

CHAPTER 13 ENVIRONMENTAL CONSIDERATIONS

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Chapter 13 ENVIRONMENTAL AND SOCIAL CONSIDERATIONS

Based on the JICA Guidelines for environmental and social considerations (Hereinafter called JICA Guidelines), this Project is classified under Category B. This Project is an expansion project involving construction of new buildings, among others, within the current airport area. There is no land acquisition involved. There is no new runway construction or extension. Thus, expected impacts are site specific, are reversible, and normal mitigation measures can be applied.

For this Project, as it is classified as Category B project, environmental and social consideration studies require the IEE level including examination of the potential positive and negative environmental impacts, mitigation measures to avoid, minimize, mitigate or compensate for adverse impacts, as well as measures to promote positive impacts, if any such measures are available.

13.1 Proposed Project Components Subject to ESC

Proper environmental and social protection against any adverse impact from a development project is the key to the project's sustainability. To ensure that, environmental and social analysis and assessment is to be carried out, and if required, proper mitigation plan is to be prepared. The environmental and social examination under this Survey is aimed at analysis of environmental and social considerations base on both JICA guidelines Bangladesh regulations, confirming the current status of environmental and social assessment, and formulating further tasks to be carried out before the Project can enter into the implementation stage.

The physical components of the proposed Project subject to environmental and social considerations are as follows:

Table 13-1 Details of Scope of Works (Phase - 1)

Works	Division	Facilities
Building	New Passenger Terminal Building (Terminal 3)	3 story building with area of approximately 220,000 m ² including supply of related equipment capacity of 12.0 mppa
	New Cargo Complex	Area of approximately 42,200 m ²
	VVIP Complex	Area of approximately 5,000 m ²
	Rescue and Fire Fighting Facilities	
	Multi-Level Car Parking with Tunnel	Area of approximately 62,000 m ²
Civil	Parking Apron (Terminal 3 Area)	Approximately 520,000 m ²
	Taxiways (two rapid exit and one connecting taxiway for the runway 14 threshold)	Approximately 60,000 m ²
	Taxiways Landside Service Road with Elevated Road	9 connecting taxiways connecting to the T3 apron: approximately 35,000 m ²
	Improvement of Drainage System	
Utility	Water Supply System	
	Sewage Treatment Plant	Area of approximately 3,000 m ²
	Intake Power Plant with Distribution System	Area of approximately 7,000 m ²
	Hydrant Fuel Supply System	

Works	Division	Facilities
	Communication System	
	Security and Terminal Equipment	

Source: JICA Study Team

The following are the scope of analysis under this Survey:

1. To confirm baseline of environmental and social conditions;
2. To confirm environmental and social system of Bangladesh;
3. To prepare item scoping of EIA study;
4. To predict future environmental and social situation with this project;
5. To assess effect of this project and to execute comparative consideration of alternative plans;
6. To consider mitigation measures;
7. To prepare draft environmental management plan and draft environmental monitoring plan;
8. To clarify budget, financial resource and implementing organization of EMP and EMoP and
9. To support stakeholders' consultations.

As the Project does not need any land acquisition and as all the Project-related construction and operation activities are expected to be confined within the HSIA area, no adverse social impact is expected. However, there are some former leaseholders, who still have facilities within the proposed work site and still occupying the land. Details of the issue are explained in Section 13.3.

13.2 Present Conditions of the Project Area

A detail description of the environmental setting of the Project area has been elaborated in the Project IEE Report (August, 2016). A brief summary is given here.

(1) Land Use

1) Land use Planning

Dhaka Metropolitan Development Plan (DMDP) was prepared in 1995 with support from UNDP under Rajdhani Unnayan Karttripakkha (RAJUK) (Capital Development Authority). The plan covers the Dhaka Metropolitan development area, an area of over 1,500 km². Height restrictions are enforced by RAJUK for the airport overlay zone. The usual practice is that RAJUK consults with CAAB in connection with high rise constructions within the airport surroundings, and particularly along the runway approach.

It may be mentioned that RAJUK recently updated the 1995 Land Use Plan in 2015 for next 20 years period of 2016 to 2035. However, the plan has not been approved yet.

2) Existing Land Use

The existing land use in the airport environment is illustrated in Figure 13-1.



Figure 13-1 Spatial View of Existing Land Use Features (Airport, Residential Areas, Wetland-Swamp, Restricted Military Zone, Army Golf Club, Govt. Offices, Trees etc.)

There are some wetland areas in north-west side of the runway. Residential area in the north-northeast side is mostly single storey buildings, and some are semi-permanent buildings. Military area is located in south-southwest of the runway.

All the infrastructures under the proposed Project will be located inside the airport boundary.

(2) Physical Environment

1) Geology, Topography, and Soils

Dhaka is basically flat low-lying land. The airport and the surroundings are at levels between 4 and 10m with only very gentle slope. The major feature of the geology is sedimentary deposit with compact soil, mainly clay, with poor porosity and percolation capacity.

2) Climate and Meteorology

The climate of Bangladesh is sub-tropical with little variation across the country. The project area lies in the South-central climate zone of the country. Gentle north/north-westerly winds with occasional violent thunderstorms called northwester during summer and southerly wind with occasional cyclonic storm during monsoon are prominent wind characteristics of the region.

Winter is from November to February; while pre-monsoon summer usually starts in March and ends in May. Monsoon (rainy) season is from June to October. This period accounts for 80 % of total rainfall. Annual rainfall in Dhaka varies from 1169 mm to 2850 mm.

3) Extreme Weather Events

Monthly rainfall in May, June and July is usually 400 - 500 mm that may concentrate over 4 - 6 days. The airport is surrounded by a dike to prevent flooding from surrounding areas. The drainage system carries water from the airport area through ditches and via a number of ponds to outlet at the Southeast and Northwest corners of the airport. The area of the airport within the airport boundary is roughly 5 km² (500 ha) of which roughly 4 km²(400 ha) area is within the

dike area.

4) Water Supply

The airport is supplied with water from three numbers of groundwater wells in the airport area. The water is pumped from the wells to three elevated water reservoirs having storage capacity of 760 m³, 190 m³, and 40 m³. The water consumption is roughly 4,000 m³ per day. Water is used for CAAB airport operation, offices, living areas for airport personnel, etc.

5) Sewerage

Sewage water from the airport is collected through sewerage system to the airports own sewage treatment plant located east of the cargo centre in the northern part of the airport area and subsequently discharge to a point north of the airport. The treatment plant is currently not operational, but rehabilitation of this plant is planned by CAAB.

(3) Biological Environment

1) Flora within Airport Boundary

Different types of flora such as grasses, herbs, and trees are visible within the airport area. Inside the airport boundary (concrete wall fence), the vegetation is dominated by different grass species. At the boundary and to the South/North of the airport area there are also several species of herbs. The grasses inside the airport area include sun-grass (*Imperata Aurandinaceae*), Durbaghas (*Cynadon Dactylon*), Lajjabati (*Mimosa pudica*), Ulu grass (*Imperara cylindrica*), and Lantana (*Lantana camara*). Along the airport boundary and along the runway to the West, the vegetation is of fast growing tree species, predominantly Akashmoni (*Acacia auriculiformis*) (90%) and Kora (*Al-beHazratShahjalalprocera*).

2) Fauna within Airport Boundary

It is likely that rodent, rabbit, hare, tortoise, lizard, snakes, and frog, may stay in the area, but no wild animals was reported. Some birds are seen within the boundary, but this is not their sole natural habitat.

(4) Socio-Cultural Environment

1) Nearby Community

Three localities are located near the airport, namely, Uttara in north and east, Cantonment in south, and Mirpur in west and north.

2) Employment

The CAAB has employed close to 2,000 people in Hazrat Shahjalal Airport. The Airport further provides direct employment to around 1,500 people in customs services, immigration, postal services and airlines. Indirectly between 5,000 and 7,000 people are employed with transport services, customs clearance services, and contractors for works and services in the airport. Roughly 10 % of the CAAB employees are women, mainly occupied as security personnel, office clerks, and cleaning personnel.

3) Community Attitudes

The airport is believed to be well accepted in community. Complaints about the airport have not been reported.

4) Natural Protected Areas near Airport Boundary/ Cultural Heritage

There are no internationally or nationally protected nature reserves, or nature parks within the close vicinity of the airport. Nearest one is Bhawal National Park at a distance of about 25 km from the airport.

There is no cultural heritage within the airport area or its immediate vicinity.

13.3 Investigation of Existing Structures/Facilities at the Proposed Work Site (Within Current Landside)

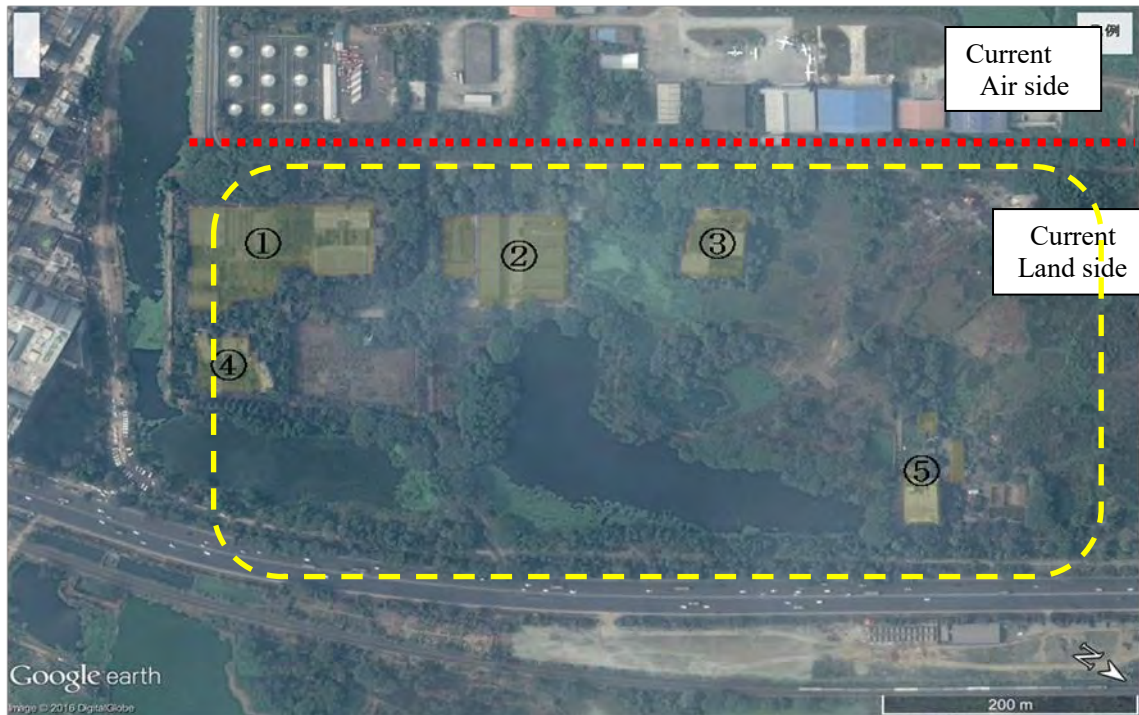
The proposed location of the Terminal 3 building, its entrance facility, and new apron will occupy some portion within the current airside area and some portion within the current landside area. The map in Figure 13-2 shows the outline of the proposed Terminal 3 and its related constructions. The structures/facilities within the current airside area are well defined and CAAB has definite plan for their relocation. The Study Team investigated the existing structures/facilities located within the current landside portion earmarked for the proposed T3 terminal.



Source: The Study Team

Figure 13-2 Future Plan Layout on the Current HSIA Map

It can be seen that there are no existing structures/facilities at the northern part of the landside area. On the contrary, there are some structures/facilities at the southern side of the plot. A close up of the yellow box marked on Figure 13-2 is shown in Figure 13-3.



Source: The Study Team

Figure 13-3 Structures/Facilities at the Southern Side

Five structures/facilities are identified during the investigation as marked in Figure 13-3. Brief descriptions of each structure/facility are given below.

Location # 1: This is where CAAB’s Central Engineering, Maintenance and Stores Unit (CEMSU) compound is located. There are one administrative building, one workshop just behind that, one warehouse in the south, and two smaller stores. There are powerhouse and water tank located just north of the administrative building. Some pictures of this location are given below.





Source: The Study Team

Figure 13-4 Existing CEMSU Compound

Location # 2: Airport Armed Police Battalion. This area is now used by the Airport Police for their barrack and office. About 300 personnel are stationed at this barrack. All the facilities in this barrack are owned by CAAB. Some pictures of this location are given below.



Source: The Study Team

Figure 13-5 Existing Airport Armed Police Battalion

Location # 4: Civil Aviation Training Center (CATC) of CAAB. There are three interconnected buildings, namely: male hostel, female hostel, and diving area. A part of the female hostel is now used by female police staffs. Some pictures of this location are given below. This facility will be relocated to the CAAB Residential Area until the end of 2017.



Source: The Study Team

Figure 13-7 Existing CATC

Location # 5: This area was leased to Builders and Design, a subsidiary of Bengal Group. There is a 5-storey building which houses a number of Bengal Group’s publications companies, a semi-pacca (brick wall with corrugated iron roof) prayer area, a restaurant named Munmun Kebab, a semi-pacca car garage, and some storage sheds. Total area is 1.5 acre. The 30-year lease expired in 2012. As the lease expired, CAAB asked for their eviction. But litigation has been filed at the judicial court, which gave a verdict in favour of CAAB in 2015. However, the Bengal Group appealed to the High Court and got a stay order. The lawsuit is now pending. The court trial were held in January and February 2017. The verdict will be given at March of 2017. Some pictures of this location are given in Figure 13-8.



Source: The Study Team

Figure 13-8 Existing Buildings near Bengal Group

Analysis: For the implementation of the Project, all these facilities/ buildings/ structures mentioned above must be removed. Facilities at Location #1 are owned by CAAB; thus their relocation can be done with CAAB internal arrangements. Similarly, all the facilities at Location #4 are owned and operated by CAAB, thus their relocation can be managed easily by CAAB. Though the facilities at Location #2 are used by Police, the facilities are owned by CAAB. The policemen are staying there “at the request” of CAAB, and CAAB is "paying" for their duty and arranging accommodation. CAAB has already finished accommodation arrangement and request Police to move to new location. So there are no social issues.

On the one hand, facilities at Locations #3 and #5 are occupied by private entity. As lease tenures have been expired for both the cases, technically there is no bar on CAAB to re-possess the land. After the issue of the verdict, these area will be vacated in accordance with government law.

13.4 Legal and Administrative Framework

(1) Environmental Policy and Regulation of GoB

For the protection, conservation, and management of the biophysical (natural) and social environment from damaging development pressures, if any, the Government of Bangladesh has developed a legal framework, including laws, regulations, decrees, and standards addressing environmental and social safeguards. These legislations also provide the principal mechanism for assessing and mitigating the environmental impacts of projects, both existing and proposed. The relevant national legislative, regulatory, and policy requirements are listed as follows:

- National Conservation Strategy (NCS), 1992 (Updated 2013)
- National Environmental Policy, 1992
- National Environmental Management Action Plan (NEMAP), 1995
- Environment Conservation Act (ECA), 1995 (Amended 2000, 2002, and 2010)
- Environment Conservation Rules (ECR), 1997 (Amended 2002, 2003)
- Environmental Quality Standards (for air, water, discharge, etc.) under ECR 1997
- National Water Policy, 1999
- National Land Utilization Policy, 1991
- National Forest Policy, 1994 (Amended 2010)
- Bangladesh Climate Change Strategy and Action Plan (BCCSAP), 2008 (revised 2009)
- Standing Orders on Disaster, 2010
- National Biodiversity Strategy and Action Plan (NBSAP), 2007
- National Adaptation Programme of Action (NAPA), 2005
- National Fisheries Policy, 1996
- Bangladesh Wildlife (Conservation and Security) Act, 2012
- Civil Aviation Ordinance, 1960 and Civil Aviation Rules, 1984 (Amended 2009)

The Environment Conservation Act (ECA), 1995 is currently the main legislation related to environmental protection in Bangladesh. The Act is applied by the Department of Environment (DOE), under the Ministry of Environment and Forest (MOEF). The Act forms the basis of the country’s environmental safeguard system.

Among other things, ECR 1997 rules set (i) the National Environmental Quality Standards for ambient air, various types of water, industrial effluent, emission, noise, vehicular exhaust, etc., (ii) the requirement for and procedures to obtain environmental clearance, and (iii) the requirement for IEE/EIA

according to categories of industrial and other development interventions. The noise from mosuqu and airport are exempted from Environmental Quality Standards for ambient noise on ECR 1997.

Before any new project can go ahead, as stipulated under the rules, the project promoter must obtain clearance from the DOE. This is a two-step approval process. First, DOE issues a “site clearance” and then “environmental clearance”. An appeal procedure does exist for those promoters who fail to obtain clearance. Failure to comply with any part of this Act may result to punishment.

As specified in Clause 7 of the Environmental Conservation Rules 1997, all new industries and projects must apply for an Environmental Clearance Certificate (ECC). Industries/ development activities are classified according to their potential impact on the environment into four categories, namely: Green, Orange-A, Orange-B, and Red. Details of these procedures are explained below.

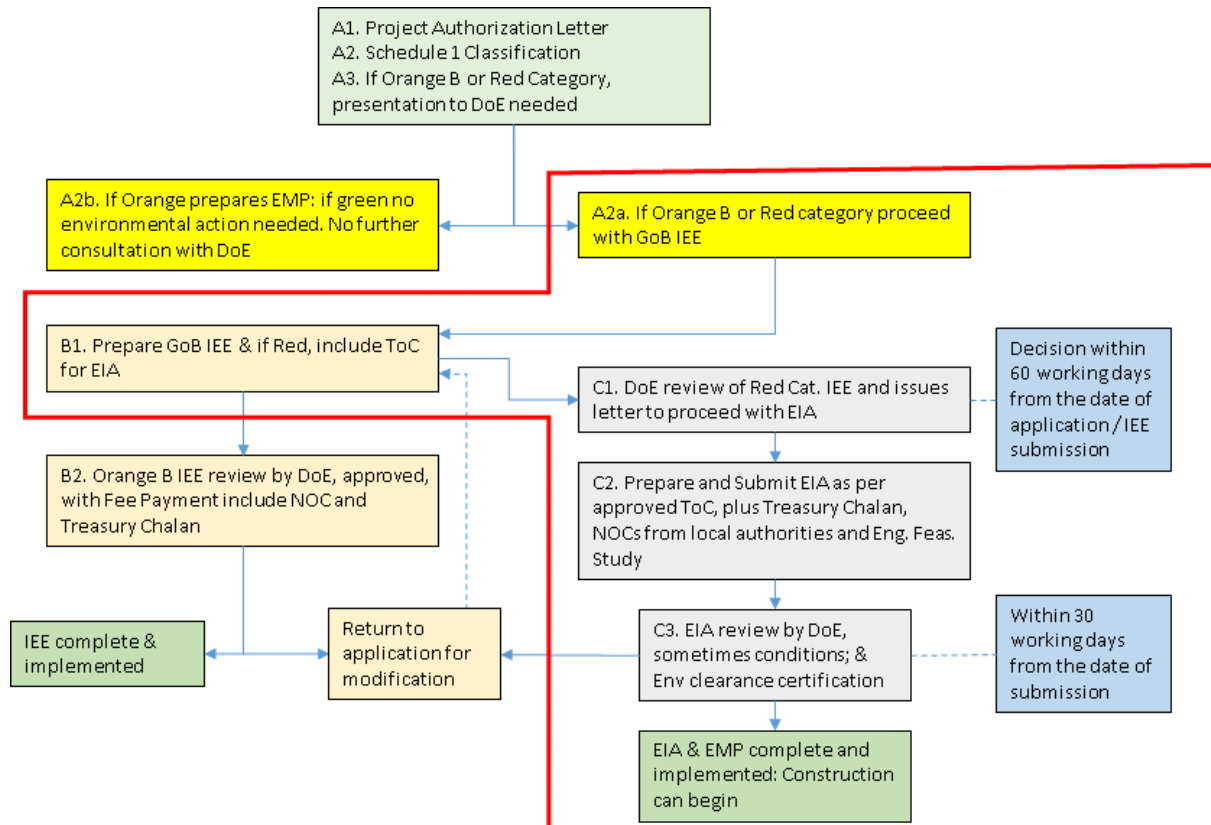
(2) Application Procedure of Environmental Clearance

As explained above, any proposed project must obtain an ECC from the DOE before its implementation. The clearance process varies depending on the project classification.

A schedule attached to the ECR 1997 defines the categories into which various types of projects fall. The Rules also set out differing requirements to be fulfilled in applying for an ECC under each of the four categories of project, identifying the level of environmental impact assessment required in each case.

As per ECR 1997, this proposed Project is classified under the “Red Category” as per item 60, Schedule I, which mentions “Engineering works: capital above 10 (ten) hundred thousand Taka”. Rule 7 of ECR 1997 states that the proponent of such projects must obtain a Location Clearance Certificate (LCC, or known as site clearance) and an ECC from the DOE.

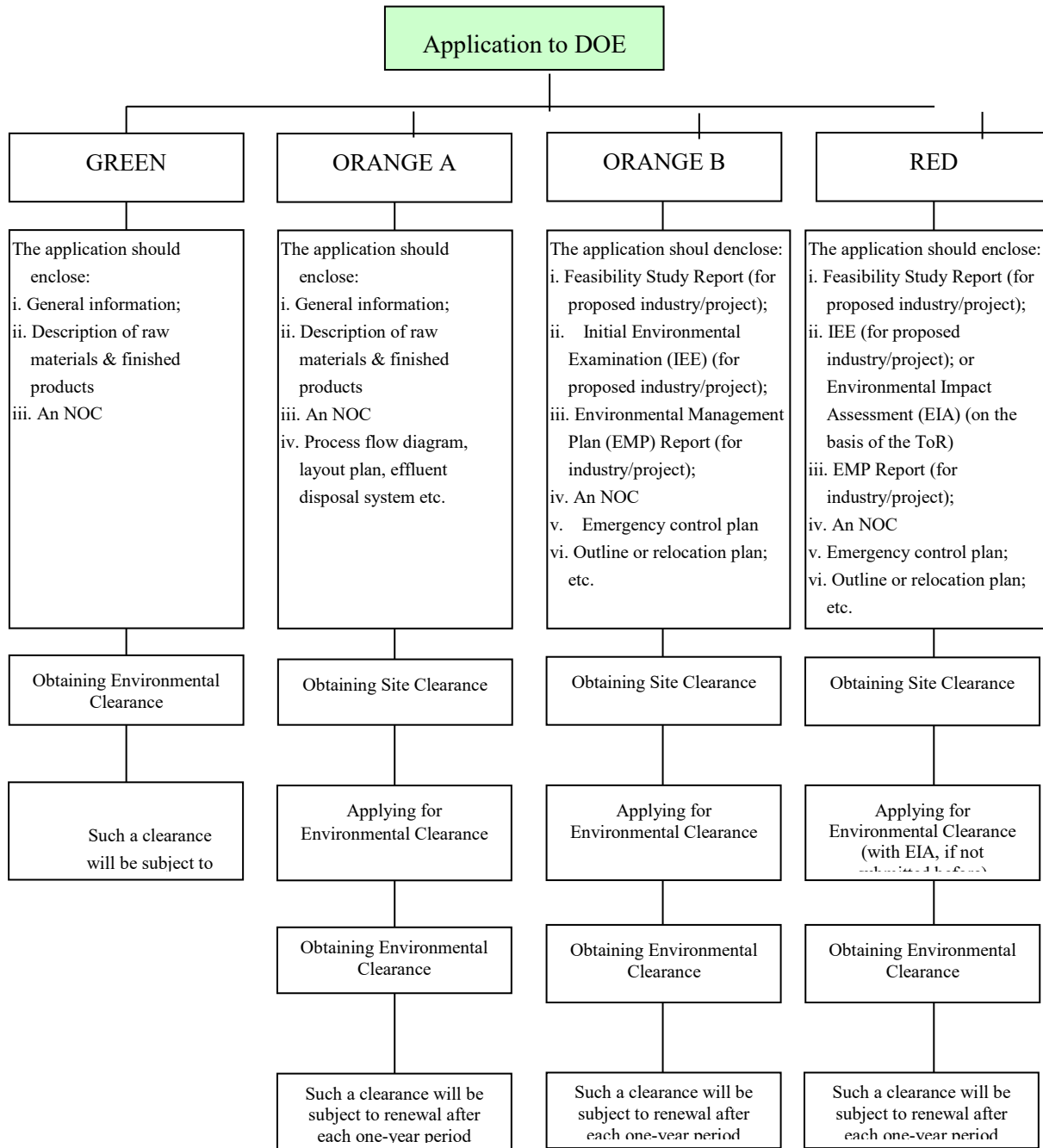
Flow diagram for the environmental clearance procedure is shown in Figure 13-9 (as this airport expansion project falls under Red Category, only red colour marked steps need to be followed).



Source: Adopted from the Environmental Guidelines (DOE, 1997)

Figure 13-9 Diagram for DOE Environmental Assessment Process

Steps involved in the environmental clearance process are shown in Figure 13-10.



Note:

1. NOC = No Objection Certificate, usually obtained from the local government.

2. Time to obtain Environmental Clearance:

for Green Category Projects, the gestation period for granting Environmental Clearance has been fixed within 15 days; while for Orange A, Orange B, and Red Category projects, at first, site clearance and thereafter Environmental Clearance will be granted. The gestation period for site clearance is within 30 days for Orange A, and within 60 days for Orange B and Red Category projects.

Source: from the Environmental Guidelines (DOE, 1997)

Figure 13-10 Steps Involved in Environmental Clearance Following DOE Guidelines

As explained in the figure above, as part of the clearance process, first an IEE with Terms of Reference (TOR) for EIA is to be prepared satisfactorily and submitted to the DOE. After obtaining the first step clearance as LCC and approval of EIA TOR, the proponent then has to prepare an EIA, which will be

examined by DOE prior to issuing the ECC. The ECC has to be renewed on yearly basis until the completion of the Project.

(3) Policy Gap between the Government and JICA

As explained in the previous sections, this Project is classified as Category B as per JICA guidelines requiring only IEE level environmental assessment. On the other hand, this Project is classified as Red Category as per ECR 1997 requiring EIA level of environmental assessment. For this particular Project, there is difference in categorization between GOB and JICA regulation. However, JICA guidelines also mentions that if an EIA procedure has been conducted to satisfy national requirement, JICA may refer to the EIA report, but this is not a mandatory requirement.

The Gap between the government law and JICA Guidelines are shown following Table.

Table 13-2 Comparison between JICA Guidelines and GOB law

Item	JICA Guidelines for Environmental and Social considerations 2010	Relevant law in Bangladesh	Gap between JICA Guidelines and Government Law/ Actions to be taken
1. Underlying Principles	<p>1. 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.</p> <p>2. Such examinations must be endeavored to include an analysis of environmental and social costs and benefits in the most quantitative terms possible, as well as a qualitative analysis; these must be conducted in close harmony with the economic, financial, institutional, social, and technical analyses of projects.</p> <p>3. The findings of the examination of environmental and social considerations must include alternatives and mitigation measures, and must be recorded as separate documents or as a part of other documents. EIA reports must be produced for projects in which there is a reasonable expectation of particularly large adverse environmental impacts.</p> <p>4. For projects that have a particularly high potential for adverse impacts or that are highly contentious, a committee of experts may be formed so that JICA may seek their opinions, in order to increase accountability.</p>	<p>1. Article 18A of the constitution states “The State shall endeavor to protect and improve the environment and to preserve and safeguard the natural resources, bio-diversity, wetlands, forests and wild life for the present and future citizens.”</p> <p>2. As per ECA 1995, “No industrial unit or project shall be established or undertaken without obtaining, in the manner prescribed by rules, an Environmental Clearance Certificate from the Director General.”</p> <p>3. As per ECR 1997, “Environmental Clearance Certificate shall be issued to all existing industrial units and projects and to all proposed industrial units and projects falling in the Green Category.”</p>	<p>Though ECA 1995 and ECR 1997 does not explain in detail regarding basic principle of environmental safeguard, by virtue of requiring IEE/ EIA (depending on intervention type), in principle the target and objectives are similar to JICA guideline.</p> <p>No gap.</p>

Item	JICA Guidelines for Environmental and Social considerations 2010	Relevant law in Bangladesh	Gap between JICA Guidelines and Government Law/ Actions to be taken
2. Examination of measures	<p>1. Multiple alternatives must be examined in order to avoid or minimize adverse impacts and to choose better project options in terms of environmental and social considerations. In the examination of measures, priority is to be given to avoidance of environmental impacts; when this is not possible, minimization and reduction of impacts must be considered next. Compensation measures must be examined only when impacts cannot be avoided by any of the aforementioned measures.</p> <p>2. Appropriate follow-up plans and systems, such as monitoring plans and environmental management plans, must be prepared; the costs of implementing such plans and systems, and the financial methods to fund such costs, must be determined. Plans for projects with particularly large potential adverse impacts must be accompanied by detailed environmental management plans.</p>	<p>As per ECR 1997, the required examination items for Red Category:</p> <p>(i) report on the feasibility;</p> <p>(ii) Environmental Impact Assessment report prepared on the basis of terms of reference previously approved by the Department of Environment, along with the Layout Plan (showing location of Effluent Treatment Plant), Process Flow Diagram, design and time schedule of the Effluent Treatment Plant of the unit or project, (these are applicable only for a proposed industrial unit or project)</p> <p>(iii) Report on the Environmental Management Plan (EMP) for the industrial unit or project, and also the Process Flow Diagram, Layout Plan (showing location of Effluent Treatment Plant), design and information about the effectiveness of the Effluent Treatment Plan of the unit or project (these are applicable only for an existing industrial unit or project)</p> <p>(iv) emergency plan relating adverse environmental impact and plan for mitigation of the effect of pollution</p> <p>(v) outline of relocation, rehabilitation plan (where applicable)</p>	<p>Mostly similar.</p> <p>However, alternate analysis is not a requirement in Bangladesh law.</p> <p>/The alternative study should be executed.</p>

Item	JICA Guidelines for Environmental and Social considerations 2010	Relevant law in Bangladesh	Gap between JICA Guidelines and Government Law/ Actions to be taken
3. Scope of Impacts to Be Assessed	<p>1. 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.</p> <p>2. 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.</p>	<p>Scope of impacts are not mentioned in ECA or ECR. But Impact assessment and management plan is a requirement.</p> <p>Also, during the first step approval of DOE, usually the approval letter includes conditions to be fulfilled and scope of special impact assessment during EIA preparation</p>	<p>There is a gap because of no spelling out the scope of impact in the act or rules. (Generally resettlement and social aspects are less focused.) / The consideration of impact items based on JICA Guidelines should be needed.</p>

Item	JICA Guidelines for Environmental and Social considerations 2010	Relevant law in Bangladesh	Gap between JICA Guidelines and Government Law/ Actions to be taken
4. Compliance with Laws, Standards, and Plans	<p>1. Projects must comply with the laws, ordinances, and standards related to environmental and social considerations established by the governments that have jurisdiction over project sites (including both national and local governments). They must also conform to the environmental and social consideration policies and plans of the governments that have such jurisdiction.</p> <p>2. Projects must, in principle, be undertaken outside of protected areas that are specifically designated by laws or ordinances for the conservation of nature or cultural heritage (excluding projects whose primary objectives are to promote the protection or restoration of such areas). Projects are also not to impose significant adverse impacts on designated conservation areas.</p>	<p>1. Projects must follow all government laws/</p> <p>2. Projects must be outside of “Ecologically Critical Areas”.</p>	No Gap
5. Social Acceptability	<p>1. Projects must be adequately coordinated so that they are accepted in a manner that is socially appropriate to the country and locality in which they are planned. 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.</p> <p>2. Appropriate consideration must be given to vulnerable social groups, such as women, children, the elderly, the poor, and ethnic minorities, all members of which are susceptible to environmental and social impacts and may have little access to decision-making processes within society.</p>	Not properly spelled out.	<p>Thought Stakeholders consultation is not spelled out in ECR, usually DOE requires this.</p> <p>Though ECR mentions about resettlement plan preparation, there is no legal elaboration. However, for any ODA project, it is a requirement to follow respective agencies guideline as part of loan agreement (but not part of environmental law).</p> <p>Major Gap exists. /Consideration should be executed as needed.</p>

Item	JICA Guidelines for Environmental and Social considerations 2010	Relevant law in Bangladesh	Gap between JICA Guidelines and Government Law/ Actions to be taken
6. Ecosystem and Biota	<p>1. Projects must not involve significant conversion or significant degradation of critical natural habitats and critical forests.</p> <p>2. Illegal logging of forests must be avoided. Project proponents etc. are encouraged to obtain certification by forest certification systems as a way to ensure the prevention of illegal logging.</p>	Not directly spelled out. But usually DOE requires such considerations.	There is a gap because of no spelling out the scope of impact in the act or rules. (DOE require the consideration for this item, so in fact there is no gap.) / Consideration should be executed as needed.

<p>7. Involuntary Resettlement</p>	<p>1. Involuntary resettlement and loss of means of livelihood are to be avoided when feasible by exploring all viable alternatives. When, after such an examination, avoidance is proved unfeasible, effective measures to minimize impact and to compensate for losses must be agreed upon with the people who will be affected.</p> <p>2. People who must be resettled involuntarily and people whose means of livelihood will be hindered or lost must be sufficiently compensated and supported by project proponents etc. in a timely manner.</p> <p>Prior compensation, at full replacement cost, must be provided as much as possible. Host countries must make efforts to enable people affected by projects and to improve their standard of living, income opportunities, and production levels, or at least to restore these to pre-project levels. Measures to achieve this may include: providing land and monetary compensation for losses (to cover land and property losses), supporting means for an alternative sustainable livelihood, and providing the expenses necessary for the relocation and re-establishment of communities at resettlement sites.</p> <p>3. Appropriate participation by affected people and their communities must be promoted in the planning, implementation, and monitoring of resettlement action plans and measures to prevent the loss of their means of livelihood. In addition, appropriate and accessible grievance mechanisms must be established for the affected people and their communities.</p> <p>4. For projects that will result in large-scale involuntary resettlement, resettlement action plans must be prepared and made available to the public. In preparing a resettlement action plan, consultations must be held with the affected people and their communities based on sufficient information made available to them in advance. When consultations are held, explanations must be given in a form, manner, and language that are understandable to the affected people. It is desirable that the</p>	<p>There is no national law for RAP. All acquisition is based on 1982 law which does not entitle anybody without legal title.</p>	<p>Major GAP exists.</p> <p>However, all ODA projects follows that respective agencies guideline.</p> <p>So in fact, there is no gap in practice. /Consideration should be executed as needed.</p>
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Item	JICA Guidelines for Environmental and Social considerations 2010	Relevant law in Bangladesh	Gap between JICA Guidelines and Government Law/ Actions to be taken
	resettlement action plan include elements laid out in the World Bank Safeguard Policy, OP 4.12, Annex A		
8. Indigenous Peoples	<p>1. 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.</p> <p>2. When projects may have adverse impacts on indigenous peoples, all of their rights in relation to land and resources must be respected in accordance with the spirit of relevant international declarations and treaties, including the United Nations Declaration on the Rights of Indigenous Peoples. Efforts must be made to obtain the consent of indigenous peoples in a process of free, prior, and informed consultation.</p> <p>3. Measures for the affected indigenous peoples must be prepared as an indigenous peoples plan (which may constitute a part of other documents for environmental and social consideration) and must be made public in compliance with the relevant laws and ordinances of the host country. In preparing the indigenous peoples plan, consultations must be made with the affected indigenous peoples based on sufficient information made available to them in advance. When consultations are held, it is desirable that explanations be given in a form, manner, and language that are understandable to the people concerned. It is desirable that the indigenous peoples plan include the elements laid out in the World Bank Safeguard Policy, OP4.10, Annex B.</p>	No legal basis.	<p>Major GAP exists.</p> <p>However, all ODA projects follows that respective agencies guideline.</p> <p>So in fact, there is no gap in practice.</p> <p>/Consideration should be executed as needed.</p>

Source: The Study Team

(4) International Civil Aviation Organization (ICAO) Recommended Practices

It may be noted that airport noise is exempted in the Bangladesh Noise regulation of 2006. Since this Project will be funded by JICA, proper noise management is required, and this Project should follow

ICAO guidelines for noise.

International design code, manual, standards, and guidelines that are relevant to the proposed project include the following: International Civil Aviation Organization (ICAO), International Air Transport Association (IATA), and U.S. Federal Aviation Administration (FAA). The relevant documents and their relevance to the Project are given below:

Table 13-3 Outline of the international standard

Guidelines	Relevance to this Project
Annex 16 to the Convention on International Civil Aviation, Volume I: Aircraft Noise, Sixth Edition, July 2011	Gives the maximum allowable noise levels depending on aircraft types, at lateral point, approach point and flyby measurement point.
ICAO Doc. 9184 - Airport Planning Manual, Part 2: Land Use and Environmental Control, 2nd Edition, 2002	Airport and runway noise and its remedial measures
FAA Advisory Circular 150/5020-1-Noise Control and Compatibility Planning for Airports, 1983	Noise measurement methods, preparation of noise contour, prediction of noise exposure, and airport noise control planning

Source: The Study Team

13.5 Alternative study

Since it is expected that the passenger of HSIA will be exceed the capacity of the existing facilities, the countermeasures of this issue had considered. The result of alternative study is shown below table. The Plan-0 will obstruct the economic development for rising up from Least Development Countries. The Plan-1 is able to meet the expected demand after 2030, but the benefit per cost is low. And the negative effect to environment and social is large. Plan-2 is able to meet the expected demand until 2030, the benefit per cost is high and the negative impact to socio environmental aspect is small. Therefore, the Plan-2 is selected on this project. On the Plan-3, the cost is high and the negative impact to socio environmental aspect is significant and tne plan-2 will be acceptable until 2030.

Table 13-4 Result of the alternative study

item	Plan-0	Plan-1	Plan-2	Plan-3
Outline of planning	Non installing new facility	Introducing 2 nd runway and new terminal building (To meet the increase of passenger after 2030)	Introducing new terminal building (To meet the increase of passenger until 2030)	Constructing new airport on other site
Land use	No change of land use	Land acquisition around airport will be needed, so the land use will change	No change of land use	Land use will change significantly on the candidate site of new airport
Technology & Economy	This plan don't meet the increase of passenger ,so the number of landing and takeoff will not be increased in future. Therefore, economic development will be obstructed.	The benefit of the 2nd runway is small because of locating close to existing runway. The number of landing & takeoff is not expected large rising up. The specific consideration and	The plan-2 is able to meet the increase of passenger until 2030 by less investment than the Plan-1. This plan don't need specific construction technology.	The construction of new airport is needed huge investment. There will be possibility of technological issue of flooding in rainy season because of drainage conditions.

		technology will be needed for construction of new runway near the existing one.		
Environmental & Social consideration	The current socio-environmental condition will be maintained.	The land acquisition and involuntary resettlement will be needed around existing airport. The negative environmental impact is large because of construction work out of the airport area. The negative impact from increasing the number of landing and takeoff will be occur.	The land acquisition and involuntary resettlement will not be occur. The negative environmental impact is small because of construction works in the airport area. The negative impact from increasing the number of landing and takeoff will be occur.	The huge land acquisition and involuntary resettlement will be occur. The negative environmental impact will be significant during construction and after construction.
Comparative Conclusion	Socio-Environmental impact is the lowest. But this plan cannot meet to increasing of passenger in future and will obstruct economic development for rising up from LDC.	The negative Socio-Environmental impact is large. The benefit per cost is low.	Socio-Environmental impact is the lowest except the Plan-0. This plan can meet the increasing of passenger for a while. This plan is selected in this project because of advantage on economic aspect and lower negative impacts.	This plan has largest Socio-Environmental negative impact. And it need the largest cost. But this plan will be needed for future demand after 2030.

Source: JICA Study Team

13.6 Scoping

The project was reviewed in light of the JICA Guideline for environmental and social considerations. The scoping result is summarized in Table 13-5.

Table 13-5 Scoping Matrix

No.	Impacts	Ratings		Brief Description
		Pre-construction/ Construction	Operation	
Pollution				
1	Air Pollution	B-	B-	Construction: Limited air pollution is expected due to heavy machinery and construction activities Operation: With the increase of flights, emission of air pollutant generated from airplanes and ground operation vehicles, as well as from commuting vehicles will increase. The impact is in range of normal activity.
2	Water Pollution	B-	B-	Construction: Temporary water pollution due to construction activity is expected. In addition, temporary water pollution from contractor's labour camp is expected. Operation: With the increase of flights and terminal users, amount of generated waste water will increase. But it would be acceptable for treatment.

No.	Impacts	Ratings		Brief Description
		Pre-construction/ Construction	Operation	
3	Waste	B-	B-	Construction: Construction and demolition materials will be generated. Also, waste soil will be generated. Operation: With the increase of flights and terminal users, amount of generated waste will increase. But it would be acceptable for treatment.
4	Soil Contamination	D	C-	Construction: Although oil leakages from construction machineries and trucks are expected, the amount, so as the impact, is negligibly small. Operation: With the increase of flight, risk of fuel leakage will increase. But it would not be expected to spread out.
5	Noise and Vibration	B-	C-	Construction: Limited noise and vibration resulting from construction activities and construction vehicle movement are predicted. Operation: With the increase of flights, degree of noise from airplane will increase. Needs further investigation.
6	Ground Subsidence	D	D	Construction/Operation: No activity that will cause ground subsidence is expected.
7	Offensive Odor	D	D	Construction: There is no plan which causes offensive odour during construction. Operation: There is no plan which causes offensive odour during operation.
8	Bottom Sediment	D	D	Construction/Operation: No activity that will affect the bottom sediment is expected.
Natural Environment				
9	Protected Area	D	D	No protected area within the Project area.
10	Flora, Fauna and Biodiversity	D	D	Effect on flora, fauna, or biodiversity is not expected since the Project will be implemented within the existing airport facilities which is not sole habitat of any endangered species.
11	Hydrology	D	D	Construction/Operation: No activity that will adversely affect the hydrological situation is expected.
12	Topography and Geology	D	D	Construction/Operation: No activity that will adversely affect the topography and geographical features is expected.
Social Environment				
13	Involuntary resettlement	C-	D	Construction/Operation: No resettlement is needed since the Project will be implemented within the existing airport facilities.
14	Vulnerable group	D	D	No direct impact on vulnerable group is predicted since the Project will be implemented within the existing airport facilities.
15	Indigenous and Ethnic Minority	D	D	No direct impact on indigenous and ethnic minorities is predicted since the Project will be implemented in the existing airport facilities.
16	Local Economy, Employment,	B+	B+	Construction: Positive impacts such as creation of local employment are predicted. Operation: Increase of flights will ultimately contribute to the local economy.
17	Land Use and Local Resources	A+	A+	Significant positive impact on use of local resources is predicted.
18	Water Use/ Water right	D	D	No activity that will adversely affect the water usage or water rights is predicted.

No.	Impacts	Ratings		Brief Description
		Pre-construction/ Construction	Operation	
19	Social infrastructures and services	B-	B-	Construction: Due to construction activities, decrease in the convenience of the airport users is expected, but very minimum. Operation: Increase in airport users will affect traffic circulation near the airport area, but impact in minimum.
20	Community Organization	D	D	No negative impact on social institutions / community organizations is predicted.
21	Unequal Distribution of Social Costs and Benefits	D	D	No negative impact on social institutions / community organizations is predicted.
22	Social Conflict	B-	D	There are some former lease holders located within the proposed Project area. CAAB is now negotiating for their relocation. Other than this, no other local conflict of interests is predicted.
23	Historical/Cultural Heritage	D	D	No cultural heritage is located within the Project area.
24	Landscape	B-	B+	Construction: Due to the construction activities, the disturbance to the scenery is expected, but impact is minimal. Operation: Renovation of the international terminal and VVIP terminal will enhance the landscape.
25	Gender	B+	B+	Construction: Construction will create female job opportunity. Operation: Operation will create female job opportunity.
26	Children's Rights	D	D	No issues on children's rights are predicted.
27	Communicable Diseases such as HIV/AIDS	B-	D	Construction: Inflow of construction workers may increase the risks on communicable diseases. Operation: No activities that will increase the risk of communicable diseases in the local communities around airport are expected.
28	Working Environment (includes work safety)	B-	D	Construction: Inappropriate management of working environment will raise the risk of accident and casualty. Operation: No activities that will increase the risk of the working environment are expected.
Others				
29	Accidents	B-	B-	Construction: The effect of construction vehicles to the local community is predicted. Operation: With the increase of airport users, the risk of traffic accidents near the airport will also increase.
30	Global Warming	D	C-	Construction: Impacts on trans-boundary effects and global warming are negligible, since the construction works of this project is limited in time, volume, and the area. Operating: CO2 emission will increase with the increase of flights and ground operation vehicles. Needs further investigation.

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

B+/-: Positive/negative impact is expected to some extent.

C+/-: Extent of positive/negative impact is unknown. (A further examination is needed, and the impact could be clarified as the study progresses)

D: No impact is expected.

Source: JICA Study Team

The Terms Of Reference for the environmental items selected on scoping matrix is shown below table.

Table 13-6 Terms of reference on environmental and social consideration study

Category	Survey Item	Method of survey
Alternative study	1.Forecast demand of Aviation and passenger 2.Hnadling capacity of airport 3.Expansion plan of the HSIA	1.Exisiting document survey 2.Exisiting document survey 3.Master plan for expansion of HSIA
Air pollution	1.National standard of air quality 2.Current situation of air quality 3.Environmental Mitigation plan during CP 4. Environmental Mitigation pla during OP	1. Exisiting document survey 2. Exisiting document survey 3. Exisiting document survey, interview survey 4. Exisiting document survey, interview survey
Water Pollution	1.National standard of water quality 2.Current situation of water quality 3.Environmental Mitigation plan during CP 4. Environmental Mitigation pla during OP	1. Exisiting document survey 2. Exisiting document survey 3. Exisiting document survey, interview survey 4. Exisiting document survey, interview survey
Solid Waste	1.Environmental Mitigation plan during CP 2. Environmental Mitigation pla during OP	1. Exisiting document survey, interview survey 2. Exisiting document survey, interview survey
Soil Contamination	1.Current situation of soil contaminatiuon 2.Environmental Mitigation plan during CP 3. Environmental Mitigation pla during OP	1. Exisiting document survey 2. Exisiting document survey, interview survey 3. Exisiting document survey, interview survey
Noise/ Vibration	1.National standard of Noise & Vibration 2.Current situation of Noise & Vibration 3.Environmental Mitigation plan during CP 4. Environmental Mitigation pla during OP	1. Exisiting document survey 2. Exisiting document survey 3. Exisiting document survey, interview survey 4. Exisiting document survey, interview survey
Local economies, such as employment, livelihood	1.Construction plan of HSIA 2.Operation plan of HSIA	1. Exisiting document survey 2. Exisiting document survey
Land use and utilization of local resources	1.Construction plan of HSIA 2.Operation plan of HSIA	1. Exisiting document survey 2. Exisiting document survey
Exisiting social infrastructuresand services	1.Construction plan of HSIA 2.Operation plan of HSIA	1. Exisiting document survey 2. Exisiting document survey
Local conflicts of interest	1.Current situation of arrangemnet for tenant moving	1. Exisiting document survey
Landscape	1.Construction plan of HSIA 2.Operation plan of HSIA	1. Exisiting document survey 2. Exisiting document survey
Gender	1.Construction plan of HSIA 2.Operation plan of HSIA	1. Exisiting document survey 2. Exisiting document survey
Infectious disease such as HIV/AIDS	1.Construction plan of HSIA	1. Exisiting document survey
Working Environment (includes work safety)	1.Construction plan of HSIA	1. Exisiting document survey
Accidents	1. Exisiting document survey	1. Exisiting document survey
Global Warming	1.Operation plan of HSIA	1. Exisiting document survey
Stake holder meeting	1.Meetings of IEE process	1. Exisiting document survey

Category	Survey Item	Method of survey
	2. Meetings of Draft EIA process	2. Existing document survey, Record of Meeting (Dec, 2016 – Jan, 2017)

Source: JICA Study Team

13.7 The result of Environmental and Social Consideration Survey

The result of survey and prediction for environmental and social consideration is shown following table.

Table 13-7 The result of Environmental and Social Consideration Survey

Environmental Item	Result of survey and prediction
Air pollution	<p>The baseline of air quality in Airport area : SO₂ 8.12 – 9.01 μ g/m³, NO_x 55.10 – 58.12 μ g/m³, PM_{2.5} 71.54 – 76.68 μ g/m³, PM₁₀ 142.50 – 148.52 μ g/m³, CO 2-3 μ g/m³</p> <p>Construction: The dust and resuspended soil will not result in significant impact on ambient air quality because dust control such as water sprinkling will be done.</p> <p>Operation: Current situation of air pollutant such as nitrogen oxides (NO_x) and sulfate oxides (SO_x) in airport is same as other monitoring point in Dhaka city. The concentration of these substances are lower than air quality standard value of Bangladesh. That means that future concentration of NO_x and SO_x will not become significant level because current aircraft emission do not affect to air quality in the airport area. On the other hand, the concentration of particulate matter (PM₁₀, PM_{2.5}) is above the environmental quality standard. According to the ADB report “Country Synthesis Report on Urban Air Quality Management”, 55% of PM₁₀ comes from soil and 32% comes from vehicles in Dhaka city. Likewise, 46% of PM_{2.5} comes from Natural gas/diesel burning, and 29% comes from vehicles. That means aircraft is not main source of particulate matter. It seems that reason of high concentration of particulate matter in Dhaka city is soil, air pollutant from stationary source such as gas engine/ diesel engine and gas emission from vehicles. Therefore, the concentration of PM₁₀ and PM_{2.5} will not become high only because of increasing of taking off and landing of aircraft and the impact of this project is small.</p> <p>The impact from vehicles travelling inside of the airport is expected. As a countermeasure of this, multi stories car parking will be implemented with adequate parking number for reduction of gas emission from waiting cars. Therefore, this impact will be mitigated.</p>
Water Pollution	<p>The baseline of water quality in Airport area : Turbidity 8.77 – 69.4 NTU, TSS 16 – 155 mg/L, COD 31 – 54 mg/L, BOD 7.2 – 19.2 mg/L</p> <p>Construction: Turbid water treatment will be done such as sedimentation tank/ pool before discharge to the canals in the airport.</p> <p>Operation: Waste water will be treated in installed treatment plant conforming to the regulations. The methods of treatment would be determined at D/D. Meanwhile oil separator will be installed for avoiding oil contamination into waste water.</p>
Solid waste	<p>Construction: Proper disposal of solid waste is responsibility of contractor and that will be ensured by appropriate clauses in the bidding document, for example, separation of waste based on category, storage and disposal based on category, inventory control, etc. Therefore, the impact will be insignificant.</p> <p>Operation: CAAB will be responsible to properly collect and dispose all internally generated solid waste. That activity will be done correctly, so the impact of waste will not be significant.</p>

Environmental Item	Result of survey and prediction
Soil conta	<p>Construction: Contaminated soil will be kept isolated from non contaminated soil, and deposited separately.</p> <p>Operation: Soil contamination may happen due to fuel leak, but that will be minimized by appropriate measures, for example, oil separator at fuel farm and drainage system.</p>
Noise/Vibration	<p>The baseline of water quality in Airport area : LAeq(Average) 54.8 – 58.6 dB Aircraft Noise (Ousside of the airport) Lden 75dB</p> <p>Construction: The impact of noise around the airport will be insignificant because propagation distance of the noise will be ensured from construction site to boundary of the airport. Additionally, perodic maintenance of construction machinery will be done.</p> <p>Operation : Airport operation is exempted from country's noise regulation. However, the noise survey of current situation is done for comparing with the aircraft noise standard of Japan and the aircraft noise prediction is also executed based on the future landing and takeoff. The area in where aircraft noise is over Japanese standard will distribute around the airport. As a countermeasure of this, CAAB will promote the using of low nosie aircraft recommended by ICAO by giving insentives. It is difficult to give subsidy for anti-noise works likewise Japan because the aircraft nosie is exempted from standards on government law. Thus, complaint section for noise will be implemented by CAAB. The impact from vehicles travelling inside of the airport is expected. The impact of noise around the airport will be insignificant because propagation distance of the noise will be ensured from construction site to boundary of the airport.</p>
Local economies, such as employment, livelihood	<p>Construction: The positive impact will be occured by local job creating effect from this project.</p> <p>Operation: The increasing of landing and takeoff will contribute to the local economy.</p>
Land use and utilization of local resources	<p>Construction /Operation: There will be significant positive impact on using of local resource.</p>
Exisiting social infrastructuresand services	<p>Construction: Due to construction activities, decrease in the convenience of the airport users is expected, but very minimum. And the carrying road will be implemented in the airport area so, negative impact around the airport will be mitigated.</p> <p>Operation: Due to increasing users of the airport, road traffic will be affected. However, the impact will be mitigated because, the new road inflastrucures will be implemented.</p>
Local conflicts of interest	<p>Construction: There are some former lease holders located within the proposed Project area. CAAB is now negotiating for their relocation.</p>
Landscape	<p>Construction: Due to the construction activities, the disturbance to the scenery is expected, but impact is minimal.</p> <p>Operation: Renovation of the international terminal and VVIP terminal will enhance the landscape.</p>
Gender	<p>Construction: Construction will create female job opportunity.</p> <p>Operation: Operation will create female job opportunity.</p>
Infectious disease such as HIV/AIDS	<p>Construction: Inflow of construction workers may increase the risks on communicable diseases. There will be a clause of contract documents on HIV/AIDS prevention measures.</p>
Working Environment (includes work safety)	<p>Construction: The impact will be insignificant because of using Personal Protective Equipment (PPE), hearing protection for workers on demolition of concrete.</p>
Accidents	<p>Construction: The contractor will prepare a traffic management plan and road safety plan for prevebnting road accident around the airport.</p>

Environmental Item	Result of survey and prediction
	Operation: Due to the increasing of users and road traffic, there is a possibility the road accident will be occurred. The impact will be mitigated because of implementing road infrastructures.
Global Warming	Operation: The emission of GHG will be increased because of energy consumption in new terminal building. The impact will be mitigated because of implementing energy reduction equipment for lighting or air conditioning.

13.8 The assessment of project effect for environmental and social conditions

The assessment of project effect for environmental and social conditions is shown below table. The negative impact of this project is considered small.

Table 13-8 Draft scoping and result of the assessment

分類	No.	Environmental Item	Ratings At Scoping		Ratings After Surveying		Brief Description
			Pre-construction/Construction	Pre-construction/Construction	Pre-construction/Construction	Pre-construction/Construction	
Pollution control	1	Air pollution	B-	B-	B-	B-	<p>Pre Construction/ Construction: The dust and resuspended soil will not result in significant impact on ambient air quality because dust control such as water sprinkling will be done.</p> <p>Operation: The impact of air quality is small because, current concentration of nitrogen oxides(NOx) and sulfate oxides(SOx) in airport are low level. Furthermore, concentration of particulate matter(PM) is mainly affected from many sources except aircraft. The impact from vehicles travelling inside of the airport is expected. As a countermeasure of this, multi storey car parking will be implemented with adequate parking number for reduction of gas emission from waiting cars. Therefore, this impact will be mitigated.</p>
	2	Water Pollution	B-	B-	B-	B-	<p>Pre Construction/ Construction: Temporary water pollution due to construction activity is expected. The Impact will be mitigated because turbid water treatment will be done such as sedimentation and collection before discharge to the canals in the airport.</p> <p>Operation: It is expected to impact of water quality around project site from generated waste water. However, this impact will be mitigated because of waste water treatment and installation of oil separator.</p>
	3	Solid waste	B-	B-	B-	B-	<p>Pre Construction/ Construction: It is expected to impact of solid waste from construction work. However, this impact will be mitigated because of proper disposal of solid waste by contractor.</p> <p>Operation: It is expected to impact of solid waste from new terminal building. However,</p>

分類	No.	Environmental Item	Ratings At Scoping		Ratings After Surveying		Brief Description
			Pre-construction/ Construction	Pre-construction/ Construction	Pre-construction/ Construction	Pre-construction/ Construction	
							this impact will be mitigated because of proper collect and dispose all internally generated solid waste as a responsibility of CAAB.
	4	Soil contamination	D	B-	B-	B-	<p>Pre Construction/ Construction: It is expected to impact of soil contamination. However, this impact will be mitigated because contaminated soil will be kept isolated from non contaminated soil, and deposited separately.</p> <p>Operation: It is expected to impact of soil contamination due to fuel leak. However, this impact will be mitigated because of installation of oil separator.</p>
	5	Noise/Vibration	B-	C-	B-	B-	<p>Pre Construction/ Construction: Limited noise and vibration resulting from construction activities and construction vehicle movement are predicted.</p> <p>The impact of noise around the airport will be mitigated because propagation distance of the noise will be ensured from construction site to boundary of the airport. And, periodic maintenance of construction machinery will be done</p> <p>Operation: The area in where aircraft noise is over Japanese standard will distribute around the airport. As a countermeasure of this issue, CAAB will promote the using of low noise aircraft recommended by ICAO by giving incentives. It is difficult to give subsidy for anti-noise works likewise Japan because the aircraft noise is exempted from standards on government law. Thus, complaint section for noise will be implemented by CAAB. The above countermeasures will mitigate the impact. The impact from vehicles travelling inside of the airport is expected. The impact of noise around the airport will be insignificant because propagation distance of the noise will be ensured from construction site to boundary of the airport.</p>
Social Environment	6	Local economies, such as employment, livelihood	B+	B+	B+	B+	<p>Pre Construction/ Construction: Positive impacts such as creation of local employment are predicted.</p> <p>Operation: Increase of flights will ultimately contribute to the local economy.</p>
	7	Land use and utilization of local resources	A+	A+	A+	A+	Pre Construction/ Construction/ Operation: Significant positive impact on use of local resources is predicted.
	8	Existing social infrastructures and services	B-	B-	B-	B-	Pre Construction/ Construction: Due to construction activities, decrease in the

分類	No.	Environmental Item	Ratings At Scoping		Ratings After Surveying		Brief Description
			Pre-construction/ Construction	Pre-construction/ Construction	Pre-construction/ Construction	Pre-construction/ Construction	
							<p>convenience of the airport users is expected, but very minimum. And the carrying road will be implemented in the airport area so, negative impact around the airport will be mitigated.</p> <p>Operation: Due to increasing users of the airport, road traffic will be affected. However, the impact will be mitigated because the new road infrastructure will be implemented.</p>
	9	Local conflicts of interest	B-	D	B-	D	<p>Pre Construction/ Construction: There are some former lease holders located within the proposed Project area. CAAB is now negotiating for their relocation.</p> <p>Operation: Other local conflict of interests is not predicted.</p>
	10	Landscape	B-	B+	B-	B+	<p>Pre Construction/ Construction: Due to the construction activities, the disturbance to the scenery is expected. However, this impact will be mitigated because of cleanup activity in construction site.</p> <p>Operation: Renovation of the international terminal and VVIP terminal will enhance the landscape.</p>
	11	Gender	B+	B+	B+	B+	<p>Pre Construction/ Construction: Construction will create female job opportunity.</p> <p>Operation: Operation will create female job opportunity.</p>
	12	Infectious disease such as HIV/AIDS	B-	D	B-	D	<p>Pre Construction/ Construction: Inflow of construction workers may increase the risks on communicable diseases. However, this impact will be mitigated because of clause of contract documents on HIV/AIDS prevention measures.</p> <p>Operation: No activities that will increase the risk of communicable diseases in the local communities around airport are expected.</p>
	13	Working Environment (includes work safety)	B-	D	B-	D	<p>Pre Construction/ Construction: Inappropriate management of working environment will raise the risk of accident and casualty. However, this impact will be mitigated because of using Personal Protective Equipment (PPE), hearing protection for workers on demolition of concrete.</p> <p>Operation: No activities that will increase the risk of the working environment are expected.</p>
Others	14	Accidents	B-	B-	B-	B-	<p>Pre Construction/ Construction: The effect of construction vehicles to the local community is predicted. However, this impact will be mitigated because of traffic management plan</p>

分類	No.	Environmental Item	Ratings At Scoping		Ratings After Surveying		Brief Description
			Pre-construction/Construction	Pre-construction/Construction	Pre-construction/Construction	Pre-construction/Construction	
							and road safety plan for preventing road accident around the airport. Operation: With the increase of airport users, the risk of traffic accidents near the airport will also increase. However, this impact will be mitigated because of implementing road infrastructures.
	15	Global Warming	D	C-	D	B-	Pre Construction/ Construction: Impacts on trans-boundary effects and global warming are negligible, since the construction works of this project is limited in time, volume, and the area. Operation: The emission of GHG will be increased because of energy consumption in new terminal building. The impact will be mitigated because of implementing energy reduction equipment for lighting or air conditioning.

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

B+/-: Positive/negative impact is expected to some extent.

C+/-: Extent of positive/negative impact is unknown. (A further examination is needed, and the impact could be clarified as the study progresses)

D: No impact is expected.

Source: JICA Study Team

13.9 Mitigation measures

It is needed to consider mitigation measures for avoiding or reducing environmental and social impact regardless the scale of the impact. The study on mitigation measures is conducted with consideration of technological feasibility and legislative system. The result of study is shown following table.

Table 13-9 Mitigation Measures

No.	Environmental Items	EMP	Implementing agency	Responsible Agency	Rough cost estimation (Million JPY)
Construction					
1.	Air pollution	<ul style="list-style-type: none"> Water sprinkling for preventing resuspend soil Cleaning activity of inside hauling road and entrance of the airport Using of low air pollutant emission type machinery for construction 	Contractor	CAAB	166
2.	Water Pollution	<ul style="list-style-type: none"> Using wastewater treatment such as sedimentation tank for discharge to the canals 	Contractor	CAAB	40
3.	Solid waste	<ul style="list-style-type: none"> Segregation and sorting of the 	Contractor	CAAB	Included in site

No.	Environmental Items	EMP	Implementing agency	Responsible Agency	Rough cost estimation (Million JPY)
		waste for appropriate reusing and recycling			management cost
4.	Soil contamination	• Securing that contaminated soil will be isolated from clean soil.	Contractor	CAAB	Depending on the quantity of contaminated soil
5.	Noise/Vibration	• Using of low noise type machinery for construction	Contractor	CAAB	1,511
6.	Existing social infrastructures and services	• Installation of inside hauling road for reducing impact to outside road.	Contractor	CAAB	90
7.	Local conflicts of interest	• Negotiating for relocation	CAAB	CAAB	—
8.	Landscape	• Cleanup activity in construction site for impact mitigation of scenery to the airport users and residents	Contractor		Included in site management cost
9.	Infectious disease such as HIV/AIDS	• Complying with criteria of HIV/AIDS prevention measures.	Contractor	CAAB	Included in site management cost
10.	Working Environment (includes work safety)	• Installing Personal Protective Equipment (PPE), hearing protection for workers on demolition of concrete.	Contractor	CAAB	20
11.	Accidents	• Preparing traffic management plan and road safety plan for preventing road accident around the airport.	Contractor	CAAB	Included in site management cost
Operation					
1.	Air pollution	• Installing multi storey car parking with adequate parking number for reduction of gas emission from waiting cars.	CAAB	CAAB	6,243
2.	Water Pollution	• Installing wastewater treatment facility for complying with the standards mentioned in Schedule 10 of the ECR 1997 for inland water discharge	CAAB	CAAB	199
3.	Solid waste	• Proper collection and disposing all internally generated solid waste	CAAB	CAAB	—
4.	Soil contamination	• Installing Oil separator for drainage in oil farm	CAAB	CAAB	15
5.	Noise/Vibration	• Establishing complaint section for issue of airport activity including aircraft noise	CAAB	CAAB	—
6.	Existing social infrastructures and services	• Installing road infrastructure for smooth traffic and human movement near airport.	CAAB	CAAB	6,786
7.	Accidents	• Installing road infrastructure for smooth traffic and human movement near airport.	CAAB	CAAB	
8.	Global Warming	• implementing energy reduction equipment for lighting or air conditioning.	CAAB	CAAB	1,290

Source: JICA Study Team

13.10 Environmental Monitoring Plan

The environmental monitoring plan during construction and operation is shown below table.

Table 13-10 Monitoring Plan

No.	Monitoring Item	Parameter	Monitoring area/ point	Term Frequency /	Responsible Agency
Construction					
1.	Air pollution	1. The number of times of water sprinkling to the carrying road and entrance of the airport 2. The number of times of cleaning of the equipment and work site	Carrying road and entrance of the airport Equipment and work site	During the construction/ reporting for once in 3 months	CAAB
2.	Water Pollution	pH, Temp, Turbidity, EC	Discharging point to the canal	During the construction/ Every 3-month survey at typical day	CAAB
3.	Solid waste	1.Types of waste 2.Monthly quantity of waste	Whole of the project site	During the construction/ Reporting for once in 3 months	CAAB
4.	Noise/Vibration	Construction Noise	Around the construction area	During the construction/ Every 3-month survey at a.m. and p.m. of typical day	CAAB
5.	Working Environment (includes work safety)	1.W=The number of workers on demolition site 2.I=The number of installation of hearing protections on demolition site 3. Ratio (IR)=I/W 4. Number of PPE must be equal or more than W	Whole of the project site	During the demolition of concrete/ Reporting for once in 3 months	CAAB
Operation					
1.	1	NO _x 、SO _x 、PM10、PM2.5	Project site	During operation/ Annual report	CAAB
2.	Water Pollution	pH, Temp, SS, EC, TDS, NH ₃ , COD, BOD, Coli, Oil&Grease	Discharging point of the treated water	During operation/ Annual report	CAAB
3.	Land contamination	1.Quantity of contaminated soil 2.Method of the storing and managing contaminated soil	Whole of the project site	During operation/ Annual report	CAAB
4.	Noise/Vibration	1.The status of implementation complaint section 2.Ambient noise level(Leq) 3. Aircraft noise (Lden)	1. Project site 2. Bboundary of the project area 3. At the point of near residential area	1,2. During operation/ Annual report 3. During operation/ Once	CAAB

Source: JICA Study Team

13.11 Next Activities Required for Obtaining ECC

As stated earlier, the DOE first step clearance (which is the site clearance) together with the approval of IEE and EIA TOR has been obtained. It may be noted here that as per JICA guidelines (2010), as this

Project is of Category B, IEE approval by DOE can fulfil minimum JICA requirement. However, as this Project is classified as Red category as per Bangladesh law, EIA approval by DOE is required before the start of construction activities.

Based on the approved EIA TOR, the EIA document is to be prepared. The EIA document must include EMP, Environmental Monitoring Plan (EMoP), EMP implementation budget, and EMP implementation arrangement, in addition to expected impacts and their remedial measures. The EIA document should also include result of public consultant meetings/ information disclosure meetings should be conducted.

The Report is to be submitted to DOE for its approval leading to the issuance of ECC. It is rather difficult to estimate the time required for such approval process., it can be assumed that two months will be required for EIA approval. A tentative timeline is given in Table 13-11.

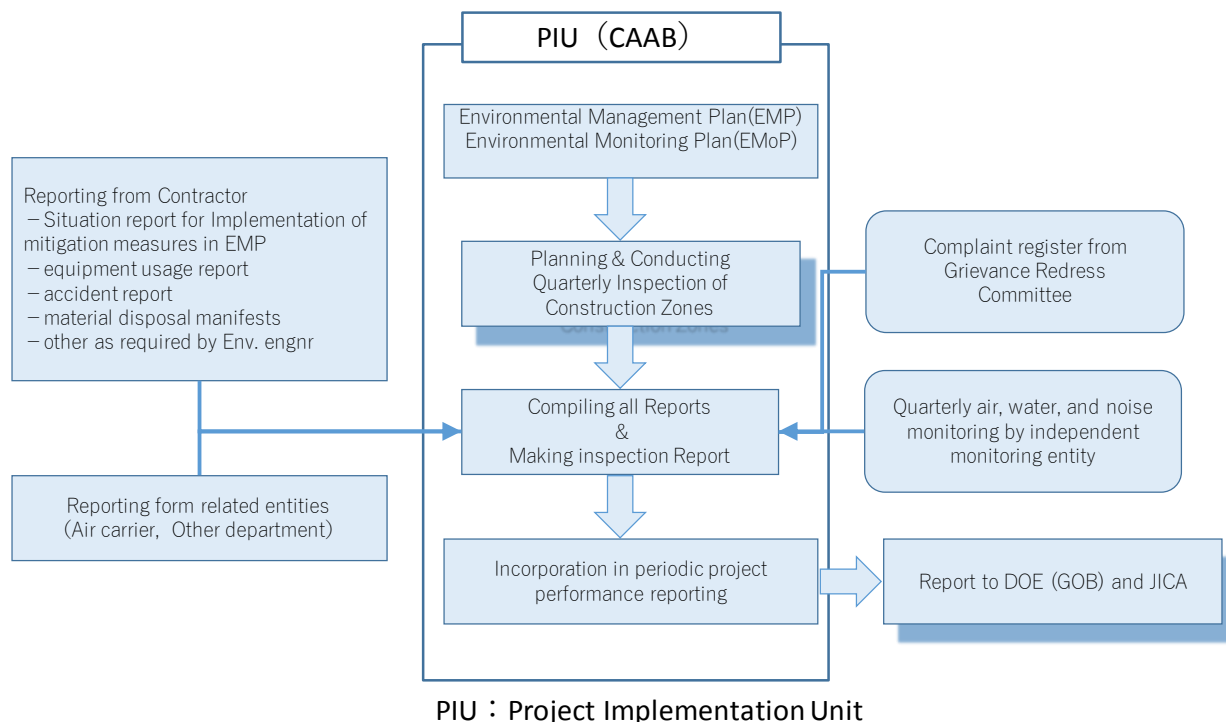
Table 13-11 Tentative Timeline

Activity	Q2, 16	Q3, 16	Q4, 16	Q1, 17	Q2, 17
IEE Approval / EIA TOR Approval by DOE			▲		
EIA Preparation by CAAB			■		
EIA Approval/ ECC Issuance by DOE				■	

Source: The Study Team

13.12 JICA Environmental Checklist, Environmental Management Plan, Monitoring Plan

As the Project is a candidate for JICA loan financing, JICA Environmental Checklist for Airport (Template Number 9) have been prepared to facilitate project appraisal by JICA. These can be found in Annex 13.1. Environmental Management Plan (EMP) are shown in Annex 13.2, Environmental Monitoring Plan (EMoP) are shown in Annex 13.3 and Environmental Monitoring Form are shown in Annex 13.4. The frameworks of Environmental monitoring is shown below figure. The project Implementation Unit (PIU) would be organized in CAAB and PIU would execute EMP and conduct EMoP during construction and operation. It has better to propose to the CAAB to establish the special sector or personnel for conducting EMP and EMoP of this project.



Source: JICA Study Team

Figure 13-11 Tentative Environmental Monitoring Framework

13.13 Stakeholder Meeting

During the IEE study, stakeholder meeting was held.

Table 13-12 Stakeholder Meetings

The date of meeting		The name of meeting
A	25 th August 2014	Stakeholders meeting during IEE Preparation
B	21 st November 2016	Focus Group Discussion (FGD)
C	10 th January 2017	Focus Group Discussion (FGD)
D	11 th – 24 th January 2017	Key Informal Interview (KII)
E	27 th – 30 th December 2016	Individual Consultation
F	26 th January 2017	Information Disclosure Meeting (IDM)
A. Stakeholders meeting during IEE Preparation		
Outline	Stakeholders meeting during IEE Preparation: During the IEE study, stakeholder meeting was held on 25 August 2014 involving CAAB officials, airport workers and surrounding people. Project objectives and anticipated impacts were explained. It was reported that no one objected the proposed Project. It was also reported that participants showed their willingness to cooperate whole heartedly during construction.	
	The plans reflected of stakeholders comments.	
	• none	
B. Focus Group Discussion (FGD)		
Outline	FGD during draft EIA preparation: An FGD type stakeholders meeting was held on 21 Nov, 2016 at CAAB (Annex 9, draft EIA report submitted to DOE, December, 2016). About forty-three (23) participants of different occupations were present at the meeting. A detail power point presentation was made to explain the objective and components of the Project, and anticipated impacts and their remedial measures. All of the participants supported the project and extended their cooperation. However, there are some concerns raised in the meeting as follows:	
	<ul style="list-style-type: none"> • Some residents claim that drainage water from airport area enters into nearby Nikunja residential 	

	<p>area causing water logging problem. It was replied that the issue would be examined.</p> <ul style="list-style-type: none"> • Similarly, people from Uttara 1 area also complained about water logging at their area. It was replied that there is no connection between airport area and Uttara 1 area, still the issue would be examined. • Participants expressed their opinion that re-plantation must be done for any tree cutting. <p>Participants inquire about new building height restriction. It was replied that no addition height restriction is needed as there will be no new runway.</p>																				
	<p>The plans reflected of stakeholders comments.</p> <ul style="list-style-type: none"> • Tree inventory survey was conducted for future cutting trees. About replantation, it will be studied in detailed design. 																				
C. Focus Group Discussion (FGD)																					
Outline	<p>FGD was held on 10 Jan, 2017 at CAAB. About sixty-six (66) participants of different groups including businessmen, social workers, local elected representative (UP Member), Government officials were present at the meeting. After presentation on the Project and its environmental issues, the participants expressed their views. The participants were positively accepted the Project and appreciated that environmental issues are considered and will be addressed. Also, the approach of taking opinion from the local people was greatly appreciated. Some of their concerns are as follows:</p> <ul style="list-style-type: none"> • Many participants inquired about land acquisition. It was replied that there would be no land acquisition as all the Project activities will be confined within the current airport premises. • Many participants also inquired about building height restriction. They were briefed that as there would be no new runway construction, there would be no change in zone wise building height restriction. 																				
	<p>The plans reflected of stakeholders comments.</p> <ul style="list-style-type: none"> • none 																				
D. Key Informal Interview (KII)																					
Outline	<p>Key Informant Interview (KII) is a useful tool of PRA (Participatory Rapid Appraisal) that gives shared understanding of common concerns of a knowledgeable/ focal person. The KII usually takes place at a suitable place where the concerned person can discuss issues in details and express his views freely and independently. KII does not follow any fixed structured questions.</p> <p>The following six persons were interviewed as part of the KII for this Project</p>																				
	<table border="1"> <thead> <tr> <th>S/N</th> <th>Name of Key Informant</th> <th>Expertise on</th> <th>Identity</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Dr. Ainun Nishat</td> <td>Water resources/ ecology</td> <td>Prof Emeritus, VC (Former) BRAC University Former Chairman, IUCN-Bangladesh Former Professor, BUET</td> </tr> <tr> <td>2</td> <td>Prof M. Feroze Ahmed</td> <td>Environmental Expert</td> <td>VC, Stamford University Former Professor, BUET</td> </tr> <tr> <td>3</td> <td>Prof A. I. Mabub Uddin Ahmed</td> <td>Sociologist</td> <td>Past Chair, Sociology, Dhaka University</td> </tr> <tr> <td>4</td> <td>Mr. Mahfuz Ullah</td> <td>Environmental Journalist</td> <td>Secretary General, Center for Sustainable Development (CFSD), Former Chairman IUCN-Bangladesh</td> </tr> </tbody> </table>	S/N	Name of Key Informant	Expertise on	Identity	1	Dr. Ainun Nishat	Water resources/ ecology	Prof Emeritus, VC (Former) BRAC University Former Chairman, IUCN-Bangladesh Former Professor, BUET	2	Prof M. Feroze Ahmed	Environmental Expert	VC, Stamford University Former Professor, BUET	3	Prof A. I. Mabub Uddin Ahmed	Sociologist	Past Chair, Sociology, Dhaka University	4	Mr. Mahfuz Ullah	Environmental Journalist	Secretary General, Center for Sustainable Development (CFSD), Former Chairman IUCN-Bangladesh
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4	Mr. Mahfuz Ullah	Environmental Journalist	Secretary General, Center for Sustainable Development (CFSD), Former Chairman IUCN-Bangladesh																		

	5	Mr. Iqbal Habib	Architecture	Director, Vitti Sthapati Brindo LTD Environmental Activist
	6	Dr. Ashan Uddin Ahmed	Climate Change	Executive Director, Centre for Global Change
<p>All these eminent scholars were highly supportive to the expansion project. Summary of KII is given below:</p> <p><Airport planning></p> <ul style="list-style-type: none"> • Expansion should be comprehensive & integrated • Accessibility should be enhanced • A National Symbol should decorate the HSIA outlook • Interconnected water channel should surround the HSIA • Entrance overcrowding by malls & hotels should be eliminated • Lounge, escalator, and other internal facilities should be improved • An emergency runway additional to the existing one is required <p><Environment></p> <ul style="list-style-type: none"> • Promote greenbelt by native timber, fruits & herbal trees • An emergency runway additional to the existing one is required • Improved safety and security should be ensured • Impact of noise pollution on the nearby residents should be minimized. • Occupational Health and Safety (OHS) should be maintained during construction • Special attention needs to be taken about fuel storage and handling • Water reuse and use of rain water should be considered. • Birds should be regulated for aircraft safety. • Tree cuttings should be property compensated by re plantation. 				
<p>The plans reflected of stakeholders comments.</p> <ul style="list-style-type: none"> • Tree inventory survey was conducted for future cutting trees. About replantation, it will be studied in detailed design. • Complaints section will be prepared for countermeasure of noise issue. • Personal Protective Equipment should be prepared for construction workers. • Implementation of Waste water treatment facility. 				
E. Individual Consultation				
Outline	<p>Conducted interview with various local people living close to the airport area for gathering their opinion on the Project and its impact. Interviewees included shopkeeper, teacher of school, college, madrasa (religious school), land owner, service holder, business man, taxi driver, rickshaw driver, van puller, Moszid Imam (religious leader), word councilor (elected representative), women leader, house wife etc, These</p>			

	<p>people are from the nearby four villages (Dolipara, Ahalia, Pakuria and Baunia) of Harirampur union under Turag Thana. Summary of their opinion are as follows:</p> <ul style="list-style-type: none"> • Aircraft noise is a problem especially for sick, pregnant, babies, and elderly persons, particularly at night. • Drainage from airport creates a problem. • Road communication is not good enough • Dense population live here because house rent of this area is comparative less
	<p>The plans reflected of stakeholders comments.</p> <ul style="list-style-type: none"> • Complaints section will be prepared for countermeasure of noise issue. • Road infrastructure will be implemented for smooth traffic and human movement near airport.
F. Information Disclosure Meeting (IDM)	
Outline	<p>Information Disclosure Meeting was arranged on 26 January, 2017, at Dhaka Regency Hotel. The purpose of the meeting was to disclose the output of the EIA study along the description of the HSIA Expansion Project. Total number of participants were twenty six (26) representing various government agencies and local elites including Dept of Forest, Road and Highway, Airlines, Metereology dept., Police, RAB, RAJUK, REB, BWDB, elected councillor, businessmen, etc. All the participants expressed their support for the Project and appreciated the proposed measures against anticipated environmental impact. Important issues are mentioned below:</p> <ul style="list-style-type: none"> • Importance of new metereological station at airport. It was replied that this is included in ongoing control tower construction project, but excluded from the HSIA Expansion project. • During tree re-plantation, exotic and invasion species of trees should be avoided. • There was an inquiry if Resettlement Action Plan was prepared or not. It was replied that as there is no land acquisition, RAP is not needed. • Emphasis on smooth access by various mode of transport, like DEE, BRT, MRT, car, BR, Bus, etc.
	<p>The plans reflected of stakeholders comments.</p> <ul style="list-style-type: none"> • Tree inventory survey was conducted for future cutting trees. About replantation, it will be studied in detailed design. • Road infrastructure will be implemented for smooth traffic and human movement near airport.

CHAPTER 14 PROJECT COST ESTIMATE

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Chapter 14 PROJECT COST ESTIMATE

14.1 Cost Estimate

Based on the construction plan mentioned in Chapter 8, the preliminary project cost was estimated.

14.1.1 Precondition for Project Cost Estimation

(1) Precondition

1) General Condition

- Exchange Rate: USD 1.00 = JPY 108.2 = BDT 78.4 (BDT 1.0 = JPY 1.38)
(T.T. rate as of November 15, 2016, based on the Bank of Bangladesh and Bank of Tokyo-Mitsubishi UFJ.)
- Price escalation:
 - 1.6% for foreign currency
 - 10.1% for local currency
- Physical contingency:
 - 5.0% of the total construction cost
 - 5.0% of the total consulting services cost
- Base year for cost estimation: January 2017
- Project Implementation Schedule:
Commencement: April 2017 and Completion: December 2021

2) Other Condition

- Import Tax: 20.0%
- Corporate Tax: 12.0%
- VAT:
 - Contractor: 6.0%
 - Consultant: 15.0%
- Income tax:
 - Contractor : 7.0%
 - Consultant: 12.0%
- Administration Cost: 0.2% of total construction cost
- Interest during Construction
 - Contractor: 0.7%
 - Consultant: 0.01%
- Front end fee: 0.2%

(2) Implementation Schedule

Implementation schedule is shown in Table 14-1.

14.2 Project Cost

14.2.1 Total Project Cost

The total project cost amounts to JPY 191.971 billion, which is composed of JPY 93.516 billion under the foreign currency (FC) portion and JPY 71.344 billion under the local currency (LC) portion. The eligible portion amounts to JPY 154.764 billion, which is composed of JPY 89.423 billion under FC and JPY 47.348 billion under LC (with a loan ratio of 81.31%). The remaining JPY 37.207 billion will be borne by the executing agency.

Table 14-2 and Table 14-3 show the financial plan and annual fund requirement of the project while Table 14-4 shows the breakdown of funds.

Table 14-2 Financial Plan

(Unit: JPY in millions)

Procurement	Cost
Eligible Portion (Draft)	154,764
Non Eligible Portion	37,207
Total	191,971

Source: JICA Study Team

Table 14-3 Annual Financial Plan

Year	Total	Eligible Portion (Draft)	Non-eligible Portion
2017	2,496	1,712	783
2018	58,153	47,515	10,638
2019	45,278	36,797	8,481
2020	47,504	38,508	8,997
2021	27,129	21,632	5,498
2022	11,411	8,601	2,810
Total	191,971	154,764	37,207

Source: JICA Study Team

Table 14-4 Breakdown of Fund

Item	Fund Total		
	Foreign	Local	Total
A .Eligible Portion	89,423	47,348	154,764
I) Procurement/Construction	85,484	46,492	149,643
A .Building Work	57,595	17,922	82,327
B. Civil Work	10,527	15,933	32,515
C. Utility Work	10,265	1,314	12,078
Dispute Board	64	0	64
Price Escalation	2,962	9,109	15,533
Physical Contingency	4,071	2,214	7,126
II) Consulting Service	3,940	856	5,121
Consulting Service	3,672	698	4,636
Price Escalation	80	117	241
Physical Contingency	188	41	244

Item		Fund Total		
		Foreign	Local	Total
B. Non-eligible Portion		0	23,995	33,114
c	Administration Cost	0	224	310
d	VAT (Contractor and Consultant)	0	3,346	4,618
e	Import Tax	0	12,389	17,097
f	Corporate Tax	0	0	0
g	Income Tax (Contractor)	0	7,591	10,475
h	Income Tax (Consultant)	0	445	615
C. Interest during Construction		3,776	0	3,776
	Contractor	3,774	0	3,774
	Consultant	2	0	2
D. Front End Fee		317	0	317
E. JICA Finance Portion (A)		89,423	47,348	154,764
G. GOB Finance Portion (B+C+D)		4,093	23,996	37,207

Source: JICA Study Team

14.2.2 Construction Cost

The breakdown of the construction cost is summarized below.

Table 14-5 Breakdown of the Construction Cost

Item	Unit	Quantity	Unit Rate		Amount (Million)		Total (Million)
			Foreign	Local	Foreign	Local	
			USD	BDT	JPY	BDT	JPY
A: Building Work	set	1			57,595	17,922	82,327
1.New Passenger Terminal Building (Terminal 3)	set	1			48,819	15,191	69,783
1.1 New Passenger Terminal Building including Terminal Equipment and Security Equipment (Terminal 3)	m ²	226,000	1,953	65,761	47,762	14,862	68,272
1.2 Additional Cost for Footing with Screwed Steel Pile	Set	150	65,107	2,192	1,057	329	1,511
2.Multi-level Car Parking with Tunnel	m ²	62,000	651	21,920	4,368	1,359	6,243
3.New Cargo Complex	m ²	41,200	651	21,920	2,902	903	4,148
4.VVIP Complex	m ²	5,900	1,953	65,761	1,247	388	1,782
5.Rescure and Fire Fighting Station and Equipment	m ²	1,840	1,302	43,841	259	81	371
B: Civil Work	set	1			10,5278	15,933	32,515
1.General	set	1			636	1,108	2,165
1.1 Site Facilities and Site Preparation	set	1	5,845,257	846,516,191	632	847	1,801
1.2 Security Cost	set	1	40,820	260,989,300	4	261	364
2.Land Development Work/Earth Works	set	1			2,518	2,545	6,031
2.1 Land Development Work/Earth Works	set	1	11,206,304	2,019,513,806	1,213	2,020	4,001
2.2 Soil Improvement	m	350,000	34	1,500	1,305	525	2,030
3.Pavement Works	set	1			4,441	7,396	14,647

Item	Unit	Quantity	Unit Rate		Amount (Million)		Total (Million)
			Foreign	Local	Foreign	Local	
			USD	BDT	JPY	BDT	JPY
3.1 Apron Works	m ²	498,500	57	10,196	3,052	5,083	10,067
3.2 Connecting Taxiway Works-1 (North End)	m ²	24,000	57	10,196	147	245	485
3.3 Connecting Taxiway Works-2 (Others)	m ²	42,500	57	10,196	260	433	858
3.4 Rapid Exit Taxiway Works-1 (North)	m ²	22,000	57	10,196	135	224	444
3.5 Rapid Exit Taxiway Works-2 (South)	m ²	19,500	57	10,196	119	199	394
3.6 Shoulder Works	m ²	105,800	36	6,541	416	692	1,371
3.7 GSE Road Works	m ²	83,800	34	6,205	312	520	1,030
3.8 Service Road Works	m ²	33,000	19	3,469	69	114	226
4.Drainage Works (Box Culvert and Protective Works)	set	1	5,978,544	1,077,407,094	647	1,077	2,133
5.Boundary Wall, Security Gate, Guard Room, Watch Tower	set	1	2,108,644	380,003,609	228	380	752
6.Landside Service Road with Elevated Road	set	1	19,015,459	3,426,819,578	2,057	3,427	6,786
C: Utility Work	set	1			10,265	1,314	12,078
1.Water Supply System	set	1	946,277	13,108,696	102	13	120
2.Sewage Treatment Plant	set	1	1,560,651	21,619,565	169	22	199
3.Intake Power Plant with Distribution System	set	1	34,461,429	477,391,304	3,729	477	4,387
4.Security and Terminal Equipment (Cargo)	set	1	20,479,128	283,695,652	2,216	284	2,608
5.Airfield Ground Lighting System (AGL)	set	1	16,242,067	225,000,000	1,757	225	2,068
6.Hydrant Fuel System	set	1	21,185,305	293,478,261	2,292	293	2,696
Total					78,387	35,169	126,920

Source: JICA Study Team

14.3 Review of validity of project cost

The review of validity of project cost compares the project cost as calculated above to similar projects conducted in other countries. The construction cost of the new terminal (T3) that accounts for about 60% of total project cost was selected as a comparison item. Table 14.6 shows the comparison of construction cost.

As a result of the comparison, the unit price of T3 construction cost of the master plan estimated by CAAB is higher than that of other similar projects. On the other hand, although the unit price of T3 construction higher than other similar projects, it is equivalent to the terminal construction cost of Noi Bai Airport and can be said that it is valid.

Table 14.6 Comparison of Construction Cost

Project Name	HSIA Expansion Project		Borg El Arab Airport	Bohol Airport	Vientian Airport	Noi bai Airport	Bandaranaike Airport	Jomo Kenyatta Airport
Contry Name	People's Republic of Bangladesh		Arab Republic of Egypt	Republic of the Philippines	Lao People's Democratic Republic	Socialist Republic of Vietnam	Democratic Socialist Republic of Sri Lanka	Republic of Kenya
Date of Loan Agreement	Expected in 2017		November, 2014	August, 2014	September, 2013	March, 2010	May, 2016	Not specified
Construction Cost for Terminal								
Construction Cost (Million JPY)	103,970	69,783	6,024	1,751	2,555	44,700	41,053	43,230
	(Source is CAAB Master plan prepared in June 2015.)							
Unit Rate (JPY/m ²)	399,886	308,774	251,000	199,000	222,850	319,286	228,072	242,865
Design Condition / Specification								
Total Floor Area	260,000	226,000	24,000	8,800	11,465	140,000	180,000	178,000
Bidding Method	International Competitive Bidding (ICB)		ICB	ICB	ICB	ICB	ICB	-
Remark					Total Area: 23,805 m ² Existing: 11,075 m ² Improvement: 11,465 m ²			It is currently F/S stage
Picture								

Source: JICA Study Team

14.4 Applicability of Japanese Advanced Technology

The approximate construction cost was estimated as shown in Table 14-7 based on the CAAB master plan. Table 14-7 shows the increase and decrease of the construction cost when advanced technology is applied and in addition, about the item which was included in the construction cost, additional markup was stipulated. Setting of quantities and unit price by the summary design has not yet been established, and it will be necessary to further improve the accuracy of the estimate.

Table 14-7 Increase and Decrease of Construction Cost

No.	Name of Technology	Cost Deviation (JPY Million)	Effectiveness	Remark
1	Screwed Steel Pile	1,500 (Already added)	Shortening of construction period	Expecting three months shortening of footing work period. Cost increase per one footing is estimated to be JPY 9-10 million and cost increase is estimated to be JPY 140-150 million assuming 150 numbers of footing.
2	Perforated earthenware pipe for underground cable protection	-100 (Already added)	Shortening of work duration and cost reduction	Underground cable protection pipe normally are laid with white gas pipe or FRP pipes and it takes time for the fixing and connection of each duct line. But for segments less than 1 m with many apertures, earthenware pipes are connected easily and speedily; construction cost is reduced.
3	Soil improvement	1,000 ~2,000 (Already added)	Prevention of settlement and liquefaction	It is necessary for the soil improvement to choose the most suitable method. Examining soil layer and depth, the JICA Study Team assumes sand compaction method with experience in Bangladesh considering area of 1/4-1/2 of whole pavement area with about 600,000 m ² . Estimating total sand pile length of 350,000 m and unit rate of JPY 6,000, soil improvement cost is calculated to be JPY 1,000-2,000 million.
4	Photocatalyst	Under investigation	Reduction of maintenance cost	Place to be used and the quantity are decided at the design stage.
5	Intelligent fire suppression system	1,600	Safety improvement	Cost is estimated to be JPY 15,000 per m ² based on the data from manufacturer and total amount is estimated to be about JPY 3,300 million. Existing cost estimate of master plan is assumed to be JPY 1,700 million. It is calculated to increase by the remaining JPY 1,600 million.
6	Facial recognition system	300	Security measure	Based on the data from manufacturer
7	Liquid scanner	7	Security measure	Based on the data from manufacturer
8	Control on vibration	Under investigation	Stability at the time of earthquake	By the setting of the damper for control of vibration use point, quantity fluctuates. The details are decided at the design stage.

Source: JICA Study Team

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***CHAPTER 15 IMPLEMENTATION ORGANIZATION
OF THE PROJECT***

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Chapter 15 IMPLEMENTATION ORGANIZATION OF THE PROJECT

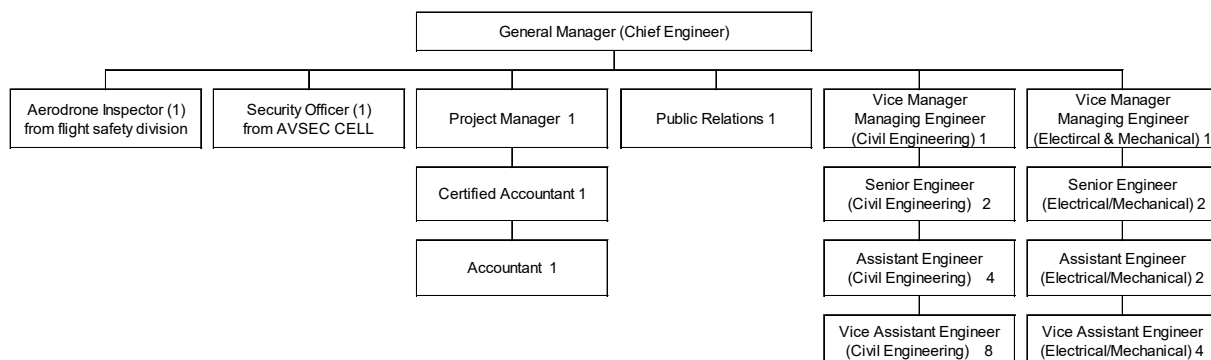
15.1 Implementation Organization

15.1.1 The Implementing Agency

The implementing agency for the terminal expansion project will be the Civil Aviation Authority, Bangladesh (CAAB), which will be responsible for the design, procurement, and construction of the project. CAAB shall establish the Project Implementation Unit (PIU) for this project, which will be an independent organization with delegated authority and specific functions.

15.2 Confirmation of Scope of PMU, Composition of the Organization and Staff

CAAB is responsible for providing air traffic control (ATC) services, securing fast and efficient flow of aviation traffic within the Bangladesh Flight Information Region (FIR), as well as the responsible agency for maintaining facilities including development and construction, for all airports in Bangladesh. The organizational organization of CAAB is composed of three councilor members and the Chief Engineer under the Chairman, as shown in Figure 15-1. It has jurisdiction over operations and planning of air traffic safety and security, formulation of aviation policies, and construction of aviation infrastructure, including airports and air navigation facilities. CAAB has a total staff of 3,716 (as of 2016), of which approximately 900 are staff exclusive of the security forces such as police. Out of this number, about 754 personnel are assigned to the Chief Engineer’s Office. Their main task is responding to engineering issues at airports and they are divided into three groups, namely: 1. Electrical and mechanical, 2. Civil engineering, and 3. Planning/design/quality survey. During the implementation of the project, dedicated staff will be assigned to the PIU as shown in Figure 15-1.



Note: numbers indicate assigned staff numbers
Source: CAAB

Figure 15-1 Organization of PIU in CAAB

15.3 Finances and Budgetary Situation of the Implementation Agency

The financial situation of CAAB related to project implementation is shown in Table 15-1. CAAB revenue has increased strongly since 2010, and doubled in a time span of four years up to 2014. The sources of revenue are the charges for use of the airports and navigational aid facilities under its jurisdiction and are independent of the government budget. In the financial years that show a deficit,

internal reserves are used to balance finances. The accumulated profit/loss is approximately BDT 39.7 billion in accordance with the financial statement for the year ended 30th of June, 2015. The revenues from regional airports are initially entered as revenue for CAAB and redistributed as budget for each airport in the following year.

The budget required for the PIU of this project will also be secured within the CAAB budget. The revenue for the Hazrat Shahjalal International Airport (HSIA) is shown in Table 15-2. It also shows a steady increase after 2010.

Table 15-1 CAAB Finances

(unit: BDT in millions)					
Fiscal Year*	2010/2011	2011/2012	2012/2013	2013/2014	2014/2015
① Total Income	6538.89	7310.51	7952.11	11,502.86	14,103.23
Increase rate		11.8%	8.8%	44.7%	22.6%
② Total Expenditure	3168.66	3785.37	3303.36	4233.34	6476.73
③ Contribution to GoB	300.00	350.00	420.00	500.00	550.00
④ Repayment of debt	366.20	366.20	366.20	436.97	472.89
⑤ Development Cost	2,403.46	3,882.80	3,705.76	4,598.25	5,272.97

*: From July to June of the following year
Source: CAAB

Table 15-2 Revenue for HSIA

(unit: BDT in million)					
Fiscal Year	2010/2011	2011/2012	2012/2013	2013/2014	2014/2015
Revenue*	5046.02	5674.43	6346.41	8968.52	10841.66

*: From July to June of the following year
Source: CAAB

15.3.1 Technical Level of the Implementation Agency

CAAB has experience in implementing projects under Japanese yen loans through the Chittagong Airport Development Project which commenced in 1995. The grant aid project for procurement of Air Navigation Equipment at Dhaka International, Chittagong, Jessore, and Saidpur airports is also presently being implemented. CAAB also has experience in constructing other international airports and domestic airports in addition to HSIA. Therefore, its technical level is considered to be high.

The contents of the guidelines for procurement of consultant's services also exhibit deep understanding of Japanese yen loan procedures gleaned from previous projects. The guidelines also show an understanding of utilizing and formulating tender and contract documents based on FIDIC standards.

15.3.2 Experience in Similar Projects by the Implementing Agency

The previous experience in similar projects by the implementing agency is shown in Table 15-3. The list includes several Japanese yen loan projects. CAAB is deemed to be well versed in the procedures

and steps required for the implementation of Japanese yen loan projects.

Table 15-3 List of Similar Projects Implemented by CAAB

No.	Project Name	Project Cost (BDT in million)	Actual Cost (BDT in million)	Date of Completion
1	Chittagong Airport Development Project	5,411	—	December 2000
2	Renewal of Displays (FIDS) at Dhaka International Airport	129.4	129.4	November 2006
3	Asphalt Overlay on Runway at Jessore Airport	121.3	120.7	June 2007
4	Asphalt Overlay on Runway and introduction of Navigation Lighting System at Cox's Bazaar Airport	246.0	236.5	June 2007
5	Development of Sylhet Airport to enable Wide-Body Aircraft Operations	1,077.9	1,060.9	June 2008
6	Renewal of Existing DVOR and DME at Dhaka International Airport	53.8	51.3	June 2008
7	Renewal of Existing Navigation Radar facilities at Dhaka International Airport	143.0	140.7	December 2008
8	Expansion of Apron north of No. 7 Spot at Dhaka International Airport	65.7	56.0	December 2008
9	Expansion and Modernization of Terminal Bldg. at Sylhet International Airport, including ground floor staircase	562.7	532.7	June 2009
10	Refurbishment of Normal Electrical Supply Circuit and Emergency Generators at Dhaka International Airport	240.0	217.0	June 2011
11	Procurement of Security Equipment for Cargo Facilities at Dhaka International Airport	287.8	—	June 2011
12	Consulting Services for Renewal of Dhaka International Airport	186.7	—	June 2014 (planned)
13	Renewal of Dhaka International Airport	4,140.5 (approved) 5,312.0 (revised)	—	June 2013 (planned)
14	Asphalt Concrete Overlay on Runway at Dhaka International Airport	878.0	—	June 2011 (planned)
15	Cox Bazaar Airport Development (Phase 1)	3,026.5 (original) 5,496.4 (revised)	—	December 2013 (planned)
16	Expansion of Apron west of Taxiway F and north of existing Export Cargo Terminal at Dhaka International Airport	444.0	—	June 2013 (planned)
17	Construction of CAAB HQ	614.2 (approved) 1,098.5 (revised)	—	June 2014 (planned)

Source: CAAB

15.3.3 Evaluation and Recommendations on the Implementing Agency (Required Staffing, Human Resource Development)

The staff required for PIU to carry out the implementation of the Japanese yen loan project will be selected from the CAAB staff with previous experience of airport development projects. In addition to DSIA, since CAAB is responsible for operation and management and development of international airports in Chittagong and Sylhet and five other domestic airports, experience of construction projects is abundant. There are no difficulties envisioned in the implementation of the project since the PIU will be appropriately established and manned mainly by experienced CAAB staff. However, the scale

of the proposed Terminal 3 is extremely large and also the first passenger terminal with capacity of ten million passengers, which exceeds the annual handling capacity of the existing terminal building for CAAB. Moreover, the construction period is only three years from commencement of construction to commencement of operations requiring highly difficult construction management.

Furthermore, security management over the whole large construction site must also be firmly addressed following the terrorist attack of July 2016.

Therefore, it will be necessary to employ staff who have the capability to manage large projects in short construction schedules and are also capable of cooperation with the security management entity. At the same time, it will also be necessary to train CAAB staff in order to acquire capabilities to carry out similar difficult projects. Therefore, on-the-job training (OJT) programs must be implemented for CAAB staff as well as appropriate off-the-job training as required.

***CHAPTER 16 MAINTENANCE AND OPERATION
ORGANIZATION***

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Chapter 16 MAINTENANCE AND OPERATION ORGANIZATION

The area inside the restricted airspace must be operated and maintained under international rules. CAAB has a responsibility to take care and protect the value of passenger's life, property, and cargo passing through for compensation and receives revenue in return.

When the airport is secure and comfortable, and the country can provide value, passengers and cargo will increase at a high rate. Bangladesh has highly valued assets in its labor forces and resources, but the passenger and cargo handling services at the international airport, one of its gateway facilities, are inferior to global standard levels. Visitors to the airport are guests of all the people who work at the airport and cargo is valued property. Airport authorities must ensure the safety and comfort of passengers and the value of property. In addition, people and cargo that use the airport and foreign airlines that undertake flight operations also value time. The airport urgently needs to provide comfortable and appropriate services to all comers and raise credibility in their services.

It is also necessary to gain the trust from foreign airline operators. The airport operations must adhere to the rules governing their execution. They should also maintain and improve the quality of the matters within their scope in order to maintain orderly functions throughout the airport.

16.1 Confirmation of Maintenance and Operation Organization

The operations, maintenance, and administration of airports in Bangladesh at present are under the jurisdiction of CAAB. The maintenance of runways, taxiways, aprons, landing strips, radio navigation facilities, and navigation aids are also their responsibility. The ground handling services are operated by Biman Bangladesh Airlines and cargo handling is operated by Biman Cargo.

Table-16-1 Organization of Operations and Management at HSIA

Category of Operation	Responsible entity	notes
Operation of passenger terminal	CAAB	
Operation of cargo terminal	Biman Cargo	
Safety management	CAAB	
Fire fighting and emergency services	CAAB	
Disaster prevention	CAAB	
Security Services (security inspections, police)	CAAB, airlines, Bangladesh Police (Airport Armed Police), Bangladesh Ansar & VDP	
Facility Management & Maintenance	CAAB	
Ground Handling Services	Biman Bangladesh Airline	
Immigration/Emigration/Quarantine	Bangladesh Police, Bangladesh Customs, Department of Agricultural Extension	
Air Traffic Control Services	CAAB	

Source: JICA Study Team

This system is expected to remain during the construction period and after commencement of operations. The project encompasses not only the expansion of the airport facilities, but also includes the continued operations of the existing terminal during construction. Therefore, the existing maintenance operations must also be continued same as before.

16.2 Confirmation of Scope, Organization, and Staffing of Maintenance and Operation Organization

The present situation of CAAB concerning its scope, organization, and staff are described in Chapter 15. In summary, approximately 900 airport staff exclusive of the security guard corps are deployed as operations and maintenance staff to each domestic airport as of 2016. The increase of approximately 700 staff by the end of phase 1 has been approved by Ministry of Finance. There are also plans to increase the staff after completion of T3 during phase 2.

Among the current maintenance and operations under the jurisdiction of CAAB, such as the maintenance and operation of basic facilities, air traffic control facilities (ATC), radio navigation (Navaid) facilities, and aerodrome lighting facilities, ATC and Navaid are currently scheduled to be upgraded under Bangladesh Government funding. However, the objective is to improve performance and replace outdated equipment with no increase in installation numbers and the upgrades are not expected to significantly increase the service volume and the present organization and number of staffs are expected to be maintained.

On the otherhand, the number of air traffic controllers are insufficient at present and all ATC operations, including airfield, terminal and air traffic services are requiring long shifts of over 6 hours from each staff. With the expected increase in air traffic demand, the number of aircraft handled by each controller will also increase and it is planned to improve the organization and staffing for air traffic controllers. However, no official government approval has been obtained at present and no details are available.

The commencement of operations at Terminal 3 is scheduled for February 2021. The Terminal3 facilities for services not operated by CAAB, such as immigration and emigration, customs and quarantine are expected to remain under the same organizations as at current terminals whose staff will operate the equivalent facilities at T3 for the time being after the commencement of operations. Although the organization and staffing after 2021 have not been finalized at present, the number of staffs will be required to be increased in accordance with the increase in floor area.

The present CAAB maintenance staff for the international airport are approximately 500 in number, excluding the security staff of ANSAR and Armed Police. Th number of staff is planned to increase to about 950, with approximately 450 out of the planned increase of 700 being assigned to HSIA.

Since CAAB has appropriately managed the operations of the passenger terminal up until now, it is expected that CAAB will continue its appropriate airport operations, maintenance, and administrations after commencement of services at Terminal 3.

16.3 Finance and Budgetary Conditions of Maintenance and Operation Organization

The project budget for maintenance and operations is secured within the CAAB budget which is independent from government budget. The budget and expenditures for 2010 to 2016 is shown in Table 16-2. It has been confirmed that over 90% of requested budget has been secured for maintenance and operations and review of current revenues and expenditures reveal no financial issues. However, while terminal floor space will increase and passenger revenues will also increase, in order to handle the increased passengers and airport visitors with a high level of service, the number of staff must be

increased and new equipment procured. This will require careful attention to balancing revenue and expenditures in project planning for maintenance and operations.

Table 16-1 Maintenance and Operation Cost

(Unit: Mil. Bangladesh Taka)

Financial Year	Requested	Allocated	Allocated Percentage
2010-11	1047.55	997.57	95.24%
2011-12	1065.17	1004.88	94.34%
2012-13	512.97	493.24	96.74%
2013-14	580.95	537.92	92.59%
2014-15	648.52	594.97	91.74%
2015-16	722.26	656.6	90.91%
2016-17	805.94	732.68	90.91%

Source: CAAB

16.4 Technical Level of Maintenance and Operation Organization

The maintenance at airports in Bangladesh is conducted following a maintenance manual prepared by CAAB based on the airport services manual published by ICAO. The maintenance division of CAAB conducts maintenance activities of basic facilities and navigation aid facilities based on these manuals. Observation of actual maintenance activities has shown that the rules are followed reliably and the technical level is not an issue. The operation procedures of various airport facilities and the basic procedures for maintenance and inspection of equipment are also provided with manuals prepared by CAAB and are carried with attention paid to the items listed below. Following the commencement of operations at Terminal 3, the facilities requiring maintenance will increase and it is assumed that CAAB recognizes that an increase in staffing is necessary. Incorporation into project planning and implementation of staff employment and training should be confirmed at appropriate times.

- Attention to conformance with procedures in manuals and guidelines in the performance of maintenance services by operation and maintenance staff.
- Improvement of equipment and technical skills and increase in efficiency
- Thorough familiarization with composition and functions of each equipment and responses prepared in advance for various accidents.
- Maintain close vigilance over the condition of each equipment and immediately report any abnormality or accident to responsible person
- Strict observance of all safety related rules.

16.5 Experience of Operation and Maintenance Organization

CAAB is responsible for operations and maintenance of HSIA at present.

CAAB carries out maintenance of basic facilities such as passenger terminal, parking facilities and the runways, taxiways and aprons, radio navigation, and aviation lighting facilities at HSIA. It also has experience in maintenance and operations of two other international airports and five domestic airports in Bangladesh. The maintenance and operations after completion of the project facilities are judged to be without issue as the organization to utilize these experiences is in place.

16.6 Evaluation and Recommendations on Maintenance and Operations (Required Staff Deployment, Human Resource Training)

CAAB has prepared manuals (Aerodrome Maintenance manual, 2013 CAAB) for operations and maintenance for airports in Bangladesh based on the airport services manual published by ICAO. The maintenance division of CAAB conducts maintenance activities of basic facilities and navigation aid facilities based on these manuals.

However, observations of present conditions at DSIA reveal many areas where service levels are significantly below that of international airports in other countries. Preparation of manuals is important, but it is eraduly apparent to outside observers whether the manuals are being followed and whether appropriate maintenance is being carried out or not. It is judged that the intent of the regulations is not properly transmitted to the actual operation organization (operation departments).

These conditions are deemed to derive from the inappropriate communication of regulations to the operation department staff and the separation of actual results from prescribed effects due to dysfunction of confirmation procedures of the maintenance activities.

The maintenance and operation departments should carry out regular periodic reviews and evaluations to determine whether actual operations are appropriately carried out and take immediate remedial measures when irregularities occur.

The alienation of actual results from prescribed processes is an issue requiring immediate correction. The implementation of appropriate training for the services carried out at each department is equally important as the introduction of new equipment and machinery.

It is recommended that the maintenance of airport facilities should be based on Shobun: Disposal, the 4th S in addition to the 3 S's (Seiri: Keep tidy, Seiton: Replace properly after use, Seisou: Clean up)

Evaluation and recommendations on the present conditions are reiterated below.

16.6.1 Passenger Terminal Operation Services

The primary mission of the passenger terminal is to provide safe and comfortable environment to the users of the passenger terminal and a similar level of respect for their luggage should be shown as well. However, at present, the luggage is taken out of aircraft, piled on to ULD dollies and handled roughly before being handed back at the terminal. The same applies to departures. This handling leads to damage of the luggage and betrayal of the trust of the passengers. The conditions are even worse during the rainy season. A shining new building is impressive, but provision of high quality services to the passengers is highly desired.

16.6.2 Cargo Terminal Operation Services

Biman Cargo carries out air cargo and the ground handling as mentioned previously. The income and expenditure situation is shown in Table 16-2. The revenue of cargo handling from 2010-2014 is estimated to be about 1.0 to 1.5 billion BDT, of these, the income and expenditure situation about grand handling was not able to do data acquisition. On the other hand, about the expenditure, the payment to CAAB which is an airport owner does not occur. It is assumed that Biman Cargo have monopolistic rights and interests about

the freight handling in the airport. As for this, it is assumed that it occurs because it is the national enterprise where is equal with CAAB in an organization in MoCAT.

Table 16-2 Income Statement of Biman Cargo

(Unit: Million BDT)

Fiscal Year	2010/2011	2011/2012	2012/2013	2013/2014	2014/2015
Revenue	1007.22	1272.38	1591.44	1334.96	1566.96
Revenue from Cargo Handling at HSIA	1007.22	1272.38	1591.44	1334.96	1566.96
Import handling revenue	215.32	271.5	307.3	322.6	315.47
Export handling revenue	791.9	1000.88	1284.14	1012.36	1251.49
Other revenues					
Revenue from Ground Handling at HSIA					
Expense	0	0	0	0	0
Expense of Cargo Handling at HSIA	0	0	0	0	0
Expense of Ground Handling at HSIA	0	0	0	0	0

Source: Biman Cargo

As mentioned in previously in Section 3.3.4, although issues with cargo handling are recognized, there are no sign of improvement. The lack of a competitive mindset due to the monopoly in handling seems to be the main reason for the slow advance of improvement.

The cargo handled at the cargo terminal are valued products and goods of the customers and their valuable assets. The main mission is to make timely deliveries to consignees of goods accepted from abroad or from domestic sources, without causing damage. However, at present, cargo with lost identification tags overwhelm not only the terminal building, but also spill out onto the apron area. This is an unacceptable situation leading to losing valuable customers and defeating the motivation of prospective new customers as well.

Each cargo has a consignor who expects smooth acceptance and delivery in exchange for their money. Utmost efforts must be expended to eliminate damage and loss and to take clear countermeasures when damage does occur to regain the trust of the consignor.

The future operations at the cargo terminal must establish upgraded services by introducing appropriate equipment to improve work efficiency. Especially, imported cargo must have clear structural delineation of airside/landside areas to limit entry of unauthorized personnel. The internal handling should be regulated to be carried out only by professionally trained personnel and a system for quick discharge to landside areas should be in place. The customs services should also take into account that they are an incidental service of an airport with 24 hour operations.

16.6.3 Safety Management Services

Safety Management System (SMS) based on International Civil Aviation Organization (ICAO) standards is prepared as standard of safety management services in HSIA. When the expansion works are started, safety of airport operations during construction and ensuring safety to all aviation users are secured in SMS mentioned above. But, ensuring safety of construction work itself and the ensuring safety to third parties will obey “ safety of works during construction “ prescribed in BNBC Part 7.

On the other hand, the mission of an airport is to support the safe operations of aircraft and also to secure the safety of the passengers. The workers undertaking operations at airports are responsible for the precious safety of the passengers and they must always keep in mind that their every action entails safety management. The organization must be established to analyze and rectify any issue that may arise to endanger safe airport operations at an early stage.

16.6.4 Fire Fighting and Evacuation Services

This service is divided into two types: fires onboard aircraft or boarding ramp and fires in the terminal building.

The main mission of the Airport Fire Station is to combat fires onboard the aircraft. They must be on 24 hour alert to respond to onboard fires that can occur at any time. They must also keep in mind that they are responsible for the evacuation of many passengers in the event of aircraft fires and they must procure and maintain equipment in peak condition. Fire engines will be at the forefront in any fire response situation and they should be possessed in sufficient numbers to allow a reliable level of service under any conditions. Considerations should be made to reduce mobilization time to a minimum.

In the event that an aircraft catches fire on the single runway now in use, the matter of secondary importance will be the removal of the damaged aircraft off the runway. Aircraft recovery equipment is provided by providers of the area, but it will be required to procure the minimum amount of equipment to remove the aircraft from the runway to allow early reopening of the runway at Dhaka International Airport. Reopening the runway will also allow easier acceptance of assistance from other countries during emergencies.

Each department must organize a self-defense fire fighting unit to coordinate with the airport fire station and prepare against emergencies. Fire extinguishers should be placed at strategic locations and kept in working order. All airport employees should be trained in the correct operation of the extinguishers.

16.6.5 Disaster Prevention

In order for the appropriate responses to emergencies, each area must have procedures in place to meet various incidents and periodic simulations and training must be carried out.

Preparation for emergencies must be undertaken in normal times. Clarification of the chain of command, setting out of procedures to ensure reliable reporting, and posting it to required areas are necessary. Evaluation and review must be carried out after each periodic simulation and training exercise.

In order to eliminate any unnecessary secondary events during emergencies, clear identification of means of egress, securing of evacuation areas, and stockpiling of emergency foodstuff must be considered in the future.

Also, as a mission of the airport, one of avoiding unnecessary emergency situations (aircraft accidents) is countermeasures against bird strikes, which can cause accidental engine failure at aircraft takeoff and landing. In the vicinity of the runway there is a pond, which is attractive to birds. Consideration is necessary in the general design of the airport.

16.6.6 Security Services (Security Check, Implementation)

Security checks are required for both protection of arriving passengers from abroad, from outside sources of danger and securing of safety within the airport. In addition to securing the safety of aircraft, it is necessary to seek out precise ways to prevent the movement of forbidden items, both domestic and foreign. However, the actual condition is not sufficiently verified at present, and it will be necessary to confirm any issue by conducting detailed investigation in the future.

16.6.7 Facility Maintenance and Administration

It is important to maintain pristine conditions of the facilities. Periodic inspections and checks on functionality are required to obtain an objective understanding of conditions and make appropriate responses to maintain the initial conditions. In addition to continuous maintenance by professionally trained and experienced maintenance crews, it will be necessary to listen to users complaints and conduct reviews by auditory committees to confirm actual implementation of services. Furthermore, maintenance records should be kept for extended periods. This will allow early discovery of defects and formulation of appropriate responses or resolution of issues.

16.6.8 Ground Handling Services

Ground handling services are the provision of various services to operational aircraft when they are on the ground at airports. The most important matter is to provide the requested services within the parking time without damaging the aircraft. The operational aircraft are the customers and provision of appropriate handling services utilizing appropriate ground service equipment (GSE) to support the safety of aircraft operations is an important service.

Some instances were observed where GSE was used improperly or inadequately maintained. GSE are expensive and securing their efficient use under appropriate maintenance over the long term will require a thorough review of procurement contents. Furthermore, it is important to conduct periodic maintenance service for each GSE at appropriate intervals and maintain proper records in order to achieve reliable service and lower maintenance costs.

Old and obsolete GSE should be removed from the ramp area to allow efficient use of the limited ramp spaces.

Aircraft from overseas demand the provision of ground handling service according to international standards and the provision of a clean and safe airport. The introduction of the latest equipment and improvement of the service level will be required.

16.6.9 Immigration/Emigration Management, Customs, Quarantine

Immigration/emigration management, custom, and quarantine are important services for the protection of Bangladesh and aircraft from external threats to security. It is also a service provided to the passengers and cargo who are the valuable revenue sources for the airport. Since the airport maintains a 24 hour operations, these organizations must also be prepared to provide services on a 24 hour basis. Especially, it requires over more than two minute for each passport clearance for both immigration and emigration, at present, causing long queues and long waiting times before the passport booths at peak hours. More efficient processing by the immigration/emigration officers is necessary. CAAB has

begun to prepare for 24 hours operation and an early establishment of the organization and commencement of operations are necessary.

16.6.10 Air Traffic Control Services

The air traffic control equipment are inferior to other international airports at present. Flight limitations due to climatic conditions are also frequent. Dhaka International Airport is the gateway to Bangladesh and a more serious consideration for the safety of aircraft in service is required.

***CHAPTER 17 FINANCIAL AND ECONOMIC
EVALUATION AND EFFECT INDICATORS***

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Chapter 17 FINANCIAL AND ECONOMIC EVALUATION AND MONITORING INDICATORS

17.1 Financial Analysis

The financial analysis of the proposed Dhaka International Airport Expansion Project was carried out by comparing the costs and revenues between the 'with project' and 'without project' cases. Based on the assumptions below, the cash flow of an 'incremental' case was prepared in order to measure the net financial impact of implementing the proposed project. The financial internal rate of return (FIRR) of the incremental case was calculated to evaluate the feasibility of the proposed project.

17.1.1 Basic Assumptions

The following are the basic assumptions applied to both with project and without project cases unless otherwise mentioned:

(1) Definition of With Project Case, Without Project Case, and Incremental Case

1) With Project Case

The proposed project will be implemented in order to meet the traffic demand in 2019-2030. The both domestic and international traffic handled at Hazrat Shahjalal International Airport (HSIA) for the period of 2031-2045 will remain constant at the same level of 2030.

2) Without Project Case

The proposed project will not be implemented. The domestic and international traffic handled in HSIA will remain constant from 2021 to 2045.

3) Incremental Case

The incremental case is for the difference between with project and without project case to measure the net financial impact of the proposed project.

(2) Project Period

The project period is 25 years from 2021 to 2045, including the initial construction period from 2017 to 2022 and evaluation period from 2017 to 2045.

(3) Price Base and Exchange Rates

The prices shown in BDT are expressed as the net price escalation using the constant price level in January 2017. Real exchange rates, net of price escalation of Bangladesh, Japan, and the US are estimated at USD 1 = JPY 108.2 = BDT 78.4 during the project period.

(4) Contingencies

A physical contingency of 5% for investment costs excluding administration costs and 5% for consulting fees is included in the investment costs. Price contingency is not included.

(5) Target Project FIRR

Investments incurred between 2017 and 2022 will be met by the Japanese yen loan except for administration costs, value added tax (VAT), and import tax. The yield curve of Bangladesh T-Bond will be utilized for the investments from 2021 to 2045. The cut-off yield of accepted government T-Bond (15 years) as of January 11, 2017 was 7.64%.

The weighted average cost of capital (WACC) was calculated at 1.983%, which was used as the target FIRR of the project.

Table 17-1 Capital Cost of the Project

	M BDT	Interest Rate	
Yen Loan	112,072	81.5%	0.700%
Bangladesh T-Bond (15 years)	25,426	18.5%	7.640%
	137,498	100.0%	1.983%

Source: JICA Study Team



Source: JICA Study Team

Figure 17-1 Cut-off Yield of Accepted Government T-Bond

17.1.2 Costs

Project costs are comprised of investment costs and operation and maintenance (O&M) costs.

(1) Investment Costs (Initial and Replacement)

The total costs of initial investment is shown in Table 17-2. The total of replacement investment costs is shown in Table 17-3.

Table 17-2 Total Cost of Initial Investment

	With Project Case	Without Project Case	Incremental Case
(1) Procurement / Construction			
A: Building Work	59,658	0	59,658
B: Civil Work	23,561	0	23,561
C: Utility Work	8,752	0	8,752
D. Dispute Board	47	0	47
(2) Consulting Services	3,359	0	3,359
(3) Administration Cost	224	0	224
(4) VAT (Contractor & Consultant)	3,346	0	3,346
(5) Import Tax	12,389	0	12,389
Physical Contingency	4,769	0	4,769
	<u>116,105</u>	<u>0</u>	<u>116,105</u>

Source: JICA Study Team

Table 17-3 Total Cost of Replacement Investment

	With Project Case	Without Project Case	Incremental Case
Building Work	7,933	0	7,933
Physical Contingency	397	0	397
	<u>8,330</u>	<u>0</u>	<u>8,330</u>

Source: JICA Study Team

(2) O&M Costs

The O&M costs was estimated based on the incremental case.

1) Labour Cost in Incremental Case

The organizational plan of CAAB indicates a 52% increase of CAAB personnel by the year 2020. According to the interview with CAAB, the increase of personnel at HSIA is being discussed and the increase rate at HSIA could possibly be double that of CAAB. Therefore, the increase rate of HSIA by 2020 was conservatively assumed as 104% .

The number of personnel in the incremental case was set as 20% after 2020.

Table 17-4 Labour Cost of Incremental Case

Present Condition of CAAB (a)	3,716	personnel
Organizational Plan (b)	1,934	
Increase Rate (b/a)	52.0%	=> 104.1% (Increase Rate at HSIA)
Present Condition of HSIA (c)	1,393	personnel
Increment (d = c x 104.1%)	<u>1,450</u>	
Condition in 2020 (e = c + d)	<u>2,843</u>	
Increase Rate with Project (f)	30%	(assumption by JICA Study Team)
Increment with Project (g = e x f)	853	
Average Unit Labour Cost in 2014/2015	348,945	BDT/post
Incremental Labour Cost with Project	298 M	BDT

Source: JICA Study Team

2) Maintenance Cost related to Construction in Incremental Case

The 2% of building, civil, and utility work was estimated as annual incremental maintenance costs.

Table 17-5 Maintenance Cost of Incremental Case

A: Building Work	59,658	
B: Civil Work	23,561	
C: Utility Work	8,752	
	<u>91,971</u>	M BDT
Percentage of Maintenance Expenses	2%	
Additional Maintenance Expenses	1,839	M BDT

Source: JICA Study Team

3) Other Administrative Expenses in Incremental Case

The other administrative expenses in the incremental case was estimated based on the increase of floor area (see Table 17-6). The other administrative expenses were separated into two parts of influenced or not influenced by floor area and the former was analyzed as shown in Table 17-7.

Table 17-6 Increase of Floor Area

	Existing	Expansion
International Passenger Terminal 1 and Terminal 2	73,400	
Domestic Passenger Terminal	2,200	
New International Passenger Terminal 3		226,000
VVIP	5,000	5,900
Total	<u>80,600</u>	<u>231,900</u>

Source: JICA Study Team

Table 17-7 Other Administrative Expenses

Other Administrative Expenses	1,823	M BDT
Less Irrelevant Items	<u>895</u>	
	<u>928</u>	M BDT
Unit Price (BDT/m ²)	11,515	BDT/m ² (= 928 M BDT /80,600 m ²)
Incremental Other Administrative Expenses	2,670	M BDT (= 231,000 m ² x 11,515 BDT/m ²)

Source: JICA Study Team

17.1.3 Revenues

Revenues consist of aeronautical and non-aeronautical revenues. Both revenues were estimated to increase in line with the passenger traffic movement as explained below. Domestic and international revenue forecasts were conducted separately.

(1) Passenger Traffic Movement

Annual passenger traffic movement under with project case, without project case, and incremental case are summarized in Table 17-8.

Table 17-8 Forecast of Passenger Traffic Movement

	With Project Case			Without Project Case			Incremental Case			Total
	International	Domestic	Total	International	Domestic	Total	International	Domestic	Total	
2021	9,304,917	1,502,326	10,807,243	8,668,579	1,029,997	9,698,575	636,338	472,329	1,108,668	
2022	9,930,487	1,640,618	11,571,105	8,668,579	1,029,997	9,698,575	1,261,908	610,621	1,872,530	
2023	10,593,591	1,779,648	12,373,240	8,668,579	1,029,997	9,698,575	1,925,013	749,651	2,674,664	
2024	11,296,482	1,927,786	13,224,268	8,668,579	1,029,997	9,698,575	2,627,903	897,789	3,525,693	
2025	12,041,546	2,085,615	14,127,161	8,668,579	1,029,997	9,698,575	3,372,967	1,055,619	4,428,586	
2026	12,765,500	2,240,510	15,006,009	8,668,579	1,029,997	9,698,575	4,096,921	1,210,513	5,307,434	
2027	13,529,271	2,404,730	15,934,001	8,668,579	1,029,997	9,698,575	4,860,692	1,374,734	6,235,426	
2028	14,335,050	2,578,828	16,913,877	8,668,579	1,029,997	9,698,575	5,666,471	1,548,831	7,215,302	
2029	15,185,146	2,763,384	17,948,530	8,668,579	1,029,997	9,698,575	6,516,567	1,733,387	8,249,954	
2030	16,081,998	2,959,015	19,041,013	8,668,579	1,029,997	9,698,575	7,413,419	1,929,018	9,342,437	
2031-2045	16,081,998	2,959,015	19,041,013	8,668,579	1,029,997	9,698,575	7,413,419	1,929,018	9,342,437	

Source: JICA Study Team

(2) Aeronautical Revenues

Aeronautical revenues consist of the passenger service fees (PSF), aircraft landing charges, boarding bridge charges, and cargo security charges.

1) Passenger Service Fees (PSF)

Table 17-9 below compares the present PSFs of HSIA with those of some neighboring countries. Both domestic and international PSFs of HSIA are much lower than those of other airports. The hypothetical international PSF of BDT 1,200, raised to the same level as the lowest of other airports, was set in this study due to the investments for the project.

Table 17-9 Passenger Service Fees

Airport	International			Domestic			GDP Per Capita in 2014
	BDT	USD	Ratio	BDT	USD	Ratio	USD
Current PSC in HSIA	500	6.4	1.00	50	0.64	1.00	1,211.7
Phnom Penh		25.0	3.92		6.00	9.41	1,158.7
Yangon		15.0	2.35		1.68	2.63	1,161.5
Kolkatta,		17.1	2.69		6.70	10.51	1,598.3
Jakarta, Soekamo-Hatta		11.3	1.78		3.02	4.74	3,346.5
Bangkok, Suvamabhumi		20.0	3.14		2.86	4.48	5,814.8
Kuala Lumpur		16.2	2.54		2.24	3.51	9,768.3
Singapore, Changi		20.4	3.19			0.00	52,888.7
Future PSC in HSIA	1,176		2.35	132		2.63	

Source: World Bank and JICA Study Team

2) Landing Charges

The present landing charges were applied in this study. The weighted average landing charges considering composition of aircraft type in time series were analyzed as shown in Table 17-10 and Table 17-11.

Table 17-10 Average Landing Charges per Aircraft (International)

Code Letter	Weighted Average (USD)	Composition in 2015	Composition in 2020	Composition in 2025	Composition in 2030	Composition in 2035
B class	135	2%	0%	0%	0%	0%
C class						
ERJ, ATR, Dash8 Q400	192	25%	22%	15%	9%	1%
B318, B737	771	25%	30%	35%	40%	45%
D class	1,500	2%	2%	2%	2%	2%
E class	3,738	45%	45%	47%	48%	51%
F class	7,140	1%	1%	1%	1%	1%
Weighted Average (USD)		2,027	2,057	2,157	2,221	2,357

Source: CAAB

Table 17-11 Average Landing Charges per Aircraft (Domestic)

Code Letter	Weighted Average (BDT)	Composition in 2015	Composition in 2020	Composition in 2025	Composition in 2030	Composition in 2035
B class						
B class	1,023	80%	75%	60%	50%	40%
C class						
ERJ, ATR, Dash 8Q400	2,068	20%	20%	20%	20%	20%
B318, B737	11,363	0%	5%	20%	30%	40%
Weighted Average (BDT)		1,232	1,749	3,300	4,334	5,368

Source: CAAB

3) Boarding Bridge Charge

The present boarding bridge charge was applied on this study. The weighted average boarding bridge charges considering composition of aircraft type in time series was analyzed for both international and domestic flights as shown in Table 17-12.

Table 17-12 Average Boarding Bridge Charges per Aircraft (International and Domestic)

International Aircraft	Boarding Bridge Charge(USD)	Composition in 2021	Composition in 2025	Composition in 2030	Composition in 2035
Below 100 ton	100	52%	50%	49%	46%
From 100 to 200 ton	150	25%	26%	26%	28%
From 200 to 300 ton	200	23%	24%	24%	26%
Over 300 ton	250	1%	1%	1%	1%
Weighted Average		136	138	139	141
Domestic Aircraft	Boarding Bridge Charge(USD)	Composition in 2021	Composition in 2025	Composition in 2030	Composition in 2030
Below 100 ton	100	100%	100%	100%	100%
Weighted Average		100	100	100	100

Source: CAAB

4) Cargo Security Charge

HSIA started collection of the cargo security charge in 2011. The unit price is USD 0.06 per 1 kg. The revenue from cargo security charge was estimated utilizing Table 17-13 of the cargo demand forecast.

Table 17-13 Cargo Demand Forecast

	With Project Case		Without Project Case			Incremental Case			Total	ton
	International	Domestic	Total	International	Domestic	Total	International	Domestic		
2021	452,680	4,510	457,191	418,152	3,447	421,599	34,528	1,063	35,592	
2022	486,624	4,922	491,546	418,152	3,447	421,599	68,472	1,475	69,947	
2023	522,605	5,339	527,944	418,152	3,447	421,599	104,453	1,892	106,345	
2024	560,745	5,783	566,528	418,152	3,447	421,599	142,592	2,337	144,929	
2025	601,172	6,257	607,429	418,152	3,447	421,599	183,020	2,810	185,830	
2026	640,455	7,842	648,297	418,152	3,447	421,599	222,303	4,395	226,698	
2027	681,898	8,417	690,314	418,152	3,447	421,599	263,746	4,970	268,716	
2028	725,620	9,026	734,646	418,152	3,447	421,599	307,468	5,579	313,047	
2029	771,747	9,672	781,419	418,152	3,447	421,599	353,595	6,225	359,820	
2030	820,411	10,357	830,768	418,152	3,447	421,599	402,259	6,910	409,169	
2031-2045	820,411	10,357	830,768	418,152	3,447	421,599	402,259	6,910	409,169	

Source: JICA Study Team

(3) Non-aeronautical Revenues

The ratio of non-aeronautical revenues in HSIA is presently 10%, which is a very low level. The non-aeronautical revenues were assumed in this analysis to increase to 20% in the with project case due to the development of proposed new international passenger terminal.

Table 17-14 Ratio of Non-aeronautical Revenue in HSIA

	<u>2010-2011</u>	<u>2011-2012</u>	<u>2012-2013</u>	<u>2013-2014</u>	<u>2014-2015</u>
Aeronautical Revenue (a)	4,589	5,182	5,785	8,503	9,849
Non-Aeronautical Revenue (b)	228	490	556	466	993
	<u>4,817</u>	<u>5,672</u>	<u>6,341</u>	<u>8,969</u>	<u>10,842</u>
(b) / (a)	4.98%	9.45%	9.60%	5.48%	10.08%

Source: Prepared by the JICA Study Team from financial statements of HSIA

(4) Revenue Summary

The revenue summary is indicated in Table 17-15. The incremental case shows that revenue increases are mainly caused by the international PSF and non-aeronautical revenues.

Table 17-15 Revenue Summary

	With Project Case	With Project Case	M BDT Incremental Case
1. Aeronautical Revenue			
Passenger Services (International)	439,553	260,057	179,495
Passenger Services (Domestic)	3,313	1,287	2,026
Landing Charge	189,422	119,224	70,199
Boarding Bridge Charge	27,377	21,394	5,983
Cargo Security Scanning Charge	88,424	49,580	38,844
2. Non-Aeronautical Revenue	149,618	22,929	126,689
Total Revenue	897,708	474,471	423,236

Source: JICA Study Team

17.1.4 Financial Evaluation

(1) Project FIRR

The financial cash flow of the incremental case is attached as Appendix. The FIRR was calculated at 6.2%, higher than the target of 1.983%. Therefore, the proposed project is financially feasible.

17.2 Economic Analysis

Economic analysis of the proposed project was carried out in this section by comparing the economic costs and benefits on the incremental case. The project's economic internal rate of return (EIRR) was calculated based on the cash flow of the incremental case to evaluate the net economic impact by the proposed project on the national economy.

17.2.1 Basic Assumptions

In addition to the relevant assumptions used in the financial analysis, the following assumptions were also applied in the project's economic analysis:

(1) Conservatism Principle

The economic impact cannot be exactly measured because of the assumption of perfect competition. Therefore, the conservative and not optimistic assumptions and data were employed in this analysis.

(2) Economic Prices

The financial prices in the FIRR analysis were applied as the economic prices.

1) Exclusion of Transfer Payment

The economic prices are to exclude transfer payment such as taxes and subsidies.

2) Opportunity Costs of Land and Unskilled Labour

The financial prices of non-tradable and non-competitive goods and services, if distorted, are to be converted to economic prices. For the present analysis, land and unskilled Labour costs were considered as the only non-tradable and non-competitive goods and services.

The average proportion 4.9% of “tax minus subsidy” on the gross domestic product (GDP) was employed as the conversion factor from the financial costs to the economic cost in the local costs as shown in Table 17-16.

Table 17-16 Gross Domestic Product (GDP) at the Current Market Prices (Crore Taka)

Sector/Sub-sector	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	Average
1. Agriculture and Forestry	125,469	138,879	148,758	163,968	176,500	190,315	157,315
2. Fishing	28,482	31,827	36,995	42,308	47,581	53,076	40,045
3. Mining and Quarrying	14,208	16,650	19,461	21,080	23,876	28,578	20,642
4. Manufacturing	146,503	167,927	197,127	223,221	254,483	295,111	214,062
5. Electricity, Gas and Water Supply	11,589	14,189	16,381	18,401	19,868	23,829	17,376
6. Construction	57,072	68,304	82,432	90,834	108,484	126,353	88,913
7. Wholesale and Retail Trade	121,332	137,396	154,579	172,575	192,585	214,257	165,454
8. Hotel and Restaurants	8,228	9,755	11,263	13,035	14,928	17,058	12,378
9. Transport, Storage & Communication	94,571	112,702	124,281	134,317	150,025	169,145	130,840
10. Financial Intermediations	27,545	36,316	42,237	48,563	55,761	63,601	45,671
11. Real Estate, Renting and Business Activities	60,119	68,715	78,820	91,229	106,061	123,740	88,114
12. Public Administration and Defense	30,282	33,499	37,678	44,728	50,674	66,711	43,929
13. Education	21,392	25,048	28,429	32,767	37,624	46,512	31,962
14. Health and Social Works	17,731	20,133	23,868	26,924	30,135	34,758	25,592
15. Community, Social and Personal Services	104,608	117,293	138,952	156,552	176,402	194,248	148,009
Tax less subsidy	46,698	56,569	57,662	63,174	70,815	85,552	63,412
% of tax less subsidy	5.1%	5.4%	4.8%	4.7%	4.7%	4.9%	4.9%
GPD at current market price	915,829	1,055,202	1,198,923	1,343,676	1,515,802	1,732,844	1,293,713
Growth rate	1,483	1,522	1,362	1,207	1,281	1,432	1,381

Source: Bangladesh Economic Review 2016, originally from BBS

3) Target Economic Internal Rate of Return (EIRR)

The EIRR indicates the average rate of annual returns on the national economy by the proposed project. International financial institutions such as the World Bank and Asian Development Bank apply a 10% to 12% economic discount rate for infrastructure projects in developing countries.

The target EIRR was set at 12% in this analysis.

17.2.2 Economic Costs

The conversion factor was applied on the local portion of initial investments and the other financial

costs were directly used as the economic costs.

17.2.3 Economic Benefits

(1) Economic Benefit Items

Table 17-17 shows the list of quantitative economic benefit items generated by the proposed project. The economic benefits by foreign passengers were not considered.

Table 17-17 Economic Benefit Items

	Existing Passengers	Incremental Passengers
Domestic flights	-	Consumer surplus
International flights	Time saving	Consumer surplus

Source: JICA Study Team

1) Share of Bangladesh and Foreign Passengers

The share of Bangladesh and foreign passengers was calculated based on data provided by CAAB as shown in Table 17-18.

Table 17-18 Share of Bangladesh and Foreign Passengers

	Bangladesh	Foreigner
Domestic	90%	10%
International	82%	18%

Source: JICA Study Team based on the interview survey to CAAB

(2) Economic Benefits

1) Domestic Flights

Benefits from Incremental Bangladesh Passengers

The net economic benefits from the incremental Bangladesh passengers on the domestic flights were estimated with consumer surplus.

Consumer Surplus

Passengers that choose to fly and are willing to pay for airfare benefit from their service in one way or another. Net economic benefits (difference between gross benefits and costs) of passengers are called 'consumer surplus'. Consumer Surplus of passengers is defined by the following formula and assumptions:

Net Economic Benefit (Consumer Surplus) of Passengers =

Gross Economic Benefit (Willingness to Pay Amount) – Economic Cost

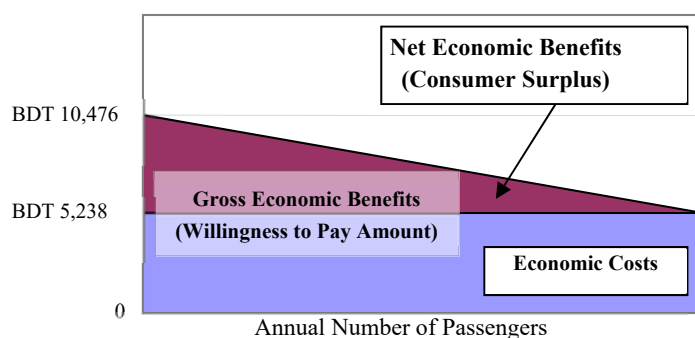
- ✈ Gross economic benefit or willingness to pay amount is defined by ticket prices (inclusive of PSF and insurance costs). It is assumed that the maximum gross benefit of passengers is equal to twice the ticket price while the minimum gross benefit is equal to the air ticket price.

- ✈ Economic costs are equal to the ticket prices paid by passengers.
- ✈ Gross economic benefit is distributed evenly among all passengers.

The total consumer surplus of Bangladesh passengers on domestic routes in a year, for instance, is exemplified by the area generated by the right triangle of the graph in Figure 17-2. The round-trip ticket price was assumed to be at BDT 5,238 for domestic flights, which is the weighted average round-trip ticket price of typical domestic routes. The ticket price of BDT 5,238 on the y-axis indicates economic cost and minimum gross economic benefit while BDT 10,476 is equal to the maximum gross economic benefit of passengers. The x-axis indicates the number of Bangladesh passengers on domestic routes each year.

From the above explanation, the net economic benefits of total Bangladesh passengers (consumer surplus) on domestic flights in a year were calculated using the following equation:

$$\text{Annual Net Economic Benefits of Total Bangladesh Passengers on Domestic Flights} = (\text{BDT } 10,476 - \text{BDT } 5,238) \times \text{annual number of Bangladesh passengers} \times 1/2$$



Source: JICA Study Team

Figure 17-2 Consumer Surplus as Net Economic Benefits of Bangladesh Passengers on Domestic Flights

2) International Flights

Benefits of Incremental Bangladesh Passengers

The net economic benefits of incremental Bangladesh passengers on international flights were estimated with consumer surplus.

The cost for roundtrip ticket, which was assumed to be at BDT 26,810, was expressed using the weighted average roundtrip ticket price of typical routes. The minimum gross benefit of passengers is equal to the air ticket price (BDT 26,810) and the maximum gross benefit is equal to double the amount of the ticket price.

Benefits of Existing Bangladesh Passengers

International passenger traffic will reach the capacity of international passenger terminal building in 2020. On the with project case, congestion will be eased and existing Bangladesh passengers on international flights will save time at the airport in comparison to the without project case.

The study estimated that passenger waiting time would be reduced by 50 minutes on average. Based on the assumption of annual income of Bangladesh passenger on international flight at BDT 1,000,000, the time cost saved per hour per person was estimated at BDT 473. Time cost saved is BDT 197 per existing Bangladesh passenger on international flights.

Table 17-19 Time Cost Saved at Airport for Each Existing Bangladesh Passenger

	Without	With	Saved Time
Departure	40	20	20
Arrival	65	35	30
Total			50

Saved Time Value= 473 BDT/hour

Source: JICA Study Team

3) Summary of Economic Benefit Amount

Table 17-20 below summarizes the project's economic benefits during the project period. The largest item is consumer surplus of incremental Bangladesh passengers on international flights, followed by Bangladesh passengers on domestic flights.

Table 17-20 Economic Benefits (2021-2045)

Economic Benefit	M BDT
Domestic flights	
Consumer surplus of Incremental Bangladesh passengers	90,798
International flights	
Consumer surplus of Incremental Bangladesh passengers	1,643,079
Saved time for Existing Bangladesh passenger	33,308
Total of Economic Benefit	<u>1,767,185</u>

Source: JICA Study Team

17.2.4 Economic Evaluation

(1) Economic Internal Rate of Return (EIRR)

The incremental economic cash flow is attached as Appendix. The EIRR was determined at 22.5%, above the target of 12%. Therefore, the proposed project is economically feasible.

17.3 Sensitivity Analysis

Table 17-21 below summarizes the results of the sensitivity test of the project FIRR and EIRR to key variables, i.e., investment cost and passenger traffic.

Table 17-21 Sensitivity Test

	Project FIRR (%)	Project EIRR (%)
Target Rate	1.983	12.000
0. Base	6.225	22.511
1. Investment Costs (+30%)	3.924	19.121
2. International Passengers (-30%)	5.077	19.347

3. Domestic Passengers (-30%)	6.215	22.297
4. Total Passengers (-30%)	5.067	19.132
5. Investment Costs (+30%) and Total Passengers (-30%)	2.938	16.255

Source: JICA Study Team

The FIRR and EIRR are higher than the respective target rates of 1.983% and 12.000% under all cases.

17.4 Conclusion

The project FIRR and EIRR were calculated at 6.2%, and 22.5%, respectively, achieving the respective targets of 1.983%, and 12.000%. The sensitivity analysis also showed higher FIRR and EIRR than the targets even on the case of +30% investment costs and -30% total passengers.

From the above discussion, it was concluded that the proposed project would bring sufficient net benefits to both HSIA and the Bangladeshi economy.

17.5 Operation and Effect Indicators

17.5.1 Quantitative Indicators

(1) Traffic volume

Passenger traffic is generally considered as both operation and effect indicators for airport development projects. Traffic movement, or the indicators, is summarized in Table 17-22. Target year of the quantitative indicators is 2023, two years after project completion.

Table 17-22 Quantitative Operation and Effect Indicators

	2015	2020	2021	2022	2023	2024	2025	2026
Passenger (Million Persons)								
International	5.569	8.669	9.305	9.930	0.594	11.296	12.042	12.765
Domestic	0.913	1.379	1.503	1.641	1.780	1.928	2.086	2.241
Total	6.482	10.047	10.808	11.571	12.373	13.224	14.127	15.006
Air Cargo (Metric ton)								
International	258,010	418,152	452,680	486,624	522,605	560,745	601,172	640,455
Domestic	1,888	3,447	4,510	4,922	5,339	5,783	6,257	7,842
Total	259,898	421,599	457,191	491,546	527,944	566,528	607,429	648,297
Aircraft movements (Number)								
International	37,192	56,289	58,156	62,066	6,210	70,603	75,260	76,901
Domestic	32,212	47,540	45,557	49,716	53,929	58,418	63,200	50,921
Total	69,404	103,830	103,713	111,781	120,139	129,021	138,460	127,821

Source: JICA STUDY TEAM

(2) The annual revenue of HSIA.

The annual revenue of CAAB, the airport administrator, is used as an effect indicator of the Project. Table 17-23 is the amount of annual revenue in HSIA after 2011.

Table 17-23 Annual revenue of HSIA

(Unit/ Million BDT)

Item	2010/2011	2011/2012	2012/2013	2013-2014	2014/2015
Aeronautical revenue	4,589	5,182	5,785	8,503	9,849
Non-Aeronautical revenue	228	490	556	466	993
Total	4,817	5,672	6,341	8,969	10,842

Source: JICA Survey Team, calculated based on the Financial Statement of HSIA.

17.5.2 Qualitative Effect Indicators

Qualitative effect indicators in 2023, two years after the completion of the Project, were considered in the following items:

(1) Upgrade of Service Levels

Currently, congestion was observed in the check-in lobby when conducting departure procedures. This results to longer waiting time.

Based on the demand forecast, due to the lack of capacity, congestion and waiting time at each facility are expected to increase. This will eventually result in the inability to maintain an acceptable standard in service levels by 2018 in the international passenger terminal building

After completion of this Project, congestion and waiting time will be reduced. Also, service level will be improved. Meanwhile, restaurants and retail shops will be expanded and service levels will be improved.

Reference indicators are shown in Table 17-24, as previously mentioned in Clause 7.2.4.

Table 17-24 Service Level Related Data

Item	Processing Time (sec./ Person)	Maximum Waiting Time (min.)
Departure Check-in	150	10
Embarkation control	20	5
Security	20	5
Arrival Immigration	50	5

Source: JICA Survey Team

Passage time should be measured based on the following conditions:

- The processing time per person at immigration departure and arrival areas and at check-in counters is measured from stand in a line to finish;
- In case of plural passengers such as a family or group, the processing time required for all members should be measured;
- Select appropriate time zones during peak hours and measure at least 10 samples; and
- In case of electricity failure at a counter, data should be excluded.

(2) Enhancement of Flight Network

Since the current terminal facility does not have enough space, the situation requires limitations to increase the number of flights particularly during peak hour. However, with the expansion of

terminal facilities by the Project, the number of flights, in the time frames desired by the airlines, will be increased. Meanwhile, at the airport terminal building restrictions are enforced limiting promotion to new airlines, because office airline spaces cannot be secured.

Therefore, after the expansion of the passenger terminal building is carried out, it is assumed that existing and new routes will be expanded and convenience will be improved.

Through the recently signed open sky agreement among members of ASEAN and west Asian countries, increased flexibility in route expansion is now possible and route expansion between member of countries is expected. Furthermore, it is expected that the entry of additional airlines on the same routes will increase competition and result in reduction in airfare and the strengthening of competitiveness.

Reference indicators of flight route and number per day are shown in Table 17-25

Table 17-25 Enhancement of Flight Network

destination	Departure	Arrival	Flights	Airlines
(AUH) Abu Dhabi	3	2	5	Etihad Airways
(BKK) Bangkok	3	3	6	Biman Bangladesh Airlines, Thai Airways, Bangkok Airways
(BOM) Mumbai	1	1	2	Jet Airways
(CAN) Guangzhou	1	1	2	China Southern Airlines
(CCU) Kolkata	5	6	1	Biman Bangladesh Airlines, Regent Airways, Etihad Airways, Air India
(CMB) Colombo	2	2	4	<i>Mihin Lanka</i>
(DEL) Delhi	1	1	2	Etihad Airways
(DMM) Dammam	2	1	3	Saudi Arabian Airlines
(DOH) Doha	3	3	6	Qatar Airways
(DXB) Dubai	6	6	12	Emirates, <i>flydubai</i>
(HKG) Hong Kong	2	2	4	Hong Kong Airlines
(HAN) Hanoi	1	1	2	Cathay Pacific
(IST) Istanbul	2	1	3	Turkish Airlines
(JED) Jeddah	2	2	4	Biman Bangladesh Airlines
(KHI) Karachi	1	1	2	Pakistan International Airlines
(KMG) Kunming	1	1	2	China Eastern Airlines
(KTM) Kathmandu	2	2	4	Biman Bangladesh Airlines, Dragonair
(KUL) Kuala Lumpur	8	8	6	Malaysia Airlines, Biman Bangladesh Airlines, Regent Airways, <i>Malindo Air</i> , <i>Air Asia</i>
(KWI) Kuwait	2	2	4	Kuwait Airways, Biman Bangladesh Airlines
(LHR) London	1	0	1	Biman Bangladesh Airlines

destination	Departure	Arrival	Flights	Airlines
(MAA) Chennai	1	1	2	Maldivian
(MCT) Muscat	2	2	4	Oman Air, Biman Bangladesh Airlines
(PBH) Paro	1	1	2	Royal Bhutan Airlines
(PKR) Pokhara	1	1	2	Biman Bangladesh Airlines
(RGN) Yangon	1	1	2	Biman Bangladesh Airlines
(RKT) Ras al-Khaimah	1	1	2	<i>Air Arabia</i>
(RUH) Riyadh	3	2	5	Biman Bangladesh Airlines, Saudi Arabian Airlines
(SHJ) Sharjah	3	3	6	<i>Air Arabia</i>
(WUH) Wuhan	1	1	2	Uni-Top Airlines
(SIN) Singapore	5	4	9	Biman Bangladesh Airlines, Regent Airways, Singapore Airlines, <i>Tigerair</i>
Total	69	65	134	

Note : Italic character is LCC

Source: JICA Study Team (based on the flight Schedule of Apr.27, 2016 ~ May 3, 2016 & Passenger data of Biman Airline)

***CHAPTER 18 POINTS TO CONSIDER FOR PROJECT
IMPLEMENTATION***

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Chapter 18 POINTS TO BE CONSIDERED FOR PROJECT IMPLEMENTATION

In the case when the project is implemented under Japan's ODA loan, the points to be considered which may directly affect the smooth implementation of the project are discussed below.

18.1 Procurement Situation of Equivalent Project in Bangladesh

18.1.1 Construction Bidding and General Circumstances of Equivalent Projects

In Bangladesh, public constructions are implemented under the authorization of the Ministry of Housing and Public Works. For the bidding and selection of contractors, the contractor shall be selected under Ministry Guidelines, which are based on World Bank guidelines, following procedures in "National Competitive Bidding Procedure".

18.1.2 General Conditions of Local Consultants (Detailed Design and Construction Supervision)

There are full service consultants in Bangladesh similar to Japanese consultants, who can provide the full range of services for design, structure, mechanical systems, electrical systems and cost estimation, but their numbers are extremely limited. Most consulting firms practice a single discipline (e.g. architecture, structure, etc.). These individual firms specializing in design, structure, building systems and cost estimation collaborate to complete large projects. In case of special projects, which require specialized technology or expertise that is not available from local consultants, foreign consultants will be required. It is expected that in projects requiring high levels of design expertise and construction supervision experience, foreign firms will form consortiums with local consultants, taking the lead in project management and incorporation of various technologies.

As a note of interest, the number of listed/registered architects is roughly 3000 (October, 2016) according to IAB (Institute of Architects, Bangladesh) records, and the number of listed/registered engineers is roughly over 50,000 according to IEB (Institute of Engineers, Bangladesh).

18.1.3 General Conditions of Local Contractors

BACI (Bangladesh Association of Construction Industry) and REHAB (Real Estate & Housing Association of Bangladesh) are the premier construction associations for construction firms in Bangladesh.

According to the annual report 2015-2016 of BACI, there is no consolidated list of listed contractors in the construction sector in Bangladesh and are listed separately by each tendering government agency. Examples are Bangladesh Thikadar Shomiti (meaning Bangladesh construction contractor's association), PWD (Public Works Department), LGED (Local Government Engineering Department), RHD (Roads and Highways Department), Water Development Board and other such bodies under different categories (i.e. A, B, C/ 1st class, 2nd class and so on). This system is employed due to tendering of contractors being under the control of IMED (Implementation Monitoring Evaluation Department) under the Bangladesh Planning Commission.

There are approximately 45,000 contractors in the entire country, 700 listed by RHD, 1200 listed by LGED, over 1000 listed by REHAB, 600 listed by WDB and 80 listed by BACI. It is believed that some overlap in listing occurs.

It is deemed that these companies are able to conduct primary works for building and civil construction. However, they will encounter some difficulty in conducting specific works at especially high technical levels, such as ODA Project, some kinds of interior finishing, precise electrical-mechanical works, and other specialist works, as evidenced by the established businesses by foreign engineers and companies in Bangladesh.

18.2 Tender Documents

The Japan International Cooperation Agency (JICA) imposes on the borrowers of Japanese ODA loans that contract documents have to be drawn up in accordance with the Standard Bidding Documents under Japan's ODA Loans Procurement of Works issued by JICA in 2009. These documents are based on the Red Book, MDB version, issued by the International Federation of Consulting Engineers (FIDIC) for project construction. The basic premise for the smooth implementation of Japan's ODA loans is that both the client and the contractor should fairly bear the risk of the project. This basic premise should also be applied to the Dhaka International Airport Expansion Project.

18.3 Selection of the Consultant

The consultant will be selected in accordance with the "Guidelines for the Employment of Consultants under Japan's ODA Loans" provided by JICA. Accordingly, experiences of consultant firms should be counted so that experienced consultant will be selected.

According to this, the following are the criteria for shortlisting of consultants:

- Having overseas experience of the consulting service in the sector concerned;
- Having experience in contracting of consulting service in the developing country; and
- Having experience of Japan's ODA loan project

Therefore, targeting for a consultant with overseas experience, the best consultant will be selected through international competitive bidding based on the "Guidelines for the Employment of Consultants under Japan's ODA Loans". In addition, since the project includes the inner and outside works under airport operation and also includes sophisticated works with high technology, the selection of the consultant will apply the quality based selection (QBS) method in accordance with the guidelines.

18.4 Selection of the Contractor

The preparatory report has identified and proposed adoption of soil improvement for some parts of the apron and taxiway area and screwed steel piling for the pile foundations of Terminal 3. It is necessary to incorporate relevant experience in these works into prequalification (PQ) condition for the selection of the contractor. The bidding mode that will be applied will be international competitive bid (ICB). In addition, because there will not be sufficient time to carry out PQ for this project, bid evaluation and PQ must be conducted in the same procedure at bid stage. Participating contractor/suppliers will be

solicited by public announcement in selected newspapers/gazettes.

Ensuring the competitiveness of the bid is also important. The work items of the project are classified roughly into building works, civil works, and equipment procurement and installation works, with an approximate estimated cost ratio of 6:3:1. In addition, it has been agreed with CAAB to procure the whole works under a single package. This means that the total contract sum will be enormous, and require specialized expertise in high technology including screwed steel pile method and soil improvement mentioned above. ICB, two envelope method will be employed.

The CAAB already has carried out some construction projects by ICB, such as expansion of apron from taxiway F to west, asphalt concrete overlay on the runway and CAAB headquarter complex. Application of Local Competitive Bid (LCB) will not be assumed due to the project scale.

18.5 Considerations for Project Implementation

18.5.1 Consultant Services

Consultant services shall be required for the following items:

- Review of preparatory survey
- Detailed design: Review of existing design documents
- Investigation of plant: location and capacity of fresh concrete and asphalt concrete plants
- Cost estimation including research on unit prices
- Preparation of tender documents: specifications, tender document
- Support during tender: PQ evaluation, tender evaluation, negotiation
- Supervision: Quality control, work progress control, cost control, construction schedule control, safety control, inspection
- Advisory service on environmental management: Monitoring, evaluation, and technical assistance on environmental management plan

The project components are as follows:

Table 18-1 Project Component (Phase - 1)

Works	Division	Facilities
Building	New Passenger Terminal Building (Terminal 3)	Three-story building with area of approximately 220,000 m ² including supply of related equipment capacity of 12.0 mppa
	Multi-Level Car Parking with Tunnel	Area of approximately 62,000 m ²
	New Cargo Complex	Area of approximately 42,200 m ²
	VVIP Complex	Area of approximately 5,000 m ²
	Rescue and Fire Fighting Facilities	
Civil	Parking Apron (Terminal 3 Area)	Approximately 520,000 m ²
	Taxiways Landside Service Road with Elevated Road	Nine connecting taxiways connecting to the Terminal 3 apron: approximately 35,000 m ²
	Taxiways (two rapid exit and one connecting taxiway for the runway 14 threshold)	Approximately 60,000 m ²
	Improvement of Drainage System	
Utility	Water Supply System	

Works	Division	Facilities
	Sewage Treatment Plant	Area of approximately 3,000 m ²
	Intake Power Plant with Distribution System	Area of approximately 7,000 m ²
	Hydrant Fuel Supply System	
	Communication System	
	Security and Terminal Equipment	

Source: JICA Study Team

Points to consider for review of the design and construction supervision are as follows:

Table 18-2 Points to Consider

Category	Item	Points to Consider
Review of the design	Building work	<ul style="list-style-type: none"> • Study of screwed steel pile • Verification of earthquake- resistance • Confirmation of floor plan in T3 and VVIP • Floor layout for cargo complex based on handling system and facilities
	Civil work	<ul style="list-style-type: none"> • Re-study of pavement thickness for landside and airside area • Design of underground pedestrian corridor based on the coordination with MRT projects • Soil improvement • Connection with DEE structure (Longitudinal slope, Transition, sight distance etc.)
	Electrical-Mechanical work	<ul style="list-style-type: none"> • Handling system in cargo complex
Tender Assistance		<ul style="list-style-type: none"> • Change of General Conditions of Contract • PQ criteria inclusive in tender
Construction Supervision		<ul style="list-style-type: none"> • Environment monitoring
Environment		<ul style="list-style-type: none"> • Demolition and shifting of existing structure • Mitigation plan

Source: JICA Study Team

18.5.2 Measures for Construction Safety

In Japan's ODA loan, construction close to public facilities is designated as an item requiring the attention to safety measures throughout the construction work period. This project is a construction project under airport operation and there must not be any disruption to the smooth airport operations or any damage to a third parties. In order to ensure safety in the construction, the following responses are necessary:

- The selection of the Consultant, including supervision, quality-based selection method (QBS) will be adopted in accordance with the Consultant Procurement Guideline, 2012.4, Section 3.02
- In event of serious accidents such as fatalities, accident with severe injuries, or collapse of the structure under construction, the implementing agency shall immediately report necessary information to JICA.
- The following three items shall be included in the terms of reference (TOR) of the contractor:
 - Describe clearly the requirements of measures for safety during construction on the contract with reference to laws and standards in Bangladesh and international guidelines.

- The bidder shall be required to submit a Construction Safety Plan that complies with the above requirements in the tender bid document.
- The bidder shall name a person to be in charge of safety measures in the tender bid document.
- The following three items shall be included in the TOR of the consultant:
 - Confirm the contents of the above and conduct tender document and review.
 - Review the Construction Safety Plan submitted by the bidders.
 - During construction, monitor the construction in accordance with the safety requirements specified in the contract and ensure that arrangement of safety personnel is being carried out. If any issues are identified, the contractor will be requested to improve the measures for safety.

18.5.3 Safety Measures in Security such as Terrorism

The terrorist incident involving private citizens that occurred in July 2016 has gravely shocked the foreign community working in Bangladesh. In view of the dangerous situation, the following safety measures will be required to be enforced on the services by the consultant and the contractor:

- Safety measures of the office
 - Arrangement of safety guard (Armed Police and /or Answar)
 - Enforcement of security checks at entry/exit to consultant/contractor offices
 - Installation of close circuit television (CCTV) in the office entrance
 - Alarm in case of emergency
 - Preparation for place of refuge shelter in the office
- Commuting vehicle
 - Attaching a dark film to vehicle windows to prevent view of interior.
 - Provision of police guard for commuting
- House
 - Lodgings in a safe district
- Safety expert
 - Conduction of safety training by the safety expert
 - Collection of information on dangerous activities by information exchange with the police, military officer, and the embassy

18.5.4 Coordination with Airport Operator

Since the project includes expansion of an existing facility under the continuous operation of the airport facilities, close coordination with airport operators should be conducted during the detailed design and construction stages. Therefore, the following items should be described in the consultant's TOR:

- To hold a meeting and coordinate with the airport operator in order to obtain the information needed to reflect the airport operator's requirements in the design.
- To coordinate with terminal users, the airlines and tenants, if necessary for the design process.
- To conduct regular monthly and weekly meetings with the contractor and airport operator to confirm each other's work plans, requests, problems, etc.
- To supervise the implementation of measures during construction and ensure the safety of airport users.

To provide information regarding the construction project in order prevent reduction in level of service for airport users, insofar as possible, during construction.

18.5.5 Measures against HIV

It is necessary to include the following items in the tender document since the project scale is quite big (project cost is more than JPY 100 billion, with peak number of construction workers on site over 500 and construction period of more than 37 months). In addition, the contractor shall implement countermeasures against HIV/AIDS for construction workers as well as local residents during the construction phase.

According to the World Bank, 2015, HIV is less than 1% of general population. According to NASP/GOB (National Agency of State Property) HIV/AIDS is less than 0.1% of general population and less than 1% of Sex Workers, and more than 1% in IDUs (Injection Drug User), although going as high as 11% in some hot spots.

An important point to be considered is in taking measures against HIV is the “Adult Prevalence Rate”. The Adult Prevalence Rate gives an estimate of the percentage of adults (aged 15-49) living with HIV/AIDS. It is calculated by dividing the estimated number of adults living with HIV/AIDS at year end by the total adult population at year end. Change of the adult prevalence rate is as shown in Table 18-3.

Table 18-3 Change of HIV/AIDS Adults Prevalence Rate
(%)

Country	1999	2001	2009	2012
Bangladesh	0.02	0.1	0.1	0.1

Source: UNAID, 2015/ CIA World Fact Book

Based on the current activities and the sources of data, modelling exercises of the future of the HIV epidemic in Dhaka suggest that, if interventions are not enhanced further, Bangladesh is likely to start with an IDU-driven epidemic, similar to other neighboring countries, which will then move to other population groups, including sex workers, males who have sex with males, clients of sex workers, and ultimately their families according to a health publication. (“HIV and AIDS in Bangladesh” by Tasnim Azim and others, September, 2008).

On site mitigation measures on this matter should include carrying out a course on basic healthcare especially on transmittable diseases for the construction workers, which shall be included in the environmental management and monitoring plan (EMMP). Accordingly, the contractor shall implement preventive measures based on the EMMP.

18.5.6 Demolition and Shifting of Existing Structure around Terminal 3 Area

In the Terminal 3 construction area, there are some properties such as Central Engineering Maintenance and Store Unit of CAAB (CEMS), Armed Police Camp, Flying Club Complex, Bengal Group Building and Civil Aviation Training Center (CATC). It is necessary to obtain the agreement of the owners of these properties on the relocation of their properties outside the project area.

Of these, in the occupation area of the Bengal group, CAAB required eviction due to the expiration of lease contract for 30 years in 2012. But CAAB filed a suit because it was not taken. The trial is held in February and March, and judgment of the High Court is planned in April.

18.5.7 Building Permit

The application method for building permit is prescribed in the city development law.

The BNBC code does not permit any building or structure to be erected, constructed, enlarged, altered, repaired, moved, improved, removed, converted or demolished (with some exceptions e.g. opening/closing up a window or a door or a ventilator; providing internal doors, providing partitions, false ceiling, painting gardening and the like) without obtaining permit for each such work from the Building official.

(1) Types of Permissions

Relevant data concerning Building permissions are given in the table below

Table 18-4 Types of permissions and validity from the date of issuance

	Stages	Validity of permissions from the date of issuance (months)
a	Land use certificate	24
b	Large and special project permits	24
c	Building permit	36 (unless construction up to plinth level is done)
d	Occupancy certificate	Perpetual (unless any change in use and physical properties)

Source: Dhaka Mohanagar Imarat Nirman Bidhimala (meaning: Dhaka City Construction Guideline), 2008, GoB

Permissions for all or any of the above may be necessary for a particular area/city/town/municipality. Requirements in this regards shall be incorporated in the building construction by laws/ rules/ regulations valid for that particular area/city/town/municipality.

Generally speaking, for different types of buildings such as low rise, high rise or special types, the following permits are required according to the guidelines.

- Low rise (up to 10 stories or roof level up to 33 m)
- High rise (more than 10 storied or roof level more than 33m)
- Project is Special when:
 - a. Residential unit more than 40 no.s
 - b. FAR (Floor Area) of more than 7500 sqm.
 - c. Shopping Complex of more than FAR 5000 sqm.
 - d. Plot adjacent to national highway
 - e. Brick manufacturing industries, other industries which are hazardous or tend to pollute the environment
 - f. Plot within 250m of heritage site, natural lake, river and forest
 - g. Plot within 250m of distance from naturally aesthetically beautiful site
 - h. Plot within 50m of cliffs, mountains or hilly area
 - i. Plot within 250m of any river bank
- Permits from other agencies*:

The owner shall obtain permit as may be applicable from other concerned agencies relating to building, zoning, grades, sewers, water mains, plumbing, signs, blasting, street occupancy, gas, electricity, highways and all other permits required in connection with the proposed work.

However, particularly large projects like the airport are excluded from the approval process, and the responsibility is taken by CAAB, who is supposed to apply for a permit to the MOCAT or Ministry of Housing and Public works. Since the procedure is rather unclear, it is necessary to confirm the correct procedure with the authorities.

18.5.8 Evasion of Military Use

As a fundamental principle of Japan's ODA, the avoidance of "military usage and facilitation of international disputes" are stipulated as general rules of aid implementation by the Japanese government.

- Are of HSIA is organeized by the military and civil aviation. Military control area, which is located in the west side from the runway, is shown in Table 18-5. As indicated in the figure, the project area shall not include the military control area.
- Passenger terminal buildings, cargo complex, and car parks are used for civil aviation and private passengers. Rapid exit taxiway is not assumed to be operated or utilized by military aircrafts from the positional relationships of the parking apron of military aircrafts and rapid exit taxiway. There are several airplanes such as fighter, carrier and rotor blade airplane in the military in the west of runway. The military aircraft movements were approximately 72,000 times of the total annual movements and frequency of use of runway was around 7% of the whole; it was confirmed that this ratio will not changed in the future.

The frequency of runway operation for civil aviation is more than 90% of all operations and it is recognized that the facilities in the HSIA are applied for civil aviation.



Source: JICA Study Team

Table 18-5 Military Area

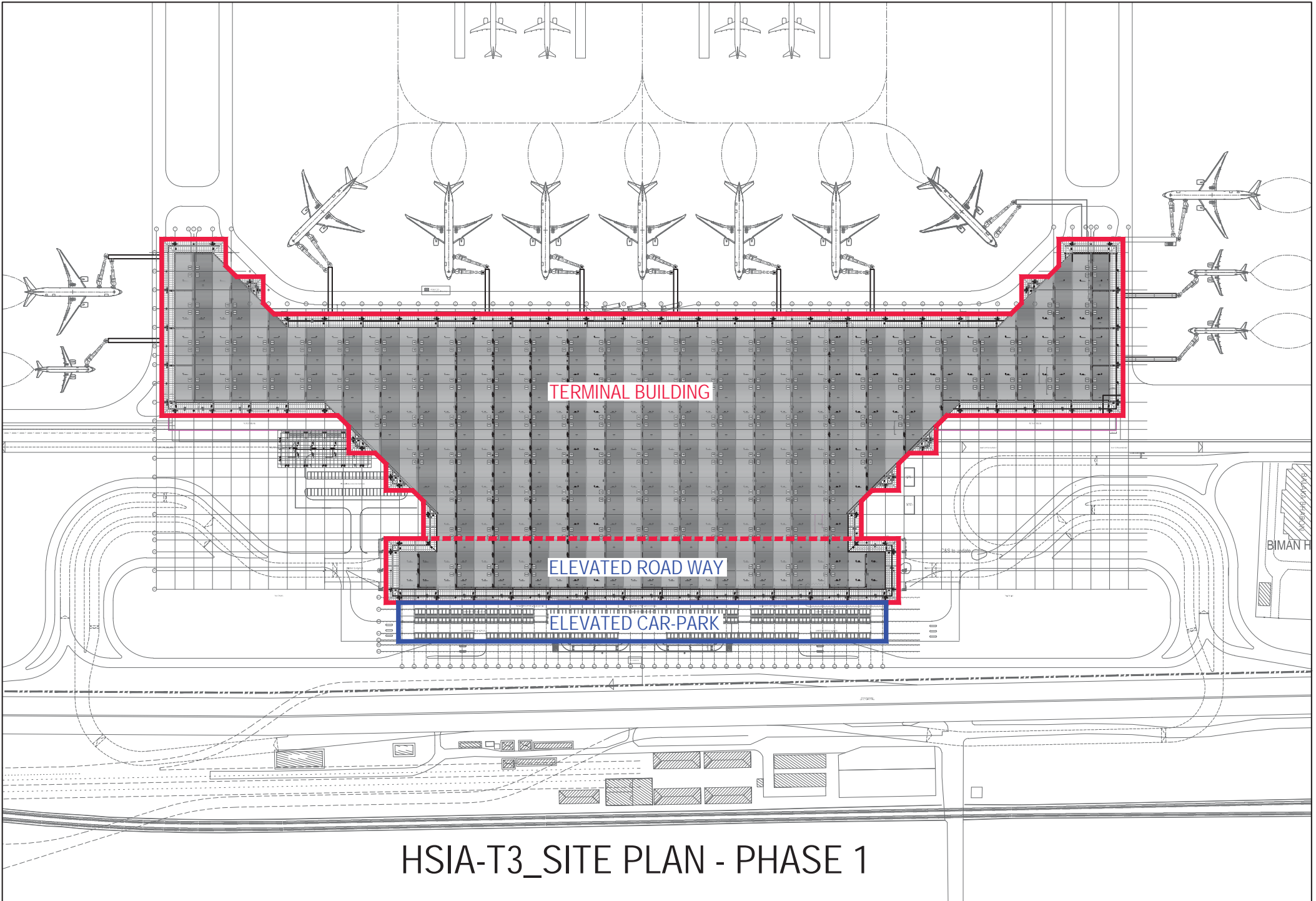
APPENDICES

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Appendix 10.1 Design Drawings
(Passenger Terminal 3)

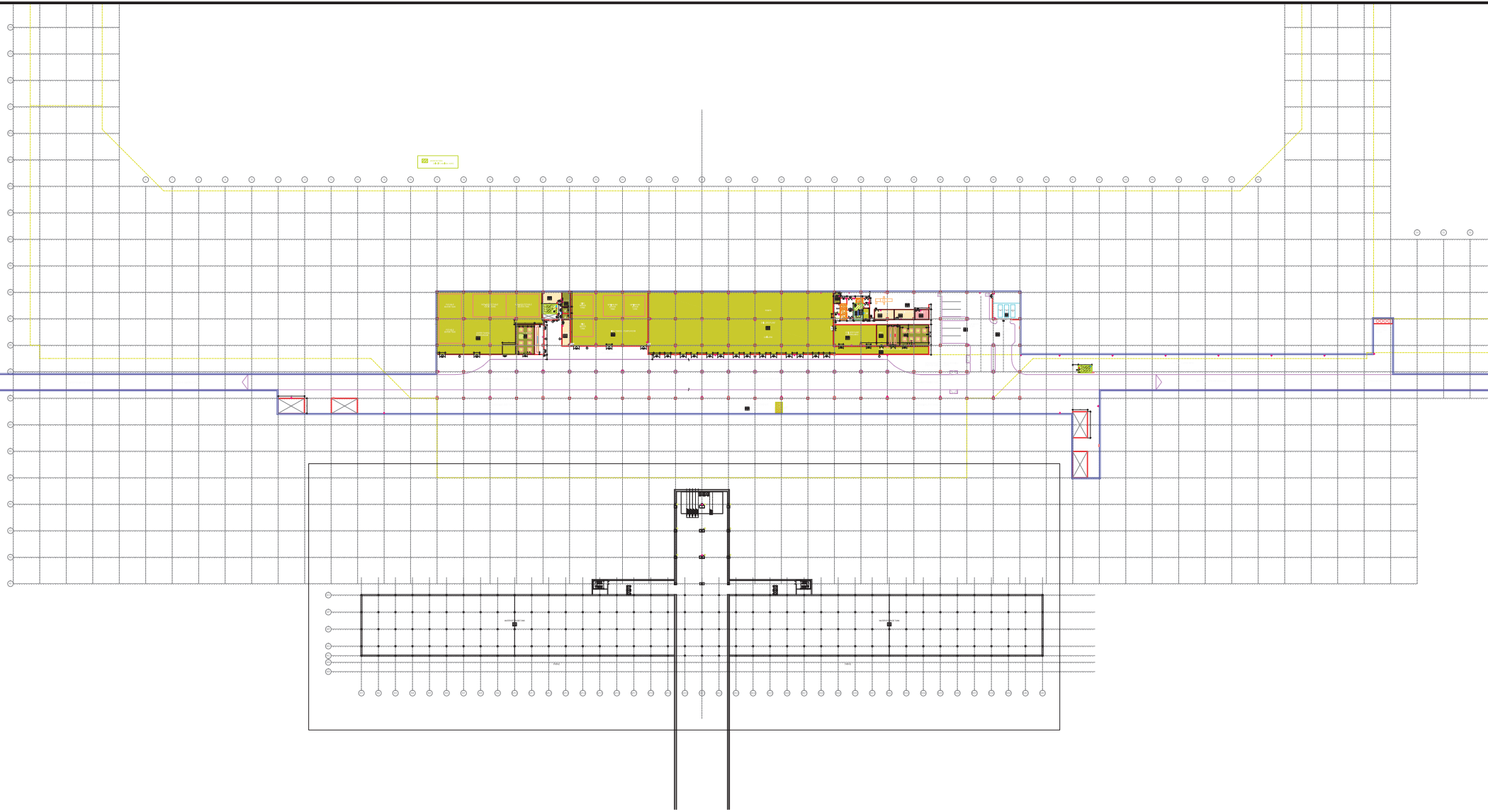
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1	Site Plan
2	Basement Plan
3	Ground Floor Plan
4	First Floor Plan
5	Second Floor Plan
6	Pile Layout
7	Floor Occupation List

A101-1



HSIA-T3_SITE PLAN - PHASE 1



A10.1-2



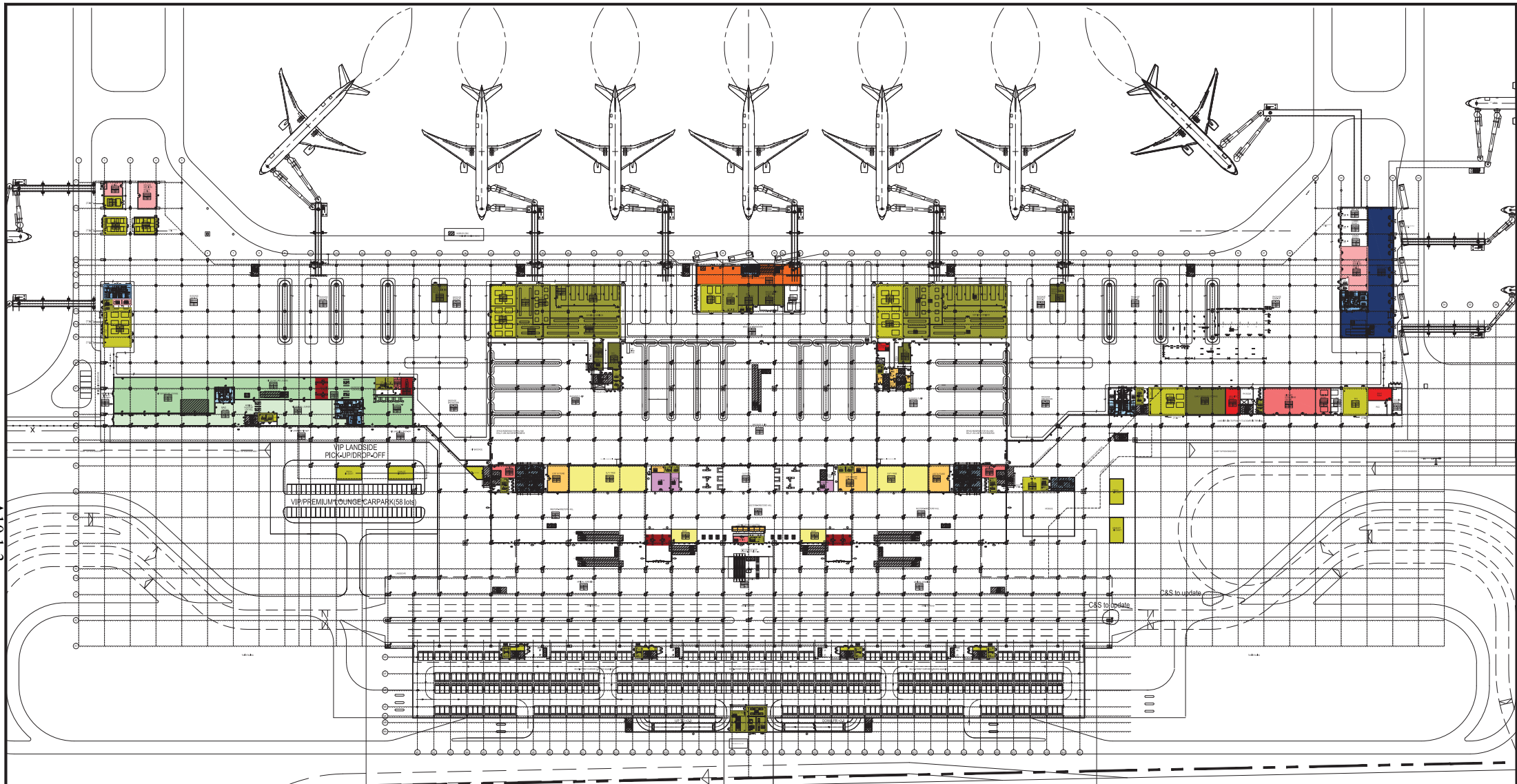
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- | | | |
|---------------------------------------|------------------------------|-------------------------------------|
| 01 MEC | 10 OFFICE(CUSTOM) | 19 VIP ARRIVAL |
| 2 ELC, IT | 11 OFFICE(IMM) | 20 CIP, AIRLINE LOUNGE |
| 3 BHS | 12 OFFICE(Quarantine) | 21 GATE LOUNGE, DEPARTURE CONCOURSE |
| 4 TOILET(P) | 13 SECURITY POINTS | 22 DEPARTURE BUS GATE |
| 5 TOILET(S) | 14 STORE | 23 DEPARTURE PASSPORT CONTROL |
| 6 OFFICE(Ground Service, Ramp OFFICE) | 15 C/S RETAIL | 24 ARRIVAL CONCOURSE |
| 7 OFFICE(AIRPORT, AIRLINE OFFICE) | 16 C/S F&B | 25 ARRIVAL BUS HALL |
| 8 OFFICE(OTHER OFFICE, GOVERNMENT) | 17 SERVICE, SERVICE COUNTERS | 26 ARRIVAL PASSPORT CONTROL |
| 9 OFFICE(SERVICE for PAX OFFICE) | 18 VIP LOUNGE, DEPARTURE | |

HSIA-T3_BASEMENT PLAN
BANGLADESH_AIRPORT_EXPANSION - T3
-6.0M

PROJECT NAME :	CLIENT :	CONSULTANT :	DRAWING TITLE :	DRAWN BY :	CHECKED BY :	APPROVED BY :	CHECKED BY :	REVIEWED BY :	APPROVED BY :	
 HAZRAT SHAHJALAL INTERNATIONAL AIRPORT PREPARATELY SURVEY OF EXPANSION OF HAZRAT SHAHJALAL INTERNATIONAL AIRPORT	 CIVIL AVIATION AUTHORITY OF BANGLADESH KURMITOLA, DHAKA-1229, BANGLADESH		BASIC DESIGN							
			SCALE :							
			DRAWING NO. :							
							THE ENGINEER	PROJECT DIRECTOR	CHIEF ENGINEER	

A10.1-3



LEGEND

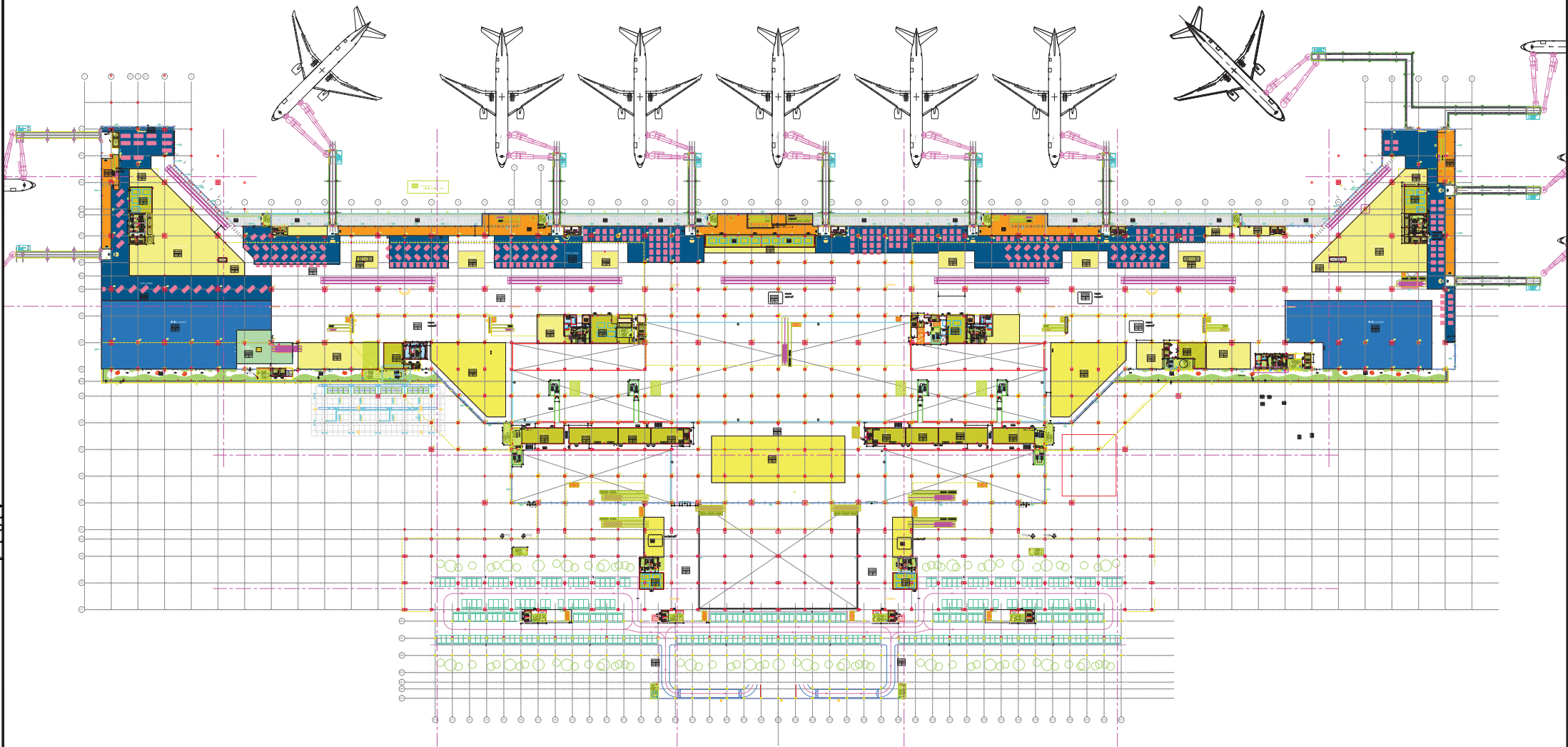
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|--|---|---|

HSIA-T3_GROUND FLOOR PLAN

BANGLADESH_AIRPORT_EXPANSION - T3
±0.0M

PROJECT NAME :	CLIENT :	CONSULTANT :	DRAWING TITLE :		DRAWN BY		CHECKED BY :		APPROVED BY :	
 HAZRAT SHAHJALAL INTERNATIONAL AIRPORT PREPARATELY SURVEY OF EXPANSION OF HAZRAT SHAHJALAL INTERNATIONAL AIRPORT	 CIVIL AVIATION AUTHORITY OF BANGLADESH KURMITOLA, DHAKA-1229, BANGLADESH		BASIC DESIGN							
			SCALE :							
			DRAWING NO. :				THE ENGINEER	PROJECT DIRECTOR	CHIEF ENGINEER	



4-1014



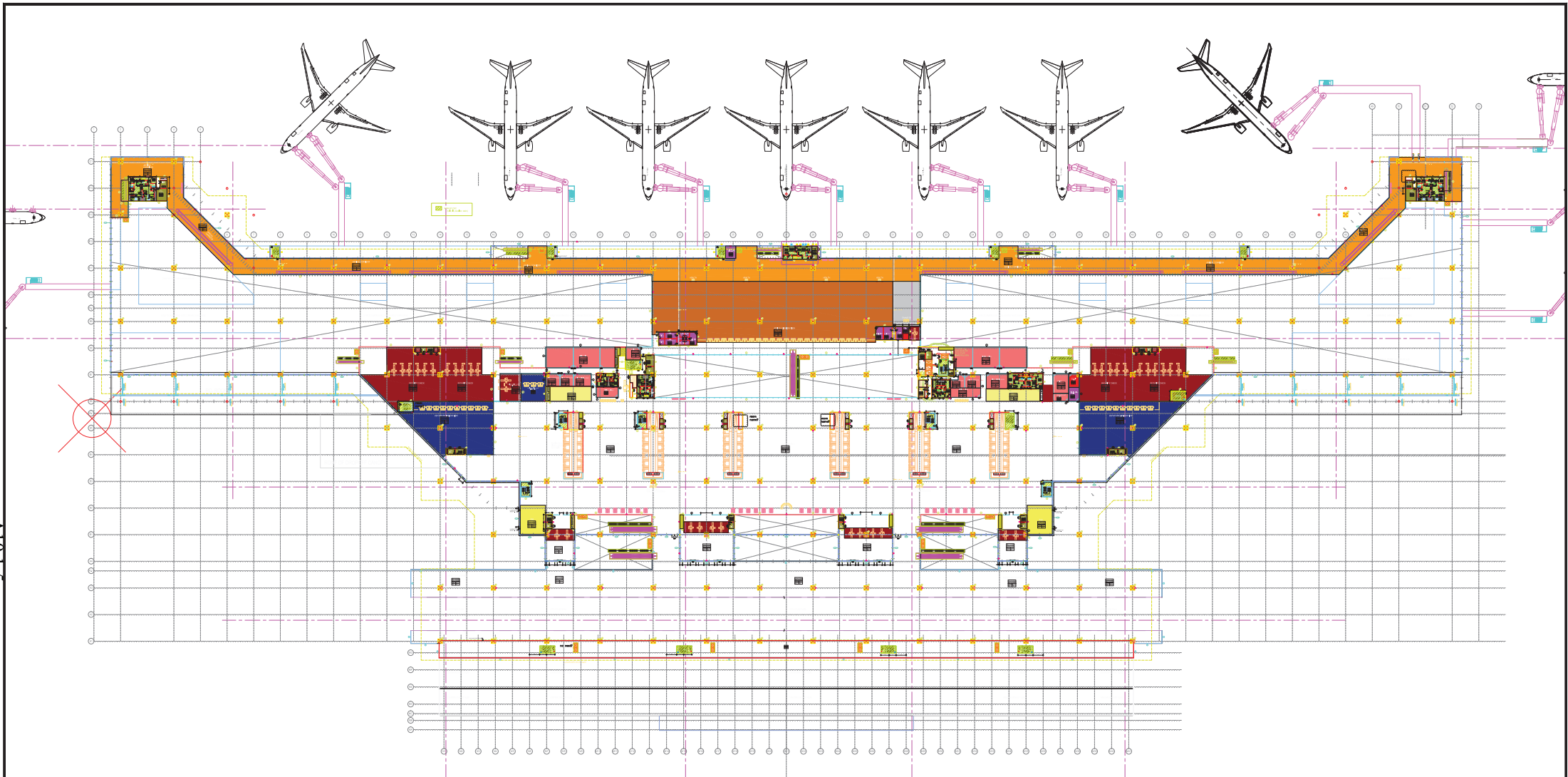
LEGEND

- | | | |
|---------------------------------------|------------------------------|-------------------------------------|
| 01 MEC | 10 OFFICE(CUSTOM) | 19 VIP ARRIVAL |
| 2 ELC, IT | 11 OFFICE(MM) | 20 CIP, AIRLINE LOUNGE |
| 3 BHS | 12 OFFICE(Quarantine) | 21 GATE LOUNGE, DEPARTURE CONCOURSE |
| 4 TOILET(P) | 13 SECURITY POINTS | 22 DEPARTURE BUS GATE |
| 5 TOILET(S) | 14 STORE | 23 DEPARTURE PASSPORT CONTROL |
| 6 OFFICE(Ground Service, Ramp OFFICE) | 15 C/S RETAIL | 24 ARRIVAL CONCOURSE |
| 7 OFFICE(AIRPORT, AIRLINE OFFICE) | 16 C/S F&B | 25 ARRIVAL BUS HALL |
| 8 OFFICE(OTHER OFFICE, GOVERNMENT) | 17 SERVICE, SERVICE COUNTERS | 26 ARRIVAL PASSPORT CONTROL |
| 9 OFFICE(SERVICE for PAX OFFICE) | 18 VIP LOUNGE, DEPARTURE | |

HSIA-T3_FIRST FLOOR PLAN
 BANGLADESH_AIRPORT_EXPANSION - T3
 +6.0M

PROJECT NAME :  HAZRAT SHAHJALAL INTERNATIONAL AIRPORT PREPARATELY SURVEY OF EXPANSION OF HAZRAT SHAHJALAL INTERNATIONAL AIRPORT	CLIENT :  CIVIL AVIATION AUTHORITY OF BANGLADESH KURMI TOLA, DHAKA-1229, BANGLADESH	CONSULTANT :	DRAWING TITLE :	DRAWN BY	CHECKED BY	APPROVED BY	CHECKED BY:	REVIEWED BY:	APPROVED BY:
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S-101-5

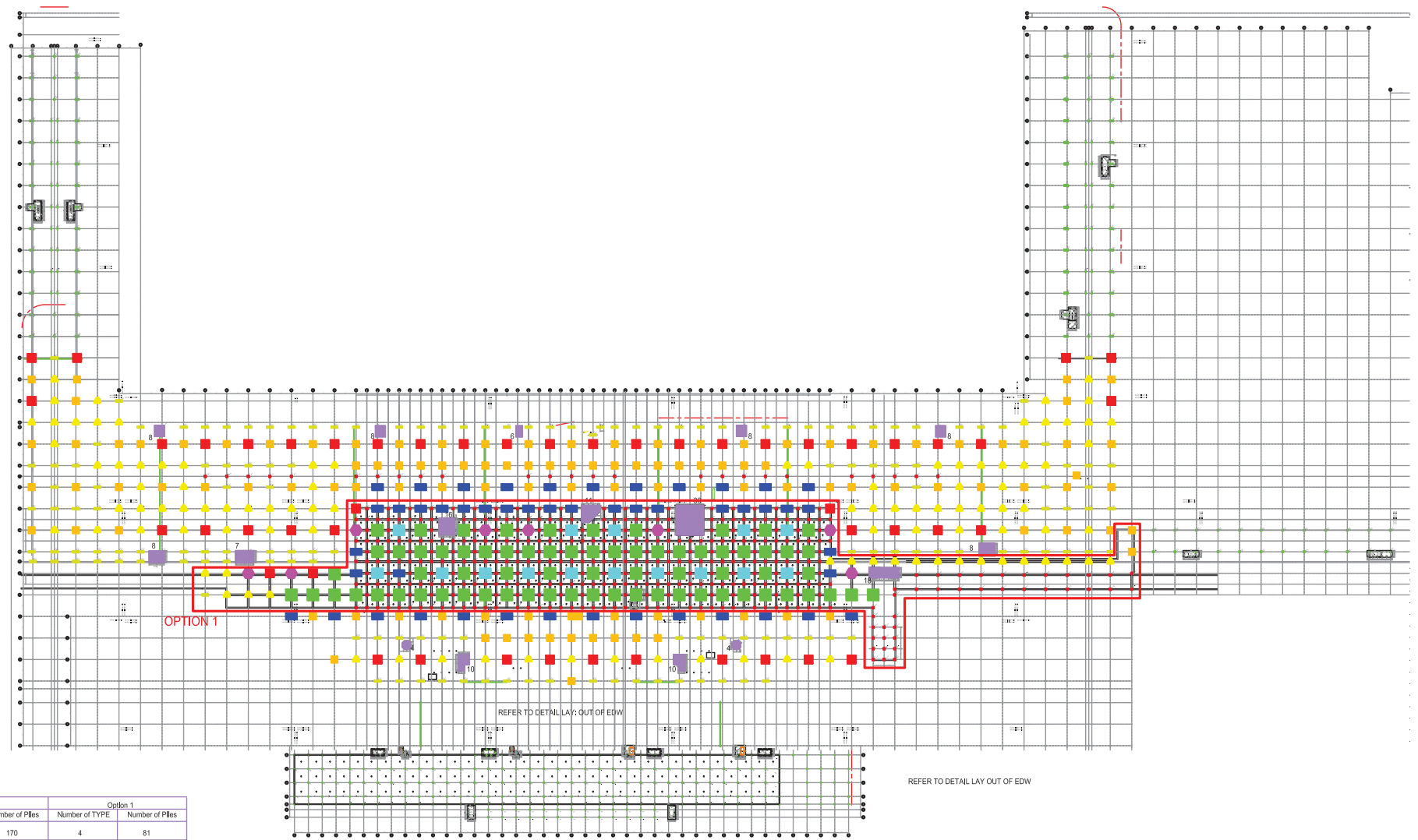


LEGEND

- | | | |
|---------------------------------------|------------------------------|-------------------------------------|
| 01 MEC | 10 OFFICE(CUSTOM) | 19 VIP ARRIVAL |
| 2 ELC, IT | 11 OFFICE(MM) | 20 CIP, AIRLINE LOUNGE |
| 3 BHS | 12 OFFICE(Quarantine) | 21 GATE LOUNGE, DEPARTURE CONCOURSE |
| 4 TOILET(P) | 13 SECURITY POINTS | 22 DEPARTURE BUS GATE |
| 5 TOILET(S) | 14 STORE | 23 DEPARTURE PASSPORT CONTROL |
| 6 OFFICE(Ground Service, Ramp OFFICE) | 15 C/S RETAIL | 24 ARRIVAL CONCOURSE |
| 7 OFFICE(AIRPORT, AIRLINE OFFICE) | 16 C/S F&B | 25 ARRIVAL BUS HALL |
| 8 OFFICE(OTHER OFFICE, GOVERNMENT) | 17 SERVICE, SERVICE COUNTERS | 26 ARRIVAL PASSPORT CONTROL |
| 9 OFFICE(SERVICE for PAX OFFICE) | 18 VIP LOUNGE, DEPARTURE | |

HSIA-T3_SECOND FLOOR PLAN
BANGLADESH_AIRPORT_EXPANSION - T3
+11.5M

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			BASIC DESIGN				THE ENGINEER	PROJECT DIRECTOR	CHIEF ENGINEER
			SCALE :						
			DRAWING NO. :						



C&S STRUCTURAL PILE & PILE CAP LAY OUT KEY PLAN
SCALE: N/A

Number of Piles/ type	PHASE 1		Option 1	
	Number of TYPE	Number of Piles	Number of TYPE	Number of Piles
VARIES	16	170	4	81
9	70	630	70	630
8	15	120	15	120
7	8	56	8	56
6	48	288	23	138
5	49	245	4	20
4	114	456	2	8
3	103	309	19	57
2	146	292	1	2
1	383	383	358	358
		2949		1470

Floor Occupation

Agency	Division	Rm Code	Grid Line	Room Name	Floor Level	T3: Room Area on Preliminary Design (m ²)	
Airline Office		2F-18/B7-1	18/B7-1	Flight Crew Rm	2F	47.6 m ²	1432.3 m ²
Airline Office		2F-19/B7-1	19/B7-1	Flight Crew Rm	2F	45.5 m ²	
Airline Office		2F-19/B7-2	19/B7-2	Flight Briefing Rm	2F	63.0 m ²	
Airline Office		2F-20/B6-1	20/B6-1	Airline Office	2F	62.2 m ²	
Airline Office		2F-19/B8-1	19/B8-1	Airline Office	2F	396.6 m ²	
Airline Office		2F-21/B8-1	21/B8-1	Airline Office	2F	52.9 m ²	
Airline Office		2F-31/B6-1	31/B6-1	Flight Crew Rm	2F	58.7 m ²	
Airline Office		2F-30/B6-1	30/B6-1	Flight Crew Rm	2F	39.4 m ²	
Airline Office		2F-35/B6-1	35/B6-1	Flight Briefing Rm	2F	88.1 m ²	
Airline Office		2F-31/B5-1	31/B5-1	Airline Office	2F	77.4 m ²	
Airline Office		2F-34/B7-1	34/B7-1	Airline Office	2F	418.0 m ²	
Airline Office		2F-37/B6-1	37/B6-1	Office	2F	82.9 m ²	
Airport Maintenance	OFFICE	G-4/B14-1	4/B14-1	Ground service / Apron Office	G	147.7 m ²	
Airport Maintenance		G-2/C1-1	2/C1-1	Office	G	77.4 m ²	
Airport Maintenance		B-35/B7-1	35/B7-1	Office	B	38.95	
Airport Operation	MEC	B-17/B8-1	17/B8-1	Water Tank & Pumps Room	B	1604.0 m ²	13695.7 m ²
Airport Operation		B-22/B8-1	22/B8-1	Fire Tanks & Pump Room	B	1160.8 m ²	
Airport Operation		B-25/B8-1	25/B8-1	Chiller Plan	B	3201.3 m ²	
Airport Operation		B-32/B6-1	32/B6-1	Chiller Water Treatment Plan	B	218.7 m ²	
Airport Operation		B-32/B7-1	32/B7-1	Chiller Plant Control / MCC	B	248.9 m ²	
Airport Operation		B-34/B7-1	34/B7-1	AHU	B	61.6 m ²	
Airport Operation		B-33/B7-1	33/B7-1	CWH Pipe Shaft	B	20.0 m ²	
Airport Operation		G-2/B14-1	2/B14-1	AHU	G	67.8 m ²	
Airport Operation		G-2/B13-1	2/B13-1	AHU	G	111.4 m ²	
Airport Operation		G-3/B13-1	3/B13-1	AHU	G	111.5 m ²	
Airport Operation		G-2/B9-1	2/B9-1	AHU	G	301.2 m ²	
Airport Operation		G-8/B6-3	8/B6-3	HVAC	G	8.1 m ²	
Airport Operation		G-11/B4-1	11/B4-1	Fresh Air Shaft	G	99.4 m ²	
Airport Operation		G-13/B4-1	13/B4-1	Exhaust Air Shaft	G	99.4 m ²	
Airport Operation		G-16/B4-1	16/B4-1	FA/EA Shaft	G	45.2 m ²	
Airport Operation		G-17/B11-1	17/B11-1	AHU	G	164.3 m ²	
Airport Operation		G-17/B9-1	17/B9-1	AHU	G	233.8 m ²	
Airport Operation		G-43/B6-1	43/B6-1	AHU	G	281.5 m ²	
Airport Operation		G-50/B6-1	50/B6-1	AHU	G	193.1 m ²	
Airport Operation		G-25/B11-1	25/B11-1	AHU	G	166.1 m ²	
Airport Operation		G-29/B11-1	29/B11-1	AHU	G	128.6 m ²	

Airport Operation		G-32/B12-1	32/B12-1	AHU	G	165.0 m ²		
Airport Operation		G-32/B11-1	32/B11-1	AHU	G	229.6 m ²		
Airport Operation		G-33/B7-2	33/B7-2	CHW Pipe Shaft	G	11.0 m ²		
Airport Operation		G-38/B3-1	38/B3-1	AHU	G	64.1 m ²		
Airport Operation		G-41/B3-1	41/B3-1	Fresh Air Shaft	G	99.4 m ²		
Airport Operation		G-41/B2-1	41/B2-1	Fresh Air Shaft	G	99.4 m ²		
Airport Operation		G-51/B11-12	51/B11-12	Mechanical Ventilation	G	1.4 m ²		
Airport Operation		1F-4/B11-2	4/B11-2	AC shaft	1F	45.5 m ²		
Airport Operation		1F-2/C1-1	2/C1-1	AC shaft	1F	1832.2 m ²		
Airport Operation		1F-3/B12-1	3/B12-1	AHU	1F	158.2 m ²		
Airport Operation		1F-13/B7-10	13/B7-10	AHU	1F	140.9 m ²		
Airport Operation		1F-8/B11-3	8/B11-3	AC shaft	1F	2.9 m ²		
Airport Operation		1F-8/B11-4	8/B11-4	AC shaft	1F	2.9 m ²		
Airport Operation		1F-20/B7-1	20/B7-1	AHU	1F	219.5 m ²		
Airport Operation		1F-11/B10-1	11/B10-1	AC shaft	1F	18.7 m ²		
Airport Operation		1F-21/B8-2	21/B8-2	HVAC	1F	21.9 m ²		
Airport Operation		1F-18/B4-1	18/B4-1	AHU	1F	177.4 m ²		
Airport Operation		1F-20/B4-1	20/B4-1	AHU	1F	207.6 m ²		
Airport Operation		1F-22/B4-1	22/B4-1	AHU	1F	137.1 m ²		
Airport Operation		1F-23/B4-1	23/B4-1	AHU	1F	137.1 m ²		
Airport Operation		1F-26/B4-1	26/B4-1	AHU	1F	177.4 m ²		
Airport Operation		1F-28/B4-1	28/B4-1	AHU	1F	207.6 m ²		
Airport Operation		1F-30/B4-1	30/B4-1	AHU	1F	137.1 m ²		
Airport Operation		1F-31/B4-1	31/B4-1	AHU	1F	137.1 m ²		
Airport Operation		1F-22/A2-1	22/A2-1	AHU	1F	105.0 m ²		
Airport Operation		1F-32/A2-1	32/A2-1	AHU	1F	105.0 m ²		
Airport Operation		1F-34/B8-2	34/B8-2	AHU	1F	140.9 m ²		
Airport Operation		1F-42/B7-1	42/B7-1	AHU	1F	160.9 m ²		
Airport Operation		1F-51/B11-1	51/B11-1	AHU	1F	203.7 m ²		
Airport Operation		2F-16/B6-1	16/B6-1	AC shaft	2F	16.7 m ²		
Airport Operation		2F-17/B5-1	17/B5-1	AC shaft	2F	5.9 m ²		
Airport Operation	ELEC/IT	B-20/B6-1	20/B6-1	TX Room	B	150.8 m ²		5286.0 m ²
Airport Operation		B-22/B8-2	22/B8-2	Load Center	B	33.3 m ²		
Airport Operation		B-22/B8-3	22/B8-3	Data Riser	B	15.7 m ²		
Airport Operation		B-22/B7-1	22/B7-1	ELV	B	13.5 m ²		
Airport Operation		B-32/B8-1	32/B8-1	Load Center	B	19.8 m ²		
Airport Operation		B-34/B8-1	34/B8-1	TX Room	B	240.0 m ²		
Airport Operation		G-2/B10-1	2/B10-1	Load Center	G	15.9 m ²		
Airport Operation		G-2/B10-2	2/B10-2	Data Riser	G	15.9 m ²		
Airport Operation		G-8/B6-1	8/B6-1	Load Center	G	15.0 m ²		

Airport Operation		G-8/B6-2	8/B6-2	Data Riser	G	18.3 m ²
Airport Operation		G-13/B7-1	13/B7-1	Load Center	G	33.8 m ²
Airport Operation		G-13/B7-2	13/B7-2	Data Riser	G	26.7 m ²
Airport Operation		G-18/B11-1	18/B11-1	High Tension Rm (HT)	G	171.6 m ²
Airport Operation		G-19/B11-1	19/B11-1	Transformer Rm (TX)	G	203.5 m ²
Airport Operation		G-18/B9-1	18/B9-1	UPS	G	141.7 m ²
Airport Operation		G-20/B11-1	20/B11-1	Gen Set Room	G	407.1 m ²
Airport Operation		G-20/B9-1	20/B9-1	Low Tension (LT)	G	441.8 m ²
Airport Operation		G-20/B10-1	20/B10-1	Service Corridor	G	261.9 m ²
Airport Operation		G-22/B8-2	22/B8-2	Load Center	G	26.1 m ²
Airport Operation		G-22/B8-3	22/B8-3	Data Riser	G	20.8 m ²
Airport Operation		G-17/B3-1	17/B3-1	Load Center	G	14.7 m ²
Airport Operation		G-17/B3-2	17/B3-2	Data Riser	G	14.5 m ²
Airport Operation		G-24/B4-1	24/B4-1	Load Center	G	14.1 m ²
Airport Operation		G-24/B4-2	24/B4-2	Data Riser	G	12.5 m ²
Airport Operation		G-31/B4-1	31/B4-1	Load Center	G	15.3 m ²
Airport Operation		G-31/B4-2	31/B4-2	Data Riser	G	14.7 m ²
Airport Operation		G-27/B1-2	27/B1-2	Load Center	G	11.5 m ²
Airport Operation		G-27/B1-3	27/B1-3	Data Riser	G	15.5 m ²
Airport Operation		G-36/B3-1	36/B3-1	Load Center	G	14.7 m ²
Airport Operation		G-36 /B3-2	36 /B3-2	Data Riser	G	14.5 m ²
Airport Operation		G-42/B7-1	42/B7-1	Load Center	G	15.8 m ²
Airport Operation		G-42/B7-2	42/B7-2	Data Riser	G	17.6 m ²
Airport Operation		G-47/B7-1	47/B7-1	Load Center	G	14.4 m ²
Airport Operation		G-47/B7-2	47/B7-2	Data Riser	G	10.4 m ²
Airport Operation		G-47/B7-3	47/B7-3	SPRCV	G	9.5 m ²
Airport Operation		G-51/C1-1	51/C1-1	MDF Room	G	103.2 m ²
Airport Operation		G-51/B14-1	51/B14-1	COMMS Room1	G	103.2 m ²
Airport Operation		G-51/B14-2	51/B14-2	COMMS Room1	G	103.2 m ²
Airport Operation		G-49/B12-1	49/B12-1	Load Center	G	14.5 m ²
Airport Operation		G-49/B12-2	49/B12-2	Data Riser	G	14.5 m ²
Airport Operation		G-25/B11-2	25/B11-2	SPRCV	G	43.3 m ²
Airport Operation		G-26/B11-1	26/B11-1	Sever Room	G	152.6 m ²
Airport Operation		G-27/B11-1	27/B11-1	Load Center	G	16.4 m ²
Airport Operation		G-27/B11-2	27/B11-2	Data Riser	G	11.2 m ²
Airport Operation		G-33/B11-1	33/B11-1	High Tension Rm (HT)	G	171.6 m ²
Airport Operation		G-34/B11-1	34/B11-1	Transformer Rm (TX)	G	203.5 m ²
Airport Operation		G-33/B9-2	33/B9-2	UPS	G	141.7 m ²
Airport Operation		G-35/B11-1	35/B11-1	Gen Set Room	G	407.1 m ²
Airport Operation		G-35/B9-1	35/B9-1	Low Tension (LT)	G	441.8 m ²

Airport Operation		G-35/B9-2	35/B9-2	Service Corridor	G	261.9 m ²
Airport Operation		G-32/B8-1	32/B8-1	Load Center	G	25.7 m ²
Airport Operation		G-32/B8-2	32/B8-2	ELV Riser	G	9.7 m ²
Airport Operation		G-38/B3-2	38/B3-2	Load Center	G	14.6 m ²
Airport Operation		G-38/B3-3	38/B3-3	Data Riser	G	10.5 m ²
Airport Operation		1F-3/B11-1	3/B11-1	Load Center	1F	18.4 m ²
Airport Operation		1F-3/B11-2	3/B11-2	Data Riser	1F	12.3 m ²
Airport Operation		1F-8/B7-1	8/B7-1	Load Center	1F	16.6 m ²
Airport Operation		1F-8/B7-2	8/B7-2	Data Riser	1F	17.4 m ²
Airport Operation		1F-13/B7-1	13/B7-1	Load Center	1F	13.7 m ²
Airport Operation		1F-13/B7-2	13/B7-2	Data Riser	1F	9.1 m ²
Airport Operation		1F-8/B11-1	8/B11-1	Load Center	1F	10.5 m ²
Airport Operation		1F-8/B11-2	8/B11-2	Data Riser	1F	10.8 m ²
Airport Operation		1F-19/B11-1	19/B11-1	Load Center	1F	12.5 m ²
Airport Operation		1F-19/B11-2	19/B11-2	Data Riser	1F	13.0 m ²
Airport Operation		1F-22/B7-1	22/B7-1	Load Center	1F	25.6 m ²
Airport Operation		1F-22/B7-2	22/B7-2	Data Riser	1F	21.3 m ²
Airport Operation		1F-23/B4-2	23/B4-2	Load Center	1F	13.6 m ²
Airport Operation		1F-23/B4-3	23/B4-3	Data Riser	1F	9.5 m ²
Airport Operation		1F-23/A1-1	23/A1-1	Load Center	1F	11.6 m ²
Airport Operation		1F-23/A1-2	23/A1-2	Data Riser	1F	8.5 m ²
Airport Operation		1F-32/B4-1	32/B4-1	Load Center	1F	13.6 m ²
Airport Operation		1F-32/B4-2	32/B4-2	Data Riser	1F	9.5 m ²
Airport Operation		1F-31/A1-1	31/A1-1	Load Center	1F	11.6 m ²
Airport Operation		1F-31/A1-2	31/A1-2	Data Riser	1F	8.5 m ²
Airport Operation		1F-32/B8-1	32/B8-1	Load Center	1F	21.2 m ²
Airport Operation		1F-32/B8-2	32/B8-2	Data Riser	1F	15.7 m ²
Airport Operation		1F-32/B8-3	32/B8-3	ELV Riser	1F	9.7 m ²
Airport Operation		1F-4/B14-1	4/B14-1	Load Center	1F	36.6 m ²
Airport Operation		1F-4/B14-2	4/B14-2	Data Riser	1F	15.5 m ²
Airport Operation		1F-50/B14-1	50/B14-1	Load Center	1F	36.6 m ²
Airport Operation		1F-50/B14-2	50/B14-2	Data Riser	1F	15.5 m ²
Airport Operation		1F-28/B11-1	28/B11-1	Load Center	1F	11.2 m ²
Airport Operation		1F-28/B11-2	28/B11-2	Data Riser	1F	8.8 m ²
Airport Operation		2F-17/B4-1	17/B4-1	Load Center	2F	5.5 m ²
Airport Operation		2F-17/B4-2	17/B4-2	Data Riser	2F	5.6 m ²
Airport Operation		2F-22/B7-1	22/B7-1	Load Center	2F	27.3 m ²
Airport Operation		2F-22/B7-2	22/B7-2	Data Riser	2F	20.8 m ²
Airport Operation		2F-32/B8-1	32/B8-1	Load Center	2F	15.7 m ²
Airport Operation		2F-32/B8-2	32/B8-2	ELV Riser	2F	15.2 m ²

Airport Operation		2F-14/B4-1	14/B4-1	Data Riser	2F	11.5 m ²	31302.0 m ²
Airport Operation		2F-14/B4-2	14/B4-2	Load Center	2F	13.7 m ²	
Airport Operation	BHS	G-5/B11-1	5/B11-1	Baggage Reconciliation Rm	G	78.7 m ²	
Airport Operation		G-15/B7-1	15/B7-1	Baggage Breakdown	G	1201.6 m ²	
Airport Operation		G-2/B12-1	2/B12-1	Baggage Make - up Area	G	12371.7 m ²	
Airport Operation		G-21/B9-1	21/B9-1	Oversize Bag Store	G	39.1 m ²	
Airport Operation		G-21/B8-1	21/B8-1	Bag Store	G	35.5 m ²	
Airport Operation		G-22/B8-1	22/B8-1	Bag Store	G	93.2 m ²	
Airport Operation		G-45/b11-1	45/b11-1	Baggage Make - up Area	G	12371.7 m ²	
Airport Operation		G-42/B11-1	42/B11-1	Baggage Reconciliation Rm	G	78.7 m ²	
Airport Operation		G-41/B7-1	41/B7-1	Vestibule (M)	G	10.6 m ²	
Airport Operation		G-41/B7-2	41/B7-2	Cleaner Rm (M)	G	2.1 m ²	
Airport Operation		G-41/B7-3	41/B7-3	Toilet (Staff) (M)	G	17.5 m ²	
Airport Operation		G-41/B7-4	41/B7-4	Break Room (M)	G	16.7 m ²	
Airport Operation		G-41/B7-6	41/B7-6	Vestibule (F)	G	9.6 m ²	
Airport Operation		G-41/B7-7	41/B7-7	Cleaner Rm (F)	G	2.1 m ²	
Airport Operation		G-41/B7-8	41/B7-8	Toilet (Staff) (F)	G	17.5 m ²	
Airport Operation		G-41/B7-9	41/B7-9	Break Room (F)	G	13.7 m ²	
Airport Operation		G-41/B7-10	41/B7-10	Prayer Room (F)	G	12.1 m ²	
Airport Operation		G-46/B6-2	46/B6-2	PA Room	G	41.5 m ²	
Airport Operation		G-24/B11-1	24/B11-1	Baggage Make-up Area	G	3287.7 m ²	
Airport Operation		G-27/B12-1	27/B12-1	BHS Office	G	119.6 m ²	
Airport Operation		G-28/B12-1	28/B12-1	BHS Security Screen Office	G	152.4 m ²	
Airport Operation		G-33/B9-1	33/B9-1	Bag Store	G	67.4 m ²	
Airport Operation		G-13/B7-3	13/B7-3	Office	G	25.9 m ²	
Airport Operation		G-17/B4-1	17/B4-1	Office	G	69.9 m ²	
Airport Operation		G-24/B3-1	24/B3-1	Office	G	105.4 m ²	
Airport Operation		G-27/B1-1	27/B1-1	Office	G	26.9 m ²	
Airport Operation		G-36/B4-1	36/B4-1	Office	G	70.4 m ²	
Airport Operation		G-47/B6-1	47/B6-1	Airport Operation Center	G	424.2 m ²	
Airport Operation		G-48/B6-2	48/B6-2	Briefing Room	G	120.6 m ²	
Airport Operation		G-49/B6-1	49/B6-1	Fire Command Center (FCC)	G	95.6 m ²	
Airport Operation		G-50/B13-1	50/B13-1	Ground service / Apron Office	G	322.4 m ²	
Airport Operation	Misc.	G-2/B11-1	2/B11-1	Vestibule (M)	G	11.4 m ²	555.9 m ²
Airport Operation		G-2/B11-2	2/B11-2	Ablution (M)	G	7.5 m ²	
Airport Operation		G-2/B11-3	2/B11-3	Prayer Room (M)	G	7.3 m ²	
Airport Operation		G-2/B11-4	2/B11-4	Cleaner Rm (M)	G	3.3 m ²	
Airport Operation		G-2/B11-5	2/B11-5	Toilet (Staff) (M)	G	23.2 m ²	
Airport Operation		G-3/B11-1	3/B11-1	Vestibule (F)	G	11.4 m ²	
Airport Operation		G-3/B11-2	3/B11-2	Ablution (F)	G	7.5 m ²	

Airport Operation		G-3/B11-3	3/B11-3	Prayer Room (F)	G	7.3 m ²		
Airport Operation		G-3/B11-4	3/B11-4	Cleaner Rm (F)	G	3.3 m ²		
Airport Operation		G-3/B11-5	3/B11-5	Toilet (Staff) (F)	G	23.2 m ²		
Airport Operation		G-2/B10-3	2/B10-3	Break Rm (M)	G	14.5 m ²		
Airport Operation		G-2/B10-4	2/B10-4	Break Rm (F)	G	14.5 m ²		
Airport Operation		G-13/B6-1	13/B6-1	VIP check-in	G	421.8 m ²		
Airport Operation	SERVICE	G-20/B4-1	20/B4-1	Lost & Found	G	174.1 m ²		494.7 m ²
Airport Operation		G-34/B3-2	34/B3-2	Lost & Found	G	172.6 m ²		
Airport Operation		G-27/B2-1	27/B2-1	Tourist Service Counter	G	45.4 m ²		
Airport Operation		G-32/B8-3	32/B8-3	Landside Disposal Rm	G	17.3 m ²		
Airport Operation		G-33/B7-1	33/B7-1	Airside Disposal Rm	G	10.5 m ²		
Airport Operation		G-32/B7-1	32/B7-1	Landside Goods Lobby	G	15.7 m ²		
Airport Operation		G-32/B7-2	32/B7-2	Airside Goods/Fire Fighting Lobby	G	23.3 m ²		
Airport Operation		2F-32/B7-1	32/B7-1	Landside Disposal Rm	2F	17.6 m ²		
Airport Operation		2F-32/B6-2	32/B6-2	First Aid	2F	18.3 m ²		
Bank		G-23/B4-1	23/B4-1	Money Change	G	24.0 m ²	48.0 m ²	
Bank		G-31/B4-3	31/B4-3	Money Change	G	24.0 m ²		
Concession		G-30/B4-1	30/B4-1	Landside Goods Lobby	G	29.1 m ²	12666.4 m ²	
Concession		G-21/B4-1	21/B4-1	Duty Free Shop	G	584.1 m ²		
Concession		G-32/B3-1	32/B3-1	Duty Free Shop	G	461.6 m ²		
Concession		G-24/B1-1	24/B1-1	Shop	G	102.2 m ²		
Concession		G-29/B1-1	29/B1-1	Shop	G	102.2 m ²		
Concession		1F-4/B11-1	4/B11-1	Duty Free Shop	1F	1832.2 m ²		
Concession		1F-10/B7-1	10/B7-1	Retail	1F	588.0 m ²		
Concession		1F-15/B8-1	15/B8-1	F&B	1F	1099.1 m ²		
Concession		1F-9/B11-1	9/B11-1	Retail	1F	103.1 m ²		
Concession		1F-11/B10-2	11/B10-2	Retail	1F	107.3 m ²		
Concession		1F-15/B10-1	15/B10-1	Retail	1F	126.0 m ²		
Concession		1F-20/B10-1	20/B10-1	Retail	1F	126.0 m ²		
Concession		1F-25/B10-1	25/B10-1	Retail	1F	169.3 m ²		
Concession		1F-18/B7-1	18/B7-1	Retail	1F	226.8 m ²		
Concession		1F-33/B10-1	33/B10-1	Retail	1F	126.0 m ²		
Concession		1F-22/A4-1	22/A4-1	F&B	1F	222.3 m ²		
Concession		1F-32/A4-1	32/A4-1	F&B	1F	222.3 m ²		
Concession		1F-27/B2-1	27/B2-1	Landside F&B	1F	1715.0 m ²		
Concession		1F-51/B11-2	51/B11-2	Duty Free Shop	1F	1704.3 m ²		
Concession		1F-44/B11-1	44/B11-1	Retail	1F	320.8 m ²		
Concession		1F-41/B11-1	41/B11-1	Retail	1F	200.2 m ²		
Concession		1F-45/B11-1	45/B11-1	Retail	1F	80.7 m ²		

Concession		1F-43/B11-1	43/B11-1	Retail	1F	69.0 m ²	
Concession		1F-42/B10-1	42/B10-1	Retail	1F	107.3 m ²	
Concession		1F-38/B10-1	38/B10-1	Retail	1F	126.0 m ²	
Concession		1F-36/B8-1	36/B8-1	Retail	1F	224.1 m ²	
Concession		1F-38/B6-1	38/B6-1	F&B	1F	1099.1 m ²	
Concession		2F-17/B6-1	17/B6-1	Shop	2F	170.8 m ²	
Concession		2F-32/B6-1	32/B6-1	Shop	2F	183.9 m ²	
Concession		2F-37/B6-2	37/B6-2	Duty Manager Office	2F	34.6 m ²	
Concession		2F-17/B1-1	17/B1-1	F&B	2F	201.5 m ²	
Concession		2F-37/B1-1	37/B1-1	F&B	2F	201.5 m ²	
Customs		G-27/B3-1	27/B3-1	Customs Area	G	1119.1 m ²	1209.9 m ²
Customs		G-24/B3-2	24/B3-2	Customs Office	G	48.2 m ²	
Customs		G-30/B3-1	30/B3-1	Customs Office	G	42.7 m ²	
Immigration		G-11/B7-1	11/B7-1	Passport Control	G	307.4 m ²	6790.6 m ²
Immigration		G-8/B6-4	8/B6-4	Arrival Passport Control	G	71.0 m ²	
Immigration		2F-27/B9-1	27/B9-1	Arrival IMM	2F	3853.8 m ²	
Immigration		2F-27/B9-2	27/B9-2	Visa Office	2F	35.3 m ²	
Immigration		2F-14/B5-1	14/B5-1	Departure IMM	2F	1076.1 m ²	
Immigration		2F-17/B7-1	17/B7-1	Business & First Class IMM	2F	185.4 m ²	
Immigration		2F-31/B8-1	31/B8-1	IMM Office	2F	26.6 m ²	
Immigration		2F-31/B8-2	31/B8-2	Magistrate Court	2F	32.7 m ²	
Immigration		2F-31/B8-3	31/B8-3	Holding Area	2F	26.6 m ²	
Immigration		2F-38/B6-1	38/B6-1	IMM Office	2F	39.3 m ²	
Immigration		2F-40/B5-1	40/B5-1	Departure IMM	2F	1136.3 m ²	
Quarantine						0.0 m ²	
Pax Facilities	BAGGAGE CLAIM AREA	G-27/B6-1	27/B6-1	Baggage Claim	G	17579.7 m ²	25506.8 m ²
Pax Facilities		G-19/B4-1	19/B4-1	Toilet (Pax) (F)	G	37.5 m ²	
Pax Facilities		G-19/B4-2	19/B4-2	Cleaner Room (F)	G	3.6 m ²	
Pax Facilities		G-19/B4-3	19/B4-3	Toilet (Pax) (M)	G	42.7 m ²	
Pax Facilities		G-19/B4-4	19/B4-4	Cleaner Room (M)	G	3.6 m ²	
Pax Facilities		G-19/B4-5	19/B4-5	Parents Rm	G	9.1 m ²	
Pax Facilities		G-19/B4-6	19/B4-6	Toilet (INV)	G	12.0 m ²	
Pax Facilities		G-35/B4-1	35/B4-1	Toilet (Pax) (F)	G	37.5 m ²	
Pax Facilities		G-35/B4-2	35/B4-2	Cleaner Room (F)	G	3.6 m ²	
Pax Facilities		G-35/B4-3	35/B4-3	Toilet (Pax) (M)	G	42.7 m ²	
Pax Facilities		G-35/B4-4	35/B4-4	Cleaner Room (M)	G	3.6 m ²	
Pax Facilities		G-35/B4-5	35/B4-5	Parents Rm	G	9.1 m ²	
Pax Facilities		G-35/B4-6	35/B4-6	Toilet (INV)	G	12.0 m ²	
Pax Facilities		G-7/B7-1	7/B7-1	Vestibule	G	15.9 m ²	

Pax Facilities		G-7/B7-2	7/B7-2	Toilet (Pax) (F)	G	25.5 m ²
Pax Facilities		G-7/B7-3	7/B7-3	Cleaner Room (F)	G	3.1 m ²
Pax Facilities		G-7/B7-4	7/B7-4	Toilet (Pax) (M)	G	22.3 m ²
Pax Facilities		G-7/B7-5	7/B7-5	Cleaner Room (M)	G	3.1 m ²
Pax Facilities		G-7/B7-6	7/B7-6	Parents Rm	G	6.5 m ²
Pax Facilities		G-7/B7-7	7/B7-7	Toilet (INV)	G	6.5 m ²
Pax Facilities		G-7/B7-8	7/B7-8	Pipe Space	G	5.6 m ²
Pax Facilities		G-18/B3-1	18/B3-1	Toilet (Pax) (F)	G	36.4 m ²
Pax Facilities		G-18/B3-2	18/B3-2	Cleaner Room (F)	G	3.6 m ²
Pax Facilities		G-18/B3-3	18/B3-3	Toilet (Pax) (M)	G	42.3 m ²
Pax Facilities		G-18/B3-4	18/B3-4	Cleaner Room (M)	G	3.6 m ²
Pax Facilities		G-18/B3-5	18/B3-5	Parents Rm	G	7.2 m ²
Pax Facilities		G-18/B3-6	18/B3-6	Toilet (INV)	G	13.9 m ²
Pax Facilities		G-18/B2-1	18/B2-1	Meeter & Greeter's Hall	G	7093.8 m ²
Pax Facilities		G-35/B3-1	35/B3-1	Toilet (Pax) (F)	G	36.4 m ²
Pax Facilities		G-35/B3-2	35/B3-2	Cleaner Room (F)	G	3.6 m ²
Pax Facilities		G-35/B3-3	35/B3-3	Toilet (Pax) (M)	G	42.3 m ²
Pax Facilities		G-35/B3-4	35/B3-4	Cleaner Room (M)	G	3.6 m ²
Pax Facilities		G-35/B3-5	35/B3-5	Parents Rm	G	7.2 m ²
Pax Facilities		G-35/B3-6	35/B3-6	Toilet (INV)	G	13.9 m ²
Pax Facilities		G-42/B6-1	42/B6-1	Vestibule (F)	G	6.4 m ²
Pax Facilities		G-42/B6-2	42/B6-2	Toilet (Pax) (F)	G	22.9 m ²
Pax Facilities		G-42/B6-3	42/B6-3	Cleaner Room (F)	G	2.3 m ²
Pax Facilities		G-42/B6-4	42/B6-4	Vestibule (M)	G	2.9 m ²
Pax Facilities		G-42/B6-5	42/B6-5	Toilet (Pax) (M)	G	22.9 m ²
Pax Facilities		G-42/B6-6	42/B6-6	Cleaner Room (M)	G	3.6 m ²
Pax Facilities		G-42/B6-7	42/B6-7	Parents Rm	G	9.1 m ²
Pax Facilities		G-42/B6-8	42/B6-8	Toilet (INV)	G	6.0 m ²
Pax Facilities		1F-13/B8-1	13/B8-1	Vestibule	1F	20.0 m ²
Pax Facilities		1F-13/B8-2	13/B8-2	Cleaner Rm (M)	1F	2.4 m ²
Pax Facilities		1F-13/B8-3	13/B8-3	Toilet (Pax) (M)	1F	29.3 m ²
Pax Facilities		1F-13/B8-4	13/B8-4	Cleaner Rm (F)	1F	2.4 m ²
Pax Facilities		1F-13/B8-5	13/B8-5	Toilet (Pax) (F)	1F	26.8 m ²
Pax Facilities		1F-13/B8-6	13/B8-6	INV	1F	5.2 m ²
Pax Facilities		1F-13/B8-7	13/B8-7	Parents Rm	1F	7.7 m ²
Pax Facilities		1F-22/A3-1	22/A3-1	Vestibule	1F	20.0 m ²
Pax Facilities		1F-22/A3-2	22/A3-2	Cleaner Rm (M)	1F	2.0 m ²
Pax Facilities		1F-22/A3-3	22/A3-3	Toilet (Pax) (M)	1F	20.2 m ²
Pax Facilities		1F-22/A3-4	22/A3-4	Cleaner Rm (F)	1F	2.5 m ²
Pax Facilities		1F-22/A3-5	22/A3-5	Toilet (Pax) (F)	1F	16.0 m ²

Pax Facilities		1F-22/A3-6	22/A3-6	INV	1F	5.5 m ²	
Pax Facilities		1F-22/A3-7	22/A3-7	Parents Rm	1F	5.6 m ²	
Pax Facilities		1F-32/A3-1	32/A3-1	Vestibule	1F	20.0 m ²	
Pax Facilities		1F-32/A3-2	32/A3-2	Cleaner Rm (M)	1F	2.0 m ²	
Pax Facilities		1F-32/A3-3	32/A3-3	Toilet (Pax) (M)	1F	20.2 m ²	
Pax Facilities		1F-32/A3-4	32/A3-4	Cleaner Rm (F)	1F	2.5 m ²	
Pax Facilities		1F-32/A3-5	32/A3-5	Toilet (Pax) (F)	1F	16.0 m ²	
Pax Facilities		1F-32/A3-6	32/A3-6	INV	1F	5.5 m ²	
Pax Facilities		1F-32/A3-7	32/A3-7	Parents Rm	1F	5.6 m ²	
Pax Facilities	VIP DEPARTURE LOUNGE	G-3/B7-1	3/B7-1	VIP Departure Lounge	G	1567.8 m ²	2078.0 m ²
Pax Facilities		G-12/B6-1	12/B6-1	Toilet (Pax) (F)	G	25.4 m ²	
Pax Facilities		G-12/B6-2	12/B6-2	Toilet (Pax) (M)	G	24.4 m ²	
Pax Facilities		G-12/B6-3	12/B6-3	Cleaner Room	G	2.3 m ²	
Pax Facilities		G-12/B6-4	12/B6-4	Parents Rm	G	7.9 m ²	
Pax Facilities		G-12/B6-5	12/B6-5	Toilet (INV)	G	5.3 m ²	
Pax Facilities		1F-7/B7-1	7/B7-1	Premier Departure	1F	444.9 m ²	
Pax Facilities	DEPARTURE LOUNGE	G-52/B14-1	52/B14-1	Remote Departures	G	1208.3 m ²	38493.7 m ²
Pax Facilities		G-51/B11-1	51/B11-1	Vestibule	G	23.9 m ²	
Pax Facilities		G-51/B11-2	51/B11-2	Cleaner Rm (M)	G	2.7 m ²	
Pax Facilities		G-51/B11-3	51/B11-3	Toilet (Pax) (M)	G	28.1 m ²	
Pax Facilities		G-51/B11-4	51/B11-4	Ablution (M)	G	10.7 m ²	
Pax Facilities		G-51/B11-5	51/B11-5	Prayer Room (M)	G	14.5 m ²	
Pax Facilities		G-51/B11-6	51/B11-6	Cleaner Rm (F)	G	2.4 m ²	
Pax Facilities		G-51/B11-7	51/B11-7	Toilet (Pax) (F)	G	28.8 m ²	
Pax Facilities		G-51/B11-8	51/B11-8	Ablution (M)	G	7.9 m ²	
Pax Facilities		G-51/B11-9	51/B11-9	Prayer Room (F)	G	13.3 m ²	
Pax Facilities		G-51/B11-10	51/B11-10	INV	G	4.3 m ²	
Pax Facilities		G-51/B11-11	51/B11-11	Parents Rm	G	6.0 m ²	
Pax Facilities		1F-3/C1-1	3/C1-1	Dep. Gate Lounge	1F	2264.0 m ²	
Pax Facilities		1F-2/B14-1	2/B14-1	FBB Hall	1F	88.1 m ²	
Pax Facilities		1F-3/B12-3	3/B12-3	Vestibule	1F	13.7 m ²	
Pax Facilities		1F-3/B12-4	3/B12-4	Cleaner Rm (M)	1F	1.8 m ²	
Pax Facilities		1F-3/B12-5	3/B12-5	Toilet (Pax) (M)	1F	26.7 m ²	
Pax Facilities		1F-3/B12-6	3/B12-6	Cleaner Rm (F)	1F	2.0 m ²	
Pax Facilities		1F-3/B12-7	3/B12-7	Toilet (Pax) (F)	1F	25.3 m ²	
Pax Facilities		1F-3/B12-8	3/B12-8	INV	1F	5.8 m ²	
Pax Facilities		1F-3/B12-9	3/B12-9	Parents Rm	1F	6.5 m ²	
Pax Facilities		1F-2/B7-1	2/B7-1	Airline Lounge	1F	2816.3 m ²	
Pax Facilities		1F-7/B11-1	7/B11-1	Dep. Gate Lounge	1F	804.5 m ²	
Pax Facilities		1F-13/B11-1	13/B11-1	Dep. Gate Lounge	1F	525.4 m ²	

Pax Facilities		1F-22/B11-1	22/B11-1	Dep. Gate Lounge	1F	1686.9 m ²	
Pax Facilities		1F-31/B11-1	31/B11-1	Dep. Gate Lounge	1F	2483.4 m ²	
Pax Facilities		1F-51/B14-1	51/B14-1	Dep. Gate Lounge	1F	1226.2 m ²	
Pax Facilities		1F-13/B7-3	13/B7-3	Vestibule	1F	18.7 m ²	
Pax Facilities		1F-13/B7-4	13/B7-4	Cleaner Rm (M)	1F	2.3 m ²	
Pax Facilities		1F-13/B7-5	13/B7-5	Toilet (Pax) (M)	1F	29.2 m ²	
Pax Facilities		1F-13/B7-6	13/B7-6	Cleaner Rm (F)	1F	2.0 m ²	
Pax Facilities		1F-13/B7-7	13/B7-7	Toilet (Pax) (F)	1F	25.3 m ²	
Pax Facilities		1F-13/B7-8	13/B7-8	INV	1F	5.2 m ²	
Pax Facilities		1F-13/B7-9	13/B7-9	Parents Rm	1F	7.5 m ²	
Pax Facilities		1F-19/B8-1	19/B8-1	Vestibule	1F	19.5 m ²	
Pax Facilities		1F-19/B8-2	19/B8-2	Cleaner Rm (M)	1F	2.5 m ²	
Pax Facilities		1F-19/B8-3	19/B8-3	Toilet (Pax) (M)	1F	35.7 m ²	
Pax Facilities		1F-19/B8-4	19/B8-4	Cleaner Rm (F)	1F	2.4 m ²	
Pax Facilities		1F-19/B8-5	19/B8-5	Toilet (Pax) (F)	1F	28.3 m ²	
Pax Facilities		1F-19/B8-6	19/B8-6	INV	1F	4.5 m ²	
Pax Facilities		1F-19/B8-7	19/B8-7	Parents Rm	1F	6.5 m ²	
Pax Facilities		1F-19/B8-8	19/B8-8	Ablution (M)	1F	14.2 m ²	
Pax Facilities		1F-19/B8-9	19/B8-9	Prayer Room (M)	1F	18.8 m ²	
Pax Facilities		1F-19/B8-10	19/B8-10	Ablution (F)	1F	7.7 m ²	
Pax Facilities		1F-19/B8-11	19/B8-11	Prayer Room (F)	1F	19.7 m ²	
Pax Facilities		1F-35/B8-1	35/B8-1	Vestibule	1F	19.5 m ²	
Pax Facilities		1F-35/B8-2	35/B8-2	Cleaner Rm (M)	1F	2.5 m ²	
Pax Facilities		1F-35/B8-3	35/B8-3	Toilet (Pax) (M)	1F	35.7 m ²	
Pax Facilities		1F-35/B8-4	35/B8-4	Cleaner Rm (F)	1F	2.4 m ²	
Pax Facilities		1F-35/B8-5	35/B8-5	Toilet (Pax) (F)	1F	28.3 m ²	
Pax Facilities		1F-35/B8-6	35/B8-6	INV	1F	4.5 m ²	
Pax Facilities		1F-35/B8-7	35/B8-7	Parents Rm	1F	6.5 m ²	
Pax Facilities		1F-35/B8-8	35/B8-8	Ablution (M)	1F	14.2 m ²	
Pax Facilities		1F-35/B8-9	35/B8-9	Prayer Room (M)	1F	18.8 m ²	
Pax Facilities		1F-35/B8-10	35/B8-10	Ablution (F)	1F	7.7 m ²	
Pax Facilities		1F-35/B8-11	35/B8-11	Prayer Room (F)	1F	19.7 m ²	
Pax Facilities		1F-49/B7-1	49/B7-1	Airline Lounge	1F	2482.8 m ²	
Pax Facilities		1F-27/B9	27/B9	Departure Concourse	1F	22274.1 m ²	
Pax Facilities	VIP ARRIVAL LOUNGE	G-3/B6-1	3/B6-1	Bag Store	G	531.8 m ²	1147.2 m ²
Pax Facilities		G-9/B6-1	9/B6-1	VIP Arrival Lounge	G	548.4 m ²	
Pax Facilities		G-11/B6-1	11/B6-1	Vestibule (F)	G	8.0 m ²	
Pax Facilities		G-11/B6-2	11/B6-2	Toilet (Pax) (F)	G	22.9 m ²	
Pax Facilities		G-11/B6-3	11/B6-3	Cleaner Room (F)	G	2.2 m ²	
Pax Facilities		G-11/B6-4	11/B6-4	Vestibule (M)	G	4.7 m ²	

Pax Facilities		G-11/B6-5	11/B6-5	Toilet (Pax) (M)	G	27.0 m ²	11272.8 m ²
Pax Facilities		G-11/B6-6	11/B6-6	Cleaner Room	G	2.2 m ²	
Pax Facilities	Arrival Hall	G-26/B13-1	26/B13-1	Arrival Buss Hall	G	525.0 m ²	
Pax Facilities		G-27/B13-1	27/B13-1	Vestibule	G	11.4 m ²	
Pax Facilities		G-27/B13-2	27/B13-2	Toilet (Pax) (F)	G	19.0 m ²	
Pax Facilities		G-27/B13-3	27/B13-3	Cleaner Room (F)	G	1.7 m ²	
Pax Facilities		G-27/B13-4	27/B13-4	Toilet (Pax) (M)	G	18.7 m ²	
Pax Facilities		G-27/B13-5	27/B13-5	Cleaner Room (M)	G	1.7 m ²	
Pax Facilities		1F-1/B13-1	1/B13-1	Arrivall Concourse	1F	300.3 m ²	
Pax Facilities		1F-16/B11-1	16/B11-1	Arrivall Concourse	1F	748.9 m ²	
Pax Facilities		1F-26/B11-1	26/B11-1	Arrivall Concourse	1F	609.9 m ²	
Pax Facilities		1F-35/B11-1	35/B11-1	Arrivall Concourse	1F	152.6 m ²	
Pax Facilities		1F-52/B14-1	52/B14-1	Arrivall Concourse	1F	256.4 m ²	
Pax Facilities		1F-52/B10-1	52/B10-1	Arrivall Concourse	1F	210.7 m ²	
Pax Facilities		2F-27/B11	27/B11	Arrivall Concourse	2F	7748.1 m ²	
Pax Facilities		2F-3/B14-1	3/B14-1	Vestibule	2F	14.0 m ²	
Pax Facilities		2F-3/B14-2	3/B14-2	Toilet (Pax) (F)	2F	47.9 m ²	
Pax Facilities		2F-3/B14-3	3/B14-3	Cleaner Room (F)	2F	3.9 m ²	
Pax Facilities		2F-3/B14-4	3/B14-4	Toilet (Pax) (M)	2F	47.7 m ²	
Pax Facilities		2F-3/B14-5	3/B14-5	Cleaner Room (M)	2F	3.3 m ²	
Pax Facilities		2F-3/B14-6	3/B14-6	INV	2F	6.2 m ²	
Pax Facilities		2F-3/B14-7	3/B14-7	Parents Rm	2F	9.1 m ²	
Pax Facilities		2F-3/B14-8	3/B14-8	Ablution (M)	2F	7.4 m ²	
Pax Facilities		2F-3/B14-9	3/B14-9	Prayer Rm (M)	2F	10.2 m ²	
Pax Facilities		2F-3/B14-10	3/B14-10	Ablution (F)	2F	7.3 m ²	
Pax Facilities		2F-3/B14-11	3/B14-11	Prayer Rm (F)	2F	9.9 m ²	
Pax Facilities				Pipe Space		14.9 m ²	
Pax Facilities		2F-51/B14-1	51/B14-1	Vestibule	2F	14.0 m ²	
Pax Facilities		2F-51/B14-2	51/B14-2	Toilet (Pax) (F)	2F	47.9 m ²	
Pax Facilities		2F-51/B14-3	51/B14-3	Cleaner Room (F)	2F	3.9 m ²	
Pax Facilities		2F-51/B14-4	51/B14-4	Toilet (Pax) (M)	2F	47.7 m ²	
Pax Facilities		2F-51/B14-5	51/B14-5	Cleaner Room (M)	2F	3.3 m ²	
Pax Facilities		2F-51/B14-6	51/B14-6	INV	2F	6.2 m ²	
Pax Facilities		2F-51/B14-7	51/B14-7	Parents Rm	2F	9.1 m ²	
Pax Facilities		2F-51/B14-8	51/B14-8	Ablution (M)	2F	7.4 m ²	
Pax Facilities		2F-51/B14-9	51/B14-9	Prayer Rm (M)	2F	10.2 m ²	
Pax Facilities		2F-51/B14-10	51/B14-10	Ablution (F)	2F	7.3 m ²	
Pax Facilities		2F-51/B14-11	51/B14-11	Prayer Rm (F)	2F	9.9 m ²	
Pax Facilities		-		Pipe Space		14.9 m ²	
Pax Facilities		2F-27/B11-1	27/B11-1	Vestibule	2F	16.6 m ²	

Pax Facilities		2F-27/B11-2	27/B11-2	Toilet (Pax) (F)	2F	27.5 m ²	
Pax Facilities		2F-27/B11-3	27/B11-3	Cleaner Room	2F	2.3 m ²	
Pax Facilities		2F-27/B11-4	27/B11-4	Toilet (Pax) (M)	2F	31.6 m ²	
Pax Facilities		2F-27/B11-5	27/B11-5	INV	2F	4.5 m ²	
Pax Facilities		2F-27/B11-6	27/B11-6	Parents Rm	2F	7.6 m ²	
Pax Facilities		-		Pipe Space		13.8 m ²	
Pax Facilities		G-31/B3-1	31/B3-1	Left Baggage Office / Store	G	160.1 m ²	
Pax Facilities		1F-20/B8-1	20/B8-1	First Aid	1F	20.6 m ²	
Pax Facilities		1F-34/B8-1	34/B8-1	First Aid	1F	20.6 m ²	
Security		G-46/B6-1	46/B6-1	Security Room	G	113.9 m ²	4947.4 m ²
Security		G-32/B9-1	32/B9-1	Fire Command Center (FCC)	G	28.2 m ²	
Security		1F-23/A1-3	23/A1-3	Office	1F	11.0 m ²	
Security		1F-31/A1-3	31/A1-3	Office	1F	11.0 m ²	
Security		G-10/B7-1	10/B7-1	Security Check	G	77.0 m ²	
Security		G-14/B7-1	14/B7-1	X-ray Rm	G	59.4 m ²	
Security		G-23/B1-1	23/B1-1	Security Point	G	240.0 m ²	
Security		G-30/B1-1	30/B1-1	Security Point	G	240.0 m ²	
Security		G-50/B6-2	50/B6-2	Swat team	G	87.0 m ²	
Security		G-50/B6-3	50/B6-3	RCC	G	77.6 m ²	
Security		G-51/B6-1	51/B6-1	Holding Room	G	79.4 m ²	
Security		2F-14/B7-1	14/B7-1	Security Check	2F	1614.7 m ²	
Security		2F-14/B8-1	14/B8-1	Search Room	2F	6.0 m ²	
Security		2F-13/B8-1	13/B8-1	Search Room	2F	6.0 m ²	
Security		2F-17/B7-2	17/B7-2	Business & First Class Security Check	2F	160.6 m ²	
Security		2F-32/B9-1	32/B9-1	Security point	2F	43.8 m ²	
Security		2F-37/B6-3	37/B6-3	Security point	2F	42.1 m ²	
Security		2F-38/B7-1	38/B7-1	Security Office	2F	39.3 m ²	
Security		2F-40/B7-1	40/B7-1	Security Check	2F	1566.5 m ²	
Security		2F-19/B1-1	19/B1-1	Security Check	2F	88.0 m ²	
Security		2F-24/B1-1	24/B1-1	Security Check	2F	133.9 m ²	
Security		2F-30/B1-1	30/B1-1	Security Check	2F	133.9 m ²	
Security		2F-35/B1-1	35/B1-1	Security Check	2F	88.0 m ²	
Storage		B-21/B8-1	21/B8-1	Storage	B	62.6 m ²	628.6 m ²
Storage		B-29/B6-1	29/B6-1	Storage	B	59.0 m ²	
Storage		B-34/B7-2	34/B7-2	Airside Store	B	55.9 m ²	
Storage		B-35/B7-2	35/B7-2	Landside Store	B	58.1 m ²	
Storage		1F-21/B8-1	21/B8-1	Store	1F	16.4 m ²	
Storage		1F-22/B8-1	22/B8-1	Store	1F	17.6 m ²	
Storage		G-44/B6-1	44/B6-1	Early Baggage Store	G	322.6 m ²	

Storage		2F-21/B7-1	21/B7-1	Oversize Bag Store	2F	20.5 m ²	
Storage		2F-32/B6-3	32/B6-3	Goods Store	2F	15.9 m ²	
Transit		2F-31/B8-4	31/B8-4	Transfer Office	2F	10.2 m ²	354.6 m ²
Transit		2F-32/B9-2	32/B9-2	Transfer Room	2F	344.4 m ²	

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