Platform Emmy Pipeline Span

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Prevention First October 2012

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Agenda

- Platform Emmy
- Problem at hand
- Proposed solutions and calculations
- Bags & sand used
- Execution by Aqueos

Platform Emmy

Platform Emmy

1.3 Miles Offshore in 50 +/- ft. of water

Production 650 BOPD from 14 wells

1.6 MCF / Day Gas from 2 wells

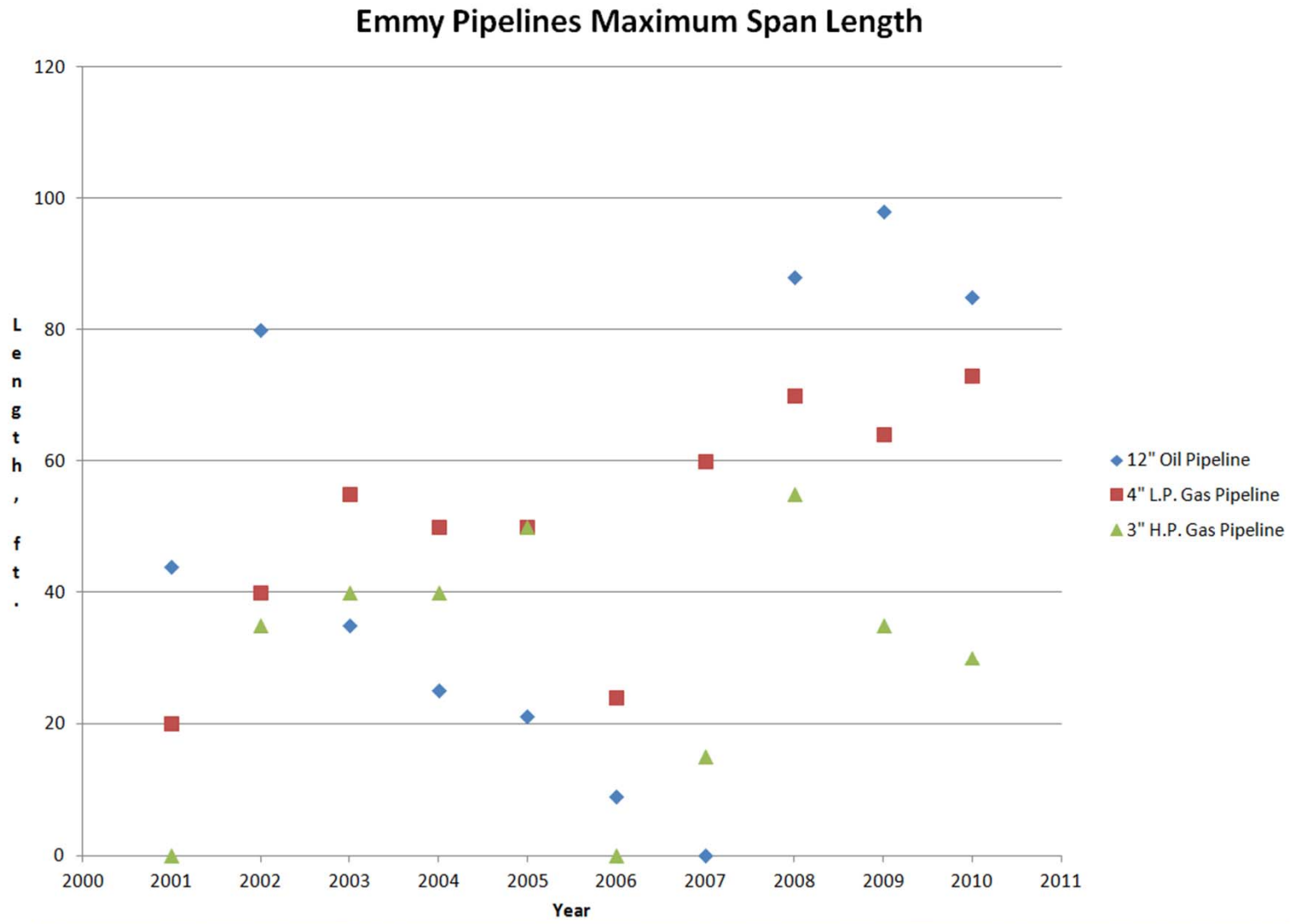
Located in “State” waters

All production sent onshore for processing

Span Problem

- Oxy performs annual pipeline survey using divers from Aqueos
- Data is logged and trended
- In 2009, the support span on the 12” production line had increased compared to historical data
- A project to address the span issue along with required permitting was started

Span Length


Emmy Pipelines Maximum Span Length
120
100
80
60
40
20
0
Length, ft.
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
Year
12" Oil Pipeline
4" L.P. Gas Pipeline
3" H.P. Gas Pipeline

Solutions Reviewed

Three options were reviewed to reduce span:

1- Jetting of the line: not feasible since in the area where the pipeline span occurs the ocean floor is rocky

2- Installing Submar mats: (or similar concrete devices) to support the line but would require special equipment to install under the pipe

3- Installing sand bags: simplest and most cost effective approach. Build a pyramid formation allowing adequate vertical as well as partial lateral pipe support

The area may also fill back in depending on the ocean current, storm activity.

Calculations

•Calculations to determine max span as well as modeling within Caesar II for the 12-inch pipeline was completed (Cannon Eng)

•The 12-inch line was reviewed for compliance with ASME B31.4

•The purpose of the pipe stress calculations was to determine if the existing pipe span is overstressed

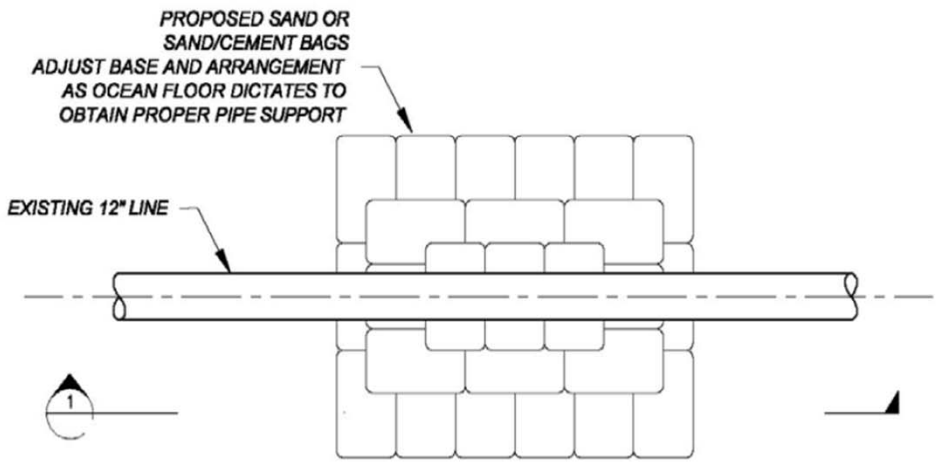
• Manual calculations to determine the max span allowable utilizing beam flexural theory as well as modeling utilizing the wave loading module were completed

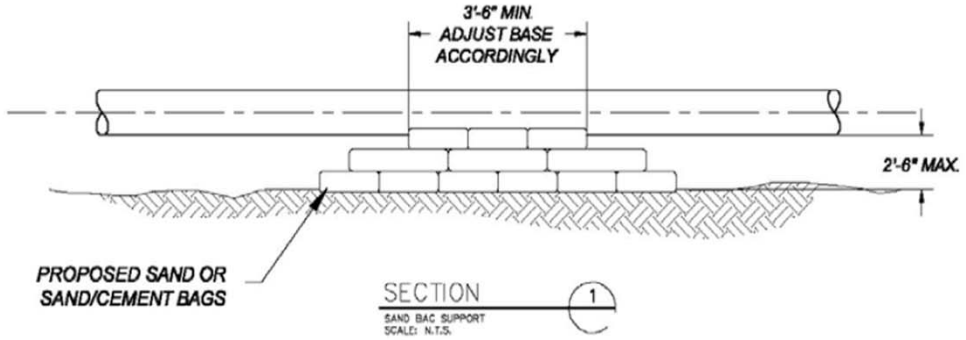
•The pipeline was modeled as semi-fixed in which the ends were simply supported with limits to restrict excess movement

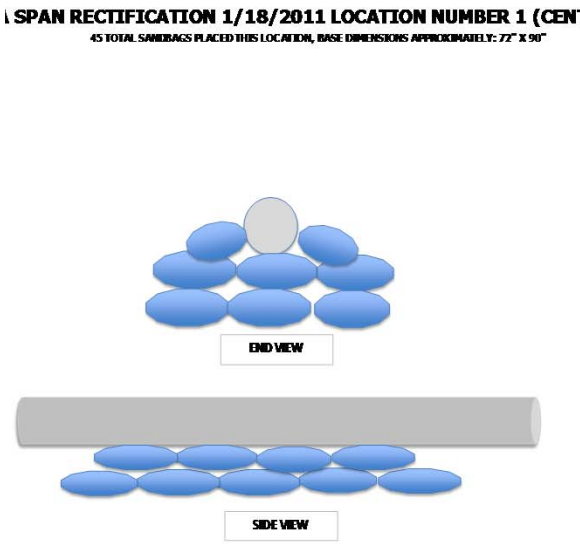
•A span of 56 feet was determined to be the max span allowable if the line was operating at its max internal pressure of 1440 psig

•The pipeline in its current service has a max allowable internal pressure of 250 psig in which the max span calculates to be 95 feet

Proposed Sand Bag Placement







Bags Used

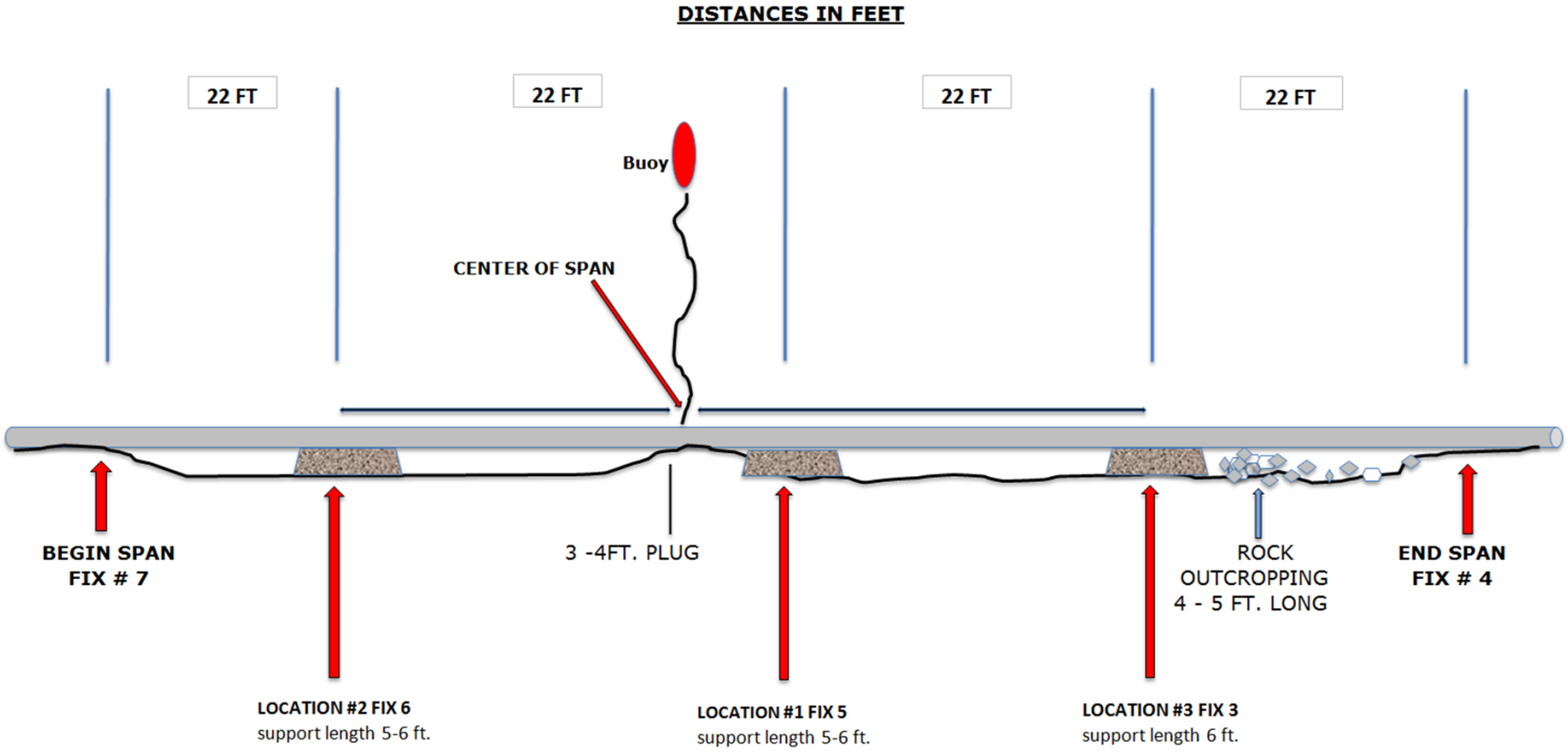
GEOTEX 4X4HF is a woven polypropylene geotextile containing heavy monofilament/fibrillated yarns produced by Propex

Special Order and long lead time

Sand had to be imported from Bolsa Chica

Proposed Layout

Total length of span area as measured by divers: 88 ft. Depth of water: 38 - 42 ft.



Who is Aqueos

Aqueos is a Subsea service provider with our core values being a commitment to “excellence” and our dedication to an “accident-free” workplace.

We provide a full range of services that includes Marine Construction, Commercial Diving, Remote Operated Vehicle (ROV), and Vessel contracting services.

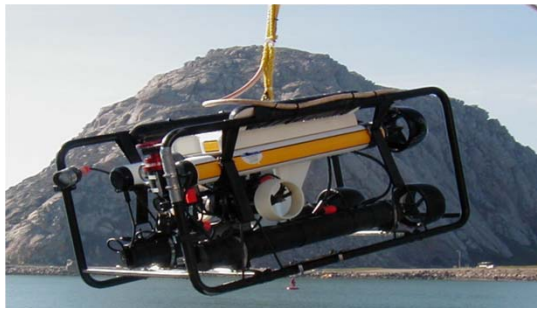
Resources

- **~180 Offshore Personnel**
- **Surface Air Equipment**
- **Surface Gas Equipment 300’**
- **12 Man, 1000’ Saturation Diving System**

  w/ Hyperbaric Rescue Chamber (HRC)

Resources

- **Light Work Class and Inspection Class ROV**
  - **Hysub 20**
  - **Phantom**
- **~Full Inspection Program**
  - **In House ASNT-TC-1A Level III**
- **Locations**
  - **Gulf of Mexico**
  - **West Coast**

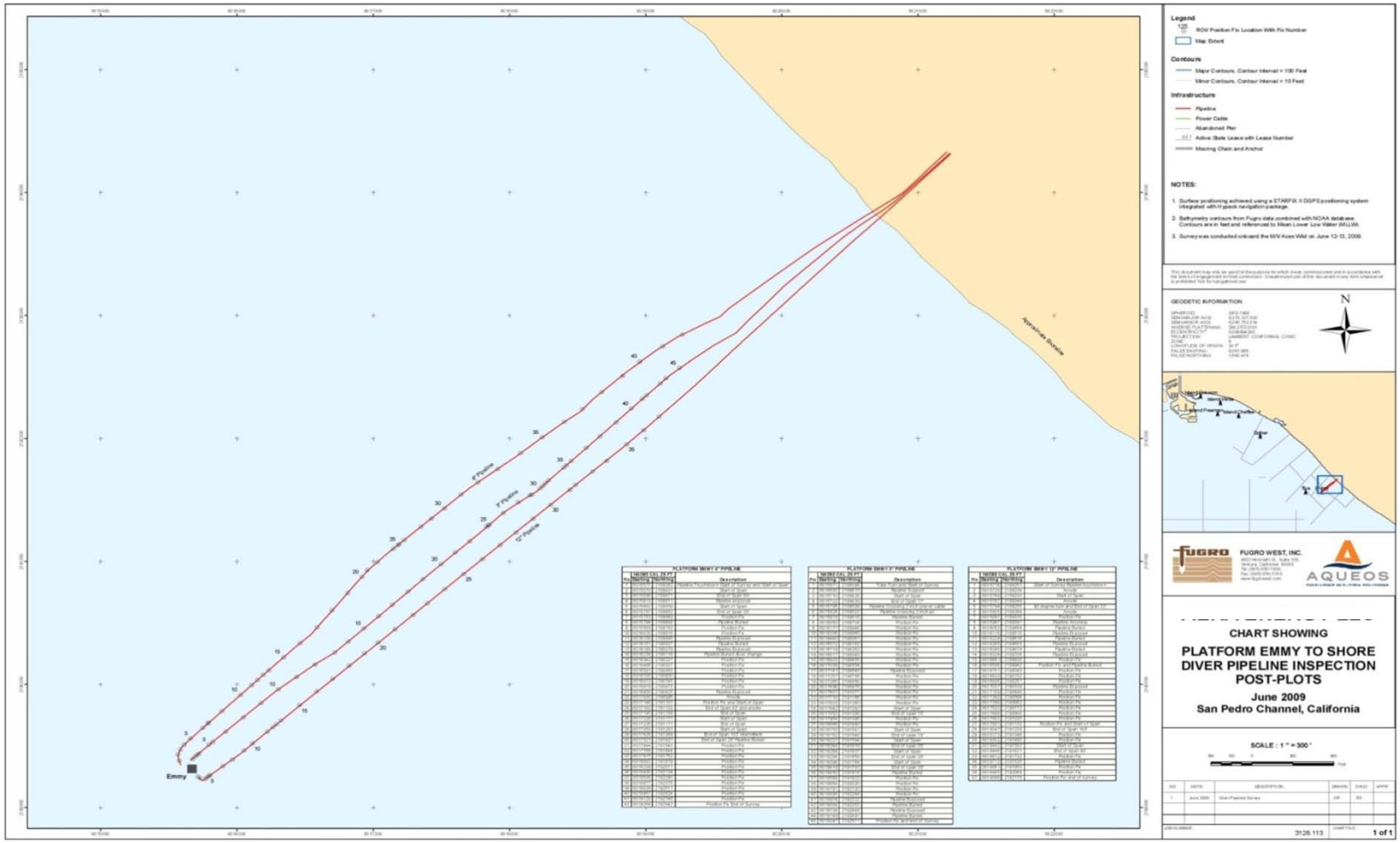


Executing The Project – The Team

Aqueos was contacted to turn key the project. We put a team together to execute the project.

- **Aqueos – Prime Diving Contractor**
- **Fugro – Provide Survey Support to locate the span and keep the vessel location.**
- **Pacific Tug – Provide Vessel Support utilize as the diving platform.**

Planning and Executing



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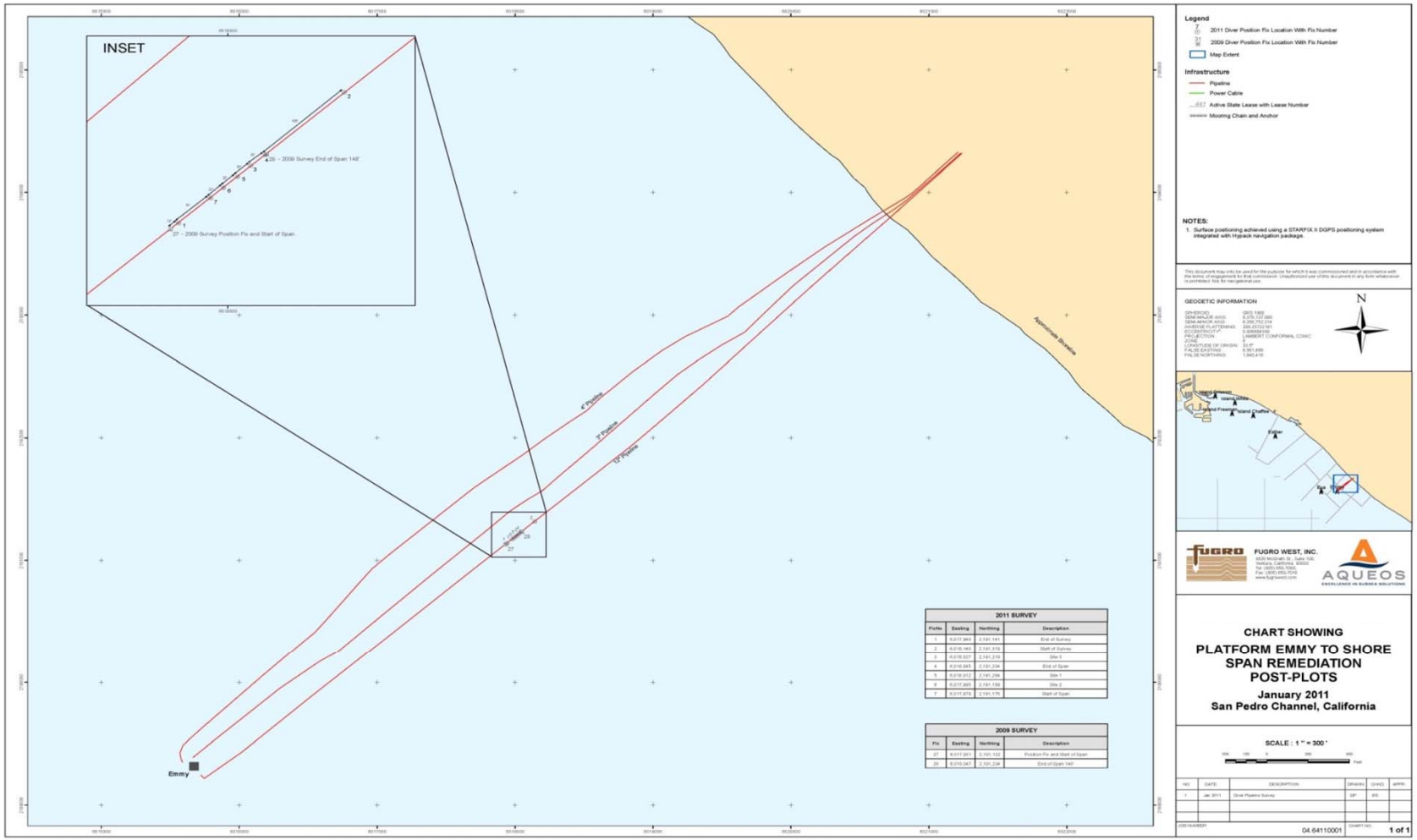
Planning and Executing



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Diver Live Boating” & “Hands On Surveys”

Diver Live Boating – maintaining a mobile vessel in support of dive operations. This method of dive tending is preferred in instances where anchoring is difficult, under conditions with high currents, when the dive plan makes it likely that divers will move away from the initial dive location

Hands on Survey – Diver locates the pipeline and span.

Mobilizing - Dive Vessel

Christopher G

- **70’ Landing Craft**
- **8 Ton Crane**
- **5 Ton Power Block**

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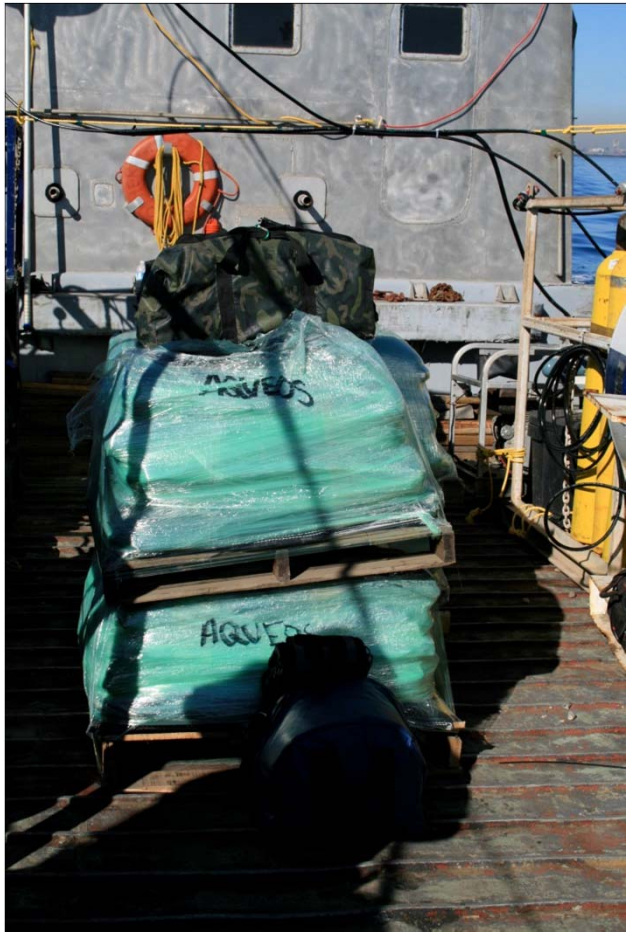
Mobilization – Diving Equipment

Mobilizing the Vessel

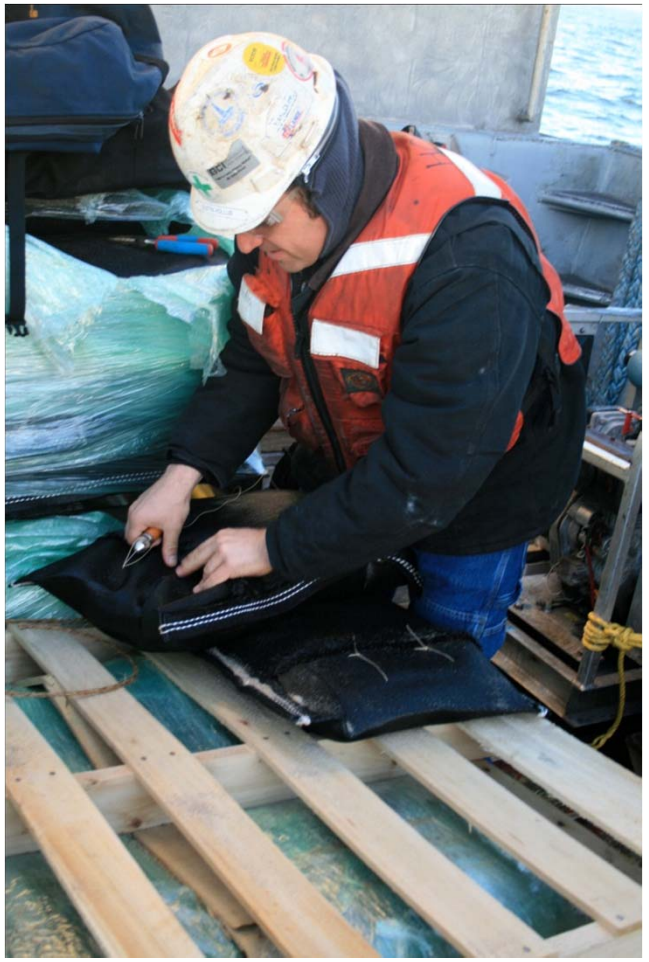


Preparing the Sand Bags

Flap Stitching in Progress

Crew member securing bag fill opening using a sailmaker's repair tool to ensure no sand escapes from bag during deployment and placement

Each bag received a tag line that was secured to the down line for placement



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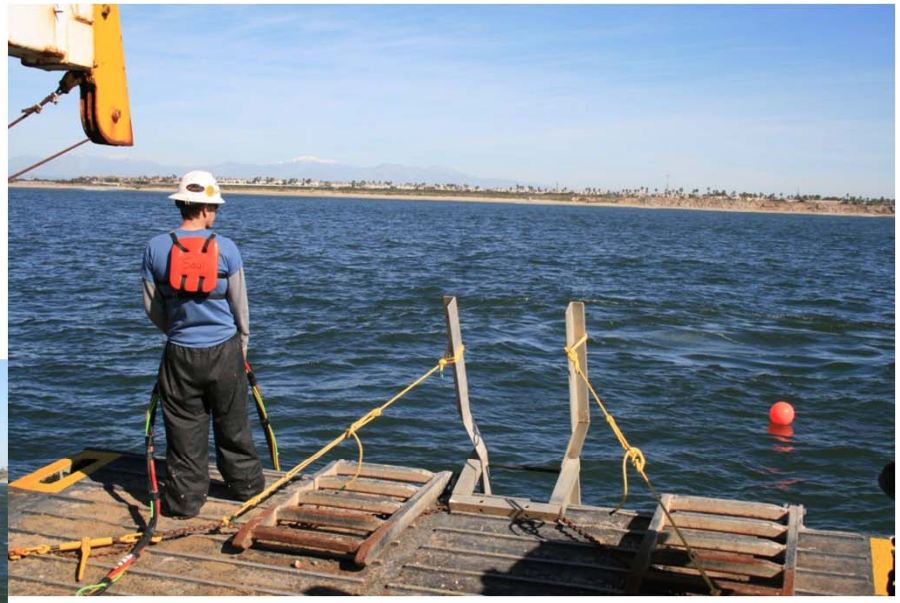
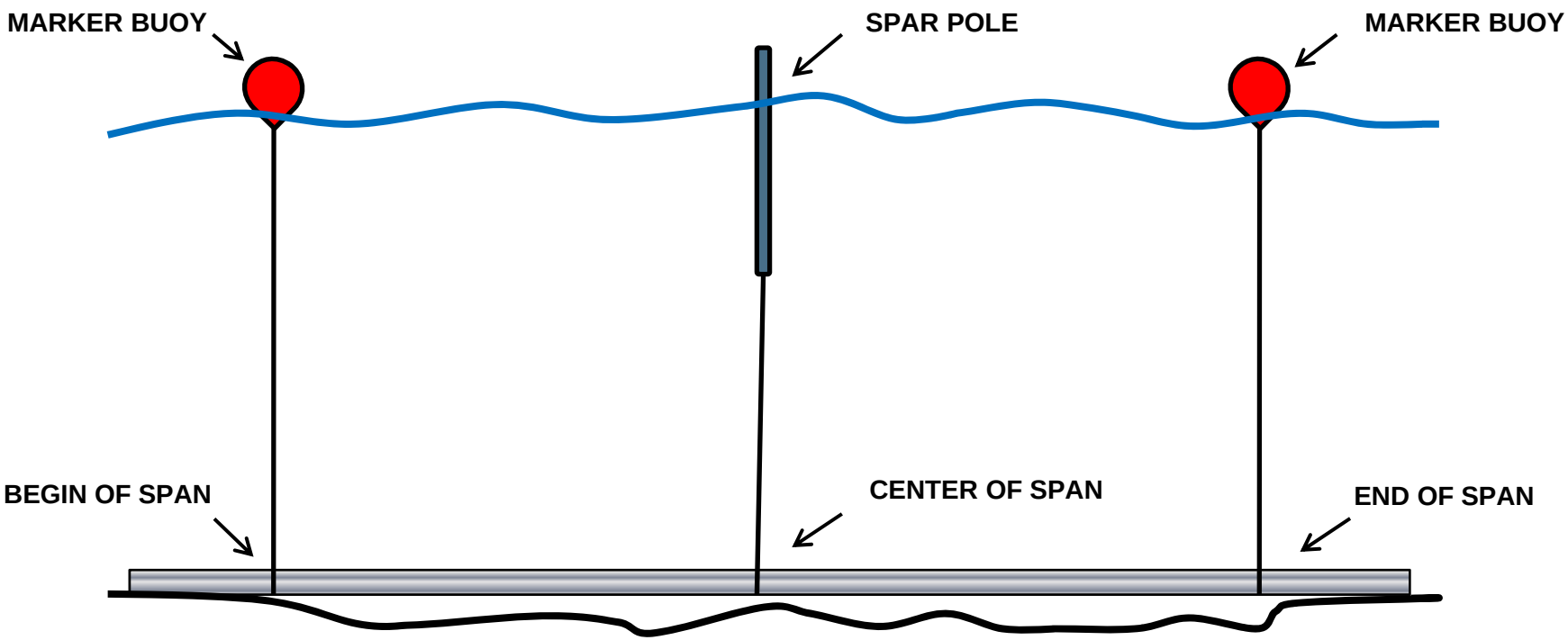
Diver Entering Water



Setting Buoys



Sand Bag Deployment

Sandbags with Taglines Ready to be Lowered Down Using Buoyed Down line

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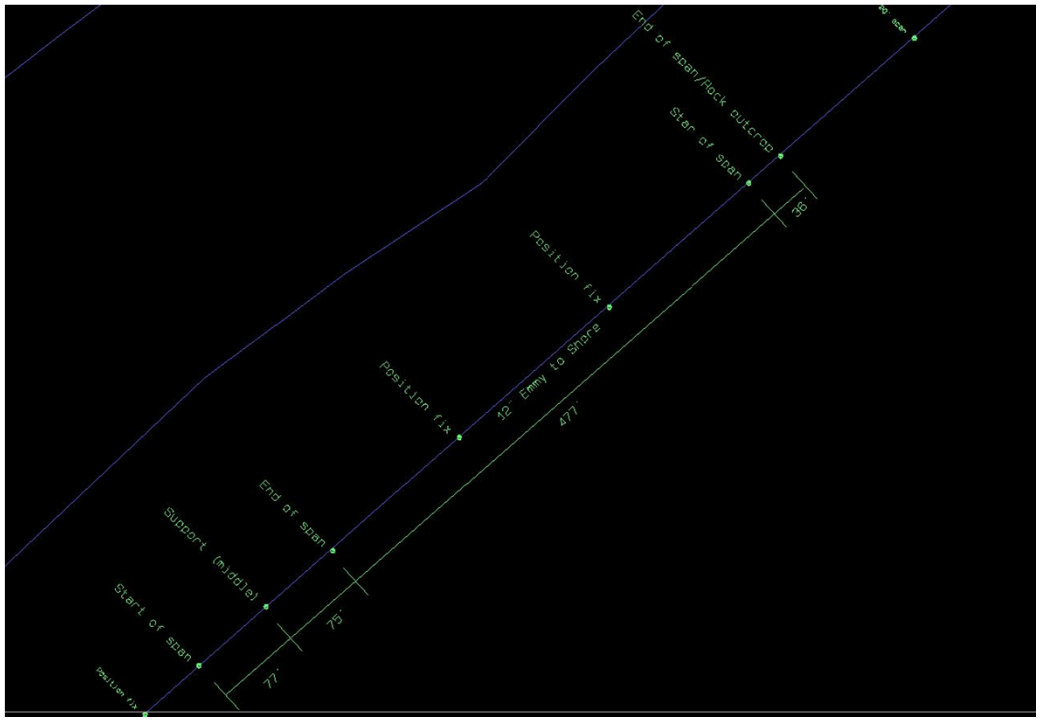
Aqueos Diver Getting Dressed to Dive

A predetermined number of bags was staged and lowered down the buoyed downline. Once deployed, diver jumped on buoyed downline, descended to the ocean floor and positioned sandbags at designated spot

Recovered Buoy with Clump Weight

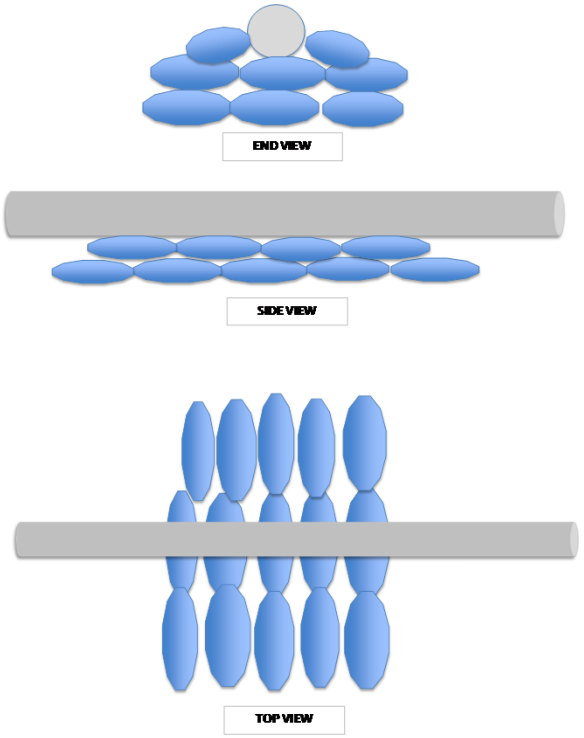
All taglines used to send bags to seabed are shown attached at clump weight and recovered back on deck

Final Inspection and Report



SPAN RECTIFICATION LOCATION NUMBER 1 – CENTER SPAN

45 SANDBAGS PLACED AT THIS LOCATION – BASE DIMENSIONS APPROXIMATELY : 72” BY 90”



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Questions?

Permitting & Conditions

Approval process

1- CSLC Long Beach - Engineering approval

2- CSLC Sacramento – CEQA exemption

3- US Army Corps of Engineers – Nationwide permit 18 minor discharge - No action required

4- RWQCB (monitoring plan) section 401 clean water act permit - No action required

5- EPA

6- California Coastal Commission – Waived requirements

7- City of Huntington Beach – No action required

Major Permit Conditions

1. Follow up dives every 6 months for 2 years (CSLC)
2. Use of special sand bags
3. Sand had to be imported from Bolsa Chica