

19. Boat Handling/Haul-Out

Modern boat handling and haul-out systems are extremely efficient and offer a wide variety of options to maintain the needs of individual fleets. Once the fleet is identified, consider the types of boat handling and haul-out systems, and associated upland and water requirements, early in the planning and design layout phases of harbor development. Six common systems available are presented here; they are not all inclusive.

- **Straddle Hoist** **19.10**

- **Tidal Grid** **19.20**

- **Marine Railway** **19.30**

- **Crane Hoist** **19.40**

- **Hydraulic Trailer** **19.50**

- **Launch Ramp(s)** **19.60**

- **Boat Storage** **19.70**

19.10 Straddle Hoist

Increases in straddle hoist capacity to lift vessels ranging from very small to those greater than 500 tons make dry storage extremely beneficial. Recent versions of straddle hoists have pneumatic wheels and steering capabilities that offer advantages in maneuvering around cramped spaces and small harbors.

Consider STRADDLE HOISTS if:

- 1) Vessel weights are within hoist capabilities
 - 2) Design includes adequate pier or dock clearance for hoist to operate properly and sufficient uplands to manage dry-docking and storage
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Note 1. Perform a detailed economic analysis before investing in a travel lift. Straddle hoists have high maintenance and operation costs.

Note 2. May be commonly referred to as *travel lifts*.

REFERENCES:

1. Tobiasson, B.O. & Kollmeyer, R.C. 1991. *Marinas and Small Craft Harbors*. New York: Van Nostrand Reinhold. Pgs. 445-454.
2. ASCE Manual No.50. Task Committee on Marinas 2000. 1982. *Planning and Design Guidelines for Small Craft Harbors*. New York. Pg.24-25, 241.

19.20 Tidal Grid

Tidal grids provide a useful and economical means of working on vessels without taking them out of the water. Typically, the repairs made on a tidal grid are minor, e.g. propeller repair or replacement, and need only a single tidal cycle for completion. Placement for grids within the harbor requires easy access for the vessel operator, alignment with currents, and proper elevations to allow vessels to get on the grid and maximize the useful work period between tides.

You may need TIDAL GRIDS when:

- 1) Sufficient tides, depth and space are present for adequate use and placement within the harbor basin.
- 2) Harbor fleet is of the appropriate size and type to make the grid functional, and there is not enough use to warrant a haul-out or alternative boat handling system.
- 3) Upland area is limited or inaccessible, making alternative repair facilities ineffective.

Note 1. Consider non-point source pollution during preliminary design stages. Clearly post rules for use.

Note 2. Alaska's best management practices suggest that, except where measures to contain and remove pollutants have been taken, maintenance on tidal grids should be limited to mechanical tasks only, such as propeller work, replacing zincs, hull inspection, replacing thru-hull fittings, and similar tasks. Make receptacles for solid waste easily accessible to the user.

Note 3. The definition of loads for a grid is complicated by the variety of vessels. The designer must use careful consideration and definition of the design vessel.

Note 4. The following guidelines can be used to establish design criteria for a grid: Design fleet (length, draft, keel, weight). Assume 80 percent of the vessel weight goes to one cap. Load could be applied anywhere on the cap.

- **Layout:** Centerline grid parallel to, or up to a maximum of 30 degrees askew of, currents and prevailing winds. Orient for ease of ingress and egress.
- **Grid length:** Minimum 1.25 times design vessel length per boat
- **Cap elevation:** Maximum is MHHW—design vessel draft. Minimum varies; for smaller vessels (up to 40 feet and less than 25 tons), use mean tide minus two feet. For larger vessels (over 60 feet and 25 tons), use mean low water.
- **Cap spacing:** Varies (typically a minimum of eight feet on center for smaller vessels; 10 feet for larger ones)
- **Cap width:** 18-foot minimum
- **Other features:** Walkways (both sides, concentrated design load of 350 pounds) and approaches, grid caps and wear timbers, ladders (two per vessel), fender piles (one per cap), depth gauge (one per vessel), and solid waste receptacle (minimum, one per vessel)

19.30 Marine Railway

For hundreds of years, marine railways were the most widely used type of boat haul-out. Today, there are more cost-effective means, which has left the railway out of most small boat harbors. The railway is usually designed for large vessel haul-out (greater than 250 tons), or where adequate sloping shoreline requirements can be met.

Consider MARINE RAILWAY systems when:

- 1) The upland area can support the space necessary for a railway system layout.
- 2) Haul-out services are needed for 250- to 6,000-ton vessels. Although marine railways can be used for vessels ranging from skiffs up to about 6,000 tons, usually straddle hoists are more economical for smaller craft.
- 3) Appropriate sloping shorelines and other geometric constraints can be met.

Note 1. Use caution to prevent a bilge block overload. *Vessel load* distribution is usually about 75 percent on the keel blocks and 25 percent on the bilge blocks.

Note 2. Railway systems can be designed in conjunction with other haul-out facilities, such as hoists or hydraulic trailers, to support the needs of the entire harbor fleet.

REFERENCES:

1. ASCE Manual No.50. Task Committee on Marinas 2000. 1982. *Planning and Design Guidelines for Small Craft Harbors*. New York. Pg. 241.
2. Tobiasson, B.O. & Kollmeyer, R.C. 1991. *Marinas and Small Craft Harbors*. New York: Van Nostrand Reinhold. Pg. 455-458.
3. Tobiasson, B.O. & Kollmeyer, R.C. 2000. *Marinas and Small Craft Harbors, Second Edition*. Maryland: Bruce O. Tobiasson.

19.40 Crane Hoist

The crane hoist has been used successfully in many older harbors. Generally, it is less desirable in modern harbors. Problems arise when the crane brake slips or winds catch the vessel, causing excessive movement. Improper load lifting can also cause the crane to topple or the boom to fail.

Consider CRANE HOIST when:

- 1) You have addressed all considerations and limitations of crane hoists.
 - 2) Other methods for boat handling/haul-out are too expensive or require more upland area to develop.
 - 3) Permanent methods of haul-out are not available and a crane hoist may be rented temporarily.
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Note 1. Fixed jib cranes, fixed boom cranes, or mobile cranes are the most common types of cranes in harbors and boat yards.

REFERENCES:

1. ASCE Manual No.50. Task Committee on Marinas 2000. 1982. *Planning and Design Guidelines for Small Craft Harbors*. New York. Pg. 240-241.
2. Tobiasson, B.O. & Kollmeyer, R.C. 1991. *Marinas and Small Craft Harbors*. New York: Van Nostrand Reinhold. Pg. 460-461.

19.50 Hydraulic Trailer

The hydraulic trailer is essentially a boat cradle on pneumatic wheels. It allows the operator to take a vessel out of the water and transport it without changing equipment. The vessel can be transported to more remote storage areas. A few advantages of the hydraulic trailer are the ability to position boats close together for land storage, speed, ease in hauling boats from the water, and the ability to move boats on roadways. Proper design of the ramp slope is of primary importance.

Consider HYDRAULIC TRAILERS if:

- 1) Shoreline slopes can accommodate the necessary design parameters for the ramp.
 - 2) Adjacent upland areas are limited and the hydraulic trailer will meet the load requirements of the harbor fleet. The hydraulic trailer can store vessels with a higher density than other haul-out equipment. It can also transport them to more remote areas.
 - 3) The hydraulic trailer can operate on soft soils, sandy beaches, or conventional asphalt or concrete.
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Note 1. Desirable *slope* for hydraulic trailer launching ramp should be between **8:1 and 7:1**.

REFERENCES:

1. ASCE Manual No.50. Task Committee on Marinas 2000. 1982. *Planning and Design Guidelines for Small Craft Harbors*. New York. Pg. 243-245.
2. Tobiasson, B.O. & Kollmeyer, R.C. 1991. *Marinas and Small Craft Harbors*. New York: Van Nostrand Reinhold. Pg. 462-469.

19.60 Launch Ramp(s)

Small boats often comprise a large percentage of a harbor fleet, especially during the summer boating season. It is generally more cost-effective to trailer smaller vessels (up to 26 feet), than to provide permanent moorage in the harbor. Consequently, a safe, well-designed, accessible launch ramp is vital in all harbors.

Consider LAUNCH RAMPS:

- 1) Usually *ALWAYS*. The launch ramp is generally cost-effective for all harbor design and layout.

Recommendations for Good Ramp Design:

AVOID:

- 1) Drainages or storm water outfalls
- 2) Areas of historical or archeological significance
- 3) Placing ramps near a hoist well
- 4) Swimming areas
- 5) Areas of high traffic flow
- 6) Areas that need large amounts of fill to construct the ramp

CONSIDER:

- 1) Adequate approach roads
- 2) Maneuvering areas for auto-trailer vehicles
- 3) Suitable land area to accommodate proper ramp design and related structures
- 4) Protection from wind, wave, and passing boat wakes
- 5) Ample room for parking
- 6) Adequate ramp length and slope

Note 1. Ramps used by both hydraulic and automobile trailers may require a greater length at the lowest water level.

REFERENCES:

1. Tobiasson, B.O. & Kollmeyer, R.C. 1991. *Marinas and Small Craft Harbors*. New York: Van Nostrand Reinhold. Pg. 470-473.
2. ASCE Manual No.50. Task Committee on Marinas 2000. 1982. *Planning and Design Guidelines for Small Craft Harbors*. New York. Pg. 244-245.

19.70 Boat Storage

A community may need dry stack (rack) storage, or yard space, to accommodate smaller, seasonal-use, or damaged vessels. Sufficient upland space for development of dry boat storage is vital to the harbor design. Consider the types of boat haul-out systems, weather conditions, fleet composition, available land, and cost benefits in the design, location, and layout of a boat storage yard or dry stack facility.

You may need BOAT STORAGE when:

- 1) Severe icing, large snow loads, or other extreme weather conditions that may compromise safety occur.
 - 2) A covered maintenance facility is needed.
 - 3) Upland area has suitable space for a boat storage structure.
 - 4) A large percentage of the design fleet is composed of vessels 26-feet or less, and there are sufficient uplands to accommodate them.
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Note 1. *Dry stack storage* is an economical and compact way to handle boat storage needs.

Note 2. You must consider *snow and wind loads* to large structures.

REFERENCES:

1. Tobiasson, B.O. & Kollmeyer, R.C. 1991. *Marinas and Small Craft Harbors*. New York: Van Nostrand Reinhold. Pg. 280-282, 479-486.
2. ASCE Manual No.50. Task Committee on Marinas 2000. 1982. *Planning and Design Guidelines for Small Craft Harbors*. Pg. 230-240.