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AGO D/A ltr 29 Apr 1980 ; AGO D/A ltr 29 Apr 1980

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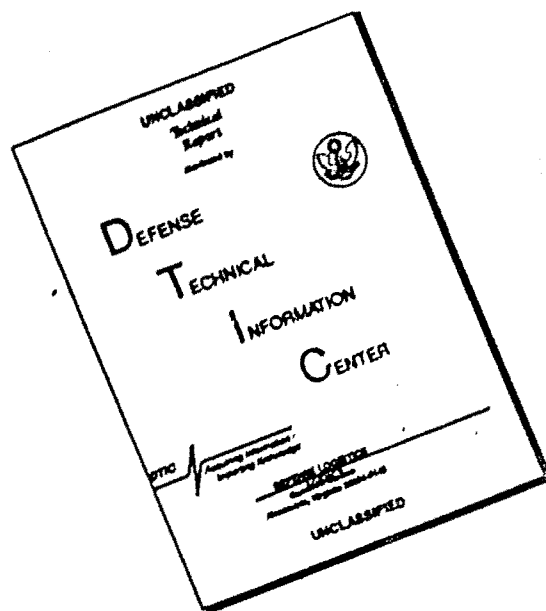
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DEPARTMENT OF THE ARMY
OFFICE OF THE ADJUTANT GENERAL
WASHINGTON, D.C. 20310

IN REPLY REFER TO

AGAM-P (M) (13 May 68)

FOR OT RD 681080

16 May 1968

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4180020
SUBJECT: Operational Report - Lessons Learned, Headquarters, 69th
Engineer Battalion (Const), Period Ending 31 January 1968 (U)

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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.

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KENNETH G. WICKHAM
Major General, USA
The Adjutant General

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 69th Engineer Battalion

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DEPARTMENT OF THE ARMY
Headquarters, 69th Engineer Battalion (Construction)
APO San Francisco 96215
"BUILDERS FOR PEACE"

EGFA-CO

8 February 1968

SUBJECT: Operational Report-Lessons Learned (RCS CSFOR-65) for Quarterly
Period Ending 31 January 1968.

THRU: Commanding Officer
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APO 96291

Commanding General
20th Engineer Brigade
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Washington, D. C. 20310

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Section 1. Significant Organization or Unit Activities.

1. General. The 69th Engineer Bn (Const) continued in its primary mission of construction during most of the reporting period. The battalion was located entirely in the Mekong Delta with units stationed as follows:

- a. Can Tho - Hq & Hq Co, Co A (Equip and Maint Co), and Co D.
- b. Dong Tam - Co E and Co C.

Of the 92 day reporting period, 91 days were spent in operational support missions, line of communication construction, and base construction. The last day of the reporting period, 31 January 1968, saw the battalion take up defensive positions and engage the enemy in battle (Incl 1).

2. Summary: During the prior report period the battalion had relocated four of the five units. This period was used for establishing effective control of the scattered units by the commander. The battalion operations, supply and maintenance sections were augmented at Dong Tam since high priority missions there demanded the utmost of men and equipment. All available means of air transportation were exploited by the battalion staff to assist the outlying units. Although changes of command were experienced at the battalion level and in two companies, all operations continued smoothly and efficiently. The fact that few other key officer personnel changed contributed significantly to the situation. The period continued to be one of tremendous growth for junior noncommissioned officers. Many promising SP4's and SP5's have been assigned NCO rank and duties. Many promotions were made in recognition of superior performance, and in most cases, time in grade has been waived. Again, some units experienced continued difficulty as squad leaders rotated with no replacements assigned to fill the gap. More command emphasis has been required while new young NCO's became seasoned in their positions.

3. Personnel: The battalion personnel strength continued to drop from a high of 77% of authorized authorization at the beginning of the period to a low of 22% at the end of the period. The officer fill continued at a high level; almost all shortages occurring in the NCO and enlisted ranks. NCO shortages continued to be filled by rapid promotion of outstanding SP4's and SP5's. The overall shortage of personnel continued to plague all aspects of the battalion's operations, particularly the construction effort. As significant shortage of individual personnel skills was noted the battalion civilian hire program was called upon to augment the military effort. The construction effort at Can Tho continued to be heavily augmented by civilians with vertical construction skills. As the period closed additional civilian hire was taking place at Dong Tam to offset rotational losses.

4. Administration: The stationing of the battalion and subsequent deployment of platoons to outlying areas of the delta has adversely affected the administrative load of the battalion. The problem has become one of communication and coordination rather than an increase of paperwork. Separate couriers have been required from battalion headquarters at Can Tho to Dong Tam and 34th Engr Gp Hq at Vung Tau in order to assure timely movement

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of reports and orders. The establishment of a workable suspense system with sufficient lead time solved many problems. Telephonic reports with a written follow-up report are necessary to meet short-fused suspense items. The assistance of the Group staff in discouraging short suspense reports, particularly in the operation section, has reduced this problem to a minimum.

5. Morale and Discipline: One of the most outstanding morale builders experienced was the prompt mail service received at Dong Tam during the Christmas holidays. During the holidays mail was received two and three times a day, seven days a week. The in-country and out-of-country R&R programs continued to aid the morale of the troops. Better utilization of quotas was achieved by assigning two or more concurrent allocations to a particular R&R center to one company, rather than spreading them over the battalion (buddy system). The Chaplain's workload increased as he joined with the other chaplains in the delta to provide service to the men, irregardless of unit or location. The battalion chaplain has traveled the length and breadth of the Mekong Delta, holding services on ships and in the field. The Chaplain, in his continuous travel around battalion projects, has proven to be one of the most valuable staff officers for the commander. Disciplinary problems continue to be few in the battalion as all units are fully committed and working hard. The battalion commander's wide latitude in administering punishment under Article 15 has proven sufficient for the majority of offenses usually meriting forceful punishment. The battalion continues to have a record of only one special court martial and no general court martials since arrival in Vietnam nine months ago.

6. Intelligence and Counterintelligence: The gathering of engineer intelligence data continues to be an important function in the battalion's area of responsibility. Daily LOC intelligence for the major highways is obtained from the IV CTZ G-2 and relayed to the Group and Brigade staffs. The local Ministry of Public Works office has proven extremely valuable and cooperative in providing bridge and highway classification data. A portion of the 559th Engineer Detachment (Terrain) continued to be attached to the battalion and performed valuable soils analysis services for many varied customers. There was no counterintelligence activity noted during the reporting period. The lack of frequent contact between the units at Dong Tam and the civilian population, occasioned by the restrictive policies of the base CO, effectively eliminated any activity there. Personnel are not allowed off post for other than official business by order of CG, 9th Infantry Division. Further, no civilian personnel are permitted to work in troop billeting or messing areas at Dong Tam.

7. Plans and Operations: The 69th Engineer Battalion became the "Delta Developers" for the 34th Engineer Group during this period. The companies had squad size or larger units at six places in the Mekong Delta and a smaller force at one. Following is a narrative of the projects started and/or completed by this unit during the months of November and December 1967, and January 1968.

a. Ap My Dien: Construction of a Special Forces A Camp in the Plain of Reeds was started in January. The project involves construction of 700 meters of berm around the camp and precutting of all timber for vertical construction. Because of the inaccessibility of the site, all equipment and

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6

and supplies were flown in. A 10 ton crawler mounted crane was disassembled into four major sections and air lifted in by sky crane. Lumber, aggregate, sand, etc; all continued to be air lifted to the site as the period closed.

b. Can Tho: Both base construction and operational support projects continued in the Can Tho area.

(1) 1359 Man Cantonment: Consists of constructing a temporary standard cantonment with central water distribution and installed sewage, air conditioned avionics buildings, motor pool repair sheds, and miscellaneous administrative and supply buildings. Fifteen each two story billets, two supply rooms and portions of six latrines were completed this period.

(2) Rehabilitation of Can Tho Runway: The scope of this project includes removal of W-6 matting from a runway 3918' x 100', placing a sand/asphalt seal/sealing layer on the base and placing a new 12al matting surface. The project was started on 20 Dec 1967 and to date is 35% complete. ARVN troops proved most valuable as they removed 200,000 square feet of old matting. A sand/asphalt layer with 6% asphalt was road mixed on the runway using washed sand, RC-800, and two Cat 12 graders. Except for one brand of matting, no unusual problems have been encountered in placing the new 12al surface.

(3) 4000 KW Power Plant: Two of four required 1000 KW generators have been installed along with necessary switching gear. A new building is half completed. Completion of this project, along with the power distribution project, will result in the Can Tho Airfield complex having 4160 volt, 60 cycle power throughout the base. At present the base is served by a 450 KVA, 50 cycle system.

(4) Power Distribution System: Materials were obtained from RMC-BRJ, Vinell Corp, and US Army sources and staged at Vung Tau, Long Binh and Saigon for Can Tho. Approximately 85% of the materials are now on hand at Can Tho to build three primary feeder lines involving installation of 7,000 LF of line, 80 poles, 15 transformers and service drops.

(5) Runway Rehabilitation: New aviation units continue to be phased into the delta. Preparations were made during this report period to receive one CH-47 unit. Significant problems, because of lack of suitable real estate, caused a continuous movement and increased crowding of existing facilities at Can Tho. The phase-in of 16 aircraft found it necessary to clear all vehicles from the last remaining hardstand area and move eight fixed wing aircraft to the parking area along with their revetments. The vehicles are now parked on the roads. Several thousand meters of fill is being placed and stabilized in order to relocate the ASP (along with its revetments) into a swamp. Finally, the CH-47 revetments can be built to accommodate the incoming unit. The lack of real estate, fill, materials, and time thus continue to make the engineer's job a most challenging one.

(6) Perimeter Road: A perimeter road 2.13 miles long stretching through the rice paddies within the airfield perimeter was started this report period. Using dragline cranes and local fill 1.1 miles of road was roughed in.

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(7) Soil Stabilization Experiment: In conjunction with the 559th Engineer Detachment (Terrain) at Can Tho, the battalion used its men and heavy equipment to determine the feasibility of stabilizing delta clays with lime. As indicated by prior work in the U.S. the experiment was successful. An aircraft taxiway and parking apron for the 5th Special Forces element was constructed. See inclosure two for a detailed description of the test.

(8) Binh Thuy Bridge: Design work for this project was completed during this period. This bridge will be 100 meters long with a 28 foot roadway and carry AASHO H-20 loading.

(9) Personnel Bunkers: This project consists of building 26 each 60 man personnel bunkers in the cantonment area. Events during the last days of the report period added emphasis to the self-help feature of the program. Virtually all units have now built the 30' x 50' bunker walls and improvised some type of overhead cover while awaiting timbers to complete the job.

(10) Completion of Contract Projects: Completion of the air conditioning work in the Commo Building and construction of the Motor Maintenance Shop made BOD on all facilities included in this project. Considerable electrical work remains to be done before the project is 100% complete.

c. Cau Lanh: Formation of the ARVN 44th Special Zone in the Mekong Delta resulted in a requirement to provide MER for the US Advisory Staff at Cau Lanh. A platoon (-) work force was dispatched on LCU's along with the necessary equipment and supplies. As the report period came to the close, the unit had hauled in 1200 CY of fill, leveled and graded the site and erected showers and latrines. The only work remaining was the placing of a mess hall slab. This project, although minor, typifies the construction work in the delta. Some of the salient features were: (1) Security was provided by ARVN at the site. (2) At least a portion of the site was rice paddy land needing fill. (3) ARVN engineers provided assistance with their equipment. (4) Movement of equipment and supplies was accomplished by water rather than over the road.

d. Dong Tam: During November and December 1967 the primary emphasis at Dong Tam continued to be on the cantonment. In January, however, both companies of the 69th Engineer Battalion swung their total effort into preparing 260 acres of fresh hydraulic fill for the arrival of new United States Forces. Following are the projects worked on at Dong Tam:

(1) 7500 Man Cantonment: During the period, twenty each two-story billets, 20' x 108', and eight other wood frame buildings were built using a combination of engineer and self-help labor. Two multipurpose athletic courts (9900 SF total), a library, craft shop, and swimming pool were also completed. A significant increase in the scope of this project is expected to be forthcoming due to the anticipated arrival of additional United States Forces.

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(2) Port Facilities: The 41st Engineer Co (PC), attached to the 69th Engineer Bn, completed its portion of this project during the period. A two berth LCU ramp, LST ramp and a four berth barge off-loading facility were completed and the unit detached in early January.

(3) PACV Site: Work consisted of constructing a stabilized ramp 1100' x 75', a 300' x 400' hardstand, and two maintenance buildings. Four of the Navy's Personnel Air Cushion Vehicles (PACV) arrived in early December. The project is 95% complete. Installation of a water tower tank and application of an asphaltic surface on the ramp remains to be done.

(4) MER, 9th Infantry Division: The project consists of building a concrete mixing plant, placing 46 messhall slabs, construction of 140 latrines and 40 showers, draining, leveling and grading 260 acres of hydraulic fill, sand/cement stabilizing 10 miles of road and installation of 95 multiple culverts and 180 headwalls. In the month of January the mix plant was completed, 15 messhall slabs placed, 40 latrines and 2 showers constructed, 90 acres of fill brought to final grade, 1.8 miles of road stabilized, 17 culverts installed and 19 headwalls constructed. Three-fourths of the battalions earthmoving capability has been massed at Dong Tam for this one project alone. All the engineer effort has been broken out into separate task forces which concentrate on a specific aspect of the MER. In addition, an expanded civilian hire program has been initiated to augment the military effort.

e. Soc Trang: Two projects were worked on at Soc Trang during this period. An aircraft overrun 500' x 120' was constructed of T-17 membrane during December. A selfhelp project involving cantonment construction was also begun in November. To date two 20' x 50' two story BOQ's and one 20' x 100' billet are completed. Construction at Soc Trang continues to take three to four times that normally required. Many of the materials used to date have been transported by the engineers from Can Tho, some 57 kilometers to the north, in armed convoys. Because of the constant threat by the VC, considerable effort is expended providing security by the engineers to accomplish movement of these materials.

f. Vinh Long: In January 1968 one squad began supporting MPW with dump trucks on the rehabilitation of National Route QL-4 from My Thuan to Can Tho. The trucks hauled rocks to fill the many craters made by the VC in recent months. The U. S. effort will be reinforced in the near future so that the entire 40 KM of road will be rehabilitated with a new base in damaged sections and surfaced with a double bituminous treatment where needed.

g. Vi Thanh: Since early November 1967 the battalion has been given the mission of surfacing the laterite runway at Vi Thanh with a sand/asphalt layer and M8A1 matting. Vi Thanh lies 30 miles SW of Can Tho in the midst of VC strongholds and is accessible by one secondary road and one canal. As the period closed all plans were finalized to move men, materials and equipment by water to Vi Thanh. A platoon of U.S. LCM-8's (11 boats), the River assault Group (RAG), the ARVN 21st Division, provincial forces, and U.S. overhead air cover will combine to thrust down the canal and deliver 2500 tons of supplies and equipment for the job. The Vietnamese RAG is

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6
providing security for civilian contract sampans which are delivering 4,000 CM of sand from sites near Cambodia. Initiation of the men, materials and equipment move to Vi Thanh was in a state of delay as the period closed due to the enemy situation.

8. Logistics: The responsiveness of the logistical system continues to govern construction operations in the delta. While CL II and IV items enjoy a low transportation priority, sufficient pre-programming of supplies has occurred so that most common items are now on hand. The battalion still suffers with the rest of the Command in lacking electrical and plumbing supplies. Contractor delivery of rock and sand has proven a blessing at Can Tho. Previously, military barges had to be off-loaded at the congested Binh Thuy port, after waiting a week or more before off-loading could commence. Movement of unit equipment between Dong Tam and Can Tho requires a long lead time and constant coordination with TMA. The battalion continues to be forced into moving CL IV supplies from the ports of Dong Tam and Can Tho in order to resupply itself. The lack of organic material handling equipment and supply personnel to run a large CL IV yard and the poor response of LSA at Dong Tam continues to challenge the S-4 in his operations at Dong Tam.

9. Civil Affairs: Although preoccupied with the military construction program, the battalion continues to aid the Vietnamese in their nation building program. Four self-help construction projects were started, two of which were completed during the period. A hamlet school and nursery were built at Dong Tam and a bridge built near Can Tho. A second hamlet school and an orphanage dormitory are being built at Can Tho. The distribution of clothing, food, soap and toys by the Chaplain was continued, as well as distribution of scrap lumber.

10. Maintenance: This period saw an intensive maintenance program put into operation as all equipment was made ready for the dry season construction effort. The use of aircraft to transport needed parts around the delta and an increased awareness of the need for maintenance brought the overall equipment deadline rate down to 2.4%, well below the 3.5% target established by 34th Engineer Group. The battalion maintenance platoon experienced the following with regards to its operations:

a. Third echelon work orders:

- (1) Total received: 269
- (2) Total completed 213
- (3) Total outstanding: 56

b. Repair parts:

- (1) Normal requisitions:
 - (a) Total submitted: 1884
 - (b) Total completed: 1092

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10

(c) Total cancelled: UNK

(d) Total outstanding 792

(2) Red Ball express requisitions:

(a) Total submitted: 328

(b) Total completed: 113

(c) Total cancelled: 21

(d) Total outstanding: 194

The total number of work orders received by this platoon was up slightly over last year and the previous quarter. This can be attributed to the increased operation of all equipment during the prime construction dry season. Work orders completed decreased from 83% to 79.2%. This decrease can be attributed to the loss of maintenance personnel. It is very encouraging to note that normal repair parts requisitions completed this period was up from 33% to 58%. Additional encouragement can be seen in the fact that Red Ball Express requisitions completed this period was up from 14% to 34.5%

Section 2, Part I, Observations (Lessons Learned)

1. Personnel:

a. ITEM: Vietnamese Civilian Hire Personnel:

(1) DISCUSSION: Despite the enemy situation, some units in the battalion have grown dependent on the local Vietnamese labor market to furnish a variety of skills. These include construction, maintenance, clerical, mess, and housekeeping personnel. The loss of these personnel, either due to VN holidays or the military situation, results in as high as a 50% reduction in the military construction effort available. As the period closed with an unprecedented VC offensive, all but a very few Vietnamese have failed to report for work.

(2) OBSERVATION: As long as the military situation is unresolved, all effort should be made to keep the battalion filled at 100% of TO&E authorized personnel strength. Dependence on Vietnamese civilian hire does not resolve personnel shortages.

b. ITEM: Engineers Guarding Base Camps:

(1) DISCUSSION: Due to enemy pressure, rapid base camp expansion and nonavailability of combat security forces, the units at Long Tam have had to increase the number of guard personnel committed for base defense. The cumulative effect of these and other personnel losses due to post details results in setbacks to the construction schedule.

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(2) OBSERVATION: A close study of all commitments was made. Where possible, full time guards were designated. Several so called "hidden" duty positions in the company areas were consolidated resulting in less productive time lost. Although the overall gain was small, the study did result in less men and equipment hours lost and increased morale as personnel found their names less frequently on the duty roster.

2. Operations:

a. ITEM: Engineers in the Defense.

(1) DISCUSSION: On 31 Jan 68 the clerks, draftsman, surveyors, photographers, etc. from battalion headquarters took the brunt of a ground attack by the VC at Can Tho Airfield. Fighting with small arms and grenades, the engineers and other personnel on the base successfully limited the penetration and ejected the VC beyond the perimeter where they were dealt a killing blow by friendly air strikes. Because of a sound base defense plan, the airfield was spared.

(2) OBSERVATIONS: Good defensive tactics used included: a plan was in effect and understood by all; troops were alert and in position behind the berms or in bunkers; illumination in the way of flares and search lights was quickly supplied; post security guards on each flank were able to deliver withering automatic fire into the enemy positions; key units were quickly re-supplied with ammunition; and friendly air was readily available once the alarm was given. Some of the lessons learned included: Communication throughout the perimeter needed improvement; although some units were re-supplied with ammunition, others ran out; additional protection in the way of bunkers was required for the reaction squads; and additional weaponry in the way of M-79 grenade launchers was desirable. The engagement again emphasized the need for engineers to train in infantry tactics.

b. ITEM: Substitute Radios.

(1) DISCUSSION: One company in the battalion is still equipped with AN/VRC-53 radios for use for primary FM radio communications. This set has a range of 5-8 KM and was issued in lieu of the AN/VRC-46/47 radios which have a range of 24-32 KM. Because of the limited range, the AN/VRC-53 has proved unsatisfactory when trying to communicate with battalion headquarters.

(2) OBSERVATION: Requisitions have been submitted through supply channels for the needed equipment.

c. ITEM: Asphalt Loading Tower.

(1) DISCUSSION: A high speed asphalt loading capability was needed during an airfield resurfacing project.

(2) OBSERVATION: An old rectangular steel tank was mounted on a tower and fitted with a 6" pipe to feed to asphalt distributors. The

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12

tank could be filled from three 55 gallon drums draining simultaneously into its top. The tank acts as a reservoir and supplies an output of asphalt at a greater rate than the methods of direct feed from the 55 gallon drums. A 750 gallon asphalt distributor can be filled in less than ten minutes with the tank method.

d. ITEM: Aircraft revetments constructed of M8A1 matting.

(1) DISCUSSION: Moving filled revetments from one location to another in a short span of time presented a problem in that manpower and time were not available to empty the revetments.

(2) OBSERVATIONS: A 20 ton crane was used to lift the revetments in 2 section pieces, allowing the sand to run out of the bottom. The sections were transported to a new site, off loaded, and refilled with a scoop loader. The revetments were lifted by a special sling made of cable and short (2') pieces of M8A1 matting. The short pieces of matting threaded into the top sheet of the revetments to provide "instant" lifting eyes.

c. ITEM: Use of demolitions in drainage.

(1) DISCUSSION: When attempting to establish initial drainage in fresh hydraulic fill, much difficulty was encountered while trying to break through the original clay dike built to contain the hydraulic fill and in proceeding with earthmoving and construction operations prior to completing adequate drainage.

(2) OBSERVATION: It was found that the use of 40 pound cratering charges would adequately blast through this berm and establish initial drainage. From this point, drainage could be continued by using earthmoving equipment and using additional cratering charges when required. If drainage was ignored and no ditches constructed, any progress at all was practically impossible because of the lack of trafficability on the fresh hydraulic fill.

f. ITEM: Additional recovery equipment.

(1) DISCUSSION: When working fresh hydraulic fill or clay, it would be advantageous to have at least four tractors (D7 or larger) with winches available for recovery purposes. As an example, only two of this unit's authorized four D7's are equipped with winches and because of this, many man and equipment hours have been lost when additional recovery equipment was needed and none was available.

(2) OBSERVATION: When units are assigned to work in hydraulic fill, consideration should be given to equipping all tractors with heavy winches in lieu of scarifier assemblies.

g. ITEM: Placement of concrete footers and sand cement slabs.

(1) DISCUSSION: In order to place concrete slabs on tight schedules, sand-cement was used in place of concrete when aggregate was

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a. ITEM: Engineers in the Defense.

(1) DISCUSSION: On 31 Jan 68 the clerks, draftsman, surveyors, photographers, etc. from battalion headquarters took the brunt of a ground attack by the VC at Can Tho Airfield. Fighting with small arms and grenades, the engineers and other personnel on the base successfully limited the penetration and ejected the VC beyond the perimeter where they were dealt a killing blow by friendly air strikes. Because of a sound base defense plan, the airfield was spared.

(2) OBSERVATIONS: Good defensive tactics used included: a plan was in effect and understood by all; troops were alert and in position behind the berms or in bunkers; illumination in the way of flares and search lights was quickly supplied; post security guards on each flank were able to deliver withering automatic fire into the enemy positions; key units were quickly re-supplied with ammunition; and friendly air was readily available once the alarm was given. Some of the lessons learned included: Communication throughout the perimeter needed improvement; although some units were re-supplied with ammunition, others ran out; additional protection in the way of bunkers was required for the reaction squads; and additional weaponry in the way of M-79 grenade launchers was desirable. The engagement again emphasized the need for engineers to train in infantry tactics.

b. ITEM: Substitute Radios.

(1) DISCUSSION: One company in the battalion is still equipped with AN/VRC-53 radios for use for primary FM radio communications. This set has a range of 5-8 KM and was issued in lieu of the AN/VRC-46/47 radios which have a range of 24-32 KM. Because of the limited range, the AN/VRC-53 has proved unsatisfactory when trying to communicate with battalion headquarters.

(2) OBSERVATION: Requisitions have been submitted through supply channels for the needed equipment.

c. ITEM: Asphalt Loading Tower.

(1) DISCUSSION: A high speed asphalt loading capability was needed during an airfield resurfacing project.

(2) OBSERVATION: An old rectangular steel tank was mounted on a tower and fitted with a 6" pipe to feed to asphalt distributors. The

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13
in short supply. Exterior and interior building foundations were made of concrete with slabs being made of sand-cement. The exterior and interior foundations required separate forming, placing and curing time which was expensive in man hours and time.

(2) OBSERVATION: It was found that time, labor, and materials could be saved by forming only the exterior of the slab excavating the interior foundations into the ground. The ring footers and interior foundations are placed using a low-slump concrete to a level of 4" below grade. Sand-cement is immediately placed over the foundation (concrete) as the slab is placed, eliminating the need for separate forming, placing, and finishing of concrete foundations.

h. ITEM: Sand-cement stabilization.

(1) DISCUSSION: When stabilizing with cement and using Rome disc harrow for mixing, it was found that the desired depth was very difficult to maintain until the operator became experienced and even then it was very difficult to maintain depths less than 8 inches. Optimum moisture content was reached originally through trial and error and recently confirmed with a Jiffy Moisture Tester.

(2) OBSERVATION: It would be advantageous to train an operator for the harrow or possibly request a trained operator before starting stabilization for a finished product. Attempting to stabilize less than 8 inches of soil was not successful; 12 inches is recommended. From experience and confirmation by testing, it has been found that the optimum moisture content for cement stabilization of hydraulic fill is around 15%. The condition of the mixture at this moisture content is such that a handful can be squeezed into a lump and then broken in two pieces cleanly without crumbling. A CBR test of the stabilized product after proper curing should be made to determine the quality of the finished product. Such tests are now in progress.

i. ITEM: Headwall construction.

(1) DISCUSSION: Sandbag headwalls were initially built at Dong Tam Base, but they proved to be temporary and consumed many man hours in building. Recently, concrete block headwalls have been constructed by combined efforts of military and local labor.

(2) OBSERVATION: Concrete block headwalls proved to be a very good addition to construction planning. They are permanent and much more sturdy than sand bag headwalls. With the same amount of manpower, this unit has installed sixteen concrete block headwalls in the same number of hours that was previously needed to install one sandbag headwall. Indigenous personnel are easily trained to erect concrete block headwalls effectively with a minimum amount of supervision.

3. Logistics:

a. ITEM: MSA1 netting manufactured by American Steel under contract number DSA 700-27213 has proven unsatisfactory for airfield construction.

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14

(1) DISCUSSION: To date this unit has been unsuccessful in three attempts to utilize the above mentioned material for an airfield surface. Two separate circumstances apparently cause the problem. First, the male locking lugs in some cases are too long to be inserted into the female slots of the adjoining sheet. This necessitates shortening the male lugs which takes time and slows production. Second, and most serious, when two sheets are fitted together the male locking lugs will make tight connections in some female slots and not in another indicating that the male or female portions are not accurately spaced when the matting is manufactured. Consequently, much difficulty is experienced in holding a centerline for a long run such as an airfield.

(2) OBSERVATION: To date no spacing or gauging system used has proven satisfactory for correcting the problem of holding a centerline.

4. Maintenance.

a. ITEM: Maintenance of Unit Communication Equipment.

(1) DISCUSSION: It was found that a majority of the unit communication section personnel were not familiar with the Army Equipment Records System as outlined in TM 38-750, thus, records were being improperly prepared and maintained.

(2) OBSERVATION: It was found that the one unit which used the company maintenance officer also as the unit communication officer had an excellent set of records. This solution is recommended as one way of eliminating most maintenance and records problems related to communication and CBR equipment.

b. ITEM: Maintenance of hydraulic brake systems and wheel bearings.

(1) DISCUSSION: The sand silt material dredged as hydraulic fill at Dong Tam combined with water acts as a paste abrasive on brake shoes and the hydraulic brake system. The fines continually enter wheel drums of almost all rolling equipment.

(2) OBSERVATION: Frequent disassembly and cleaning of wheel and master cylinders has eased this problem. Scheduled services have been increased to one-half the normal period, and all wheels are pulled, brake drums and shoes cleaned, and brake cylinders checked. Also consideration should be given to increasing the authorized PLL stockage for brake parts for units initially deploying to RVN.

c. ITEM: Gear box vents.

(1) DISCUSSION: Extreme dust and mud conditions causes rapid clogging of gear box vents; thus, there has been an increase in blown seals.

(2) OBSERVATION: The number of seals blown has recently been reduced greatly by removing and cleaning all gear box vents weekly.

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d. ITEM: Tracked Engineer equipment.

(1) DISCUSSION: The increased use of tracked engineer equipment (i.e. D7 dozers) in sand-silt hydraulic fill has resulted in rapid track rail and roller wear, although the track pads remain serviceable.

(2) OBSERVATION: Time and money can be saved by effective coordination between engineer units working in sand-silt and those working in rock quarries. Since track pads wear out quickly in quarry operations (rather than rails and rollers), a lateral transfer between units provides the required parts to return some equipment to immediate operation.

e. ITEM: Increased contamination of fuel.

(1) DISCUSSION: Recently the contamination of fuel has been increased by dust during the day and water condensation during the cool nights.

(2) OBSERVATION: It was found that this problem can be minimized by changing fuel filters in bulk supply systems more frequently than normal and by draining water condensation from fuel storage tanks daily. Also, fuel filters on vehicles should be checked more often during a period of adverse conditions such as these.

f. ITEM: Storage of PLL in conex containers.

(1) DISCUSSION: Storage of PLL items is a problem for units which move periodically or must work out of tents or very temporary buildings. Construction of adequate parts storage facilities can become a problem.

(2) OBSERVATION: It has been found that PLL can be stored more easily and be more readily available in home-made conex inserts constructed in a vertical fashion and divided into various sized bins. The bins can be marked in accordance with the PLL index file for easy accessibility. In the event of a unit move, the bins can be boarded up, remain marked and be loaded into conex containers. When the move is completed all parts are available immediately for operations.

5. Civic action.

a. ITEM: Distribution of goods at Refugee Hamlet.

(1) DISCUSSION: In December 1967 the men of the battalion collected clothing, toilet articles, candy, and toys for distribution to the needy families at a refugee hamlet. Plans for the distribution were coordinated with representatives of U.S. and Vietnamese agencies. On the appointed day the goods were taken out to the village in a truck. The village chief met the truck at the entrance to the village and took the chaplain to pay a courtesy call on the local clergymen. When the chaplain returned to the truck he found a scene of great disorder. A soldier had

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14

precipitated the disorder by casually giving away a few toys to some children. When this occurred, the people began snatching items from the truck. The village chief found it impossible to restore order until the last item was carried off.

(2) OBSERVATION: This civic action may have done as much damage as good because the neediest families did not in fact receive the goods that were taken out. In the future, when making such distribution of goods, all personnel must be thoroughly briefed as to procedures to be followed. The needy families often have identification cards, with family photographs, and the notation as to the last time they had received aid. The village chief is thus able to determine which families need assistance. Soldiers, or other assistants, must "stand guard" over the goods and operate under the direction of the village officials. In this way, repetitions of this unfortunate incident can be avoided.

Section 2, Part II, Recommendations.

1. Increased Weaponry and Communication. This battalion has had to take up defensive position on numerous occasions within the base camps of South Vietnam. On one occasion, the battalion bore the brunt of a ground attack on Can Tho airfield. From these experiences it can be stated that the unit definitely lacks a good, short range, personnel carried radio capability, and sufficient fire power. Such equipment is also required to increase security of road convoys. It is felt that pack mounted radios and the M-79 grenade launcher should be included in the TO&E of each unit.

Recommendation: That each company sized unit be supplied with three AN/PRC-25 radios (or equivalent) and two M-79 grenade launchers.

2. Increased Transportation and Logistical Support Requirement. The construction and maintenance operations of the battalion still suffer from the delta logistical elements inability to perform their mission. The situation is somewhat improved from the last period but only because planning now encompasses a long lead time. Examples of construction effort which has been diverted to logistical support type activities are: at both Dong Tam and Can Tho the engineers are still required to clear much of the Class IV materials from the port; the engineers are required to haul much of their Class IV materials to Soc Trang from Can Tho and logistical planning for construction of Vi Thanh airfield initially envisioned the engineers off loading and storing all Class IV materials. Similarly, the transport of equipment between Dong Tam and Can Tho takes at least thirty days lead time.

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17

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Recommendation: That the transportation and logistical elements increase their capability to transport and handle Class IV material and equipment in the Delta.



ROBERT A. POTTS
LTC, CE
Commanding

2 Incl

1. After Action Report
2. Feasibility Report, Project CLIME

DISTRIBUTION:

- 5-CO, 34th Engr Gp (Const)
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- 2-CINCUSARPAC, ATTN: GOPP-OT (Airmail)
- 1-File

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19

EGF-OP (8 Feb 68) 1st Ind MAJ Dorris/wec/VT 2987
SUBJECT: Operational Report-Lessons Learned (RCS CSFOR-65) for Quarterly
Period Ending 31 January 1968.

→ HQ, 34th Engineer Group (Const), APO 96291, 20 February 1968

→ TO: Commanding General, 20th Engr Bde, ATTN: AVBI-OPN, APO 96491

This Headquarters concurs with the 69th Engineer Battalion's ORLL Report subject to the following comments:

a. Section 1, para 8: Coordination has been effected with the 53d General Support Group and the 4th Transportation Command in an attempt to obtain additional terminal service support at Dong Tam. 4th Trans Comd is in the process of increasing their capability at Dong Tam; however, at this time sufficient assets are not available.

b. Section 1, para 9: Materials for construction indicated are being provided by the local CORDS agency. 69th Engr Bn is authorized to provide only manpower and scrap lumber for any civic action project.

c. Section 2, Part I, para 2b: AN/VRC-46/47 shortages have been included in all Periodic Logistic Reports as critical items and follow-up made on requisitions. Information received indicates they are still back ordered and assets are not available in country to fill shortages.

d. Section 2, Part I, para 2h: Optimum moisture content will vary with the type material pumped. Fifteen percent has proved to be optimum for the Dong Tam fill.

e. Section 2, Part I, para 3a: This is the first time that a problem has been encountered with American Steel M8A1 matting. Further observations of future American Steel matting will be made and a report, if warranted, submitted. Pickard manufactured matting has been reported as a problem elsewhere. However, experience in recent employment at An Thoi on Phu Quoc Island has been favorable. Further tests are being conducted. The preliminary overall judgement is that bad batches are being produced on occasion as opposed to one manufacturer's product being totally unsatisfactory. It would also appear that either production criteria, specifications or quality control need to be improved.

f. Section 2, Part I, para 4d: A program of exchanging track assemblies has been initiated between units in the Group to obtain maximum use of both the track rails and pads.

g. Section 2, Part II, para 1: Concur. Emergency MTOE action will be initiated to obtain the items which are considered essential.

70

EGF-OF

20 February 1968

SUBJECT: Operational Report-Lessons Learned (RCS CSFOR-65) for Quarterly
Period Ending 31 January 1968. (Cont'd)

h. Section 2, Part II, para 2: Concur. Current plans provide for the movement of additional engineer units into the delta in the future. Each unit places a significant additional demand on the transportation and logistical systems. A significant number of manhours of engineer effort now has to be utilized in accomplishing transportation and depot functions. An increase in terminal service and transportation assets is required in the delta especially at Can Tho and Dong Tam.

FOR THE COMMANDER:



W C TOMSEN
Major, CE
Adjutant

Copies furnished:

2 - ACSFOR DA

1 - CO, 69th Engr Bn

21

AVBI-OS (8 Feb 68) 2nd Ind (U)
SUBJECT: Operational Report - Lessons Learned (RCS CSFOR-65) for
Quarterly Period Ending 31 January 1968.

DA, HEADQUARTERS, 20TH ENGINEER BRIGADE, APO 96491 1 March 1968

Commanding General, USAECV(F), ATTN: MVCC-F&O, APO 96491

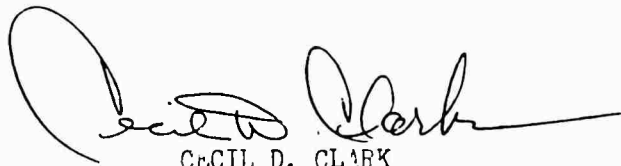
1. Forwarded for your information and necessary action IAW USAECV(F)
Regulation 1-19, dated 15 April 1967.

2. This headquarters concurs with the ORLI submitted by the 69th
Engineer Battalion and comments in the first indorsement as modified
by the following comments:

a. Section II, Part I, Paragraph 1a: Brigade resources are in-
sufficient to maintain unit strength at 100%. No matter what the US
present-for-duty strength of a unit may be, the loss of local national
employees for any reason will cause a loss of production, if those
personnel have been considered an integral part of the unit's production
capability. Prior planning must be made to compensate for the loss of
this production effort, whether schedule or unexpected.

b. Section II, Part II, Paragraph 1: This headquarters recommends
the addition of 4 AN/PRC 25 radios to each construction company and
3 to A Company of the construction battalion. M79's have been
authorized at 4 per company by MTOE.

FOR THE COMMANDER:



CECIL D. CLARK
Major, CE
Adjutant

AVCC-P&O (8 Feb 68) 3rd Ind (U)
SUBJECT: Operational Report-Lessons Learned for Quarterly Period
Ending 31 Jan 68.

HEADQUARTERS, UNITED STATES ARMY ENGINEER COMMAND
VIETNAM (PROV), APO 96491 18 MAR 1968

TO: Commanding General, United States Army Vietnam, ATTN: AVHGC-DST,
APO 96375

The attached ORLL submitted by the 69th Engineer Battalion (Construction)
has been reviewed by this headquarters and is considered adequate.

FOR THE COMMANDER:

John Thrautomb 1LT, AGC
RICHARD B. BIRD
Captain, AGC
Assistant Adjutant General

13

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AVHGC-DST (8 Feb 68) 4th Ind (FOUO) CPT Arnold/twl/LBN 4485
SUBJECT: Operational Report-Lessons Learned (RCS CSFOR-65) for
Quarterly Period Ending 31 January 1968.

HEADQUARTERS, US ARMY VIETNAM, APO San Francisco 96375 28 MAR 1968

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 quarterly period ending 31 January 1968 from Headquarters, 69th Engineer Battalion (Construction) (WDZKAA) as indorsed.

2. Pertinent comments follow:

a. Reference item concerning Engineers in the defense, page 9, paragraph 2a; page 14, paragraph 1; 1st Indorsement, paragraph g; and 2d Indorsement, paragraph 2b. MTOE's submitted to DA for approval included 40mm (M-79) Grenade Launchers as follows:

(1) Engineer Equipment and Maintenance Company (MTOE 5-117E),
Engineer Construction Battalion: Seven.

(2) Engineer Construction Company (MTOE 5-118E), Engineer Construc-
tion Battalion: Ten.

The above MTOE submissions, if approved by DA, would more than meet the desires of the commander for M-79 Grenade Launchers. MTOE's submitted to DA for approval did not include communication equipment. As indicated in paragraph g, 1st Indorsement, MTOE action will be initiated to include AN/-PRC-25 radios for the Engineer Equipment and Maintenance Company (three) and the three Engineer Construction Companies (four each). Once received by this headquarters, action will be expedited to process the MTOE submission for DA approval.

b. Reference item concerning transportation and logistical support requirements, page 14, paragraph 2; and 1st Indorsement, paragraph h. Water transport resources in RVN are limited and require long lead time to schedule and obtain maximum utilization of available assets. USARV is presently upgrading water transportation service in the Delta. Unit pickup of cargo at FSA's, Can Tho, and Dong Tam is in consonance with provisions of USARV Administrative Order Number 1-68. Units are required to pickup all Class II and IV cargo with organic vehicular capability.

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AVHGC-DST (8 Feb 68) 4th Ind
SUBJECT: Operational Report-Lessons Learned (RCS CSFOR-65) for
Quarterly Period Ending 31 January 1968.

3. A copy of this indorsement will be furnished to the reporting unit through channels.

FOR THE COMMANDER:

C. S. Nakatsukasa
C. S. NAKATSUKASA
Captain, AGC
Assistant Adjutant General

Copies furnished:
HQ 69th Engr Bn (Const)
HQ USAECV(P)

25-

GPOP-DT (8 Feb 68) (U) 5th Ind
SUBJECT: Operational Report of HQ, 69th Engr Bn (Const) for Period
Ending 31 January 1968, RCS CSFOR-65 (R1)

HQ, US Army, Pacific, APO San Francisco 96558

26 APR 1968

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:

C.L. Shortt

C.L. SHORTT
CPT, AGC
Asst AG

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DEPARTMENT OF THE ARMY
Headquarters, 69th Engineer Battalion (Construction)
APO San Francisco 96215

EGFA-OP

2 February 1968

SUBJECT: After Action Report (U)

TC: Commanding Officer
34th Engineer Group (Const)
ATTN: EGF-OP
APO 96291

1. (U) On the afternoon of 30 January 1968 a MACV directed yellow alert notification was received at Can Tho Airfield. Increased security measures were ordered by the airfield commander to include the arming of all personnel and posting of reaction forces around the airfield perimeter prior to dusk. Reserve forces were ordered to standby in the billets.

2. (U) At 0100 hours 31 January 1968 the 69th Engineer Battalion guard force was changed with the second relief going on duty. Their positions were on the northwest corner of the airfield perimeter. In addition to the engineer troops, post security personnel occupied three towers and one bunker in this sector. All was quiet. The weather was warm and slightly hazy. The stars and a small sliver of the new moon were visible.

3. (C) Sometime before 0300 a band of approximately 130 VC from the 303rd Battalion quietly began infiltrating through the woods in front of HHC position. Undetected they cut the barrier wire and slithered through a drainage ditch up to the edge of the perimeter road between bunker four and tower four. At this time the HHC Commander of the Relief (COR) was checking the engineer positions, E-1 through E-5. At about 0300 he was walking on the road between position E-3 and E-4 when the VC launched their attack. Two hand grenades were thrown knocking him down and wounding the engineers in position E-2. A momentary lull ensued during which the COR got up from the ground and ran to position E-3. He found that both men were wounded and ran to tower five to telephone for aid. Meanwhile all personnel in positions E-3, E-4 and the post security forces in bunker four and tower five opened fire on the VC, and mortar crews on the east side of the airfield began firing illuminating rounds.

4. (C) The eastern portion of the HHC positions also came under heavy fire. The two engineer troops in position E-4 were mortally wounded. The personnel in E-5 were alert by the initial clash and were

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23
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23
DOWNGRADED AT 3 YEAR INTERVALS;
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EGFA-OP
SUBJECT: After Action Report (U)

2 February 1968

74

behind a berm with their M-16s at the ready as the VC crested the road in front of them. The engineers emptied two clips apiece in a matter of seconds as they were assaulted. Several of the VC were seen falling. Suddenly a grenade went off directly behind position D-5 mortally wounding one engineer and knocking the other unconscious. The VC continued eastward down the perimeter road taking up positions around the sand pile. Their objective seemed to be the POL storage area.

5. (C) At this point, approximately 0310 hours, the VC had about fifty personnel inside the fence. A group had advanced as far as the sand pile, others were swarming around tower four trying to knock out the machine gun inside. More VC were strung out on both sides of the perimeter road for 300 meters as far west as bunker four. Suppressive fire was being placed on the enemy by friendly personnel all along the western sector.

6. (C) Reaction to the enemy attack was swift. A post security radio jeep with a grenade launcher proceeded up the old French road from the aircraft apron. As it turned right onto the perimeter road, the jeep was met by the HHC CCR. The driver and the CCR made their way down the perimeter road as far as bunker four when a hail of bullets forced them to halt. Although both men were wounded they began firing M-79 grenades and automatic weapons and reported the situation to the airfield TOC. They directed gunships to the scene and turned on their headlights to mark the target. The combination of airstrikes and ground fire halted any enemy attempts to expand this penetration westward.

7. (C) At about the time the post security jeep was racing up the old French road, the reserve force from HHC, 69th Engineer Battalion was arriving near the POL area. Several personnel from some other unit were already in the bunkers to the west of the POL area. As the reserve force deployed they came under enemy fire and several men were wounded. Enemy automatic weapons fire came from the group of huts north of tower 4 forcing everyone to keep low. The reserve force, along with a member of the post security force worked its way to the sand pile thinking it was a secure area. Suddenly a VC raised his head from the other side. The friendly forces immediately responded with grenades. Three VC were later found dead on the other side. The enemy attackers now were forced to fall back. As they moved westward down the perimeter road they came under intense fire. They took shelter among the bulldozers and backhoe crane parked along the road.

8. (C) The fight continued with unabated ferocity for about one hour. The VC could be seen crossing back and forth along the perimeter road, in the ditches, and in the wooded area. They began firing rockets toward the POL area. Several rounds detonated in front of the sand pile and one hit a building. All were short of the POL storage area. As more and more helicopters responded the VC position became untenable. Suddenly one of the grass huts caught fire from a rocket burst and

24

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EGFA-CP

2 February 1968

SUBJECT: After Action Report(U)

burned with great intensity. The VC in forward positions were caught in a trap as the fire to their rear illuminated their positions. Sometime after 0400 the enemy began withdrawing in small groups.

9. (C) Action continued until dawn. The enemy was hard pressed to extricate himself without heavy losses because of the friendly firepower. The 40th ARVN Engineer Group had formed a blocking position to the north. The 40th ARVN Group compound on the east was well defended so that avenue of escape was blocked. A few of the enemy finally succeeded in working their way westward out of the battle area before daylight. Small arms fire continued to be received from the woods until 0715 when three or four gunships raked the entire area for the last time. All was quiet after this.

10. (C) Casualties included 5 KIA and 8 WIA from HHC, 69th Engineer Battalion. Other friendly personnel were injured. Enemy casualties included 60KIA and 30 captured. 27 VC bodies were picked up inside the perimeter fence.

11. (C) The lessons learned from this attack are many. Foremost is that good defensive tactics will prevent or contain an enemy penetration. The proliferation of post personnel with automatic weapons in towers and bunkers backed up by reaction forces contained the initial enemy penetration. The prompt response of the reserve forces and gunships drove the attackers back from the compound. Illumination by flares, truck headlights and floodlights prevented freedom of movement by the enemy once he was detected. Quick resupply of ammunition to the forces in the eastern sector of the penetration enabled them to keep a heavy volume of fire on the enemy. Finally, the aggressive actions of the defenders probably surprised and disorganized the attackers.

12. (C) The attack on the airfield also pointed out areas for improvement. There was a need for additional communications for the reaction forces. Personnel in positions E-1 and E-2 ran low of ammunition without being resupplied. Although the reaction force positions were protected by berms, there was a need for prepared positions. In some instances the reaction force was fired on by friendly personnel in bunkers to their rear.

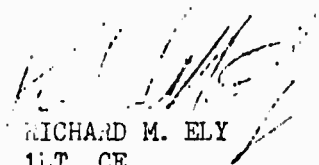
13. (C) In the final analysis, intelligence reports indicate that the better portion of one enemy company was destroyed in the action. Although five Engineer soldiers were killed the battle must be considered a victory.

FOR THE COMMANDER:

2 Incl

1. Chart, Attack on Can Tho Airfield

2. ~~Roster, HHC, Second Relief~~
Withdrawn, Hqs, DA


RICHARD M. ELY
1LT, CE
Adjutant

25
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31

DEPARTMENT OF THE ARMY
Headquarters, 69th Engineer Battalion (Construction)
APO San Francisco 96215

EGFA-OP

26 December 1967

SUBJECT: Interim Feasibility Report #1, Project Clime

TO: Commanding Officer
34th Engineer Group (Const)
ATTN: EGF-OP
APO 96291

1. Reference is made to:

a. Letter, EGFA-OP, HQ, 69th Engr Bn, 28 Oct 67, subject; Preliminary Feasibility Report, Project Clime with three inclosures.

b. MFR, 559th Engr Det Soil Team, USAECV(P), 30 Nov 67, subject: Lime and Lime-Cement Stabilization of Delta Clays.

2. Background. Previous work on this project consisted of establishing a soils testing laboratory at Can Tho Airfield and completion of laboratory tests with the medium stiff clays found around Can Tho (ref a and b). With the assistance of the 559th Engineer Detachment (Terrain) plans were made to initiate limited field work with small test plots in the rice paddies adjacent to the airfield. Subsequently, the 5th Special Forces Group at Can Tho Airfield requested the stabilization of their aircraft loading/turnaround ramp and taxiway area adjacent to the main runway. Since this opportunity presented a more practical test, plans were changed and effort placed on building the loading/turnaround ramp and taxiway. This report will cover the work done for the 5th Special Forces Group and make recommendations for further testing.

3. Aircraft Loading/Turnaround Ramp and Taxiway Experiment.

a. The site was originally a rice paddy onto which soil from the immediate area was heaped and left to consolidate. The top nine inches was built up with 5"(-) rock. Because of the low bearing strength of the foundation materials, the surface contributed little to the overall usability of the ramp in the rainy season. Aircraft such as C-123 and C7A experienced difficulty in maneuvering on the ramp, frequently miring down. The ramp became completely unusable for a considerable period during the last rainy season.

b. The objectives of the test included the following:

(1) Determination of construction procedures with available equipment.

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27

SUBJECT: Interim Feasibility Report #1, Project Cline

(2) Determination of the degree of scarification possible for adequate stabilization.

(3) Methods of lime application - dry or in a slurry, single or double treatments, roadmix vs pugmill, etc.

(4) Depth of lift possible.

c. Work commenced on 8 December 1967. A light farm tractor with disk harrow was obtained from the Can Tho Agricultural College. In addition to the normal TO&E earthmoving equipment, a 7 ton disk harrow, a component part of the Rome Plow Land Clearing set, was also used. The nine inch lift of rock was stripped and placed aside. An additional eleven inches was then stripped, placed aside for future use and the subgrade compacted. Using sheepsfoot and wobbly wheel rollers, 90% modified AASHO density was achieved on the subgrade. Next, an eight inch loose lift of medium stiff clay was placed on the 40' x 80' taxiway and the 70' x 70' turnaround/ loading ramp. The loose soil was scarified with the military disk harrow into 4"-5" clods. A 6% lime treatment was applied in slurry form to the taxiway and in dry form to the turnaround/taxiway. After several hours of setting, the soil was readily scarified to 2"(-) clods with the 7 ton disk harrow and the farm tractor with small disk harrow. Curing took place over the next two days with the soil being frequently turned by the farm tractor and harrow to aid in the process. The soil was compacted into a 6" lift after two days to 95% modified AASHO density. A second lift of soil (11" loose - 8" compacted) was then placed using the same methods and techniques as on the prior lift.

d. The lime application portion of the experiment is now complete. A six inch lift of sand-cement, followed by a double surface treatment remains to be placed. Standard construction methods will be used so that no problems are anticipated in completing the experiment.

4. Lessons Learned - Aircraft Loading/Turnaround Ramp and Taxiway Experiment. The following are preliminary observations gained thusfar. A detailed report containing all technical data will be submitted within the next 30 days by the 559th Engr Det (Terrain)

a. As expected, the Delta medium-stiff clays are quite susceptible to stabilization on a large scale. Both dry and slurry lime application give acceptable results. A firm, non-plastic lift with a CBR of 20 was achieved by the addition of 6% lime.

b. The slurry application is more difficult to apply as it requires more equipment and is subject to the whims of many mechanical breakdowns. The only advantage of the slurry application method appears to be in limiting the loss by wind blowing to practically zero.

26 December 1967

SUBJECT: Interim Feasibility Report #1, Project Cline

c. A six inch compacted lift is easier to work than an eight inch lift with resultant more thorough mixing. The eight inch (compacted) lift appears to be the maximum possible with the equipment used.

d. If a slurry application is used, a double treatment of 3% lime is recommended. On the other hand, a single 6% lime treatment is recommended for dry mix application.

e. The use of a small agricultural type "X" disk harrow (with tractor) is necessary if slurry application is employed. Otherwise the soil cannot be scarified to the desired 2"(-) diameter size necessary for optimum field stabilization with lime. The agricultural harrow is used after the heavy military harrow has scarified the clay to as small a size as possible. With dry lime application, the 7 ton disk harrow can scarify the treated soil without the assistance of the small disk harrow.

f. It is necessary to reduce the natural moisture content of the clay by about 10% by air drying before applying lime. Thus it appears that lime-clay stabilization operations are best done in the dry season (beginning in late November). On the other hand, once the lime has been applied, the soil continues to dry at an even faster rate so that periodic moistening is needed to aid in compaction.

g. A compacted lime-stabilized course must be covered, either with additional soil (next lift) or a thin asphaltic application to prevent drying and cracking. The final base course must be sealed with a wearing surface.

5. Recommendations.

a. That additional experiments be conducted to determine lime-clay stabilization parameters for a Delta road carrying limited traffic and a small bivouac area.

b. That the concept of lime-clay stabilization be taken into consideration for future airfield construction in the Delta where a permanent type facility is desired.

FOR THE COMMANDER:

/s/RICHARD M. ELY
/t/RICHARD M. ELY
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Adjutant

"A TRUE COPY"


JOSEPH A. BEBEN

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