

Dredging 101

Beach Renourishment in Southern California

Presented By:

Jon Finegold, Coastal Engineer/Dredging Specialist



SANDAG



1

Dredging 101

Beach Renourishment in Southern California

- Understanding of Dredging Is Critical to Successful Project Design and Implementation
- Major Factors in the Cost of a Dredging Project
 - Types of Dredges and Applicability
 - Placement Methods
 - Borrow Site Location and Design
 - Environmental Constraints / Weather-Wave Conditions
 - Execution Factors – Pipeline, Attendant Plant
 - Historic Success, Lessons Learned
 - Factors to Control Costs



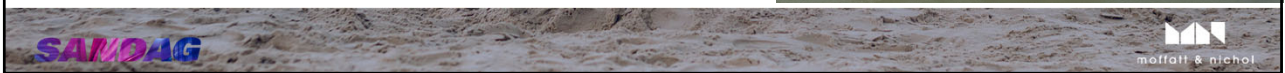
SANDAG



2

Dredging Methods – Types of Dredges

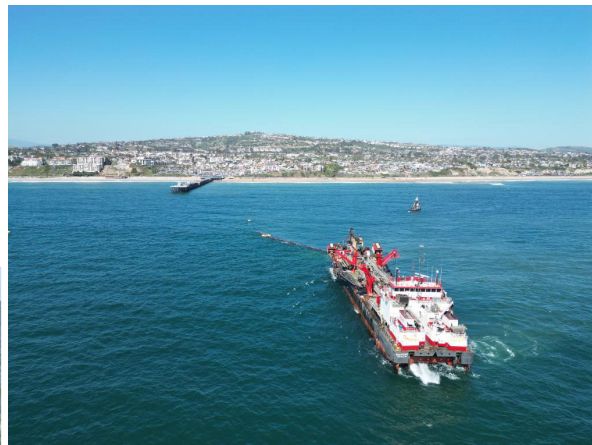
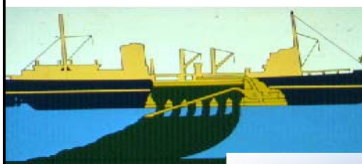
- Trailing Suction Hopper Dredge



3

Placement Methods & Required Handling

- Trailing Suction Hopper Dredge
 - Bottom Placement
 - Pump-out / Beach Placement
 - Rainbow (rare in USA)



4

Dredging Methods – Types of Dredges

- Cutter Suction Dredges (also called cutterhead dredges, CSD, pipeline dredges, or hydraulic dredges)
 - Measured by diameter of discharge pipe
 - 30 inch dredge is massive



SANDAG

moffatt & nichol

5

Placement Methods & Required Handling

- Pipeline Dredges
 - Beach Fill
 - Land Reclamation
 - Wetland Creation



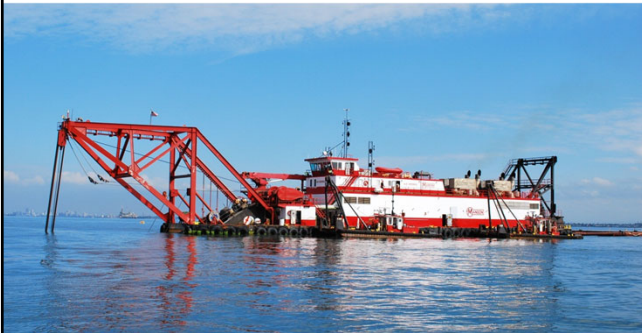
SANDAG

moffatt & nichol

6

Dredging Methods – Types of Dredges

- Large Cutter Dredges



SANDAG

moffatt & nichol

7

Dredging Methods – Types of Dredges

- Small Cutter Dredges
 - Often truckable
 - Work inside protected harbors



SANDAG

moffatt & nichol

8

Dredging Methods – Types of Dredges

- Mechanical Dredges
 - Clamshell
 - Backhoe
 - Ladder/Dipper
 - Dragline



Backhoe Dredge



Clamshell Dredge

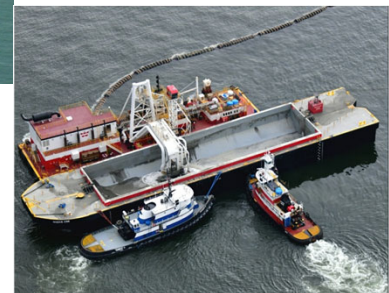
SANDAG

moffatt & nichol

9

Placement Methods & Required Handling

- Mechanical Dredges
 - Barges/Scows towed to disposal location with tug boat
 - Material Bottom Dumped, or
 - Hydraulic Offload, or
 - Mechanical Offload



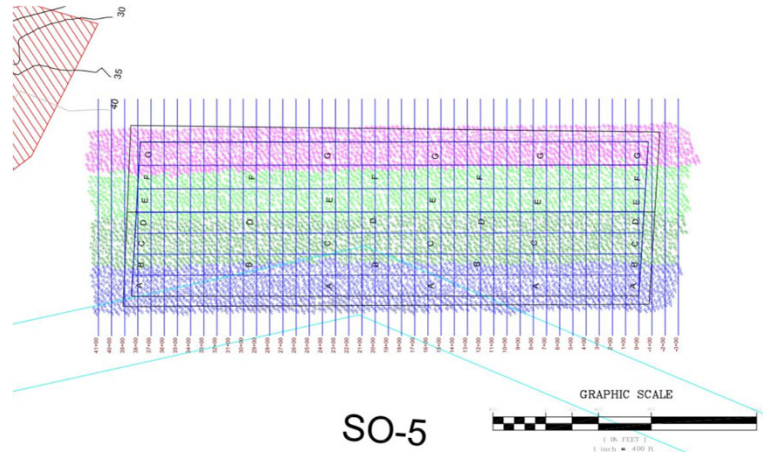
SANDAG

moffatt & nichol

10

Borrow Site Design Factors

- Proximity to Placement Sites
- Material Quality
- Reachable Depth
- Borrow Length to Minimize Dredge Turns during Loading
- Wave Conditions



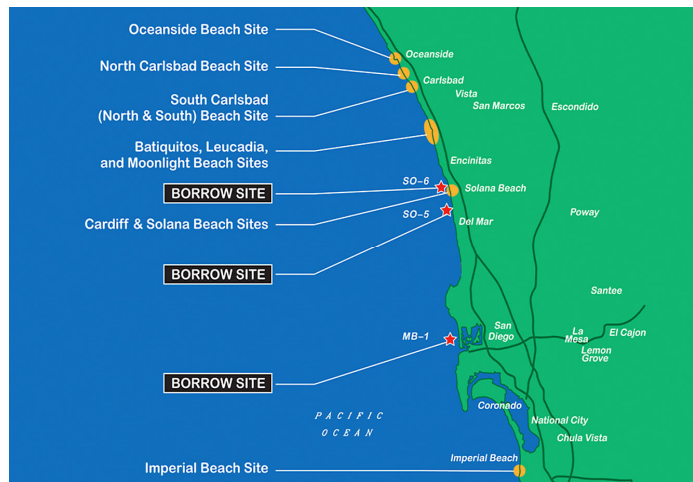
SANDAG

maffett & nichol

11

Borrow Site Design Factors

- Wide Array of Receiver Sites
- Each site needs a Borrow Source no more than 20 miles away, the closer the better
- Offshore investigations about to start to identify more borrow sites in South Orange County



Taken from 2012 SANDAG Presentation

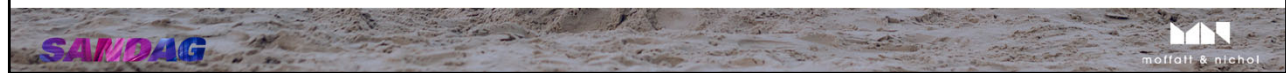
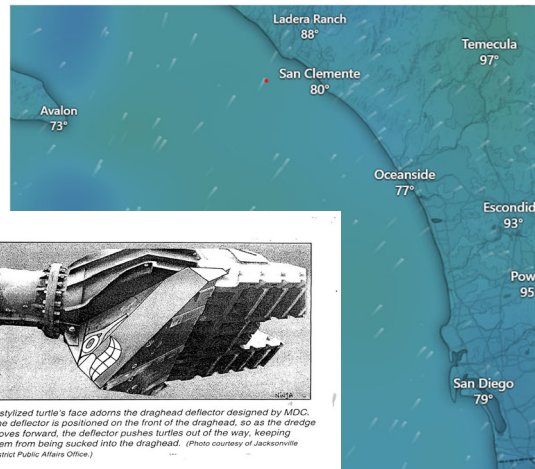
SANDAG

maffett & nichol

12

Environmental Constraints and Weather

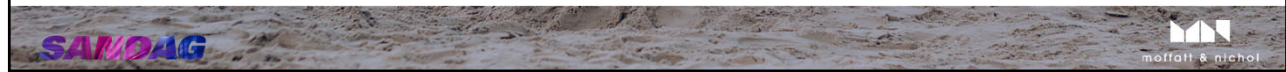
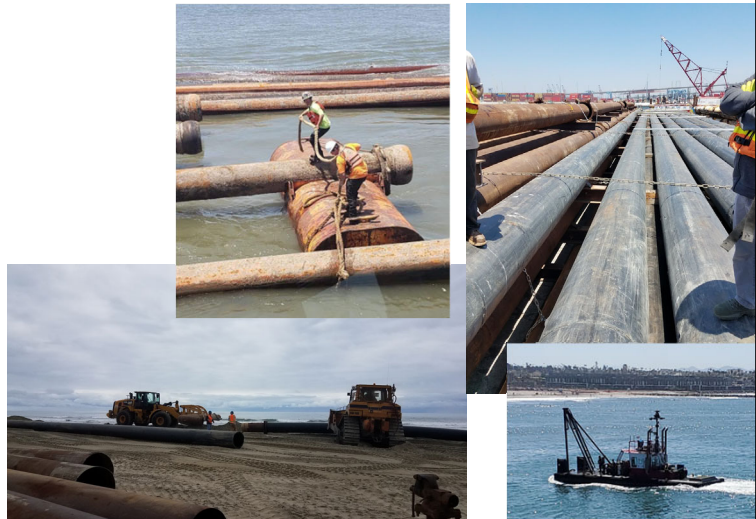
- Environmental Constraints
 - Marine Mammals (Speed, Observers, Time of Year)
 - Turtles
 - Grunion
 - Bird Nesting
 - Commercial Lobster Fishing
 - Air and Water Quality
- Weather
 - Wave Conditions, Downtime, Safety,



13

Mobilization and Execution

- Offshore Pipeline
 - Dedicated Crew
 - Crane Barge
 - Work Boats
 - Floating and Submerged Pipeline
 - Pontoons
- Shore Pipeline
 - Shore Crew with Flagmen for Public Safety
 - Bull Dozers
 - Front End Loaders
 - Excavators



14

West Coast Hopper Dredge Market – Past Bids

SANDAG Regional Beach Sand Project II - 2012

Bidder 1	Bidder 2	Bidder 3
\$23,817,200	\$25,558,700	\$28,185,590

SANDAG Regional Beach Sand Project I - 2001

Bidder 1	Bidder 2	Bidder 3	Bidder 4
\$10,827,163	\$16,955,200	\$18,800,200	\$25,300,000

SANDAG

maffett & nichol

15

West Coast Hopper Dredge Market – Past Bids

USACE West Coast Hopper (Columbia River) Bid Results 2015-2025

Year	Bids			Winning Bidder
	Bidder 1	Bidder 2	Bidder 3	
2025		\$32,858,750		Bidder 2
2024		\$30,482,500		Bidder 2
2023		\$68,929,000		Bidder 2
2022		\$26,993,500		Bidder 2
2021		\$32,452,500	\$28,996,369	Bidder 3
2020		\$26,782,500	\$25,815,000	Bidder 3
2019	\$28,558,000	\$22,851,000	\$25,404,000	Bidder 2
2018	\$33,013,750	\$25,787,500	\$23,228,055	Bidder 3
2017	\$19,618,320	\$20,762,500		Bidder 1
2016		\$23,817,000		Bidder 2
2015		\$26,993,500		Bidder 2

SANDAG

maffett & nichol

16

Summary

- Factors that Determine Applicable Dredge Plant and Cost
 - Dredge Volume, Template, Location, and Site Access
 - Dredged Material Type, Quality
 - Placement Site, Methods, and Handling
 - Applicable Dredge Type Production Capabilities
 - Environmental Constraints and Estimated Weather Downtime
 - Other Current and Projected Market Needs for Applicable Dredge Type
 - Project Frequency (Annual, Every 5 Years?, 10 Years?)

Cost Control Measures

- Things You Can Do to Help Control Costs
 - Early Engagement with Permit Agencies to Negotiate Restrictions, Time of Year Dredging and Placement Allowed and BMPs
 - Identify and Permit Nearby Borrow Sources with Desired Material Qualities
 - Early Contractor Engagement, Understand Market and Schedule Constraints
 - Allow Contractor Flexibility (Tolerances, Oversized Borrow Areas, Project Delivery Timeline) as Much as Practicable
 - Bid Early – allows time for planning

Thank You, Questions?



SANDAG

maffatt & nichol