
Photo by Peter Shugert, U.S. Army Corps of Engineers, New York District

# USACE-Navy Team Frees the USS Intrepid

*By Dr. JoAnne Castagna*

Felix Novelli was 19 years old when he was assigned to the *USS Intrepid* during World War II. He clearly remembers the horror and splendor he experienced while onboard the aircraft carrier, including the first attack.

"I was standing on the flight deck when a twin-engine Japanese dive-bomber attacked from the fantail. He came along the starboard side when one of our guns hit him, blowing his wing off and sending it into the ship, causing a very bad fire," said Novelli, who saw many of his "brothers" being killed and wounded.

Novelli witnessed numerous attacks during the war, to include many kamikaze attacks that blackened the sky. They kept on coming from the left and the right, 200 to 300 each day, trying to sink the *Intrepid*. She was hit five times by kamikaze bombers.

In addition to its World War II service, the 925-foot-long ship saw action in the Korean and Vietnam conflicts. "The Ghost Ship," as she was known by the enemy, tracked Soviet submarines during the Cold War and served as the National Aeronautics and Space Administration's prime recovery vessel for Mercury and Gemini capsules in the 1960s.

In 1981, the aircraft carrier was saved from being scrapped when it was purchased by the Intrepid Foundation, a charitable organization started by the New York City-based Fisher construction and real estate family. The


Photo by Peter Shugert, U.S. Army Corps of Engineers, New York District

**The *USS Intrepid* docked at Pier 86 on the Hudson River on Manhattan's west side.**

foundation, through its Fallen Heroes Fund, the Center for the Intrepid, and Fisher Houses, responds to the hardships of military service and meets a humanitarian need beyond that normally provided by the Department of Defense. Fisher Houses are located at military hospitals worldwide and provide assistance to the families of critically injured servicemen and servicewomen. Novelli, who also supports these programs, says that every time a Fisher House is opened, American flags are raised from the *Intrepid* flight deck and then presented to the Fisher House at a ceremony.

In 1982, the retired warship became the Intrepid Sea, Air, and Space Museum. It is the world's largest naval museum and has been berthed at Pier 86 on Manhattan Island in the Hudson River. After 24 years as a museum, officials of the Intrepid Foundation decided that the ship needed repairs and refurbishment, as well as a rebuilt public pier to serve the 700,000 visitors each year.

In August 2006, the museum received a federal permit from the United States Army Corps of Engineers® (USACE) to dredge an access channel from the berthing area to the main federal channel of the Hudson River to move the vessel to Bayonne, New Jersey, where it would undergo inspection and necessary repairs. The dredging operation, which was completed in October, removed approximately 16,000 cubic yards of river mud.

Photo by Peter Shugert, U.S. Army Corps of Engineers, New York District

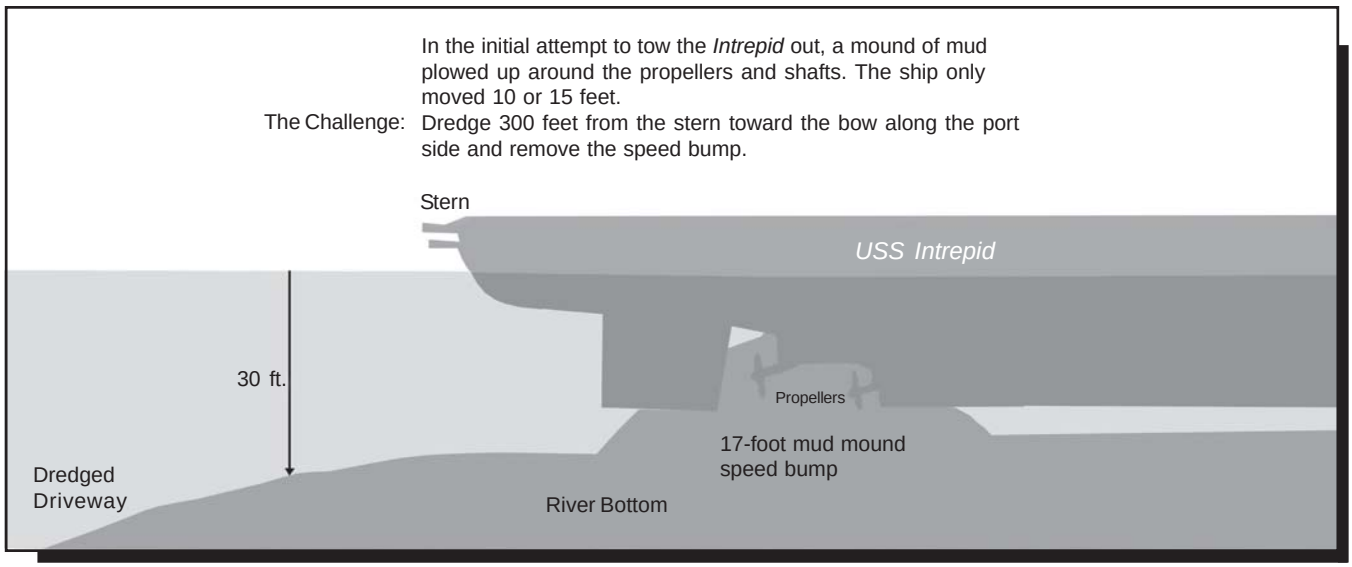
**USACE vessels *Gelberman* and *Hayward* lead the flotilla as the *USS Intrepid* is towed stern first down the New York Harbor, en route to its temporary dock in Bayonne, New Jersey.**

On 6 November 2006, an "*Intrepid* on Leave" celebration was conducted by Intrepid Foundation officials to give the ship an elaborate send-off to its temporary home. Several public service agencies' vessels were invited to escort the ship downriver, with four USACE workboats leading the flotilla. During this initial attempt to remove the engineless ship, seven tugboats began to pull, and the *Intrepid* literally got stuck in the mud.

The 27,100-ton ship moved backward, stern first, about 15 feet before its four giant propellers, each measuring 16 feet in diameter, dug into the river sediment and prevented any further movement. Try as the straining tugboats might, the *Intrepid* would not budge. The effect was a compacted "speed bump" of mud under the ship's fantail (see figure below).

Museum officials immediately called numerous government agencies for help, including Pentagon officials. The USACE New York District, the closest federal agency with expertise, responded within 2 hours with its district commander and technical experts on the adjacent pier assessing the situation.

The stern of the ship was 2 feet higher than the bow. At low tide, the ship was only resting on the bow and the stern's speed bump. This was adding serious stress to the hull, according to the District Chief of Operations. This was not a simple matter of more dredging, but



a grounded ship that needed to be carefully freed.

USACE recommended that *Intrepid* officials contact United States Navy salvage experts, since they have unique knowledge and experience in freeing large ships. They would also know how the *Intrepid* would react to being in such a precarious situation. The next day, the United States Naval Sea Systems Command (NAVSEA) salvage contractor had an assessment team at the *Intrepid*. Salvage divers surveyed below the waterline to inspect the vessel for damage and determine the extent of the speed bump. The divers' firsthand examination confirmed the initial assumptions and documented the extent of the problem. Soon the Navy was working with USACE, the Intrepid Foundation, and state and city agencies to execute a unique and highly visible dredging operation to remove compacted sediment from around the propellers and shafts.

The Navy brought technical and contractor expertise to the partnership, and USACE provided project oversight and integration. Because this is their home area, District team members had the local knowledge and existing relationships with stakeholders, government agencies and officials, and the media. This mission was executed as a joint military operation with daily progress meetings and situation reports. The team devised a three-phase execution plan.

- Dig the existing access channel deeper and wider and add an access trench on the south side of the vessel from the *Intrepid's* stern to beyond its trapped propellers and shafts.
- Use a drag bar under the stern and rake the sediment out.
- Airlift or vacuum the remaining mud from under the ship's fantail.

Crews worked around the clock to remove the mud in 29 days, before the next high tide, which would provide an extra 5 feet of water to remove the ship. That was their best shot at freeing the vessel, and they didn't want to miss the opportunity.

Work also moved swiftly due to environmental concerns over the *Intrepid's* precarious state. Her hull plates could separate and leak petroleum-contaminated bilge water—which was to be removed and environmentally disposed of during the shipyard visit in Bayonne—into the river. Also concerned about the return of anadromous fish species to the river estuary for the winter spawning season, work continued so the fish would settle into other parts of the estuary. Since the weather and the river temperatures were remaining unusually warm, the return of the fish was delayed. Because of this and the urgent need to dredge, the Intrepid Museum received extended work permits from USACE and the New York State Department of Environmental Conservation to allow the dredging to start a week after the grounding.

An environmental dredging bucket was used to minimize any adverse water quality and fisheries impacts. The clamshell bucket is fitted with gaskets over the openings so dredged material stays inside the bucket and the water goes back into the river. First, the existing dredged access channel to the main channel was deepened and widened. Then, to start access under the ship, a 150-foot-long by 30-foot-wide by 35-foot-deep trench was dredged down the starboard (outboard) stern side of the ship, from the *Intrepid's* stern to beyond the propellers and shafts encased in mud. Unfortunately, the access trench could not be dug directly beside the hull because the flight deck overhang prevented the crane dredge from coming up next to the ship.

To overcome this, a drag-bar barge was moved under the flight deck alongside the hull, where the drag-bar blade was lowered to the shallow bottom. Then, pulling the barge and blade away from the ship, the bar raked the river mud into the trench, working like an underwater bulldozer. The plowed mud was then dredged out of the trench, and the process was repeated until the 35-foot trench expanded all the way to the ship's hull. As the trench approached the hull, river mud that fell into the trench from under the fantail and around the propellers and shafts was raked by the drag bar and removed by the environmental bucket dredge.

The ship needed 28 feet of water to be extracted from its berth. As divers and hydrographic survey crews measured progress next to and under the ship, they saw that the propellers and shafts on the starboard (outboard) side of the ship were nearly exposed as the mud was sloughing down into the trench. These in-progress investigations, together with the experience of the salvage crew, prompted officials to extend the access trench an additional 150 feet toward the bow. The extended trench allowed the

Photo by Dan Desmet, U.S. Army Corps of Engineers, New York District

**As it passes Ground Zero, a 100-foot American Flag is unfurled by *USS Intrepid* veterans as a tribute to the lives lost there on 11 September 2001.**


Photo courtesy of USS Intrepid Sea and Air Space Museum

**The *USS Intrepid* receives a water cannon salute in New York Harbor as the ship pauses near the Statue of Liberty.**

ship to be pulled both sideways from the pier and backward toward the main channel before being extricated from the remaining mud on the port side.

After almost 3 weeks of work and the removal of approximately 39,000 cubic yards of river mud, divers were able to touch the exposed propellers and shafts, showing that the dragging and dredging operations were working and the ship would soon be ready to tow. Luckily, the slow and inefficient airlifting method would not have to be used.

One of the biggest challenges was the availability of dredged material processing barges. To ensure that an empty barge was next to every dredge, the New York City Economic Development Corporation and the Department of Sanitation worked jointly to locate and track barges around the clock so the dredging cycle could continue.

Another challenge was how to beneficially use the dredged material. The 39,000 cubic yards of river mud were transported and processed in fifty-three New York City Department of Sanitation barges. The sediment was tested for pollutants and found to be acceptable for reuse. Portland cement was added to each barge load and thoroughly mixed, which chemically and structurally stabilized the dredged material, capturing any pollutants in the processed material. It was then used as interim cover in the closure of New York City's former Fresh Kills landfill at Staten Island. Once the largest landfill in the world, it is being transformed into reclaimed wetlands, recreational facilities, and a landscaped public park.

On 6 December 2006—the 29th day of the emergency operation—officials from the Intrepid Foundation, USACE, and the Navy, as well as *USS Intrepid* veterans (including Felix Novelli) and the media, stood on the *Intrepid's* flight deck. The ship was surrounded by tugboats, USACE harbor workboats, United States Coast Guard cutters, New York City police boats and fireboats, and a flock of helicopters. It was the coldest morning of the year—with constant winds of 10 to 20 knots from the west pushing against the ship—and the Hudson River's high tide and slack water were not at the same time. When the tide was the highest, the river's strong current had not stopped yet and was still running upriver at more than 5 knots. The tugboats had to extract the *Intrepid* with great force and finesse, pulling the ship at a 5-degree angle away from the remaining mud in the berth, while maintaining tight control so it didn't swing out and crash back into Pier 86 as it entered the swift river currents.

After 29 minutes of relentless pulling by five powerful tugboats and the combined force of 21,000 horsepower, the *Intrepid* moved forward. The ship moved gracefully out of the berth, through the newly dredged access channel, and out to the main Hudson River federal channel in a slow but majestic voyage 5 miles down the Hudson River.

On the way downriver, the *Intrepid* slowed slightly while passing the World Trade Center site, as twenty former crewmembers unfurled a 100-foot American flag to honor those who died there on 11 September 2001. The *Intrepid* paused again briefly while passing the Statue of Liberty en route to the ship's temporary home, the Bayonne Dry Dock Company at the former United States Army Military Ocean Terminal in Bayonne, New Jersey. There the 63-year-old ship began a long-overdue refurbishment, after which it will be moved to Staten Island, New York, for interior renovations before returning to a rebuilt Pier 86 in late 2008.

Seeing the *Intrepid* move again was inspiring for Novelli, who stood on the flight deck like he did as a teenager. "It was like I was a kid, waking up on Christmas morning and finding a nice set of electric trains under the tree. You're filled with joy. I was back at sea and 19 years old again. A million thoughts came back. My main thought being the kids that we left on the floor of the ocean."

*For more information about the Intrepid Sea, Air, and Space Museum, please visit <www.intrepidmuseum.org>.*

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