Cruise Plan
Coastal Pioneer 6 Deployment
Leg 1: R/V *Armstrong* Cruise AR-04A
12 May – 15 May 2016
Leg 2: R/V *Armstrong* Cruise AR-04B
17 May - 24 May 2016
Leg 3: R/V *Armstrong* Cruise AR-04C
26 May - 2 June 2016

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Approved:

Coastal and Global Scale Nodes
Ocean Observatories Initiative
Woods Hole Oceanographic Institution

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Revision History

Version	Description	Originator	Release Date
0-01	Draft for IRR 2016-04-25	A. Plueddemann	
0-02	Minor edits and drawing updates	S. White	
0-03	Updates to Appendices	A. Plueddemann	
0-04	Final draft	A. Plueddemann	
0-05	Final updates on personnel, etc.	A. Plueddeman, S. White	
1-00	Initial Release	P. Matthias	

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1.0 Introduction

1.1. Overview

This is the sixth major infrastructure deployment and servicing cruise for the Pioneer Array of the National Science Foundation's Ocean Observatories Initiative (OOI; http://www.oceanobservatories.org). The Pioneer Array includes a network of moorings and autonomous robotic vehicles to monitor waters of the continental shelf and slope south of New England and, in particular, the shelfbreak front where nutrients and other properties are exchanged between the coast and the deep ocean. Data from the Pioneer Array will provide new insights into coastal ocean processes such as shelf/slope nutrient exchange, air-sea property exchange, carbon cycling, and ocean acidification that are important to the New England shelf and to continental shelf ecosystems around the world.

The Pioneer 6 deployment cruise (Pioneer-6) has 27 Primary Objectives (see Section 2.3) that include the recovery and deployment of Coastal Surface Moorings (CSMs), recovery and deployment of Coastal Profiler Moorings (CPMs), deployment of Coastal Surface Piercing Profiler (CSPP) moorings, recovery and deployment of gliders, operation of an AUV, and CTD casts with water sampling at the mooring sites. The Pioneer-6 cruise also has Additional Objectives, including CTD/ADCP surveys in the vicinity of the Pioneer moored array, meteorological comparisons between ship and buoys, and multi-beam bathymetry surveys of the Pioneer region.

1.2. Operating Area

The Pioneer operating area is the southern New England continental shelf and slope within a region bounded by approximately 39.0°-40.7° N and 69.9°-71.5° W (Figure 2-1). Pioneer-6 operations will be focused on the Pioneer Moored Array centered near 40.15°N, 70.83°W (Figure 2-2) and the glider lines (Figure 2-3). Mooring site locations and water depths are provided in Appendix A.

2.0 Cruise Plan

2.1. Background

The Pioneer Array deployment plan, and the instrument configurations on each platform, assumes that CSM and CPM moorings will be deployed for ~6 months, and gliders and CSPPs will be serviced at ~90 day intervals. The current status of Pioneer Array assets are as follows: Two Coastal Surface Moorings (CSMs) are deployed. The anchor from the Central CSM (CNSM) was left behind when the mooring riser was recovered on the *Armstrong* Science Verification Cruise SVC-III. Five Coastal Profiler Moorings (CPMs) are deployed. The Upstream Inshore Profiler Mooring Buoy (CP02PMUI) parted from the mooring on 3 April 2016 and was recovered. One glider is operating, on the Slope Sea (SS-1) line.

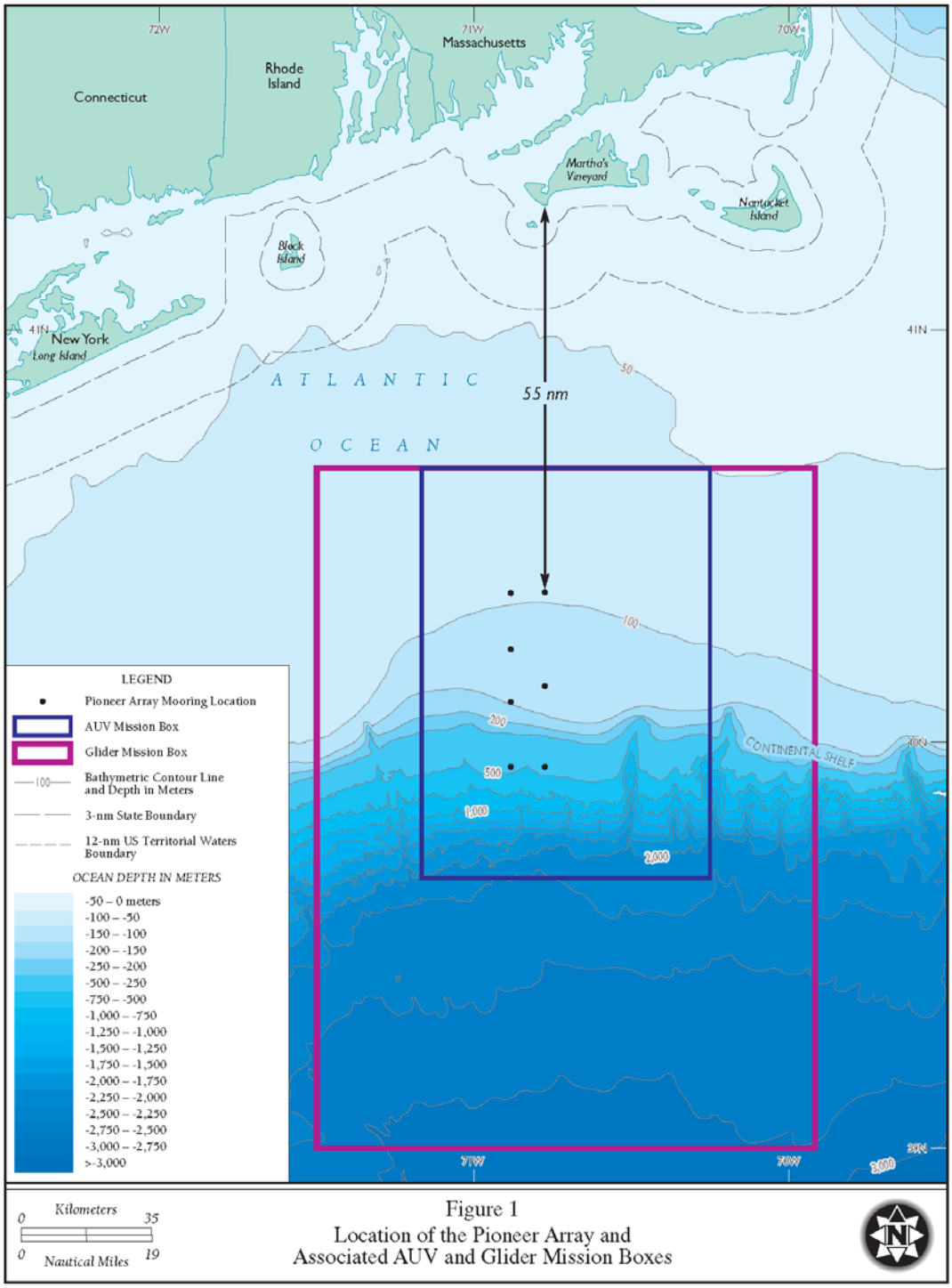

Figure 2-1 – Map of the Pioneer Array region.
The seven sites of the moored array, the AUV operating region and the glider operating region are shown along with bathymetric contours.

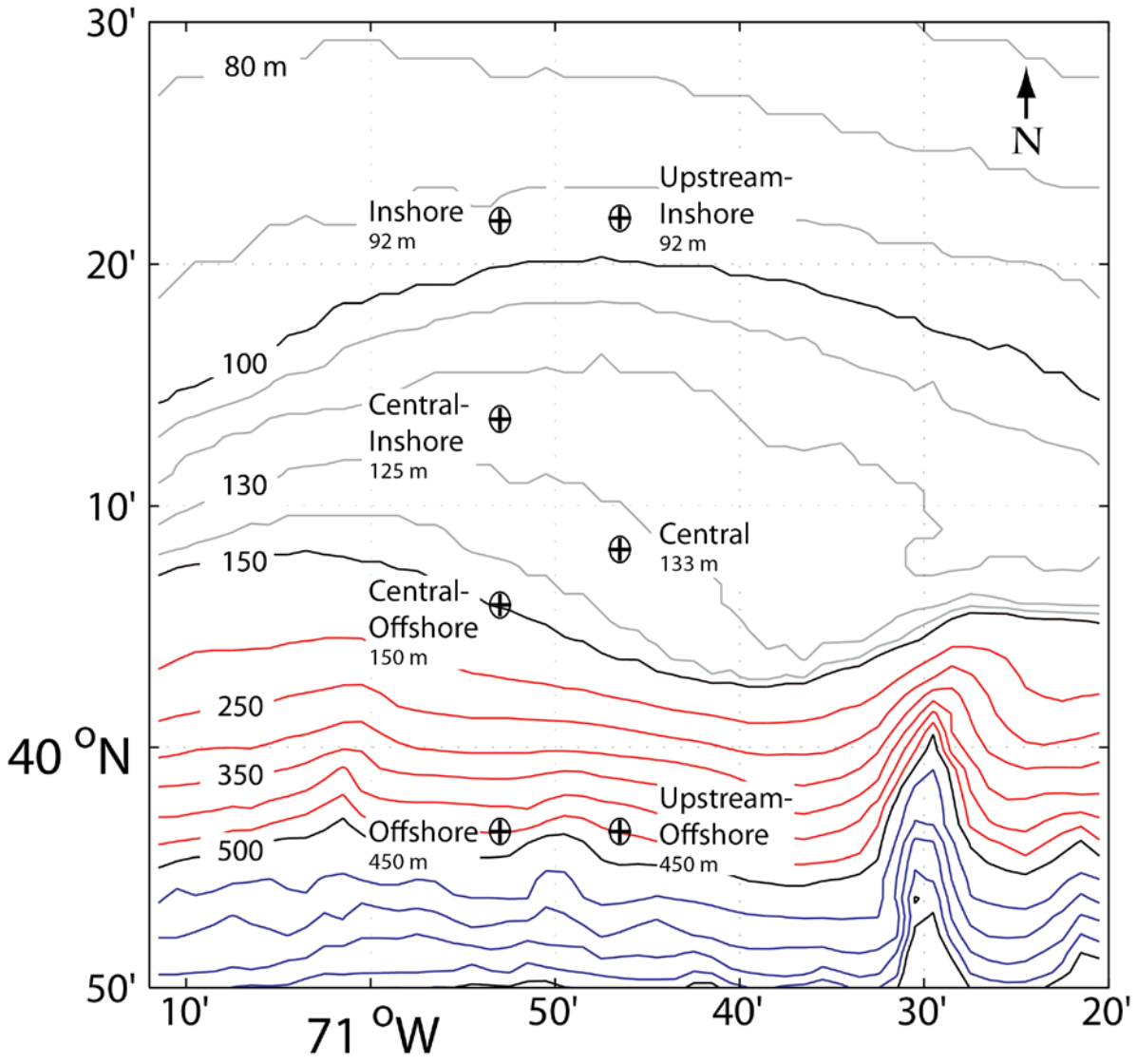

Figure 2-2 – Pioneer Array mooring site locations.
Site centers are marked by black "+" and encircled by approximate 0.5 nm radius buffer zones. Bathymetry is shown at 10 m (gray), 50 m (red) and 100 m (blue) intervals, respectively. Black contours are at 100 m, 150 m, 500 m and 1000 m.

2.2. Staging and De-Staging

Staging and loading will be done at the Woods Hole Oceanographic Institution (WHOI) dock during 10-11 May 2016. In addition, some staging for Leg 1 will occur during 29 April – 1 May, prior to Science Verification Cruise SVC-IV. Offloading and loading will occur between each of the legs. The ship's crane will be suitable for loading most science gear. If necessary, this will be supplemented by a commercial crane (e.g. Baxter Crane & Rigging) for loading 20' containers/vans and other large items. At the discretion of the R/V *Armstrong*, partial loading and access to the ship may be possible before 10 May.

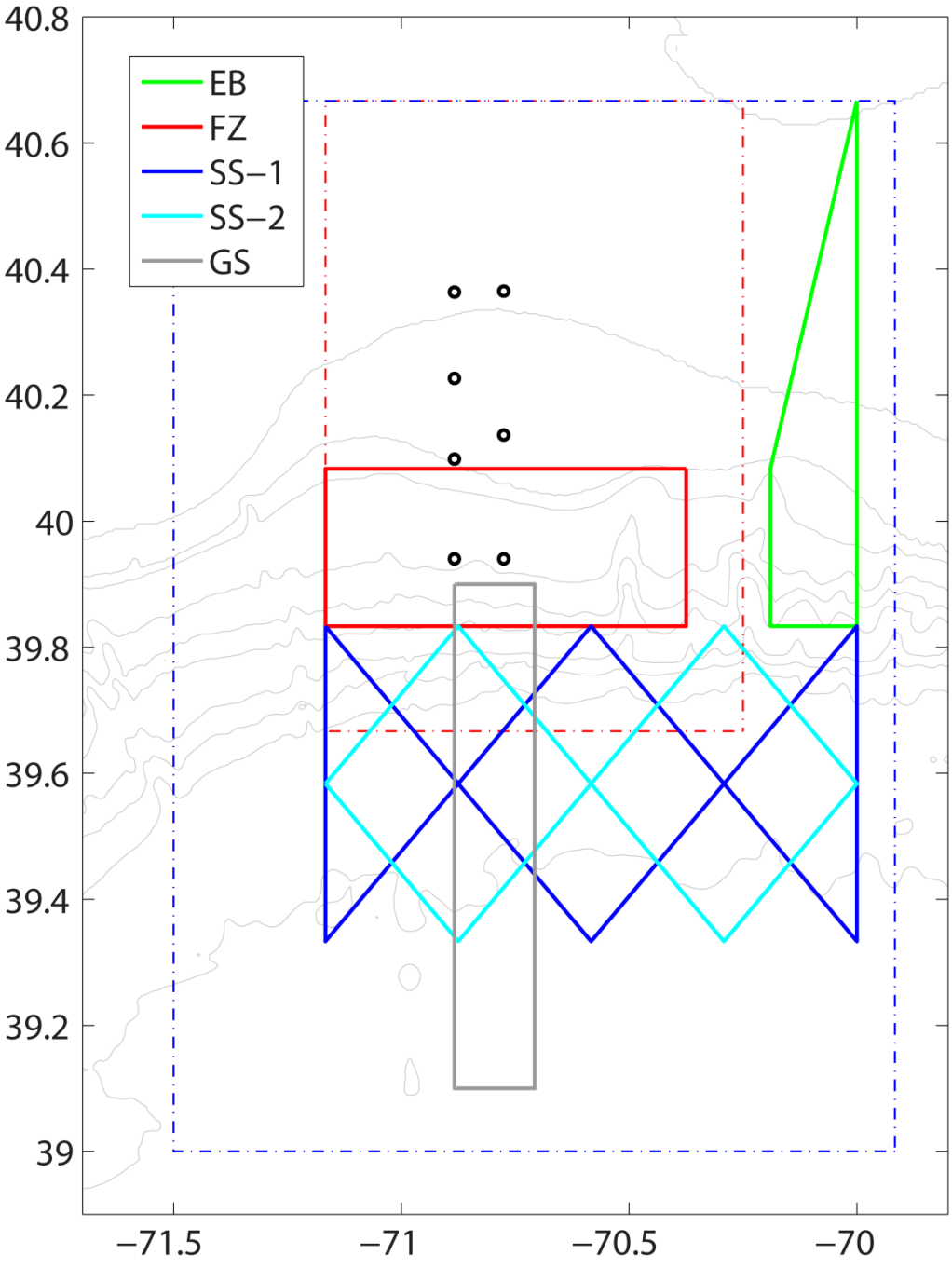

Figure 2-3 – Pioneer Array glider lines.
The Eastern Boundary (EB, green), Frontal Zone (FZ, red), Slope Sea (SS-1, blue; SS-2, cyan) and Gulf Stream (GS, gray) tracks are shown along with the Pioneer Array moorings (circles) and the glider and AUV operating areas (blue and red dashed lines, respectively).

As part of the staging operation, it will be necessary to mount several antennas and run cables from these antennas to the main lab. Antenna mount locations and cable runs will be determined by consultation with the ship. A deck plan showing the location of major deck components is provided in Appendix A.

Destaging and offloading of scientific equipment will be initiated at WHOI upon termination of the cruse on 2 June and will continue on 3 June as necessary. The ship's crane will be suitable for offloading most science gear, supplemented by a commercial crane for containers/vans if necessary.

2.3. Cruise Operations and Objectives

The R/V *Armstrong* will depart from Woods Hole and transit to the location of the first field operation. Successive cruise days will include a combination of activities, focusing on AUV Dock operations (and possible CSM deployment/recovery) during Leg 1, CPM operations during Leg 2 and CSM, glider and AUV operations during Leg 3. CTDs with bottle samples will be done in conjunction with deployment and recovery operations. Glider deployments and CSPP deployments will be interspersed with mooring operations at times and locations chosen for efficiency. Additional activities will typically be conducted overnight or in late evening after Primary Objectives for the day are completed.

The Primary Objectives (*O1-O27*) are listed below. Nominal dates for these activities are given in the cruise timeline provided in Appendix A. Site locations are listed in Appendix B.

O1. Recover the Offshore Coastal Surface Mooring (CP04OSSM-00003).

O2. Recover the Central Coastal Surface Mooring anchor (CP001CNSM-00004).

O3. Recover the Inshore Coastal Surface Mooring (CP03ISSM-00003).

O4. Recover the Upstream-Offshore Profiler Mooring (CP02PMUO-00006).

O5. Recover the Offshore Profiler Mooring (CP04OSPM-00004).

O6. Recover the Central Offshore Profiler Mooring (CP02PMCO-00005).

O7. Recover the Central Inshore Profiler Mooring (CP02PMCI-00004).

O8. Recover the Upstream Inshore Profiler Mooring (CP02PMUI-00006).

O9. Recover one deep (1000 m engine) coastal glider (SS-1).

O10. Recover the AUV Dock and ground line at the Offshore site

O11. Deploy the Offshore Coastal Surface Mooring (CP04OSSM-00004).

O12. Deploy the Central Coastal Surface Mooring (CP01CNSM-00005).

O13. Deploy the Inshore Coastal Surface Mooring (CP03ISSM-00004).

O14. Deploy the Upstream-Offshore Profiler Mooring (CP02PMUO-00007).

O15. Deploy the Offshore Profiler Mooring (CP04OSPM-00005).

O16. Deploy the Central Offshore Profiler Mooring (CP02PMCO-00006).

O17. Deploy the Central Inshore Profiler Mooring (CP02PMCI-00005).

O18. Deploy the Upstream-Inshore Profiler Mooring (CP02PMUI-00007).

O19. Deploy the Inshore Surface Piercing Profiler Mooring (CP03ISSP-00004).

O20. Deploy the Central Surface Piercing Profiler Mooring (CP01CNSP-00005).

O21. Deploy a shallow (200 m engine) coastal glider on the EB line.

O22. Deploy a deep (1000 m engine) coastal glider on the FZ line (FZ-1).

O23. Deploy a deep (1000 m engine) coastal glider on the SS line (SS-1).

O24. Deploy a deep (1000 m engine) coastal glider on the SS line (SS-2).

O25. Deploy a shallow (200 m engine) coastal glider on the FZ line (FZ-2).

O26. Conduct multiple AUV missions in the vicinity of the moored array

O27. Conduct CTD casts with water sampling at the deployment/recovery sites.

Some additional activities are nominally scheduled in the cruise timeline (Appendix A), and will be fit in as time allows: Ship vs. buoy meteorological comparisons will typically be conducted from late evening, after mooring operations are completed, to early morning before the start of the next operation. Specific bathymetric and oceanographic surveys may be conducted based on time constraints and weather conditions.

The Additional objectives (*A1-A8*) are listed in rough priority order below, and will be completed as time and conditions permit.

A1. Conduct CTD surveys (no bottle samples) in the vicinity of the moored array.

A2. Conduct ship vs. buoy meteorological comparisons at each CSM site.

A3. Deploy a deep (1000 m engine) coastal glider on the GS line.

A4. Recover the abandoned anchor from CP02PMUO-00004.

A5. Inspect Offshore Surface Mooring (CP04OSSM-00003) using ROV camera.

A6. Inspect malfunctioning Profiler Mooring (CP02PMUI-00006) using ROV camera.

A7. Conduct multibeam bathymetry surveys in the Pioneer region.

A8. Conduct shipboard ADCP surveys in the vicinity of the moored array.

Based on the glider line priorities and the mix of buoyancy engines, the available gliders will be assigned to lines as shown in Table 2-1 (in priority order).

Name	Region	Priority	Buoyancy Engine	Pioneer-6
EB	Eastern Boundary	As-deployed	200 m	Planned deployment
FZ-1	Frontal Zone	As-deployed	1000 m	Planned deployment
SS-1	Slope Sea	As-deployed	1000 m	Planned deployment
SS-2	Slope Sea	As-deployed	1000 m	Planned deployment
FZ-2	Frontal Zone	Baseline	200 m	Planned deployment
GS	Gulf Stream	Baseline	1000 m	Additional objective

Table 2-1 – Pioneer-6 glider deployment plan.

The Chief Scientist (CS) will execute the cruise according to the direction of the Program Manager (PM) in order to accomplish, to the extent practicable, programmatic and scientific objectives as described above. The ship's Master and the CS have discretion to alter the order of operations as well as determine that some operations cannot be accomplished safely or effectively, based on conditions encountered at sea. The CS and PM have discussed tasks and responsibilities for the cruise, have reviewed likely at-sea failure modes and actions, have reviewed guiding principles for at-sea decision making, and have established communication pathways for both routine reporting (e.g. email) and emergency contact (e.g. satellite telephone).

The CS and PM will communicate frequently (typically daily by email) during the cruise to exchange status information and to assess the potential impact of at-sea decisions driven by weather or technical issues. Significant modifications to the cruise objectives (e.g. inability to deploy/recover a platform) or changes to the cruise plan anticipated to have significant financial impacts (e.g. additional ship days) will be communicated to the PM at the earliest opportunity. Incidents involving injury or damaged/lost equipment will follow established Program protocols (UNOLS policies, OOI Incident Reporting Process). Anomalies, suspected failures and confirmed failures will be handled according to the OOI Equipment Notification and Escalation Process.

2.3.1. Release Tests

At a convenient time prior to deployment of the moorings, the science party will to perform release tests. The release tests involve lowering multiple acoustic releases, to one or more depths between 500 m and the surface and holding them there while conducting acoustic interrogation. The science party will bring an acoustic transceiver (deck box) than can be lowered over the rail with a cable run to the main lab and connected to a transceiver controller. Alternatively, the deck box can be connected directly to a 12 kHz hull transducer on the ship.

2.3.2. Mooring Operations

Mooring deployments and recoveries will be done in stages using the ship's crane and A-frame, plus winches and air tuggers supplied by the science party. Science party personnel will be familiar with mooring deployment and recovery, and will be capable of directing operations in cooperation with the ship's crew. Additional science personnel will assist with mooring operations, met watches, and other observation and data collection activities.

2.3.3. Glider Operations

Glider deployments and recoveries will typically be done using the ship's crane, starboard arm, or A-frame, supplemented by air tuggers and handling equipment supplied by the science party. Science party personnel will be familiar with glider deployment and recovery, and will be capable of directing operations in cooperation with the ship's crew during all phases of glider operations.

2.3.4. AUV Operations

AUV deployments and recoveries are expected to be done using the ship's crane supplemented by a handling gear supplied by the science party. AUV recoveries may require a small boat operation prior to lifting the vehicle aboard. Science party personnel will be familiar with AUV deployment and recovery, and will be capable of directing operations in cooperation with the ship's crew during all phases of AUV operations.

2.3.5. AUV Dock operations

The AUV Dock will be recovered through the A-frame. Disconnection of the ground line from the Multi-Function Node (MFN) at the base of the surface mooring, and connection of a recovery line to the Dock, will require a Remotely Operated Vehicle (ROV). The ROV will be deployed off the starboard side using the starboard arm and a special purpose winch. Initially, the ship will use Dynamic Positioning (DP) to position the ROV for disconnection of the ground line from the MFN. The ship will then use DP to re-position over the dock. A reel of recovery line will be deployed on a device called the "parking meter". The recovery line will be captured by the ROV, maneuvered to the Dock and connected. After verifying a secure connection, the ROV will be recovered. The Dock will then be recovered through the A-frame using the recovery line and the Lantec heavy-lift winch. The ground line from dock to MFN will be recovered through the A-frame after the Dock is aboard. Science party personnel specializing in ROV use will direct operations in cooperation with the ship's crew.

2.3.6. Anchor Surveys

Once the anchor has settled on the bottom, the ship will occupy three stations 0.3 to 0.5 nm from the anchor drop point in a triangular pattern. At each station the slant range to the acoustic release will be determined. Ranging from three stations will allow the release position, and thus the mooring anchor position, to be determined by triangulation.

2.3.7. CTD casts

CTD casts will be conducted using the ship's 9-11 CTD sensors, 24 bottle rosette frame, and deck box. Sensors requested in addition to C,T,D are dissolved oxygen, chlorophyll fluorometer, transmissometer, and PAR. CTD operations will be supervised by shipboard SSSG technicians – the science party will supply line handlers and a lab operator. Water sampling and analysis will be handled by the science party.

2.3.8. Sensor Performance Evaluation

Sensor evaluation may be conducted with at surface mooring sites. For evaluation of meteorological and sea surface variables the ship may establish and hold a position, with bow into the wind, approximately 0.10 nm downwind of a buoy. This station will be held, and adjusted if necessary, while the science party evaluates data received from the buoy. During this period, the ships underway data will be continuously recorded. At a convenient time during the

cruise, the ship may make a close approach to buoys to allow visual inspection, determination of the water line, and photographs.

2.3.9. Shipboard Underway Data

The ship's meteorological system will be used to continuously monitor weather conditions while underway and for evaluation of buoy meteorology during the intercomparison period. The ship's ADCP systems will be used to continuously measure the currents in the upper ocean while. Sea surface temperature and salinity will be recorded continuously, using the ship's thermosalinograph.

2.3.10. Shipboard Multi-beam Bathymetry

Bathymetric surveys will be conducted within the Pioneer Array region (e.g. within the AUV Mission Box of Figure 2-1). Nominal waypoints for each survey will be provided to the bridge and discussed with survey technicians. Cruising speed, leg length, and leg spacing can be adjusted as needed to ensure adequate data optimal system performance. The results of the bathymetry survey should be displayed immediately after completion for evaluation by the Chief Scientist.

2.3.11. Small Boat Operations

The use of a work boat may be requested for AUV recovery operations and other operations such as glider recovery or attending to unforeseen problems that would require physical access to a buoy tower. Expected duration of use is approximately 0.5 to 1.5 hr. Work boat operations would be within 0.5-1.0 nm of the ship. It is recognized that such operations are weather dependent and would be conducted at the discretion of the ship.

2.4. Potential Restrictions

Small boat activities may be restricted by weather. In the case of a recovery operation, the ship will maneuver to the item to be retrieved and grappling lines and/or pick up poles will be used. Mooring activities may be restricted by severe weather or equipment failure. Severe weather would result in postponement until conditions eased. Failure of a given piece of Project equipment (e.g. winch, air tugger) can typically be compensated by use of an alternative approach. Failure of ship's equipment (e.g. electrical or hydraulic system) would result in postponement of operations until the failure was addressed. Deployment and recovery activities may be restricted by the presence of multiple fixed objects (e.g. fishing gear) in the deployment area or along the deployment/recovery track. If possible, operations will be delayed until conditions are more favorable (e.g. change in prevailing wind direction allowing deployment approach along a different, unobstructed course).

3.0 Appendices

Appendix A – Cruise Timeline

Appendix B – Selected Waypoints and Maps

Appendix C – Deck Plan

Appendix D – Science Party

Appendix E – Mooring Drawings

Appendix A – Cruise Timeline

10 – 11 May, Mobilization, LOSOS and WHOI pier
12 May – 02 Jun, Cruise dates, Leg-1 (4 days), Leg-2 (8 days), Leg-3 (8 days), 2 mob days
03 Jun, Demob, WHOI pier and LOSOS

Timeline

12 May	Complete loading, depart WHOI
13 May	Recover AUV Dock, inspect mooring
14 May	Recover PMUO anchor, deploy CNSP, CTD casts
15 May	Arrive WHOI, offload, begin onloading
16 May	In-port WHOI, staging and loading for Leg 2
17 May	Complete loading, depart WHOI (TBD: recover glider)
18 May	Recover OSPM, deploy OSPM, CTD casts
19 May	Recover PMUO, deploy PMUO, CTD casts
20 May	Recover PMCO, deploy PMCO, CTD casts
21 May	Recover PMCI, deploy PMCI, CTD casts
22 May	Recover PMUI, deploy PMUI, CTD casts
23 May	Cross-shelf CTD survey and/or complete primary objectives
24 May	Arrive WHOI, offload
25 May	In-port WHOI, staging and loading for Leg 3
26 May	Complete loading, depart WHOI, (TBD: recover glider)
27 May	Deploy OSSM, recover OSSM, deploy gliders, CTD casts
28 May	Deploy CNSM, recover CNSM anchor, CTD casts
29 May	Deploy ISSP, deploy ISSM, CTD casts
30 May	Recover ISSM, CTD casts
31 May	Cross-shelf AUV/CTD survey and/or complete primary objectives
01 Jun	Dual AUV survey and/or complete primary objectives
02 Jun	Arrive WHOI, begin offload

Appendix B – Selected Waypoints and Maps

Station List: Pioneer 6, R/VArmstrong, May-June 2016					
See timeline for order of occupation; some sites are occupied more than once					
"Mooring Turn" implies recovery of one mooring and deployment of another					
Name	**Code**	**Lat**	**Lon**	**water depth**	**comments**
Upstream-Inshore	UI	40 21.9	70 46.5	95 m	profiler mooring turn, CTD
Inshore	IS	40 21.8	70 53.0	95 m	surface mooring turn, profiler mooring deploy, CTD
Central-Inshore	CI	40 13.6	70 53.0	127 m	profiler mooring turn, CTD
Central	CN	40 08.2	70 46.5	134 m	surface mooring turn, profiler mooring delploy, CTD
Central-Offshore	CO	40 05.9	70 53.0	147 m	profiler mooring turn, CTD
Offshore	OS	39 56.4	70 53.0	450 m	surface mooring turn, profiler mooring turn, dock recovery, CTD
Upstream-Offshore	UO	39 56.4	70 46.5	450 m	profiler mooring turn, CTD
Cross-shelf 1	CS-1	40 17.6	70 46.5	115 m	part of cross-shelf CTD line
Cross-shelf 1	CS-2	40 13.2	70 46.5	125 m	part of cross-shelf CTD line
Cross-shelf 1	CS-3	40 04.3	70 46.5	140 m	part of cross-shelf CTD line
Cross-shelf 1	CS-4	40 00.4	70 46.5	270 m	part of cross-shelf CTD line
gliders		various	various	various	glider recoveries and deployments, CTDs

Table 3-1 – Pioneer-6 station list

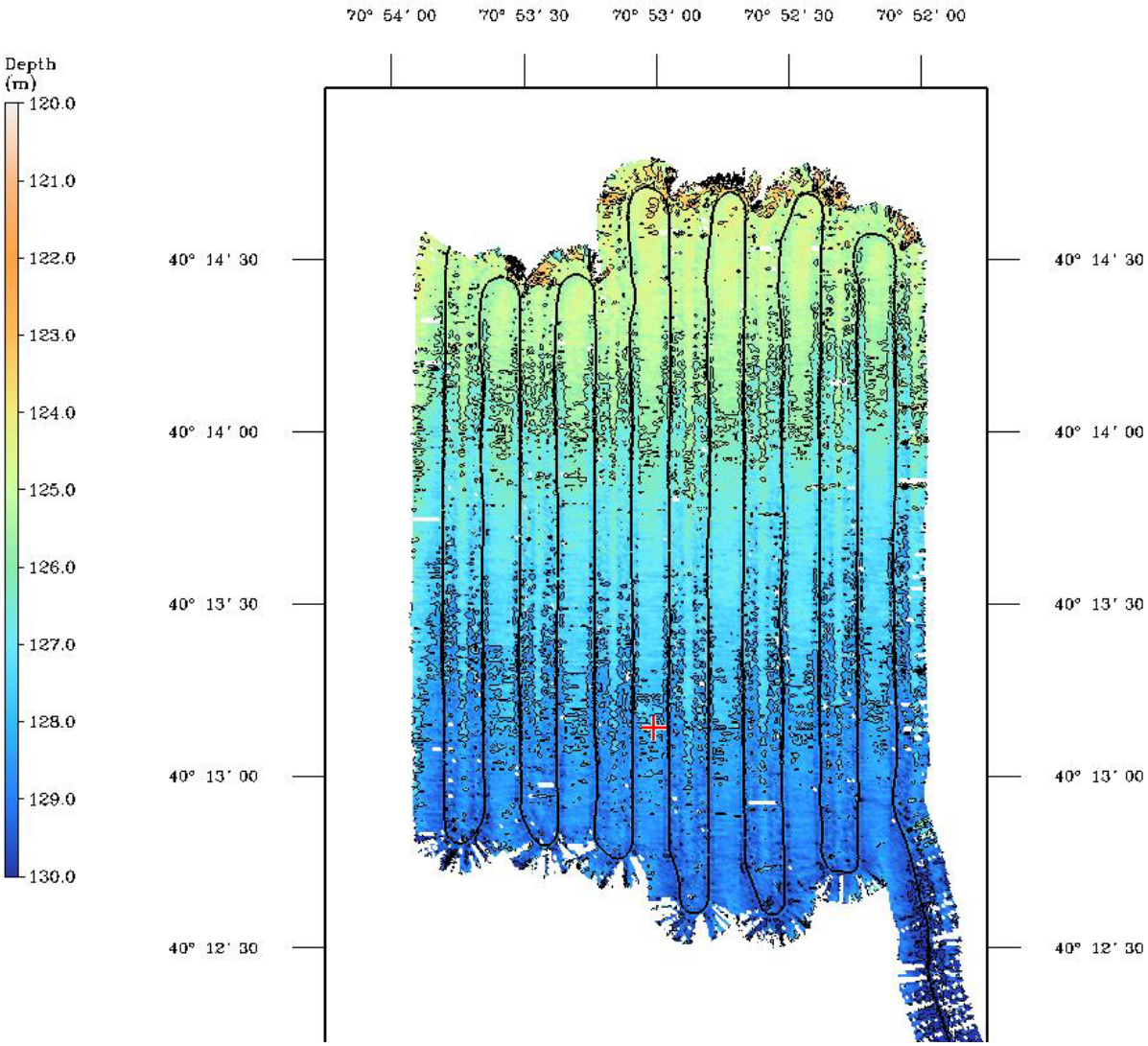

Figure 3-1 – Example of "small scale" bathymetry survey.
This survey of the Central Inshore site covers about 1.5 x 1.5 nm. The spacing between lines is about 0.1 nm. The total track distance is ~35 nm, which would take about 5 h to complete at 8 kt. Such a survey could be completed overnight

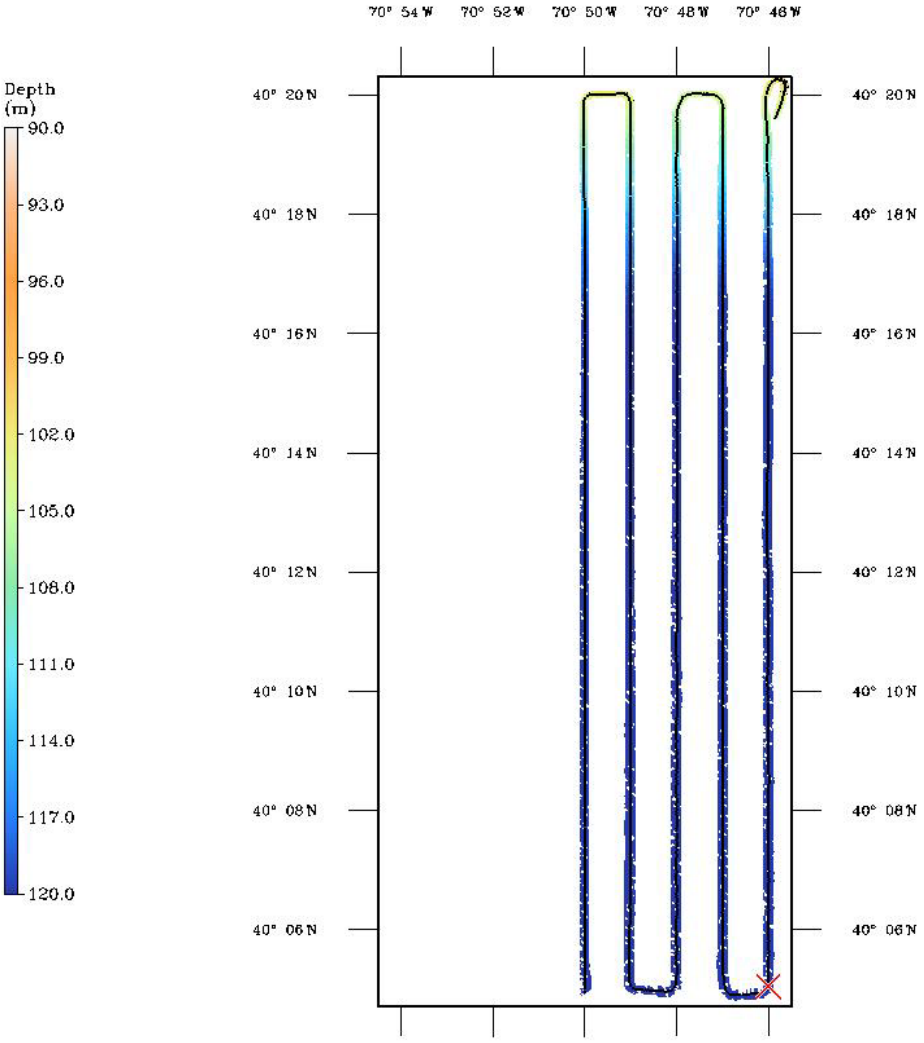

Figure 3-2 – Example of "large scale" bathymetry survey.
This survey covers about 7 x 15 nm. The desired survey area is approximately 10 x 28 nm. The spacing between lines would be about 0.8 nm – it is recognized that successive tracks will not overlap. The total track distance for the desired survey is ~360 nm, which would take about 46 h to complete at 8 kt. Such a survey could be completed over multiple 8 h overnight periods (e.g. two track lines per night).

Appendix C – Deck Plan

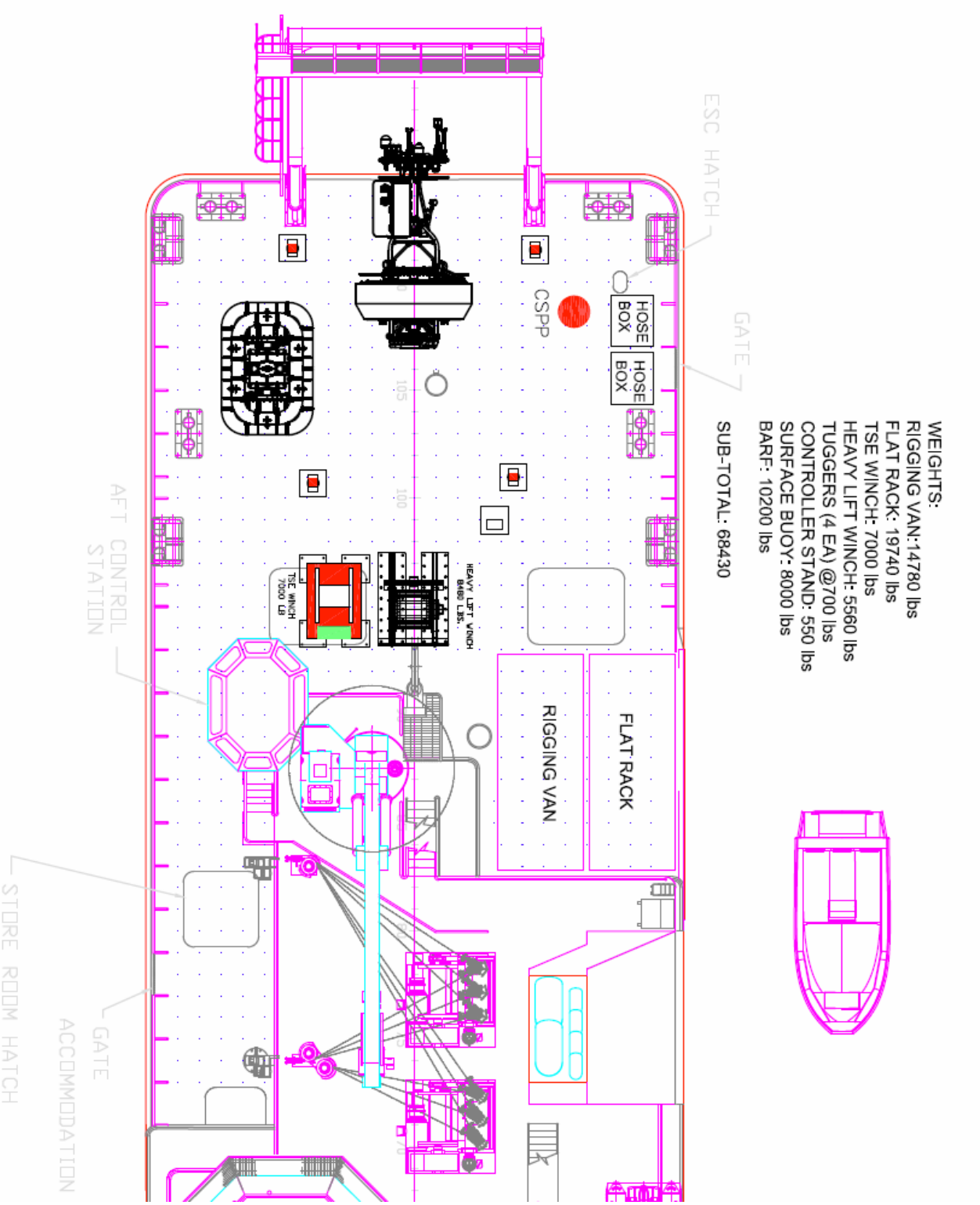

Figure 3-3 – Deck plan for Pioneer-6, Leg 1.
Nominal deck layout for the major components associated with Pioneer-6 Leg 1 operations.

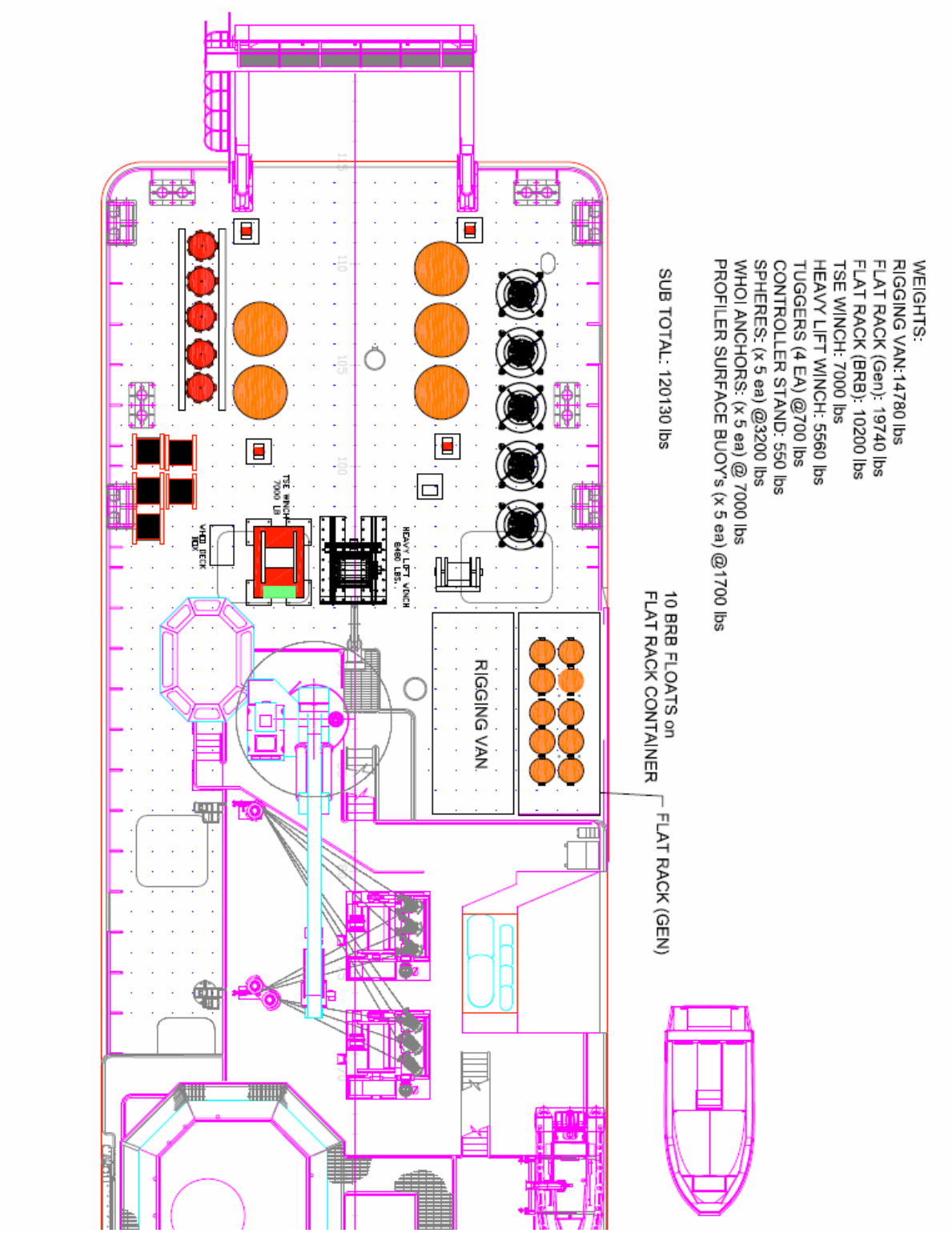

Figure 3-4 – Deck plan for Pioneer-6, Leg 2.
Nominal deck layout for the major components associated with Pioneer-6 Leg 2 operations.

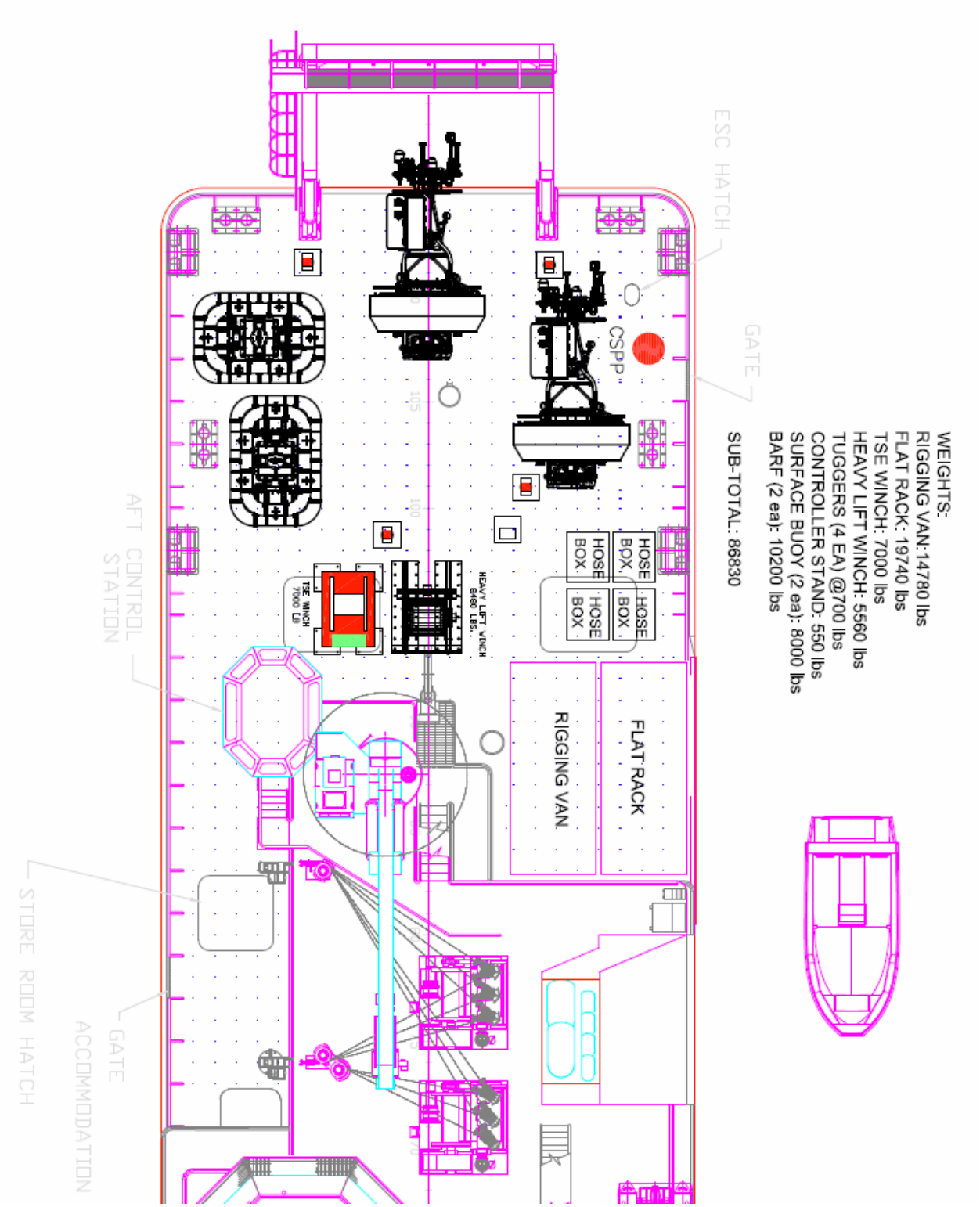

Figure 3-5 – Deck plan for Pioneer-6, Leg 3.
Nominal deck layout for the major components associated with Pioneer-6 Leg 3 operations.

Appendix D – Science Party

Leg 1: There will be 16 participants in the science party for Leg 1. The Chief Scientist is Dr. Albert J. Plueddemann (WHOI). An alphabetical list is given in the table below.

Participating Scientists

Name	Gender	Nationality	Affiliation
1. Alai, Aidan (TBD)	M	USA	WHOI
2. Basque, Chris	M	USA	WHOI
3. Dunn, James	M	USA	WHOI
4. Glidden, Eric	M	USA	U Conn
5. Joy, Kevin	M	USA	U Conn
6. Kemp, John	M	USA	WHOI
7. Matthias, Paul	M	USA	WHOI
8. McKee, Michael	M	USA	U Conn
9. Murphy, Stephen	M	USA	WHOI
10. Palanza, Matt	M	USA	WHOI
11. Peters, Don	M	USA	WHOI
12. Petillo, Stephanie	F	USA	WHOI
13. Plueddemann, Al	M	USA	WHOI/Chief Sci
14. Sargent, Kim	F	USA	WHOI
15. Wellwood, Dave	M	USA	WHOI
16. Yonkoske, Greg	M	USA	Raytheon

Roles and responsibilities will be delegated among individuals and groups per the following major categories. These assignments are representative, and not intended to be limiting – all participants will assist with multiple aspects of the cruise effort as warranted.

- Overall cruise coordination and execution
  - Al Plueddemann, John Kemp
- Cruise documentation, deployment records, platform and instrument metadata
  - Al Plueddemann, Matt Palanza, Aidan Alai (CSM)
- Logistics, deck operations, mooring hardware, mooring operations
  - John Kemp, Jim Dunn, Steve Murphy, Chris Basque
- Mooring control, power and telemetry systems
  - Matt Palanza, Greg Yonkoske (CSM)
- Instrument configuration, preparation and pre-deployment checks
  - Aidan Alai (CSM)
- Platform configuration and mission plan
  - Matt Palanza (CSM)
- Hydrographic sampling, including physical sample preparation
  - Dave Wellwood
- ROV mission planning and operation
  - Kevin Joy, Michael McKee, Eric Glidden

Leg 2: There will be 12 participants in the science party for Leg 2. The Chief Scientist is Dr. Albert J. Plueddemann (WHOI). An alphabetical list is given in the table below.

Participating Scientists

	Name	Gender	Nationality	Affiliation
1.	Alai, Aidan	M	USA	WHOI
2.	Basque, Chris	M	USA	WHOI
3.	Cucchiara, Don	M	USA	U Miami
4.	Guerrero, Brad	M	USA	Raytheon
5.	Lund, John	M	USA	WHOI
6.	Martin, Brendan	M	USA	McLane
7.	Mogul, Johnathan	M	USA	McLane
8.	Murphy, Stephen	M	USA	WHOI
9.	Plueddemann, Al	M	USA	WHOI/Chief Sci
10.	Ryder, James	M	USA	WHOI
11.	Wellwood, Dave	M	USA	WHOI
12.	Williams, Mike	M	USA	WHOI

Roles and responsibilities will be delegated among individuals and groups per the following major categories. These assignments are representative, and not intended to be limiting – all participants will assist with multiple aspects of the cruise effort as warranted.

- Overall cruise coordination and execution
  - Al Plueddemann, Jim Ryder
- Cruise documentation, deployment records, platform and instrument metadata
  - Al Plueddemann, John Lund (CPMs), Don Cucchiara
- Logistics, deck operations, mooring hardware, mooring operations
  - Jim Ryder, Chris Basque, Steve Murphy, Mike Williams
- Mooring control, power and telemetry systems
  - John Lund (CPMs)
- Instrument configuration, preparation and pre-deployment checks
  - John Lund, Aidan Alai (CPMs)
- Platform configuration and mission plan
  - John Lund (CPMs)
- Hydrographic sampling, including physical sample preparation
  - Dave Wellwood, Don Cucchiara

Leg 3: There will be 15 participants in the science party for Leg 3. The Chief Scientist is Dr. Albert J. Plueddemann (WHOI). An alphabetical list is given in the table below.

Participating Scientists

Name	Gender	Nationality	Affiliation
1. Batryn, Jennifer	F	USA	WHOI
2. Brickley, Peter	M	USA	WHOI
3. Caldwell, Steve	M	USA	WHOI
4. Colgan, Ed	M	USA	Raytheon
5. Cucchiara, Don	M	USA	U Miami
6. Donohue, Meghan	F	USA	WHOI
7. Kelly, Brian	M	USA	WHOI
8. Kemp, John	M	USA	WHOI
9. Kukulya, Amy	F	USA	WHOI
10. Ngo, Han	M	USA	Raytheon
11. Plueddemann, Al	M	USA	WHOI/Chief Sci
12. Wellwood, Dave	M	USA	WHOI
13. White, Sheri	F	USA	WHOI
14. Williams, Mike	M	USA	WHOI
15. Yonkoske, Greg	M	USA	Raytheon

Roles and responsibilities will be delegated among individuals and groups per the following major categories. These assignments are representative, and not intended to be limiting – all participants will assist with multiple aspects of the cruise effort as warranted.

- Overall cruise coordination and execution
  - Al Plueddemann, John Kemp
- Cruise documentation, deployment records, platform and instrument metadata
  - Sheri White, Brian Kelly (CSMs), Peter Brickley (gliders, CSPPs, AUV)
- Logistics, deck operations, mooring hardware, mooring operations
  - John Kemp, Meghan Donohue, Williams, Mike
- Mooring control, power and telemetry systems
  - Brian Kelly (CSMs), Peter Brickley (gliders, CSPPs)
- Instrument configuration, preparation and pre-deployment checks
  - Jennifer Batryn (CSMs), Peter Brickley (gliders, CSPPs)
- Platform configuration and mission plan
  - Brian Kelly (surface moorings), Peter Brickley (gliders, CSPPs)
- Hydrographic sampling, including physical sample preparation
  - Dave Wellwood, Don Cucchiara
- AUV mission planning and execution
  - Amy Kukulya, Peter Brickley

Appendix E – Mooring Drawings

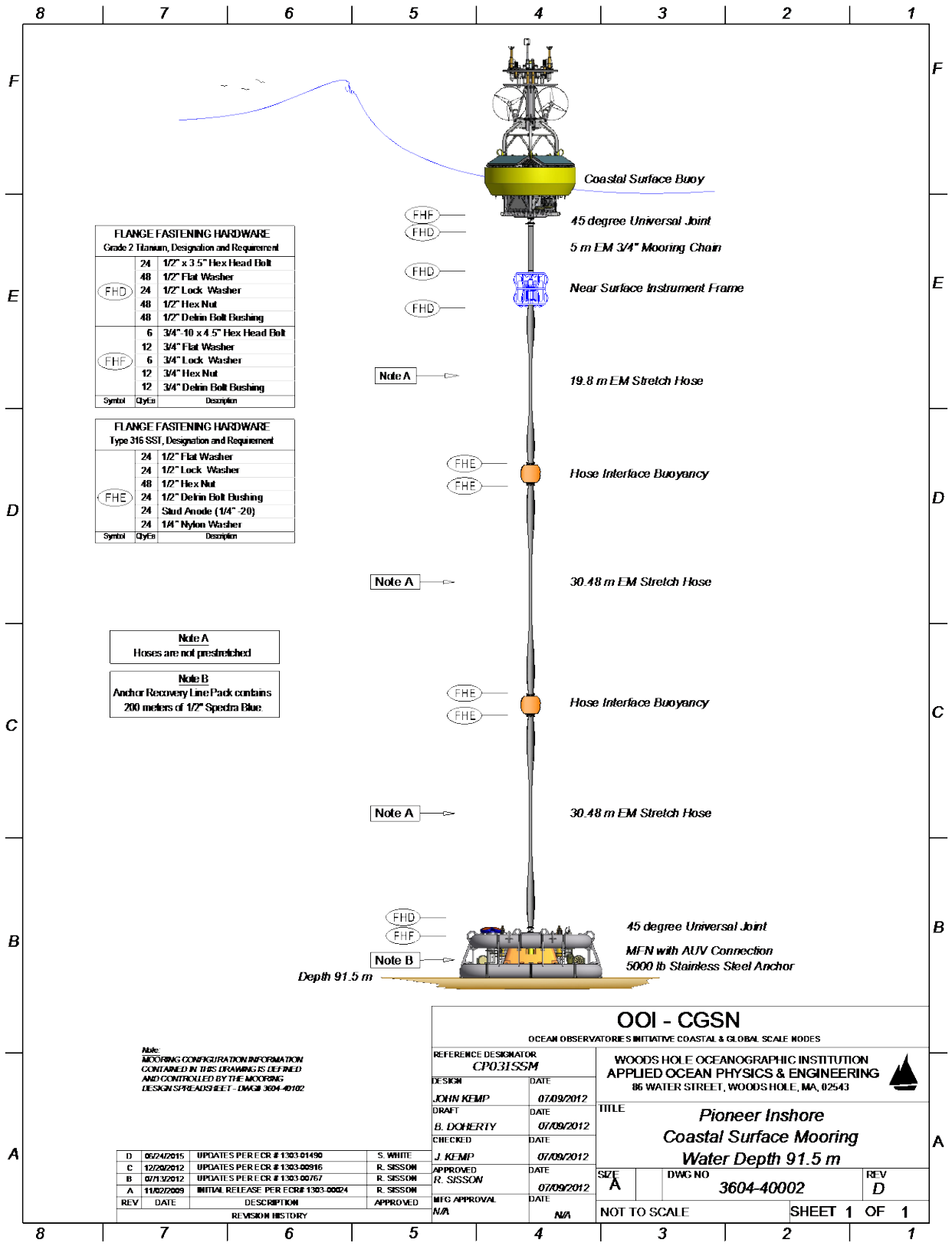

Figure 3-6 – Pioneer Inshore Surface Mooring (ISSM).

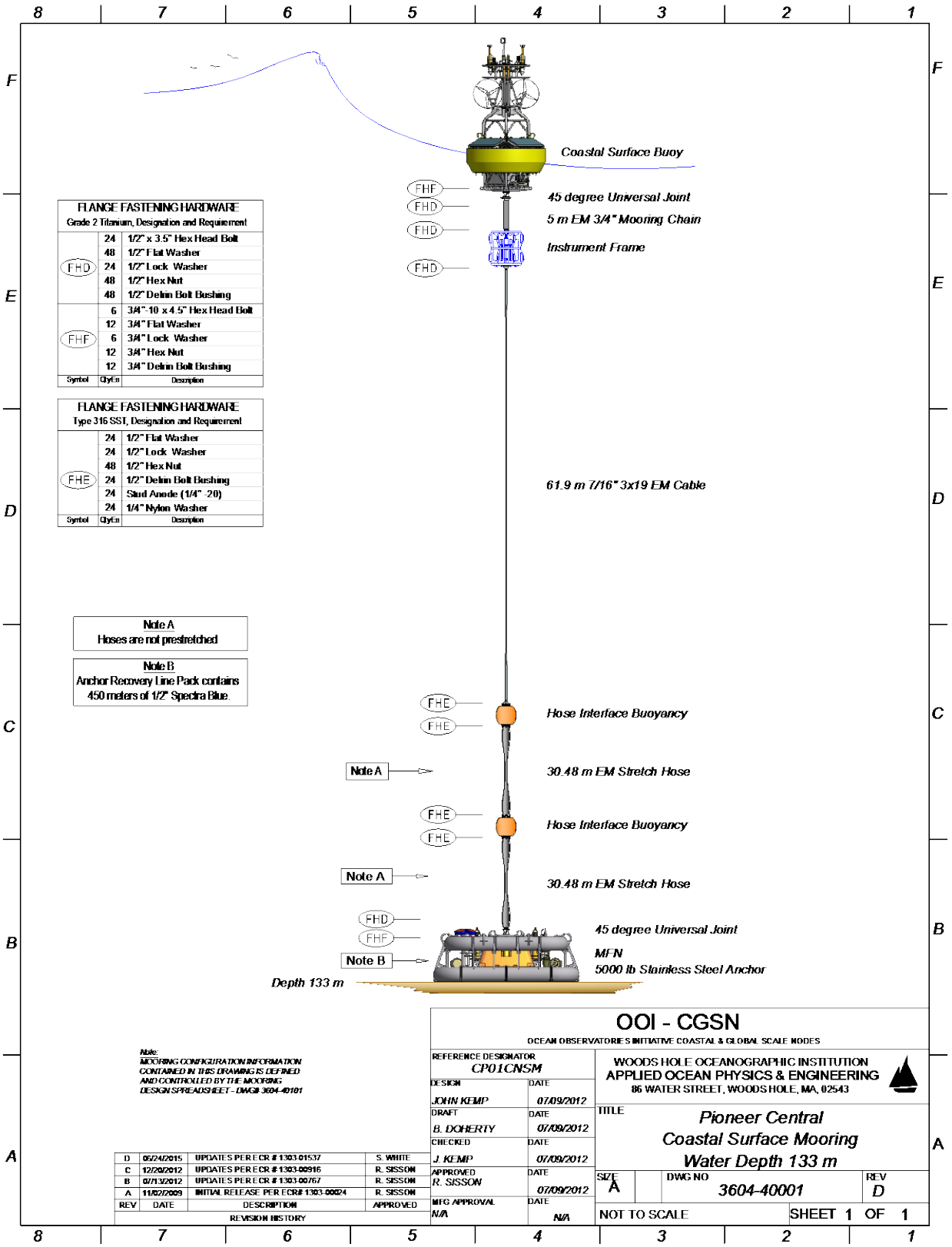

Figure 3-7 – Pioneer Central Surface Mooring (CNSM).

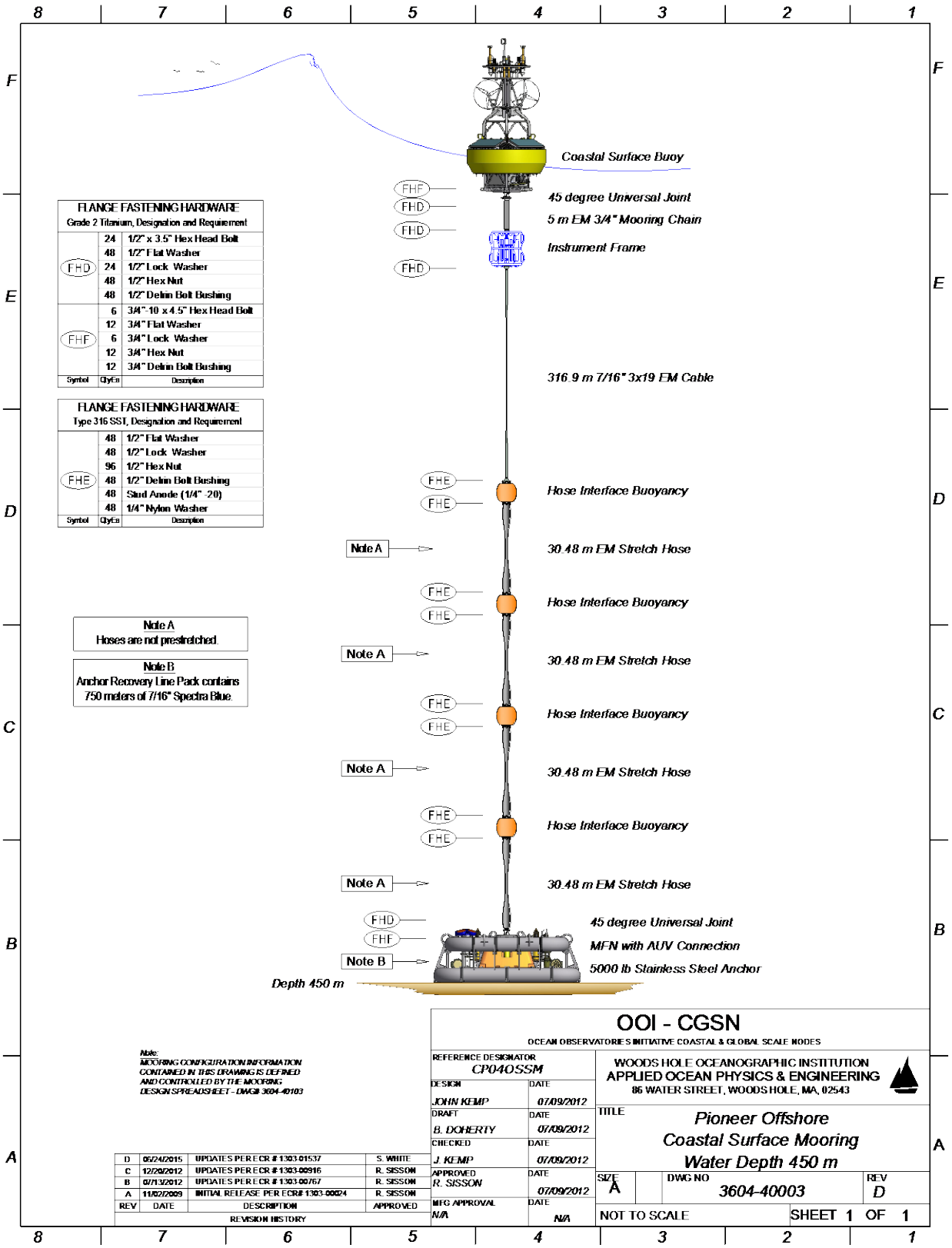

Figure 3-8 – Pioneer Offshore Surface Mooring (OSSM).

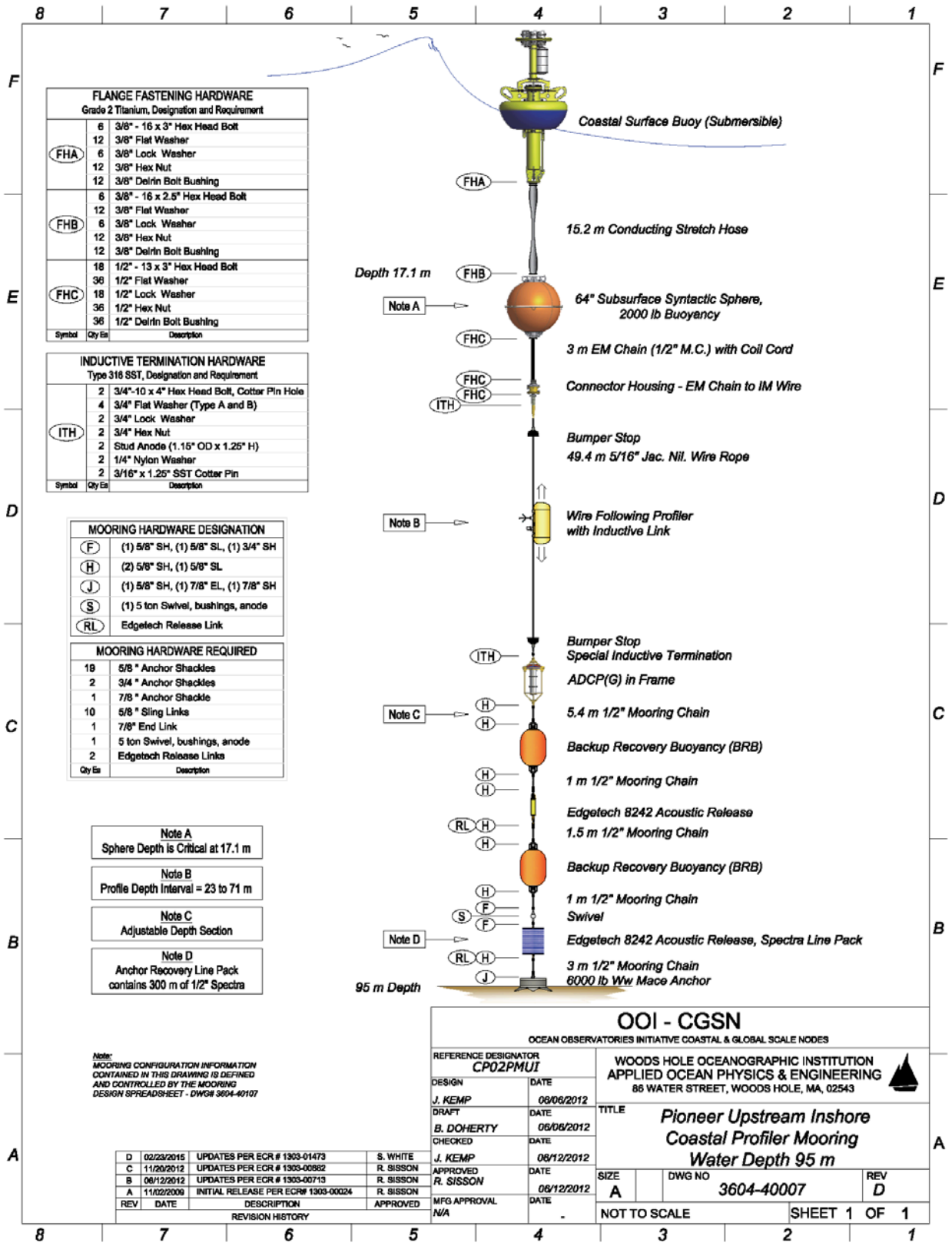

Figure 3-9 – Pioneer Upstream Inshore Mooring (PMUI).

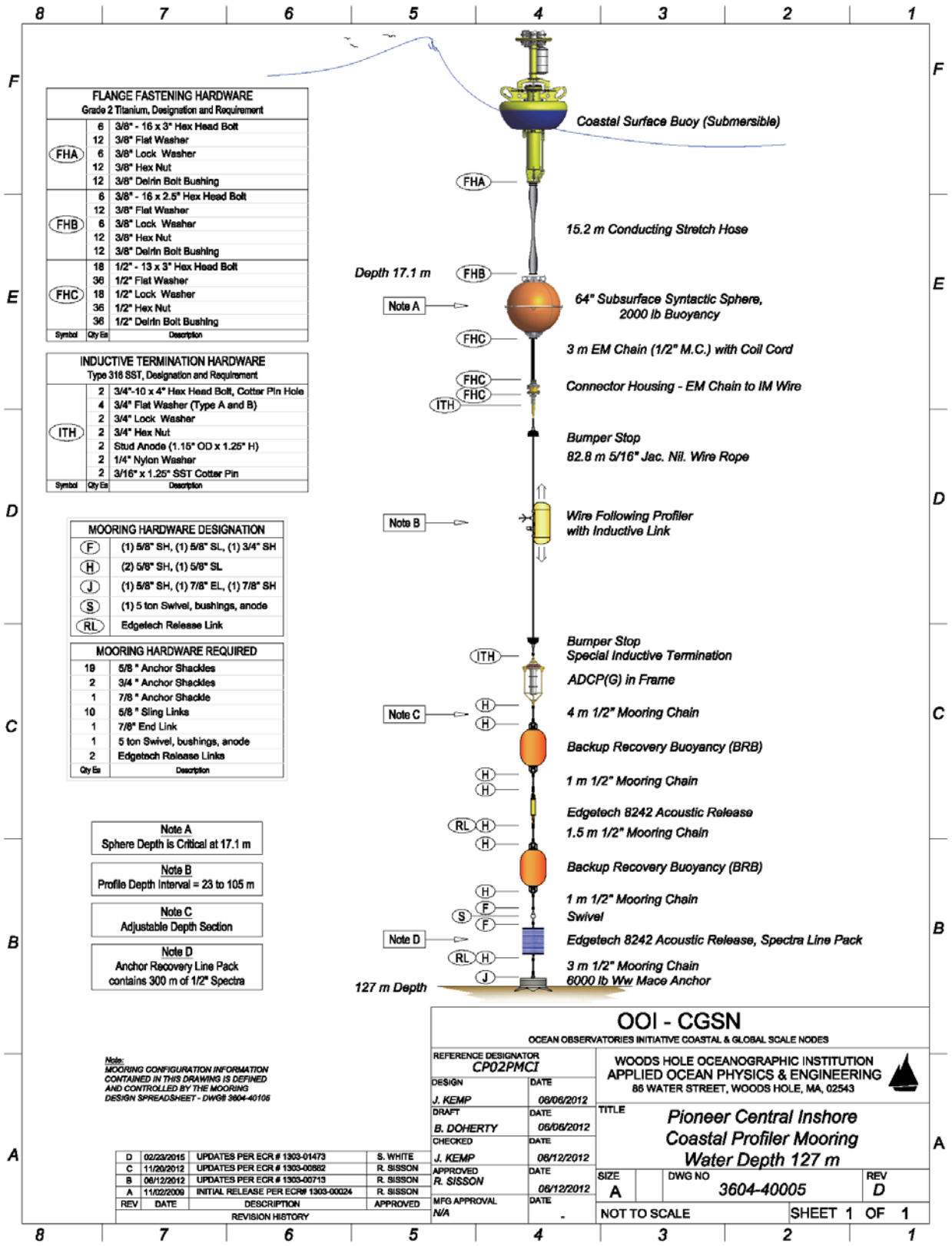

Figure 3-10 – Pioneer Central Inshore Profiler Mooring (PMCI).

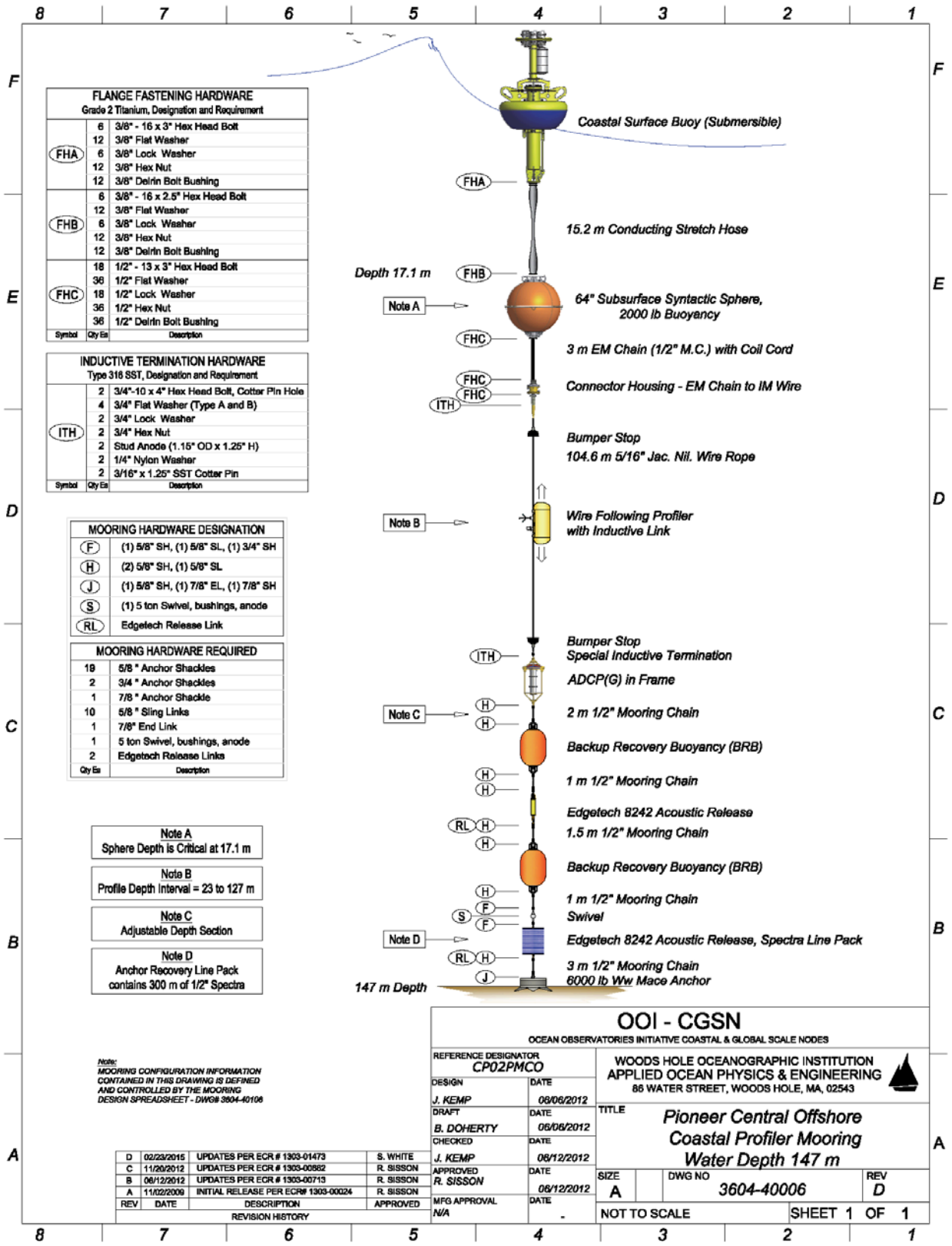

Figure 3-11 – Pioneer Central Offshore Profiler Mooring (PMCO).

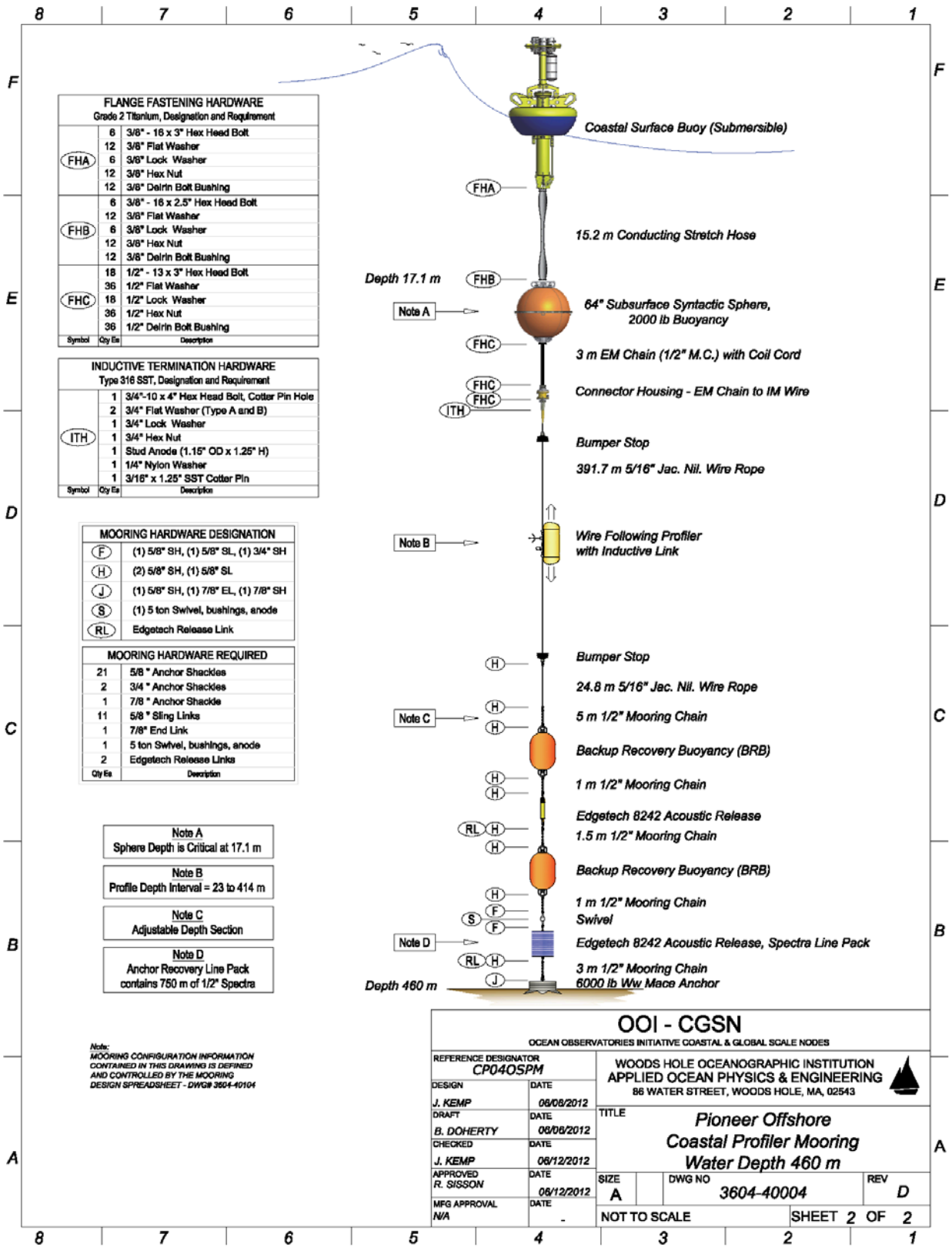

Figure 3-12 – Pioneer Offshore Profiler Mooring (OSPM).

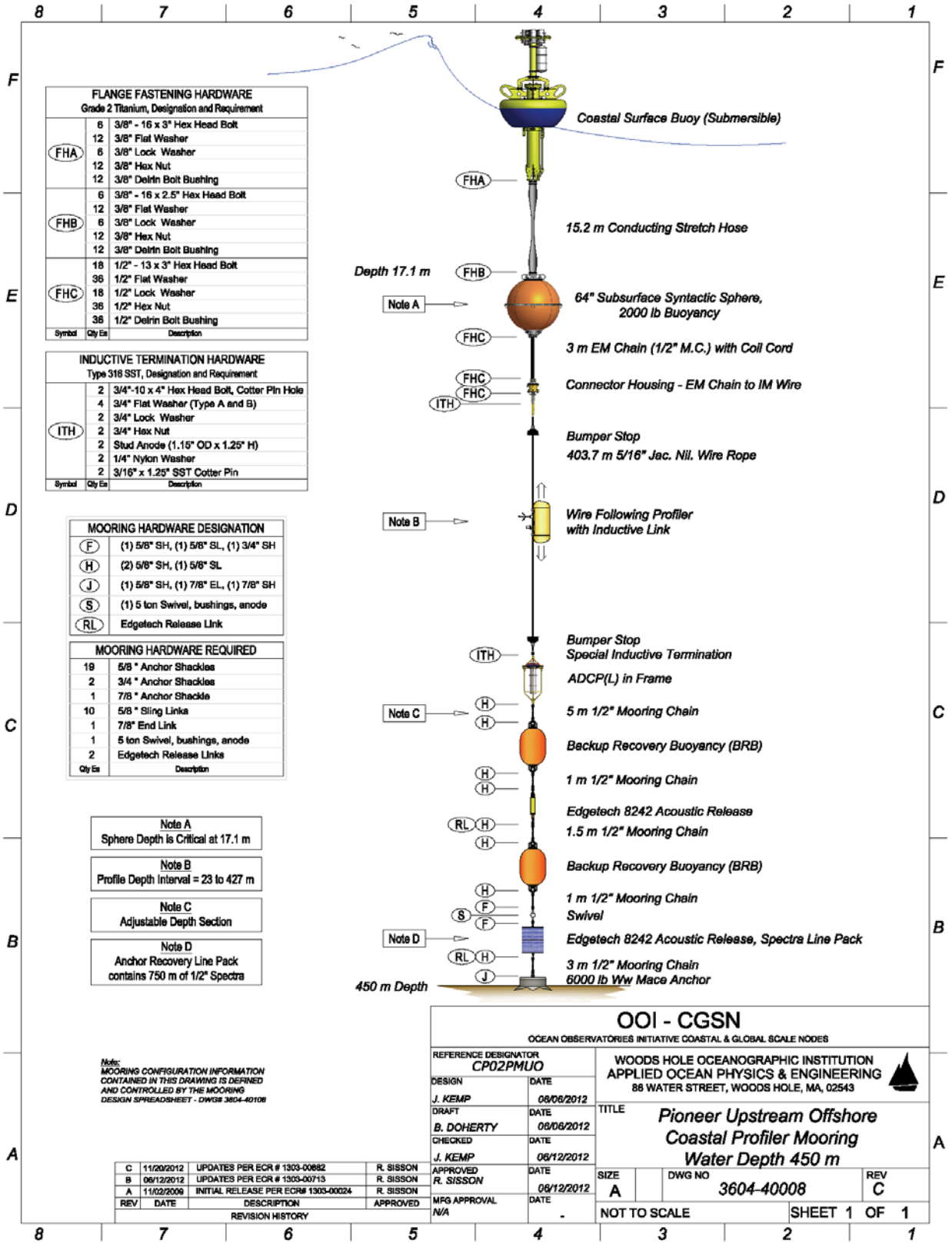

Figure 3-13 – Pioneer Upstream Offshore Profiler Mooring (PMUO).

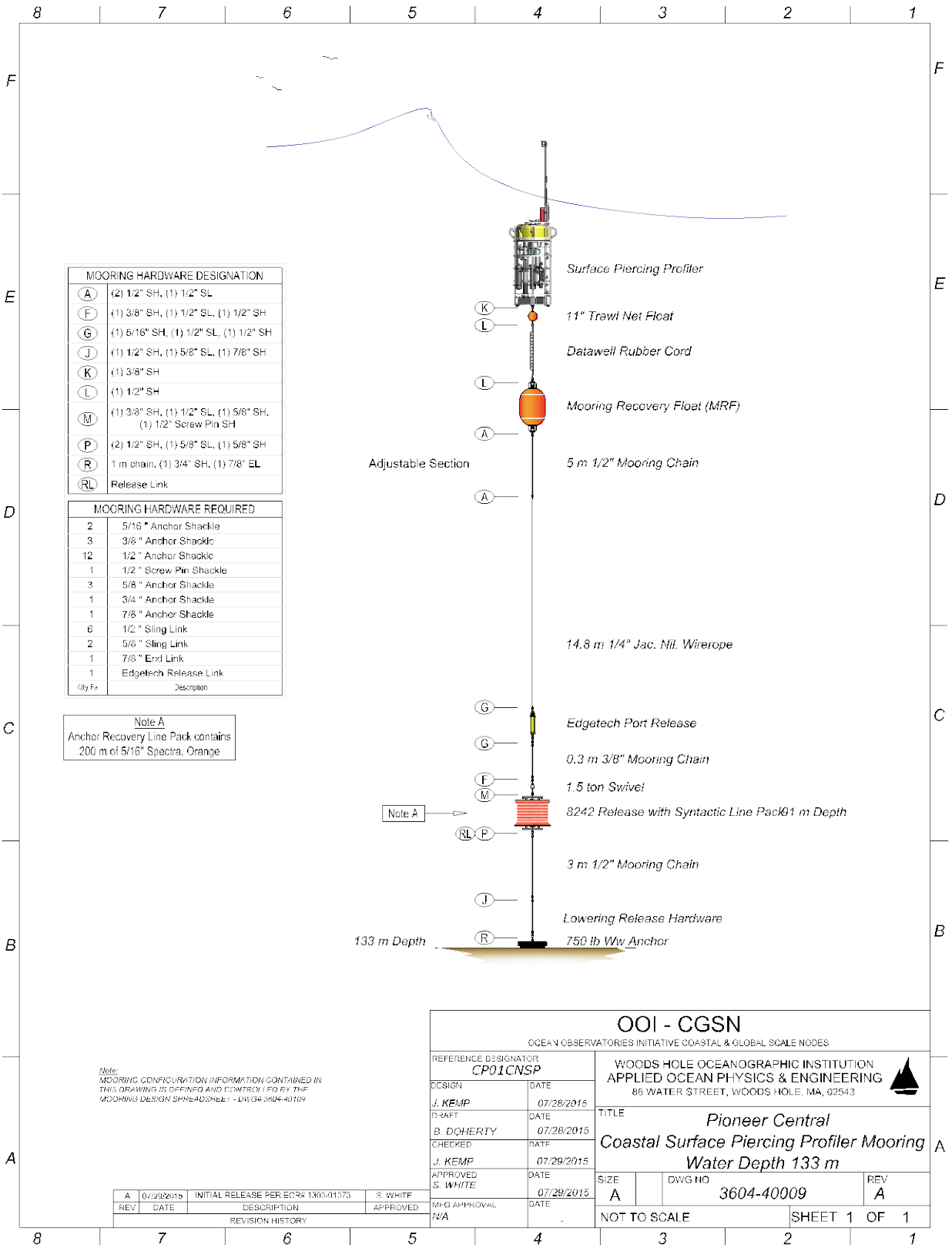

Figure 3-14 – Pioneer Central Surface Piercing Profiler (CSPP).

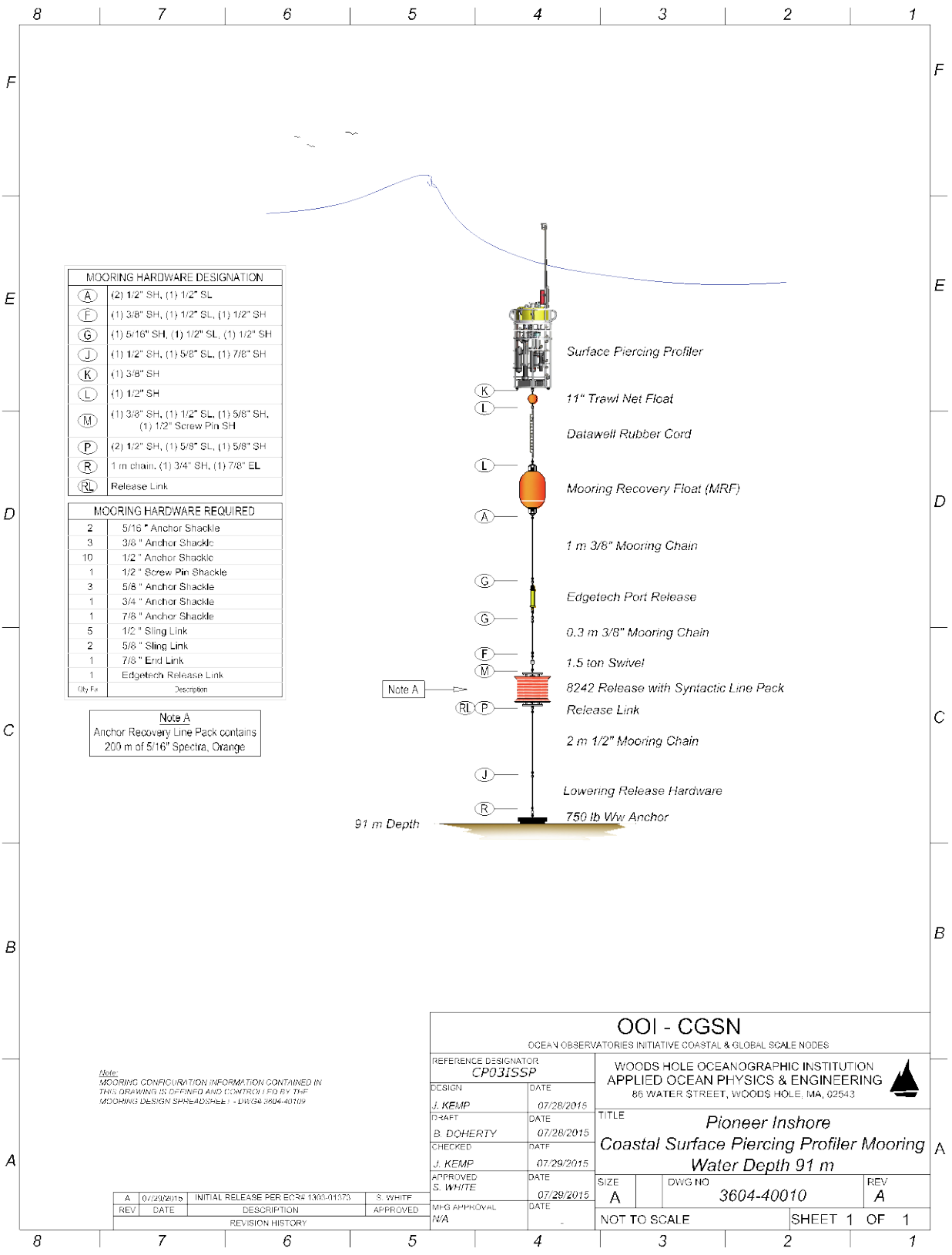

Figure 3-15 – Pioneer Inshore Surface Piercing Profiler (CSPP)