HEADQUARTERS
84TH ENGINEER BATTALION CONSTRUCTION
APO 96238
San Francisco, California

EGC-84E-CO 14 May 1966

SUBJECT: Operational Report on Lessons Learned for Period Beginning 1 January 1966, and Ending 30 April 1966, (Reports Control Symbol CSGPO-28 (R1))

THRU: Commanding Officer
937th Engineer Group (Combat)
ATTN: EGC-3
APO US Forces 96238

TO: Assistant Chief of Staff for Force Development
Department of the Army (ACSFOR DA)
Washington, D. C. 20310

1. (U) References:

a. AR 525-24, dated 29 October 1959, Combat Operations and Command Report.

b. USARV Circular 670-1, dated 11 November 1965, The Quarterly Command Report (RCS CSGPO-28 (R1)).

c. CH/1, USARV Circular 670-1, dated 1 April 1966, The Quarterly Command Report (RCS CSGPO-28 (R1)).

2. (C) Section One, Significant or Unit Activities. The following is a narrative description of the significant organization activities occurring during the reporting period.

a. During the period beginning 1 Jan 66, and ending 30 Apr 66, the battalion continued to develop and operate a laterite borrow pit near the Qui Nhon Logistical Depot. The pit supplies fill for projects under construction by this battalion and other units operating in this area. In addition, quarrying operations were continued until late Feb, which supplied laterite rock for the crushing plant, thereby providing a continous supply of crushed rock for general construction work.

b. The battalion continued construction of a 480 bed Hospital to include;

(1) Erection of 20 round arch, 20'x 48' quonsets. The completed project requires a total of 92 quonsets. 57 have been erected to date.

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(2) Construction of concrete side walks between buildings in the hospital complex.

(3) Construction of one 29'x 30' connecting "H" between 20'x 100' mess bldgs.

(4) Construction of walkway coverings between bldgs.

(5) Installation of partitions and shelving in quonset huts to facilitate hospital operations.

(6) Continued development of drainage ditches and culverts.

(7) Construction of a helipad with an asphaltic surface (completed).

(8) Installation of poles, platforms and transformers.

(9) Construction of a 60'x 60' generator plant.

(10) Emplacement of concrete as required for quonset footers and pads.

c. Other construction projects in the Qui Nhon area were continued and included:

(1) Completed erection of one 120'x 200' warehouse.

(2) Continued erection of five 20'x 100' prefabricated bldgs.

(3) Completed erection of seven each 39'x 199', six each 39'x 186', and two each 39'x 166' open shed storage bldgs.

(4) Completed erection of two each 40'x 220' warehouses. Two additional 40'x 220' warehouses are in progress.

(5) Erection of two each 80'x 220' warehouses (in progress).

(6) Foundation for two each 120'x 200' warehouses (in progress).

(7) Completed erection of one double 20'x 96' round arch quonset.

(8) Forming and placing concrete pads for refrigeration facilities (in progress).

(9) Continued development of drainage ditches and culverts.

(10) Completed installation of temporary security lighting system around depot complex.

(11) Continued shaping of roads through depot in preparation for surface treatment.

d. The battalion completed filling and compacting an area of approximately 4.2 acres, with laterite, for use as a trailer transfer point. 31,643 tons of fill were emplaced.

e. The battalion completed construction of a signal relay site in the Qui Nhon area consiting of:

(1) Construction of two miles of road leading through mountainous terrain to provide access to the site.

(2) Clearing and leveling of the top of a hill to accomodate the signal relay facility.

(3) Design and construction of concrete pads for tropscatter radio antennas, power generating equipment and concrete deadmen for guy anchors.

(4) Erection of one 20'x 48' round arch quonset with concrete floor and an elevated concrete wall.

(5) Design and construction of an open shed building to house generators.

f. The Battalion completed installation of two pile dolphins to anchor and safeguard the 4" marine assault pipeline.

g. The construction of an LST beach extension is presently in progress. Accomplishments on project to date consist of the driving of sheet piles, the emplacement of 21,972 CY of fill, construction of 5 bollards and the installation of a free swing barge mooring system.

h. The battalion completed construction of the Safe Haven Anchorage system designed to secure the floating crane. This consisted of placing 2 each 6-ton concrete sinkers and 4 each 3,000 lb stockless anchors.

i. Construction of two each 40'x 100' butler buildings for PX storage was completed.

j. The battalion is presently engaged in rehabilitation of Qui Nhon airfield. A 1,197 foot extension has been added to the airfield and a parking ramp was completed. Removal of excess sand from airfield and emplacement of laterite fill to provide additional roadways and parking areas was completed. Emplacement of drainage facilities for the airfield is now in progress.

k. Construction of a dial central office at An Khe which consisted of a concrete cable vault and a 40'x 100' wood frame building has been completed.

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l. Construction is presently in progress on a crypto building at An Khe for utilization by the 1st Cav Division. This project requires construction of a 20'x60' wood frame building with a builtin reinforced concrete security room.

m. Battalion crushed 3,580, CU of 3" granite rock for the 6th ARVN Engineers for use on the Pagoda Ramp at Qui Nhon Airfield.

o. Quarry and crusher operations were moved to An Khe to crush rock in preparation for construction of a C-130 airfield. Also in progress is the emplacement of drainage for the airfield.

p. The battalion is presently establishing a new quarry and crusher site for the 225-ton crusher unit, at Phu Tai.

q. Supported the 70th Engineers with two construction platoons to construct 10 "H" type mess buildings at An Khe.

r. Road maintenance, pot-hole repair and dust control on fourteen miles of road in and around the city of Qui Nhon was in operation throughout the reporting period.

s. Continued support of the 19th and 299th Engineer battalion's throughout the reporting period with various types of engineer equipment.

t. Design missions performed during the reporting period included:

(1) PX facilities and storage site.

(2) Airfield at An Khe to include new runway, parking apron and ramps.

(3) Prefabricated wooden structure, billet type building for assembly by unskilled troops.

(4) Tropicalized quonsets.

(5) Refrigeration facilities, Qui Nhon Depot.

(6) Generator building (60'x 60') foundation.

(7) Electrical Distribution for 85th evacuation hospital.

(8) 800 foot sea wall.

(9) Security vault and storage facility.

(10) Modification of 4 ea, 20'x 100' administration building in the Log Depot.

(11) Foundation for 2 warehouses (80'x 220' and 120'x 200').

(12) APO building (12'x 16').

u. Eighteen M-51 five-ton dump trucks were laterally transferred to this unit from the 513th dump truck company. These trucks were manufactured in 1962-1963, and replaced trucks that were manufactured in 1951-1952. The reduction in maintenance down time has greatly enhanced the battalion haul capability.

v. Red Ball Express has continued to alleviate the immediate equipment deadline rate.

3. (C) Section two.

a. Commanders Recommendations.

(1) Milstrip must be improved in order to provide adequate stockages of repair parts. The following is this unit's Milstrip experience since arrival in country ten months ago:

Priority	No. Submitted	No. Filled	Filled
A	1366	541	39.8
B	1162	424	36.4
C & D	15325	9022	58.8
TOTAL	17853	9987	55.9

A fifty-eight and one-half percent fill of Red Ball Express requisitions has been experienced. An adequate fill of replenishment requisitions would reduce the amount of Red Ball Express requisitions required. It is felt that increased emphasis should be placed on Milstrip and gradually decreasing use of Red Ball Express be made.

(2) In order to maximize the construction effort and to minimize loss of manhours and construction materials, the following recommendations are made:

(a) Maximum effort should be made to complete a project once it has been started.

(b) Starting dates should be based on the availability of materials, relative priority to other jobs, and the total construction effort available.

(c) Completion dates should be based on at least a rough construction schedule which in turn should be based on the number of workers who will be expected daily on the job.

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b. Lessons Learned.

(1) Item: Personnel Turbulence.

(a) Discussion: One year after deployment of a unit to a combat zone, that unit loses a disproportionate number of personnel due to normal rotation. These personnel are largely officers, NCO's and skilled enlisted men. This unit was scheduled to lose fifty-eight percent of its assigned personnel during May 1966. The Commanding General, 18th Engineer Brigade directed that a total of seventy personnel with later rotation dates be reassigned to this battalion; a corresponding number was transferred out. These reassignments reduced the expected personnel loss in May 1966 to forty-six percent.

(b) Observation: When a unit arrives in country, some supervisory personnel and personnel with key skills should be exchanged with like units in order to stagger rotation dates of key personnel over a longer time period.

(2) Item: Use of Indigenous Personnel.

(a) Discussion: Construction work involves many tasks that can be readily accomplished by supervised unskilled labor, with a subsequent saving of specialist skill for use in other tasks.

(b) Observation: Use of indigenous personnel has contributed substantially to this unit's construction effort. It is highly desirable that the same personnel be employed daily developing a trained and coordinated crew. A specialist system with a graduated pay scale would also be desirable.

(3) Item: Concrete Vibrating.

(a) Discussion: When placing reinforced concrete walls with a thickness of eight inches or less, it is difficult to obtain internal vibration with the TOE concrete vibrating equipment.

(b) Observation: Utilization of pneumatic nail drivers as external form vibrators has proven satisfactory for elimination of air pockets and the possibility of disturbing the reinforcing material.

(4) Item: Concrete Preparation.

(a) Discussion: In order to obtain uniform concrete mixes. Markings are placed on the dividers providing for variation of mixes.

(5) Item: Concrete Finishing.

(a) Discussion: When finishing concrete using the screen method, there is a tendency for the surface to tear, leaving coarse aggregate exposed. Handworking with wood or bull floats tends to create depressions on the surface. Use of a three-inch pipe sufficiently

long to span the concrete pad with an internal concrete vibrator inserted in each end of the pipe is an excellent method of vibrating the concrete surface.

(b) Observation: The vibrating effect of the pipe assembly brings enough mortar to the surface to allow for final trowling with little or no hand floating, and eliminates depressions on the finished slab.

(6) Item: Hot Boxes.

(a) Descussion: The humid environment in Vietnam adversely affects certain items; e.g. Survey instruments, Class I supplies, and clothing.

(b) Observation: Construction of a plywood box fitted with a small lightbulb provides a dry storage environment.

(7) Item: Tent Erection.

(a) Discussion: In erecting a medium or large GP tent, if the sides and ends are raised and supported outward, the useable space is greatly increased.

(b) Observation: Erection of a tent in the manner described above increases the floor space approximately thirty percent and creates a cooler work area due to the increased ventilation.

(8) Item: TOE Generators.

(a) Discussion: Each generator assigned by TOE has an assigned TOE mission. This requires generators to be operated for extended periods when a unit is deployed under field conditions for sustained operations. This allows for little or no down time, nor does it take into consideration the power required to operate equipment normally operated by commercial power sources (IE refrigeration equipment for perishable food and medical supplies).

(b) Observation: Additional generators should be authorized to allow for down time and alternating of the equipment, and for providing the extra power needed for those non TOE purposes listed in the above discussion.

(9) Item: Refrigeration.

(a) Discussion: When a unit is deployed for sustained periods in a field environment, refrigeration is required for the storage of Class I supply.

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(b) Observation: Refrigeration should be included in TOE's as WABTCC items. The following is a recommended basis of issue for a companysized unit:

(1) Freezer, 24 Cubic foot; one each.

(2) Refrigerator, 65 Cubic foot; one each.

(3) Ice maker, 400 pound; one each.

4. Section Three, Headquarters, Department of the Army Survey Information. No request has been made by the Department of the Army for submission of combat information upon a specific subject.

JAMES G. MADISON JR.
Lt Col, CE
Commanding

EGC-3 (14 May 66) 1st Ind
SUBJECT: Operational Report on Lessons Learned for Period Beginning 1 January 1966 and Ending 30 April 1966, (Reports Control Symbol CSGPO-28 (R1)

HEADQUARTERS, 937TH ENGINEER GROUP (COMBAT), APO US Forces 96238
18 May 1966

THRU: Channels

TO: Assistant Chief of Staff for Force Development, Department of the Army (ACSFOR DA), Washington, D. C. 20310

1. Concur with recommendations of the Battalion Commander.

2. This headquarters maintains close liaison with the direct support units and the Director of Supply of USASC, QN to insure maximum benefits from the MILSTRIP procedures.

3. Because of the large amount of engineer work programmed, projects must be incremented to allow timely completion of the most urgent phases of each job. Every effort is made to prevent waste of effort through change of priority and relocation of construction forces.

4. Action was taken by this and higher headquarters to minimize the impact of the mass rotation of personnel. The action taken coupled with normal losses through ETS reduced the turn over in this battalion to less than 40%. It is recognized that increased emphasis needs to be placed on this problem in order to smooth out this wholesale change over of a large percentage of personnel of other units on their in-country anniversary.

5. Lessons learned by units of this Group are published in newsletter form to take advantage of these valuable experiences and provide guidance to incoming personnel.

for Edward Salego
W. W. WATKIN JR.
Colonel CE
Commanding

Lt Col, CE

[illegible] (14 May 66) 2d Ind

SUBJECT: Operational Report of Lessons Learned for Period Beginning 1 January 1966 and Ending 30 April 1966. (Reports Control Symbol CSCFO-28 (R1))

HEADQUARTERS, 18TH ENGINEER BRIGADE, APO 96307, 21 July 1966

TO: SEE DISTRIBUTION

The following comments are furnished pertaining to the Operational report of Lessons Learned, [illegible] Engineer Battalion:

Section II

a. Paragraph 3a(1): Shortages and long lead time on delivery of parts is a direct result of the rate of buildup in this command without properly prepared Prescribed Load Lists (PLL). PLL's have been forwarded for all Brigade units and will ultimately result in more adequate supply of repair parts.

b. Paragraph 3a(6): Unit has been directed to submit request and justification for additional generators. Current supply concept permits assignment of additional generators wherever justified and as they become available.

c. Paragraph 3a(9): Adequate refrigeration equipment is currently being issued to all units having a requirement for same.

[illegible]
Colonel, CE
Deputy Commander

DISTRIBUTION:
Original - Assistant Chief of Staff for Force Development, DA, Washington, D.C. 20310, (Thru channels)
Cy 1 - Asst C of S for Force Development, DA, Wash, D.C. 20310 (Direct)
Cy 2 - Commanding General, USARPAC, APO US Forces 96558, ATTN: GPOP-MH
Cy 3, 4, 5 - Commanding General, USARV, ATTN: AVC
Cy 6 - Unit Files

AVHGC-DH (14 May 66) 3d Ind
SUBJECT: Operational Report on Lessons Learned for Period Beginning 1 January 1966, and Ending 30 April 1966, (Reports Control Symbol CSGPO-28 (R1))

31 JUL 1966

HEADQUARTERS, UNITED STATES ARMY, VIETNAM, APO San Francisco 96307

THRU: Commander in Chief, United States Army, Pacific, ATTN: GPOP-MH, APO 96558

TO: Assistant Chief of Staff for Force Development, Department of the Army, Washington, D.C. 20310

This headquarters concurs with the 84th Engineer Battalion operational report on Lessons Learned as indorsed.

FOR THE COMMANDER:

[illegible]ROVICH
[illegible]
[illegible] General

GPOP-MH (14 May 66) 4th Ind
SUBJECT: Operational Report on Lessons Learned for Period Beginning 1 January 1966, and Ending 30 April 1966, (Reports Control Symbol CSGPO-28 (R1)

HQ, US ARMY, PACIFIC, APO San Francisco 96558 3 AUG 1966

TO: Assistant Chief of Staff for Force Development, Department of the Army, Washington D.C. 20310

1. A second copy of the Operational Report on Lessons Learned of the 84th Engineer Battalion for the period 1 January - 30 April 1966 is forwarded herewith.

2. An earlier copy, previously indorsed only by the 937th Engineer Group, was forwarded by CINCUSARPAC 2d Indorsement, dated 6 June 1966. The addition of indorsements by the 18th Engineer Brigade and USARV requires no change in the previous CINCUSARPAC indorsement. The 18th Engineer Brigade's 2d Indorsement of 21 July 1966 is noted.

FOR THE COMMANDER IN CHIEF:

D. A. HARRISON
Capt, AGC
Asst AG

HEADQUARTERS
84TH ENGINEER BATTALION CONSTRUCTION
APO 96238
San Francisco, California

EGC-84E-CO

14 August 1966

SUBJECT: Operational Report on Lessons Learned for Period 1 May 1966 to 31 July 1966 (RCS: CSGPO-28 (R-1))

THRU: Commanding Officer
937th Engineer Group (C)
APO 96238

THRU: Commanding General
18th Engineer Brigade
APO 96307

THRU: Commanding General
United States Army, Vietnam
ATTN: AVC (History)
APO 96307

THRU: CINCUSARPAC
ATTN: GPOP-MH
APO 96558

TO: Department of the Army
Assistant Chief of Staff for Forces Development
Washington, D.C. 20315

OPS-05 009

1. SIGNIFICANT ORGANIZATIONAL ACTIVITIES: - during the reporting period the 84th Engineer Battalion (Construction) was active on the following projects.

a. Forward Area Medium Lift Airfield Brigade 45-937/V-66

The 84th Engineer Battalion worked in support of the 8th Engineer Battalion. The 84th Engineer Battalion's responsibility was to construct the base course.

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This involved hauling, grading and compacting approximately 62,000 tons of earth fill, requiring the expenditure of 8,738 manhours and 3,893 equipment hours. The project began on 30 May 1966 and was completed on 8 June 1966.

b. Cryptographic Facility, 1st Calvary Division, Brigade 16-937/V-66

The project entailed construction of a wood frame cryptographic materials maintenance and storage building, 20' X 60', with a built-in reinforced concrete security room. The project began on 12 April 1966 and was completed on 31 May 1966. 6,298 manhours and 693 equipment hours were expended on the project.

c. Post Exchange Storage Area, Brigade 21-937/V-66

The project entailed relocation of the CRVV confidence course from the storage area to a location behind the Popular Forces Billets and filling and leveling an area of approximately 250 meters X 40 meters. The project was started on 12 April 1966 and was completed on 7 July 1966. 1230 man-hours and 1280 equipment hours were expended on the project and 4540 cubic yards of laterite were hauled.

d. Data Processing Unit, Brigade 66-120DC-937

The project entailed design and construction of a dust proof Quonset hut, 20' X 48', to house a data processing unit. The project was started on 21 April 1966 and was completed on 29 June 1966. 2,893 U.S. and 1,312 Local National manhours and 580 equipment hours were expended on this project.

e. POL Facility (Interim), Brigade 66-82DC-937

The project entailed installation of a 2700 foot, 4" submarine pipeline, a one-point buoy mooring system, a temporary booster pumping station and connection into the 8 inch overland line. The project was begun on 26 April 1966 and was completed on 1 June 1966. Effort expended was 1972 U.S. manhours, 690 Local National manhours and 258 equipment hours.

f. 60-Ton Ice Plant, An Khe, Brigade 35-937/V-66

The project consists of construction of a 60-ton ice plant complete with all associated structures. The project was started on 20 May 1966 and is presently 12.5% complete. To date, 4,696 manhours and 722 equipment hours have been expended.

g. Qui Nhon Airfield, Brigade 66-11DC-937

The project consists of design and construction of a forward area, medium-life airfield with associated ramps, taxiways and parking aprons. The wearing surfaces are to be 2" of asphalt. The project was started on 7 March 1966 and is presently 31% complete. To date, 34,178 U.S. manhours, 456 Local National manhours and 15,326 equipment hours have been expended.

h. Post Exchange Shopping Center, Brigade 67-937/V

The project consisted of hauling, grading and compacting 4,365 cubic yards of earth fill to provide a stabilized parking lot and storage area. The project started on 15 July 1966. The battalions portion of the project was completed on 25 July 1966. The project involved the expenditure of 2,222 manhours and 1,739 equipment hours.

i. Contonment Construction, Valley ., Brigade 66-142DC-937

The project consists of design of self-help construction of a 3000-man contonment in Valley ... The project started on 10 September 1965. To date, this unit has expended 2,482 U.S. manhours and 2,066 Local National manhours.

j. Port Facilities, Access Road, Brigade 66-119DC-937

The project requires the design and construction of a class (X) port access road with a 48' wide traveled way. The starting date was 13 June 1966. The design has been completed but construction has not yet started.

k. Vung Chua Signal Relay Site, Improvements, Brigade 66-113C-937, Phase I.

The project consists of cutting and grading an area approximately 80' X 100' and constructing 3 concrete pads for the installation of a TRCPO unit. The project started on 1 June 1966 and is presently 70% complete. To date, 912 U.S. manhours, 420 Local National manhours, and 397 equipment hours have been expended.

l. Qui Nhon Depot, Brigade 66-27DC-937

The project includes construction of open storage areas, shed storage, depot prefabricated metal warehouses, depot administration building, security fencing, roads, and drainage facilities. The project was started on 1 August 1965 and is presently 61% complete. The completed work includes 112,359 square feet of open storage and 149,400 square feet of covered storage.

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To date, 221,317 U.S. manhours, 23,205 Local National manhours and 33,895 equipment hours have been expended.

m. 85th Evacuation - 540 bed hospital, Brigade 65-7DC-937

The project was originally base camp project 937-09 and later re-designated as a hospital. Work began on 12 October 1965 and is presently 88% complete. To date, 121,929 U.S. manhours, 11,291 Local National man-hours and 27,554 equipment hours have been expended.

n. Rehabilitation of Roads #1, #2 and Villa Road, Brigade 65-20DC-937

The project consists of the design and construction of roads 1,2 and Villa Road. The starting date for the project was 11 November 1965. The project is presently 12% complete. The only work done to date consists of placing laterite fill. To date 5,570 U.S. manhours, 490 Local National manhours and 1,363 equipment hours have been expended.

o. Shape and Surface Treat 85th Evac Hospital Road, Brigade 65-30C-937

The project consisted of grading and applying a S.ST to a road of 3,570 SY. The project started on 24 February 1966 and is presently 73% complete. To date, 5,968 U.S. manhours, 5,796 Local National manhours and 3,358 equipment hours have been expended.

p. Ramp "L" Repairs QN 2F, Brigade 65-67DC-937

The repair of Ramp "L" consists of removing existing PSP and sand, placing a base course of crushed granite rock and a wearing surface of 2" penetration macadam. The project started on 15 January 1966 and is presently 82% complete. To date, 14,468 U.S. manhours, 836 Local National manhours and 6,159 equipment hours have been expended.

q. Pontoon Pier LCU, LCM & LST Ramps

The project consists of the design and construction of 500' pontoon finger pier, 250' of LST ramps and 510' of LCU & LCM ramps. The project started on 14 February 1966 and is presently 44% complete. To date, 45,858 U.S. manhours, 18,842 Local National manhours and 10,092 equipment hours have been expended.

r. Refrigeration Facilities, Brigade 66-61C-937

The project consists of construction of 76 - 9' X 32' concrete pads and erection of reefer units in Qui Nhon Depot and 35 - 9' X 32' concrete pads and erection of reefer units in Phu Tai, Valley "L" Cantonment area.

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The project was started on 27 April 1966 and is presently 20% complete. To date, 4,984 U.S. manhours, 6,648 Local National manhours and 991 equipment hours have been expended.

a. 85th Evacuation Hospital Improvements, Brigade 28-937/V-66

The project consisted of the installation of a pathological destructor w/concrete foundations and installation of lighting around helipad. The project was started on 28 April 1966 and completed on 1 June 1966. There were 328 U.S. manhours, 170 Local National manhours and 73 equipment hours expended.

t. Rock Crusher, 225T, Phu Tai, Brigade 14-937/V-66

The project consists of installing and operating a 225T Crusher to provide crushed rock for use in Qui Nhon area. The crusher began operation on 26 January 1966. To date, 18,152 U.S. manhours, 6,884 Local National manhours and 12,346 equipment hours have been expended.

u. Cantonment Construction, Brigade 65-150-937

The project consists of the following parts:

1. Site layout and electrical distribution for Headquarters USARV Qui Nhon, 1000-man cantonment; 41st Signal Battalion, 625-man cantonment, Area B, 1200-man; Area A, 150-man; Area F, 850-man; 85th Evacuation Hospital, 550-man. All designs have been completed.

2. Establish and operate a prefabrication assembly plant to provide billets for issue to using units under the Self-Help program. To date, 8 - 20' X 120' Double Story, 11 - 20' X 100' Double Story, 2 - 20' X 60' Double Story, 3 - 20' X 140' Single Story, 2 - 20' X 120' Single Story, 2 - 20' X 100' Single Story, 3 - 20' X 80' Single Story and 8 - 20' X 60' Single Story Billets have been prefabricated, issued and erected. The project started 10 September 1965 and to date, 40,007 U.S. manhours, 26,921 Local National manhours, and 6,113 equipment hours have been expended.

3. Draw and issue construction materials to the using units and provide technical assistance to Self-Help program, such as erecting the first building in each area while at the same time training their work force in erection procedures.

4. In addition, the 84th Engineer Battalion provides assistance to the QHN ALF and Vung Chun Signal Relay Site.

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2. COMMANDER'S RECOMMENDATIONS AND OBSERVATIONS AND LESSONS LEARNED:

a. Lessons Learned:

(1)

(a) ITEM: Removing PSP from an asphalt runway.

(b) DISCUSSION: M-6 & M-8 PSP were removed from the An Khe airfield. Three conditions of PSP existed affecting removal operations; PSP on top of PSP, PSP on asphalt but only slightly imbedded in the asphalt, PSP totally imbedded in asphalt with rock ½" to 1" on top of PSP.

Condition (PSP)	Methods Tried	Results
PSP on top of PSP	50' by 80' sheets dragged off by 2 ea HD-16M crawler tractors using one clamp each fabricated from two HD-16M end bits with two bolts through PSP.	Satisfactory
PSP slightly imbedded in asphalt (½" depth of PSP)	Same as above	Satisfactory when PSP was broken loose from asphalt using 20 ton crane
	50' by 80' sheets were inverted by hooking to one edge and pulling with HD-16M crawler tractors.	Satisfactory but dismantling of mat difficult when inverted.
	Rooling 50' by 80' sheets into tubes, axis transverse to centerline of runway.	Satisfactory but amount of PSP salvageable after unrolling reduced.
PSP deeply imbedded in asphalt (full depth PSP) with rock fill ½" to 1" on PSP.	Only by inverting sheets and rolling sheets could this PSP be removed from runway.	Little PSP could be salvaged after removal with this method.

(c) OBSERVATIONS: Rolling PSP mats into tubes is the fastest way to remove PSP mats but little PSP can be salvaged after removal.

(2)

(a) ITEM: Leakage of roof vents under wind blown rain.

(b) DISCUSSION: Only roof vents providing coverage against rain incidence 60 degrees from the verticle have proven satisfactory against wind blown rain in the An Khe area.

(c) OBSERVATION: Current roof vents can be improved by adding facia boards to provide the required protection against rain.

(3)

(a) ITEM: Deterioration PSP runway An Khe ✓

(b) DISCUSSION: M-8 PSP laid on asphalt base course shows rapid deterioration under heavy C-130, C-123, CV-2, & OV-1 traffic. The PSP showed two major failings. The PSP panels split lengthwise at the base of the corrigations and the end "L" shaped locking devices break. Both types of breaks cause conditions that are extremely hazardous to aircraft tires.

(c) OBSERVATION: PSP shouldn't be used on heavy runway if other surfacing methods are available.

(4)

(a) ITEM: Alignment of corrugated steel roofing and siding. ✓

(b) DISCUSSION: Difficulty is often encountered in aligning the initial row of corrugated steel roofing or siding so that the subsequently applied rows fit properly and that the completed roof or side has a neat appearance.

(c) OBSERVATION: Pre-fastening two or three sheets of corrugated steel together before final placement increases the speed and accuracy of alignment.

(5)

(a) ITEM: Fabrication of sway bracing for perfabricated steel ✓ buildings.

(b) DISCUSSION: Shortages of sway braces for perfabricated steel buildings have occured due to loss in shipment and damage.

(c) OBSERVATION: Sway braces may be fabricated by welding turnbuckles to lengths of steel reinforcing bar. Wire rope with cable clamps may be used in lieu of reinforcing bar.

(6)

(a) ITEM: Application of Steel sheeting during high winds

(b) DISCUSSION: Injuries have occured while applying steel sheeting for roofing and siding of buildings during high or gusty winds.

(c) OBSERVATION: To avoid the possibility of injury to personnel and damage to materials, all sheeting application should be suspended during periods of high or gusty winds.

(7)

(a) ITEM: Stretching bracket for stretching pierced steel planking.

(b) DISCUSSION: Brackets used for stretching PSP which only hook into two or three holes in a PSP panel do not distribute stretching load adequately and often the result is severe deformation of the panels.

(c) OBSERVATION: An excellent stretching bracket may be made by welding a hook to a half panel of PSP. the half panel is then inserted into the PSP to be stretched and the load is distributed across the length of the panel.

(8)

(a) ITEM: Alignment of PSP runways.

(b) DISCUSSION: Alignment of long strips of PSP is difficult to maintain during the laying operation and during stretching.

(c) OBSERVATION: After laying the complete strip of PSP, alignment imperfections are very noticeable to the naked eye and may be straightened by pulling from the sides of the strip with a dozer winch. Truck mounted winches of smaller capacity will not satisfactorily serve due to the heavy weight of the PSP.

(9)

(a) ITEM: Spotting PSP prior to laydown.

(b) DISCUSSION: The distance interval between bundles of PSP, Which must be calculated prior to spotting the bundles, is critical if an efficient laying operation is to be maintained. A loss factor for damaged panels must be included in the distance calculation.

(c) OBSERVATION: An initial calculation using a loss factor of 10% may be used for the first few hundred feet and then the loss factor can be adjusted according to the average number of non-serviceable panels.

(10)

(a) ITEM: Transport and handling of heavy construction materials for Self Help Prefabrication Yard.

(b) DISCUSSION: An Engineer Construction Company does not organically have the men or equipment necessary to adaquately support an operation of this size. Attempting to do so results in a shortage of nails today, lumber tomarrow, etc.

(c) OBSERVATION: Arrange through higher headquarters for a throughput shipment of all lumber from the Port of Debarkation to the prefabrication site. This eliminates double handling of the material at an Engr Supply Depot, and leaves trucks free to haul other less bulky materials such as hardware or electrical equipment.

(11)

(a) ITEM: Maintenance of Jigs used for construction of prefabricated wall panels.

(b) DISCUSSION: It has been observed that workers have a tendency to force precut panel members into the jig rather than cut them to fit. This practice causes the jig stops to move and results in finished panels that are off specification.

(c) OBSERVATION: Adaquately supervise workers and continually check dimensions of jigs.

(12)

(a) ITEM: Control of waste in Operation of 2-Story Billets Prefabrication.

(b) DISCUSSION: The largest single source of waste is that associated with cutting of studs, plates, and bracing for the wall panels.

(c) OBSERVATION: Draw sized lumber rather than random length so that in many cases no cutting is required.

(13)

(a) ITEM: Preparation and application of cold mix bituminous material in road repair.

(b) DISCUSSION:

1. Equipment needed: 1 grader, 1 asphalt distributor, 1 front loader. Materials Needed: 20 yards 3/4" minus rock, 375 to 425 gallons of RC-3, 3 to 4 yards coarse sand if required.

2. Spread rock evenly on a pad approximately 20' x 300', use grader to put the rock in one continuous wind row. Spread rock approximately 4" to 5" thick and 12' wide. Shoot the rock with RC-3 using approximately 100 gallons per pass. Wind row the rock and asphalt back and forth on the pad to mix and then spread out again as before. Repeat the operation as many times as required until all rock is covered with asphalt. Do not shoot to heavy, if by chance the rock is shot to heavy it can be put in a pile and allowed to bleed for 3 to 5 days before using. If the right mixture is used the cold mix may be used immediately.

3. Prepare the hole by squaring the hole and edges, blow all loose dirt out of the hole. Hole must be at least 2 inches below grade. If hole is between 2 and 6 inches deep and has a solid base, cold mix may be applied without any further preparation. If deeper than 6 inches it must be built up and compacted to approximately 4 inches with rock or other stabel material and then cold mix applied. If less than 2 inches the hole must be dug out to approximately 4 inches. Before applying cold mix to any hole other than one that has been built up and shot with a tack coat it is best to sprinkle or spray a light coat of diesel in the bottom and the side of the hole. The cold mix should be built up above the level of the existing surface to allow compaction. This depends on the depth and size of the hole and experience is the best guide. A roller is recommended but not a necessity, traffic may drive on the repaired section immediately after finishing, no curing time is required. The finished product may be covered with sand but it will work just as well with out it. If after a short period of time the cold mix starts flaking out of the holes, 3 or 4 yards of dry coarse sand may be added to the rock before mixing. This will require a few more gallons of asphalt than the mix without sand. Normally the sand is not required.

4. If dirty rock is used in the mix or too much sand, it will require an excessive amount of asphalt which will cause the mix to roll out of the holes after heavy traffic has been on it.

(c) OBSERVATION: Clean, dry rock and the right amount of RC-3 is the whole key to a good cold mix.

(14)

(a) ITEM: Dummy joints in concrete slabs.

(b) DISCUSSION: In placing dummy joints in concrete slabs the displacement of the coarse aggregate for the joint can be a frustrating experience. This is particularly true if the concrete has set up. In many cases the result is an unsightly meandering joint.

(c) OBSERVATION: By dragging a long piece of re-bar (w/ deformations) from end point to end point of the desired joint, a straight, deep joint will be formed. This is done befor the concrete sets up. The joint is dressed later when the concrete has set up.

(15)

(a) ITEM: Loading equipment for dump truck units.

(b) DISCUSSION: The loading equipment of the supported unit is insufficient to permit optimum utilization of a dump truck platoon on a mission basis.

(c) OBSERVATION: Whenever the 513th used a majority of its available trucks on a mission basis, either for long or short hauls, the supported unit could not provide sufficient loading equipment to yield a balanced equipment utilization. Recommendation for TOE addition of a 2½ cu yd front loader to each dump truck platoon, TOE 5-124D, is being prepared.

(16)

(a) ITEM: Loading of Pierced Steel Planking (PSP)

(b) DISCUSSION: Excessive time was required to load PSP onto trucks.

(c) OBSERVATION: PSP must be securely bundled to be loaded properly. The best method appears to be steel strapping of at least 1 in width, with 5 straps per bundle. One strap should be not more than 12" from each end. When bundled this way, field loading equipment (5-ton wrecker or 20 ton crane) can be efficiently used with easily manufactured hooks inserted in the top piece of PSP, without bending the PSP. The use of wire rope slings is unsatisfactory because too much time is required to disengage the cable from between the PSP and the truck.

(17)

(a) ITEM: Use of Template in Driving Sheet Pile

(b) DISCUSSION: Driving sheet pile walls one pile at a time without any lateral restraint tends to cause gross misalignment which both slows down progress and results in an unsatisfactory finished product.

(c) OBSERVATION: Sheet pile should always be set in a template several piles at a time and plummed before driving proceeds.

(18)

(a) ITEM: Use of Swinging Leads.

(b) DISCUSSION: Fixed leads are often not well adapted to driving sheet pile due to the fact that the adjacent piles are in the way and the sheet pile cap must be aligned with the sheet pile.

//

(c) OBSERVATION: Swinging leads may be used in lieu of fixed leads, allowing the leads to be raised, lowered, and rotated. In this rig the leads are attached to one hoist line and the hammer to the other.

(19)

(a) ITEM: Sheet Pile Cofferdam Design.

(b) DISCUSSION: Failures of sheet pile cofferdams are not uncommon and can be extremely costly in money, time, and human life.

(c) OBSERVATION: Insure that cofferdam design is checked for sufficient pile penetration and lateral stability to prevent bending of piles, overturning of wall, and soil blowout or quick condition.

(20)

(a) ITEM: Soil Conditions for Pile Foundations.

(b) DISCUSSION: Major delays have been caused in projects calling for a pile foundation due to lack of information on soil conditions.

(c) OBSERVATION: When pile foundations are to be used or any project using piles is anticipated, soil borings should be taken and carefully analyzed and the results used in the design.

(21)

(a) ITEM: Sheet Pile Corners.

(b) DISCUSSION: It is often necessary to change direction of sheet pile walls.

(c) OBSERVATION: Sheet pile corners (45°, 90°, 60°) may be ordered from the manufacturer or fabricated by slicing a pile and welding or bolting it back together at the desired angle.

(22)

(a) ITEM: Pile Extractors

(b) DISCUSSION: Sheet pile must often be extracted during the driving of a wall or cofferdam.

(c) OBSERVATION: Always have a pile extractor and air compressor sufficient to operate it on hand while driving sheet pile. Make sure that sheet pile pickup holes are large enough for the extractor pin.

(23)

(a) ITEM: Pumping Out Cofferdams.

(b) DISCUSSION: you can expect sheet pile cofferdams to leak at the joints and some water to flow underneath.

(c) OBSERVATION: Pumping of cofferdams must be continuous and requires at least two reliable, heavy duty, large capacity pumps. Leaks in sheet pile may be stopped by pouring a sealer, such as wet sawdust, into the water next to the joints on the outside of the wall.

(24)

(a) ITEM: Navy Pontoon Barge Deck.

(b) DISCUSSION: The decks of Navy pontoon barges are of steel plate, angles and bolts which on a work barge can be bent, warped and cause a safety hazard.

(c) OBSERVATION: The application of a heavy wooden deck over the steel deck protects the steel deck and fasteners and facilitates the safe movement of equipment and personnel on the deck.

(25)

(a) ITEM: Formation of sand boils or springs.

(b) DISCUSSION: While pumping out a cofferdam, sand boils or springs were observed. This is a warning of an impending failure either by "piping"or by complete loss of bearing by the soil due to quick condition. The springs are especially dangerous when found in fine, non-cohesive type soils.

(c) OBSERVATIONS: As soon as springs are observed they should be covered with surcharge consisting of gravel or sand type material. For best results the surcharge should meet filter specifications; however, a good field expedient is obtained by using sandbags filled with clean sand. The surcharge will serve two (2) purposes. First, it will prevent washing away of fines which could lead to a sudden blowout like failure caused by "piping". Second, the weight of the surcharge will increase the factor of safety against heave or quick condition type failure, caused by the upward flow of water.

EGC-843-00 4 August 1966
SUBJECT: Operational Report on Lessons Learned for Period 1 May 1966 to 31 July 1966 (RCS: CSGPC-28 (R-1))

2. Commanders Recommendations:

b. Red Ball requistions should be authorized for anticipated deadline. Many times a faulty part is discovered while the equipment is still operational. If the part was placed on Red Ball at this time, there is a good chance that the new part would be received before the piece of equipment was deadlined. This would eliminate a large percentage of equipment deadline time.

3. Section Three, Headquarters, Department of the Army Survey Information. A negative report is submitted.

David G. Hainville
DAVID G. HAINVILLE
Major, CE
Commanding

EGC-CO (14 Aug 66) 1st Ind
SUBJECT: Operational Report on Lessons Learned for Period 1 May 1966 to 31 July 1966 (RCS CSFOR-65)

HEADQUARTERS, 937TH ENGINEER GROUP (COMBAT), APO 96238, 22 August 1966

THRU: Commanding General, 18th Engineer Brigade, ATTN: AVEB-3, APO 96307

TO: Headquarters, Department of the Army, ATTN: ACSFOR, Washington D.C. 20310

1. I do not concur in the recommendation of the Battalion Commander (subparagraph 2.b. on the last page). I share his view that an adequate level of replacement parts should be provided, but I feel that his recommendation that Red Ball requisitions be authorized for anticipated deadline, if implemented, would negate the Red Ball system.

2. Lessons learned reports submitted by units of the Group are disseminated throughout the Group in order that all units may profit from past experience.

E. P. Braucher

E. P. BRAUCHER
Colonel, CE
Commanding

FOR OT

OCE

Operational Report - Lessons Learned

FOR OT
LTC Ray/77682/mt

1. References:

a. CSM 66-31, Operational Report - Lessons Learned, 18 January 1966.

b. Operational Report - Lessons Learned, Headquarters, 84th Engineer Battalion.

2. In accordance with paragraph 3b(1)(c)2 of reference 1a, the following comment is extracted from reference 1b:

a. Page 11, para 15. Item: Loading Equipment for Dump Truck Units.

Observation: "Whenever the 513th used a majority of its available trucks on a mission basis, either for long or short hauls, the supported unit could not provide sufficient loading equipment to yield a balanced equipment utilization. Recommendation for TOE addition of a 2½ cu yd front loader to each dump truck platoon, TOE 5-124D, is being prepared.

3. It is requested that you review the lessons learned cited on page 6 through 13 and determine if any of the observations are contrary to good engineering practices. It is anticipated that this report will given wide dissemination to the Service Schools and Engineering Units. It is recognized that ACSFOR has the primary responsibility for change to TOE's and that such action will not be forthcoming until a recommendation is made by USARPAC, however, please evaluate the observations cited above to determine the desirability for inclusion in all Engineer Units of this type.

4. Please advise this office NLT COB 28 October, of your evaluations and any actions taken in this case. The reply from your agency will be used to inform the CofSA of progress in this area.

FOR THE ASSISTANT CHIEF OF STAFF FOR FORCE DEVELOPMENT:

1 Incl
Rpt, 84th Engineer Bn.

JACK B. MATTHEWS
Colonel, GS
Director of Organization,
Unit Training & Readiness, OACSFOR

010466

DISPOSITION FORM

(AR 340-15)

REFERENCE OR OFFICE SYMBOL	SUBJECT
FOR OT RD	Operational Report - Lessons Learned, Hqs, 84th Engineer Battalion (Construction)

TO	FROM	DATE	CMT 1
OCE	OACSFOR LTC RAY/77682/mt	10 FEB 1967	

1. References:

a. AR 1-19, subject: "Operational Report - Lessons Learned", dated 26 May 1966.

b. Operational Report - Lessons Learned, Hqs, 84th Engineer Battalion (Construction) for quarterly period ending 31 October 1966.

2. Operational Report - Lessons Learned, cited in reference 1b above, is forwarded for your information.

FOR THE ASSISTANT CHIEF OF STAFF FOR FORCE DEVELOPMENT:

1 Incl
a/s

JACK B. MATTHEWS
Colonel, GS
Director of Organization,
Unit Training & Readiness, OACSFOR

W. F. WADSWORTH, JR.
Colonel, GS
Chief, Readiness Division

OPS-05009

DA FORM 1 FEB 62 2496 REPLACES DD FORM 96, EXISTING SUPPLIES OF WHICH WILL BE ISSUED AND USED UNTIL 1 FEB 63 UNLESS SOONER EXHAUSTED.

DEPARTMENT OF THE ARMY
OFFICE OF THE ADJUTANT GENERAL
WASHINGTON, D.C. 20310

IN REPLY REFER TO
AGAM-P (M) (25 Jan 67) FOR OT 2 February 1967

SUBJECT: Operational Report - Lessons Learned, HQ, 84th Engineer Battalion (Construction)

TO: SEE DISTRIBUTION

1. Forwarded as inclosure is Operational Report - Lessons Learned, Headquarters, 84th Engineer Battalion (Construction) for quarterly period ending 31 October 1966. Information contained in this report should be reviewed and evaluated by CDC in accordance with paragraph 6f of AR 1-19 and by CONARC in accordance with paragraph 6c and d of AR 1-19. Evaluations and corrective actions should be reported to ACSFOR OT within 90 days of receipt of covering letter.

2. Information contained in this report is provided to the Commandants of the Service Schools to insure appropriate benefits in the future from lessons learned during current operations, and may be adapted for use in developing training material.

BY ORDER OF THE SECRETARY OF THE ARMY:

Kenneth G. Wickham

KENNETH G. WICKHAM
Major General, USA
The Adjutant General

1 Incl
a/s

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(Continued on page 2)

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HEADQUARTERS
84TH ENGINEER BATTALION (CONSTRUCTION)
APO 96238
San Francisco, California

EGD-84E-CO 14 November 1966

SUBJECT: Operational Report-Lessons Learned (RCS CSFOR-65), for Quarterly Period Ending 31 October 1966

THRU: Commanding Officer
45th Engineer Group (Const)
APO 96238

Commanding General
18th Engineer Brigade
APO 96307

Commanding General
United States Army, Vietnam
ATTN: AVC-DH
APO 96307

Commander In Chief
United States Army, Pacific
ATTN: GPOP-MH
APO 96558

TO: Assistant Chief of Staff for Force Development
Department of the Army (ACSFOR DA)
Washington, D. C. 20310

1. SIGNIFICANT ORGANIZATIONAL ACTIVITIES: During the reporting period the 84th Engineer Battalion (Construction) was active on the following projects:

a. An Khe Airfield, Brigade 66-11DC-937

The project consists of design and construction of a forward area, medium-lift airfield with associated ramps, taxiways and parking aprons. The wearing surfaces are to be 2" of double surface asphalt.

Incl 1

The project was started on 7 March 1966 and is presently 59% complete. To date, 98,789 US man-hours and 21,814 equipment hours have been expended. During this period, starting on 1 October 1966, rehabilitation of the existing PSP runway was undertaken. This rehabilitation consists of removing the existing PSP wearing surface; removing the sand layer beneath the PSP by blading, sweeping and blowing; and providing an asphalt double surface treatment for the wearing surface. This work, being done while insuring that the runway remains operational, is 100% complete. A total of 12,000 US man-hours and 2940 equipment hours were expended.

b. 60-Ton Ice Plant, An Khe, 35-937/V-66

This project, started on 20 May 1966 and presently 65% complete, consists of construction of a 60-ton ice plant, including site layout, electrical wiring, power installation and associated structures. To date, 30,704 US man-hours and 3253 equipment hours have been expended.

c. Dial Office, An Khe, Brigade 66-40DC-937

This project, started on 5 March 1966 and completed on 10 October 1966, consisted of site preparation and construction of a 40' x 100' wood frame building to be used as a central dial office building. Construction effort included the expenditure of 24,517 man-hours and 1773 equipment hours.

d. Interior, Dial Office, An Khe, Brigade 66-140C-937

This project consists of the completion of the interior of the Dial Exchange building IAW standard Yards and Docks Drawings. Since the starting date of 27 September 1966, 3741 man-hours and 164 equipment hours have been expended, and the project is presently 82% complete.

e. Permanent Ammunition Storage, Phu Tai Valley, Brigade 66-26C-937

This project was started on 24 November 1965 under Construction Directive Log 937-37 by the 299th Engineer Battalion (Combat). Responsibility for completion of this project was assigned to this command with an effective starting date of 20 August 1966. The scope of work includes completion of fifty-four (54) 40' x 140' reinforced concrete storage pads, four (4) each four-hole latrines and twenty (20) ea guard towers. New construction includes a 300' x 300' hardstand, 20' x 50' surveillance building, two (2) ea 20' x 48' steel arch earth-covered magazines and access roads throughout the area. The project is presently 83% complete, and to date this unit has expended 33,744 US man-hours, 37,670 VN man-hours and 8842 equipment hours.

f. Cantonment Construction, Phu Tai Valley, Brigade 66-142DC-937

Initially this directive called for the design of self-help construction for a 3000-man cantonment in Valley A. Recently, however, new cantonment areas throughout Phu Tai Valley have come to be included under this directive. Presently approved plans call for construction of 14,400 SF of community facilities, 168,000 SF of troop housing, 23,200 SF of mess halls and 23,200 SF of administration-supply buildings. Engineer troop effort in support of this project amounts to 20,864 man-hours since the project starting date of 10 September 1965. In addition, 16,642 VN man-hours and 320 equipment hours have been expended. Approximately 18,000 man-hours of self-help construction have also been expended. The effort listed above has resulted in the completion of 38,400 SF of troop billets, 8000 SF of mess halls, and 3600 SF of administration-supply buildings. Based on the number of buildings completed and proposed at the present time, this project is 19% complete.

g. Cantonment Construction, Brigade 65-15C-937

This directive covers self-help construction throughout the Qui Nhon area. Presently approved plans call for the construction of 374,000 SF of troop billets, 27,600 SF of mess halls, 75,200 SF of administration-supply buildings and 4056 SF of maintenance buildings. To date, 59,450 US engineer, 57,672 local national and approximately 140,000 self-help man-hours have been expended to complete the following: 172,000 SF of troop housing, 5600 SF of mess halls and 21,600 SF of administration-supply buildings. Based on the number of buildings completed and presently proposed, this project is 39% complete.

h. Rock Quarry and Crusher, 75-ton, An Khe, 61-937/V-66

The project consists of operating two (2) ea 75-ton crushers to provide crushed rock to be used for projects in the An Khe area. To date, 97,113 US man-hours and 36,650 equipment hours have been expended, and approximately 36,600 CY of rock have been crushed.

i. Rock Quarry and Crusher, 225-ton, Phu Tai, 2-937/V-65

This crusher, which began operation on 15 June 1966, provides crushed rock for use in the Qui Nhon area. To date, 33,922 US man-hours, 16,560 local national man-hours and 23,652 equipment hours have been expended. Approximately 18,900 CY of rock have been crushed.

j. Vung Chua Signal Relay Site Improvements, Brigade 66-113C-937

This project, started on 1 June 1966 and completed on 15 October 1966, consisted of cutting and grading an area approximately 80' x 100' and constructing three (3) concrete pads for the installation of

TROPO units. Pads were also constructed for two (2) shelters and two (2) antenna bases. The project involved the expenditure of 2924 US and 2810 local national man-hours and 734 equipment hours.

k. Qui Nhon Depot, Brigade 66-27DC-937

The project includes construction of open storage areas, shed storage, prefabricated metal warehouses, administration buildings, security fencing, roads and drainage facilities. The project was started on 1 August 1965 and is presently 66% complete. The completed work consists of 112,400 SF of open storage, 177,400 SF of covered storage and 22,000 SF of administration buildings. To date, 236,029 US man-hours, 36,502 local national man-hours and 36,448 equipment hours have been expended.

l. Storm Drainage, Qui Nhon Army Airfield, 76-937/V-66

Project consists of constructing 3 or 4 dry wells with PSP lids. This project, started on 1 September 1966, is 75% complete, and to date, 932 US man-hours and 100 local national man-hours and 204 equipment hours have been expended.

m. Port Access Road (Interim), 70-937/V-66

This road, in excess of 4000 feet long, is to extend from Gia Long Street in the city of Qui Nhon to the DeLong Pier. Phase I consists of the actual construction of the laterite road over hydraulic fill. The minimum compacted thickness of laterite is 18", and the road has a 48' traveled way with 6' shoulders for approximately the first half of the length; at this point the traveled way narrows to a width of 24 feet. Phase I also includes associated facilities, such as grade crossings and drainage. Phase II consists of completing the interim access road by placing a select base of rock on the laterite subbase and then applying a double bituminous surface treatment as the wearing course. Phase I is presently 95% complete, and to date, 15,328 US man-hours and 2990 local national man-hours and 10,818 equipment hours have been expended. This effort includes the hauling of 22,112 CY of laterite.

n. 85th Evacuation 540-Bed Hospital, Brigade 65-7DC-937

This project was originally base camp project 937-09 and later redesignated as a hospital. Work on this project, which began on 12 October 1965, is presently 98% complete. In addition to the 540-bed facility with its associated structures, covered walkways were constructed between and alongside the hospital quonsets. At the present time hospital drainage facilities are being completed, and three of ten proposed 20' x 120' standard frame troop billets are complete. To date, this project has involved the expenditure of 128,293 US and 17,761 local national man-hours and 28,678 equipment hours.

o. Rehabilitation of Roads #1 and #2 and Villa Road, Brigade 65-20DC-937

Although initial plans called for the eventual surfacing of these roads with a double surface treatment, engineer effort has been confined to maintenence of the roads. Hauling of 11,000 CY of fill to maintain these roads has resulted in the expenditure of 10,843 US and 3351 local national man-hours and 4447 equipment hours.

p. Pontoon Pier LCU, LCM & LST Ramps, Brigade 66-37DC-937

The project consists of design and construction of a 500' pontoon finger pier and two each LCU, LCM ramps and appropriate mooring facilities. One of the ramps is 210' x 58' with a granite cube stone (6" x 8" x 8") surface. The other is 120' x 58' with an 8" reinforced concrete surface. Mooring facilities consist of four (4) each pile mooring dolphins adjacent to the derelict at the end of the can dock; one (1) each single pile at each end of the derelict and ten (10) each mooring anchors at the LCU, LCM ramps. The project is 98% complete, and to date, 63,000 US and 22,073 local national man-hours and 16,375 equipment hours have been expended.

q. Refrigeration Facilities, Brigade 66-61C-937

This project consists of the construction of 9' x 32' concrete pads and the erection of 1600 CF prefabricated reefer units upon these pads. Fifty-nine (59) of these units have already been installed in the Qui Nhon Log Depot and are presently operational; thirty-four (34) units are programmed for the Valley A cantonment area in Phu Tai Valley. To date, the erection of these units has resulted in the expenditure of 9829 US and 15,647 local national man-hours and 1707 equipment hours.

r. 4" Submarine Pipeline, Brigade 66-177DC-937

Under the provisions of this directive, the existing 4" pipeline in the Qui Nhon harbor is to be extended to a length of 5500' to an existing four-point mooring system. In addition, two (2) other 5500' 4" submarine pipelines are to be installed alongside the existing line. This project is approximately 50% complete, with the extension of the existing line having been accomplished, and to date 6960 US and 990 local national man-hours and 908 equipment hours have been expended.

s. 314-Man Cantonment, Brigade 66-159DC-937

This directive provides for the construction of a 314-man cantonment adjacent to the 67th Evacuation Hospital. Engineer effort will be utilized for site preparation, construction of a 20' x 120'

double-story EM billet and two (2) each 20' x 48' tropicalized quonsets with concrete floors for administration and community facilities, and to provide adequate drainage facilities. Work accomplished so far has been limited to site preparation, and to date 130 US and 380 local national man-hours and 23 equipment hours have been expended.

t. Log Depot Expansion, Phu Tai Valley, Brigade 66-158DC-937

Based on a Qui Nhon Base Development Plan, this directive calls for the design and construction of the Qui Nhon Depot expansion as follows: Cold Storage: 456,000 CF; Covered Storage: 400,000 SF; Open Storage: 512,000 SY. Provisions are also included for drainage facilities and access and internal roads. Engineer effort to date has been confined to extensive survey work and translation of field data to useable information. It is expected that the entire project will entail the expenditure of better than four (4) battalion months and several hundred thousand man-hours of local national effort.

u. Combat Support

Throughout this reporting period battalion construction was delayed due to combat support commitments. To date, over 90,000 US engineer troop man-hours and over 15,000 equipment hours have been expended.

2. COMMANDER'S OBSERVATIONS AND RECOMMENDATIONS

a. Part I: Lessons Learned

PERSONNEL

(1) ITEM: Supervision of Vietnamese National day labor

(a) DISCUSSION: Vietnamese National day laborers are used on routine activities, such as ditch digging, grass cutting and building security fences. These activities are conducted with a GI supervisor for four (4) crews totaling 80 Vietnamese. Production of the work crews is about 65% of the production of work crews supervised at one (1) GI per 30 laborers.

(b) OBSERVATION: Vietnamese day labor can be worked with minimum supervision if the lower efficiency can be tolerated.

(2) ITEM: Safety hazards in utilizing Vietnamese National day labor

(a) DISCUSSION: Vietnamese semi-skilled and unskilled day labor was used in construction of two-story 20' x 80' standard billets

for carrying materials, placing panels and other semi-skilled work. Without very close supervision, they present a safety hazard to themselves and others working on the same project. The laborers give no consideration to movement or where they set down tools and materials when working around scaffolding, causing a safety hazard for personnel working in the area.

(b) OBSERVATION: When utilizing Vietnamese day labor around vertical construction projects, at least one (1) US should be employed as a "safety supervisor" for the day labor.

OPERATIONS

(3) ITEM: Erosion control

(a) DISCUSSION: In using peneprime for erosion control, two (2) factors seem to determine whether or not it will be effective. One is the condition of the surface it is applied to; the other is the length of time it is allowed to cure before any traffic or water hits the surface.

(b) OBSERVATION: By first smoothing and compacting the surface of an area to which peneprime is to be applied, a more erosion-resistant surface will be obtained. If a layer of dust exists, it is best to spray it with water and compact it into a firm surface so that the peneprime will penetrate into a solid surface rather than a soft dust layer. Once peneprime is applied, it should be allowed to cure for 24 to 48 hours before water gets to it and there should be absolutely no traffic on it. Peneprime, once it cures, forms a hard crust on the surface which is water resistant; however, if this crust is broken, the water gets underneath it and simply erodes the remaining portion away. This is why it is so necessary to keep traffic off the peneprimed areas, especially around culvert headwalls and ditch walls, which have a high percent slope.

(4) ITEM: Erosion and sedimentation

(a) DISCUSSION: On large drainage surfaces consisting of loose soil without any cover and having slopes greater than 2 or 3%, serious erosion to be followed by silting of drainage structures in low relief areas can be expected during the monsoon season. The above problem was encountered at the Ammo Supply Point, located about 5.5 miles from Qui Nhon at a grid azimuth of approximately 230°. The stripped areas and fills with excessive slopes experience serious erosion, while the drainage ditches and some of the culverts were completely clogged by sediment deposits.

(b) OBSERVATION: When designing drainage structures the effects of construction on the natural terrain must be predicted.

The design must integrate the proposed construction area into the existing drainage basin drainage. Design of slopes is critical, since high slopes will result in excessive erosion, and low slopes will cause sediments to be deposited. Fines and sand will not be deposited over grades greater than about 2%, while ditches having slopes greater than 6 to 8% will probably have to be lined. In areas where minimum slope criteria cannot be met due to low relief, settling basins must be provided and cleaned out periodically to insure a functional drainage system.

(5) ITEM: **Liquefaction**

(a) DISCUSSION: Complete loss of soil bearing capacity was encountered while clearing and grubbing with dozers at the depot expansion site, located approximately 7.5 miles from Qui Nhon on a grid azimuth of 250°. The soil failed almost instantaneously under the tracks of a dozer and changed into freely flowing mud, allowing the dozer to settle past the top of the tracks. Upon examination it was found that the water table was almost at the surface and that the soil had a large content of silt to fine sand-sized particles with some organic matter. It was not possible to predict the location of the likely failure zones, but a ¼-ton vehicle could drive up to the stuck dozer with no difficulty.

(b) OBSERVATION: Under certain loading conditions associated with some type of vibratory motion, soil consisting of silt- to sand-sized particles and having a high water table is susceptible to losing all bearing capacity in a matter of a few minutes. Two possible solutions are to decrease the water table and/or to raise the finished grade with fill, thereby decreasing the load. When soil conditions as described are encountered, a careful engineering study should be made to determine the feasibility of carrying out a construction program at such a site without the problems cited above.

(6) ITEM: Rolling asphalt

(a) DISCUSSION: Rolling asphalt in rainy weather may crack the surface enough to allow water penetration, which will result in softening of the subsurface.

(b) OBSERVATION: Rolling of asphalt should be suspended during rain.

(7) ITEM: Spreading rock for surface treatment asphalt

(a) DISCUSSION: Spreading rock for asphalt in excessively thick layers requires many additional man-hours to remove the excess.

(b) OBSERVATION: Care must be exercised to insure that rock is spread evenly and in the correct quantity.

(8) ITEM: Finish surface for double surface treatment asphalt

(a) DISCUSSION: It is desirable to have a seal coat on double surface asphalt pavement which will also enhance the appearance of the finished job.

(b) OBSERVATION: On a double surface treatment of 3/4" (-) rock and chips, a seal coat of crusher fines makes a good finished surface.

(9) ITEM: Removing PSP runway sections

(a) DISCUSSION: It is often difficult to "unseat" PSP that has been in place for long periods and is imbedded into the subsurface.

(b) OBSERVATION: The use of two dozers, one to push and one to pull, will easily "unseat" large sections of PSP. After "unseating," the pull dozer can drag the sections alone.

(10) ITEM: Assembly of corrugated metal culvert

(a) DISCUSSION: Difficulty is often encountered when trying to match holes of two halves of culvert pipe during assembly.

(b) OBSERVATION: Assembly is greatly facilitated by the use of "C" clamps to hold the two halves together while they are being bolted.

(11) ITEM: Fabrication of louver blocks for louvered siding

(a) DISCUSSION: A repetitive cutting operation, such as cutting louver blocks for siding, is most efficiently performed by a radial arm saw; however, most units do not have radial arm saws as TC&E equipment.

(b) OBSERVATION: As a substitute for a radial arm saw, a bench saw may be improvised by mounting a Skill Saw upside down on a sheet of plywood.

(12) ITEM: Water for concrete

(a) DISCUSSION: Difficulty is often encountered in obtaining water distributors to be used for concrete pours.

(b) OBSERVATION: A fuel bladder filled with water and carried on a truck provides a good solution to the problem.

(13) ITEM: Drainage systems in Qui Nhon

(a) DISCUSSION: Having worked on several drainage projects in the area, this unit has encountered many problems. The largest seems to be the flatness of the area and the lack of coordination between units to come up with an overall drainage system for the Qui Nhon area. Lack of this is evident in the 85th Evacuation Hospital area, where water is drained under the most difficult conditions, caused by lack of adequate fill and the absence of satisfactory drainage collection areas. Two (2) makeshift sumps have been constructed at each end of the system to collect the water and allow it to seep through the sand down to the water table. Laterite washed down from the hospital area has settled to the bottom and sealed off the sand, thus preventing water seepage to the water table. A better solution would be to design an overall system whereby water is drained in a surface ditch to the ocean.

(b) OBSERVATION: Better coordination is needed between local population and US units and among US units themselves to solve the drainage problem. An attempt should be made to remove the laterite cover on the sand sump to enhance its water absorption capabilities.

(14) ITEM: Tire changing on 5-ton trucks

(a) DISCUSSION: Five-ton dump trucks have become a critical item to all engineer units. The rough roads and quarry operations have increased the "down" time due to flat tires. The time required to change tires can be reduced by utilization of the electric impact wrench, which is a component in the Pioneer Electric Trailer.

(b) OBSERVATION: The time required to change flats, either inside or outside, is more than 50% reduced. This time savings can be used to advantage when hauling equipment is critical.

(15) ITEM: Electrical power for job sites

(a) DISCUSSION: After extended duty in Vietnam, many of our smaller generators are either deadlined or not a reliable source of power. A large percentage of vertical construction projects are located in areas where power could be obtained within 500 feet from neighboring units and installations. Construction platoons should be authorized to draw wire and a circuit breaker panel. This power line could be used on various construction projects.

(b) OBSERVATION: The TO&E generators can be utilized for emergency power requirements on projects where no suitable power is available.

(a) DISCUSSION: Throughout construction of LCU, LCM Ramps, the problem of a certain amount of water leaking through the joints in the sheet pile was prevalent.

(b) OBSERVATION: The first attempt to stop the leaking was with sweeping compound taken under water on the outside of the sheet pile wall and stuffed into the joints of the pile where it was leaking. It was expected that the hydraulic head would force the compound into the area which was leaking. Only moderate success was achieved when instead it was attempted to use sawdust. It was soaked, water-logged and employed in the same manner as the sweeping compound. The latter method worked better than the compound, but only moderate success was achieved.

(20) ITEM: Extraction of cofferdam wall

(a) DISCUSSION: In the extraction of a cofferdam wall, it was discovered that a crane could not apply enough force to pull the pile.

(b) OBSERVATION: A piece of one and one-half (1½) inch pipe about fifteen (15) feet long was welded to an air hose connection at one end. This pipe was coupled to a 600 CFM air compressor with an air hose. The combination was used by "jetting" the pipe down along the side of the sheet pile. The large quantity and high pressure of the air blast flushed the soil away from the pile and allowed extraction.

PREPARATION FOR OVERSEAS MOVEMENT

(21) ITEM: Shipment of general red TAT equipment

(a) DISCUSSION: Pallets are susceptible to being severly damaged in shipment, rained upon and, in some cases, lost in the moving shuffle. Unit commanders should insist on all red TAT being shipped overseas in conex containers. Extra man-hours due to the handling of excessive quantities of palletized cargoes during various stages of shipment can be eliminated by the use of conex containers.

(b) OBSERVATION: Difficulty was encountered state side when Post Transportation was approached concerning the need for conexes. It is suggested that units on orders for shipment overseas be allowed to draw a minimum number of conexes IAW the size and requirement of the unit. Local transportation authorities should be made aware that ammunition must be shipped overseas in conex containers only.

(22) ITEM: Transportation of issued weapons

(16) ITEM: Changing 830M tires

(a) DISCUSSION: Changing 830M tires without a wrecker or port-a-power can be done if the following procedure is used. The outer rim can be broken by using a dozer and a 4" x 8" timber, pushing the tire back against the inner rim and breaking it loose. The tire is then broken loose from the inner rim by a cable sling between the rim and tire in a horizontal plane to the axle. A dozer or grader will pull the cable between the rim and tire. The tire can then be removed. With four (4) men and a long pry bar the new tire can be mounted.

(b) OBSERVATION: This operation eliminates the use of two (2) items of equipment, the port-a-power and wrecker or crane. This method is almost as fast as with the proper equipment. One drawback is that this can only be used on the tractor; a wrecker is still required to change scraper tires.

(17) ITEM: Formation of sand boils or springs

(a) DISCUSSION: While pumping out a cofferdam, sand boils or springs were observed. This is a warning signal of an impending failure either by "piping" or by complete loss of bearing by the soil due to quick condition. The springs are especially dangerous when found in fine, non-cohesive type soils.

(b) OBSERVATION: As soon as springs are observed, they should be covered with surcharge consisting of gravel or sand type material. For best results the surcharge should meet filter specifications; however, a good field expedient is obtained by using sandbags filled with clean sand. The surcharge will serve two (2) purposes. First, it will prevent washing away of fines which could lead to a sudden blowout-like failure caused by "piping." Secondly, the weight of the surcharge will increase the factor of safety against heave or quick condition type failure, caused by the upward flow of water.

(18) ITEM: "Boiling" during cofferdam construction

(a) DISCUSSION: The problem of "boiling," which was evidently partly caused by the hydraulic head on the outside of the cofferdam, was encountered during construction. This "boiling" is one indication that the wall may not have sufficient penetration.

(b) OBSERVATION: During later construction, a thirty-foot pile instead of the twenty footers was used. A greater penetration was obtained as well as a stronger wall as a result. The "boiling" action was negligible as a result.

(19) ITEM: Water leakage in sheet pile

(a) DISCUSSION: Upon embarkation one unit was required to break down all M-14 rifles into the three major groups and stuff components into individual duffle bags. This caused extra work, inconvenience and the loss of several small rifle parts.

(b) OBSERVATION: It is recommended that issued weapons be carried in sturdy, lockable boxes for ease of handling and security reasons.

(23) ITEM: Assignment of personnel

(a) DISCUSSION: Last minute assignments were filled with personnel who could not be prepared for POR status within a reasonable time frame.

(b) OBSERVATION: The unit commander should endeavor to arrange with his post level AG personnel section for an appropriate cut-off date to prevent such last minute assignments. It is also recommended that all further personnel assignments to an alerted unit be cut off upon the date of the commencement of POM leave. Exceptions should only be authorized with the unit commander's consent.

(24) ITEM: TO&E equipment

(a) DISCUSSION: Due to the critical shortage and need of all items of engineer and ordinance equipment, pieces of equipment necessary for essential purposes of the mission are pressed into almost immediate service upon their unloading at the port of debarkation. Poorly prepared equipment that is not up to the high standards of maintenance demanded by the RVN operations will immediately break down and place unit maintenance at a marked disadvantage before it can become effectively operational.

(b) OBSERVATION: Since one of the most crippling delays of the engineer mission is deadlined vehicles, every effort must be made to see that all equipment is in top operational order prior to shipment overseas. Only equipment that has received a full POM check for serviceability should be shipped initially with the unit. Any equipment received with too short a time frame to successfully undergo such a check should be held back temporarily for shipment upon attainment of POM status.

(25) ITEM: Possession of personal firearms

(a) DISCUSSION: Provost Marshall authorities and local area command headquarters throughout Vietnam are making it increasingly inconvenient and complicated for a person who is in possession of a personal side arm. For those who have such weapons,

uniform regulations prevent their authorized wear or carrying on the person, and regulation and shipment back to CONUS is tightly controlled and regulated.

(b) OBSERVATION: Unit commanders will save themselves and their assigned personnel much time and money if the carrying overseas of personal firearms is emphatically discouraged.

b. Part II: Recommendations: None

WILLIAM A RANK
LTC, CE
Commanding

EGC-3 (14 Nov 66) 1st Ind
SUBJECT: Operational Report-Lessons Learned (RCS CSFOR-65), for Quarterly Period Ending 31 October 1966

HEADQUARTERS, 937TH ENGINEER GROUP (COMBAT), APO 96318, 20 November 1966

THRU: Commanding General, 18th Engineer Brigade, APO 96307

Commanding General, United States Army, Vietnam, ATTN: AVC-DH, APO 96307

Commander In Chief, United States Army, Pacific, ATTN: GPOP-MH, APO 96558

TO: Assistant Chief of Staff for Force Development, Department of the Army (ACSFOR DA), Washington, D.C. 20310

1. Observations under title "PREPARATION FOR OVERSEAS MOVEMENT" (Section II, Part I, Items (21), (22), (23), (24), and (25)) are based on experience of the 585th Engr Co (DT), 73d Engr Co (CS), and 444th Engr Det (Conc) which arrived in-country during the period.

2. I concur in all observations except item (24), TO&E Equipment. Maximum emphasis must be placed on proper preparation of vehicles and equipment before movement; however, to leave behind "temporarily" equipment not fully prepared would in all probability, result in an excessive time lag before joining its parent unit. It is recommended that such equipment be shipped with the remainder of the unit equipment and prepared after arrival in-country for operations. Although this is burdensome and inefficient, it will still result in the equipment being available sooner than if left behind for later processing and shipment.

E. P. BRAUCHER
Colonel, CE
Commanding

AVBC-C (14 Nov 66) 2d Ind
SUBJECT: Operational Report-Lessons Learned (RCS CSFOR-65) for Quarterly Period Ending 31 October 1966

Headquarters, 18th Engineer Brigade, APO 96307 12 DEC 66

TO: Commanding General, United States Army, Vietnam, ATTN: AVC-DH, APO 96307

1. The subject report, submitted by the 84th Engineer Battalion (Const), has been reviewed and is considered an adequate report of organizational activities.

2. This headquarters concurs with the observations of the submitting and indorsing commanders, subject to the following comments:

a. Section 2, Part I, para a(5) Liquefaction. Competent personnel in soils engineering or geology should be included in the initial area reconnaissance. Their observations should include the location of the ground water table, old lake formations, clay plugs (oxbow lakes) and other troublesome features. Such observations are essential for an adequate foundation, route, or other type vertical or horizontal construction design.

b. Section 2, Part I, para a(9). Non-concur. Each removal operation must be evaluated in accordance with the physical engineering peculiarities which are in being at the site. The salvage value, of the in place pierced steel plank (PSP), must be considered which off times dictates the removal method.

c. Section 2, Part I, para a(11). Fabrication. This is a good expedient, with one caution. When mounting the skill saw in this manner the safety shield must be left in place.

d. Section 2, Part I, para a(14). Frequent use of "oil can" maintenance will further reduce the "down" time in this operation.

e. Section 2, Part I, para a(15). The expedient power line is an excellent auxiliary and would provide adequate power in most instances. Units can requisition the required material through normal supply channels.

f. Section 2, Part I, para a(16). This headquarters agrees with this operation in principle, but does not concur with the use of a grader, as it must never be used to pull a heavy load or to be subjected to undue stresses.

FOR THE COMMANDER:

Wayne J. Reynolds

WAYNE J. REYNOLDS
Major, CE
Adjutant

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AVHGC-DH (14 Nov 66) 3d Ind
SUBJECT: Operational Report-Lessons Learned for the Period Ending 31 October 1966 (RCS CSFOR-65)

29 DEC '66

HEADQUARTERS, UNITED STATES ARMY VIETNAM, APO San Francisco 96307

TO: Commander in Chief, United States Army, Pacific, ATTN: GPOP-OT
APO 96558

1. This headquarters has reviewed the Operational Report-Lessons Learned for the period ending 31 October 1966 from Headquarters, 84th Engineer Battalion (Construction) as indorsed.

2. Concur with the basic report as modified by the previous indorsements.

FOR THE COMMANDER:

for W. R. AUTREY
Cpt, AGC
Asst Adjutant General

GPOP-OT (14 Nov 66) 4th Ind
SUBJECT: Operational Report-Lessons Learned for the Period Ending 31 October 1966

HQ, US ARMY, PACIFIC, APO San Francisco 96558 14 JAN 1967

TO: Assistant Chief of Staff for Force Development, Department of the Army, Washington, D. C. 20310

This headquarters concurs in the basic report as indorsed.

FOR THE COMMANDER IN CHIEF:

L. L. CHAPPELL
MAJ, AGC
Asst AG

HEADQUARTERS
84TH ENGINEER BATTALION (CONSTRUCTION)
APO 96238

EGD-BB-CO 14 February 1967

SUBJECT: Operational Report-Lessons Learned (RCS CSFOR-65), for Quarterly Period Ending 31 January 1967

THRU: Commanding Officer
45th Engineer Group (Const)
APO 96238

Commanding General
18th Engineer Brigade
APO 96377

Commanding General
United States Army Engineer Command Vietnam (Prov)
APO 96491

Commanding General
United States Army, Vietnam
ATTN: AVC-DH
APO 96307

Commander In Chief
United States Army, Pacific
ATTN: GPOP-MH
APO 96558

TO: Assistant Chief of Staff for Force Development
Department of the Army (ACSFOR DA)
Washington, D. C. 20310

Section 1. SIGNIFICANT ORGANIZATIONAL ACTIVITIES: During the reporting period the 84th Engineer Battalion (Construction) was active on the following projects:

Incl 1

OPS-05-009

EGD-BB-CO 14 February 1967
SUBJECT: Operational Report-Lessons Learned (RCS CSFOR-65), for Quarterly Period Ending 31 January 1967

a. An Khe Airfield, Bde 66-110C-45

Work was started on this project on 7 Mar 66 and consisted of design and construction of a forward area, medium-lift airfield with associated ramps, taxiways and parking aprons. Although originally designed to be surfaced with a double-surface treatment, it was decided in Dec 66 to use a concrete surface. On 10 Dec 66, this project was transferred to 937th Engr Gp (C). At this time, B Co, 84th Engr Bn, was attached to 937th Engr Gp (C). Throughout construction, the future taxiway was used as a runway and was rehabilitated twice. The first time in May 66, the taxiway was covered with PSP over an asphalt base throughout its length. The second time, in Oct 66, the PSP was removed and a double-surface treatment was applied to the runway. The effort expended on this project while under the 84th Engr Bn included 110,547 US man-hours and 109,371 equipment hours.

b. 60-Ton Ice Plant, An Khe, 35-937/V-66

The construction of a 60-ton ice plant, including site layout, electrical wiring, power installation and associated structures, was started on 20 May 66. The facility became operational approximately ten (10) days after the constructing unit was attached to 937th Engr Gp (C), on 10 Dec 66. Associated structures included a generator shed, water tower, ground water storage tank, ordlator shed and a septic tank. Effort expended included 40,978 US and 1791 Vietnamese man-hours and 4897 equipment hours.

c. Interior, Dial Office, An Khe, Bde 66-140C-45

This project consisted of the completion of the interior of a 40' x 100' Dial Exchange building completed on 10 Oct 66 by B Co, 84th Engr Bn. At the time of transfer of this project to 937th Engr Gp (C) on 10 Dec 66, 7292 US man-hours and 2085 equipment hours had been expended.

d. Permanent Ammo Storage, Phu Tai Valley, Bde 66-26C-45

84th Engr Bn assumed responsibility for this project from 299th Engr Bn on 20 Aug 66. Before transfer of this project to 19th Engr Bn on 21 Dec 66, work accomplished included completion of fifty-four (54) concrete storage pads (40' x 100') and earth berms; construction of twenty (20) 937th Engr Gp standard guard towers, four (4) 937th Engr Gp standard four-hole latrines, one (1) 20' x 50' standard surveillance building, two (2) 20' x 48' steel arch magazines; stabilized 116,587 SY of earth with penetrime treatment; excavated 22,820 LF of ditches and placed 4426 CY of concrete. This work was accomplished with the expenditure of 41,376 US and 53,621 Vietnamese man-hours and 7348 equipment hours.

Incl 1