Cruise Plan
Coastal Pioneer 9 Deployment
Leg 1: R/V *Armstrong* Cruise AR-24A
22 October – 26 October 2017
Leg 2: R/V *Armstrong* Cruise AR-24B
28 October – 4 November 2017
Leg 3: R/V *Armstrong* Cruise AR-24C
5 November – 12 November 2017

Control Number: 3204-00901
Version: 0-04
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Date: 2017-10-12
Approved: Paul Matthias, xxxx-xx-xx

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

Template 3401-00003 Version 2-01

Revision History

Version	Description	Originator	Release Date
0-01	Initial draft	R. Travis	
0-02	Added Ver 1 of timeline, updated glider recovery info, updated staffing	R. Travis	
0-03	Final draft, needs updated deck plans and mooring deck drawings	A. Plueddemann	
0-04	Minor updates/corrections to text, updated all deck drawings	S. White	

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1.0 Introduction

1.1. Overview

This is the ninth 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 ninth Pioneer Array service cruise (Pioneer-9) has 28 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), recovery and deployment of gliders, operation of AUVs, recovery of anchors using an ROV, and CTD casts with water sampling at the mooring sites. The Pioneer-9 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 1-1). Pioneer-9 operations will be focused on the Pioneer Moored Array centered near 40.15°N, 70.83°W (Figure 1-2) and the glider lines (Figure 3-1). The cruise track is advisory in nature, for displaying the distances needed for planning and timing of cruise operations. The ship's officers will determine the actual courses and waypoints. The Chief Scientist will direct navigation within the array. The cruise originates from and returns to Woods Hole, MA. Mooring site locations and water depths are provided in Appendix B.

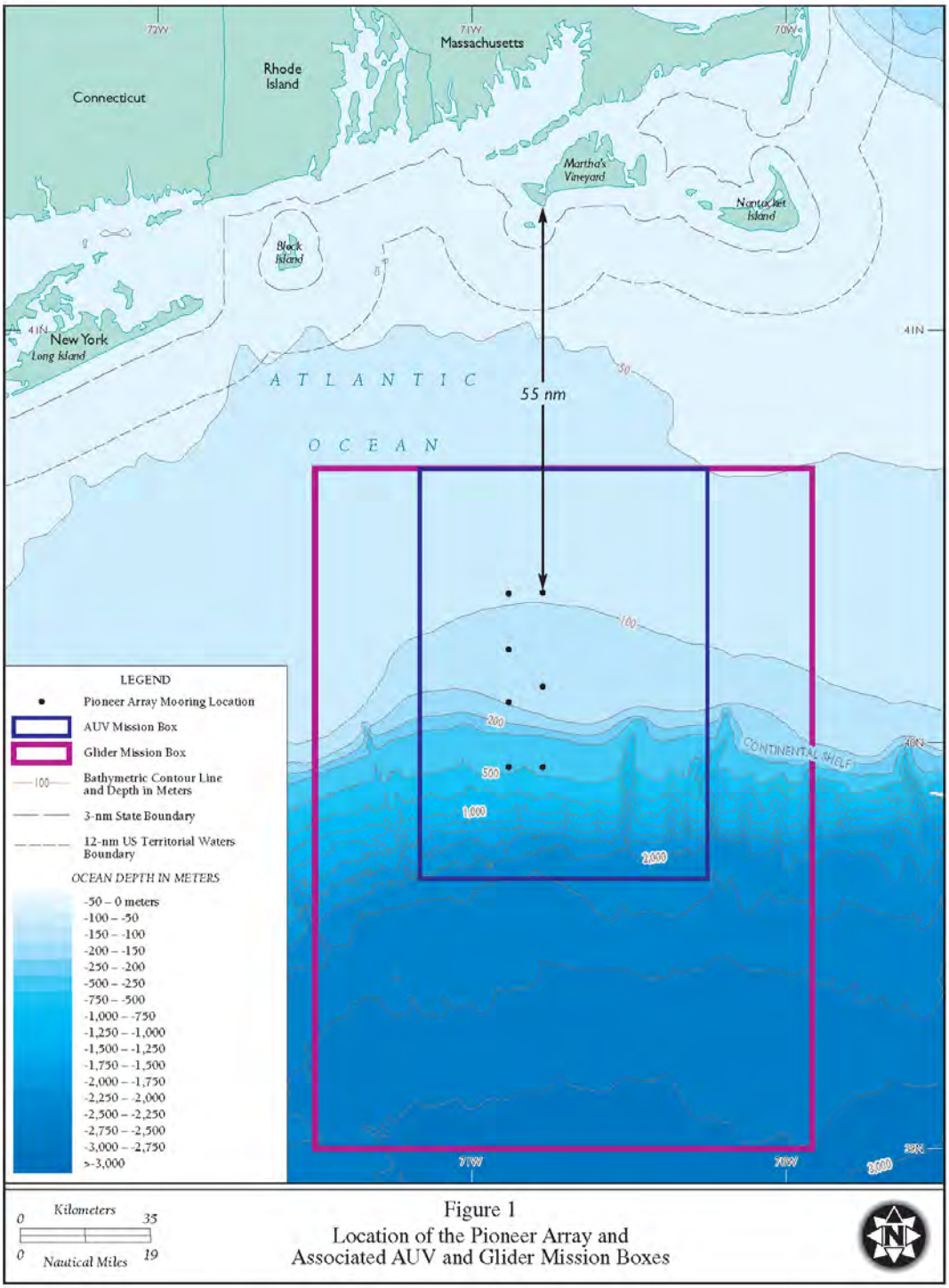

Figure 1-1 Map of the Pioneer Array region
The seven moored array sites (dots), the AUV operating region and the glider operating region are shown along with bathymetric contours.

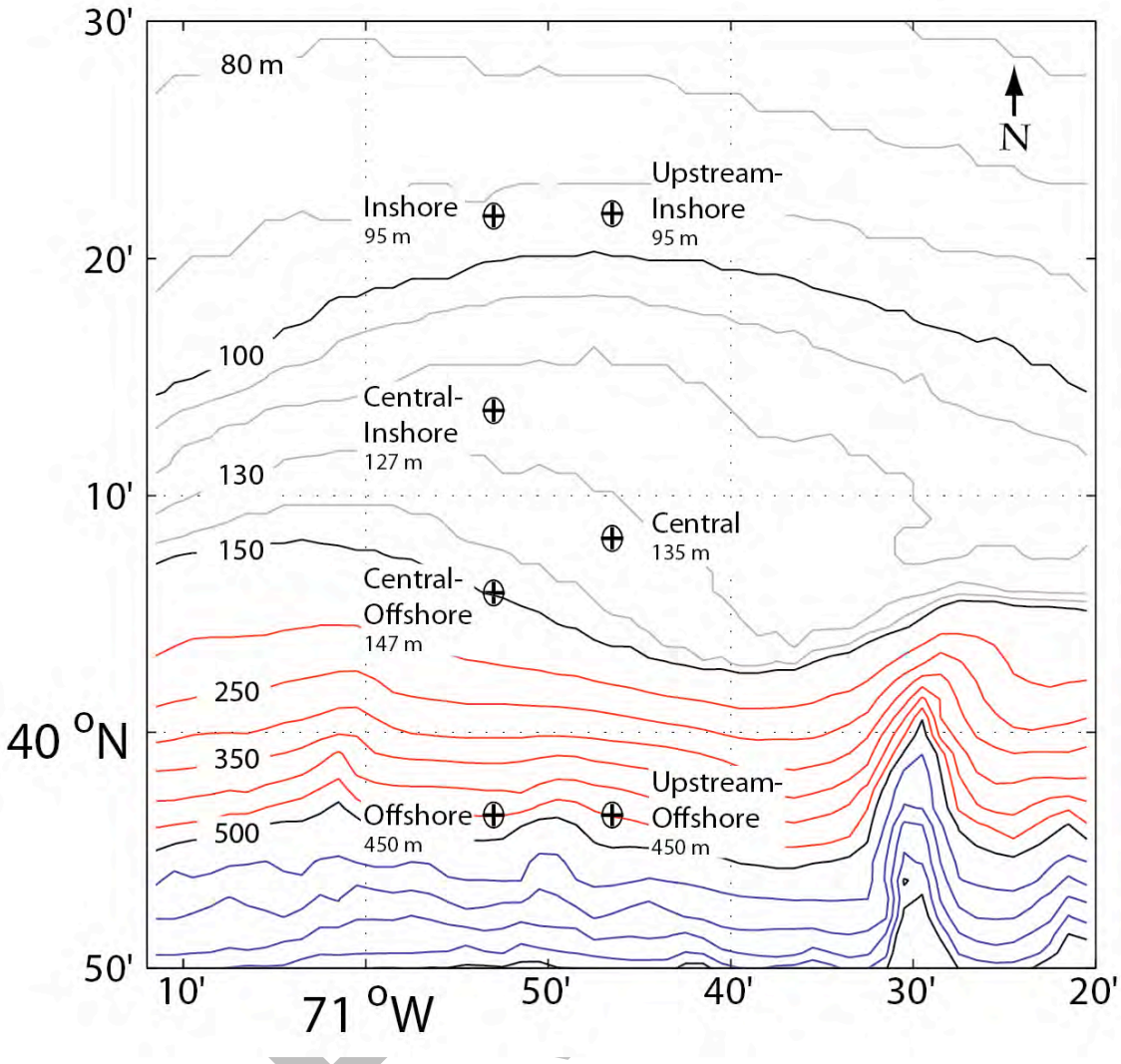

Figure 1-2 Pioneer Array mooring sites
Site centers are marked by black "+" and encircled by approximate 0.5 nm radius buffer zones. Bathymetry is shown at 10 m (gray), 50 m (red) and 100 m (blue) intervals, respectively. Black contours are at 100 m, 150 m, 500 m and 1000 m.

2.0 Cruise Plan

2.1. Background

The Pioneer Array operating plan calls for two major field operations per year to “turn” the moorings (recover old and deploy new). These mooring turn cruises nominally occur in April and October, but the vagaries of ship scheduling may result in different timing. The mooring turn cruises are also used as an opportunity to turn the gliders and operate AUVs from the ship. The current status of the Pioneer Array is as follows: Three Coastal Surface Moorings (CSMs) are deployed. Five Coastal Profiler Moorings (CPMs) are deployed. Three CPM anchors (PMCO-6, PMCO-7, PMUO-4) were left unrecovered from prior cruises. Two gliders are currently operating – on the Eastern Boundary (EB) line and the Frontal Zone (FZ-1) line.

2.2. Staging and De-staging

Staging and loading will be done at the Woods Hole Oceanographic Institution (WHOI) in three periods. Staging for Leg 1 will begin on 19 October with the preparation and loading of major deck gear (winches, tuggers) and the U Conn ROV gear. The primary loading day for Leg 1 will be 20 October. Staging for Leg 2 will begin on 23 October with the transport of CSM, CPM, glider and AUV equipment to the WHOI dock. The primary loading day for Leg 2 will be 27 October. Staging for Leg 3 will begin on 1 November with the transport of CPMs to the dock. The primary loading day for Leg 3 will be 4 November. The ship's crane will be suitable for loading most science gear. If necessary, this will be supplemented by the large WHOI crane or outside services (e.g., Baxter Crane) for loading 20' containers/vans and other heavy items. At the discretion of the R/V *Armstrong*, partial loading and access to the ship may be possible prior to the primary loading days.

As part of the staging operation, it may 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 in consultation with the ship. A deck plan showing the location of major deck components is provided in Appendix A.

Between Leg 1 and Leg 2 it will be necessary to mount and test the AUV Launch and Recovery System (LARS) on the *Armstrong* aft starboard arm. The complete installation includes a hydraulic power pack, hydraulic hoses, and the LARS assembly, which replaces the wire roller head on the aft starboard arm. This unit was successfully test fit in port previously.

Offloading and destaging of scientific equipment will be conducted between the first two cruise legs and upon termination of Leg 3 on 12 November. Destaging may continue during 13 November. The ship's crane will be suitable for offloading most science gear, supplemented by a shore crane for containers/vans if necessary.

2.3. Cruise 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 ROV operations and CPM deployments during Leg 1, CSM, glider and AUV operations during Leg 2, and CPM operations during Leg 3. CTDs with bottle samples will be done in conjunction with deployment and recovery operations on all three Legs. Glider operations will be interspersed with mooring operations at times and locations chosen for efficiency. Additional objectives and ancillary activities will typically be conducted overnight or in late evening after Primary Objectives for the day are completed.

The primary objectives of the Pioneer cruise 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.

1) Recover the Central Coastal Surface Mooring (CP01CNSM-00007).
2) Recover the Inshore Coastal Surface Mooring (CP03ISSM-00006).
3) Recover the Offshore Coastal Surface Mooring (CP04OSSM-00006).
4) Recover the Central Inshore Profiler Mooring (CP02PMCI-00008).
5) Recover the Central Offshore Profiler Mooring (CP02PMCO-00008).
6) Recover the Upstream Inshore Profiler Mooring (CP02PMUI-00009).
7) Recover the Upstream Offshore Profiler Mooring (CP02PMUO-00009).
8) Recover the Offshore Profiler Mooring (CP04OSPM-00007).

9) Recover the Central Offshore Profiler Mooring anchor (CP02PMCO-00006).
10) Recover the Central Offshore Profiler Mooring anchor (CP02PMCO-00007).
11) Recover the Upstream Offshore Profiler Mooring anchor (CP02PMUO-00004).
12) Recover 1 deep (1000 m engine) Coastal Glider (FZ-1).
13) Recover 1 shallow (200 m engine) Coastal Glider (EB).
14) Deploy the Central Coastal Surface Mooring (CP01CNSM-00008).
15) Deploy the Inshore Coastal Surface Mooring (CP03ISSM-00007).
16) Deploy the Offshore Coastal Surface Mooring (CP04OSSM-00007).
17) Deploy the Central Inshore Profiler Mooring (CP02PMCI-00009).
18) Deploy the Central Offshore Profiler Mooring (CP02PMCO-00009).
19) Deploy the Upstream Inshore Profiler Mooring (CP02PMUI-00010).
20) Deploy the Upstream Offshore Profiler Mooring (CP02PMUO-00010).
21) Deploy the Offshore Profiler Mooring (CP04OSPM-00008).
22) Deploy the Inshore Profiler Mooring (CP03ISPM-00001).
23) Deploy the Central Profiler Mooring (CP01CNPM-00001).
24) Deploy 4 deep (1000 m engine) Coastal Glider(s) (FZ-1, FZ-2, SS-1, SS-2).
25) Deploy 1 shallow (200 m engine) Coastal Glider(s) (EB).
26) Conduct multiple AUV missions in the vicinity of the moored array.
27) Conduct CTD casts with water sampling at the deployment/recovery sites.
28) Conduct ship vs. buoy meteorological comparisons at each CSM site.

The additional objectives of the Pioneer cruise are listed below. These objectives will be completed as time and conditions permit. Shipboard underway sampling will typically be conducted from late evening, after mooring operations are completed, to early morning before the start of the next operation. Bathymetric, CTD and other surveys may be conducted at various times based on weather conditions and other factors.

1) Carry out shipboard underway sampling in support of field calibration/validation
2) Conduct CTD surveys (no bottle samples) in the vicinity of the moored array.
3) Conduct underway surveys (ADCP, EK-80) 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).

Table 2-1 – Pioneer glider deployment plan.

Name	Region	Buoyancy Engine	Pioneer-9
EB	Eastern Boundary	200 m	Planned deployment
FZ-1	Frontal Zone	1000 m	Planned deployment
SS-1	Slope Sea	1000 m	Planned deployment
SS-2	Slope Sea	1000 m	Planned deployment
FZ-2	Frontal Zone	1000 m	Planned deployment
GS	Gulf Stream	1000 m	Not planned

The cruise also has ancillary activities, requested by outside users and scheduled in consultation with the Chief Scientist and Program Manager. On Leg 1, Tim Duda and Gordon Zhang (WHOI AOPE Department) will conduct surveys using the ship's EK-80 echosounder in the vicinity of the Pioneer moored array. Also on Leg 1, Taylor Crockford (WHOI Biology Department) will install and operate an Imaging FlowCytoBot (IFCB) connected to the ship's underway seawater system. On Leg 2, Kristen Hunter-Cevera (Marine Biological Laboratory) will collect water samples for plankton analyses from CTD casts. On Legs 2 and 3, we will attempt to add one or two shallow (60-90 m depth) CTD stations in support of the Northeast U.S. Shelf Long Term Ecological Research (LTER) Project. These will be most easily accommodated on the transits to and from the Pioneer Array. On Leg 3, WHOI graduate student Mallory Ringham (Marine Chemistry & Geochemistry Department) will operate a Dissolved Inorganic Carbon (DIC) sensor attached to the CTD rosette frame, supplemented by bottle samples of DIC. These ancillary operations will either be conducted at night or concurrent with OOI operations per prior arrangements with the OOI team, and will not interfere with any OOI objectives.

The Chief Scientist and Program Manager 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) will be communicated to the Program Manager at the earliest opportunity. Changes to the cruise plan anticipated to have significant financial impacts (e.g. additional ship days) require approval from the PM prior to execution. 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.

2.4. Specific Cruise Operations

2.4.1. Release Tests

At a convenient time prior to deployment of the moorings, the science party will 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.

2.4.2. 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.

2.4.3. 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.

2.4.4. AUV Operations

AUV deployments and recoveries are expected to be done using the OOI LARS attached to the starboard arm located aft of the CTD. The LARS and supplemental handling gear for the AUV will be supplied by the science party. AUV recoveries may require a small boat operation prior to lifting the vehicle aboard, but this is not expected to be a normal part of the operation. 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.

2.4.5. Anchor Surveys

Once the anchor has settled on the bottom, the ship will occupy three stations 0.2 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. Efficiency of the surveys is increased if the release deck gear can be connected to the ship's 12 kHz hull transducer.

2.4.6. 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.

2.4.7. Sensor Performance Evaluation

Sensor evaluation will be conducted at surface mooring sites. For evaluation of meteorological and sea surface variables the ship will 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.

2.4.8. 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 periods. The ship's ADCP systems will be used to continuously measure the currents in the upper ocean while underway. The EK-80 system will be used for selected transects or time-series stations. Sea surface temperature and salinity will be recorded continuously, using the ship's thermosalinograph.

2.4.9. Shipboard Multi-beam Bathymetry

Bathymetric surveys may be conducted within the Pioneer Array region (e.g., within the AUV Mission Box). 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.

2.4.10. Small Boat Operations

The use of a work boat may be requested for AUV recovery operations or 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.

2.5. 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 typically result in postponement until conditions improve. 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) may result in postponement of operations until the failure is 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 Appendixes

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

Timeline

22 Oct	Complete loading, depart WHOI (13:00)
23 Oct	ROV test dive, Recover PMUO-00004 anchor
24 Oct	Recover PMCO-00006 anchor, Recover PMCO-00007 anchor
25 Oct	Deploy ISPM, CTD cast, Deploy CNPM, CTD cast
26 Oct	Arrive WHOI (08:30), offload
27 Oct	In-port WHOI, staging and loading for Leg 2, prep OSSM for deployment
28 Oct	Complete loading, depart WHOI (10:30), LTER CTDs, turn EB glider
29 Oct	Deploy OSSM, CTD cast, deploy FZ gliders, CTD cast
30 Oct	Deploy CNSM, CTD cast, deploy shelf gliders, CTD cast
31 Oct	Deploy ISSM, CTD casts, recover ISSM, recover FZ glider
01 Nov	Recover OSSM, Recover CNSM, AUV test mission
02 Nov	Start dual AUV survey, with cross-shelf CTD survey
03 Nov	Complete dual AUV survey
04 Nov	Arrive WHOI (11:00), offload CSMs, load CPMs for Leg 2
05 Nov	Complete loading, depart WHOI (10:30 or 15:30), LTER CTDs
06 Nov	Recover OSPM, deploy OSPM, CTD casts (Wang samples)
07 Nov	Recover PMUO, deploy PMUO, CTD casts (Wang samples)
08 Nov	Recover PMCO, deploy PMCO, CTD casts (Wang samples)
09 Nov	Recover PMCI, deploy PMCI, CTD casts (Wang samples)
10 Nov	Recover PMUI, deploy PMUI, CTD casts (Wang samples)
11 Nov	Cross-shelf CTD survey and/or complete primary objectives
12 Nov	Arrive WHOI (10:00), offload

Appendix B – Selected Waypoints and Maps

Table 3-1 – Pioneer-9 station list

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 deployment, CTD
Central-Inshore	CI	40 13.6	70 53.0	127 m	profiler mooring turn, CTD
Central	CN	40 08.2	70 46.5	135 m	surface mooring turn, profiler mooring deployment, CTD
Central-Offshore	CO	40 05.9	70 53.0	147 m	profiler mooring turn, anchor recoveries (2), CTD
Offshore	OS	39 56.4	70 53.0	450 m	surface mooring turn, profiler mooring turn, CTD
Upstream-Offshore	UO	39 56.4	70 46.5	450 m	profiler mooring turn, anchor recovery, CTD
Cross-shelf 1	CS-1	40 17.6	70 46.5	115 m	part of cross-shelf CTD line
Cross-shelf 2	CS-2	40 13.2	70 46.5	125 m	part of cross-shelf CTD line
Cross-shelf 3	CS-3	40 04.3	70 46.5	140 m	part of cross-shelf CTD line
Cross-shelf 3	CS-4	40 00.4	70 46.5	270 m	part of cross-shelf CTD line
AUV cross 1	AC-1	39 55.3	70 54.5	TBD	AUV cross-shelf mission box
AUV cross 2	AC-2	40 20.6	70 54.5	TBD	AUV cross-shelf mission box
AUV cross 3	AC-3	40 20.6	70 45.0	TBD	AUV cross-shelf mission box
AUV cross 4	AC-4	39 55.3	70 45.0	TBD	AUV cross-shelf mission box
AUV along 1	AL-1	40 12.3	71 05.7	TBD	AUV along-shelf mission box
AUV along 2	AL-2	40 12.3	70 33.3	TBD	AUV along-shelf mission box
AUV along 3	AL-3	40 20.6	70 33.3	TBD	AUV along-shelf mission box
AUV along 4	AL-4	40 20.6	71 05.7	TBD	AUV along-shelf mission box
Gliders	N/A	various	various	various	recoveries and deployments, CTDs

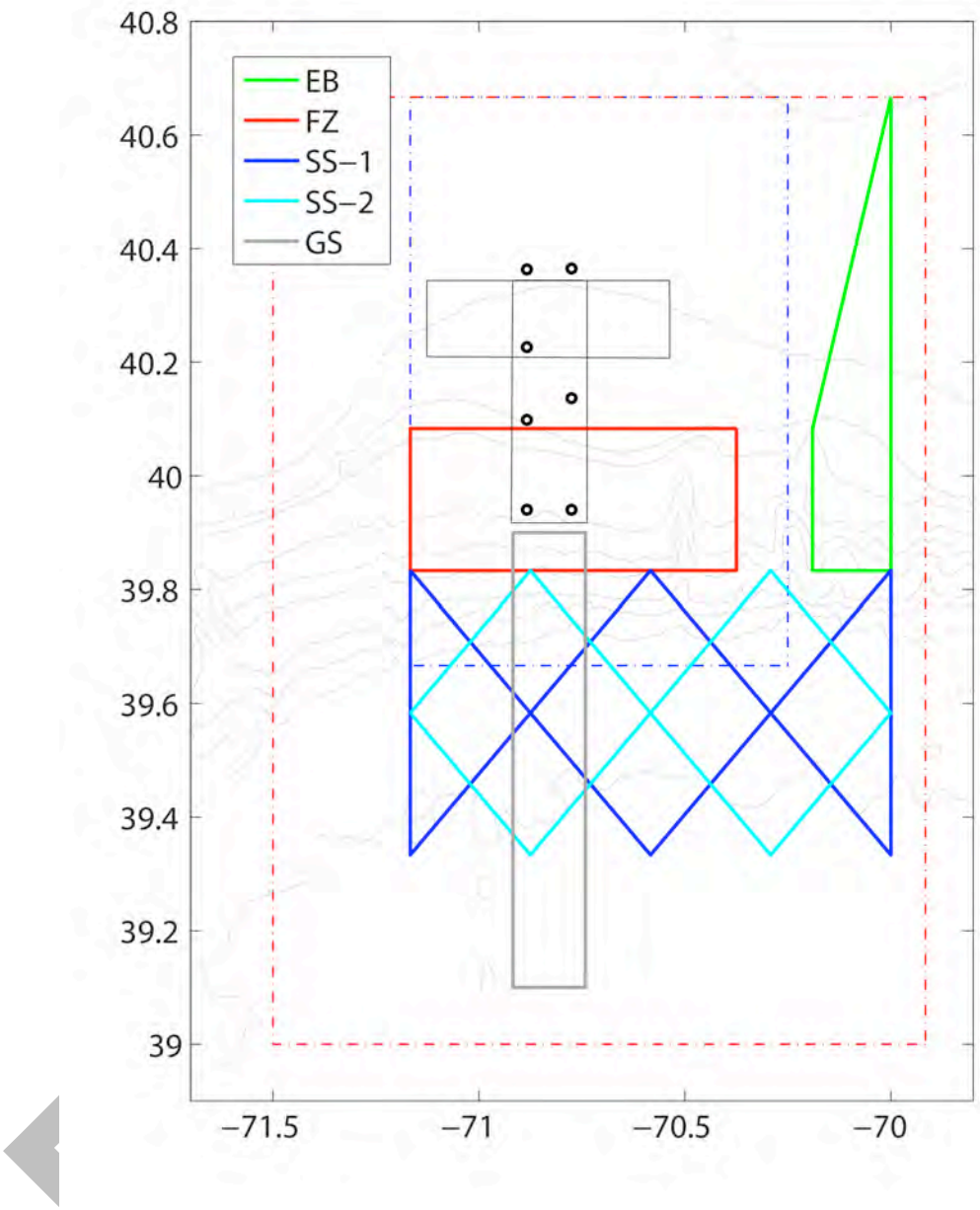

Figure 3-1 Pioneer glider and AUV track lines
The Eastern Boundary (EB, green), Frontal Zone (FZ, red), Slope Sea (SS-1, blue; SS-2, cyan) and Gulf Stream (GS, gray) tracks are shown along with the Pioneer Array moorings (circles), the AUV track lines (thin black lines) and the glider and AUV operating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

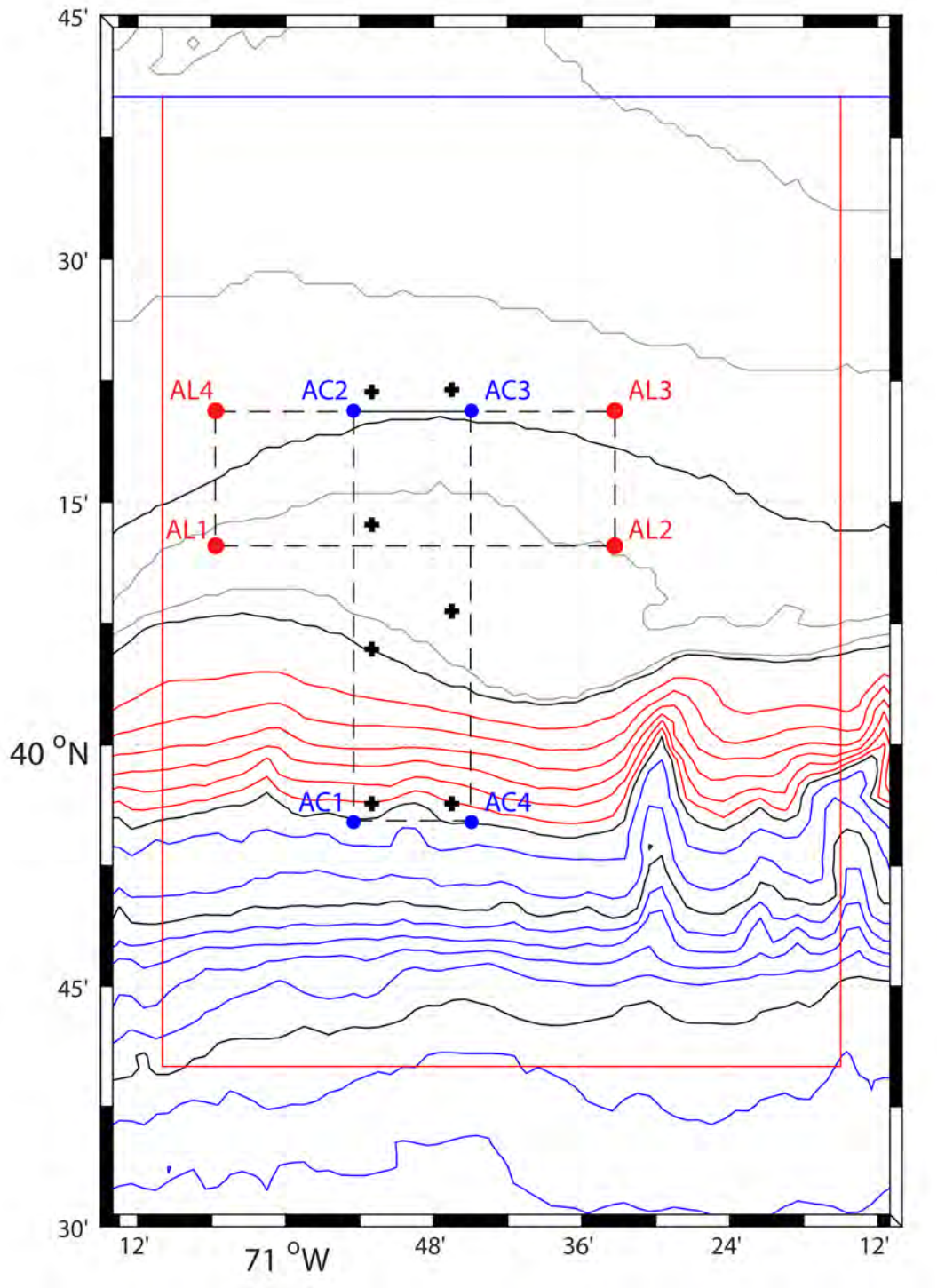

Figure 3-2 Pioneer AUV track line detail
The Along-Shelf (AL, red) and Across-Shelf (AC, blue) track lines are shown (dashed lines) along with the Pioneer Array moorings (crosses) and the AUV operating area (red rectangle).

Appendix C – Deck Plans

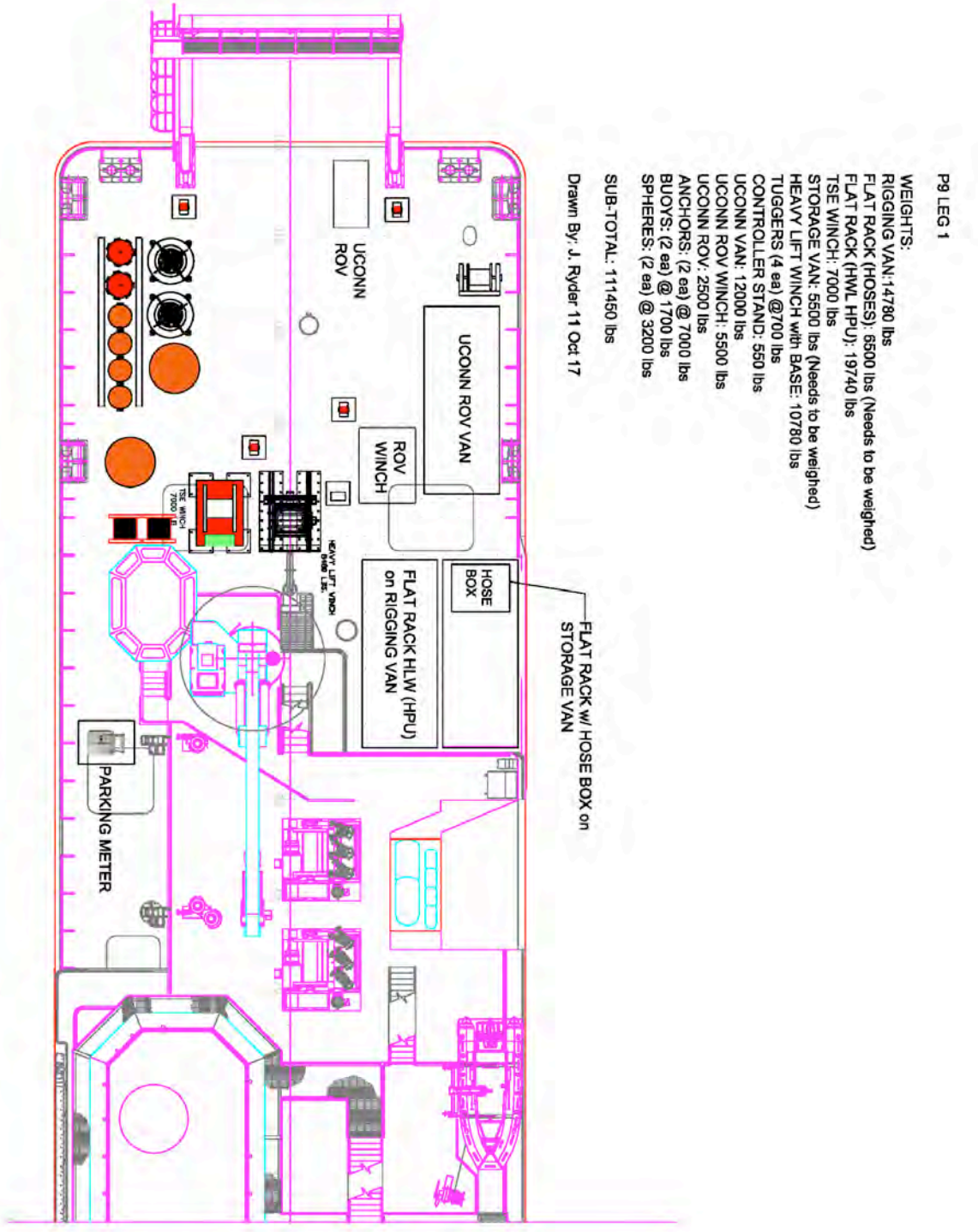

Figure 3-3 Pioneer 9 Leg 1 Deck Plan

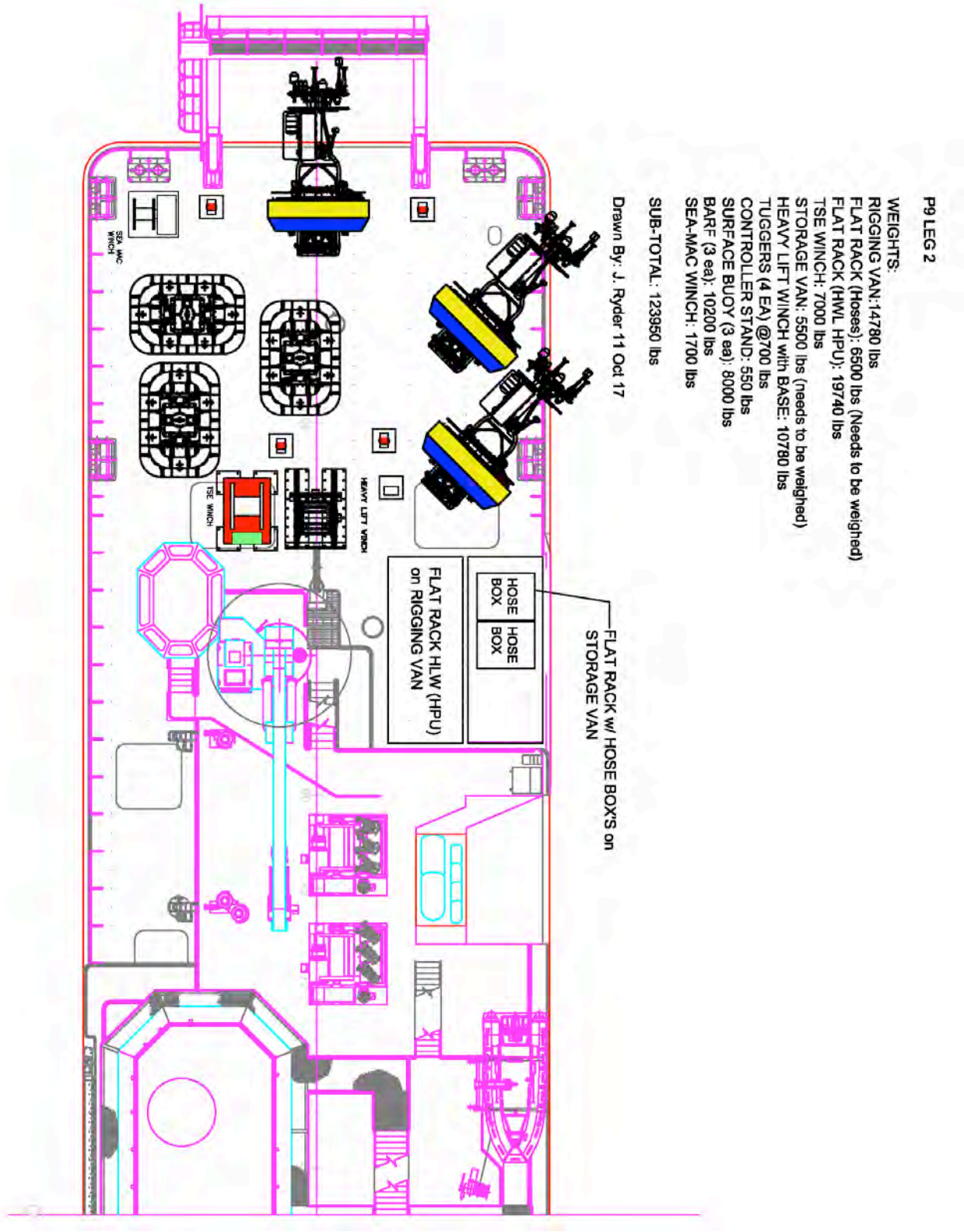

Figure 3-4 Pioneer 9 Leg 2 Deck Plan

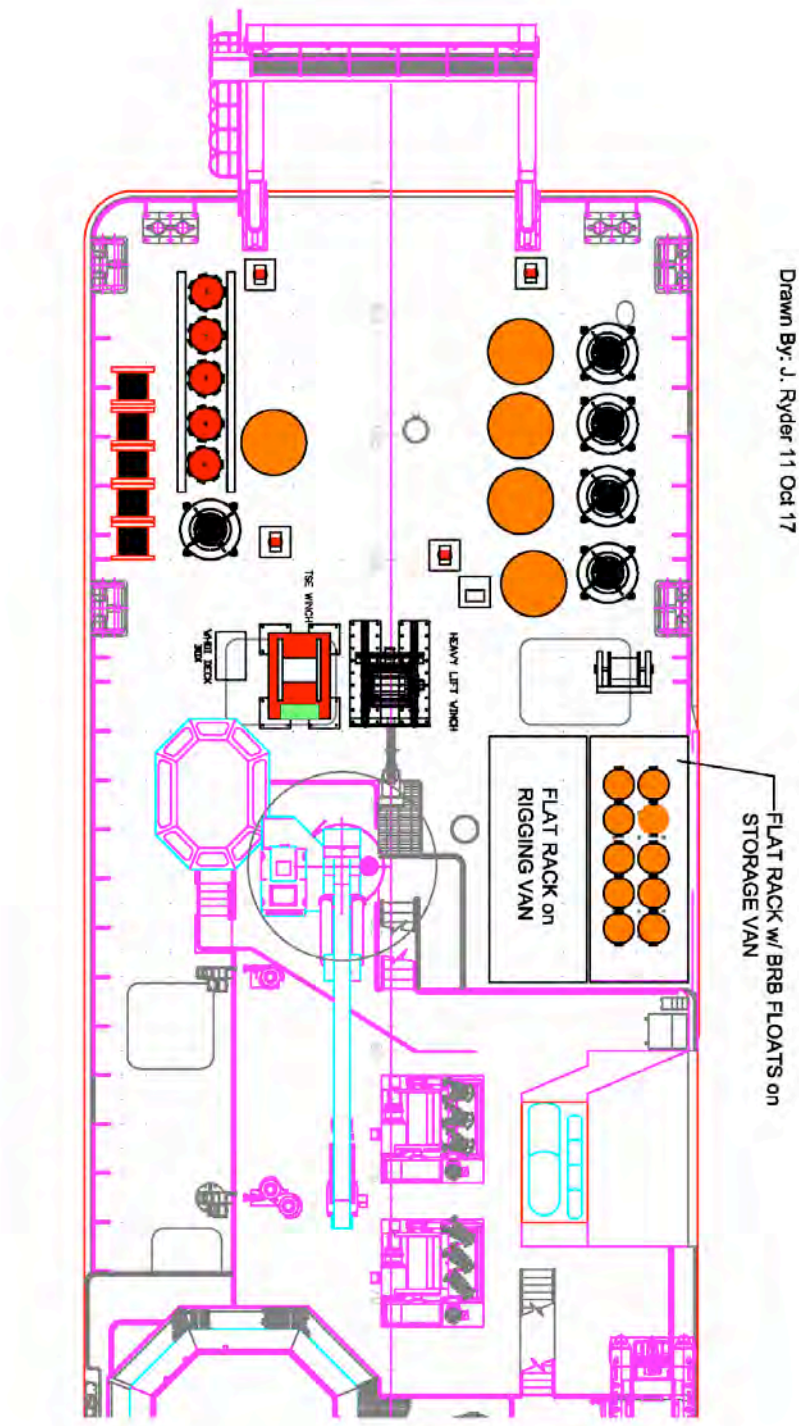

Figure 3-5 Pioneer 9 Leg 3 Deck Plan

Appendix D – Science Party

Leg 1: There will be 18 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. Arbige, Dennis	M	USA	UConn
2. Batryn, Jennifer	F	USA	WHOI
3. Benway, Eric	M	USA	WHOI
4. Crockford, E. Taylor	F	USA	WHOI
5. Duda, Tim	M	USA	WHOI
6. Greto, Carmen	M	USA	TAMU/UNOLS
7. Hutt, Eric	M	USA	TAMU/UNOLS
8. Joy, Kevin	M	USA	U Conn
9. Kemp, John	M	USA	WHOI
10. Kowalski, Lauren	F	USA	TAMU/UNOLS
11. Kuo, James	M	USA	WHOI
12. Llanos, Nico	M	USA	WHOI
13. McKee, Mike	M	USA	U Conn
14. Plueddemann, Al	M	USA	WHOI/Chief Sci
15. Ryder, Jim	M	USA	WHOI
16. Travis, Rebecca	F	USA	WHOI
17. Wellwood, Dave	M	USA	WHOI
18. Zhang, Weifeng (Gordon)	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, John Kemp, Jim Ryder
- Cruise documentation, deployment records, platform and instrument metadata
  - Rebecca Travis, Eric Benway, Jennifer Batryn (Instr.), James Kuo (CPMs)
- Logistics, deck operations, mooring hardware, mooring operations
  - John Kemp, Jim Ryder, Carmen Greto, Eric Hutt, Nico Llanos
- Mooring control and power, telemetry systems
  - James Kuo (CPMs)
- Instrument configuration, preparation and pre-deployment checks
  - James Kuo (CPMs); Jennifer Batryn
- Platform configuration and mission plan
  - James Kuo (CPMs)
- ROV operations
  - Kevin Joy, Mike McKee, Dennis Arbige
- Hydrographic sampling, including physical sample preparation
  - Dave Wellwood, Lauren Kowalski

Leg 2: There will be 19 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. Basque, Chris	M	USA	WHOI
2. Batryn, Jennifer	F	USA	WHOI
3. Dobson, Collin	M	USA	WHOI
4. Franks, Alex	M	USA	WHOI
5. Greto, Carmen	M	USA	TAMU/UNOLS
6. Hunter-Cevera, Kristen	F	USA	MBL
7. Hutt, Eric	M	USA	TAMU/UNOLS
8. Kemp, John	M	USA	WHOI
9. Kowalski, Lauren	F	USA	TAMU/UNOLS
10. Latvis, Matthew	M	USA	WHOI
11. Macdonald, Alison	F	USA	WHOI
12. McPhee, Neil	M	USA	WHOI
13. Palanza, Matt	M	USA	WHOI
14. Plueddemann, Al	M	USA	WHOI/Chief Sci
15. Reine, John	M	USA	WHOI
16. Schwartz, Jared	M	USA	WHOI
17. Travis, Rebecca	F	USA	WHOI
18. Wellwood, Dave	M	USA	WHOI
19. Wickman, Diana	F	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, John Kemp
- Cruise documentation, deployment records, platform and instrument metadata
  - Rebecca Travis, Jennifer Batryn & Neil McPhee (Instrumentation), Alex Franks (CSMs), Jared Schwartz (AUVs), Diana Wickman & Collin Dobson (gliders)
- Logistics, deck operations, mooring hardware, mooring operations
  - John Kemp, Carmen Greto, Eric Hutt, Chris Basque
- Mooring control and power, telemetry systems
  - Alex Franks (CSMs), Jared Schwartz (AUVs), Diana Wickman (gliders)
- Instrument configuration, preparation and pre-deployment checks
  - Alex Franks (CSMs); Jennifer Batryn, Neil McPhee
- Platform configuration and mission plan
  - Alex Franks (CSMs)
- Hydrographic sampling, including physical sample preparation
  - Dave Wellwood, Lauren Kowalski

Leg 3: There will be 12 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. Greto, Carmen	M	USA	TAMU/UNOLS
2. Fuller, Sarah	F	USA	WHOI
3. Hutt, Eric	M	USA	TAMU/UNOLS
4. Kemp, John	M	USA	WHOI
5. Kowalski, Lauren	F	USA	TAMU/UNOLS
6. Lund, John	M	USA	WHOI
7. Plueddemann, Al	M	USA	WHOI/Chief Sci
8. Ringham, Mallory	F	USA	WHOI
9. Ross, Chris	M	USA	WHOI
10. Smith, G. Allen	M	USA	WHOI
11. Travis, Rebecca	F	USA	WHOI
12. Wellwood, Dave	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, John Kemp
- Cruise documentation, deployment records, platform and instrument metadata
  - Rebecca Travis, John Lund (CPMs), Allen Smith (Instrumentation)
- Logistics, deck operations, mooring hardware, mooring operations
  - John Kemp, Carmen Greto, Eric Hutt, Chris Ross
- Mooring control and power, telemetry systems
  - John Lund (CPMs)
- Instrument configuration, preparation and pre-deployment checks
  - John Lund (CPMs); Allen Smith (Instruments)
- Platform configuration and mission plan
  - John Lund (CPMs)
- Hydrographic sampling, including physical sample preparation
  - Dave Wellwood, Lauren Kowalski

Appendix E – Mooring Drawings

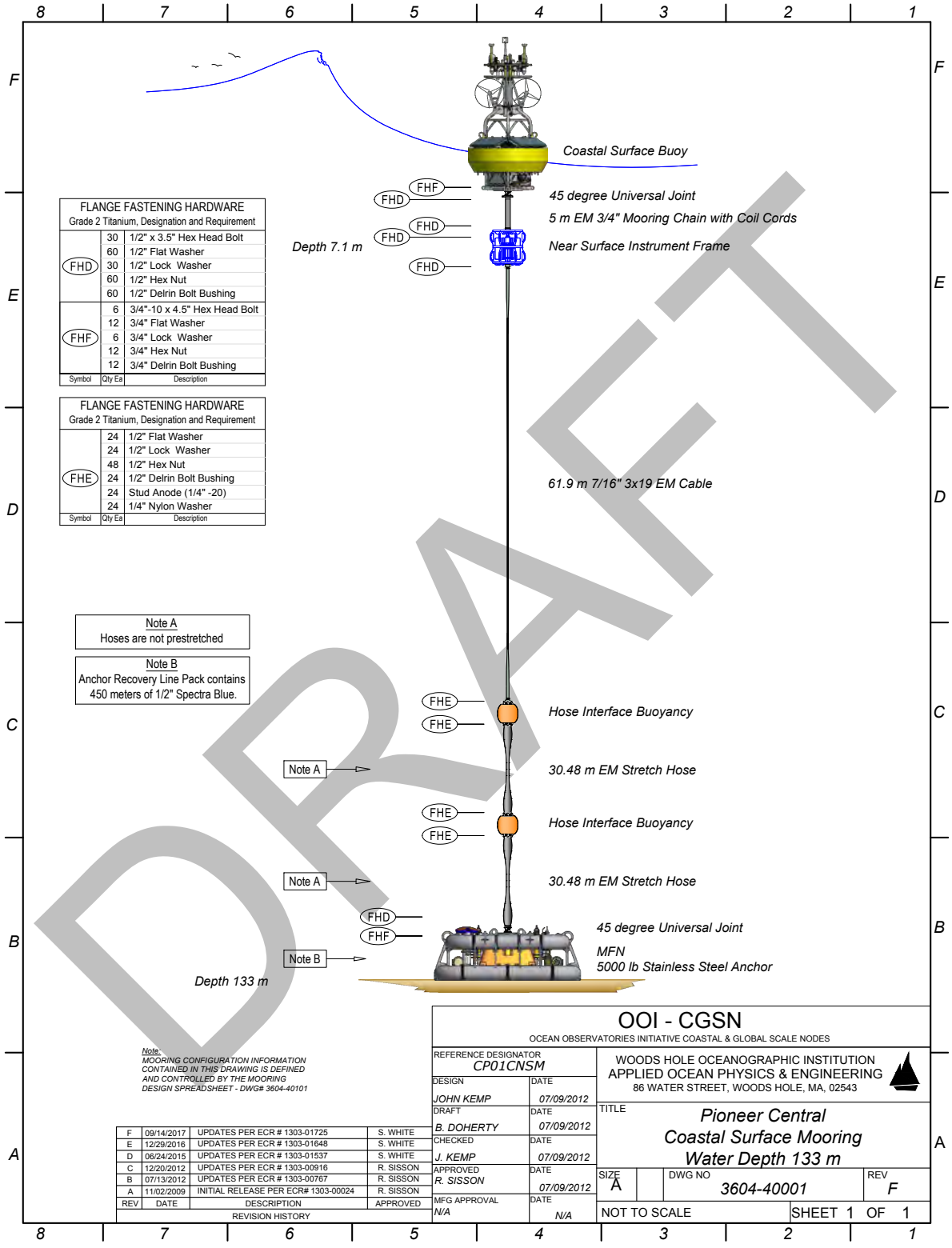

Figure 3-6 Pioneer Central Surface Mooring (CNSM)

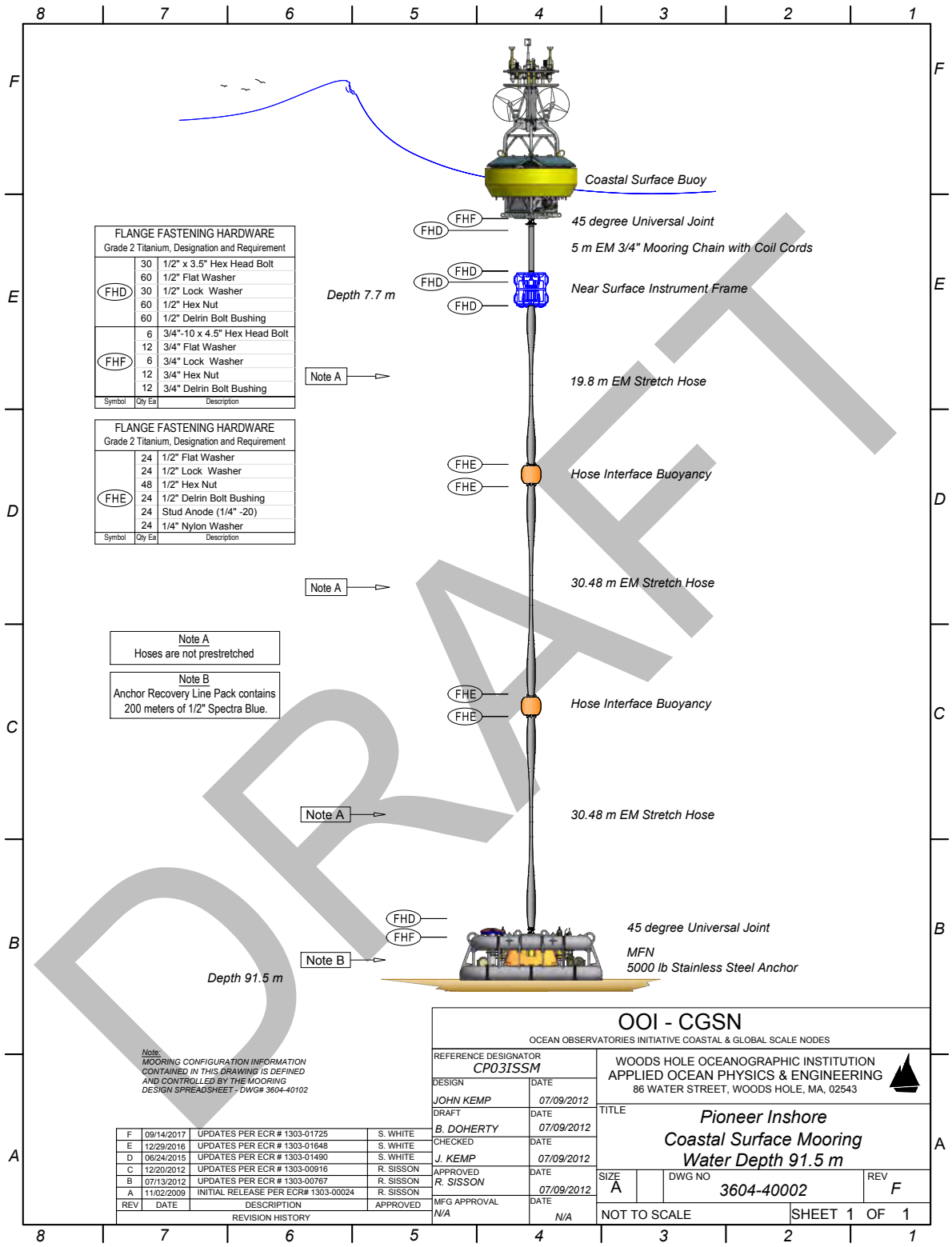

Figure 3-7 Pioneer Inshore Surface Mooring (ISSM)

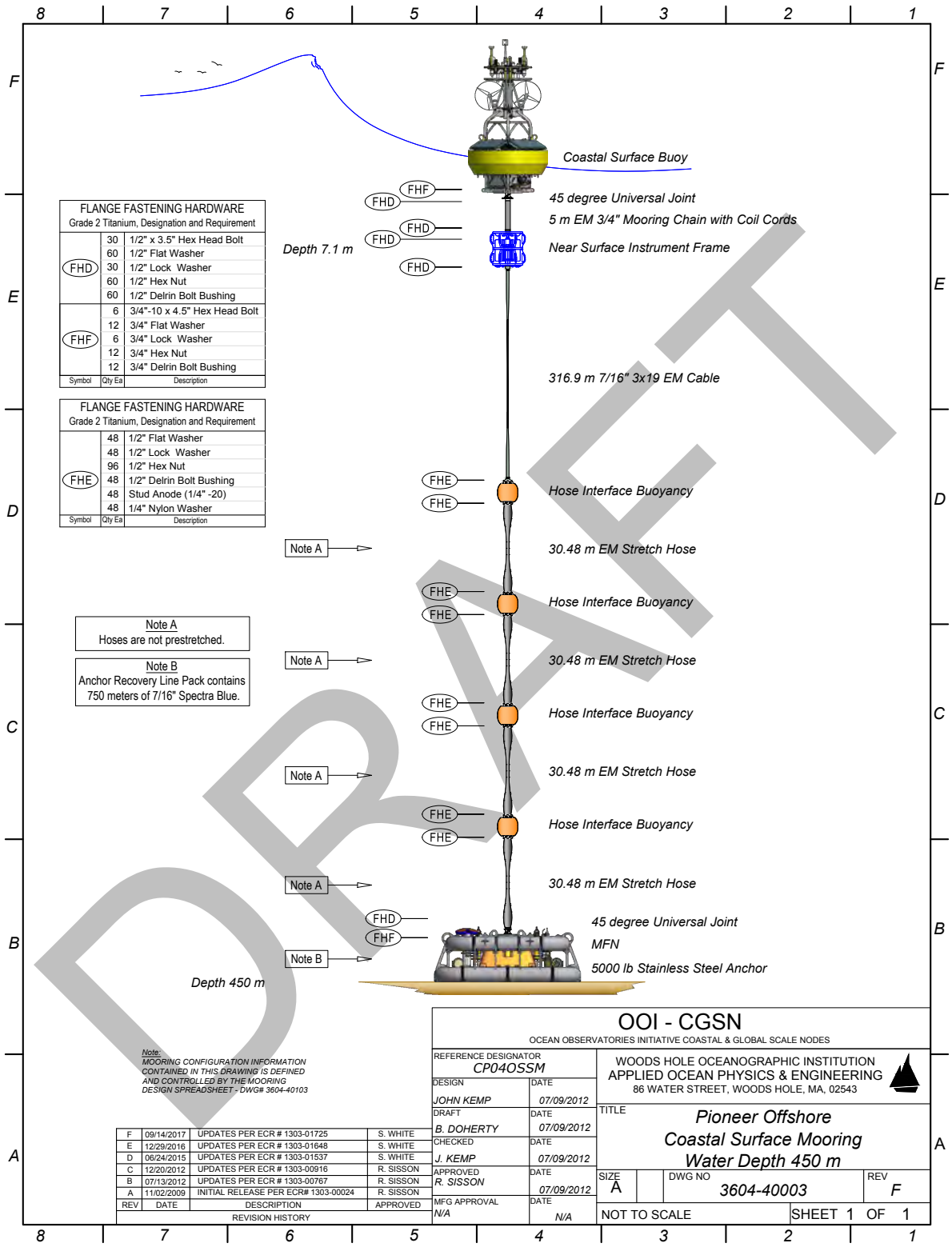

Figure 3-8 Pioneer Offshore Surface Mooring (OSSM)

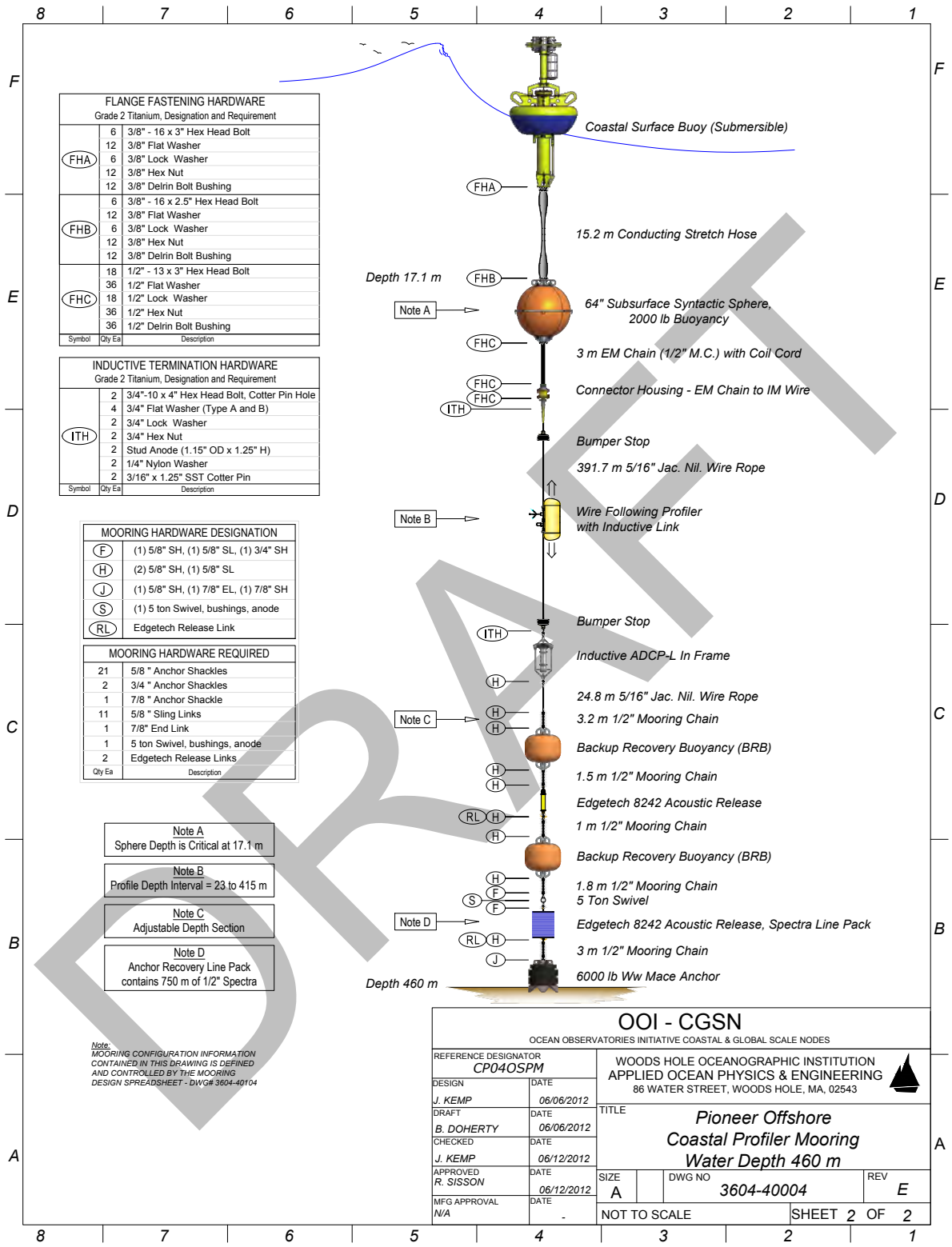

Figure 3-9 Pioneer Offshore Profiler Mooring (OSPM)

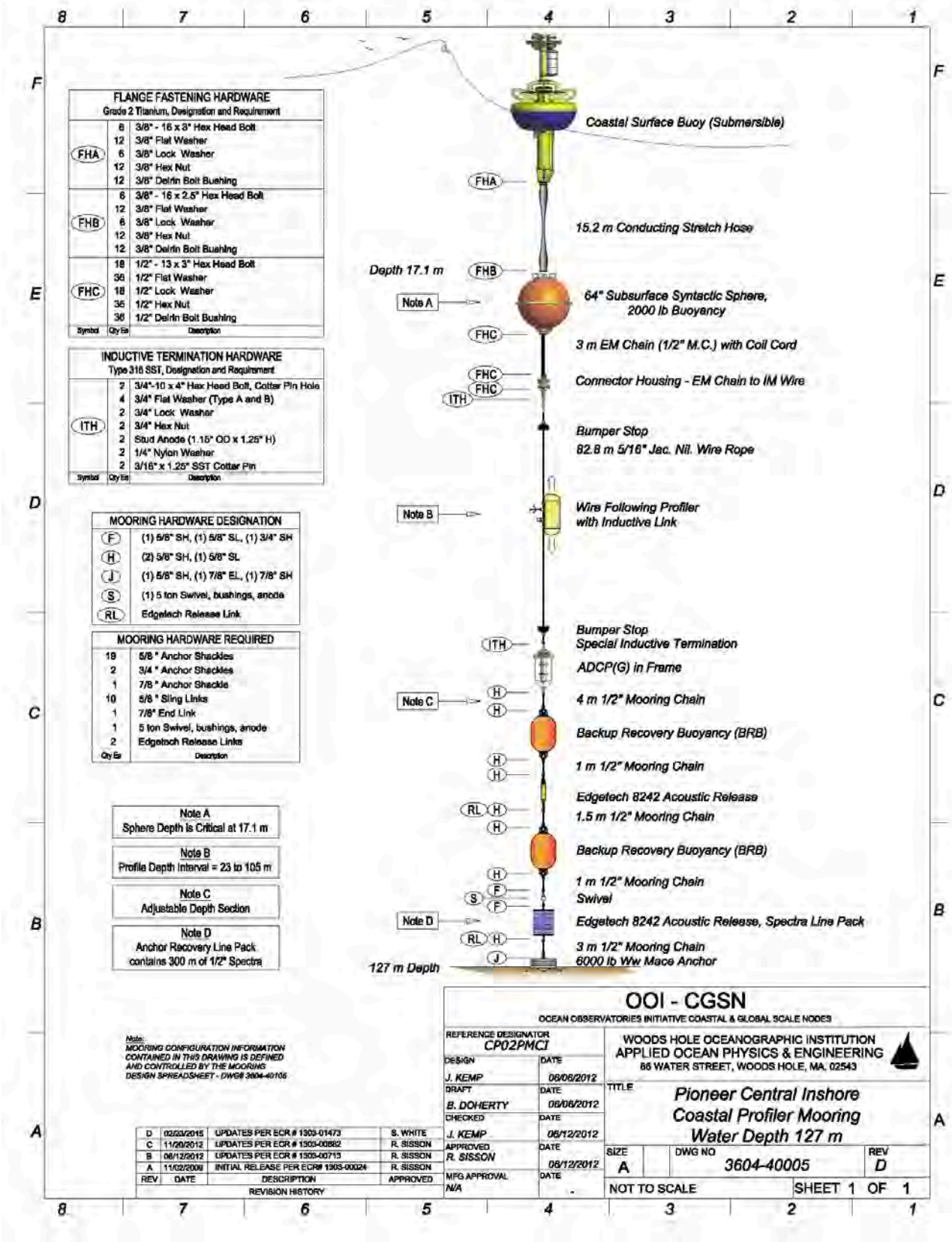

Figure 3-10 Pioneer Central Inshore Profiler Mooring (PMCI)

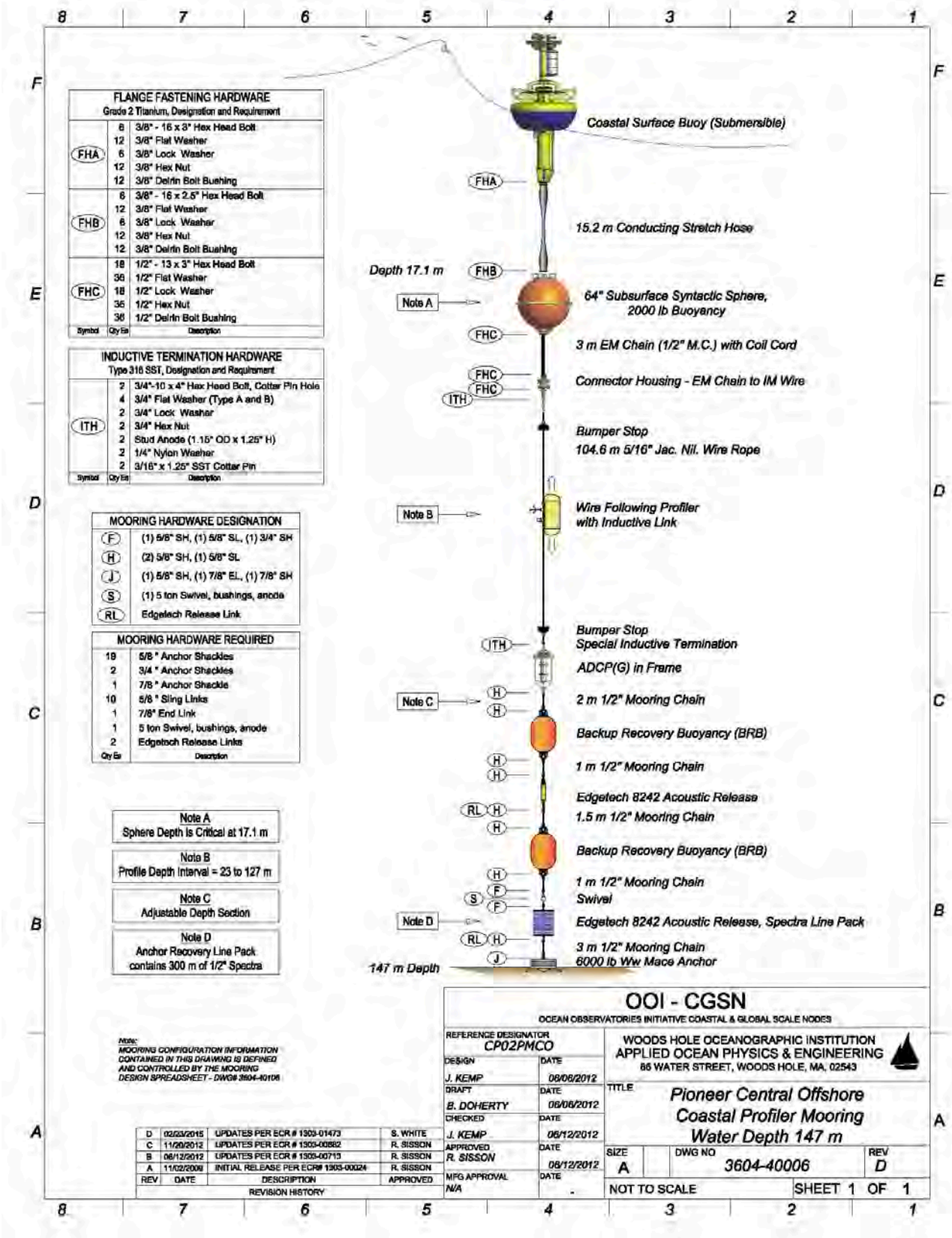

Figure 3-11 Pioneer Central Offshore Profiler Mooring (PMCO)

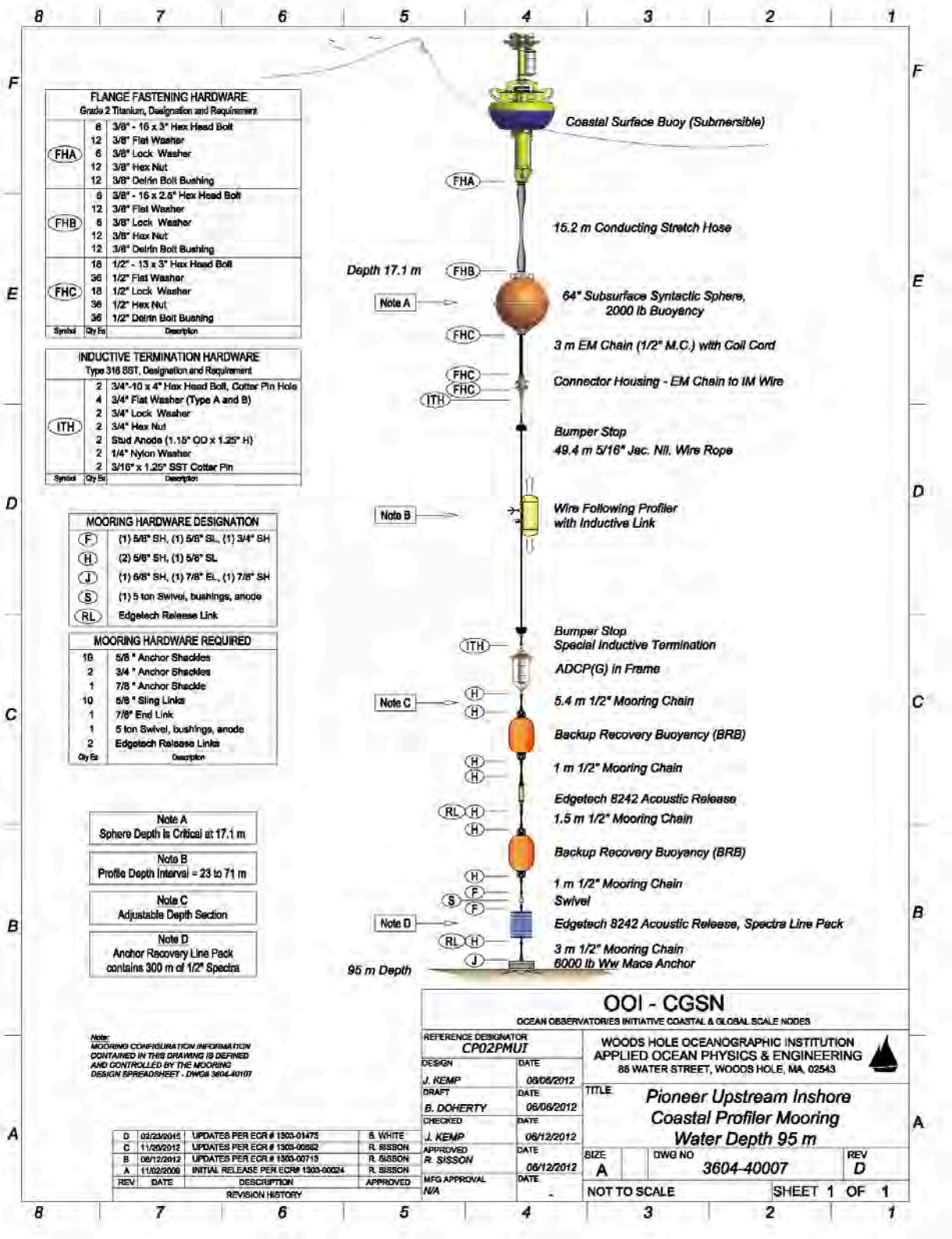

Figure 3-12 Pioneer Upstream Inshore Profiler Mooring (PMUI)

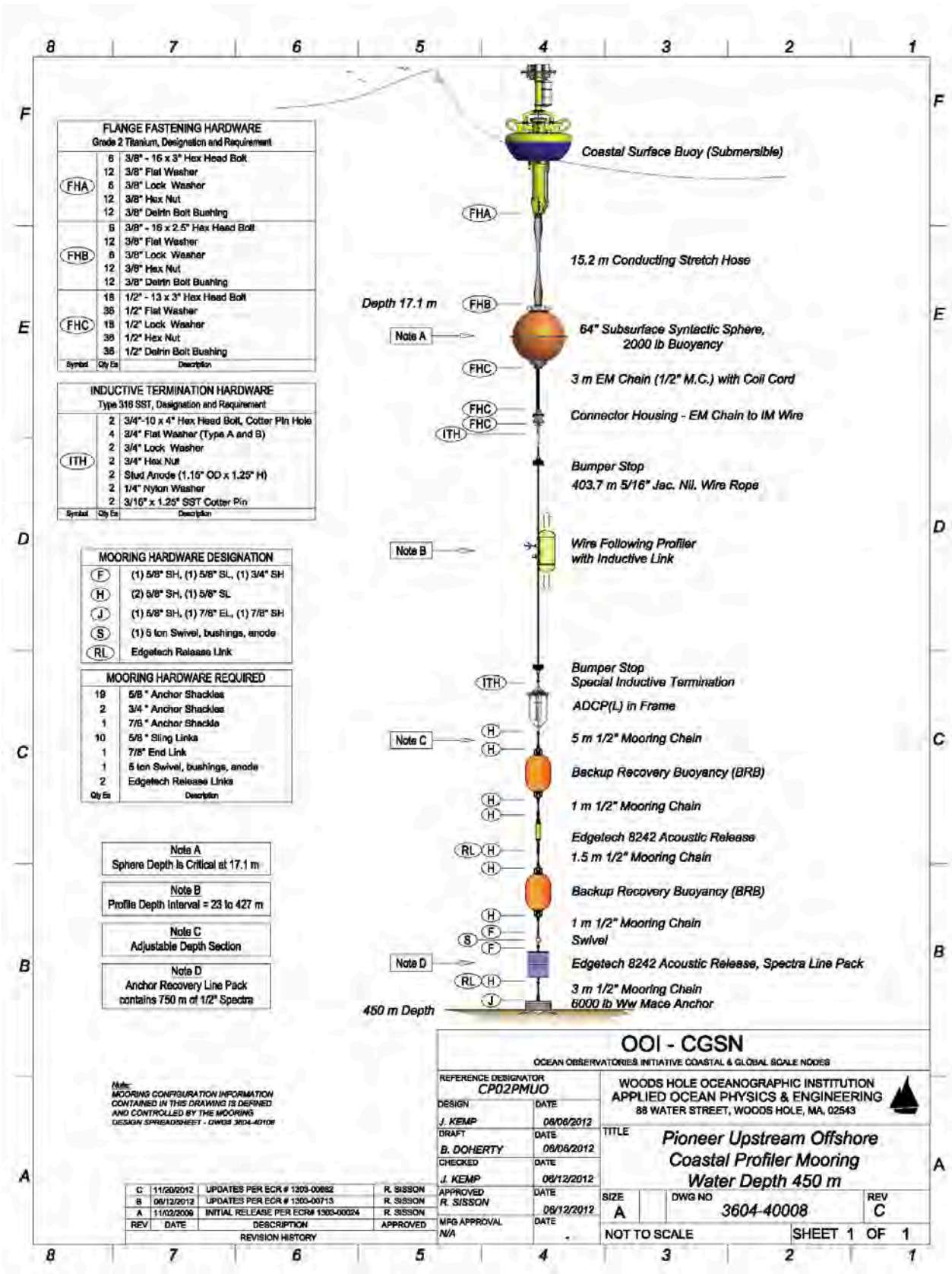

Figure 3-13 Pioneer Upstream Offshore Profiler Mooring (PMUO)

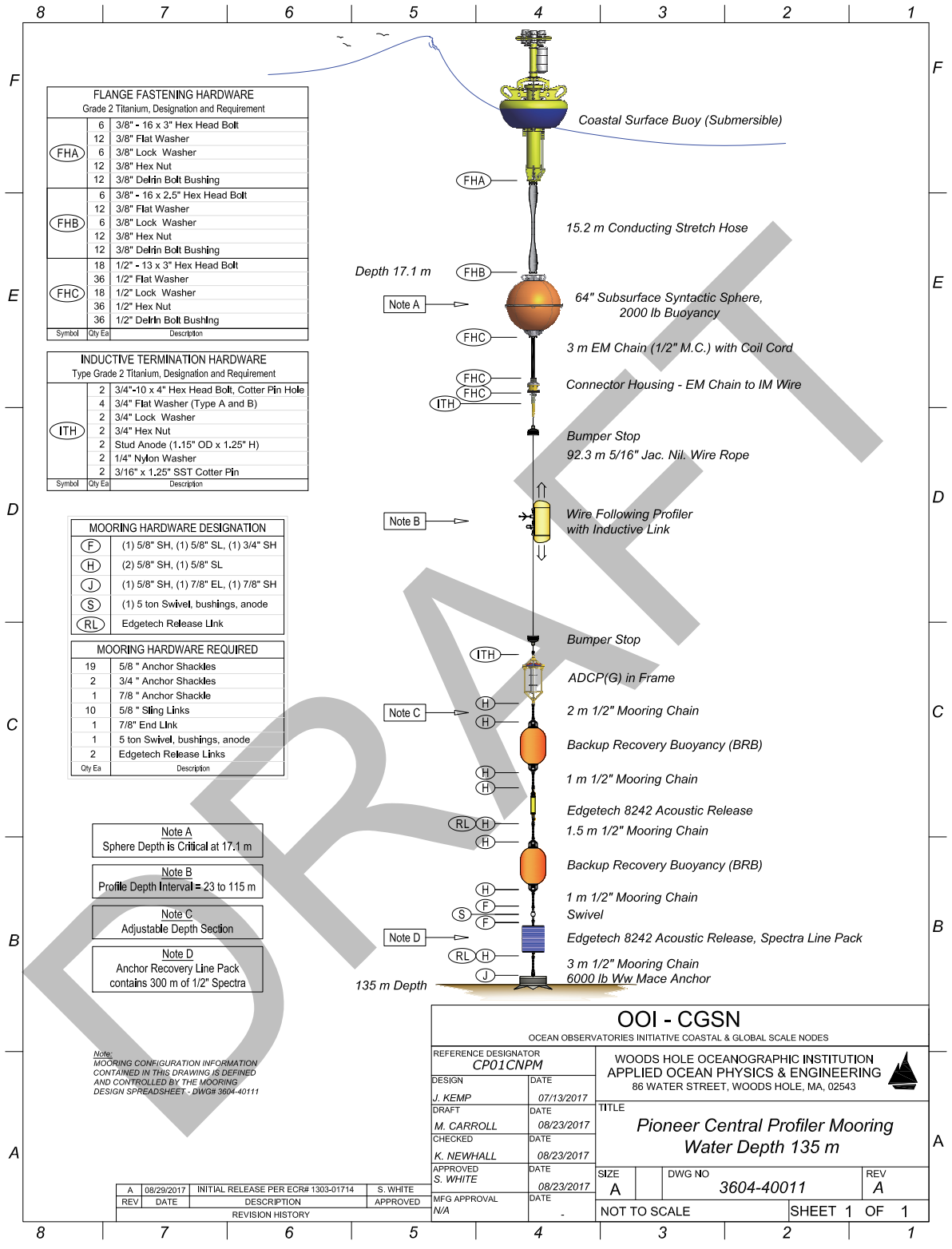

Figure 3-14 Pioneer Central Profiler Mooring (CNPM)

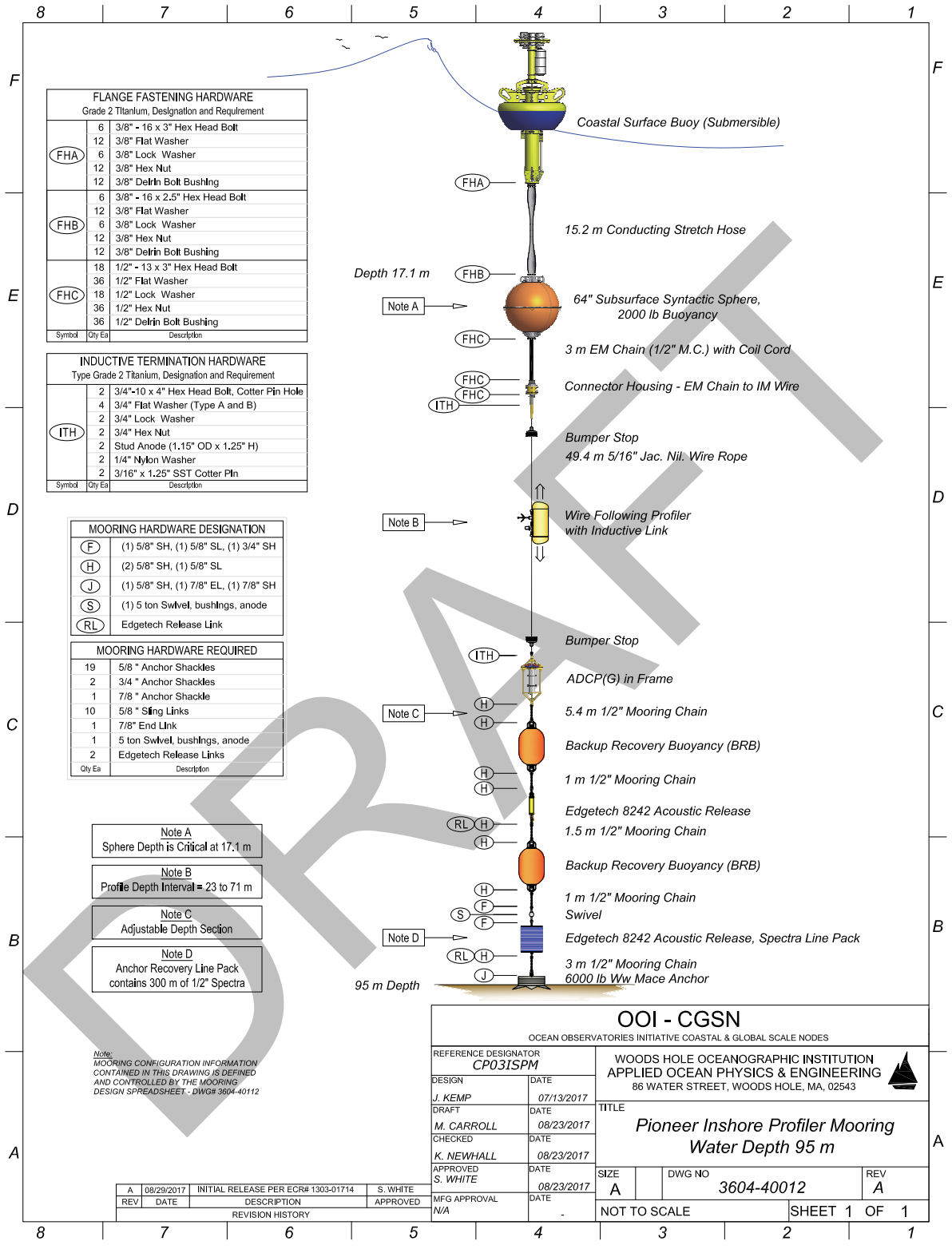

Figure 3-15 Pioneer Inshore Profiler Mooring (ISPM)