



WPPA Fall Marina Committee Mtg

Capital Investments in Docks

December 7, 2022

ReidMiddleton

OUTLINE

Steps in Renovation and Reconstruction of Marina Facilities

1. Planning
2. Permitting
3. Design
4. Construction

1. Planning

- Renovate in Place or Reconfigure
- Expansion
- Improve Slip Mix and Sizes
- Inwater and Upland Infrastructure
- Funding

2. Permitting

- Timeline
- Layout Impacts
- Material Choices
- Mitigation and Restoration

3. Design

- Dock Materials
- Sea Level Rise
- Flood & Seismic Considerations
- Shorelines

4. Construction

- Costs
- Contractors
- Best Management Practices
- Monitoring, Work Windows, Env.

Planning

- Renovation in Similar Footprint
 - Allow for multi-phased renovation
 - Potential simpler permit process
 - Less support infrastructure mods required
 - Can update utilities, amenities
 - Existing breakwater and basin to remain
 - Limited ability to update slip sizes to match newer market demands
 - Could eliminate a dock lateral and increase finger lengths, fairway or remove finger floats and use side tie for large vessels



Planning

- Replace and Reconfigure in Same Basin
 - Allows for change in slip mix
 - Demand for longer, wider slips
 - Result in fewer slips unless expand footprint
 - May need to modify support infrastructure
 - Access piers, new utility source or locations, parking



Planning

- Expansion
 - Allow for multi-phased renovation
 - Complicated permit process
 - Potential for Significant infrastructure changes
 - Access piers, gangways, utility supply, parking
 - New breakwater and dredging may be required
 - Increase number of slips in updated market sizes
 - Potential for significant mitigation requirements
 - Habitat improvements, shoreline and habitat restoration, public access

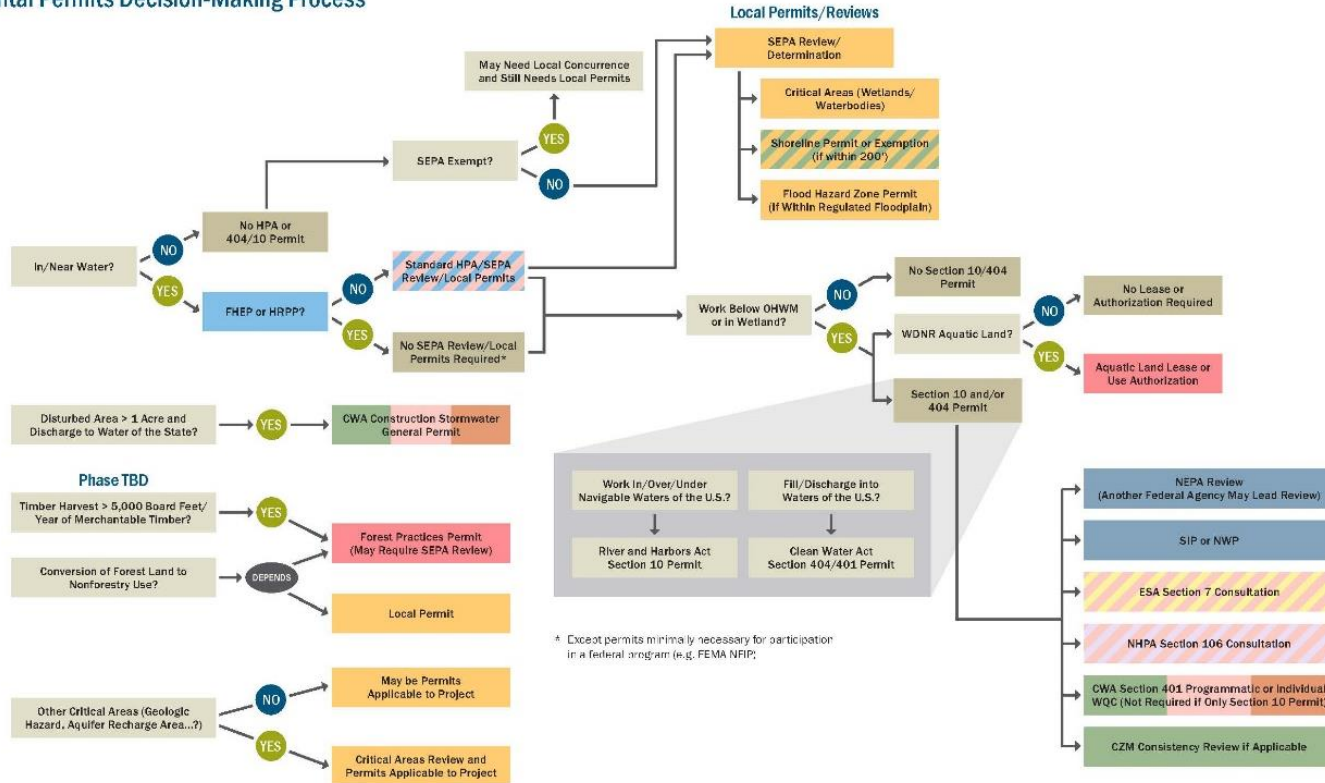


- Funding
 - Marina infrastructure is expensive
 - Funding should be allocated well in advance of need for replacement
 - Market moorage rates have not kept up with infrastructure costs
 - Grants available for transient moorage, cleanup, economic development, public access, etc.
 - Generally, no grants available for permanent recreational moorage facilities

- Permitting
 - Continues to be a key driver of schedule and design elements for marina infrastructure projects
 - Regulatory and environmental considerations should be incorporated throughout planning and design
 - Previous requested considerations are often included in updated regulations and DNR lease requirements
 - For example - use of grating in dock systems, limit on use of submerged treated-wood in WACs
 - Continue to be new environmental considerations over time

Permitting

Environmental Permits Decision-Making Process



- Key Environmental Considerations for Design
 - Driving changes in types of materials for piling, decking, floats, and other elements
 - Balance of overwater coverage
 - Continued increase in required habitat and shoreline restoration associated with marina infrastructure projects

Design – Slip Mixes

- Changes in size of inwater slips
 - Fewer to no slips under 30'
 - Larger slip widths to accommodate larger beams
 - Variable sizes for flexibility

Design – Amenities

- Boaters are looking for more than just a place to keep their boat
 - More electrical power, Wi-Fi service
 - Convenient boat sewage pumpout facilities
 - Clubhouses, restrooms, laundry
 - Safety and security
 - Retail, restaurant, other services
 - Aesthetics and character of a place

Design

- Changes in types of materials for piling, decking, floats, and other elements
 - Piling
 - Hydraulic hammer preference, treatment
 - Floats
 - Fifty-percent open space
 - Decking
 - Grating with sixty percent open space



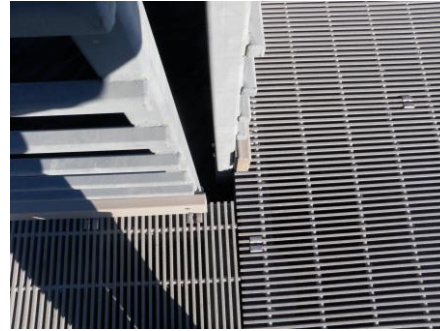
Design

- Floats
 - Decision on structural system and flotation



Design

- Floats and Piers
 - Decision on decking



Design – Sea Level Rise

- Sea Level Rise Considerations
 - Pile Top Elevations
 - Pier Deck Elevations
 - Bulkhead Heights
 - Landside elevations
 - Parking, buildings
 - Fill Elevations
 - Utility pad elevations

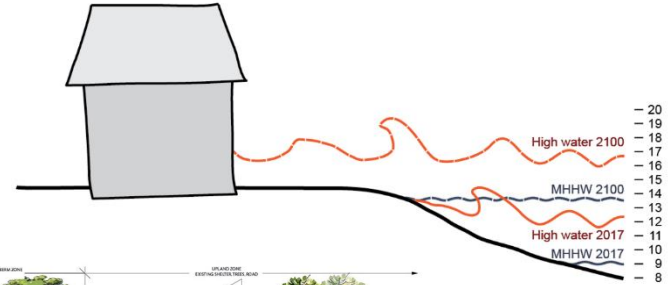
- Sea Level Rise Risk Level
 - Low, Moderate, High
 - By Location
 - Number of Years, Life Cycle

PROJECTED RELATIVE SEA LEVEL CHANGE FOR 2100 (feet, averaged over a 19-year time period)							
Location	Vertical Land Movement Estimate	Greenhouse Gas Scenario	Central Estimate (50%)	Likely Range (83-17%)	Higher magnitude, but lower likelihood possibilities		
					10% probability of exceedance	1% probability of exceedance	0.1% probability of exceedance
Tacoma (47.3N, 124.4W)	-0.5 ± 0.2	Low	2.1	1.5-2.7	3	4.6	7.9
		High	2.5	1.9-3.3	3.6	5.3	8.8
Neah Bay (48.4N, 124.6W)	1.1 ± 0.3	Low	0.5	-0.1 - 1.2	1.5	3.1	6.3
		High	1	0.3 - 1.7	2	3.8	7.4
Taholah (47.4N, 124.3W)	0.3 ± 0.5	Low	1.3	0.6-2.1	2.4	3.9	7.1
		High	1.7	1.0-2.6	2.9	4.6	8.1

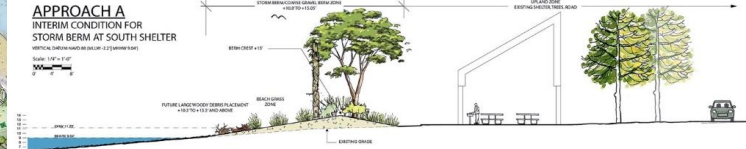
Design – Sea Level Rise



Day Use Improvements
Kayak Point Park



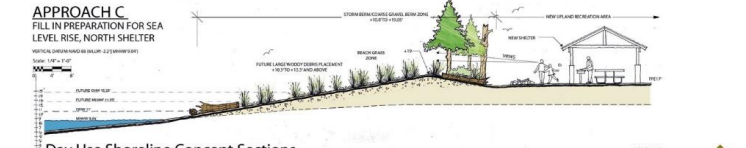
APPROACH A
INTERIM CONDITION FOR
STORM BERM AT SOUTH SHELTER
VERTICAL DRAINAGE: SEE PLAN 22 (SHRIMP 010)



APPROACH B
INTERIM CONDITION FOR STORM
BERM & SEAT WALL AT WEST
END OF SOUTH SHELTER
VERTICAL DRAINAGE: SEE PLAN 22 (SHRIMP 010)



APPROACH C
FILL IN PREPARATION FOR SEA
LEVEL RISE, NORTH SHELTER
VERTICAL DRAINAGE: SEE PLAN 22 (SHRIMP 010)



Day Use Shoreline Concept Sections
Kayak Point Regional Park | Snohomish County Parks and Recreation

Design – Flood and Seismic

- Increased Emphasis on Flood and Seismic Design Criteria
 - Jurisdictions requiring flood analysis of pier structures
 - American Society of Civil Engineers preparing design Guidelines for Seismic Design of Piers and Wharves
 - Liquefaction of soft marine soil layers can create large loads on inwater pile-supported structures

Design – Shoreline Restoration

- Port of Bellingham Marine Park



Design – Shoreline Restoration

Waypoint
Park - ASBPA
Best Restored
Beach 2020



Design – Shoreline Restoration



Design – Breakwaters



- Cost of Marina Infrastructure
 - Increased significantly over the past five to ten years
 - Steel, flotation, timber, concrete, composites, fiberglass
 - Polystyrene foam is a petroleum product and price fluctuates with oil pricing
 - Floats can range from \$150 to \$250 per square foot
 - Piles costs depend on size and type and treatment
 - steel piling under 24” diameter range from \$12K to \$20k each

- Marine Contractors
 - Fewer mid to small size marine contractors
 - Limited number of float manufacturers in region
- Means and Methods
 - Tighter environmental controls
 - Allowable work window
 - Monitoring for listed species during construction
 - Restrictions on number of pile strikes by hammer per day

- Plan Ahead
 - Marinas are Expensive, Early and Varied Sources of Funding is Critical
 - Make informed decisions on Replace, Reconfigure, Expand, & Configuration.
- Coordinated Multi-Faceted Approach
 - Integrate planning, permitting, and design considerations
 - Consider overall timeline, phasing, continued operations
 - Don't underestimate & coord environmental and regulatory requirements
 - Be creative and adaptable,



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