

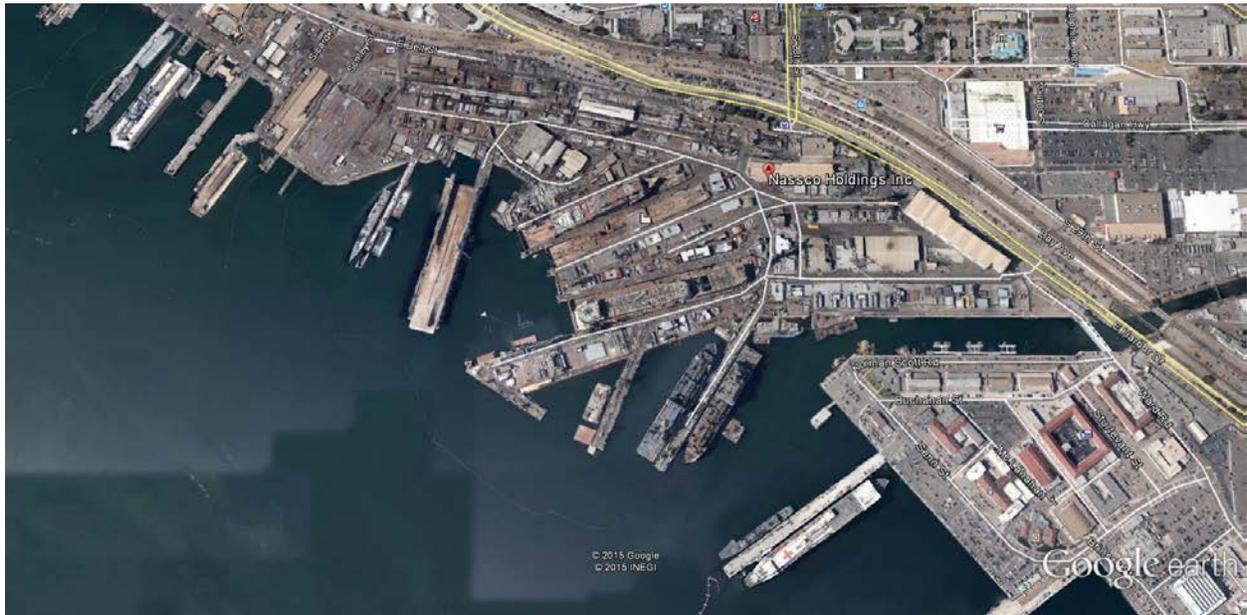
**To: WEDA Environmental Award Committee**

**From: R.E. Staite Engineering**

**Feb. 26, 2015**

**Re: Application Environmental Dredging Award**

**Background:** The R.E. Staite Engineering, Inc. ("RES") team successfully completed the remediation of toxic sediments from the General Dynamics NASSCO (NASSCO) shipyard in March 2014. RES removed approximately 27,000 cubic yards of toxic sediments in a highly innovative manner by deploying several unique environmental control methods. These innovation methods included (1) a process whereby the toxic sediment remained in the loading barge (scow) until sufficiently dried with a cement additive and then moved directly to a disposal truck thereby eliminating contact with the ground during the process and (2) a sand placement process that delivered sand under pier and onto the shoreline utilizing a conveyor system mounted on a barge thereby eliminating shoreline obstructions during the process and enabling the reach under piers during high tides. The project required the shipyard to remain fully operational during all phases of the nine month remediation. The principle tenets of the contract specifications required the contractor to maintain scheduling flexibility to work around shipyard operations while adhering to the operating window for the Least Turn and prevent any harm to environmental resources.



**San Diego Bay Shipyards.**

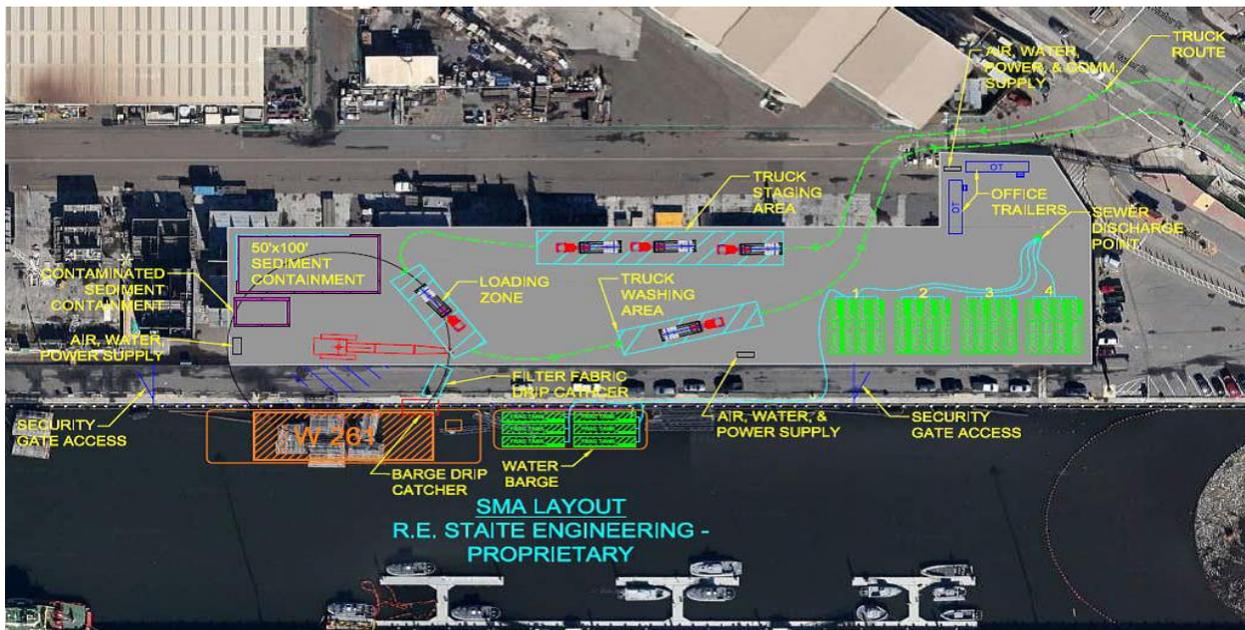
For 25 years the Regional Water Quality Control Board and the Port of San Diego sought to remove toxic sediments from the San Diego Bay. In 2012 a cleanup and abatement order was issued to NASSCO and BAE Systems, Inc. (BAE) shipyards to remove the sediments and several lawsuits followed. Eventually, a comprehensive settlement was crafted and a Trustee (de maximus, inc.) for the San Diego Bay Environmental Restoration Fund was appointed to oversee the cleanup effort. The Trustee then

employed Anchor QEA (Anchor) to monitor the daily clean-up operations. The project was competitively bid and RES was awarded the contract. There were five main challenges RES had to meet: 1. Reduce impacts to shipyard operations, 2. complete dredging before the start of the California Least Tern breeding season, 3. place sand cover under the NASSCO piers, 4. treat and store all bay water captured in the dredging process, and 5. contain and reduce all turbidity caused by dredging. RES solved these issues by re-engineering equipment and by performing unique dredging methods. Timing was critical because RES only had a two to three month window to determine the approach, secure the specialized equipment, modify the equipment and test its performance prior to the start of the project. If the approach failed so would the project, there was no extra time given to reinvent other dredging methods.

**Goals:** Complete the environmental dredging project without impacting shipyard operations prior to the start of the Least Term season.

**Objectives:** Develop innovative environmental dredging methods without impacting shipyard operations while protecting marine life.

**Accomplishments:** RES timely completed the project prior to the California Least Tern season and developed an innovative technology to complete the project without impacting shipyard operations.



Sediment Management Area NASSCO Shipyard.

**Environmental benefits:** This project removed approximately 27,000 cubic yards of sediments from the San Diego bay improving bay water quality.



**Environmental bucket during dredging operations.**

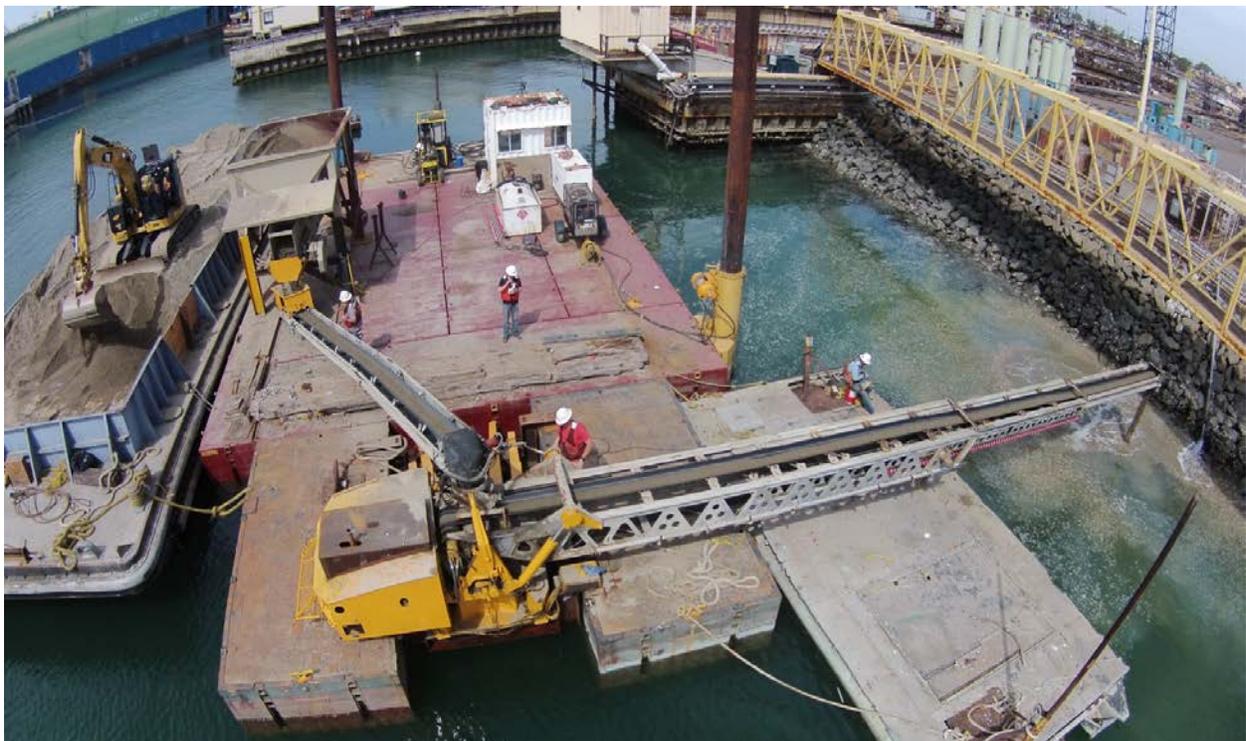
**Innovation:** There were five innovative methods used to meet the project goals: treating sediments while in the barge, sand cover placement under piers, the use of environmental dredging buckets, deployment of double silt curtains, and treatment and storage of all bay water removed during the process.

**1. Barge Sediment Treatment:** Although the contract specifications allowed for sediments to be treated on-land, it would have consumed several acres of scarce shipyard land resulting in impacts to shipyard operations. RES avoided this impact by treating sediments while they were contained in the barge. Cement slurry was added to the sediments to reduce water content and accelerate the sediment drying process. The slurry was pumped from land into the barges and mixed using an excavator. Once dry, the sediments were offloaded into lined trailer trucks and transported to a landfill for final disposal.



*Sediment cement mixing in barge.*

**2.Sand Cover:** Toxic sediments under piers had to remain in place because removing them could undermine the pier structures. There was no off-the-shelf technology to place sand under pier structures. RES developed a floating telli-belt conveyor system that discharged sand between the pier piles at a specified rate called out by the contract. The telli-belt radial arm had the ability to reach far under the pier structure and place sand in otherwise inaccessible areas. This work had to be performed during low tide conditions in order to align the telli-belt's discharge arm under the piers. This innovative approach was successfully used under all NASSCO's piers.



*Telli-belt sand cover operations.*

**3. Reduce turbidity from dredging operations:** RES deployed double silt curtains to insure that dredging of the contaminated sediments created no further contamination. Silt curtains are made of geotextile material attached to a floating boom that extends to the seafloor and traps suspended sediments caused by dredging activities. The first of these curtains were deployed around the dredge and then a second silt curtain was deployed around the perimeter of the dredge area. Real time monitoring performed by Anchor would verify the effectiveness of the silt curtains. As result of these efforts, no water quality violations occurred.



#### Double Silt Curtains.

**4. Environmental Bucket:** Another method of reducing turbidity was the use of a special environmental bucket to remove the sediment. The environmental bucket is designed to take clean cuts along the seafloor while minimizing the amount of sea water trapped in the bucket. As the bucket is closed by the crane operator, sea water is expelled out of the bucket's side flaps. As it is brought to the surface a smaller level of sea water is held in the bucket compared to traditional clamshell buckets. Like the silt curtains, the environmental bucket prevented the spread of contaminated sediments to other parts of the bay.

**5. Water capture and treatment:** Before the project began, the Regional Water Quality Control Board was concerned that seawater contained in the sediments could spread throughout the bay resulting in further contamination. As a result no in bay water discharge was allowed. The seawater had to be treated in on-shore storage tanks before it could be discharged to the city's sewer system. As the sediments were loaded into the barges the seawater was pumped from the barge into storage tanks contained on a separate barge. The water was held in the tanks until the suspended sediments fell to the bottom of the tanks. Once the water tested clean it was discharged to the city's sewer system but

never back in to the bay.



*Truck carrying the sediments to the landfill were first lined to prevent discharges to public roads.*

**Economic Benefits:** This project employed a number of highly skilled laborers and it also created jobs for environmental engineers, biological monitors, civil engineers, project managers, contract administrators, accountants, and lawyers. There were literally hundreds of individuals involved in this project from the regulators to the: City of San Diego, Port of San Diego, US Navy, SDG&E, and shipyard staff's. By removing the contaminated sediments it now allows the shipyard to deepen its water depths without impediment.

**Transferability:** The means and methods deployed for this project by RES is transferable to in any bay in containing contaminated sediments. These methods proved to be practical, cost effective and can be performed timely. Today, these methods are being used by RES to remediate the San Diego BAE Ship and Repair facility under the direction Trustee of the San Diego Bay Environmental Trust Fund .

**Outreach and Education:** Throughout this project, the Trustee (de maximis, inc.) hosted a publically viewable website that tracked project progress from start to completion. Large educational signs were also posted at the job site and community meetings were held to explain the process and the timing of each element of the work. In addition, educational tours were provided during the implementation of the project and members of the Regional Water Quality Control Board, Port of San Diego and others were allowed to view the project.

**Team Members:** NASSCO- Mike Chee and Matt Luxton; de maximis, inc. Project Trustee: Mike Palmer; Anchor QEA Project Engineer: Michael Whelan; R.E. Staite Engineering: Ray Carpenter, CEO; Katha Carpenter, COO ; Chad Carpenter , Project Manager, , Project Facilities ;Equipment: Walt Jellison; Ralph Hicks ,Regulatory Affairs; Ryan Armijo ,Assistant Project Manager, and Ross McDonald Project Engineer.

