Hover Freight
air cushion systems

Heavy Lift Hovercraft

logistics problems? *rise above it*

Who is HFL?

Hoverbarge Freight Ltd (HFL) incorporated in Ontario, Canada is owned by the leading experts in Hoverbarges/hovercraft, and since the first modular Hoverbarges that were operated on the successful Yukon River crossing for the Alaskan pipe line in 1976. They have been involved in al the commercially successful heavy lift Hoverbarge operations around the world. Our latest modular design is ABS classified for coastal and inland waterways use.

This has lead to the formation of a new Hoverbarge Charter company.

What is a Hoverbarge?

A standard cold weather marine steel barge, built to marine rules with an air cushion system to provide lift.

Hovering 1.8m in the air, the Hoverbarge is amphibious enabling it to traverse, wetlands & mudflats etc.

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What is a Hoverbarge?

Hoverbarge floating **off hover** with a 90 tonne payload.

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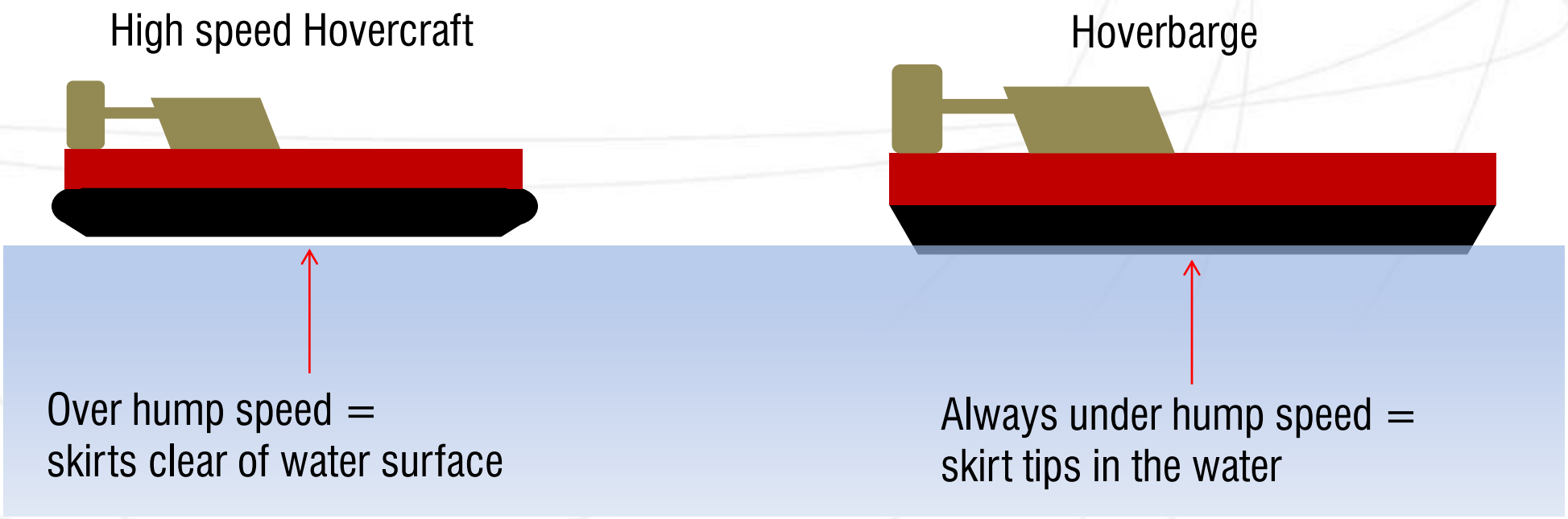
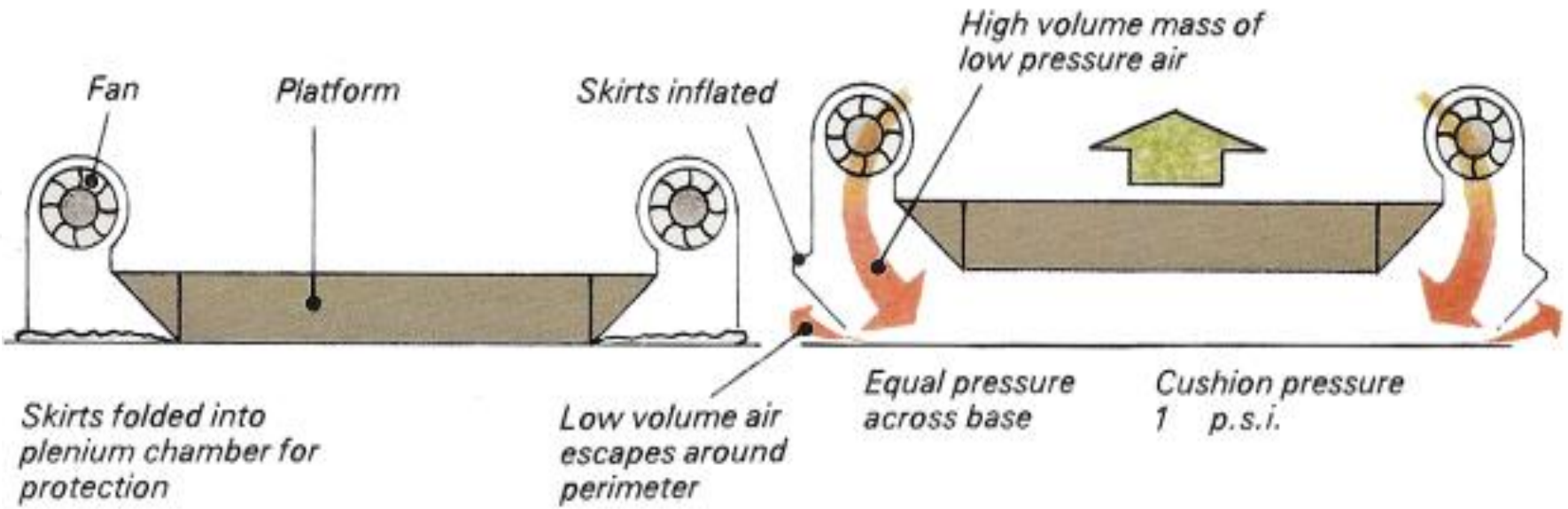
Hovercraft v Hoverbarge

Hovercraft reach a speed where the skirt lifts out of the water (over hump) and then hover just above the water surface.

The Hoverbarge travelling a slower speed of 5 knots will always remain under hump speed with the tip of the skirts in the water. This results in less spray than high speed Hovercraft.



Air is fed into the skirt plenum chamber and the skirt creates a flexible seal around the periphery of the barge



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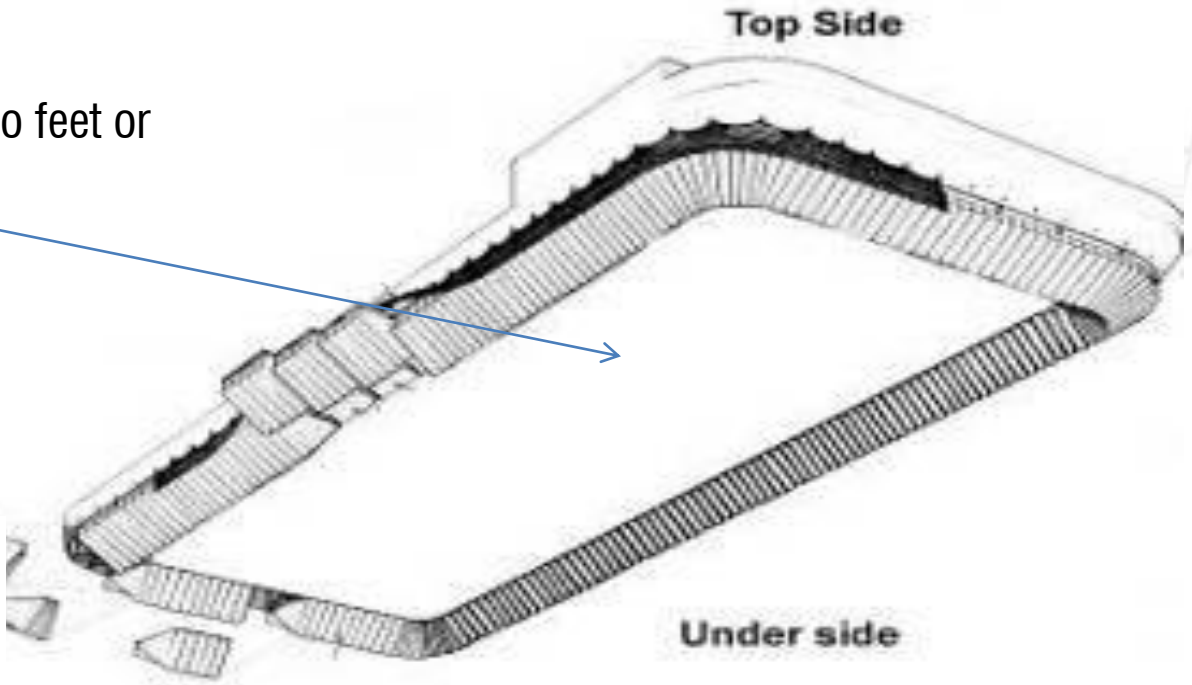
Air feeds into the skirt that seals the periphery

Cold weather marine steel hull

The base is flat with no feet or protrusions



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Previous Hoverbarge Projects

250t Deep Sea 1976

160t Ferry Crossing 1976

The management team have been involved in all of these Hoverbarge projects.

300T Payload 2009

Ice Breaking Hoverbarge 1980

50t Core Sampling 1979

90t test barge skirt 2010

200t Siberian 2009 Cold Weather

330t swamp drilling 2008

Hoverbarge projects conducted by:
Mackace Ltd., Hovertrans Inc. and Hovertrans Ltd.

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Hoverbarge Environmental Advantages

Minimal Environmental Footprint

The Hoverbarge only exerts 1psi ground pressure when on hover, compared to a human footprint of 7-8psi, thus the Hoverbarge has minimal impact to the terrain it travels over.

Large Flat top deck

The Hoverbarge has a large cargo deck, clear of any equipment, along with being flat top (rather than in a well deck) the Hoverbarge provides huge flexibility in the type of operations it can be deployed on.

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Hoverbarge Operational Advantages

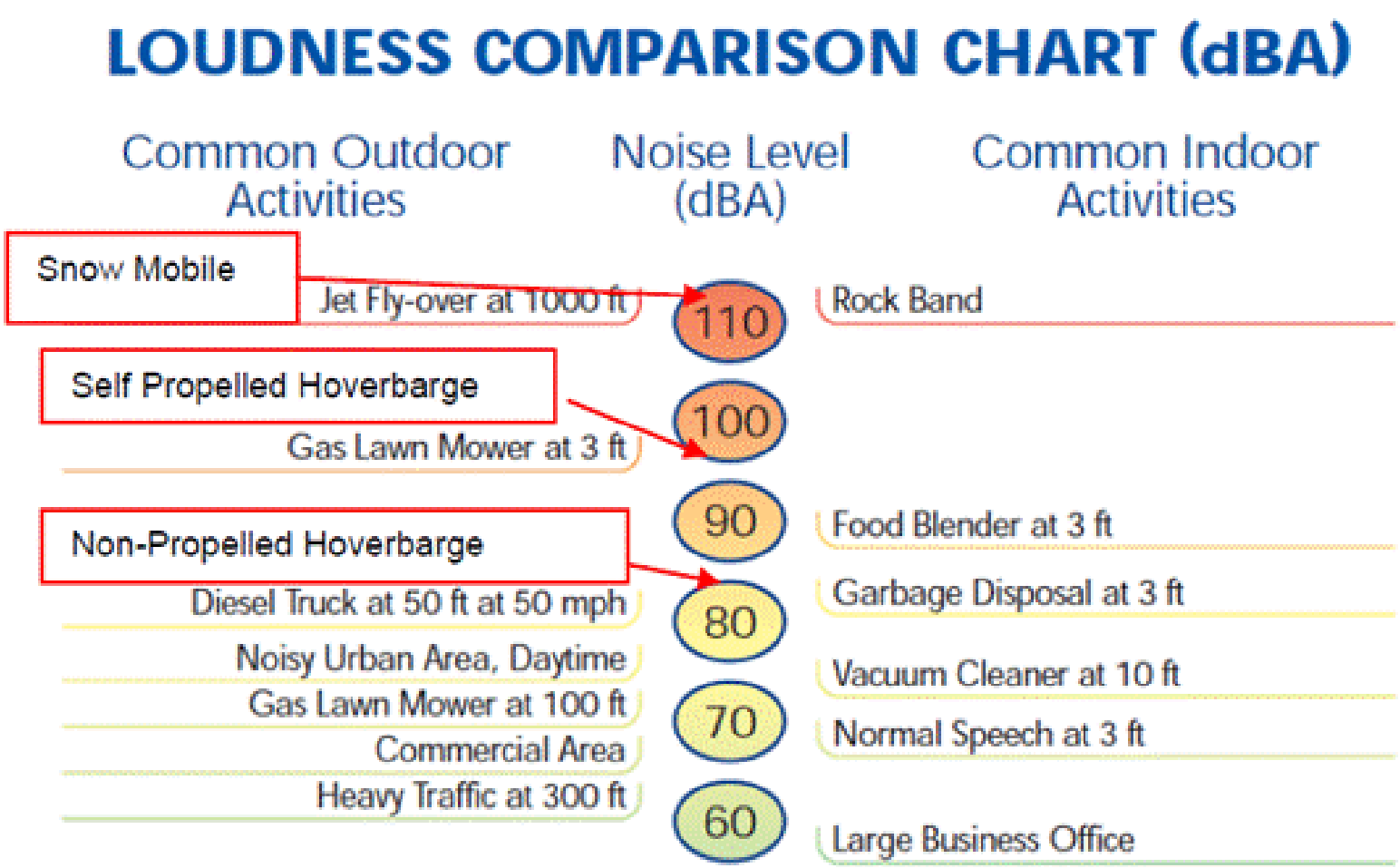
Redundancy

In soft mud / water conditions, the Hoverbarge has 100% redundancy built into its lift fan capacity, ensuring minimal disruption to operations in the event of an engine failure.

Engine Enclosures

Engine enclosures are designed to ensure the engine, fuel tank and lift fans are protected from extreme temperature. The housing also reduces sound levels and shore power can supply heaters in the enclosures whilst the craft is not in service.

Hoverbarge Sound Levels



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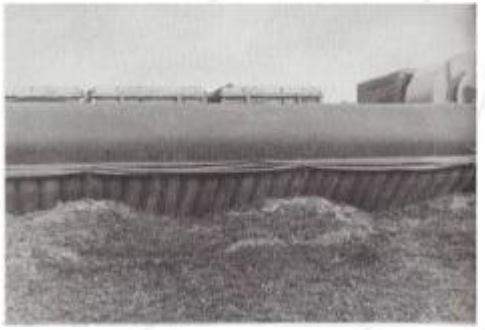
Hoverbarge Skirt System Advantages

Skirt System

The segmented skirt system provides added redundancy, where if a segment is damaged the one either side balloons out to fill the gap, minimising any air loss. Replacement of damaged skirts can be done on site and does not require special skills or tools

Missing skirt segment – the one each side fills the gap



Skirt following contours of the ground

Skirt R&D – Hoverfreight is constantly improving designs for different applications

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Modular Hoverbarge

- ✓ Reduced Shipping Costs
- ✓ Access to inland areas via trucks
- ✓ Easy to use on different projects
- ✓ Use the pontoons as standard marine pontoons
- ✓ Steel Construction
- ✓ Easy to assemble on site

The first Modular Hoverbarge was invented by the Technical Director of HFL in the 1970's.

TRUCK TO SITE

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Modular v Monocoque

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Mono Hull Hoverbarge

- Increased payload
- Can be built on-site
- Ideal for long term contracts
- Built to certification

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Launching the Hoverbarge

Once built or re-assembled the Hoverbarge can be launched direct from a beach or graded river bank.

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Yukon Princess Working Across the Yukon

95% availability working 24/7 when river was in full flood and even when frozen over

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Loading/ Unloading

A portable steel framed ramp with wooden decking was used to enable easy movement up or down the graded approach to the river depending on the high of the water was all that was required.

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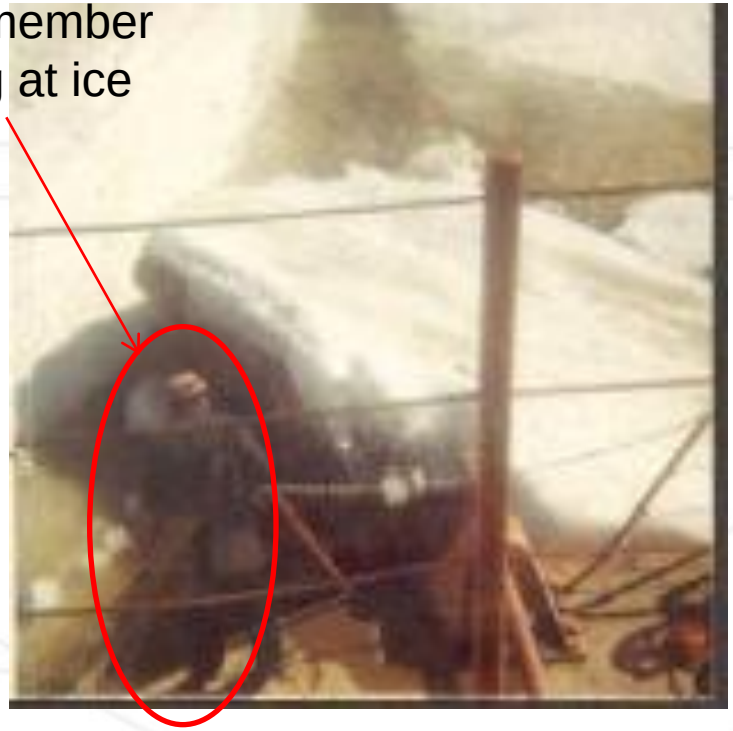
This shows the extreme conditions that the Hoverbarge coped with over breaking ice.

Crew member looking at ice



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Ex Employee Comments From Yukon Project.

'I did every bit of the fabrication that went into the building of the two ships and both of the ships were constructed on the north bank of the Yukon during the winter of 1975. Upon completion the ships engines were fired up, the ships hovered up and after tying off lowered onto the banks of the river via bulldozers. It was quite a sight.

Structurally the ships were invincible. The frame work design that the skirts were installed on was very unique in themselves because at no time were they ever exposed to damage by landing on the rocky shores of the river. The only maintenance that was ever really addressed was occasionally blowing out a skirt.

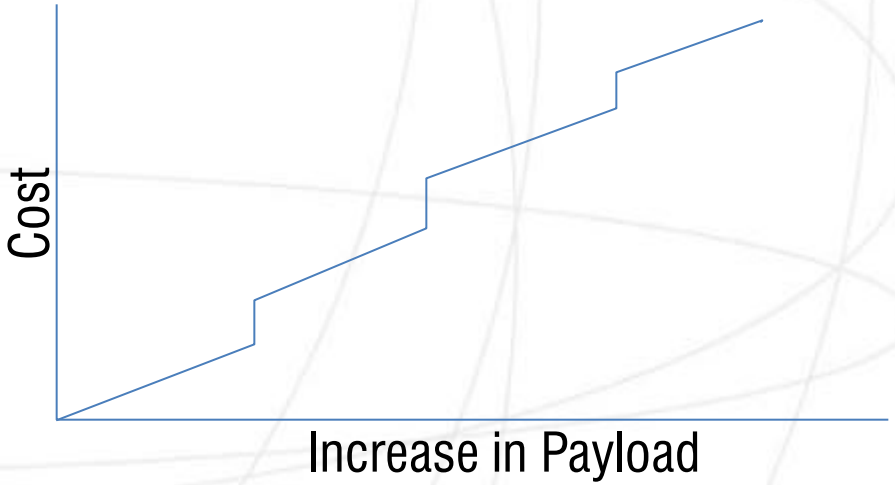
Unless one was there it would hard to grasp the full picture of a hundred different trucks on each side of the river waiting to cross. Although it was nearly always 45 to 50 below zero that winter of 74/75. The bottom line is that they were designed, built and put into service. They never failed us and did the job they were designed to do.

Respectfully, Andy Rogers'

Note at the time of writing this reference Andy Rogers was Public Works Director, City of Colfax, Washington State. USA

Size & Cost

- As the Hoverbarge size increases, the cost increases in steps
- For a small increase in size with little extra power, the payload increases significantly



Hoverbarge

200t Payload

Hoverbarge

300t Payload

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Example Hoverbarge Applications

Ice roads – an alternative

Recently 2015 warmer winters means thinner ice making ice roads dangerous places Another warm winter will probably mean the closure of many mines if the ice roads start failing. The Hoverbarge would mean an environmentally friendly year round service.

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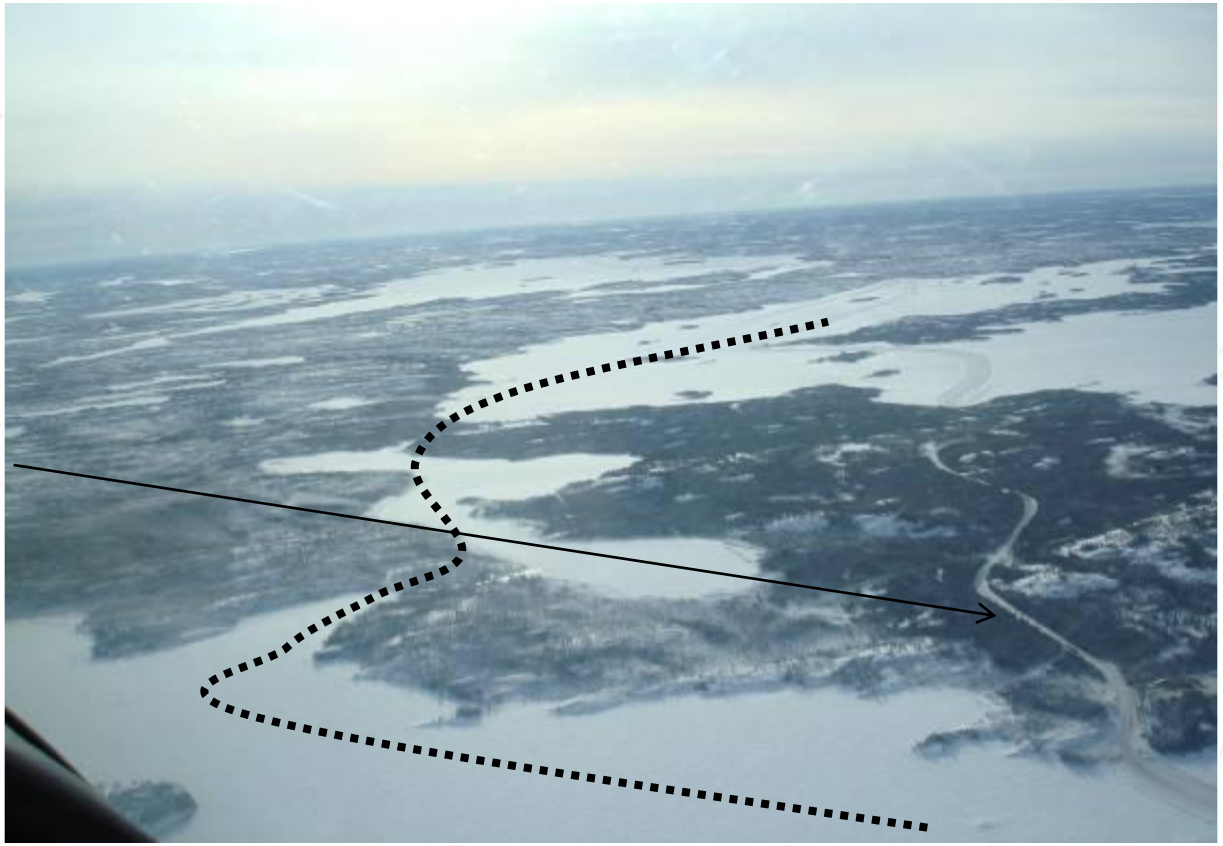
IMPROVING ON THE TRADITIONAL ICE ROAD ROUTES CAN BE MODIFIED AND PORTAGES AVOIDED

Hover route would avoid narrow portages



320 tonne Self Propelled Hoverbarge on frozen lake (Mining Transport)

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All Weather Road Alternative

The Eureka highway is only 20km but provides an important link

Long 300km roads cost $1bn and do effect animal migration linking only two points, whereas the Hoverbarge is flexible and can delivery out of gauge loads to mines and communities without roads

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Ship to Shore

- Access tidal zones
- No need for docks / port
- No need to dredge
- Gain access quickly without having to build infrastructure
- Operate over mudflats and shallow water

Stores Unloading Baffin Island

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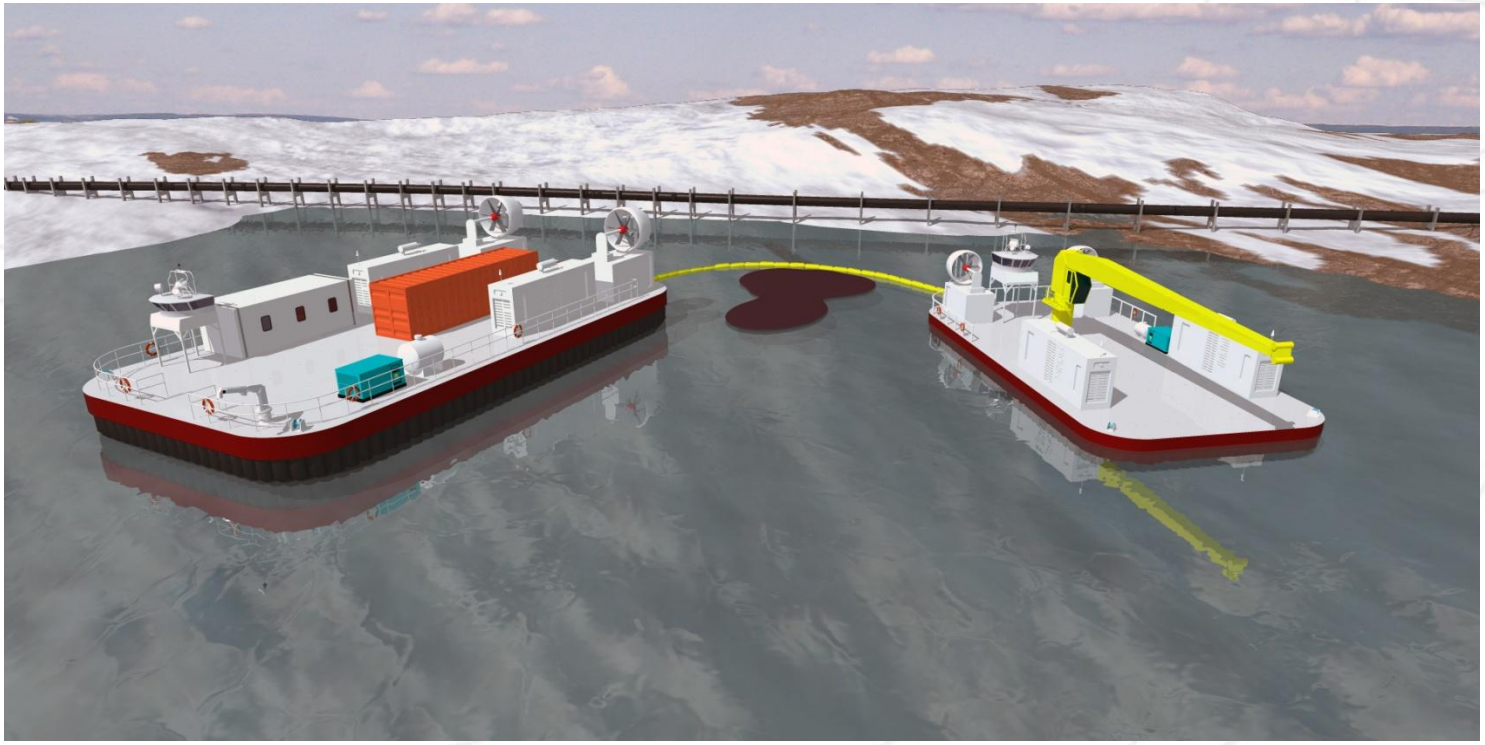
Shallow Water Oil Spill Response

- Shallow water oil spill response
- Environmentally sensitive areas
- Reed beds / Wetlands
- Access when shore based approach is restricted



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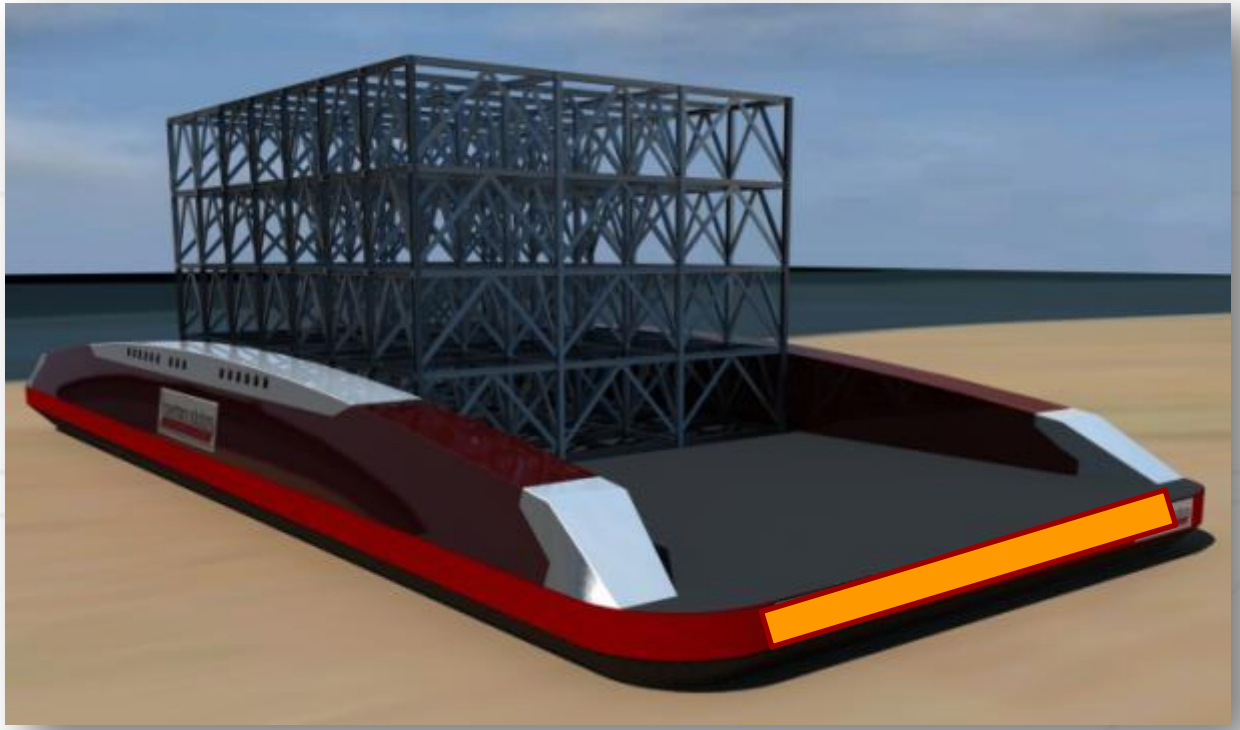
Moving Modules Reduce Cost and Time



- Transport large prefabricated modules to remote sites
- Avoid building infrastructure such as road, rail and bridges
- Avoid dredging
- Use on multiple projects

Length = 177m
Width = 75m
Payload = 2500t

Moving pre fabricated modules into a process site such as the oil sands is a game changer saving cost and time

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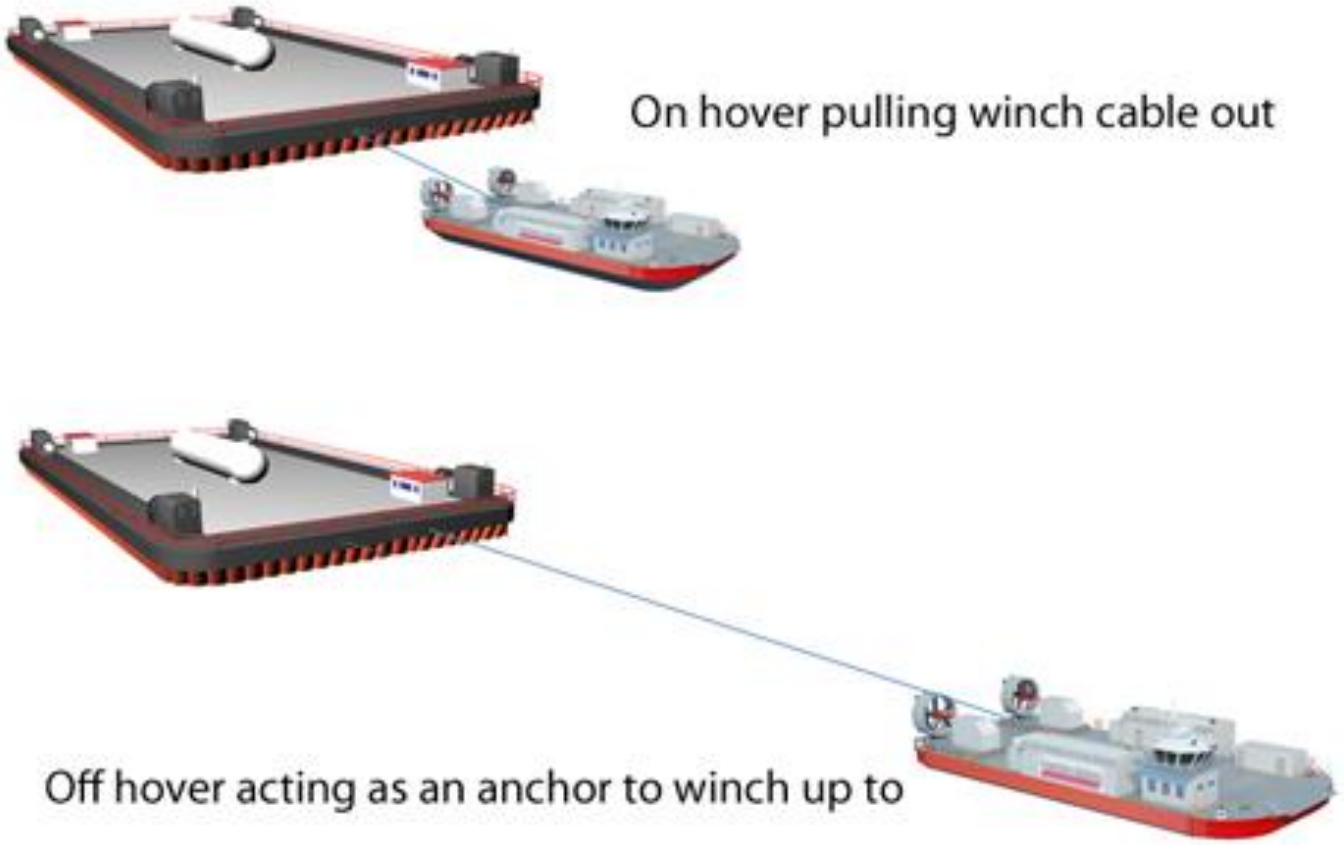
Moving Anchor

To move the large Hoverbarges, a smaller Hoverbarge can be used as a moving anchor point for the larger Hoverbarge to winch up to causes no environmental damage



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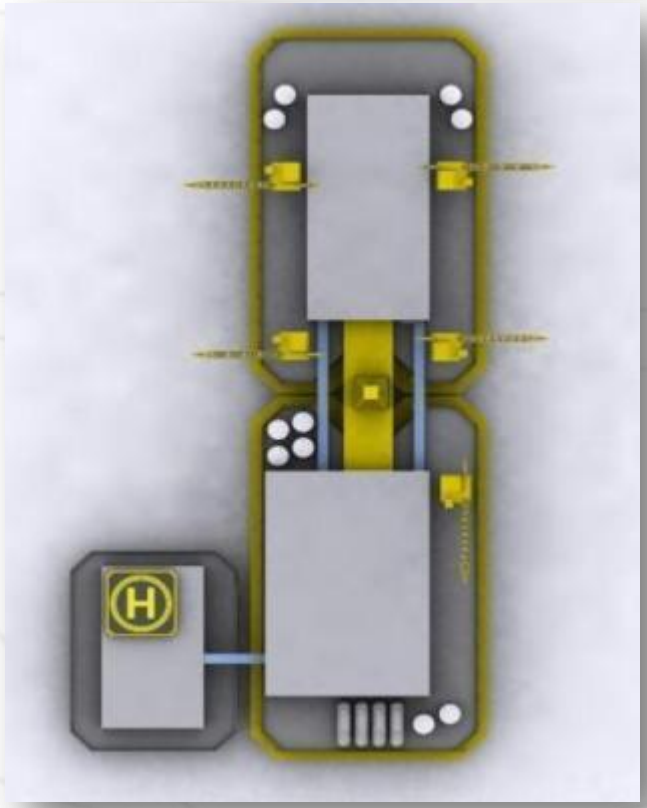
Shallow Water Drilling

7000 tonne hover drilling complex, designed for working in 0-5m of water.

Beach can be used as a safe haven



Hoverbarges can be brought together to form a larger drilling pad

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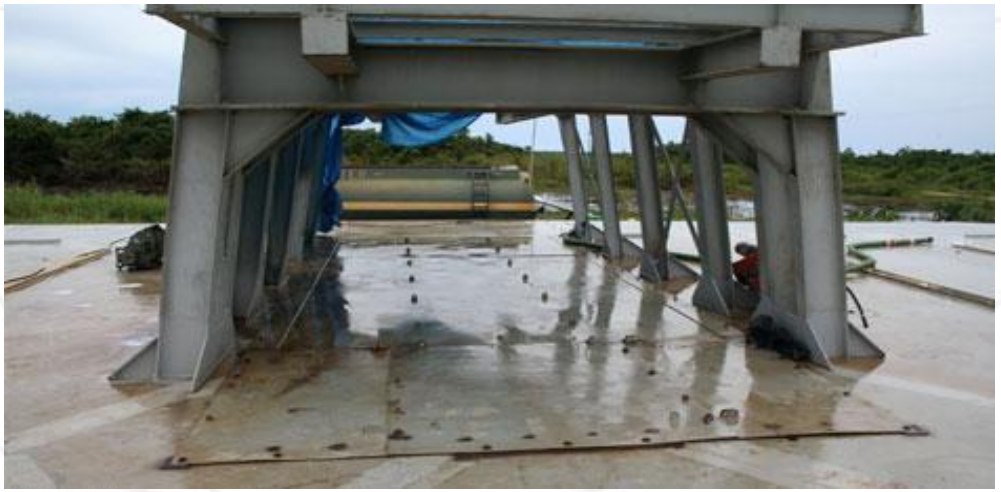
Wetlands / Swamp Drilling

330 tonne payload hover drilling barge in Suriname



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Wind Farms

•Access shallow water

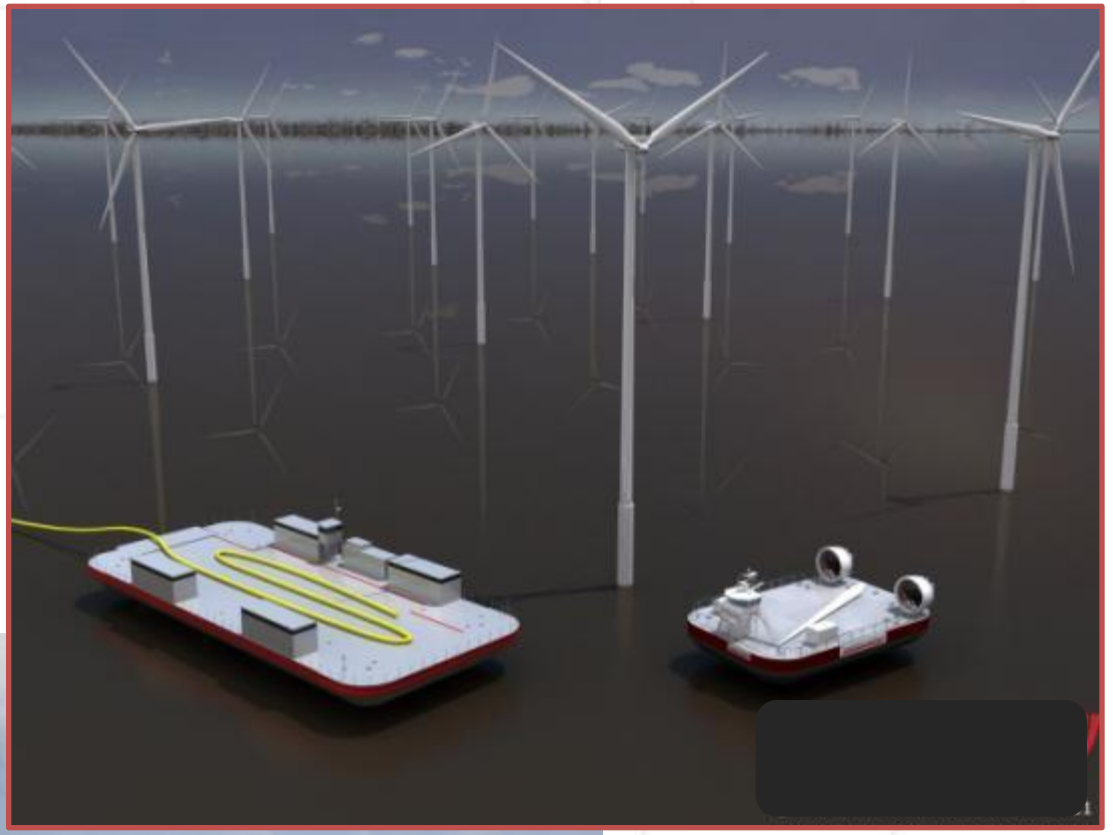
• **Operate regardless of tide** – help against limiting operational factors such as wildlife seasons

• Transport parts

• Cable laying

• Move equipment such as excavators

• Offshore support platform for directional drilling



No need to stop work when the tide is out!

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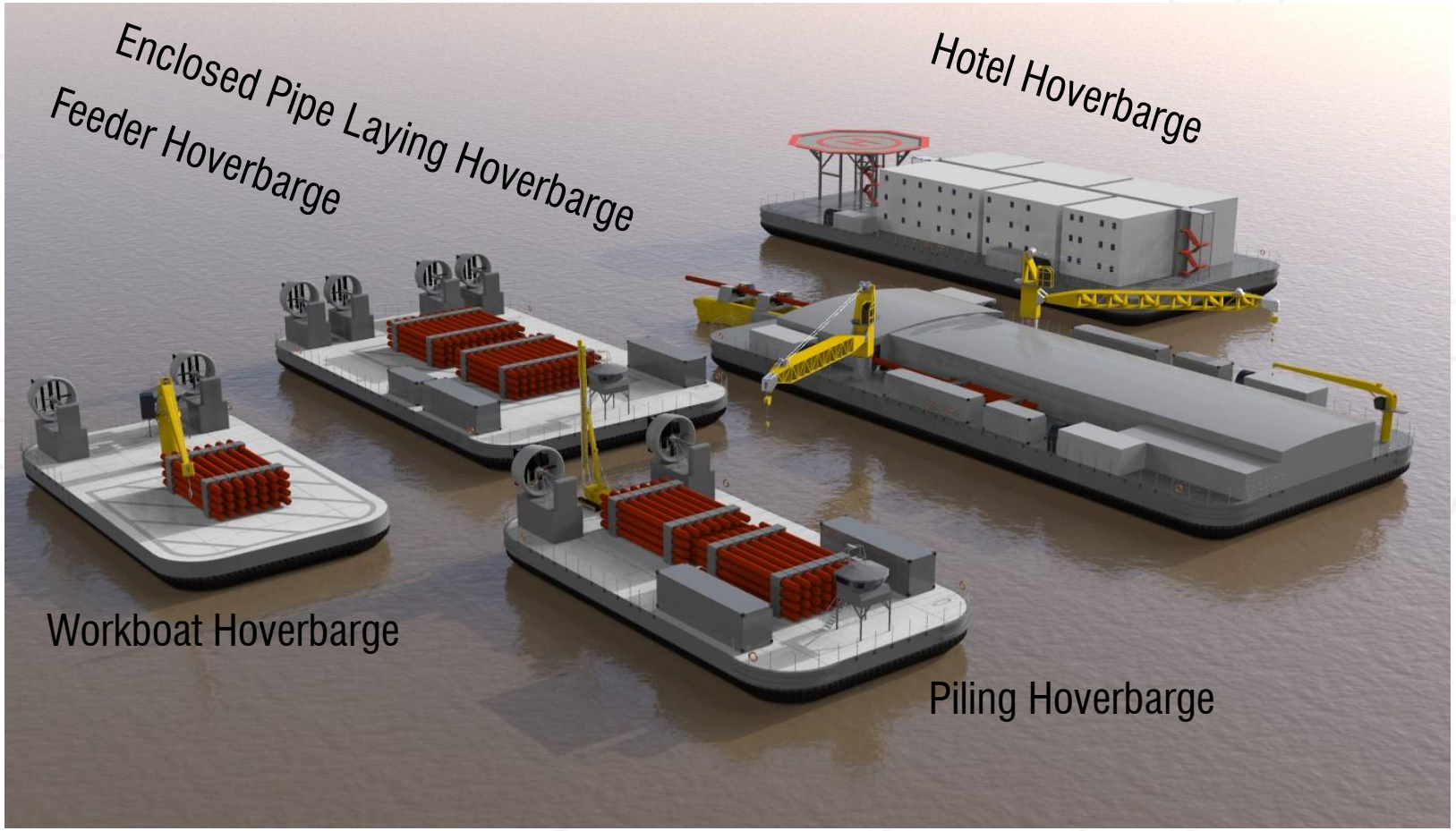
The Pipe Laying Hoverbarge Fleet



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The Hover Onshore Pipeline Fleet

Construction onshore reduces **man power and time**

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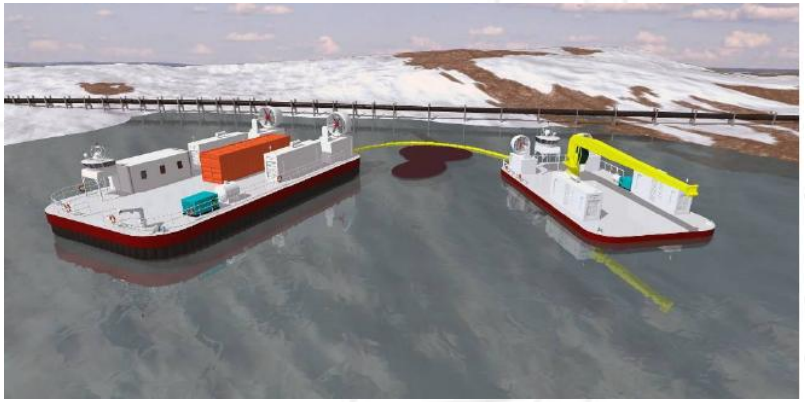
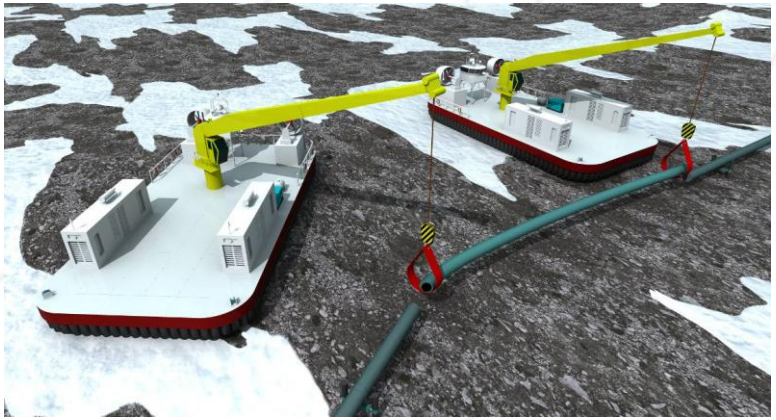
Hoverbarge Flexibility Covers all Phases

Equipment delivery



Oil spill response 24/7

Piling



Repair and maintenance

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HOVER90TM – Military Test Hoverbarge

The successful HFL skirt working without anti spray skirt.

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Periodic Maintenance Requirements

CAT Engines:
Oil & Filters 500 hours
Top and overhaul 5,000 hours
Major Overhaul 10,000 hours
Fluid Drives:
Oil change 4,000 hours
Life 10-20 years
Lift Fans:
General inspection 1,500 hours
Bearings life 50,000 hours
Propellers:
Overhaul /replace 2,000 hours
Spare sets of propellers, belt drives to be kept in store
Main Structure:
Normal paint repair
Skirt:
Depending on operating conditions and utilization.
However hover barge skirt requires far less maintenance than traditional high speed hovercraft.

Skirts being repaired on site

Chain mail wear pads to protect front of skirts

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Propulsion

Methods of propulsion include:

- Amphibious tractors
- Tugs
- Winching
- Ducted Props (for smaller Hoverbarges)

Pictures on the Right:
Some examples of methods used to move the non propelled Hoverbarge

Amphibious Tracked Vehicle

Shallow Draft Tug Boats

Amphibious Tractor

Shore Based Winch System

Swamp Excavator

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Self Propelled Hoverbarge

Ducted Propellers – as currently used on Hovercraft can propel the Hoverbarge up to speeds of 5 knots

Picture shows Canadian Coast Guard Hovercraft

Self Propelled Charter Hoverbarge

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100 tonne payload self Propelled Hoverbarge

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Supply Hoverbarge Local Communities

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Summary

- Hoverfreight has the **most experienced** Hoverbarge design team in the World :
  - Route Surveys / viability reports
  - Full Feasibility Studies
  - Hoverbarge Design & Manufacture
  - New charter Modular self propelled Hoverbarge being built in 2017

- Heavy loads can be transported to sites using Hoverbarges

- Smaller self propelled Hoverbarges can be used for supplies

- Eliminates the need for infrastructure

Contact

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Hoverbarge pictures used within this presentation are of Hoverbarges built by Mackace Ltd. Hovertrans Inc., Hovertrans Ltd. & ST Marine

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Thank You