2.2.6 QIP for Support for Radio Station (Building)

(1) Design Condition

1) Scope of Design Work

The nationally-operated Radio Republic of Indonesia (RRI) is located in the center of Banda Aceh City. It was severely damaged by the earthquake and tsunami, and has been forced to shorten their broadcasting time as a result. The facilities included various structures related to broadcasting, such as a studio building, generator room, auditorium, transmitter, and antenna tower, of all which suffered damage from the earthquake. The scope of work comprises (1) design works and cost estimate, and (2) preparation of technical report for repair works for some facility buildings. Figure 2.2.18 shows RRI Site Plan.

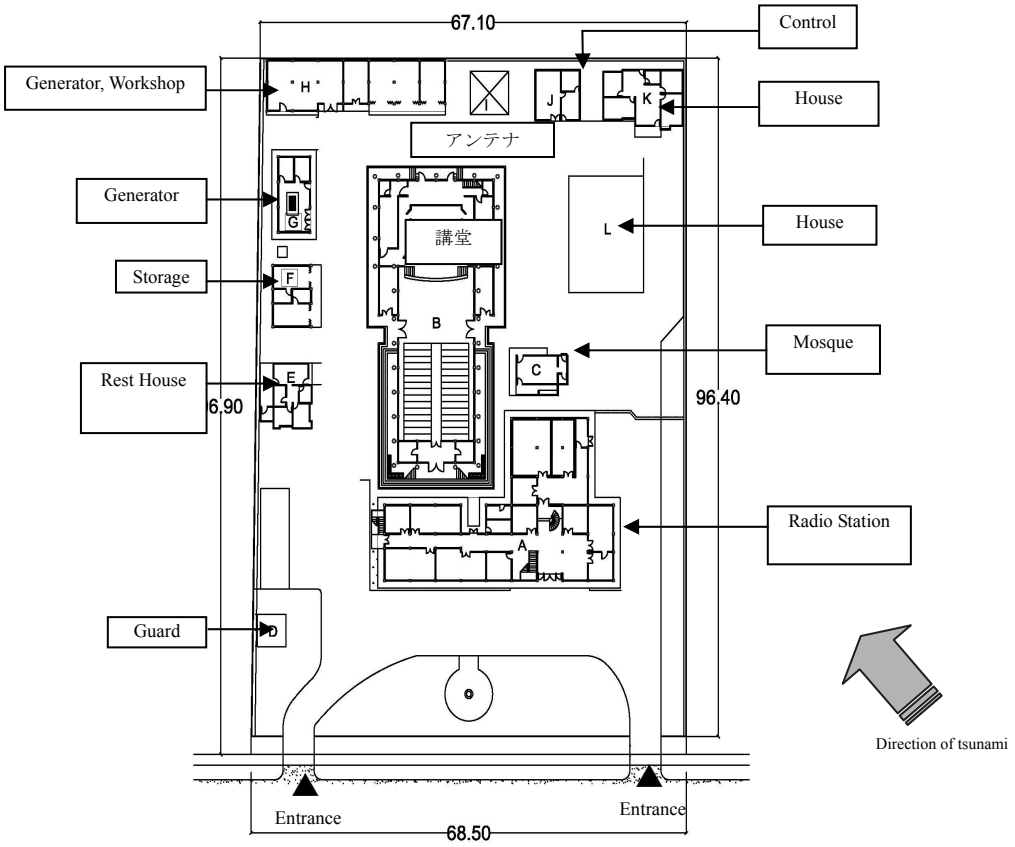


Figure 2.2.18 RRI Site Plan

2) Building Damage

Areas for repair in the existing buildings within the radio-related are shown in Table 2.2.21. Building structures and roofs were generally damaged in their limited extent, while interior walls, ceilings, joints and fixtures, and light fixtures were damaged considerably.

Table 2.2.21 Areas for Repair in RRI

Symbol	Facility Name		Repair Category (○: Useable, X: Not useable, ▲: Complete repairs, △: Partial repairs)									
			Structure	Exterior walls	Interior walls	Indoor flooring	Halls stairs	Ceilings	Roofs	Fixtures	Light fixtures	Plumbing fixtures
AA	Studio building	2nd floor	○	▲	▲	○	○	▲	▲	▲	▲	○
		1st floor		▲	▲	○	○	▲		▲	▲	○
C	Mosque		○	○	▲	○	NA	△	○	△	○	NA
D	Gatehouse		Completely destroyed, so new building will be constructed									
F	Garage for broadcast vehicles		○	○	▲	▲	NA	▲	○	▲	▲	NA
G	Generator room		○	○	▲	○	NA	▲	○	▲	▲	NA
H	Fuel and repair shop		○	○	▲	▲	NA	▲	○	▲	▲	NA
J	Control room		○	○	▲	△	NA	△	○	▲	▲	NA
K	Editor's office		○	○	▲	△	NA	▲	○	▲	○	○

In addition to the repairs listed above, the following repairs for road, wall, and gates will also be carried out.

- Facility road maintenance: The area in question is in a low-lying area, and consequently has considerable flood damage. The tsunami caused catastrophic damage to broadcasting equipment on the first floor of the studio. To prevent such damage from occurring again, drainage for the facility grounds and land improvements are required. As part of this, the repair plan for facility roads calls for the use of interlocking block material, which offers good drainage.
- Grounds construction: Non-paved, open areas within the facility will be covered in sod.
- Gutters: Some of the facility gutters were damaged, and will be repaired.
- Fences, walls, and gates: To be built anew, as washed away by the tsunami.
- Gatehouse: To be built anew, as washed away by the tsunami.
- Parking lot roof: To be built anew, as washed away by the tsunami.

RRI Radio Station - Studio

Damage of column

Damage of Generator

Damage of Garage

Figure 2.2.19 RRI Damage Condition

(2) Detail Design

1) Repair Methods

Followings show the repair works:

- The portion of the walls with cracks will be removed, along with their mortar base, and the holes filled in with new mortar. To get rid of already deteriorated paint and the salt adhering to the surface as a result of the tsunami, a wire brush will be used to scrape off the deteriorated surface. Then, the walls will be washed, dried thoroughly, and recoated with plaster (adhesive process), and painted. Since the quality of the final paint job is, to a large extent, determined by the quality of the underlying base, this process will be carried out with great care.
- For the floors of the rooms, the repair work involves replacing the damaged tile. Since the existing underlying mortar base under the tiles is thin, both the tiles and the

underlying mortar will be removed. After putting down a new mortar base, new tiles will be put in place.

- The damaged parts of the ceiling will be completely removed and replaced with materials similar to the existing ceiling. However, cement asbestos material will not be used as it is a health hazard. Basically, hooks will not be replaced. Only the ceiling material itself will be replaced and painted. The parts of the ceiling that can be repaired only by painting will be handled in the same way as with the wall repairs. A wire brush will be used to scrape off the deteriorated surface paint and then the ceiling will be primed and painted.
- The method for repairing the roofing material will vary according to the type of materials used in the existing roofing. For facilities with steel sheet roofing (galvanized iron roofing) that exhibit severe rusting and are leaking, the entire roof will be replaced. Since facilities with tiled roofs have comparatively minor damage, only the damaged parts will be replaced.
- Repair work on fixtures (doors and windows) will depend on the extent of damage. The work is divided into the following categories: glass replacement only, frame repainting, frame usable but door or window itself is replaced with a new one, and complete replacement including frame. Mounting hardware, knobs, and metal fixtures such as locks have been exposed to salt due to the tsunami and may rust. Therefore, these parts will be thoroughly washed and any fixtures that are have already begun to rust will be replaced.
- For repairs to toilets, only the plumbing fixtures which were severely damaged will be replaced. Repair on pipes that show no signs of damage will be limited to cleaning.
- For lighting fixtures, lighting fixtures and hooks that show extensive damage will be replaced, and repairs will be made to any broken indoor wiring. However, since the outlets and switches are usable, the existing ones will be kept and used.
- Faucets and indoor pipes that are part of the water supply equipment only suffered minor damage, and as a result are still usable. Therefore, no particular repairs are planned on these items.
- For studio buildings, since broadcasting equipment will be installed mainly on the second floor, reconstruction of the room will be undertaken

The rehabilitation of this facility includes some new construction, such as a gatehouse ($16m^2$), but this new construction is very small and requires no structural calculation. All other rehabilitation work consists of repairs only.

2) Design Drawings

Based on the results of the field survey, design drawings were prepared. As for the buildings that will be repaired, design plans that explain the overall design of existing buildings were prepared with respect to each facility (e.g. floor plans, elevations, cross-sections, fixture drawings, and equipment-related drawings), and all of the parts requiring repair are indicated. List of design drawings is shown in Table 2.2.22.

Table 2.2.22 List of Drawings

No.	Dwg. No.	Building Name	Title	No.	Dwg. No.	Building Name	Title
01	01	SITE PLAN	PROPOSED SITE PLAN	33	G-01	GENERATOR HOUSE	PLAN AND FITTINGS PLAN
02	02		EXISTING SITE PLAN	34	G-02		ELEVATION
03	03		LAY OUT PLAN	35	G-03		LIGHTING PLAN
04	04		DETAILS OF FENCE				
				36	H-01	DISEL AND WORKSHOP	PLAN AND FRONT ELEVATION
05	A-01	MAIN BUILDING	1st FLOOR PLAN EXISTING	37	H-02		BACK, LEFT, RIGHT ELEVATION
06	A-02		1st FLOOR PLAN EXISTING AND MODIFICATION	38	H-03		CEILING PLAN
07	A-03		ELEVATION PROPOSED	39	H-04		FITTINGS SCHEDULE
08	A-04		ELEVATION EXISTING				
09	A-05		STUDIO MODIFICATION PLAN	40	J-01	CONTROL HOUSE OF MAIN TOWER	PLAN AND ELEVATION
10	A-06		CEILING PLAN	41	J-02		FITTING SCHEDULE
11	A-07		CEILING DETAILED SECTION	42	J-03		FRONT VIEW AFTER AND BEFOR REHABILITION
12	A-08		FITTINGS SCHEDULE-1	43	J-04		LIGHTING PLAN
13	A-09		FITTINGS SCHEDULE-2				
14	A-10		FITTINGS SCHEDULE-3	44	K-01	HOUSE OF HEAD OF BROADCAST SECTION	PLAN AND ELEVATION
15	A-11		1st FLOOR LIGHTINH PLAN	45	K-02		DETAILED FOUNDATION
16	A-12		2nd FLOOR LIGHTINH PLAN	46	K-03		CEILING SECTION
				47	K-04		FITTINGS SCHEDULE
17	C-01	MOSQUE(MUSHALLA)	PLAN AND ELEVATION				
18	C-02		CEILING AND LIGHTING PLAN				
19	D-01	SECURITY POST	PLAN AND ELEVATION				
20	D-02		SECTION				
21	D-03		DETAILED FOUNDATION				
22	D-04		DETAILED TIMBER TRUSS				
23	D-05		DETAILED BATHROOM AND TOILET				
24	D-06		CEILING PLAN & SECTION				
25	D-07		FITTINGS SCHEDULE				
26	D-08		FRAMING DETAIL AND MEMBER				
27	D-09		LIGHTING PLAN				
28	D-10		SEWERAGE AND PLUMBING PLAN				
29	D-11		SEPTIC TANK AND BASIN CONTROL				
30	F-01	GARAGE OB VAN	PLAN & ELEVATION				
31	F-02		FITTINGS SCHEDULE				
32	F-03		LIGHTING PLAN				

3) Cost Estimate

The construction cost was estimated based on the bill of quantities and the unit prices for construction in the Aceh region. Table below shows the results of the rough estimate of construction cost.

Table 2.2.23 Construction Cost by Facility for RRI

Name of facility	Classification	Size	Rough construction costs (converted to Japanese yen)
Studio building	Repair	RC, 2-story	¥6,745,000
Garage for broadcast vehicles	Repair	RC, 1-story	¥392,000
Mosque	Repair	RC, 1-story	¥77,000
Repair shop	Repair	RC, 1-story	¥899,000
Editor's office	Repair	RC,1-story	¥647,000
Control room	Repair	RC, 1-story	¥47,000
Generator room	Repair	RC, 1-story	¥8,017,000
Gatehouse	New construction	RC, 1-story	¥762,000
Grounds construction	New construction	—	¥9,205,000
Total			¥26,898,000

(3) Preparation of Technical Report

Technical report was prepared. Composition of the report is same as that of the Project: RECOVERY OF WATER SUPPLY SYSTEM IN BANDA ACEH CITY. JICA Study Team has produced Volumes II: Technical Specifications and III: Drawings as Technical Report.

2.2.7 QIP for Support for Radio and TV Stations (Broadcasting Equipment Component)

(1) Design Condition

1) Scope of Design Work

Radio Republic Indonesia (RRI) and Television Republic Indonesia (TVRI), the state-owned broadcast in Indonesia, has suffered from the tremendous damage inflicted by the Indian Ocean earthquake off the west coast of Northern Sumatra, and is hence forced to shorten its air time. The scope of works comprises (1) design works and cost estimate, and (2) preparation of technical report for broadcasting equipment for the RRI and TVI necessary for restoration.

2) Configuration of Broadcasting Equipment

Table 2.2.24 below shows the radio broadcasting equipment of RRI to be procured in this Project.

Table 2.2.24 Configuration of Broadcasting Equipment of RRI

No.	Description	Q'ty	
1.	Continuity Studio-1 System	1	lot
2.	Continuity Studio-2 System	1	lot
3.	Master Control System	1	lot
4.	Editing Room System	1	lot
5.	Radio OB(Out Broadcasting) VAN	1	lot
6.	STL (Studio Transmission Link)	1	lot
7.	SNG (Satellite News Gathering) Car	1	lot
8.	5kW FM Transmitter	1	lot
9.	Measuring Equipment and Tools	1	lot
10.	Consumable Parts	1	lot
11.	Installation Materials	1	lot

Figure 2.2.20 is a schematic diagram of configuration of the equipment to be procured in this Project.

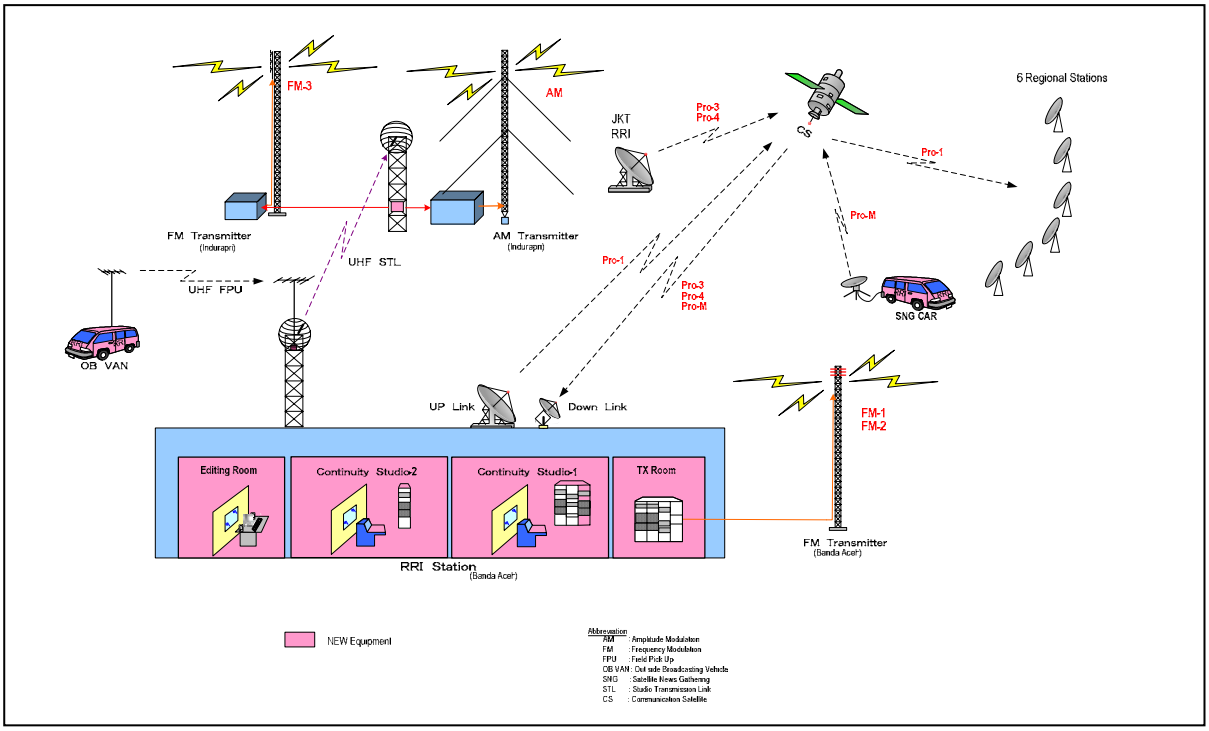


Figure 2.2.20 Plan of Project Component for RRI

Table 2.2.25 below shows the television broadcasting equipment of TVRI to be procured in this Project.

Table 2.2.25 Configuration of Broadcasting Equipment of TVRI

NO.	Description	Q' ty	
1.	Field Recording (ENG) System	3	lots
2.	1:1 Editing System	1	lot
3.	Video Non-Linear Editing System	1	lot
4.	Sending Digital VTR (REC/PB)	1	set
5.	OB VAN System	1	lot
6.	SNG System	1	lot
7.	Measuring Equipment	1	lot
8.	Consumable Parts	1	lot

Figure 2.2.21 shows outline of configuration of the equipment to be procured in this Project.

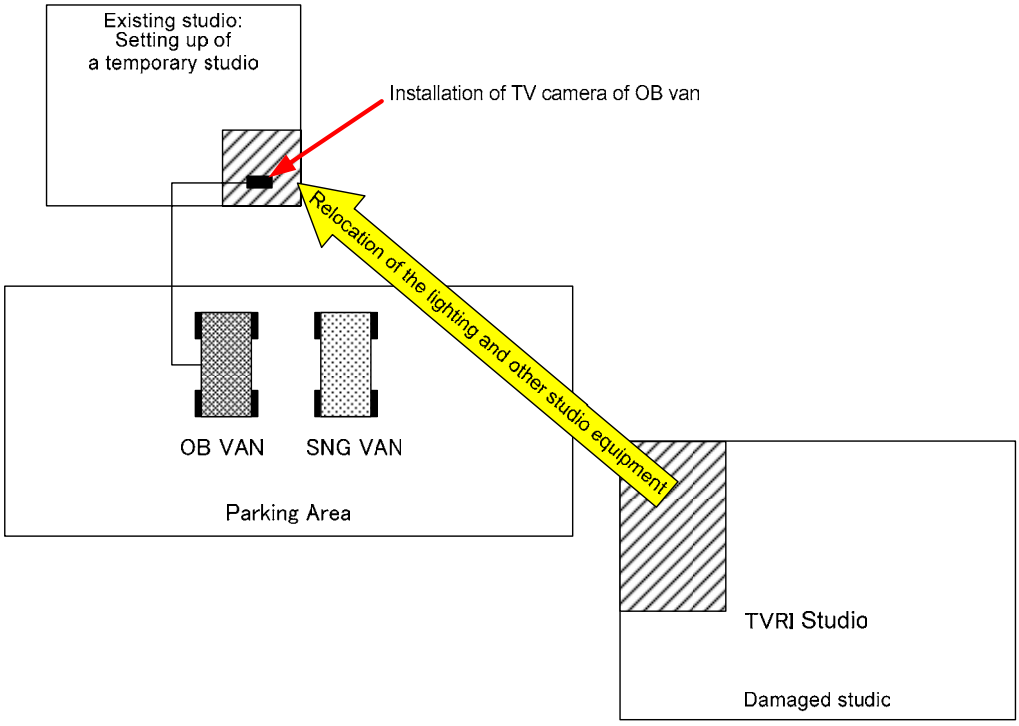


Figure 2.2.21 Plan of Project Component for TVI

2) Detail Design

① Applicable Codes/Standards and Units

With regard to the design of the Project, such international standards as IEC and ISO or Japanese standards will be used for the main equipment and materials.

The International System of Units (SI) shall be also used for the units of length, area, volume, mass (weight), etc., in the Specifications and Drawings for the Project, except where specified otherwise. Applicable codes/ standards and units are shown in Table 2.2.26.

Table 2.2.26 Applicable Codes/ Standards and Units

	Name of Standards	Application
(a)	International Electrotechnical Commission (IEC)	Main functions of electrical goods in general
(b)	International Standardization Organization (ISO)	Performance of industrial products in general
(c)	Japanese Industrial Standards (JIS)	Industrial products in general
(d)	Japanese Electrotechnical Commission (JEC)	Electrical goods in general
(e)	The Standard of Japan Electrical Manufacturer's Association (JEM)	Same as above
(f)	Japan Electric Association Code (JEAC)	Same as above
(g)	Japan Cable Maker's Association Standard (JCS)	Electrical wires and cable
(h)	Electrical Industrial Association of Japan (EIAJ)	Electrical goods in general
(i)	International Telecommunication Union (ITU)	Electrical goods in general
(j)	Society of Motion Picture and Television Engineers (SMPTE)	Broadcasting equipment in general
(k)	Other related Japanese and International standards such as AES/EBU (Audio Engineering Society/European Broadcast Union)	Industrial products in general

3) Design Drawings

As for design drawings of RRI, schematic diagram of signal flow, block diagram of radio OB Van, and other systems, new layout plan, etc. were prepared.

As for design drawings of TVI, composition of field recording system, outline of systems, block diagram of various systems, etc. were prepared.

List of these drawings is shown below.

The Broadcasting Equipment of RRI

Drawing No.	**Title**
Sy-001	Schematic Diagram of Signal Flow
Sy-002	Block Diagram of Radio OB VAN
Sy-008-1	Block Diagram of SNG CAR
Sy-003	Block Diagram of Continuity Studio-1 System
Sy-004	Block Diagram of Continuity Studio-2 System
Sy-005	Block Diagram of Master Control System
Sy-006	Block Diagram of Editing Room System

Sy-007	Block Diagram of Radio OB VAN Audio System
Sy-008-2	Block Diagram of SNG Car System
Sy-009	Block Diagram of 5kW FM Transmitter / Antenna
Sy-010	Block Diagram of Audio STL System
Ps-001	Block Diagram of AC Power Facilities
L-000	New Layout Plan
L-001	Equipment Layout of Continuity Master Editing Room

The Broadcasting Equipment of TVRI

Drawing No.	**Title**
GE-01	Composition of Field Recording (ENG) System
GE-02	Out Line of 1:1 Editing System
GE-03	Out Line of Non-Liner Editing System
G-01	Out Line of TV OB VAN System
G-02	Block Diagram of SNG CAR System
Sy-06	Block Diagram of 1:1 Editing System
Sy-07	Block Diagram of Non-Liner Editing System
Sy-01	Block Diagram of TV OB VAN Video System
Sy-02	Block Diagram of TV OB VAN Audio System
Sy-03	Block Diagram of TV OB VAN Intercom System
Ex-01	Outside View of TV OB VAN
Sy-04	Block Diagram of SNG CAR Video System
Sy-05	Block Diagram of SNG CAR Audio System
Ex-02	Outside View of SNG CAR

4) Cost Estimate

The following Table 2.2.27 shows the breakdown of the project cost for RRI.

Table 2.2.27 Cost Estimation (Radio)

〈Unit: 1,000 yen〉

No.	Description	Q'ty		Amount
I	Radio Total (A+B+C)			357,000
A	Equipment			294,800
1.	Continuity Studio-1 System	1	lot	26,600
2.	Continuity Studio-2 System	1	lot	26,600
3.	Master Control System	1	lot	17,000
4.	Editing Room System	1	lot	12,500
5.	Radio OB(Out Broadcasting) VAN	1	lot	44,100
6.	STL (Studio Transmission Link)	1	lot	5,400

No.	Description	Q'ty		Amount
7.	SNG (Satellite News Gathering) Car	1	lot	70,400
8.	5kW FM Transmitter	1	lot	70,900
9.	Measuring Equipment and Tools	1	lot	2,000
10.	Consumable Parts	1	lot	100
11.	Installation Materials	1	lot	19,200
B	Transport and packaging			16,200
C	Installation			46,000

The following Table 2.2.28 shows the breakdown of the project cost for TVI.

Table 2.2.28 Cost Estimation (TV)

<Unit: 1,000 yen>

No.	Description	Q'ty		Amount
II	TV Total (A+B+C)			453,000
A	Equipment			421,800
1.	Field Recording (ENG) System	3	lot	48,900
2.	1:1 Editing System	1	lot	16,400
3.	Video Non-Linear Editing System	1	lot	20,200
4.	Sending Digital VTR (REC/PB)	1	lot	6,000
5.	OB VAN System	1	lot	196,100
6.	SNG System	1	lot	116,600
7.	Measuring Equipment	1	lot	10,600
8.	Consumable Parts	1	lot	7,000
B	Transport and packaging			21,200
C	Installation			10,000

(3) Preparation of Technical Report

Technical report was prepared. Composition of the report is same as that of the Project: RECOVERY OF WATER SUPPLY SYSTEM IN BANDA ACEH CITY. JICA Study Team has produced Volumes II: Technical Specifications and III: Drawings as Technical Report.

2.3 MONITORING WORKS

2.3.1 Project Summary

Summary of Quick Impact Projects (QIPs) are presented on the following tables:

Table 2.3.1 Project Summary of "Rehabilitation of Septage Treatment Plant"

1. Project Title: Rehabilitation of Septage Treatment Plant

2. Background (Necessity and positioning of the cooperation)

Septage Treatment Plant (STP), located on the coast of Kampung Jawa area in Banda Aceh City, was originally built in 1995. The plant became totally inoperative due to the severe damage by the earthquake and tsunami disaster in December 2004. Since then, the collected human septage has been dumped around the sea and Aceh River without any treatment and causing severe deterioration of the aqua-ecology.

Under this situation, the Municipal Government of Banda Aceh City requested Japan International Cooperation Agency (JICA) Indonesia Office for implementation of the rehabilitation project.

3. Framework of the Project

(1) Project Purpose

Contribute to improve sanitary condition of Banda Aceh City and mitigate negative environmental impact caused by septage disposal.

(2) Output

1) STP is rehabilitated with the original treatment capacity of 50m^3/day*.

* A plant with the capacity of 100m^3/day is required for proper treatment of all septage collected from the city. However, STP was operated beyond its capacity even before the tsunami disaster.

2) Septage from the city is properly treated and disposed.

(3) Main Activities

1) Carrying out technical studies (surveys, detail designs, preparation of tender documents).

2) Selecting contractor for the rehabilitation works.

3) Carrying out construction supervision.

4) Providing technical assistance on sanitation education.

(4) Inputs

Japanese Side	Indonesia side
- Consultant (facility planner, design engineers, cost estimate/procurement expert, construction supervisor, project monitoring expert) - Cost on STP rehabilitation works	- Counterparts (project manager, facility O&M staffs, administrative supporting staffs)

(5) Preliminary Cost Estimate

- Rehabilitation of STP: Approximately US$ 900,000-

(6) Project Period

- Technical studies: May to June 2005
- Rehabilitation works: July 2005 to December 2005

(7) Implementing Agency

- Banda Aceh Municipality, Sanitation and Park Department

4. External Factors

Implementing Agency acquires necessary equipments, human resources and budget for collection of human septage and O&M of STP.

Table 2.3.2 Project Summary of "Recovery of Water Supply System in Banda Aceh City"

1. Project Title: Recovery of Water Supply System in Banda Aceh City

2. Background (Necessity and positioning of the cooperation)

Pipe water supply system in Banda Aceh city had a daily capacity of 40,000 m^3 before the disaster in December 2004. It had 24,411 individual connections and 100 public taps for providing water to the people of 138,984, meaning service connection ratio of about 57%. However, distribution pipelines were destroyed in many locations by the disaster, especially along the coast areas.

Under this situation, recovery of water supply system in Banda Aceh City was proposed to be implemented by the Government of Indonesia (GOI) as one of the urgent rehabilitation programs under Non-project Type Grant Aid Scheme supported by the Government of Japan (GOJ). JICA also identified this project as one of the Quick Impact Projects (QIPs).

3. Framework of the Project

(1) Project Purpose

Restoring water distribution network in Banda Aceh City to the pre-disaster situation.
(*Water demands from after-disaster to 2009 are forecasted and taken into account in the design.*)

(2) Output

- by JICA:	1) Detail designs and draft tender documents for the restoration works are prepared.
- by Implementing Agency:	2) Tender documents on procurement and installation works are finalized. 3) Rehabilitation works are properly carried out.

(3) Main Activities

- by JICA:	1) Carry out technical studies. (surveys, detail designs, preparation of draft tender documents)
- by Implementing Agency:	2) Select suppliers, contractors and construction supervision consultants. 3) Supervise restoration works.

(4) Inputs

Japanese Side	Indonesia side
- Consultant (water supply planner, design engineers, cost estimate/procurement expert, construction management expert) - Cost on procurement and installation works	- Counterparts (project manager, assistant engineers)

(5) Preliminary Cost Estimate

- Restoration works: App. Rp.44,550 million (JPY 524 million @ JPY 1 = Rp.85)

(6) Project Period

- Technical studies (by JICA): May to September 2005
- Rehabilitation works : December 2005 to December 2006

(7) Implementing Agency

- Competent Authority: Ministry of Public Works (PU: Departemen Pekerjaan Umum)
- Implementing Agent: JICS
- Recipient: Water Supply Authority (PDAM: Perusahaan Daerah Air Minum)

4. External Factors

- Water Treatment Plants are rehabilitated with technical and financial assistance by other international organization(s).
- Recipients acquire necessary equipments, human resources and budget for O&M of the water supply system.

Table 2.3.3 Project Summary of "Emergency Repair Works of Aceh River and Floodway"

1. Project Title: Emergency Repair Works of Aceh River and Floodway

2. Background (Necessity and positioning of the cooperation)

Because of the location together with its geographical feature of low flat land, Banda Aceh City has frequently been inundated by floods. In order to protect the city from flood, "Aceh River Flood Control Project" was implemented in 1993 with technical and financial assistance from Japan. However, river system improved by the project was severely damaged by the earthquake and tsunami disaster in December 2004. As a result, Banda Aceh City is presently exposed to high risk on flooding. The risk appears even higher than before since some parts of the city, especially on the costal areas, were subsided by the earthquake and tsunami disaster.

Under this situation, "Emergency Repair Works for Aceh River and Floodway" was proposed to be implemented by the Government of Indonesia (GOI) as one of the urgent rehabilitation programs under Non-project Type Grant Aid Scheme supported by the Government of Japan (GOJ). JICA also identified this project as one of the Quick Impact Projects (QIPs).

3. Framework of the Project

(1) Project Purpose

Risk of flooding in Banda Aceh City is reduced.

(The project focused on urgent rehabilitation. River system cannot be restored to pre-disaster level because of the limited budget and time frame.)

(2) Output

- by JICA:	1) Detail designs and draft tender documents for urgent rehabilitation works are prepared.
- by Implementing Agency:	2) Tender documents for rehabilitation works are finalized. 3) Rehabilitation works are properly carried out.

(3) Main Activities

- by JICA:	1) Carrying out technical studies (Surveys, detail designs, preparation of draft tender documents).
- by Implementing Agency:	2) Select suppliers, contractors and construction supervision consultants. 3) Supervise rehabilitation works.

(4) Inputs

Japanese Side	Indonesia side
- Consultant (facility planner, design engineers, cost estimate/tender expert, construction management expert) - Cost on urgent rehabilitation works	- Counterparts (project manager, assistant engineers)

(5) Preliminary Cost Estimate

- Rehabilitation works: Approximately JPY 435.5 million

(6) Project Period

- Technical studies (by JICA): May to September 2005
- Rehabilitation works: November 2005 to December 2006

(7) Implementing Agencies

- Competent authority: Ministry of Public Works (PU: Departemen Pekerjaan Umum)
- Implementing Agent: JICS

4. External Factors

- Recipients acquire necessary equipments, human resources and budget for O&M of the river management system.

Table 2.3.4 Project Summary of "Rehabilitation of Lamplo Fish Market"

1. Project Title: Rehabilitation of Lamplo Fish Market

2. Background (Necessity and positioning of the cooperation)

Lampulo Fish Market, located close to the mouth of the Aceh River (approximately 1 km), is the biggest wholesale fish market in Banda Aceh City. It was severely damaged by the disaster in December 2004 and lost all functions. Because the market played an important role both in economic and social activities, urgent recovery of the market became urgent. Especially, recovery of ice-making facility appeared as the first priority since it would ensure safe and stable food supply to retailers, and consequently to the people of Banda Aceh City.

Under this situation, "Support for Rehabilitation of Local Market Places" was proposed to be implemented by the Government of Indonesia (GOI) as one of the urgent rehabilitation programs under Non-project Type Grant Aid Scheme supported by the Government of Japan (GOJ). JICA also identified this project as one of the Quick Impact Projects (QIPs).

3. Framework of the Project

(1) Project Purpose

Safety of seafood unloaded to Lamplo Fish Market is enhanced.

(2) Output

- by JICA:	1) Detail designs and draft tender documents for rehabilitation works are prepared.
- by Implementing Agency:	2) Tender documents for rehabilitation works are finalized. 3) Rehabilitation works are properly carried out.

(3) Main Activities

- by JICA:	1) Carrying out technical studies (Surveys, detail designs, preparation of draft tender documents.)
- by Implementing Agency:	2) Select suppliers, contractors and construction supervision consultants. 3) Supervise rehabilitation works.

(4) Inputs

Japanese Side	Indonesia side
- Consultant (facility planner, design engineers, cost estimate/tender expert, construction management expert) - Cost on rehabilitation works	- Counterparts (project manager, assistant engineers)

(5) Preliminary Cost Estimate

- Rehabilitation works: Approximately JPY 19.5 million

(6) Project Period

- Technical studies (by JICA): May to September 2005
- Rehabilitation works: January 2006 to May 2006

(7) Implementing Agency

- Competent authority: Ministry of Marine Affairs and Fisheries
- Implementing Agent: JICS

4. External Factors

- Recipient acquires necessary equipments, human resources and budget for O&M of the fish market.

Table 2.3.5 Project Summary of "Rehabilitation of Orphanages"

1. Project Title: Rehabilitation of Orphanages (Jroh Naguna and Nirmala)

2. Background (Necessity and positioning of the cooperation)

The province-run Jroh Naguna orphanage and the city-run Nirmala orphanage, both located approximately 3 km east of Banda Aceh City center, were severely damaged by the earthquake and tsunami disaster in December 2004. Totally 250 orphans were living and studying in these facilities. Moreover, demand for orphanages in Banda Aceh City and its vicinity have largely been increased since many children lost their families including fathers and mothers by the disaster.

Under this situation, "Rehabilitate, Rebuild or Expand Orphanages for Disaster Orphans" was proposed to be implemented by the Government of Indonesia (GOI) as one of the urgent rehabilitation programs under Non-project Type Grant Aid Scheme supported by the Government of Japan (GOJ). JICA also identified this project as one of the Quick Impact Projects (QIPs). Besides technical assistance by JICA, GOI appointed JICS as a project implementing agent.

3. Framework of the Project

(1) Project Purpose

- Safety for orphans living and studying in these facilities is ensured.
- Capacity of the facilities is increased to meet the increased demand after the disaster. (Total from 250 to 400 orphans)

(2) Output

- by JICA:	1) Detail designs and draft tender documents for rehabilitation works are prepared.
- by Implementing Agency:	2) Tender documents for rehabilitation works are finalized. 3) Rehabilitation works are properly carried out.

(3) Main Activities

- by JICA:	1) Carrying out technical studies (Surveys, detail designs, preparation of draft tender documents).
- by Implementing Agency:	2) Select suppliers, contractors and construction supervision consultants. 3) Supervise rehabilitation works.

(4) Inputs

Japanese Side	Indonesia side
- Consultant (facility planner, design engineers, cost estimate/tender expert, construction management expert) - Cost on rehabilitation works	- Counterparts (project manager, assistant engineers)

(5) Preliminary Cost Estimate

- Rehabilitation works: JPY 106.4 million

(6) Project Period

- Technical studies (by JICA): May to September 2005
- Rehabilitation works: January 2006 to September 2006

(7) Implementing Agency

- Competent authority: Provincial Government of NAD, Social Department (Jroh Naguna)
  Banda Aceh Municipality, Social Department (Nirmala)
- Implementing Agent: JICS

4. External Factors

- Recipients acquire necessary equipments, human resources and budget for O&M of the orphanages.

Table 2.3.6 Project Summary of "Supporting for Radio and TV Stations"

1. Project Title: Supporting for Radio and TV stations

2. Background (Necessity and positioning of the cooperation)

Radio Republic Indonesia (RRI) and Television Republic Indonesia (TVRI) in Banda Aceh City, which are local stations of state-owned radio and TV broadcaster in Indonesia, have been effectively used for disseminating information to the public on real time. Information includes governmental policy, activities, economic and social news, as well as the local news of Banda Aceh City and its vicinity. After the disaster in December 2004, however, they have been forced to narrow their broadcasting area and program contents owing to limited facilities operative.

Considering usefulness of broadcasting systems on public benefit, "Support for Radio/TV Broadcasting Activities" was proposed to be implemented by the Government of Indonesia (GOI) as one of the urgent rehabilitation programs under Non-project Type Grant Aid Scheme supported by the Government of Japan (GOJ). JICA also identified this project as one of the Quick Impact Projects (QIPs).

3. Framework of the Project

(1) Project Purpose

Useful public information is disseminated through RRI and TVRI.

(2) Output

- by JICA:	1) Detail designs and draft tender documents for rehabilitation works are prepared. (Rehabilitation of RRI building and equipments supply for RRI and TVRI)
- by Implementing Agency:	2) Tender documents for rehabilitation works and equipments supply are finalized. 3) Rehabilitation works and procurement of equipments are properly implemented.

(3) Main Activities

- by JICA:	1) Carrying out technical studies (Surveys, detail designs, preparation of draft tender documents)
- by Implementing Agency:	2) Select suppliers, contractors and construction supervision consultants. 3) Supervise rehabilitation works.

(4) Inputs

Japanese Side	Indonesia side
- Consultant (facility planners, architect, design engineers, broadcasting equipment specialist, cost estimate/procurement expert, construction management expert) - Cost on rehabilitation works	- Counterparts (project manager, assistant engineers)

(5) Preliminary Cost Estimate

- Rehabilitation of RRI building: Approximately JPY 26.9 million
- Procurement of RRI and TVRI equipments: Approximately JPY 810.0 million

(6) Project Period

- Technical studies (by JICA): May to September 2005
- Rehabilitation and procurement works: January 2006 to August 2006

(7) Implementing Agency

- Competent authority: Radio Republic Indonesia (RRI) in Banda Aceh
Television Republic Indonesia (TVRI) in Banda Aceh
- Implementing Agent: JICS

4. External Factors

- Recipients acquire necessary equipments, human resources and budget for O&M of RRI and TVRI.

2.3.2 Monitoring Period

Monitoring activities by JICA Study Team have been carried out on the implementation stage of QIPs in accordance with the Scope of Works. However, implementation schedule on rehabilitation works for each QIP differs one from another. Difference between "Rehabilitation of Septage Treatment Plant (STP)" and other five (5) QIPs is especially large. Rehabilitation works on STP were commenced from July 2005, while these on other projects were mostly from January 2006. As a result, monitoring activities on STP were undertaken for the whole implementation period, while these on other five (5) QIPs could be carried out only an initial stage of the rehabilitation works. Relationship between monitoring period by JICA Study Team and implementation schedule of QIPs is shown on the following diagram:

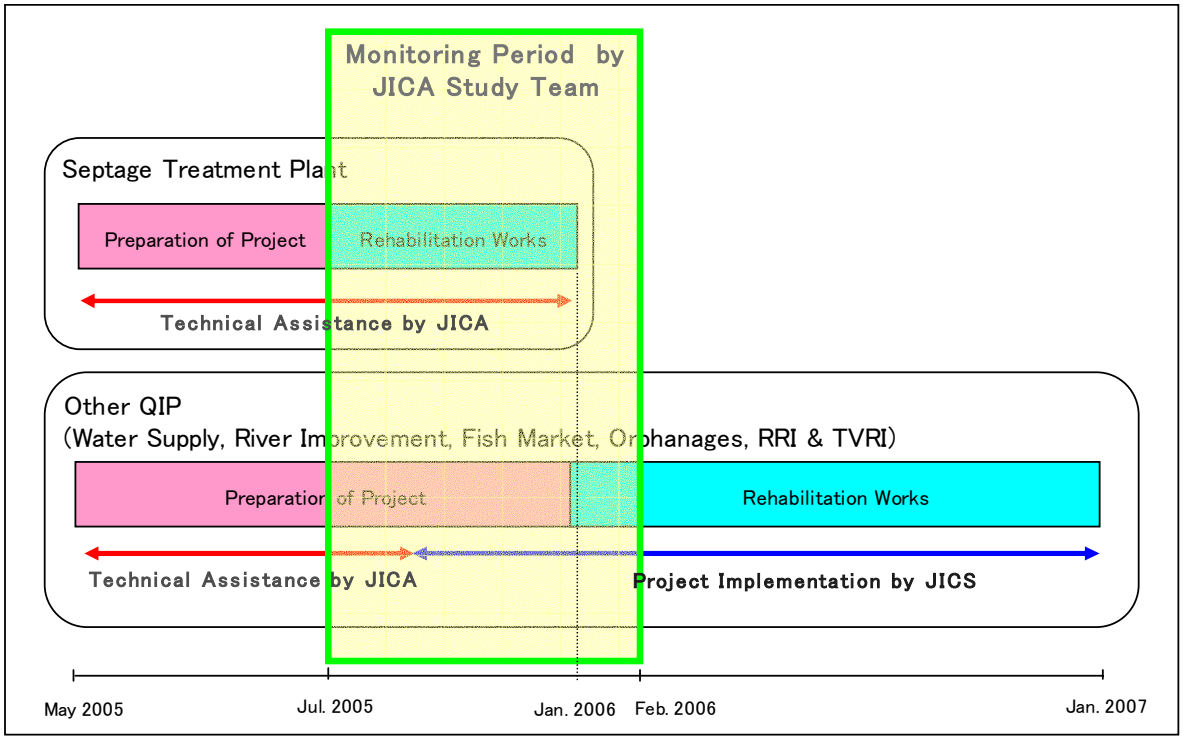


Figure 2.3.1 Relationship between Monitoring Period and Implementation Schedule for QIPs

2.3.3 Monitoring Tool

Progress of rehabilitation works is monitored by preparing a so-called "S-curve" chart. It is commonly used on construction supervision works. The chart is formulated by showing time frame on X-axis and accumulated work volume, converted into monetary terms in percentage (%), on Y-axis. In this chart, construction progress is appeared as S-shaped curve in most cases. In order to monitor and make necessary correction on progress of construction works, both original plan and actual progress are drawn on the same chart.

2.3.4 Monitoring on Output and Project Purpose for Septage Treatment Plant

On completion of rehabilitation works, achievement on Outputs and Project Purpose were also monitored by the Study Team. Following Outputs and Project Purpose were originally identified, as shown in Table 2.3.1.

Project Purpose: Contribute to improve sanitary condition of Banda Aceh City and mitigate negative environmental impact caused by septage disposal.

Output 1); STP is rehabilitated with the original treatment capacity of $50m^3$/day.

Output 2); Septage from the city is properly treated and disposed.

Rehabilitation works were successfully completed with the originally planed schedule and specification. In addition, Sanitary and Park Department (DKP: *Dinas Kebersihan dan Pertamanan*) of the city prepared annual operation plan for the rehabilitated STP. Annual budget, together with personnel employment plan, was submitted and approved by the Municipal government. Based on the facilities, together with institutional arrangements made by DKP, $50m^3$/day of septage from the city is ensured to be properly treated and disposed. Hence, these Outputs and Project Purpose have been dully achieved by the project.

However, total volume of septage from Banda Aceh City is estimated as $100m^3$/day. DKP has obtained nine (9) vacuum cars, which is enough for collecting all septage from the city. Under this situation, rehabilitated STP is posed on a risk to be overused and resulted in deterioration of quality of effluent from the facility.

To solve the problem, a request for technical and financial assistance on new STP construction project was made by DKP. On response, the new project has been commenced with a financial assistance from UNICEF. Technical studies and design works have been carried out by a German consulting company. Construction works for the new plant, with a treatment capacity of $50m^3$/day, will be started form March 2006 and completed in September 2006. After the completion of this new plant, all septage from the city will be properly treated and disposed.

2.3.5 Monitoring on Output and Project Purpose for Other (5) QIPs

As shown in Tables from 2.3.2 to 2.3.6, expected Outputs from QIPs were identified on three different levels. The first level was output from technical assistance by JICA Study Team, including preparation of detail design and technical report for each rehabilitation work. The second was finalization of tender documents, and the third is actual implementation of rehabilitation works by JICS.

The technical report on each QIP was prepared in September 2005 and finalized by respective implementing agencies. Subsequently, tendering was held, and rehabilitation works have been

commenced from late January to early February 2006 as described on the previous chapters. Hence, it is concluded that Outputs on the first and second level have been dully achieved. On the other hand, achievement of Output on the third level, i.e) "Rehabilitation works are properly carried out", has been confirmed only on the initial stage. Achievements in the future will be monitored and confirmed by JICS.

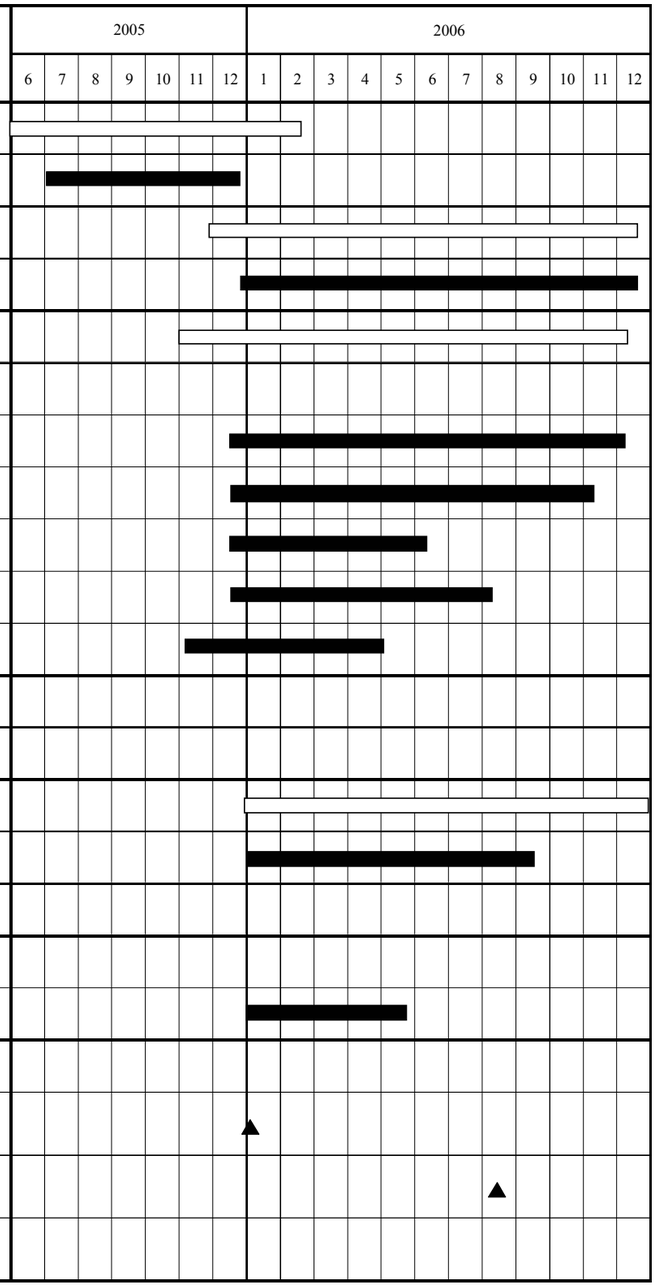
There is also another important issue to be noted during implementation stage of these QIPs. Capacity of implementation agencies on operation and maintenance (O&M) should be strengthened. This issue is identified as an "External Factor" on each Project Summary Sheet since QIPs were designed for quickly responding to the urgent need on rehabilitation of public infrastructure and facilities. In many public agencies in Banda Aceh City, however, large number of technical and administrative staffs lost their lives by the disaster in December 2004. Therefore capacity building of these public agencies is also required for achieving the Project Purpose of each QIP which will enhance sustainability of the projects.

Overall progress of Quick Impact Projects (QIPs) is shown in Table 2.3.7.

Table 2.3.7 Overall Progress of Quick Impact Projects (QIPs)

(As of February 2006)

Project Name	Name of Company		Invitation for Bid	Distribution of Bid Document	Date of Bid (Open Envelope A)	Date of Bid (Open Envelope B)	Date of Signing Contract	Notice to Proceed	Kick-off Meeting	Coordination Meeting in Aceh	Completion Date
1. Rehabilitation of Septage Treatment Plant	*Consultant*	JICA URRP Study Team									
	Contractor	PT. Tenaga Inti Makumu Beusare	1-Jun-2005	6/2	16-Jun-2005	-	28-Jun-2005	5-Jul-2005	5-Jul-2005	5-Jul-2005	28-Dec-2005
2. Recovery of Water Supply System in Banda Aceh City	*Consultant*	PT. Arkonin Engineering Manggala Pratama					29-Nov-2005			18-Jan-2006	
	Contractor	Glynwed Pipe System (Asia) Pte.Ltd	24-Oct-2005	10/25-10/27	21-Nov-2005	9-Dec-2005	23-Dec-2005	6-Jan-2006	-		18-Dec-2006
3. Emergency Repair Works of Aceh River and Floodway	*Consultant*	PT. Tri Tunggal Pratyakasa					31-Oct-2005				
	Contractor										
	(Package 1)	PT. Adhi Karya (Persero)	20-Sep-2005	9/20-9/22	24-Oct-2005	15-Nov-2005	12-Dec-2005	14-Dec-2005	29-Nov-2005	-	9-Dec-2006
	(Package 2)	PT. Waskita Karya (Persero)	20-Sep-2005	9/20-9/22	24-Oct-2005	15-Nov-2005	8-Dec-2005	14-Dec-2005	29-Nov-2005	-	9-Nov-2006
	(Package 3)	PT. Istaka Karya (Persero)	20-Sep-2005	9/20-9/22	24-Oct-2005	15-Nov-2005	8-Dec-2005	14-Dec-2005	29-Nov-2005	-	12-Jun-2006
	(Package 4)	PT. Istaka Karya (Persero)	20-Sep-2005	9/20-9/22	24-Oct-2005	15-Nov-2005	8-Dec-2005	14-Dec-2005	29-Nov-2005	-	11-Aug-2006
	(Package 7)	PT Bina Pratama Persada	29-Aug-2005	8/29-31	20-Sep-2005	28-Sep-2005	1-Nov-2005	2-Nov-2005	29-Nov-2005	-	1-May-2006
4. Rehabilitation of Lampulo Fisk Market *1	*Consultant*	*No plan to employ consultant for this component.*									
	Contractor	*Tender documents are under finalization.*									
5. Rehabilitation of Orphanages (Jroh Naguna and Nirmala)	*Consultant*	PT. Bina Karya					26-Dec-2005			26-Jan-2006	Dec-2006
	*Contractor (Package 1) *2*	PT. Istaka Karya (Persero)	9-Nov-2005	11/14-15	6-Dec-2005	16-Dec-2005	26-Dec-2005	1-Feb-2006	11-Jan-2006		17-Sep-2006
6. Supporting for Radio and TV Stations	*Consultant*	*No plan to employ consultant for this component.*									
	Contractor										
	RRI (Rehabilitation of building)	PT.Piyeung Jaya Perkasa	9-Nov-2005	11/14-15	6-Dec-2005	16-Dec-2005	26-Dec-2005	20-Jan-2006	10-Jan-2006	28-Jan-2006	20-May-2006
	Supplier										
	RRI (Emergency Equipment)	Sumitomo Corporation	20-Jun-2005	6/21-6/23	15-Jul-2005	-	18-Aug-2005	-	-	-	4-Jan-2006
	RRI (Rehabilitation Equipment)	Sumitomo Corporation	30-Aug-2005	8/31-9/2	22-Sep-2005	-	31-Oct-2005	-	-	-	12-Aug-2006
	TVRI (Emergency & Rehabilitation Equipment)		12-Sep-2005	9/13-9/15	7-Oct-2005	-	(Under Evaluation)		-	-	(Not fixed)



*Note: *1: JICA Study Team supported design work on building for ice-making facility. This building work has consequently been included in the contract package for equipment supply.*

**2: Package 1 includes another one (1) orphanage other than Jroh Naguna and Nirmala. There is also Package 2 including rehabilitation of three (3) orphanages.*

CHAPTER 3 GIS FOR ARRIS (ACEH REHABILITATION AND RECONSTRUCTION INFORMATION SYSTEM)

3.1 AVAILABLE GEOGRAPHIC INFORMATION FOR THE PROJECT

3.1.1 Situation after Tsunami

As of the middle of March 2005 after the tsunami occurred on December 2004, relatively larger scale maps, geographic data and spatial information were not available to the people in charge of preparing plans for the rehabilitation and reconstruction of Banda Aceh City. However, these maps and geographic information would be needed by the JICA Study Team for preparation of a master plan for rehabilitation and reconstruction of Banda Aceh City.

Previously, the National Land Institute (BPN) had prepared topographic maps with scales of 1:1,000 and 1:2,500 in 1993 and 1997, respectively. These maps cover Banda Aceh City and the surrounding vicinity. The aerial photographs that were used for the base imagery and to plot features shown on the maps were acquired in 1970's. Unfortunately, those maps and aerial photographs were not suitable for use in the rehabilitation and reconstruction planning process because the base imagery and maps derived from it were very outdated. The actual situation that existed in the Banda Aceh City immediately prior to the tsunami on 26 December 2004 would have been quite different to that shown on the maps. In addition, no information could be obtained about areas which had been washed out and devastated by the tsunami, specifically in the northwestern half of the city.

3.1.2 Obtained Geographic Information

The JICA Study Team acquired or obtained the relevant geographic information, which were considered to be useful for The Study (Table 3.1.1).

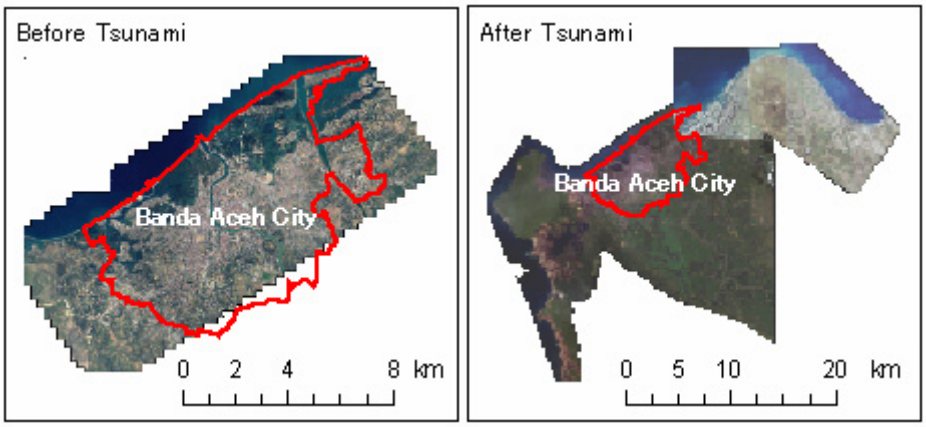
Table 3.1.1 List of Base Map Images Obtained by the JICA Study Team

Map	Contents	Scale
IKONOS Satellite Images	IKONOS satellite images acquired before/after the tsunami.	1:5,000
1:1,000 Topographic Maps	Scanned 1:1,000 topographic maps originally prepared by BPN.	1:5,000
1:2,500 Topographic Maps	Scanned 1:2,500 topographic maps originally prepared by BPN.	1:5,000
1:15,750 Topographic Maps	Scanned city map.	1:15,750
1:50,000 Topographic Maps	BAKOSURTANAL 1:50,000 topographic maps.	1:50,000

Source: JICA Study Team

(1) IKONOS Satellite Images

The IKONOS satellite images acquired before and after the tsunami disaster were used as one of the most important base image data for The Study.



Source: Japan Space Imaging and JICA Study Team

Figure 3.1.1 Coverage of Digital Maps and IKONOS Images

Figure 3.1.1 above shows the coverage of the IKONOS satellite images, which were procured in The Study. The original images were prepared with approximately one (1) meter per pixel resolution.

Table 3.1.2 below shows the acquisition date of the IKONOS satellite images before and after the tsunami disaster.

Table 3.1.2 List of IKONOS Satellite Images Procured by the JICA Study Team

Target	Area	Acquisition	Date of Acquisition
Coastal areas of Banda Aceh	100 km^2	Before the tsunami on Dec. 26, 2004	18 June 2004
Coastal areas of Banda Aceh	100 km^2	After the tsunami on Dec. 26, 2004	29 December 2004
Suburbs of Banda Aceh	250 km^2	After the tsunami on Dec. 26, 2004	29 December 2004
Suburbs of Banda Aceh	75 km^2	After the tsunami on Dec. 26, 2004	29 January 2005
West coast of northwestern Sumatra	62 km^2	After the tsunami on Dec. 26, 2004	29 December 2004
East coast of northeastern Sumatra	22 km^2	After the tsunami on Dec. 26, 2004	15 June 2005

Source: JICA Study Team

(2) BPN Topographic Maps

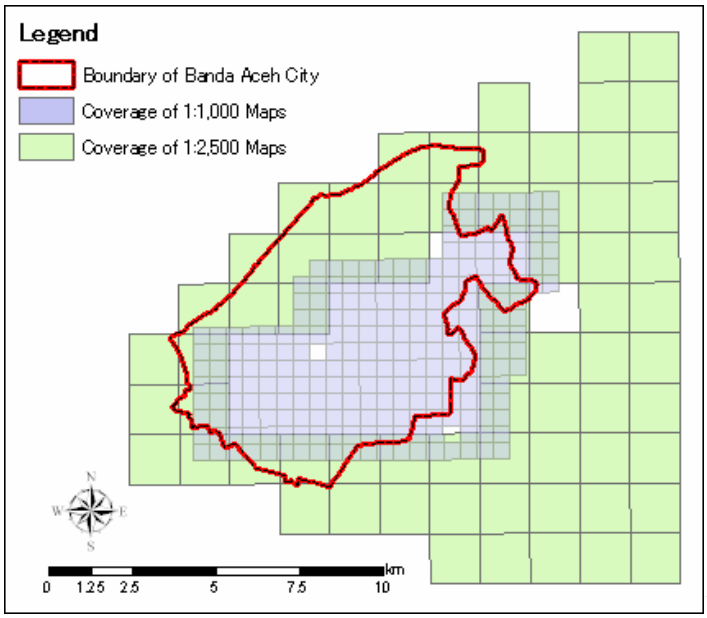
The existing topographic maps with scales of 1:1,000 and 1:2,500 covering Banda Aceh City were obtained by the JICA Study Team, and used as the geographic reference for The Study.

These maps were supplied as scanned digital images (TIFF format). The original maps were prepared by BPN in 1994 and 1998. Aerial photographs used for preparation of those maps were acquired from 1975 until 1996. Figure 3.1.2 below shows the coverage of the BPN maps for Banda Aceh City and its suburbs, and Table 3.1.3 show the number of the map sheets.

Table 3.1.3 Number of BPN Maps

Nominal Scale	Number of Sheet	Base Aerial Photographs	Published
1:2,500	35 sheets	1975	1994
1:1,000	240 sheets	1996	1998

Source: BPN



Source: JICA Study Team

Figure 3.1.2 Coverage of BPN Topographic Maps

(3) Map of Banda Aceh

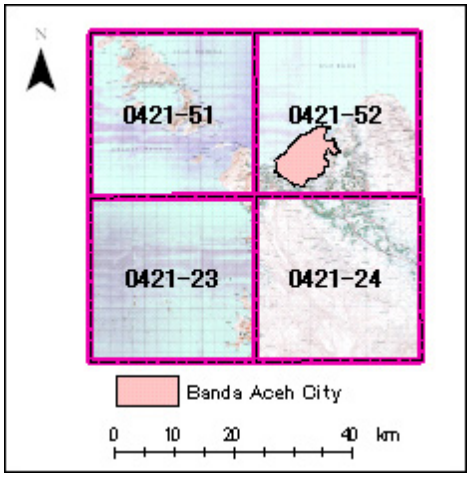
A city map named "Map of Banda Aceh" that has been published by an Indonesian company (U.D. Fajar Baru) was used to identify and extract administrative area boundaries, of which are *desa* (a village within a city) and *kecamatan* (a sub-district of a city; lager than *desa*)" within Banda Aceh City. This map, which is shown in Figure 3.1.3 below, was the only map available for identifying the administrative boundaries of kecamatans and desas within Banda Aceh City in the first stage of The Study. The nominal scale of the map is 1:15,750. However, the accuracy of this map was unknown. In The Study, the map was digitally scanned and then geometrically rectified as much as possible using the ground control points (GCPs) identifiable on the BPN maps or the IKONOS satellite images that were mentioned above.

Source: U.D Fajar Baru

Figure 3.1.3 "Map of Banda Aceh"

(4) BAKOSURTANAL Topographic Maps

Topographic maps with a scale of 1:50,000 were also scanned and processed as reference images. These maps were generated by the National Coordination Agency for Surveys and Mapping (BAKOSURTNAL), and published firstly in 1978. The scanned map images were used as a supplemental reference, as shown in Figure 3.1.4 below. The map sheet names are listed in Table 3.1.4.



Source: BAKOSURTANAL

Figure 3.1.4 Coverage of 1:50,000 Scale BAKOSURTANAL Topographic Maps

Table 3.1.4 List of BAKOSURTANAL Topographic Maps

Map Sheet No.	Publishing Year	Acquisition Year of Aerial Photographs for Mapping	Scale of Aerial Photographs for Mapping
0421-51	1978	1977	1:100,000
0421-52	1978	1977	1:100,000
0421-23	1978	1977	1:100,000
0421-24	1978	1977	1:100,000

Source: BAKOSURTANAL

3.2 BASIC PROCEDURE FOR ESTABLISHMENT OF ARRIS

3.2.1 Objectives of ARRIS

The objectives of ARRIS are to build a geographic information system and to prepare relevant topographic maps and data. These maps and data would be able to be used efficiently for rehabilitation and reconstruction planning of Banda Aceh City.

The following two points were the final goals of the activities related to geographic matters in the Study:

- To prepare digital topographic maps for Banda Aceh City
  Digital topographic maps and related data would be prepared and used as base maps with a geographical information system (GIS). The basic GIS data would be prepared at a nominal scale of 1:2,000.

- To develop an Aceh Rehabilitation and Reconstruction Information System

  A GIS named "Aceh Rehabilitation and Reconstruction Information System (ARRIS)" would be established and utilized for various purposes in the rehabilitation and reconstruction planning of Banda Aceh City. In addition, ARRIS would be shared by various groups who were concerned with the activities of rehabilitation and reconstruction of Banda Aceh City.

The target area of the digital mapping and ARRIS is Banda Aceh City (about 68km^2) and its neighboring towns and villages, which are located in the northern end of Sumatra in Indonesia as shown in Figure 3.2.1.

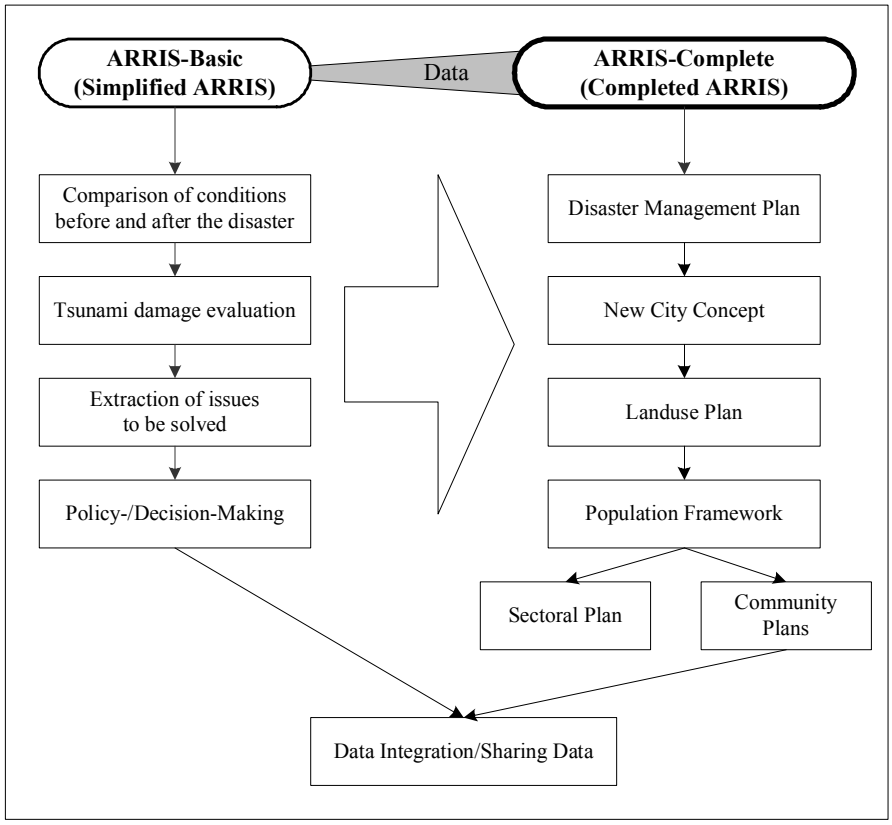
Source: JICA Study Team

Figure 3.2.1 Location of Banda Aceh

3.2.2 Basic Procedure

(1) Procedure and Concept

Since urgency was required for the JICA Study, formulation of the ARRIS had been implemented by two steps (Figure 3.2.2).

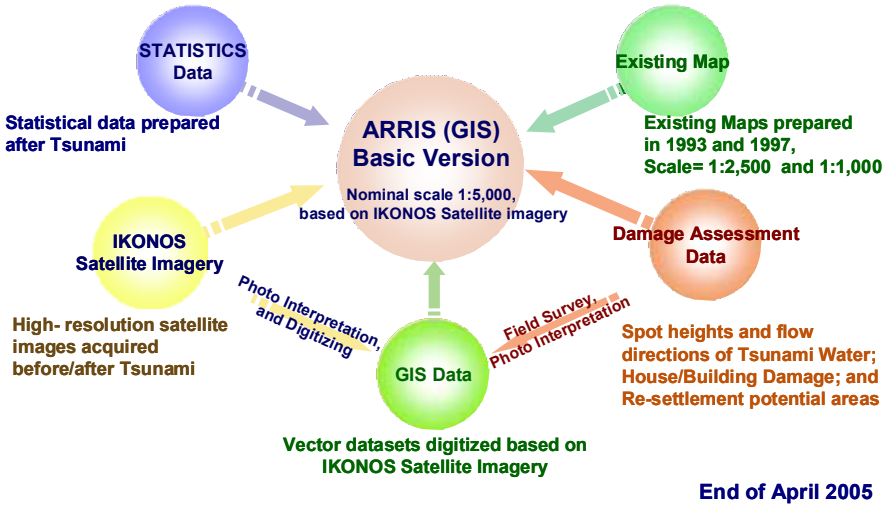


Source: JICA Study Team

Figure 3.2.2 Development Plan and Utilization of ARRIS

- Basic Version of ARRIS

  The basic version of ARRIS had been developed (based on the IKONOS satellite images), as a first step, to understand the physical conditions in Banda Aceh City by comparing before and after conditions. The related work for development of the simplified ARRIS had been finished by the end of April, 2005. Figure 3.2.3 shows a concept of the basic version of ARRIS.

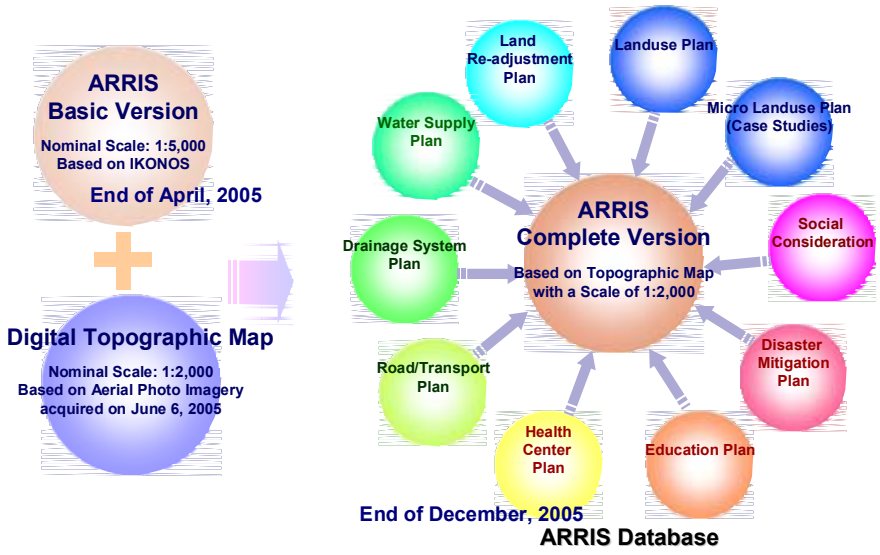


Source: JICA Study Team

Figure 3.2.3 Concept of Formulation of Basic Version of ARRIS

- Complete Version of ARRIS

  Since the basic version of ARRIS had been completed, the complete version of ARRIS was developed. The complete version of ARRIS was planned to be developed for supporting the rehabilitation/reconstruction plans to be prepared by the JICA Study Team, and contains relevant GIS data and thematic maps. Finally, the ARRIS also contains the GIS data of the digital topographic maps of Banda Aceh City with a nominal scale of 1:2,000. Figure 3.2.4 shows a concept of the complete version of ARRIS.



Source: JICA Study Team

Figure 3.2.4 Concept of Formulation of Complete Version of ARRIS

The formation of ARRIS was finished at the end of December, 2005 (Figure 3.2.4).

(2) Software and Data Format

1) GIS Software

ArcGIS (Arcview 8 and 9) for Windows was used as a standard of GIS software in developing ARRIS and the geographic data.

2) Vector Data Format

ESRI Shapefile was used as a standard file format for GIS data of the ARRIS. The Shapefile is convertible to other vector data format such as AutoCAD dxf, using the relevant software.

3) Raster Data Format

GeoTIFF is used as a standard raster data format for GIS data in ARRIS, and is utilizable with ArcGIS.

4) Projection and Datum

All the geographic data for ARRIS were projected for UTM Zone 46 N (WGS 1984).

3.2.3 Data Preparation

Figure 3.2.5 below shows the work flow for the data preparation on ARRIS.

(1) First Stage

Data for ARRIS were prepared in accordance with the planned development stages of ARRIS. In the first stage, between the middle of March and the end of April 2005, the basic version of ARRIS was to be used to:

- Understand the affect of tsunami damage on Banda Aceh City;
- Disseminate and share information among those who were interested in activities for rehabilitation and reconstruction of Banda Aceh; and
- Review and support reconstruction planning and activities in an initial stage.

A basic GIS database for the basic version of ARRIS was quickly prepared by the JICA Study Team in this stage. The basic GIS database covers an area of 100km^2 that include Banda Aceh City. Geographic features (e.g., roads, buildings, bridges, lands, and water bodies) were digitized at a nominal scale of 1:5,000 by interpreting the IKONOS satellite images (before and after the tsunami) and existing maps (prepared before the tsunami). The related existing thematic maps or other data were needed, such as administrative boundaries and public facilities, were digitized as GIS data.

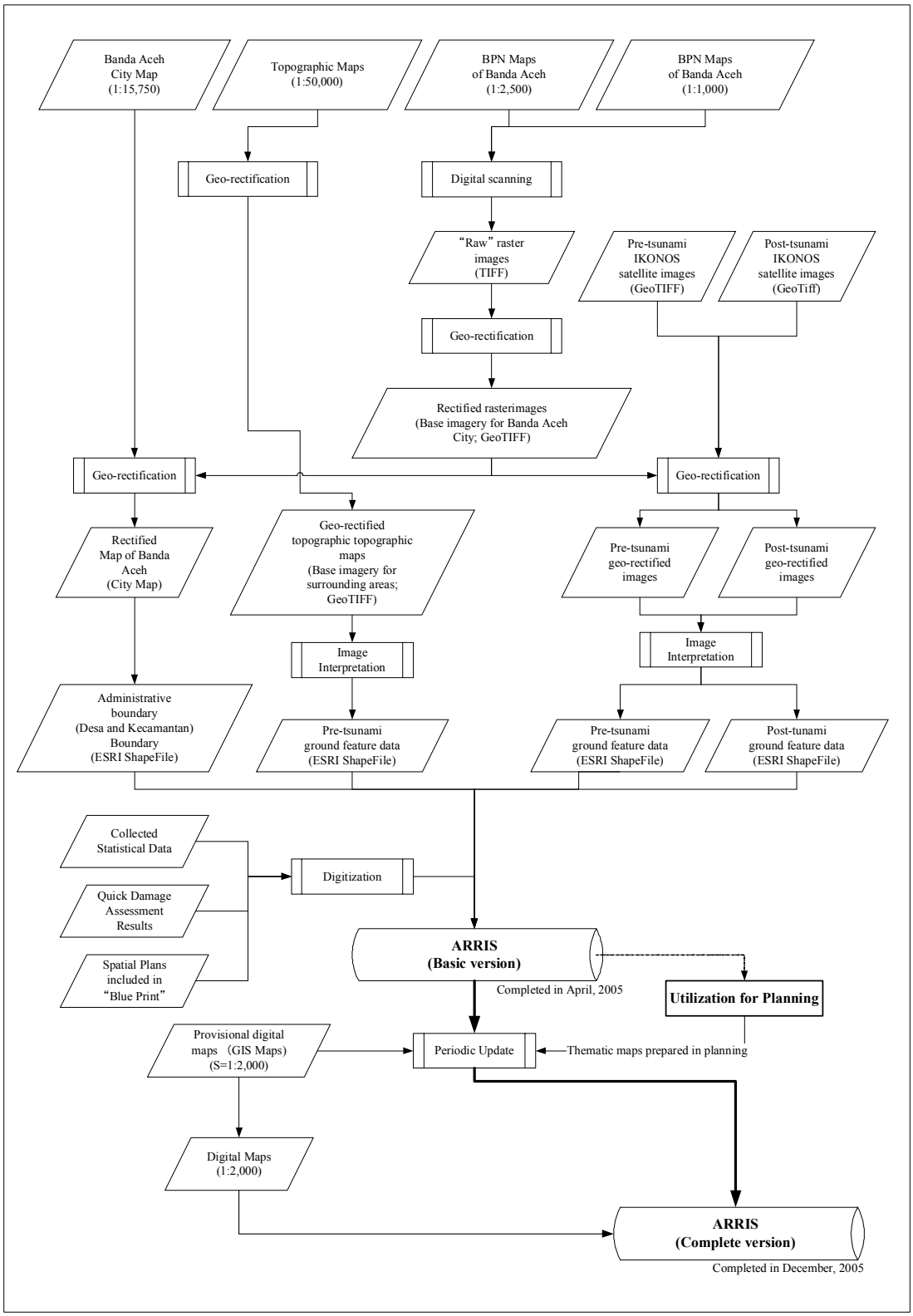
(2) Second Stage

In the second stage, between the beginning of May and the end of December 2005, the complete version of ARRIS was expected to:

- Be utilized for city planning or local area planning in The Study;
- Include precise base maps (digital topographic maps with a nominal scale of 1:2,000); and
- Include all geographic data generated in The Study.

Additional data for the complete version of ARRIS had been prepared since the beginning of May

2005. These data had been analyzed or utilized with ARRIS in The Study, and the results of the analysis and utilization were incorporated into the database, too.



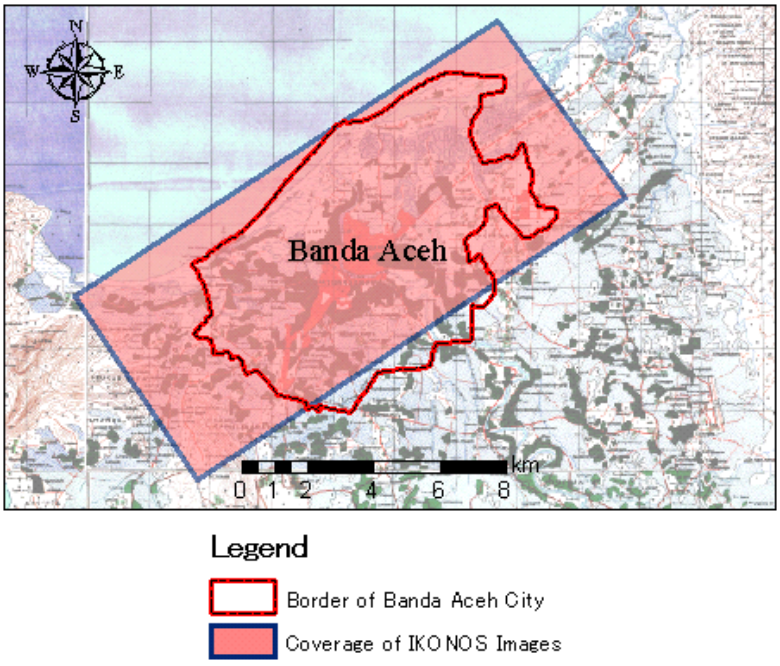
Source: JICA Study Team

Figure 3.2.5 Preparation of Data for ARRIS

3.2.4 Basic Version of ARRIS

(1) Target Area of Basic Version of ARRIS

The basic version of ARRIS targeted an area of 100 km^2, which includes Banda Aceh City and its suburbs and almost coincides with the coverage of the pre-tsunami IKONOS satellite images procured by the JICA Study Team for the first stage of The Study, especially coastal areas, as shown in Figure 3.2.6 below. A targeted nominal scale of the GIS layers in the basic version of ARRIS was planned at 1:5,000.



Source: BAKOSURTANAL and JICA Study Team

Figure 3.2.6 Coverage of IKONOS Images for the Basic Version of ARRIS

(2) Spatial Data for Basic Version of ARRIS

The needed spatial data were prepared as the vector data (shapefiles) by digitizing the features shown on the base map images, e.g., the IKONOS satellite images, and scanned maps (Table 3.2.1).

The data for the basic version of ARRIS were finally integrated into the data set of the complete version of ARRIS.

Table 3.2.1 List of Prepared Data for Basic Version of ARRIS

Type	Feature/Theme	Method of digitizing and contents	Scale
Vector (Point)	Building	Building features extracted by interpreting IKONOS satellite images before/after the tsunami.	1:5,000
Vector (Point)	Damage assessment point	Locations checked in the damage assessment; each location was identified with handheld GPS.	1:5,000
Vector (Point)	Health/Medical	Location of hospitals, clinics and health care centers located after the tsunami; facilities were identified based on existing location maps.	1:5,000
Vector (Point)	School/Education	Location of schools located before the tsunami; each school was identified on the satellite images by a person who knew the locations of the schools.	1:5,000
Vector (Line)	Roads	Road features extracted by interpreting IKONOS satellite images acquired before/after the tsunami.	1:5,000
Vector (Line)	Water Pipes	Location of water distribution mains; original data were prepared in CAD data format; a map with a scale of 1:15,750 was used as the base map and converted to GIS data for Simplified ARRIS.	1:15,750
Vector (Line)	Bridges	Bridge features extracted by interpreting IKONOS satellite images acquired before/after the tsunami.	1:5,000
Vector (Line)	Maximum Height of Tsunami Water	Contours showing the maximum water levels in the tsunami; generated automatically from GIS data of the spot damage assessment map using a GIS function.	1:5,000
Vector (Polygon)	Land	Land features extracted by interpreting IKONOS satellite images acquired before/after the tsunami.	1:5,000
Vector (Polygon)	Building	Building features having a side of 30 m or longer extracted by interpreting IKONOS satellite images acquired before/after the tsunami.	1:5,000
Vector (Polygon)	Vacant Land	50 m-mesh data classifying vacant land and utilized land; classified by interpreting IKONOS satellite images acquired after the tsunami.	1:5,000
Vector (Polygon)	Building Damage Assessment Map	100 m-mesh data classifying building damage by the tsunami; classified by interpreting IKONOS satellite images before/after the tsunami.	1:5,000
Vector (Polygon)	Administrative Boundary	Administrative boundaries of Banda Aceh City and its kecamantans and desas shown on the city map of Banda Aceh.	1:15,750
Vector (Polygon)	Landuse Plan	Future landuse plan for Banda Aceh City prepared in April 2005.	1:15,750
Vector (Polygon)	Spatial Plan	Future spatial plan for Banda Aceh City and neighboring areas shown in “Blue Print” prepared in April 2005.	1:50,000
Raster (Image)	IKONOS Satellite Images	IKONOS satellite images acquired before/after the tsunami; geo-rectified based on existing maps with scales of 1:1,000 and 1:2,500	1:5,000
Raster (Image)	1:1,000 Topographic Maps	Scanned 1:1,000 topographic maps originally prepared by BPN; geo-rectified in UTM Zone 46N	1:5,000
Raster (Image)	1:2,500 Topographic Maps	Scanned 1:2,500 topographic maps originally prepared by BPN; geo-rectified in UTM Zone 46N	1:5,000
Raster (Image)	1:15,750 Topographic Maps	Scanned city map; geo-rectified in UTM Zone 46N	1:15,750
Raster (Image)	1:50,000 Topographic Maps	BAKOSURTANAL 1:50,000 topographic maps; geo-rectified in UTM Zone 46N	1:50,000

Source: JICA Study Team

(3) Dissemination of Data for Basic Version of ARRIS

Since there was not any relevant communication infrastructure for the basic version of ARRIS, the GIS data sets were planned to deliver data on CD-ROM or by e-mail to persons concerned with the

project or who were responsible for the rehabilitation and reconstruction of Banda Aceh in the first stage of The Study.

The GIS data (both vector and raster data sets) were delivered by the JICA Study Team to BAPPEDA Province-NAD, UNSYIAH and BAPPENAS by May 2, 2005. After the first delivery of the basic data to these three organizations, some GIS data layers were revised as needed. The updated GIS data sets were quickly distributed by The Study Team and sent through the internet to the three (3) ARRIS holders (BAPPEDA Province-NAD, UNSYIAH and BAPPENAS).

3.3 COMPLETE VERSION OF ARRIS

3.3.1 Basic Methodology

The complete version of ARRIS had been developed since May 2005. Especially since post-tsunami digital topographic maps with a nominal scale of 1:2,000 were indispensable for preparing various plans in The Study that had to be finalized by the end of August 2005, it was decided to prepare a provisional version of the maps of Banda Aceh City by digitizing the available (but outdated) 1:1,000 and 1:2,500 scale maps. Although not ideal, this provided a reasonable alternative because even though features such as buildings and roads shown on the old maps do not necessarily match the pre-tsunami situation, the land surface contour would generally be similar to the post-tsunami situation, except where some development work etc. has occurred in the intervening time period. Doing this allowed the IKONOS satellite images to provisionally be ortho-rectified by using the results of the JICA Study Team's control point survey, and matching features on the digitized version of the existing topographic maps and orhto-rectified IKONOS imagery to be prepared in June 2005, and the results were supplied to the other Study Team members whose planning work depend on having digital maps and recent imagery.

The following methodologies were basically applied for the complete version.

1) Conversion of the provisional (1:2,000) digital topographic maps prepared in July 2005 to ESRI shapefiles (the features included in the provisional digital maps were shown in Table 3.3.1 below.);
2) Revision of the GIS data for the basic version of ARRIS;
3) Digitizing other geographic features, planning maps and relevant data;
4) Replace of the digital topographic maps of Banda Aceh City with a nominal scale of 1:2,000 from the provisional version prepared in July to the complete version completed in December, 2005.

Especially, by preparing the provisional digital maps of Banda Aceh City, more detailed basic geographic feature data were able to be used as listed in Table 3.3.1 below. These data have been processed as thematic data for use in planning work done as part of the Study.

Table 3.3.1 Basic Geographic Features from Provisional Digital Maps (1:2,000)

Category	Feature	Name	Point	Line	Polygon
Boundary	City boundary			Yes	
Boundary	Sub district boundary			Yes	
Boundary	Village boundary			Yes	
Road	Main Road: parallel lines			Yes	Yes
Road	Other Road: parallel lines			Yes	
Road	Footpath: centerline			Yes	
Road	Bridge (Main Road)	Yes		Yes	Yes
Road	Bridge (Other Road)	Yes		Yes	Yes
Road	Bridge (Footpath)			Yes	
Road	Culvert		Yes		
Road	Main Road Centerline			Yes	
Road	Other Road Centerline			Yes	
Road	Bridge Centerline (Main Road)			Yes	
Road	Bridge Centerline (Other Road)			Yes	
House	House: with Roof				Yes
House	Mosque	Yes			
House	Church	Yes			
House	Temple	Yes			
House	School	Yes			
House	Hospital	Yes			
House	Dispensary	Yes			
House	Government office	Yes			
House	Public office	Yes			
House	Factory	Yes			
House	Transformer substation	Yes			
House	Other	Yes			Yes
Land mark	Tower		Yes		
Land mark	Electricity powerline				
Land mark	Cemetry	Yes			Yes
Land mark	Park	Yes			Yes
Water	River(width over 3m): parallel lines	Yes			Yes
Water	River(width under 3m): centerline			Yes	
Water	Water way(width under 3m): centerline			Yes	
Water	Coast line				Yes
Water	Lake, Pond				Yes
Water	Swamp, Marsh				Yes
Water	Fish pond				Yes
Water	River centerline (width over 3m)			Yes	
Water	Water way centerline (width over 3m)			Yes	
Vegetation	Trees	Yes			Yes
Vegetation	Grassland				Yes
Vegetation	Open space, Wasteland				Yes
Vegetation	Agricultural land				Yes
Vegetation	Mangrove				Yes
Vegetation	Other (residential area)				Yes
Vegetation	Cultivation limit			Yes	
Geodetic points	GPS survey point		Yes		
Geodetic points	Leveling survey point		Yes		

Source: JICA Study Team

As for the thematic data layers, those were prepared through the creation of each thematic maps, which were required in the planning by the JICA Study Team.