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MISCELLANEOUS PAPER S-68-26

CONDITION SURVEY, DAVISON ARMY AIRFIELD, FORT BELVOIR, VIRGINIA

by

P. J. Vedros

November 1968

Sponsored by

Office, Chief of Engineers
U. S. Army

D D C
OCT 13 1971

Conducted by

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

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[redacted]

FOREWORD

Authority for performance of condition surveys at selected airfields is contained in "Instructions and Outline for Existing Pavement Condition Surveys, FY 1967," and is in accordance with the Long-Range Program, "Investigations and Studies Program for Development of Engineering Criteria, FY 1967, Army Funds," dated March 1966.

The inspection of the facilities at Davison 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 R. Oswalt, Jr., CE, and COL Levi A. Brown, CE, were Directors of the WES during the conduct of the study and preparation of this report. Mr. J. B. Tiffany 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:

Multiply	By	To Obtain
inches	2.54	centimeters
feet	0.3048	meters
miles	1.609344	kilometers
pounds	0.45359237	kilograms
pounds per square inch	0.070307	kilograms per square centimeter
pounds per cubic inch	0.061024	pounds per cubic centimeter

CONDITION SURVEY, DAVISON ARMY AIRFIELD
FORT BELVOIR, VIRGINIA

PURPOSE

1. The purpose of this report is to present the results of an inspection performed at Davison Army Airfield (DAAF) 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. DAAF is located in the northwest part of Fort Belvoir in Fairfax County, Virginia, approximately 20 miles* south of the center of Washington, D. C.

3. The airfield is in the embayed section of the Coastal Plain Province. The surface soils in the area occupied by the airfield are of alluvial origin, consisting mostly of sandy clay. The topography in the immediate vicinity consists of a rolling relief sloping northeastward with elevations ranging from approximately 40 to 80 ft msl.

4. In June 1967, the airfield consisted of facilities for both fixed- and rotary-wing aircraft. The fixed-wing facilities consisted of a 3365- by 75-ft runway, connecting taxiways, and a parking apron. A small parking apron for U. S. Army Mobility Equipment Research and Development Center (MERDC) test operations is also located on this side of the field. On the northeast side of the field, the rotary-wing facilities consist of a heliport with two runways, connecting taxiways, and a parking apron. An area for aircraft parking is also located at the northwest end of the fixed-wing runway.

Previous Report

5. The load-carrying capabilities of the pavements at DAAF were reported in U. S. Army Engineer Waterways Experiment Station Technical Report No. 3-466, Report 2, "Army Airfield Pavement Evaluation, Davison Army Airfield, Fort Belvoir, Virginia," October 1957.

History of Airfield Pavements

6. *Fixed-wing facilities.* As stated in the report referenced in paragraph 5, the exact date of construction of the runway, taxiway, and asphaltic concrete parking apron could not be determined, but construction was accomplished as a training program for engineer troops over a period of years. These facilities were initially surfaced with approximately 2 in. of asphaltic concrete over a 3- to 10-in. gravel base course. The overrun at the northwest end of the runway was surfaced with a bituminous surface treatment. During the original construction program, a refueling apron was constructed of 7-in.-thick portland cement concrete over the natural clayey subgrade (plate 1). The pavement was designed for a 28-day flexural strength of 550 psi. In August 1956, the runway and taxiways were overlaid with approximately 2 in. of asphaltic concrete. In 1959 the fixed-wing parking apron was extended, and construction drawings indicate construction consisted of 10-in.-thick portland cement concrete over 16 in. of select base course material. Pavement design was for a 28-day flexural strength of 560 psi. In 1960, a parking apron, connecting taxiway, and washrack were

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

constructed for MERDC (then ERDL) operations (plate 1). The apron and taxiway consisted of 2-in. asphaltic concrete surface over 8-in. stabilized aggregate base course. The washrack was paved with 6 in. of portland cement concrete over a 6-in. stabilized aggregate base course.

7. *Rotary-wing facilities.* The rotary-wing or heliport facilities located on the northeast side of the field consisted of a parking apron, two runways, and connecting taxiways. These facilities were constructed in 1960. The parking apron and runways consisted of 9-in.-thick portland cement concrete over 9 in. of select material. Design requirements for these pavements were a 28-day flexural strength of 550 psi and a subgrade modulus of 200 lb per cu in. The construction for the taxiways consisted of 2-in. asphaltic concrete over a 7-in. stabilized aggregate base course and 4-in. select material subbase course.

Maintenance

8. Prior to the overlay placed on the runway and taxiways in 1956, maintenance consisted of replacing distressed areas where base course failure had occurred with a higher quality base material. Operations by H-21 helicopters on the taxiway on the fixed-wing side of the field prior to construction of the heliport had caused scuffed-out depressions in the asphaltic concrete surface. These areas were repaired and have not reoccurred since the helicopters are operating from the heliport. A slurry seal coat was placed on the runway and on portions of the fixed-wing parking apron in 1965.

Traffic History

9. Traffic records obtained from the Signal Corps for the period May 1957 to June 1966 at DAAF are shown in the following tabulation. As can be noted, the traffic activity count is given as rotary-wing and fixed-wing aircraft (types and loads not indicated). The majority of the traffic is light aircraft of less than 10,000-lb gross load with occasional traffic by heavier aircraft.

Period	Aircraft Activity Count	
	Fixed Wing	Rotary Wing
May-Dec 1957	10,360	10,621
1958	28,963	19,126
1959	47,974	29,292
1960	47,740	25,233
1961	47,341	26,175
1962	39,658	53,743
1963	32,465	46,385
1964	37,090	58,270
1965	43,308	71,274
Jan-June 1966	17,349	31,164

Condition of Pavement Surfaces

10. In June 1967, the asphaltic surface on the runway was considered to be in fair condition (photograph 1). Some longitudinal and transverse cracking was evident in the pavement. The slurry seal coat placed in 1965 did not cover the cracking and was showing signs of peeling in some areas. The overrun at the northwest side of the runway is now maintained as a mowed area (photograph 2). The parallel taxiway for the fixed-wing facilities was in fair condition (photograph 3). Gouged-out areas caused by H-21 helicopter wheels had been repaired, and similar damage was not reoccurring because the helicopters were operating from the heliport. This taxiway did not receive a slurry seal coat. The fixed-wing parking apron appeared to be in

satisfactory condition. The slurry seal coat placed over the portland cement concrete area was peeling badly (photograph 4). The runways and parking apron in the heliport area were in excellent condition, but the parallel taxiway from the heliport area to the northwest end of the runway was in poor condition (photograph 5).

Future Construction

11. There is a proposal to widen and overlay the existing fixed-wing taxiway probably in FY 1968 or FY 1969. The taxiway is to be widened 15 ft and overlaid with approximately 2 in. of asphaltic concrete.

EVALUATION

12. The evaluation table (table 4 from the report referenced in paragraph 5) was updated for this report to include new pavements that have been constructed since 1956. The loads shown in tables 1 and 2 were determined using the pavement sections and CBR values selected in the 1957 report and the reported design values and overlay thicknesses for new or overlaid pavements. As can be noted in table 1, the basic field evaluation is controlled by the load-carrying capacity of the fixed-wing taxiway, which had a pavement section consisting of 4 in. of asphaltic concrete and 3-in. base course (CBR 25) over the subgrade (CBR 8). The flexible pavement portion of the fixed-wing parking apron had a lower evaluation than the taxiway but was not considered in the basic evaluation, as the rigid pavement portion could be used for parking aircraft.

Table 1

Summary of Basic Evaluation

Airfield: Davison Army Airfield Date: June 1967

Pavement Identification (Primary Use Pavements)	Allowable Gross Aircraft Loading in Pounds: Normal Period Evaluation, Single-Wheel Gear	Normal Period Evaluation, Twin-Wheel Gear	Frost-Melting Period Evaluation, Single-Wheel Gear	Frost-Melting Period Evaluation, Twin-Wheel Gear	Remarks
Fixed-Wing Airfield Pavements					
Runway	18,000	30,000	(a)	(a)	
Taxiways	12,000	19,000	(a)	(a)	Basic evaluation
Parking apron (flexible)	8,500	17,000	(a)	(a)	
Parking apron (rigid)	60,000+	50,000+	58,000	50,000+	
Heliport Pavements					
Runways	48,000	50,000+	43,000	50,000	
Parking apron	48,000	50,000+	43,000	50,000	

NOTE: (a) Denotes allowable gross loading less than 5000 lb.
Plus sign denotes allowable gross loading greater than the maximum gross weight of any existing aircraft having indicated gear configuration.

Table 2

Summary of Pavement Evaluation for Overload Aircraft

Basic Evaluation

Single wheels, 12,000-lb gross load
Twin wheels, 19,000-lb gross load

Overload Aircraft			Gross Weight, lb		
Aircraft	Empty Weight lb	Gross Weight lb	1 Cycle per Month	1 Cycle per Week	1 Cycle per Day
C-47	17,900	33,000	31,000	20,000	
C-123	30,000	60,000	31,000	20,000	
C-131	30,700	60,000	48,000	32,000	
C-119	41,000	77,000	48,000		
C-54	39,000	82,500	48,000		
C-130	57,300	135,000	75,000		
C-124	100,700	216,000			
C-141	134,000	316,600			
C-5A	318,200	770,000			

Note: Operations with overload aircraft will be restricted during frost-melting period.

Legend: Evaluation is less than empty weight of aircraft.

20,000 Aircraft can operate at load indicated.

a. View of runway looking southeast

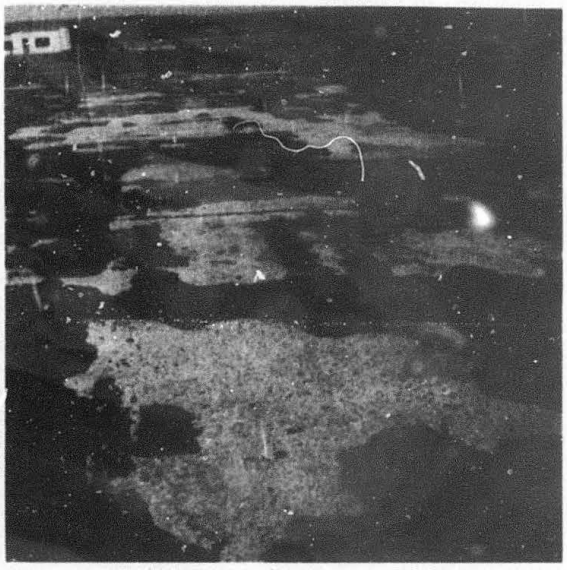
b. Evidence of longitudinal cracking on runway surface

Photograph 1. General condition of fixed-wing runway

Photograph 2. Bituminous-surfaced overrun at northwest end of runway overgrown with grass

Photograph 3. View of fixed-wing taxiway

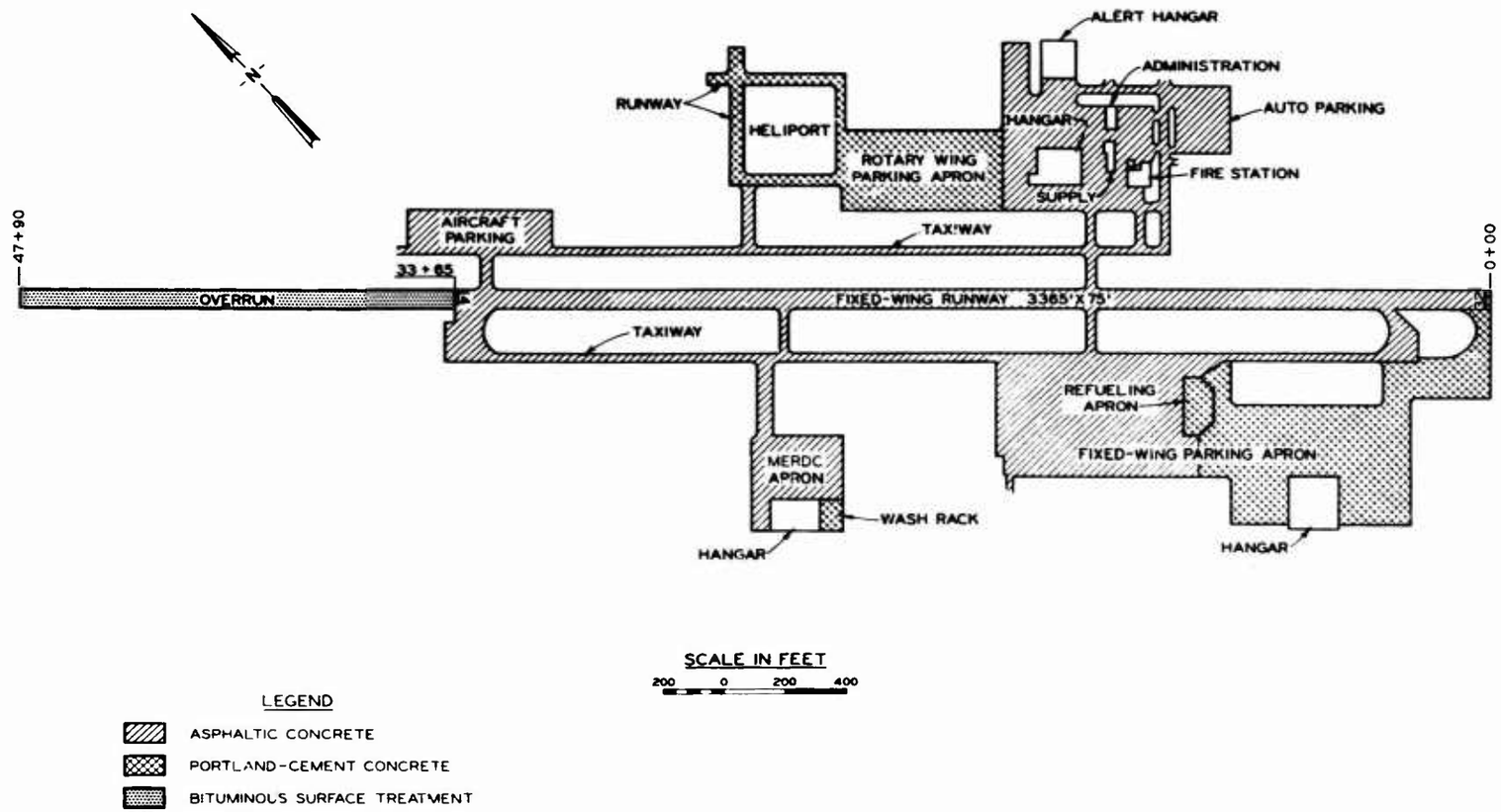
a. Portion of taxiway adjacent to parking apron



b. Seal coat peeling off portion of fixed-wing parking apron

Photograph 4. Slurry seal coat peeling off portland cement concrete portion of taxiway and parking apron

Photograph 5. Taxiway adjacent to heliport area



DAVISON ARMY AIRFIELD

FT. BELVOIR, VA.

LAYOUT OF AIRFIELD PAVEMENT

PLATE I