



# Breakwater Installation





# The Challenge

- To facilitate Rig Moves in areas where Seasonal Monsoon or Trade winds and associated seas may support times of marginal sea states for move operations, but never reduce to levels within the operational limits of standard Jack-Ups or Tenders.



*Today, There are rigs waiting on weather, in these conditions, all around the world.*



# Solution

Using a bulk vessel or tanker as a floating breakwater to reduce combined sea height at a drilling location in order to enable the MODU to jack the hull into the water and pull the legs, or rig down.

Then re-locate the vessel to the new location and enable the MODU to set up on the new location.



*The concept of a breakwater vessel was first used in 1942 to protect the Allied troops during D-Day in WWII*



# Expectations

- The use of a floating breakwater will, in fact, mitigate a “marginal condition”. It should be expected to see reductions from significant 7 foot seas down to significant 5 foot seas. In most swell and wind wave combinations.



*Photo showing the effect of the shadow from the breakwater vessel*

Testing in Trinidad and two actual installations in Suriname, the breakwater concept proved effective to mitigate the marginal conditions.



## Station Keeping Options

- Dynamic Positioning – Tug Backup
- Dynamic Position Assist – Ship's anchors, and Tug Backup
- Drag Embedment anchors – Tug Backup
- Permanent Mooring – Pile, SEPLA, Torpedo
- The type of station keeping mode is dependent upon the vessel, proximity of assets, and current direction. Anchors in last two options would normally be preset.



# Requirements

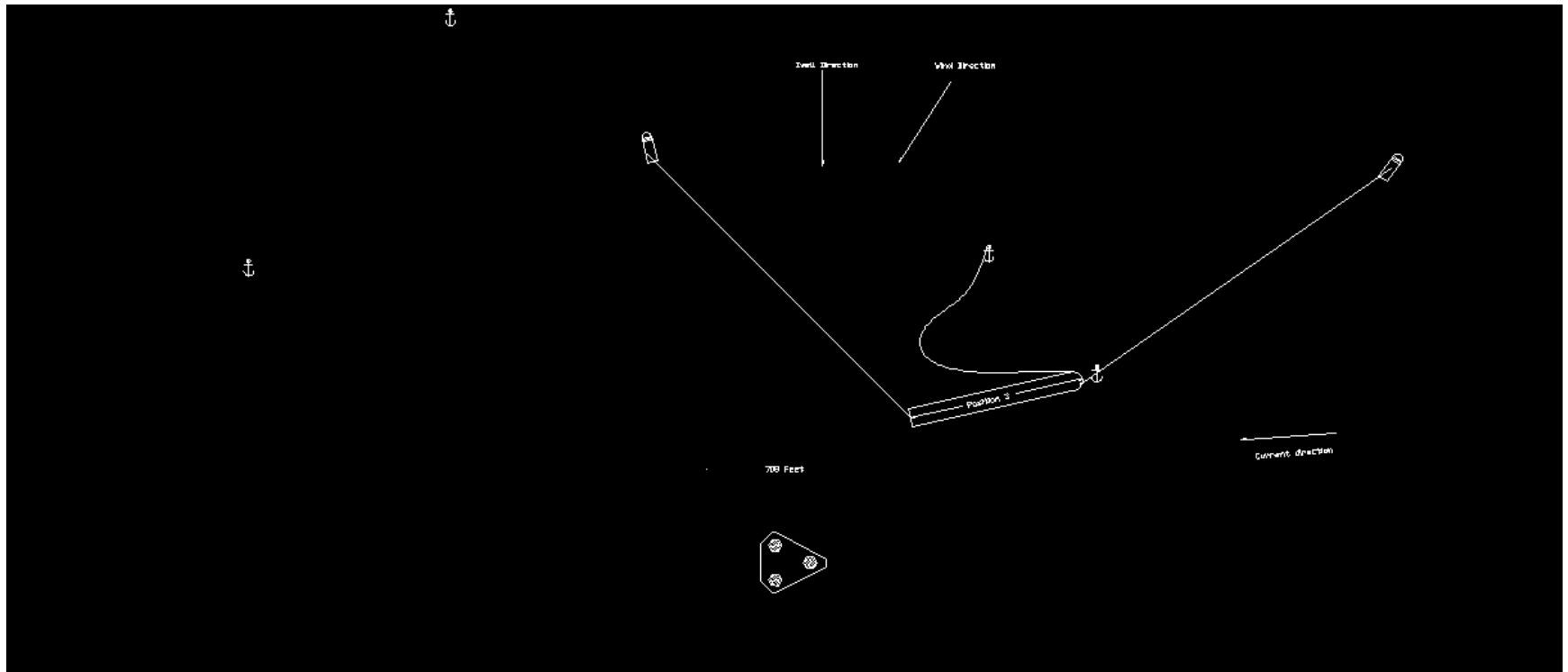
- Large bulk carrier or tanker (1000' long) with a draft of 40' – 60' with extended anchor chains.
- 4 each high holding power anchors and gear in addition to ship's anchors (option 3).
- Redundant Positioning gear and personnel to preset anchors
- Anchor handling crew.
- 2 ea. 10,000 hp tugs to assist ship.
- Current monitoring and recording equipment.

*The cost analysis yields a break-even point of 10-15 days of operator rig cost, so if you expect to wait on weather for more than two weeks, this is your option.*



# Position Ship

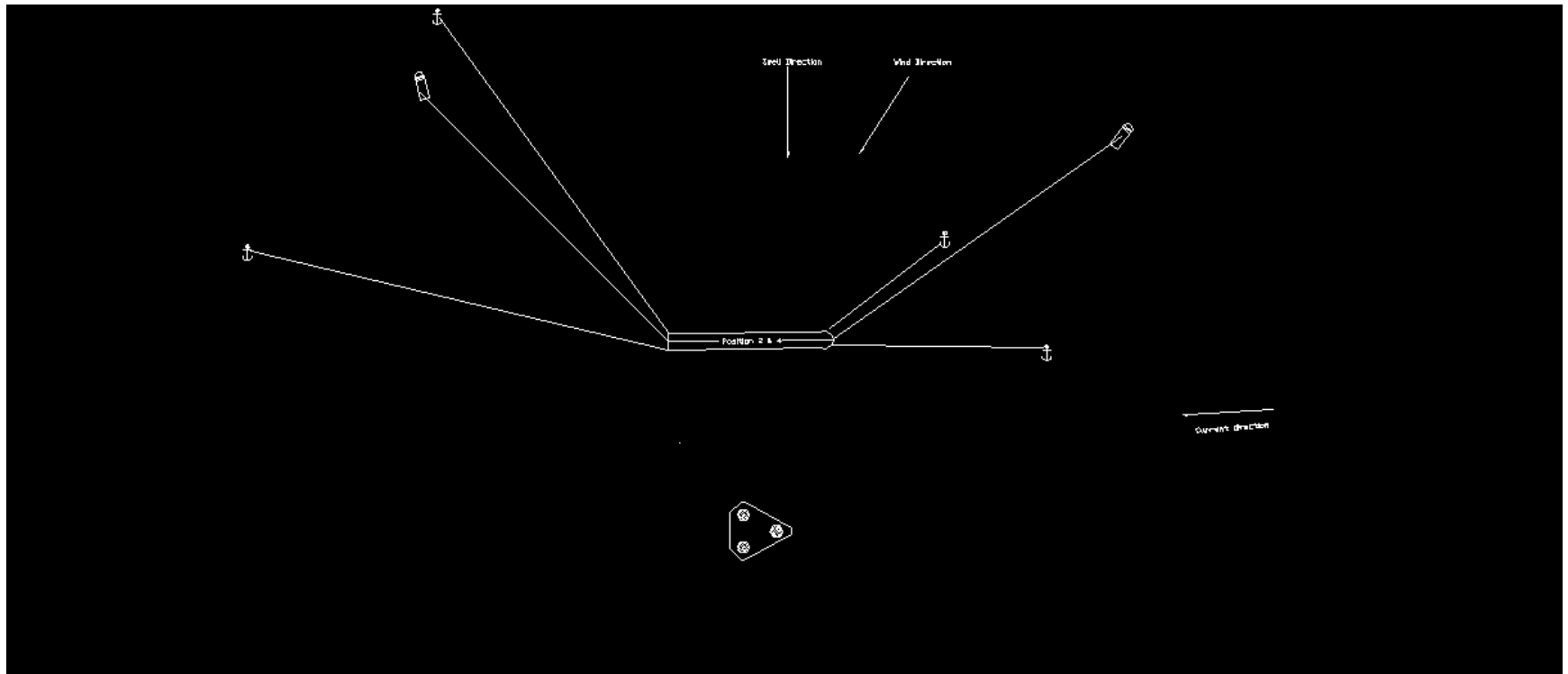
Ship's second anchor dropped, using standard multi-anchor procedure.





# Mooring Set

With Mooring, Tugs, and Ship's thrusters there are 3 means of positioning.  
Two means of redundancy.

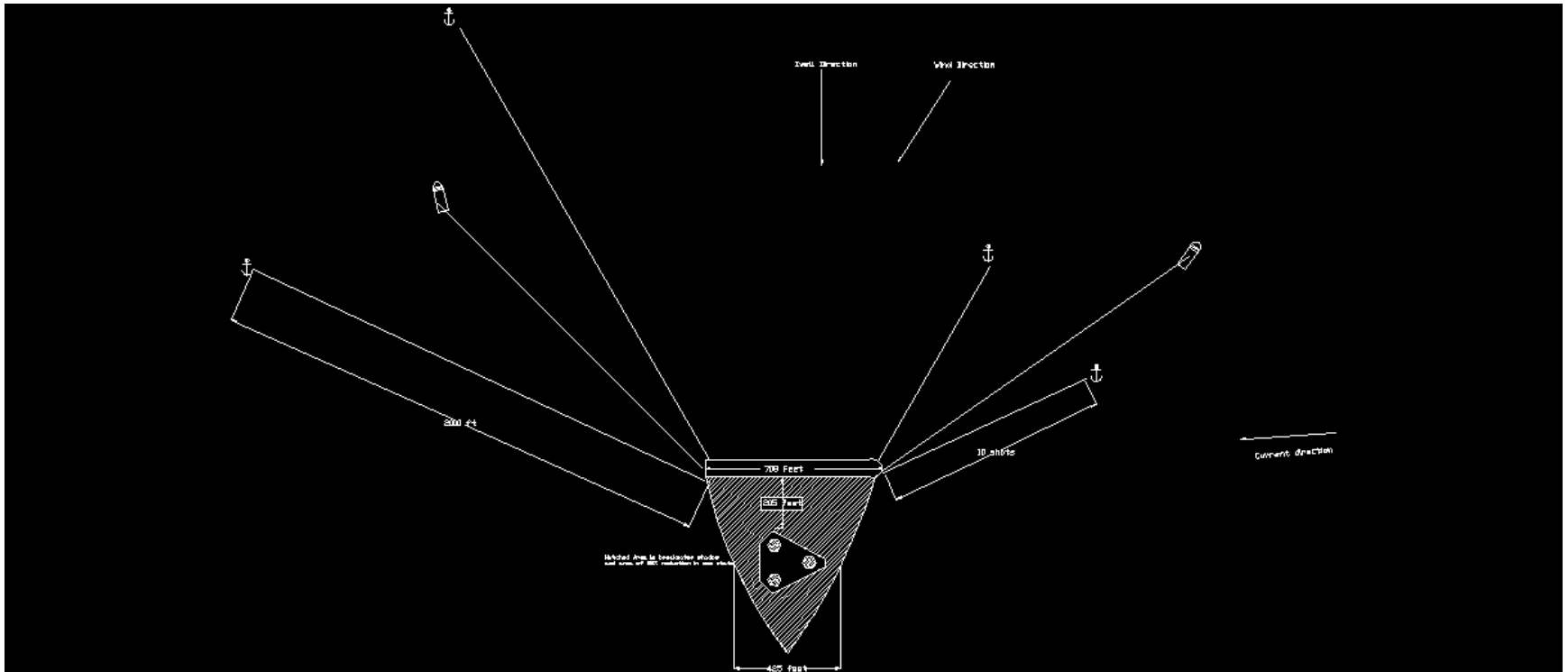






# Final Position

Monitor sea states and continue with move.





# Live Position Monitoring

