21.0 Floating Booms, Trashracks, and Screens

21.1 Floating Booms

Depending on factors such as proximity to a populated area or residences, and hazard potential, floating booms have been installed to warn the public about the potential danger that may be associated with a specific water control structure. In those cases, the floating boom located upstream of the structure acts as a safety barrier and warning system, and not as a debris boom. The following discussion relates solely to the design of a floating safety boom. For some structures (e.g. reservoir inlet), floating booms are also provided downstream of the structure to keep the public (i.e. boaters) away from the hydraulic jump area.

Typically, a floating safety boom installation would include floats, wire rope, and anchors as shown on Figure 21-1. It is preferred that the boom be located such that its length is as short as practicable, and so that intermediate, submerged anchors are not required. This is particularly important where the boom has to be removed at the onset of winter to avoid ice damage. The length of the boom should also include an allowance to accommodate fluctuating water levels.

The floats should normally consist of an orange coloured, polyethylene hull filled with urethane foam. The sizing of the galvanized wire rope should consider wind and current loads acting against the floats with an allowance for the effects of some debris. Some design information for wire ropes can be found in USACE EM 1110-2-3200 (1998).

A shore anchor typically consists of a steel post or beam set into a hole drilled into the ground that is backfilled with concrete. The shore anchor is usually designed for a pull that is greater than the breaking strength of the cable.

21.2 Trashracks

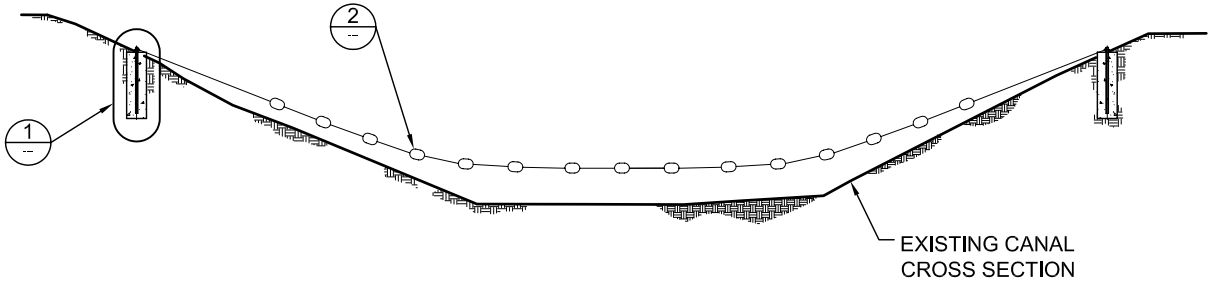
In general, the hydraulic structure should be located, sized or chosen such that the type of debris expected does not enter the structure, or can be readily passed through the structure.

The use of trashracks should be considered for headgate structures, the intakes of pumping stations or hydro power plants to prevent damage to equipment, and the intakes of conduits where valves susceptible to blockage have been installed.

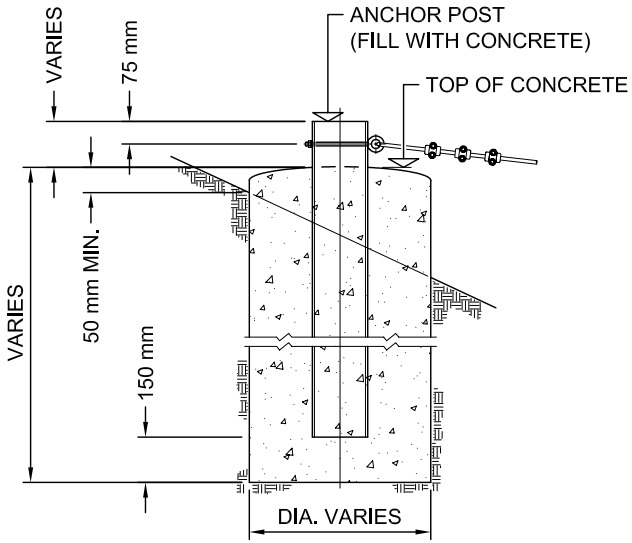
The design intent is to provide an appropriate bar spacing that will exclude larger particles that could block or damage the structure or equipment but will allow smaller particles to pass through (i.e. reduces potential and frequency of the trashrack becoming plugged). In some instances, the maximum bar spacing may be governed by safety concerns.

The design of the trashracks should ordinarily consider the following factors:

- Accessibility and provisions for cleaning.



FLOATING BOOM IN CANAL
Not To Scale



1 ANCHOR POST
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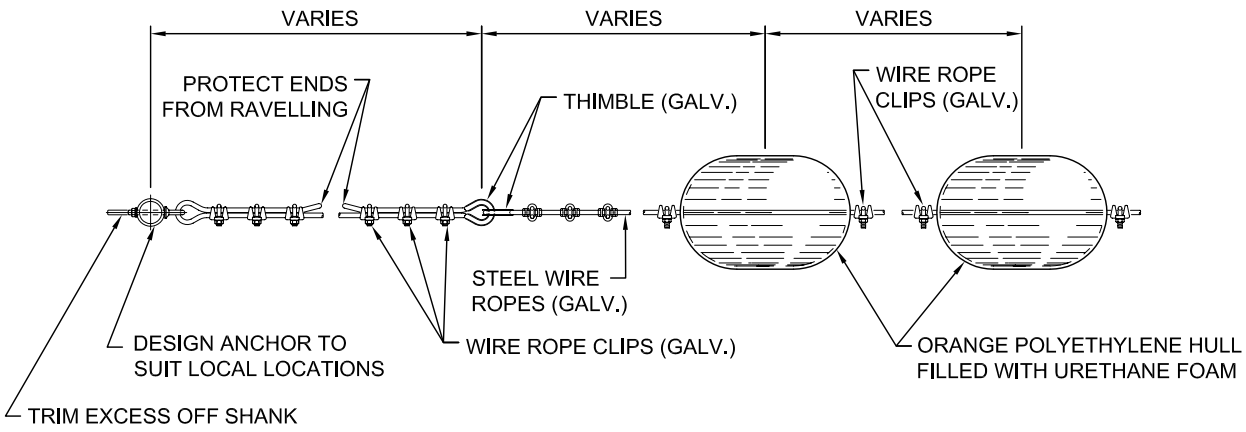

2 FLOATING BOOM
Not To Scale

SOURCE: GENERAL ALBERTA ENVIRONMENT, 2000.

ALBERTA TRANSPORTATION
CIVIL PROJECTS BRANCH

ALBERTA ENVIRONMENT
WATER MANAGEMENT OPERATIONS

WATER CONTROL STRUCTURES - SELECTED DESIGN GUIDELINES

TYPICAL FLOATING BOOM

DATE:	CAD FILE:	FIGURE No.:
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- Differential head across the trashrack primarily due to head loss including the effects of accumulated debris.
- The impact of a plugged trash rack on equipment performance.
- Maximum size of debris that can be allowed to pass through.
- Permissible flow velocity on the upstream side of the screen.
- Safety considerations.
- Vibration.
- Corrosion.

Typically, trashracks are designed so that they can be withdrawn for cleaning or are equipped with a mechanical cleaning system. Where possible, it is preferred that the trashrack be sloped to increase the surface area and to permit debris to ride up as the water level rises.

21.3 Screens

Screens are normally used to exclude weeds, very small particles, or fish. Examples include screens provided either within the turnout structure or at the pump intake used primarily to exclude weeds and very small particles from pipelines that supply water to sprinkler irrigation systems, and screens used to exclude fish.

Because of the small openings, these screens can easily become plugged. Consequently, measures to facilitate their cleaning on a regular basis are usually provided. Typical cleaning systems may include manual, mechanical, airburst, and hydraulic systems.

Engineering considerations will be similar to those described in Section 21.1 for trashracks.

Guidelines for fish exclusion devices including screens will be addressed by the Province at a later date either as an addition to this document or as a separate document.