PORT OF BALTIMORE
SEAGIRT MARINE TERMINAL BERTH 3 DEEPENING

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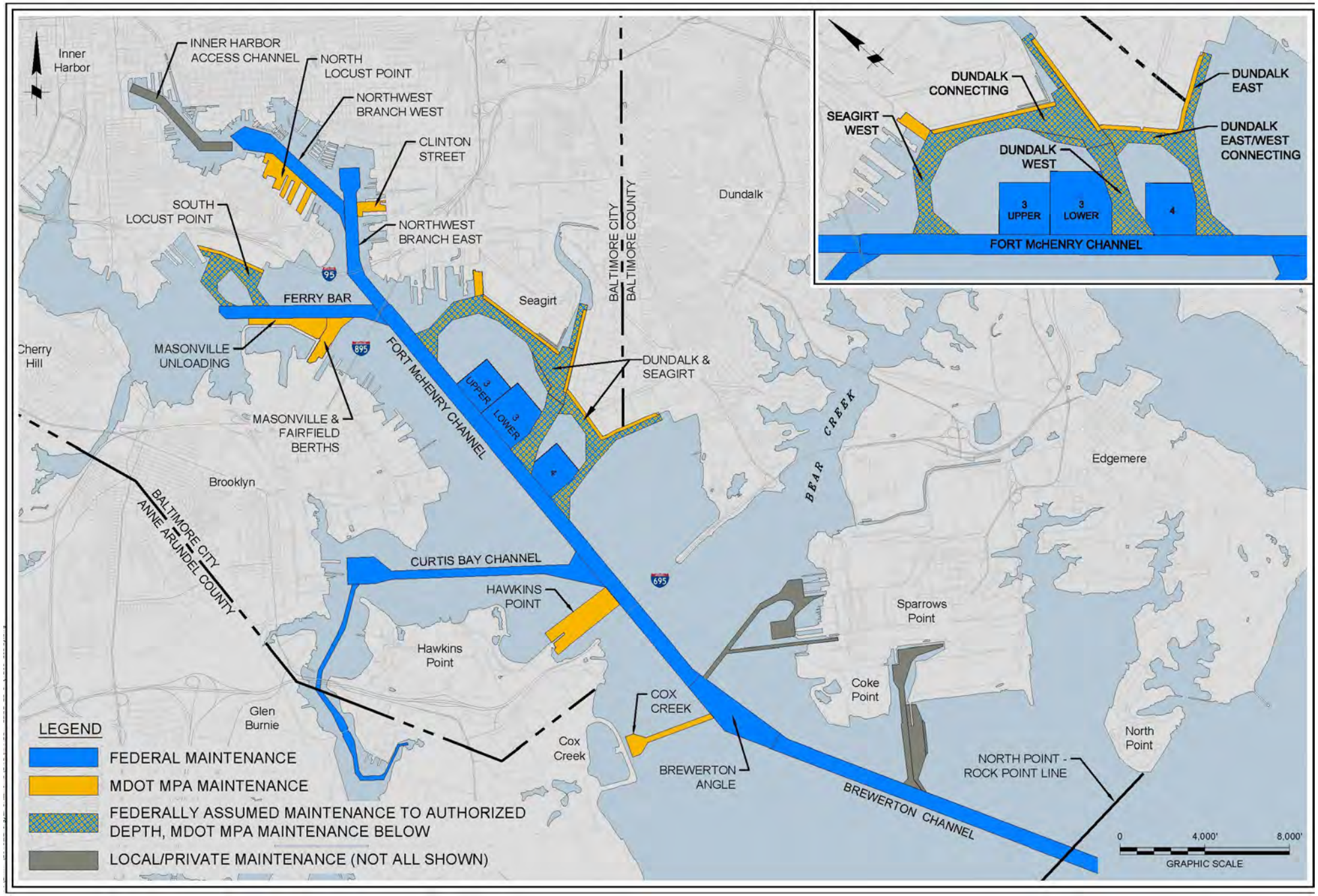
Presented by: Ben Cushing and Lauren Folkert
Gahagan and Bryant Associates, Inc.


Inner Harbor
INNER HARBOR ACCESS CHANNEL
NORTH LOCUST POINT
NORTHWEST BRANCH WEST
CLINTON STREET
SOUTH LOCUST POINT
NORTHWEST BRANCH EAST
FERRY BAR
MASONVILLE UNLOADING
MASONVILLE & FAIRFIELD BERTHS
FORT McHENRY CHANNEL
DUNDALK & SEAGIRT
BALTIMORE CITY
BALTIMORE COUNTY
Dundalk
Seagirt
Cherry Hill
Brooklyn
BALTIMORE CITY
ANNE ARUNDEL COUNTY
CURTIS BAY CHANNEL
HAWKINS POINT
Hawkins Point
Glen Burnie
Cox Creek
COX CREEK
BREWERTON ANGLE
BEAR CREEK
Edgemere
Sparrows Point
Coke Point
North Point
NORTH POINT - ROCK POINT LINE
BREWERTON CHANNEL
3 UPPER
3 LOWER
4
DUNDALK CONNECTING
DUNDALK EAST
SEAGIRT WEST
DUNDALK EAST/WEST CONNECTING
DUNDALK WEST
FORT McHENRY CHANNEL
LEGEND
FEDERAL MAINTENANCE
MDOT MPA MAINTENANCE
FEDERALLY ASSUMED MAINTENANCE TO AUTHORIZED DEPTH, MDOT MPA MAINTENANCE BELOW
LOCAL/PRIVATE MAINTENANCE (NOT ALL SHOWN)
0
4,000'
8,000'
GRAPHIC SCALE

Study Area – Seagirt Marine Terminal

- The Seagirt-Dundalk Marine Terminal complex is one of Baltimore's primary terminals.
- Operated by Ports America Chesapeake (PAC) under a 50-year public – private partnership with the Maryland Department of Transportation Maryland Port Administration (MDOT MPA).
- MDOT MPA responsible for maintaining channels.
- PAC responsible for berth modifications.

Seagirt Marine Terminal – Past Channel Modifications

- 1998 Baltimore Harbor Anchorages and Channels study resulted authorization of federal navigation improvements in Baltimore harbor which included deepening and widening the Seagirt Branch channels. (El. -42' MLLW)
- MDOT MPA has chosen to to complete the following channel modifications through the regulatory process rather than the civil works process.
  - 2007 – Deepened and Widened West Loop to El. -45' MLLW.
  - 2008 – Deepened East Loop to El. -50' MLLW.
  - 2015 – Widened East Loop

Seagirt Marine Terminal – Recent Berth 4 Construction

- New Berth 4 wharf structure and berthing pocket dredged in 2012
- Purchased 4 Super-Post Panamax ZPMC Gantry Cranes which became operational at Berth 4 in 2013.
  - Outreach of 22 containers wide
  - Working height: 140 ft.
  - Capable of handling 1.5 million twenty-foot-equivalent units (TEU) per year

Seagirt Berth 3 –New Work Dredging

IDENTIFY NEED FOR DREDGING

- Increasing Vessel Size
- Economic Benefits

PLANNING CONSIDERATIONS

- Safe Navigation
- Geotechnical Investigations
- Berth Stability
- Permitting
- Placement

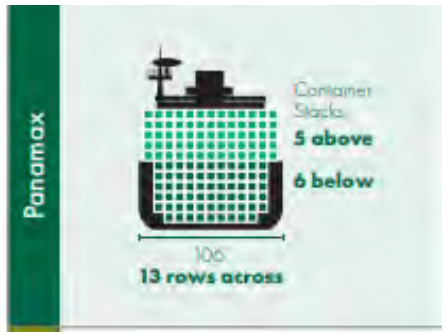
CONSTRUCTION

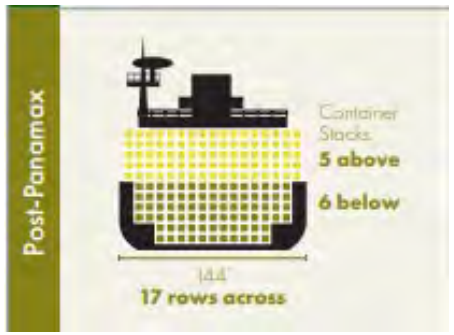
- New Work
- Maintenance
- Berth Modifications

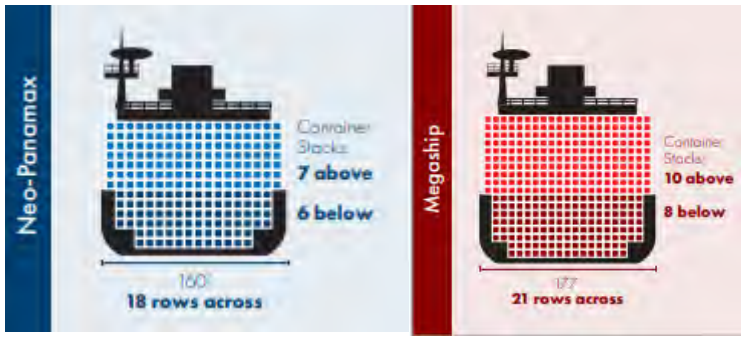
Increasing Vessel Size

Category	TEU	Length (ft)	Beam (ft)	Draft (ft)
Megaship	>14,500	>1,200	>160	>49.9
New Panamax	10,000–14,500	1,200	160	49.9
Post Panamax	4,500–10,000	1,100	144	49.9
Panamax	3,000–5,000	965	106	39.5

- New-Panamax ships designed to transverse the Expanded Panama Canal.
- As the fleet vessel size increases, ports need to fund improvements to allow larger vessels to call.
  - Larger Cranes
  - Deeper and wider channels.
  - Larger turning basins.
  - More container storage space.
  - Higher bridges
  - On dock rail capacity

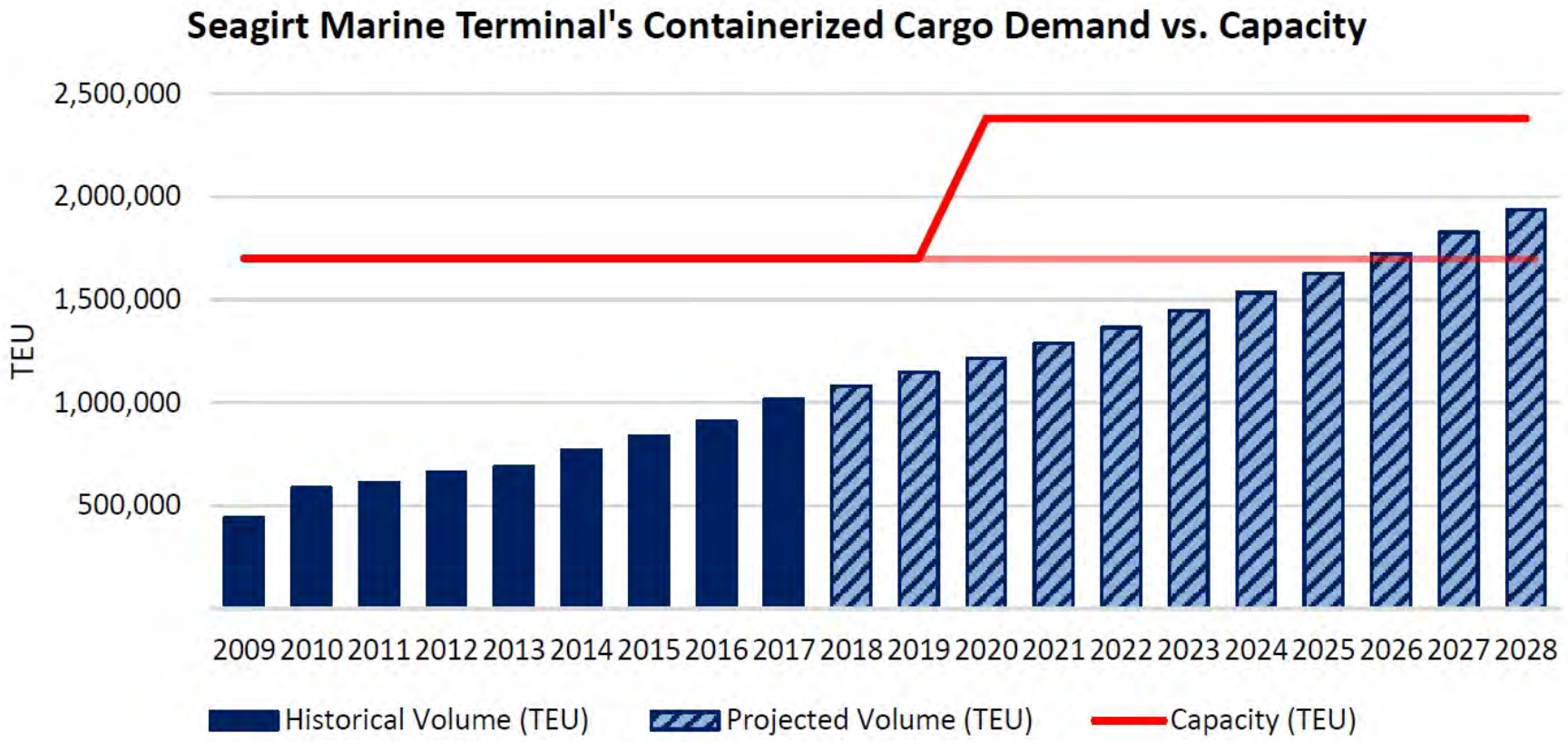






Source: Bureau of Transportation Statistics – Vessel Size and Corresponding Port Infrastructure

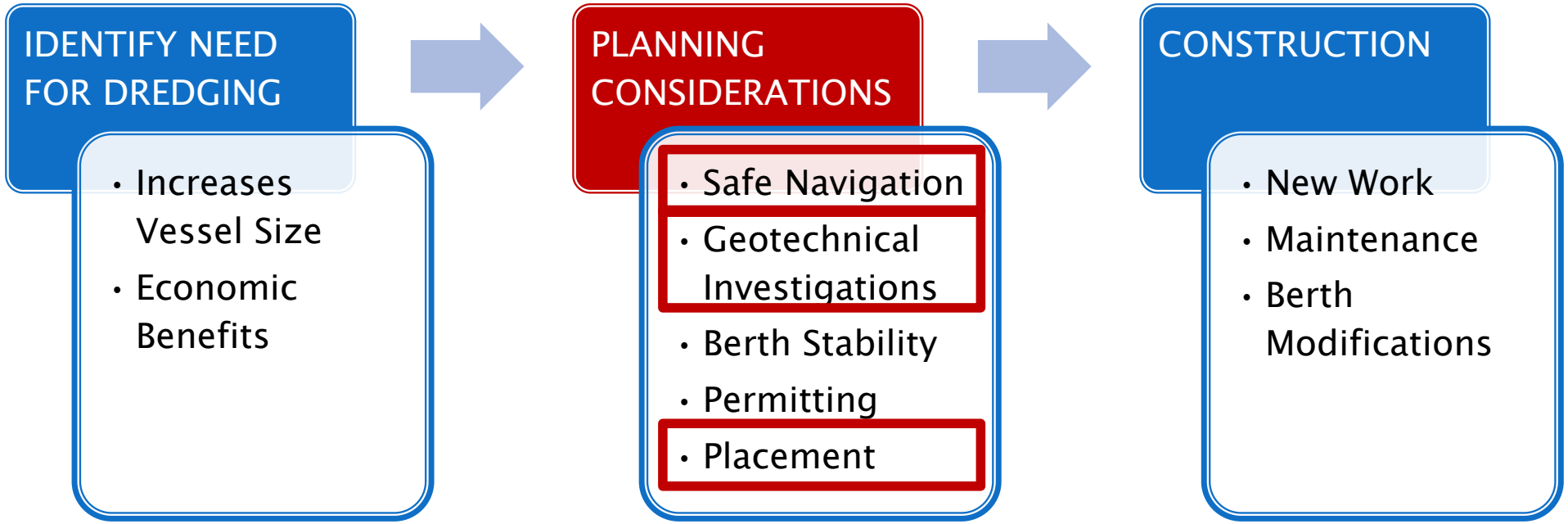
Berth 3 – Economic Benefits



- Increase SMT capacity by 700,000 TEU
- Brings jobs to Baltimore.
- Howard Street Tunnel project will allow double stacking containers.

Source: MPA Berth 3 Modernization P3 Project FY2018 BUILD Grant Application – Martin Associates

Seagirt Berth 3 – New Work Dredging



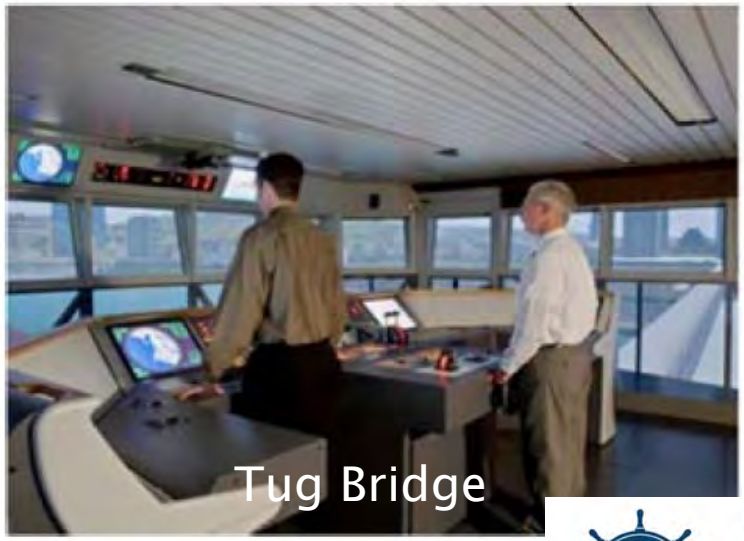
Safe Navigation

- Required Channel Improvements:
  - Deepen 1,400' x 60' Berth 3 Pocket to El. -50' MLLW. (PAC)
  - Deepen the channel in front of Berth 3 to El. -50' MLLW.
  - Increase channel width in front of Berth 3 (Widener 1)
  - Larger Turning Basin (Wideners 2A/2B)
- MDOT MPA funded ship simulations.
  - Evaluate the feasibility of a ULCV to transit to/from Berth 3 with proposed channel improvements.
  - Verify and/or optimize proposed channel improvements.

Ship Simulations


Bridge 1 FMSS

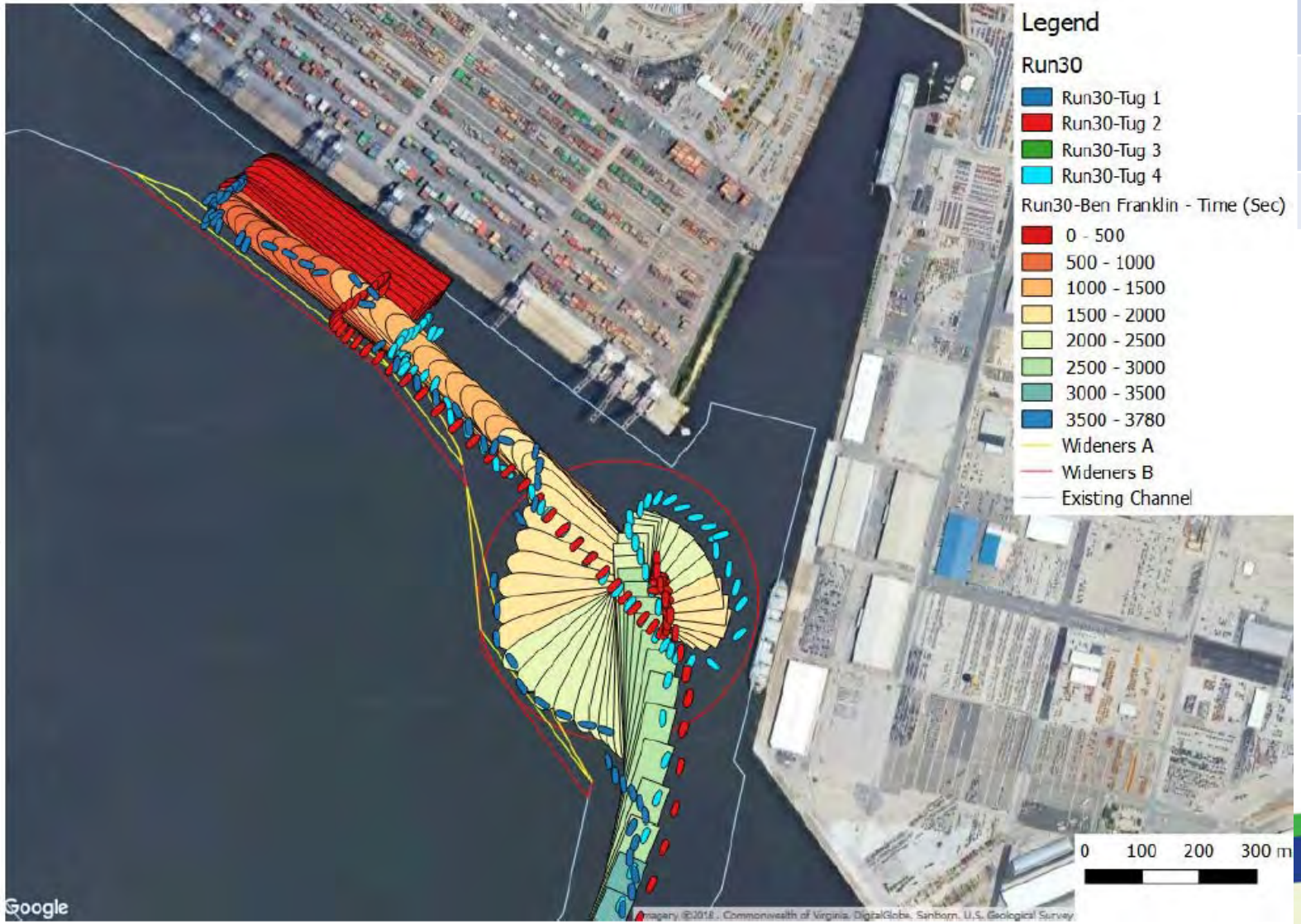

Simulation Control Room


Tug Bridge


Tug Bridge

- Maritime Institute of Technology and Graduate Studies
- Simulation research capabilities.
  - 360- degree Full-Mission Ship Simulator
  - 120-degree Bridge Tug Simulator
  - 300-degree Bridge Tug Simulator

Ship Simulations

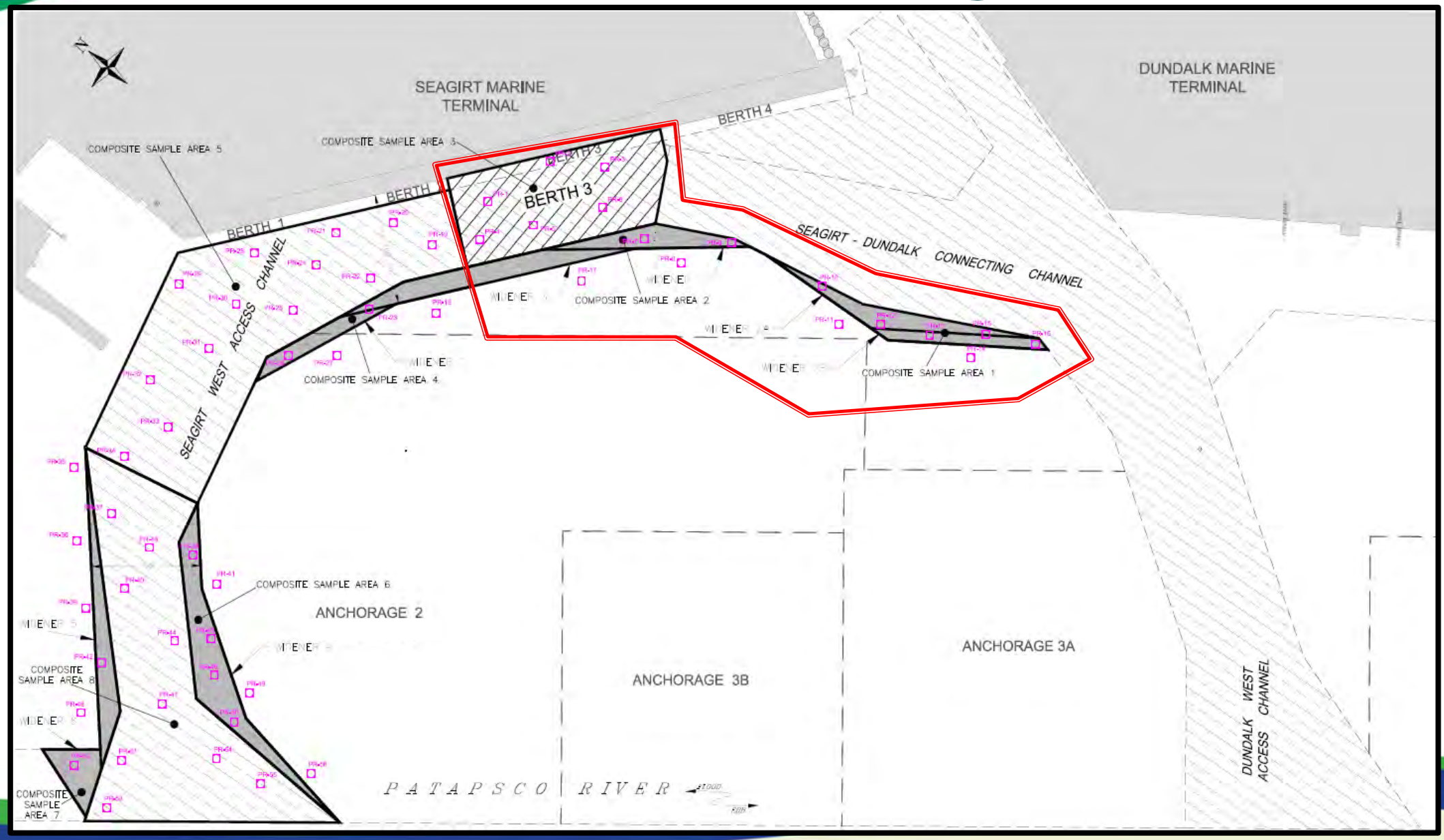


Vessel Models

Parameter	Kalina	Ben Franklin
Capacity (TEU)	14,000	18,000
Length (ft)	1,200	1,310
Beam (ft)	168	177
Load Draft (ft)	47	47

- 24 runs conducted with Ships entering and exiting Berth 3 via the East Loop.
- Turning Basin Widener 2A and 2B verified
- Widener 1 refined
  - Reduced dredging area by about 13,600 SF
  - Reduced quantity by about 14,000 CY

Geotechnical Investigation



Baltimore Harbor Dredged Material Containment Facilities

Baltimore Harbor Dredged Material Containment Facilities

- MDOT MPA funds:
  - Community Outreach
  - Mitigation
  - Permitting
  - Design
  - Construction
  - Operations and maintenance
  - Other Planning
- Tipping fee for federal and private dredging projects.

Masonville DMCF

Hydraulic Inflow

- Dredged material & water elevation constraints within the DMCF's.
- Baltimore Harbor dredging projects typically require mechanical dredging with hydraulic unloading.
- Recirculation plan
  - Limit bay water introduced to the DMCF.
  - Minimize required operations and water management.

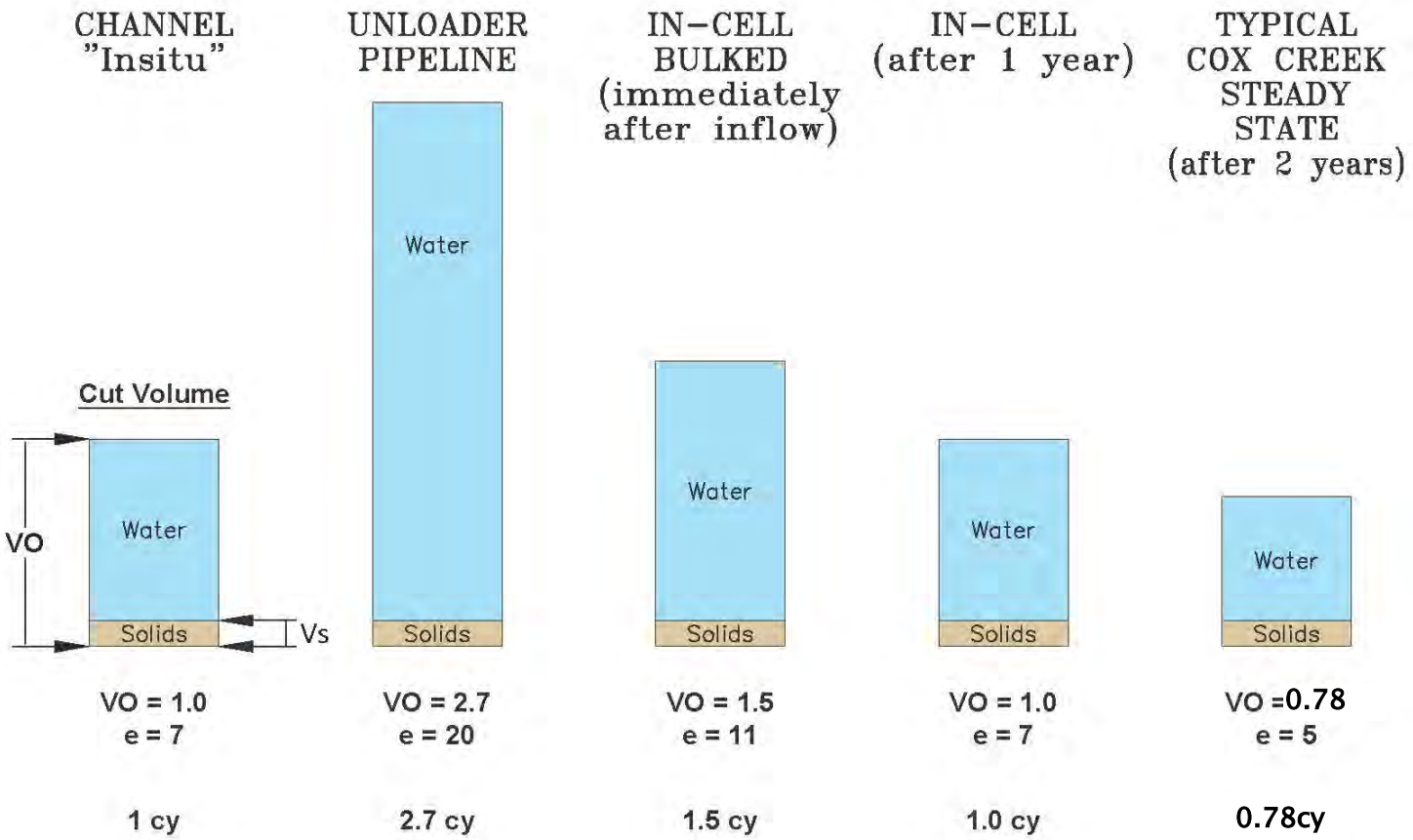

Corman Kokosing *CKCC Unloader No. 3*


Recirculation Pump


Inflow point in the Masonville DMCF

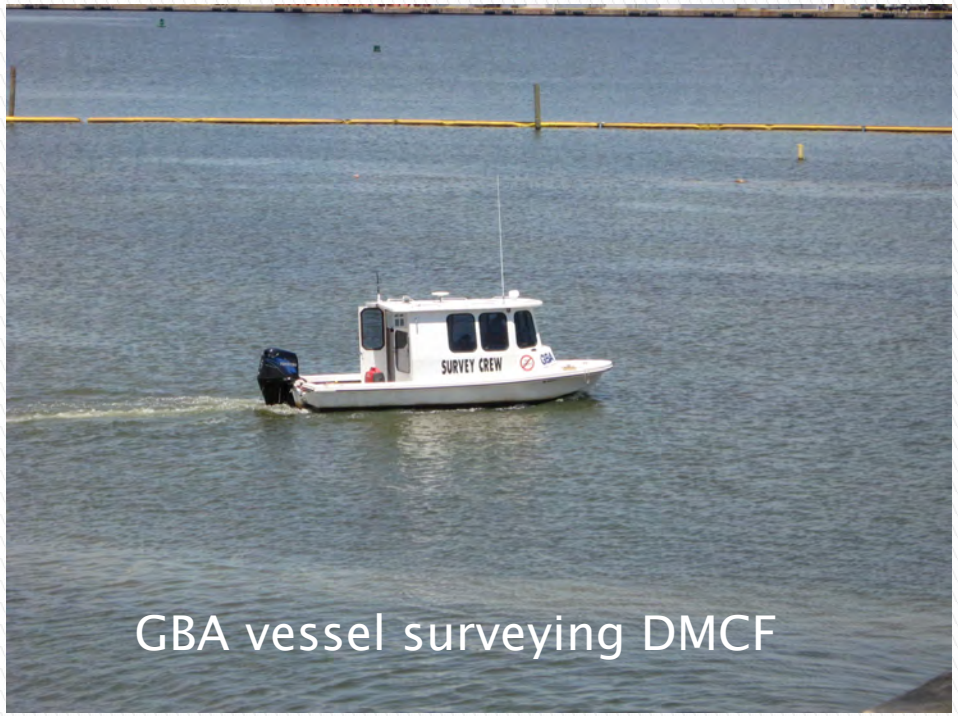
Dredged Material Volume Change

- Void ratio of saturated material: $e = \frac{V_f}{V_s}$
- The "volume occupied" (VO), is used to describe the changes in volume over time that occur in DM as it is dredged and placed in a DMCF
  - VO changes over time as the DM consolidates
  - VO at time t $= \frac{V_t}{V_{cut}} = \frac{(et+1)}{(ecut+1)}$



DMCF Surveying and Sampling

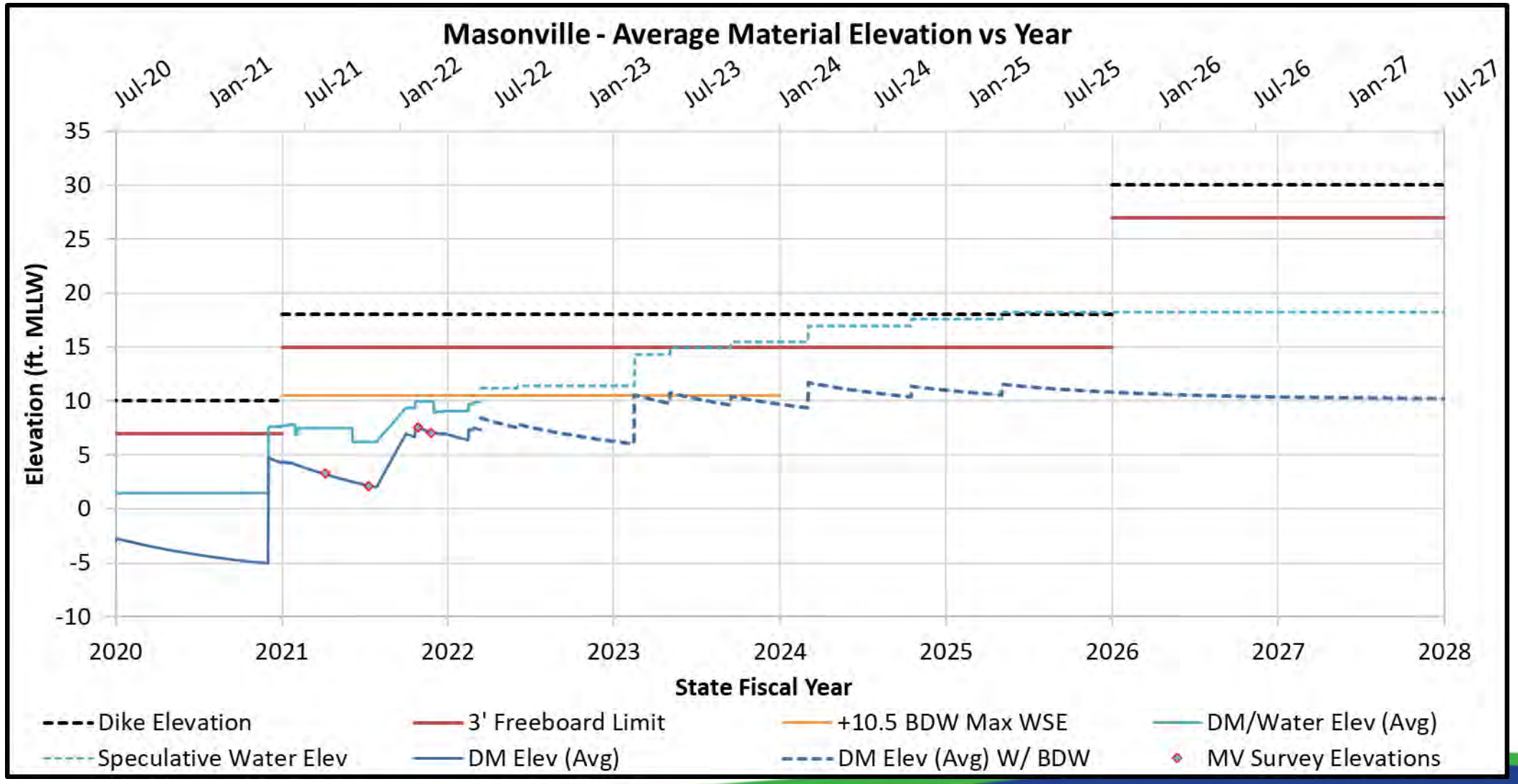
- Perform regular surveys within the DMCFs to obtain volume occupied.
- Perform sampling to obtain moistures contents at different depth
- Placement of the Seagirt Berth 3 New Work material created an opportunity to monitor the behavior of New Work material.



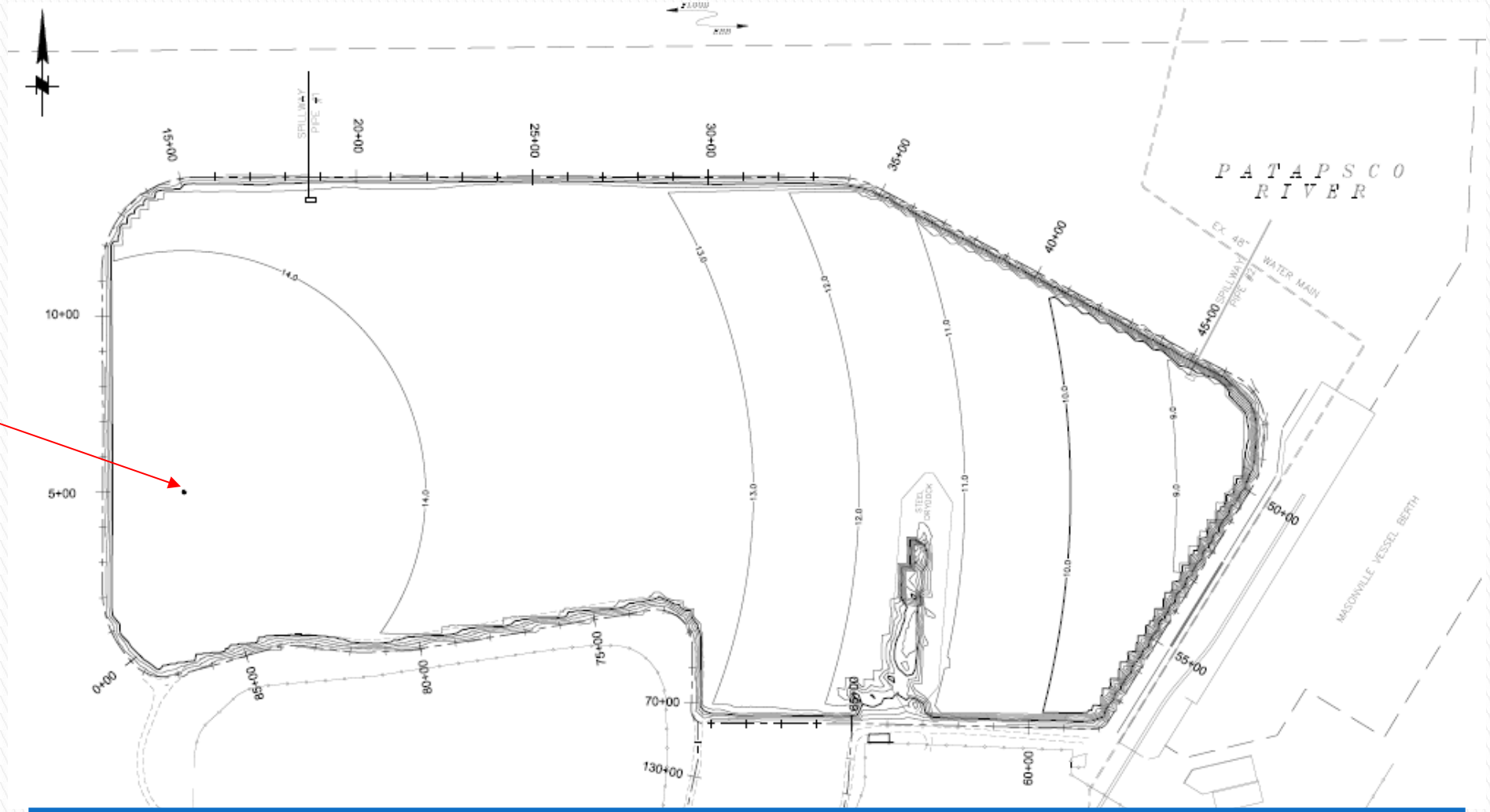
GBA vessel surveying DMCF


Push Sampler

Predicting DMCF Elevations – 1D Modeling

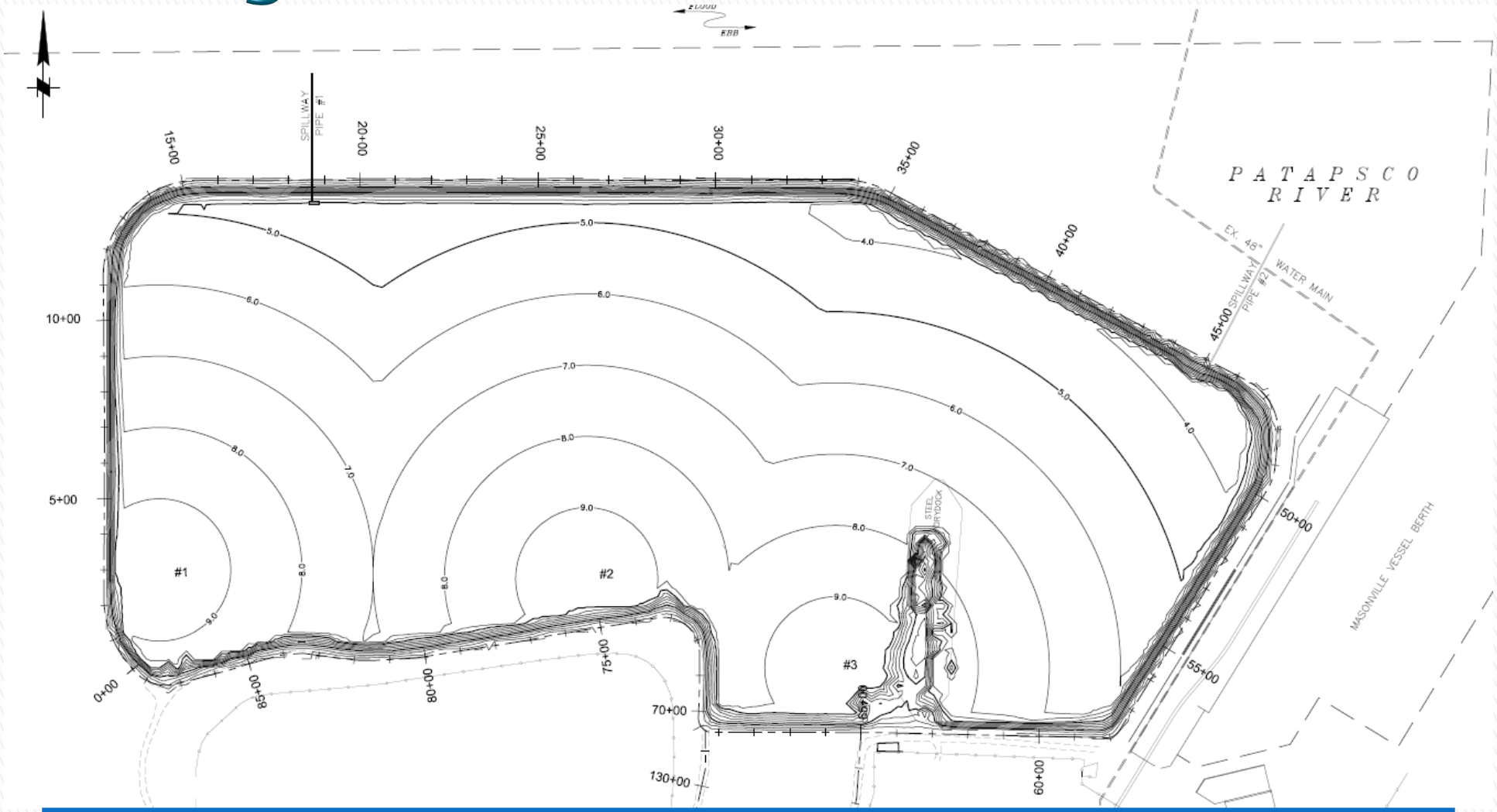


Predicting DMCF Elevations – 3D Modeling



Scenario 1: No limiting peak elevation

Predicting DMCF Elevations – 3D Modeling



Scenario 2: Limiting peak elevation of EL. +10 ft MLLW

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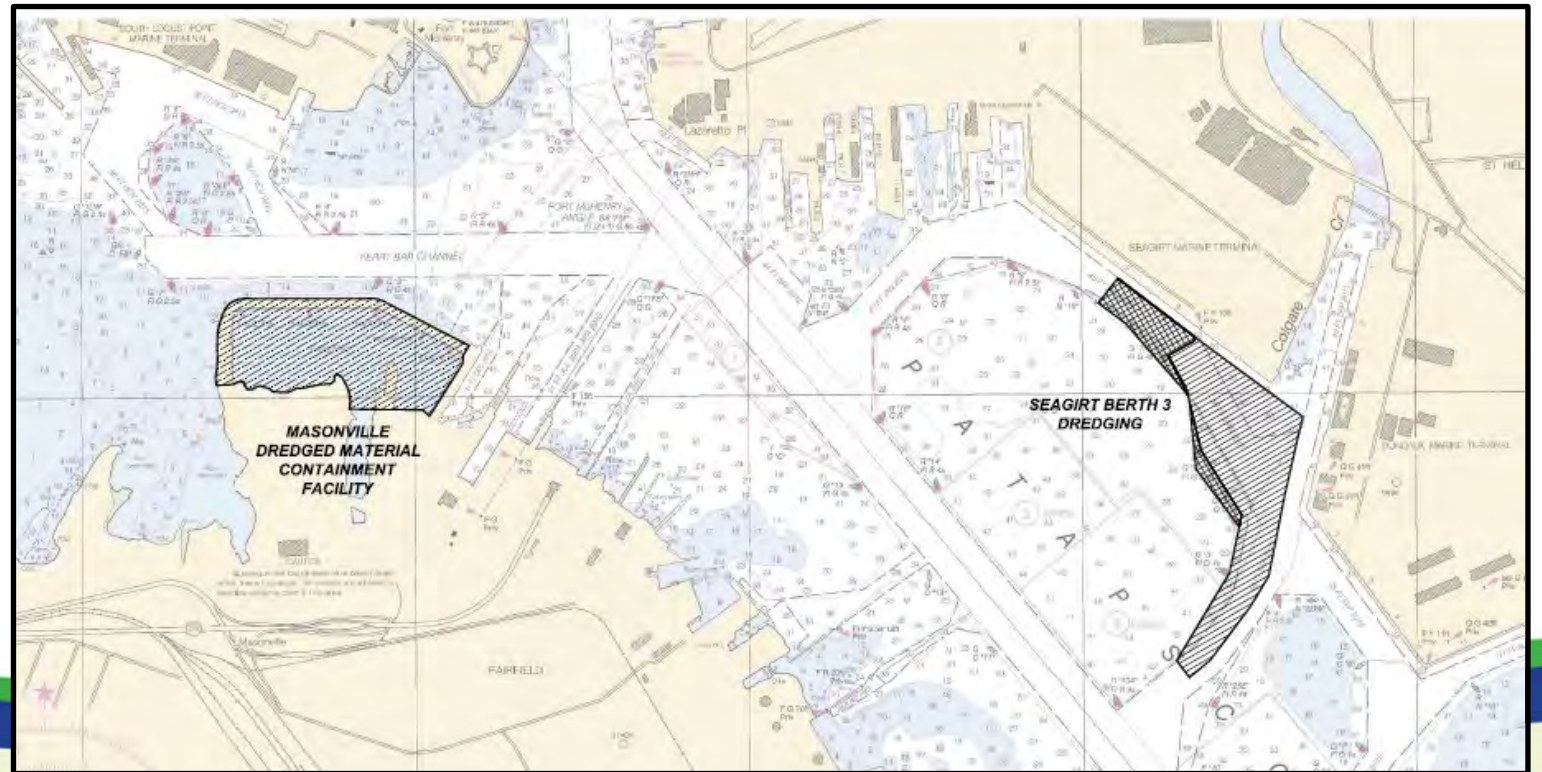
Channel Modifications (MDOT MPA)

- Contract awarded to Corman Kokosing Construction
  - Dredging to El. -51' + 1' OD MLLW
  - New Work: 400 KCY
  - Maintenance: 81 KCY
  - $10,077,750
- Completed June 10, 2021



Construction (PAC)

- Berth 3 Wharf Improvements awarded to FAY.
  - Contract Total: $23,281,000
- FAY subcontracted dredging items to Corman
  - Dredging (32 KCY): $1,718,500
  - Phase 1 completed September 3, 2021
  - Phase 2 planned to be completed in December
- Cranes delivered on September 9, 2021
  - Operational in 2022.
- Seagirt Berth 3 deepening will be a successful project completed through the regulatory process and a public / private partnership.


Cranes delivered aboard *the Zhen Hua 24*

Future New Work Projects

- Maintain a healthy dredging program to support future growth at the Port of Baltimore.
  - Deepening and widening of the Seagirt West Loop.
  - A third 50' berth at Seagirt Marine Terminal

Thank You

Lauren Folkert

GBA
ENGINEERS ★ SURVEYORS

Ben Cushing