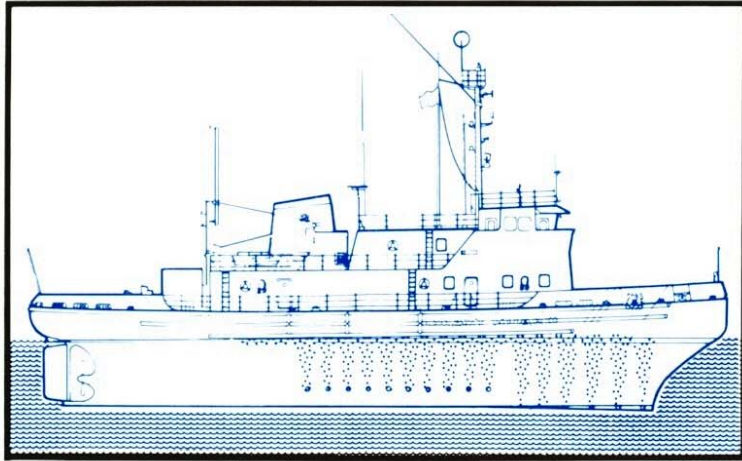


140-foot Icebreaker/Harbor Tug

Constructed by Bay City Marine
for the United States Coast Guard



Hull Air Lubrication System...



Bubbling air from ports in lower hull assists icebreaking.

The hull air lubrication system — referred to graphically as the “bubbler” — is an auxiliary means of improving the icebreaking ability of the WTGBs.

Large quantities of compressed air at low pressures is piped through small ports in the vessel hull near the keel. Air bubbles rise along the hull surface, causing an upwelling of water. The action serves as a “lubricant” between hull and ice, reducing friction and, thus, reducing the horsepower needed to move the icebreaker through the ice.

Compressed air is delivered to the ports through four separately controlled manifolds. Various combinations of manifolds can be selected for specific ice conditions, and, it has been shown in actual use, the air pressure system can be used for turning or positioning the vessel.

The air lubrication system is powered by

a diesel engine and compressor that are contained in a portable van which is positioned on the main deck aft of the deck house. The van is removed for shoreside stowage and maintenance when not needed.

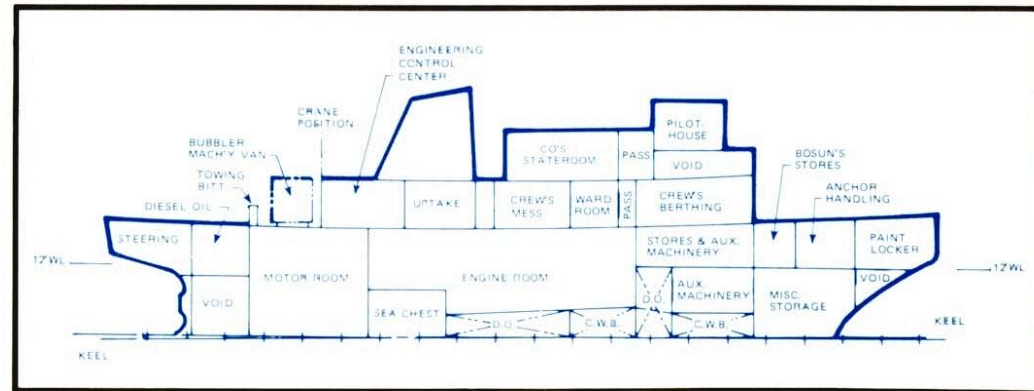
Accommodations...

Crew accommodations for the 140-foot WTGBs are significantly improved over those of the older WYTMs. All compartments, for instance, with the exception of the paint locker, are accessible from within the vessel.

Living areas, pilothouse, and engineering control center are air conditioned and humidity controlled for summer and winter operations.

Also included are spacious mess areas, galley, ship's office and wardroom, and laundry facilities. All berthing and messing areas are located on or above the main deck, and include:

- Commanding officer's stateroom
- Ship's officers' double stateroom
- Chief petty officers' double stateroom
- Two 6-man crew-berthing areas



Inboard profile of WTGB shows location of “bubbler” van, and vessel operations and living areas.

MISSIONS: Icebreaking... for assisting Maritime Commerce

The primary duty for the WTGB icebreaking tugs is ice operations in domestic waters, primarily the Great Lakes and other coastal waters of the Northeast. Ice operations include opening and maintaining channels in ice-covered waters (the WTGB can break open a swath 150 feet wide), freeing of beset vessels, and icebreaking in rivers for flood relief.

With the strong emphasis on icebreaking, the design and construction effort resulted in maximum horsepower, high displacement, and wide, reinforced hull. The result is a vessel that routinely breaks ice more than twice as thick as the predecessor WYTM.

Use of a single shaft and propeller and a large rudder, together with its uniquely shaped hull, provides maximum protection for the vessel from pack or floe ice. The hull design also results in a smooth flow of water and ice for ice operations as well as open water transiting.

Design tests and predictions had estimated an icebreaking capability of 18-20 inches of hard ice in a continuous operating mode. In actual use, the WTGBs have cleared and broken ice of more than 24 inches thickness routinely, and up to 30 inches in several instances.

A hull surface "air lubrication" system—the first such use of the system on a USCG icebreaker—assists in extracting the WTGBs from ice and improves the vessels' icebreaking capability by giving the effect of higher horsepower.



Four of the Coast Guard's 140-foot WTGB icebreakers helped late-April maritime commerce resume voyages through the Great Lakes in 1984 after the worst ice jam in 30 years clogged the St. Clair River near Detroit. The jam-up was costing shipping companies \$1 million a day. Leading the flotilla of ore boats, freighters, and ice breakers is a USCG cutter/icebreaker, heading toward the open waters of Lake Huron. Photo courtesy of The Detroit News.

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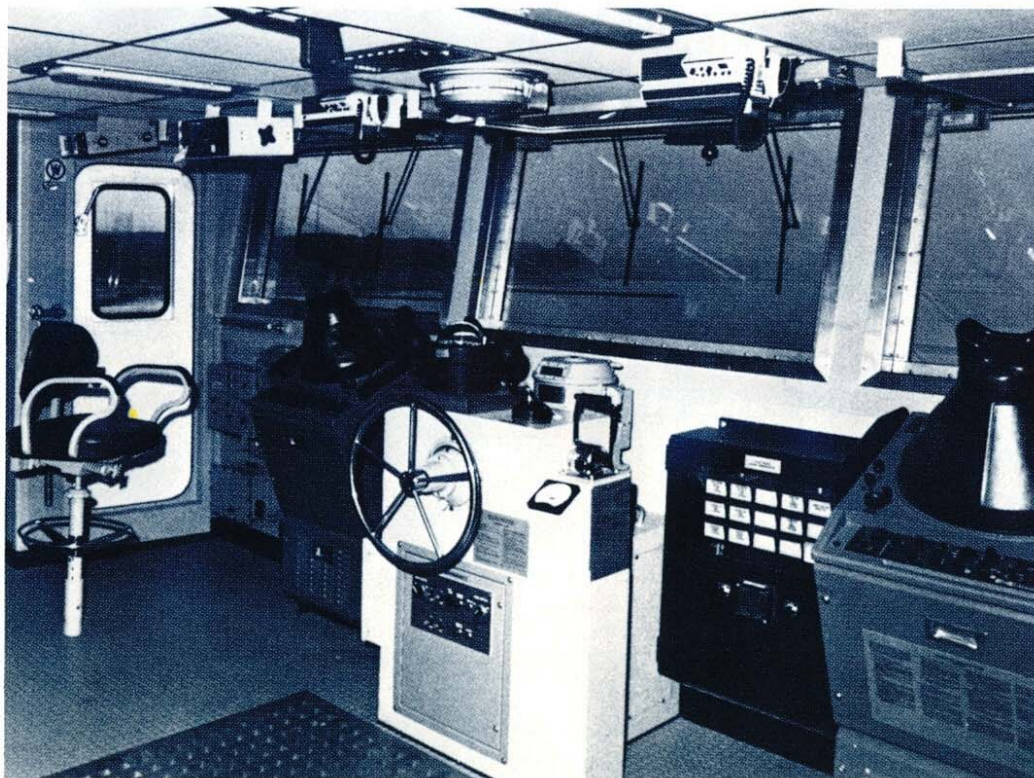
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Photo courtesy of The Detroit News.

MISSIONS: Search & Rescue ... ongoing duty for the USCG

One of the vessels' important duties is search and rescue. The 140-foot WTGBs will be better equipped for this task than the 40-year-old WYTMs.

The greater speed and higher freeboard of the "buck forties" enables them to reach search areas sooner, especially during adverse conditions of sea and weather. Longer range allows them to work in search areas for extended periods of time.

The electronics on board the new vessels provide substantially improved navigating and communicating capabilities for search and rescue. The navigation system includes a 60-mile-range surface radar with IFF, fathometer, Loran C, automatic radio direction finder, autopilot, and VHF/FM homing unit. The communications system consists of 4 radio sets: two VHF/FM transceivers, a UHF transceiver, and an HF transceiver.



Center portion of WTGB bridge showing helm, gyrocompass, and two radar stations.

Other Missions ...

For emergency towing, a large bitt and capstan are installed on the aft deck, and each vessel is equipped with towing lines including 900 feet of 5¼-inch nylon hawser of 90,000 pounds pull for vessels of up to 2500 dwt.

For firefighting in port or at-sea, the ice-breakers have a substantially improved capability with two 250 gpm monitors, each with a horizontal range of 210 feet.

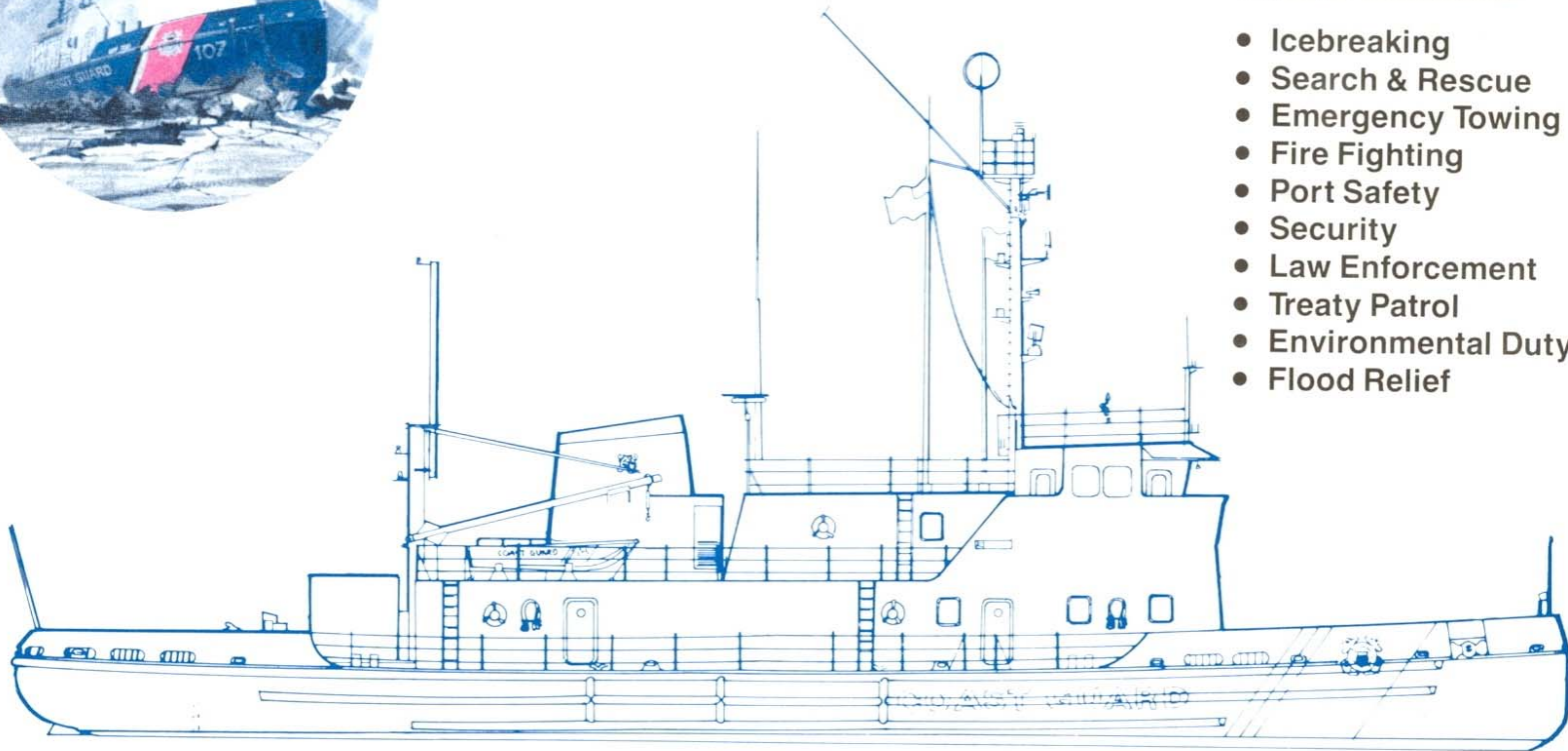
The vessel is equipped with small arms for the USCG's law enforcement missions.



140-foot WTGB Icebreaker/Harbor Tug

Vessel Missions

- Icebreaking
- Search & Rescue
- Emergency Towing
- Fire Fighting
- Port Safety
- Security
- Law Enforcement
- Treaty Patrol
- Environmental Duty
- Flood Relief



Bay City Marine Inc.
San Diego, California
New Construction Yard
Tacoma, Washington

Principal Characteristics of the 140-foot WTGBs

Length overall	140' 0"
Length between perpendiculars	130' 0"
Beam (maximum)	37' 6"
Draft (mean)	12' 0"
Freeboard to main deck (minimum)	6' 0"
Propeller diameter	8' 6"
Full load displacement (fresh water)	662 tons
Shaft horsepower	2500 shp
Speed (maximum)	14.7 knts
Speed (cruising)	12.0 knts
Range (cruising)	4000 miles
Manning (officers and enlisted)	17
Icebreaking ability	to 30 inches

Features

Diesel/electric propulsion (DC-DC)
twin O-P diesel engines

Single shaft and rudder

Two 125kw auxiliary generators

Hull air lubrication system

Engineering control center

Fire fighting monitors:
two @ 250 gpm; range 210'

Utility boat of 17'

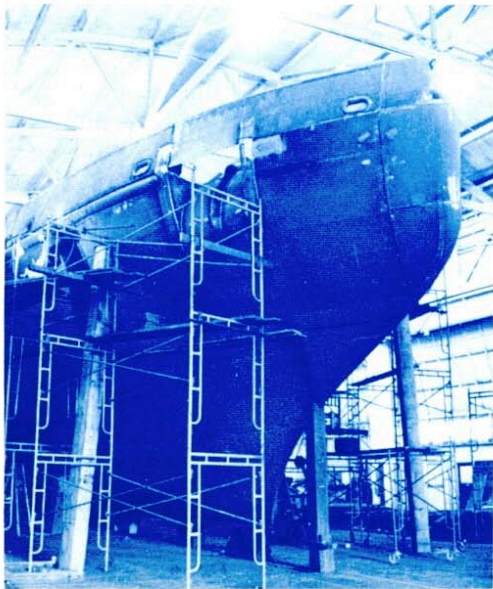
Boat/cargo crane rtd 2 tons

Nearly 360° visibility for house

Clean water ballast system

Smoke and flooding alarms

Pollution control, including a
collection-holding-transfer
system; oily water separator



Hull of WTGB under construction in Tacoma.

Comparisons of the WTGBs and Old WYTMs

The WTGB series of 140-foot icebreaking tugs are replacing 110-foot WYTMs put into service in the 1940s for work in the Great Lakes and domestic waters of the Northeast Coast.

The 30 feet of additional length may be the most apparent difference between the two vessels, but overall sea-keeping ability and improved mission capabilities are the most important. The beam of the WTGBs is nearly 30% wider, and its full-load displacement is 70% greater. It can break more than twice the thickness of ice — 2½ feet rather than 1 foot thick. Range is doubled to 4000 nautical miles.

Quarters for the crew are comfortable, cheerful, and roomy for harsh winter duty. Provisions for on-deck safety are vastly improved. Even though it is larger and has more missions, the new tug's complement of 17 is 3 fewer crew members than for the WYTMs because of improved instrumentation and automation.



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