

# Marina Maintenance Dredging Challenges

*A Case Study on the Port of Skagit La Conner Marina*

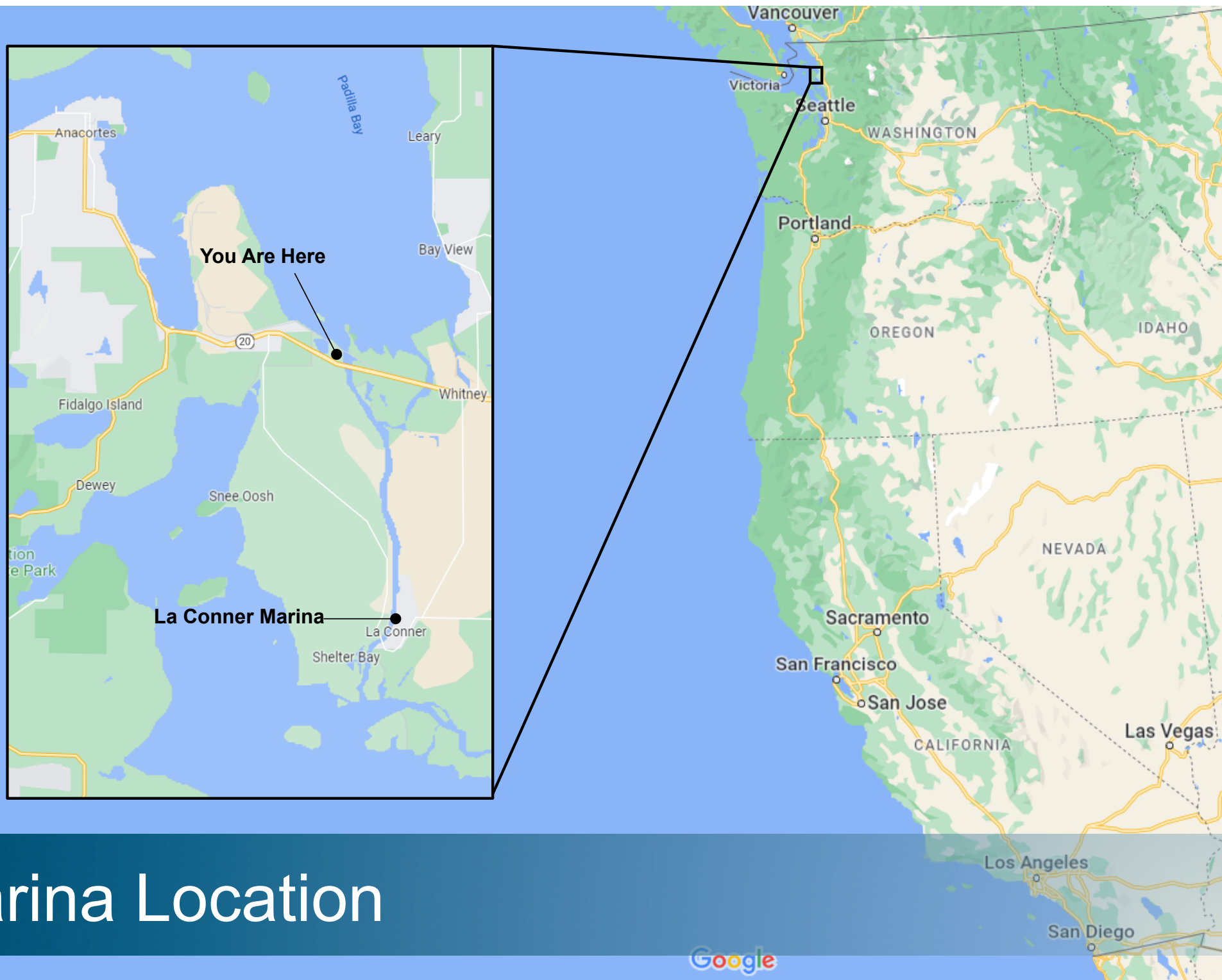


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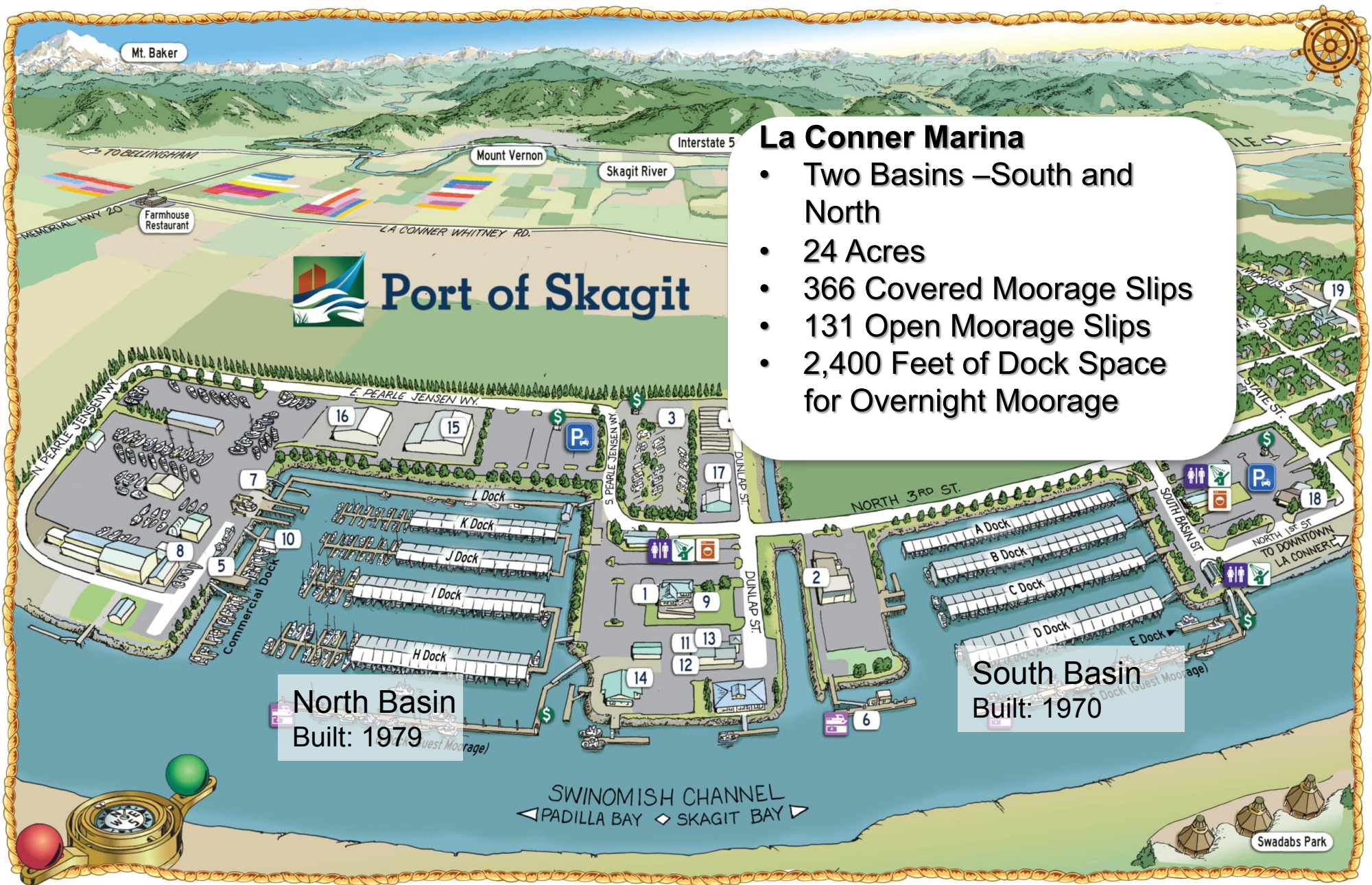


# Marina Location and Overview



# Marina Location





## La Conner Marina

- Two Basins –South and North
- 24 Acres
- 366 Covered Moorage Slips
- 131 Open Moorage Slips
- 2,400 Feet of Dock Space for Overnight Moorage

# Marina Overview



# Maintenance Dredging Project Summary

# Maintenance Dredging Project Summary

- Maintenance dredging was completed in two in-water work seasons – July 2018 through February 2019 and July 2019 through March 2020.
- Approximately 100,000 cubic yards of sediment were dredged from both the north and the south basins of La Conner Marina.
- All sediment were transported and disposed at Department of Natural Resources' (DNR's) Rosario Strait open water disposal site.





# Challenges & Solutions

# Boat Relocation

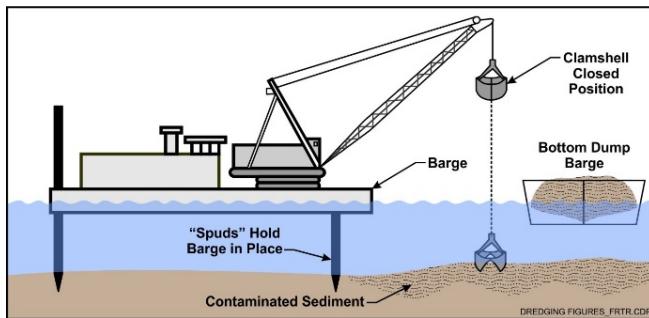
- **Problem:** Boat relocation has a potential of becoming the biggest pain point for harbormasters/project managers during marina dredging project. Factors at play that seldom align include:
  - Tenant's availability to move the boat,
  - Requirements for existing operations/industries at the marina,
  - Contractors' dredge production rate and breakdowns,
  - Inclement weather, etc.
- **Solution/What Worked at La Conner Marina:**
  - Developed a boat relocation/dredge sequencing plan considering transient dock space available to move the boats and estimated dredge production rate.
  - Port stayed nimble with an awareness that the plan will change every week or more often.
  - Port worked with tenants early on so the tenants were aware of what was coming.
  - Port performed some of the boat relocation themselves which helped them keep up with contractor's changing needs.
  - Frequent and direct communication between harbormaster and contractor foreman was pivotal.





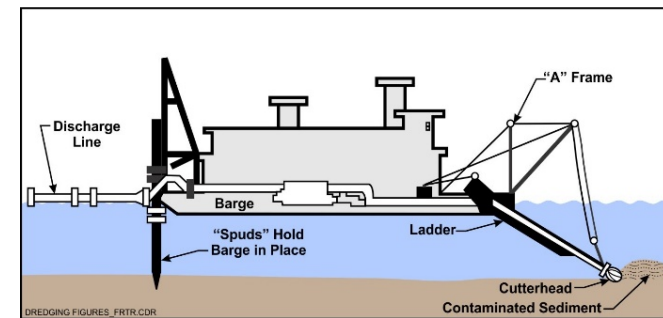
# Dredging Method

Mechanical Clamshell Dredge mounted on Crain Cables or Excavator Arm



- Generates dredged material in a solid form.
- Ideal if you are planning to transport dredged material off-site via barges or trucks/trailers.
- Suitable dredging method for a wide range of material types
- Generates more turbidity at the point of dredging as compared to hydraulic.
- Access can be limited if permits do not allow use of an open excavator bucket or beam.

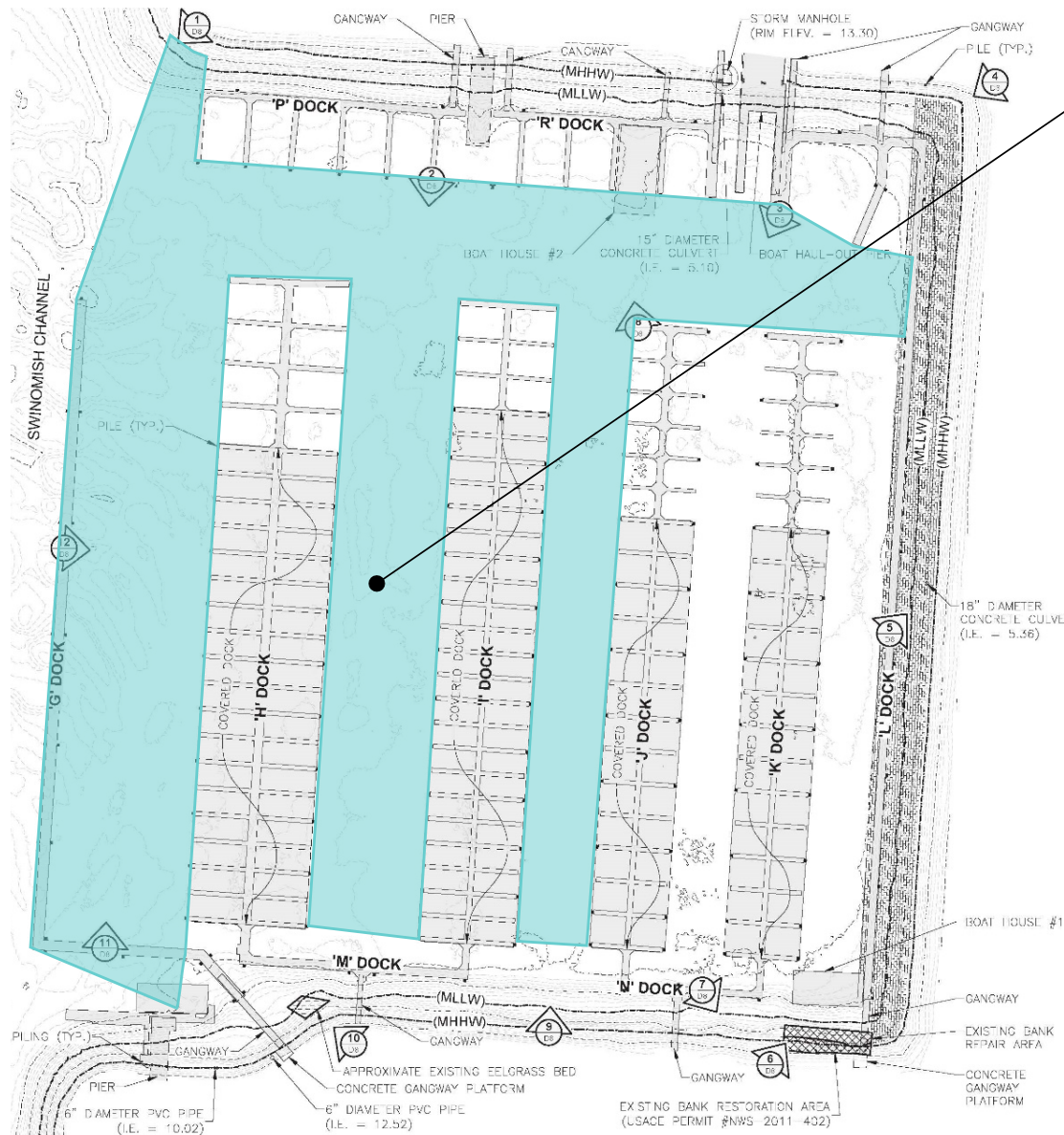
Hydraulic (suction) Dredge



- Generates dredged material in a slurry form (80% water and 20% sediment) and therefore requires a water filtration/processing system to separate solid from liquid.
- Ideal if disposal facility is nearby the site where material can be discharged and dewatered.
- Not suitable for larger rocks and debris.
- Generates less turbidity at the point of dredging as compared to mechanical dredging.
- Provides better maneuverability and access under structures.

- La Conner Marina was predominantly dredged using mechanical dredge method since the contractor could not demonstrate means and method to manage large amount water/slurry that would be generated as a result of hydraulic dredge.

# Access



**Wider fairways and easy to access areas**  
**Primary Dredge Equipment:** Hitachi 470 Excavator with a 2.5 CY clamshell bucket.  
**Dredge Rate:** Approximately 500 to 600 CY per day.



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# Access



## Narrower fairways and open slips

**Primary Dredge Equipment:** Hitachi 270 Excavator with 1.5 CY clamshell bucket.

**Dredge Rate:** Approximately 300 to 400 CY per day.





# Access



## **Covered Slips/Docks**

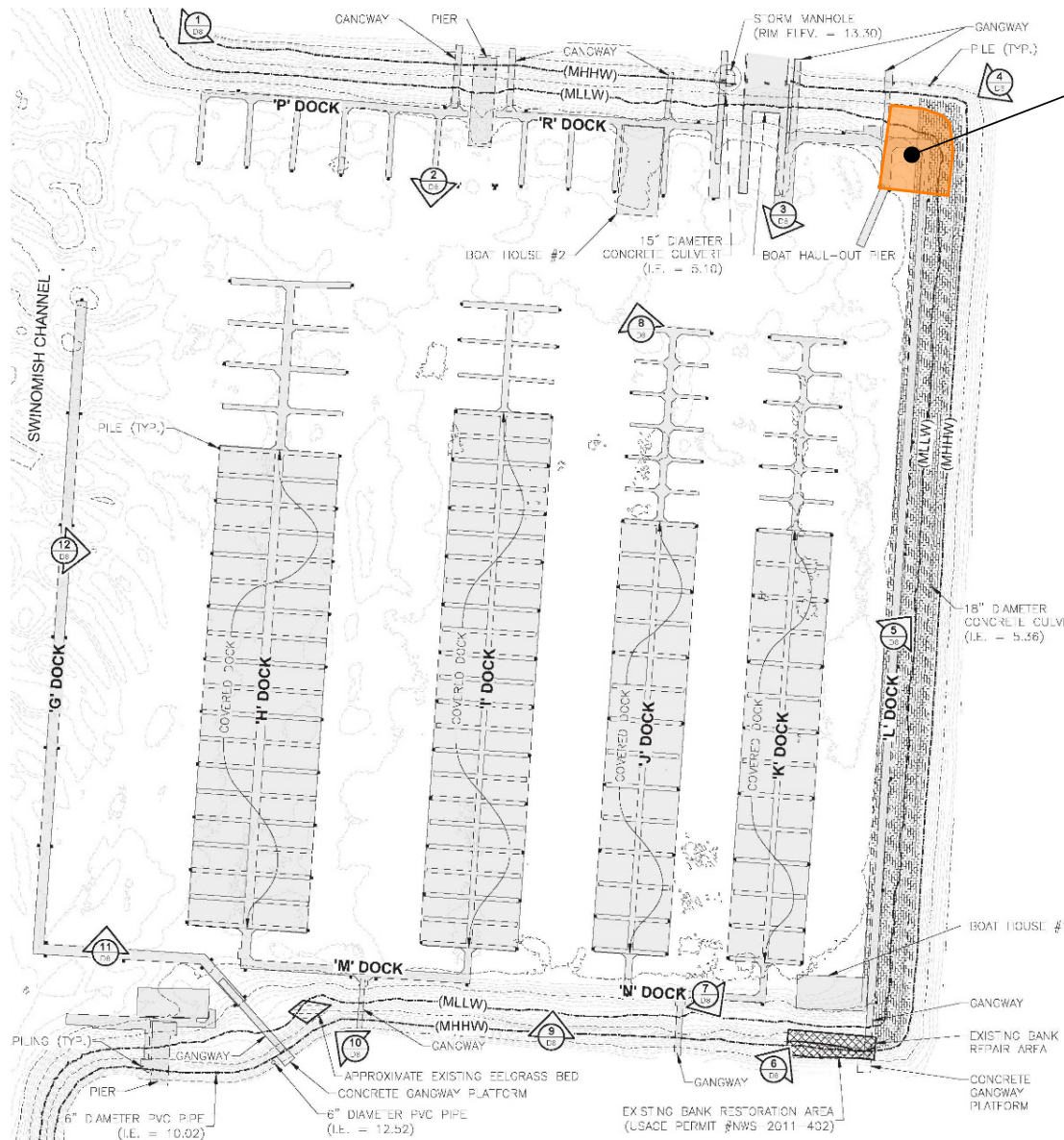
**Primary Dredge Equipment:** Custom-built dredge (Dr. Dredge) with a 0.5 CY clamshell bucket.

**Dredge Rate:** Approximately 150 to 200 CY per day.





# Access



## Hard to reach areas

**Primary Dredge Equipment:** Diver-operated hydraulic dredge with a barge mounted water filtration system.

**Dredge Rate:** Approximately 20 CY of sediment per day



# Disposal of Dredged Material

- Disposal of dredged material can be a significant cost driver for a dredging project.
- **Clean sediment** is eligible for an economical disposal option at an open water disposal site costing approximately **3 to 5 dollars per cubic yards**.
- **Contaminated sediment** may require upland landfill disposal costing approximately **90 to 120 dollars per cubic yards**.
- Given the huge cost difference, completing dredged material characterization as soon as possible gives project managers the information needed for project planning and budgeting.
- Methodical and strategic dredged material characterization informed by existing data and contaminant sources at the site can play a key role in maximizing clean and isolating contaminated sediment (if present).
- **At La Conner, all dredged material was characterized as clean and disposed at an open water disposal site.**



Bottom dumping barge typically used to transport clean material to an open water disposal site



Flat-deck barge typically used to transport contaminated material to an upland transload facility



# Permitting

- Permitting can have significant impact on project schedule taking up to 12 to 18 months depending on project conditions.
- Habitat surveys are typically required to identify/characterize aquatic habitat and species affected by dredging.
- Mitigation may be required if critical habitat such as eelgrass/microalgae are impacted due to dredging project.
- At La Conner, the following permits/regulatory approvals were required:
  - Open water disposal suitability determination
  - State Environmental Policy Act (SEPA)
  - United State Army Corps of Engineers (USACE) Individual Permit
  - Hydraulic Project Approval (HPA)
  - Water Quality Certification (WQC)
  - Shoreline Management Act (SMA) Substantial Development Permit Exemption



# Questions?

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