

MISCELLANEOUS PAPER 9402

**CONDITION SURVEY, LIBERTY ARMY AIRFIELD
FT. STEWART, GEORGIA**

by

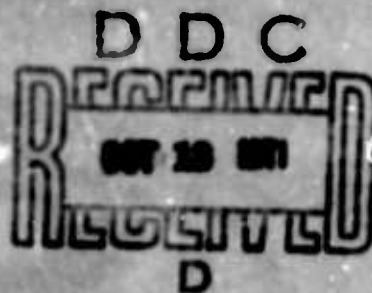
P. J. Vidoe



May 1960

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U. S. Army**



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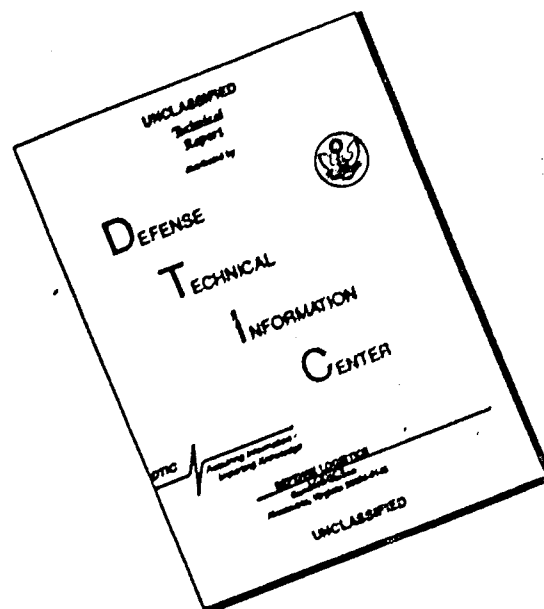
**U. S. Army Engineer Waterways Experiment Station
CORPS OF ENGINEERS
Vicksburg, Mississippi**

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MISCELLANEOUS PAPER 2-40-2

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FORM-200 (REV. 1-60)



Foreword

Authority for performance of condition surveys at selected airfields is contained in Instructions and Outline for existing pavement condition surveys, IT 1948, and is in accordance with the Long-Range Program, "Investigations and Studies Program for Development of Engineering Criteria, IT 1948, Army Funds," dated March 1947.

The inspection of the facilities at Liberty Army Airfield was requested by the Office, Chief of Engineers, and was made by Mr. P. J. Vedros of the Flexible Pavement Branch, U. S. Army Engineer Waterways Experiment Station (WES). This report was prepared by Mr. Vedros under the general supervision of Messrs. W. J. Turnbull, A. A. Maxwell, R. G. Ahlvin, and A. H. Joseph of the Soils Division, WES.

COL John B. Overall, Jr., CE, was Director of the WES during the conduct of the study and the preparation of this report. Mr. J. B. Tiffney was Technical Director.

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Conversion Factors, British to Metric Units of Measurement

British units of measurement used in this report can be converted to metric units as follows:

<u>Multiply</u>	<u>By</u>	<u>To Obtain</u>
inches	2.54	centimeters
feet	0.3048	meters
miles	1.609344	kilometers
square inches	6.4516	square centimeters
pounds	0.45359237	kilograms
pounds per square inch	0.070307	kilograms per square centimeter

CONDITION SURVEY, LIBERTY ARMY AIRFIELD

FT. STEWART, GEORGIA

Purpose

1. The purpose of this report is to present the results of an inspection performed at Liberty Army Airfield (IAAF) in June 1967. The inspection was limited to visual observations, and no tests were conducted on the existing runways and taxiways. A layout of the airfield is shown in plate 1.

Pertinent Background Data

General description of airfield

2. IAAF is located on the reservation of Ft. Stewart approximately 40 miles south of Savannah, Ga.

3. The airfield is located physiographically in the Atlantic Coastal Plains province. Natural soils in the immediate vicinity are of marine origin, consisting of relatively pervious silty and sandy clays.

4. In June 1967 the airfield consisted of four runways (runways 1 and 4 are considered temporary), connecting taxiways, one rigid pavement apron, two steel landing mat areas, and a surface treatment temporary apron for helicopters (plate 1).

Previous reports

5. Reports pertaining to the load-carrying capabilities of the pavements at IAAF that have previously been published are as follows:

- a. U. S. Army Engineer Division, Ohio River Division Laboratories, Cincinnati, Ohio, "Pavement Evaluation Report, Liberty Army Airfield, Fort Stewart, Georgia," dated July 1960.
- b. U. S. Army Engineer District, Savannah, Georgia, "Army Airfield Pavement Evaluation, Liberty Army Airfield, Fort Stewart, Georgia, and Appendix A, Studies Made for Evaluation," dated August 1962.

* A table of factors for converting British units of measurement to metric units is presented on page vii.

History of Airfield Pavements

Construction history

6. The construction at LAAF was accomplished in four phases, with two phases of major reconstruction work. The layout and description of pavements at the time of this survey are shown in plate 1.

- a. 1942-1943 construction. Facilities constructed during this period included runways 1 and 2, each 50 ft wide by 5000 ft long, and taxiways A, B, and C. These facilities were paved with 1-1/2 in. of asphaltic concrete over a 4-in. sand-tar base. The rigid pavements of apron A were of the thickened-edge type slab, with 9-6-6-9-in. section and a slab size of 12-1/2 by 25 ft. The apron taxiway was 6-in. portland cement concrete. A number of rigid pavement hardstands and connecting taxiways constructed at this time have since been abandoned, and are not shown on the airfield layout. Pavements were designed to support a gross aircraft load of 30,000 lb.
- b. 1944 construction. The east and west aprons consisted of steel landing mat, and were placed as extensions to apron A.
- c. 1954 reconstruction. In 1954, cracks were sealed and a bituminous seal coat containing aggregate of 3/8-in. maximum size was placed on the flexible pavements.
- d. 1962 construction. In 1962, runway 1 and taxiways A and C were overlaid with 4-1/2 in. of asphaltic concrete. Engine runup areas consisting of 2-in. asphaltic concrete over 8-in. stabilized base were constructed on taxiways A and C. Aircraft parking pads were constructed on the east steel landing mat with pads of 8-in. portland cement concrete pavement accessible by 2-in. asphaltic concrete overlay on surrounding steel mat. The 1962 pavements were designed for a single-wheel load of 22,000 lb with a tire pressure of 100 psi, except for the parking pads, which were designed for a 15,000-lb gear load on dual wheels spaced 20 in. c-c with a tire contact area of 100 sq in.
- e. 1966 construction and reconstruction. In the summer of 1966, runways 3 and 4 and the rotary wing apron were constructed. Construction was of a temporary type consisting of a 6-in. stabilized base course mixed in place using emulsified asphalt. The runways received an asphalt seal coat, and the apron received a triple bituminous surface seal. These pavements were intended for use only by the light Army aircraft of the "Bird Dog" type (gross weight of 2000 to 3000 lb). In the fall of 1966, runway 2 was overlaid with

a keystone course and a 1-1/2- to 1-3/4-in. asphaltic concrete surface course.

Traffic history

7. A detailed traffic record for IAAF is not available. It is stated in the report referenced in paragraph 2 that approximately 140 cycles of C-124 and C-130 aircraft traffic were applied on the strengthened runway (runway 1) during a five-day period in July 1962 without causing any apparent damage. At the time of this inspection, June 1967, there were approximately 11,000 cycles per month being applied (5500 cycles on each) on runways 1 and 2 by light Army type trainer aircraft. It is reported that some C-130 aircraft have operated on the field, but their gross weight was restricted to 106,000 lb.

Condition of Pavement Surface

8. In June 1967, the condition of the pavement surface ranged from excellent to fair. Surfaces of the pavement on runways 1 and 2 (photograph 1) and taxiways A (photograph 2) and C were in excellent condition. There were no visible signs of any types of cracking in the surface. The severe cracking that existed on the southwest end of runway 1 and that is described in the report referenced in paragraph 5b had not reflected through the 1962 overlay. The pavement surface on taxiway B was in fair condition. The surfaces of the two temporary runways (3 and 4) were in fairly good condition (photograph 3a) considering the low-quality pavement used. Some of the seal on runway 4 had peeled off (photograph 3b), and there were numerous areas where small clay balls had popped out of the mixed-in-place bituminous stabilized base course. The rigid apron pavement contained some corner breaks and numerous transverse breaks. The thin asphalt covering on the landing mat areas were cracked due to the movement of the underlying mat.

9. The pavement evaluation from the report referenced in paragraph 5b was updated for this report, and the pavement thicknesses and strength values shown in table 1 were obtained from that report. The overload evaluation is shown in table 2.

Summary

10. Conclusions based on the foregoing discussion and on observations made during the survey are as follows:

- a. The pavements are performing satisfactorily under the present aircraft usage.
- b. The use of a keystone course before placement of a thin asphaltic concrete surface course appears to help prevent reflection cracking from occurring.

Table 1

SUMMARY OF PAVEMENT EVALUATION

Facility			Overlay Pavement			Pavement			Base			Subgrade		Allowable Gross Wt of Aircraft for Basic Evaluations, lb.	
Identification	Length ft.	Width ft.	Thickness in.	Description	Thickness in.	Description	Flowed Strength psi	Thickness in.	Description	CBR or K	Classification	CBR or K	Single Wheels		Trailer Wheels
Primary Pavements															
Runway 1	5000	150	4-1/2	AC*	1-1/2	AC*		4	Seed, tar	00	SM*	20	60,000*	60,000*	
Taxiway A	2100	50	4-1/2	AC*	1-1/2	AC*		4	Seed, tar	00	SM*	20			
Taxiway C	2100	50	4-1/2	AC*	1-1/2	AC*		4	Seed, tar	00	SM*	20	60,000*	60,000*	
Apron taxiway	650	50			6	PCC†	720				SM*	20	11,000	44,000	
Parking apron A	100	250			6	PCC†	720				SM*	20	11,000	44,000	
Airport parking pads	20	20			6	PCC†	700				SM*	20	17,000	62,000	
Access pavement to hangars	Approx 500	Approx 150	2	AC*		Steel loading mat					SC‡				
Taxiway A ramp	200	100			2	AC*		6	Gravelized aggregate	00	SM*	20	60,000*	60,000*	
Taxiway C ramp	200	100			2	AC*		6		00	SM*	20	60,000*	60,000*	
Secondary Pavements															
Runway 2	5000	150	1-1/2	AC*	1-1/2	AC*		4	Seed, tar	00	SM*	20	12,000	44,000	
Taxiway B	2100	50			1-1/2	AC*		4	Seed, tar	00	SM*	20	21,000	15,000	
Runway 3	2000	100						6	Fill with loose stabilized base		SM*				
Runway 4	2000	100						6			SM*				
Runway wing apron	650	200						6	Fill with loose stabilized base		SM*				

* AC = asphaltic concrete.

† SM = city sand.

‡ PCC = portland-cement concrete.

§ SC = clayey sand.

* Denotes allowable gross loading greater than the maximum gross weight of existing Army aircraft having the indicated gear configuration.

Table 2

**SUMMARY OF PAVEMENT EVALUATION FOR OVERLOAD AIRCRAFT
ON PRIMARY PAVEMENTS LISTED IN TABLE 1
BASIC EVALUATION**

Single wheels, 60,000-lb gross load
Twin wheels, 50,000-lb gross load

Overload Aircraft			Allowable Gross Weight, lb		
Type Aircraft	Empty Weight lb	Gross Weight lb	One Cycle per Month	One Cycle per Week	One Cycle per Day
YAO-1	9,000	14,000			
H-21	9,000	15,000			
H-34	7,600	13,000			
AC-1	14,700	26,000			
H-37	20,700	31,000			
C-47	17,900	33,000			
C-123	30,000	60,000			
C-131	30,700	60,000			
C-119	41,000	77,000			
C-54	39,000	82,500			
C-130	57,300	135,000			
C-124	100,700	216,400			170,000

LEGEND

Aircraft can operate at maximum gross weight.



Aircraft can operate at load indicated.

WARNING: Runway length required for the safe operation of the overload aircraft has not been considered.



a. View along runway 2 looking toward northwest



b. Close-up of surface texture of pavement of runway 2

Photograph 1. Runway 2 in June 1967



Photograph 2. View along taxiway A
looking south in June 1967



a. General view

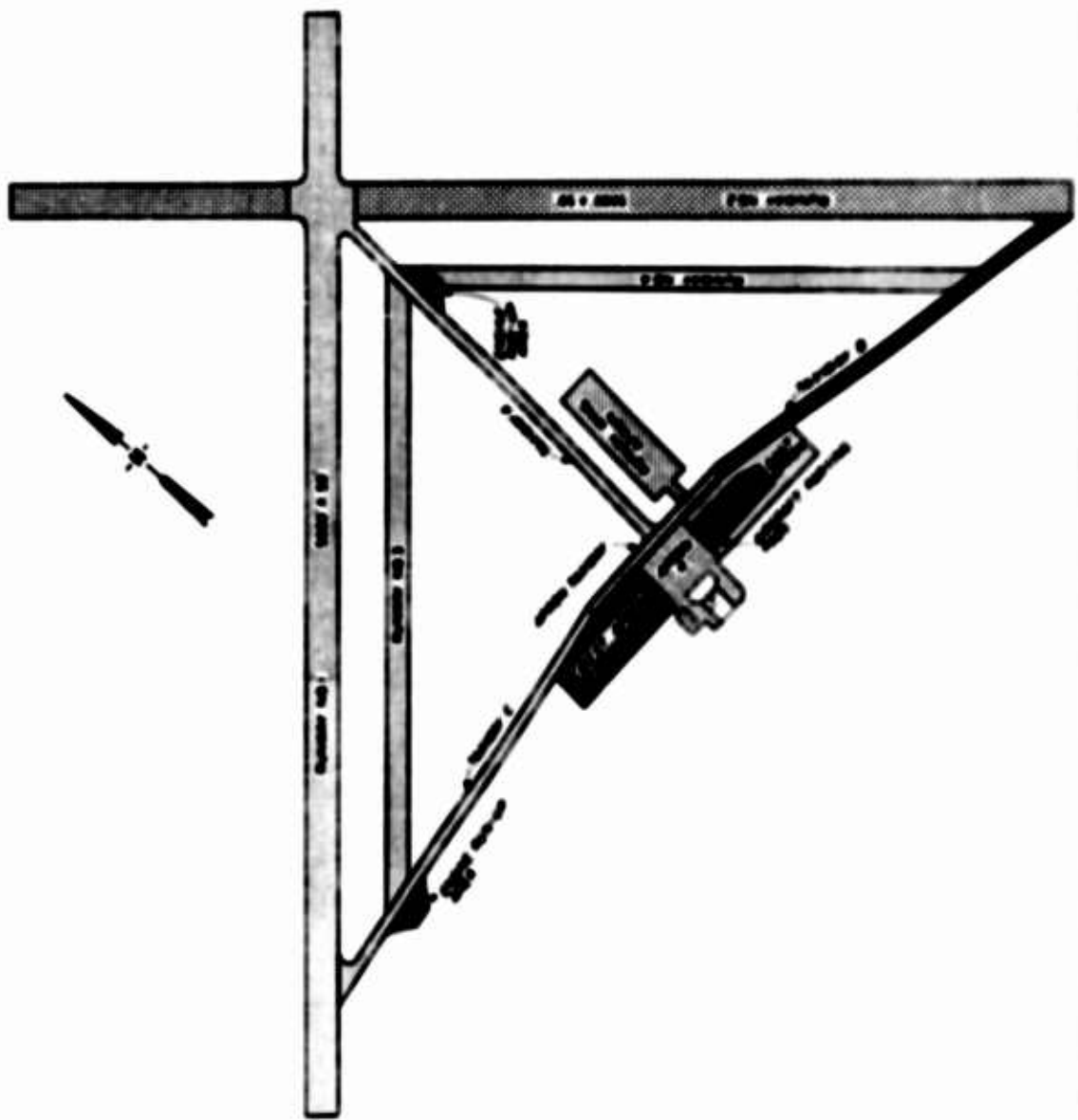


b. Close-up of peeling surface seal

Photograph 3. Runway 4 (considered a temporary facility) in June 1967

LEGEND

- 1. 10' WIDE ASPHALT
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**LAYOUT OF PAVEMENT PLAN
LIBERTY ARMY AIRFIELD
PORT STEWART, GEORGIA**

SCALE 1:1000
DATE 10-1-50