Airport Pavement Design & Evaluation Workshop
Dakar, Senegal

AIRPORT PAVEMENT DESIGN – CLASS EXERCISE

A pavement is being designed for a new runway at a commercial airport in Dakar. Based on the information obtained from the Airport Master Plan, the new runway is expected to handle the traffic mix presented in Table 1. Eight soil borings were performed for this project, the results of which are presented in Table 2.

Table 1. Aircraft traffic mix for pavement design example.

Aircraft	Departure Weight, kg	Arrival Weight, kg	Annual Departures
Single-Wheel	13,608	10,206	8,000
Fokker F100	44,452	34,019	6,500
Boeing 737-300	62,822	52,163	5,000
Boeing 767-300 (ER)	158,757	131,541	3,200
Airbus 380-800 WV000	544,310	462,664	400
Boeing 777-300	263,083	237,682	1,500

Table 2. Soil boring results for pavement design example.

Boring No.	UCSC Soil Type	Moisture Content, %	Opt. Moisture Content, %	Dry Unit Weight, lb/ft^3	Water Table Depth, ft	CBR, %
B-1	SC	12.2	10.4	129.0	10	10.6
B-2	SC	14.4	12.2	124.6	10	7.2
B-3	SC	16.5	9.6	132.4	8.5	8.4
B-4	CL	15.8	13.5	120.2	6.5	6.3
B-5	CL	17.0	14.5	122.5	8	4.8
B-6	CL	16.2	13.8	120.7	5.5	5.9
B-7	CL	16.8	12.6	124.0	4.5	4.2
B-8	CL	14.2	12.8	128.2	6	6.4
Average:						
Std. Dev.:						

Use the given information to answer the following questions:

1. What do the soil boring results tell us about the in-situ soil properties? What subgrade support value do you recommend for design?

2. What type and thickness of base/subbase materials do you recommend? Are positive drainage features required?

3. Should the pavement be designed for aircraft arrival or departure weights? What is the required pavement thickness (for flexible and rigid) for the runway? What is the most demanding aircraft?

4. What is the PCR of designed pavement?

5. Perform a sensitivity analysis on the following variables:

   - Average annual departures of most demanding aircraft (+/- 10 percent of departures).
   - Departure weight of the most demanding aircraft (+/- 10 percent of weight).
   - Subgrade modulus (+/- 10 percent of modulus).
   - How do the above six changes affect PCR value?