

# PROJECT COMBAT AID

*LCDR A. Bruce Beran  
Civil Engineering Division  
U.S. Coast Guard Headquarters*

During February 1968, Commandant, U.S. Coast Guard was requested to evaluate certain independent studies that had been conducted for the Department of Defense. The studies dealt with the improvement of LORAN-C repeatability and accuracy in Southeast Asia. Coast Guard recommendations included the introduction of a fourth transmitting station on the northeastern coast of the Republic of Vietnam (RVN). These recommendations were concurred with and the Coast Guard was requested to conduct a preliminary site investigation in anticipation of an official request for establishment

of the transmitting station.

The survey was conducted during October/November 1968 under the direction of Commander, U.S. Coast Guard Section, Southeast Asia. Operations and engineering personnel representing both the Commandant and Commander, Fourteenth Coast Guard District participated as members of the survey team.

The survey covered the area from Chu Lai Air Base north to the Vietnamese Imperial Capital of Hue, including off-shore islands. A primary site was selected at Tan My, RVN, a village at the mouth of the Perfume River. Tan My is approximately

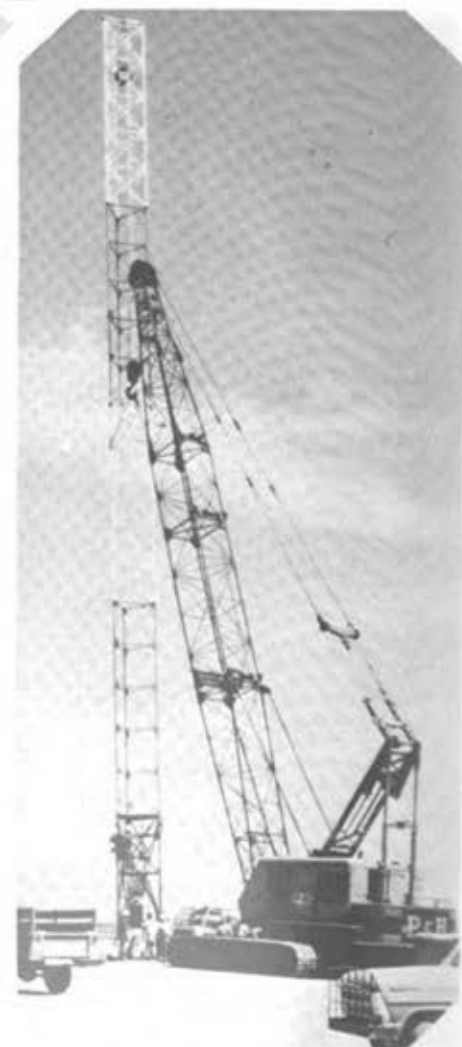
45 miles north of DaNang and 35 miles south of the Demilitarized Zone which separates the two Vietnams.

It was recognized at the time of selection that the site had two major engineering shortcomings. First, it was a spoil area for local dredging operations and the bearing value of the material deposited was suspected of being poor. Second, because the area was known to flood, a good amount of fill material would be required.

However, the factors to be weighed in selecting a LORAN station site in a combat area go beyond engineering considerations. In this case, real estate under United States control was



An ATLS shelter being positioned.



Installing the tower.



Protective embankments.

available. (Land acquisition at alternate sites was estimated to require a minimum of six months.) The site was adjacent to the U.S. Navy port facilities which serve the northern I Corps region of RVN and only 15 miles from Phu Bai Air Base. The Tan My port could handle LST's and C-130 aircraft could be accommodated at Phu Bai. Naval Support Activities, Tan My, was less than two miles from the site. Perhaps the most important factor was that the area was relatively secure. Another factor associated with Tan My was that the construction contractor was already engaged in work at the port facility.

In late December 1968, the Coast Guard was officially requested to establish a LORAN transmitting station at Tan My. The Department of Defense assigned the project code name,

"Combat Aid," and indicated that it was essential for the station to be operational as soon as possible. The requirement for this station was to be considered a "temporary" one. Although not defined at that time, temporary was assumed to mean from two to five years.

A good deal of preliminary planning had been accomplished at Headquarters which permitted the Coast Guard to react immediately. A critical path method (CPM) network had been formulated and a "start date" of 31 December 1968 was established. This 34-week network was used as the basic project scheduling document. It called for a station operational date of 23 August 1969, which was later revised to 15 August 1969. This critical path network is shown in Figure 1.

Project funds in the amount

\$5.2 million were passed from the Department of Defense to Naval Facilities Engineering Command (NAVFACENGCOM), since the Navy is the DOD Execution Agent for the LORAN-C Navigation System. (The Coast Guard may be considered the "technical" agent.) NAVFACENGCOM in turn transferred \$3.9 million to the Coast Guard, since the majority of project costs were for the procurement of government furnished equipment.

In receipt of both funds and authority to proceed, the next step was to contact the appropriate U.S. military commands in RVN to finalize land acquisition and to arrange for station design and construction. Finalization of land acquisition was handled by Commander, Naval Forces Vietnam (COMNAVFORV) without difficulty. Al-

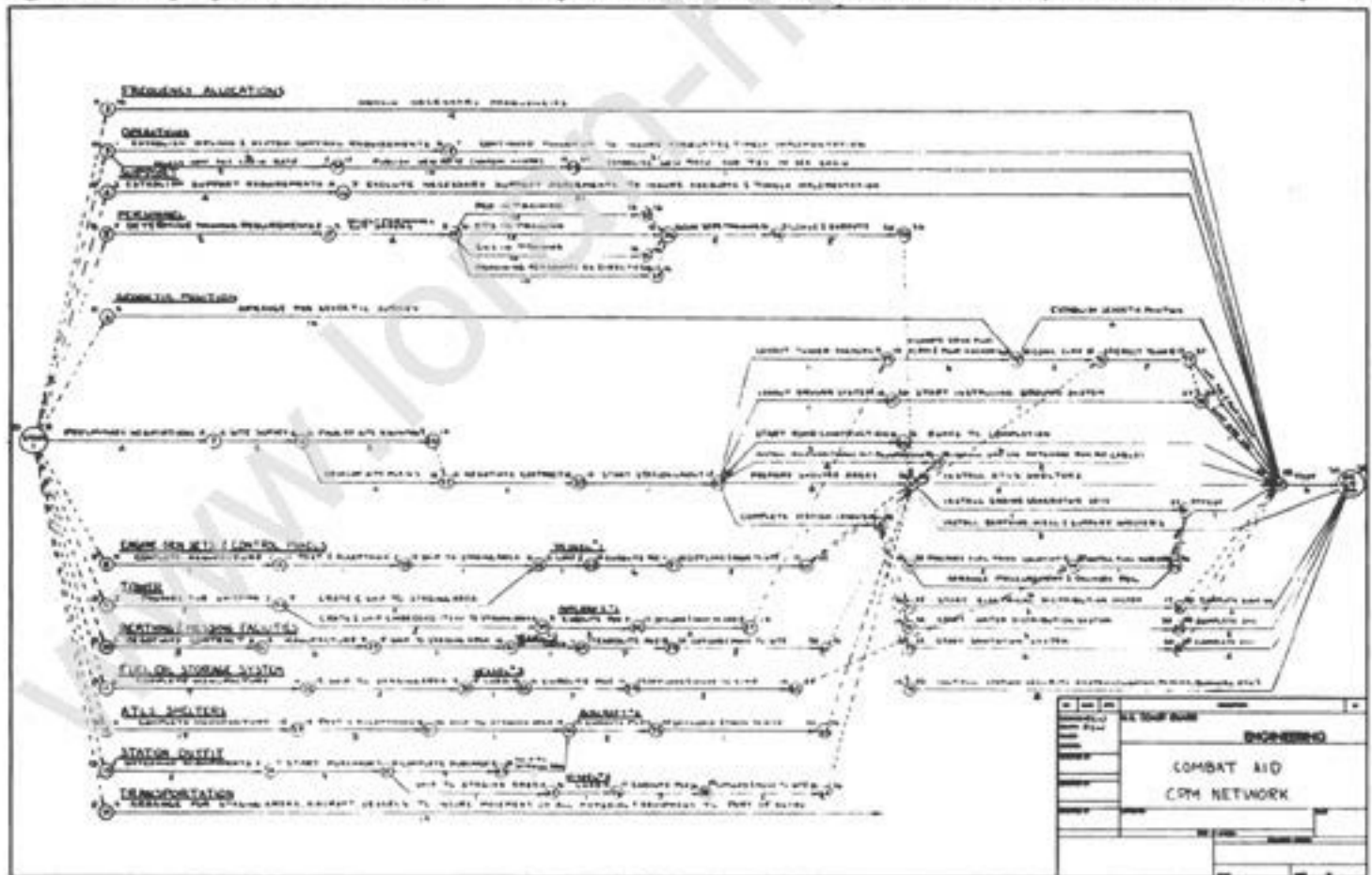


Figure 1. Critical path method chart.

though Commander, U.S. Military Assistance Command, Vietnam (COMUSMACV) approves and assigns a priority to all construction, the military contract construction agent for the U.S. Government is Officer-in-Charge of Construction, NAVFACENGCOM Contracts, Republic of Vietnam (OICC RVN). The latter was requested to provide design, contracting, and construction services and, in return, required that a Coast Guard civil engineer be provided as a fulltime project co-ordinator in Vietnam. An officer was assigned from Headquarters with the title Coast Guard Liaison Officer, Project Combat Aid and given the authority to make decisions on behalf of both the Commandant and Commander, 14th Coast Guard District.

OICC RVN engaged the Architect-Engineer (A/E) firm of Adrian Wilson, Assc. (International) on 24 January 1969. The A/E immediately performed a detailed topographic survey and site investigation, although soil borings were not acquired until a later date. None-the-less, enough information was obtained to permit the design to begin.

As stated earlier, much of the planning for this LORAN station had been accomplished at Headquarters. OICC RVN utilized the Coast Guard plans and the task of the architect-engineer firm became one of adapting the government furnished equipment to the site and designing those facilities required to complete the station.

A LORAN-C transmitting station can be thought of as consisting of three major systems. These are the LORAN transmitting antenna system, the personnel support system, and the operations system.

Plans called for utilization of a standard 625-foot LORAN-transmitting antenna-tower system which was available in Headquarters Controlled Material. The personnel support system was to consist of prefabricated shelters, manufactured by Porta-Kamp Manufacturing Company, Inc. of Houston, Texas. These support facilities included a galley/mess complex, offices, sick-bay, shops, toilet facilities, recreation space, and berthing shelters. Thirty Porta-Kamp shelters were eventually procured and erected at Tan My. The majority of items of outfitting were government furnished equipment. An Air Transportable LORAN System (ATLS), at that time under development, was to be utilized as the operations system. The ATLS consists of four 250 KW engine-generator sets, a complete fuel oil transfer and 60,000 gallon storage facility, communications transmitting/receiving and LORAN receiving antennas, and eighteen shelters housing the AN-FPN 44/46 LORAN and all necessary communications equipment and spare parts.

In addition to getting all of the government furnished equipment on site, it remained for the architect-engineer firm to design a 40,000 gallon potable water system, sewage disposal system, antenna pedestal and anchor foundations, maintenance building, roads, exterior utilities, site grading plan, and security facilities. The latter consisted of revetments around shelters, perimeter fencing and lighting, guard towers, fighting bunkers, and a vehicular perimeter road to permit easy access to towers and bunkers under all conditions. These requirements were based upon two independent physical

security surveys. The first was conducted at Coast Guard request by the Third Marine Amphibious Force. The second was conducted by a USAF Security Police Squadron who were ultimately to provide security troops for the station.

OICC RVN has entered into a large reimbursable cost-plus-award-fee contract with the firms of Raymond International, Morrison-Knudsen, Brown and Root, and J. A. Jones, operating in a joint venture under the title of RMK-BRJ. It was under this incentive type contract that a Notice-to-Proceed was issued on 12 March 1969 for the grading and LORAN transmitting antenna foundations only. The station design was not complete at this time; however, the procedure followed was not unique under this extremely flexible contract.

The antenna foundation design was based on 200-foot soil borings and called for a 9-pile cluster under the tower base. Twelve-inch piles were specified. However, because a barge enroute Tan My with 10,000 linear feet of piling was lost at sea, 14BP73H piles were used. They were driven vertically to depths of 150-185 feet.

Inner, outer, and top load radial anchors consisted of 12-BP53H piles in clusters of seven, eleven, and two, respectively. These piles were all driven on a 3:1 batter to depths of approximately 50 feet.

Prior to commencing pile driving operations, it was necessary to construct a road to the antenna base to support the pile driving equipment. Temporary roads had to be constructed to the inner and outer structural anchors for the same reason. The pile driving equipment had to

proceed on mats, constructed of 12 inch timbers, to reach the top load radial anchor locations, since the perimeter road was not completed at that time. In spite of these difficulties, pile driving operations, which had begun some seven weeks earlier, were completed on 6 June 1969. A total of 6,800 linear feet (l.f.) of piling was driven.

The fill required for the site was far in excess of that originally estimated, largely due to settlement within the spoil area. Approximately 100,000 cubic meters of fill had been placed, the majority of it being required for the perimeter road.

Once the tower pedestal was completed, the Chief, Mapping and Intelligence Division of the U.S. Army, Vietnam Engineers was requested to conduct a geodetic survey of its location. The survey was conducted and the results were forwarded to the U.S. Naval Oceanographic Office for use in developing LORAN coverage charts.

Upon completion of the station design, the notices to proceed for the remainder of the project (less installation of the ATLS shelters) were issued and the construction proceeded without incident.

RMK-BRJ subcontracted with Trylon, Inc. for the tower erection. Trylon provided two supervisors and entered into a labor contract with Page Communications Engineers who had personnel resources in-country. The tower was "topped out" on 21 June 1969, after only twelve days, which speaks well for the caliber of personnel on the job.

The ATLS shelters were flown via C-141 aircraft from McGuire AFB, New Jersey to DaNang

Air Base. They were transported and handled only by military labor and eventually installed by the Coast Guard station crew under the direction of Headquarters civil and electronics engineers. This was done for two reasons. The first reason was an economic one. RMK-BRJ's fee is, in part, based on the value of the government furnished equipment handled; in this case the value was \$1.9 million. Second, ATLS was designed for installation by a 29-man Coast Guard crew.

Because RMK-BRJ did not have the capability in the area, approximately 4,000 square yards of asphaltic concrete paving was accomplished at the station by the "Seabees."

Throughout the project, coordination of the logistics effort proved to be of the utmost importance. A Coast Guard Storekeeper was assigned to the project to assist the Coast Guard Liaison Officer prior to delivery of any of the government furnished equipment.

During the course of this project, there were other commands with which to coordinate activities. Communications circuits (teletype) to the monitor station at Udorn, Thailand had to be cleared with COMUSMACV (Communications-Electronics Directorate) and Defense Communications Agency (DCA). Inter-service support agreements had to be arranged. Air Support for staff members of COMCOGARD SEASEC had to be obtained from Commander, U.S. Military Assistance Command, Thailand (COMUSMACTHAI).

The station first transmitted a LORAN signal on 13 July and was capable of continuous op-

erations as of 20 July 1969. LORSTA Tan My was declared fully operational and commissioned by COMCOGARD SEASEC on 15 August 1969.

In conclusion, it may be stated that Project Combat Aid was more than just the establishment of a new LORAN station. It was the establishment of a LORAN-C Station in a combat environment in record time. Although the personnel berthing, messing, and recreation facilities are somewhat less than what has become standard for "permanent" LORAN-C stations, they are superior to any other enlisted billets in Vietnam. Additionally, the concept of prepackaging sophisticated electronics equipment in an Air Transportable Loran System was proved to be not only feasible, but highly successful.

#### ABOUT THE AUTHOR

LCDR A. Bruce Beran is a 1957 graduate of the U.S. Coast Guard Academy. He served on board CGC OWASCO in deck assignments as Gunnery Officer, First Lieutenant, and Navigator. He was assigned to shipboard engineering training and subsequently to engineering duty on the same vessel. Duty on board CGC YEATON as Executive Officer was his next assignment. In 1960 he was assigned as Commanding Officer of LORSTA Iwo Jima. Following that, he attended Rensselaer Polytechnic Institute, graduating with a Bachelor of Civil Engineering degree in 1962. He served in a civil engineering billet in the Seventh Coast Guard District for 20 months, followed by another tour of duty as a civil engineer, this time on the staff of Commander, Coast Guard Activities Europe. He is presently serving as Chief of the Loran Section in the Civil Engineering Division at Headquarters. LCDR Beran recently received the degree of Master of Science in Administration from George Washington University.