

Project Name: East Coast Air Combat Maneuvering Range (EC/ACMR)

Organizations/People Involved:

FPO-1: LT Bob Mayer, Don Masso, LCDR Geoff Cullison (Temporary duty)

UCT ONE

Date: 1976-1977

Project Summary:

The EC/ACMR project was a unique endeavor for FPO-1, which was responsible for management and execution of this \$13M project, the first Navy ocean military construction (MCON) project. The project involved the design and construction of four off-shore instrumentation towers in support of the EC/ACMR, which provided the Navy with a unique dimension in fighter-pilot training. The range system provided for the simultaneous tracking of as many as twenty aircraft as they engage in combat/dogfight maneuvers and fire simulated (vice live) electronic missiles. Air combat and escort tactics were developed and evaluated by means of real-time three-dimensional displays of all range activity, while being continually monitored by highly trained ground instructors.

The EC/ACMR Towers are located in 83-106 feet of water, 15-32 miles off the coast of Kitty Hawk, NC. The range is located just north of Cape Hatteras, an area so plagued by high winds and storms that it is known as the graveyard of the Atlantic. Environmental conditions anticipated over 20-year design life of the towers included 62-foot wave heights, 2-3 knot currents, 140 mph winds, and temperatures varying from freezing to 100°F. The required design was without historical precedent – the towers were to be installed in an area where no previous records of offshore structures existed.

FPO-1 first became involved with the project in the summer of 1974, when it was tasked to provide ocean engineering and consultant type services to the range project sponsor, Naval Air Systems Command (NAVAIRSYSCOM). NAVAIRSYSCOM was pursuing range development as an Other Procurement Navy (OPN) equipment procurement through a contract with Cubic Corporation. Cubic had developed the electronic system and was prepared to provide the offshore towers by subcontract. During the summer of 1975, with a preliminary tower design in-hand, it was apparent that funding requirements would exceed OPN guidelines. Accordingly, construction of the EC/ACMR towers was included in the NAVFAC MCON program for FY1976.

Although FPO-1 was the center of expertise for ocean facility engineering and construction, this expertise had been achieved primarily through in-house Navy construction projects. It had little experience with the offshore industry, and designers and contractors were neither familiar nor enthused with DoD or Navy facility contract procedures. Essentially, offshore design and construction was procured on a cost-plus basis, with the customer assuming all risks and liabilities. In the end, FPO-1 was able to negotiate a fixed price, A&E contract with Crest Offshore of Tulsa, OK, who accepted the 20-year design life liability negotiated as a cost of the fee. Crest Offshore was the same firm that developed the original OPN tower design for NAVAIRSYSCOM. In addition, FPO-1 contracted with TERA Inc. of Houston, Texas, to provide design quality assurance including an independent analysis of the A&E's design and resolution of critical design issues. A three-legged

jacket-type structure was selected as the most economical. Plans and specifications were completed in October 1976.

Using a prequalification acquisition process, the construction contract was awarded to Brown & Root Marine Operators, Inc. in December 1976. The contractor was faced with a tight 8-month construction schedule; nevertheless, fabrication was completed by 1977, and construction in August 1977. The superstructures were fabricated on their sides at Brown & Root's Green's Bayou facility on the Houston Ship Channel. One side of each superstructure and the two decks were welded out between two columns; the remaining two sides were framed into the third column. The third column was subsequently lifted, rotated, and set down atop the other two columns and decks for weldout. The superstructures were then uprighted in a two-crane lift operation for installation of the jib cranes, stairways, solar panel frames, navigational aids, and final painting.

Transportation of the tower components and offshore construction equipment was accomplished in two phases. The first involved transportation of the derrick barge and two cargo barges loaded with the components of two towers.

As the installation of tower #2 neared completion, the transportation plan called for a third barge with components of the remaining towers to be transported to site as Phase II. Once onsite, the floating crane was used to lift the jackets and lower them into the water, where divers released flood valves. The jackets reoriented themselves to an upright position and were set down on the seafloor. Piles were driven through the jacket columns 250 feet into the seabed. The towers were then placed atop the piles and welded to the jacket.

Subsequent to completion of each tower, UCT ONE divers performed an extensive visual inspection of each critical jacket weld and each anode to ensure that the quality of workmanship was sound and that the jackets were not damaged during installation. The divers also obtained baseline data of each tower's electro-potential and sea bottom conditions. This baseline data will be useful in future years to evaluate the effectiveness of the cathodic protection system and the extent of bottom scour.

The ocean construction platform SEACON, which was used to support the government diving operations, was considered an over-kill as an inspection vessel. However, for this assignment, the UCT ONE-SEACON combination provided the ROICC with a responsive inspection capability. Because of the contract requirement of a soon-as-practical inspection, the possibility of demurrage charges of \$60,000 per day for contractor delays, and the uncertainty of the tower completion schedule, an equivalent, responsive, commercial inspection capability could not have been achieved except through contract for a summer-long standby diving force at an excessive (estimated \$200K) cost.

The EC/ACMR project was a success story. Design and construction were accomplished well within the original MCON budget, and remarkably almost exactly on schedule. These offshore towers, serve as a visible example of NAVFAC's ocean engineering and ocean construction contracting capability to support Fleet Readiness.

Project Report Link:

East Coast Air Combat Maneuvering Range Construction Completion Report (ADA163320)

Navy Ocean Facilities Booklet (date unknown)

East Coast ACMR Survey Report - ADA182693