Rec'd 1/2/62 [illegible] No unit breakdown just totals

U. S. NAVAL MOBILE CONSTRUCTION BATTALION THREE
c/o Fleet Post Office
San Francisco, California

NCB3:10:JET:me
5213
Ser: 1061
DEC. 29. 1961

From: Commanding Officer
To: Commander, U. S. Naval Construction Battalions, Pacific

Subj: MCAF, Futema Completion Report; submission of

Ref: (a) COMCBPAC INST 5213.1 Ch 2 of 26 Jan 1959
(b) CO NCB3 ltr 11260 Ser 810 of 25 Jul 1961

Encl: (1) Completion Report Narrative and Photographs
(2) Labor Utilization Summary
(3) Safety Report
(4) Final Monthly Financial Summary dated 31 July 1961
(5) Final Construction Cost Summary Sheet
(6) MCAF, Futema Construction Cost Estimates
(7) Progress and Performance Chart (Stage I)

1. In accordance with reference (a), the completion report for the construction of Marine Corps Air Facility, Futema, Okinawa, is submitted herewith.

2. The Equipment Utilization Summary has been deleted as authorized by COMCBPAC and confirmed by reference (b).

3. A separate letter containing general design and construction problems not considered pertinent to the completion report will be submitted at a later date.

JOHN M. DANIELS

Copy to:
BUDOCKS
BUDOCKS (Dep. Chief)
BUDOCKS (Code 50)
CINCPACFLT
DIRPACDOCKS
OIC CECOS PORHUE
OIC COMCBPAC DET ALFA
OIC CBBU PORHUE
OICC FE REP J

NCB3:lO:JAM:bt
5213
Ser 258
2 April 1962

From: Commanding Officer, U.S. Naval Mobile Construction Battalion THREE
To: Commander, Naval Construction Battalions, Pacific

Subj: NCAF, Okinawa Completion Report; corrections to

Ref: (a) CO, NCB-3 ltr 5213 Ser 1061 of 29 Dec 61

Encl: (1) Enclosure (7) to subject report

1. Enclosure (1) has been corrected and is forwarded for insertion in the NCAF Okinawa Completion Report which was previously submitted by reference (a).

JOHN M. DANIELS

Copy to:
BuDocks
BuDocks (Dep Chief)
BuDocks (Code 50)
Cinc Pac Flt
Dir Pac Docks
Cic CNCUS Per Hae
CiC COMSERPAC Det Alfa
CiC CHEU Per Hae
CiCC FE Rep

GENERAL INSTRUCTION NARRATIVE

The Marine Corps Air Facility, Futema, is a helicopter base located on a plateau south of the village of Futema, Okinawa. The base, with the exception of the runway, was constructed by Mobile Construction Battalion THREE. Its construction, which required about three and a half years, included four hangars, four squadron administration buildings and one group administration building, with an attached communication wing, twenty barracks, ten BOQs, station and vehicle maintenance buildings, a galley, a theatre, a gymnasium, an exchange, a dispensary, four clubs, a chapel, an operations building with control tower, a fire and crash facility, one general storage warehouse, an inflammable storage warehouse, a 750,000 gallon water storage tank, a pyrotechnics and small arms magazine, an entire POL storage and dispensing system, and a 69,000 volt master switching station. Also constructed were all roads and utilities necessary for an operational facility.

The main body of the Battalion arrived in the latter part of January 1958. Due to the magnitude of the construction effort, the Battalion was increased in size to approximately 1000 men. The complexity and phasing of construction made it advisable to utilize the same Battalion for the entire construction period. Leave and training were accomplished by rotation of the men to CONUS every 9 months. Coincidentally, the same ship which brought the Battalion to Okinawa transported the men home in August 1961.

Extensive preparation was necessary to receive the main body and to provide shop and storage space for the job. To accomplish this, an advance party, Detachment Charlie of MCB THREE, was sent to Okinawa in the latter part of 1957. Their job was to rehabilitate and enlarge Camp Kubasaki and construct shops and storage facilities for Battalion use.

The Battalion started actual construction of Futema in April 1958. This was limited to site preparation for the barracks and the roads. Personnel were also engaged in the erection of the concrete batch plant and the construction of the precast yard.

The precast yard produced all the roof panels and wall panels used at Futema. In addition, roof panels for the warehouse project at Sukiran were made in the MCB 3 yard. In an attempt to speed production time the use of high early strength cement was tried; however, this was not successful, as it set up too rapidly in the thin shell portion of the roof panels. A straddle truck was modified for use in transporting the roof panels and a vacuum lift method for picking up the roof panels was used during the long period of operation, saving time by eliminating the need for cast-in lifting eyes. Over

6500 roof panels were cast before the last one was finished on 8 November 1960. With the pouring of the last wall panel on 25 November 1960, the precast yard was closed. Another time saving factor was the production in the yard of repetition type concrete structures. These included plenum boxes for the barracks heating systems and the standard 30' bents. The large 52' bents and endwalls were cast on the building sites, utilizing the tilt-up method of construction.

Several innovations were developed to speed on-the-job construction of these bents. These included:

(1) The use of high early strength cement, allowing erection in 5 days after concrete placement.

(2) Stacking the hinged bents three high and the wall bents two high to save time in forming.

(3) Where feasible, construction of temporary base slabs instead of the more time consuming cribbing process normally used.

(4) The use of sliding cribbing where the crane had to walk the bents into place.

Other steps were taken to achieve a "mass production" type sequence to speed construction. Steel bending and tying on specially made jigs and form construction in central locations are examples. A phased construction schedule was established in the barracks to move trained crews through the buildings, with each crew performing its particular task. This procedure produced maximum efficiency until the construction sequence was disrupted by the operational needs of the base.

To meet operational needs, MCB 3 was committed to provide certain first increment buildings to the station by 1 May 1960. This meant that crews trained to perform highly efficient sequential construction tasks were reassigned to work on finishing buildings for earlier turnover. By the time construction of the second increment facilities were commenced, the crews were broken up by transfers and rotations. Time was lost in establishing and training new crews.

Numerous problems were encountered during the construction of Futema. One of the first, and perhaps the most basic, was the lack of plans for the project. Material take-offs were made and construction was often started before signed prints were received. Officers and CPOs visited Camp Schwab, a facility of similiar construction, to familiarize themselves with certain construction details. The lack of prints also necessitated a departure from the most expeditious construction sequence. Lack of grading and utilities drawings often resulted in entering an area two and three times to install underground utilities, frequently resulting in extensive rework.

The delay in obtaining prints resulted in a delay in procurement of materials. With the distances involved, lead time was often six or more months. Materials ordered on "best guesses" sometimes required reordering or field changes which created delays. Austerity changes also meant reorders which resulted in further delays. To overcome the lead time in tool procurement, many Japanese tools were purchased. These didn't prove entirely satisfactory as a general rule.

The rock crusher could not produce sufficient coral to meet the needs of the project. This was supplemented by contract purchases later in the job.

Beach sand availability was a constant problem. Sources of acceptable sand were few and deliveries by the contractors were both tardy and inadequate.

The specifications in some cases proved inadequate. The door hinges originally specified were aluminum. These could not withstand the combined effects of the heavy door weights and the strong winds frequently experienced. These were later replaced with steel hinges.

The radial type compressors permitted by the specifications in the air conditioning systems will tend to raise maintenance cost on the units.

Roof leaks were a problem both as a result of inadequate specifications and inexperience in this work. In most cases the leaks were caused by:

(1) Dirty joints between roof panels and lack of grooves in which to place the mastic.

(2) Insufficient thickness of mastic below and above the glass fabric.

(3) Inadequate width or lack of glass fabric.

This problem created the need for considerable re-roofing in the first increment buildings. The second increment, in general, had few problems in this area.

The original door stop design proved to be inadequate for the high winds experienced on Okinawa. It was late in the job before a revision of the design was received which would adequately prevent damage to the doors.

As previously mentioned, personnel were rotated to CONUS approximately every nine months. This was necessary for leave and training, but it did create problems and additional work. Crew leaders often left before a suitable cut-off point was reached. This created administrative as well as operational problems. The determination of monthly draft requirements and assignments consumed valuable time of the project supervisors.

Problems were encountered due to equipment shortages. The ever present coral also added to the down time of equipment, as did delays in procurement of spare parts. One new TD-24 was down for 8 months awaiting parts. Critical pieces of equipment were frequently in short supply. Drilling equipment was always in demand due to the coral. Almost $60,000.00 was spent for blasting supplies during the job. It was found that one "air trac" could drill about four times the footage of a wagon drill, therefore this equipment was almost constantly in use. Compressors were continually critical items of equipment; however this shortage was alleviated in the final stages of the project by renting two large compressors from the Army.

The extensive drainage, utility and footing work made the Gradall one of the most popular pieces of equipment on the job. Two could have been kept in use almost continuously had they been available.

Front end loaders were also often needed. Due to the phasing of the work, grading and clean up often was accomplished immediately adjacent to finished structures. To move this earth, equipment, often too big for the job, had to be moved in. This occasionally resulted in damage to completed work and was slow and cumbersome.

The hydraulic ripper achieved outstanding results. However, it was found that the transmission on the 1956 TD-24 was inadequate for the increased load. When the ripper was put on the 1951 TD-24, it worked out very well.

When extensive finish grading was being done, graders were never plentiful enough. This need became so critical in the final months that a grader was rented from the Army.

The asphalt finisher and distributor were often down for repairs. During the critical paving period, a paver was rented from the Army for use as a standby.

In the final months, funds were available for rentals. During the intermediate stages however, this was not so. This meant that equipment shortages often resulted in a complete shut-down of particular increments of work.

In addition to the task of constructing Futema, MCB 3 was designated as the Ready Battalion. This function was actually fulfilled twice; once in December 1960 and again in March 1961, when the Battalion was called upon to furnish support to the Marines. About three months were lost to the job during these exercises.

In spite of the many problems encountered, work quality and production continued to increase and by August 14, when the main body departed, all buildings had been finished and transferred to the station.

CI 1.1 ROADS

a. There are three principal roads at Futema. The "A" Road, which leads from the station entrance, runs past the Marine Exchange, Theatre and Gymnasium and joins the "G" Road at the south end of the runway. The "B" Road serves the Barracks and BOQ areas. The "G" Road serves the operational side of the field, running parallel to the runway on the east side. These roads are all paved with 2" asphaltic concrete. Several smaller feeder roads generally with single surface treatment serve outlying buildings.

b. Work started on the roads in June 1958. At this time work had just started on the barracks, and effort was concentrated on developing the "B" Road to provide access. The "A" Road was brought to dirt grade for this same reason. By July, the complete "A" and "B" Road loop was coral surfaced, which greatly improved traffic flow. In September the "B" Road in the BOQ area was coral surfaced, as was the "C" Road. The "C" Road was then used as a storage area for the roof panels produced in the precast yard.

c. Little additional road work was scheduled until the middle of 1959. At this time, the road from the "G" Road to the water tank was started. The "A" Road, from the "B" Road intersection to the NIKE access road, received coral in September 1959. Most rough road work was done by this time. In January 1960, clearing for the Vehicle Maintenance Building parking lot started.

d. The rough grade on the SOQ road was accomplished only after consideruble excavation in coral.

e. The Access Road was paved in June and July 1960.

f. By October 1960, finish work started on the roads and parking. The parking lots in the BOQ areas were brought to finish grade. In November, the "B" Road was paved through the barracks area from the "A" Road intersection to the main gate intersection. In December, the "B" Road paving continued from the access road to BOQ 3. Due to the condition of the MCB 3 asphalt finisher, the Army's machine was used with excellent results. That same month, the road to the Water Tank and Small Arms Magazine received its single surface treatment. The shoulders on the "B" Road also received their single surface treatment at this time.

g. In January 1961, the gate area intersection was paved as were the parking lots between BOQs 2 and 3, and 4 and 5. The Operations Tower parking lot was paved in March.

h. Increased paving operations started in June 1961, with paving of the E. M. Galley, Dispensary and Commissioned Officers' Mess parking lots. By July, the "G" Road had been primed and paved, and the "A" Road primed.

i. Due to the limited reliability of MCB 3's machine, a paver was rented from the Army during the paving season. Problems arose in obtaining final commitments for the supply of asphaltic concrete. The supplier claimed this was due to a lack of aggregate. To help alleviate this problem, MCB 3 personnel located a second source of aggregate and designed a mix for the plant. The lack of an alternate source of asphaltic concrete was a distinct disadvantage. The Army was rehabilitating their plant as the job drew to a close but could offer no support in this respect.

j. As road construction increased, added demands were placed upon the crusher. As a result of the financial reconciliations, funds were recovered which permitted procurement of coral by contract. This proved to be very satisfactory and the contractor performed very well.

CI 1.2 ACCESS ROAD

a. The Access Road extends from the gate house at the top of the hill at Futema to Route 1 at the foot of the hill.

b. Work started on the initial clearing and blasting for this road in January 1959. Property clearance had not yet been received at this time and work was suspended until March, when the rights were secured. The road was staked out at this time.

c. Heavy grading and extensive blasting in coral were necessary to get the road to grade. Frequent shortages of drilling equipment created many delays.

d. In June 1960, and 11 foot width was paved. Critical equipment was pulled for urgent work in other areas and it was 29 July before paving was completed. In December 1960, the shoulders received their single surface treatment and the road was completed.

CI 1.3/1.6 POWER AND COMMUNICATIONS

a. The power system for Futema starts at Highway 1 with a 69,000 volt, 400 ampere switching station. Two 60 foot transmission towers carry the power up to the master substation which contains a 5000 KVA transformer and a metal clad switch gear assembly containing all automatic controls and breakers for distribution by four transmission circuits to 22 unit substations ranging from 25 to 500 KVA. Power is then distributed to various load centers within the buildings.

b. The communications system consists of several runs of 303, 202 and 101 pair cables. A 303 pair cable connects the communications Wing on the west side of the field to the Operations Building on the east.

c. Power and communications work started in February 1959 with the placing of the first 380 feet of the 10 conduit duct crossing the runway. In July the first unit substation was placed on its pad between barracks 7 and 8. With the arrival of the units, work started in August on the assembly of the switching and master substation. Work started in November on the four 60 foot towers in the switching station. By December the switching station was complete except for the tie-in to island power. In January 1960 the switching station was tied in and work started on the foundation for the master substation. The main transformer was set in February and power poles were set in the BOQ and barracks areas. The metal clad switch gear assembly for the master substation was in a damaged condition upon arrival. A technical representative from ITE Maloney, the supplier, came to Okinawa and spent 3 days in inspecting, adjusting and lifting the assembly. Replacements were ordered for the assembly that was damaged. Four of the five assemblies were made operable at that time. In April, the master substation and 5 unit substations were energized and island power was brought into the BOQs, barracks and E. M. Mess.

d. In April a contract was awarded for cable splicing. Men had been specially trained for this work at Port Hueneme and the opportunity to work closely with the contractor provided excellent experience which became invaluable as the job progressed.

e. A delay was incurred due to the non-receipt of pot heads from a U. S. supplier. To maintain the tight construction schedule and to enable MCB 3 to meet its construction commitments, potheads were procured from PWC Subic Bay and installed. The potheads were installed by contract and several blew out as a result of faulty installation. It was determined that this was caused by too sharp a bend in the lead sheathed cable. These repairs caused the battalion to spend considerable time in maintenance work.

f. In May the substation for the Group Administration Building was placed in operation. Also that month, the Army NIKE circuit from the main switch was energized.

g. In July 4900 feet of 303 jute covered cable was pulled from the east to west side of the field. This proved to be much harder to pull than lead covered cable and operations were done in the cooler night hours.

h. The hangar side of the field was tied into island power in August 1960. In September much work was done in "typhoon proofing" the outdoor open-type unit substations which were quite vulnerable to rain storms. Work was accomplished to reinsulate the bus bars and primary leads to prevent arcing. Also completed that month was the pulling of the 303 cable across the field. The splices in this run were completed in October.

i. In November 1960 secondary power was brought into BOQs 7, 8 and 9. The 202 pair cable from the Communications Wing to the BOQs also was installed and spliced. In January 1961 the cable installation was complete from the Communications Wing to the Operations Building and Hangars A-1, A-3 and A-5, and Squadron Administration Building A-2, A-4 and A-6. By February all phones were installed in the BOQs and the cable was laid to Hangar A-7 and Squadron Administration Building A-8. The main frame arrived but its installation was delayed by lack of silk and cotton cable.

. In May 1961 power was installed in the Vehicle Maintenance Building and the co-axial cable pulled for the whip antenna adjacent to the Operations Building. In June, secondary power was installed to E.M. Clubs "A" and "B", the NCO Club, the Chapel and to the Pyrotechnics Magazine. The support brackets for the street lighting system had arrived but work was delayed pending receipt of the luminaires and poles. The main frame in the Operations Building was completed and phones were installed in all the hangars, Squadron Administration buildings, Station Maintenance building, Warehouse, Dispensary, Commissioned Officers' Mess and Post Office. The cable was installed to the clubs and Barracks 2 - 8, the Marine Exchange and the Gymnasium.

k. On 15 July the grounding grid was completed on the monopole antenna behind the warehouse.

l. With the completion of the street lighting system in August 1961, the power and communications work was completed.

CI 1.4A WATER DISTRIBUTION

a. Water for Futema comes from the Sukiran reservoir about seven miles distant. A 16" line about a mile east on Highway 30 ties into 1100 feet of 12" pipe installed by MCB 3. A loop of 6500 feet of 14" pipe and 3000 feet of 10" and 8" cast iron pipe serves the Hangars, Vehicle Maintenance, Fire and Crash, the Operations and Administrative Buildings on the operations side of the field. In addition to the 12" main connecting the BOQ and Hangar areas, a 2400 foot run of 10" pipe completes the loop tying the Hangar area to the barracks. 6000 feet of 8" cast iron pipe provides water service to the barracks, BOQs, Galley and Clubs. In addition to the domestic service, 750,000 gallons of water is stored in a reinforced concrete water tank constructed by MCB 3 to provide fire protection on the operations side of the field.

b. Work started with the laying of the water line along the "B" Road in September 1958. In February 1959, a 10" cast iron water line was laid under the runway in the same trench as the 10-duct run for power and communications. Work continued and in April, 3800 feet of 12" pipe was placed. June was a productive month with 5450 feet being placed. Of this, 3000 feet of 12" pipe was placed by contract.

c. On 16 May work started on laying the 12" pipe from Route 30 to the BOQ area. In July a change order was issued to this contract to include the 12" run from the BOQs to the Hangars.

d. By September 1959, the 8" loop around the "A" and "B" Roads was complete and water was available, at low pressure, on both sides of the field. In October, service lines were complete to all 1 May turnover items.

e. Extensive coral in the A-1, A-3 Hangar areas delayed completion of the 14" loop serving those buildings. Except for the altitude valve installation, the 16" line from the water tank was completed in September.

f. Miscellaneous work remained, and as crews were available, these items were accomplished: the flow meter serving Futema in October, 12 fire hydrants in the Hangar area in November and forming and pouring flush type hydrant boxes in December. The last major item of water distribution was completed in December with the laying of 200 feet of cast iron pipe behind Hangar A-1.

g. In May 1961, water to the E. M. Clubs "A" and "B" was tied-in and with the tie-in of the Chapel service in July, the water distribution was completed.

CI 1.4B WATER TANK

a. To provide adequate water for the fire protection sprinkler systems in the Hangars and Warehouses, it was necessary to construct a 750,000 gallon reinforced concrete water tank. The tank is thirty feet high and has a diameter of 70 feet. The walls are 18" thick and the poured-in-place roof is 8" thick.

b. Work started in January 1960, with the subdrains and supply pipes. The forms for the tank were fabricated in the carpenter shop. The footings for the walls and columns were poured in February, and placing of the reinforcing steel started. The four spiral columns were poured in March. The first ten-foot lift of the wall section was poured and the deck slabs were started in April. The deck pour and the second wall lift was done in May, and by June the last wall pour was completed. The Forms were stripped and shoring for the roof pour was started.

c. The she-bolts holes were filled and by August, the roof slab was poured. In September, the she-bolt holes were holy-stoned and painted with silicone paint to prevent leakage.

d. The water level indicator gage and the other appertenances were completed in October. A question had arisen as to the type of altitude valve on hand. It was determined that it was a two-way valve as required and its installation was completed in January 1961. The tank was filled in February. The she-bolt holes wept for a short time and then dried. A leak still existed and the tank was drained in June and the joints in the deck slab were cleaned, recaulked with oakum, and sealed with mastic. The tank was again filled, but the leakage continued. This problem was referred to OICCPE REP for study.

CI 1.5 SEWERAGE

a. The sewerage system at Futema consists of two systems connected by a run across the runway and having a common outfall. The system on the operational side of the field consists of over 5000 feet of 6" and 8" concrete pipe. The run across the field is an 8" run about 8000 feet long. On the community side, 11,000 feet of 6" and 8" pipe provide the service. These systems flow into a 10" concrete pipe which empties into the 24" sewer on Highway 1.

b. Construction of the sewerage system started in the barracks area in August 1958. By October, the system serving Barracks 1 through 4 was completed. In November work started in the BOQ area, however, extensive coral was encountered and much blasting was required in this area.

c. In May 1959, a contract was awarded for construction of a sewer line from the BOQ area to the 24" outfall on Route 1. In June the contractor had laid 1000 feet of 10" pipe on this run. In July he encountered coral and delays were incurred. Progress was slow and it was not until January 1960 that the line to the outfall was operating. With this completed, the BOQs and Barracks 1 through 4 had operating sewers.

d. In February, a service line serving the remaining barracks and the Mess Hall was completed. Contract work continued on the operational side of the field. By April, sewerage was completed and open to all 1 May turnover items. By May 1960, all sewerage was completed except for the second increment buildings.

e. In January 1961, the run to the Commissioned Officers' Mess was completed, again involving time consuming cuts in coral. The run to the NCO Club was completed in February, the run to E. M. Clubs "A" and "B" in May and the Chapel and SOQ tie-in were completed in July.

f. With the completion of the Chapel run, all sewerage work within the project was completed.

CI 1.7 SITE PREPARATION

a. In order to erect the sixty buildings at Futema, extensive site preparation had to be accomplished. The sequence of work was such that this item, instead of being completed early in the job, continued until practically the last day. Many factors combined to create this situation; most were not within the control of the battalion. Basically these factors were equipment availability, manpower, operational commitments and, to a lesser extent, the weather.

b. The equipment allowance was not tailored for the extensive amount of earthmoving that was required. At the beginning of the project, the battalion had about ten bulldozers. Due to their age and the constant battle with coral, availability was rarely over 50%. In contrast, when the contractor started site preparation work on a similar job at Camp Hansen, he had over 50 bulldozers operating at one time.

c. The battalion manpower was not set up to conduct extensive earthwork in the initial stages of construction. As a consequence, many of the UTs and CEs could not be employed directly on the job while the EOs were on a three-shift operation.

d. Operational commitments, and the decision to make certain buildings available to the Marines on 1 May 1960, disrupted the production-line sequence of construction and placed greater demand on equipment for use in construction of building pads. This caused a shift from the critical area of utilities and drainage.

e. The weather was a nuisance factor, the effects of which could have been reduced had early attention and effort been placed on creating complete drainage structures. As it was, over 50% of the drainage was left for accomplishment in the last three months, after all the buildings had been erected.

f. The following comments are more of a general nature but help explain the sequence of work that was actually employed.

g. Work started in the barracks area in June 1958 with the shaping of the pads for Barracks 7 and 8. The access roads to these pads were also roughed at this time. Before the barracks area was completely prepared for construction, 10,000 yards of coral had to be removed. This required extensive blasting. Next to be prepared were the sites for the E. M. Galley and the Hangars. This was started in August 1958.

h. In February 1959, the Group and Squadron Administration building sites were prepared. The POL sites were roughed-in in April and in June work started on the Marine Exchange site. This site was not completely finished until August 1961 when work was accomplished on the loading ramps and parking lot for this building.

i. In July 1959 the pads for the Master Substation and the Commissioned Officers' Mess were prepared. When work on the water tank started in August a cave was discovered under the site. This matter was referred to HQICC Okinawa and a method of completing construction was developed.

j. By December 1959, work on the pads for the second increment barracks was completed. The Dispensary pad was done in April 1960 and in May work on the Chapel pad was completed. Assistance was received from the 3rd Marine Pioneer Battalion, as a joint training project, in the preparation of the Theatre and Gymnasium pads. The fill and pad for the E. M. Club "A" was completed in July and, by October, the site prep work for all buildings had been completed. One item added to the project in early 1961 was the construction of a whip and monopol antenna near the Operations Building and Warehouse. This work was completed in July 1961.

k. When site prep started for the drainage structures at the end of the runway in June 1961, assistance was received from the 809th Army Engineers. Their equipment and operators were of great assistance in this area. They also did site prep work for the E. M. Club "A" and NCO Club parking areas. Final work was done in August and September 1961 in preparing sites for drainage structures to be installed in later construction programs.

CI 1.8 DRAINAGE

a. The storm drainage system at Futema consists of about 11,000 feet of concrete pipe varying from 15" to 45" in diameter and about 27,000 feet of grouted stone ditches and scour aprons. The grouted stone ditches were constructed exclusively by contract while the Seabees placed the bulk of the concrete pipe.

b. Work started in September 1958 with construction of the 36" storm drain under the Aircraft Parking Apron. This work continued until November when drainage work was temporarily suspended in order to utilize equipment on the site prep for building and roads. Little additional drainage work was done except for some contract work on grouted stone ditches. In February 1960, the contractor started work on the grouted stone ditches along the Access Road. In November 1960, Seabee drainage work resumed with the laying of 800 feet of 24" storm drain in the Aircraft Parking Apron. In February 1961 the storm drain across theHangar A-3 taxiway was laid. Additional work done in March tied in the Access Road drainage to the island drainage system along Highway 1.

c. In May 1961, heavy effort was placed on drainage. The 24" culvert was laid infront of the Vehicle Maintenance Building and parking lot and preparation was started on the 42" pipe installation across the "G" Road near the Vehicle Maintenance Building. This was completed in June. July saw completion of 920 feet of 36" concrete pipe across the "G" Road at the end of the runway, and 350 feet of 36" RCP across the taxiway west of Hangar A-1. The Army 809th Engineers cut an 8 foot trapezoidal ditch in that area which further increased the drainage gains. Their equipment had been idle and they welcomed the opportunity to train their operators.

d. Extensive contract work started in July on grouted stone ditches along the "B" Road in the barracks area. Contractors also laid 2 - 36" RCP across the "A" Road by the NIKE acess road. In the last three months, more drainage work was accomplished than during the entire previous period. The drainage system as designed and constructed is inadequate and considerable Seabee time and effort was spent in maintaining drainage during heavy rains. Study and redesign will be necessary in some areas to provide as adequate system.

CI 1.9 HANGAR ACCESS WAYS

a. The hangar access ways run from the concrete aprons at each of the hangars to the taxiway. Originally scheduled for single surface treatment, these are now just at coral grade to allow for the portland cement parking apron to be constructed in the near future.

b. Work on these access ways started in June of 1959 at Hangars A-5 and A-7. These required little grading and were at finish grade in July 1959. The A-3 access way required some coral fill which was accomplished in August.

c. Extensive coral was encountered in the A-1 access way and the coral removal required about three months. Work progressed slowly due to lack of drilling equipment and other equipment shortages. The non-availability of the paving machine and other critical equipment prevented paving the road leading from the Control Tower to the aircraft parking apron.

d. By October 1959, all the access ways were completed; and by February 1960, the concrete aprons at the hangars were completed.

CI 1.11 SEEDING, SODDING AND SPRIGGING

a. Work on this item started in March 1961, with some seeding in the BOQ area. Extensive work started in April when a contract for sodding was awarded. By using sod from the open areas on the station, the price was quite reasonable and the contractor proved to be very satisfactory. By May, the contractor had completed the banks around the Station Maintenance Building, two Squadron Administration Buildings A-2 and A-8, and some work in the BOQ area. In June the areas around the Dispensary and some of the barracks were completed under the same contract.

b. The large Mack Dumps were used to haul top soil around the barracks, BOQs and Clubs in July. Here, as in the finish grade, a small farm tractor would have proved of great assistance in spreading the top soil. The barracks areas were sodded in late July and August.

CI 04 FIRE AND CRASH FACILITY

a. The 96' X 41' building is one of the three completely poured-in-place structures on MCAF. Access to the vehicle parking area is through eight 12' X 15' roll-up doors. Berthing and head facilities for the crew are in the low bay portion of the building.

b. The poured-in-place bents and beams in the high-bay section were completed in June 1960. The next month saw completion of the columns, beams and roof of the low-bay section. Bituminous coating of the low-bay roof and installation of the underslab utilities work was completed in August. In September, all the block work was done, the decks poured and work was started on the window installation. The windows and doors were finished in October as was the tile work in the heads. The roll-up doors were installed in November, with the exception of painting and installation of the motors.

c. The exterior finish and silicone treatment were completed in February and on 30 March, the building was transferred to MCAF.

d. Considerable trouble was experienced in obtaining satisfactory operation of the roll-up doors. Many remedies were tried including realigning the tracks and readjusting the runners. A manufacturer's representative from Japan visited the site and installed 3-phase 1 HP motors in place of the single phase 1 HP motors specified in the prints. With this change, the doors worked satisfactorily.

CI 05 POL SYSTEM

a. The POL system consist of two 2000 barrel bolted steel AVGAS tanks and two 25,000 gallon bolted steel MOGAS and Diesel tanks. Each system is an integral unit containing filters, water separators, valve manifolds and pits, fire protection foam lines and generator units and truck fill stands. The entire facility is protected by a complete cathodic protection system. Since specialized skills were required in its construction, personnel were trained in Port Hueneme a year before construction started, in welding aluminum pipe using the heli-arc machine.

b. It was decided not to use the existing system so one of the first items of work was to demolish the old truck fill stand. This, along with the excavation of service lines to the AVGAS site was completed in February 1960. The concrete base rings for the tanks were poured in March and some fittings were placed on the separator pad.

c. Erection of the tanks started in April and concrete was poured for the truck fill stand. The job was progressing well when the crews were reassigned for use in more critical areas for the 1 May turnover.

d. By June the crews had returned and erection of the AVGAS and MOGAS tanks was completed. The lack of site prep work delayed further work for a short period.

e. In July, the crews were again pulled for other work. Upon resuming work, effort was concentrated on the grounding system and the aluminum welding on the AVGAS truck fill stand. The concrete drain pit at MOGAS was poured in September. Further work was delayed pending completion of the site prep. The truck fill stand was installed in October and, in November, the exterior of the MOGAS tanks was painted. That same month, cleaning and painting of the interior of the MOGAS tanks was started.

f. The MOGAS tanks were water tested in December and the few leaks noted were repaired. The truck fill stand at AVGAS was completed as was all aluminum during February 1961

g. By March, all electrical work on the pump pads was done, all piping but the foam system was done (a delay was incurred here pending receipt of the design for the foam system), the cathodic protection was nearly done, and work started on the dikes at AVGAS.

h. The foam generator house at AVGAS was structurally complete in May as were the sub-surface foam injection lines. The concrete apron at AVGAS was paved in June and all foam lines were installed. A delay in receipt of the swing check valves prevented further work. It was decided to have steel spools made with the same face to face dimensions for insertion in place of the valve to allow testing of the lines. These were later removed when the valves arrived.

i. Final wind up of the project in July 1961 saw completion of the cathodic protection system interior, coating of the foam tanks with serun, finish grade on the dikes and touch up painting.

j. Considerable discussion as to interior painting of the tanks arose and, in late July 1961, ROICC Okinawa stated that the interior of the AVGAS tank should be bare. These tanks had been shop painted on both sides, thus necessitating removal of this paint. The attached letter (CO MCB THREE ltr 9 Aug 1961) recommended certain action to be taken before this work was done.

k. Material shortages plagued this project. The cathodic protection paint with a shelf life of six months was received a year before it could be used. This necessitated a re-order causing a delay in completion. The swing check valves were ordered on time but a series of disasters at sea delayed their arrival on time. A great deal of experience in POL systems was gained in the construction of this facility.

U. S. NAVAL MOBILE CONSTRUCTION BATTALION THREE
c/o Fleet Post Office
San Francisco, California

MCB3:10:JMD:wk
5010
Ser: 866
9 Aug 1961

From: Commanding Officer
To: ROICC BuDocks Contracts Okinawa

Subj: POL Farm Tanks, MCAF, Futema; interior painting on

Ref: (a) ROICC Oki ltr ser 450 of 4 Aug 61

1. Reference (a) requested that the interior surface of all POL tanks at the Futema project be processed to bare metal.

2. The ROICC cited as a reason the following:

(a) The plans and specifications.

(b) The Army POL Division-Sub-Area Petroleum Office requires it.

3. The Commanding desires to point out:

(a) The plans and specifications develop the requirement more by negative reference and interpretation than by specific statement. This has undoubtedly been obvious to the ROICC otherwise your office would not have waited, until the last week this Battalion is on the job, to formalize the requirement.

(b) The requirements of the Army POL Division-Sub-Area Petroleum Office are not a factor in the context stated. There are many petroleum tanks in service with interior linings varying from gunite, special paint including cathodic liners, saran lining, etc. Many of the government petroleum tank interiors on this island are painted with zinc chromate. This is a matter easily verified.

4. It is obvious that MCB THREE cannot in the remaining time remove the interior coating. It is true that a sandblasting contract can be let to perform this function. In order to proceed from a base of sound engineering judgement however, the following procedure is recommended:

(a) Test the tank coating to see if it reacts in the presence of, or is deleterious to petroleum products.

This command considers, on the basis of recent lab tests, that it is not harmful.

(b) If lab tests are successful then accept the installations, as is. If tests indicate otherwise let an informal contract for sandblasting interiors. It is perhaps superfluous to note that extraordinary protection will have to be given to the special cathodic protection lining in the tank bottoms.

/S/ JOHN M. DANIELS

Copy to:
OICC FE
MCB FIVE

CI 09 COMMUNICATIONS

a. This 135' X 30' building extends at right angles from the center of the Group Administration Building. It houses the telephone exchange, message center, two vaults for registered publications, a crypto room and a mechanical room. The wing is windowless for security reasons; therefore, it is airconditioned throughout.

b. Construction of this building closely followed that of the Group Administration Building. Site work was started in August 1958. The footings were completed in July 1959, and the cable trenches were formed and poured in August. By September erection of the frames and end walls was completed. December saw the completion of the block work for the vaults and crypto spaces, and placing of the roof panels.

c. Installation of the telephone exchange was started by the manufacturers in February. Delays in receipt of the mechanical equipment precluded turning over a complete facility by May 1960. The air conditioning system finally arrived in the latter part of August 1960. Problems arose when the equipment didn't match up with the openings provided during construction. This entailed chipping of concrete and some additional work. The air conditioning system was completed and tested in October 1960, completing all work in the building.

d. The major problem in this building was the lack of adequate ventilation of the mechanical spaces. One proposal was to extend the room to allow better circulation and equipment arrangement; however, the required results were achieved through an increased amount of forced ventilation.

CI 10 HANGARS

a. The four hangars, A-1, A-3, A-5 and A-7 represented one of the largest single construction item at Futema. All hangars consist of a six-bay high bay building with an interior clear space of 94' X 118' X 34'. These buildings also have a leanto section on the runway side which houses the administrative spaces. In addition, Hangar A-5, the maintenance hangar, has a maintenance shop which covers 20,000 square feet. This shop contains a photo lab, a parachute loft with drying tower, a battery room, an avionics repair shop and 14 offices. Access to the hangars is through a 34' high sliding door and three roll-up doors.

b. With the receipt of the unsigned prints for grading and drainage in the hangar areas on 25 June 1958, work started on site preparation for A-7. In August 1958 the site prep was completed and the footings poured for A-7.

c. Due to the need for typhoon protection of aircraft by 1 July 1959, the hangar construction schedule was revised to complete the shells before starting work on the lean-to sections. Some difficulties were experienced in handling the #11 bar used in the bents due to its weight. In spite of this, the precast frames for A-5 and A-7 were erected by November. The shortage of #11 bar on the island was a critical problem and was met by borrowing steel from other projects and from the Army.

d. All the precast frames were ready and the roof panels were placed on A-7 in January 1959. Block work on this building was also underway. By February all precast frames had been erected on all the hangars and the A-7 shell block work had been done.

e. The excessive clear height of these buildings made it necessary to erect scaffolding in the bed of dump trucks in order to grout the roof panels. By April, the A-5 and A-3 roof panels had been set and the deck slab in A-7 had been poured. The sliding and roll-up doors in A-7 were completed in May as was the deck slab in A-5, the block in A-3 and the roof panels in A-1.

f. June saw the completion of the A-7 lean-to bent section and stiffner pour, the installation of the sliding and roll-up doors in A-5 and A-3, the deck pours in A-3 and the block work in A-1.

g. The glass installation in A-7 was completed and the hangar was used for typhoon protection of aircraft on 14 - 17 July. Due to the typhoon threat, the forms for A-5 had to be taken down and erected 4 times before the pour could be made. A-1 was turned over to the MCAF Prospective Commanding Officer in October 1959 for material storage due to the loss of a warehouse during typhoon Charlotte.

h. Turnover of A-7 was delayed in November by Material shortages. As materials arrived, they were installed and on 26 January 1960, A-7 was transferred to MCAF.

i. The drying tower in A-5 was completed in April and the hangar was ready for the 1 May 1960 turnover. The material which had been stored in A-3 was transferred to the Supply Warehouse and the hangar was also ready for the 1 May transfer.

j. Due to severe roof leaks in A-1 the roof joints had to be re-sealed in July. On 1 September this building was transferred to MCAF, thus completing acceptance of the hangars.

k. A problem arose in the operation of the sliding doors requiring repetitive adjustment of the doors. The actuating cables tended to stretch and ride off the sheaves so the doors could not open easily. Continuing adjustment finally eliminated this problem, but the indiscriminate use of shop mules, fork lifts, etc, by the using activity damaged the door edge safety switch mechanism. It is recommended that future doors of this type be clearly marked to minimize damage during construction as well as operation of the doors.

l. The exterior finish and silicone treatment of the block work on the hangars was accomplished by contract.

m. As in a number of other first increment buildings, serious problems were encountered with regard to roof leakage after acceptance of the buildings. Investigation by the CO, MCB 3, indicated extensive resealing of roof joints were required in A-3, A-5 and A-7 after about one year's weathering. A contract was prepared by MCB 3 to accomplish these required repairs during August and September 1961.

CI 11.1 SUPPLY WAREHOUSE

a. The General Storage Warehouse, with overall dimensions of 203' X 257', covers the largest area of any building on the Futema project. It consists of two large storage areas separated by a precast concrete firewall. An earthquake joint separates these two areas. Each side is made up of two of 33' bents connected by an apex beam. A total of 48 of these 33' bents had to be erected. Access is through 9 roll-up aluminum doors.

b. Revised prints for the Warehouse to permit aluminum roof coating were received on 30 January 1959. In February, trenching for the footings and fabrication of the reinforcing steel commenced. The first typical 33' bent was poured in April. By June 1959, all precast roof and wall panels had been produced in the precast yard. The first 33' bent cracked at the lifting point during erection. This problem was solved by use of a steel "splint" and no further problems were encountered in erection.

c. On 27 July 1959 the end-wall frame was erected using a Bucyrus Erie 54B and a P&H 955A crane. This lift weighed 45 1/2 tons and was the largest precast concrete lift made in Okinawa until that time. Placing of the apex beams started in August 1959. A delay in setting roof panels was encountered due to a breakdown in the vacuum lifting machine. This was soon overcome and by September, one half of the Warehouse had been completed. Shortage of personnel and the fact that the large 54B crane was being used on the White Beach project created delays in further erection; however, on 8 and 9 December 1959, the crane was back and two lifts of 53 and 54 tons respectively were made. These were the last of the end bents. The last wall panel was set on 15 December completing the erection of the building.

d. Work on the window installation started in January 1960 and, by 1 May, the building was complete and in use by MCAF and MCB 3.

e. After acceptance and occupancy of this building serious roof leaks began developing. An investigation by the CO, MCB3 indicated almost a complete resealing of the roof joints was required; therefore a contract was let by MCB 3 during the last weeks of the deployment to accomplish the required repairs at no cost to the using facility.

CI 11.2 INFLAMMABLE STORAGE

a. This 59' X 30' building contains four precast wall bents. It is used to store volatile materials not suitable for storage in the adjacent General Storage Warehouse.

b. Construction started in May 1960. During the month, work was started on the slab and the wall bents were poured. These, as in the Marine Exchange, were poured in stacks of two. This proved to be quite a timesaving innovation.

c. In June the building was erected, all roof and wall panels were set and the stiffners and grade beams were poured. The building was structurally complete in July, and work started on the loading dock.

d. The doors and windows were installed, the loading dock was poured and the explosion-proof light fixture installation were all accomplished in August. No further work could be done until the sprinkler system arrived. Its arrival and installation in January 1961 completed work in the building.

CI 12 PYROTECHNICS AND SMALL ARMS MAGAZINE

a. This is a small poured-in-place structure consisting of two separate rooms. The built-up roof is designed to blow off in event of explosion. An extensive grounding system protects the building from strong electric current.

b. The footings and grade beams were poured 1 August 1960. The job site was cleaned up and secured until personnel were available, due to work of higher priority.

c. In May 1961, crews returned and the walls and deck were poured and the blow-off roof installed. The built-up roof was finished in June, as were the lightning arrestors. Delay in procurement of the two louvers delayed final completion, but they were installed in August and the building was turned over to MCAF.

d. The construction of this facility raised serious doubts with regard to the practicality of the design when the efforts required are related to the construction and functional results achieved. It appeared the same safety and utility requirements could have been met by a standard functional type unit.

CI 13 BARRACKS (first increment)

a. This item represented one of the largest increments of work in the entire Futema Project. It consists of 12 buildings of precast concrete construction, each 212' X 30', capable of housing 69 men in normal conditions and 96 men in emergencies. Twelve bents form eleven bays. The four end-bays on each end contain berthing areas; the three center bays contain two shower rooms, two head sections and a large central lavatory. The mechanical room for the building is also in this section.

b. Site preparation and pad compaction started in April 1958 for Barracks 7 and 8. Approximately 10,000 yards of coral had to be excavated in the entire barracks area. This created unexpected problems since it could not be removed with a bulldozer and rooter as anticipated but had to be drilled and blasted.

c. On 14 August 1958, the frame for Barracks 8 was erected. This was the first precast erection on the Futema job. By December 1958 all shells had been erected and all stiffeners were poured in the first increment barracks. A delay in delivery of the plumbing fixtures held up interior work. As the material take-off on the buildings had been predicted on the Camp Schwab design, minor field changes had to be accomplished when the actual design turned out to be somewhat different. This also created a delay in the receipt of the windows for this increment which had been ordered under the old design. This again delayed interior work.

d. The roofing was completed in August 1959 and by October 1959, much of the interior work had been completed. On 29 October, Barracks 1, the first building to be completed on the project was accepted by the Prospective Commanding Officer, MCAF, Futema. Buildings were then turned over as finish work progressed and by 20 July 1960, the west half of Barracks 15 was accepted by the Marines. The east half of Barracks 15, used as the MCB 3 Operations Office, was turned over in August 1961. This completed work on the first increment barracks.

CI 14 E. M. MESS, BAKERY AND GALLEY

a. The overall dimensions of this building, 158' X 105', contain perhaps the most complex spaces on the project. The galley has seven fully automatic reefer rooms, a 500 KVA transformer serving as a main substation, a boiler room with two 1500 gallon boilers and a 75 KW generator for emergency power. The design capacity of the mess hall is 1000 men per meal.

b. In June 1958, the site was cleared of rock; by September, site prep was completed and the first footings were poured. Rains in October caused the loss of one deck section, but by 6 December 1958 the first 52' bent was erected. This heralded a new frontier in Seabee construction. A great deal of skepticism surrounded the ability to make such a lift since three similar bents had been cracked by a civilian contractor at Camp Schwab. Due to the size involved, the south end wall was poured in place. One bent did crack during erection, but a stiffner of 18" channel was used and a special rigging design was developed which proved to be very successful.

c. To save time, the intermediate bents were poured on the deck slabs in stacks of two. By March 1959, the remaining precast bents and roof panels were in place on the mess hall. By June the entire shell erection was complete and in August, window installation commenced. Work was delayed in October because the tile setters from the barracks were not available. Some rework was involved when equipment to be installed differed materially from the details on the plans. Thefts of plumbing fixtures became a problem and only stopped when a guard was placed in the building on a permanent basis.

d. By March 1960 the block and tile work was completed and on 30 April, the galley was ready for transfer to MCAF.

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CI 15 BOQS (First Increment)

a. This increment consisted of six of the ten BOQs to be constructed at Futema. Each building, like the barracks, used twelve standard 30' precast bents. The dimensions of each building are 213' X 30'. Under normal conditions with one officer per room, each BOQ will house 20 men. The rooms each have a lavatory and every two rooms have an adjoining bath. In addition, each room has a three-door wardrobe with a built-in heater.

b. Work on this increment started with the site preparation for BOQ 4 in August 1958. In September 1958, the footings on two BOQs were poured. By January 1959, all precast shell erection was completed. The construction was phased so that the crews finishing in the Barracks would move into the BOQs. For this reason, no further work was accomplished until September 1959, when crews moved in and started work on the roofing. By October, a few of the Barracks crew were free to start on the interior work, but delays were encountered when all the crews weren't available as planned. To offset this delay, it was decided to conctract the ceramic tile work. This contract, along with the interior block work, was completed by March 1960.

c. In April of 1960, BOQs 1 and 4 were turned over to ROICC. Interior work progressed and, with the transfer of BOQs 5 and 6 to ROICC in August 1960, the first increment BOQs were completed.

d. Several minor modifications were made to the second increment BOQs as a result of experience gained in the first increment. These were mainly refinements of methods used previously to provide a better building. Among these changes were reducing the number of deck pours to decrease the need for as many construction joints, pouring the stiffeners in one pour to reduce the possibility of leaks, boxing in around the base of the wardrobes and placing the conduit within the walls for a more finished looking building.

CI 17 INFIRMARY

a. The 116' X 30' Dispensary contains offices and examination/ treatment rooms for two doctors and two dentists, an X-ray room, a pharmacy and laboratory, a dark room, diet kitchen and a six-bed ward.

b. Construction started on 10 May 1960, with the construction of the coral pad. In June the endwalls and footings had been poured and the underslab utilities work had been completed. The shell was erected in July and work was started on the deck slab. By August, the decks were done, the stiffners had been poured and grouting of the roof panels was completed.

c. A delay in starting of the sub-contract for the installation of doors and windows held up interior work during September. Rework was also necessitated in the mechanical room when it was discovered that the air conditioning system as delivered had its controls on the opposite side from those shown on the drawings. Work stopped for two weeks in October to allow the sub-contractor to mobilize. Additional delays were experienced in November in getting sub contracts awarded for tile and plaster work. Contracts finally started and by February 1961, the doors and windows and ceramic tile were completed. The acoustical tile was also installed that month. Interior work continued with the laying of the acid resistant tile and interior carpentry. When final interior and exterior finish work was completed, the building was inspected and accepted by ROICC, Okinawa on 8 June 1961.

CI 18 GROUP ADMINISTRATION BUILDING

a. This building consists of twelve 30' precast bents. The building is 212' long. In addition to the office spaces, the building contains head facilities and a specially designed court room.

b. The site for this building was cleared in August 1958. Little further work was accomplished until July 1959 when the footings were completed and some of the precast frames were poured. In September 1959, the frames and wall panels were erected and some decks were poured. By November 1959 the roof panels had been set and all decks were completed. Window installation started in January 1960. Some material shortages were experienced and difficulties arose in the installation of the cement shaving board which was not of uniform size. These problems were overcome and the building was transferred in May 1960.

CI 19 SQUADRON ADMINISTRATION BUILDING

a. This item is made up of four 93' X 30' precast concrete buildings. These buildings provide office space for the squadron which uses the adjacent hangar. In addition to offices they contain lavatory facilities (including heads), a locker room, a briefing room, and a central utilities room.

b. Site preparation started on this item in February 1959. Site prep and footings for all buildings were completed by May.

c. A-8 and A-6 were first in the construction sequence and by June the bents and wall panels for these two buildings had been erected. The telephone duct fittings did not arrive as scheduled, which caused some delay in pouring the decks. By using some fittings from the Group Administration Building some decks were poured; and by September 1959 all deck slabs had been poured and the roof panels set in A-8 and A-6.

d. In October the stiffner was poured and the block work was started in A-8. Crews from these buildings were reassigned during the month to erect a quonset hut at Sukiran to house camp component gear.

e. To overcome the lag, contracts were negotiated in December for concrete block and ceramic tile work and window installation. These contracts were completed in March 1960.

f. A-8 was inspected and accepted by MCAF prior to the 1 May turnover date. Both ROICC, Okinawa and the Commanding Officer, MCAF commented on the superior workmanship in this building. A-4 and A-6 were transferred in June, and by September A-2, the last building of the group, was accepted by MCAF.

CI 20 CHAPEL

a. The 96' X 30' Chapel has the same shell configuration as the Squadron Administration Buildings with the exception that the bent legs in the chapel are 2 feet longer. The building contains extensive window area of blue and clear glass. The rear of the building contains the office space and a mechanical room. With its white exterior, this is an extremely attractive building.

b. The footings for the Chapel were excavated in September 1960. No further work was done until November when the footings and end walls were poured and the longitudinal heating duct laid. Erection was completed in December as was the under slab utilities work. After another delay due to a mount-out exercise, the roof was set and the decks were poured in January 1961.

c. Block work started in February and the contract commenced for installation of the doors and windows. With the conpletion of the block work, efforts were directed toward the interior carpentry. Much of this work was accomplished by contracts. Extensive coral was encountered during the installation of the sewer line and water service line to the building and repeated blasting was necessary. This created some delays, but by 19 July, the building was transferred to ROICC, Okinawa.

CI 21 MARINE EXCHANGE

a. This 158' X 52' building contains a large open sales area, the station post office, and barber shop. In addition, there are restrooms and storage spaces.

b. The pad was completed and half the footings poured for this building in May 1960.

c. In June the wall bents were poured. An innovation was tried, pouring the bents in stacks of two on a temporary concrete pad. This worked well and speeded construction considerably. While the bents were curing, the crews were used in construction of the Gymnasium and Theater.

d. The erection took place in August and the stiffeners were poured that month. Work was started on the decks in September, and by the end of the month the roof had been completed.

e. The decks and block walls were completed in October. Interior work was delayed somewhat in November due to the lag in the contractor's starting the window and door installation. The cement shaving board was installed in the Post Office area in December. Lack of sufficient shaving board created some delays; however this was partially overcome by use of board previously rejected for use in the hangars. This was made possible by an NCB 3 design which incorporated a 4" wide wooden batter. The irregularities in the board were not evident and the entire installation was much more attractive. By February, additional cement shaving board arrived and its installation was completed.

f. By March, all interior painting was done and interior finishing progressed. The building was accepted by ROICC Okinawa on 26 May 1961. An apparent lack of coordination with the eventual user was evident by the fact that the decks which received a green floor stain were covered with asphalt tile. Also, the painted walls were covered with built-in shelves and a partition was placed in the sales area. Considerable time could have been saved had these changes been incorporated during construction.

CI 22 ENLISTED MEN'S CLUB, TYPE "A"

a. This 157' X 52' building contains enlisted men's recreational facilities. It contains a bar, dining room, snack bar, lounge and complete galley facilities. The building is completely air conditioned.

b. The pad for the building was an extensive fill area on a coral ledge. The building was relocated slightly to avoid extensive coral excavation. Due to the varying depths of fill, the footing depths had to be adjusted to prevent excessive differential settlement. This redesign delayed initial construction somewhat, but by October 1960 actual construction of the footings began. Work continued on the footings and the pouring of bents. By December, the building was ready for erection. This was postponed, however, due to the first mount-out exercise. Erection was completed on the first day the crews returned to the field in January. The stiffeners were poured in February and installation of the mechanical equipment was started. Work continued in March on the roofing, blockwork, and installation of the doors and windows. In May, the patio and loading dock were poured, and utilities service to the building was completed. The sub-contract for painting and installation of the applied ceiling also started this month. In June, the exterior finish was completed as was the installation of the air conditioning system. Testing of the system was delayed pending the exchange of two motors incorrectly furnished by the supplier. The circuit breaker specified for this building, as in most of the other air conditioned buildings, proved to be inadequate to carry the load when the larger compressor motor "kicked in". An adjustment of the pressure switch by MCB 3 personnel modified the system to counteract the overload characteristics and resulted in satisfactory operation. A special heating tip for soldering the large size copper tubing encountered in the air conditioning system would have been of great assistance, but was not available during the construction period.

c. The acoustical tile installation was completed in July and the galley equipment was installed. Asphaltic tile was laid in August and the building was transferred to ROICC Okinawa.

CI 23 NCO CLUB

a. The 82' X 52' NCO Club is situated to take full advantage of the choice site it occupies. The completely air conditioned club itself contains a large dining area, a lounge, a bar and a complete galley. A terrace runs the length of the building, commanding a fine view of the East China Sea.

b. Construction started with the site prep work in June 1960. The footings were poured in September and in October five bents were poured. The final bent pour was made on 2 November and by using high early strength cement, erection was possible on the 9th. By the end of the month, the wall and roof panels were in place.

c. January saw completion of the decks; this was a major accomplishment requiring forming for seven different levels.

d. Three contractors started in February for installation of doors and windows, sheetmetal and block work. The suspended ceilings were finished in May; and by June power had been brought into the building, kitchen equipment was installed and the asphalt tile laid.

e. On 14 July, final turnover was made and a 72 hour operational test satisfactorily completed on the air conditioning system. In this building, as in most others, it was found that the condensing unit specified for the reefers was too small and proved inadequate due to the high ambient air temperatures in the area.

CI 24/16 COMMISSIONED OFFICERS MESS

a. This building was designed as an Officers Mess and Club. It contains complete galley facilities, a snack bar, a large dining area and a smaller lounge and bar. It is completely air conditioned. A Large patio extends the entire length of the building on the seaward side.

b. Work on the footings commenced in March 1960. The footings were completed and the endwalls poured in May. Erection took place in June and by July both the longitudinal and transverse stiffeners had been poured. The under slab utilities work was completed in August and during the month, the roofing was started using a hard application of coal tar enamel.

c. The interior decks were poured in September and In October, the patio deck was completed. During December great strides were made in the laying of concrete block. Several sub-contracts were awarded for tile and plaster work, sheet metal work, installation of the acoustical tile ceiling and the bar installation.

d. The door and window contractor finished in February as did the contractor installing the bar. It was found that the mahogany used in the bar top was not kiln dried which caused it to crack and warp upon drying. A formica covering was applied which turned out to be quite attractive.

e. During March, work was completed on the duct work, ceiling installation, tile and plaster work and setting of the light fixtures.

f. Due to the high local humidity, the factory installed insulation on the condensate line proved inadequate, causing excessive condensation on the line. The 46 ton unit was thought by the using activity to be inadequate for the building when a number of people were present. Minor interior work and equipment testing proceeded and on 19 June 1961, the building was transferred to MCAF. The CO, MCAF, Futema invited all MCB THREE Officers to the grand opening on 30 June.

CI 25 BARRACKS (Second Increment)

a. These buildings are identical to the first increment barracks. While 12 were constructed before, only 8 were included on this group. The workmanship in this increment was noticeably superior to that of the first increment, reflecting the experience gained in heavy concrete construction. In the second increment barracks, decks were poured after erection to preclude the necessity for forming block-outs for bent legs in the decks. The wall bents were also stacked two high, resulting in a savings of time and form material. As the result of previous experiences, more effective methods were utilized in the application of roofs, providing a much better roof coating. The material status on this increment was also much more firm and fewer delays were encountered.

b. Construction started in March with the excavation for the footings in Barracks #11. By May, these were completed and the end walls for Barracks #10 and #11 were poured using the new method of stacking the bents two high. These two buildings were erected in June and the panels were set.

c. In July, water service to all building sites had been installed. Work started on the floor slabs for Barracks 10 and 11, and 19 was erected. Barracks 9 was erected in August. The use of high early strength concrete permitted erection five days after the pour. Considerable rain hampered operation, but form work continued and by September, Barracks 16 and 17 were erected. Barracks 20, the last barracks to be erected, was up in November.

d. The contract for concrete block work started in November. No response was received on the initial invitation for the contract to install the doors and windows. After advertising a second time a contract was awarded, and in December work started on the door and window installation and on application of roof coating. In January 1961, the tile contractor started setting ceramic tile in Barracks 10.

e. By February, with the pouring of the stiffeners in Barracks 20, the last major concrete work was completed in this increment. The doors and windows were installed in all but Barracks 20 by March. Continued effort was placed in touch-up work and in May, Barracks 9 and 11 were transferred to the station. All fuel oil tanks were set that month and by June, Barracks 16, 17, 18 and 19 were substantially completed. Barracks 10 was transferred on 21 July and on 3 August, the rest of this increment was inspected and accepted by ROICC, Okinawa.

CI 26 BOQ'S (Second Increment)

a. The buildings in this increment were identical with those of the first increment, with the exception of the SOQ. This latter building contains a kitchen, four bedroom and a living room.

b. Work started in May 1960 with the footings for BOQs 7 and 8. By June, the site prep work was done on all three BOQs and the SOQ. BOQs 7 and 8 were erected in July. A force of six prisoners from the Army stockade at Sukiran was used to excavate some of the footings. They worked out well in this particular building but in the final analysis they proved to be somewhat of a burden. The conditions under which they were permitted to work were so limited that it became a parody to make Seabees do work a prisoner was not allowed to do.

c. BOQs 9 and 10 were erected in August, with all shells completed in September. The underslab utilities work was also done that month. By October the decks in 8 and 9 were poured and the stiffeners in 7 and 8 were completed.

d. The roofing contractor started in November. Prefabrication of the wardrobes started in December as did the contract for block and tile. The roofing was accepted in June. This allowed the interior carpentry to start.

e. The door and window contractor finished in February. Also done that month was much of the mechanical work. Much interior work was completed in May, including the interior carpentry, wardrobes, tile in the heads and installation of the kitchen cabinets in the SOQ. Sewerage and water service were brought to the building in June. Touch-up work continued and, on 27 July, the increment was transferred to NCAF.

CI 27/28 STATION MAINTENANCE BUILDING

a. This 52' X 119' building houses the MCAF Public Works Shops and offices. In this building is a paint shop, sheetmetal shop, plumbing shop and a carpenter shop with a sawdust collection system.

b. Work started on the footings for this building in February 1960. In April the footings had been completed and all bents ahd been poured. The shell was erected in May and work was started on the deck slab. The roof sealing was completed in June and work was started on the interior block walls. Progressing ahead of schedule, the block and tile work was done during July. The sawdust collection system was completed and the interior wiring was pulled in August. By October the door and window installation was complete, the wire mesh and movable plywood partitions were installed, and the mechanical work was done.

c. Minor interior work was done in November and, although the crews were off the job, the building was accepted with a very small punch list on 22 December 1960. The equipment which was procured by the station differed from that shown on the plans. This necessitated rework by MCB 3 to adapt the power and sawdust collection system to serve the equipment purchased.

CI 29/31 VEHICLE MAINTENANCE BUILDING

a. This 207' X 59' building contains the shop spaces for the repair and maintenance of the station vehicles. Included are two grease pits, a large general repair area, a tire shop, battery shop, parts and tool room, general storage room and office spaces. A large parking lot adjoins the building.

b. An error discovered in the prints necessitated either a change in the bents or in the doors specified. This discrepancy was submitted to ROICC Okinawa and a design change was made. Work on the building started in November 1960 with the pouring of some of the 28 footings and pedestals. In February 1961, four exterior wall bent forms were built. This delay was caused by the mount-out in December 1960 and the revision to the prints.

c. An innovation was tried which allowed the forms and cribbing for the bents to be pulled from under the half raised bents. This eliminated the necessity for men to work under the bent and expedited the erection. This procedure proved to be about 80% effective.

d. Interior bents were stacked two high to conserve time and materials. While lifting off the top bent, it slipped forward and one leg struck the ground causing the bent to twist and break. This was corrected by building a steel leveling box to prevent the leg from slipping forward and by redesigning the rigging. No further problems were encountered.

e. Erection was completed in March and all wall panels and most of the 72 roof panels were set. Interior work started in April with the completion of the grease pits, decks and block work. Contracts were let to grout and seal the roof and to install the doors and windows. By June the doors and windows were in and the wood and wire partitions had been assembled and installed. The 16 large overhead doors arrived 3 weeks early and their installation proceeded with few problems. Their installation was completed in July and their operation was satisfactory. The building was transferred to ROICC Okinawa early in August 1961.

CI 32 ENLISTED MEN'S CLUB, TYPE "B"

a. This 135' X 30' building serves as the enlisted man's library. It contains two large rooms and a center section which contains heads and the mechanical rooms. This building is completely air conditioned.

b. The footings for the building were poured in October 1960. The three wall bents were poured in one stack which proved to be very satisfactory. Erection was substantially complete in November. By February the underslab work was done and the decks and stiffeners were poured. No work was done in the final two weeks of the month. In March the doors and windows were installed, the interior block laid and the equipment was set in the mechanical room.

c. The ceiling and piping were installed by crews from the barracks. The building had a low priority and the same crews worked on both projects. The air conditioning, the boiler and the control center were also completed in April. The condensing unit on the air conditioning system proved to be inadequate. Also the operation of the expansion valve with the feeler bulb in the air stream was unsatisfactory.

d. In June the asphalt tile was laid and minor touch-up work was accomplished. The building was transferred to RCICC Okinawa in July 1961.

CI 33 THEATER

a. The 333 seat theater is one of the three poured-in-place buildings on MCAF. It contains complete facilities including adjustable indirect lighting, a hardwood stage and an elaborate show-type lighting system. It is air conditioned for additional comfort. The concrete deck slopes down and curves out as it approaches the stage.

b. Work started in July 1960. Extensive spread footings were required to attain the necessary bearing capacity. The site was contoured to provide for the slope seating arrangement. The first pour was on frames 5 and 6 and the columns to the second deck containing the projection booth. Work progressed toward the rear of the building with the forms for the frames being reused. In October, the entrance canopy was poured and forming continued so that by November, the beams, walls and columns between frames 5 and 6 were completed. Block work started in December and continued in January. Also during the month, the air conditioning equipment arrived and was placed within the building.

c. With the completion of frames 1 and 2 in February, the structural concrete work in the building was finished. The block work was 90% complete in March, with the remainder held in abeyance to allow access to the stage area. During this time the proscenium grid iron was installed.

d. In May the last remaining stiffener was poured and the block work completed. Work on the interior was delayed somewhat by the local contractor's elaborate scaffolding needed for the sheetmetal and suspended ceiling. By June the ceiling was done and the plastering was underway. Work continued in the mechanical room during this period.

e. The building was inspected and accepted by ROICC Okinawa in August 1961.

f. In view of the fact that practically all other buildings on the project were precast construction, it seemed strange that this theater should have been poured-in-place. Due to the various types of forming needed, special training was required and considerable additional time was spent in its construction.

CI 34 GYMNASIUM

a. The Gymnasium is constructed of both poured-in-place and precast concrete. The high-bay section contains poured-in-place end bents with precast hinged bents in between. A poured-in-place lean-to section houses the showers, warm-up room and gear locker. The playing floor and the floor in the warm-up room are of maple.

b. The pad for this building was completed and the footings were excavated in June 1960. In July, the footings were poured and work started on both the precast and poured-in-place bents. The first poured-in-place member, frame 8, was completed in September. By October all precast members had been erected and work was started on the block between the frames. All the exterior block in the lean-to section was completed and two-thirds of the roof panels had been set by January 1961.

c. With the completion of the north stiffeners and the deck slabs in February, all concrete work was done. The block work was completed in March and all interior wiring was pulled. The exterior finish and silicone treatment was completed in May.

d. Work on the hardwood deck started in June with the laying of the sleepers. This was delayed somewhat due to the lack of the loads for stud guns. The actual installation of the hardwood went very rapidly, using Power Nailers. Men learned to use the nailers rapidly and in one day, four men with two nailers laid 1100 square feet of flooring. The nailers held a supply of staple-like nails which fed automatically and pulled the flooring into place as they were driven. A special two pound hammer was furnished with each nailer. The cost of sixty dollars for each nailer was more than repaid by ease of installation and the quality of the finish. Their use resulted in a great saving of time. The deck was finished by contract thus completing the building. The building was accepted in August 1961 by RDICC Okinawa.

DIRECT LABOR UTILIZATION SUMMARY

STANDARD WORK ELEMENTS

LABOR CODE		DESCRIPTION	MAN DAYS
A		EARTHMOVING	
AO		SITE PREPARATION	
	A01	Clearing	161
	A02	Blasting	2463
	A03	Earthmoving, Cut and/or fill	4692
	A04	Tree removal	336
	A05	Removal of concrete structures (sidewalks, etc.)	4
	A06	A.C. removal (concrete, asphalt)	41
			7697
A1		EARTH WORK	
	A11	Trench or ditching	7551
	A12	Backfilling and tamping	2610
	A13	Excavation for foundations and footings	4032
	A14	Excavation General	1280
	A15	Dredging	9
			15482
A2		PREPARING SUBBASE AND/OR BASE	
	A21	Placing select material	391
	A22	Processing of base and subbase.	653
	A23	Fine grading	850
			1894
A3		EROSION CONTROL	
	A31	Sloping shoulders, banks and ditches	62
	A32	Hauling rip-rap to job site	1
	A33	Placing of rip-rap	29
	A34	Planting and seeding	232
	A35	Placing of rubble	1
	A36	Placing of top soil	442
			767
		SUB TOTAL	25840
B		ASPHALT PLANT	
	B01	Operation of asphalt plant	
	B02	Hauling of asphalt to job (state tons hauled to each construction item)	647
			647
B1		CONCRETE BATCH PLANT	
	B11	Operation of batch plant	5185
	B12	Hauling of batched material to job (state CY hauled to each construction item)	2476
			7661
B2		QUARRYING	
	B21	Stripping	152
	B22	Drilling and Blasting	2346

	B23	Handling and loading of quarried material	497
	B24	Hauling of rubble material. Use this element only if hauling directly to the job site.	44
			3039
B3		ROCK CRUSHING PLANT	
	B31	Hauling from quarry and charging the plant	1044
	B32	Operation of the crusher-includes segregation and stock piling at crusher site	1959
	B33	Hauling crusher material to job site. (State Cy hauled to each construction item)	1965
			4968
B 4		MANUFACTURING CONCRETE PRODUCTS	
	B41	Block, complete. Describe work entailed to determine mandays reported.	9
	B42	R,C. Pipe, complete (by size)	4
			13
B5		MANUFACTURING OF PRECAST ITEMS.	
	B51	Form place reinforcing, pour, finish and cure concrete wall panels.	2296
	B52	Form place reinforcing, pour, finish and cure concrete roof panels.	3308
	B53	Form place reinforcing, pour, finish and cure open concrete frames.	10315
	B53a	Same as B53 except for closed end frames.	
	B54	Form place reinforcing, pour, finish and cure concrete curbs.	11
	B55	Form place reinforcing, pour, finish and cure concrete culverts - box sections	2
	B56	Form, place reinforcing, pour, finish and cure concrete piles.	63
	B57	Form place reinforcing, pour, finish and cure concrete columns.	19
	B58	Form, place reinforcing, pour, finish, and cure concrete beams and girders.	59
	B 59	Form, place reinforcing, pour, finish and cure concrete miscellaneous members. (Stairs, manholes, etc.)	985
	B60	Handling in precast yard and hauling to job site of precast members.	264
			17322
B6		REINFORCING STEEL SHOP	
	B61	Reinforcing steel cutting	3622
	B62	Reinforcing steel bending	3422
	B63	Reinforcing steel fabrication	6210
			13254
B7		CARPENTRY SHOP	
	B71	Manufacture doors	60
	B72	Manufacture windows, jalousies, louvers	301
	B73	Manufacture stairs	46
	B74	Manufacture cabinets	961
	B75	Manufacture forms	794
			2162
		SUB TOTAL	49066

C	PAVING		
CO		ASPHALT PAVING	
	C01	Tack cost	197
	C02	Spreading asphaltic concrete	160
	C03	Rolling asphaltic concrete	124
	C04	Seal cost	194
	C05	Spread chip or gravel coat	53
	C06	Patching asphaltic concrete paving	23
			751
C1		CONCRETE PAVING:	
	C11	Setting forms and stripping	440
	C12	Placing expansion and contraction joints	17
	C13	Placing reinforcing steel and dowels	13
	C14	Pouring(including wetting down)	118
	C15	Finishing and curing	62
	C16	Joint Sawing	35
	C17	Joint sealing	128
	C18	Patching concrete paving	26
			839
C2		CURBS, WALKS AND SIDEWALKS:	
	C21	Construct asphaltic concrete curbs (Berms)	20
	C22	Poured-in-place concrete curbs	149
	C23	Install precast curbs.	14
	C25	Constract concrete walks and/or sidewalks complete	677
			860
		SUB TOTAL	2450
D	CARPENTRY		
DO		FRAMING	
	D01	Floor framing	111
	D02	Wall and partition framing	1223
	D03	Roof framing	41
	D04	Stairs complete (state if fabricated in shop or field)	63
			1438
D1		SHEATHING AND SIDING	
	D11	Ship lap	20
	D12	Plywood	91
	D14	Asbestos siding	82
	D15	Other - Describe(Cement shaving board)	447
			640
D2		FLOORING	
	D22	Plywood	15
	D23	Hardwood	287
	D24	Softwood	7
	D25	Subflooring (2" Material)	125
			434
D3		TILING (SOFT)	
	D31	Install asphalt or vinyl tile	551
	D32	Install accoustical tile	784
	D33	Install cork tile	11
			1346

D4		FINISH WORK	
	D41	Install trim and molding (except doors and windows).	1299
	D42	Install cabinets	1494
	D43	Install paneling	382
	D44	Install wall board.	1445
			4620
D5		WINDOWS	
	D51	Casement windows	2109
	D52	Jalousies	658
	D53	Sliding windows	39
	D54	Louvers	87
	D55	Double hung	47
			2940
D6		DOORS	
	D61	Sliding doors	183
	D62	Dutch doors	173
	D63	Hinged door: single	1913
	D64	Hinged door double	274
	D65	Pivot door single	134
	D66	Pivot door double	29
			2706
		SUB TOTAL	14124
E	CONCRETE		
E0		SLABS	
	E01	Forming, stripping and relocating forms	6328
	E02	Place reinforcing steel or mesh	2408
	E03	Pouring	4137
	E04	Finishing, hand and curing	859
	E05	Finishing, machine and curing	766
			14498
E1		COLUMNS AND BEAM AND STIFFNERS	
	E11	Forming, stripping and relocating forms	10120
	E12	Place reinforcing steel	1005
	E13	Pouring	1041
	E14	Finishing and curing (after stripping)	2089
			14255
E2		WALLS	
	E21	Forming, stripping and relocating forms	3391
	E22	Place reinforcing steel	612
	E23	Pouring	358
	E24	Finishing and curing (after stripping)	481
			4842
E3		OVERHEAD SLABS	
	E31	Forming, stripping, includes shoring and relocating forms	3964
	E32	Place reinforcing steel and/or mesh	1684
	E33	Pouring	754
	E34	Finish hand and cure	554
	E35	Finish machine and cure	60
			7016

E4		CULVERTS BOX, POURED-IN-PLACE (Including or excluding head walls)	
	E41	Forming and stripping	380
	E42	Placing reinforcement, steel or mesh	127
	E43	Pour	48
	E44	Finishing and curing (after stripping)	22
			577
E5		GUNITE	
	E52	Place reinforcing steel or mesh	3
	E53	Spray	4
	E54	Finish	1
			8
E6		FOOTING AND FOUNDATIONS	
	E61	Form and strip	1680
	E62	Place reinforcement	944
	E63	Pour	457
	E64	Finish and cure	566
			3647
E7		TRANSFORMER VAULT, MAN HOLES AND HAND HOLES	
	E71	Forming and stripping	611
	E72	Place reinforcing steel	62
	E73	Pour	102
	E74	Finishing and curing (after stripping)	10
			785
E8		MISCELLANEOUS CONCRETE	
	E81	Forming and stripping	3495
	E82	Placing reinforcing steel or mesh	1322
	E83	Pouring	345
	E84	Finishing and curing	149
	E85	Placing and stripping scaffolding	2573
			7884
E9		ERECTION OF PRECAST MEMBERS	
	E91	Erection of precast frames	2495
	E92	Erection of precast wall panels	602
	E93	Erection of precast roof panels	913
	E94	Erection of precast columns	3
	E95	Erection of precast girders	3
	E96	Erection of precast beams	13
	E97	Erection of miscellaneous members	214
			4243
		SUB TOTAL	57755
F	MASONRY		
FO		CONCRETE BLOCKS	
	F01	8" X 8" X 16"	6930
	F02	4" X 8" X 16"	1977
	F03	4" X 6" X 16"	72
	F04	6" X 6" X 16"	485
	F05	12" X 8" X 16"	196
			9660

F1		BRICK		41
F3		FIRE BRICK		29
F4		CERAMIC TILE (Hand tile)		
	F41	Wall tile		3353
	F42	Floor tile		1468
F5		STRUCTURAL FACE TILE		191
F6		GLAZED STRUCTURAL UNITS		53
F7		PLASTERING COMPLETE		262
F8		CAULKING		3596
F9		TUCKPOINTING BLOCK LAYERS		1389
				10382
			SUB TOTAL	20042
G4		PIER DECK HARDWARE		
	G42	Cleats		25
				25
			SUB TOTAL	25
H	PAINTING			
H0		EXTERIOR		
	H01	Spray		411
	H02	Brush, steel		657
	H03	Brush, wood		19
	H04	Brush, masonry		3552
	H05	Sand blasting		460
				5099
H1		INTERIOR		
	H11	Spray		222
	H 12	Brush, metal		1097
	H13	Brush, wood		337
	H14	Brush, masonry		10296
	H15	Roller, metal		86
	H16	Varnishing		431
				12469
H2		STRUCTURAL STEEL		
	H21	Spray		47
	H22	Brush		40
				87
H3		FENCE METAL		
	H32	Brush		6
				6
			SUB TOTAL	17661
J	METAL WORK			
J0		STRUCTURAL STEEL FABRICATION		
	J01	Structural frames		122

	J02	Special made up members	1898
	J03	Trusses	6
	J04	Columns	11
	J05	Girders	54
	J06	Beams	112
	J08	Other (Describe)	197
			2401
J1		STRUCTURAL STEEL ERECTION	
	J11	Structural frames	619
	J12	Columns	15
	J13	Girders	157
	J14	Beams	78
	J15	Purlins, girts, struts, etc.	36
	J17	Miscellaneous	91
			996
J2		SHEET METAL WORK (Fabrication and/or installing as specified)	
	J21	Siding	93
	J22	Roofing	6
	J23	Downspouts	28
	J24	Gutters	19
	J25	Flashing	641
	J26	Ducts	3045
	J27	Ventilators	387
	J28	Hood for ventilating stove	74
	J29	Miscellaneous	800
			5093
J3		METAL PARTITIONS	
	J31	Panel partitions	353
	J32	Stud partitions	25
			378
J4		MISCELLANEOUS METAL PRODUCTS	
	J41	Stairs	4
	J42	Security grills	4
	J44	Ladders	20
	J45	Hand rails	57
	J46	Platforms and catwalks	14
	J47	Other(describe) Install air register	227
			326
J6		METAL DOORS	
	J61	Sliding motorized	702
	J62	Rollup motorized	184
	J63	Roll up manual	548
	J64	Sliding manual	163
	J65	Swinging	1252
			2849
J7		REINFORCING STEEL(Field)	
	J71	Cutting	27
	J72	Bending	23

	J73	Fabrication	3895
	J74	Placement	183
			4128
		SUB TOTAL	16171
K	EXTERIOR ELECTRICAL:		
KO		LINE WORK	
	KO1	Setting poles-including hardware and grounding	554
	KO2	Stringing wire	566
	KO3	Guying and tying (aligning, deadman, etc.)	68
	KO4	Connections(splicing, cross connection, hookups, etc.)	3472
	KO5	Transformers	635
	KO6	Capacitors, voltage regulators	14
	KO7	Disconnects	20
			5329
K1		STREET LIGHTING AND SECURITY LIGHTING	
	K11	Install and wiring of lighting standards or poles	114
	K12	Installing and wiring of lighting fixtures	566
	K13	Install cable including splicing up to control vault	63
	K14	Control devices(includes all work within control vault)	37
			780
K2		AIRFIELD LIGHTING	
	K21	Lighting fixtures, including placing and wiring	20
	K22	Install cable(including splicing up to control vault	78
	K23	Install control devices(includes all work within control vault) (describ e system, manual or automatic.)	7
			105
K4		UNDERGROUND POWER SYSTEM	
	K41	Install ducts complete	2401
	K42	Install conduit risers(incoming and outgoing) including potheads.	169
	K43	Pull cable	192
	K44	Install transformers	24
	K45	Connections including grounding systems and busses	166
			2952
		SUB TOTAL	9166
L		INTERIOR ELECTRICAL:	
LO		ROUGH-IN(HOUSING)	
	LO1	Electric service main(includes main disconnects,meters, feeders to panels) and panels.	386
	LO2	Install conduit and outlet boxes	4519
	LO3	Pull and splice wire	1489
			6394
L1		FINISH OR TRIM (HOUSING)	
	L11	Service installation(receptacles and switches.)	328
	L12	Hang fixtures	1088
	L13	Appliance installation(ranges, hot water heater, etc.)	25
	L14	Circuit testing	152
			1593

L2		ROUGH-IN (INDUSTRIAL, BARRACKS, OFFICE, ETC.)	
	L21	Electric service main(includes main disconnects meter)	1770
	L22	Panels, install and connect	328
	L23	Conduit 1½" and larger includes outlet boxes	356
	L24	Conduit 1¼" and smaller includes outlet boxes	3109
	L25	Pull and splice wire. #8 and larger	276
	L26	Pull and splice wire, #10 and smaller	1781
	L27	Install transformers complete(includes main curcuit, busses, and current transformers.)	286
	L28	Circuit testing	546
			8460
L3		FINISH OR TRIM (INDUSTRIAL AND OFFICE)	
	L31	Install wiring devices (receptacles and switches)	309
	L32	Hang fixtures	1525
	L33	Hook up light duty appliances (small heater, air conditioning units up to one ton, fans, etc.) including testing.	224
	L34	Hook up heavy duty utility devices with controls, including testing, (air conditioning, central heating, etc.)	224
	L35	Circuit testing	96
			2678
L4		ALARM SYSTEM	
	L41	Fire alarm systems	284
		SUB TOTAL	19409
M	PLUMBING EXTERIOR:		
MO		INSTALL CAST IRON PIPE LINES (INCLUDING VALVES, THRUST BLOCKS, ETC.)	
	MO1	Install 3" and smaller	75
	MO2	Install 4" to 6"	496
	MO3	Install 8" to 12"	578
	MO4	Install 14" to 18"	433
	MO8	Install thrust blocks complete	5
			1309
M1		INSTALL STEEL PIPE LINES. (INCLUDING VALVES, THRUST BLOCKS ETC.)	
	M11	Install 3" and smaller	594
	M12	Install 4" to 6"	496
	M13	Install 8" to 12"	43
	M14	Install 14" to 18"	8
			1142
M2		INSTALL VALVES, (DESCRIBE TYPE)	
	M21	Install 4" and smaller.	35
	M22	Install 6" to 10"	604
	M23	Install 12" to 16"	21
	M24	Install 18" to 24"	4
	M26	Install fire hydrants including tees and gate valves	4
			668

M3		INSTALL R.C.: V.C.: OR TRANSITE PIPE	
	M31	Install 4" to 6"	350
	M32	Install 8" to 12"	2494
	M33	Install 14" to 18"	309
	M34	Install 18" to 24"	695
	M35	Install 48" and larger	207
			4055
M4		CATCH BASINS	
	M41	Concrete, interior volume less than 25 cu. ft.	155
	M42	Concrete, interior volume 25 to 50 cu. ft.	54
	M44	Concrete, interior volume 76 to 100 cu. ft.	658
			867
M5		HEAD AND WING WALLS	
	M56	Concrete, exterior surface area (1 side) between 150 S.F.C.S. and larger.	91
			91
M6		CULVERTS, GALVANIZED PIPE	
	M61	Install 12" to 24"	2
	M63	Install 60" or larger.	9
			11
		SUB TOTAL	8143
N		INTERIOR PLUMBING:	
N0		ROUGH-IN (HOUSING)	
	N01	Sanitary line, (5' outside of bldg., line to fixtures.)	832
	N02	Water line, (5' outside of bldg. line to fixtures.)	434
			1266
N1		FINISH PLUMBING (HOUSING)	
	N11	Set and tie in fixtures.	900
	N12	Laying of all pipes.	1269
			2169
N2		ROUGH IN (INDUSTRIAL, BARRACKS SUBSISTANCE BLDGS, OFFICES, ETC.)	
	N20	Vents and drains	138
	N21	Sanitary line (5' outside of bldg. line to fixtures.)	3944
	N22	Water lines, (5' outside of bldg. line to fixtures.)	2967
	N23	Install fire protection system complete, including sprinklers and hose connections.	4765
	N24	Install compressed air lines complete	467
	N25	Install grease tanks with vents complete	56
	N26	Install concrete duct work complete	553
			12752
N3		FINISH PLUMBING(INDUSTRIAL, BARRACKS, OFFICE, ETC.)	
	N31	Set and tie in standard fixtures.	2212
	N32	Set and tie in industrial wash basins.	446
			2658
		SUB TOTAL	18845
P		EQUIPMENT INSTALLATION:	
P0		AIR CONDITIONING	1068
P1		GENERATOR	3
P2		PUMPS	73
P3		SPECIAL EQUIPMENT. (ELECTRIC, ETC.)	665
P4		DEHUMIDIFIER	156

P5	HOT WATERBOILER	796
P6	WARM AIR FURNACE	628
P7	EXPANSION TANKS	636
P8	HOT WATER STORAGE HEATER	134
P9	AIR COMPRESSORS	2
P10	SHOP EQUIP. (metal, electric, machine, carpenter, etc.)	10
P11	MONO RAIL SYSTEM	520
P12	LAUNDRY EXTRACTOR	1
P13	LAUNDRY WHEELS	1
P14	MOTORS	2
P15	EXHAUST FANS	7
	SUB TOTAL	4702
Q MISCELLANEOUS:		
Q1	Miscellaneous items	6062
Q2	Project clean up	7932
Q3	Work accomplished not covered by a specific work element includes the accumulation of all man days expended on the construction item not being reported under a specific work element. Give description of work accomplished under this element.	2273
	SUB TOTAL	16267
R ITEM COMPLETE:-This item is used at end of project to report total labor of each structure. Do not use on daily reports.		
R3	Personnel barracks complete.	940
	SUB TOTAL	940
S COMMUNICATIONS:		
S0	EXTERIOR OVERHEAD TELEPHONE LINE, CONST OF.	
S01	Setting poles includes hardware, cross arms, etc.	10
S02	String wire or paired cable, includes typing and guying.	7
S04	Connection work (paired cable) includes splicing and terminal hook-up	43
		60
S1	EXCHANGE INSTALLATIONS	
S11	Install switchboards, includes main frame, power pack, etc.	11
S12	Connection work (wiring of switchboard, paired cable)	2
		13
S2	INTERIOR TELEPHONE SERVICES.	
S21	Service drops (or picking up underground systems at riser) Including connecting to terminal.	65
S22	Installing telephones, including running wires from terminal and testing.	194
		259
S3	EXTERIOR UNDERGROUND TELEPHONE, CONST OF.	
S31	Install ducts complete including terminal boxes.	354
S32	Pull cable.	330

S33	Splice cables and connect terminals	1061
S34	Install service conduits or ducts, pulling wire	13
		1758
	SUB TOTAL	2090
T ROOFING		
TO	BUILT UP ROOFING INCLUDING GRAVEL SHIELD IF NEEDED	1512
T3	RIGID INSULATION PLANK INCLUDING BUILT UP ROOFING.	95
T4	SPRAY ON ALUMINUM ROOFING.	1145
	SUB TOTAL	2752
W REEFERS		
WO	FORM UP (STEEL, CONCRETE, ETC.	7
W1	INSTALL TAR AND FIBER GLASS	257
W2	INSTALL ALL DOORS AND HARDWARE, COMPLETE.	96
	SUB TOTAL	360
	TOTAL	285808
*55		4217
*57		3534
*89		28612
*NOTE. C.E. IN LUMP SUMS	GRAND TOTAL	322171
DIRECT, INDIRECT, COMMAND & MISCELLANEOUS LABOR (	GRAND TOTAL)	682657

WORK ELEMENT LABOR CODES

INDIRECT LABOR

X01	OPERATIONS & ENGINEERING (FIELD AND OFFICE)	25834
X02	PROJECT OFFICES (FIELD SHOP & PLANTS)	6589
X03	CENTRAL TOOL ROOM	3258
X04	SUPPLY (PROJECT FUNCTIONS SUCH AS MATERIAL PROCUREMENT AND HANDLING, ACCOUNTING, ETC.)	3162
X05	EQUIPMENT OFFICES (DISPATCHERS, SHOP & RECORDS, TAXI DRIVERS)	16344
X06	EQUIPMENT MAINT. & REPAIR (FUEL & GREASE TRUCK DRIVER)	54462
X07	SPARE PARTS, SHOP - STORE	6517
X08	LOCATION MOVING (MOVING EQUIP., FIELD OFFICES, TOOLS, ETC)	7418
X09	MOBILIZATION/DEMOBILIZATION (UNLOADING, UNPACKING, PACKING & LOADING AT EMPLOYMENT LOCATION, NOT INCLUDING CONSTRUCTION OR REHABILITATION OF CAMP FACILITIES).	802
X10	EQUIPMENT PRESERVATION/DEPERSERVATION (SERVICING, PREPARATION FOR OPERATION, AND PRESERVATION AT BEGINING AND END OF EMPLOYMENT)	230

X11	OTHER (DESCRIBE ON TIME SHEET	4769
X12	ELECT FIELD MAINTENANCE	1567
	SUB TOTAL	130952

COMMAND LABOR

Y01	PERSONNEL & ADMIN. (INCLUDING LEGAL, I & E LIBRARY	10052
Y02	MEDICAL & DENTAL DEPTS.	12788
Y03	NAVY EXCHANGE ACTIVITIES	2051
Y04	DISBURSING & SUPPLY (LESS PROJ. FUNCTIONS)	22958
Y05	COMMISSARY (COOKS, STEWARDS, MESS COOKS, BAKERS, ETC.)	30265
Y06	CAMP UPKEEP & REPAIR (INCLUDING COMPARTMENT CLEANERS)	14199
Y07	SECURITY (MAA, ARMORY, BRIG, SHORE PATROL)	26809
Y08	SPECIAL SERVICES (INCLUDING BATTALION PAPER)	6740
Y09	COMPANY OFFICES	4076
Y10	OTHER (CHAPLAIN, POST OFFICE, ETC.: DESCRIBE ON TIME SHEET)	4124
	SUB TOTAL	134062

MISCELLANEOUS

Z01	LEAVE, LIBERTY, RECREATION	15584
Z02	MASTS, COURTS, & CONFINEMENT	2295
Z03	SICK CALL, DENTAL & HOSPITALIZATION	8991
Z04	PERSONAL AFFAIRS (PERSONNEL & PAY RECORDS), LEGAL ADVISE ADVANCEMENT IN RATE, CHECK-IN, CHECK-OUT, PAY DAY, ETC.)	8186
Z05	MILITARY TRAINING	26425
Z06	INCLEMENT WEATHER	13429
Z07	TECHNICAL & SAFETY TRAINING (FORMAL TRAINING ONLY INCLUDING TAD TO SCHOOLS. ON THE JOB TRAINING IS ACCOUNTED FOR IN APPROPRIATE WORK CATEGORY)	18807
Z08	TAD NOT FOR UNIT PURPOSES	240
Z09	OTHER (DESCRIBE ON TIME SHEET)	1515
	SUB TOTAL	95472

6. MCAF FUTEMA SAFETY REPORT:

(a) Personnel injuries reported according to the Safety Manual are based on a 24 hour day, seven day a week.

(1) Total first aid cases - 717
(2) Total disabling work injuries - 78
(3) Total man days lost - 479
(4) Total time charges - 710

(b) Equipment and property damages (24 hour day, 7 days a week).

(1) Total accidents (government property and equipment) - 57
(2) Total accidents (private property and equipment) - 16
(3) Total damage to government property and equipmen -$7018.23
(4) Total damage to private property and equipment - $861.50

(c)

	Battalion	Nat'l average (1)
Frequency rate per 100,000 mandays	12.07	14.49 (1)
Severety rate mandays lost per 100,000 mandays	125.33	1813.6 (1)

(d) His significant to note that in the entire construction period, there were no on-the-job deaths.

NOTES:

1. National average rates are for the construction industry in 1960, as indicated in "Accident Facts", published by the National Safety Councils 1961.

2. These figures are based on the total direct and indirect mandays for the battalion (646,292).

ENCLOSURE (3)