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DEVELOPEMENT PLAN

The attached form the developement plan to restore a boat to the site of the old shipyard and develope the site with a marine theme. This will allow the visitors and guests a view of a boat in a cradle showing hull, propeller etc. of the underside of a boat, and depicting a fixed dock "finger" around the hull to meet fire regulations and permit pedestrian access.

The boat will be cradled on driven creosote piles and bracing foundation surrounded by cedar decking and railings. A ramp similar to a dock will attach this ship to the boardwalk. Hand railed openings will provide viewing areas to the underside of the boat and into the bay underneath.

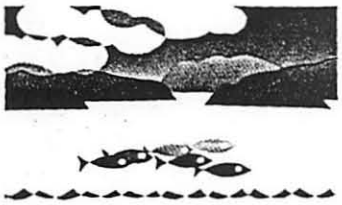
Information depicting the early history of the Cow Bay and of the habitat underneath will provide background interest to the visitors.

ENHANCEMENT PLAN.

Enhancement by way of constructed riprap, placement of rock and selected debris will increase the growth of fucus and intertidal algal vegetation, and will be visible from above. In areas where continual shading will occur, cover can be placed for small invertebrates and juvenile fish. The small drainage channel will be enhanced as possible to multiply the fucus growth. Rock or other material can be placed around th pilings on the parimeters of the structure to replace a portion of the area lost due to shading.

Enhancement of the adjoining Lots 4, 5, & 6 have been discussed with the City of Prince Rupert. The planning department is willing to establish the foreshore of Lots 4, 5, & 6 as protected area towards the enhancement of the Cow Bay Slough. Vegetation (deciduous shrubs) could be planted along the waterfront edge of these lots, and additional patchy cobble added to mulitply the Fucus on those shores and produce small intertidal pools.

Sand and silt pockets can be replaced along the crushed gravel embankment to increase the growth of terrestrial grasses, along with some additional riprap, made up of beachcombed driftwoods.



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November 16, 1995

Bryan and Mary Allen Cox
Eagle Bluff Bed and Breakfast
201 Cow Bay Road
Prince Rupert, BC

Re: Cow Bay Slough

Dear Brian and Mary Allan:

At your request I conducted a brief habitat survey of the Lot 17 portion of the Cow Bay Slough during the low tide of October 26, 1995. The enclosed map and photographs summarize my observations. As you are aware the slough is intertidal, and empties on a tide of about 4m. From the lot plan which you provided it appears that the slough was once considerably larger than present, but has been filled to form Cow Bay Road and the upland portions of Lots 7, 6 and 5, which are protected by log cribbing. The present shoreline is formed of crushed gravel and riprap bank along Lots 16, 17 and 18 and also the section of Lot 7 at the head of the slough. There are pockets of terrestrial grasses and some alder/ceder vegetation just below the crushed gravel at Lot 17 (see enclosed map and photographs). The northeast shoreline is formed of log cribbing (parts of Lot 7 and 6) and a gravel and grass bank containing fringing bush and tree vegetation (Lot 5 and part of Lot 6, see photographs).

The intertidal area of the slough is formed of fine sand and silt with a some overlaying cobble (I estimated 20-30% of the intertidal area is cobbled). At Lot 17 the sand/cobble area immediately below the riprap bank supports some intertidal algal vegetation, primarily the green algae *Cladophora* sp., which forms moss-like mats over the mud, and rockweed (*Fucus distichus)* which, in this zone, is small and contains few reproductive structures (see photographs) I estimated the vegetative cover in this zone to be about 50%. In the deeper, central portion of the slough the cobble content increases, barnacles are common on the larger cobbles, and larger sized, reproductive *Fucus* is the dominant vegetation form (about 20% cover). The filamentous red algae *Rhodomela larix* is common along a 2-3m fringe on either side of the central drainage channel. At the time of the survey there was also a considerable amount of drift *Fucus* in the drainage channel under and just upstream of the railway bridge.

None of the specific habitats within the slough constitute particularly sensitive or highly valued features such as eelgrass beds, canopy kelps or intertidal clam areas. However it is important to recognize that the slough itself is an important component of shoreline habitat complexity and diversity along the Prince Rupert waterfront. These intertidal habitats provide input of organic and vegetative material into nearshore areas, providing food for small invertebrates which, in turn, are eaten by juvenile fish (including salmon and herring) using nearshore areas at specific times of the year. They also provide important foraging and rearing areas for young fish which may move into the slough area over the high tide cycle. In urban areas many sloughs and wetlands have historically been infilled for upland development, and it is important to conserve both the form and productivity of remaining areas to ensure continued diversity of shoreline habitat.

You have proposed to construct a piled structure on Lot 17, over a portion of the Cow Bay Slough. In consideration of the above discussion on the fish habitat value of the area, we have two primary concerns with respect to your proposal:

- The loss of intertidal vegetation under the proposed structure (likely *Fucus* and *Cladophora*) due to shading effects of the proposed structure. Loss of this vegetation will reduce the productivity and amount of cover (small spaces where fish hide and rest) in the slough. This can now be seen under the Cow Bay Gift Shop, where there is little vegetative growth at the tidal height where *Cladophora* and *Fucus* now grows at Lot 17.
- There is a potential risk of increasing the input of contaminants (sewage, waste water, household chemicals) into the slough. Unlike the loss of vegetation this impact is not inevitable, and measures can be taken to minimize the risk of increased contaminant input.

We also wish to point out that there are several possible benefits to fish habitat associated with your proposal:

- The pilings will provide physical substrate for filter feeders such as barnacles and mussels. There is not likely to be much plant growth on the pilings due to the shading effect.
- Some fish species aggregate under the shade of piled structures, which thus will provide a form of cover and habitat for these species.

Any proposal which you put forward for Lot 17 should recognise the habitat features of the slough and attempt to minimize the potential negative impacts outlined above. Some suggestions follow:

- The bottom of the structure (eg. top of the piles) should be at approximately street level. This is about 2m higher than the lower level of the Cow Bay Gift Gallery (see photo). This will provide an increased sun angle and reduced shading effect.
- Restrict the piled structure to within 50 feet (15m) of the boardwalk railing (the area inside the solid line delineating the two types of *Fucus* cover on the habitat map). This will ensure than there is little shading effect on the central area of the slough which

contains the bulk of the vegetative material. Balconies should be designed with some open area, and spacing between the planks or grating to permit maximum light penetration

- Partially mitigate for the loss of vegetative material by creating areas of cobble under the structure. This will not compensate for the productivity losses but will provide additional cover and habitat complexity for juvenile fish which use the slough area.
- Rockweed (*Fucus*) grows primarily on firm rock substrates. Therefore cobble could also be added in unshaded areas to increase the amount of substrate available for *Fucus* settlement. Cobble could be placed around the outer piles of the proposed structure, and in a patchy fashion in areas of Lot 17 not subject to shading. I emphasize the word patchy as the slough should remain fundamentally an area of mud and sand bottom.
- Conserve and enhance the input of vegetative debris (detritus) into the slough by ensuring that the "riparian" fringe along Lots 5, 6 &7 is retained under any development proposals for the lots adjacent to the slough. Consider planting deciduous shrubs or small trees on the crush gravel area just below the broadwalk on sections of Lot 16 and 17. This will increase the quantity of vegetative material entering the slough, partially offsetting the loss of *Fucus*, and also it will increase shoreline cover for fish at high tide.
- Minimize the potential for contaminant input by ensuring that the structure is properly connected to city sewage and storm sewer lines.

When you have completed a design proposal for Lot 17, the Department of Fisheries and Oceans will require an estimate of habitat loss and gain associated with your proposal. We can do this by overlying your design proposal on the habitat map which we have produced. At that time you should also be prepared to put forward a proposal to mitigate or compensate for the calculated habitat loss. We would be prepared to assist you in this, primarily by incorporating the above suggestions into a more formal proposal.

Should you have any questions please give me a call.

Sincerely,

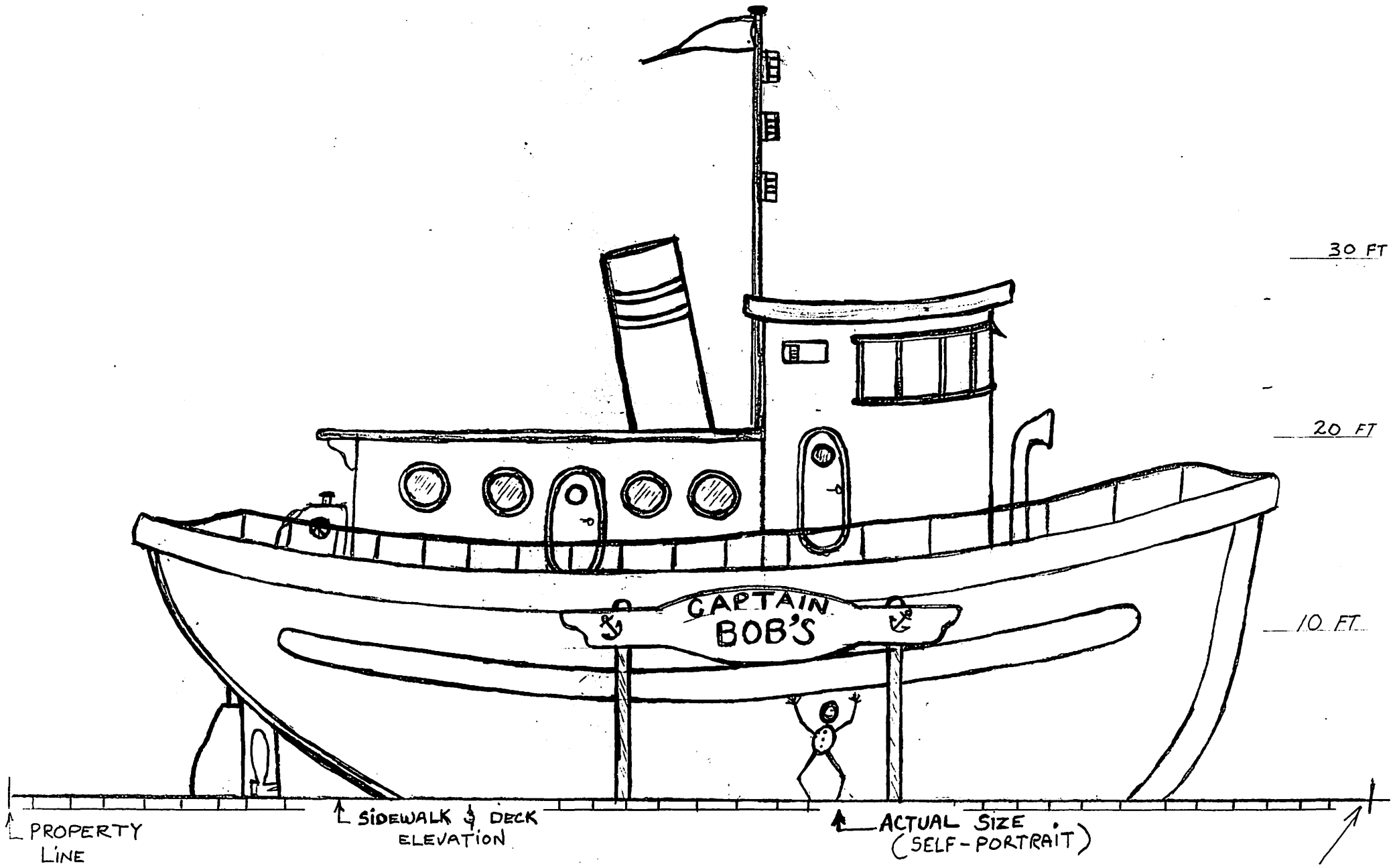
Brian Emmett
President

Lot 17 area of Cow Bay Slough at low and high tide, October 26 1995.

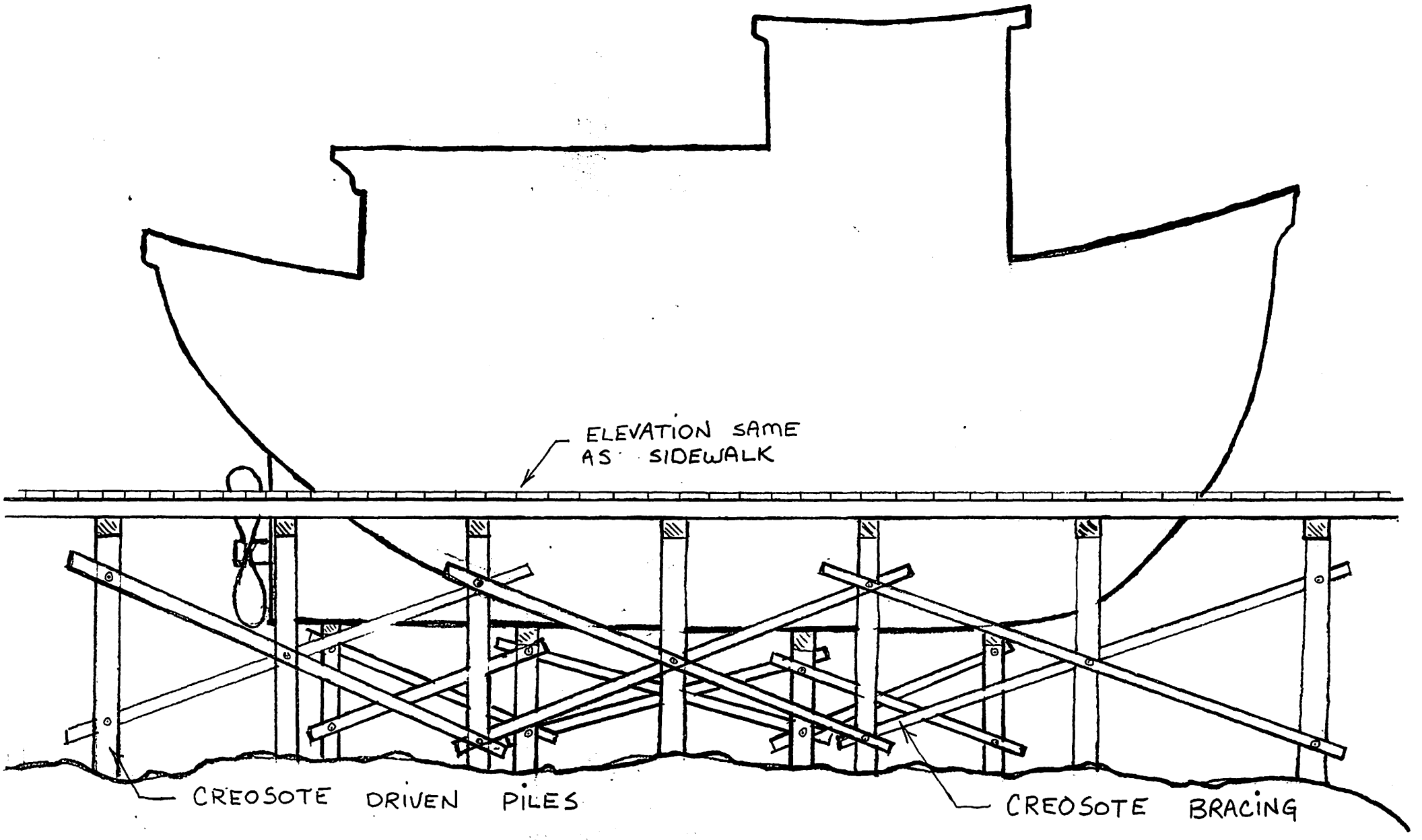
Cow Bay Slough at low tide. Note the log cribbing (upper photo) and gravel/vegetative bank (lower photo) which forms the northeast shoreline of the slough.

Top Photo. Habitat features of the Lot 17 area of Cow Bay Slough, including (A) terrestrial grasses and vegetation, (B) *Cladophora* and non-reproductive *Fucus*, (C)reproductive *Fucus*.

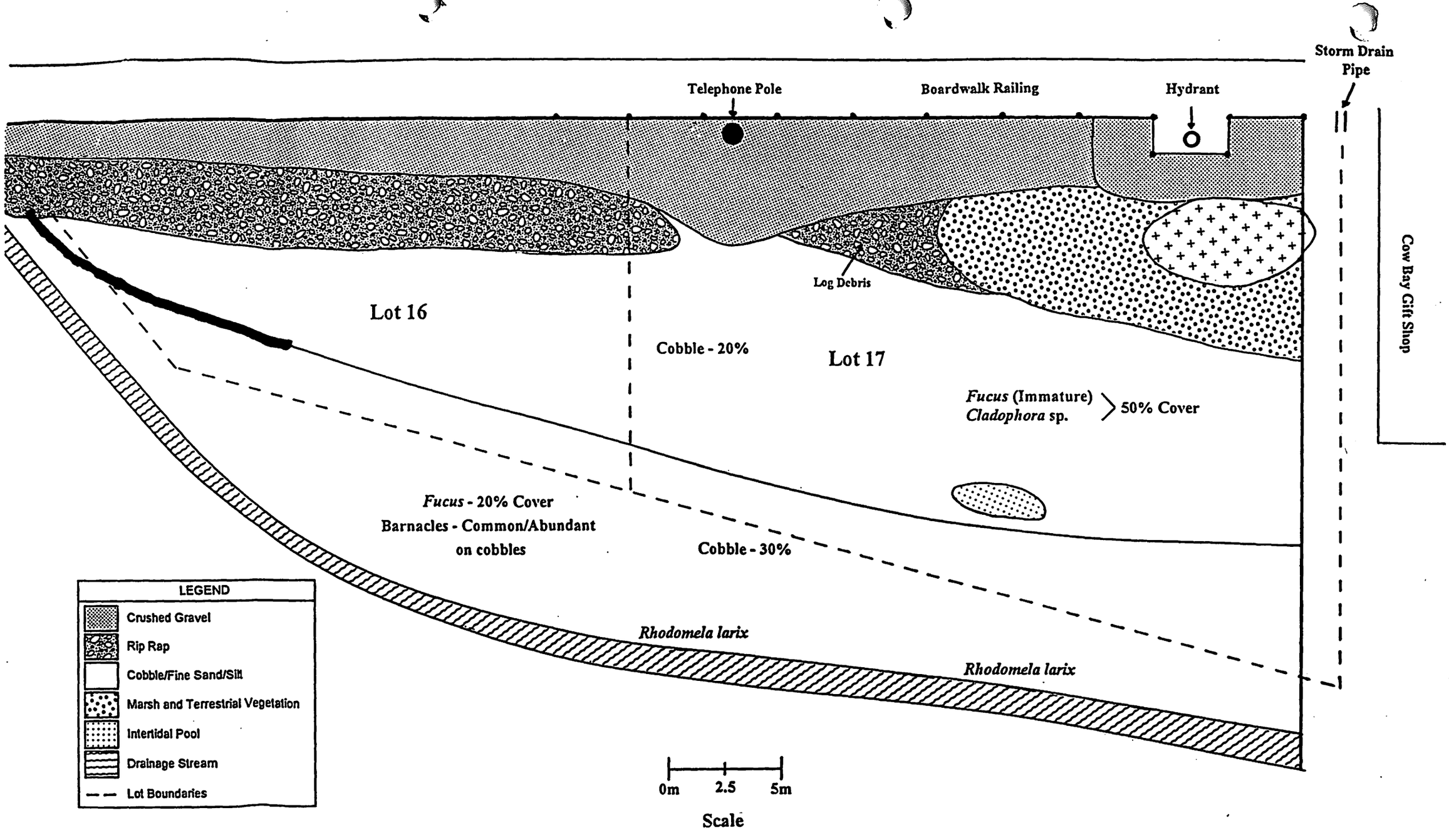
Lower Photo. Detail of *Cladophora* mat and non-reproductive *Fucus*.



VIEW FROM COW BAY ROAD (EAST)



VIEW LOOKING WEST



Map of habitat features of the Lot 16 and 17 portion of Cow Bay Slough.

J. Bryan Cox,
Mary Allen,
201 Cow Bay Road,
Prince Rupert, B.C.
V8J 1A2
Ph. 627-4955
Fax 627-7945

May 6, 1995.

Fisheries and Oceans Canada,
Habitat Management,
417 - 2nd Ave. West,
Prince Rupert, B.C.

ATTENTION: Mr. Oriah Orr,
Habitat Technician.

Dear Mr. Orr,

Please find enclosed a copy of our initial proposal and habitat assessment to be located on Lot 17 of the Cow Bay Slough. Included in this package is a developement plan, enhancement plan and habitat survey undertaken by Archipelago Marine Research Ltd. as well as site plans.

We would appreciate an opportunity to work with you to preserve this intertidal waterway in a realistic manner which minimizes habitat loss and the impact of developement on the Cow Bay Slough. We feel this plan can increase productivity in the slough, and welcome your input towards this end.

Further to this plan we have met with the City of Prince Rupert department of Planning and Economic Developement to discuss prtection and enchancement of the foreshore area of Lots 4, 5 & 6 in the slough. Mr. Ireland is willing to meet further to carry out these actions.

When you have had an opportunity to review this package please contact us to arrange an appointment to discuss this further. Please note that we submit this proposal to you in strictest confidence.

Yours truly,
Mary Allen
Mary Allen.

c.c. Mr. Les Powell, Manager
Habitat Division.

PHYSICAL DETAIL

OVERALL LOT SIZE: 94.3 wide by 75.5 and 49 feet deep.
(5,965 feet of area, Lot not square.)

PARTIAL OR FULLY SHADED AREA, occupied by boat and wooden deck area: 3,765 feet, (63%)

HABITAT REPLACED ON EXISTING LOT in "patchy" fashion over sand and silt bottom so as to minimize impact on existing bottom, and consisting of driftwood logs for algea growth and rock pinnacles for fucus growth -1,000 ft.

ROCK SLABS PLACED AS VERTICAL FINS at the base of parimeter piling, not fully shaded, for fucus beds -1,000 ft.

DRIFTWOOD/SILT/SAND BEDS for grasses close to embankment 880 ft.

INTERTIDAL POOL (or POOLS) created through the placement of log and rock pinacles referred to above.

NOTE: This does not include (at this point) include any enhancement which may be undertaken on Lots 4, 5 and 6 foreshores held by the City of Prince Rupert and referred to in paragraph two of the ENHANCEMENT PLAN.