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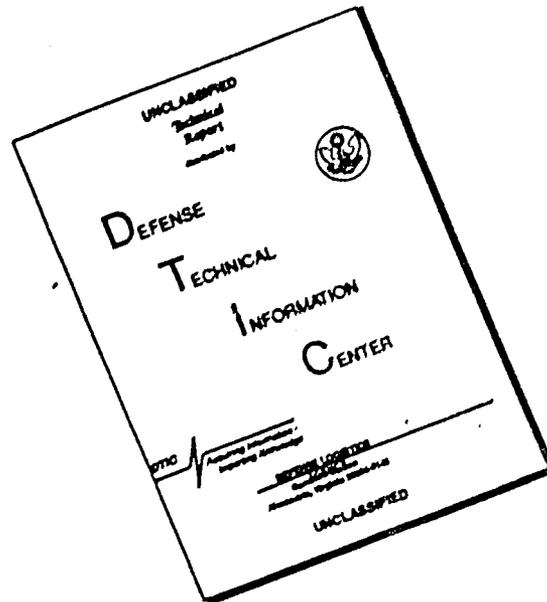
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DEPARTMENT OF THE ARMY
OFFICE OF THE ADJUTANT GENERAL
WASHINGTON, D.C. 20310

IN REPLY REFER TO

AGAM-P (M) (3 Jan 68) FOR OT RD_670521 8 January 1968

SUBJECT: Operational Report - Lessons Learned, Headquarters, 70th
Engineer Battalion (Cbt)(A), Period Ending 31 July 1967

TO: SEE DISTRIBUTION

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2. Information contained in this report is provided 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
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DEPARTMENT OF THE ARMY
HEADQUARTERS, 70TH ENGINEER BATTALION (COMBAT)(ARMY)
APO 96294

EGC-70E-CO

10 August 1967

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

THRU: Commanding Officer
937th Engineer Group (Cbt)
APO 96318

Commanding General
18th Engineer Brigade
ATTN: AVBC-C
APO 96377

Commanding General
United States Army Engineer Command, Vietnam
ATTN: AVCC-PO

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

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

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

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

SECTION I. SIGNIFICANT UNIT ACTIVITIES

1. COMMAND.

a. MISSION:

- (1) To command assigned and attached units.
- (2) To plan and coordinate operations of units assigned or attached to the battalion.
- (3) To provide all non-divisional engineer support required for tactical operations in the battalion area of responsibility.
- (4) To serve as the construction agency for all Army troop labor construction projects within the battalion area of responsibility.
- (5) To act as point of contact for, and to maintain liaison with the Director of Construction, Qui Nhon, Regional Officer in Charge of Construction in An Khe and to provide a contracting officer's representative on army contracts as assigned by higher headquarters.
- (6) To act as a counterattack force to restore the integrity of the Camp Radcliff barrier in the event the barrier is penetrated by an enemy force.

b. ORGANIZATION:

(1) To accomplish the mission the following units were assigned or attached to the battalion during the reporting period:

- (a) 511th Engr Co (PB)
- (b) Co B/84th Engr Bn (Const)(Attached 14 Dec 66)
- *(c) 630th Engr Co (LE)
- (d) 444th Engr Det (HO) (Attached 1 Jan 67)
- ** (e) 1 Plt 585th Engr Co (DT)

*Previously one (1) Plt of 630th Engr Co (LE) was attached to this Bn. On 13 May 67 the 630th Engr Co (LE) was attached to the Bn.

**1st Plt 585th Engr Co (DT) was attached to this Bn on 15 Dec 66. Platoon was released from attached status 15 May 67.

(2) Status of Personnel in the 70th Engr Bn (Cbt)(A) and the attached units is as follows:

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Units	Auth Strength		Asgd	Asgd	Present for Duty	Percent of
	(Old)	(New)	1 May 67	31 Jul 67	Strength	Auth Strength
*70th	619	794	778	665	656	82.6%
511th		127	139	116	113	89.0%
**B/84th	185	200	196	192	191	95.5%
***630th		186		216	213	114.6%
444th		27		28	32	115.0%

*The Bn Previously operated under TO&E 5-35D. The TO&E was changed to 5-35E by Hq United States Army Pacific, General Order #107, effective date: 12 Jun 67.

**B/84th (Attached) Also Changed from TO&E 5-11D to 5-117E during this reporting period. Effective date and time same as above.

***Additional 30 personnel assigned to operate and maintain the rock quarry and crusher equipment assigned to this battalion.

2. PERSONNEL, ADMINISTRATION, MORALE AND DISCIPLINE.

a. Personnel: The average present for duty strength of the battalion with its assigned and attached units remained within the range of 92% to 108%, with an average of approximately 97% during the reporting period.

b. Morale and Discipline:

(1) Morale remained at a high level during the reporting period. Weather conditions were such as to permit a large amount of gainfully employed and possessed high morale.

(2) Movies are shown on an average of six nights each week in three locations within the battalion. Officer, NCO, and EM clubs are operated nightly. In addition the clubs often hire commercial entertainment for evening performances. Television from Qui Nhon is received in this area.

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3. INTELLIGENCE AND SECURITY

a. Physical security: This unit continues to stress constant surveillance while employing local Vietnamese Nationals. One guard per 10 workers is employed, both in the battalion area and on the project sites.

Through periodic instruction and frequent inspections, all members of the command are aware of the proper procedures to follow while handling classified material.

b. Reconnaissance: Ground route reconnaissance of Highway 19 (QL19E), within the Battalion area of responsibility, and 13 KM of Kannack Rd (508) were conducted during this reporting period.

The battalion continued its frequent spot checks of all routes within the battalion's sector of LOC to insure that proper procedures are being followed in controlling the class and spacing of vehicles utilizing the bridges.

c. Intelligence: Daily coordination is effected with intelligence gathering agencies of the 1st Air Cavalry Division and especially with the base defense battalion for current local intelligence data.

4. PLANS, OPERATIONS AND TRAINING

Operational Support: This unit had two operational support missions during this reporting period, Operations Marauder 2 and 3.

a. Both missions were of the same type and duration. A one-day search and clear operation was performed from the Camp Radcliff barrier out to a distance of 4000 meters. Battalion headquarters was the command and control element for 6 companies of 3 platoons each. Three of these units were organic engineer line companies, and the remaining three companies were attached to this headquarters from elements of the 1st Air Cavalry Division.

The major problem in each operation was maintenance of communications when companies were in high-canopy jungle areas. The range of the PRC-25 radio is about 2-3 miles under such conditions.

The operations were conducted in two phases.

(1) Phase I. Companies were positioned immediately outside the barrier within their designated areas by 0645 on the morning of the operation, Companies began to search and clear in a line of skirmishers to a distance of 2000 meters with the mission of leaving no stone unturned. (All enemy mortar attacks of Camp Radcliff have been initiated in this zone).

(2) Phase II. Companies closed on designated assembly areas 2000 meters from the Camp Radcliff perimeter. They then continued to search in tactical company formation for another 2000 meters out from the camp perimeter. Upon reaching the 4000 meter point, each company changed direction and moved left along a predetermined azimuth for another 1000 meters. The companies then turned on a designated inbound azimuth to search and clear back toward the camp perimeter.

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b. CONSTRUCTION

(1) During the reporting period the following projects were completed:

(a) The An Khe Logistical Complex was completed during this period, with the following specific projects being completed:

(1) 40' x 200' open storage shed in the class II & IV yard.

(2) Access roads and drainage work in the log complex area, to include placement of 200 feet of 60" metal culvert and 655 feet of 24" metal culvert. Over 3000 cu yards of 3"(-) rock was placed around building sites and on access roads to stabilize the soil.

(b) The dial central building was completed during this period. The electrical system was tested and units at Camp Radcliff can now communicate more readily and with much less difficulty via the dial system.

(c) Nine tee-shaped Armco Revetments, each 110' long and 12' high, were completed by 28 June 1967, in conjunction with a continual construction and repair program on the 432 aircraft helipads of the 1st Air Cavalry Division's "Golf Course" heliport. After each revetment had been filled with soil and compacted, the surrounding areas were shot with peneprime to loosen dust erosion.

(d) By 15 June 1967 a 65,000 BBL tank farm was complete, with the exception of some berm stabilization work and additional work on culverts and access roads. The tank farm is now distributing fuel to points west of An Khe and is adequately satisfying the division base fuel consumption requirements of the 1st Air Cavalry Division. The tank farm complex consists of five 10,000 BBL tanks, five 3,000 BBL tanks, a pipeline distribution system, a manifold system, a pump station, four tanker fill stands, and a road network. By positioning each tank on a well compacted foundation of earth and choked aggregate, time and materials were saved by not having to place a foundation of concrete. (It must be stressed, however, that any foundation must be solid and perfectly level. A minimum of hammering and prying will insure a tighter tank with fewer sealing problems).

As work continues on the culvert headwalls, the huge tankers line the access road and can be seen hauling diesel, JP-4, AVGAS and MOGAS which the farm receives from the six-inch pipeline which extends from the coastal city of Qui Nhon, fifty miles to the east of An Khe.

(e) The STRATCOM IWCS (Integrated Wideband Communications System) site number 47, begun on 6 December 1966, was officially completed 28 July 1967, to include the concrete antenna base and foundation on Hon Cong Mountain.

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(f) Building construction and final site work was completed on a 5000 sq foot APO building on 30 June 1967.

(g) 7520 sq foot of billeting space was completed for the 1st Air Cavalry Division G-Staff BOQ on 1 June 1967. This construction featured a new and attractive truss and roof design, with no greater expenditure of materials over standard billeting designs.

(h) Recreational facilities in the form of a USO building (40' x 100'), and a lakeside concession stand and sporting equipment storage building (40' x 40'), were completed during this period for the 1st Air Cavalry Division. These projects were in support of the Division Commanding General's desire to increase the scope of recreational facilities at Camp Radcliff and to offer more alternatives to visiting the local village.

(i) A 200' x 500' ramp extension with taxiways was completed 31 July 1967 for the Division's ASTA (Mohawk) platoon. This ramp was constructed with MSAL and permits the ASTA platoon to move from inadequate facilities at An Khe Airfield.

(j) Double single bridges at Check Points 98 and 102 100' long and 80' long respectively were reinforced to Double Double. This reinforcement increased the bridge classification from 50 (wheeled) and 40 (tracked) to 80 (wheeled) and 60 (tracked). This was in accordance with Route 19 line of communication upgrading program to permit movement of heavier loads from Qui Nhon to Pleiku during the monsoon season when the bypasses are not negotiable.

(k) A class 35, 2-lane timber trestle bridge (25' wide and 40' long) was constructed on East Perimeter road in Camp Radcliff in conjunction with the camp flood control program.

(1) Division Supply Point.

(1) The Class I Yard was completed during this period with the completion of a 4' x 85' concrete retaining wall for a loading dock, and a 30' x 75' ventilated warehouse.

(2) Class II and IV Yard: A nap storage warehouse (40' x 100') was completed, six open storage sheds (20' x 100') were completed and 4200 cu yds of fill was placed in the Division II & IV yard during this period. Much of the work now being accomplished in the II & IV yard is in the area of site preparation. The yard is located in a low lying region and many more thousand yards of fill and rock will eventually be placed, compacted, and leveled to provide adequate drainage for the 21 structures now programmed for this facility.

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(3) Class III Yard: Work progress in this yard consists only of the earth work necessary to construct a 50' x 150' loading dock and the completion of a 30' x 60' Administration building constructed by the operating element (Self-Help). In addition a 40' x 100' warehouse and a 40' x 75' open storage shed with a 25' x 40' administration building on one end is yet to be constructed.

(m) As a combat battalion, this battalion rarely finds itself performing combat engineer support, as base construction has been its primary mission at Camp Radcliff. However, the upgrading of Kannack road, which runs north from An Khe to a forward tactical airfield, was an exception to this rule. Thirteen kilometers of road were upgraded to a class 32 "fair weather" road, to include grading, ditching and the installation of culverts, fords, and bypasses. This project was begun 1 May 1967 and was completed 7 June 1967.

(n) Quarry and rock crushing operations at An Khe have seen considerable improvement, with the following lessons learned during this reporting period:

(1) Shaped charges used as a substitute for drilling in a hard rock quarry are more hindrance than help, as they crack the rock without giving a productive yield, and hamper subsequent drilling operations. (The rock is a dolomite cap over granite.)

(2) Haul roads require constant maintenance to permit the shortest haul time and to minimize damage to equipment.

(3) Cat D7E dozers have proven to be too light for extensive use in hard rock quarry operations, resulting in increased maintenance problems.

(4) End bits on dozers must be built up to give them a useful life span in a hard rock quarry.

(5) The use of the rear mounted ripper on a dozer can greatly increase quarry production.

(6) The weak spot in dozers with hydraulic blades has been the tilt cylinder. If the tractor is to be used extensively in a quarry, the tilt cylinder should be replaced by a solid adjustable brace.

(7) Track drills are not available in sufficient quantity to support a large crusher and quarry operation. Two track drills are required per 75 TPH crusher as a minimum.

(8) Safety cannot be over emphasized. The OIC and NCOIC must know where all quarry personnel are at all times.

(9) Quarry sites must be kept in a high state of police to prevent trash from damaging crushing units. (A dozer end bit or a shovel teeth can wreck a primary crusher.)

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(10) Scheduled preventive maintenance of all quarry and rockcrushing equipment is extremely important. Four hours maintenance per eight hours of operation is a minimum. Cleaning and lubrication of all moving components during each maintenance period is a necessity.

(11) Combat engineer battalions, light equipment companies and construction companies which operate rockcrushing equipment are frequently required to perform repairs above second echelon to keep the equipment operable. The 75 TPH unit is a relatively fragile unit and is not designed for continuous plant operation. It's high mobility could easily be sacrificed in favor of ruggedness.

(2) Projects under construction at the end of this reporting period:

(a) Work on the Division Supply Point during this period was primarily concentrated in the Class II and IV yard. Fourteen structures remain to be built at that location in addition to 12,000 Sq Yds, of surface treated hardstand. Three structures remain in the Class III yard. The expected date of completion for the Division Supply Point is 30 October 1967.

(b) Work continues on the DBST AnKhe runway, repairing bad spots with blast rock, 3" minus rock, selected fill, and cold mix, to insure safe landing and take-off conditions as work on the new runway progresses steadily. Maintenance of the old runway is continuous and requires periodic inspection, for both surface and subgrade failures and placement and compaction of rock chips on areas where asphalt bleeds during hot weather.

(c) The 4365 foot concrete airstrip presently under construction at AnKhe requires twenty-four hour operations. Daylight hours are utilized for final basecourse preparation with paving operations taking place at night to allow for slower curing and easier handling of freshly placed concrete. (Experience here has shown that thick concrete slabs placed in the daytime tend to develop large contraction cracks within a couple hours of placing). During this reporting period, concrete was placed on the west lane (4365 feet long, 24 feet wide), and a portion of the east lane was placed (940 feet long, 24 feet wide). The center lane will be placed last to complete the 72 foot wide runway and work will commence on the taxiways, overruns, and turn around points. This project, at the end of this reporting period, is 45.8% complete.

(d) Work is progressing steadily now on a 175' x 190' prefabricated aircraft maintenance hanger. A major concern during construction has been the erection of several 130' long roof trusses, positioned at a height of nearly 50' and weighing 14 tons each. The problem is being solved by the use of two 20-ton cranes with 50' booms and tag lines at strategic points to guide the trusses into position. The cranes are just barely able to lift the trusses. At the end of this reporting period the project is 68% complete.

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(e) Earthwork began 24 May 1967 for the Camp Radcliff main Post Exchange. (Total scope of 24,000 sq ft). Although converting 24 metal PASCO open storage buildings into a 120' x 200' air conditioned post exchange seemed unique at first, the work is highly interesting and is progressing at a satisfying pace. By using metal roof liner material for walls, arranging the buildings in a functional and symmetrical pattern, and by placing greater emphasis on bolt spacing and building connection, the initial problems of building construction were readily resolved. The building shell is completed but the lack of electrical supplies for lighting and air conditioning is hampering the final completion.

(f) Site work for placement of concrete was completed during this period for two 72' x 250' PX warehouse pads. The concrete placement itself was also completed during this period by use of the slip-form paver of the 444th Concrete Mixing and Placing Detachment. Initial problem areas in using the paver were uncovered at this time, and served as an excellent training vehicle for the operators prior to use of the slipform paver to pave AnKhe Airfield. Although one additional 77' x 170' concrete pad is programmed for this project, work has been suspended due to the competition for concrete with the airfield and ammunition pads. Air inflated buildings will be erected on the three pads.

(g) One of the major projects during this period was the placement of 3555 cu yds of concrete for 24 ammunition pads (Average 75' x 80'). A total of 30 pads are programmed for this project (4444 cu yds of concrete), with an expected date of completion of 21 August 1967. This EDC is flexible, however, as this project must compete with Airfield for concrete.

(h) Only drainage and berm stabilization work remains on the 65,000 BBL Tank Farm. The expected date of completion is 21 August 1967.

(i) Progress on 432 helipads at the Golf Course Air-strip is still being made. Although the remaining commitment in this area is for a relatively few pads, technical advice and some equipment is readily available for the units engaged in revetment construction under a self-help program.

(j) Considerable progress has been made during this reporting period on the Camp Radcliff Communications Center (2400 sq ft). Specifications for this project, are the same as those required for the Dial central and the IWCS projects, and are very closely defined. All these buildings require a dust free, temperature and moisture-controlled environment (airconditioning & tile floors!). This project is 75% complete at the end of this reporting period, however some future delay is expected due to the non-availability of electrical materials, air conditioning units and duct work.

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(k) National Route 19, 27 miles of which traverse the battalions area of responsibility, provides passage for the large daily convoys that move from Qui Nhon to AnKhe and on to Pleiku. This highway is vital to our effort in Vietnam and must be kept open at all times. Enemy efforts to interdict this route and to harass the convoys have increased in recent weeks. This battalion, in addition to maintaining 27 miles of Route QL19 (from the top of the AnKhe Pass to the top of the Mang Giang Pass), occasionally provides mine sweeping teams and work crews to repair damaged sections of the highway, following mining incidents. These incidents have been relatively infrequent.

(l) A new project, begun at the end of this reporting period, is the construction of three pump stations which will be a part of the POL pipeline from AnKhe to Pleiku. This project was begun 28 July 1967.

(m) The battalion continues to prefab, issue, and supervise construction of all buildings for the 21,900-man cantonment program at Camp Radcliff. This responsibility has been handled well by the battalion and quality construction through the self help program has been achieved. During this period 295 troop billets (20' x 80') were erected in addition to supply, administration, messhall, and maintenance buildings.

c. Contract Liaison and Installation Master Planning: This battalion continues to maintain liaison in the following RMK-EMJ contracts:

- (1) AnKhe Central Power Distribution System.
- (2) AnKhe Airfield Lighting System.

5. LOGISTICS

a. The battalion continues to handle an average of 600 tons of construction materials weekly. A 15,000 pound fork lift has been acquired from the area support command to handle the large quantities of cement that this battalion uses, but it is not suited to the terrain in which it must work and therefore is less effective than a rough terrain fork lift would be

a. A battalion water supply point became operational 3 July and produces an average of 8000 gallons of potable water per day for the battalion and attached units. The water point serves principally as a training site for Erdlatop operators as potable water is available from the Post Engineer-operated water point.

6. Force Development: None.
7. Command Management: None.
8. Inspector General: None.
9. Information: None.
10. Civil Affairs:

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a. This Battalion has been particularly active in the area of Civil Affairs during this reporting period, with the following endeavors:

(1) A newly-established refugee village was sponsored by the battalion for 3500 Vietnamese refugees. Biweekly sick calls are held in the camp, with 75 to 100 persons treated each time. Over 400 pounds of clothing, 1950 pounds of food, and 200 pounds of soap was distributed during this period, and a water truck delivered 2000 gallons of potable water each day to the refugees. To further help the refugees get settled, 150 equipment hours of dozer work was provided to clear land and level sites for living quarters. The refugees are being assisted in the construction of a 1200 sf school. Scrap tin, scrap lumber (crating) and salvage canvas has been supplied to aid the village. Immunizations against plague and cholera were given to 350 refugees.

(2) In the Hamlet of An Tan, just outside the village of AnKhe, the 70th Engineer Battalion is Supervising the construction of a small cinder block school house. Sponsored by the City of Waynesville Evangelical Church, Waynesville, Ohio, with a \$3600 Grant. The supervision, some equipment and some scrap material is supplied by the battalion in this endeavor. Most of the labor and material is supplied by the local populace. Biweekly English classes are also held in this hamlet with an average attendance of 30 children and adults.

(3) Weekly sick calls are sponsored by the battalion in the village of Song An, with an average of 30 patients: a visit.

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SECTION II. PART I, OBSERVATIONS (LESSONS LEARNED)

ITEM: Use of cold mix for pothole patches.

DISCUSSION: After experimentation with a series of various cold mix techniques, it was found that best results were obtained with a mixture of 67 per-cent 3/4" minus rock and 33 per-cent rock chips in conjunction with either RC-3 or MC-2 asphalt (depending upon time available for curing). The rock, of course, must be clean. Patch is retained longer when the patch is cut perpendicular to the flow of traffic and is well-tamped.

OBSERVATION: A cold mix design of 67 per-cent 3/4" minus rock and 33 per-cent rock chips, used with RC-3 or MC-2, is suitable if the patches are cut perpendicular to flow of traffic and the mix is well-tamped.

ITEM: DBST Airfield repair

DISCUSSION: During hot weather, the DBST asphalt runway at An Khe bleeds considerably, creating a dangerous situation.

OBSERVATION: Spreading of rock chips (secondary crusher waste) adequately absorbs the asphalt and compaction with a steel wheel roller gives a satisfactory surface.

ITEM: Slip form paving.

DISCUSSION: The Rex slip form paver can be used efficiently and profitably, provided a workable mix is used. Serious damage to the paver results when attempting to use concrete with very low slump.

OBSERVATION: To avoid damaging the paver, concrete with a slump of less than 1 1/2" should not be used, or an air-entraining agent should be used. Such agents are not normally available.

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ITEM: Dowel joints in Airfield Pavement

DISCUSSION: During construction of the An Khe Army Airfield, dowels were required in "Type A" pavements required at each end of the strip. While using the slip form paver, considerable difficulties arose once the slip forms had passed a section and dowels had to be inserted into the pavement. Since the initial set had taken place, forcing the dowels into the concrete disrupted the surface of the concrete. Breaking the bond around the coarse aggregate weakened the concrete in the vicinity of the dowel and allowed small voids to be present.

OBSERVATION: With the difficulties encountered using dowelled longitudinal construction joints in conjunction with a slip form paver, it is recommended that a thickened edge type joint be used in lieu of the dowels. The thickened edge is easily obtained by shaping the subgrade and using an elevated track for the paver to ride on. TM-5-824-3 provides for the use of thickened edge joints in lieu of dowelled longitudinal construction joints.

ITEM: Concrete finishing for a rough texture

DISCUSSION: Concrete slabs requiring a rough finish may be easily obtained by dragging rough burlap over the concrete during the initial setting. This requires only that the concrete be screeded and bull-floated prior to its initial setting. No troweling is necessary as the burlap drag provides a uniform and attractive non-skid surface.

OBSERVATION: Concrete slabs may be easily given a neat and uniform non-skid finish by dragging a piece of wet burlap over the slab during the initial setting.

ITEM: Concrete Batch Plant Operation

DISCUSSION: With a concrete batch plant in full operation, 3.9 yards of concrete can be mixed and loaded into trucks every two (2) minutes. An Khe airfield concrete specifications dictate that for every batch of concrete (3.9 yards) 27 bags of cement are required. The silo in the batch plant can store 1300 bags of cement, but with a full operational output the 1300 bag supply is soon exhausted. The problem then, is how to operate the batch at full capacity for any given length of time, and at the same time replenish the silo with cement at the rate of twenty seven (27) bags every two (2) minutes.

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At first seven men and one supervisor were tasked for this job. It was soon evident that the rate required for these men to work in order to keep up with the plant could not be maintained. Another seven (7) men were added to the crew so alternating shifts of personnel could be established. One crew would load 240 bags of cement and then rest while the other crew loaded another 240 bags. The requirement for 27 bags every 2 minutes was almost being met. The task was requiring 120 man-hours each time the plant went into full operation. However, the operation was quite exhausting, in that the bags had to be lifted about four (4) feet, placed on a roller, forcefully pushed down the roller across a knife blade (to cut the bags), and then emptied into the hopper. It required two men to load the bags on the roller, two men to push the bags across the cutting blade, two men to empty the bags and one man to clean up the empty pallets.

It was evident that a new arrangement for debagging the cement was in order.

A platform eight (8) feet from the hopper, and nine (9) feet above it was constructed. A steel slide which reached from the platform to the hopper was fabricated with cutting blades positioned above and below the approaching bags.

This slide eliminated the need for the two men required to push the bags across a cutting edge, and the tiring work involved in breaking the bags.

Two raised stands (the size of a cement pallet) were constructed on the platform so that lifting could be accomplished with a fork lift.

OBSERVATION: A platform and slide apparatus at the An Khe Batch Plant has decreased the size of the required crew to eight men (2 four-man crews) and one supervisor. The work is less exhausting, and the man-hour requirement has been reduced to 72 from an original 120.

Further improvements in the operation are in the process of development. A vibrator will be placed on the hopper to facilitate faster screening of the cement. The hopper size will be enlarged in order to accept the now rapid rate of debagging. These projected changes should reduce the required number of men by two and increase the effectiveness of the operation considerably.

ITEM: Steel Armco Revetments

DISCUSSION: In the construction of Armco Revetments it was discovered that many of the factory formed parts were damaged beyond possible repair or were missing.

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OBSERVATION: Steel plate, 1/8" and 1/4", was found to be an adequate substitute for the base plates, as dimensions were not critical in this area.

When it became necessary to use parts which were damaged, but not beyond repair, a large block of wood and a five pound hammer were kept on the job site to perform on the spot straightening.

ITEM: Laying MSAL matting for Aircraft facilities

DISCUSSION: The Mohawk ramp aircraft parking and servicing facility required more than 100,000 square feet of MSAL. A major problem encountered was the matching and connection of panels, as slight variations existed between panels of different manufactures.

OBSERVATION: To overcome this problem, panels were sorted and loaded by manufacturer prior to placement. Great care had to be taken when a transition from one brand to another was made. Acetylene cutting torches were required to lengthen slots so that alignment could be maintained.

ITEM: Drainage of POL facilities

DISCUSSION: Since POL facilities are constructed to provide for a gravity - motivated flow of petroleum from the storage tanks to a central manifold system, the tanks are necessarily located on high ground. Naturally, drainage problems occur in the area around the tanks and in the vicinity of the interconnecting pipeline.

In most cases a simple solution to the problem is to construct V-ditch drainage channels by use of a grader. In some instances, particularly with berms and steep embankments, more detailed steps must be taken to insure soil stabilization. At the An Khe tank farm, an asphalt distributor was employed to spray the berms, once with an MC-2 compound for deepest penetration, and once with an RC-3 compound for a hard set. In cases where the distributor could not reach the area to be sprayed, a soil-cement solution was used. Cement was salvaged from broken bags at the concrete batch plant and was raked into the soil. The area was then sprayed with water to form a hard and fairly satisfactory crust.

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In the manifold area, soil-cement sandbags were employed as a wall in conjunction with V-ditches to direct water flow and prevent erosion.

OBSERVATION: A series of V-ditches, asphalt, and soil-cement procedures were employed to facilitate drainage and insure soil stabilizations at the An Khe tank farm.

ITEM: Construction of POL fuel stand

DISCUSSION: A design for tank truck refueling facilities is recommended on sheet 12 - 43 of TM 5-302, which proposes operating the loading facility from the truck tank. In conflict with this design, the fuel stand at the An Khe Tank farm was designed similar to the one shown on sheet 12 - 41 of TM 5-302, which is for railroad tank cars. It was determined, that to properly load the trucks in accordance with POL requirements, stands would have to be erected to allow an operator to do so from an elevated position on the fill stand.

The platform was constructed to meet the same width measurements as the recommended apparatus, allowing the trucks to pull up close to the loading facility. The stand in no way interferes with truck movement and allows exact positioning of the loading device over the tank's fuel reception point.

OVSERVATION: When it became necessary to construct a fuel stand for the tank trucks at the An Khe tank farm, a design was adopted which combined the advantages of both the design recommended for tank cars, and the one recommended for tank trucks in Tm 5-302, sheets 12 - 41 and 12 - 43 respectively.

ITEM: Spare wheels for large rubber tired vehicles

DISCUSSION: Quarry-crusher operations and concrete batch plant operations demand loading equipment, specifically bucket loaders, to be operational 24 hours a day. An inordinately long down time is usually the case each time a loader or tractor-scraper has a flat tire. This is due to the fact that the piece of equipment must stand idle while the tire is removed, repaired, and replaced, as spare wheels do not come as an attachment or in the OEM.

OBSERVATION: Excessive long down times are prevalent due to flat tires on equipment without spare wheels. If a spare wheel was incorporated in the PLL of units with large rubber-tired vehicles (particularly bucket loaders) down time would be minor.

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SUBJECT: Operational Report-Lessons Learned (RCS CSFOR-65) for Quarterly
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SECTION II, PART II, RECOMMENDATIONS

1. PERSONNEL: None.

2. OPERATIONS:

a. Rock production: The most important and most difficult job this battalion has been assigned is the production of very large quantities of crushed rock. The tools to accomplish this are far from satisfactory. Japanese-manufactured track drills, "FURUKAWA" are excellent drills. Parts are totally unavailable for these drills. The Red Ball requisition system is totally unresponsive for foreign-manufactured, foreign-produced parts such as are required to keep these drills operational. Numerous specialists from higher headquarters drift through An Khe and are apprised of these problems, furnished copies of cancelled requisitions, etc, and the story remains the same. No parts. For the five months I have commanded this battalion, I would estimate that 60 - 70% of the blast rock fed to the crusher has been produced by blasting boulders. It has worked, but it is far from satisfactory or economical. The small size of the jaw crusher of the 75 TPH rock crusher is also a major problem. Many hours are lost in extracting blast rock from the jaws which will not handle the rock which can be loaded by a 40-ton shovel. The capacities of the shovel (in dimensions of rock that can be handled) and the primary crusher are not balanced. The output of the primary "Eagle" 75-TPH crusher is in most cases about twice what one secondary "Eagle" 75-TPH can handle. From many hours of observing crushing operations, I would estimate that one primary unit could feed two secondary units when the final size rock being produced is 2" or less. The output of a 75 TPH secondary "Eagle" unit is only about 75-TPH when 3/4"(-) is being produced. The "roll crusher" system used in the "Eagle" secondary is not satisfactory. This battalion has recently acquired a "cone secondary" unit which is smaller than the "Eagle" secondary, has about the same power requirement, and has demonstrated that it has four times the crushing capacity of an "Eagle" secondary.

b. Loading equipment. The single most critical piece of engineer equipment in this battalion is the bucket loader, of 21 authorized in the battalion and attached units, 8 are on hand. To have 3 off deadline at one time is a very good day. These loaders are pacing items of equipment and many potentially productive hours are lost because of their nonavailability. No spare wheels and tires are provided as OVM or PLL and flat tires cost much in productivity. The loaders are principally hydraulically-operated and the PLL and repair parts system are very deficient in seals, pistons, etc, which are the heart of any hydraulic system.

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c. Welding Apparatus. This battalion has nine rockcrushers. Those not deadlined (usually about 5 or 6 of them) are operated 16 hours per 24 hour period, seven days per week. It is a fair statement that one or more contact maintenance trucks is always committed to the crushers for welding jobs. The crushers are relatively fragile and the welding requirement is very frequent. With six crushers operating, it is almost constant. No welding apparatus is TOE to the crushing apparatus. This causes delays in the maintenance of the TOE equipment which requires welding. So long as we insist on trying to crush rock with light weight, highly mobile rockcrushing apparatus, we should supply one arc-welding unit and one oxy-acetylene cutting apparatus to each primary-secondary crusher combination.

d. Personnel Augmentation. One combat engineer platoon, augmented by about ten men, are required to operate the 5-6 primary-secondary units in the battalion, on a 2-shift basis. The equipment (track drills, 40-ton shovels, 600 cfm air compressors, extra crushers) come without operators or mechanics. The line platoon capability and the normal maintenance capability are highly degraded by the requirement to operate and maintain this "excess" (but vital) equipment. The answer is a TOE augmentation which can be added to an engineer combat battalion or to an engineer light equipment company. It can be done and should be done.

e. The TOE 5-500 (HO) Concrete Mixing and Placing Detachment.

(1) Batch Plant. The TOE plant is first class and needs very minor modification, which we have done, to increase the capability to charge the cement silo.

(2) Slip-form Paver. This is a wonderful machine for paving highways. It is an abortion when used to pave an airfield where dowels are used in longitudinal joints, or keyways are used in longitudinal joints. The team should be equipped with a form-riding paving train matched to the batch plant output and a minimum of 5000' of steel forms. We are using the slip-form paver to pave an airfield that has a concrete runway 4,365' x 72' x 9". It would be twice as easy with a form-riding paving train. This observation is based upon experience with both types of paving apparatus.

3. TRAINING AND ORGANIZATION:

Should more TOE 5-500 (HO) concrete mixing and placement detachments be formed, the slip-form paver should be deleted and replaced by a form-riding paving train. One rough terrain forklift should be added to handle the huge quantities of cement that must be debagged daily (2000-3000 bags). The team should be manned to provide 24-hour operational capability.

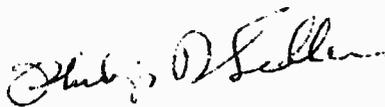
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4. INTELLIGENCE: None.

5. LOGISTICS: This battalion still needs a rough terrain forklift to handle the 600 tons of construction materials that are normal to a weeks operation. 20-ton truck-mounted cranes, 5-ton wreckers, RMK cheery-pickers (small hydraulic cranes) and warehouse (small-wheeled) forklifts help, but are not the proper machinery for the job, and their use in this role is usually at the expense of something else.

6. OTHER: None



PHILIP D. SELLERS
LTC CE
Commanding

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EGC-CO (10 Aug 67) 1st Ind
SUBJECT: Operational Report - Lessons Learned (RCS CSFOR 65), for Quarterly
Period Ending 31 July 1967.

DEPARTMENT OF THE ARMY, HEADQUARTERS, 937TH ENGINEER GROUP (COMBAT), AI-O
96318, 14 August 1967.

TO: Commanding General, 18th Engineer Brigade, ATTN: AVBC-C, APO 96377

1. The subject report, submitted by the 70th Engineer Battalion (Combat), has been reviewed and is considered an excellent report of organizational activities.

2. I concur in the observations and recommendations of the Battalion Commander with the following additional comments:

a. Page 2, paragraph 2.b.(1) is amended to read: Morale remained at a high level during the reporting period. Weather conditions were such as to permit a large amount of construction effort on assigned projects. As a result the men were gainfully employed and possessed high morale.

b. Page 16, Section II, Part II, Para 2 -- 70th Engr Bn (C) has been advised of procedures to obtain parts for FURUKAWA equipment in accordance with 1st Log Command Reg 750-17.

R. C. Marshall

R. C. MARSHALL
Colonel, CE
Commanding

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AVCC-P&O(10 Aug 67) 3rd Ind CPT Whitley/bw/LBN-4581
SUBJECT: Operational Report-Lessons Learned for Quarterly Period Ending
31 July 1967

HEADQUARTERS, UNITED STATES ARMY ENGINEER CORPS
VIETNAM (PROV), APO 96491

TO: Commanding General, United States Army Vietnam, ATTN: AVHCC-XI,
APO 96375

This headquarters concurs with the 70th Engineer Battalion's ORLL report and previous indorsements as written, subject to the following comments:

1. Reference Section I, paragraph 4b(1)(n)(6), page 6: Concur. This problem was previously recognized by the engineers, USAMEC and factory technicians. Current tractors are being issued with interchangeable solid braces and hydraulic tilt cylinders. Units will be advised to replace the hydraulic tilt cylinder with the solid tilt brace when working in quarries, or other areas that could cause excessive strain on the tilt cylinder, and to requisition the solid tilt brace as a repair part, if not issued with the tractor.

2. Reference Section II, Part I, page 15, item concerning spare wheels for large rubber tired vehicles: Nonconcur. The unit will be advised that tires may be added to their PLL under the provisions of paragraph C-6, AR 735-35. Also, the unit will be advised that extra wheels for the scoop loaders may be requested under the provisions of paragraph 5b, Appendix E, AR 220-1.

3. Reference Section II, Part II, paragraph 2d, page 17: Concur. MFOE action is currently being taken.

FOR THE COMMANDER:


PAUL A. LOOP
Colonel, CE
Chief of Staff

Cys Furn:
CG, 8th US Army, ATTN: Engr
CG, 18th Engr Bde
CO, 937th Engr Gp
CO, 70th Engr Bn

AVHGC-DST (10 Aug 67)

4th Ind

SUBJECT: Operational Report-Lessons Learned for the Period Ending
31 July 1967 (RCS CSFOR-65) (U)

HEADQUARTERS, UNITED STATES ARMY VIETNAM, APO San Francisco 96375 10 1967

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

1. This headquarters has reviewed the Operational Report-Lessons Learned for the period ending 31 July 1967 from Headquarters, 70th Engineer Battalion (Combat) (Army) (AZBA) as indorsed.

2. Concur with report as indorsed. Report is considered adequate.

FOR THE COMMANDER:

ja
Joseph J. Munnie Lt
STANLEY B. SCHULTZ
Major, AGC
1967 11 10 10 00 AM

cc:

HQ, 70th Engr Bn (Combat) (Army)
HQ, United States Army Engr Comd

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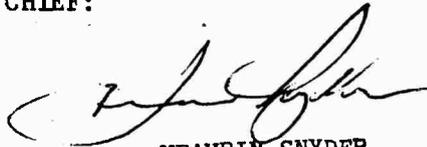
GPOP-DT (10 Aug 67) 5th Ind (U)
SUBJECT: Operational Report for the Quarterly Period Ending 31 Jul 67
from HQ, 70th Engineer Battalion (Cbt) (UIC: WAZ8AA) (RCS
CSFOR-65)

HQ, US ARMY, PACIFIC, APO San Francisco 96558 6 DEC 1967

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

This headquarters has evaluated subject report and forwarding indorse-
ments and concurs in the report as indorsed.

FOR THE COMMANDER IN CHIEF:

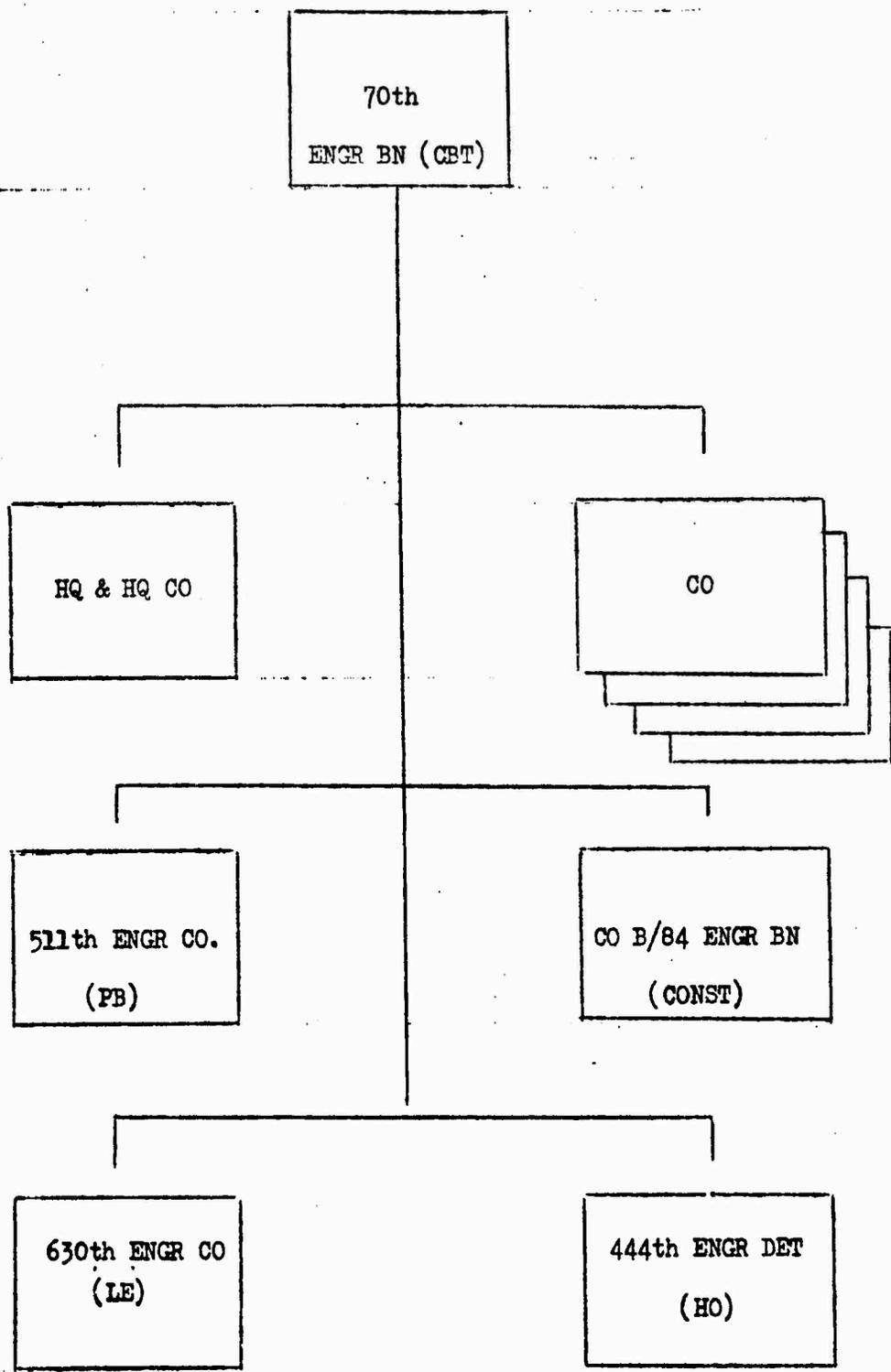


HEAVRIN SNYDER
CPT, AGC
Asst AG

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