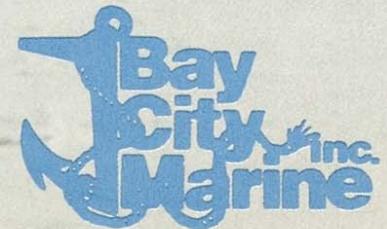


# 140-foot Icebreaker/Harbor Tug

Constructed by Bay City Marine  
for the United States Coast Guard



# 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.

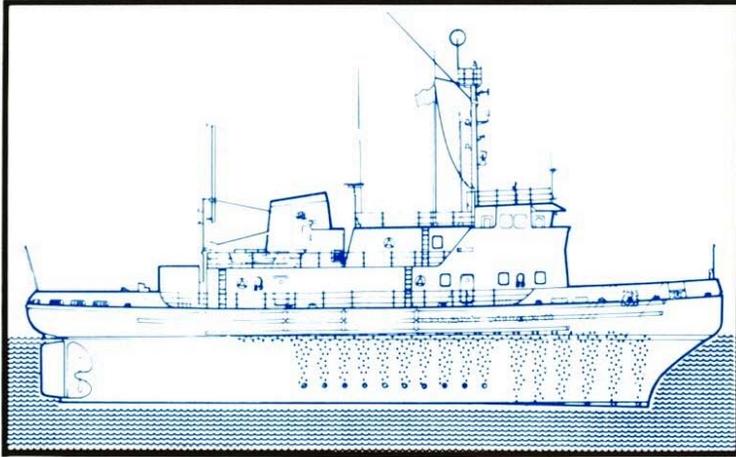
## Comparisons of the WTGBs and Old WYTMs

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.

## 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.

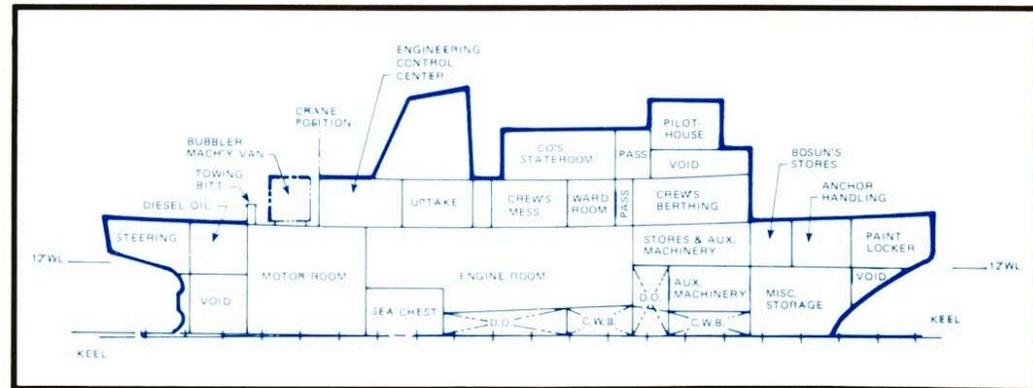
## Accommodations...

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



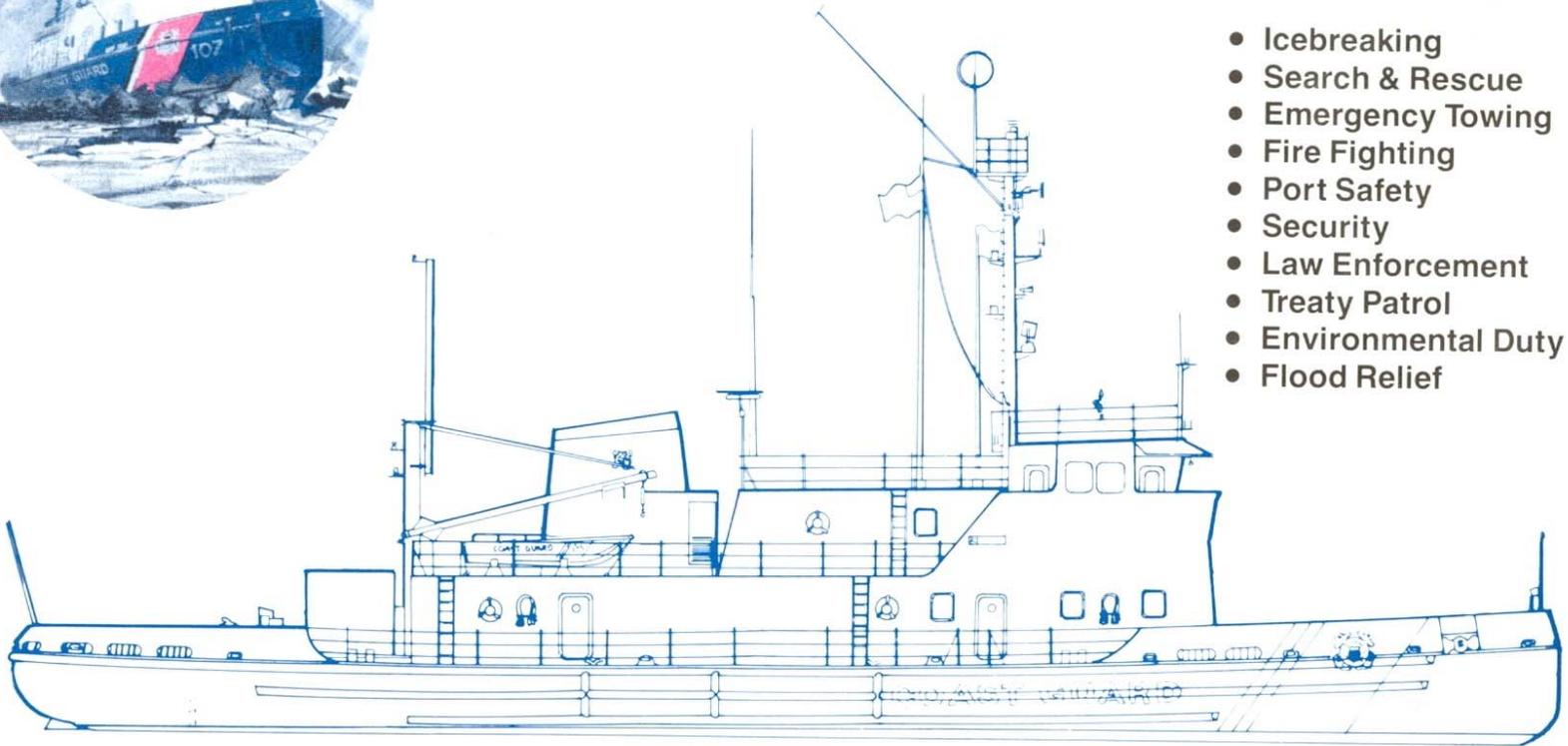
*Inboard profile of WTGB shows location of “bubbler” van, and vessel operations and living areas.*



# 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



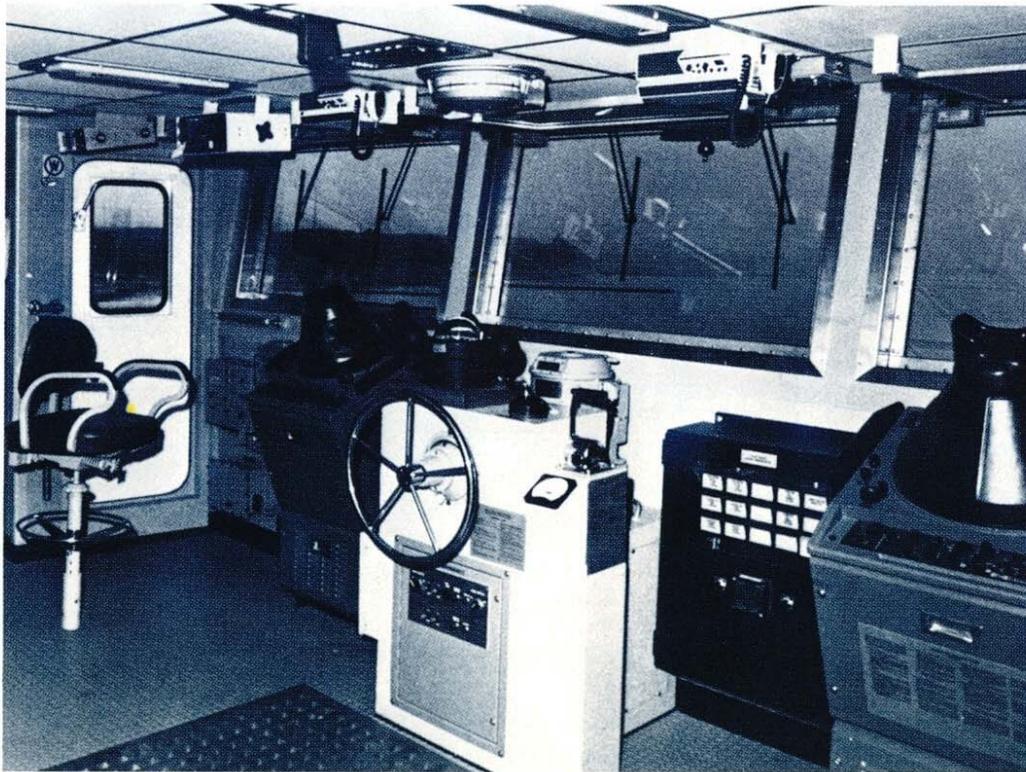
Bay City Marine Inc.  
San Diego, California  
New Construction Yard  
Tacoma, Washington

## 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.

## 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.



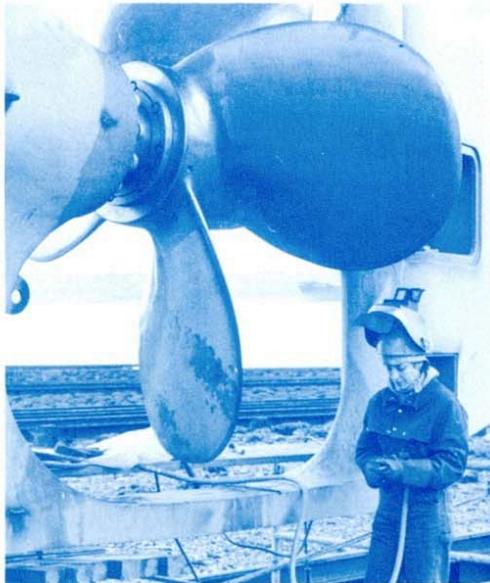
Four of the Coast Guard's 140-foot WTGB icebreakers helped late-April maritime commerce resume voyages through the Great Lakes in 1984 after the worst ice jam in 30 years clogged the St. Clair River near Detroit. The jam-up was costing shipping companies \$1 million a day. Leading the flotilla of ore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

Photo courtesy of The Detroit News.

## Naming WTGBs...

The first of the 10-vessel fleet of 140-foot WTGB icebreakers was commissioned in early 1979, and subsequent vessels have been completed about every 12 months. The lead ship of the series, the *Katmai Bay*, actually went to work freeing a beset vessel in the Great Lakes before she was officially commissioned.

The vessels are all named for significant coastal bays of the United States, including several within the Great Lakes. Following the *Katmai Bay* are these bay-named vessels: *Bristol*, *Mobile*, *Biscayne*, *Neah*, *Morro*, *Penobscot*, *Thunder*, *Sturgeon*, and *Curtis*.



## Project Vendors

### Hull Structures

American Steel  
Corwell-Carr  
water-tight doors, hatches  
Isaacson Steel  
Olympic Foundry  
Overbeke-Kain  
water-tight doors  
Joseph T. Ryerson  
Schneider-Simpson  
Specialty Metals

### Propulsion System

Colt Industries  
main diesel engines  
Craig Taylor  
muffler  
Matsui Corporation  
propeller and shaft  
SSI-Steering Systems Inc.  
steering system and autopilot  
Westinghouse  
generators and motor

### Electrical Components, Systems

Anixter  
Consolidated Electric  
Dynalec  
General Electric  
Hardware Specialties  
Mariner Electric  
electrical contractor  
Sea-Land  
Stusser Electric

### HVAC Components, Systems

Brower Company  
Buffalo Forge  
National Blower  
New York Blower  
U.S. Sheet Metal

### Other

Henschel Corporation  
navigation lights  
Honeywell  
smoke detection system  
Kahlenberg  
horn system  
Mortrude Floor Company  
Pioneer Painting  
Sea-Mar Electronics  
communication equipment  
Tacoma Boatbuilding Co.  
U.S. Riley  
annunciator panel

## Bay City Marine

Bay City Marine was incorporated in San Diego in 1971. Since then it has earned an outstanding record for new construction, overhaul and repair, and mobile emergency services for naval and commercial vessels. The company is rated as a master ship repair contractor by the U.S. Navy.

The company's corporate headquarters and principal shipyard is located in San Diego. Other fabricating and shipbuilding facilities are in nearby National City and in Tacoma, Washington.

Most of the company's work has been for the Navy and Coast Guard; but, in a unique assignment for a shipyard, Bay City Marine fabricated a 100-foot-high triangular Orbiter Lifting Frame for the Air Force for use in mounting/demounting the space shuttle for its 747 delivery aircraft.

The San Diego shipyard primarily repairs and overhauls steel vessels. Its certified drydocks handle ships to 500 tons. Pier space accommodates vessels to 300 feet.

Fiberglass new construction and repairs are the principal activities at the National City facility for both military and commercial work.

In Tacoma, Bay City Marine has an enclosed 137,000-square-foot fabrication and erection shop where ships are constructed and outfitted. The facility has overhead cranes for moving heavy fabricated modules from side bays for master butting. The Tacoma operations also repairs ships at dockside sites in the Pacific Northwest.



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