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AGO ltr 29 Apr 1989 ; AGO ltr 29 Apr 1989

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CONFIDENTIAL

HEADQUARTERS,
864TH ENGINEER BATTALION (CONSTRUCTION)
APO US Forces 96312

EGACBC-3

14 May 66

SUBJECT: Operational Report on Lessons Learned, RCS, CSGPO - 28 (R1) (U).

TO: Commanding Officer
35th Engineer Group (Const)
APO US Forces 96312

Under the provisions of paragraph 5b(1), AR 525-24, subject report is forwarded.

FOR THE COMMANDER:

1 Incl
as

PAUL R. HABLE, JR
1st Lt, CE
Adjutant

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HEADQUARTERS
864TH ENGINEER BATTALION (CONSTRUCTION)
APO US Forces 96312

EGACBC-3 14 May 1966

SUBJECT: Operational Report on Lessons Learned, RCS, CSGPO - 28 (R1) (U)

TO: Assistant Chief of Staff
for Force Development
Department of the Army
Washington, DC, 20310

1. Significant Organizational Activities:

a.(U) One of the major projects assigned to the 864th Engineer Battalion (Construction) was that of constructing a suitable base coarse for the application of an asphaltic wearing surface. The first cold mix wearing surface to be applied in the Republic of South Vietnam was done by this unit. It was applied over a decomposed granite and cement stabilized base coarse. (See incl: 1) During the quarter, the 864th Engineer Battalion (Construction) has stabilized 2.8 miles of roadway, of which 1.8 miles have been surfaced with an asphaltic cement.

b.(U) During this quarter, units of the battalion completed the erection of seven (7) 120' x 200' Soule' warehouses, for a total of 168,000 square feet of covered storage; also, seven (7) 20' x 96' quonset huts were erected for a total of 13,440 square feet of administrative floor space. Erection of 30 - 40' x 220' maintenance warehouses have been started. Twenty (20) of which have been scheduled to be completed during the next reporting period.

c.(C) Company C of the 364th Engineer Battalion (Construction), in direct support of the Nha Trang Support Area, completed the mission of constructing a site for a Hawk Missile Battery. Also, they have started work on a 115,000 barrel tank farm which is scheduled to be complete during the next reporting period.

d.(U) The all important mission that has been assigned to the 864th Engineer Battalion (Construction) has been that of developing a rock quarry which will produce 525 tons of rock per hour when fully operational. When fully developed, crushing capability will consist of one (1) 225 TPH crusher, two 75 TPH Eagle primaries, and two 75 TPH Eagle primary - secondary tandems. The products will be used for road construction, asphaltic mixtures, concrete aggregate, and sumps utilized by all construction units on Cam Ranh peninsula.

FOR OT RD
660043

EGACBC-3 14 May 1966

SUBJECT: Operational Report on Lessons Learned (Con't)

The operation is being sustained with two (2) ten hour shifts daily. Because of mechanical breakdowns, shortages of drill components, new quarry developing, and personnel turnover, maximum production has not yet been obtained. However, as quarry development and personnel training progresses production will improve.

e.(U) Because 80% of the battalion personnel rotated during the last month of this reporting period, production and progress has not been normal. Moreover, filler personnel have been slow in arriving to fill the vacancies. Presently there is a shortage of cooks, mechanics, and carpenters.

2. Commander's Recommendations and Lessons Learned:

a.(U) Discussion: A mobile concrete facility can be constructed by mounting two 16S concrete mixers on a 10 ton lowbed trailer and fabricating a chute to pour directly into the forms. The mounting of a Navy cube water source on the neck of the trailer increases the efficiency of the apparatus and reduces water distribution requirements. The apparatus can be pulled with a 5 ton tractor on well compacted surfaces or a crawler tractor on low bearing pressure surfaces. By utilizing this mobile method of placing concrete, it is possible to reduce the number of personnel required to operate two separate mixers. The result is an increased efficiency in the number of yards of concrete placed per manhour. Also, this method eliminates the use of scoop loaders, a critical item in the theater.

b.(U) During the rainy season decomposed granite tends to clog the crusher's discharge chutes as well as adhere to the finished product producing a poor quality material. Crushed rock can be produced at a reduced rate in rainy weather by adding water to the feed material. This will make the otherwise sticky decomposed granite soupy and allow it to separate more readily from the rock. A cat walk can be rigged around the discharge chute below the vibrating grizzly on the 75 TPH primary unit and push poles employed to keep the material from clogging the chutes. The product pile will contain quantities of decomposed granite; however, it is acceptable as a coarse aggregate for a road base. If allowed to dry, this product can be recycled through a tandem crusher to provide an acceptable concrete aggregate.

c.(U) It is recommended that filler personnel arrive at units before rotating personnel leave. (Reference para 1e.(U)) It is felt that this will help reduce the period of low production caused by personnel turnover.

ROBERT A SEELYE
Lt. Colonel, Corps of Engineers
Commanding

CEMENT - DECOMPOSED GRANITE STABILIZATION (U)

INTRODUCTION

One of the principal engineering problems encountered in the development of Cam Ranh Bay was the construction of a road base coarse capable of withstanding the heavy load requirements necessary for the voluminous movement of critical bulk supplies. Suitable construction materials, such as rock and asphaltic cements, were in limited supply or difficult to produce in sufficient quantity to sustain a maximum road construction effort. The quantities of rock required for a suitable base coarse, not to mention the wearing surface, would be of such magnitude as to require all available product from the quarry operation.

The beach type sand is not suitable for use in rock as it fails exceedingly in shear and does not hold the rock. A solution to the problem was to distribute a load uniformly to the sand in such a manner as to make use of its maximum bearing capacity. It was felt that through the use of decomposed granite, a quarry waste product available in large quantities, a suitable base coarse could be constructed with the necessary characteristics.

Decomposed granite is the product of the chemical weathering of the silica molecule from the feldspars in the granite rock and produces a residual clay material containing a high percentage of small quartz crystals. Decomposed granite is not to be confused with lateritic soils which are common to this area.

Incl: 1

AVAILABLE CONSTRUCTION MATERIALS

The well rounded, fine grained, poorly graded beach sand is undesirable as a construction material. When used as a subgrade material with a six to eight inch sub-base of three inch minus crushed rock, subgrade failure was experienced. Test results indicated that the sand was undesirable for use with cement as a sand-cement stabilized road base. Laboratory tests and field test strips of various sand-cement ratios all produced similar results of low strength and poor wearing ability.

Laboratory tests were performed on decomposed granite concerning its acceptability as a construction material. Sieve analysis, optimum moisture curves, and test specimens were performed all producing satisfactory results. Based on these test results, a twelve inch test roadway was designed and constructed consisting of a six inch sub-base of 50% decomposed granite and 50% beach sand followed by a six inch base coarse of cement and decomposed granite.

PROCEDURES

The test area was excavated to a grade nine inches below the desired final grade of the wearing surface and a three inch lift of decomposed granite was placed, spread, and blended with a roto-tiller. This mixture was compacted, at OMC to 90% plus, using a sheeps-foot roller and a thirteen wheel "wobbly" roller pulled in tandem.

A second six inch lift of decomposed granite followed after test results indicated a 90% plus compaction had been obtained throughout. This second lift was compacted and shaped to final grade. This portion of the procedure has since been modified to eliminate the compaction of the second lift as it is unnecessary effort. This first compaction was found to be unsatisfactory also in that the roto-tiller blade experienced considerable wear from blending. Cement was placed on the base coarse at intervals which would yield a 10% by volume cement to decompose granite ratio when roto-tilled to a six inch depth. The cement was roto-tilled into the six inch base coarse. Three passes of the roto-tiller were required to achieve a uniform blend of material. When properly blended, the surface was a uniform gray color. Water was added through the roto-tiller during the third pass to obtain optimum moisture content. Constant testing was required to determine the exact quantity of water to be added. Constant supervision was required to insure that OMC was not exceeded. This was necessary because the mixture at OMC appears dry to the touch and personnel have a tendency to add more water. The blended material was again compacted with a sheeps-foot roller and a thirteen wheel roller pulled in tandem and finished rolled with a ten ton steel wheel roller. Some finish grading was required to achieve the desired road shape.

Speed in construction procedures from the time the water is added is essential in order to complete the entire operation in less than four hours. This time frame is necessary to prevent a breakdown of the hydration of the cement by the compactive effort.

PROCEDURES (Con't)

After completion of the final shaping, the surface was kept moist for a period of seven days to allow proper curing; all traffic was kept off the road until the cure period was completed. Periodic checks of the surface was a necessity. If a surface crack developed additional water was required to aid curing. After curing the cement decomposed granite base coarse was covered with an asphalt road mix wearing surface.

Note: The wearing surface has since been modified to be a hot mix laid by a Barber-Green asphalt paver.

CONCLUSIONS AND RECOMMENDATIONS

The decomposed granite cement stabilized coarse constructed was capable of carrying the loads for which it was designed. The 1,000 feet of road, constructed by the procedures outlined here-in has withstood the test of time and use. It required no maintenance since its conception in February 1966 as it has not suffered a base coarse or a subgrade failure of any type, nor a surface failure of any type.

The use of decomposed granite cement stabilized base coarse would release considerable quantities of rock for other uses. The only requirement for rock would remain to be the quantity necessary for the hot mix surface. Decomposed granite is an abundant waste product of quarry operations and would remain available to meet the needs of a large scale road building operation.

Further experimentation in this field to determine other possible mixtures to include a 45% DG, 45% beach sand, and 10% cement are presently under consideration and planning. If successful mixtures are found, thereby reducing the requirements of DG, it would make the material available for other uses.

EGA-3 (14 May 1966) 1st Ind
SUBJECT: Operational Report on Lessons Learned, RCS, CSGPO - 28 (RI) (U)

HEADQUARTERS, 35th Engineer Group (Construction), APO U.S. Forces 96312
16 May 1966

TO: Commanding General, 18th Engineer Brigade, ATTN: AVEB-3, APO U.S. Forces 96307

1. In accordance with Department of the Army Regulation 525-24, dated 29 October 1959 and USARV Circular 870-1, dated 11 November 1965, with Change 1 dated 1 April 1966; Subject: Operational Report on Lessons Learned (RCS CSGPO-28 (RI)), the subject report is forwarded for the 864th Engineer Battalion (Construction).

2. Concur in Commanders Observations.

FOR THE COMMANDER:

JOHN M HERREID
Capt, CE
Adjutant

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AVEB-DBC (14 May 66) 2d Ind
SUBJECT: Operational Report on Lessons Learned, RCS, CSGPO-28 (R-1)(U)

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

TO: SEE DISTRIBUTION

The following comments pertaining to Section II, paragraph 2c of the Operational Report on Lessons Learned for the 864th Engineer Battalion are furnished:

(U) Filler personnel could not be supplied to this unit in sufficient number to offset the large number of losses in the 864th Engineer Battalion and still provide replacement personnel to maintain satisfactory strength in other units. This is a general problem created by the "hump" period which occurs one year after a unit arrives in theatre. It is being resolved throughout the command for the present by brief extensions and curtailment of personnel and by the earlier or later arrival of fillers to coincide with these extensions and curtailments. This program is being operated by the direction of Department of the Army. Future "humps" existing in other units of this command, will be alleviated by inter and intra Group transfers of personnel within the Brigade.

P. W. RAMEE
Colonel, CE
Deputy Commander

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

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AVHGC-DH (14 May 66) 3d Ind
SUBJECT: Operational Report on Lessons Learned, RCS, CSGPO-28 (R1) (U)

HEADQUARTERS, UNITED STATES ARMY, VIETNAM, APO San Francisco 96307 JUL 30 1966

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

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

This headquarters concurs with the 864th Engineer Battalion operational report on lessons learned as indorsed.

FOR THE COMMANDER:

SAMUEL E HARMON
Capt AGC
Asst Adj. General

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GPOP-MH (14 May 66) 4th Ind (U)
SUBJECT: Operational Report on Lessons Learned, RCS, CSGPO-28 (R1) (U)

HQ, U.S. ARMY, PACIFIC, APO San Francisco 96558 6 SEP 1966

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

1. The Operational Report on Lessons Learned of the 864th Engineer Battalion for the period 1 January - 30 April 1966 is forwarded herewith. This report, dated 14 May, was unaccountably delayed in the mail on the way from Vietnam.

2. This headquarters concurs with the basic ORLL as modified by the previous indorsements. The ingenuity of the 864th Engineer Battalion is commendable.

FOR THE COMMANDER IN CHIEF:

D. A. HARRISON
Capt, AGC
Asst AG

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