Federal Aviation Administration

Memorandum

Date: MAR 4 2008

To: All Airports Regional Division Managers

Rick Marinelli

From: Rick Marinelli, Manager, Airport Engineering Division, AAS-100, x77669

Prepared by: George Legarreta, Engineer, Airport Engineering Division, AAS-100 x78766

Subject: Engineering Brief No. 74, Minimum Requirements to Widen Existing 150-Foot Wide Runways for Boeing 747-8 Operations

Engineering Brief No. 74, *Minimum Requirements to Widen Existing 150-Foot Wide Runways for Boeing 747-8 Operations,* is attached. The specific conditions cover a permissible temporary alternative for converting an existing 150-foot wide runway into a 200-foot wide runway to accommodate limited operations by Boeing 747-8 aircraft.

Airport Regional Offices may approve proposed modifications to standards that meet the requirements of this engineering brief. Forward all other proposals to this office.

Attachment

Engineering Brief No. 74

Minimum Requirements to Widen Existing 150-Foot Wide Runways For Boeing 747-8 Operations

February 27, 2008

A. BACKGROUND

A relatively few U.S. airports will receive commerce service by the Boeing 747-8 aircraft starting with a freighter model in 2009 and followed by a passenger model in 2010. Both models are Airplane Design Group (ADG) VI aircraft or more commonly referred to as New Large Airplanes. Today 26 airports accommodate 747 freighters, passenger, or a combination of both commerce services; a few expecting the Airbus A380.

In *Advisory Circular 150/5300-13, Airport Design*, we recommend a runway width of 200 feet for these aircraft. However, most existing runways at affected airports were built to ADG V standards with a recommended runway width of 150 feet. As with the Airbus and their A380 entry, the Boeing Company additionally expects that FAA will conclude that the 747-8 can operate on existing 150-footwide runways. As we cannot be sure of all of the operational consequences of an aircraft that has not completed its airworthiness trials, it would be inappropriate at this time to recommend operations on such runways. A case in point, *FAA Engineering Brief No. 65A, Use Of 150-Foot- (45-M) Wide Runways For Airbus A380 Operations,* dated December 10, 2007, imposed the Flight Standards' operational restriction on airport operators to inspect the full length of 150-foot wide runways for the presence of foreign object debris after each A380 takeoff unless the existing stabilized shoulders measure at least 50 feet in width (see attachment A, Flight Standards memorandum). The shoulder design standard for a 150-foot runway only measures 35 feet.

In the interim, recognizing that airport authorities need to plan, we recommend the conversion of existing shoulder pavement to useable runway pavement and a wider shoulder width. That is, for full performance, it is necessary to reinforce the inner 25 feet of shoulder pavement to at least 70 percent of the runway's full-pavement thickness as prescribed in paragraph 307, *Advisory Circular 150/5320-6D, Airport Pavement Design and Evaluation,* and illustrated in attachment B. Moreover the overall total width of the converted runway plus wider stabilized shoulders should measure 280 feet and comply with the ADG VI design standards per Advisory Circular 150/5300-13.

B. PURPOSE

This engineering brief is issued to provide criteria for approval of modifications to standards by Airports Regional Offices that convert 150-foot wide into 200-foot wide runways for Boeing 747-8 operations. The engineering brief converts 25 feet of shoulder pavement section into useable runway to obtain a 200-foot wide runway and widens the remaining shoulders. This guidance anticipates that the converted shoulder pavement section, which meets the minimum pavement layer thickness below, will not be used for a period exceeding five years. New

pavement construction should comply with AC 150/5320-6D design requirements and AC 150/5300-13 design standards for ADG VI category aircraft.

C. SPECIFIC CONDITION

Approval of modification to standards to convert shoulder pavement to useable runway pavement on an existing 150-foot wide runway for B747-8 operations are subject to the conditions detailed below.

1. Minimum Number of Coverages. Proposed shoulder pavement conversions into useable runway must be designed to allow a minimum of 240 coverages of the B747-8. Please note that coverages are not the same as annual departures (see AC 150/5320-6 for an explanation of coverages).

2. Minimum Runway Pavement Layer Thicknesses. Proposed shoulder pavement sections for useable runway must have at least 5 inches of hot mix asphalt surfacing over existing aggregate base and/or subbase materials. Asphalt surfacing materials need to meet the requirements of Item P-401; however, a higher quality state highway department standard mixture with a 3/4" maximum size aggregate is also acceptable. Sections built to this minimum pavement layer thickness are considered temporary and will not be used for a period exceeding five years. That is, it is expected that new construction will obtain either 0.7T or 1.0T (full-strength thickness) of the runway thickness as shown on the accompanying figure.

3. Grading, Marking, and Lighting. All existing and converted pavement surfaces are to be graded in accordance with the runway grading standards prescribed in Advisory Circular 150/5300-13. Furthermore, existing runway edge markings and lighting must be relocated to the new edges of the runway.

4. Wider Stabilized Shoulders. Existing stabilized shoulders need to be expanded to provide an overall total width (runway plus shoulders) of 280 feet. Expanded shoulders are in accordance with AC 150/5320-6D design requirements and AC 150/5300-13 design standards for ADG VI category aircraft

5. Precautionary Shoulder Inspection. Shoulder pavement sections should be designed in accordance with Chapter 8 of AC 150/5320-6D. As described, the pavement section provides strength for a very limited coverage of the Boeing 747-8. Therefore as a precaution, the areas should be inspected and repair anticipated after any runway veer off.

Rick Marinelli, P.E.
Manager, Airport Engineering Division, AAS-100

Attachment A

Federal Aviation Administration

Memorandum

Date: JUL 17 2007

To: David Bennett, Director, Airport Safety and Standards, AAS-1

From: James J. Ballough, Director, Flight Standards Service, AFS-1 for JJB

Prepared by: Jerry Ostronic, Aviation Safety Inspector, Air Carrier Operations, AFS-200

Subject: Airbus A380 Operations Evaluation Results

The Flight Standardization Board (FSB) completed its operations evaluation of the Airbus A380 on June 14, 2007. In addition to the normal FSB tasking, the evaluation team focused on two unique operational issues, operations on runways as narrow as 45 meters (150 feet) wide and taxiing on taxiways as narrow as 75 feet without taxiway centerline lighting and without the aid of the taxi camera system.

Operations Issue Paper O-9 was developed and issued to Airbus to identify the FAA's concerns for the operation of the A380 on runways narrower than the standard Airplane Design Group-VI criteria of 60 meters (200 feet) wide. Airbus and the FAA agreed to a three-pronged approach to evaluating and demonstrating that the aircraft could be safely operated on runways as narrow as 45 meters. Throughout the development and certification flight program, all runway centerline lateral deviation data were recorded with differential global positioning system for all takeoffs and landings. These data were made available to the FAA team for evaluations. All flight testing for both normal and failure cases was conducted on 45-meter wide runways, or if wider, was considered to be 45 meters for evaluation purposes. Additionally, a subset of A380 takeoff and landing runway centerline lateral deviation data was extracted from the total and compared to pre-existing A330/340 runway centerline lateral runway deviation data obtained under approximately the same configuration, pilot, and meteorological conditions. Finally, subjective evaluations were conducted by the FSB operations evaluation pilots assisted by inputs from FAA certification flight test pilots. These FSB evaluations were supported by subjective reports of the multinational Joint Operations Evaluation Board operations evaluation pilots. In all, 14 pilots took part in the evaluations for the use of 45-meter wide runways. The team found that the A380 could be safely operated on runways as narrow as 45 meters with the use of average pilot skills and knowledge. The following statement will replace the current statement in the FAA Airbus A380 Aircraft Flight Manual for minimum runway width requirements.

> "This aircraft has been shown to be safely controllable and to be compliant with applicable airworthiness requirements when operating on runways with a width of 45 meters (150 feet) or more."

Additionally, the FAA will issue domestic and/or foreign air carriers (operating into the U.S.) operating the A380 Operations Specifications that specify the following:

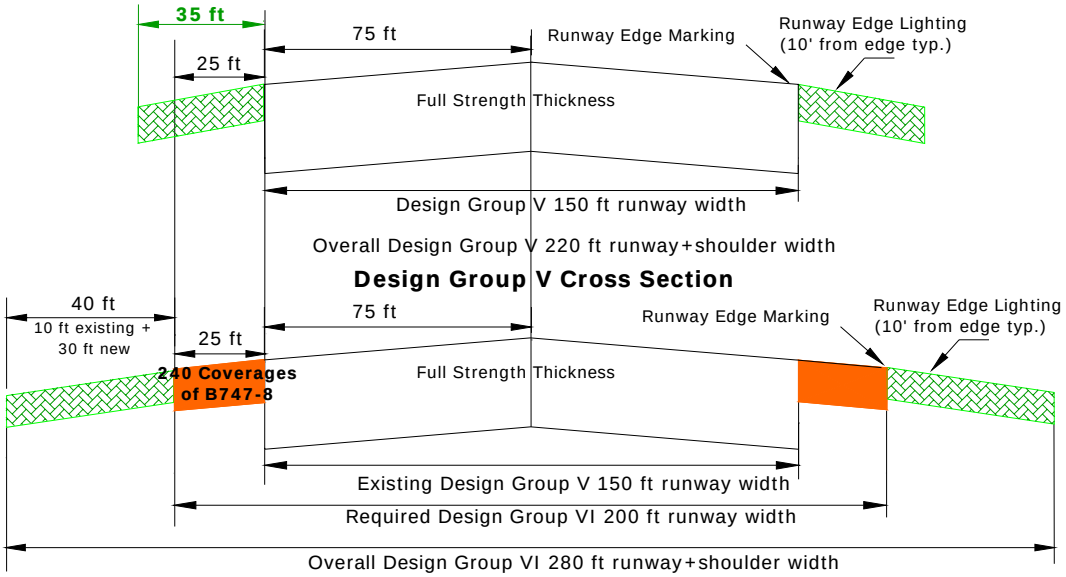
- Runways for takeoffs and landings shall be at least 45 meters (150 feet) wide with stabilized runway shoulders on both sides of the runway extending an additional 15 meters (50 feet) outward from the runway edge.
- Runways as narrow as 45 meters (150 feet) wide without stabilized shoulders may be used for takeoffs and landings provided applicable flight manual procedures for takeoffs on 45-meter wide runways without stabilized runway shoulders are followed, and procedures are implemented for the full length of the runway to be inspected for foreign object damage after takeoff prior to successive aircraft operations.

As per your request, the team also evaluated the adequacy of 75-feet wide taxiway restrictions contained in engineering briefing 63 (EB63). In particular, the requirement for taxiway centerline lighting for normal operations and the required use of the onboard taxi camera system were evaluated. The team conducted this evaluation under the full range of lighting conditions and found that the aircraft could be safely taxied on 75-feet wide taxiways under normal visibility conditions without taxiway centerline lighting using average pilot skills and knowledge. Likewise, the onboard taxi camera system was found not to be necessary for safe taxi on 75-feet wide taxiways using average pilot skills and knowledge. This finding is also valid for the combined conditions of no taxiway centerline lighting and inoperative onboard taxi camera system under day and night lighting conditions with no other operational requirement for taxiway centerline lighting. Based on the results of this evaluation, the Flight Operations Evaluation Board chairman will allow the taxi camera system to be inoperative in the master minimum equipment list.

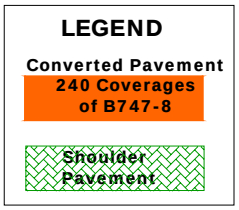
End of Memorandum

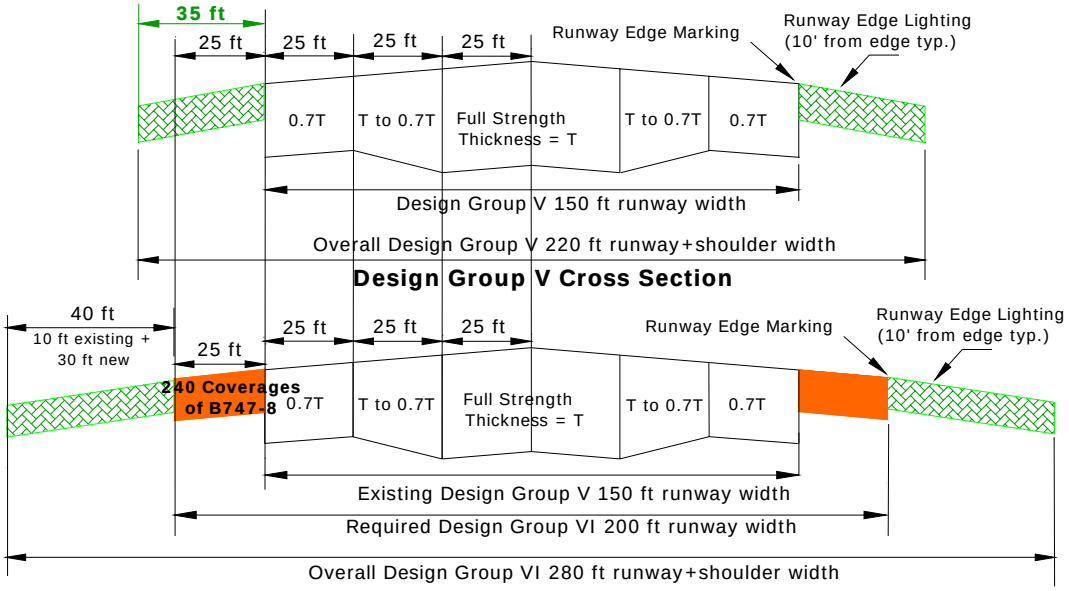
Attachment B

Engineering Brief #74 Runway Pavement Strength Requirements for Temporary Accommodation of the Boeing 747-8



Engineering Brief #74 Temporary Cross Section (meets Design Group VI requirements)





Engineering Brief #74 Temporary Cross Section (meets Design Group VI requirements)