

# BANDARANAIKE INTERNATIONAL AIRPORT PLANNING FOR THE FUTURE



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## Background

Commercial aviation in Sri Lanka commenced from Ratmalana Airport, which was formally opened in 1938 and catered for both domestic and international civil aviation until the inauguration of the airport at Katunayake.

Katunayake airport was originally a Royal Air Force base and was taken over by the Royal Ceylon Air Force (now Sri Lanka Air Force) in 1957. Consequent to a decision of the Government in 1958 to develop the international Airport at Katunayake, construction commenced in 1962 with Canadian Government aid under the Colombo Plan Culminating in the Ceremonial Opening of the Katunayake Airport in August 1968.

Katunayake Airport renamed Bandaranaike International Airport (BIA) has been improved over the years with a major expansion being carried out from 1984 to 1987 after the preparation of a comprehensive airport Master Plan.

## The Airport System

Airports are national assets and are crucial for international travel and trade. Air Traffic levels are, in general, doubling every decade and this time span is well within the economic life span of almost all airport infrastructure. The Master Plan for the airport should therefore facilitate expansion and upgrading of the airport, to add capacity, without there-being any requirement to demolish infrastructure within its economic life span. The airport system is dynamic and therefore is undergoing change in the form of expansion and upgrading. The airport development Plan should provide for the orderly and rational growth of the airport.

The airport system can be divided into airside and landside functions. The major elements of the airside system consist of the terminal air space, runways,

taxiways and aircraft parking aprons while the major landside elements consist of the passenger terminal building, cargo terminals, vehicle circulation system and vehicle parking etc.

A good balance is required between the airside and landside facilities in order to derive maximum benefits.

Airport access too is significant since it could be a potential constraint to the development and functioning of the airport system. Airport access caters to a variety of users such as air travelers (33% - 56%) visitors and those seeing off or meeting passengers (31% - 42%) employees (11% - 16%) and service suppliers (3% - 7%).

Since the airport system is dynamic, the aviation planning process has to be a continuous and *iterative* process with a top – down guidance and a bottom-up identification of needs, options and proposed upgrading or expansion.

## Traffic Forecasts

An important input into the planning process is the aviation traffic forecast for the airport in particular and the country in general. An accurate traffic forecast is most desirable since the sizing and phasing of infrastructure facilities will be mainly based on the forecasts. It is therefore, seen that the traffic forecasts provide a consistent set of assumptions for the parameters of design and evaluation.

It should however, be remembered that it is impossible to predict with certainty the future traffic levels since there are a number of highly variable factors which effect traffic. This would be more so as forecast periods become longer.



The important consideration therefore is that the traffic forecasts form the planning statements of the traffic levels for the airport. Hence it is necessary to monitor traffic levels regularly with respect to traffic forecasts and available capacity, all within a continuous planning process.

The two most frequently used forecasting methods are Trend Projection and Econometric Forecasting.

In Trend projection, it is assumed that the factors which effected historic traffic will continue in the future too and the traffic trend represents a regular development over the medium term forecast period.

Econometric forecasting involves the development of a mathematical relationship between the dependant variable traffic and important factors or variables termed casual variables, which exert an important influence on traffic.

### **Demand and Capacity**

The comparison of demand (as derived from traffic forecasts) with capacity (defined as the processing capability of a set of service facilities) provides the fundamental data for expansion and upgrading of airport facilities. The effectiveness of the airport system is perceived in terms of its ability to effectively and efficiently process the passengers and cargo. The performance of the airport system is dependant upon all the many individual components which comprise the system. Therefore, evaluation of each and every component of the systems is essential to determine the capacity of the system.

If a service facility is to realize its' ultimate capacity, then it is necessary that there is a continuous and non- fluctuating demand for the service. Such a demand pattern does not exist at an international airport. It is also not possible to create an artificial continuous demand as it will result in an unacceptable delay and a very poor standard of service. On the other hand a system with no delay will require uneconomical and large scale facilities (with corresponding large investment) which cannot be justified.

Therefore, sufficient capacity should be provided to accommodate the fluctuating demand with an acceptable level of service and such capacity should be adequate to ensure that a relatively high percentage of demand will be subject to an acceptable level of delay. The level of acceptable delay may be determined on economic factors which will dictate the quantum of investment which in turn will be reflected in the prices applicable to the airport users.

### **Detailed Facility Planning**

Detailed facility planning is based upon hourly flows. Daily peak hour operations could be as high as 12% to 20% of daily total operations. Facility planning however is not based on absolute peak hour flows since such facilities would be oversized and under utilized most of the time. Facility planning is based on the "design hour". The design hour could be defined as the peak hour of the busy day with the busy day being the second busiest day in an average week during the peak month.

The peak hour flow is obtained from historical data and expressed as a ratio of annual passenger traffic. The ratio is then applied to the forecast annual passenger flows of the design year to obtain the "design hour" flow.

### **Development Project being implemented -**

The current development project is funded by the Japan Bank for International Cooperation with a loan amount of Japanese Yen 12.3 billion.

### **Detail Design of the Project-**

The detail design of the project was carried out on grant aid basis by Consultants of the Japan International Cooperation Agency together with a Counter Part Team of Airport & Aviation Services (Sri Lanka) Limited. The Japanese Multi-disciplinary Consultancy team engaged in the detailed design consisted of Airport Specialists; Architects, Civil/Structural/Mechanical/Sanitary/Geo-technical and Electronics Engineers, Airport Administration Specialists, Air Navigation System Specialists, Environmental Specialists, Contract Specialists, Quantity Surveyors and Construction Planners. In addition, a Sri Lankan firm also provided specialized support to the Japanese Consultants. The detail designs were carried out during the year 2000 and completed with the preparation of design drawings and Pre-qualification and Tender Documents. The project was divided into 4 contract packages as given below:

1. Contract Package 'A' - Civil and Utility works
2. Contract Package 'B1' - Passenger Building Works
3. Contract Package 'B2' - New Cargo Building Works
4. Contract Package 'C' - Air Navigation Systems

### **Scope of the Project**

#### **Outline of Detailed Design for Civil Works**

The main area of the Civil Works under the Project has been divided into the following items; Rehabilitation of southern section of the parallel taxiway; Strengthening of parts of existing apron pavement; Expansion of apron

#### **Outline of Detailed Design for Utility Works**

##### **(1) Water Supply System**

Detailed Design for water supply system included a new water reserve tank, bore well water receiving tank, new water supply pumps, new water treatment equipment, main supply pipe to the terminal building area, fire protection water main to the terminal building area and associated piping system around the pumping station.

##### **(2) Sewer and Sewage Treatment Systems**

Oxidization Ditch Process, which system employs a long channel for sewage to be subjected to biological digestion was adopted as the sewage treatment method

for BIA. The sewage treatment plant will have a treatment capacity of 2,000 m<sup>3</sup>/day for the Project phase, and will be expanded to 2,400 m<sup>3</sup>/day in the next development stage. Adequate provision has been made at this stage to accommodate another unit for future expansion.

### **(3) Solid Waste Disposal System**

An incinerator for solid waste disposal has been designed.

### **Detailed Design of Pier No. 1 and the Existing Building**

Pier No. 1 building is designed to be reinforced cement concrete structure and 2-storey, with a floor area of 17,800 m<sup>2</sup> including 8 passenger gate lounges and 3 first / business class passenger lounges. Coloured stainless steel stepped roofing will be utilized for the roof of Pier No. 1, and aluminium back-mullion curtain wall framing system is designed to be used for horizontal façade of Pier No. 1.

Detailed design for Pier No. 1 also included the mechanical and electrical works such as ventilation and air-conditioning system, sanitary and plumbing system for water supply, fire protection system, main power supply system, emergency power supply system, low-voltage power distribution system, lighting and power outlet system, telephone system, public address system, clock system, master antenna television system, automatic fire alarm system, lightning protection system, closed circuit television system and spot number display system.

10 Passenger-boarding bridges, 8 moving sidewalks (total length 240m), 3 elevators and 8 security screening equipment will be installed at Pier No. 1.

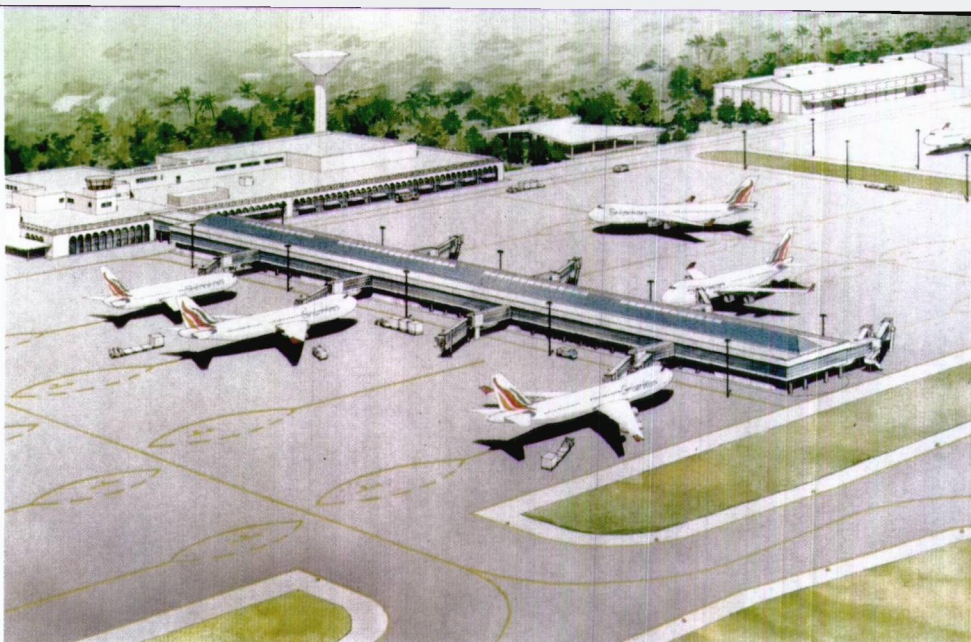
Detailed design for renovation works (5,600m<sup>2</sup>) of the existing building was also conducted including removal works, structural works, roofing / facades, flooring / partitioning, door / windows / louvers, metal works, finishing works, mechanical and electrical works.

### **Detailed Design of New Cargo Building Works -**

New Cargo Building is planned to be constructed at the area of the old aircraft fuel farm, which has relocated to a new site. The building will be reinforced concrete structure with 2-storey, and its floor area is about 12,700 m<sup>2</sup>.

Roofing structure of cargo handling area will be pitched howe truss and finishing of roof is corrugated fibre cement panel. Waterproofing of office area will be hot applied rubberised asphalt water proofing system covered with protection concrete.

Detailed design for New Cargo Building included the mechanical and electrical works such as ventilation and



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air-conditioning system, sanitary and plumbing system for water supply, fire protection system, main power supply system, emergency power supply system, low-voltage power distribution system, lighting and power outlet system, telephone system, public address system, clock system, master antenna television system, automatic fire alarm system, and lightning protection system.

### **Air Navigation System - Radar Control System (MSSR)**

The new MSSR will be installed separately at an independent site. The MSSR shall include only the surveillance function in Mode-S according to the SARPs in ICAO Annex 10. In the design of new radar console, due attention was paid to non-interruption of operation at the airport.

### **Aeronautical Communication System**

Air Traffic Control (ATC) communication system includes the automatic terminal information services system. In addition, multi-channel VHF transceivers operated by batteries will be installed on VFR console for emergency, and VHF scanning receiver will be installed on the console for monitoring other air traffic communications.

All VHF transmitters and receivers, except for the emergency VHF equipment, are connected with digital voice communication switching system (DVCSS).

### **Meteorological Observation System**

A set of airfield weather observation instruments comprising wind sensor (anemometer and wind vane), temperature and humidity probe, atmospheric air pressure gauge and RVR transmissometers, and central data processor with visual display unit will be installed as scope of the Project.

Ceilometers will be installed at middle marker site and at the DVOR/DME site. Central data processor, visual display unit and log printer will be installed at technical room. Wind indicator and atmospheric air pressure display will be mounted on each radar control console at the approach radar control room.

### **Additional Improvements**

The following additional improvements are also planned: Construction of a new departure public concourse and incorporation of the present concourse into passenger check-in-area. Construction of a new arrival public concourse. Expansion of the passenger check-in-area with the addition of 14 new check-in positions. Construction of a domestic passenger terminal. Construction of a Multi-storey Car Park.

### **Project Implementation:**

The project is being implemented with Package 'A' being awarded to Joint Venture of Taisei Corporation and Mitsubishi Corporation of Japan. Package 'B1' - Contract has also been awarded to Joint Venture of Taisei Corporation and Mitsubishi Corporation of Japan. Package 'B2' - Has been awarded to Maga Engineering of Sri Lanka and Package 'C' - Has been awarded to Alenia Marconi Systems of Italy.

The project administration is carried out by the Consultants, Joint Venture of Japan Airport Consultants and Nippon Koei Company Limited with specialist support from two Sri Lankan Consultancy Firms together with a specialized Counter Part Team of Airport & Aviation Services (Sri Lanka) Limited. The project is expected to be completed by September 2005.

### **Future Projects -**

Expansion of the Passenger Terminal Building, construction of Pier No.2, expansion of the Apron and associated Civil and Utility works.

Parallel Runway project with the construction of the infrastructure in between the runways. Alternate International Aerodrome. ▲