NAVY SEABEE OPERATIONS PACIFIC THEATER DURING WORLD WAR II

J. David Rogers, Ph.D., P.E., P.G., C.E.G., C.HG.
Karl F. Hasselmann Chair in Geological Engineering
Missouri University of Science & Technology

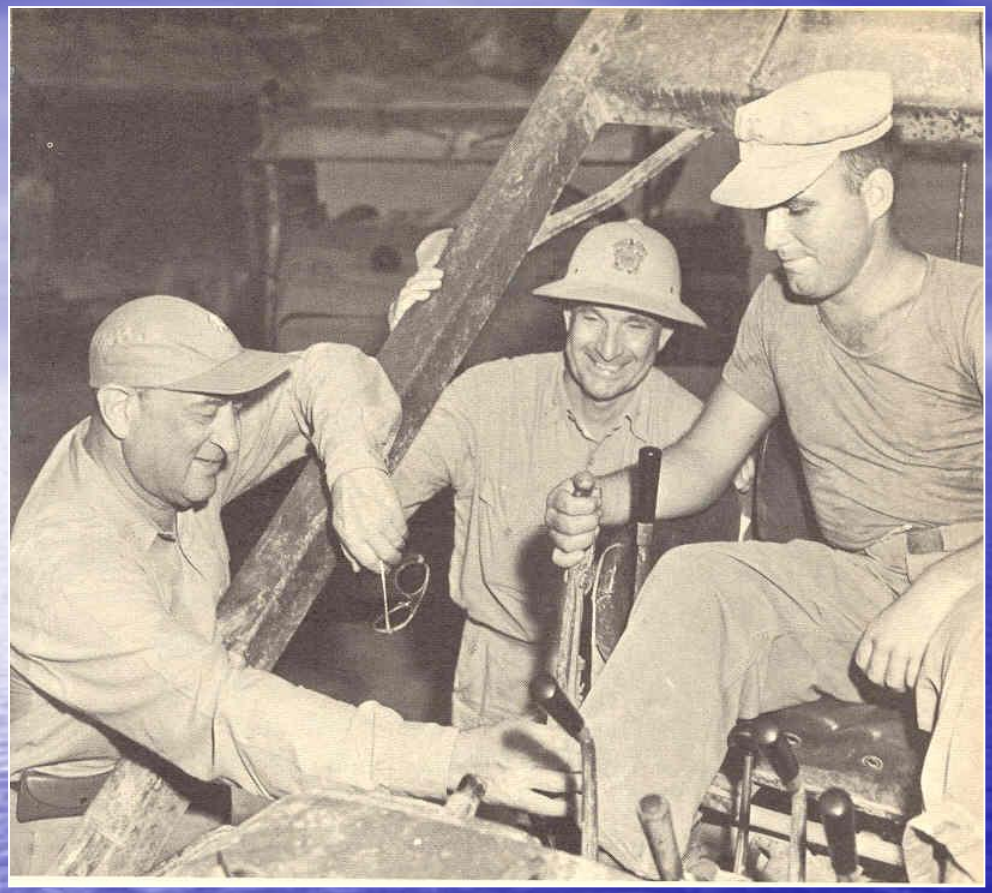
King Bee

Admiral Ben Moreell (1892-1978) was Chief of the Navy's Bureau of Yards & Docks and of the Civil Engineering Corps

ADM Ben Moreell was Chief of the Navy's Bureau of Yards and Docks and the Civil Engineering Corps during World War II. He was selected by President Roosevelt in 1937, from O-5 to O-8.

BSCE degree from Washington University in St Louis in 1913 and commissioned as a LTJG in the Navy CE Corps in 1917, during World War I. He served in the Azores with Navy Under-secretary Franklin Roosevelt

He attended École Nationale des Ponts et Chaussées in France in 1932-33, as a LCDR



Moreell (at left) was promoted to Vice Admiral (three stars) in 1944 and was the first staff corps officer and the first American of Jewish ancestry to attain 4-star rank, in June 1946.

- BuDocks developed war plans in the 1930s which envisioned a massive build-up of Navy construction battalions
- Moreell requested activation of these war plans in Dec 1941, after the attack on Pearl Harbor.
- In July 1940 there were 267 Civil Engineering Corps officers in the US Navy. By 1945 this grew to 10,186 officers.
- The first battalion was formed in Jan 1942, and initial Seabee deployments began in March 1942

The Navy Recruited "*Cream of the Heavy Construction Industry*"

Personnel had prior experience with projects like:

- **Boulder Dam**
- **National Highways**
- **New York Skyscrapers**
- **Mines, Quarries, and Subway Tunnels**
- **Ship Yards, Docks, Wharfs, even Aircraft Carriers**

Experience Comes with age (average age 37)

Battalions Designed to be:

"Completely equipped and self-sustaining able to construct airfields, roads, bridges, and buildings at an advance base and to install operate and maintain its public utilities."

Very Basic Military Training

350 Seabee units were formed during the Second World War, many from existing heavy construction firms across the USA

They were provided with military training and discipline, including basic use of weapons, shown here.

Birth of the Seabees

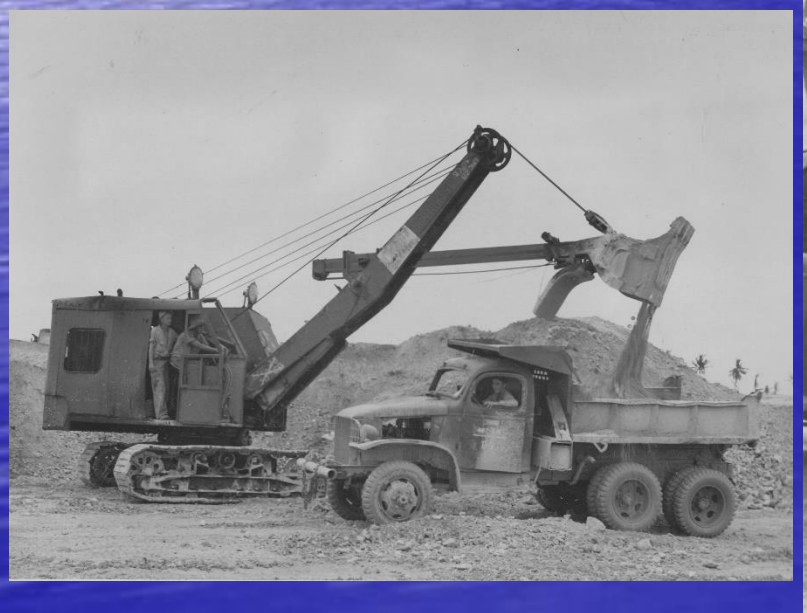
early 1942

First projects were construction of patrol base facilities in Iceland and construction of graving docks at Pearl Harbor, critical to the war effort
The first Naval construction battalion, the Bobcats, were deployed on 5 Mar 1942 and the NCB was officially named "Seabees"
Their motto was "*Construimus, Butuimus*"

- **Moreell posed the idea for Seabee construction battalions to be drawn from the ranks of civilian heavy construction firms in his initial proposal, in late 1941. Construction trade and labor unions were dubious of the concept. Seabees were the highest paid group in the military and fought in every theatre of WWII**

- **Crucial in Pacific island hopping during World War II**

Seabee Unit Compositions

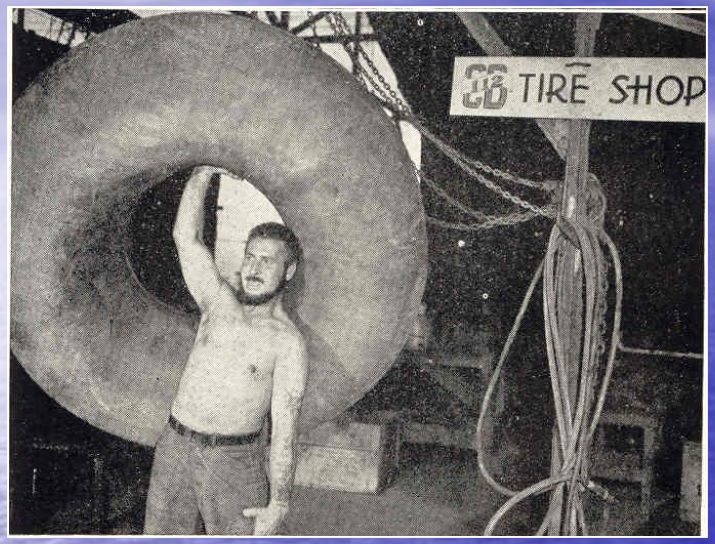


There were 151 Naval Construction Battalions (NCBs) and 39 special battalions; each comprised of seasoned workers.

258,000 officers and men served in the Seabees during World War II
80% of these forces served in the Pacific Theater

In 1945 the average age of a Seabee was 37 years.

164 Special Detachments- Anything from tire repair shops to Quarrying

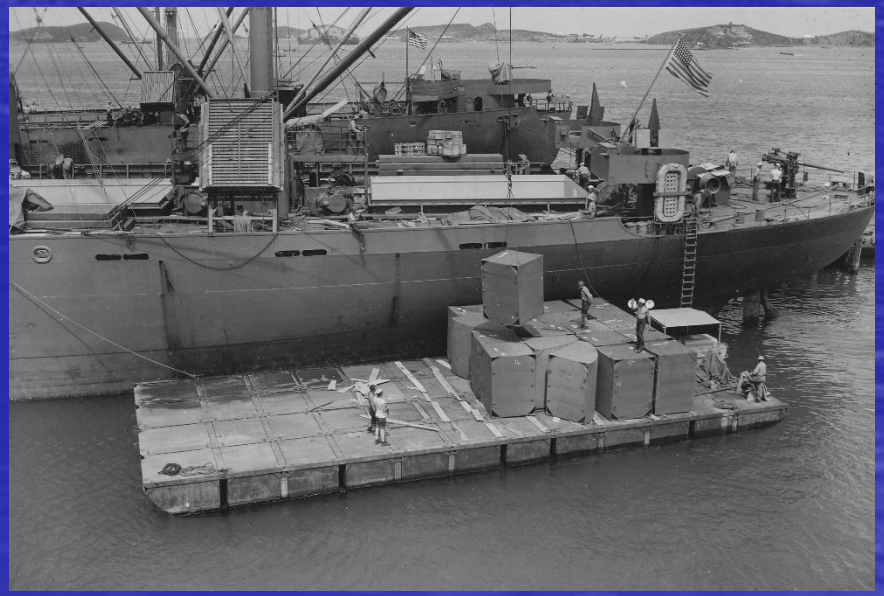


Most units were capable of constructing pontoon causeways, roads, bases, airfields and wharf facilities

The Navy also formed 136 Seabee Maintenance Battalions

Repairing Marston Mats (PSP) at Henderson Field on Guadalcanal in 1943

39 Special (stevedore) Battalions



5 Pontoon Assembly Detachments

Each Seabee unit had its own surveyors

Seabees also built their own floating dry docks –

THE NAVY'S UBIQUITOUS STEEL PONTOONS

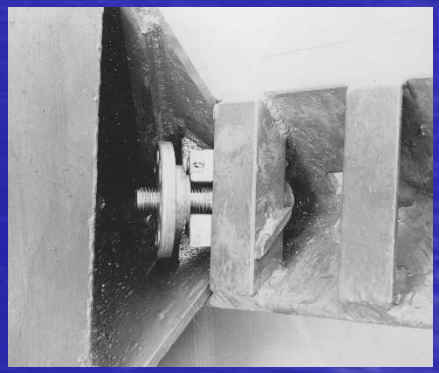
(Naval Lighterage)

Origins of the Seabee's Steel Pontoons

Captain Laycock invites Admiral Moreell to lean on a cigar-box model of a string of

- A better way to bridge the gap from ship to shore was needed, known as Naval Lighterage, or simply "N.L."
- Idea came from a report written in 1935, followed by observations of segmented steel pontoons supporting the gold dredge Yuba, built by Bethlehem Steel in California in 1937, for shipping to a remote site.
- Captain John Laycock began experimenting with cigar boxes and kite sticks in 1940-41.

At left: In September 1941, the first segmented steel pontoons were delivered to the Navy at Davisville, along with the requisite "attachment jewelry," (shown at right) used to connect the units.

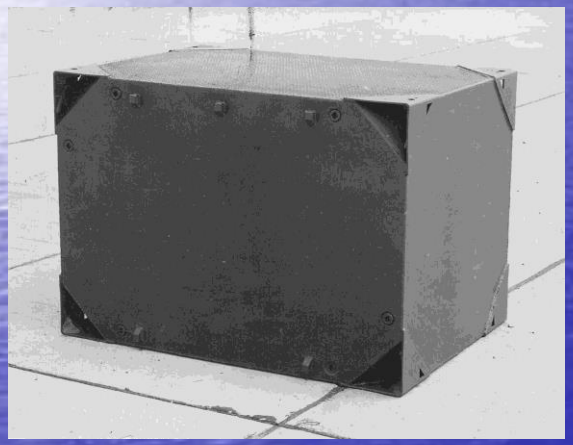


Wedge, bolt, and nut attachment employed between pontoon corners and angle stiffeners

The ubiquitous T-6 box Pontoon

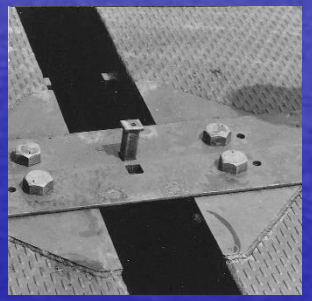
"Pontoon strings" were fabricated by employing steel angle stiffeners along each corner.

The T-6 displaced 175 cubic feet Could float in 1.5 ft of water
Each pontoon could support about 5.5 tons through buoyancy

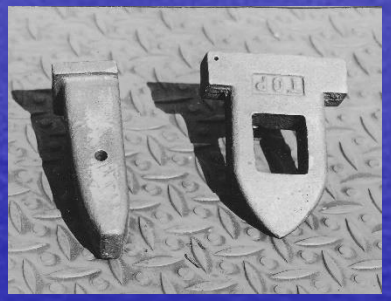


The standard Type 6 pontoon boxes were 5 ft x 7 ft x 5 ft. These were shipped flat, then assembled in-theater.

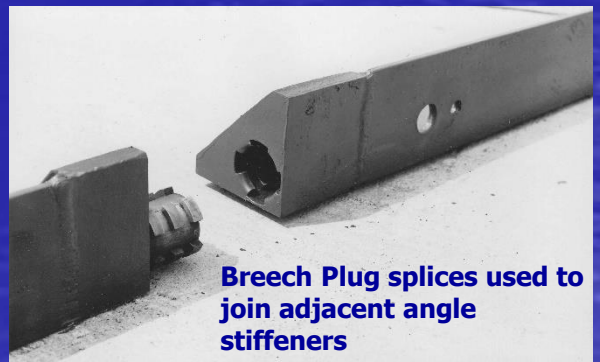
Tapered Type 7 pontoons were attached to the ends of pontoon barges, to aid their navigation through open water.



Link pin being driven into top angles connecting adjacent strings of pontoons

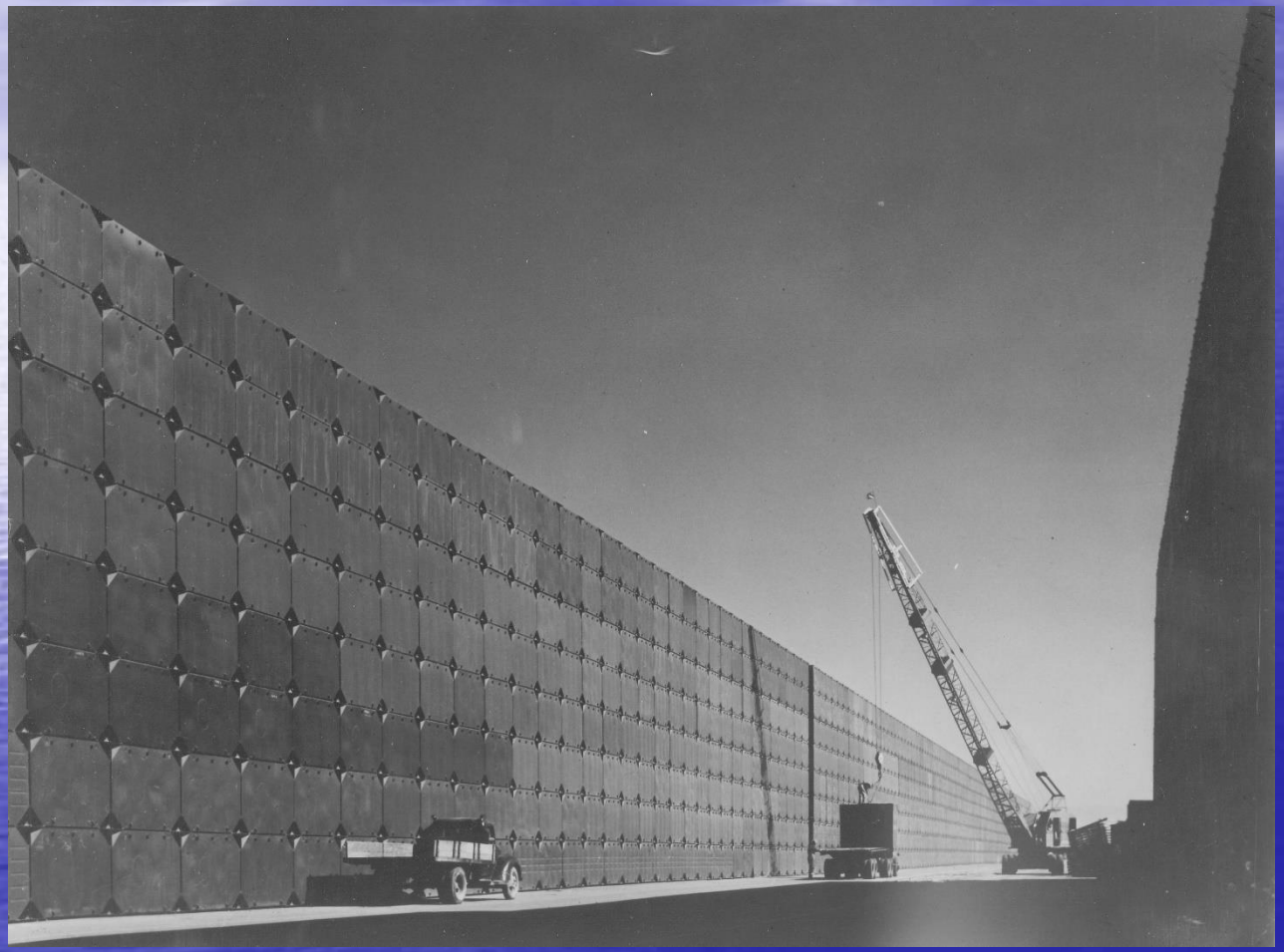


Link pin (left) and link (right), into which it was driven

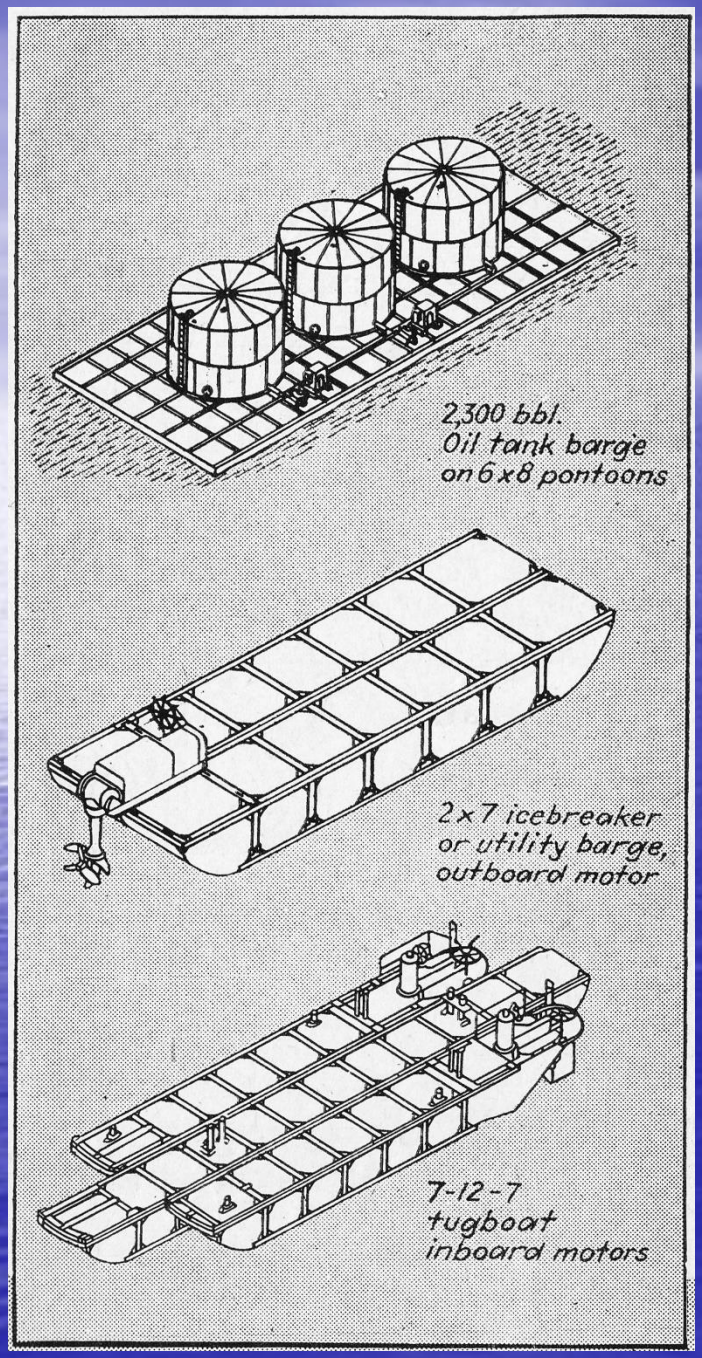


Breech Plug splices used to join adjacent angle stiffeners

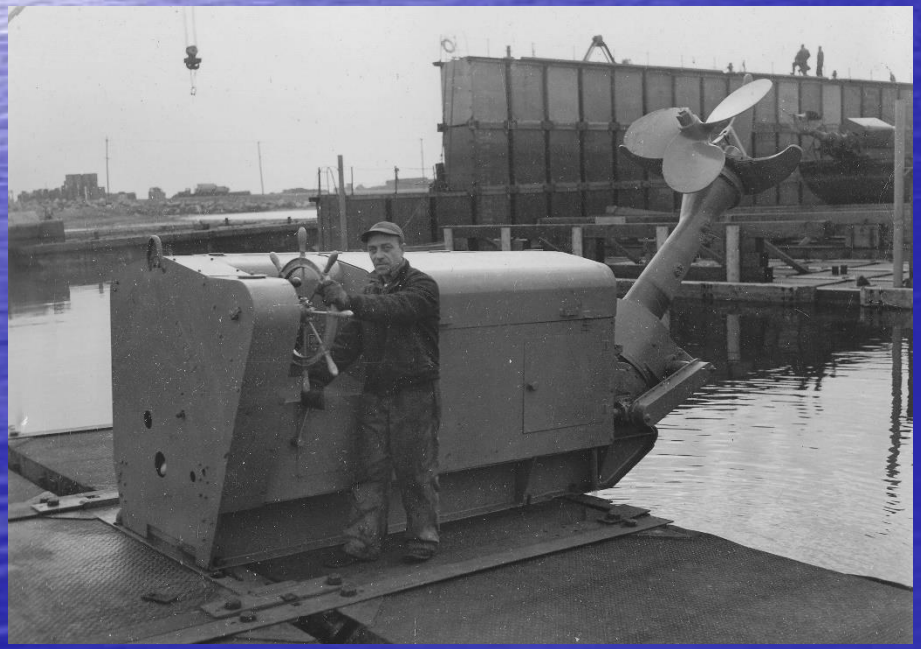
Pontoon stockpiles



- Dozens of sub-contractors produced the ubiquitous Type 6 steel pontoons shown here at Port Hueneme, which were 5 x 7 x 5 ft
- Each pontoon weighed 2000 lbs and were shipped flat, then assembled onsite



- **7-12-7 pontooon tugboat (shown above and at bottom left) was assembled from Type 6 and Type 7 steel pontoons, with two 1-AT marine tractor motors for propulsion**

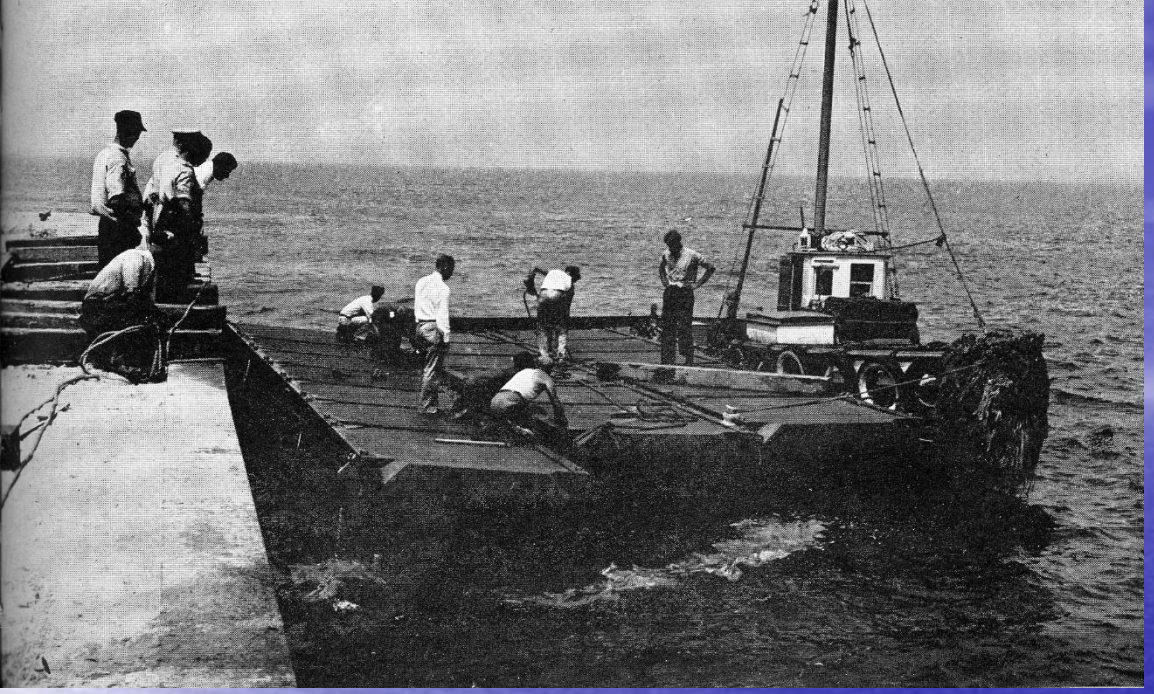


Outboard Motors for pontoon barges

- The Navy used the world's largest outboard motors; either General Motors O2D or Gray-Marine diesels, generating 350 HP. These were about the size of a large tractor engine.

- The propeller shaft could be rotated and turned upward, as shown here. This helped to facilitate clearance in shallow water and allow on-board maintenance of the props, should they get damaged or fouled. This proved to be a wise precaution in wartime, when uncharted sunken debris were a daily hazard.

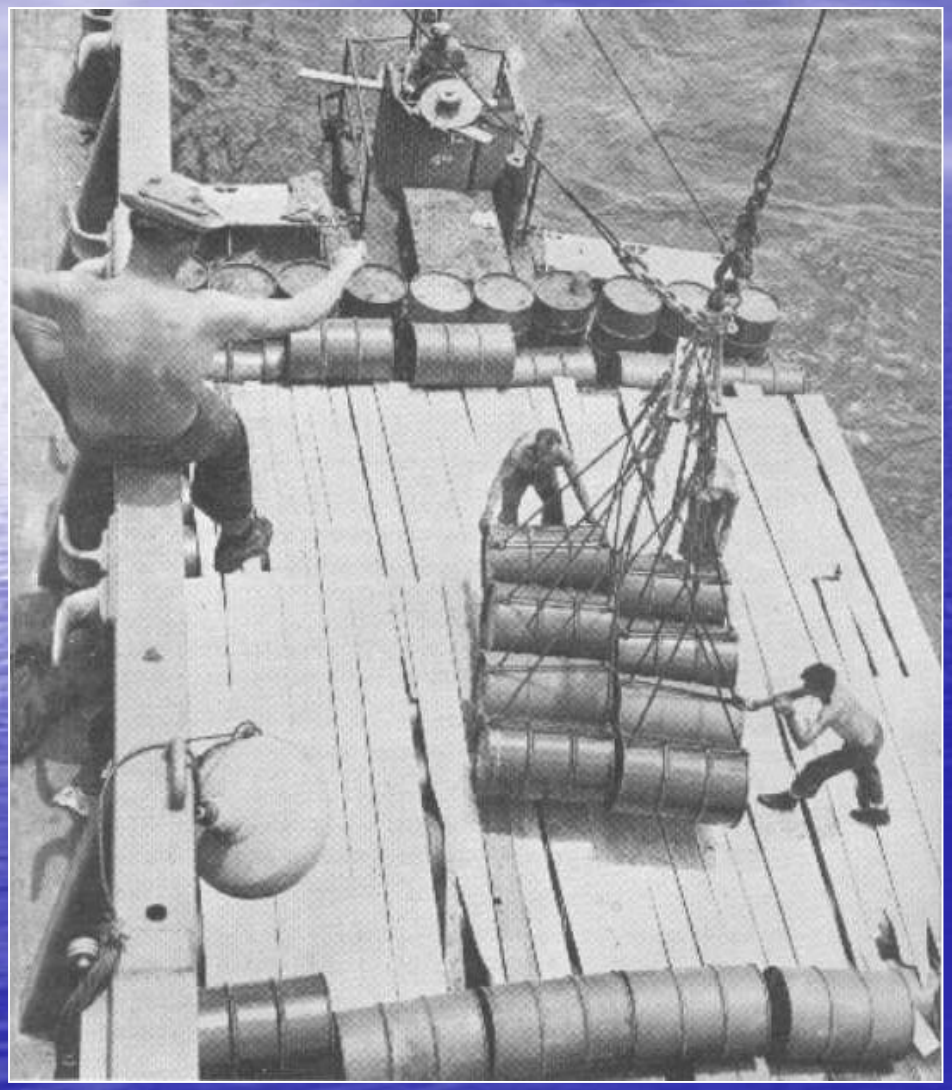
Pontoon Barges



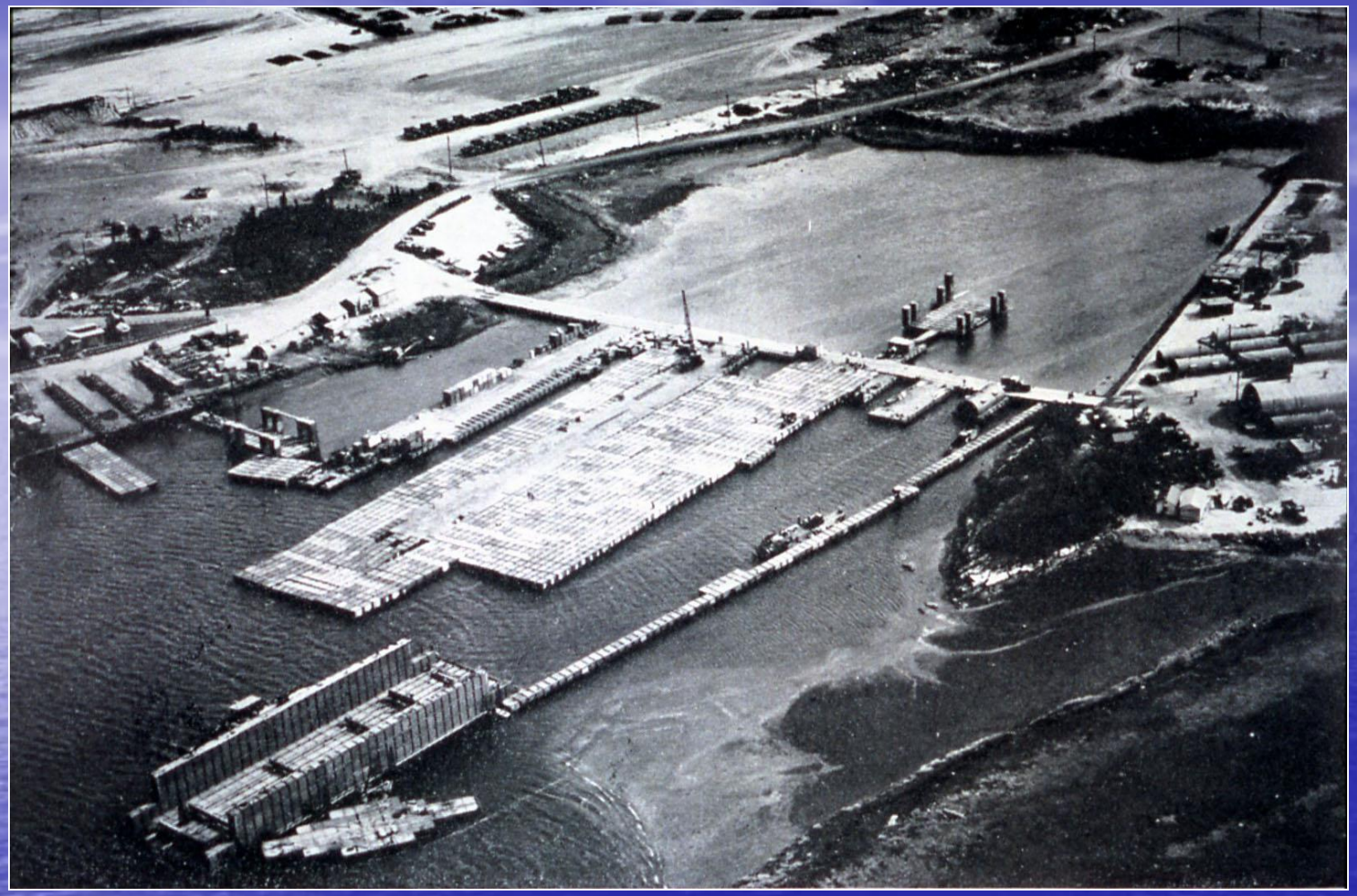
Forward deployed Pontoon Detachments within the Naval Construction Battalions (NCBs) usually assembled the pontoons, which were shipped flat on freighters to save cargo space

This shows 3 x 7 pontoon barges, commonly used as lighters, in-theater

Pontoon Barges and Lighters



- Pontoons were often used as offloading lighters; they could haul tons of supplies ashore quickly
- Able to navigate in very shallow water
- In this view members of the 4th Special Stevedore Battalion unload drums of gasoline and diesel fuel from a cargo ship onto a pontoon barge at Guadalcanal.



- The Navy's Advance Base Proving Ground at Davisville, Rhode Island was established in the spring of 1942. This facility developed and experimented with the steel pontoons that were used in by Allied forces in the European, Middle Eastern, and Pacific Theaters.

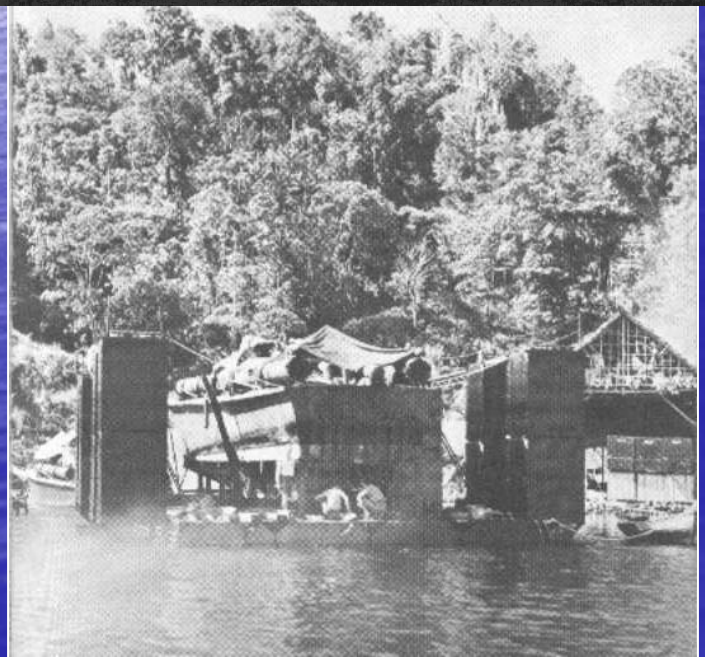
Pontoon Drydocks

- Pontoons were configured in a variety of combinations that could be constructed in-theater, like the drydocks shown here.
- Water was allowed to flood the pontoons to submerse the dock, then pumped out to raise it with the vessel cribbed on keel blocks.

Pontoon Drydocks in theater

Standard 7 x 30 pontoon dry dock; the most commonly used in the Pacific Theater

- Drydocks are crucial to hull, shaft, and rudder maintenance and repair.
- Lifted ships out of the water so their hulls, shafts, screws, and rudders could be repaired



Lower Left: A small pontoon dry dock being used to effect maintenance on a PT boat at Tulagi, in the Solomon Islands, in March 1943

6 x 12 pontoon seaplane barge underway, without seaplane. Note ramp at one end.

6 x 12 pontoon seaplane barge, carrying a Martin PBM Mariner patrol bomber

Load tests on two self-propelled 3 x 12 50-ton barges, their maximum capacity

Standard pontoon warping barge, used to assemble larger pontoon barge assemblies

Rhino Ferries

A rhino ferry carrying truckloads of supplies and equipment, heads for one of the Normandy beaches.

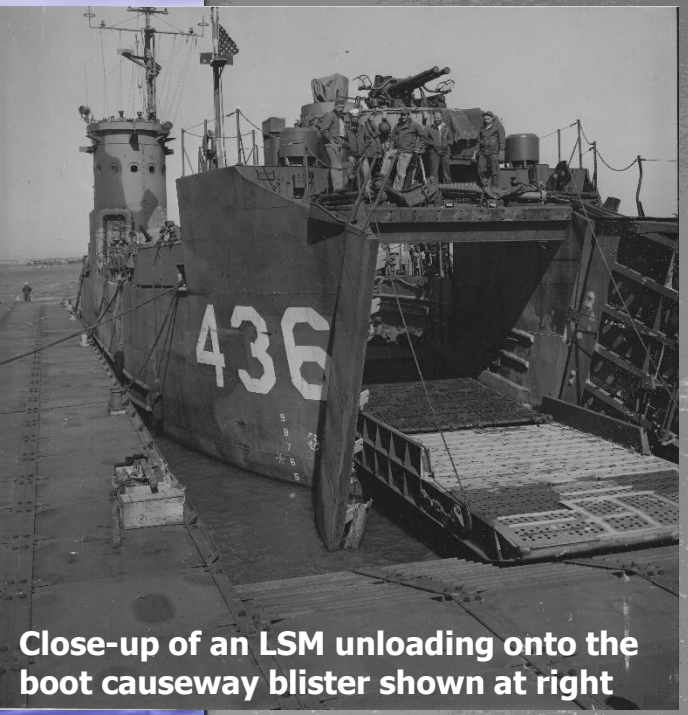
Rhino Ferries were powered by Grey-Marine 350 HP outboard motors, the largest ever made

- 36 Rhino Ferries were assembled from steel pontoons. They 42 ft wide and 176 ft long and fitted with a 14 by 20 ft loading ramp
- They could carry 600 tons of material, about half the cargo load of an LST (Landing Ship Tank)
- Used by the British and Americans in the Normandy D-Day landings
- Advantage: could float in shallower water than an LST

Pontoon Tows

- Above: "Pontoon Tows" were enormous barges that were towed to landing beaches, to form landing causeways.
- Left: triple pontoon "teeth," which were employed to conjoin adjacent tows, and thereby extend the causeways

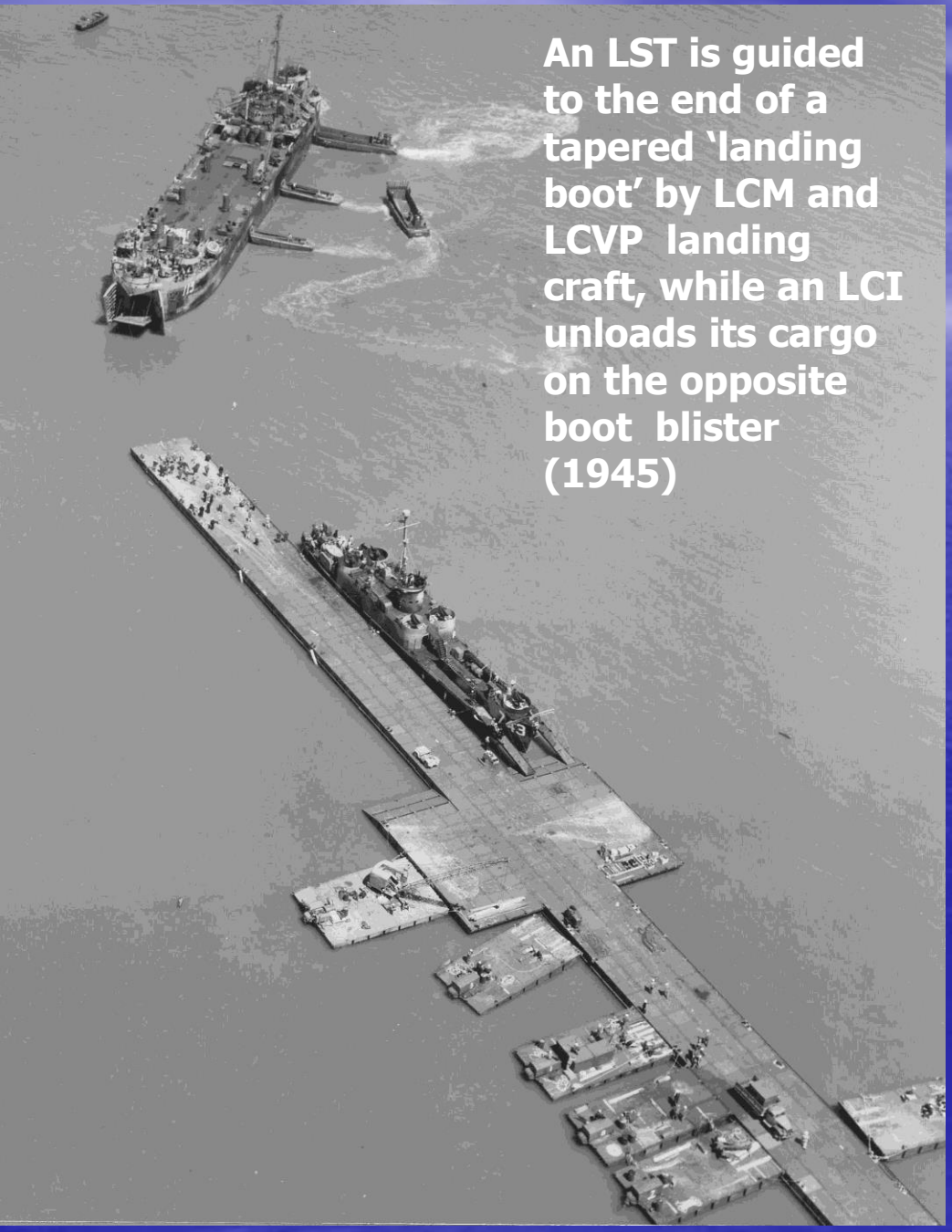
Boot Causeways



Close-up of an LSM unloading onto the boot causeway blister shown at right

- Boot causeways were assembled from pontoons to allow large landing craft, such as LCTs, LCIs, LSMs, and LSTs to offload their equipment well offshore, and tapered platforms known as "blisters," shown here.

Pontoon landing causeways

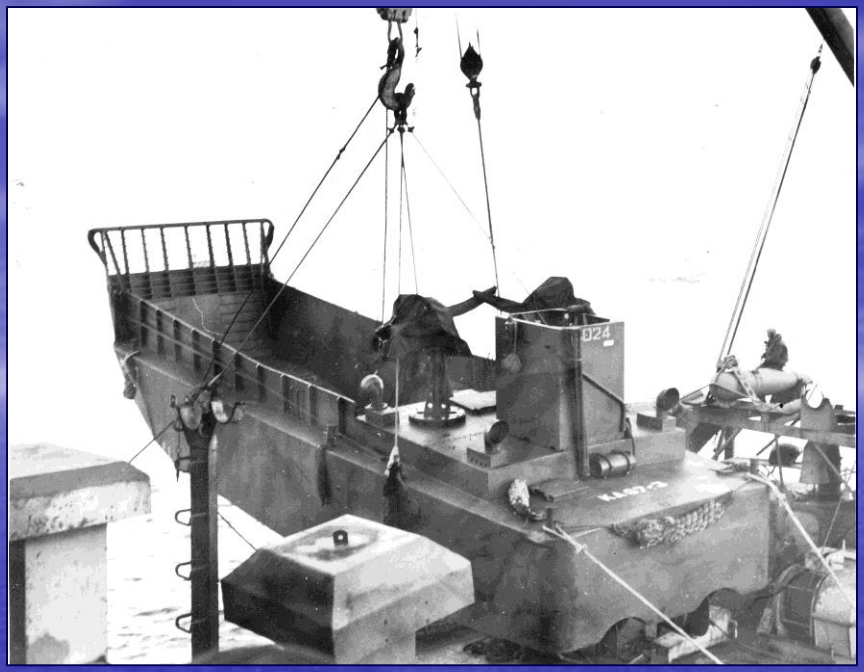


An LST is guided to the end of a tapered 'landing boot' by LCM and LCVP landing craft, while an LCI unloads its cargo on the opposite boot blister (1945)

Above: An LSM is coaxed into position on a tapered pontoon 'boot blister,' while an LCT is being unloaded on the opposing blister.

Assembly protocols were developed by the Seabee Pontoon Assembly Detachments during the war to accommodate increasingly sophisticated landing causeway systems to effect more rapid unloading of amphibious assault vessels.

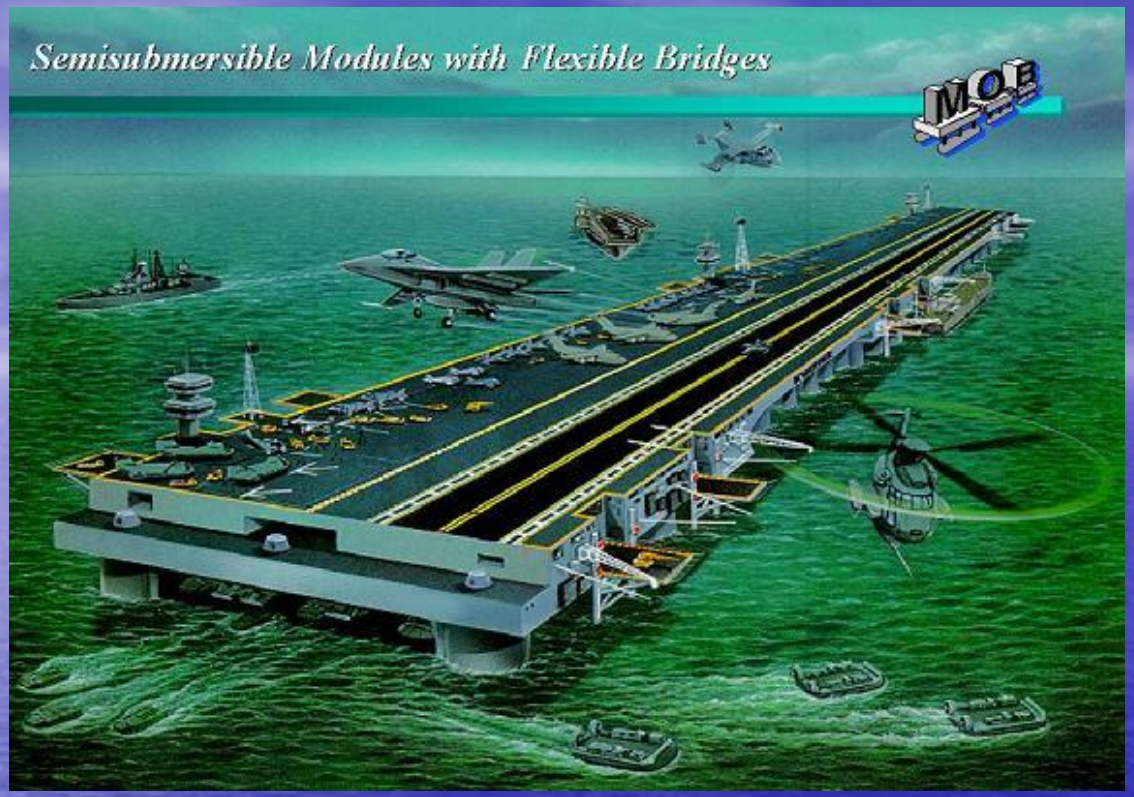
Landing Craft Mechanized (LCM)



LCM's could carry Jeeps, 2-1/2 ton trucks, or even an M4 Sherman tank. They were widely employed by Seabees to ferry equipment and materials to the beachhead

Project Sock -1943

The most ambitious pontoon craft of the war was the mobile floating airfield shown here, code-named "Project Sock." After testing this concept was deemed impractical to handle sustained pounding by wave action that could expected in forward deployed areas of the Pacific.

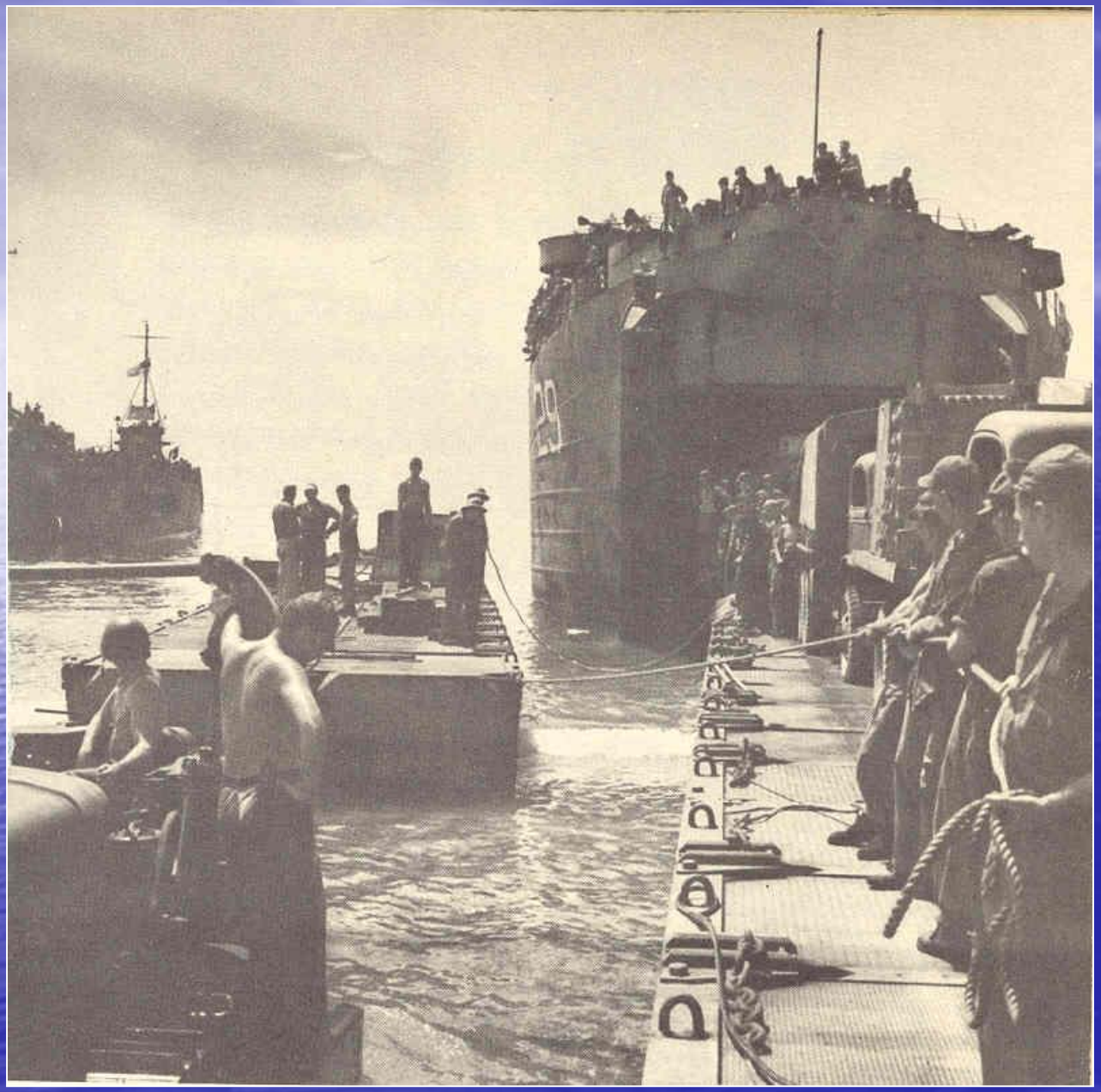


DARPA's Modular Sea Base is an emerging concept to craft a floating base from standard 20 foot ISO container size modules. The modules could be deployed from commercial containerships, would have self-contained propulsion, a means of structural interconnection, and low-level autonomy algorithms to allow sufficient flexibility in the water.

Ten modules could theoretically be arranged in a 40-foot by 40-foot pad with 170 tons of collective buoyant capacity, enough to serve as an ad hoc helicopter landing pad. Since even smaller containerships are capable of carrying thousands of modules, large numbers of modules could be conjoined to construct large scale joint force deployment bases, to combat flexible threats, like pirates.

The self-assembling modular seabases could also provide docking facilities for inshore craft such as the Mark V Special Operations gunboats and other vessels used by Navy SEALs, or the LCAC hovercraft employed by Marine Corps.

Self-propelled lighter barges were crucial to the logistical support critical to amphibious operations. This view shows lighters at IeShima, Okinawa in April 1945.



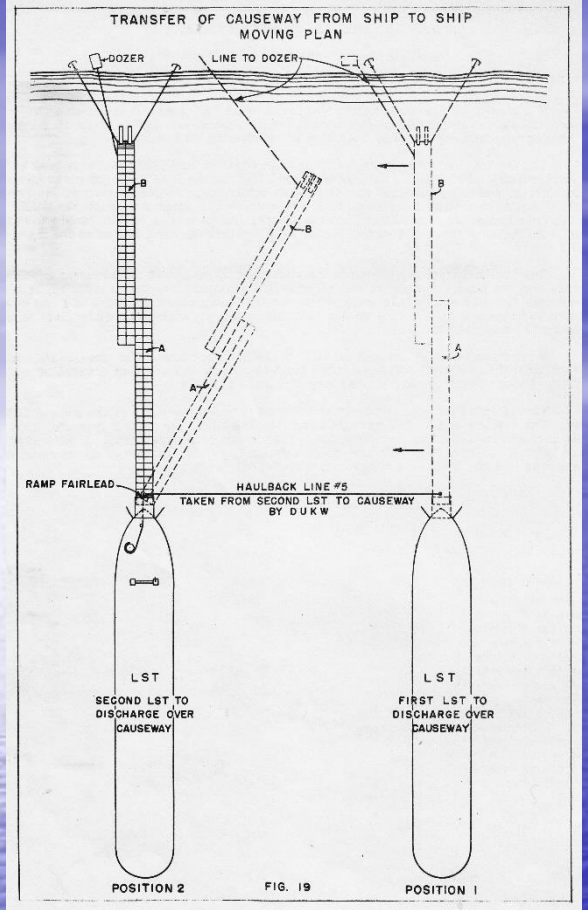
Pontoon lighters

Segmented steel box pontoons were used as lighters and strung together as a loading wharf for an LST during the invasion of Guam in June 1944

60-ton Mobile Crane hoisting pontoon causeways onto an LST

A 60-ton crane on a pontoon barge, is hoisting a pontoon causeway to lash it to the side of an LST.

Cutting a pontoon causeway loose from the starboard side of an LST, prior to deployment at the beachhead



In the Pacific Theater, coral reefs prevented the deeper draft landing vessels from beaching.
By mid 1944 most Pacific-based LSTs were fitted with two pre-assembled 2 x 30 pontoon causeways, lashed to the side of the vessels, as shown at left.

These were then used to allow the LST to unload their cargoes directly onto the beach, as shown above.

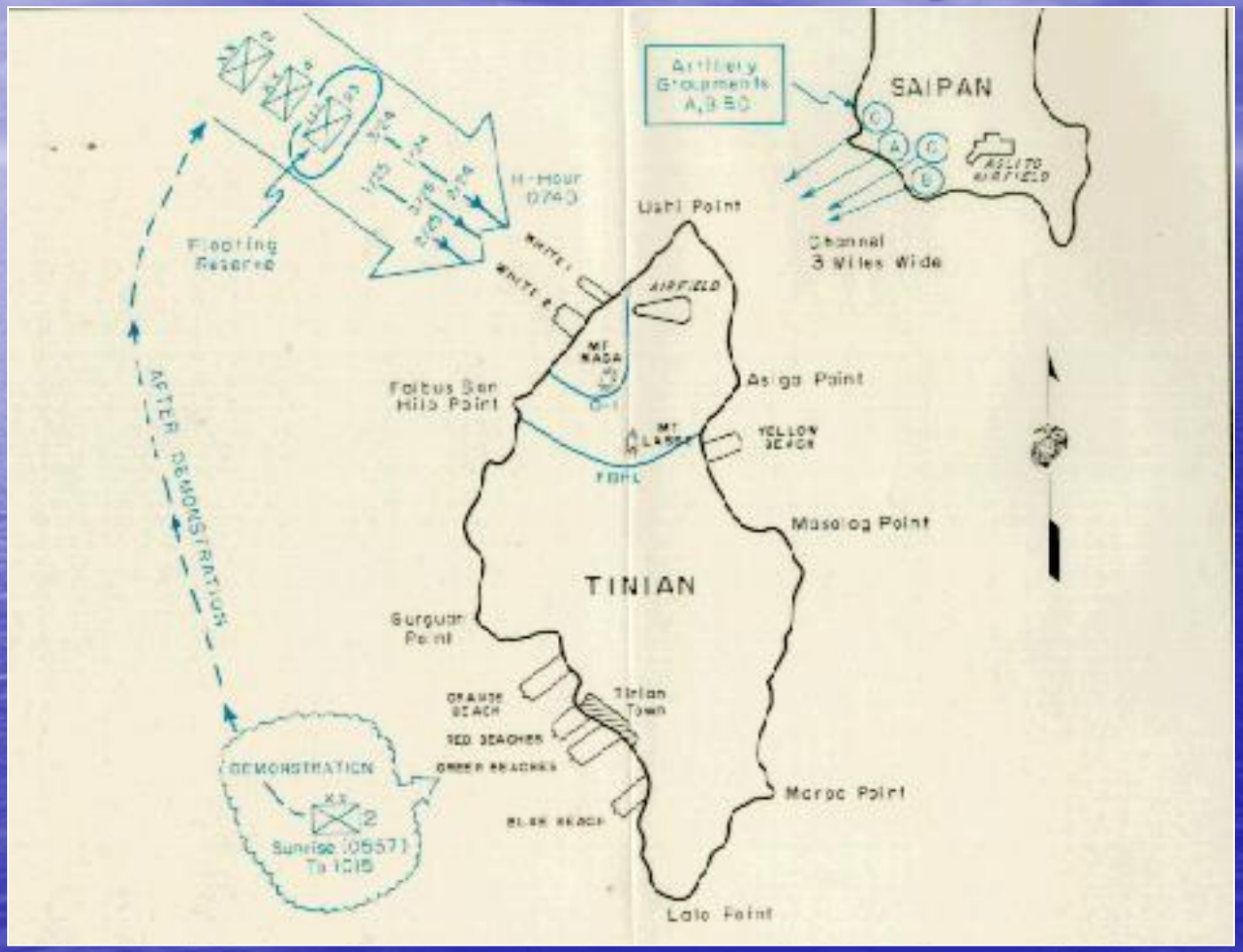
Pontoon strings were even employed as highway bridges

A 3 x 18 pontoon barge was placed on timber pilings over the Upper Lunga River on Guadalcanal to create a temporary highway bridge, after the wooden trestle structure was destroyed by floods in May 1944.

Naval Lighterage today

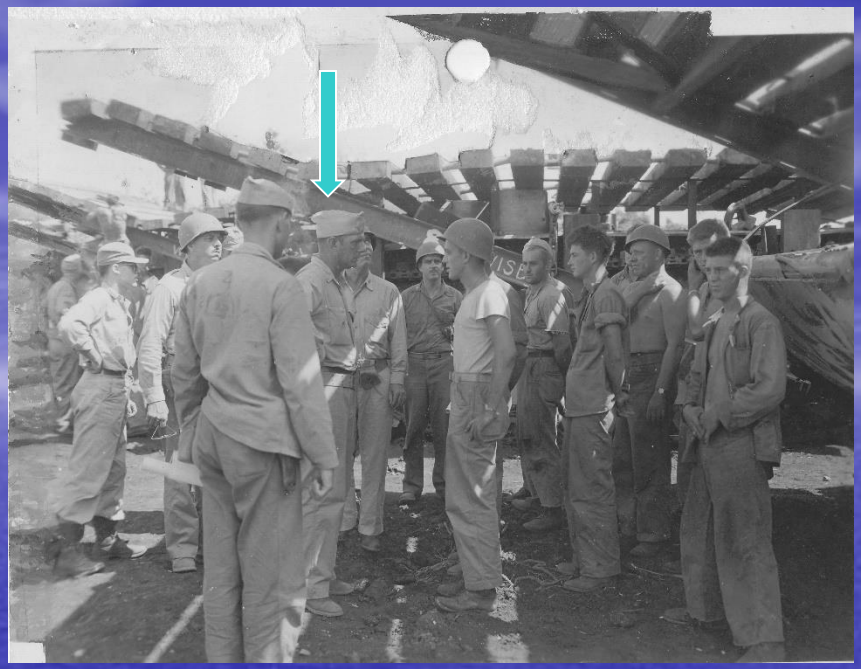
ASSUALT OF THE *DOODLEBUGS* ON TINIAN ISLAND July 1944

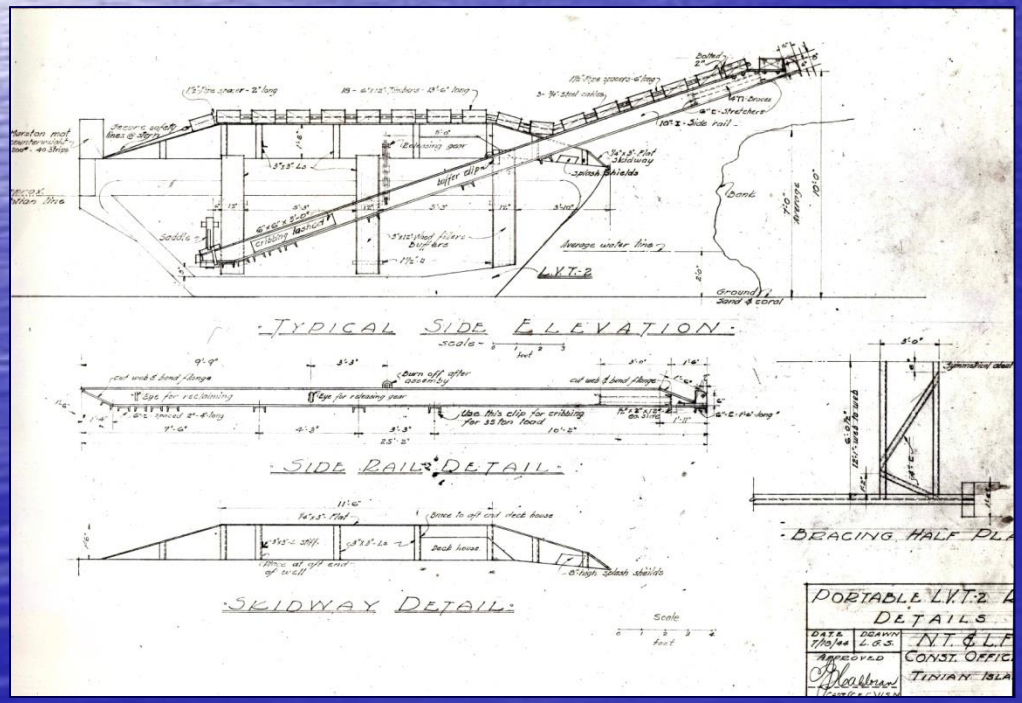
Assault on Tinian Island by the 2nd and 4th Marine Divisions in July 1944



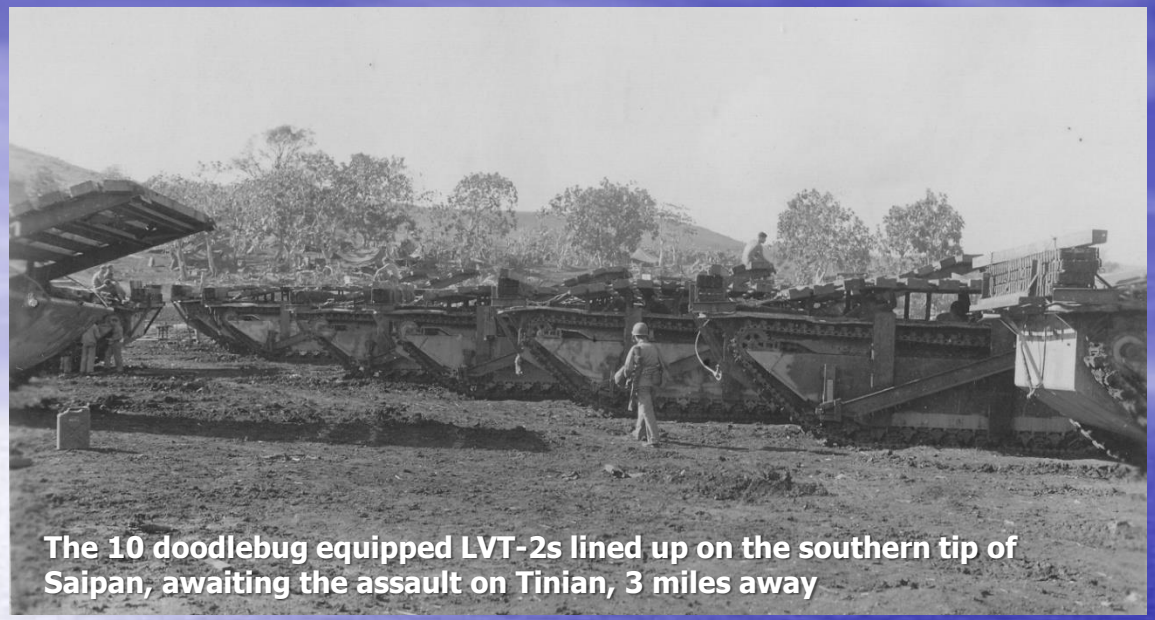
A landing was feigned off Tinian Town on the south end of the island by the 2nd Marine Division, while the 4th Division landed across the tiny beaches at White 1 and White 2, on the northwest tip of the island. After the 4th had secured a beachhead, the 2nd Division churned northward and landed that same day, July 24, 1944.

Two Marine divisions landed on the tiny strips of beach, designated as White 1 and White 2, on Tinian Island, each les than 200 feet wide (shown at left). This area was lightly defended because if its 8 ft high cliffs.



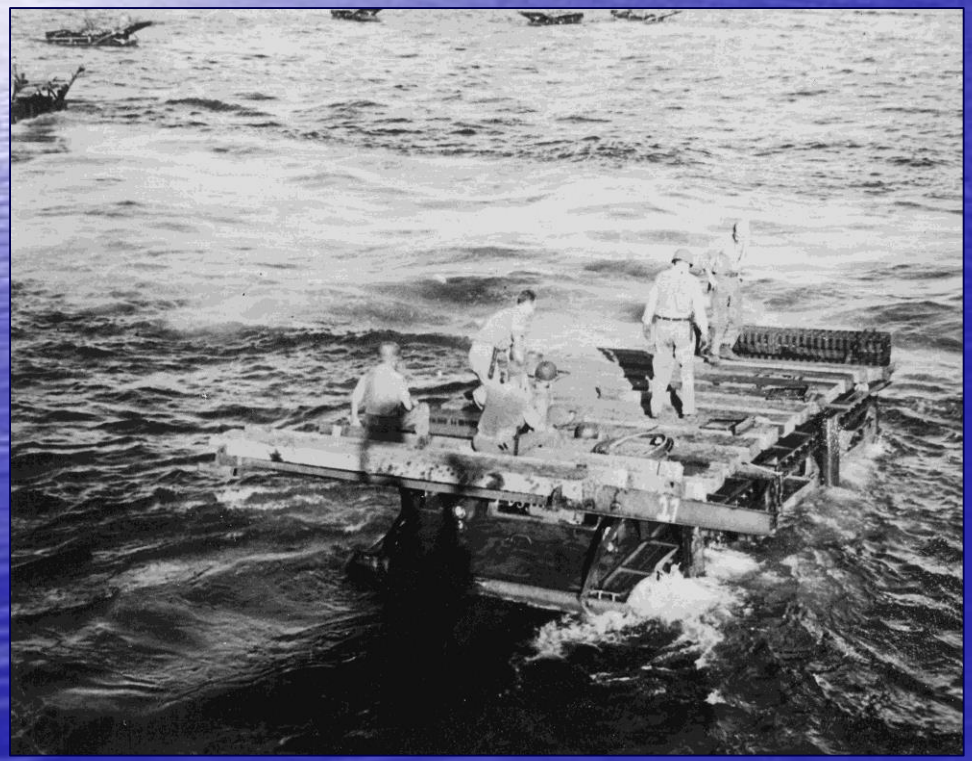


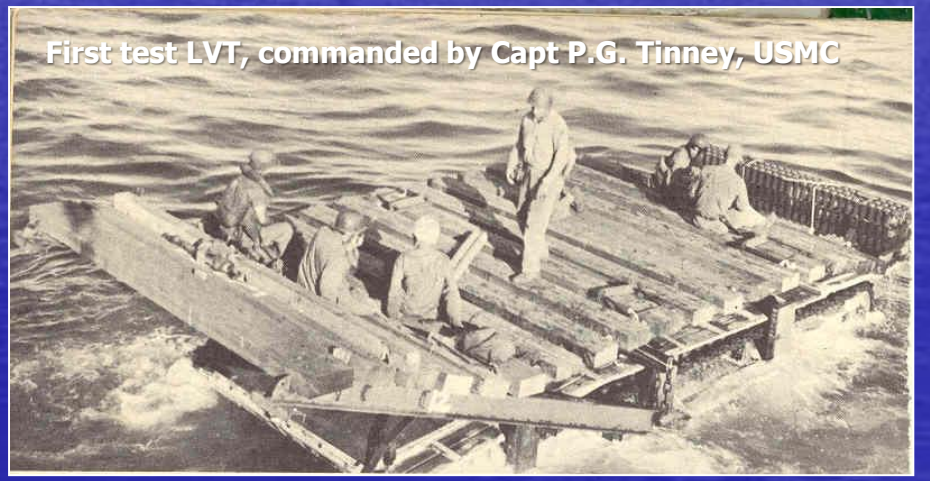
The concept of the doodlebug landing ramps was conceived by Seabee officers Captain Paul J. Halloran, (arrow), assisted by LT W.G. McRae, and built by the 2nd Marine Amphibious Battalion, using scrap steel taken from a Japanese Sugar Mill on Saipan. The ramps allowed the Marines' LVT Amtracs to scale the 8-foot high coral cliffs adjacent to the White Beaches landing zone.



The 10 doodlebug equipped LVT-2s lined up on the southern tip of Saipan, awaiting the assault on Tinian, 3 miles away

American engineering ingenuity in one of its finest hours....

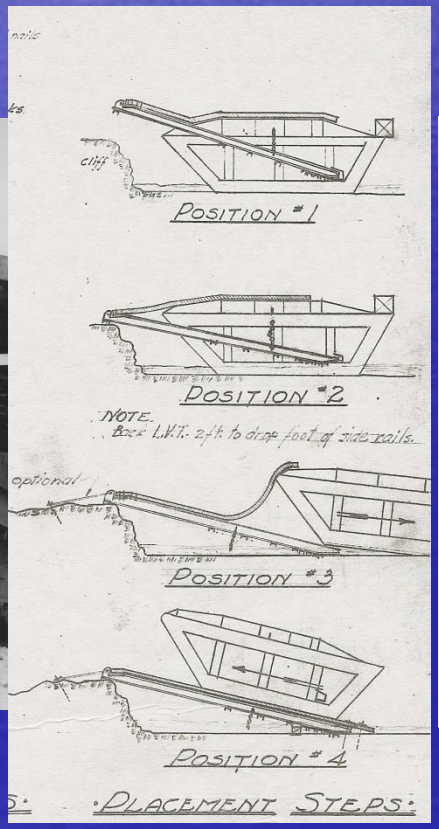




First test LVT, commanded by Capt P.G. Tinney, USMC

Ten LVT-2 Doodlebug Amtracs , each carrying 3 Marines and 4 Seabees of the 18th Naval Construction Battalion, crossed three miles of open water to land on the northwest tip of Tinian Island on July 24th 1944.

Launching the timber treadway ramps



The ramps were fashioned from two 10-inch steel I-beams 25 ft long, welded to form a rectangular frame to support a flexible timber ramp

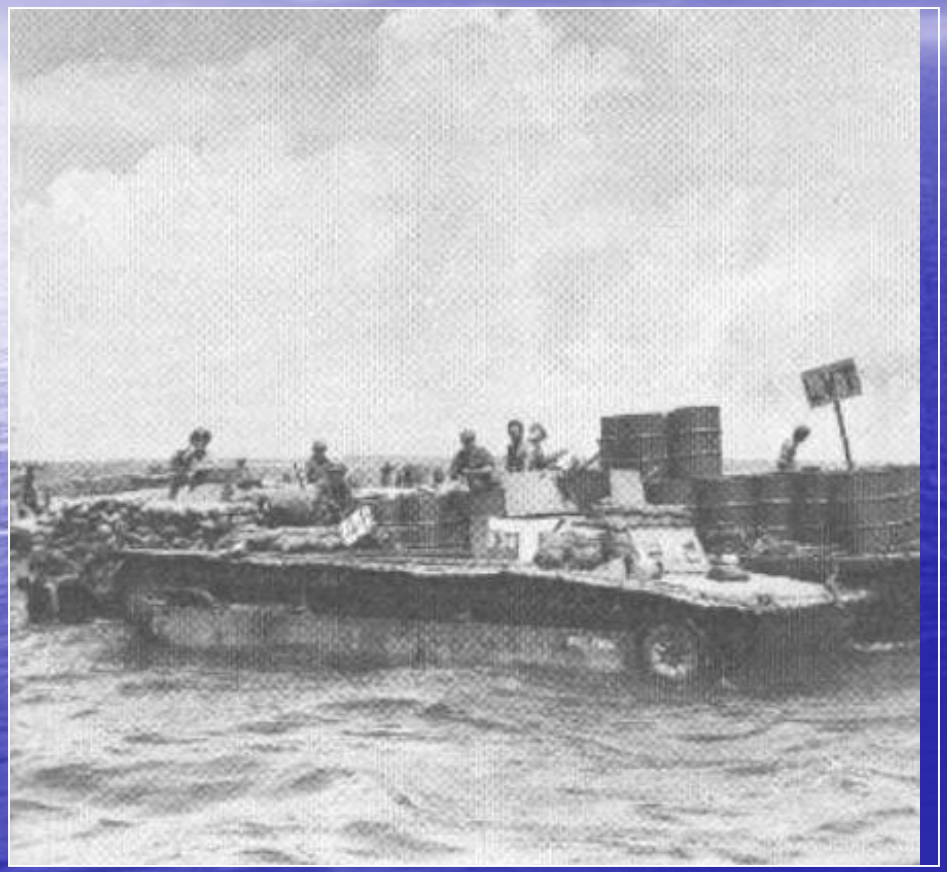
The flexible timber treadway was laid in place by retracting the Amtrac, as shown at left

30,000 Marines swarmed ashore over two tiny beaches on Tinian, creating one of the most congested beachheads of the war. The island was secured within 7 days, and the battle witnessed the first use of napalm in the Pacific War (upper frames). American losses were 328 killed and 1,571 wounded while the Japanese lost 8,010 dead, with 313 taken prisoner.

Tinian Harbor was constructed by Seabees, to supply the 50,000 personal and 1,200 bombers on Tinian

SEABEES WERE RENOWN AS INNOVATORS

Floating Filling Stations



During the assault on Tinian Atoll in the Marianna Islands, Seabees of the 302nd Battalion operated pontoon barges as filling stations to refuel amphibious alligators (Amtracs fitted with special landing ramps)

Clearing Jungles

A Seabee uses a special jig frame used to uproot coconut palm trees.

Men of the 62nd Naval Construction Battalion filling in erosion ravines caused by a tropical storm in July 1945 on Iwo Jima

Bridge Repairs

On Okinawa an army truck rolls across a battered Japanese bridge temporarily repaired by the Seabees with logs and coral fill.

Men from the 7th Battalion assemble the tower of a pile driver for use in construction work on Okinawa.

Cumshaw Pile Drivers

"Cumshaw" is a nautical term for the procurement of needed material *outside* the supply chain, usually by swapping, barter, or mutual back-scratching. This often involved bartering with coffee or other food items. Of course, it was "officially frowned upon."

Seabees stacking steel box pontoons to fashion a water tower.

The 5 x 7 x 5 ft steel pontoons could float in 1.5 feet of water

There were used for innumerable applications, from docks and lighters to floating dry docks and water towers.

Typical pontoon shower set-up

Cumshaw Washing Machine

A Seabee on a Pacific island loads his "cumshaw" washing machine. The clothes go into the drum, which is then placed on the plank under the tower. As the windmill spins, the plunger — an inverted funnel—goes up and down to slosh the clothes about in the water.

ROAD CONSTRUCTION

Challenges of construction in the tropics

- The annual monsoon between mid-May and mid-October made earthwork near-impossible at times

- **The soft organic soils lying within poorly drained coastal mangrove swamps had to be filled in and the roads paved with free-draining coral.**

- The workhorse of the Pacific Theater were Letourneau Tournapull and Carry-All scrappers, like that shown here. 17,000 Letourneau scrappers were built during the war.

- **Filling, compaction, and drainage were the essential elements of highway construction**

- **The Seabees used every variant of the road grader manufactured in the United States. Graders were essential to the upkeep and maintenance of the road network. Note protective hood added in the field.**

TYPICAL AIRFIELD CONSTRUCTION

- **The first two days of airfield construction typically involved extensive grubbing of vegetation**

The essential first step in grading any airfield was to set up a quarry and crushing/classification. This shows a runway quarry on Tinian.

Where free-draining fill like coral was unavailable, suitable borrow material had to be located. This shows one of the runway borrow sites at Attu in the Aleutians.

Overexcavation

- Deleterious materials were often removed to prevent differential settlement or gain access to high-quality earth or rock fill.

Old Massey-Ferguson grader being pulled by an Allis-Chalmers tractor in January 1945 on Tinian, by the 135th NCB.

- Setting off demo charges in coral reef to allow collection of live coral for paving airstrips

Most airfields projects were completed in 14 days. The bulk of this work involved laying down high-quality engineered fill and compacting it.

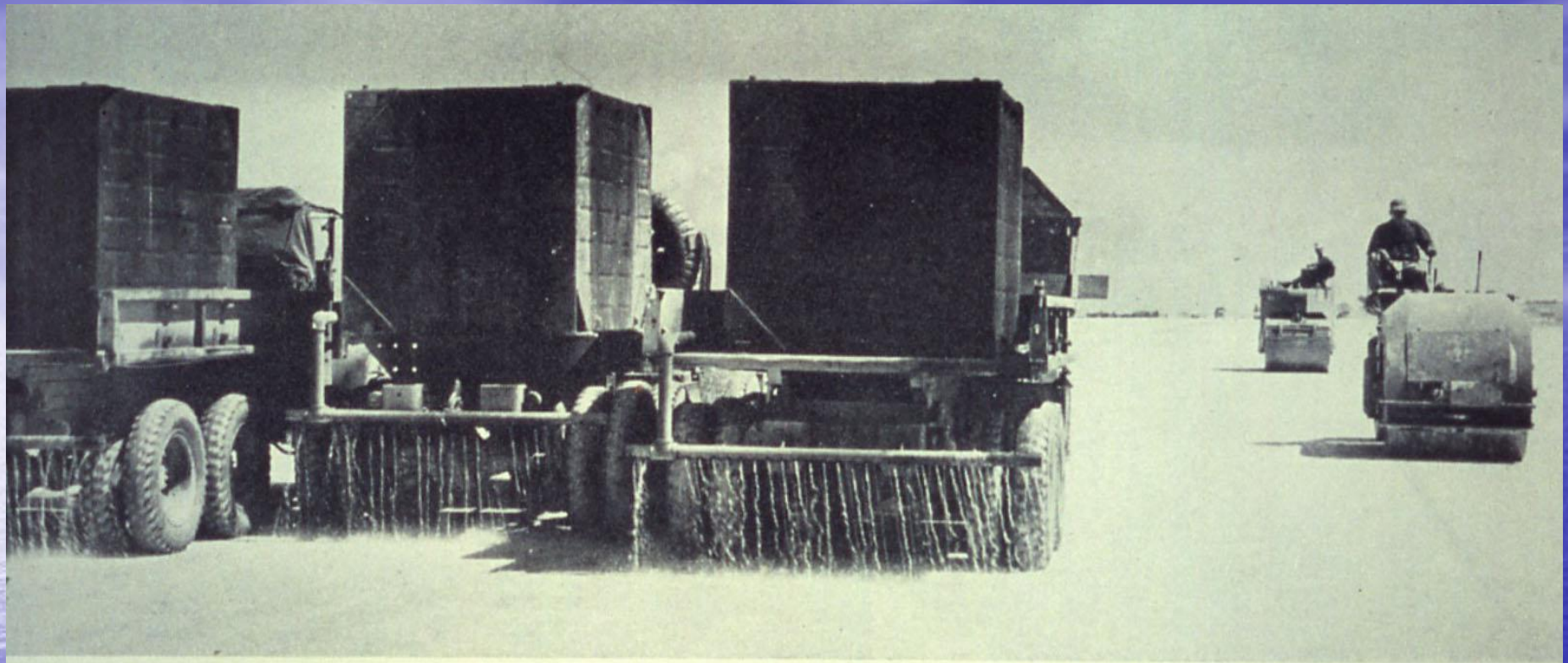
- **Paving stone for the main runway begins to be rolled from one end to the other by Day 8.**

Runway Subgrade Compaction

Improvised Euclid water spreader and sheepsfoot rollers pack down coral fill for an airfield runway

5. Surfacing with finely crushed coral – twelfth day. (*Official U. S. Navy Photo*)

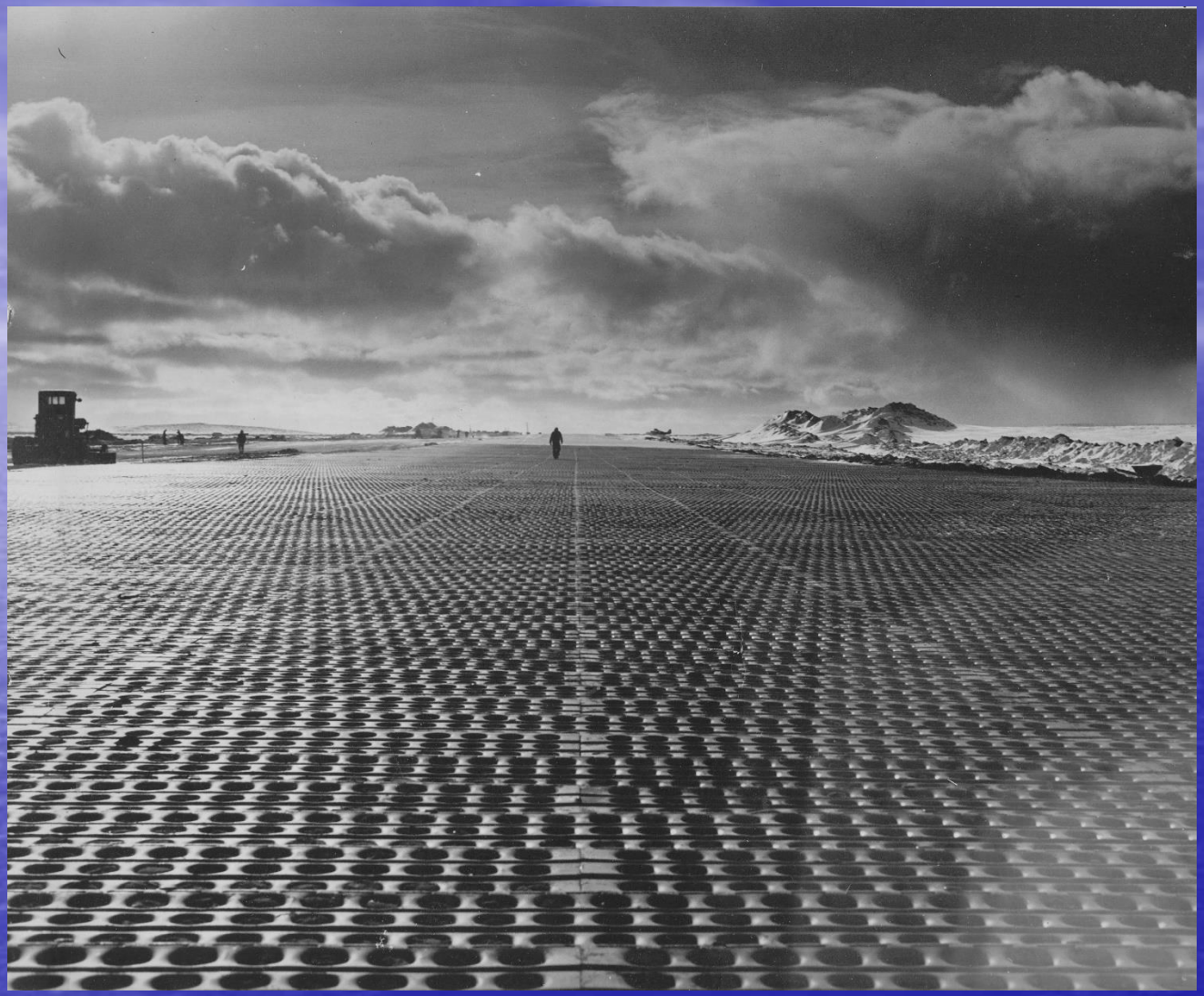
Day 12



PONTOONS RIGGED AS SPRINKLER TANKS ON DUMP TRUCKS
Sprinkling freshly laid coral flight strips on Okinawa.

- **Seabee pontoons rigged as sprinkler tanks to irrigate live coral with seawater for runway construction on Okinawa.**

Runway pavements included live coral, compacted coral, soil-cement, asphalt, and perforated metal planking (Marston Mat)

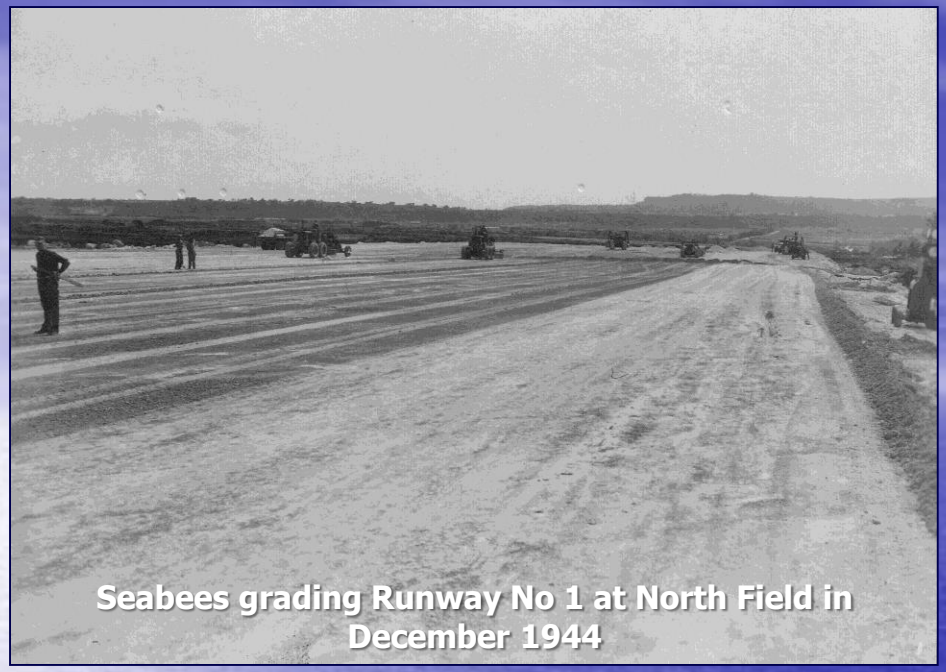


- Marston Mat runway at Cascu Field on Attu, in the west end of Aleutian Islands. This became a major base of operations for patrols over the Kural Islands.

New coral runway supporting long range Army Air Corps B-24 bombers on the new airstrip at Munda, in the Solomon Islands

Seabees built the World's Largest Air Bases on Tinian

Aerial view of Tinian looking south. North Field is in foreground, while West Field complex lies in background. The six massive runways supported seven heavy bombardment groups



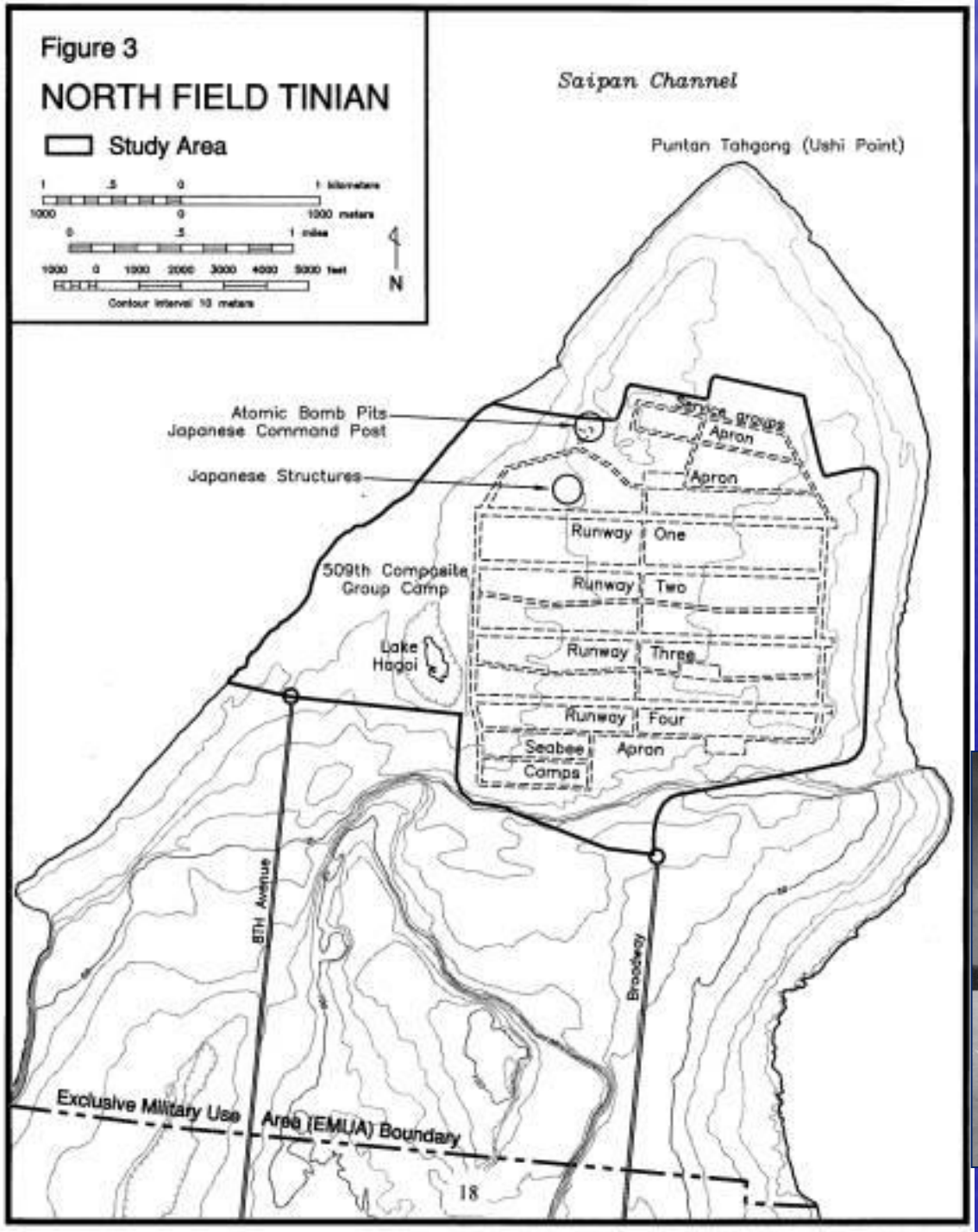
Seabees grading Runway No 1 at North Field in December 1944

Excavation along the eastern side of Runway No 1 at North Field in November 1944

The first B-29 taking off from Runway No 1 at North Field, on January 1945

B-29s parked on coral hardstands built by the Seabees at North Field

After Tinian was secured, 15,000 Seabees constructed several of the most important bases for the Allied air assault on Japan. Quarters were built for 50,000 troops, and six 8500 ft long runways for B-29 Superfortress bombers. The atomic missions to Hiroshima and Nagasaki were also staged from North Field on Tinian in August 1945.



North Field

Four 8,500 foot runways were eventually constructed by the Seabees at North Field on Tinian, in addition to two similar runways constructed at West Field, a few miles to the southwest.

Transient aircraft ramp on Runway No 1 at North Field, Tinian, in December 1944

The four runways at **North Field complex** on Tinian comprised the largest single airport in world in mid-summer 1945. Hardstands for the 509th Composite Group's B-29s were along the circular taxiway at extreme left foreground. North Field was home to the 314th Bombardment Wing, while the 58th Bomb Wing operated from West Field (each wing was comprised of four bomb groups). The nuclear capable 393rd Squadron of the 509th Composite Group operated from North Field during the last two months of the war.

Taxiways and hardstands constructed by the Seabees for B-29 bombers at West and North Fields

A B-29 Superfortress of the 6th Bomb Group taking off from Runway 2 at North Field, in January 1945, bound for the Japanese home islands.

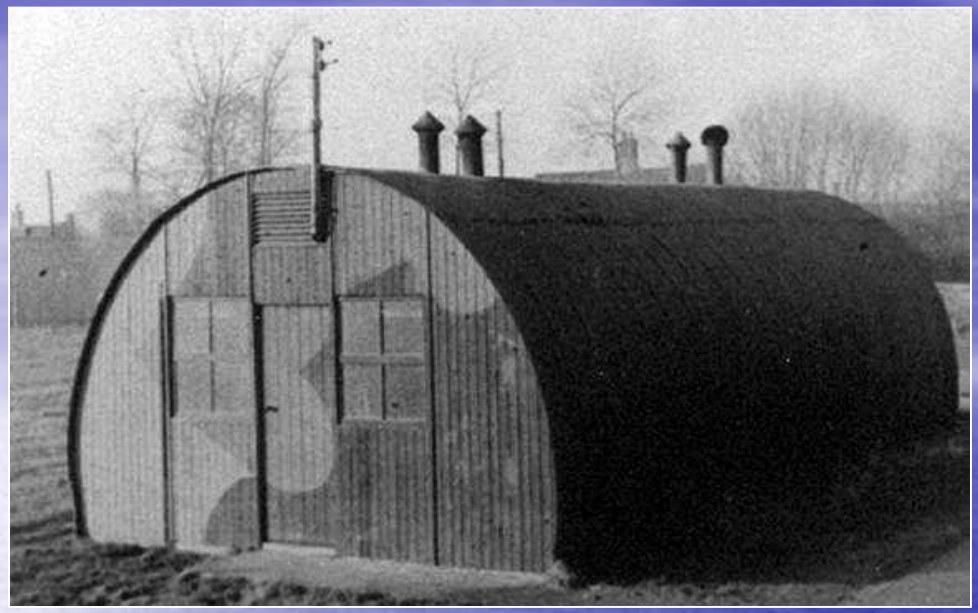
13th Seabees standing on a B-29 named after the 13th Naval Construction Battalion, at Tinian

B-29 named after the 121st Naval Construction Battalion, on Tinian

Snapshots of some of the massive B-29 bomber bases in the Marianna Islands

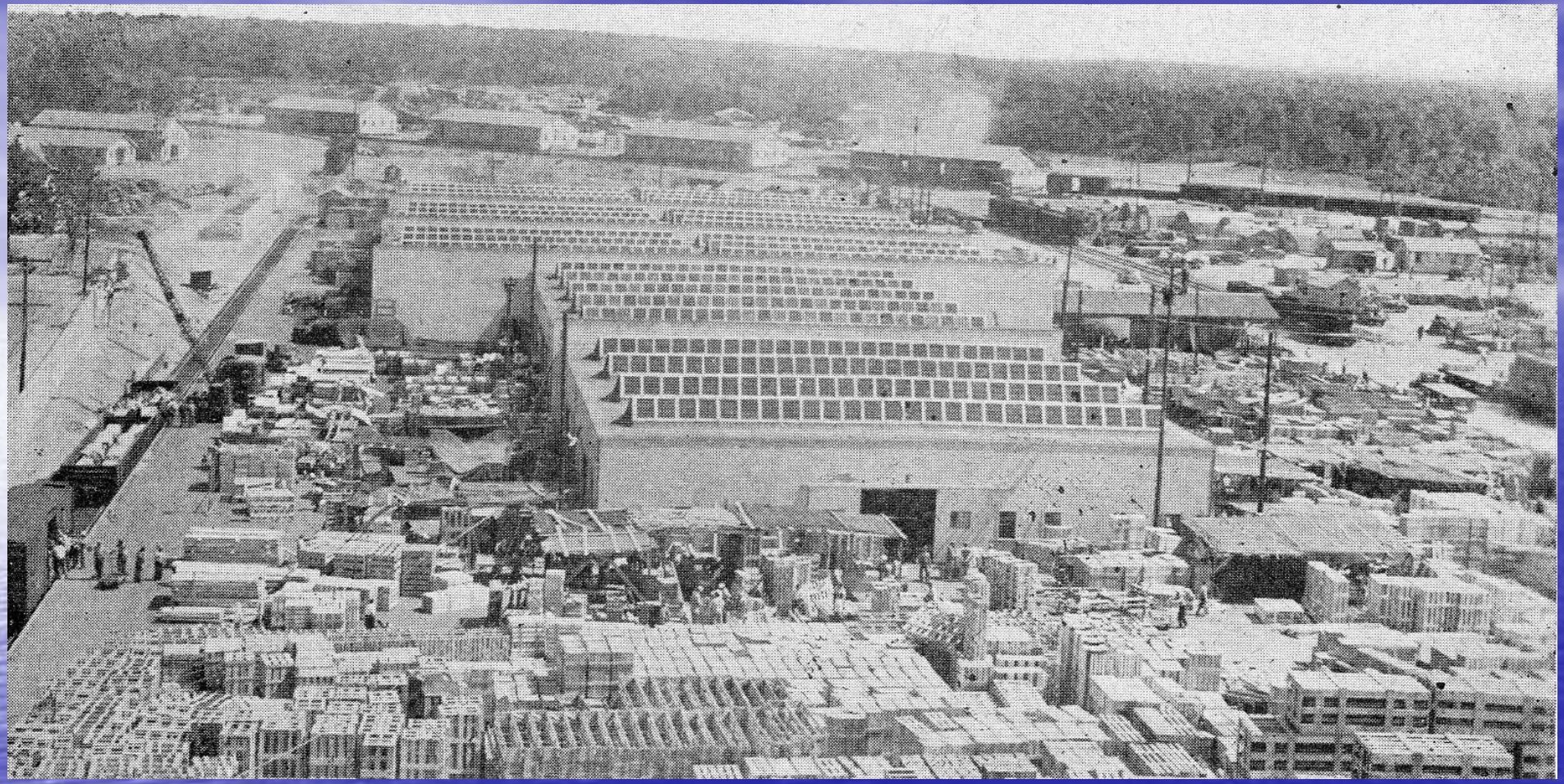
QUONSET HUTS:
the ubiquitous structure

Quonset Huts evolved from Nissen Huts



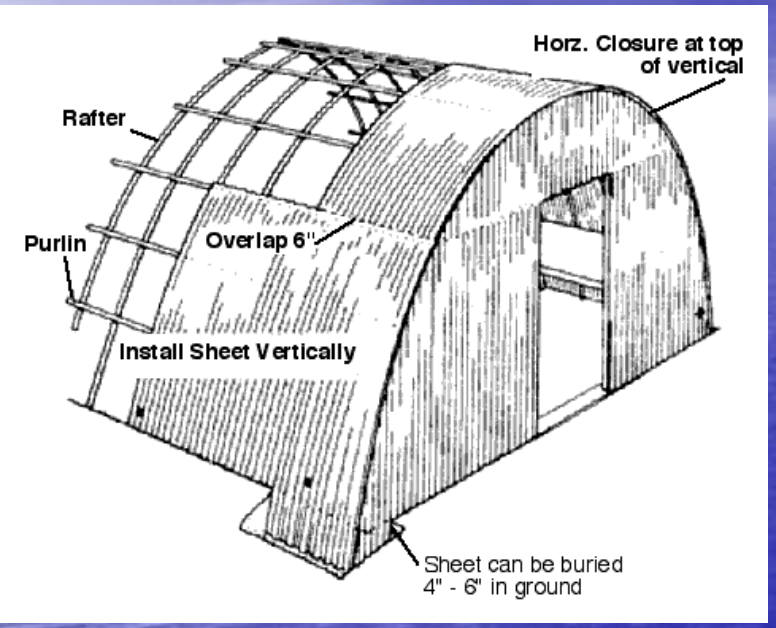
English Nissen Hut (above) and American Quonset Hut (below)

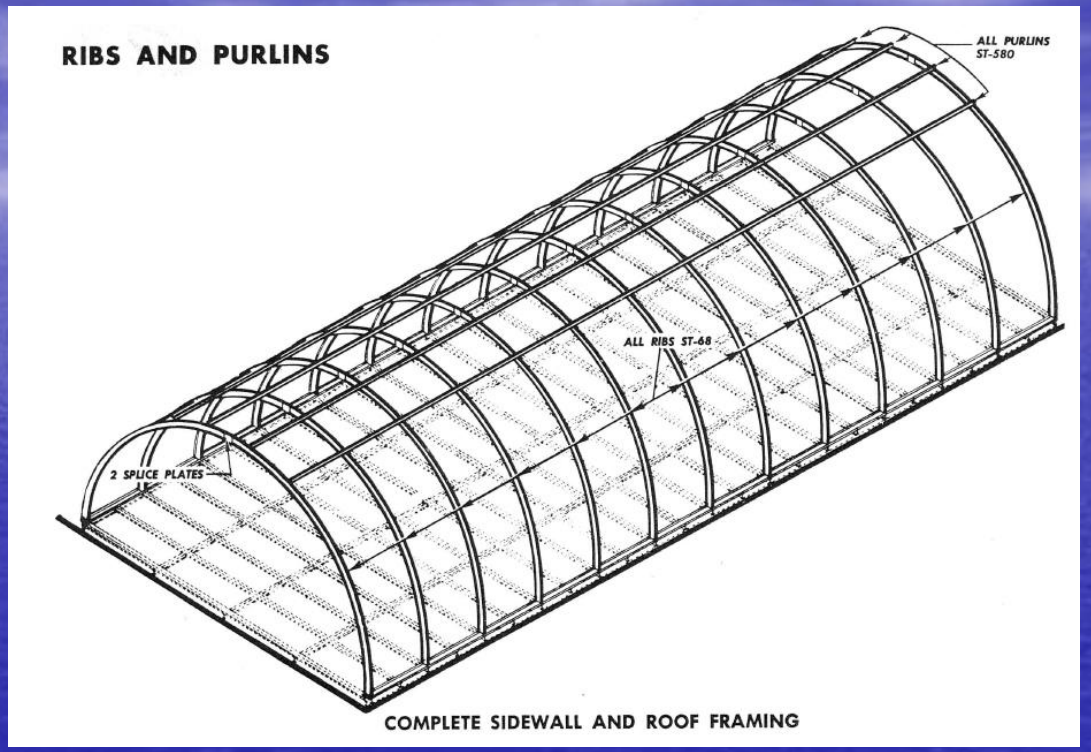
- The 8 ft radius of an English Nissen Hut was smaller than a Quonset 20 and encompassed 210 degrees of curvature; while the curvature of a 10 ft radius American Quonset Hut never exceeded 180 degrees, as seen here.
- The British felt their version allowed greater utilization of floor space, which was true.



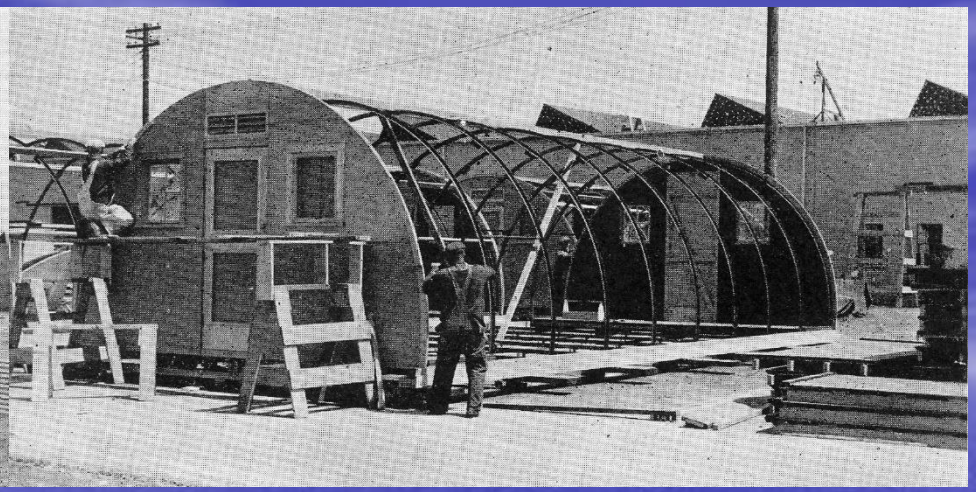
- In the spring of 1941 the Navy established a Temporary Advance Facilities compound at West Davisville, Rhode Island. It was here that the design and manufacturing concepts for prefabricated Quonset Huts was developed by a team from the George A. Fuller Co of New York, led by engineer Peter Dejongh and architect Otto Brandenberger.

Hallmark was its easy assembly

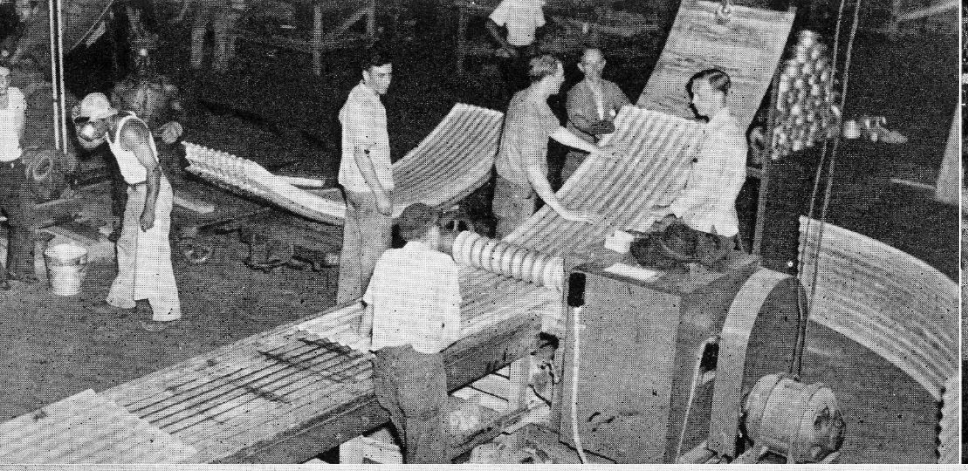


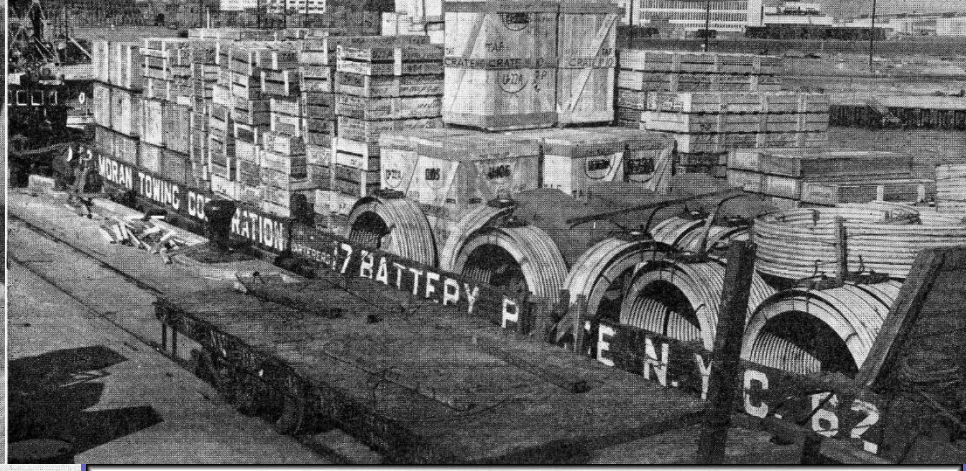


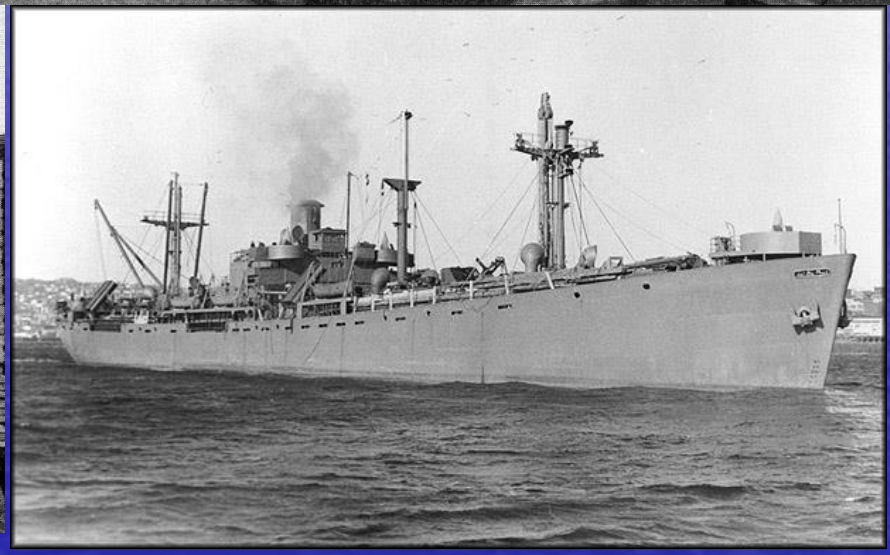
- The original Quonset Huts utilized arched ribs using steel T-sections, 2 x 2 x $\frac{1}{4}$ inches, and the hut was only 16 by 36 ft. These were replaced by Stran-Steel's novel ribs, which were 2 x 3-5/8 inches, formed by sandwiching two lightweight channels welded back-to-back (see detail in following slide)



- Details of the original Fuller-built 16' x 36' Quonset Huts, assembled at West Davisville in the summer of 1941. The American hut employed masonite interior walls with a galvanized steel shell, and the gap filled with insulation.

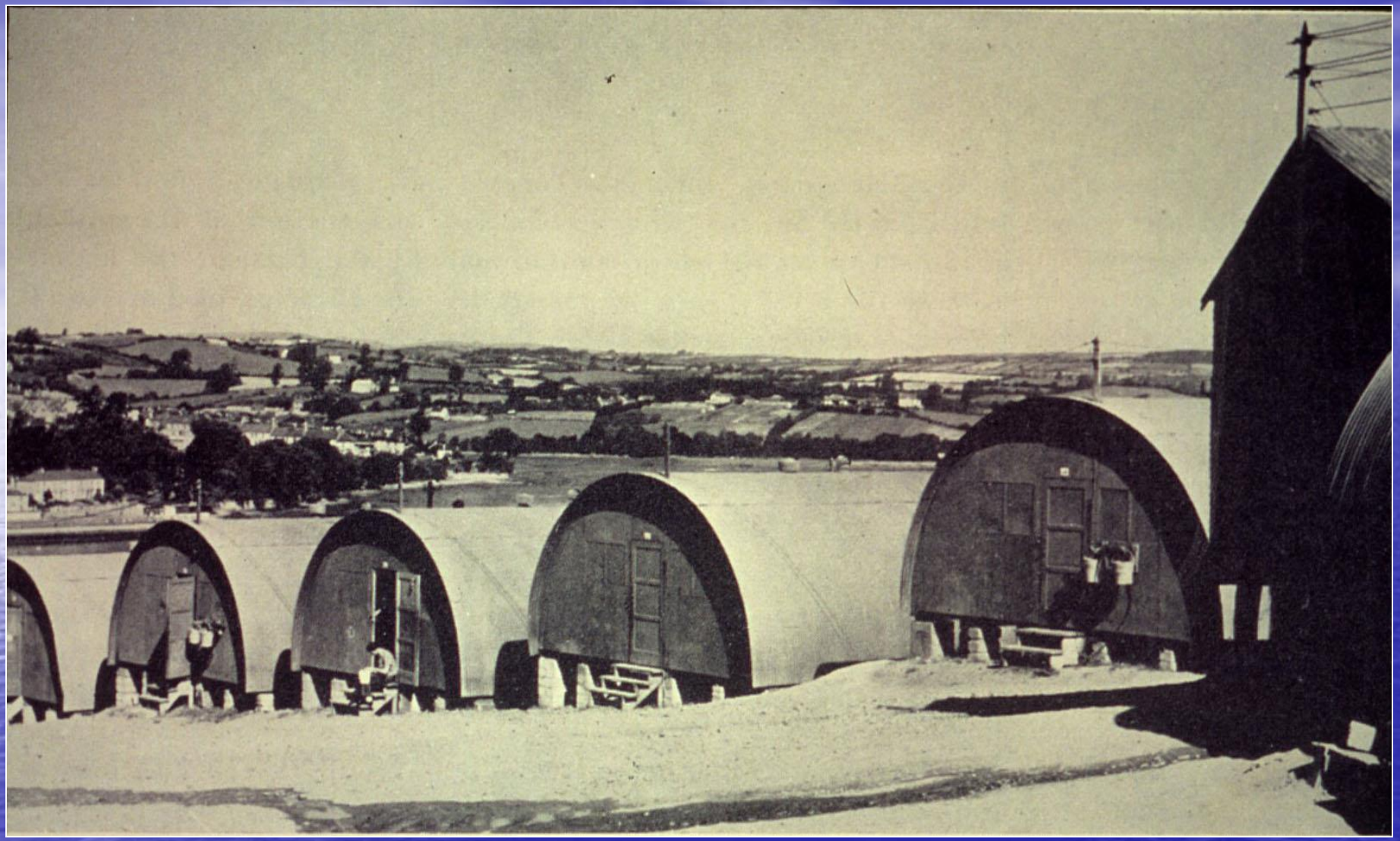






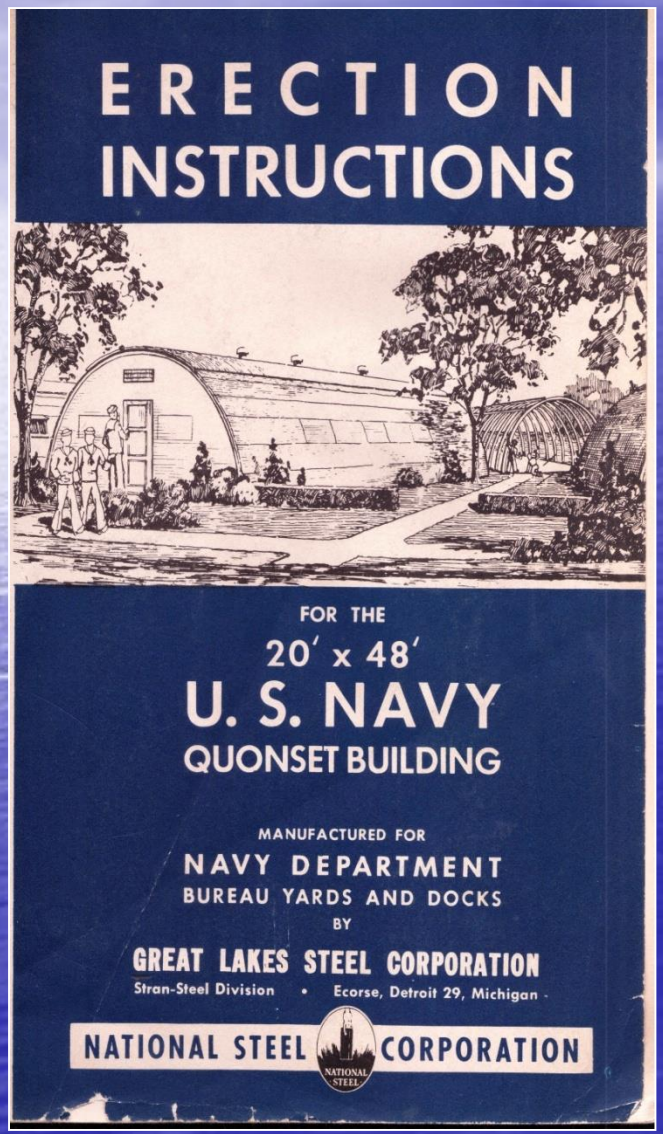
- The corrugated steel shapes were bent at Fuller's factory in West Davisville (upper left), and shipped in 12 crate sets, shown at upper right and lower left. Various packing schemes evolved during the war, to make more efficient use of cargo hold space aboard transport ships (lower right.)

- Early model 16 x 36 ft Fuller Quonset Hut, fabricated in West Davisville, RI sometime between June 1941 and Dec 1942. Note absence of windows on the sides, which was the most basic 'warehouse configuration.' These early models were painted olive drab. Any number of windows could be added to the sides by inserting prefab window dormers between adjacent ribs, which were 4 ft apart.
- Several thousand surplus huts were sold off after World War II. In 1946 a standard Quonset 20 sold for $1048 and a Elephant Warehouse 40 for $3436, plus shipping. This hut is preserved at the Castle Air Museum in Atwater, CA.

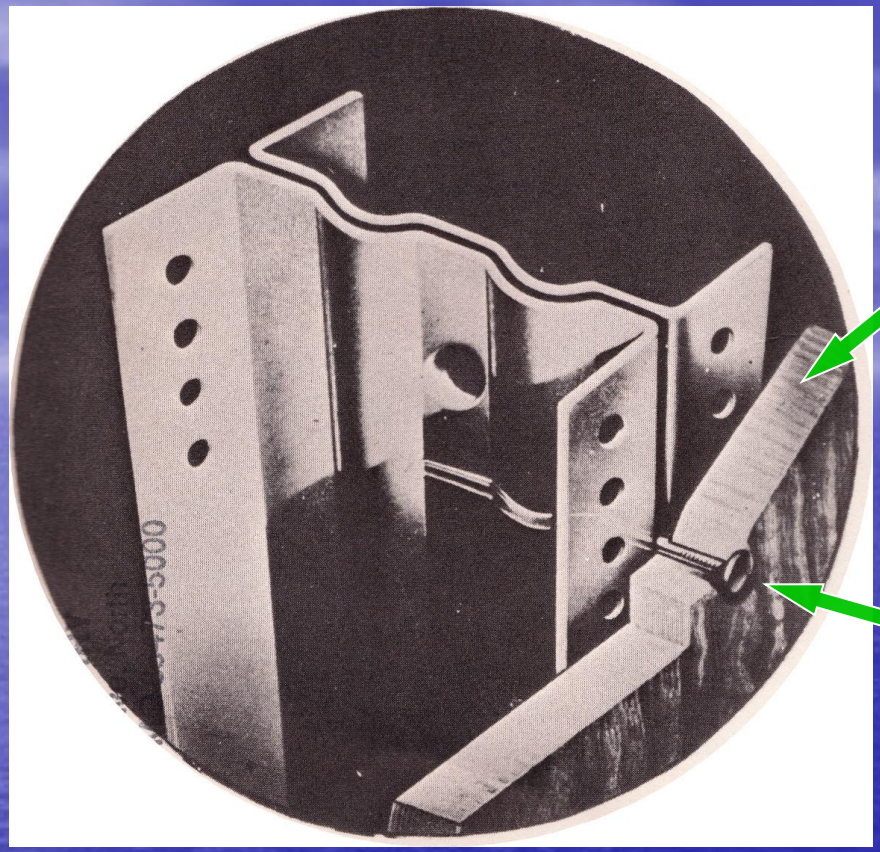


- Early 16 x 36 ft Quonset Huts fabricated by the George A. Fuller Co. in Rhode Island employed wood end walls, with optional widow cut-outs. This views shows Fuller Huts at the Vicarage Base on the English coast near Plymouth, in the summer of 1943. These Huts were used for billeting American naval forces operating in the English Channel.

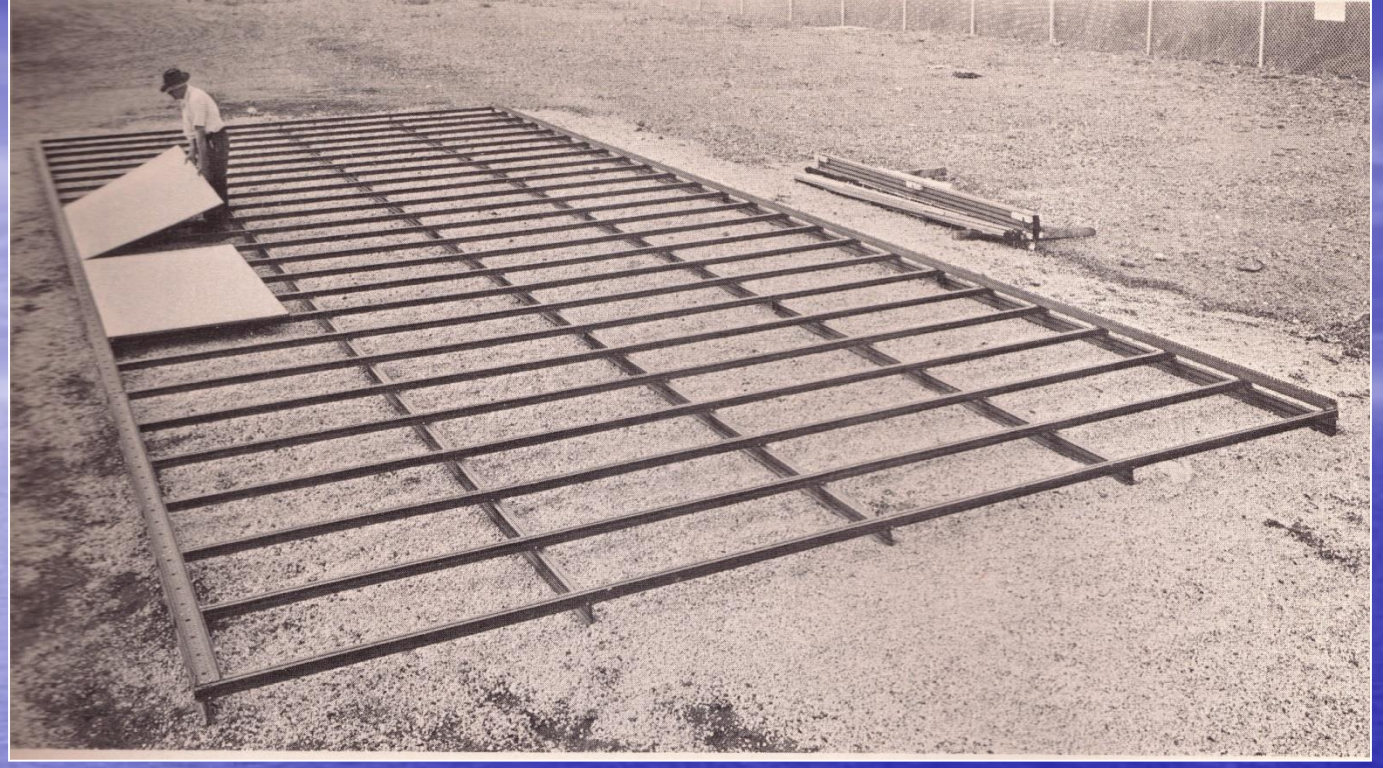
Navy 20 by 48 ft Quonset Huts



- Developed at Navy Seabee Base Quonset Point, Rhode Island, the original Fuller version was 16 by 36 ft
- This was succeeded by the Stran-Steel 20-by-48 model, which became the most produced version
- The 20x48 kit weighed 7000 pounds; requiring 270 to 325 ft^3 of shipping space
- 10 Seabees could assemble a Quonset 20 in less than one day
- Intended to house 25 men
- Northern, southern and tropical styles
- Final design required less shipping space than tents with wood floors and frames for the same occupancy
- A total of 153,200 units produced or procured by the U.S. Navy during World War II



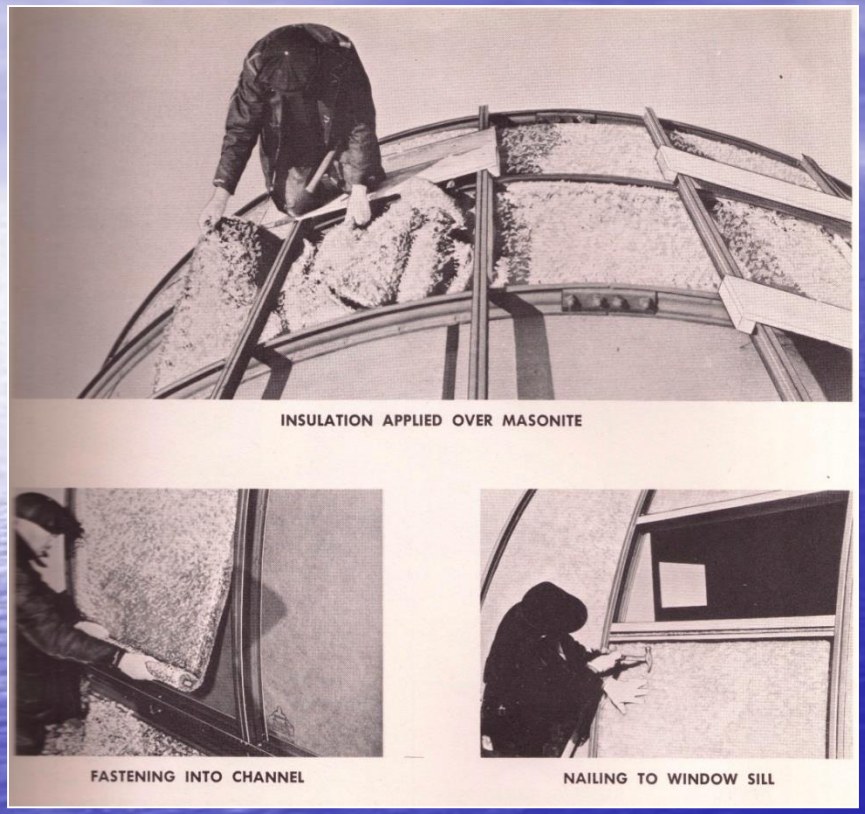
The George A. Fuller Co couldn't produced a sufficient quantity of the new huts, so Stran-Steel, a subsidiary of the Great Lakes Steel Corporation in Detroit, was retained to fabricate the thousands of Quonset Huts that were needed. Stran-Steel came up with a novel grooved ribs by spot welding two W-shape (grooved) channels together to form the arched rib sections (shown above). This allowed simple nailing of the corrugated steel skins and interior Masonite liner sheets to the arched frames, which further reduced the erection time, by eliminating most of the nuts and bolts used in the early model huts fabricated the Fuller. These new pressed ribs were also lighter than the old steel T ribs.



The basic 20-by-48 kit included a floor frame (upper left) which allowed placement of a one inch thick tongue-and-groove plywood floor, using 4 x 8 ft sheets (later, using 5/8-inch thick plywood floors on steel floor joists, 24 inches apart). This system was intended to maintained a 2 to 4 inch air space between the gravel leveling subbase and the floor. Practice found this gap created favorable habitat for rats and other vermin in the tropics, so slabs-on-grade were constructed for more permanent installations, whenever possible. The original design requirement was for a team of 10 Seabees to erect a Quonset 20 in one day.

Quonset Huts were known for quick erection of arched frame ribs and connecting purlins. This shows a hut being assembled on a jig, or erection platform by 33rd Naval Construction Battalion in the Russell Islands in Nov. 1943. The exterior sheathing was nailed to the frames and the purlins. After assembly of the frame and exterior sheathing, the unit was moved to its pad (note completed shells in background).

Insulation was only supplied for American Quonset Huts



INSULATION APPLIED OVER MASONITE

FASTENING INTO CHANNEL

NAILING TO WINDOW SILL

The assembly instructions directed that the Masonite lining be installed first, followed by the wood fiber insulation, then by the exterior corrugated steel sheathing. Image at right shows window and door frames/dormers on a standard 20-by-48 ft Quonset Hut, produced by Stran-Steel.

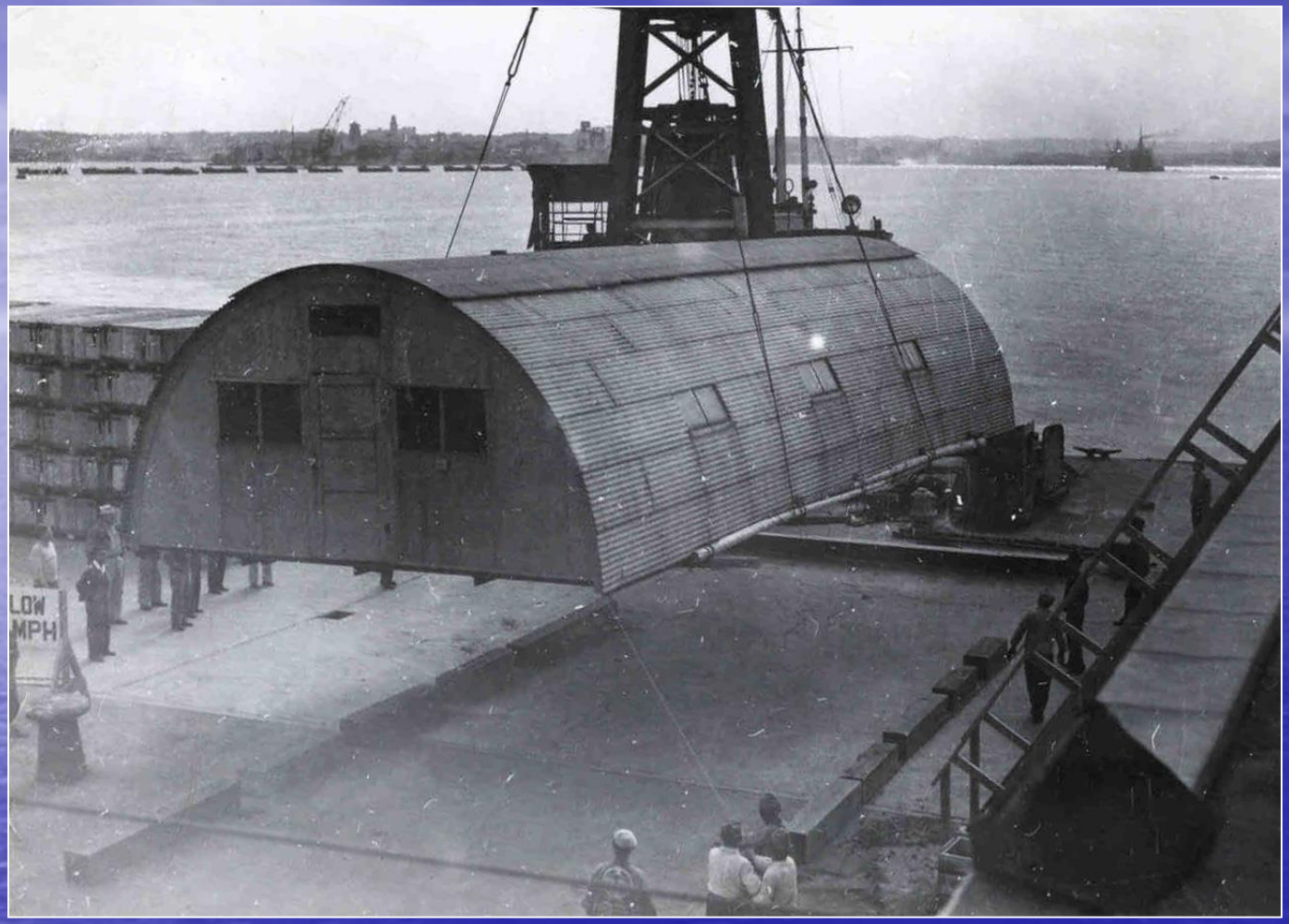
- Several dozen Seabees of NCB 90 man-handle a 20 by 48 Quonset Hut on Iwo Jima using steel stretchers with pipe handles, moving it to a new location. An empty hut weighed about 7000 lbs

- **Q20 huts were routinely assembled on jigs and then moved by crane onto their foundations. Note lifting frame used to spread the four cables.**

Monsoon Season

- Seasonal flooding during the summer monsoon season was a major design issue in laying out any of the large military bases in the South Pacific.
- These views show dry season (upper left) and same are during the wet season (below left), on Guadalcanal.

- Prefabrication of Quonset frames was a necessity in those islands subject to severe flooding during the summer monsoon season. This shows completed huts on elevated frames, to keep their contents dry during seasonal inundation of the local flood plain. This shows Naval Hospital No. 3 at Espiritu Santo.



- Mobile crane lifting an assembled Quonset 20 to a newly poured foundation, while constructing a base in occupied Japan in early 1946.

- Interior Masonite panels were nailed to the inside of the steel frame ribs, as shown here, somewhere in the South Pacific. Metal splines were then installed between the sheets. Note plywood floor, already in-place.

- Quonset 20 configured as a 24 bed temporary hospital ward (St. Michael's Hospital in Falmouth). Note 6 sets of bunk beds at far end and hinged window covers, lying vertical. Late war huts employed vertical walls on lower 4 ft of both sides, because of the wasted space in this zone.

- In the oppressive heat and humidity of the South Pacific, Seabees began modifying the huts to promote as much ventilation as possible. This shows the 'Hotel DeGink' transient aviator quarters on Guadalcanal.

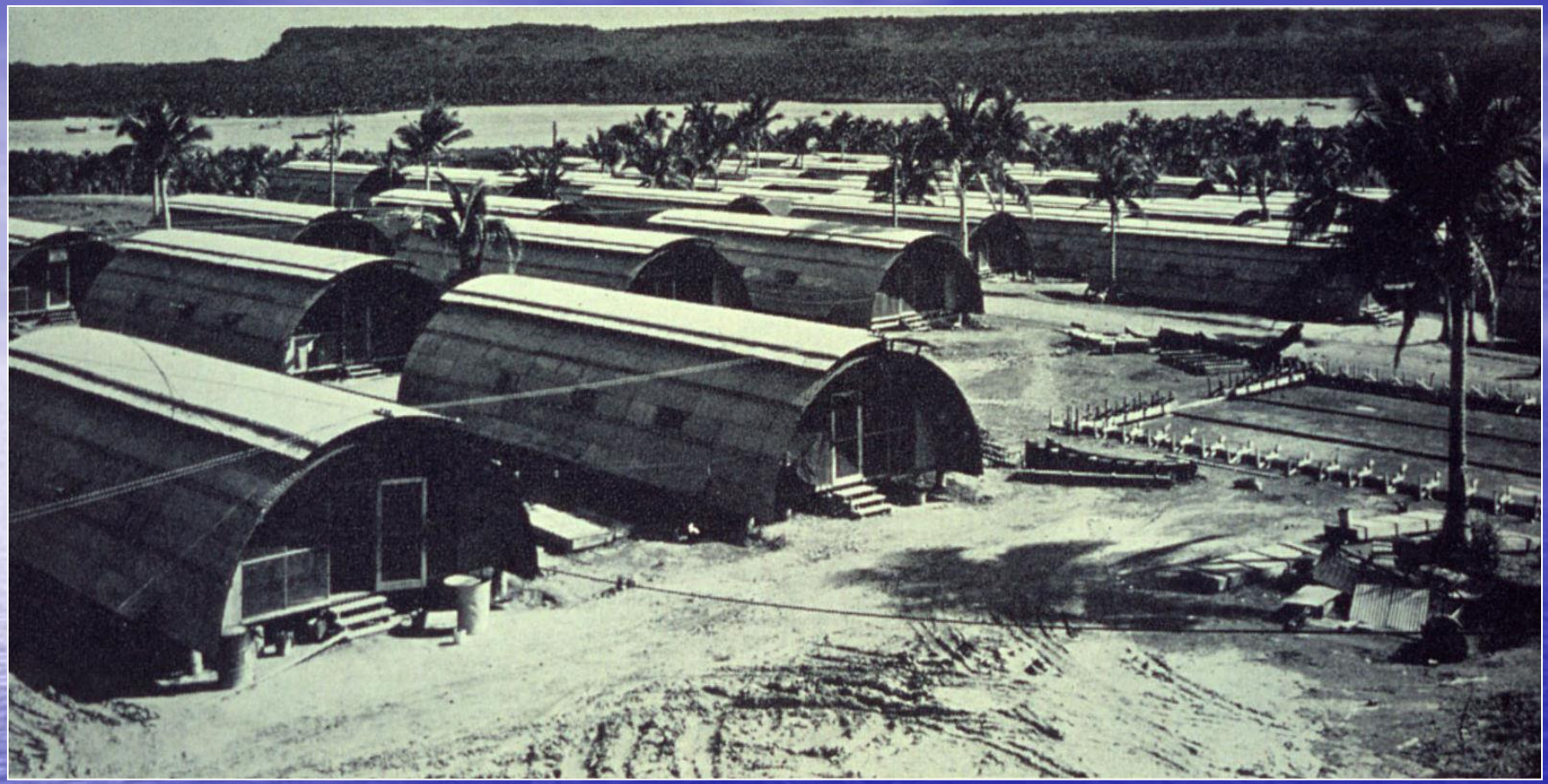
- **In late 1942 the standard Q20 hut was re-designed with straight sides to better utilize floor space, but these required additional cargo space, so the Navy reverted to the hemispherical design.**

- Another in-theater adaptation was the so-called '**monitor hood**' or '**umbrella hood**' added to the crown of the huts. This shows the first known example, the 34th NCB officer's mess on Guadalcanal in 1943.

- From mid-1943 onward, virtually all of the standard Quonset 20s were modified during construction with open, upturned sides to make them more bearable in tropical climates. This shows the living quarters at Carter City on Florida Island in the Solomons. Frame structures in foreground are the base laundry and one of the power plants.

- Quonset 20s with 4 ft overhangs, screened ends, and umbrella vet hoods were designated as "tropical design" huts. The tropical models shown here in the Marianna Islands employed a 12 ft wide 'umbrella hood,' which sat 1.5 ft above the arched frame ribs, and the inside ceilings were unsheathed for a width of 8 ft. This allowed warm air to rise and vent off during the cooler evening hours. This gap had be screened to preclude entry by mosquitoes.

- Tropical Quonset 20 with its raised 'umbrella hood,' occupied by elements of the 509th Composite Group on Tinian in 1945. Tropical Quonsets employed screened end walls, raised roofs, and additional vent flaps along their sides to promote better air circulation. Note elevation of floor in this example, well above the ground. This enhanced better cooling as well.



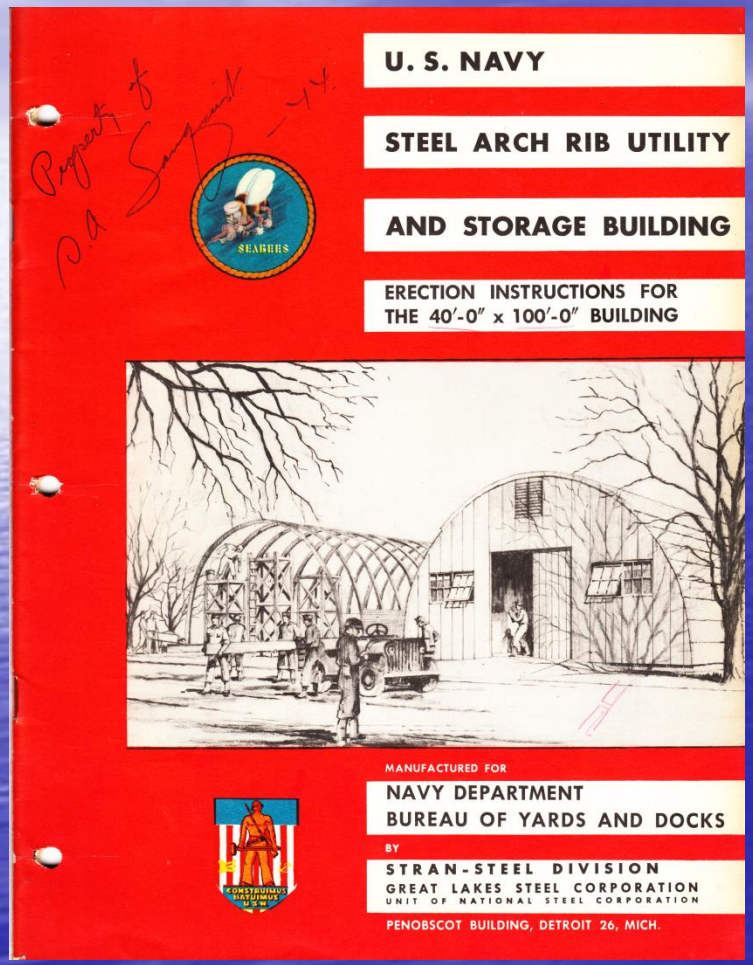
- Late model Tropical Quonset 20s at the forward receiving station at Tubabao on Samar, in the Philippine Islands. These huts employed 'double umbrella hoods,' with additional laps that helped prevent blowing rain from entering the open top of the huts during the monsoon season, between mid-May and mid-October. Note open screened end walls and two ft high crawl space beneath the huts, which aided cooling and prevented flooding.

- **Continuous screened sides, screened ends, and ever-larger umbrella hoods became standard options with all tropical huts shipped after early 1944.**

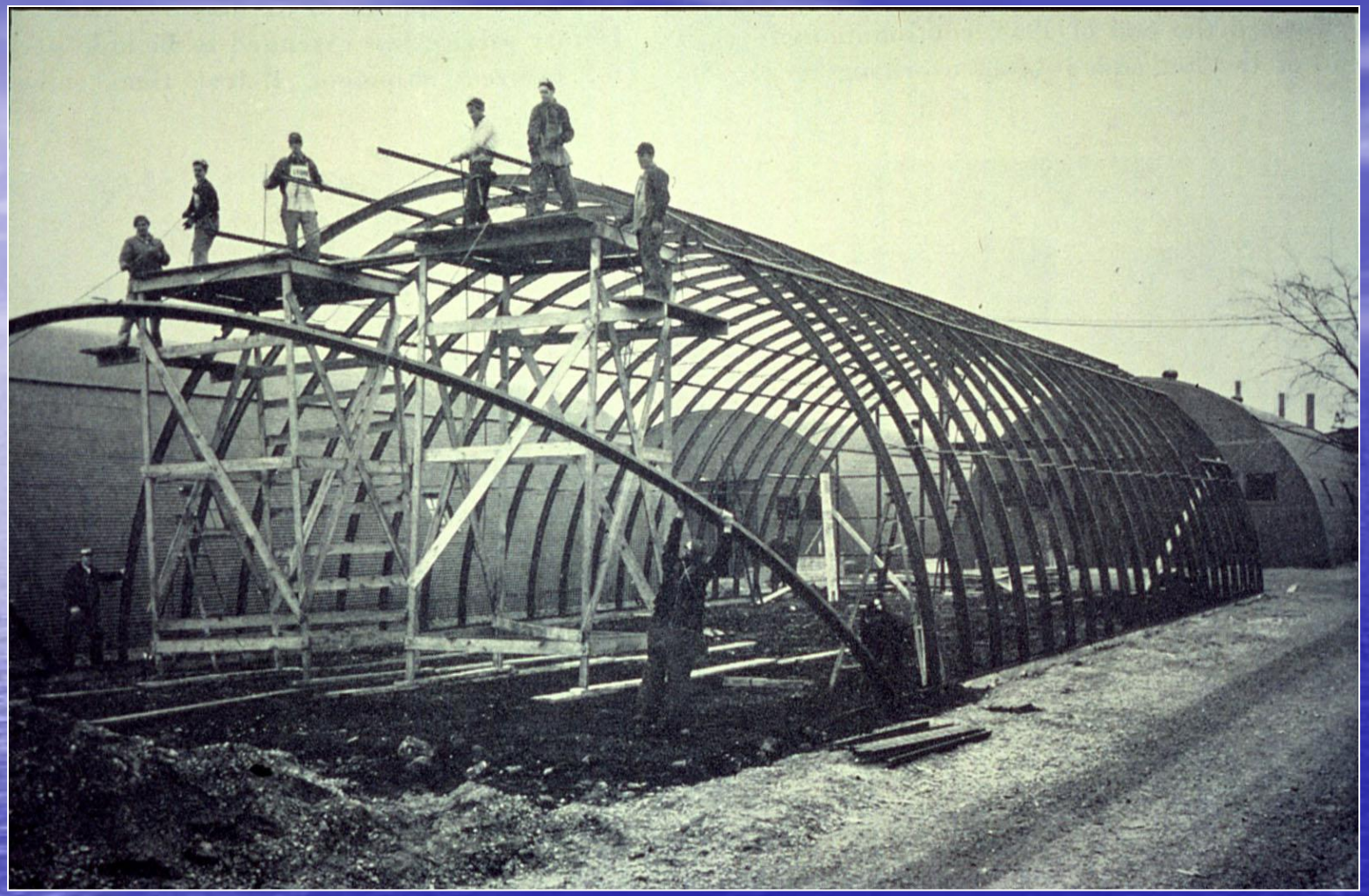
- Seabees were famous for their 'cumshaw' work, a nautical term for the procurement of needed material through swapping, barter, mutual back-scratching, or 'midnight requisition.' This shows a covered porch the Seabees tacked onto a standard tropical 20-by-56 hut on Tinian, taken over by the 504th BG.

- Late model tropical Quonset 20 huts with upturned side walls at the Philippine Sea Frontier headquarters at Tolosa on Leyte, constructed by the 61st Seabees in January 1945. The entire hut was fitted with screens to promote cross ventilation. These modifications came about as a matter of necessity and comfort, operating in extreme heat and humidity.

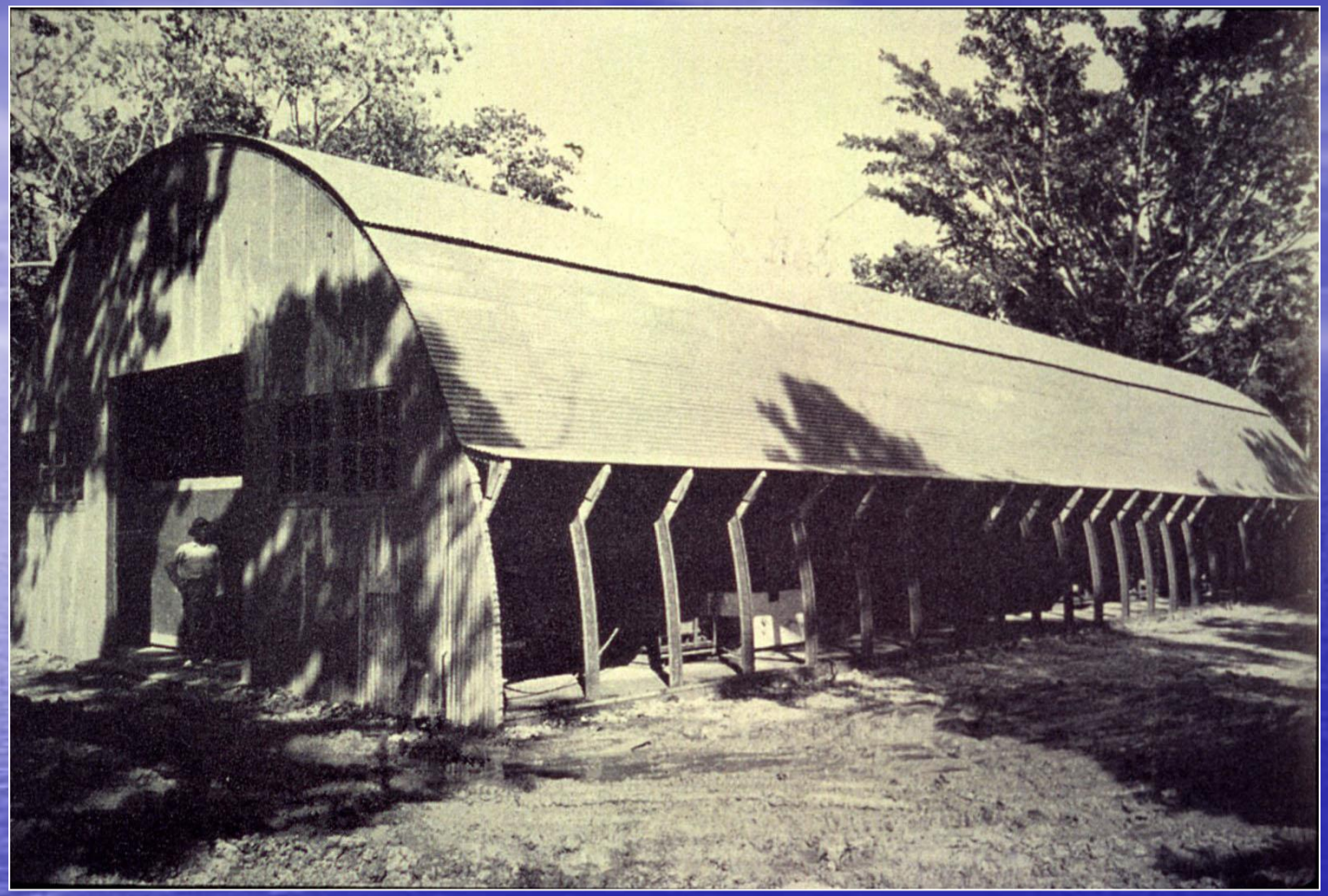
40 x 100 ft 'Elephant Huts'



- The "Quonset 40-by-100" Arched Rib Warehouse version was developed for use at 'advance bases' (supply)
- Referred to as 'Elephant Huts'
- Used 20 tons of steel and required 650 cubic feet of shipping space in cargo holds
- 11,800 produced during World War II
- Olive drab camouflage paint was added to exposed panels at the factory to retard reflectance. Later the color was changed to flat light grey.

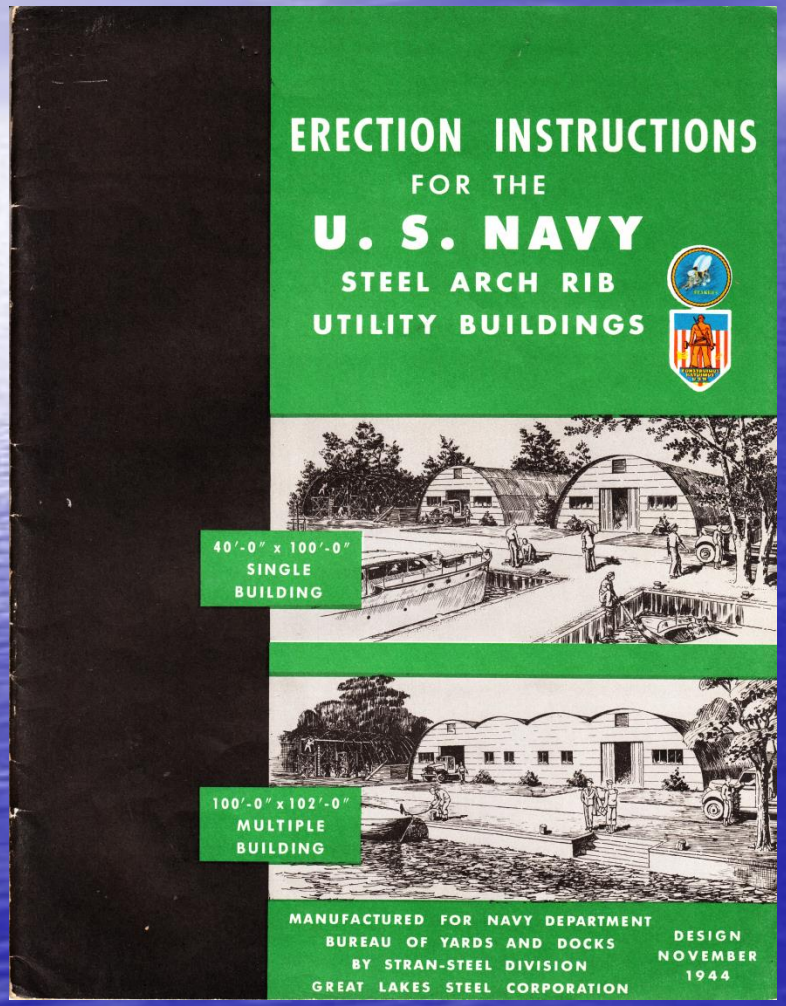


- The larger Elephant Huts were usually assembled directly upon on gravel pads and/or concrete floors of their building pads, as shown here. Note temporary scaffolding.



- Quonset 40-by-100s were used as warehouses, machine shops, power and pump plant enclosures, etc. Note the large doorway in the end wall. The suffocating heat of the tropics soon led to on-site adaptations, such as that shown here. This allowed better ventilation while keeping most of the rain off of equipment. This shows a refrigerator warehouse at Havannah Harbor on Efate in the New Hebrides.

100 x 102 ft "Multiple Mae West" Structures

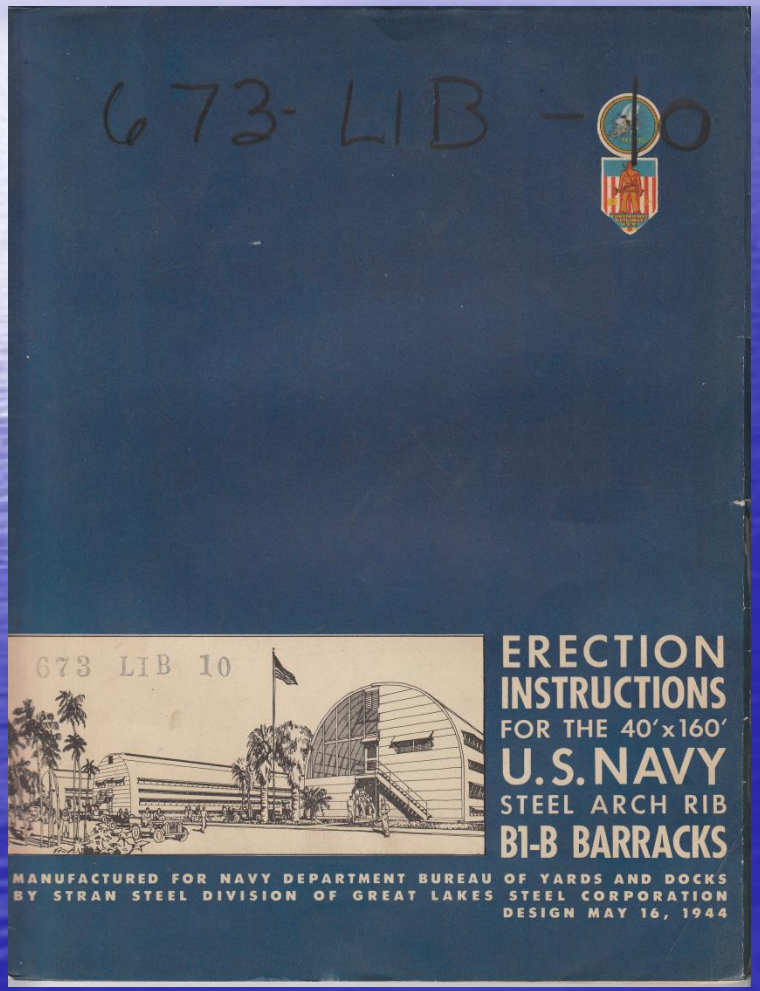


- Officially christened the "multiple building," it was a variation of the standard 40 x 100 Elephant Quonset Warehouse, to accommodate larger operations under a single roof.
- First used on Manus Island Advance Base Depot
- Largest structure was the mail sorting facility constructed on Guam, to handle all servicemen's mail to the Western Pacific Theater

Multiple Bay Warehouses

- The largest Quonset structure assembled during World War II was this '**Multiple Mae West**' facility on Guam, a massive warehouse with 54,000 square feet of floor space. It was fashioned from a series of Elephant Warehouse Huts.

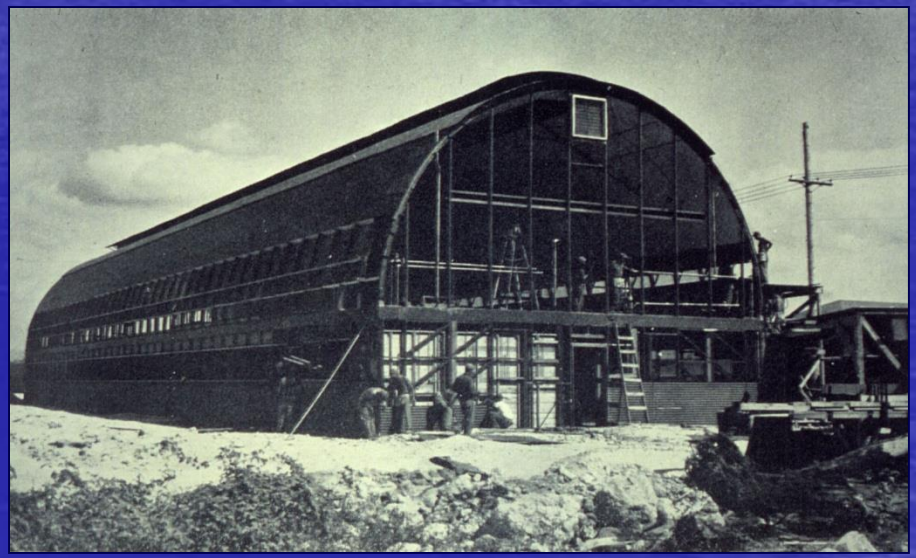
40 x 160 ft B-1B double deck barracks

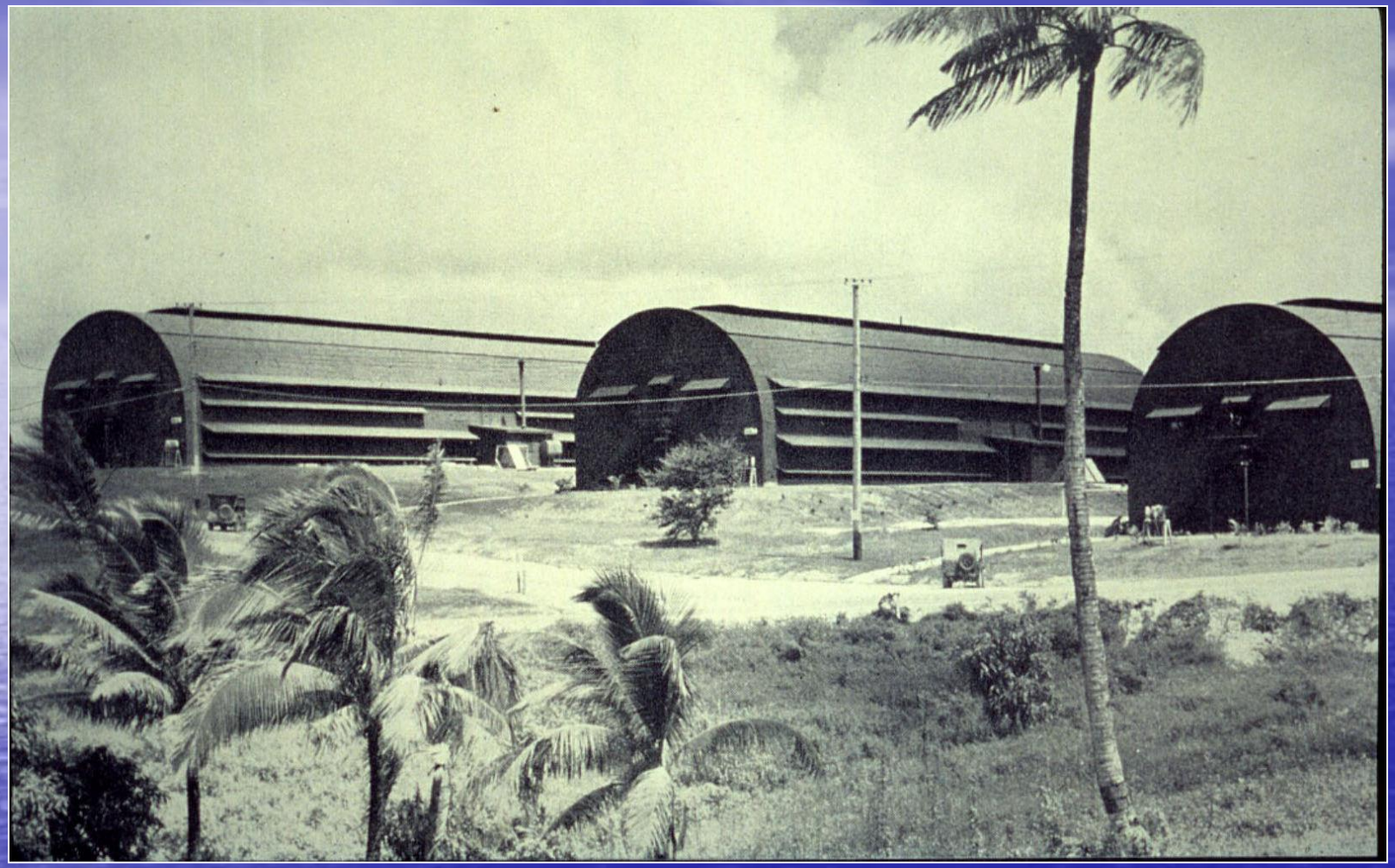


- The B-1B Barracks represented the ultimate evolution of Stran Steel's innumerable improvements to the basic Quonset Hut, as the Pacific War dragged on and the need for more expansive and more permanent quarters was envisioned for the invasion of the Japanese homeland
- First used in the Hawaiian Islands, then on Guam

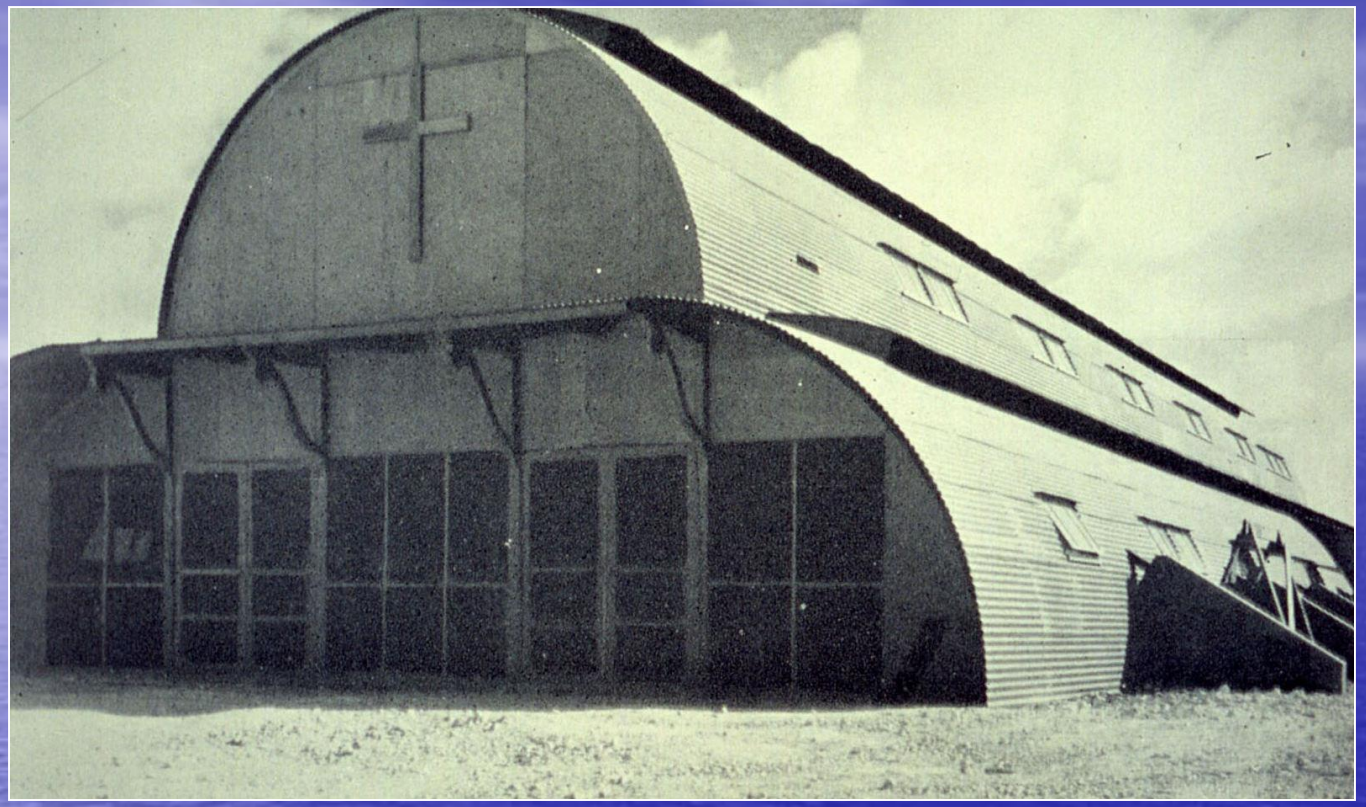
B-1B Barracks

- The B-1B barracks could accommodate up to 80 officers, and were usually occupied by Navy, Marine, or Army Air Corps fliers, as well as male and female medical corps officers
- Note extensive use of screens to promote cross ventilation and fan portal at crest of arched end wall.
- The umbrella hoods on B-1B Elephant Quonsets were 28 ft wide, as shown here.





- B-1B double deck Quonsets were used as Bachelor's Officer's Quarters on Guam. Note extensive use of awnings over screened window openings and diminutive umbrella hoods along the crest.



- This shows an improvised design combining four standard Q20 Quonset Hut kits to fashion a non-standard base chapel, built by the 117th Seabees on Saipan. Note concrete thrust blocks along the right side, to accommodate the loads of the upper hemisphere shell.