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The Improvement Of The Pavement Classification Number (Pcn) On Taxiway Alpha In International Airport Of Supadio Pontianak West Kalimantan

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Abtract: *Supadio Pontianak Airport with total traffic in 2016 reaches ± 90 movement per day, but service less than optimal because the strength of pavement on Taxiway Alpha only have PCN 40 FDXT, while for taxiway Bravo with PCN 51 FDXT. The size of the PCN Strength of pavement on the Alpha taxiway is considered less able to support large-bodied aircraft types such as the B737-800 and A320-200 types as it has a MTOW 78.240 kg and 73,500 kg. The aims of this research is to improve the Pavement Classification Number (PCN) on Taxi way Alfa to be able to serve the aircraft type B-737 series 800 and Airbus 320 series 200. The research method is descriptive qualitative and quantitative based on pavement calculation graph of pavement thickness according to maximum take off weight (MTOW) against the currently operated aircraft. Increased PCN taxiway Alfa to serve B-737 series 800 and A-320 series 200 can be done through reconstruction of pavement with thick sub base: 52 cm, base 32 cm and surface 10 cm.*

Keywords: *Taxiway Alpha, PCN and Aircraft B-737 series 800*

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I. Introduction

Some airlines operated the Boeing B-737 series 900, the 800 series in early 2000, but the airport was not yet ready for the taxiway facility because its Pavement Classification Number (PCN) did not fulfill the required standards. In 2016 the number of aircraft movements reaches ± 90 per day, but the service is less optimal because the strength of pavement on Taxiway Alpha only has PCN 40 FDXT, while for taxiway Bravo with PCN 51 FDXT. [1,2]

The size of the PCN Strength of pavement on the Alpha taxiway is considered less able to support large-bodied aircraft types such as the B737-800 and A320-200 types as it has a MTOW 78.240 kg and 73,500 kg. while this type of aircraft reaches ± 50 movements per day which of course is not allowed to pass the taxi alpha to avoid pavement damage The purpose of this research is to increase pavement classification number (PCN) on taxi way alpha to be able to serve aircraft type B-737 series 800 and Airbus 320 series 200 [3,4,5,6,7]. The benefits of this research are (i) to optimize alpha taxiway function as a means of liaison between apron and runway (ii) to improve efficiency and smoothness for aircraft operating in the movement area.

II. Methodology

This research is a non experiment research in the form of case study on air traffic service using qualitative and quantitative descriptive method based on the pavement thickness calculation graph in accordance with maximal take off weight (MTOW) against the current operated aircraft. A review of the data by evaluating the existing pavement thickness of the alpha taxiway and further finding the exact pavement thickness based on the desired type of aircraft.

Data Analysis

Data analysis in plotting pavement thickness using Federal Aviation Admnistraton (FAA) planning method is based on the formula and pavement thickness calculation graph in accordance with the maximum take off weight (MTOW) against the currently operated aircraft [3,4,5,6,7].

III. Literature Review

Pavement is a structure consisting of several layers with different hardness and carrying capacity. Pavilion serves as a plane of the average plane, the flat surface produces a comfortable airplane path, from its function it must be guaranteed that each layer from top to bottom is sufficiently hardness and thickness so as not to experience "distress"

The flexible rim consists of layers of surface course, base course, and subbase course, each one or more layers. Everything is deployed on the original compacted soil called a subgrade, the subgrade layer can be located on top of a heap or pit.

Surface course consists of a mixture of asphalt and *agregate*, having a thickness range of 5 cm, or more. The base course can be made from a prepared material (mixed with cement or bitumen), as well as from natural ingredients without mixture. This layer is installed just below the surface layer. Subbase course is made from material that is repaired first, can also be natural material. Subbase course is material that is installed under base on top of subgrade. The load is retained by a portion of the bottom edge of the pavement, and then forwarded to the subgrade [3,4,5,6,7].

The Federal Aviation Administration (FAA) method assumes that gross weight aircraft weight is borne by the main landing gear or 95% of main landing gear while the rest is borne by the nose wheel. This method uses a graph/curve to determine the thickness of the pavement layer. The required variables are the CBR subgrade value, and the CBR Subbase plan, the plan of the equivalent Annual Departure, the take-off weight of the landing gear [3,4,5,6,7], to find out the Flexible Solution Plan Curve.

IV. Results And Discussion

Aircraft Movement

The growth of aircraft movement during the last 3 years has increased, i.e in the year 2014 of 29,466 movements increased to 31,471 in 2015 or increased 6.8%, in 2016 increased to 32,197 movements or increased 2.3%. On average during the last 3 years the growth of aircraft movement of 4.55% as in Figure 1.

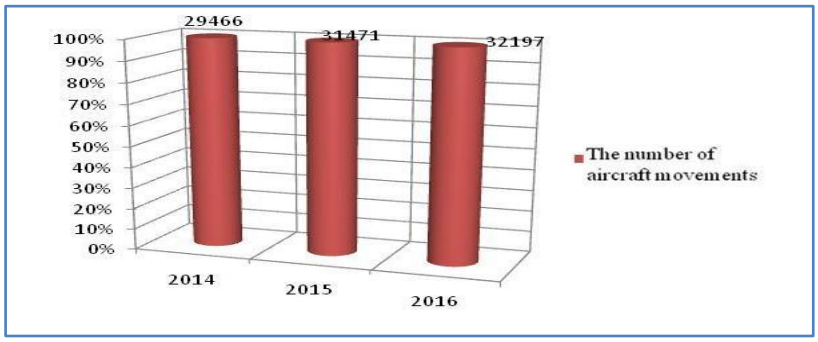

Figure 1. Growth of aircraft movement 2014 to 2016
Source: Perum LPPNPI of Pontianak Districk, 2016

Taxiway Alpha and Taxiway Bravo

The taxiway position connecting the runway and the parking runway *(apron)* is located in the middle of the runway, so that the aircraft to be departure using runway 15 and runway 33 must perform a back track maneuverent both when the plane passes the alpha or bravo taxiways. Similarly, for aircraft that landed on runway 15 or 33, when the landing plane can not reduce its speed before reaching the taxiway that allows the plane to get out of the runway. Then the plane must maneuver 180 turns first before it can exit the runway using the nearest taxiway.

Especially for the aircraft included in the category of heavy aircraft such as aircraft type boieng 737-800 and A320-200. The two types of aircraft are operating at Supadio Pontianak International Airport with Lion Air, Garuda Airlines, Sriwijaya air, Citilink. And since the aircraft maneuver that operates in the ground area takes a long time, then the movement of the aircraft may become inefficient, the taxiway layout can be seen in Figure 2.

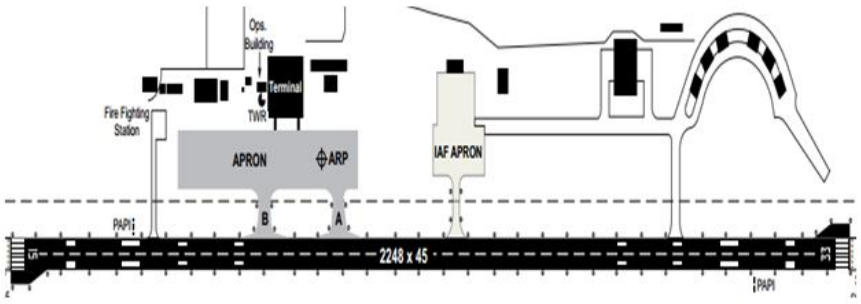

Figure 2. Layout International Airport Supadio Pontianak

Taxiway Pavement Thickness

Taxiway Alpha

Total thickness of alpha taxiway pavement is now 64 cm. with a surface layer 7 cm thick, base course layer 20 cm, sub layer base 37 cm. with the pavement thickness the alpha taxiway can not be bypassed by the aircraft type B737-500 and above, as in Figure 3.

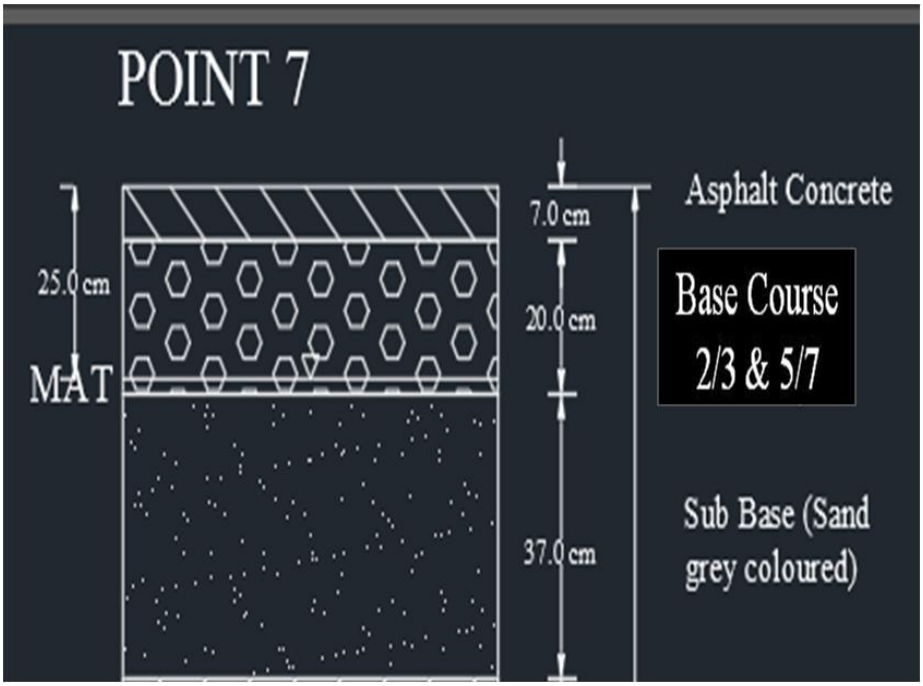

Figure 3. The thickness of the alpha taxiway now

Calculation of Pavement Thickness

Taxiway pavement thick calculation method

a. Method of the *federal Aviation Administration* (FAA)

To plan the pavement thickness used the method of planning the Federal Aviation Administration (FAA). This method uses a graph/curve to determine the thickness of the pavement layer. The required variables are the CBR Sub Grade value and the CBR Subbase plan, the Plan of the number of departure aircraft movement (Equivalent Annual Departure), the takeoff weight to the landing gear (MTOW).

b. The calculation of the thickness of the Alpha taxiway pavement

Known planes B737-800 planes for producing the thickest thickness of pavement. Then produced annual Departure For the plane B737-800 Is 14,364 In 2016.

The data that can and used for the calculation, among others:

1) Annual Departure = 14.364
2) CBR Sub Grade = 6%
3) CBR Sub Base = 20%
4) MTOW B737-800 = 78.240 kg or 172.334 Lb

Then the data is plotted into the graph to get the total pavement thickness as follows

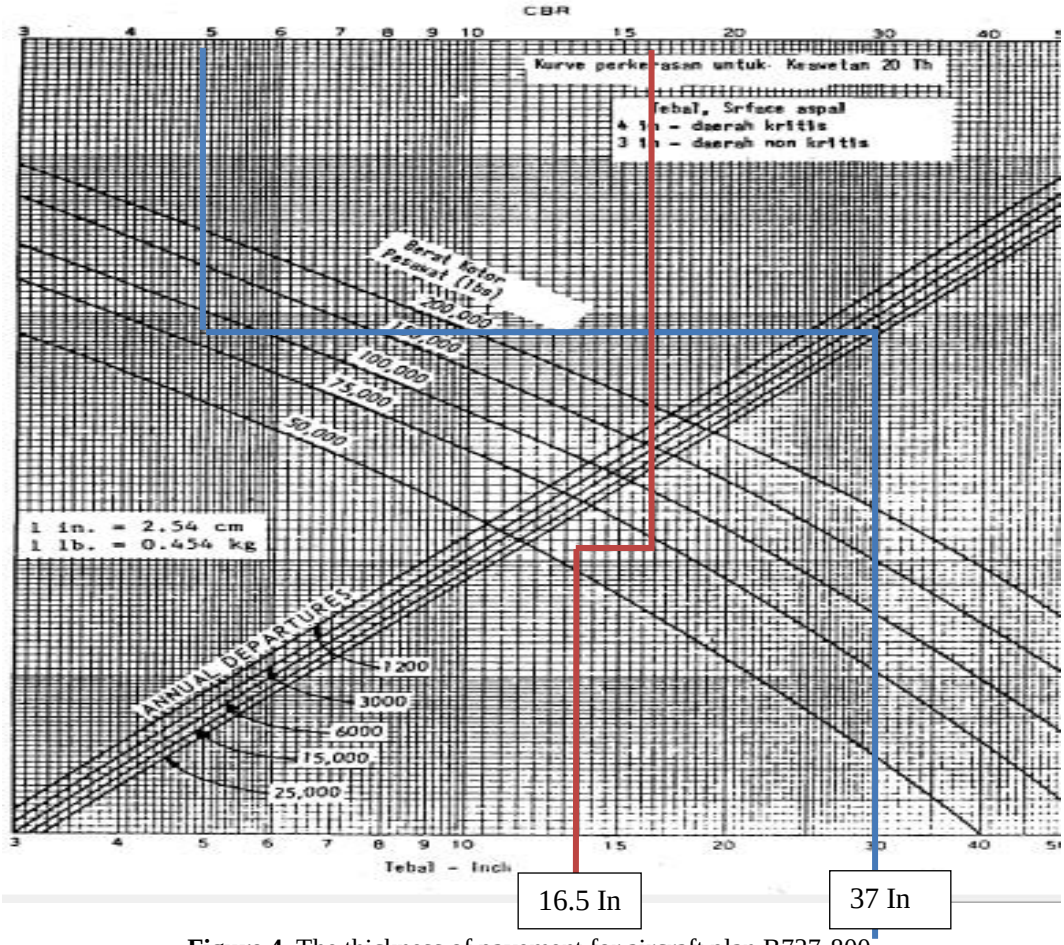

Figure 4. The thickness of pavement for aircraft plan B737-800

Explanation:

= Line for total pavement thickness (6% CBR)

= Line for subbase layer pavement (CBR 20%)

From the Figure 4 above, total paved thickness obtained = 37 In Or 93.98 Cm
Thickness calculation of pavement layer
Thickness of pavement Total = 37 In = 93.98 cm

Thick subbase layer

To obtain the surface thickness and Base above the subbase layer, also use the image 5. By ploting the value of CBR 20% gained thickness of 16.5 In = 41.91 cm. So for Subbase Layer thickness is (37-16.5) in = 20.5 in = 52.07 cm, rounded 52 cm.

1) Thick base Course

The thickness of the base course layer is 37 - (20.5 + 4) = 12.5 In = 31.75 cm, rounded to 32 cm

2) Thick surface

Based on the requirements shown in Figure 5 that for the thickness of the surface layer critical area = 4 In = 10.16 cm, As for the noncritical area = 3 In = 6.2 cm
Thickness of surface layer of critical area used for surface thickness that is 4 In = 10,16 cm, rounded to 10 cm

3) Thick minimum base

To determine the minimum thickness of the base, by ploting the total pavement thickness value on the Minimum Base Course thick planning chart required, then drag the horizontal line up to touch the 4% CBR subgrade. After that drag the line downwards until it touches the bottom absis. From the ploting results in the graph below, the value of thickness of the minimum Base of 12.1 In. The results obtained for base Course

Calculation is 12.5 In, while the results obtained from the graph is 12.1 In, so no need correction of thickness again.

So the pavement thickness to get PCN ≥ 51FDXT is subbase: 52 cm, Base: 32 cm and Surace: 10 cm, as shown in Figure 9.

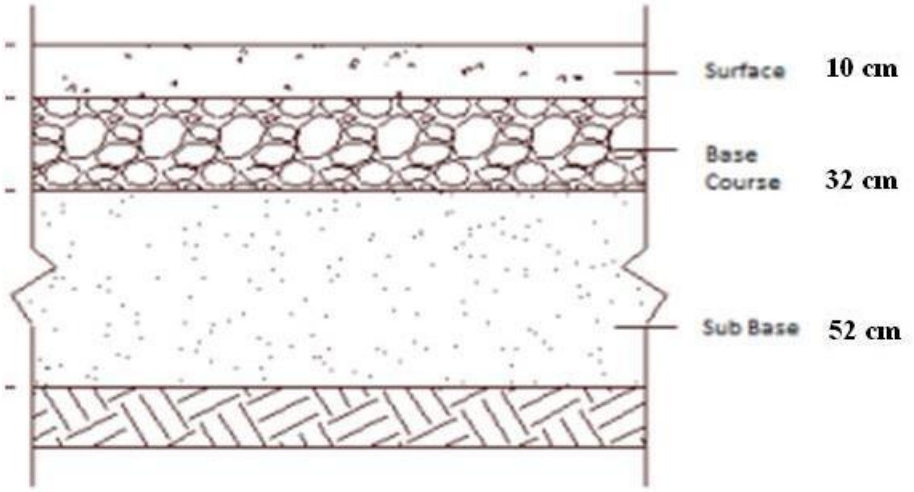

Figure 5. Pavement Thickness for PCN ≥ 51 FDXT

V. Conclusion

Increased PCN taxiway Alfa to serve B-737 series 800 and A-320 series 200 can be done through reconstruction of pavement with thick sub base: 52 cm, base 32 cm and surface 10 cm

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