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ARMY AIFRIELD PAVEMENT EVALUATION: LAWSON ARMY AIRFIELD, FORT BENNING, GEORGIA

Army Engineer Waterways Experiment Station
Vicksburg, Mississippi

September 1960

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FORT BENNING, GEORGIA

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CORPS OF ENGINEERS
Vicksburg, Mississippi

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ARMY AIRFIELD PAVEMENT EVALUATION

LAWSON ARMY AIRFIELD, FORT BENNING, GEORGIA

Pertinent Background Data

General description of airfield

1. In March 1960, the Lawson Army Airfield facilities consisted of three runways, two parking aprons for fixed-wing aircraft, a parking area for helicopters, and numerous connecting taxiways. The NW-SE runway was 8000 ft long and 150 ft wide, and the NE-SW runway was 5900 ft long and 150 ft wide. The E-W runway, which is 5300 ft long and 150 ft wide, is used only for taxiing or parking aircraft. Taxiways 1 through 7 were 50 ft wide, and taxiways A, B, C, and 8 were 75 ft wide. The heliport parking area consisted of 27 parking stubs with connecting taxiways to the stubs and a maintenance hangar. A layout of the airfield and heliport pavements is shown in fig. 1.

Design and construction history

2. Information was not available on the design wheel loadings for the pavements constructed prior to 1958. The shop hangar aprons constructed in 1958-59 were designed in accordance with the requirements outlined in the Military Engineering Manual, Part XVIII, Chapter 3, to support a single-wheel load of 22,000 lb with a tire pressure of 200 psi. The heliport parking areas and extension to taxiway 8, constructed in 1959-60, were designed in accordance with EM 1110-3-312 to support a single-wheel load of 22,000 lb with a tire pressure of 200 psi. The shoulder pavements were designed for a single-wheel load of 8000 lb with a tire pressure of 100 psi. The pavement types and thicknesses and approximate date of construction of the individual Lawson AAF pavement facilities are shown in table 1. Physical properties of the pavement and foundation materials are listed in fig. 2.

Condition of pavement

3. A visual inspection of Lawson Field in March 1960 showed the pavements to be in poor to excellent condition. The portland-cement concrete pavements that were 6 in. thick had cracked badly, and the cracks had been sealed. Parking apron 1 extension, which was constructed of 7 in. of

portland-cement concrete, was in good condition with only about 5 to 10% of the slabs containing major defects. The portland-cement concrete pavements constructed since 1956 (access aprons and wash racks) were in excellent condition. The flexible pavement on the runways and taxiways was in fair to poor condition, the asphaltic concrete surface containing numerous bird-baths, map cracks, and open construction joints. This condition appeared to be prevalent on all the flexible pavements except the NW-SE runway where open joints appeared to be the major cause of cracking. The defects are not considered severe enough at this time to impair the load-carrying ability of the pavements. At the time of this survey, the asphaltic concrete surface had not been placed on the heliport parking areas or taxiway 8 extension.

Evaluation

Allowable gross aircraft loads

4. The allowable gross aircraft loadings shown herein are based solely upon the load-carrying capacity of the Lawson AAF pavements and do not take into account the dimensional requirements of the pavement facilities for aircraft operations. The required length and width of runway, taxiway, and apron facilities for safe operation are beyond the scope of this report and must be taken into consideration by the using agency for the various types of aircraft for which the airfield is to be used.

a. Basic evaluation. A basic evaluation of the Lawson airfield-heliport pavements has been made for both single- and twin-wheeled gear aircraft. The basic evaluation contemplates use of the pavement facilities by Army-type aircraft and indicates the load-carrying capacity of the primary-use facilities without limitations as to the number of cycles of operation by these aircraft during the life of the pavement. The basic evaluation is also valid for many of the single- and twin-wheeled gear cargo-type aircraft having tire inflation pressures not exceeding 100 psi that are commonly used by other branches of the Armed Forces.

(1) Primary-use pavements. Allowable gross aircraft loadings for the airfield and heliport primary-use pavement systems at Lawson AAF are shown in fig. 3. The primary-use systems are those that are considered to be essential for normal aircraft operations and comprise the NW-SE runway; taxiways A, B, 1, 5, and 8; apron 2; apron 1 extension; the original apron; and the heliport parking areas.

(2) Secondary-use pavements. The facilities considered to be secondary-use pavements are the NE-SW and E-W runways; taxiways C, 2, 3, 4, 6, and 7; and the access aprons and wash racks. The allowable loads for these facilities are slightly higher than the loads shown for the basic field evaluation (fig. 3).

b. Basic field evaluation. The basic field evaluation, which is shown in fig. 3, is controlled by the load-carrying capacity of the fixed-wing aircraft parking aprons (original apron and extension, apron 1, and apron 2).

c. Overload evaluation. It is recognized that occasional use of the pavement facilities by aircraft having gross weights greater than the basic evaluation may be necessary, and such use can be permitted without undue damage to the pavements if the frequency of operation of these aircraft is limited. An overload evaluation has been made (shown in fig. 4) to indicate the allowable loadings of aircraft heavier than the basic evaluation which can be permitted to operate at frequencies of one cycle per day, one cycle per week, and one cycle per month (a cycle is one landing and take-off). These operational frequencies are average degrees of usage and need not be too closely interpreted. For instance, it is not intended to prohibit two cycles of operation on alternate weeks if one cycle per week is indicated as allowable. However, minor overloading regularly applied or major overloading applied too often will reduce the life of a pavement and will necessitate increased maintenance in the later stages of the expected life of the pavement. The degree of overloading, both with respect to load magnitude and number of cycles, will be reflected directly in the degree of decrease in pavement life and increase in required maintenance.

Example of the use of fig. 4. The user desires to know whether the airfield can sustain operations of the AC-1 (Caribou) aircraft. The overload evaluation indicates the following: At a maximum gross load of 26,000 lb the aircraft can be allowed to operate at an operational frequency of one cycle per month; at reduced loads of 25,000 and 24,000 lb it can be allowed to operate at frequencies of one cycle per week and one cycle per day, respectively.

Tabl 1

Construction History

Pavement Facility	Pavement Thickness in.	Pavement Type	Construction Date	Construction Agency
NW-SE runway				
Sta 0+00 to 22+60	15*	Flexible	1951-1952	CE
Sta 22+60 to 25+60	6**	Rigid	1941-1943	CE
Sta 22+60 to 25+60 (overlaid)	8*	Flexible	1950-1951	CE
Sta 25+60 to 77+00	10*	Flexible	1941-1943	CE
Sta 25+60 to 77+00 (overlaid)	8*	Flexible	1950-1951	CE
Sta 77+00 to 80+00	6**	Rigid	1941-1943	CE
Sta 77+00 to 80+00 (overlaid)	8	Rigid	1950-1951	CE
NE-SW runway				
Sta 0+00 to 3+00	6**	Rigid	1941-1943	CE
Sta 3+00 to 18+00	27*	Flexible	1948	CE
Sta 18+00 to 56+00	10*	Flexible	1941-1943	CE
Sta 56+00 to 59+00	6**	Rigid	1941-1943	CE
E-W runway				
Sta 0+00 to 3+00	6**	Rigid	1941-1943	CE
Sta 3+00 to 50+00	10*	Flexible	1941-1943	CE
Sta 50+00 to 53+00	6*	Rigid	1941-1943	CE
Taxiway A				
Original	10*	Flexible	1941-1943	CE
Overlaid	8*	Flexible	1950-1951	CE
Taxiway B				
Original	10*	Flexible	1941-1943	CE
Overlaid	8*	Flexible	1950-1951	CE
Taxiway C	10*	Flexible	1941-1943	CE
Taxiways 1-5	10*	Flexible	1941-1943	CE
Taxiways 6 and 7				
Original	10*	Flexible	1941-1943	CE
Overlaid	8*	Flexible	1950-1951	CE
Taxiway 8				
Original	15*	Flexible	1951-1952	CE
Extension	16*	Flexible	1959-1960	CE
Original apron	6**	Rigid	1940-1941	QM
Extension	6**	Rigid	1941-1943	CE
Apron 1	6**	Rigid	1941-1943	CE
Extension	7†	Rigid	1941-1943	CE
Apron 2	6**	Rigid	1941-1943	CE
Hangar apron (light aircraft)	8†	Rigid	1956	CE
Shop hangar aprons and wash rack	10††	Rigid	1958-1959	CE
Heliport parking areas and access aprons	16*	Flexible	1959-1960	CE
Wash racks	10	Rigid	1959-1960	CE

* Thickness of flexible pavement includes asphaltic concrete, base course, and subbase course where applicable.
** Edges thickened to 8 in.
† Edges thickened to 10 in.
†† Edges thickened to 12-1/2 or 13 in.

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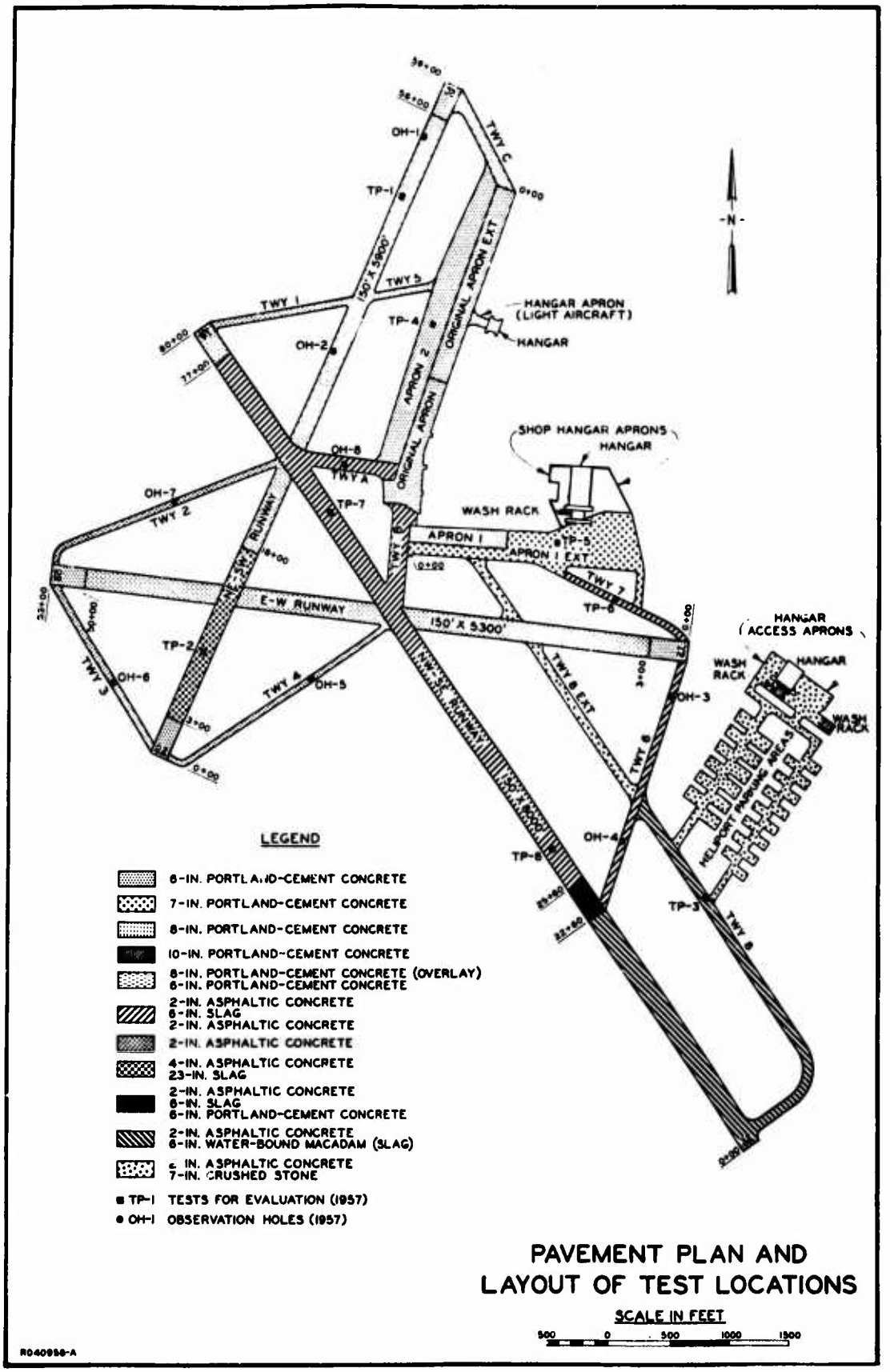
TWY C
OH-1
TP-1
150' X 5900'
TWY 5
TWY 1
HANGAR APRON (LIGHT AIRCRAFT)
HANGAR
TP-4
OH-2
ORIGINAL APRON EXT
APRON 2
ORIGINAL APRON
SHOP HANGAR APRONS
HANGAR
OH-8
TWY A
OH-7
TWY 2
TP-7
WASH RACK
APRON 1
TP-5
APRON 1 EXT
TWY 7
TWY 6
E-W RUNWAY
150' X 9300'
TP-6
HANGAR (ACCESS APRONS)
WASH RACK
HANGAR
TP-2
TWY 3
OH-6
TWY 4
OH-5
TWY 8 EXT
OH-3
TWY 8
HELIPORT PARKING AREAS
OH-4
TP-8
TP-3
TWY 9
N
LEGEND
6-IN. PORTLAND-CEMENT CONCRETE
7-IN. PORTLAND-CEMENT CONCRETE
8-IN. PORTLAND-CEMENT CONCRETE
10-IN. PORTLAND-CEMENT CONCRETE
8-IN. PORTLAND-CEMENT CONCRETE (OVERLAY) 6-IN. PORTLAND-CEMENT CONCRETE
2-IN. ASPHALTIC CONCRETE 6-IN. SLAG 2-IN. ASPHALTIC CONCRETE
2-IN. ASPHALTIC CONCRETE
4-IN. ASPHALTIC CONCRETE 23-IN. SLAG
2-IN. ASPHALTIC CONCRETE 6-IN. SLAG 6-IN. PORTLAND-CEMENT CONCRETE
2-IN. ASPHALTIC CONCRETE 6-IN. WATER-BOUND MACADAM (SLAG)
c IN. ASPHALTIC CONCRETE 7-IN. CRUSHED STONE
TP-1 TESTS FOR EVALUATION (1957)
OH-1 OBSERVATION HOLES (1957)
PAVEMENT PLAN AND LAYOUT OF TEST LOCATIONS
SCALE IN FEET
500 0 500 1000 1500
R040958-A

FIGURE 1

SUMMARY OF PHYSICAL PROPERTY DATA

FACILITY			OVERLAY PAVEMENT			PAVEMENT			BASE			SUBGRADE		GENERAL CONDITION OF AREA CONSIDERED
NUMBER AND IDENTIFICATION	LENGTH FT	WIDTH FT	THICK. IN.	DESCRIPTION	FLEX. STR PSI OR CBR	THICK. IN.	DESCRIPTION	FLEX. STR PSI	THICK. IN.	CLASSIFICATION	CBR OR K	CLASSIFICATION	CBR OR K	
NW-SE runway (sta 0+00 to 22+60) and taxiway 8	2260 3100	150 75				2	Asphaltic concrete		6 7	Slag (GP) Clayey sand (SC)	80+ 20	Silty sand (SM)	20	
NW-SE runway (sta 22+60 to 25+60)	300	150	2 6	Asphaltic concrete Slag (GP)	 80+	6	Portland-cement concrete	400		None		Silty sand (SM)	150	
NW-SE runway (Sta 25+60 to 77+00) Taxiway A Taxiway B Taxiway 6 Taxiway 7	5140 800 800 2100 1100	150 100 150 50 50	2 6	Asphaltic concrete Slag (GP)	 80+	2	Asphaltic concrete		8	Silty sand (SM)	35	Silty sand (SM)	30	
NW-SE runway (sta 77+00 to 80+00)	300	150	8	Portland-cement concrete	750	6	Portland-cement concrete	400		None		Silty sand (SM)	150	
NE-SW runway (sta 0+00 to 3+00 and 56+00 to 59+00) E-W runway (sta 0+00 to 3+00 and 50+00 to 53+00) Original parking apron Original apron extension Apron 1 Apron 2	600 600 1050 1650 800 2500	150 150 Var 150 150 200				6	Portland-cement concrete	400		None		Lean clay (CL)	150	
NE-SW runway (sta 3+00 to 18+00)	1500	150				4	Asphaltic concrete		23	Slag (GP)	80+	Silty sand (SM)	8	
NE-SW runway (sta 18+00 to 56+00) E-W runway (sta 3+00 to 50+00) Taxiway C Taxiway 1 Taxiway 2 Taxiway 3 Taxiway 4 Taxiway 5	3800 4700 800 1200 2100 1600 2150 500	150 150 100 50 50 50 50 50				2	Asphaltic concrete		8	Silty sand (SM)	35	Silty sand (SM)	30	
Apron 1 extension	1900	Var				7	Portland-cement concrete	750	9	Clayey sand (SC)		Clayey sand (SC)	150	
Taxiway 8 extension Heliport parking areas and access aprons	1500 Var	75 Var				2	Asphaltic concrete		7 7	Graded crushed aggregate Gravelly sand (SW-SM)	80 25	Silty sands (SP and SM) to lean clays (CL)	12	
Hangar apron (light aircraft)	Var	Var				8	Portland-cement concrete	715		None		Lean clay (CL)	100	
Shop hangar aprons and wash rack	Var	Var				10	Portland-cement concrete	780	12	Selected soils (SP-SM and SC)		Lean clay (CL)	225	

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FIGURE 2

Summary of Basic Evaluation

Airfield: Lawson Army Airfield, Columbus, Ga. — Date: July 1960

Pavement System Identification (Primary-Use Pavements)	Allowable Gross Aircraft Loadings in Pounds				Remarks
	Normal-Period Operation		Frost-Melting-Period Operation		
	Single-Wheel Gear	Twin-Wheel Gear	Single-Wheel Gear	Twin-Wheel Gear	
Fixed-Wing Airfield Pavements					
Runway system (NW-SE runway)	50,000	50,000+	Not applicable		
Taxiway system (taxiways 1 and 5)	12,000	22,000	Not applicable		
Parking apron system					
Original apron and extension and aprons 1 and 2	11,000	22,000	Not applicable		Basic field evaluation
Apron 1 extension	41,000	50,000	Not applicable		
Heliport Pavements					
Heliport parking and access aprons	50,000+	50,000+	Not applicable		

Note: A plus sign denotes allowable gross loading greater than the maximum gross weight of any existing aircraft having indicated gear configurations.

070860-C

FIGURE 3

SUMMARY OF PAVEMENT EVALUATION FOR OVERLOAD AIRCRAFT

Basic Evaluation

Single wheels, 11,000-lb gross load
Twin wheels, 22,000-lb gross load

Overload Aircraft			Allowable Gross Weight, lb		
Type Aircraft	Empty Weight lb	Max Gross Weight lb	One Cycle Per Month	One Cycle Per Week	One Cycle Per Day
YAO-1	9,000	14,000	13,500	13,000	12,000
H-21	9,000	15,000	13,500	13,000	12,000
H-34	7,600	13,000		13,000	12,000
AC-1	14,700	26,000		25,000	24,000
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			

LEGEND

- Aircraft can operate at maximum gross load.
- Aircraft can operate at indicated gross load.
- Aircraft cannot operate as evaluation is less than the empty weight of the aircraft.

070860-D

FIGURE 4