MINISTRY OF COMMUNICATION AND AVIATION
SOLOMON ISLANDS

PREPARATORY SURVEY FOR THE PROJECT FOR IMPROVEMENT OF HONIARA AIRPORT

APRIL 2018

JAPAN INTERNATIONAL COOPERATION AGENCY

GYROS CORPORATION
EHIRA ARCHITECTS AND ENGINEERS, INC.
ORIENTAL CONSULTANTS GLOBAL CO., LTD.

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PREFACE

Japan International Cooperation Agency (JICA) decided to conduct the preparatory survey and entrust the survey to consist of Gyros Corporation, Ehira Architects and Engineers, Inc. and Oriental Consultants Global CO., Ltd.

The survey team held a series of discussions with the officials concerned of the Government of the Solomon Islands, and conducted field investigations. As a result of further studies in Japan, the present report was finalized.

I hope that this 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 concerned of the Government of the Solomon Islands for their close cooperation extended to the survey team.

April 2018

Istu Adachi
Director General,
Infrastructure and Peace building Department
Japan International Cooperation Agency

Summary

1. Project Background

Honiara International Airport (Hereinafter referred to Honiara Airport) is a capital airport of the Solomon Islands and the only one international airport. As the Solomon Islands is island country, air transport is one of the important mode of domestic transport. The Solomon Islands considers tourism development is one of the pillars of economic development and tourism resources are located in regional islands. In this regard, development of air transport network and improvement of safety of air transport is very important in regards to tourist development. Since Honiara Airport is a gateway airport and at the same time is hub airport of domestic air transport, it is necessary to improve connectivity between international and domestic flights.

Although Honiara Airport is important for tourism development and economic growth, its facility has been deteriorated and to continue safe aircraft operation, there are many facilities need to be rehabilitated. And, the temperature of the inside of the existing international passenger building is high and it is not a comfortable environment.

Honiara Airport was flooded during heavy rain in April 2014 and aircraft operation was suspended for a week. Because the domestic building and the control tower are located in the lower ground, the area is flooded with heavy rain and it is troublesome for airport operation. Since it is important to secure transport route during a disaster, it is necessary for Honiara Airport, as the largest airport in the Solomon Islands, not to suspend operation during heavy rain and to be able to correspond to a disaster situation.

2. Results of the Survey and Contents of the Project

Based on the request from the Government of Solomon Islands, the Government of Japan decided to conduct the preparatory survey. The Japan International Cooperation Agency dispatched a study team to Honiara from May 8 to June 23, 2017. The study team held several meetings with the Ministry of Communication and Aviation and Honiara Airport to discuss the content of the request. The team also conducted field surveys, the study of operation and maintenance organization, and planning of facility and equipment development plan. After the site survey, the team prepared the 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 the Solomon Islands from February 13 to February 18, 2018 in Honiara. After which the contents were agreed upon.

Main project components in the project are summarized in the table below.

Table 1 Outline of Buildings

Buildings	Structure/ scale	Building Area	Total Floor Area	Construction Floor Area
Expansion Work (EW)				
International Departure Terminal Building (IDT)	2-story steel structure	2,988.05 ㎡	3,399.79 ㎡	4,872.37 ㎡
Utility Building (UB)	1-story steel structure	99.84 ㎡	99.84 ㎡	99.84 ㎡
Total Area		3,087.89 ㎡	3,499.63 ㎡	4,991.05 ㎡
Rehabilitation Work (RW)				
Existing Passenger Terminal Building (ETB)	2-story steel structure		967.69 ㎡ (Renovation area)	1,929.33 ㎡ (Renovation area)
Existing Sub-station (SUB)	1-story steel structure		110.52 ㎡ (Renovation area)	110.52 ㎡ (Renovation area)
Total Area			1,078.21 ㎡	2,039.85 ㎡
Overall Total Area			4,577.84 ㎡	7,030.90 ㎡

Table 2 Outline of Special Equipment

Items	Outline	Location/ Scale
Baggage Handling System (BHS)	Facility to transport hold baggage of international passenger to baggage makeup area	IDT: 1 set
Security Equipment		
Hold baggage X-ray Inspection System (Dual View)	Baggage inspection system for hold baggage of international departure passengers and cabin baggage for VIP passengers	IDT: 2 sets
Hold baggage X-ray Inspection System (Single View)	Hold baggage inspection system of international arrival passengers in Customs Area	ETB: 1 set
Cabin baggage X-ray Inspection system (Dual View)	Baggage inspection system for cabin baggage of international departure passengers	IDT: 2 sets
Small baggage X-ray Inspection System (Single View)	Baggage inspection system for airport staff	ETB: 1 set
Gate type walk through metal detector	Security equipment for international departure passengers, VIP and airport staffs	IDT: 2 sets ETB: 1set
Hand held metal detector	Security equipment for international departure passengers, VIP and airport staffs	IDT: 2 sets ETB: 1set

Table 3 Outline of Civil Facilities

Items	Outline	Type/ Scale
Expansion of Aprons	Construction of 4 aircraft parking spots for international and 6 spots for domestic	Concrete pavement: Approx. 900 ㎡、 Asphalt pavement: Approx. 30,380 ㎡
New Taxiway	Length: 235m Widths: 23m	Asphalt pavement: Approx. 5,500 ㎡
Rehabilitation of existing pavement	Rehabilitation of pavements in existing taxiway and apron	Asphalt overlay: Approx. 15,400 ㎡
Landside Roads	Length: 250m Width: 3.0m-9.0m	Asphalt pavement: Approx. 1,670 ㎡
Airfield Lighting System	New installation and renewal of existing facilities	Apron flood light: 6 poles, Taxiway lights 26 lights, Mandatory instruction signs: 3 lights, Aerodrome beacon 1 set
Flood Protection Dike	Construct dike at the southern side of the runway	Dike length Approx. 600m, Height: 3.0m

3. Project Implementation Schedule

The detailed design stage will take 5.25 months, the tender period will be 3.0 months and the construction period will be 31 months.

4. Project Evaluation

(1) Relevance

Mitigating congestion, extending its capacity to cater the increasing demand, and enhancing the safety of Honiara Airport is an urgent issue. As the project compliance with a basic policy of Japan's Country Assistance Policy for the Solomon Islands, necessity and validity of the project implementation is high. Also, as the project meets national development strategy of the Government of the Solomon Islands, the significance of the project implementation as Japanese Grant Aid Project is high.

(2) Effectiveness

The expected quantitative effectiveness of the project is shown below.

Table 4 Quantitative Effects of the Project

Index	Baseline (2017 value)	Target Value (2024) [3 years after completion]
Annual International Passengers at Honiara Airport (person/year)	93,484	125,000
Annual Aircraft Movements at Honiara Airport (number/year)	8,595	9,000

Qualitative effects of the project are as follows:

- The convenience of the airport user will be improved by expansion and renovation of the passenger terminal buildings;
- The congestions at the apron will be mitigated, and aircraft operation safety will be enhanced through the new construction and rehabilitation of taxiways, and the expansion and renovation of the apron;
- Industries and tourism will be promoted, and the investment environment will be improved, with an increased number of tourists, business people, and investment amount;
- Airport operations will not be interrupted by heavy torrential rains and be able to continue its service.

As this project is expected to provide various effects as mentioned above and to contribute improvement of Basic Human Needs (BHN) of nationals of the Solomon Islands, it has high relevance and effectiveness to be implemented under the Japanese Grand Aid Scheme.

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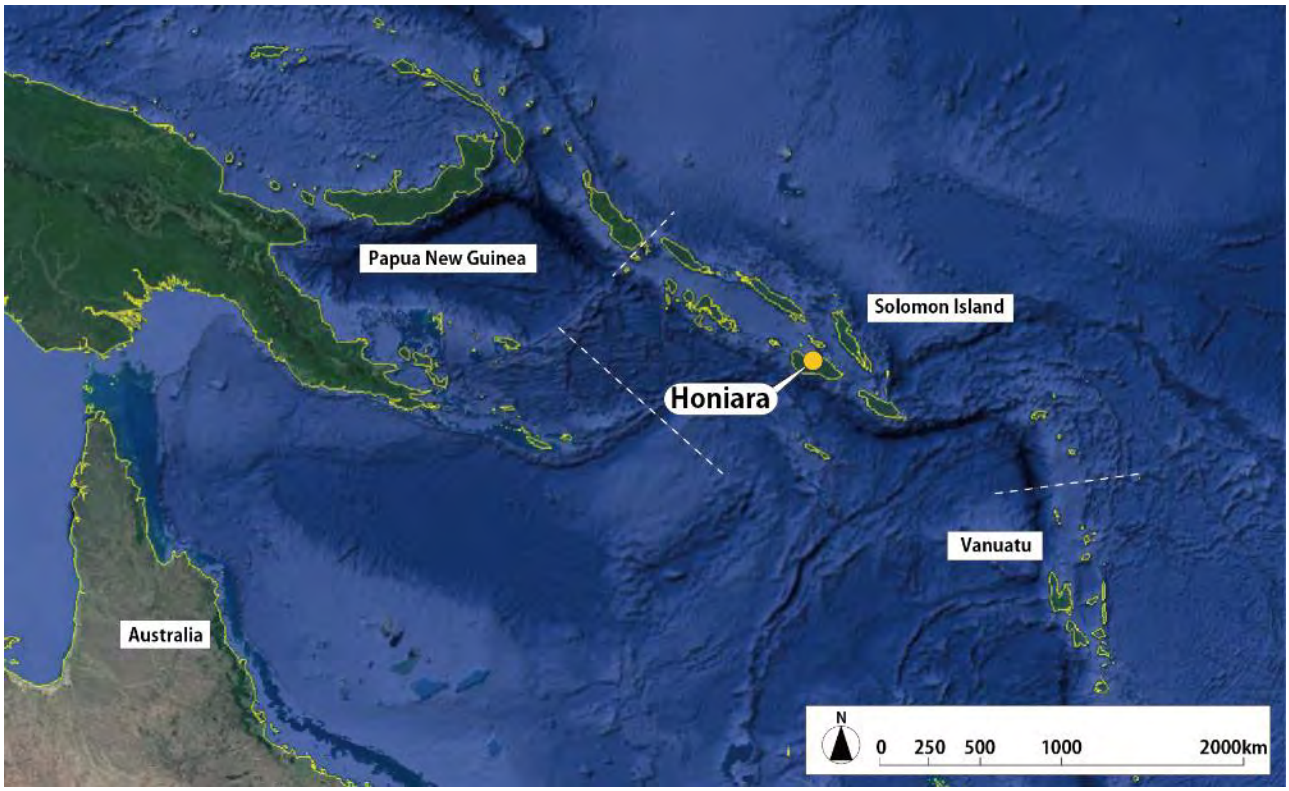

Location Map of Survey Site

Perspective

Perspective

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Runway in front and international building far side

Photograph 2 International Building

View from access road

Photograph 3 International Building

View from airside

Photograph 4 International Check-in Hall

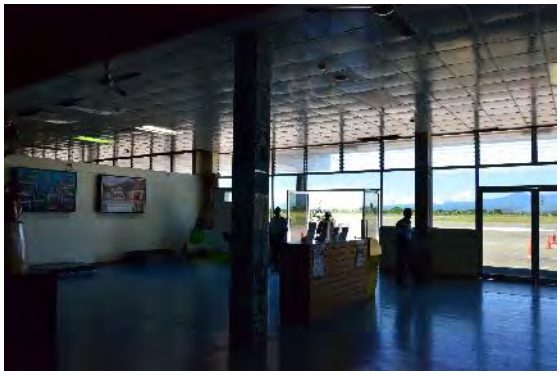
Photograph 5 International Security Check Point

All equipment are working condition

Photograph 6 International Departure Lounge

Room temperature is high. There are partition and air conditioning units.

Photograph



Photograph 7 Arrival Lounge

Illumination is low.

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Abbreviations

ADB	Asian Development Bank
ADS-B	Automatic Dependent Surveilance-Broadcast
AEP	Acrylic Emulsion Paint
AFL	Air Field Lighting
AFTN	Aeronautical Fixed Telecommunication Network
ATC	Air Traffic Control
ATM	Air Traffic Management
BHN	Basic Human Needs
BHS	Baggage Handling System
B737	Boeing 737
B767	Boeing 767
CAASI	Civil Aviation Authority of Solomon Islands
CCR	Constant Current Regulator
CCTV	Closed Circuit Television
CFO	Chief Financial Officer
COO	Chief Operating Officer
DME	Distance Measuring Equipment
EAC	Environmental Advisory Committee
ECD	Environmental and Conservation Division
EIA	Environmental Initial Analysis
EIS	Environmental Impact Statement
ETB	Existing Terminal Building
EW	Expansion Works
FAA	Federal Aviation Administration
FIDS	Flight Information Display System
JICA	Japan International Cooperation Agency
JIS	Japanese Industrial Standards
GDP	Gross Domestic Product
GNI	Gross National Income
GSE	Ground Support Equipment
HF	High Frequency
IATA	International Air Transport Association
ICAO	International Civil Aviation Organization
IDT	International Departure Terminal Building
IMF	International Monetary Fund
IUCN	International Union for Conservation of Nature
LED	Light Emitting Diode
LGS	Light Gauge Steel
MARS	Multiple Aircraft Ramp System
MCA	Ministry of Communication and Aviation
MDF	Main Distribution Frame

MECDM	Ministry of Environment, Climate Change, Disaster Management and Meteorology
MID	Ministry of Infrastructure Development
ODA	Official Development Assistance
PA	Public Address
PAPI	Precision Approach Path Indicator
PCI	Pavement Condition Index
PER	Public Environmental Report
PMV	Predicted Mean Vote
PQ	Prequalification
RAMSI	Regional Assistance Mission to Solomon Islands
RW	Renovation Works
SALS	Simple Approach Lighting System
SIACL	Solomon Islands Airport Corporation Limited
SIEA	Solomon Islands Electricity Authority
SIWA	Solomon Islands Water Authority
SLSC	Standard Least-Squares Criterion
SOP	Synthetic Oil Paint
SUB	Existing Electrical Substation
TEDL	Taxiway Edge Light
UB	Utility Building
UNWTO	UN World Tourism Organization
USACE	United States Army Corps of Engineers
USGS	United States Geological Survey
VHF	Very High Frequency
VIP	Very Important Person
VOR	VHF Omni Directional Radio Range

Chapter 1 Background of the Project

1.1. Objectives of the Project

Honiara International Airport (Hereinafter referred to Honiara Airport) is a capital airport of the Solomon Islands and the only one international airport. As the Solomon Islands is island country, air transport is one of an important mode of domestic transport. Solomon Islands considers tourism development is one of the pillar of economic development and tourism resources are located in regional islands. In this regard, development of air transport network and improvement of safety of air transport is very important in regards to tourist development. Since Honiara Airport is a gateway airport and at the same time is hub airport of domestic air transport, it is necessary to improve connectivity between international and domestic flights.

Although Honiara Airport is important for tourism development and economic growth, its facility has been deteriorated and to continue safe aircraft operation, there are many facilities need to be rehabilitated. And, the temperature of the inside of the existing international passenger building is high and it is not a comfortable environment.

Honiara Airport was flooded during heavy ran in April 2014 and aircraft operation was suspended for a week. Because the domestic building and the control tower are located in the lower ground, the area is flooded during heavy rain and it is troublesome for airport operation. Since it is important to secure transport route during a disaster, it is necessary for Honiara Airport, as the largest airport in the Solomon Islands, not to suspend operation during heavy rain and to be able to correspond to a disaster situation.

1.2. Overall Goal and Project Objectives

The Government of the Solomon Islands is positioning development of Honiara Airport as one of the strategy of “expand and upgrade weather resilient infrastructure and utilities focused on access to productive resources and markets and to essential services” in “National Development Strategy 2016-2035” and also as priority project in sector development plan such as “National Transport Plan 2011-2030”, “National Infrastructure Investment Program in 2013” and “Civil Aviation Master Plan in 2007”.

The objectives of the project are to improve the safety of the airport and to cope with future air traffic demand by the development of civil facilities such as aprons, taxiways and airfield lighting system and building facilities such as passenger terminal building in Honiara Airport.

1.3. Request from the Government of Solomon Islands

Request from the Government of Solomon Islands is shown in the table below.

Table 1 Requests from Solomon Islands Government

	Requests	Remarks
1	Repair/rehabilitation of the existing pavements (taxiway and apron)	Request from the Government of Solomon Islands to the Government of Japan.
2	Expansion of aprons	
3	Construction of new taxiway.	
4	Installation of new airfield lighting system	
5	Renovation of the existing international building	
6	Construction of a new international building	Components, which were added to the request based on the pre survey by JICA in September 2016.
7	Construction of a new air traffic control tower	
8	Construction of a new fire station	
9	Construction of flood control embankment	

Based on the request from the Government of Solomon Islands, the Government of Japan decided to conduct the preparatory survey. The Japan International Cooperation Agency (Hereinafter referred to JICA) dispatched a study team to Honiara from May 8 to June 23, 2017. The study team held several meetings with the Ministry of Communication and Aviation and Honiara Airport to discuss the content of the request. The team also conducted field surveys, the study of operation and maintenance organization, and planning of facility and equipment development plan. After the site survey, the team prepared the 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 the Solomon Islands from February 13 to February 18, 2018 in Honiara. After which the contents were agreed upon.

1.4. Conditions of existing facilities

1.4.1. Facility Layout

A layout of facilities in Honiara Airport is shown below.

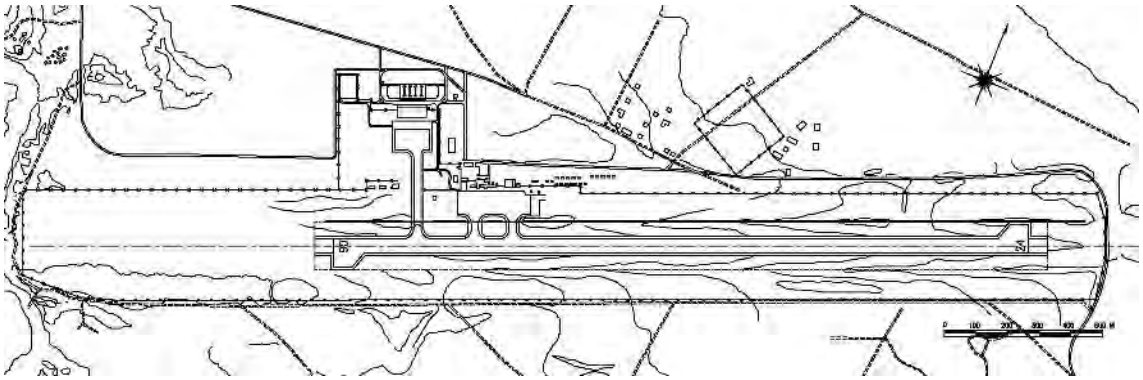


Figure 1 Airport Layout Plan of Honiara Airport

Passenger terminal area is located on the northern side of the runway. The domestic terminal area is on the eastern side and closed to the runway and the international terminal area is on the western side. The international terminal area was constructed by Japanese Grant Aid Project in 1997.

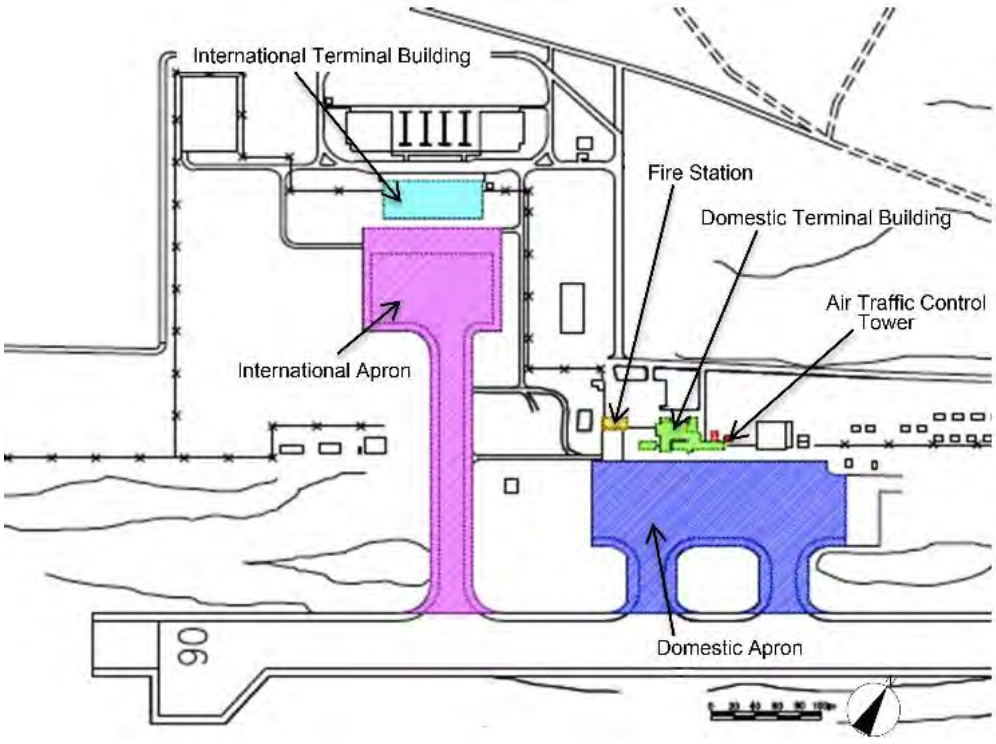


Figure 2 Passenger Terminal Area

1.4.2. International Apron

The international apron was constructed together with the international passenger terminal building in 1997 by Japanese Grant Aid. The area is 7,000 ㎡ and 2 small size jet aircraft such as Boeing 737 (B737) can park the area.

There is a case when 3 international flights arrive at the same time period. In that case, 1 aircraft parks in the domestic apron, which locates approximately 300m from the international apron, or 1 aircraft wait on the runway until parking spot is available in the international apron.

In case of operation of medium size jet such as Boeing 767 (B767) by charter flight, 2 parking spots are occupied by the 1 medium size jet so that schedule operation of small size jet in the apron is not possible.

1.4.3. Domestic Apron

The area of the domestic is approximately 10,000 ㎡. There is enough space for 6 small size propeller aircraft to park in the apron. Non-schedule freighter B737 also parks this domestic apron. The apron is used for business jet and military aircraft.

The domestic apron is located closer to the runway as compared with the international apron. There is no problem for small propeller aircraft park on the apron but the tail wing of aircraft such as B737 parking on the apron infringes transitional surface so that it is not appropriate to park such aircraft.

The ground height of the domestic apron area is lower than international terminal area. The area is often damaged by the flood. When Lungga river overflowed in 2014, flood water flowed from the south side of the runway into the airport area, and drainage system was not working properly. The domestic apron was flooded and the airport was closed for 3 days.

The main users of the domestic flights are international transit passengers visiting tourist area in regions. As the domestic terminal area is far from the international terminal area, such transit passengers have to walk approximately 400 m on the road.

1.4.4. Conditions of apron and taxiway pavements

Pavement conditions of existing apron and taxiway were evaluated by Pavement Condition Index (PCI) methods. PCI methods were developed by United States Army Corps of Engineers (USACE) as pavement survey and evaluation methods and it is included in ASTM International Standards.

Visual observation and measurement on site to each unit, which was divided into standards area units from the target area, is the method of PCI. Pavement distresses such as crack, segregation, weathering, etc. on the pavement are categorized by type, severity and scale by visual observation and measurements and recorded in the sheet shown below.

After a site inspection, calculation processing is conducted based on the recorded information, the pavement conditions are shown in PCI from 0 to 100. The larger PCI shows better condition and smaller PCI is worse conditions.

The existing international apron was divided into 15 units and taxiway was divided into 22 units. Visual observation and measurements were conducted and the results (PCI of each unit) are shown below.

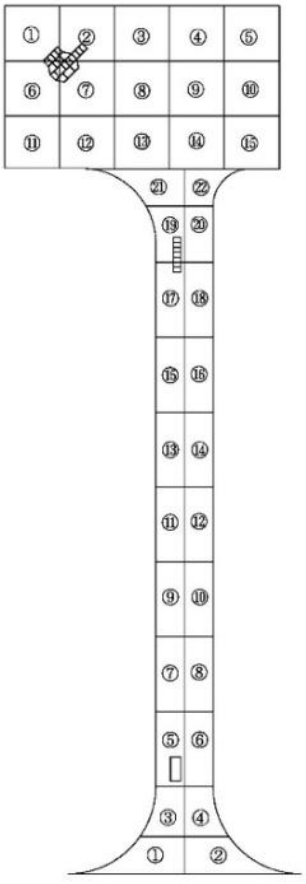


Figure 3 PCI Units

Table 2 PCI Survey Results

Apron		Taxaiwai	
Unit No.	PCI	Unit No.	PCI
①	39	①	43
②	30	②	43
③	35	③	38
④	30	④	38
⑤	33	⑤	38
⑥	38	⑥	40
⑦	43	⑦	38
⑧	35	⑧	38
⑨	34	⑨	39
⑩	29	⑩	43
⑪	39	⑪	43
⑫	43	⑫	43
⑬	35	⑬	43
⑭	38	⑭	43
⑮	43	⑮	38
		⑯	43
		⑰	38
		⑱	43
		⑲	43
		㉙	43
		㉑	33
		㉒	38

Since all units were evaluated in very poor (PCI 20 to 40) or poor (PCI 40 to 55) in PCI method, the study team evaluated the condition by further divide the category in detail. The figure below shows the evaluation results.

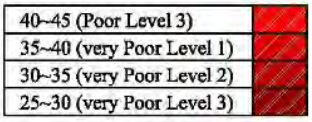


Figure 4 PCI Evaluation Category

Figure 5 PCI Evaluation Results

It was confirmed that condition of aircraft parking spot area (4B) is bad and parking spot on the western side (4A) was rehabilitated by concrete pavement.

Photo 1 Concrete Pavement on the Parking Spot

The figure below shows the location of alligator crack, which is most severing distress among other distresses. An alligator crack is observed in such location where there are repetition loads on the pavement and the crack normally reaches to the bottom of the pavement.

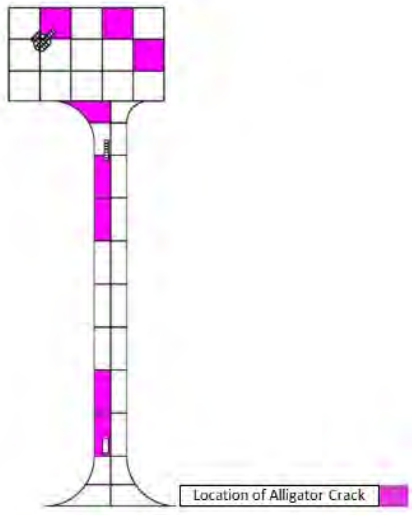


Figure 6 Location of Alligator Cracks

Photo 2 Alligator crack on the International Apron (Unit No. 2)

Photo 3 Alligator crack on the International Apron (Unit No. 5)

1.4.5. Drainage system

Rainwater in the airport is drained to the northern side of the airport by 2 drainage routes, to the south side by 3 drainage routes and to the west side goes to Longa River by 2 drainages.

The airport area is flat and there is only 1 to 2 m height difference between the runway and the airport boundary area. In this regards, if a flood occurred in outside of the airport, it is possible that such water flows backwards to the airport area.

Most of the drainage system in the airport consists of mainly open drainage without protection and concrete box culvert or pipe culvert where the drainage crosses the runway and the road. Maintenance of this drainage is not well done judging from observation of drainages as grass grows in the open drainage and sand and stones accumulate in the culvert.

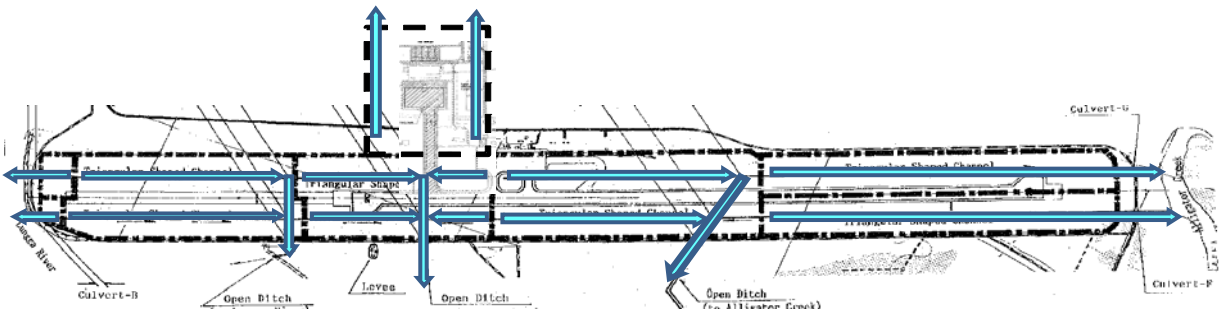


Figure 7 Existing Main Drainage System

1.4.6. Conditions of the Airfield Lighting Systems

There are following existing airfield lighting systems in the airport.

- Simple Approach Lighting System (SALS) at both sides of the runway
- Runway lights
- Taxiway lights
- Apron flood lights

Conditions of theses systems are described below.

1.4.6.1. SALS

SALS at the runway 06 side inaugurated in 1985 and 32 years has already passed. All isolation transformers were replaced and it was observed that all lights are working well during night.

SALS at the runway 24 is shorter SALS because of limitation of available area and it was inaugurated in 2005. One of the lighting fixture close to the perimeter fence was missing at the time of survey from a vehicle According to MCA, the light was stolen but it was fixed after a few days.

1.4.6.2. Runway Lights

All runway lights and constant current regulators (CCR) was renewed when the runway was overlayed in 2005. A cover of 1 runway turning pad light was broken. It was confirmed most of the lights were working well during night time survey but 1 embedded light of the runway threshold light at 24 side was not on and 2 of runway edge lights were not on and the another was dark.

1.4.6.3. Taxiway Lights

It was confirmed that all taxiway edge light (TEDL) in domestic apron area, which was inaugurated in 1985 and in international apron area, which was inaugurated in 1997, was working well during night time survey. There is one circuit connecting both TEDL in domestic area and in the international area. The power to the TEDL is supplied from a CCR with a capacity of 4kw.All high voltage cables and isolation transformers of TEDL of domestic area are buried in the ground. It has already passed 32 years from its installation and there are many failures. MCA staff requested to separate the circuit of the domestic area and international area.

Some of the covers of the hand holes, which contains an isolation transformer of the international TEDL was broken by a mower. Inside of such hand holes were full of water and mad and only top of the transformer could be seen. One of manholes installed at the crossing point of the taxiway contained water inside and it was not possible to see the cables and pipes inside. It was confirmed conditions of cables and pipes were good after draining the water from the manhole.

Photo 4 Hand Hole of TEDL without Cover

Photo 5 Hand Hole of TEDL with Cover

Photo 6 International TEDL

Photo 7 Precision Approach Path Indicateor (PAPI)

1.4.6.4. Apron Flood Lights

Apron lights for the domestic apron are high-pressure sodium 400W and metal halide 400W. There are 3 fixed masts of 20m height. There are 4 metal halide 1000W lights and 4 high-pressure sodium 1000W lights on each pole. These lights were installed in 1997 and inaugurated in 1998. There were difficulties to maintain the metal halide lights and power supply to the lights were terminated after 2 years and it had not been used up to now for 19 years. There was burnout accident of stabilizer of the metal halide lights on the western mast so that all circuit for metal halide was removed from the mast. The mast is a fixed type and a person have to climb to the top of the mast on maintenance and there is no catwalk for the works so that it is not possible to replace the lights. Because of above reason, all operation of the metal halide lights were terminated. There are 4 high-pressure sodium lights on each mast. 2 lights on the west side mast, 1 light on the center mast and 3 lights on the eastern mast were on at the time of the survey. All lights of the high pressure sodium lights were replaced in September 2016 from New Zealand but after one year, the condition became as described above.

Measurement of illuminance was conducted at the international apron on 31st May 2017. The average illuminance of the western spot was 7.925lx. This is much lower than ICAO standards of minimum 20 lx. Average uniformity ratio of the area is 0.08 and this figure is also less than the ICAO standards. The illuminance far from 60m toward the taxiway was almost 0.1 lx. The measurement result is shown in the figure below.

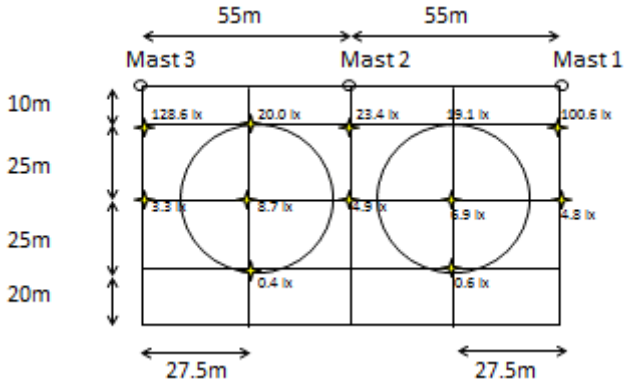


Figure 8 Illuminance Measurement of International Apron

1.4.6.5. CCR

CCR of airfield lighting systems is installed inside of a building located between the fire station and Solomon Islands Airlines Office on the western side of the domestic car park. The layout of CCR is shown below.

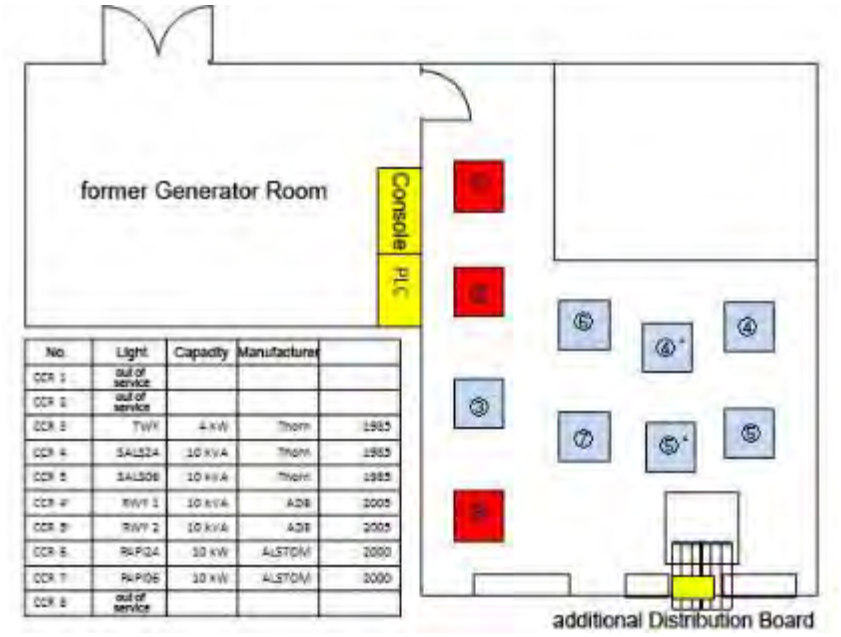


Figure 9 Layout of CCRs

Photo 8 CCR Building

Photo 9 CCRs in the CCR Building

Insulation resistance of CCR circuits were measured as shown in the table below.

Table 3 Results of Insulation Resistance of CCR Circuits

Circuit	CCR Capacity, Manufacture and Year	Brightness Tap 1～3、5or7 Current Value	Insulation Resistance (Mega Ohm) *1	Remarks
TEDL	4KW, Thorn（UK） 1985	2.8A, 2.8A, 2.8A	One side: 0.422 Other side: 0.000	Insulation failure
PAPI-06	10KW Alstom（UK） 2000	2.5A, 2.5A, 4A, 4.8A, 5.2A, 6.4A, 6.6A	One side:0.139 Other side: 0.113	Insulation failure

PAPI-24	10KW Alstom （UK） 2000	3A, 3.5A, 4.0A, 4.2A, 5.8A, 6.4A, 6.6A	One side:0.138 Other side: 0.005	Insulation failure
RWY-(1)	10KVA ADB（Belgium） 2005	2.78A, 3.38A, 4.07A, 5.2A, 6.58A	Meg meter value of CCR: 22.9	Normal
RWY-(2)	10KVA ADB（Belgium） 2005	2.78A, 3.37A, 4.07A, 5.14A, 6.57A	Meg meter value of CCR:0.217	Insulation failure
SALS-06	10KVA Thorn（UK） 1981	2.8A, 3.4A, 4.5A, 5.2A, 5.6A, 5.5A	One side:0.005 Other side: 0.058	Insulation failure*2
SALS-24	10KVA Thorn（UK） 1981	2.8A, 3.2A, 4.1A, 5.2A, 5.7A(?)	One side:0.19 Other side: 0.000	Insulation failure

*1 Preferable for CCR output insulation resistance is more than 1 mega ohm

*2 Originally, 2 CCR with 7.5kw capacity were used but because there was a failure, the circuit was integrated to one circuit and CCR with 10KVA capacity is used and because of lack of capacity, maximum tap of 6.6A is not achieved.

1.4.6.6. AFL Console in Control Tower

AFL console in the control tower was installed in 1985. It was possible to operate power on and off of the lightings but all indicators were not working.

Photo 10 AFL Console in the Control Tower

1.4.7. Conditions of the Existing Terminal Building

1.4.7.1. General

The existing international passenger building was constructed in 1997 and it is steel structure 2 story building (Floor area: 4,265.77m^2). It has been 20 years since its construction. According to interviews with airport staffs and passengers, the rooms are hot and not comfortable, especially, arrival lobby, check-in counter area and departure lobby are uncomfortable.

There is an issue in arrival immigration, it takes a long time to process international arrival passengers. Processing time for each passenger were 1.5 to 2 minutes and this period is not so different from other international airports, however, there are only a few immigration officers

despite there are 4 counters, it takes a long time for the immigration process. Solomon Islands' passport are all e-passports and there is 2 automatic immigration equipment, which can be used by e-passport, however, these equipment are seldom used.

Photo 11 Arrival Immigration Area

Photo 12 Automatic Immigration Equipment

There are 2 issues of international departure passengers, one is it takes a long time for immigration process and the other is passenger has to spend a long time in hot check-in hall because a door to departure immigration area will not open before one and half hours of departure time. According to the airport staff, check-in process takes time because of low speed of internet lines in the Solomon Islands, because check-in system requires airline's internet system. It is necessary to improve connection speed between city centre and the airport to solve the problem and MCA will take measures on this matter. There is no optic fibber connection between Solomon Islands and other countries and all internet line uses satellite system. According to MCA, there is a plan to install optic fibre connection under the ocean.

There is a VIP lounge on the south side of the centre of the passenger building. To access to this area, it is necessary to path through common security area and immigration area with other passengers. To avoid for VIP passengers to mix with other passengers, VIP passengers use their own vehicle to access to the area from the airside through a gate at the east side of the terminal area. Arrival VIP passengers go to the VIP lounge from the airside and immigration process is carried out in the lounge and use their own vehicle from the airside to the landside through the same gate. There are many staffs come to the airside for well wishing and welcome the VIP passengers, many vehicles enter the airside without proper security check and it is an issue of security as an international airport.

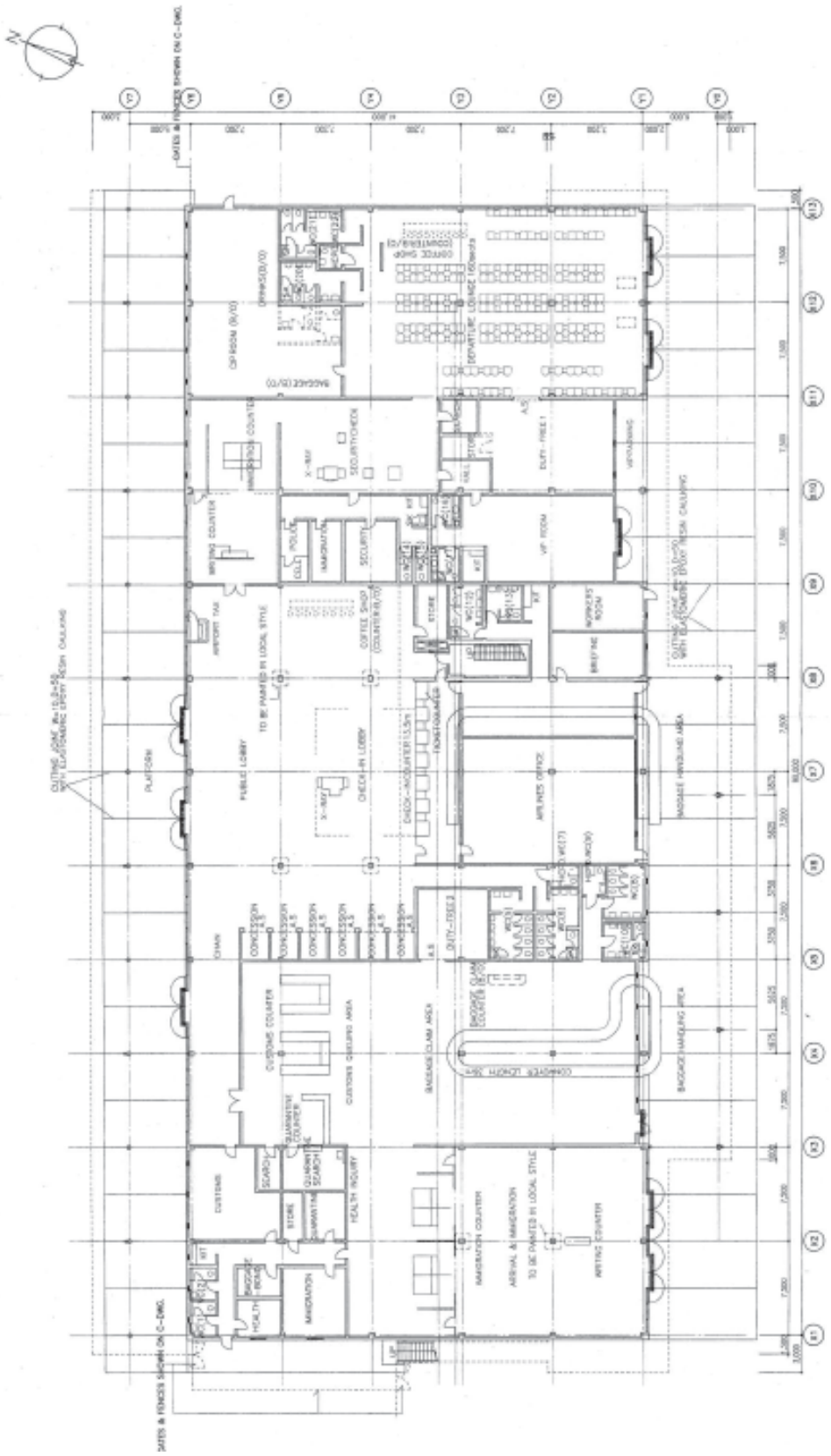


Figure 10 Floor Layout Plan of Existing International Terminal Building

1.4.7.2. Exterior Wall

The exterior wall is finished with paint on concrete and paint on concrete block mortar up to the level of GL +2.8 mm, and above that, steel siding wall and steel plate wall are used.

Photo 13 International Passenger Building

Photo 14 Exterior Finishing of International Passenger Building

Damage such as cracks cannot be observed in the concrete and block parts. Also, no noticeable deterioration such as rust is confirmed on the exterior of steel.

1.4.7.3. Roofing

A variety of roofing materials are used in the existing building, such as folded roofs are used at the public space and eaves on the land side, the flat steel at the large high-pitched roof, standing seam for the joints of the low-pitched area and the large roof, asphalt waterproofing at around the observation deck.

The exposed part of the asphalt waterproofing around the observation deck is severely deteriorated.

Photo 15 Asphalt Waterproofing (1)

Photo 16 Asphalt Waterproofing (2)

Traces of joints sealed for repair are found in connecting parts of the flat roof and the large high-pitched roof.

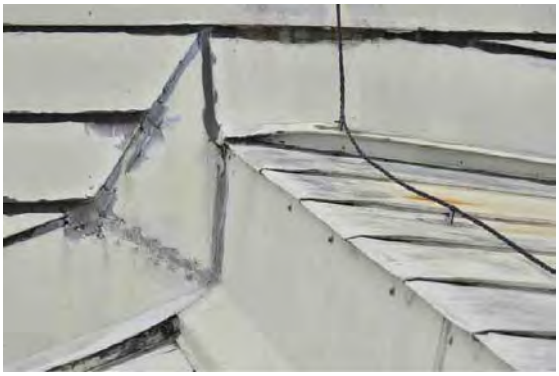


Photo 17 Repaired Roof (1)

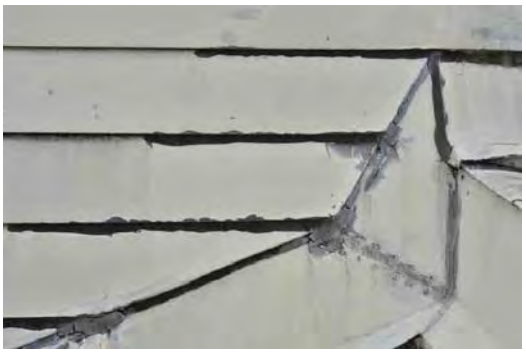


Photo 18 Repaired Roof (2)

Heavy damage is found on parts of the exterior soffit on the airside.

Photo 19 Exterior Soffit (1)

Photo 20 Exterior Soffit (2)

On the land side, the wooden soffits used for both gable ends of the large roof are deteriorated with exfoliated and colour-faded paints, and with other damaged parts.

1.4.7.4. Conditions of Interior Finish

Conditions of interior finish are summarized in the table below.

Table 4 Conditions of Interior Finish

Facility	Conditions
Floor	There are many places where P tiles are peeled off and repaired.
Wall	Painted finish, but there are no significant matters to be noted
Ceiling	There are deformation and falling of the integrated ceiling frame were confirmed at the arrival lobby and the baggage claim area
Toilet	There are no broken tiles but components of ammonia penetrate joints of floor tiles and have an odor.
Immigrations	The ceiling of the arrival and departure passport control area is clean because the ceiling was set up when the air conditioners were installed.
Check in Hall	The roof of the check-in hall made of wood is kept in good condition retaining aesthetic appearance without any frame falling or paints exfoliating.

Photo 21 P Tile Flooring

1.4.7.5. Structure

The specifications of beams and pillars were confirmed visually from the ceiling plenum or backside of the ceiling since the fireproofing has not been coated despite the steel structure of the terminal building. These structures are in good condition without rusting.

Photo 22 Condition of the Structure of backside of the Ceiling (1)

Photo 23 Condition of Structure of backside of the Ceiling (2)

Corrosion was seen at the root of the outer pillow column of baggage handling area at the air side. An attempt was made to clean it with a hammer and rasp, but it seems that the rust is stable with no holes created in the base material.

Maintenance by painting deterioration is needed if only with repainting, such measures as root winding with concrete are necessary to prevent the column base from deteriorating.

Photo 24 Rust Damage on Column Base at Airside (1)

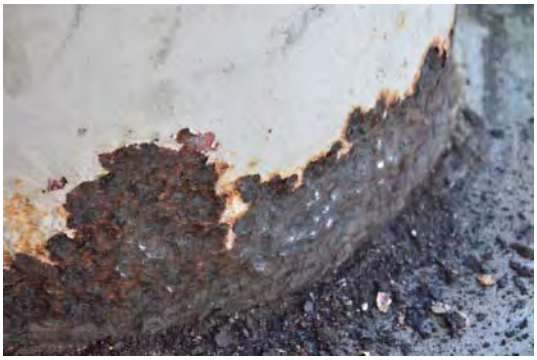


Photo 25 Rust Damage on Column Base at Airside (2)

Also, repainting after cleaning is necessary for the area where the ceiling material at airside has dropped, because a little rust is appearing on the steel frame. Except for the column base of the external piloti column at airside, the steel structure is in good condition.

Photo 26 Back side of Ceiling at Airside

Photo 27 Back side of Ceiling at Airside

1.4.7.6. Water Supply and Sewage System

At the international passenger terminal building's water supply facility, deep well water and rainwater were used as water sources at first.

A deep well (depth of about 20 m), a pumping room accommodating the filtration unit and water pump, and a ground type FRP well water tank are located in the west side of the terminal building.

The treated well is sent to a rainwater tank (basement type) on the east side of the terminal building. The rainwater tank stores rainwater and well water from the terminal building roof, is stored in a ground type FRP tank (effective capacity 54 m^3) via a filtration tank in the pump chamber adjacent to the rainwater tank, and is installed in the pump chamber from the tank It was planned to send water to a terminal building with a pressurized water supply pump unit that was being used.

At present, the pump and the sand filtration unit for primary treatment of the well water are not functioning/broken and unused. Also, through the field survey, the well tank was found almost empty and impossible to use well water.

Photo 28 Deep Well Pump

Photo 29 Well Pump

The rainwater tank was almost full. The filtration unit and the rainwater feed pump are broken, transferred temporarily from the rainwater tank to the FRP tank by the temporary pump, and from there, there is a water supply pump unit renewed in 2017 to supply water to the international passenger terminal building. Filtration and chlorine sterilization confirmed the status that the equipment was broken and not processing at all.

Photo 30 Water Supply System

Photo 31 Rain Water Tank and Man Hole

Photo 32 Water Supply Pump Unit

Photo 33 FRP Water Tank

Photo 34 Pump Filter Unit

Photo 35 Chlorine Sterilization Unit

The merger treatment septic tank is not functioning because all automatic/electric screens, blowers, transfer pumps are broken. There is a rising concern that sewage is being discharged without any treatment. In addition, sewage from the international passenger terminal building's toilet is collected through the outdoor drain pipe to the sewage pumping tank next to the east side rainwater underground tank, then transferred to the merger treatment septic tank by the submersible pump installed in the tank. However, the equipment of the existing septic tank and the sewage relay pump tank has been damaged and heavily deteriorated, and the sewage is accumulated in the drainage line.

Photo 36 Sewage Treatment Area

Photo 37 Broken Blower

Photo 38 Screen and Entrance of Mechanical Room

Photo 39 Sewage Water Pump

1.4.7.7. Air Conditioning and Ventilation System

The international passenger terminal building has received complaints that zones used by passengers are uncomfortable because the room temperature is high. Initially, these rooms were designed with natural ventilation utilizing the ample space under the triangular roof. However, since this natural ventilation does not function sufficiently, some air conditioners have been installed, but remains insufficient.

Photo 40 Check-in Lobby (1)

Photo 41 Check-in Lobby (2)

Thermal environment survey was conducted during the first field survey and Predicted Mean Vote (PMV) was calculated to evaluate thermal comfort of the rooms. The results are summarized in the table below.

Table 5 Evaluation of Thermal Comfort based on PMV Value

Measurement Location	PMV Value
Arrival Lobby	PMV＋1.95
Baggage Claim	PMV＋1.68
Check-in Counter	PMV＋2.4
Departure Lobby	PMV+0.98

Note: As parts of parameter couldn't be measured, estimated value is applied.

The PMV value of check-in counter area, where there are many complains from the airport user and no air conditioning, was PMV +2.4. On the other hand, PMV of departure lobby was +0.98 because there are air condition systems in surrounding rooms such as immigration area and transit lobby and room temperature was relatively low.

Generally, a comfortable value of PMV is ±0.5. PMV +2.4 is such thermal environment that more than 95% of people feel hot and very uncomfortable.

1.4.7.8. Light and Electrical Outlet

It was observed that some of the room lights did not power on because of failure and lamp out but some of the lights were replaced with LED for low energy consumption. Day lights were used in the hall areas but illumines was less than 200lx in general and an impression of the area was dark. There are enough electrical outlets in appropriate locations.

Photo 42 Lights in Check-in Hall

Photo 43 Lights in Baggage Claim Area

1.4.7.9. Telephone

Telephone cables were installed to the Main Distribution Frame (MDF) of both domestic and international passenger terminal buildings by Solomon Telekom. Telephone cables were distributed through switching panel to telephone sets in each room.

Photo 44 MDF

Photo 45 Telephone Exchange

1.4.7.10. LAN

Internet lines by Solomon Islands Government are installed in departure immigration, arrival immigration, customs and police rooms. LAN cables are distributed to each consoles in these rooms through a server.

1.4.7.11. Television System

There is a television in the international departure lounge. There is a satellite antenna to receive the radio outside of the building. The cable is installed to the television system in the check-in hall but the system was broken..

1.4.7.12. Automatic Fire Alarm System

Automatic fire alarm system, which was installed at the time of the construction, was broken and information board in the fire station was also out of order.

Photo 46 Receiver of Automatic Fire Alarm System

Photo 47 Information Board

1.4.7.13. Lightning Protection

Frame conductor was installed to protect whole building from lightning.

1.4.7.14. CCTV

There are 2 Closed Circuit Television (CCTV) systems in the international passenger terminal building. One is installed and operated by MCA and another is by Solomon Airlines.

The CCTV system by MCA was broken and not operated. The system was installed by the Government budget in 2012 and there was no maintenance service contract. The system was out of order within a year from the installation and it had broken and not operated since then. There were 9 cameras where departing passenger used to move in the international passenger terminal building. The monitoring and control room was located in the international passenger building and there was on a server and on a monitor. The surveillance was conducted by the security department of MCA. There are 43 staffs in the department. There were 2 shifts, one was from 6:00 to 12:00 and the other was 12:00 to 18:00 when it was operated.

There are 4 cameras of CCTV system by Solomon Airlines. There are 2 cameras in the international passenger building and there are 2 cameras in the domestic passenger building. The monitoring room is located in the head office building of Solomon Airlines. The CCTV system is monitored from the room together with other cameras in the office.

Table 6 Existing CCTV Cameras

No.	Building	Location	Quantity	Status	Owner
1	International	Departure Immigration	2	Out of service	MCA
2		Departure Gate	1	Out of service	MCA
3		Transit Gate	1	Out of service	MCA
4		Baggage Conveyor	1	Out of service	MCA
5		Arrival Immigration	2	Out of service	MCA
6		Customs	2	Out of service	MCA
Sub Total			9		
7	International	Check-in Counter	1	Operational	Solomon Airlines
8		Terminal Airside	1	Operational	Solomon Airlines
9	Domestic	Check-in Counter	1	Operational	Solomon Airlines
10		Terminal Airside	1	Operational	Solomon Airlines
Sub Total			4		
Grand Total			13		

1.4.7.15. FIDS

There is no Flight Information Display System (FIDS) in Honiara Airport. Information of airlines and priority lanes are shown on the board at the check-in counter. There is nothing to inform flight schedule and flight status in departure gate, arrival lobby, and baggage claim area.

1.4.7.16. PA

There was a public address system (PA) in the international terminal when it was constructed however, the system was out of service. There are small scale PA in the international passenger building. There are 2 speakers, one in check-in lobby and the other in departure gate to announce boarding information. The mike of the system is located in Solomon Airlines office behind the check-in counter. The announcement was made by a staff of Solomon Airlines.

The areas with speakers, where the passenger can listen to the announcement, are only check-in hall and departure gate. There is no way of broadcast announce in the arrival area. It is a problem form view points of not only passenger convenience but also evacuation on an emergency.

1.4.7.17. Special Equipment

There are 2 baggage handling systems in the airport. One is a U-shaped belt for holding baggage for international departures, which locate behind check-in counter to the baggage make-up area in the airside and another is L-shaped belt for arrival hold baggage. Both BHSs are working well.

X-ray equipment and metal detectors in passenger security check-point and hold baggage screening area are working normally without problem.

1.4.8. Domestic Passenger Terminal Building

The domestic passenger terminal building is a concrete block structure and one-story building. The floor area is 850m^2 and constructed in the 1980s. Before the development of the international terminal area, the building was used for both international and domestic flights. The building is old and facilities are deteriorated. Because the ground height of the area is lower than the surrounding area, the area was flooded during heavy rain season. There is an issue of location as the building is approximately 800m far from the international terminal building and it is inconvenient for transit passenger from international flights.

Photo 48 Domestic Termianl Building

Photo 49 Check-in Area of Domestic Terminal

1.4.9. Air Traffic Control Tower

1.4.9.1. Conditions of existing control tower

The control tower was constructed in 1984. The building is reinforced concrete frame structure. Walls are concrete block and there is a steel cabin at the top of the building. Eye height of the

air traffic controller in the control cabin is approximately 10.7m, the height of the roof is approximately 12.5m and the floor area of the control cabin is approximately 22 m^2.

Visibility to the runway 06 threshold, taxiways and aprons are good. The existing eye height doesn't comply with the required height of United States Federal Aviation Administration (FAA) standard. The building including antenna doesn't infringe transitional surface of the total width of 150m runway strip.

There is more than 5mm width cracks on 2 of the square 30cm columns of reinforced concrete by earthquake occurred in 2014. There is a possibility that the reinforcement bar is corrosion and it is difficult to repair the crack. The floor of the control cabin in free access floor and carpet is laid on the floor. The metal fitting is old and rattling and habitability is not good. The direction of the sunlight in the morning and the evening is as same as the direction to the runway thresholds so that it is necessary to install sunshades, however, they were removed because of deterioration. There are 4 air conditioning units in on columns. These units are view obstruction for air traffic control service and effectiveness of air conditioning is low. The control console is deteriorated but because the small floor area of the control cabin, it is difficult to renew it.

Photo 50 Details View of Crack on a Column of Air Traffic Control Tower

Photo 51 View of Crack

1.4.9.2. Aeronautical Information Service Office and Equipment Rooms

There are offices at the eastern side of the domestic terminal building. It is presumed that these offices were constructed in 1950s at the same time of the domestic terminal building. It has already passed more than 60 years and aging is severe. The ground height of the building is lower than surrounding area. The office were more than 1m flooded on the heavy rain in 2014.

The flood affected equipment and documents were lost. The area was expanded in the past and the room layout became complicated. There are equipment provided by INDRA in a small space of the communication equipment room under the control tower. There is no spare space in the room. It was planned to operate ocean air route navigation by Solomon Islands side and Air Traffic Management (ATM) center was installed but this system hasn't completed and it was not functional.

1.4.9.3. Air Traffic Control Equipment

Almost all of air traffic control equipment in Honiara Airport were installed by "Honiara Airport CNS/ATM Rehabilitation Project (2008-2012)", which funded from national budget. Equipment not included in the project was Very High Frequency (VHF) Ground to Air Transceiver for backup, VHF and High Frequency (HF) movable transceiver, desktop computers for aeronautical information services, meteorological observation system, and light gun for air traffic control.

"Honiara Airport CNS/ATM Rehabilitation Project" was planned to renew air traffic control equipment in Honiara Airport and to provide air traffic control service in ocean air route in Honiara Flight Information Region (FIR) and aerodrome control in Honiara Airport. There were 5 phased plan from 2008 to 2017 to install VHF Omni Directional Radio Range (VOR)/ Distance Measuring Equipment (DME), air traffic flow processing system, VHF Air to Ground Transceiver, HF Air to Ground Transceiver, Microwave Lines, Automatic Dependent Surveillance-Broadcast (ADS/B), and Instrument Landing System (ILS). The fund of the project was from the Government budget of Solomon Islands, the contract was signed with the local company. Equipment was installed by INDRA, which was a sub-contractor. In April 2012, the contractor terminated the contract during the project implementation and on-site training and commissioning test with warm-up operation hadn't been conducted and equipment wasn't taking over. By this result, ADS/B and ILS were not installed.

The problems of the project are those the hardware was installed in advance and there is no consistency among with software planning such as air traffic control plan and training of air traffic controllers. Site tests of DVOR/DME, Air Traffic Flow Processing System, VHF transceiver, HF transceiver and microwave link were completed in March 2012 however, there was no further on-site training and warm-up operation so that official taking over of the system hadn't been completed. As a result, operation and maintenance of equipment haven't been conducted properly. Because the connection between Aeronautical Fixed Telecommunication Network (AFTN) and ADS/B hadn't completed, air traffic flow processing system was left uncompleted. Although the equipment was not taking over officially, part of equipment has

already used. Equipment under operation and not operation are mixed. There is some equipment such that there is no installation of PC software such as voice recording system for air traffic control. Also, there is no measuring equipment and spare parts, it is not possible to maintain the equipment. The table below summarized equipment by the project and its remarks.

Table 7 Conditions of Equipment by the Rehabilitation Project and Issues

Equipment installed by INDRA	Current Status	Remarks
Aircon 2100 Air Traffic Management System	It was planned to provide air traffic control services of ocean air route in Honiara FIR but there is no air traffic control plan by Solomon Civil Aviation. Air traffic management system is uncompleted and not operational. As AFTN network equipment is not connected and there is no flight information. As ADS/B is not installed there is no information of surveillance.	There systems are not required for current aeronautical information service.
AFTN	There is no connection to AFTN network and it is not used.	Currently, simple system called CADAS* and Windows Outlook are used.
Digital Voice Communication Control System (SDC-2000)	It is operational but operation is complicated and air traffic information officer cannot use the function properly.	Improvement is required.
Voice Recording System (Neptuno 3000)	There is no software and not functional.	
VHF Transceiver (Park Air Systems, T6TR)	VHF Transceiver in the transmitter station is operational without problem.	
HF Transceiver (Barret 2050 transceiver/ Barret 2075 1kW Linea Amp)	2 HF Transceiver in the transmitter station is operational without problem. HF Transceiver in communication equipment room in the control tower cannot be used because of noise. Receiver site are under selection and tested. (Receiver is temporary installed close to VOR site)	
Microwave Link (RAISECOM, RC3000-6)	Communication between transmitter station and control tower is operational normally.	
DVOR/DME (VRB-52D/LDB-102)	Operational without problem.	

NDB (Nautel)	Operational without problem.	
NDB for Regional Airport	Not operational in 6 airports.	

* CADAS: Comsoft's Aeronautical Data Access System and is simple aeronautical information access system provided by Comsoft Solutions GmbH

Conditions of other equipment are summarized below.

Table 8 Conditions of Air Traffic Control Equipment

Equipment	Status	Remarks
VHF Transceiver for Backup (Park Air Systems, T6TR)	Operational without problem. The equipment is old.	
VHF Portable Transceiver (ICOM)	Operational without problem. The equipment is old.	
HF Portable Transceiver (IC-M700 Pro, ICOM)	Operational without problem. The equipment is old.	
Air Traffic Information Console	Operational without problem.	
Automatic Weather Data Observation System (AWOS)	Operational without problem.	Operated by MECDM**
Light Gun for Air Traffic Control	Operational without problem.	

** Ministry of Environment, Climate Change, Disaster Management and Meteorology

1.4.10. Fire Station

The existing fire station was constructed by “Henderson Airport Development Project” in 1997. The floor area is 352m^2 and there are 4 bays for fire trucks. The building was not new construction. The old fire station was renovated in 1997. Since there hasn’t been no major rehabilitation, there are many water leaks and broken grasses by strong wind but these are not repaired.

1 of the 3 fire trucks are the large size and because the entrance of the bay is small, it was parked outside of the fire station, but part of the outside wall was removed and it can park inside at the time of the site survey. The fire station also located the area easily affected by a flood.

Photo 52 Fire Station View from Airside

Photo 53 Fire Statio View from Landside

1.4.11. Electrical System

Currently, there are two incoming power supply systems to draw electricity, one from the north of the airport to the transformer located in the east side of the car park, and another from the east of the airport towards the transformer installed in the west side of the catering building.

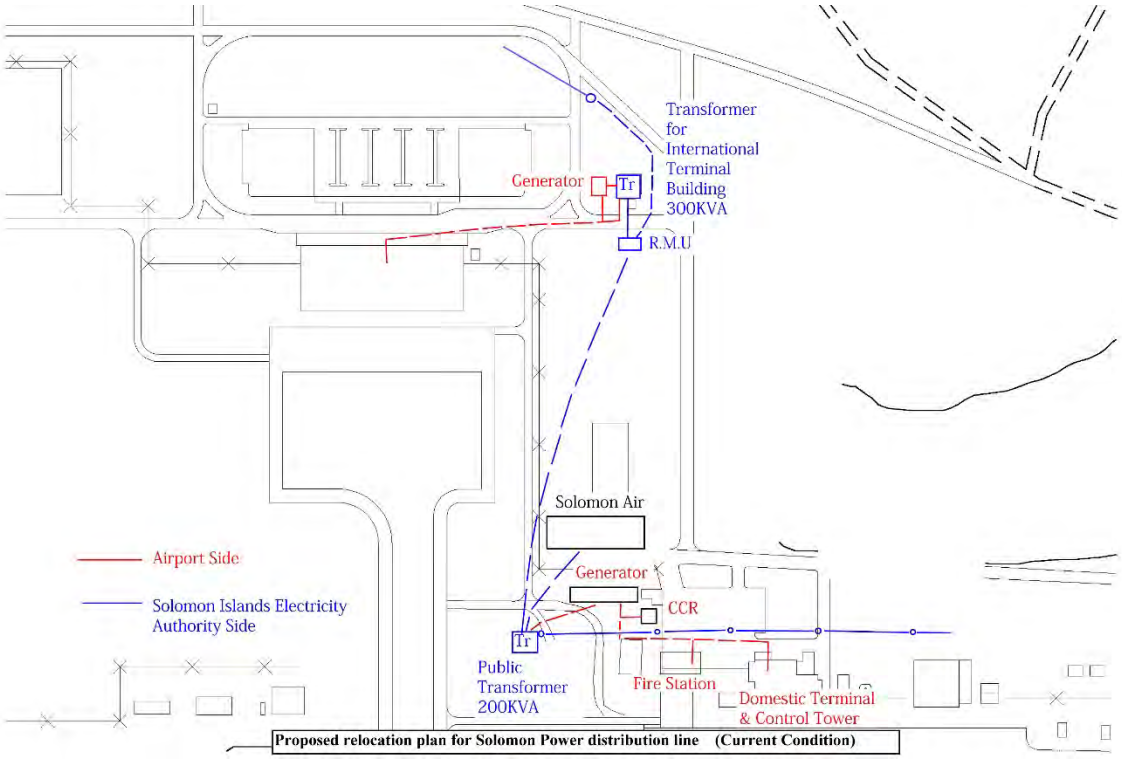


Figure 11 Existing Power Supply System Layout

Incoming power supply system for the international passenger terminal building which was completed in 1998, draws power through the existing substation (SUB) located at the east of the parking lot. The voltage of the power is reduced by the transformer at the SUB that was installed by Solomon Islands Electricity Authority (SIEA), and then drawn into the terminal building via distribution board. A generator (120 KVA) is installed at the SUB and distributes emergency power at times of power failure to AC/GC loads.

Photo 54 Existing Sub Station

Photo 55 Ring Main Unit

The transformer inside the SUB is currently operating without trouble. A 3,500 liter-fuel tank for the generator is set next to the SUB, but since the frequency of power failure is only one to two hours in a month (seven to eight hours maximum), only 200 liters of fuel is prepared inside the tank. The front door of the distribution board is broken, but the board is working without any problem.

Photo 56 Transformer

Photo 57 Generator

Photo 58 Switching Board

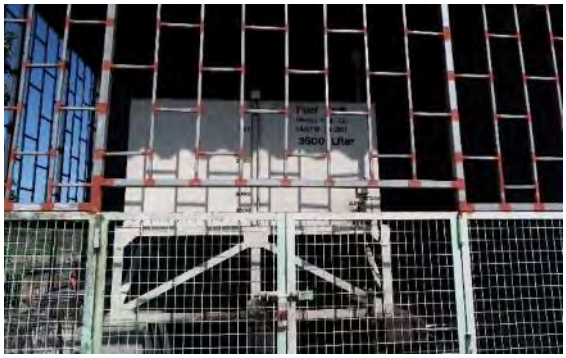


Photo 59 Fuel Tank

The electrical system and distribution status of the international passenger terminal building are as follows.

Table 9 The Electrical System of the International Building

Equipment	Specification
High voltage power (by SIEA)	11kV three - phase four - wire system 50Hz
Existing substation facilities	Transformer capacity: 300KVA 11kV/ 415V/ 240V
Distribution system of low voltage side	three - phase four - wire system 415V/ 240V
Emergency generator	Rated power: 150KVA

	three - phase four - wire system 415V/ 240V, 50Hz Power factor: 0.8

Outdoor transformers (200 KVA) are installed around the international passenger terminal building, and power is supplied to domestic passenger terminal building, control tower, fire station, airfield lighting system, and Solomon Airlines.

In the premise, there is another substation on the western side of the catering building. Power is supplied to the domestic terminal building, the control tower, and the fire station through the generator (100 KVA × 2 units), which was installed in 2002 inside the container adjacent to the transformer. Also, electric power is supplied to the airfield lighting system via the CCR installed in the adjacent CCR building from the generator. Two generators (100 KVA) installed in 2002 are operating without trouble. Although the generator's fuel tank placed separately is broken, each generator has a built-in fuel tank (each containing 600 liters).

The electrical system and distribution status of the domestic passenger terminal building, fire station and AFL are as follows.

Table 10 The Electrical System of the Domestic Building Area

Equipment	Specification
High voltage power (by SIEA)	11kV three - phase four - wire system 50Hz
Existing substation facilities	Transformer capacity: 200KVA 11kV/ 415V/ 240V
Distribution system of low voltage side	three - phase four - wire system 415V/ 240V
Emergency generator	Rated power: 100KVA x 2 set three - phase four - wire system 415V/ 240V, 50Hz Power factor: 0.8

Photo 60 Transformer

Photo 61 Container Room of Generator

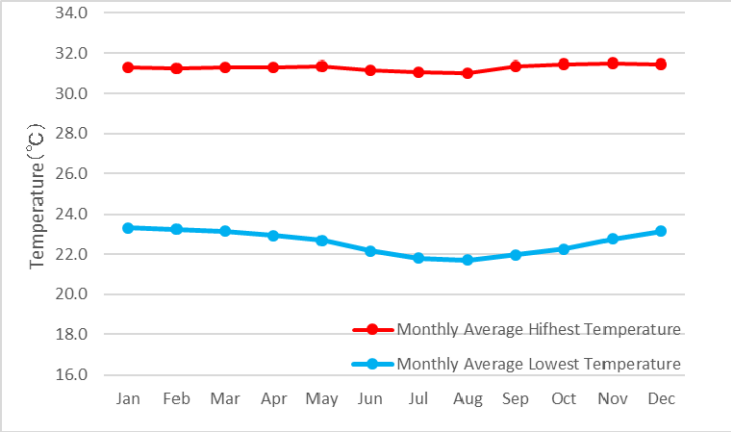
Photo 62 Inside CCR Building

Photo 63 CCR's Distribution Board

1.5. Natural Environment

1.5.1. Temperature

Solomon Islands has high temperature throughout the year, and it is the same in Honiara where the project site is located. Figure 2 shows the average highest and lowest temperatures by month based on observation records of Honiara Airport over the past 20 years.

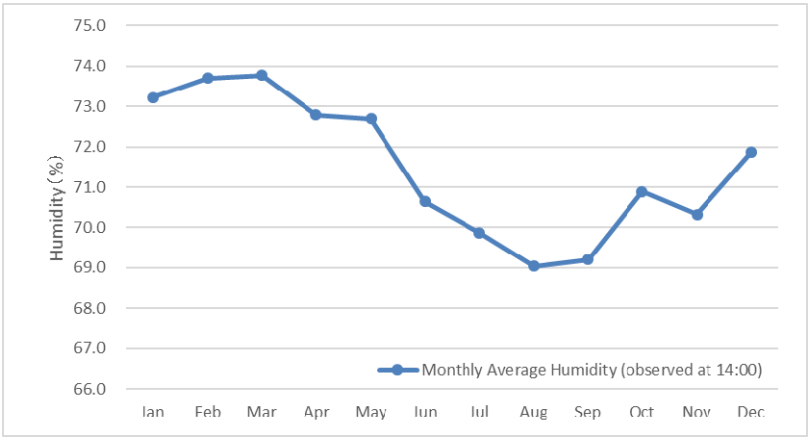


Source: Created by the study team based on data obtained from Solomon National Weather Station

Figure 12 Average Highest and Lowest Temperatures by Month

1.5.2. Humidity

Solomon Islands has a humid climate throughout the year, and it is the same in Honiara where Project site is located. Figure 3 shows average monthly humidity based on observation records of Honiara Airport over the past 20 years.



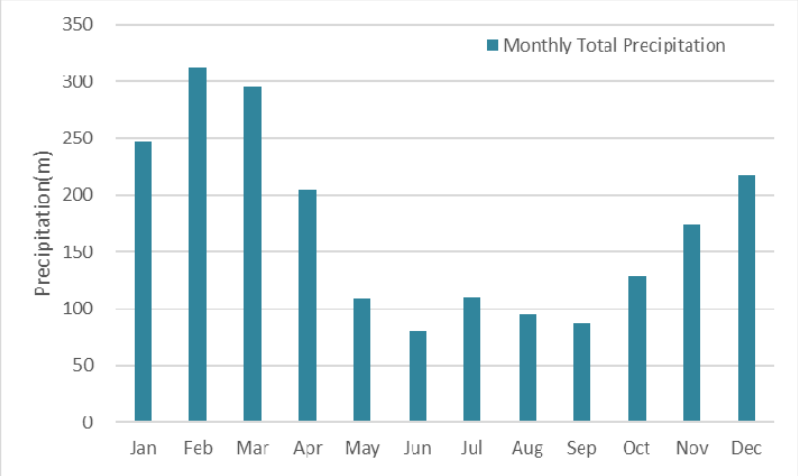
Source: Created by the study team based on data obtained from Solomon National Weather Station

Figure 13 Monthly Average Humidity

1.5.3. Precipitation

It rains heavily in Honiara from December through April and relatively little from May to November. The figure below shows the average monthly rainfall based on observation records of Honiara Airport over the past 20 years. The largest daily precipitation observed at Honiara Airport in the past 20 years is 265.6 mm on 29th December 2012. The largest daily precipitation (317.6 mm) ever recorded in Honiara City was observed on 4th April 2014, but the record of

this day is missing at Honiara Airport due to inundation of the observation facilities.

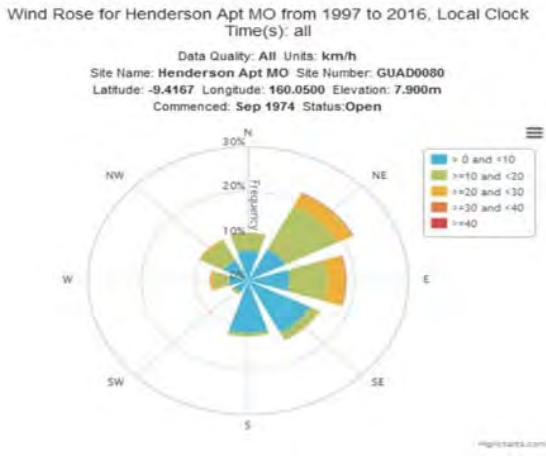


Source: Created by the study team based on data obtained from Solomon National Weather Station

Figure 14 Monthly Precipitation

1.5.4. Wind Direction and Wind Speed Data

The figure below shows wind direction and wind speed data based on observation record at Honiara Airport over the past 20 years.



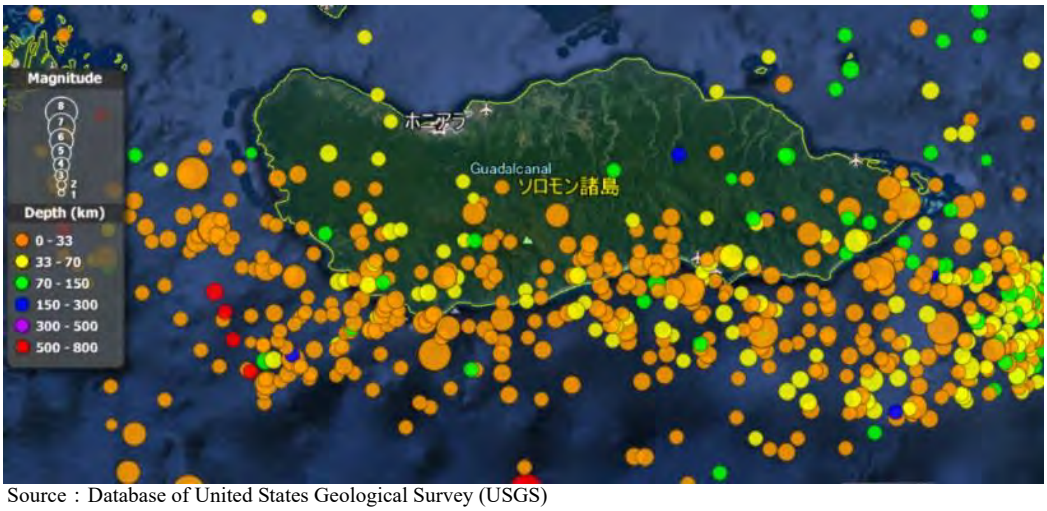
Source: Solomon Airport Weather Station

Figure 15 Wind Direction and Wind Speed

1.5.5. Natural Disasters

1.5.5.1. Earthquakes

The figure below shows the distribution of earthquakes occurred around Guadalcanal Island from 1900 to 2010. Since the San Cristobal trench is located in the south side of Guadalcanal Island, earthquakes with hypocenters on the south side of the island occur frequently.



Source：Database of United States Geological Survey (USGS)

Figure 16 Distribution of Earthquakes around Guadalcanal Island

1.5.5.2. Floods

The table below shows floods that occurred in Honiara in the past. Many of the floods are caused by the tropical cyclone.

Table 11 Historical Flood Damages around Honiara

Season	Total Precipitation	Damages
March 1948	Unknown	・Lungga River surrounding area flooded.
January 23 and 24, 1952	Unknown	・A bridge washed away by a rise in water level of Lungga River.
November 15 and 16, 1966	209mm	・Many damages to houses around White River. 8 houses collapsed. ・Serious damage to the village of Mataniko. Traffic on the Mataniko bridge blocked.
March 27 and 28, 1967	204mm	・Abutment of the bridge on Lungga River eroded. ・Facilities of Honiara Airport flooded. Damage to the runway.
January 9 to 14, 1972	724mm	・Houses collapsed around White River ・Surrounding area of King George Ⅵ School was flooded.
May 18 to 20, 1986	323mm	・Surrounding area of Tuvaruhu flooded. ・A bridge washed away by a rise in water level of Mataniko River. Water supply is blocked. ・Facilities of Honiara Airport flooded. ・Surrounding area of Burns Creek flooded.
January 30, 2009	252mm	・Mataniko River surrounding area flooded. ・Damage to houses in Burns Creek area
January 21, 2010	Unknown	・Lungga River surrounding area flooded. ・2 children missing.
June 8, 2012	104mm	・White River surrounding area flooded.

		・Lungga River surrounding area flooded.
April 2 to 4, 2014	601mm	・White River surrounding area flooded. 6 houses collapsed. ・Rove Creek surrounding area flooded. ・Mataniko River surrounding area flooded. 239 houses collapsed. 21 people dead. The bridge washed away. ・Facilities of Honiara Airport flooded.

Source：Honiara Flood Risk Management Study and Plan（2017, World Bank）

1.5.6. Topography and Geology

Most of Guadalcanal Island are highlands consisting of a large number of mountains. The highest mountain of Solomon Islands, Mt. Makarakombu (2,447 m), is located on the central south side of the island. The alluvial plain spreads out on the coast, and the project site of Honiara Airport is located in the alluvial plain north of Guadalcanal Island.

The soil of Guadalcanal Island consists of volcanic rocks, sedimentary rocks, loam, humus soils, clay and the like in the highlands, and of loam, clay, peat and the like in the coastal plains, respectively.

1.6. Natural Condition Survey

1.6.1. Topographic Survey

The table below shows overview of the topographic survey conducted at Honiara Airport in June 2017.

Table 12 Outline of Topographic Survey

Survey	Target Area	Equipment Used	Area
Plane Table Survey	・International terminal area to runway ・Surrounding area of the Airport circumference road ・The riverbank of Lungga River	・Total station ・Drone	692,600 ㎡
Longitudinal Transverse Measurement	・Existing taxiway ・Proposed construction site of the new taxiway	・Total station ・Automatic level	500m
Levelling	・Existing apron ・Planned site for Apron expansion	・Total station ・Automatic level	50,400 ㎡

1.6.2. Geological Survey

The outline of the geological survey conducted in December 2017 is described below.

1.6.2.1. Boring

To determine the basic structure and depth of the foundation of building facilities, a boring was conducted at 3 locations where building facilities were planned. The figure below indicates boring points.

Based on the results of the geological survey carried out at Honiara Airport in the past, it was decided that the boring is conducted up to the layer with the standard penetration test (SPT) N value of 20 or more and continuous 3 m or more. Samples were collected in each layer, and the following laboratory tests were conducted on the collected samples.

- Water content ratio test
- Dry density test
- Wet density test
- Particle size test
- Atterberg limit test
- Uniaxial compression test

1.6.2.2. Dynamic Cone Penetration Test

Dynamic cone penetration test was carried out at 4 locations shown in the figure below to obtain information necessary for determining pavement structure of apron and taxiway. To obtain information on the subgrade, the test was carried out to a depth of 1.5 m or more from the ground surface. Samples were taken at each survey point, and the following laboratory tests were conducted on the collected samples.

- Water content ratio test
- Dry density test
- Wet density test
- Particle size test
- Atterberg limit test
- Uniaxial compression test
- Compaction test
- CBR test

Figure 17 Geological Survey Points

1.7. Environment and Social Consideration

The project is to rehabilitate the existing airport and does not require resettlement or land acquisition. In this regard, it is assumed that the impact on the environment and society by this project is not serious. Also, since it does not correspond to "influential characteristics and vulnerable areas" listed in JICA Guidelines for Environmental and Social Considerations, it is classified as environmental category B in the category classification of the same guideline. In the law (THE ENVIRONMENTAL ACT 1998) of Solomon Islands, the proposed project is classified as “Prescribed Development), thus Environmental Impact Assessment (EIA) based on laws of Solomon Islands is needed.

1.7.1. Project Component to Affect Environment and Society

1.7.1.1. Project Component

The project component is as below

(1) Aprons
(2) Taxiways
(3) Airfield Lighting System
(4) Existing International Building
(5) International Departure Building
(6) Flood Protection Dike

1.7.1.2. Quarry and Temporary Facility Yard

It is necessary to secure a quarry to procure cobblestone. Also, temporary facility yard is necessary to store construction equipment, to install three plants (stone crushing plant, concrete batching plant, asphalt batching plant) as well as to construct a contractor’s site office.
MCA will sign on the land use agreement for quarry and other necessary lands, and those will be secured before the tender. Landowners will not offer the quarry involuntarily because quarry and other necessary lands will be chosen as the result of negotiation between MCA and landowners. The EIA on the quarry is not obligated in the law (THE ENVIRONMENTAL ACT 1998). However, MCA will implement the Initial Environmental Examination (IEE) on the quarry after the quarry is decided.

1.7.2. Baseline Environmental and Social Conditions

1.7.2.1. Location and Overview

Solomon Islands is an island country located approximately 1,900 km in the northeast of Australia (the south latitude 5 to 12 degrees, the east longitude 154 to 172 degrees), with an area of 28,900 ㎢. Guadalcanal Island, where the project site of Honiara Airport is located, is the largest island in the country, 160 km east to west and 48 km north to south, with an area of 5,336 ㎢. Most of the island is a mountainous area consisting of many mountains, although Honiara Airport is located on the north side of the island where the alluvial plain spreads.

1.7.2.2. Social Environment

(1) Land Use

Honiara, the capital located on the northern part of Guadalcanal, is the center of politics and economy of Solomon Islands, where residential, commercial facilities, government agencies, schools, hospitals, etc. are located.

In the surrounding area of Honiara Airport, residential, commercial facilities, government agencies, schools etc. are scattered around. The east side of the airport is being developed as a large-scale palm plantation.

The land ownership form in Solomon Islands is divided into Public Land owned by the country and Customary Land owned by individuals and tribes. It is possible to use the Public Land with the due date by paying the fee to the Commissioner of Lands. Honiara city is entirely Public Land, but there is Customary Land around Honiara Airport as it is located outside Honiara city. Land acquisition and resettlement are not required in this project as construction and expansion of airport facilities will be completed inside the existing premises of the airport.

In Honiara city, illegal residents have become a big problem in recent years, and it is estimated that approximately 22,600 people, about 35% of the population of Honiara, are illegal residents. It is caused by the sudden population inflow from other islands and regions to Honiara city, coupled with the rise in housing prices and rents in Honiara. An illegal resident district also exists around the airport.

1.7.2.3. Natural and Cultural Heritages

(1) Natural Heritages

No natural heritage or protected area exists around the project site of Honiara Airport and transport routes. The area does not fall under the UNESCO World Heritage, UNESCO-MAB, Ramsar Wetlands, etc. where the importance of nature conservation is recognized internationally. This fact is confirmed by examining following documents and hearing from governmental organizations in Solomon Islands.

- Solomon Islands State of Environment Report 2008 (2008, Ministry of Environment Conservation and Meteorology)
- Solomon Islands National Biosafety Framework (2012, Minister for Environment, Climate Change, Disaster Management & Meteorology)
- Summary of species on the 2008 IUCN Red List (2008, International Union for Conservation of Nature and Natural Resources)
- A Forests Strategy for Solomon Islands 2006-2011 (2005, World Wide Fund for Nature)
- Solomon Islands Forestry Outlook Study (2009, Food and Agriculture Organization)

The table lists official reserved areas of Solomon Islands as reference.

Table 13 Official Conservation Areas of Solomon Islands

Name	Outline
East Rennel (Rennel, Verllona Province)	It is part of Rennell Island, which is the world's largest raised coral reef. It was designated as a World Natural Heritage Site in 1998. The island is situated approximately 130 km south of Guadalcanal Island, where the project site is located.
Queen Elizabeth National Park （Guadalcanal Province）	This is a protected area of 1,093 ha located on Guadalcanal Island, located about 15km southwest of the project site. Destruction of vegetation has advanced in recent years due mainly to illegal living.

Although not officially designated as sanctuary, several organizations perform conservation activities for the areas listed in the table below.

Table 14 Unofficial Conservation Areas of Solomon Islands

Name	Outline
Tetepare Conservation Area（Western Province）	A conservation area around Tetepara Island. It is listed on the World Heritage Interim List as a cultural and natural compound heritage. It is conserved as 97% of the area stays

	as untouched nature. Tetepara descendants Association manages this area to protect the high diversity of vegetation and species. It is located 280km away to the northwest from the project site.
Makira Conservation Area（Makira/Urawa Province)	A conservation area of Makira Island. It is a habitat for tropical rainforests, mangroves and many kinds of birds. Makira Community Conservation Foundation manages this area. It is located from 240km away to the southeast from the project site.
Simbo Conservation Area（Western Province）	It is protected as a birds' spawning ground called Megapode. Island Megapode Management Committee performs conservation activities. Megapode is not listed in the IUCN Red List. It is located 420 away to the northwest from the project site.
Komarindi Catchment Area（Guadalcanal Province）	19,300 ha protected area in northeastern Guadalcanal. It is wildlife sanctuary protected by South Pacific Regional Environment Programme and South Pacific Biodiversity Conservation Programme. It is located 30km away to the southwest from the project site.
Arnavon Conservation Area（Western Province）	Ocean Reserve around Arnavon Island. The habitat of the hawksbill sea turtle is protected by Arnavon Community Marine Conservation Area Management Committee. Hawksbill sea turtle is listed in the IUCN Red List as a critically endangered species. It is located 320 away to the northwest from the project site.

(2) Cultural Heritages

There is no designated cultural heritage around the project site, although there is a memorial park for the war dead of World War II on the north side of Honiara Airport. There is also the possibility that new war-related heritage, remains and the like will be discovered during construction.

1.7.2.4. Endangered Species and Rare Species

There are 4,500 species of plants in Solomon Islands. Regarding palm, orchid, and pandanus, the region boasts one of the world's rich vegetation. 57% of palm species, 50% of orchid species and 75% pandanus species are endemic species of Solomon Islands. In the Solomon Islands State of Environment Report 2008, 16 species are designated as concerning threats as defined by IUCN Red Data Criteria. Endangered species and rare species etc. do not exist in the project site. This fact is confirmed by examining documents stated in 1.6.2.4 (1) and hearing from governmental organizations in Solomon Islands.

1.7.2.5. Environmental Pollution at Project Site Area

(1) Air Quality

Traffic volume around Honiara Airport is not so much, and thus the impact on the roadside living quarters by vehicles' exhaust gas is small. However, shuttle vehicles and taxis often stop at idling in front of the terminal building and the influence of exhaust gases from aircraft is also expected. Hence, air pollution in the vicinity of the terminal building is a cause for concern.

(2) Water Quality

The septic tank installed in the airport is not functioning as the automatic screens, blowers, transfer pumps, etc. are all broken. Solomon Islands has no regulations on the quality of wastewater, and the situation is serious as the wastewater is discharged without being treated.

Regarding the supply of water, water pumped from wells in the premises of the Airport and rainwater from the terminal building roof is stored in a tank. Previously the stored water was filtrated and chlorine-sterilized, and then sent to the terminal building. But since the equipment that performs filtration and chlorine sterilization process broke, water in the tank has been sent directly to the terminal building.

In this project, a merger treatment septic tank and drainage relay pump aquarium will be newly installed for drainage from the passenger buildings. For construction water, the newly installed water supply from the city will be used. The water supply from the city is also used for the newly established international passenger building and the existing building.

(3) Waste Disposal

Waste treatment around Honiara city is under the jurisdiction of Honiara City Council. All household wastes collected at the garbage collection sites in the city of Honiara, as well as all the wastes from commercial facilities such as Central Market, and public facilities are carried to the Ranadi Dumpsite and landfilled. Wastes generated by the present project will also be disposed at the Ranadi Dumpsite

Previously, Ranadi Dumpsite did not process or manage leachate water at all, nor recorded any information on the number of waste transport vehicles or the amount of wastes. In response to this situation, JICA set up facilities to drain leachate, organized disposal spaces, set up administrative offices, and the like at the Ranadi Dumpsite in 2013, as part of the "Pacific Regional Waste Management Improvement Assistance Project."

Photo 64 Ranadi Dumpsite

1.7.2.6. Regulations and Organizations related to Environmental and Social Considerations

(1) Regulations and Standards related to Environmental and Social Considerations

1) The Environmental Act 1998

It was enacted in 1998 for the purpose of environmental protection. In this act, establishment of ECD (Environmental and Conservation Division) and EAC (Environmental Advisory Committee) is stipulated. The component of The Environmental Act 1998 is as shown in the table below.

Table 15 Component of the Environmental Act 1998

Major Classification	Sub Classification
PART Ⅰ Preliminary	1. Short Title and Commencement 2. Interpretation 3. Object of the Act 4. Effect of this Act on Other Acts
PART Ⅱ Administration	DIVISION 1 Establishment of ECD 5. Establishment of Division and Appointment of Director and Other Officers 6. Functions of the Division 7. Functions and Powers of the Director 8. Environment Report 9. Performance Targets for Public Authorities 10.Power to Give Directions 11.Power of Entry by Inspectors 12.Minister's Power to Issue General Directions to the Director DIVISION 2 Establishment, Functions and Powers of EAC 13 Establishment of EAC 14 Functions and Powers of EAC
PART Ⅲ Development Control, Environmental Impact	15. General Duty to Consider Environmental Impact 16. Declaration of Prescribed Development 17. Application for Approval

Assessment, Review and Monitoring	18. Requirement for Information Request Concerning Existing Prescribed Developments 19. Consent Required for Prescribed Development 20. Contents of Public Environmental Report (PER) 21. Requirement for Further Information 22. Publication of PER and Procedure in respect of Objections and Appeal 23. Contents of Environmental Impact Statement (EIS) 24. Publication of EIS and procedure in respect of Objections and Appeal 25. Development to be Carried Out in accordance with Development Consent 26. Offence of Providing False or Misleading Information 27. Prescribed Forms 28. Director to Keep Records 29. Director to Issue Guidelines for Assessment of Report and Statements 30. Responsibility for PER, etc. 31. Monitoring Environmental Aspects of Development 32. Appeal to EAC 33. Development Consents Non-Transferable
PART Ⅳ Control of Pollution	34. Causing Pollution and Noxious Discharges 35. Discharge of Waste in Circumstances in which it is likely to Cause Pollution 36. Occupiers of Premises to Take Certain Measures. 37. Penalties for Breach of Section 34 or 35 38. Occupiers of Prescribed Premises to Obtain a License for Discharge of Waste or Emissions of Noise, Odor or Radiation 39. Application for License 40. Revocation, Suspension or Amendment of Licenses by Director 41. Duty of Persons Becoming Occupiers of Prescribed Premises 42. Conditions of Licenses 43. Pollution Abatement notice 44. Outgoing Owner or Occupier to Notify the Director and Successor in Ownership or Occupation 45. Environmental Inspector May Serve Stop Notice 46. Record of Licenses, Pollution Abatement Notice and Notices 47. Powers Concerning Discharges of Waste and Creation of Pollution 48. Defenses to Certain Proceeding 49. Vehicles and vessels 50. Interference with Anti-Pollution Devices on Vehicles or Vessels. 51. Installation of Equipment Emitting Unreasonable Noise
PART Ⅴ Miscellaneous	52. Protection of Officers 53. Offences by Corporation 54. General Penalty 55. Regulations
Appendix	First Schedule 1. Constitution of EAC

	2. Term of Office 3. Revocation of Appointment 4. Reimbursement of Members 5. Remuneration 6. Protection of members 7. Proceedings and Quorum 8. Proceedings and Quorum 9. Appointment of Sub-Committees, etc. 10. Proceedings of the Sub-Committees, etc. 11. Attendance of Meetings by Public Officers Second Schedule Prescribed Development 1. Food Industry 2. Iron and Steel Industry 3. Non-Metallic Industry 4. Leather, Paper, Textile and Wood Industry 5. Fishing and Marine Product Industry 6. Chemical Industry 7. Tourism Industry 8. Agriculture Industry 9. Public Works Sector 10. Other

In PART III_16, it is stated that the projects described in the Appendix_Second Schedule are the "Prescribed Development" that requires EIA.

In addition, in Appendix "Second Schedule_ 9". it is stipulated that public works projects shall include the following projects.

(a) Landfills
(b) Infrastructure development
(c) Major waste disposal plan
(d) Soil erosion and siltation control
(e) Hydropower schemes
(f) Reservoir development
(g) Airport development
(h) Waste management, drainage and disposal systems
(i) Dredging
(j) Watershed management
(k) Ports and harbors

Since this project corresponds to (g) Airport development, EIA procedure based on the Environmental Act 1998 is required.

2) The Environmental Regulation 2008

The Environmental Regulation 2008 was enacted in 2008 to supplement the Environmental Act 1998. The structure is as shown in the table below.

Table 16 Structure of the Environmental Regulation 2008

Major Classification	Sub Classification
PART Ⅰ Preliminary	1. Citation and Commencement 2. Interpretation
PART Ⅱ Preparation of PER of EIA	3. Guidelines to Assist in Evaluation pf PER or EIS 4. Persons Authorized to Undertake PER or EIS 5. Additional Matters to EIS
PART Ⅲ Application or Prescribed Development	DIVISION 1 General 6. Proposal Application 7. Development Application 8. Timelines for Processing Applications 9. Power to Dispense Requirements of Section 17 DIVISION 2 Processing of Development Application where PER or EIS not Needed 10 Matters to be Taken into Account DIVISION 3 Processing of Development Applications where PER or EIS needed 11. Notice of Applications 12. Meeting to Consider Applications 13. Considerations of Objections and Submissions 14. Matters to be Taken into Account by Director before Issuing Development Consent 15. Conditions to Imposed on Development Consent 16. Publication of Decisions 17. Mitigation Costs
PART Ⅳ Procedure of Appeal	18. Grounds of appeal
PART Ⅴ Pollution Prevention	19. Prescribed Premises 20. Application for License to Discharge Waste, etc. 21. Applicant to Produce PER or EIS 22. Application and Meeting Notice 23. Issuance and Amendment of Licenses 24. Director not to Issue License if Application without PER or EIS 25. Abatement Notice 26. Stop Notices 27. Fees 28. Forms 29. Amendment to Second Schedule to the ACT
Appendix	Schedule 1 (regulation 19) Prescribed Premises Schedule 2 (regulation 27) Prescribed Fees Schedule 3 (regulation 28) Prescribed Forms

3) Environmental Impact Assessment Guideline 2010

The Environmental Impact Assessment Guideline 2010 was issued in 2010 to clearly explain the EIA procedure stipulated in the Environmental Act 1998 and the Environmental Regulation 2008. The structure is as follows.

1. Acronyms
2. Glossary

3. Introduction
4. Purpose of EIA
5. The EIA procedure
6. EIA procedural Descriptions
7. Stakeholders in the EIA process
8. Fees
9. References

(2) EIA procedure

EIA procedure in Solomon Islands is outlined in Figure A-1 and Table A-1 in Appendix.1.

(3) Treaties and Agreement Documents with Neighboring Countries

Treaties and agreement documents in the country are shown in Table A-2 in Appemdix.1.

(4) Comparison of Environmental Assessment System of Solomon Islands and JICA Guidelines

Table A-3 in Appendix.1 shows the gap between Environment Assessment System of Solomon Islands and JICA Guidelines as well as the policy to fill the gap.

1.7.2.7. Governmental Organizations related to Environmental and Social Considerations

(1) Ministry of Environment, Climate Change, Disaster Management and Meteorology (MECDM)

MECDM is a central government ministry of Solomon Islands and has jurisdiction over matters related to environment, disaster and meteorology. Figure 9 shows MECDM Organizational Chart.

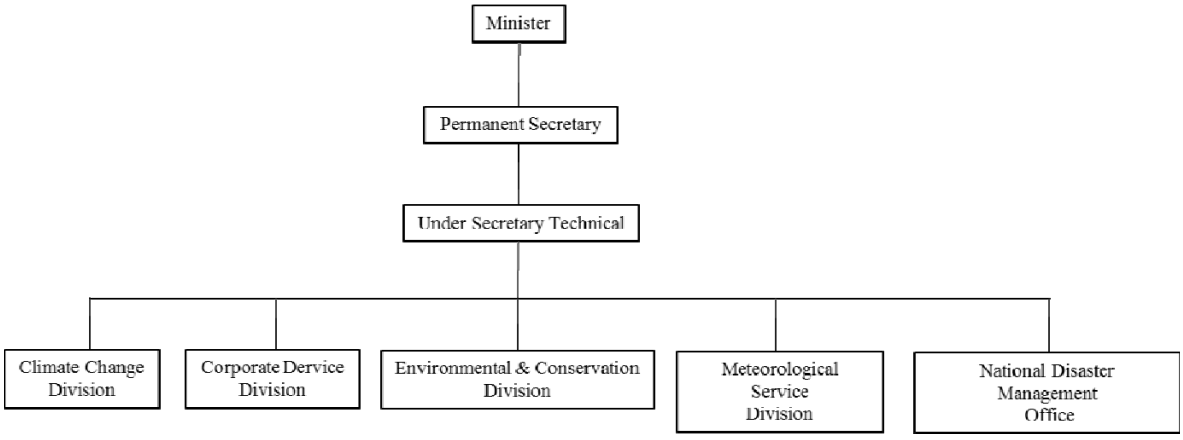


Figure 18 MECDM Organizational Chart

(2) Environmental and Conservation Division (ECD)

ECD is one of MECDM departments and is in charge of EIA procedure. The main role of ECD in the EIA procedure is to accept and screen proposal applications, report screening results, implement scoping, review PER/EIS reports, issue project approval, monitor projects, and provide advice to operators on the EIA procedure.

(3) Environmental Advisory Committee (EAC)

EAC is an agency that advises the ECD and the minister on cases concerning environmental protection. Residents' notice of opposition to the ECD decision is submitted to the EAC.

1.7.2.8. Review of Alternative Plans

Alternative plans are examined for the construction site, construction method and flood protection dike, from the viewpoint of technical aspects, costs, environmental and social considerations as well as land acquisition.

(1) Construction Location

Two alternatives are examined for the location of the terminal district. The alternative plan ① plans to develop the terminal district in the east side of the existing terminal, while alternative plan ② designs to develop it on its west side. Since the scale of facilities of alternative ① and alternative ② are equivalent, there is no difference in project effect. The alternative ① is deployment to the unused place in the airport premises and there are no houses etc. in the vicinity. Under alternative ②, it is necessary to acquire the land outside the airport and it is also close to the staff residential area. In addition, since it is necessary to set up a taxiway in the existing domestic flight area, the influence on the existing airport operation during construction is large. From above, the alternative plan ① is selected.

Figure 19 Location of Alternative Plan for Terminal District

(2) Construction Method

Regarding matters related to the construction method, alternatives are examined as to soil residue treatment and the building structure. Under the alternative ①, waste soil generated during construction is disposed at a landfill outside the airport, and an alternative ② is to utilize it as a foundation of the dike at the airport. The alternative ① has the effect of dust, vibration, noise and air pollution along the road from the dump truck when carrying the soil generated from the airport. The alternative ② is a mere movement of the soil inside the premise of the airport and thus the impact on the surrounding environment is small. From this result, alternative ② is selected.

For the building structure, a comparison is made between the reinforced concrete structure (alternative ①)) and a mixed structure of reinforced concrete and steel frame (alternative ②). Under the alternative ①, a large amount of locally produced concrete is required and the construction period is long. Moreover, the impact of noise and air pollution from the concrete plant is large as the concrete production process is prolonged. Meanwhile, under the alternative ②, the environmental impact to the quarry is small since it requires less amount of locally produced concrete and, hence less amount of crushed stone from the quarry. In addition, as less amount of concrete is to be produced on site, less operating time for the concrete plant and hence, less impact of noise and air pollution. From the above, the alternative plan ② is selected.

(3) Flood Protection Dike

Among the project components, alternatives for flood protection facility is reviewed as follows. The figure below shows the location of alternatives.

① To build embankment and seawall at the bank of the Lungga river.

② To build embankment at the south side of the airport premises.

③ No flood countermeasures are taken.

Figure 20 Location of Alternative Plans for Flood Protection Dike

Among the three alternatives, ① is a large-scale river construction and is difficult to be implemented as part of this project. In addition, environmental and social impact of ① is large. Meanwhile alternative ② is expected to be effective, with a little environmental and social impact. Thus, alternative ② is chosen.

The table below outlines the result of review of alternative plans.

Table 17 Review of Alternative Plans

No	Alternatives	Evaluation				Overall Evaluation
		Technical Aspect	Costs	Environmental and Social Considerations	Necessity of Land Acquisition	
Construction Location						
①	Develop the terminal district in the east side	It will not affect the operation of the airport.	Same as ②	Since the construction site is distant from the residential area, there is little influence on local residents from vibration, noise and air pollution.	None	Implementation effect is large, and impact on environment/social is small.

②	Develop the terminal district in the west side	Operation of domestic flight will be disturbed due to the construction.	Same as ①	carried out in the vicinity of the residential area, if not near, so the influence on local residents due to vibration, noise, air pollution etc. will be concerned.	Construction location is out of the airport and land acquisition is necessary.	Although implementation effect is great, cost is high and negative impact on environment / social is also great.
Construction Method (Soil Disposal)						
①	Disposed the soil at a landfill outside the airport	It needs to carry the soil to remote place.	High	Vibration, noise, air pollution etc. produced by transportation will be concerned.	None	Negative impact on environment / social is great.
②	Utilize it as a foundation of the dike	It doesn't need to carry the soil to remote place.	Low	Transportation of soil will not affect out of the airport	None	Negative impact on environment / social is small
Construction Method (Structure of the Terminal Building)						
①	Reinforced concrete	It needs large amount of concrete and construction will be longer.	High	Noise, vibration and air pollution due to long time operation of plants will be concerned.	None	Construction period will be long and Negative impact on environment / social is great.
②	Mixed structure of reinforced concrete and steel frame	Amount of concrete is small compared to ① and construction will be shorter.	Low	Operation of plant will be shorter, and noise, vibration and air pollution will be relatively low.	None	Construction Period will be short and Negative impact on environment / social is small
Flood Protection Facility						
①	Construct the dike and seawall on the Lungga river bank	It needs deforestation to prepare transportation route. The amount of needed soil is 16 times as large as ② and it also needs the concrete of 8,000m3	High	As construction will be carried out in the immediate vicinity of the high residential area, the influence on the local people due to vibration, noise and air pollution will be concern.	Construction location is mainly out of the airport and land acquisition is necessary. Even in airport area, there are several illegally living households and it is necessary to evict evacuation.	Although implementation effect is great, cost is high and negative impact on environment / social is also great.
②	Construct the dike on the south side of Airport premises	No objections around construction site. The embankment length will be half of ① and the effect can be expected by constructing a low embankment in a high place.	Low	Since the construction site (40m at nearest) is distant from the residential area, there is little influence on local residents from vibration, noise and air pollution.	None	Implementation effectiveness is small and there is concern about environmental and social impact, albeit not serious.
③	Do nothing for flood protection	"To become a disaster-resilient airport" can not be realized.	-	-	-	One of the objectives of this project, "to improve safety of the airport " can not be realized.

	Do not implement the project	Safety of the airport will not be improved, and future demand will not be coped.	-	Improvement of sewage and water supply will not be realized.	-	The objectives of this project, "to improve safety of the airport" "to cope with future air traffic demand" can not be realized.

1.7.2.9. Scoping and TOR of Environmental and Social Considerations

The following table describes the result of scoping.

Table 18 Scoping Results

Category		Impact Item	Evaluation		Reasons for Evaluation
			Before/ During Construction	During Operation	
Pollution Control	1	Air Pollution	B-	D	**Before/during construction:** Temporary influence on the atmosphere is expected due to the use of various plants, construction machinery and transportation equipment. **During operation:** The aircraft traffic will not increase sharply and the impact of exhaust gases from aircraft and vehicles will not change.
	2	Water Contamination	B-	D	**Before/during construction:** There is a possibility that the water quality may be adversely affected by oil leakage and dust scattering from various plants, construction machinery and transportation vehicles. Drainage from the workers' lodging place may also negatively affect the water quality. **During operation:** Improvement of sewage treatment facilities is scheduled in this project.
	3	Wastes	B-	D	**Before/during construction:** Wastes will be generated by construction implementation. **During operation:** Although the airport facility is expanded by implementing this project, the amount of wastes generated does not change significantly.
	4	Soil Contamination	B-	D	**Before/during construction:** There is a possibility that the soil may be contaminated by oil leakage from construction machinery and transportation vehicles. **During operation:** The aircraft and the passenger traffic will not increase abruptly and thus there is no change in oil leakage from aircraft and vehicles.
	5	Noise and Vibration	B-	D	**Before/during construction:** There is a possibility that various plants, construction machinery and transportation vehicles will generate noise and vibration. **During operation:** The aircraft and passenger traffic will not increase abruptly and thus there is no change in noise or vibration from aircraft and vehicles.

	6	Ground Subsidence	D	D	**Before/during construction:** Construction will not affect ground subsidence. **During operation:** The aircraft and the passenger traffic will not increase abruptly and thus there is no change in impact of ground subsidence from aircraft and vehicles.
	7	Malodor	D	D	**Before/during construction:** There is no work that is assumed to generate malodor. **During operation:** The occurrence of malodor is not assumed.
	8	River Sediment	D	D	**Before and during construction:** There is no work that is assumed to affect river sediment quality. **During operation:** No impact on river sediment quality is assumed.
Natural Environ.	9	Protected Areas	D	D	**Before/during construction:** There are no national parks, protected areas and the like at the project site and its surroundings. **During Operation:** There are no national parks, protected areas and the like at the project site and its surroundings.
	10	Ecosystem	B-	D	**Before/during construction:** There is a possibility that the ecosystem may be affected by air pollution, water pollution, waste, soil pollution and noise, generated by the construction. Also, quarrying may affect to the ecosystem around the quarry. **During operation:** Impact on ecosystem is not assumed.
	11	Hydro-meteor	B-	D	**Before/during construction:** There is a possibility that the hydro-meteor may be affected by drainage from construction site. Also, hydro-meteor of the river may be affected by quarrying. **During operation:** No impact on hydro-meteor is assumed.
	12	Topography and Geology	B-	D	**Before/during construction:** Since embankments and cuts are planned in this construction, there is a possibility that it may affect the topography and geology of the project site. It also influences the terrain of the quarry by quarrying. **During operation**：No impact on topography or geology is assumed.
Social Environ.	13	Land Acquisition and Settlement	D	D	**Before/during construction:** There is no need for land acquisition or resettlement for implementing this project. **During operation:** There is no need for land acquisition or resettlement during the operation period.
	14	The Poor	D	D	**Before/during construction:** The project implementation will not have impact on the poor. **During operation**：There is no impact on the poor during operation.

	15	Minorities and Indigenous People	D	D	**Before/during construction:** There is no impact on minorities or indigenous people by implementing construction. **During operation :** There is no impact on minorities or indigenous people during operation.
	16	Regional Economy such as Employ. and Livelihood Measures	B+	D	**Before/during construction:** There is a high possibility that local labor is hired for the construction. **During operation:** Although the airport facility is expanded by implementing this project, the number of airport staff is not assumed to increase.
	17	Land Use and Regional Resource Use	B-	D	**Before/during construction:** As construction takes place at the existing airport, there is no impact on use of land or regional resources in the vicinity of the airport. However, quarrying may affect to use of land or regional resources in the vicinity of the quarry. **During operation:** There is no impact on use of land or regional resources.
	18	Water Use	D	D	**Before/during construction:** There is no impact on water use by implementing the construction. **During operation :** There is no impact assumed on water use.
	19	Existing Social Infrastructure and Social Services	B-	B+	**Before/during construction:** Since the construction takes place at the existing airport, it may have impact on airport operation. Transportation vehicles may also have a little impact on road transportation. **During operation :** Facilities of existing airport will be expanded.
	20	Social Organizations Including Social Capital and Regional Decision-Making Bodies	D	D	**Before/during construction:** Since the construction takes place at the existing airport, it may not have impact on social organizations. **During operation:** It does not have impact on social organizations.
	21	Uneven Distribution of Damages and Benefits	D	D	**Before/during construction:** Since the construction takes place at the existing airport, it will not bring damages or benefits to the neighboring areas. **During operation:** It will not bring damages or benefits to the neighboring regions.
	22	Conflict of Interest within the Region	D	D	**Before/during construction**: Since the construction takes place at the existing airport, it will not cause conflict of interest in the neighboring region. **During operation:** It will not cause conflict of interest in the neighboring region.

	23	Cultural Heritages	B-	D	**Before/during construction :** There is a war dead memorial park around the project site. There is also a possibility that war legacy and remains etc. will be discovered during construction. **During operation:** There is no impact on cultural heritages.
	24	Landscape	D	D	**Before/during construction:** Since the construction takes place at the existing airport, it will not have impact on landscape. **During operation:** It will not have impact on landscape during operation.
	25	Gender	D	D	**Before/during construction:** The construction takes place at the existing airport and women are not employed as non-skilled workers in the country. Thus, it will not have impact on gender. **During operation:** It will not have impact on gender during operation.
	26	Children's Rights	D	D	**Before/during construction:** The construction takes place at the existing airport and children are not employed as non-skilled workers in the country. Thus, it will not have impact on gender. **During operation:** It will not have impact on children's rights during operation.
	27	Infectious Diseases such as HIV/AIDS	B-	D	**Before/during construction:** Foreign workers staying around the project site during construction period may spread infectious diseases. **During operation:** The project will not have impact on diseases during operation.
	28	Working Environment	B-	D	**Before/during construction:** There is a need to pay attention to the work environment of workers engaged in construction. **During operation:** It is assumed that the working environment of the airport staff will be the same as before.
Others	29	Accidents	B-	D	**Before/during construction:** There is a need for safety measures against accidents during construction period. **During operation:** The probability of accidents will not change during the operation.
	30	Transboundary Impact and Climate Change	D	D	**Before/during construction:** The construction scale is not so large to cause transboundary impact or climate change. **During operation:** Since aircraft traffic does not increase abruptly, emission of greenhouse gases from aircraft will not change.

A+/-: Significant positive or negative impact expected.

B+/-: Some positive or negative influence is expected.

C: The impact cannot be predicted at present and further investigation is necessary.

D: No impact

The following table describes TOR of Environmental and Social Considerations.

Table 19 TOR of Environmental and Social Considerations

Impact Item	Survey Items	Survey Method
Review of Alternatives	1. Construction site 2. Construction method	1. Review of the plan to minimize the impact on environment and society while maximizing the project effect. 2. Examination of construction method to minimize the influence on environment and society as well as on airport operation.
Air Pollution	1. Standards on air quality 2. Confirmation of households, schools, hospitals and any other facilities in the vicinity of the project site 3. Impacts during construction 4. Incremental aircraft traffic during operation based on air traffic demand forecast	1. Collection of existing materials, gathering of information at related organizations 2. Field survey 3. Confirmation of construction (contents, method, duration, location and range); construction machinery (type, operating location and operating period); and construction vehicles (the number of vehicles traveling, period and travel route), etc. 4. Impact forecast based on the results of air demand projection
Water Contamination	1. Standards on water quality 2. Status of water supply and sewage facilities 3. Impact during construction	1. Collection of existing materials, gathering information at concerned organizations, field survey 2. Field survey, information gathering at related organizations 3. Confirmation of construction (contents, method, duration, location and range); construction machinery (operating location and operating period); and construction vehicles (the number of vehicles traveling), etc.
Wastes	1. Disposal method of construction wastes 2. Waste volume	1. Information collection at related organizations, study of similar cases 2. Confirmation of content, material used and material volume used for construction
Soil Contamination	1. Impact during construction	1. Confirmation of construction (content, method and period) and construction machinery and equipment (type, operating location and storage location)
Noise and Vibration	1. Standards on noise and vibration 2. Distance between the source and residential area and public facilities 3. Impact during construction 4. Impact due to the increase of aircraft movement	1. Collection of existing material, data collection at concerned organizations 2. Field survey 3. Confirmation of construction (content, method, period, location and range); construction machinery (operating location and period); and construction vehicles (the number of vehicles travelling, period and travel route) 4. Impact forecast based on the number of aircraft movement.
Ecosystem	1. Situation of existence of endangered species and rare species. 2. Impact during construction	1. Collection of existing materials, gathering of information at related organization 2. Confirmation of construction (contents, method, duration, location and range);

Impact Item	Survey Items	Survey Method
		construction machinery (type, operating location and operating period); and construction vehicles (the number of vehicles traveling, period and travel route), etc.
Hydro-meteor	1. Standards on water quality 2. Impact during construction	1. Collection of existing materials, gathering of information at related organization 2. Confirmation of construction (contents, method, duration, location and range); construction machinery (type, operating location and operating period); and construction vehicles (the number of vehicles traveling, period and travel route), etc.
Topography and geology	1. Topography and geology at the target project site 2. Impact on local due to the change of topography and geology	1. Field survey, geological survey 2. Collection of existing materials, field survey
Regional Economy such as Employ. and Livelihood Measures	1. Impact on regional economy by implementing the project	1. Confirmation of construction plan, change in facility scale and results of air traffic demand forecast
Land Use and Regional Resource Use	1. Situation of possible site for quarry	1. Field survey
Existing social infrastructure and social services	1. Impact to airport operation during construction 2. Impact on road transportation volume in surrounding area of the airport 3. Location of households, schools and hospitals, etc. in the surrounding area of the target project site	1. Confirmation of construction plan 2. Confirmation of construction plan and results of air traffic demand projection 3. Field survey
Cultural heritages	1. Cultural heritages in the surrounding area of the target project site 2. Response in case that heritages and remains are discovered during construction	1. Existing material survey, field survey 2. Interview with concerned organizations and survey of similar cases
Infectious diseases such as HIV/AIDS	1. Status of HIV/AIDS and malaria etc. in the neighborhood	1. Existing material survey and interview with concerned organizations
Working environment	1. Working environment 2. Occupational safety measures	1. Survey of similar cases (content of contract with construction contractor in other similar projects etc.) 2. Confirmation of construction plan
Accidents	1. Accident prevention measures during construction	1. Confirmation of construction plan

1.7.2.10. Survey Results

Scoping results by item is summarized in the table below.

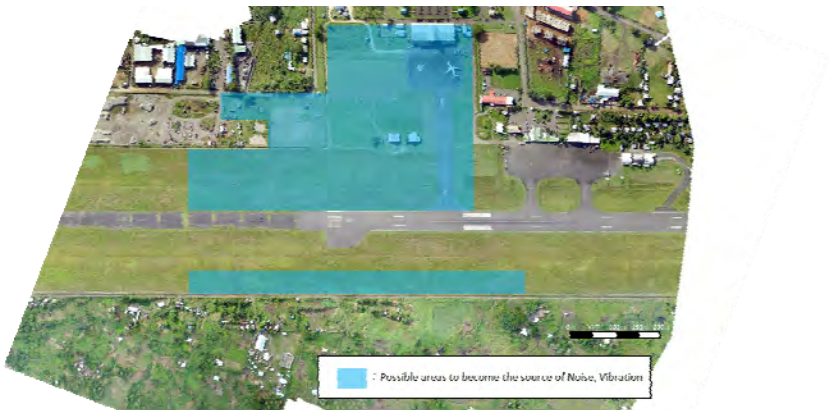
Table 20 Scoping Survey Results

Impact Item	Survey Results
Air Pollution	Before Construction: According to WHO publication, the concentration of PM2.5 is 5μg/m^3 (annual average) in the urban area of Solomon Islands[1]. It is expected that concentration is almost same as 5μg/m^3 in the vicinity of Honiara airport. WHO sets 10μg/m^3 (annual average) as long-term guideline value for PM2.5[2], and the value in the vicinity of Honiara airport is below guideline value. During Construction: Solomon Islands has no standards concerning air quality. It is expected that air quality in surrounding area of the project site is affected by the exhaust gas and dust generated by plants, construction machinery and transportation vehicles operating during construction. However, the impact is temporary and local. Moreover, since there are few residences and commercial facilities in the vicinity of the project site (including the quarry) and the distance is also far away, the influence on the residents' life and the human body is not assumed. During Operation: Air quality caused by the exhaust gas from aircraft and airport users' vehicles is expected to affect air quality. However, since aircraft and passenger traffic will not increase abruptly after the project implementation, impact on air quality will be the same level as before implementation.
Water Contamination	Before/during Construction: Solomon Islands has no standards related to water quality. During construction, oil flowing out of plants, construction machinery and transportation vehicles, dust scattered from the construction site, construction materials, as well as wastewater from workers' lodges, etc. will flow into drain near the project site. Thus, there is a possibility of affecting quality of surrounding rivers and the sea. However, contaminated water will not flow into drain directly and impact will not be significant. As for the quarry, since oil will not be flow into water directly from construction machinery and transportation vehicles, impact will not be significant. The project will not affect the water quality of the airport facilities or surrounding area during construction as the water source is located approximately 3km west of the project site. During Operation: The septic tank used for treatment of sewage from the airport facility is not currently functioning. As this project is scheduled to establish a merger treatment septic tank, improvement of water quality can be expected. Meanwhile, the influence on water quality caused by oil flowing out from aircraft and airport users' vehicles by flowing into the drainage channel is almost the same as before since aircraft and passenger traffic will not increase abruptly after completion of the project.
Wastes	Before/during Construction: Main wastes generated from the project site during construction is as follows. · Sludge · Concrete, asphalt crushed pieces · Partition board, etc. (generated by rehabilitation work of the existing building) These wastes are disposed of at the Ranadi Dumpsite located on the west side of the project site. It is about 2.5 km from the project site to Ranadi Dumpsite, and there is little environmental impact due to waste transport. It is possible to reduce the remaining soil by using it as much as

1 http://apps.who.int/gho/data/view.main.SDGPM25116v?lang=en
2 http://apps.who.int/iris/bitstream/10665/69477/1/WHO_SDE_PHE_OEH_06.02_eng.pdf

Impact Item	Survey Results
	possible for embankment construction. The results of comparison between the volume of generated waste and capacity of Ranadi Dumpsite is stated below. 1. Waste Volume Although the volume of generated waste during construction will be approximately 950m^3, the volume will increase by accumulating. In consideration of the increment, we used 1.3 as the increment rate. This rate was decided with reference to the standard of Ministry of Land, Infrastructure, Transport and Tourism in Japan that is generally used for the earthwork. 2. Capacity of Ranadi Dumpsite Improvement of Solid Waste Management – A & E Papua New Guinea, Solomon, Vanuatu and Samoa Project Completion Report (March 2014)[3] states that the capacity of Ranadi Dumpsite is 180,000m^3. 3. Result of Comparison The volume of waste generated in this project is 0.7% of the capacity of Ranadi Dumpsite. It means Ranadi Dumpsite has enough capacity as the disposal site for this project. <u>During Operation:</u> Although the facilities of Honiara Airport will be expanded by the implementation of this project, the aircraft and passenger traffic will not increase abruptly after completion of the project. Accordingly, the amount of wastes generated will also be comparable to before the project implementation.
Soil Contamination	<u>Before/during Construction</u> During construction, there is possibility that the oil flowing out of the plants, construction machinery and transportation vehicle affect the soil of the project site, quarry. However, the amount of oil leaked from construction machinery and transportation vehicle will be very small and it will not have significant impact. <u>During Operation:</u> There is a possibility that the oil flowing out of the aircraft or the vehicle of the airport users affect the soil. But as aircraft and passenger traffic will not increase sharply after completion of the project, the impact is expected to be the same level as before implementation.
Noise and Vibration	<u>Before Construction:</u> The figure below shows INM (Integrated Noise Model)[4] of Honiara airport. Noise level is expressed in DNL (Day – Night Average Sound Level)[5], DNL is the unit to evaluate the noise occurring from aircraft movement which is accepted and used in many countries. DNL above 65 is considered incompatible level with residential are. The number of aircraft movements is based on the actual number in 2016. As shown in figure, no residence is located in the area of DNL above 65, and noise occurring from current aircraft movements is not significant.

3 http://libopac.jica.go.jp/
4 https://www.faa.gov/about/office_org/headquarters_offices/apl/research/models/inm_model/
5 https://www.faa.gov/airports/airport_development/omp/FAQ/Noise_Monitoring/#q4

Impact Item	Survey Results
	 Figure. Noise level around Honiara airport (2016) <u>During Construction:</u> Noise and vibration may be generated at the airport premises due to the use of plants, construction machinery and transportation vehicles. The distance from the source to the surrounding residential area, shops, public facilities, etc. is 100 m or more. (The figure below shows that there are basically no facilities near the noise/vibration generation areas, except for airport facilities.). Noise is reduced by 40 dB when it is 100 m away from the source. Therefore, the noise of the construction site has little impact to the surrounding environment. The same also applies to vibration, and its influence is very small when it is more than 100 m away. Solomon Islands does not have standards concerning noise and vibration, but it can be judged that the impact on the surrounding area of noise and vibration generated in this project is not serious. However, since it is necessary to consider the impact on airport users, mitigation measures will be implemented to minimize the impact.  Figure: Generation Area of Noise and Vibration <u>During Operation:</u> Since aircraft and passenger traffic does not increase abruptly after completion of the project, the impact will be the same level as before project implementation. The figure below shows expected noise level on 2025. The number of aircraft movements is based on the result of demand forecast. Same as before construction, no residence is located in the area of DNL above 65, thus noise occurring from aircraft movements is not significant.

Impact Item	Survey Results
	 Figure. Noise level around Honiara airport (2025)
Ecosystem	Before/during construction: There is a possibility that the ecological system may be affected by air pollution, water pollution, waste, soil pollution and noise, generated by the construction. However, as described in air pollution, water pollution, waste, soil pollution and noise, the impact is not significant. Also, endangered species and rare species do not exist in the project site and the quarry. During operation: Impact on ecosystem is not assumed.
Hydro-meteor	Before/during construction: There is a possibility that the hydro-meteor near the project site and the quarry may be affected by drainage from construction site. As described in water pollution, since the large amount of contaminated water will not flow into the drain and the river, no significant impact is assumed. During operation: No impact on hydro-meteor is assumed.
Topography and Geology	Before/during Construction: It is expected that cutting and filling work affects topography and geology of the project site. Although the change in topography and geology itself is small, such change, in turn, is assumed to cause negative impacts. Also, If the same scale flood as 2014 happens after completion of this project, the south side of the airport will be flooded and the water level will be 3%~6% higher than 2014 due to the dike. The rise of water level is small and the possibility of same scale flood as 2014 is very low, thus the impact to topography and geology seems very small. During Operation: The influence on topography and geology is not assumed during operation.
Regional Economy such as Employ. and Livelihood Measures	Before/during Construction The project hires local workers during construction, and thus it is expected to affect the employment of the surrounding area. It is expected that the project will bring only positive impact, i.e., employment generation, but it is necessary to proceed the project with caution so as not to have any negative influence on the regional economy. During Operation: Airport facilities will be expanded by implementing the project, but employment of the airport staff will not increase.
Land Use and Regional Resource Use	Before/during Construction Since the construction takes place at the existing airport, it does not affect the land use and regional resource use around Honiara airport. Quarrying affects the land use and regional resource use of the quarry. However, there is no residence and commercial/public facility in the vicinity of the quarry and interests of local people will not be affected.

Impact Item	Survey Results
	During Operation: The influence on land use and regional resource use is not assumed during operation.
Existing Social Infrastructure and Social Services	Before/during Construction Since the construction takes place at the existing airport, it may affect airport operation. To minimize such impact, mitigation measures will be implemented. As for the influence on the road traffic by transport vehicles, the influence is not serious since the number of transport vehicles is very small compared to the total traffic volume in Honiara city. During Operation: Expansion of the existing airport facilities will have positive impacts such as increased convenience in transit between domestic and international and increased safety of aircraft operation. Since the number of airport users will not increase abruptly after the project is completed, the road traffic conditions around the airport will not change from before the project is implemented.
Cultural Heritages	Before/during Construction: During construction, the influence on the war dead memorial park should be taken into consideration as it is located near the project site within the airport premises. Mitigation measures should be implemented to minimize the risk of impact. Also, if a war related heritage or remains are discovered during construction, the construction will be suspended, and it is reported to the embassy and related organizations to ask for instructions.  Figure: Location of War Dead Memorial Park During Operation Impact on cultural heritages is not assumed during the operation.
Infectious Diseases such as HIV/AIDS	Before/during Construction: During construction, labor workers from third countries will stay around the project site and thus there is a possibility that infectious diseases will spread. In Solomon Islands, 22 HIV-infected persons were confirmed between 1994 and 2013, and 8 people died. As about 0.3%[6] of the population is undergoing HIV examinations, infected people and deceased people are considered to be significantly larger than the confirmed numbers. Also, Solomon Islands is the first-class contaminated area of malaria and 99% of the population have suffered from malaria. About 65% of malaria in Solomon Islands is tropical malaria called malignant malaria and it is easy to become severe.[7] Mitigation measures will be implemented to reduce the risk of infection. During Operation: In the future, the aircraft movement, passenger traffic and foreign visits are expected to grow. However, the aircraft and passenger traffic does not increase abruptly after completion of the project and the risk of infectious diseases is about the same level as before the implementation.
Working Environment	Before/during Construction: It is necessary to pay full attention to the working environment of the workers engaged in construction and to ensure safety and health of laborers. Mitigation measures will be taken to ensure a desirable work environment.

6 Solomon Islands Global AIDS Response Progress Report 2014 (2013, Solomon Islands National Aids Council)
7 Ministry of Foreign Affairs website（http://www.mofa.go.jp/mofaj/toko/medi/oceania/solomon.html）

Impact Item	Survey Results
	During Operation The work environment of the airport staff is assumed to be unchanged from before the project implementation.
Accidents	Before/during Construction Accidents may occur during construction. To ensure the safety of workers and passengers during construction, mitigation measures will be implemented. During Operation It is thought that aircraft operation safety will be improved after the completion of the project. Nonetheless, MCA will be urged to provide sufficient initial guidance to airlines and airport staff to avoid accidents arising from the change.

1.7.2.11. Environment Evaluation

The table below summarizes evaluation of impact items based on the survey results.

Table 21 Summary of Environment Evaluation based on Survey Results

Category		Impact Item	Evaluation by Scoping		Evaluation based on Survey Results		Reasons for Evaluation
			before/ during Const.	During Operation	before/ during Const.	During Operation	
Pollution Control	1	Air Pollution	B-	D	B-	D	**Before/during Construction** : The impact on air quality is temporary and local, and not critical. Also, there are few residences and commercial facilities near the project site (including the quarry) and the distance is far away. Therefore, there is no concern about the influence on the living and the human body of the surrounding residents. In addition, it can be expected to reduce the impact by implementing mitigation measures. **During Operation :** As aircraft traffic will not increase abruptly, influence of the exhaust gas from aircraft will not change.
	2	Water Contamination	B-	B-	B-	D	**Before/during Construction :** Since the amount of contaminated water may be flow into the drain and river is small, impact is assumed to be not serious. Furthermore, mitigation measures are expected to reduce the influence. **During Operation:** The project plans to set up a merger treatment septic tank for treating wastewater from airport facilities, and thus improvement of water quality can be expected.

Category		Impact Item	Evaluation by Scoping		Evaluation based on Survey Results		Reasons for Evaluation
			before/ during Const.	During Operation	before/ during Const.	During Operation	
	3	Wastes	B-	D	B-	D	**Before/during Construction:** The distance between the project site and the wastes disposal site is about 2.5 km, and thus the environmental impact due to the transport of wastes is not serious. Furthermore, mitigation measures are expected to reduce the influence. **During Operation:** Although this project expands airport facilities, there is no major change in the amount of wastes generated from airport during operation.
	4	Soil Contamination	B-	D	B-	D	**Before/during Construction:** Impact to soil due to oil leakage from construction machinery and transportation vehicles is not serious. Also, it is expected that mitigation measures contribute to reduction in such adverse impact. **During Operation:** The aircraft traffic does not increase abruptly, and the influence of oil outflow from the aircraft does not change.
	5	Noise and Vibration	B-	D	B-	D	**Before/during Construction** : The impact of noise and vibration is local. Moreover, since the distance between the project site (including quarry) and neighboring residential areas and commercial facilities is far away, the influence on the lives of the surrounding residents is not serious. Furthermore, mitigation measures are expected to reduce the influence. **During Operation:** The aircraft traffic does not increase abruptly, and the influence of noise and vibration caused by aircraft operation does not change.
Natural Environ.	10	Ecosystem	B-	D	B-	D	**Before/during construction:** The possibility to affect the ecosystem in the project site and the quarry is very small and no endangered species and rare species do not exist in the project site and the quarry. Furthermore, mitigation measures are expected to reduce the influence. **During operation:** Impact on ecosystem is not assumed.

Category		Impact Item	Evaluation by Scoping		Evaluation based on Survey Results		Reasons for Evaluation
			before/ during Const.	During Operation	before/ during Const.	During Operation	
	11	Hydro-meteor	B-	D	B-	D	**Before/during construction:** Impact to the river, ocean around the project site due to drainage from construction site is not significant. Also, impact to the river due to quarrying is not significant. Furthermore, mitigation measures are expected to reduce the influence. **During operation:** No impact on hydro-meteor is assumed.
	12	Topography and Geology	B-	D	B-	D	**Before/during Construction :** Changes of topography and geology due to embankment, cutting, construction of dike and quarrying are small, Furthermore, impact can be minimized by implementing counter measures. **During Operation:** The influence on the topography and geology is not assumed during operation.
Social Environ.	16	Regional Economy such as Employ. and Livelihood Measures	B+	D	B+	D	**Before/during Construction :** Only positive influence of job creation is assumed as there is a high possibility of employing local labor during construction. Nonetheless, attention is to be paid so as not to cause a negative influence on the regional economy. **During Operation:** Airport facilities will be expanded, but employment of the airport staff will increase accordingly.
	17	Land Use and Regional Resource Use	B-	D	B-	D	**Before/during Construction :** Changes of land use of regional resource use are not expected around the project site. Although, changes are expected around the quarry, no adverse impact is expected. Furthermore, mitigation measures are expected to reduce the influence. **During Operation:** The influence on the land use and regional resource use is not assumed during operation.
	19	Existing Social Infra structure	B-	B+	B-	B+	**Before/during Construction :** It is impossible to avoid influence on

Category		Impact Item	Evaluation by Scoping		Evaluation based on Survey Results		Reasons for Evaluation
			before/ during Const.	During Operation	before/ during Const.	During Operation	
		and Social Services					airport operation since the construction takes place at the exiting airport. However, it is expected that implementation of mitigation measures could reduce the impact. Also, due to traffic of transport vehicles, slight influence on road traffic is assumed. **During Operation:** As facilities of the existing airport is expanded, convenience will improve.
	23	Cultural Heritages	B-	D	B-	D	**Before/during Construction :** There is a war memorial park around the project site. However, it is possible to reduce the risk of impact by implementation mitigation measures. Also, there is a possibility that war-time legacy, remains etc. will be discovered during construction. **During Operation:** Influence on cultural heritages is not assumed.
	27	Infectious Diseases such as HIV/AIDS	B-	D	B-	D	**Before/during Construction :** Foreign workers staying around the project site during construction may spread infectious diseases. Since there is a high possibility of infection with malaria, implementation of mitigation measures will be taken to reduce the risk of infection. **During Operation:** Influence on infectious diseases does not change before and after the project implementation.
	28	Working Environment	B-	D	B-	D	**Before/during Construction :** It is necessary to pay attention to the work environment of workers engaged in construction. A desirable working environment is to be secured by implementing mitigation measures. **During Operation:** The working environment of the airport staff during operation is assumed to be the same as before the project.
Others	29	Accidents	B-	D	B-	D	**Before/during Construction :** Taking safety measures against accidents during construction period is necessary. The risk of accidents will be reduced by implementing mitigation measures.

Category		Impact Item	Evaluation by Scoping		Evaluation based on Survey Results		Reasons for Evaluation
			before/ during Const.	During Operation	before/ during Const.	During Operation	
							During Operation: The possibility of accidents during operation does not change before and after the project.

A+/-: Significant positive or negative impact expected.

B+/-: Some positive or negative influence is expected.

C: The impact cannot be predicted at present and further investigation is necessary.

D: No impact

1.7.2.12. Mitigation Measures and Implementation Costs of Mitigation Measures

Mitigation measures are described in the table below.

Table 22 Mitigation Measures

Impact Item	Mitigation Measures	Location	Implementation Timing	Implementation Organization	Manage. Organization	Cost
Air Pollution	Choose the appropriate transport route in transporting materials. The route should be the shortest and must be determined in consideration of the surrounding environment.	Transportation Route	Before Construction	Construction Company	MCA	Included in construction cost
	When transporting materials, take measures such as covering the load with sheets to prevent dust from scattering.	Transportation Route	During Construction	Construction Company	MCA	Included in construction cost
	Turn off the engine of the construction machines frequently to avoid idling.	Project Site, Quarry	During Construction	Construction Company	MCA	Included in construction cost
	Sprinkle water according to the situation during work, to suppress dust scattering.	Project Site, Quarry	During Construction	Construction Company	MCA	Included in construction cost
	Maintain the plants, construction machinery and transportation vehicles in good condition to reduce exhaust emissions.	Project Site, Transportation Route, Quarry	During Construction	Construction Company	MCA	Included in construction cost
	Use low emission construction machinery and transportation vehicles if possible.	Project Site, Transportation Route, Quarry	During Construction	Construction Company	MCA	Included in construction cost
	Although EIA is not needed, MCA will	Quarry	Before Construction	MCA	MCA	MCA will cover

Impact Item	Mitigation Measures	Location	Implementation Timing	Implementation Organization	Manage. Organization	Cost
	implement the Initial Environmental Examination (IEE) on the quarry after the quarry is decided.					
Water Contamination	Refuel carefully so as not to spill oil and avoid refueling as much as possible during rain.	Project Site, Quarry	During Construction	Construction Company	MCA	Included in construction cost
	Frequently collect small garbage etc. generated at the work place by using a vacuum cleaner and the like.	Project Site, Quarry	During Construction	Construction Company,	MCA	Included in construction cost
	Cover the materials at the temporary storage place and soil exposed during work by using sheets etc. to prevent scattering as necessary.	Project Site,	During Construction	Construction Company	MCA	Included in construction cost
	Maintain the plants, construction machinery and transportation vehicles well and keep them in good condition so as not to cause oil leakage.	Project Site, Quarry	During Construction	Construction Company	MCA	Included in construction cost
	Although EIA is not needed, MCA will implement the Initial Environmental Examination (IEE) on the quarry after the quarry is decided.	Quarry	Before Construction	MCA	MCA	MCA will cover
	Implement appropriate maintenance so that the newly constructed septic tank functions properly.	Honiara Airport	During Operation	MCA	MCA	Included in operation cost
Wastes	Frequently collect and transport generated wastes.	Project Site, Transportation Route	During Construction	Construction Company	MCA	Included in construction cost
	When transporting wastes, take measures to prevent falling and scattering, such as covering the loading platform with a sheet.	Transportation Route	During Construction	Construction Company	MCA	Included in construction cost
	Reduce soil residue by using soil generated during construction as much as possible for embankment and levee construction.	Project Site	During Construction	Construction Company	MCA	Included in construction cost
	Wastes are transported to Ranadi Dumpsite, a	Transportation Route,	During Construction	Construction Company	MCA	Included in construction

Impact Item	Mitigation Measures	Location	Implementation Timing	Implementation Organization	Manage. Organization	Cost
	designated disposal site with environmental permit.	Disposal Site				cost
	Select the work plan and materials to reduce wastes as much as possible.	Project Site,	Before/During Construction	Construction Company	MCA	Included in construction cost
Soil Contamination	Refuel carefully so as not to spill oil and avoid refueling during rain as much as possible	Project Site, Quarry	During Construction	Construction Company	MCA	Included in construction cost
	Frequently collect small garbage etc. generated at the work place by using a vacuum cleaner and the like.	Project Site, Quarry	During Construction	Construction Company	MCA	Included in construction cost
	When doing material processing work etc. on the soil, spread sheets and the like to prevent chips etc. from falling on the soil.	Project Site, Quarry	During Construction	Construction Company	MCA	Included in construction cost
	Although EIA is not needed, MCA will implement the Initial Environmental Examination (IEE) on the quarry after the quarry is decided.	Quarry	Before Construction	MCA	MCA	MCA will cover
Noise and Vibration	Limit plant operating hours and avoid nighttime operation.	Project Site	During Construction	Construction Company	MCA	Included in construction cost
	Maintain plants, construction machines and transportation vehicles in good condition and avoid operation under excessive load.	Project Site, Transportation Route, Quarry	During Construction	Construction Company	MCA	Included in construction cost
	Frequently turn off the engines of plants, construction machines and transport vehicles to avoid idling.	Project Site, Transportation Route, Quarry	During Construction	Construction Company	MCA	Included in construction cost
	Use low noise construction machinery if possible.	Project Site, Transportation Route, Quarry	During Construction	Construction Company	MCA	Included in construction cost
	Although EIA is not needed, MCA will implement the Initial Environmental Examination (IEE) on the quarry after the quarry is decided.	Quarry	Before Construction	MCA	MCA	MCA will cover
Ecosystem	Turn off the engine of the construction machines	Project Site, Quarry	During Construction	Construction Company	MCA	Included in construction

Impact Item	Mitigation Measures	Location	Implementation Timing	Implementation Organization	Manage. Organization	Cost
	frequently to avoid idling.					cost
	Maintain the plants, construction machinery and transportation vehicles in good condition to reduce exhaust emissions.	Project Site, Transportation Route, Quarry	During Construction	Construction Company	MCA	Included in construction cost
	Refuel carefully so as not to spill oil and avoid refueling as much as possible during rain.	Project Site, Quarry	During Construction	Construction Company	MCA	Included in construction cost
	Frequently collect and transport generated wastes.	Project Site, Quarry	During Construction	Construction Company	MCA	Included in construction cost
	Although EIA is not needed, MCA will implement the Initial Environmental Examination (IEE) on the quarry after the quarry is decided.	Quarry	Before Construction	MCA	MCA	MCA will cover
Hydro-meteor	Maintain the plants and construction machinery well to keep them in good condition so as not to cause oil leakage.	Project Site, Quarry	During Construction	Construction Company	MCA	Included in construction cost
	Refuel carefully so as not to spill oil and avoid refueling as much as possible during rain.	Project Site, Quarry	During Construction	Construction Company	MCA	Included in construction cost
	Frequently collect and transport generated wastes.	Project Site, Transportation Vehicle	During Construction	Construction Company	MCA	Included in construction cost
	Although EIA is not needed, MCA will implement the Initial Environmental Examination (IEE) on the quarry after the quarry is decided.	Quarry	Before Construction	MCA	MCA	MCA will cover
Topography and Geology	Use as much soil generated during construction as possible for embankment and construction of the dike	Project Site	During Construction	Construction Company	MCA	Included in construction cost
	Quarrying in the designated area based on the contract.	Quarry	During Construction	Construction Company	MCA	Included in construction cost
	Although EIA is not needed, MCA will implement the Initial Environmental Examination (IEE) on the quarry after the quarry is decided.	Quarry	Before Construction	MCA	MCA	MCA will cover
Regional	Instruct third-country	Project Site	Before/During	Construction	MCA	Included in

Impact Item	Mitigation Measures	Location	Implementation Timing	Implementation Organization	Manage. Organization	Cost
Economy such as Employ. and Livelihood Measures	laborers not to affect the local regional economy by conducting business etc.		Construction	Company		construction cost
Land Use and Regional Resource Use	Quarrying in the designated area based on the contract.	Quarry	During Construction	Construction Company	MCA	Included in construction cost
	Although EIA is not needed, MCA will implement the Initial Environmental Examination (IEE) on the quarry after the quarry is decided.	Quarry	Before Construction	MCA	MCA	MCA will cover
Existing Social Infrastructure and Social Services	Establish a construction plan that would minimize the impact on the airport operation during construction.	Project Site	Before Construction	Construction Company	MCA	Included in construction cost
	Partition the work area thoroughly and clearly divide the operation area from the work area.	Project Site	During Construction	Construction Company	MCA	Included in construction cost
	Ensure that transport vehicles travel on the appropriate route complying with traffic rules.	Transportation Route	During Construction	Construction Company	MCA	Included in construction cost
	Educate the airport staff so that the facilities expanded by this project are properly operated.	Honiara Airport	During Operation	MCA	MCA	Included in operation cost
Cultural Heritages	Provide barricades between the war dead memorial park and the work area and carefully work around the boundary.	Project Site	During Construction	Construction Company	MCA	Included in construction cost
	Set up procedure in case that legacy or remains are discovered during the construction and notify the workers in advance.	Project Site	During Construction	Construction Company	MCA	Included in construction cost
Infectious Diseases such as HIV/AIDS	Educate all construction workers on prevention of infectious diseases.	-	During Construction	Construction Company	MCA	Included in construction cost
	In case of suspected infection, prompt the workers to seek medical attention.	-	During Construction	Construction Company	MCA	Included in construction cost
Working Environment	Develop a work plan that fully takes into account the safety of workers.	-	Before Construction	Construction Company	MCA	Included in construction cost
	Conclude labor contracts in	-	Before / During	Construction	MCA	Included in

Impact Item	Mitigation Measures	Location	Implementation Timing	Implementation Organization	Manage. Organization	Cost
	accordance with the local labor standards.		Construction	Company		construction cost
	In addition to the health check at the time of employment, regularly confirm the health condition of workers during construction.	-	Before / During Construction	Construction Company	MCA	Included in construction cost
Accidents	Implement safety education for workers.	-	Before / During Construction	Construction Company	MCA	Included in construction cost
	Ensure workers to wear protective equipment (helmet, safety belt, gloves, etc.).	Project Site, Quarry	During Construction	Construction Company	MCA	Included in construction cost
	Partition the work area clearly. Particularly, the section of heavy equipment operation range is to be clearly defined.	Project Site, Quarry	During Construction	Construction Company	MCA	Included in construction cost

1.7.2.13. Monitoring Plan

Monitoring will be implemented before/during/after construction to confirm impacts to environment and society and implementation status of mitigation measures. Monitoring is planned as shown in the table below.

Table 23 Monitoring Plan

【Before Construction】					
Item	Method	Period	Frequency	Implementation Organization	Management Organization
Air Pollutions, Water Contamination, Soil Contaminations, Noise and Vibrations, Ecosystems, Hydro-meteor, Topography Geology, Land Use and Regional Resource Use	Review if air pollutions, water contamination, soil contaminations, noise and vibrations, ecosystems, hydro-meteor, topography geology, land use and regional resource use are properly considered in IEE of quarry site in accordance with JICA Environment and Social Consideration Guideline	Before construction	At least once	MCA	MCA
Air Pollution, Water Contamination, Wastes, Soil Contamination, Noise and Vibration, Ecosystem, Hydro-meteor, Topography and Geology, Regional	Confirm if mitigation measures stated in Environmental Management Plan (EMP) are included in the construction plan.	Before construction	At least once	MCA	MCA

Economy such as Employ and Livelihood Measures, Land Use and Regional Resource Use, Existing Social Infrastructure and Social Services, Cultural Heritages, Infectious Diseases such as HIV/AIDS, Working Environment, Accidents						
Item	Method	Location	Period	Frequency	Implementation Organization	Management Organization
Air Pollution	Measure the PM2.5 Consentration	Project site, Quarry	Before construction	At least once	MCA	MCA
Water Contamination	Measure the COD of drainage, river	Project site, Quarry	Before construction	At least once	MCA	MCA
	Measure the amount of phenols included in drainage, river	Project site, Quarry	Before construction	At least once	MCA	MCA
【During Construction】						
Item	Method		Period	Frequency	Implementation Organization	Management Organization
Air Pollutions, Water Contamination, Soil Contaminations, Noise and Vibrations, Ecosystems, Hydro-meteor, Topography Geology, Land Use and Regional Resource Use	Check implementation status and effect of mitigation measures described in IEE of quarry site		Entire period of construction	Monthly	MCA	MCA
Item	Method	Location	Period	Frequency	Implementation Organization	Management Organization
Air Pollution	Monitor the operation situation of plants, construction machineries and transportation vehicles (operation time, load, etc.).	Project site, Transportation route, Quarry	Entire period of construction	Monthly	MCA	MCA
	Monitor the maintenance situation of plants, construction machineries and transportation vehicles.	Project site, Transportation route, Quarry	Entire period of construction	Monthly	MCA	MCA
	Monitor the implementation situation of mitigation measures to prevent scattering of dust (spraying water, etc.).	Project site, Transportation route, Quarry	Entire period of construction	Monthly	MCA	MCA
	Monitor the situation of transportation (route, mitigation measures for scattering, etc.).	Transportation route	Entire period of construction	Monthly	MCA	MCA
	Measure the PM2.5	Project site,	Entire period	Monthly	MCA	MCA

	concentration	Quarry	of construction			
Water Contamination	Monitor the maintenance situation of plants, construction machineries and transportation vehicles.	Project site, Transportation route, Quarry	Entire period of construction	Monthly	MCA	MCA
	Monitor the situation of fueling.	Project site, Quarry	Entire period of construction	Monthly	MCA	MCA
	Monitor the implementation situation of mitigation measures to prevent scattering of dust (spraying water, etc.).	Project site, Transportation route, Quarry	Entire period of construction	Monthly	MCA	MCA
	Monitor the situation of sewage treatment of workers' lodgings.	Workers' lodgings	Entire period of construction	Semi-annually	MCA	MCA
	Measure the COD of drainage, river	Project site, Quarry	Entire period of construction	Monthly	MCA	MCA
	Measure the amount of phenols included in drainage, river	Project site, Quarry	Entire period of construction	Monthly	MCA	MCA
Wastes	Monitor the transportation and disposal situation of wastes.	Transportation route Disposal site	Entire period of construction	Monthly	MCA	MCA
	Confirm waste volume generated.	Project site	Entire period of construction	Monthly	MCA	MCA
Soil Contamination	Monitor the maintenance situation of plants, construction machineries and transportation vehicles.	Project site, Transportation route, Quarry	Entire period of construction	Monthly	MCA	MCA
Noise and Vibration	Monitor the maintenance situation of plants, construction machineries and transportation vehicles.	Project site, Transportation route Quarry	Entire period of construction	Monthly	MCA	MCA
	Measure the Noise level	Boundary of the project site, quarry	Entire period of construction	Monthly	MCA	MCA
Ecosystem	Monitor the operation situation of plants, construction machineries and transportation vehicles (operation time, load, etc.).	Project site, Transportation route Quarry	Entire period of construction	Monthly	MCA	MCA
	Monitor the maintenance situation	Project site, Transportation	Entire period of	Monthly	MCA	MCA

	of plants, construction machineries and transportation vehicles.	route Quarry	construction			
	Monitor the implementation situation of mitigation measures to prevent scattering of dust (spraying water, etc.).	Project site, Transportation route Quarry	Entire period of construction	Monthly	MCA	MCA
	Monitor the situation of fueling.	Project site, Quarry	Entire period of construction	Monthly	MCA	MCA
	Monitor the situation of sewage treatment of workers' lodgings.	Workers' lodgings	Entire period of construction	Semi-annually	MCA	MCA
	Monitor the situation of transportation and disposal of wastes.	Transportation route Disposal site	Entire period of construction	Monthly	MCA	MCA
Hydro-meteor	Monitor the maintenance situation of plants, construction machineries and transportation vehicles.	Project site, Transportation route Quarry	Entire period of construction	Monthly	MCA	MCA
	Monitor the situation of fueling.	Project site, Quarry	Entire period of construction	Monthly	MCA	MCA
	Monitor the implementation situation of mitigation measures to prevent scattering of dust (spraying water, etc.).	Project site, Transportation route, Quarry	Entire period of construction	Monthly	MCA	MCA
	Monitor the situation of sewage treatment of workers' lodgings.	Workers' lodgings	Entire period of construction	Semi-annually	MCA	MCA
Topography and Geology	Monitor the situation of storage and reuse of excavated soil.	Project site	Entire period of construction	Monthly	MCA	MCA
Regional Economy such as employ. and Livelihood Measures	Monitor the employment situation of local workers.	-	Entire period of construction	Semi-annually	MCA	MCA
Land Use and Regional Resource Use	Monitor the working situation at the quarry.	Quarry	Entire period of construction	Monthly	MCA	MCA
Existing Social Infrastructure and Social Services	Monitor the situation of partition of work area.	Project site, Transportation route	Entire period of construction	Monthly	MCA	MCA
	Monitor the operation situation of the airport.	Honiara airport	Entire period of construction	Monthly	MCA	MCA
Cultural	Monitor the working	Project site	Entire period	At	MCA	MCA

Heritages	situation near the war-dead memorial par		of construction	appropriate time		
Infectious Diseases such as HIV/AIDS	Confirm the health condition of workers	-	Entire period of construction	Monthly	MCA	MCA
Working Environment	Confirm the content of the labor contract for workers.	-	Entire period of construction	Semi-annually	MCA	MCA
	Confirm the health condition of workers	-	Entire period of construction	Monthly	MCA	MCA
Accidents	Monitor the situation of workers' usage of protection equipment.	Project site, Quarry	Entire period of construction	Monthly	MCA	MCA
	Monitor the situation of partition of work area	Project site, Quarry	Entire period of construction	Monthly	MCA	MCA
	Monitor the operation situation of the airport.	Honiara airport	Entire period of construction	Monthly	MCA	MCA
【During Operation】						
Item	Method	Location	Period	Frequency	Implementation Organization	Management Organization
Water Contamination	Monitor the operation situation of new sewage disposable facilities.	Honiara Airport	Entire period of construction	Semi-annually (for 3 years after construction)	MCA	MCA
Existing Social Infrastructure and Social Services	Monitor the operation situation of the airport.	Honiara Airport	Entire period of construction	Semi-annually (for 3 years after construction)	MCA	MCA

Chapter 2 Contents of the Project

2.1. Basic Concept of the Project

Considering the current situation of Honiara Airport, components bellows are planned.

(1) Aprons
(2) Taxiways
(3) Airfield Lighting System
(4) Existing International Building (for International Arrivals and Domestic)
(5) International Departure Building
(6) Flood Protection Dike

Facility Layout Plan is shown in the figure below.

Figure 21 Facility Layout Plan

Main project components in the project are summarized in the table below.

Table 24 Outline of Buildings

Buildings	Structure/ Scale	Building Area	Total Floor Area	Construction Floor Area
Expansion Work (EW)				
International Departure Terminal Building (IDT)	2-story steel structure	2,988.05m^2	3,399.79m^2	4,872.37m^2 (including Balcony and Exterior Pavement)
Utility Building (UB)	1-story steel structure	99.84m^2	99.84m^2	118.68m^2 (including External Staircase)
Total Area		3,087.89m^2	3,499.63m^2	4,991.05m^2

Rehabilitation Work (RW)				
Existing Passenger Terminal Building (ETB)	2-story steel structure		967.69m^2 (Renovation area) (Total floor area: 4,265.77m^2)	1,929.33m^2 (including Balcony)
Existing Sub-station (SUB)	1-story steel structure		110.52m^2 (Renovation area) (Total floor area: 132.00m^2)	110.52m^2
Total Area			1,078.21m^2	2,039.85m^2
Overall Total Area			4,577.84m^2	7,030.90m^2

Table 25 Outline of Special Equipment

Items	Outline	Location/ Scale
Baggage Handling System (BHS)	Facility to transport hold baggage of international passenger to baggage makeup area	IDT: 1 set
Security Equipment		
Hold baggage X-ray Inspection System (Dual View)	Baggage inspection system for hold baggage of international departure passengers and cabin baggage for VIP passengers	IDT: 2 sets
Hold baggage X-ray Inspection System (Single View)	Hold baggage inspection system of international arrival passengers in Customs Area	ETB: 1 set
Cabin baggage X-ray Inspection system (Dual View)	Baggage inspection system for cabin baggage of international departure passengers	IDT: 2 sets
Small baggage X-ray Inspection System (Single View)	Baggage inspection system for airport staff	ETB: 1 set
Gate type walk through metal detector	Security equipment for international departure passengers, VIP and airport staffs	IDT: 2 sets ETB: 1set
Hand held metal detector	Security equipment for international departure passengers, VIP and airport staffs	IDT: 2 sets ETB: 1set

Table 26 Outline of Civil Facilities

Items	Outline	Type/ Scale
Expansion of Aprons	Construction of 4 aircraft parking spots for international and 6 spots for domestic	Concrete pavement: Approx. 900 ㎡、 Asphalt pavement: Approx. 30,380 ㎡
New Taxiway	Length: 235m Widths: 23m	Asphalt pavement: Approx. 5,500 ㎡
Rehabilitation of existing pavement	Rehabilitation of pavements in existing taxiway and apron	Asphalt overlay: Approx. 15,400 ㎡
Landside Roads	Width: 3.0m-9.0m Length: 250m	Asphalt pavement: Approx. 1,670 ㎡
Airfield Lighting System	New installation and renewal of existing facilities	Apron flood light: 6poles, Taxiway lights 26 lights, Mandatory instruction signs: 3 lights, Aerodrome beacon 1 set
Flood Protection Dike	Construct dike at the southern side of the runway	Dike length Approx. 200m, Height: 2.0m

2.2. Outline Design of the Japanese Assistance

2.2.1. Design Policy

Objectives of the project are to expand the capacity of the airport and strengthening to cope with disasters. The project components include expansion of the apron, new taxiway, new installation of airfield lighting system, rehabilitation of the existing international passenger terminal building, construction of international departure building and construction of flood protection dike. The scale of the components is planned based on results of air traffic demand forecast. Facility layout plan is prepared to secure airport operation even during flood under heavy rain.

2.2.1.1. Policy of Natural Environment Conditions

Honiara is located in a tropical rainforest climate. Rainy season is from December to April. From the data shown in 2.2.2, annual average rainfall is 2,009mm and it is more than that of Tokyo, which is 1,500mm. Average maximum temperature is 31.3 degrees Centigrade and average minim temperature is 22.6 degrees Centigrade, there is not much difference between cold and summer seasons.
Climate in the Solomon Islands is relatively comfortable climate but it is necessary to take measures to sunlight and heavy rain. Fluorine resin paint, which has weather ability, is applied on a metal roof and phenol boards, which has good heat insulating performance, is put under the roof.

Phenolic laminate is applied on the ceiling of stairwell area in the check-in fall and the gate lounge in IDT so that the roof become double roofs. The double roofs will mitigate noise from the metal roof by rain. Rainwater on the large roof will be collected and used for sprinkling water in the green area.

Earthquakes often occur at the northern side of Guadalcanal Islands and earthquake with 7.8 magnitudes was observed in December 2016, however, there was no report of damage in Honiara city and the airport.

2.2.1.2. Policy on Local Construction/Procurement Environment and Business Customs

(1) Construction permit, relative regulations, and design standards

1) Construction permit

Construction permit procedure for a public building is under the jurisdiction of Ministry of

Infrastructure Development (MID). The procedure is that the application form submitted by MCA will be examined by MID and MID will submit it to the city council and after the formal review, the construction permit will be obtained.

There is a building code for a wooden house based on that of New Zealand and Australia in the Solomon Islands, but it cannot be applied to a large-scale public building. It was confirmed with MID there is no problem to apply Japanese building standards, which is more stringent.

2) Structural Standards

Based on the above background and study of the earthquake history in the Solomon Islands, a structural design was conducted based on the following Japanese building standards:

Table 27 Structural Standards

Items	Standards
Standard shear force coefficient	Co=0.1875 (Same as medium scale earthquake in Japan, including importance factor: I=1.25)
Wind load	Vo=46m/sec (Same as standard wind speed in isolated islands in Japan)
Allowable stress design	Cross section design against stress of long term (Permanent load) and short term (Earthquake and wind)

3) Category of special buildings

According to the building standards in Japan, airport facilities are not included in a category by usage, so that it is not clear if the provision of a refractory building is applied or not. Because steel structure is applied to IDT, the building is designed as semi-refractory building with incombustible material of pillars and columns.

4) Fire protection zone

It is necessary to set fire protection zone for semi-refractory building with the floor space of more than 1,500 m^2 in accordance with Japanese building standards. However, setting such zone in IDT is difficult because of the usage. It is easy to escape from the building on fire because the building functions are located on the ground floor other than the business lounge, which has the partial 2nd floor, and even in the business lounge, there are always staffs in the lounge, who can guide, and there is no room with fire use.

(2) Equipment plan

The following equipment is planned based on Japanese building standards, Japanese fire

protection law and Japan Industrial Standards (JIS).

- Emergency light
- Mechanical ventilation
- Indoor fire hydrant
- Guidance light
- Septic tank

(3) Trading custom, level and availability of labor force, procurement of local materials, etc.

1) Material

Locally available material is very limited. Some material from Australia and New Zealand is available in local market, however, a quantity of supply doesn't meet the requirement for the project and price is high.

Further, it is difficult to purchase stone in the Solomon Islands. It is possible to procure some stone in a market but these are not enough quantity for the project. Thus, it is planned to obtain stones by excavating a riverbed, transport it to the site, and obtain enough quantities. Also, production plant of crushed stone, concrete and asphalt will be temporary set on the construction site and use them for the material.

2) Labour force

According to sample survey on a local construction site, it was found that general labour is local, supervisors and superintendents are Australian. It is assumed local labour will be employed locally and Japanese and other third country supervisors and technicians will be employed.

Local working hours, overtime conditions and holidays are shown below:

Working Hours

Weekdays:	8：00～17：00 (8 hours excluding lunch time)
Saturday:	8：00～14：00 (5 hours excluding lunch time)
Sunday and holidays:	Off day

Overtime fee

Daily over time:	1.5 times
Late night and Sunday:	2.0 times
Holidays:	3.0 times

Local national holidays in 2017 are shown in the table below. There were 8 holidays.

Table 28 National Holidays in Solomon Islands in 2017

Name	Date
New Year's Day	January 1
Good Friday	April 14
Easter Monday	April 17
Whit Monday	June 5
Queen's Birthday	June 16
Independence Day	July 7
Christmas Days	December 25
	December 26

Source; Ministry of Home Affairs

3) Construction equipment

There is no lease company of construction equipment. Local contractors own their construction equipment such as tracks and excavators for their own construction work but basically, they will not lease these equipment. In this regards, it is necessary to bring most of the construction equipment and machines for the project from Japan.

4) Transport

Landing port

The landing port is Honiara port, which locates approximately 11.5 km west from the airport. There are scheduled cargo ships between Japan and Solomon Islands. The airport was rehabilitated by Japanese Grant Aid in 2016 so that there is no problem on handling capability of the port.

Inland Transport

A national highway connects Honiara Port and the site. The road is 2 lanes paved road but the surface condition is bad and driving speed is not high. There happens traffic jam and it takes time to pass through the town area. There are several bridges from the port to the site but there is no structural problem.

5) Traffic Regulation

There is no traffic regulation to restrict large size vehicles. The longest construction material used in the past airport project was 12m. It was necessary to apply traffic restriction during driving of long size trailers in some intersections.

6) Policy on local contractors

There are small size construction companies in the country and they are mainly working on small size road repair and residence building constructions. It is not adequate to use these local companies as a sub contractor of a Japanese contractor because their capacity and quality control skills are not sufficient. It is necessary to conduct construction works under adequate super vision and instruction by skilled labors and technicians from Japan or a third country under a Japanese main contractor. There was no local engineering consultant during the time of the site survey.

7) Policy on operation and maintenance

MCA is responsible for operation and maintenance of all airports in the Solomon Islands at the time of site survey. New Zealand Government is supporting to re-organize MCA. After completion of the project, Solomon Islands Airport Corporation Limited (SIACL) will be responsible for operation and maintenance of Honiara Airport. Candidates of a Chief Financial Officer (CFO) and a Chief Operation Officer (COO) were employed with support from New Zealand Government. SIACL was formally established but organization and staffing hasn't been completed.

8) Policy on setting a grade of facility and equipment

Since Honiara Airport is a gateway airport of Solomon Islands and there are international scheduled flights, planning and designing of airport basic facilities are in accordance with Standards and Recommended Practices of International Civil Aviation Organization (ICAO), which international airport shall comply with.

9) Construction methods

Asphalt pavements and concrete pavements are used for civil works.

Considering the special condition of the project such as the difficulty of production of concrete, weight saving and shortening of the construction period, the steel structure is applied for

building structures.

10) Procurement methods

As described above, locally available materials are mainly for residential houses, quantity is not adequate. Also, it is difficult to procure construction equipment. Thus, other than cement and other materials, which can be procured locally, equipment are planned to procure in Japan except for equipment, which is adequate to procure from a third country from viewpoints of the difficulty of procuring in local and Japan and cost.

11) Implementation period

It is planned that it will take 3 months to procurement and preparation plants of crushed stones, concrete and asphalt prior to the commencement of preparation work and it will take a month to dismantle those plants after completion of the project.

2.2.2. Basic Plan

2.2.2.1. Air Traffic Demand Forecast

Since completion of the project is estimated to be early 2021, target year of the project is set to the year 2025 to cope with demand after 5 years of completion of the project. The results of air traffic demand forecast are summarized in the table below. Details of air traffic demand forecast are attached in Appendix-1.

Table 29 Summary of Air Traffic Demand Forecast

	2016 (Current)	2020	2025	2030
Annual Traffic				
International Passengers	93,484	107,894	131,048	157,545
Domestic Passengers	38,050	50,465	65,992	83,711
Total	131,534	158,359	197,040	241,256
International Cargo(kg)	315,578	461,280	560,272	673,556
Domestic Cargo (kg)	127,745	217,823	284,842	361,326
Total (kg)	443,323	679.103	845,114	1,034,792
International Aircraft Movements	2,012	2,156	2,383	2,663
Domestic Aircraft Movements	6,583	6,583	6,583	7,349
Total	8,595	8,739	8,966	10,012

Peak Day Traffic				
International Passengers	421	486	590	709
Domestic Passengers	190	212	225	238
International Aircraft Movements	8	9	10	11
Domestic Aircraft Movements	22	22	22	22
Peak Hour Traffic				
International Passengers	354	406	390	465
—Departures	177	203	195	233
—Arrivals	177	203	195	233
Domestic Passengers	52	58	61	65
—Departures	17	19	20	22
—Arrivals	35	38	41	43
International Aircraft Movements	4	4	4	4
Domestic Aircraft Movements	6	6	6	6

2.2.2.2. Basic Policy

(1) Requested Items and Basic Measures

The following list describes the content of the request made by the Government of the Solomon and policy for measures to be taken.

Table 30 Requested Items and Measures to be Taken

Content of Request	Measures
1) Repair/rehabilitation of the existing pavements (taxiway and apron)	Existing pavements will be rehabilitated.
2) Expansion of aprons	Aprons will be expanded.
3) Construction of new taxiway.	A new taxiway will be constructed.
4) Installation of new airfield lighting system	Taxiway and apron lighting will be installed
5) Renovation of the existing international building	Existing international terminal building will be renovated to a building with functions of international arrivals and domestic terminal building. (ETB)
6) Construction of a new international departure building	A new international terminal building for departures (IDT) will be constructed.
7) Construction of a new air traffic control tower	Will be omitted from the scope of this Project

8) Construction of a new fire station	Will be omitted from the scope of this Project
9) Construction of flood control embankment	Flood control embankment will be constructed within the airport premise

Construction of a new air traffic control tower and a new fire station were omitted from the scope of this project considering priority.

(2) Overall Plan

The objectives of this Project are described below:

1) Architectural Facilities

To expand the existing international terminal building to cope with the increasing air traffic volume and improve the level of convenience for passengers of the existing terminal building.

To renovate existing facilities depending on the conditions affecting the functions and safety of the building, and if any new purpose of the building may arise.

2) Civil Engineering Facilities

- To rehabilitate and upgrade the deteriorating pavements and enhance aircraft operation safety.
- To improve safety by eliminating incidents of parking in spaces that violate ICAO standards.
- To respond to the increasing traffic demands by expanding parking aprons.
- To upgrade and renew airfield lighting system and enhance aircraft operation safety.
- To take flood control measures and strengthen the resilience of the transport system and infrastructure development.

2.2.2.3. Architectural Facility Planning

(1) Policy for improving the terminal building

The initial request made by the Government of Solomon was to build a new domestic passenger terminal building and rehabilitate the existing international passenger terminal building. In response to this request, the JICA Survey Team carried out the field survey with a plan to build a new domestic passenger building on the west side of the existing international passenger building. However, due to the structure of the existing international passenger building, the

study revealed that space is limited and cannot accommodate departing passengers even if the international terminal were to be rehabilitated, and thus, unable to meet the increasing future demand. Also, to carry out renovation works while operating international passenger building was found to become a challenge. The Survey Team reviewed the above findings and proposed to build a new international departure building and renovate the existing international passenger building to accommodate international arrivals as well as to function as the domestic terminal building.

The annual number of passengers at Honiara Airport in 2016 reached to over 93,500 for international flights and approximately 38,000 for domestic flights. Since the number of international passengers is about 2.4 times of the domestic flight passengers, more benefits could be anticipated for constructing a new international passenger building compared to those for domestic passengers.

From the economic point of view, because the number of international departing passenger is larger than the total of the arriving and departing passengers for domestic flights, the necessary floor space becomes large, so the project cost will become larger when building a new international departure building.

Many international passengers arriving at Honiara Airport are transfer/transit passengers moving to rural areas. Since the international and domestic terminal areas are located approximately 200 meters apart, such passengers must walk on a roofless road which imposes inconvenience. If the domestic passenger building is relocated to the west side of the international terminal building, the level of convenience shall be improved, but the necessity of moving from one terminal to another by foot outdoors remains the same. Therefore, if the current international terminal building is renovated/ rehabilitated to have the necessary functions of the domestic terminal building, the ease of access between domestic and international terminals will be highly improved, and the level of convenience of passengers can be enhanced substantially.

After completion of the new international terminal building, the departure area of the existing international terminal building can be closed for renovation in which the area will be refurbished and modified to a new domestic terminal. In such way, renovation can be carried out with much ease while operating other facilities of the airport.

Table 31 Comparison of International Departure Terminal Building and Domestic Terminal Building

Indicator	International Departure Terminal Building		Domestic Terminal Building	
Number of beneficiaries	○	A larger number of beneficiaries with more international passengers.	X	A smaller number of beneficiaries with less domestic passengers.
Economic performance	△	Higher cost due to larger floor area, but lower renovation cost for the existing building.	△	Lower cost due to smaller floor area, but higher renovation cost for the existing building.
Level of convenience of passengers	○	International passengers can transfer to domestic flights within the same building.	△	International passengers need to walk outside to transfer to domestic flights, but with less walking distance than at present.
Renovation works	△	Require renovation of the existing international departure area into domestic terminal building.	○	Require less renovation since the existing international terminal building will be retained.

Based on the above survey results, it was confirmed that a new international departure building should be built, and outline design shall be prepared accordingly.

(2) Floor Plan

1) Scale Calculation of Rooms and Facilities

The numerical value for the various rooms was derived from the calculation based on the figures from the demand forecast survey and International Air Transport Association (IATA) standards.

Table 32 Facility Planning for IDT

Name of Room	Calculated Value	Proposed Plan
Check-in Hall	198m^2	225m^2
Check-in Counter	7.3 units	8 units
X-ray Inspection System for Baggage/Security	0.8 unit	1 unit
Security Check-point	0.8 set	2 sets (1 set added in case of operation failure)
Immigration Booth	3 units	4 units + 2 units (E gate) (E-gate is excluded from the planned

		number since it is currently not in full use. 4 units are planned as 2 units (in front and behind) will be installed for each booth.)
Departure Lounge	400m^2	432m^2

Table 33 Facility Planning for ETB

Facility (room)	Calculated Value	Proposed Plan
Concourse	300m^2	375.5m^2（International Arrivals 87.5m^2、Domestic 288m^2）(Existing)
Arrival hall	66m^2	181m^2（Existing）
Immigration booth	1.8 unit	4 units +2 units（E gate）（Existing）
BHS	0.66 unit	1（Existing）
Arrival immigration counter	1.83 unit	2（Existing）
International arrival customs queuing area	13.75m^2	31m^2

(3) Floor Plan for Each Facility

1) IDT

Considering the level of convenience, movement of the passengers and ease of maintenance, facilities other than the business lounge located on the west side shall be a flat one-storied structure. The one-storied building will be designed so that after entering the building from the northern side of the sidewalk and going through the check-in, security check, and immigration procedures, the passenger can reach the departure lounge with ease. The business lounge and the VIP lounge will be located on the second and first floor in the west side respectively, separating from passengers boarding on economy class. Moreover, the entrance of the VIP lounge will be built separately restricting other passengers or airport users to enter.

The floor plan for each room/facility is as follows:

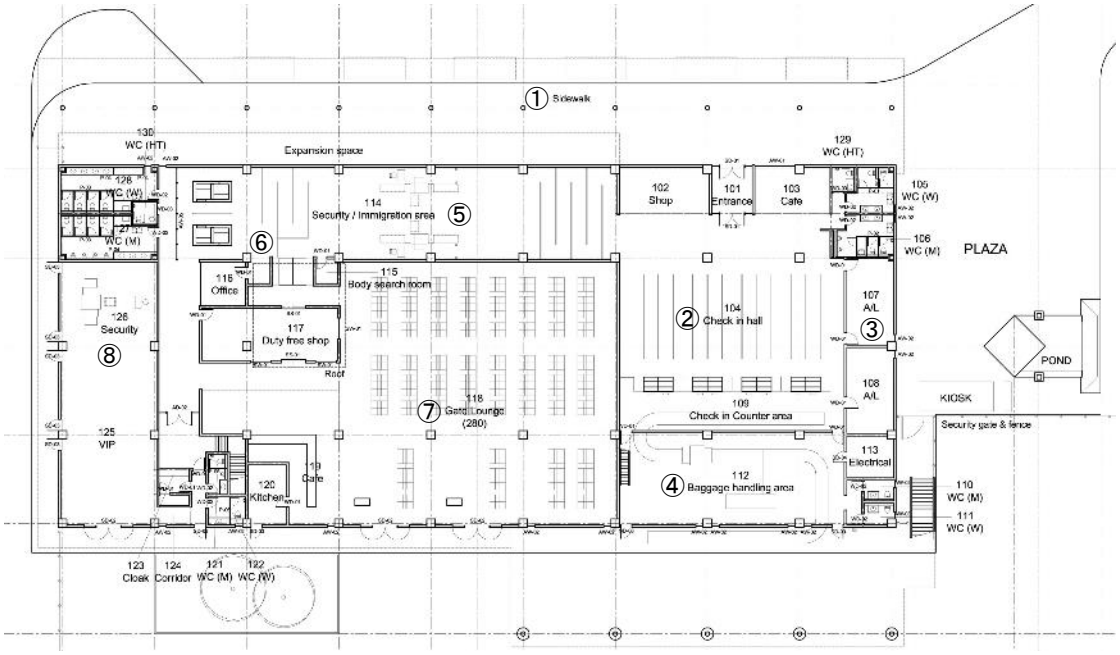


Figure 22 IDT 1F Plan

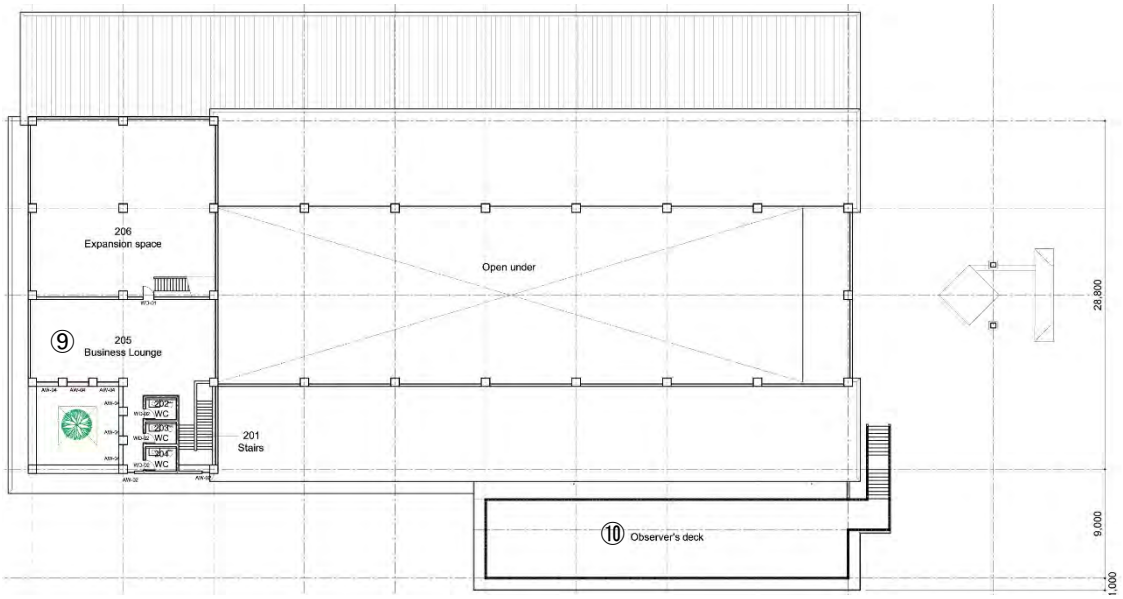


Figure 23 IDT 2 Plan

Table 34 Room Planning in IDT

Room/ Facility	Plan
1. Sidewalk	When approaching IDT, passengers will enter from the sidewalk with an eave stretching approximately 8.5 meters in length from the front road in the north and unload the luggage from the car. As soon as they

	walk into the entrance, they will arrive at the check-in hall. This external/exterior space can also be used as a waiting area. The VIP will pass through the front road in the north, turn left, and after pulling the car to the west side of the terminal, the VIP will arrive at the security inspection site designated for VIP use.
2. Check-in Hall	Eight (8) check-in counters will be installed securing enough space at the check-in hall approximately ten meters in front of the counters, which could accommodate a maximum of eight people to queue in each counter. In addition, shops and café will also be planned to increase convenience and improve usability of passengers and users of the airport.
3. Airline Offices	Two airline offices shall be built facing the check-in hall. These offices will have access to the toilet for staff use and also to the apron by passing through the security door connecting to the baggage handling area
4. Baggage Handling Area	X-ray inspection system will be installed at approximately in 51 meter-point of the baggage handling belt behind the check-in counter, and security check for hold baggage will be carried out.
5. Security Checkpoints	After passing through the queuing space, cabin baggage and passengers will be screened by two X-ray inspection systems and two metal detectors.
6. Immigration	Four passport inspection counters will be set up, and the existing two electronic security gates (E-gate) will be relocated. Queueing space shall be set up at the passport inspection counter. However, since the number of E-gate users is still limited and require less time for passport inspection, there will be no queueing space provided after security check.
7. Gate Lounge	In the gate lounge with an area of 432 m^2, 280 seats shall be placed to accommodate all passengers at peak hours. Other facilities such as café, duty-free shop, and washrooms will also be built.
8. VIP Departure Lounge	Security inspection equipment only for VIP use will be installed at the entrance of the VIP departure lounge, allowing VIP passengers to enter the lounge only after going through security check. Inside the lounge, toilet and pantry shall be set up.
9. Business Lounge	The business lounge will be located on the second floor of the IDT. Passengers using the business lounge will enter through the

	designated lounge entrance after the security check and walk upstairs passing the reception counter. The lounge is designed facing towards the terrace on the airside and washroom, and a food counter shall be installed inside the lounge.
10. Observation Deck	The observation deck for international departing passengers which will also be accessible from outside via the plaza between the ETB and IDT. A fence with a height of approximately 2.5 meters will be constructed to secure safety.

2) ETB

According to the floor plan of ETB, the concourse shared by both departing and arriving passengers is located at the landside, while departure zone is located at the east side including the check-in hall at the centre, and arrival zone is at the west of the building. International departure function will be transferred to the new international departure building which will be constructed under this Project. Moreover, domestic flight services and functions will be transferred to the central and east part of the existing international terminal building, which is the space currently used for the international departure operation. The proposed floor plan for each room/facility is as follows:

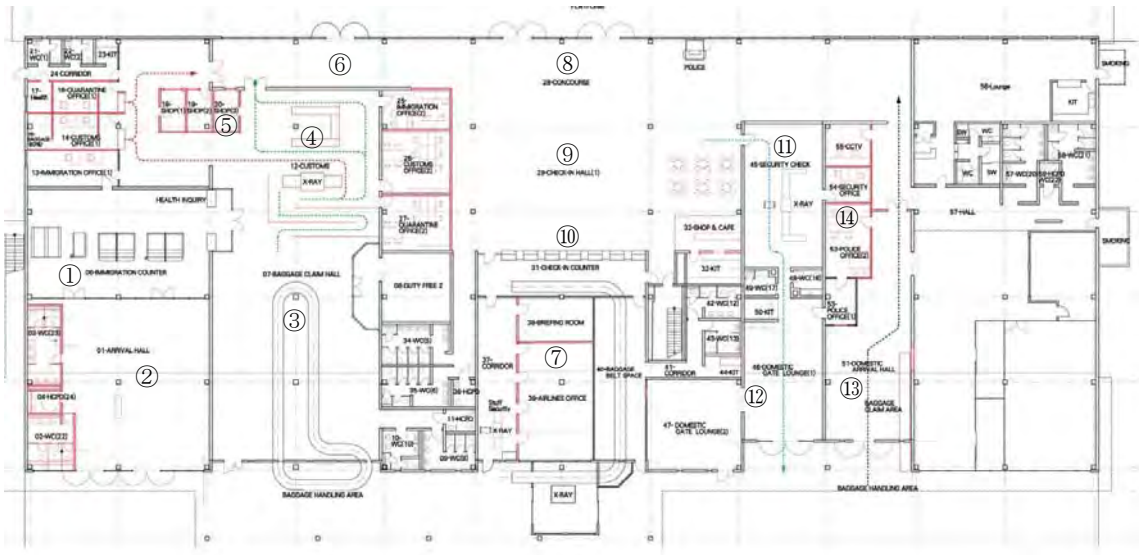


Figure 24 Ground Floor Layout of ETB

Table 35 Room Planning in ETB

Room/ Facility	Plan
1. International Arrival Hall	The existing space of the international arrival hall will be used. Since no toilets are available for arriving passengers, the space along the exterior wall of the international arrival hall will be utilized to install toilets for women, men, and persons with disabilities to improve the level of convenience of passengers.
2. Immigration	The current system will be used. (Four immigration counters and two e-Gate systems)
3. Baggage Claim Hall (international flights)	The current system will be used. (One BHS)
4. Customs for International Flights	All hold baggage will be inspected by X-ray inspection system, and if the baggage is found suspicious, it will be inspected at the counter of customs office. Others are inspected at the two customs counters and proceed to the arrival concourse. If quarantine is necessary, the required procedures are carried out at the quarantine office. The location of the existing offices will be changed to a new layout so that customs office, storage warehouse, and quarantine office will be placed adjacent to the customs area.
5. Currency Exchange Facilities and Others	Changes shall be made to the current layout, and currency exchange facilities will be allocated in an area which is accessible from both customs and concourse.
6. Arrival Concourse	The existing concourse will be partially used as international arrival concourse.
7. Briefing Room and Airline Office	Changes will be made to the current layout of the airline office, and instead, briefing room and airline office will be arranged. In the airline office, partitions can be installed at each airline's own expense. The new corridor will have security check function for all airport staff entering to the airside will be screened through the metal detector and X-ray inspection device which will be deployed to the corridor.
8. Domestic Concourse	The existing concourse will be retained, and the existing security check space will be renovated and converted to a part of the concourse.
9. Check-in Hall for Domestic Flights	The existing international check-in hall shall be used as the check-in hall for domestic terminal. The café currently in service will be closed

	and demolished. Instead, the warehouse will be renovated and converted to a kitchen space and a new café will be established.
10. Check-in Counter	The existing international check-in counter shall be converted and used as a domestic check-in counter.
11. Security Check	The existing office space will be renovated and converted to security check where the existing X-ray inspection system and metal detectors (a walk-through metal detector and a hand-held metal detector) will be installed.
12. Domestic Gate Lounge	The current VIP room, briefing room, and police office will be renovated and converted into gate lounge.
13. Domestic Arrival Hall and Baggage Claim Area	The duty-free shops and passport control areas will be renovated and diverted to arrival hall and baggage claim area. One roller belt system will be newly installed for cabin baggage.
14. Airport Security and Police Office	The current immigration area will be renovated and replaced by police office and CCTV monitoring room.
15. Other rooms and facilities	The current business lounge and international departure lounge will be retained.

(4) Cross-Sectional Plan for IDT

The floor height will be 3.2 meters or 4.0 meters excluding the open ceiling located in the centre of the building, considering the economic aspects (structure and finishing), an efficiency of air conditioning, and to reduce the volume of the building.

The pitched roof will have enough slope to prevent rain from accumulating on the rooftop, and the highest point of the roof will be at GL+9.5 meters. Using the height difference created by the roof pitch, the space in the attic can help to reduce the air-conditioning load with the wind blowing through it.

The pressure-resistant slab will be placed at 1.85 meters below the ground floor considering its soil bearing capacity and adopt raised slab structure which space could be used as a storage for utility pipes.

(5) Structural Plan for IDT

Through the field survey, it was revealed that quality control and production capacity of the local concrete manufacturers could not meet the level required for this project. Therefore, a concrete plant will be built at the planned construction site. In addition, aggregates are usually

made of crushed rocks and stones excavated from riverbeds and require a crushing plant to prepare aggregates from the raw stones and rocks. Since no crushing plant is locally available, it should also be constructed for the project along with the concrete plant. Based on such local conditions, and in line with civil engineering works, the use of concrete shall be reduced for the construction, and therefore, for all the newly constructed structures other than the foundation works and floor slabs, steel structure will be adopted.

Concrete with a strength of Fc＝21N/mm2, reinforcing steel that complies with JIS standard SD295A and SD345, with a radius of D10 to D25, and SS400 (rolled steel for general Structure), STKR 400 (square pipe), SM 490 A (rolled steel for welded structure) of JIS standard will be adopted as the steel frame.

According to the results of the geological survey (standard penetration test), the long-term soil bearing capacity should be 50kN/m2 since the level of pressure resistant slab is argillaceous/clay type and has an N-value of 6 to 10. In addition, pile foundation is unnecessary since the upper structure made of steel is relatively light.

Moreover, the groundwater level was GL-0.6 meters, but the water permeability was not high due to the clayey soil type and seen as pooled water. (The actual water head seems to be in a sand layer which is more than GL-5.0m to 6.0m deep.)

Based on the local conditions where procurement of concrete is difficult, and to reduce the amount of concrete used for the construction, pressure resistant slab will not be placed for the whole area. Only for the perimeter span will the double pit consisting of a pressure resistant plate and a floor slab be created, and space could be used for utility pipes. For other parts in the centre, foundation beam is chosen, and soil stabilization/foundation improvement is planned for the ground under the soil slab of the first floor (improving the surface layer by adding effective cementations solidifying additives to the viscous soil).

The framing formula to be applied is an unbraced rigid-frame of steel structure, in which the roof is furnished with lightweight finishing material and the second floor is made of concrete with a steel deck used as a formwork material. Considering habitability and floor vibration, stud connector will be used to combine and integrate the steel beam and the floor slab, and to increase the flexural rigidity of the steel beam material.

(6) Equipment Plan

1) Electrical System

① Trunk Line Equipment

Power consumption required for the renovation of ETB and the expansion of IDT will exceed the capacity of the current power receiving and transforming equipment including the transformers (installed by SIEA) and generators. Construction work will take place while operating the airport. Since there is sufficient space in the SUB where the transformer, the distribution board, generators are installed, a new transformer and a generator with the required capacity will be deployed and replaced with the existing equipment.

Transformers installed by SIEA on the airside are shared with Solomon Airlines, and issues concerning its maintenance are being discussed between the airport and power company. Therefore, under the works of SIEA, the transformer, utility pole, and overhead power distribution cable will be relocated to the public road on the north side of the airport premises, and a new transformer will be installed to supply power to airfield lighting facilities.

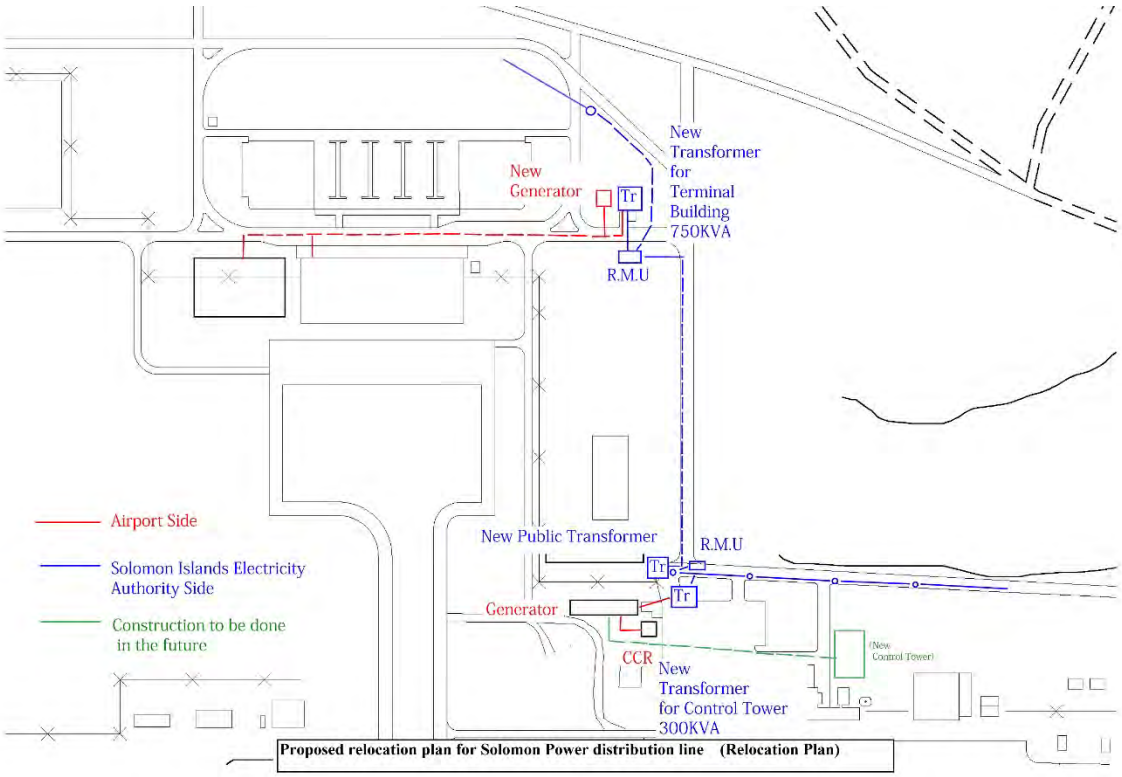


Figure 25 Proposed Plan for Power Supply System and Distribution Lines

② Electrical Lighting Outlets

The new lighting system for the newly constructed and renovated area will use mostly LED lights considering the maintenance and running cost. Illuminance (general illuminance) will be referred to the average illumines of JIS standard and conditions applied to the existing facilities. Emergency evacuation lights will be installed in evacuation passages, stairs, and evacuation gates.

The outlet is I type which is commonly used locally.

③ Outlets will be put in place wherever necessary; installed at each booth in the check-in counters and passport control areas. Light Electrical Equipment

In the newly built building and rooms, the telephone cable will be drawn to the newly installed main distribution frame (MDF), and piping wiring adopted to each operation terminal via each terminal board. For the rooms under renovation, telephone wiring will be laid from the existing terminal board. Also, empty pipe from the terminal board and outlet box will be installed for telephone equipment used in airlines, shops, and other facilities.

Empty piping will be laid in the new building and the rehabilitated rooms so that the internet connection can be retracted. LAN will be planned wherever necessary and install empty piping and outlet box.

An antenna in the IDT will be installed and wiring to wherever in need, such as the lounge, to enable to watch television.

The automatic fire alarm system installed in the ETB will be removed and renewed, and sensors will be put in place so that new areas could also be alerted against fire.

For lightning protection equipment, a roof conductor will be installed to protect the entire building as with lightning protection at ETB.

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

CCTV

CCTV system will be introduced to secure the safety of passengers and to enhance airport security at the airport. The following table shows the locations and number of cameras to be installed (see Table 5). Operation terminals will be deployed at CCTV

operation room, police office, and airport administrator's office to enable monitoring from each place.

Table 36 Locations of CCTV Cameras

Terminal	Floor	Location	Quantity	
			Pan Tilt Zoom (PTZ)	FIX
ETB	1	Check-in hall	3	1
	1	Office area No.1	-	3
	1	Domestic departure area	3	1
	1	Domestic arrival area	1	1
	1	International arrival area	4	7
	2	Office area No.2	1	1
	-	Outside ETB	1	3
IDT	1	Check-in hall	-	2
	1	Security check	2	4
	1	Gate lounge	5	-
	1	VIP lounge	1	-
	1	Office area	1	1
	2	Business lounge	1	
		Outside IDT	4	3

FIDS

To enhance passenger convenience at the airport, Flight Information Display System (FIDS), which provides real-time information on flight arrival and departure time, will be introduced. Operation terminals will be installed in the operations department office of the airport authority. Table 6 shows the locations where the displays will be deployed.

Table 37 Locations of FIDS

Terminal	Floor	Location	Monitor (inch)	Qty
ETB	1	Check-in hall	55	1
	1	Lounge	40	1
	1	Departure gate	40	1
	1	Passenger exit hall	40	1
	1	Office area	40	2
IDT	1	Check-in hall	32	8

Terminal	Floor	Location	Monitor (inch)	Qty
			55	1
	1	Departure gate	40	3
	1	VIP lounge	40	1
	2	Business Lounge	40	1
		Outside IDB	40	1

PA

Public Address System (PA) will be introduced in both terminals for relaying flight information as well as making emergency announcements to passengers and airport staff. The control system shall be installed where the operations department office will be allocated in the terminal buildings. Also, remote microphones will be installed at the boarding gate and check-in counter so that announcements can be made from each location. Moreover, sound collecting microphones will be placed in the check-in halls and have the volume automatically adjusted to the appropriate level suitable under the given conditions. Table 7 describes the plan for installing.

Table 38 Installation Plan for PA

No.	Terminal	Sections	No. of Speaker
1	ETB	Check-in hall	7
2		Security check	1
3		Domestic departure gate	2
4		Lounge	1
5		International arrival area	7
6		Office area (1st floor)	3
7		Office area (2nd floor)	5
8	IDT	Check-in hall	2
9		Security check	2
10		Immigration	1
11		International departure gate	4
12		VIP lounge	1
13		Business lounge (2nd floor)	2

2) Mechanical Equipment

① Water Supply and Drainage System

Water is drawn from the 150 mm water main of Solomon Islands Water Authority (SIWA) to the ETB area and connected to the water collector tank through 75 mm pipeline.

The water supply system will be used with tap water of SIWA, the miscellaneous use water system will be used with rainwater treated water and treated water treated by the consolidated septic tank. After existing old aqueduct tank will be removed, new FRP water tank (30 m3) and miscellaneous use water receiving tank (45 m3) will be established.

Figure 26 Water pipe Network around the Airport

The outdoor drainpipe will be reused after cleaning. However, combined septic tanks and drainage relay pumps which are not functioning will be newly constructed.

Two combined septic tanks will be installed, one for IDT and the other for ETB.

② Air Conditioning and Ventilating System

Air conditioning system will be installed in each room and area of IDT and ETB, such as the passenger flow areas, office for airport staff and other places, and split type air-conditioners will be installed so each could be operated separately.

However, since utility costs can surge if all the space under the open-ceiling is fully air-conditioned, installation of air conditioners will be minimized through the combined use of both a large fan in the atrium and air conditioners, which can improve and optimize the thermal environment.

Figure 27 Areas Subject to Air Conditioning (IDT)

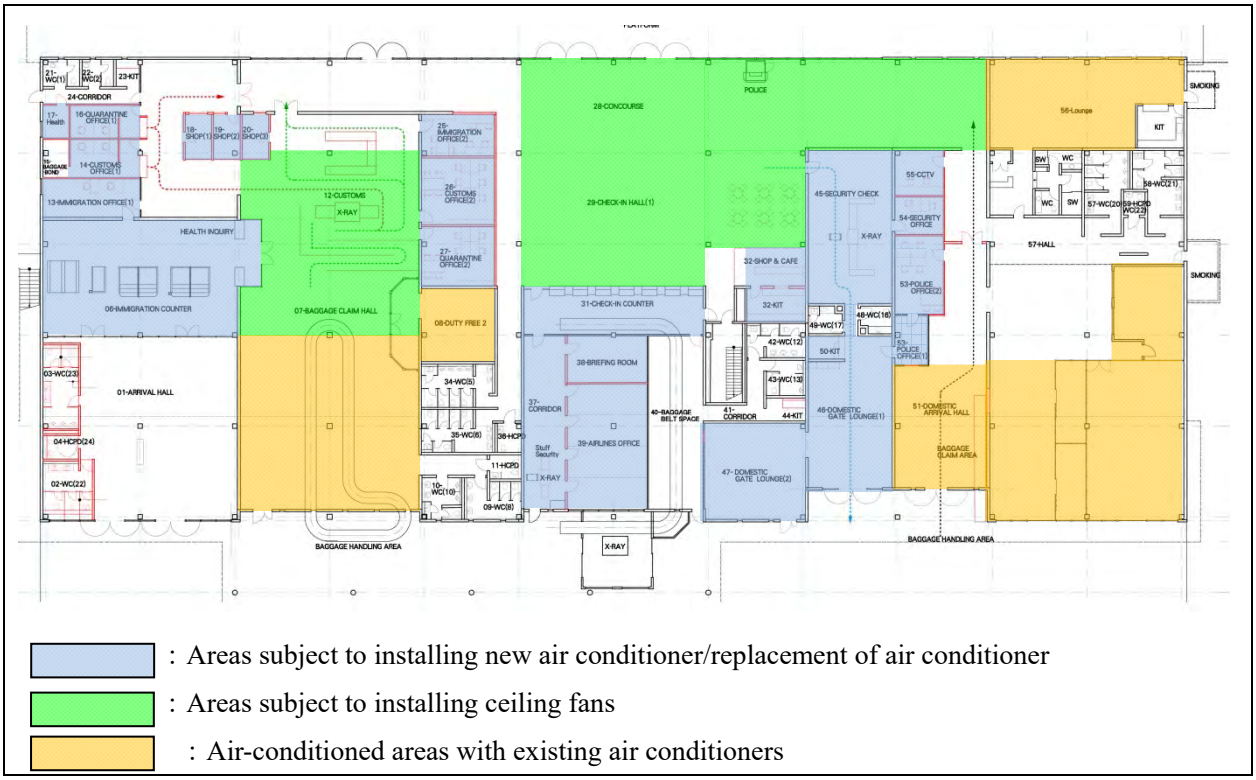


Figure 28 Areas Subject to Air Conditioning ETB

③ Fire Fighting System

At the ETB, indoor fire hydrants are installed in compliance with the Japanese Fire Service Act. During this renovation, fire hydrant pumps, indoor fire hydrants, and pipes which are severely deteriorated will be renewed and indoor fire hydrants for IDT will be planned. In addition, fire extinguishers will also be installed.

(7) Special Equipment Planning

1) BHS

One Baggage handling System (BHS) will be installed to deliver hold baggage from IDT's Check-in Counter to the Baggage Handling Area at airside. A Hold baggage X-ray Inspection System (Dual View) is installed on the belt, as “Mini-Inline Screening Method” is adopted.

Specifications of BHS System are described in the following table.

Table 39 Specifications of BHS

Parts	Specification	Quantity
Weigh Scale	Installed beside Check-in Counter Display: Displayed in increments of 0.1 kg up to 100 kg	8 set
Conveyor belt	Wide: 1m Maximum load: 60kg/m	Collector belt: 13.4m (1 set) Curve belt: 4 set Straight belt: 4.6m (1 set) Manual roller belt: 2 set
Steel Shutter	Installed on the outer wall penetration part of the belt	1 set
Rubber Curtain	Installed on the outer wall penetration part of the belt	1 set

2) Security Equipment

Specifications of Security Equipment are described in the following table.

Table 40 Specifications of Security Equipment

Type	Specifications	Quantity
Hold baggage X-ray Inspection System (Dual View)	Maximum baggage size: W1.0×H1.0m Maximum load: 200kg Size: L3.8×W1.6×H1.9m Weight: 1,050kg HI-SCAN 100100T-2is*	IDT:2 set
Hold baggage X-ray Inspection System (Single View)	Maximum baggage size: W1.0×H1.0m Maximum load: 200kg Size: L3.6×W1.2×H1.9m Weight: 930kg HI-SCAN 100100T*	ETB:1 set
Cabin baggage X-ray Inspection system (Dual View)	Maximum baggage size: W0.615×H0.41m Maximum load: 160kg Size: L2.34×W1.31×H1.37m Weight: 820kg HI-SCAN 6040-2is*	IDT:2 set
Small baggage X-ray Inspection System (Single View)	Maximum baggage size: W0.615×H0.41m Maximum load: 160kg Size: 2.0×W0.85×H1.28m Weight: 400kg HI-SCAN 6040i*	ETB:1 set
Gate type walk through metal detector	Type: Multi-zone type Internal dimensions: W 0.7x 2.0 m Detection target: Magnetic material and Nonmagnetic material	IDT:2 set ETB:1 set
Hand held metal detector	Type: Mobile and Rechargeable Detection target: Magnetic material and Nonmagnetic material Weight: less than 500g	IDT:2 set ETB:1 set

* Type and manufacture specified by Solomon Islands Government

(8) Construction Material Planning

The standard finish specifications of each facility are described in the following table.

Table 41 Standard Finish Specifications of EW

Section	IDT	UB
Exterior Finish		
Exterior Wall	Wall: Fluororesin coated galvalume steel plate siding wall Column: SOP	Same as IDT
Roof	Fluororesin coated galvalume steel plate standing seam roof	Same as IDT
Interior Finish		
Floor	porcelain tiles (600 sized)	Fair-faced concrete, trowel finish
Wall	General: light-gauge steel partition (100 sized) +plasterboard setting beds (t=12.5+12.5mm), AEP Toilet: porcelain tiles (600 sized) Steel flame uncovered part: SOP	Same as IDT
Ceiling	Open ceiling: wood wool board (t=25mm), SOP Toilet and small rooms: plasterboard setting beds (t=9.5+9.5mm),AEP Steel flame uncovered part: SOP	Wood wool board (t=25mm), SOP

Table 42 Standard Finish Specifications of RW

Section	ETB	SUB
Exterior Finish		
Exterior Wall	No changes	No changes
Roof	Metal roof: no changes to be made Concrete flat roof (observation deck) : waterproof coating + protection concrete	No changes
Soffit	Damaged parts: repaired using the same materials as the existing Soffit	
Column	Column base: concrete-encased	
Interior Finish		
Floor	New office area: vinyl tiles New toilet: vinyl tiles Damaged areas: repaired using the same materials	No changes
Wall	New partitions: plasterboard (t=12.5+12.5mm) setting base: AEP	New partitions: plasterboard setting bed, AEP
Ceiling	New ceilings: plasterboard (t=9.5+9.5mm) setting base AEP System ceiling (damaged areas): repaired	No changes

Since the main structure of the newly built building will be steel structure, lightweight galvalume steel plate will be used as the finishing material in order to reduce weight; 0.4 mm for the roof and 0.6mm for the exterior walls. More durable fluoroplastic-coated galvalume steel plate with a longer life cycle for 15 to 20 years will be used considering its maintenance cycle.

Large-format porcelain tiles will be used as the finishing floor material given its durability against heavy walk load.

With consideration to lightweight construction and enhanced workability, a dry wall finish using light gauge steel frame (LGS) base will be adopted for finishing of walls and ceiling foundation.

2.2.2.4. Civil Facility Plan

(1) Apron

1) Basic Policy

Basic policies of apron design are below.

- Expand the existing international apron and use as international / domestic apron after expansion.
- Apron shall be planned to meet future air traffic demand.
- Apron shall be planned to accommodate middle size jet aircraft.
- Apron shall be expanded within the area of existing airport.

2) Design Condition

① Aircraft Parking Spot

Based on results of air traffic demand forecast, number of parking spots is calculated as follows.

Table 43 Number of Aircraft Parking Spot

Usage	Aircraft (ICAO Code)	Number
International	B737, A320 (Code C)	4 spots
Domestic	DHC-8 (Code C)	2 spots
	DHC-6 (Code D)	4 spots

② Parking configuration

Parking configuration currently applied in Honiara Airport is self-maneuvering including international aircraft and no airline plans to introduce a toeing tractor. In this case, all aircraft parking configuration is planned for self-maneuvering

③ Minimum Separation Distance

The table below shows separation distance recommended by ICAO. As for the distance between apron taxiway centreline and object, recommendation for Code D aircraft is applied in consideration of middle size jet aircraft.

Table 44 ICAO Recommendations to be Applied

ICAO Code	Distance between an aircraft entering/exiting the parking spot and object	Distance between centreline and object
Code B	3m and more	20m and more
Code C	4.5m and more	26m and more
Code D	7.5m and more	37m and more

3) Layout Plan

The figure below shows the layout plan of apron.

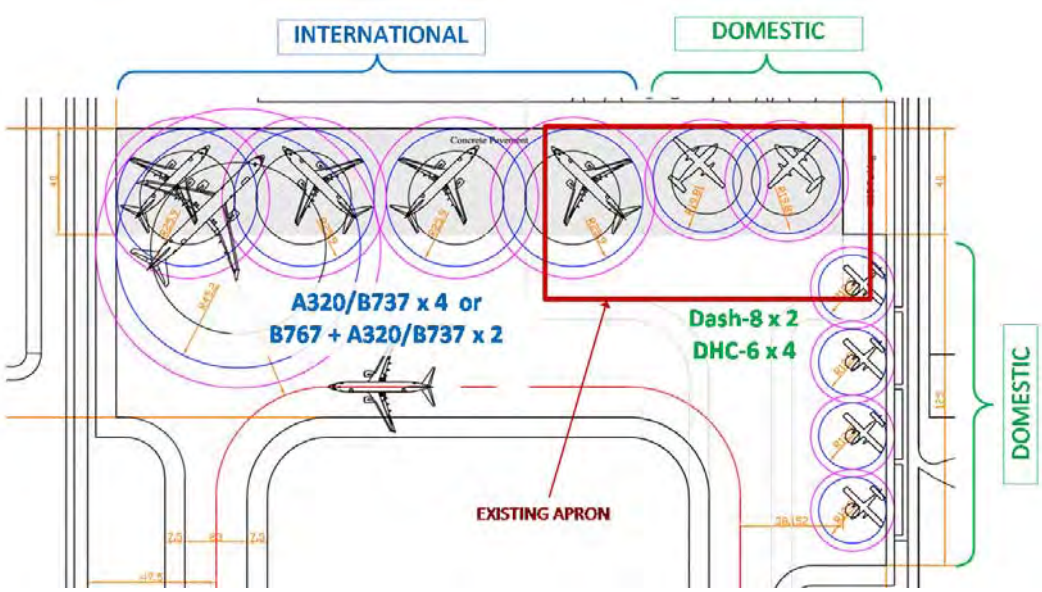


Figure 29 Apron Layout Plan

① Direction of Expansion, Layout of Aircraft Parking Spot

As described in “2.3.2.9 Consideration of Alternative Plan”, there are office buildings of airline, cargo terminal building and other buildings at the eastern side of the international apron, so that there is little area for apron expansion. On the other hand, the distance between the western edge of the international apron and airport boundary is approximately 200m, and there is no object in that area. In this situation, it was decided to expand the apron to the western side.

Considering the movement of passengers, international aircraft parking spots are planned in the western part of the expanded apron, and domestic aircraft parking spots are planned in the eastern part.

② Correspondence to medium size jet aircraft (Code D)

There are once or twice international chartered flights by B757 and B767 class aircraft. To correspondence to this operation, Multiple Aircraft Ramp System: MARS, which uses 2 spots of Code C aircraft to 1 parking spot for Code D aircraft. Two aircraft parking spots in western side are planned for MARS and marking for Code D aircraft will be painted.

③ GSE (Ground Service Equipment) Road / Parking

GSE road is planned between apron and IDT. GSE parking is planned in the eastern and western side of the apron. The width of GSE road is 10m with reference to Japanese standard.

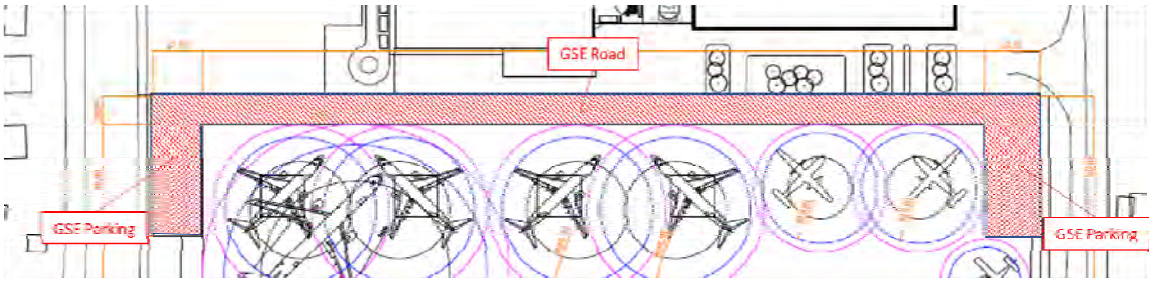


Figure 30 GSE Road, Parking Layout Plan

④ Jet Blast Effect

Based on the spot assignment plan, effect by the jet blast is evaluated. According to ICAO recommendation, the maximum jet blast velocity to the building should not be more than 56 km/h. The figure below shows area of the jet blast of 56km/h in case of the idle thrust. As shown, there is no building and road for general transport so that the effect of the jet blast will not be anticipated.

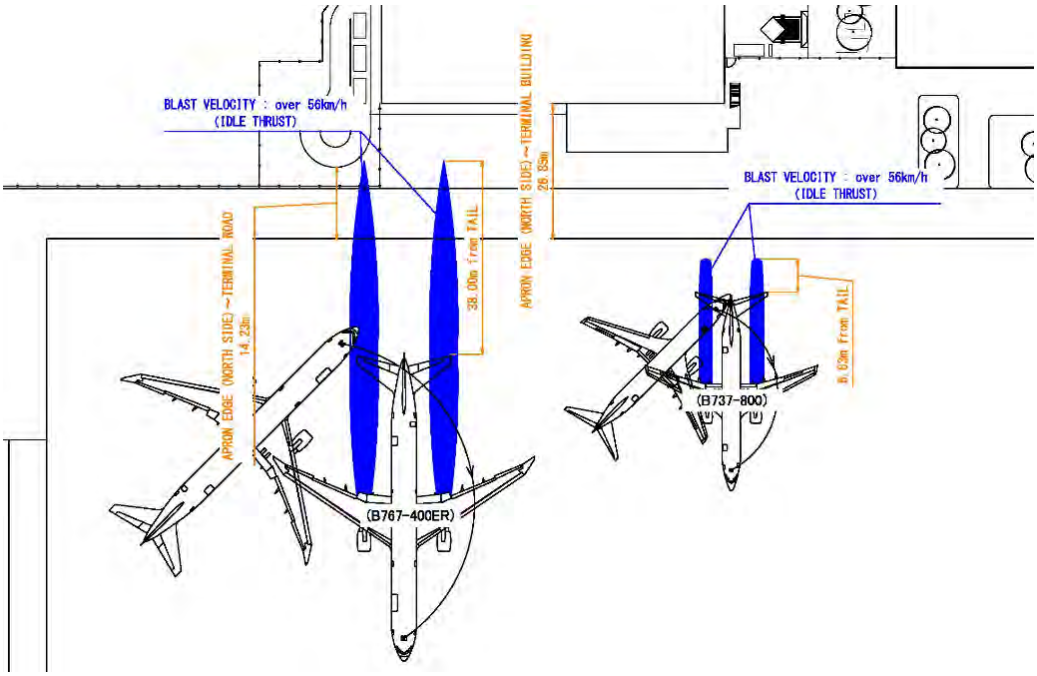


Figure 31 Aircraft Parking Spot Layout Plan in the Apron

4) Longitudinal and Traverse Plan

The height of the apron, longitudinal and traverse slopes were decided in consideration of follows.

- To minimize earth work volume
- Ease of sliding to the existing ground
- Utilize the existing drainage facility and minimize the new drainage facility

Considering the above, slopes were planned to go down to the eastern and western side in addition to the northern side. Slopes were planned within 1% in accordance with ICAO recommendation.

5) Pavement Design

① Pavement Type

Asphalt pavement will be used for the apron pavement as same as the existing international airport. However, concrete pavement with the size of 15m x 15m is planned in the area of the main gear and nose gear parking spots for small size jet of international flights (Total 4 locations). Followings are reasons for adoption of this pavement.

- The largest aircraft except non-scheduled flight operated in Honiara Airport is B737, a small jet aircraft. Pavement deterioration by driving on the pavement such as rut is relatively small and basically, asphalt pavement can stand for such aircraft.
- Cost of asphalt pavement is cheaper than that of concrete pavement in Solomon Islands
- Construction of concrete pavement requires longer curing period so that large area of concrete pavement leads to longer construction period. It is desirable to minimize the area of concrete pavement.
- It is reasonable to construct concrete pavement at parking spots for international aircraft because this area will be especially damaged by parking loads, running operation, leak of fuel, etc.

② Pavement Design Condition

Pavement design was conducted with reference to FAA AC 150/5320-6F Airport Pavement Design and Evaluation. The following conditions are used.

Table 45 Pavement Design Conditions

Subgrade Strength	Design CBR : 5.0% or more
Subbase Course Strength	Modified CBR : 20.0% or more
Base Course Strength	Modified CBR : 80.0% or more
Concrete Flexural Strength	4.5 N/㎟ or more
Pavement Life	Approx. 20 year

Aircraft	Annual Departures (Number)	Annual Growth Rate (%)
B737	880	3.84
B767	20	0.00

*The annual departures and annual growth rate are based on results of air traffic demand forecasts.
*It is assumed that there will be international non-scheduled flights by B767 class aircraft once or twice in a month.

③ Pavement structure

Based on results of design calculation withe above design conditions, the following pavement structure is applied.

Table 46 Pavement Structure of Apron

Pavement Type	Thickness
Asphalt Pavement	
Surface course (fine asphalt)	5cm
Binder course (coarse asphalt)	5cm
Base course (asphalt stabilized)	15cm
Sub-base course (crushed aggregate)	55cm
Total	80cm
Concrete Pavement	
Concrete slab	40cm
Base course (asphalt stabilized)	15cm
Sub-base course (crushed aggregate)	15cm
Total	70cm

(2) New Taxiway

1) Basic Policy

Basic policies of taxiway design are below.

- New taxiway shall meet ICAO recommendations for middle size jet aircraft (code D).
- New taxiway is planned in the area of existing airport.

2) Design Condition

① Design Aircraft

Middle size jet aircraft (Code D)

② Taxiway Width

Taxiway : 23m
Shoulder : 7.5m

③ Minimum Separation Distance

Distance between 2 taxiway centrelines : 63m or more
Distance between taxiway centreline to object : 37m or more

3) Layout Plan

Based on basic policies and design conditions, the layout plan of the taxiway was decided as below.

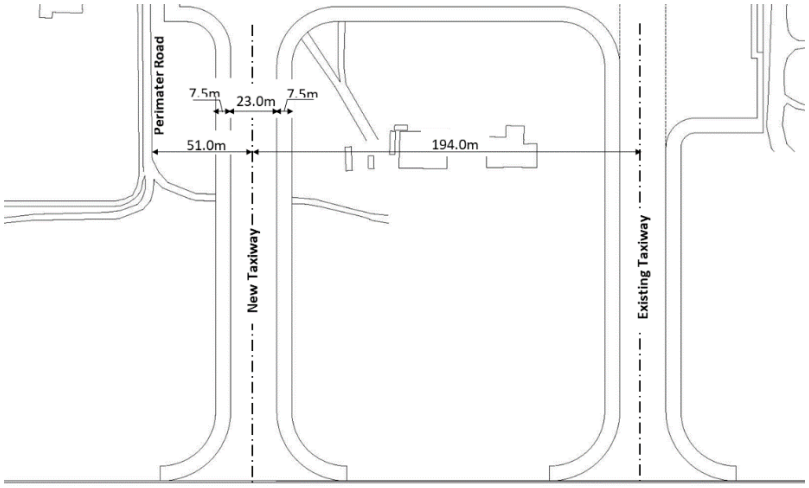


Figure 32 Location of the New Taxiway

4) Longitudinal and Transverse Plan

To decide the height and longitudinal and transverse plan, followings were considered.

- To minimize earth work volume
- Ease of sliding to the existing ground
- To secure enough clearance between pipe culvert and the surface

Considering the above, the longitudinal slope is planned as maximum slope is not more than 1% and the transverse slope is planned as 1.5% down from the taxiway centreline to both edge. It meets ICAO recommendations.

5) Pavement Plan

The whole area of the new taxiway is asphalt pavement, and the pavement structure is same as the new apron pavement.

(3) Existing apron and taxiway

There has been no major rehabilitation of the existing international apron and the taxiway since its construction in 1998. As segregation of the aggregates is observed on the surface in the whole area, 5cm thickness overlay with scarifying is planned in the whole area.

The location, where deterioration of the pavement is severe and alligator cracks are observed, the existing pavement will be removed and re-paved from the subbase course.

(4) Terminal road

New road to access to the new terminal building (IDT) is planned

1) Basic Policy

Basic policies of terminal road design are below.

- Terminal road will be one way and clockwise.
- Secure the alternative road in case the road is closed by accidents, construction work.
- Prepare the road for fuel vehicles.
- Separate the movement of VIP vehicles from that of regular vehicles.

2) Design Condition

Design conditions of terminal road are below.

[Design Standard]	Japanese Road Design Standard
[Design Vehicle]	Large Vehicle : Length 12.0m x Width 2.5m
	Small Vehicle : Length 4.7m x Width 1.7m
[Design Speed]	20km/h
[Lane Width]	3.0m

3) Layout Plan

Based on basic policies and design conditions, following layout was planned.

3 lanes road is planned in front of IDT, and 1 lane of 3 lanes will be stand lane. The road will be separated into U-turn road and dedicated VIP road at the western side of IDT. Also, the alternative road for U-turn is planned in case the road is closed by accidents, construction, etc.

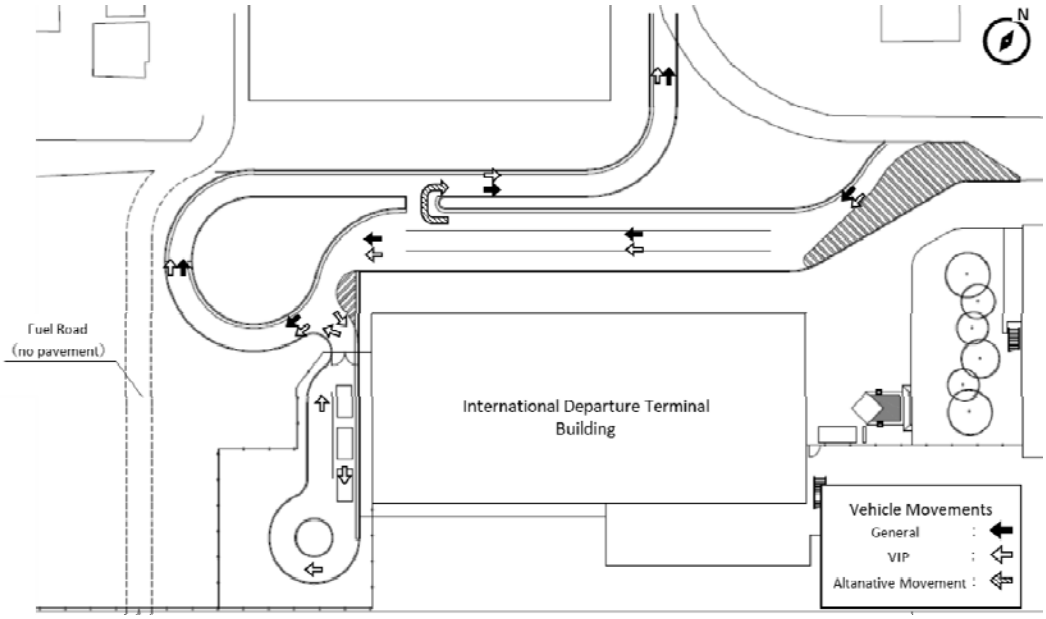


Figure 33 Layout Plan of Terminal Road

4) Typical Cross Section

As described in design condition, the width of the lane is 3m and 0.5m shoulder is secured to both side of the road.

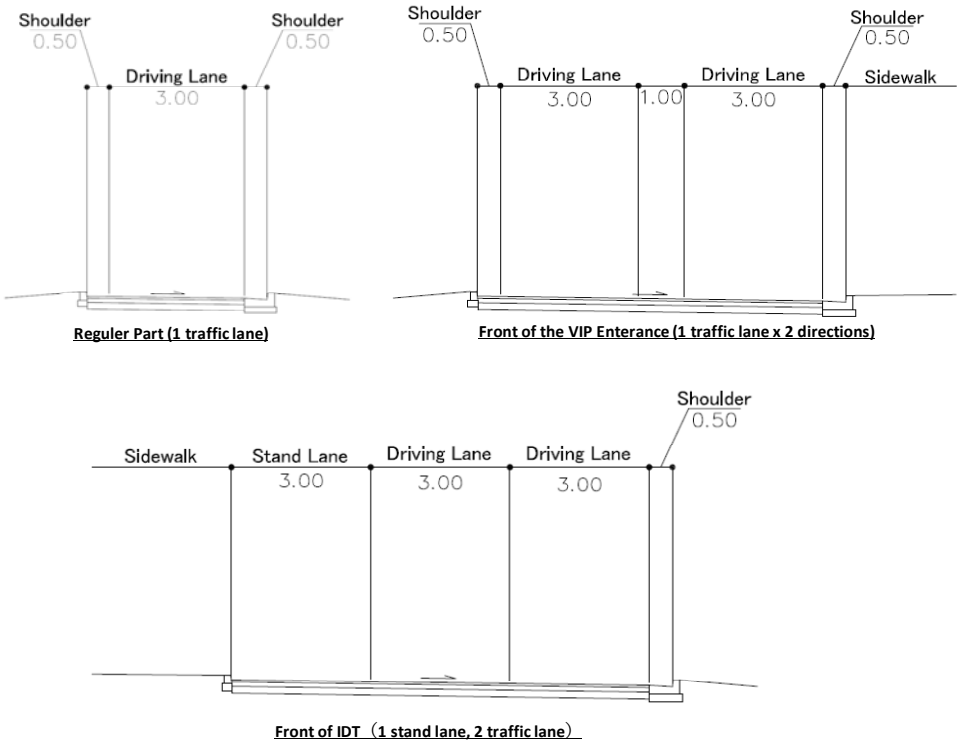


Figure 34 Typical Cross Section of Terminal Road

5) Pavement plan

Pavement type and design conditions are below.

[Pavement Type]	Traffic Lane: Asphalt Pavement
	Stand Lane: Concrete Pavement
[Subgrade Strength]	Design CBR: 5.0% or more
[Subbase Course Strength]	Modified CBR: 20.0% or more
[Base Course Strength]	Modified CBR: 80.0% or more
[Concrete Flexural Strength]	4.5 N/㎟ or more

As a result of consideration, structure shown in the following table was planned.

Table 47 Pavement Structure of Roads

Pavement Type	Thickness
Asphalt Pavement	
Surface course (fine asphalt)	5cm
Base course (asphalt stabilized)	10cm
Sub-base course (crushed aggregate)	15cm
Total	30cm
Concrete Pavement	
Concrete slab	15cm
Base course (crushed aggregate)	15cm
Total	30cm

(5) Drainage system

1) Basic Policy

Basic policies of drainage facility plan is below.

- Deal with 10-year probability rainfall
- Utilize the existing drainage facility as much as possible
- Utilize surface flow as much as possible to minimize the new drainage facility
- Use U-shaped channel as much as possible for easy maintenance.

2) Design Conditions

[Planned Rainfall Intensity]	I=11,900/(t+58.5)mm/h (t (min) = duration of rainfall)
[Outflow Amount]	Q=1/360×C×I×A (Rational Formula)
[Outflow coefficient]	Roof : 0.9, Pavement : 0.85, Grass : 0.3
[Flow Capacity]	Q'=A x V, V=1/n x R2/3 x S1/2 (Manning Formula)

3) Apron Drainage Plan

The figure below shows drainage plan of the apron. Extend the existing U-shaped channel to both side and lead the water to the existing soil open channel.

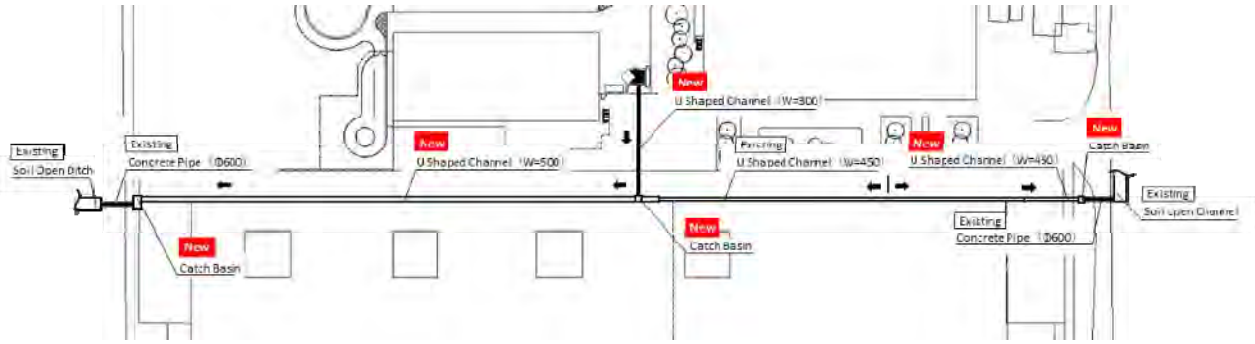


Figure 35 Existing Drainage System in the Existing Apron

4) Taxiway drainage system

The figure below shows the drainage plan of the taxiway. There are soil open channels and 3 corrugated pipes (ϕ 600) are crossing the existing taxiway. Based on the outflow calculation, it is planned to put 3 corrugated pipes (ϕ 600) under the new taxiway as well as the existing drainage. The pipe is protected by 360 degrees concrete protection.

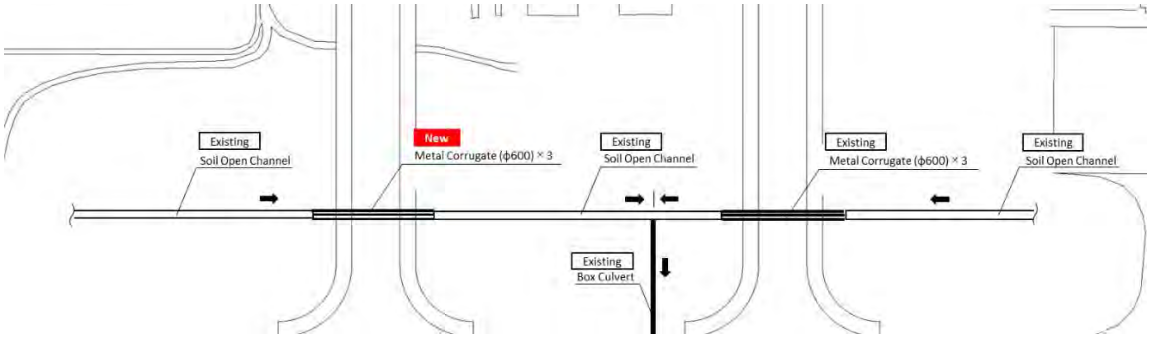


Figure 36 Taxiway Drainage Layout

5) Drainage Plan of the Terminal Road

The figure below shows the drainage plan of the terminal road. Water from the road surface will flow along L-gutter and will be collected in catch basins. Water in catch basin will flow to the existing drainage through PVC pipes.

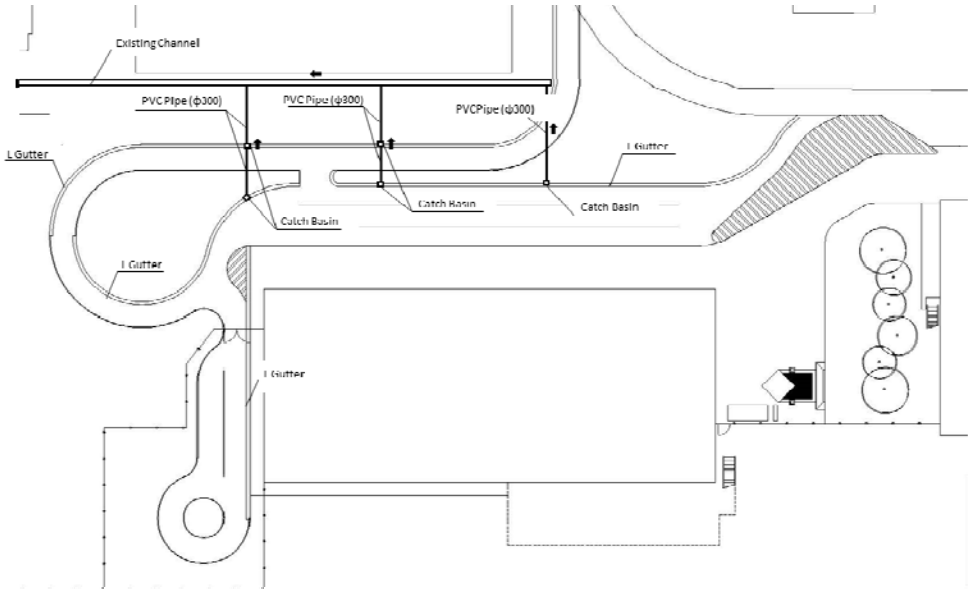


Figure 37 Drainage Plan in the Terminal Road Area

(6) Fence

As shown in the figure below, security fence will be installed at the boundary between airside and landside and around dedicated VIP road. The gate will be provided on the road for fuel vehicles, and another gate will be provided on the dedicated VIP road.

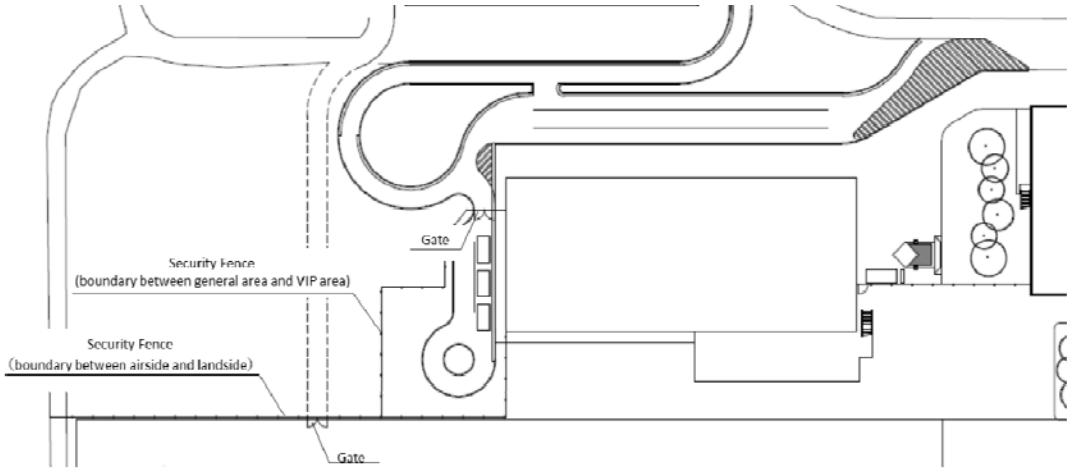


Figure 38 Layout Plan of Fence, Gate

(7) Flood Protection Facility

1) Basic Policy

Basic policies for flood protection facility are below.

- Construct the dike inside the airport and protect the airport from the flooded water.
- Planned water level is the same level as the flood in April 2014.
- Use the excavated soil generated from apron and taxiway construction for the dike.
- Structure and margin height of the dike are based on Japanese standard

Basic policy of flood protection dike and its structure plan is shown below. The structure is designed based on the requirement of design conditions.

2) Design Condition

① Design High Water Level

The water level of the Lungga river has not been measured and information about geography, soil, cross section of the river, etc., which are necessary for water consumption analysis, are not available so that design high water level is planned based on interview survey, photographs and movies of the flood. Ground level from results of the topographic survey and design high water level are shown in the figure below.

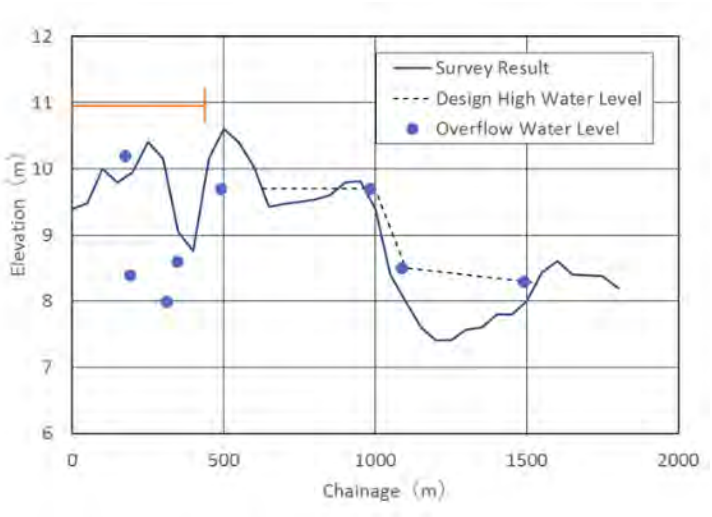


Figure 39 Layout Plan of Fence, Gate

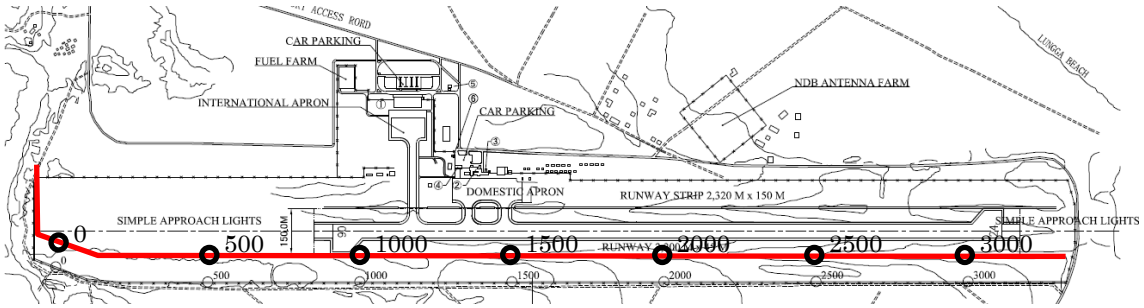


Figure 40 Distance Mark

② Margin Height

The planned dike will not be constructed along the river and the purpose of the dike to prevent flood water from the river flowing to the airport area. Thus, margin height of the dike is not affected by water volume of Lungga River and tope level of the dike is planned by adding 60cm margin height considering affection of waves.

3) Facility Plan

① Location and Length of the Dike

Followings are considered to decide the location and length of the dike.

- Maximize the effect of flood protection.
- The dike will not infringe the runway strip and obstacle limitation surface.
- It will be easy to access and maintain the dike
- The dike allows airport staffs to climb on the top of the dike to see around the airport in case of the flood.

Considering the above, the dike was planned on the south side of the airport.

Structure order of river management facility etc." and "Mechanical Design of Revetment " are used for reference materials for the planning.

② Earthquake Resistance

The dike will be constructed away from the river and will not be affected by the river water in normal condition. Therefore, the risk of damages caused by river water is very low if dike collapses by the earthquake. For this reason, the structure of the dike is embankment and design

for earthquake resistance is not conducted, so that repair work of the dike will be easy and cheap if the dike collapses.

③ Prevention of back flow from the existing drainage

There is no system to prevent backflow of water from the river in case if the water level of Lungga river is increased because the purpose of the existing drainage is to naturally discharge rainwater from the airport to outside for the rain of 5-year to 10-year probability. Installation of flap gates is planned to prevent backflow of the drainage while keeping the function of the existing drainage

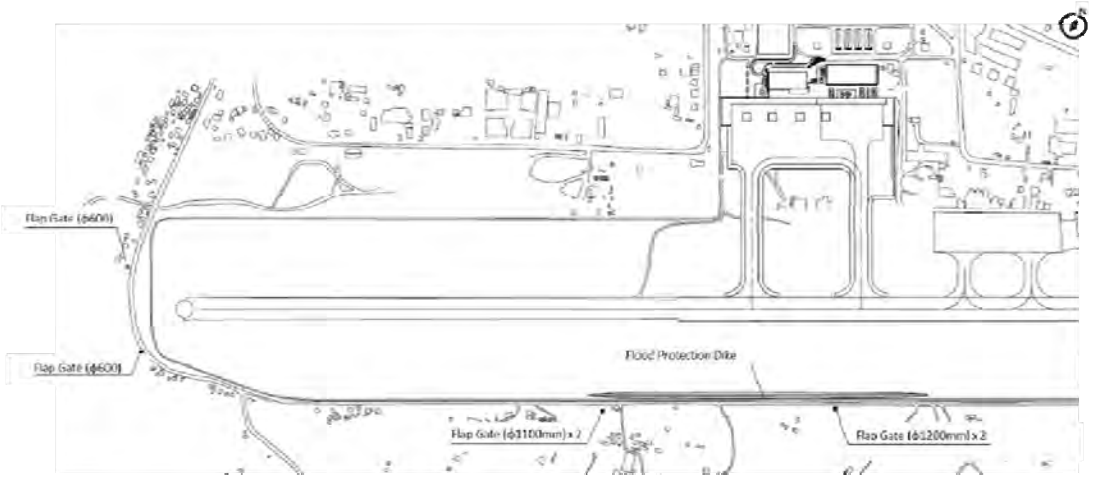


Figure 41 Location of Flood Protection Dike, Flap Gate

④ Typical Cross Section

The slope of the dike is 1:2 and the height is 3m considering the dike is relatively low and affect by wet line is low.

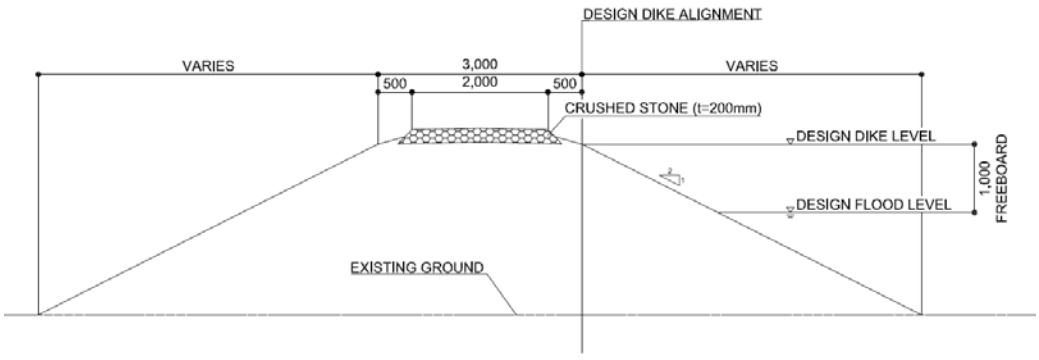


Figure 42 Typical Cross Section of Dike

2.2.2.5. Airfield Lighting System

The following airfield lighting system is planned for apron expansion area and new taxiway. Because deterioration of sub station and lack of capacity of part of the existing Constant Current Regulator: CCR, replacement of CCR and new CCR are planned.

(1) Taxiway Edge Lights

In line with the apron expansion of a new taxiway, taxiway edge lights will be installed. The new taxiway light type is LED, along with the installation; existing taxiway lights in the international apron area will be replaced to LED. Energy consumption and design life of the LED is 70% less and 50 times more than the ordinal one, respectively.

A new CCR and pipe will be installed for the circuit of the taxiway light in the international apron and it will be separated from troublesome domestic apron circuit, which its wire is buried without pipe.

(2) Mandatory instruction signs

New mandatory instruction signs will be installed. Two of location of runway destination singe will be installed at the new taxiway and one will be at the existing taxiway. One each of runway vacated location sign will be installed at the entrance of the taxiway A and B exist area. The circuit of these signs will be connected to the new taxiway edge light circuit of the international apron area.

(3) Runway Edge Light

The existing on ground type runway edge light will be replaced with embedded type. The runway edge lights are installed 60m intervals along the runway and one light will be replaced by the project.

(4) Apron Floodlights

Apron floodlights are planned in the apron expansion area. The height of the lighting mast is 25m considering operation of large size aircraft. Since the existing mast of the apron floodlight is fixed type and there is no platform, it is difficult to replace the lighting lamps and no replacement has been took place. The new apron light mast is elevated type with electrical lift to consider ease of maintenance. LED type is used in the apron floodlights.

The luminance of the lights should be not less than 50,000lm and number of lights in each mast

is shown in the table below.

Table 48 Number of Lights in Apron Floodlight Mast

ID	Mast 1	Mast 2	Mast 3	Mast 4	Mast 5	Mast 6
Number of Lights	3	5	5	5	5	3

Layout of apron floodlights is shown in the figure below.

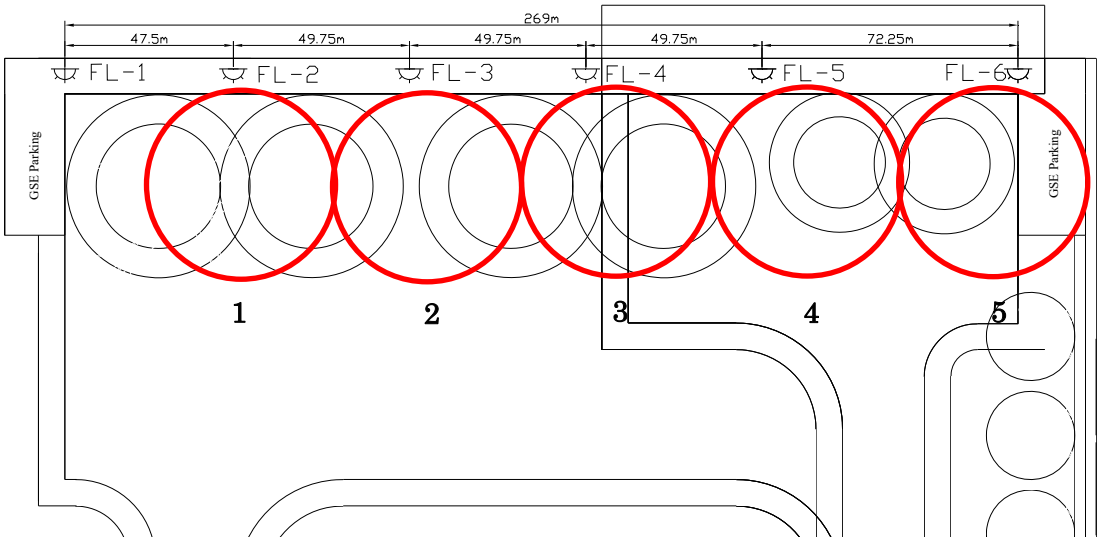


Figure 43 Layout of Apron Floodlights

Results of the luminance calculation based on location of above figure are shown in the table below.

Table 49 Calculation Results of Luminance of Apron Floodlight

Spot Number	Average Luminance [lx]	Minimum Luminance [lx]	Maximum Luminance [lx]	Uniformity Ratio
1	25	10	46	0.222
2	26	12	40	0.299
3	25	12	39	0.300
4	26	12	40	0.299
5	25	10	46	0.227

(5) Control and Monitoring System of Airfield Lightings

The existing control and monitoring system of airfield lightings is integrated into the air traffic control desk. It is possible to control the lights in the international apron area however there is no function to show the status and it is difficult to upgrade because the system is integrated into the desk. An independent control and monitoring system of airfield lightings will be installed and the new system will be able to control the existing airfield lighting systems. The existing CCRs will be moved to the new planned sub-station. The new and the existing CCRs plan is shown in the table below.

Table 50 Plan of New and Exiting CCRs

ID	Category	Load Name	Capacity	Manufacture Year	Remarks
1	Renew	Taxiway Lights	4kW	1981	Old and replaced with new 5kVA
2	Relocation	PAPI 06	10kW	2000	Relocation of existing CCR
3	Relocation	PAPI 24	10kW	2000	Relocation of existing CCR
4	Relocation	Runway Light A	10kVA	2005	Relocation of existing CCR
5	Relocation	Runway Light B	10kVA	2005	Relocation of existing CCR
6	Renew	SALS 06	10kVA	1981	Old and replaced with new 15kVA
7	Renew	SALS 24	10kVA	1981	Old and replaced with new 10kVA
8	New	Taxiway Lights	—	New	New 5kVA

2.2.3. Outline Design Drawings

2.2.3.1. General

2.2.3.2. Building Works

2.2.3.3. Civil Works

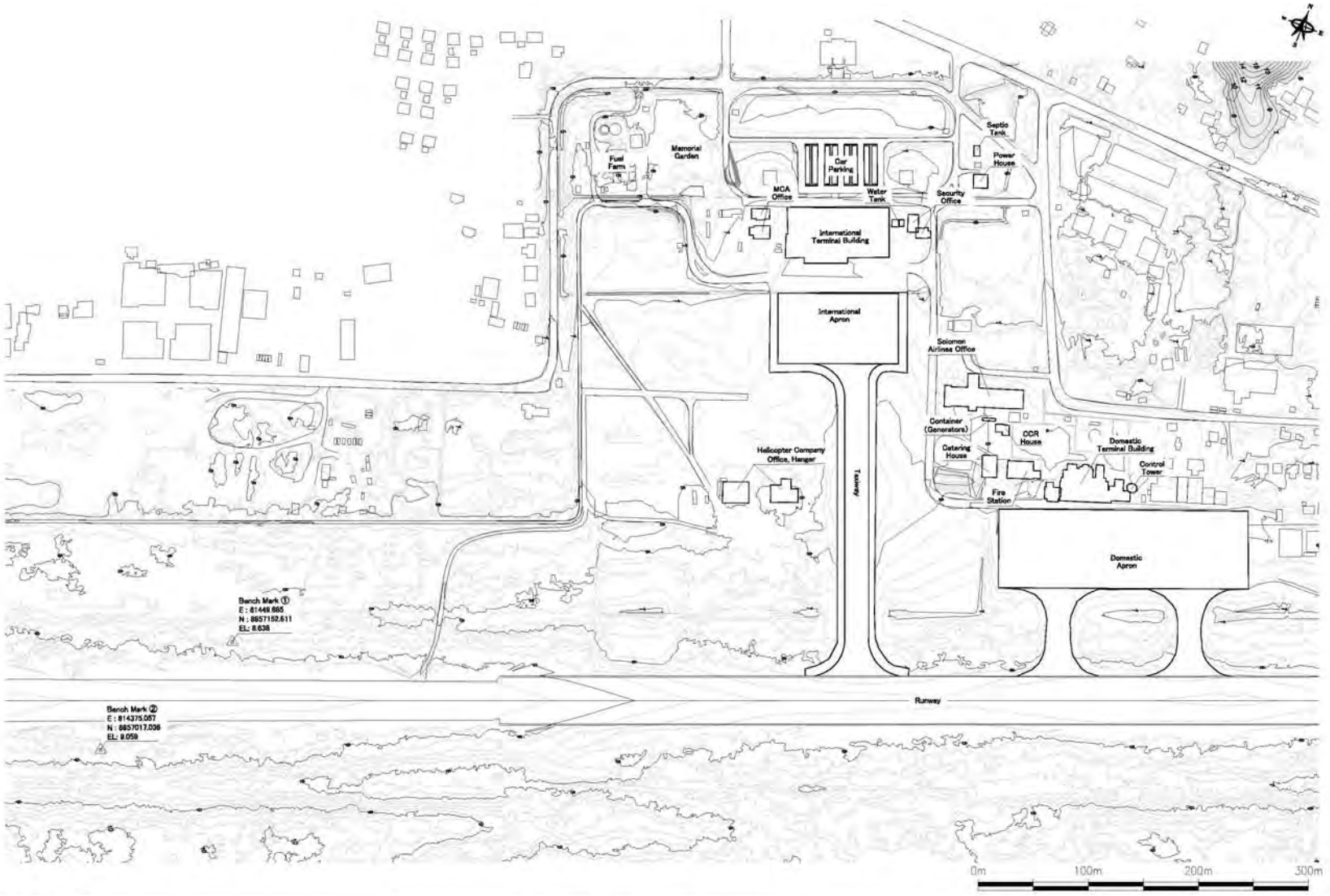


Figure 44 Existing Airport Terminal Layout Plan

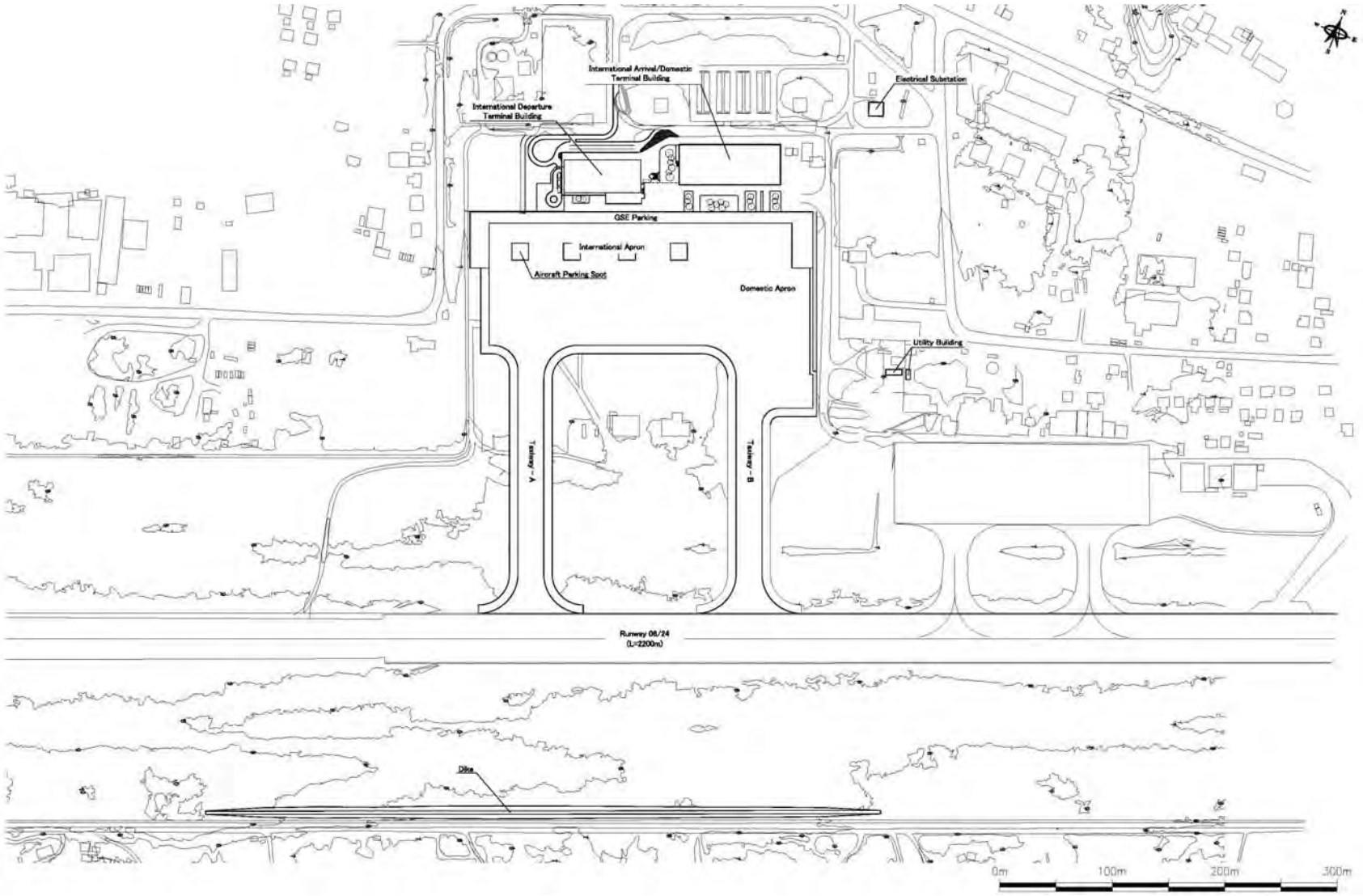


Figure 45 Facility Layout Plan

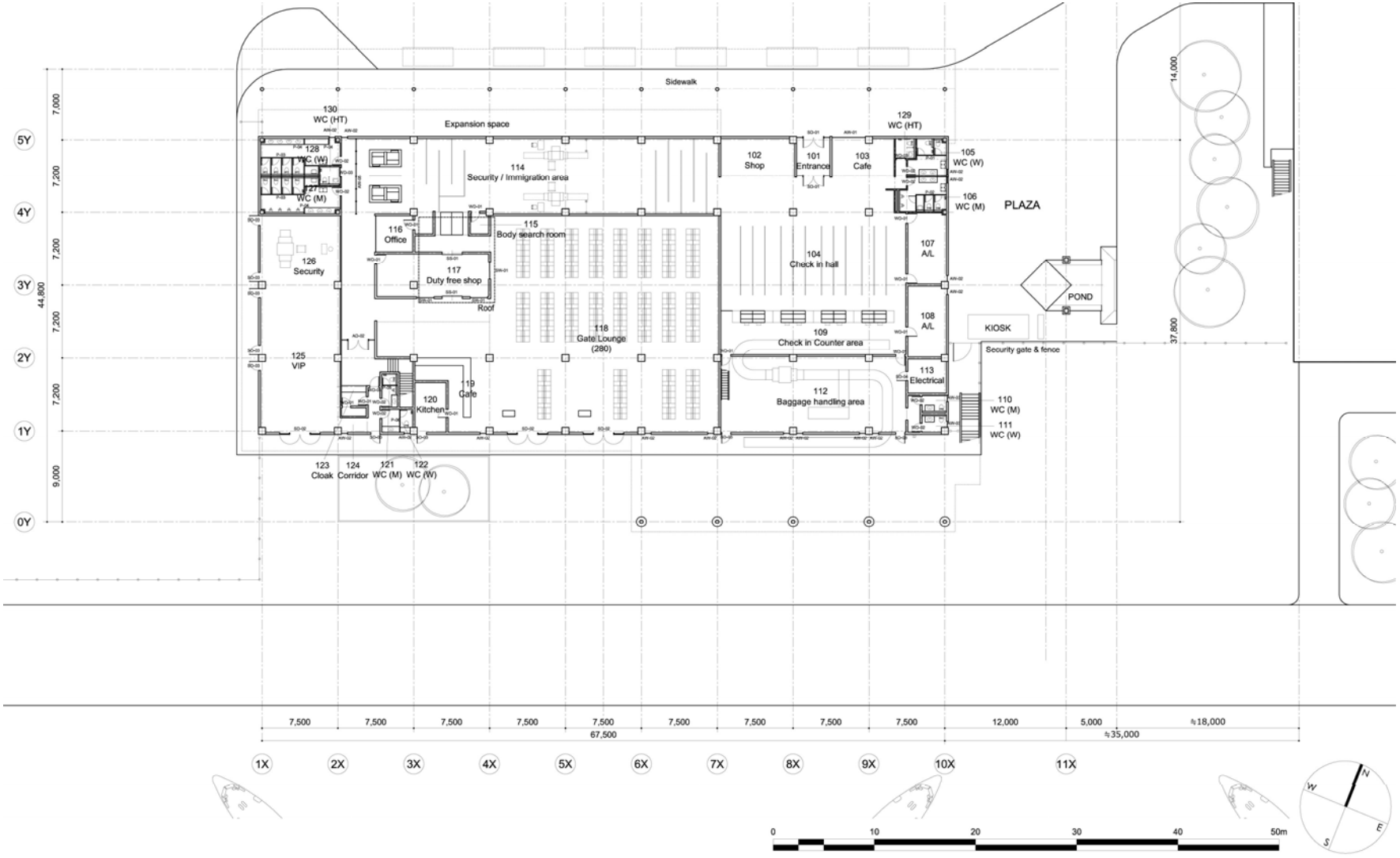


Figure 46 1st Floor Plan (IDT)

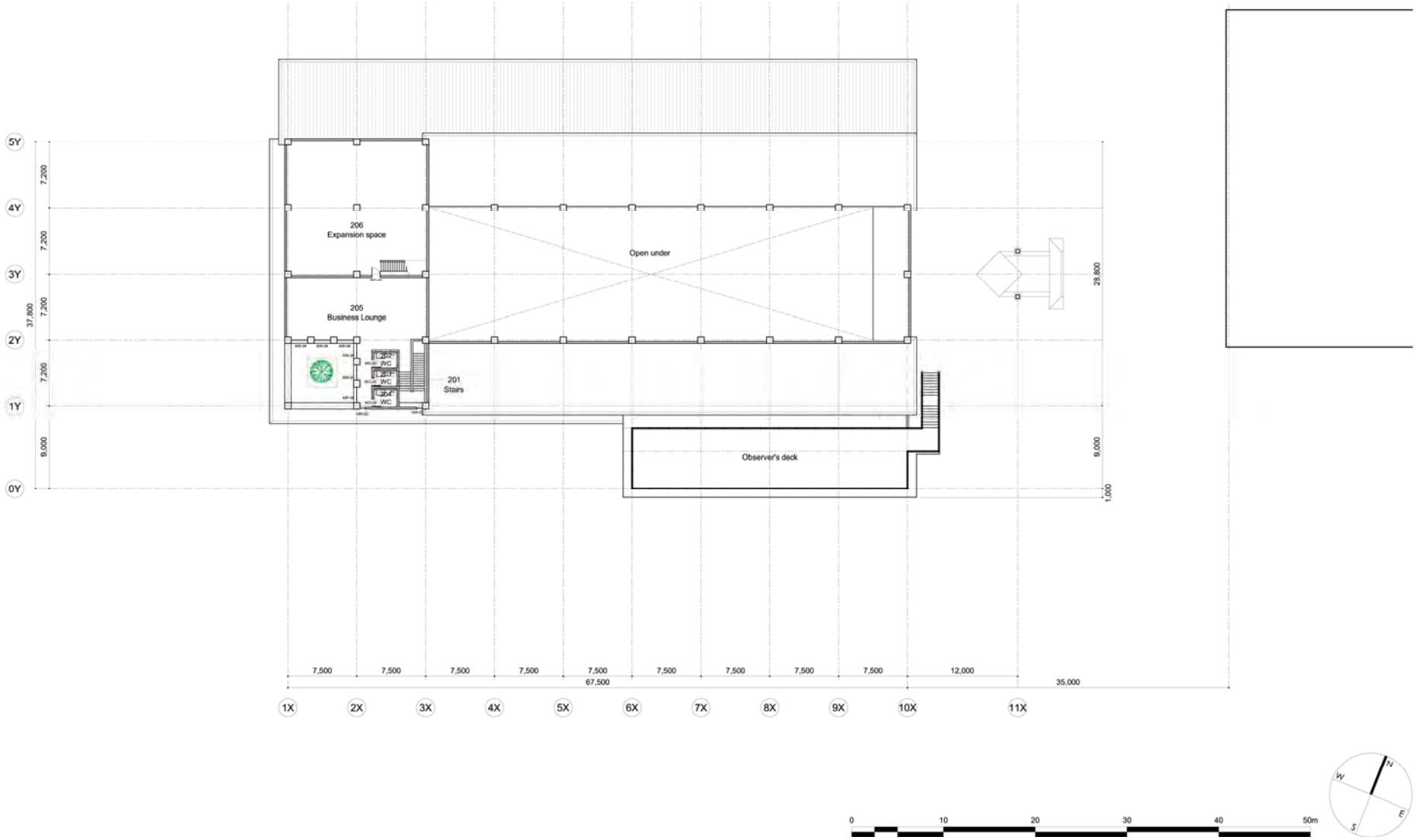


Figure 47 2nd Floor Layout Plan (IDR)

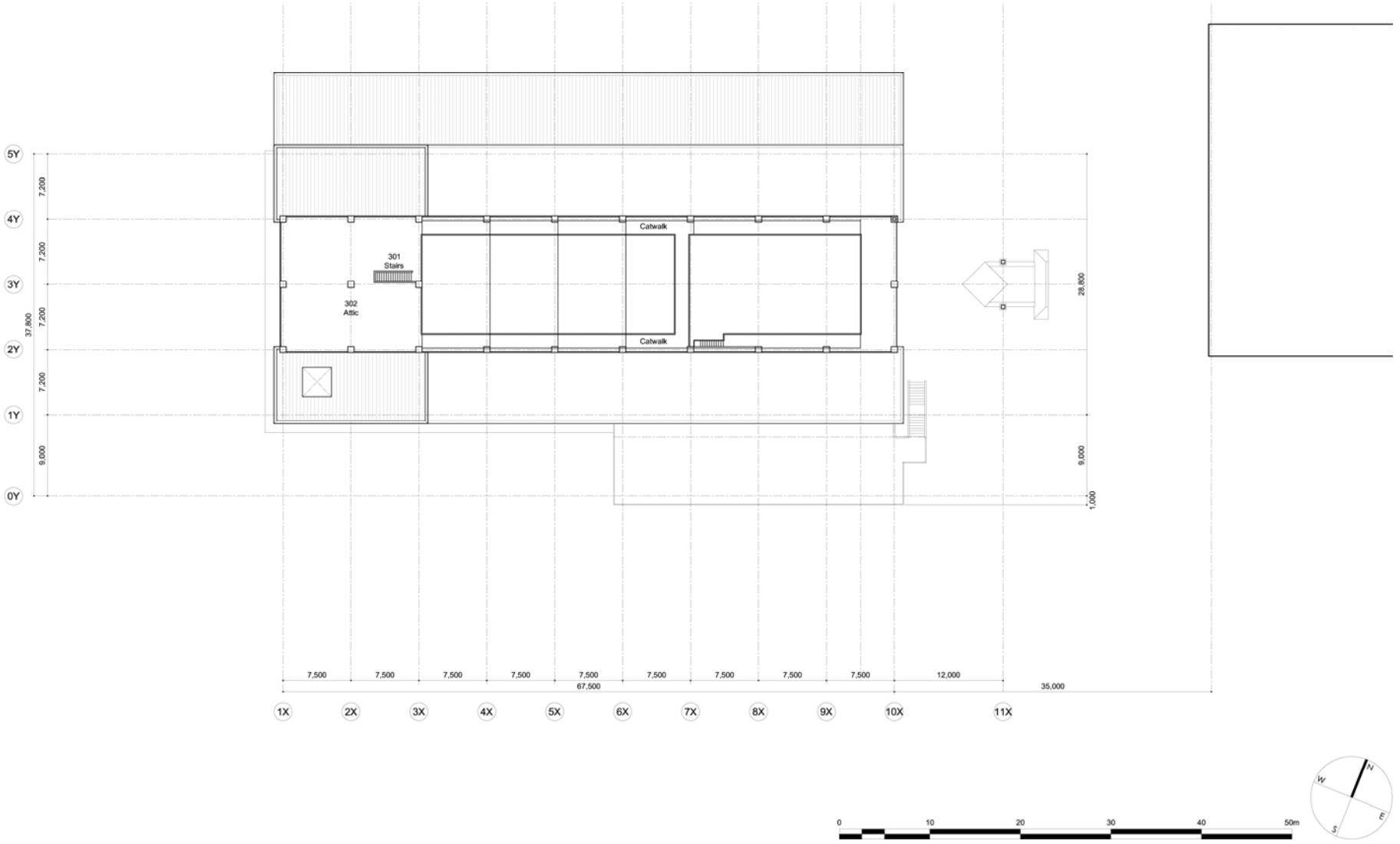


Figure 48 Attic Plan (IDT)

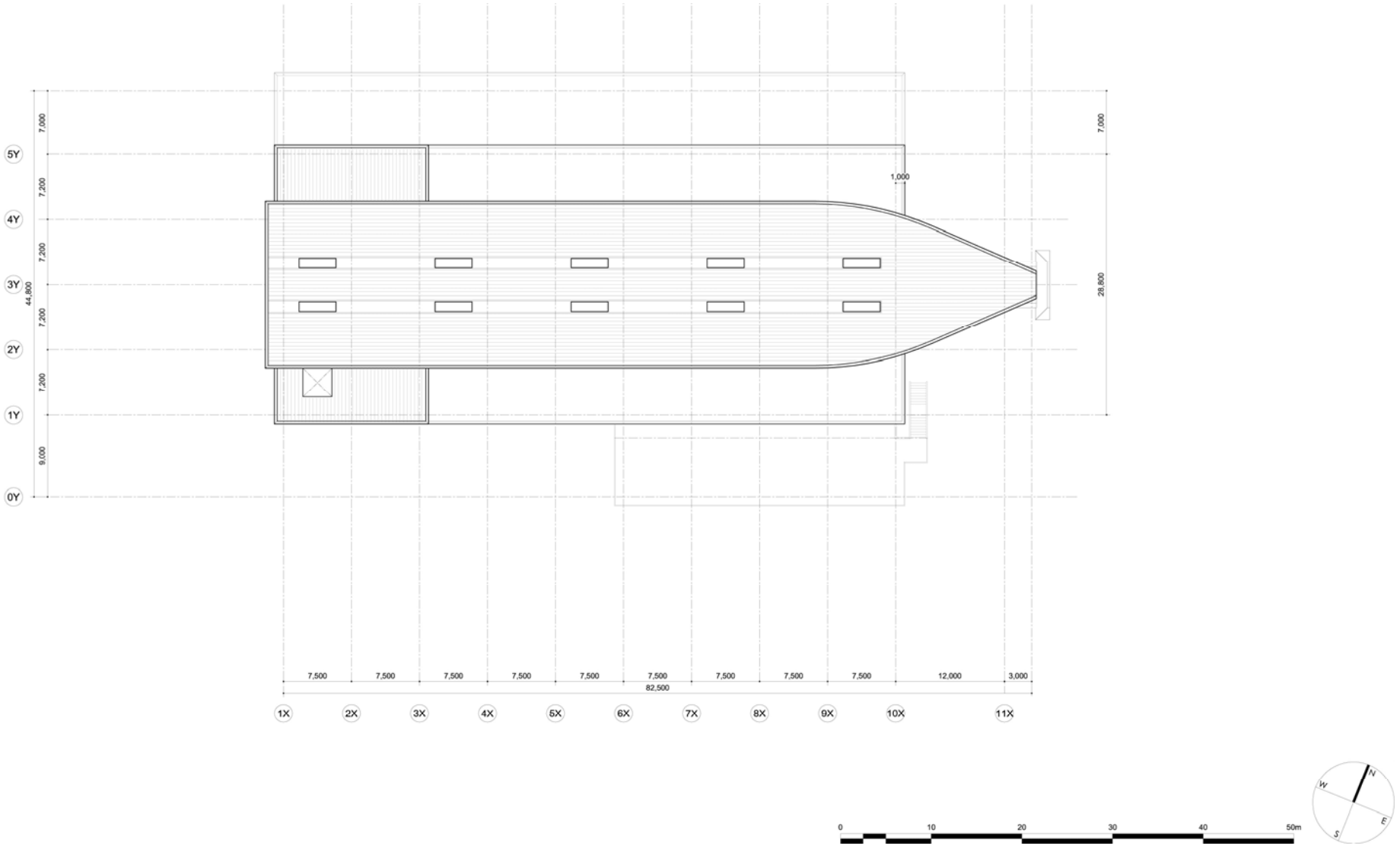


Figure 49 Roof Plan (IDT)

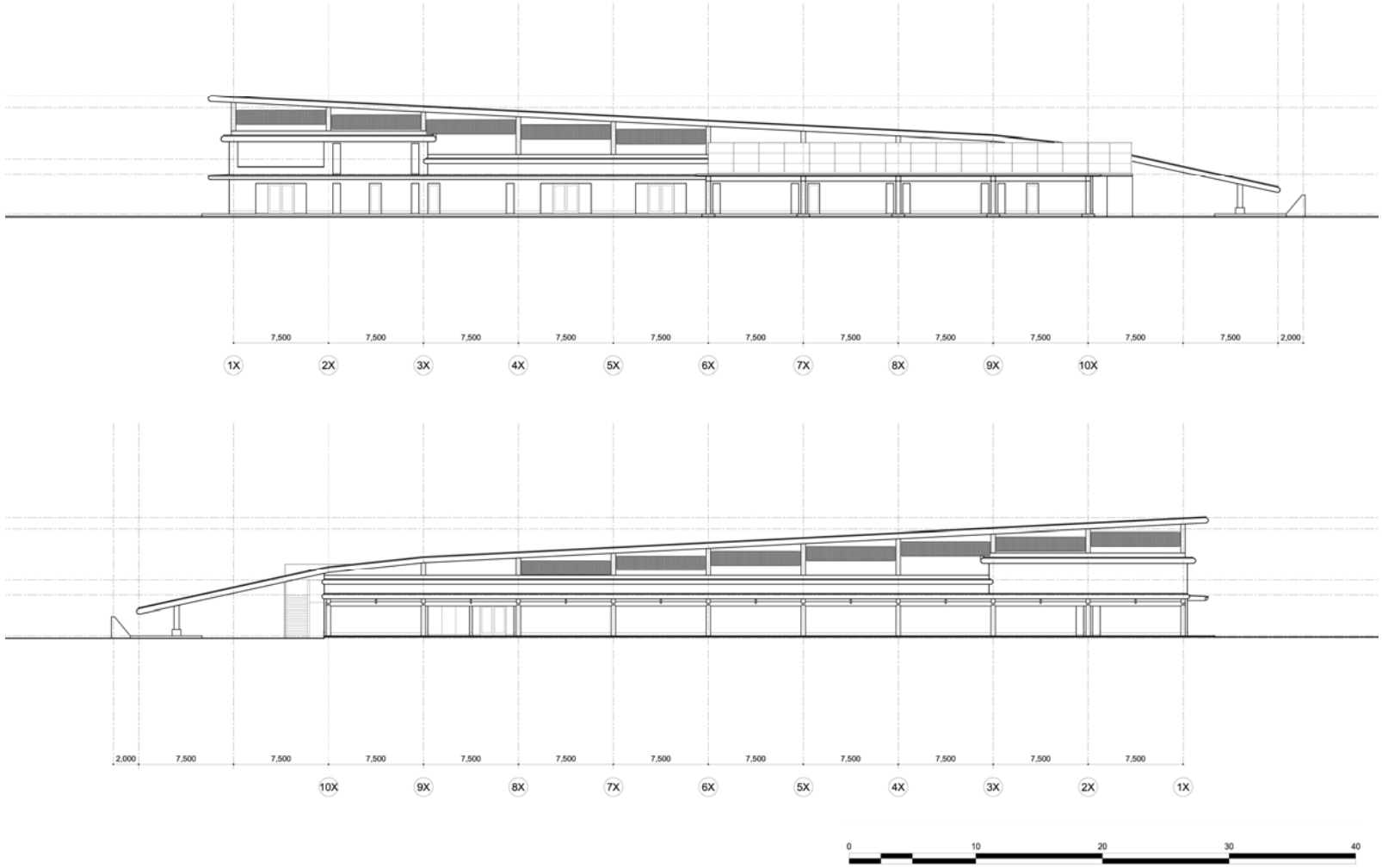


Figure 50 Elevation -1 (IDT) (Up: South side (Airside), Down: North side (Landside))

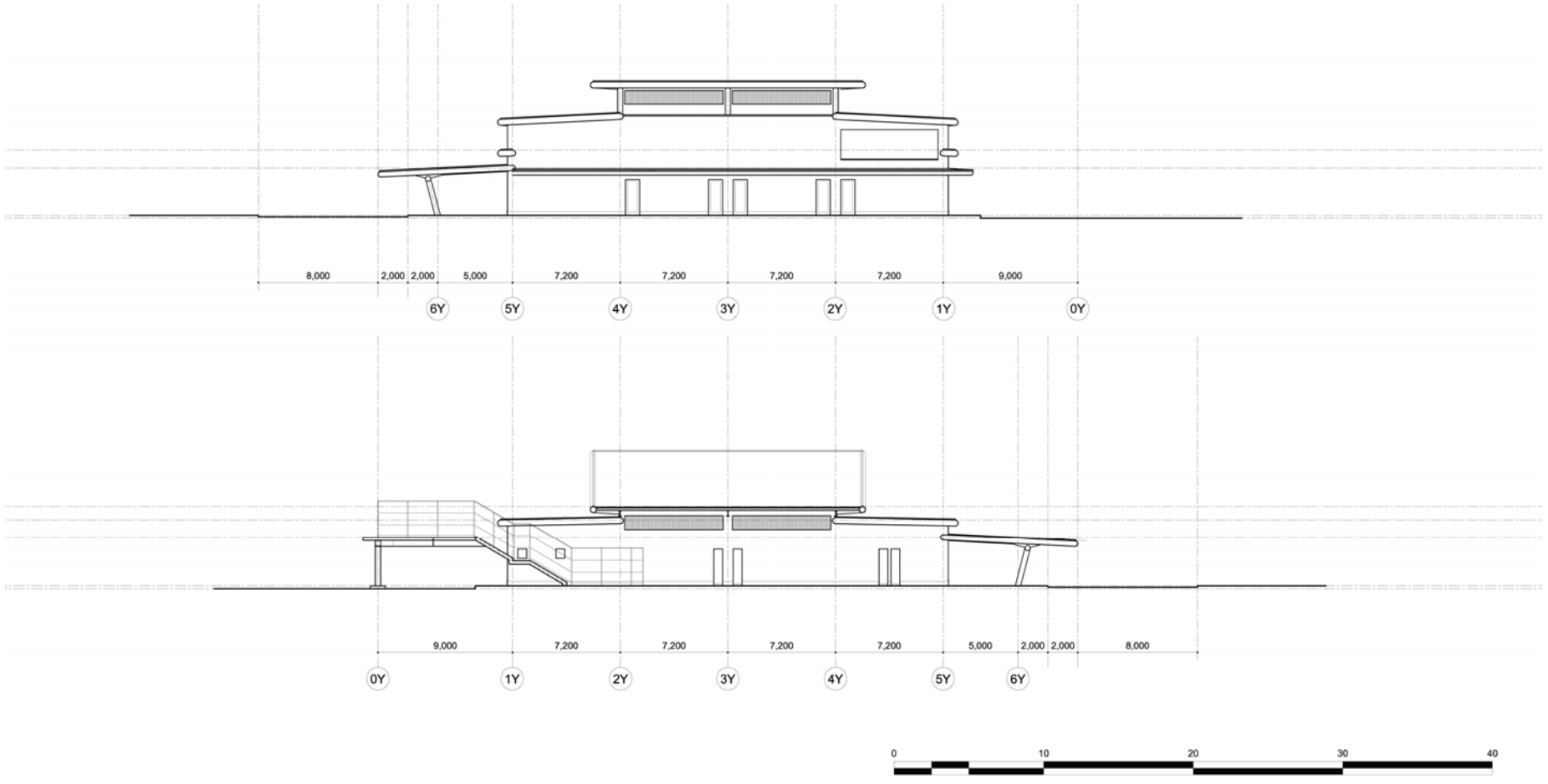


Figure 51 Elevation -2 (IDT) (Up: West side, Down: East side)

Figure 52 Section -1 (IDT)

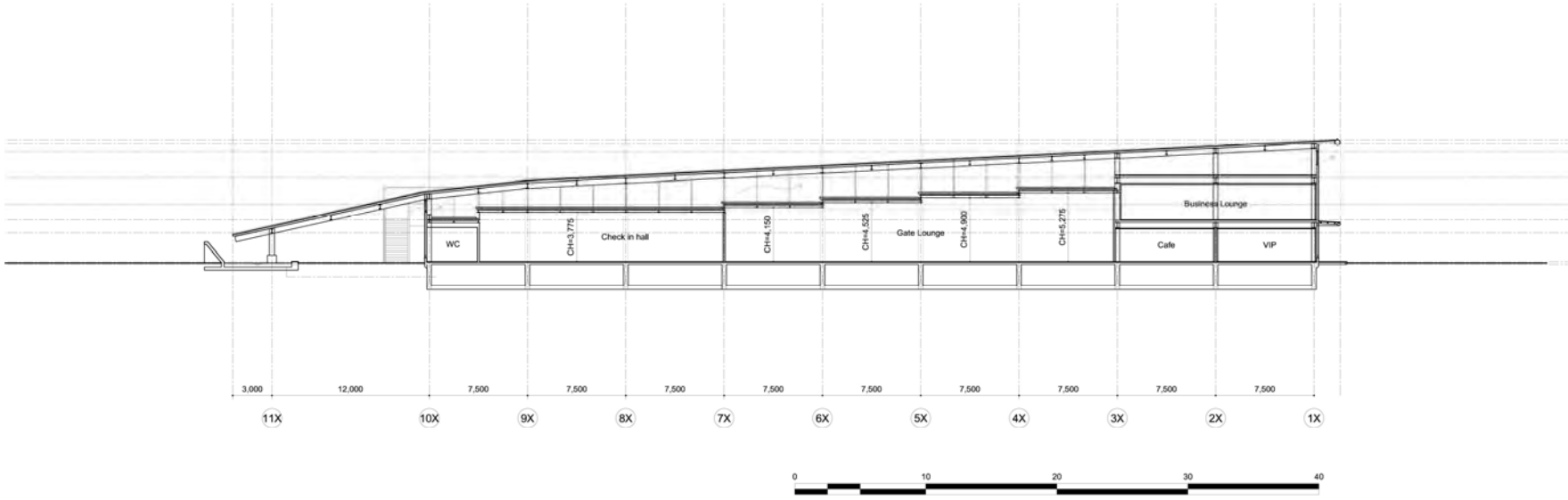


Figure 53 Section -2 (IDT)

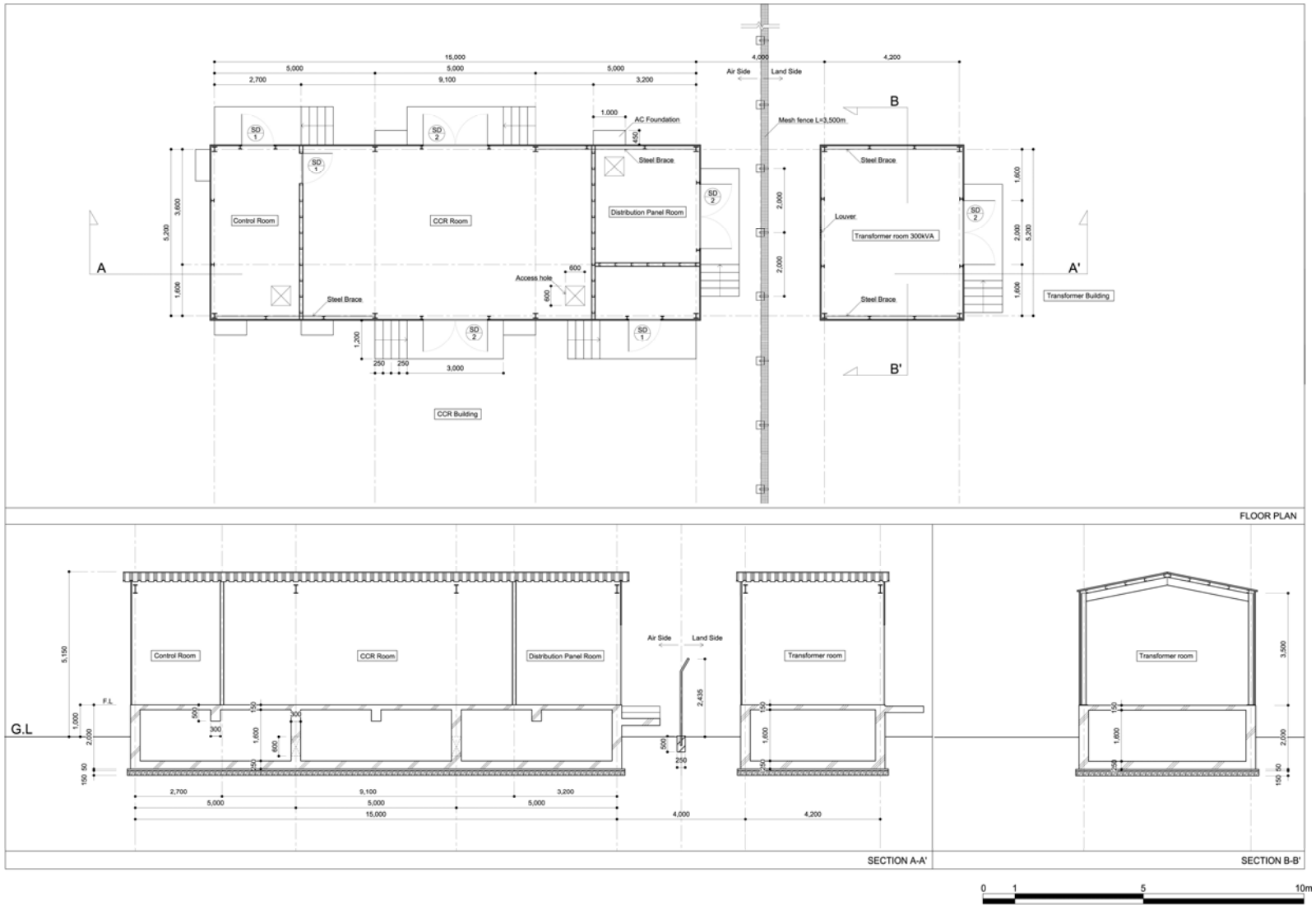


Figure 54 Layout Plan and Section Plan of Utility Building

Figure 55 Ground Floor Layout Plan (ETB) (Red line indicates removal of partitions)

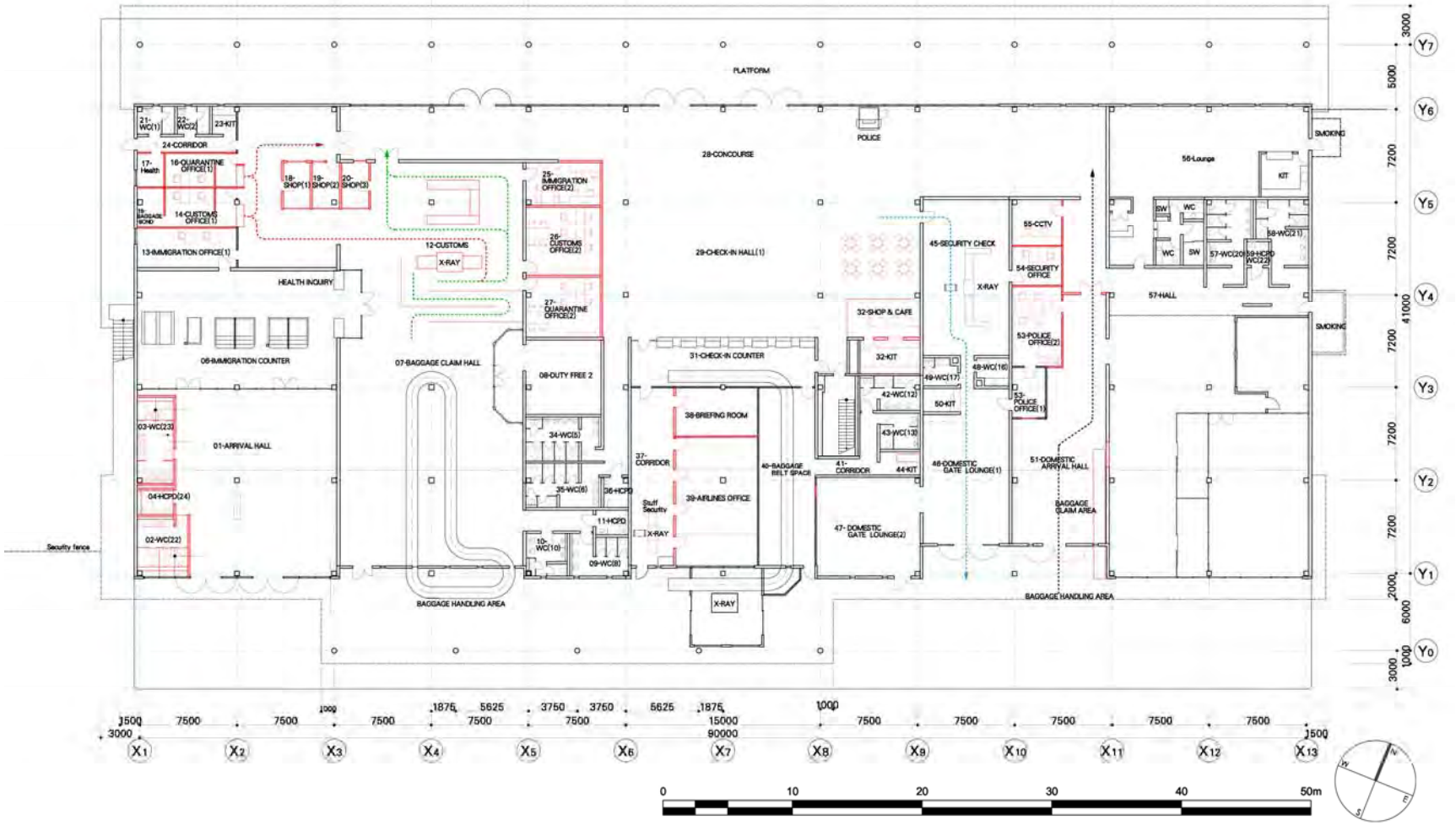


Figure 56 Ground Floor Renovation Layout Plan (ETB) (Red line shows new partitions)

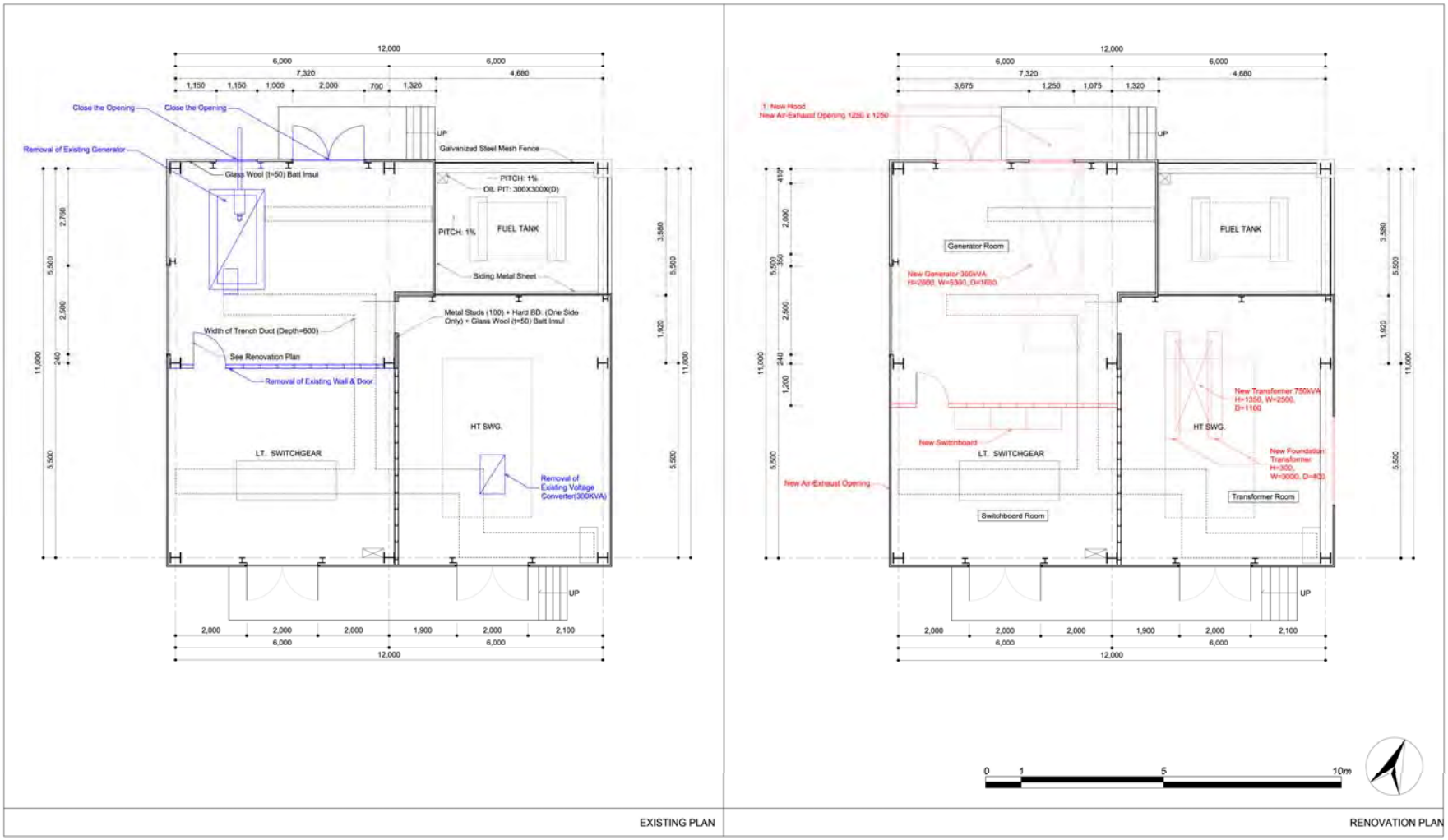


Figure 57 Layout Plan of Existing Sub-station (Left: Existing condition, Right: After Renovation)

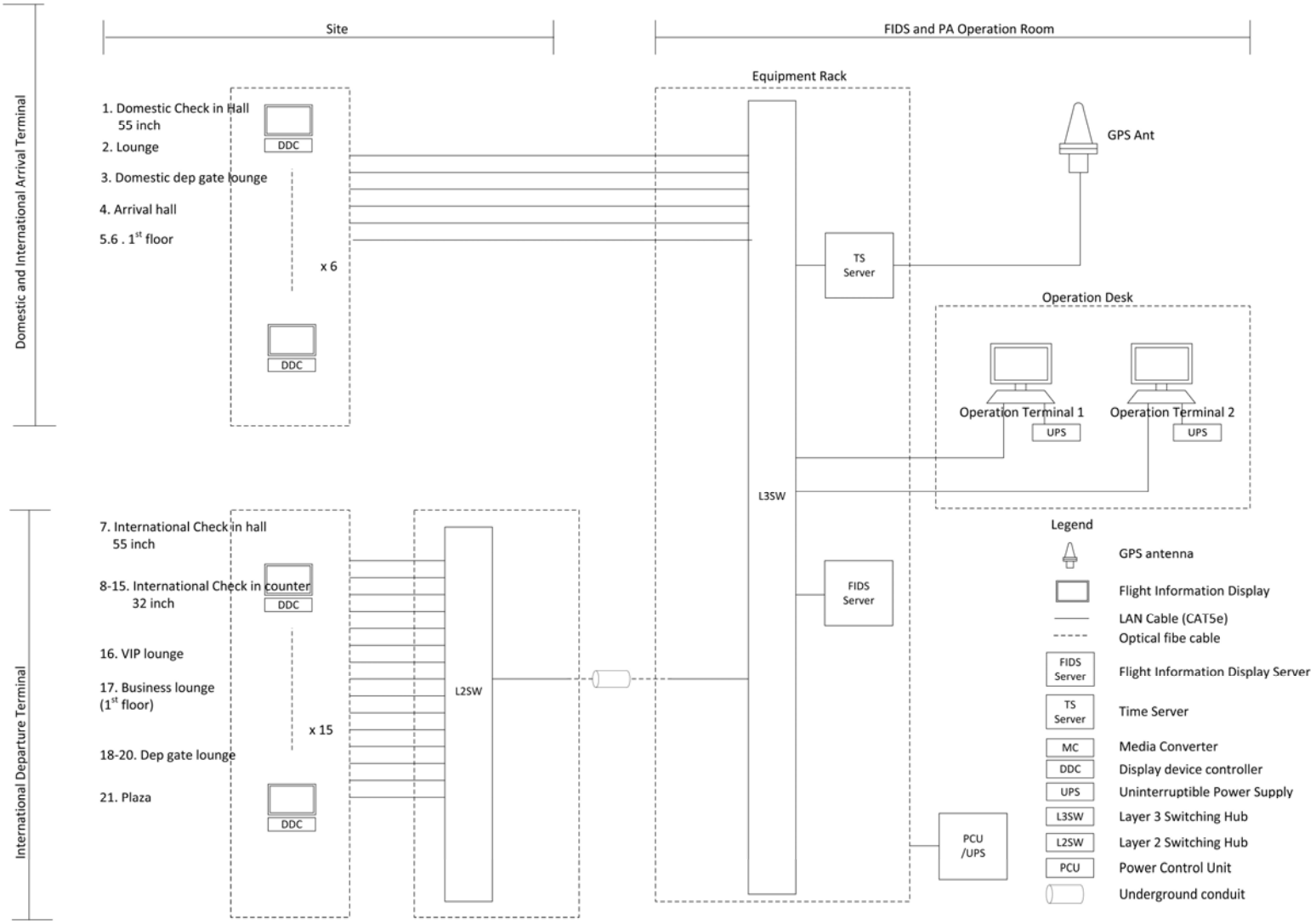


Figure 58 FIDS Diagram

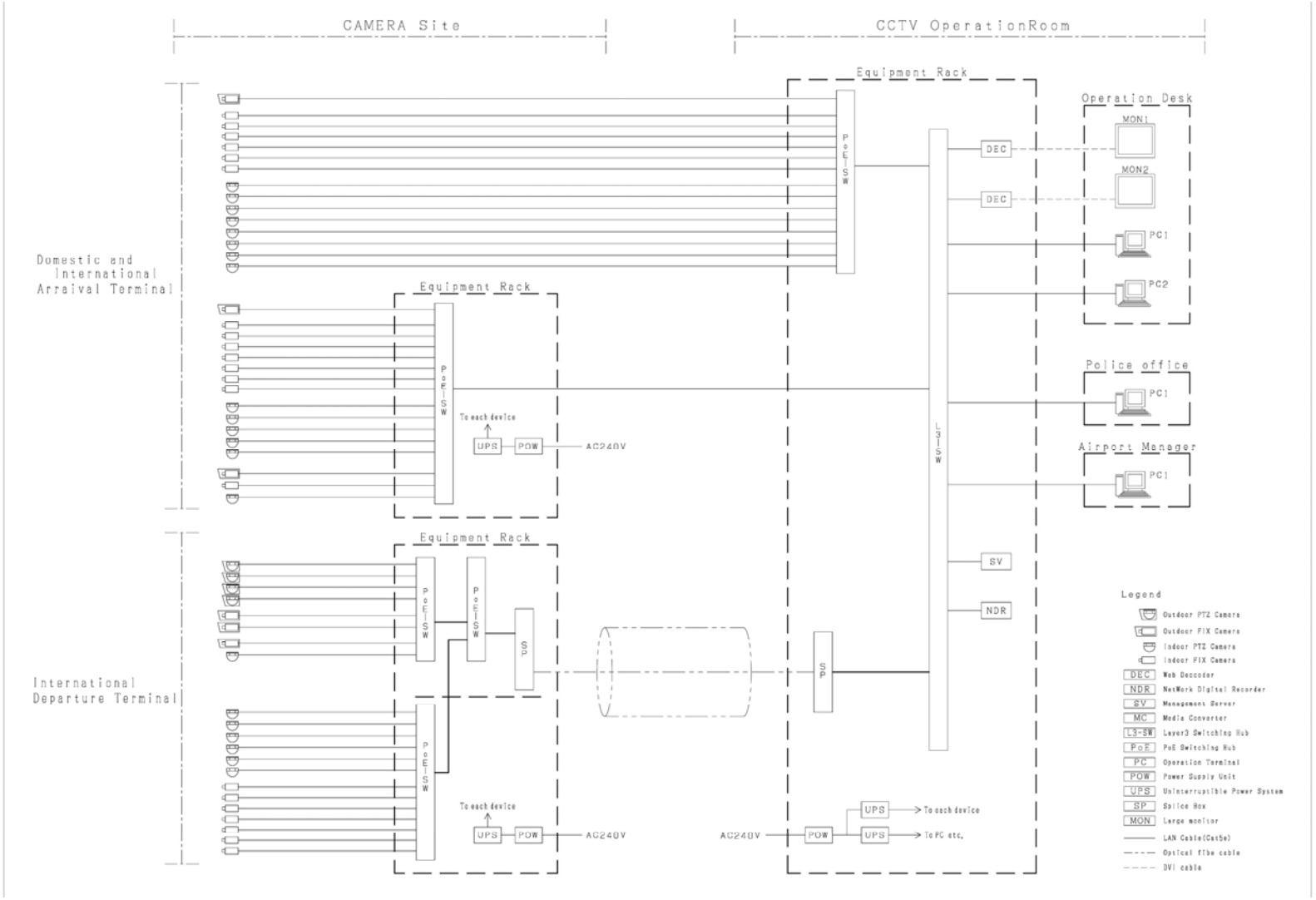


Figure 59 CCTV Diagram

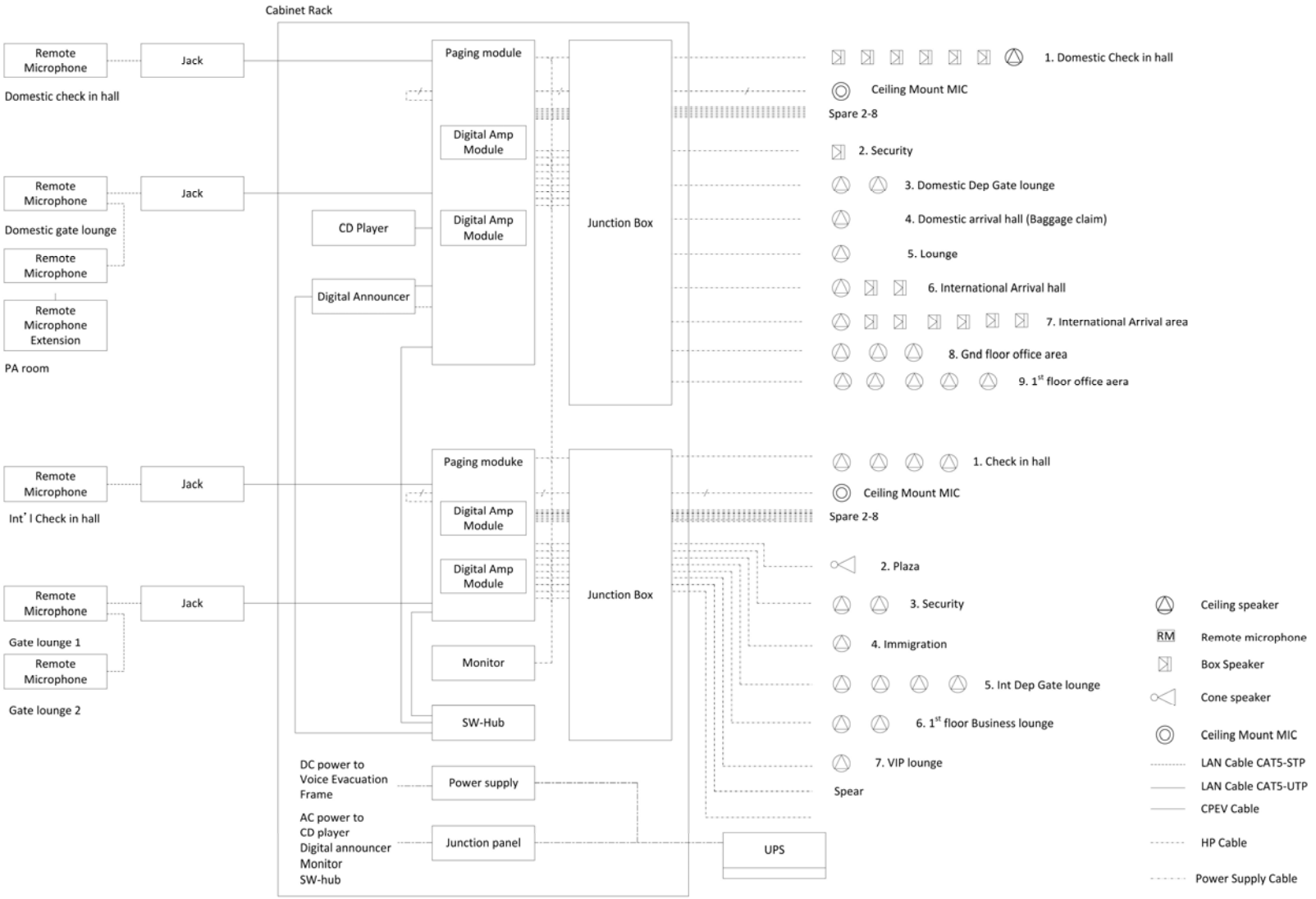


Figure 60 PA Diagram

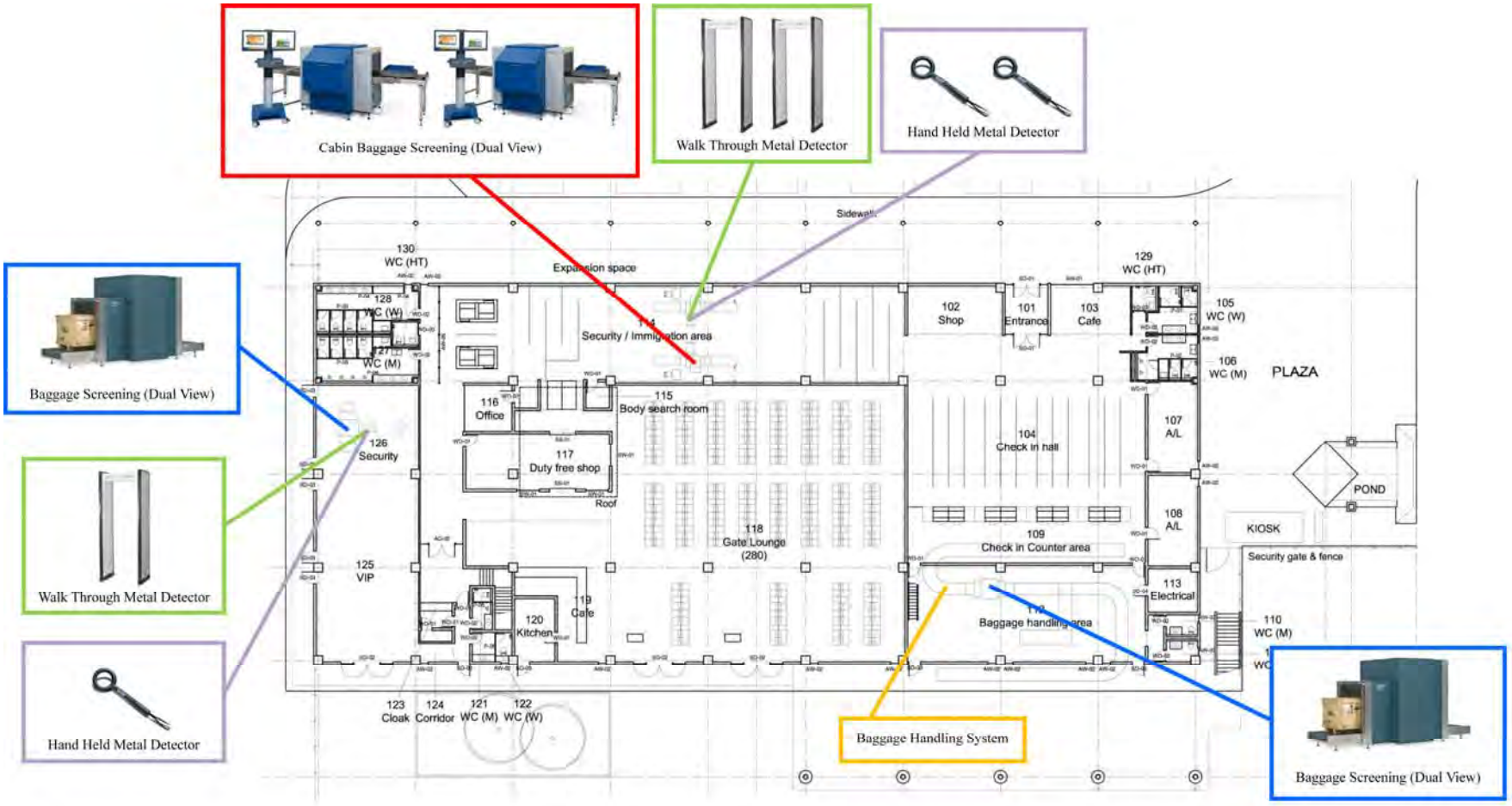


Figure 61 Special Equipment Layout Plan -1 (IDT 1st Floor)

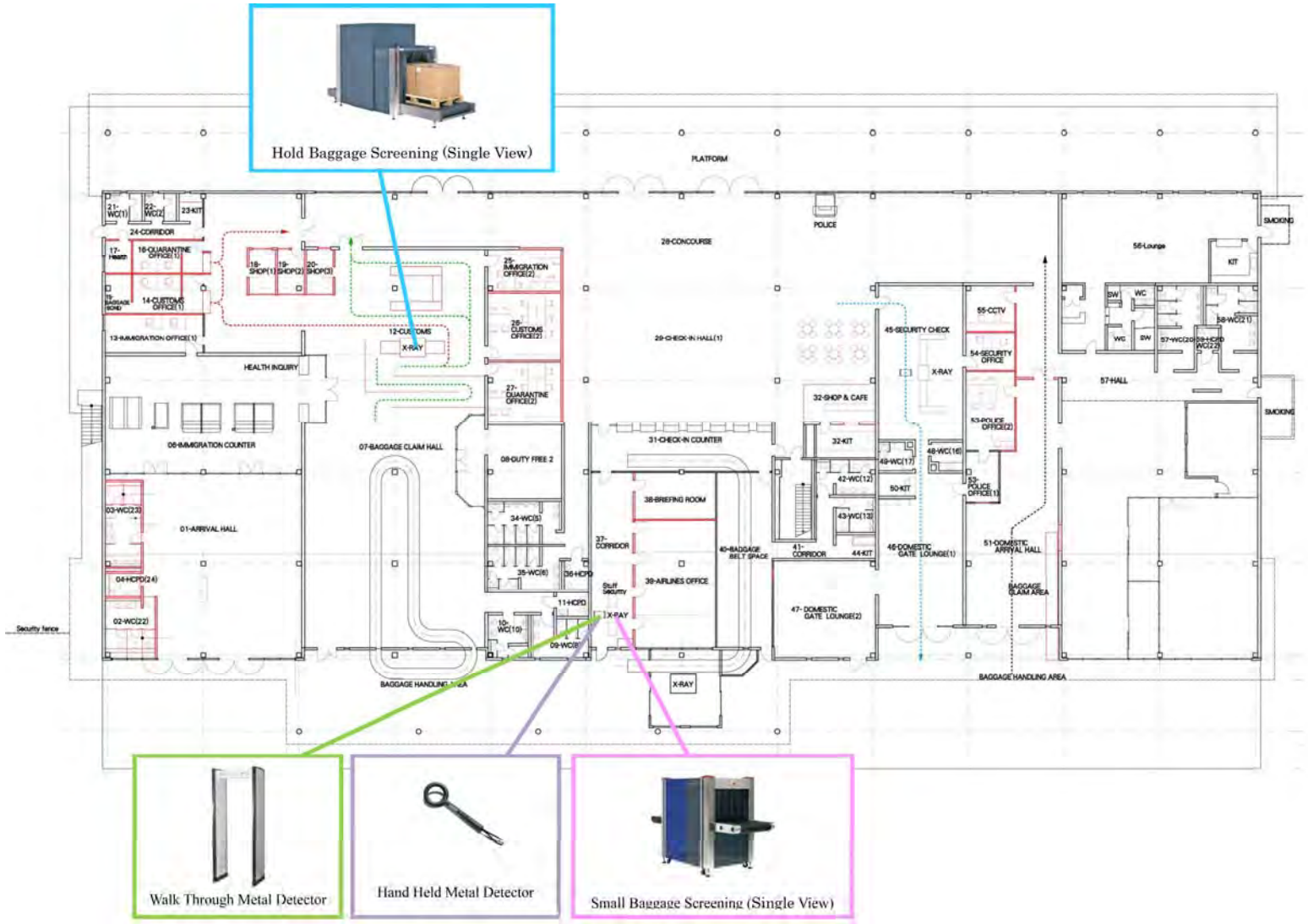


Figure 62 Special Equipment Layout Plan -2 (ETB 1st Floor)

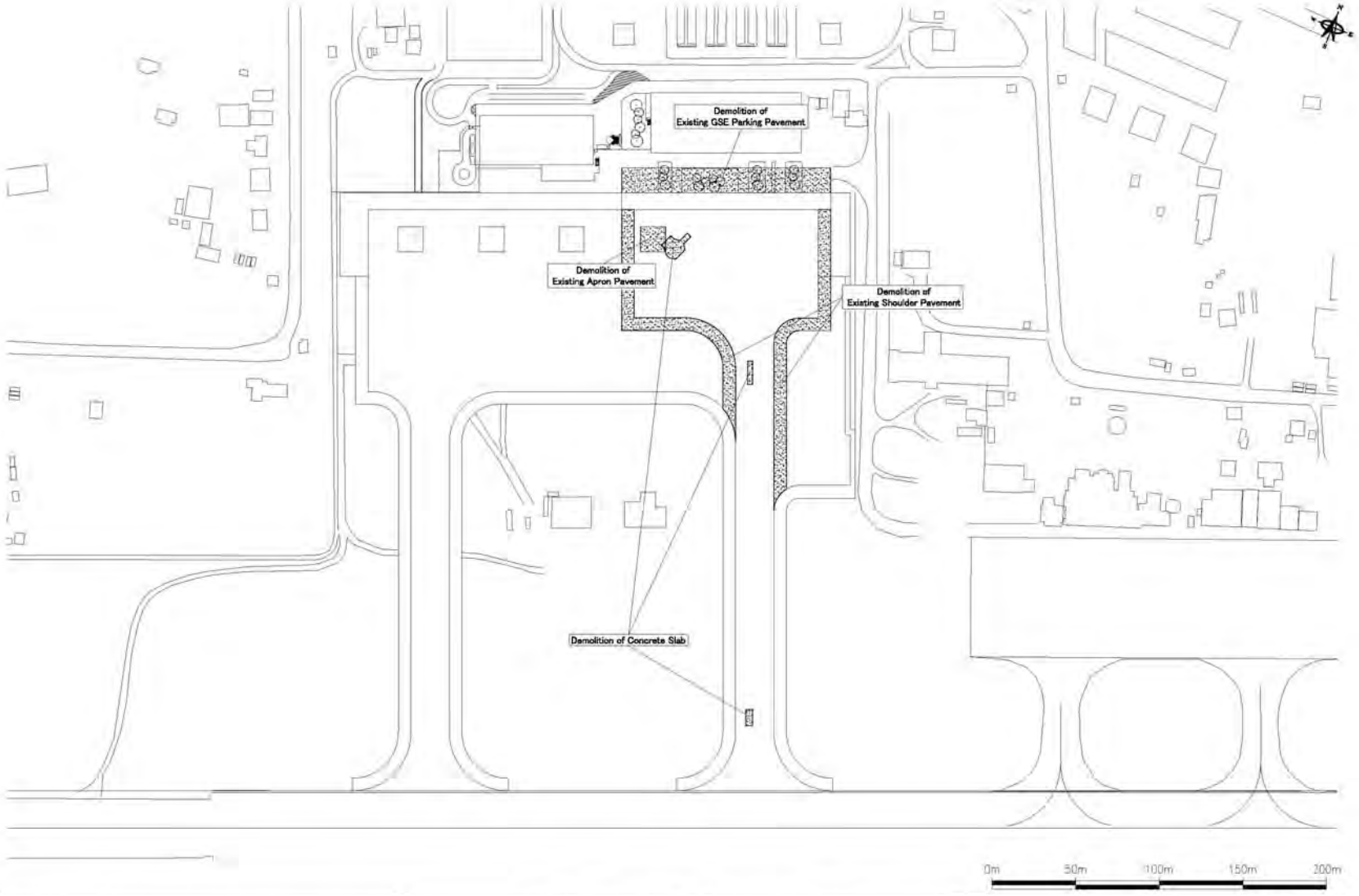


Figure 63 Existing Facility Removal Plan

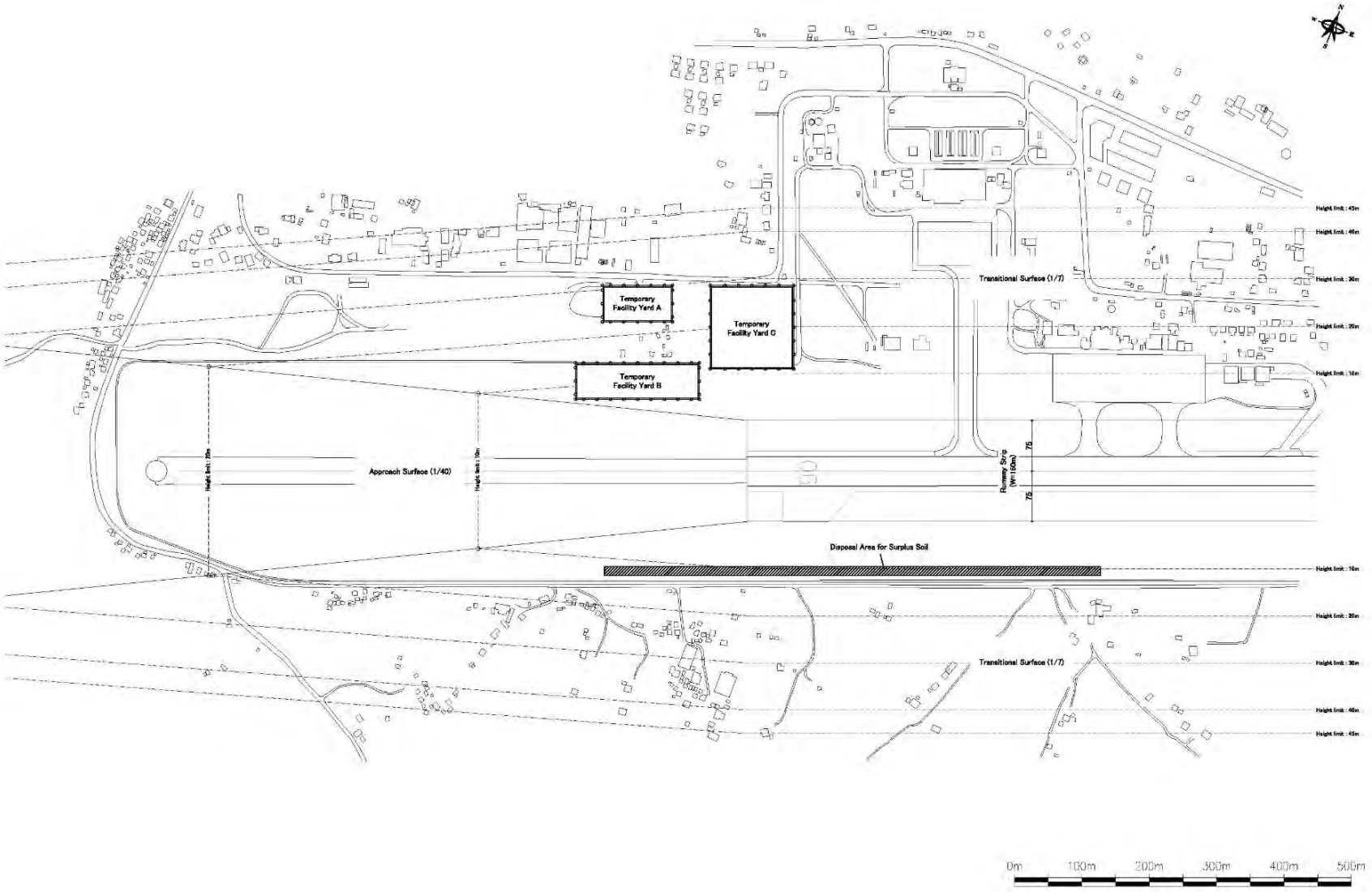


Figure 64 Temporary Work Plan

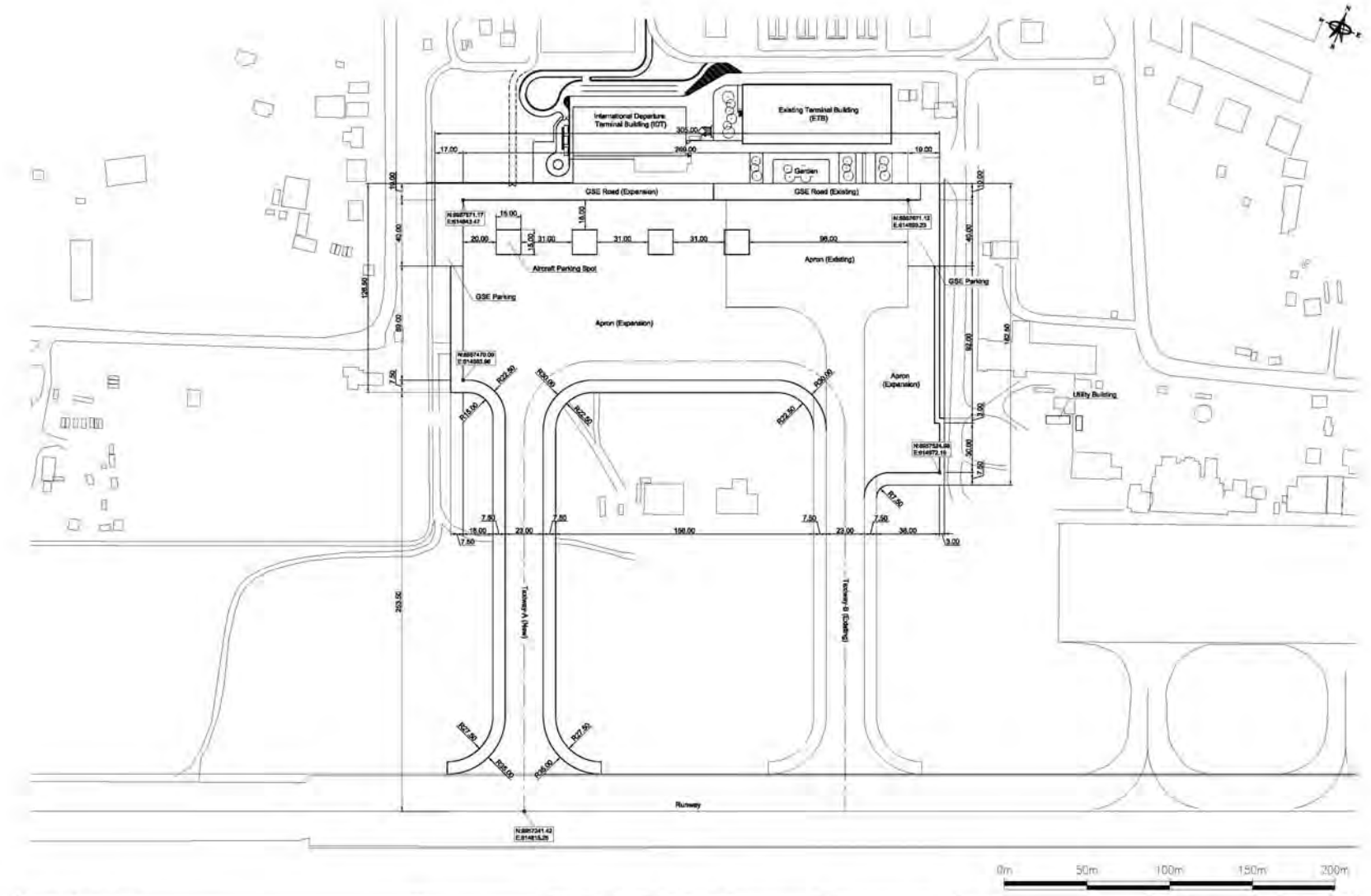
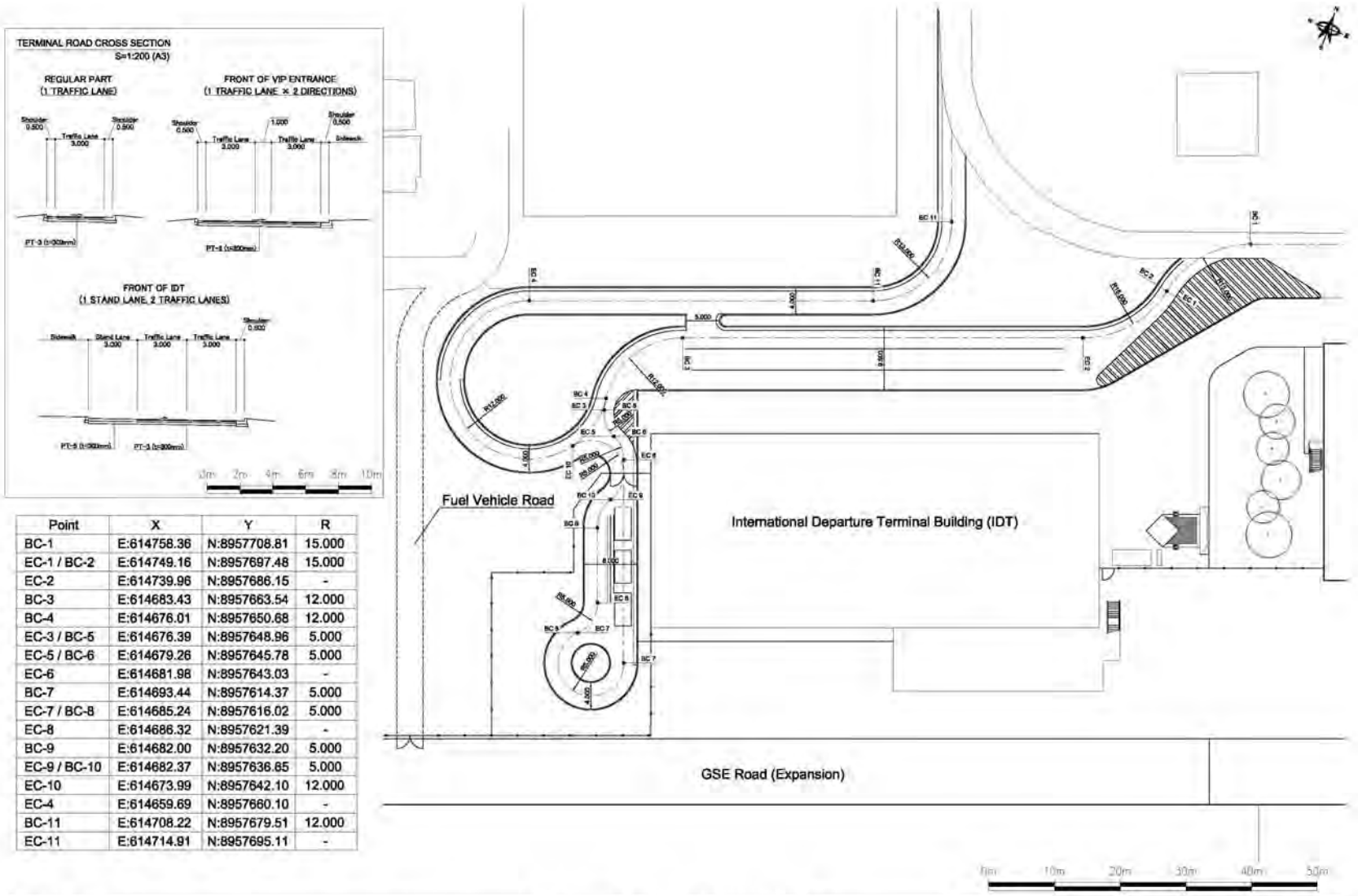


Figure 65 Apron and Taxiways Layout Plan



Point	X	Y	R
BC-1	E:614758.36	N:8957708.81	15.000
EC-1 / BC-2	E:614749.16	N:8957697.48	15.000
EC-2	E:614739.96	N:8957686.15	-
BC-3	E:614683.43	N:8957663.54	12.000
BC-4	E:614676.01	N:8957650.68	12.000
EC-3 / BC-5	E:614676.39	N:8957648.96	5.000
EC-5 / BC-6	E:614679.26	N:8957645.78	5.000
EC-6	E:614681.98	N:8957643.03	-
BC-7	E:614693.44	N:8957614.37	5.000
EC-7 / BC-8	E:614685.24	N:8957616.02	5.000
EC-8	E:614686.32	N:8957621.39	-
BC-9	E:614682.00	N:8957632.20	5.000
EC-9 / BC-10	E:614682.37	N:8957636.65	5.000
EC-10	E:614673.99	N:8957642.10	12.000
EC-4	E:614659.69	N:8957660.10	-
BC-11	E:614708.22	N:8957679.51	12.000
EC-11	E:614714.91	N:8957695.11	-

Figure 66 Terminal Road Layout Plan and Typical Cross Section

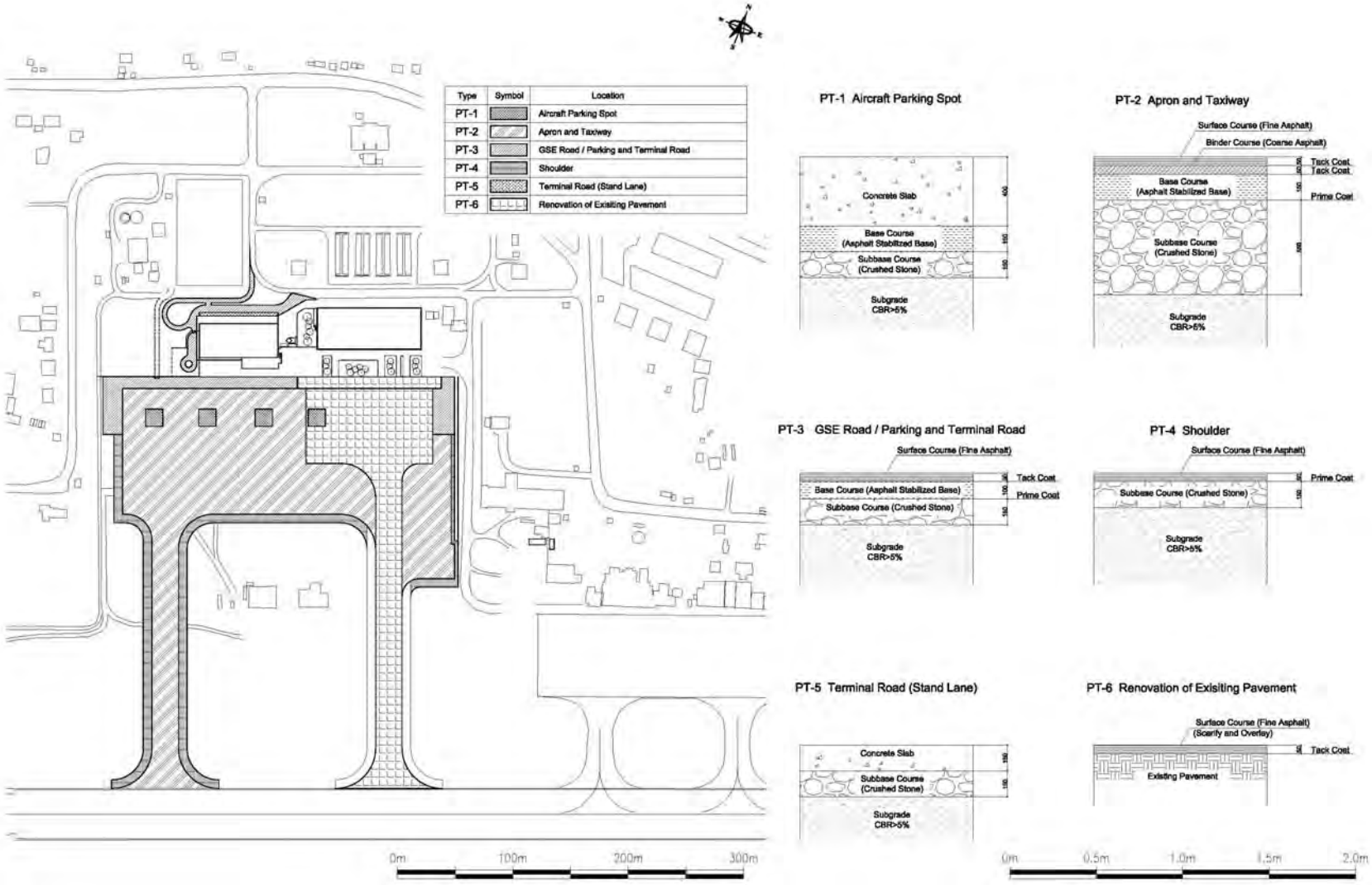


Figure 67 Pavement Layout Plan

Figure 68 Taxiway Longitudinal Profile

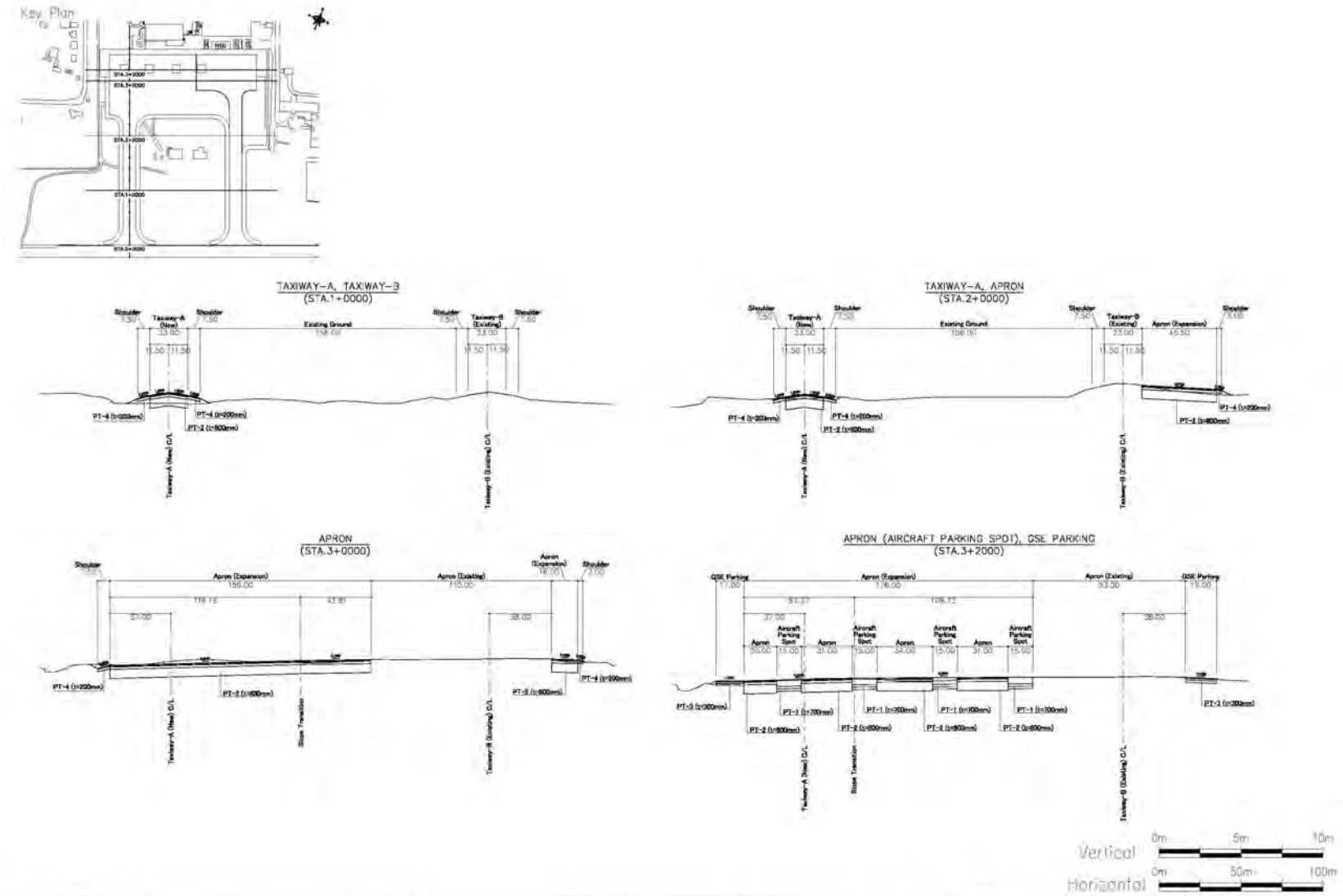


Figure 69 Typical Cross Sections (Apron and Taxiway)

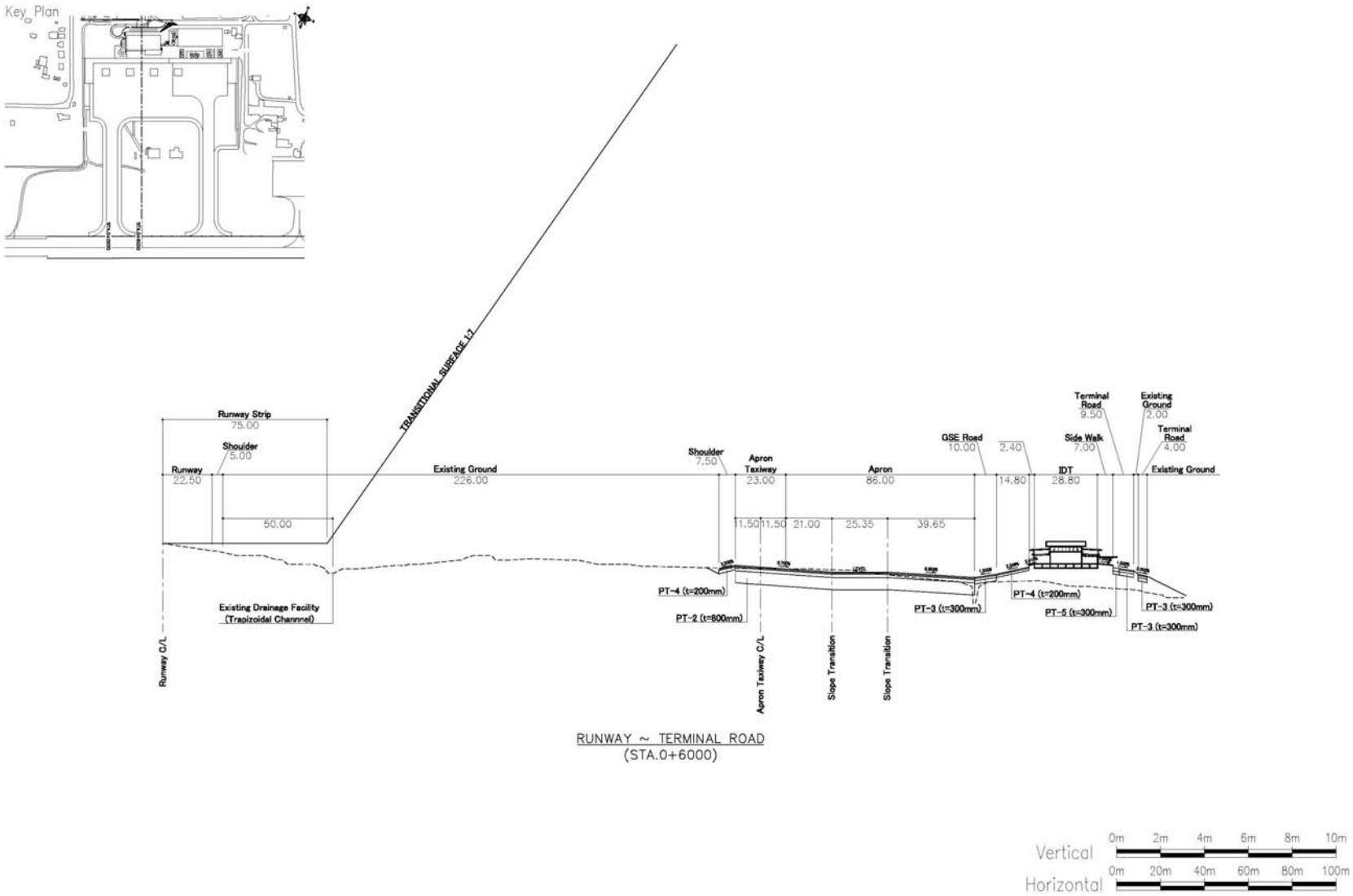


Figure 70 Typical Cross Sections (Runway ~ Terminal Road)

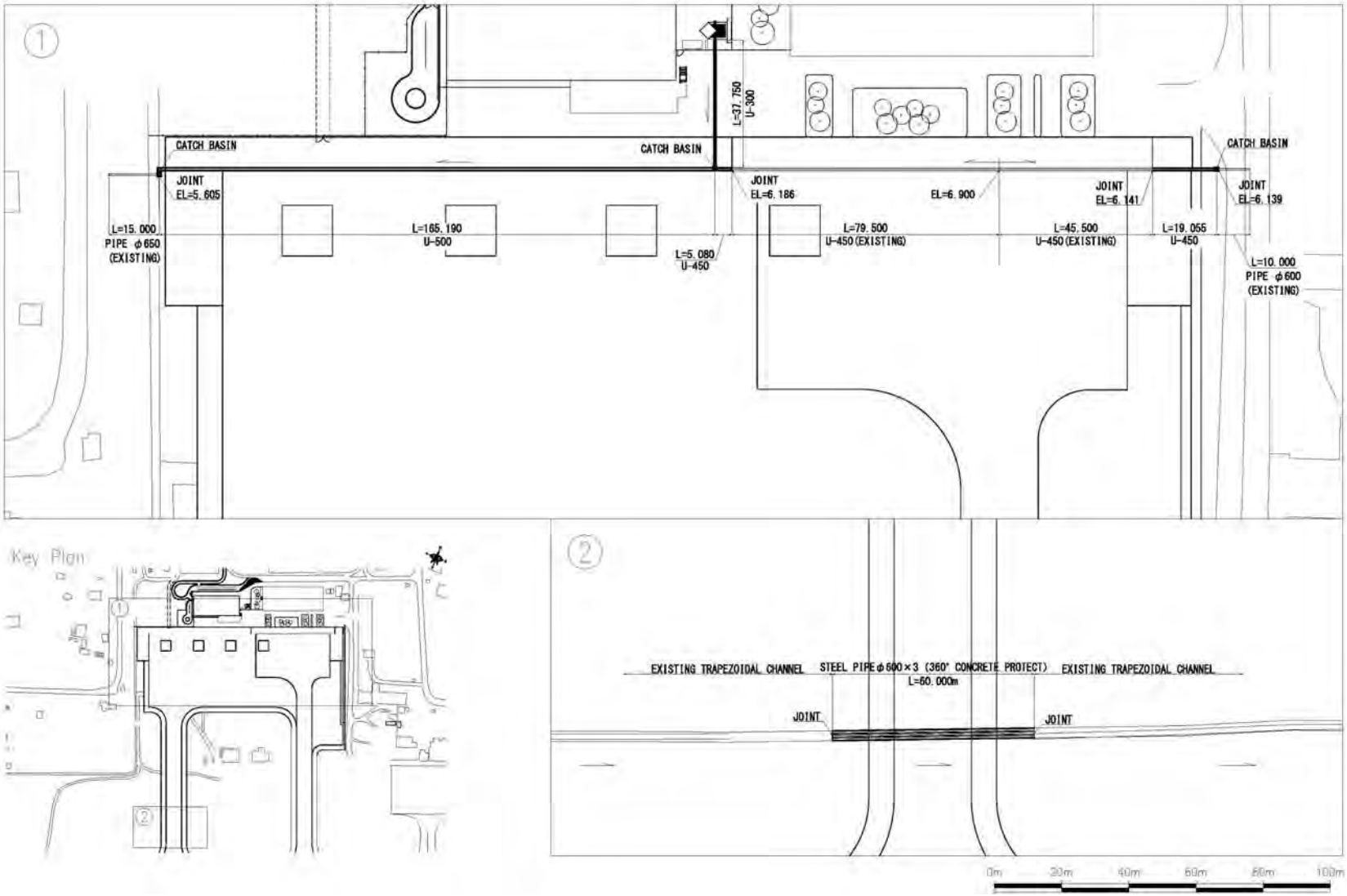


Figure 71 Drainage Plan (Apron and Taxiway)

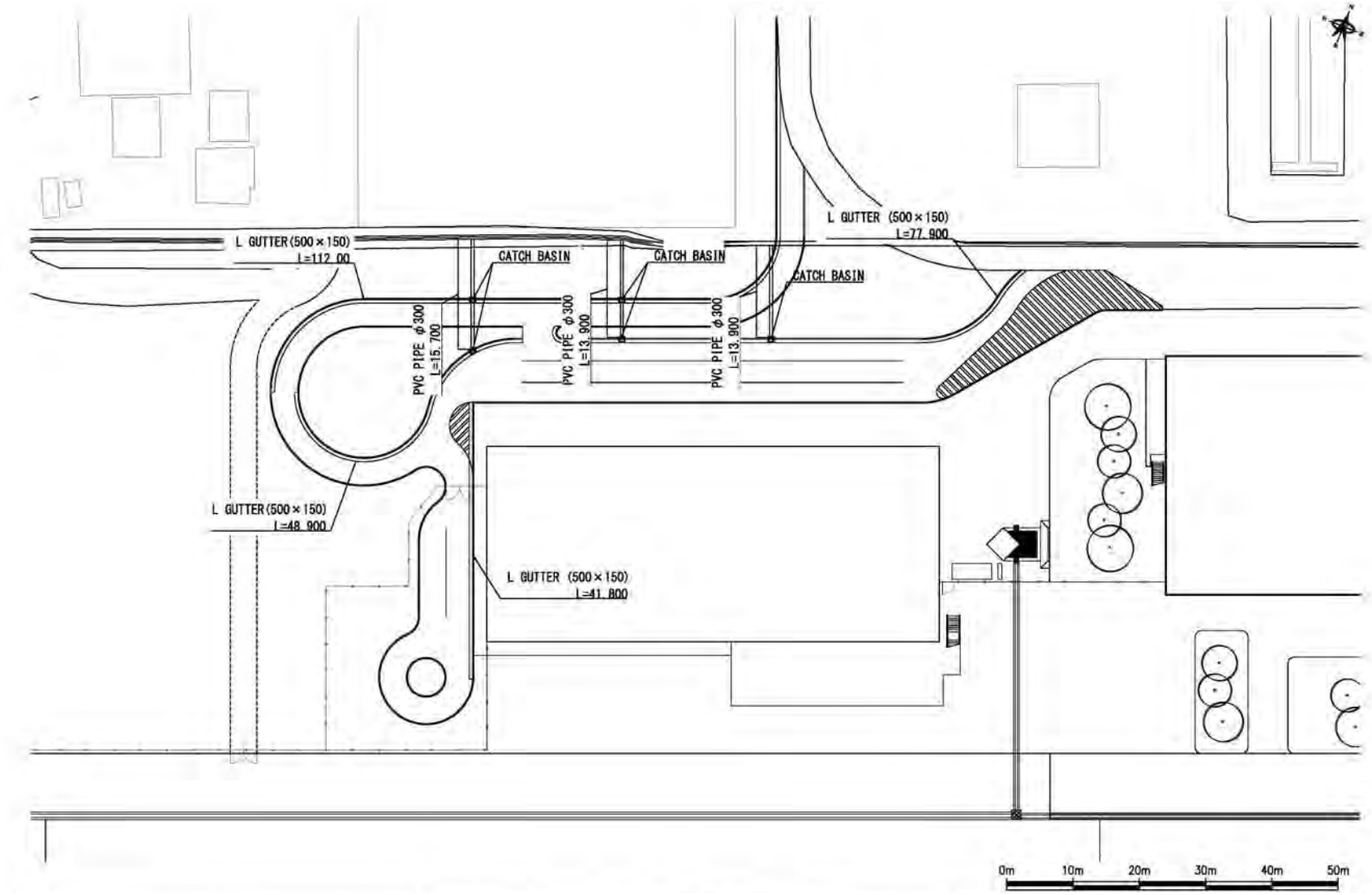


Figure 72 Drainage Plan (Terminal Road)

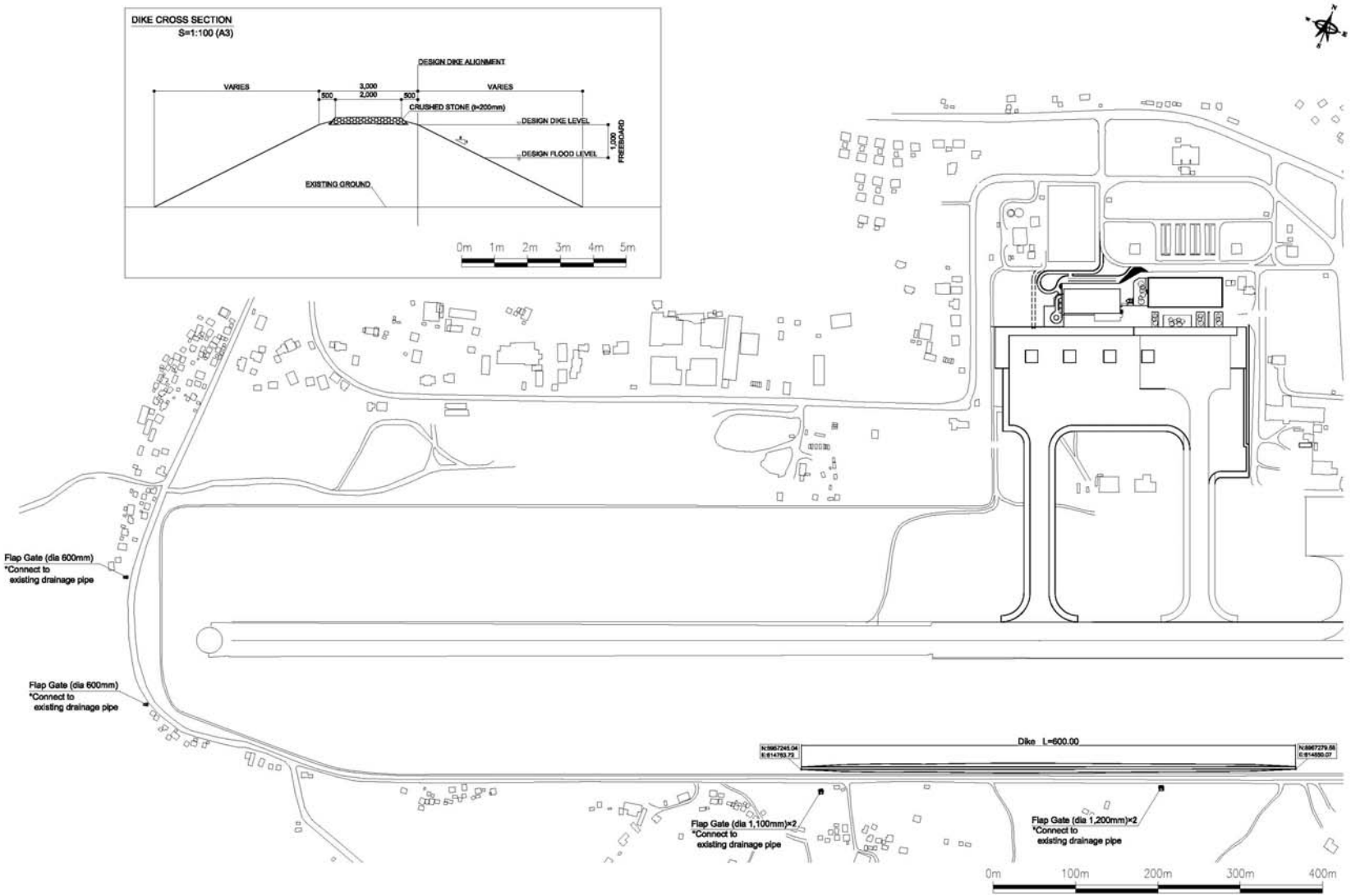


Figure 73 Flood Protection Dike Layout and Cross Section

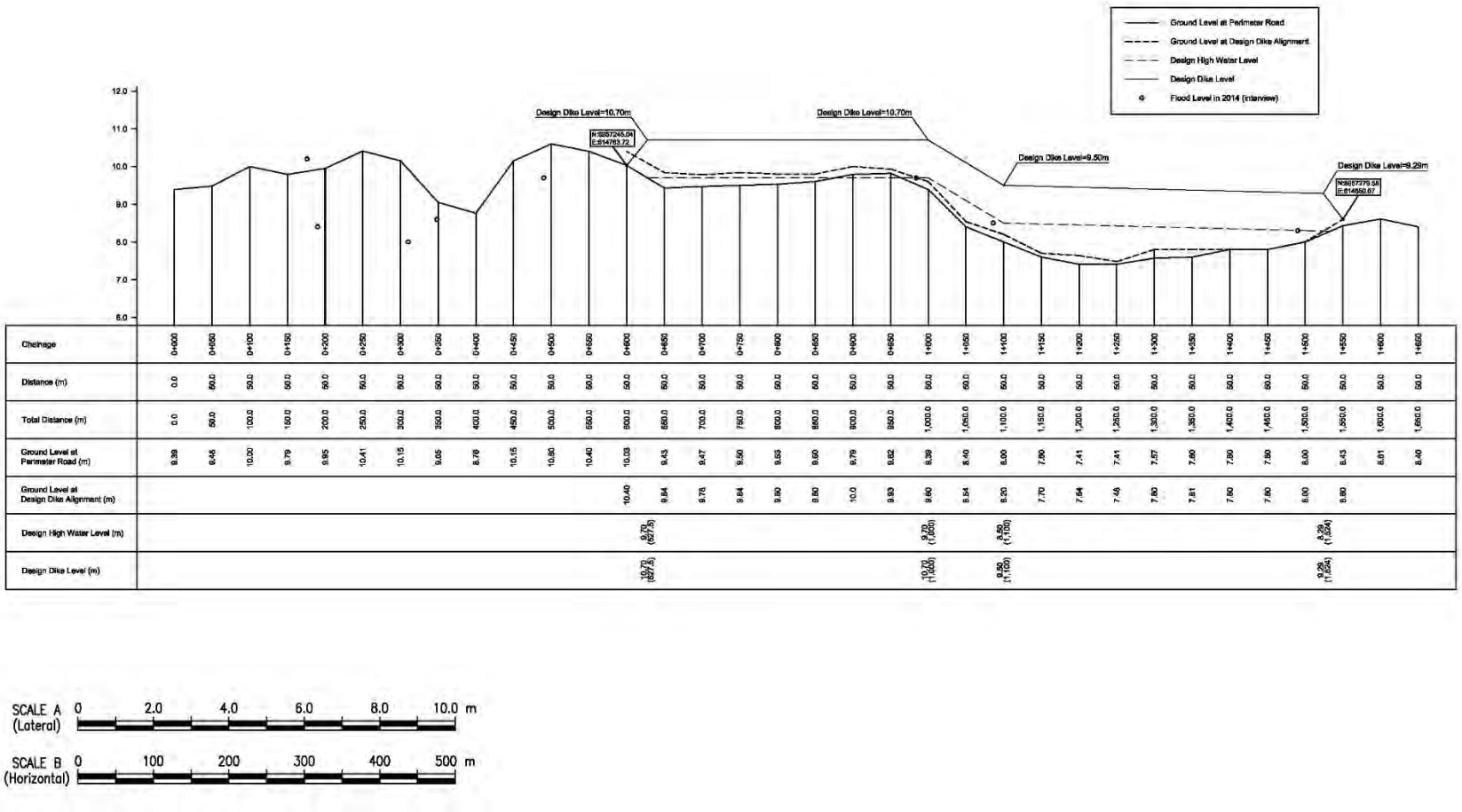


Figure 74 Flood Protection Dike Longitudinal Profile

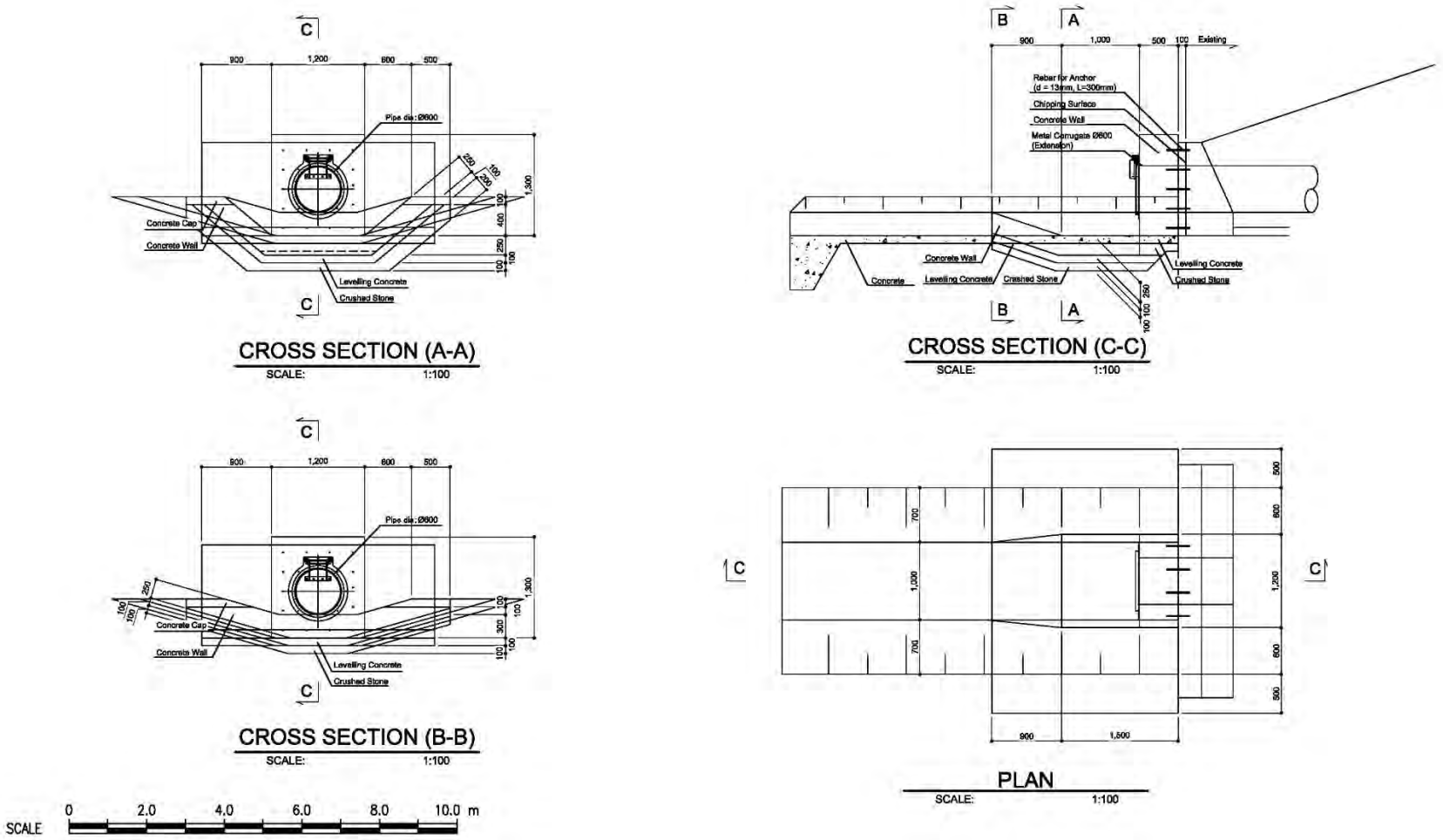


Figure 75 Flap Gate Details （φ600）

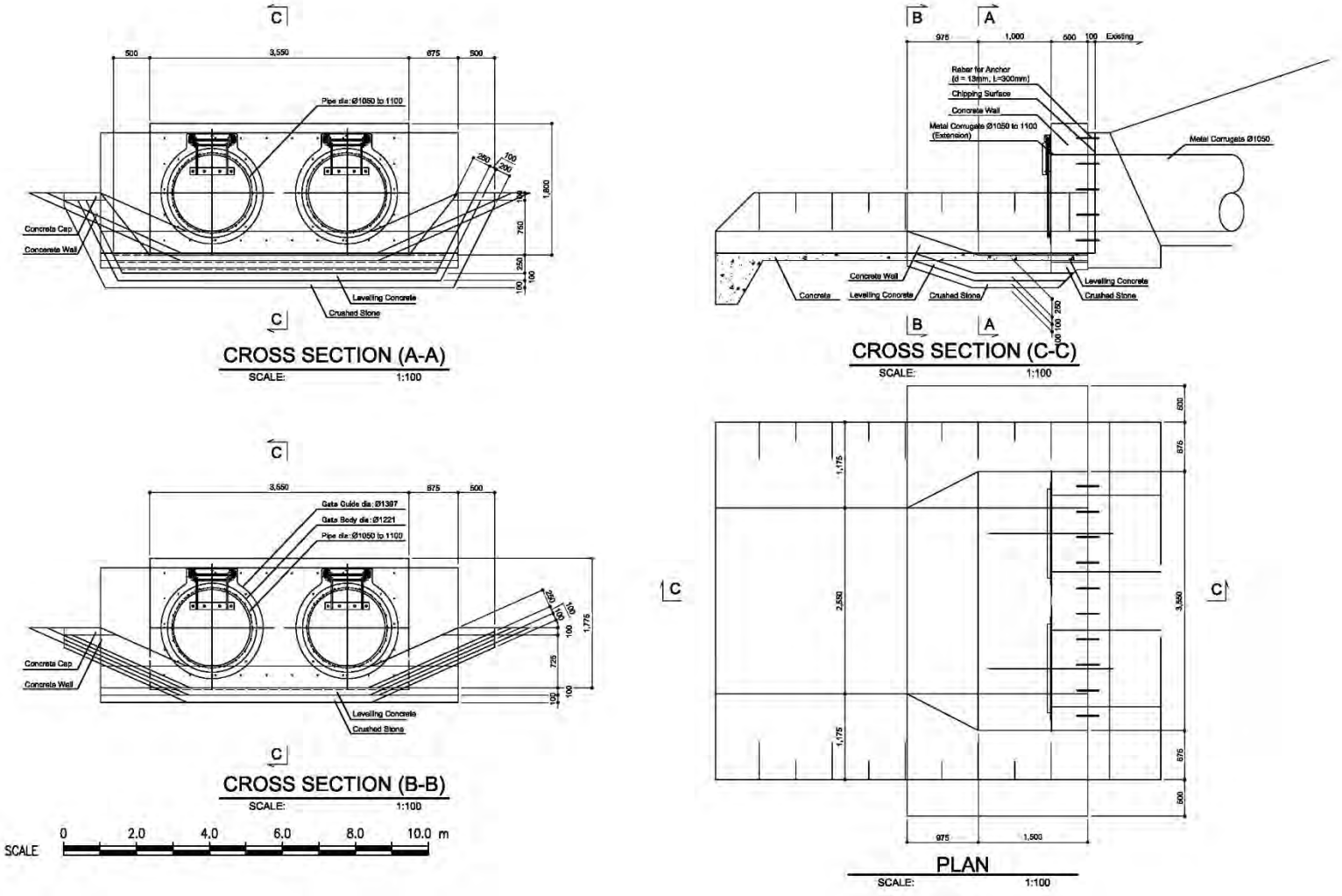


Figure 76 Flap Gate Details （φ1100）

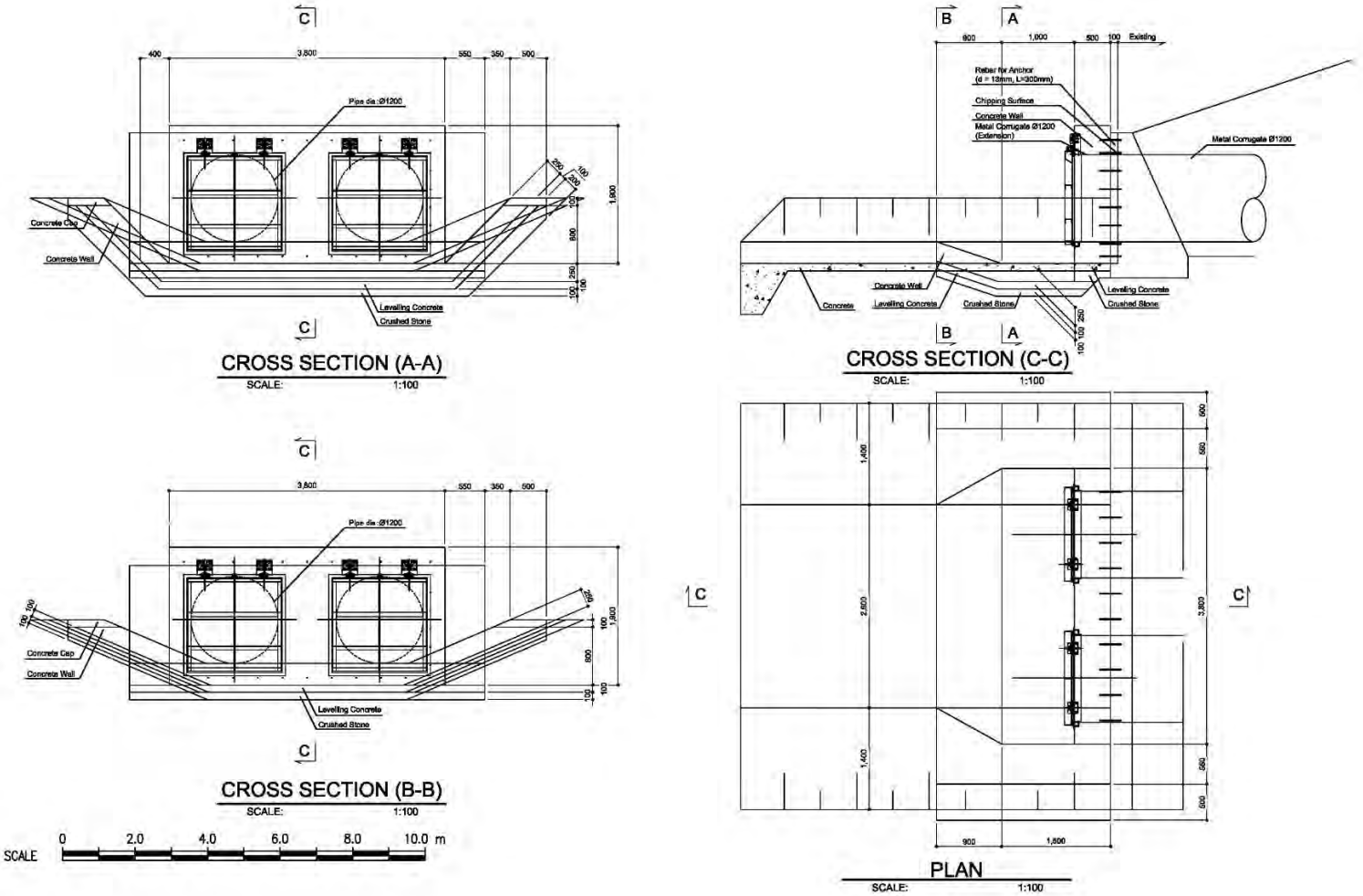
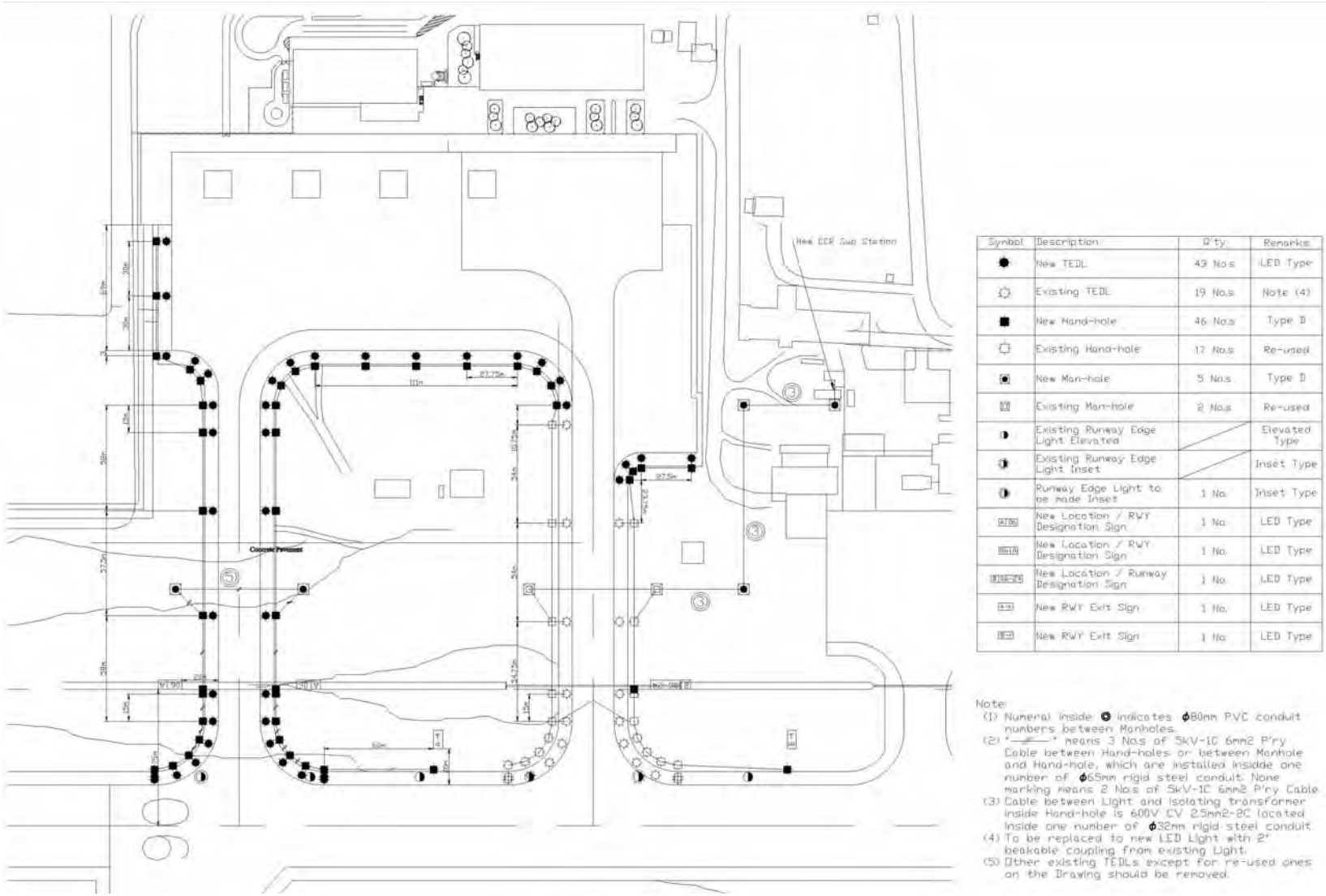


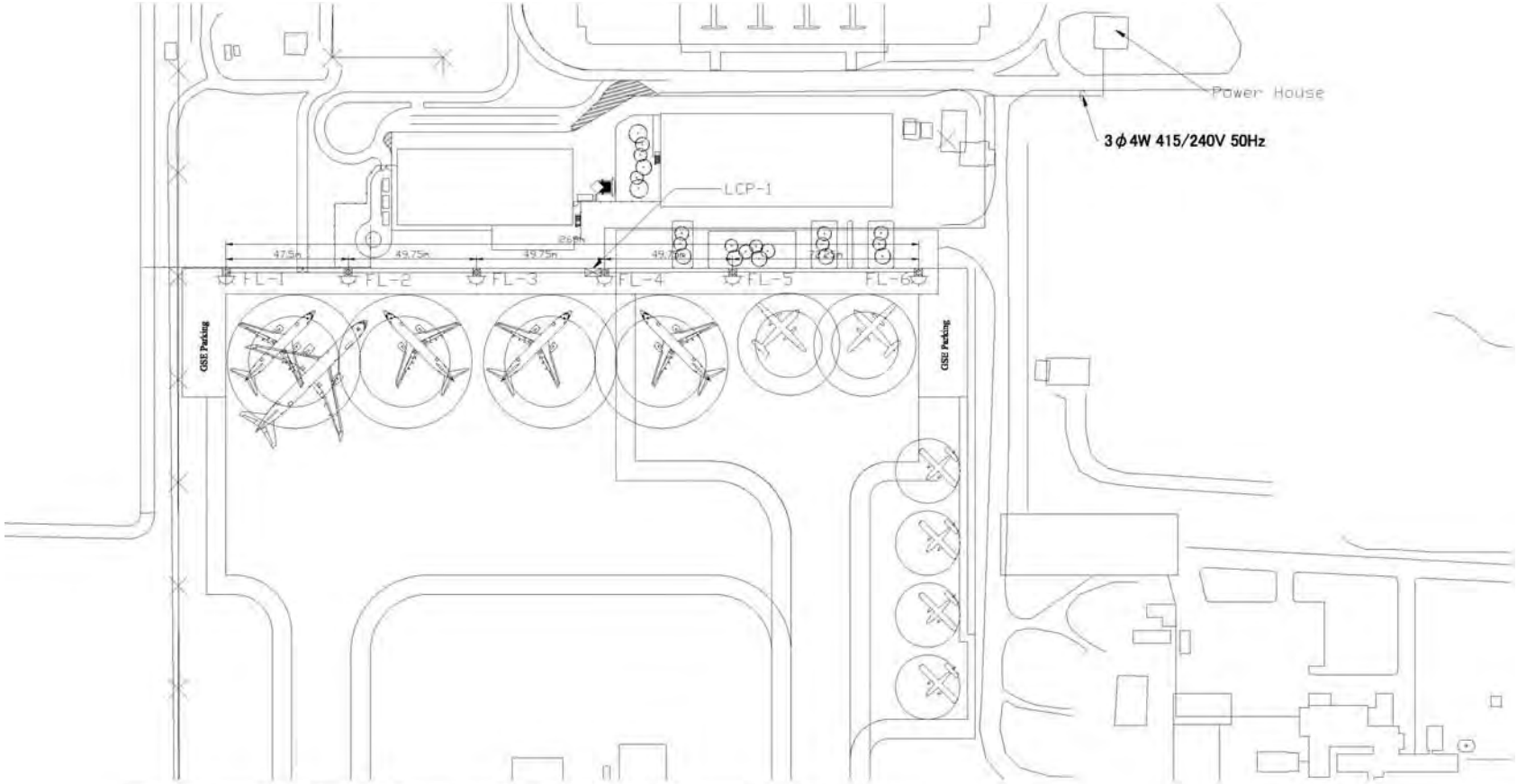
Figure 77 Flap Gate Details （φ1200）



Symbol	Description	Q'ty	Remarks
●	New TEDL	43 Nos	LED Type
☼	Existing TEDL	19 Nos	Note (4)
■	New Hand-hole	46 Nos	Type D
☐	Existing Hand-hole	17 Nos	Re-used
▣	New Man-hole	5 Nos	Type D
▣	Existing Man-hole	2 Nos	Re-used
◑	Existing Runway Edge Light Elevated		Elevated Type
◑	Existing Runway Edge Light Inset		Inset Type
◑	Runway Edge Light to be made Inset	1 No.	Inset Type
01/19	New Location / RWY Designation Sign	1 No.	LED Type
01/19	New Location / RWY Designation Sign	1 No.	LED Type
01/19	New Location / Runway Designation Sign	1 No.	LED Type
←	New RWY Exit Sign	1 No.	LED Type
→	New RWY Exit Sign	1 No.	LED Type

Note:
(1) Numeral inside ● indicates ϕ80mm PVC conduit numbers between Manholes.
(2) "——" means 3 Nos of 5kV-1C 6mm2 P'ry Cable between Hand-holes or between Manhole and Hand-hole, which are installed inside one number of ϕ65mm rigid steel conduit. None marking means 2 Nos of 5kV-1C 6mm2 P'ry Cable.
(3) Cable between Light and Isolating transformer inside Hand-hole is 600V CV 2.5mm2-2C located inside one number of ϕ32mm rigid steel conduit.
(4) To be replaced to new LED Light with 2" breakable coupling from existing Light.
(5) Other existing TEDLs except for re-used ones on the Drawing should be removed.

Figure 78 Airfield Lighting Layout Plan (Taxiways)



Mast No.	Height	Floodlight to be attached	Obstruction Light	Local Control Panel	Branch Panel	Man-hole
FL-1	25m	3Nos	1No.		1No.	1No.
FL-2	25m	5Nos	1No.		1No.	1No.
FL-3	25m	5Nos	1No.		1No.	1No.
FL-4	25m	5Nos	1No.	LPC-1: 1No.	1No.	1No.
FL-5	25m	5Nos	1No.		1No.	1No.
FL-6	25m	3Nos	1No.		1No.	1No.

Note:
(1) New main apron area is 269m in width x 86m in length and sub one is 110m in width x 42m in length as shown in the drawing.

(2) Apron Floodlights are applied for LED type 480W, 220 to 240V or equivalent.

(3) Local Control Panels located near by FL-4 is supplied non-essential power 3 Phase 4 Wire 415/240V 50 Hz from Power House and supply controlled power, single phase 240V to each Branch Panel located inside Floodlight Mast respectively

(4) Local Control Panels should have change-over switch of "Auto", "Manual ON" and "Manual OFF" per Spot Lighting each, General Lighting and Obstruction Light respectively.

Figure 79 Airfield Lighting Layout Plan (Apron)

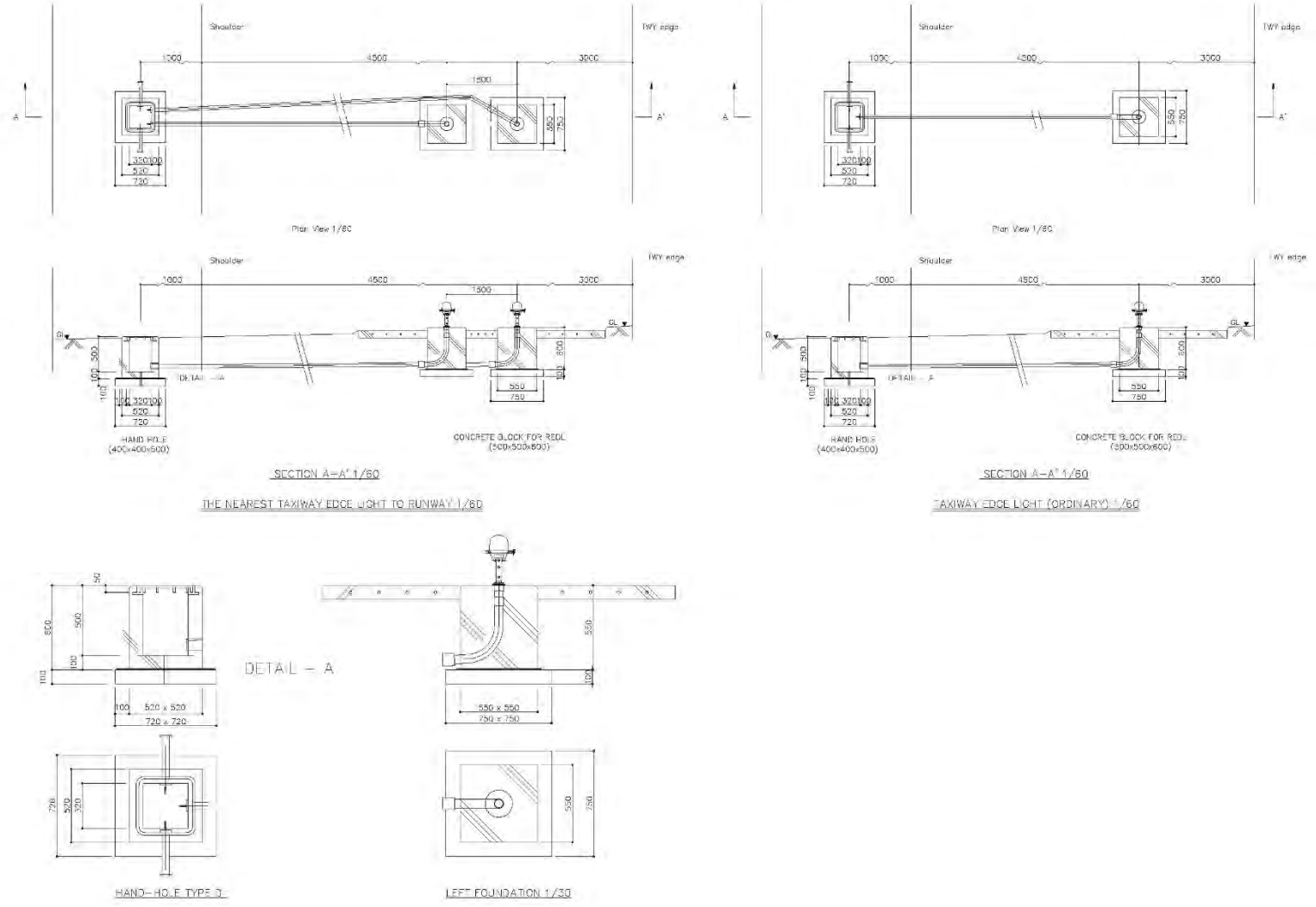
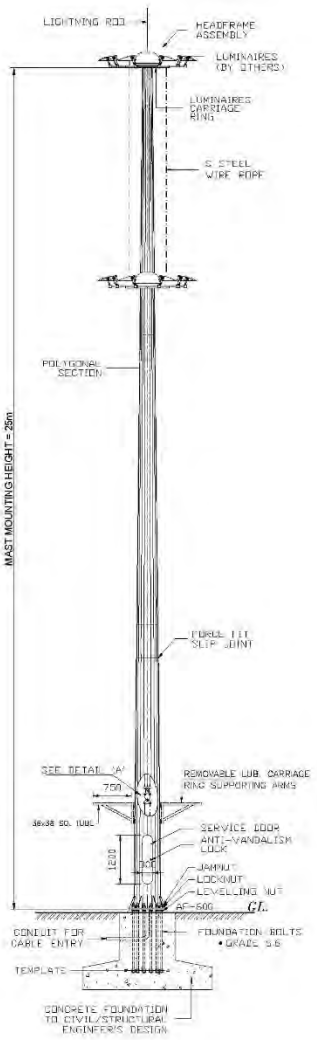
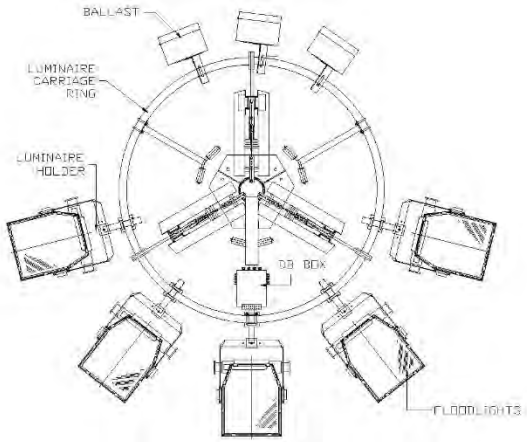


Figure 80 Taxiway Lights Details

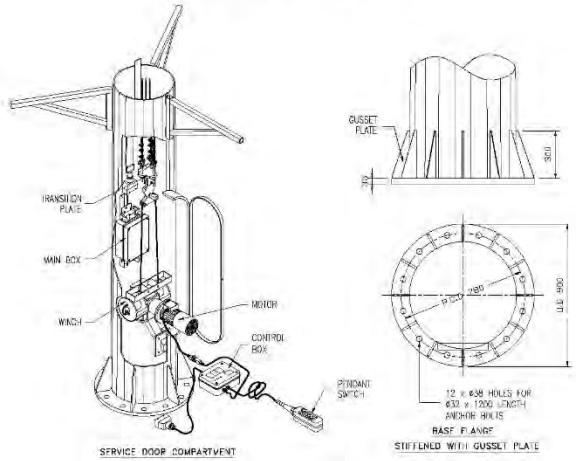


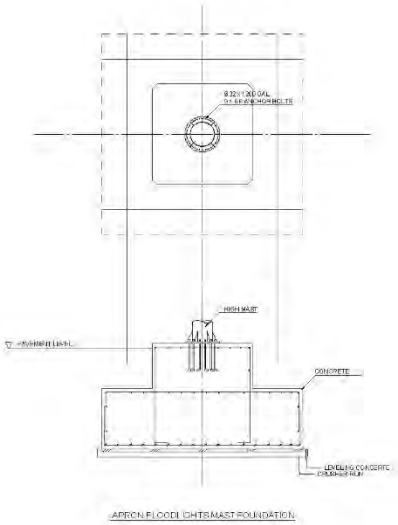


HIGH MUST HEADFRAME
TYPICAL ARRANGEMENT OF LUMINAIRES
5 NOS FLOODLIGHT 180° AIMING

TECHNICAL SPECIFICATION
(1) High Mast Dimension etc.
1) Mounting Height : 25m
2) Cross Section Shape (No of Side) : 20
3) Outer Diameter at Base : 600mm
4) Outer Diameter at top : 180mm
5) Max Total No of Sections : 4
6) Thickness
6.0mm in lowest part 5.0mm to 4.0mm in middle parts, and 4.0mm in top part

(2) Design Conditions
1) Number of Luminaries : 5 Nos
2) Luminaries rating : 480W LED
3) Max Luminaries and Ballast Mass : 400kg
4) Wind Velocity : 35m/s Max





APRON FLOODLIGHTS MAST FOUNDATION

Figure 81 Apron Floodlights Details

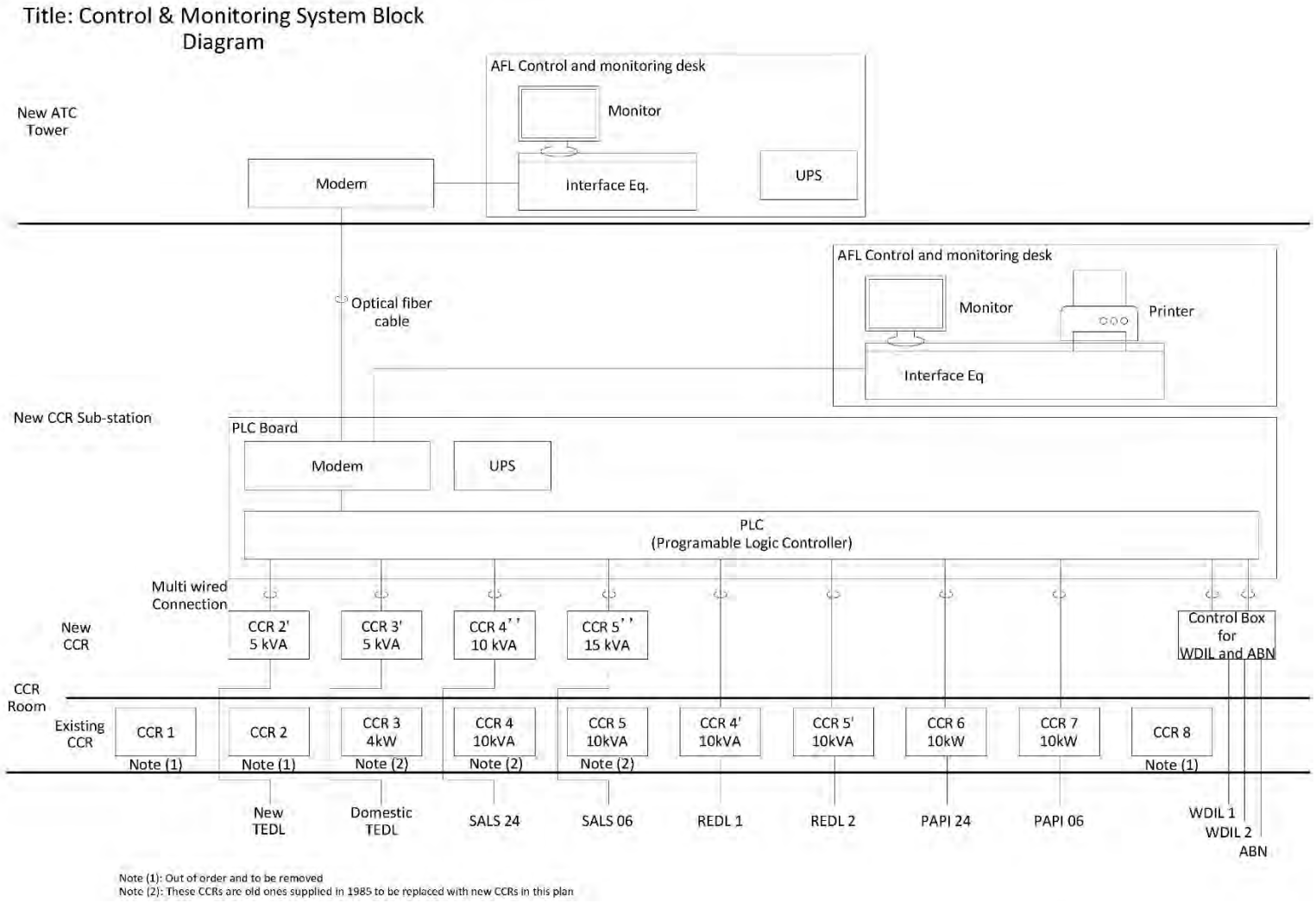


Figure 82 Airfield Lighting System Diagram

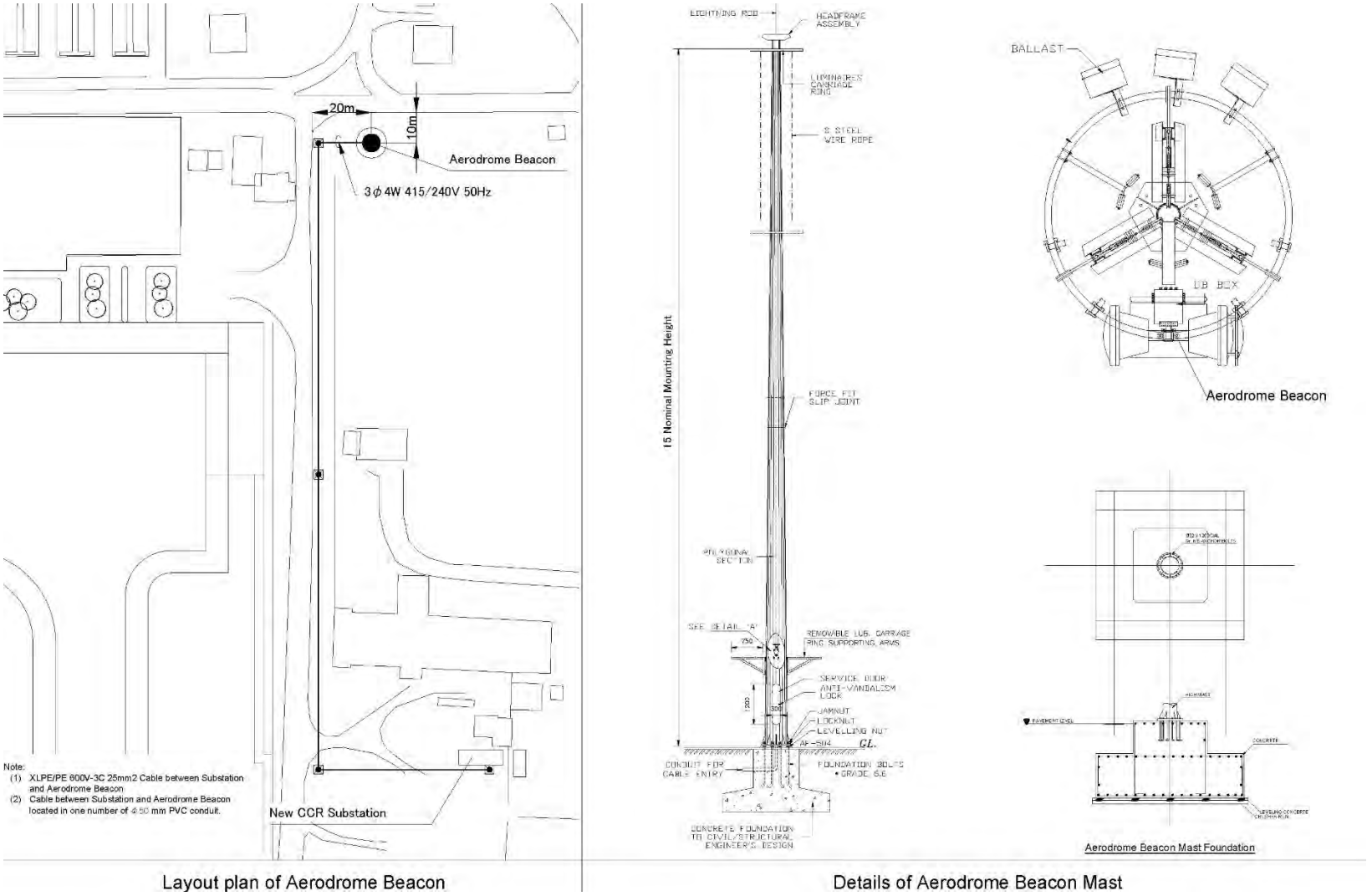


Figure 83 Aerodrome Beacon

2.2.4. Installation Plan

2.2.4.1. Implementation Policy

As Honiara Airport is operational airport, the implementation plan was prepared to minimize effect to the airport operation. Basically the construction work will be started from new buildings and after relocating functions of international departure from ETB to the completed IDT, renovation work of ETB will be started.

The following points were considered on planning the implementation schedule.

- Aircraft movement has priorities to all other vehicle movements
- Permission is required to enter the aircraft operation area (Airside)
- Safety clearance from moving aircraft should be secured.
- Visible wear such as vest, flags and lights should be put on the labors and equipment
- Proper temporary partitions should be installed to separate the passenger flow and construction worker' flow and to prevent scattering of dust during the renovation works.
- On an emergency, all equipment and labors should be moved to outside.

2.2.4.2. Implementation Conditions

The characteristic of this project is that there are no contractors of the scale that will become subcontractors of Japanese construction companies and there are no holders of crushed stone plant, asphalt plant and concrete plant. Therefore, it is necessary to transport these plants from Japan or third countries and install them. Also, there are any rental companies for construction machines, local construction companies own trucks and excavators for their own construction, but in principle they do not lease, so it is necessary for this project Construction machines need to procure most of them from abroad.

2.2.4.3. Scope of Works

Table 51 Work by Japanese Side and Solomon Islands Side

Item	Japanese Side	Solomon Islands Side
Preparation of the project site		Temporary yard in the airport, disposal area, and riverbed site for gravel acquisition
Construction permission	Support to prepare allocation forms	Applicant: MCA Actual Examination: MID Formal Examination: City Council
Environmental Approval		EIA Approval Application
UXO Survey		Temporary Yard and riverbed for gravel
Removal of Obstructions		MCA Office in western side of ETB, deep well, and power cables
Facility construction	- Airfield pavement rehabilitation and expansion - Airfield lighting system Building facilities - Building works - Electrical and mechanical works - Special equipment - Flood protection dike	Relocation of transformer in the airside, power mast, and high voltage power line (Maintenance view points) Removal Replacement of transformer for the passenger buildings Connection of water sully, power supply and communication lines Furniture
Others		NOTAM（Notice to Airmen）

2.2.4.4. Construction supervision plan

(1) Detailed design

1) Detailed design stage

The consultant agreement will be signed at the end of May 2018 and approval of the tender documents will be October 2018. Experienced persons for detailed design work of grand aid projects will be allocated including chief consultant and others. Site survey will be 0.5 months and design work and cost estimates in Japan will be 4.0 months.

2) Assistance in tendering stage (No.1)

Preparation of tender documents will be 0.5 months. After completion of the documents, the chief consultant, the architect and the civil engineer will come to Solomon Islands to explain the contents for 0.5 months.

3) Assistance in trending stage (NO.2)

Documents for pre-qualification to participate the tender will be prepared and published, the submitted documents will be evaluated and tender documents will be distributed to the qualified tenderer. Answers to the questions from tenderer will be prepared and tender opening ceremony will be organized. After submission of the tender, the submitted documents will be evaluated. The duration from distribution of the tender documents to tender opening will be 60 days and the chief consultant, architect and civil engineer will participate the works. Tender opening ceremony will be in Japan. Two officials from the Client will participate the tender opening ceremony. The contract with the contractor will be signed in Japan after the ceremony.

(2) Construction supervision

Two resident engineers, one for building and the other for civil works will be assigned. Other engineers will participate the works such as kick off meeting, intermediate test, acceptance test, etc.

The chief consultant will participate quality assurance meetings, which will held for 0.3 months (5 days on site and 4 days for travel) every 6 months.

After 12 months of completion of the project, final test before expiring of defect liability period will be carried out for both civil works and building works.

Along with the progress of the construction, local engineers will be employed; an office administrator, drivers and office manager will also be employed.

2.2.4.5. Quality control plan

The following table summarized item, test methods and frequency of tests.

Table 52 Quality Control Items

Items	Test Item	Test Methods/ Frequency
- Earth works		
Embankment	Density Test	One test in every 500m^3
- Pavement Works		
Base Course	Field density test	One test in every 1,000m^3
	Compaction, uniaxial test	One test in every 1,000m^3

	Bearing strength	Proof rolling test
Asphalt Course	Aggregate wear test	Los Angeles wearing test: One test in every 1,500m^3
	Temperature	After Plant, Spread, and compaction (5 times/ day)
- Concrete Works		
Cement	Cement property test	Before test mix, 1 test per 500 m^3 in every batch and when change mix
Aggregate	Physical property test	1 test before trial mix, 1 test in every 500 m^3
	Sieve analysis	Once a month
Water	Water quality test	1 test before trial mix
Concrete	Slump test	After unlading once a day
	Air content test	After unlading once a day
	Compressive strength test	6 samples on each batch (7days strength: 3 and 28 days strength: 3)
	Salinity concentration test	Twice every other day
- Steel bars	Tensile strength	Mill sheet
	Bar layout test	Before concrete pore and after steel bars layout
- Steel Structure		
Steel material	Material test	Mill sheet
High tension bolt	Material test	Mill sheet
- Pluming works		
Water pipes	Water pressure	Each route on piping finish
Drainage pipes	Full water test	Each route on piping finish

2.2.4.6. Procurement plan

(1) Concrete

Since the following manufacture of concrete in Solomon Islands doesn't meet requirement in terms of quality control and production capacity, concrete produced by the manufacture cannot be used for the project.

Douglas Concrete (Largest concrete producer)

- Maximum Production Capacity： 20m^3/h At reality level 17m^3/h
- Production Equipment： 17 years old Australian made
- Computer System： None (Manual measurements)
- Quality test laboratory： None
- Others: No experience of Japanese ODA Project

Photo 65 Concrete plant of Douglass Concrete

(2) Cement

Cement produced in Papua New Guinea (PNG) is widely used and available in local market and its supply quantity seems no problem. In terms of quality, there is no problem and can be used for the project because the cement is used by several project including Japanese ODA project.

Photo 66 Storage Condition of Cement

Photo 67 Cement from PNG

(3) Steel Bars

Steel bars from Australia is widely available in the local market. The study team requested unit price of ton's of steel bars to the local contractor. Unit price of a bar is provided, it was found that fluctuation of price by size of bar is large after converting the bar price into ton.

It was also found that as quantity in the market of large diameter steel bars are limited the price is high. To consider these situation, it was planned to procure steel bars from Japan.

Photo 68 Locally Avilable Ateel Bars

(4) Asphalt (mixture)

There is no company who produce and sell hot mix asphalt concrete so that it is planned to prepare asphalt mixing plant on site to produce hot mix asphalt for the project.

(5) Aggregate

There is no other way to obtain large quantity of aggregate in reasonable price that excavate stones from riverbed and crush the stone by a crushing plant. This methods has been used by all Japanese Grant Aid in past.

The right to excavate stones from riverbed is very completed in each site and it often takes time for the Government of Solomon Islands to discuss and make a contract with stakeholders. Further, stones become short of supply and there is a risk to be a problem in terms of quantity and quality.

There are 4 possible sites for obtaining gravel. Because possibility to use Tamboko river is high as the river is used by current on-going project, it is planned to the river for the project.

It is necessary to produce aggregate for 23 months along with civil works, produced aggregate will be stored on site for first 2 months and after that it will be used for the construction. The maximum volume for storage is estimated as 6,500 m^3, and approximately 2,000 m^2 area will be required for storage.

Table 53 Major Riverbed for Stones close to Honiara Airport

Location	Photograph	Situation
Tamboko River		The river is located approximately 31.5 km east from the airport and it takes approximately 70 minutes, depends on traffic congestion. The river is used for the Project for Upgrading of Kukum Highway (By November 2018)
Poha River		The river is located approximately 19.6km east from the airport. It takes approximately 45 minutes depends on the traffic congestion. The river is initially used by the Honiara Port Project but because of additional requirements by the owner, it was changed to Tamboko River.
Lungga River		The river is located approximately 2.2km east from the airport and it takes approximately 10 minutes. The river is used by past airport grant aid project.
Ngalimbiu River		The river is located approximately 16km southeast from the airport. It takes approximately 30 minutes. The river was used by 3 bridge replacement project in the east area by Japanese Grant Aid from 2007 to 2008.

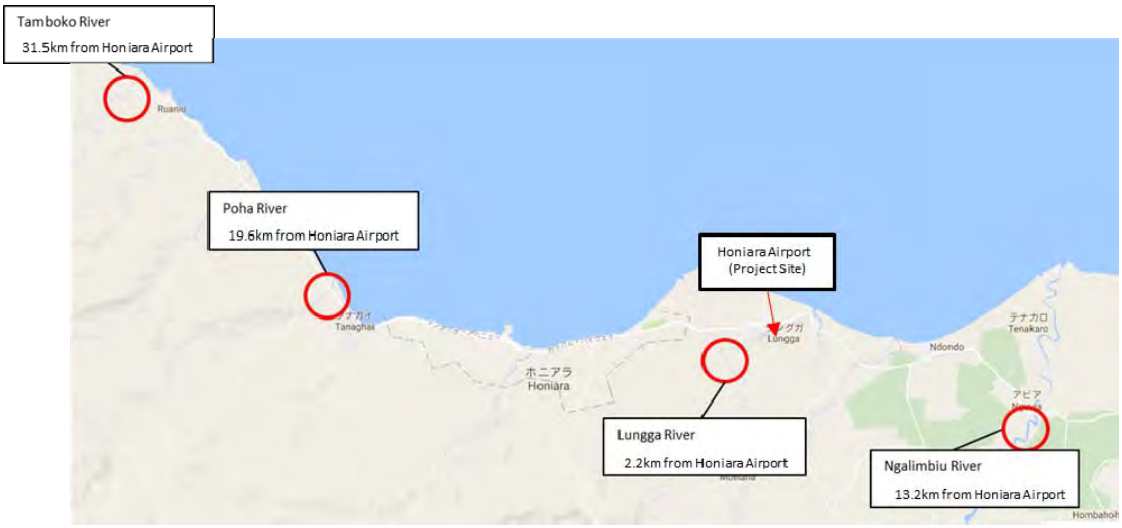


Figure 84 Candidate Location of Riverbed for Stone

(6) Steel Structure

There is only steel structure producer who can perfume simple process and it cannot meet accuracy and quality of the project so that it was planned to procure from Japan.

(7) Other Construction Materials (Building, electrical and mechanical systems)

There are shops selling construction materials mainly target to general residential houses and materials from Australia and New Zealand are available. However, supply system and prices are issues. According to interview survey, other than cement and part of electrical system material such as cables and pipes, which can confirm that the supply is stable and local unit prices are obtained, most of construction materials will be purchased from Japan.

Photo 69 Sanitary from Australia

Photo 70 Pipes

(8) Special Equipment

The following special equipment will be procured from the third countries. There is no local importer for these equipment so that a local agent, which can conduct repair even after the expire of the guarantee period, will be selected and imported from the third country.

- Baggage Handling System: Malaysia
- Security Equipment: Malaysia

Local staffs can perform maintenance and simple repair works of the equipment after receiving proper maintenance training by the manufacture, which will be conducted after installation. It was confirmed that airport staff carried out maintenance and simple repair work of existing special equipment.

The manufacture and the type of airport security equipment was selected based on the request from the client.

1) Major source of construction material (Building works)

Table 54 Major Source of Construction Material

Material	Local	Japan	Third Country	Remarks
Temporary material (Scaffoldings)		○		
Hot mix asphalt	○			Local production
Concrete mix	○			Local production
Aggregate	○			Local production
Cement	○			
Steel bars		○		
Formworks		○		
Steel structure		○		
Finishing materials		○		
Electrical and mechanical equipment	○	○		
BHS			○	
Security equipment			○	
Fuel	○			
Airfield Lighting System		○	○	

2.2.4.7. Operation Guidance Plan

(1) FIDS

There is no FIDS in Honiara Airport so that it is necessary to conduct initial operation training regarding general operation method such as how to input and update information and trouble shootings.

(2) BHS

There are one BHS for departure hold baggage behind check-in counter to the behind of the building and one BHS for arrival hold baggage in L shape configuration in the baggage claim area in ETB. The conditions of these BHSs are good and operated normally. It is necessary to conduct initial operation training for general operation method such as daily maintenance and cleaning and trouble shooting by a instructor from the manufacture because the manufacture of the new BHS behind the check-in counter of ITB.

(3) Security Equipment

New security equipment (X-ray machine and metal detector) will be procured by the project will be higher performance as compared with the existing security equipment in Honiara Airport. Especially, X-ray machine in IDT will be high performance dual view system so that number of parts and inspection procedure is more that that of ordinal one. In this regards, it is necessary to conduct initial operation training for daily maintenance and cleaning and trouble shooting by an instructor from the manufacture after completion of installation in IDT.

(4) Airfield Lighting System

Air traffic controller from the control tower in Honiara Airport operates airfield lighting system. Since the existing control system is integrated into the control desk, it is difficult to renew. New control and monitoring system will be installed. The system is changed from ordinal electrical signal to control system by network type and also will be changed to human interface so that it is necessary to conduct training to air traffic controllers and electrical engineers who will maintain the system. On the job training will be conducted during site test and site acceptance test by an instructor from the manufacture.

Item, contents and trainees of technical trainings are shown in the table below.

Table 55 Technical Training Items

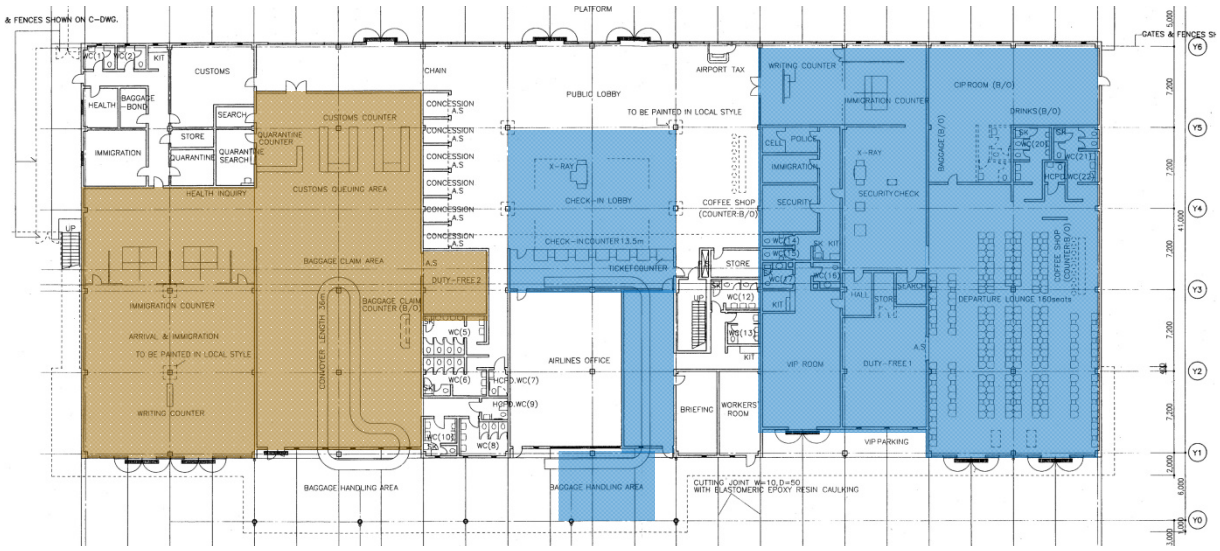
Items	Contents	Duration	Trainee
FIDS	Operation of FIDS (Class room)	2 days	MCA（SIACL） 5 people
BHS	Operation of BHS (Site) How to change consumables and trouble shooting (Site)	7 days	MCA（SIACL） 4 people
Security Equipment	Operation of security equipment (site) Trouble shootings (Site)	2 days	MCA（SIACL） 10 people
Airfield Lighting System	Management of airfield lighting system (Class room) Trouble shootings (Site)	2 days	Air traffic controllers and electrical engineer 10 people

2.2.4.8. Implementation Schedule

(1) Construction Sequences

1) Passenger Terminal Building

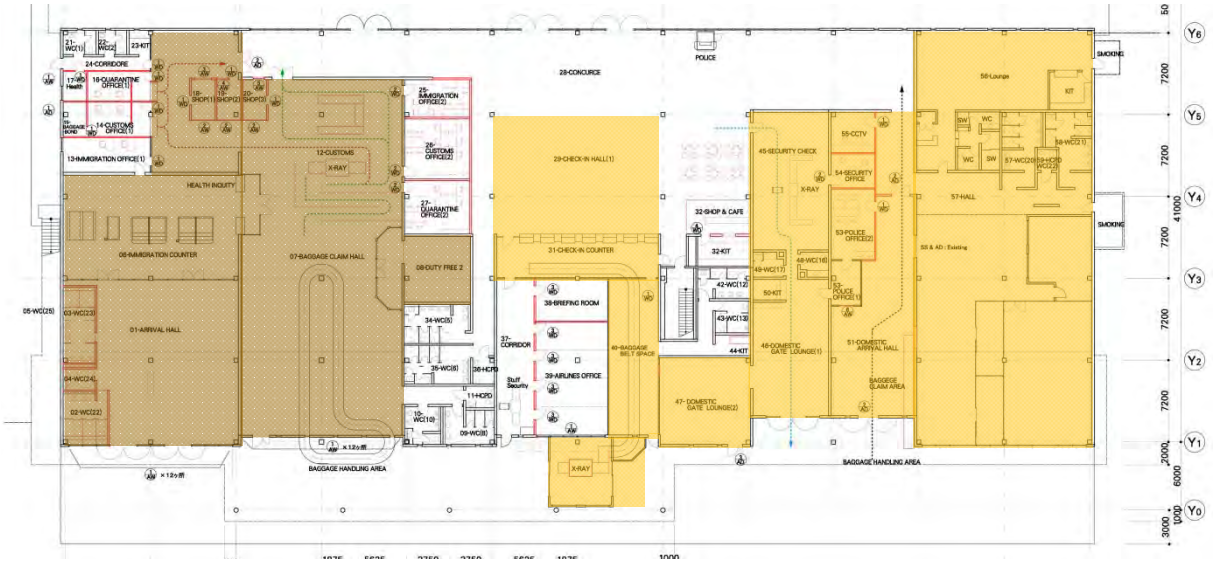
The ETB has functions, international departure and international arrival. After construction of IDT, which has international departure function, the international departure function area in ETB will be changed to domestic departure and domestic arrival area. The existing function of ETB is shown in the figure below.



: International Departure : International Arrival

Figure 85 Existing function of ETB

The figure below shows function area after rehabilitation.



: Domestic area : International arrival

Figure 86 ETB Layout Plan after Renovation

There is no change of function in international arrival area so that rehabilitation work will be conducted in parallel with construction of IDT.

Renovation of international departure area to the domestic area will be conducted after

completion of construction of IDT and function of international departure is completely moved to IDT.

Rehabilitation of the area of public lobby and management area, which is not colored in the above figure, will be conducted properly to consider shortening the construction period.

Phasing plan of ETB rehabilitation is shown in the figure below.

Phase1

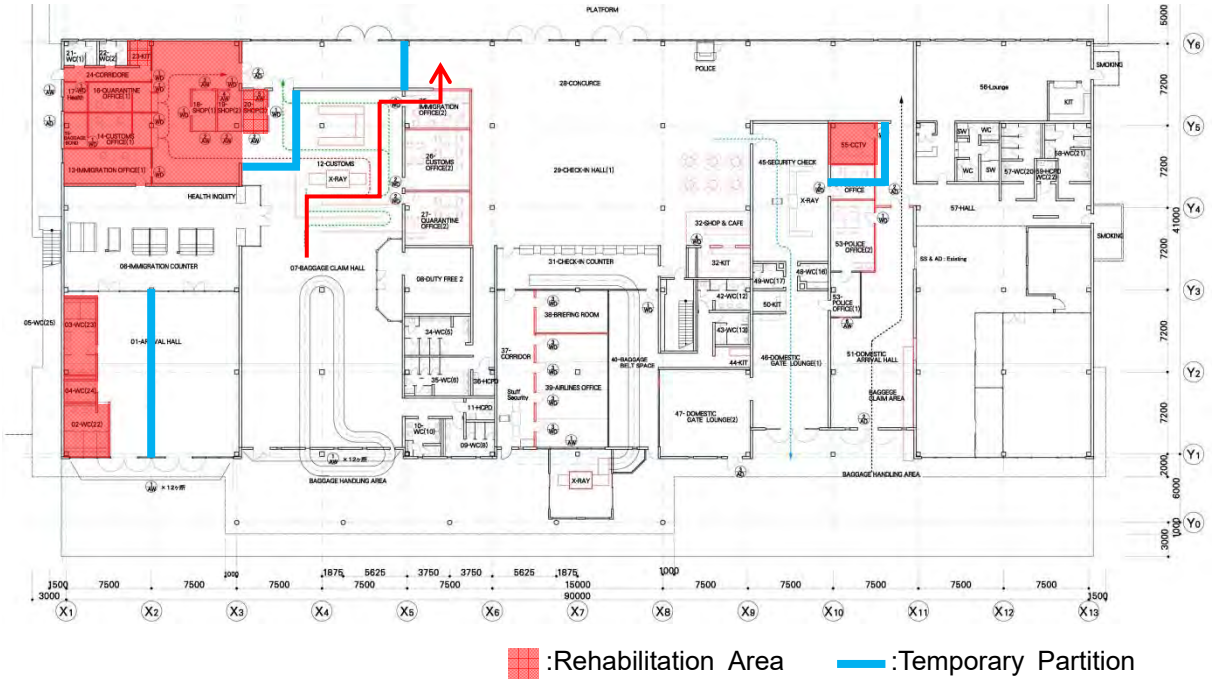


Figure 87 ETB Rehabilitation Sequence (Phase 1)

CCTV installed in the project will be managed at CCTV (X10/Y6) room in ETB so that this room will be rehabilitated earlier than others.

There is no toilet for international arrival passengers in immigration, baggage claim area and customs area, the new toilet in the arrival hall (X1/Y1) will be constructed in early stage for convenience of passengers.

The rehabilitation of operation area (X1-3/Y4-6) will be carried out by changing part of international arrival passenger flow with temporary partitions.

Phase2

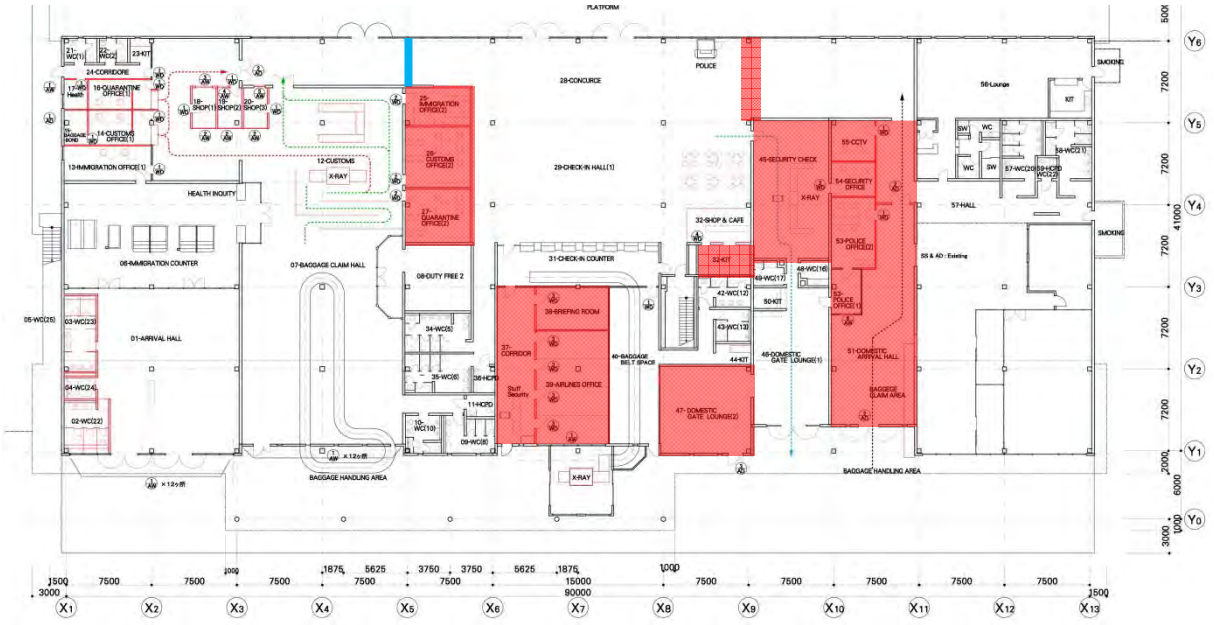


Figure 88 ETB Rehabilitation Sequence (Phase 2)

After international departure function is moved to IDT completely, renovation work to convert X5-11 area to the domestic function will be carried out.

2) Other facilities

There is no restriction of construction sequence of other buildings except terminal building, IDT and ETB.

Rehabilitation of SUB and construction of UB are planned to implement to avoid lapping with other construction works requires construction equipment, such as civil work, concrete work and steel work.

3) Construction sequence of civil works

To prevent influence to airport operation, the apron and the taxiways will be constructed in a sequence shown below.

Construction of crushing plant, asphalt plant and concrete plant

Phase 1 Works (Expansion of the eastern apron and the new taxiway)

a) Removal works (Shoulder pavement)
b) Earth works (Excavation and embankment at flood protection dike)
c) Concrete pavement works
d) Asphalt pavement works
e) Storm water drainage works
f) Airfield lighting works
g) Markings
h) Flood protection dike construction

After completion of the Phase 1 works, the works will be tested and aircraft operation will be switched.

Phase 2 Works (Eastern apron expansion and rehabilitation of the existing pavements)

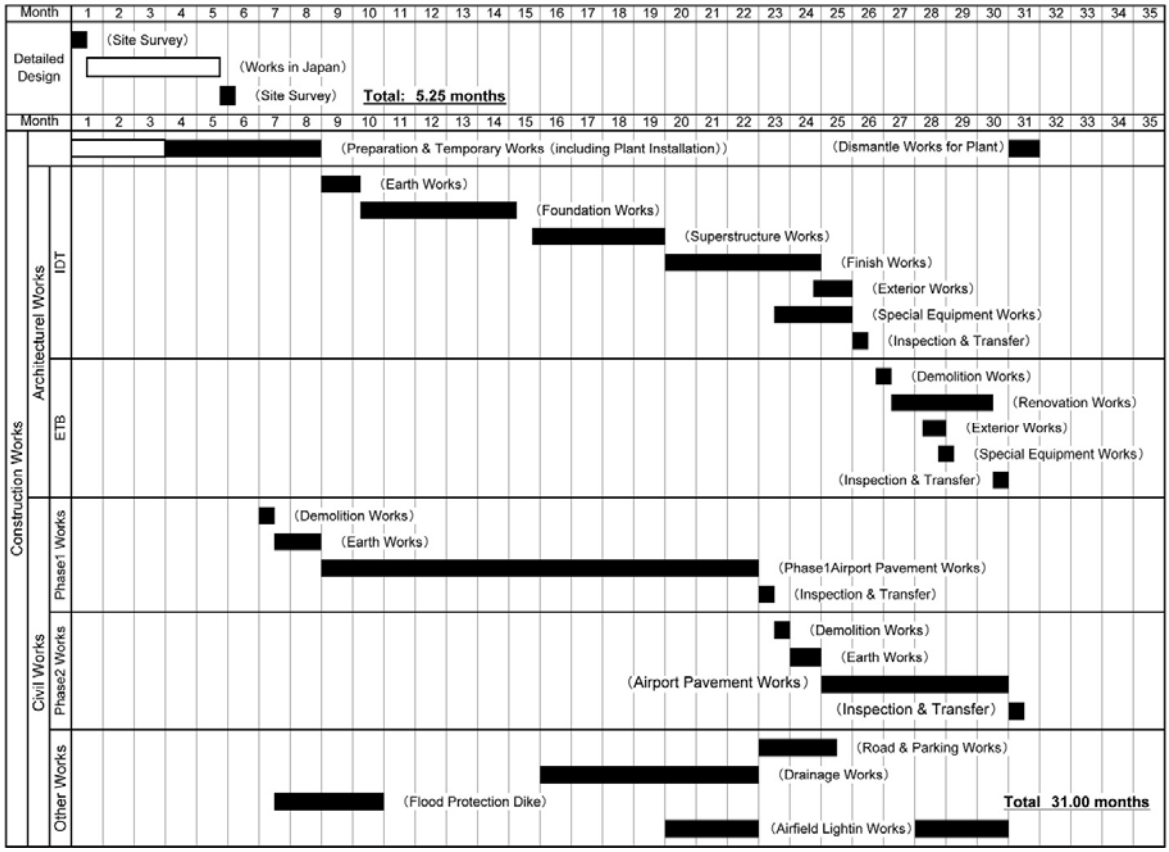
a) Removal works (Shoulder pavement)
b) Earth works (Excavation and embankment at flood protection dike)
c) Concrete pavement works
d) Asphalt pavement works
e) Storm water drainage works
f) Airfield lighting works
g) Markings

After completion of the Phase 2 works the area will be handed over.

(2) Implementation Schedule

Implementation schedule by Japanese Side is shown in the table below.

Table 56 Implementation Schedule



2.2.4.9. Tax Exemption Information

Information regarding tax, tax exemption and conditions to obtain tax exemption are described below.

(1) Corporate Tax

It is obliged to pay corporate tax in Solomon Islands. Rate of corporate tax for local company is 30% of profit and that for foreign company is 35%. However, corporate tax is exempted for foreign companies, which work for foreign donor and international organizations.

The contractor of the project has to submit an application, which proves the company is working for the project, to the tax office (Tax exemption committee). The application varies for a year and the contractor has to submit the application every year.

The sub contractor's corporate tax is not subjected to tax exemption and the local contractor has

to pay the tax, in case if the main contractor makes a contract to the local company.

(2) Withhold Income Tax

Withhold income tax of 10% is applied to both local and foreign companies. The employer has to withhold 10% of the salary and rest is paid to the employee.

Withhold tax is exempted to foreign companies, which work for foreign donor and international organizations. The procedure to benefit the tax exemption is as same as the corporate tax. As same as the corporate tax, the sub-contractor is not exempted from withhold tax.

(3) Personal Income Tax

Rate of personal income tax in Solomon Islands is summarized in the table below. Personal income tax is exempted to foreign companies, which work for foreign donor and international organizations.

The procedure to benefit the tax emption is as same as the corporate tax and withholds income tax. The contractor of the project has to submit an application, which proves the company is working for the project, to the tax office (Tax exemption committee). The application varies for a year and the contractor has to submit the application every year.

The employee of the sub-contractor is not subjected to tax exemption of personal income tax and the sub-contractor has to pay the tax as shown in the table below.

Table 57 Personal Income Tax Ratios

Annual Income（SBD）	Tax Ratio (%)
1~15,000	11
15,001~30,000	23
30,001~60,000	35
60,001~	40
* SBD15,080 per annum is subjected to tax exemption	

(4) Indirect Tax

1) Goods TAX

Goods Tax is imposed to import and purchase of goods. The tax ratio for products made in Solomon Islands is 10% and that of imported goods is 15%.

To benefit the exemption of Goods Tax, the contractor has to submit an application with a list of import goods and support letter from MCA to the tax office (Tax exemption committee). It took a few months to approve the application in case of past projects. The application varies for a year and the contractor has to submit the application every year.

2) Sales TAX

Sales Tax is imposed to purchase of special goods and services. The target of the Sales Tax includes communication fee, public transport fee, vehicle lease fee, petroleum fee, etc. The ratio of the tax is different but mainly 10%.

It is necessary to submit a application with a list of goods and services for the project and support letter from MCA to the tax office (Tax exemption committee) to benefit the exemption of Sales Tax. As same as the Goods Tax, it takes a few months to obtain approval of tax exemption. The application varies for a year and the contractor has to submit the application every year.

(5) Import Tax

Import tax of 10% is imposed to all imported goods in Solomon Islands, however the tax is exempted for the project.

It is necessary to submit a application with a list of import goods and support letter from MCA to customs office. It takes a few months to obtain approval of the tax exemption.

2.3. Obligations of Recipient Country

The Government of the Solomon Islands will be responsible to undertake the following items which are relevant for the implementation of this Project.

2.3.1. General Items

- To provide data and information necessary for the implementation of the project;
- To secure land necessary for the project;
- To open a bank account in Japan under the name of the Government of the Solomon Islands and to issue the Authorization to Pay (A/P);
- To ensure swift unloading of cargo, tax exemption, and smooth customs clearance;
- To allow entry and residency permits for Japanese nationals under verified contracts;
- To exempt Japanese nationals and entities engaged in this project from any taxes in the Solomon Islands under the verified contracts;
- To ensure a smooth start and proper use after the project completion, and organize an effective management system to facilitate sound operation, and secure necessary funds for appropriate operation and maintenance;
- To bear all expenses other than those covered by the Japanese Grant Aid necessary for this Project.

2.3.2. Specific Items

- To coordinate with concerned organizations relevant to airport operation;
- To issue various permits, such as entry permission, for all workers involved in the construction work;
- To divert or relocate sewage and drain pipes within the construction area and to prepare temporary diversion channels;
- To have trunk line facilities strengthened by SIEA;
- To remove the existing equipment in the substation and to install a transformer;
- To relocate the transformer, utility poles, overhead pipes from the airside to the public road located in the north;

- To remove the existing structures and facilities: structures (MCA office on the west side of the existing passenger terminal building, water well, catering service facility), utility poles and cables;
- To secure land for disposing tree and wood waste from airport staff housing;
- To secure temporary worksite;
- To select the quarry site and sign a contract for crushed stone production;
- To remove unexploded bombs prior to construction;
- To acquire a construction permit for the project;
- To approve EIA report.

2.3.3. Provision of Land for Extension of Building

There are utility poles, a prefabricated hut, and a catering service building within the planned construction site. A small prefabricated hut as shown below is used by MCA and serves as the office for maintaining the facilities, which is built within the land planned for the international terminal building. The removal of these facilities will be carried out under the scope of the Government of the Solomon Islands prior to the commencement of construction by the Japanese side.

Photo 71 A Prefabricated Hut within the Terminal Area

2.3.4. Selection of Quarry Site and Contract for Crushed Stone Production

Due to the production capacity and pricing level, crushed stones are difficult to be obtained within the Guadalcanal Island where Honiara Airport is located. Even for the past grant aid projects and other projects for road and port construction, contractors have been responsible for preparing crushed stones.

Procurement of raw materials for producing crushed stones is limited to excavating and transporting from riverbeds. In the Solomon Islands, such land and area are usually privately owned, and with the complex land rights system, it will be difficult for the contractor to arrange an agreement with the landowner. In past projects, the government agency has been responsible for negotiating with the landowners and signing a contract prior to the construction, but such process has usually been time-consuming.

Therefore, it will be necessary for the Government of the Solomon Islands to determine the site for quarrying and have a signed contract for extracting crushed stones ready before the bidding process begins.

2.3.5. Disposal of Unexploded Bombs

The construction site and its surroundings were once subject to intense battles during WWII, and there remain many of unexploded bombs which are left untouched. According to the local requirements, a survey must be conducted to investigate unexploded bombs prior to the execution of the construction works and to assure the safety of the site. If in case an unexploded bomb is detected, it will be handled by the police. It was confirmed that the airport terminal area had been surveyed by the Regional Assistance Mission to Solomon Islands (RAMSI) in 2003 and unexploded bombs have already been removed from the area. In any case, wherever decided, the quarry site needs to be surveyed before the construction.

Figure 89 A View of RAMSI Camp in Honiara Airport in 2003

2.3.6. Temporary Work Site

Based on the discussion with the airport operators and relevant entities, construction of temporary field office, stockyards for construction materials and heavy equipment, plant sites will be planned on the west of the terminal area. Since this area had been used as temporary works site for past projects, water and electricity can be easily drawn and supplied, and moreover, the risk of finding unexploded bomb is low. However, a temporary road from the national highway to the temporary work site, which is approximately 500 meters, needs to be built at the site.

The facilities which require temporary construction works are as follows:

- Contractor's office, consultant's office, testing laboratory, warehouse, temporary accommodation for laborers;
- Electric power and water systems, waste disposal site;
- Stockyards for construction materials and machinery;
- Production plants for crushed stones, concrete, asphalt;
- Parking area, access aisle, and others.

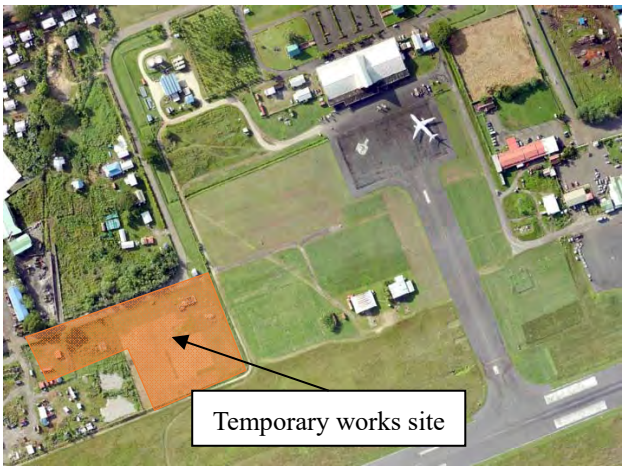


Figure 90 Proposed Area for Temporary Work

2.3.7. Waste Disposal Site

General wastes can be transported and disposed at the Ranadi Dumping Area in Honiara City, free of charge since it is under ODA. Also, disposal sites for other wastes, such as construction debris, fragments of crushed concrete, will be designated by the client. At present, the reclaimed land adjacent to the work site will most likely become the dump site for those wastes, but it will be finalized by the client before the construction begins.

2.4. Project Operation Plan

MCA is the executing agency for this project. And after its completion, SIACL, a state-owned enterprise newly established, will take over manage operation and maintenance of Honiara Airport from MCA.

2.4.1. Operation and Maintenance of Passenger Terminal Buildings

The many equipment to be installed in the terminal buildings, hold baggage X-ray inspection system, carry-on baggage X-ray inspection system, walk-through metal detection system, and other security equipment will be maintained by SIACL. To ensure appropriate maintenance of these equipment, initial operation and maintenance training will be provided by each manufacturer at the time of installation.

Daily cleaning, thorough inspection, proper servicing, and repair of damaged and dilapidated places are essential means for long-term usage and maintenance of buildings. As MCA is

currently managing the terminal buildings in good condition, no technical issue can be found in their daily cleanup and inspection methods. However, since the floor area will expand through this project, with an increase of approximately 3,400 m2, more staff will be necessary to clean and maintain the whole area of about 7,700 m2, which will be 1.8 times of the current size. Moreover, an additional budget for maintaining various equipment needs to be secured as the number of equipment, such as baggage claim belt and X-ray inspection systems, will increase under this project.

2.4.2. Operation and Maintenance of Airfield Pavements

As for the airport pavement, there are no equipment nor engineer is available to carry out maintenance and repair works on the pavements. If any repair work is required, MPW will deploy an engineer to MCA to provide technical support and outsource to local agents. Instead of relying on the current system, assistance to enable MCA to develop the necessary technical capacity for maintenance, to manage simple repair works without depending on others, and to outsource such services with ease is needed.

MCA is also responsible for the operation and maintenance of the airfield lighting, but the present maintenance condition is extremely poor/deplorable. Routine inspection and daily cleanup are critical to keeping the airfield lighting in the right conditions, and thus such technical assistance for MCA is necessary. Such technical support for MCA will be provided by the Government of New Zealand which is also assisting the establishment of SIACL.

Also, the World Bank is considering implementing capacity development related to airport operation (air traffic control, fire rescue, security, etc) in SIRAP.

Thanks to these planned capacity development, SIACL is expected to be able to properly implement the operation and maintenance work of Honiara Airport.

2.5. Project Cost Estimation

2.5.1. Initial Cost Estimation

The total project cost was estimated based on the conditions described below. However, this amount is not equivalent to the amount of the grant specified in the Exchange of Notes (E/N).

Basis of Cost Estimate

Exchange rate (as of June 2017)

- 1 USD = 112.84 Japanese Yen
- 1 SBD = 14.21 Japanese Yen

2.5.2. Cost to be Borne by the Government of the Solomon Islands

The estimated cost to be borne by the Government of Solomon is described in the following table. Since the amount is approximately 13 percent of the total annual budget of MCA, and thus the cost shall be borne by the Government of the Solomon Islands.

Table 58 Cost Borne by the Government of the Solomon Islands

Item	Cost (Thousand SBD)
Removal Cost	704 (approximately 10 million JPY)
Survey of Unexploded Bombs	744 (approximately 10.6 million JPY)
SIEA Construction Works	1,850 (approximately 26.3 million JPY)
Bank Commission	296 (approximately 4.2 million JPY)
Total	3,594 (approximately 51.1 mill JPY)

2.5.3. Operation and Maintenance Cost

After the handover of the equipment, a one-year warranty period for maintenance will be guaranteed and included under the grant aid project, but from the second year and then on, the maintenance cost shall be borne by the Solomon Government based on a contract with the maintenance company. The spare parts necessary for one year will be procured through the

grant aid project, and the rest shall be purchased by the Solomon Islands Government.

The annual operation and maintenance cost required for the equipment is shown in the following table. From the second year and onwards, the annual amount estimated is approximately SBD 854,000. Although this amount will lead to a 17 percent increase in the annual maintenance cost, it is anticipated that the Government of the Solomon Islands can bear the cost, since MCA spends/invests over 5 million SBD for operation and maintenance annually.

Personnel expenses required for the operation and maintenance of the procured equipment will not increase sharply since the number of personnel is sufficient, and the tasks are manageable by MCA personnel.

Table 59 Estimated Annual Operation & Maintenance Cost

Item	Annual Operation & Maintenance Cost (Thousand SBD)
Annual Maintenance Cost for the Passenger Terminal Building	221 (approximately 3.1 million JPY)
Annual Maintenance Cost for Airside Pavement	422 (approximately 6 million JPY) (approximately 2% of pavement construction
Contract Cost for Maintenance of Specialized Equipment (including spare parts cost) ※from the second year, after the end of manufacturer's warranty period	176 (approximately 2.5 million JPY) (approximately 3% of the equipment cost)
Maintenance Cost for Airfield Lighting System	35 (approximately 0.5 million JPY) (approximately 3% of the equipment cost)
Total	854 (approximately 1.2 million JPY)

Chapter 3 Project Evaluation

3.1. Preconditions

To facilitate the Project, the Government of the Solomon Islands shall fulfill their obligations, especially, preparation of temporary yards, selection of quarry site and contract for crushed stone, disposal of unexploded bombs and approval of EIA report should be completed before commencement of the tender.

3.2. Necessary Inputs by Solomon Islands Side

The following undertakings should be fulfilled by Solomon Islands side for effective project implementation.

- To support tax exemption procedures during the project implementation,
- To allow entry and give residency for project staffs,
- To implement environmental monitoring and report to the relevant authorities, and
- To pay the land owner of the quarry site.

Also, it is necessary that staffs who receive initial operation and maintenance training will continue operation and maintenance of equipment and necessary budgets for operation and maintenance will be secured.

3.3. Important Assumptions

It is assumed that security in Solomon Islands will not be deteriorated.

3.4. Project Evaluation

3.4.1. Relevance

3.4.1.1. Beneficiaries of the Project

As the gateway to the Solomon Islands, mitigating congestion, extending its capacity to cater

the increasing demand, and enhancing the safety of Honiara Airport will contribute to upgrading the overall aviation safety in the country, and the project beneficiaries are all the citizens of the Solomon Islands.

3.4.1.2. Objectives of the Project

The objectives of this project are to increase airport capacity of Honiara Airport to cater the growing number of passengers, to improve the level of convenience of airport users, to secure the safety of aircraft operation, and to enhance airport resilience against natural disasters through the expansion and renovation of passenger terminal buildings, extension/expansion and rehabilitation of the apron and taxiway, upgrade and renewal of airfield lighting system, and construction of flood control embankment. In addition, the overall goal of this project is to contribute to the promotion of cross-border movement of people in the Solomon Islands.

3.4.1.3. Consistencies with Development Goals

Honiara Airport development is in line with one of the medium-term strategies stipulated in the "Solomon Islands National Development Strategy, 2016-2035," which is to "expand and upgrade weather resilient infrastructure and utilities focused on access to productive resources and markets and to essential services." Moreover, the development of Honiara Airport is stated as one of the priorities in the sector development plans such as in the "National Transport Plan 2011-2030," "National Infrastructure Investment Plan 2013," and the "Civil Aviation Master Plan" and thus, this project is consistent with these development goals set forth by the Government of the Solomon Islands.

3.4.1.4. Consistencies with Japanese Development Assistance Policies and Objectives

The Project is consistent with the priority areas and issues highlighted in Japan's Country Assistance Policy and JICA's Country Analysis Paper for the Solomon Islands, and therefore, the significance of supporting the implementation of this project by Japanese Grant Aid is high.

3.4.2. Effectiveness

The quantitative and qualitative effects expected from this project are described in the tables below.

3.4.2.1. Quantitative Effects

Table 60 Quantitative Effects

Index	Baseline (2017 value)	Target Value (2024) [3 years after completion]
Annual International Passengers at Honiara Airport (person/year)	93,484	125,000
Annual Aircraft Movements at Honiara Airport (number/year)	8,595	9,000

3.4.2.2. Qualitative Effects

The expected qualitative effects of the project are as follows:

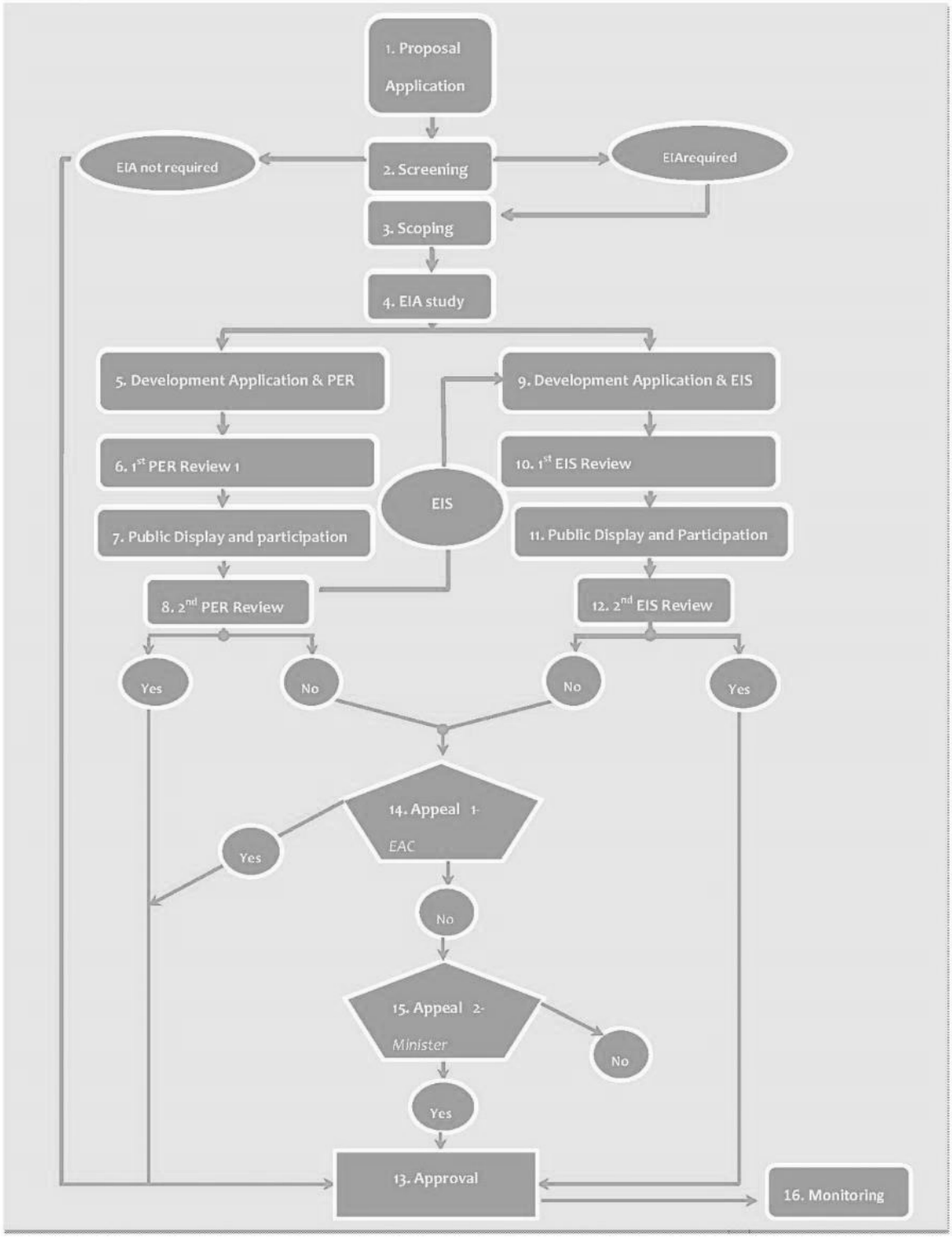
- Convenience of the airport user will be improved by expansion and renovation of the passenger terminal buildings;
- Congestions at the apron will be mitigated, and aircraft operation safety will be enhanced through the new construction and rehabilitation of taxiways, and the expansion and renovation of the apron;
- Industries and tourism will be promoted, and the investment environment will be improved, with an increased number of tourists, business people, and investment amount;
- Airport operations will not be interrupted by heavy torrential rains and be able to continue its service.

As this project is expected to provide various effects as mentioned above, it has high relevance and effectiveness to be implemented under the Japanese Grand Aid Scheme.

Appendix

1. Environmental and Social Considerations Data
2. Result of Soil Investigation
3. Air Traffic Demand Forecast
4. Probability Statistical Evaluation of Rainfall in April 2014
5. Survey Team Members
6. List of Relevant Personnel (interviewees)
7. Survey Schedule
8. Minutes of Discussions (M/D) -1
9. Technical Memorandum (T/M)
10. Minutes of Discussions (M/D) -2
11. Minutes of Discussions (M/D)-3
12. Draft Monitoring Form
13. Environmental Check List

Appendix -1. Environmental and Social Considerations Data



Source: ENVIRONMENTAL IMPACT ASSESSMENT GUIDELINE 2010

Figure A-1 EIA Procedures in Solomon Islands

Table A-1 EIA Procedure in Solomon Islands

No.	Process	Details	Days Required	Responsible Organizations
1	Submission of Proposal Application	The business operator (MCA) submits a Proposal Application describing the outline of the project to the ECD according to the stipulated form.	-	・Business Operator（MCA）
2	Screening	ECD judges the necessity of EIA for applied business by screening.	15 days	・ECD ・Business Operator（MCA）
3	Scoping	If EIA is deemed necessary, the ECD will identify the major impact on the environment due to the project implementation by scoping and judge which procedure (PER or EIS) is required.		・ECD ・Business Operator（MCA）
4	EIA Implementation	The business operator (MCA) collects and examines information on the environment, and creates PER or EIS	-	・Business Operator（MCA）
5	Submission of PER and Development Application	The business operator (MCA) submits the PER and the Development Application to ECD.	-	・Business Operator（MCA）
6	First Preview	ECD examines PER and Development Application and confirms whether PER conforms to the Environmental Act 1998. If there is a deficiency, ECD will request for additional information.	Review：10 Decision：5	・ECD
7	Public Release of PER	PER is made open to the public and a stakeholder meeting will be held. Information on the meeting will be announced by posting in newspapers and posting at public facilities.	30 days	・ECD ・Business Operator（MCA） ・Related organizations ・Stakeholders
8	Second Preview	ECD will review the PER again taking into consideration information and objections obtained during the public release period. After review, ECD judges "approval", "rejection", or "implementation" of EIS for the project.	15 days	・ECD
9	Submission of Application for EIS and Development	The business operator (MCA) submits EIS and the Development Application to ECD.	-	・Business Operator（MCA）
10	First EIS Review	ECD reviews the EIS and Development Application and confirms whether the EIS conforms to the Environmental Act 1998. If there is a deficiency, ECD will request for additional information.	Review：10 Decision：5	・ECD
11	Public Release of EIS	EIS is made open to the public and a stakeholder meeting will be held. Information on the meeting will be announced by posting in newspapers and posting at public facilities.	30 days	・ECD ・Business Operator（MCA） ・Related organizations ・Stakeholders
12	Second EIS Review	ECD will review the EIS again taking into consideration the information and objections obtained during the public release period. After the review, ECD judges "approval" or "rejection" of the project.	15 days	・ECD

13	Approval	ECD issues business approval to the business operator, which then is made public in newspapers and the like.	5 days	・ECD
14	First Appeal	In case of opposing the EAC decision on the first decision, the business operator, other related agencies and stakeholders shall submit an opposition letter to the Minister.	30 days	・Business Operator(MCA） ・Related organizations ・Stakeholders
15	Second Appeal	In case of opposing the EAC decision on the first appeal, the business operator, other related agencies and stakeholders shall submit an opposition letter to the Minister.	30 days	・Business Operator（MCA） ・Related organizations ・Stakeholders
16	Monitoring	ECD and related public organizations monitor projects from the environmental point of view during and after project implementation.	-	・ECD ・Related public organizations

Table A-2 Treaties and Agreement Documents with Neighbouring Countries

Treaties and Agreement Documents	Year	Purpose	Responsible Organizations/Related Businesses
Regional Treaties			
ⅰ) Waigani Convention	Ratified on 1998/10/7	・Import ban on hazardous wastes and radioactive wastes into the region ・Management of transboundary movement of hazardous substances within the South Pacific Region.	ECD
ⅱ) Pollution Protocol for Dumping	Ratified on 1989/9/10	・Prevention of contamination in the South Pacific region by dumping wastes	Marine Div./ECD
ⅲ) Pollution Protocol for Emergencies	Ratified on 1989/9/10	・Cooperation in dealing with emergency crisis on pollution	Marine Div./ECD Project：National Pollution Prevention Plan
ⅳ) Natural Resources and Environment of South Pacific (SPREP Convention)	Ratified on 1989/9/10	・Protection of natural resources and the environment in management and development of ocean and coastal environment in the South Pacific	ECD
Chemical Substances, Wastes and Marine Pollution			
ⅰ) Liability for Oil Pollution Damage	Ratified	・Provision of strict obligation that a ship owner owes to contamination of coastal area	Marine Div.
ⅱ) Marine Pollution Convention (London)	Ratified	・Prevention of contamination by waste disposal and the like.	ECD/Foreign Affairs
ⅲ) POPs Convention (Stockholm)	Joined on 2004/7/28	・Protection of human body and environment from persistent organic contaminants	ECD/Environmental Health Div. Project：National Implementation Plan (NIP)
Biodiversity			
ⅰ) Desertification (UNCCD)	Joined on 1999/4/16	・Agreement to cope with and mitigate impact in countries where desertification and drought is advanced	Agriculture Div./ECD Project：National Action Plan on Land Degradation and Drought; National Capacity Self-Assessment (NCSA)
ⅱ) Cartagena Protocol on Biosafety	Joined on 2004/10/26	・Protection of human body and environment from adverse effects of recent biological products (especially genetically modified organisms)	ECD Project：National Biosafety Framework
ⅲ) Convention on Biological Diversity (UNCBD)	Ratified on 1995/10/3	・Equal sharing of profits by genetic resources and protection of biodiversity through sustainable use	ECD Project：National Capacity Self-Assessment (NCSA); National Biodiversity Strategy and Action Plan (NBSAP); 3rd National Report
ⅳ) CITES	Ratified	・Restriction and regulation of animal and plant trade through export/import certification system	ECD
ⅴ) World Heritage Convention	Joined on1992/6/10	・Protection of natural and cultural heritages with noteworthy universal value. In Solomon Islands, East Rennel Island is designated as a World Natural Heritage.	Museum/ECD
Climate			
ⅰ) Kyoto Protocol	Ratified on 2003/3/13	・Reduction of emissions of greenhouse gases (especially carbon dioxide) by 39 industrialized countries by 5.2% on average by 2012	Meteorology Div.
ⅱ) Climate Change	Ratified	・Establishment of a framework for	Meteorology Div./ECD

(UNFCCC)	on1994/12/28	intergovernmental efforts to respond to climate change problems	Project：National Adaptation Plan of Action (NAPA); Second National Communication on Climate Change; National Capacity Self-Assessment (NCSA)
iii) Montreal Protocol	Joined on 1993/6/17	・Reduction of substances that destroy the ozone layer	ECD/Energy Div.
iv) Ozone Layer Convention (Vienna)	Joined on 1993/6/17	・ Protection of the ozone layer through intergovernmental cooperation in the survey of ozone layer, systematic observation as well as monitoring of chlorofluorocarbon production	ECD/Energy Div.

Table A-3 Gap Analysis Example on EIA

Items	JICA Guidelines for Environmental and Social Considerations	Environmental Assessment System of Solomon Islands	Presence/absence of gap, policy to fill the gap
Underlying Principles	-Environmental impacts that may be caused by projects must be assessed and examined in the earliest possible planning stage. Alternatives or mitigation measures to avoid or minimize adverse impacts must be examined and incorporated into the project plan. (JICA Guidelines, Appendix 1.1)	In implementing the project, the business operator submits a Proposal Application summarizing the project outline, as well as expected environment and social impact to ECD. Then, ECD performs screening based on Proposal Application and judges whether EIA is necessary or not. When it is judged that EIA is necessary, scoping is carried out to judge which one of PER or EIS is necessary. ECD then give instruction to the business operator and the business operator creates PER or EIS. Alternatives and mitigation measures will be considered to avoid and minimize the environment and social impact in PER/EIS.	No gap
Public Release of Information	- EIA reports (which may be referred to differently in different systems) must be written in the official language or in a language widely used in the country in which the project is to be implemented. When explaining projects to local residents, written materials must be provided in a language and form understandable to them. EIA reports are required to be made available to the local residents of the country in which the project is to be implemented. The EIA reports are required to be available at all times for perusal by project stakeholders such as local residents and copying must be permitted (JICA Guidelines, Appendix 2)	PER/EIS, which is equivalent to an environmental assessment report in Solomon Islands, is created in English which is the official language, and description materials are also prepared in English. The Stakeholders meetings will be held after being widely disseminated in newspaper advertisements and bulletin boards. ECD is also responsible for issuing a copy of PER/EIS if requested by stakeholders such as local residents.	No gap
Consultation with Local Residents	For projects with a potentially large environmental impact, sufficient consultations with local stakeholders, such as local residents, must be conducted via disclosure of information at an early stage, at which time alternatives for project plans may be examined. The outcome of such consultations must be incorporated into the contents of project plans. (JICA Guidelines, Appendix 1, Social Acceptability 1) -In preparing EIA reports, consultations with stakeholders, such as local residents, must take place after sufficient information has been disclosed. Records of such consultations must be prepared; - Consultations with relevant stakeholders, such as local residents, should take place if necessary	Implementation of consultation with local residents is not required in lows and regulations in Solomon Islands.	This project is not classified as the project with a potentially large environmental impact, and implementation of consultation with local residents is not essential. However, implementation of consultation with local residents will be suggested to MCA when they prepare the PER/EIS.

Items	JICA Guidelines for Environmental and Social Considerations	Environmental Assessment System of Solomon Islands	Presence/absence of gap, policy to fill the gap
	throughout the preparation and implementation stages of a project. Holding consultations is highly desirable, especially when the items to be considered in the EIA are being selected, and when the draft report is being prepared; and (JICA Guidelines, Appendix 2. Environmental Assessment Report Required for Category A Report)		
Impacts to be Assessed	-The impacts to be assessed with regard to environmental and social considerations include impacts on human health and safety, as well as on the natural environment, that are transmitted through air, water, soil, waste, accidents, water usage, climate change, ecosystems, fauna and flora, including trans-boundary or global scale impacts. These also include social impacts, including migration of population and involuntary resettlement, local economy such as employment and livelihood, utilization of land and local resources, social institutions such as social capital and local decision-making institutions, existing social infrastructures and services, vulnerable social groups such as poor and indigenous peoples, equality of benefits and losses and equality in the development process, gender, children's rights, cultural heritage, local conflicts of interest, infectious diseases such as HIV/AIDS, and working conditions including occupational safety. (JICA Guidelines, Attachment 1. Scope of Impacts to Be Assessed 1） -In addition to the direct and immediate impacts of projects, their derivative, secondary, and cumulative impacts as well as the impacts of projects that are indivisible from the project are also to be examined and assessed to a reasonable extent. It is also desirable that the impacts that can occur at any time throughout the project cycle should be considered throughout the life cycle of the project. (JICA Guidelines, Attachment 1. Scope of Impacts to Be Assessed 2）	In Proposal Application, anticipated impact on human health and safety, the natural environment as well as social consideration are widely pointed out. Then, scoping for target project is carried out based on Proposal Application, and the expected environmental impact will be evaluated in PER/EIS.	No gap
Monitoring and Complaint Handling	- Project proponents etc. should make efforts to make the results of the monitoring process available to local project stakeholders. (JICA Guidelines, Attachment 1, Monitoring 3）	It is regulated that ECD and related organizations conduct monitoring before, during and after implementing the project. When a complaint from a third party is submitted, a forum for	It is stipulated to implement monitoring, but it is not stipulated to publish the results to

Items	JICA Guidelines for Environmental and Social Considerations	Environmental Assessment System of Solomon Islands	Presence/absence of gap, policy to fill the gap
	-When third parties point out, in concrete terms, that environmental and social considerations are not being fully undertaken, forums for discussion and examination of countermeasures are established based on sufficient information disclosure, including stakeholders' participation in relevant projects. Project proponents etc. should make efforts to reach an agreement on procedures to be adopted with a view to resolving problems. (JICA Guidelines, Attachment 1, Monitoring 4)	consultation with the ECD and related organizations is set up, and the details of the objection are made open to the public.	stakeholders. Thus, ECD will be prompted to publish the results to stakeholders.
Ecosystem and Biota	Projects must not involve significant conversion or significant degradation of critical natural habitats and critical forests.	It is stipulated to evaluate and examine PER/EIS from the perspective of ecosystem and biota.	Solomon domestic law does not clearly define as JICA Guidelines. But it can be said that there is no gap as mitigation measures should naturally be considered if the project is judged to involve significant conversion or degradation of natural habitats or forests.
Indigenous People	Any adverse impacts that a project may have on indigenous peoples are to be avoided when feasible by exploring all viable alternatives. When, after such an examination, avoidance is proved unfeasible, effective measures must be taken to minimize impacts and to compensate indigenous peoples for their losses.	The expected influence on residential district of indigenous people is pointed out in Proposal Application and evaluated and examined in PER/EIS. If avoidance is difficult, measures will be taken after consultation.	No gap

Appendix -2. Result of Soil Investigation

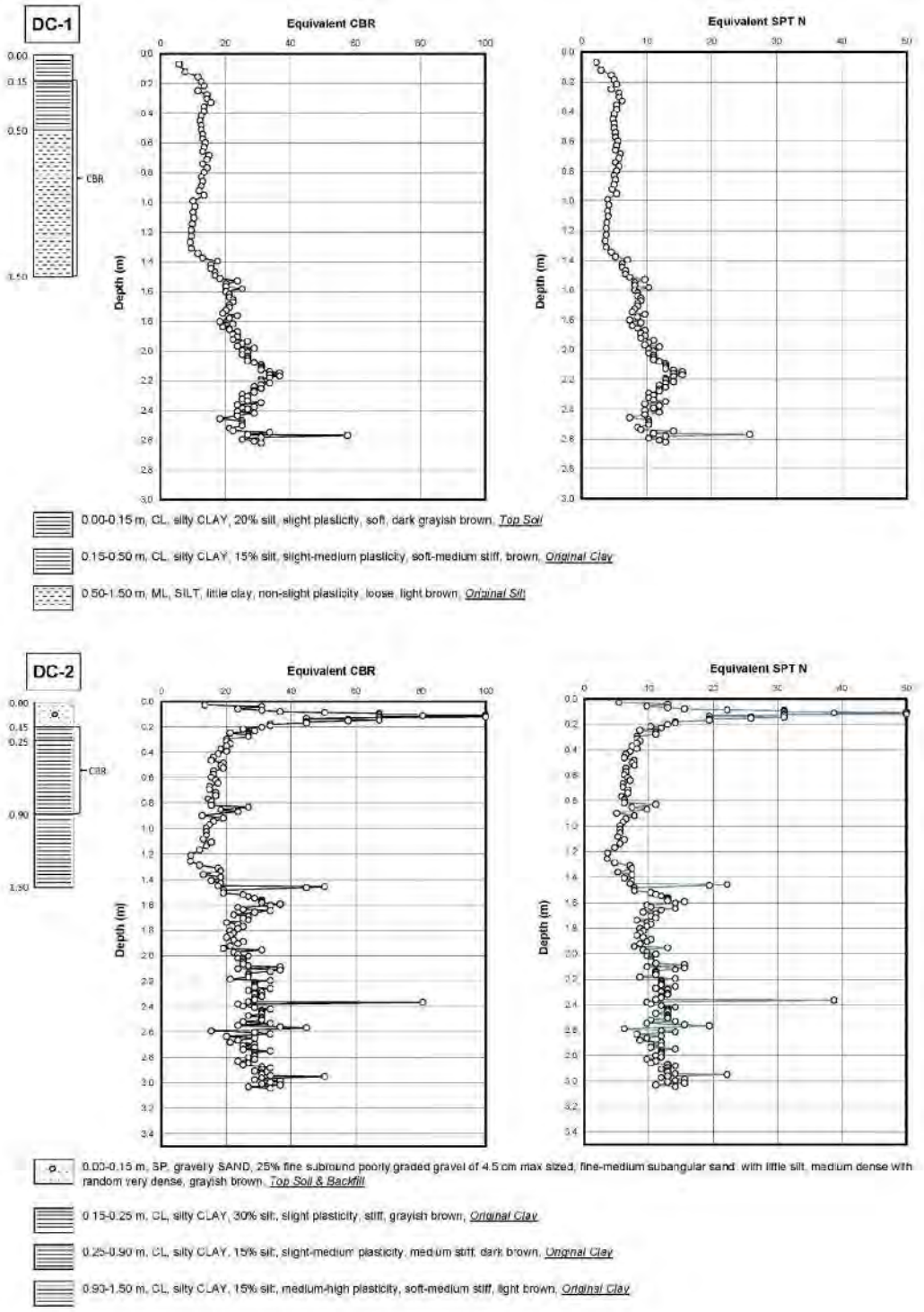


Figure A-2 Dynamic Cone Penetration Test (DCPT) Graphical Presentation as Converted to SPT and CBR (DC-1, -2)

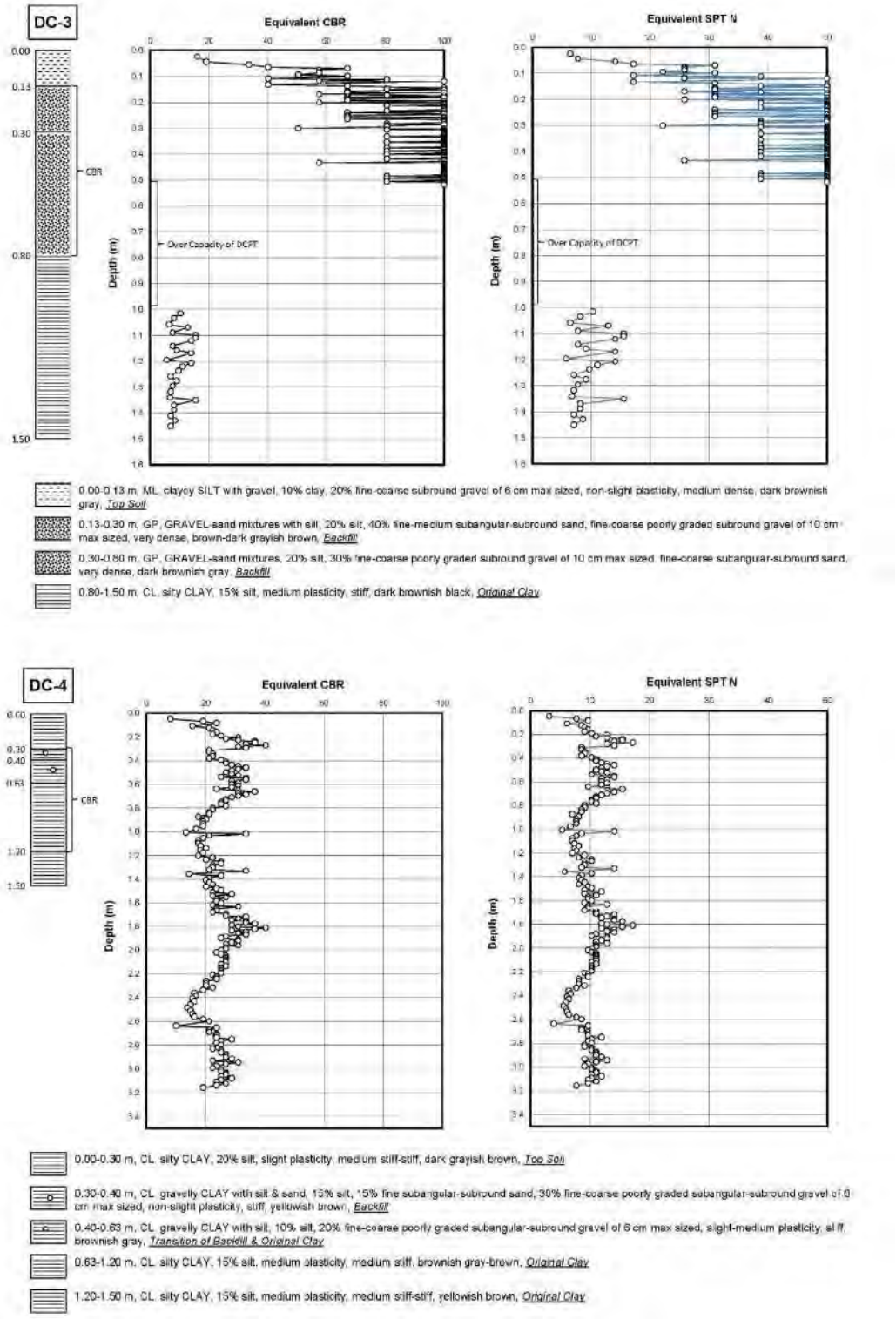


Figure A-3 Dynamic Cone Penetration Test (DCPT) Graphical Presentation as Converted to SPT and CBR (DC-3, -4)

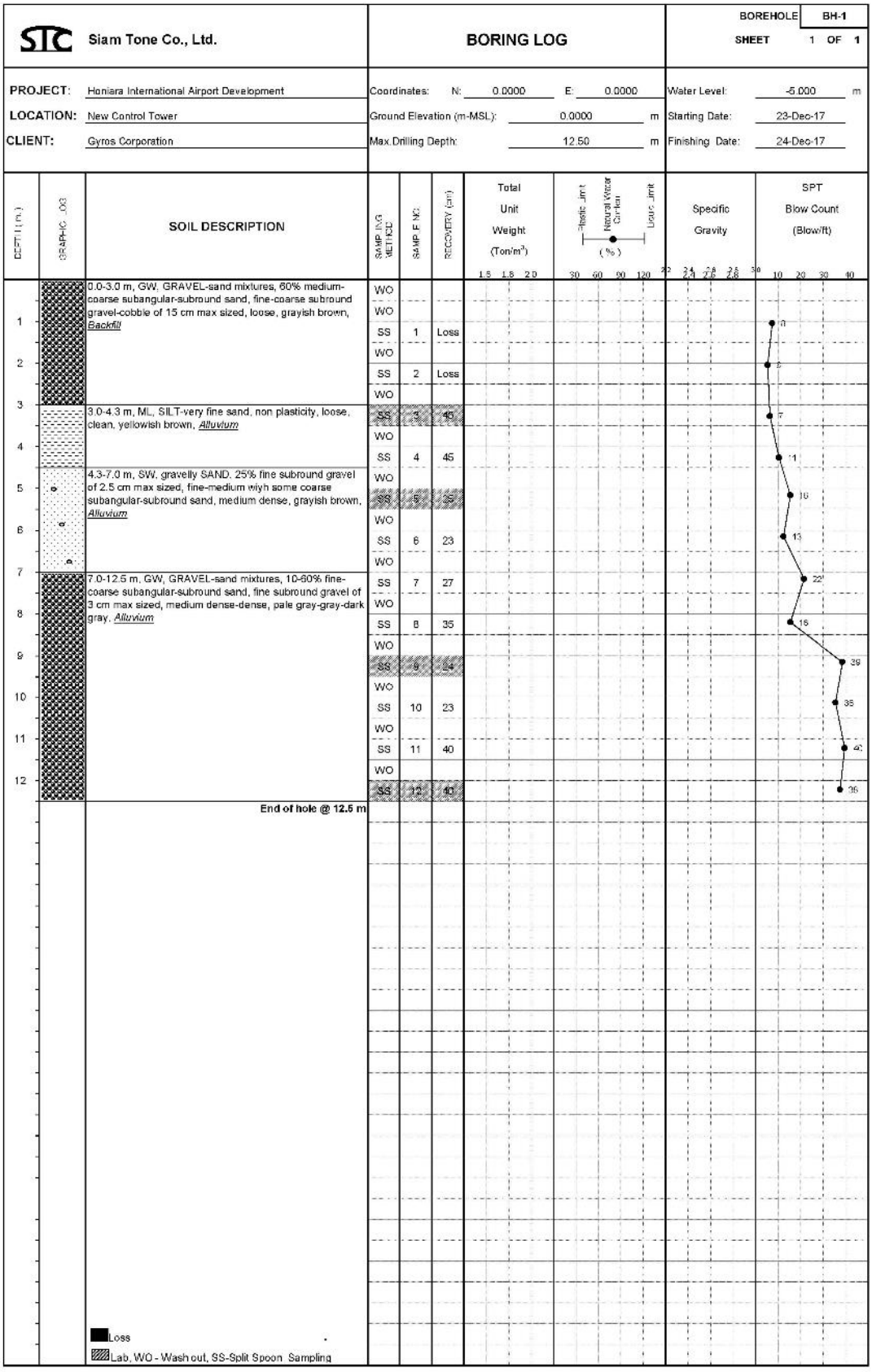


Figure A-4 Boring Log (BH-1)

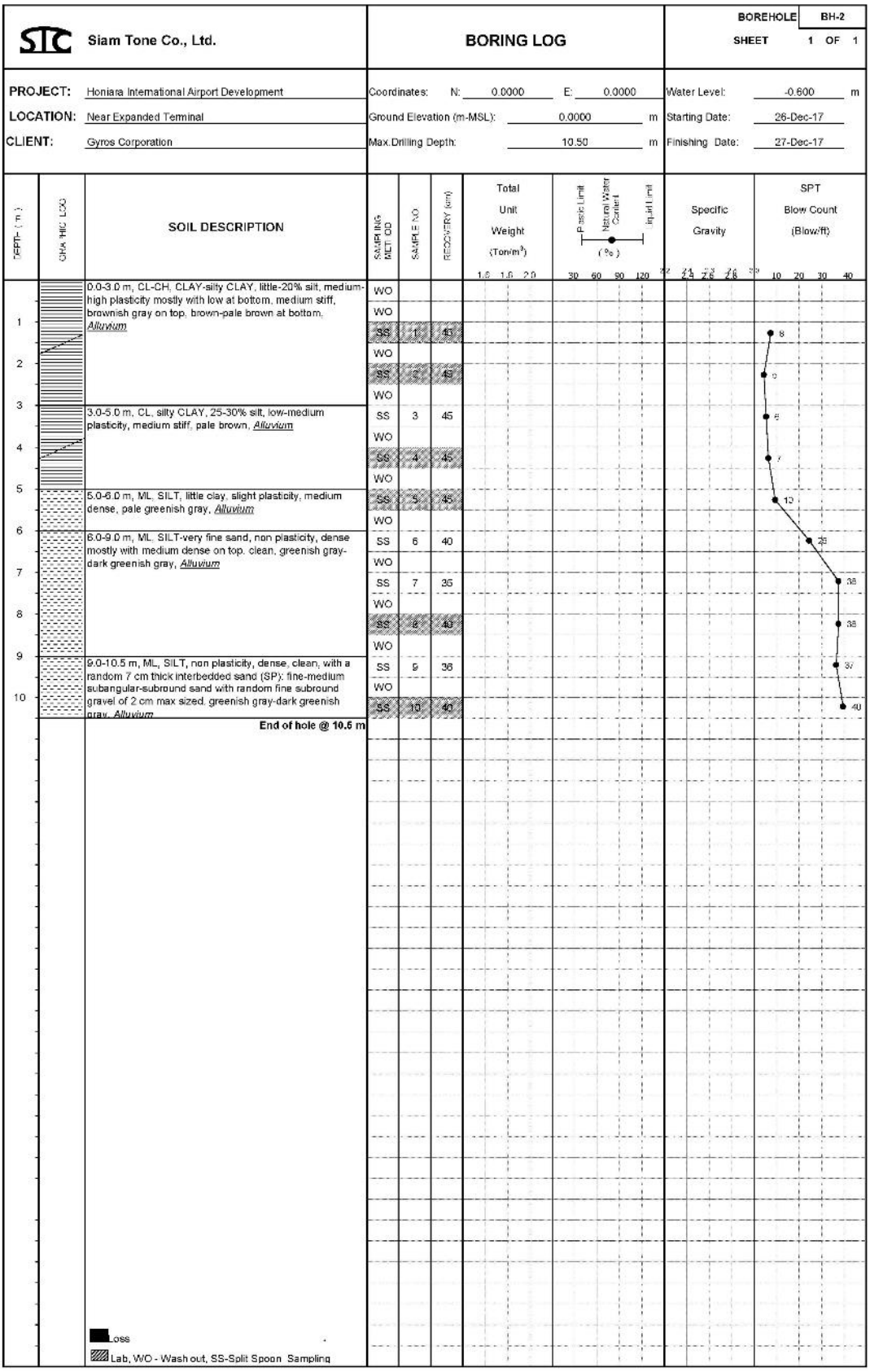


Figure A-5 Boring Log (BH-2)

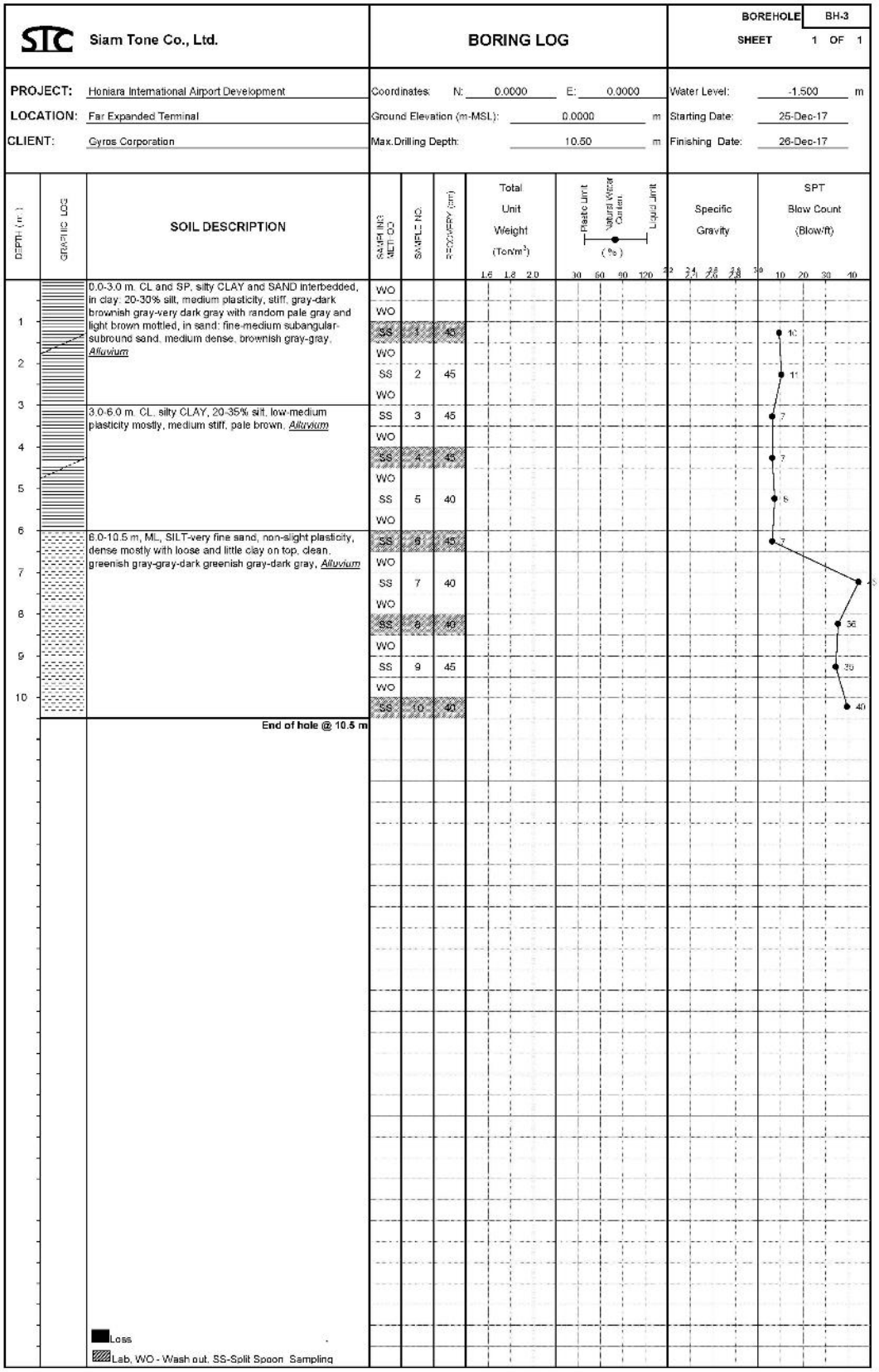
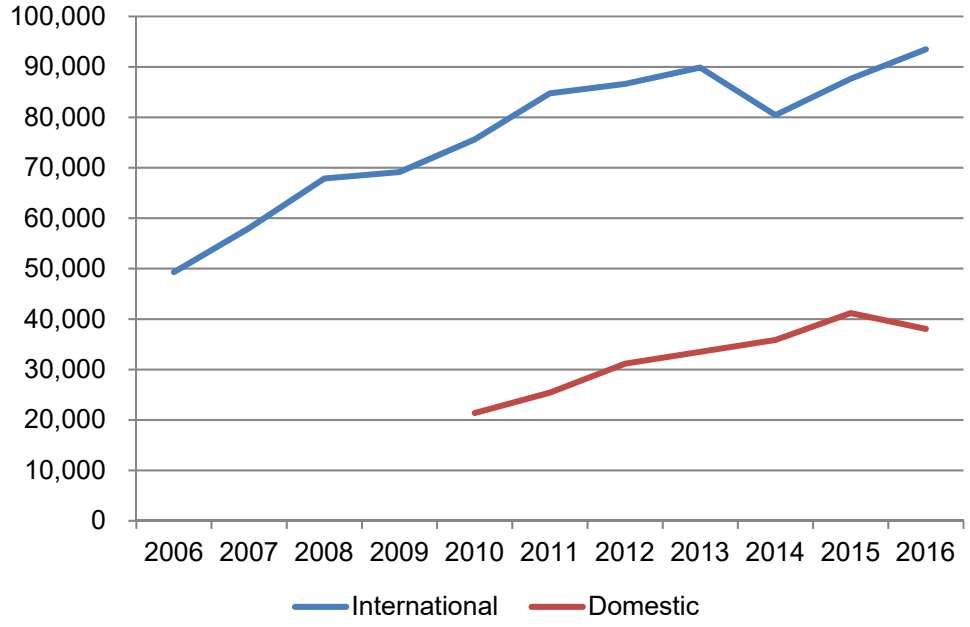


Figure A-6 Boring Log (BH-3)

Appendix -3. Air Traffic Demand Forecast

(1) Passenger Traffic

The figure below shows historical trend of international and domestic passenger traffic at Honiara Airport. Basic data were provided by National Statistics Office, Solomon Airlines and Honiara Airport.



Sources：JICA Study Team, National Statistics Office, Solomon Airlines and Honiara Airport

Figure A-7 International and Domestic Flight Passenger Traffic

International passenger traffic shows a steady upward trend in 2006-2016, with the exception in 2014.The sharp increase in 2010-2013 is attributable to active RAMSI operation, which in turn explains the drop in 2014.

Original data provided by CAASI, Honiara Airport, Solomon Airlines and National Statistics Office were not suitable for use as they were. Some data were partially, or even completely, lacking. Some data seemed to be just copied from the past data. For this reason, the study team made some adjustment to the original data to make the basis for future demand forecast. The adjustment method is detailed in the following. The table below lists traffic data.

Table A-4 Traffic Data List

No.	Data	Source	Notes
1.	Passenger Data (Domestic, international)	Honiara Airport	ATC data Passengers include flight crew. Domestic and international data are combined. Some data are overlapping.
		Solomon Airlines	Domestic data combine passengers of all airports. Data of Honiara Airport alone is not available. International data of 2014-2016 (annual, monthly and daily)
		National Statistics Office	2005-2016 immigration data by nationality (annual and monthly)
2.	Cargo Data	Solomon Airlines	Domestic data of 2015-2016, International data of 2012-2016 (exports and imports are combined.)
		National Statistics Office	Exports and imports data (most of volume data is missing)
3.	Flight Schedule	Solomon Airlines	Time schedule (domestic, International)
		CAASI	Time schedule (domestic and international)
4.	Equipment Data	Solomon Airlines	Flight cycle and flight time data by equipment

International passenger data compiled by Bureau of Statistics should be reliable as the immigration must be strictly controlled. The study team, therefore, used the immigration data of Bureau of Statistics in forecasting international flight passengers. Departing passengers are assumed to be the same as immigration data, i.e., arrival passengers.

ATC and Solomon Airlines keep a record of domestic flight passengers. ATC has monthly data by airport. ATC's passenger data, however, include pilots and crew while domestic and international data are not broken down. Solomon Airlines' data combines domestic passengers of all airports in the country and has no separate data by airport.

From the above, the study team estimated existing domestic flight passenger traffic as below.

a) International passenger data of National Statistics Office is subtracted from ATC's passenger data (domestic and international combined) at Honiara Airport passengers, in order to derive

domestic passenger data at Honiara Airport.

b) Above domestic passenger data at Honiara Airport is divided by data of domestic passengers at all airports.

c) Annual domestic flight passenger data at Honiara Airport is calculated by multiplying above ratio (calculated in (2)) to passenger data of Solomon Airlines.

(2) Cargo Data

Cargo data were obtained from Solomon Airlines and National Statistics Office. Solomon Airlines has domestic cargo data for only two years and they are not broken down by loading and unloading. Export and import data provided by National Statistics Office were inappropriate for use as most data were missing. Thus, data of Solomon Airlines is used for the present analysis.

(3) Foreign Passengers

The table below summarizes foreigners visiting Solomon in 2016 by nationality and purpose.

Australia accounts for the top 41.1%, followed by New Zealand, the US and Fiji. Visitors from Asian countries are also large. As for purpose of the visit, vacation is the largest (31.5%), followed by business (28.2%).

Table A-5 Foreigners by Nationality and Purpose

Country of Residence	Business & Conference	Holiday & Vocation	Transit & Stopover	Visiting friends & relatives	Others	Total	Share
Australia	2,300	3,439	68	1,654	2,078	9,539	41.1%
PNG	448	241	136	301	253	1,379	5.9%
US	254	788	32	138	272	1,484	6.4%
NZ	593	262	20	265	404	1,544	6.7%
UK	73	140	3	54	77	347	1.5%
Japan	158	265	4	48	77	552	2.4%
Germany	24	113	1	17	6	161	0.7%
Canada	32	94	5	23	12	166	0.7%
Other Pacific	315	66	29	71	184	665	2.9%
Vanuatu	241	168	10	172	277	868	3.7%
Hong Kong	22	48	4	14	11	99	0.4%
Fiji	738	160	63	256	345	1,562	6.7%
Other Asia	946	698	76	419	878	3,017	13.0%
Netherlands	20	47	0	11	2	80	0.3%
Other Europe	80	303	17	39	60	499	2.2%
France	22	64	2	9	20	117	0.5%
Italy	8	49	4	14	20	95	0.4%
China	204	295	13	101	214	827	3.6%
Others	57	56	6	25	49	193	0.8%
Total	6,535	7,296	493	3,631	5,239	23,194	
Share	28.2%	31.5%	2.1%	15.7%	22.6%	100.0%	

Source：Solomon Island National Statistics Office

The table below summarizes foreigners visiting Solomon in 2016 by airline flown. Solomon Airlines is the largest, accounting for 48.2% of total.

Table A-6 Foreign Visitors by Airline Flown

Country of Residence	Solomon Airlines	Fiji Airways	Air Niugini	Air Nauru	Air Vanuatu	Non-scheduled	Qantas	Virgin Australia
Australia	63.9%	2.0%	2.0%	0.2%	0.0%	0.6%	0.0%	31.3%
PNG	7.0%	23.6%	67.4%	0.5%	0.0%	0.2%	0.0%	1.2%
US	37.6%	33.8%	8.2%	0.8%	0.0%	7.3%	0.0%	12.4%
NZ	43.5%	7.2%	2.4%	0.2%	0.0%	2.3%	0.0%	44.4%
UK	50.7%	10.7%	9.5%	0.0%	0.0%	1.4%	0.0%	27.7%
Japan	34.1%	13.2%	37.7%	0.4%	0.0%	1.1%	0.0%	13.6%
Germany	41.0%	13.7%	19.9%	1.9%	0.0%	0.0%	0.0%	23.6%
Canada	50.6%	29.5%	5.4%	1.8%	0.0%	1.2%	0.0%	11.4%
Other Pacific	33.4%	29.6%	7.5%	24.4%	0.0%	0.0%	0.0%	5.1%
Vanuatu	68.5%	11.1%	19.2%	0.1%	0.0%	0.0%	0.0%	1.0%
Hong Kong	35.4%	24.2%	32.3%	0.0%	0.0%	1.0%	1.0%	6.1%
Fiji	23.5%	64.0%	11.0%	0.3%	0.0%	0.0%	0.0%	1.2%
Other Asia	47.8%	10.8%	25.6%	0.5%	0.0%	0.0%	0.1%	15.1%
Netherlands	42.7%	9.0%	10.1%	0.0%	0.0%	0.0%	5.6%	32.6%
Other Europe	47.9%	11.6%	16.8%	1.6%	0.0%	1.4%	0.0%	20.6%
France	55.6%	12.0%	22.2%	0.0%	0.0%	0.0%	0.0%	10.3%
Italy	52.6%	11.6%	11.6%	2.1%	0.0%	0.0%	0.0%	22.1%
China	13.7%	28.9%	53.1%	0.1%	0.0%	1.1%	0.0%	3.1%
Others	43.5%	13.0%	22.3%	1.6%	0.0%	3.6%	0.0%	16.1%
Total	48.2%	14.3%	14.5%	1.1%	0.0%	1.1%	0.0%	20.9%

Source：Solomon Island National Statistics Office

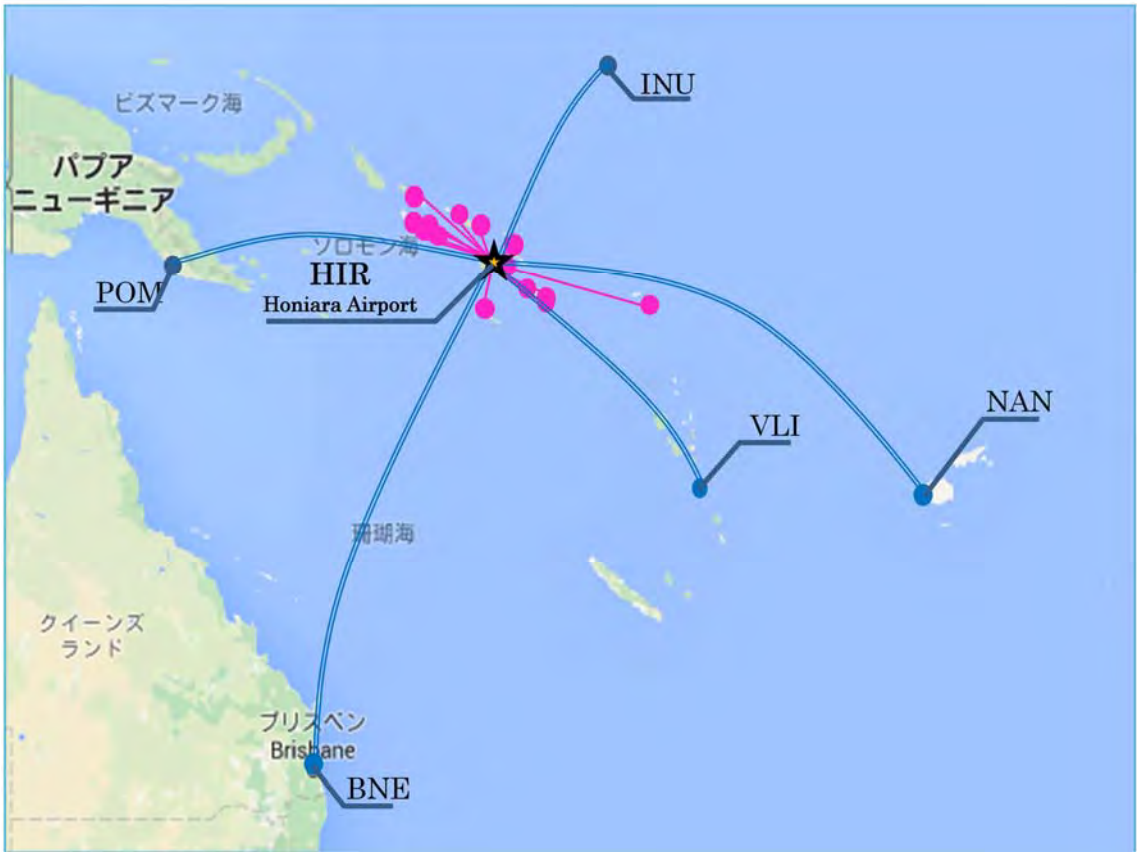


Figure A-8 International Flight Routes

(4) Domestic Flight Passengers

There are two types of domestic passenger data. ATC at Honiara Airport and Solomon Airlines collect such data. ATC lost all paper data due to the flood in 2014. Digital data made available to the study team covers the period of 2010-2016, though some data is missing. ATS keeps domestic flight passenger data by airport. But the data includes pilots and the crew and domestic and international data are combined. Thus, it is not appropriate to use the ATC's original data as they are.

Solomon Airlines' data is not appropriate either as its domestic passenger data from 2000 combines total domestic passengers of all airports and is not broken down by airport. It is, therefore, necessary to adjust two types of original data in order to derive reasonable domestic flight passenger data and make the basis for demand forecast

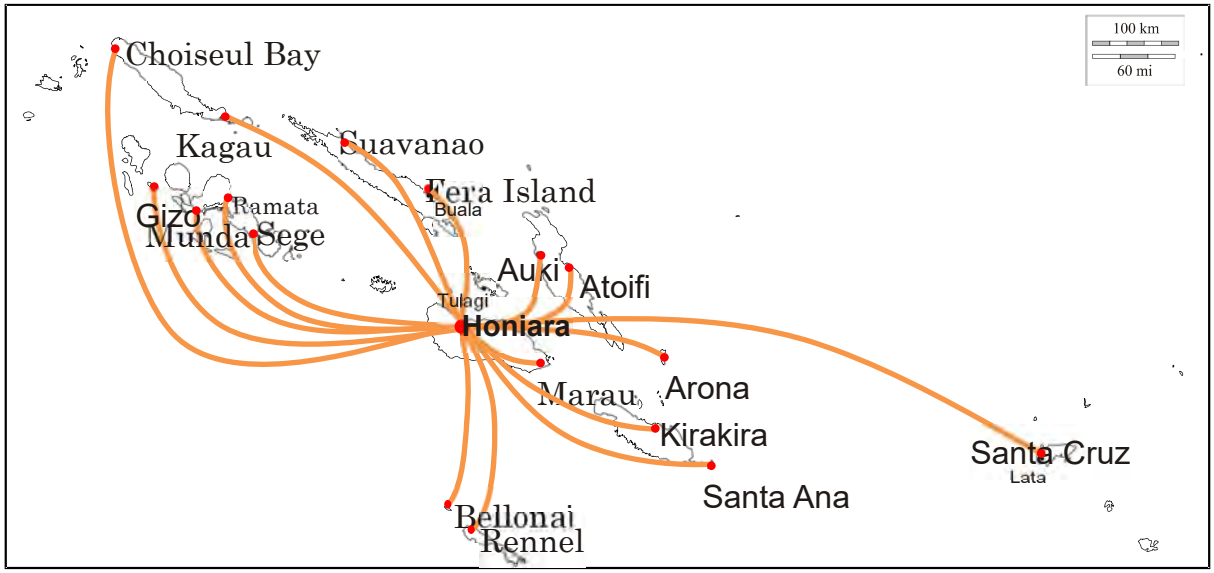


Figure A-9 Domestic Flight Routes

(5) International Cargoes

International cargo data of 2012-2016 was obtained from Solomon Airlines. The data combines exports and imports with no breakdown. Data from National Statistics Office was also made available but most of the volume data is missing and is thus inappropriate for analysis.

Table A-7 International Cargo Volume

Year	Cargo (Kg)
2012	374,876
2013	377,763
2014	492,377
2015	293,378
2016	315,578

Source; Solomon Airlines

(6) Domestic Cargoes

Domestic cargo data was also provided by Solomon Airlines. The data notes ‘zero kg’ in 2012-2014. Domestic data of 2015 and 2016 are available but they are not broken down by loading and unloading.

Table A-8 Domestic Cargoes

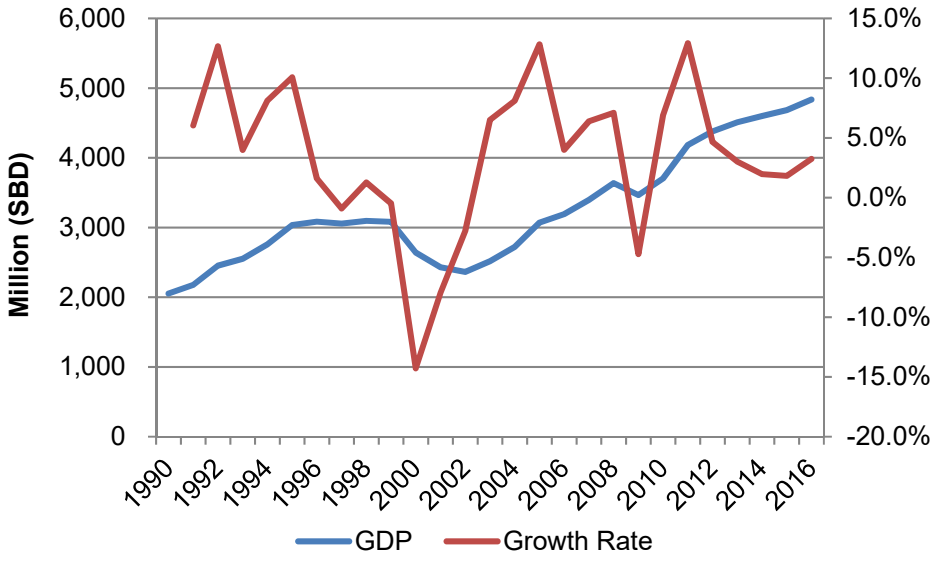
Year	Cargoes (Kg)
2015	217,352
2016	127,745

Source: Solomon Airlines

(7) Social and Economic Background

Ethnic tension between native people of Guadalcanal Island and settlers from Malaita island intensified since 1998. Civil unrest continued even after the Townsville Peace Agreement was signed in 2000. The Regional Assistance Mission to Solomon Islands (RAMSI) was created with the leadership of Australia and was missioned to Solomon Islands in 2003.

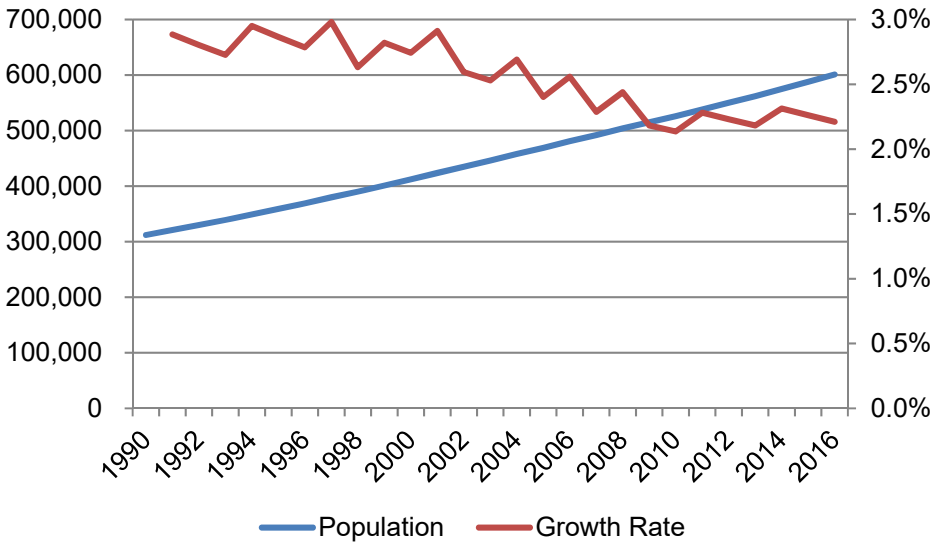
As the figure below indicates, the country's GDP made a steady growth in 1990-1998. It nosedived during the period of social confusion but regained momentum in 2003. The drop in 2009 is attributable to global financial crisis precipitated by the Lehman Brothers bankruptcy in 2008.



Note: IMF estimates for 2015-2016.
Source: IMF

Figure A-10 GDP of Solomon Islands

The figure below plots historical population and growth of Solomon Island. Population growth rate averaged 2.3% during the past decade although the growth rate has been diminishing since 2000.



Note: IMF estimates for 2015-2016.
Source: IMF

Figure A-11 Population of Solomon Islands

(8) Air Traffic Demand Forecast

A model to forecast passenger traffic is built in conformity with ICAO Manual. Regression analysis is run to model the relationship between passenger traffic and following explanatory variables. The target year is 2025 and values after 2025 are listed for reference. Validity of the model is tested based on the criteria mentioned in the table below.

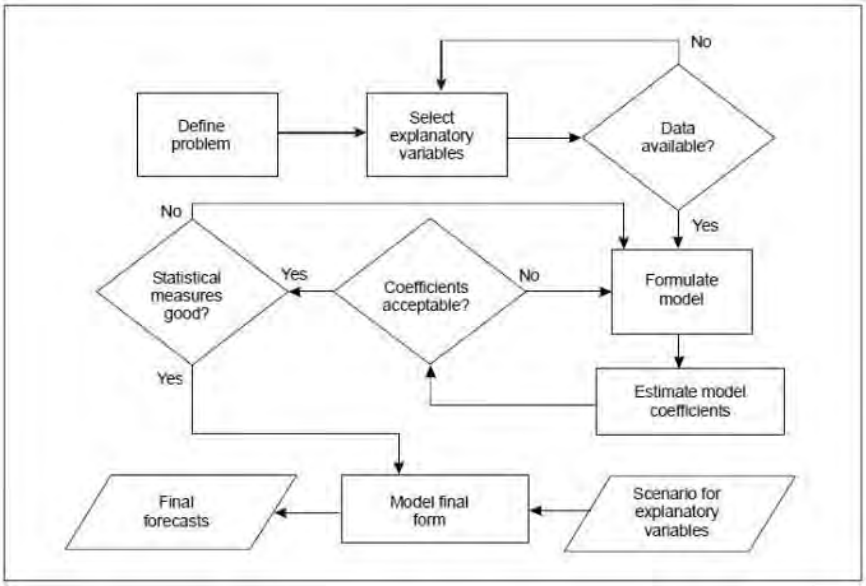


Figure A-12 Flow of Demand Forecast

Table A-9 Validity Testing Criteria of the Model

t-value	Adjusted R^2	Coefficient Sign
Significance (higher than 2)	1 - 0.8	GDP: +

As explained above, there is no sufficient cargo data to run a regression model with. Thus, the present analysis assumes that cargo volume increases in direct proportion to passenger traffic. Unit volume per passenger is calculated to forecast future volume.

Explanatory variables of the model of international passengers include real GDP of Solomon Islands (Solomon dollar) and other countries (US dollar). Meanwhile, real GDP of Solomon Islands (Solomon dollar) was used as the only explanatory variable for the model of domestic passengers. Dummy variables are used where necessary to reflect qualitative influence into the models.

Table A-10 Explanatory Variables

Year	Solomon (Mil. SID)	RAMSI (Bil. USD)	No RAMSI (Bil. USD)	Dummy
2006	3,193	1,185	59,301	0
2007	3,397	1,228	61,834	0
2008	3,638	1,266	62,949	0
2009	3,466	1,286	61,836	0
2010	3,705	1,312	64,542	1
2011	4,184	1,344	66,562	1
2012	4,379	1,391	68,154	1
2013	4,511	1,425	69,882	1
2014	4,600	1,464	71,788	0
2015	4,684	1,498	73,743	0
2016	4,836	1,538	75,737	0

In building a forecast model, international passengers are categorized into three subgroups, nationals of Solomon Islands (including foreign residents in the country), nationals of RAMSI member countries, and national of the other countries. The rationale behind this is as follows. Economic situation and travel purpose should differ between people of Solomon Islands and foreigners. Travelers from RAMSI member countries have always been large as they are comprised of neighboring countries. A significant number of police and military personnel came to the country from RAMSI countries since 2003. Thus, a dummy (RAMSI dummy) is used for 2010-2013 as travelers from RAMSI member countries increased sharply in the period.

Table A-11 Results of Demand Forecast Model

	Coefficients (t-value)			Adjusted R-squared
	Intercept α	GDP β	Dummy γ	
Nationals of Solomon Islands	-3324 (-0.869)	1.00E-05 (10.712)		0.9192
Nationals of RAMSI Member Countries	-22120 (-2.821)	3.50E-08 (6.061)	9441 (7.198)	0.9029
Nationals of Other Foreign Countries	-20240 (-8.317)	4.60E-10 (12.694)		0.9412

Natives of Solomon Islands: $Y_{SI} = \alpha + \beta * X_{SI\_GDP}$

Nationals of RAMSI Member Countries: $Y_{RAMSI} = \alpha + \beta * X_{RAMSI\_GDP} + \gamma * X_{RAMSI\_Dummy}$

Nationals of Other Foreign Countries: $Y_{noRAMSI} = \alpha + \beta * X_{noRAMSI\_GDP}$

Number of Passengers： Y

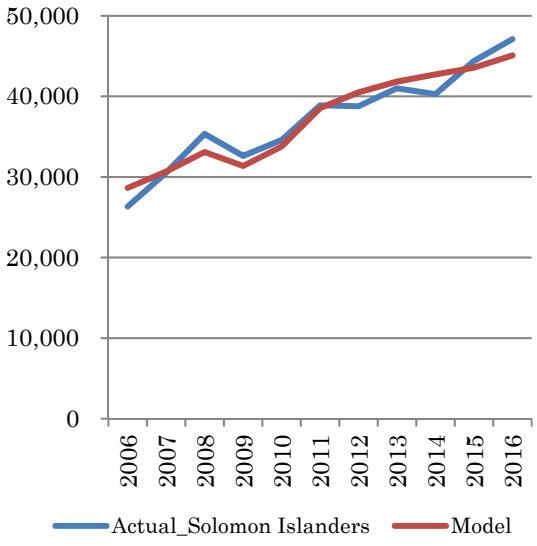
GDP of Solomon Islands（real Solomon dollar）： X_{SI_GDP}

GDP of RAMSI member countries（real US dollar）： X_{RAMSI_GDP}

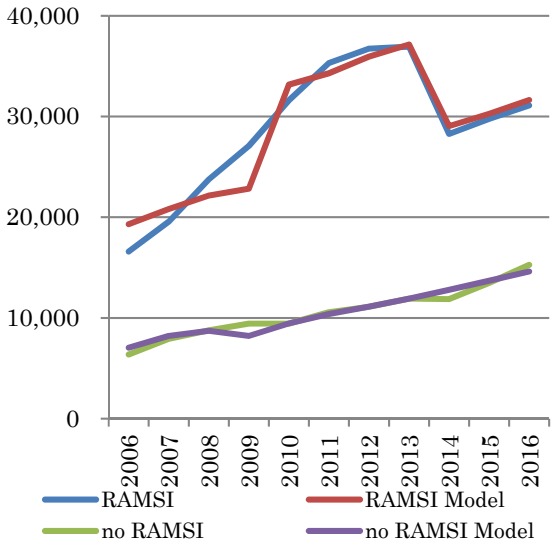
GDP of Other Foreign Countries（real US dollar）： $X_{noRAMSI\_GDP}$

RAMSI dummy（2010-2013）： X_{RAMSI_Dummy}

Coefficients：α, β, γ



Passengers of Solomon Islands



Passengers from RAMSI and Other Foreign Countries

Figure A-13 Comparison of Forecast Model to Actual Data

Above results should prove that the model is statistically significant and sufficiently explains passenger movement.

Regression analysis is run to model the relationship between domestic passenger traffic and GDP of Solomon Islands. Results are summarized in the table below

Table A-12 Results of Demand Forecast Model

	Coefficients (t-value)		Adjusted R-squared
	Intercept α	GDP β	
Domestic Passengers	-45260 (-3.795)	1.76E-05 (6.53)	0.8741

Domestic Passengers： $Y_{Domestic} = \alpha + \beta * X_{SI\_GDP}$

Number of Passengers： $Y_{Domestic}$

GDP of Solomon Islands（real Solomon dollar）： X_{SI_GDP}

Coefficients： α, β

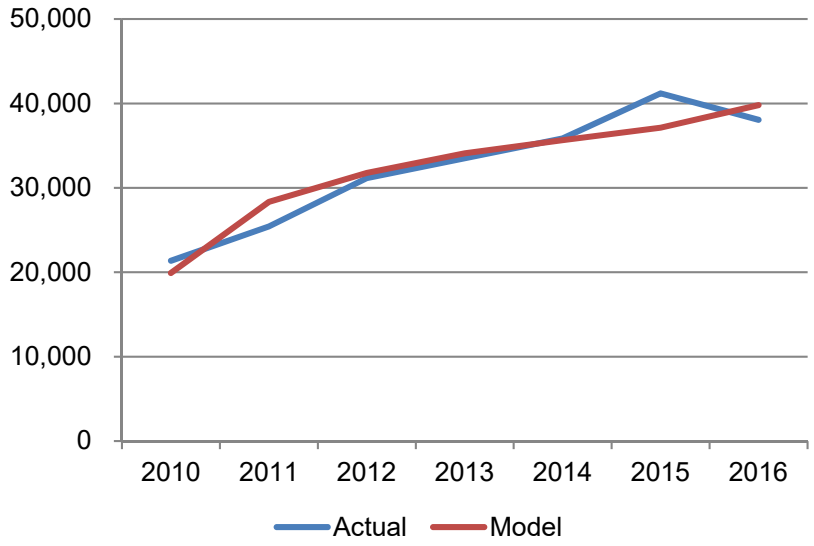


Figure A-14 Comparison of Forecast Model to Actual Data

Above results should prove that the model is statistically significant and sufficiently explains passenger traffic.

Cargo data are too few to run regression analysis with. Only five years' data are available for international cargoes (2012-2016) and two years for domestic cargoes (2015-2016). Furthermore, the data are combined figures. That is to say, there is no breakdown between

exports and imports in case of international cargoes, and no breakdown between loading and unloading volume in case of domestic cargoes. To make a forecast, therefore, cargo volume per passenger (2012-2016) is used.

Unit cargo volume per passenger is calculated as 4.32 kg for international cargoes and 4.28kg for domestic cargoes.

Table A-13 Estimated Cargo Volume per Passenger

Cargo Type	Volume per Passenger (Kg)
International Cargoes	4.32
Domestic Cargoes	4.28

(9) Estimated Air Traffic Demand

IMF GDP growth estimate was used until 2022 and for the period of 2023-2030 five-year moving average growth of preceding five years were employed. The RAMSI dummy is set as '0' for the future as the mission withdrew in 2016. Explanatory variables are summarized in the table below

Table A-14 Estimated Explanatory Variables

Year	Solomon (MN SID)	RAMSI (BN USD)	No RAMSI (BN USD)	Dummy
2006	3,193	1,185	59,301	0
2007	3,397	1,228	61,834	0
2008	3,638	1,266	62,949	0
2009	3,466	1,286	61,836	0
2010	3,705	1,312	64,542	1
2011	4,184	1,344	66,562	1
2012	4,379	1,391	68,154	1
2013	4,511	1,425	69,882	1
2014	4,600	1,464	71,788	0
2015	4,684	1,498	73,743	0
2016	4,836	1,538	75,737	0
2017	4,979	1,586	77,712	0
2018	5,130	1,633	79,774	0
2019	5,284	1,681	81,912	0
2020	5,442	1,728	84,102	0
2021	5,611	1,776	86,344	0
2022	5,788	1,824	88,641	0
2023	5,962	1,875	91,005	0

2024	6,140	1,928	93,434	0
2025	6,325	1,982	95,926	0
2026	6,514	2,037	98,484	0
2027	6,710	2,093	101,109	0
2028	6,911	2,152	103,806	0
2029	7,119	2,212	106,575	0
2030	7,332	2,274	109,417	0

A sensitivity analysis is conducted below using the same GDP growth rates.

(10) International Flight Passenger

International flight passengers are forecast as expressed in the figure and table below.

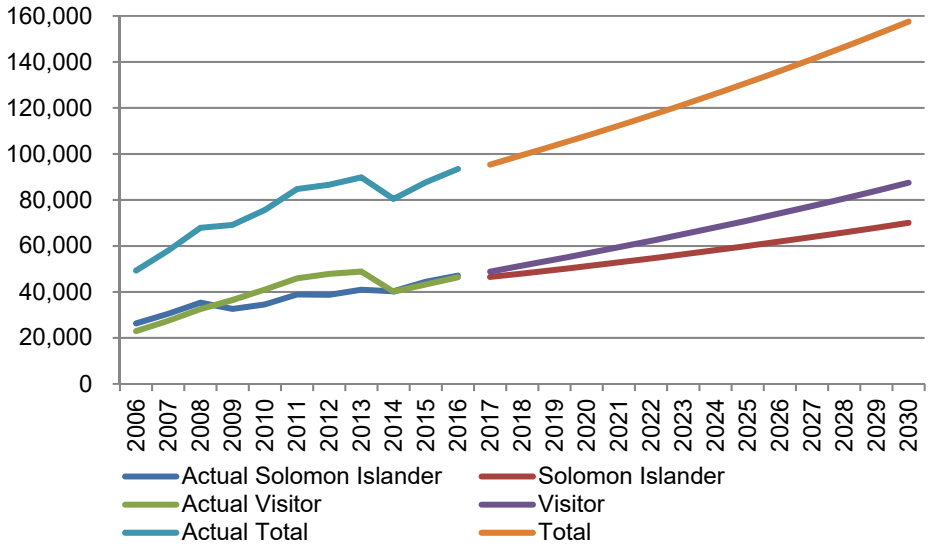


Figure A-15 International Flight Passenger Demand

Table A-15 Estimated International Flight Passengers

Year	Solomon Islander	Visitors	Total
2016 (Actual)	47,108	46,376	93,484
2020	51,150	56,743	107,894
2025	59,986	71,062	131,048
2030	70,070	87,475	157,545

Sensitivity analysis is conducted under three cases (base case, high case and low case) to determine the impact of GDP growth on domestic passenger traffic. GDP growth in three different country groups under each case is indicated in the table below. Growth rate of Solomon Islands under High Case and Low Case are assumed to be 1.0% higher and 1.0% lower than that of Base Case, respectively. On the other hand, the difference in growth rate

between Base Case and High Case (Low Case) of RAMSI member countries is assumed to be 0.6% (-0.6%). The difference in growth rates between Base Case and High Case (Low Case) of other foreign counties is assumed to be 1.6% (-1.6%). Difference of 0.6% and 1.6% are taken from deviation value of the previous years in respective groups.

Table A-16 Assumptions of Sensitivity Analysis

	Solomon		RAMSI Member Countries		Other Foreign Countries	
	GDP Growth Rate	Difference to Base Case	GDP Growth Rate	Difference to Base Case	GDP Growth Rate	Difference to Base Case
Base Case	3.0%	-	2.7%	-	2.5%	-
High Case	4.0%	+1.0%	3.3%	+0.6%	4.1%	+1.6%
Low Case	2.0%	-1.0%	2.1%	-0.6%	0.9%	-1.6%

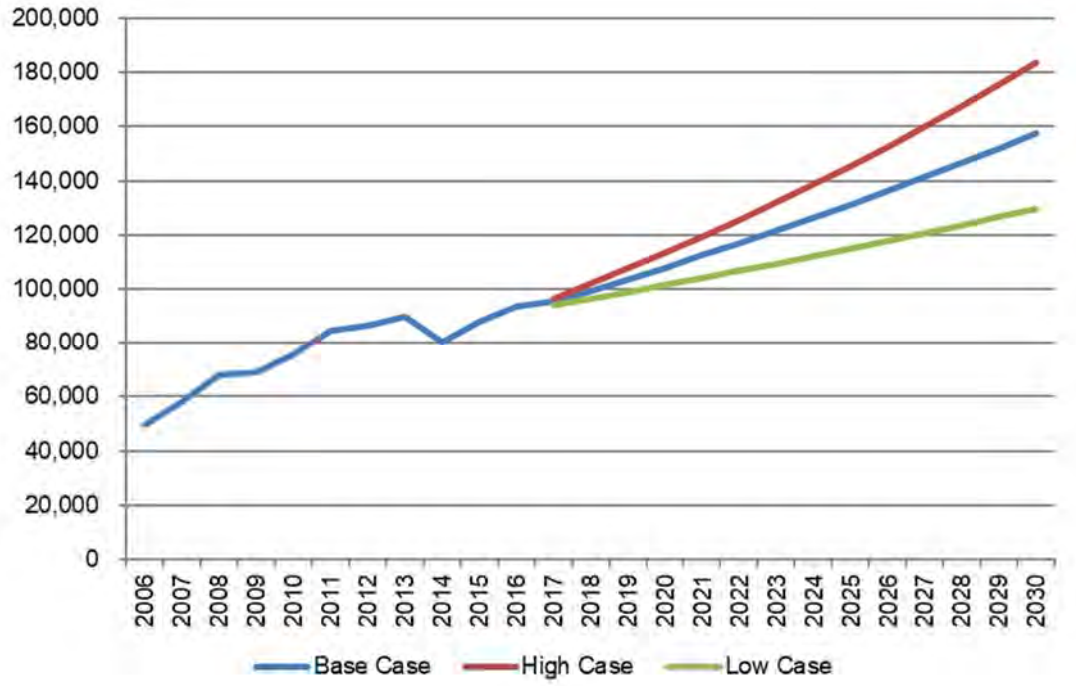


Figure A-16 Results of Sensitivity Analysis (Domestic Passengers)

Table A-17 Results of Sensitivity Analysis

Year	Base Case		High Case		Low Case	
	Passenger	CAGR*	Passenger	CAGR*	Passenger	CAGR*
2016	93,484	2.2%	-	-	-	-
2020	107,894	4.3%	113,265	5.5%	101,424	2.6%
2025	131,048	4.0%	145,305	5.1%	114,871	2.5%
2030	157,545	3.8%	183,647	4.8%	129,553	2.4%

*Compound annual growth rate of previous five years

`UNWTO[1] Tourism Towards 2030` estimates an average 3.8% growth of travelers for emerging countries/regions in 2020-2030. It could be said, therefore, that results of the Base Case is appropriate as the growth rate of 3.0% is comparable to UNWTO's forecast of 3.8%.

(11) Domestic Flight Passengers

Domestic flight passengers are forecast as depicted in the figure below. Sensitivity analysis is carried out in the same way as for international passengers. As in the case for international passengers, GDP growth rate of Solomon Islands under High Case and Low Case are assumed to be 1.0% higher and 1.0% lower than that of Base Case, respectively.

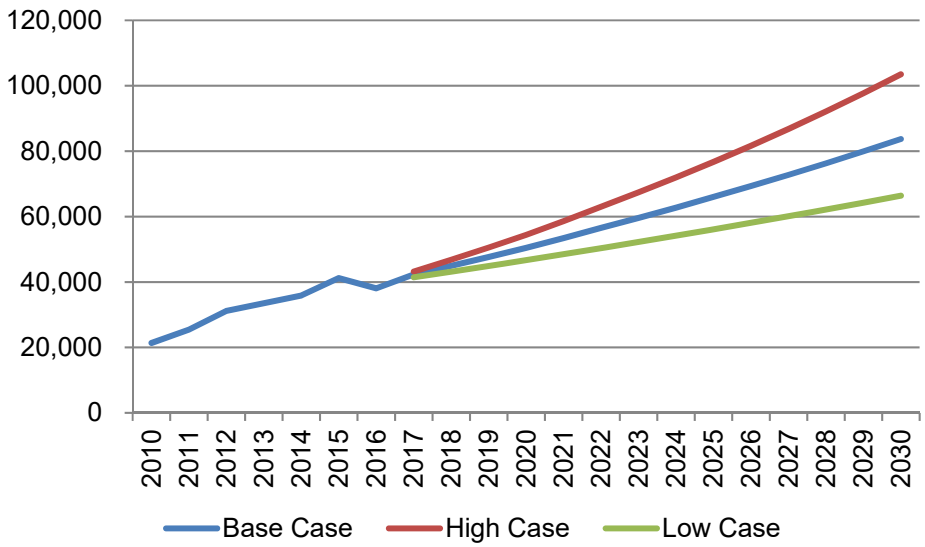


Figure A-17 Results of Sensitivity Analysis of Domestic Passengers

Table A-18 Results of Sensitivity Analysis

Year	Base Case		High Case		Low Case	
	Passenger	CAGR*	Passenger	CAGR*	Passenger	CAGR*
2016	38,055	8.9%	-	-	-	-
2020	50,465	4.3%	54,422	8.0%	46,626	4.0%
2025	65,992	5.5%	76,721	7.1%	56,109	3.8%
2030	83,711	4.9%	103,506	6.2%	66,386	3.4%

*Compound annual growth rate of previous five years

[1] United Nations World Tourism Organization

(12) International Flight Cargoes

The figure below indicates estimated international air cargo volume.

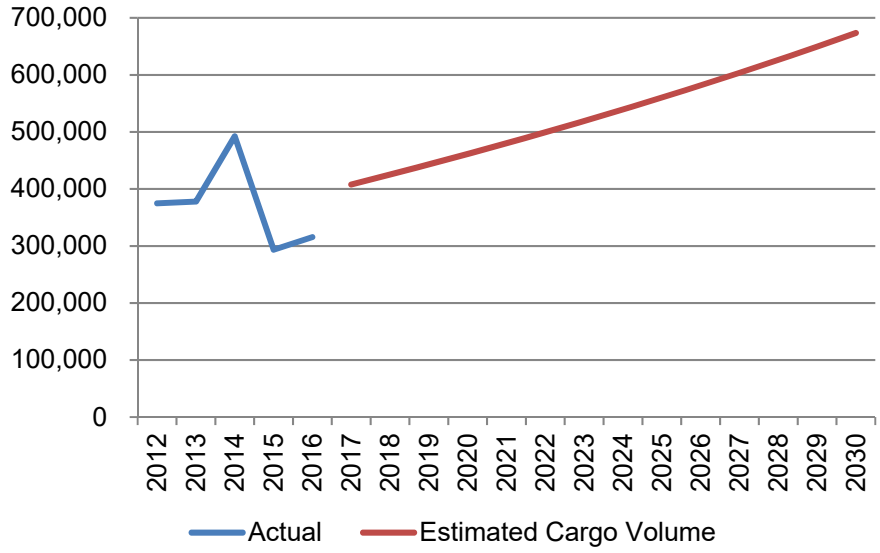


Figure A-18 Estimated International Cargo Demand

Table A-19 International Cargo Demand

	Cargo (kg)	Growth Rate
2016	315,578	-
2020	461,280	4.2%
2025	560,272	4.0%
2030	673,556	3.8%

(13) Domestic Flight Cargoes

The figure below depicts estimated domestic air cargo volume.

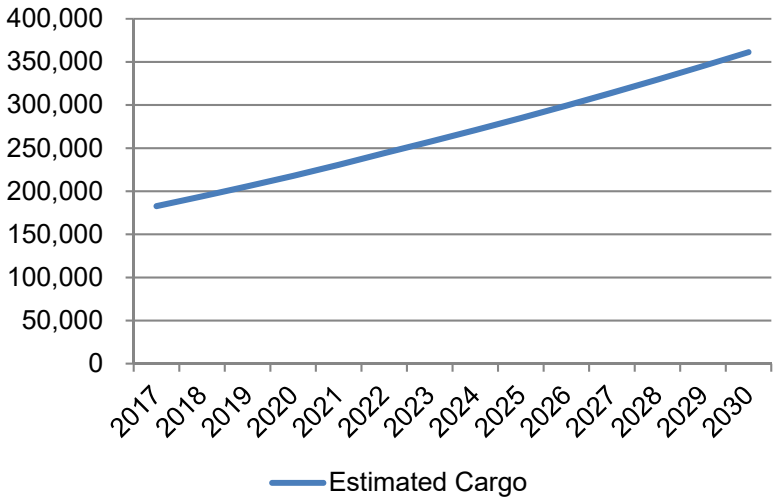


Figure A-19 Estimated Domestic Cargo Demand

Table A-20 Domestic Cargo Demand

	Cargoes (kg)	Growth Rate
2016	127,745	-
2020	217,823	6.0%
2025	284,842	5.5%
2030	361,326	4.9%

According to Solomon Islands Visitors Bureau, there are approximately 1,800 guest rooms in Solomon Islands, half of which are in Honiara. There is reportedly a plan to increase guest rooms to 2,000 to meet the future demand.

It is verified in the following whether accommodation capacity could be a constraint to air travel demand growth in Solomon Islands in the future. Available number of beds is calculated and tested based on the below assumptions.

- Average days of stay in the country: 13 days (source: Solomon Islands Visitors Bureau)
- Average number of beds per room: 2 (source: Solomon Islands Visitors Bureau)
- Operation rate at middle and high-class hotels: 70-80%
- Guests per room: 1.8 (considering single travelers)

The analysis calculates that the operation rate of the present guest rooms will be approximately 78% in 2025, comparable to the present operation rate. Thus, it would be difficult to regard

accommodation capacity to be a constraint to future air travel demand growth in Solomon Islands, except possibly for temporary period of international events such as Pacific Games. It is especially so if guest rooms are increased by 200. It should be noted, however, that the present analysis is based on annual average and actual situation may possibly be different from the analysis.

(14) Forecast of Annual Aircraft Movements

Aircraft movements of both international and domestic flights are forecast. Equipment presently operational at Honiara Airport are small jets such as A320 and B737 for international flights, and propeller planes such as DHC 8 and DHC 6 for domestic flights. In forecasting aircraft movements, difference in equipment is ignored as they are of comparable size. That is to say, A320 and B737 are more or less of the same size and DHC8 and DHC6 are equally the small size.

Present international aircraft movements of scheduled flights are reportedly to be about 1,006 per annum. Weighted average number of seats is calculated at 168 based on 136 seats of A320 and 180 seats of B737. Average load factor of aircraft then is calculated at 55%. The table below indicates load factor by route and airplane.

Table A-21 Load Factor by Route

	HIR-BNE	HIR-INU	HIR-NAN	HIR-POM	HIR-VLI	HIR-VLI-NAN
AIR NIUGINI	-	-	5.0%	9.9%	22.7%	-
FIJI AIRWAYS	48.9%	-	33.7%	-	28.6%	-
NAURU AIRLINES	4.2%	0.2%	0.0%	-	-	-
QANTAS	54.1%	-	41.9%	-	-	-
SOLOMON AIRLINES	59.1%	-	33.0%	-	63.4%	56.1%
VIRGIN AUSTRALIA	41.1%	-	-	56.1%	-	-

Load factor of Air Niugini and Nauru Airlines are very low. The reason being that aircraft stopping over at Honiara Airport (e.g., Port Moresby-Honiara-Nadi and Brisbane-Honiara-Nauru) are included in aircraft movements of Honiara Airport while not all passengers on those connecting flights depart from or arrive at Honiara Airport.

The only domestic aircraft movement data was provided by ATC. The data, however, is not

detailed enough. There is no breakdown by international/domestic flight, equipment, or departure/arrival. The present timetable seems to be the only data source showing domestic routes. A reference month in 2016 is selected and is multiplied by 12 to assume seats and aircraft movements.

(15) Future Flight Routes

There are international scheduled flights to and from Brisbane, Nauru, Nadi, Port Moresby ad Port Vila at present.

Solomon Airlines operates flights between Honiara and Brisbane (four times a week), Nauru (once a week) and Nadi (once a week). Air Niugini operates most flights including connecting flights such as Port Moresby-Honiara-Nadi flights.

Solomon Airlines hopes to install A330 in the future although the company does not yet have concrete equipment plan or schedule. The analysis assumes that Solomon Airlines will not install any new equipment in the future.

(16) International Flight Passenger Demand by Route

The table below summarizes estimated international passengers by nationality. There is no breakdown data by route for Solomon Islanders. Thus, to approximate number of national travelers for each route, number of foreign passengers is deducted from total seats taken, calculated based on load factor and seats by route.

Table A-22 International Passenger Demand by Nationality

Country	Share (Average of 2014-2016)	2016	2020	2025	2030
Australia	43.5%	20,191	24,705	30,939	38,085
PNG	6.1%	2,835	3,469	4,344	5,348
US	6.2%	2,875	3,518	4,405	5,423
NZ	6.8%	3,149	3,853	4,826	5,940
UK	1.7%	768	939	1,176	1,448
Japan	2.5%	1,172	1,434	1,796	2,211
Germany	0.6%	264	323	404	498
Canada	0.7%	335	410	513	631
Other Pacific	2.8%	1,298	1,588	1,988	2,448
Vanuatu	3.1%	1,421	1,739	2,178	2,681

Country	Share (Average of 2014-2016)	2016	2020	2025	2030
Hong Kong	0.4%	206	252	315	388
Fiji	6.5%	3,002	3,673	4,600	5,663
Other Asia	11.6%	5,400	6,608	8,275	10,186
Netherlands	0.3%	130	160	200	246
Other Europe	2.1%	978	1,197	1,499	1,845
France	0.6%	271	331	415	511
Italy	0.4%	165	202	252	311
China	3.5%	1,621	1,983	2,484	3,057
Others	0.6%	295	361	452	556
Total	100.0%	46,376	56,743	71,062	87,475

Tables below summarize estimated international flight passengers by route and airline, calculated based on scheduled flights. As chartered flights are not included in the calculation, below figures may differ from actual or estimated traffic.

Table A-23 International Passenger Demand by Route and Airline (2016)

	HIR-BNE	HIR-INU	HIR-NAN	HIR-POM	HIR-VLI	HIR-VLI-NAN	Total
SOLOMON AIRLINES	24,324	0	2,617	0	616	5,388	32,945
FIJI AIRWAYS	122	0	12,296	0	122	0	12,539
AIR NIUGINI	70	0	5,249	7,243	1,855	0	14,417
NAURU AIRLINES	438	446	16	0	0	0	900
QANTAS	6,349	0	1,411	0	0	0	7,760
VIRGIN AUSTRALIA	15,750	0	0	149	0	0	15,899
Total	47,053	446	21,588	7,392	2,592	5,388	84,460

Table A-24 International Passenger Demand by Route and Airline (2020)

	HIR-BNE	HIR-INU	HIR-NAN	HIR-POM	HIR-VLI	HIR-VLI-NAN	Total
SOLOMON AIRLINES	28,064	0	3,020	0	710	6,217	38,011
FIJI AIRWAYS	140	0	14,186	0	140	0	14,467
AIR NIUGINI	81	0	6,056	8,357	2,140	0	16,634
NAURU AIRLINES	506	515	18	0	0	0	1,038
QANTAS	7,325	0	1,628	0	0	0	8,953
VIRGIN AUSTRALIA	18,172	0	0	171	0	0	18,344
Total	54,289	515	24,908	8,529	2,991	6,217	97,448

Table A-25 International Passenger Demand by Route and Airline (2025)

	HIR-BNE	HIR-INU	HIR-NAN	HIR-POM	HIR-VLI	HIR-VLI-NAN	Total
SOLOMON AIRLINES	34,081	0	3,667	0	863	7,550	46,160
FIJI AIRWAYS	171	0	17,228	0	171	0	17,569
AIR NIUGINI	98	0	7,354	10,149	2,599	0	20,200
NAURU AIRLINES	614	625	22	0	0	0	1,261
QANTAS	8,896	0	1,977	0	0	0	10,873
VIRGIN AUSTRALIA	22,068	0	0	208	0	0	22,277
Total	65,928	625	30,248	10,357	3,632	7,550	118,340

Table A-26 International Passenger Demand by Route and Airline (2030)

	HIR-BNE	HIR-INU	HIR-NAN	HIR-POM	HIR-VLI	HIR-VLI-NAN	Total
SOLOMON AIRLINES	40,966	0	4,408	0	1,037	9,075	55,486
FIJI AIRWAYS	205	0	20,708	0	205	0	21,118
AIR NIUGINI	118	0	8,840	12,200	3,124	0	24,281
NAURU AIRLINES	738	751	26	0	0	0	1,516
QANTAS	10,693	0	2,376	0	0	0	13,069
VIRGIN AUSTRALIA	26,527	0	0	250	0	0	26,777
Total	79,247	751	36,359	12,450	4,366	9,075	142,248

The table below lists aircraft equipment.

Table A-27 Aircraft Equipment List

	Equipment	Seats	Airline	Notes
International Flight	A 320	136	Solomon Airlines	
	B 737	180	Virgin Australia, Air Niugini, Air Pacific, Nauru Airlines	
Domestic Flight	DHC 8	36	Solomon Airlines	1 aircraft
	DHC 6	18	Solomon Airlines	3 aircraft
	Islander	8	Solomon Airlines	2 aircraft （0 after March 2017）

(17) Peak Day Demand

To project daily international aircraft movements, the peak day factor is first determined based on annual demand. IATA ADRM 10th Edition defines the peak day factor as the value of the 30th largest daily passengers of the year divided by annual passenger traffic. The peak day factor is accordingly calculated at 1/222 based on the average 30th largest daily passenger traffic in 2014-2016. The load factor is formulated assuming that an additional flight will be operational in 2025, when the load factor of the peak day is expected to approximate 85%.

(18) Peak Hour Demand

Peak hour demand depends strongly on operation schedule of aircraft. Under existing operation schedule, the peak hour is 14:00 to 15:00 on Tuesday, with 2 departures and 2arrivals. Congestion will not likely worsen any further as there is enough capacity for aircraft movements in other hours. The peak hour demand is calculated by multiplying the peak day load factor by available seats. Results are shown below. Passengers are expected to decrease temporarily in 2025 following addition of 1 flight in the year.

(19) Projection of International Aircraft Movements

Annual international aircraft movements by route is presented in tables below. Routes with very low load factor are included in non-scheduled flights.

Table A-28 International Aircraft Movements by Route and Airline (2016)

	BNE	INU	NAN	POM	VLI	VLI -NAN	Non -scheduled	Total
SOLOMON AIRLINES	316	0	34	0	8	70	-	428
FIJI AIRWAYS	2	0	202	0	2	0	-	206
QANTAS	90	0	20	0	0	0	-	110
VIRGIN AUSTRALIA	212	0	0	2	0	0	-	214
Total	620	0	256	2	10	70	1,054	2,012

Table A-29 International Aircraft Movements by Route and Airline (2020)

	BNE	INU	NAN	POM	VLI	VLI -NAN	Non -scheduled	Total
SOLOMON AIRLINES	283	0	55	0	7	66	0	410

FIJI AIRWAYS	2	0	250	0	3	0	0	255
QANTAS	81	0	23	0	0	0	0	104
VIRGIN AUSTRALIA	263	0	0	2	0	0	0	265
Total	628	0	328	2	10	66	1,123	2,156

Table A-30 International Aircraft Movements by Route and Airline (2025)

	BNE	INU	NAN	POM	VLI	VL I-NAN	Non -scheduled	Total
SOLOMON AIRLINES	343	0	66	0	8	80	0	498
FIJI AIRWAYS	2	0	304	0	4	0	0	310
QANTAS	98	0	28	0	0	0	0	126
VIRGIN AUSTRALIA	319	0	0	2	0	0	0	322
Total	763	0	398	2	12	80	1,138	2,393

Table A-31 International Aircraft Movements by Route and Airline (2030)

	BNE	INU	NAN	POM	VLI	VLI -NAN	Non -scheduled	Total
SOLOMON AIRLINES	413	0	80	0	10	96	0	598
FIJI AIRWAYS	2	0	366	0	4	0	0	372
QANTAS	118	0	34	0	0	0	0	151
VIRGIN AUSTRALIA	384	0	0	3	0	0	0	387
Total	917	0	479	3	14	96	1,155	2,663

(20) International Aircraft and Passenger Traffic in Peak Month and Day

The table below summarizes estimated international aircraft and passenger traffic in the peak month and day.

Table A-32 International Aircraft and Passenger Traffic (Peak Month and Day)

	Peak Month			Peak Day		
	Aircraft Movements	Passengers		Aircraft Movements	Passengers	
		Traffic	Peak Ratio		Traffic	Peak Ratio
2016	194	9,442	59%	8	421	62%
2020	194	10,897	68%	9	486	72%
2025	218	13,236	73%	10	590	69%
2030	258	15,912	73%	11	709	83%

(21) International Aircraft and Passenger Traffic in Peak Hour

The table below shows estimated international aircraft movements and passenger traffic in the peak hour.

Table A-33 International Aircraft and Passenger Traffic (Peak Hour)

	Aircraft Movements	Passenger Traffic		
		Departure	Arrival	Total
2016	4	177	177	354
2020	4	203	203	406
2025	4	195	195	390
2030	4	233	233	465

(22) Domestic Flight Routes by Equipment

Tables below summarize domestic flight routes by equipment. Figures show total aircraft movements.

Table A-34 Domestic Flight Routes（DHC 8）

	GZO	IRA	MUA	SCZ
DHC 8	14	4	12	4

Table A-35 Domestic Flight Routes（DHC 6）

	AKS	ATD	BNY	CHY	EGM	FRE	GZO	IRA	KGE	MUA	NNB	RBV	RNA	RNL	RUS	VAO
DHC6	14	4	4	2	11	8	16	3	3	2	2	2	2	8	5	8

(23) Projection of Domestic Aircraft Movements

Domestic aircraft movements are projected as are summarized in the table below. The demand should be comfortably accommodated with the present movements until 2027 by increasing the load factor. Average load factor will exceed 50% after 2027 with present movements. The analysis assumes that aircraft movements are increased after 2027 to maintain 50% load factor.

Table A-36 Projected Domestic Aircraft Movements

Year	Movement
2016	6,583
2020	6,583
2025	6,583
2030	7,349

(24) Projection of Domestic Aircraft and Passenger Movements in Peak Month and Day

The table below summarizes projected domestic aircraft movements and passenger traffic in the peak month and day.

Table A-37 Domestic Aircraft and Passenger Traffic (Peak Month and Day)

	Peak Month			Peak Day		
	Aircraft Movements	Passengers		Aircraft Movements	Passengers	
		Traffic	Peak Ratio		Traffic	Peak Ratio
2016	549	3,920	31%	22	190	38%
2020	549	4,359	35%	22	212	42%
2025	549	4,633	37%	22	225	45%
2030	549	4,912	39%	22	238	48%

(25) Domestic Aircraft and Passenger Traffic in Peak Hour

The table below summarizes estimated domestic aircraft movements and passenger traffic in the peak hour.

Table A-38 Domestic Aircraft and Passenger Traffic (Peak Hour)

	Aircraft Movements	Passenger Traffic		
		Departure	Arrival	Total
2016	6	17	35	52
2020	6	19	38	58
2025	6	20	41	61
2030	6	22	43	65

Appendix -4. Probability Statistical Evaluation of Rainfall in April 2014

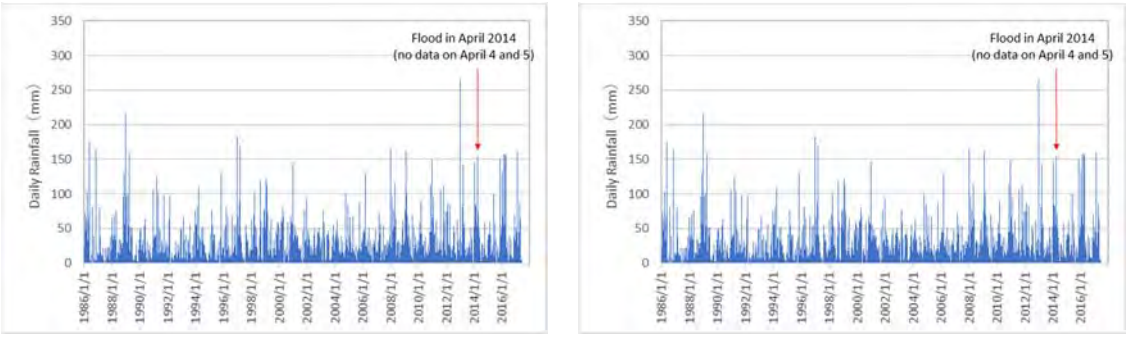
In the vicinity of the project site, meteorological observation has been conducted at Honiara Airport and the city area of Honiara. In our study, the hydrological analysis was conducted based on following data that we acquired from Meteorological Services of Solomon Islands in the field survey.

Honiara Airport: Daily Rainfall (1986 to May 2017, 31 years and 5 months)
Honiara City Area: Daily Rainfall (1986 to May 2017, 31 years and 5 months)
The table below shows top 5 rainfall at each observation station.

Table A-39 Top 5 Rainfall (1986 to May 2017)

No	Honiara Airport	Honiara City Area
1	265.6 mm (2012/12/29)	317.6 mm (2014/4/4)
2	216.0 mm (1988/12/27)	251.8 mm (2009/1/30)
3	183.0 mm (1996/12/23)	231.9 mm (2012/12/29)
4	176.0 mm (1986/5/20)	219.2 mm (2017/2/7)
5	169.0 mm (1997/3/8)	195.5 mm (2008/4/16)

Compared to Honiara city area, there are few deficiencies in the data recorded in Honiara Airport. However, the rainfall of 4th April 2014, the day when the highest rainfall was recorded in Honiara city area, and 5th April 2014 was not observed due to the damage by flood. For this reason, the data recorded in Honiara Airport is not suitable for statistic analysis, thus the data recorded in Honiara city area was used for analysis. The rainfall of rainy season (December and January) is missing in the data of 2001 and 2003 so that these were excluded from analysis.



Honiara Airport Honiara City Area

Figure A-20 Daily Rainfall in Honiara Airport and Honiara City Area

We processed the rainfall data of 29 years (1986 to 2016, 2001 and 2003 are excluded) recorded at Honiara city area. In accordance with the estimation method suggested in “Extreme Weather Risk Map (Japan Meteorological Agency)”, we adopt “Gumbel distribution” among extreme value distributions. Reasons for adoption are followings.

・Standard Least Squares Criterion (SLSC) is less than 0.04

・Estimation Deference is less than other distributions

The figure below shows the probability of exceedance and following tables summarizes the estimated difference between SLSC and Jackknife method and calculated probable daily rainfall. The result shows the rainfall when the flood was occurred in April 2014 (318mm) is 100-year probability rainfall. (the rainfall when the flood occurred in May 1986 was 145mm and it was 3-year probability rainfall)

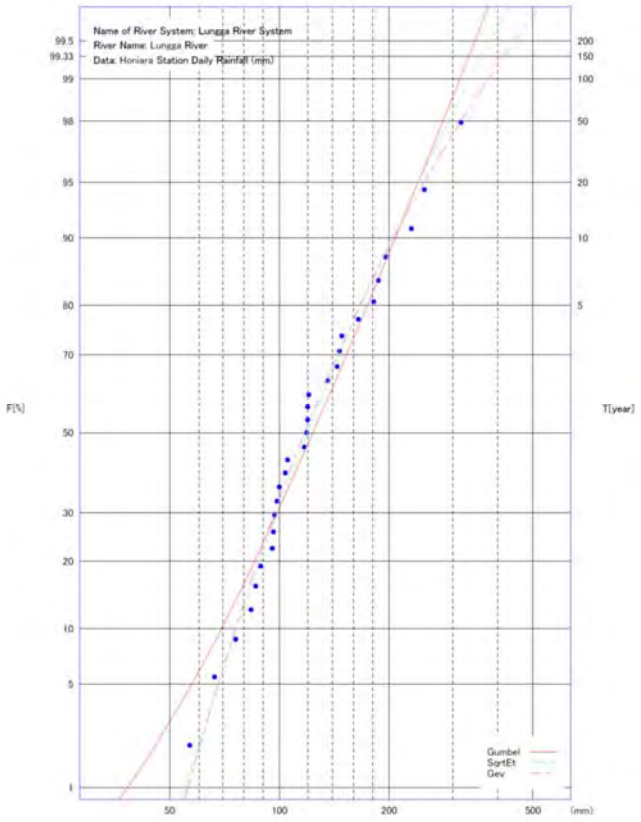


Figure A-21 Probability of Exceedance

Table A-40 SLSC of Each Method and Estimated Difference by Jackknife Method

Distribution	SLSC	Estimated Difference (50 year)	Estimated Difference (100 year)
Gumbel	0.039	39.0	45.2
Maximum Value of Square Root Index	0.028	40.2	49.1
General Extreme Value	0.021	55.6	79.7

Table A-41 Probable Daily Rainfall (Gumbel Distribution)

(Unit: mm)

Probability Year	2 year	3 year	5 year	10 year	20 year	50 year	100 year
Honiara City Area	123.4	147.6	174.5	208.4	240.9	282.9	314.4

Appendix -5. Survey Team Members

Title	Name	Organization
Team Leader	Hiroyuki UEDA	Senior Advisor for Transport Sector, JICA
Program Management	Shota SETO	Transportation and ICT Group Infrastructure and Peacebuilding Department, JICA
Chief Consultant / Airport Planner	Takao YAMAGUCHI	GYROS Corporation
Airport Civil Engineering Designer	Shinichi SAKABE	Oriental Consultants Global Co., Ltd.
Architectural Designer	Kanji EHIRA	EHIRA Architects and Engineers, Inc.
Architectural Structural Designer	Yasuhito INOUE	EHIRA Architects and Engineers, Inc.
Architectural Facility and Equipment Designer (1)	Ado KAMAGATA	System Planning Corporation Co., Ltd.
Architectural Facility and Equipment Designer (2)	Takahiro MATSUO	System Planning Corporation Co., Ltd.
Air Navigation Equipment Planner/Cost Estimator	Keiichi TAKEDA	GYROS Corporation
Airfield Lighting System Designer/Cost Estimator	Kenjiro ISHIMATSU	K. I. Engineering
Electrical Equipment Designer	Katsuya TERABAYASHI	Oriental Consultants Global Co., Ltd.
Flood Control Planner	Satoshi TAKATA	CTI Engineering International Co., Ltd.
Construction and Procurement Planner/Cost Estimator (Civil Engineering)	Hiromui KADOWAKI	GYROS Corporation
Construction and Procurement Planner/Cost Estimator (Architectural)	Marie IOKAWA	GYROS Corporation
Natural Condition Surveyor/Social and Environmental Planner/Project Coordinator	Tetsuya ISHIKAWA	GYROS Corporation
Aviation Demand Forecaster	Yuki KAWAHARA	Oriental Consultants Global Co., Ltd.

Appendix -6. List of Relevant Personnel (interviewees)

Ministry of Communication and Aviation (MCA)

Mr. Moses Virivolomo	Permanent secretary
Mr. Sylvester Kenatsi	Chief Operating Officer
Mr. Daniel Blue	Chief Financial Officer
Mr. Rex Alafa	Assist APM
Mr. Alfred Pita'a	Air Traffic Service Operations
Mr. Allard Puikers	Aviation Technical Services
Mr. Alson Navo	Aviation Security Services
Mr. Raziv Hilly	Airport Civil Engineer
Mr.Fred Dolah	Financial Controller

Civil Aviation Authority of Solomon Island (CASSI)

Mr. George Satu	Director

Ministry of Infrastructure Development (MID)

Mr. Jimmy Nuake	Under Secretary Technical
Mr. Patteson Fakavai Manuiki	Director (Architecture Building Management Service Division)
Mr. Timothy Gulolo	Cost Estimator (Architecture Building Management Division)
Mr. Mike Qaqara	Deputy Director (Transport and Geotechnical Devision)
Mr. Winston Lapo	Environmental Office (Transport and Geotechnical Devision)

Solomon Airlines

Mr. Brett Gebers	Chief Executive Officer
Mr. David Pearce	Manager Operations
Mr. Reginald William Tyson	Manager Corporate

Ministry of Development Planning and Aid Cooperation(MDPAC)

Mr. Shabrach Fanega	Permanent Secretary
Mr. Matsuko Pelomo	Principal Planning Officer, Bilateral
Ms. Siona Koti	Chief Planning Officer, Bilateral
Mr. Roy Mae	UST-Financial

Mr. Andrew Prakash	Director, Economic & Productive Sector Division

Ministry of Culture and Tourism (MCT)

Mr. Andrew Nihopara	Permanent Secretary
Mr. Moses Tepai	Under Secretary
Barney Sivoro	Director (Tourism Department)

Ministry of Environment, Climate Change, Disaster Management and Meteorology (MECDM)

Ms. Rosemary Apa	Deputy Director (Environmental and Conservation Devision)
Mr. Lloyd Tahani	Director (Meteorological Service Division)

National Statistics Office

Mr. Douglas Kimi	Government Statistician
Ms. Anterlyn Tuzakana	Principal Statistician

Tax Exemption Committee

Mr. George Tapo	Chairman of Exemption Committee
Mr. Casper Sonia	Deputy Assistant Commissioner

Honiara City Council

Mr. George Titiulu	Chief Environment Inspector

Solomon Water (Solomon Islands Water Authority : SIWA)

Mr. Scravin Tongi	Operation Manager

Solomon Power (Solomon Islands Electricity Authority : SIEA)

Mr. Mathew Korinihona

Ms. Ann Marie

Mr. Bruno Mishack

Solomon Telekom Company Limited

Mr. Patrick Kologete	Manager (Network Designs Project9

New Zealand High Commission

Mr. Don Higgins	High Commission
Mr. Steve Hamilton	First Secretary

New Zealand Civil Aviation Authority

Athol Glover	Principal Aviation Secretary Advisor

Australian High Commission

Alexandra Hutchison	First Secretary (Economic Infrastructure)

KITANO CONSTRUCTION CORP.

Mr. Yoshiyuki Kurasawa	Site Representative Project Manager (The Project for Upgrading of Kukum Highway)
Mr. Kiyoshi Katagami	General Manager (Overseas department)

WORLD KAIHATSU KOGYO CO.,LTD.

Mr. Masakazu Miura	Project Manager (The Project for Upgrading of Kukum Highway)

KATAHIRA & ENGINEERS INTERNATIONAL

Mr. Sueki Fukunaga	General Manager (Project Development Department)

Embassy of Japan in Solomon Islands

Mr. Kenichi Kimiya	Ambassador Extraordinary and Plenipotentiary
Ms. Yuko Morikawa	Researcher / Adviser

JICA Solomon Islands Office

Mr. Kyoji Mizutani	Resident representative
Mr. Shitau Miura	Assistant Representative

Appendix -7. Survey Schedule

First Field Survey

No.	Date	Team Leader (JICA)	Planning Manager (JICA)	Chief Consultant / Airport Planner	Airport Civil Engineering Designer	Architectural Designer	Architectural Structural Designer	Architectural Facility and Equipment Designer (1)	Architectural Facility and Equipment Designer (2)	Air Navigation Equipment Planner / Cost Estimator	Airfield Lighting System designer / Cost Estimator	Electrical Equipment Designer	Flood Control Planner	Construction and Procurement Planner / Cost Estimator (Civil Engineering)	Construction and Procurement Planner / Cost Estimator (Architectural)	Natural Condition Surveyor / Social and Environment Planner / Project Coordinator	Aviation Demand Forecaster
1	2017/5/7 Sun			NRT→BNE												NRT→BNE	
2	2017/5/8 Mon			BNE→HIR												BNE→HIR	
3	2017/5/9 Tue			Explanation and Discussion with Related Organizations, Field Survey, Basic Planning												Explanation and Discussion with Related Organizations, Field Survey, Basic Planning	
4	2017/5/10 Wed																
5	2017/5/11 Thu																
6	2017/5/12 Fri												NRT→BNE				
7	2017/5/13 Sat	NRT→POM		Field Survey, Basic Planning				NRT→POM				NRT→POM	BNE→HIR			Field Survey	NRT→POM
8	2017/5/14 Sun	POM→HIR		Team meeting				POM→HIR, Team Meeting				POM→HIR, Team Meeting	Team Meeting			Team Meeting	POM→HIR, Team Meeting
9	2017/5/15 Mon	Visit JICA Solomon Office and Japanese Embassy, Kick Off Meeting		Visit JICA Solomon Office and Japanese Embassy, Kick Off Meeting, Field Survey								Visit JICA Solomon Office and Japanese Embassy, Kick Off Meeting, Field Survey				Visit JICA Solomon Office and Japanese Embassy, Kick Off Meeting, Field Survey	
10	2017/5/16 Tue	Explanation and Discussion with Related Organizations, Field Survey		Explanation and Discussion with Related Organizations, Field Survey, Basic Planning								Explanation and Discussion with Related Organizations, Field Survey, Basic Planning				Explanation and Discussion with Related Organizations, Field Survey, Basic Planning	
11	2017/5/17 Wed																
12	2017/5/18 Thu																
13	2017/5/19 Fri	Signing of MD, Reporting to JICA Solomon Office and Japanese Embassy			Explanation and Discussion with Related Organizations, Field Survey, Basic Planning												
14	2017/5/20 Sat	HIR→POM			Team Meeting					NRT→POM		Team Meeting				Team Meeting	
15	2017/5/21 Sun	POM→NRT			Organizing the Collected Data					POM→HIR		Organizing Collected Data				Organizing the Collected Data	
16	2017/5/22 Mon				Explanation and Discussion with Related Organizations, Field Survey, Basic Planning												HIR→POM
17	2017/5/23 Tue															Explanation and Discussion with Related Organizations, Field Survey, Basic Planning	
18	2017/5/24 Wed																
19	2017/5/25 Thu																
20	2017/5/26 Fri																
21	2017/5/27 Sat				Team Meeting											Team Meeting	
22	2017/5/28 Sun				Organizing the Collected Data											Organizing the Collected Data	
23	2017/5/29 Mon				Explanation and Discussion with Related Organizations, Field Survey, Basic Planning									NRT→BNE		Explanation and Discussion with Related Organizations, Field Survey, Basic Planning	
24	2017/5/30 Tue													BNE→HIR			
25	2017/5/31 Wed													Explanation and Discussion with Related Organizations			
26	2017/6/1 Thu				Explanation and Discussion with Related Organizations, Field Survey, Basic Planning								HIR→BNE	Survey on Procurement Conditions			
27	2017/6/2 Fri				Explanation and Discussion with Related Organizations, Field Survey, Basic Planning		HIR→BNE			Explanation and Discussion with Related Organizations, Field Survey, Basic Planning			BNE→NRT				
28	2017/6/3 Sat			BNE→HIR, Team Meeting	Team Meeting		BNE→SIN、SIN→HND			Team Meeting				Team Meeting			
29	2017/6/4 Sun			Organizing the Collected Data						Organizing the Collected Data				Organizing the Collected Data			
30	2017/6/5 Mon			Basic Planning						Basic Planning				Basic Planning			
31	2017/6/6 Tue			Explanation and Discussion with Related Organizations, Field Survey, Basic Planning						Explanation and Discussion with Related Organizations, Field Survey, Basic Planning				Survey on Procurement Conditions, Survey for Construction/Installation Planning		Explanation and Discussion with Related Organizations, Field Survey, Basic Planning, Natural Condition Survey	
32	2017/6/7 Wed																
33	2017/6/8 Thu									Explanation and Discussion with Related Organizations, Basic Planning		HIR→POM、POM→SIN					
34	2017/6/9 Fri									HIR→BNE		SIN→HND					
35	2017/6/10 Sat			Team Meeting						BNE→SIN、SIN→HND				Team Meeting			
36	2017/6/11 Sun			Organizing the Collected Data	HIR→BNE	Organizing the Collected Data								Organizing the Collected Data			
37	2017/6/12 Mon			Explanation and Discussion with Related Organizations, Basic Planning, Confirmation of Obligations of Solomon Government, Planning for Operation and Maintenance	BNE→NRT	Explanation and Discussion with Related Organization, Basic Planning, Planning for Operation and Maintenance								Survey on Procurement Conditions, Survey for Construction/Installation Planning		Explanation and Discussion with Related Organizations, Basic Planning, Natural Condition Survey	
38	2017/6/13 Tue																
39	2017/6/14 Wed																
40	2017/6/15 Thu																
41	2017/6/16 Fri			Organizing the Collected Data		Organizing the Collected Data								HIR→BNE		Organizing the Collected Data	
42	2017/6/17 Sat													BNE→NRT			
43	2017/6/18 Sun																
44	2017/6/19 Mon			Reporting to JICA Solomon Office and Japanese		Reporting to JICA Solomon Office and Japanese										Reporting to JICA Solomon Office and Japanese	
45	2017/6/20 Tue			Explanation and Discussion with Related Organizations, Preparation for Reporting to Solomon Side		HIR→BNE、BNE→SYD										HIR→BNE、BNE→SYD	
46	2017/6/21 Wed					SYD→HND										SYD→HND	
47	2017/6/22 Thu			Reporting to Solomon Side, Signing of Technical Memorandum													
48	2017/6/23 Fri			HIR→BNE													
49	2017/6/24 Sat			BNE→NRT													

Second Field Survey

No.	Date	Day	Natural Condition Surveyor / Social and Environment Planner / Project Coordinator
1	2017/11/26	Sun	NRT→BNE (QF062 19:30-05:40)
2	2017/11/27	Mon	BNE→HIR (QF379 10:00-14:15)
3	2017/11/28	Tue	Explanation to JICA Solomon Islands Office、Meeting with MCA
4	2017/11/29	Wed	Arrangement for Immigration and Working Permit for Survey Members
5	2017/11/30	Thu	Arrangement for Immigration and Working Permit for Survey Members, Arrival of Survey Members
6	2017/12/1	Fri	Introduction Meeting with Survey Members and MCA members
7	2017/12/2	Sat	Dynamic Cone Penetration Test (for Subgrade Soil)
8	2017/12/3	Sun	
9	2017/12/4	Mon	
10	2017/12/5	Tue	
11	2017/12/6	Wed	Laboratory Tests (for Subgrade Soil)
12	2017/12/7	Thu	
13	2017/12/8	Fri	
14	2017/12/9	Sat	Preparation of Documents
15	2017/12/10	Sun	
16	2017/12/11	Mon	Arrangement for Customs Clearance for Boring Equipment, Meeting with MCA and Other Organizations
17	2017/12/12	Tue	
18	2017/12/13	Wed	
19	2017/12/14	Thu	
20	2017/12/15	Fri	Reporting to JICA Solomon Islands Office, Take Over to MCA
21	2017/12/16	Sat	HIR→POM (PX085 10:50-12:10)、POM→NRT (PX054 14:20-20:05)

Explanation of Draft Report

No.	Date	Day	Team Leader (JICA)	Planning Manager (JICA)	Chief Consultant / Airport Planner	Architectural Designer	Natural Condition Surveyor / Social and Environment Planner / Project Coordinator
1	2018/2/12	Mon	NRT→MNL				
2	2018/2/13	Tue	MNL→POM, POM→HIR, Team Meeting				
3	2018/2/14	wed	Visit JICA Solomon Office and Japanese Embassy				
4	2018/2/15	Thu	Explanation and Discussion of Draft Fina Report, Explanation on Japanese Grant Aid Project, Advance Discussion on MD				
5	2018/2/16	Fri	Discussion and Signing of MD, Reporting to JICA Solomon Office and JapanesenEmbassy				
6	2018/2/17	Sat	HIR→POM→NRT				

Appendix -8. Minutes of Discussions (M/D) -1

MINUTES OF DISCUSSIONS
ON
THE PREPARATORY SURVEY
FOR
THE PROJECT FOR IMPROVEMENT OF HONIARA AIRPORT

In response to the request from the Government of Solomon Islands, Japan International Cooperation Agency (hereinafter referred to as "JICA") dispatched the Preparatory Survey Team for the Outline Design (hereinafter referred to as "the Team") of the Project for Improvement of Honiara Airport (hereinafter referred to as "the Project"), headed by Hiroyuki Ueda, Senior Transport Sector Advisor of JICA, from May 14 to 20, 2017. The Team held a series of discussions with the officials of the Government of Solomon Islands and conducted a field survey. In the course of the discussions, both sides have confirmed the main items described in the attached sheets.

Honiara, May 19, 2017

Hiroyuki Ueda
Leader
Preparatory Survey Team
Japan International Cooperation Agency
Japan

Moses S. Virivolomo
Permanent Secretary
Ministry of Communication and Aviation
Solomon Islands

ATTACHMENT

1. Objective of the Project

The objective of the Project is to strengthen safety of airport operations, to cope with future growth of air traffic demands and to reduce vulnerability of airport facilities against natural disaster through the improvement of facilities and equipment at Honiara Airport, thereby contributing to socio-economic development of Solomon Islands.

2. Title of the Preparatory Survey

Both sides confirmed the title of the Preparatory Survey as "the Preparatory Survey for the Project for Improvement of Honiara Airport".

3. Project Site

Both sides confirmed that the site of the Project is Honiara Airport, of which location map is shown in Annex 1.

4. Responsible Authorities for the Project

Both sides confirmed the authorities responsible for the Project are as follows:

4-1. Ministry of Communication and Aviation (MCA) will be the executing agency for the Project (hereinafter referred to as "the Executing Agency"). The Executing Agency shall coordinate with all the relevant authorities to ensure smooth implementation of the Project and ensure that the undertakings for the Project shall be managed by relevant authorities properly and on time. The organization chart of MCA is shown in Annex 2.

4-2. Solomon Islands Airports Corporation Limited (SIACL) will be responsible for operation and maintenance of Honiara Airport. Honiara Airport is currently owned by MCA, and its ownership will be planned to be transferred with operation and maintenance obligation to SIACL in January 2018.

4-3. JICA will monitor the progress of transfer of Honiara Airport from MCA to SIACL, and confirm that adequate staff and budget will be allocated for operation and maintenance of Honiara Airport.

5. Items requested by the Government of Solomon Islands

5-1. As a result of discussions between both sides, the items shown in the following table were finally requested by the Government of Solomon Islands.

Scope of the Project
1. Rehabilitation of existing taxiway and apron
2. Expansion of existing apron
3. Construction of new connecting taxiway

4.	Installation of new airfield lights
5.	Renovation of existing international passenger terminal building
6.	Construction of a new domestic passenger terminal building
7.	Construction of a new control tower building with equipment
8.	Construction of a new rescue and firefighting station
9.	Construction of flood protection embankment

5-2. JICA will assess the feasibility of the above requested items through the survey and will report the findings to the Government of Japan. The final scope of the Project will be decided by the Government of Japan.

6. Procedures and Basic Principles of Japanese Grant

6-1. The Solomon Islands side agreed that the procedures and basic principles of Japanese Grant as described in Annex 3 shall be applied to the Project.

6-2. The Solomon Islands side agreed to take the necessary measures, as described in Annex 4, for smooth implementation of the Project. The contents of the Annex 4 will be elaborated and refined during the Preparatory Survey and agreed in the mission dispatched for explanation of the Draft Preparatory Survey Report. Annex 4 will eventually be used as an attachment to the Grant Agreement (G/A).

6-3. As for the monitoring of the implementation of the Project, JICA requires the Solomon Islands side to submit the Project Monitoring Report, the form of which is attached as Annex 5.

7. Schedule of the Survey

7-1. The Team will proceed with further survey in Solomon Islands until June 20, 2017.

7-2. JICA will prepare a draft Preparatory Survey Report in English and dispatch a mission to the Solomon Islands in order to explain its contents around middle of December 2017.

7-3. If the contents of the draft Preparatory Survey Report are accepted and the undertakings for the Project are fully agreed by the Solomon Islands side, JICA will finalize the Preparatory Survey Report and send it to Solomon Islands side around middle of May 2018.

7-4. The above schedule is tentative and subject to change.

8. Environmental and Social Considerations

8-1. The Solomon Islands side confirmed to give due environmental and social considerations before and during implementation, and after completion of the Project, in accordance with the JICA Guidelines for Environmental and Social Considerations (April 2010).

8-2. The Team explained that the Project is categorized as "Category B" according to the

JICA Guidelines for Environmental and Social Considerations (April 2010) since the Project includes construction of new pavements, buildings and flood protection embankment, which may impact on the surrounding areas of the Project.

The Solomon Islands 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 Solomon Islands side will obtain an Environmental Impact Assessment (EIA) certificate by the time of Exchange of Notes (E/N) between the Government of Japan and the Government of Solomon Islands, if EIA is required by the Solomon Islands regulation.

9. Other Relevant Issues

9-1 The Solomon Islands side 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) Credentials or identification cards;
(4) Entry permits necessary for the Team members to conduct field surveys;
(5) Support in obtaining other privileges and benefits, if necessary;
(6) Security-related information as well as measures to ensure the safety of the Team; and
(7) Information as well as support in obtaining medical service.

9-2 The Solomon Islands side agreed that it would find a riverbed at reasonable distance from the airport where rocks and stones for gravel can be taken for the Project, and it would pay rent and premium for taking those raw materials for the Project. The Solomon Islands side indicated the riverbed site at Lunga River owned by a church as a candidate site. The Solomon Islands side agreed to provide the Team with information of the candidate site by the end of May 2017.

9-3 The Solomon Islands side will provide the Team with site clearance report of Unexploded Objects (UXOs) for the Project site by the end of May 2017. For areas where site clearance has not been confirmed, the grant aid will cover the survey cost for detection and discrimination of UXOs. Such areas should include the riverbed where rocks and stones for gravel to be used by the Project will be taken. The Solomon Islands side will be responsible for clearance of UXOs found by the survey.

9-4 The Solomon Islands side agreed that custom duties, internal taxes and other fiscal levies which may be imposed in the Solomon Islands with respect to the purchase of the products and/or services procured by Japanese Grant under the Project should be

exempted.

For smooth tax exemption process, MCA is to start the following preparations for the application of tax exemption and consultation with Ministry of Finance and Treasury (hereinafter referred to as MoFT) and relevant organizations, if any, based on the past E/N contents as soon as possible.

(1) MCA consults with MoFT to acquire comprehensive approval for the exemption from MoFT for all imposed tax with respect to the project, just after the completion of detailed design,

(2) MCA consults with MoFT to apply "automatic" tax exemption procedures for each shipment, procurement, and purchase of products and/or services in response to MCA's request based on the comprehensive approval abovementioned.

In case the exemption would not be processed in a timely manner, anyhow, both sides confirmed such tentative payment(s) would owned by the Solomon Islands side.

9-5 The Solomon Islands side informed that it would remove the hangar and office of general aviation operator located in the south of existing international apron by the signing of the G/A.

9-6 The Solomon Islands side understood the principle of the Japan's Development Cooperation Charter, which stresses that ODA must not be utilized for military purpose or promoting international conflicts, and agreed to ensure that the facilities and equipment to be procured in the Project will never be used for any military purposes.

9-7 Both sides agreed that the contents of the Preparatory Survey Report excluding cost estimation of the Project will be disclosed to the public after completion of the Preparatory Survey. All the contents of the Preparatory Survey Report including cost estimation of the Project will be disclosed to the public after the contract for construction/supply of the Project facilities/equipment is concluded. Nevertheless of the above, both can discuss the parts of the Preparatory Report that should not be disclosed to the public from security aspect, and exclude those parts from disclosure before the Preparatory Report is published.

9-8 To avoid accidents on site during the implementation of the Project, the Solomon Islands side agreed to cause the consultant and the contractor to enforce safety measures such as setting safety assurance to the site, providing information for security control to public, and deploying adequate security personnel, based on the JICA Guidance for the Management of Safety for Construction Works in Japanese ODA Projects (September 2014), which has been published on JICA's website shown below.

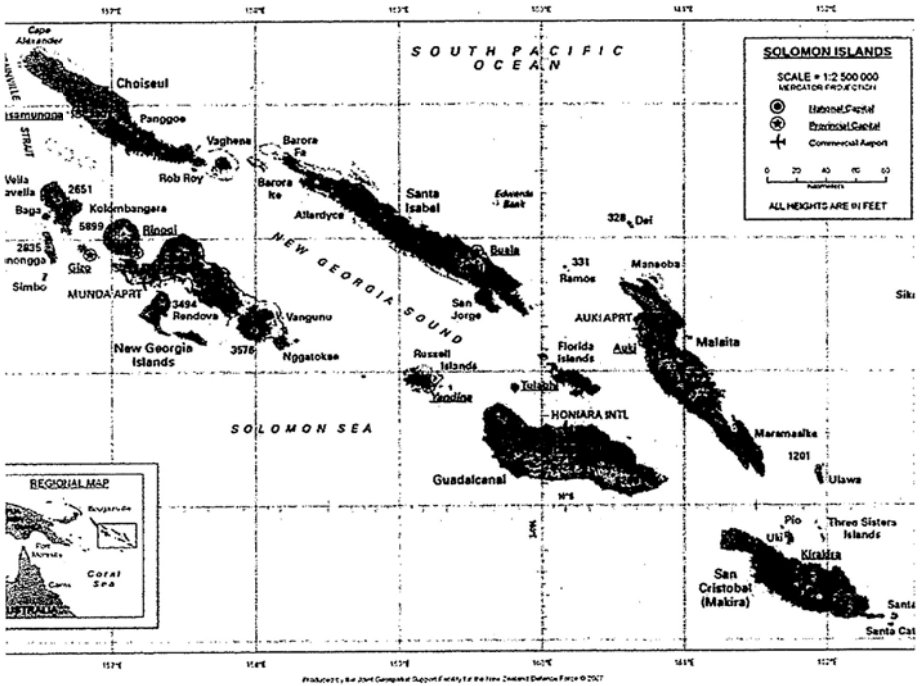
https://www.jica.go.jp/english/our_work/types_of_assistance/c8h0vm00008zx0m8-att/guidance_en.pdf

9-9 The Solomon Islands side shall provide security measures for all concerned Japanese nationals working for the Project, if deemed necessary.

Annex 1: Project Site
Annex 2: Organization Chart
Annex 3: Japanese Grant
Annex 4: Major Undertakings to be taken by the Government of Solomon Islands
Annex 5: Project Monitoring Report (template)

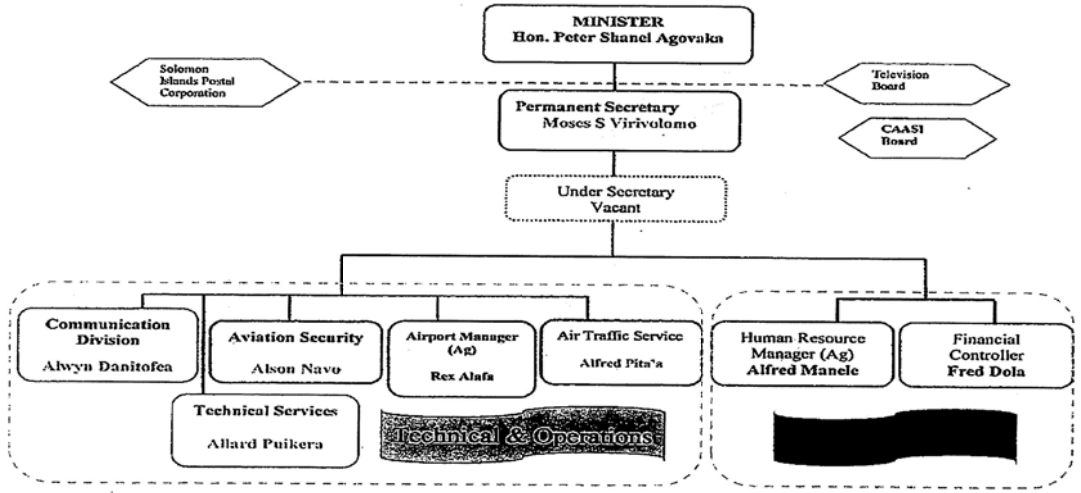
Annex 1

PROJECT SITE



Annex 2

ORGANIZATION CHART OF MINISTRY OF COMMUNICATION AND AVIATION



Annex 3

JAPANESE GRANT

The Japanese Grant is non-reimbursable fund provided to a recipient country (hereinafter referred to as "the Recipient") to purchase the products and/or 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. Followings are the basic features of the project grants operated by JICA (hereinafter referred to as "Project Grants").

1. Procedures of Project Grants

Project Grants are conducted through following procedures (See "Attachment-1: Procedures of Japanese Grant" for details):

(1) Preparation
- The Preparatory Survey (hereinafter referred to as "the Survey") conducted by JICA

(2) Appraisal
- Appraisal by the government of Japan (hereinafter referred to as "GOJ") and JICA, and Approval by the Japanese Cabinet

(3) Implementation

Exchange of Notes
- The Notes exchanged between the GOJ and the government of the Recipient

Grant Agreement (hereinafter referred to as "the G/A")
- Agreement concluded between JICA and the Recipient

Banking Arrangement (hereinafter referred to as "the B/A")
- Opening of bank account by the Recipient in a bank in Japan (hereinafter referred to as "the Bank") to receive the grant

Construction works/procurement
- Implementation of the project (hereinafter referred to as "the Project") on the basis of the G/A

(4) Ex-post Monitoring and Evaluation
- Monitoring and evaluation at post-implementation stage

2. Preparatory Survey

(1) Contents of the Survey

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

- Confirmation of the background, objectives, and benefits of the Project and also institutional capacity of relevant agencies of the Recipient necessary for the implementation of the Project.
- Evaluation of the feasibility of the Project to be implemented under the Japanese Grant from a technical, financial, social and economic point of view.

- Confirmation of items agreed between both parties concerning the basic concept of the Project.
- Preparation of an outline design of the Project.
- Estimation of costs of the Project.
- Confirmation of Environmental and Social Considerations

The contents of the original request by the Recipient are not necessarily approved in their initial form. The Outline Design of the Project is confirmed based on the guidelines of the Japanese Grant.

JICA requests the Recipient to take 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 executing agency of the Project. Therefore, the contents of the Project are confirmed by all relevant organizations of the Recipient based on the Minutes of Discussions.

(2) Selection of Consultants

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

(3) Result of the 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 feasibility of the Project.

3. Basic Principles of Project Grants

(1) Implementation Stage

2) 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 singed between the GOJ and the Government of the Recipient to make a pledge for assistance, which is followed by the conclusion of the G/A between JICA and the Recipient to define the necessary articles, in accordance with the E/N, to implement the Project, such as conditions of disbursement, responsibilities of the Recipient, and procurement conditions. The terms and conditions generally applicable to the Japanese Grant are stipulated in the "General Terms and Conditions for Japanese Grant (January 2016)."

3) Banking Arrangements (B/A) (See "Attachment 2: Financial Flow of Japanese Grant (A/P Type)" for details)

a) The Recipient shall open an account or shall cause its designated authority to open an account under the name of the Recipient in the Bank, in principle. JICA will disburse the Japanese Grant in Japanese yen for the Recipient to cover the obligations incurred by the Recipient under the verified contracts.

b) The Japanese Grant will be disbursed when payment requests are submitted by the Bank to JICA under an Authorization to Pay (A/P) issued by the Recipient.

4) Procurement Procedure

The products and/or services necessary for the implementation of the Project shall be procured in accordance with JICA's procurement guidelines as stipulated in the G/A.

5) Selection of Consultants

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

6) Eligible source country

In using the Japanese Grant disbursed by JICA for the purchase of products and/or services, the eligible source countries of such products and/or services shall be Japan and/or the Recipient. The Japanese Grant may be used for the purchase of the products and/or services of a third country as eligible, if necessary, taking into account the quality, competitiveness and economic rationality of products and/or services necessary for achieving the objective of the Project. However, the prime contractors, namely, constructing and procurement firms, and the prime consulting firm, which enter into contracts with the Recipient, are limited to "Japanese nationals", in principle.

7) Contracts and Concurrence by JICA

The Recipient will conclude contracts denominated in Japanese yen with Japanese nationals. Those contracts shall be concurred by JICA in order to be verified as eligible for using the Japanese Grant.

8) Monitoring

The Recipient is required to take their initiative to carefully monitor the progress of the Project in order to ensure its smooth implementation as part of their responsibility in the G/A, and to regularly report to JICA about its status by using the Project Monitoring Report (PMR).

9) Safety Measures

The Recipient must ensure that the safety is highly observed during the implementation of the Project.

10) Construction Quality Control Meeting

Construction Quality Control Meeting (hereinafter referred to as the "Meeting") will be held for quality assurance and smooth implementation of the Works at each stage of the Works. The member of the Meeting will be composed by the Recipient (or executing agency), the Consultant, the Contractor and JICA. The functions of the Meeting are as followings:

a) Sharing information on the objective, concept and conditions of design from the Contractor, before start of construction.

b) Discussing the issues affecting the Works such as modification of the design, test, inspection, safety control and the Client's obligation, during of construction.

(2) Ex-post Monitoring and Evaluation Stage

1) After the project completion, JICA will continue to keep in close contact with the Recipient in order to monitor that the outputs of the Project is used and maintained properly to attain its expected outcomes.

2) In principle, JICA will conduct ex-post evaluation of the Project after three years from the completion. It is required for the Recipient to furnish any necessary information as JICA may reasonably request.

(3) Others

1) Environmental and Social Considerations

The Recipient shall carefully consider environmental and social impacts by the Project and must comply with the environmental regulations of the Recipient and JICA Guidelines for Environmental and Social Considerations (April, 2010).

2) Major undertakings to be taken by the Government of the Recipient

For the smooth and proper implementation of the Project, the Recipient is required to undertake necessary measures including land acquisition, and bear an advising commission of the A/P and payment commissions paid to the Bank as agreed with the GOJ and/or JICA. The Government of the Recipient shall ensure that customs duties, internal taxes and other fiscal levies which may be imposed in the Recipient with respect to the purchase of the Products and/or the Services be exempted or be borne by its designated authority without using the Grant and its accrued interest, since the grant fund comes from the Japanese taxpayers.

3) Proper Use

The Recipient is required to maintain and use properly and effectively the products and/or services under the Project (including the facilities constructed and the equipment purchased), to assign staff necessary for this operation and maintenance and to bear all the expenses other than those covered by the Japanese Grant.

4) Export and Re-export

The products purchased under the Japanese Grant should not be exported or re-exported from the Recipient.

Attachment 1 (Annex 3)

PROCEDURES OF JAPANESE GRANT

Stage	Procedures	Remarks	Recipient Government	Japanese Government	JICA	Consultants	Contractors	Agent Bank
Official Request	Request for grants through diplomatic channel	Request shall be submitted before appraisal stage.	x	x				
1. Preparation	(1) Preparatory Survey Preparation of outline design and cost estimate		x		x	x		
2. Appraisal	(2)Preparatory Survey Explanation of draft outline design, including cost estimate, undertakings, etc.		x		x	x		
	(3)Agreement on conditions for implementation	Conditions will be explained with the draft notes (E/N) and Grant Agreement (G/A) which will be signed before approval by Japanese government.	x	x (E/N)	x (G/A)			
	(4) Approval by the Japanese cabinet			x				
3. Implementation	(5) Exchange of Notes (E/N)		x	x				
	(6) Signing of Grant Agreement (G/A)		x		x			
	(7) Banking Arrangement (B/A)	Need to be informed to JICA	x					x
	(8) Contracting with consultant and issuance of Authorization to Pay (A/P)	Concurrence by JICA is required	x			x		x
	(9) Detail design (D/D)		x			x		
	(10) Preparation of bidding documents	Concurrence by JICA is required	x			x		
	(11) Bidding	Concurrence by JICA is required	x			x	x	
	(12) Contracting with contractor/supplier and issuance of A/P	Concurrence by JICA is required	x				x	x
	(13) Construction works/procurement	Concurrence by JICA is required for major modification of design and amendment of contracts.	x			x	x	
	(14) Completion certificate		x			x	x	
4. Ex-post monitoring & evaluation	(15) Ex-post monitoring	To be implemented generally after 1, 3, 10 years of completion, subject to change	x		x			
	(16) Ex-post evaluation	To be implemented basically after 3 years of completion	x		x			

Notes:

1. Project Monitoring Report and Report for Project Completion shall be submitted to JICA as agreed in the G/A.

2. Concurrence by JICA is required for allocation of grant for remaining amount and/or contingencies as agreed in the G/A.

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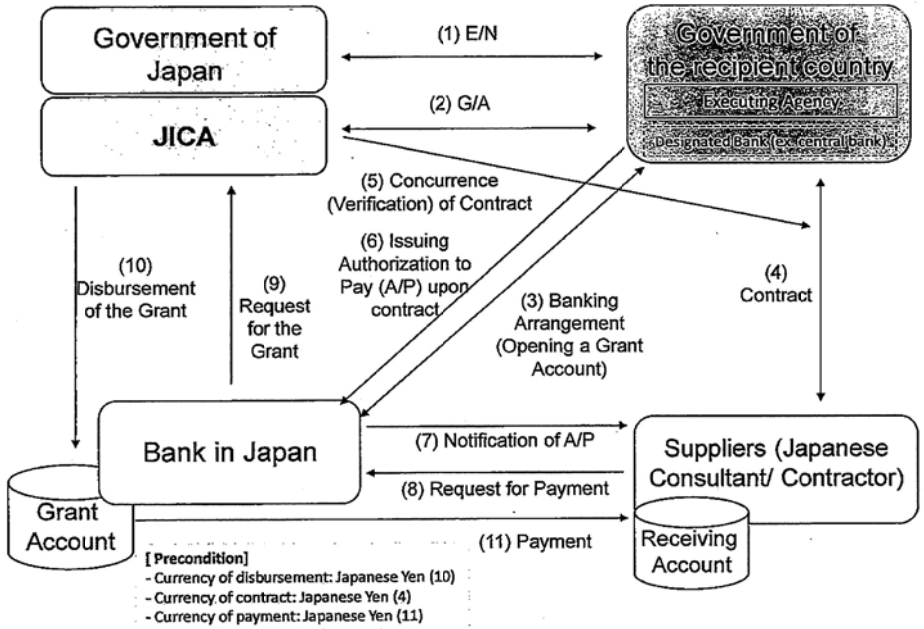
Attachment 2 (Annex 3)

FINANCIAL FLOW OF JAPANESE GRANT (A/P TYPE)



Annex 4

MAJOR UNDERTAKINGS TO BE TAKEN BY THE GOVERNMENT OF SOLOMON ISLANDS

1. Specific obligations of the Government of Solomon Islands which will not be funded with the Grant

(1) Before the Tender

NO	Items	Deadline	In charge	Estimated Cost	Ref.
1	(1) To secure the lots of land necessary for the Project including land for site office, plant yards (asphalt, concrete, crusher etc), material storage yard, motor pool, temporary construction yard, and waste disposal site with good access to the Project sites; (2) To relocate existing utilities within the Project sites; (3) To obtain or arrange for license, permission and other necessary procedures for the Project.	Before G/A signing	MCA		
2	To remove the hangar and office of general aviation operator located in the south of international apron.	Before G/A signing	MCA		
3	To open bank account (B/A)	within 1 month after the signing of the G/A	MCA		
4	To issue A/P to a bank in Japan (the Agent Bank) for the payment to the consultant	within 1 month after the signing of the contract with Consultant	MCA		
5	To submit Project Monitoring Report (with the result of Detail Design)	before preparation of bidding documents	MCA		
6	To finalize location of riverbed and conclude the contract with owner of the riverbed where rocks and stones for gravel will be taken for the Project.	before announcement of the tender	MCA		

Note: B/A: Banking Arrangement, A/P: Authorization to pay,

During the Project Implementation

NO	Items	Deadline	In charge	Estimated Cost	Ref.
1	To issue A/P to a bank in Japan (the Agent Bank) for the payment to the Contractor(s) and Supplier(s)	within 1 month after the signing of the contract(s) with Contractor(s) and Supplier(s)	MCA		
2	To bear the following commissions to a bank in Japan for the banking services based upon the B/A		MCA		
	1) Advising commission of A/P	within 1 month after the signing of the contract(s) with Contractor(s) and Supplier(s)			

	2) Payment commission for A/P	every payment for Consultant, Contractor(s) and Supplier(s)			
3	To secure sites and spaces for installation of the equipment	1 month before installation of each equipment	MCA		
4	To enable provision of electric power supply for the equipment	1 month before installation of each equipment	MCA		
5	To ensure prompt unloading and customs clearance at ports of disembarkation in recipient country and to assist the Contractor(s) and/or Supplier(s) with internal transportation therein	during the Project	MCA		
6	To accord Japanese nationals 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 country of the Recipient and stay therein for the performance of their work	during the Project	MCA		
7	To ensure that customs duties, internal taxes and other fiscal levies which may be imposed in the country of the Recipient with respect to the purchase of the products and/or the services	during the Project	MCA		
8	To clear Unexploded Objects (UXOs) in the Project site and designated riverbed when UXOs are found by the survey.	during the Project	MCA		
9	To bear all the expenses, other than those covered by the Grant, necessary for the implementation of the Project	during the Project	MCA		
10	To submit Project Monitoring Report after each work under the contract(s) such as shipping, hand over, installation and operational training	within 1 month after completion of each work	MCA		
	To submit Project Monitoring Report (final)	within 1 month after signing of Certificate of Completion for the works under the contract(s)	MCA		
	To submit a report concerning completion of the Project	within 6 months after completion of the Project	MCA		
11	To take necessary measure for safety of construction and installation	during the the Project	MCA		

(2) After the Project

NO	Items	Deadline	In charge	Estimated Cost	Ref.
1	To maintain and use properly and effectively the facilities constructed and equipment provided under the Grant Aid 1) Allocation of maintenance cost 2) Operation and maintenance structure 3) Routine check/Periodic inspection	after completion of the construction	MCA		