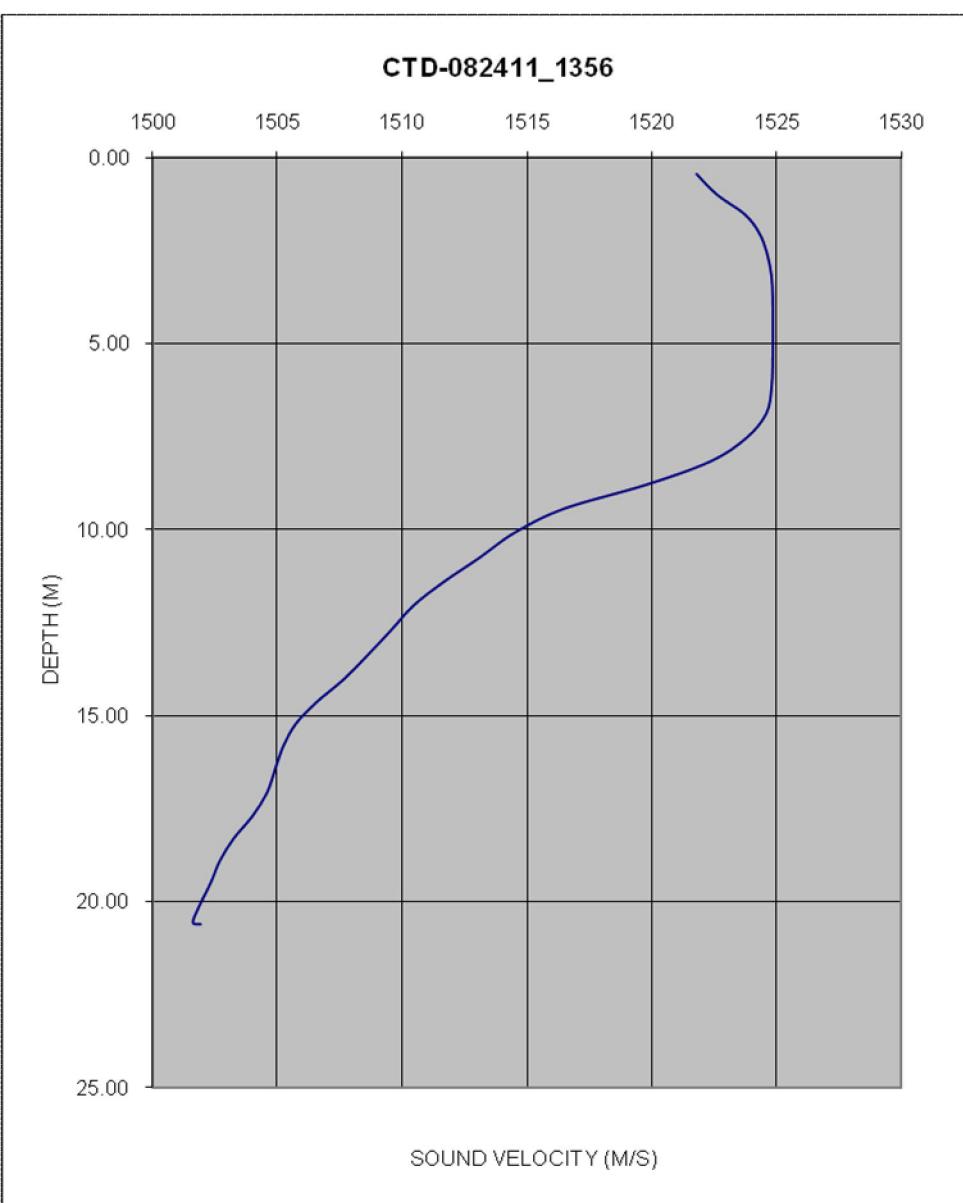


Figure 3.2-55
SVP 082411_1546 taken during the Fall 2011 multibeam survey at the HARS

1522.53	0.05
1522.23	0.53
1522.74	1.19
1524.19	1.88
1524.78	2.56
1525.05	3.17
1525.14	3.74
1525.17	4.25
1525.17	4.74
1525.15	5.36
1525.09	6.02
1524.65	6.67
1523.81	7.25
1522.95	7.82
1521.84	8.37
1520.35	8.95
1517.71	9.57
1514.51	10.17
1511.83	10.81
1510.42	11.40
1509.72	12.03
1509.01	12.68
1508.12	13.33
1507.00	13.96
1506.03	14.57
1505.48	15.18
1505.16	15.81
1504.95	16.45
1504.34	17.09
1503.30	17.73
1502.42	18.36
1501.43	18.98
1499.99	19.60
1498.02	20.24
1496.07	20.91
1495.08	21.51
1495.19	21.67

CTD PROFILE # 082411 1546

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
08/24/11	15:46	1022884	77355	71	40.37890986 73.86133640

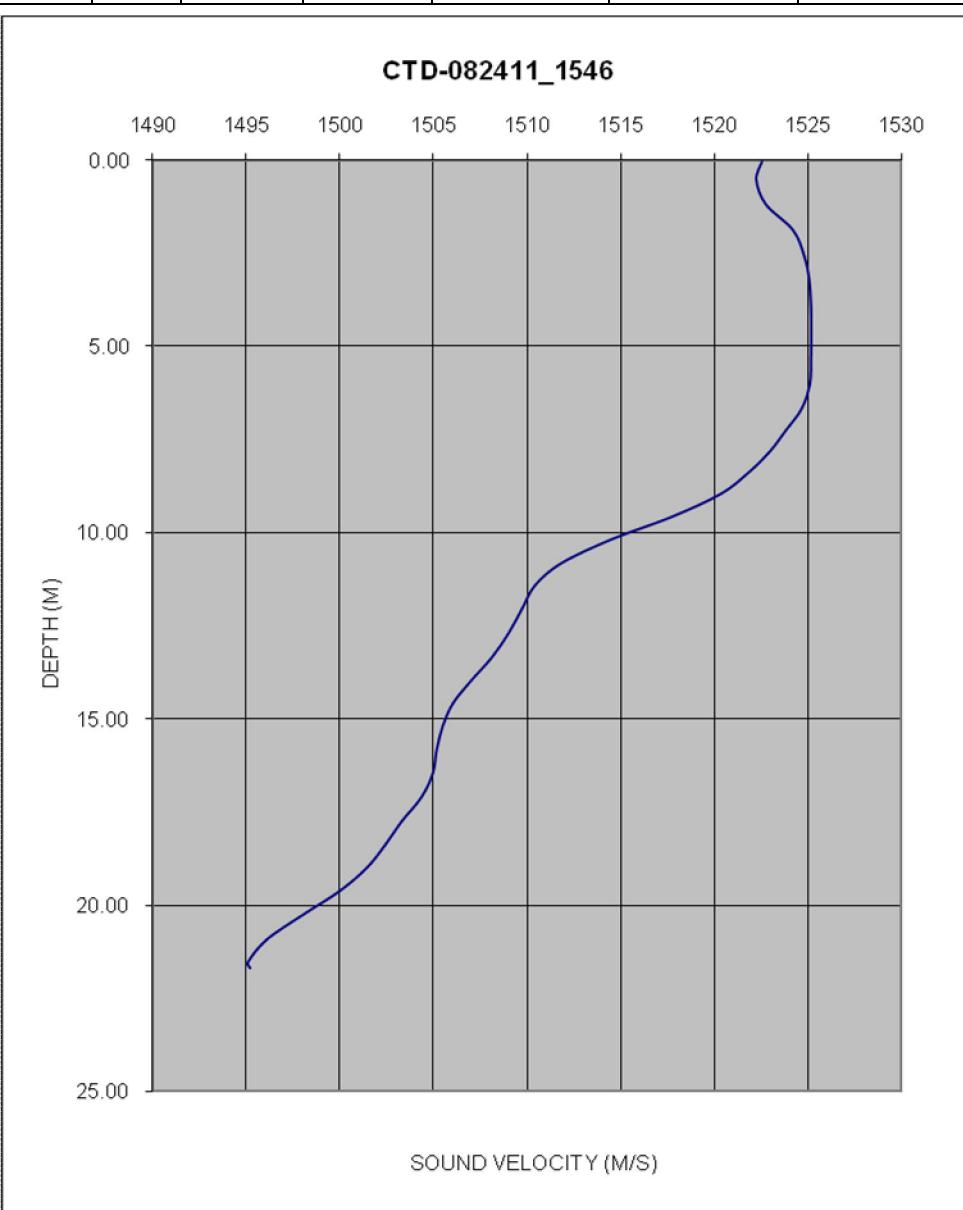


Figure 3.2-56
SVP 082411_1739 taken during the Fall 2011 multibeam survey at the HARS

1521.55	0.29
1521.50	0.85
1522.15	1.43
1522.77	2.05
1523.00	2.69
1523.18	3.33
1523.36	3.96
1523.49	4.54
1523.53	5.16
1523.66	5.77
1523.68	6.36
1523.68	6.95
1523.68	7.48
1523.69	8.07
1523.70	8.67
1523.90	9.26
1523.26	9.79
1521.46	10.32
1520.28	10.90
1519.38	11.49
1518.15	12.14
1515.67	12.80
1513.00	13.44
1511.64	14.09
1509.85	14.74
1507.14	15.40
1504.88	16.04
1503.69	16.62
1503.60	16.80

CTD PROFILE # 082411 1739

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
08/24/11	17:39	1023960	90542	55	40.41510113 73.85739712

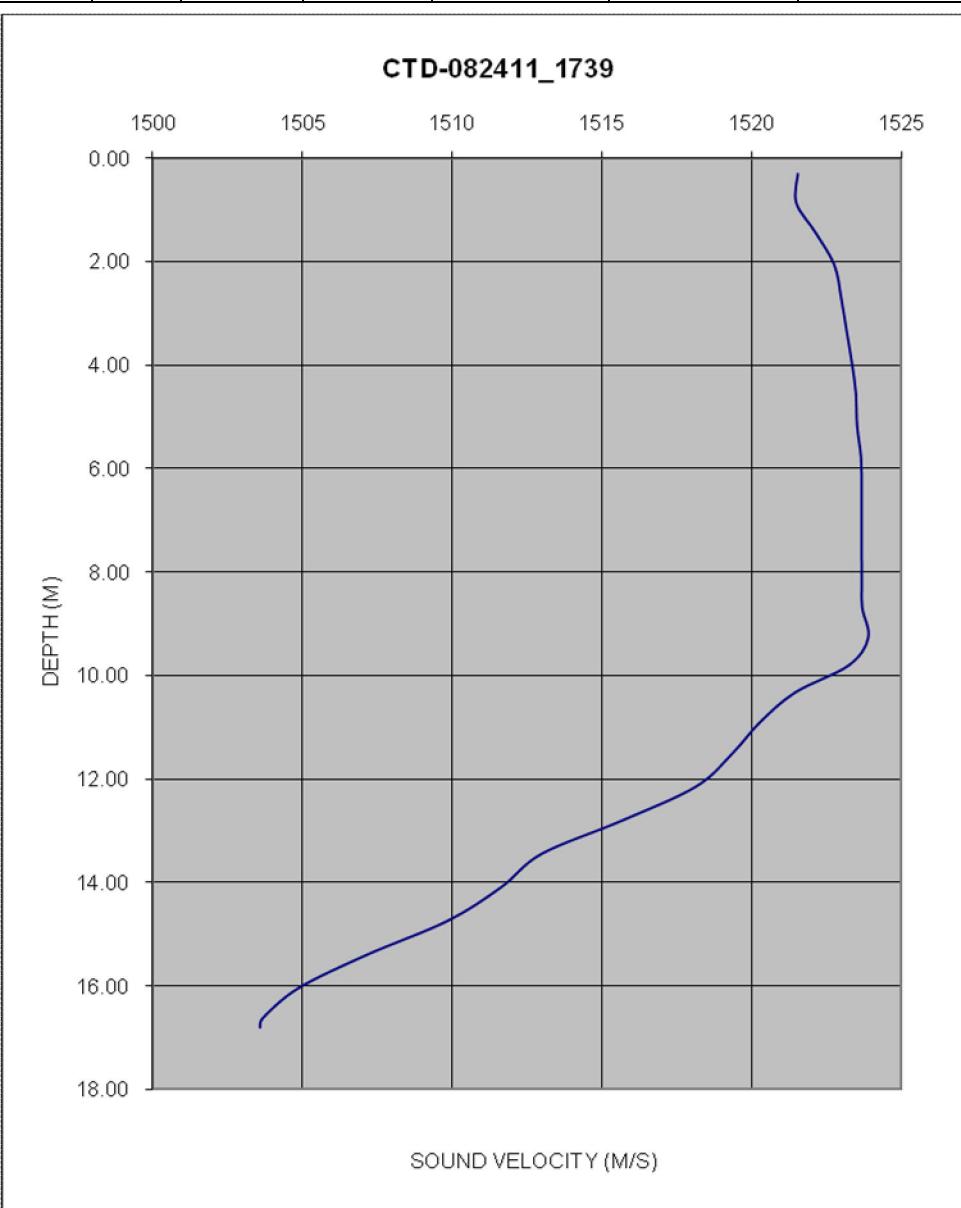


Figure 3.2-57
SVP 091211_1307 taken during the Fall 2011 multibeam survey at the HARS

1515.33	0.45
1515.75	0.98
1516.49	1.55
1516.94	2.19
1517.25	2.88
1517.46	3.54
1517.72	4.09
1517.83	4.59
1517.88	5.11
1517.80	5.69
1517.64	6.25
1517.60	6.76
1517.73	7.24
1517.83	7.73
1517.93	8.16
1518.02	8.60
1518.07	9.07
1518.07	9.54
1518.08	10.05
1518.09	10.56
1518.07	11.06
1518.04	11.57
1518.02	12.03
1518.03	12.48
1518.08	13.00
1518.12	13.60
1518.13	14.18
1518.13	14.76
1518.06	15.37
1517.92	16.01
1517.81	16.61
1517.74	17.19
1517.68	17.80
1517.54	18.40
1517.06	19.01
1516.40	19.59
1515.86	20.14
1515.41	20.75
1515.17	21.34
1514.93	21.90
1514.68	22.49
1514.33	23.04
1514.12	23.25

CTD PROFILE # 091211 1307

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
09/12/11	13:07	1020837	77135	76	40.37831457 73.86868431

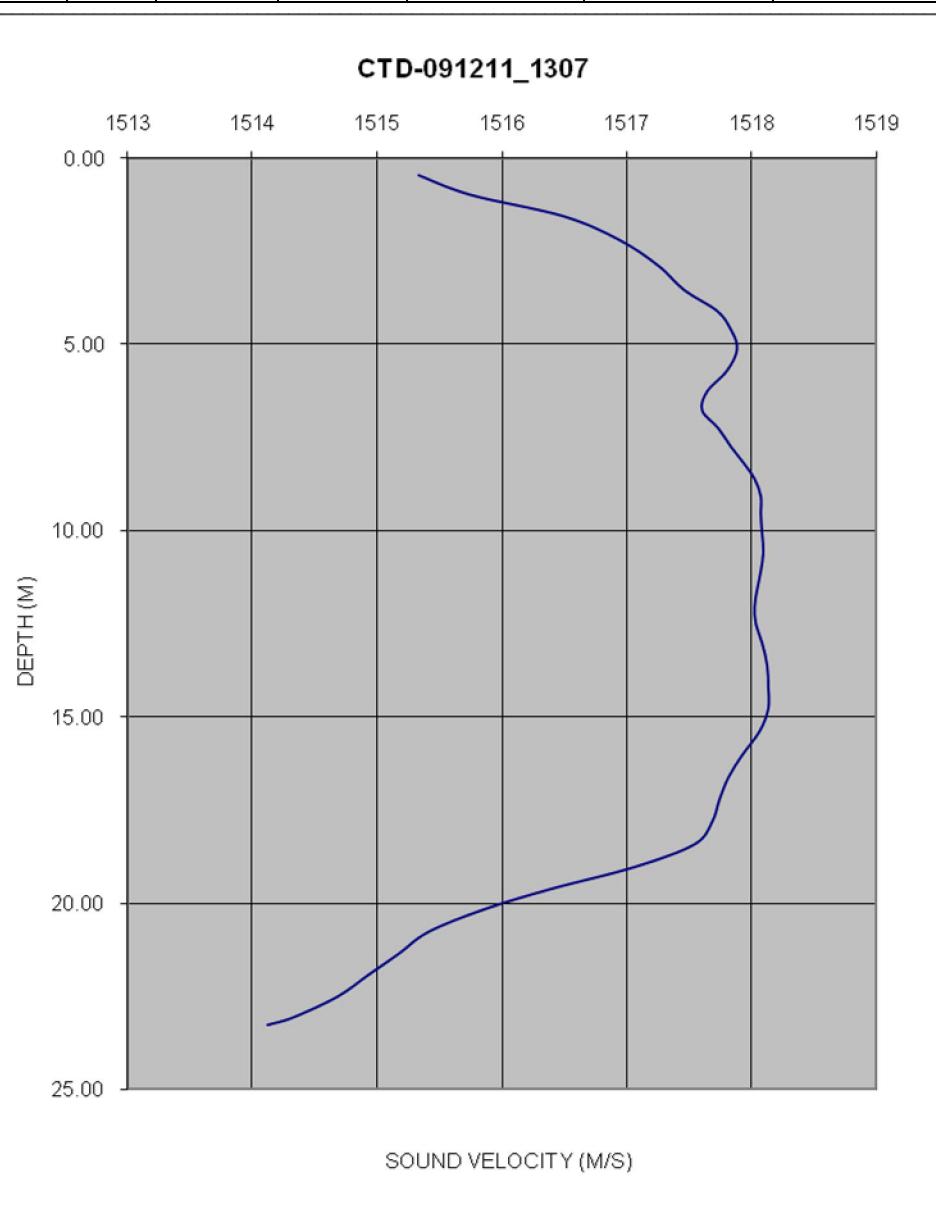


Figure 3.2-58
SVP 091211_1420 taken during the Fall 2011 multibeam survey at the HARS

1515.28	0.20
1516.37	0.80
1516.77	1.47
1517.21	2.18
1517.65	2.85
1517.86	3.48
1517.92	4.09
1517.95	4.70
1517.89	5.36
1517.83	6.03
1517.64	6.70
1517.57	7.40
1517.72	8.08
1517.84	8.78
1517.91	9.47
1517.96	10.12
1518.03	10.79
1518.07	11.49
1518.05	12.19
1518.01	12.89
1517.99	13.57
1518.00	14.26
1518.02	14.94
1518.03	15.54
1518.06	16.07
1518.08	16.49
1518.10	16.87
1518.12	17.30
1517.98	17.80
1517.63	18.31
1517.26	18.83
1516.88	19.38
1516.35	19.89
1516.00	20.29
1515.73	20.80
1515.48	21.39
1514.91	22.02
1514.34	22.53
1514.11	22.58

CTD PROFILE # 091211_1420

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
09/12/11	14:20	1021602	77124	74	40.37828120 73.86593868

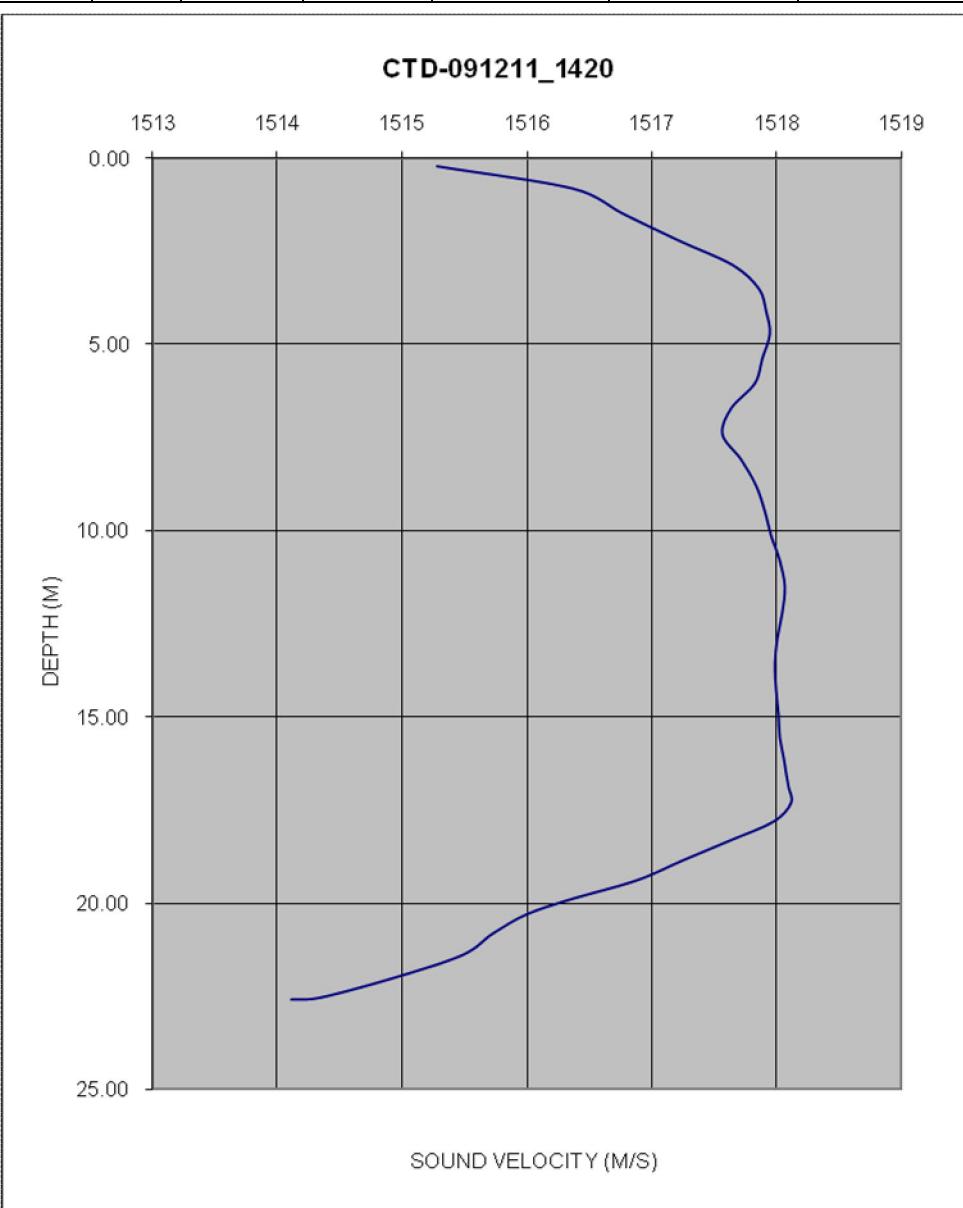


Figure 3.2-59
SVP 091211_1548 taken during the Fall 2011 multibeam survey at the HARS

1512.33	0.34
1514.43	0.90
1515.86	1.54
1516.18	2.20
1516.51	2.90
1516.29	3.61
1516.46	4.33
1516.81	5.01
1517.22	5.68
1517.44	6.35
1517.47	7.00
1517.54	7.67
1517.66	8.35
1517.77	9.03
1517.83	9.69
1517.93	10.36
1518.08	11.01
1518.09	11.69
1517.93	12.36
1517.57	13.03
1517.17	13.69
1516.76	14.37
1516.49	15.03
1516.37	15.68
1516.30	16.31
1516.32	16.58
1516.44	16.61
1516.55	16.62
1516.59	16.66
1516.66	16.68

CTD PROFILE # 091211 1548

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
09/12/11	15:48	1024025	86398	55	40.40372626 73.85718796

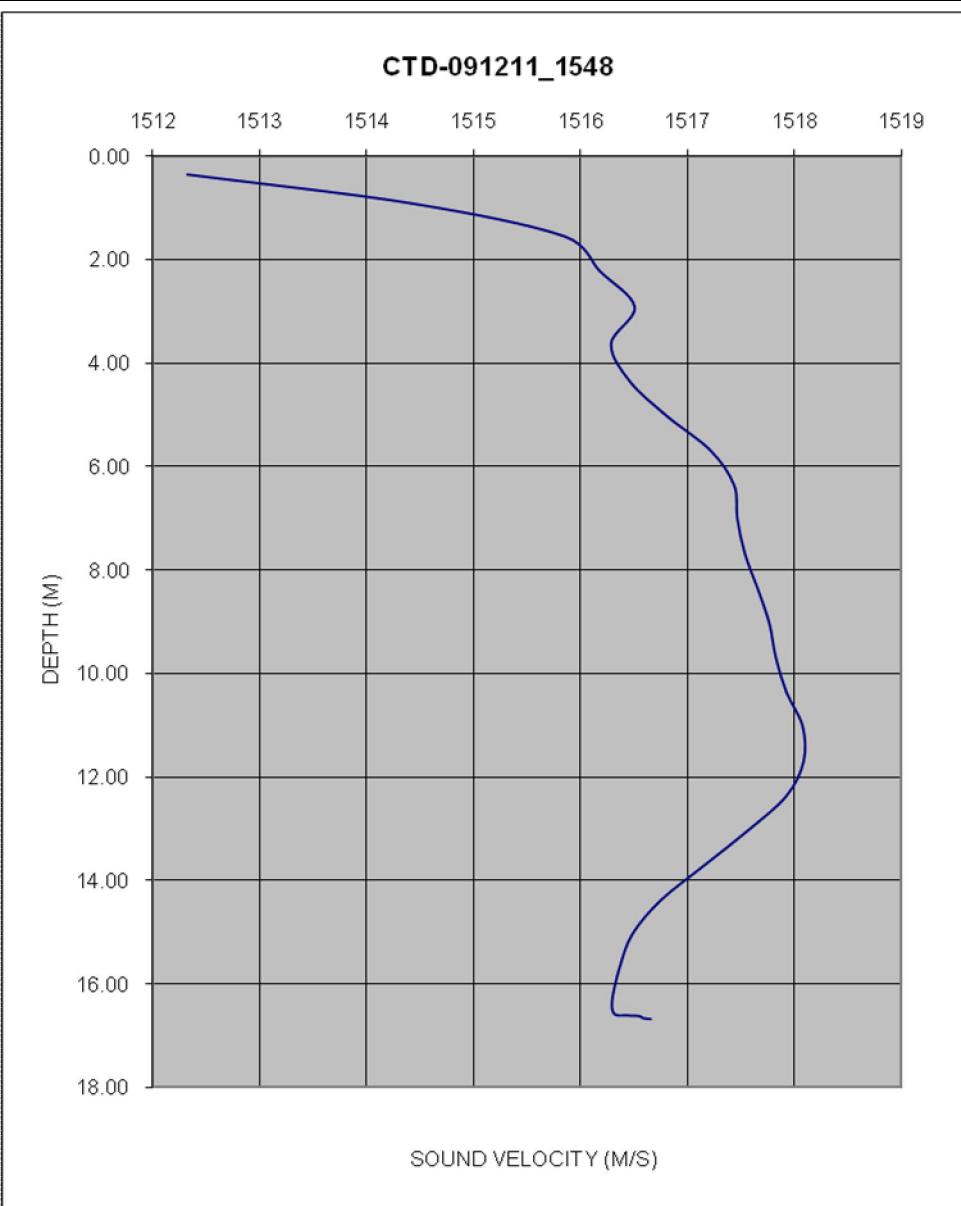


Figure 3.2-60
SVP 091211_1648 taken during the Fall 2011 multibeam survey at the HARS

1508.70	0.09
1511.94	0.56
1514.48	1.07
1515.25	1.60
1515.82	2.14
1516.41	2.69
1516.92	3.23
1516.75	3.77
1516.66	4.29
1516.68	4.79
1516.76	5.28
1516.89	5.78
1517.16	6.32
1517.35	6.86
1517.24	7.40
1517.21	7.95
1517.25	8.52
1517.52	9.05
1517.73	9.56
1517.81	10.03
1517.82	10.56
1517.86	11.08
1517.89	11.62
1517.92	12.17
1517.93	12.72
1517.90	13.28
1517.90	13.82
1517.93	14.36
1517.96	14.90
1517.96	15.43
1517.78	15.96
1517.53	16.47
1517.38	16.99
1517.34	17.45
1517.39	17.56
1517.44	17.59
1517.34	17.62

CTD PROFILE # 091211 1648

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
09/12/11	16:48	1023670	95853	58	40.42968020 73.85840771

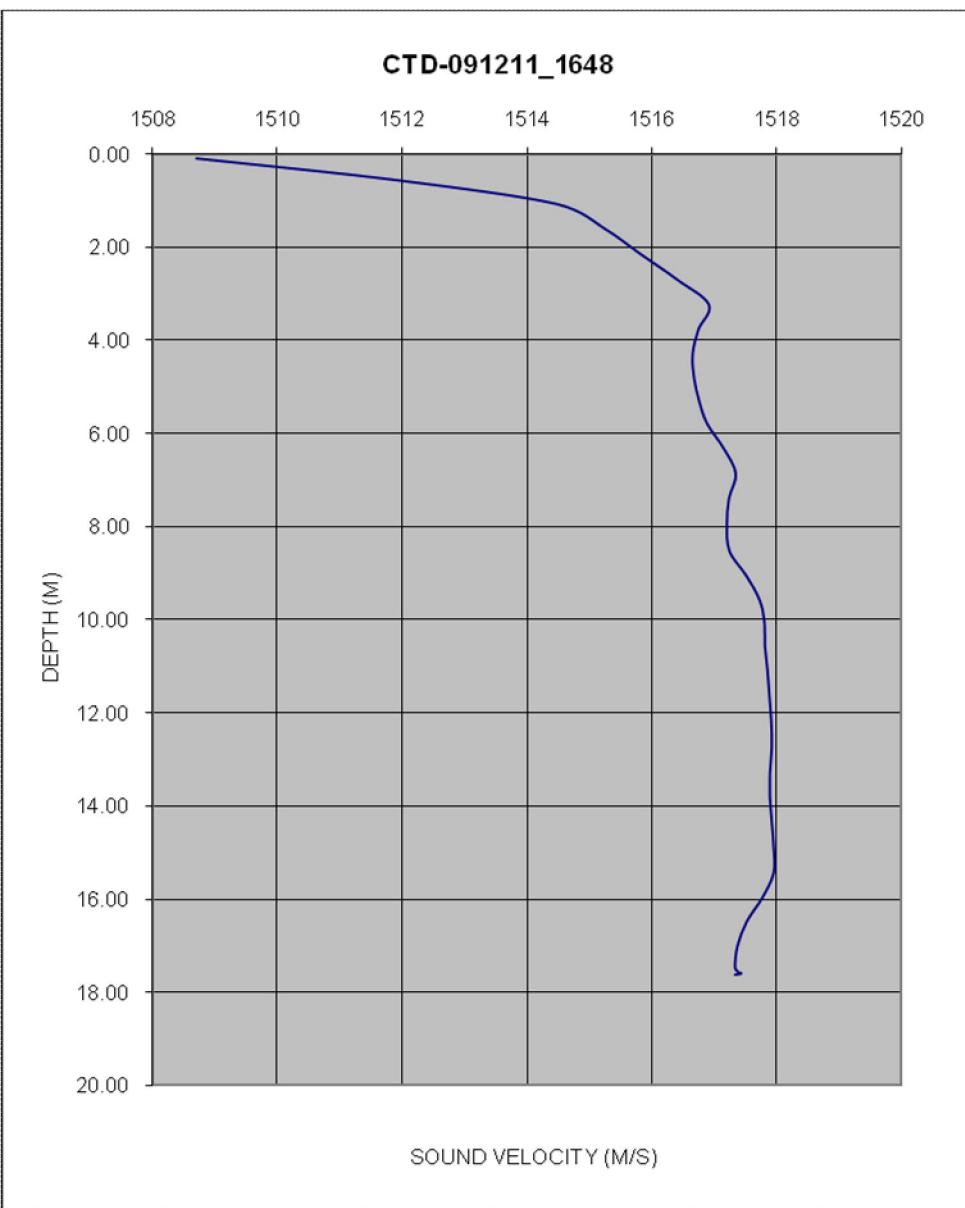


Figure 3.2-61
SVP 091211_1904 taken during the Fall 2011 multibeam survey at the HARS

CTD PROFILE # 091211 1904

1505.36	0.61
1505.17	0.87
1505.87	1.13
1506.36	1.42
1504.87	1.61
1505.81	1.70
1508.28	1.86
1510.81	2.26
1511.45	2.73
1512.49	3.22
1513.98	3.72
1515.71	4.22
1516.47	4.75
1516.59	5.30
1516.51	5.80
1516.53	6.30
1516.61	6.74
1516.80	7.15
1516.97	7.58
1517.17	8.05
1517.48	8.55
1517.56	9.05
1517.57	9.58
1517.60	10.10
1517.64	10.64
1517.73	11.26
1517.86	11.94
1517.88	12.64
1517.90	13.33
1517.68	14.02
1517.40	14.70
1517.26	15.37
1517.25	15.68

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
09/12/11	19:04	1022355	86635	51	40.40438410 73.86318275

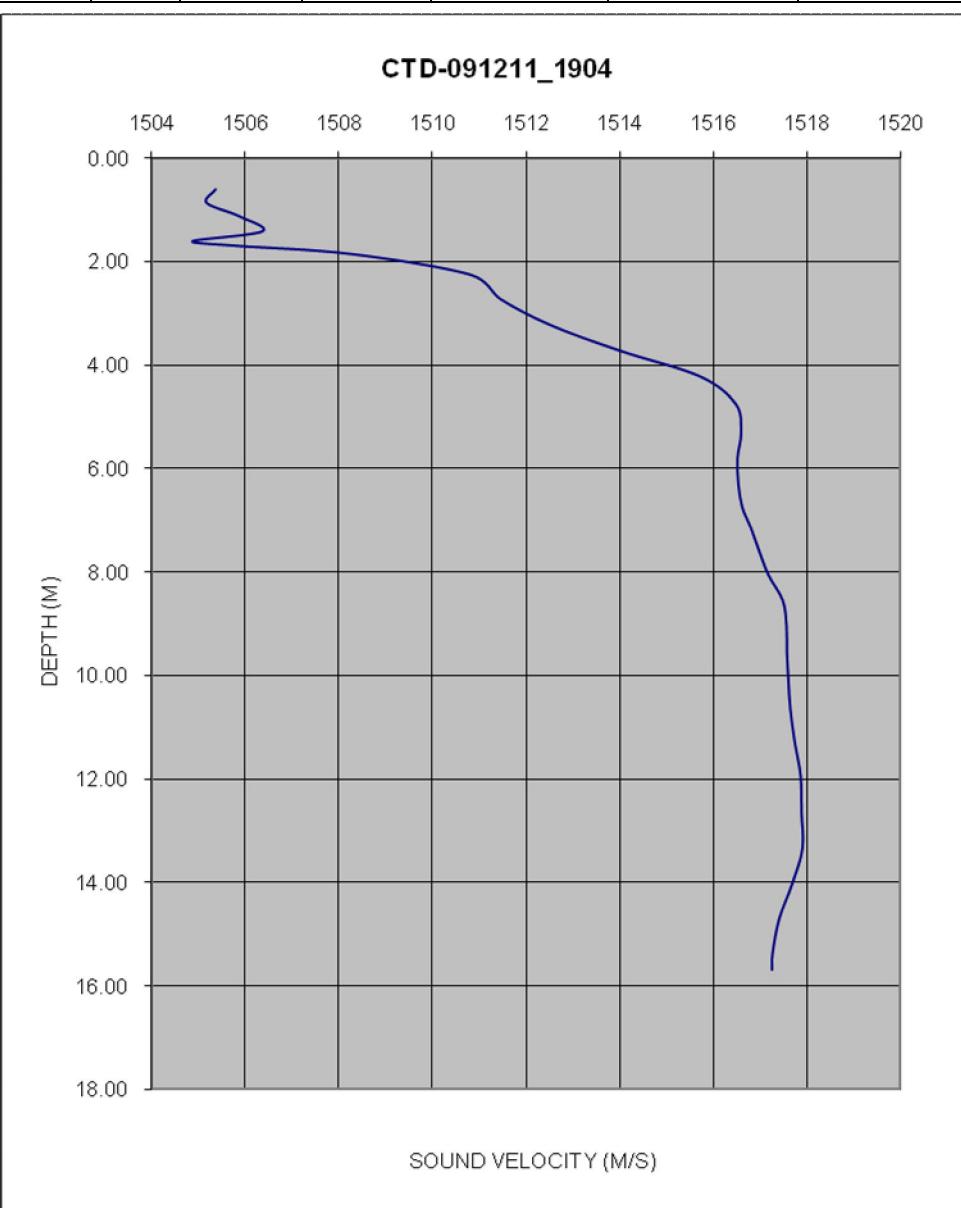


Figure 3.2-62
SVP 091211_2012 taken during the Fall 2011 multibeam survey at the HARS

1507.80	0.57
1511.22	1.32
1512.43	2.10
1513.77	2.89
1515.36	3.63
1516.47	4.30
1516.78	4.97
1516.93	5.68
1516.97	6.36
1516.99	7.02
1517.02	7.70
1517.13	8.39
1517.24	9.05
1517.35	9.70
1517.32	10.29
1517.27	10.99
1517.27	11.66
1517.32	12.35
1517.51	13.06
1517.58	13.65
1517.74	14.13
1517.98	14.62
1518.11	15.10
1517.98	15.59
1517.72	16.08
1517.58	16.55
1517.51	17.04
1517.47	17.54
1517.43	18.08
1517.43	18.65
1517.49	18.86

CTD PROFILE # 091211 2012

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
09/12/11	20:12	1021907	95917	62	40.42986352 73.86473985

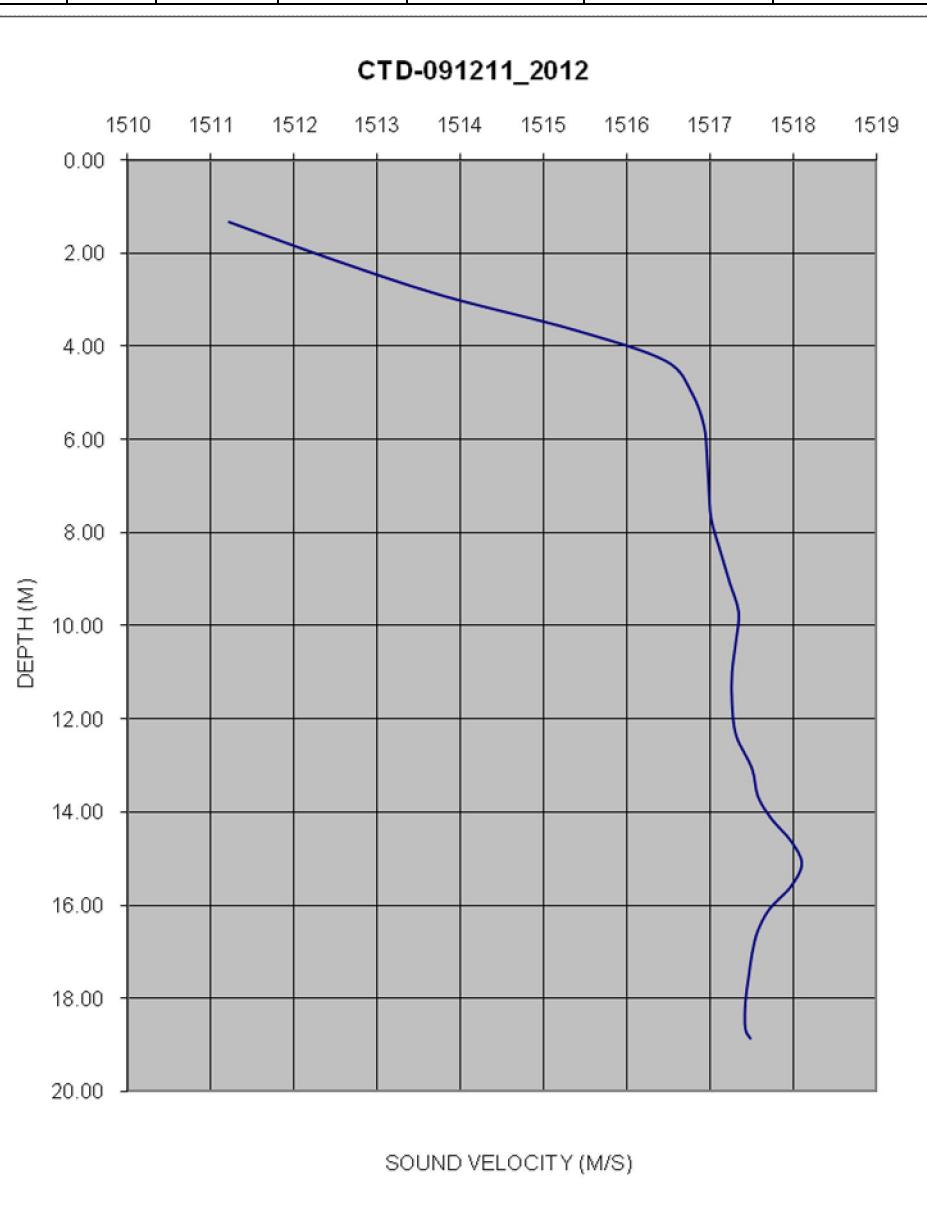


Figure 3.2-63
SVP 091311_1427 taken during the Fall 2011 multibeam survey at the HARS

1516.78	0.27
1516.77	0.77
1516.79	1.30
1516.80	1.80
1516.89	2.39
1517.21	3.06
1517.38	3.75
1517.36	4.42
1517.29	5.02
1517.28	5.60
1517.31	6.17
1517.33	6.75
1517.36	7.30
1517.38	7.84
1517.40	8.46
1517.41	9.08
1517.43	9.74
1517.45	10.44
1517.46	11.09
1517.47	11.64
1517.48	12.20
1517.48	12.90
1517.47	13.63
1517.44	14.36
1517.40	15.10
1517.35	15.81
1517.25	16.50
1517.16	17.26
1517.01	18.01
1516.85	18.76
1516.78	19.34
1516.81	19.41

CTD PROFILE # 091311_1427

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
09/13/11	14:27	1021687	95726	64	40.42933900 73.86552990

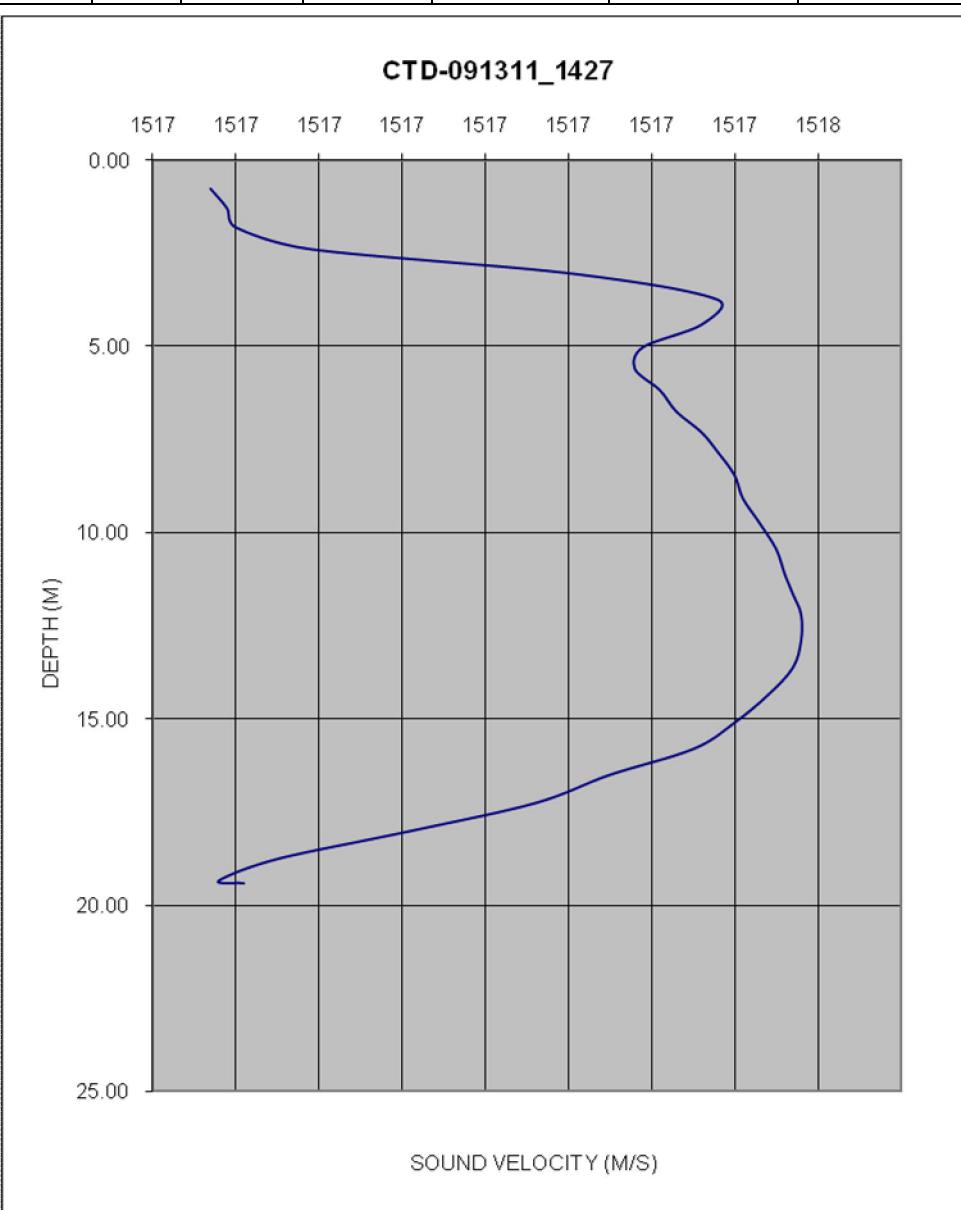


Figure 3.2-64
SVP 091311_1552 taken during the Fall 2011 multibeam survey at the HARS

1516.85	0.25
1517.69	0.96
1517.56	1.59
1517.46	2.14
1517.22	2.76
1517.25	3.44
1517.52	4.09
1517.54	4.72
1517.55	5.35
1517.54	6.03
1517.45	6.75
1517.38	7.43
1517.41	8.08
1517.36	8.70
1517.32	9.32
1517.31	9.94
1517.32	10.53
1517.33	11.09
1517.35	11.65
1517.36	12.22
1517.38	12.80
1517.37	13.44
1517.37	14.13
1517.37	14.84
1517.38	15.56
1517.38	16.29
1517.31	17.02
1516.11	17.75
1514.77	18.46
1514.17	19.17
1514.02	19.77
1514.16	19.94

CTD PROFILE # 091311_1552

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
09/13/11	15:52	1021112	95928	65	40.42989729 73.86759513

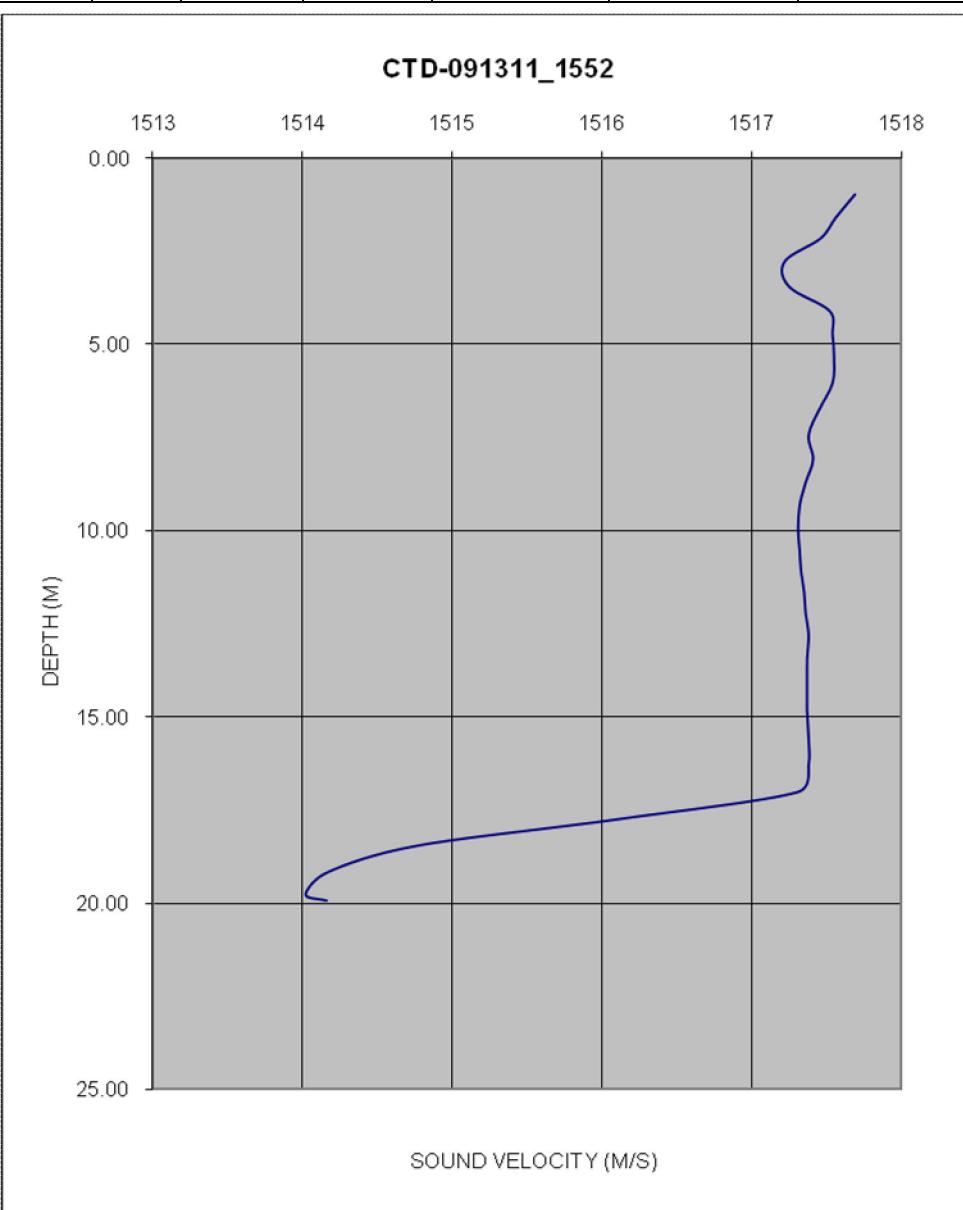


Figure 3.2-65
SVP 091311_1719 taken during the Fall 2011 multibeam survey at the HARS

1514.78	0.53
1516.52	1.13
1515.78	1.77
1515.53	2.38
1515.89	3.02
1515.91	3.69
1516.32	4.35
1517.03	5.02
1517.29	5.66
1517.40	6.32
1517.28	6.99
1517.32	7.65
1517.33	8.31
1517.25	8.96
1517.24	9.61
1517.29	10.27
1517.28	10.94
1517.25	11.60
1517.24	12.27
1517.12	12.95
1517.10	13.62
1517.08	14.30
1517.07	14.98
1517.07	15.65
1517.14	16.33
1517.20	17.02
1517.21	17.46
1517.20	17.49
1517.22	17.51
1517.23	17.55

CTD PROFILE # 091311_1719

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
09/13/11	17:19	1020169	86384	58	40.40370346 73.87103427

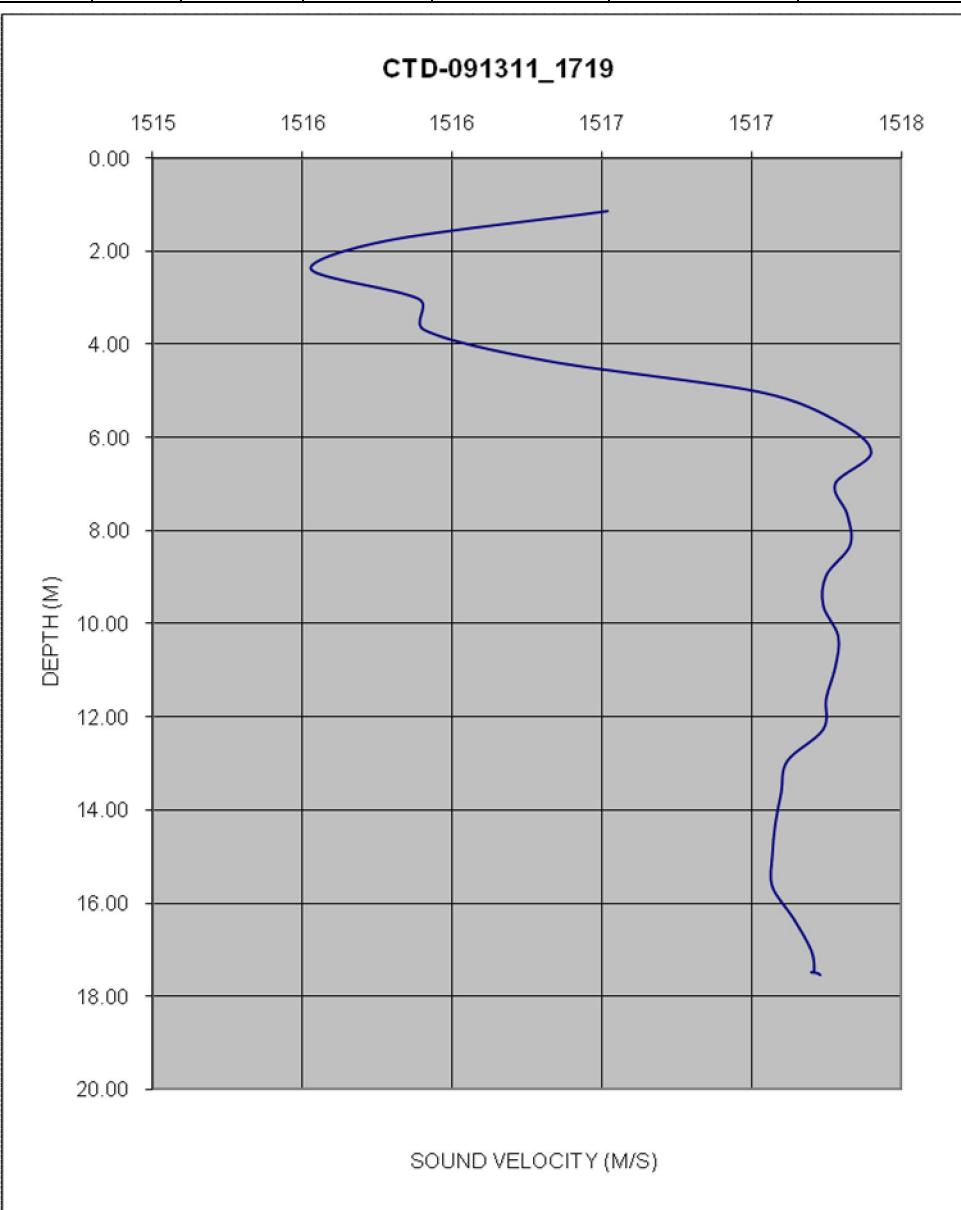


Figure 3.2-66
SVP 091311_1851 taken during the Fall 2011 multibeam survey at the HARS

1511.97 0.28

1511.86 0.77

1511.89 1.35

CTD PROFILE # 091311 1851

1512.76 1.99

1513.74 2.57

1513.66 3.08

<u>Date</u>	<u>Time</u>	<u>NAD83 NY LI (Feet)</u>		<u>Water Depth</u>	<u>Latitude</u>	<u>Longitude</u>
		<u>Easting</u>	<u>Northing</u>	<u>Feet</u>	<u>N</u>	<u>W</u>
09/13/11	18:51	1020059	86707	57	40.40459128	73.87142622

1514.18 3.59

1514.65 4.16

1514.95 4.76

1515.44 5.38

1516.14 6.00

1516.72 6.61

1517.15 7.21

1517.22 7.81

1517.22 8.42

1517.35 9.07

1517.51 9.70

1517.60 10.36

1517.68 11.02

1517.72 11.66

1517.69 12.32

1517.55 12.98

1517.46 13.64

1517.38 14.31

1517.38 14.97

1517.29 15.65

1517.14 16.33

1517.06 16.99

1517.12 17.29

1517.25 17.33

1517.40 17.36

1517.47 17.39

1517.51 17.41

1517.53 17.43

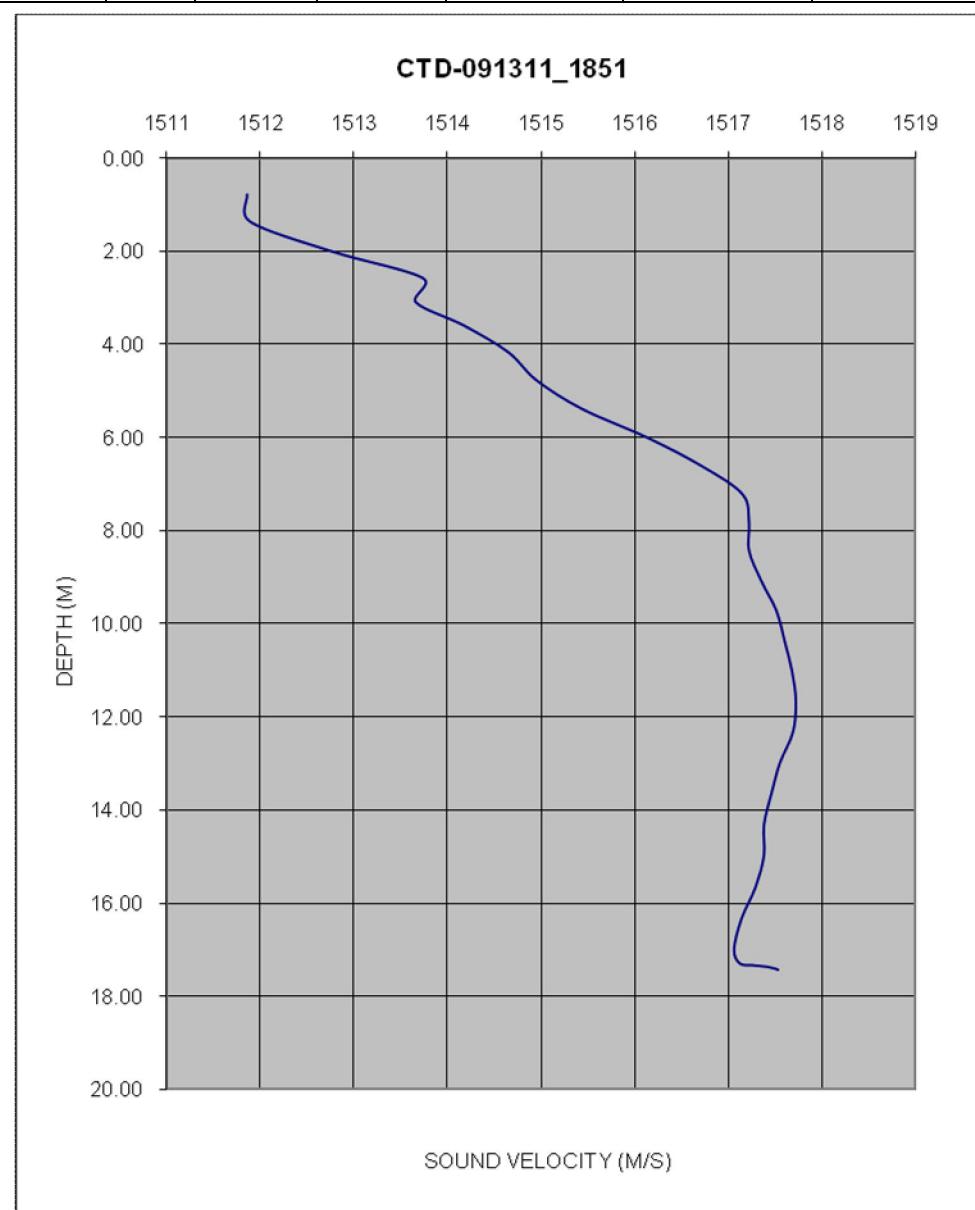


Figure 3.2-67
SVP 091411_1151 taken during the Fall 2011 multibeam survey at the HARS

1505.83	0.31
1511.08	0.94
1513.70	1.57
1516.03	2.25
1516.61	2.90
1516.71	3.55
1516.82	4.10
1516.79	4.49
1516.80	4.77
1516.83	5.18
1516.84	5.72
1516.87	6.22
1516.96	6.60
1516.92	6.78
1517.02	6.90
1517.10	7.22
1517.05	7.65
1517.01	8.08
1517.02	8.50
1517.05	8.85
1517.07	9.15
1517.07	9.42
1517.04	9.69
1516.97	10.16
1516.90	10.67
1516.90	11.15
1516.91	11.59
1516.92	11.98
1516.93	12.42
1516.83	12.82
1516.71	13.26
1516.53	13.75
1516.35	14.23
1516.19	14.73
1516.09	15.28
1516.03	15.86
1515.92	16.48
1515.83	17.15
1515.78	17.76
1515.73	18.40
1515.59	19.01
1515.44	19.64
1515.36	20.30
1515.31	20.97
1515.23	21.60
1515.13	22.26
1515.05	22.90
1515.00	23.21

CTD PROFILE # 091411_1151

Date	Time	NAD83 NY LI (Feet)		Water Depth	Latitude	Longitude
		Easting	Northing	Feet	N	W
09/14/11	11:51	1011817	95836	76	40.42967822	73.90098240

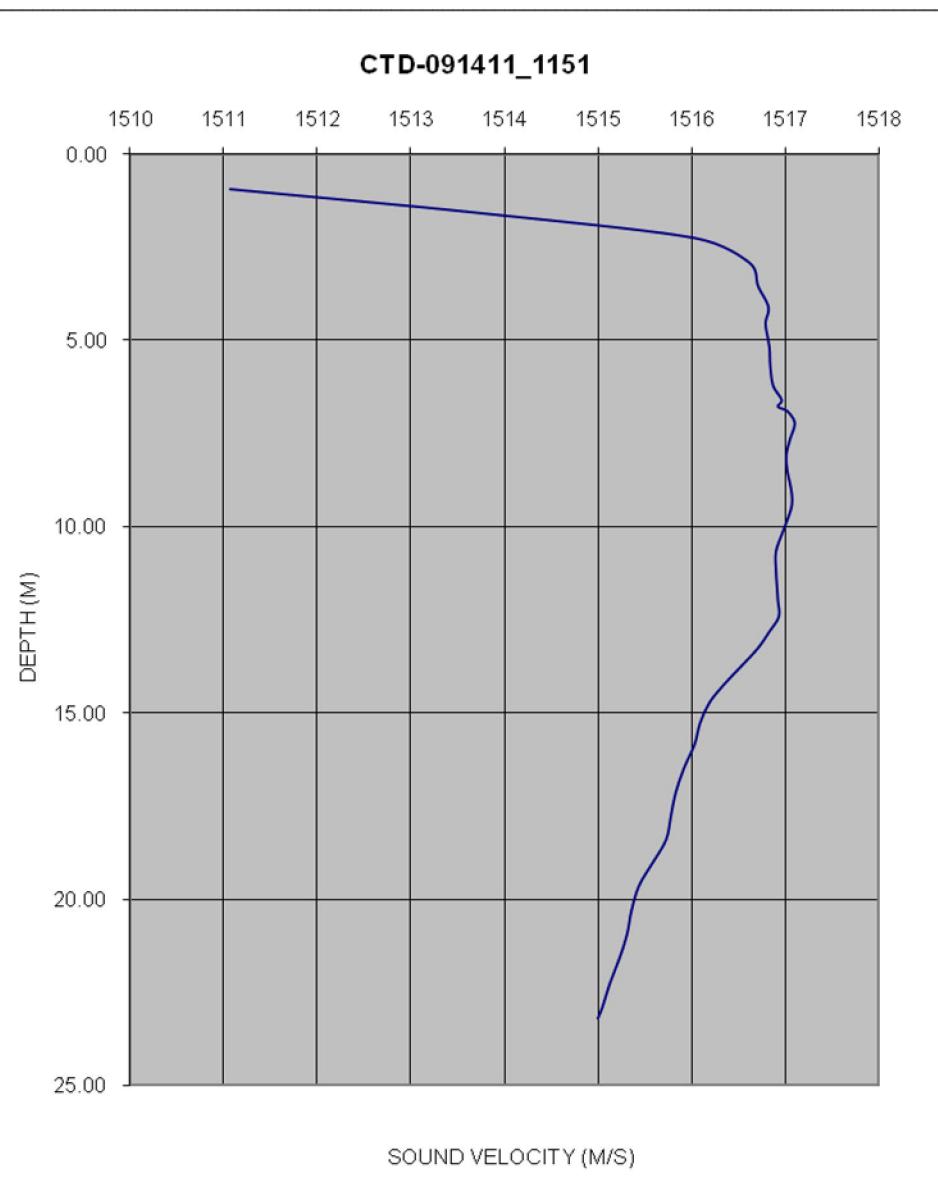


Figure 3.2-68
SVP 091411_1314 taken during the Fall 2011 multibeam survey at the HARS

1508.69	0.19
1513.52	0.82
1515.56	1.46
1516.42	2.11
1516.62	2.80
1516.81	3.48
1516.85	4.15
1516.86	4.83
1516.91	5.52
1516.99	6.19
1517.11	6.81
1517.11	7.40
1517.01	7.98
1517.00	8.59
1516.99	9.24
1516.98	9.89
1516.96	10.55
1516.93	11.21
1516.85	11.85
1516.77	12.49
1516.69	13.13
1516.60	13.79
1516.51	14.44
1516.39	15.11
1516.20	15.78
1516.01	16.34
1515.78	16.89
1515.57	17.50
1515.44	18.21
1515.32	18.98
1515.23	19.77
1515.10	20.53
1514.89	21.22
1514.75	21.87
1514.69	22.57
1514.69	23.20
1514.75	23.37

CTD PROFILE # 091411 1314

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
09/14/11	13:14	1012784	95812	77	40.42960929 73.89750915

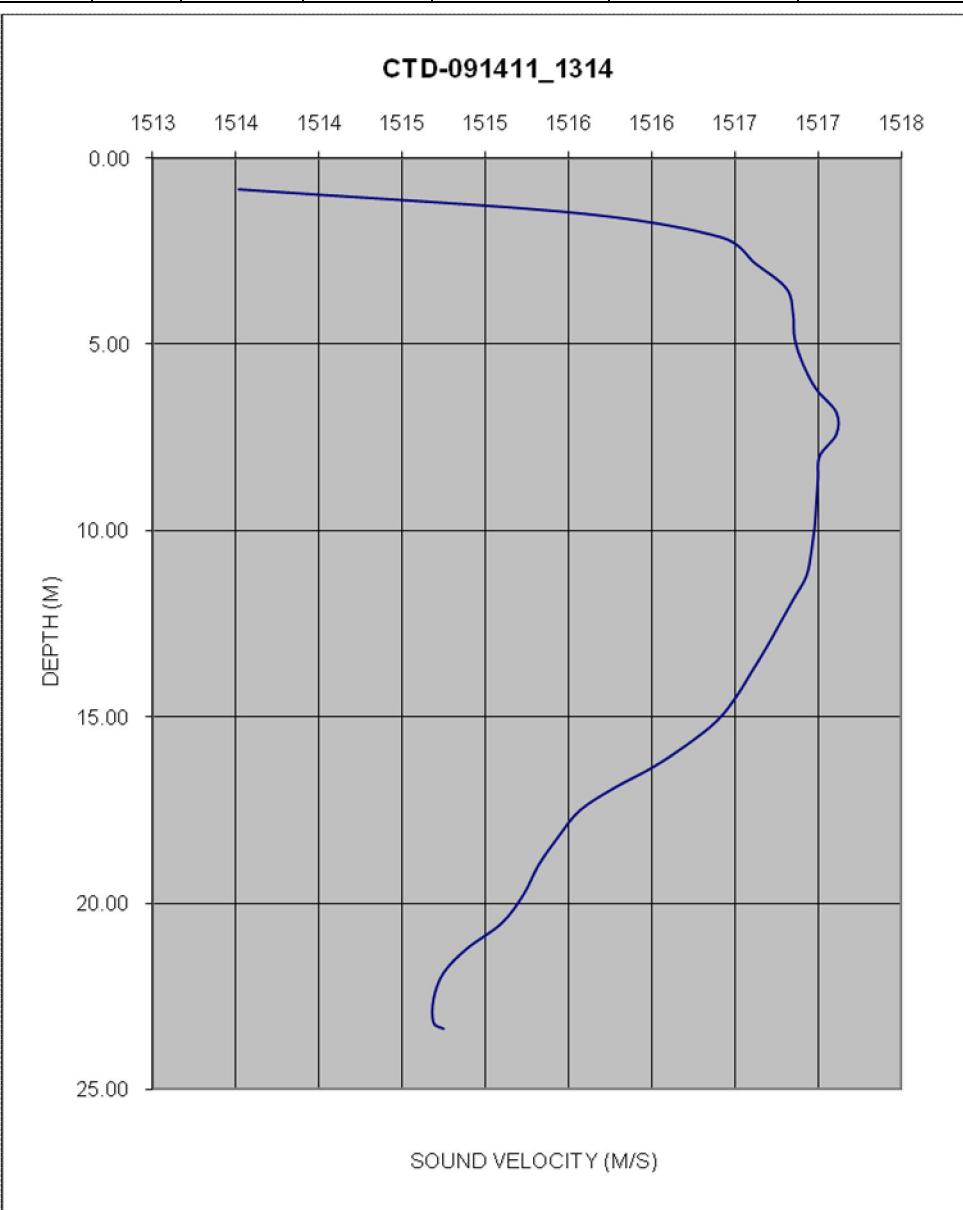


Figure 3.2-69
SVP 091411_1508 taken during the Fall 2011 multibeam survey at the HARS

1510.56	0.58
1514.41	1.21
1515.18	1.85
1515.24	2.49
1516.13	3.11
1516.67	3.73
1516.78	4.34
1516.89	4.94
1516.85	5.56
1516.87	6.17
1516.88	6.78
1516.85	7.44
1516.92	8.11
1517.10	8.78
1517.08	9.43
1517.03	10.05
1516.98	10.70
1516.88	11.36
1516.71	12.00
1516.67	12.61
1516.66	13.20
1516.59	13.79
1516.50	14.37
1516.33	14.93
1516.10	15.50
1515.84	16.10
1515.61	16.72
1515.49	17.33
1515.39	17.94
1515.28	18.54
1515.18	19.13
1515.11	19.72
1515.05	20.36
1515.01	21.02
1514.96	21.68
1514.90	22.31
1514.95	22.55

CTD PROFILE # 091411 1508

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
09/14/11	15:08	1014218	95860	74	40.42973632 73.89235818

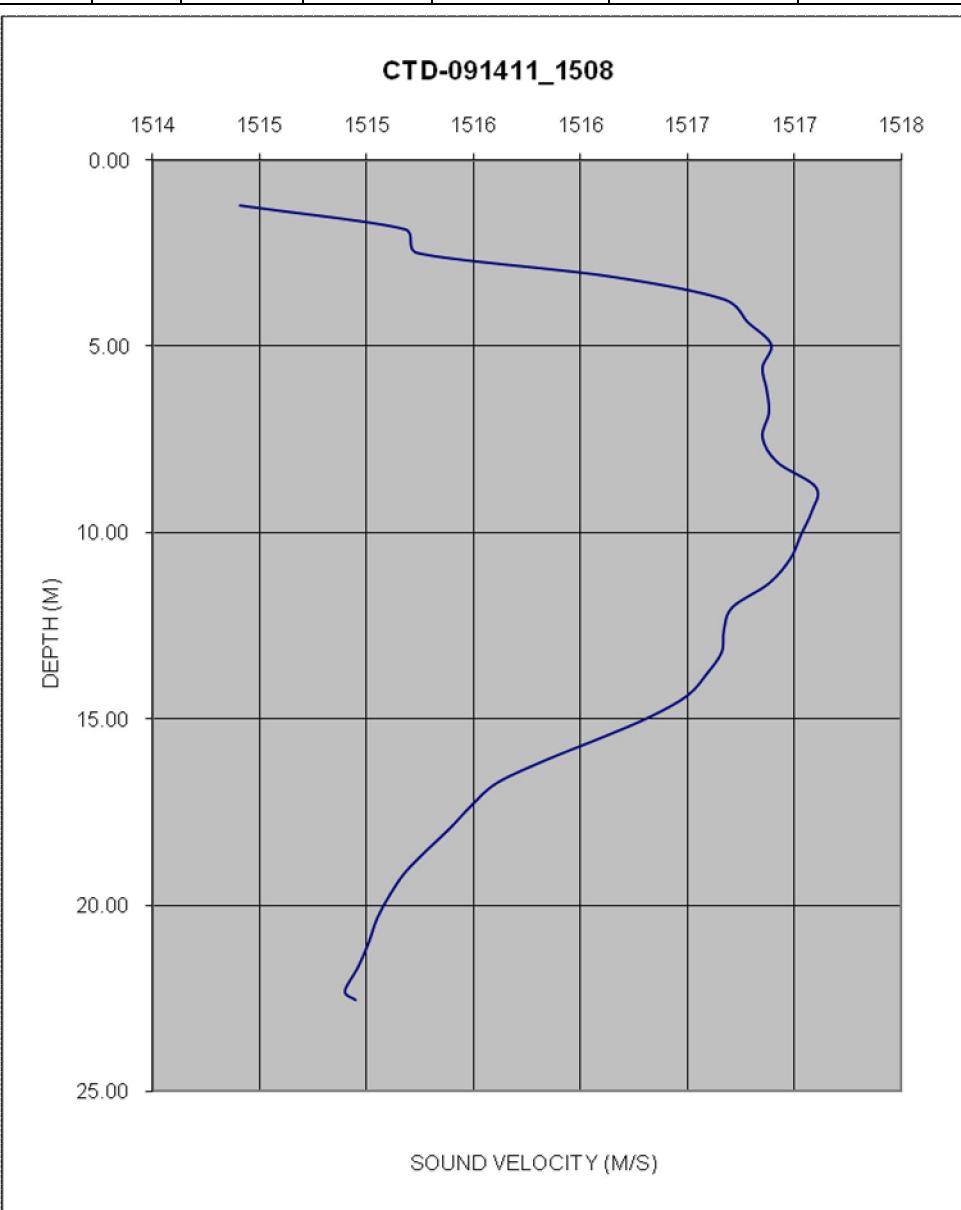


Figure 3.2-70
SVP 091411_1621 taken during the Fall 2011 multibeam survey at the HARS

CTD PROFILE # 091411 1621

1513.93	0.63					
1515.44	1.38	<u>Date</u>	<u>Time</u>	<u>NAD83 NY LI (Feet)</u>	<u>Water Depth</u>	<u>Latitude</u>
1515.75	2.14			<u>Easting</u>	<u>Northing</u>	<u>Longitude</u>
1516.08	2.89				<u>Feet</u>	<u>N</u>
1516.65	3.60	09/14/11	16:21	1015242	95860	73.88868009

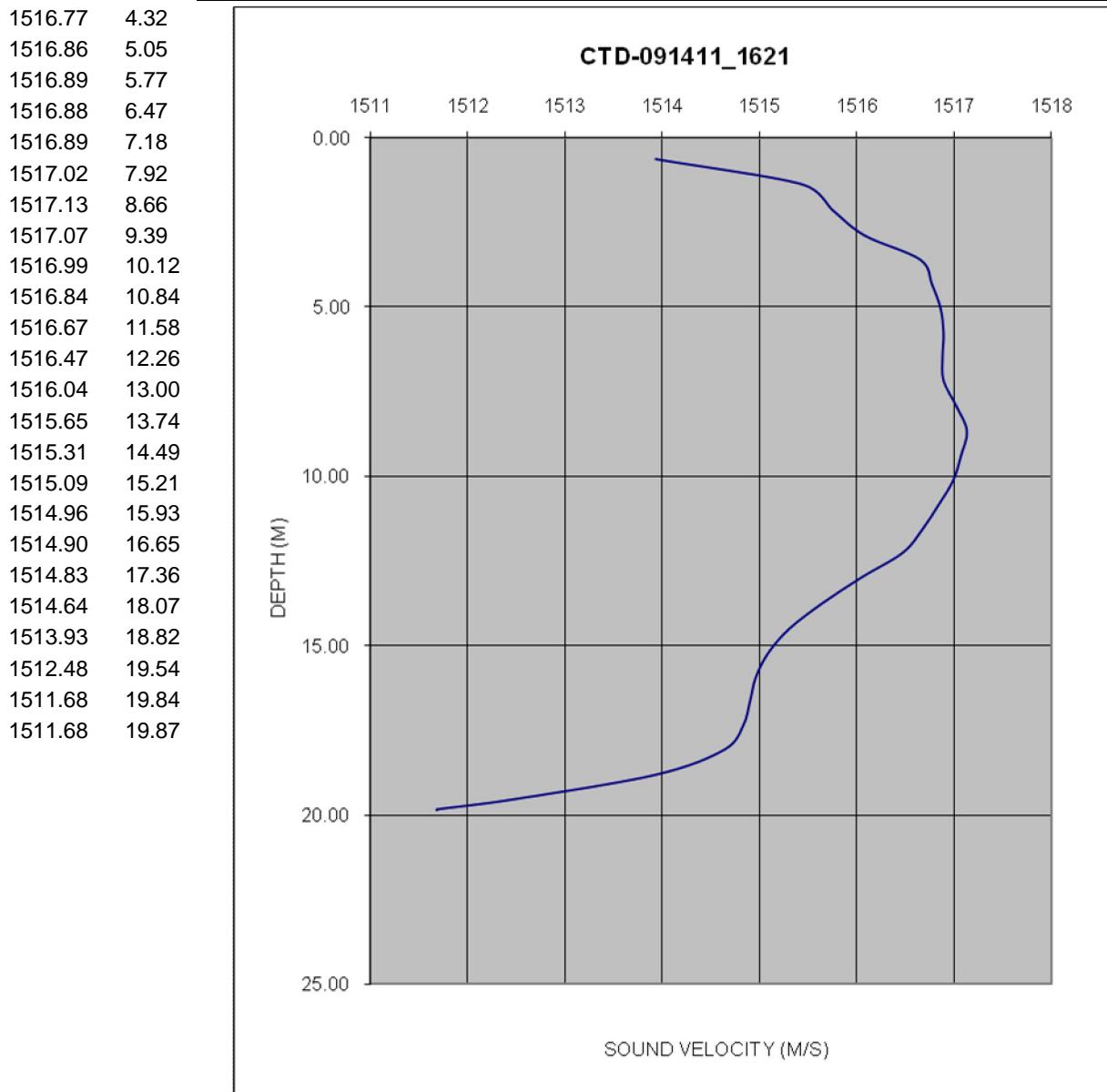


Figure 3.2-71
SVP 091411_1751 taken during the Fall 2011 multibeam survey at the HARS

CTD PROFILE # 091411 1751

1512.15	0.62
1512.53	1.13
1513.60	1.79
1514.88	2.49
1516.72	3.16
1516.95	3.76
1516.84	4.29
1516.79	4.75
1516.94	5.20
1517.04	5.63
1517.06	6.06
1517.10	6.50
1517.11	7.01
1517.00	7.63
1516.94	8.29
1516.93	9.04
1516.94	9.75
1517.01	10.43
1517.15	11.10
1517.25	11.78
1517.30	12.45
1517.34	13.13
1517.38	13.81
1517.32	14.47
1516.97	15.11
1516.21	15.77
1515.21	16.48
1514.57	17.22
1514.34	17.94
1514.17	18.62
1513.96	19.35
1513.71	20.10
1513.39	20.83
1513.11	21.53
1512.98	22.23
1513.06	22.52

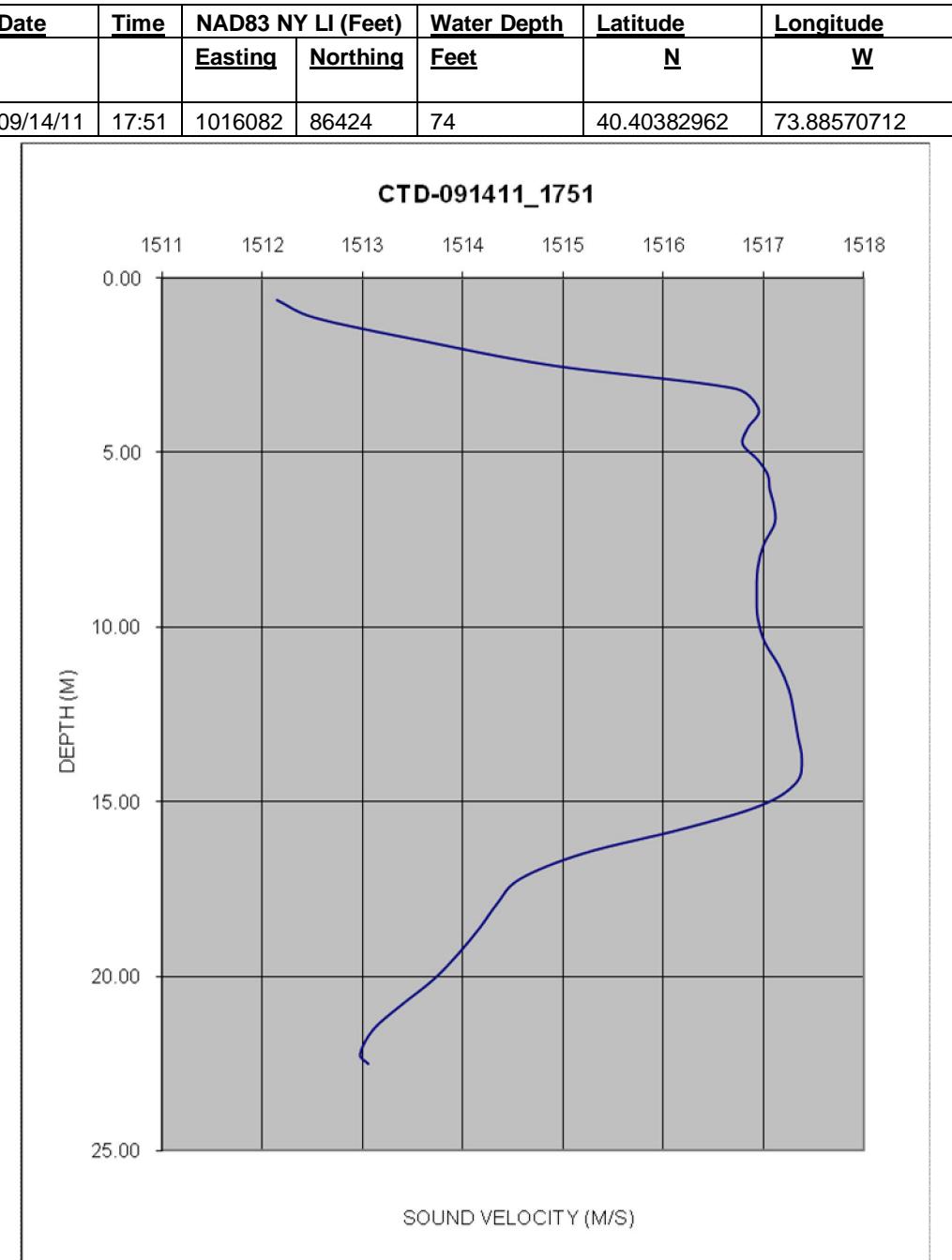


Figure 3.2-71
SVP 091411_1937 taken during the Fall 2011 multibeam survey at the HARS

CTD PROFILE # 091411 1937

1510.36	0.19
1510.34	0.84
1510.42	1.55
1511.20	2.25
1512.48	2.92
1513.16	3.57
1513.69	4.24
1513.86	4.92
1514.00	5.59
1514.73	6.23
1515.43	6.84
1516.09	7.45
1516.86	8.12
1517.52	8.81
1517.20	9.52
1516.69	10.24
1516.34	10.94
1516.09	11.64
1515.94	12.36
1515.70	13.07
1515.40	13.73
1515.19	14.39
1515.01	15.03
1514.84	15.62
1514.39	16.24
1513.25	16.85
1510.99	17.47
1508.48	18.13
1507.47	18.72
1507.46	18.86

<u>Date</u>	<u>Time</u>	<u>NAD83 NY LI (Feet)</u>	<u>Water Depth</u>	<u>Latitude</u>	<u>Longitude</u>	
		<u>Easting</u>	<u>Northing</u>	<u>Feet</u>	<u>N</u>	<u>W</u>
09/14/11	19:37	1016377	95649	62	40.42914962	73.88460429

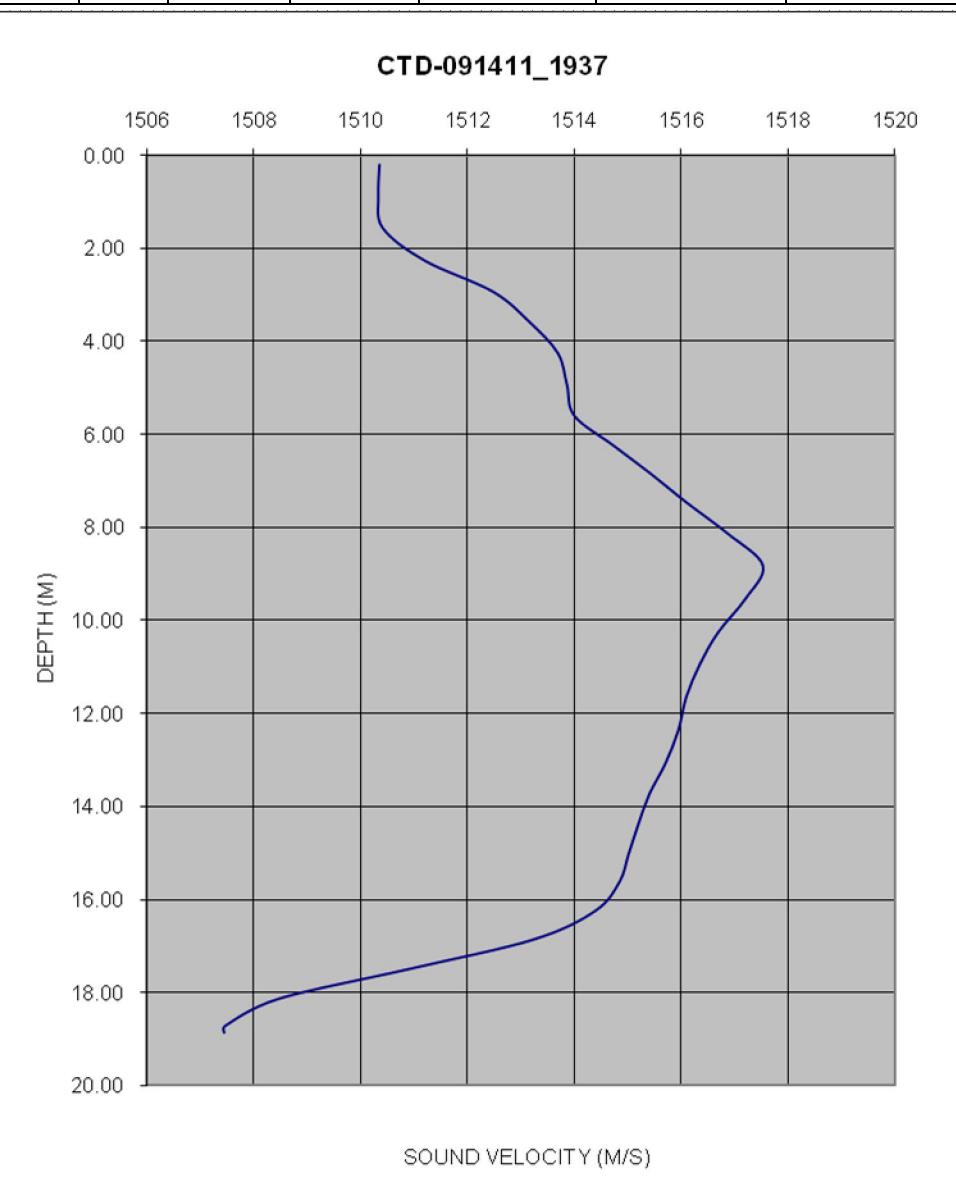


Figure 3.2-72
SVP 092111_1126 taken during the Fall 2011 multibeam survey at the HARS

1503.66	0.36
1505.63	0.87
1506.66	1.43
1507.17	2.05
1507.74	2.70
1508.18	3.39
1508.35	4.09
1508.59	4.75
1508.77	5.38
1509.29	6.01
1510.29	6.59
1511.54	7.13
1512.22	7.70
1512.57	8.33
1512.73	8.95
1513.07	9.68
1513.09	10.40
1513.03	11.10
1512.77	11.76
1512.56	12.40
1512.54	13.01
1512.60	13.65
1512.59	14.18
1512.56	14.58
1512.35	15.09
1511.68	15.67
1511.01	16.21
1510.79	16.81
1510.97	17.43
1511.25	18.04
1511.45	18.66
1511.53	19.02
1511.57	19.09
1511.62	19.14
1511.64	19.18
1511.65	19.21

CTD PROFILE # 092111 1126

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
09/21/11	11:26	1017258	95909	63	40.42985884 73.88143943

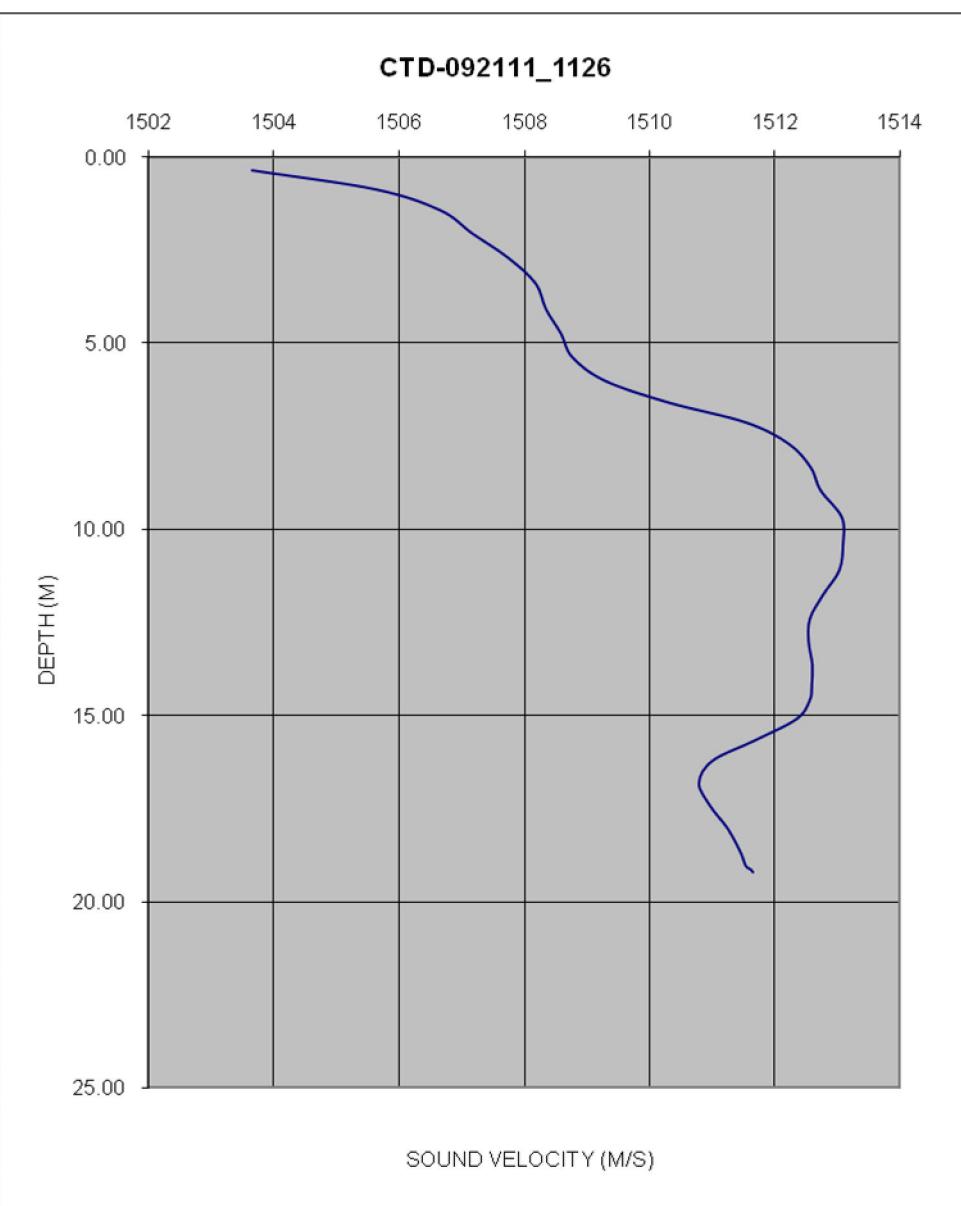


Figure 3.2-73
SVP 092111_1226 taken during the Fall 2011 multibeam survey at the HARS

1505.09	0.16
1506.12	0.76
1506.71	1.37
1507.83	1.98
1508.58	2.58
1508.88	3.18
1509.11	3.77
1509.60	4.41
1510.30	5.05
1511.39	5.68
1512.42	6.30
1512.95	6.93
1513.14	7.52
1512.97	8.13
1512.88	8.74
1512.98	9.38
1513.03	10.02
1513.04	10.66
1513.07	11.30
1513.02	11.94
1512.91	12.57
1512.85	13.23
1512.71	13.88
1513.37	14.53
1514.00	15.19
1514.16	15.82
1513.95	16.44
1513.55	17.06
1513.32	17.67
1513.30	18.29
1513.20	18.91
1513.08	19.52
1512.98	20.13
1512.91	20.73
1512.88	21.33
1512.89	21.57

CTD PROFILE # 092111 1226

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
09/21/11	12:26	1017291	95716	71	40.42933080 73.88131964

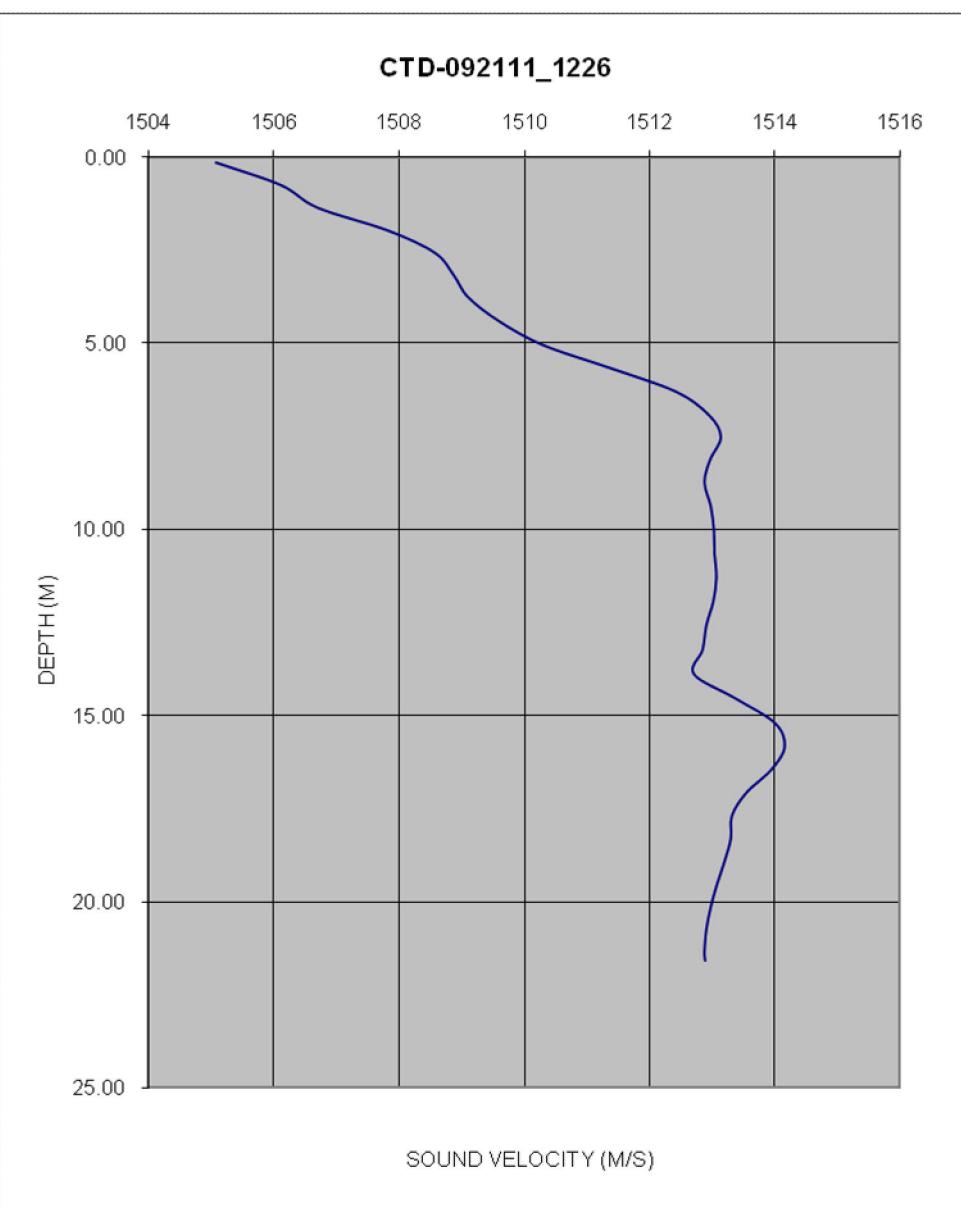


Figure 3.2-74
SVP 092111_1323 taken during the Fall 2011 multibeam survey at the HARS

1503.19	0.18
1502.95	0.57
1503.03	0.99
1503.32	1.43
1503.84	1.89
1504.64	2.30
1506.02	2.75
1506.75	3.24
1507.25	3.71
1507.81	4.17
1508.63	4.60
1509.58	5.04
1511.12	5.53
1512.35	6.07
1512.60	6.58
1512.87	7.08
1512.95	7.57
1512.99	8.08
1513.03	8.60
1513.04	9.12
1513.08	9.60
1513.02	10.06
1512.98	10.54
1513.11	11.03
1513.55	11.51
1513.68	12.02
1513.76	12.63
1513.84	13.25
1513.75	13.86
1513.84	14.45
1513.81	15.02
1513.09	15.59
1512.35	16.16
1511.80	16.71
1511.54	17.26
1511.58	17.81
1511.72	18.35
1511.73	18.88
1511.73	19.06

CTD PROFILE # 092111 1323

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
09/21/11	13:23	1018475	95877	63	40.42976884 73.87706800

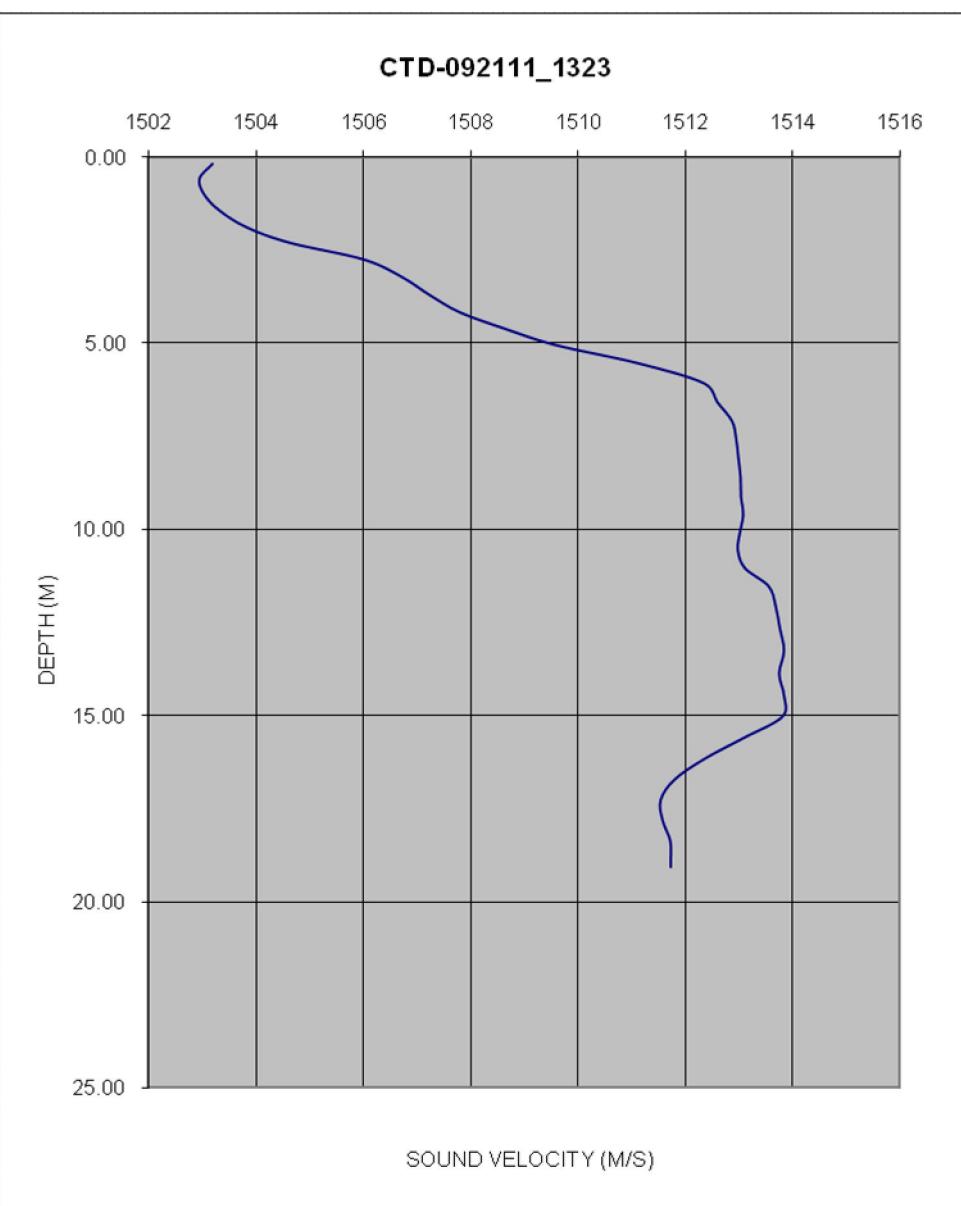


Figure 3.2-75
SVP 092111_1447 taken during the Fall 2011 multibeam survey at the HARS

1503.04	0.30
1503.34	0.73
1504.11	1.30
1505.63	1.86
1506.64	2.36
1507.83	2.97
1509.42	3.66
1511.63	4.36
1512.55	5.03
1512.69	5.72
1512.89	6.44
1512.99	7.12
1513.08	7.78
1513.13	8.46
1513.11	9.15
1513.10	9.82
1513.07	10.51
1513.36	11.18
1513.74	11.84
1513.45	12.50
1513.18	13.15
1513.12	13.80
1513.07	14.43
1512.94	15.06
1513.01	15.66
1513.15	16.24
1512.92	16.89
1512.46	17.53
1511.97	18.19
1511.74	18.86
1511.75	19.50
1511.77	19.68
1511.87	19.70

CTD PROFILE # 092111_1447

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
09/21/11	14:47	1019102	95902	65	40.42983368 73.87481662

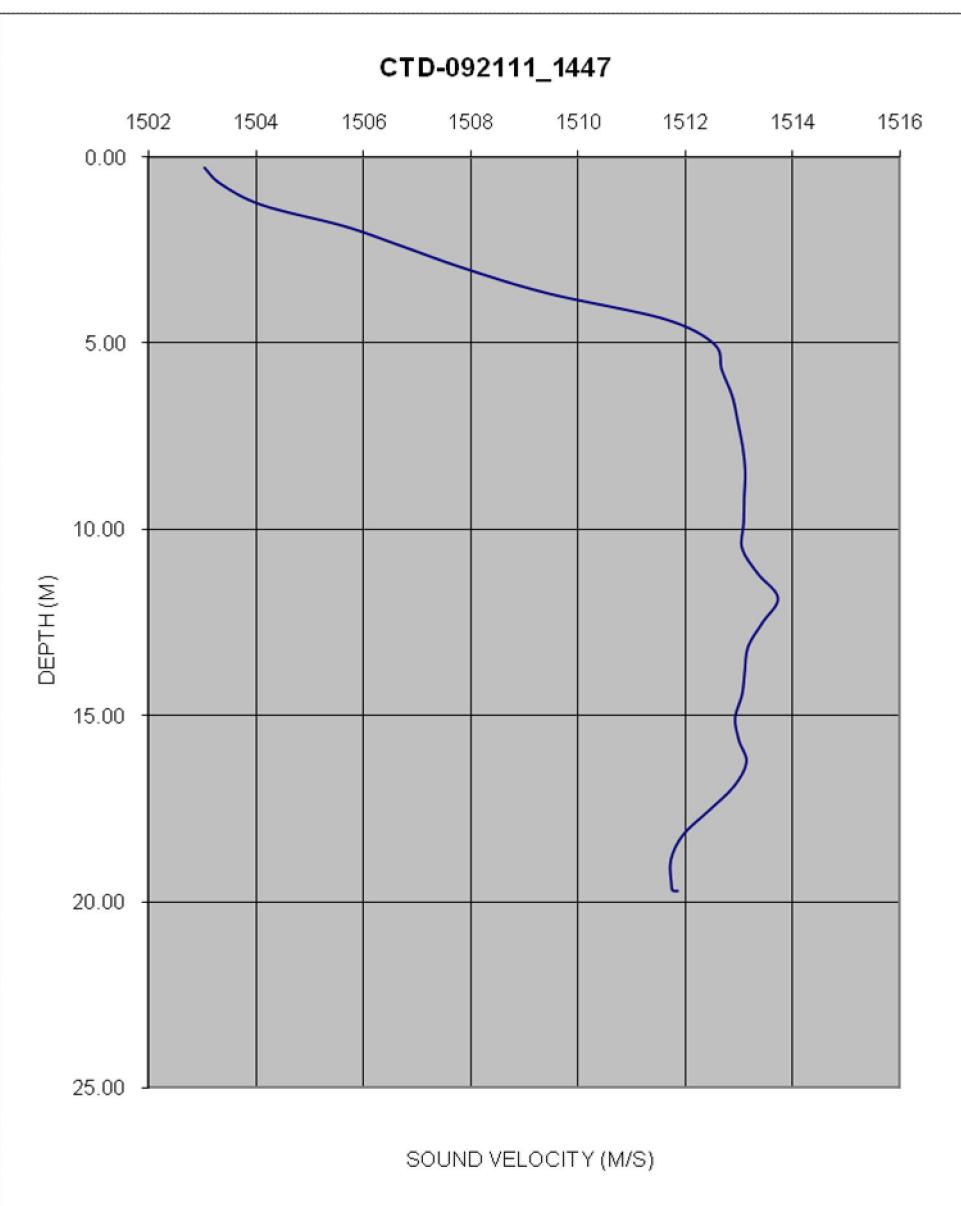


Figure 3.2-76
SVP 092111_1534 taken during the Fall 2011 multibeam survey at the HARS

1503.51	0.04
1503.48	0.44
1503.54	0.85
1503.60	1.24
1504.44	1.68
1506.07	2.19
1507.26	2.73
1508.50	3.26
1509.74	3.80
1511.26	4.39
1512.45	5.00
1512.88	5.59
1512.94	6.17
1513.01	6.75
1513.03	7.36
1513.05	7.99
1513.07	8.70
1513.13	9.43
1513.24	10.13
1513.31	10.79
1513.15	11.45
1512.97	12.09
1512.79	12.74
1512.65	13.40
1513.33	14.08
1513.57	14.76
1513.25	15.40
1512.90	16.01
1512.72	16.61
1512.68	17.21
1512.69	17.81
1512.64	18.38
1512.47	18.95
1512.28	19.51
1512.11	20.10
1511.93	20.72
1511.85	21.17
1511.87	21.22

CTD PROFILE # 092111 1534

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
09/21/11	15:34	1017703	93586	70	40.42348214 73.87985166

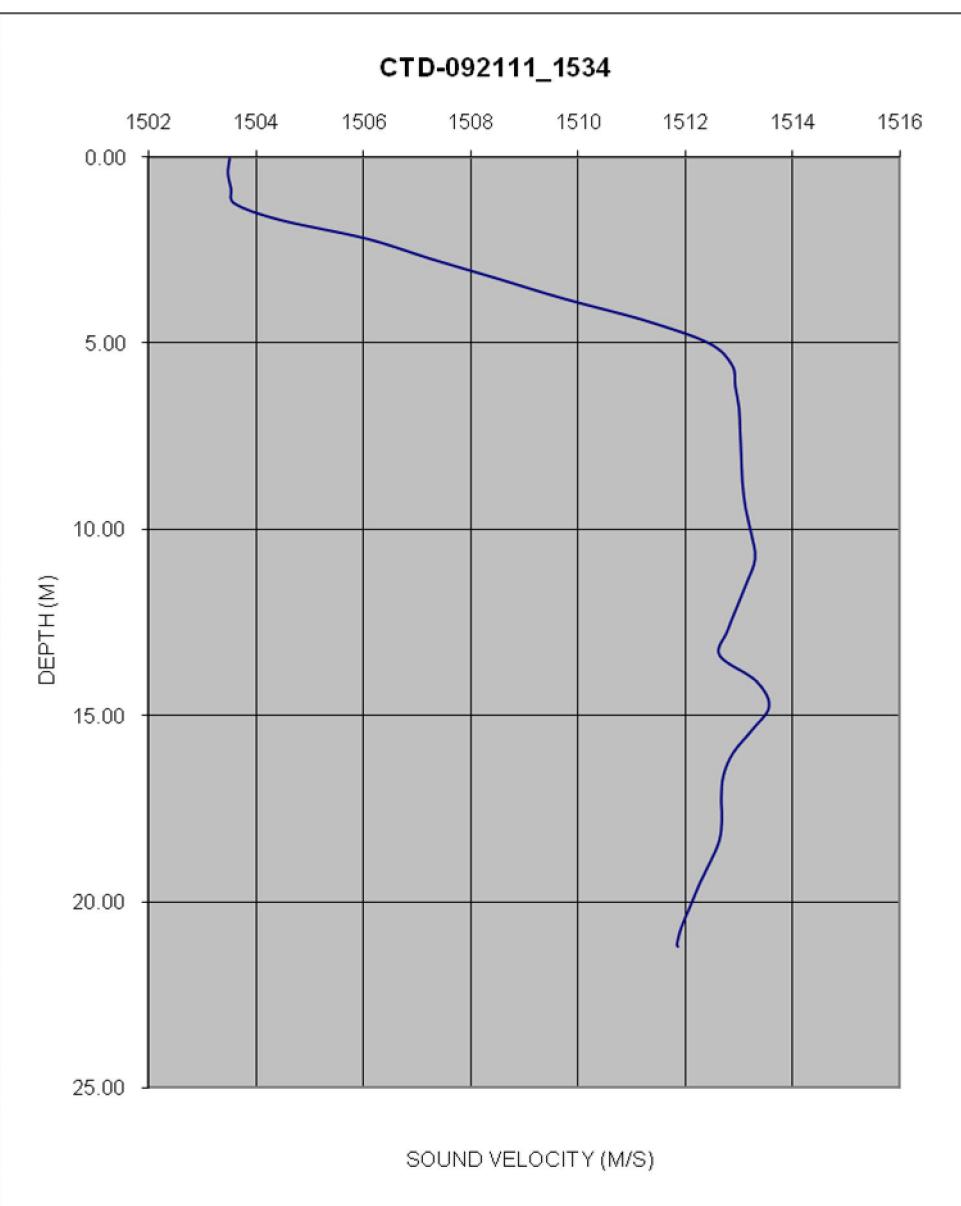


Figure 3.2-77
SVP 110711_1139 taken during the Fall 2011 multibeam survey at Fire-Island Reef

1472.78	0.21
1474.10	0.77
1474.70	1.38
1475.02	2.01
1475.19	2.63
1475.39	3.24
1475.64	3.84
1475.77	4.43
1475.88	5.03
1476.05	5.67
1476.48	6.33
1476.74	7.00
1476.85	7.68
1477.07	8.35
1477.64	9.01
1478.14	9.68
1478.80	10.37
1479.28	11.02
1479.64	11.62
1479.84	12.17
1479.90	12.71
1479.83	12.99
1479.77	13.01

CTD PROFILE # 110711 1139

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
11/07/11	11:39	1198030	159768	43	40.60262308 73.23012567

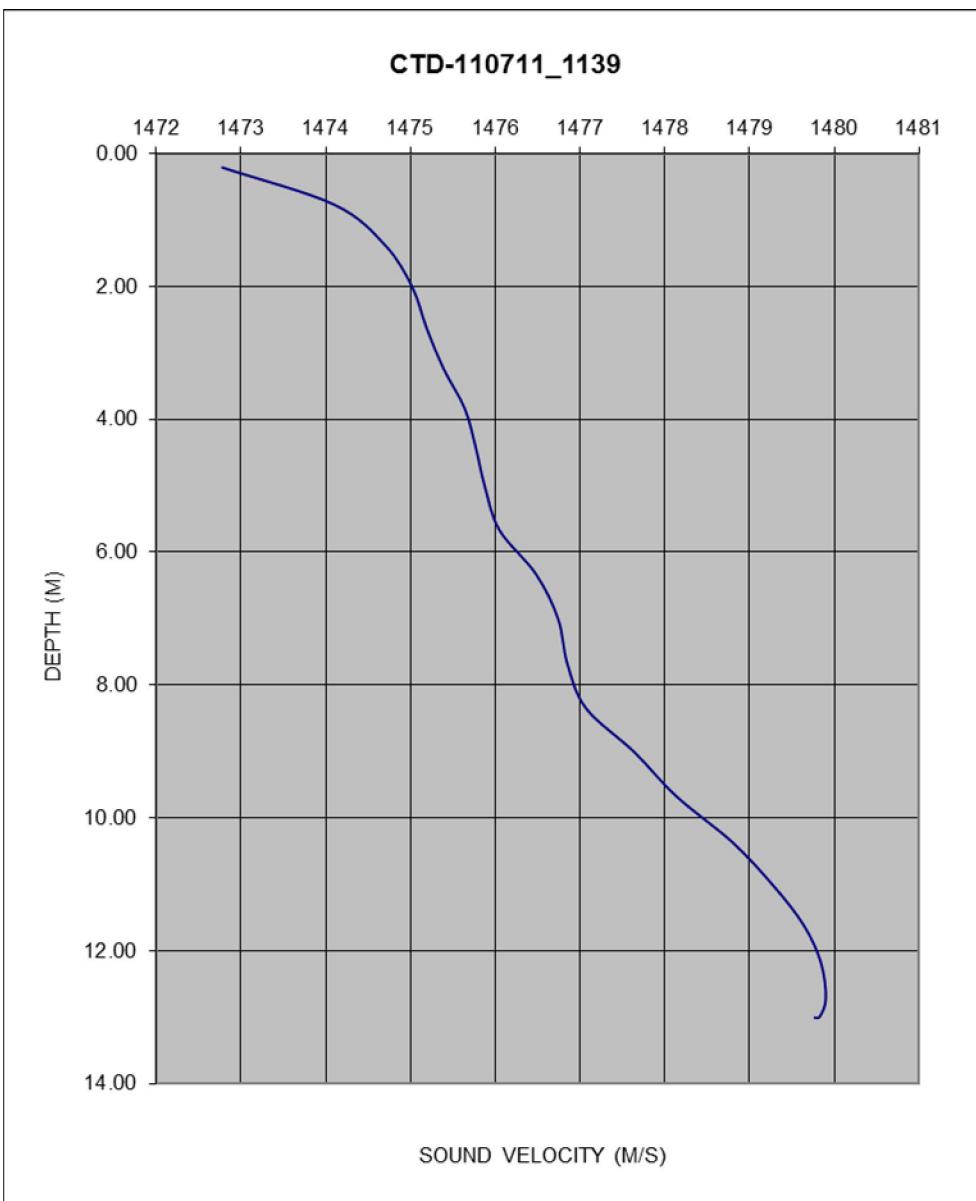


Figure 3.2-78
SVP 110711_1536 taken during the Fall 2011 multibeam survey at Fire-Island Reef

1495.55	0.03
1494.97	0.62
1494.69	1.31
1494.60	2.02
1494.58	2.72
1494.57	3.40
1494.57	4.07
1494.57	4.71
1494.59	5.34
1494.59	5.95
1494.60	6.55
1494.61	7.15
1494.62	7.76
1494.63	8.38
1494.64	9.00
1494.65	9.62
1494.66	10.24
1494.67	10.86
1494.67	11.48
1494.68	12.11
1494.70	12.75
1494.71	13.42
1494.72	14.09
1494.73	14.75
1494.74	15.40
1494.75	16.05
1494.76	16.71
1494.77	17.35
1494.78	17.99
1494.79	18.61
1494.80	19.15
1494.83	19.29
1494.87	19.31

CTD PROFILE # 110711_1536

Date	Time	NAD83 NY LI (Feet)		Water Depth	Latitude	Longitude
		Easting	Northing	Feet	N	W
11/07/11	15:36	1208914	156522	63	40.59344550	73.19104149

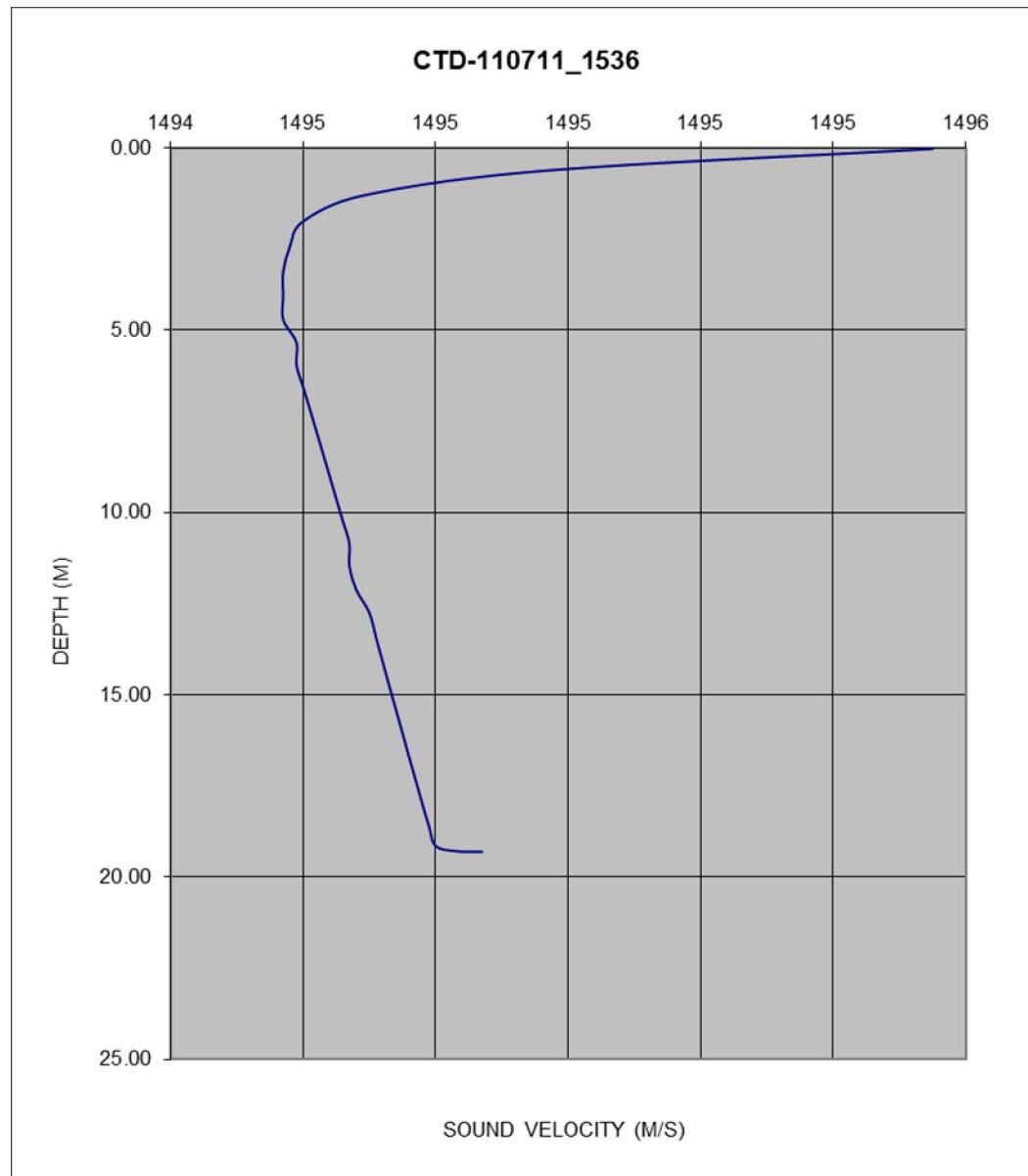


Figure 3.2-79
SVP 110711_1728 taken during the Fall 2011 multibeam survey at Fire-Island Reef

1495.84	0.07
1495.08	0.66
1494.71	1.30
1494.54	2.03
1494.48	2.74
1494.46	3.48
1494.45	4.23
1494.45	4.91
1494.47	5.55
1494.48	6.16
1494.48	6.74
1494.49	7.32
1494.52	7.91
1494.54	8.50
1494.56	9.10
1494.54	9.73
1494.50	10.39
1494.49	11.05
1494.49	11.71
1494.51	12.38
1494.52	13.05
1494.53	13.72
1494.55	14.41
1494.57	15.09
1494.60	15.76
1494.63	16.42
1494.64	17.07
1494.66	17.70
1494.67	18.32
1494.72	18.60

CTD PROFILE # 110711_1728

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	W
11/07/11	17:28	1199251	157261	61	40.59571377 73.22581026

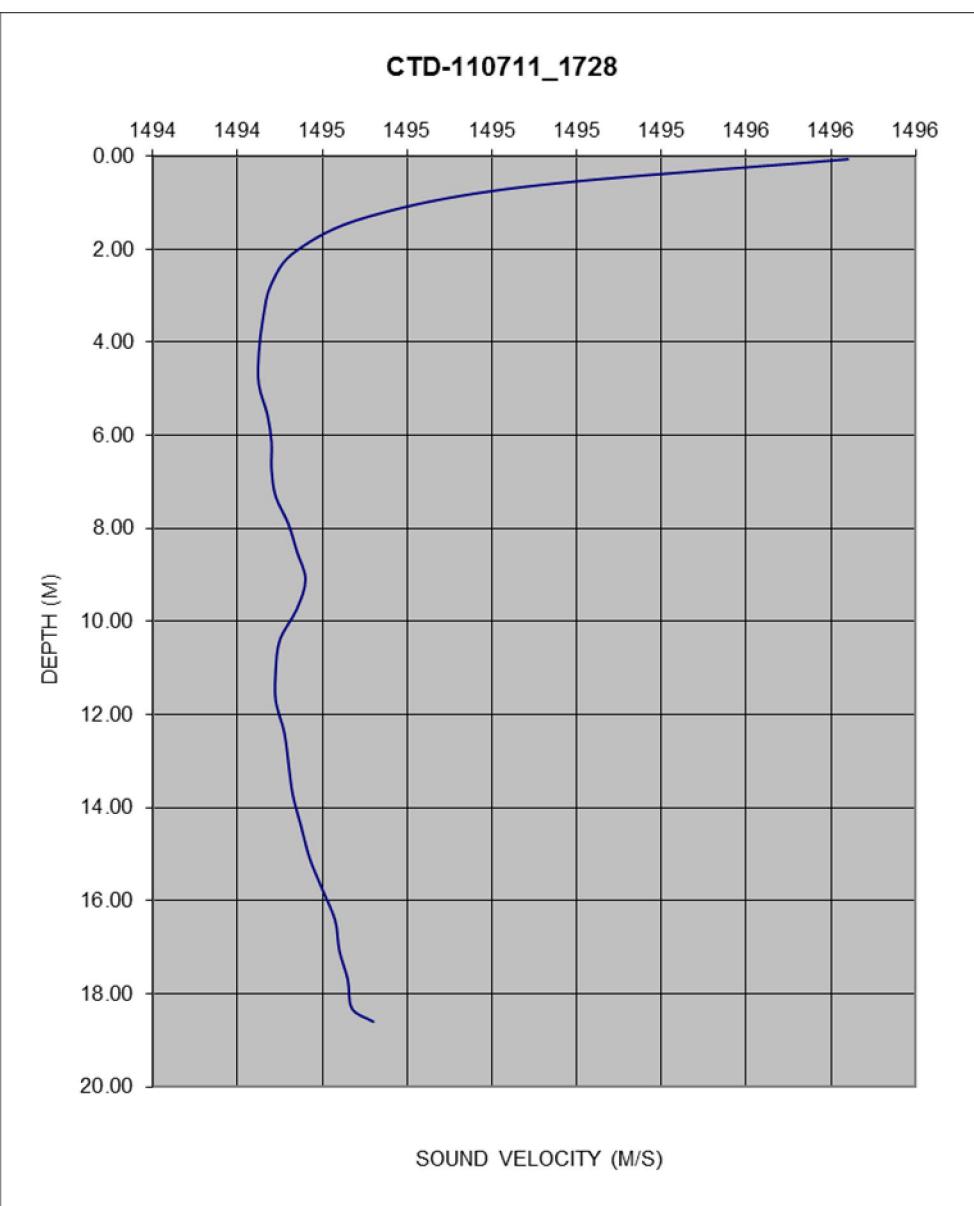


Figure 3.2-80
SVP 110711_1927 taken during the Fall 2011 multibeam survey at Fire-Island Reef

1495.25	0.28
1494.75	1.01
1494.58	1.71
1494.53	2.37
1494.50	3.01
1494.48	3.63
1494.46	4.22
1494.44	4.81
1494.42	5.39
1494.42	5.97
1494.43	6.55
1494.44	7.15
1494.44	7.74
1494.45	8.34
1494.45	8.94
1494.44	9.57
1494.45	10.20
1494.46	10.85
1494.47	11.49
1494.48	12.13
1494.49	12.79
1494.51	13.46
1494.55	14.13
1494.57	14.81
1494.60	15.49
1494.64	16.19
1494.67	16.90
1494.70	17.60
1494.73	18.29
1494.74	18.92
1494.81	19.13

CTD PROFILE # 110711 1927

Date	Time	NAD83 NY LI (Feet)		Water Depth	Latitude	Longitude
		Easting	Northing	Feet	N	W
11/07/11	19:27	1199403	158558	63	40.59926978	73.22522071

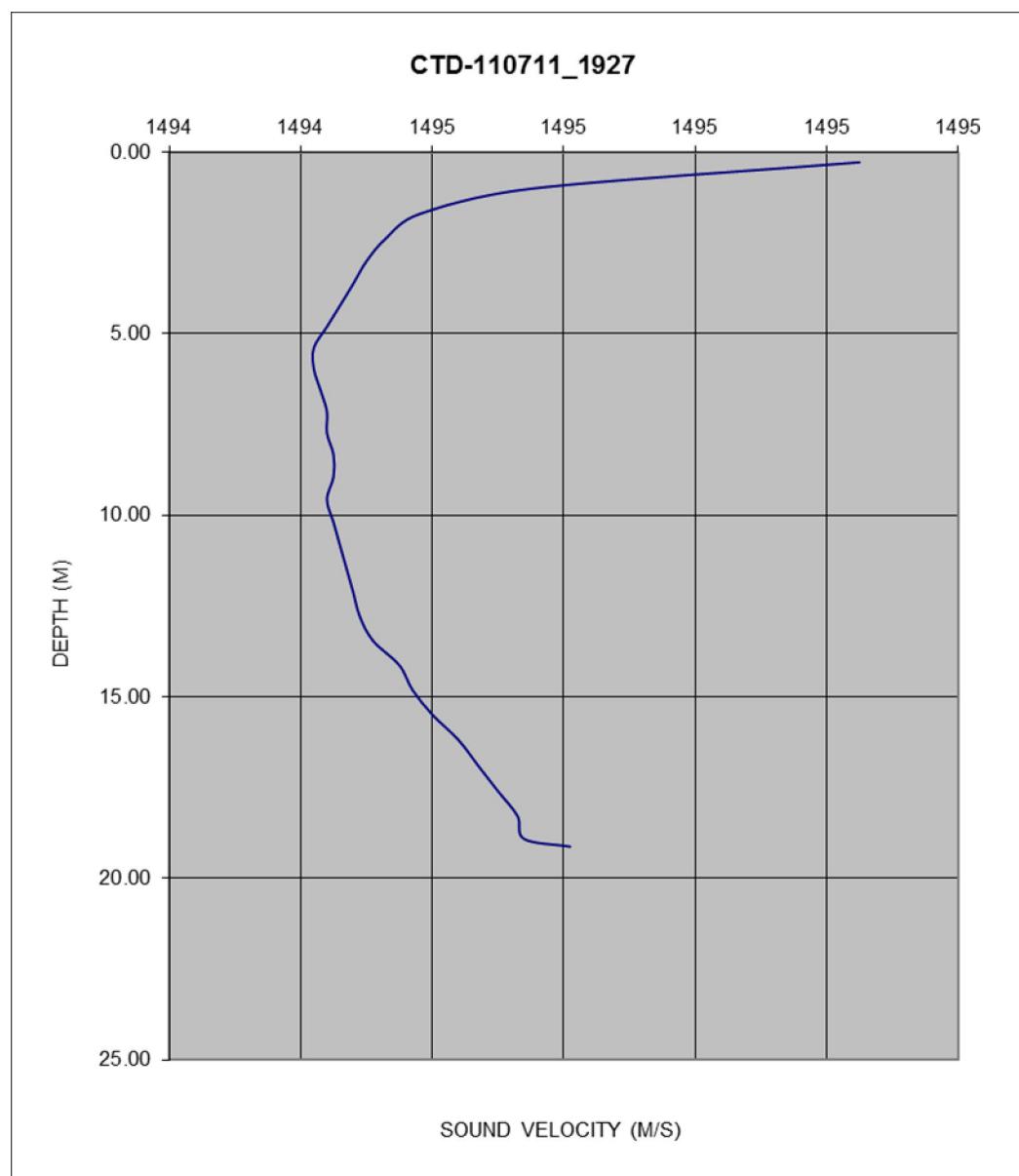


Figure 3.2-81
SVP 110711_2129 taken during the Fall 2011 multibeam survey at Fire-Island Reef

1494.50	0.15
1494.36	0.80
1494.30	1.54
1494.30	2.21
1494.29	2.88
1494.29	3.55
1494.30	4.23
1494.31	4.92
1494.32	5.59
1494.33	6.25
1494.35	6.91
1494.36	7.56
1494.37	8.20
1494.38	8.86
1494.43	9.51
1494.47	10.15
1494.51	10.81
1494.54	11.48
1494.56	12.15
1494.59	12.83
1494.63	13.51
1494.67	14.21
1494.70	14.87
1494.74	15.52
1494.82	16.18
1494.88	16.83
1494.91	17.49
1494.93	18.17
1494.94	18.81
1494.95	19.45
1494.99	19.75

CTD PROFILE # 110711 2129

<u>Date</u>	<u>Time</u>	<u>NAD83 NY LI (Feet)</u>		<u>Water Depth</u>	<u>Latitude</u>	<u>Longitude</u>
		<u>Easting</u>	<u>Northing</u>	<u>Feet</u>	<u>N</u>	<u>W</u>
11/07/11	21:29	1199630	158274	65	40.59848593	73.22441442

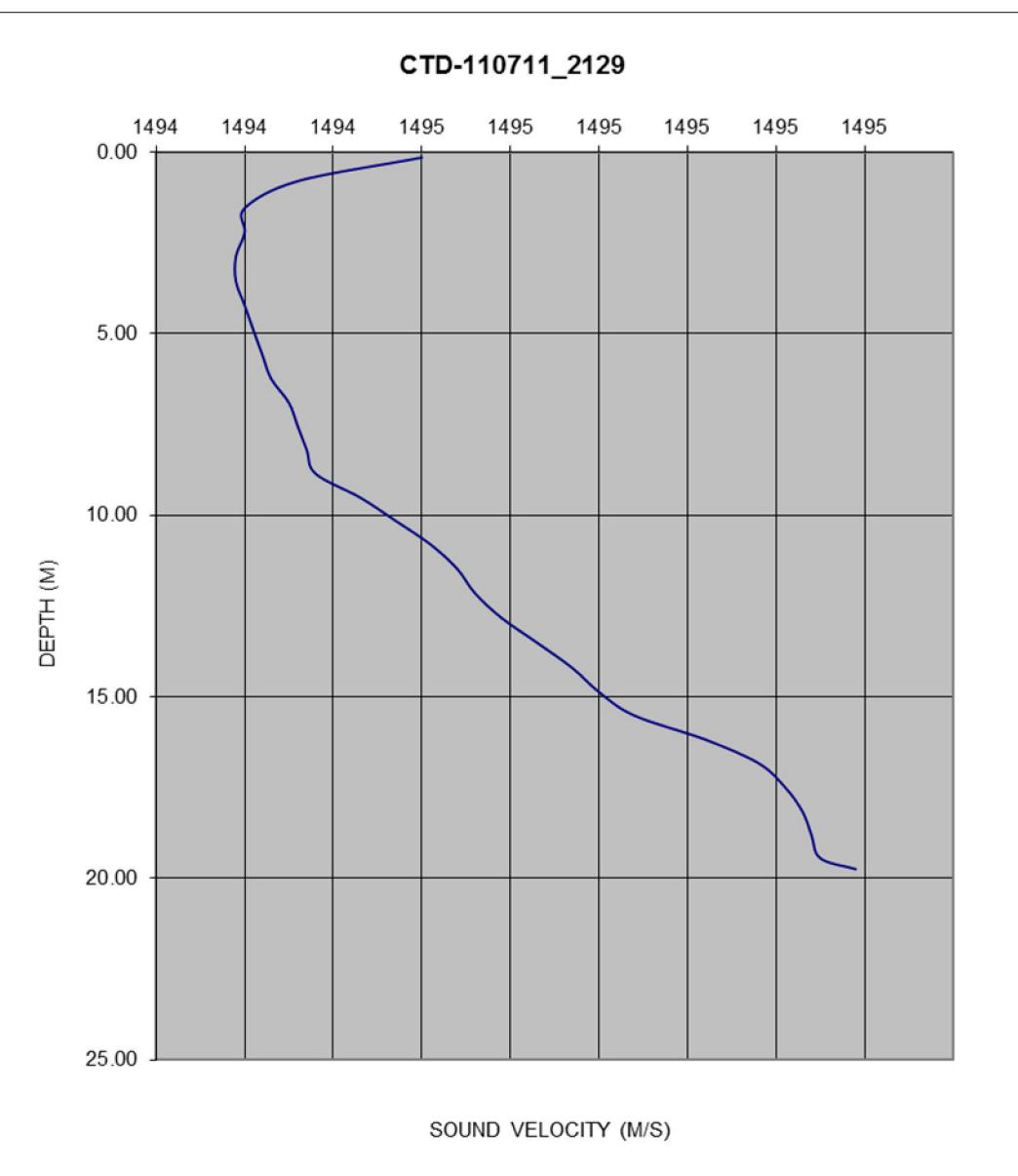


Figure 3.2-82
SVP 110811_1200 taken during the Fall 2011 multibeam survey at Fire-Island Reef

1492.96	0.09
1493.02	0.69
1493.08	1.41
1493.13	2.15
1493.15	2.89
1493.20	3.64
1493.24	4.40
1493.24	5.15
1493.32	5.88
1493.44	6.60
1493.61	7.33
1493.80	8.05
1494.04	8.73
1494.26	9.42
1494.45	10.09
1494.62	10.79
1494.77	11.50
1494.93	12.21
1495.06	12.88
1495.17	13.54
1495.26	14.25
1495.34	14.98
1495.42	15.71
1495.47	16.42
1495.52	17.13
1495.56	17.85
1495.59	18.54
1495.58	18.79

CTD PROFILE # 110811_1200

<u>Date</u>	<u>Time</u>	<u>NAD83 NY LI (Feet)</u>		<u>Water Depth</u>	<u>Latitude</u>	<u>Longitude</u>
		<u>Easting</u>	<u>Northing</u>	<u>Feet</u>	<u>N</u>	<u>W</u>
11/08/11	12:00	1199179	156238	62	40.59290717	73.22610240

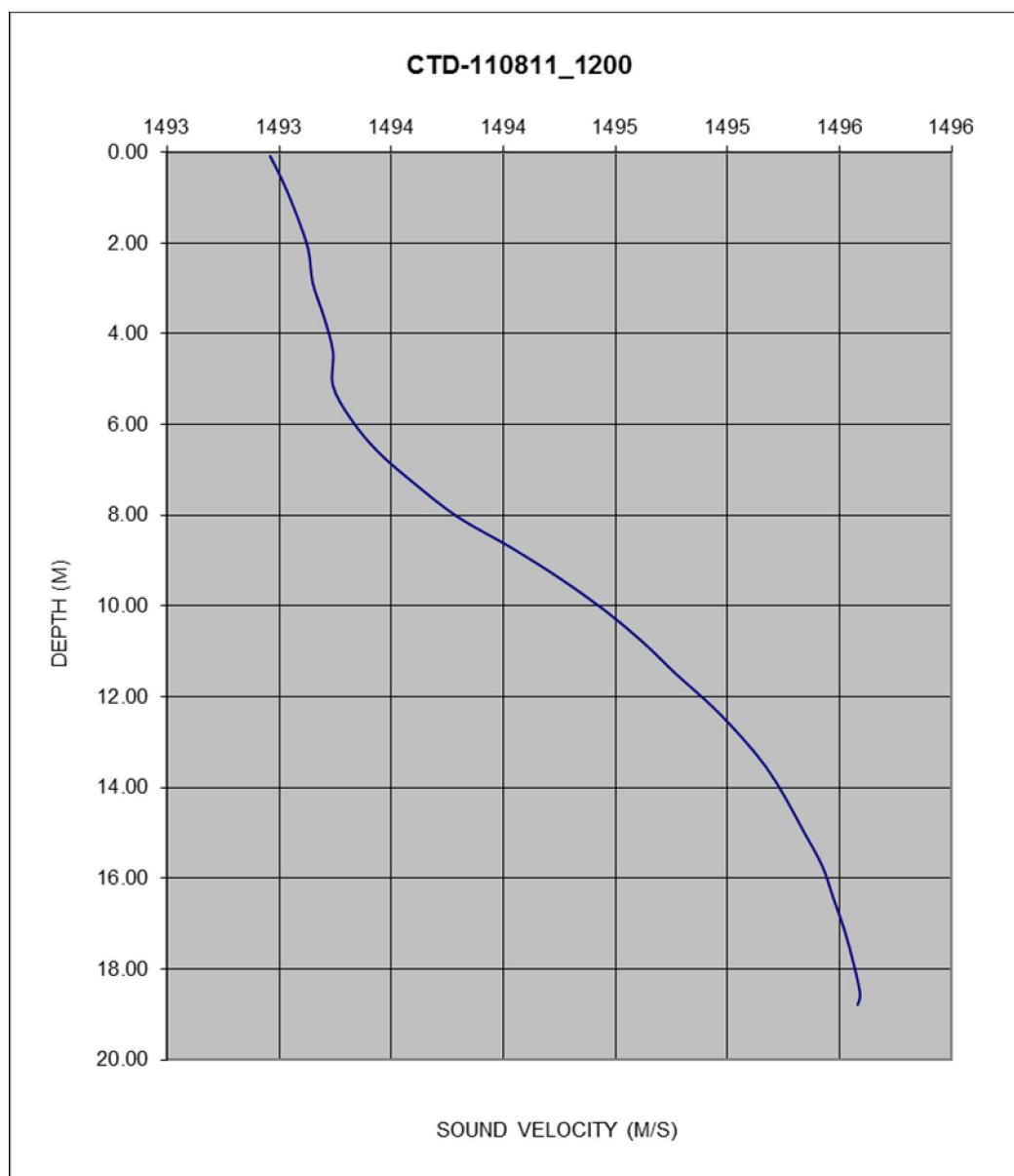


Figure 3.2-83
SVP 110811_1538 taken during the Fall 2011 multibeam survey at Hempstead Reef

1496.71	0.46
1496.33	1.09
1496.13	1.78
1496.02	2.44
1496.00	3.05
1496.03	3.70
1496.07	4.39
1496.13	5.05
1496.22	5.70
1496.36	6.35
1496.51	7.01
1496.74	7.70
1496.98	8.38
1497.15	9.04
1497.22	9.67
1497.29	10.28
1497.41	10.90
1497.66	11.45
1497.83	11.86
1497.95	12.47
1498.06	13.10
1498.14	13.78
1498.19	14.48
1498.22	15.17
1498.24	15.86
1498.28	16.55
1498.30	17.25
1498.31	17.94
1498.31	18.60
1498.32	19.02
1498.32	19.05

CTD PROFILE # 110811_1538

Date	Time	NAD83 NY LI (Feet)		Water Depth	Latitude	Longitude
		Easting	Northing	Feet	N	W
11/08/11	15:38	1107511	129542	62	40.52138225	73.55665015

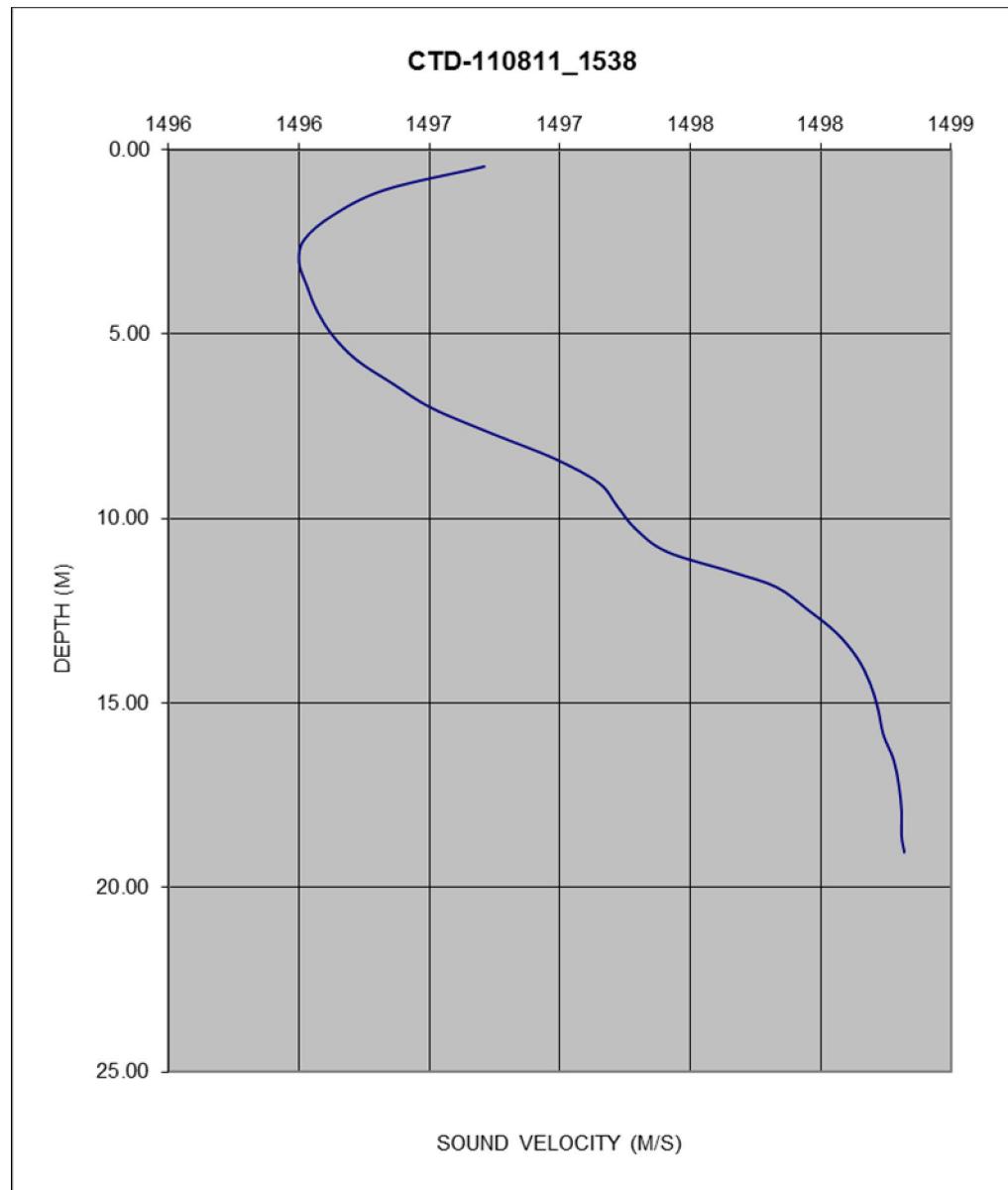


Figure 3.2-84
SVP 110811_1729 taken during the Fall 2011 multibeam survey at Hempstead Reef

1498.83	0.42
1497.15	1.24
1496.27	2.08
1495.91	2.86
1495.77	3.64
1495.73	4.44
1495.89	5.24
1496.19	6.04
1496.70	6.82
1497.32	7.62
1497.68	8.44
1497.92	9.24
1498.05	9.98
1498.12	10.66
1498.15	11.30
1498.18	11.93
1498.22	12.55
1498.26	13.16
1498.28	13.79
1498.29	14.44
1498.30	15.11
1498.33	15.78
1498.38	16.46
1498.41	17.13
1498.43	17.84
1498.46	18.54
1498.48	19.26
1498.51	19.69
1498.58	19.75
1498.66	19.79
1498.72	19.82

CTD PROFILE # 110811_1729

Date	Time	NAD83 NY LI (Feet)		Water Depth	Latitude	Longitude
		Easting	Northing	Feet	N	W
11/08/11	17:29	1107037	128517	65	40.51857614	73.55837399

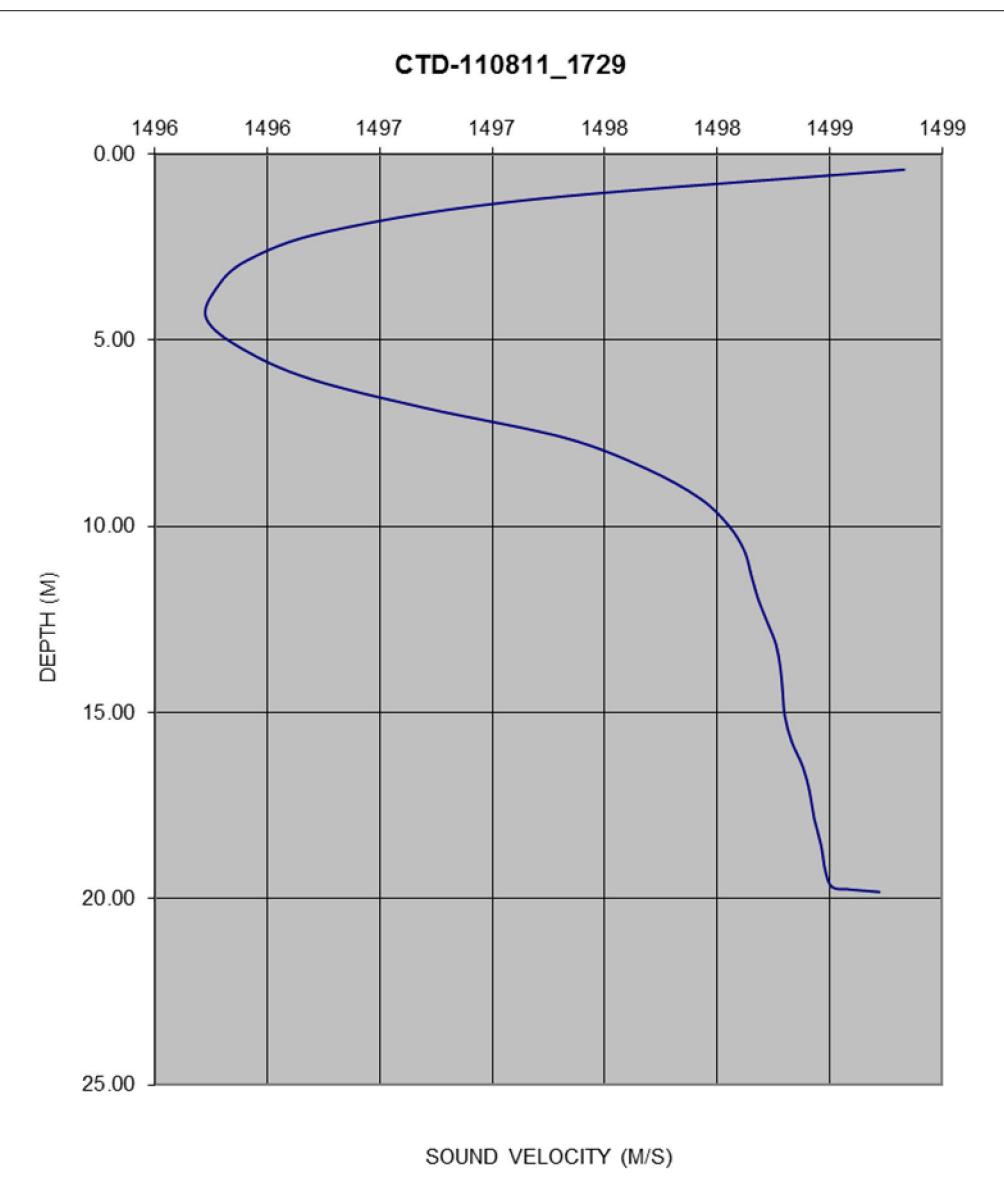


Figure 3.2-85
SVP 110811_1926 taken during the Fall 2011 multibeam survey at Hempstead Reef

1499.34	0.16
1497.96	0.73
1496.78	1.40
1496.17	2.12
1495.94	2.89
1495.88	3.68
1496.06	4.45
1496.48	5.22
1496.97	5.94
1497.52	6.62
1497.85	7.24
1498.04	7.76
1498.10	8.21
1498.15	8.67
1498.22	9.19
1498.25	9.77
1498.23	10.36
1498.21	11.01
1498.20	11.65
1498.22	12.30
1498.26	12.93
1498.31	13.56
1498.34	14.19
1498.37	14.84
1498.40	15.48
1498.43	16.12
1498.48	16.77
1498.52	17.44
1498.54	18.11
1498.59	18.41
1498.69	18.44

CTD PROFILE # 110811_1926

Date	Time	NAD83 NY LI (Feet)		Water Depth	Latitude	Longitude
		Easting	Northing	Feet	N	W
11/08/11	19:26	1106934	127448	60	40.51564166	73.55876360

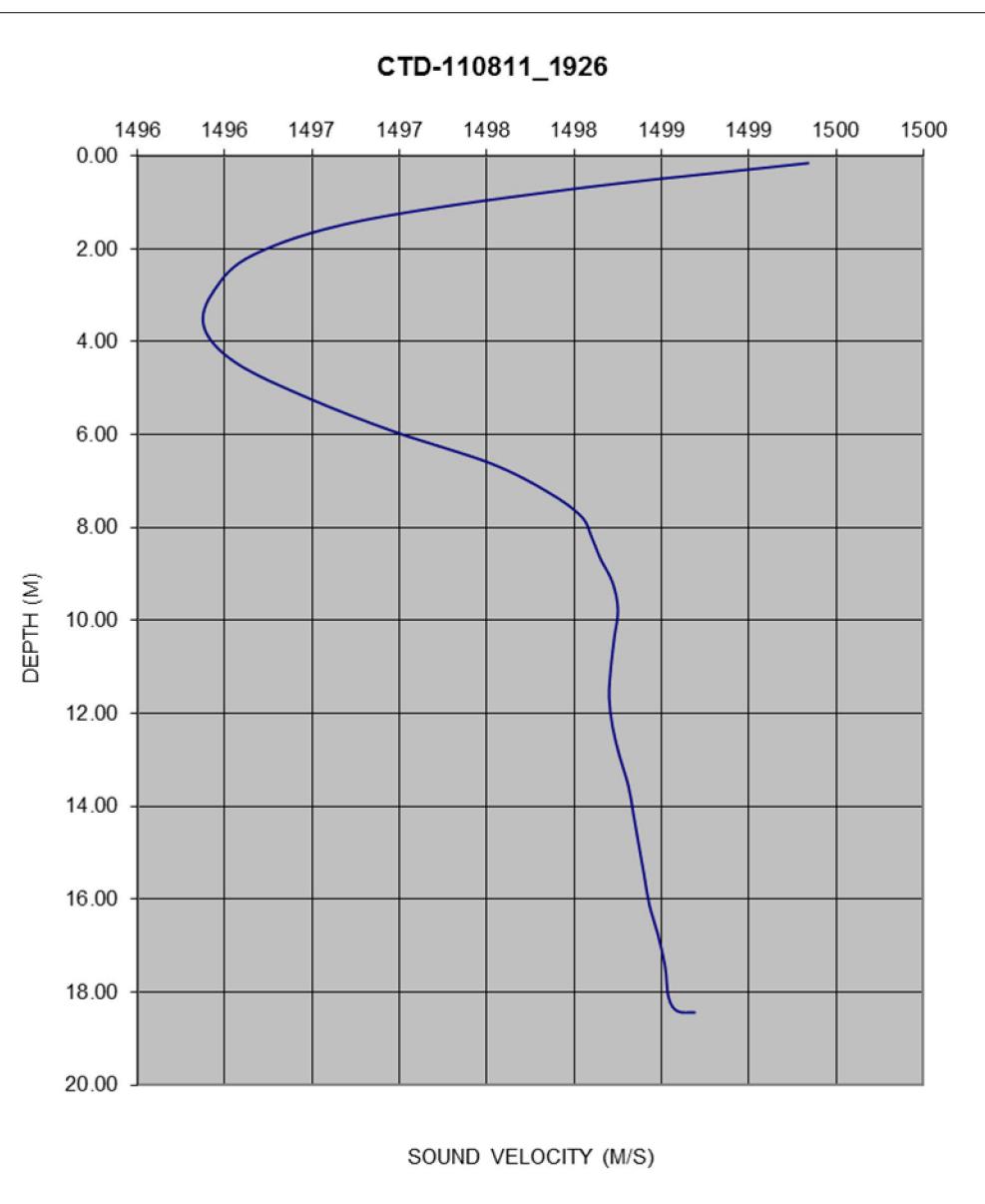


Figure 3.2-86
SVP 110811_2113 taken during the Fall 2011 multibeam survey at Hempstead Reef

1498.24	0.14
1497.88	0.81
1497.20	1.56
1496.53	2.34
1496.25	3.10
1496.42	3.76
1496.87	4.42
1497.47	5.13
1497.79	5.80
1498.00	6.48
1498.13	7.19
1498.22	7.89
1498.27	8.59
1498.30	9.29
1498.32	10.00
1498.34	10.72
1498.40	11.39
1498.45	12.01
1498.48	12.68
1498.50	13.37
1498.51	14.05
1498.51	14.74
1498.50	15.41
1498.49	16.08
1498.49	16.73
1498.50	17.39
1498.52	18.02
1498.57	18.19

CTD PROFILE # 110811_2113

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Foot	
11/08/11	21:13	1106712	126323	60	40.51255662 73.55958198

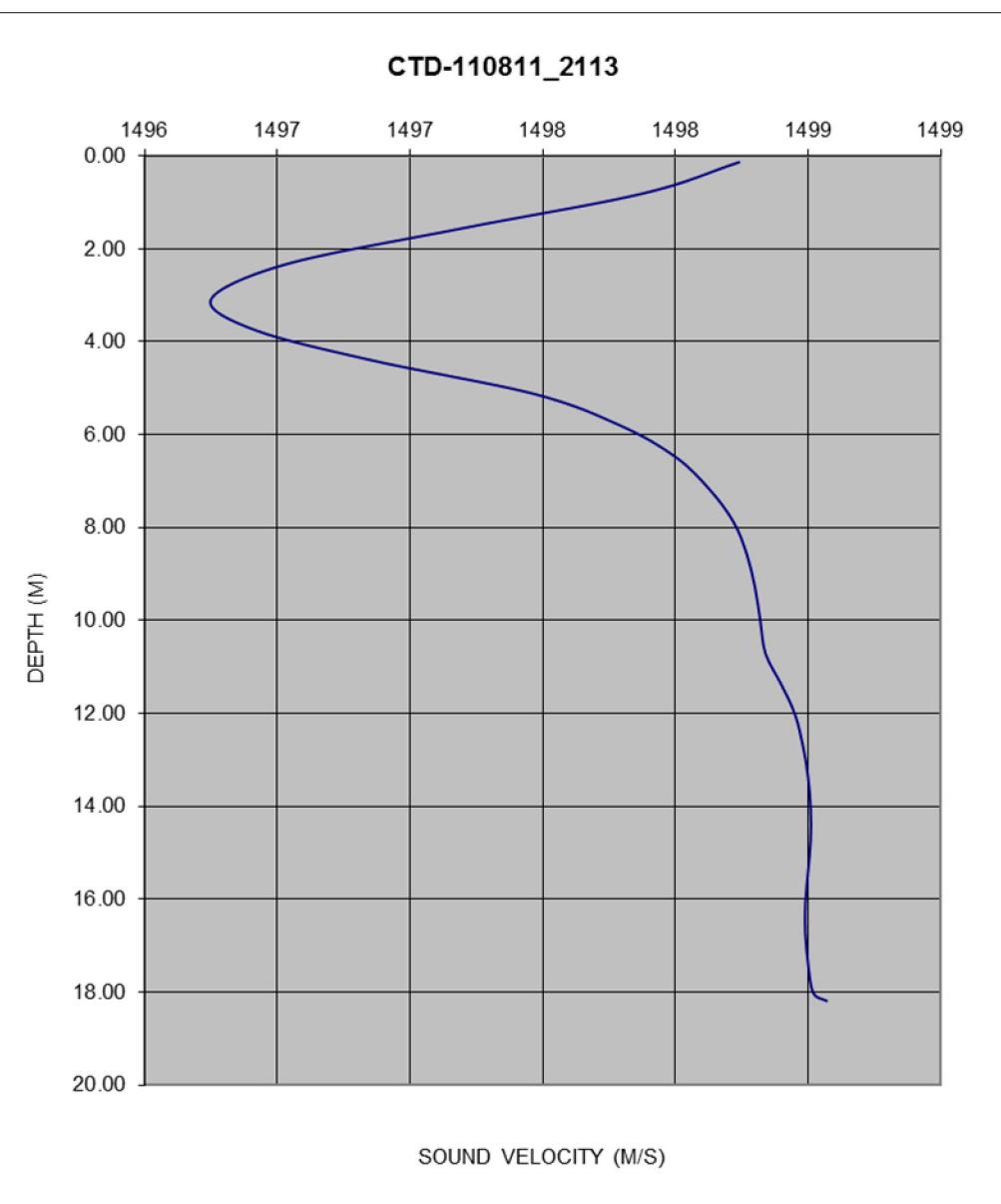
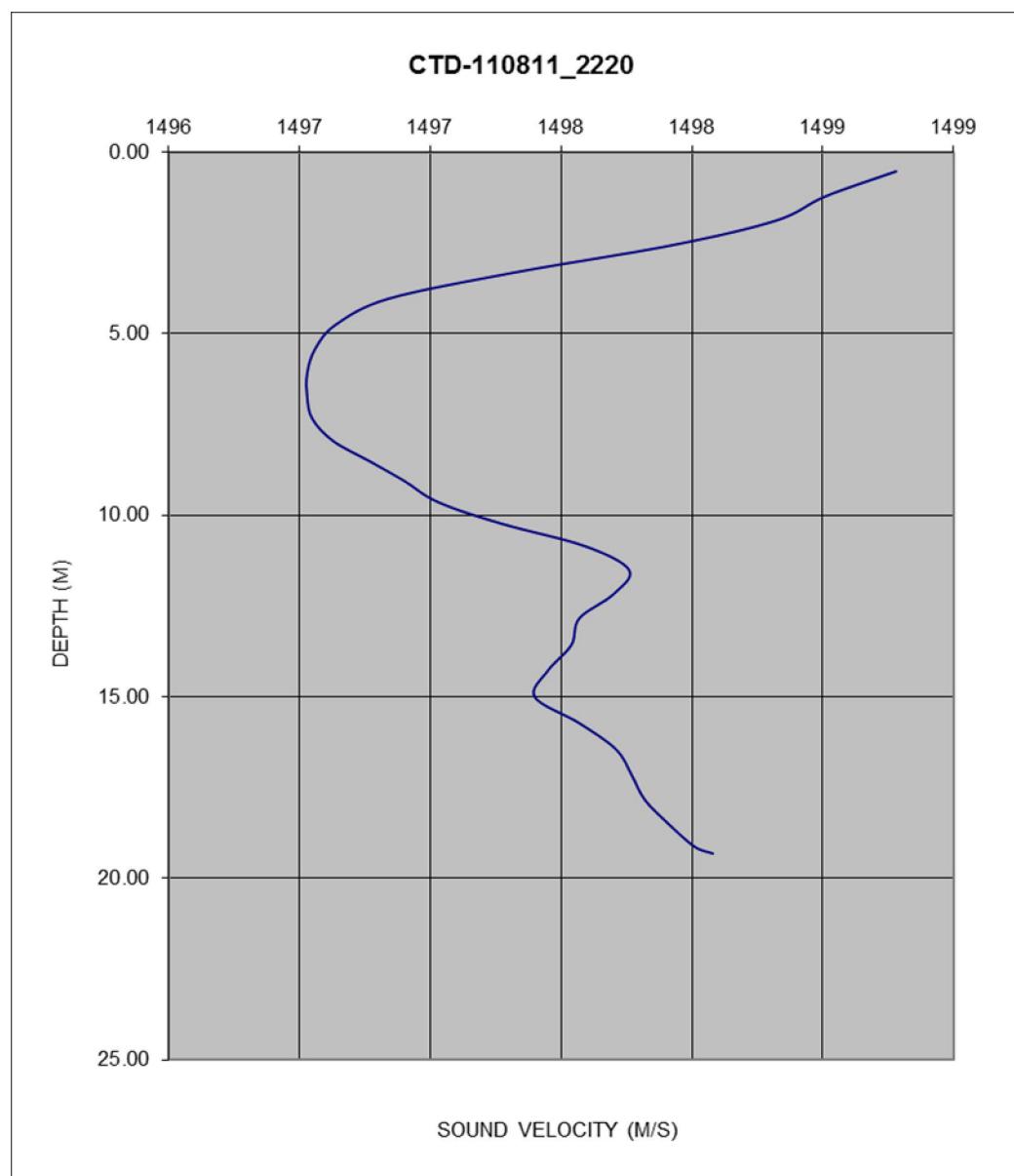


Figure 3.2-87
SVP 110811_2220 taken during the Fall 2011 multibeam survey at Hempstead Reef

1498.78	0.53
1498.51	1.22
1498.32	1.89
1497.92	2.57
1497.32	3.32
1496.84	4.04
1496.64	4.75
1496.56	5.43
1496.53	6.10
1496.53	6.74
1496.55	7.35
1496.63	7.96
1496.77	8.52
1496.90	9.05
1497.03	9.64
1497.27	10.23
1497.59	10.85
1497.76	11.51
1497.70	12.18
1497.57	12.84
1497.54	13.57
1497.45	14.28
1497.40	15.01
1497.57	15.73
1497.71	16.45
1497.77	17.16
1497.82	17.84
1497.91	18.50
1498.01	19.13
1498.08	19.32

CTD PROFILE # 110811 2220

Date	Time	NAD83 NY LI (Feet)	Water Depth	Latitude	Longitude
		Easting	Northing	Feet	
				N	W
11/08/11	22:20	1112555	128736	63	40.51909729 73.53852380



3.3 Survey Line Report

Multibeam survey lines were run in a North-South direction at the HARS location, and East-West at both Reef locations, primarily to best facilitate vessel operation under wave and current conditions at the time of the survey. Table 3.3-1 to 3.3-3 lists survey line start times, location and cardinal direction run.

Table 3.3-1
Multibeam Survey Lines run during the Fall 2011 multibeam survey at the HARS

File Name	Date	Time (UTC)	Latitude	Longitude	Direction
000_1231	8/5/2011	12:31	N40.42964897	W073.8133211	South
000_1247	8/5/2011	12:47	N40.40378763	W073.81473346	North
000_1303	8/5/2011	13:03	N40.42953843	W073.81507981	South
000_1319	8/5/2011	13:19	N40.40376557	W073.81686058	North
000_1336	8/5/2011	13:36	N40.42957991	W073.81707435	South
000_1352	8/5/2011	13:52	N40.40373813	W073.81901818	North
000_1409	8/5/2011	14:09	N40.42967338	W073.81927909	South
000_1436	8/5/2011	14:36	N40.40376841	W073.82142466	East (Cross-Line)
000_1452	8/5/2011	14:52	N40.42969104	W073.82115945	South
000_1509	8/5/2011	15:09	N40.40361568	W073.82319691	North
000_1524	8/5/2011	15:24	N40.42952368	W073.82270298	North
000_1526	8/5/2011	15:26	N40.42885462	W073.82379119	East (Cross-Line)
000_1533	8/5/2011	15:33	N40.42863458	W073.81457466	West (Cross-Line)
000_1535	8/5/2011	15:35	N40.42878735	W073.82212567	West (Cross-Line)
00A1535	8/5/2011	15:35	N40.42879493	W073.82286218	West (Cross-Line)
000_1537	8/5/2011	15:37	N40.42957612	W073.82376282	South
000_1553	8/5/2011	15:53	N40.40371437	W073.82584172	North
000_1609	8/5/2011	16:09	N40.42969819	W073.82562965	South
000_1625	8/5/2011	16:25	N40.40373071	W073.82839811	North
000_1647	8/5/2011	16:47	N40.42968073	W073.8279796	South
000_1704	8/5/2011	17:04	N40.40370513	W073.83060459	North
000_1720	8/5/2011	17:20	N40.42972478	W073.82995624	South
000_1738	8/5/2011	17:38	N40.40373717	W073.83302451	North
000_1754	8/5/2011	17:54	N40.4296724	W073.83223534	South
000_1812	8/5/2011	18:12	N40.40373781	W073.83530679	North
000_1828	8/5/2011	18:28	N40.42895504	W073.833877	East (Cross-Line)
000_1838	8/5/2011	18:38	N40.42972057	W073.83411135	South
000_1858	8/5/2011	18:58	N40.4036963	W073.83698964	North

000_1915	8/5/2011	19:15	N40.42986232	W073.8362686	South
000_1939	8/5/2011	19:39	N40.40365653	W073.83888594	North
000_1956	8/5/2011	19:56	N40.42976953	W073.83784102	South
000_2020	8/5/2011	20:20	N40.40369175	W073.840715	North
000_2038	8/5/2011	20:38	N40.42877206	W073.83928286	East (Cross-Line)
000_1139	8/10/2011	11:39	N40.42954352	W073.83936123	South
000_1154	8/10/2011	11:54	N40.4036503	W073.84232955	North
000_1210	8/10/2011	12:10	N40.42981403	W073.84081439	West (Cross-Line)
000_1226	8/10/2011	12:26	N40.40359564	W073.84426262	North
000_1242	8/10/2011	12:42	N40.42976014	W073.84269708	South
000_1258	8/10/2011	12:58	N40.40366298	W073.8459443	North
000_1315	8/10/2011	13:15	N40.42969504	W073.84440085	South
000A1336	8/10/2011	13:36	N40.4036833	W073.8474399	North
000_1353	8/10/2011	13:53	N40.42968984	W073.84575535	West (Cross-Line)
000_1408	8/10/2011	14:08	N40.40384308	W073.84879041	North
000_1425	8/10/2011	14:25	N40.42886584	W073.84739567	East (Cross-Line)
000_1430	8/10/2011	14:30	N40.4263383	W073.84083528	South
000_1434	8/10/2011	14:34	N40.42956087	W073.84705895	West (Cross-Line)
000_1449	8/10/2011	14:49	N40.40362986	W073.8499387	North
000_1506	8/10/2011	15:06	N40.42961816	W073.84861244	South
000_1521	8/10/2011	15:21	N40.40361774	W073.85117169	North
000_1544	8/10/2011	15:44	N40.42956413	W073.84978233	West (Cross-Line)
000_1558	8/10/2011	15:58	N40.4036015	W073.85258111	North
000_1615	8/10/2011	16:15	N40.42980667	W073.85126371	South
000_1629	8/10/2011	16:29	N40.40369376	W073.85378187	North
000_1645	8/10/2011	16:45	N40.42975182	W073.85259296	South
000_1700	8/10/2011	17:00	N40.4037612	W073.85492386	North
000_1717	8/10/2011	17:17	N40.42877922	W073.85410994	East (Cross-Line)
000_1725	8/10/2011	17:25	N40.42950738	W073.85372193	South
000_1742	8/10/2011	17:42	N40.40377218	W073.85595467	North
000_1804	8/10/2011	18:04	N40.42964569	W073.85485803	West (Cross-Line)
000_1819	8/10/2011	18:19	N40.40360982	W073.8569982	North
000_1837	8/10/2011	18:37	N40.42971265	W073.85622491	South
000_1848	8/10/2011	18:48	N40.42005291	W073.85722156	North
000_1856	8/10/2011	18:56	N40.42868852	W073.85735277	East (Cross-Line)
000A1201	8/11/2011	12:01	N40.40441908	W073.8136411	South
000_1216	8/11/2011	12:16	N40.37812432	W073.81428409	North
000_1233	8/11/2011	12:33	N40.40442519	W073.81511332	West (Cross-Line)
000_1250	8/11/2011	12:50	N40.37807381	W073.81670044	North

000_1308	8/11/2011	13:08	N40.40451056	W073.81769875	South
000_1324	8/11/2011	13:24	N40.37806638	W073.81940569	North
000_1342	8/11/2011	13:42	N40.40448722	W073.81998363	West (Cross-Line)
000_1402	8/11/2011	14:02	N40.37786231	W073.82166239	North
000_1422	8/11/2011	14:22	N40.40442352	W073.8223697	West (Cross-Line)
000_1439	8/11/2011	14:39	N40.3781522	W073.82377914	North
000_1500	8/11/2011	15:00	N40.40331074	W073.82460279	East (Cross-Line)
000_1510	8/11/2011	15:10	N40.40449025	W073.82487561	South
000_1528	8/11/2011	15:28	N40.37817041	W073.82580004	North
000_1546	8/11/2011	15:46	N40.40450394	W073.82679198	South
000_1603	8/11/2011	16:03	N40.37822295	W073.82773292	North
000_1624	8/11/2011	16:24	N40.40452109	W073.82849483	West (Cross-Line)
000_1640	8/11/2011	16:40	N40.37825392	W073.82991732	North
000_1657	8/11/2011	16:57	N40.40447825	W073.83095789	South
000_1714	8/11/2011	17:14	N40.37831198	W073.83176889	North
000_1731	8/11/2011	17:31	N40.404406	W073.83284217	West (Cross-Line)
000_1747	8/11/2011	17:47	N40.37812689	W073.83342904	North
000_1810	8/11/2011	18:10	N40.40362209	W073.83474531	East (Cross-Line)
000_1820	8/11/2011	18:20	N40.40447691	W073.8343651	West (Cross-Line)
00A1837	8/11/2011	18:37	N40.37820131	W073.83459258	North
000_1854	8/11/2011	18:54	N40.40450866	W073.83672241	South
000_1911	8/11/2011	19:11	N40.37822252	W073.83638998	North
000_1927	8/11/2011	19:27	N40.40432604	W073.83884252	South
000_1943	8/11/2011	19:43	N40.37820985	W073.83736383	North
000_2003	8/11/2011	20:03	N40.40437225	W073.84066085	South
00A2020	8/11/2011	20:20	N40.37822263	W073.83877205	North
000_2036	8/11/2011	20:36	N40.4043726	W073.84232697	South
000_2054	8/11/2011	20:54	N40.37844248	W073.84023074	North
000_2112	8/11/2011	21:12	N40.40360493	W073.84380078	East (Cross-Line)
000_2120	8/11/2011	21:20	N40.40434819	W073.8436323	West (Cross-Line)
000_2137	8/11/2011	21:37	N40.37831185	W073.84147397	North
000_2154	8/11/2011	21:54	N40.40348705	W073.84528884	East (Cross-Line)
000_1320	8/12/2011	13:20	N40.40454829	W073.84526463	South
018_1339	8/12/2011	13:39	N40.37829895	W073.84247444	North
002_1357	8/12/2011	13:57	N40.40441576	W073.84699956	South
018_1414	8/12/2011	14:14	N40.37828153	W073.84363181	North
00A1430	8/12/2011	14:30	N40.40433172	W073.84859343	South
000_1446	8/12/2011	14:46	N40.37830328	W073.8447289	North
000_1502	8/12/2011	15:02	N40.40444242	W073.84972009	South

000_1521	8/12/2011	15:21	N40.37829124	W073.84541735	West (Cross-Line)
000_1539	8/12/2011	15:39	N40.40437359	W073.85101185	South
000_1555	8/12/2011	15:55	N40.37831273	W073.84666784	North
000_1613	8/12/2011	16:13	N40.40378564	W073.85215168	East (Cross-Line)
000_1621	8/12/2011	16:21	N40.40432302	W073.85670246	West (Cross-Line)
000_1637	8/12/2011	16:37	N40.37829866	W073.85635858	North
000_1653	8/12/2011	16:53	N40.4043936	W073.85604983	South
00A_1714	8/12/2011	17:14	N40.3783486	W073.85520142	North
00A_1731	8/12/2011	17:31	N40.40439974	W073.85473658	South
00A_1747	8/12/2011	17:47	N40.3783008	W073.85381127	North
000_1805	8/12/2011	18:05	N40.404307	W073.85370124	South
000_1822	8/12/2011	18:22	N40.37838947	W073.8525622	North
000_1839	8/12/2011	18:39	N40.40434469	W073.85246082	South
000_1855	8/12/2011	18:55	N40.37830301	W073.85138103	North
000_1912	8/12/2011	19:12	N40.40305213	W073.85153765	West (Cross-Line)
000_1921	8/12/2011	19:21	N40.40035457	W073.85198649	South
000_1934	8/12/2011	19:34	N40.37833283	W073.8502706	North
000_1950	8/12/2011	19:50	N40.39359285	W073.84979712	East (Cross-Line)
000_1959	8/12/2011	19:59	N40.3783285	W073.84942014	North
000_2009	8/12/2011	20:09	N40.39173398	W073.8490657	South
000_2018	8/12/2011	20:18	N40.37838541	W073.84864347	North
000_2026	8/12/2011	20:26	N40.39028404	W073.84775977	South
000_2034	8/12/2011	20:34	N40.37829971	W073.84772514	North
000_2040	8/12/2011	20:40	N40.38413509	W073.84707184	South
000_2044	8/12/2011	20:44	N40.38029592	W073.84676364	North
000_2139	8/12/2011	21:39	N40.40102109	W073.84546275	North
002_1211	8/16/2011	12:11	N40.3787399	W073.8139414	East (Cross-Line)
018_1228	8/16/2011	12:28	N40.3527096	W073.81509394	West (Cross-Line)
000_1245	8/16/2011	12:45	N40.37890566	W073.8155313	South
000_1302	8/16/2011	13:02	N40.35262315	W073.81753345	North
00A1320	8/16/2011	13:20	N40.37884849	W073.81788243	South
000_1337	8/16/2011	13:37	N40.35275006	W073.81982297	West (Cross-Line)
000_1356	8/16/2011	13:56	N40.37891639	W073.82006351	West (Cross-Line)
000_1417	8/16/2011	14:17	N40.3526312	W073.82281836	North
000_1435	8/16/2011	14:35	N40.37888074	W073.82254251	South
000_1451	8/16/2011	14:51	N40.35260131	W073.82502044	North
00A1510	8/16/2011	15:10	N40.37791636	W073.82490397	East (Cross-Line)
00A1521	8/16/2011	15:21	N40.37888737	W073.8250093	South
000_1536	8/16/2011	15:36	N40.35259757	W073.82699404	North

00A1553	8/16/2011	15:53	N40.37885857	W073.8271529	South
000_1608	8/16/2011	16:08	N40.35279055	W073.82940057	North
002_1630	8/16/2011	16:30	N40.37883587	W073.82945185	East (Cross-Line)
000_1646	8/16/2011	16:46	N40.35278632	W073.83139967	North
00A1704	8/16/2011	17:04	N40.37878377	W073.83124679	South
00A1720	8/16/2011	17:20	N40.352761	W073.83303255	West (Cross-Line)
00A1738	8/16/2011	17:38	N40.37882368	W073.83302919	South
000_1755	8/16/2011	17:55	N40.35272988	W073.83529056	North
000_1813	8/16/2011	18:13	N40.37816392	W073.83471163	East (Cross-Line)
00A1821	8/16/2011	18:21	N40.37884823	W073.83475698	South
000_1842	8/16/2011	18:42	N40.35267878	W073.83707192	North
000_1859	8/16/2011	18:59	N40.37877013	W073.83653499	South
00A1915	8/16/2011	19:15	N40.3528351	W073.83911182	North
000_1932	8/16/2011	19:32	N40.3788658	W073.83802292	South
000_1948	8/16/2011	19:48	N40.3528015	W073.84110504	North
000_2006	8/16/2011	20:06	N40.37897274	W073.83944513	South
000_2021	8/16/2011	20:21	N40.35285808	W073.84234923	West (Cross-Line)
000_2048	8/16/2011	20:48	N40.37879208	W073.84066715	South
000_2101	8/16/2011	21:04	N40.35278775	W073.84435186	North
000_2123	8/16/2011	21:23	N40.37814988	W073.84217169	East (Cross-Line)
000_2129	8/16/2011	21:29	N40.37839631	W073.83756475	West (Cross-Line)
000_2130	8/16/2011	21:30	N40.37876802	W073.84190823	West (Cross-Line)
000_2146	8/16/2011	21:46	N40.35281466	W073.84615007	North
000_2204	8/16/2011	22:04	N40.37807853	W073.84387664	East (Cross-Line)
000_1316	8/17/2011	13:16	N40.37871353	W073.85727517	South
000_1332	8/17/2011	13:32	N40.3528207	W073.85659961	North
000_1355	8/17/2011	13:55	N40.37880357	W073.85619805	East (Cross-Line)
000_1411	8/17/2011	14:11	N40.35250103	W073.8550557	North
000_1431	8/17/2011	14:31	N40.37886719	W073.8546057	South
000_1453	8/17/2011	14:53	N40.35241546	W073.85324071	North
00B_1510	8/17/2011	15:10	N40.37883285	W073.85323533	East (Cross-Line)
00A_1526	8/17/2011	15:26	N40.35270774	W073.85155713	East (Cross-Line)
000_1543	8/17/2011	15:43	N40.37877872	W073.85192211	South
000_1602	8/17/2011	16:02	N40.35285168	W073.84954311	North
000_1619	8/17/2011	16:19	N40.37818743	W073.85072748	West (Cross-Line)
000_1630	8/17/2011	16:30	N40.37875223	W073.85069101	South
00A_1646	8/17/2011	16:46	N40.35285617	W073.8477552	North
000_1702	8/17/2011	17:02	N40.37872635	W073.84978875	South
000_1719	8/17/2011	17:19	N40.35520606	W073.84669007	North

000_1734	8/17/2011	17:34	N40.37875189	W073.84899049	South
000_1748	8/17/2011	17:48	N40.36536361	W073.84521756	North
000_1756	8/17/2011	17:56	N40.37891028	W073.84849441	South
00A_1805	8/17/2011	18:05	N40.36855976	W073.84443054	North
00A_1812	8/17/2011	18:12	N40.37876216	W073.84726058	East (Cross-Line)
000_1815	8/17/2011	18:15	N40.37634872	W073.84436548	North
000_1818	8/17/2011	18:18	N40.37889826	W073.84535118	South
000_1820	8/17/2011	18:20	N40.37784874	W073.84380093	North
00B_1821	8/17/2011	18:21	N40.37880079	W073.84380407	South
000_1822	8/17/2011	18:22	N40.37763281	W073.84300548	West (Cross-Line)
000_1828	8/17/2011	18:28	N40.37702285	W073.84704789	South
000_1838	8/17/2011	18:38	N40.3561414	W073.83675561	South
000_1853	8/17/2011	18:53	N40.35295967	W073.85740825	North
000_1909	8/17/2011	19:09	N40.37883503	W073.85797511	South
00A_1927	8/17/2011	19:27	N40.35287283	W073.85909714	North
000_1942	8/17/2011	19:42	N40.37896891	W073.85946517	South
000_2000	8/17/2011	20:00	N40.35274182	W073.86060116	West (Cross-Line)
000_2016	8/17/2011	20:16	N40.37896283	W073.86092523	South
00A_2037	8/17/2011	20:37	N40.35294919	W073.86221671	West (Cross-Line)
000_2053	8/17/2011	20:53	N40.37815475	W073.86220597	East (Cross-Line)
000_2057	8/17/2011	20:57	N40.37848241	W073.85894817	West (Cross-Line)
000_1206	8/18/2011	12:06	N40.37893406	W073.86209617	South
000_1223	8/18/2011	12:23	N40.3527496	W073.86413948	North
000_1241	8/18/2011	12:41	N40.37890607	W073.86395964	South
000_1257	8/18/2011	12:57	N40.35275403	W073.86584787	North
00A_1315	8/18/2011	13:15	N40.37890194	W073.86565447	South
000_1331	8/18/2011	13:31	N40.35277396	W073.86731758	West (Cross-Line)
000_1350	8/18/2011	13:50	N40.37879714	W073.86720111	South
00A_1411	8/18/2011	14:11	N40.35280359	W073.86910098	North
000_1428	8/18/2011	14:28	N40.37873358	W073.86905305	South
000_1444	8/18/2011	14:44	N40.35281255	W073.87038853	North
00A_1502	8/18/2011	15:02	N40.3781571	W073.87054512	East (Cross-Line)
000_1512	8/18/2011	15:12	N40.37891118	W073.87041534	West (Cross-Line)
000_1529	8/18/2011	15:29	N40.35294889	W073.87208622	North
000_1547	8/18/2011	15:47	N40.37883157	W073.87238551	South
000_1604	8/18/2011	16:04	N40.352887	W073.87333953	West (Cross-Line)
00A_1624	8/18/2011	16:24	N40.3787996	W073.87406721	South
000_1641	8/18/2011	16:41	N40.35291019	W073.87518496	North
00A_1657	8/18/2011	16:57	N40.37896338	W073.8758787	South

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00B_1714	8/18/2011	17:14	N40.35292417	W073.8767272	North
000_1730	8/18/2011	17:30	N40.37885783	W073.87733037	South
00B_1747	8/18/2011	17:47	N40.35286094	W073.87786832	West (Cross-Line)
000_1803	8/18/2011	18:03	N40.37825975	W073.87910434	East (Cross-Line)
000_1811	8/18/2011	18:11	N40.37866268	W073.87946085	South
00A_1835	8/18/2011	18:35	N40.35290282	W073.87949031	North
000_1835	8/18/2011	18:35	N40.35290847	W073.87948385	North
000_1851	8/18/2011	18:51	N40.37877792	W073.88108818	South
00A_1909	8/18/2011	19:09	N40.35280543	W073.88088023	North
000_1924	8/18/2011	19:24	N40.37889568	W073.88263321	South
00A_1943	8/18/2011	19:43	N40.35286908	W073.88249923	North
000_1958	8/18/2011	19:58	N40.3789055	W073.88430147	South
00A_2018	8/18/2011	20:18	N40.35290879	W073.88367687	West (Cross-Line)
000_2033	8/18/2011	20:33	N40.37891127	W073.88597359	South
00A_2034	8/18/2011	20:34	N40.37867032	W073.88597593	South
00B_2034	8/18/2011	20:34	N40.37833079	W073.88570748	East (Cross-Line)
000_1150	8/19/2011	11:50	N40.37884965	W073.88607258	South
000_1207	8/19/2011	12:07	N40.35290986	W073.88526725	North
00A_1223	8/19/2011	12:23	N40.378869	W073.88762132	South
000_1240	8/19/2011	12:40	N40.3529345	W073.88690944	North
00A1_1257	8/19/2011	12:57	N40.37881438	W073.88945047	South
000_1314	8/19/2011	13:14	N40.35285487	W073.88840894	North
000_1330	8/19/2011	13:30	N40.37879526	W073.89118971	South
00A_1353	8/19/2011	13:53	N40.35292821	W073.88988125	North
00A_1409	8/19/2011	14:10	N40.37878096	W073.8929192	South
00A_1428	8/19/2011	14:28	N40.35289774	W073.89095918	North
00A_1446	8/19/2011	14:46	N40.37803675	W073.89461465	East (Cross-Line)
000_1454	8/19/2011	14:54	N40.3779675	W073.89133113	West (Cross-Line)
000_1458	8/19/2011	14:58	N40.37875121	W073.90072053	West (Cross-Line)
000_1514	8/19/2011	15:14	N40.35289454	W073.90057065	North
000_1531	8/19/2011	15:31	N40.37887251	W073.90010791	South
000_1548	8/19/2011	15:48	N40.35286788	W073.89943862	North
000_1610	8/19/2011	16:10	N40.37884717	W073.89874308	South
000_1628	8/19/2011	16:28	N40.35281156	W073.89844763	North
00A_1645	8/19/2011	16:45	N40.37878048	W073.89756539	South
000_1703	8/19/2011	17:03	N40.3528594	W073.89721787	North
00B_1720	8/19/2011	17:20	N40.37887304	W073.89606598	South
000_1739	8/19/2011	17:39	N40.35288001	W073.89619378	North
000_1801	8/19/2011	18:01	N40.37879893	W073.89467263	South

00A_1803	8/19/2011	18:03	N40.37802518	W073.89430636	West (Cross-Line)
00A_1815	8/19/2011	18:15	N40.36057215	W073.89418694	South
00B_1820	8/19/2011	18:20	N40.35285916	W073.8949855	North
000_1825	8/19/2011	18:25	N40.35908156	W073.89332901	South
000_1830	8/19/2011	18:30	N40.35285172	W073.89365634	North
000_1833	8/19/2011	18:33	N40.3578803	W073.89200556	South
00B_1837	8/19/2011	18:37	N40.35290232	W073.89251061	North
000_1840	8/19/2011	18:40	N40.35629347	W073.89111579	South
000_1843	8/19/2011	18:43	N40.35289759	W073.89161092	North
000_1900	8/19/2011	19:00	N40.37838854	W073.90074924	North
00B_1915	8/19/2011	19:15	N40.40435914	W073.90060748	South
00A_1939	8/19/2011	19:39	N40.37826736	W073.89993908	East (Cross-Line)
000_1955	8/19/2011	19:55	N40.40445201	W073.89924802	South
000_2017	8/19/2011	20:17	N40.37827244	W073.89848438	North
00A_2036	8/19/2011	20:36	N40.40362499	W073.89764451	West (Cross-Line)
000_2038	8/19/2011	20:38	N40.40363253	W073.90131292	North
00A_1247	8/23/2011	12:47	N40.40421311	W073.89418018	South
000_1324	8/23/2011	13:24	N40.40416477	W073.89329617	North
00A_1436	8/23/2011	14:36	N40.40334016	W073.88993404	West (Cross-Line)
00A_1613	8/23/2011	16:13	N40.37838324	W073.88620958	North
000_1140	8/23/2011	11:40	N40.40440818	W073.89691903	West (Cross-Line)
000_1156	8/23/2011	11:56	N40.37826441	W073.89681278	North
000_1213	8/23/2011	12:13	N40.40439561	W073.89600755	South
000_1229	8/23/2011	12:29	N40.37825099	W073.89525877	North
000_1307	8/23/2011	13:07	N40.37829332	W073.89412664	North
000_1325	8/23/2011	13:25	N40.4043068	W073.89264718	South
000_1340	8/23/2011	13:40	N40.37828269	W073.8925971	North
000_1359	8/23/2011	13:59	N40.40434492	W073.89128754	South
000_1415	8/23/2011	14:15	N40.37824998	W073.8909159	North
000_1436	8/23/2011	14:36	N40.40334016	W073.88993405	West (Cross-Line)
000_1443	8/23/2011	14:43	N40.4041795	W073.89021321	East (Cross-Line)
000_1459	8/23/2011	14:59	N40.37829052	W073.88922388	North
000_1518	8/23/2011	15:18	N40.40428679	W073.88848578	East (Cross-Line)
000_1534	8/23/2011	15:34	N40.37831132	W073.88807085	North
000_1557	8/23/2011	15:57	N40.40419456	W073.88645077	South
000_1635	8/23/2011	16:35	N40.40426659	W073.88498395	South
00A_1833	8/23/2011	18:33	N40.40427945	W073.88017665	South
000_1652	8/23/2011	16:52	N40.37828914	W073.88443709	North
000_1711	8/23/2011	17:11	N40.4043199	W073.88331781	South

000_1727	8/23/2011	17:27	N40.37817637	W073.88291159	North
000_1749	8/23/2011	17:49	N40.40342585	W073.88192727	West (Cross-Line)
000_1758	8/23/2011	17:58	N40.40426763	W073.88201801	North
000_1814	8/23/2011	18:14	N40.37827745	W073.88134404	North
000_1850	8/23/2011	18:50	N40.37829872	W073.88016553	North
000_1907	8/23/2011	19:07	N40.40427279	W073.87867685	South
000_1929	8/23/2011	19:29	N40.37840541	W073.87856368	North
000_1946	8/23/2011	19:46	N40.40447127	W073.87707091	South
00A_2006	8/23/2011	20:06	N40.37828524	W073.87708836	North
000_2025	8/23/2011	20:25	N40.4043271	W073.87553647	South
000_2043	8/23/2011	20:43	N40.37839409	W073.87533797	North
000_2100	8/23/2011	21:00	N40.4035292	W073.87418743	West (Cross-Line)
000_2108	8/23/2011	21:08	N40.40419119	W073.87421958	South
00A_1140	8/24/2011	11:40	N40.40437577	W073.87335757	South
00A_1337	8/24/2011	13:37	N40.40434233	W073.85748673	South
00A_1359	8/24/2011	13:59	N40.37839455	W073.857597	North
00A_1434	8/24/2011	14:34	N40.3783639	W073.85907685	North
00A_1451	8/24/2011	14:51	N40.40428929	W073.85964639	South
00A_1608	8/24/2011	16:08	N40.40425468	W073.86227721	South
00B_1526	8/24/2011	15:26	N40.40430759	W073.86091865	South
00B_1553	8/24/2011	15:53	N40.37825314	W073.86190421	East (Cross-Line)
00C_1510	8/24/2011	15:10	N40.37836342	W073.86062951	North
000_1158	8/24/2011	11:58	N40.37839088	W073.87285632	North
000_1214	8/24/2011	12:14	N40.40431666	W073.87208222	South
000_1235	8/24/2011	12:35	N40.37838872	W073.8709464	North
000_1251	8/24/2011	12:51	N40.40437715	W073.87071648	South
000_1311	8/24/2011	13:11	N40.37821472	W073.86953135	North
000_1328	8/24/2011	13:28	N40.40361062	W073.86955405	West (Cross-Line)
000_1416	8/24/2011	14:16	N40.40431025	W073.85836685	South
000_1626	8/24/2011	16:26	N40.38426606	W073.86267559	South
000_1631	8/24/2011	16:31	N40.37848857	W073.86345142	North
000_1655	8/24/2011	16:55	N40.40433254	W073.86315853	West (Cross-Line)
000_1716	8/24/2011	17:16	N40.37845345	W073.86518132	North
000_1736	8/24/2011	17:36	N40.40367571	W073.86429903	East (Cross-Line)
00A_1316	9/12/2011	13:16	N40.37832124	W073.86868624	North
000_1318	9/12/2011	13:18	N40.37846631	W073.8686868	North
000_1335	9/12/2011	13:35	N40.40432088	W073.86872723	South
00A_1349	9/12/2011	13:49	N40.37835354	W073.86715473	North
000_1406	9/12/2011	14:06	N40.40430045	W073.86755363	South

000_1424	9/12/2011	14:24	N40.3782821	W073.86593954	North
000_1442	9/12/2011	14:42	N40.40429946	W073.86610831	South
000_1455	9/12/2011	14:55	N40.38419384	W073.86509873	North
00A_1509	9/12/2011	15:09	N40.40428141	W073.86494408	South
000_1517	9/12/2011	15:17	N40.39244903	W073.8642461	North
000_1525	9/12/2011	15:25	N40.40416425	W073.86390639	South
00A_1531	9/12/2011	15:31	N40.39492101	W073.86276237	East (Cross-Line)
000_1532	9/12/2011	15:32	N40.39607426	W073.85981901	North
00A_1534	9/12/2011	15:34	N40.3965353	W073.86335745	North
000_1540	9/12/2011	15:40	N40.40348242	W073.86328693	West (Cross-Line)
00A_1555	9/12/2011	15:55	N40.40372783	W073.8571895	North
000_1614	9/12/2011	16:14	N40.42969262	W073.85755377	South
00A_1628	9/12/2011	16:28	N40.403644	W073.85835143	North
00A_1653	9/12/2011	16:53	N40.42968069	W073.85840693	South
000_1709	9/12/2011	17:09	N40.40362476	W073.85957393	North
000_1733	9/12/2011	17:33	N40.42970014	W073.85994251	South
000_1750	9/12/2011	17:50	N40.40375154	W073.86086951	North
00A_1813	9/12/2011	18:13	N40.42961629	W073.86087467	West (Cross-Line)
00B_1828	9/12/2011	18:28	N40.40370533	W073.86187878	North
000_1849	9/12/2011	18:49	N40.4297196	W073.86213378	South
00B1909	9/12/2011	19:09	N40.40438319	W073.86318207	East (Cross-Line)
000_1916	9/12/2011	19:16	N40.40365967	W073.86315778	North
000_1937	9/12/2011	19:37	N40.42975111	W073.86313654	South
000_1952	9/12/2011	19:52	N40.40362027	W073.8643047	North
000_2022	9/12/2011	20:22	N40.42986332	W073.86473973	South
000_2039	9/12/2011	20:39	N40.40420335	W073.86577671	West (Cross-Line)
000_1440	9/13/2011	14:40	N40.42964048	W073.86537416	South
000_1457	9/13/2011	14:57	N40.40365909	W073.8666505	North
000_1514	9/13/2011	15:14	N40.42972131	W073.86679734	South
00B1521	9/13/2011	15:21	N40.4209151	W073.86555951	South
000_1533	9/13/2011	15:33	N40.4036829	W073.86775471	North
00B1555	9/13/2011	15:55	N40.42970016	W073.86805445	South
000_1611	9/13/2011	16:11	N40.40376743	W073.8691758	North
00B1628	9/13/2011	16:28	N40.42982336	W073.86972686	South
00B1645	9/13/2011	16:45	N40.40378764	W073.87042084	North
000_1701	9/13/2011	17:01	N40.42981224	W073.87098563	South
00B1731	9/13/2011	17:31	N40.40363672	W073.87132699	North
00A1748	9/13/2011	17:48	N40.42973942	W073.87222954	South
00A1749	9/13/2011	17:49	N40.42896385	W073.87234032	East (Cross-Line)

000_1757	9/13/2011	17:57	N40.42968226	W073.87218153	South
00B1813	9/13/2011	18:13	N40.40376791	W073.8727815	North
00A1830	9/13/2011	18:30	N40.42952602	W073.87363378	South
000_1847	9/13/2011	18:47	N40.40433105	W073.87416899	East (Cross-Line)
00B1201	9/14/2011	12:01	N40.42967442	W073.90098397	South
000_1219	9/14/2011	12:19	N40.40361876	W073.90042116	North
000_1237	9/14/2011	12:37	N40.42977964	W073.89932068	South
000_1255	9/14/2011	12:55	N40.40373953	W073.89879989	North
00A1318	9/14/2011	13:18	N40.42960743	W073.89750959	South
00A1335	9/14/2011	13:35	N40.40366721	W073.89729328	North
000_1351	9/14/2011	13:51	N40.42975303	W073.89592198	South
000_1409	9/14/2011	14:09	N40.40363571	W073.89547177	North
000_1426	9/14/2011	14:26	N40.42973562	W073.89419811	South
00A1443	9/14/2011	14:43	N40.40366443	W073.89363445	North
000_1501	9/14/2011	15:01	N40.42884941	W073.89249368	West (Cross-Line)
000_1513	9/14/2011	15:13	N40.4297327	W073.89235722	South
000_1530	9/14/2011	15:30	N40.40372652	W073.89181388	North
00A1546	9/14/2011	15:46	N40.42978277	W073.89059102	East (Cross-Line)
00A1603	9/14/2011	16:03	N40.40385557	W073.89022221	North
00A1629	9/14/2011	16:29	N40.42973152	W073.88868152	South
00C1645	9/14/2011	16:45	N40.40371444	W073.88873129	North
00A1701	9/14/2011	17:01	N40.42973625	W073.88732717	South
000_1718	9/14/2011	17:18	N40.40376713	W073.88702518	North
00A1733	9/14/2011	17:33	N40.42982469	W073.88583201	East (Cross-Line)
00A1755	9/14/2011	17:55	N40.40382991	W073.88570708	North
00C1813	9/14/2011	18:13	N40.42902996	W073.88434307	West (Cross-Line)
00A1822	9/14/2011	18:22	N40.42973021	W073.88433002	South
00A1840	9/14/2011	18:40	N40.4037958	W073.88400536	North
00A1855	9/14/2011	18:55	N40.42967815	W073.88259348	South
000_1914	9/14/2011	19:14	N40.40380059	W073.88226003	North
00A1932	9/14/2011	19:32	N40.42913216	W073.88129044	West (Cross-Line)
000_1133	9/21/2011	11:33	N40.42968564	W073.88080125	South
000_1152	9/21/2011	11:52	N40.40368339	W073.88052048	North
000_1209	9/21/2011	12:09	N40.42965817	W073.87966322	South
00A_1229	9/21/2011	12:29	N40.40375338	W073.87864259	North
00B1247	9/21/2011	12:47	N40.42967938	W073.87832235	South
00A1302	9/21/2011	13:02	N40.40374123	W073.87714096	North
00A1328	9/21/2011	13:28	N40.4295616	W073.87658089	South
000_1345	9/21/2011	13:45	N40.40370211	W073.87544953	North

000_1408	9/21/2011	14:08	N40.42969715	W073.87568641	South
000A1424	9/21/2011	14:24	N40.40373482	W073.87400644	North
000_1450	9/21/2011	14:50	N40.42907692	W073.87359338	West (Cross-Line)
000A1455	9/21/2011	14:55	N40.42871513	W073.8819478	West (Cross-Line)
000_1456	9/21/2011	14:56	N40.42913146	W073.88142198	North
000A1500	9/21/2011	15:00	N40.42956505	W073.87444206	East (Cross-Line)
000A1517	9/21/2011	15:17	N40.41167396	W073.88966162	North
000C1521	9/21/2011	15:21	N40.41665538	W073.88142465	East (Cross-Line)
000A1525	9/21/2011	15:25	N40.41794634	W073.87315352	North
000A1532	9/21/2011	15:32	N40.42339865	W073.87949849	West (Cross-Line)

Table 3.3-2

Multibeam Survey Lines run during the Fall 2011 multibeam survey at Fire-Island Reef

File Name	Date	Time (UTC)	Latitude	Longitude	Direction
000A1544	11/7/2011	15:44	N40-35.606779	W73-11.462527	West
000B_1603	11/7/2011	16:03	N40-35.627781	W73-13.526184	East
000_1623	11/7/2011	16:23	N40-35.664773	W73-11.448860	West
000_1648	11/7/2011	16:48	N40-35.687398	W73-13.562522	East
000_1705	11/7/2011	17:05	N40-35.718023	W73-11.439814	West
000C1731	11/7/2011	17:31	N40-35.747695	W73-13.551383	East
000B1748	11/7/2011	17:48	N40-35.782610	W73-11.444852	West
000A1810	11/7/2011	18:10	N40-35.806345	W73-13.556198	East
000C1828	11/7/2011	18:28	N40-35.846819	W73-11.449180	West
000A1849	11/7/2011	18:49	N40-35.871513	W73-13.548551	East
000A1907	11/7/2011	19:07	N40-35.907862	W73-11.444282	West
000A1929	11/7/2011	19:29	N40-35.928120	W73-13.485435	South (Cross-Line)
000_1938	11/7/2011	19:38	N40-35.937857	W73-13.552203	East
000A1955	11/7/2011	19:55	N40-35.966376	W73-11.445338	West
000_2014	11/7/2011	20:14	N40-36.000957	W73-13.556191	East
000A2032	11/7/2011	20:32	N40-36.033247	W73-11.438448	West
000_2050	11/7/2011	20:50	N40-36.066509	W73-13.555356	East
000_2106	11/7/2011	21:06	N40-36.111311	W73-11.441404	West
000A2123	11/7/2011	21:23	N40-36.145102	W73-13.508994	South (Cross-Line)
000_1212	11/8/2011	12:12	N40-35.580937	W73-13.551401	East

Table 3.3-3
Multibeam Survey Lines run during the Fall 2011 multibeam survey at Hempstead Reef

File Name	Date	Time (UTC)	Latitude	Longitude	Direction
000A1548	11/8/2011	15:48	N40-31.280473	W73-33.393110	East
000C1603	11/8/2011	16:03	N40-31.517642	W73-31.298413	West
000A1619	11/8/2011	16:19	N40-31.220970	W73-33.425397	East
000_1636	11/8/2011	16:36	N40-31.462310	W73-31.318433	West
000A1652	11/8/2011	16:52	N40-31.149097	W73-33.437948	East
000A1709	11/8/2011	17:09	N40-31.414519	W73-31.332591	West
000_1732	11/8/2011	17:32	N40-31.090866	W73-33.474822	East
000C1748	11/8/2011	17:48	N40-31.370558	W73-31.334340	West
000B1805	11/8/2011	18:05	N40-31.020157	W73-33.490552	East
000B1822	11/8/2011	18:22	N40-31.325061	W73-31.366943	West
000B1840	11/8/2011	18:40	N40-30.956506	W73-33.458627	North (Cross-Line)
000_1848	11/8/2011	18:48	N40-30.988280	W73-33.494885	East
000B1907	11/8/2011	19:07	N40-31.247328	W73-31.385338	West
000B1929	11/8/2011	19:29	N40-30.924253	W73-33.518732	East
000A1948	11/8/2011	19:48	N40-31.204794	W73-31.376880	West
000_2005	11/8/2011	20:05	N40-30.857918	W73-33.527950	East
000A2022	11/8/2011	20:22	N40-31.144748	W73-31.403970	West
000A2039	11/8/2011	20:39	N40-30.802714	W73-33.540617	East
000_2056	11/8/2011	20:56	N40-31.080113	W73-31.428815	West
000_2115	11/8/2011	21:15	N40-30.744046	W73-33.561921	East
000_2134	11/8/2011	21:34	N40-31.004293	W73-31.458255	West
000_2151	11/8/2011	21:51	N40-30.689037	W73-33.579130	East
000_2153	11/8/2011	21:53	N40-30.653036	W73-33.583235	East
000_2159	11/8/2011	21:59	N40-30.747579	W73-32.719172	East
000_2208	11/8/2011	22:08	N40-30.924043	W73-31.471083	West
000_2215	11/8/2011	22:15	N40-30.792829	W73-32.210374	North (Cross-Line)

4.0 Tidal Corrections (HARS)

For the Fall 2011 bathymetry survey at HARS a “Valeport Mini” submersible tide gauge was deployed prior to collection of multibeam data at the HARS. This gauge which measures pressure was located on the sea floor attached to an anchor with an additional attachment to an acoustic release buoy (see Figure 3.0-1).

Real Time Kinematic GPS (RTK) option of the POS/MV on board the survey vessel was used to provide real time water level elevations. This system was referenced to NAVD88 during data collection. After 90% of the field survey was complete at the HARS, the acoustic release of tidal sensor was activated and the sensor was brought to the surface. The sensor has a limited power supply due to battery capacity. It was decided to change the batteries and download the recorded tidal data. The sensors data was downloaded and reviewed. The sensors had recorded at the specified 6 minute intervals with an apparent malfunction of the sensors pressure portion. The downloaded data was determined by the manufacturer to be useless and un-recoverable. Due to redundancy in recording water levels with the RTK GPS option of the POS/MV, a decision was made at that time to continue with the survey at HARS, relying on RTK GPS water levels and recorded NOAA water levels at Sandy Hook.

As with previous surveys at the HARS site, tide data from NOAA’s reference tide station at Sandy Hook (Figure 4.0-1) was downloaded from N.O.A.A.’s web site. This NAVD88 tide data was then referenced to MLW as per the USACOE SOW, (0’ MLW is 1.73’ below 0’ NGVD29 and 2.84’ below NAVD88). Historic range and time correctors (used since 2006) of 0.94 and -30 minutes were then used to correct the Sandy Hook NOAA tide data for the HARS survey area.

4.0.1 Tidal Corrections (Fire Island Reef)

For the Fall 2011 bathymetry survey at Fire Island and Hempstead Reefs the *Valeport Mini* submersible tide gauge was replaced with the more robust *Valeport WLR*. The gauge was deployed prior to collection of multibeam data at the reefs. It was decided to begin with Fire Island Reef and then move on to Hempstead Reef. This gauge which measures pressure was located on the sea floor (see Figure 3.0-3), attached to an anchor with an additional attachment to an acoustic release buoy (see Figure 3.0-1). Real Time Kinematic GPS (RTK) option of the POS/MV on board the survey vessel was used to provide real time water level elevations. This system was referenced to NAVD88 during data collection. The Fire Island Reef survey area was within cellular coverage and RTK GPS was constant for the entire survey. Using RTK GPS the water level was measured at the seabed tidal sensor for a length of time while sea conditions were relatively calm. This calibration or water level was then used to derive a fixed offset from sensors water level to NAVD 88. NOAA’s *VDATUM* program was then used to determine mean low water (MLW) at the Fire Island Site, which was determined to be 2.23’ below 0’ NAVD88.

4.0.2 Tidal Corrections (Hempstead Reef)

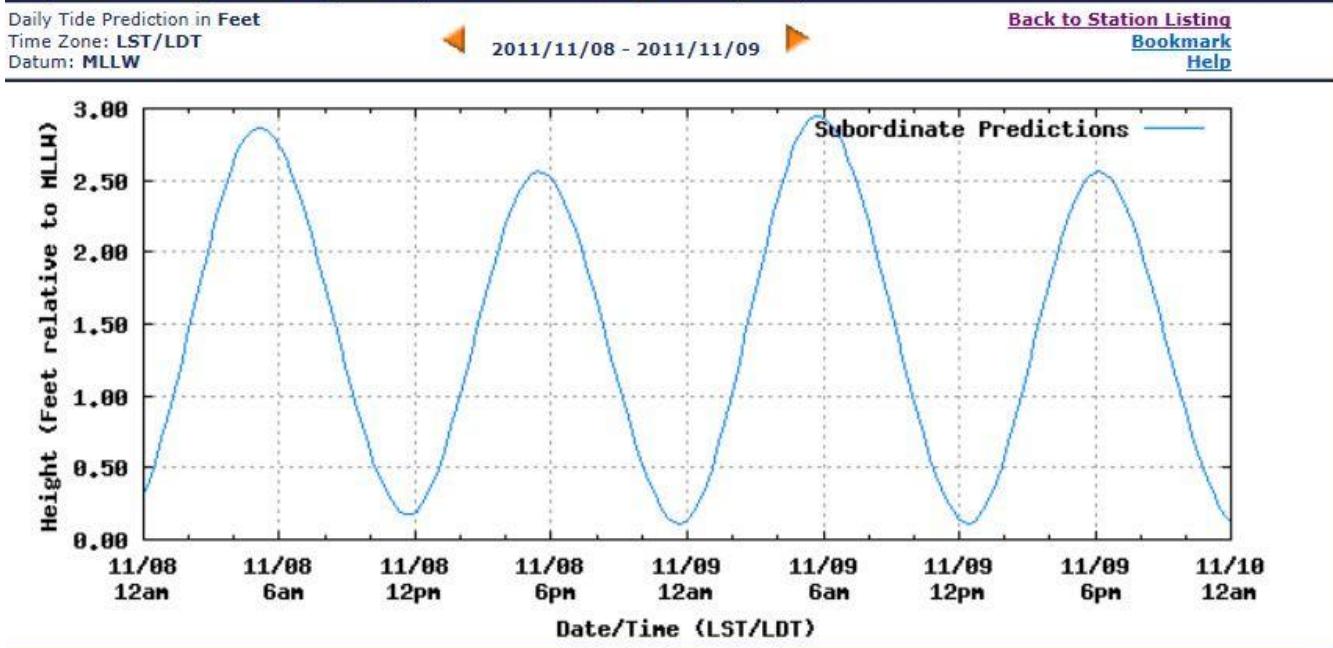
Once the survey data for Fire Island Reef was collected it was planned to recover the seabed tidal sensor and move it to the Hempstead Reef site. It was intended to use the same procedure for determining mean low water at the Hempstead Reef as was used for the Fire Island Reef survey. Unfortunately, the acoustic release for the seabed tidal sensor failed and the sensor remained on the sea floor collecting data. Being that the weather window at the time was very small it was decided to mobilize the survey vessel to the Hempstead Reef as soon as possible, and attempt to recover the tide sensor and its data at a later date. The multibeam survey was conducted at the Hempstead Reef site; however cellular phone coverage at that location was not available, negating the ability to record RTK GPS water levels. The following procedure was utilized to determine the MLW tide at Hempstead Reef; From NOAA's web site <http://tidesandcurrents.noaa.gov/>, the predicted tide option was selected to determine the time offsets from Sandy Hook (Fort Hancock Station) to the two locations closest to Fire-Island Reef and Hempstead Reef. These were "Democrat Point, Fire Island" and "Jones Inlet, Point Lookout". Figure 4.0.2-1 show plots for these two locations. It shows High Tide at Fire Island to be 39 minutes earlier than Sandy Hook, and Low Tide to be 27 minutes earlier. It shows High Tide at Jones Inlet to be 20 minutes earlier than Sandy Hook, and Low Tide to be 25 minutes earlier. From this it was decided to use the difference in these time offsets to establish the time offsets between Fire Island and Jones Inlet, which were then applied to the seafloor tide gauge data recorded at Fire-Island Reef. The time offsets used were as follows; High Tide at Hempstead Reef to be 19 minutes later than Fire-Island Reef, and Low Tide at Hempstead Reef to be 2 minutes later. These times were pro-rated through the tide cycle, as they were applied to the tide data from Fire-Island Reef. In addition to applying a time offset from Fire-Island Reef to Hempstead Reef, a Range offset was also applied. In order to determine the Range difference between the two Reef sites, it was decided to utilize NOAA's VDatum software. Figures 4.0.2-2 and 4.0.2-3 show plots of the MHW and MLW determinations at the two reefs. From this information the Range in tide at Fire-Island Reef was found to be 3.87' and the Range at Hempstead Reef was found to be 4.24'. Subsequently it was decided to use the difference in Range between Fire-Island Reef and Hempstead Reef, such that a Range multiplier offset of 1.1 was applied to the tide data recorded at Fire-Island Reef. The Time and Range offsets were applied to the NAVD88 tide data from the seafloor tide gauge at Fire-Island Reef to establish the NAVD88 tide at Hempstead Reef and then NOAA's VDatum program was used to determine mean low water (MLW) at the Site, which was determined to be 2.41' below 0' NAVD88.

Figure 4.0.2-1

Tide Prediction Plots from NOAA's Tides and Currents web site, showing Time Offsets.

Democrat Point, Fire Island Inlet, NY StationId: 8515228

Referenced to Station: SANDY HOOK (Fort Hancock) (8531680)
 Height offset in feet (low: *0.55 high: * 0.56) Time offset in mins (low: -27 high: -39)

**Jones Inlet (Point Lookout), NY StationId: 8516385**

Referenced to Station: SANDY HOOK (Fort Hancock) (8531680)
 Height offset in feet (low: *0.75 high: * 0.77) Time offset in mins (low: -25 high: -20)

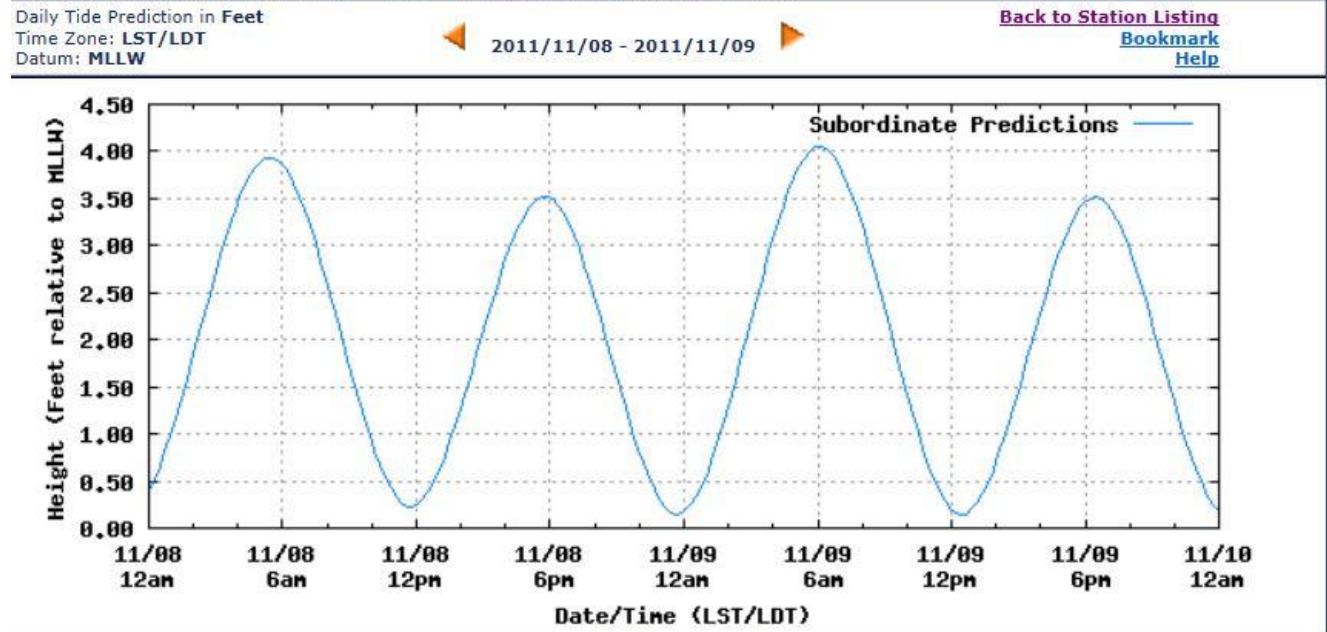


Figure 4.0.2-2
NOAA's VDatum MLW and MHW determination for Fire-Island Reef.

The figure consists of two side-by-side screenshots of the "Vertical Datums Transformation Tool 2.3.3".

Screenshot 1 (Top): Conversion from NAVD 88 to Mean Low Water (MLW)

- Datum Information:**
 - Horizontal Datum: NAD 83 (NSRS2007/CORS96/HARN), WGS84, ITRF
 - Input Vertical Datum: NAVD 88
 - Output Vertical Datum: MLW - Mean Low Water
 - Geoid: (required) [dropdown]
 - Height Units: meter (radio button selected)
 - Height/Sounding: Height (radio button selected)
- Point Conversion:**

Input	Output
Latitude: 40 35 51.81	40.597725
Longitude: 73 12 27.44	-73.207622
Height: 0	2.2331
- File Conversion:**
 - File(s) Format: With ID Key (GIS data) (checkbox checked)
 - Output File or Folder: [dropdown]
 - Save output data as in geographic coor. system (checkbox checked)
 - Convert button

Screenshot 2 (Bottom): Conversion from NAVD 88 to Mean High Water (MHW)

- Datum Information:**
 - Horizontal Datum: NAD 83 (NSRS2007/CORS96/HARN), WGS84, ITRF
 - Input Vertical Datum: NAVD 88
 - Output Vertical Datum: MHW - Mean High Water
 - Geoid: (required) [dropdown]
 - Height Units: meter (radio button selected)
 - Height/Sounding: Height (radio button selected)
- Point Conversion:**

Input	Output
Latitude: 40 35 51.81	40.597725
Longitude: 73 12 27.44	-73.207622
Height: 0	-1.6430
- File Conversion:**
 - File(s) Format: With ID Key (GIS data) (checkbox checked)
 - Output File or Folder: [dropdown]
 - Save output data as in geographic coor. system (checkbox checked)
 - Convert button

Figure 4.0.2-3
NOAA's VDatum MLW and MHW determination for Hempstead Reef.

Vertical Datums Transformation Tool 2.3.3			
Choose an Area:	New Jersey/New York/Connecticut - Northern NJ, NY Harbor, western Long Island Sound, Version 02		
Tidal Transf. Grid Folder:	C:\VDatum\NYNJ_hbr02_8301_03		
Datum Information			
Horizontal Datum:	NAD 83 (NSRS2007/CORS96/HARN), WGS84, ITRF		
Input Vertical Datum:	NAVD 88		
Output Vertical Datum:	MLW - Mean Low Water		
Geoid: (required)			
Height Units:	Height/Sounding:		
<input type="radio"/> meter	<input checked="" type="radio"/> Height		
<input checked="" type="radio"/> feet	<input type="radio"/> Sounding		
Coordinate System			
<input checked="" type="radio"/> Geographic (Latitude, Longitude)			
<input type="radio"/> UTM - Zone :	North Hemisphere		
Point Conversion			
Latitude:	40 31 8.51	Input	Output
Longitude:	73 32 25.61	Convert	40.519031
Height:	0	Reset	-73.540447
File Conversion			
File(s) Format	<input checked="" type="checkbox"/> With ID Key (GIS data) <input checked="" type="radio"/> Latitude Longitude <input type="checkbox"/> Longitude Latitude		
Input File(s):	<input type="button" value="..."/>		
Output File or Folder:	<input type="button" value="..."/>		
<input checked="" type="checkbox"/> Save output data as in geographic coor. system <input type="button" value="Convert"/>			
Vertical Datums Transformation Tool 2.3.3			
Choose an Area:	New Jersey/New York/Connecticut - Northern NJ, NY Harbor, western Long Island Sound, Version 02		
Tidal Transf. Grid Folder:	C:\VDatum\NYNJ_hbr02_8301_03		
Datum Information			
Horizontal Datum:	NAD 83 (NSRS2007/CORS96/HARN), WGS84, ITRF		
Input Vertical Datum:	NAVD 88		
Output Vertical Datum:	MHW - Mean High Water		
Geoid: (required)			
Height Units:	Height/Sounding:		
<input type="radio"/> meter	<input checked="" type="radio"/> Height		
<input checked="" type="radio"/> feet	<input type="radio"/> Sounding		
Coordinate System			
<input checked="" type="radio"/> Geographic (Latitude, Longitude)			
<input type="radio"/> UTM - Zone :	North Hemisphere		
Point Conversion			
Latitude:	40 31 8.51	Input	Output
Longitude:	73 32 25.61	Convert	40.519031
Height:	0	Reset	-73.540447
File Conversion			
File(s) Format	<input checked="" type="checkbox"/> With ID Key (GIS data) <input checked="" type="radio"/> Latitude Longitude <input type="checkbox"/> Longitude Latitude		
Input File(s):	<input type="button" value="..."/>		
Output File or Folder:	<input type="button" value="..."/>		
<input checked="" type="checkbox"/> Save output data as in geographic coor. system <input type="button" value="Convert"/>			

4.1 Cross-Track Analysis

Cross-track analysis was performed to provide a quality check on the accuracy of the multibeam data. Cross-track lines are run perpendicular to the main direction of survey lines to produce areas of overlapping data that can be analyzed and errors quantified to provide an indication of the overall quality of data.

For the Fall 2011 survey the main body of survey lines were run in a North-South direction at the HARS location, and East-West at both Reef locations, and for every ten (10) main body lines, cross-track line were run in East-West, and North-South directions respectively. This yielded a total of thirty nine (39) cross-track lines for the HARS, and two (2) cross-track lines for each of the reef locations, which were then analyzed utilizing the Beam Angle Test module within the Hypack Processing software. The Beam Angle Test compares multibeam check lines to a reference surface and estimates the depth accuracy of the multibeam data at different angle limits. The estimated accuracy can be used to determine if the multibeam data meets survey specifications. In this case the reference surface used was the final 10x10 xyz of the processed main body multibeam data. Results from this analysis are in Section 4.1.

4.2 Cross-Track Analysis Results

Tables 4.1-1 to 4.1-3 show the results from the Hypack Beam Analysis for each crossing. The analysis software generates; Max Outlier, Mean Difference, Standard Deviation and 95% Confidence for the beam angle limits specified. For the HARS location the averages for all crossings show that the 95% confidence is less than 0.8', while the mean difference for all crossings averages out to less than 0.1', the standard deviation for all crossings averages out to less than 0.4', and the maximum outlier is 17.6'. For the Fire-Island Reef location the averages for all crossings show that the 95% confidence is less than 0.6', while the mean difference for all crossings averages out to less than 0.24', the standard deviation for all crossings averages out to less than 0.31', and the maximum outlier is 1.6'. For the Hempstead Reef location the averages for all crossings show that the 95% confidence is less than 0.41', while the mean difference for all crossings averages out to less than 0.08', the standard deviation for all crossings averages out to less than 0.21', and the maximum outlier is 3.5'. Figures 4.1-1 to 4.1-3 show screen captures of the summary plots for the errors at +/- 20 deg. for each crossing.

Table 4.1-1
Summary of Beam Analysis Results for all crossings during HARS Fall 2011 survey

Crossing	Beam Angle	Max. Outlier	Mean Diff.	Std Dev.	95%	Crossing	Beam Angle	Max. Outlier	Mean Diff.	Std Dev.	95%	Crossing	Beam Angle	Max. Outlier	Mean Diff.	Std Dev.	95%
0805_1828	+/-20	2.30	0.35	0.36	0.70	0805_2037	+/-20	1.64	0.03	0.19	0.38	0810_1425	+/-20	2.49	0.00	0.24	0.47
	+/-25	2.23	0.32	0.32	0.62		+/-25	1.51	0.07	0.22	0.43		+/-25	2.07	0.02	0.23	0.46
	+/-30	3.02	0.30	0.29	0.57		+/-30	1.50	0.09	0.22	0.43		+/-30	2.10	0.03	0.24	0.47
	+/-35	3.18	0.37	0.33	0.65		+/-35	1.28	0.06	0.21	0.41		+/-35	1.80	0.03	0.25	0.49
	+/-40	2.27	0.32	0.32	0.63		+/-40	1.31	0.05	0.21	0.42		+/-40	1.64	0.07	0.24	0.47
	+/-45	2.30	0.29	0.33	0.65		+/-45	1.64	0.03	0.22	0.43		+/-45	1.84	0.07	0.24	0.47
	+/-50	1.81	0.31	0.34	0.66		+/-50	1.81	0.01	0.24	0.48		+/-50	2.40	0.12	0.25	0.48
	+/-55	2.96	0.30	0.35	0.69		+/-55	1.91	0.02	0.24	0.47		+/-55	2.43	0.20	0.27	0.52
	+/-60	2.36	0.33	0.38	0.75		+/-60	1.96	0.04	0.25	0.49		+/-60	2.89	0.29	0.31	0.60
0810_1717	+/-20	1.21	0.08	0.20	0.39	0810_1856	+/-20	1.74	0.02	0.18	0.36	0811_1500	+/-20	4.14	0.19	0.43	0.84
	+/-25	1.34	0.07	0.18	0.36		+/-25	1.51	0.01	0.19	0.37		+/-25	3.84	0.18	0.37	0.73
	+/-30	1.51	0.09	0.19	0.38		+/-30	1.64	0.02	0.18	0.35		+/-30	5.70	0.18	0.40	0.78
	+/-35	1.25	0.06	0.20	0.39		+/-35	2.04	0.03	0.19	0.37		+/-35	4.49	0.21	0.44	0.86
	+/-40	1.34	0.05	0.19	0.37		+/-40	1.38	0.02	0.18	0.35		+/-40	3.25	0.20	0.37	0.73
	+/-45	1.64	0.02	0.20	0.39		+/-45	1.74	0.04	0.19	0.37		+/-45	5.31	0.18	0.39	0.76
	+/-50	1.84	0.00	0.20	0.40		+/-50	1.77	0.03	0.19	0.37		+/-50	6.10	0.19	0.40	0.78
	+/-55	1.81	-0.02	0.21	0.42		+/-55	1.80	0.03	0.20	0.40		+/-55	10.67	0.18	0.43	0.85
	+/-60	2.03	-0.02	0.22	0.44		+/-60	2.20	0.03	0.21	0.40		+/-60	17.59	0.29	0.47	0.92
0811_1810	+/-20	4.49	0.00	0.42	0.81	0811_2112	+/-20	3.15	0.04	0.26	0.51	0811_2154	+/-20	1.21	0.08	0.24	0.47
	+/-25	4.52	0.02	0.38	0.74		+/-25	3.41	0.04	0.22	0.44		+/-25	1.19	0.08	0.25	0.49
	+/-30	4.39	0.03	0.34	0.67		+/-30	1.97	0.05	0.21	0.41		+/-30	1.28	0.09	0.26	0.51
	+/-35	4.43	0.06	0.37	0.73		+/-35	2.00	0.04	0.22	0.43		+/-35	1.54	0.08	0.26	0.52
	+/-40	3.87	0.01	0.36	0.71		+/-40	2.43	0.03	0.23	0.44		+/-40	1.67	0.08	0.28	0.55
	+/-45	3.78	0.01	0.35	0.68		+/-45	2.30	0.00	0.24	0.46		+/-45	1.51	0.03	0.28	0.54
	+/-50	4.01	-0.02	0.37	0.73		+/-50	2.10	-0.03	0.26	0.50		+/-50	1.41	0.01	0.26	0.51
	+/-55	4.66	-0.01	0.38	0.75		+/-55	2.30	-0.07	0.26	0.51		+/-55	1.35	-0.03	0.27	0.52
	+/-60	5.38	0.04	0.46	0.91		+/-60	2.00	-0.12	0.28	0.54		+/-60	1.68	-0.06	0.28	0.55

0812_1613	+/-20	1.54	0.11	0.21	0.40	0812_1912	+/-20	1.61	0.01	0.19	0.38	0816_1510	+/-20	5.15	-0.03	0.64	1.25
	+/-25	1.47	0.10	0.22	0.42		+/-25	1.57	-0.01	0.18	0.36		+/-25	4.92	0.03	0.60	1.18
	+/-30	1.84	0.11	0.21	0.41		+/-30	2.00	-0.02	0.18	0.36		+/-30	4.85	0.00	0.61	1.19
	+/-35	1.94	0.11	0.20	0.39		+/-35	1.74	0.00	0.17	0.34		+/-35	5.84	0.03	0.59	1.15
	+/-40	1.51	0.10	0.20	0.39		+/-40	1.54	-0.02	0.17	0.34		+/-40	5.25	-0.01	0.59	1.16
	+/-45	1.54	0.09	0.21	0.41		+/-45	1.48	-0.02	0.19	0.37		+/-45	5.06	-0.01	0.63	1.24
	+/-50	1.81	0.07	0.21	0.42		+/-50	1.71	-0.03	0.18	0.35		+/-50	5.31	0.00	0.64	1.26
	+/-55	2.03	0.07	0.25	0.49		+/-55	1.90	-0.05	0.20	0.40		+/-55	6.93	0.02	0.69	1.35
	+/-60	4.89	0.07	0.29	0.57		+/-60	2.17	-0.04	0.21	0.41		+/-60	7.54	0.08	0.75	1.48

0816_1813	+/-20	3.67	0.08	0.34	0.66	0816_2123	+/-20	2.99	0.00	0.34	0.67	0816_2204	+/-20	1.67	-0.08	0.21	0.40
	+/-25	4.13	0.08	0.32	0.63		+/-25	2.95	-0.04	0.31	0.60		+/-25	1.64	-0.05	0.23	0.45
	+/-30	4.10	0.09	0.38	0.75		+/-30	3.74	-0.03	0.30	0.58		+/-30	1.91	-0.11	0.27	0.53
	+/-35	4.04	0.12	0.37	0.72		+/-35	3.81	-0.04	0.34	0.67		+/-35	3.05	-0.03	0.33	0.65
	+/-40	3.05	0.13	0.33	0.64		+/-40	2.89	-0.04	0.28	0.54		+/-40	3.91	-0.07	0.40	0.79
	+/-45	2.62	0.11	0.30	0.58		+/-45	2.66	-0.04	0.25	0.49		+/-45	3.81	-0.11	0.56	1.10
	+/-50	2.53	0.09	0.39	0.77		+/-50	2.82	-0.05	0.26	0.51		+/-50	3.84	-0.04	0.52	1.01
	+/-55	3.08	0.16	0.38	0.75		+/-55	3.55	-0.07	0.30	0.59		+/-55	3.61	-0.03	0.50	0.97
	+/-60	2.85	0.19	0.45	0.89		+/-60	2.26	-0.06	0.29	0.56		+/-60	3.81	0.05	0.68	1.33

0817_1619	+/-20	3.09	-0.02	0.56	1.10	0817_1822	+/-20	4.47	0.06	0.65	1.26	0817_2053	+/-20	3.84	0.09	0.28	0.54
	+/-25	4.53	0.00	0.55	1.08		+/-25	4.93	0.02	0.61	1.20		+/-25	3.51	0.08	0.32	0.63
	+/-30	4.95	0.03	0.56	1.10		+/-30	4.33	0.05	0.59	1.15		+/-30	3.84	0.05	0.36	0.70
	+/-35	4.00	-0.03	0.54	1.07		+/-35	5.12	0.06	0.62	1.21		+/-35	3.64	0.09	0.43	0.85
	+/-40	4.23	0.03	0.56	1.09		+/-40	5.38	0.03	0.63	1.24		+/-40	5.45	0.10	0.50	0.98
	+/-45	3.87	-0.02	0.55	1.08		+/-45	5.05	0.07	0.57	1.11		+/-45	5.12	0.07	0.47	0.92
	+/-50	3.48	0.08	0.52	1.01		+/-50	4.43	0.08	0.54	1.07		+/-50	3.88	0.03	0.36	0.70
	+/-55	3.97	0.18	0.57	1.12		+/-55	4.00	0.09	0.59	1.15		+/-55	2.33	-0.01	0.38	0.74
	+/-60	5.06	0.26	0.64	1.25		+/-60	4.33	0.13	0.60	1.18		+/-60	2.16	0.00	0.41	0.80

0818_1502	+/-20	1.81	-0.03	0.22	0.44	0818_1803	+/-20	4.00	0.01	0.62	1.22	0818_2034	+/-20	0.99	-0.11	0.45	0.87
	+/-25	1.84	-0.05	0.24	0.47		+/-25	5.97	0.02	0.65	1.27		+/-25	1.09	-0.38	0.40	0.78
	+/-30	2.04	-0.06	0.24	0.46		+/-30	6.49	-0.01	0.60	1.18		+/-30	0.86	-0.11	0.38	0.75
	+/-35	1.78	-0.05	0.24	0.48		+/-35	5.71	-0.01	0.61	1.20		+/-35	0.86	0.00	0.43	0.84
	+/-40	2.30	-0.07	0.24	0.47		+/-40	6.30	-0.04	0.59	1.15		+/-40	0.96	-0.25	0.44	0.86
	+/-45	2.36	-0.12	0.23	0.46		+/-45	5.41	-0.04	0.55	1.08		+/-45	1.34	-0.26	0.53	1.03
	+/-50	1.51	-0.15	0.23	0.45		+/-50	4.62	-0.05	0.59	1.16		+/-50	1.81	-0.22	0.42	0.83
	+/-55	1.70	-0.18	0.25	0.49		+/-55	5.15	-0.04	0.63	1.24		+/-55	0.88	-0.06	0.33	0.65
	+/-60	3.74	-0.19	0.29	0.57		+/-60	4.43	0.02	0.64	1.25		+/-60	0.95	-0.19	0.39	0.76

0819_1446	+/-20	6.62	-0.01	0.61	1.19	0819_1803	+/-20	1.02	0.03	0.20	0.39	0819_2036	+/-20	0.99	0.08	0.19	0.38
	+/-25	6.56	-0.06	0.52	1.02		+/-25	1.02	0.02	0.19	0.37		+/-25	1.01	0.09	0.18	0.36
	+/-30	6.43	-0.03	0.58	1.14		+/-30	1.15	0.02	0.19	0.37		+/-30	0.98	0.08	0.19	0.37
	+/-35	5.35	-0.02	0.55	1.08		+/-35	1.15	0.03	0.21	0.42		+/-35	1.31	0.08	0.19	0.37
	+/-40	5.91	-0.10	0.42	0.83		+/-40	1.05	0.04	0.19	0.37		+/-40	0.95	0.07	0.18	0.35
	+/-45	6.33	-0.10	0.57	1.11		+/-45	1.24	0.05	0.20	0.38		+/-45	0.86	0.07	0.17	0.34
	+/-50	7.35	-0.06	0.65	1.28		+/-50	1.38	0.07	0.21	0.41		+/-50	0.98	0.04	0.19	0.37
	+/-55	5.41	-0.18	0.55	1.08		+/-55	1.44	0.10	0.25	0.48		+/-55	0.86	0.05	0.20	0.40
	+/-60	4.66	-0.31	0.55	1.08		+/-60	1.57	0.20	0.28	0.54		+/-60	0.92	0.06	0.24	0.47

0823_1436	+/-20	6.96	0.00	0.72	1.41	0823_1749	+/-20	4.95	0.04	0.56	1.10	0823_2100	+/-20	2.69	-0.11	0.36	0.70
	+/-25	6.99	-0.02	0.70	1.37		+/-25	5.18	0.02	0.69	1.35		+/-25	2.82	-0.10	0.37	0.72
	+/-30	7.71	0.04	0.70	1.37		+/-30	4.93	-0.02	0.61	1.19		+/-30	2.92	-0.14	0.37	0.73
	+/-35	7.12	0.07	0.68	1.33		+/-35	5.44	0.03	0.58	1.13		+/-35	3.15	-0.16	0.36	0.71
	+/-40	6.43	0.04	0.75	1.48		+/-40	5.45	0.02	0.61	1.20		+/-40	5.42	-0.17	0.42	0.83
	+/-45	6.73	-0.02	0.66	1.28		+/-45	6.53	-0.03	0.62	1.21		+/-45	4.50	-0.16	0.45	0.88
	+/-50	6.79	-0.05	0.70	1.37		+/-50	6.17	0.01	0.63	1.24		+/-50	3.09	-0.19	0.44	0.86
	+/-55	6.69	-0.06	0.72	1.42		+/-55	6.27	0.01	0.69	1.35		+/-55	3.32	-0.25	0.52	1.02
	+/-60	7.15	-0.06	0.78	1.53		+/-60	6.95	-0.05	0.82	1.60		+/-60	2.86	-0.27	0.53	1.04

0824_1328	+/-20	1.44	0.03	0.19	0.36	0824_1655	+/-20	4.69	0.02	0.29	0.56	0824_1736	+/-20	1.15	0.13	0.22	0.43
	+/-25	1.44	0.03	0.19	0.36		+/-25	4.43	0.03	0.30	0.59		+/-25	1.05	0.07	0.18	0.36
	+/-30	1.25	0.01	0.18	0.36		+/-30	6.03	0.01	0.30	0.58		+/-30	0.98	0.11	0.20	0.39
	+/-35	0.98	0.01	0.18	0.35		+/-35	5.48	0.03	0.29	0.58		+/-35	1.08	0.08	0.23	0.44
	+/-40	0.96	-0.01	0.17	0.33		+/-40	5.09	0.02	0.33	0.64		+/-40	1.18	0.07	0.20	0.39
	+/-45	0.79	-0.03	0.17	0.33		+/-45	4.53	0.00	0.29	0.58		+/-45	1.14	0.07	0.18	0.36
	+/-50	0.95	-0.06	0.18	0.36		+/-50	4.79	0.02	0.33	0.65		+/-50	1.32	0.04	0.25	0.50
	+/-55	1.48	-0.10	0.20	0.40		+/-55	5.15	0.04	0.36	0.70		+/-55	1.15	0.08	0.29	0.57
	+/-60	1.55	-0.14	0.22	0.43		+/-60	6.89	0.05	0.39	0.76		+/-60	1.21	0.09	0.31	0.60

0912_1540	+/-20	1.57	-0.02	0.23	0.45	0912_1909	+/-20	1.31	0.03	0.24	0.47	0912_2039	+/-20	2.00	0.06	0.25	0.49
	+/-25	1.57	-0.04	0.24	0.46		+/-25	1.48	0.02	0.25	0.48		+/-25	1.61	0.04	0.27	0.52
	+/-30	1.70	-0.03	0.22	0.42		+/-30	1.38	0.02	0.25	0.50		+/-30	2.17	0.06	0.28	0.54
	+/-35	1.31	-0.04	0.21	0.40		+/-35	1.80	-0.03	0.23	0.46		+/-35	1.74	0.06	0.28	0.54
	+/-40	1.57	-0.04	0.20	0.40		+/-40	2.40	-0.05	0.23	0.45		+/-40	1.94	0.03	0.23	0.45
	+/-45	1.51	-0.03	0.20	0.38		+/-45	1.57	-0.11	0.26	0.51		+/-45	2.07	0.02	0.24	0.47
	+/-50	1.74	-0.02	0.20	0.40		+/-50	3.38	-0.17	0.29	0.56		+/-50	2.04	-0.01	0.26	0.51
	+/-55	1.96	-0.01	0.25	0.49		+/-55	2.76	-0.27	0.35	0.69		+/-55	2.95	-0.02	0.26	0.52
	+/-60	1.77	-0.01	0.29	0.57		+/-60	2.79	-0.41	0.41	0.80		+/-60	2.10	-0.05	0.27	0.54

0913_1749	+/-20	1.83	0.04	0.23	0.45	0913_1847	+/-20	1.28	0.12	0.24	0.48	0914_1501	+/-20	1.38	0.00	0.25	0.50
	+/-25	1.83	0.01	0.22	0.44		+/-25	1.42	0.12	0.25	0.48		+/-25	2.00	-0.03	0.27	0.53
	+/-30	1.38	0.00	0.21	0.41		+/-30	1.25	0.10	0.22	0.44		+/-30	1.54	-0.01	0.28	0.56
	+/-35	1.77	-0.02	0.21	0.41		+/-35	1.57	0.04	0.21	0.41		+/-35	1.21	-0.01	0.29	0.56
	+/-40	1.41	-0.07	0.20	0.39		+/-40	1.41	0.02	0.21	0.42		+/-40	1.35	-0.04	0.30	0.60
	+/-45	1.48	-0.12	0.22	0.43		+/-45	1.38	-0.01	0.21	0.41		+/-45	1.64	-0.08	0.32	0.63
	+/-50	1.61	-0.17	0.23	0.45		+/-50	0.96	-0.06	0.23	0.46		+/-50	1.74	-0.10	0.33	0.65
	+/-55	1.80	-0.28	0.23	0.45		+/-55	2.04	-0.13	0.24	0.48		+/-55	2.17	-0.15	0.40	0.78
	+/-60	2.43	-0.33	0.26	0.51		+/-60	2.17	-0.17	0.26	0.51		+/-60	2.10	-0.18	0.47	0.91

0914_1813	+/-20	2.07	0.19	0.29	0.56	0914_1932	+/-20	1.05	-0.05	0.25	0.49	0921_1450	+/-20	1.38	0.08	0.23	0.44
	+/-25	1.74	0.19	0.32	0.62		+/-25	1.18	-0.05	0.24	0.47		+/-25	1.70	0.08	0.26	0.50
	+/-30	2.23	0.18	0.34	0.66		+/-30	1.28	-0.08	0.27	0.53		+/-30	2.07	0.07	0.25	0.50
	+/-35	2.03	0.21	0.33	0.65		+/-35	1.32	-0.10	0.26	0.51		+/-35	1.83	0.05	0.27	0.54
	+/-40	1.80	0.21	0.34	0.67		+/-40	1.08	-0.09	0.29	0.57		+/-40	2.19	0.05	0.30	0.59
	+/-45	2.69	0.21	0.39	0.76		+/-45	2.00	-0.11	0.30	0.58		+/-45	2.85	0.06	0.34	0.67
	+/-50	3.35	0.15	0.41	0.80		+/-50	1.83	-0.13	0.37	0.72		+/-50	2.98	0.04	0.37	0.72
	+/-55	2.86	0.09	0.43	0.85		+/-55	1.91	-0.02	0.45	0.88		+/-55	3.38	0.05	0.44	0.87
	+/-60	3.80	0.13	0.53	1.04		+/-60	2.75	0.17	0.56	1.10		+/-60	4.79	0.09	0.51	1.01

Summary of averages for all crossings HARS Fall 2011 survey.

Beam	Max.	Mean	Std	95%
Angle	Outlier	Diff.	Dev.	
+/-20	6.96	0.05	0.26	0.50
+/-25	6.99	0.04	0.27	0.52
+/-30	7.71	0.03	0.27	0.52
+/-35	7.12	0.02	0.26	0.52
+/-40	6.43	0.00	0.27	0.52
+/-45	6.73	-0.02	0.28	0.55
+/-50	7.35	-0.05	0.31	0.60
+/-55	10.67	-0.07	0.34	0.68
+/-60	17.59	-0.07	0.40	0.78

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Table 4.1-2

Summary of Beam Analysis Results for all crossings during Fire Island Reef Fall 2011 survey

Crossing	Beam Angle	Max. Outlier	Mean Diff.	Std Dev.	95%	Crossing	Beam Angle	Max. Outlier	Mean Diff.	Std Dev.	95%
1107_1929	+/-20	1.28	0.22	0.25	0.50	1107_2123	+/-20	1.08	0.23	0.19	0.38
	+/-25	1.41	0.25	0.26	0.50		+/-25	1.08	0.23	0.19	0.38
	+/-30	1.25	0.21	0.25	0.49		+/-30	1.08	0.23	0.20	0.38
	+/-35	1.15	0.18	0.23	0.45		+/-35	1.22	0.20	0.18	0.36
	+/-40	1.11	0.16	0.22	0.44		+/-40	1.08	0.18	0.21	0.41
	+/-45	1.15	0.14	0.24	0.47		+/-45	1.34	0.18	0.22	0.43
	+/-50	1.35	0.12	0.26	0.50		+/-50	1.31	0.15	0.24	0.47
	+/-55	1.38	0.09	0.28	0.56		+/-55	1.28	0.11	0.26	0.51
	+/-60	1.64	0.11	0.31	0.60		+/-60	1.57	0.10	0.30	0.58

Summary of averages for all crossings Fire Island Reef Fall 2011 survey

Beam Angle	Max. Outlier	Mean Diff.	Std Dev.	95%
+/-20	1.28	0.23	0.22	0.44
+/-25	1.41	0.24	0.23	0.44
+/-30	1.25	0.22	0.23	0.44
+/-35	1.22	0.19	0.21	0.41
+/-40	1.11	0.17	0.22	0.43
+/-45	1.34	0.16	0.23	0.45
+/-50	1.35	0.14	0.25	0.49
+/-55	1.38	0.10	0.27	0.54
+/-60	1.64	0.11	0.31	0.59

Table 4.1-3

Summary of Beam Analysis Results for all crossings during Hempstead Reef Fall 2011 survey

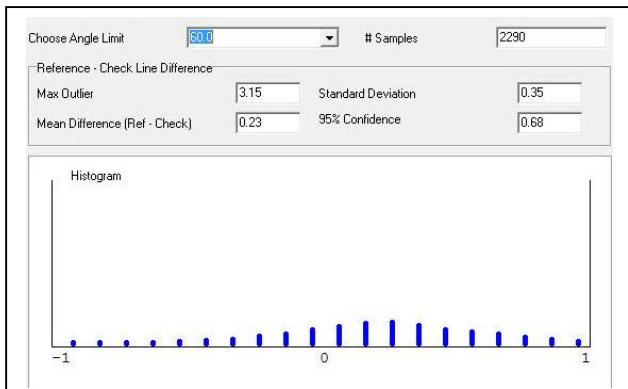
Crossing	Beam Angle	Max. Outlier	Mean Diff.	Std Dev.	95%	Crossing	Beam Angle	Max. Outlier	Mean Diff.	Std Dev.	95%
1108_1840	+/-20	0.79	-0.08	0.16	0.31	1108_2215	+/-20	0.88	0.01	0.16	0.31
	+/-25	1.25	-0.09	0.17	0.33		+/-25	0.85	0.00	0.15	0.30
	+/-30	1.11	-0.10	0.16	0.32		+/-30	0.95	0.00	0.15	0.29
	+/-35	0.98	-0.12	0.15	0.28		+/-35	1.05	0.00	0.15	0.30
	+/-40	0.95	-0.14	0.15	0.29		+/-40	1.44	0.01	0.15	0.30
	+/-45	0.96	-0.16	0.15	0.29		+/-45	2.69	0.04	0.18	0.36
	+/-50	1.25	-0.19	0.16	0.31		+/-50	3.51	0.04	0.26	0.50
	+/-55	1.21	-0.23	0.17	0.33		+/-55	2.69	0.08	0.25	0.49
	+/-60	1.18	-0.26	0.17	0.34		+/-60	2.69	0.16	0.24	0.47

Summary of averages for all crossings Hempstead Reef Fall 2011 survey

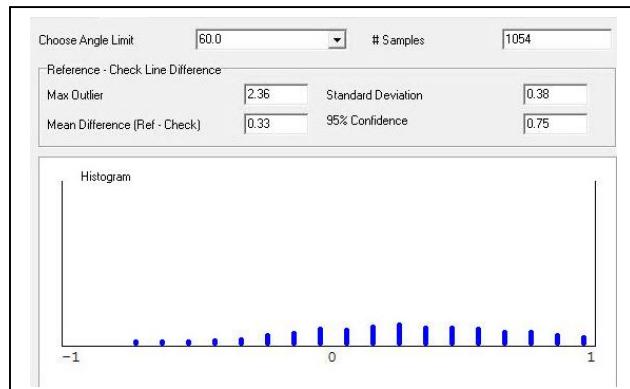
Beam Angle	Max. Outlier	Mean Diff.	Std Dev.	95%
+/-20	0.88	-0.04	0.16	0.31
+/-25	1.25	-0.05	0.16	0.32
+/-30	1.11	-0.05	0.16	0.31
+/-35	1.05	-0.06	0.15	0.29
+/-40	1.44	-0.07	0.15	0.30
+/-45	2.69	-0.06	0.17	0.33
+/-50	3.51	-0.08	0.21	0.41
+/-55	2.69	-0.08	0.21	0.41
+/-60	2.69	-0.05	0.21	0.41

Figure 4.1-1

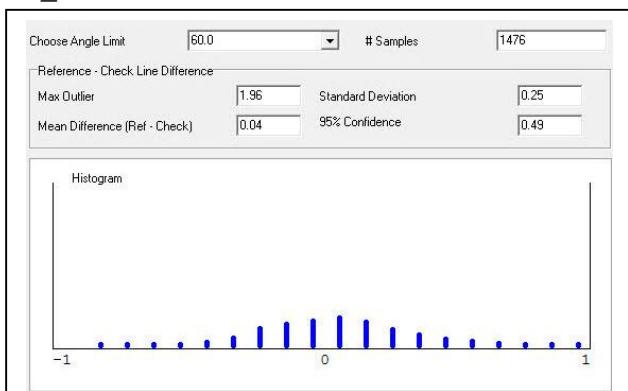
Plots of +/- 20 Deg. Beam Analysis Results for crossings 08/05 to 9/21 during HARS Fall 2011 survey.



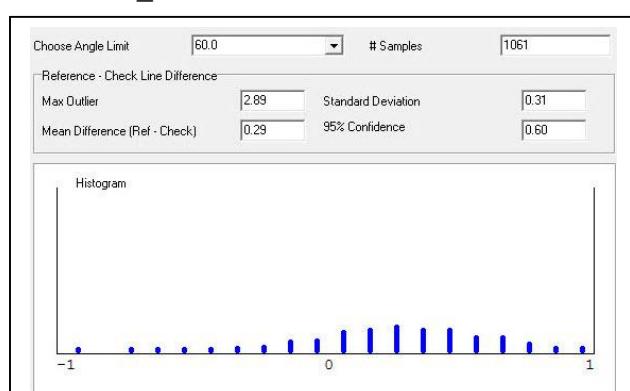
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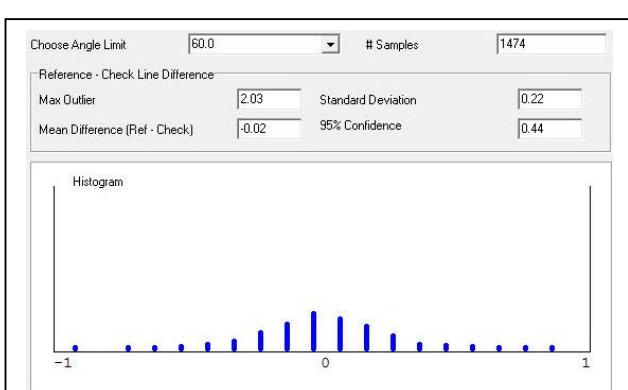
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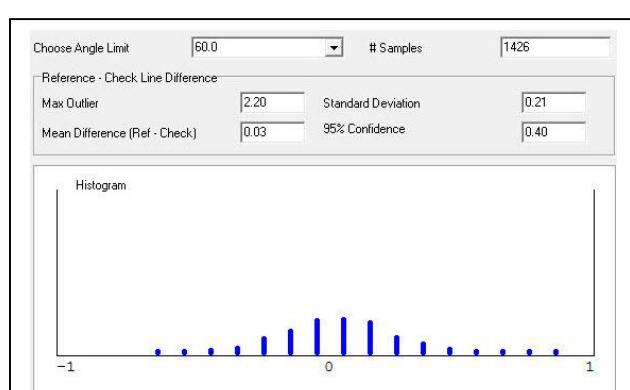
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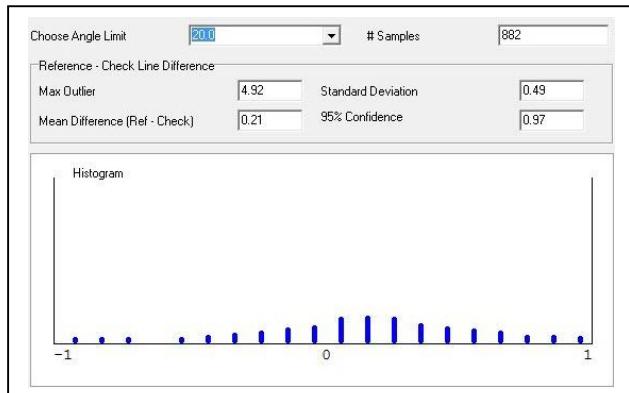
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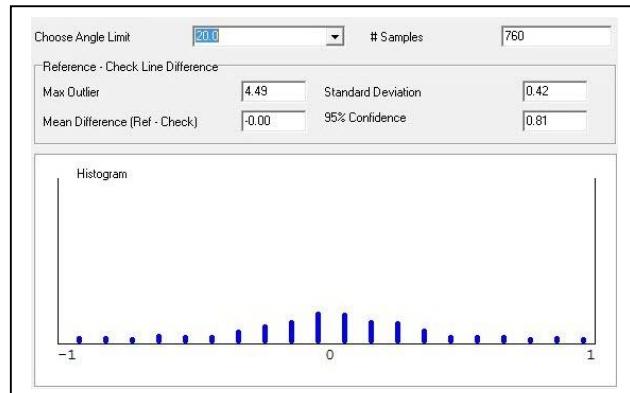
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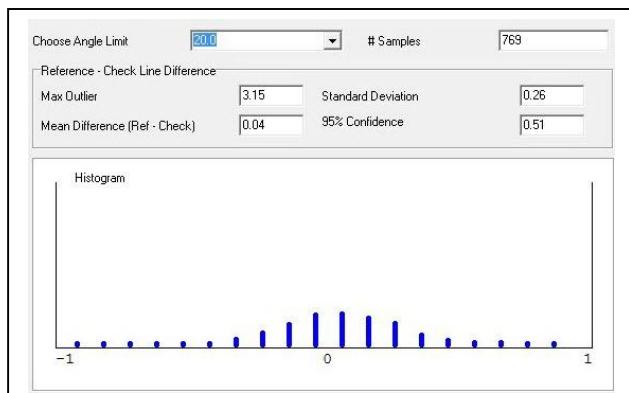
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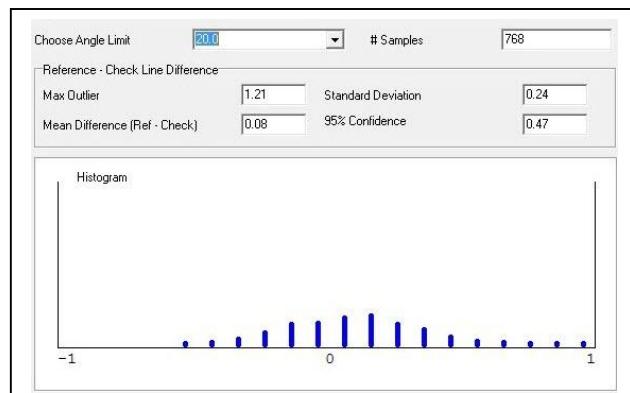
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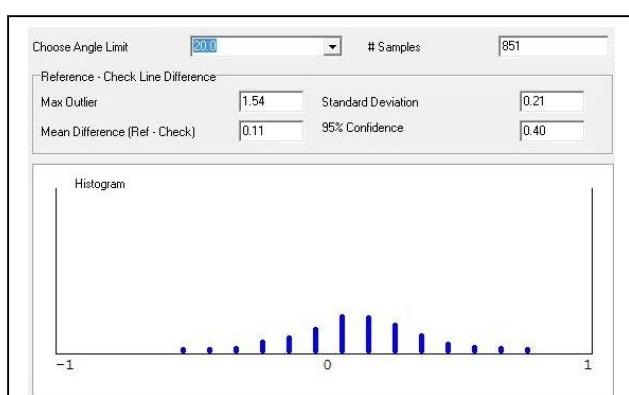
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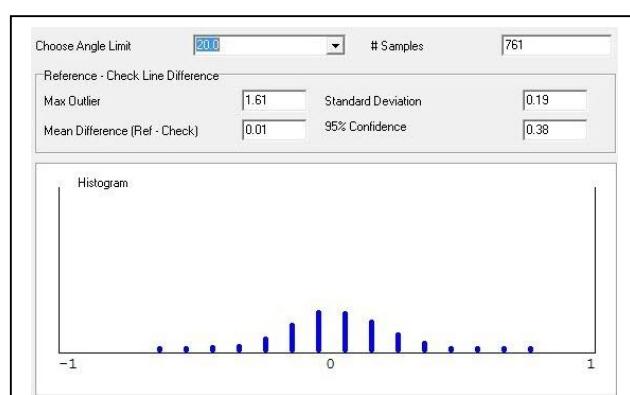
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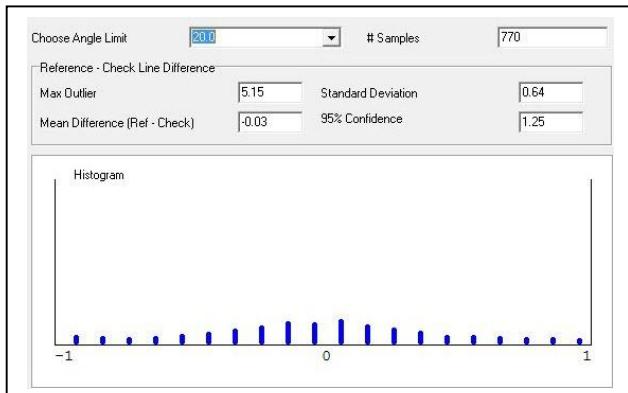
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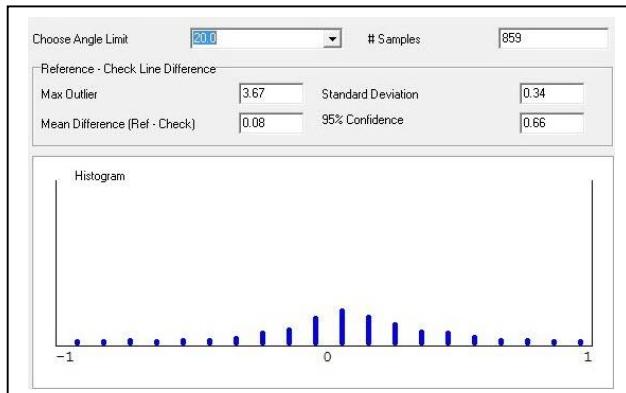
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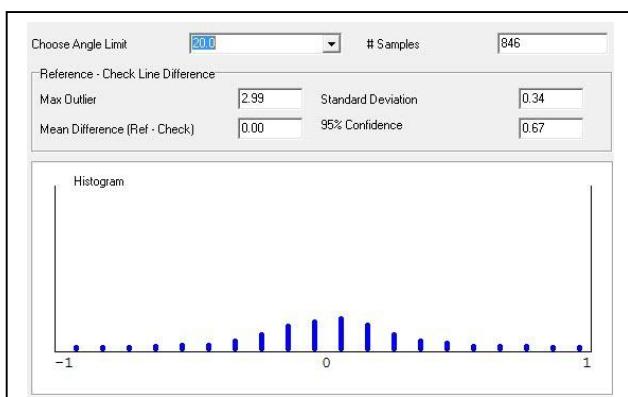
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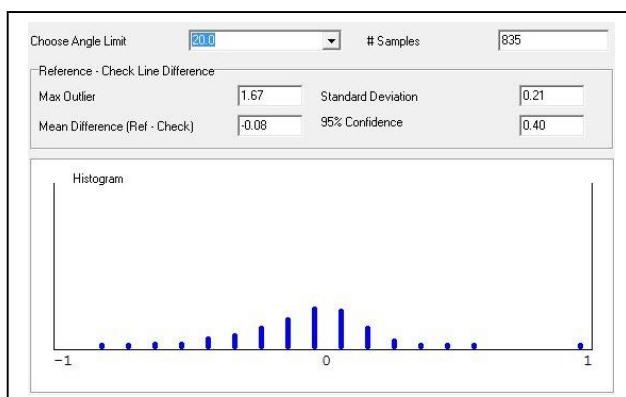
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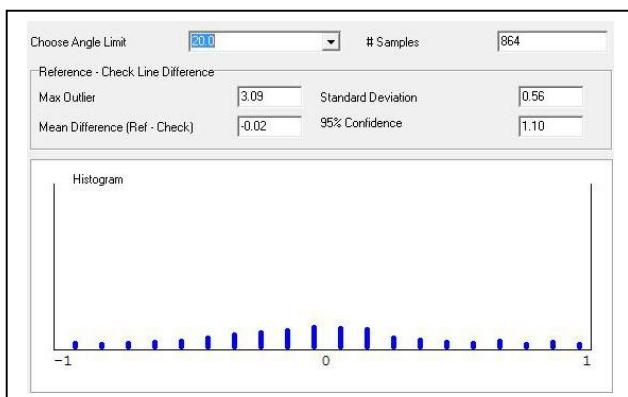
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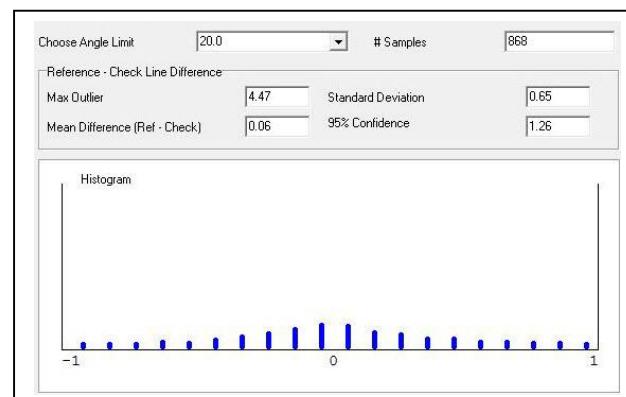
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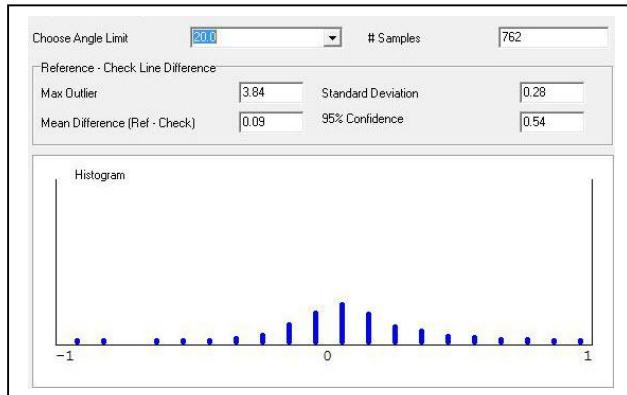
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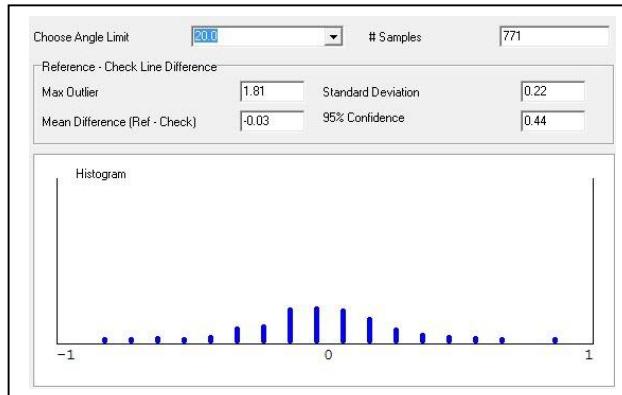
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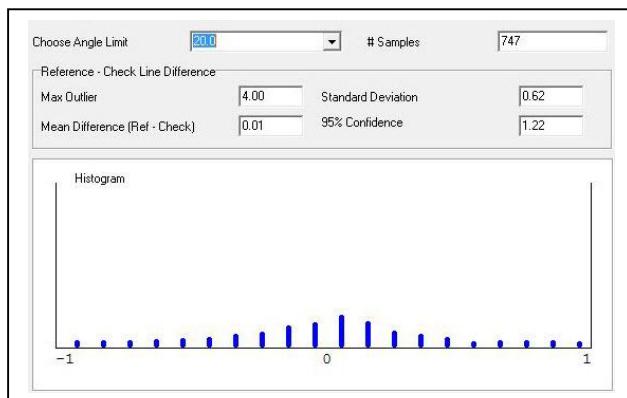
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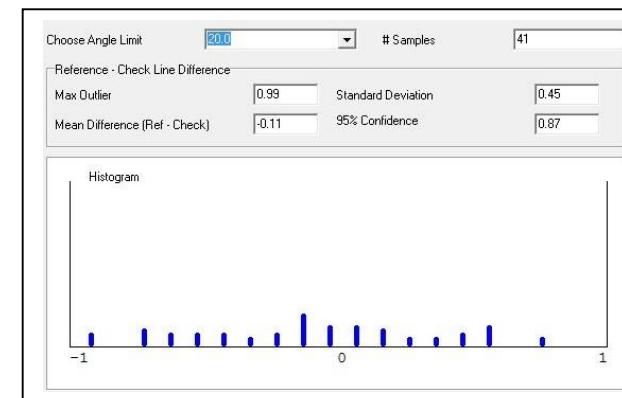
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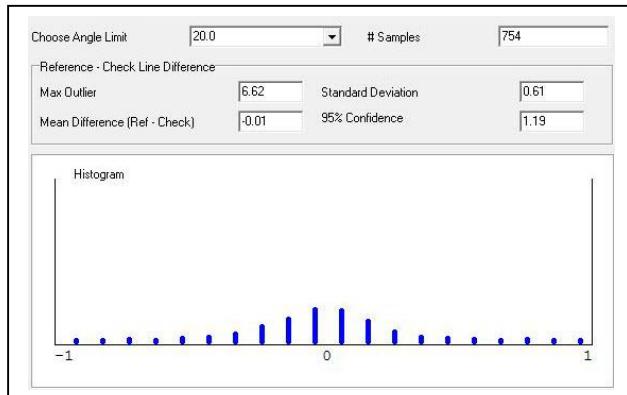
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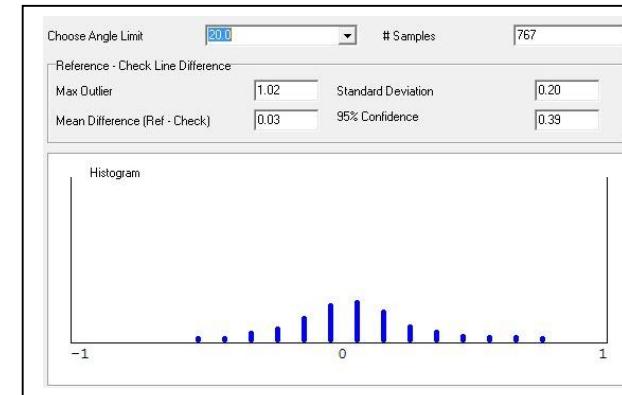
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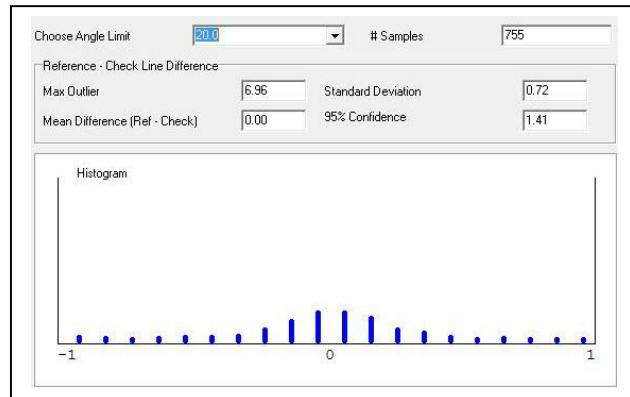
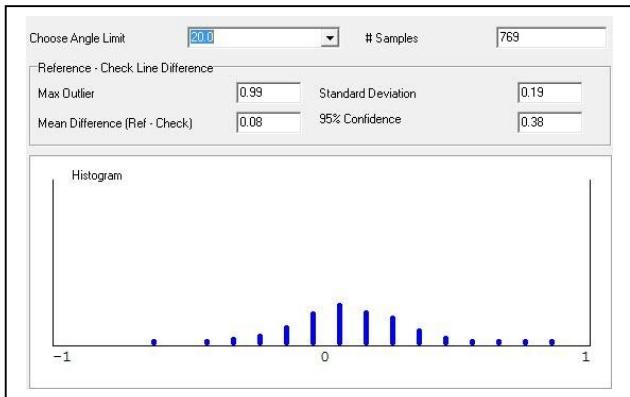
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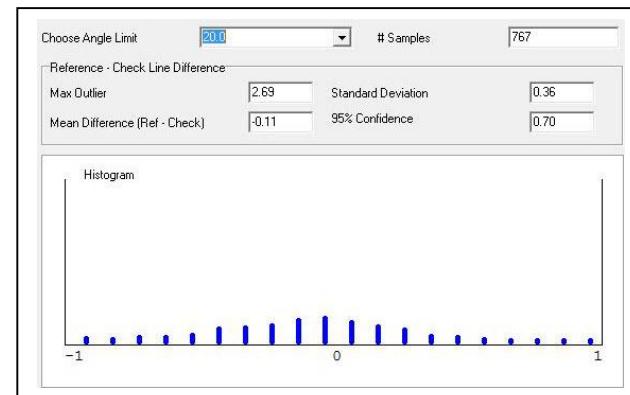
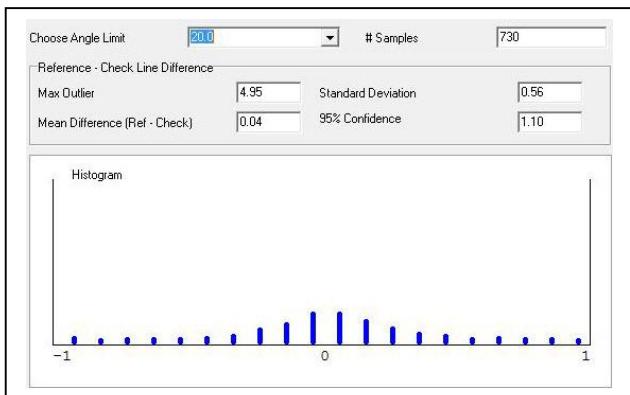


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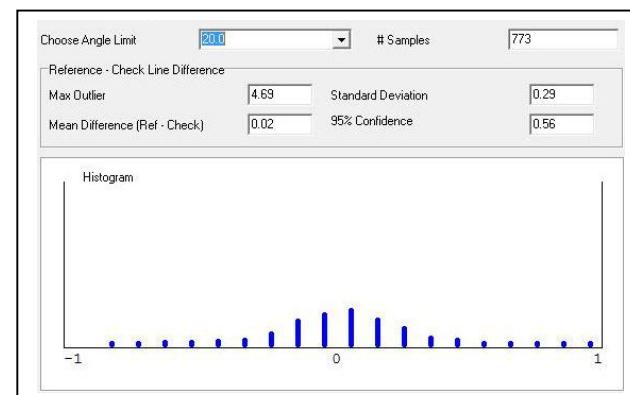
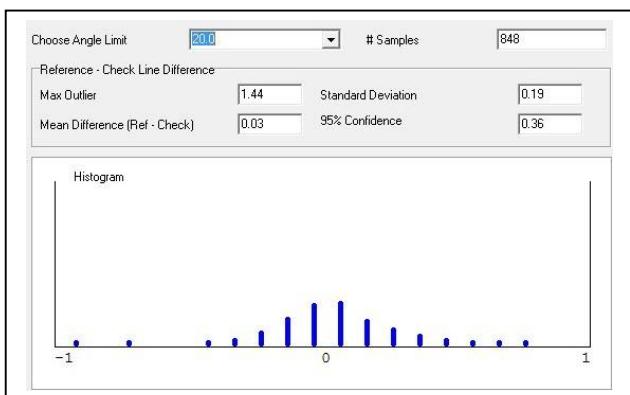
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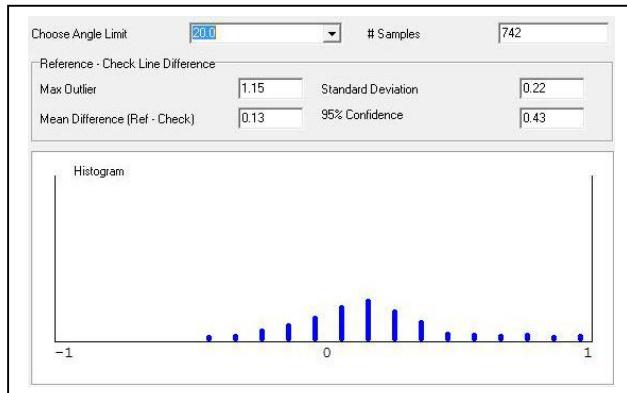
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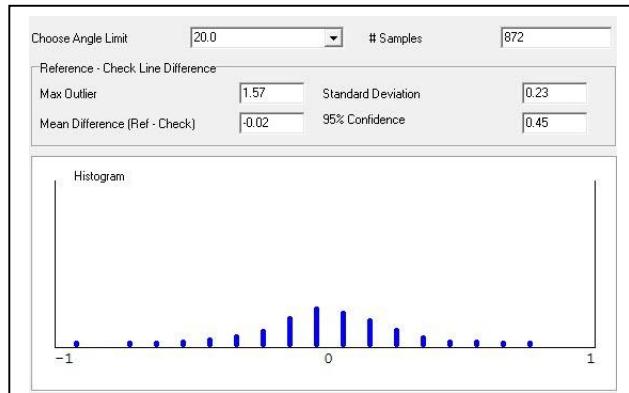


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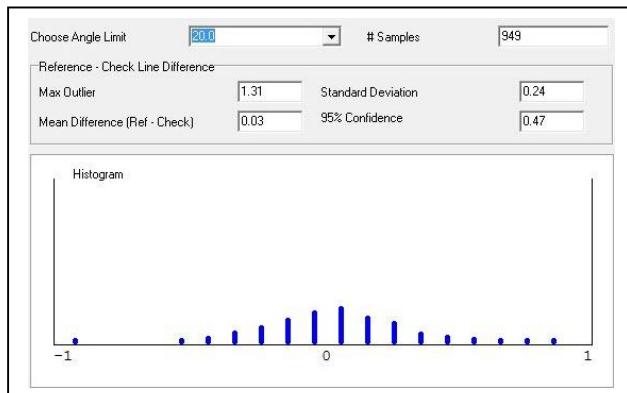
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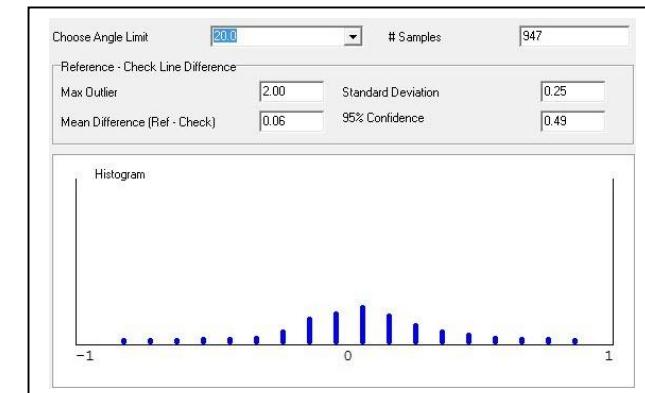
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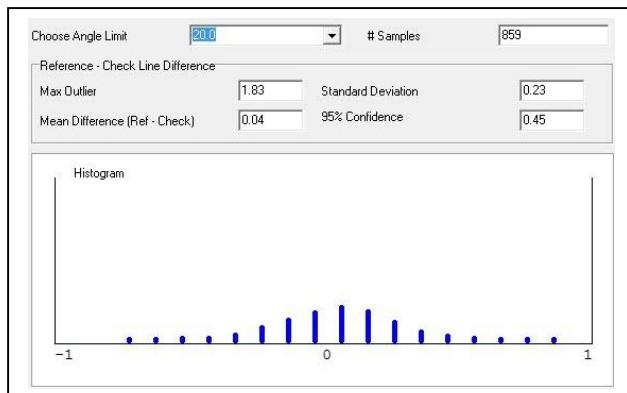
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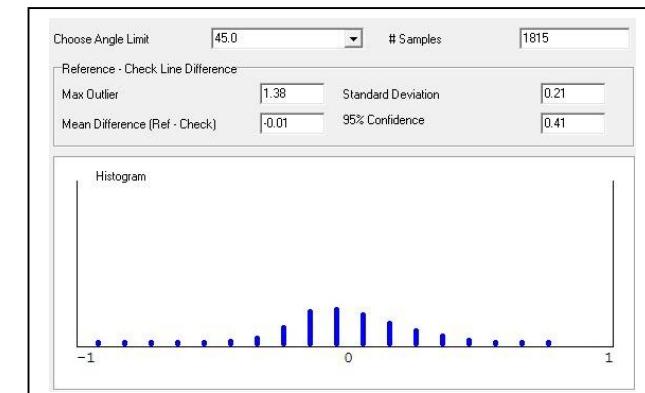
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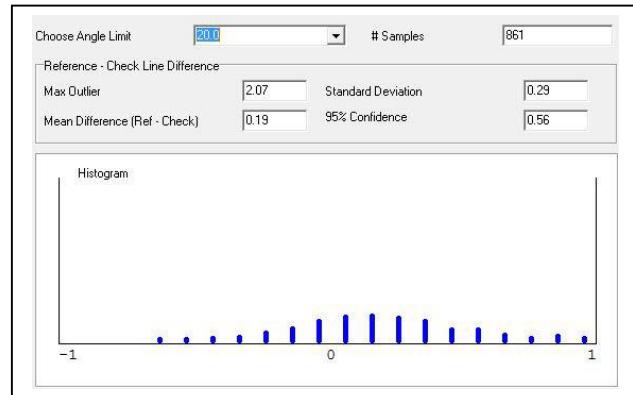
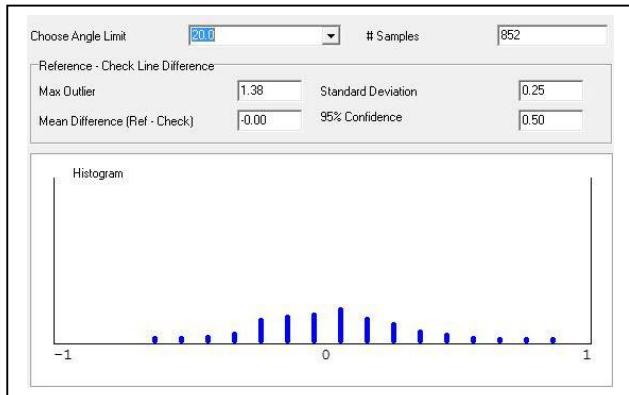
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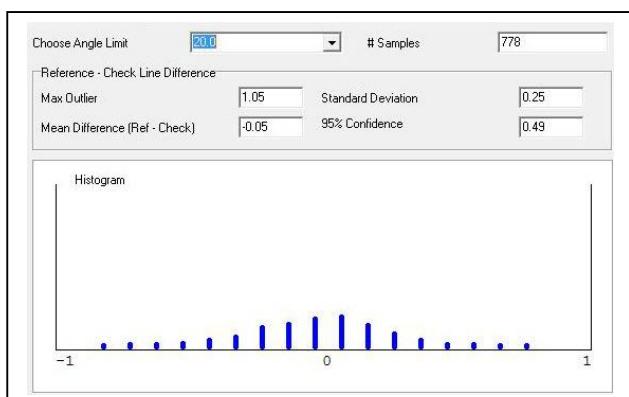
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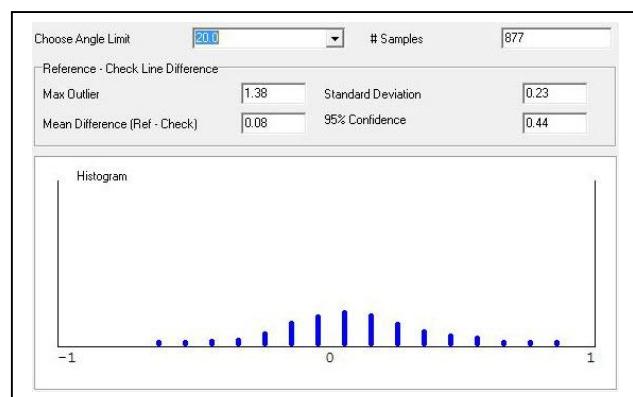
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09/14_1813

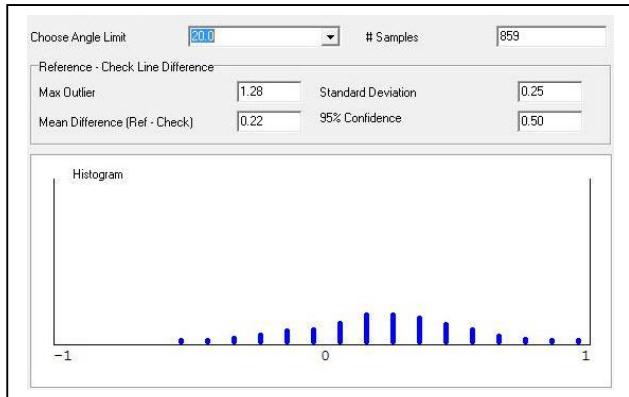


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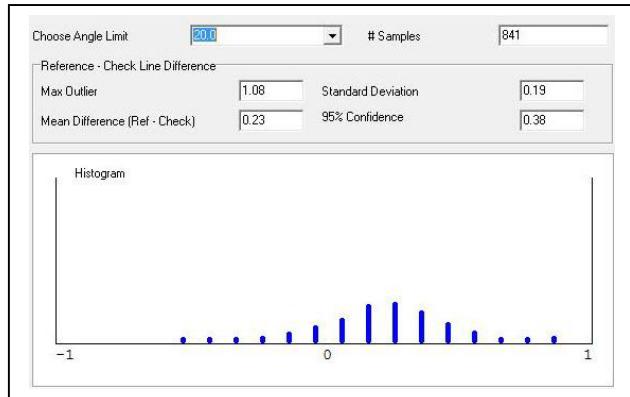
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Figure 4.1-2

Plots of +/- 20 Deg. Beam Analysis Results for crossings 08/05 to 9/21 during Fire Island Reef Fall 2011 survey.



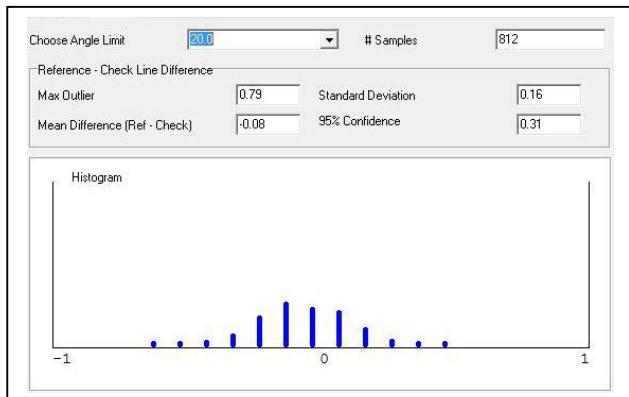
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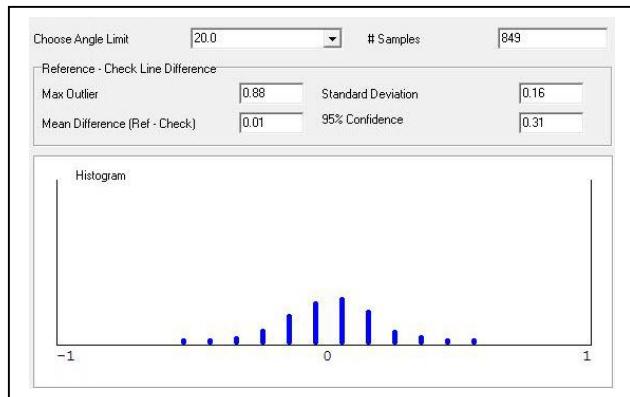
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Figure 4.1-3

Plots of +/- 20 Deg. Beam Analysis Results for crossings 08/05 to 9/21 during Hempstead Reef Fall 2011 survey.



11/08_1840



11/08_2215