

CHAPTER II

LITERATURE REVIEW

2.1 Airport

The Special Region of Yogyakarta is located near the southern coast of Java, surrounded on three sides by the province of Central Java, and with the Indian Ocean on the south side. Yogyakarta located at 07° 47 'S 110° 22' E below the Central Java Province. (Wikipedia, 2017)

New Yogyakarta International Airport planned to have 3.600 m length of runway, 195.400 m² area of terminal, 45 parking stand, and designed to accommodate up to 20.000.000 (million) of passengers. Location of New Yogyakarta International Airport placed in Temon, Kulon Progo.

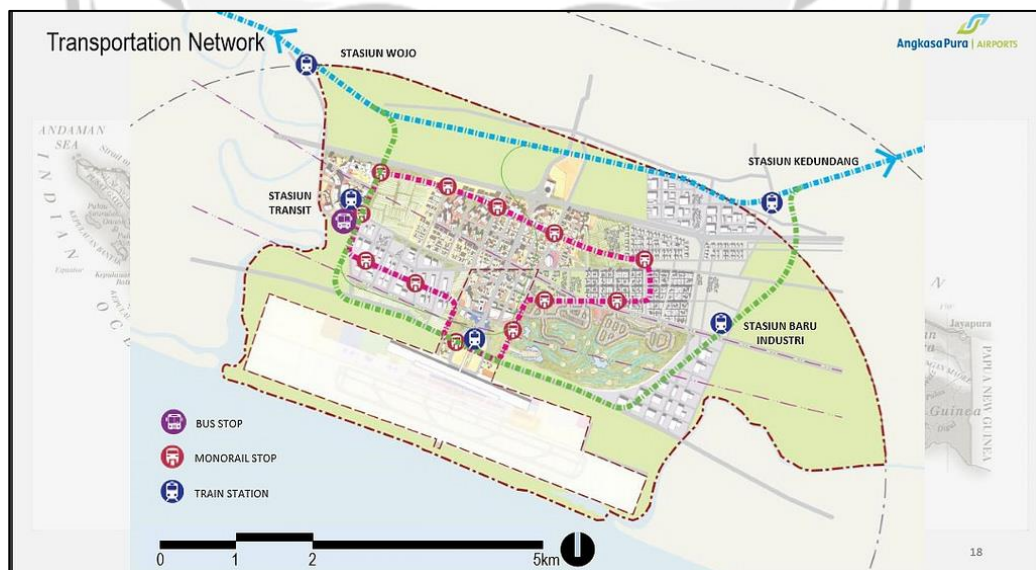


Figure 2.1. Map of New Yogyakarta International Airport
Source: Keputusan Menteri Perhubungan Nomor :KP.1161 Tahun 2013 tentang Penetapan Lokasi Bandar Udara Baru di Kabupaten Kulon Progo Provinsi DIY

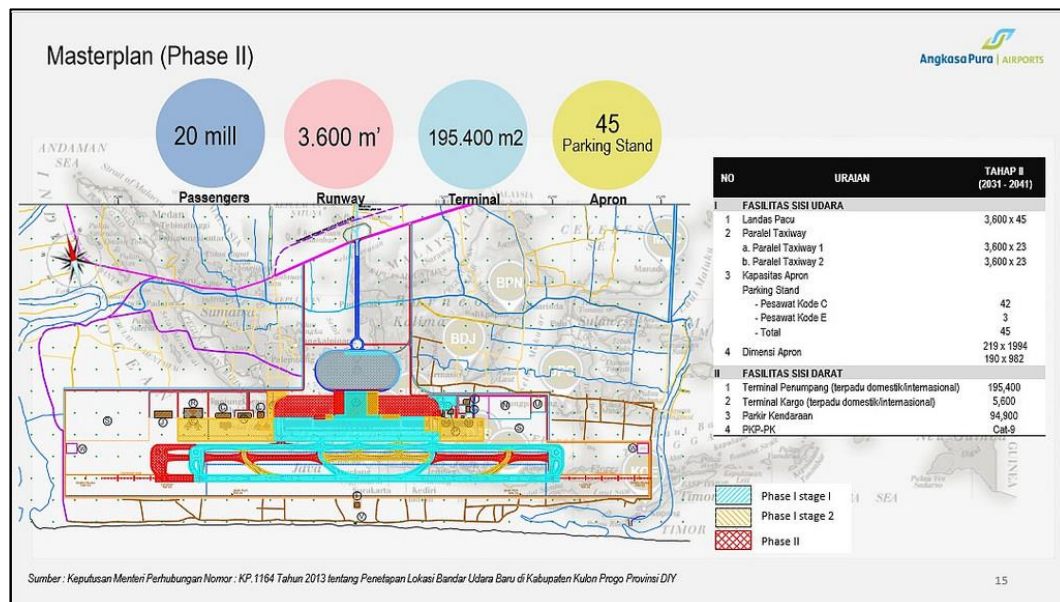


Figure 2.2. Master Plan of New Yogyakarta International Airport
Source: Keputusan Menteri Perhubungan Nomor :KP.1161 Tahun 2013 tentang Penetapan Lokasi Bandar Udara Baru di Kabupaten Kulon Progo Provinsi DIY

2.1.1. General Overview

In Undang-Undang Republik Indonesia Nomor 1 Tahun 2009 (Indonesian Law) in chapter 1 article 33, has defined airport is an area in land and/or waters with certain borders used as a place of aircraft landing and taking off, passengers entrance and out, stevedoring, displacement intra and inter transport, that equipped with safety and security aviation facilities, as well as basic facilities and other supporting facilities.

According to Annex 14 from ICAO (International Civil Aviation Organization) International Standards and Recommended Practices, airport or aerodrome is a defined area on land or water (including any buildings, installations

and equipment) intended to be used either wholly or in part for the arrival, departure and surface movement of aircraft.

Definition of airport according Angkasa Pura I is an airfields, including all buildings and equipment which are the minimal completeness to ensure the availability of facilities for air transport to society.

Annex 9 Facilitation, Chapter I states International Airport as any airport designated by the Contracting State in whose territory it is situated as an airport of entry and departure for international air traffic, where the formalities incident to customs, immigration, public health, animal and plant quarantine and similar procedures are carried out.

2.1.2. Airport Terms

Airport consists of some parts that have different function to fulfill the standards from the government to be approved as airport.

The parts of the airport are below (Annex 14 ICAO, 2016; Basuki, 1996; PP No. 70 Tahun 2001) :

- a. Airport : Area in land and/or waters with certain borders used as a place of aircraft landing and taking off, passengers entrance and out, stevedoring, displacement intra and inter transport, that equipped with safety and security aviation facilities, as well as basic facilities and other supporting facilities.
- b. Airside : Land and/or air that is used for take off and landing activity of planes, parking, repairment and terminal building to organizes outcoming and incoming planes.

- c. Aerodrome : Is location from which aircraft flight operations take place, involve air cargo, passengers, etc. Aerodromes include small general aviation airfields, large commercial airports, and military airbases.
- d. Landing Area : Area that is used to take off and landing of planes.
- e. Landing Strip : An area symmetrical about the extended runway centre line and adjacent to the end of the strip primarily intended to reduce the risk of damage to an aeroplane undershooting or overrunning the runway.
- f. Runway : A long section of track at the aerodrome that used for the take off and landing of the plane.
- g. Taxiway : The side part of aerodrome used by planes to moves (taxing) from runway to apron or reverse.
- h. Apron : Parts of aerodrome used by planes to parking, await, refuel, transport and unload goods and passengers.
- i. Holding Apron : Parts of aerodrome area located near the end of the runway used by pilots for the last checking from all instruments and plane machines before take off.
- j. Holding Bay : Area for planes to pass other planes while the planes is at taxing.
- k. Terminal Building : Aerodrome parts functioned to fulfill all passengers requirement and goods, starts from checking ticket, waiting rooms, cafe, souvenirs sale, information, communication, etc.
- l. Turning Area : A defined area on a land aerodrome adjacent to a runway for the purpose of completing a 180-degree turn on that runway.

- m. Over Run : Parts of end of the runway used for accommodate if planes fail to take off.
- n. Fillet : Additional parts from pavement which provided at the junction of the runway or taxiway to prevents turns of the plane if plane slips or off the tracks.
- o. Shoulders : the edges of pavement which left, right, front, or behind runway, taxiway and apron.

2.2. Factors that Influence the Size of Airport

Factors that influence in determining the size of the airports are :

1. Characteristic of plane.
2. Estimate of passenger volume.
3. Location of airport.
4. Surrounding environment.
5. Accesibility.

2.3. Airport System

An airport covers a very broad activity and also has different needs. System airfield is divided into two, namely the land (land side) and air side (air side), which are both limited by terminal (Figure 2.1). In the system of the airfield, the properties of ground vehicles and air vehicles has a great influence to the draft. (Horonjeff 1975).

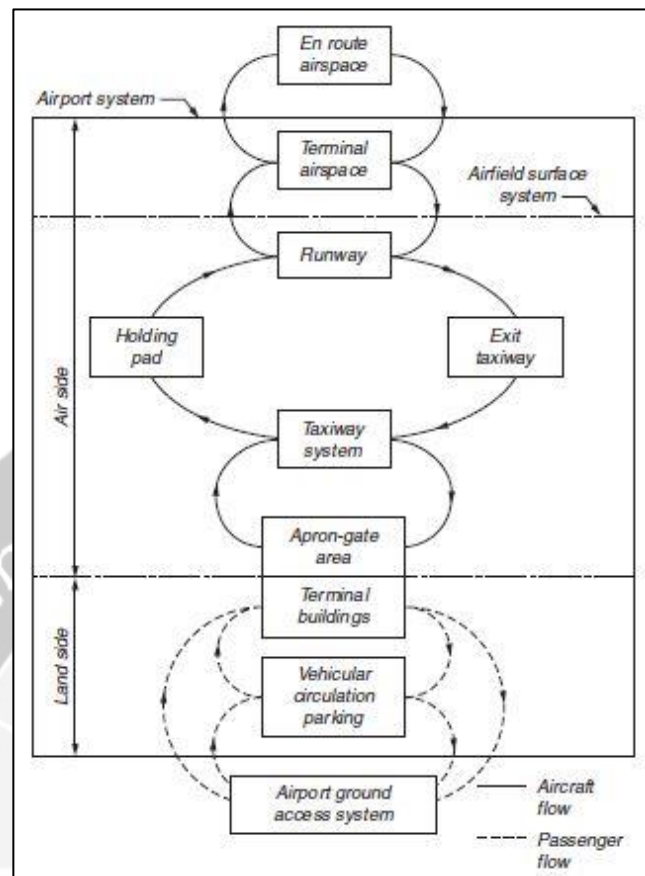


Figure 2.3. Parts of the Airport System
Source: (Horonjeff) (1975) : 156

2.4. Runway

Runway is a long section of track at the aerodrome that used for the take off and landing of the plane. In Annex 14 Aeroplanes document, (ICAO) International Civil Aviation Organization, stated that the number and orientation of runways at an aerodrome should be such that the usability factor of the aerodrome is not less than 95% for the aeroplanes that the aerodrome is intended to serve.

Elements for designing the runway are:

- a. Runway actual length.
- b. Runway width.
- c. Effective gradient.
- d. Longitudinal slope.
- e. Rate of change of longitudinal slope.
- f. Transverse slope.
- g. Sight distance.
- h. Width and length of landing strip.
- i. Separation distance.

According to Annex 14 Aerodromes, systems in Runway is separate in several parts consists of runway shoulders, runway turn pads, runway strips, runway end safety areas. Explanation of the systems of the runway are as follows:

2.4.1. Runway Length

The selection of runway length is one of the most important decisions for an airport planner. Length of the runway determines size, cost, and also types of plane that can use the runway. The length of runway can also determines payload limit that the planes carry.

The runway must be long enough so that planes can take off and landing safely with the available of tool aids. Runway must accommodate types of plane, operating requirements, and the ability of pilot.

Factors that most affect length of runway (Federal Aviation Administration, 2005)

- a. Characteristic of planes.
- b. Total weight of planes while landing or take off.
- c. Airport elevation.
- d. Average air temperature in airport.
- e. Runway slope.

2.4.2. Length of Runway (ICAO)

Length of runway is calculated with ICAO calculation, when there are no availability of manual perform characteristic of plane. The length of runway is obtained by calculating general correction factor, which is :

1. Basic Runway Length

Basic runway length is determined according to assuming condition in airport, which is :

- a. Airport elevation regarding to sea level.
- b. Standard temperation at airport is 15°C (59°F).
- c. Runway has no slope at longitudinal direction.
- d. No wind blows in runway.
- e. Planes is at full capacity.
- f. There are no winds that blow to the destination ways.
- g. Exploration temperature of planes is at standard temperature.

2.4.3. Width of Runway

According to ICAO, width of runway can not less than appropriate dimension specified that determined which is :

Table 2.1. Width of Runway (Annex 14 Aeroplanes, 2016)

Code Number	Code Letter					
	A	B	C	D	E	F
1	18 m	18 m	23 m	-	-	-
2	23 m	23 m	30 m	-	-	-
3	30 m	30 m	30 m	45 m	-	-
4	-	-	40 m	45 m	45 m	60 m

2.4.4. Runway Shoulders

An area immediately beyond the edge of the pavement prepared to provide a transition between the pavement and the adjacent surface for aircraft running off the pavement, drainage, and sometimes blast protection. (Annex 14 Aeroplanes, 2016; Basuki, 1990)

2.4.5. Runway Turn Pads

A defined area on a land aerodrome adjacent to a runway for the purpose of completing a 180-degree turn on that runway. (Annex 14 Aeroplanes; 2016)

2.4.6. Runway Strips

An area symmetrical about the extended runway centre line and adjacent to the end of the strip primarily intended to reduce the risk of damage to an aeroplane undershooting or overrunning the runway. (Annex 14 Aeroplanes; 2016)

2.4.7. Runway End Safety Area

Area surface surrounding the runway prepared or suitable for reducing the risk of damage to airplanes in the event of an undershoot, overshoot, or excursion from the runway. (Annex 14 Aeroplanes; 2016)

2.5. Apron

The airport apron is the area of an airport where aircraft are parked, unloaded or loaded, refueled, maintenance or boarded. The use of the apron is covered by regulations, it is typically more accessible to the passengers than the runway or taxiway. (Annex 14 Aeroplanes; 2016)

2.6. Holding Apron

Apron holding that part of the track which is located near the end of the airport runway. Used also for a place to wait before take off, Apron holding to be made in place very close to the end of the runway in order to conduct a final inspection before the plane takes off. (Annex 14 Aeroplanes; 2016; Horonjeff, 1990)