

# Study on the Field Test Methods of Asphalt Pavement of Highway Runway

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**Abstract:** as one kind of airport, highway runway must be tested and assessed on scene before enable. Aimed at the situation of our country is short of performance index test regulations and methods, this research discussed the test characteristics and demands through several side like vehicle drive, traffic security, test time. According to the performance parameters and operating requirements of operational aircraft, search for the width of test field of highway runway, not only take out the test scheme of close parts of lanes, take related measures, ensure traffic safety, and suggest a test program of roughness-friction factor-bearing capacity-pavement damage investigation.

## 1 Introduction

Highway runway is a major part of airport system, it can provide taking off and landing areas in emergency circumstances. Because of the benefit of need less area, build quick, good sheltered performance, many countries, especially developed country, pay more attention to the construction of highway runway, our country also build or rebuild several highway runways in the construction of highway.

Highway runway is a large-scale, open-air layer struction, in the long-term use process, asphalt pavement suffer the load effect of cars, and go through the works of environmental factor like air temperature, humidity, sunshine, ultraviolet rays, obviously make the performance change to some extent. With the developing of transportation industry in our country, the situation of transport vehicle overloading is exist a long time, heavy load always damage the pavement struct in early stage. Before enable the highway runway, in case of the using safety, we need make a test program which according to the characteristics of highway runway asphalt pavement, and do some related performance index field test, to evaluate the asphalt pavement scientifically<sup>[1]</sup>.

## 2 Highway runway field test program and characteristics

### 2.1 Field test performance index program

Highway runway meet the need of vehicle drive at ordinary times, and in wartime or particular cases, meet the requirements of aircraft's taking off, landing, taxiing, etc. The requirements of airport runway pavement for modern operational aircraft is not only limited to the floor area when aircrafts are working, but mostly, should have enough bearing capability and ensure aircraft taxiing safety in high speed, it's means that highway runway should have enough bearing capability, skid-resisting capability, roughness.

To evaluate highway runway pavement performance accurately, and which can estimate whether the pavement can work for the aircraft or not, there are two major parts, one is bearing capability and integrity of the pavement, its performance index is pavement deflection value and pavement damage investigation; another one is its surface function, its performance index is roughness, friction factor, texture depth. However, the performance index of highway runway asphalt pavement is about roughness, friction factor, texture depth, falling weight deflection value and pavement damage investigation, the major devices are laser profilometer, three meters ruler,

friction factor test vehicle, pendulum type frictiograph, texture depth tester, falling weight deflection and core sampler, etc.

## 2.2 Characteristics and requirements of field test

Highway runway is neither permanent airport, nor highway, it has specific use requirement and characteristics, however, the field test requirements also are different. To know well the surface functions and bearing capability widely and accurately, that can provide reliable technical parameters for evaluating the pavement, analysis is necessary to the highway runway field test characteristics and requirements.

### 2.2.1 Access requirements of vehicles

Most of highway runway build in expressway in our country, cars and trucks access, heavy traffic is the most important characteristics, interrupt traffic or close to traffic need application and approve. If the traffic is interrupt, it will bring some troubles and inconveniences to drivers, and cause a economic benefit loss to this expressway, however, we should not interrupt traffic for a long time. As one part of express way, highway runway should only close one to two ways during the test, and it is necessary to guide traffic, limit the speed of vehicle.

### 2.2.2 Safety requirement of traffic

Lanes are so much, long-distance transport truck is much, speed is fast, is the characteristics of expressway. During the test, because one to two lanes was closed, path become more narrow, traffic is heavier than normal, personal safety is very important, several measures should be taken like put safety cone, set traffic controls and speed limit denoter, so that can make drivers slow down their speed and ensure the personal safety. At the same time, test members should have some safety education to ensure the safety.

### 2.2.3 Time requirements of test

Highway runway asphalt pavement usability programs is very much, include roughness test, skid-resisting performance test, bearing capability test, pavement damage investigation, etc. the type of devices is very much too, heavy devices, minitype and so on, heavy workload should be finished in a certain time. Highway runway always is used in wartime or emergency circumstances, so field test must be fast enough, that is why we can't arrange test work as normal, work must be done in shortest time to make sure the evolution could be done in high speed.

## 3 The width of highway runway test field

### 3.1 Aircraft performances

The width of Highway runway is decided by performance parameters of used aircraft, mostly depend on the type of aircraft and width of main gear. Main performance parameters of aircraft which can be used in highway runway are listed in table 1<sup>[2]</sup>.

Table 1 parameters of main aircrafts

number	Type	main parameters of aircrafts	Width of main gear
1	fighter A	Main tire static load 38.25KN, main tire pressure 1.08MP	4.16m
2	fighter B	Main tire static load 89.95KN, main tire pressure 1.27MP	3.74m
3	fighter C	Main tire static load -KN, main tire pressure 1.53MP	4.34m
4	Bomber A	Main tire static load 85.95KN, main tire pressure 0.88MP	9.78m
5	Bomber B	Main tire static load 65.85KN, main tire pressure 1.23MP	7.9m
6	Transport A	Main tire static load 50.77KN, main tire pressure 0.59MP	4.92m
7	Transport B	Main tire static load 48.91KN, main tire pressure 0.49MP	7.87m
8	Transport C	Main tire static load -KN, main tire pressure 0.52MP	6.1m

There is some information we can found in table 1, the widest main gear is 9.78m, nearly 10m, aircraft's main gear wider than 6.1m are large transport and bomber, which narrower than 6.1m is fighter.

### 3.2 The wide of test field

The width of expressway is 28m to 45m in normal, however, the width of highway runway's subgrade is wider than 28m, and the width of pavement is wider than 25m, sometimes wider than 30m. If aircraft landed or took off in highway runway, aircraft taxied according the middle line, there is no serious error during the taxiing, it means the taxi deviation is not too much, the width of test field will be decided by the type of aircraft. Highway runway is mainly used by fighters, supplemented used by large transports and bombers

Technical Standard of Highway Engineering(JTG B01-2003)<sup>[3]</sup>clearly stipulate that width of the lane is designed by driving speed, width of the lane is 3.75m when driving speed is more than 80km/h, width of the lane is less than 3.75m when driving speed is less than 80km/h. In this case, the requirement of speed is more than 80km/h in expressway, so the width of highway runway lanes is 3.75m, the width of center partition walls and marginal strips is 3m to 3.5m in normal,  $3.75+3(3.5)+3.75=10.5-11m$ , that means half of the runway include lanes, partition walls and marginal strips maybe 10.5m to 11m width.

According to the analysis, aircraft mainly use two lanes which close to the middle line when it's taxiing, other lanes are barely used, so center part is the key point in highway runway pavement field test, the width decided to be 5.25m to 5.5m range from middle line to two sides, field test to usability index can be done in uplink lane and downlink lane for a full range.

### 4 Highway runway field test project

Aim at the characteristics and requirements of highway runway usability, ensure the test work can be finished safely, quickly and wholly, there must have a detailed field test project.

#### 4.1 Close parts of lanes, ensure the traffic

Coordinate local Highways Departments, introduce the contents and requirements, and solve test related problems. According to the situation of traffic and highway lanes, firstly close uplink lanes inside two lanes, then downlink lanes inside two lanes, take these areas as safety buffer zone and test zone, arrange the outside lanes for running, floor plan of lane close-run and cross-sectional arrange can be found in Fig 1 and Fig 2.

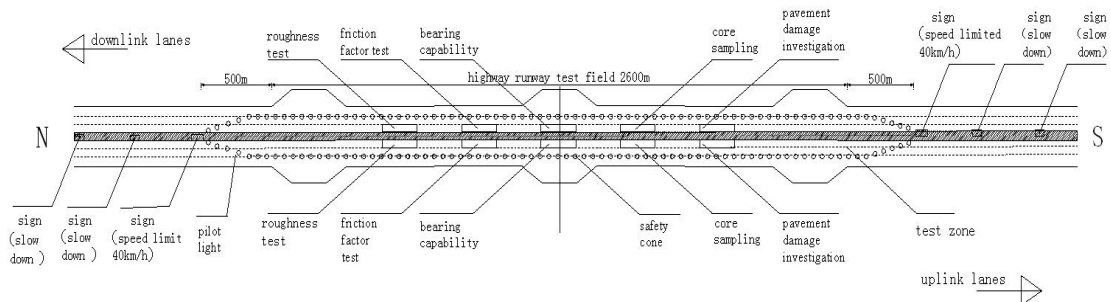


Fig. 1 Highway runway field test lane floor plan of lane close-run

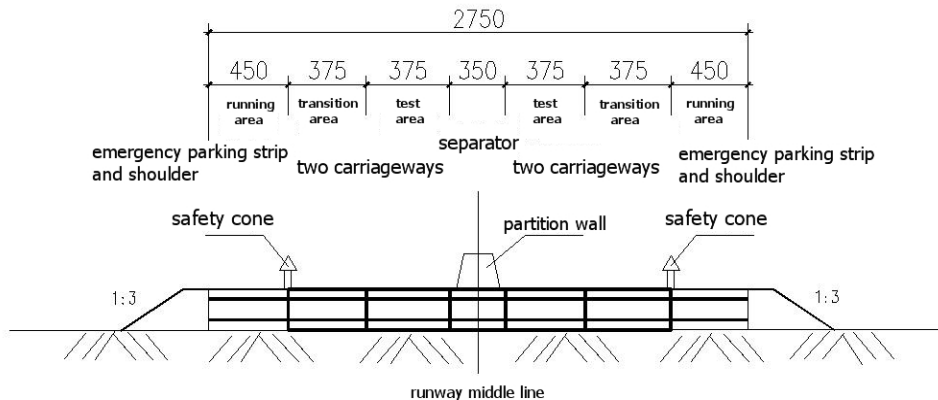


Fig. 2 Highway runway field test lane cross-sectional arrange

#### **4.2 Take related measures, ensure safety**

To ensure the safety of testing members and running vehicles, first, coordinate local Highways Departments to take charge of personal safety problem, arrange specialist to direct traffic; then, make a plan of lane close, close the lanes in order, and set up signs, pilot light and safety cone; at last, give a safety lesson to test members, and discipline active region and route.

#### **4.3 Analysis the tasks, work out test order**

From front analysis we can found highway runway test zone is mainly between uplink lanes inside and downlink lanes inside. According to the field test task, degree of difficulty of index tests and time consuming situation, the test order maybe laser profilometer-friction factor test vehicle-falling weight deflection-three meters ruler-pendulum type frictiograph-texture depth tester-core sampler-pavement damage investigation. Test operation can reference Field Test Methods of Subgrade and Pavement for Highway Engineering(JTG E60-2008) <sup>[4]</sup>and Technical Specifications of Aerodrome Pavement Evaluation and Management(MH/T5024-2009) <sup>[5]</sup>.

### **5 Conclusions**

There is no pavement usability field test procedures, methods, evaluation standards which match with actual conditions of highway runway in our country, so we can't diagnosis the pavement whether can meet the use requirement or not after cars used for a period of time, so it has a realistic significance to study on highway runway asphalt pavement usability field test methods. According to highway runway field test index program, based on test characteristics and requirements, this paper study on the test width, provide test project and safety guarantee measures, what can provide references for test in the future.

### **References**

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