

APPENDIX J

NAVY BRAINSTORMING SESSION RESULTS

Following in Section 1 are brainstorming ideas, regarding things to incorporate in the new generation of Navy piers, were developed in a Navy brainstorming session in early 2001. Section 2 listed actions the Navy could take to facilitate getting the best possible new generation piers.

Section 1. Brainstorming Ideas

Primary Structures

- Incorporate lateral load isolation devices in seismic regions
- Incorporate fusion-bonded, epoxy-coated reinforcing bars
- Incorporate the use of FRP, carbon, glass, etc., in rebar, strands, fibers
- Incorporate the use of high-performance concrete
- Increase the strength and durability of concrete by using by-products from energy production
- Use FRP stay-in-place form work to construct concrete decking
- Use composite bearing piles (large) 24 to 36-inch OD
- Use FRP tie-backs for direct piling/bulkheading
- Use FRP rebar/tendons to strengthen reinforced concrete slabs/beams (precast/prestressed)
- Use special FRP hybrid beams for columns and beams that interlock to create flexible framing with sensors
- FRP composite columns
- Use bridge-type composite deck
- Use FRP bridge decks (modular) that are interchangeable for various loads
- Explore modularity [e.g., precast/prestressed planks only in lower deck of composite planks (low loads)].
- Evaluate floating structure (it would eliminate height problems)
- Construction of mobile, lightweight elevated ramp and deck for mobile crane operation
- Hydraulically supported second deck with adjustable elevation
- Two levels either
 - (1) Double deck
 - (2) Single deck with (a) handing utilities (b) catwalk access below
- Deep-box type extruded FRP modules (20 by 20 by 6 feet)

Modularity

- Easy replacement of all components and systems
- Easy access to all components or systems
- Ability to disassemble/relocate the pier to another site
- Composite cells for pier construction
 - Ballast – reuse – deballast and move
- Increase pier flexibility to accommodate any class of ship
- Standard material usage to minimize purchase and maintenance of a large variety of materials and products
- Ability to expand/increase in size with mission change
- Research the use of modular section, easy repair or removal if damaged

Utilities

- FRP pipe and pipe hangers could be used in all water transmission lines
- Provide numerous empty conduit runs/ducts for future cable runs
- Single deck pier – provide trenches covered with grating to place utilities
- Use FRP grating and catwalks to house all utility lines below decks (possible color coded for identification)
- Utility meters
- Eliminate the need for steam and saltwater utilities – both are high maintenance
- Portable (nonflexed) utilities
- FRP cable traps could be used to support electrical cables, hoses, or other utilities (modular)
- Use FRP manhole covers to access utilities below deck
- Incorporate use of composite utility hangers/supports

Fendering and Mooring

- Use of composite fendering system for easy maintenance and repair
- Falling weight, constant mooring connection
- Dynamic mooring system to dampen ship motion (hydraulic dampers)
- Self-tensioning bollards (pneumatic system)
- Low-maintenance, versatile fendering system

Miscellaneous Standards

- Eliminate as much as possible the need for support structure shore
- Spray recycled plastic on exposed underside surfaces of pier
- Use precast/prestressed concrete
- Use materials that require no preventative maintenance
- Standard pier striping system for such things as vehicle lanes, ammo handling areas, crane pad locations, and no-load locations
- Correct cleat and bollard height for each class of ship
- Standard power and water depth for every pier so they can be used by every possible class of ship
- Standard curb height
- Helicopter landing deck for offloading personnel or supplies

Lighting

- Develop FRP modular lighting standards (track lighting) for below-deck operations (double-deck piers)
- Use translucent glazing in buildings to increase lighting
- Translucent deck materials
- Reduce energy consumption by using photovoltaic lighting

Pier Support Services

- Standard security guard/alarm house with phones and heating system
- Support services for sailors and ships
- Standard pay phone and vending structures on each pier
- Use composite brows and platforms

Cranes

- Use mobile container mover for all containerized pier operations
- Use sky cranes located in the center of the pier
- Use rail-mounted cranes (including container type cranes) versus mobile cranes

Secondary Structures

- Incorporate the use of composite timber
- FRP handrails can be used to provide a barrier for pedestrians around the perimeter of the pier deck
- Construct portable FRP buildings that can be moved to any location on the pier
- Incorporate FRP dowel beams embedded in concrete deck to provide connection of curbs and barriers
- Apply FRP grating on decks and walkways
- Use FRP ladders that are adjustable in height to access different levels on the pier

Ballistic Protection

- Standard means of providing terrorist security barriers at the head of each pier
- Contact a movable FRP ballistic wall that would serve as a shield to certain operations on the deck
- Decrease ESQD arc by using high performance magazine barge

Security

- Standard lighting system for both safety and security
- Video cameras to monitor pier security

Structure Monitoring Devices

- Incorporate monitoring devices – strain/stress gages in structures and fenders
- Install sensors to measure impact/mooring forces

Trash Disposal

- Waste product handling, which is convenient and out of the way
- Automated and concealed travel removal
- Pneumatic trash conveyor

Signage

- Standard signage for crane load limits, etc.
- FRP signs and signposts that are interchangeable or removable and could be used to signify certain work areas

Section 2: Possible Actions

The following actions were identified by the Navy as possible actions that could be taken to facilitate getting the best possible pier developed and constructed as new generation Navy piers.

Use an Integrated Project Team

- Provide resources, money, and man power
- All design team's final decisions must be made by the Navy, not other government agencies
- The Navy should lead the design team
- Avoid exposure and defense contractors
- Composites Institute coordinated review of two or more project "teams"
- The design team must have permanent representation from ship design and Port OPS
- Team to include Navy, Composites Institute (CI)/Civil Engineering Research Foundation (CERF), design/build or designer, and highly qualified contractor
- CERF as project coordinator or other qualified source
- Make operation more flexible
- Look to minesweeper program;/ large composite structure, ocean environment, structural experience
- Document and widely disseminate successes with the new uses of composite materials on the waterfront, especially Navy applications
- Integrate issues; environmental, energy
- "Best Efforts" project
- Prequalify participants
- Hand pick the design team

Use Innovative Technologies

- Lightweight aggregate concrete
- Implement innovative technologies quickly into existing facilities
- Select the best materials and systems for the pier
- Share the risk on introducing new materials and design methods
- Benchmark other nations waterfront practices and technologies
- The "best possible" must be defined
- Trash chutes on piers
- Lightweight utility vault covers
- Consult representative from foreign Navy and commercial interests to ensure their requirements are met
- Floating pier
- All material will be state of the art
- Commandeer stainless steel or epoxy coated rebar
- Eliminate corrosion and requirements for coating and other maintenance
- Publish and widely disseminate features of "best" pier throughout Navy community, especially fleet users
- Develop test method to confirm all assumptions
- Make sure sufficient testing and evaluation is done before concepts are introduced on a large scale
- Need good acceptance criteria for new products and materials
- Establish extreme levels of quality control throughout all stages of the process
- Multifunctional applications
- Develop and utilize the expertise of each industry – construction fabricators, material components, suppliers
- Partner with ADCE and other commercial ports to leverage technologies
- Gather information on other non-naval structures to find solutions that were used
- Ensure all inputs on design material from worldwide sources are reviewed before final decision is made
- Composites Institute as primary source of composites knowledge
- Industry to lead in durability issues – Navy defines need – industry responds
- Recognize that FRP composites is primarily an industrial technology