

MINISTRY OF TRANSPORT AND PUBLIC WORKS  
THE REPUBLIC OF MALAWI

PREPARATORY SURVEY REPORT  
ON THE PROJECT FOR EXPANSION  
OF THE TERMINAL BUILDING  
AT KAMUZU INTERNATIONAL AIRPORT  
IN THE REPUBLIC OF MALAWI

AUGUST 2015

JAPAN INTERNATIONAL COOPERATION AGENCY

GYROS CORPORATION  
EHIRA ARCHITECTS AND ENGINEERS, INC.  
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## PREFACE

Japan International Cooperation Agency (JICA) decided to conduct this preparatory survey, entrusting it to the Consortium of Gyros Corporation, Ehira Architects and Engineers Inc., and Nippon Koei Co., Ltd. .

The survey team held a series of discussions with officials from the Government of the Republic of Malawi and conducted field investigations from August 2014 to August 2015. As a result of further studies in Japan, the present report was finalized.

I hope that report will contribute to the promotion of the project and to the enhancement of friendly relations between our two countries.

Finally, I wish to express my sincere appreciation to the officials from the Government of the Republic of Malawi for the close cooperation extended to the survey team.

August 2015

Akira Nakamura  
Director General,  
Infrastructure and Peacebuilding  
Department  
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## Summary

### 1. Project Background

The building facilities of the Kamuzu International Airport (KIA) were constructed some 35 years ago and are now severely deteriorated, requiring major rehabilitation work. The immigration, baggage claim, check-in counter, safety inspection area, and departure lobby are chronically congested, as they are too small to accommodate the current demand. The radar equipment, which was installed in KIA in 1980, has been broken for some time and is not presently used for air traffic control. Such neighboring countries of Malawi as Mozambique, Zambia, and Zimbabwe, have each agreed to adopt an air traffic control system incorporating ADS-B. In this situation, the Government of Malawi requested the Government of Japan to rehabilitate and to expand the passenger terminal building and to install ADS-B equipment.

### 2. Results of the Survey and Contents of the Project

Based on the request from the Government of Malawi, the Government of Japan decided to conduct the preparatory survey. The Japan International Cooperation Agency (JICA) dispatched a study team to Malawi from August 24 to October 4, 2014. The study team held several meetings with the Department of Civil Aviation (DCA), Ministry of Transport and Public Works (MTPW) and Airport Company Limited (ADL) to discuss the content of the request. The team also conducted field surveys, study of operation and maintenance organization, and planning of facility and equipment development plan. After the site survey, the team prepared development plan and conducted outline design and the results were summarized in the draft final report. The report was subsequently explained to relevant organizations in Malawi from May 30 to June 7, 2015 in Lilongwe. After which the contents were agreed upon.

Based on the results of the discussions, development plan of facilities and installation plan of equipment were established as shown in table 1 and 2 below.

(1) Facility Plan

**Table 1 Outline of Facility Plan**

	Structure / scale	Building area	Total floor area	Floor space of building
<b>Expansion</b>				
International Passenger Terminal Building, Arrival Wing (IAW)	1-story reinforced concrete structure	2,033m <sup>2</sup>	1,597m <sup>2</sup>	2,033m <sup>2</sup>
International Passenger Terminal Building, Departure Wing (IDW)	1-story reinforced concrete structure	1,546m <sup>2</sup>	1,220m <sup>2</sup>	1,606m <sup>2</sup>
Domestic Terminal Building (DTB)	1-story (partially 2-story) reinforced concrete structure	1,519m <sup>2</sup>	849m <sup>2</sup>	1,606m <sup>2</sup>
<b>Rehabilitation</b>				
Existing Passenger Terminal Building (ETB)	4-story steel structure		5,043m <sup>2</sup> (Floor area subject to rehabilitation)	5,043m <sup>2</sup> (Floor area subject to rehabilitation)

Special Incidental Facility

Baggage Handling System (BHS)

- For arriving international flights: 2 units (to be installed in the Arrival Wing of International Passenger Terminal Building)
- For departing international flights: 1 unit (to be installed in the existing Passenger Terminal Building)
- For arriving domestic flights: 1 unit (to be installed in the Departure Wing of International Passenger Terminal Building)

(2) Equipment Plan

**Table 2 Outline of Equipment Plan**

Equipment	Quantity	Location / Purpose
[REDACTED]	1	[REDACTED]
[REDACTED]	1	[REDACTED]
[REDACTED]	1	[REDACTED]
[REDACTED]	1	[REDACTED]
Aerial work platform	1	Maintenance of high ceilings
Aircraft Surveillance system	1	Surveillance in air space and air traffic control

3. Project Implementation Schedule

The detailed design stage will take 6.5 months, the tender period will be 3.0 months and the construction period will be 23 months.

#### 4. Project Evaluation

##### (1) Relevance

Congestion reduction at Kamuzu International Airport is urgent issue. As the project is compliance with basic policy of Japan's Country Assistance Policy for Malawi, necessity and validity of the project implementation is high. Also, as the project meets national development strategy of the Government of Malawi, significance of the project implementation as Japanese Grand Air Project is high.

##### (2) Effectiveness

Expected quantitative effectiveness of the project is shown below.

**Table 3 Quantitative Effects of the Project**

Index	Baseline (Year 2014 Value)	Target Value (Year 2021) 【3 years after Project Completion】
Annual air passengers at Kamuzu International airport (Thousand/ Year)	215	306
Average waiting time at check in counter during peak hour(minutes)	12	9
Average waiting time at arrival immigration counter during peak hour(minutes)	7	3
Average waiting time at departure immigration counter during peak hour(minutes)	5	2
Ratio of aircraft under surveillance coverage of aircraft surveillance system (%)	0	100

Qualitative effects of the project are as follows:

- Convenience of the airport will be improved by expansion and rehabilitation of the passenger terminal building.
- Safety and reliability of airport function will be improved by new installation of the aircraft surveillance system.
- It will contribute to industrial development, improvement of investment environment and promote tourism.

The Project is considered to promote great effectiveness for the recipient country. Thus, it is concluded that the Project is appropriate to implement under the Japanese Grand Aid Scheme.

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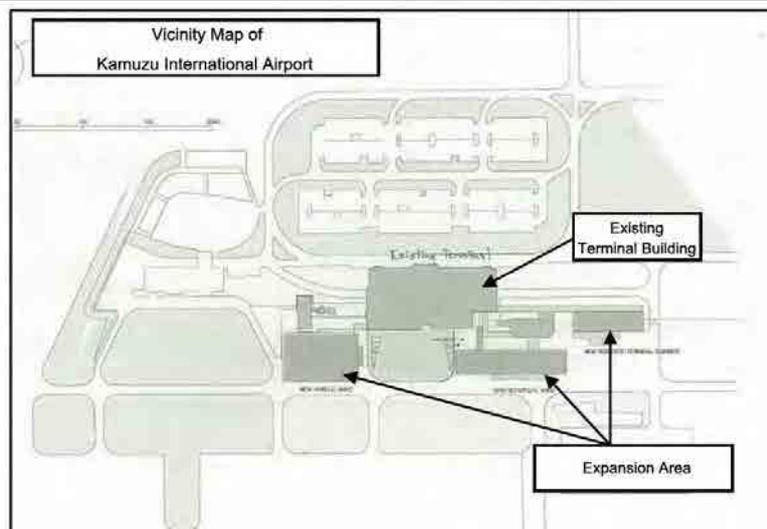
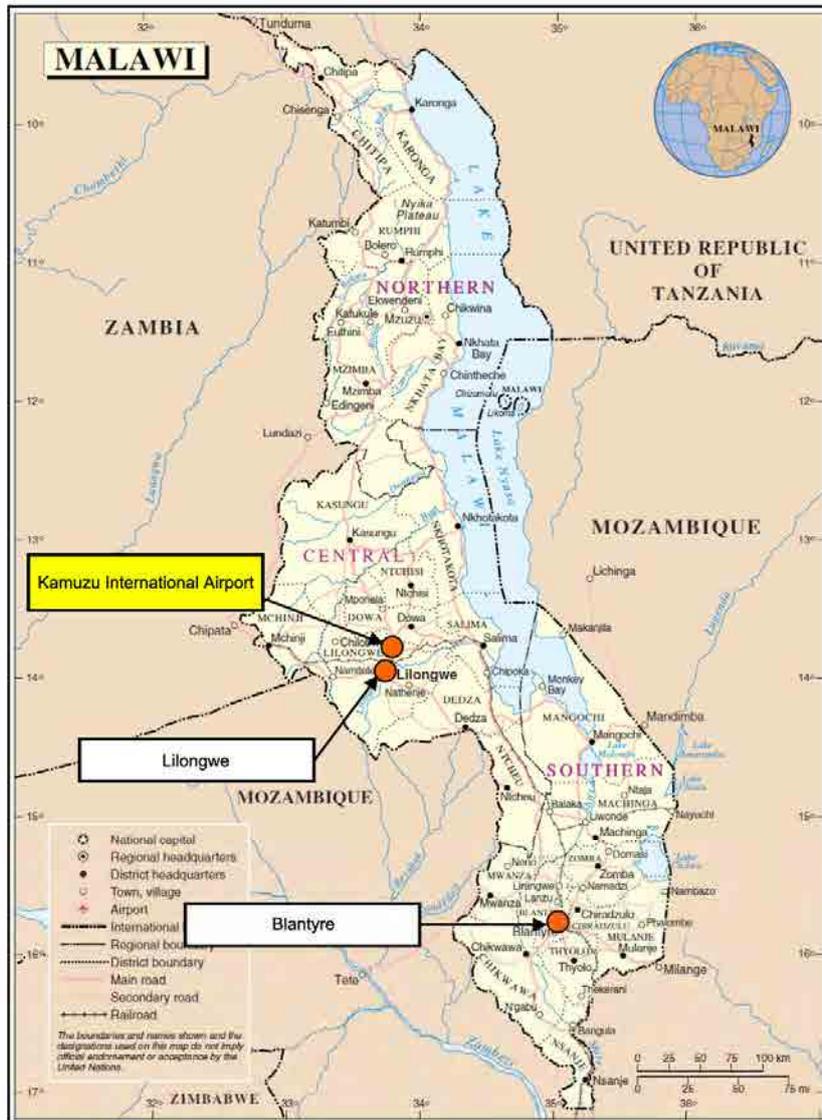
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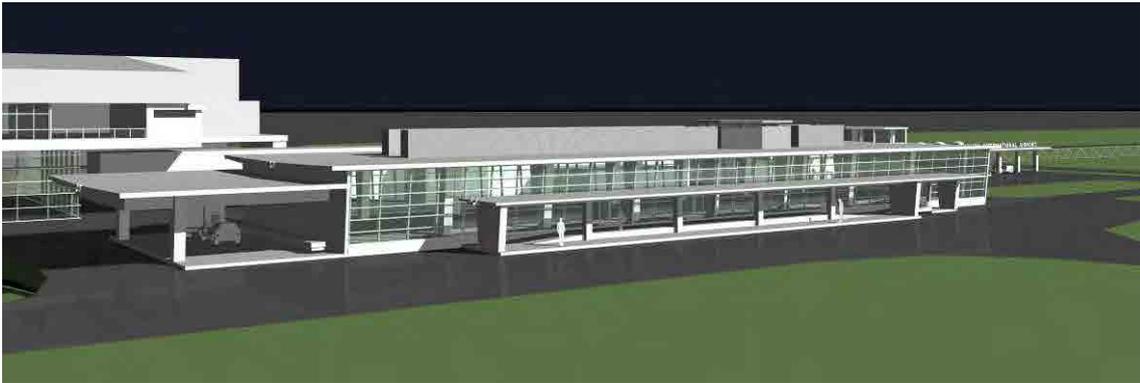
Project Location Map



Perspective (1)



International Arrival Wing



International Departure Wing



Domestic Terminal Building (View from Landside)



Domestic Terminal Building (View from Airside)

Perspective (2)

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## Abbreviations

AEP	Acrylic Emulsion Paint
ADL	Airport Development Limited
ADS-B	Automatic Dependent Surveillance - Broadcast
AVR	Automatic Voltage Regulator
CCTV	Closed Circuit Television
DCA	Department of Civil Aviation
DEA	Department of Environment Assessment
DTB	Domestic Terminal Building
EAD	Environmental Affairs Department
EIA	Environmental Initial Analysis
ESCOM	Electric Supply Corporation of Malawi
ETB	Existing Terminal Building
EU	European Union
FIDS	Flight Information Display System
FS	Feasibility Study
JICA	Japan International Cooperation Agency
GDP	Gross Domestic Product
IAW	International Arrival Wing
IDW	International Departure Wing
IEE	Initial Environmental Evaluation
KIA	Kamuzu International Airport
LAN	Local Area Network
LIHACO	Lilongwe Handling Company Limited
MDF	Main Distribution Frame
MGDS II	Malawi Growth and Development Strategy II
MNREM	Ministry of Natural Resources, Energy and Mining
MTPW	Ministry of Transport and Public Works
NCE	National Council for the Environment
NCIC	National Construction Industry Council
SADC	Southern African Development Community
SSR	Secondary Surveillance Radar
S'D	Serge Protective Device
TSA	Transport Security Administration
TCE	Technical Committee on the Environments
UNICEF	United Nations Children's Fund
UPS	Uninterrupted Power Supply
VIP	Very Important Person
WHO	World Health Organization

## Chapter 1 Background of the Project

### 1-1 Background of the Project

#### 1-1-1 Background of the request

The building facilities of the Kamuzu International Airport (KIA) were constructed some 35 years ago and are now severely deteriorated, requiring major rehabilitation work. The immigration, baggage claim, check-in counter, safety inspection area, and departure lobby are chronically congested, as they are too small to accommodate the current demand. The radar equipment, which was installed in KIA in 1980, has been broken for some time and is not presently used for air traffic control. Such neighboring countries of Malawi as Mozambique, Zambia, and Zimbabwe, have each agreed to adopt an air traffic control system incorporating ADS-B. In this situation, the Government of Malawi requested the Government of Japan to rehabilitate and to expand the passenger terminal building and to install ADS-B equipment.

#### 1-1-2 Outline of the request and study results

Based on the request from the Government of Malawi, the Government of Japan decided to conduct the preparatory survey. The Japan International Cooperation Agency dispatched a study team to Malawi from August 24 to October 4, 2014. The study team held several meetings with the Department of Civil Aviation (DCA), Ministry of Transport and Public Works (MTPW) and Airport Company Limited (ADL) to discuss the content of the request. The team also conducted field surveys, study of operation and maintenance organization, and planning of facility and equipment development plan. After the site survey, the team prepared development plan and conducted outline design and the results were summarized in the draft final report. The report was subsequently explained to relevant organizations in Malawi from May 30 to June 7, 2015 in Lilongwe. After which the contents were agreed upon.

The initial request from the Government of Malawi included rehabilitation and expansion of the passenger building, upgrading of catering facilities, installation of airport surveillance system, replacement of ground service equipment, rehabilitation of high voltage airport power supply system, and installation of ADS-B equipment, however it was not possible to implement all of the request, the scope of work was limited to facilities in the passenger building, which needed urgent rehabilitation, facilities for passenger handling, and air traffic control equipment. Catering facilities, airport surveillance system and ground service equipment was excluded from the scope of works.

Initial request from the Government of Malawi is shown in the table 4.

**Table 4 Initial Request from the Government of Malawi**

1. Rehabilitation of Passenger Terminal and Associated Facilities	
1-1	Terminal Roof Rehabilitation
1-2	Terminal Ceiling Rehabilitation
1-3	Terminal Plumbing Works
1-4	Terminal Electrical Installations
1-5	Arrival Hall Extension
1-6	Departure Hall Extension
1-7	Extension of the Front of Terminal Hall
1-8	Installation of New Baggage Conveying System
1-9	Purchase of Sky Jack
1-10	Purchase of Beam Lifter
1-11	Upgrading Washroom and Sanitation Facilities
1-12	Installation of Public Address System
1-13	Installation of Flight Information Display System
1-14	Installation of CUTE System
1-15	Waving Bay Screening
1-16	Provision of Central Cooling System
2. Upgrading of Inflight Catering Equipment	
2-1	Purchase of New Catering Hi-Loaders
2-2	Refurbishment of Cold Rooms
2-3	Replacement of Kitchen Equipment
2-4	Replacement of Laundry Equipment
3. Provision of Airport Surveillance Systems	
3-1	Installation of Terminal CCTV Cameras
3-2	Installation of Perimeter Fence CCTV Cameras
3-3	Installation of Solar Farm CCTV Cameras
3-4	Electrification of Perimeter Fence
4. Ground Handling Equipment	
5. Airport High Voltage Distribution and Electrical System	
6. Automated Dependent Surveillance Broadcast	

Counter measures to the initial request is shown in the table 5.

**Table 5 Initial Requests and Counter Measures**

Initial Request	Counter Measures
Rehabilitation of Passenger Terminal and Associated Facilities'	
Terminal Roof Rehabilitation	Deterioration is significant and water leak is observed. It will be rehabilitated by cover roof method.
Terminal Ceiling Rehabilitation	Part of the ground floor, which is seen from the passengers, will be rehabilitated.
Terminal Plumbing Works	As deterioration is significant, it will be rehabilitated.
Terminal Electrical Installations	As deterioration is significant, it will be rehabilitated.
Arrival Hall Extension	Arrival annex building will be constructed and the arrival hall will be expanded.
Departure Hall Extension	Departure annex building will be constructed and the departure hall will be expanded.
Extension of the Front of Terminal Hall	Expansion plan was reviewed and extension of the front of the terminal hall became unnecessary.
Installation of New Baggage Conveying System	As deterioration is significant and number of belt is not enough, new belts will be installed.
Purchase of Sky Jack	It will be procured to ease the cleaning work at high place.
Purchase of Beam Lifter	It will not be necessary if a sky jack is procured.
Upgrading Washroom and Sanitation Facilities	As deterioration is significant, it will be rehabilitated.
Installation of Public Address System	As existing system is out of order, new system will be installed.
Installation of Flight Information Display System	As number of information display is not sufficient, new system will be installed.
Installation of Cute System	As it is planned to install new Cute system by a budget from ADL in 2014, it is not included in the Project.
Waving Bay Screening	As necessity is low, it will not be included in the Project.
Provision of Central Cooling System	Instead of central system, split type system will be installed.
Upgrading of Inflight Catering Equipment	Not included in the Project.
Purchase of New Catering Hi-Loaders	Not included in the Project.
Refurbishment of Cold Rooms	Not included in the Project.
Replacement of Kitchen Equipment	Not included in the Project.
Replacement of Laundry Equipment	Not included in the Project.
Provision of Airport Surveillance Systems	Not included in the Project.
Installation of Terminal CCTV Cameras	Surveillance camera will be installed in the passenger buildings.
Installation of Perimeter Fence CCTV Cameras	As necessity is low and cost is high, it will not be included in the Project.
Installation of Solar Farm CCTV Cameras	As necessity is low and cost is high, it will not be included in the Project.
Electrification of Perimeter Fence	As necessity is low, it will not be included in the Project.
Ground Handling Equipment	Although deterioration is significant, it will be requested to EIB.
Airport High Voltage Distribution and Electrical System	As scale is large to cover the whole airport area, it will be requested to EIB.
Automated Dependent Surveillance Broadcast	ADS-B and SSR will be installed.

### 1-1-3 Objective of the Project

Objective of the Project is to expand passenger handling capacity of the airport, improvement of usability of the passengers, and secure the safety of the aircraft operation, by rehabilitation and expansion of the passenger building, and by installation of aircraft surveillance system and also it is expected that the project will contribute enhancement of people movements over borders in Malawi.

### 1-1-4 Contents of the Project

#### 1-1-4-1 Contents of Facility and Equipment

##### [Facility]

- Extension of arrival and departure hall in the international passenger building
- New construction of a domestic passenger terminal building
- Rehabilitation of the existing passenger terminal building

##### [Equipment]

- 
- 
- Aerial work platform
- Aircraft Surveillance System (Secondary Surveillance Radar, ADS-B, Multi-sensor data processing system, air traffic control display system, UPS, etc.)

#### 1-1-4-2 Consulting Service

- Detailed design, construction and procurement supervision service (No soft component)

#### 1-1-4-3 Procurement and construction method

- Following procurement guideline of general grant aid project and procurement of equipment goods will be from Malawi or Japan

### 1-1-5 Relation to the other JICA Projects

A technical cooperation project, “The Project for Capacity Development for Air Navigation Services in the Republic of Malawi” had started since April 2014, the objective of the project is to develop human resources for air traffic control and maintenance of CNS facilities in Malawi. Technical cooperation for operation and maintenance of the aircraft surveillance system, which will be installed by this project, will be conducted through the above technical cooperation

project or a new technical cooperation project.

## 1-2 Natural Conditions

### 1-2-1 Meteorological Conditions

Lilongwe City is situated at an altitude of 1,200m in a subtropical zone with annual precipitation of 850mm and 78 rainy days per year (on average between 2004 and 2009). These figures are slightly over 1/2 of Tokyo’s annual precipitation of 1,500mm and 115 rainy days per year. 90% of rainfall occurs during the wet season (from October to March) during which daily precipitation is as much as 10mm. The temperatures are the highest during the wet month of October and November. The average annual precipitation between 2004 and 2009 is 853.2mm. December and January experience the heaviest rainfalls averaging 212.8mm and 230.5mm per month, respectively. Because of such highly concentrated rainfalls in the wet season, flooding damage occurs in the low-lying areas near Lake Malawi. Lilongwe belongs to a subtropical zone, and the high heat during the dry season lasts only for a relatively short period under low humidity. While the city’s climate is generally more temperate than that of Japan, potential damage caused by intense sunlight should not be overlooked.

Shown below is the climatic data of Lilongwe.

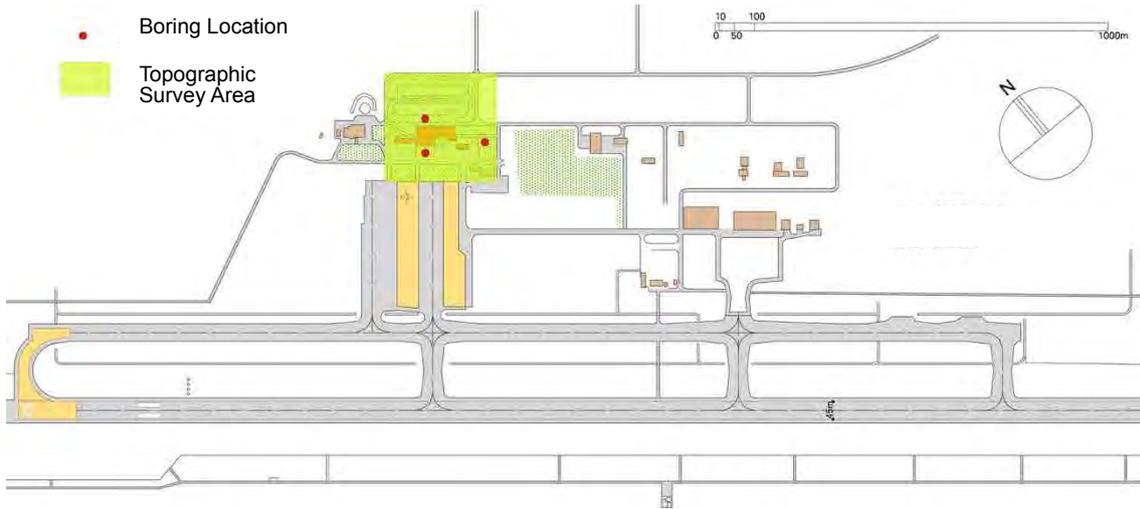


Source: Kamuzu International Airport Weather Station. The graph shows 5-year mean annual precipitation between 2004 and 2009 and mean temperature between 2009 and 2012.

**Figure 1 Climate of Lilongwe**

### 1-2-2 Result of Natural Condition Survey

To survey the soil condition and topography of the site, soil investigation (Boring Survey) and topographic survey (Plane Table Survey and Longitude and Transverse Survey) were conducted by subcontracting local companies through nominated competitive quotation. Location of the surveys are shown in the figure 2.



**Figure 2 Location of Natural Condition Survey**

Results of the boring survey are attached in this report.

### 1-3 Environmental and Social Considerations

#### 1-3-1 Overview of Project Components Having Environmental and Social Impact

This Project, which consists of the expansion of the passenger terminal buildings and the installation of the airspace surveillance system, is classified as “Category B” in accordance with the standards of the “JICA Guidelines for Environmental and Social Considerations (issued in April 2010)” because, according to the guidelines, it is not a large-scale project in the airport sector that will likely have a significant adverse impact on the environment, nor does it have sensitive characteristics or located in or near sensitive areas.

#### 1-3-2 Necessity of EIA for this Project

Because the “expansion work of existing airport and incidental facility” to be conducted by this Project belongs to List A (projects for which EIA is mandatory), DCA submitted a project brief to the Environmental Affairs Department (EAD) of the Ministry of Natural Resources, Energy and Mining (MNREN). Based on the review of a project brief submitted by DCA, EAD decided the EIA is necessary for the project and DCA prepared the EIA report and submitted to EAD. EAD

has commented that public hearing would not be necessary, as the Project would take place within the site of the airport with minimal impact on the residents of the adjacent areas. In addition, implementation of this Project will require no environment-related permits or licenses.

### 1-3-3 Baseline Environmental and Social Conditions

#### 1-3-3-1 Land Use

The Kamuzu International Airport is situated in the middle of crop fields (of corn, peanuts, tobacco, beans, sweet potatoes, cassava, etc.) in Lilongwe District. There are no protected areas or heritage sites (archeological, historical, cultural, or religious) around the airport.

#### 1-3-3-2 Environmental Management of Kamuzu International Airport

##### (1) Solid Waste

ADL collects solid wastes generated within the airport once a week and dispose of them, except for medical wastes, in a dump site about 1 km northwest of the Terminal Building. Medical wastes are collected periodically by WHO and UNICEF.



Sources: Google Earth, JICA Study Team

**Figure 3 Waste Disposal and Sewage Treatment Facility of Kamuzu International Airport**

##### (2) Sewage

Wastewater generated from KIA is treated in a sewage treatment plant (consisting of three sewage basins) constructed in 1979 on a site about 2km east of the Terminal Building. Our field

survey and interview with ADL confirmed that the wastewater treatment was properly managed, the sewage basins were generating no bad orders, and fish were swimming in the third basin.

(3) Water service

Twice a week (on Mondays and Fridays), Lilongwe Water Board inspects the water quality of KIA's water tanks, VIP Building, and two tanker trucks that bring water to airplanes. No problems related to water quality have occurred so far.

1-3-3-3 Malawian Legislation/Organizations Related to Socio-Environmental Considerations

(1) Environmental Management Act of 1996

Environmental affairs in Malawi are governed by the Environmental Management Act (EMA) of 1996, which provides the process of Environmental Impact Assessment (EIA), requires project developers to comply with the process, and sets out penalties for those who do not comply. The EIA process is managed by the Director of Environmental Affairs (DEA)) of the Environmental Affairs Department (EAD).

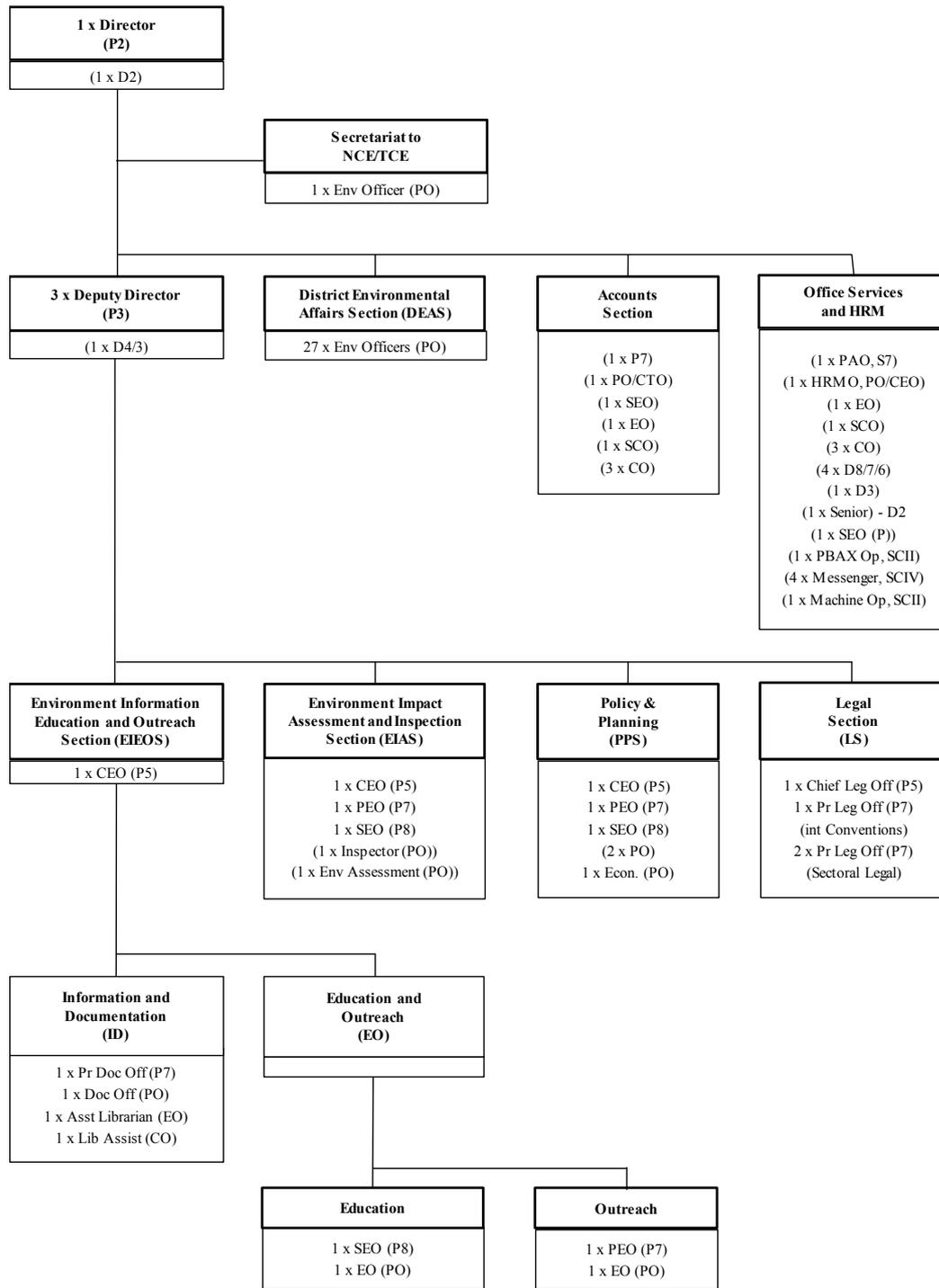
EMA specifies the types and scales of project subject to EIA. The EIA Guidelines of 1997 expressly provides that "any project subject to EIA requirements cannot be licensed and implemented until a satisfactory EIA study has been completed, and the project has been approved by DEA."

1-3-3-4 Relevant Government Organizations

(1) Ministry of Natural Resources, Energy and Mining (MNREM), Environmental Affairs Department (EAD)

The Environmental Affairs Department (EAD) is a Malawian government organization established under Section 9 of EMA, implementing and coordinating all government policies and programs related to the environment and natural resources. In addition, EAD monitors each development project to ensure that it is implemented in line with the principle of sustainable development.

Shown below is an organization chart of EAD.



Source: EAD

**Figure 4 Organization Chart of EAD**

(2) Technical Committee on the Environment (TCE)

While EAD is legally obligated to ensure that all applicable projects satisfy the EIA

requirements, it can seek advice on technical and specialized matters from the Technical Committee on the Environment (TCE) established under Section 16 of EMA. TCE provides specialized knowledge of a broad spectrum of technical challenges related to the environment for NCE.

TCE members take turns in serving as its representative. EAD provides office support for TCE. Duties performed by TCE member organizations are; gathering of information related to projects subject to EIA, examination of Project Brief /EIA TOR/EIA Report, establishment of criteria for approval of projects, development of project review program and monitoring, and drafting of recommendations for DEA of EAD who takes into account the advice of TCE as necessary.

### (3) Competent Authorities

Competent Authorities serve the following functions:

- Guarantee that the project satisfies the EIA requirements under EMA.
- Participate in the TCE.
- Give advice to the project developer pertaining to applicable regulations and the criteria for monitoring when the project is approved.
- Guarantee that the project satisfies all criteria for approval of the project, including those presented by DEA.

### 1-3-3-5 Environmental Impact Assessment (EIA)

#### (1) Mandatory EIA Projects (List A)

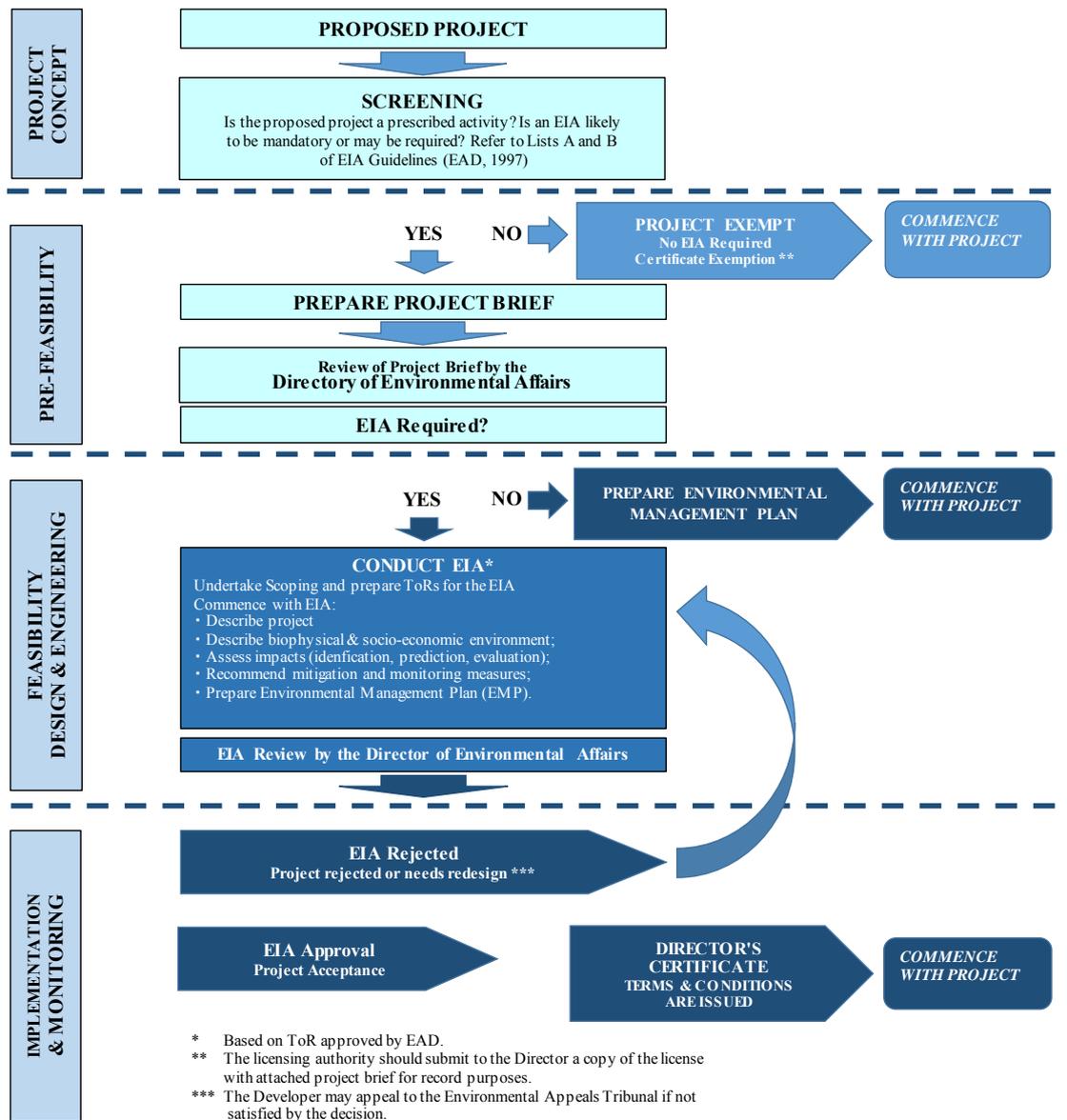
As described above, implementation of EIA is prescribed by law in Malawi. EIA requirements are applied to certain development projects (both public and private) stipulated in Article 24 of the Environment Management Act (EMA), which are listed in Appendix B of the EIA Guidelines. Projects in 14 sectors (A1 through A14), for which EIA is required, are categorized as “List A” projects. “Expansion of an existing airport and incidental facility” belongs to “A4 Infrastructure Projects” on List A.

As explained in Article 26 of EMA, a “List A” project needs to be certified by DEA in writing if it is to be exempted from the EIA requirements, or approved by DEA based on the EIA report in order to obtain permits and licenses from competent authorities to proceed with the project. When a project is deemed to cause significant and irreparable damage to the environment, DEA is authorized under EMA to require the developer to change the contents of the project to reduce its environmental impact, or reject the project.

(2) EIA Process

The EIA process described in EMA is managed by DEA of EAD.

The chart below shows the EIA process of Malawi.



Source: EAD

**Figure 5 EIA Process of Malawi**

Upon receiving the following documents, DEA has to make a decision within the numbers of days shown in the table 6.

**Table 6 Maximum Number of Work Days Allowed for EIA-related Review**

Procedure	EIR Review Days
Determine the necessity of EIA after receiving Project Brief.	15 days
Review the commissioned EIA studies (draft) submitted to DEA	10 days
Review 1 <sup>st</sup> EIA Draft Report.	50 days
Review (2 <sup>nd</sup> and subsequent) EIA Draft Report(s).	25 days

Source: EAD

1) Project Brief

A developer must, before implementing any project listed in EMA, submit a Project Brief to DEA.

2) Screening

Screening is a process, in which whether or not a project is subject to EIA is determined. DEA, upon receiving a project brief, consult with TCE to obtain technical advice. Based on the information on the Project Brief and the criteria for project screening, TCE examines the necessity of EIA and gives recommendations to DEA as to what actions to take, based on which DEA decides on whether EIA is necessary or not.

If EIA is determined necessary, DEA requests the developer and/or a relevant government agency to prepare an EIA Report. If EIA is determined unnecessary, DEA authenticates such decision by issuing a written certificate. In some cases, the developer or relevant government agency may be exempted from the submission of an Environmental Management Plan.

3) Scoping

When a project requires EIA, the range of issues to be analyzed by EIA is defined through a process called scoping, which is conducted by a project preparation team consisting of the developer and a team of interdisciplinary experts.

4) EIA

Shown in Appendix C of the EIA Guidelines are typical contents of an EIA Report. EIA is usually conducted during the Pre-FS phase or at an early stage of FS.

1-3-3-6 Scoping

Result of the scoping is shown in the table 7. It is expected that minimum level negative impact for air, water quality, wastes, noise and vibration, and accidents will occur during the construction stage but such effect is limited within the project site.

**Table 7 Result of Scoping**

No.	Environmental Item	Evaluation		Reasons	
		During Construction	During Implementation	During Construction	During Implementation
1 Pollution Control	(1) Air	C	-	Operation of construction machinery and equipment may temporarily have negative impact to the air quality.	C
	(2) Water Quality	C	-	Concrete forming may have negative impact on water quality.	C
	(3) Wastes	B	-	Construction may produce some construction wastes such as concrete, asphalt and mud.	C
	(4) Noise and Vibration	C	-	Operation of construction machinery and vehicles may increase noise.	C
	(5) Soil Contamination	-	-	The project's construction works will not contaminate soil.	The project will not increase aircraft/passenger traffic.
	(6) Subsidence	-	-	The project construction works will not cause ground subsidence	The project will not increase aircraft/passenger traffic.
	(7) Odor	-	-	The project construction works will not generate odor.	The project will not increase aircraft/passenger traffic.
2 Natural Environment	(1) Protected Areas	-	-	The project site is not located near protected areas.	The project site is not located near protected areas.
	(2) Ecosystem	-	-	The project will take place on the KIA premise where there are no endangered species.	The project will take place on the KIA premise where there are no endangered species.
	(3) Hydrology	-	-	The project's construction works will not adversely affect river or underground water.	The project implementation will not adversely affect river or underground water.
	(4) Topography and Geology	-	-	The project construction works will not change topographic/geographic features.	The project implementation will not change topographic/geographic features.
3 Social Environment	(1) Resettlement	-	-	There are no inhabitants at the project site and thus, there will be no resettlement.	There are no inhabitants at the project site and thus, there will be no resettlement.
	(2) Poverty	-	-	The project will take place on the KIA premise and thus, it will not affect the poverty aspect in the vicinity of KIA.	The project will take place on the KIA premise and thus, it will not affect the poverty aspect in the vicinity of KIA.
	(3) Gender	-	-	The project will take place on the KIA premise and thus, it will not affect the gender aspect in the vicinity of KIA.	The project will take place on the KIA premise and thus, it will not affect the gender aspect in the vicinity of KIA.
	(4) Employment and regional economy	C+	-	The project may hire construction workers living near the KIA.	The project will not likely increase employment during the implementation period as the project will not increase aircraft/passenger traffic.
	(3) Heritage	-	-	There are no local archeological, historical, cultural, and religious heritage.	There are no local archeological, historical, cultural, and religious heritage.
4 Others	(1) Accidents	C	-	Construction vehicles may increase the number of car accidents in the area.	C

A: Significantly adverse impact is anticipated., B: Some adverse impact is anticipated., C: Minimal adverse impact is anticipated., + positive impact is anticipated., U: Impacts are unknown at this stage and should be surveyed., -: No impacts are anticipated.

#### 1-3-3-7 Initial Environmental Evaluation

Based on the site survey and interviews from ADL, DCA, LIHACO and EAD, Initial Environmental Evaluation was conducted based on JICA Guidelines for Environmental and Social Consideration. As the results, minimum negative impacts are expected in air, water quality, wastes, noise and vibration, and accidents during the implementation stage caused by operation of construction equipment as same as the scoping results. These negative impact is considered to be minimized with taking appropriate measures by the construction contractor as describes in the table 8.

**Table 8 Result of IEE**

No.	Environmental Item	Evaluation (Scoping)		Evaluation (after survey)		Reasons	
		During Construction	During Implementation	During Construction	During Implementation	During Construction	During Implementation
1 Pollution Control	(1) Air	C	-	-	C	Operation of construction machinery and equipment may temporarily have minimal negative impact to the air quality.	The project will not increase aircraft/passenger traffic.
	(2) Water Quality	C	-	-	C	Concrete forming may have temporal negative impact on water quality. However, wastewater from construction will be minimal and will be treated by the sewage treatment system of the airport.	The project will not increase aircraft/passenger traffic.
	(3) Wastes	B	-	-	C	Construction may produce some construction wastes such as concrete, asphalt and mud. The existing open dump area on the premise of KIA has sufficient capacity for these construction wastes. The project will not generate any hazardous wastes.	The project will not increase aircraft/passenger traffic.
	(4) Noise and Vibration	C	-	-	C	Operation of construction machinery and vehicles may generate noise. However, the impact is minimal and temporal.	The project will not increase aircraft/passenger traffic.
	(5) Soil Contamination	-	-	-	-	The project's construction works will not contaminate soil.	The project will not increase aircraft/passenger traffic.
	(6) Subsidence	-	-	-	-	The project construction works will not cause ground subsidence	The project will not increase aircraft/passenger traffic.
	(7) Odor	-	-	-	-	The project construction works will not generate odor.	The project will not increase aircraft/passenger traffic.
2 Natural Environment	(1) Protected Areas	-	-	-	-	The project site is not located near protected areas.	The project site is not located near protected areas.
	(2) Ecosystem	-	-	-	-	The project will take place inside the KIA premise where there are no endangered species.	The project will take place inside the KIA premise where there are no endangered species.
	(3) Hydrology	-	-	-	-	The project's construction works will not adversely affect river or underground water.	The project implementation will not adversely affect river or underground water.
	(4) Topography and Geology	-	-	-	-	The project construction works will not change topographic/geographic features.	The project implementation will not change topographic/geographic features.
3 Social Environment	(1) Resettlement	-	-	-	-	There are no inhabitants at the project site and thus, there will be no resettlement.	There are no inhabitants at the project site and thus, there will be no resettlement.
	(2) Poverty	-	-	-	-	The project will take place inside the KIA premise and thus, it will not affect poverty aspect in the vicinity of KIA.	The project will take place inside the KIA premise and thus, it will not affect poverty aspect in the vicinity of KIA.
	(3) Gender	-	-	-	-	The project will take place inside the KIA premise and thus, it will not affect the gender aspect in the vicinity of KIA.	The project will take place inside the KIA premise and thus, it will not affect the gender aspect in the vicinity of KIA.
	(4) Employment and regional economy	C+	-	C+	-	The project may hire construction workers living near the KIA.	The project will not likely increase employment during the implementation period as the project will not increase aircraft/passenger traffic.
	(3) Heritage	-	-	-	-	There are no local archeological, historical, cultural, and religious heritage.	There are no local archeological, historical, cultural, and religious heritage.
4 Others	(1) Accidents	C	-	-	C	Construction vehicles may increase car accidents in the area. Car accidents can be avoided and minimized by adequate management.	The project will not increase aircraft/passenger traffic.

A: Significantly adverse impact is anticipated., B: Some adverse impact is anticipated., C: Minimal adverse impact is anticipated., + positive impact is anticipated., U: Impacts are unknown at this stage and should be surveyed., -: No impacts are anticipated.

### 1-3-3-8 Monitoring Plan

Based on the IEE, mitigation measures are prepared and environmental management and monitoring plan is prepared as shown in the table 9. It is necessary for DCA as the implementation agency to monitor mitigation measures are taken to minimize environmental effect during the construction stage. A monitoring form is attached in this report.

Although, water quality check should be done by a staff of the Ministry of Health stationed in KIA, the water quality check had not been conducted since the inspection equipment was broken about 10 years ago. In this regard, it is preferable to conduct the water quality check and discussion among DCA, ADL and the Ministry of Health should be done.

**Table 9 Environmental Management and Monitoring Plan**

Stage	Expected Effect		Mitigation Measures	Responsible Organization	Monitoring Organization
Construction	Air	Dust from construction	Watering of site and installation of temporary fences	Contractor	DCA
	Water Quality	Waste water from construction	Waste water should be discharged through treatment plant or processing groove	Contractor	DCA
		Waste water from office	Waste water management from kitchen and toilet, installation of processing groove, restoration of temporary office area	Contractor	DCA
	Wastes	Construction waste	Waste material should be placed at disposal area in KIA	Contractor	DCA
	Noise and Vibration	Construction equipment and vehicle	Installation of temporary fences	Contractor	DCA
	Accidents	Inappropriate construction management	Installation of safety devices, safety equipment for workers, traffic rule for accident prevention, minimize dust, crisis management planning	Contractor	DCA

## Chapter 2 Contents of the Project

### 2-1 Basic Concept of the Project

#### 2-1-1 Outline of the Project

##### 2-1-1-1 Background and Necessity of the Project

The building facilities of the Kamuzu International Airport (KIA) were constructed some 35 years ago and are now severely deteriorated, requiring major rehabilitation work. According to the survey by DCA, annual passengers in the airport has been increased from approximately 110 thousand in 2003 to approximately 210 thousand in 2013. The immigration, baggage claim, check-in counter, safety inspection area, and departure lobby are chronically congested, because of heavy traffic during peak hour period and expansion of the passenger building and improvement of equipment and facilities are urgent requirements. It has passenger more than 35 years since its inauguration, structural and facility deterioration has observed and it needs to be rehabilitated to consider passenger convenience.

The radar equipment, which was installed in KIA in 1980, has been broken for some time in 2000 and is not presently used for air traffic control. Aircraft surveillance service are provided by manual method. To reduce risk of human error and to improve safety aircraft operation, installation of new aircraft surveillance system is necessary.

##### 2-1-1-2 Objectives of the Project

The objectives of this Project are to expand the passenger handling capacity of the Kamuzu International Airport, improve convenience for its passengers, and ensure aviation safety by expanding/rehabilitating its passenger terminal buildings and upgrading its aviation safety equipment in order to facilitate the movement of people across the borders of Malawi.

##### 2-1-1-3 Components of the Project

This Project consists of two major components of architectural construction (expansion of the passenger terminal buildings) and equipment procurement.

The descriptions of the buildings to be expanded/rehabilitated are outlined the table 10.

**Table 10 Outline of Buildings to be Expanded/Rehabilitated**

Facility	Structure / scale	Building area	Total floor area	Floor space of building
<b>Expansion</b>				
International Passenger Terminal Building, Arrival Wing (IAW)	1-story reinforced concrete structure	2,033m <sup>2</sup>	1,597m <sup>2</sup>	2,033m <sup>2</sup>
International Passenger Terminal Building, Departure Wing (IDW)	1-story reinforced concrete structure	1,546m <sup>2</sup>	1,220m <sup>2</sup>	1,606m <sup>2</sup>
Domestic Terminal Building (DTB)	1-story (partially 2-story) reinforced concrete structure	1,519m <sup>2</sup>	849m <sup>2</sup>	1,606m <sup>2</sup>
<b>Rehabilitation</b>				
Existing Passenger Terminal Building (ETB)	4-story steel structure		5,043m <sup>2</sup> (Floor area subject to rehabilitation)	5,043m <sup>2</sup> (Floor area subject to rehabilitation)

Special Incidental Facility

Baggage Handling System (BHS)

- For arriving international flights: 2 units (to be installed in the Arrival Wing of International Passenger Terminal Building)
- For departing international flights: 1 unit (to be installed in the existing Passenger Terminal Building)
- For arriving domestic flights: 1 unit (to be installed in the Departure Wing of International Passenger Terminal Building)

Equipment to be procured by this Project consists of the following items.

**Table 11 Outline of Equipment**

Equipment	Quantity	Location / Purpose
████████████████████	1	████████████████████
████████████████████	1	████████████████████
████████████████	1	████████████████████
████████████████	1	████████████████████
Aerial work platform	1	Maintenance of high ceilings
Aircraft Surveillance system	1	Surveillance in air space and air traffic control

## 2-2 Outline Design of the Japanese Assistance

### 2-2-1 Design Policy

#### 2-2-1-1 Basic Policy

KIA is the target site of this Project, which comprises the two major components, namely, the expansion of the Passenger Terminal Building and the renewal of the aircraft surveillance system.

#### 2-2-1-2 Expansion of the Passenger Terminal Building

In order to continue using the Passenger Terminal Building, its severely deteriorated plumbing and electrical wires need to be renewed. In addition, the building's passenger handling capacity needs to be elevated to mitigate congestion and enhance the convenience for its passengers. The catering facilities and ground support equipment, which were also requested by the Malawian Government in addition to the expansion of the Passenger Building, will not be implemented by this Project due to limited budget. Because an international airport located in a capital city is a gateway airport of the country, the renewed KIA should be of world-class standards appropriate for a capital airport. As it is difficult for Malawi with a limited national budget to independently undertake such a large-scale expansion work, it is deemed appropriate to implement the work as a grant aid project of Japan.

Since the expansion work will need to take place while the airport remains fully operational, we devised an expansion work plan in such a way to minimize its impact on the airport operation. In addition, we took an approach that will expedite and streamline the movement of international passengers by reconfiguring the building to allow passengers to go through the check-in, passport control, and safety inspection on the 1st floor without needing to climb up and down the stairs.

#### 2-2-1-3 Aircraft Surveillance System

The Malawian Government also requested the installation of the Automatic Dependent Surveillance – Broadcast (ADS-B) system, as all the SADC member states (namely, Botswana, Malawi, Mozambique, and Zambia) had signed a Memorandum of Agreement, which commits the states to work together toward the implementation of ADS-B in the region. Mozambique and Zambia are already in the process of adopting ADS-B. However, introducing ADS-B alone would not be sufficient for air traffic control at KIA, as the air traffic control monitor cannot detect and display small propeller planes or other old aircrafts not installed with ADS-B receivers. In order to monitor these old-type aircrafts, a Secondary Surveillance Radar (SSR) needs to be installed as well. By adopting SSR and ADS-B at the same time, it will become possible to use SSR to verify the location data captured by ADS-B. Accordingly, it was decided to install both the ADS-B and SSR systems, as well as monitors that can display data from both systems.

#### 2-2-1-4 Policy on Electric Power Supply

In Malawi, power outages frequently occur, and voltage is generally unstable. However, power outage protection is not particularly necessary for KIA, as it receives electricity from outside via two separate circuits, and the ring-main method of high-voltage distribution is used inside the airport, which is also equipped with emergency generators in the Electrical Room. However, it was decided to attach an uninterruptible power supply (UPS) with a runtime of 10 minutes or longer, as well as an automatic voltage regulator (AVR), to each equipment item in order to ensure stable voltage and continuous operation during power outages.

#### 2-2-1-5 Policy on Natural Conditions

Climate in Lilongwe belongs to subtropical climate and temperature and humidity during dry season are relatively low. However, as it is subtropical climate, effect of sunshine cannot be ignored. Considering the conditions, thermal insulation measures on the roof and cooling with outdoor air by mechanical ventilation are planned on designing the building.

Though the Great Rift Valley runs through Malawi, the country experiences little earthquakes with no record of major earthquake damage for the past 100 years. Since Malawi has yet to establish building and fire codes related to anti-quake measures, the appropriate seismic resistance level for this Project is determined based on data gathered by seismic field survey and by referring to the Japanese Building Standards Act as follows:

- Seismic Load:  $C_0=0.1$  (Half of Seismic Load in Japan)
- Wind Load:  $V_0=35\text{m/sec}^2$  (Standard wind speed in Malawi)
- Allowable stress design method: Long Term (Normal Load) and safety ratio is considered

#### 2-2-1-6 Policy on Socioeconomic Conditions

Since 12.8% of Malawian population is Muslims, separate prayer rooms for men and women will be set up in the Passenger Terminal Building.

#### 2-2-1-7 Policy on Local Construction/Procurement Environment and Business Customs

Any construction project in Malawi needs to obtain a license from the Building Commission of the city in which the architecture is to be built. For the Kamuzu International Airport, a development license needs to be issued by the Urban Planning Commission of Lilongwe City. In case of a private development projects, private consulting firms file applications for license. However, foreign companies are not allowed to apply for a project license in Malawi and, therefore, need to work with local consulting firms to prepare and file paperwork. For state initiated projects, such as this Project, relevant government agencies file applications with the Urban Planning Commission. In this Project, DCA will take lead in obtaining a development license.

Such ordinary construction materials as gravel, cement, and reinforcing bars are locally available and generally of decent quality. However, as there are no large concrete plants or manufacturers/dealers of raw concrete within the city, a concrete mixing plant is usually set up in each construction site. Doors, windows, sanitary fixtures, special equipment, and other such items are not locally available, or if they are, most of them are not of reliable quality.

#### 2-2-1-8 Policy on Employing Local Contractors

Malawi has large construction companies owned by European and American Investors, as well as local building contractors, which are registered with the National Construction Industry Council (NCIC) and classified according to the scale of business, number of engineers, equipment owned, and business sector (building/civil/electrical). NCIC registered contractors can be searched on the website of NCIC<sup>1</sup>. According to the local builders we interviewed, there is a sufficient supply of construction workers and equipment in Lilongwe City even though public works projects are hardly implemented in the city due to lack of state budget. Most of the local consulting firms are small-sized, and very few private companies are capable of conducting land surveying. No private firms can perform geological survey, which can be done only by some department(s) of the Ministry of Public Works and Housing.

#### 2-2-1-9 Policy on Operation and Maintenance

Considering the chronic budgetary shortages of the Malawian Government, equipment to be procured by this Project should be easy to maintain, requiring no special skills for operation and maintenance. In addition, natural lighting should be used wherever possible to reduce the running cost.

#### 2-2-1-10 Policy on Determining the Grades of Facilities and Equipment

Since KIA is a gate airport situated in the capital city of Malawi, the grades of the facilities and equipment to be constructed and installed by this Project should be comparable to those of similar-sized international airports.

#### 2-2-2 Basic Plan

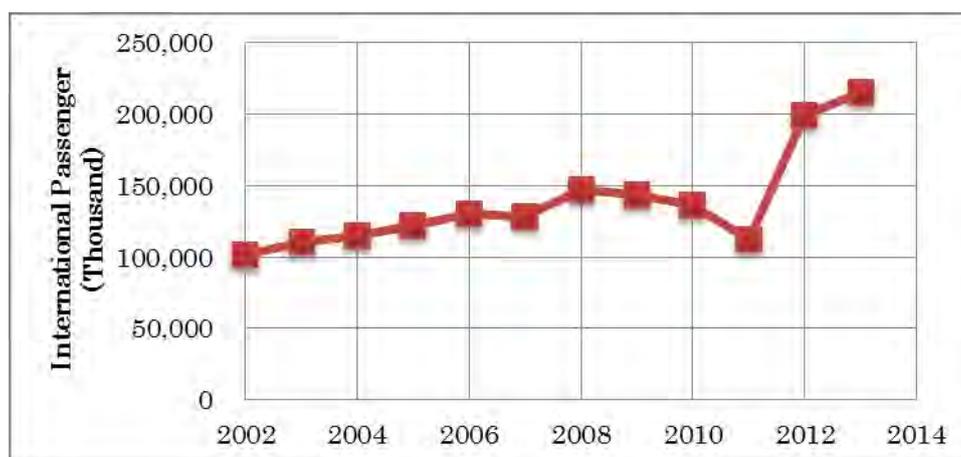
##### 2-2-2-1 Basic Plan of Passenger Terminal Building

###### (1) Air Transport Demand Forecast

Shown in the figure 3 are the actual numbers of passengers who used the Kamuzu International Airport in recent years.

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<sup>1</sup> <http://www.ncic.mw/>



**Figure 1 Number of International Air Passengers at KIA**

The annual number of passengers remained virtually the same for 10 years between 2000 and 2011 and dropped in 2011 when Air Malawi, the state-owned national airline of Malawi, was liquidated and stopped operation. The number of passengers suddenly grew in 2012, when Air Malawi was restructured as Malawi Airlines with the assistance of Ethiopian Airlines, and increased further to over 210,000 passengers in 2013.

Future GDP was estimated from published value of international organization such as IMF. IMF estimated average of approximately 6 % of annual growth rate to 2019. On the other hand, the World Bank estimated approximately 4.5 %, African Development Bank (AfDB) estimated approximately above 6 % and the Asian Development Bank estimate is almost same as the IMF. According to the Study on Programme for Infrastructure Development in Africa (PIDA), Africa's Infrastructure Outlook 2040 by AfDB, average annual growth rate of 6% of GDP was estimated.

**Table 12 GDP growth rate estimates by international organizations**

Year	Future Annual Growth Rate		
	IMF (%)	World Bank (%)	AfDB (%)
2014	6.1	4.4	6.1
2015	6.5	4.6	6.2
2016	6.5	4.7	—
2017	6.2	—	—
2018	6.3	—	—
2019	5.9	—	—

Source: IMF, World Economic Outlook Database, April 2014

World Bank, Global Economic Prospects, January 2014

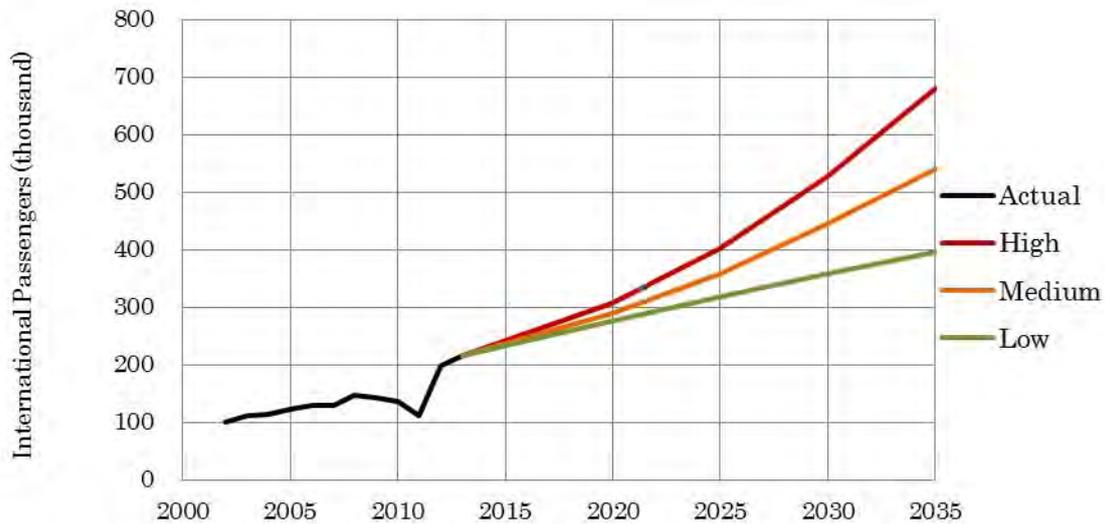
AfDB, African Economic Outlook 2014

Based on the above IMF estimates for long-term prediction, annual growth rate of 6.0 % was applied to 2030 and after 2030, 1% of reduction in 10 years is presumed as shown in the table 13.

**Table 13 Estimated GDP growth rate**

Year	Billion Kwacha	Change
2013	717	
2014	760	6.0%
2015	806	6.0%
2016	854	6.0%
2017	905	6.0%
2018	959	6.0%
2019	1,017	6.0%
2020	1,078	6.0%
2025	1,443	6.0%
2030	1,931	6.0%
2035	2,524	5.5%
2040	3,221	5.0%

Shown below are projected numbers of international passengers forecasted by using the correlation between the number of passengers and GDP in the past as a function of the predicted GDP in the future.



**Figure 6 Result of Demand Forecast**

**Table 14 Result of Demand Forecast (annual passengers)**

Year	Passenger Demand Forecast	
	Annual Passengers	Annual Change
2013	215,000	—
2018	266,000	4.4%
2023	330,000	4.4%
2028	408,000	4.3%

The above demand forecasts predict that the number of passengers in 2023 will reach around 330,000, an increase by about 150% from the 2013 record. Generally, airport buildings are designed not to require major expansion work for at least five years after completion. Since this Project is scheduled for completion around 2018, the demand forecast of 2023 was used as design value.

There are 3 arrival flights in period between 12 to 13 o'clock and 3 departure flights between 13 to 14 o'clock in KIA. The number of flights depends on days however, 1 large size jet and 2 small size jets are operated during one hour and this operational pattern has been same for last five years. To consider the pattern, peak hour passenger of 500 passengers per hour for both arrival departure are presumed.

- Large Size Jet (315 seats) x 1 movement + Small Size Jet (155 seats) x 2 movements = 625 seats
- 625 seats x Load Factor (80 %) = 500 passengers

In this study, it is presumed that this operational pattern will not be changed by year 2023 and following peak hour aircraft movements and aircraft passengers are applied.

**Table 15 Result of Demand Forecast on Design Year (2023)**

Annual Passengers	
Arrival & Departure	330,000 passengers per annum
Peak Hour Aircraft Movements	
Arrival	3 movements (1 Large Jet and 2 small Jet)
Departure	3 movements (1 Large Jet and 2 small Jet)
Peak Hour Passengers	
Arrival	500 Passengers
Departure	500 Passengers

(2) Status of the Existing Passenger Building

The passenger building was constructed 35 years ago and deterioration of the building has been

progressing, however renovation work had been done by the operator and conditions of some areas are kept in good conditions.

#### 1) Outer Finish

Most parts of the roof of the passenger building are folded-plate steel roof and surface deterioration has progressing. Waterproof membranes are peeling and water leaks are observed on below floors.

The materials of outer wall are square corrugated steel plate, mortar and mosaic tiles. The condition of the steel plate is relatively good but color fade-out and pollution are observed. The condition of wall surface with mortar finish is good without cracks but some dirty areas are observed. Rust is observed on the foot area of the column of handrail on the balcony in level 1 and level 2 and exploding and exfoliation of the tile are observed. Because of this, there is dirty area by the rust fluid.

Most of the outer fittings are aluminum doors and windows and there are no functional problems although some of the fittings are dirty. Exfoliation and stiffen are observed on the grass ceiling.

#### 2) Inner Finish

Rubber sheet with non-slip finish are used in the wide area such as concourse, departure and arrival lobbies and baggage claim area. Some areas are in good condition but clacks and exfoliation are observed in many places.

Large size tiles such as the 300 mm and 600 mm square size are used in departure lounge, business lounge, restaurants and some of the offices. The condition of the tiles is good and it can be used for future.

Vinyl tiles with 300 mm square size used in offices and corridors are deteriorated and there is side exfoliation area.

Wooden packet floor is used in duty free shop area and part of concourses. The surface paint is exfoliated and floor itself are exfoliated in some areas.

Paint on mortar finish on bricks is used in most of the interior walls. Some parts are repaired by pain and some areas are dirty but no major cracks are observed.

Aluminum spandrel is used on ceilings of the wide-open area. Some parts are missing and deformed and some areas are dirty.

Direct paint on the waffle slab is used on some parts of the ceilings. There is no problem on the conditions but trace of water leaks are observed.

Printed plasterboards are used on some parts of ceilings in international arrival hall and small rooms. The condition is good and there is no problem.

It is presumed that finishes on floors and walls in toilets were mosaic tile finish but some

rooms were renovated with large size tile and porcelain tile. The conditions of such renovated rooms are good but dirt on mosaic tile is remarkable. Some of the toilet booths and sink counters are damaged.

All doors are made by woods and damage and peeling of paints are observed also some keys and door levers are damaged.

3) Others

Waterproof of the pond in the western part of the custom area on the level 0 is deteriorated and water leak are observed in the road under the area.

Insulating materials are lapped flat seam behind the folded-plate steel roof. Flocculating insulating materials are lying by layers in the ceiling of the top floor. The material of the insulation was not known and asbestos analysis was carried out in Japan from the material brought to Japan but no asbestos was found.

(3) Issues of the Existing Passenger Building

As described earlier, the existing Passenger Building consists of four tiers, and the facilities for departing international passengers are situated on the 1st, mezzanine, and 2nd floors. The problems of the existing Passenger Building are outlined below.

1) Facilities for arriving international passengers

- Because of little space at the quarantine counter, arriving passengers have to stand in line outside the building.
- The immigration and baggage claim areas are extremely congested during peak hours.
- Because there is only one baggage claim belt, it cannot hold all the bags and suitcases when two or more planes arrive at the same time.
- Passengers have to stand in a long line for immigration due to lack of immigration counters.

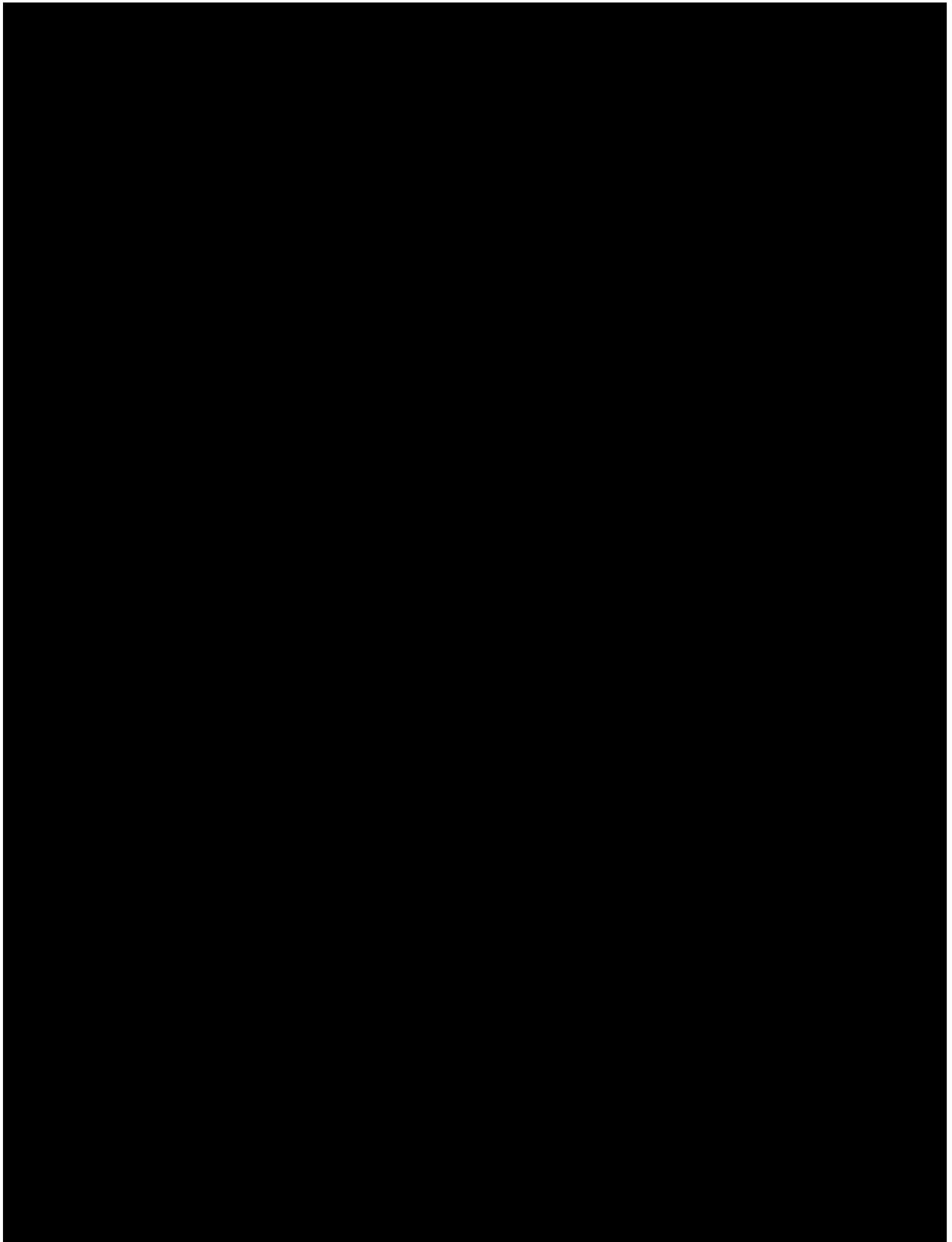
2) Facilities for departing international passengers

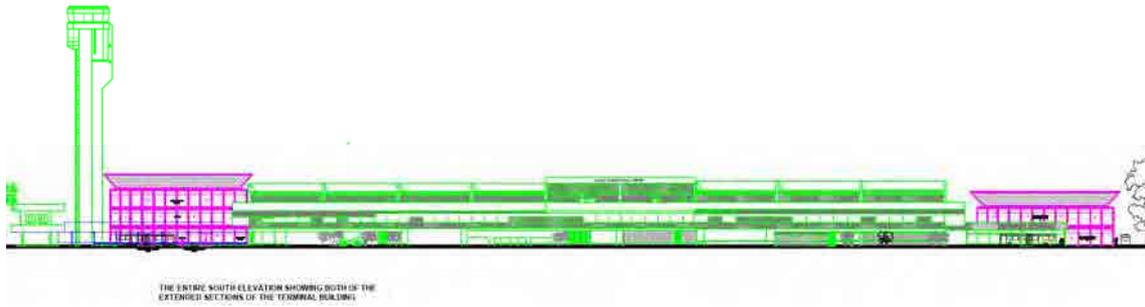
- As the concourse does not have enough depth, it lacks space for passengers to form a line in front of the check-in counter.
- Departing international passengers need to walk up and down the stairs and slope, which is very difficult for wheelchair passengers, as the elevator for the handicapped is broken.
- The check-in counters, passport control, safety inspection area, and departure lobby are extremely congested during peak hours.
- [REDACTED]

(4) Evaluation of the Expansion Plan

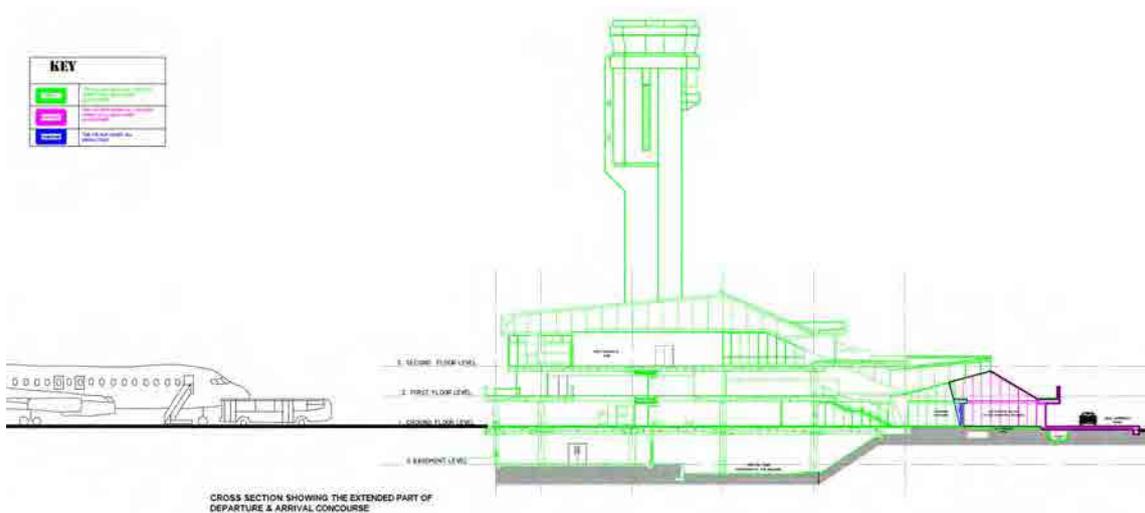
The request from the Malawian Government included the rehabilitation of the existing Passenger Building, for which ADL was drafting an extension plan to extend the northeastern and southeastern sections and renovate inside the existing Passenger Building. This plan intends to expand the arrival lobby, check-in lobby, and departure gate on the 1st floor, set up additional offices on the mezzanine, and add an observation deck on the 2nd floor without changing the present flows of passengers. ADL's expansion plan is shown in the figures below.







**Figure 10 Passenger Building Expansion Plan by ADL (elevation seen from the airside)**



**Figure 11 Passenger Building Expansion Plan by ADL (cross section)**

ADL's expansion plan would not significantly increase the handling capacity of the airport. In addition, since the plan consists mostly of the expansion of the existing building, it would be quite challenging to carry out the construction work without interrupting the normal operation of the airport.

In light of the above, the Study Team has drafted alternative rehabilitation/expansion plans as describe below.

(5) Building Configuration

The International Arrival Wing, International Departure Wing, and Domestic Passenger Building will be arranged so as not to significantly alter the present flows of passengers on a horizontal plane. The International Arrival Wing will be situated on the airside of the present arrival facilities, the International Departure Wing on the airside of the present departure lounge, and the Domestic Passenger Terminal Building on the southeastern side of the existing Passenger Terminal Building.

Shown below is the planned building configuration.

1) International Arrival Wing

The International Arrival Wing will be situated in the paved section (the current bus stop area for arriving passengers) on the northwestern side of the existing Passenger Terminal Building so as not to change the present west-to-east flow of arriving passengers and to provide easy access to the customs inspection area in the existing Terminal Building on the east side.

2) International Departure Wing

The International Departure Wing will be situated in the paved section (the current bus stop area for departing passengers) on the southeastern side of the existing Passenger Terminal Building so as not to change the present east-to-west flow of departing passengers and to provide easy access to the International Arrival Wing on the west side via the check-in hall, passport control, and safety inspection area in the existing Terminal Building.

3) Domestic Passenger Building

The Domestic Passenger Building will be built in the green zone on the southeastern side of the existing Passenger Terminal Building, from the concourse of which domestic passengers will move through a corridor to the pilotis of the Domestic Passenger Terminal Building. Separating the traffic lines of domestic passengers from those of international passengers will also enhance security.

(6) Floor Planning

1) International Arrival Wing

The International Arrival Wing will be one-storied in consideration of the movement of passengers, as well as ease of construction, operation, and maintenance. A bus terminal will be set

up on the western side of the Wing so that passengers, after getting off the bus, can enter the Wing from the airside entrance, go through the quarantine and immigration, claim baggage, and then exit the Wing to go to the customs inspection area in the existing Passenger Terminal Building via a connecting passageway.

The quarantine station will have enough space to set up four counters in consideration of infectious diseases and other conditions of the African Region. Using the IATA formula based on the number of passengers during the peak hour (500 passengers) and the results of the site survey, 12 quarantine booths will be set up in the immigration control area.

The baggage claim area will have two 40-meter-long baggage handling belts, which can accommodate four planes arriving during the peak hour (based on assumption that passengers stay around each belt for 30 minutes).

In addition, offices of the Quarantine Station, Airport Police, Airport Administrator, and passenger service companies, as well as the storage of lost items will be set up in the International Arrival Wing.

## 2) International Departure Wing

International Departure Wing will be one-storied for the same reason as the International Arrival Wing.

The floor plan was drafted based on the traffic line of passengers who move from the safety inspection area in the existing Passenger Terminal Building through a corridor to the lounges (business and economy) of the International Departure Wing.

The 57-seat business lounge will be attached with an Internet counter, reception, bar, kitchen, and restrooms. The 360-seat economy lounge will be attached with duty-free shops, café, prayer rooms, and restrooms. The bus stop for departing passengers will be situated on the southwestern front of the airside.

## 3) Domestic Passenger Building

As is the case with the International Arrival and Departure Wings, the Domestic Passenger Building will be one storied, except for the office/administrative section, which will be two storied.

The floor plan was drafted based on the traffic line of domestic passengers who move from the concourse of the existing Passenger Building via a corridor to the Domestic Passenger Building to go through the chick-in hall and safety inspection area to get to the lounge.

The 70-seat lounge will be attached with a café, prayer rooms, and restrooms.

Because there are not so many domestic passengers, the bus terminals for arriving and departing buses will be put together in one area on the southwestern front of the airside. Though separation of arriving and departing passengers is necessary for security reasons, it can be done

by coordinating the timetables of departing and arriving buses.

4) Rehabilitation of the Existing Passenger Terminal Building

Improving Passenger Flows

At present, passengers check in on the 1st floor, climb up the stairs to the mezzanine to go through passport control, climb up the stairs further to the 2nd floor to spend some time in the lounge area, and then walk down the slope to the 1st floor to go through safety inspection before reaching the departure lounge. The horizontal and vertical distances each passenger needs to cover on foot before getting on the plane are quite long compared to the size of the airport. In addition, the elevator for wheel chair persons remains broken, making the airport not accessible to the handicapped. To solve these problems, it was decided to put together the facilities for passengers (and their traffic lines) on the 1st floor.

Arrival and Departure Zones of the Existing Passenger Building

From the standpoint of minimizing the renovation work that will affect the operation of the airport during construction, it was decided to follow the present layout (arrival zone on the western side, and departure zone on the eastern side). Based on the number of passengers during the peak hour, we estimated the required space for each of the major areas to mitigate congestion.

As a result, it was decided to use the present departing baggage-handling area in the existing Passenger Building as Check-in Hall, and convert the present baggage belt space into Passport Control. The existing lounge for departing international passengers will be converted to duty-free shops, etc.

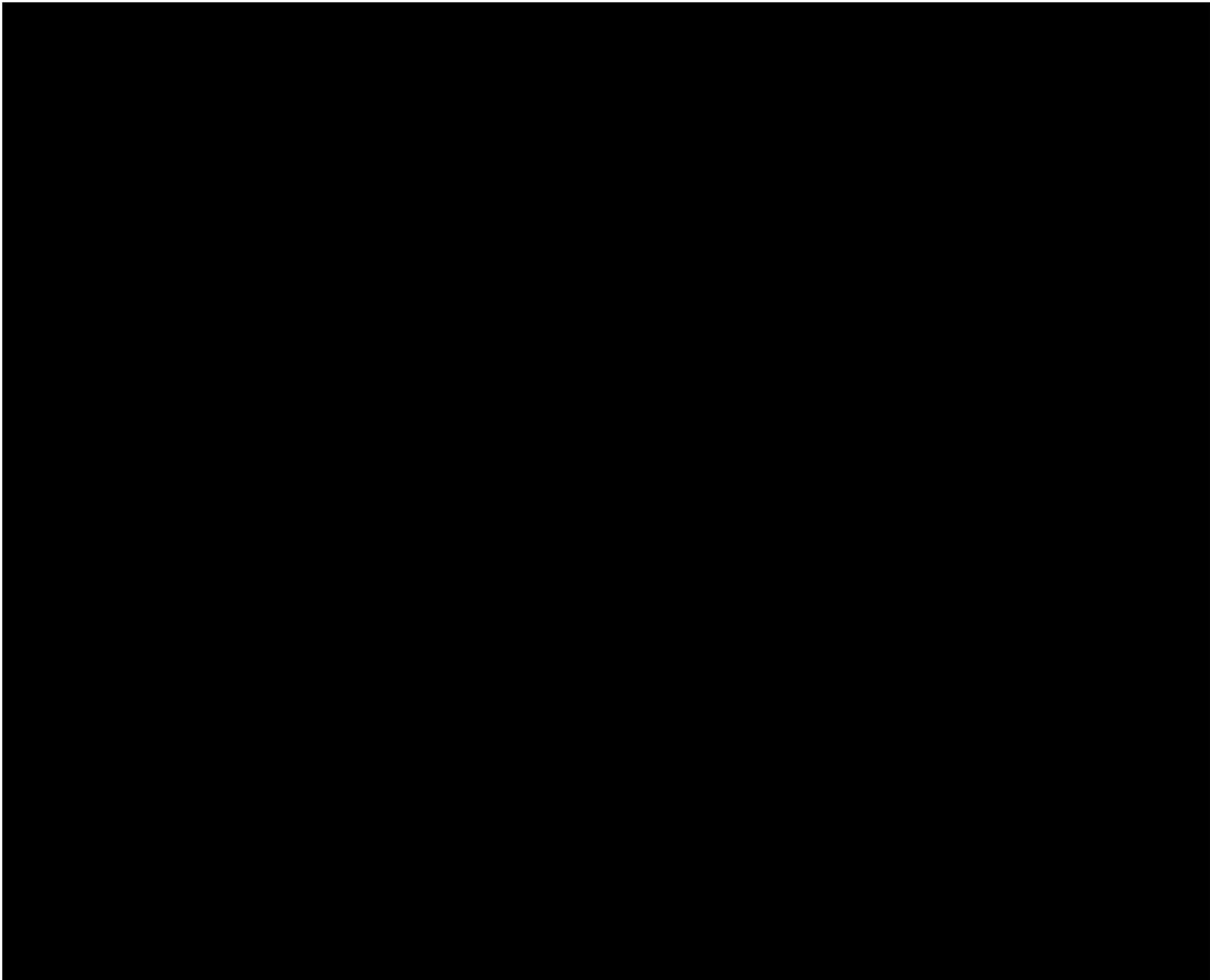
As for the arrival zone, it was decided to relocate the Quarantine and Immigration to the International Arrival Wing and use the space as Customs Inspection Area installed with two x-ray scanners.

Numbers of major counters are summarized in the table 16.

**Table 16 Numbers of Major Counters**

Facilities	Existing Number	Planning Number
Check in counters	6	16
Departure immigration counters	5	14
Arrival immigration counters	6	12
Arrival quarantine counters	2	4
Arrival custom counters	6	6

The building configurations before and after the renovation work are shown in the figure 13.



(7) Cross-Sectional Plan

1) International Arrival & Departure Wings

The floor height from the finished floor level on the 1st floor to the highest ridge of the roof slab will be 5.0m. The height of the frame-suspended ceiling will be 3.2m with a 0.81m-tall roof space under the beam, where air-conditioning equipment and ventilating fans, etc. will be housed. Based on the results of the geological survey, it was decided to place the pressure resistant concrete at 2.0m depth below the floor level of the 1st floor, and the space between the concrete and the floor slab will be used as an underground pit with an maintenance opening on the foundation beam to install utility pipes.

2) Domestic Passenger Building

The floor height from the finished floor level on the 1st floor to the highest ridge of the roof slab will be 3.35m. As it is the smallest of the three buildings to be newly constructed, the ceiling height was set just enough not give an oppressive feeling to a relatively small number of passengers. The foundation type and cross sectional plan are the same as those of the other two buildings.

(8) Exterior/Interior Finish

The standard finish specifications of the new buildings are as follows.

**Table 17 Standard Finish Specifications of Departure/Arrival Wings**

Section	International Arrival Wing	International Departure Wing	Domestic Passenger Building
Exterior Finish			
Exterior wall	Wall: AEP on mortar bed on stacked bricks, partially AEP on stacked bricks Post/beam: AEP on mortar bed on fair-faced concrete	Same as on the left.	Same as on the left.
Roof	Waterproof coating on concrete slab	Same as on the left.	Same as on the left.
Interior Finish			
Floor	Porcelain tiles	Same as on the left.	Same as on the left.
Interior wall	Framework: AEP on mortar bed Brick partition: AEP on mortar bed, porcelain tiles in some sections Restroom: porcelain tiles	Same as on the left.	Same as on the left.
Ceiling	Concrete section: AEP on concrete slab on insulating panels (inside insulation) Steel lattice: OP Restroom and other small rooms: AEP on gypsum board	Same as on the left.	Same as on the left.

**Table 18 Standard Finish Specifications of Renovated Existing Building**

Section	Existing Passenger Terminal Building	
	Renovation	Repair
Exterior Finish		
Exterior wall		RC section: AEP (equivalent finish to the existing walls)
Ceiling		Metal roof (overlay)
Interior Finish		
Floor	Porcelain tiles	Porcelain tiles (equivalent finish to the existing floor) Rubber sheet (equivalent finish to the existing floor) Wooden parquet floor (equivalent finish to the existing floor)
Interior wall	Partition: AEP on gypsum board	AEP (equivalent finish to the existing walls)
Ceiling	AEP on gypsum board	AEP (equivalent finish to the existing ceiling)

(9) Repair Work

1) Roofing

Since the existing folded-plate steel roof is worn out and leaking, the entire roof will be renewed using a roofing method called “overlay” (adding a top layer of shingles to the existing roof). The overlay technique not only saves the cost of removing the existing roof materials but also allows the construction to take place without affecting the business operation under the roof or causing leaks in case of rain.

2) Exterior Walls

In some sections of the balcony, wall cracks, peeling tiles and other damages are occurring and posing danger due to rusted rail posts. These rails will be renewed and the tiles will be removed and replaced with paint finish.

3) Interior Walls

For the existing concourse, baggage claim, inspection, and other areas, which will continue to be used in their present setup, the entire rubber floor will be replaced with new rubber sheets. For the sections that will be converted to serve different functions, the walls, ceilings, fixtures, etc. will be removed according to the renewal plan.

4) Other

The floor/wall finish, fixtures, etc. of the three restrooms on the mezzanine level will be renewed completely. The restrooms on the 1st floor, which will continue to be used, will be partially patched up and repainted. The leaking artificial pond by the baggage inspection area will be waterproofed and retiled.

(10) Structural Plan

1) International Arrival Wing

This Wing will have a one-storied unbraced-rigid-frame reinforced-concrete (RC) structure with a floor height of 5.0m and maximum span of 12m. It will be built using construction methods commonly used in Malawi, such as applying waterproof coating on the concrete roofing slabs, so that maintenance work is relatively easy for local contractors. In addition, inverted pyramidal shape pillars will be used to increase rigidity to minimize vertical deflection of roof girder. Based on the results of ground survey, it was decided to use direct (mat) foundation and create a double pit between the foundation and the floor slabs.

2) International Departure Wing

This Wing will also have a one-storied unbraced-rigid-frame RC structure (with a floor height of 5.0m and maximum span of 13m). The shape of pillars and the type of foundation will be the same as those of the Arrival Wing.

3) Domestic Passenger Building

This Building will also have a one-storied unbraced-rigid-frame RC structure (with a floor height of 3.35m and maximum span of 7.0m). RC will be used in some sections of the external walls that support the stairs inside the building that are made of RC. Foundation type will be the same as that of the other two buildings.

(11) Equipment Plan

1) Expansion Plan

Electrical Equipment

As the existing substation system is long past its service life and noticeably deteriorated, it will be replaced with a new system to supply power to the new buildings (International Arrival and Departure Wings and Domestic Passenger Building).

Because facility will be developed while airport operation is carrying out with the existing facilities, a new substation room will be prepared for quick switch over to renewed substation equipment. The new substation room will be located next to the existing substation room in the basement floor. It is agreed with Malawi side that renewal of high voltage power distribution system for whole airport would not be included in the project.

Existing high voltage distribution line of 11 KV, 3 phase, 3 wire, 50 Hz is used.

It is necessary to consider total power requirements of expansion area, the new domestic passenger building and existing airport facility for estimation of required capacity of substation equipment. Required capacity is estimated from total power current of existing switchboard in the substation because demand capacity of the existing airport facility is unknown.

Total load of existing airport:  $P = \sqrt{3}VI\cos\phi$  ( $\cos\phi$  : Power factor = 0.8)  
 $= \sqrt{3} \times 230V \times 1,600A \times 0.8 = 1,470KW$

Estimated expansion area load:  $5000 \text{ m}^2 \times (1,470KW/8,000 \text{ m}^2) = 920KW$

Total floor area of existing building: 8,000m<sup>2</sup>

Floor area of expansion and new area: 8,000 m<sup>2</sup>

Estimated total capacity is 2,390 KW and if demand factor of 60% is adopted, estimated required maximum power capacity is 1500 KVA ( $2,390 \text{ KW} \times 0.60 = 1,434KW \rightarrow 1500KVA$ ).

Capacity of existing transformer is 2,000KVA ( $1,000KVA \times 2$ ) and the capacity is enough including expansion area, the required capacity of the transformer is the same as the existing one.

Emergency backup generator was renewed in 2012 and the capacity of the new one is 60 KW more than the old one. This generator will be used in future and power load for important facility is planned to be less than capacity of the generator. Details of the generator is shown in the table 19.

**Table 19 Outline of Existing Backup Generator**

Item	Specification
Type	Radiator-cooled indoor installation package type
Capacity	3 phases 4 wires 400/230V 50Hz 700KVA (560KW)
Fuel	Diesel, Tank Capacity: 1,500 litter
Quantity	1

Power to the expansion area and rehabilitation area of the existing passenger building are planned to be distributed from the new substation by 3 phases 4 wire, 400/230 V 50 Hz line from each distribution board considering load use and facility characteristics. Also, new trunk line to outside of the expansion area will be installed.

Capacity of trunk line power is planned to satisfy appropriate voltage drop and allowable current value for capacity of each equipment. Cable rack is basically adopted inside shaft and piping wiring is adopted in other locations. The following distribution methods are adopted.

**Table 20 Distribution Method**

Item	Specification
Distribution method	Trunk line 3φ4W 230V/400V
Single phase load	1φ2W 230V
Power load	3φ3W400V

The new lighting system will use mostly LED lights to reduce running cost. Switch of the light is located in each room and switch circuit is divided to necessary small area to be able to switch in each area. Power distribution to lighting fixtures and outlet circuit is single-phase 2 line 230 V. Lighting fixtures on the generator distribution line are located along emergency escape route.

Illuminance of each area is planned to refer average illuminance of International standard and JIS standard and conditions in Malawi as shown in the table 21.

**Table 21 Illuminance Plan**

Area	Illuminance
Lounge	300 lux
Check-in counter	400 lux
Baggage claim	400 lux
Lobby	300 lux
Office	300 lux
Toilet and storage	50 lux
Staircases	100 lux

For the telephone system, ducts and cables will be installed from the existing MDF to new terminal boards and telephone terminals (or ducts only for tenants).

For the LAN system, this Project will only secure the space for wiring and install ducts, as the wiring work and equipment installation will be performed by specialized vendors, as is the case with the existing Passenger Building.

In addition to the above, the flight information display system (FIDS), surveillance camera equipment (CCTV), and public address (PA) system will be installed, as they are essential electrical equipment for the airport.

For the fire alarm system, manual emergency alarm bells, etc., similar to those of the existing building, will be installed.

The lightning protection of the existing passenger terminal building is lightning rod on the control tower and frame conducting wire on the roof of the passenger terminal building. A new lightning rod is planned on the new building for lightning protection of whole building. On lightning strike, abnormal voltage and power induce to electrical equipment through power cable and telephone cable by direct lightning and induction lightning and damage the equipment. To prevent such incident, Surge Protection Devices (SPD) is planned in new buildings where new computer, telephone switch boards, etc., are installed, to protect abnormal voltage and power from power cable and telephone lines and also to provide stable power.

### Water supply and drainage system

Water will be supplied to new buildings (International Arrival and Departure Wings and Domestic Passenger Building) from the elevated water tank situated at the top of the existing Passenger Building. The existing water tank is noticeably deteriorated due to aging and therefore will be replaced with a new one. Wastewater from the new buildings will flow into the outdoor sewage main pipeline of the existing building and treated in the existing sewage treatment unit. Storm sewer will be connected via pipe to the nearest storm-water ditch. Restrooms will be installed with electric hot-water heaters to locally supply hot water to wash basins, etc.

Daily water consumption volume is estimated from the current water usage record. Unit water usage is calculated from past records of the existing passenger terminal building.

**Table 22 Water Consumption**

Item	Quantity
Daily water usage	33.3 m <sup>3</sup> /Day
Average Daily Passengers	Approx. 630 Passenger/Day
Daily water usage per passenger	52 Litter/Day
Maximum water usage per passenger ( Daily average×1.2)	62 Litter/Day

From above value, design daily water usage is calculated as follows:

$$\begin{aligned} \text{Design Daily Water Usage:} & \quad 900 \text{ Pax} \times 52 \text{ Litter/Day} = 46,800 \text{ Litter/Day} \\ & \quad \rightarrow 47 \text{ m}^3/\text{Day} \end{aligned}$$

Appropriate capacity of elevated water tank is same as hourly average water usage as follows:

$$\text{Required capacity} \quad 47 \text{ m}^3/\text{Day} \times 1/8 = 5.88 \text{ m}^3 \rightarrow 6.0 \text{ m}^3$$

Renewed elevated water tank is planned to satisfy above capacity. The specification of existing elevated water tank is shown in the table 23.

**Table 23 Specification of Existing Elevated Water Tank**

Item	Specification
Type	Steel board panel tank Capacity: 5 m <sup>3</sup>
Outer Dimensions	2 m (W)×4 m (D)×1 m(H) Quantity: 2

As rehabilitation work will be conducted while operating the airport, same size elevated water tank is planned and replaced one by one.

**Table 24 Specification of New Elevated Water Tank**

Item	Specification
Type	FRP Panel tank (Earthquake Resistance 1.0G) Capacity: 5 m <sup>3</sup>
Outer Dimensions	2 m (W)×4 m (D)×1 m(H) Quantity: 2

Sanitary Ware Equipment

All toilet basins in the existing passenger terminal building are flash valve western type toilet basin. Implantable wash basins for passenger are used in many locations. Wall-mounted flash valve type urinals are basically used but common type stainless steel urinals are also used. All sanitary wares has been used after the completion of the project but condition of maintenance is good and functioning well.

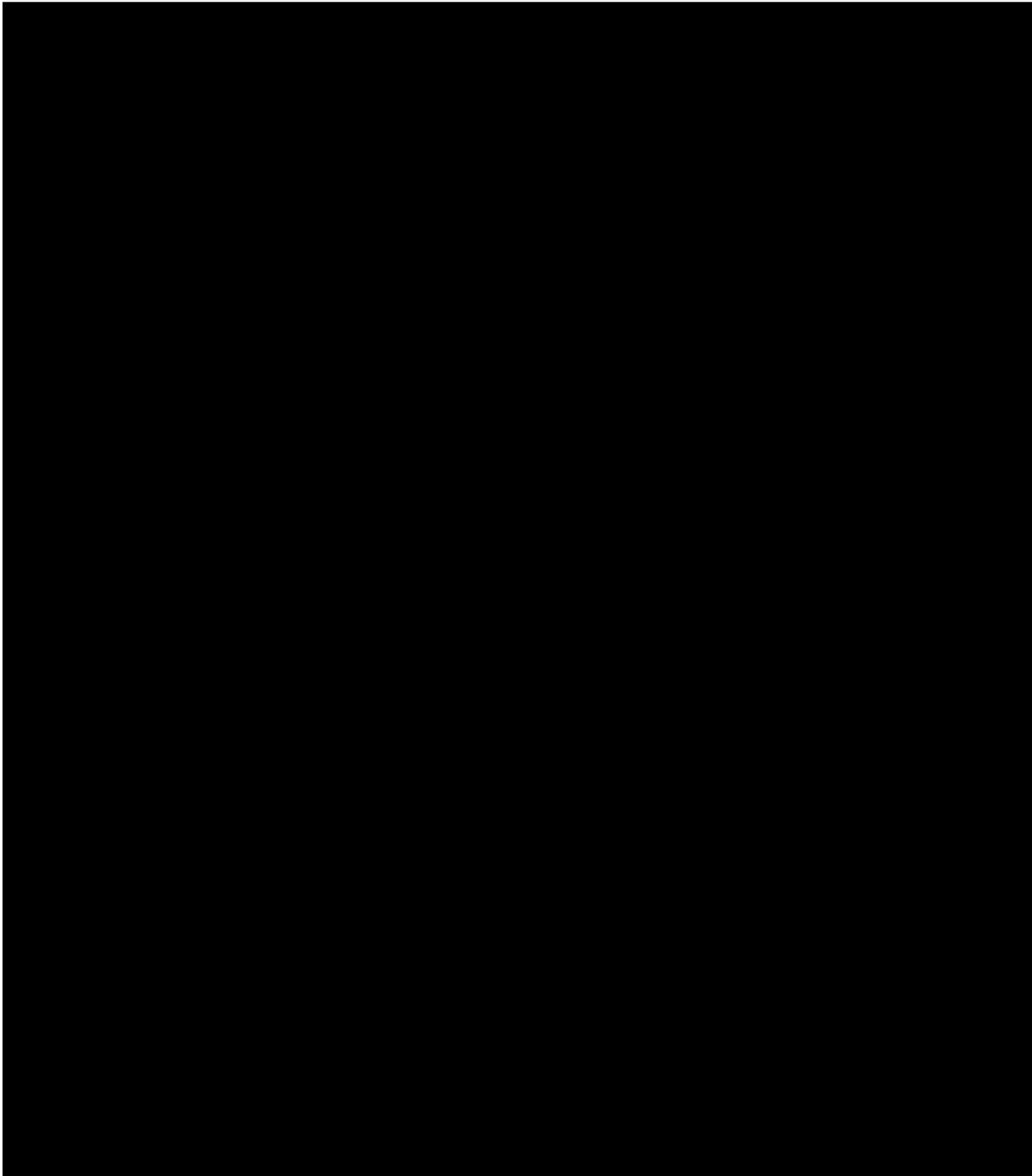
Water saving type flush valve western toilet basins and wall-mounted flash valve type urinals are planned in the international arrival wing, the international departure wing and the new domestic passenger terminal building. New toilet for physical disabled toilet is planned in the ground floor of rehabilitated area in the existing passenger terminal building.

HVAC

As the climate is relatively temperate, air-conditioners will be installed in the passenger areas and office space (see the Figures below) for cooling purposes only. For easy maintenance, split-type air-conditioners will be used, which will be of ceiling-duct, cassette, or wall-mounted type depending on the place of installation. Ventilating fans will supply fresh air to air-conditioned rooms and force out foul air from restrooms, etc. Ventilating equipment standards applied in the project is shown in the table 25 with reference to American Society of Heating, Refrigerating and Air-conditioning Engineers, Inc. (ASHRAE) and standards of the Ministry of Land Infrastructure and Transport of Japan.

**Table 25 Specifications of Ventilating Equipment**

Room	Ventilation Methods	Unit of Ventilation	Remarks
Room with air conditioning unit	Air supply fan only	25 m <sup>3</sup> /Person•Hour	For fresh air intake and pressure retention
Server room, etc.	Air supply and exhaust fan	25 m <sup>3</sup> /Person•Hour	For pressure retention
Storage	Exhaust fan only	5 times /Hour	
Toilet	Exhaust fan only	10 times/Hour	For odor elimination
Water receiving tank room	Exhaust fan only	3 times/Hour	
Kitchen	Air supply and exhaust fan	20 times /Hour	For odor and heat elimination
Generator room	Air supply and exhaust fan	25~30 times/Hour	Air supply for combustion and heat elimination



### Fire Fighting Facility

There is neither building standard law nor fire law to specify necessary fire protection equipment for building users safety. In Malawi, procedure is such that fire fighting equipment is planned by the designer based on the international standards and city housing department reviews the plan.

There are 2 fire fighting pumps (one of them is for backup) in the pump station in the airport and pressured water is distributed with the fire hydrant pipes to cover the airport area. Concrete water receiving tank is used as water resource. Outside type fire hydrants are provided on the loop type pipe system and fire hydrants are located to cover all buildings as water source for fire pump vehicle.

There are indoor type fire house reel equipment in the existing passenger terminal building. Fire fighting water is distributed from water intake pipe 100mm $\phi$  in mechanical room on the basement floor through 2 fire hydrant pumps. However, at the time of the site survey the indoor fire hydrant pumps were out of order and water pressure for the fire hydrant is only water supply pressure.

As it has passed more than 35 years after the inauguration of the fire hydrant system and it has passed its life, hydrant pump, fire hydrant and fire hydrant pipes are planned to renew. The expansion area such as international arrival wing, international departure wing and new domestic passenger terminal building will be covered by the renewed fire hydrant system and also fire extinguishers, which is effective for initial fire fighting, will be installed.

## 2) Rehabilitation Plan

### Electrical Equipment

As the substation system in the Electrical Room on the basement floor of the existing

Passenger Building is long past its service life and noticeably deteriorated, a new substation room will be built next to the existing room to install new substation equipment for switchover. The mains cables from the new substation to the distribution and power control panels of the existing Passenger Building will be renewed. Lighting fixtures, power outlets, and light electrical equipment will be renewed where necessary as part of the building rehabilitation work. For the fire alarm system, the broken emergency bells and buttons in the existing Terminal Building will be replaced.

#### Mechanical Equipment

As the plumbing equipment of the existing Passenger Building is severely deteriorated due to aging, the elevated water tank on the 2nd floor and the water/sewage mains will be renewed. In addition, plumbing work will be conducted for the restrooms on the 1st and mezzanine floors as part of the rehabilitation work of the check-in counter on the 1st floor.

In the Machinery Room on the basement floor of the existing Passenger Building, there is an electric water boiler, which used to centrally supply hot water to the restrooms on each floor, but is currently out of service. As the Machinery Room on the basement floor will be converted into Electrical Room, the existing electric boiler and pipes will be removed all together. A storage-type electrical water heater will be installed in each of the restrooms to be renovated on the 1st and mezzanine floors of the existing Passenger Building to locally supply hot water to their washbasins.

For the HVAC system, air-conditioners will be installed in the check-in counter and office areas for cooling purposes only. The areas subject to air-conditioning are shown in the figure 17. For easy maintenance, split-type air-conditioning equipment will be installed, which will be of ceiling-duct, ceiling-cassette, or wall-mount type depending on the location of installation. In addition, ventilating fans will be installed to supply fresh air to air-conditioned rooms and force out foul air from restrooms, etc.



5) Aerial work platform

A model type with a platform 7.5m or higher above the ground, on which two or more persons can work at the same time, shall be selected.

6) Aircraft Surveillance system

Aircraft Surveillance system, which can cover the entire airspace of Malawi and capture/integrate flight numbers, altitudes, velocities, and other information of a large number of aircrafts to perform highly accurate air traffic control, shall be selected.

Basically, items 1) - 4) are not available in Malawi and therefore will be procured from third countries whereas items 5) and 6) will be procured from Japan in consideration of ease of operation and maintenance in future.

(2) Equipment Plan

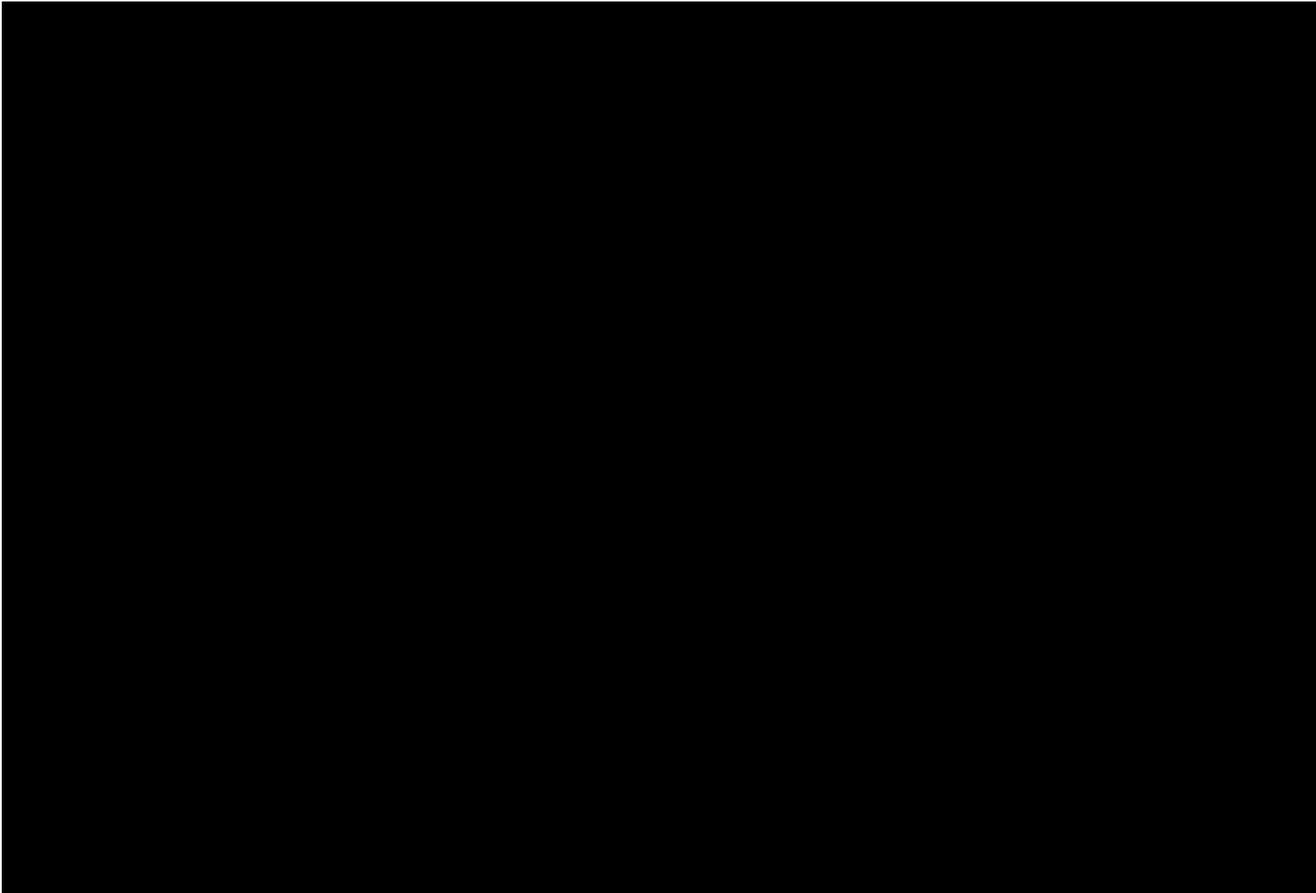
Equipment items to be procured by this Project are shown in the table 26.

**Table 26 Equipment List**

ID	Equipment	Specification/Configuration	Qty.	Purpose of use
█	█ █ █ █	█ █ █ █ █	█	█ █ █ █
█	█ █ █ █	█ █ █ █ █	█	█ █ █
█	█ █	█ █ █ █	█	█ █
1-5	Aerial work platform	Type: mobile battery driven Max. platform height: 7.5m or greater Max. loading capacity: 250Kg or greater	1	Maintenance, repair, cleaning of ceilings, etc.
2-1	Aircraft surveillance system	Type: MSSR / ADS-B integrated Coverage: 200 Nm or greater Surveillance targets: 200 or more aircrafts Complied with ICAO Annex 10 [MSSR] Inquiry Mode: 1, 2, 3 / A,C Mode S: Data link / Down link Target rate: 95 % or more [ADS-B Sensor] Receiver: Frequency 1090 MHz Decoder DF17 and DF18 Coverage: 250 NM Target Aircraft: 300 Standard: RCTA DO-260 EUROCAE ED 102, RTCA DO-260A ICAO Annex 10	1 set	Aircraft surveillance and air traffic control

(3) Equipment Layout Plan

In this Project, security inspection equipment will be installed in the Passenger Building as shown in the figure 18.



For Aircraft Surveillance, SSR and ADS-B equipment will be installed in the Radar Site and the Radar Control Room as shown below.



**Figure 19 Aircraft Surveillance Equipment Layout Plan**

(4) Spare Parts and Expendables

The equipment items to be procured in this Project need to be capable of operating 24 hours a day 365 days a year without interruption due to failure or breakage, as such interruption could seriously affect the security of the airport and airline services. Stocking sufficient quantities of spare parts and expendables is imperative to minimize uninterrupted operation of the airport.

The sufficient quantities of spare parts for one year will be calculated and supplies by the Consultant based on the advice of the manufacturer of each equipment item. The warranty period for each item will be one year, as is generally the case with other grant aid projects. No particular expendables will be needed for any of the equipment.

### 2-2-3 Outline Design Drawings

The outline design drawings of this Project are shown below.

Figure 20 International Arrival Wing Layouts

Figure 21 International Arrival Wing Elevation (South and East)

Figure 22 International Arrival Wing Section (North and West)

Figure 23 International Departure Wing Layout

Figure 24 International Departure Wing Layout

Figure 25 International Departure Wing Elevation (North and West)

Figure 26 International Arrival Wing Elevation (South and East)

Figure 27 International Departure Wing Section

Figure 28 Existing Passenger Terminal Building Expansion Layout (1st Floor)

Figure 29 Existing Passenger Terminal Building Expansion Layout (mezzanine)

Figure 30 Domestic Passenger Building Layout (1st Floor)

Figure 31 Domestic Passenger Building Layout (2nd Floor)

Figure 32 Domestic Passenger Building Elevation (South and West)

Figure 33 Domestic Passenger Building Elevation (North and East)

Figure 34 Domestic Passenger Building Section

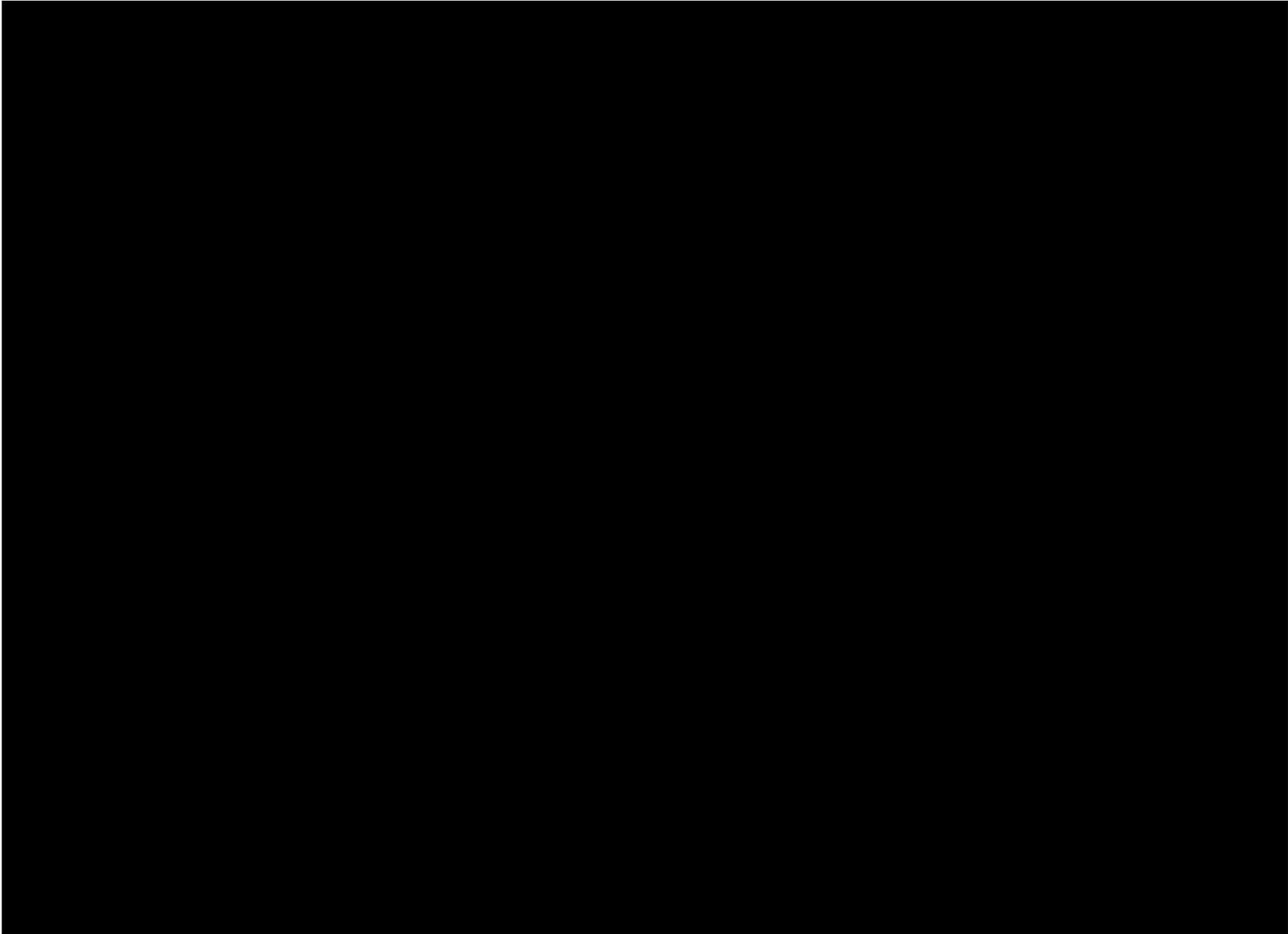
Figure 35 Domestic Passenger Building Section

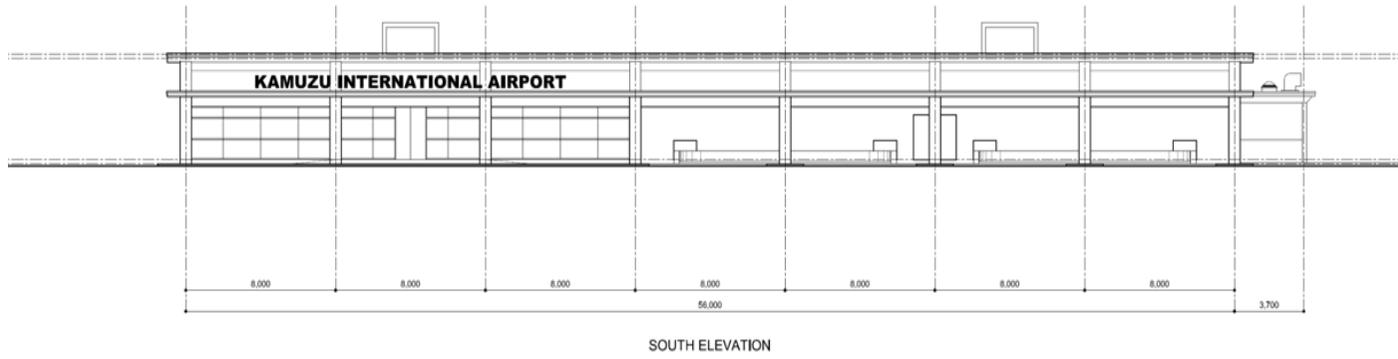
Figure 36 Diagram of CCTV

Figure 37 Diagram of FIDS

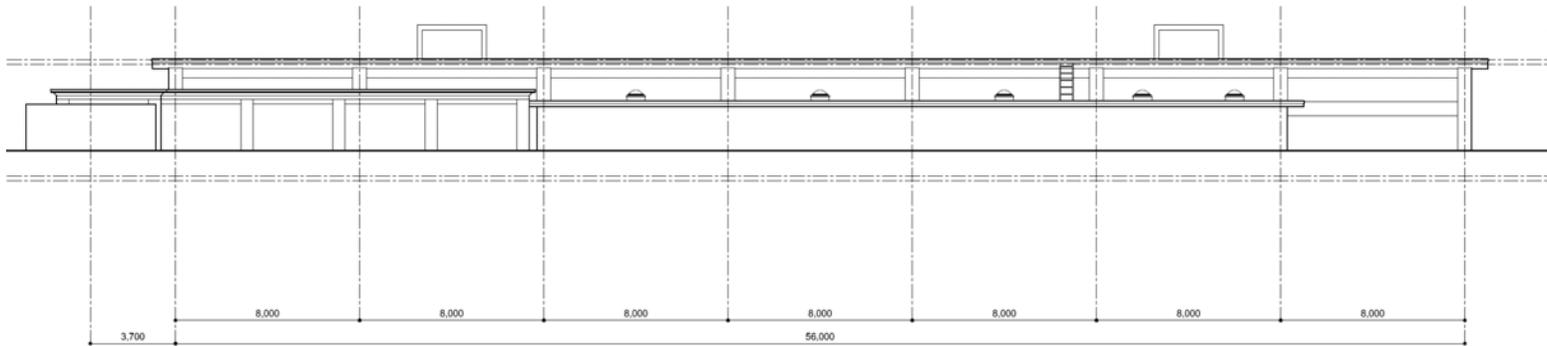
Figure 38 Diagram of Aircraft Surveillance System

Figure 39 Layout of Aircraft Surveillance System Equipment

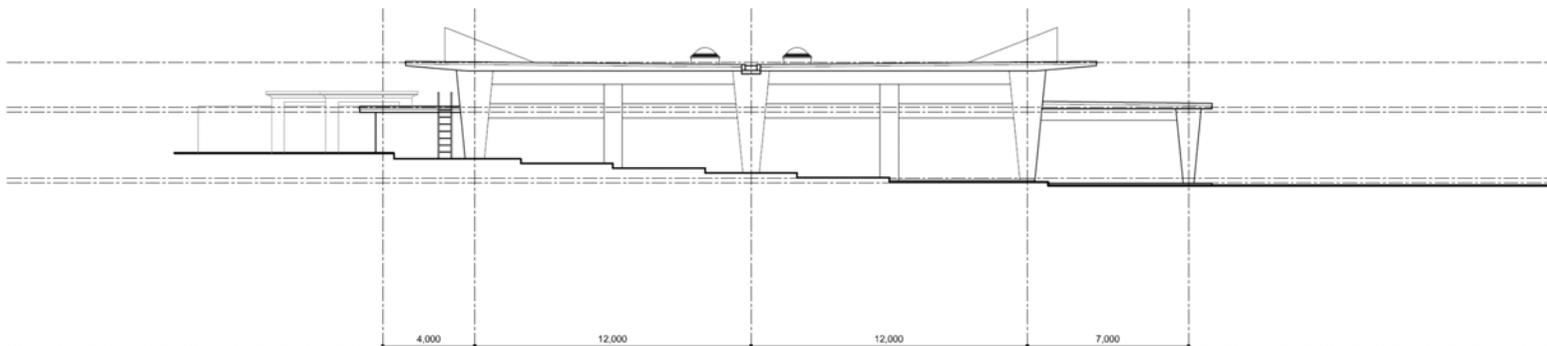




**Figure 21 International Arrival Wing Elevation (South and East)**



NORTH ELEVATION



WEST ELEVATION

**Figure 22 International Arrival Wing Section (North and West)**

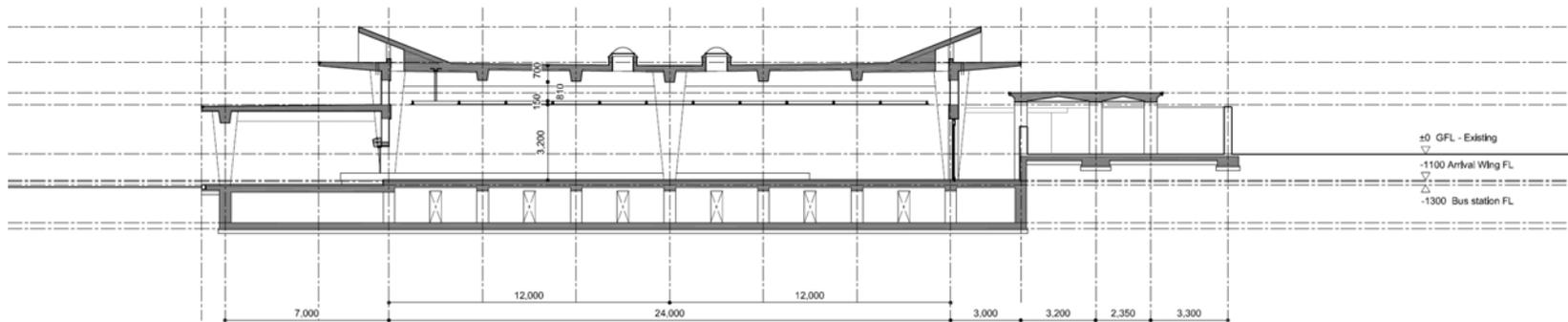
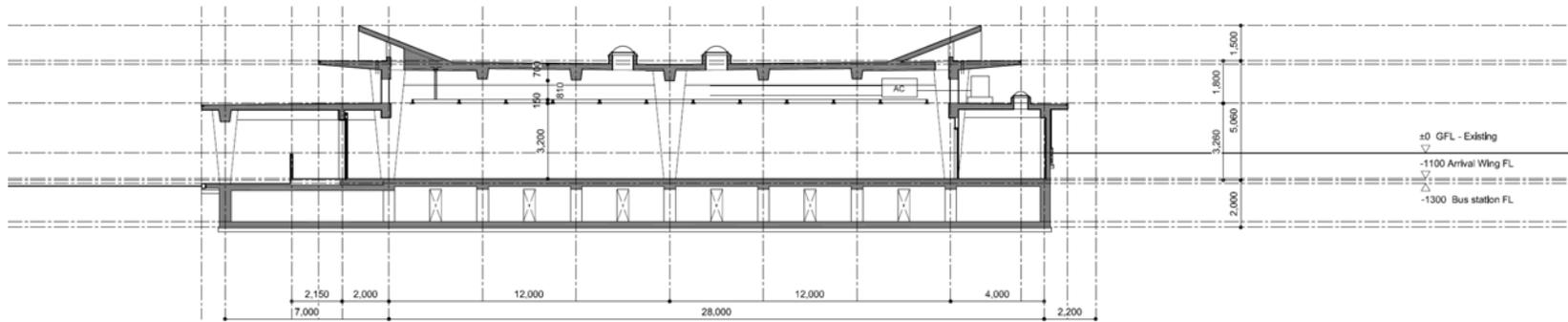
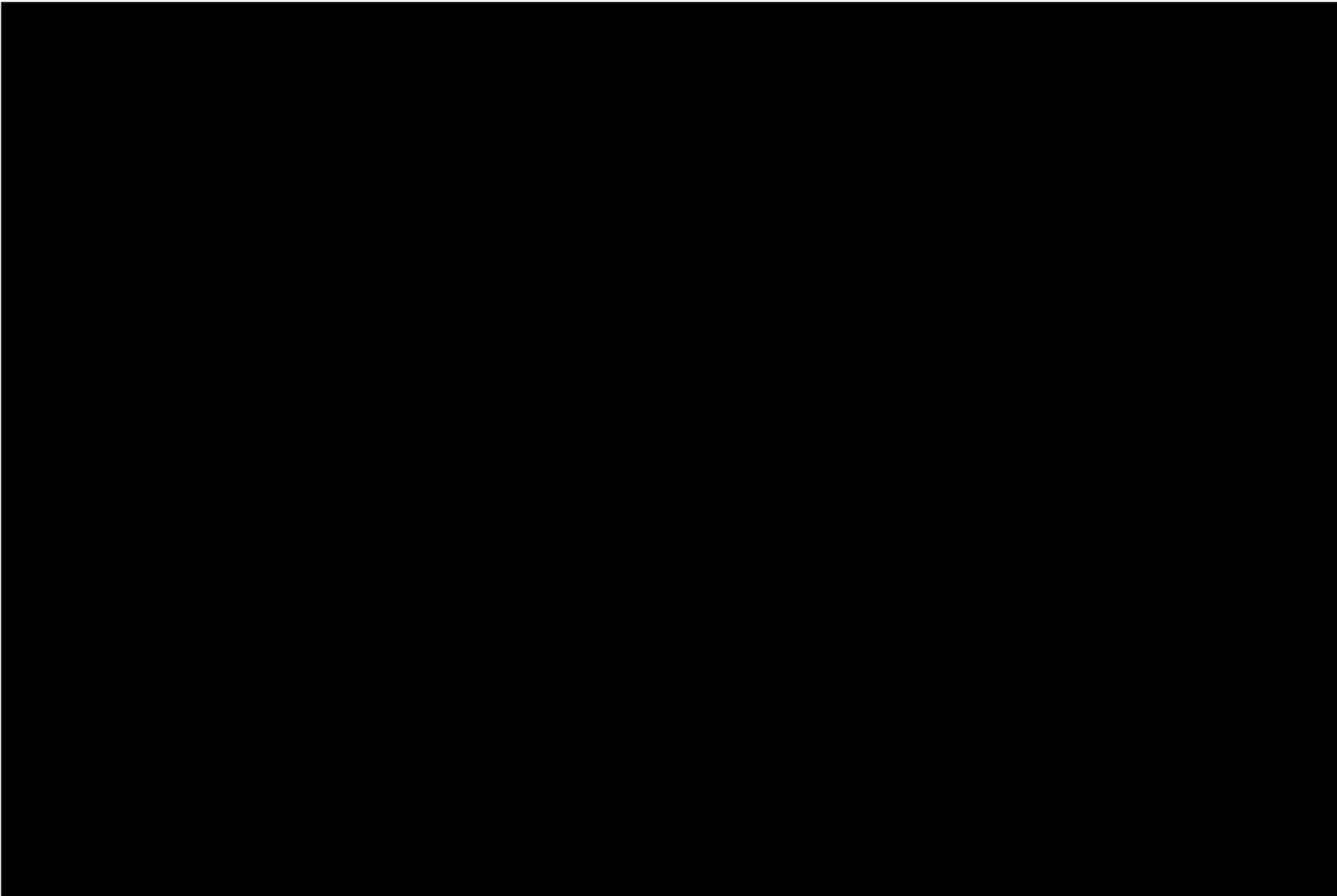
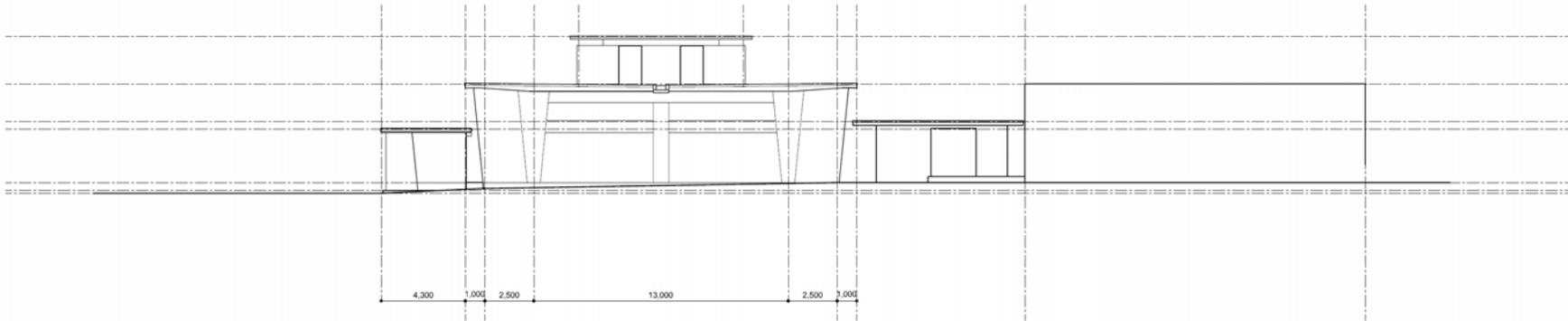
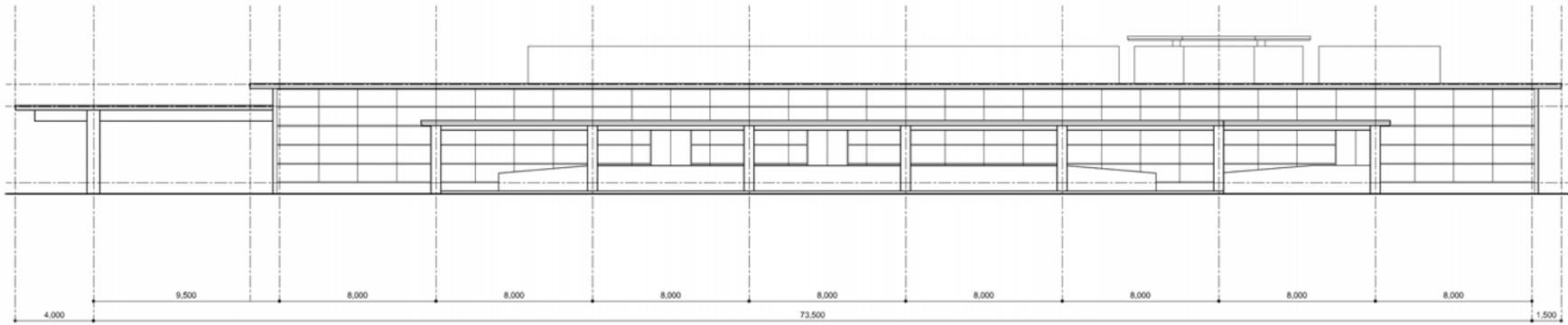
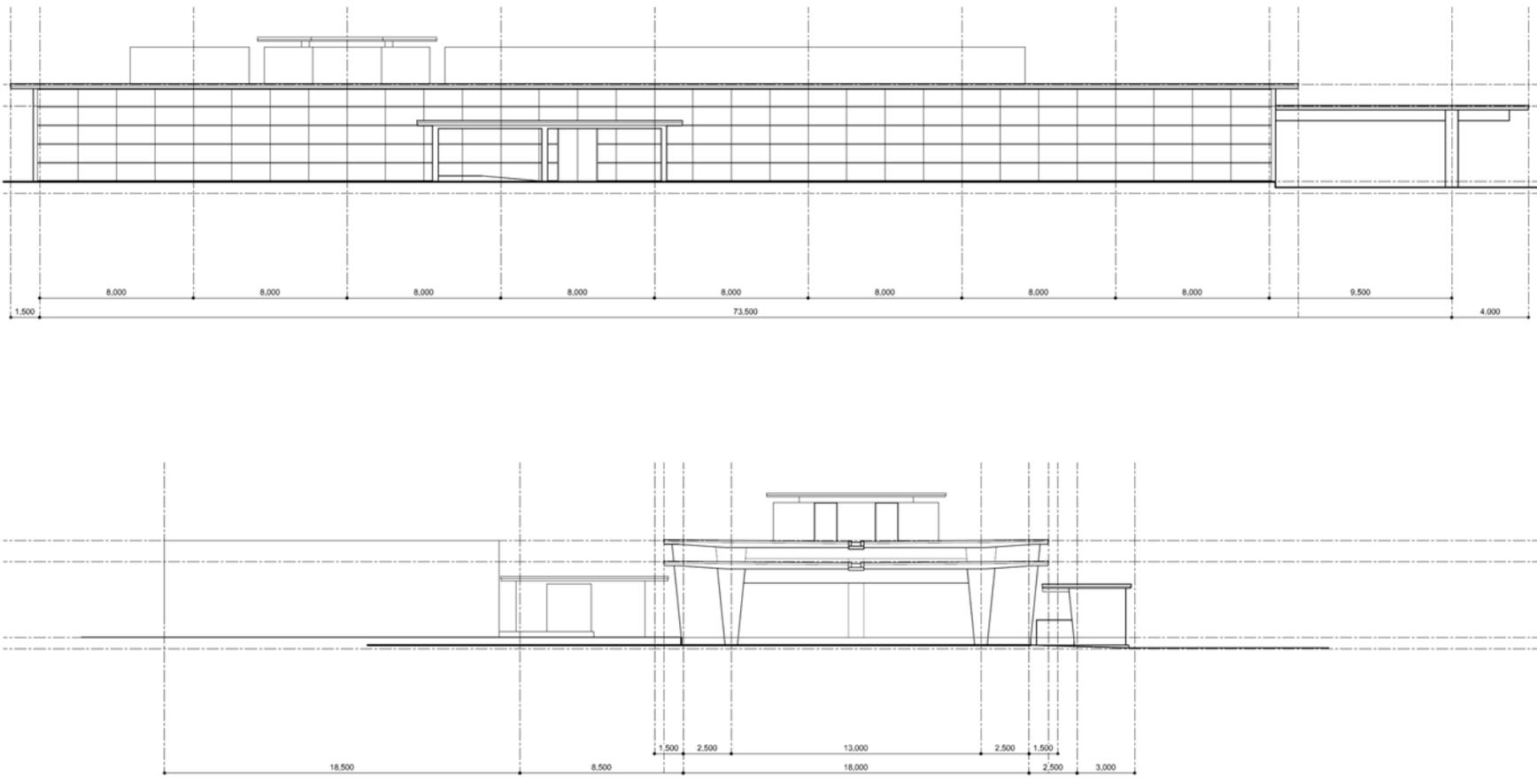


Figure 23 International Departure Wing Layout

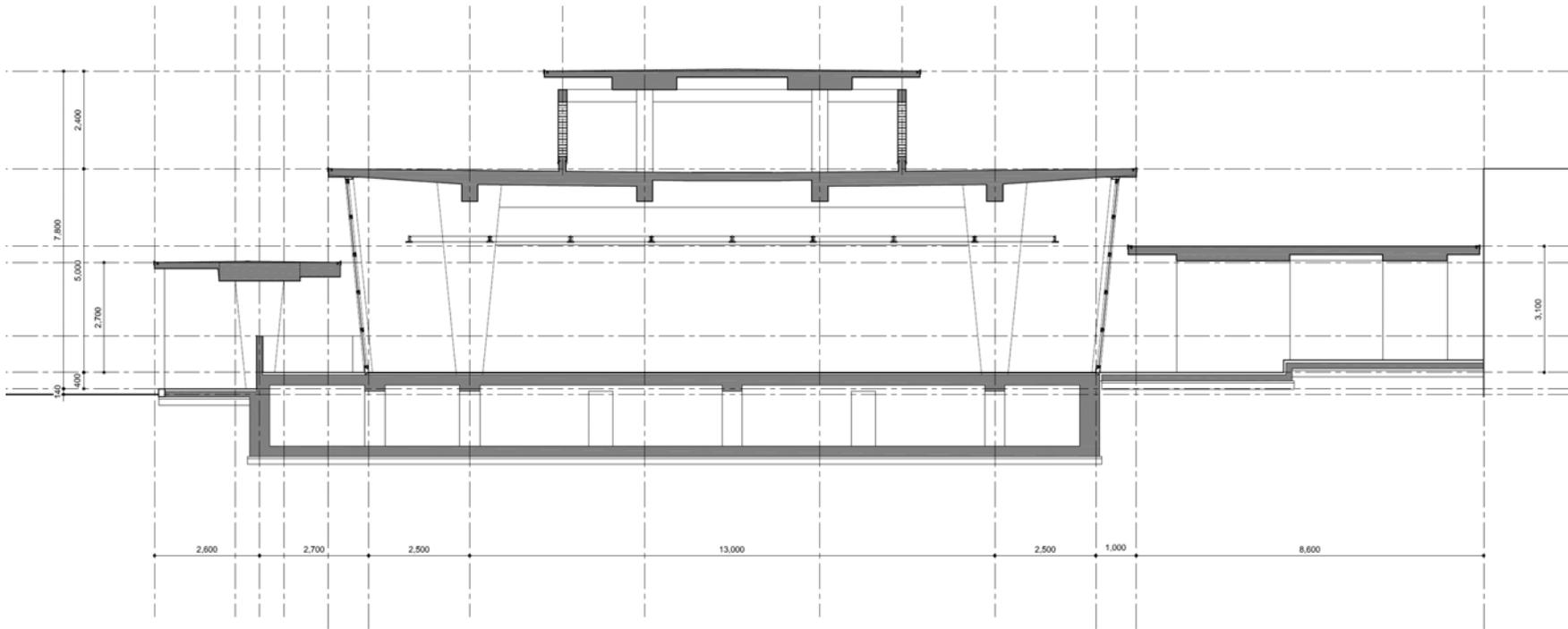




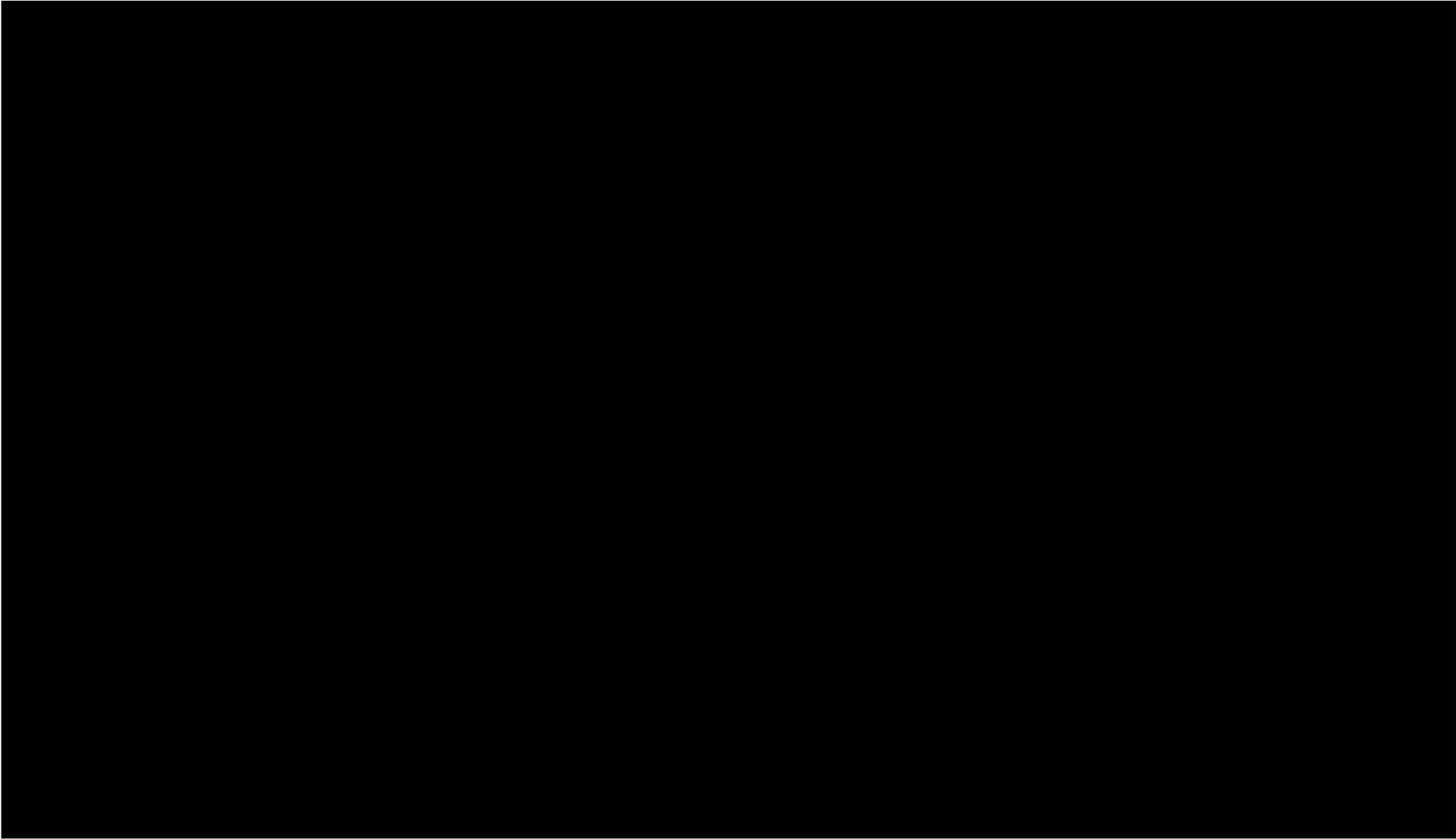
**Figure 25 International Departure Wing Elevation (North and West)**



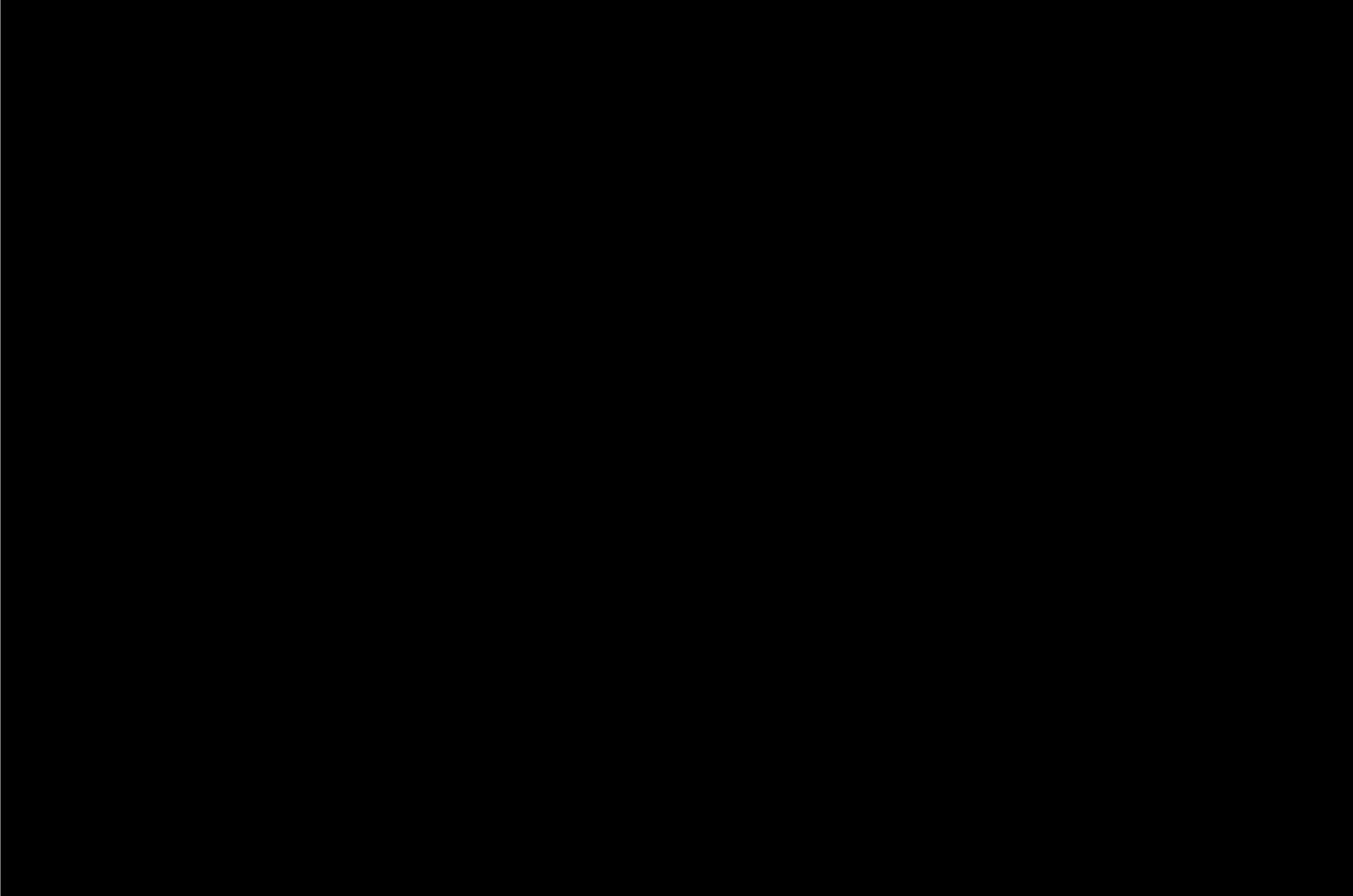
**Figure 26 International Arrival Wing Elevation (South and East)**

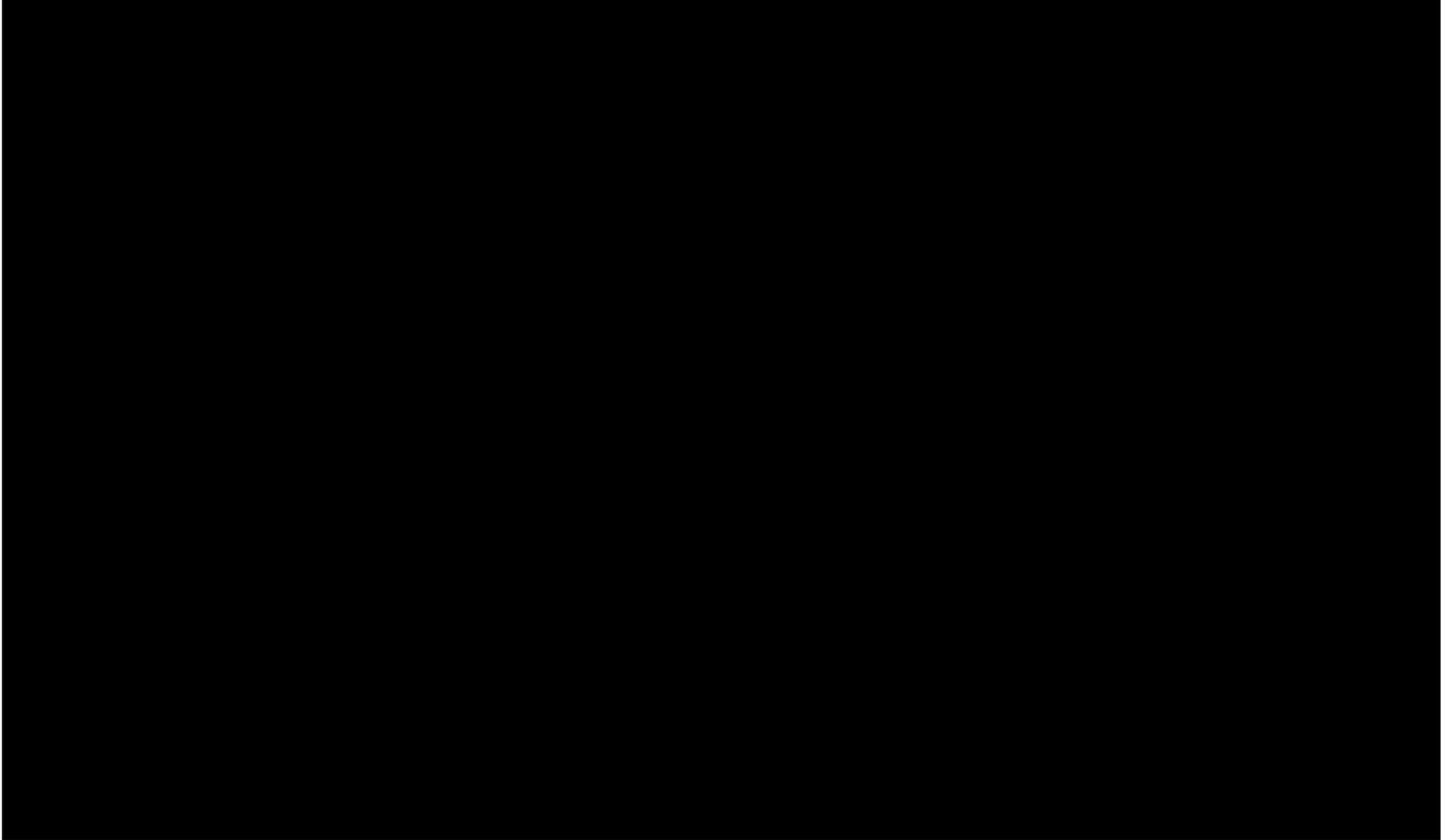


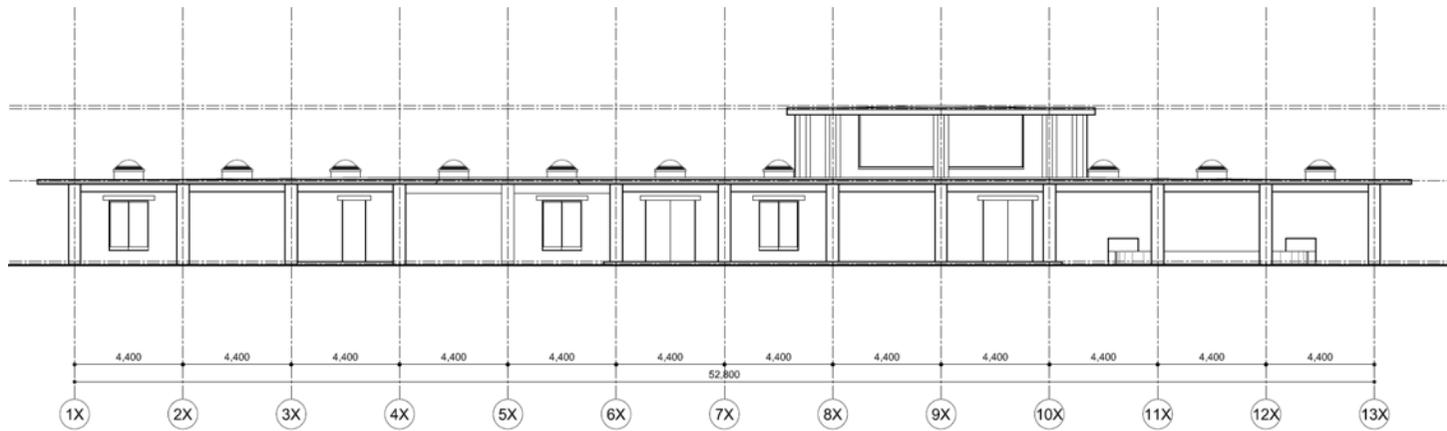
**Figure 27 International Departure Wing Section**



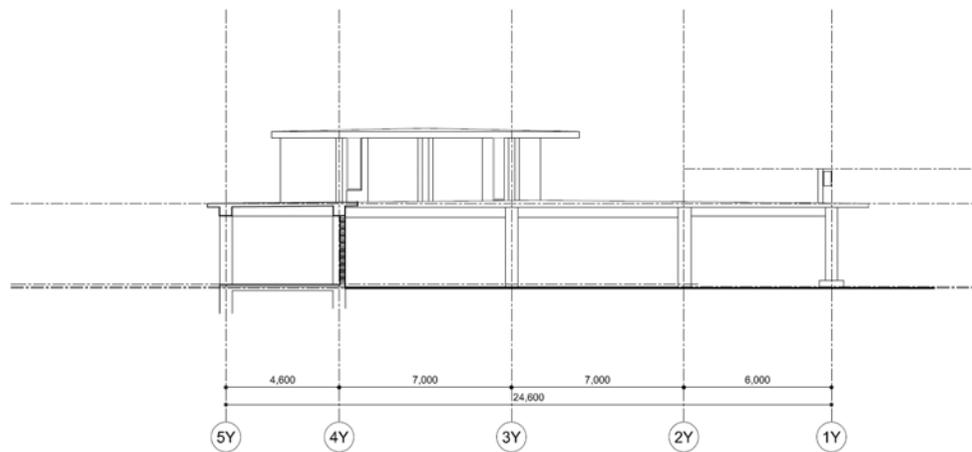






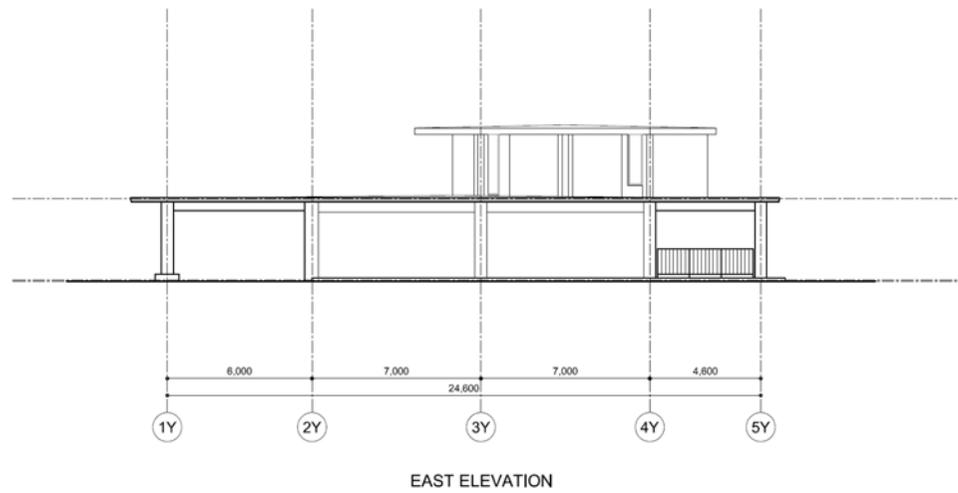
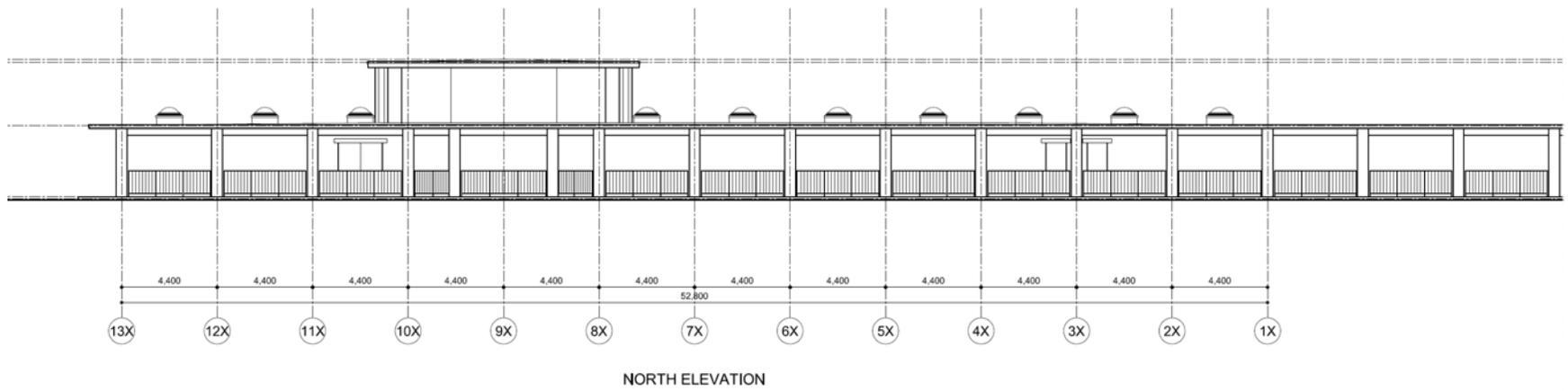


SOUTH ELEVATION

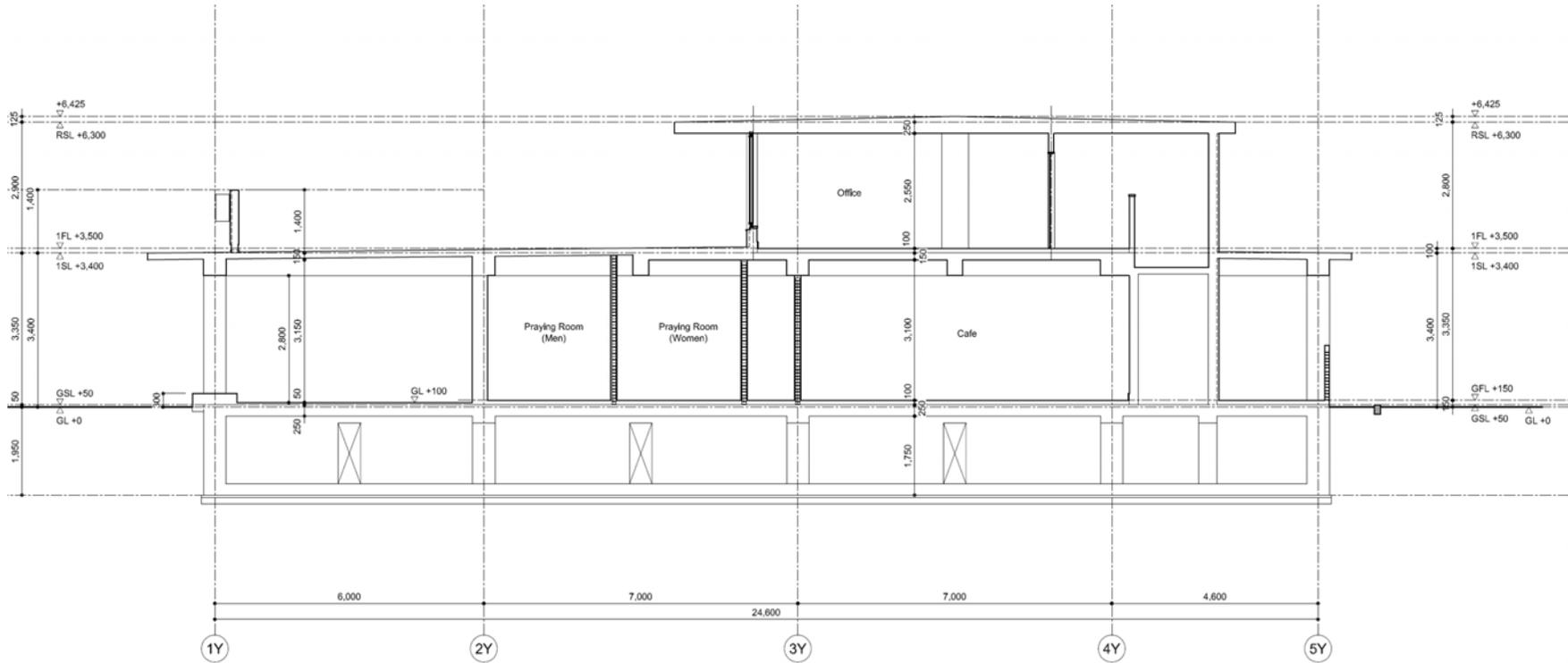


WEST ELEVATION

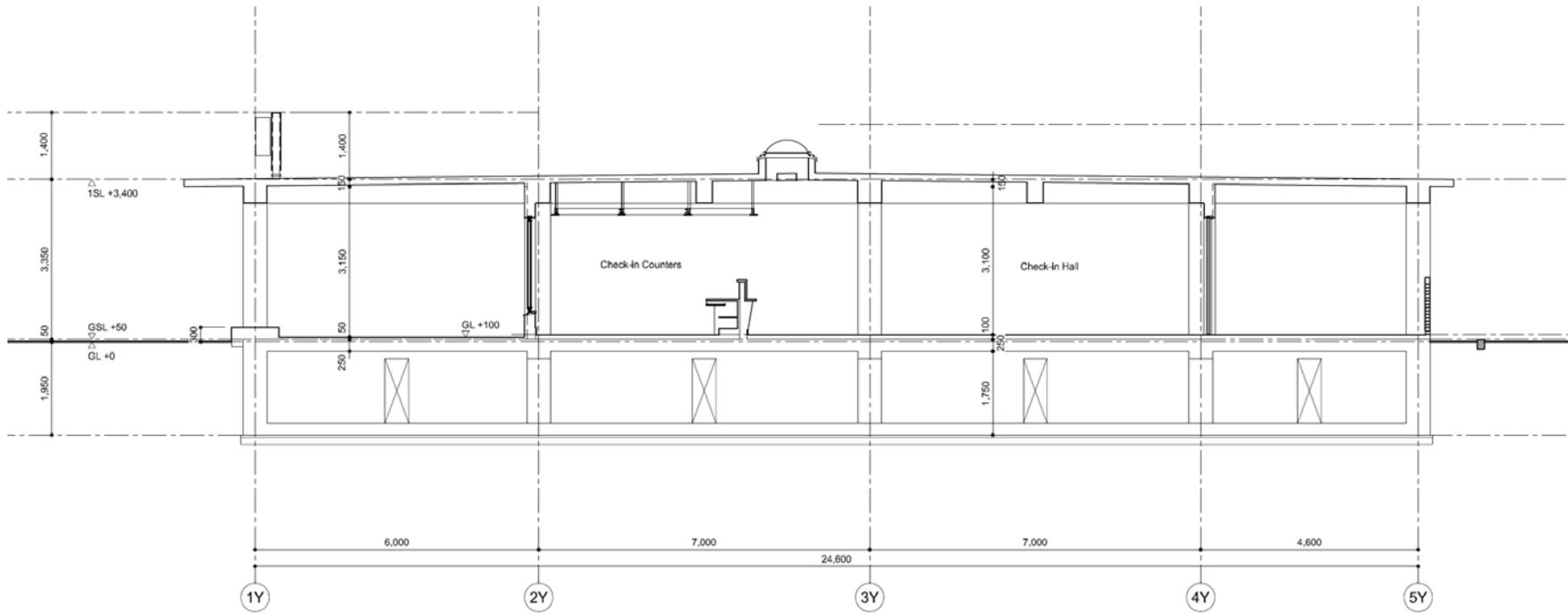
**Figure 32 Domestic Passenger Building Elevation (South and West)**



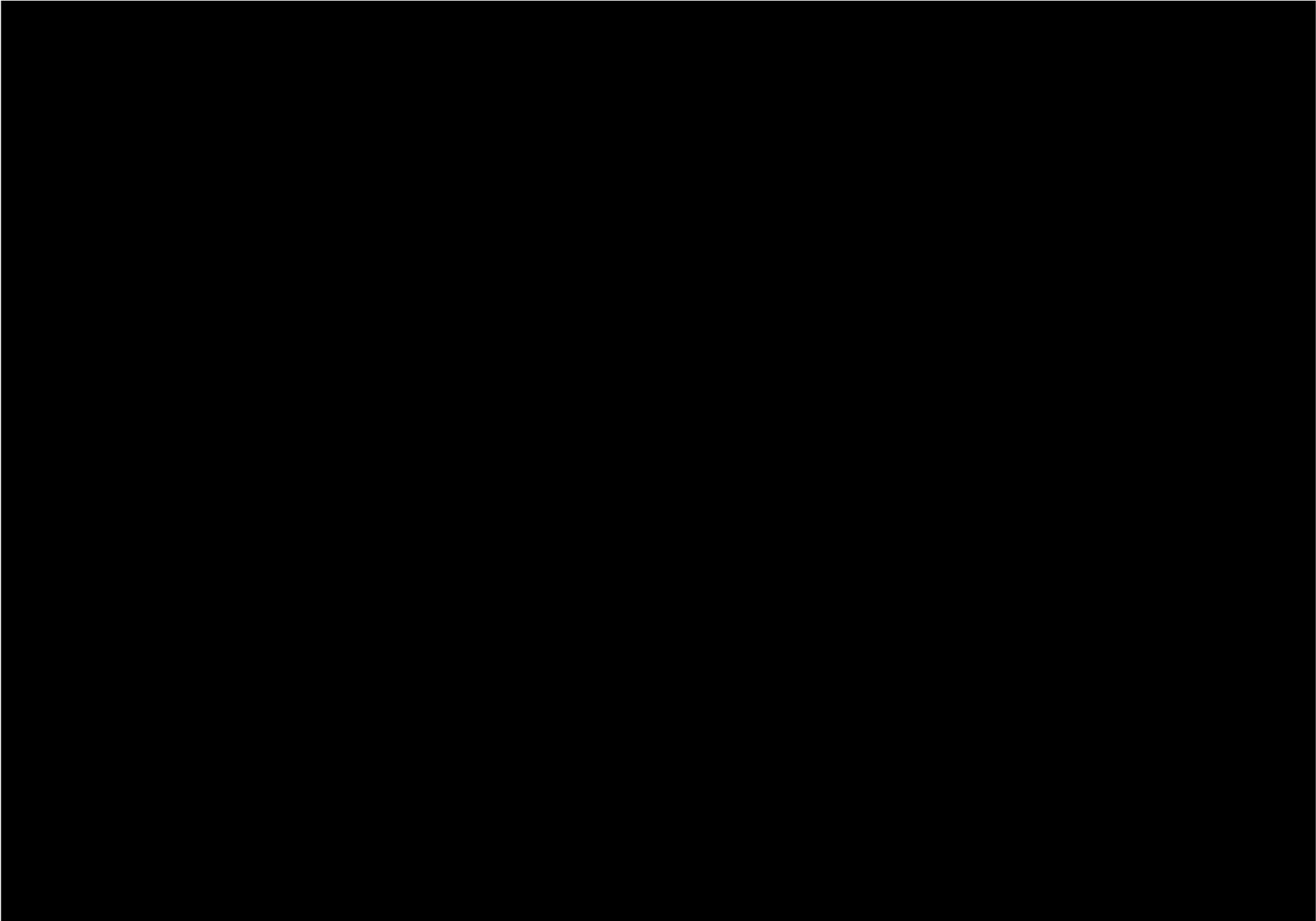
**Figure 33 Domestic Passenger Building Elevation (North and East)**



**Figure 34 Domestic Passenger Building Section**



**Figure 35 Domestic Passenger Building Section**



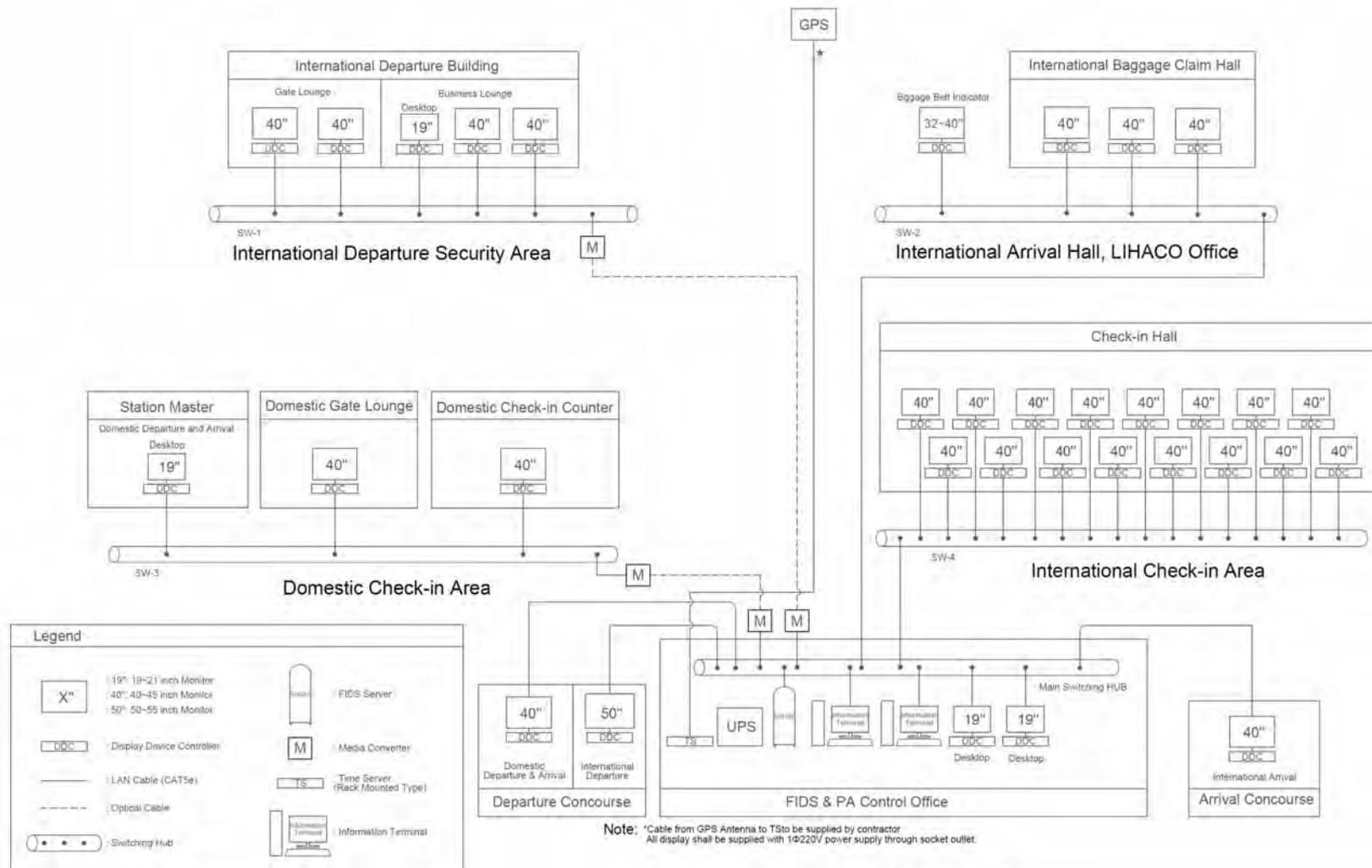


Figure 37 Diagram of FIDS

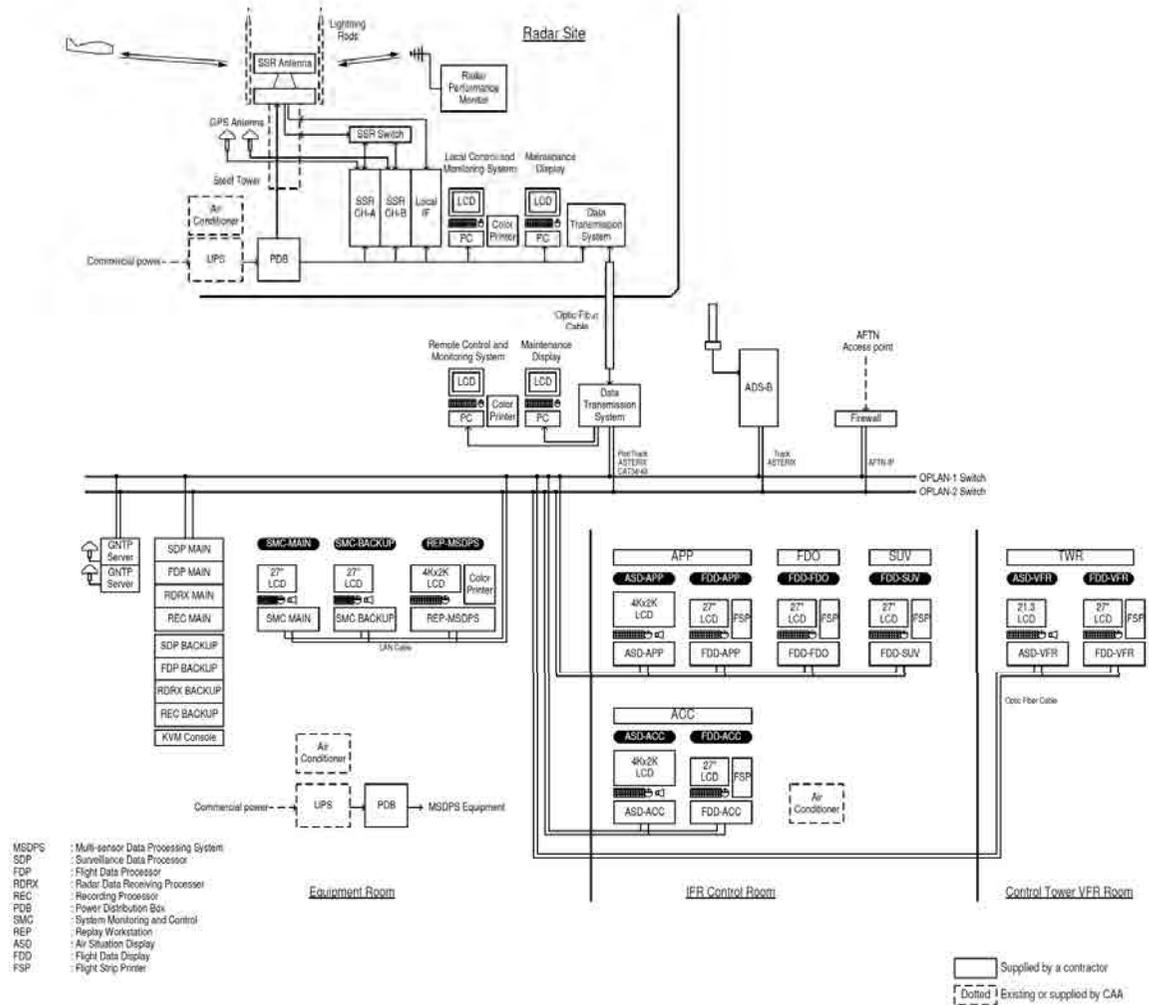
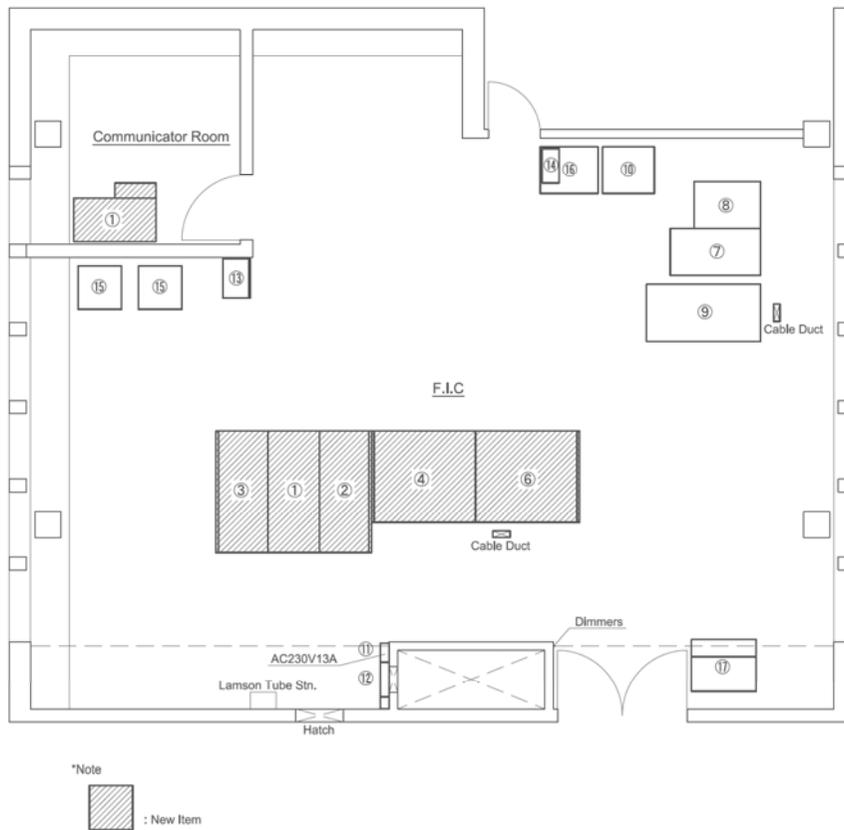


Figure 38 Diagram of Aircraft Surveillance System



**F.I.C.**

Ident. No.	Description	Remark
	F.I.C Console No.1 (Radar)	
①	New Radar Controller Display Console (Deds)	
②	New Radar Controller's Console	
③	New Radar Assistant Console	
	F.I.C Console No.2 (Area)	
④	New Area Assistant Console	
⑤		
⑥	New Area Controller Console	
⑦	Computer	
⑧	Data Acquisition System	
⑨	ATC Display for Maintenance (Deds)	
⑩	Typewriter	
⑪	Power Distribution Board	Wall Mount
⑫	Power Distribution Board	
⑬	Remote Control Equipment	
⑭	Paper Type Reader	
⑮	Teleprinter	
⑯	Desk	
⑰	Broadcasting Console	

**Communicator Room**

Ident. No.	Description	Remark
①	Communicator Console	

**Figure 39 Layout of Aircraft Surveillance System Equipment**

## 2-2-4 Installation and Procurement Plan

### 2-2-4-1 Implementation Policy

This Project will be implemented upon the signing of the Exchange of Notes (E/N) between the Government of Japan and the Government of the Republic of Malawi after being reviewed by the related governmental agencies of Japan based on this survey and approved by the Japanese Cabinet. During the implementation stage of this Project, Department of Civil Aviation (DCA), which is the implementing agency in Malawi, will conclude contract with Japanese Consultants for the detailed design and construction supervision and contract for construction with Japanese Contractors, respectively. Verifications by JICA must be obtained for these contracts.

This project will be carried out in accordance with the following guidelines of the Japanese Grant Aid Scheme:

- To help create employment opportunities, enhance technical transfer, and activate the local economy, materials, labors and contractors will be procured locally wherever possible.
- Since local contractors usually lack highly skilled technicians/engineers and veteran workers, Japanese Contractors will dispatch engineers, and if necessary technicians, with expertise from Japan or third countries in order to train the local workers.
- In order to facilitate a smooth implementation of the Project, a communication and coordination organization will be established, consisting of representatives of the Malawian Government, Consultants and Contractors.

### 2-2-4-2 Implementation Conditions

The following issues need to be considered to facilitate the implementation of the Project.

#### (1) Safety Procedures

Since this Project mainly involves construction work within the vicinity of an operational airport, taking adequate measures to secure operational safety during construction work is crucial.

#### (2) Communication with the airport operation organization

As the work will take place in an operational airport, the airport's operation rules must be followed. The contractor should carry out safety confirmation measures thoroughly on a daily basis, i.e. during explanation of the construction before the work and after the work. The contractor should also control the entrance permission properly. In addition, as it can be easily predicted that emergencies and schedule changes could occur frequently, the contractor should secure a system in which the airport operation organization and the contractor can communicate by transceivers at all times during the construction period.

(3) Consultation and coordination with airport operation

The Project team will discuss and coordinate with the airport operation organizations and other relevant entities involved on the construction schedule, replacement of protection signs and fences, nighttime lights in order to minimize the impact on airport operations.

(4) Construction office, stock yards and work area

The construction site office for contractors and constructors, stock yards and work area will be constructed in the empty lot next to the School of Aviation, located in the east side of KIA.

(5) Environmental Measures

In order to minimize the adverse impact of environmental pollution, environmental measures for construction of temporary yard, construction techniques and other components of the Project need to be considered based on thorough discussion with the airport operation organization. Measures to protect against dust during site work and sewage treatment at the temporary yard are especially important and should require basic approval.

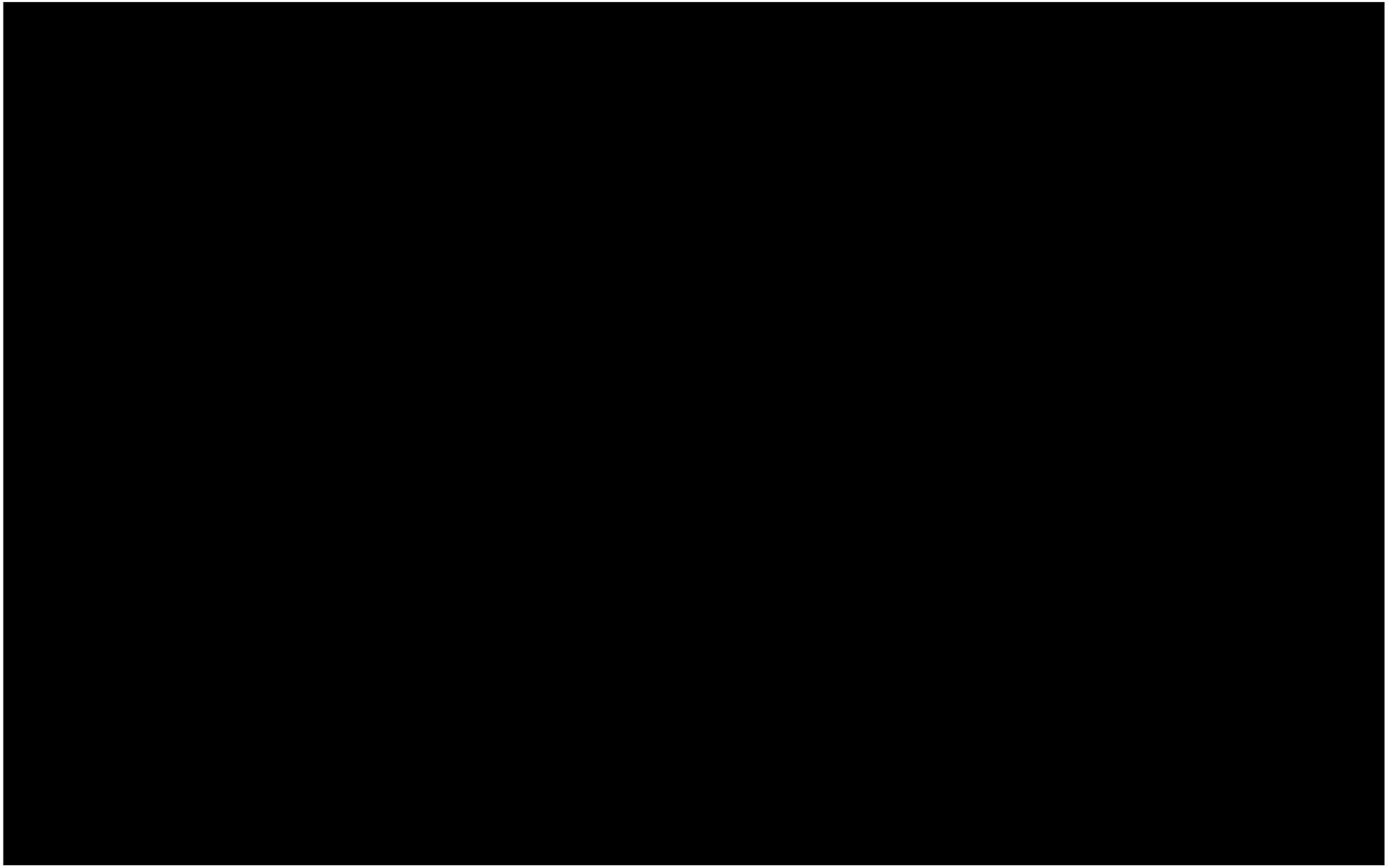
(6) Construction Schedule

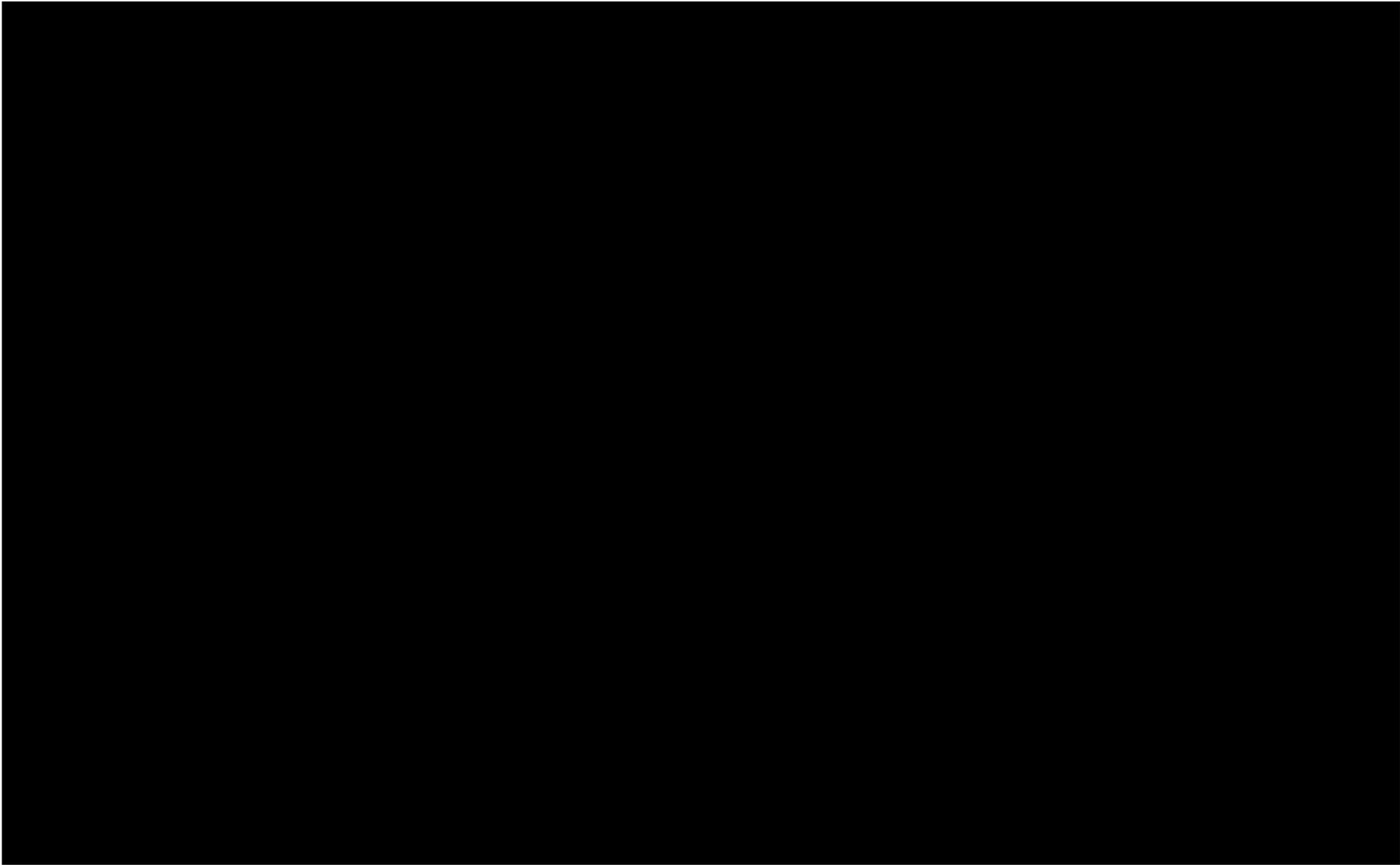
This Project could be divided into two major components, which are the expansion and the rehabilitation of Passenger Terminal Buildings. The descriptions of the buildings to be expanded/rehabilitated are outlined below. Since rehabilitation and expansion works will be carried out in the operation area of the passenger terminals, the construction plan was designed in consideration of securing passenger flows without undermining the capacity of the passenger terminal facilities.

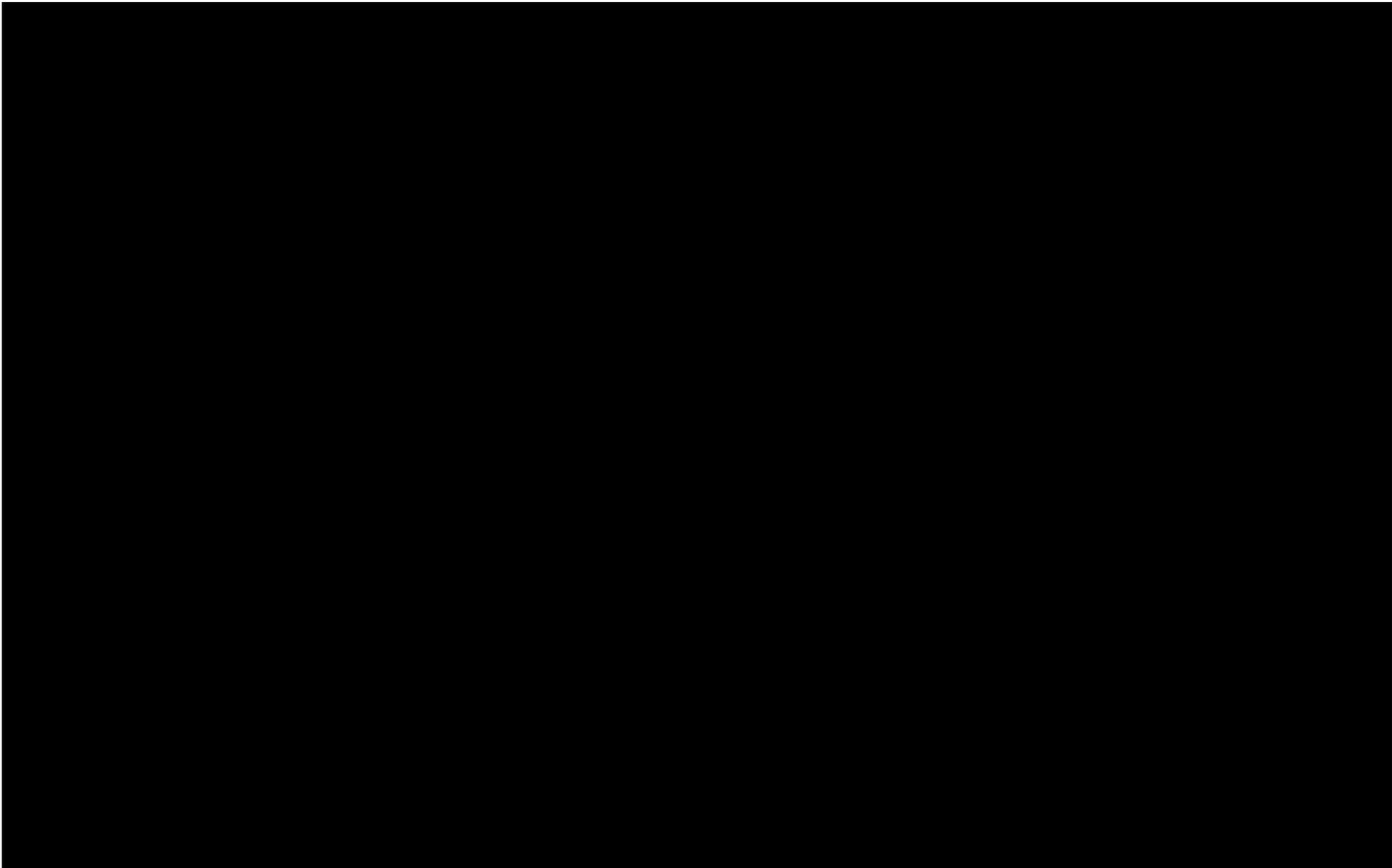
The expansion work involves construction of the new International Passenger Terminal Building Arrival Wing, International Passenger Terminal Building Departure Wing, and Domestic Passengers Terminal Building. The rehabilitation work mainly involves renovation and improvement of international flight check-in halls and immigration after the primary functions are shifted to the newly constructed terminal buildings. The rehabilitation work will commence after the completion and handover of the expansion work.

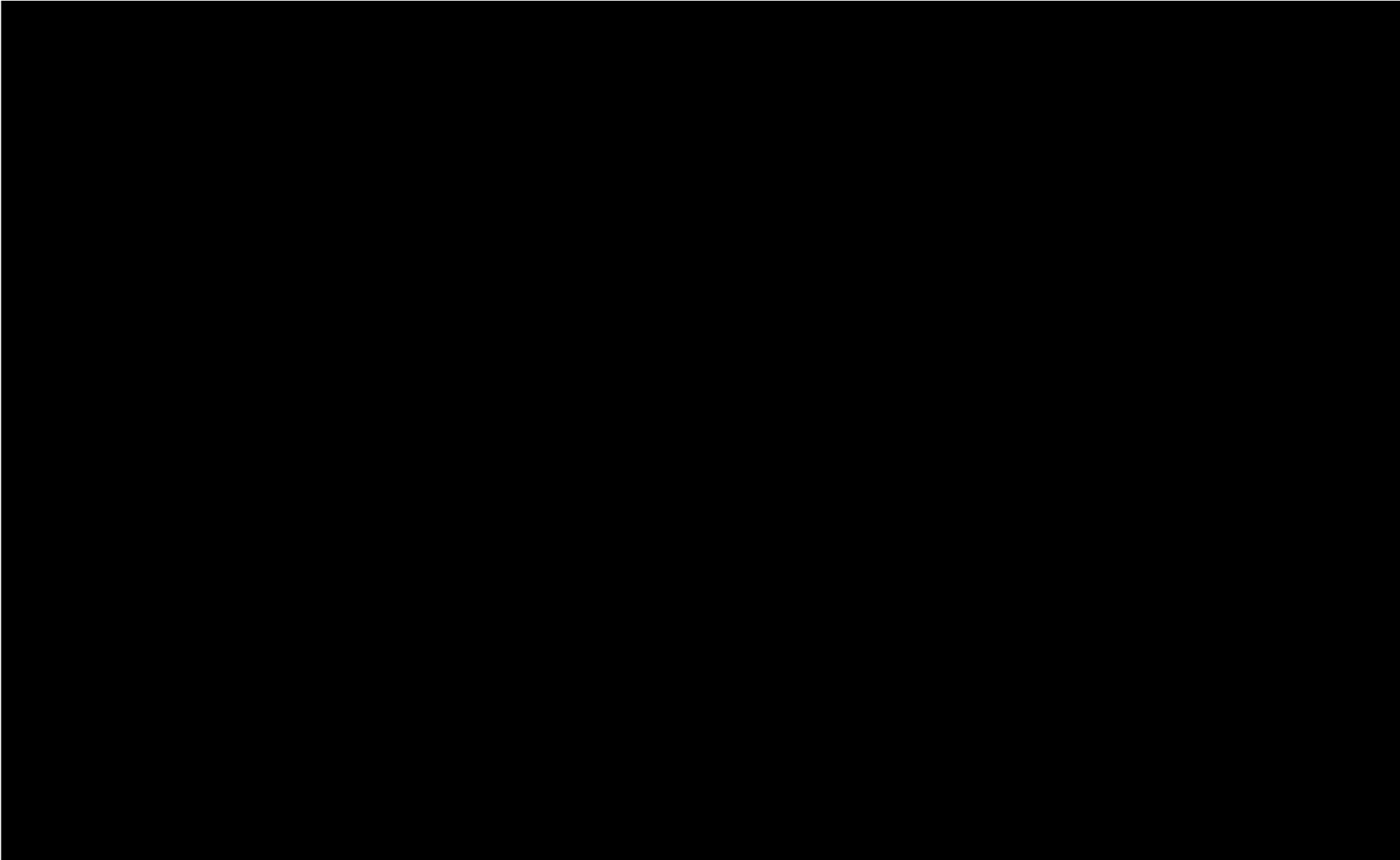
To facilitate an earlier start of expansion work, some parts/components of the expansion work, which do not have much impact on airport operations, such as construction/installation of toilets, will be carried out simultaneously with the rehabilitation work.

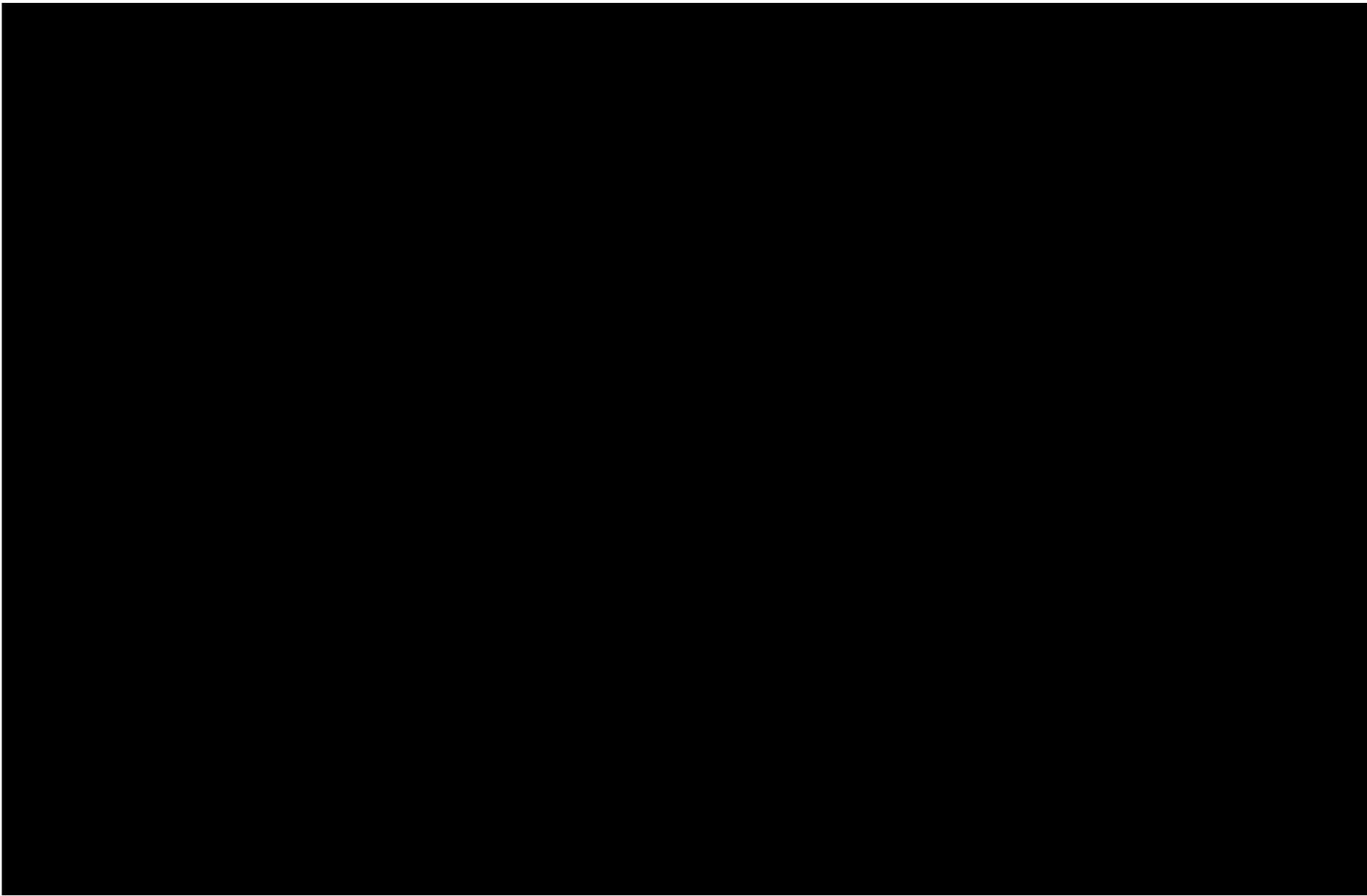
The construction schedule is as follows.



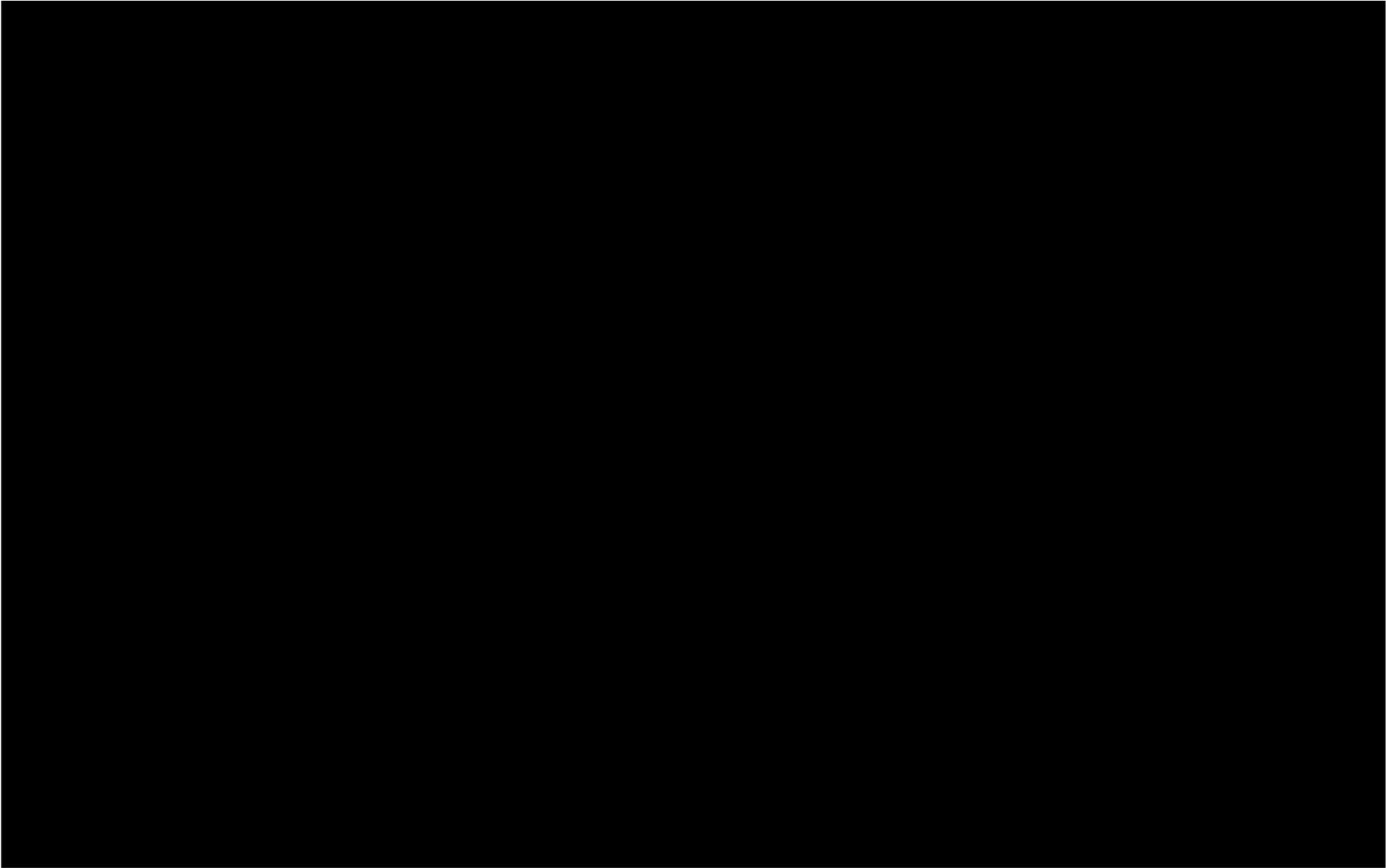




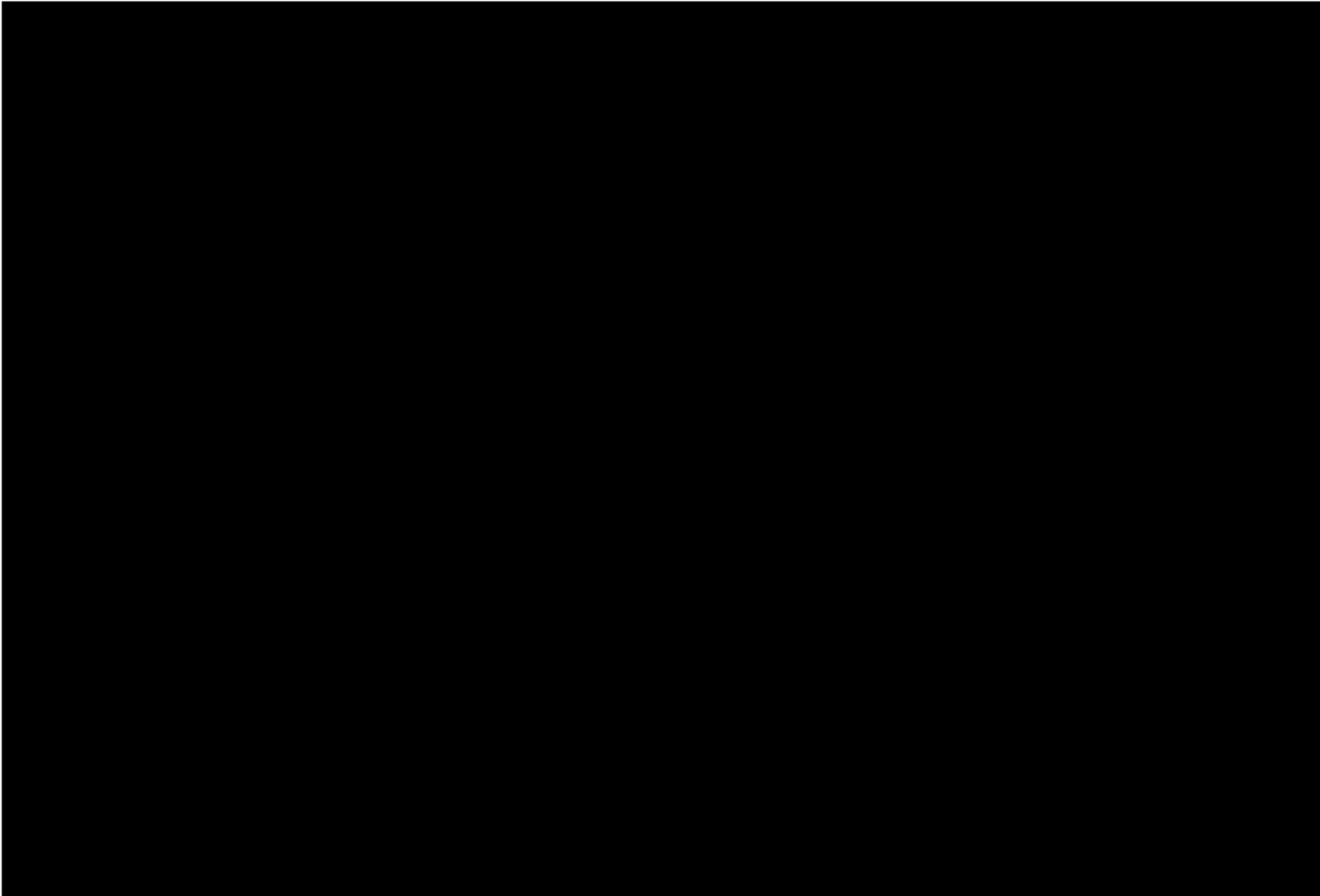












2-2-4-3 Scope of Works

The respective scope of work by the Malawian and the Japanese Governments regarding the Project implementation is as follows:

- Japanese Government: Expansion and rehabilitation of the Passenger Terminal Building;  
Procurement and installation of special equipment associated with the above work;  
Procurement and installation of aircraft surveillance system.
- Malawian Government: Securing land for the project site (removal of pavement and lighting tower, cleaning of radar control room, provision of installation location for radar equipment);  
Relocation of underground piping (fire cabinet and drainage);  
Removal of the existing shops in the renovation area and materials, such as furniture in related areas;  
Flight verification of radar.

Respective undertakings of the Japanese and Malawian sides for the equipment maintenance under this Project are as follows.

**Table 27 Undertakings of Japanese and Malawian Sides**

Items	Undertakings	Japan	Malawi
Common	Banking Arrangement (B/A), Authorization to Pay (A/P) procedures		○
	Tax exemption measures, customs duties, internal taxes and other fiscal levies		○
	Acquisition of import permit		○
	Acquisition of installation permit for X-ray-using device		○
	Procurement of equipment	○	
	Shipping and packing the equipment	○	
	Installation, tuning and trial operation of the equipment	○	
	Guidance on initial operations and maintenance	○	

2-2-4-4 Consultation Supervision

The design and procurement supervision works to be provided by the Consultants under this Project are divided into: 1) detailed design, and 2) procurement supervision. The required man-months for each supervision and work details are described below.

(1) Detailed Design

Final Confirmation of the Contents of the Project (in Malawi)

A total of six personnel will be dispatched to Malawi for the final confirmation of the contents of the Project, i.e. the Chief Consultant (No.2), Architect 1 (No.3), Facility Designer 1 (No.3), Electrical Designer (No.3), Special Equipment Manager (No.3), and Cost Estimator (No.4).

In addition, one Equipment Planner 3 (No.4), will be dispatched for the final confirmation of the equipment plan.

#### Review of Detailed Design and Equipment Specifications (in Japan)

Detailed design will be carried out by a total of personnel, i.e. the Chief Consultant (No.2), Architect 1 (No.3), Architect 2 (No.3), Architect 3 (No.4), Structural Designer (No.3), Facility Designer 1 (No.3), Facility Designer 2 (No.4), Electrical Designer 1 (No.3), Electrical Designer 2 (No.4), Special Equipment Manager (No.3), and Cost Estimator (No.4).

Specifications of the equipment will be reviewed in Japan by Equipment Planner 1 (No.3), Equipment Planner 2 (No.3) and Equipment Planner 3 (No.4).

#### Preparation of Tender Documents (in Japan)

Tender documents will be prepared in Japan in which six personnel will be required, i.e. the Chief Consultant (No.2), Architect 1 (No.3), Facility Designer 1 (No.3), Electrical Designer 1 (No.3), Special Equipment Manager (No.3), and Tender/Contract (No.4). In addition, tender documents for the equipment will be prepared by the Equipment Planner 1 (No.3) and Equipment Planner 2 (No.3).

#### Approval of Tender Documents (in Malawi)

The Chief Consultant (No.2) and Architect 1 (No.3) will be dispatched to Malawi in order to obtain approval of the tender documents for the construction work. For the approval of the tender documents for the equipment, Equipment Planner 1 (No.3) and Equipment Planner 2 (No.3) will be dispatched to Malawi.

#### Official Announcement of Tender, Distribution of Drawings, and Briefing (in Japan)

Two personnel will be required to undertake official announcement of tender and distribution of drawings and briefing, i.e. the Chief Consultant (No.2), the Architect 1 (No.3), and Tender/Contract (No.4). In addition, for the equipment tender procedures, Equipment Planner 1 (No.3) will be assigned.

#### Tender and Tender Evaluation (in Malawi)

The Chief Consultant (No.2) and the Architect 1 (No.3) will be dispatched to Malawi for tender and tender evaluation, whereas for the equipment, the Equipment Planner 1 (No.3) will be dispatched to Malawi.

## (2) Construction and Procurement Supervision

### 1) Construction Supervision

A Japanese resident supervisor will stay in Malawi throughout the project period and supervise the construction and implementation of the project. The main tasks of work are as follows.

- Management of the process, quality, budget of the construction work.
- Meetings with the Malawian executing agency, coordinating with other relevant parties involved
- Monthly report to the owner of this Project or the executing agency, JICA Malawi and Japanese Embassy
- Confirmation of the implementation of Safety Measures

The main tasks of Supervisory Engineer are communication and coordination with the Government of Malawi, coordination with DCA/contractors, having meetings with the airport operating agency/ADL and airline companies. In addition, as from other projects, it is expected that the Supervisory Engineer will be requested to attend important meetings and ceremonies during the project. Therefore, the Supervisory Engineer must visit Malawi several times during the Project, i.e. beginning and mid-term of the construction work and twice for the completion inspection.

Resident Supervisor is expected to have not only sufficient background in construction work, but also broad knowledge on airport management. In addition, since there will be three new buildings constructed simultaneously, No. 3 rated engineer will be assigned throughout the Project period.

Besides the complex nature of airport construction, further safety measures are required since this construction will be carried out while the existing airport is under operation. Therefore, all Japanese engineers allocated in each field of expertise will be rated No. 3 and local engineers will be hired as assistants to each Japanese engineer.

During the construction supervision period, seven personnel will be dispatched to Malawi, i.e. Supervisory Engineer (No. 2), Resident Supervisor (No. 3), Architect (No.3), Structural Designer (No. 3), Facility Designer (No. 3), Electrical Planner (No. 3) , Special Equipment Manager (No. 3).

### 2) Procurement Supervision

Procurement supervision of equipment includes the following tasks/work.

#### Verification/Approval of Shop Drawings, Collation Inspection (in Japan)

Equipment Inspection Engineer 1 (No. 4) and Equipment Inspection Engineer 2 (No. 4) will

carry out the collation inspections of the shop drawings submitted by the manufacturers in Japan.

Attendance to Factory Inspection (in Japan)

Before shipment, Equipment Inspection Engineer 1 (No. 4) and Equipment Inspection Engineer 2 (No. 4) will verify and collate the quantity, appearance, and specifications of the equipment at the sites in Japan specified by the manufacturers.

Pre-shipment Inspection (in Japan)

Equipment Inspection Engineer 1 (No. 4) and Equipment Inspection Engineer 2 (No. 4) will carry out the pre-shipment inspection in Japan, which consists of communication, coordination, and verification of the inspection report.

Local Procurement Supervision (in Malawi)

Procurement Supervisor 1 (No. 3) and Procurement Supervisor 2 (No. 3) will be dispatched to Malawi from the time of unpacking and loading, installation of the equipment to the site, until the completion of the supervision of initial guidance on operations and maintenance, and the acceptance inspection.

Acceptance Inspection/Handover (in Malawi)

Procurement Supervisor 1 (No. 3) will be dispatched to Malawi for the final stages of the acceptance inspection, handover and other related activities.

Final Inspection before the Expiration of the Defect Liability Period

Procurement Supervisor 1 (No. 3) will be dispatched to Malawi shortly before the expiration of the defect liability period for grant aid (hereinafter called “defect liability period”).

2-2-4-5 Quality Control Plan

Table 28 shows the items, ways/methods, frequency/timing, etc. of the main tests to be performed for quality control of the materials/implementation of this Project.

**Table 28 Items for Quality Control (Facility)**

Items		Testing Method	Frequency
<b>(1) Concrete Work</b>			
Cement	Conformity with standard	Cement mill sheet	Monthly
Aggregate	Type and maximum size	Visual inspection	Every emplacement
	Particle size, specific gravity, water absorption, water contents	Test at laboratory	Before mix design
Site mix	Slump	Test on site	Every placement
	Air content	Test on site	Every placement
	Compressive strength	Test on site	Every 150m <sup>3</sup>
<b>(2) Reinforcement work</b>			
Materials	Conformity with standard, material strength	Check mill sheet, metal tag, and rolling mark	Every type and lot
Bar arrangement inspection	Accuracy of dimension	Visual inspection, scale measurement	During and after assembling
<b>(3) Steel-frame work</b>			
Materials	Conformity with standard, material strength	Check mill sheet and stamp	Every type and lot
Product inspection	Accuracy of dimension	Visual inspection, scale measurement	After completion of product
High-strength bolt	Tightening force test	Turn of nut method, visual and marking check	All high strength bolts
<b>(4) Masonry</b>			
Accuracy	---	By transit and auto level, etc.	---
<b>(5) Waterproofing work</b>			
Waterproof material	Conformity with standard	Visual check, conformity with JIS, JASS	Every placement
Waterproof performance	Leak test by filling water	Check of water after 48-hour leak test	Every block upon completion of waterproof work
<b>(6) Metal work</b>			
Materials	Conformity with standard	Conformity with JIS	Every placement
	Check thickness and material	Visual Inspection, factory records inspection	Every placement
<b>(7) Finishing work</b>			
Finishing materials	Conformity of approved drawing	Visual check and scale measurement, conformity of drawings	As necessary
<b>(8) Equipment</b>			
Water pipe	Water pressure test	Pressure gage	Every construction area
Drainage pipe	Leak test by filling water	Visual inspection	Every construction area
Air ventilation duct	Material and assembly condition	Visual inspection and scale measure	Every construction area
Air ventilation equipment	Setup condition	Comparison with manual	After assembly
Special equipment	Setup/assembly condition	Comparison with manual	After assembly
<b>(9) Electrical work</b>			
Electrical cable	Insulation test	Insulation resistance and pressure resistance testers	Before turning off electricity
Power transformer/trans	Pressure test	Pressure resistance tester	Before turning off electricity
Lighting equipment	Insulation test, illuminometer test	Insulation resistance tester and illuminometer	Before turning off electricity after installing lighting

Furthermore, consultants shall take note of the following items in performing/conducting quality control for equipment of this Project.

**Table 29 Items for Quality Control (Equipment)**

Items	Contents
Collation of Equipment specification and related documents	Consultants shall ensure that equipment specifications are consistent with the description in the catalogue, which was attached to the tender documents, and confirm the shop drawing.
Factory Inspection	Consultants shall collate the content of the specification and the quantities indicated in the specification and test operation of the equipment.
Pre-shipment Inspection	The Consultants shall be present at the pre-shipment inspection by the third party and collate the contents of the equipment specification, which includes quantity and shipping documents. The Consultants shall also check the equipment before packing for any flaw or defect as well as the conditions of packaging.
Incidental work	The Consultants shall supervise and monitor the work procedures in the factories, the use of equipment and schedule in order to ensure that the work will be carried out without any delay due to accidents.
Tuning/trial operation of equipment	The Consultants shall detect flaws before handover and identify issues, which need to be reflected and incorporated in the guidance on initial operations and maintenance. The Consultants shall also be present during the guidance to respond and correct the defects found in manuals and other documents

#### 2-2-4-6 Procurement Plan

##### (1) Procurement Plan for Construction Materials

The following equipment and materials shall be procured from Japan or a third Country.

**Table 30 Procurement Plan**

Material	Reasons for procurement
Steel	Local steel manufacture can only process simple steel and cannot fulfill the required accuracy and quality. Therefore, they will be procured from Japan like other local projects.
Fittings	Locally available steel sash and fittings cannot meet material quality and production accuracy and the quantity available is also limited. In addition, it is most likely that those fittings procured from Southeast Asia and other third countries will not conform to locally required materials. Therefore, Japanese products will be procured.
Finishing Units	Only finishing units for houses are available in Malawi. Considering its durability suitable for such public building, Japanese products will be procured.
Furniture	Since production quantity is limited in Malawi, furniture will be procured from Japan.
Electrical Equipment and Material	Due to the limited variety and low quality, electrical equipment and materials will be procured from Japan.
Sanitary Fixtures	Since durability of and their available quantity are limited in Malawi, sanitary fixtures will be procured from Japan.
Special Equipment	Since BHS is not available in Malawi, special equipment will be procured from third countries, which ensure maintenance services abroad.

##### (2) Procurement Plan for Equipment

The table 31 summarizes the countries from which the materials and equipment will be

procured.

**Table 31 Procurement Plan of Material and Equipment**

Equipment	Source Country			Remarks
	Malawi	Japan	Third Country	
[REDACTED]			■	[REDACTED]
[REDACTED]			■	[REDACTED]
[REDACTED]			■	[REDACTED]
[REDACTED]			■	[REDACTED]
1-5 Slab Scissor Lift		○		
2-1 Aircraft Surveillance System		○		

(3) Transportation Method

Since Malawi is a land-locked country, the equipment procured will be first shipped and discharged at the ports of neighboring countries and then transported by road. Such prospective ports include Durban in South Africa, Beira in Mozambique, Dar es Salaam in Tanzania. However, after the field interviews, and having considered the road conditions, time required for shipping and transport, Port of Beira will be used for this Project.

The equipment procured from Japan and Asian countries will be shipped through the Indian Ocean and those from European countries will be shipped via the Mediterranean Sea and the Suez Canal.

(4) Installation Plan

Among the equipment to be procured for this Project, portable metal detector and slab scissor lift require no construction work, while other equipment requires installation work as described below. Since ways of installation differs according to each manufacturers, the presumed installation work plan is shown in the table 32.

**Table 32 Equipment Installation Plan**

Equipment	Installation Methods
██	████████████████
██	████████████████
████████████████████████████████████	████████████████
████████████████████████████████	████
Slab Scissor Lift	None
Aircraft Surveillance System	Repainting the Radar Tower, assembly, installation and wiring

(5) Tuning and Trial Operation Plan

Engineers from the manufacturers will be dispatched for tuning/calibration and trial operations of all the equipment, assisted by local engineers. The period for such activities is expected to be six days for security equipment and forty-two days for the aircraft surveillance equipment.

2-2-4-7 Guidance on Initial Operations and Maintenance

Although most of the security equipment resemble those of which are currently in use, since the ways of handling each equipment may differ depending on manufacturers, guidance on initial operation and maintenance will be carried out by the engineers dispatched by the manufacturer. The expected period is expected to be approximately two days.

Since aircraft surveillance system will be introduced for the first time and due to its extremely high degree of expertise, fourteen days for operation and fourteen days for maintenance guidance are planned.

2-2-4-8 Soft Component Plan

No Soft Component is planned for this Project. Since capacity development concerning the introduction of the aircraft surveillance system will require approximately 1.5 to 2 years, technical cooperation for further assistance needs to be considered.

2-2-4-9 Project Implementation Schedule

The Project implementation schedule is shown in Table 33.

**Table 33 Project Implementation Schedule**

Item	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28							
Detailed Design	■	(Site Survey)																																	
	△						(Work in Japan)				Total 6.5 Months																								
Item	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28							
Construction and Procurement	Facility Construction	■	【Expansion】																																
		■	Preparatory/Temporary Work					Expansion Work										Test for Expansion Work/Handover																	
Construction and Procurement	Equipment Procurement	■	【Rehabilitation】					Rehabilitation										Test for Rehabilitation Work/Handover								Clearance				Total 24 Months					
		■	【Security/Maintenance Equipment】					(Product Approval)				(Manufacture)				(Transport)				(Manufacture)				(Transport)				(Installation)				(Test/Handover)			
Construction and Procurement	Equipment Procurement	■	【Aircraft Surveillance System】					(Product Approval)				(Manufacture)				(Transport)				(Manufacture)				(Transport)				(Installation)				(Installation/Tuning/Test)			

## 2-3 Obligations of the Recipient Country

To facilitate the Project, the Government of the recipient country shall fulfill the following undertakings.

### 2-3-1 General Matters

- To provide the necessary data and information to implement the Project;
- To secure land necessary for the Project;
- To open a bank account under the name of the Government of the recipient country in a bank in Japan and issue an Authorization to Pay (A/P);
- To ensure swift unloading of cargo, tax exemption and customs clearance;
- To allow entry and give residency for Japanese nationals under verified contracts;
- To exempt Japanese nationals and Japanese entities relevant to this Project from custom duties and other internal taxes under the Verified Contracts;
- To operate and use the facilities properly and effectively after completion of the Project. Organize a system to facilitate sound operation and prepare funds for appropriate operation and maintenance.
- To bear all expenses, other than those to be borne by the Grant Aid, within this Project.

### 2-3-2 Specific Matters

- To coordinate with organizations relevant to airport operation
- To issue various permits, such as entry permission, for construction work members.
- To maintain land for the expansion of the building, to manage sewer and drainpipes, to prepare flight control room, to secure enough space for installing radar equipment, to complete construction work, such as removal of existing shops and furniture and others;
- To acquire development permit;
- To obtain approval of EIA Report;
- To carry out flight check for the aircraft surveillance system.

## 2-4 Project Operations Plan

DCA is the executing agency of this Project. ADL operates and manages the passenger terminal buildings, other facilities and the land of KIA. Ground support operations such as transportation from the passenger terminal buildings to the aircrafts and loading of cargo onto the aircrafts are carried out by LIHACO, which is an affiliated company of DCA.

### 2-4-1 Operation and Maintenance of the Passenger Building

ADL, currently in charge of the operations and maintenance of the existing passenger terminal building, will also be responsible for the operation and maintenance of the new passenger terminal building. In addition, maintenance of the equipment to be procured and installed in the passenger terminal building, i.e. security system equipment such as checked baggage X-ray inspection system, cabin baggage X-ray inspection system, walk-through metal detector and slab scissor lift, will also be carried out by ADL. For proper maintenance of the equipment, engineers from the manufacturers will be dispatched at the time of installation to provide guidance on the initial operation and maintenance work.

Adequate housekeeping, maintenance services, inspection on a daily basis as well as repair and mending are important means to sustain good condition of buildings. Since ADL has been maintaining the existing airport in a fairly good condition, it is anticipated that ADL will be able to manage such required tasks for cleanup and inspections of the new building. However, due to the scale, i.e. 1.4 times the area of the current airport in which the total floor space will be enlarged from 12,000 m<sup>2</sup> to 17,000 m<sup>2</sup>, new staff for cleaning and service will be needed. Moreover, an increase in budget needs to be secured, since additional baggage claim belt and carry-on baggage X-ray inspection equipment will be installed.

Lighting equipment installed in the high ceilings of the existing terminal building has not been replaced since there is no service vehicles could reach such height in KIA. Such situation will be improved with the slab scissor lift that will be introduced through this Project.

### 2-4-2 Operation and Maintenance of the Aircraft Surveillance System

#### 2-4-2-1 Secondary Surveillance Radar

In general, air traffic control service is divide into three major services such as air route traffic control, approach control and aerodrome control. The secondary surveillance radar installed by the project is used for air route traffic control and approach control services.

#### (1) Training Plan for Air Traffic Controllers

Aerodrome control, approach control and air route traffic control services are provided for 24 hours in KIA. These services are provided with 3 shifts and 4 teams. It is necessary to keep at least 3 controllers in each team, total of 12 controllers in 4 teams should have radar rating to

provide stable radar control system. It is practical to conduct training for air traffic controllers to 6 controllers in 2 groups to avoid affection to the current services.

Training will be conducted in both overseas aviation training center and practical training in Malawi. Before approximately one and half years from operation of the radar, the first group, 6 air traffic controllers will be sent to the aviation training center with ICAO authorization. They will receive approximately 5 months intensive training for air route traffic control with radar and approach control with radar to receive radar rating. After the training, they will return to Malawi and receive simulation training with air traffic control training simulator, which was installed by on-going technical assistance project, and conduct test operation with the aircraft surveillance equipment by the project and it will be possible for the trained controllers to provide radar air traffic control in KIA.

It is necessary to provide training courses for air route traffic control by radar and approach radar control in Malawi Aviation School in order to conduct training for radar air traffic control service continuously.

The training for 6 controllers in the second groups will be trained in Malawi Aviation School by the training, implementation organization for the radar air traffic control service will be structured and also sustainable training of air traffic controller for the service will be possible.

## (2) Operation and Maintenance Plan

It is necessary to train maintenance staffs, as maintenance work is mandatory to operate the SSR. At least 4 maintenance staff for SSR, who holds the rating, will be necessary to provide maintenance service with 2 members in 4 teams with 3 shifts.

Training for maintenance of the radar was provided when the Japanese Government installed ASR, however all staffs who hold technic for maintenance of ASR were retired. Also, there is nobody in DCA who experienced maintenance of radar, trainings of theory, operation and maintenance of radar will be provided.

The training course for maintenance of radar equipment will be provided in order to train maintenance technicians continuously.

### 2-4-2-2 ADS-B

Only ADS-B cannot be used for air traffic control service because the equipment is just reference equipment for air traffic control, it is useful system to provide various aircraft operation when it is connected with SSR and used as expanded system of SSR.

## (1) Operation Plan

Because only ADS-B cannot be used for air traffic control service, there is no operation staff only for ADS-B and such operator of ADS-B is included in operation of SSR as ADS-B is supplement system to provide additional SSR information.

(2) Maintenance Plan

ADS-B system is a simple system as compared to the SSR, failure rate of the system is low. The failure is concentrated on connection systems such as connection between its antenna and equipment, and between equipment and SSR. It is practical to train the maintenance staff together with the training for SSR.

## 2-5 Project Cost Estimation

### 2-5-1 Initial Costs Estimation

The cost to be borne by the Malawian side is as follows.

**Table 34 Cost of the Malawian Side**

Items	Cost (Thousand Malawian Kwacha)
Clear land for expansion of the building	7,870
Manage fire hydrant and drainage	43,540
Prepare air traffic control room	1,970
Secure space for installing radar equipment	1,180
Flight check for the aircraft surveillance system	35,410
Bank commissions	7,870
Total	97,840

#### Cost Estimation Conditions

- (1) Time of estimation: October 2014
- (2) Exchange rate:  
1 USD = 104.83 Japanese Yen  
1 EURO = 139.25 Japanese Yen  
1 Malawian Kwacha = 0.266 Japanese Yen
- (3) Taxation: All equipment procured under this Project will be exempted from all taxes imposed in Malawi, such as custom duties, VAT, etc.

### 2-5-2 Operations and Maintenance Cost

Operation and maintenance cost of the passenger terminal building, special equipment, and aircraft surveillance system are shown in the table below. Total maintenance cost of the passenger terminal building and special equipment is 74,680 thousand Kwacha and this cost is borne by ADL. On the other hand maintenance cost of aircraft surveillance system, 2,540 thousand Kwacha will be borne by DCA.

ADL's annual budget for the equipment operation and maintenance in 2013 was 48.4 million Malawian Kwacha and it is necessary to increase the amount to approximately 1.5 times more. ADL's profit from airport operation in 2013 was 561 million Kwacha and the maintenance cost was approximately 8.6%. The growth rate of ADL's profit has been increased with average of approximately 18% for last 3 years and it will be expected to increase together with increase of air traffic volume. So that it is reasonably presumed that there is no problem to bear the increased maintenance cost.

On the other hand, expenditure of maintenance cost of DCA in 2014 was 2.824 million Kwacha

and approved budget was 6.333 million Kwacha. For maintenance of aircraft surveillance system, 2.540 million Kwacha will be necessary every year. Because there is enough reserve, 3.509 million Kwacha, between approved budget and actual expenditure, it is considered that DCA can secure the budget for maintenance.

**Table 35 Operations and Maintenance Cost**

Equipment	Annual Operation and Maintenance Cost (Thousand Malawian Kwacha)
Passenger Terminal Building	74,000
Special Equipment	680
Aircraft Surveillance System	2,540
Total	77,220

## Chapter 3 Project Evaluation

### 3-1 Preconditions

Preconditions for project implementation are, preparation of land for construction, which is necessary for expansion and rehabilitation of the passenger terminal, demolition of existing facilities and equipment, relocation of sewer and drainpipes, and removal of furniture in tenant and related area, will be completed by DCA, ADL, and others before commencement of the construction works.

Also, DCA, ADL, and others have to prepare spaces for radar equipment consoles in air traffic control rooms and control cabin in the control tower building, and to remove the existing radar console. DCA, ADL, and others should conduct flight check.

### 3-2 Necessary Input by Recipient Country

To obtain and keep effective benefit of the Project, it is necessary for the staff, who received initial operation and maintenance training, or for the staff trained by such staff to operate and maintain the procured equipment and to secure the necessary budget for operation and maintenance.

### 3-3 Important Assumptions

It is assumed that deficiency of fuel and construction materials caused by low foreign currency reserve occurred for a few months in June 2011, will not happened.

### 3-4 Project Evaluation

#### 3-4-1 Relevance

##### 3-4-1-1 Beneficiaries of the Project

To relief congestion and expansion of capacity in the national gateway airport, Kamuzu International Airport and to improve air safety by installation of aircraft surveillance system will contribute to aviation safety in Malawi. Thus, the beneficiaries of the Project are whole Malawi National.

##### 3-4-1-2 Objective of the Project

Objectives of the Project are to expand passenger handling capacity of Kamuzu International Airport, to improve convenience of users, and improve air safety, by expansion and rehabilitation of the passenger terminal building and to develop air traffic control equipment. Upper level plan of the Project is to facilitate

##### 3-4-1-3 Compliance with National Policy

Improvement of air safety and quality of air service are included in the important issues in

Malawi Growth and Development Strategy II: MGDS II and Vision 2020, which are long term development strategy of the Government of Malawi. The project to expand the passenger terminal building and to install aircraft surveillance equipment will contribute to resolve these issues, thus complies with national policy.

#### 3-4-1-4 Compliance with Japanese Foreign Policy

The Project meets Japan’s Country Assistance Policy for Malawi and priority areas and priority issues in JICA Country Analysis Paper and significance of implementation of the project by Japanese Grant Aid Project is high.

#### 3-4-2 Effectiveness

Expected effectiveness of the project is shown below.

##### 3-4-2-1 Quantitative Effect

**Table 36 Quantitative Effects of the Project**

Index	Baseline (Year 2014 Value)	Target Value (Year 2021) 【3 years after Project Completion】
Annual air passengers at Kamuzu International airport (Thousand/ Year)	215	306
Average waiting time at check in counter during peak hour(minutes)	12	9
Average waiting time at arrival immigration counter during peak hour(minutes)	7	3
Average waiting time at departure immigration counter during peak hour(minutes)	5	2
Ratio of aircraft under surveillance coverage of aircraft surveillance system (%)	0	100

##### 3-4-2-2 Qualitative Effect

Qualitative effects of the project are as follows:

- Convenience of the airport will be improved by expansion and rehabilitation of the passenger terminal building.
- Safety and reliability of airport function will be improved by new installation of the aircraft surveillance system.
- It will contribute to industrial development, improvement of investment environment and promote tourism.

The Project is considered to promote great effectiveness for the recipient country. Thus, it is concluded that the Project is appropriate to implement under the Japanese Grand Aid Scheme.

[Appendix]

1. List of JICA Study Team

Name	Title	Organization
Hiroyuki UEDA	Team Leader	Senior Advisor for Transport Sector, JICA
Shinichi SAITO	Planning Management	Deputy Director, Transportation and ICT Group, Infrastructure and Peacebuilding Department, JICA
Takao YAMAGUCHI	Chief Consultant/ Architectural Planner (2)	GYROS Corporation
Kanji EHIRA	Sub-Chief Consultant/ Architectural Planner (1)	EHIRA Architects and Engineer, Inc.
Ado KAMAGATA	Airport Facility & Equipment Procurement Planner (1)	System Planning Corporation Co., Ltd.
Kiyoshi IIDA	Airport Facility & Equipment Procurement Planner (2)	ALEC ENGINEERING CO., LTD
Reynaldo BATACAN	Air Navigation Equipment Procurement Planner	International Civil Aviation Organization
Toshiya WATANABE	Architectural Rehabilitation Planner	NIPPON KOEI CO., LTD.
Yasuhito INOUE	Architectural Structural Designer	EHIRA Architects and Engineer, Inc.
Takahiro MATSUO	Electrical Facility Designer	SYSTEM PLANNING CORPORATION
Shunji SAITO	Construction & Procurement Planner	Saito Engineering Construction Co. Ltd.
Hiromu KADOWAKI	Cost Estimator	GYROS Corporation
Masaaki TAKAHASHI	Natural Condition Surveyor/ Civil Facility Designer	NIPPON KOEI CO., LTD.
Kinuyo FUKUDA	Environmental & Social Consideration Specialist	GYROS Corporation
Kimihiko OGIHARA	Project Coordinator/ Assistant Architectural Planner	GYROS Corporation

## 2. List of Relevant Personnel of the Recipient Country

Moffat J. Chitimbe	Principal Secretary, MoTPW
Alfred C. Mtilatila	Director of Civil Aviation, DCA
M.F.T. Bongwe	Chief Aeronautical telecommunications Engineer, DCA
Oxford J. Mutambo	Chief Aerodrome Engineer, DCA
Francis Z. M. Kholowa	Chief Air Traffic Services Officer, DCA
Rodrick Chataika	CEO, ADL
David F. Pankomera	Financial Controller, ADL
Kenneth T. Chiseko	ICT & Estates Manager, ADL
Hilary T. KAMELA	Director of Planning and Development Management, LCC
Catherine Kulemeka	Town Planning Manager, LCC
Hastings J.K. Chiudzu	Director of Buildings, Buildings Department
G.R. Kunje	Officer, Buildings Department
Aaron Chikuse	Officer, Buildings Department
Flora Ngombende	Officer, Buildings Department
Tawonga Mbale	Assistant Director, EAD
Patrick Nyirenda	Environmental Officer, EAD
Catherine Musa	Environmental Officer, EAD
Patrick NYIRENDA	Environmental Officer, EAD
Catherine MUSA	Environmental Officer, EAD

### 3. Survey Schedule

#### First Field Survey

No.	Date	Leader (JICA)	Planning Management (JICA)	Chief Consultant/ Architectural Planner (2)	Sub-chief Consultant/ Architectural Planner (1)	Airport Facility & Equipment Procurement (1)	Airport Facility & Equipment Procurement (2)	Air Navigation Equipment Procurement Planee	Architectural Rehabilitation Planee	Architectural Structural Designer	Structural Fa-802 Designer	Construction & Procurement Planee	Cost Estimator	Natural Condition Surveys Civil Facility Designer	Environmental & Social Consultation Specialist	Project Coordinator/ Assistant Architectural Planner	
1	2014.8.23	Sat		NRT-HKG										NRT-HKG		NRT-HKG	
2	2014.8.24	Sun		HKG-JNB-LLW										HKG-JNB-LLW		HKG-JNB-LLW	
3	2014.8.25	Mon		Courtesy Call to JICA Makati Office & Embassy of Japan										Site Survey			
4	2014.8.26	Tue		Explanation & Discussion on Inspection Report										Site Survey			
5	2014.8.27	Wed		Project Background & Implementation Schedule										Site Survey			
6	2014.8.28	Thu		Site Survey										Site Survey			
7	2014.8.29	Fri		Site Survey										Site Survey			
8	2014.8.30	Sat		Data Analysis			NRT-HKG	MGO-HKG		NRT-HKG		NRT-HKG		Data Analysis		Data Analysis	
9	2014.8.31	Sun		Data Analysis			HKG-JNB-LLW				HKG-JNB-LLW						
10	2014.9.1	Mon												Site Survey			
11	2014.9.2	Tue												Procurement Survey		Site Survey	
12	2014.9.3	Wed												Procurement Survey		Site Survey	
13	2014.9.4	Thu												Procurement Survey		Site Survey	
14	2014.9.5	Fri												Procurement Survey		Site Survey	
15	2014.9.6	Sat														Data Analysis	
16	2014.9.7	Sun															
17	2014.9.8	Mon												Procurement Survey		Site Survey	
18	2014.9.9	Tue		LLW-JNB										Procurement Survey		Site Survey	
19	2014.9.10	Wed		JNB-HKG-NRT										Procurement Survey		Project Formulation	
20	2014.9.11	Thu												Procurement Survey		Project Formulation	
21	2014.9.12	Fri												Procurement Survey		Project Formulation	
22	2014.9.13	Sat		Internal Meeting			LLW-JNB		Internal Meeting				LLW-JNB	Internal Meeting	Internal Meeting		
23	2014.9.14	Sun					JNB-HKG-NRT							JNB-HKG-NRT			
24	2014.9.15	Mon		Site Survey					Project Formulation				Construction & Procurement Survey	Procurement Survey		Env & Soc Survey	
25	2014.9.16	Tue		Site Survey					Project Formulation				Construction & Procurement Survey	Procurement Survey		Env & Soc Survey	
26	2014.9.17	Wed		Site Survey	LLW-JNB			LLW-JNB	Site Survey	LLW-JNB				Construction & Procurement Survey	Procurement Survey		Env & Soc Survey
27	2014.9.18	Thu		Project Formulation	JNB-HKG-NRT			JNB-HKG-NRT	Site Survey	JNB-HKG-NRT				Construction & Procurement Survey	Procurement Survey		Env & Soc Survey
28	2014.9.19	Fri		Project Formulation					Project Formulation				Construction & Procurement Survey	Procurement Survey		Env & Soc Survey	
29	2014.9.20	Sat		NRT-HKG	Internal Meeting				Internal Meeting						Internal Meeting	Internal Meeting	
30	2014.9.21	Sun		HKG-JNB-LLW													
31	2014.9.22	Mon		Courtesy Call to JICA Makati Office & Japanese Embassy										Project Formulation			
32	2014.9.23	Tue		Discussion on Understanding of the Recipient Country										LLW-JNB		LLW-JNB	
33	2014.9.24	Wed		Preparation of the Minutes of Meeting										JNB-HKG-NRT		JNB-HKG-NRT	
34	2014.9.25	Thu		Preparation of the Minutes of Meeting													
35	2014.9.26	Fri		Signing of the Minutes with DCA, Courtesy Call to JICA Makati Office & Embassy of Japan													
36	2014.9.27	Sat		LLW-JNB												LLW-JNB	
37	2014.9.28	Sun		JNB-HKG-NRT												JNB-HKG-NRT	

#### Explanation of Draft Report

Days	Date	Team Leader JICA	Planning Management, JICA	Chief Consultant/ Architectural Planner (2)	Sub-Chief Consultant/ Architectural Planner (1)
1	30 May, 2015	HND-SIN			
2	31 May, 2015	SIN-JNB-LLW			
3	1 June, 2015	JICA Office, Explanation of Draft Final Report to DCA and ADL			
4	2 June, 2015	Discussion on the Minutes of Meeting			
5	3 June, 2015	Preparation of Minutes		KIA Survey	
6	4 June, 2015	Signing of Minutes of Meeting, JICA Office			
7	5 June, 2015	Japanese Embassy			
8	6 June, 2015	LLW-JNB	LLW-ADD-DXB		LLW-JNB
9	7 June, 2015	JNB-SIN-HND			JNB-SIN-HND

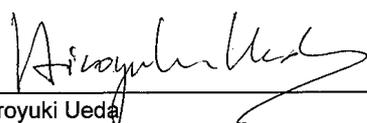
4. Minutes of Meeting (M/M)



**THE MINUTES OF MEETINGS  
ON  
THE PREPARATORY SURVEY  
ON  
THE PROJECT FOR EXPANSION OF THE TERMINAL BUILDING  
AT KAMUZU INTERNATIONAL AIRPORT  
IN  
THE REPUBLIC OF MALAWI  
AGREED UPON BETWEEN  
THE GOVERNMENT OF THE REPUBLIC OF MALAWI  
AND  
THE JAPAN INTERNATIONAL COOPERATION AGENCY**

Lilongwe, 2 October 2014

  
Moffat J. Chitimba  
Principal Secretary  
Ministry of Transport and Public Works

  
Hiroyuki Ueda  
Leader  
Preparatory Survey Team  
Japan International Cooperation Agency

The Government of the Republic of Malawi (hereinafter referred to as 'GOM') and the Japan International Cooperation Agency (hereinafter referred to as 'JICA') have made several preliminary discussions in order to identify priority projects in the field of the aviation sector, and agreed to make preparation for the Project for Expansion of the Terminal Building at Kamuzu International Airport (hereinafter referred to as the 'Project'). Accordingly, JICA dispatched a Preparatory Survey Team on the Project (hereinafter referred to as the 'Team') to the Republic of Malawi from 24 August to 4 October 2014 in order to confirm the scope and implementing arrangements of the Preparatory Survey and to study the outline of the Project.

The scope and implementing arrangements of the Preparatory Survey are described in the Annex 1. The main points discussed during its visit are shown in Annex 2.

It should be noted that implementation of the Preparatory Survey does not imply any decision or commitment by the Government of Japan (hereinafter referred to as 'GOJ') to extend its grant for the Project at this stage.

#### Annex 1: Scope and Implementing Arrangements of the Preparatory Survey

Annex 1-1: Project Site Location Map

Annex 1-2: Organization Chart of MoTPW

Annex 1-3: Organization Chart of DCA

Annex 1-4: Organization Chart of KIA

Annex 1-5: Organization Chart of ADL

Annex 1-6: List of the Requested Items

Annex 1-7: Japan's Grant Aid Scheme

Annex 1-8: Flow Chart of Japan's Grant Aid Procedures

Annex 1-9: Major Undertakings to be taken by Each Government

#### Annex 2: Main Points Discussed

*MJ*

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**SCOPE AND IMPLEMENTING ARRANGEMENTS**  
**OF THE PREPARATORY SURVEY**

**1. Background and Objectives of the Preparatory Survey**

Since its official inauguration in 1983, Kamuzu International Airport (hereinafter referred to as 'KIA') has played an important role as the main international airport of Malawi. Having passed 30 years, KIA came to require expansion and rehabilitation of the passenger terminal building as well as modernization of equipment in order to increase airport capacity, improve efficiency of airport operation, and secure safety of airport users.

Considering the current situation of KIA, the objectives of the Preparatory Survey are as follows:

- To understand the background, objectives and contents of the Project;
- To examine the impact and appropriateness of the Project;
- To consider the components, outline design, and cost estimation of the Project based on the data and information collected through the Preparatory Survey and the results of meetings between the Japanese and Malawi sides; and
- To study the issues of environmental and social considerations through the Preparatory Survey.

**2. Objective of the Project**

The objective of the Project is to increase airport capacity, improve efficiency of airport operation and secure safety of airport users at KIA through the expansion and rehabilitation of the passenger terminal building and provision of necessary equipment.

**3. Project Site**

The project site of the Project is KIA, whose map is shown in Annex 1-1.

**4. Executing Agency**

The executing agency of the Project will be the Department of Civil Aviation (hereinafter referred to as 'DCA') of the Ministry of Transport and Public Works



(hereinafter referred to as 'MoTPW').

Operation and maintenance of the facilities and equipment at KIA are conducted by DCA and Airport Development Limited (hereinafter referred to as 'ADL') as follows:

- DCA: Airport management, rescue and firefighting services, and air navigation services; and
- ADL: Management, operation and maintenance of passenger terminal building, cargo terminal building and car park.

The organization charts of MoTPW, DCA, KIA and ADL are shown in Annexes 1-2, 1-3, 1-4 and 1-5. The Malawi side will promptly inform JICA of plans of the changes in the legal character, ownership, or control of MoTPW, DCA, and ADL, if any.

#### **5. Items Requested by the Government of the Republic of Malawi**

The items requested by GOM are shown in Annex 1-6. JICA will assess the appropriateness of the request and report the findings to GOJ.

The final designs, specifications and quantities of the items to be constructed and procured shall be decided by the Japanese side and described in the draft Preparatory Survey Report (hereinafter referred to as the 'Report'), considering necessity, technical viability, sustainability, cost-effectiveness, and budget availability. The Malawi side understood that all the requested items, therefore, may not be accepted as final components of the Project.

#### **6. Schedule of the Preparatory Survey**

On the basis of the field study in Malawi and technical examination in Japan, JICA will prepare a draft final Report and explain its contents including the final components and cost estimation of the Project to the Malawi side around March 2015. The final Report will be sent to GOM by May 2015. The schedule above is tentative and subject to change.

#### **7. Japan's Grant Aid Scheme**

GOM understood Japan's Grant Aid Scheme explained by the Team as described in Annex 1-7 1-8 and 1-9.



**8. Undertakings of the Government of the Republic of Malawi**

DCA shall act as a counterpart agency to the Team and also as a coordinating body with other organizations concerned for the smooth implementation of the Preparatory Survey.

DCA shall, at its own expense, provide the Team with the following items in cooperation with other organizations concerned:

- (1) Data and information related to the Preparatory Survey;
- (2) Counterpart personnel;
- (3) Suitable office space with necessary equipment and secretarial service;
- (4) Credentials or identification cards;
- (5) Entry permits necessary for the Team members to conduct field surveys;
- (6) Support in obtaining other privileges and benefits, if necessary;
- (7) Security-related information as well as measures to ensure the safety of the Team; and
- (8) Information as well as support in obtaining medical service.

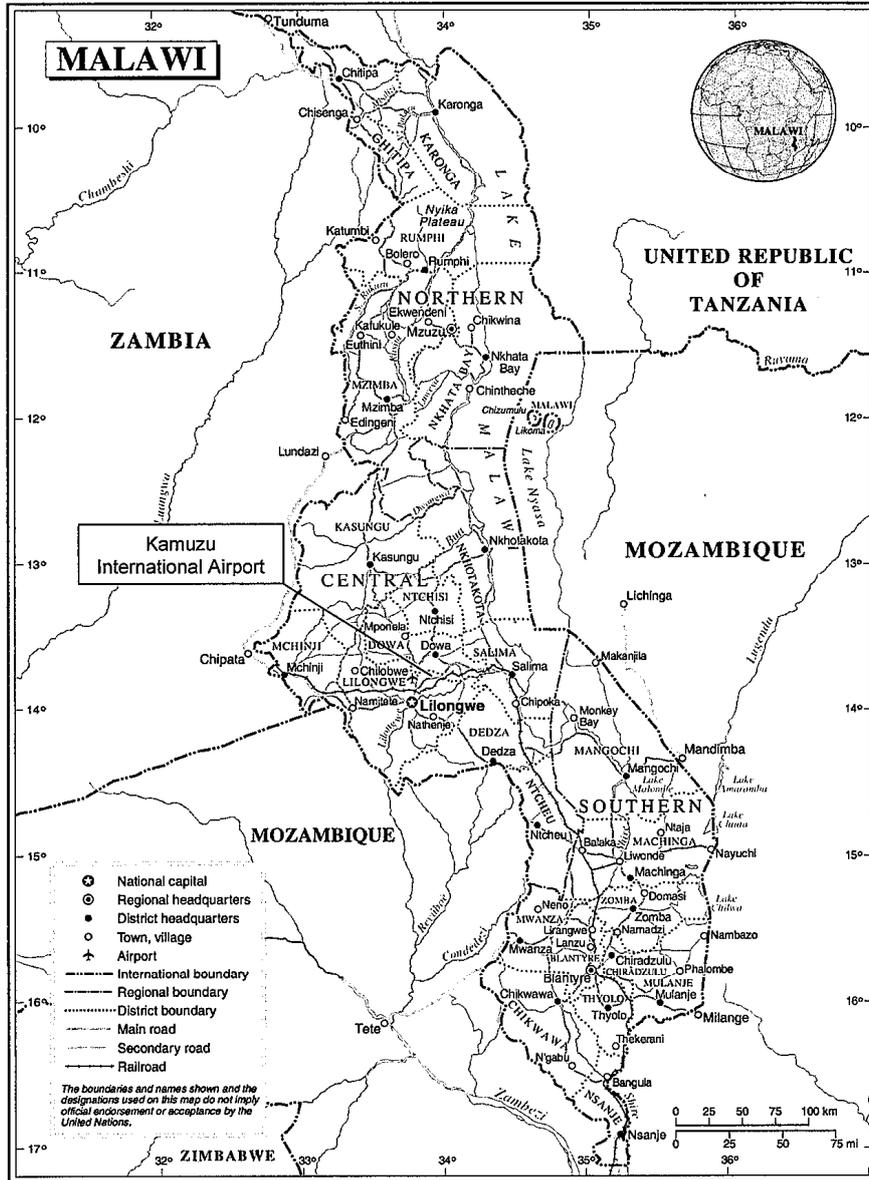
**9. Consultation**

JICA and GOM shall consult with each other in respect of any matter that may arise from or in connection with the Preparatory Survey.

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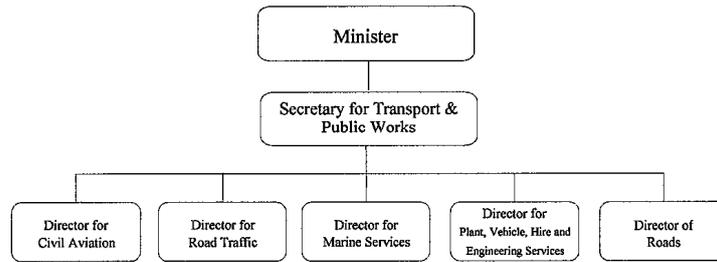
**Project Site Location Map**



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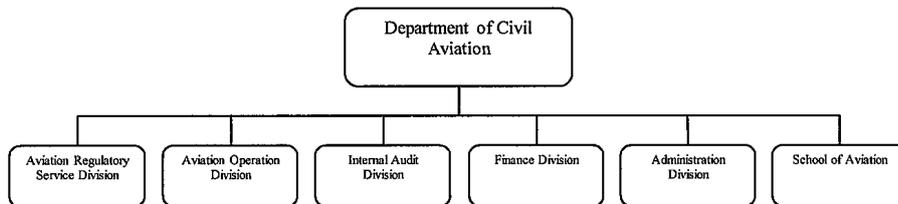
**Organization Chart of MoTPW**



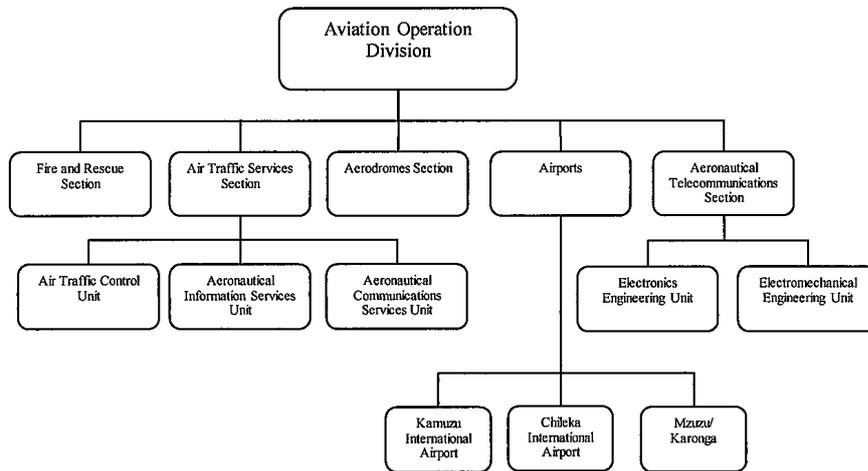
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**Organization Chart of DCA**



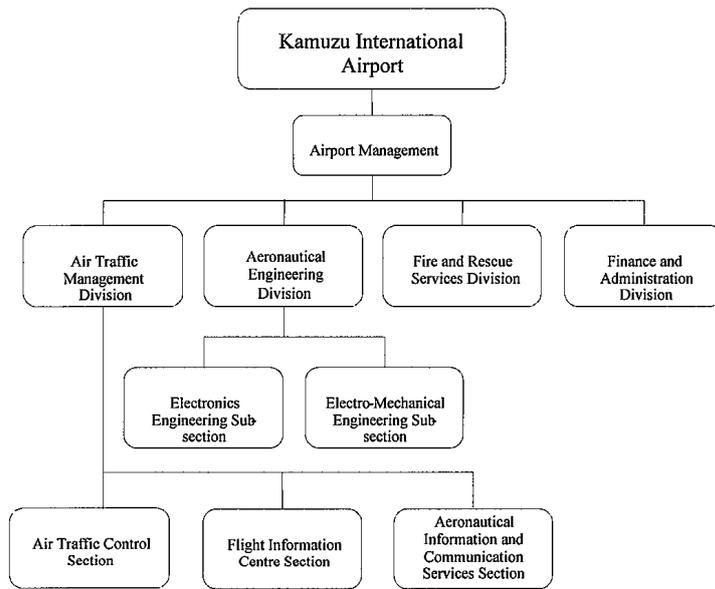
A detailed organization chart of the Aviation Operation Division, which manages development and operation of airports in Malawi, is shown below:



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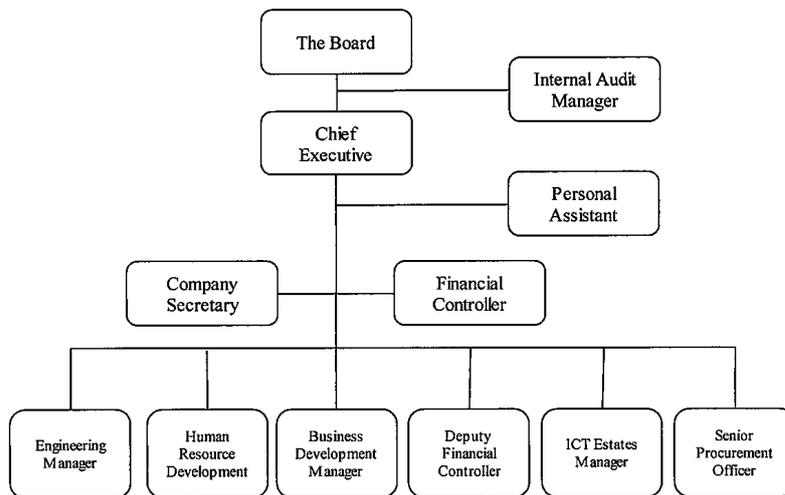
**Organization Chart of KIA**



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**Organization Chart of ADL**



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**List of the Requested Items**

The components of each item with approximate quantities will be given based on the result of the field survey in Malawi. Priorities will also be determined in consideration of cost-effectiveness and budget constraints.

1. Expansion and Rehabilitation of Passenger Terminal Building
2. Provision of Aircraft Surveillance System



**Japan's Grant Aid Scheme**

The GOJ is implementing the organizational reforms to improve the quality of ODA operations, and as a part of this realignment, a new JICA law was entered into effect on October 1, 2008. Based on this law and the decision of the GOJ, JICA has become the executing agency of the Grant Aid for General Projects, for Fisheries and for Cultural Cooperation, etc.

The Grant Aid is non-reimbursable fund provided to a recipient country to procure the facilities, equipment and services (engineering services and transportation of the products, etc.) for its economic and social development in accordance with the relevant laws and regulations of Japan. The Grant Aid is not supplied through the donation of materials as such.

**1. Grant Aid Procedures**

The Japanese Grant Aid is supplied through following procedures:

- (a) Preparatory Survey
  - The survey conducted by JICA
- (b) Appraisal & Approval
  - Appraisal by the GOJ and JICA, and Approval by the Japanese Cabinet
- (c) Authority for Determining Implementation
  - The Notes exchanged between the GOJ and a recipient country
- (d) Grant Agreement (hereinafter referred to as the 'G/A')
  - Agreement concluded between JICA and a recipient country
- (e) Implementation
  - Implementation of the Project on the basis of the G/A.

**2. Preparatory Survey**

(1) Contents of the Survey

The aim of the Preparatory Survey is to provide a basic document necessary for the appraisal of the Project made by the GOJ and JICA. The contents of the Preparatory Survey are as follows:

- (a) Confirmation of the background, objectives, and benefits of the Project and also institutional capacity of relevant agencies of the recipient country necessary for the implementation of the Project;



- 
- (b) Evaluation of the appropriateness of the Project to be implemented under the Grant Aid Scheme from a technical, financial, social and economic point of view;
  - (c) Confirmation of items agreed between both parties concerning the basic concept of the Project;
  - (d) Preparation of the outline design of the Project; and
  - (e) Estimation of the costs of the Project.

The contents of the original request by the recipient country are not necessarily approved in their initial form as the contents of the Grant Aid project. The Outline Design of the Project is confirmed based on the guidelines of the Japan's Grant Aid scheme.

JICA requests the Government of the recipient country to take whatever measures necessary to achieve its self-reliance in the implementation of the Project. Such measures must be guaranteed even though they may fall outside of the jurisdiction of the organization of the recipient country which actually implements the Project. Therefore, the implementation of the Project is confirmed by all relevant organizations of the recipient country based on the Minutes of Discussions.

(2) Selection of Consultants

For smooth implementation of the Preparatory Survey, JICA employs (a) registered consulting firm(s). JICA selects (a) firm(s) based on proposals submitted by interested firms.

(3) Result of the Preparatory Survey

JICA reviews the Report on the results of the survey and recommends the GOJ to appraise the implementation of the Project after confirming the appropriateness of the Project.

**3. Japan's Grant Aid Scheme**

(1) The E/N and the G/A

After the Project is approved by the Cabinet of Japan, the Exchange of Notes (hereinafter referred to as the 'E/N') will be signed between the GOJ and the Government of the recipient country to make a pledge for assistance, which is



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followed by the conclusion of the G/A between JICA and the Government of the recipient country to define the necessary articles to implement the Project, such as payment conditions, responsibilities of the Government of the recipient country, and procurement conditions.

(2) Selection of Consultants

In order to maintain technical consistency, the consulting firm(s) which conducted the Preparatory Survey will be recommended by JICA to the recipient country to continue to work on the Project's implementation after the E/N and G/A.

(3) Eligible source country

Under the Japanese Grant Aid, in principle, Japanese products and services including transport or those of the recipient country are to be purchased. When JICA and the Government of the recipient country or its designated authority deem it necessary, the Grant Aid may be used for the purchase of the products or services of a third country. However, the prime contractors, namely, constructing and procurement firms, and the prime consulting firm are limited to 'Japanese nationals.'

(4) Necessity of 'Verification'

The Government of the recipient country or its designated authority will conclude contracts denominated in Japanese yen with Japanese nationals. Those contracts shall be verified by JICA. This 'Verification' is deemed necessary to fulfill accountability to Japanese taxpayers.

(5) Major undertakings to be taken by the Government of the Recipient Country

In the implementation of the Grant Aid Project, the recipient country is required to undertake such necessary measures as attached in Annex 1-9.

(6) Proper Use

The Government of the recipient country is required to maintain and use properly and effectively the facilities constructed and the equipment purchased under the Grant Aid, to assign staff necessary for this operation and maintenance and to bear all the expenses other than those covered by the Grant Aid.



(7) Misconduct

If JICA receives information concerning suspected corrupt or fraudulent practices, the Government of the recipient country shall take necessary measures in accordance with the Procurement Guidelines in the competition for, or in execution of, the contract funded by the Grant:

- (a) To provide JICA with such information, as JICA may reasonably request, including information related to any concerned official of the government and/or public organizations of the recipient country; and
- (b) Not to treat unfairly or unfavorably the physical persons and juridical persons that provide the information.

(8) Export and Re-export

The products purchased under the Grant Aid should not be exported or re-exported from the recipient country.

(9) Banking Arrangements (B/A)

- (a) The Government of the recipient country or its designated authority should open an account under the name of the Government of the recipient country in a bank in Japan (hereinafter referred to as the 'Bank'). JICA will execute the Grant Aid by making payments in Japanese yen to cover the obligations incurred by the Government of the recipient country or its designated authority under the Verified Contracts.
- (b) The payments will be made when payment requests are presented by the Bank to JICA under an Authorization to Pay issued by the Government of the recipient country or its designated authority.

(10) Authorization to Pay (A/P)

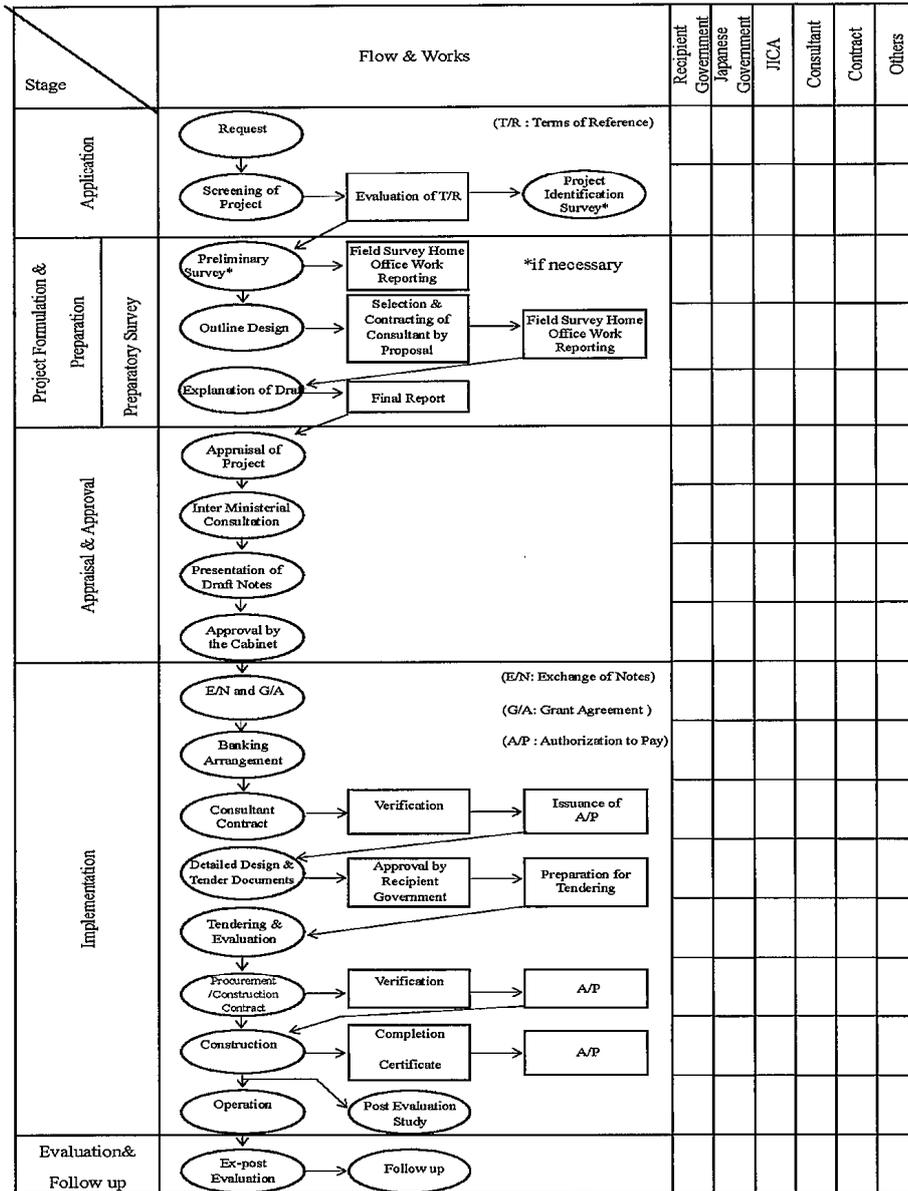
The Government of the recipient country should bear an advising commission of an A/P and payment commissions paid to the Bank.

(11) Social and Environmental Considerations

A recipient country must carefully consider social and environmental impacts by the Project and must comply with the environmental regulations of the recipient country and JICA's socio-environmental guidelines.



**Flow Chart of Japan's Grant Aid Procedures**



## Annex 1-9

**Major Undertakings to be taken by Each Government**

No.	Items	To be covered by Grant Aid	To be covered by Recipient Side
1	to secure lots of land necessary for the implementation of the Project and to clear the sites		●
2	To construct the following facilities		
	1) The building	●	
	2) The gates and fences in and around the site		●
	3) The parking lot	●	
	4) The road within the site	●	
	5) The road outside the site		●
3	To provide facilities for distribution of electricity, water supply and drainage and other incidental facilities necessary for the implementation of the Project outside the sites		
	1) Electricity		
	a. The distributing power line to the site		●
	b. The drop wiring and internal wiring within the site	●	
	c. The main circuit breaker and transformer	●	
	2) Water Supply		
	a. The city water distribution main to the site		●
	b. The supply system within the site (receiving and elevated tanks)	●	
	3) Drainage		
	a. The city drainage main (for storm sewer and others to the site)		●
	b. The drainage system (for toilet sewer, common waste, storm drainage and others) within the site	●	
	4) Gas Supply (if any)		
	a. The city gas main to the site		●
	b. The gas supply system within the site	●	
	5) Telephone System		
	a. The telephone trunk line to the main distribution frame/panel (MDF) of the building		●
	b. The MDF and the extension after the frame/panel	●	
	6) Furniture and Equipment		
	a. General furniture		●
	b. Project equipment	●	
4	To transport the Products from Japan to the project site		
	1) Marine/Air transportation of the Products from Japan to the recipient country	●	
	2) To ensure prompt customs clearance of the products and to assist internal transportation of the products in the recipient country.		●
	3) Internal transportation from the port of disembarkation to the project site	●	
5	To ensure that customs duties, internal taxes and other fiscal levies which may be imposed in the recipient country with respect to the purchase of the products and the services be exempted.		●

6	To accord Japanese physical persons and / or physical persons of third countries whose services may be required in connection with the supply of the products and the services such facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work		●
7	To ensure that the Facilities and the products be maintained and used properly and effectively for the implementation of the Project		●
8	To bear all the expenses, other than those covered by the Grant, necessary for the implementation of the Project		●
9	To bear the following commissions paid to the Japanese bank for banking services based upon the B/A		
	1) Commission of B/A		●
	2) Payment commission		●
10	To give due environmental and social consideration in the implementation of the Project.		●

(B/A: Banking Arrangement, A/P: Authorization to Pay)

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**MAIN POINTS DISCUSSED**

**1. Project Title**

Both sides agreed that the project title was changed as follows from the one in the application form submitted by the Republic of Malawi in August 2013.

Old: Project for Rehabilitation of the Terminal Building at Kamuzu International Airport

New: Project for Expansion of the Terminal Building at Kamuzu International Airport

**2. Expansion of the Passenger Terminal Building**

Both sides agreed on the concept design for expansion and rehabilitation of the passenger terminal building as shown below:

(a) Design peak-hour passengers

- International Passengers
  - Passengers for one B777 class aircraft and two B737 class aircraft
- Domestic Passengers
  - Passengers for one Bombardier Q400 class aircraft

(b) Requirements for key facilities of the passenger terminal building

- International passenger terminal building
  - Check-in counters: 16
  - Outbound passport control counters: 14
  - Passenger security check points: 2
  - Seats of waiting areas for departing passengers: 416
  - Inbound passport control counters: 12
  - Baggage claim conveyors: 2
  - Customs/security X ray screening equipment 2
  - Customs check counters: 2
- Domestic passenger terminal building
  - Check-in counters: 4
  - Passenger security check points: 1
  - Seats of waiting areas for departing passengers: 54
  - Baggage claim conveyors: 1




(c) Special equipment for the passenger terminal building

- Flight information system
- Public address system
- Baggage conveyors
- X-ray machines
- CCTV system
- Building maintenance equipment

(d) Concept design drawings

- Site plan: Annex 2-1
- Floor plan of international passenger terminal building: Annex 2-2
- Floor plan of domestic passenger terminal building: Annex 2-3

**3. Rehabilitation of Existing Passenger Terminal Building**

Both sides agreed on the major work items of the rehabilitation of existing passenger terminal building as follows:

- New roof over the existing roof and rehabilitation of roof gutters
- Rehabilitation of the existing facade, terraces and hand-rails with re-painting and rust proof finishes
- Cleaning of glass and aluminum sash of the facade
- Re-painting of the ceiling louvers and replacement of the damaged parts
- Finishing and partitions for all the passenger process areas on the ground floor, including the check-in/passport control counters
- New toilet facilities for the passengers on the ground floor
- New LIHACO offices, CCTV, FIDS, PA rooms and a room for ADL CUTE
- Rehabilitation of all toilets on the mezzanine floor
- Conversion of the existing ventilation/boiler room on the basement floor into a new electrical room to house new transformers, etc. (Existing generator and UPS room will be retained in the existing electrical room)
- Rehabilitation of the cold water supply system
- Rehabilitation of the existing hose reel system
- Rehabilitation of the existing domestic water supply system
- Rehabilitation of the existing electrical substation
- Rehabilitation of the existing master antenna TV system
- Rehabilitation of the existing manual fire alarm system

- New electrical cablings and electrical panels
- New plumbing for service water and sewer
- Conversion of the existing toilets into a new fan room on the basement floor

**4. Major Preparatory Works to be undertaken by the GOM for the Passenger**

**Terminal Construction**

- Preparation of sites for the construction in general
- Removal of lighting poles, asphalt pavement, curb stones, greeneries, gutters and under-ground plumbing (Annex 2-4)
- Re-routing of the sewer pipe (Annex 2-4)
- Removal of all furniture, counters, bill boards, shop partitions, lighting fixtures , etc. for these shops and respective areas

**5. Provision of Aircraft Surveillance System**

Both sides agreed on the major work items of the provision of aircraft surveillance system as follows:

- Secondary Surveillance Radar (SSR) with Mode S Capability
- Automatic Dependent Surveillance System – Broadcast (ADS-B)
- Multi-Sensor Data Processing System
- ATC Display System (Main display for ACC, slave display for APP and TWR)
- Renewal of Power System including Uninterruptible Power Supply (UPS)
- Refurbishment of Radar Equipment Room and ACC Room

**6. Major Preparatory Works to be undertaken by the GOM for Aircraft Surveillance System**

- Securing Installation Space for the Radar Equipment (Radar Equipment Room, ACC Room and Control Tower Cab)
- Removal of Old Radar Console in the ACC Room
- Flight calibration of SSR/ ADS-B systems

**7. Training for Operation and Maintenance of the Equipment**

The Team explained that training for operation and maintenance of the equipment included in the Project would be provided in the construction contract or the supplier's contract of the Project.

The Malawi side requested technical assistance for the training for operation of Radar Approach and Area Control Services, and maintenance training for SSR/ADS-B equipment. The Japanese side took note, and will consider its necessity and appropriateness in the Survey.

#### **8. Environmental and Social Considerations**

The Team explained that the Project is categorized as "Category B" according to JICA's Guidelines for Environmental and Social Considerations, since the Project includes the extension of the existing passenger terminal which may impact the surrounding environment.

The Malawi side understood that the Project needs to follow the JICA guideline and that the initial environmental examination (IEE) will be done through the Preparatory Survey.

The Malawi side will obtain an Environmental Impact Assessment (EIA) certificate if it is required by the Malawi regulation by the time of Exchange of Notes (E/N) between the GOJ and the GOM.

#### **9. Development Certificate**

The Malawi side will complete the processes for Development Certificate for the expansion of the passenger terminal building by the time of commencement of construction tender.

#### **10. Maintenance and Operation**

The Malawi side shall secure enough budget and personnel necessary for the operation and maintenance of the facilities and equipment to be procured by the Project, including the periodical maintenance work after the completion of the Project.

#### **11. Use of the Grant**

The Malawi side understood the principle of the Japan's Official Development Assistance Charter, which stresses that the assistance must not be utilized for any military purposes or promoting international conflicts. The Malawi side also agreed to ensure that no facilities and equipment to be procured in the Project will be used for military purposes.



## **12. Tax Exemption**

The Malawi side agreed that customs duties, internal taxes and other fiscal levies which may be imposed in the Republic of Malawi are exempted under the mutual agreement of the Exchange of Notes (E/N). If any expenses stated above are caused by some reasons such as the delay of execution of tax exemption, the Malawi side shall pay for it temporarily.

## **13. Disclosure of Information**

Both sides confirmed that the study results excluding the project cost will be disclosed to the public after completion of the Preparatory Survey. All the study results including the Project cost will be disclosed to the public after all the contracts of the Project are concluded.

## **14. Tentative Project Schedule with Undertakings by the GOM**

The Team indicated the tentative project schedule below to indicate necessary preparatory work by the GOM. This schedule is based on the assumption that this Project will be appraisal by the GOJ and JICA, and approval by the Japanese Cabinet by May 2015. It should be noted that indication of the project schedule does not imply any decision or commitment by the GOJ to extend its grant for the Project at this stage.

### (a) Project Formulation and Preparation Stage

- Site Survey by the Team: 24 August – 4 October 2014
- Work in Japan by the Team: October 2014 – March 2015
- Explanation of Draft Report: March 2015
- Finalization of Preparatory Survey Report: March – May 2015

### (b) Appraisal and Approval Stage

- Appraisal by the GOJ and JICA, and approval by the Japanese Cabinet by May 2015

### (c) Implementation Stage

- E/N and G/A: June 2015  
(EIA certificate to be completed by the GOM before E/N)  
(Necessary process for tax exemption to be undertaken by the GOM in accordance with E/N)



- Banking Arrangement June 2015  
(Commission of B/A to be paid by the GOM immediately after G/A)
- Consultant Contract July 2015  
(Payment commission to be paid by the GOM in accordance with payment schedule in the consultant contract)

Expansion of Passenger Terminal Building

- Detailed Design and Tender Documentation: July 2015 – January 2016  
(Development Permit to be completed by the GOM before the commencement of construction tender)
- Tender, Evaluation and Contract: February – April 2016  
(Payment commission to be paid by the GOM in accordance with payment schedule in the construction contract)
- Construction: 24-30 months from May 2016  
(Clearing of site including demolition of existing pavement and lighting poles to be completed by the GOM by the commencement of the construction contract)

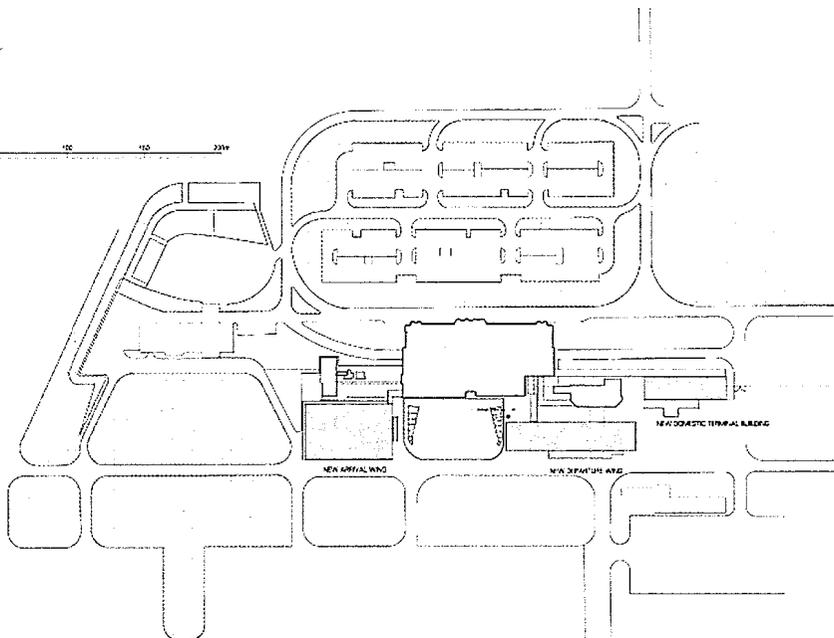
Provision of Aircraft Surveillance System

- Detailed Design and Tender Documentation: July – October 2015
- Tender, Evaluation and Contract: November 2015– January 2016  
(Payment commission to be paid by the GOM in accordance with payment schedule in the supplier's contract)
- Construction: 12 months from February 2016
- (Securing equipment space and supply of electric power for the equipment to be completed by the GOM by the time of installation of equipment in the supplier's contract)

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Annex 2-1: Site Plan

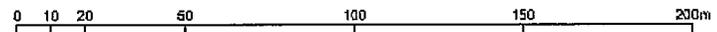
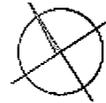
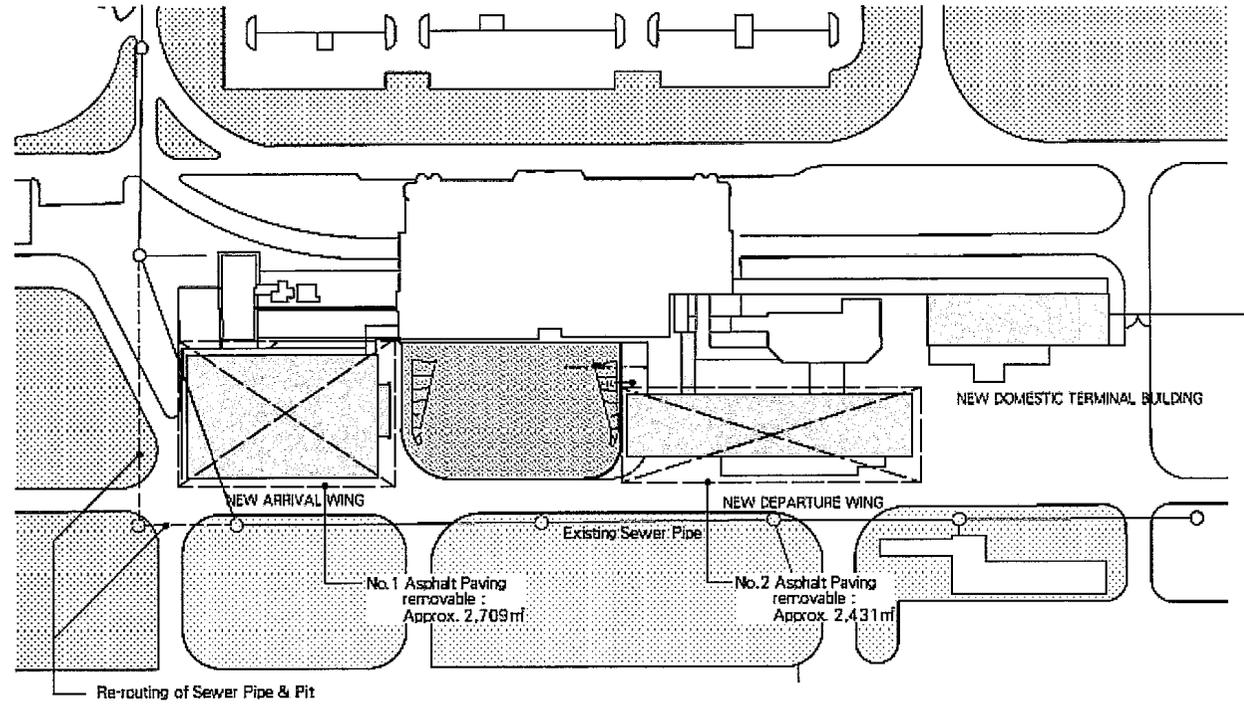


DCA		ADL
Mr. Ated C. Velasco	Mr. Rodolfo Ortobaca	
Mr. Don Chantango	Mr. David Pangasinan	
PREPARATORY SURVEY ON THE PROJECT FOR RENABILITATION OF THE TERMINAL BUILDING AT KAMUZU INTERNATIONAL AIRPORT		APR 2013 - SEP 2014 (24/1/13)
DATE TITLE		DATE
SITE PLAN		12.08.13
GENERAL CONTRACTOR: <b>GYROS CORPORATION</b>   <b>EHIRA AG</b>   <b>NIPPON KOEI</b>		Draw No: A-003

NO	REVISIONS	DATE	BY	APPD	NO	REVISIONS	DATE	BY	APPD	REFERENCE DRAWINGS

125

Annex 2-4: Airside preparatory works by GOM



Removal of Asphalt Paving and Re-routing of Sewer Pipe & Pit to be executed by Malawi Government - Scale: 1:1500

126

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## 5. Minutes of Discussions on Draft Final Report (M/D)

### **Minutes of Discussions on the Preparatory Survey for the Project for Expansion of the Terminal Building at Kamuzu International Airport (Explanation on Draft Preparatory Survey Report)**

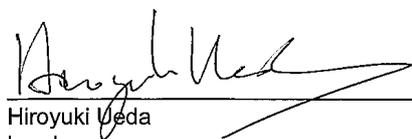
On the basis of the discussions and field survey in the Republic of Malawi (hereinafter referred to as "Malawi") from August to October 2014 and the subsequent technical examination of the result in Japan, the Japan International Cooperation Agency (hereinafter referred to as "JICA") prepared a Draft Preparatory Survey Report (hereinafter referred to as "the Draft Report") on the Project for Expansion of the Terminal Building at Kamuzu International Airport (hereinafter referred to as "the Project").

In order to explain the Draft Report and to consult with the Department of Civil Aviation (hereinafter referred to as "DCA") of the Ministry of Transport and Public Works (herein after referred to as "MoTPW") and the concerned officials of the Government of Malawi on its contents, JICA sent to Malawi the Preparatory Survey Team (hereinafter referred to as "the Team"), headed by Mr. Hiroyuki Ueda, Senior Advisor of JICA, and the Team is scheduled to stay in the country from 31<sup>st</sup> May to 6<sup>th</sup> June 2015.

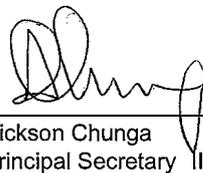
As a result of discussions, both sides confirmed the main items described in the attached sheets.

It should be noted that the implementation of the Preparatory Survey does not imply any decision or commitment by JICA to extend its grant for the Project at this stage.

Lilongwe, 4<sup>th</sup> June 2015



Hiroyuki Ueda  
Leader  
Preparatory Survey Team  
Japan International Cooperation Agency



Dickson Chunga  
Principal Secretary II  
Ministry of Transport and Public Works

## ATTACHMENT

### 1. Components of the Draft Report

After the explanation of the contents of the Draft Report by the Team, the Malawi side agreed in principle to its contents. In particular, the components of the Project described below, were discussed and agreed by both sides.

- Expansion and Rehabilitation of the Passenger Terminal Building
- Provision of Special Equipment (X-ray scanners, metal detectors, aerial work platform and aircraft surveillance system)

### 2. Cost Estimation

Both sides confirmed that the Project Cost Estimation described in Annex-1 including the contingency was provisional and would be examined further by the Government of Japan for its final approval. The contingency would cover the additional cost against natural disaster, unexpected natural conditions, etc.

### 3. Confidentiality of the Cost Estimation and Specifications

Both sides confirmed that the Project cost estimation in Annex-1 and technical specifications in the Draft Report should never be duplicated or disclosed to any third parties until all the contracts of the Project would be concluded.

### 4. Validity of the Previous Minutes of Meetings

Both sides confirmed that all agreements in the Minutes of Meetings of the preceding Preparatory Survey signed on 2<sup>nd</sup> October 2014 are valid unless information was updated by the Draft Report.

### 5. Japan's Grant Aid Scheme

The Malawi side reconfirmed and fully understood the scheme of the Japan's Grant Aid and the necessary measures to be undertaken by the Malawi side, which was explained by the Team and agreed as the Minutes of Meetings signed on 2<sup>nd</sup> October 2014.

### 6. Project Implementation Schedule

The Team explained to the Malawi side that the expected implementation schedule is as attached in Annex-2.

### 7. Undertakings by the Japanese Sides

The Grant Aid will cover the costs for the following:

- Expansion and rehabilitation of the Passenger Terminal Building
- Provision of Special Equipment (X-ray scanners, metal detectors, aerial work platform, aircraft surveillance system)
- Transportation of the Products from Japan/third countries to the Project site
- Installation, tuning and trial operation of the Equipment
- Guidance on initial operations and maintenance

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## 8. Undertakings by the Malawi Sides

- 8-1. The Malawi side promised to undertake the Major Undertakings to be taken by the Malawi side for the Project listed in Annex-3 with full responsibility and at its own expenses based on the contents of the Report.
- 8-2. The Malawi side fully understood the possibilities of the suspension/termination of this grant financial assistance if any violations on the undertakings occurred.
- 8-3. The Malawi side confirmed that the customs duties, internal taxes and other fiscal levies, imposed in Malawi with respect to the purchase of the products and the services should be exempted in accordance with the regulations of E/N between the two governments. In case the exemption would not be processed in a timely manner, anyhow, both sides confirmed such tentative payment(s) would be owed by the Malawi side.
- 8-4. Both sides confirmed that DCA should conduct the following administrative procedures in coordination with related organizations and agencies in a timely manner since the delay in procedures would exert crucial influence on the implementation of the Project.
  - (1) Environmental and Social Considerations Assessment  
Obtaining the Environmental Impact Assessment (hereinafter referred to as "EIA") certificate for the Project if it is required from Environmental Affairs Department (hereinafter referred to as "EAD") of Ministry of Natural Resources, Energy & Mining. Both sides confirmed that information on Environmental and Social Considerations including major impacts and relevant mitigation measures is summarized in the Environmental Checklist attached as Annex-4. Both sides also confirmed that continuous environmental monitoring will be conducted by the Malawi side in accordance with the Environmental Checklist and Monitoring Form attached as Annex-4 and Annex-5. The Malawi side agreed to complete the process of EIA certificate by the time of E/N.
  - (2) Development Certificate  
Obtaining Development Certificate for the expansion of the passenger terminal building from Town Planning Committee of Lilongwe City Council. The Malawi side agreed to complete the process of Development Certificate by the time of commencement of construction tender.
- 8-5. Both sides confirmed that DCA will report to JICA Malawi office the progress of the Major Undertakings by the Malawi side until all works to be done. Reports to JICA Malawi office should be provided monthly with actual progress bar chart in Annex-3. Other than the monthly report, MoTPW and DCA should reply if requested by JICA.

## 9. Schedule of the Study

JICA will complete the Final Report in accordance with the confirmed items and send it to the Malawi side around August 2015. The schedule is tentative and subject to change.



## 10. Other Relevant Issues

### 10-1. Operation and Maintenance of the Facilities and Equipment

The Team explained about the importance of operation and maintenance of facilities and equipment considering the fact that proper asset management impacts greatly on maintenance cost and life plan of the facilities and equipment. The Malawi side shall secure enough staff and budgets necessary for appropriate operation and maintenance of the facilities and equipment to be provided by the Project, including periodical maintenance work after the completion of the Project. The annual operation and maintenance costs are estimated and shown in Annex-6.

### 10-2. Safety Measures for Construction Works

To avoid accidents on site during the implementation of the Project, the Malawi side agreed to take and cause the consultant and the contractor to take safety measures based on "The Guidance for the Management of Safety for Construction Works in Japanese ODA Projects" which has been published on JICA's URL below.

[http://www.jica.go.jp/activities/schemes/oda\\_safety/ku57pq00001nz4eu-att/guidance\\_en.pdf](http://www.jica.go.jp/activities/schemes/oda_safety/ku57pq00001nz4eu-att/guidance_en.pdf)

### 10-3. Cooperation among Relevant Organizations

MoTPW and DCA promised to work closely with relevant organizations, such as Ministry of Finance, Environmental Affairs Department and Lilongwe City Council for smooth implementation of the Project.

### 10-4. Misconduct

- (1) The Government of Malawi will take all measures necessary to prevent any offer, gift or payment of any consideration or benefit, which would be construed as a corrupt practice or fraudulent practice in Malawi from being made as an inducement or reward related to the award of the contracts. JICA and the Government of Malawi understand that when the corrupt practice or fraudulent practice above occurs, the Government of Malawi will refund to JICA the portion of the Grant equivalent to the amount spent in such corrupt practice or fraudulent practice, which is determined by JICA.
- (2) JICA may, in addition, exercise other remedies. It is JICA's policy to require that the Authority, as well as bidders and contractors, under contracts funded with Japanese Grant Aid and other Japanese ODA observe the highest standard of ethics during the procurement and execution of such contracts. In pursuance of this policy, JICA;
  - (a) will reject a proposal for award if it determines that the bidder recommended for award has engaged in corrupt or fraudulent practices in competing for the contract in question; and
  - (b) will recognize a physical or juridical person as ineligible, for a period determined by JICA, to become a party to, to become a subcontractor under, or be delegated any responsibilities under any contract funded with Japanese Grant Aid if JICA, at any time, determines that the person



has engaged in a corrupt practice or fraudulent practice in competing for, or in executing, another contract funded with Japanese Grant Aid or other Japanese ODA.

- (3) If JICA receives information concerning suspected corrupt practice or fraudulent practices, the Government of Malawi shall take necessary measures in accordance with the Procurement Guidelines in the competition for, or in execution of, the contract funded by the Grant:
- (a) to provide JICA with such information as JICA may reasonably request, including information related to any concerned official of the government and/or public organization of Malawi; and
  - (b) not to treat unfairly or unfavourably the physical persons and juridical persons, that provide the information.

10-5. Restructuring of Organizations

The Malawi side agreed to promptly inform JICA of any plans of the changes in the legal character, ownership, or control of the implementing organizations, namely MoTPW, DCA and Airport Development Limited (ADL).

10-6. Disclosure of Information

Both sides confirmed that the study results excluding the Project Cost Estimation and details of the planned procurement and construction works will be disclosed to the public after completion of the Preparatory Survey. All the Study results including the Project Cost and details of the planned procurement and construction works will be disclosed to the public after all the contracts for the Project are concluded.

Annex-1: Project Cost Estimation

Annex-2: Project Implementation Schedule

Annex-3: Major Undertakings to be taken by the Malawi side

Annex-4: Environmental Checklist

Annex-5: Environmental Monitoring Form

Annex-6: Annual Operation and Maintenance Costs





## Major Undertakings to be taken by the Malawi side

## 1. Undertakings as a condition for the Japan Grand Aid to be implemented

No	Items	Remarks
1	To confirm land registration and its property, and permission for the implementation of the Project and to clear the site	
2	To bear the following commissions paid to the Japanese bank for banking services based upon the Banking Arrangement (B/A)	
	1) Advising commission of Authorization to pay (A/P)	
	2) Payment commission	
3	To ensure prompt unloading and customs clearance at the port(s) of disembarkation	
4	To ensure that customs duties, internal taxes and other fiscal levies which may be imposed in the Republic of Malawi with respect to the purchase of the products and the services be exempted/be borne by the Authority without using the Grant	
5	To accord Japanese physical persons and / or physical persons of third countries whose services may be required in connection with the supply of the products and the services such facilities as may be necessary for their entry into the Republic of Malawi and stay therein for the performance of their work	
6	To maintain and use properly and effectively the facilities constructed and the equipment provided under the Grant Aid	
7	To bear all the expenses, other than those covered by the Grant, necessary for the implementation of the Project	
8	To give due environmental and social consideration in the implementation of the Project	



## Environmental Checklist

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
1 Permits and Explanation	(1) EIA and Environmental Permits	(a) Have EIA reports been already prepared in official process? (b) Have EIA reports been approved by authorities of the host country's government? (c) Have EIA reports been unconditionally approved? If conditions are imposed on the approval of EIA reports, are the conditions satisfied? (d) In addition to the above approvals, have other required environmental permits been obtained from the appropriate regulatory authorities of the host country's government?	(a) N (b) N (c) N (d) N/A	(a), (b) and (c) 'Project Brief' is under preparation by DCA to be submitted to the EAD. EAD will evaluate the Project Brief and decide whether an EIA is required for the proposed project or not. (d) Not required.
	(2) Explanation to the Local Stakeholders	(a) Have contents of the project and the potential impacts been adequately explained to the local stakeholders based on appropriate procedures, including information disclosure? Is understanding obtained from the local stakeholders? (b) Have the comment from the stakeholders (such as local residents) been reflected to the project design?	(a) Y (b) N/A	(a) DCA, ADL and EAD have held meetings regarding environmental impacts of the project. (b) The public hearing has not been held as EAD consider it unnecessary on the ground that the project will take place on the premise of KIA and have limited impact on residents in the neighborhood.
	(3) Examination of Alternatives	(a) Have alternative plans of the project been examined with social and environmental considerations?	(a) Y	(a) Both the alternative plan and the proposed plan will have the same level of environmental impacts..
2 Pollution Control	(1) Water Quality	(a) Do pollutants, such as Suspended Solids (SS), and oils contained in effluents comply with the country's effluent standards (BOD, COD etc.)? Is there a possibility that the effluents from the project will cause areas not to comply with the country's ambient water quality standards?	(a) N	(a) Wastewater from the airport will be minimal and will be treated by the sewage treatment system of the airport. WATER RESOURCES (WATER POLLUTION CONTROL) REGULATIONS (consolidated version of G.N. 31/1978 as amended by G.N. 39/1997) provide for measures to prevent or reduce water pollution in Malawi. They state that no person shall, without written consent of the Minister, discharge effluents in public water but do not mention quality standards, except in the category of fees. The regulations applies whether discharge of such waste or effluent is by seepage or drainage but do not apply where any waste or effluent specified therein has been accepted into a local authority sewer.
	(2) Wastes	(a) Are wastes generated from the airports and other project facilities properly treated and disposed of in accordance with the country's regulations?	(a) N/A	(a) There is no regulations on solid waste management in Malawi. There is a waste dumping site on the airport premise where all wastes from the airport, except for some medical waste, are dumped once a week.
	(3) Noise and Vibration	(a) Does noise from aircraft comply with the country's standards? (b) Is there a possibility that noise and vibrations from various sources, such as airport users vehicles and vehicles for airport operations will adversely affect ambient noise levels? If impacts are anticipated, are adequate noise mitigation measures considered?	(a) Y (b) N/A	(a) There is no noise level standards in Malawi. (b) No. The project will not generate any additional passengers. Moreover, the airport's periphery is agricultural land.
	(4) Soil Contamination	(a) Has the soil in the project site been contaminated in the past? Are adequate measures taken to prevent soil contamination by leakage of fuels?	(a) N	(a) No. Adequate measures to prevent soil contamination from oils and other liquids will be taken.
	(5) Subsidence	(a) In the case of extraction of a large volume of groundwater, is there a possibility that the extraction of groundwater will cause subsidence?	(a) N/A	(a) Not applicable as it is not planned to extract large volumes of groundwater.
	(6) Odor	(a) Are there any odor sources? Are adequate odor control measures taken?	(a) N	(a) There are no odor sources.

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
3 Natural Environment	(1) Protected Areas	(a) Is the project site located in protected areas designated by the country's laws or international treaties and conventions? Is there a possibility that the project will affect the protected areas?	(a) N	(a) No
	(2) Ecosystem	(a) Does the project site encompass primeval forests, tropical rain forests, ecologically valuable habitats (e.g., coral reefs, mangroves, or tidal flats)? (b) Does the project site encompass the protected habitats of endangered species designated by the country's laws or international treaties and conventions? (c) If significant ecological impacts are anticipated, are adequate protection measures taken to reduce the impacts on the ecosystem? (d) Is there a possibility that the amount of water (e.g., surface water, groundwater) used by the project will adversely affect aquatic environments, such as rivers? Are adequate measures taken to reduce the impacts on aquatic environments, such as aquatic organisms?	(a) N (b) N (c) N/A (d) N	(a) No, (b) No, (c) N/A, (d) No
	(3) Hydrology	(a) Is there any possibility that alteration of drainage system due to the constructions of airports and related facilities will adversely affect surface water and groundwater flows? (b) Do the facilities affect adversely flow regimes, waves, tides, currents of rivers and etc. if the project facilities are constructed on/by the seas?	(a) N (b) N	(a) No, (b) No
	(4) Topography and Geology	(a) Does the project require the large scale change of topographic/geographic features? (b) Is there a possibility that civil works, such as cutting and filling will cause slope failures or landslides? Are adequate measures considered to prevent slope failures or landslides? (c) Is there a possibility that soil runoff will result from cut and fill areas, waste soil disposal sites, and borrow sites? Are adequate measures taken to prevent soil runoff? (d) In the case of offshore projects, is there any possibility that the project will erode natural beaches?	(a) N (b) N (c) N (d) N/A	(a) No, (b) No, (c) No, (d) N/A

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Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
4 Social Environment	(1) Resettlement	(a) Is involuntary resettlement caused by project implementation? If involuntary resettlement is caused, are efforts made to minimize the impacts caused by the resettlement? (b) Is adequate explanation on compensation and resettlement assistance given to affected people prior to resettlement? (c) Is the resettlement plan, including compensation with full replacement costs, restoration of livelihoods and living standards developed based on socioeconomic studies on resettlement? (d) Are the compensations going to be paid prior to the resettlement? (e) Are the compensation policies prepared in document? (f) Does the resettlement plan pay particular attention to vulnerable groups or people, including women, children, the elderly, people below the poverty line, ethnic minorities, and indigenous peoples? (g) Are agreements with the affected people obtained prior to resettlement? (h) Is the organizational framework established to properly implement resettlement? Are the capacity and budget secured to implement the plan? (i) Are any plans developed to monitor the impacts of resettlement? (j) Is the grievance redress mechanism established?	(a) N (b) N/A (c) N/A (d) N/A (e) N/A (f) N/A (g) N/A (h) N/A (i) N/A (j) N/A	(a) There are no inhabitants at the project site. (b), (c), (d), (e), (f), (g), (h), (i) and (j) N/A
	(2) Living and Livelihood	(a) Is there any possibility that the project will adversely affect the living conditions of inhabitants? Are adequate measures considered to reduce the impacts, if necessary? (b) Is there any possibility that the project causes the change of land uses in the neighboring areas to affect adversely livelihood of local people? (c) Is there any possibility that diseases, including infectious diseases, such as HIV will be brought due to immigration of workers associated with the project? Are adequate considerations given to public health, if necessary? (d) Is sufficient infrastructure (e.g., roads) available for the project implementation? If the existing infrastructure is insufficient, is a plan developed to construct new infrastructure or improve the existing infrastructure? (e) Is there any possibility that the airports and other project structures will cause a sun shading and radio interference?	(a) N (b) N (c) N/A (d) Y (e) N	(a) Adequate measures will be taken to minimize the impact the living conditions of the inhabitants. (b) There is slight possibility that the project causes the change of land uses. (c) There is no possibility that diseases will be brought due to immigration of workers associated with the project. (d) Sufficient infrastructure is available for the project implementation. (e) There is no possibility that the airports and other project structures will cause a sun shading and radio interference.
	(3) Heritage	(a) Is there a possibility that the project will damage the local archeological, historical, cultural, and religious heritage? Are adequate measures considered to protect these sites in accordance with the country's laws?	(a) N	(a) No
	(4) Landscape	(a) Is there a possibility that the project will adversely affect the local landscape? Are necessary measures taken?	(a) N	(a) No

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
4 Social Environment	(5) Ethnic Minorities and Indigenous Peoples	(a) Are considerations given to reduce impacts on the culture and lifestyle of ethnic minorities and indigenous peoples? (b) Are all of the rights of ethnic minorities and indigenous peoples in relation to land and resources respected?	(a) N/A (b) N/A	(a) No, (b) N/A
	(6) Working Conditions	(a) Is the project proponent not violating any laws and ordinances associated with the working conditions of the country which the project proponent should observe in the project? (b) Are tangible safety considerations in place for individuals involved in the project, such as the installation of safety equipment which prevents industrial accidents, and management of hazardous materials? (c) Are intangible measures being planned and implemented for individuals involved in the project, such as the establishment of a safety and health program, and safety training (including traffic safety and public health) for workers etc.? (d) Are appropriate measures taken to ensure that security guards involved in the project not to violate safety of other individuals involved, or local residents?	(a) N (b) N/A (c) Y (d) Y	(a) No, (b) N/A, (C) Safety and health measures will be included in the terms of reference of the subcontractor. (d) Local laws will be respected.
5 Others	(1) Impacts during Construction	(a) Are adequate measures considered to reduce impacts during construction (e.g., noise, vibrations, turbid water, dust, exhaust gases, and wastes)? (b) If construction activities adversely affect the natural environment (ecosystem), are adequate measures considered to reduce impacts? (c) If construction activities adversely affect the social environment, are adequate measures considered to reduce impacts?	(a) Y (b) N/A (c) N/A	(a) Adequate measures will be considered to reduce impacts during construction. (b) No construction activities will adversely affect the natural environment (ecosystem). (c) No construction activities will adversely affect the social environment.
	(2) Monitoring	(a) Does the proponent develop and implement monitoring program for the environmental items that are considered to have potential impacts? (b) What are the items, methods and frequencies of the monitoring program? (c) Does the proponent establish an adequate monitoring framework (organization, personnel, equipment, and adequate budget to sustain the monitoring framework)? (d) Are any regulatory requirements pertaining to the monitoring report system identified, such as the format and frequency of reports from the proponent to the regulatory authorities?	(a) Y (b) N/A (c) N/A (d) N	(a) The IEE report will include a Environmental Management and Monitoring Plan and will be provided to the project proponent for implementation. (b) and (c) These will be addressed in the IEE report. (d) No.

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Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
6 Note	Reference to Checklist of Other Sectors	(a) Where necessary, pertinent items described in the Roads, Railways, and Bridges checklist should also be checked (e.g., projects including large areas of deforestation). (b) If the airport is constructed on the sea, pertinent items described in the Ports and Harbors checklist should also be checked (e.g., projects including installation of power transmission lines and/or electric distribution facilities). (c) Where necessary, pertinent items described in the Forestry Projects checklist should also be checked (e.g., projects including large areas of deforestation).	(a) N/A (b) N/A (c) N/A	(a) N/A, (b) N/A, (c) N/A
	Note on Using Environmental Checklist	(a) If necessary, the impacts to trans boundary or global issues should be confirmed, if necessary (e.g., the project includes factors that may cause problems, such as trans boundary waste treatment, acid rain, destruction of the ozone layer, or global warming).	(a) N/A	(a) No trans boundary or global climate change issues are envisaged.

1) Regarding the term "Country's Standards" mentioned in the above table, in the event that environmental standards in the country where the project is located diverge significantly from international standards, appropriate environmental considerations are required to be made.  
 In cases where local environmental regulations are yet to be established in some areas, considerations should be made based on comparisons with appropriate standards of other countries (including Japan's experience).  
 2) Environmental checklist provides general environmental items to be checked. It may be necessary to add or delete an item taking into account the characteristics of the project and the particular circumstances of the country and locality in which it is located.

Environmental Monitoring Form

As the executing agency, DCA is responsible to monitor the dust control measures of dust, noise/vibration and accidents as well as disposal of waste material by the Contractor during the construction works. The form below should be used to submit the monitoring results.

Monitoring Item	Situation
Dust Control	
Disposal of Waste Water	
Disposal of Waste Material	
Noise/vibration control	
Mitigation of accidents	



## 6. Draft Monitoring Form

As the executing agency, the DCA is responsible to monitor the dust control measures and disposal of waste material by the Contractor during implementation phase. The form below should be used to submit the monitoring results.

Monitoring Item	Situation
Dust Control	
Disposal of Waste Water	
Disposal of Waste Material	

## 7. Environmental Checklist

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
1 Permits and Explanation	(1) EIA and Environmental Permits	(a) Have EIA reports been already prepared in official process? (b) Have EIA reports been approved by authorities of the host country's government? (c) Have EIA reports been unconditionally approved? If conditions are imposed on the approval of EIA reports, are the conditions satisfied? (d) In addition to the above approvals, have other required environmental permits been obtained from the appropriate regulatory authorities of the host country's government?	(a) N (b) N (c) N (d) N/A	(a), (b) and (c) 'Project Brief' is under preparation by DCA to be submitted to the Ministry of Environment and Climate Change Management (MoECCM). MoECCM will evaluate the Project Brief and decide whether an EIA is required for the proposed project or not. (d) Not required.
	(2) Explanation to the Local Stakeholders	(a) Have contents of the project and the potential impacts been adequately explained to the local stakeholders based on appropriate procedures, including information disclosure? Is understanding obtained from the local stakeholders? (b) Have the comment from the stakeholders (such as local residents) been reflected to the project design?	(a) Y (b) Y	(a) DCA and ADL have held meetings regarding environmental impacts of the project. (b) Yes
	(3) Examination of Alternatives	(a) Have alternative plans of the project been examined with social and environmental considerations?	(a) Y	(a) All three alternative plans will have the same social and environmental impacts.
2 Pollution Control	(1) Water Quality	(a) Do pollutants, such as Suspended Solids (SS), and oils contained in effluents comply with the country's effluent standards (BOD, COD etc.)? Is there a possibility that the effluents from the project will cause areas not to comply with the country's ambient water quality standards?	(a) N	(a) Wastewater from the airport will be minimal and will be treated by the sewage treatment system of the airport. WATER RESOURCES (WATER POLLUTION CONTROL) REGULATIONS (consolidated version of G.N. 31/1978 as amended by G.N. 39/1997) provide for measures to prevent or reduce water pollution in Malawi. They state that no person shall, without written consent of the Minister, discharge effluents in public water but do not mention quality standards, except in the category of fees. The regulations applies whether discharge of such waste or effluent is by seepage or drainage but do not apply where any waste or effluent specified therein has been accepted into a local authority sewer.
	(2) Wastes	(a) Are wastes generated from the airports and other project facilities properly treated and disposed of in accordance with the country's regulations?	(a) N/A	(a) There is no regulations on solid waste management in Malawi. There is a waste dumping site inside the airport premise where all wastes from the airport, except for some medical waste, are dumped once a week.
	(3) Noise and Vibration	(a) Does noise from aircraft comply with the country's standards? (b) Is there a possibility that noise and vibrations from various sources, such as airport users vehicles and vehicles for airport operations will adversely affect ambient noise levels? If impacts are anticipated, are adequate noise mitigation measures considered?	(a) Y (b) N	(a) There is no noise level standards in Malawi. (b) No. The project will not generate any additional passengers. Moreover, the airport's periphery is agricultural land.
	(4) Soil Contamination	(a) Has the soil in the project site been contaminated in the past? Are adequate measures taken to prevent soil contamination by leakage of fuels?	(a) N	(a) No. Adequate measures to prevent soil contamination from oils and other liquids will be taken.
	(5) Subsidence	(a) In the case of extraction of a large volume of groundwater, is there a possibility that the extraction of groundwater will cause subsidence?	(a) N/A	(a) Not applicable as it is not planned to extract large volumes of groundwater.

	(6) Odor	(a) Are there any odor sources? Are adequate odor control measures taken?	(a) N	(a) There are no odor sources.
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Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
3 Natural Environment	(1) Protected Areas	(a) Is the project site located in protected areas designated by the country's laws or international treaties and conventions? Is there a possibility that the project will affect the protected areas?	(a) N	(a) No
	(2) Ecosystem	(a) Does the project site encompass primeval forests, tropical rain forests, ecologically valuable habitats (e.g., coral reefs, mangroves, or tidal flats)? (b) Does the project site encompass the protected habitats of endangered species designated by the country's laws or international treaties and conventions? (c) If significant ecological impacts are anticipated, are adequate protection measures taken to reduce the impacts on the ecosystem? (d) Is there a possibility that the amount of water (e.g., surface water, groundwater) used by the project will adversely affect aquatic environments, such as rivers? Are adequate measures taken to reduce the impacts on aquatic environments, such as aquatic organisms?	(a) N (b) N (c) N/A (d) N	(a) No, (b) No, (c) N/A, (d) No
	(3) Hydrology	(a) Is there any possibility that alteration of drainage system due to the constructions of airports and related facilities will adversely affect surface water and groundwater flows? (b) Do the facilities affect adversely flow regimes, waves, tides, currents of rivers and etc. if the project facilities are constructed on/by the seas?	(a) N (b) N	(a) No, (b) No
	(4) Topography and Geology	(a) Does the project require the large scale change of topographic/geographic features? (b) Is there a possibility that civil works, such as cutting and filling will cause slope failures or landslides? Are adequate measures considered to prevent slope failures or landslides? (c) Is there a possibility that soil runoff will result from cut and fill areas, waste soil disposal sites, and borrow sites? Are adequate measures taken to prevent soil runoff? (d) In the case of offshore projects, is there any possibility that the project will erode natural beaches?	(a) N (b) N (c) N (d) N/A	(a) No, (b) No, (c) No, (d) N/A

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
4 Social Environment	(1) Resettlement	<p>(a) Is involuntary resettlement caused by project implementation? If involuntary resettlement is caused, are efforts made to minimize the impacts caused by the resettlement?</p> <p>(b) Is adequate explanation on compensation and resettlement assistance given to affected people prior to resettlement?</p> <p>(c) Is the resettlement plan, including compensation with full replacement costs, restoration of livelihoods and living standards developed based on socioeconomic studies on resettlement?</p> <p>(d) Are the compensations going to be paid prior to the resettlement?</p> <p>(e) Are the compensation policies prepared in document?</p> <p>(f) Does the resettlement plan pay particular attention to vulnerable groups or people, including women, children, the elderly, people below the poverty line, ethnic minorities, and indigenous peoples?</p> <p>(g) Are agreements with the affected people obtained prior to resettlement?</p> <p>(h) Is the organizational framework established to properly implement resettlement? Are the capacity and budget secured to implement the plan?</p> <p>(i) Are any plans developed to monitor the impacts of resettlement?</p> <p>(j) Is the grievance redress mechanism established?</p>	<p>(a) N</p> <p>(b) N/A</p> <p>(c) N/A</p> <p>(d) N/A</p> <p>(e) N/A</p> <p>(f) N/A</p> <p>(g) N/A</p> <p>(h) N/A</p> <p>(i) N/A</p> <p>(j) N/A</p>	(a) There are no inhabitants at the project site. (b), (c), (d), (e), (f), (g), (h), (i) and (j) N/A
	(2) Living and Livelihood	<p>(a) Is there any possibility that the project will adversely affect the living conditions of inhabitants? Are adequate measures considered to reduce the impacts, if necessary?</p> <p>(b) Is there any possibility that the project causes the change of land uses in the neighboring areas to affect adversely livelihood of local people?</p> <p>(c) Is there any possibility that diseases, including infectious diseases, such as HIV will be brought due to immigration of workers associated with the project? Are adequate considerations given to public health, if necessary?</p> <p>(d) Is sufficient infrastructure (e.g., roads) available for the project implementation? If the existing infrastructure is insufficient, is a plan developed to construct new infrastructure or improve the existing infrastructure?</p> <p>(e) Is there any possibility that the airports and other project structures will cause a sun shading and radio interference?</p>	<p>(a) N</p> <p>(b) N</p> <p>(c) N/A</p> <p>(d) Y</p> <p>(e) N</p>	<p>(a) Adequate measures will be taken to minimize the impact the living conditions of the inhabitants.</p> <p>(b) There is slight possibility that the project causes the change of land uses and will be explained to the stakeholders.</p> <p>(c) There is no possibility that diseases will be brought due to immigration of workers associated with the project.</p> <p>(d) Sufficient infrastructure is available for the project implementation.</p> <p>(e) There is no possibility that the airports and other project structures will cause a sun shading and radio interference.</p>
	(3) Heritage	<p>(a) Is there a possibility that the project will damage the local archeological, historical, cultural, and religious heritage? Are adequate measures considered to protect these sites in accordance with the country's laws?</p>	(a) N	(a) No
	(4) Landscape	<p>(a) Is there a possibility that the project will adversely affect the local landscape? Are necessary measures taken?</p>	(a) N	(a) No

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
4 Social Environment	(5) Ethnic Minorities and Indigenous Peoples	(a) Are considerations given to reduce impacts on the culture and lifestyle of ethnic minorities and indigenous peoples? (b) Are all of the rights of ethnic minorities and indigenous peoples in relation to land and resources respected?	(a) N/A (b) N/A	(a) No, (b) N/A
	(6) Working Conditions	(a) Is the project proponent not violating any laws and ordinances associated with the working conditions of the country which the project proponent should observe in the project? (b) Are tangible safety considerations in place for individuals involved in the project, such as the installation of safety equipment which prevents industrial accidents, and management of hazardous materials? (c) Are intangible measures being planned and implemented for individuals involved in the project, such as the establishment of a safety and health program, and safety training (including traffic safety and public health) for workers etc.? (d) Are appropriate measures taken to ensure that security guards involved in the project not to violate safety of other individuals involved, or local residents?	(a) N (b) N/A (c) Y (d) Y	(a) No, (b) N/A, (C) Safety and health measures will be included in the terms of reference of the subcontractor. (d) Local laws will be respected.
5 Others	(1) Impacts during Construction	(a) Are adequate measures considered to reduce impacts during construction (e.g., noise, vibrations, turbid water, dust, exhaust gases, and wastes)? (b) If construction activities adversely affect the natural environment (ecosystem), are adequate measures considered to reduce impacts? (c) If construction activities adversely affect the social environment, are adequate measures considered to reduce impacts?	(a) Y (b) N/A (c) N/A	(a) Adequate measures will be considered to reduce impacts during construction. (b) No construction activities will adversely affect the natural environment (ecosystem). (c) No construction activities will adversely affect the social environment.
	(2) Monitoring	(a) Does the proponent develop and implement monitoring program for the environmental items that are considered to have potential impacts? (b) What are the items, methods and frequencies of the monitoring program? (c) Does the proponent establish an adequate monitoring framework (organization, personnel, equipment, and adequate budget to sustain the monitoring framework)? (d) Are any regulatory requirements pertaining to the monitoring report system identified, such as the format and frequency of reports from the proponent to the regulatory authorities?	(a) Y (b) N/A (c) N/A (d) N	(a) The IEE report will include a Environmental Management and Monitoring Plan and will be provided to the project proponent for implementation. (b) and (c) These will be addressed in the IEE report. (d) No.

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
6 Note	Reference to Checklist of Other Sectors	(a) Where necessary, pertinent items described in the Roads, Railways, and Bridges checklist should also be checked (e.g., projects including large areas of deforestation). (b) If the airport is constructed on the sea, pertinent items described in the Ports and Harbors checklist should also be checked (e.g., projects including installation of power transmission lines and/or electric distribution facilities). (c) Where necessary, pertinent items described in the Forestry Projects checklist should also be checked (e.g., projects including large areas of deforestation).	(a) N/A (b) N/A (c) N/A	(a) N/A, (b) N/A, (c)N/A
	Note on Using Environmental Checklist	(a) If necessary, the impacts to trans boundary or global issues should be confirmed, if necessary (e.g., the project includes factors that may cause problems, such as trans boundary waste treatment, acid rain, destruction of the ozone layer, or global warming).	(a) N/A	(a) No trans boundary or global climate change issues are envisaged.

**1) Regarding the term “Country's Standards” mentioned in the above table, in the event that environmental standards in the country where the project is located diverge significantly from international standards, appropriate environmental considerations are required to be made.**

**In cases where local environmental regulations are yet to be established in some areas, considerations should be made based on comparisons with appropriate standards of other countries (including Japan's experience).**

**2) Environmental checklist provides general environmental items to be checked. It may be necessary to add or delete an item taking into account the characteristics of the project and the particular circumstances of the country and locality in which it is located.**

8. Results of Boring Test

MINISTRY OF TRANSPORT AND PUBLIC INFRASTRUCTURE  
MATERIALS LABORATORY  
DRILLING HOLE LOG

PROJECT :		Rehabilitation of Kamuzu International Airport										
LOCATION :		Lumbadzi						SURVEYED BY:		J Bwanausi		
GROUND ELEVATION :		-						LOGGED BY:		E.G. Machila		
GROUND WATER LEVEL :								DATE:		8-11/09/14		
BORE HOLE NO. :		1										
ELEVATION (m)	DEPTH (m)	GRAPHIC	DEPTH (m)	DEPTH (m)	SAMPLE TYPE	NUMBER OF BLOWS			SPT N VALUE 300mm	DESCRIPTION OF MATERIAL	REMARKS	
						IN 150mm	IN 150mm	IN 150mm				
	0.00									Loose darkish brown sandy silty CLAY	Percussive	
			0.87								Drilling	
			1.07							Loose reddish brown laterite GRAVEL		
			1.50	1.52	SPT	2	3	3	6	Reddish brown sandy silty CLAY		
	2.00		2.13							Reddish brown decomposed ROCK		
			3.00	2.58	SPT	2	2	4	6	Medium dense reddish brown micaceous decomposed ROCK		
	4.00		4.02	3.45	SPT	7	6	9	15	Firm to stiff mottled brown micaceous decomposed ROCK		
			5.60	4.47	SPT	4	5	6	11	Medium dense decomposed ROCK		
			5.60	5.60	SPT	5	7	10	17			
	6.00		6.50	6.45	SPT	4	6	7	13	Medium dense mottled micaceous decomposed ROCK		
			7.60	7.45	SPT	5	5	9	14	Micaceous decomposed ROCK		
	8.00			8.45	SPT	15	24	37	61			
				9.55	SPT	21	35	52	87	Dense mottled brown micaceous ROCK		
	10.00			10.45	SPT	5	8	12	20			
				11.00	SPT	5	9	10	19			
			11.89							Medium dense weathered ROCK		
	12.00			12.45	SPT	8	10	15	25			
				13.45	SPT	14	21	20	41	Dense greyish brown micaceous weathered ROCK		
			13.65									
	14.00			14.45	SPT	7	11	15	26			
				15.65	SPT	9	10	17	26	Medium dense to dense greyish brown micaceous highly weathered ROCK		
	16.00			16.50	SPT	10	19	38	57			
			16.97									
	18.00			17.66	SPT	15	24	45	69			
				18.37	SPT	38	55++				120 mm Pen.	
	20.00			19.32	SPT	40	55++				160 mm Pen.	
			20.41	20.07	42.00	55++				Very dense greyish brown micaceous weathered ROCK	95 mm Pen.	
UD		=	Undisturbed Sample			*****			=	Sand		
N		=	SPT N-Value			.....			=	Gravel		
D		=	Disturbed Sample			-----			=	Silt		
									=	Clay		
									=	Decomposed Rock		

MINISTRY OF TRANSPORT AND PUBLIC INFRASTRUCTURE  
MATERIALS LABORATORY  
DRILLING HOLE LOG

PROJECT :		Rehabilitation of Kamuzu International Airport										
LOCATION :		Lumbadzi			SURVEYED BY:		J Bwanausi					
GROUND ELEVATION :		-			LOGGED BY:		E.G. Machita					
GROUND WATER LEVE :					DATE:		8-11/09/14					
BORE HOLE NO. :		1										
ELEVATION (m)	DEPTH (m)	GRAPHIC	DEPTH (m)	DEPTH (m)	SAMPLE TYPE	NUMBER OF BLOWS			SPT N VALUE 300mm	DESCRIPTION OF MATERIAL	REMARKS	
						IN 150mm	IN 150mm	IN 150mm				
	0.00		0.87							Loose darkish brown sandy silty CLAY	Percussive	
			1.07							Loose reddish brown laterite GRAVEL	Drilling	
	2.00		1.50	1.52	SPT	2	3	3	6	Reddish brown sandy silty CLAY		
			2.13							Reddish brown decomposed ROCK		
				2.58	SPT	2	2	4	6	Medium dense reddish brown micaceous decomposed ROCK		
	4.00			3.00								
				3.45	SPT	7	6	9	15	Firm to stiff mottled brown micaceous decomposed ROCK		
				4.02								
				4.47	SPT	4	5	6	11	Medium dense decomposed ROCK		
				5.60	SPT	5	7	10	17			
	6.00			6.45	SPT	4	6	7	13	Medium dense mottled micaceous decomposed ROCK		
				7.45	SPT	5	5	9	14	Micaceous decomposed ROCK		
				8.45	SPT	15	24	37	61			
				9.55	SPT	21	35	52	87	Dense mottled brown micaceous ROCK		
	10.00			10.45	SPT	5	8	12	20			
				11.00	SPT	5	9	10	19			
				11.89						Medium dense weathered ROCK		
				12.45	SPT	8	10	15	25			
				13.45	SPT	14	21	20	41	Dense greyish brown micaceous weathered ROCK		
				13.65								
	14.00			14.45	SPT	7	11	15	26			
				15.85	SPT	9	10	17	26	Medium dense to dense greyish brown micaceous highly weathered ROCK		
				16.50	SPT	10	19	38	57			
				16.97								
	18.00			17.66	SPT	15	24	45	69			
				18.37	SPT	38	55++				120 mm Pen	
	20.00			19.32	SPT	40	55++				160 mm Pen.	
				20.41	42.00	55++					95 mm Pen.	
UD		=	Undisturbed Sample						=	Sand		
N		=	SPT N-Value						=	Gravel		
D		=	Disturbed Sample						=	Silt		
									=	Clay		
									=	Decomposed Rock		

MINISTRY OF TRANSPORT AND PUBLIC INFRASTRUCTURE  
MATERIALS LABORATORY  
DRILLING HOLE LOG

PROJECT :		Rehabilitation of Kamuzu International Airport									
LOCATION :		Lumbadzi				SURVEYED BY:		J Bwanausi			
GROUND ELEVATION :		-				LOGGED BY:		E.G. Machila			
GROUND WATER LEVE :						DATE:		15-16/09/2014			
BORE HOLE NO. :		3									
ELEVATION (m)	DEPTH (m)	GRAPHIC	DEPTH (m)	DEPTH (m)	SAMPLE TYPE	NUMBER OF BLOWS			SPT N VALUE 300mm	DESCRIPTION OF MATERIAL	REMARKS
						IN 150mm	IN 150mm	IN 150mm			
	0.00		0.62							Loose darkish brown sandy SILT	Percussive
	2.00			1.45	SPT	4	4	6	10	Medium dense reddish brown micaceous decomposed ROCK	Drilling
				2.55	SPT	3	5	6	11		
	4.00			3.65	SPT	5	5	8	13		
				4.60	SPT	5	6	8	14	Medium dense reddish brown micaceous decomposed ROCK	
	6.00			5.45	SPT	8	7	7	14		
				6.45	SPT	6	8	9	17		
				7.20							
	8.00			7.65	SPT	5	10	14	24		
				8.55	SPT	4	6	10	16		
				9.55	SPT	4	7	8	15	Medium dense molled decomposed quartz GRAVEL	
	10.00			10.55	SPT	5	7	11	18		
				11.66	SPT	6	8	10	18		
	12.00		12.65	SPT	7	10	13	23			
			12.05								
	14.00		13.45	SPT	9	12	13	25			
			14.65	SPT	10	14	15	29	Medium dense whitish grey decomposed quartz GRAVEL		
	16.00		15.59	SPT	7	14	16	30			
			16.50	SPT	8	15	18	33			
			16.89								
	18.00		17.65	SPT	10	17	29	46			
			18.52	SPT	22	37	55++		Medium dense to very dense greyish micaceous decomposed ROCK		
	20.00		19.05	SPT	24	39	55++				
			20.39	SPT	32	55++					
			20.3920.387	SPT						120 mm Pen 100 mm Pen 137 mm Pen.	
UD		=	Undisturbed Sample						= Sand		
N		=	SPT N-Value						= Gravel		
D		=	Disturbed Sample						= Silt		
									= Clay		
									= Decomposed Rock		