CHAPTER 5:  
DRILLING AND CORING REQUIREMENTS

Based on the scientific objectives of the IODP, there are a number of drilling and coring characteristics that were defined by the CDC as necessary or desirable for the Phase 2 riserless platform. Of primary importance is the ability to provide continuous sampling. Continuous sampling is defined as the ability to retrieve samples (core) as the hole is deepened without tripping the drill string back to the surface. This is typically accomplished using a wire line retrieval method. There are modifications and additions required to basic drilling equipment in order to achieve this goal. This is a departure from typical exploration/production drilling, but in keeping with drilling operations on the JOIDES Resolution. Additionally, due to the nature of riserless drilling and the remote operations of the program, the CDC report recommends that there be sufficient capacity for bulk mud storage and storage facilities for 1500 m of casing. Finally, the CDC report requested a combined drill string length of approximately 11,000 m and that the drill pipe have a minimum interior diameter of 4.125 inches to ensure passage of all sampling, coring, and wireline logging tools. In all the cases listed above, the RFP meets or exceeds the requirements specified in the CDC report.

This section seeks to provide a vision of the drilling and coring package for the new riserless program. All of the equipment outlined below has been requested in the RFP. The eventual specifications for the drilling and coring equipment will depend on the selection of an SODV for the riserless program. Other improvements and compromises will be made during the engineering design phase to deliver an enhanced drilling and coring package with the funds available for conversion. For more detailed information than is provided here, please refer to the RFP at the following website: http://www.joialliance.org/MREFC/Planning/default.html.

DERRICK EQUIPMENT SET

BRIDGE CLEARANCE FOR DERRICK HEIGHT

• Bridge Clearance of derrick must comply with the Panama Canal Authority’s vessel size limitations for transiting the Panama Canal and passage under the Bridge of the Americas.
• Bridge Clearance = Freeboard to Main Deck + Substructure Height + Derrick Height.

SUBSTRUCTURE HEIGHT

• Low substructure height (H) = 24 ft (7.38 m).

DRILLING TUBULAR RACKING AND STORAGE Capacity

<table>
<thead>
<tr>
<th>Storage Specification</th>
<th>Low</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drillpipe Racker (Operating)</td>
<td>4500 m (14,625 ft) of 5 inch</td>
<td>5000 m (16,250 ft) of 5 inch</td>
</tr>
<tr>
<td></td>
<td>1500 m (4875 ft) of 5-1/2 inch</td>
<td>2700 m (8775 ft) of 5-1/2 inch</td>
</tr>
<tr>
<td></td>
<td>1000 m (3250 ft) of 5-1/2 inch with bend limiters</td>
<td>2600 m (8450 ft) of 5-1/2 inch with bend limiters</td>
</tr>
<tr>
<td></td>
<td>2500 m (9750 ft) of 6-5/8 inch</td>
<td>6000 m (19,500 ft) of 6-5/8 inch</td>
</tr>
<tr>
<td>Backup Drillpipe Storage</td>
<td>4500 m (14,625 ft) of 5 inch</td>
<td>NA</td>
</tr>
<tr>
<td></td>
<td>1500 m (4875 ft) of 5-1/2 inch</td>
<td>NA</td>
</tr>
<tr>
<td>Bottom-Hole Assembly (BHA)/Drill Collar Storage (deck)</td>
<td>Number</td>
<td></td>
</tr>
<tr>
<td>------------------------------------------------------</td>
<td>--------</td>
<td></td>
</tr>
<tr>
<td>8-1/4 inch controlled length</td>
<td>48</td>
<td></td>
</tr>
<tr>
<td>6-3/4 inch</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>8-1/4 inch tapered drill collars</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>8-1/4 inch seal-bore drill collars</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>8-1/4 inch Monel</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>8-1/4 inch 30 ft (9.25 m) knobbies</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>8-1/4 inch 20 ft (6.15 m) knobbies</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

**DERRICK EQUIPMENT SET CAPACITY**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Low</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>Derrick Gross Nominal Capacity (lb)</td>
<td>1,200,000</td>
<td>1,500,000</td>
</tr>
<tr>
<td>Active Heave Compensation Capacity (lb)</td>
<td>800,000</td>
<td>1,000,000</td>
</tr>
<tr>
<td>Trip Speed (stands/hr)</td>
<td>25</td>
<td>40</td>
</tr>
</tbody>
</table>

**DRILLPIPE HANDLING**

Drillpipe handling on rigfloor and for laydown to utilize dual elevator system (DES) (no slips).

**DERRICK TRAVELING EQUIPMENT**

Equipment is to be sized to match the capacity of the derrick in the Drilling Contractor’s proposals for the derrick equipment set. Where applicable, all equipment must be able to pass tools with a 4-1/8 inch outer diameter, with the exception of the Wireline Blowout Preventer (BOP) and Oil Saver.

**Crown Block**
- Crown block is split to allow passage for the core barrel retrieval assembly.
- Twin coring wireline turn-down sheaves are mounted on the water table.
- Wireline logging turn-down sheaves are mounted on the water table.

**Traveling Block**
- Traveling block is split to allow the passage of the core barrel retrieval assembly on the coring wireline.

**Active Heave Compensator (AHC)**
- AHC is used to drill and core samples from the sea bottom in 75–7000 m water depths with seafloor penetrations of 2500 m below seafloor (mbsf).
- The AHC system needs to:
  o Control drill string motion within 4 inch (±2 inch) deviation (within three [3] drillship heave periods).
  o Remove more than 90% of ship’s heave from the absolute motion of the drill string.
  o Operate with vessel heave = 15 ft, roll = ±4°, pitch = ±5°, and heave velocity not exceeding 5 ft/s (assume heave periods of 6 seconds).
  o Operate with hanging load of 700,000–800,000 lb of drill string and BHA based on derrick equipment set. Hanging load does not include derrick traveling equipment above the top joint of the drill string such as the swivel, traveling block, top drive, or any other hardware in the derrick that contributes to increased hook load indication.
Have a locked load rating that is compatible with the derrick gross nominal capacity.
Have minimum stroke of 20 ft (6.1 m).

- The AHC may be used for the following tasks during scientific coring operations:
  - Piston coring: the drill string and the coring line must be compensated at the same rate so no relative motion exists between the drill string and core line.
  - Landing of wellheads and cementing operations.
  - Drill bit reentry.
  - Bare rock spud on hard rock.
  - Drilling operations with a hydraulic hammer to install casing in hard rock (e.g., basalt).
  - CORK completion operations on a cased hole.

- If mechanical or electronic system failure occurs with the AHC controls:
  - AHC reverts to a PHC system.
  - In the event of a single-point mechanical, hydraulic, or control system failure on AHC while in the hole, driller requires the ability to pull out of the hole with the drill string.

**Hook**
- Accommodates the passage of the core barrel retrieval assembly on the coring wireline.

**Swivel, Wireline BOP, and Oil Saver**
- Accommodate the passage of the core barrel retrieval assembly on the coring wireline

**Top Drive**
- Accommodate the passage of the core barrel retrieval assembly on the coring wireline.
- Compatible with the iron roughneck for spinning in pipe.
- Powered by alternating current (AC) with a single motor. (DC powered is an option.)
- Rackback capability.
- Generate ~80,000 ft-lb of torque maximum (intermittent) with speed up to 300 rpm.

**Drawworks**
- Alternating-current (AC) or direct-current (DC) driven with 3000 hp installed continuous input power.
- Main drum grooved for 1-3/4 inch or larger wireline.
- Equipped with dual disc type brake capable of controlling the rate of descent of the traveling block at rated hook load.
- Crown protection system that disconnects drawworks power source and applies drawworks brakes automatically once the traveling block reaches a preset height, to prevent traveling block from striking crown block.
- Safety device to prevent the traveling block from running into the drill floor.

**Cathead**
- Independent hydraulic catheads to make up and break out tubulars that exceed the capacity of the iron roughneck.

**Weight Indicator**
- Weight indicator system can be Martin-Decker type EB or equivalent.
- Deadline anchor rated for the derrick equipment set.

**Rig Instrumentation System**
- Capable of recording in a relational database various drilling and ship motion parameters from standard measuring devices.
- Capable of parallel recording of data in two different domains—depth and time.
• Capable of two-way communication with other data acquisition systems (i.e., measurement while drilling/logging while drilling [MWD/LWD]).
• Capable of providing large, easy-to-read, user configurable display of “real-time” data.
• Capable of providing multiple displays (rigfloor and remote stations).
• Capable of providing real-time and historical views of data.
• Capable of easily configured print formats.
• Capable of recording selected data at 1 second rate.
• Capable of printing daily geolograph format logs.
• Driller’s control readouts of information that will:
  o Assist driller in handling the pipe on and to the drill floor.
  o Expedite tripping pipe.
  o Monitor coring and drilling parameters during coring and drilling operations.
  o Manage a handling system for offline stand building and breakdown.

Iron Roughneck
• Compatible with the top drive for spinning in drillpipe and stab-in assist; and compatible with the rotary table.
• Capable of making up and breaking out drillpipe, drill collars, and casing or some combination system (e.g., modular iron roughneck).
• Compatible with dual-elevator system for tripping pipe.

Dual Elevator System
• To maintain the integrity of the drill string, which is subjected to a high degree of vessel motion inherent in the riserless drilling program, all drillpipe is to be handled at all times utilizing a dual elevator arrangement.
• Use of drillpipe slips that mark/damage pipe is not an acceptable practice.

Rotary Table
• Compatible with the rating of the derrick equipment set.
• Compatible with the design of the (upper) guide horn (either 49-1/2 or 60-1/2 inch).
• Compatible with the top drive system, the iron roughneck, and the DES; can be hydraulically powered.

Drillpipe Handling, Racking, Laydown, and Storage System
• Horizontal racking in triples to accommodate pipe configurations from 5 to 6-5/8 inch
• Drillship carries:
  o A working drill string and a backup string on board at all times.
  o Drillpipe with bend restrictors, which are knobs (similar to tool joints or heavy-wall drillpipe) fabricated on the pipe at 10 ft (3.1 m) centers; bend restrictors may affect pipe handling.
  o In harsh weather, knobbies (similar to heavy wall but cut from drill collar stock) are run through the moonpool to help handle bending stresses at the top of the drill string. The upper string with bend restrictors could be used for coring operations in good weather vs. picking up the knobbies and can also be used for running heavy casing strings.
• Drill string configurations are as follows:

<table>
<thead>
<tr>
<th>Drillpipe (size, weight, API grade)</th>
<th>Lower String (without bend limiter)</th>
<th>Middle String (without bend limiter)</th>
<th>Upper String (with bend restrictors)</th>
<th>Drill String (total length)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 inch, 19.50 lb/ft, S-140</td>
<td>4,955 m (16,100 ft)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
SAFE WORKING PLATFORM

The safe working platform, located at the main deck level, needs to be:

• Structurally capable of supporting the reentry cone and 150 m of 20 inch casing.
• Designed to withstand wave load-induced banging from the bottom while on location and during transits.
• Used as a working deck for assembly of CORK completions and guide bases.
• Compatible with guide horn design.

GUIDE HORN

• Upper section of the guide horn extends from just below the rotary table to the moonpool on the main deck.
  The guide horn needs to be:
  o Designed to pass a 9-7/8 inch rotary core barrel (RCB) core bit and BHA.
  o Designed with the option to pass an 11-7/16 inch advanced piston corer (APC) core bit and BHA.
  o Removable through the rotary table or split design.
  o Compatible with the design of the moonpool.
  o Removable to run bits greater than 11-7/16 inch and the VIT frame.
• The lower section of the guide horn will be:
  o Designed for deployment of large equipment and seafloor structures (e.g., reentry cones).
  o Designed for seawave- and current-induced banging while on location and during transits.
  o Continued as a tapered split cylinder from just below the moonpool to the keel of drillship.
  o Designed with a tapered internal diameter: narrow at the top, starting at ~22 inch internal diameter (ID) at the moonpool, and flared at the bottom to ~120 inch ID.
  o Split into two halves and designed to “clam-shell” around the drill string. When the two halves are mated, hydraulically actuated locking pins with tapered profiles positively lock both halves together (or alternative design).
  o Controlled at the moonpool level located on the main deck level.
  o Opened to run free-fall funnel, VIT frame, and reentry cones.
• The upper and lower sections of the guide horn are connected for integrity.
• Designed for specific SODV radius of curvature to minimize drillpipe bending, and taking into consideration typical operations to minimize delays.

SUBSEA TELEVISION AND SONAR SYSTEM

• Capable of operating at 7000 m of water depth.
• Subsea television camera with zoom capability rated for specified water depth complete with pan and tilt assembly, light assembly, and protective guide frame.
• Gyro package for heading reference during reentries.
• Color TV monitors located at driller’s control and in dynamic positioning control room.
• Video output connected to the ship’s internal video distribution system.
• Surface control console with power supply; lighting, focusing, and zoom control; pan and tilt control; and winch control.
• Winch unit with line tension/depth readout and data feed into rig instrumentation system.
• A heave-compensated subsea winch capable of handling 9144 m (30,000 ft) of cable with the following capabilities:
  o Control TV and sonar motion to within 4 inch (±2 inch) deviation (within three [3] vessel heave periods).
o Remove more than 90% of ship’s heave from the absolute motion of the subsea cable.
o Operate with vessel heave = 15 ft (6.1 m), vessel roll = ±4°, vessel pitch = ±5°, and with vessel heave velocity not exceeding 5 ft/s (assume heave periods of 6 seconds).
o In the event of a heave compensator mechanical or electronic system failure of the subsea winch, able to operate as a standard winch.
o Subsea reentry winch control panel easily accessible with simplicity of operation, operator friendly in cold weather, and easily read gauges in bright sunlight.

• Umbilical with sufficient length for the specified water depth and suitable for re-terminating on the rig (including all re-terminating equipment and supplies)
• Color sonar system equivalent to Kongsberg Mesotech 1071 series sonar heads (with dual range capability) and the MS1000 Scanning Sonar Processor (including computer and color display).
• Shock-isolated frame (to support TV and sonar system) clamped around drillpipe and deployed by running up and down the drill string on the coaxial cable winch. The split guide that goes around the drill string is ~9 inch ID to go over drillpipe and ~18 inch ID to go over 16 inch casing.
• TV camera capable of detaching from protective frame on a 50 m (162.5 ft) tether for inspection of guide base or CORK completions.

MUD CIRCULATING, PROCESSING EQUIPMENT, AND STORAGE

HIGH-PRESSURE MUD (TRIPLEX) PUMPS AND PIPING

• Two (2) (three preferred) triplex pumps and associated equipment.
• Rated for 1600 hp input.
• Equipped with DC motors. AC drives are an acceptable alternative.
• Pump liners and related equipment capable of rates and pressures as high as 2922 lpm (772 gpm) at 3200 psi (each pump) and pump pressures as high as 345 bar (5000 psi) at 1682 lpm (444 gpm).
• Equipped with pulsation dampeners on the discharge manifold rated for 345 bar (5000 psi).
• Equipped with adjustable safety relief valves.
• Equipped with forced lubrication for low-speed operation to 10 spm (~50 gpm).
• Charging pumps capable of supplying the mud pump with 2922 lpm (772 gpm) (each pump) at 1.4 bar (20 psi) suction manifold pressure while mud pumps are running at that same rate.
• All rotary and jumper hoses rated for 345 bar (5000 psi) working pressure.
• Stand pipe, stand pipe manifold, and valves rated for minimum 345 bar (5000 psi) working pressure. A spare rotary hose will be kept on board.

MUD MIXING SYSTEM

• Two-hopper system of mud mixing pumps and mud mixing system capable of mixing independently to and from all mud pits.
• Capable of mixing and transferring.
• Mud shearing system installed to mix sepiolite mud and seawater to a 120 marsh funnel viscosity.
• Maintenance of 12.5 ppg mud with a seawater, sepiolite, and barite formulation.
• Agitators in mud pits to maintain 120 funnel viscosity with seawater and sepiolite from 8.6 to 12.5 ppg mud.
• All mud pits equipped with motorized agitation equipment.
• Mud testing equipment.

MUD STORAGE

• Bulk mud/cement P-tank storage capacity range of 13,000–24,000 ft³ (368–41.82 m³).
• Process liquid mud tank capacity range of 3000–6400 bbl.
• Pallet and Sack storage capacity range of 5000–16,000 ft³ (142–454.5 m³).
CEMENTING EQUIPMENT

- Two (2) charged high-pressure triplex pumps (10,000–15,000 psi), output 5.0 bbl/min (bpm) in low gear.
- Twenty (20) barrel recirculating systems.
- Two (2) 10-bbl capacity mix water tanks with seawater and drill water fill.
- Cement surge tank and mixer to recirculating system.

CASING HANDLING EQUIPMENT AND STORAGE

The rig will have a complete assortment of elevators, slips, tongs, tong jaws, safety clamps, lift subs, and lift protectors to fit and safely handle all Prime Contractor–supplied casing components:

- One (1) set of casing tools for casing sizes (4-1/2, 10-3/4, 13-3/8, 16, and 20 inch).
- Second set of side door elevators for large-outside diameter pipe.
- Power tongs with power unit equipped to run casing sizes 4-1/2 to 5-5/8 inch and from 10-3/4 through 20 inch.
- Two (2) clamp-on (or equivalent) steel casing thread protectors for 20, 16, 13-3/8, and 10-3/4 inch casing.
- Storage for casing sizes (4-1/2, 10-3/4, 13-3/8, 16, and 20 inch). Capacity target:
  - 20 inch: 100 m (325 ft)
  - 16 inch: 600 m (1950 ft)
  - 13-3/8 inch: 700 m (2275 ft)
  - 10-3/4 inch: 2000 m (6500 ft)

DRILL STRING AND FISHING TOOLS

All drill string components (drillpipe, drill collars, etc.) and connections must be compatible with continuous coring operations having a drift ID of 4.125 inch. Use of “standard” ID connections and tool joints will not be acceptable for this program.

- Bit Subs
  - Two (2) each for 7-5/8, 6-5/8, and 4-1/2 inch regular bit connections to connect to drill string components.
  - Bit subs bored for appropriate float.

- Crossover Subs
  - Two (2) each: all necessary sizes and types to allow all connections for supplied drill string components.
  - All subs to be equipped with stress relief groove for pins and bore back for boxes.

- Safety Equipment
  - Two (2) top drive/upper inside BOP valves, 5000 psi working pressure.
  - One (1) drillpipe safety valve, 5000 psi working pressure, to fit drillpipe.
  - One (1) inside BOP, 5000 psi working pressure, to fit drillpipe.
  - Adequate supply of drillpipe float valves for all bit sub sizes.

- Inspection Equipment
  - Inspection equipment to conduct magnetic particle inspection on tubular connections.
  - DC coil only.

- Fishing Tools:
  - A complete set of overshots to catch and recover all drillpipe, drill collars, and drill string components in conventional hole sizes.
  - Reverse circulating junk baskets for all conventional hole sizes drilled.
  - Junk subs for use with bits with 6-5/8, 4-1/2, and 3-1/2 inch regular connections.
o Skirted magnets for 17-1/2, 12-1/4, and 8-1/2 inch hole sizes.
o Ito-type spears for drillpipe and drill collars.
o Impression blocks.
o Subsea release (SSR) cementing manifold.
o Core Handling System

**CORING WINCH**

- Equipped with double-drum high-speed drawworks to permit rapid continuous coring.
- Equipped with a selectable dual drum capacity (side by side).
- Sized to handle 1/2 inch diameter wire rope with 32,800 ft (10,000 m) capacity per drum based on:
  o Pull-out force: 12,000 lb.
  o Core barrel retrieval assembly weight: 1500 lb.
- Equipped with an AC drive motor with a variable frequency drive. DC or hydraulic motors are an acceptable alternative.
- Capable of core recovery speed: 200–250 m/min (650–820 ft/min).
- Has clear view of the drill floor, the derrick, and the driller from the control cabin.
- Provides an approved man-riding winch on the drill floor to handle wireline tools in derrick.
- Core barrel and core sizes as follows:

<table>
<thead>
<tr>
<th>Drill String (inch)</th>
<th>Drill String Clearance ID</th>
<th>Core Barrel OD (inch)</th>
<th>Core Diameter OD (inch)</th>
<th>Core Weight (lb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 x 5-1/2 (existing)</td>
<td>4.125</td>
<td>3.5</td>
<td>2.312</td>
<td>135</td>
</tr>
</tbody>
</table>

**HEAVE COMPENSATOR FOR CORING WINCH WIRELINE**

- Control the coring line motion to within 4 inch (±2 inch) deviation (within three [3] vessel heave periods).
- Remove more than 90% of the ship’s heave from the absolute motion of the coring line.
- Operate with vessel heave = 15 ft, vessel roll = ±4°, vessel pitch = ±5°, and with vessel heave velocity not exceeding 5 ft/s (assume 6 second heave periods).
- Operate as a standard core winch in the event of a mechanical or electronic system failure of the heave compensator.
- Coring line winch control panel that is easily accessible with simplicity of operation, easy to read the gauges in bright sunlight, and operator friendly in cold weather.
- Control panel that is user friendly related to shutdown and start-up of the compensator when pipe connections are made.
- Minimize relative motion between the actively compensated drill string and the actively compensated coring wireline.

**CORING WIRELINE PACKOFF AND WIPER SYSTEM**

Coring-wireline-packoff/air-wiper systems above the top drive that:
- Allows circulation up to 500 psi.
- Rotates pipe slowly with wireline inside during inner core barrel deployment and retrieval.
- Wipes mud from wireline during retrieval to minimize spray onto drill floor and derrick.
- Allows removal of sinker bar system prior to connection at circulating pressures >500 psi.

**WIRELINE TOOL STABBING GUIDE**

Mechanical wireline-tool stabbing system that mechanically:
- Removes the wireline sinker-bars/overshot from the pipe through the top drive, wireline BOP, and split traveling block.
• Holds the wireline sinker bars/overshot while removing the inner core barrel on the rigfloor and making up a new drillpipe connection,
• Reinserts the wireline sinker bars/overshot into the pipe through the split traveling block, wireline BOP, and top drive.

**MECHANIZED CORE HANDLING SYSTEM**

Mechanical handling system for core removal that:
• Protects operator from the sudden release of gas and toxic gas hazards.
• Removes core catcher in a safe and controlled manner.
• Extracts the core liner/core from the inner core barrel in a manner that prevents the core liner/core from flexing.
• Supports the core liner to prevent buckling or bending.
• Moves the core liner/core to the core handling area (~75 ft; 23 m).

**TOOL STORAGE**

• Tool storage areas typically encompass several locations on board the drill ship.
• Storage space for a variety of items including drill bits, inner barrels, and crossover subs.
• Heavy tool (running tools, cement retainers, and fishing tools) storage areas located within easy access to the rigfloor to provide safe and efficient handling.
• Deck loading for all tool storage: 1200 lb/ft².
• Climate controlled.
• Coring system storage requirements as follows:

<table>
<thead>
<tr>
<th>Storage Specification</th>
<th>Low</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core Bits (etc.) Storage Area</td>
<td>500 ft² (46.5 m²)</td>
<td>650 ft² (60 m³)</td>
</tr>
<tr>
<td>Coring Crossover Storage Area</td>
<td>500 ft² (46.5 m²)</td>
<td>650 ft² (60 m³)</td>
</tr>
<tr>
<td>Heavy Tools Storage Area</td>
<td>500 ft² (46.5 m²)</td>
<td>650 ft² (60 m³)</td>
</tr>
<tr>
<td>Heavy Tool Storage (hold) Casing Tools</td>
<td>1400 ft³ (130 m³)</td>
<td>2100 ft³ (195 m³)</td>
</tr>
<tr>
<td>Coring Tools Storage Vertical Shucks (deck)</td>
<td>25 (6 inch x 35 ft. high)</td>
<td>35 (6 inch x 35 ft. high)</td>
</tr>
</tbody>
</table>

**TOOL STORAGE SCABBARDS**

• Tool storage scabbards or “shucks”: 6 inch ID x 35 ft (10.8 m) glycol-filled cylinders that provide vertical storage and protection for all inner barrel wireline deployed tools.
• 25 shucks around the perimeter of the drawworks shed roof.
• Drain valves at the bottom of shucks.

**LOGGING RIGFLOOR SHEAVES**

• Attachment points for the 36 inch logging sheaves on rigfloor.
• Crown-mounted 36 inch logging sheave.

**REENTRY FUNNEL STORAGE AND ASSEMBLY AREA**

• Main deck area with clear access to the moonpool
• Deck area: 450–675 ft² (42–63 m²).
• Deck loading: 1200 lb/ft2.

**SUBSEA SHOP**

Enclosed air conditioned space (400–600 ft²; 37–56 m²) suitable for operation, maintenance, and storage of reentry systems and beacons.

**DRILL WATER STORAGE**

• Storage capacity: 8,000–10,000 bbl.