REPORT NO. FAA-RD-72-61

RUNWAY FRICTION DATA FOR 10 CIVIL AIRPORTS AS MEASURED WITH A MU-METER AND DIAGONAL BRAKED VEHICLE

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JULY 1972
FINAL REPORT

Prepared for

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
Systems Research & Development Service
Washington, D.C. 20591

TECHNICAL REPORT STANDARD TITLE PAGE

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
FAA RD 72-61		

4. Title and Subtitle	5. Report Date
RUNWAY FRICTION DATA FOR TEN CIVIL AIRPORTS AS MEASURED WITH A MU-METER AND DIAGONAL BRAKED VEHICLE	July 1972
	6. Performing Organization Code

7. Author(s)	8. Performing Organization Report No.
Peter J. Nussbaum, Pavement Safety Corp. W. A. Hiering and C. Grisel, FAA-NAFEC	PSC-107

9. Performing Organization Name and Address	10. Work Unit No.
Pavement Safety Corporation 5420 Old Orchard Road Skokie, Illinois 60076	Project 183-731-027/03x
	11. Contract or Grant No.
	DOT FA72WA-2744
	13. Type of Report and Period Covered
12. Sponsoring Agency Name and Address	FINAL REPORT Nov 1971 - July 1972
Department of Transportation Federal Aviation Administration Washington, D.C. 20591	14. Sponsoring Agency Code

15. Supplementary Notes

16. Abstract

Runway friction measurements were made on ten civil airports representative of large and medium hub airports. Wet and dry surface data were obtained with a Mu-Meter and FAA Diagonal Braked Vehicle. Pavements were wetted with sprinkler trucks. Water depth and friction data were time correlated. DBV data were normalized to 60 MPH and corrected for ambient temperature per NASA methods. Specialized supplementary equipment used and techniques and procedures developed to conduct the tests are described. Raw and processed data for each airport are tabulated in separate appendixes. Included are runway and airport traffic statistics and photographs of the pavements tested. A summary table of friction data is shown to facilitate review and analysis of information. This is a data type report

17. Key Words	18. Distribution Statement
Diagonal Brake Vehicle Mu-Meter Friction Runway	Availability is unlimited. Document may be released to the National Technical Information Service, Springfield, Va. 22151

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price
Unclassified	Unclassified	296	$3.00 PC .95 MF

Form DOT F 1700.7 (8-69)

PREFACE

This report was prepared for the Federal Aviation Administration by Pavement Safety Corporation, Skokie, Illinois, in collaboration with the National Aviation Facilities Experimental Center. The program was administered by Mr. Robert C. McGuire, Program Manager, Systems Research and Development Service, Washington, D. C.

The cooperation of airport managers, air traffic control and other industry and government personnel involved in conducting this runway friction survey effort is gratefully acknowledged.

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RUNWAY FRICTION DATA FOR TEN CIVIL AIRPORTS AS MEASURED WITH A MU-METER AND DIAGONAL BRAKED VEHICLE

INTRODUCTION

With the introduction of heavier and faster jet transports, the skid resistance of pavement surfaces assumed a greater role in the safety of airport operations. Recognition of the problem by the Federal Aviation Administration (FAA) resulted in revisions to airworthiness regulations in 1966 to improve the safety of operations on wet runways. In addition, the FAA, National Aeronautics and Space Administration (NASA), Air Force, and others initiated research and development programs leading to further improvements in safety. Emphasis was given to methods of measurement and procedures to obtain, maintain, and improve runway skid resistance. One of the more significant developments was the recognition of grooved runways as a means of delaying the onset of hydroplaning. In addition, the FAA began planning the program for the certification of airports as required by the Airport and Airway Development Act of 1970. One of the certification items under consideration is the measurement of runway friction. Following a joint Government/Industry meeting held in February 1971 to discuss methods of measuring friction, the FAA decided that additional runway friction data were required to evaluate the Diagonal Braked Vehicle (DBV) and the Mu-Meter. Accordingly, the FAA contracted for a program of runway friction measurements on airports considered representative of large and medium hubs.

Objective

The objective of the test program was to measure wet and dry runway friction of typical asphalt and concrete runways. Data were obtained using both the DBV and the Mu-Meter. This report tabulates the raw and processed data and includes associated airport construction and traffic statistics. Analysis and implementation of the data will be made by the FAA.

TEST PROGRAM

The field test program was supervised by the Pavement Safety Corporation (PSC). The test team consisted of two engineers, one being project director, and four technicians from PSC, and one engineer and a technician from the FAA National Aviation Facilities Experimental Center (NAFEC). PSC was responsible for planning the test schedule, pretest liaison with airport management, and the field test methods. The two man crew from NAFEC conducted the DBV stopping distance test. All other test operations were performed by PSC personnel. As the airport itinerary was formally scheduled in terms of the requirements of the airports and the contract, the friction measurements were conducted mostly at night and under prevailing environmental conditions.

To assure compatability between data obtained in this project with that obtained in the FAA/NASA/USAF runway research program, which involved a B727 and a DC9 airplane, the correlation between test vehicles used in each was investigated by the FAA prior to this program. Correlation between the FAA and NASA DBV's was substantiated on the Wallops Island test runway which contains concrete, asphalt, and grooved textures. Similar tests were successfully conducted between the FAA and USAF Mu-Meters--the latter being used in the DC9 test program.

Airport Itinerary

The airport itinerary of the runway friction survey is shown in Table I. It was organized to avoid seasonal extremes that influence friction values. The test program was divided into two groups. The first five airports visited were located in the more southern region and were tested during November and December of 1971. The second five airports were located in the more northern central region and were tested in April of 1972. A total of 31 runways, 18 with an asphaltic concrete surface and 13 with a portland cement concrete surface, were included in the test program. Three of the runways were grooved. All runways were tested with the Mu-Meter at a speed of 40 miles per hour and with the DBV at a threshhold speed of 60 miles per hour. In addition, 20 runways were tested with the Mu-Meter at speeds of 20 and 60 miles per hour. At Jacksonville two tests were made at 80 mph.

TABLE 1
AIRPORT ITINERARY AND TEST RUNWAYS

Airport	Test Date	Runway	Surface	Mu-Meter Test Speed, mph
Douglas Municipal Charlotte, N.C.	Nov. 1971	18-36 5-23	AC AC	20, 40, 60 40
William B. Hartsfield Atlanta, Ga.	Nov. 1971	9L-27R 9R-27L* 3-21 15-33	PC PC AC AC	20, 40, 60 20, 40, 60 20, 40, 60 40
Jacksonville International Jacksonville, Fla.	Nov. 1971	13-31 7-25	PC PC	20, 40, 60, 80 20, 40, 60, 80
Miami International Miami, Fla.	Dec. 1971	12-30 9R-27L 9L-27R 17-35	AC AC AC AC	40 40 40 40
New Orleans International New Orleans, La.	Dec. 1971	10-28 5-23 1-19	2/3 PC & 1/3 AC AC 2/3 PC & 1/3 AC	40 40 40
St. Louis International St. Louis, Mo.	Apr. 1972	17-35 12R-30L 12L-30R 6-24	PC AC PC PC	20, 40, 60 20, 40, 60 20, 40, 60 20, 40, 60
Memphis International Memphis, Tenn.	Apr. 1972	3-21 9-27 17L-35R 17R-35L	AC AC PC PC	20, 40, 60 20, 40, 60 20, 40, 60 20, 40, 60
Nashville Metropolitan Nashville, Tenn.	Apr. 1972	2L-20R* 2R-20L 13-31	AC AC AC	20, 40, 60 40. 20, 40, 60
Kanawha Charleston, W. Va.	Apr. 1972	5-23* 14-32	PC AC	20, 40, 60 20, 40, 60
Greater Cincinnati Covington, Ky.	Apr. 1972	18-36 9R-27L 9L-27R	AC AC PC	40 20, 40, 60 20, 40, 60

*Grooved Runway
AC - Asphaltic Concrete
PC - Portland Cement Concrete
All DBV tests conducted at 60 mph

Pretest Liaison with Airports

The Airports Service of FAA was asked to notify the test airports prior to initiation of the test program. Subsequently, a liaison coordinator provided by PSC visited each of the airports covered by the contract to coordinate the test program with airport management, flight operations, and air traffic control, as well as others affected by the project work. The test program and its relation to the airport certification program and the airworthiness goals was discussed. Test procedures, test equipment, and time requirements for the various tasks were reviewed. Included were the number and types of vehicles to be used and the number of runs both the DBV and Mu-Meter would make on the test runway. Testing requirements during rain and the expected disposition of water trucks during testing and the routing to obtain supplies of water were discussed. Fire hydrant locations with respect to runway test areas were selected for refilling of the water trucks. The cooperation of air traffic control and airport operations personnel responsible for traffic on runways, taxiways, and aprons was enlisted to assure safe movement of water trucks and other test vehicles on the airport.

Communications between airport control and all testing units is essential to safety, operations under emergency conditions, and for access to the test runway. The FAA program administrator obtained temporary authority to use voice communication on the airport ground control frequency. Call letter identification was assigned to all vehicles. The liaison coordinator confirmed the ground control frequency communication procedures with the airport manager and FAA tower personnel. The test crew was made aware of communication procedures and the radio frequency to be used at each airport.

The most suitable time for a test was selected based on safety considerations to airport operations and test crew, the time-density factor of airport traffic, and the environment imposed operating limitations. Thus, night or day test operations and runway occupancy time requirements were selected for each test runway by mutual agreement with the airport.

Provisions were made for the equipment storage at the airport prior to and during periods when tests were not in progress. ASTM tires required for DBV tests were preshipped to each of the airports.

Both instrumented and non-instrumented runways were included in the test program. Occupancy time on instrumented runways was held to a minimum by generally selecting non-instrumented runways for multiple speed tests with the Mu-Meter. In the pretest liaison conference any special requirements for occupancy of instrument runways were determined. It was anticipated that testing of instrument runways would be most desirable during periods of good weather. Thus, in fixing the order of runway tests for a given airport, a schedule was chosen to contemplate changes in weather.

The liaison coordinator discussed special emergency procedure requirements for each airport and obtained runway and airport statistics from airport engineering departments. Following the meeting with airport personnel the liaison coordinator transmitted all aspects of the planned operations for each airport to the PSC engineer in charge of the survey team.

TEST EQUIPMENT

Two devices, the FAA's DBV and the Mu-Meter were used to gather the runway friction survey data. Two water trucks were used to wet the runway pavement surface. Two station wagons were used, one to tow the Mu-Meter, and a second to haul test equipment and the test crew. Two-way VHF radios were installed in all test vehicles. A constant focal length camera with side lighting was used to obtain photographs of the runway pavement texture.

FAA Diagonal Braked Vehicle

The FAA Diagonal Braked Vehicle (DBV) tester, Fig. 1, was made from a 1968 Chrysler Station Wagon which had been procured and equipped by NAFEC for runway friction research. Diagonal braking capabilities, stopping distance and speed indicating instrumentation were added. Modifications and installations were made to the vehicle braking system to permit the braking of one pair of diagonally opposite wheels equipped with ASTM E-249 smooth tread test tires inflated to 24 psi. To provide directional control and stability, the diagonally opposite pair of wheels, equipped with standard production tires, having good skid resistent tread and inflated to 32 psi, were unbraked. The following detail modifications were made to incorporate the DBV system in the test vehicle:

1. The 15-inch wheels were changed to 14-inch wheels to accommodate the size 7.50-14 ASTM E-249 test tires.

2. Conventional drum brakes, in lieu of the original disc and drum brake installations, were installed front and rear to equalize braking action.

3. The front-end suspension system was modified to accompany the 14-inch wheel installation.

4. A one-chamber master brake cylinder replaced the dual brake cylinder to equalize braking action.

DIAGONAL BRAKED VEHICLE

Figure 1

5. The "posi-traction" rear axle drive system was replaced by a standard differential for proper diagonal braking action.

6. Four 12 VDC solenoid-operated hydraulic control valves were installed in the wheel-brake lines for brake selection in the diagonal braking mode.

7. A roll bar was installed in the vehicle for safety reasons.

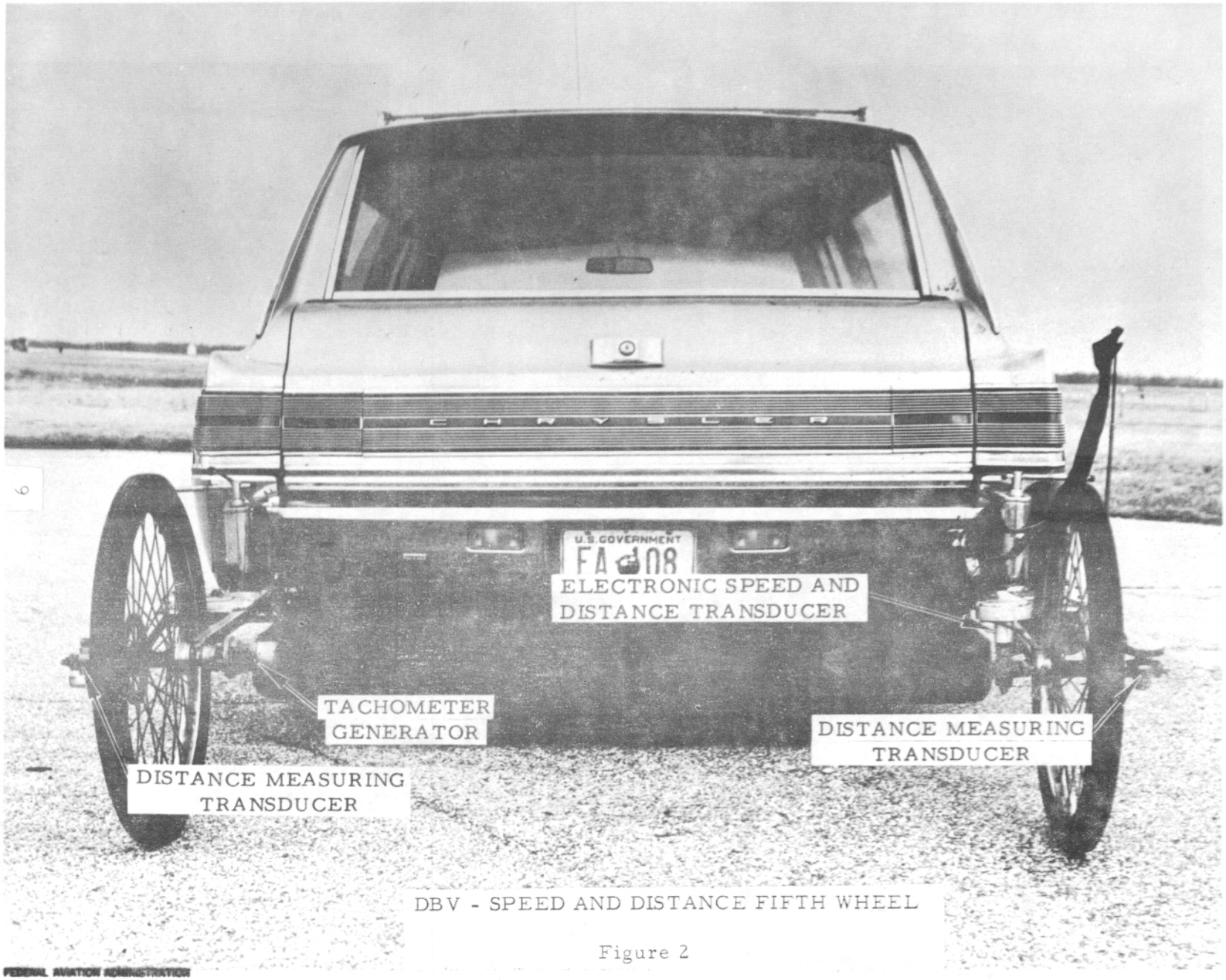
8. Three separate speed and distance measuring systems were installed.

These instrument systems were comprised of a primary and two backup systems. The primary system consisted of an electronic digital indicating system activated by a fifth wheel, Fig. 2. The master transducer for the primary system integrally contains speed and distance transducers. The speed transducer transmits electronic pulses to a digital indicating meter mounted on the dash panel, Fig. 3. This indicator provides vehicle speed to the nearest mile per hour and "holds" the vehicle speed upon brake application. Pulse outputs from the distance transducer are tallied by the distance digital counter when this circuit is actuated by brake application and continues counting to register the braked stopping distance.

The backup systems employ fifth wheel tachometer generators to provide speed information. These speeds are indicated in one system by an analog-type meter, and in the other system, by a digital voltmeter. Distance measuring transducers mounted on the fifth wheel are also activated by brake application to measure distances, which are indicated by digital magnetic counters.

Mu-Meter

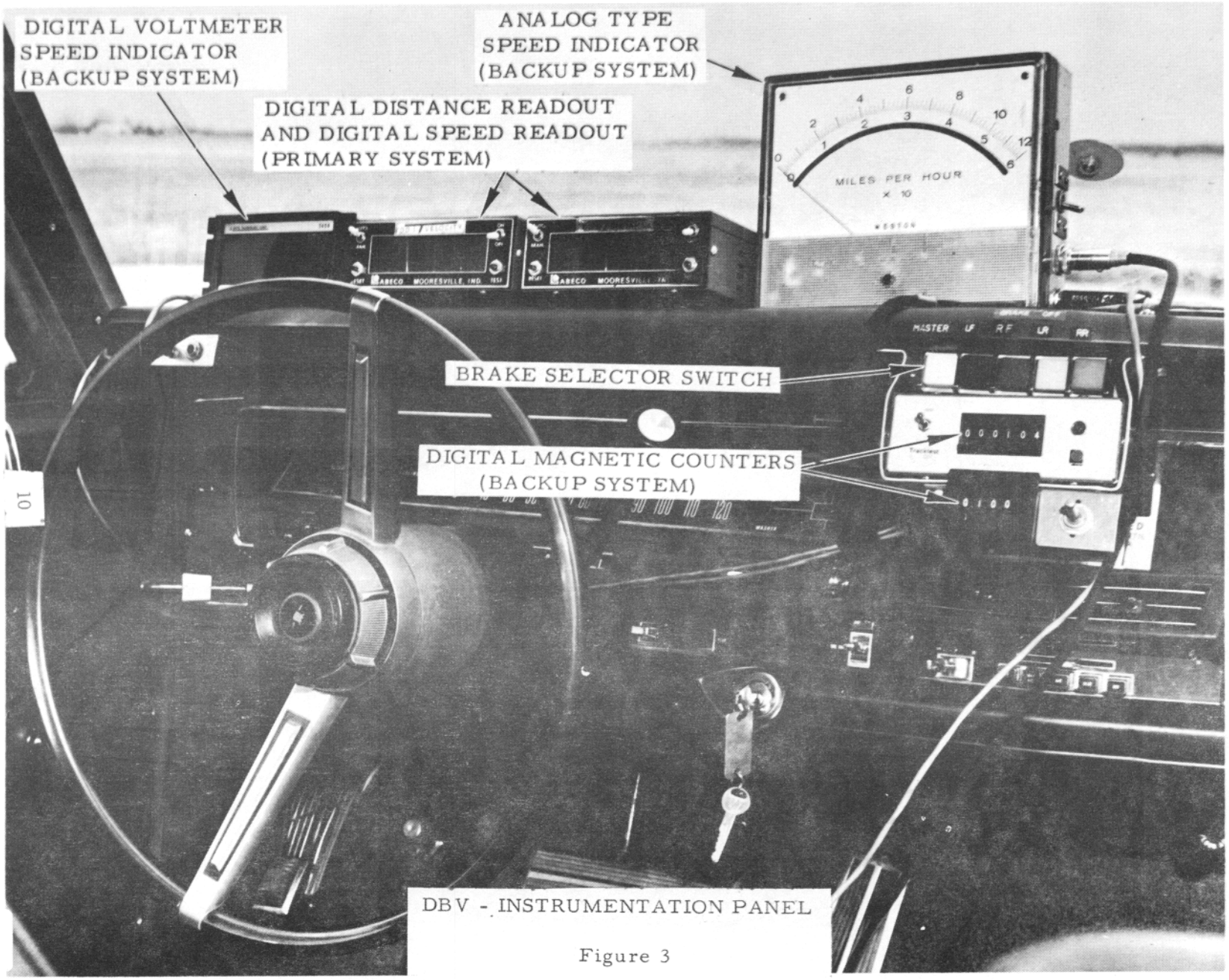
The Mu-Meter, shown in Fig. 4, is a side force friction measuring trailer with a total weight of about 540 pounds. Essential elements of this instrument are the friction measuring wheels, one rear wheel for advancing the recorder chart paper, a sensing unit, and a recorder, shown in Fig. 5. Any light vehicle equipped with a suitable towing hitch may be used to tow the Mu-Meter



DBV - SPEED AND DISTANCE FIFTH WHEEL

Figure 2

FEDERAL AVIATION ADMINISTRATION
ATLANTIC CITY, NEW JERSEY



DBV - INSTRUMENTATION PANEL

Figure 3

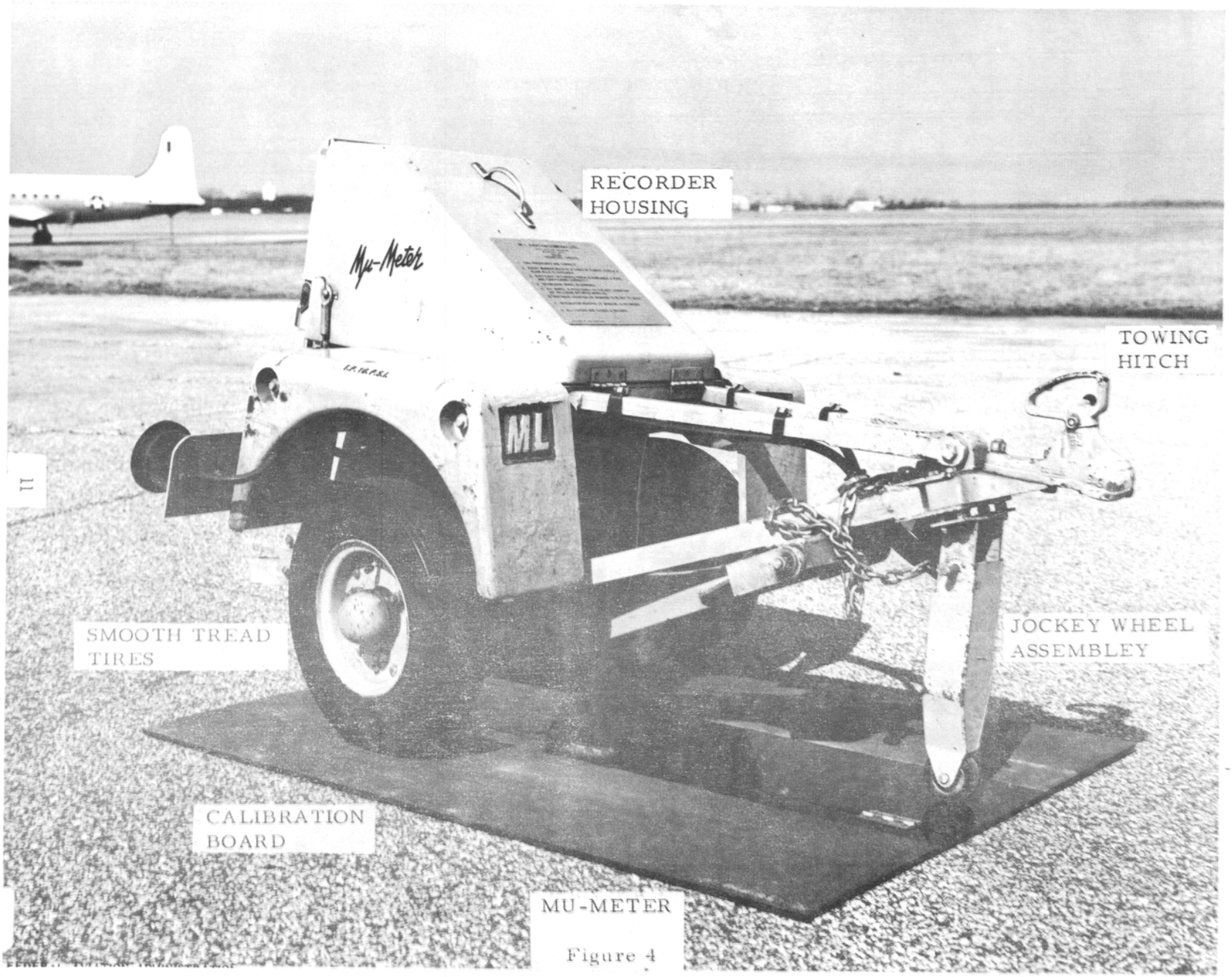

RECORDER HOUSING
Mu-Meter
TOWING HITCH
ML
SMOOTH TREAD TIRES
JOCKEY WHEEL ASSEMBLEY
CALIBRATION BOARD
MU-METER

Figure 4

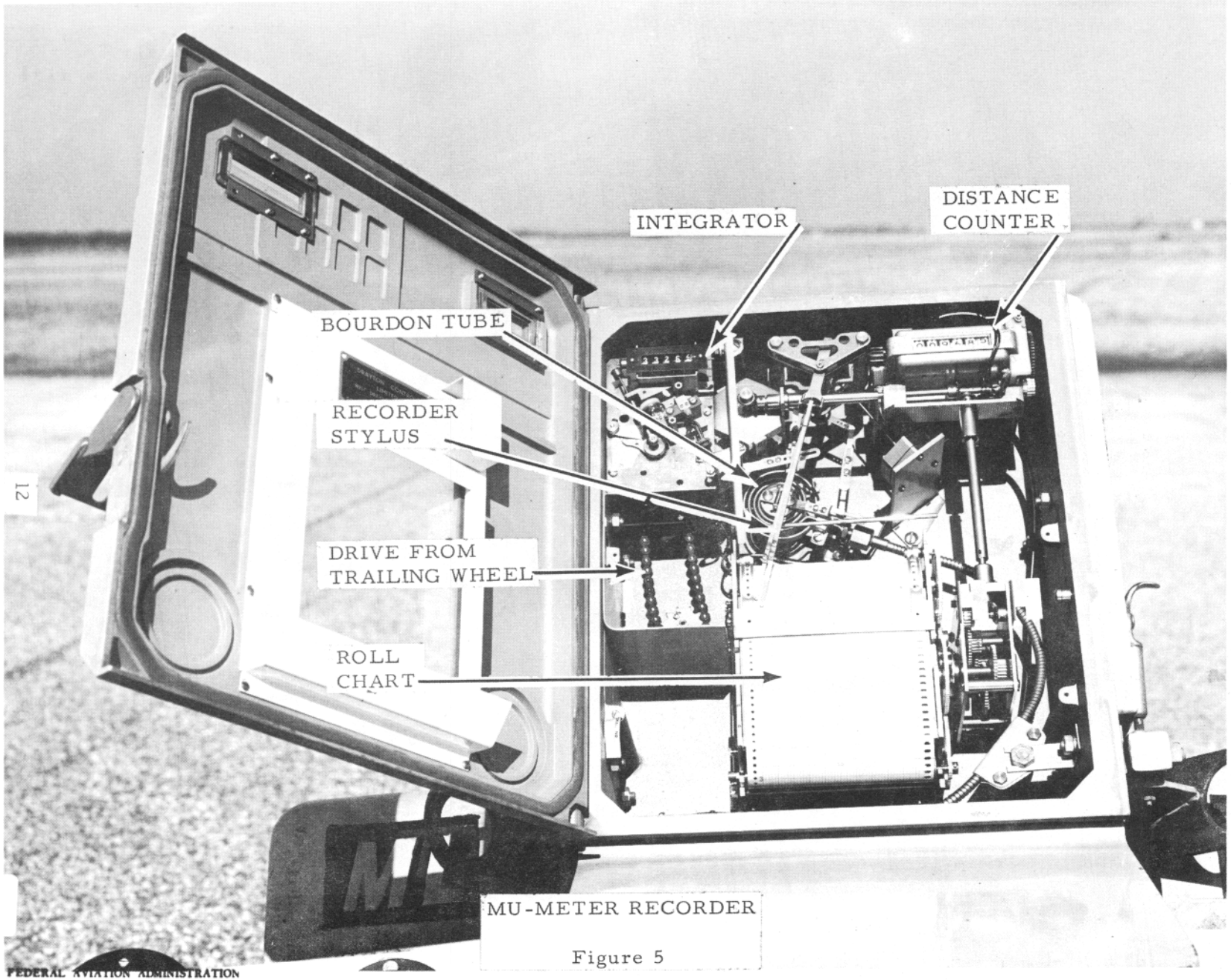


Figure 5

FEDERAL AVIATION ADMINISTRATION
Atlantic City, New Jersey

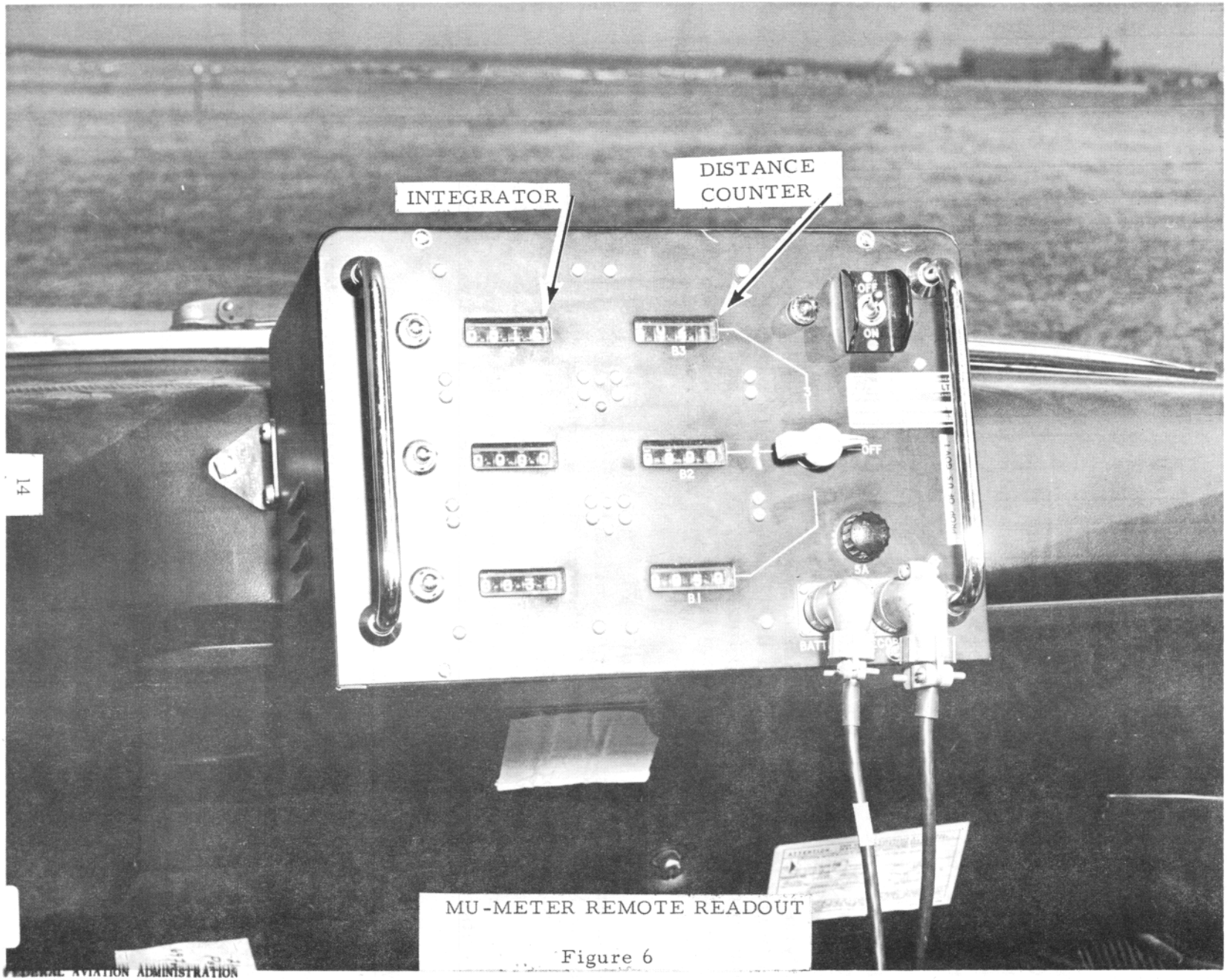
In the testing mode the two friction measuring wheels are in a toed out position forming an included angle of 15 degrees. The test wheels are equipped with 6 ply smooth tread 4.00 by 16 tires inflated to 10 psi pressure. A third wheel located behind the test tires drives the chart advance mechanism. This wheel has a 4.00 by 16 patterned tire inflated to 30 psi.

Frictional force is sensed by a load cell mounted on a Y shaped lower frame of the Mu-Meter. The hydraulic load cell system is connected to a bourdon tube which actuates a recording stylus. A trace is made on the continuously moving chart paper by the recording stylus. Chart paper movement is controlled through a gear system. A movement of one inch on the chart represents a 450-ft. length of pavement. A second recording stylus is connected to a hand operated pressure bulb. This system is used to mark the chart for specific test events.

A remote readout unit, Fig. 6, with an integrated friction value counter and a distance counter for each of three channels is connected to the Mu-Meter recorder. The remote readout is mounted on the passenger side of the dashboard. It samples friction at 20-ft. increments and provides a visual display of the intergrated value. The distance counter records the length of pavement tested in 20-ft. increments. Average friction values are computed from the two readouts.

Water Trucks (4000 gallon capacity)

The water was drawn from the compartmented water tank through two inch lines into a manifold. A four inch diameter pipe connected the manifold to a four inch diameter spreader bar provided with 1/2 inch diameter orifices located 5.5 inches on center. The spreader bar assembly consisted of a six-foot long center section and two 2-foot long end sections that were removed for travel between test sites. The water tank spreader system delivered about 200 gallons per minute over a 10-foot wide test lane. Water flow was controlled by means of a gate valve located in-line between the manifold and the spreader bar.



MU-METER REMOTE READOUT

Figure 6

FEDERAL AVIATION ADMINISTRATION
Atlantic City, New Jersey

NASA Water Film Depth Gage

The NASA gage is designed to measure water depths between 0.01 and 0.10 in. The gage consists of a 5-in. diameter face plate, 3 support legs of 1-in. length, and 10 plastic rods protruding from the plate 0.90 to 0.99 in. in increments of 0.01 in. The tripod legs positioned at a 120 degree spacing on the plate support the gage on the pavement and act as the datum reference for water depth measurements. Water depth is given by the reading corresponding to the largest value that presents an opaque appearance. For night readings tape was placed around the periphery of the rods and a flashlight was used as a light source.

Traffic Cones

Traffic cones were used to mark the beginning and end of test zones and sections. Luminescent tape was applied to the cones for increased visibility during night time testing.

VHF Radios

All Pavement Safety Corporation and NAFEC vehicles used on the airport runways were equipped with VHF transceivers capable of receiving and transmitting voice communications between the tower ground control and the test crews. The PSC radios were Comco Model-730, 5 Watt, 3 channel transceivers. The NAFEC vehicles were equipped with King Model KY90A, 10 Watt transceivers. Temporary authorization for communications on the test airports was cleared with FAA. The transceivers were equipped to communicate on channels 121.7, 121.8, and 121.9 Mhz., which correspond to the frequency bands used by the test airports. Walkie-talkie radios used for inter-vehicle communications were Amphenol M80, 1-1/2 Watt, operating on 27.575 and 27.585 Mhz. All vehicles and walkie-talkies were assigned call numbers.

Camera

A specially designed camera box, Figure 8, was used to take photographs of the surface texture of the runway pavements. Unique features were a fixed distance between camera lens and pavement surface and side lighting provided in a lightproof box. Constant surface to lens distance was maintained so that texture photographs collected as part of the friction survey would be comparable. Side lighting with a strobe light flash system was provided to accentuate surface texture. Photographs are scaled to illustrate a 5 by 6 in. sample of the surface.

TEST OPERATIONS AND PROCEDURES

As discussed in the test program section of this report, detailed test operations at an airport were arranged by the liaison coordinator in advance of the test crew arrival. The engineer in charge of the test crew notified airport management upon arrival and made final arrangements. All test personnel were briefed on communications, tower control, and safety requirements. Water trucks were filled and all Mu-Meter and DBV instrumentation was checked and calibrated prior to runway occupancy. All vehicles were equipped with VHF radios tuned to the tower ground control frequency and ground control call identification was assigned to each of the test vehicles.

Vehicle Calibration Checks

The DBV distance and speed indicating systems were calibrated and checked prior to each airport test by driving the vehicle between two check points of known distance at a constant speed and recording time and indicated distance between check points.

For Mu-Meter calibration tire pressures were checked and adjusted to 10 psi when required. A test board consisting of a standardized rough surface was cleaned and placed ahead of the Mu-Meter. The Mu-Meter wheels were moved into the test mode and cleaned prior to pulling the Mu-Meter at walking speed across the board. The strip chart reading to satisfy calibration requirements was 77 $\pm$ 3 for three trials.

Runway Occupancy

The following paragraphs enumerate the tasks and sequence of test operations started immediately upon confirmation that the test runway had been closed to air traffic. Upon gaining clearance from tower ground control, all test equipment and test crew moved to one end of the runway.

Location of Test Areas

Approximately 1,000 ft. at each end of the test runway was used for acceleration and deceleration of the test vehicles and was not included in the test area. Based on a visual exmination of rubber deposits and non-contaminated portions of the runway, three test zones were established within the touchdown, braking, and rollout areas of the runway. The location and length of each test zone was marked with traffic cones. The zones were designated A, B, and C, with zone A being the first zone encountered in the direction of the test. The length of each zone was accurately measured as was the length of the rubber-coated and nonrubber-coated surfaces. The latter lengths are shown on the runway charts in the appendices as distances S-1, S-2, S-3, S-4, and S-5.

Mu-Meter tests were required for the complete length of each zone. However, DBV tests were required on only a portion of the zone. This was generally in the middle of the zone. The location of rubber deposits on the ends of the runway was significant in selecting these DBV test sections. Comparative data for the Mu-Meter and DBV were obtained by subdividing each zone into two or three test sections - one being the DBV - depending on the useable length of the zone. The DBV test section, for data reporting, was labeled with the letter "D" followed by the zone letter; such as "DA." The remaining sections of this zone were then labeled A-1 and A-2 with A-1 being the first section encountered. The B and C zones were similarly identified.

The beginning and the end of each test zone was marked by pairs of traffic cones; for each pair, one was placed on the runway centerline and the other placed perpendicular to the centerline at a distance of about 12 feet, thus delineating the location of the test lane. The beginning and end of the DBV test section was marked by single cones placed on the runway centerline. The length of each test zone and section is presented in the diagrams in the Appendices. The lengths of the test sections were measured with the distance measuring instrumentation of the DBV. The test lane was about 10 feet wide. Location of test lane to the left or right of centerline was influenced by wind direction. The upwind lane was normally used to take advantage of the wind's effect in retarding water drainage. Refer Figure 7 for view of typical test area.

Surface Photographs

A photograph of the dry pavement surface texture was taken at a representative site within each DBV test section. A constant focal length camera with side lighting to accent surface texture was used. These photographs are included in the runway charts in the appendices. Some photographs are not available because of camera, light, or film faults which were not disclosed until the program was completed.

VIEW OF A RUNWAY TEST AREA

Figure 7

CAMERA FOR SURFACE PHOTOGRAPHS

Figure 8

Runway Wetting

Two 4000-gallon capacity water-trucks were used for wetting the runway pavement surfaces. Wet surface testing was limited to one test zone at a time. Truck speed was limited to 3 mph, to assure sufficient water depth over the length of the test surface.

Runway wetting was initiated upon conclusion of dry surface friction tests on the three test zones. In a few instances, as dictated by rainy weather conditions, wet testing preceded dry tests. At one airport, Atlanta, dry surface DBV and Mu-Meter tests were made on all the runways prior to wet surface testing. Because weather forcasts predicted rain for the next few days, wet surface tests were made during the rain.

Initial wetting of a 10-ft. wide test lane was accomplished by one pass each of the two water trucks prior to the first set of wet surface test runs. A pass is one complete traverse of a test zone. A set of tests consists of one run by the Mu-Meter immediately followed by a run by the DBV travelling in the same direction. Subsequent rewetting of the same test zone prior to each set of tests was accomplished by a single pass with one water truck. When runway wetting and rainfall coincided, runway wetting by trucks was discontinued when sufficient water depth existed on the test surface. Rainfall was measured with raingages placed along the runway edge. Rain occurred during testing at Atlanta and St. Louis, and rainfall rate data are reported in Appendices B and F. Some rain also fell during the tests at Jacksonville and Charleston.

Test Methods

Test methods for the DBV and Mu-Meter were similar to those used during the FAA/NASA/USAF Runway Research Program. Views of test operations are shown in Figs. 9 and 10.

DBV stopping distance tests were made in each of the DBV test sections of zones, A, B, and C. Dry stopping distance tests with a 60 mile per hour threshold speed were made in one direction only. This was done because NASA experience showed that dry tests in the return heading were not significantly different from those in the initial test heading. In addition, time and tire costs were also considered in arriving at the decision to make dry DBV tests in one direction only.

MU-METER TEST RUN

Figure 9

DBV TEST RUN

Figure 10

To further control costs, test tires used for the dry test were used for wet tests on a previous test runway. Tires were checked after each run for flat spots and excessive wear. At the end of the three dry tests, the tires were removed and new ASTM tires, balanced on rims, were mounted in preparation for wet testing.

Wet surface DBV tests were made twice in each direction. Data obtained from the test runs were recorded on three separate distance readout systems. Each of the DBV test runs was made as follows:

1. The test vehicle was positioned on the runway about 800 feet from the test zone. The fifth wheels were placed in contact with the runway, instrumentation checked for proper operation, and the proper brake shutoff valves were actuated. The car was accelerated to slightly above 60 mph before entering the DBV test section.

2. As the vehicle approached the test area, the transmission was shifted into neutral. When the speed decayed to 60 mph and when the vehicle entered the test area, the brakes were fully applied, locking the diagonal wheels. Brakes were kept fully locked until the vehicle came to a stop.

3. Speed and distance data was then recorded on a log sheet prior to driving from the test section.

Mu-Meter dry and wet surface tests were made at 40 miles per hour for the entire length of each zone in both directions. Prior to the start of a test run the test wheels were moved into the yawed position and the third wheel was lowered to the pavement. The remote readout unit was switched from the first to second and then to the third channel as the test vehicle passed through each of the three test sections of the test zone. The event marker was used to mark on the Mu-Meter strip trace the beginning and end location of each test section. The Mu-Meter strip chart was marked after each test run with the corresponding test run number and the remote readout data for each ot the test sections was recorded on a data sheet.

As shown in Table 1, Mu-Meter tests were made in both directions at 20, 40, and 60 miles per hour on 20 runways. In addition, an 80 mile per hour test run was made over the middle test zone of two runways at Jacksonville International Airport.

Water Depth Measurements

Water depth measurements were made with the NASA water depth gage immediately prior to and after each set of Mu-Meter and DBV test runs. Five locations within the test zone were randomly selected for water depth measurements. These points were located within the central portion of the DBV test section and were marked with a spray of paint prior to runway wetting. Thus, successive water depth measurements were made at the same locations within the test zone and variations in water depth readings due to changes in location of the measurements were held to a minimum. Water depth averages obtained from measurements at the five locations within the DBV test section were representative of the average water depth for the wetted test zone. This was confirmed by comparing measurements taken within the DBV test section with measurements taken at other locations throughout the entire wetted zone. Water depths and test run times were recorded. Thus, all friction and water depth data in this report are time correlated.

When periods of rain coincided with wet surface testing, water depth measurements were made in the same manner as that used for truck wetted surfaces. Rain gages placed along the edge of the runway were used to measure the amount of rainfall during test periods. Calculated rainfall rates are reported in the Appendixes.

Water depth measurements were not recorded for the grooved runways at Atlanta and Charleston, as rapid drainage resulted in no measurable depth. Water depth data was obtained on the grooved runway at Nashville because measurable depths were available.

Rain, Temperature and Wind Measurements

As recorded in the Appendixes, periodic runway surface temperature measurements were made during dry and wet runway test periods. In addition, hourly air temperature, as well as wind velocity and direction data, were obtained from the U.S. weather office at the airport.

PRESENTATION OF DATA

Data obtained during the runway survey program are reported in two categories: friction data and airport/runway statistics. The former includes wet and dry friction values, test data and time, run number, test section, runway and airport identification, wind, precipitation rate, water depth, and ambient and runway surface temperature. All data are time correlated. The runway statistics include runway numbers, length and width, construction information, pavement condition, and traffic information.

All data are presented by airport in a series of Appendixes to enable effective review of the material. The sequence of the Appendixes is in the same order as the test program. Mu-Meter and DBV data are presented separately for each tested portion of the runway. As described previously, the runway was generally divided into three zones. However, on two short runways where there was not sufficient length, only two zones were tested. This occurred on runways 5-23 at New Orleans, and 2R-20L at Nashville. At Memphis, runway 17R-35L was being constructed and only one zone was available for testing.

To facilitate review and analysis of the runway friction data contained in the appendixes, pertinent information for each airport and runway are summarized in Table 2. All DBV, Mu-Meter, and water depth data are identified by run number and are time correlated. Mu-Meter data for 40 mph runs only are presented because this is the prescribed test speed for the instrument. Specific normalized dry DBV stop distance and dry Mu-Meter friction values for each zone are omitted from Table 2 because wet data are considered the primary information for analysis.

DBV Data Processing

During the first five airport tests the speed and distance data for each test run indicated by the three separate systems were not the same. This was traced to electrical-mechanical problems with some of the instrumentation which could not be corrected en route. It was therefore decided to use the speed data from the primary system and distance data from one backup system based on calibration checks.

Distance data were converted to feet from "counts," one count being equal to 5.28 feet. Before the second group of five airports were tested, improvements were made by the manufacturer and NAFEC to the instrumentation systems. Speed and distance values from the improved primary system were determined to be more accurate than values from the backup systems. Consequently, these data were used. Data from both groups of tests, normalized and processed, were used to calculate stopping distance ratios (SDR) contained in the Appendixes. Stopping distances were normalized to 60 miles per hour brake application speed by means of the velocity square ratio, as the stopping distance is a function of kinetic energy. The equation used to normalize stop distances when threshold speeds where different than 60 miles per hour was:

$$S_{60} = \frac{V^2_{60}}{V^2_{test}} S_{test}$$

where

S_{60} = corrected DBV stopping distance from 60 mph, feet

S_{test} = DBV stopping distance, feet

V_{test} = DBV test basic brake application speed, mph

V_{60} = correlation brake application speed = 60 mph

It has been shown that temperature affects tire friction values. Consequently, to provide compatibility with data obtained during NASA/FAA/USAF runway program, an equivalent dry stopping distance was determined for the ambient air temperature existing at the time of the wet tests. The data gathered during the dry stopping tests were used to calculate the equivalent dry stopping distance values for the wet test ambient air temperatures by applying the methods used by NASA Langley Research Center. The normalized dry stopping distance data for each runway tested were plotted on a graph wherein the abscissa was ambient air temperature in degrees fahrenheit, and the ordinate was equivalent dry stopping distance in feet. The mean value

of these points was then determined and a line drawn through this point having a slope of zero, from 0^{o} to 63^{o}F and a slope of 1.27 for values over 63^{o}F. By this method, the values of the equivalent dry stopping distance for the wet stop ambient air temperatures were calculated as follows:

$$S_{dry,\ 60} = b \text{ for } T \text{ from } 0^{o} \text{ to } 63^{o}F$$

$$S_{dry,\ 60} = b + 1.27\ (T-63^{o}) \text{ for } T \text{ above } 63^{o}\ F$$

where

$S_{dry,\ 60}$ = equivalent dry stopping distance, 60 mph brake application speed

b = ordinate intercept of the line of the graph having a slope of zero

T = wet test ambient air temperature, ^{o}F

The SDR for each wet stopping test was then calculated by dividing the wet stop distance by the equivalent dry stop distance. These SDR values were calculated for each of the four wet test runs in each zone of the test runway.

When comparing wet runway DBV stopping distances taken in opposite directions, it will be noted that the distances may be substantially different. Differences in the data are caused by:

1. The speed and direction of the wind in relation to the test site affects the aerodynamic drag and thus the deceleration of the vehicle.

2. The slope of the test portion of the runway influences stopping distance due to the effect of gravity.

3. Friction developed by the locked diagonal wheels is influenced by:

   a. Temperature of the tires and the pavement.

   b. Runway surface properties: asperities, contaminates, finish, etc.

c. Water depth and drainage of test surface.

d. Brake efficiency as influenced by wet brakes or non-uniform brake pressure.

e. Variations in driver technique.

f. Variations in the test paths.

Mu-Meter Data Processing

Mu-Meter average friction values for each of the test sections were obtained from the strip charts. The data from strip charts were considered to be more accurate than data from the remote readout for zone testing. This was noted particularly for the shorter test sections and at the higher speeds. The strip chart is a continuous record, whereas the remote readout yields an integrated Mu-Meter value from a sampling taken at 20-foot increments along the runway length. The variations of friction values within short distances may unduly unbalance the integrated value sampled by the remote readout system. The Mu-Meter average friction values were obtained visually from the strip charts. Accuracy of the readings was spot checked by obtaining values from the strip charts by planimeter methods.

On 20 runways tests were made with the Mu-Meter at 20, 40, and 60 miles per hour, and at Jacksonville two sections were also tested at 80 miles per hour. Friction versus speed curves for the "DBV" test sections of these runways are given in the appendices.

Water Depth Data Processing

Water depths were measured before and after each test run. Measurements were obtained using the NASA gage at five locations in each test zone. Each measurement is reported in the Appendix together with the associated time of taking the reading. Water depths reported in Summary Table 2 are the average values for each zone. All water depth data were time correlated with the test runs and were interpolated based on the before and after test measurements.

Artificial truck wetting was used on all runways except those at Atlanta and Zones A and B of runway 6-24 at St. Louis. Rainfall provided sufficient water depth at these locations.

The grooved runways at Atlanta and Charleston provided good drainage, and no water depths could be obtained. However, the grooves on runway 2L-20R at Nashville possessed a measurable depth of water.

Runway Friction Averaging

In general, the average friction value of each zone of a runway, as determined in this program, can be used to assess the slipperiness of the touchdown, braking and rollout areas of a runway. However, the relative slipperiness of the entire runway can be compared with other runways by computing average friction value for each one. This can be done by using a method similar to that described in NASA Tech Brief 70-10712, " A New Method for Measuring Slipperiness of Airport Runways." This method weights the average friction for the rubber-coated and nonrubber-coated portions of the runway in terms of the distances affected. The runway length data, S-1 to S-5, on the runway charts in the appendices may be used for this purpose. For example, the average friction ($\bar{x}$) for a typical runway could be calculated as follows:

$$\bar{X} = \frac{S_2 X_A + (S_1 + S_3 + S_5) X_B + S_4 X_C}{S}$$

TABLE 2
FRICTION DATA SUMMARY

Airport	Run-way	Test Sec-tion	Avg. Water Depth in.	Air Temp °F	Head-ing	Diagonal Brake Vehicle (1)				Mu-Meter (2)	
						Run No.	Stopping Distance, ft.		Stopping Distance Ratio	Run No.	Average Friction
							Dry	Wet			
Charlotte, North Carolina Douglas Municipal	18-36	DA	.022	57	18	12	327	420	1.28	6	.68
		DA	.029	57	36	14	327	486	1.49	6R	.54
		DB	.031	59	36	17	327	491	1.50	11	.48
		DB	.024	59	18	18	327	465	1.42	11R	.48
		DC	.022	56	36	8	327	722	2.21	3	.43
		DC	.018	56	18	9	327	796	2.43	3R	.47
	5-23	DA	.018	54	5	27	315	713	2.26	4	.55
		DA	.016	54	23	28	315	424	1.35	4R	.65
		DB	.034	54	5	33	315	383	1.22	6	.77
		DB	.016	54	23	34	315	381	1.21	6R	.72
		DC	.030	54	23	37	315	464	1.47	7	.70
		DC	.014	54	5	38	315	407	1.29	7R	.77

NOTES: (1) Normalized data
(2) Tested wet at 40 mph

TABLE 2
FRICTION DATA SUMMARY

Airport	Runway	Test Section	Avg. Water Depth in.	Air Temp °F	Heading	Diagonal Brake Vehicle				Mu-Meter	
						Run No.	Stopping Distance, ft.		Stopping Distance Ratio	Run No.	Average Friction
							Dry	Wet			
Atlanta, Georgia William B. Hartsfield	9L-27R	DA	.013	32	27	58	335	869	2.59	2	.67
		DA	.012	32	9	59	335	643	1.92	2R	.65
		DB	.020	31	27	62	335	475	1.42	5	.77
		DB	.020	31	9	63	335	449	1.34	5R	.76
		DC	.017	31	27	66	335	1062	3.17	8	.34
		DC	.016	31	9	67	335	869	2.59	8R	.42
		DC	.018	31	27	68	335	853	2.55	9	.50
		DC	.016	31	9	69	335	919	2.74	9R	.47
	3-21	DA	.025	31	21	70	338	602	1.78	12	.79
		DA	.024	31	3	71	338	542	1.60	12R	.78
		DB	.020	31	21	76	338	459	1.36	15	.76
		DB	.020	31	3	77	338	460	1.36	15R	.77

TABLE 2
FRICTION DATA SUMMARY

Airport	Runway	Test Section	Avg. Water Depth in.	Air Temp °F	Heading	Diagonal Brake Vehicle				Mu-Meter	
						Run No.	Stopping Distance, ft.		Stopping Distance Ratio	Run No.	Average Friction
							Dry	Wet			
Atlanta	3-21	DC	.042	31	21	80	338	480	1.42	18	.80
		DC	.038	31	3	81	338	548	1.62	18R	.80
	9R-27L	DA	*grooved	31	27	84	345	718	2.08	21	.66
		DA	grooved	31	9	85	345	723	2.10	21R	.64
		DB	grooved	31	27	88	345	391	1.13	24	.78
		DB	grooved	32	9	89	345	380	1.10	24R	.78
		DC	grooved	32	27	92	345	414	1.20	27	.80
		DC	grooved	32	9	93	345	438	1.27	27R	.80
	15-33	DA	.018	32	33	106	322	617	1.92	32	.78
		DA	.017	32	15	107	322	486	1.51	32R	.75
		DB	.020	32	33	102	322	470	1.46	31	.80
		DB	.018	32	15	103	322	494	1.53	31R	.78

*No Measurable Depth

TABLE 2
FRICTION DATA SUMMARY

Airport	Runway	Test Section	Avg. Water Depth in.	Air Temp °F	Heading	Diagonal Brake Vehicle				Mu-Meter	
						Run No.	Stopping Distance, ft.		Stopping Distance Ratio	Run No.	Average Friction
							Dry	Wet			
Atlanta	15-33	DC	.025	32	33	98	322	730	2.27	30	.76
		DC	.023	32	15	99	322	688	2.14	30R	.76
Jacksonville, Florida Jacksonville International	13-31	DA	.025	69	31	112	318	924	2.91	1	.42
		DA	.040	70	13	113	319	761	2.39	1R	.45
		DB	.036	74	31	118	324	649	2.00	5	.45
		DB	.030	74	13	119	324	628	1.94	5R	.49
		DC	.060	76	31	122	327	766	2.34	9	.47
		DC	.038	76	13	123	327	760	2.32	9R	.49
	7-25	DA	.025	65	25	132	343	803	2.34	7	.45
		DA	.032	65	7	133	343	930	2.71	7R	.37
		DB	.032	67	25	138	345	744	2.16	10	.45
		DB	.038	67	7	139	345	713	2.07	10R	.42

TABLE 2
FRICTION DATA SUMMARY

Airport	Runway	Test Section	Avg. Water Depth in.	Air Temp °F	Heading	Diagonal Brake Vehicle				Mu-Meter	
						Run No.	Stopping Distance, ft.		Stopping Distance Ratio	Run No.	Average Friction
							Dry	Wet			
Jacksonville	7-25	DC	.016	70	25	142	349	934	2.68	14	.32
		DC	.026	70	7	143	349	999	2.86	14R	.33
Miami, Florida Miami International	12-30	DA	.020	71	12	150	322	612	1.90	3	.62
		DA	.024	70	30	151	321	676	2.11	3R	.65
		DB	.033	70	12	154	321	500	1.56	4	.70
		DB	.054	70	30	155	321	502	1.56	4R	.76
		DC	.046	70	12	159	321	517	1.61	6	.70
		DC	.062	70	30	160	321	602	1.88	6R	.76
	9R-27L	DA	.037	75	27	163	344	987	2.87	1	.52
		DA	.034	75	9	164	344	993	2.89	1R	.45
		DB	.041	75	27	167	344	547	1.59	2	.63
		DB	.026	75	9	168	344	695	2.02	2R	.64

TABLE 2
FRICTION DATA SUMMARY

Airport	Run-way	Test Sec-tion	Avg. Water Depth in.	Air Temp °F	Head-ing	Diagonal Brake Vehicle				Mu-Meter	
						Run No.	Stopping Distance, ft.		Stopping Distance Ratio	Run No.	Average Friction
							Dry	Wet			
Miami	9R-27L	DC	.046	75	9	173	344	1457	4.24	3	.30
		DC	.035	75	27	174	344	1595	4.64	3R	.30
	17-35	DA	.026	75	35	177	348	448	1.29	4	.76
		DA	.034	75	17	178	348	470	1.35	4R	.76
		DB	.040	75	35	181	348	455	1.31	5	.73
		DB	.064	75	17	182	348	469	1.35	5R	.72
		DC	.052	75	35	187	348	446	1.28	6	.74
		DC	.062	75	17	188	348	490	1.41	6R	.75
	9L-27R	DA	.038	73	27	200	325	710	2.18	10	.58
		DA	.044	73	9	201	325	578	1.78	10R	.58
		DB	.051	73	27	206	325	547	1.68	11	.58
		DB	.036	72	9	207	323	567	1.76	11R	.60

TABLE 2
FRICTION DATA SUMMARY

Airport	Run-way	Test Sec-tion	Avg. Water Depth in.	Air Temp °F	Head-ing	Diagonal Brake Vehicle				Mu-Meter	
						Run No.	Stopping Distance, ft.		Stopping Distance Ratio	Run No.	Average Friction
							Dry	Wet			
Miami	9L-27R	DC	.040	72	27	210	323	882	2.73	12	.50
		DC	.036	72	9	211	323	977	3.02	12R	.50
New Orleans Louisiana New Orleans International	5-23	DA	.016	67	23	214	360	475	1.32	1	.79
		DA	.013	67	5	215	360	403	1.12	1R	.80
		DB	.086	67	23	219	360	480	1.33	3	.65
		DB	.050	67	5	220	360	469	1.30	3R	.64
	10-28	DA	.042	73	10	229	336	1188	3.64	8	.28
		DA	.040	73	28	230	336	1299	3.87	8R	.30
		DB	.034	72	10	233	334	776	2.32	9	.45
		DB	.026	72	28	234	334	755	2.19	9R	.42
		DC	.020	72	10	237	334	756	2.26	10	.44
		DC	.025	71	28	238	333	726	2.18	10R	.42

TABLE 2
FRICTION DATA SUMMARY

Airport	Run-way	Test Sec-tion	Avg. Water Depth in.	Air Temp °F	Head-ing	Diagonal Brake Vehicle				Mu-Meter	
						Run No.	Stopping Distance, ft.		Stopping Distance Ratio	Run No.	Average Friction
							Dry	Wet			
New Orleans	1-19	DA	.040	74	19	246	329	979	2.98	4	.27
		DA	.030	74	1	247	329	1134	3.45	4R	.29
		DB	.033	74	19	250	329	685	2.08	5	.52
		DB	.030	74	1	251	329	741	2.25	5R	.49
		DC	.019	74	19	254	329	945	2.87	6	.41
		DC	.031	74	1	255	329	1051	3.19	6R	.38
St. Louis, Missouri St. Louis International	17-35	DA	.027	67	17	262	332	578	1.74	3	.47
		DA	.026	67	35	263	332	593	1.79	3R	.47
		DB	.032	67	17	266	332	556	1.67	6	.52
		DB	.029	66	35	267	331	629	1.90	6R	.50
		DC	.040	54	17	287	327	466	1.43	22	.53
		DC	.037	54	35	288	327	597	1.83	22R	.48

TABLE 2
FRICTION DATA SUMMARY

Airport	Runway	Test Section	Avg. Water Depth in.	Air Temp °F	Heading	Diagonal Brake Vehicle				Mu-Meter	
						Run No.	Stopping Distance, ft.		Stopping Distance Ratio	Run No.	Average Friction
							Dry	Wet			
St. Louis	12R-30L	DA	.029	54	12	273	338	1510	4.47	12	.17
		DA	.034	54	30	274	338	1724	5.10	12R	.14
		DB	.033	54	12	278	338	1003	2.97	15	.51
		DB	.027	54	30	279	338	952	2.82	15R	.44
		DC	.036	54	12	282	338	981	2.90	18	.43
		DC	.033	54	30	283	338	1390	4.11	18R	.37
	12L-30R	DA	.029	55	30	294	372	527	1.42	28	.54
		DA	.036	55	12	295	372	476	1.28	28R	.60
		DB	.035	57	30	298	372	705	1.90	31	.40
		DB	.032	58	12	299	372	638	1.72	31R	.53
		DC	.035	63	30	304	372	702	1.89	36	.46
		DC	.044	63	12	305	372	730	1.96	36R	.47

TABLE 2
FRICTION DATA SUMMARY

Airport	Run-way	Test Sec-tion	Avg. Water Depth in.	Air Temp °F	Head-ing	Diagonal Brake Vehicle				Mu-Meter	
						Run No.	Stopping Distance, ft.		Stopping Distance Ratio	Run No.	Average Friction
							Dry	Wet			
St. Louis	6-24	DA	.026	61	6	309	327	719	2.20	4	.40
		DA	.022	60	24	310	327	672	2.06	4R	.50
		DB	.030	58	6	313	327	566	1.73	7	.66
		DB	.026	57	24	314	327	641	1.96	7R	.64
		DC	.032	56	6	318	327	796	2.43	11	.53
		DC	.033	56	24	319	327	824	2.52	11R	.53
Memphis, Tennessee Memphis International	3-21	DA	.029	69	3	325	339	375	1.11	4	.63
		DA	.029	69	21	326	339	419	1.24	4R	.64
		DB	.035	69	3	329	339	376	1.11	7	.62
		DB	.038	69	21	330	339	414	1.22	7R	.60
		DC	.036	69	3	333	339	376	1.11	10	.72
		DC	.033	69	21	334	339	410	1-21	10R	.68

TABLE 2
FRICTION DATA SUMMARY

Airport	Run-way	Test Sec-tion	Avg. Water Depth in.	Air Temp °F	Head-ing	Diagonal Brake Vehicle				Mu-Meter	
						Run No.	Stopping Distance, ft.		Stopping Distance Ratio	Run No.	Average Friction
							Dry	Wet			
Memphis	9-27	DA	.024	76	9	342	329	545	1.66	4	.62
		DA	.029	76	27	343	329	492	1.50	4R	.56
		DB	.033	75	9	346	327	446	1.36	7	.75
		DB	.030	75	27	347	327	414	1.27	7R	.75
		DC	.041	74	9	350	326	494	1.52	10	.62
		DC	.035	74	27	351	326	693	2.13	10R	.58
	17L-35R	DA	.027	74	17	358	324	1103	3.40	4	.35
		DA	.033	73	35	359	323	1369	4.24	4R	.30
		DB	.035	72	17	362	321	700	2.18	7	.40
		DB	.032	72	35	363	321	864	2.69	7R	.42
		DC	.028	71	17	366	320	1008	3.15	10	.42
		DC	.028	71	35	367	320	1237	3.87	10R	.37

TABLE 2
FRICTION DATA SUMMARY

Airport	Run-way	Test Sec-tion	Avg. Water Depth in.	Air Temp °F	Head-ing	Diagonal Brake Vehicle				Mu-Meter	
						Run No.	Stopping Distance, ft.		Stopping Distance Ratio	Run No.	Average Friction
							Dry	Wet			
Memphis	17R-35L	DB	.028	77	35	373	362	532	1.47	2	.52
		DB	.032	78	17	374	363	500	1.38	2R	.53
Nashville, Tennessee Nashville International	*2L-20R	DA	.023	57	2	381	340	679	2.00	4	.61
		DA	.013	57	20	382	340	555	1.63	4R	.64
		DB	.020	57	2	386	340	628	1.85	7	.45
		DB	.016	56	20	387	340	755	2.22	7R	.51
		DC	.018	55	2	390	340	535	1.57	10	.54
		DC	.019	55	20	391	340	879	2.59	10R	.56
	13-31	DA	.025	53	13	398	311	548	1.76	4	.60
		DA	.024	53	31	399	311	514	1.65	4R	.60
		DB	.025	53	13	402	311	486	1.56	7	.56
		DB	.033	53	31	403	311	566	1.82	7R	.54

*Grooved

TABLE 2
FRICTION DATA SUMMARY

Airport	Run-way	Test Sec-tion	Avg. Water Depth in.	Air Temp °F	Head-ing	Diagonal Brake Vehicle				Mu-Meter	
						Run No.	Stopping Distance, ft.		Stopping Distance Ratio	Run No.	Average Friction
							Dry	Wet			
Nashville	13-31	DC	.021	54	13	406	311	473	1.52	10	.50
		DC	.025	54	31	407	311	843	2.71	10R	.53
	2R-20L	DA	.023	59	20	413	311	386	1.24	3	.64
		DA	.020	59	2	414	311	420	1.35	3R	.65
		DB	.024	59	20	417	311	392	1.26	4	.75
		DB	.017	60	2	418	311	377	1.21	4R	.80
Charleston, West Virginia Kanawha	14-32	DA	.031	65	32	421	361	447	1.24	1	.63
		DA	.030	65	14	422	361	419	1.16	1R	.47
		DB	.031	63	32	425	358	437	1.22	4	.62
		DB	.030	63	14	426	358	390	1.09	4R	.58
		DC	.026	51	32	432	358	382	1.07	10	.64
		DC	.027	51	14	433	358	406	1.11	10R	.55

TABLE 2
FRICTION DATA SUMMARY

Airport	Run-way	Test Sec-tion	Avg. Water Depth in.	Air Temp °F	Head-ing	Diagonal Brake Vehicle				Mu-Meter	
						Run No.	Stopping Distance, ft.		Stopping Distance Ratio	Run No.	Average Friction
							Dry	Wet			
Charleston	5-23	DA	grooved	51	5	439	318	323	1.02	16	.71
		DA	grooved	51	23	440	318	371	1.17	16R	.74
		DB	grooved	51	5	443	318	337	1.06	19	.71
		DB	grooved	51	23	444	318	356	1.12	19R	.73
		DC	grooved	51	5	447	318	417	1.31	22	.70
		DC	grooved	51	23	448	318	430	1.35	22R	.73
Covington, Kentucky Greater Cincinnati	18-36	DA	.029	41	36	455	308	766	2.49	4	.57
		DA	.030	41	18	456	308	741	2.41	4R	.54
		DB	.032	41	36	460	308	531	1.72	5	.66
		DB	.027	41	18	461	308	536	1.74	5R	.66
		DC	.028	40	36	464	308	520	1.69	6	.67
		DC	.032	40	18	465	308	668	2.17	6R	.66

TABLE 2
FRICTION DATA SUMMARY

Airport	Run-way	Test Sec-tion	Avg. Water Depth in.	Air Temp °F	Head-ing	Diagonal Brake Vehicle				Mu-Meter	
						Run No.	Stopping Distance, ft.		Stopping Distance Ratio	Run No.	Average Friction
							Dry	Wet			
Covington	9R-27L	DA	.024	35	9	482	328	741	2.26	13	.68
		DA	.024	35	27	483	328	631	1.92	13R	.64
		DB	.023	34	9	471	328	565	1.72	4	.65
		DB	.022	34	27	472	328	597	1.82	4R	.64
		DC	.021	35	9	486	328	729	2.22	16	.60
		DC	.019	35	27	487	328	834	2.54	16R	.54
	9L-27R	DA	.027	34	9	478	345	497	1.44	10	.56
		DA	.025	34	27	479	345	401	1.16	10R	.56
		DB	.021	40	9	490	345	366	1.06	19	.62
		DB	.023	41	27	491	345	497	1.44	19R	.74
		DC	.022	43	9	495	345	399	1.16	22	.82
		DC	.020	43	27	496	345	393	1.14	22R	.80

APPENDIX A

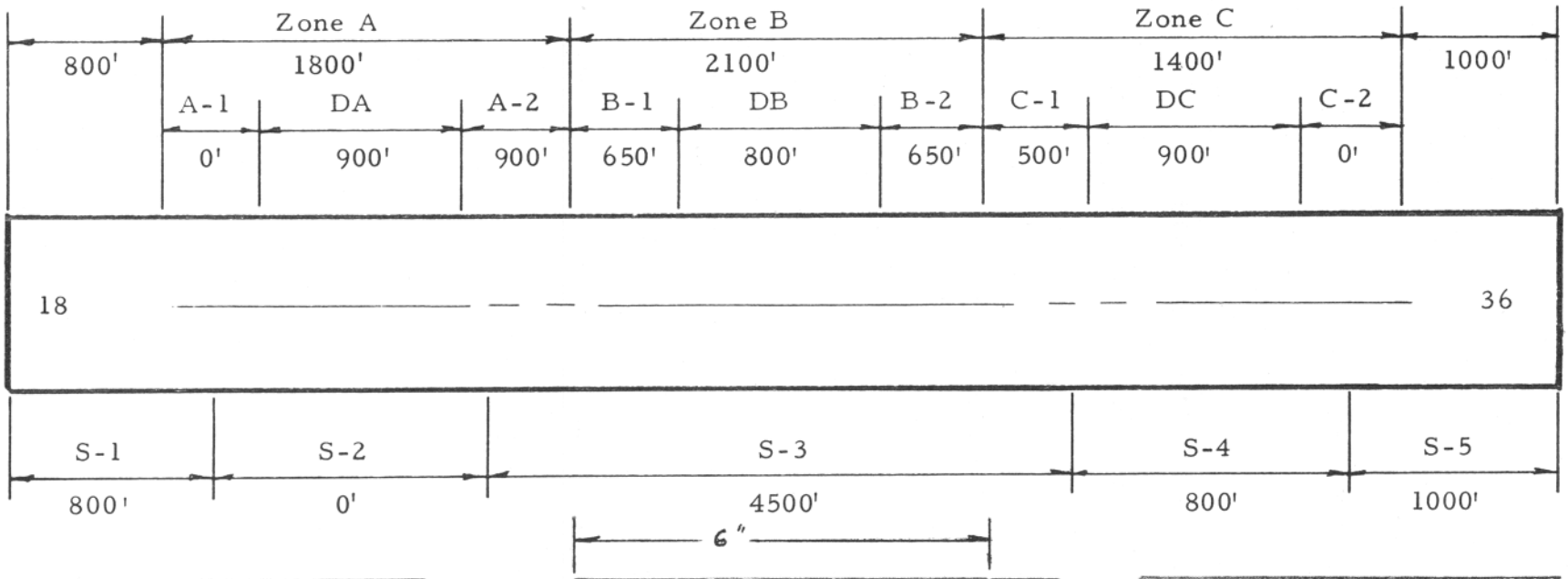
DOUGLAS MUNICIPAL AIRPORT

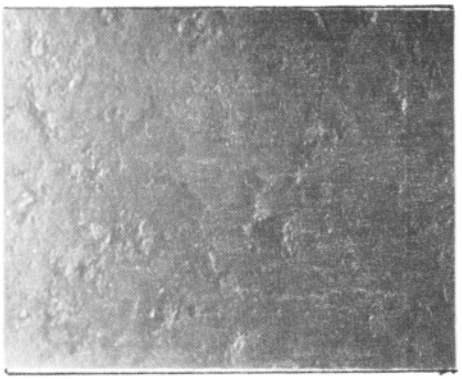
CHARLOTTE, NORTH CAROLINA

Table of Contents

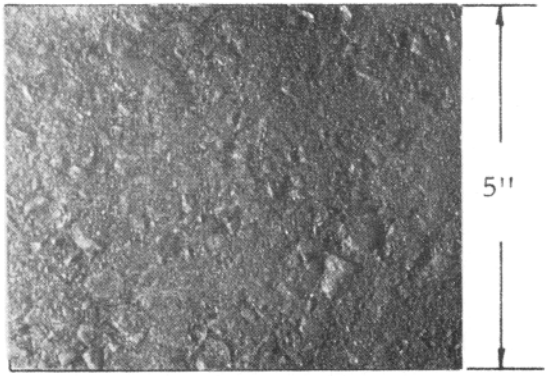
Airport: Charlotte

Runway: 18-36

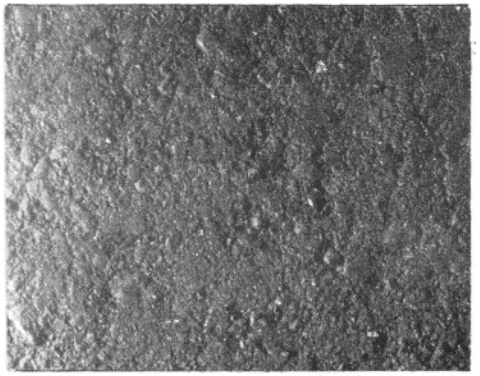




Zone A



Zone B

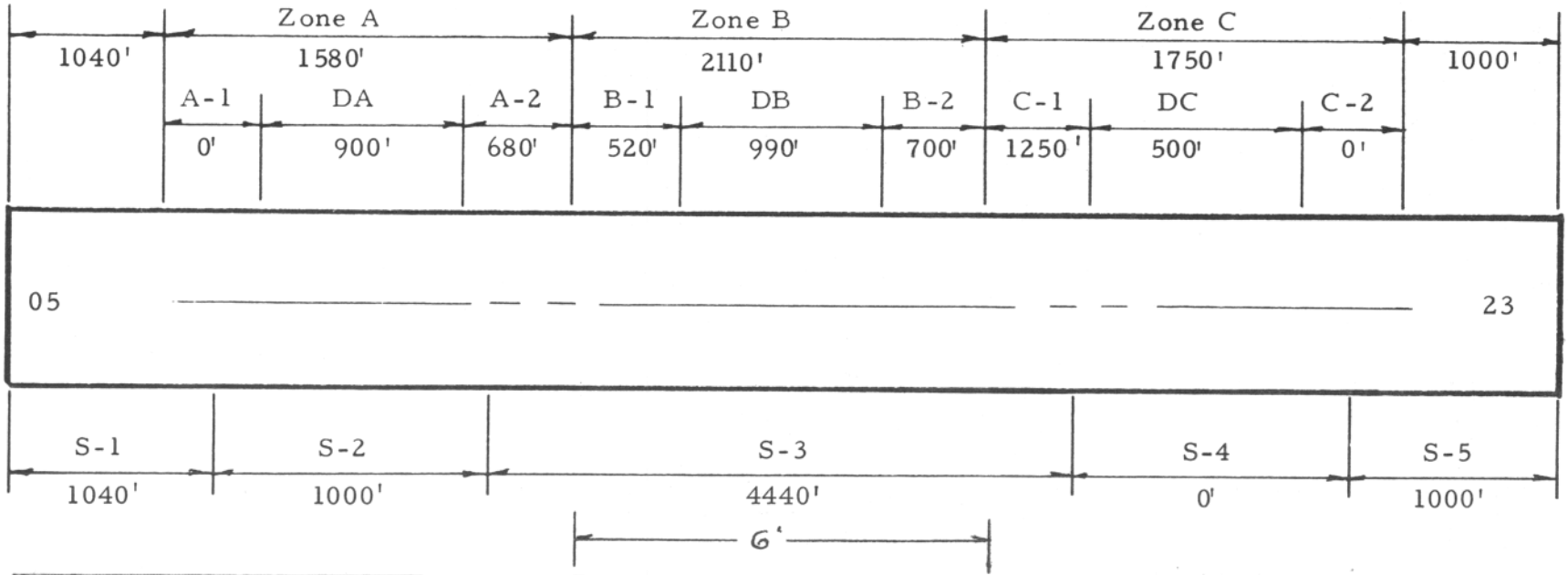


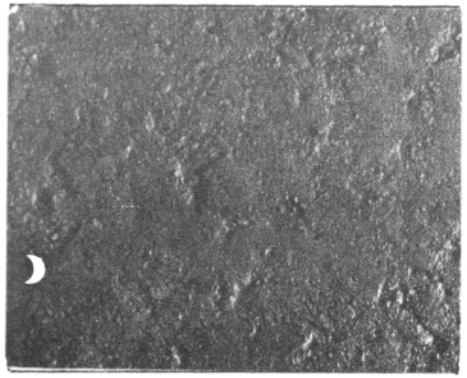
Zone C

Figure A1

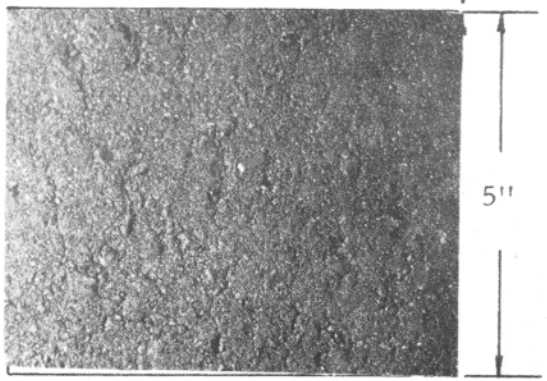
Airport: Charlotte

Runway: 5-23





Zone A



Zone B

Zone C

Figure A2

TABLE A1
RUNWAY STATISTICS

Airport: Charlotte

Runway No.	5-23	18-36
Length, ft.	7480	7100
Width, ft.	150	150
Transverse slope, %	.2 to 1.3	.2 to 1.0
Effective gradient, %	.65	.29
Pavement surface	AC	AC
Monthly operations	3920	1310
Surface condition	Both runways received a AC overlay in October 1971. Excellent drainage on both.	

Annual precipitation, in. (last 40 years)

highest:	rain - 59	snow - 22
lowest:	rain - 30	snow - none

TABLE A2

RAIN, WIND AND TEMPERATURE DATA

Airport: Charlotte			Date: November 20, 1971	
	Wind		Temperature, °F	
Time	Heading, deg.	Speed, knots	Ambient	Surface
1100	-	calm	55	
1200	240	8	57	71
1300	290	9	58	77
1400	290	8	60	
			Date: November 21, 1971	
1100	330	18-26 gusts	54	
1200	330	18-28 gusts	54	68
1300	320	15-30 gusts	52	

Rainfall - None

TABLE A3

Water Depth Measurements

Airport: Charlotte		Runway: 18-36				Date: November 20, 1971	
Zone	Time	Water Depth, hundredth inch					Avg. Water Depth (in.)
		1	2	3	4	5	
A	1206	4	3	3	3	3	0.032
	1212	3	2	2	3	2	0.024
	1220	4	4	3	3	2	0.032
	1224	3	3	2	3	2	0.026
	1233	2	3	2	3	2	0.024
	1235	2	2	1	2	1	0.016
	1244	4	5	4	4	3	0.040
	1255	4	5	3	4	3	0.038
	1258	3	2	3	3	2	0.026
	1306	2	3	2	2	1	0.020
	1308	1	2	1	2	1	0.014
B	1336	4	3	3	4	3	0.034
	1339	3	2	3	3	2	0.026
	1345	6	3	5	4	3	0.042
	1358	4	4	3	3	3	0.034
	1401	2	1	3	2	1	0.018
	1407	4	3	4	5	2	0.036
	1412	3	2	4	3	2	0.028
	1425	2	3	2	2	2	0.022
C	1056	2	3	2	3	3	0.026
	1058	1	2	2	1	2	0.016
	1100	1	3	2	1	1	0.016
	1114	3	3	3	3	2	0.028
	1117	2	2	3	2	1	0.020
	1127	2	4	3	4	3	0.032
	1130	3	2	3	3	3	0.028
	1134	3	4	3	6	4	0.040
	1137	2	2	3	1	2	0.020

TABLE A3

Water Depth Measurements

Airport: Charlotte		Runway: 5-23			Date: November 21, 1971		
Zone	Time	Water Depth, hundredth inch					Avg. Water Depth (in.)
		1	2	3	4	5	
A	1054	2	1	2	2	2	0.018
	1059	1	2	1	1	1	0.012
	1104	4	3	4	2	3	0.032
	1107	1	2	2	3	1	0.018
	1112	4	3	3	4	3	0.034
	1114	2	3	3	2	2	0.024
B	1120	1	2	1	2	2	0.016
	1124	2	2	2	1	1	0.016
	1127	2	1	2	2	1	0.016
	1128	2	1	1	2	1	0.014
	1133	4	3	3	4	3	0.034
	1135	4	3	3	4	2	0.032
	1138	4	3	3	3	2	0.030
C	1215	3	3	4	2	2	0.028
	1218	2	1	2	1	1	0.014
	1228	3	3	4	2	2	0.028
	1234	2	1	3	3	2	0.022
	1235	1	1	1	1	1	0.010

TABLE A4
BASIC DBV DRY SURFACE DATA

AIRPORT Charlotte, N. C.

1971 Date	Run No.	R/W Sect.	R/W Head.	Time of Run Hr-Min	Temp. °F		Primary Instr.		Backup Instr.	
					Amb. Air	R/W Surf.	Brake Speed mph	Stop. Dist. ft.	Brake Speed mph	Stop. Dist. ft.
11/20	2	DA	18	1013	53	63	60	349	60	327
11/20	3	DB	18	1017	54	63	58	311	58	290
11/20	5	DC	36	1020	54	64	60	351	60	343
11/21	22	DA	5	1007	54	59	59	316	59	317
11/21	23	DB	5	1008	54	59	60	298	59	296
11/21	24	DC	23	1015	54	60	61	332	60	333

TABLE A5

BASIC DBV WET SURFACE DATA

AIRPORT Charlotte, N. C.

1971 Date	Run No.	R/W Sect.	R/W Head.	Time of Run Hr-Min	Avg. Water Depth in.	Temp. °F		Primary Instr.		Backup Instr.	
						Amb. Air	R/W Surf.	Brake Speed mph	Stop. Dist. ft.	Brake Speed mph	Stop. Dist. ft.
11/20	8	DC	36	1116	.022	56	68	62	817	61	771
11/20	9	DC	18	1118	.018	56	69	62	907	61	850
11/20	10	DC	36	1129	.029	56	69	61	853	60	850
11/20	11	DC	18	1131	.027	56	70	61	825	60	797
11/20	12	DA	18	1213	.022	57	73	62	446	60	449
11/20	13	DA	18	1214	.020	57	73	59	562	60	428
11/20	14	DA	36	1222	.029	57	74	59	630	59	470
11/20	15	DA	36	1234	.020	58	75	58	573	59	422
11/20	17	DB	36	1337	.031	59	80	58	483	58	459
11/20	18	DB	18	1340	.024	59	80	55	393	57	391
11/20	19	DB	36	1359	.028	60	82	61	541	60	523
11/20	20	DB	18	1400	.023	60	82	61	491	60	465
11/21	27	DA	5	1054	.018	54	62	60	711	60	713
11/21	28	DA	23	1056	.016	54	63	61	436	60	438
11/21	29	DA	5	1105	.028	54	63	60	749	61	750
11/21	30	DA	23	1106	.023	54	64	59	494	60	480
11/21	33	DB	5	1123	.034	54	64	61	397	60	396
11/21	34	DB	23	1127	.016	54	65	62	405	61	407

TABLE A5
BASIC DBV WET SURFACE DATA

AIRPORT Charlotte, N. C.

1971 Date	Run No.	R/W Sect.	R/W Head.	Time of Run Hr-Min	Avg. Water Depth in.	Temp. °F		Primary Instr.		Backup Instr.	
						Amb. Air	R/W Surf.	Brake Speed mph	Stop. Dist. ft.	Brake Speed mph	Stop. Dist. ft.
11/21	35	DB	5	1135	.032	54	66	60	422	59	407
11/21	36	DB	23	1137	.030	54	66	60	478	60	470
11/21	37	DC	23	1214	.030	54	69	61	483	61	480
11/21	38	DC	5	1218	.014	54	70	60	415	61	407
11/21	39	DC	23	1229	.026	53	70	62	502	61	486
11/21	40	DC	5	1235	.032	53	71	60	375	59	375

TABLE A6
CORRECTED DBV DATA

AIRPORT Charlotte, North Carolina DATE 11/20/71

RUNWAY 18-36 SURFACE TYPE Asphalt

WEATHER Dry WETTING Truck

Wet Test Run No.	Wet Test R/W Head.	Wet Test Run Time	R/W Test Sect.	Avg. Water Depth (in)	Wet Test Temp. (°F)		Stopping Distance		Stopping Distance Ratio (SDR)
					Amb. Air	R/W Surface	Equiv. Dry (ft)	Wet (ft)	
12	18	1213	DA	.022	57	73	327	420	1.28
13	18	1214	DA	.020	57	73	327	443	1.35
14	36	1222	DA	.029	57	74	327	486	1.49
15	36	1234	DA	.020	58	75	327	451	1.38
17	36	1337	DB	.031	59	80	327	491	1.50
18	18	1340	DB	.024	59	80	327	465	1.42
19	36	1359	DB	.028	60	82	327	506	1.55
20	18	1400	DB	.023	60	82	327	450	1.38
8	36	1116	DC	.022	56	68	327	722	2.21
9	18	1118	DC	.018	56	69	327	796	2.43
10	36	1129	DC	.029	56	69	327	822	2.51
11	18	1131	DC	.027	56	70	327	771	2.36

TABLE A6
CORRECTED DBV DATA

AIRPORT Charlotte, North Carolina DATE 11/21/71

RUNWAY 5-23 SURFACE TYPE Asphalt

WEATHER Dry WETTING Truck

Wet Test Run No.	Wet Test R/W Head.	Wet Test Run Time	R/W Test Sect.	Avg. Water Depth (in)	Wet Test Temp. (°F)		Stopping Distance		Stopping Distance Ratio (SDR)
					Amb. Air	R/W Surface	Equiv. Dry (ft)	Wet (ft)	
27	5	1054	DA	.018	54	62	315	713	2.26
28	23	1056	DA	.016	54	63	315	424	1.35
29	5	1105	DA	.028	54	63	315	750	2.38
30	23	1106	DA	.023	54	64	315	496	1.57
33	5	1123	DB	.034	54	64	315	383	1.22
34	23	1127	DB	.016	54	65	315	381	1.21
35	5	1135	DB	.032	54	66	315	407	1.29
36	23	1137	DB	.030	54	66	315	470	1.49
37	23	1214	DC	.030	54	69	315	464	1.47
38	5	1218	DC	.014	54	70	315	407	1.29
39	23	1229	DC	.026	53	70	315	455	1.44
40	5	1235	DC	.032	53	71	315	375	1.19

TABLE A7
Mu-Meter Data

Airport: Charlotte	Runway: 18-36	Date: November 20, 1971					
Run No.	R/W Heading	Zone	Avg. Water Depth (in.)	Test Time	Speed (mph)	Test Section	Avg. Frict.
1	18	C	Dry	1015	40	--	.84
1	18	B	Dry	1017	40	--	.85
1	18	A	Dry	1021	40	--	.86
1-R	36	A	Dry	1023	40	--	.86
1-R	36	B	Dry	1028	40	--	.86
1-R	36	C	Dry	1032	40	--	.84
2	36	C	0.029	1055	40	DC C-1	.44 .62
2-R	18	C	0.016	1059	40	C-1 DC	.63 .50
3	36	C	0.022	1116	40	DC C-1	.43 .64
3-R	18	C	0.018	1118	40	C-1 DC	.60 .47
4	36	C	0.029	1129	20	DC C-1	.72 .79

TABLE A7
Mu-Meter Data

Airport: Charlotte	Runway: 18-36	Date: November 20, 1971					
Run No.	R/W Heading	Zone	Avg. Water Depth (in.)	Test Time	Speed (mph)	Test Section	Avg. Frict.
4-R	18	C	0.027	1131	20	C-1 DC	.77 .68
5	36	C	0.040	1134	60	DC C-1	.30 .47
5-R	18	C	0.026	1136	60	C-1 DC	.45 .29
6	18	A	0.022	1213	40	DA A-2	.68 .64
6-R	36	A	0.029	1222	40	A-2 DA	.50 .54
7	18	A	0.027	1223	40	DA A-2	.57 .57
8	VOID						
9	18	A	0.039	1245	20	DA A-2	.78 .77
9-R	36	A	0.030	1247	20	A-2 DA	.78 .81
10	18	A	0.031	1256	60	DA A-2	.45 .54
10-R	36	A	0.017	1307	60	A-2 DA	.51 .52

TABLE A7
Mu-Meter Data

Airport: Charlotte	Runway: 18-36	Date: November 20, 1971					
Run No.	R/W Heading	Zone	Avg. Water Depth (in.)	Test Time	Speed (mph)	Test Section	Avg. Frict.
11	36	B	0.031	1337	40	B-1 DB B-2	.62 .48 .54
11-R	18	B	0.024	1340	40	B-2 DB B-1	.48 .48 .62
12	18	B	0.028	1359	20	B-2 DB B-1	.76 .78 .81
12-R	18	B	0.023	1400	20	B-2 DB B-1	.76 .78 .81
13	36	B	0.034	1408	60	B-1 DB B-2	.45 .30 .36
13-R	18	B	0.030	1410	60	B-2 DB B-1	.38 .38 .45

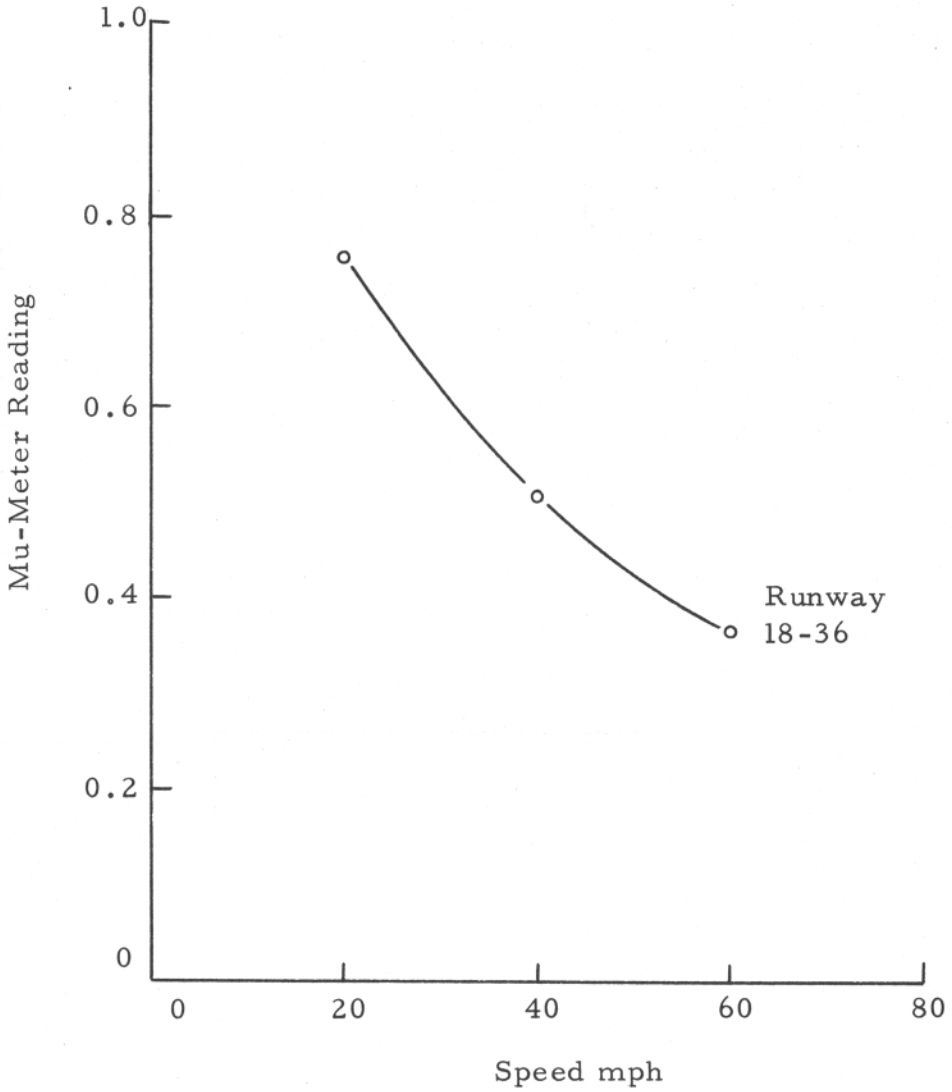
TABLE A7
Mu-Meter Data

Airport: Charlotte	Runway: 5-23		Date: November 21, 1971				
Run No.	R/W Heading	Zone	Avg. Water Depth (in.)	Test Time	Speed (mph)	Test Section	Avg. Frict.
1	5	A	Dry	1008	40	DA A-2	.87 .86
1-R	23	A	Dry	1011	40	A-2 DA	.87 .85
2	5	B	Dry	1014	40	B-1 DB B-2	.88 .87 .87
2-R	23	B	Dry	1017	40	B-2 DB B-1	.87 .86 .87
3	5	C	Dry	1021	40	C-1 DC	.85 .85
3-R	23	C	Dry	1025	40	DC C-1	.85 .88
4	5	A	0.018	1054	40	DA A-2	.55 .71
4-R	23	A	0.016	1056	40	A-2 DA	.76 .65
5	VOID						
6	5	B	0.034	1123	40	B-1 DB B-2	.65 .77 .79
6-R	23	B	0.016	1127	40	B-2 DB B-1	.76 .72 .62

TABLE A7
Mu-Meter Data

Airport: Charlotte		Runway: 5-23		Date: November 21, 1971			
Run No.	R/W Heading	Zone	Avg. Water Depth (in.)	Test Time	Speed (mph)	Test Section	Avg. Frict.
7	23	C	0.030	1214	40	DC C I	.70 .73
7-R	5	C	0.014	1218	40	C I DC	.74 .77

Charlotte , N.C.



MU vs. SPEED - WET

Figure A 3

APPENDIX B

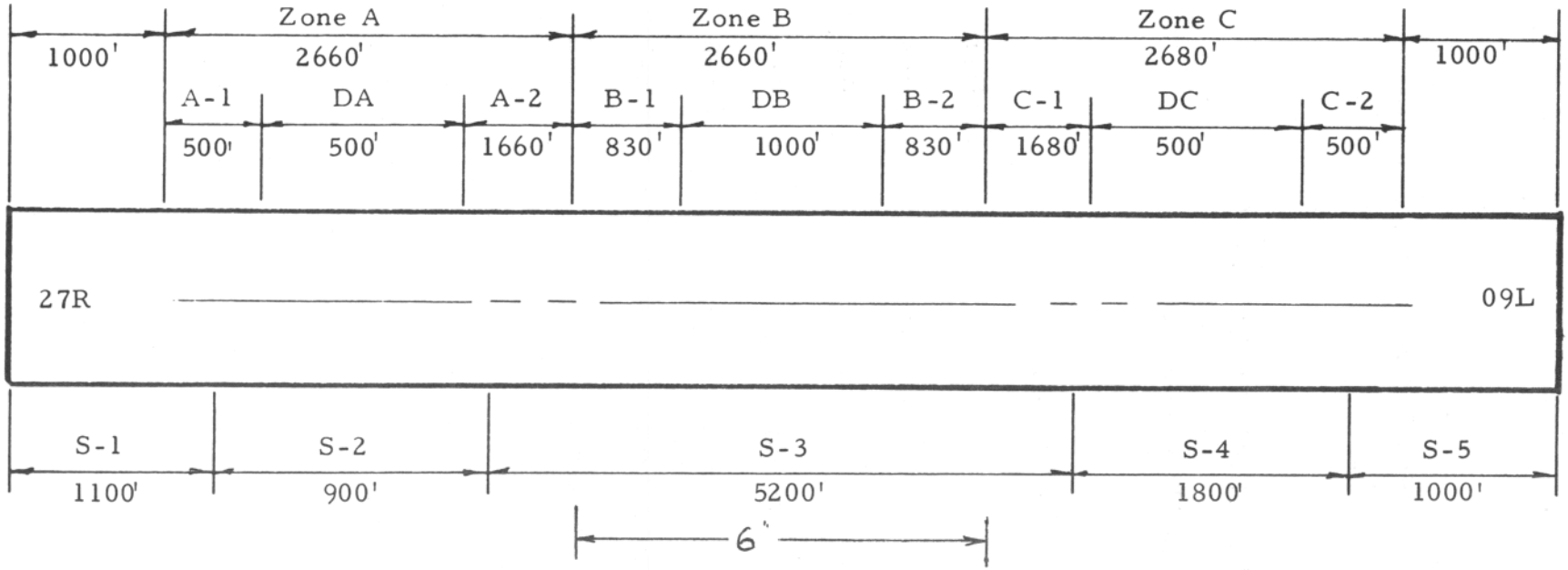
WILLIAM B. HARTSFIELD AIRPORT

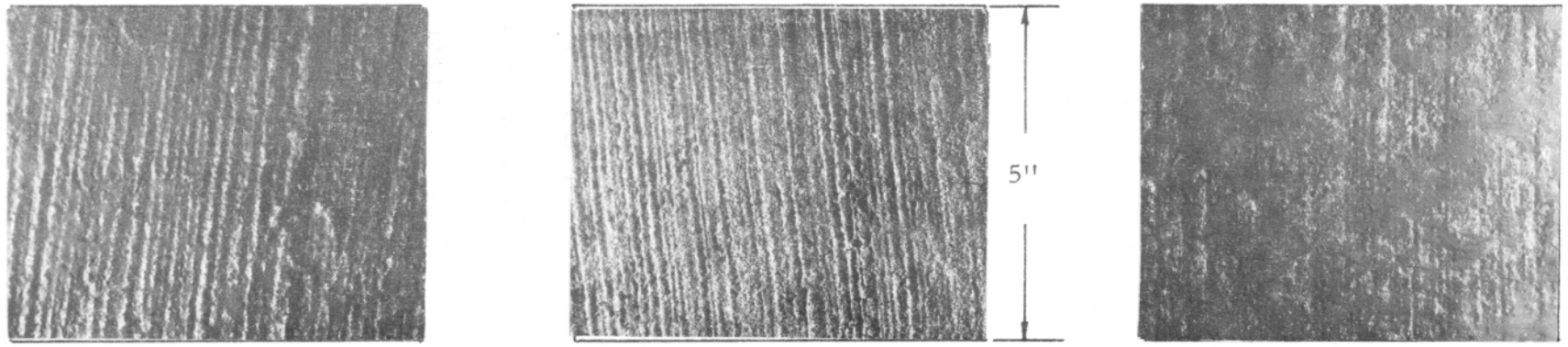
ATLANTA, GEORGIA

Table of Contents

Airport: Atlanta

Runway: 9L-27R





Zone A

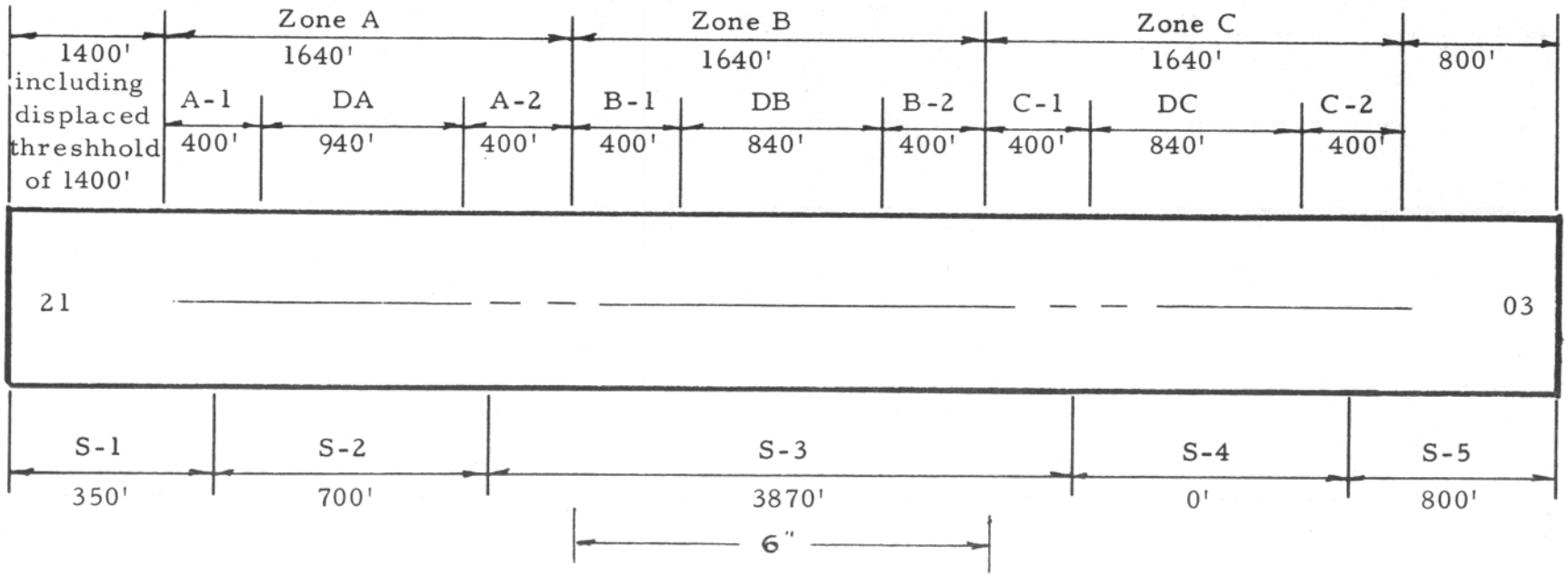
Zone B

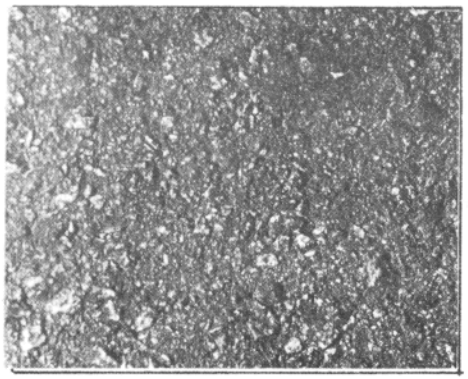
Zone C

Figure B1

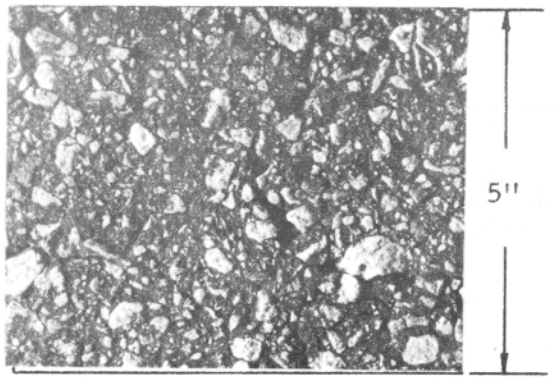
Airport: Atlanta

Runway: 03-21

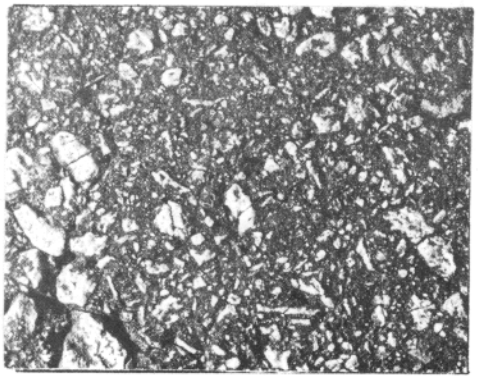




Zone A



Zone B

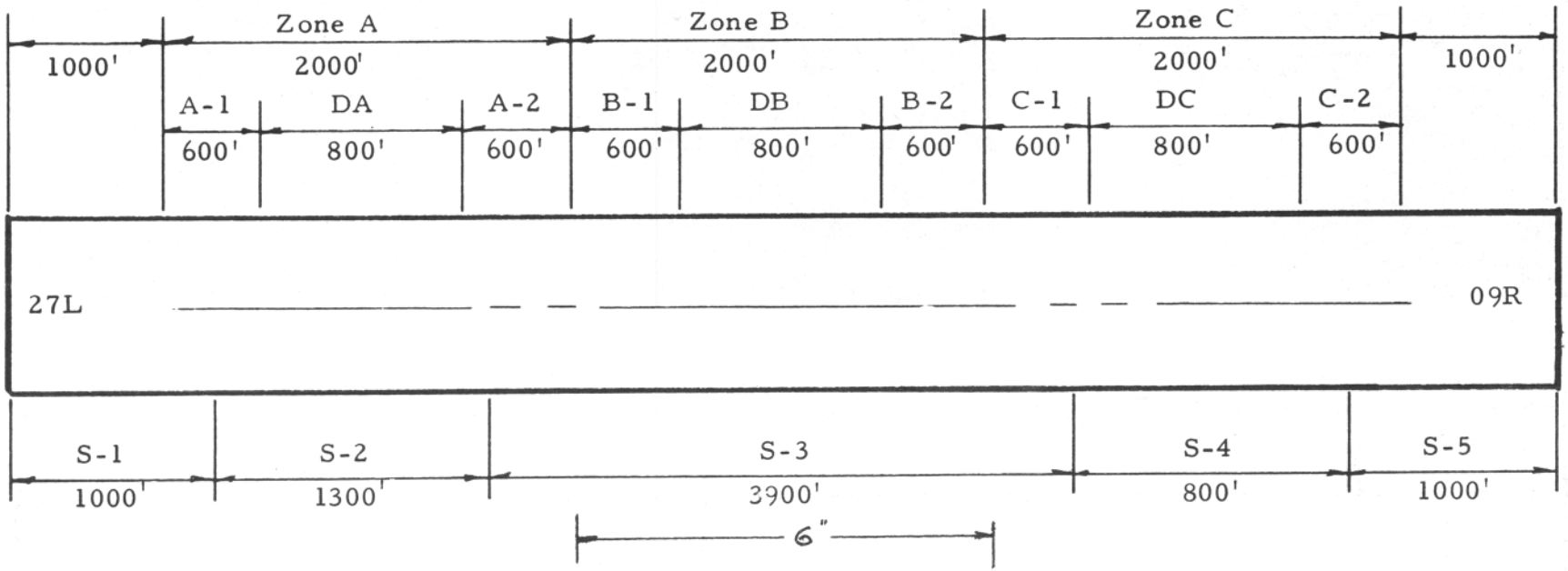


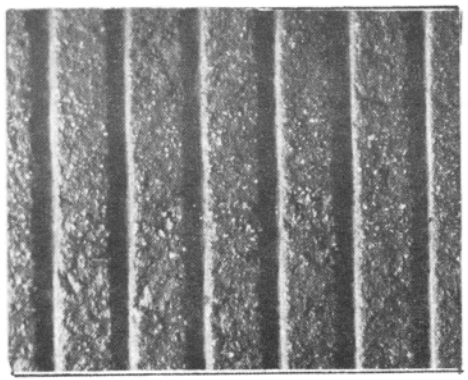
Zone C

Figure B2

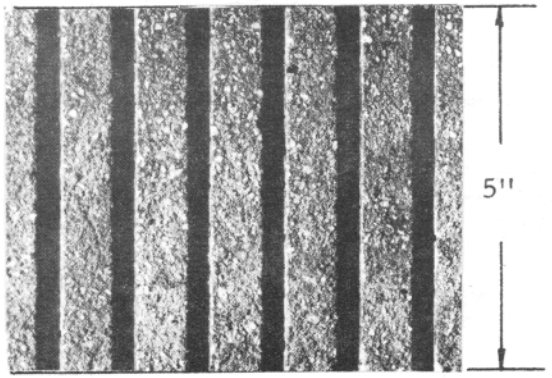
Airport: Atlanta

Runway: 9R-27L

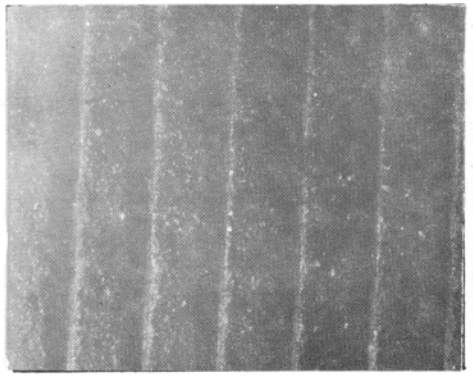




Zone A



Zone B

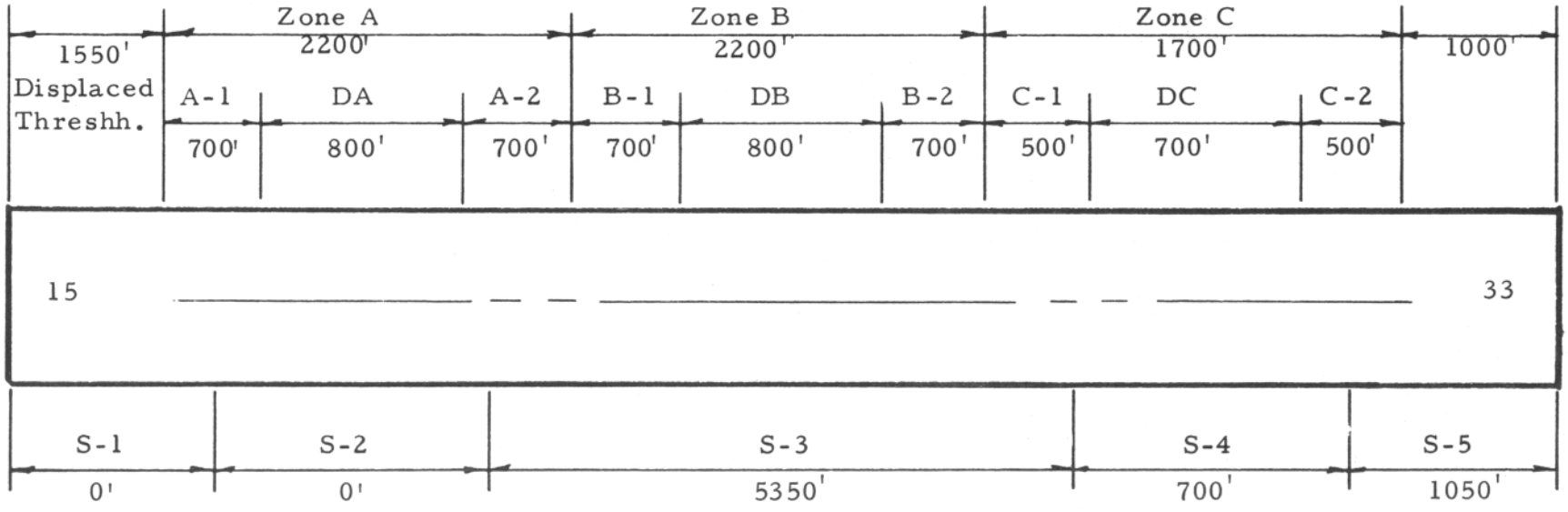


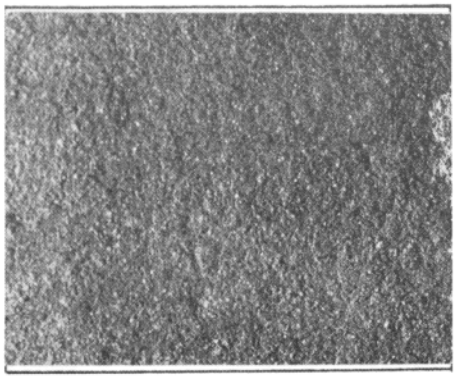
Zone C

Figure B3

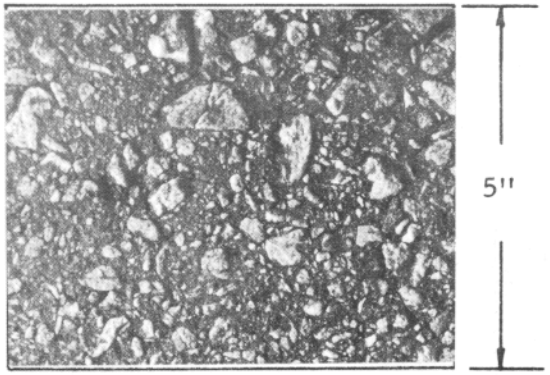
Airport: Atlanta

Runway: 15-33

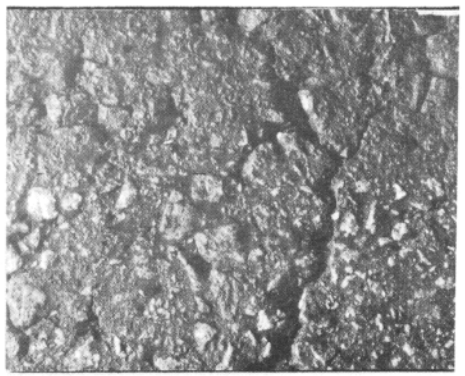




Zone A



Zone B



Zone C

Figure B4

TABLE B1
RUNWAY STATISTICS

Airport: Atlanta

Runway No.	9L-27R	9R-27L	15-33	3-21
Length, ft.	10000	8000	8650	7120
Width, ft.	150	150	150	150
Transverse slope, %	1.5	1.5	1.5	1.5
Effective gradient, %	.55	.42	.20	.35
Pavement surface	PC	PC	AC & PC	AC
Monthly operations	14100	14100	2500	625
Surface condition	Concrete paving at the ends of runway 15-33 had a relatively smooth finish but drainage was fair. Runway 3-21 had a rough surface profile with good drainage. Runway 9R-27L was grooved. There were a few asphalt patches but drainage was excellent. Runway 9L-27R had a good transverse broom finish and good drainage. There were significant rubber deposits in Zone C of 9L-27R and Zone A of 9R-27L.			

Annual precipitation, in. (last 40 years)

highest:	rain - 71	snow - 11
lowest:	rain - 32	snow - none

TABLE B2

RAIN, WIND AND TEMPERATURE DATA

Airport: Atlanta			Date: November 23, 1971	
	Wind		Temperature, °F	
Time	Heading, deg.	Speed, knots	Ambient	Surface
0000	70	6	36	
0100	110	7	36	
0200	100	8	36	
0300	110	10	36	46
0400	110	15	36	
0500	90	17	36	52
0600	100	18	35	52
0700	100	16	35	46
0800	90	16-23 gusts	35	
			Date: November 24, 1971	
0100	80	16	32	
0200	90	14	32	41
0300	100	13	31	41
0400	80	12	31	46
0500	80	11	31	
0600	90	10	31	41
0700	90	10	32	46
0800	80	8	32	

RATE OF RAINFALL NOVEMBER 24, 1971

Time	Rainfall, in./hr.
0235	0.24
0325	0.20
0445	0.24
0530	0.35
0605	0.18

TABLE B3
Water Depth Measurements

Airport: Atlanta		*Runway: 9L-27R				Date: November 24, 1971	
Zone	Time	Water Depth, hundredth inch					Avg. Water Depth (in.)
		1	2	3	4	5	
A	0204	3	2	2	3	2	0.024
	0206	2	1	2	3	2	0.020
	0209	2	1	1	2	1	0.014
	0212	2	2	1	2	2	0.018
	0215	2	2	1	2	1	0.016
	0218	2	1	1	2	1	0.014
	0221	2	1	2	2	2	0.018
	0224	3	2	3	1	2	0.022
	0227	3	2	1	2	1	0.018
	0230	1	2	1	1	2	0.014
	0234	1	2	1	2	1	0.014
B	0247	2	2	2	2	2	0.020
	0248	2	2	2	2	2	0.020
	0252	2	2	3	1	2	0.020
	0256	2	3	2	3	2	0.024
	0301	2	3	2	3	1	0.022
	0305	2	3	1	2	3	0.022
	0308	3	3	2	3	2	0.026
C	0320	2	1	2	3	2	0.020
	0322	2	3	1	1	2	0.018
	0327	2	2	2	1	3	0.020
	0330	3	2	1	3	2	0.022
	0340	3	2	3	2	1	0.022
	0345	2	1	1	2	3	0.018
	0348	1	.5	1	1	2	0.011
	0400	1	1	2	1	1	0.012
	0405	1	.5	1	1	1	0.009
	0408	1	.5	1	.5	1	0.008

*Runway 9R-27L Grooved; No Measurable Depth

TABLE B3
Water Depth Measurements

Airport: Atlanta		Runway: 3-21			Date: November 24, 1971		
Zone	Time	Water Depth, hundredth inch					Avg. Water Depth (in.)
		1	2	3	4	5	
A	0423	3	2	3	2	3	0.026
	0426	3	2	2	3	2	0.024
	0429	2	2	1	2	1	0.016
	0431	1	1	2	1	1	0.012
	0434	3	2	1	1	2	0.018
	0436	2	1	2	2		0.0175
	0440	2	2	2	2	2	0.020
	0443	1	2	1	2	2	0.016
B	0450	2	1	2	3		0.020
	0454	2	3	1	2		0.020
	0457	3	2	1	3		0.0225
	0501	3	3	3	3		0.030
	0504	3	2	4	3	3	0.030
C	0524	7	2	3	7	2	0.042
	0528	6	2	3	4	2	0.034
	0532	3	2	7	2	6	0.040
	0536	3	5	4	6	4	0.044
	0540	4	3	6	5	4	0.038

TABLE B3
Water Depth Measurements

Airport: Atlanta Runway: 15-33 Date: November 24, 1971

Zone	Time	Water Depth, hundredth inch					Avg. Water Depth (in.)
		1	2	3	4	5	
A	0744	3	1	2	2	2	0.020
	0748	3	2	2	1	1	0.018
	0753	1	2	2	2	1	0.016
	0755	2	2	1	2	2	0.018
B	0722	3	2	3	1	2	0.022
	0725	2	4	1	2	1	0.020
	0729	4	3	1	2	1	0.022
	0734	2	3	1	2	1	0.018
C	0711	3	2	3	3	3	0.028
	0714	3	1	4	3	1	0.024
	0717	2	3	3	2	1	0.022

TABLE B4
BASIC DBV DRY SURFACE DATA

AIRPORT Atlanta, Georgia

1971 Date	Run No.	R/W Sect.	R/W Head.	Time of Run Hr-Min	Temp. °F		Primary Instr.		Backup Instr.	
					Amb. Air	R/W Surf.	Brake Speed mph	Stop. Dist. ft.	Brake Speed mph	Stop. Dist. ft.
11/23	41	DA	27R	0250	36	46	61	354	60	348
11/23	42	DB	27R	0316	36	46	59	329	59	327
11/23	43	DC	9L	0350	36	46	63	363	61	364
11/23	44	DA	21	0450	36	52	60	338	59	343
11/23	45	DB	21	0517	36	52	59	358	59	354
11/23	46	DC	3	0535	35	52	60	303	59	306
11/23	47	DA	15	0612	35	52	61	318	60	317
11/23	48	DB	15	0633	35	52	61	320	60	322
11/23	50	DC	33	0647	35	52	61	358	61	359
11/23	51	DA	27L	0708	35	46	61	372	60	370
11/23	52	DB	27L	0730	35	46	61	320	61	317
11/23	54	DC	9R	0736	35	46	59	360	59	359

TABLE B5
BASIC DBV WET SURFACE DATA

AIRPORT Atlanta, Georgia

1971 Date	Run No.	R/W Sect.	R/W Head.	Time of Run Hr-Min	Avg. Water Depth in.	Temp. °F		Primary Instr.		Backup Instr.	
						Amb. Air	R/W Surf.	Brake Speed mph	Stop. Dist. ft.	Brake Speed mph	Stop. Dist. ft.
11/24	98	DC	33	0713	.025	32	46	61	757	60	755
11/24	99	DC	15	0715	.023	32	46	59	767	59	665
11/24	100	DC	33	0716	.023	32	46	61	746	60	739
11/24	101	DC	15	0718	.021	32	46	61	752	60	739
11/24	102	DB	33	0725	.020	32	46	60	487	60	470
11/24	103	DB	15	0728	.018	32	46	62	565	61	528
11/24	104	DB	33	0731	.020	32	46	61	508	61	480
11/24	105	DB	15	0733	.019	32	46	61	557	60	486
11/24	106	DA	33	0747	.018	32	46	59	659	59	597
11/24	107	DA	15	0750	.017	32	46	60	538	60	486
11/24	108	DA	33	0754	.017	32	46	61	658	61	591
11/24	109	DA	15	0757	.018	32	46	61	643	60	560

TABLE B5
BASIC DBV WET SURFACE DATA

AIRPORT Atlanta, Georgia

1971 Date	Run No.	R/W Sect.	R/W Head.	Time of Run Hr-Min	Avg. Water Depth in.	Temp. °F		Primary Instr.		Backup Instr.	
						Amb. Air	R/W Surf.	Brake Speed mph	Stop. Dist. ft.	Brake Speed mph	Stop. Dist. ft.
11/24	55	DA	27R	0204	.024	32	41	61	829	60	824
11/24	57	DA	9L	0211	.010	32	41	61	738	61	739
11/24	58	DA	27R	0219	.013	32	41	59	838	59	840
11/24	59	DA	9L	0220	.012	32	41	61	669	60	665
11/24	62	DB	27R	0249	.020	31	41	60	481	59	475
11/24	63	DB	9L	0250	.020	31	41	60	450	59	449
11/24	64	DB	27R	0253	.020	31	41	60	550	60	544
11/24	65	DB	9L	0304	.022	31	41	61	389	60	385
11/24	66	DC	27R	0323	.017	31	41	61	1112	62	1098
11/24	67	DC	9L	0325	.016	31	41	61	899	60	898
11/24	68	DC	27R	0344	.018	31	41	61	882	60	882
11/24	69	DC	9L	0346	.016	31	41	60	918	59	919
11/24	70	DA	21	0425	.025	31	46	60	602	61	602
11/24	71	DA	3	0426	.024	31	46	61	563	60	560
11/24	72	DA	21	0431	.012	31	46	60	556	59	554
11/24	73	DA	3	0433	.010	31	46	61	604	61	607
11/24	76	DB	21	0452	.020	31	46	60	458	59	459
11/24	77	DB	3	0453	.020	31	46	61	479	62	475

TABLE B5
BASIC DBV WET SURFACE DATA

AIRPORT Atlanta, Georgia

1971 Date	Run No.	R/W Sect.	R/W Head.	Time of Run Hr-Min	Avg. Water Depth in.	Temp. °F		Primary Instr.		Backup Instr.	
						Amb. Air	R/W Surf.	Brake Speed mph	Stop. Dist. ft.	Brake Speed mph	Stop. Dist. ft.
11/24	78	DB	21	0456	.020	31	46	60	544	60	517
11/24	79	DB	3	0457	.020	31	46	61	604	61	570
11/24	80	DC	21	0524	.042	31	46	61	510	62	496
11/24	81	DC	3	0526	.038	31	46	58	513	59	512
11/24	82	DC	21	0528	.034	31	46	59	441	59	428
11/24	83	DC	3	0536	.044	31	46	60	506	60	517
11/24	84	DA	27L	0600	*	31	41	60	762	59	718
11/24	85	DA	9R	0601	GROOVED RUNWAY	31	41	60	764	60	723
11/24	86	DA	27L	0607		31	41	59	751	59	713
11/24	87	DA	9R	0608		31	41	60	741	59	718
11/24	88	DB	27L	0626		31	41	60	387	60	391
11/24	89	DB	9R	0628		32	41	60	378	59	380
11/24	90	DB	27L	0632		32	41	61	389	60	391
11/24	91	DB	9R	0636		32	41	60	431	59	428
11/24	92	DC	27L	0642		32	41	61	446	61	428
11/24	93	DC	9R	0645		32	41	60	514	59	438
11/24	94	DC	27L	0648		32	41	60	655	60	644
11/24	95	DC	9R	0700		32	41	60	484	59	459

*No Measurable Depth

TABLE B6
CORRECTED DBV DATA

AIRPORT Atlanta, Georgia DATE Dry Tests 11/23/71 Wet Tests 11/24/71

RUNWAY 9L-27R SURFACE TYPE Concrete

WEATHER 11/24 Rain - 11/23 Dry WETTING Rain

Wet Test Run No.	Wet Test R/W Head.	Wet Test Run Time	R/W Test Sect.	Avg. Water Depth (in)	Wet Test Temp. (°F)		Stopping Distance		Stopping Distance Ratio (SDR)
					Amb. Air	R/W Surface	Equiv. Dry (ft)	Wet (ft)	
55	27	0204	DA	.024	32	41	335	797	2.38
57	9	0211	DA	.010	32	41	335	715	2.13
58	27	0219	DA	.013	32	41	335	869	2.59
59	9	0220	DA	.012	32	41	335	643	1.92
62	27	0249	DB	.020	31	41	335	475	1.42
63	9	0250	DB	.020	31	41	335	449	1.34
64	27	0253	DB	.020	31	41	335	544	1.62
65	9	0304	DB	.022	31	41	335	372	1.11
66	27	0323	DC	.017	31	41	335	1062	3.17
67	9	0325	DC	.016	31	41	335	869	2.59
68	27	0344	DC	.018	31	41	335	853	2.55
69	9	0346	DC	.016	31	41	335	919	2.74

TABLE B6

CORRECTED DBV DATA

AIRPORT Atlanta, Georgia DATE Dry Tests 11/23/71 Wet Tests 11/24/71

RUNWAY 3-21 SURFACE TYPE Asphalt

WEATHER 11/24 Rain - 11/23 Dry WETTING Rain

Wet Test Run No.	Wet Test R/W Head.	Wet Test Run Time	R/W Test Sect.	Avg. Water Depth (in)	Wet Test Temp. (°F)		Stopping Distance		Stopping Distance Ratio (SDR)
					Amb. Air	R/W Surface	Equiv. Dry (ft)	Wet (ft)	
70	21	0425	DA	.025	31	46	338	602	1.78
71	3	0426	DA	.024	31	46	338	542	1.60
72	21	0431	DA	.012	31	46	338	554	1.64
73	3	0433	DA	.010	31	46	338	587	1.74
76	21	0452	DB	.020	31	46	338	459	1.36
77	3	0453	DB	.020	31	46	338	460	1.36
78	21	0456	DB	.020	31	46	338	517	1.53
79	3	0457	DB	.020	31	46	338	551	1.63
80	21	0524	DC	.042	31	46	338	480	1.42
81	3	0526	DC	.038	31	46	338	548	1.62
82	21	0528	DC	.034	31	46	338	443	1.31
83	3	0536	DC	.044	31	46	338	517	1.53

TABLE B6

CORRECTED DBV DATA

AIRPORT Atlanta, Georgia DATE Dry Tests 11/23/71 Wet Tests 11/24/71

RUNWAY 9R-27L SURFACE TYPE Concrete-Grooved

WEATHER 11/24 Rain - 11/23 Dry WETTING Rain

Wet Test Run No.	Wet Test R/W Head.	Wet Test Run Time	R/W Test Sect.	Avg. Water Depth (in)	Wet Test Temp. (°F)		Stopping Distance		Stopping Distance Ratio (SDR)
					Amb. Air	R/W Surface	Equiv. Dry (ft)	Wet (ft)	
84	27	0600	DA	-	31	41	345	718	2.08
85	9	0601	DA	-	31	41	345	723	2.10
86	27	0607	DA	-	31	41	345	737	2.14
87	9	0608	DA	-	31	41	345	718	2.08
88	27	0626	DB	-	31	41	345	391	1.13
89	9	0628	DB	-	32	41	345	380	1.10
90	27	0632	DB	-	32	41	345	378	1.10
91	9	0636	DB	-	32	41	345	428	1.24
92	27	0642	DC	-	32	41	345	414	1.20
93	9	0645	DC	-	32	41	345	438	1.27
94	27	0648	DC	-	32	41	345	644	1.87
95	9	0700	DC	-	32	41	345	459	1.33

TABLE B6

CORRECTED DBV DATA

AIRPORT Atlanta, Georgia DATE Dry Tests 11/23/71 Wet Tests 11/24/71

RUNWAY 15-33 SURFACE TYPE Asphalt

WEATHER 11/24 Rain - 11/23 Dry WETTING Rain

Wet Test Run No.	Wet Test R/W Head.	Wet Test Run Time	R/W Test Sect.	Avg. Water Depth (in)	Wet Test Temp. (°F)		Stopping Distance		Stopping Distance Ratio (SDR)
					Amb. Air	R/W Surface	Equiv. Dry (ft)	Wet (ft)	
98	33	0713	DC	.025	32	46	322	730	2.27
99	15	0715	DC	.023	32	46	322	688	2.14
100	33	0716	DC	.023	32	46	322	715	2.22
101	15	0718	DC	.021	32	46	322	715	2.22
102	33	0725	DB	.020	32	46	322	470	1.46
103	15	0728	DB	.018	32	46	322	494	1.53
104	33	0731	DB	.020	32	46	322	464	1.44
105	15	0733	DB	.019	32	46	322	470	1.46
106	33	0747	DA	.018	32	46	322	617	1.92
107	15	0750	DA	.017	32	46	322	486	1.51
108	33	0754	DA	.017	32	46	322	572	1.78
109	15	0757	DA	.018	32	46	322	542	1.68

TABLE B7
Mu-Meter Data

Airport: Atlanta			Runway: 9L-27R	Date: November 23, 1971			
Run No.	R/W Heading	Zone	Avg. Water Depth (in.)	Test Time	Speed (mph)	Test Section	Avg. Frict.
1	27R	A	Dry	0252	40	A-1 DA A-2	.75 .76 .77
1-R	9L	A	Dry	0254	40	A-2 DA A-1	.76 .75 .73
2	27R	B	Dry	0317	40	B-1 DB B-2	.80 .79 .77
2-R	9L	B	Dry	0320	40	B-2 DB B-1	.78 .78 .77
3	27R	C	Dry	0354	40	C-1 DC C-2	.78 .76 .77
3-R	9L	C	Dry	0357	40	C-2 DC C-1	.80 .80 .80
						11/24/71	
1	27R	A	0.012	0210	40	A-1 DA A-2	.75 .74 .74
1-R	9L	A	0.010	0211	40	A-2 DA A-1	.76 .73 .74
2	9L	A	0.013	0219	40	A-2 DA A-1	.70 .67 .66
2-R	27R	A	0.012	0220	40	A-1 DA A-2	.68 .65 .68

TABLE B7

Mu-Meter Data

Airport: Atlanta			Runway: 9L-27R	Date: November 24, 1971			
Run No.	R/W Heading	Zone	Avg. Water Depth (in.)	Test Time	Speed (mph)	Test Section	Avg. Frict.
3	27R	A	0.020	0225	20	A-1 DA A-2	.77 .78 .80
3-R	9L	A	0.019	0226	20	A-2 DA A-1	.81 .79 .77
4	27R	A	0.014	0232	60	A-1 DA A-2	.67 .64 .65
4-R	9L	A	0.014	0233	60	A-2 DA A-1	.70 .67 .64
5	27R	B	0.020	0249	40	B-1 DB B-2	.74 .77 .80
5-R	9L	B	0.020	0250	40	B-2 DB B-1	.79 .76 .73
6	27R	B	0.020	0253	20	B-1 DB B-2	.80 .82 .85
6-R	9L	B	0.020	0255	20	B-2 DB B-1	.85 .84 .83
7	27R	B	0.022	0303	60	B-1 DB B-2	.66 .66 .66
7-R	9L	B	0.022	0304	60	B-2 DB B-1	.66 .60 .54
8	27R	C	0.017	0323	40	C-1 DC C-2	.44 .34 .45

TABLE B7
Mu-Meter Data

Airport: Atlanta			Runway: 9L-27R	Date: November 24, 1971			
Run No.	R/W Heading	Zone	Avg. Water Depth (in.)	Test Time	Speed (mph)	Test Section	Avg. Frict.
8-R	9L	C	0.016	0325	40	C-2 DC C-1	.47 .42 .48
9	27R	C	0.018	0344	40	C-1 DC C-2	.62 .50 .58
9-R	9L	C	0.016	0346	40	C-2 DC C-1	.50 .47 .55
10	27R	C	0.012	0400	20	C-1 DC C-2	.74 .70 .72
10-R	9L	C	0.011	0401	20	C-2 DC C-1	.70 .63 .75
11	27R	C	0.009	0405	60	C-1 DC C-2	.44 .36 .40
11-R	9L	C	0.008	0407	60	C-2 DC C-1	.40 .33 .44

TABLE B7
Mu-Meter Data

Airport: Atlanta			Runway: 3-21		Date: November 23, 1971		
Run No.	R/W Heading	Zone	Avg. Water Depth (in.)	Test Time	Speed (mph)	Test Section	Avg. Frict.
5	21	A	Dry	0452	40	A-1 DA A-2	.79 .79 .82
5-R	3	A	Dry	0454	40	A-2 DA A-1	.81 .78 .79
6	21	B	Dry	0518	40	B-1 DB B-2	.82 .83 .81
6-R	3	B	Dry	0521	40	B-2 DB B-1	.80 .81 .81
7	21	C	Dry	0537	40	C-1 DC C-2	.82 .82 .82
7-R	3	C	Dry	0539	40	C-2 DC C-1	.79 .80 .80
						11/24/71	
12	21	A	0.025	0425	40	A-1 DA A-2	.73 .68 .73
12-R	3	A	0.024	0426	40	A-2 DA A-1	.78 .71 .75
13	21	A	0.012	0431	20	A-1 DA A-2	.79 .79 .83
13-R	3	A	0.010	0433	20	A-2 DA A-1	.82 .82 .83

TABLE B7
Mu-Meter Data

Airport: Atlanta			Runway: 3-21		Date: November 24, 1971		
Run No.	R/W Heading	Zone	Avg. Water Depth (in.)	Test Time	Speed (mph)	Test Section	Avg. Frict.
14	21	A	0.017	0437	60	A-1 DA A-2	.64 .55 .65
14-R	3	A	0.020	0440	60	A-2 DA A-1	.56 .52 .60
15	21	B	0.020	0452	40	B-1 DB B-2	.75 .76 .74
15-R	3	B	0.020	0453	40	B-2 DB B-1	.76 .77 .78
16	21	B	0.020	0456	20	B-1 DB B-2	.78 .78 .77
16-R	3	B	0.022	0457	20	B-2 DB B-1	.78 .79 .79
17	21	B	0.030	0501	60	B-1 DB B-2	.68 .66 .68
17-R	3	B	0.030	0502	60	B-2 DB B-1	.73 .73 .76
18	21	C	0.042	0524	40	C-1 DC C-2	.76 .80 .80
18-R	3	C	0.038	0526	40	C-2 DC C-1	.80 .80 .70
19	21	C	0.034	0528	20	C-1 DC C-2	.80 .84 .84

TABLE B7
Mu-Meter Data

Airport: Atlanta			Runway: 3-21		Date: November 24, 1971		
Run No.	R/W Heading	Zone	Avg. Water Depth (in.)	Test Time	Speed (mph)	Test Section	Avg. Frict.
19-R	3	C	0.030	0530	20	C-2 DC C-1	.85 .84 .80
20	21	C	0.034	0535	60	C-1 DC C-2	.60 .74 .71
20-R	3	C	0.044	0536	60	C-2 DC C-1	.68 .71 .62

TABLE B7
Mu-Meter Data

Airport: Atlanta			Runway: 9R-27L		Date: November 23, 1971		
Run No.	R/W Heading	Zone	Avg. Water Depth (in.)	Test Time	Speed (mph)	Test Section	Avg. Frict.
11	27L	A	Dry	0710	40	A-1 DA A-2	.80 .80 .82
11-R	9R	A	Dry	0713	40	A-2 DA A-1	.80 .77 .79
12	27L	B	Dry	0732	40	B-1 DB B-2	.87 .87 .86
12-R	9R	B	Dry	0735	40	B-2 DB B-1	.84 .84 .83
13	27L	C	Dry	0738	40	C-1 DC C-2	.83 .82 .83
13-R	9R	C	Dry	0741	40	C-2 DC C-1	.80 .82 .84
						11/24/71	
21	27L	A	*	0600	40	A-1 DA A-2	.66 .66 .70
21-R	9R	A	*	0601	40	A-2 DA A-1	.64 .64 .64
22	27L	A	*	0607	20	A-1 DA A-2	.75 .73 .80
22-R	9R	A	*	0608	20	A-2 DA A-1	.80 .75 .75

*Grooved - No Measurable Depth

TABLE B7
Mu-Meter Data

Airport: Atlanta		Runway: 9R-27L		Date: November 24, 1971			
Run No.	R/W Heading	Zone	Avg. Water Depth (in.)	Test Time	Speed (mph)	Test Section	Avg. Frict.
23	27L	A	*	0610	60	A-1 DA A-2	.58 .57 .62
23-R	9R	A	*	0612	60	A-2 DA A-1	.55 .55 .57
24	27L	B	*	0626	40	B-1 DB B-2	.78 .78 .79
24-R	9R	B	*	0628	40	B-2 DB B-1	.80 .78 .76
25	27L	B	*	0629	20	B-1 DB B-2	.82 .81 .82
25-R	9R	B	*	0632	20	B-2 DB B-1	.82 .80 .80
26	27L	B	*	0636	60	B-1 DB B-2	.74 .76 .78
26-R	9R	B	*	0638	60	B-2 DB B-1	.80 .76 .75
27	27L	C	*	0642	40	C-1 DC C-2	.82 .80 .75
27-R	9R	C	*	0645	40	C-2 DC C-1	.74 .80 .83
28	27L	C	*	0648	20	C-1 DC C-2	.83 .82 .80

*Grooved - No Measurable Depth

TABLE B7
Mu-Meter Data

Airport: Atlanta			Runway: 9R-27L	Date: November 24, 1971			
Run No.	R/W Heading	Zone	Avg. Water Depth (in.)	Test Time	Speed (mph)	Test Section	Avg. Frict.
28-R	9R	C	*	0651	20	C-2 DC C-1	.79 .83 .84
29	27L	C	*	0654	60	C-1 DC C-2	.80 .74 .70
29-R	9R	C	*	0655	60	C-2 DC C-1	.70 .74 .80

*Grooved - No Measurable Depth

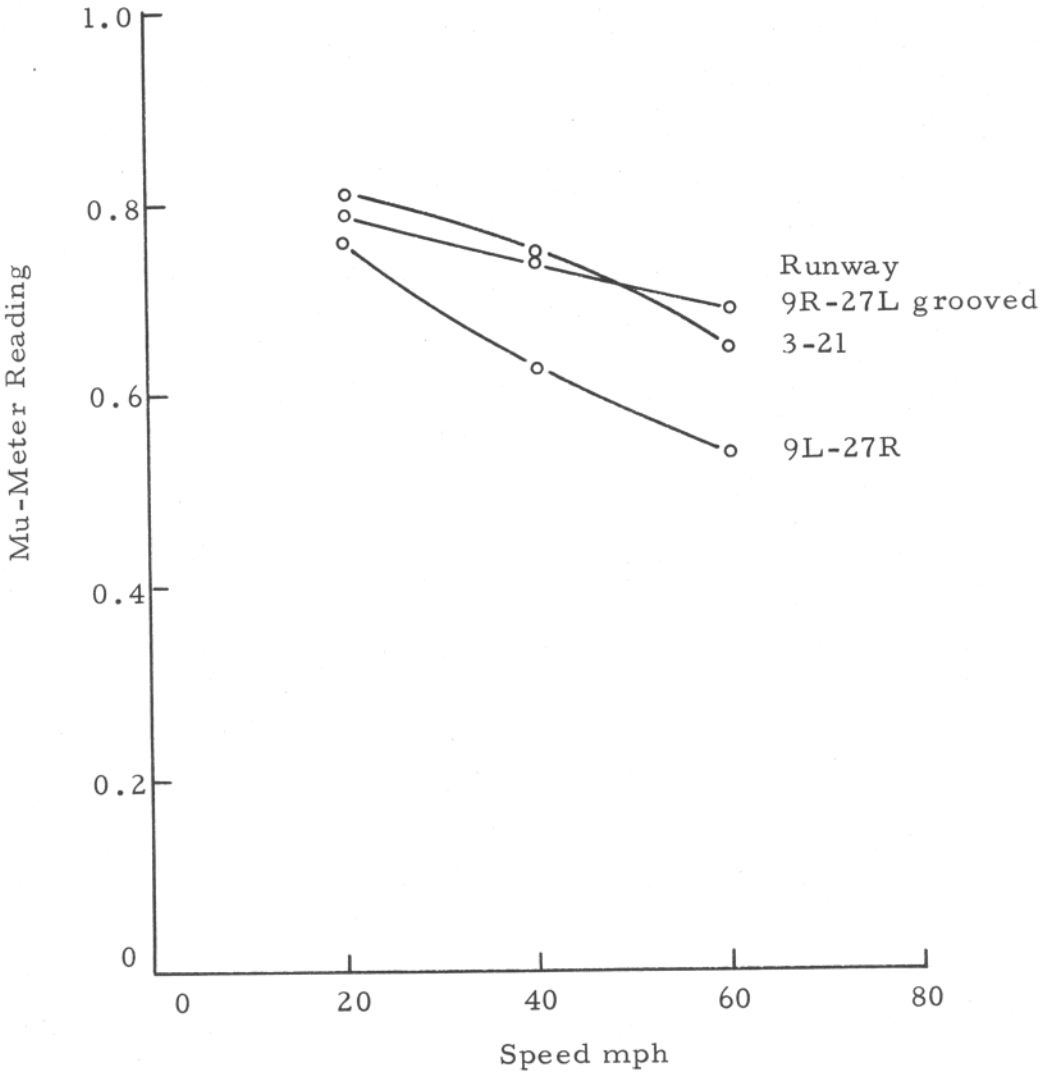
TABLE B7
Mu-Meter Data

Airport: Atlanta			Runway: 15-33		Date: November 23, 1971		
Run No.	R/W Heading	Zone	Avg. Water Depth (in.)	Test Time	Speed (mph)	Test Section	Avg. Frict.
8	15	A	Dry	0615	40	A-1 DA A-2	.84 .87 .84
8-R	33	A	Dry	0618	40	A-2 DA A-1	.83 .85 .81
9	15	B	Dry	0635	40	B-1 DB B-2	.85 .84 .84
9-R	33	B	Dry	0638	40	B-2 DB B-1	.81 .82 .81
10	15	C	Dry	0649	40	C-1 DC C-2	.84 .81 .79
10-R	33	C	Dry	0653	40	C-2 DC C-1	.80 .80 .83
						11/24/71	
30	33	C	0.025	0713	40	C-2 DC C-1	.83 .76 .82
30-R	15	C	0.023	0715	40	C-1 DC C-2	.84 .76 .84
31	33	B	0.020	0725	40	B-2 DB B-1	.82 .80 .76
31-R	15	B	0.018	0728	40	B-1 DB B-2	.74 .78 .82

TABLE B7
Mu-Meter Data

Airport: Atlanta			Runway: 15-33		Date: November 24, 1971		
Run No.	R/W Heading	Zone	Avg. Water Depth (in.)	Test Time	Speed (mph)	Test Section	Avg. Frict.
32	33	A	0.018	0747	40	A-2 DA A-1	.77 .78 .80
32-R	15	A	0.017	0750	40	A-1 DA A-2	.82 .75 .78

Atlanta, Ga.



MU vs. SPEED - WET

Figure B5

APPENDIX C

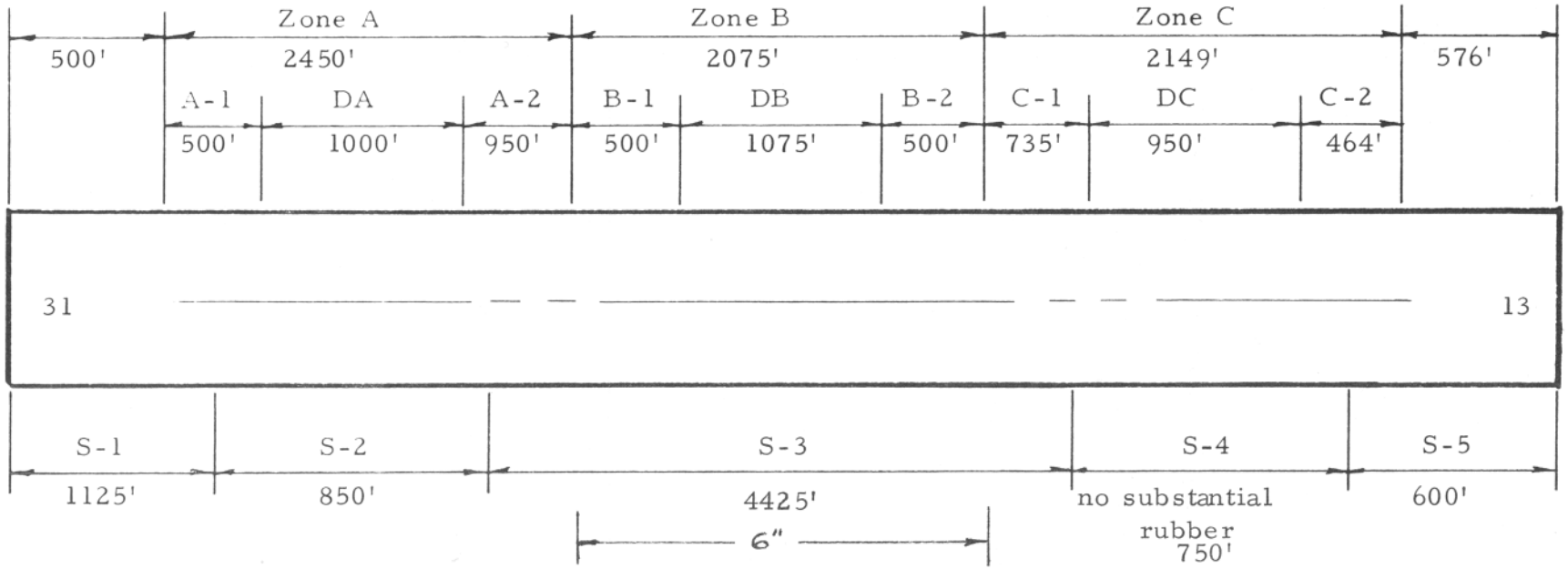
JACKSONVILLE INTERNATIONAL AIRPORT

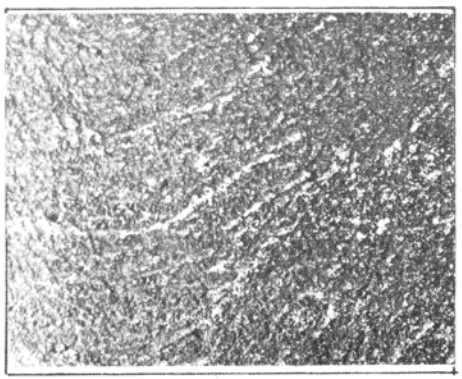
JACKSONVILLE, FLORIDA

Table of Contents

Airport: Jacksonville

Runway: 13-31





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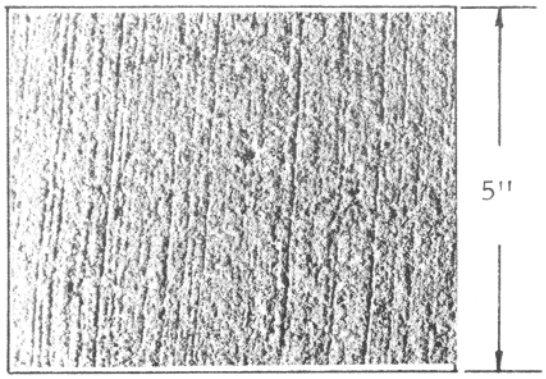
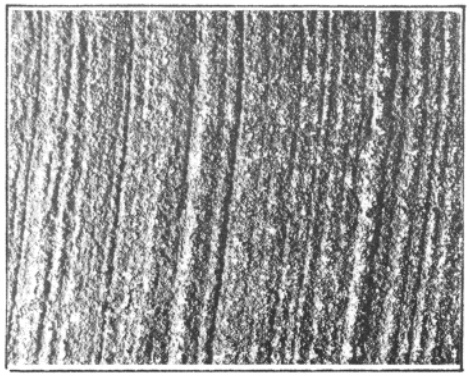


Zone B

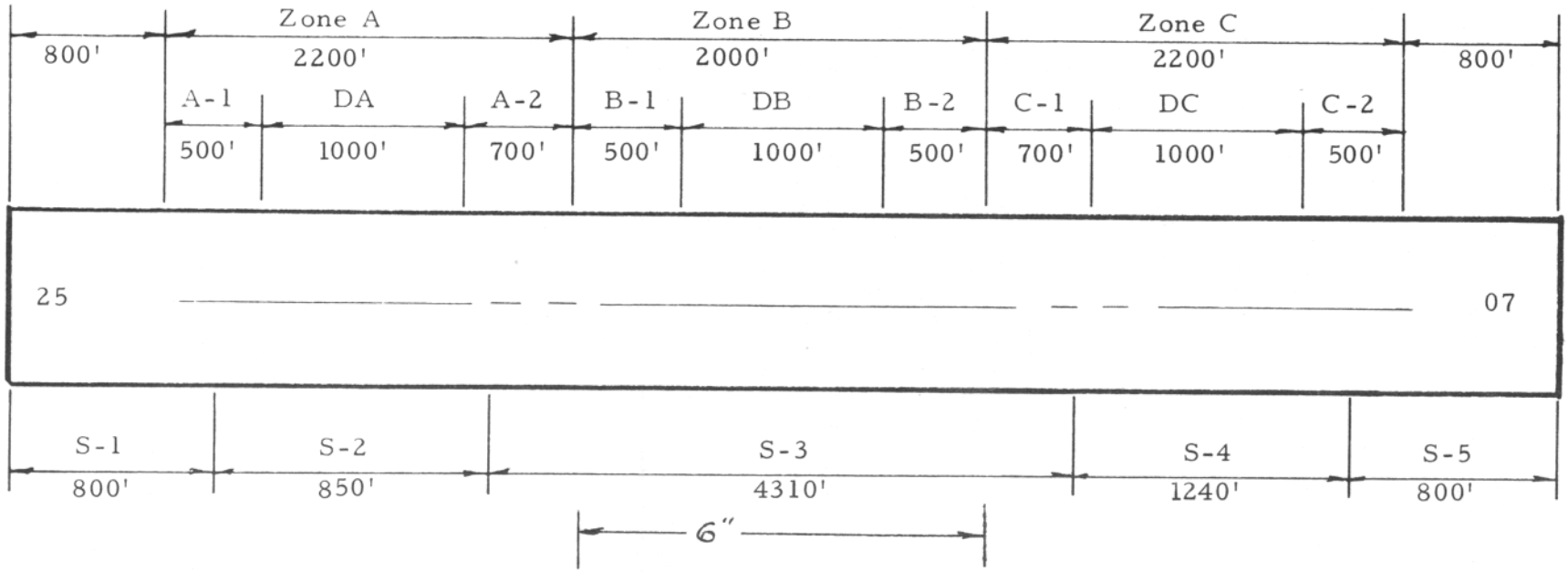


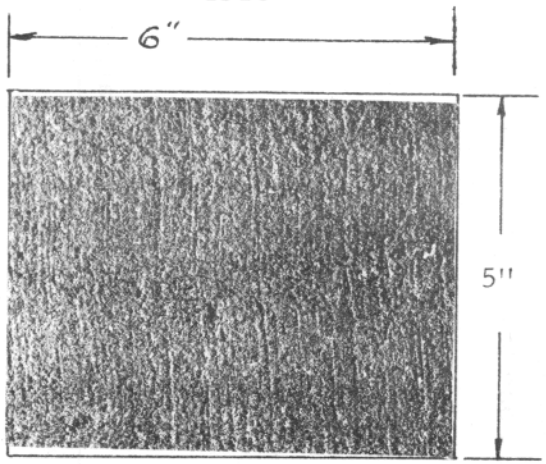
Zone C

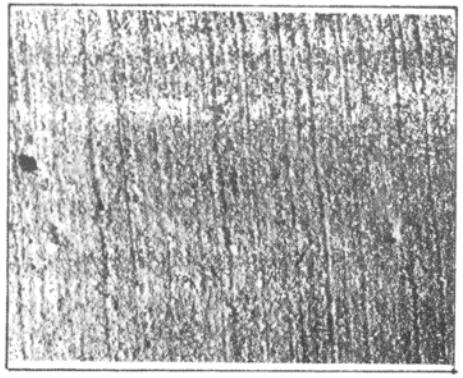
Figure C1

Airport: Jacksonville

Runway: 07-25

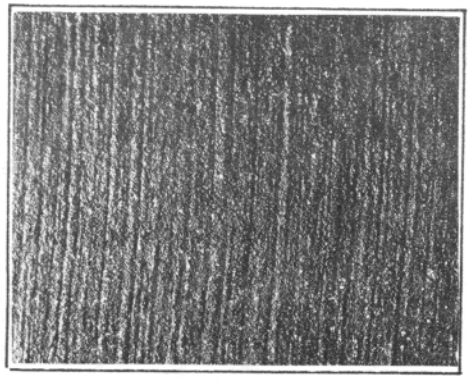






Zone A

Zone B



Zone C

Figure C2

TABLE C1
RUNWAY STATISTICS

Airport: Jacksonville

Runway No.	7-25	13-31
Length, ft.	8000	7750
Width, ft.	150	150
Transverse slope, %	.5	.5
Effective gradient, %	.04	.04
Pavement surface	PC	PC
Monthly operations	4000	4000
Surface condition	Both the Burlap drag finish in Zone A portion of runway 13-31 and the broom finish in the remainder of the two runways resulted in a fair surface texture. Rubber deposits of some significance in Zone C of runway 7-25. Also, some asphalt patches, spalling, and corner breaks. Good drainage on both runways.	

Annual precipitation, in. (last 40 years)

highest:	rain - 68	snow - none
lowest:	rain - 32	snow - none

TABLE C2

RAIN, WIND AND TEMPERATURE DATA

Airport: Jacksonville			Date: November 29, 1971	
	Wind		Temperature, °F	
Time	Heading, deg.	Speed, knots	Ambient	Surface
0800	180	13	66	
0900	190	11	67	
1000	180	12	70	82
1100	180	13-19 gusts	74	82
1200	230	14-20 gusts	76	
1300	220	11-19 gusts	79	
1400	210	8	75	
			Date: November 30, 1971	
0800	230	5	51	
0900	310	5	55	64
1000	310	9	60	
1100	310	8	63	64
1200	310	11	67	
1300	310	7	70	66
1400	330	8	72	

Rainfall - Slight at 11:24 Hours

TABLE C3
Water Depth Measurements

Airport: Jacksonville		Runway: 13-31			Date: November 29, 1971		
Zone	Time	Water Depth, hundredth inch					Avg. Water Depth (in.)
		1	2	3	4	5	
A	0954	5	4	5	5	-	0.047
	0955	4	4	3	4	3	0.036
	1000	6	4	4	3	3	0.040
	1002	3	4	5	4	3	0.038
	1004	4	3	5	4	4	0.040
	1006	3	2	3	2	3	0.026
	1007	4	5	5	4	5	0.046
	1010	4	3	4	5	5	0.042
	1011	5	4	6	3	4	0.044
	1017	5	4	3	5	4	0.042
	1019	4	3	4	3	2	0.032
	1021	3	6	6	7	5	0.054
	1028	3	6	4	2	2	0.032
	1032	3	4	4	5	4	0.040
B	1056	4	3	4	4	3	0.036
	1058	2	3	2	2	2	0.022
	1103	3	2	3	4	3	0.030
	1107	4	3	3	4	5	0.038
	1109	4	2	3	3	2	0.028
	1113	3	2	3	4	3	0.030
	1115	2	1	2	1	2	0.016
	1116	2	6	3	5	4	0.040
	1119	2	3	4	1	3	0.026
	1123	2	3	4	3	3	0.030
	1125	5	1	6	4	4	0.040
	1128	5	6	2	3	4	0.040
	1129	4	1	3	1	2	0.022
	1132	5	3	2	4	4	0.036
	1133	5	2	3	2	2	0.028

TABLE C3
Water Depth Measurements

Airport: Jacksonville	Runway: 13-31	Date: November 29, 1971					
Zone	Time	Water Depth, hundredth inch					Avg. Water Depth (in.)
		1	2	3	4	5	
C	1153	6	6	6	6	6	0.060
	1154	2	2	1	1	1	0.014
	1158	2	2	5	6	-	0.037
	1200	1	1	1	2	2	0.014
	1204	6	2	3	6	2	0.038
	1206	1	2	2	1	2	0.016
	1209	5	3	5	6	4	0.046
	1211	4	4	3	5	3	0.038
	1214	6	6	5	6	-	0.057
	1216	2	1	2	2	1	0.016
	1219	4	4	4	4	4	0.040
	1220	5	4	1	3	1	0.028

TABLE C3

Water Depth Measurements

Airport: Jacksonville		Runway: 7-25				Date: November 30, 1971	
Zone	Time	Water Depth, hundredth inch					Avg. Water Depth (in.)
		1	2	3	4	5	
A	1129	3	3	2	2	2	0.024
	1131	4	4	2	2	1	0.026
	1134	5	5	5	3	4	0.044
	1136	3	1	1	1	4	0.020
	1140	3	2	2	2	2	0.022
	1141	2	2	2	1	1	0.016
	1144	6	3	6	3	3	0.042
	1145	3	3	2	2	3	0.026
	1148	5	4	3	2	4	0.036
	1149	2	2	2	2	2	0.020
	1153	5	5	4	3	5	0.044
	1154	1	3	1	2	2	0.018
B	1159	6	6	4	5		0.0525
	1201	4	4	3	3	2	0.032
	1206	3	5	5	3	3	0.038
	1210	3	3	4	4	4	0.036
	1212	2	2	2	2	2	0.020
	1213	2	2	2	1	1	0.016
	1216	5	5	3	3	5	0.042
	1218	3	2	1	1	1	0.016
	1219	1	1	1	1	1	0.010
	1221	6	5	5	5	4	0.050
	1222	3	4	3	2	2	0.028
	1224	3	3	3	2	2	0.026
	1226	4	4	3	1	3	0.036
	1228	4	3	5	1	2	0.026
	1231	4	4	3	3	3	0.034
	1233	4	3	3	3	2	0.030
	1239	3	3	2	2	2	0.024
	1241	3	2	2	2	2	0.022
	1244	3	3	3	2	2	0.026
	1245	1	2	2	2	2	0.018

TABLE C3
Water Depth Measurements

Airport: Jacksonville	Runway: 7-25	Date: November 30, 1971					
Zone	Time	Water Depth, hundredth inch					Avg. Water Depth (in.)
		1	2	3	4	5	
C	1258	2	5	6	4	3	0.040
	1259	2	2	1	3	1	0.018
	1304	3	2	3	2	3	0.026
	1305	2	1	1	2	1	0.014
	1308	3	4	3	2	4	0.032
	1310	2	2	1	2	2	0.018
	1313	3	4	4	3	4	0.036
	1315	2	2	2	2	3	0.022
	1316	3	2	3	2	3	0.026
	1317	2	2	2	2	2	0.020
	1321	4	2	3	4	3	0.034
	1322	2	3	2	2	2	0.026

TABLE C4
BASIC DBV DRY SURFACE DATA

AIRPORT Jacksonville, Florida

1971 Date	Run No.	R/W Sect.	R/W Head.	Time of Run Hr-Min	Temp. °F		Primary Instr.		Backup Instr.	
					Amb. Air	R/W Surf.	Brake Speed mph	Stop. Dist. ft.	Brake Speed mph	Stop. Dist. ft.
11/30	126	DA	31	0900	55	64	60	318	59	317
11/30	127	DB	31	0908	56	64	61	311	60	312
11/30	128	DC	31	0920	57	64	61	325	60	322
11/30	129	DA	25	1053	63	64	60	335	60	338
11/30	130	DB	25	1103	63	64	59	324	59	327
11/30	131	DC	25	1109	64	64	60	339	60	343

TABLE C5
BASIC DBV WET SURFACE DATA

AIRPORT Jacksonville, Florida

1971 Date	Run No.	R/W Sect.	R/W Head.	Time of Run Hr-Min	Avg. Water Depth in.	Temp. °F		Primary Instr.		Backup Instr.	
						Amb. Air	R/W Surf.	Brake Speed mph	Stop. Dist. ft.	Brake Speed mph	Stop. Dist. ft.
11/29	112	DA	31	0956	.025	69	82	60	919	60	924
11/29	113	DA	13	1000	.040	70	82	61	838	60	787
11/29	114	DA	31	1005	.033	70	82	61	910	60	913
11/29	115	DA	13	1011	.044	71	82	59	730	59	734
11/29	118	DB	31	1056	.036	74	82	59	628	59	628
11/29	119	DB	13	1103	.030	74	82	60	634	59	628
11/29	120	DB	31	1108	.033	74	82	60	717	60	702
11/29	121	DB	13	1115	.016	75	82	60	640	60	618
11/29	122	DC	31	1153	.060	76	82	60	765	60	766
11/29	123	DC	13	1158	.038	76	82	60	767	60	760
11/29	124	DC	31	1204	.038	76	82	61	759	61	755
11/29	125	DC	13	1209	.046	77	82	61	768	61	760
11/30	132	DA	25	1130	.025	65	64	60	803	59	803
11/30	133	DA	7	1135	.032	65	64	61	964	60	961
11/30	134	DA	27	1141	.016	66	65	61	910	60	908
11/30	135	DA	7	1145	.026	66	65	60	846	60	845
11/30	138	DB	25	1201	.032	67	65	60	748	60	744
11/30	139	DB	7	1207	.038	67	65	60	726	59	713

TABLE C5
BASIC DBV WET SURFACE DATA

AIRPORT Jacksonville, Florida

1971 Date	Run No.	R/W Sect.	R/W Head.	Time of Run Hr-Min	Avg. Water Depth in.	Temp. °F		Primary Instr.		Backup Instr.	
						Amb. Air	R/W Surf.	Brake Speed mph	Stop. Dist. ft.	Brake Speed mph	Stop. Dist. ft.
11/30	140	DB	25	1217	.029	68	65	59	642	59	634
11/30	141	DB	7	1222	.028	68	65	59	783	59	713
11/30	142	DC	25	1300	.016	70	66	59	902	59	903
11/30	143	DC	7	1304	.026	70	66	59	968	59	966
11/30	144	DC	25	1308	.032	70	66	61	933	60	919
11/30	145	DC	7	1313	.036	71	66	60	1025	60	1019

TABLE C6
CORRECTED DBV DATA

AIRPORT Jacksonville, Florida DATE 11/30/71, Dry Tests
11/29/71, Wet Tests

RUNWAY 13-31 SURFACE TYPE Concrete

WEATHER Dry except rain at 1124 hours WETTING Truck/Rain

Wet Test Run No.	Wet Test R/W Head.	Wet Test Run Time	R/W Test Sect.	Avg. Water Depth (in)	Wet Test Temp. (°F)		Stopping Distance		Stopping Distance Ratio (SDR)
					Amb. Air	R/W Surface	Equiv. Dry (ft)	Wet (ft)	
112	31	0956	DA	.025	69	82	318	924	2.91
113	13	1000	DA	.040	70	82	319	761	2.39
114	31	1005	DA	.033	70	82	319	883	2.77
115	13	1011	DA	.044	71	82	320	759	2.37
118	31	1056	DB	.036	74	82	324	649	2.00
119	13	1103	DB	.030	74	82	324	628	1.94
120	31	1108	DB	.033	74	82	324	702	2.17
121	13	1115	DB	.016	75	82	325	618	1.90
122	31	1153	DC	.060	76	82	327	766	2.34
123	13	1158	DC	.038	76	82	327	760	2.32
124	31	1204	DC	.038	76	82	327	730	2.23
125	13	1209	DC	.046	77	82	328	735	2.24

TABLE C6
CORRECTED DBV DATA

AIRPORT Jacksonville, Florida DATE 11/30/71

RUNWAY 7-25 SURFACE TYPE Concrete

WEATHER Dry WETTING Truck

Wet Test Run No.	Wet Test R/W Head.	Wet Test Run Time	R/W Test Sect.	Avg. Water Depth (in)	Wet Test Temp. (°F)		Stopping Distance		Stopping Distance Ratio (SDR)
					Amb. Air	R/W Surface	Equiv. Dry (ft)	Wet (ft)	
132	25	1130	DA	.025	65	64	343	803	2.34
133	7	1135	DA	.032	65	64	343	930	2.71
134	25	1141	DA	.016	66	65	344	878	2.55
135	7	1145	DA	.026	66	65	344	845	2.46
138	25	1201	DB	.032	67	65	345	744	2.16
139	7	1207	DB	.038	67	65	345	713	2.07
140	25	1217	DB	.029	68	65	346	656	1.90
141	7	1222	DB	.028	68	65	346	737	2.13
142	25	1300	DC	.016	70	66	349	934	2.68
143	7	1304	DC	.026	70	66	349	999	2.86
144	25	1308	DC	.032	70	66	349	889	2.55
145	7	1313	DC	.036	71	66	350	1019	2.91

TABLE C7

Mu-Meter Data

Airport: Jacksonville	Runway: 13-31		Date: November 30, 1971				
Run No.	R/W Heading	Zone	Avg. Water Depth (in.)	Test Time	Speed (mph)	Test Section	Avg. Frict.
1	31	A	Dry	0905	40	A-1 DA A-2	.93 .91 .92
1-R	13	A	Dry	0910	40	A-2 DA A-1	.90 .90 .92
2	31	B	Dry	0914	40	B-1 DB B-2	.92 .91 .92
2-R	13	B	Dry	0918	40	B-2 DB B-1	.93 .93 .93
3	31	C	Dry	0922	40	C-1 DC C-2	.91 .89 .89
3-R	31	C	Dry	0925	40	C-2 DC C-1	.90 .90 .92
						11/29/71	
1	31	A	0.025	0956	40	A-1 DA A-2	.45 .42 .43
1-R	13	A	0.040	1000	40	A-2 DA A-1	.50 .45 .47
2	31	A	0.033	1005	20	A-1 DA A-2	.72 .74 .70
2-R	13	A	0.044	1011	20	A-2 DA A-1	.72 .72 .75

TABLE C7
Mu-Meter Data

Airport: Jacksonville	Runway: 13-31	Date: November 29, 1971					
Run No.	R/W Heading	Zone	Avg. Water Depth (in.)	Test Time	Speed (mph)	Test Section	Avg. Frict.
3	31	A	0.042	1017	60	A-1 DA A-2	.27 .26 .30
3-R	13	A	0.054	1021	60	A-2 DA A-1	.31 .25 .27
4	31	A	0.038	1026	60	A-1 DA A-2	.26 .25 .30
4-R	13	A	0.032	1028	60	A-2 DA A-1	.25 .23 .24
5	31	B	0.036	1056	40	B-1 DB B-2	.47 .45 .49
5-R	13	B	0.030	1103	40	B-2 DB B-1	.46 .49 .50
6	31	B	0.033	1108	20	B-1 DB B-2	.67 .70 .71
6-R	13	B	0.016	1115	20	B-2 DB B-1	.74 .71 .68
7	31	B	0.026	1119	60	B-1 DB B-2	.32 .32 .33
7-R	13	B	0.012	1122	60	B-2 DB B-1	.23 .31 .40
8	31	B	0.040	1128	80	B-1 DB B-2	.27 .31 .25

TABLE C7
Mu-Meter Data

Airport: Jacksonville	Runway: 13-31		Date: November 29, 1971				
Run No.	R/W Heading	Zone	Avg. Water Depth (in.)	Test Time	Speed (mph)	Test Section	Avg. Frict.
8-R	13	B	0.020	1130	80	B-2 DB B-1	.15 .29 .37
9	31	C	0.060	1153	40	C-1 DC C-2	.49 .47 .45
9-R	13	C	0.038	1158	40	C-2 DC C-1	.48 .49 .48
10	31	C	0.038	1204	20	C-1 DC C-2	.69 .69 .69
10-R	13	C	0.046	1209	20	C-2 DC C-1	.70 .69 .72
11	31	C	0.057	1214	60	C-1 DC C-2	.31 .39 .43
11-R	13	C	0.040	1219	60	C-2 DC C-1	.29 .31 .32

TABLE C7
Mu-Meter Data

Airport: Jacksonville	Runway: 7-25	Date: November 30, 1971					
Run No.	R/W Heading	Zone	Avg. Water Depth (in.)	Test Time	Speed (mph)	Test Section	Avg. Frict.
4	25	A	Dry	1057	40	A-1 DA A-2	.90 .92 .92
4-R	7	A	Dry	1100	40	A-2 DA A-1	.92 .92 .90
5	25	B	Dry	1105	40	B-1 DB B-2	.95 .95 .94
5-R	7	B	Dry	1108	40	B-2 DB B-1	.94 .93 .93
6	25	C	Dry	1111	40	C-1 DC C-2	.93 .90 .88
6-R	7	C	Dry	1113	40	C-2 DC C-1	.89 .90 .92
7	25	A	0.025	1130	40	A-1 DA A-2	.40 .45 .45
7-R	7	A	0.032	1135	40	A-2 DA A-1	.46 .37 .42
8	25	A	0.016	1141	20	A-1 DA A-2	.65 .72 .78
8-R	7	A	0.026	1145	20	A-2 DA A-1	.76 .69 .62
9	25	A	0.016	1150	60	A-1 DA A-2	.27 .29 .33

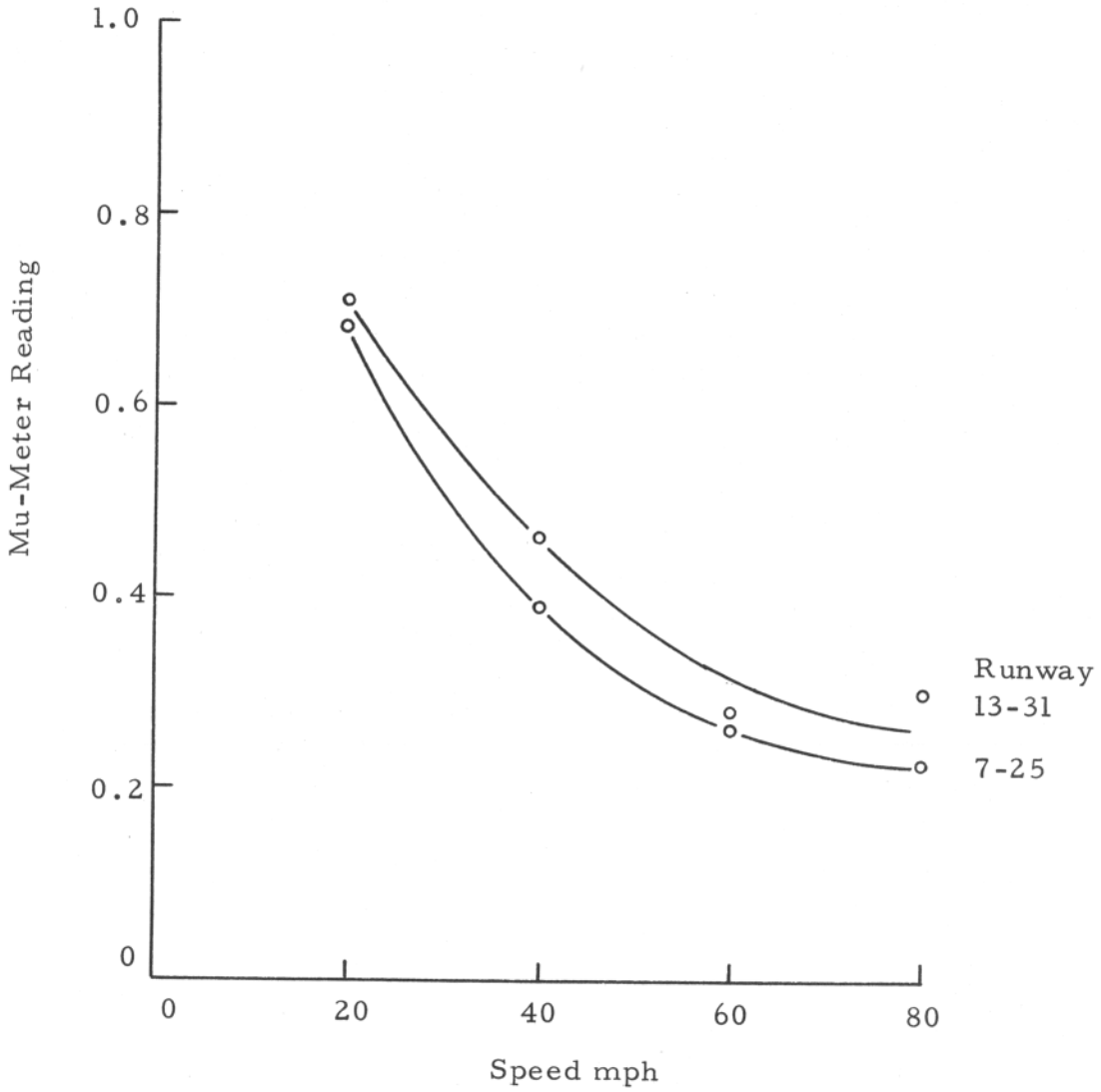
TABLE C7
Mu-Meter Data

Airport: Jacksonville	Runway: 7-25		Date: November 30, 1971				
Run No.	R/W Heading	Zone	Avg. Water Depth (in.)	Test Time	Speed (mph)	Test Section	Avg. Frict.
9-R	7	A	0.016	1155	60	A-2 DA A-1	.33 .26 .24
10	25	B	0.032	1201	40	B-2 DB B-1	.46 .45 .50
10-R	7	B	0.038	1207	40	B-2 DB B-1	.44 .42 .43
11	25	B	0.028	1211	20	B-1 DB B-2	.76 .77 .72
11-R	7	B	0.029	1217	20	B-2 DB B-1	.68 .69 .73
12	25	B	0.028	1222	60	B-1 DB B-2	.32 .29 .30
12-R	7	B	0.031	1227	60	B-2 DB B-1	.32 .28 .26
13	25	B	0.030	1233	80	B-1 DB B-2	.26 .25 .30
13-R	7	B	0.026	1244	80	B-2 DB B-1	.27 .20 .21
14	25	C	0.016	1300	40	C-1 DC C-2	.42 .32 .32
14-R	7	C	0.026	1304	40	C-2 DC C-1	.29 .33 .47

TABLE C7
Mu-Meter Data

Airport: Jacksonville	Runway: 7-25		Date: November 30, 1971				
Run No.	R/W Heading	Zone	Avg. Water Depth (in.)	Test Time	Speed (mph)	Test Section	Avg. Frict.
15	25	C	0.032	1308	20	C-1 DC C-2	.64 .60 .58
15-R	7	C	0.036	1313	20	C-2 DC C-1	.60 .62 .66
16	25	C	0.026	1316	60	C-1 DC C-2	.32 .24 .21
16-R	7	C	0.034	1321	60	C-2 DC C-1	.16 .20 .31

Jacksonville, Fla.



MU vs. SPEED - WET

Figure C3

APPENDIX D

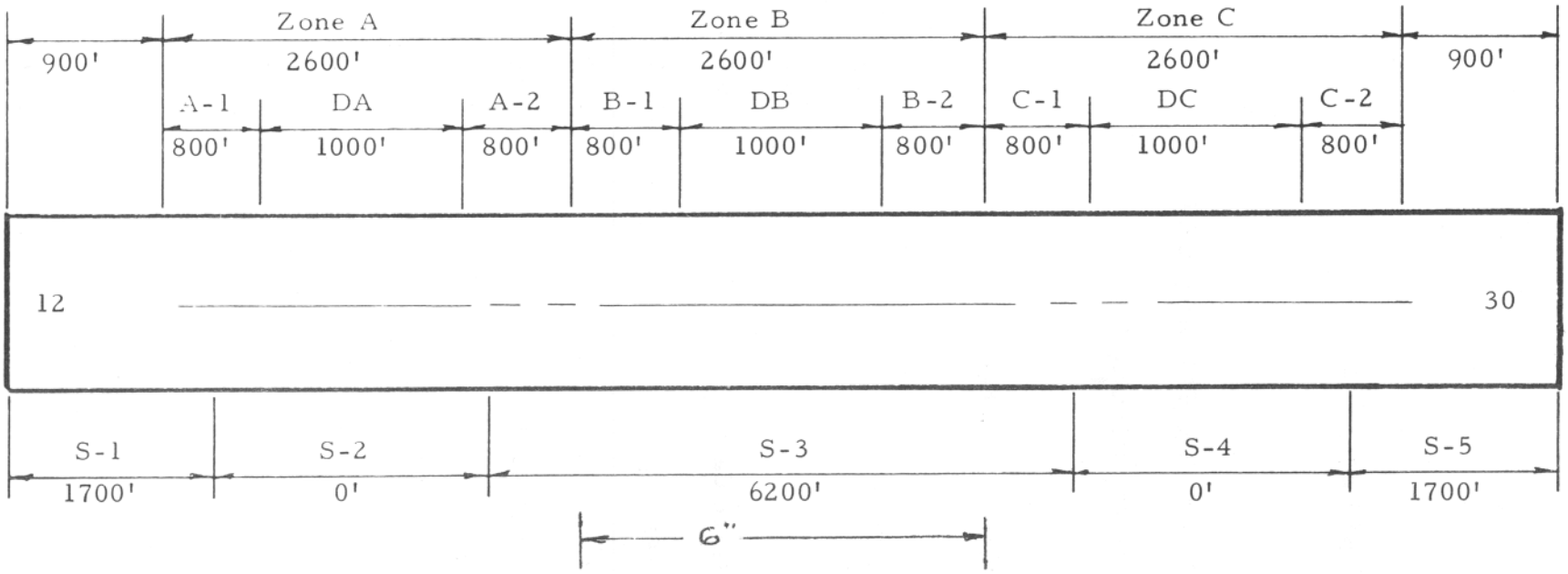
MIAMI INTERNATIONAL AIRPORT

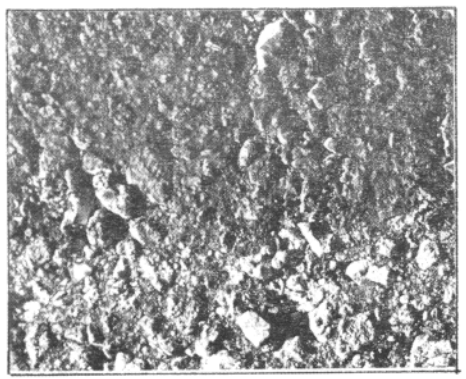
MIAMI, FLORIDA

Table of Contents

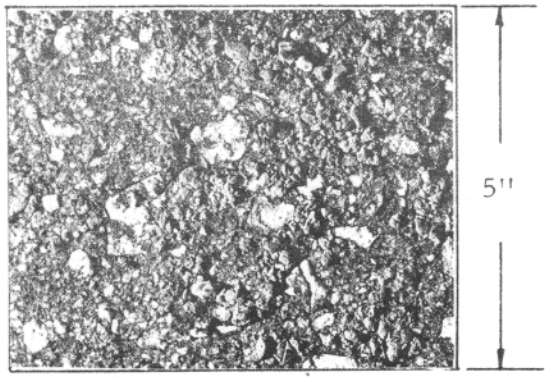
Airport: Miami

Runway: 12-30

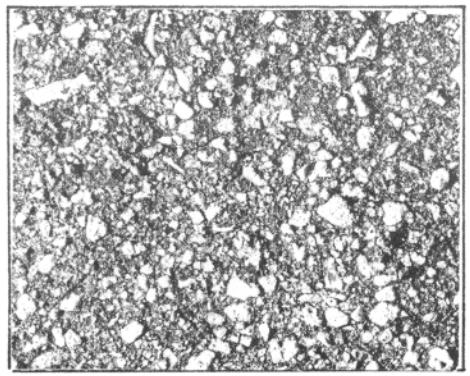




Zone A



Zone B

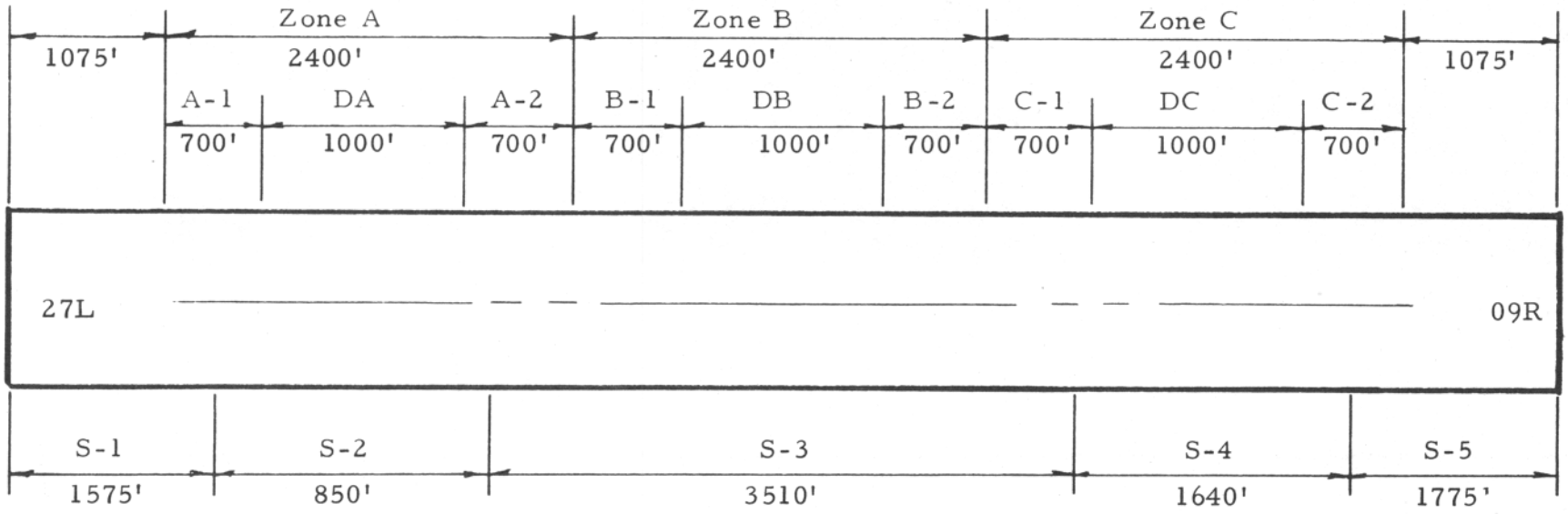


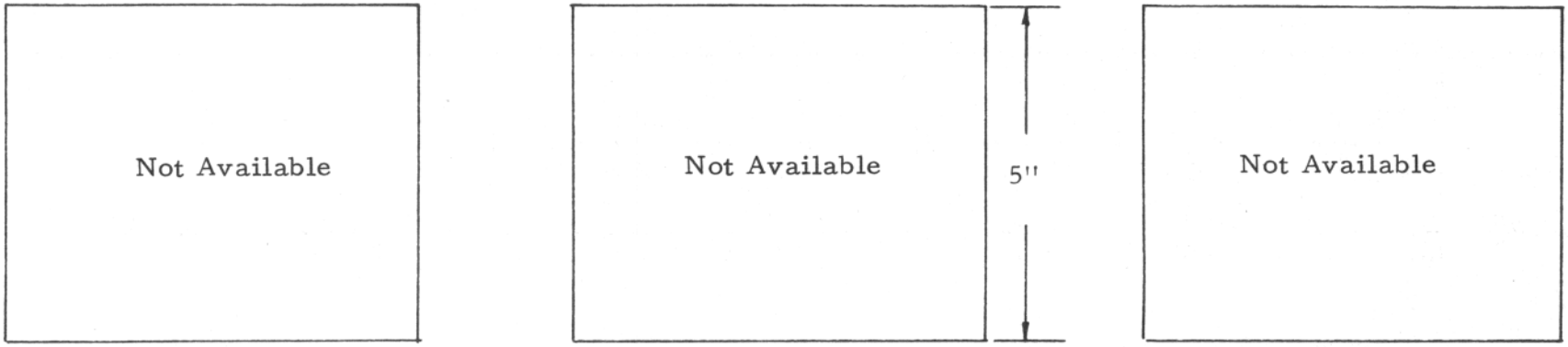
Zone C

Figure D1

Airport: Miami

Runway: 9R-27L





Zone A

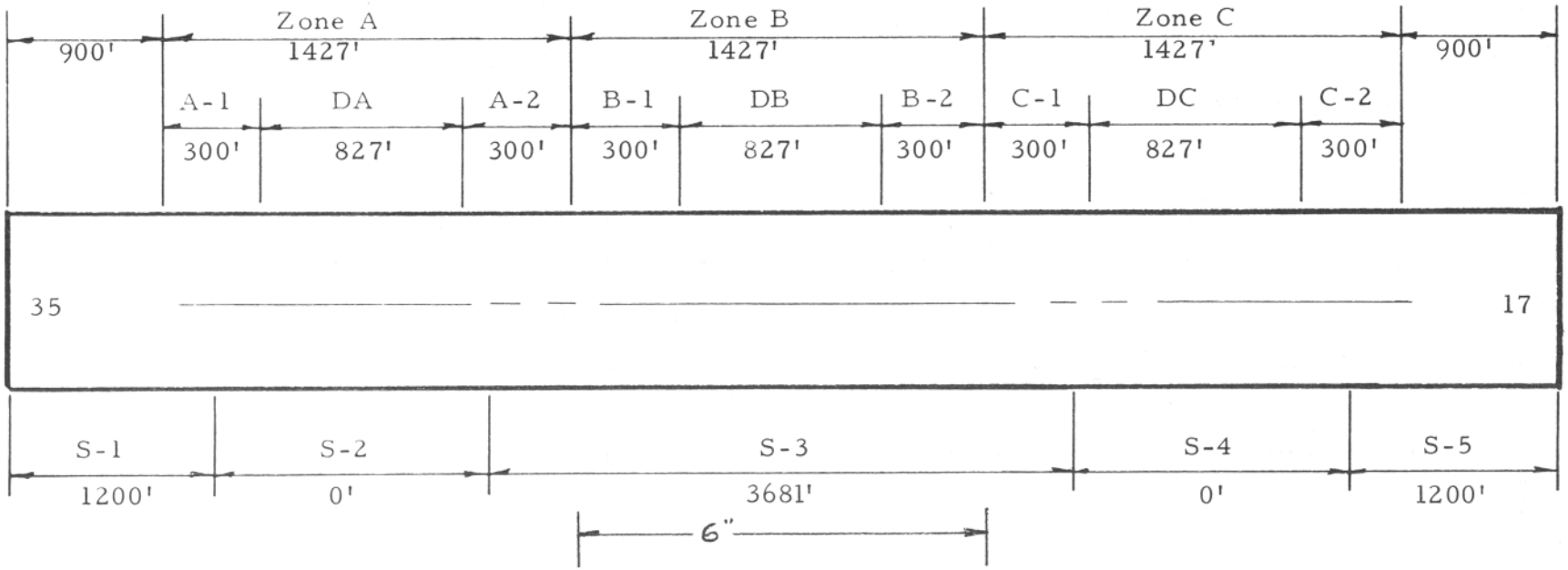
Zone B

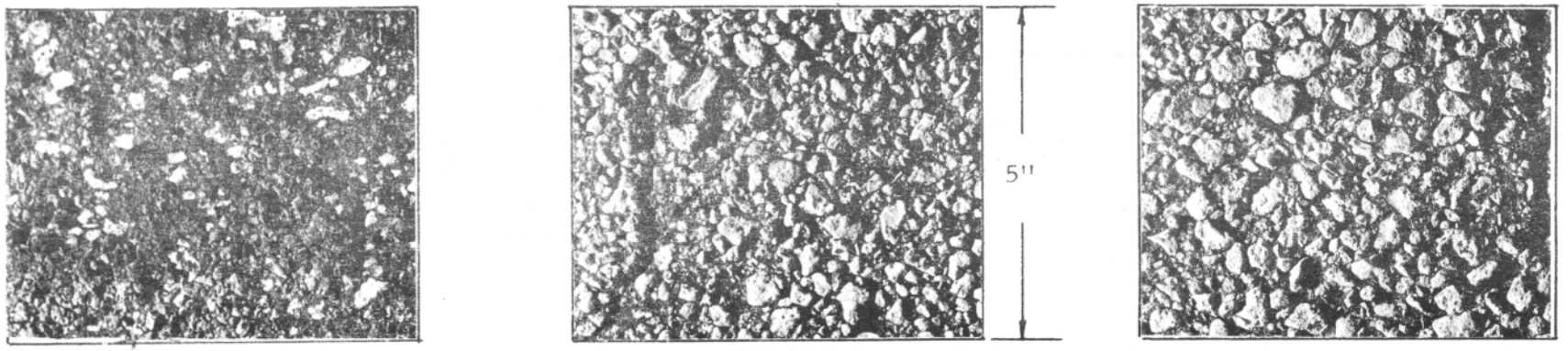
Zone C

Figure D2

Airport: Miami

Runway: 17-35





Zone A

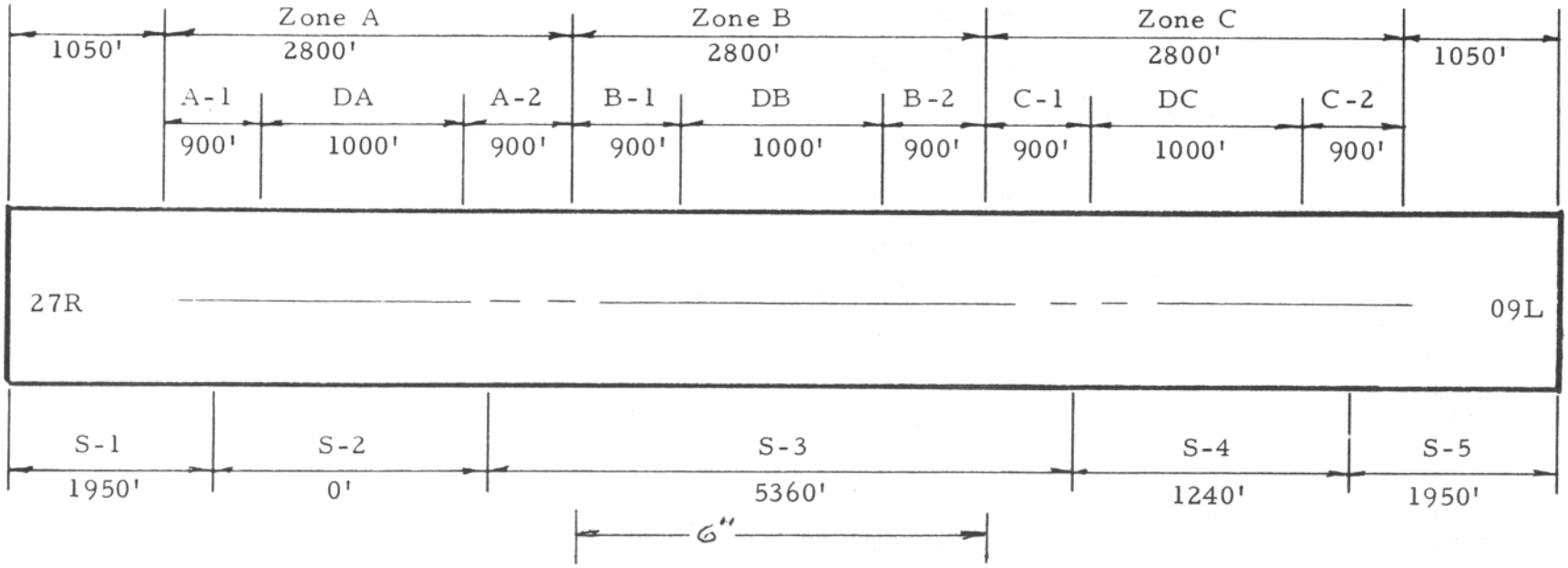
Zone B

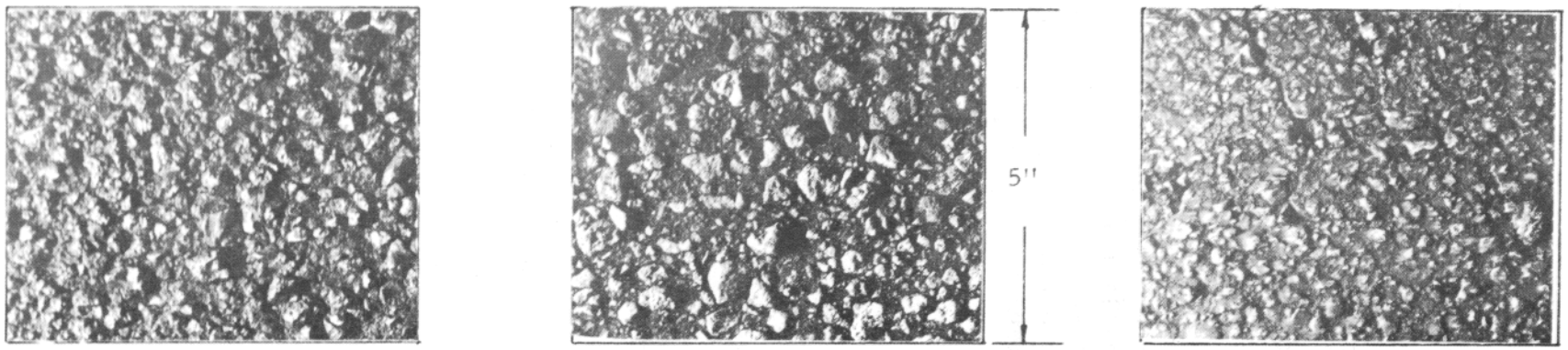
Zone C

Figure D3

Airport: Miami

Runway: 9L-27R





Zone A

Zone B

Zone C

Figure D4

TABLE D1
RUNWAY STATISTICS

Airport: Miami

Runway No.	9L-27R	9R-27L	17-35	12-30
Length, ft.	10500	9350	6081	9600
Width, ft.	150	150	150	150
Transverse slope, %	1	1	1	1
Effective gradient, %	0	.02	.05	0
Pavement surface	AC	AC	AC	AC
Monthly operations	8860	6480	none	6260
Surface condition	Asperities were good for all runways. Significant rubber deposits in Zone C of runways 9L-27R and 9R-27L. Some longitudinal and transverse cracking but no apparent problems with drainage.			

Annual precipitation, in. (last 40 years)

highest:	rain - 60	snow - none
lowest:	rain - 37	snow - none

TABLE D2

RAIN, WIND AND TEMPERATURE DATA

Airport: Miami			Date: December 6, 1971	
	Wind		Temperature °F	
Time	Heading, deg	Speed, knots	Ambient	Surface
0000	80	6	72	
0100	90	6	71	77
0200	90	5	70	
0300	80	4	70	75
0400	80	5	70	
0500	80	5	70	
0600	70	5	69	
			Date: December 7, 1971	
0000	90	9	75	
0100	90	5	75	79
0200	100	5	75	79
0300	120	6	75	80
0400	110	7	75	
0500	120	6	75	
0600	120	5	74	
			Date: December 8, 1971	
0000	110	4	75	77
0100	100	3	74	77
0200	120	4	74	77
0300	90	4	73	77
0400	60	5	73	77
0500	80	4	72	77

Rainfall - None During Tests; Damp from Prior Rain

TABLE D3
Water Depth Measurements

Airport: Miami		Runway: 12-30			Date: December 6, 1971		
Zone	Time	Water Depth, hundredth inch					Avg. Water Depth (in.)
		1	2	3	4	5	
A	0129	6	5	6	3	5	0.050
	0131	1	2	2	1	2	0.016
	0134	1	2	3	1	3	0.020
	0136	3	4	4	3	5	0.038
	0139	2	2	3	2	3	0.024
	0140	2	1	2	1	2	0.016
	0150	7	6	2	4	5	0.048
	0152	6	1	4	5	3	0.038
	0155	7	6	1	3	2	0.038
B	0200	6	4	5	6	3	0.048
	0204	4	6	1	2	5	0.036
	0206	4	7	5	1	4	0.042
	0210	4	5	4	3	6	0.044
	0212	6	5	1	9	7	0.058
	0214	5	5	4	6	5	0.050
	0217	6	6	7	5	3	0.054
	0218	5	4	2	3	4	0.036
	0220	7	4	6	1	5	0.046
C	0325	7	7	2	2	5	0.046
	0326	2	2	4	2	4	0.028
	0328	3	4	2	2	3	0.028
	0332	6	8	3	8	6	0.062
	0334	2	2	3	2	4	0.026
	0335	5	4	3	3	2	0.034
	0337	5	3	3	3	2	0.032
	0338	3	5	4	2	3	0.034
	0340	4	5	3	2	4	0.036

TABLE D3
Water Depth Measurements

Airport: Miami		Runway: 9R-27L		Date: December 7, 1971			
Zone	Time	Water Depth, hundredth inch					Avg. Water Depth (in.)
		1	2	3	4	5	
A	0031	5	4	3	3	4	0.038
	0034	5	4	3	3	3	0.036
	0035	4	4	3	2	2	0.030
	0037	2	2	7	3	3	0.034
	0038	4	4	3	3	3	0.034
	0040	3	3	3	3	3	0.030
	0042	7	5	7	6	5	0.060
	0044	5	4	5	4	4	0.044
	0045	3	3	3	3	3	0.030
B	0055	4	3	4	3	4	0.036
	0057	4	3	2	2	2	0.026
	0058	4	3	4	3	2	0.032
	0105	4	3	4	3	3	0.034
	0106	4	3	3	3	4	0.034
	0107	4	2	1	2	4	0.026
	0110	4	5	4	4	4	0.042
	0111	4	3	3	3	3	0.032
	0114	4	3	3	3	3	0.032
C	0121	4	5	5	5	4	0.046
	0122	5	5	5	5	5	0.050
	0125	4	5	4	5	4	0.044
	0127	5	5	5	4	6	0.050
	0128	4	3	4	3	4	0.036
	0131	4	3	3	4	3	0.034
	0134	4	4	4	3	4	0.038
	0136	4	4	3	3	3	0.034
	0137	4	4	3	4	4	0.038

NOTE: Prewetted by Rain

TABLE D3
Water Depth Measurements

Airport: Miami		Runway: 17-35			Date: December 7, 1971		
Zone	Time	Water Depth, hundredth inch					Avg. Water Depth (in.)
		1	2	3	4	5	
A	0249	4	6	4	4	5	0.044
	0251	3	2	2	3	3	0.026
	0252	3	2	3	4	3	0.030
	0254	4	5	5	3	3	0.040
	0257	3	4	4	2	3	0.032
	0258	6	4	1	4	2	0.034
	0259	7	4	6	1	3	0.042
	0300	6	1	7	4	2	0.040
	0301	4	3	7	6	1	0.042
B	0317	4	5	5	4	3	0.042
	0319	7	8	3	1	3	0.044
	0320	4	7	3	1	5	0.040
	0322	7	9	1	3	1	0.042
	0323	9	7	1	5	10	0.064
	0324	6	1	3	9	4	0.046
	0326	7	5	5	10	10	0.074
	0328	6	5	4	5	6	0.052
	0330	6	4	1	1	1	0.034
C	0347	10	10	5	4	3	0.064
	0349	5	4	4	3	4	0.040
	0350	4	4	9	6	3	0.052
	0352	4	5	4	3	4	0.040
	0354	10	10	4	1	6	0.062
	0356	3	1	4	5	4	0.034
	0357	5	4	3	4	6	0.044
	0359	5	1	4	4	6	0.040
	0360	4	3	1	2	4	0.028

NOTE: Prewetted by Rain

TABLE D3
Water Depth Measurements

Airport: Miami		Runway: 9L-27R		Date: December 8, 1971			
Zone	Time	Water Depth, hundredth inch					Avg. Water Depth (in.)
		1	2	3	4	5	
A	0410	5	4	3	4	3	0.038
	0412	3	4	4	4	2	0.034
	0413	3	2	4	2	3	0.028
	0414	3	6	2	4	3	0.036
	0416	4	1	10	5	2	0.044
	0417	7	0	4	10	2	0.046
	0418	10	7	1	0	4	0.044
	0420	10	7	3	1	3	0.048
	0422	9	10	7	5	1	0.054
B	0429	5	5	5	6	5	0.052
	0431	6	5	5	5	5	0.052
	0434	6	3	4	2	5	0.050
	0435	6	1	5	4	5	0.042
	0437	6	3	4	4	2	0.038
	0439	5	4	4	7	1	0.042
	0441	5	6	7	3	3	0.048
	0442	10	5	4	3	6	0.056
	0444	8	4	4	3	3	0.044
C	0449	6	3	3	3	3	0.036
	0450	5	4	4	6	3	0.044
	0451	5	3	6	3	4	0.042
	0455	7	4	4	5	6	0.052
	0458	5	4	3	3	3	0.036
	0500	7	5	3	4	2	0.042
	0501	5	4	4	4	4	0.042
	0502	4	3	5	4	4	0.040
	0503	5	4	3	2	4	0.036

TABLE D4
BASIC DBV DRY SURFACE DATA

AIRPORT Miami, Florida

1971 Date	Run No.	R/W Sect.	R/W Head.	Time of Run Hr-Min	Temp. °F		Primary Instr.		Backup Instr.	
					Amb. Air	R/W Surf.	Brake Speed mph	Stop. Dist. ft.	Brake Speed mph	Stop. Dist. ft.
12/6	146	DA	12	0044	71	77	61	330	60	333
12/6	147	DB	12	0050	71	77	61	333	61	338
12/6	158	DC	12	0307	70	75	59	306	58	306
12/8	191	DA	27L	0021	75	77	61	335	60	338
12/8	192	DB	27L	0033	74	77	61	362	60	364
12/8	193	DC	27L	0035	74	77	60	353	60	354
12/8	194	DA	35	0153	74	77	61	370	61	370
12/8	195	DB	35	0205	74	77	61	365	62	364
12/8	196	DC	35	0238	73	77	63	365	62	364
12/8	197	DA	27R	0323	73	77	60	327	60	327
12/8	198	DB	27R	0324	73	77	61	336	61	333
12/8	199	DC	27R	0326	73	77	60	330	60	327

TABLE D5
BASIC DBV WET SURFACE DATA

AIRPORT Miami, Florida

1971 Date	Run No.	R/W Sect.	R/W Head.	Time of Run Hr-Min	Avg. Water Depth in.	Temp. °F		Primary Instr.		Backup Instr.	
						Amb. Air	R/W Surf.	Brake Speed mph	Stop. Dist. ft.	Brake Speed mph	Stop. Dist. ft.
12/6	150	DA	12	0134	.020	71	77	60	613	59	612
12/6	151	DA	30	0139	.024	70	76	60	677	60	676
12/6	152	DA	12	0150	.048	70	76	59	649	59	649
12/6	153	DA	30	0151	.043	70	76	61	639	60	634
12/6	154	DB	12	0205	.033	70	76	61	519	60	517
12/6	155	DB	30	0213	.054	70	76	60	499	60	502
12/6	156	DB	12	0217	.054	70	76	62	585	61	586
12/6	157	DB	30	0219	.040	70	76	59	471	59	465
12/6	159	DC	12	0325	.046	70	75	60	518	60	517
12/6	160	DC	30	0332	.062	70	75	60	606	61	602
12/6	161	DC	12	0337	.032	70	74	61	557	61	560
12/6	162	DC	30	0340	.036	70	74	60	609	60	612
12/7	163	DA	27L	0033	.037	75	79	60	988	59	987
12/7	164	DA	9R	0037	.034	75	79	60	991	60	993
12/7	165	DA	27L	0041	.028	75	79	60	1049	61	1051
12/7	166	DA	9R	0044	.044	75	79	62	1061	61	1061
12/7	167	DB	27L	0054	.041	75	79	61	569	61	565
12/7	168	DB	9R	0107	.026	75	79	61	729	61	718

TABLE D5
BASIC DBV WET SURFACE DATA

AIRPORT Miami, Florida

1971 Date	Run No.	R/W Sect.	R/W Head.	Time of Run Hr-Min	Avg. Water Depth in.	Temp. °F		Primary Instr.		Backup Instr.	
						Amb. Air	R/W Surf.	Brake Speed mph	Stop. Dist. ft.	Brake Speed mph	Stop. Dist. ft.
12/7	169	DB	27L	0110	.042	75	79	60	743	60	744
12/7	170	DB	9R	0112	.032	75	79	60	567	59	570
12/7	172	DC	27L	0121	.046	75	79	60	1721	60	1732
12/7	173	DC	9R	0124	.046	75	79	60	1461	60	1457
12/7	174	DC	27L	0129	.035	75	79	60	1602	60	1595
12/7	175	DC	9R	0136	.034	75	79	60	1542	60	1542
12/7	177	DA	35	0251	.026	75	81	59	427	60	433
12/7	178	DA	17	0256	.034	75	81	60	467	61	470
12/7	179	DA	35	0259	.042	75	81	62	505	62	502
12/7	180	DA	17	0303	.038	75	81	60	448	60	449
12/7	181	DB	35	0318	.040	75	82	62	483	62	486
12/7	182	DB	17	0323	.064	75	82	63	520	63	517
12/7	183	DB	35	0327	.060	75	82	60	505	60	507
12/7	184	DB	17	0329	.043	75	83	60	444	61	444
12/7	187	DC	35	0348	.052	75	84	58	419	59	417
12/7	188	DC	17	0354	.062	75	84	61	507	61	507
12/7	189	DC	35	0357	.044	75	84	60	496	61	491
12/7	190	DC	17	0359	.040	75	84	60	474	61	475

TABLE D5
BASIC DBV WET SURFACE DATA

AIRPORT Miami, Florida

1971 Date	Run No.	R/W Sect.	R/W Head.	Time of Run Hr-Min	Avg. Water Depth in.	Temp. °F		Primary Instr.		Backup Instr.	
						Amb. Air	R/W Surf.	Brake Speed mph	Stop. Dist. ft.	Brake Speed mph	Stop. Dist. ft.
12/8	200	DA	27R	0410	.038	73	77	61	742	61	734
12/8	201	DA	9L	0416	.044	73	77	61	597	62	597
12/8	202	DA	27R	0420	.048	73	77	61	762	61	755
12/8	203	DA	9L	0421	.050	73	77	63	711	63	697
12/8	206	DB	27R	0432	.051	73	77	61	571	60	565
12/8	207	DB	9L	0438	.036	72	77	61	591	61	586
12/8	208	DB	27R	0441	.048	72	77	61	516	60	512
12/8	209	DB	9L	0443	.050	72	77	59	538	59	533
12/8	210	DC	27R	0452	.040	72	77	60	888	60	882
12/8	211	DC	9L	0458	.036	72	77	60	987	60	977
12/8	212	DC	27R	0501	.042	72	77	60	900	60	887
12/8	213	DC	9L	0503	.036	72	77	62	1036	61	1030

TABLE D6
CORRECTED DBV DATA

AIRPORT Miami, Florida DATE 12/6/71

RUNWAY 12-30 SURFACE TYPE Asphalt

WEATHER Dry WETTING Truck

Wet Test Run No.	Wet Test R/W Head.	Wet Test Run Time	R/W Test Sect.	Avg. Water Depth (in)	Wet Test Temp. (°F)		Stopping Distance		Stopping Distance Ratio (SDR)
					Amb. Air	R/W Surface	Equiv. Dry (ft)	Wet (ft)	
150	12	0134	DA	.020	71	77	322	612	1.90
151	30	0139	DA	.024	70	76	321	676	2.11
152	12	0150	DA	.048	70	76	321	671	2.09
153	30	0151	DA	.043	70	76	321	613	1.91
154	12	0205	DB	.033	70	76	321	500	1.56
155	30	0213	DB	.054	70	76	321	502	1.56
156	12	0217	DB	.054	70	76	321	549	1.71
157	30	0219	DB	.040	70	76	321	481	1.50
159	12	0325	DC	.046	70	75	321	517	1.61
160	30	0332	DC	.062	70	75	321	602	1.88
161	12	0337	DC	.032	70	74	321	542	1.69
162	30	0340	DC	.036	70	74	321	612	1.91

TABLE D6

CORRECTED DBV DATA

AIRPORT Miami, Florida DATE Dry Tests, 12/8/71 Wet Tests, 12/7/71

RUNWAY 9R-27L SURFACE TYPE Asphalt

WEATHER Damp/Dry WETTING Truck/Wet from Rain

Wet Test Run No.	Wet Test R/W Head.	Wet Test Run Time	R/W Test Sect.	Avg. Water Depth (in)	Wet Test Temp. (°F)		Stopping Distance		Stopping Distance Ratio (SDR)
					Amb. Air	R/W Surface	Equiv. Dry (ft)	Wet (ft)	
163	27	0033	DA	.037	75	79	344	987	2.87
164	9	0037	DA	.034	75	79	344	993	2.89
165	27	0041	DA	.028	75	79	344	1051	3.06
166	9	0044	DA	.044	75	79	344	994	2.89
167	27	0054	DB	.041	75	75	344	547	1.59
168	9	0107	DB	.026	75	75	344	695	2.02
169	27	0110	DB	.042	75	75	344	744	2.16
170	9	0112	DB	.032	75	75	344	570	1.66
172	27	0121	DC	.046	75	75	344	1732	5.03
173	9	0124	DC	.046	75	75	344	1457	4.24
174	27	0129	DC	.035	75	75	344	1595	4.64
175	9	0136	DC	.034	75	75	344	1542	4.48

TABLE D6
CORRECTED DBV DATA

AIRPORT Miami, Florida DATE Dry Tests, 12/8/71 Wet Tests, 12/7/71

RUNWAY 17-35 SURFACE TYPE Asphalt

WEATHER Damp/Dry WETTING Truck/Wet from Rain

Wet Test Run No.	Wet Test R/W Head.	Wet Test Run Time	R/W Test Sect.	Avg. Water Depth (in)	Wet Test Temp. (°F)		Stopping Distance		Stopping Distance Ratio (SDR)
					Amb. Air	R/W Surface	Equiv. Dry (ft)	Wet (ft)	
177	35	0251	DA	.026	75	81	348	448	1.29
178	17	0256	DA	.034	75	81	348	470	1.35
179	35	0259	DA	.042	75	81	348	470	1.35
180	17	0303	DA	.038	75	81	348	449	1.29
181	35	0318	DB	.040	75	82	348	455	1.31
182	17	0323	DB	.064	75	82	348	469	1.35
183	35	0327	DB	.060	75	82	348	507	1.46
184	17	0329	DB	.043	75	83	348	444	1.28
187	35	0348	DC	.052	75	84	348	446	1.28
188	17	0354	DC	.062	75	84	348	490	1.41
189	35	0357	DC	.044	75	84	348	491	1.41
190	17	0359	DC	.040	75	84	348	475	1.36

TABLE D6
CORRECTED DBV DATA

AIRPORT Miami, Florida DATE 12/8/71

RUNWAY 9L-27R SURFACE TYPE Asphalt

WEATHER Dry WETTING Truck

Wet Test Run No.	Wet Test R/W Head.	Wet Test Run Time	R/W Test Sect.	Avg. Water Depth (in)	Wet Test Temp. (°F)		Stopping Distance		Stopping Distance Ratio (SDR)
					Amb. Air	R/W Surface	Equiv. Dry (ft)	Wet (ft)	
200	27	0410	DA	.038	73	77	325	710	2.18
201	9	0416	DA	.044	73	77	325	578	1.78
202	27	0420	DA	.048	73	77	325	730	2.25
203	9	0421	DA	.050	73	77	325	632	1.94
206	27	0432	DB	.051	73	77	325	547	1.68
207	9	0438	DB	.036	72	77	323	567	1.76
208	27	0441	DB	.048	72	77	323	495	1.53
209	9	0443	DB	.050	72	77	323	551	1.71
210	27	0452	DC	.040	72	77	323	882	2.73
211	9	0458	DC	.036	72	77	323	977	3.02
212	27	0501	DC	.042	72	77	323	887	2.75
213	9	0503	DC	.036	72	77	323	965	2.99

TABLE D7
Mu-Meter Data

Airport: Miami			Runway: 12-30	Date: December 6, 1971			
Run No.	R/W Heading	Zone	Avg. Water Depth (in.)	Test Time	Speed (mph)	Test Section	Avg. Frict.
1	12	A	Dry	0045	40	A-1 DA A-2	.86 .84 .85
1-R	30	A	Dry	0048	40	A-2 DA A-1	.85 .86 .86
2	12	B	Dry	0051	40	B-1 DB B-2	.86 .86 .86
2-R	30	B	Dry	0054	40	B-2 DB B-1	.86 .85 .86
3	12	A	0.020	0134	40	A-1 DA A-2	.52 .62 .66
3-R	30	A	0.024	0139	40	A-2 DA A-1	.67 .65 .56
4	12	B	0.033	0205	40	B-1 DB B-2	.75 .70 .72
4-R	30	B	0.054	0213	40	B-2 DB B-1	.76 .76 .72
5	12	C	Dry	0309	40	C-1 DC C-2	.83 .83 .82
5-R	30	C	Dry	0313	40	C-2 DC C-1	.83 .83 .82
6	12	C	0.046	0325	40	C-1 DC C-2	.62 .70 .67

TABLE D7
Mu-Meter Data

Airport: Miami			Runway: 12-30		Date: December 6, 1971		
Run No.	R/W Heading	Zone	Avg. Water Depth (in.)	Test Time	Speed (mph)	Test Section	Avg. Frict.
6-R	30	C	0.062	0332	40	C-2 DC C-1	.70 .76 .65

TABLE D7
Mu-Meter Data

Airport: Miami		Runway: 9R-27L	Date: December 8, 1971				
Run No.	R/W Heading	Zone	Avg. Water Depth (in.)	Test Time	Speed (mph)	Test Section	Avg. Frict.
1	27L	A	Dry	0018	40	A-1 DA A-2	.72 .74 .74
1-R	9R	A	Dry	0021	40	A-2 DA A-1	.76 .75 .74
2	27L	B	Dry	0023	40	B-1 DB B-2	.74 .73 .74
2-R	9R	B	Dry	0025	40	B-2 DB B-1	.76 .76 .76
3	27L	C	Dry	0027	40	C-1 DC C-2	.76 .76 .74
3-R	9R	C	Dry	0029	40	C-2 DC C-1	.76 .77 .77
						12/7/71	
1	27L	A	0.037	0033	40	A-1 DA A-2	.48 .52 .68
1-R	9R	A	0.034	0037	40	A-2 DA A-1	.63 .45 .44
2	27L	B	0.041	0054	40	B-1 DB B-2	.68 .63 .60
2-R	9R	B	0.026	0107	40	B-2 DB B-1	.61 .64 .65

TABLE D7
Mu-Meter Data

Airport: Miami			Runway: 9R-27L	Date: December 7, 1971			
Run No.	R/W Heading	Zone	Avg. Water Depth (in.)	Test Time	Speed (mph)	Test Section	Avg. Frict.
3	9R	C	0.046	0124	40	C-1 DC C-2	.50 .30 .19
3-R	27L	C	0.035	0129	40	C-2 DC C-1	.23 .30 .47

TABLE D7
Mu-Meter Data

Airport: Miami			Runway: 17-35		Date: December 8, 1971		
Run No.	R/W Heading	Zone	Avg. Water Depth (in.)	Test Time	Speed (mph)	Test Section	Avg. Frict.
4	35	A	Dry	0154	40	A-1 DA A-2	.74 .74 .74
4-R	17	A	Dry	0158	40,	A-2 DA A-1	.71 .71 .71
5	35	B	Dry	0207	40	B-1 DB B-2	.71 .74 .72
5-R	17	B	Dry	0213	40	B-2 DB B-1	.71 .71 .71
6	35	C	Dry	0239	40	C-1 DB C-2	.75 .72 .72
6-R	17	C	Dry	0243	40	C-2 DC C-1	.71 .71 .72
						12/7/71	
4	35	A	0.026	0251	40	A-1 DA A-2	.75 .76 .72
4-R	17	A	0.034	0256	40	A-2 DA A-1	.69 .76 .72
5	35	B	0.040	0318	40	B-1 DB B-2	.69 .73 .90
5-R	17	B	0.064	0323	40	B-2 DB B-1	.87 .72 .66

TABLE D7

Mu-Meter Data

Airport: Miami			Runway: 17-35		Date: December 7, 1971		
Run No.	R/W Heading	Zone	Avg. Water Depth (in.)	Test Time	Speed (mph)	Test Section	Avg. Frict.
6	35	C	0.052	0348	40	C-1 DC C-2	.89 .74 .74
6-R	17	C	0.062	0354	40	C-2 DC C-1	.74 .75 .84

TABLE D7
Mu-Meter Data

Airport: Miami			Runway: 9L-27R	Date: December 8, 1971			
Run No.	R/W Heading	Zone	Avg. Water Depth (in.)	Test Time	Speed (mph)	Test Section	Avg. Frict.
7	27R	A	Dry	0325	40	A-1 DA A-2	.72 .72 .72
7-R	9L	A	Dry	0328	40	A-2 DA A-1	.74 .74 .74
8	27R	B	Dry	0331	40	B-1 DB B-2	.74 .74 .74
8-R	9L	B	Dry	0334	40	B-2 DB B-1	.76 .75 .75
9	27R	C	Dry	0337	40	C-1 DC C-2	.76 .76 .76
9-R	9L	C	Dry	0341	40	C-2 DC C-1	.77 .77 .77
10	27R	A	0.038	0410	40	A-1 DA A-2	.56 .58 .59
10-R	9L	A	0.044	0416	40	A-2 DA A-1	.58 .58 .50
11	27R	B	0.051	0432	40	B-1 DB B-2	.60 .58 .55
11-R	9L	B	0.036	0438	40	B-2 DB B-1	.60 .60 .59
12	27R	C	0.040	0452	40	C-1 DC C-2	.60 .50 .20

TABLE D7
Mu-Meter Data

Airport: Miami			Runway: 9L-27R	Date: December 8, 1971			
Run No.	R/W Heading	Zone	Avg. Water Depth (in.)	Test Time	Speed (mph)	Test Section	Avg. Frict.
12-R	9L	C	0.036	0458	40	C-2 DC C-1	.30 .50 .60

APPENDIX E

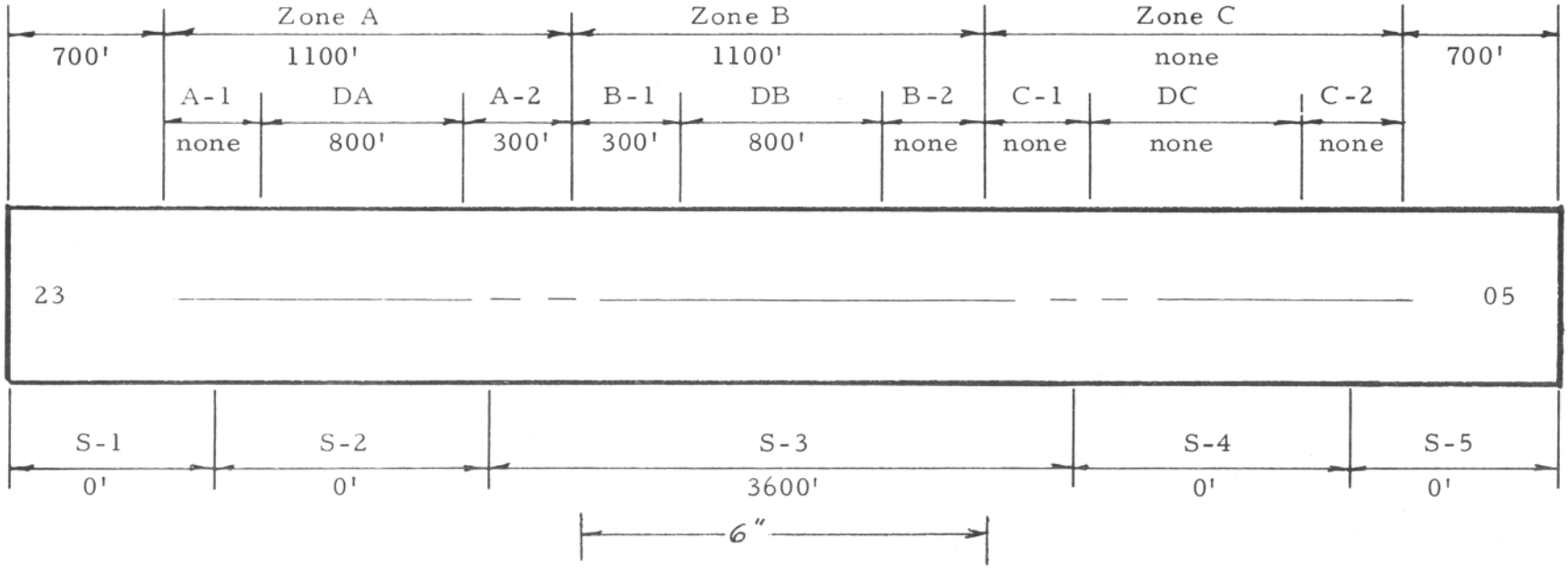
NEW ORLEANS INTERNATIONAL AIRPORT

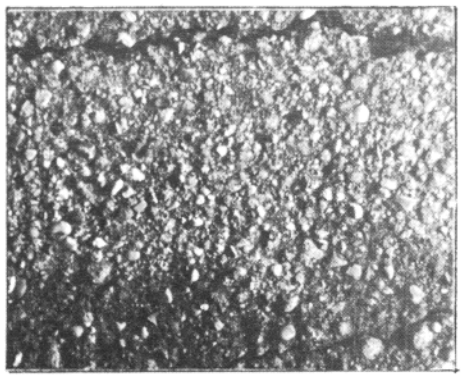
NEW ORLEANS, LOUISIANA

Table of Contents

Airport: New Orleans

Runway: 05-23





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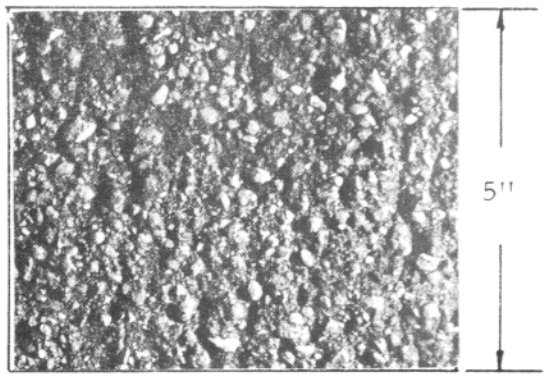


Zone B

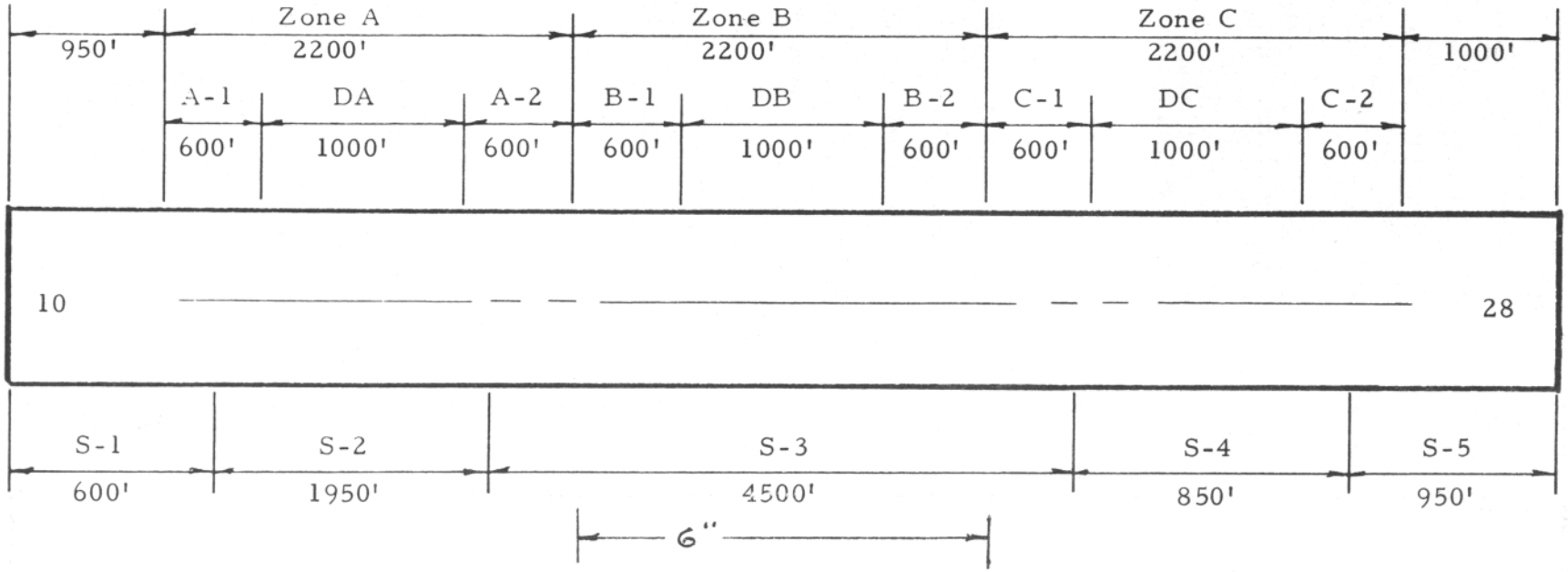
Not Available

Zone C

Figure E1

Airport: New Orleans

Runway: 10-28



Zone A

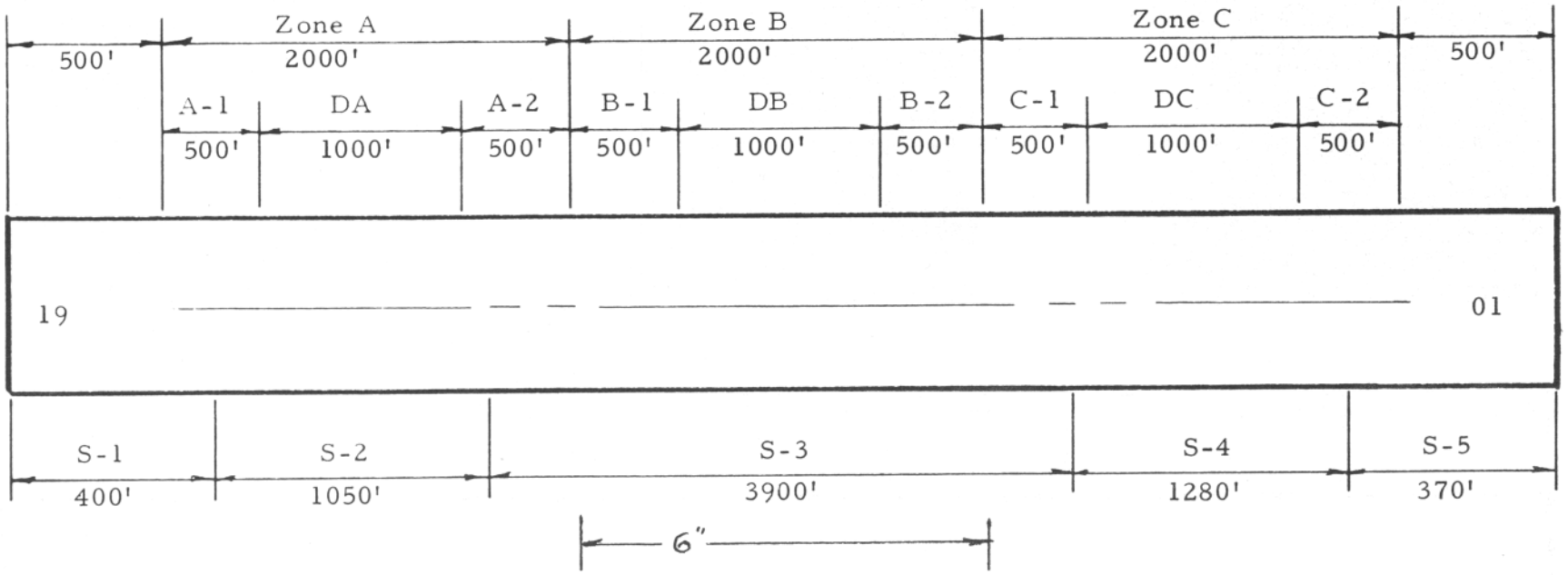
Zone B

Zone C

Figure E2

Airport: New Orleans

Runway: 01-19



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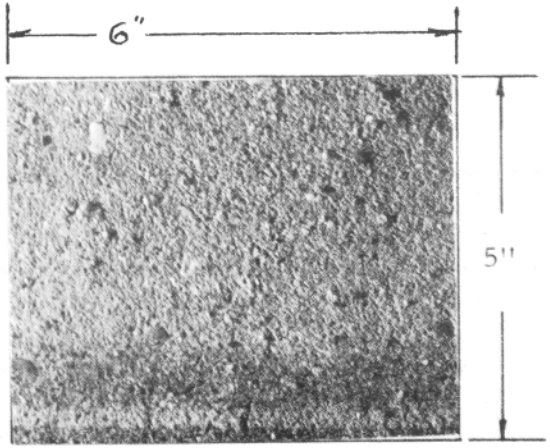
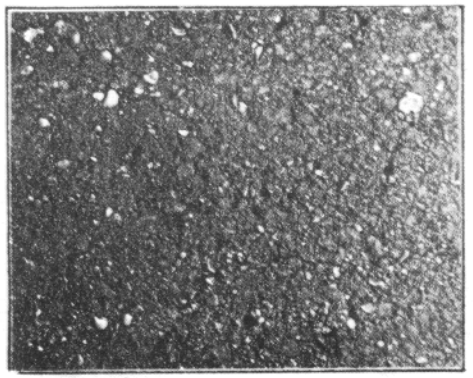


Zone B



Zone C

Figure E3

TABLE E1
RUNWAY STATISTICS

Airport: New Orleans

Runway No.	10-28	1-19	5-23
Length, ft.	8550	7000	3600
Width, ft.	150	150	150
Transverse slope, %	1.5	1.5	1.5
Effective gradient, %	.01	.02	.04
Pavement surface	PC & AC	PC & AC	AC
Monthly operations	4875	4875	none
Surface condition	Asphaltic concrete in Zone C of runways 1-19 and 10-28. Surface texture for these runways was generally smooth. Pavement distress, localized depressions, and chuck holes in runway 5-23. Poor drainage on runway 5, others no apparent problem.		

Annual precipitation, in. (last 40 years)

highest:	rain - 84	snow - none
lowest:	rain - 39	snow - none

TABLE E2

RAIN, WIND AND TEMPERATURE DATA

Airport: New Orleans			Date: December 13, 1971	
	Wind		Temperature, °F	
Time	Heading, deg	Speed, knots	Ambient	Surface
1000	80	3	69	
1100	10	5	67	73
1200	10	2	68	73
1300	-	calm	73	
1400	20	7	73	
1500	30	5	73	74
1600	60	5	73	74
1700	70	6	71	74
			Date: December 14, 1971	
0900	130	12	73	72
1000	150	15	76	
			Date: December 15 & 16, 1971	
2300	180	10	74	
2400	180	9	74	73
0100	180	9	74	73

Rainfall - None

TABLE E3

Water Depth Measurements

Airport: New Orleans	Runway: 5-23	Date: December 13, 1971					
Zone	Time	Water Depth, hundredth inch					Avg. Water Depth (in.)
		1	2	3	4	5	
A	1050	2	1	2	1	3	0.018
	1053	1	2	1	1	3	0.016
	1054	1	0	1	3	1	0.012
	1055	3	2	3	3	3	0.028
	1057	1	1	3	2	1	0.016
	1059	10	10	6	3	1	0.060
	1100	7	8	1	6	2	0.048
	1102	7	6	4	7	6	0.060
	1104	4	5	6	4	2	0.042
	1106	4	6	7	6	8	0.062
	1107	4	6	1	3	7	0.042
	1108	1	7	4	4	5	0.042
B	1116	6	5	1	7	5	0.048
	1117	7	6	10	10	10	0.086
	1118	7	3	10	10	6	0.072
	1120	2	2	5	8	8	0.050
	1122	6	5	3	6	5	0.050
	1123	9	8	7	8	5	0.074
	1125	7	7	4	5	4	0.054
	1126	1	6	2	4	8	0.042
	1128	5	5	1	3	6	0.040
	1129	1	3	3	5	9	0.042
	1130	7	7	3	1	4	0.044
	1131	1	7	4	1	5	0.036

TABLE E3
Water Depth Measurements

Airport: New Orleans Runway: 10-28 Date: December 13, 1971							
Zone	Time	Water Depth, hundredth inch					Avg. Water Depth (in.)
		1	2	3	4	5	
A	1555	3	5	7	7	4	0.052
	1559	5	5	4	5	5	0.048
	1601	4	3	5	2	4	0.036
	1603	2	3	3	3	4	0.030
	1605	6	6	3	2	3	0.040
	1607	2	2	6	4	8	0.044
	1610	2	4	3	2	2	0.026
	1611	8	8	2	6	5	0.058
	1612	2	2	2	4	2	0.024
B	1616	6	6	4	3	3	0.044
	1618	3	2	5	3	4	0.034
	1620	1	2	1	1	3	0.016
	1622	5	4	3	4	3	0.038
	1623	4	3	2	1	3	0.026
	1624	2	1	3	2	2	0.020
	1626	2	2	3	5	4	0.032
	1628	2	1	2	3	1	0.018
	1629	1	1	2	3	1	0.016
C	1644	2	5	3	3	1	0.028
	1645	2	2	3	1	2	0.020
	1646	2	2	1	2	1	0.016
	1648	5	4	4	4	2	0.038
	1650	1	0	2	1	2	0.012
	1651	2	3	1	1	1	0.016
	1652	2	2	3	2	3	0.024
	1655	3	2	1	1	2	0.018

TABLE E3
Water Depth Measurements

Airport: New Orleans Runway: 1-19 Date: December 15-16, 1971

Zone	Time	Water Depth, hundredth inch					Avg. Water Depth (in.)
		1	2	3	4	5	
A	2340	6	4	3	4	3	0.040
	2342	6	5	6	4	4	0.050
	2343	5	4	6	3	2	0.040
	2345	6	4	5	5	4	0.048
	2347	4	5	3	2	2	0.032
	2350	5	5	3	3	3	0.038
	2351	5	5	4	8	6	0.056
	2353	6	5	6	7	2	0.052
	2354	5	5	5	3	3	0.042
B	2359	4	5	4	4	5	0.044
	0001	4	5	4	3	3	0.038
	0003	1	3	2	5	3	0.028
	0004	8	3	1	4	4	0.040
	0006	4	3	1	4	1	0.038
	0008	2	1	2	3	3	0.022
	0009	6	1	5	7	6	0.050
	0012	3	2	3	3	2	0.026
	0014	2	3	1	3	2	0.022
C	0019	4	5	5	4	4	0.044
	0020	4	3	2	2	1	0.024
	0022	1	1	1	3	1	0.014
	0024	5	5	4	5	6	0.050
	0025	4	4	5	3	1	0.034
	0029	3	2	1	3	2	0.022
	0030	5	5	4	5	4	0.046
	0032	3	3	2	3	5	0.032
	0034	3	2	3	1	6	0.030

TABLE E4

BASIC DBV DRY SURFACE DATA

AIRPORT New Orleans, Louisiana

1971 Date	Run No.	R/W Sect.	R/W Head.	Time of Run Hr-Min	Temp. °F		Primary Instr.		Backup Instr.	
					Amb. Air	R/W Surf.	Brake Speed mph	Stop. Dist. ft.	Brake Speed mph	Stop. Dist. ft.
12/13	225	DA	10	1525	73	74	60	333	60	327
12/13	226	DB	10	1526	73	74	59	344	59	343
12/13	227	DC	10	1527	73	74	61	343	60	338
12/14	241	DA	23	0904	73	72	60	377	60	380
12/14	242	DB	23	0909	73	72	59	341	61	343
12/15	243	DA	19	2319	74	74	60	329	60	333
12/15	244	DB	19	2320	74	74	59	299	59	301
12/15	245	DC	19	2321	74	74	60	348	61	343

TABLE E5
BASIC DBV WET SURFACE DATA

AIRPORT New Orleans, Louisiana

1971 Date	Run No.	R/W Sect.	R/W Head.	Time of Run Hr-Min	Avg. Water Depth in.	Temp. °F		Primary Instr.		Backup Instr.	
						Amb. Air	R/W Surf.	Brake Speed mph	Stop. Dist. ft.	Brake Speed mph	Stop. Dist. ft.
12/13	214	DA	23	1053	.016	67	73	60	489	61	475
12/13	215	DA	5	1058	.013	67	73	61	420	59	417
12/13	216	DA	23	1103	.051	67	73	60	526	61	517
12/13	217	DA	5	1107	.042	67	73	60	476	61	465
12/13	219	DB	23	1117	.086	67	73	61	505	60	496
12/13	220	DB	5	1122	.050	67	73	63	541	61	517
12/13	221	DB	23	1126	.042	67	73	61	539	62	533
12/13	222	DB	5	1130	.044	67	73	60	494	61	486
12/13	229	DA	10	1600	.042	73	74	60	1191	60	1188
12/13	230	DA	28	1605	.040	73	74	60	1310	60	1299
12/13	231	DA	10	1608	.038	73	74	61	1227	60	1220
12/13	232	DA	28	1612	.024	72	74	61	1323	60	1346
12/13	233	DB	10	1618	.034	72	74	60	782	60	776
12/13	234	DB	28	1623	.026	72	74	60	751	60	755
12/13	235	DB	10	1624	.020	72	74	60	778	60	776
12/13	236	DB	28	1628	.018	72	74	61	791	61	787
12/13	237	DC	10	1645	.020	72	74	61	787	60	781
12/13	238	DC	28	1649	.025	71	74	61	756	60	750

TABLE E5
BASIC DBV WET SURFACE DATA

AIRPORT New Orleans, Louisiana

1971 Date	Run No.	R/W Sect.	R/W Head.	Time of Run Hr-Min	Avg. Water Depth in.	Temp. °F		Primary Instr.		Backup Instr.	
						Amb. Air	R/W Surf.	Brake Speed mph	Stop. Dist. ft.	Brake Speed mph	Stop. Dist. ft.
12/13	239	DC	10	1653	.022	71	74	61	782	60	781
12/13	240	DC	28	1655	.018	71	74	61	754	60	755
12/15	246	DA	19	2343	.040	74	73	62	1065	61	1045
12/15	247	DA	1	2348	.030	74	73	61	1184	60	1172
12/15	248	DA	19	2352	.054	74	73	60	1154	60	1146
12/15	249	DA	1	2353	.052	74	73	61	1211	60	1204
12/15	250	DB	19	2400	.033	74	73	61	707	61	708
12/16	251	DB	1	0007	.030	74	73	61	771	61	766
12/16	252	DB	19	0012	.026	74	73	61	711	61	713
12/16	253	DB	1	0014	.022	74	73	60	796	61	792
12/16	254	DC	19	0021	.019	74	73	61	977	60	977
12/16	255	DC	1	0026	.031	74	73	60	1053	61	1051
12/16	256	DC	19	0032	.032	74	73	61	1229	62	1098
12/16	257	DC	1	0034	.030	74	73	62	1230	61	1125

TABLE E6

CORRECTED DBV DATA

AIRPORT New Orleans, Louisiana DATE Dry Tests, 12/14/71 Wet Tests, 12/13/71

RUNWAY 5-23 SURFACE TYPE Concrete

WEATHER Dry WETTING Truck

Wet Test Run No.	Wet Test R/W Head.	Wet Test Run Time	R/W Test Sect.	Avg. Water Depth (in)	Wet Test Temp. (°F)		Stopping Distance		Stopping Distance Ratio (SDR)
					Amb. Air	R/W Surface	Equiv. Dry (ft)	Wet (ft)	
214	23	1053	DA	.016	67	73	360	475	1.32
215	5	1058	DA	.013	67	73	360	403	1.12
216	23	1103	DA	.051	67	73	360	517	1.44
217	5	1107	DA	.042	67	73	360	465	1.29
219	23	1117	DB	.086	67	73	360	480	1.33
220	5	1122	DB	.050	67	73	360	469	1.30
221	23	1126	DB	.042	67	73	360	516	1.43
222	5	1130	DB	.044	67	73	360	486	1.35

TABLE E6
CORRECTED DBV DATA

AIRPORT New Orleans, Louisiana DATE 12/13/71

RUNWAY 10-28 SURFACE TYPE Concrete

WEATHER Dry WETTING Truck

Wet Test Run No.	Wet Test R/W Head.	Wet Test Run Time	R/W Test Sect.	Avg. Water Depth (in)	Wet Test Temp. (°F)		Stopping Distance		Stopping Distance Ratio (SDR)
					Amb. Air	R/W Surface	Equiv. Dry (ft)	Wet (ft)	
229	10	1600	DA	.042	73	74	336	1188	3.64
230	28	1605	DA	.040	73	74	336	1299	3.87
231	10	1608	DA	.038	73	74	336	1180	3.51
232	28	1612	DA	.024	72	74	334	1302	3.90
233	10	1618	DB	.034	72	74	334	776	2.32
234	28	1623	DB	.026	72	74	334	755	2.19
235	10	1624	DB	.020	72	74	334	776	2.32
236	28	1628	DB	.018	72	74	334	761	2.28
237	10	1645	DC	.020	72	74	334	756	2.26
238	28	1649	DC	.025	71	74	333	726	2.18
239	10	1653	DC	.022	71	74	333	756	2.27
240	28	1655	DC	.018	71	74	333	730	2.19

TABLE E6
CORRECTED DBV DATA

AIRPORT New Orleans, Louisiana DATE Dry Tests, 12/15/71 Wet Tests, 12/15 & 16/71

RUNWAY 1-19 SURFACE TYPE Concrete

WEATHER Dry WETTING Truck

Wet Test Run No.	Wet Test R/W Head.	Wet Test Run Time	R/W Test Sect.	Avg. Water Depth (in)	Wet Test Temp. (°F)		Stopping Distance		Stopping Distance Ratio (SDR)
					Amb. Air	R/W Surface	Equiv. Dry (ft)	Wet (ft)	
246	19	2343	DA	.040	74	73	329	979	2.98
247	1	2348	DA	.030	74	73	329	1134	3.45
248	19	2352	DA	.054	74	73	329	1146	3.48
249	1	2353	DA	.052	74	73	329	1165	3.54
250	19	2400	DB	.033	74	73	329	685	2.08
251	1	0007	DB	.030	74	73	329	741	2.25
252	19	0012	DB	.026	74	73	329	690	2.10
253	1	0014	DB	.022	74	73	329	792	2.41
254	19	0021	DC	.019	74	73	329	945	2.87
255	1	0026	DC	.031	74	73	329	1051	3.19
256	19	0032	DC	.032	74	73	329	1062	3.23
257	1	0034	DC	.030	74	73	329	1054	3.20

TABLE E7

Mu-Meter Data

Airport: New Orleans	Runway: 5-23	Date: December 13, 1971					
Run No.	R/W Heading	Zone	Avg. Water Depth (in.)	Test Time	Speed (mph)	Test Section	Avg. Frict.
1	23	A	0.016	1053	40	DA A-2	.79 .63
1-R	5	A	0.013	1058	40	A-2 DA	.80 .80
2	23	A	0.051	1103	20	DA A-2	.81 .77
2-R	5	A	0.042	1107	20	A-2 DA	.76 .81
3	23	B	0.086	1117	40	B-1 DB	.61 .65
3-R	5	B	0.050	1122	40	DB B-1	.64 .69
4	23	B	0.042	1126	20	B-1 DB	.79 .78
4-R	5	B	0.044	1130	20	DB B-1	.78 .77
						12/14/71	
1	23	A	Dry	0905	40	DA A-1	.83 .81
1-R	5	A	Dry	0906	40	A-2 DA	.81 .82

TABLE E7
Mu-Meter Data

Airport: New Orleans	Runway: 5-23			Date: December 14, 1971			
Run No.	R/W Heading	Zone	Avg. Water Depth (in.)	Test Time	Speed (mph)	Test Section	Avg. Frict.
2	23	B	Dry	0909	40	B-1 DB	.82 .73
2-R	5	B	Dry	0911	40	DB B-1	.75 .75

TABLE E7

Mu-Meter Data

Airport: New Orleans Runway: 10-28 Date: December 13, 1971							
Run No.	R/W Heading	Zone	Avg. Water Depth (in.)	Test Time	Speed (mph)	Test Section	Avg. Frict.
5	10	A	Dry	1527	40	A-1 DA A-2	.81 .85 .85
5-R	28	A	Dry	1529	40	A-2 DA A-1	.88 .85 .83
6	10	B	Dry	1532	40	B-1 DB B-2	.90 .89 .88
6-R	28	B	Dry	1534	40	B-2 DB B-1	.89 .89 .90
7	10	C	Dry	1536	40	C-1 DC C-2	.88 .87 .86
7-R	28	C	Dry	1540	40	C-2 DC C-1	.87 .88 .89
8	10	A	0.042	1600	40	A-1 DA A-2	.21 .28 .38
8-R	28	A	0.040	1605	40	A-2 DA A-1	.42 .30 .19
9	10	B	0.034	1618	40	B-1 DB B-2	.41 .45 .41
9-R	28	B	0.026	1623	40	B-2 DB B-1	.44 .42 .44
10	10	C	0.020	1645	40	C-1 DC C-2	.51 .44 .39

TABLE E7
Mu-Meter Data

Airport: New Orleans Runway: 10-28 Date: December 13, 1971							
Run No.	R/W Heading	Zone	Avg. Water Depth (in.)	Test Time	Speed (mph)	Test Section	Avg. Frict.
10-R	28	C	0.025	1649	40	C-2 DC C-1	.42 .42 .44

TABLE E7

Mu-Meter Data

Airport: New Orleans	Runway: 1-19		Date: December 15, 1971				
Run No.	R/W Heading	Zone	Avg. Water Depth (in.)	Test Time	Speed (mph)	Test Section	Avg. Frict.
1	19	A	Dry	2320	40	A-1 DA A-2	.85 .84 .87
1-R	1	A	Dry	2322	40	A-2 DA A-1	.84 .83 .82
2	19	B	Dry	2327	40	B-1 DB B-2	.88 .88 .87
2-R	1	B	Dry	2330	40	B-2 DB B-1	.85 .85 .85
3	19	C	Dry	2332	40	C-1 DC C-2	.87 .85 .85
3-R	1	C	Dry	2334	40	C-2 DC C-1	.85 .85 .86
4	19	A	0.040	2343	40	A-1 DA A-2	.31 .27 .43
4-R	1	A	0.030	2348	40	A-2 DA A-1	.47 .29 .21
						12/16/71	
5	19	B	0.033	0002	40	B-1 DB B-2	.56 .52 .46
5-R	1	B	0.030	0007	40	B-2 DB B-1	.54 .49 .47

TABLE E7

Mu-Meter Data

Airport: New Orleans	Runway: 1-19		Date: December 16, 1972				
Run No.	R/W Heading	Zone	Avg. Water Depth (in.)	Test Time	Speed (mph)	Test Section	Avg. Frict.
6	19	C	0.019	0021	40	C-1 DC C-2	.55 .41 .39
6-R	1	C	0.031	0026	40	C-2 DC C-1	.42 .38 .43

APPENDIX F

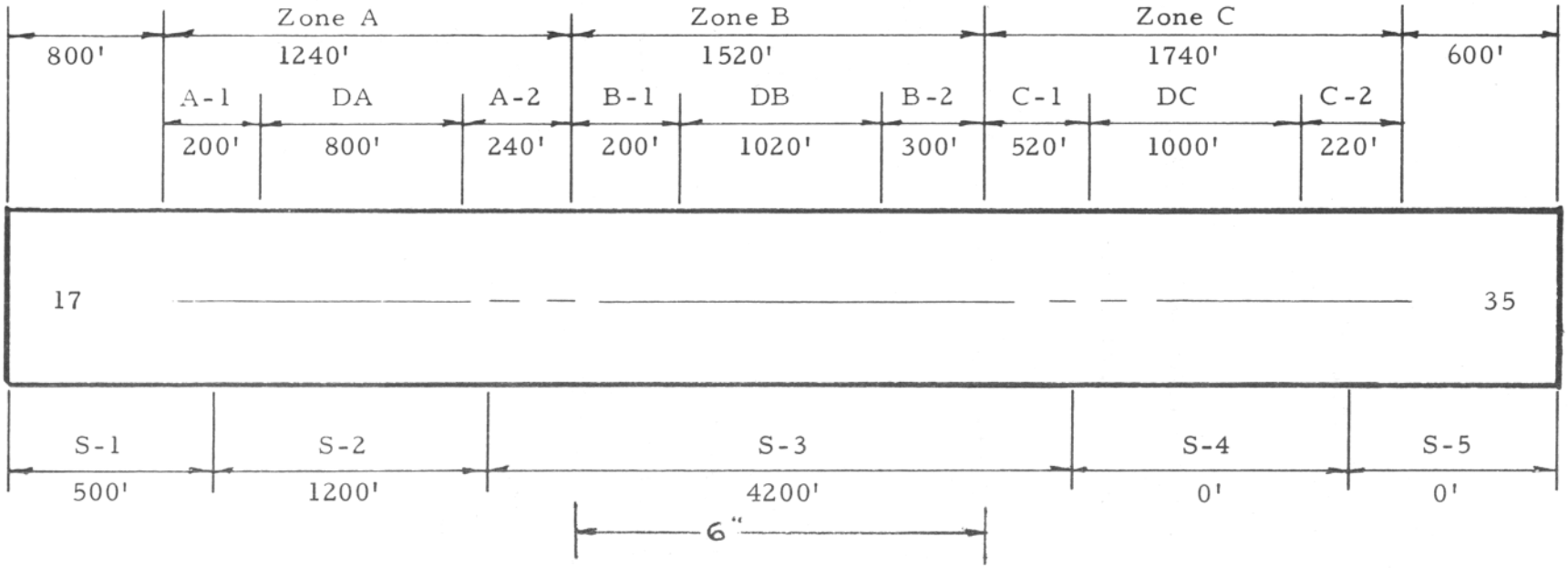
ST. LOUIS INTERNATIONAL AIRPORT

ST. LOUIS, MISSOURI

Table of Contents

Airport: St. Louis

Runway: 17-35



Zone A

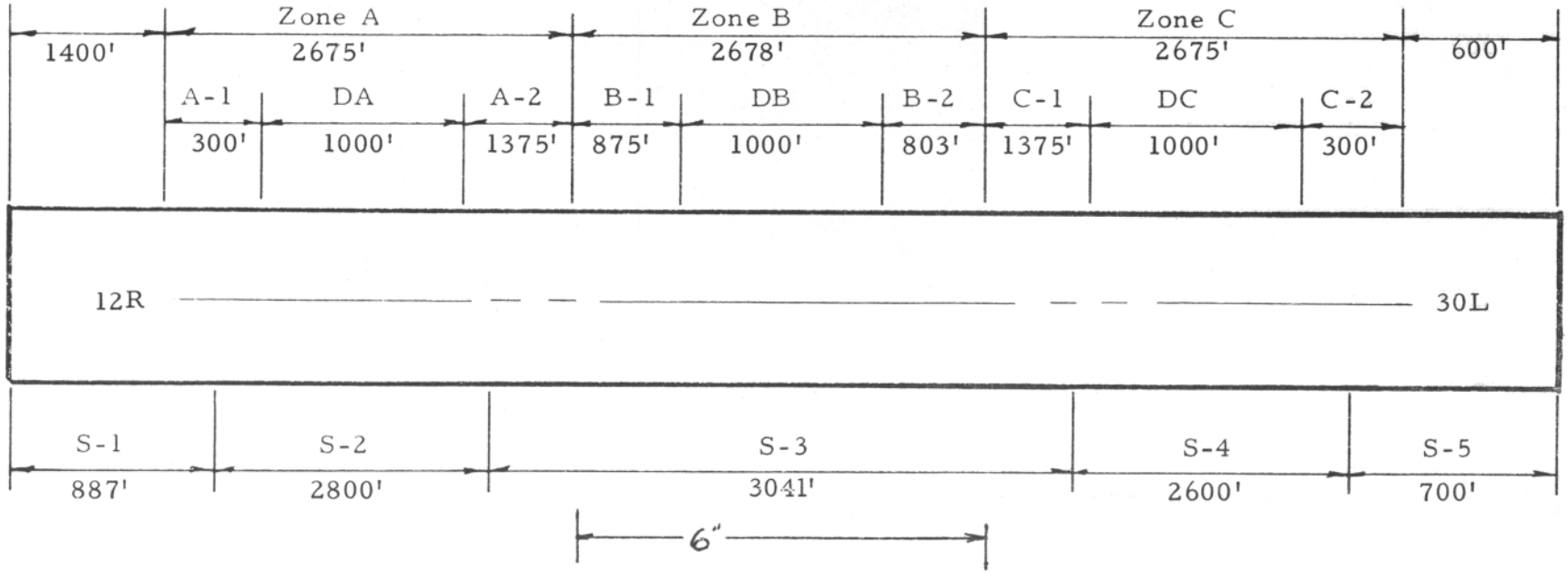
Zone B

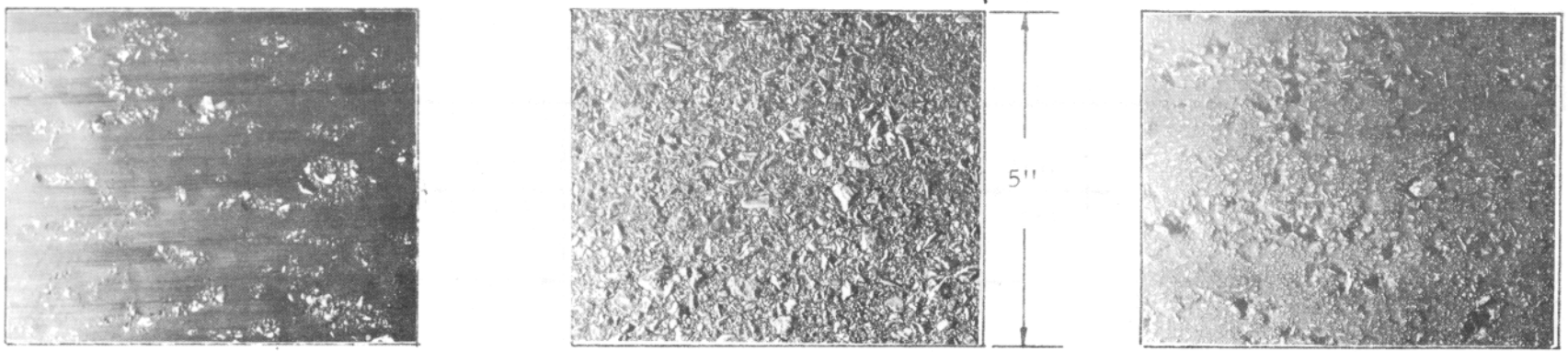
Zone C

Figure F1

Airport: St. Louis

Runway: 12R-30L





Zone A

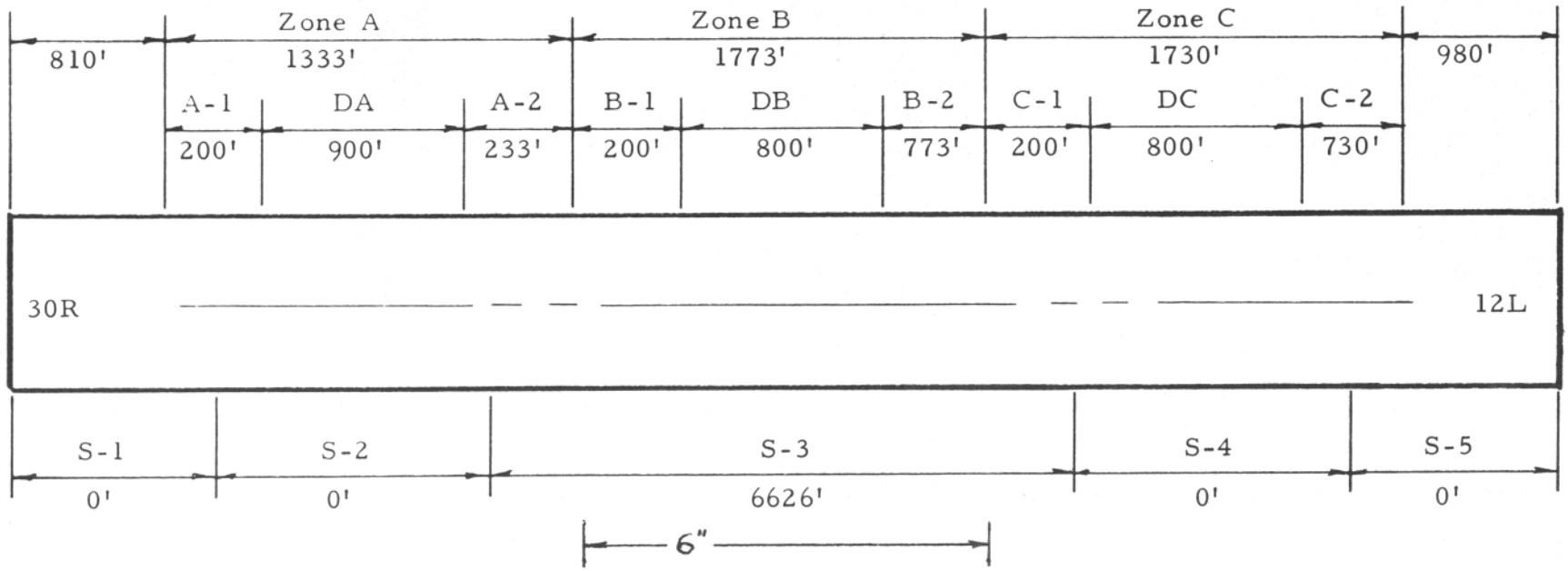
Zone B

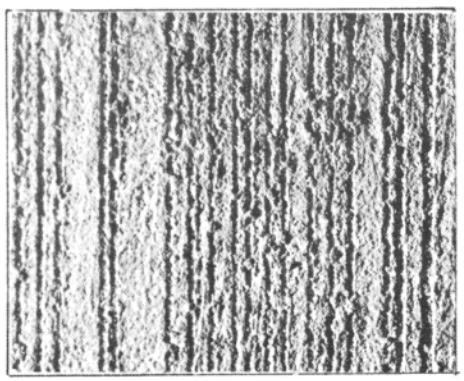
Zone C

Figure F2

Airport: St. Louis

Runway: 12L-30R





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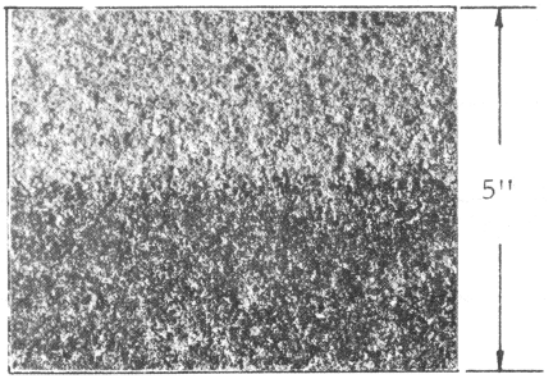

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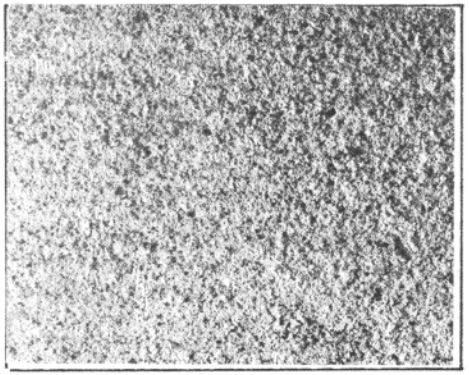
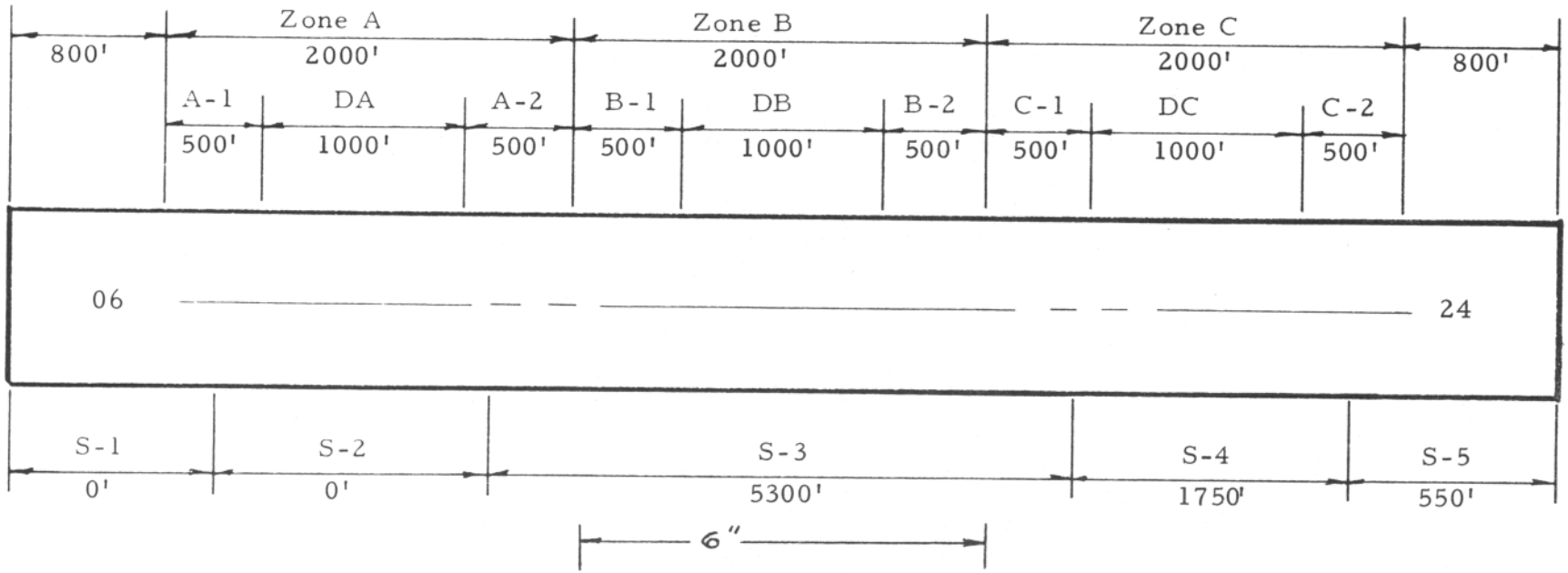


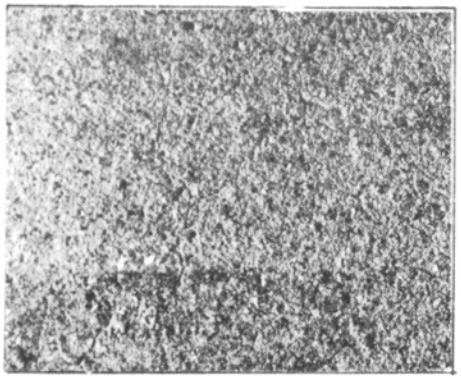
Zone C

Figure F3

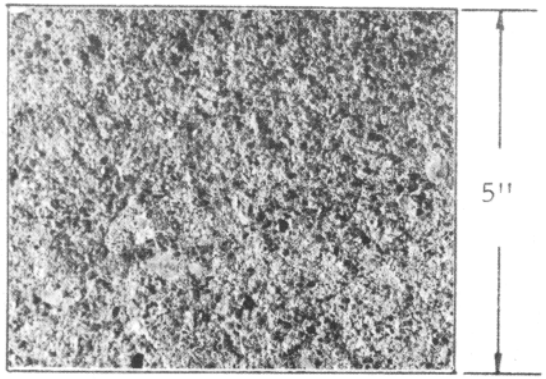
Airport: St. Louis

Runway: 6-24

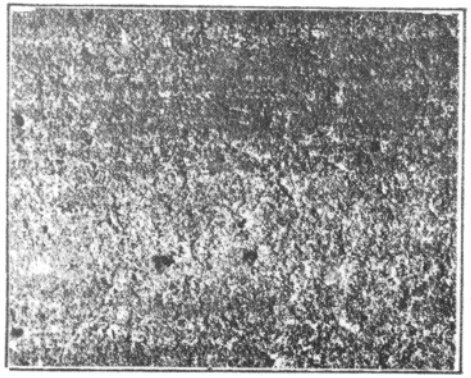




Zone A



Zone B



Zone C

Figure F4

TABLE F1
RUNWAY STATISTICS

Airport: St. Louis

Runway No.	12R-30L	6-24	12L-30R	17-35
Length, ft.	10028	7600	6626	5900
Width, ft.	200	200	150	150
Transverse slope, %	1.5	1.5	1.5	1.5
Effective gradient, %	.41	.41	.70	.43
Pavement surface	AC	PC	PC	PC
Monthly operations	12000	3200	none	800
Surface condition	Runway 12R-30L had substantial rubber deposits in Zone A but drainage is good. Pavement of Runway 12L-30R Zone A was newly constructed with a heavy transverse broom finish and had not been opened to traffic. Zones B & C had a smoother concrete finish, but generally good drainage except for an area near the 17-35 runway crossing where the slope became flatter. Runway 6-24 had a smooth finish but good drainage. Runway 17-35 surface had numerous pop-outs and a medium rough surface texture.			

Annual precipitation, in. (last 40 years)

highest:	rain - 50	snow - 31
lowest:	rain - 20	snow - 2

TABLE F2

RAIN, WIND AND TEMPERATURE DATA

Airport: St. Louis			Date: April 5, 1972	
Time	Wind		Temperature, °F	
	Heading, deg.	Speed, knots	Ambient	Surface
1300	200	8	66	81
1400	140	10	67	81
1500	200	6	67	80
1600	260	8	67	79
			Date: April 6, 1972	
0000	190	9	53	61
0100	200	9	55	61
0200	200	7	54	61
0300	210	6	54	62
0400	210	8	54	61
0500	210	10	54	66
0600	220	10	54	65
0700	230	10	56	65
0800	230	12	62	66
			Date: April 7, 1972	
0400	10	6	65	71
0500	100	6	62	71
0600	30	20	57	61
0700	240	10	56	57
0800	360	12	55	57

RATE OF RAINFALL, APRIL 7, 1972

Time	Rainfall, in./hr.
0544	0.30
0608	0.34

TABLE F3
Water Depth Measurements

Airport: St. Louis		Runway: 17-35		Date: April 5-6, 1972			
Zone	Time	Water Depth, hundredth inch					Avg. Water Depth (in.)
		1	2	3	4	5	
A	1431	3	3	5	2	3	0.032
	1433	2	3	3	2	1	0.022
	1434	5	2	3	1	3	0.028
	1436	2	3	2	3	2	0.024
	1438	2	5	4	3	2	0.032
	1440	3	2	5	2	2	0.028
	1441	6	3	3	4	2	0.036
	1443	3	2	4	2	3	0.028
	1446	6	4	4	5	4	0.046
	1447	6	5	3	2	2	0.036
	1448	6	6	5	4	4	0.050
	1450	3	5	5	3	3	0.038
B	1529	3	4	5	5	4	0.042
	1531	3	2	2	2	2	0.022
	1533	3	6	3	3	3	0.036
	1535	3	3	2	2	1	0.022
	1538	3	4	3	2	2	0.028
	1540	2	2	2	1	2	0.018
	1541	3	6	6	3	4	0.044
	1543	3	3	2	3	3	0.028
	1544	4	3	3	4	3	0.034
	1546	3	3	2	3	3	0.028
	1548	6	3	4	4	3	0.048
	1550	4	2	3	3	2	0.028
C	0454	5	5	4	6	5	0.050
	0457	2	2	1	3	2	0.020
	0501	5	5	3	6	5	0.048
	0503	2	2	2	3	4	0.026
	0505	6	5	4	4	5	0.048
	0507	2	3	2	2	2	0.022
	0509	4	3	4	4	5	0.040
	0510	2	2	1	3	2	0.020
	0511	4	4	3	4	3	0.036
	0513	2	1	1	1	2	0.014
	0514	3	4	3	4	3	0.034
	0516	2	4	2	4	2	0.028

TABLE F3
Water Depth Measurements

Airport: St. Louis		Runway: 12R-30L		Date: April 6, 1972			
Zone	Time	Water Depth, hundredth inch					Avg. Water Depth (in.)
		1	2	3	4	5	
A	0134	4	3	3	4	4	0.036
	0136	2	2	3	2	2	0.022
	0144	3	3	5	4	4	0.038
	0146	3	2	4	3	3	0.030
	0148	5	5	3	4	5	0.044
	0150	3	4	2	4	4	0.034
	0155	4	5	5	6	4	0.048
	0158	2	3	3	3	2	0.026
	0159	4	5	5	4	4	0.044
	0202	2	3	3	2	3	0.026
	0204	5	4	3	4	4	0.040
	0207	2	3	2	3	2	0.024
B	0217	3	5	5	3	5	0.042
	0220	4	2	3	2	3	0.028
	0224	4	3	3	4	3	0.034
	0226	3	1	2	2	2	0.020
	0229	4	2	5	5	3	0.038
	0232	3	2	2	2	1	0.020
	0236	3	3	4	3	3	0.032
	0238	2	1	3	1	2	0.018
	0241	3	4	4	3	3	0.034
	0244	2	3	3	1	2	0.022
	0246	4	3	4	3	4	0.036
	0248	2	1	2	3	2	0.020
C	0357	6	5	5	3	4	0.046
	0359	3	4	2	2	2	0.026
	0402	6	4	5	3	4	0.044
	0404	2	2	3	2	2	0.022
	0407	5	6	3	4	3	0.042
	0411	2	3	1	2	1	0.018
	0414	4	3	3	4	6	0.040
	0416	3	2	3	2	3	0.026
	0418	6	4	6	3	5	0.048
	0420	3	2	3	1	2	0.022
	0423	4	3	3	4	2	0.036
	0425	3	2	3	2	2	0.024

TABLE F3
Water Depth Measurements

Airport: St. Louis		Runway: 12L-30R Date: April 6, 1972					
Zone	Time	Water Depth, hundredth inch					Avg. Water Depth (in.)
		1	2	3	4	5	
A	0642	4	3	4	3	3	0.034
	0644	3	2	2	3	2	0.024
	0645	6	5	5	4	4	0.048
	0647	3	2	2	3	2	0.024
	0648	6	4	3	5	5	0.046
	0650	4	3	3	3	2	0.030
	0651	6	5	4	4	4	0.046
	0653	3	2	3	2	3	0.026
	0654	6	5	6	5	4	0.052
	0656	4	3	3	4	3	0.034
	0658	6	5	5	6	5	0.054
	0700	4	3	4	4	2	0.034
B	0713	6	5	5	4	3	0.046
	0715	3	2	2	3	2	0.024
	0717	4	3	5	4	3	0.038
	0719	3	3	2	3	2	0.026
	0721	4	3	3	4	5	0.038
	0723	2	2	2	3	3	0.024
	0725	3	4	3	3	4	0.034
	0727	3	2	1	2	2	0.020
	0728	3	3	4	4	3	0.034
	0730	3	2	2	3	2	0.024
	0731	5	4	3	3	5	0.040
	0733	3	2	2	3	4	0.028
C	0748	5	6	4	4	6	0.050
	0750	3	2	2	3	3	0.026
	0753	4	4	3	4	3	0.036
	0755	2	3	3	2	3	0.026
	0757	4	5	3	5	4	0.042
	0759	4	3	3	3	2	0.030
	0802	4	5	4	5	4	0.044
	0804	4	3	2	3	2	0.028
	0805	4	4	4	5	2	0.046
	0807	3	2	2	3	2	0.024
	0809	5	8	5	3	3	0.048
	0811	6	3	4	4	3	0.040

TABLE F3
Water Depth Measurements

Airport: St. Louis		Runway: 6-24			Date: April 7, 1972		
Zone	Time	Water Depth, hundredth inch					Avg. Water Depth (in.)
		1	2	3	4	5	
A	0523	2	3	3	2	3	0.026
	0525	2	3	2	2	2	0.022
	0534	3	5	2	2	3	0.030
	0536	2	2	3	3	2	0.024
	0539	3	3	4	3	3	0.032
	0540	3	2	3	3	3	0.028
B	0549	3	3	3	3	3	0.030
	0552	3	2	3	2	3	0.026
	0553	2	2	2	2	2	0.020
	0600	2	2	1	2	2	0.018
	0606	2	1	2	2	1	0.016
	0607	2	2	1	2	2	0.018
C	0655	5	4	3	5	3	0.040
	0657	2	3	2	2	3	0.024
	0659	5	4	5	3	3	0.040
	0701	4	3	2	2	2	0.026
	0703	3	4	6	3	3	0.038
	0705	2	3	2	2	2	0.022
	0707	5	4	3	4	4	0.040
	0709	2	3	2	3	2	0.024
	0712	6	3	3	4	3	0.038
	0714	3	2	3	2	2	0.022
	0725	3	3	3	2	3	0.028
	0727	2	3	2	2	2	0.022

TABLE F4
BASIC DBV DRY SURFACE DATA

AIRPORT St. Louis, Missouri

Date	Run No.	R/W Sect.	R/W Head.	Time of Run Hr-Min	Temp. °F		Primary Instr.		Backup Instr.	
					Amb. Air	R/W Surf.	Brake Speed mph	Stop. Dist. ft.	Brake Speed mph	Stop. Dist. ft.
4/5	260	DA	17	1350	67	82	61	312	60.5	312
4/5	261	DB	17	1356	67	82	60	306	59.5	306
4/6	270	DA	12R	0049	55	61	60	383	59.0	380
4/6	271	DB	12R	0101	55	61	59	287	59.0	301
4/6	272	DC	12R	0110	55	61	61	344	60.5	343
4/6	286	DC	17	0449	54	66	60	374	60.0	375
4/6	291	DA	30R	0611	54	65	61	399	60.5	396
4/6	292	DB	30R	0612	54	65	60	386	60.0	380
4/6	293	DC	30R	0613	54	65	59	332	59.0	333
4/7	306	DA	6	0450	63	72	60	313	60.0	-
4/7	307	DB	6	0451	63	72	59	305	59.0	306
4/7	308	DC	6	0452	63	72	60	353	60.0	354

TABLE F5
BASIC DBV WET SURFACE DATA

AIRPORT St. Louis, Missouri

1972 Date	Run No.	R/W Sect.	R/W Head.	Time of Run Hr-Min	Avg. Water Depth in.	Temp. °F		Primary Instr.		Backup Instr.	
						Amb. Air	R/W Surf.	Brake Speed mph	Stop. Dist. ft.	Brake Speed mph	Stop. Dist. ft.
4/5	262	DA	17	1432	.027	67	82	58	540	58.0	539
4/5	263	DA	35	1435	.026	67	81	60	593	59.5	591
4/5	264	DA	17	1439	.030	67	81	60	591	60.0	591
4/5	265	DA	35	1442	.032	67	81	60	625	59.5	623
4/5	266	DB	17	1530	.032	67	80	60	556	59.5	560
4/5	267	DB	35	1534	.029	66	79	60	629	60.0	628
4/5	268	DB	17	1539	.023	66	79	60	578	60.0	576
4/5	269	DB	35	1542	.036	66	79	60	683	60.0	681
4/6	273	DA	12R	0135	.029	55	61	60	1510	60.0	1510
4/6	274	DA	30L	0145	.034	54	61	59	1667	59.0	1668
4/6	275	DA	12R	0149	.039	54	61	60	1685	60.5	1684
4/6	277	DA	30L	0205	.035	54	61	61	1738	60.0	1742
4/6	278	DB	12R	0219	.033	54	62	59	970	59.0	966
4/6	279	DB	30L	0225	.027	54	62	60	952	59.5	950
4/6	280	DB	12R	0230	.032	54	62	60	1107	60.0	1103
4/6	281	DB	30L	0237	.025	54	62	60	987	60.0	987
4/6	282	DC	12R	0358	.036	54	61	60	981	59.5	982
4/6	283	DC	30L	0403	.033	54	61	60	1390	60.0	1394

TABLE F5
BASIC DBV WET SURFACE DATA

AIRPORT St. Louis, Missouri

1972 Date	Run No.	R/W Sect.	R/W Head.	Time of Run Hr-Min	Avg. Water Depth in.	Temp. °F		Primary Instr.		Backup Instr.	
						Amb. Air	R/W Surf.	Brake Speed mph	Stop. Dist. ft.	Brake Speed mph	Stop. Dist. ft.
4/6	284	DC	12R	0409	.030	54	62	59	961	59.0	961
4/6	285	DC	30L	0415	.033	54	63	60	1383	60.0	1383
4/6	287	DC	17	0455	.040	54	66	61	482	60.5	486
4/6	288	DC	35	0502	.037	54	67	60	597	60.0	597
4/6	289	DC	17	*0506	.035	54	67	60	604	60.0	602
4/6	290	DC	35	0509	.030	54	67	60	630	60.0	628
4/6	294	DA	30R	0643	.029	55	65	59	510	58.5	512
4/6	295	DA	12L	0646	.036	56	65	59	460	59.0	459
4/6	296	DA	30R	0649	.038	56	65	61	581	60.5	581
4/6	297	DA	12L	0652	.036	56	65	60	457	59.0	459
4/6	298	DB	30R	0714	.035	57	65	60	705	60.0	708
4/6	299	DB	12L	0718	.032	58	66	59	617	59.0	623
4/6	300	DB	30R	0722	.032	58	66	61	821	60.0	824
4/6	301	DB	12L	0726	.027	59	66	60	637	59.5	639
4/6	302	DC	30R	0758	.036	62	67	60	751	60.0	755
4/6	303	DC	12L	0803	.036	62	67	60	695	59.5	692
4/6	304	DC	30R	0806	.035	63	67	60	702	59.5	702
4/6	305	DC	12L	0810	.044	63	67	60	730	60.0	734

*Start of Rain - Minor Surface Dampness

TABLE F5
BASIC DBV WET SURFACE DATA

AIRPORT St. Louis, Missouri

1972 Date	Run No.	R/W Sect.	R/W Head.	Time of Run Hr-Min	Avg. Water Depth in.	Temp. °F		Primary Instr.		Backup Instr.	
						Amb. Air	R/W Surf.	Brake Speed mph	Stop. Dist. ft.	Brake Speed mph	Stop. Dist. ft.
4/7	309	DA	6	0523	.026	61	69	61	743	60.5	744
4/7	310	DA	24	0525	.022	60	68	60	672	60.0	671
4/7	311	DA	6	0534	.030	59	66	61	723	60.5	729
4/7	312	DA	24	0536	.024	59	65	60	645	60.0	644
4/7	313	DB	6	0549	.030	58	63	60	566	59.5	570
4/7	314	DB	24	0552	.026	57	62	60	641	59.0	639
4/7	315	DB	6	0553	.020	57	62	61	613	60.5	612
4/7	316	DB	24	0600	.018	57	61	61	611	60.5	607
4/7	318	DC	6	0656	.032	56	58	60	795	59.5	797
4/7	319	DC	24	0700	.033	56	57	61	852	60.5	855
4/7	320	DC	6	0704	.030	56	57	60	779	60.0	781
4/7	321	DC	24	0708	.032	56	57	60	880	60.0	876

TABLE F6
CORRECTED DBV DATA

AIRPORT St. Louis, Missouri DATE 4/5/72 & 4/6/72

RUNWAY 17-35 SURFACE TYPE Concrete except asphalt intersection of R/W 12R-30L

WEATHER Dry WETTING Truck

Wet Test Run No.	Wet Test R/W Head.	Wet Test Run Time	R/W Test Sect.	Avg. Water Depth (in)	Wet Test Temp. (°F)		Stopping Distance		Stopping Distance Ratio (SDR)
					Amb. Air	R/W Surface	Equiv. Dry (ft)	Wet (ft)	
262	17	1432	DA	.027	67	82	332	578	1.74
263	35	1435	DA	.026	67	81	332	593	1.79
264	17	1439	DA	.030	67	81	332	591	1.78
265	35	1442	DA	.032	67	81	332	625	1.88
266	17	1530	DB	.032	67	80	332	556	1.67
267	35	1534	DB	.029	66	79	331	629	1.90
268	17	1539	DB	.023	66	79	331	578	1.75
269	35	1542	DB	.036	66	79	331	683	2.06
287	17	0455	DC	.040	54	66	327	466	1.43
288	35	0502	DC	.037	54	67	327	597	1.83
289	17	0506	DC	.035	54	67	327	604	1.85
290	35	0509	DC	.030	54	67	327	630	1.93

TABLE F6
CORRECTED DBV DATA

AIRPORT St. Louis, Missouri DATE 4/6/72

RUNWAY 12R-30L SURFACE TYPE Asphalt

WEATHER Dry WETTING Truck

Wet Test Run No.	Wet Test R/W Head.	Wet Test Run Time	R/W Test Sect.	Avg. Water Depth (in)	Wet Test Temp. (°F)		Stopping Distance		Stopping Distance Ratio (SDR)
					Amb. Air	R/W Surface	Equiv. Dry (ft)	Wet (ft)	
273	12	0135	DA	.029	55	61	338	1510	4.47
274	30	0145	DA	.034	54	61	338	1724	5.10
275	12	0149	DA	.039	54	61	338	1685	4.99
277	30	0205	DA	.035	54	61	338	1681	4.97
278	12	0219	DB	.033	54	62	338	1003	2.97
279	30	0225	DB	.027	54	62	338	952	2.82
280	12	0230	DB	.032	54	62	338	1107	3.28
281	30	0237	DB	.025	54	62	338	987	2.90
282	12	0358	DC	.036	54	61	338	981	2.90
283	30	0403	DC	.033	54	61	338	1390	4.11
284	12	0409	DC	.030	54	62	338	994	2.94
285	30	0415	DC	.033	54	63	338	1383	4.09

TABLE F6
CORRECTED DBV DATA

AIRPORT St. Louis, Missouri DATE 4/6/72

RUNWAY 12L-30R SURFACE TYPE Concrete with new concrete in Test Section A

WEATHER Dry WETTING Truck

Wet Test Run No.	Wet Test R/W Head.	Wet Test Run Time	R/W Test Sect.	Avg. Water Depth (in)	Wet Test Temp. (°F)		Stopping Distance		Stopping Distance Ratio (SDR)
					Amb. Air	R/W Surface	Equiv. Dry (ft)	Wet (ft)	
294	30	0643	DA	.029	55	65	372	527	1.42
295	12	0646	DA	.036	56	65	372	476	1.28
296	30	0649	DA	.038	56	65	372	562	1.51
297	12	0652	DA	.036	56	65	372	457	1.23
298	30	0714	DB	.035	57	65	372	705	1.90
299	12	0718	DB	.032	58	66	372	638	1.72
300	30	0722	DB	.032	58	66	372	794	2.13
301	12	0726	DB	.027	59	66	372	637	1.71
302	30	0758	DC	.036	62	67	372	751	2.02
303	12	0803	DC	.036	62	67	372	695	1.87
304	30	0806	DC	.035	63	67	372	702	1.89
305	12	0810	DC	.044	63	67	372	730	1.96

TABLE F6
CORRECTED DBV DATA

AIRPORT St. Louis, Missouri DATE 4/7/72

RUNWAY 6-24 SURFACE TYPE Concrete

WEATHER Rain and Wet WETTING Rain Test Section A & B Truck for Test Section C

Wet Test Run No.	Wet Test R/W Head.	Wet Test Run Time	R/W Test Sect.	Avg. Water Depth (in)	Wet Test Temp. (°F)		Stopping Distance		Stopping Distance Ratio (SDR)
					Amb. Air	R/W Surface	Equiv. Dry (ft)	Wet (ft)	
309	6	0523	DA	.026	61	69	327	719	2.20
310	24	0525	DA	.022	60	68	327	672	2.06
311	6	0534	DA	.030	59	66	327	699	2.14
312	24	0536	DA	.024	59	65	327	645	1.97
313	6	0549	DB	.030	58	63	327	566	1.73
314	24	0552	DB	.026	57	62	327	641	1.96
315	6	0553	DB	.020	57	62	327	593	1.81
316	24	0600	DB	.018	57	61	327	591	1.81
318	6	0656	DC	.032	56	58	327	796	2.43
319	24	0700	DC	.033	56	57	327	824	2.52
320	6	0704	DC	.030	56	57	327	779	2.38
321	24	0708	DC	.032	56	57	327	880	2.69

TABLE F7

Mu-Meter Data

Airport: St. Louis			Runway: 17-35	Date: April 5, 1972			
Run No.	R/W Heading	Zone	Avg. Water Depth (in.)	Test Time	Speed (mph)	Test Section	Avg. Frict.
1	17	A	Dry	1345	40	A-1 DA A-2	.82 .83 .84
1-R	35	A	Dry	1347	40	A-2 DA A-1	.83 .82 81
2	17	B	Dry	1350	40	B-1 DB B-2	.84 .85 .84
2-R	35	B	Dry	1352	40	B-2 DB B-1	.82 .83 .84
3	17	A	0.027	1432	40	A-1 DA A-2	.45 .47 .51
3-R	35	A	0.026	1435	40	A-2 DA A-1	.42 .47 .52
4	17	A	0.030	1439	20	A-1 DA A-2	.69 .69 .69
4-R	35	A	0.032	1442	20	A-2 DA A-1	.67 .67 .68
5	17	A	0.041	1446	60	A-1 DA A-2	.34 .33 .40
5-R	35	A	0.044	1449	60	A-2 DA A-1	.30 .30 .35
6	17	B	0.032	1530	40	B-1 DB B-2	.50 .52 .55

TABLE F7
Mu-Meter Data

Airport: St. Louis	Runway: 17-35	Date: April 5, 1972					
Run No.	R/W Heading	Zone	Avg. Water Depth (in.)	Test Time	Speed (mph)	Test Section	Avg. Frict.
6-R	35	B	0.029	1534	40	B-2 DB B-1	.47 .50 .54
7	17	B	0.023	1539	20	B-1 DB B-2	.70 .70 .69
7-R	35	B	0.036	1542	20	B-2 DB B-1	.68 .70 .70
8	17	B	0.031	1545	60	B-1 DB B-2	.32 .36 .35
8-R	35	B	0.038	1549	60	B-2 DB B-1	.32 .35 .41
						4/6/72	
21	17	C	Dry	0440	40	C-1 DC C-2	.86 .77 .78
21-R	35	C	Dry	0445	40	C-2 DC C-1	.77 .78 .85
22	17	C	0.040	0455	40	C-1 DC C-2	.69 .53 .47
22-R	35	C	0.037	0502	40	C-2 DC C-1	.43 .48 .58
23	17	C	0.035	0506	20	C-1 DC C-2	.77 .72 .64

TABLE F7
Mu-Meter Data

Airport: St. Louis			Runway: 17-35		Date: April 6, 1972		
Run No.	R/W Heading	Zone	Avg. Water Depth (in.)	Test Time	Speed (mph)	Test Section	Avg. Frict.
23-R	35	C	0.030	0509	20	C-2 DC C-1	.62 .71 .74
24	17	C	0.025	0512	60	C-1 DC C-2	.60 .38 .36
24-R	35	C	0.031	0515	60	C-2 DC C-1	.28 .34 .48

TABLE F7
Mu-Meter Data

Airport: St. Louis	Runway: 12R-30L	Date: April 6, 1972					
Run No.	R/W Heading	Zone	Avg. Water Depth (in.)	Test Time	Speed (mph)	Test Section	Avg. Frict.
9	12	A	Dry	0050	40	A-1 DA A-2	.82 .80 .85
9-R	30	A	Dry	0055	40	A-2 DA A-1	.83 .78 .80
10	12	B	Dry	0101	40	B-1 DB B-2	.85 .86 .86
10-R	30	B	Dry	0105	40	B-2 DB B-1	.83 .83 .83
11	12	C	Dry	0111	40	B-1 DB B-2	.85 .84 .80
11-R	30	C	Dry	0114	40	B-2 DB B-1	.82 .83 .86
12	12	A	0.029	0135	40	A-1 DA A-2	.30 .17 .37
12-R	30	A	0.034	0145	40	A-2 DA A-1	.44 .14 .26
13	12	A	0.039	0149	20	A-1 DA A-2	.48 .37 .63
13-R	30	A	0.037	0156	20	A-2 DA A-1	.62 .42 .50
14	12	A	0.038	0200	60	A-1 DA A-2	.18 .11 .28

TABLE F7
Mu-Meter Data

Airport: St. Louis			Runway: 12R-30L	Date: April 6, 1972			
Run No.	R/W Heading	Zone	Avg. Water Depth (in.)	Test Time	Speed (mph)	Test Section	Avg. Frict.
14-R	30	A	0.035	0205	60	A-2 DA A-1	.28 .05 .10
15	12	B	0.033	0219	40	B-1 DB B-2	.53 .51 .52
15-R	30	B	0.027	0225	40	B-2 DB B-1	.52 .44 .44
16	12	B	0.032	0230	20	B-1 DB B-2	.64 .64 .65
16-R	30	B	0.025	0237	20	B-2 DB B-1	.64 .62 .63
17	12	B	0.026	0243	60	B-1 DB B-2	.36 .39 .41
17-R	30	B	0.028	0247	60	B-2 DB B-1	.36 .27 .32
18	12	C	0.036	0358	40	C-1 DC C-2	.45 .43 .43
18-R	30	C	0.033	0403	40	C-2 DC C-1	.39 .37 .37
19	12	C	0.030	0409	20	C-1 DC C-2	.62 .61 .64
19-R	30	C	0.033	0415	20	C-2 DC C-1	.62 .58 .63

TABLE F7

Mu-Meter Data

Airport: St. Louis			Runway: 12R-30L Date: April 6, 1972				
Run No.	R/W Heading	Zone	Avg. Water Depth (in.)	Test Time	Speed (mph)	Test Section	Avg. Frict.
20	12	C	0.035	0419	60	C-1 DC C-2	.26 .22 .26
20-R	30	C	0.030	0424	60	C-2 DC C-1	.23 .19 .20

TABLE F7

Mu-Meter Data

Airport: St. Louis			Runway: 12L-30R	Date: April 6, 1972			
Run No.	R/W Heading	Zone	Avg. Water Depth (in.)	Test Time	Speed (mph)	Test Section	Avg. Frict.
25	30	A	Dry	0615	40	A-1 DA A-2	.76 .74 .76
25-R	12	A	Dry	0618	40	A-2 DA A-1	.78 .76 .76
26	30	B	Dry	0623	40	B-1 DB B-2	.80 .82 .82
26-R	12	B	Dry	0626	40	B-2 DB B-1	.84 .85 .84
27	30	C	Dry	0630	40	C-1 DC C-2	.84 .84 .83
27-R	12	C	Dry	0632	40	C-2 DC C-1	.83 .85 .84
28	30	A	0.029	0643	40	A-1 DA A-2	.48 .54 .70
28-R	12	A	0.036	0646	40	A-2 DA A-1	.70 .60 .50
29	30	A	0.038	0649	20	A-1 DA A-2	.74 .76 .77
29-R	12	A	0.036	0652	20	A-2 DA A-1	.75 .75 .75
30	30	A	0.043	0655	60	A-1 DA A-2	.42 .46 .55

TABLE F7
Mu-Meter Data

Airport: St. Louis			Runway: 12L-30R	Date: April 6, 1972			
Run No.	R/W Heading	Zone	Avg. Water Depth (in.)	Test Time	Speed (mph)	Test Section	Avg. Frict.
30-R	12	A	0.044	0659	60	A-2 DA A-1	.55 .42 .35
31	30	B	0.035	0714	40	B-1 DB B-2	.49 .40 .32
31-R	12	B	0.032	0718	40	B-2 DB B-1	.49 .53 .51
32	30	B	0.032	0722	20	B-1 DB B-2	.74 .73 .70
32-R	12	B	0.027	0726	20	B-2 DB B-1	.73 .74 .74
33	30	B	0.029	0729	60	B-1 DB B-2	.38 .34 .26
33-R	12	B	0.036	0732	60	B-2 DB B-1	.27 .31 .30
34	30	C	0.038	0749	60	C-1 DC C-2	.35 .31 .28
34-R	12	C	0.031	0754	60	C-2 DC C-1	.36 .33 .32
35	30	C	0.036	0758	20	C-1 DC C-2	.71 .70 .70
35-R	12	C	0.036	0803	20	C-2 DC C-1	.70 .70 .70

TABLE F7

Mu-Meter Data

Airport: St. Louis			Runway: 12L-30R Date: April 6, 1972				
Run No.	R/W Heading	Zone	Avg. Water Depth (in.)	Test Time	Speed (mph)	Test Section	Avg. Frict.
36	30	C	0.035	0806	40	C-1 DC C-2	.45 .46 .46
36-R	12	C	0.044	0810	40	C-2 DC C-1	.50 .47 .50

TABLE F7
Mu-Meter Data

Airport: St. Louis			Runway: 6-24		Date: April 7, 1972		
Run No.	R/W Heading	Zone	Avg. Water Depth (in.)	Test Time	Speed (mph)	Test Section	Avg. Frict.
1	6	A	Dry	0450	40	A-1 DA A-2	.84 .82 .78
1-R	24	A	Dry	0452	40	A-2 DA A-1	.78 .82 .85
2	6	B	Dry	0455	40	B-1 DB B-2	.78 .86 .86
2-R	24	B	Dry	0457	40	B-2 DB B-1	.84 .84 .74
3	6	C	Dry	0500	40	C-1 DC C-2	.80 .78 .80
3-R	24	C	Dry	0503	40	C-2 DC C-1	.76* .72* .72*
4	6	A	0.026	0523	40	A-1 DA A-2	.43 .40 .30
4-R	24	A	0.022	0525	40	A-2 DA A-1	.39 .50 .48
5	6	A	0.030	0534	20	A-1 DA A-2	.74 .72 .68
5-R	24	A	0.024	0536	20	A-2 DA A-1	.68 .72 .74
6	6	A	0.032	0539	60	A-1 DA A-2	.42 .42 .24

*Start of rain - minor surface dampness

TABLE F7
Mu-Meter Data

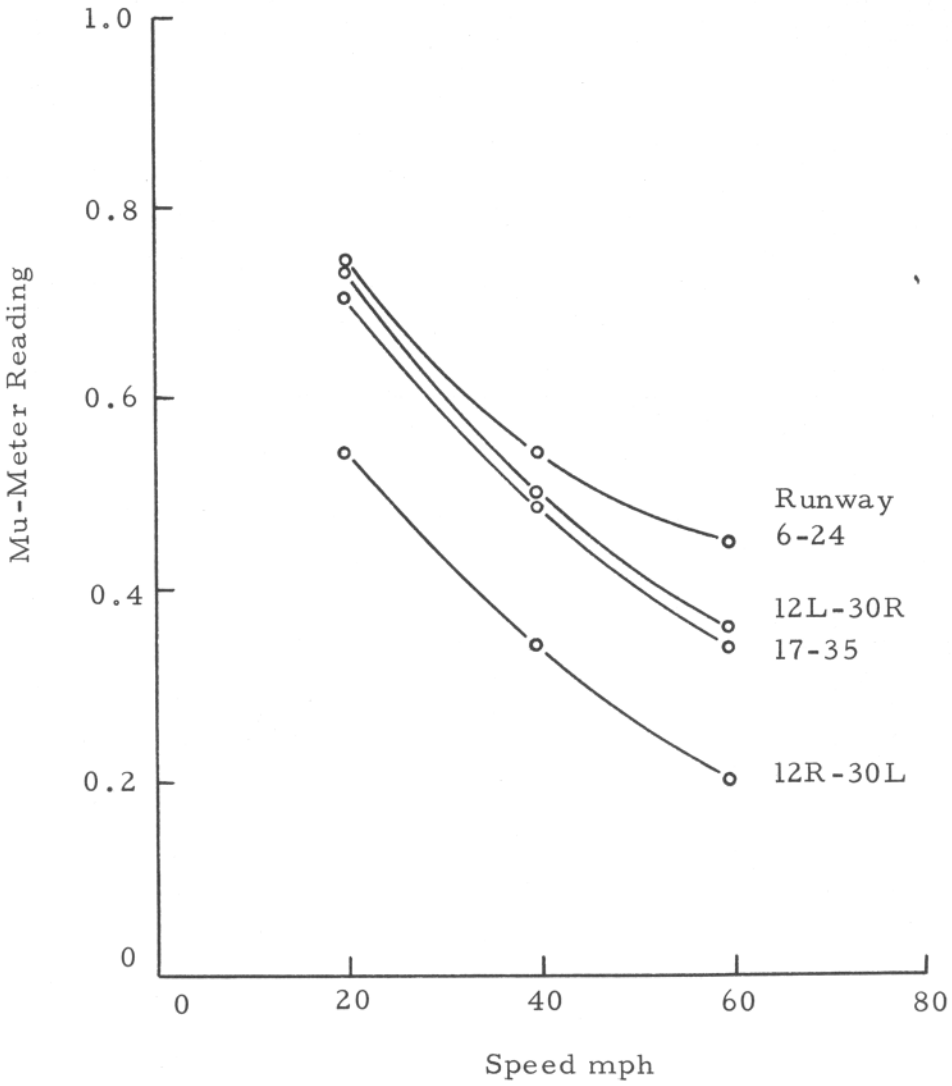
Airport: St. Louis		Runway: 6-24		Date: April 7, 1972			
Run No.	R/W Heading	Zone	Avg. Water Depth (in.)	Test Time	Speed (mph)	Test Section	Avg. Frict.
6-R	24	A	0.028	0540	60	A-2 DA A-1	.27 .42 .42
7	6	B	0.030	0549	40	B-1 DB B-2	.35 .66 .65
7-R	24	B	0.026	0552	40	B-2 DB B-1	.64 .64 .26
8	6	B	0.020	0553	20	B-1 DB B-2	.62 .73 .76
8-R	24	B	0.018	0600	20	B-2 DB B-1	.76 .74 .62
9	6	B	0.016	0606	60	B-1 DB B-2	.24 .60 .58
9-R	24	B	0.018	0607	60	B-2 DB B-1	.58 .60 .20
11	6	C	0.032	0656	40	C-1 DC C-2	.63 .53 .55
11-R	24	C	0.033	0700	40	C-2 DC C-1	.60 .53 .56
12	6	C	0.030	0704	20	C-1 DC C-2	.76 .77 .77
12-R	24	C	0.032	0708	20	C-2 DC C-1	.76 .74 .74

TABLE F7

Mu-Meter Data

Airport: St. Louis			Runway: 6-24		Date: April 7, 1972		
Run No.	R/W Heading	Zone	Avg. Water Depth (in.)	Test Time	Speed (mph)	Test Section	Avg. Frict.
13	6	C	0.030	0713	60	C-1 DC C-2	.35 .27 .32
13-R	24	C	0.025	0726	60	C-2 DC C-1	.48 .38 .39

St. Louis, Mo.



MU vs. SPEED - WET

Figure F5

APPENDIX G

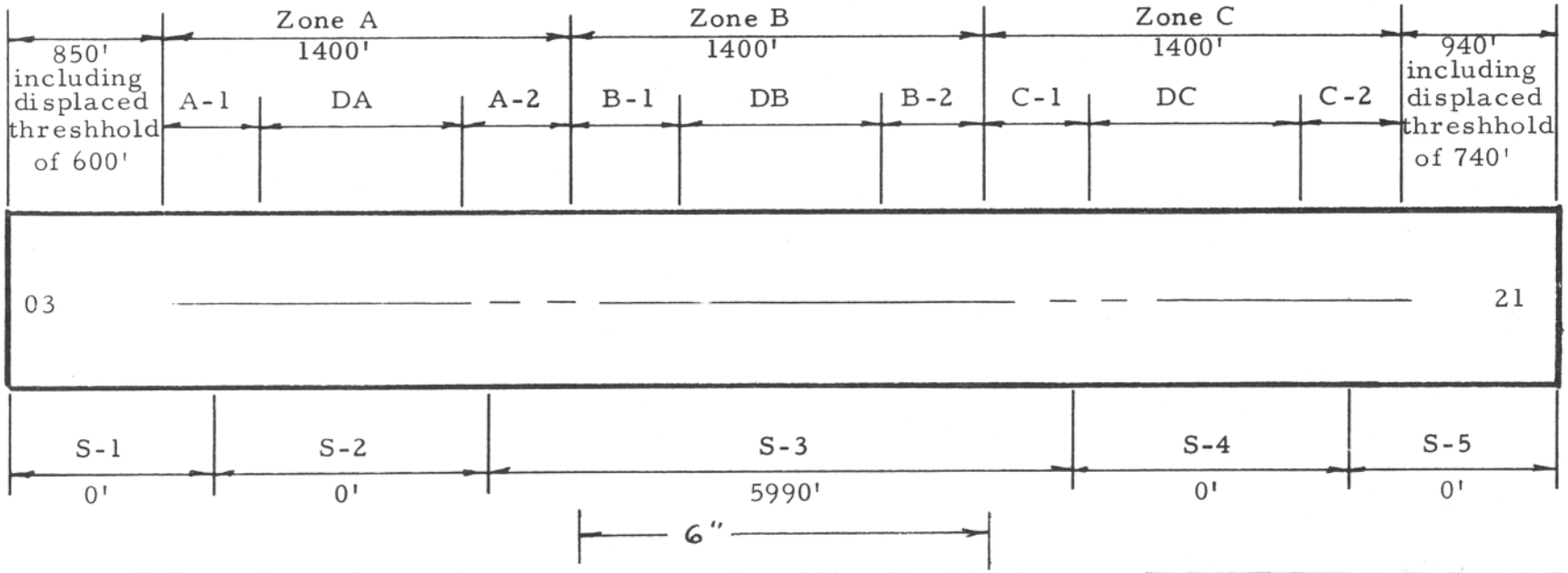
MEMPHIS INTERNATIONAL AIRPORT

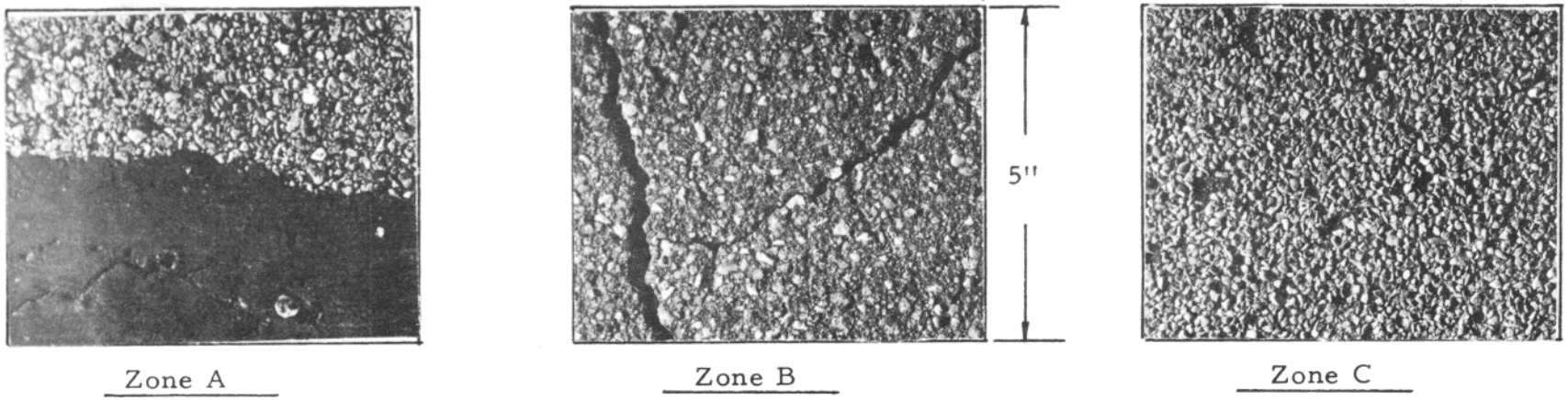
MEMPHIS, TENNESSEE

Table of Contents

Airport: Memphis

Runway: 03-21





Zone A

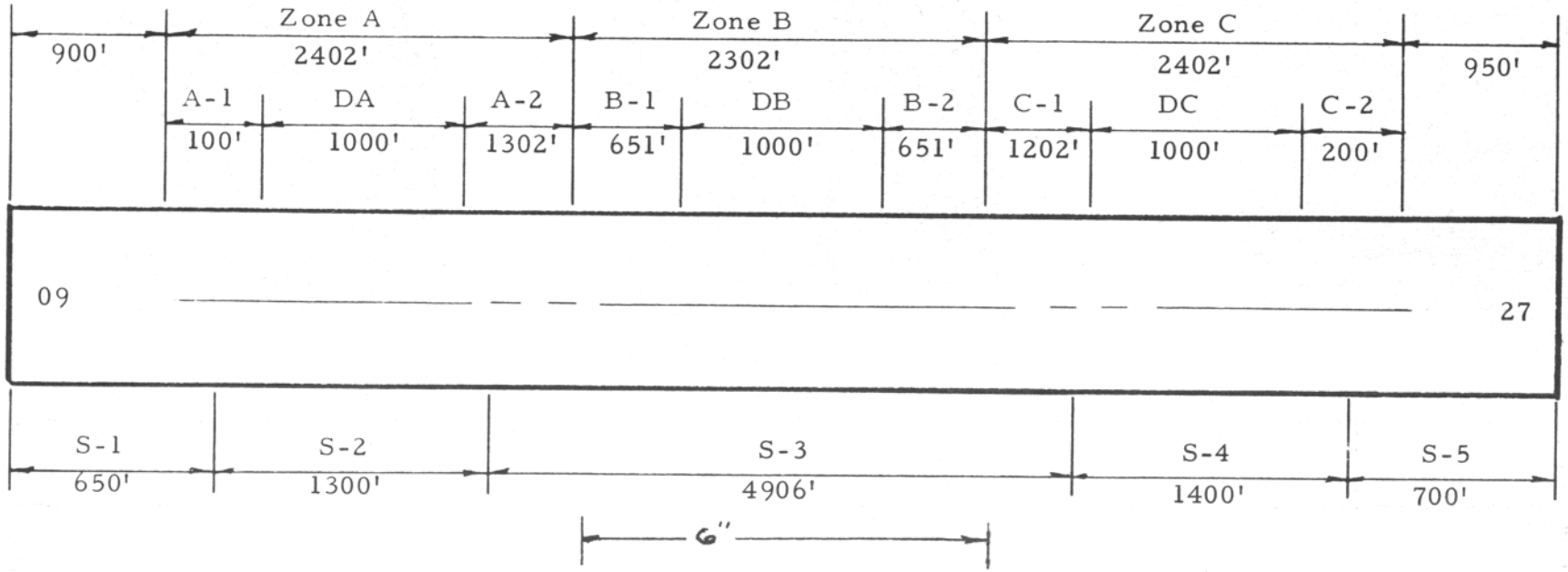
Zone B

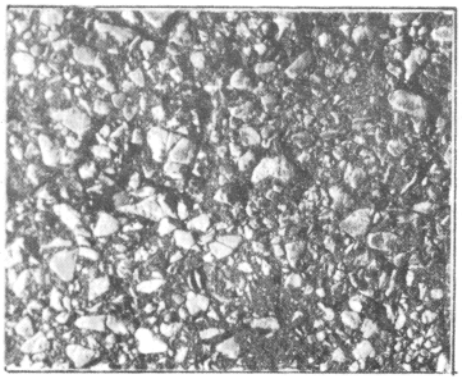
Zone C

Figure G1

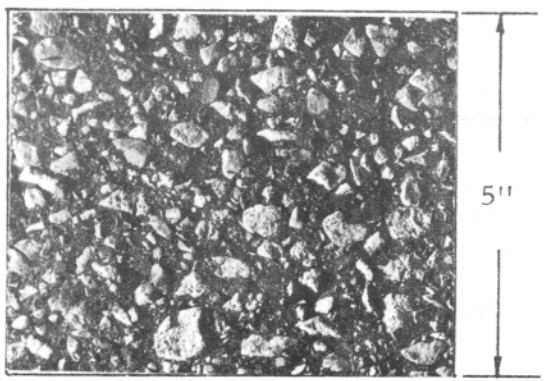
Airport: Memphis

Runway: 09-27

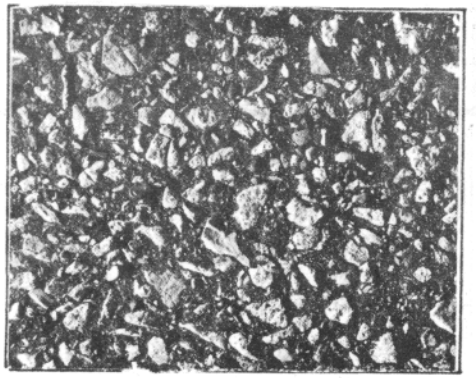




Zone A



Zone B

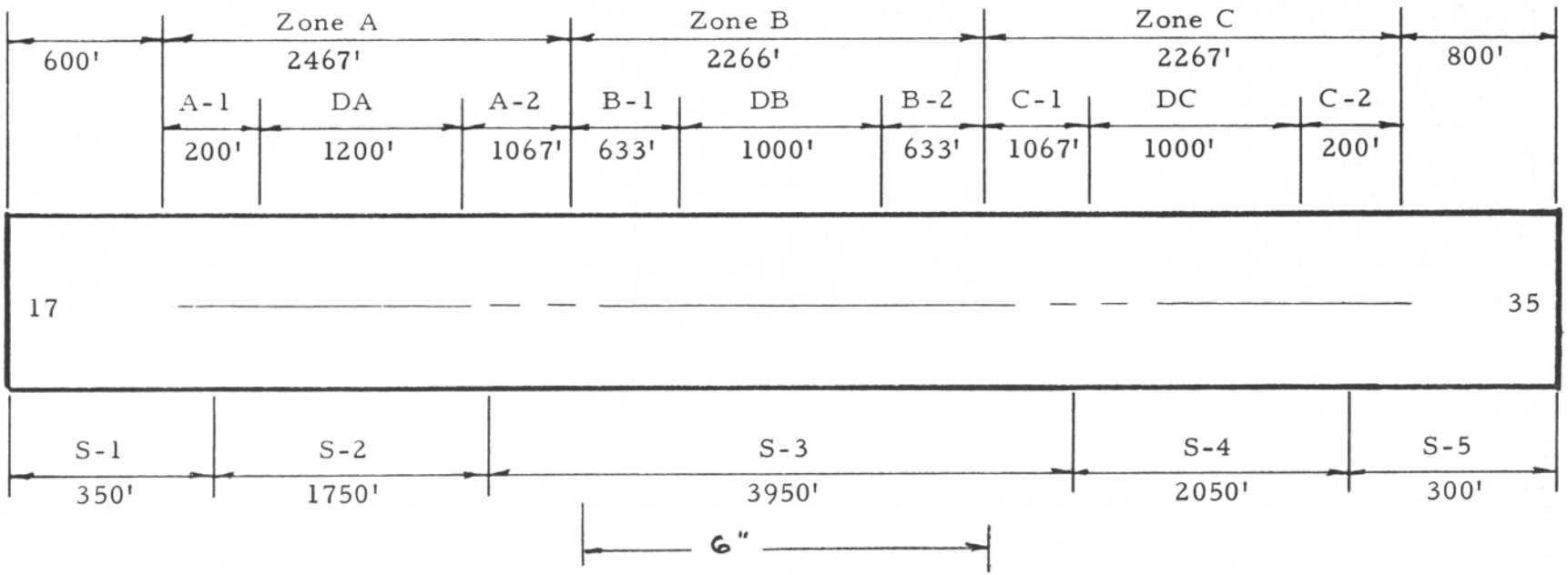


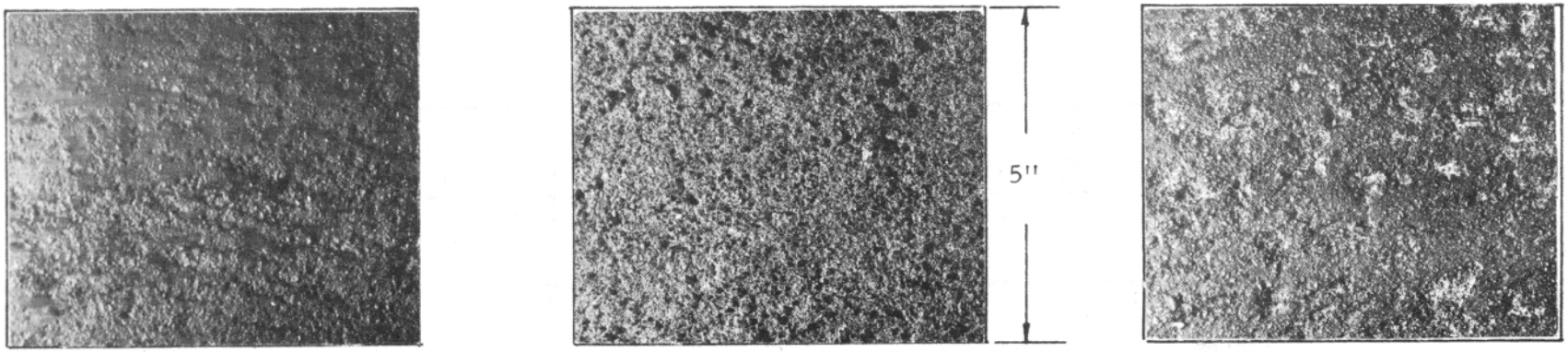
Zone C

Figure G2

Airport: Memphis

Runway: 17L-35R





Zone A

Zone B

Zone C

Figure G3

Airport: Memphis

Runway: 17R-35L

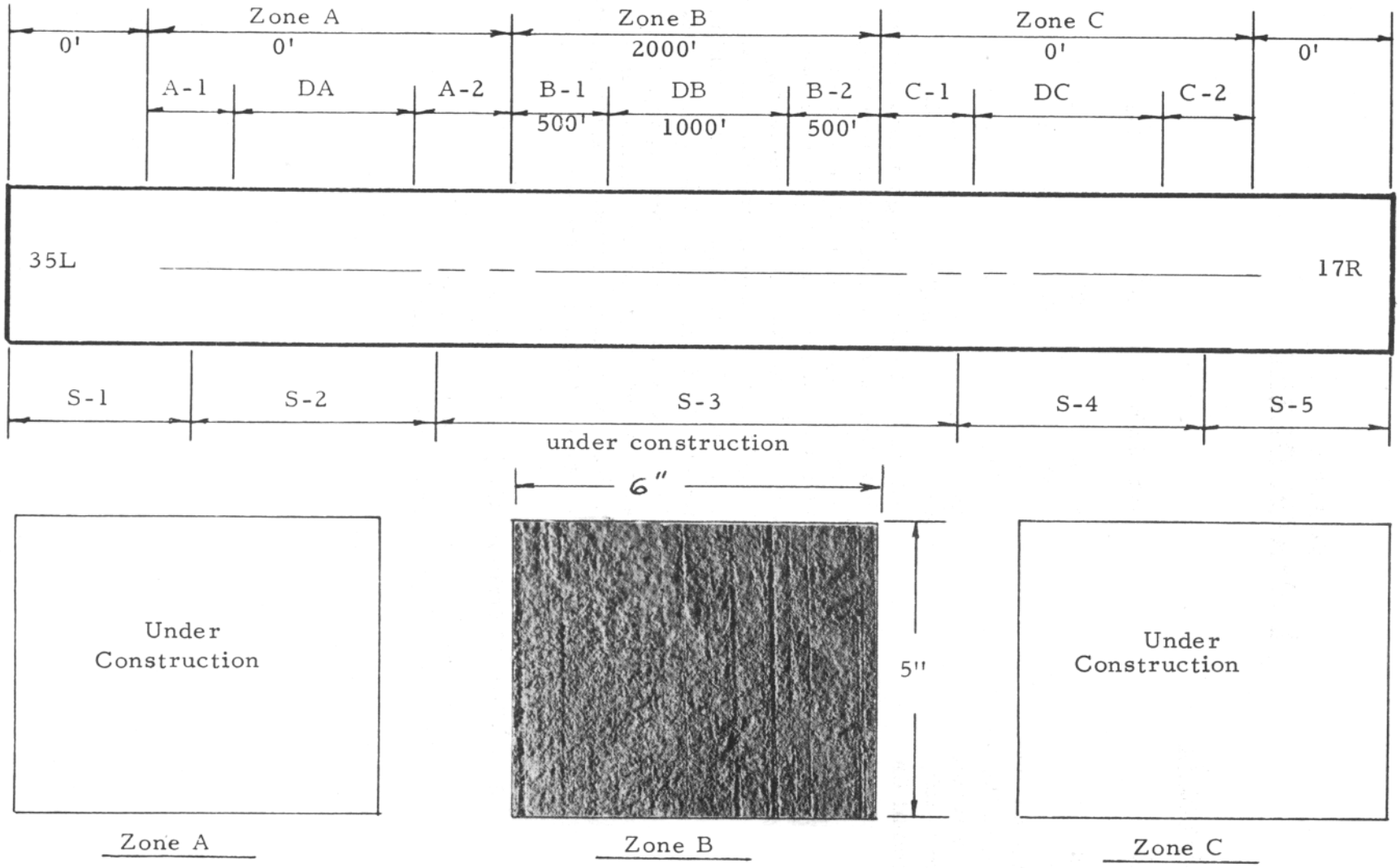


Figure G4

TABLE G1
RUNWAY STATISTICS

Airport: Memphis

Runway No.	17L-35R	9-27	3-21	17R-35L
Length, ft.	8400	8956	5990	9300
Width, ft.	150	150	150	150
Transverse slope, %	1	.5	.5	1
Effective gradient, %	.78	.44	.26	.45
Pavement surface	PC	AC	AC	PC
Monthly operations	8640	960	none	under constr.
Surface condition	Runway 17L-35R had significant rubber deposits in Zone A and somewhat less in Zone C. Transverse cracks, joint faulting and a few corner breaks were noted, but drainage was good on the burlap drag finish. Runway 17R-35L, under construction at time of testing had a medium depth broom finish and good drainage. Runway 9-27 had uncoated coarse aggregate exposed at surface and good drainage. Runway 3-21 had a distressed, cracked, and undulating surface with poor drainage.			

Annual precipitation, in. (last 40 years)

highest:	rain - 76	snow - 24
lowest:	rain - 30	snow - none

TABLE G2

RAIN, WIND AND TEMPERATURE DATA

Airport: Memphis			Date: April 11, 1972	
	Wind		Temperature, °F	
Time	Heading, deg.	Speed, knots	Ambient	Surface
0500	220	13	69	73
0600	220	12	69	73
0700	220	7	69	75
2100	210	11	76	81
2200	220	12	76	81
2300	210	10	75	80
2400	220	10	74	80
			Date: April 12, 1972	
0100	210	12	74	80
0200	220	12	73	75
0300	220	15	72	73
0400	220	15	71	73
1200	210	16	75	84
1300	200	15	78	84

Rainfall - None

TABLE G3

Water Depth Measurements

Airport: Memphis		Runway: 3-21			Date: April 11, 1972		
Zone	Time	Water Depth, hundredth inch					Avg. Water Depth (in.)
		1	2	3	4	5	
A	0525	3	5	3	4	4	0.038
	0527	2	3	3	2	2	0.024
	0530	5	3	4	3	4	0.038
	0532	3	2	2	3	2	0.024
	0534	6	5	3	2	3	0.038
	0536	3	3	2	3	2	0.026
	0539	4	2	4	3	3	0.032
	0541	2	2	3	2	2	0.022
	0542	3	3	4	5	3	0.036
	0544	3	2	2	3	2	0.024
	0546	3	4	2	5	4	0.036
	0548	3	2	1	3	3	0.024
B	0553	5	4	4	3	4	0.040
	0555	4	3	3	3	2	0.030
	0557	5	6	5	4	4	0.048
	0559	2	4	3	2	3	0.028
	0601	4	3	4	4	4	0.038
	0603	3	3	3	2	3	0.028
	0604	4	3	4	4	3	0.036
	0606	3	2	3	4	3	0.030
	0608	5	4	4	4	3	0.040
	0610	4	3	4	3	2	0.032
	0611	5	4	4	3	4	0.040
	0613	4	3	3	4	3	0.034
C	0621	6	4	5	4	2	0.042
	0623	4	2	3	3	3	0.030
	0624	4	3	5	4	3	0.038
	0626	2	3	3	4	2	0.028
	0628	3	3	4	4	2	0.032
	0630	2	2	3	2	2	0.022
	0632	4	3	4	3	3	0.034
	0634	2	3	2	3	2	0.024
	0635	4	3	5	4	3	0.038
	0637	3	3	3	3	2	0.028
	0638	3	5	3	5	4	0.040
	0640	2	3	2	4	3	0.028

TABLE G3
Water Depth Measurements

Airport: Memphis		Runway: 9-27			Date: April 11-12, 1972		
Zone	Time	Water Depth, hundredth inch					Avg. Water Depth (in.)
		1	2	3	4	5	
A	2219	2	3	2	3	3	0.026
	2221	2	2	3	2	2	0.022
	2226	4	3	3	4	3	0.034
	2228	2	3	2	2	3	0.024
	2239	4	3	3	4	4	0.036
	2241	2	3	2	2	3	0.024
	2245	5	4	3	4	3	0.038
	2247	3	2	2	3	3	0.026
	2250	3	3	4	3	3	0.032
	2252	2	3	2	1	2	0.020
	2254	5	4	3	3	4	0.038
	2256	3	3	2	3	2	0.026
B	2309	4	4	3	3	5	0.038
	2311	2	4	2	3	3	0.028
	2315	4	3	4	3	3	0.034
	2317	3	2	3	2	3	0.026
	2319	5	4	5	4	3	0.042
	2321	4	3	3	4	3	0.030
	2324	4	3	5	4	5	0.042
	2326	4	2	4	3	3	0.032
	2329	4	4	3	5	5	0.042
	2331	4	4	2	2	5	0.034
	2333	4	4	4	3	6	0.042
	2335	4	4	3	2	4	0.034
C	2348	5	5	4	4	4	0.044
	2350	5	5	4	2	3	0.038
	2354	3	5	5	4	3	0.040
	2356	3	3	4	3	2	0.030
	2359	4	4	5	5	3	0.042
	0001	4	4	3	4	3	0.036
	0005	4	6	5	3	5	0.046
	0007	4	4	3	3	4	0.036
	0010	5	5	5	5	5	0.050
	0012	3	4	3	3	4	0.034
	0015	5	4	4	4	5	0.044
	0017	4	4	4	3	3	0.036

TABLE G3
Water Depth Measurements

Airport: Memphis		Runway: 17L-35R Date: April 12, 1972					
Zone	Time	Water Depth, hundredth inch					Avg. Water Depth (in.)
		1	2	3	4	5	
A	0134	3	5	3	5	4	0.040
	0136	1	2	2	2	2	0.014
	0139	3	5	4	4	4	0.040
	0141	3	2	3	2	3	0.026
	0145	2	3	5	4	3	0.034
	0147	2	3	2	3	2	0.024
	0153	3	3	4	3	3	0.032
	0155	2	2	1	2	3	0.020
	0231	3	4	3	3	3	0.032
	0233	2	1	2	3	2	0.020
	0239	3	5	4	3	3	0.036
	0241	3	2	3	3	2	0.026
B	0255	4	3	4	6	5	0.044
	0257	2	2	4	2	3	0.026
	0302	4	3	5	4	3	0.034
	0304	2	3	3	4	3	0.030
	0308	4	4	3	5	3	0.038
	0310	3	2	2	3	3	0.026
	0315	4	3	3	4	3	0.034
	0317	2	4	3	3	2	0.028
	0321	3	5	4	5	4	0.042
	0323	4	3	3	4	2	0.032
	0328	3	4	3	4	5	0.038
	0330	4	3	2	3	3	0.030
C	0342	3	4	2	3	4	0.032
	0344	3	2	2	3	2	0.024
	0348	3	3	3	3	3	0.030
	0350	3	2	2	3	3	0.026
	0353	3	4	3	4	3	0.034
	0355	2	3	2	2	3	0.024
	0405	4	3	3	4	3	0.034
	0407	3	3	2	3	2	0.026
	0410	4	4	3	4	5	0.040
	0412	4	3	2	2	3	0.028
	0415	4	3	4	2	2	0.030
	0417	3	2	3	1	2	0.022

TABLE G3
Water Depth Measurements

Airport: Memphis Runway: 17R-35L Date: April 12, 1972

Zone	Time	Water Depth, hundredth inch					Avg. Water Depth (in.)
		1	2	3	4	5	
B	1242	2	4	3	3	4	0.032
	1244	2	3	2	3	2	0.024
	1247	4	5	5	4	3	0.042
	1249	2	2	3	2	2	0.022
	1252	5	2	3	3	4	0.034
	1254	3	2	4	3	2	0.028
	1257	4	3	4	5	4	0.040
	1259	3	2	3	1	1	0.020
	1302	5	3	5	5	4	0.044
	1304	3	1	2	2	3	0.022
	1308	5	5	4	3	4	0.042
	1310	3	4	3	2	3	0.030
A Under Constr.							
C Under Constr.							

TABLE G4
BASIC DBV DRY SURFACE DATA

AIRPORT Memphis International,
Tennessee

1972 Date	Run No.	R/W Sect.	R/W Head.	Time of Run Hr-Min	Temp. °F		Primary Instr.		Backup Instr.	
					Amb. Air	R/W Surf.	Brake Speed mph	Stop. Dist. ft.	Brake Speed mph	Stop. Dist. ft.
4/11	322	DA	3	0459	69	73	62	366	61.0	359
4/11	323	DB	3	0500	69	73	60	350	60.0	354
4/11	324	DC	3	0501	69	73	59	312	59.0	312
4/11	338	DA	9	2122	76	83	60	336	60.0	338
4/11	339	DB	9	2123	76	83	61	330	60.5	333
4/11	340	DC	9	2124	76	83	61	344	60.5	343
4/12	355	DA	17L	0106	74	80	61	349	61.0	348
4/12	356	DB	17L	0108	74	80	60	302	60.0	301
4/12	357	DC	17L	0109	74	80	60	332	60.0	333
4/12	371	DB	17R	1218	76	85	60	366	60.0	364
4/12	372	DB	35L	1222	76	85	61	368	60.5	364

TABLE G5
BASIC DBV WET SURFACE DATA

AIRPORT Memphis International, Tennessee

1972 Date	Run No.	R/W Sect.	R/W Head.	Time of Run Hr-Min	Avg. Water Depth in.	Temp. °F		Primary Instr.		Backup Instr.	
						Amb. Air	R/W Surf.	Brake Speed mph	Stop. Dist. ft.	Brake Speed mph	Stop. Dist. ft.
4/11	325	DA	3	0526	.029	69	74	60	375	59.5	375
4/11	326	DA	21	0531	.029	69	74	61	433	61.0	433
4/11	327	DA	3	0535	.032	69	74	61	502	60.5	502
4/11	328	DA	21	0540	.027	69	74	60	462	59.5	459
4/11	329	DB	3	0554	.035	69	75	62	402	61.5	401
4/11	330	DB	21	0558	.038	69	75	59	400	59.0	401
4/11	331	DB	3	0602	.033	69	75	59	426	59.0	422
4/11	332	DB	21	0605	.033	69	75	60	438	60.0	438
4/11	333	DC	3	0622	.036	69	76	62	402	61.5	401
4/11	334	DC	21	0625	.033	69	76	60	410	60.0	407
4/11	336	DC	3	0636	.033	69	76	60	400	60.0	401
4/11	337	DC	21	0639	.034	69	76	60	437	60.0	433
4/11	342	DA	9	2220	.024	76	82	60	545	60.0	549
4/11	343	DA	27	2227	.029	76	82	59	476	59.0	475
4/11	344	DA	9	2240	.030	75	81	60	429	60.0	428
4/11	345	DA	27	2246	.032	75	81	60	559	60.0	560
4/11	346	DB	9	2310	.033	75	81	60	446	60.0	449
4/11	347	DB	27	2316	.030	75	81	60	414	60.0	412

TABLE G5
BASIC DBV WET SURFACE DATA

AIRPORT Memphis International, Tennessee

1972 Date	Run No.	R/W Sect.	R/W Head.	Time of Run Hr-Min	Avg. Water Depth in.	Temp. °F		Primary Instr.		Backup Instr.	
						Amb. Air	R/W Surf.	Brake Speed mph	Stop. Dist. ft.	Brake Speed mph	Stop. Dist. ft.
4/11	348	DB	9	2320	.036	75	81	60	490	60.0	491
4/11	349	DB	27	2325	.037	75	81	60	394	59.5	391
4/11	350	DC	9	2349	.041	74	81	60	594	59.5	597
4/11	351	DC	27	2355	.035	74	81	60	693	59.5	692
4/11	352	DC	9	2400	.039	74	81	60	582	60.0	581
4/12	353	DC	27	0006	.041	74	81	60	746	60.0	739
4/12	358	DA	17L	0135	.027	74	78	60	1103	60.0	1104
4/12	359	DA	35R	0140	.033	73	77	61	1415	61.0	1415
4/12	360	DA	17L	0146	.029	73	76	60	1085	60.0	1082
4/12	361	DA	35R	0154	.026	73	75	61	1198	60.5	1199
4/12	362	DB	17L	0256	.035	72	73	61	724	60.5	723
4/12	363	DB	35R	0303	.032	72	73	59	835	59.0	834
4/12	364	DB	17L	0309	.032	72	73	60	699	59.5	697
4/12	365	DB	35R	0316	.031	72	73	59	771	59.0	771
4/12	366	DC	17L	0343	.028	71	73	57	910	57.5	913
4/12	367	DC	35R	0349	.028	71	73	61	1279	60.5	1283
4/12	368	DC	17L	0354	.029	71	73	62	915	61.5	919
4/12	369	DC	35R	0406	.030	71	73	62	1217	61.5	1214

TABLE G5
BASIC DBV WET SURFACE DATA

AIRPORT Memphis International, Tennessee

1972 Date	Run No.	R/W Sect.	R/W Head.	Time of Run Hr-Min	Avg. Water Depth in.	Temp. °F		Primary Instr.		Backup Instr.	
						Amb. Air	R/W Surf.	Brake Speed mph	Stop. Dist. ft.	Brake Speed mph	Stop. Dist. ft.
4/12	373	DB	35L	1243	.028	77	85	61	550	60.5	544
4/12	374	DB	17R	1248	.032	78	85	60	500	60.0	496
4/12	376	DB	35L	1303	.034	78	85	60	574	60.0	576
4/12	377	DB	17R	1309	.036	79	85	60	488	60.0	491

TABLE G6
CORRECTED DBV DATA

AIRPORT Memphis International, Tenn. DATE 4/11/72

RUNWAY 3-21 SURFACE TYPE Asphalt

WEATHER Dry WETTING Truck

Wet Test Run No.	Wet Test R/W Head.	Wet Test Run Time	R/W Test Sect.	Avg. Water Depth (in)	Wet Test Temp. (°F)		Stopping Distance		Stopping Distance Ratio (SDR)
					Amb. Air	R/W Surface	Equiv. Dry (ft)	Wet (ft)	
325	3	0526	DA	.029	69	74	339	375	1.11
326	21	0531	DA	.029	69	74	339	'419	1.24
327	3	0535	DA	.032	69	74	339	486	1.43
328	21	0540	DA	.027	69	74	339	462	1.36
329	3	0554	DB	.035	69	75	339	376	1.11
330	21	0558	DB	.038	69	75	339	414	1.22
331	3	0602	DB	.033	69	75	339	441	1.30
332	21	0605	DB	.033	69	75	339	438	1.29
333	3	0622	DC	.036	69	76	339	376	1.11
334	21	0625	DC	.033	69	76	339	410	1.21
336	3	0636	DC	.033	69	76	339	400	1.18
337	21	0639	DC	.034	69	76	339	437	1.29

TABLE G6
CORRECTED DBV DATA

AIRPORT Memphis International, Tenn. DATE 4/11 & 12/72

RUNWAY 9-27 SURFACE TYPE Asphalt

WEATHER Dry WETTING Truck

Wet Test Run No.	Wet Test R/W Head.	Wet Test Run Time	R/W Test Sect.	Avg. Water Depth (in)	Wet Test Temp. (°F)		Stopping Distance		Stopping Distance Ratio (SDR)
					Amb. Air	R/W Surface	Equiv. Dry (ft)	Wet (ft)	
342	9	2220	DA	.024	76	82	329	545	1.66
343	27	2227	DA	.029	76	82	329	492	1.50
344	9	2240	DA	.030	75	81	327	429	1.31
345	27	2246	DA	.032	75	81	327	559	1.71
346	9	2310	DB	.033	75	81	327	446	1.36
347	27	2316	DB	.030	75	81	327	414	1.27
348	9	2320	DB	.036	75	81	327	490	1.50
349	27	2325	DB	.037	75	81	327	394	1.20
350	9	2349	DC	.041	74	81	326	494	1.52
351	27	2355	DC	.035	74	81	326	693	2.13
352	9	2400	DC	.039	74	81	326	582	1.79
353	27	0006	DC	.041	74	81	326	746	2.29

TABLE G6
CORRECTED DBV DATA

AIRPORT Memphis International, Tenn. DATE 4/12/72

RUNWAY 17L-35R SURFACE TYPE Concrete

WEATHER Dry WETTING Truck

Wet Test Run No.	Wet Test R/W Head.	Wet Test Run Time	R/W Test Sect.	Avg. Water Depth (in)	Wet Test Temp. (°F)		Stopping Distance		Stopping Distance Ratio (SDR)
					Amb. Air	R/W Surface	Equiv. Dry (ft)	Wet (ft)	
358	17	0135	DA	.027	74	78	324	1103	3.40
359	35	0140	DA	.033	73	77	323	1369	4.24
360	17	0146	DA	.029	73	76	323	1058	3.28
361	35	0154	DA	.026	73	75	323	1159	3.59
362	17	0256	DB	.035	72	73	321	700	2.18
363	35	0303	DB	.032	72	73	321	864	2.69
364	17	0309	DB	.032	72	73	321	699	2.18
365	35	0316	DB	.031	72	73	321	797	2.48
366	17	0343	DC	.028	71	73	320	1008	3.15
367	35	0349	DC	.028	71	73	320	1237	3.87
368	17	0354	DC	.029	71	73	320	857	2.68
369	35	0406	DC	.030	71	73	320	1140	3.56

TABLE G6
CORRECTED DBV DATA

AIRPORT Memphis International, Tenn. **DATE** 4/12/72

RUNWAY 17R-35L (Center) **SURFACE TYPE** Concrete

WEATHER Dry **WETTING** Truck

Wet Test Run No.	Wet Test R/W Head.	Wet Test Run Time	R/W Test Sect.	Avg. Water Depth (in)	Wet Test Temp. (°F)		Stopping Distance		Stopping Distance Ratio (SDR)
					Amb. Air	R/W Surface	Equiv. Dry (ft)	Wet (ft)	
373	35	1243	DB	.028	77	85	362	532	1.47
374	17	1248	DB	.032	78	85	363	500	1.38
376	35	1303	DB	.034	78	85	363	574	1.58
377	17	1309	DB	.036	79	85	364	488	1.34

NOTE: Zones A and C under construction

TABLE G7
Mu-Meter Data

Airport: Memphis	Runway: 3-21	Date: April 11, 1972					
Run No.	R/W Heading	Zone	Avg. Water Depth (in.)	Test Time	Speed (mph)	Test Section	Avg. Frict.
1	3	A	Dry	0500	40	A-1 DA A-2	.82 .79 .82
1-R	21	A	Dry	0503	40	A-2 DA A-1	.82 .79 .80
2	3	B	Dry	0505	40	B-1 DB B-2	.82 .81 .79
2-R	21	B	Dry	0507	40	B-2 DB B-1	.79 .79 .80
3	3	C	Dry	0510	40	C-1 DC C-2	.81 .78 .78
3-R	21	C	Dry	0513	40	C-2 DC C-1	.77 .79 .80
4	3	A	0.029	0526	40	A-1 DA A-2	.62 .63 .40
4-R	21	A	0.029	0531	40	A-2 DA A-1	.53 .64 .60
5	3	A	0.032	0535	20	A-1 DA A-2	.78 .77 .80
5-R	21	A	0.027	0540	20	A-2 DA A-1	.80 .77 .78
6	3	A	0.030	0543	60	A-1 DA A-2	.57 .55 .33

TABLE G7
Mu-Meter Data

Airport: Memphis		Runway: 3-21		Date: April 11, 1972			
Run No.	R/W Heading	Zone	Avg. Water Depth (in.)	Test Time	Speed (mph)	Test Section	Avg. Frict.
6-R	21	A	0.030	0547	60	A-2 DA A-1	.38 .55 .56
7	3	B	0.035	0554	40	B-1 DB B-2	.54 .62 .53
7-R	21	B	0.038	0558	40	B-2 DB B-1	.62 .60 .55
8	3	B	0.033	0602	20	B-1 DB B-2	.80 .80 .82
8-R	21	B	0.033	0605	20	B-2 DB B-1	.84 .81 .80
9	3	B	0.036	0609	60	B-1 DB B-2	.33 .44 .58
9-R	21	B	0.037	0612	60	B-2 DB B-1	.45 .42 .30
10	3	C	0.036	0622	40	C-1 DC C-2	.73 .72 .68
10-R	21	C	0.033	0625	40	C-2 DC C-1	.73 .68 .71
11	3	C	0.027	0629	20	C-1 DC C-2	.84 .82 .82
11-R	21	C	0.029	0633	20	C-2 DC C-1	.82 .83 .82

TABLE G7
Mu-Meter Data

Airport: Memphis		Runway: 3-21		Date: April 11, 1972			
Run No.	R/W Heading	Zone	Avg. Water Depth (in.)	Test Time	Speed (mph)	Test Section	Avg. Frict.
12	3	C	0.033	0636	60	C-1 DC C-2	.64 .55 .65
12-R	21	C	0.034	0639	60	C-2 DC C-1	.57 .55 .64

TABLE G7
Mu-Meter Data

Airport: Memphis		Runway: 9-27		Date: April 11, 1972			
Run No.	R/W Heading	Zone	Avg. Water Depth (in.)	Test Time	Speed (mph)	Test Section	Avg. Frict.
1	9	A	Dry	2130	40	A-1 DA A-2	.78 .78 .79
1-R	27	A	Dry	2133	40	A-2 DA A-1	.79 .78 .78
2	9	B	Dry	2137	40	A-1 DA A-2	.80 .81 .80
2-R	27	B	Dry	2142	40	A-2 DA A-1	.78 .80 .80
3	9	C	Dry	2146	40	A-1 DA A-2	.81 .80 .79
3-R	27	C	Dry	2151	40	A-2 DA A-1	.78 .79 .80
4	9	A	0.024	2220	40	A-1 DA A-2	.68 .62 .56
4-R	27	A	0.029	2227	40	A-2 DA A-1	.54 .56 .70
5	9	A	0.030	2240	20	A-1 DA A-2	.77 .75 .70
5-R	27	A	0.032	2246	20	A-2 DA A-1	.72 .77 .77
6	9	A	0.026	2252	60	A-1 DA A-2	.58 .48 .22

TABLE G7

Mu-Meter Data

Airport: Memphis			Runway: 9-27	Date: April 11, 1972			
Run No.	R/W Heading	Zone	Avg. Water Depth (in.)	Test Time	Speed (mph)	Test Section	Avg. Frict.
6-R	27	A	0.032	2255	60	A-2 DA A-1	.28 .52 .66
7	9	B	0.033	2310	40	B-1 DB B-2	.53 .75 .78
7-R	27	B	0.030	2316	40	B-2 DB B-1	.77 .75 .70
8	9	B	0.036	2320	20	B-1 DB B-2	.78 .76 .78
8-R	27	B	0.037	2325	20	B-2 DB B-1	.78 .78 .78
9	9	B	0.036	2330	60	B-1 DB B-2	.45 .62 .45
9-R	27	B	0.038	2334	60	B-2 DB B-1	.47 .62 .35
10	9	C	0.041	2349	40	C-1 DC C-2	.74 .62 .68
10-R	27	C	0.035	2355	40	C-2 DC C-1	.62 .58 .67

TABLE G7

Mu-Meter Data

Airport: Memphis			Runway: 9-27		Date: April 12, 1972		
Run No.	R/W Heading	Zone	Avg. Water Depth (in.)	Test Time	Speed (mph)	Test Section	Avg. Frict.
11	9	C	0.039	0000	20	C-1 DC C-2	.76 .74 .74
11-R	27	C	0.041	0006	20	C-2 DC C-1	.74 .75 .78
12	9	C	0.042	0011	60	C-1 DC C-2	.67 .52 .50
12-R	27	C	0.040	0016	60	C-2 DC C-1	.53 .52 .44

TABLE G7
Mu-Meter Data

Airport: Memphis			Runway: 17L-35R	Date: April 12, 1972			
Run No.	R/W Heading	Zone	Avg. Water Depth (in.)	Test Time	Speed (mph)	Test Section	Avg. Frict.
1	17	A	Dry	0113	40	A-1 DA A-2	.82 .82 .85
1-R	35	A	Dry	0115	40	A-2 DA A-1	.85 .83 .81
2	17	B	Dry	0118	40	B-1 DB B-2	.85 .85 .86
2-R	35	B	Dry	0120	40	B-2 DB B-1	.86 .86 .86
3	17	C	Dry	0123	40	C-1 DC C-2	.84 .82 .80
3-R	35	C	Dry	0125	40	C-2 DC C-1	.80 .82 .84
4	17	A	0.027	0135	40	A-1 DA A-2	.35 .35 .42
4-R	35	A	0.033	0140	40	A-2 DA A-1	.38 .30 .28
5	17	A	0.029	0146	20	A-1 DA A-2	.58 .57 .59
5-R	35	A	0.026	0154	20	A-2 DA A-1	.60 .60 .55
6	17	A	0.026	0232	60	A-1 DA A-2	.26 .28 .28

TABLE G7
Mu-Meter Data

Airport: Memphis		Runway: 17L-35R	Date: April 12, 1972				
Run No.	R/W Heading	Zone	Avg. Water Depth (in.)	Test Time	Speed (mph)	Test Section	Avg. Frict.
6-R	35	A	0.030	0240	60	A-2 DA A-1	.28 .20 .20
7	17	B	0.035	0256	40	B-1 DB B-2	.48 .40 .40
7-R	35	B	0.032	0303	40	B-2 DB B-1	.47 .42 .42
8	17	B	0.032	0309	20	B-1 DB B-2	.65 .68 .65
8-R	35	B	0.031	0316	20	B-2 DB B-1	.65 .68 .65
9	17	B	0.027	0322	60	B-1 DB B-2	.42 .38 .32
9-R	35	B	0.034	0329	60	B-2 DB B-1	.33 .32 .28
10	17	C	0.028	0343	40	C-1 DC C-2	.54 .42 .38
10-R	35	C	0.028	0349	40	C-2 DC C-1	.38 .37 .44
11	17	C	0.029	0354	20	C-1 DC C-2	.68 .65 .60
11-R	35	C	0.030	0406	20	C-2 DC C-1	.62 .60 .63

TABLE G7
Mu-Meter Data

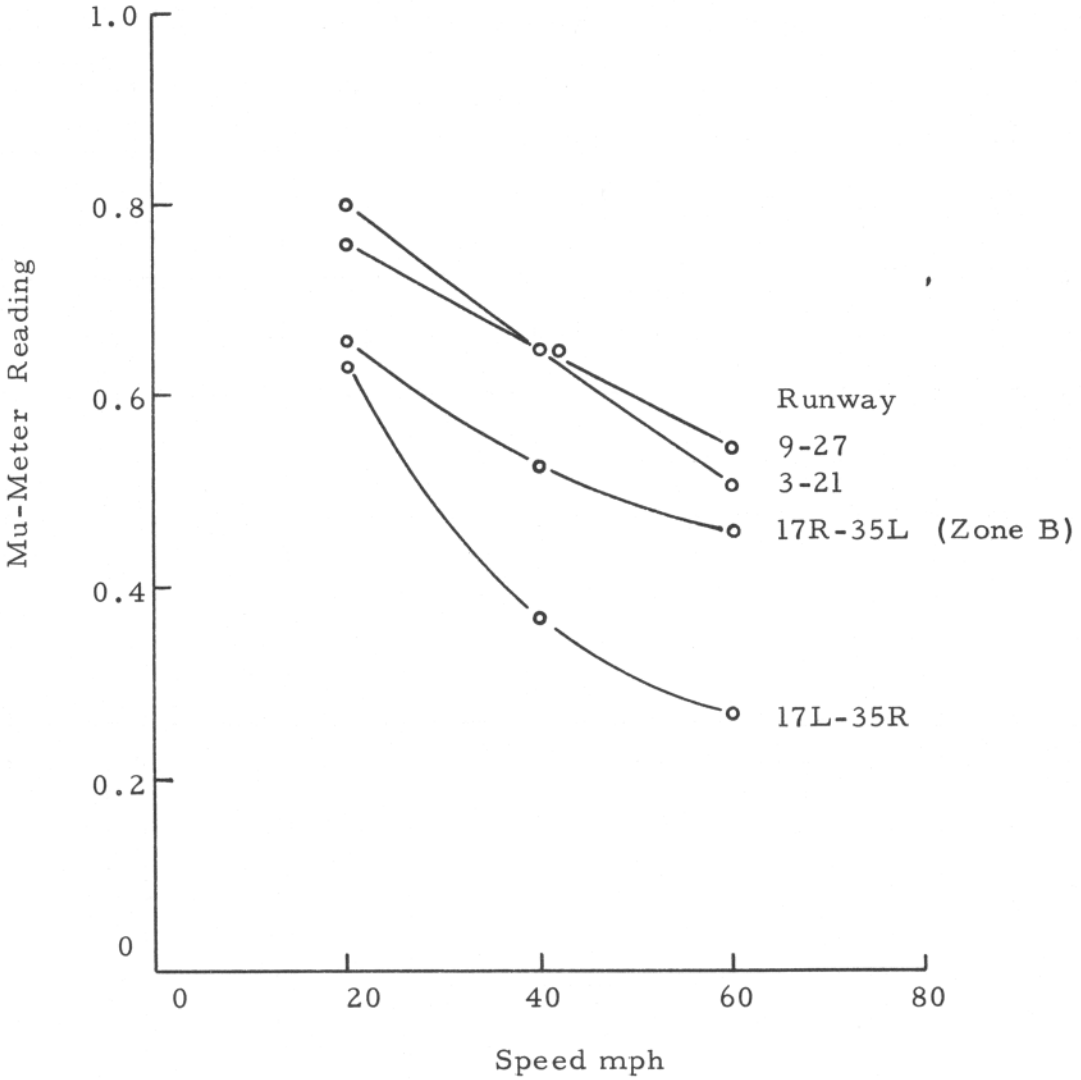
Airport: Memphis			Runway: 17L-35R	Date: April 12, 1972			
Run No.	R/W Heading	Zone	Avg. Water Depth (in.)	Test Time	Speed (mph)	Test Section	Avg. Frict.
12	17	C	0.034	0411	60	C-1 DC C-2	.38 .23 .22
12-R	35	C	0.026	0416	60	C-2 DC C-1	.28 .25 .35

TABLE G7
Mu-Meter Data

Airport: Memphis			Runway: 17R-35L	Date: April 12, 1972			
Run No.	R/W Heading	Zone	Avg. Water Depth (in.)	Test Time	Speed (mph)	Test Section	Avg. Frict.
1	35	B	Dry	1220	40	B-1 DB B-2	.75 .74 .70
1-R	17	B	Dry	1225	40	B-2 DB B-1	.75 .76 .76
2	35	B	0.028	1243	40	B-1 DB B-2	.50 .52 .56
2-R	17	B	0.032	1248	40	B-2 DB B-1	.62 .53 .45
3	35	B	0.031	1253	20	B-1 DB B-2	.64 .65 .65
3-R	17	B	0.030	1258	20	B-2 DB B-1	.70 .68 .63
4	35	B	0.034	1303	60	B-1 DB B-2	.42 .42 .48
4-R	17	B	0.036	1309	60	B-2 DB B-1	.60 .50 .33

NOTE: Zones A and C under construction

Memphis, Tenn.



MU vs. SPEED - WET

Figure G5

APPENDIX H

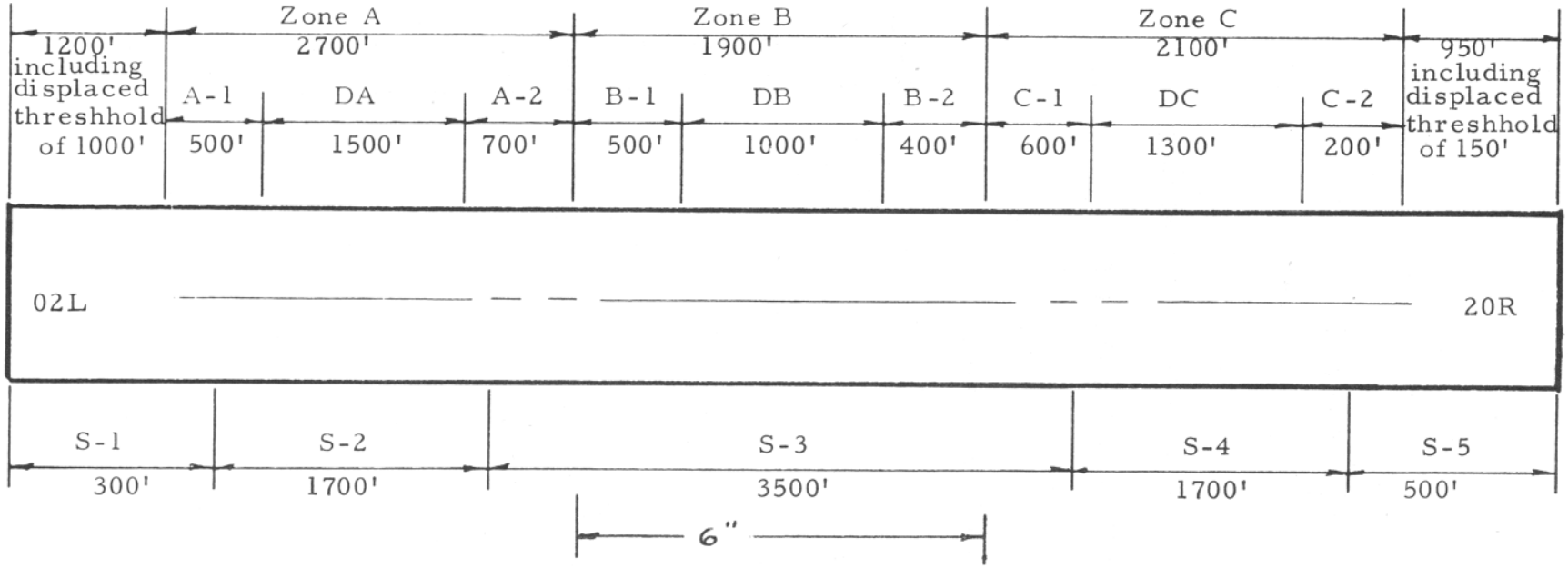
NASHVILLE METROPOLITAN AIRPORT

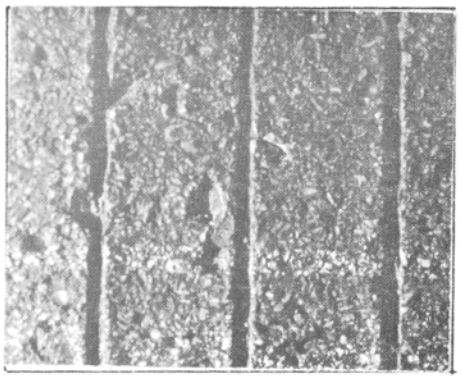
NASHVILLE, TENNESSEE

Table of Contents

Airport: Nashville

Runway: 02L-20R





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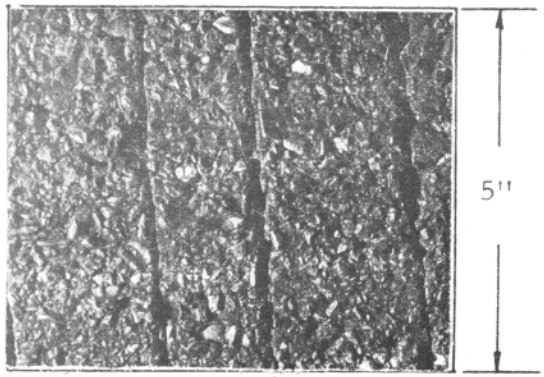

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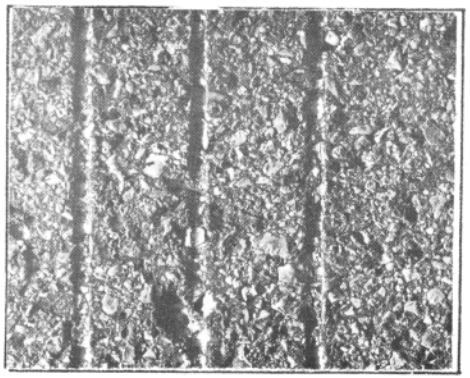
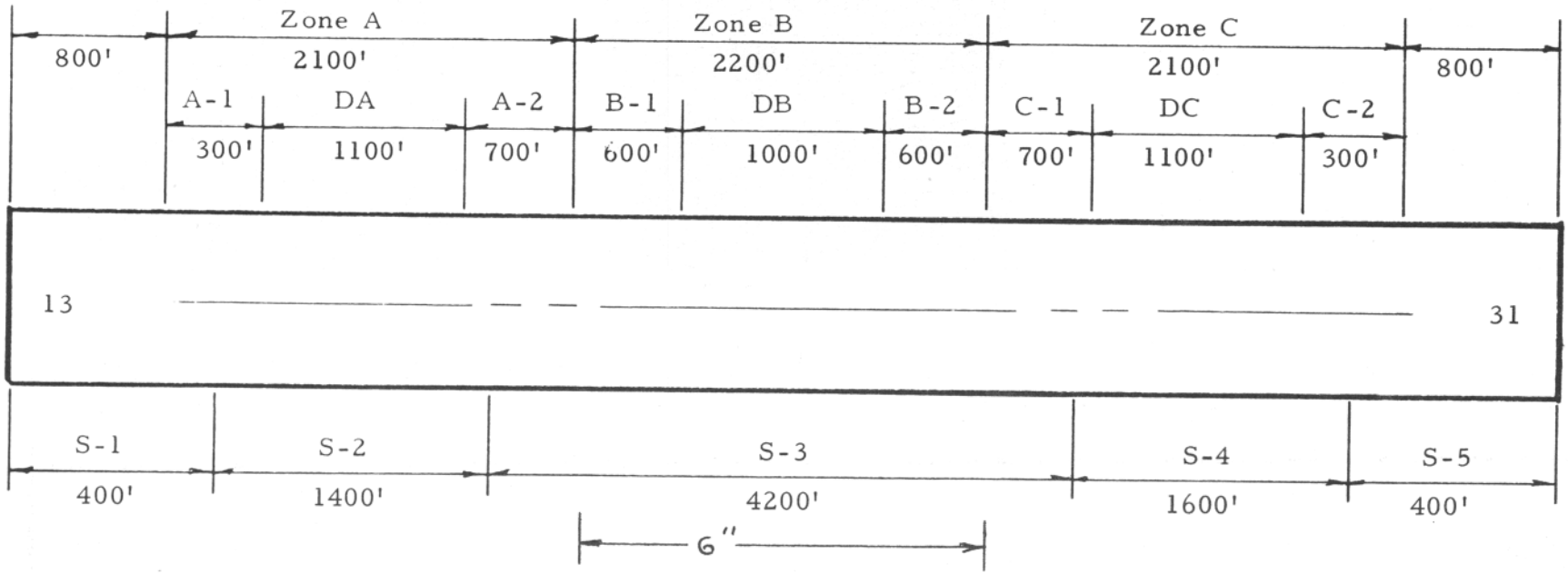


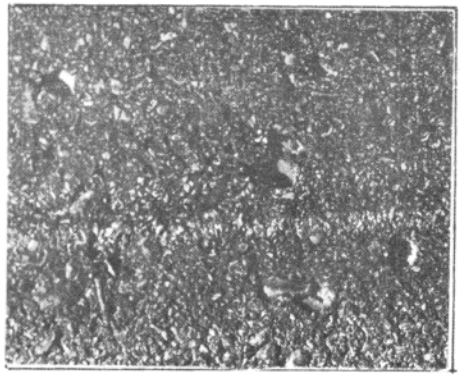
Zone C

Figure H1

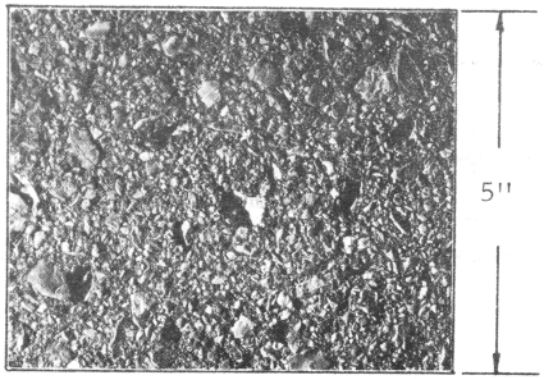
Airport: Nashville

Runway: 13-31

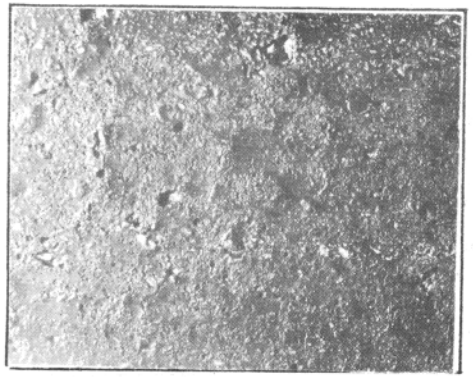




Zone A



Zone B

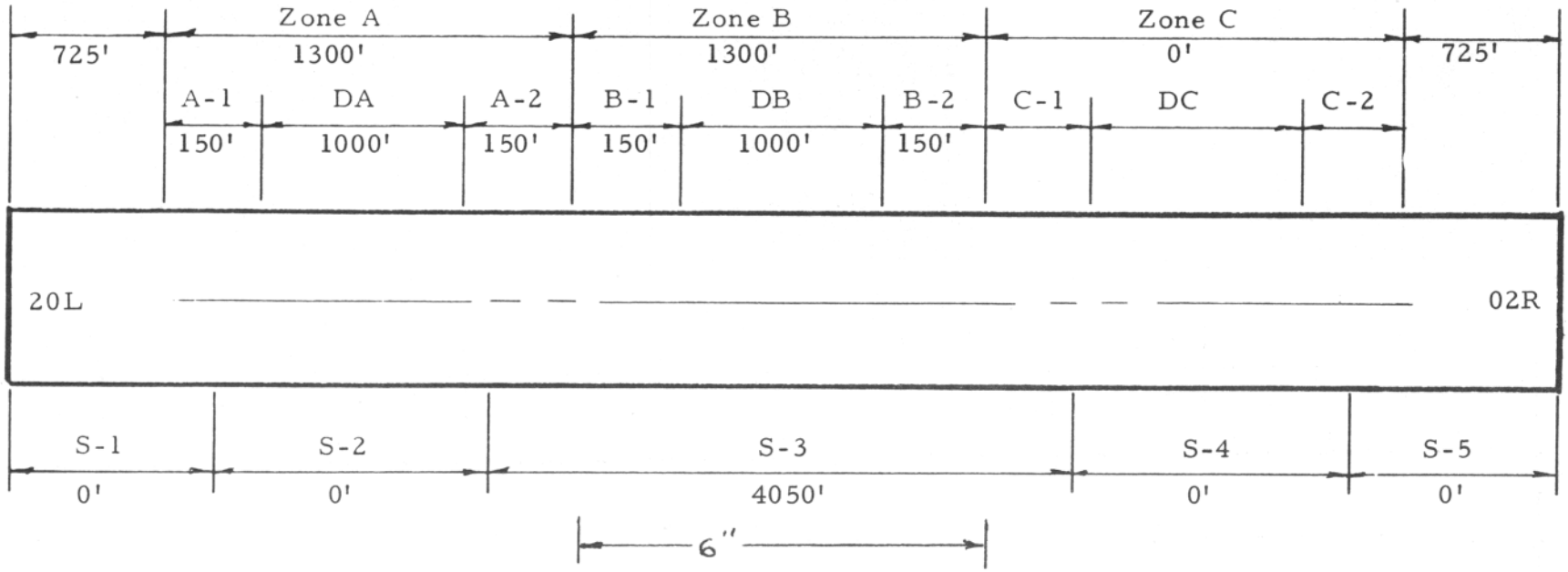


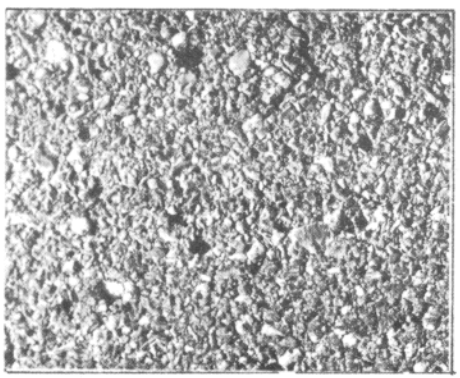
Zone C

Figure H2

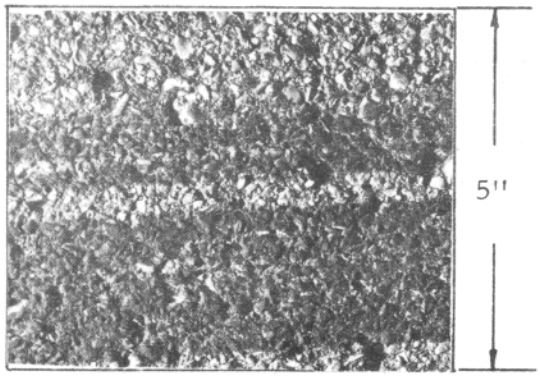
Airport: Nashville

Runway: 02R-20L





Zone A



Zone B

Not Applicable

Zone C

Figure H3

TABLE H1
RUNWAY STATISTICS

Airport: Nashville

Runway No.	2L-20R	13-31	2R-20L
Length, ft.	8850	8000	4050
Width, ft.	150	150	150
Transverse slope, %	1	1	.5
Effective gradient, %	.3	.3	.6
Pavement surface	AC	AC	AC
Monthly operations	3350	2120	none
Surface condition	Runway 2L-20R grooved, excellent drainage. Runway 13-31 had signifcant rubber deposits in Zone C, good drainage. Runway 2R-20L had uncoated small aggregate exposed and good drainage.		

Annual precipitation, in. (last 40 years)

highest:	rain - 64	snow - 33
lowest:	rain - 30	snow - trace

TABLE H2

RAIN, WIND AND TEMPERATURE DATA

Airport: Nashville			Date: April 16, 1972	
	Wind		Temperature, °F	
Time	Heading, deg.	Speed, knots	Ambient	Surface
2200	310	19	59	79
2300	310	19	58	79
2400	320	19	57	77
			Date: April 17, 1972	
0100	330	12	57	77
0200	330	16	56	75
0300	350	14	55	75
0400	340	13	54	75
0500	360	11	53	73
0600	360	12	52	73
0700	10	11	54	73
0800	30	12	56	73
0900	40	11	58	75
1000	20	8	59	75
1100	30	9	62	75

Rainfall - None

TABLE H3
Water Depth Measurements

Airport: Nashville *Runway: 2L-20R Date: April 17, 1972

Zone	Time	Water Depth, hundredth inch					Avg. Water Depth (in.)
		1	2	3	4	5	
A	0030	3	2	3	2	3	0.026
	0035	1	1	1	1	1	0.010
	0039	2	1	2	1	2	0.016
	0043	1	1	1	1	1	0.010
	0048	2	2	2	2	2	0.020
	0050	1	1	1	1	1	0.010
	0055	2	2	2	2	2	0.020
	0058	1	1	1	1	1	0.010
	0102	2	1	2	1	2	0.016
	0105	1	1	1	1	1	0.010
	0109	2	1	3	2	1	0.018
	0112	1	1	1	1	1	0.010
B	0126	3	3	3	4	2	0.030
	0128	1	1	1	1	1	0.010
	0132	3	3	2	3	3	0.028
	0135	1	1	1	1	1	0.010
	0138	3	4	3	3	3	0.032
	0140	1	1	1	1	1	0.010
	0142	3	3	3	4	3	0.032
	0146	1	2	1	1	2	0.014
	0150	3	3	3	3	4	0.032
	0152	1	2	1	2	1	0.014
	0246	3	4	3	3	3	0.032
	0250	1	1	1	1	1	0.010
C	0256	3	3	2	3	2	0.026
	0258	1	1	1	1	1	0.010
	0303	3	3	3	2	3	0.028
	0305	1	1	1	1	1	0.010
	0309	3	3	3	3	3	0.030
	0311	1	1	1	1	1	0.010
	0317	3	3	4	3	3	0.032
	0319	1	1	1	1	1	0.010
	0324	3	4	3	3	3	0.032
	0326	1	1	1	1	1	0.010
	0330	3	3	4	3	3	0.032
	0332	1	1	1	1	1	0.010

*Grooved

TABLE H3

Water Depth Measurements

Airport: Nashville		Runway: 13-31			Date: April 17, 1972		
Zone	Time	Water Depth, hundredth inch					Avg. Water Depth (in.)
		1	2	3	4	5	
A	0503	4	4	4	4	4	0.040
	0505	1	1	1	1	1	0.010
	0509	3	3	3	3	3	0.030
	0512	1	1	1	1	1	0.010
	0516	3	3	3	3	3	0.030
	0519	1	1	1	1	1	0.010
	0524	3	3	3	3	,3	0.030
	0526	1	1	1	1	1	0.010
	0534	3	3	3	3	3	0.030
	0537	1	1	1	1	1	0.010
	0540	3	3	3	3	3	0.030
	0543	1	1	1	1	1	0.010
B	0617	3	3	3	3	3	0.030
	0621	1	1	1	1	1	0.010
	0625	4	4	4	5	4	0.042
	0628	2	1	2	1	1	0.016
	0632	4	4	4	4	4	0.040
	0634	2	1	2	1	1	0.016
	0640	3	3	3	3	3	0.030
	0642	1	1	1	1	1	0.010
	0644	4	3	3	3	3	0.032
	0647	2	1	1	1	1	0.012
	0651	4	3	3	4	3	0.034
	0653	1	1	1	1	1	0.010
C	0701	4	3	3	3	3	0.032
	0703	1	1	1	1	1	0.010
	0706	3	3	4	3	3	0.032
	0709	1	1	1	1	1	0.010
	0713	3	4	3	3	3	0.032
	0715	1	1	1	1	1	0.010
	0718	3	3	4	3	3	0.032
	0721	1	1	1	1	1	0.010
	0724	3	3	3	3	3	0.030
	0726	1	1	1	1	1	0.010
	0729	3	3	3	3	3	0.030
	0731	1	1	1	1	1	0.010

TABLE H3
Water Depth Measurements

Airport: Nashville Runway: 2R-20L Date: April 17, 1972

Zone	Time	Water Depth, hundredth inch					Avg. Water Depth (in.)
		1	2	3	4	5	
A	0945	2	4	2	2	4	0.024
	0947	2	3	2	2	2	0.022
	0955	2	3	2	2	2	0.022
	0957	2	1	2	1	2	0.016
	0959	4	3	4	3	4	0.036
	1001	1	1	2	1	2	0.014
	1002	4	3	2	4	3	0.032
	1004	1	1	2	2	1	0.014
B	1009	4	3	3	3	3	0.032
	1011	2	1	2	2	1	0.016
	1013	2	3	3	2	2	0.024
	1015	1	1	1	1	1	0.010
	1016	3	4	3	3	2	0.030
	1018	1	2	1	1	1	0.012
	1020	4	3	3	3	3	0.032
	1022	1	2	1	1	1	0.012
C	Short Runway - No Zone C						

TABLE H4
BASIC DBV DRY SURFACE DATA

AIRPORT Nashville, Tennessee

1972 Date	Run No.	R/W Sect.	R/W Head.	Time of Run Hr-Min	Temp. °F		Primary Instr.		Backup Instr.	
					Amb. Air	R/W Surf.	Brake Speed mph	Stop. Dist. ft.	Brake Speed mph	Stop. Dist. ft.
4/16	378	DA	2L	2335	57	78	60	340	60.0	338
4/16	379	DB	2L	2337	57	78	59	320	59.0	322
4/16	380	DC	2L	2339	57	78	59	337	59.0	338
4/17	394	DA	13	0430	54	74	61	308	61.0	312
4/17	395	DB	13	0431	53	74	59	310	59.0	312
4/17	396	DC	13	0432	53	74	60	314	60.0	317
4/17	410	DA	20L	0920	58	75	60	308	61.0	306
4/17	411	DB	2R	0923	58	75	59	303	59.0	306

TABLE H5
BASIC DBV WET SURFACE DATA

AIRPORT Nashville, Tennessee

1972 Date	Run No.	R/W Sect.	R/W Head.	Time of Run Hr-Min	Avg. Water Depth in.	Temp. °F		Primary Instr.		Backup Instr.	
						Amb. Air	R/W Surf.	Brake Speed mph	Stop. Dist. ft.	Brake Speed mph	Stop. Dist. ft.
4/17	381	DA	2L	0031	.023	57	77	60	679	60.0	676
4/17	382	DA	20R	0040	.013	57	77	61	574	60.5	576
4/17	383	DA	2L	0049	.015	57	77	60	787	60.0	787
4/17	384	DA	20R	0056	.017	57	76	60	502	59.0	507
4/17	386	DB	2L	0127	.020	57	76	61	649	60.0	649
4/17	387	DB	20R	0134	.016	56	76	60	755	60.5	755
4/17	388	DB	2L	0139	.016	56	76	61	642	60.5	644
4/17	389	DB	20R	0144	.023	56	75	60	748	60.0	750
4/17	390	DC	2L	0257	.018	55	75	60	535	60.0	539
4/17	391	DC	20R	0304	.019	55	75	60	879	59.0	882
4/17	392	DC	2L	0310	.020	55	75	60	667	59.5	671
4/17	393	DC	20R	0318	.021	55	75	60	901	61.0	898
4/17	398	DA	13	0504	.025	53	73	61	566	60.0	565
4/17	399	DA	31	0510	.024	53	73	59	497	59.0	502
4/17	400	DA	13	0517	.024	53	73	60	515	60.0	523
4/17	401	DA	31	0525	.024	53	73	61	513	60.5	517
4/17	402	DB	13	0618	.025	53	73	60	486	60.0	486
4/17	403	DB	31	0626	.033	53	73	60	566	60.0	565

TABLE H5
BASIC DBV WET SURFACE DATA

AIRPORT Nashville, Tennessee

1972 Date	Run No.	R/W Sect.	R/W Head.	Time of Run Hr-Min	Avg. Water Depth in.	Temp. °F		Primary Instr.		Backup Instr.	
						Amb. Air	R/W Surf.	Brake Speed mph	Stop. Dist. ft.	Brake Speed mph	Stop. Dist. ft.
4/17	404	DB	13	0633	.028	53	73	60	591	60.0	591
4/17	405	DB	31	0644	.020	53	73	60	552	59.5	549
4/17	406	DC	13	0702	.021	54	73	60	473	59.5	470
4/17	407	DC	31	0707	.025	54	73	60	843	60.0	840
4/17	408	DC	13	0714	.021	54	73	60	510	60.0	512
4/17	409	DC	31	0719	.025	55	73	61	879	61.5	892
4/17	413	DA	20L	0946	.023	59	75	61	399	60.5	396
4/17	414	DA	2R	0954	.020	59	75	61	434	61.0	433
4/17	415	DA	20L	1000	.025	59	75	60	473	60.0	475
4/17	416	DA	2R	1003	.023	59	75	62	522	61.5	523
4/17	417	DB	20L	1010	.024	59	75	60	392	60.0	391
4/17	418	DB	2R	1014	.017	60	75	61	390	60.0	391
4/17	419	DB	20L	1017	.021	60	75	60	428	60.0	428
4/17	420	DB	2R	1021	.022	60	75	60	474	60.0	475

TABLE H6
CORRECTED DBV DATA

AIRPORT Nashville, Tennessee DATE Dry Tests 4/16/72 Wet Tests 4/17/72

RUNWAY 2L - 20R SURFACE TYPE Grooved Asphalt

WEATHER Dry WETTING Truck

Wet Test Run No.	Wet Test R/W Head.	Wet Test Run Time	R/W Test Sect.	Avg. Water Depth (in)	Wet Test Temp. (°F)		Stopping Distance		Stopping Distance Ratio (SDR)
					Amb. Air	R/W Surface	Equiv. Dry (ft)	Wet (ft)	
381	2	0031	DA	.023	57	77	340	679	2.00
382	20	0040	DA	.013	57	77	340	555	1.63
383	2	0049	DA	.015	57	77	340	787	2.31
384	20	0056	DA	.017	57	76	340	502	1.48
386	2	0127	DB	.020	57	76	340	628	1.85
387	20	0134	DB	.016	56	76	340	755	2.22
388	2	0139	DB	.016	56	76	340	621	1.83
389	20	0144	DB	.023	56	75	340	748	2.20
390	2	0257	DC	.018	55	75	340	535	1.57
391	20	0304	DC	.019	55	75	340	879	2.59
392	2	0310	DC	.020	55	75	340	667	1.96
393	20	0318	DC	.021	55	75	340	901	2.65

TABLE H6
CORRECTED DBV DATA

AIRPORT Nashville, Tennessee DATE 4/17/72

RUNWAY 13 - 31 SURFACE TYPE Asphalt

WEATHER Dry WETTING Truck

Wet Test Run No.	Wet Test R/W Head.	Wet Test Run Time	R/W Test Sect.	Avg. Water Depth (in)	Wet Test Temp. (°F)		Stopping Distance		Stopping Distance Ratio (SDR)
					Amb. Air	R/W Surface	Equiv. Dry (ft)	Wet (ft)	
398	13	0504	DA	.025	53	73	311	548	1.76
399	31	0510	DA	.024	53	73	311	514	1.65
400	13	0517	DA	.024	53	73	311	515	1.66
401	31	0525	DA	.024	53	73	311	496	1.59
402	13	0618	DB	.025	53	73	311	486	1.56
403	31	0626	DB	.033	53	73	311	566	1.82
404	13	0633	DB	.028	53	73	311	591	1.90
405	31	0644	DB	.020	53	73	311	552	1.77
406	13	0702	DC	.021	54	73	311	473	1.52
407	31	0707	DC	.025	54	73	311	843	2.71
408	13	0714	DC	.021	54	73	311	510	1.64
409	31	0719	DC	.025	55	73	311	850	2.73

TABLE H6
CORRECTED DBV DATA

AIRPORT Nashville, Tennessee DATE 4/17/72

RUNWAY 2R - 20L SURFACE TYPE Asphalt

WEATHER Dry WETTING Truck

Wet Test Run No.	Wet Test R/W Head.	Wet Test Run Time	R/W Test Sect.	Avg. Water Depth (in)	Wet Test Temp. (°F)		Stopping Distance		Stopping Distance Ratio (SDR)
					Amb. Air	R/W Surface	Equiv. Dry (ft)	Wet (ft)	
413	20	0946	DA	.023	59	75	311	386	1.24
414	2	0954	DA	.020	59	75	311	420	1.35
415	20	1000	DA	.025	59	75	311	473	1.52
416	2	1003	DA	.023	59	75	311	489	1.57
417	20	1010	DB	.024	59	75	311	392	1.26
418	2	1014	DB	.017	60	75	311	377	1.21
419	20	1017	DB	.021	60	75	311	428	1.38
420	2	1021	DB	.022	60	75	311	474	1.52

TABLE H7
Mu-Meter Data

Airport: Nashville *Runway: 2L-20R Date: April 16, 1972							
Run No.	R/W Heading	Zone	Avg. Water Depth (in.)	Test Time	Speed (mph)	Test Section	Avg. Frict.
1	2	A	Dry	2340	40	A-1 DA A-2	.78 .77 .81
1-R	20	A	Dry	2342	40	A-2 DA A-1	.84 .83 .79
2	2	B	Dry	2345	40	B-1 DB B-2	.83 .84 .83
2-R	20	B	Dry	2347	40	B-2 DB B-1	.82 .83 .84
3	2	C	Dry	2349	40	C-1 DC C-2	.82 .79 .77
3-R	20	C	Dry	2352	40	C-2 DC C-1	.79 .80 .84
						4/17/72	
4	2	A	0.023	0031	40	A-1 DA A-2	.54 .61 .63
4-R	20	A	0.013	0040	40	A-2 DA A-1	.68 .64 .49
5	2	A	0.015	0049	20	A-1 DA A-2	.64 .69 .69
5-R	20	A	0.017	0056	20	A-2 DA A-1	.70 .68 .60

*Grooved

TABLE H7
Mu-Meter Data

Airport: Nashville	*Runway:2L-20R	Date: April 17, 1972					
Run No.	R/W Heading	Zone	Avg. Water Depth (in.)	Test Time	Speed (mph)	Test Section	Avg. Frict.
6	2	A	0.014	0103	60	A-1 DA A-2	.49 .51 .52
6-R	20	A	0.015	0110	60	A-2 DA A-1	.63 .60 .48
7	2	B	0.020	0127	40	B-1 DB B-2	.54 .45 .49
7-R	20	B	0.016	0134	40	B-2 DB B-1	.54 .51 .59
8	2	B	0.016	0139	20	B-1 DB B-2	.63 .62 .63
8-R	20	B	0.023	0144	20	B-2 DB B-1	.68 .63 .64
9	2	B	0.023	0151	60	B-1 DB B-2	.48 .39 .37
9-R	20	B	0.021	1249	60	B-2 DB B-1	.43 .44 .55
10	2	C	0.018	0257	40	C-1 DC C-2	.52 .54 .35
10-R	20	C	0.019	0304	40	C-2 DC C-1	.39 .56 .54
11	2	C	0.020	0310	20	C-1 DC C-2	.69 .67 .63

*Grooved

TABLE H7
Mu-Meter Data

Airport: Nashville		*Runway: 2L-20R		Date: April 17, 1972			
Run No.	R/W Heading	Zone	Avg. Water Depth (in.)	Test Time	Speed (mph)	Test Section	Avg. Frict.
11-R	20	C	0.021	0318	20	C-2 DC C-1	.68 .70 .73
12	2	C	0.021	0325	60	C-1 DC C-2	.43 .49 .28
12-R	20	C	0.021	0331	60	C-2 DC C-1	.35 .52 .51

*Grooved

TABLE H7

Mu-Meter Data

Airport: Nashville		Runway: 13-31		Date: April 17, 1972			
Run No.	R/W Heading	Zone	Avg. Water Depth (in.)	Test Time	Speed (mph)	Test Section	Avg. Frict.
1	13	A	Dry	0437	40	A-1 DA A-2	.79 .78 .77
1-R	31	A	Dry	0439	40	A-2 DA A-1	.79 .78 .77
2	13	B	Dry	0441	40	B-1 DB B-2	.82 .80 .82
2-R	31	B	Dry	0443	40	B-2 DB B-1	.82 .80 .82
3	13	C	Dry	0445	40	C-1 DC C-2	.82 .82 .82
3-R	31	C	Dry	0447	40	C-2 DC C-1	.82 .82 .82
4	13	A	0.025	0504	40	A-1 DA A-2	.45 .60 .72
4-R	31	A	0.024	0510	40	A-2 DA A-1	.60 .60 .55
5	13	A	0.024	0517	20	A-1 DA A-2	.72 .75 .77
5-R	31	A	0.024	0525	20	A-2 DA A-1	.75 .74 .73
6	13	A	0.024	0535	60	A-1 DA A-2	.32 .50 .60

TABLE H7
Mu-Meter Data

Airport: Nashville	Runway: 13-31	Date: April 17, 1972					
Run No.	R/W Heading	Zone	Avg. Water Depth (in.)	Test Time	Speed (mph)	Test Section	Avg. Frict.
6-R	31	A	0.024	0541	60	A-2 DA A-1	.45 .50 .43
7	13	B	0.025	0618	40	B-1 DB B-2	.70 .56 .64
7-R	31	B	0.033	0626	40	B-2 DB B-1	.68 .54 .58
8	13	B	0.028	0633	20	B-1 DB B-2	.78 .73 .78
8-R	31	B	0.020	0641	20	B-2 DB B-1	.78 .70 .75
9	13	B	0.025	0647	60	B-1 DB B-2	.60 .45 .55
9-R	31	B	0.017	0652	60	B-2 DB B-1	.63 .45 .52
10	13	C	0.021	0702	40	C-1 DC C-2	.73 .50 .35
10-R	31	C	0.025	0707	40	C-2 DC C-1	.40 .53 .66
11	13	C	0.021	0714	20	C-1 DC C-2	.78 .68 .58
11-R	31	C	0.025	0719	20	C-2 DC C-1	.64 .71 .78

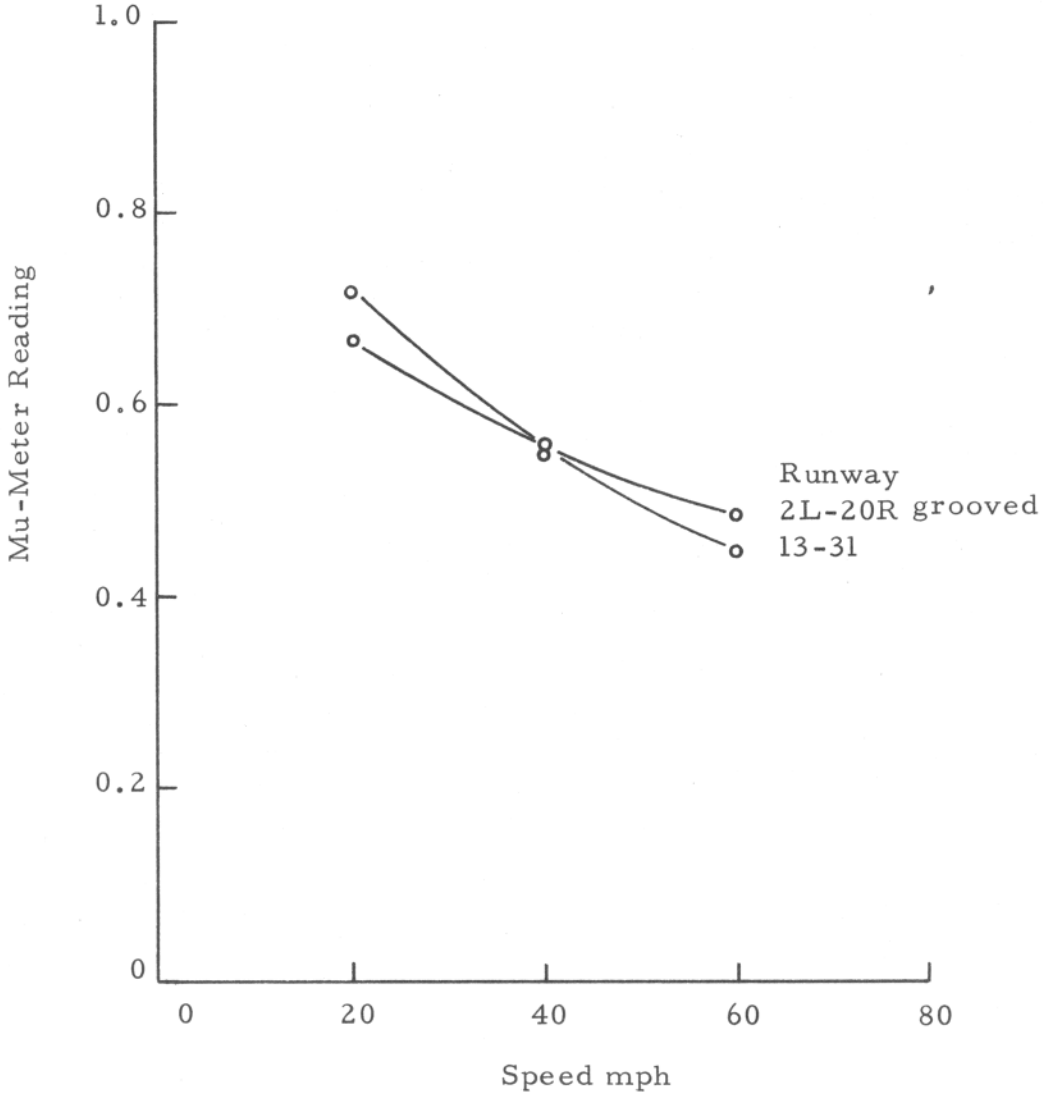
TABLE H7
Mu-Meter Data

Airport: Nashville		Runway: 13-31		Date: April 17, 1972			
Run No.	R/W Heading	Zone	Avg. Water Depth (in.)	Test Time	Speed (mph)	Test Section	Avg. Frict.
12	13	C	0.020	0725	60	C-1 DC C-2	.65 .42 .26
12-R	31	C	0.020	0730	60	C-2 DC C-1	.26 .38 .50

TABLE H7
Mu-Meter Data

Airport: Nashville	Runway:2R-20L	Date: April 17, 1972					
Run No.	R/W Heading	Zone	Avg. Water Depth (in.)	Test Time	Speed (mph)	Test Section	Avg. Frict.
1	20	A	Dry	0923	40	A-1 DA A-2	.81 .80 .79
1-R	2	A	Dry	0925	40	A-2 DA A-1	.79 .79 .78
2	20	B	Dry	0927	40	B-1 DB B-2	.81 .80 .79
2-R	2	B	Dry	0929	40	B-2 DB B-1	.81 .81 .81
3	20	A	0.023	0946	40	A-1 DA A-2	.58 .64 .70
3-R	2	A	0.020	0954	40	A-2 DA A-1	.70 .65 .71
4	20	B	0.024	1010	40	B-1 DB B-2	.77 .75 .77
4-R	2	B	0.017	1014	40	B-2 DB B-1	.76 .80 .76

Nashville, Tenn.



MU vs. SPEED - WET

Figure H4

APPENDIX I

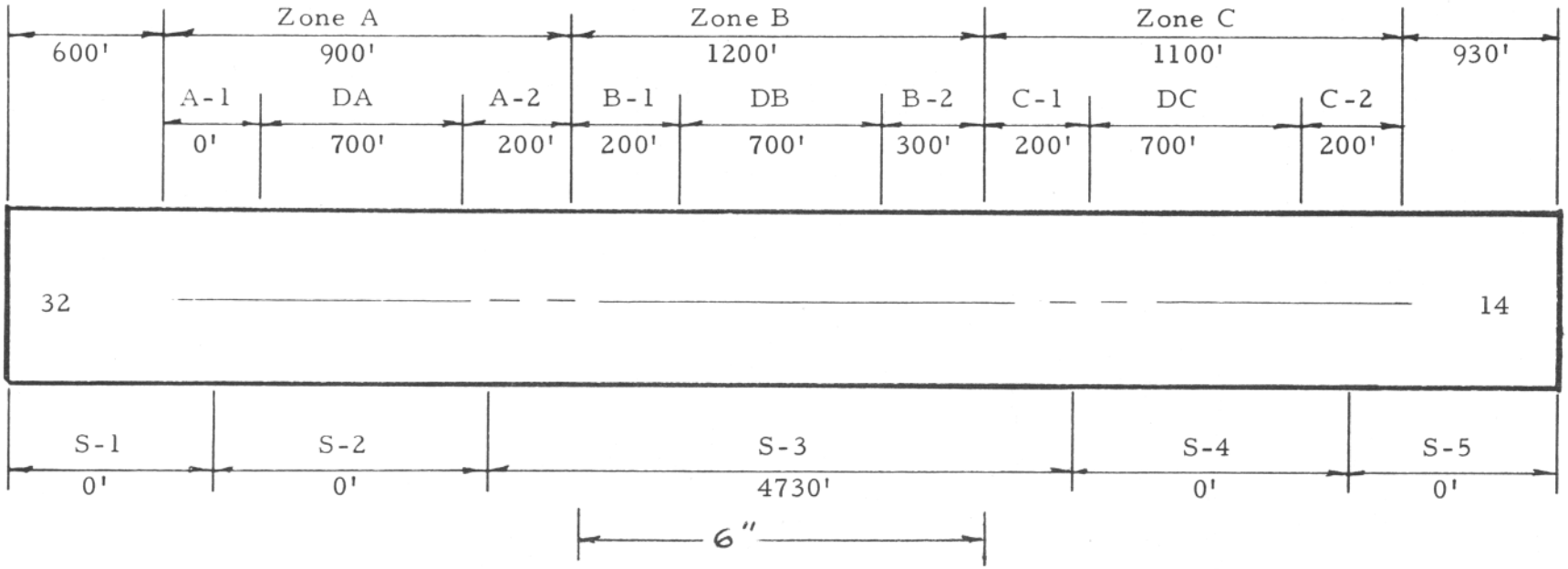
KANAWHA AIRPORT

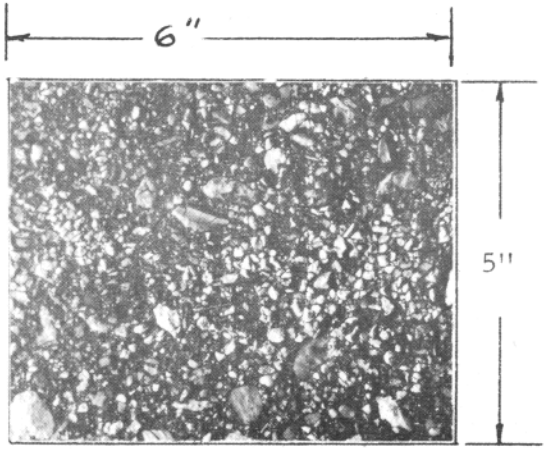
CHARLESTON, WEST VIRGINIA

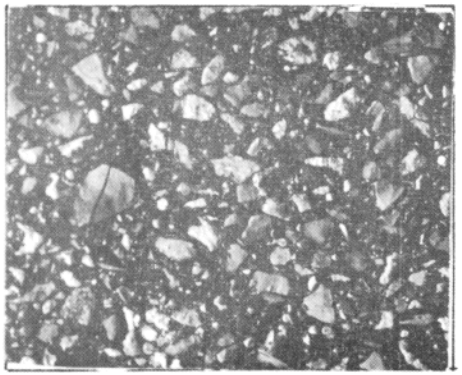
Table of Contents

Airport: Charleston

Runway: 14-32

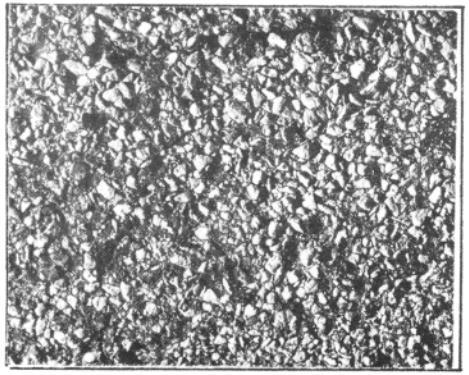






Zone A

Zone B

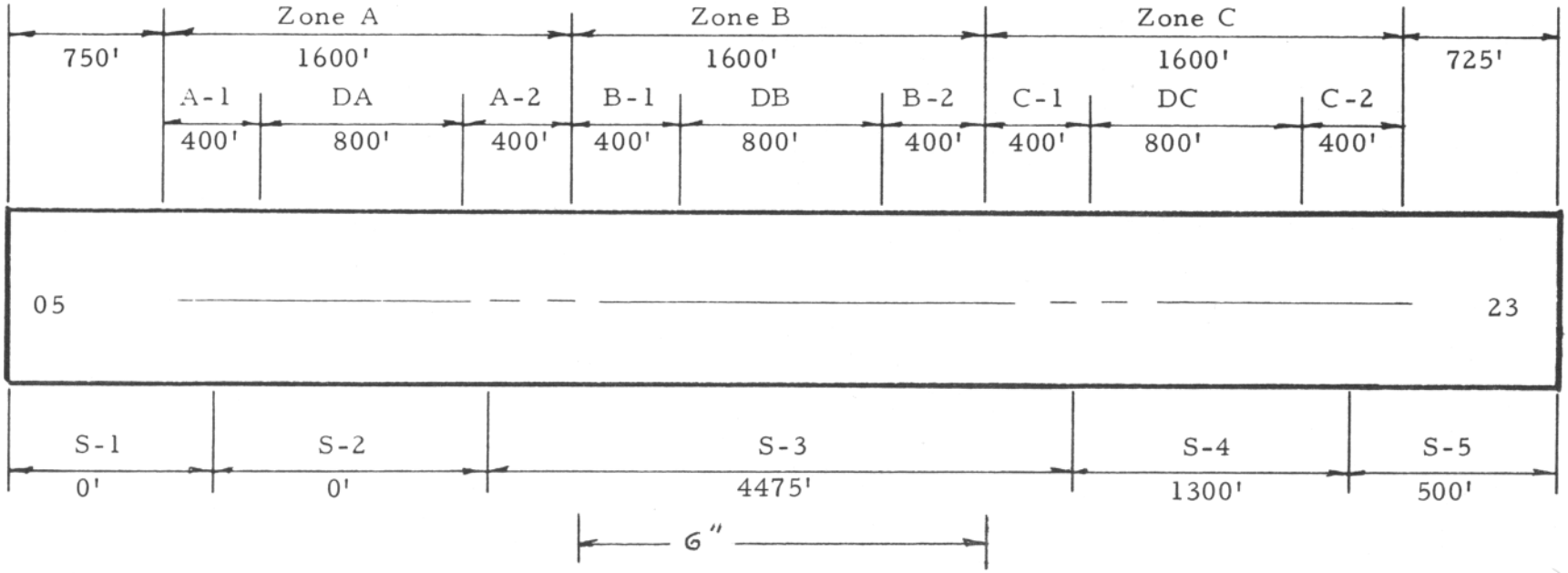


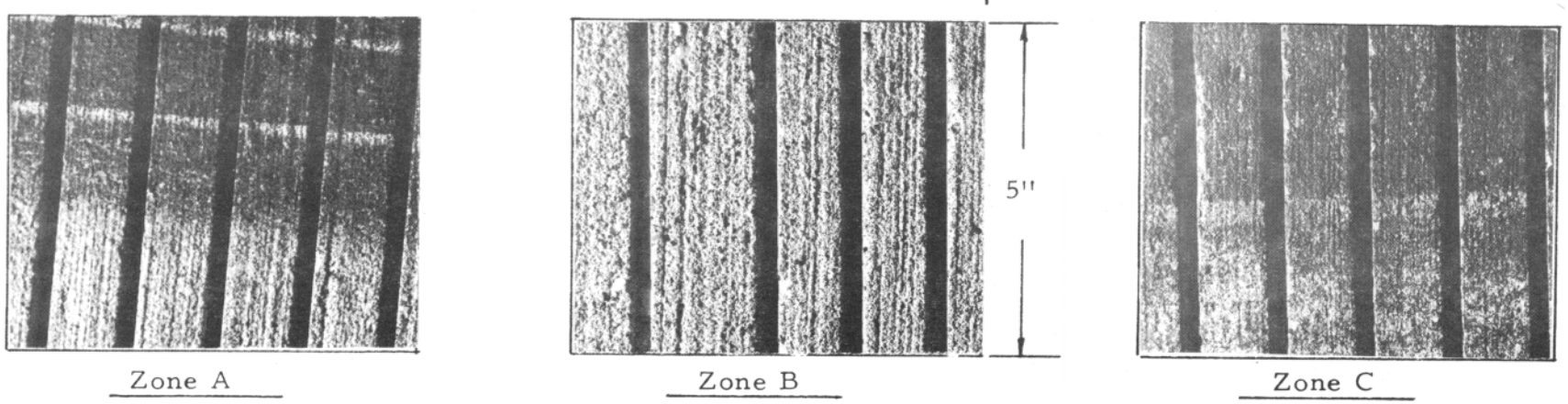
Zone C

Figure I 1

Airport: Charleston

Runway: 05-23





Zone A

Zone B

Zone C

Figure I 2

TABLE I 1
RUNWAY STATISTICS

Airport: Charleston

Runway No.	5-23	14-32
Length, ft.	6275	4730
Width, ft.	150	150
Transverse slope, %	.8	1
Effective gradient, %	1	1
Pavement surface	PC	AC
Monthly operations	1670	420
Surface condition	Runway 5-23 grooved concrete, excellent drainage. 60' concrete pavement keel with 45' AC on either side	Runway 14-32 exposed uncoated coarse aggregate, some pavement cracking and chuck holes with localized depressions and poor drainage.

Annual precipitation, in. (last 40 years)

highest:	rain - 60	snow - 53
lowest:	rain - 32	snow - 3

TABLE I 2

RAIN, WIND AND TEMPERATURE DATA

Airport: Charleston			Date: April 20, 1972	
	Wind		Temperature, °F	
Time	Heading, deg.	Speed, knots	Ambient	Surface
1100	300	4	65	64
1200	300	6	64	66
1300	310	5	61	66
			Date: April 21, 1972	
0000	10	5	52	64
0100	50	5	52	60
0200	10	5	50	55
0300	20	7	51	55
0400	40	8	51	55
0500	60	7	51	55

Rainfall - (4-20-72) Intermittent Rain - No Measurable rate

(4-21-72) None

TABLE I 3

*Water Depth Measurements

Airport: Charleston		Runway: 14-32			Date: April 20-21, 1972		
Zone	Time	Water Depth, hundredth inch					Avg. Water Depth (in.)
		1	2	3	4	5	
A	1100	4	5	3	2	4	0.036
	1102	2	3	2	3	2	0.024
	1103	3	4	3	5	4	0.038
	1107	2	4	1	2	3	0.024
	1109	4	3	3	3	4	0.034
	1111	3	2	2	3	2	0.024
	1114	6	4	3	2	,5	0.040
	1116	3	2	2	2	3	0.024
	1118	6	3	5	6	3	0.046
	1120	3	2	3	2	3	0.026
	1122	6	5	2	3	4	0.040
	1125	2	3	1	2	1	0.018
B	1215	5	3	3	6	2	0.038
	1217	3	2	2	3	2	0.024
	1219	2	4	4	5	3	0.036
	1221	2	3	3	3	1	0.024
	1223	4	3	4	5	4	0.040
	1225	3	2	3	3	3	0.028
	1227	6	2	4	4	4	0.040
	1229	3	1	2	2	3	0.022
	1231	3	6	3	4	4	0.040
	1233	2	3	2	3	3	0.026
	1235	4	5	3	4	5	0.042
	1237	3	3	2	3	3	0.028
C	0115	4	3	3	4	3	0.034
	0117	2	2	1	2	2	0.018
	0119	4	3	4	3	2	0.032
	0121	3	2	2	2	2	0.022
	0123	4	3	3	4	3	0.034
	0125	2	2	3	2	2	0.022
	0131	4	3	2	3	3	0.030
	0133	2	1	2	2	1	0.018
	0135	4	3	2	3	4	0.032
	0137	2	3	2	1	2	0.020
	0139	4	3	2	2	3	0.028
	0141	2	2	1	2	2	0.018

*No Measurable Water Depth on Grooved Runway 5-23

TABLE I 4

BASIC DBV DRY SURFACE DATA

AIRPORT Charleston, West Virginia

1972 Date	Run No.	R/W Sect.	R/W Head.	Time of Run Hr-Min	Temp. °F		Primary Instr.		Backup Instr.	
					Amb. Air	R/W Surf.	Brake Speed mph	Stop. Dist. ft.	Brake Speed mph	Stop. Dist. ft.
4/21	429	DA	32	0013	52	63	61	362	60.5	364
4/21	430	DB	32	0015	52	63	60	362	60.0	364
4/21	431	DC	32	0036	52	62	60	363	60.0	364
4/21	436	DA	5	0222	50	55	59	290	58.0	290
4/21	437	DB	5	0234	51	55	61	337	60.0	333
4/21	438	DC	23	0242	51	55	59	316	59.0	317

TABLE I 5
BASIC DBV WET SURFACE DATA

AIRPORT Charleston, West Virginia

1972 Date	Run No.	R/W Sect.	R/W Head.	Time of Run Hr-Min	Avg. Water Depth in.	Temp. °F		Primary Instr.		Backup Instr.	
						Amb. Air	R/W Surf.	Brake Speed mph	Stop. Dist. ft.	Brake Speed mph	Stop. Dist. ft.
4/20	421	DA	32	1101	.030	65	64	61	462	60.0	470
4/20	422	DA	14	1106	.031	65	64	60	419	60.0	422
4/20	423	DA	32	1111	.029	65	64	61	477	60.5	480
4/20	424	DA	14	1115	.032	65	65	60	402	60.0	417
4/20	425	DB	32	1216	.031	63	66	60	437	59.0	438
4/20	426	DB	14	1220	.030	63	66	60	390	60.0	391
4/20	427	DB	32	1224	.034	63	66	60	507	60.0	507
4/20	428	DB	14	1228	.031	63	66	60	386	59.5	385
4/21	432	DC	32	0116	.026	51	59	62	408	61.5	407
4/21	433	DC	14	0120	.027	51	59	61	420	60.5	422
4/21	434	DC	32	0124	.028	51	58	60	494	60.0	491
4/21	435	DC	14	0132	.024	51	58	60	424	60.0	422
4/21	439	DA	5	0305	-	51	55	62	345	61.0	343
4/21	440	DA	23	0310	-	51	55	60	371	59.5	375
4/21	441	DA	5	0314	-	51	55	59	374	59.0	375
4/21	442	DA	23	0318	-	51	55	60	315	59.5	364
4/21	443	DB	5	0351	-	51	55	60	337	60.0	333
4/21	444	DB	23	0356	-	51	55	60	356	59.5	354

TABLE I 5

BASIC DBV WET SURFACE DATA

AIRPORT Charleston, West Virginia

Date	Run No.	R/W Sect.	R/W Head.	Time of Run Hr-Min	Avg. Water Depth in.	Temp. °F		Primary Instr.		Backup Instr.	
						Amb. Air	R/W Surf.	Brake Speed mph	Stop. Dist. ft.	Brake Speed mph	Stop. Dist. ft.
4/21	445	DB	5	0359	* -	51	55	59	382	59.0	380
4/21	446	DB	23	0403	* -	51	55	59	358	60.0	354
4/21	447	DC	5	0420	-	51	55	61	431	61.0	433
4/21	448	DC	23	0425	-	51	55	60	430	59.5	433
4/21	449	DC	5	0428	-	51	55	60	403	60.0	407
4/21	450	DC	23	0433	-	51	55	60	475	60.0	470

* Wet-grooved runway - No measurable depth

TABLE I 6
CORRECTED DBV DATA

AIRPORT Charleston, West Virginia DATE Dry Tests 4/21/72 Wet Tests 4/20 & 21/72

RUNWAY 14-32 SURFACE TYPE Asphalt

WEATHER 4/20/72 Rain 4/21/72 Dry WETTING Truck (4/20 & 21/72)

Wet Test Run No.	Wet Test R/W Head.	Wet Test Run Time	R/W Test Sect.	Avg. Water Depth (in)	Wet Test Temp. (°F)		Stopping Distance		Stopping Distance Ratio (SDR)
					Amb. Air	R/W Surface	Equiv. Dry (ft)	Wet (ft)	
421	32	1101	DA	.030	65	64	361	447	1.24
422	14	1106	DA	.031	65	64	361	419	1.16
423	32	1111	DA	.029	65	64	361	461	1.28
424	14	1115	DA	.032	65	65	361	402	1.11
425	32	1216	DB	.031	63	66	358	437	1.22
426	14	1220	DB	.030	63	66	358	390	1.09
427	32	1224	DB	.034	63	66	358	507	1.42
428	14	1228	DB	.031	63	66	358	386	1.08
432	32	0116	DC	.026	51	59	358	382	1.07
433	14	0120	DC	.027	51	59	358	406	1.13
434	32	0124	DC	.028	51	58	358	494	1.38
435	14	0132	DC	.024	51	58	358	424	1.18

TABLE I 6
CORRECTED DBV DATA

AIRPORT Charleston, West Virginia DATE 4/21/72

RUNWAY 5-23 SURFACE TYPE Concrete-Grooved

WEATHER Dry WETTING Truck

Wet Test Run No.	Wet Test R/W Head.	Wet Test Run Time	R/W Test Sect.	Avg. Water Depth (in)	Wet Test Temp. (°F)		Stopping Distance		Stopping Distance Ratio (SDR)
					Amb. Air	R/W Surface	Equiv. Dry (ft)	Wet (ft)	
439	5	0305	DA	-	51	55	318	323	1.02
440	23	0310	DA	-	51	55	318	371	1.17
441	5	0314	DA	-	51	55	318	387	1.22
442	23	0318	DA	-	51	55	318	315	0.99
443	5	0351	DB	-	51	55	318	337	1.06
444	23	0356	DB	-	51	55	318	356	1.12
445	5	0359	DB	-	51	55	318	395	1.24
446	23	0403	DB	-	51	55	318	370	1.16
447	5	0420	DC	-	51	55	318	417	1.31
448	23	0425	DC	-	51	55	318	430	1.35
449	5	0428	DC	-	51	55	318	403	1.27
450	23	0433	DC	-	51	55	318	475	1.49

TABLE I 7
Mu-Meter Data

Airport: Charleston	Runway: 14-32		Date: April 20, 1972				
Run No.	R/W Heading	Zone	Avg. Water Depth (in.)	Test Time	Speed (mph)	Test Section	Avg. Frict.
1	32	A	0.030	1101	40	DA A-2	.63 .60
1-R	14	A	0.031	1106	40	A-2 DA	.62 .47
2	32	A	0.029	1110	20	DA A-2	.77 .74
2-R	14	A	0.032	1115	20	A-2 DA	.73 .70
3	32	A	0.036	1119	60	DA A-2	.44 .39
3-R	14	A	0.033	1123	60	A-2 DA	.65 .37
4	32	B	0.031	1216	40	B-1 DB B-2	.54 .62 .68
4-R	14	B	0.030	1220	40	B-2 DB B-1	.70 .58 .50
5	32	B	0.034	1224	20	B-1 DB B-2	.72 .72 .78
5-R	14	B	0.031	1228	20	B-2 DB B-1	.78 .75 .74
6	32	B	0.033	1232	60	B-1 DB B-2	.58 .55 .51

TABLE I 7
Mu-Meter Data

Airport: Charleston	Runway: 14-32		Date: April 20, 1972				
Run No.	R/W Heading	Zone	Avg. Water Depth (in.)	Test Time	Speed (mph)	Test Section	Avg. Frict.
6-R	14	B	0.035	1236	60	B-2 DB B-1	.43 .36 .40
						4/21/72	
7	32	A	Dry	0015	40	DA A-2	.76 .74
7-R	14	A	Dry	0017	40	A-2 DA	.71 .73
8	32	B	Dry	0019	40	B-1 DB B-2	.73 .72 .73
8-R	14	B	Dry	0021	40	B-2 DB B-1	.74 .73 .72
9	32	C	Dry	0038	40	C-1 DC C-2	.76 .67 .64
9-R	14	C	Dry	0040	40	C-2 DC C-1	.67 .66 .77
10	32	C	0.026	0116	40	C-1 DC C-2	.77 .64 .56
10-R	14	C	0.027	0120	40	C-2 DC C-1	.50 .55 .77
11	32	C	0.028	0124	20	C-1 DC C-2	.77 .70 .65

TABLE I 7

Mu-Meter Data

Airport: Charleston	Runway: 14-32		Date: April 21, 1972				
Run No.	R/W Heading	Zone	Avg. Water Depth (in.)	Test Time	Speed (mph)	Test Section	Avg. Frict.
11-R	14	C	0.024	0132	20	C-2 DC C-1	.63 .73 .77
12	32	C	0.026	0136	60	C-1 DC C-2	.69 .37 .30
12-R	14	C	0.023	0140	60	C-2 DC C-1	*

*large surface irregularity caused test wheels to jump from test mode into towing position.

TABLE I 7
Mu-Meter Data

Airport: Charleston	Runway: 5-23		Date: April 21, 1972				
Run No.	R/W Heading	Zone	Avg. Water Depth (in.)	Test Time	Speed (mph)	Test Section	Avg. Frict.
13	5	A	Dry	0224	40	A-1 DA A-2	.73 .73 .74
13-R	23	A	Dry	0226	40	A-2 DA A-1	.76 .76 .76
14	5	B	Dry	0233	40	B-1 DB B-2	.74 .73 .73
14-R	23	B	Dry	0235	40	B-2 DB B-1	.76 .76 .76
15	5	C	Dry	0240	40	C-1 DC C-2	.73 .73 .72
15-R	23	C	Dry	0242	40	C-2 DC C-1	.74 .75 .76
16	5	A	*	0305	40	A-1 DA A-2	.71 .71 .71
16-R	23	A	*	0310	40	A-2 DA A-1	.73 .74 .74
17	5	A	*	0314	20	A-1 DA A-2	.72 .71 .70
17-R	23	A	*	0318	20	A-2 DA A-1	.72 .72 .73
18	5	A	*	0322	60	A-1 DA A-2	.72 .73 .72

*wet-grooved runway - No Measurable Depth

TABLE I 7
Mu-Meter Data

Airport: Charleston		Runway: 5-23		Date: April 21, 1972			
Run No.	R/W Heading	Zone	Avg. Water Depth (in.)	Test Time	Speed (mph)	Test Section	Avg. Frict.
18-R	23	A	*	0325	60	A-2 DA A-1	.74 .74 .75
19	5	B	*	0351	40	B-1 DB B-2	.72 .71 .71
19-R	23	B	*	0356	40	B-2 DB B-1	.74 .73 .74
20	5	B	*	0359	20	B-1 DB B-2	.70 .70 .70
20-R	23	B	*	0403	20	B-2 DB B-1	.74 .72 .72
21	5	B	*	0407	60	B-1 DB B-2	.71 .72 .72
21-R	23	B	*	0411	60	B-2 DB B-1	.74 .72 .72
22	5	C	*	0420	40	C-1 DC C-2	.70 .70 .70
22-R	23	C	*	0425	40	C-2 DC C-1	.71 .73 .74
23	5	C	*	0428	20	C-1 DC C-2	.70 .71 .70
23-R	23	C	*	0433	20	C-2 DC C-1	.72 .71 .72

*wet-grooved runway - No Measurable Depth

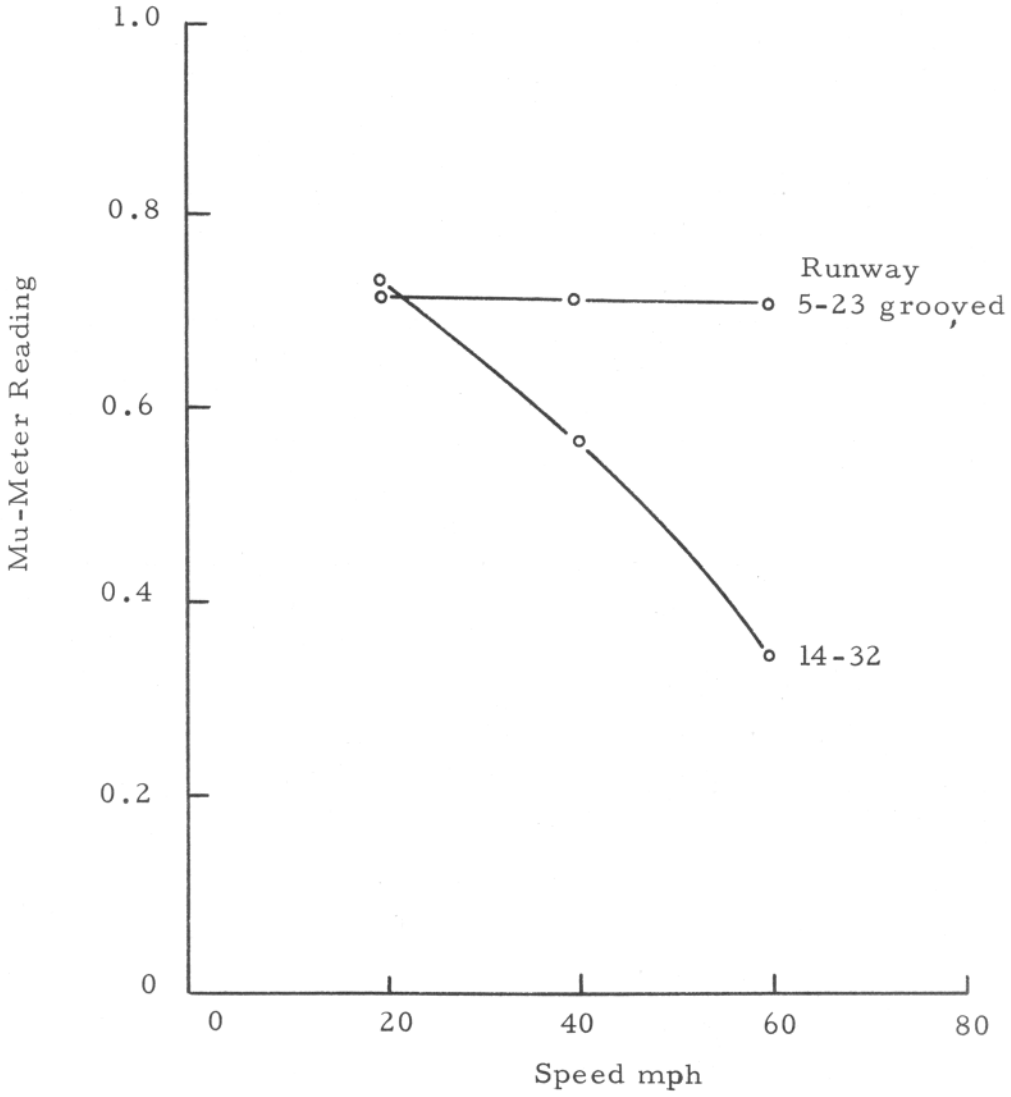
TABLE I 7

Mu-Meter Data

Airport: Charleston	Runway: 5-23		Date: April 21, 1972				
Run No.	R/W Heading	Zone	Avg. Water Depth (in.)	Test Time	Speed (mph)	Test Section	Avg. Frict.
24	5	C	*	0437	60	C-1 DC C-2	.72 .72 .71
24-R	23	C	*	0442	60	C-2 DC C-1	.72 .73 .74

*wet-grooved runway - No Measurable Depth

Charleston, W. Va.



MU vs. SPEED - WET

Figure I 3

APPENDIX J

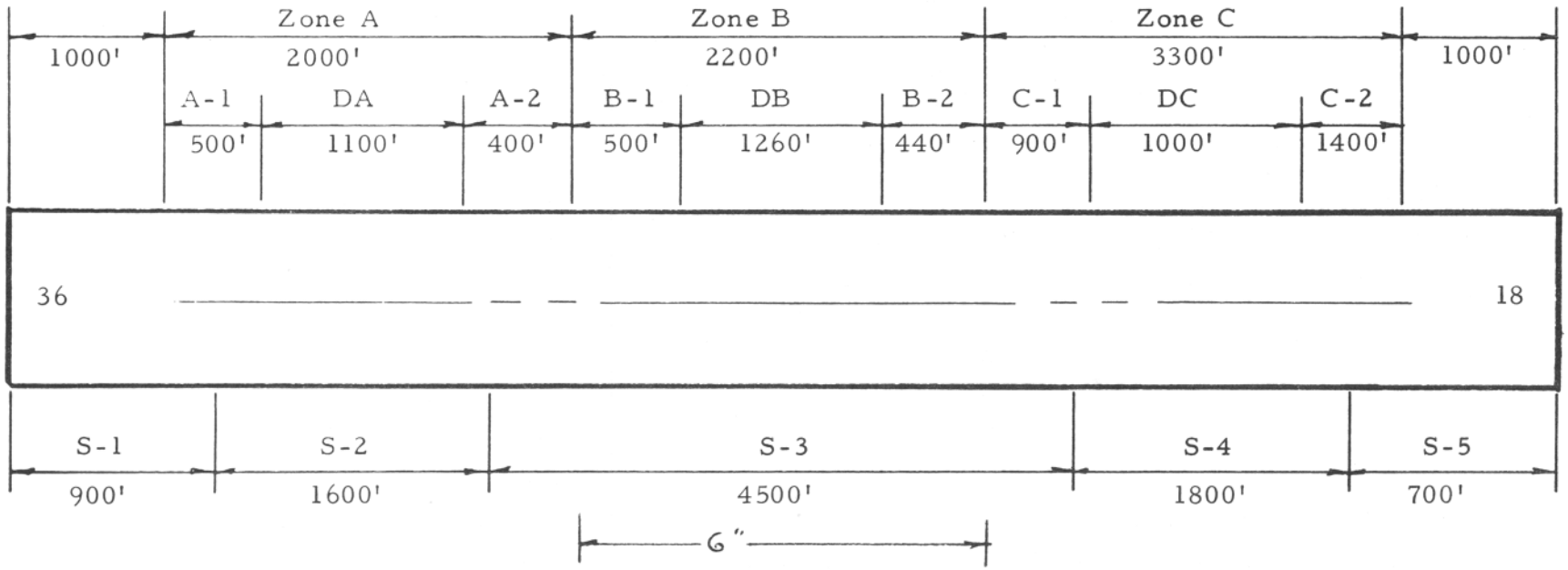
GREATER CINCINNATI AIRPORT

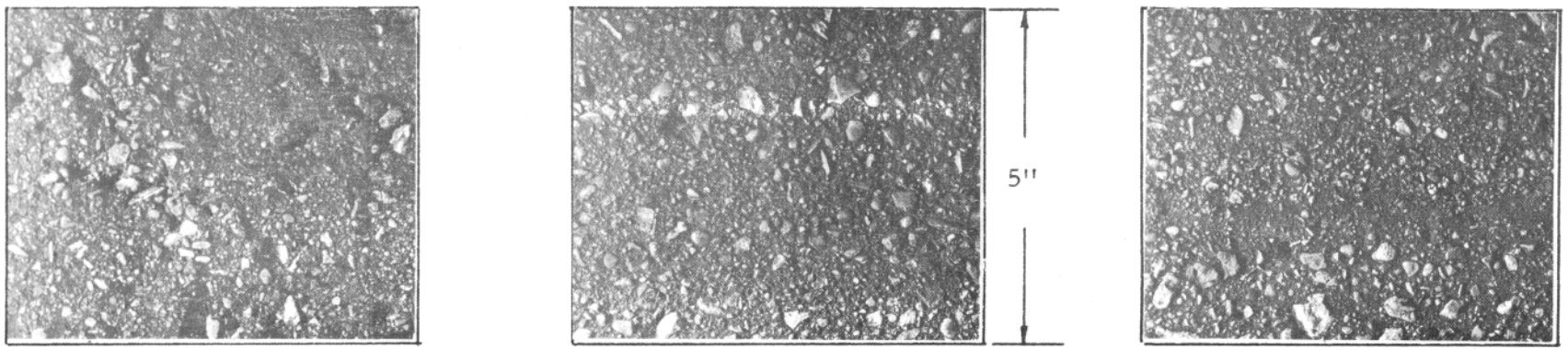
COVINGTON, KENTUCKY

Table of Contents

Airport: Cincinnati

Runway: 18-36





Zone A

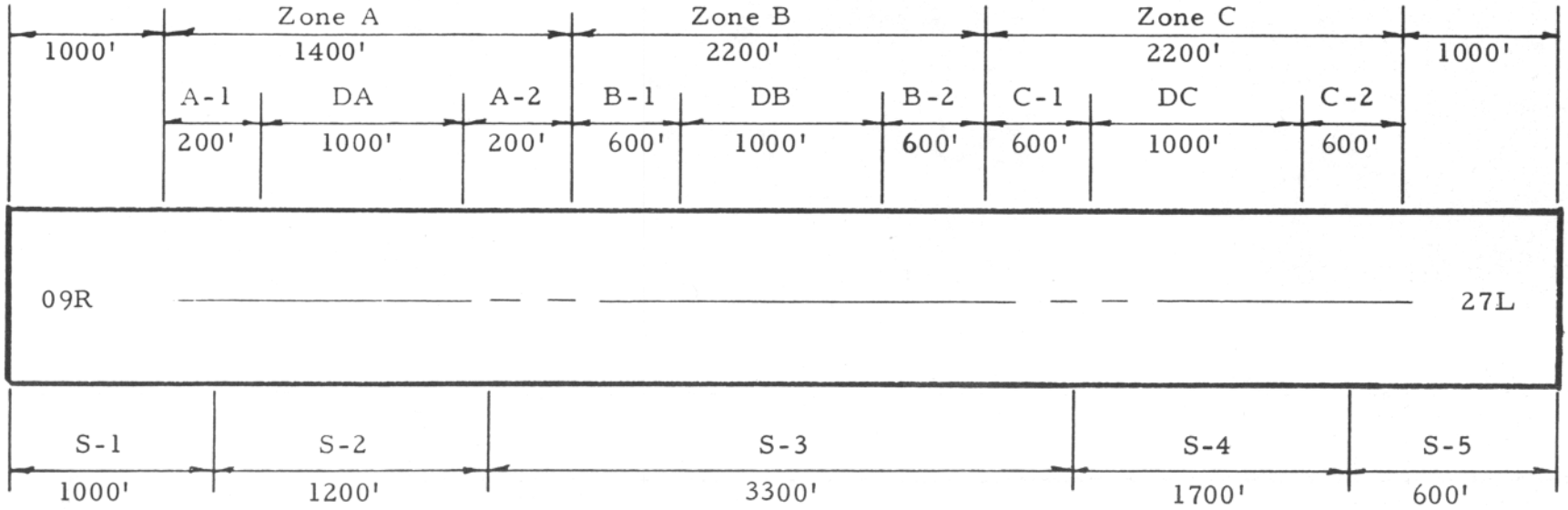
Zone B

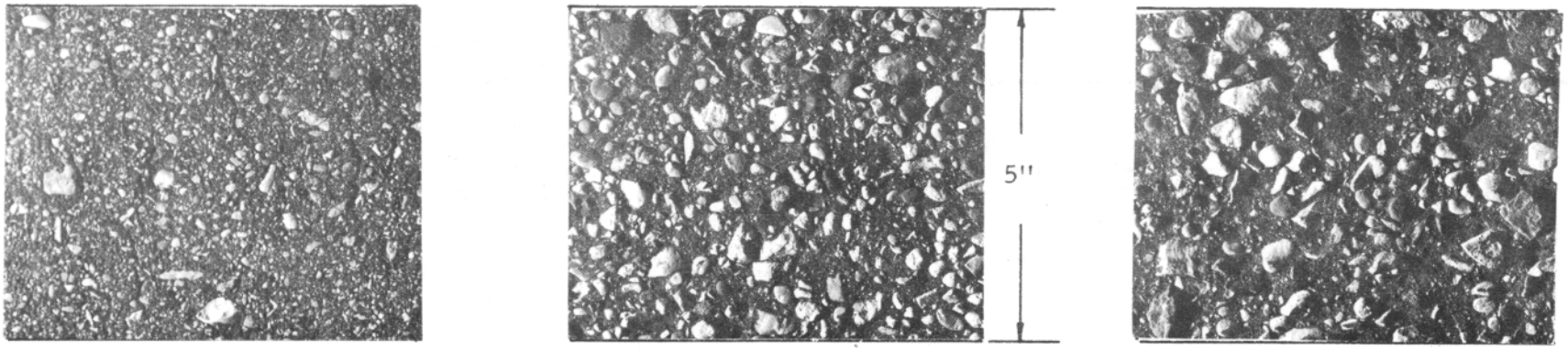
Zone C

Figure J1

Airport: Cincinnati

Runway: 09R-27L





Zone A

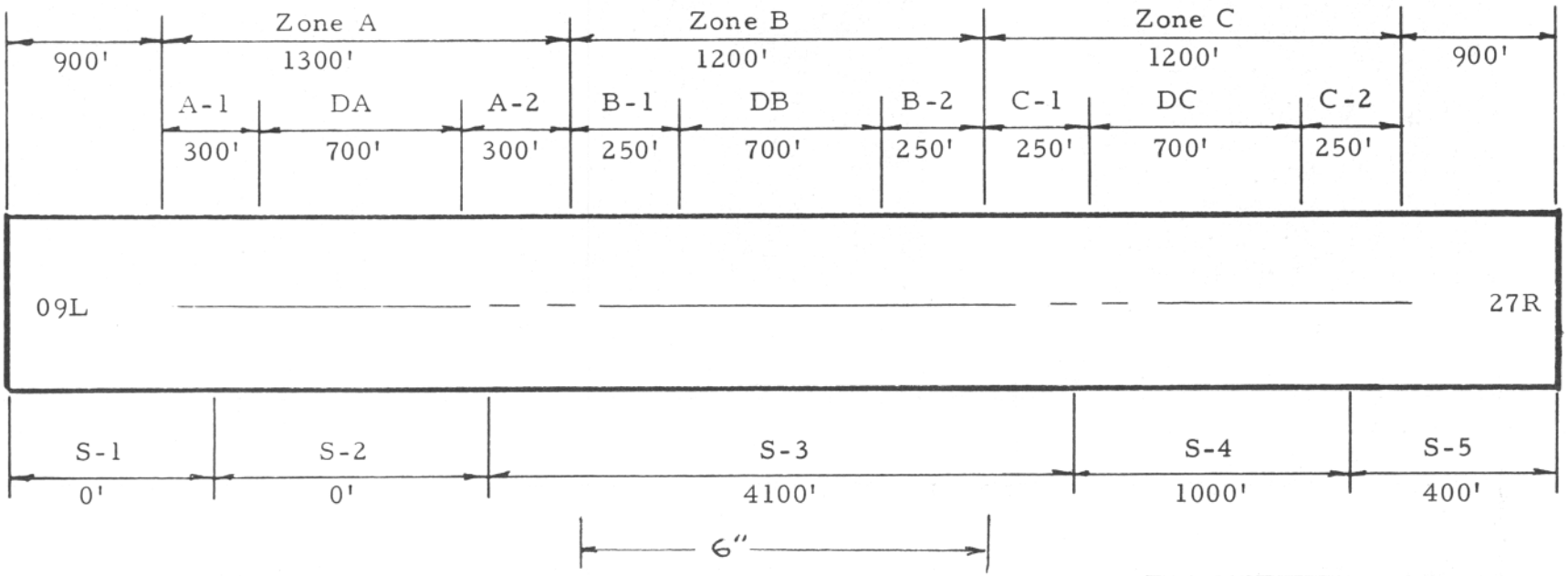
Zone B

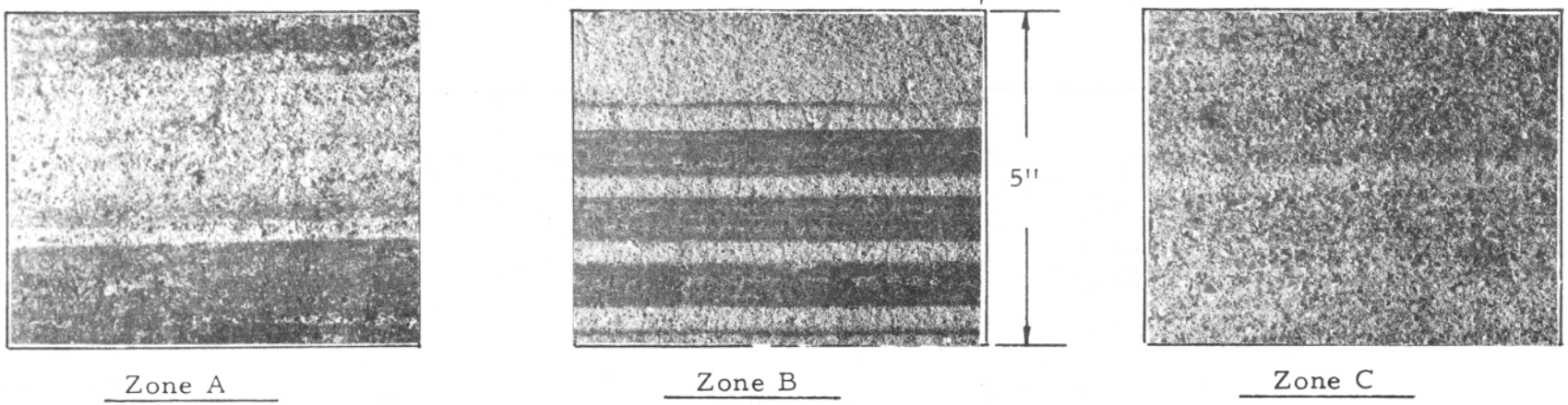
Zone C

Figure J2

Airport: Cincinnati

Runway: 09L-27R





Zone A

Zone B

Zone C

Figure J3

TABLE J1
RUNWAY STATISTICS

Airport: Cincinnati

Runway No.	18-36	9R-27L	9L-27R
Length, ft.	9500	7800	5500
Width, ft.	150	150	150
Transverse slope, %	1	1	.5
Effective gradient, %	.35	.23	.50
Pavement surface	AC	PC	AC
Monthly operations	5000	1930	770
Surface condition	Runway 18-36 had some uncoated exposed aggregate with good drainage. Zone A of runway 9R-27L had a dense surface. Zones B and C had coarse aggregate exposed resulting in a rough surface texture with a few localized depressions but fair drainage. Runway 9L-27R had a smooth finish burlap drag texture but good drainage.		

Annual precipitation, in. (last 40 years)

highest:	rain - 45	snow - 46
lowest:	rain - 28	snow - 7

TABLE J2

RAIN, WIND AND TEMPERATURE DATA

Airport: Cincinnati			Date: April 25, 1972	
	Wind		Temperature, °F	
Time	Heading, deg.	Speed, knots	Ambient	Surface
0200	10	8	41	50
0300	30	9	40	50
0400	360	7	41	50
0500	30	10	41	45
0600	30	10	40	45
			Date: April 26, 1972	
0300	-	calm	35	48
0400	40	4	34	45
0500	40	5	33	48
0600	-	calm	35	50
0700	10	4	35	50
0800	100	6	42	50
0900	90	4	46	52

Rainfall - None

TABLE J3
Water Depth Measurements

Airport: Cincinnati		Runway: 18-36		Date: April 25, 1972			
Zone	Time	Water Depth, hundredth inch					Avg. Water Depth (in.)
		1	2	3	4	5	
A	0328	3	6	3	5	6	0.046
	0331	2	2	1	3	2	0.020
	0350	3	4	6	3	5	0.042
	0353	1	3	2	2	4	0.024
	0356	3	4	6	3	4	0.040
	0358	1	3	3	4	2	0.026
	0405	3	5	5	4	5	0.044
	0407	2	2	3	4	2	0.026
B	0438	4	4	4	4	3	0.038
	0440	2	3	3	2	3	0.026
	0443	4	4	4	3	4	0.038
	0446	2	2	3	2	2	0.022
	0449	4	3	4	3	4	0.036
	0451	2	3	2	3	3	0.026
	0453	4	3	3	4	3	0.034
	0455	2	3	2	3	3	0.026
C	0537	5	3	2	3	5	0.036
	0539	3	1	2	3	1	0.020
	0542	7	5	3	3	4	0.044
	0544	2	3	2	2	3	0.022
	0551	4	5	3	5	2	0.038
	0553	2	3	2	2	2	0.022
	0555	5	3	4	4	4	0.040
	0557	3	2	2	3	2	0.024

TABLE J3
Water Depth Measurements

Airport: Cincinnati Runway: 9R-27L Date: April 26, 1972

Zone	Time	Water Depth, hundredth inch					Avg. Water Depth (in.)
		1	2	3	4	5	
A	0623	3	3	3	4	3	0.032
	0625	2	2	1	2	1	0.016
	0626	3	3	3	2	4	0.030
	0628	2	2	1	2	2	0.018
	0630	3	3	4	3	3	0.032
	0632	2	1	2	1	1	0.014
	0634	3	3	4	3	3	0.032
	0636	2	2	1	1	2	0.016
	0638	3	4	5	4	3	0.038
	0640	2	3	2	2	1	0.020
	0642	3	3	4	3	4	0.034
	0644	2	2	3	2	2	0.022
B	0401	3	3	4	3	3	0.032
	0403	2	2	1	1	1	0.014
	0406	4	3	3	2	3	0.030
	0408	2	1	1	2	1	0.014
	0411	3	4	3	3	3	0.032
	0413	2	2	2	2	2	0.020
	0419	3	3	3	3	3	0.030
	0421	2	1	2	2	1	0.016
	0426	3	3	3	3	3	0.030
	0428	2	2	1	1	2	0.016
	0432	3	3	3	4	3	0.032
	0434	2	2	1	1	2	0.016
C	0656	3	3	2	3	2	0.026
	0658	2	2	1	2	1	0.016
	0700	3	3	2	1	3	0.024
	0702	1	1	2	1	2	0.014
	0705	3	2	3	3	2	0.026
	0707	1	1	2	1	2	0.014
	0709	3	3	2	3	2	0.026
	0711	1	3	2	2	1	0.018
	0713	3	3	3	3	3	0.030
	0715	1	2	2	1	2	0.016
	0718	2	2	2	2	3	0.022
	0720	2	1	1	1	2	0.014

TABLE J3
Water Depth Measurements

Airport: Cincinnati	Runway: 9L-27R	Date: April 26, 1972					
Zone	Time	Water Depth, hundredth inch					Avg. Water Depth (in.)
		1	2	3	4	5	
A	0534	4	3	3	3	4	0.034
	0536	1	2	3	3	1	0.020
	0538	3	3	3	2	3	0.028
	0540	2	3	2	2	2	0.022
	0542	3	5	3	3	3	0.034
	0544	2	1	2	1	2	0.016
	0546	3	3	2	4	,3	0.030
	0548	2	2	1	2	1	0.016
	0550	4	3	3	2	3	0.030
	0552	2	2	1	2	1	0.016
	0554	2	2	4	3	3	0.028
	0556	1	1	3	2	1	0.016
B	0751	3	3	4	3	2	0.030
	0753	1	1	2	1	1	0.012
	0755	3	3	4	3	3	0.032
	0757	2	1	1	2	1	0.014
	0759	3	4	3	3	4	0.034
	0800	2	1	2	1	1	0.014
	0804	3	3	4	3	3	0.032
	0806	3	3	1	2	2	0.022
	0808	4	4	3	3	3	0.034
	0810	2	2	1	2	2	0.018
	0812	4	4	3	3	4	0.036
	0814	2	2	1	1	2	0.016
C	0820	3	4	2	2	3	0.028
	0822	1	1	1	1	2	0.012
	0824	3	4	3	2	3	0.030
	0826	2	1	2	1	1	0.014
	0827	3	3	2	3	3	0.028
	0829	1	1	2	1	1	0.012
	0830	3	2	3	3	3	0.028
	0832	1	1	2	1	2	0.014
	0833	3	3	2	3	4	0.030
	0835	2	2	1	1	1	0.014
	0838	3	3	4	3	3	0.032
	0839	2	2	1	2	1	0.016

TABLE J4
BASIC DBV DRY SURFACE DATA

AIRPORT Cincinnati, Ohio

1972 Date	Run No.	R/W Sect.	R/W Head.	Time of Run Hr-Min	Temp. °F		Primary Instr.		Backup Instr.	
					Amb. Air	R/W Surf.	Brake Speed mph	Stop. Dist. ft.	Brake Speed mph	Stop. Dist. ft.
4/25	452	DA	36	0236	40	50	60	306	59.5	306
4/25	453	DC	36	0252	40	50	60	311	59.5	312
4/25	454	DB	36	0304	40	50	61	317	60.5	317
4/26	468	DA	9R	0207	37	48	60	333	60.0	338
4/26	469	DB	9R	0209	37	48	60	316	60.0	312
4/26	470	DC	9R	0211	37	48	60	335	60.0	338
4/26	475	DA	9L	0512	33	48	60	344	59.0	348
4/26	476	DB	9L	0513	33	48	60	323	60.0	327
4/26	477	DC	9L	0514	33	48	60	367	60.0	370

TABLE J5
BASIC DBV WET SURFACE DATA

AIRPORT Cincinnati, Ohio

1972 Date	Run No.	R/W Sect.	R/W Head.	Time of Run Hr-Min	Avg. Water Depth in.	Temp. °F		Primary Instr.		Backup Instr.	
						Amb. Air	R/W Surf.	Brake Speed mph	Stop. Dist. ft.	Brake Speed mph	Stop. Dist. ft.
4/25	455	DA	36	0330	.029	41	50	60	766	60.0	771
4/25	456	DA	18	0352	.030	41	50	60	741	59.0	739
4/25	457	DA	36	0357	.033	41	50	60	790	60.0	787
4/25	459	DA	18	0406	.037	41	49	60	835	59.5	829
4/25	460	DB	36	0439	.032	41	47	60	531	59.5	523
4/25	461	DB	18	0445	.027	41	47	60	536	60.0	539
4/25	462	DB	36	0450	.031	41	47	61	598	60.0	597
4/25	463	DB	18	0454	.030	41	46	60	620	58.5	618
4/25	464	DC	36	0538	.028	40	46	60	520	60.0	517
4/25	465	DC	18	0543	.032	40	46	59	646	59.0	649
4/25	466	DC	36	0552	.030	40	46	60	593	59.0	586
4/25	467	DC	18	0556	.032	40	46	61	702	60.5	702
4/26	471	DB	9R	0402	.023	34	46	61	584	61.0	570
4/26	472	DB	27L	0407	.022	34	46	60	597	60.0	597
4/26	473	DB	9R	0412	.026	34	47	61	586	61.0	586
4/26	474	DB	27L	0420	.023	34	47	60	532	60.0	533
4/26	478	DA	9L	0535	.027	34	49	61	514	61.0	507
4/26	479	DA	27R	0539	.025	34	49	60	401	59.5	391

TABLE J5
BASIC DBV WET SURFACE DATA

AIRPORT Cincinnati, Ohio

1972 Date	Run No.	R/W Sect.	R/W Head.	Time of Run Hr-Min	Avg. Water Depth in.	Temp. °F		Primary Instr.		Backup Instr.	
						Amb. Air	R/W Surf.	Brake Speed mph	Stop. Dist. ft.	Brake Speed mph	Stop. Dist. ft.
4/26	480	DA	9L	0543	.025	34	49	61	550	60.5	554
4/26	481	DA	27R	0547	.023	35	50	61	516	60.5	512
4/26	482	DA	9R	0624	.024	35	50	60	741	59.5	739
4/26	483	DA	27L	0627	.024	35	50	60	631	60.0	634
4/26	484	DA	9R	0631	.023	35	50	60	802	60.5	808
4/26	485	DA	27L	0635	.024	35	50	61	766	61.0	766
4/26	486	DC	9R	0657	.021	35	50	60	729	60.0	734
4/26	487	DC	27L	0701	.019	35	50	60	834	59.5	850
4/26	488	DC	9R	0706	020	36	50	60	758	59.5	760
4/26	489	DC	27L	0710	.022	36	50	60	960	59.5	961
4/26	490	DB	9L	0752	.021	40	50	60	366	60.0	375
4/26	491	DB	27R	0756	.023	41	50	61	514	60.5	507
4/26	492	DB	9L	0759	.024	41	50	61	352	60.5	354
4/26	493	DB	27R	0805	.027	41	50	61	463	60.5	465
4/26	495	DC	27R	0825	.022	43	51	60	399	60.0	385
4/26	496	DC	9L	0828	.020	43	51	60	393	60.0	385
4/26	497	DC	27R	0831	.021	44	51	60	498	60.0	502
4/26	498	DC	9L	0834	.022	44	51	61	408	61.0	412

TABLE J6
CORRECTED DBV DATA

AIRPORT Cincinnati, Ohio DATE 4/25/72

RUNWAY 18-36 SURFACE TYPE Asphalt

WEATHER Dry WETTING Truck

Wet Test Run No.	Wet Test R/W Head.	Wet Test Run Time	R/W Test Sect.	Avg. Water Depth (in)	Wet Test Temp. (°F)		Stopping Distance		Stopping Distance Ratio (SDR)
					Amb. Air	R/W Surface	Equiv. Dry (ft)	Wet (ft)	
455	36	0330	DA	.029	41	50	308	766	2.49
456	18	0352	DA	.030	41	50	308	741	2.41
457	36	0357	DA	.033	41	50	308	790	2.56
459	18	0406	DA	.037	41	49	308	835	2.71
460	36	0439	DB	.032	41	47	308	531	1.72
461	18	0445	DB	.027	41	47	308	536	1.74
462	36	0450	DB	.031	41	47	308	579	1.88
463	18	0454	DB	.030	41	46	308	620	2.01
464	36	0538	DC	.028	40	46	308	520	1.69
465	18	0543	DC	.032	40	46	308	668	2.17
466	36	0552	DC	.030	40	46	308	593	1.93
467	18	0556	DC	.032	40	46	308	679	2.20

TABLE J6
CORRECTED DBV DATA

AIRPORT Cincinnati, Ohio DATE 4/26/72

RUNWAY 9R - 27L SURFACE TYPE Asphalt

WEATHER Dry WETTING Truck

Wet Test Run No.	Wet Test R/W Head.	Wet Test Run Time	R/W Test Sect.	Avg. Water Depth (in)	Wet Test Temp. (°F)		Stopping Distance		Stopping Distance Ratio (SDR)
					Amb. Air	R/W Surface	Equiv. Dry (ft)	Wet (ft)	
471	9	0402	DB	.023	34	46	328	565	1.72
472	27	0407	DB	.022	34	46	328	'597	1.82
473	9	0412	DB	.026	34	47	328	567	1.73
474	27	0420	DB	.023	34	47	328	532	1.62
482	9	0624	DA	.024	35	50	328	741	2.26
483	27	0627	DA	.024	35	50	328	631	1.92
484	9	0631	DA	.023	35	50	328	802	2.45
485	27	0635	DA	.024	35	50	328	741	2.26
486	9	0657	DC	.021	35	50	328	729	2.22
487	27	0701	DC	.019	35	50	328	834	2.54
488	9	0706	DC	.020	36	50	328	758	2.31
489	27	0710	DC	.022	36	50	328	960	2.93

TABLE J6
CORRECTED DBV DATA

AIRPORT Cincinnati, Ohio DATE 4/26/72

RUNWAY 9L - 27R SURFACE TYPE Asphalt

WEATHER Dry WETTING Truck

Wet Test Run No.	Wet Test R/W Head.	Wet Test Run Time	R/W Test Sect.	Avg. Water Depth (in)	Wet Test Temp. (°F)		Stopping Distance		Stopping Distance Ratio (SDR)
					Amb. Air	R/W Surface	Equiv. Dry (ft)	Wet (ft)	
478	9	0535	DA	.027	34	49	345	497	1.44
479	27	0539	DA	.025	34	49	345	401	1.16
480	9	0543	DA	.025	34	49	345	532	1.54
481	27	0547	DA	.023	35	50	345	499	1.45
490	9	0752	DB	.021	40	50	345	366	1.06
491	27	0756	DB	.023	41	50	345	497	1.44
492	9	0759	DB	.024	41	50	345	341	0.99
493	27	0805	DB	.027	41	50	345	448	1.30
495	27	0825	DC	.022	43	51	345	399	1.16
496	9	0828	DC	.020	43	51	345	393	1.14
497	27	0831	DC	.021	44	51	345	498	1.44
498	9	0834	DC	.022	44	51	345	395	1.14

TABLE J7
Mu-Meter Data

Airport: Cincinnati	Runway: 18-36		Date: April 25, 1972				
Run No.	R/W Heading	Zone	Avg. Water Depth (in.)	Test Time	Speed (mph)	Test Section	Avg. Frict.
1	36	A	Dry	0238	40	A-1 DA A-2	.82 .82 .82
1-R	18	A	Dry	0240	40	A-2 DA A-1	.79 .79 .79
2	36	C	Dry	0250	40	C-1 DC C-2	.80 .80 .78
2-R	18	C	Dry	0252	40	C-2 DC C-1	.78 .79 .80
3	36	B	Dry	0302	40	B-1 DB B-2	.80 .80 .81
3-R	18	B	Dry	0306	40	B-2 DB B-1	.79 .80 .81
4	36	A	0.029	0330	40	A-1 DA A-2	.61 .57 .64
4-R	18	A	0.030	0352	40	A-2 DA A-1	.67 .54 .50
5	36	B	0.032	0439	40	B-1 DB B-2	.68 .66 .72
5-R	18	B	0.027	0445	40	B-2 DB B-1	.71 .66 .72
6	36	C	0.028	0538	40	C-1 DC C-2	.69 .67 .73

TABLE J7

Mu-Meter Data

Airport: Cincinnati	Runway: 18-36		Date: April 25, 1972				
Run No.	R/W Heading	Zone	Avg. Water Depth (in.)	Test Time	Speed (mph)	Test Section	Avg. Frict.
6-R	18	C	0.032	0543	40	C-2 DC C-1	.68 .66 .50

TABLE J7
Mu-Meter Data

Airport: Cincinnati			Runway: 9R-27L	Date: April 26, 1972			
Run No.	R/W Heading	Zone	Avg. Water Depth (in.)	Test Time	Speed (mph)	Test Section	Avg. Frict.
1	9	A	Dry	0330	40	A-1 DA A-2	.86 .86 .87
1-R	27	A	Dry	0331	40	A-2 DA A-1	.85 .84 .83
2	9	B	Dry	0333	40	B-1 DB B-2	.85 .86 .87
2-R	27	B	Dry	0335	40	B-2 DB B-1	.85 .85 .85
3	9	C	Dry	0337	40	C-1 DC C-2	.86 .84 .84
3-R	27	C	Dry	0338	40	C-2 DC C-1	.83 .85 .86
13	9	A	0.024	0624	40	A-1 DA A-2	.77 .68 .66
13-R	27	A	0.024	0627	40	A-2 DA A-1	.73 .64 .60
14	9	A	0.023	0631	20	A-1 DA A-2	.85 .85 .85
14-R	27	A	0.024	0635	20	A-2 DA A-1	.83 .84 .84
15	9	A	0.029	0639	60	A-1 DA A-2	.49 .45 .50

TABLE J7
Mu-Meter Data

Airport: Cincinnati		Runway: 9R-27L		Date: April 26, 1972			
Run No.	R/W Heading	Zone	Avg. Water Depth (in.)	Test Time	Speed (mph)	Test Section	Avg. Frict.
15-R	27	A	0.028	0643	60	A-2 DA A-1	.50 .39 .54
4	9	B	0.023	0402	40	B-1 DB B-2	.74 .65 .59
4-R	27	B	0.022	0407	40	B-2 DB B-1	.71 .64 .58
5	9	B	0.026	0412	20	B-1 DB B-2	.86 .85 .87
5-R	27	B	0.023	0420	20	B-2 DB B-1	.86 .84 .85
6	9	B	0.023	0425	60	B-1 DB B-2	.64 .51 .44
6-R	27	B	0.024	0433	60	B-2 DB B-1	.48 .42 .42
16	9	C	0.021	0657	40	C-1 DC C-2	.75 .60 .42
16-R	27	C	0.019	0701	40	C-2 DC C-1	.55 .54 .56
17	9	C	0.020	0706	20	C-1 DC C-2	.84 .83 .82
17-R	27	C	0.022	0710	20	C-2 DC C-1	.80 .82 .83

TABLE J7
Mu-Meter Data

Airport: Cincinnati	Runway: 9R-27L	Date: April 26, 1972					
Run No.	R/W Heading	Zone	Avg. Water Depth (in.)	Test Time	Speed (mph)	Test Section	Avg. Frict.
18	9	C	0.023	0714	60	C-1 DC C-2	.53 .40 .32
18-R	27	C	0.015	0719	60	C-2 DC C-1	.33 .46 .56

TABLE J7
Mu-Meter Data

Airport: Cincinnati			Runway: 9L-27R	Date: April 26, 1972			
Run No.	R/W Heading	Zone	Avg. Water Depth (in.)	Test Time	Speed (mph)	Test Section	Avg. Frict.
7	9	A	Dry	0513	40	A-1 DA A-2	.78 .81 .81
7-R	27	A	Dry	0514	40	A-2 DA A-1	.78 .80 .79
8	9	B	Dry	0517	40	B-1 DB B-2	.80 .79 .79
8-R	27	B	Dry	0518	40	B-2 DB B-1	.79 .79 .78
9	9	C	Dry	0522	40	C-1 DC C-2	.80 .80 .80
9-R	27	C	Dry	0523	40	C-2 DC C-1	.79 .79 .79
10	9	A	0.027	0535	40	A-1 DA A-2	.47 .56 .49
10-R	27	A	0.025	0539	40	A-2 DA A-1	.46 .56 .44
11	9	A	0.025	0543	20	A-1 DA A-2	.77 .80 .79
11-R	27	A	0.023	0547	20	A-2 DA A-1	.77 .79 .78
12	9	A	0.023	0551	60	A-1 DA A-2	.36 .43 .33

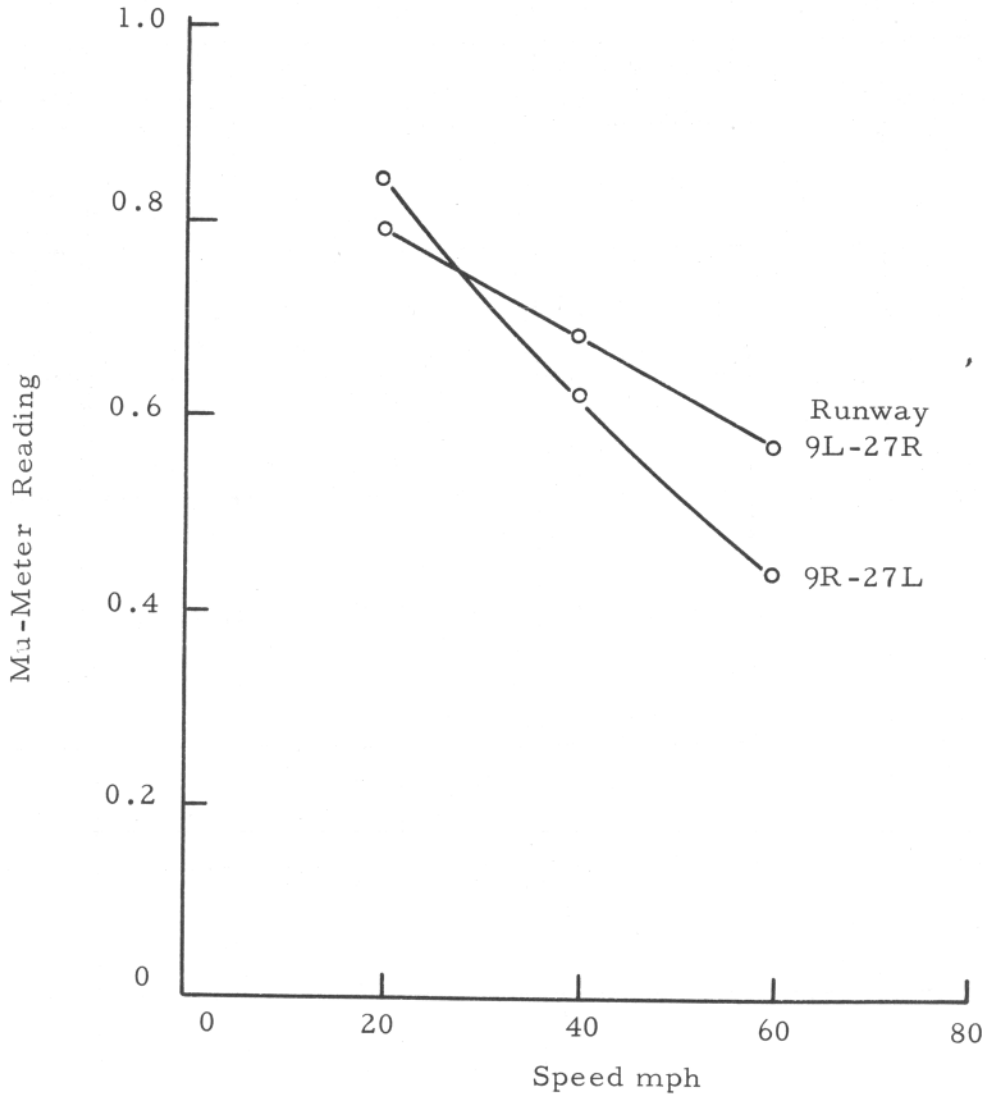
TABLE J7
Mu-Meter Data

Airport: Cincinnati		Runway: 9L-27R		Date: April 26, 1972			
Run No.	R/W Heading	Zone	Avg. Water Depth (in.)	Test Time	Speed (mph)	Test Section	Avg. Frict.
12-R	27	A	0.022	0555	60	A-2 DA A-1	.26 .39 .29
19	9	B	0.021	0752	40	B-1 DB B-2	.60 .62 .58
19-R	27	B	0.023	0756	40	B-2 DB B-1	.72 .74 .64
20	9	B	0.024	0759	20	B-1 DB B-2	.80 .78 .77
20-R	27	B	0.027	0805	20	B-2 DB B-1	.75 .77 .78
21	9	B	0.026	0809	60	B-1 DB B-2	.58 .52 .61
21-R	27	B	0.026	0813	60	B-2 DB B-1	.60 .64 .54
22	9	C	0.020	0821	40	C-1 DC C-2	.79 .82 .83
22-R	27	C	0.022	0825	40	C-2 DC C-1	.79 .80 .78
23	9	C	0.020	0828	20	C-1 DC C-2	.80 .79 .81
23-R	27	C	0.021	0831	20	C-2 DC C-1	.79 .79 .79

TABLE J7
Mu-Meter Data

Airport: Cincinnati		Runway: 9L-27R		Date: April 26, 1972			
Run No.	R/W Heading	Zone	Avg. Water Depth (in.)	Test Time	Speed (mph)	Test Section	Avg. Frict.
24	9	C	0.022	0834	60	C-1 DC C-2	.79 .76 .80
24-R	27	C	0.024	0838	60	C-2 DC C-1	.75 .72 .74

Cincinnati, Ohio



MU vs. SPEED - WET

Figure J4

APPENDIX K

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