APPENDIX 6

SUPPORTING FOR RADIO AND TV STATIONS UNDER JAPAN'S NON-PROJECT TYPE GRANT AID

APPENDIX-6(1) SUPPORT FOR RADIO AND TV STATIONS UNDER JAPAN'S NON-PROJECT TYPE GRANT AID

Table of Contents

Page

List of Table

Page

List of Figure

Page

CHAPTER 1 DESIGN AND ESTIMATED CONSTRUCTION COSTS

1.1 DESIGN CONDITIONS

1.1.1 Purpose and Overview of the Project

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 that occurred off the shore of Sumatra, and have been forced to shorten their broadcasting time as a result. Radio is extremely effective means of disseminating information in real time, including in communicating recovery efforts to affected residents across a wide area and providing information about medical services and food. This makes it important that the broadcasting systems in Banda Aceh destroyed by the earthquake be restored for public broadcast as soon as possible. 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. Given this social backdrop, a long-term complete shutdown which would be required to rebuild these broadcasting stations and important sources of information would have a grave social impact including prolonging the area resident confusion and unease. Therefore, the restoration plan for facility buildings is focused not on rebuilding, but rather on repairs which will restore broadcasting capabilities as soon as possible.

Figure 1.1.1 shows RRI Site Plan.

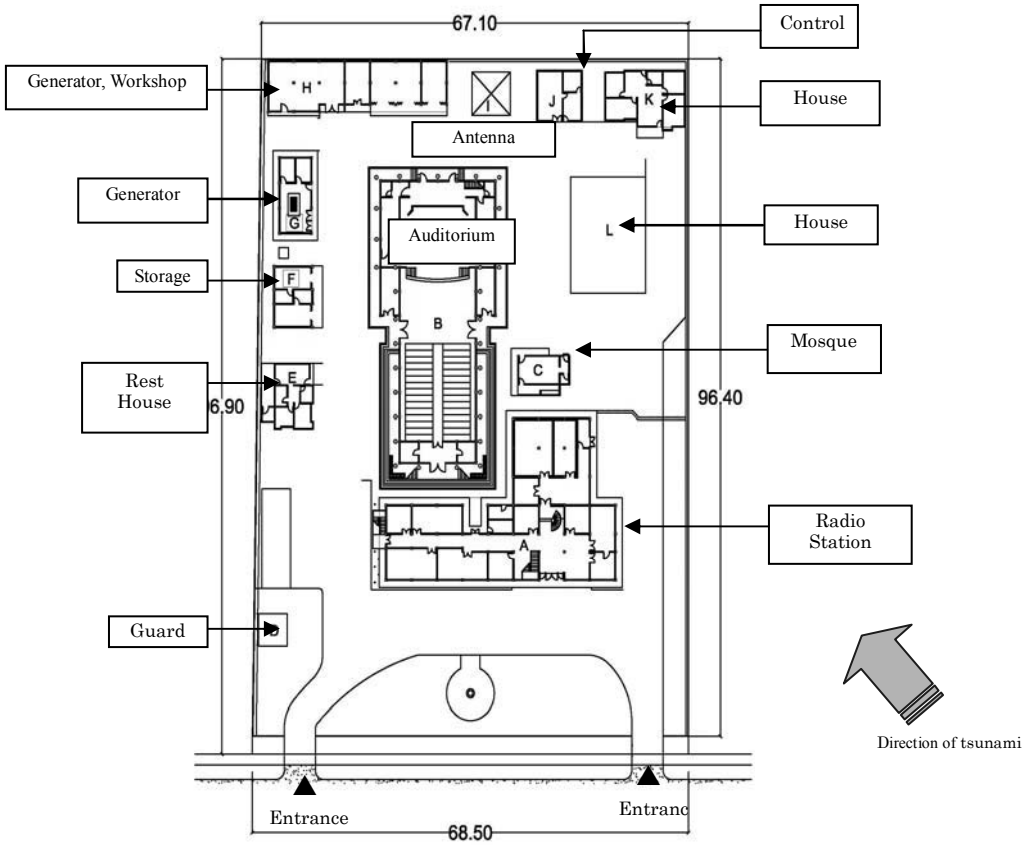


Figure 1.1.1 RRI Site Plan

1.1.2 Location of the Site

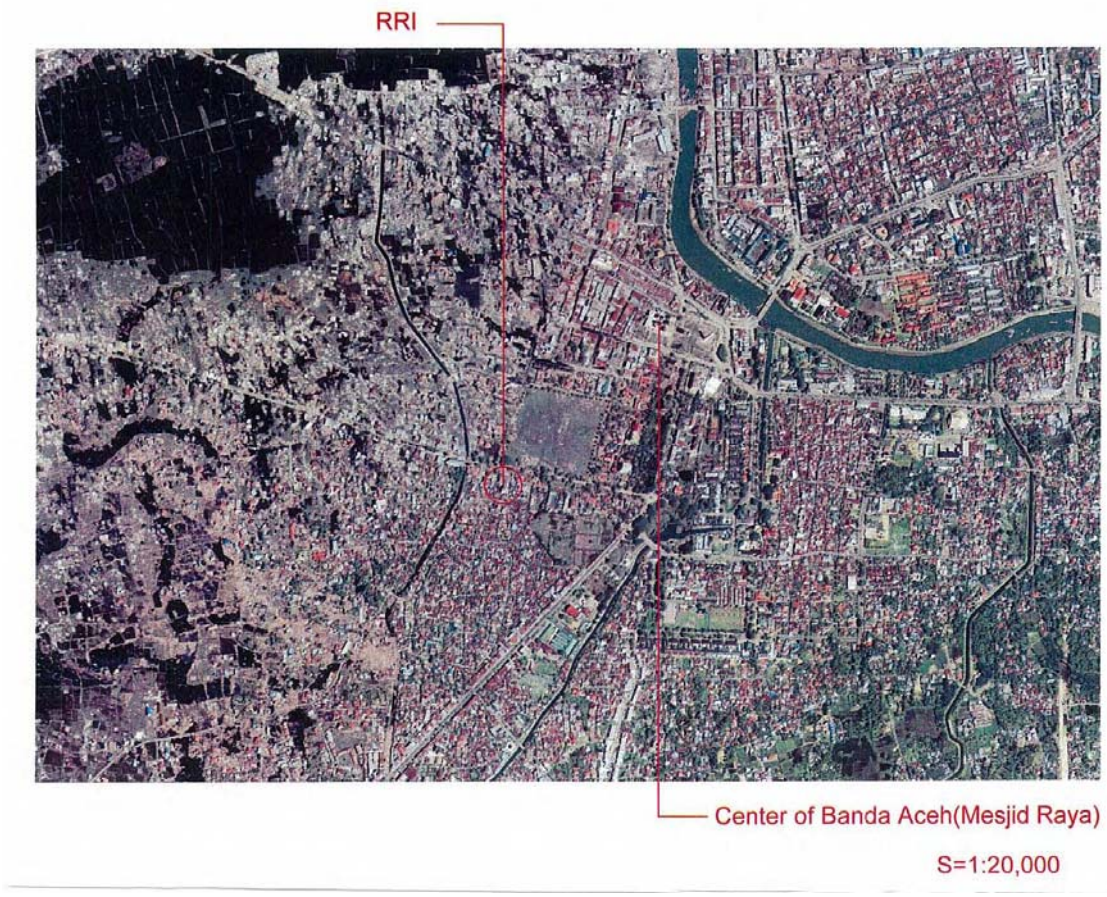


Figure 1.1.2 Location of RRI

1.1.3 Building Damage

Areas for repair in the existing buildings within the radio-related are shown in Table 1.1.1. Building structures and roofs generally had limited damage, while interior walls, ceilings, joints and fixtures, and light fixtures were damaged considerably.

Table 1.1.1 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 in Table 1.1.1., the following repair 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 1.1.3 RRI Damage Condition

1.1.4 Building Equipment and Electrical Plan

The plan calls for power supply from a 125kVA emergency power generator to ensure the minimum amount of power required primarily for the broadcast equipment, even during power outages in the city. As a result of discussions with the Indonesian government, areas including the studio building where the broadcast equipment is installed and the generator room will be powered by an emergency generator, while it was decided that the auditorium, employee dormitory, and other buildings will not be connected to the generator. For hookup to the city power grid, the contractor will need to apply to the PLN for wires up to the distribution board, and carry out any other necessary procedures for receiving power. The contractor will bear any necessary costs, such as for hookup cables and electricity meters.

Since the ambient temperature affects the useful lifespan of broadcasting equipment, an air conditioning unit will also be added primarily for the room where the broadcasting equipment is

installed, and will also serve the purpose of dust control. The state of the radio broadcasting equipment is shown in the following photographs.

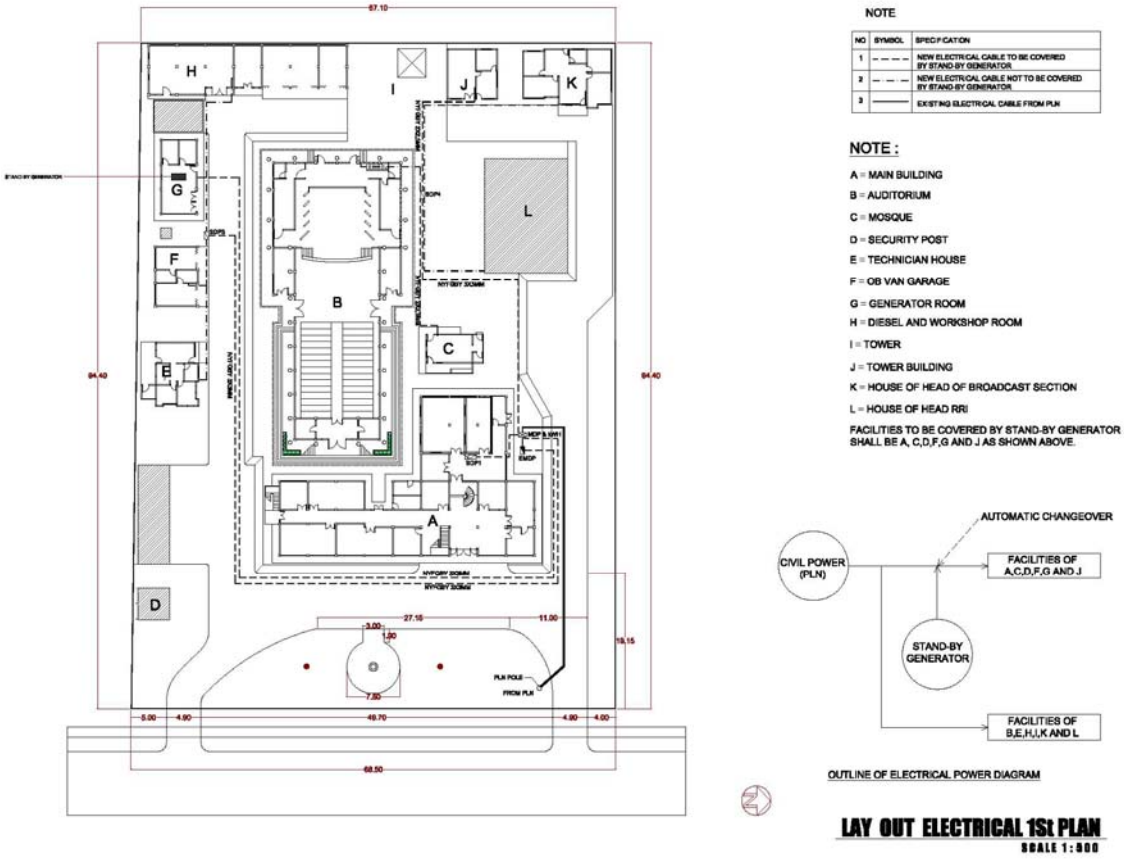


Figure 1.1.4 RRI Electrical System Plan

Broadcasting Equipment

Electrical Pole from PLN

Figure 1.1.5 Broadcasting Equipment and Electrical Pole

Regarding the water supply, the pipes exhibit only minor damage, and the city water supply is currently in use for the employee dormitory, indicating no need to dig any new deep wells. As such, water supply issues are not included in the current repair plan.

1.1.5 Plans for Repairs to Existing Buildings

For facilities damaged by the tsunami, the plan is to make repairs using the methods described below. Construction materials similar to existing finishing materials will be chosen, in consideration of economical efficiency and marketability.

(1) Repair methods

- After the cracks in the exterior and interior walls are repaired, the walls will be painted. 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.

(2) Studio building reconstruction

The main building for this facility is the studio building. The broadcasting equipment on the studio's first floor was dealt a devastating blow by the tsunami. To prevent this from happening again, the broadcasting equipment will now be installed mainly on the second floor instead of the first, with the existing recording studio partitions removed to make room for the equipment, and soundproofing added to the room walls. Furthermore, though the roof shows only limited damage, there are many leaks which may cause problems both for the equipment and for the long-term maintenance of the building. Consequently, the whole roof was to be replaced, but the plan was changed to lay new roofing down over the existing roof such that broadcasting activities may continue without interruption.

Figure 1.1.6

Equipment Out of Order by Tsunami

1.2 DESIGN STANDARDS

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, which requires no design standards.

1.3 DESIGN DRAWINGS

Based on the results of the field survey, design drawings were created to serve the purposes of draft tender documents, calculation of construction costs, and the actual construction. As for the buildings that will be repaired, design plans that explain the overall design of existing buildings will be created 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 will be indicated. A list of drawings for each facility is attached as reference, with the number of drawing pages given below.

Table 1.3.1 List of Drawing

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				

1.4 ESTIMATED CONSTRUCTION COSTS

1.4.1 Basic Policy for Rough Estimation of Construction Costs

The rough construction costs were estimated using the volume of construction calculated based on the design drawings and specifications that were drafted and the unit prices for construction in the Aceh region of Indonesia. For the unit prices for construction and labor, the principal unit prices described in Indonesia's official standard construction unit prices (noted below) were used, and then indirect costs were added in. Costs such as transportation costs are included in the indirect costs, and comprise approximately 15 to 20% of the principal unit prices. Construction unit prices that could not be obtained from the principal unit prices were calculated by taking the standard measure used in Indonesia for the ratio of work that can be accomplished in a certain unit period of time and calculating the complex unit prices.

- PENETAPAN HARGA SATUAN BAHAN BANGUNAN DAN JASA PASCA BENCANA
- KUBUTUHAN PEMERINTAH PROVINSI NANGGROE ACEH DARUSSALAM TAHUN 2005 NOMOR: 050.205/082/2005. TANGGAL 27 MEI 2005.
  (Official standard unit construction costs for Aceh Province, FY2005)

1.4.2 Overview of Rough Construction Costs

The table below shows the results of the rough estimate of construction costs.

Table 1.4.1 Construction Costs Outline 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

CHAPTER 2 PREPARATION OF TECHNICAL REPORT

2.1 TENDER CONDITION

2.1.1 Source of Fund

The Government of Indonesia has received from the Government of Japan a Grant Aid amounting to Fourteen Billion Six Hundred Million Japanese Yen (Yen 14,600,000,000) as per Exchanged Note dated on January 17, 2005, for the purchase of products and services necessary for the execution of Program by the Government of Indonesia for Efforts to cope with the Damages caused by the Great Earthquake of the Coast of Sumatra, and by the Indian Ocean Tsunami Disaster which includes the Project.

Under this program, the Japan International Cooperation System (JICS) acts as an implementing agency for and on behalf of the Government of Indonesia in accordance with the Exchange of Notes.

2.1.2 Mode of Tender

The Contractor for construction will be procured through international competitive bidding which will be executed by JICS.

The contract is presumed to be unit price contract with bill of quantities.

2.2 TECHNICAL REPORT

The tender documents will comprise three (3) volumes as listed up here under:

(1)	VOLUME I	Section 1 Invitation for Bids
		Section 2 Instructions to Bidders
		Section 3 Bid Data
		Section 4 Bill of Quantities
		Section 5 Forms, Annexes and Enclosures
		Section 6 Conditions of Contract
		Part I: General Conditions of Contract
		Part II: Conditions of Particular Application
		Part III: Appendix to Bid
(2)	VOLUME II	Section 7 Technical Specifications
(3)	VOLUME III	Section 8 Drawings

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.

APPENDIX-6(2) SUPPORTING FOR RADIO AND TV STATIONS (BROADCASTING EQUIPMENT COMPONENT)

UNDER JAPAN'S NON-PROJECT TYPE GRANT AID

Table of Contents

Page

List of Table

Page

List of Figure

Page

CHAPTER 1 DESIGN AND COST ESTIMATE

1.1 DESIGN CONDITIONS

1.1.1 Purpose and Contents of the Project

Radio Republic Indonesia (RRI) and Television Republic Indonesia (TVRI), the state-owned radio broadcaster 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. On the other hand, radio and television, being able to distribute a large amount of information in real time, are one of the most effective means to call for reconstruction efforts or provide daily-life information including medicine and food to the large number of people in the wide disaster-stricken areas. Thus, it is a pressing need to recover and resume the public broadcasting function in Banda Aceh.(Figure 1.1.1, Figure 1.1.2 and Figure 1.1.3)

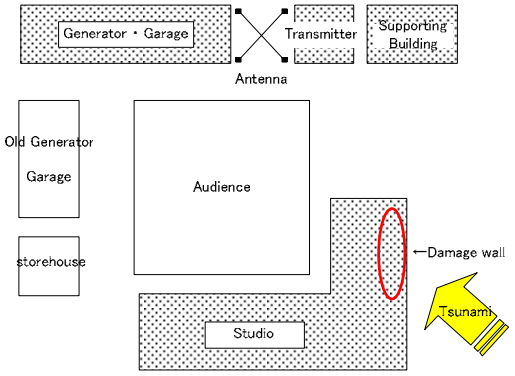


Figure 1.1.1 RRI Layout

Figure 1.1.2 Appearance of the RRI Studio after the Disaster

Consequently the station now produce and broadcast one-hour local programs, more specifically spot news programs in the morning and evening and live interview or recorded programs between 16 to 17 o'clock, using the cameras installed at the entrance of the neighboring transmitting station. The programs basically call for reconstruction efforts to the residents, provide the government's public information and report on assistance activities by various donors including the Japanese Self-Defense Forces.

Figure 1.1.3 Appearance of the TVRI Studio after the Disaster

The area surrounding the existing TVRI building is currently used as an evacuation center where approximately 4,000 IDPs are living. Therefore, it is very important to implement measures for public safety, etc. when the construction takes place. Most of these refugees have no option but to live in tents with aid provided by international institutions. Under such circumstances it is deemed as difficult to carry out actual construction of this Project in this site.

1.1.2 Outline of the Project

(2)-1. The Radio Broadcasting Equipment of RRI

The new broadcasting equipment will be installed in 2nd floor of existing RRI building as shown Figure 1.2.1.

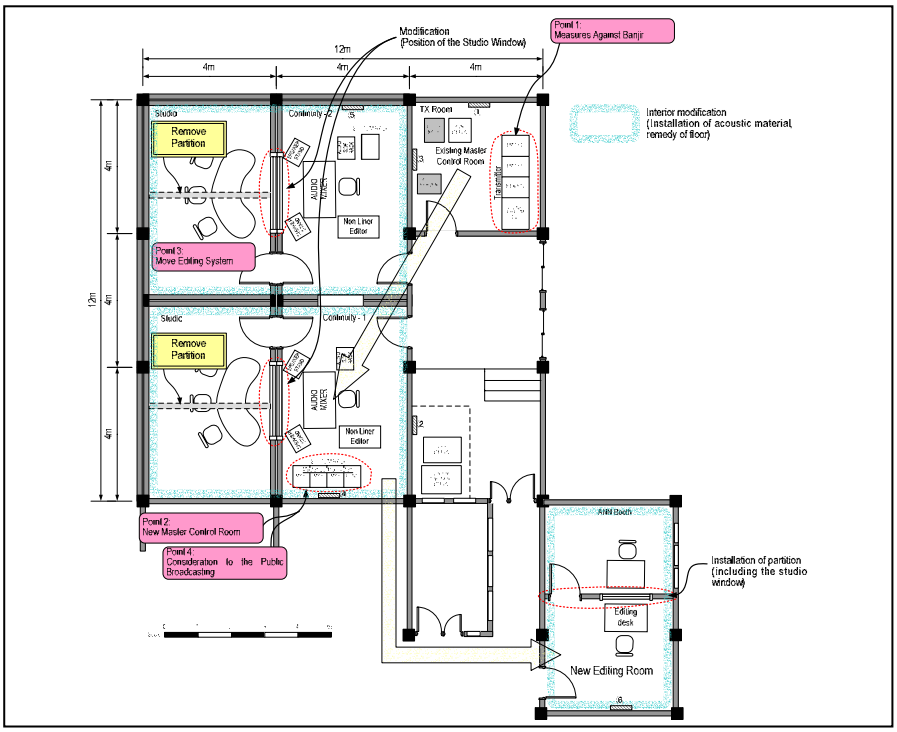


Figure 1.2.1 New Layout Plan

1) Measures against high waters (banjir)

In rehabilitating the transmitting facilities that had suffered enormous damage from the magnitude-9 earthquake, it is important to give consideration to possible damage from high waters (banjir). In the light of the findings from the Study and discussions with the Indonesian side (RRI), it has been decided to use a single-type FM transmitter instead of the initially-proposed dual-type one, so as to economize the space for installation. The facilities will be installed in the master control room on the second floor of the studio building in order to minimize possible future damage from banjir.

2) Modification to the master control system

The master control system will employ digital equipment for the purposes of downsizing of the machine components and saving of the installation space. This will also make it possible to install the digital equipment together with the equipment for studio recording in the current sub-control room (Continuity-1). To this end, the small-scale editing equipment used for production of TV programs will be moved from the sub-control room to the office on the second floor.

3) Move of the recording studio

The interior and exterior of the first floor of the studio building were badly damaged by the tsunami

that occurred in December 2004. Taking also into account the damage from the resulting banjir, it is difficult to use the first floor as recording studios any longer. For this reason, instead of the original recording studio on the first floor, the announce booth on the second floor will be remodeled into a recording studio which can accommodate shooting of talk shows with several persons.

4) Public broadcasting role during the construction period and system switchover within the possible shortest time.

The installation work in this Project is considered as to take approximately two months. Since the RRI needs to continue providing daily-life information to the people in the Province of Aceh and calling on post-disaster reconstruction efforts, it is vital to keep its role as a public broadcaster even during the construction period. This Project enables the old and new systems to be operated simultaneously by downsizing the master control system and installing it in the sub-control room. Furthermore, it is also important to pay attention to the wiring to the transmitter in order to enable swift changeover of systems in the shortest possible time.

5) Restoration of the medium-wave transmitter

The medium-wave transmitter with an output power of 10kW provided by Japan to the Indurapuri Transmitting Station has been partially broken down and is not in use for the time being. Since this transmitter covers a wider reception area (coverage) than an FM transmitter, it is regarded as one of the most important pieces of equipment for realizing the expected effects of the upgrading of the studio. In line with this, the Study Team, with supply of repair parts from Japanese manufactures, has been directly operating the transmitter and supervising the RRI as preliminary efforts in restoration. However, this can be excluded from the scope of the Project if the supervision of operation detects no further malfunction.

(2)-2. The Television Broadcasting Equipment of TVRI

The field survey has found that the following equipment is needed for rehabilitating the TV station.

1) Utilizing the existing studio

The requests raised by the TVRI include reconstruction of the TVRI Aceh Station building and transmitting facilities. However, as already stated, it is extremely difficult to repair or reconstruct the building while the fleeing Acehnese are living in the vicinity of the station. Furthermore, it is judged as difficult to relocate the broadcasting equipment in the damaged studio because the equipment is old-fashioned and hence is not reliable for re-assembly. It is also fairly dangerous to work in the disaster-affected building. Accordingly, it is regarded as most realistic to resume TV broadcasting in the following manner.

The discussions held so far have identified that it is possible to relocate the existing lighting equipment in the existing TVRI studio next to the TVRI transmitting station, which is used as a storage room today. The TVRI has allocated some of its own budget to convert it to the temporary new studio and is currently proceeding with the interior repair work, etc.

2) Urgent Rehabilitation by OB VAN

Utilizing the existing studio, broadcasting equipment, mainly OB vans and SNG cars, will be procured. The OB vans and SNG cars will record videos or broadcast live programs with the cameras onboard and also can control the cameras and communicate with the central station.

1.2 DESIGN CRITERIA

1.2.1 Configuration of Broadcasting Equipment

Table 1.2.1 below shows the radio broadcasting equipment of RRI to be procured in this Project.

Table 1.2.1 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 1.2.2 is a schematic diagram of configuration of the equipment to be procured in this Project.

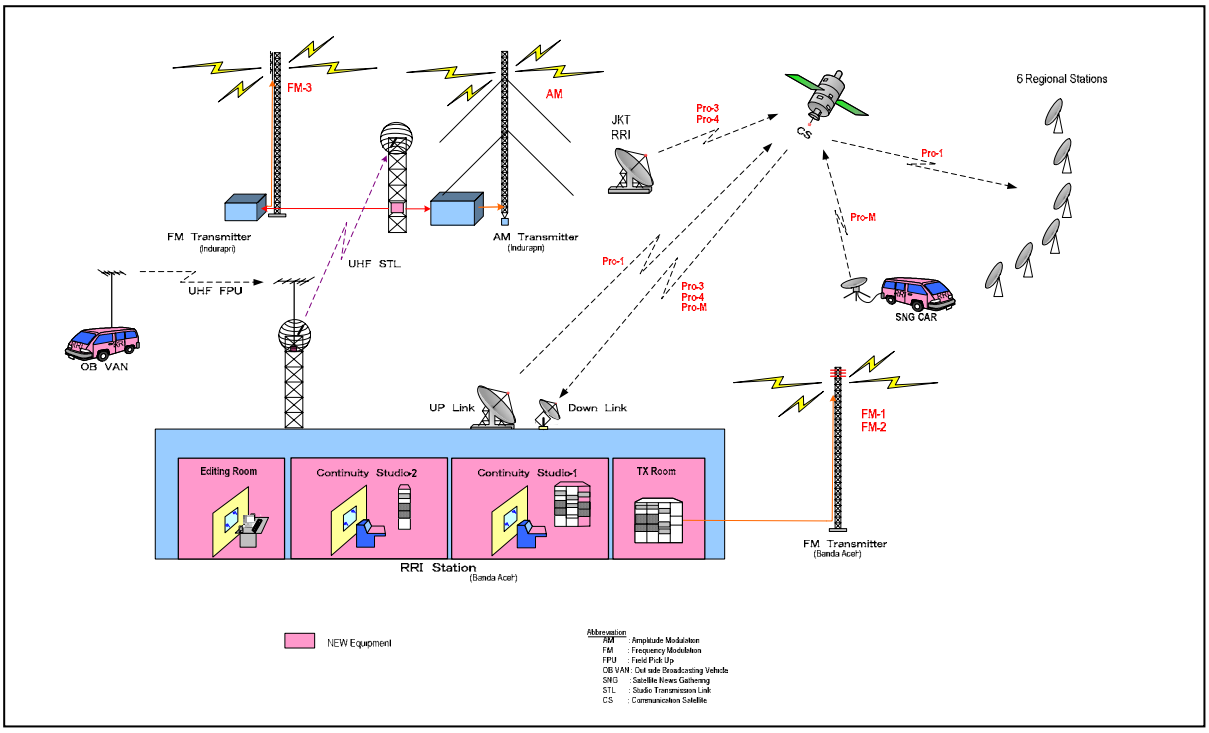


Figure 1.2.2 Plan of the Project

Table 1.2.2 below shows the television broadcasting equipment of TVRI to be procured in this Project.

Table 1.2.2 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 1.2.3 is a outline of configuration of the equipment to be procured in this Project.

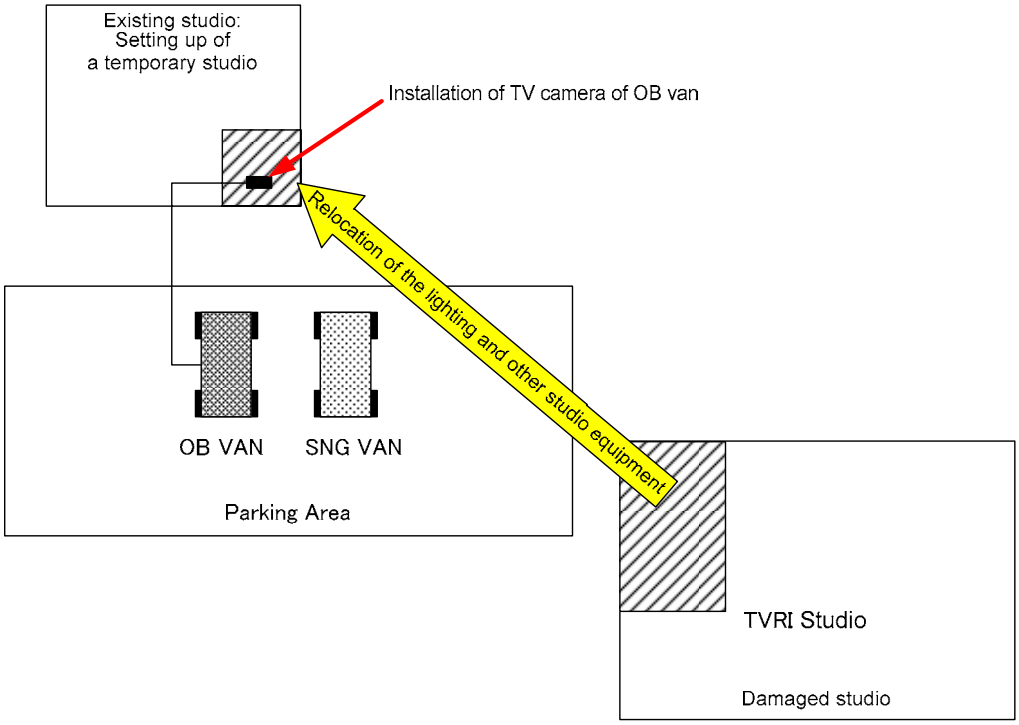


Figure 1.2.3 Plan of the Project

1.2.2 Applicable Codes/Standards and Units

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 as follows Table 1.2.3.

Table 1.2.3 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

2) Language

The Specifications, Drawings and other documents for the Project shall be written in English.

1.3 DESIGN DRAWINGS

The following drawing shall be included in the draft tender documents.

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

1.4 COST ESTIMATE

1.4.1 Radio Broadcasting Equipment

The total cost to implement this Project is estimated at approximately 357 million yen.

The following Table 1.4.1 table shows the breakdown of the project cost.

Table 1.4.1 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
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

1.4.2 TV Broadcasting Equipment

The total cost to implement this Project is estimated at approximately 453 million yen.

The following Table 1.4.2 shows the breakdown of the project cost.

Table 1.4.2 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

CHAPTER 2 PREPARATION OF TECHNICAL REPORT

2.1 TENDER CONDITION

2.1.1 Points to be Considered in Installing the Equipment

The following points need to be considered in the installation work.

The supplier will be responsible for reparation of the broadcasting system even after the delivery of equipment in order to secure smooth operation and maintenance. Furthermore, in the implementation stage, it is essential to fully understand the urgency of the Project and the social responsibility of RRI as a public broadcaster as well as instructing the equipment supplier with the basic philosophy of human life and main emphasis on quality control and prevention of public disaster and damage to the existing equipment. It is also important to select a contractor in the tender who will help in good faith Indonesia carry out the operation and maintenance.

In the construction supervision phase, it is essential to prepare and plan temporary broadcasting facilities, system switchover and test broadcasts with close attention to prevention of broadcasting accidents.

The counterpart has experience in handling broadcasting equipment but is not familiar enough with operation of digital equipment. Therefore, it is necessary that the equipment supplier provides OJT to the Indonesian side to ensure that operation and maintenance will not be interrupted in any way.

2.1.2 Conditions for Tender Participants

In the upgrading of equipment at RRI Banda Aceh Station, which is a public broadcaster, the contractor needs to be able to replace the system, instruct on operation up to the test broadcast phase, and ensure the realization of the expected effects of new equipment while keeping public broadcasting. Therefore, the contractor is expected to have a certain degree of experiences and performance records. For this reason, the tenderers are expected to be as follows.

1) Trading company or manufacturer who has responsibly delivered a system in Indonesia.
2) Trading company or manufacturer who has responsibly delivered a system to the RRI.
3) Trading company or manufacturer who has an office in Indonesia or Japan.

2.2 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.

APPENDIX 7

GIS FOR ARRIS (ACEH REHABILITATION AND RECONSTRUCTION INFORMATION SYSTEM)

APPENDIX 7 GIS FOR ARRIS (ACEH REHABILITATION AND RECONSTRUCTION INFORMATION SYSTEM)

Table of Contents

Page

List of Tables

Page

List of Figures

CHAPTER 1 INTRODUCTION

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.

1.2 BACKGROUND OF ARRIS

JICA and the JICA Study Team supported the Republic of Indonesia to build a geographic information platform and prepare relevant maps and data. These maps and data have been 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, is shown in Figure 1.1.1 below.

Source: JICA Study Team

Figure 1.1.1 Location of Banda Aceh

CHAPTER 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 2.1.1).

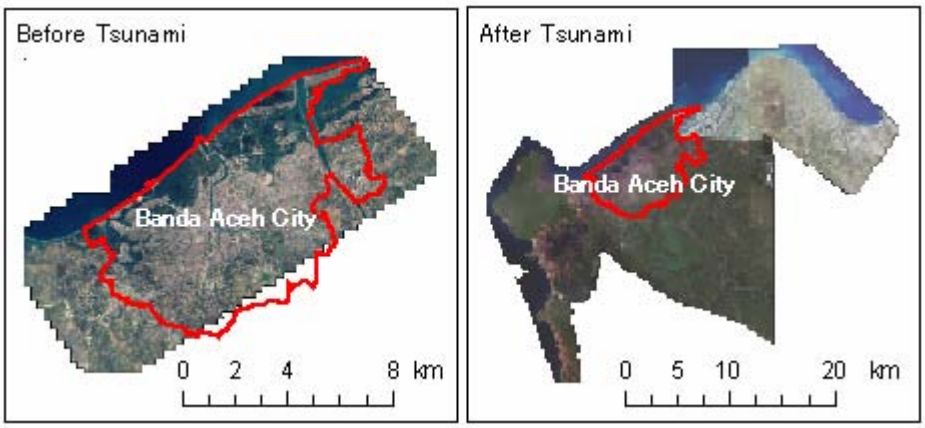
Table 2.1.1 List of Base Map Images Obtained by the JICA Study Team

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

2.1 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 2.1.1 Coverage of Digital Maps and IKONOS Images

Figure 2.1.1 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 2.1.2 below shows the acquisition date of the IKONOS satellite images before and after the tsunami disaster.

Table 2.1.2 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

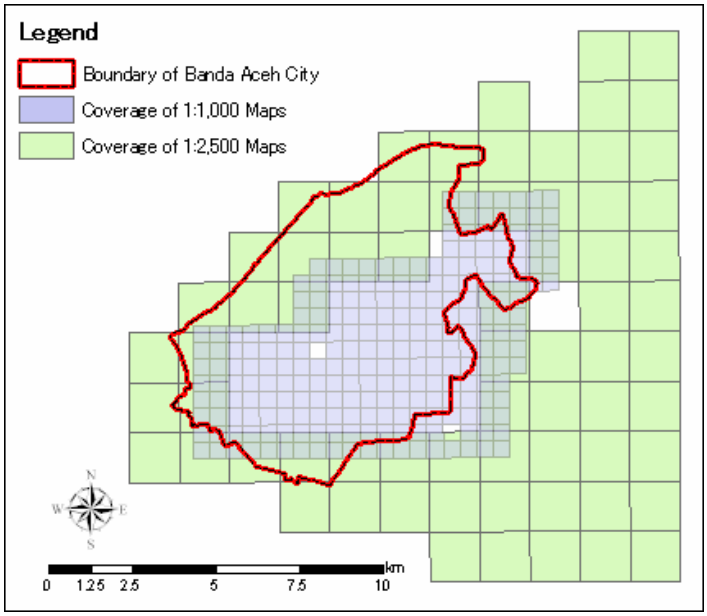
Source: JICA Study Team

2.2 EXISTING MAPS

2.2.1 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 2.2.1 below shows the coverage of the BPN maps for Banda Aceh City and its suburbs, and Table 2.2.1 show the number of the map sheets.



Source: JICA Study Team

Figure 2.2.1 Coverage of BPN Topographic Maps

Table 2.2.1 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

2.2.2 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 2.2.2 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.

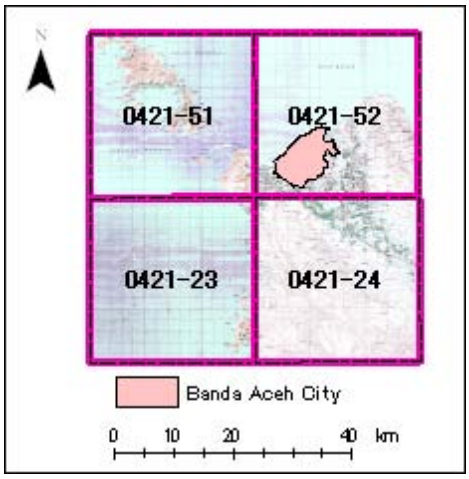
Source: U.D Fajar Baru

Figure 2.2.2 "Map of Banda Aceh"

2.2.3 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 2.2.3 below.

The map sheet names are listed in Table 2.2.2



Source: BAKOSURTANAL

Figure 2.2.3 Coverage of 1:50,000 Scale BAKOSURTANAL Topographic Maps

Table 2.2.2 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

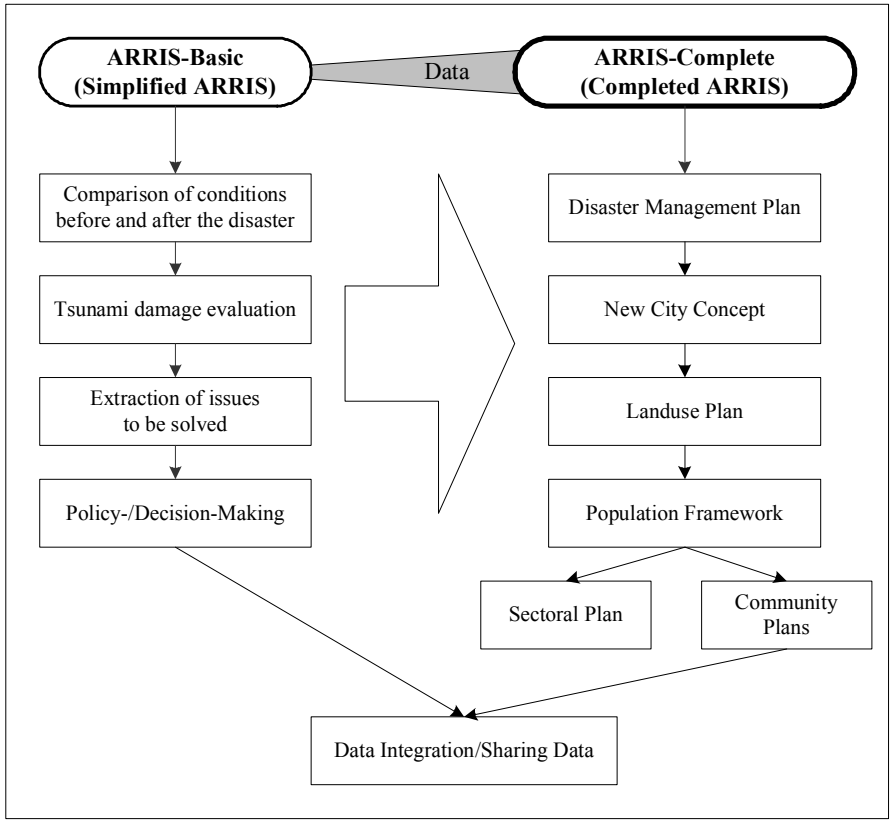
Source: BAKOSURTANAL

CHAPTER 3 FORMULATION OF ARRIS

3.1 BASIC PROCEDURE

3.1.1 Procedure and Concept

Since urgency was required for the JICA Study, formulation of the ARRIS had been implemented by two steps (Figure 3.1.1).

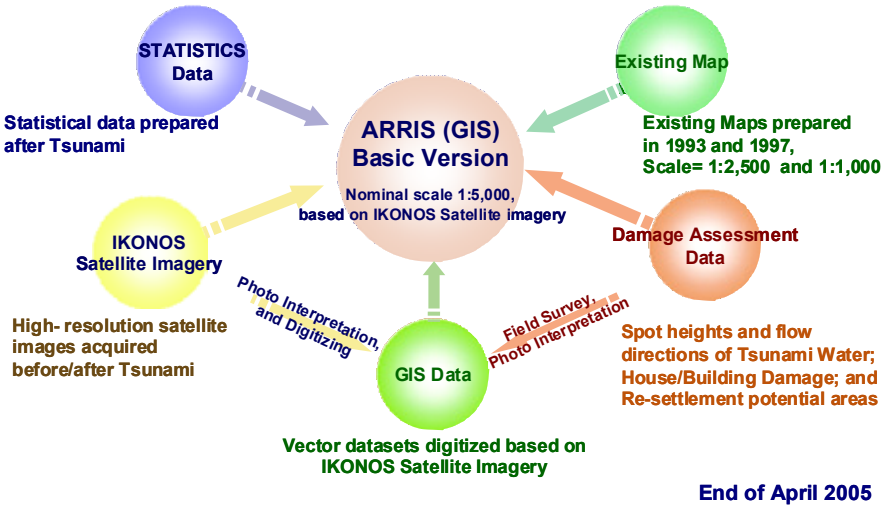


Source: JICA Study Team

Figure 3.1.1 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 3.1.2 shows a concept of the basic version of ARRIS.

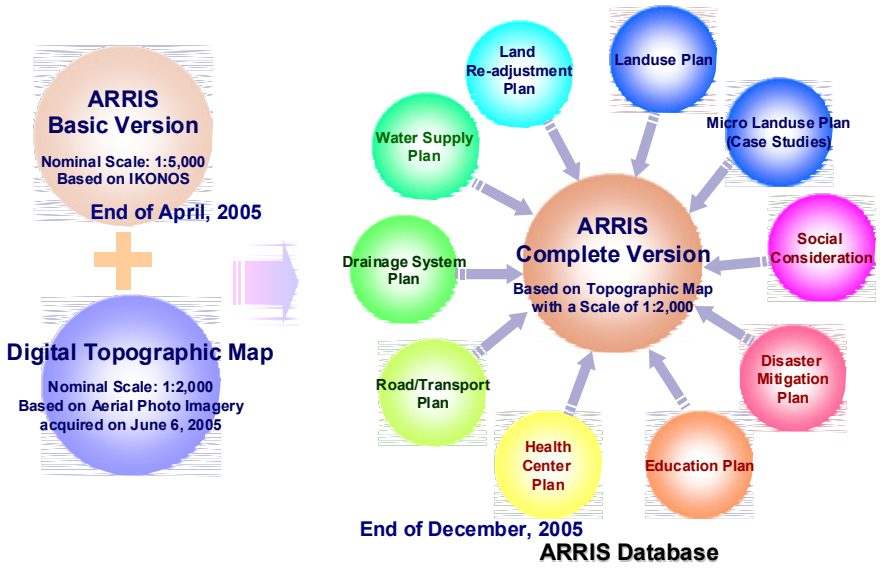


Source: JICA Study Team

Figure 3.1.2 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 3.1.3 shows a concept of the complete version of ARRIS.



Source: JICA Study Team

Figure 3.1.3 Concept of Formulation of Complete Version of ARRIS

The formation of ARRIS was finished at the end of December, 2005.

3.1.2 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 DATA PREPARATION

3.2.1 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.

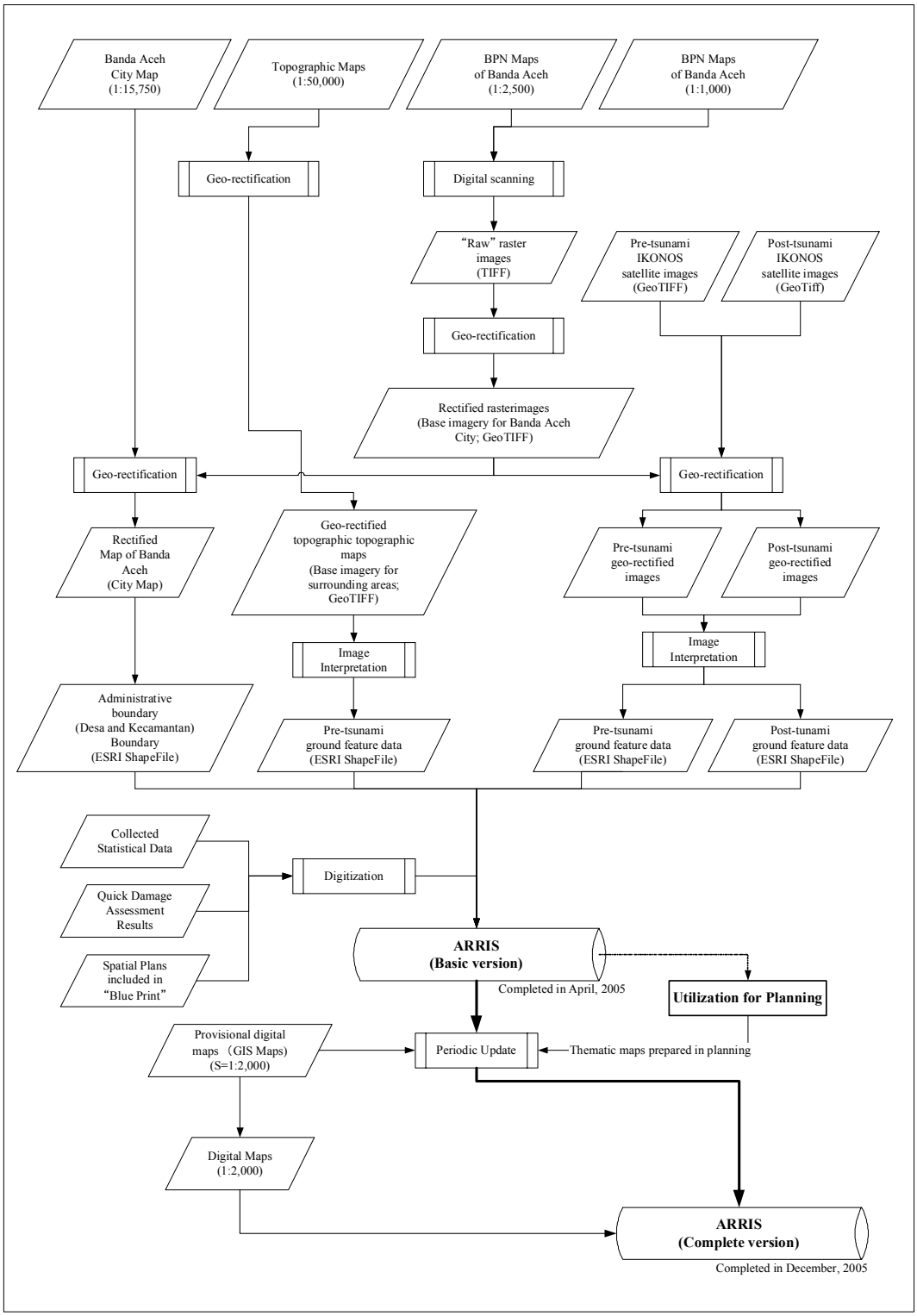
3.2.2 Second Stage

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.

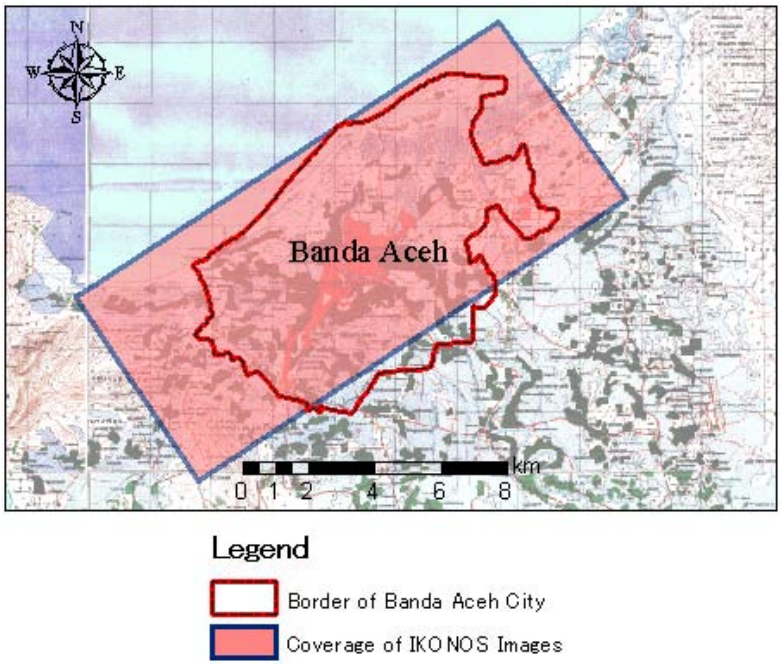


Source: JICA Study Team

Figure 3.2.1 Preparation of Data for ARRIS

3.3 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 3.3.1 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 3.3.1 Coverage of IKONOS Images for the 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 3.3.1).

Table 3.3.1 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

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).

3.4 COMPLETE VERSION OF ARRIS

3.4.1 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 as shown in Figure 3.2.1.

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 3.2 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.

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 3.4.1 below. These data have been processed as thematic data for use in planning work done as part of the Study.

Table 3.4.1 Basic Geographic Features from Provisional Digital Maps

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 mentioned in CHAPTER 4.

3.4.2 Contents OF ARRIS

The formation of ARRIS had been completed in December 2005. Finally, ARRIS contains the various kinds of maps and data as mentioned below. The finalized data of ARRIS can be written within a 700MB CD-R for data-sharing.

(1) Category of Information

The map information in ARRIS is mainly divided into the following two categories.

- Digital topographic maps of Banda Aceh City with a nominal scale of 1:2,000
- Thematic maps showing rehabilitation and reconstruction plans for Banda Aceh City (prepared by the JICA Study Team)

As for the thematic maps, about 50 maps were finally prepared with ARRIS through the JICA Study. The thematic maps are shown in CHAPTER 4.

(2) File Format and Required Software for ARRIS

The following data format were used or applied to comprise of the thematic maps in ARRIS (Table 3.4.2).

Users of ARRIS are required to use the relevant software to manipulate the files of the maps included in ARRIS.

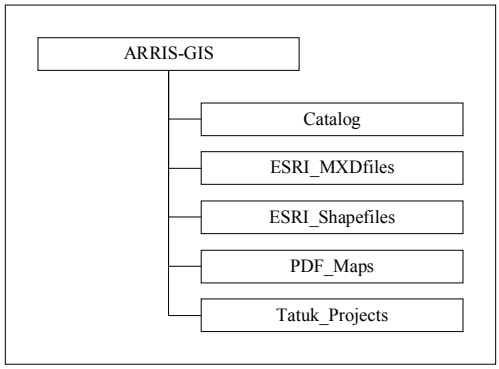
Table 3.4.2 File Formats for Information and Data in ARRIS

Format	Relevant/Required Software	Target Information/Data
MXD	ArcGIS (8.3 and later)	Thematic maps for planning
PDF	Acrobat and Acrobat Reader	Digital topographic maps of Banda Aceh City with a nominal scale of 1:2,000, thematic maps for planning with various scales (fixed for A3 paper)
Ttkgp	TatukGIS	Thematic maps for planning, a sample view of the digital topographic map of Banda Aceh City
SHP	ArcGIS, ArcView	Digital topographic maps of Banda Aceh City, thematic maps for planning
GeoTIFF	ArcGIS, ArcView, ENVI, Imagine	IKONOS satellite images

Source: JICA Study Team

(3) Arrangement of Maps and Data

The maps and data for ARRIS have been arranged in structural data folders as shown in Figure 3.4.1.



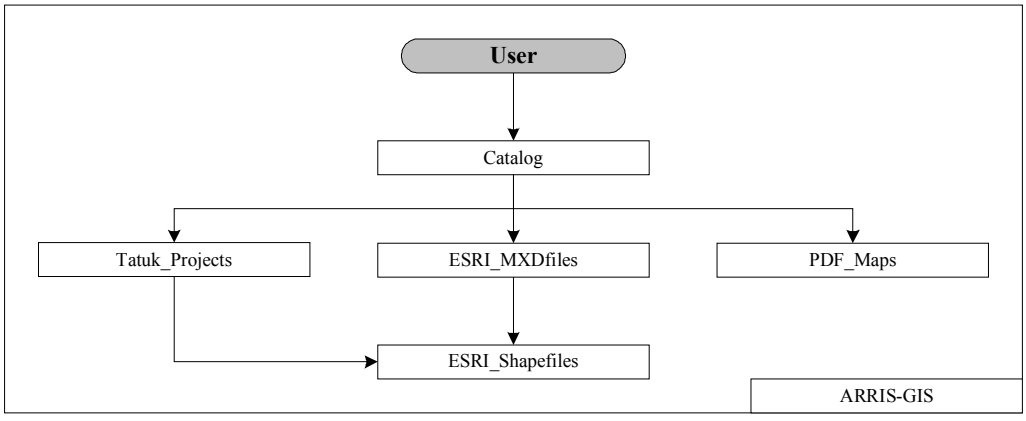
Source: JICA Study Team

Figure 3.4.1 Data Arrangement Scheme for ARRIS

All the files for ARRIS are included in the folder named "ARRIS-GIS". "ARRIS-GIS" contains five (5) data folders named "Catalog", "ESRI_MXDfiles", "ESRI_Shapefiles", "PDF_Maps", and "Tatuk_Projects".

- Catalog: includes the data for the catalog of the thematic maps.
- ESRI_MXDfiles: includes MXD files of the thematic maps.
- ESRI_Shapefiles: includes shapefiles (GIS data) of the digital maps of Banda Aceh City with a nominal scale of 1:2,000, and the thematic maps with various scales.
- PDF_Maps: includes PDF files of the digital topographic maps of Banda Aceh with a nominal scale of 1:2,000, and the thematic maps.
- Tatuk_Projects: includes Ttkgp files of the thematic maps.
-

Figure 3.4.2 shows how the five (5) folder functions for the user.

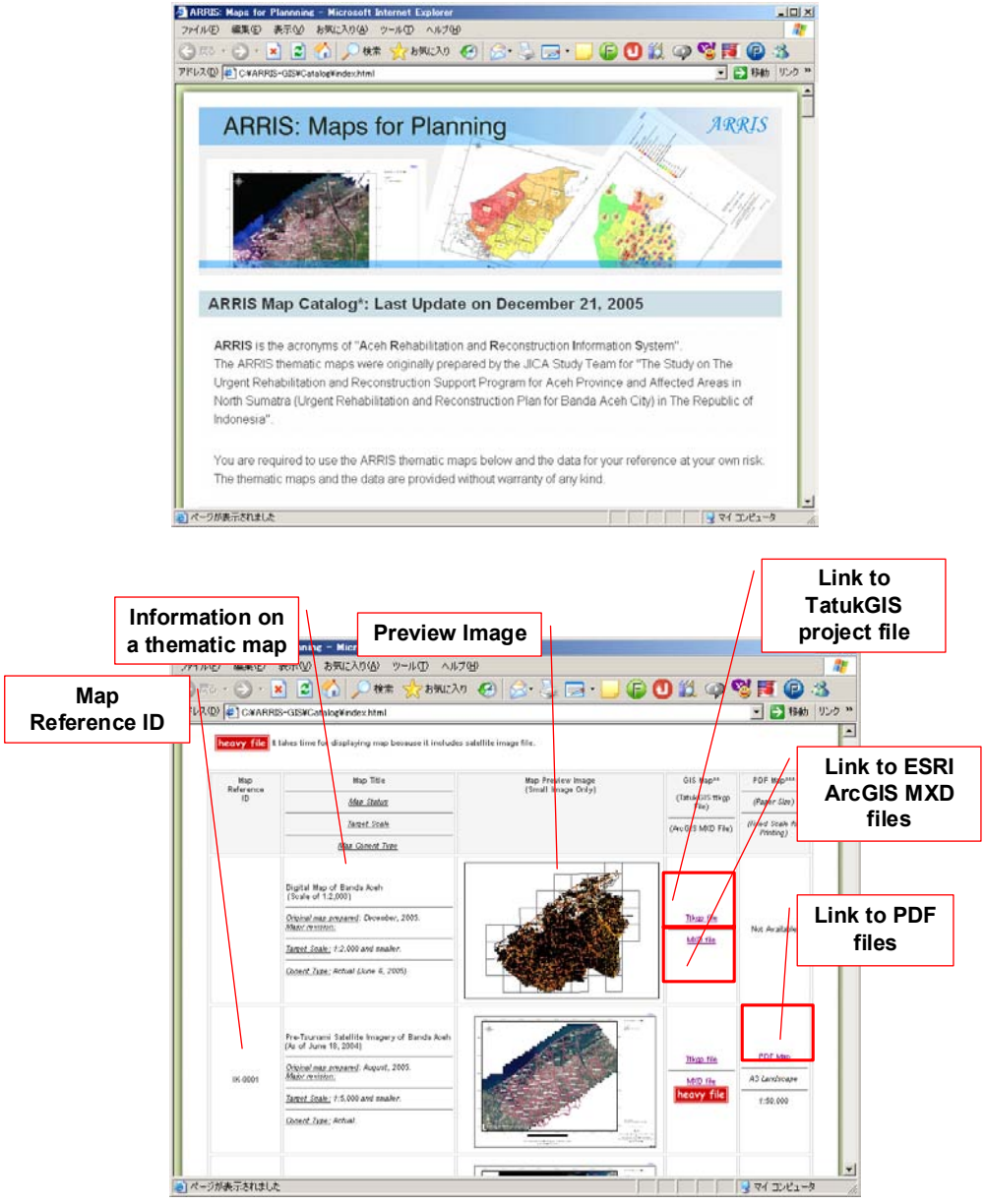


Source: JICA Study Team

Figure 3.4.2 Function of Data Folders

"Catalog" folder includes a hyper text mark-up language file (html) that are named "index.html" for the catalog of the maps included in ARRIS. Other files in "Catalog" are used as materials for "index.html". Figure 3.4.3 shows a sample image of "index.html" in "Catalog".Users can access to the digital maps and the thematic maps by opening "index.html" with browser software (Internet Explorer version 6.0 or later versions are recommended). Users can also access the files of the digital maps or the thematic maps with relevant software shown in Table 3.4.2 directly.

The files included in the five (5) data folders above are arranged in subfolders based on the contents or theme of each file.



Source: JICA Study Team

Figure 3.4.3 Sample View Images of ARRIS Map Catalog

CHAPTER 4 UTILIZATION OF ARRIS AND MAPS FOR PLANNING

4.1 UTILIZATION OF ARRIS FOR PLANNING

ARRIS were used as a planning tool for the JICA Study Team to assist with the planning process for rehabilitation and reconstruction of Banda Aceh. ARRIS has generated various thematic maps and results of analyses needed for the planning, which enabled the planners of the JICA Study Team to consider and solve spatial and non-spatial relevant to rehabilitation and reconstruction. The practical use cases of ARRIS in the Study are mentioned below and the Final Report (1) of the Study, which were prepared in August 2005.

4.1.1 Quick Tsunami Damage Assessment

In the beginning of the Study, it was important to know where the damage induced by the tsunami was located in Banda Aceh, and what type of damage had occurred. It was important for those who were concerned with rehabilitation and reconstruction activities to see the damaged areas visually with relevant maps. In accordance with such an urgent need, the tsunami damage assessment maps were prepared with ARRIS.

The damage was assessed on both the spot damage assessment results and interpretation of the satellite images before and after the tsunami in Banda Aceh. The damage determined at each check spot was plotted on the base map layers, including the tsunami inundated are layers.

4.1.2 Hazard and Risk Assessment

It was essential for Banda Aceh City to incorporate the experience of the tsunami disaster and possible hazard potential into both a post-tsunami city framework and a disaster mitigation and management plan. In addition, ARRIS was used to estimate hazard potential was estimated for each disaster type using criteria derived form a combination of topographic zoning, road density, and building density. The hazard potentials for each desa were shown as hazard potential maps with ARRIS.

4.1.3 Post Tsunami City Plan Concept

A “post-tsunami” city plan concept proposed by the JICA Study Team were prepared, based on both the spatial plan included in the “Blue Print” presented by BAPPENAS on April 2005 and the existing land use plan prepared by Banda Aceh City. The “Blue Print” shows necessary guidelines and concepts for planning in the devastated areas of North Sumatra, and includes a spatial zoning concept of Banda Aceh City and its neighboring areas. The land use plan map included in the previous master plan of Banda Aceh City shows more detailed land use, targeting the year 2010. The spatial plan had been drawn up on mosaiced BAKOSURTANAL topographic maps having a scale of 1:50,000; the land use plan had been drawn on a base map that seems to be based on “Map of Banda Aceh” with a nominal scale of 1:15,750 previously. Those planning maps were scanned

and incorporated into ARRIS, and visually compared with the damage assessment maps, the hazard potential maps, and the high resolution (IKONOS) post-tsunami satellite images. This assisted the JICA Study Team to prepare a post-tsunami new city concept for Banda Aceh.

4.1.4 Road Planning

Road networks are important infrastructures for the framework of a city. The tsunami that occurred on 26 December 2004 devastated the roads, particularly those located in coastal areas of Banda Ache City. With ARRIS, damage to roads and bridges was checked carefully by using the post-tsunami IKONOS satellite images. The tsunami damage to road networks was assessed quantitatively from various view points. Taking the tsunami damage assessment results into consideration, a post-tsunami road framework for Banda Aceh City and its suburbs was planned. This plan was based on various view points (e.g., economic or disaster mitigation) in accordance with the city development concept (prepared by the JICA Study Team). The new road framework was visualized and checked together with other plans or existing conditions in Banda Aceh City. This work was done with ARRIS.

4.1.5 Disaster Mitigation and Management Plan

It was necessary to incorporate the view points of disaster mitigation and disaster management into city planning for Banda Aceh City, and take into account the experiences of the recent tsunami disaster. Doing this allowed a disaster management resources plan to be prepared. A plan for allocating disaster mitigation/management resources, e.g., public open spaces, disaster management centers, or buildings nominated for urgent evacuation (especially in the event of a tsunami), was prepared with support of ARRIS. These components of the Disaster Management Resources Plan are described below.

(1) Allocation of Disaster Mitigation/Management Resources

Public open space, a location of a new emergency center, and locations of buildings that require urgent evacuation were carefully selected using the IKONOS satellite images acquired after the tsunami, the tsunami damage assessment maps, and the hazard potential maps. The location of the identified features was stored in the ARRIS database.

(2) Case Study for Selection of Evacuation Routes

The shortest route for each desa to the nearest designated emergency open space or center was identified with ARRIS by using a road network data layer consisting of existing roads and newly planned roads,. The selected routes were stored in the ARRIS database.

(3) Integrated Map

Locations of the disaster mitigation/management resources and the selected evacuation routes for a case study were visualized and prepared as a planning map using ARRIS

4.1.6 Land Use Plan

A land use plan map for Banda Aceh City was prepared with ARRIS. The plan was prepared based on the new city concept, the related plans (prepared by the JICA Study Team), and existing plans and conditions, such as the Blue Print as mentioned above.

4.1.7 Population Plan

The population of Banda Aceh City in the target year 2009 was estimated by adopting one of three population increase scenarios from 2005 to 2009 that were prepared by the Study Team. For the estimation, land vacancies that appeared after the tsunami and are utilizable for housing were interpreted on the IKONOS satellite images. With ARRIS, the result of interpretation of land vacancies, excluding planned areas, was recorded as a GIS data layer, and intersected with the desa boundary layer in order to calculate a vacancy ratio for each desa. The calculated vacancy ratio for each village (*desa*) was used as the basis for estimating the population of Banda Aceh in 2009. The new population was allocated to vacant land areas, which are scattered throughout the city. The estimated population for 2009 is one of the most important plans, as it was used as a planning basis for other plans for schools, health centers and water supply, which were prepared by the Study Team in each sector.

4.1.8 Planning for School

ARRIS assisted with allocation planning for elementary schools, junior high schools, and senior high schools in Banda Aceh City for the target year of 2009. The number of school-aged children in 2009 was predicted using the ratio of the school-aged children in the total population of Banda Aceh City in 2004. This ratio is shown in Table 4.1.1 below. Doing this allowed the predicted number of the children to be calculated for each desa.

Table 4.1.1 Adopted Ratio for Estimation of School-aged Children Numbers

Category of School	Adopted Ratio for Estimated Number of School-aged Children
Elementary School	15 % of the total population of Banda Aceh in 2009
Junior High School	7 % of the total Population of Banda Aceh in 2009
Senior High School	9 % of the total Population of Banda Aceh in 2009

Source: JICA Study Team

The estimated numbers of school-aged children for each desa were linked with a desa boundary data layer and were shown with a graduated color scale on a map. The location of the existing and damaged schools was plotted on the map in ARRIS. Circular buffer zones surrounding the schools were generated and also displayed on the map, as shown in Figure Table 4.1.2 below.

Table 4.1.2 School Buffers Zones (Circles) Used, for Planning

Category of School	Created Buffer Areas
Elementary School	Radii of circles : 250 m, 500 m
Junior High School	Radii of circles : 500 m, 1,000 m
Senior High School	Radii of circles: 5,00 m, 1,000 m, 1,500 m

Source: JICA Study Team

Maps comprising data layers for the estimated number of school children, location of schools, and school buffer zones were used for planning the allocation of schools in Banda Aceh City, targeting the year 2009.

4.1.9 Planning for Health Centers

ARRIS was used for planning health center and sub-health center locations in Banda Aceh City. The population by district (*kecamatan*) predicted for 2009 was shown with a graduated color scale on a map , and location points of existing hospitals, health centers and sub-health centers were overlaid on the population density layer. The necessity for new health centers was reviewed by comparing the population predicted for 2009 with the health centers' capacity.

4.1.10 Planning for Water Supply

ARRIS was used to present the existing water pipes after the tsunami and the improved water distribution network for 2009 on Banda Aceh City. The estimated water supply demand by village (*desa*) predicted for 2009 was shown with a graduated color scale on a map, and the water distribution network within Banda Ache City were overlaid on the 2009 water demand layer.

4.2 MAPS FOR PLANNING

A set of 49 thematic maps, showing actual condition or plans for Banda Aceh City, were prepared in the Study, and incorporated in ARRIS Data CD as mentioned in CAHPTER 6. Table 4.2.1 shows the list of 49 thematic maps. The prepared thematic maps were divided into ten (10) categories as shown in Table 4.2.2.

Table 4.2.1 Map Reference IDs and Titles of Maps

Map ID	Title of Map (Remark)	Condition
IK-0001	Pre-Tsunami Satellite Imagery of Banda Aceh	Actual
IK-0002	Post-Tsunami Satellite Imagery of Banda Aceh	Actual
DA-0001	Tsunami Damage Assessment Map (Maximum Tsunami Water Height)	Actual
DA-0002	Tsunami Damage Assessment Map (Tsunami Water Flow)	Actual
DA-0003	Tsunami Damage Assessment Map (Buildings)	Actual
DA-0004	Tsunami Damage Assessment Map (Electricity Supply)	Actual
DA-0005	Tsunami Damage Assessment Map (Drainage System Integrity)	Actual
DA-0006	Tsunami Damage Assessment Map (Telephone Services)	Actual
DA-0007	Tsunami Damage Assessment Map (Roads and Bridges)	Actual
DA-0008	Tsunami Damage Assessment Map (Demography as of April 12, 2004)	Actual
DA-0009	Tsunami Damage Assessment Map (Landuse in 2004, as of June 18, 2004)	Actual
DA-0010	Tsunami Damage Assessment Map (Landuse immediately after the tsunami)	Actual
HP-0001	Hazard Potential Map (Earthquake; Liquefaction)	Actual
HP-0002	Hazard Potential Map (Tsunami; Inundation)	Actual
HP-0003	Hazard Potential Map (Flood; Drainage)	Actual
HP-0004	Hazard Potential Map (Fire Spreading)	Actual
HP-0005	Hazard Potential Map (Escaping Activity)	Actual
HP-0006	Topographic Zoning Map	Actual
CP-0001	Post-Tsunami Landuse Map	Actual
CP-0002	Post-Tsunami Vacancies in Banda Aceh	Actual
ED-0001	Tsunami Damage Map for Elementary School	Actual
ED-0002	Tsunami Damage Map for Junior High School	Actual
ED-0003	Tsunami Damage Map for Senior High School	Actual
TR-0001	Road Classification	Actual

TR-0002	Number of Road Lane	Actual
TR-0003	Width of Road	Actual
TR-0004	Damage Rate of City Roads by Kecamatan	Actual
TR-0005	Damage Rate of Streets by Kecamatan	Actual
WS-0001	Existing Water Distribution Network	Actual
DM-1001	Disaster Management Resource Plan and Evacuation/Relief Plan	Plan
CP-1001	Banda Aceh City Plan Concept	Plan
CP-1002	Landuse Plan for Banda Aceh City	Plan
CP-1003	Estimated Population Increase (by Desa) from 2005 to 2009	Plan
ED-1001	Map for Elementary School Plan	Plan
ED-1002	Map for Junior High School Plan	Plan
HM-1001	Map for Health Center and Sub Health Center Plan	Plan
TR-1001	Banda Aceh Road Network Framework Plan	Plan
WS-1001	Improved Water Distribution Network based on Water Demand in 2009	Plan
ML-1001	Location on Case Study for Micro Landuse Plans	Plan
ML-1002	Case Study for Landuse Plan in Syiah Kuala (Option 1)	Plan
ML-1003	Case Study for Landuse Plan in Syiah Kuala (Option 2)	Plan
ML-1004	Case Study for Landuse Plan in Ulee Lheue	Plan
ML-1005	Case Study for Landuse Plan in Meraxa	Plan
ML-1006	Case Study for Landuse Plan in Kuta Alam	Plan
ML-1101	Locations on Case Study for Micro Landuse Plan in the Southeast of Banda Aceh City	Plan
ML-1102	Case Study for Landuse Plan in /around the Southeast of Banda Aceh City (“A” Area)	Plan
ML-1103	Case Study for Landuse Plan in /around the Southeast of Banda Aceh City (“B” Area)	Plan
ML-1104	Case Study for Landuse Plan in /around the Southeast of Banda Aceh City (“C” Area)	Plan
ML-1105	Case Study for Landuse Plan in /around the Southeast of Banda Aceh City (“D” Area)	Plan

Source: JICA Study Team

Table 4.2.2 Category and Number of Thematic Maps

Category of Thematic Map	Number of Maps	
	Condition	
	Actual	Plan
IKONOS Satellite Images	2	0
Damage Assessment	10	0
Hazard and Risks	6	0
Disaster Management Plan	0	1
City Concept/Spatial Plan	2	3
Transportation Plan	5	1
Water Supply Plan	1	1
Education (School) Plan	3	2
Health Center Plans	0	1
Case Studies (Micro Landuse Plan)	0	11
Total	29	20

Source: JICA Study Team

CHAPTER 5 PLAN OF OPERATION AND MAINTENANCE OF ARRIS

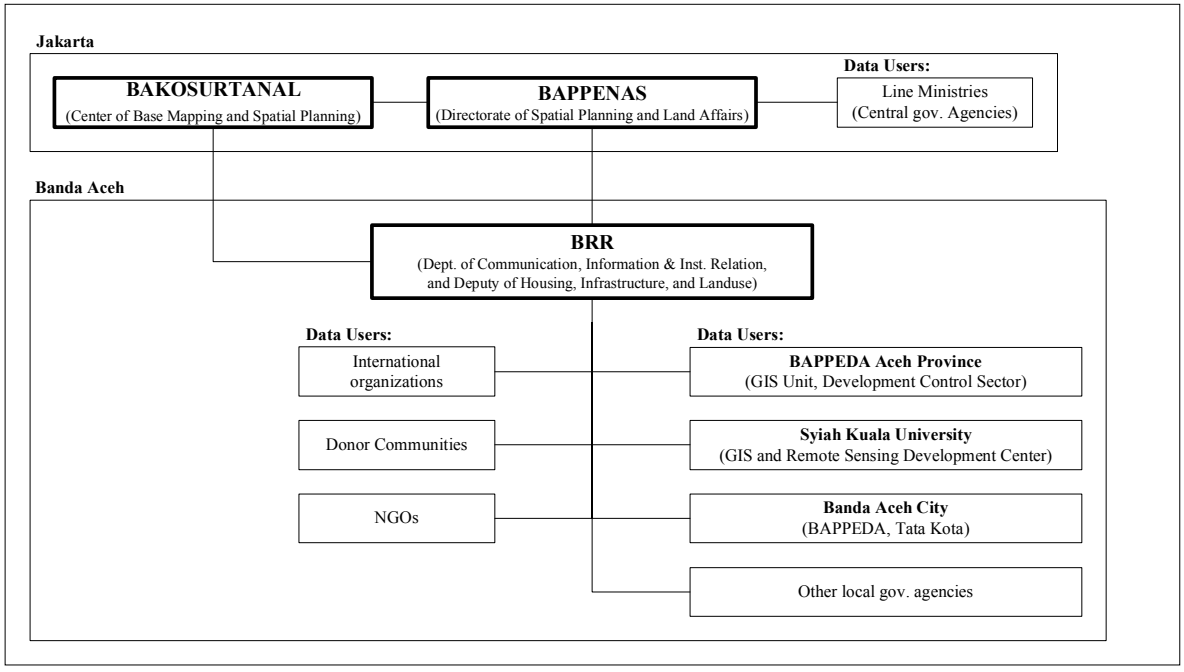
5.1 IMPORTANT ORGANIZATIONS

The following three (3) governmental institutions are considered to be the most important organizations in formulating the schemes of operation and maintenance of ARRIS (Figure 5.1.1).

- BAKOSURTANAL (Center of base mapping and spatial planning)
- BAPPENAS (Directorate of spatial planning and land affairs, Deputy of regional autonomy and regional development)
- BRR (Deputy of Housing, infrastructure and land use)

1) BAKOSURTANAL shall be the most important institution as the coordination of the national spatial data infrastructure (NSDI) including ARRIS data (the topographic maps of Banda Aceh City with a nominal scale of 1:2,000 and the thematic GIS layers), the (data) production house, the technical supporter for the central and local governmental institutions, and an ARRIS hub in Jakarta.
2) BAPPENAS shall be another important ARRIS hub in Jakarta, especially for the central government institutions (the line ministries).
3) BRR shall be the ARRIS hub in Aceh, and the main governmental organization for formulating and executing the operation and maintenance of ARRIS.

Those three (3) organizations shall be required to cooperate with each other closely.



Source: JICA Study Team

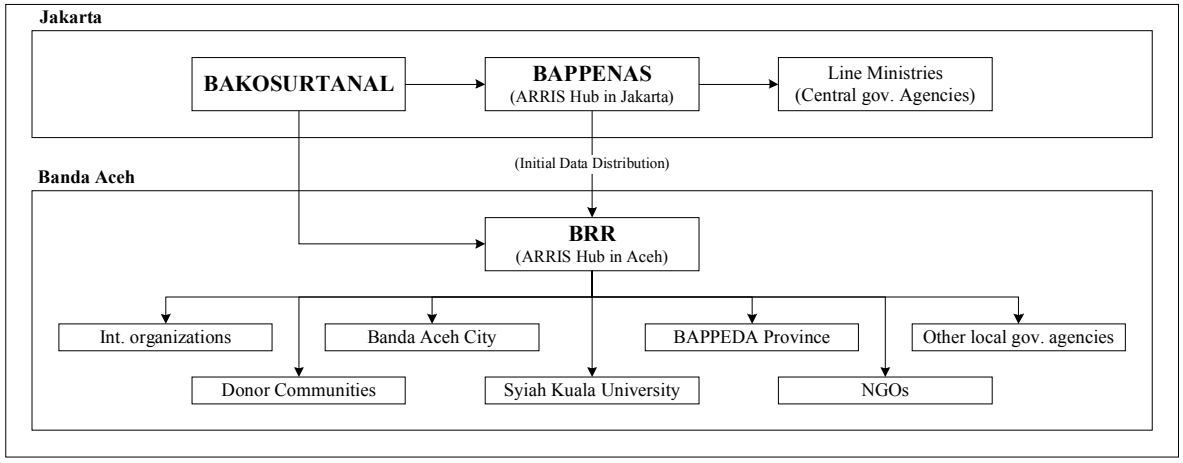
Figure 5.1.1 Organizational Framework for Operation and Maintenance of ARRIS (Plan)

It is proposed that the plan of the operation and maintenance of ARRIS is divided into the following four aspects: 1) Data Dissemination; 2) Operation; 3) Maintenance; and 4) Technical Support; as mentioned in the Section 5.2 below.

5.2 PLAN OF OPERATION AND MAINTENANCE

5.2.1 Data Dissemination

Figure 5.2.1 shows a plan of data dissemination originally planned by BAPPEANS in January 2006.



Source: BAPPENAS, revised by JICA Study Team

Figure 5.2.1 Data Dissemination Flow (Originally Planed by BAPPENAS)

- The original data (all data for ARRIS) that were prepared by the JICA Study Team shall be kept and managed by BAKOSURTANAL.
- BAPPENAS shall be a data distribution center as an ARRIS hub in Jakarta for the central governmental institutions (the line ministries).
- BRR shall be the data distribution center as the ARRIS hub in Banda Aceh for the local governmental institutions, international organizations, donor communities, NGOs, and universities.
- ARRIS hubs shall distribute one (1) CD, which includes the ARRIS data, to each organization, based on the request from the organization (one CD for one organization).

5.2.2 Operation

(1) Digital Topographic Maps of Banda Aceh City

The data for the digital topographic maps of Banda Aceh City with a nominal scale of 1:2,000 shall be updated and maintained by BAKOSURTANAL, periodically.

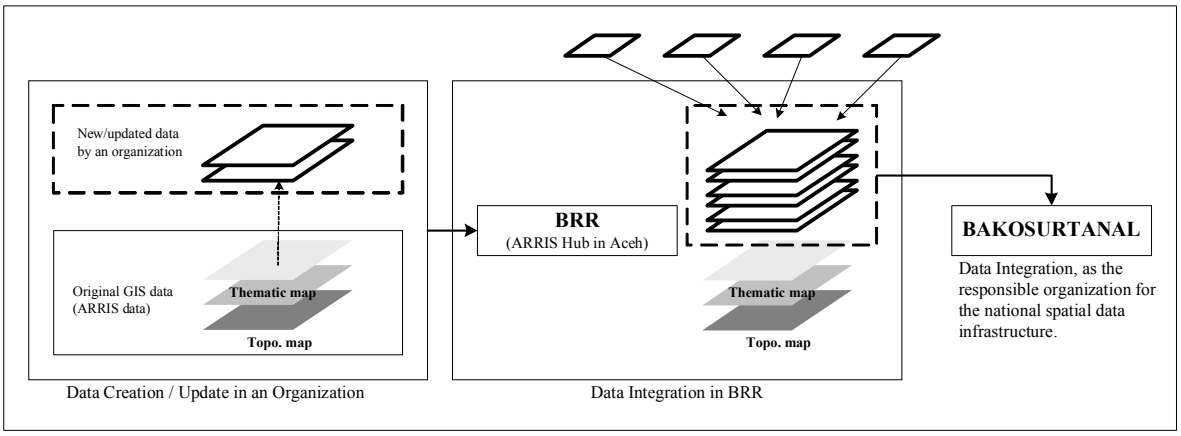
(2) Thematic GIS data

The thematic GIS data, which are used in the thematic maps for the rehabilitation and

reconstruction plans for Banda Aceh City prepared by the JICA Study Team, shall be basically utilized and maintained by each data user (organization) because the data will be modified, revised, or updated by each organization based on its need (Figure 5.2.3).

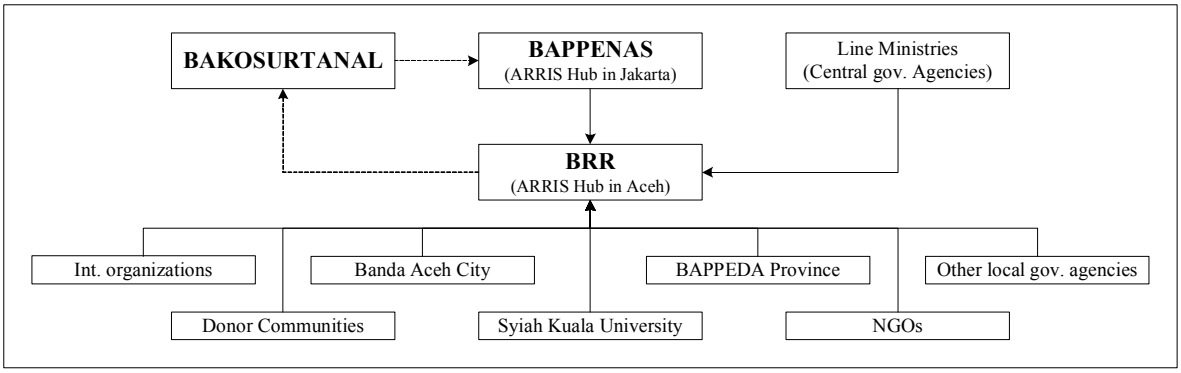
5.2.3 Maintenance

- The thematic GIS data shall be maintained in each data user (organization) basically.
- BRR shall collect and compile the new/modified thematic GIS data from each data user periodically (e.g., annually), in case of need. Periodically collected data shall be directly sent to BAKOSURTANAL, and to BAPPENAS through BAKOSURTANAL (Figure 5.2.2 and Figure 5.2.3).
- Collected/compiled data to be shared shall be periodically re-distributed to the data users through the ARRIS bubs, in accordance with the plan of the data dissemination flow shown in Figure 5.2.2.
- BAKOSURTANAL is expected to be a technical advisor for BRR.



Source: BAPPENAS, revised by JICA Study Team

Figure 5.2.3 (a)Concept on Data Update/Maintenance (Recommendation)



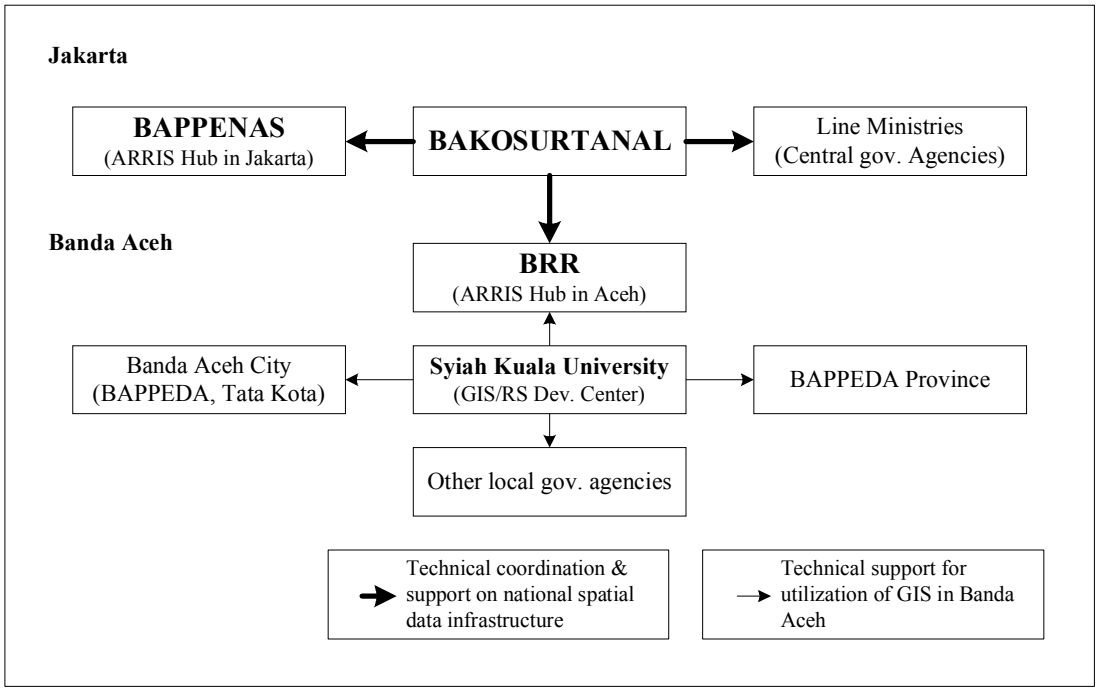
Source: JICA Study Team

Figure 5.2.3 (b) Data Integration Flow (Recommendation)

5.2.4 Technical Support

- BAKOSURTANAL shall play an important role on preparation on GIS data formats and technical supports to central/local governmental institutions, especially for BRR and BAPPENAS, as the responsible organization for the NSDI in the Republic of Indonesia.
- The GIS and Remote Sensing Development Center of Syiah Kula University shall also play an important role on technical support for the ARRIS data users in Banda Aceh City, as the local supporter. Currently the GIS and Remote Sensing Development Center of Syiah Kuala University is the only one institution that knows the technology and the utilization of GIS than other organizations in Banda Aceh.

Figure 5.2.4 shows a concept on the technical supports concerning ARRIS.



Source: JICA Study Team

Figure 5.2.4 Technical Support Plan on ARRIS (Recommendation)

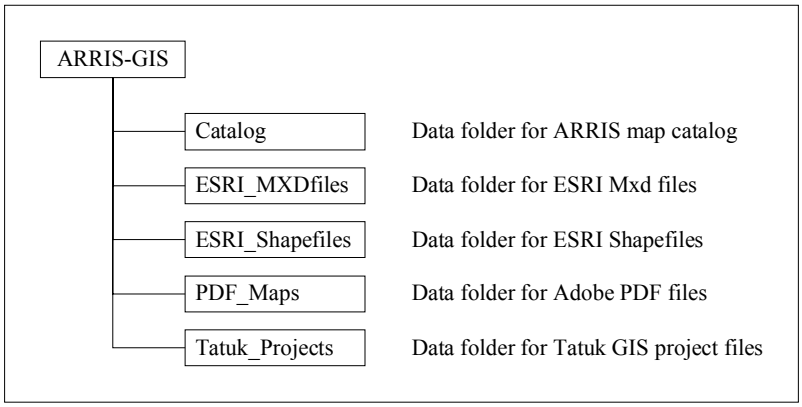
In order to build the operation and maintain the framework on ARRIS, BRR shall play a central role as the execution agency as for the rehabilitation and reconstruction of Banda Aceh City. In addition, BAKOSURTANAL and BAPPENAS shall support BRR in technical and administrative aspects on ARRIS.

CHAPTER 6 DATA STRUCTURE

6.1 DATA STRUCTURE

6.1.1 Main Data Folders

A set of the data for ARRIS (excluding the IKONOS satellite images) can be written into a 700MB CD-R (ARRIS Data CD). "ARRIS-GIS" included in an ARRIS Data CD is the main folder, which contains all the data for ARRIS. Figure 6.1.1 shows the constitution of the data folder inside "ARRIS-GIS".



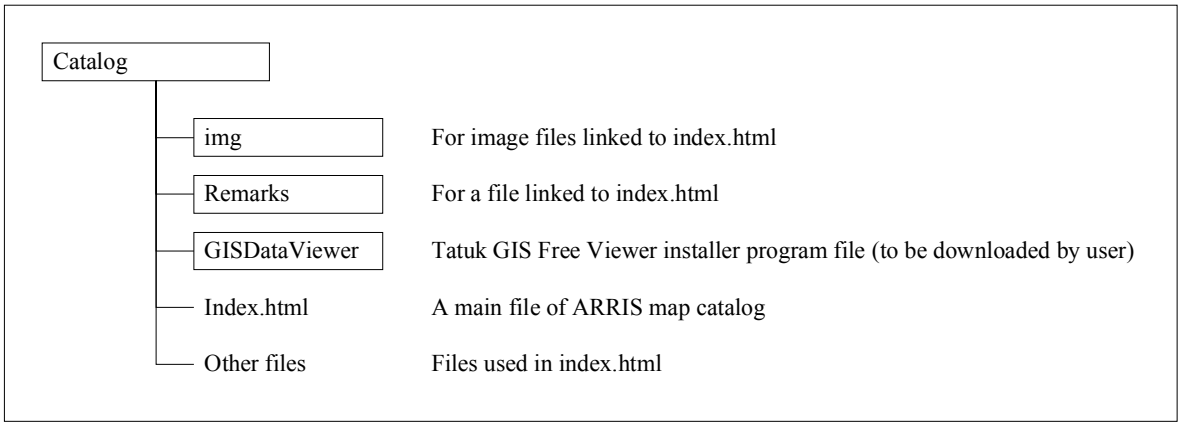
Source: JICA Study Team

Figure 6.1.1 Constitution of "ARRIS-GIS" Folder

6.1.2 Sub Data Folders

(1) Catalog

Figure 6.1.2 shows the constitution of "Catalog" folder. The folder is used to contain the files for ARRIS map catalog.



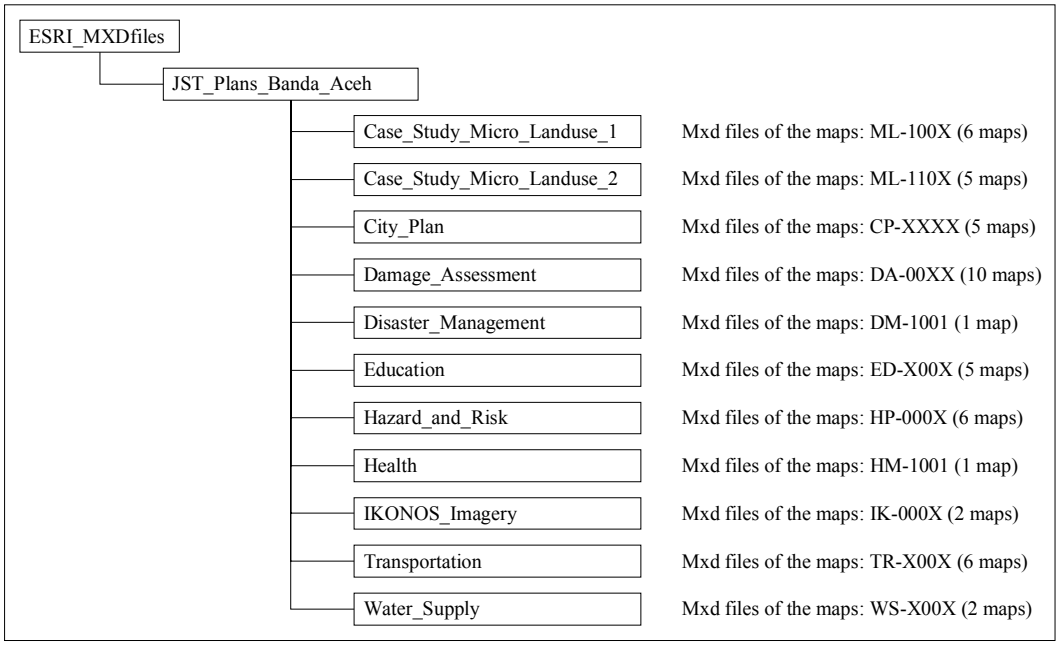
Source: JICA Study Team

Figure 6.1.2 Constitution of "Catalog" Folder

(2) ESRI_MXDfiles

The folder named "ESRI_MXDfiles" contains ESRI Mxd format files representing the thematic maps for planning, which were prepared in the Study. Figure 6.1.3 shows the constitution of

"ESRI_MXDfiles" folder.

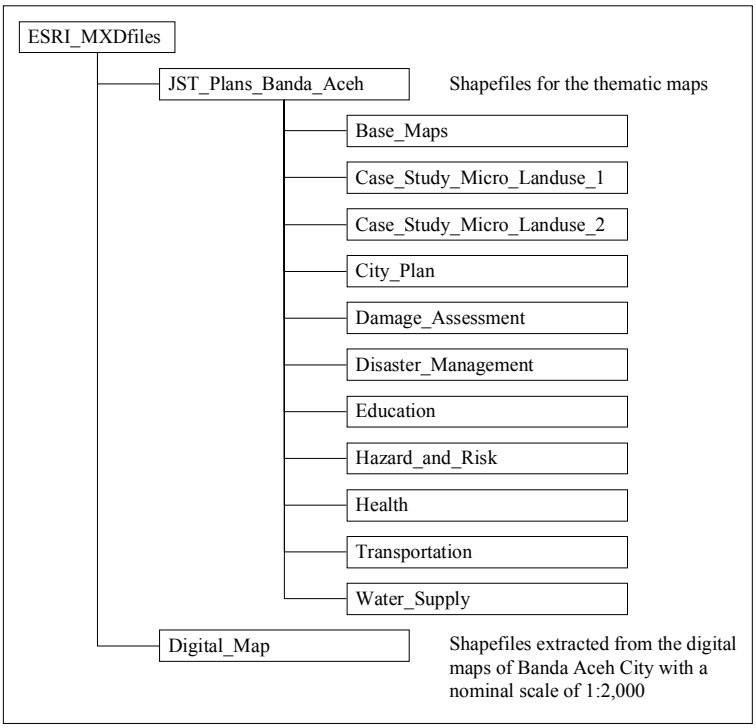


Source: JICA Study Team

Figure 6.1.3 Contents of "ESRI_MXDfiles" Folder

(3) ESRI_Shapefiles

The folder named "ESRI_Shapefiles" contains ESRI Shapefile format files as GIS data, which were used for the thematic maps. Figure 6.1.4 shows the constitution of "ESRI_Shapefiles" folder.

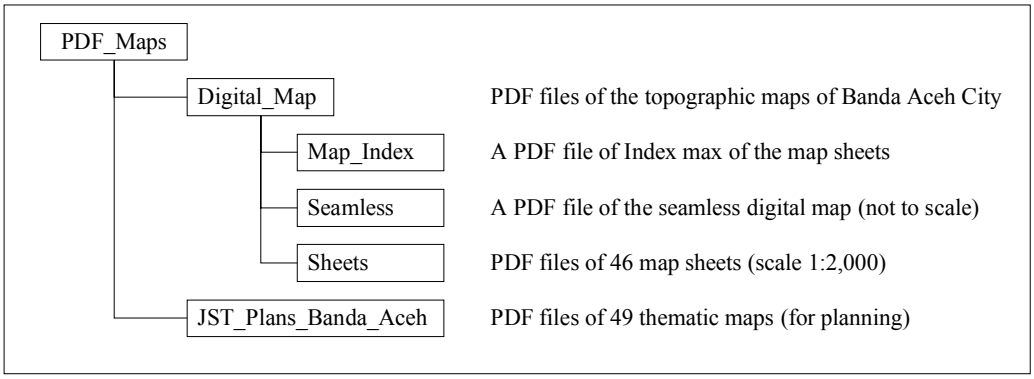


Source: JICA Study Team

Figure 6.1.4 Constitution of "ESRI_Shapefiles" Folder

(4) PDF_Maps

The folder named "PDF_Maps" contains Adobe Pdf format files of the digital topographic maps of Banda Aceh City with a nominal scale of 1:2,000 and the thematic maps prepared at fixed scales by the JICA Study Team. Figure 6.1.5 shows the constitution of "PDF_Maps" folder.

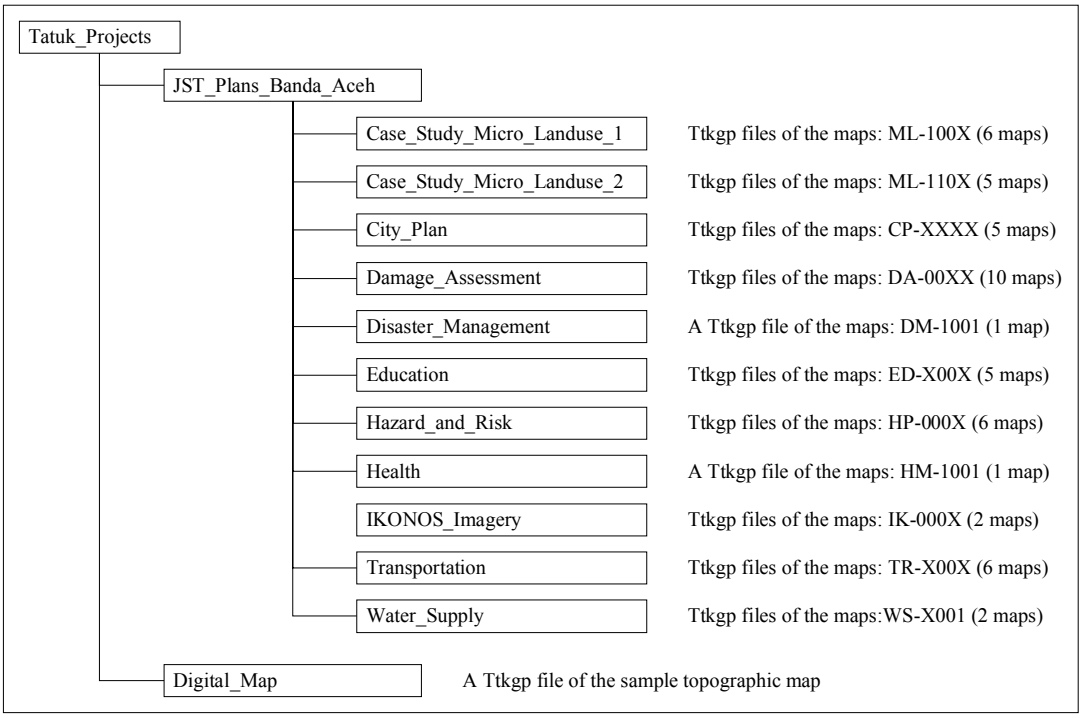


Source: JICA Study Team

Figure 6.1.5 Constitution of "PDF_Maps" Folder

(5) Tatuk_Projects

The folder named "Tatuk_Projects" contains TatukGIS Ttkgp format files representing the thematic maps for planning, which were prepared in the Study. Figure 6.1.6 shows the constitution of "Tatuk_Projects" folder.



Source: JICA Study Team

Figure 6.1.6 Constitution of "Tatuk_Projects" Folder

The list of the data files for ARRIS is included in a data CD: [ARRIS Data CD] > [ARRIS-GIS] > [Catalog] > Data_Book.pdf).

6.2 METADATA OF ARRIS THEMATIC GIS LAYERS

The metadata of the thematic GIS layers are included in an ARRIS data CD. The metadata of the thematic GIS layers comprises of the following items.

- Layer Name: name of the layer
- Feature Class: type of vector data (point, line, or polygon)
- Description: brief explanation of the layer
- Data Currency: currency of the layer
- Date of Ground Condition: date of ground condition included in the layer
- Stored Data Format: file format of the layer
- Projection/Datum: projection and datum applied for the layer
- Geographic Extent: geographic extent of the layer
- Targeted Mapping Scale: targeted mapping scales of the layer
- Meta Data Date: date of the metadata preparation
- Attributes, codes, and values: information on attribute tables

As for the shapefiles extracted from the digital maps of Banda Aceh City with a nominal scale of 1:2,000, the metadata are shown in "Feature Catalog" (APPENDIX-8).

CHAPTER 7 PLANNING TOOLS FOR ARRIS USER

In order to support the preparation of rehabilitation and reconstruction plans with a GIS in The Study, the JICA Study Team had developed the tools (ARRIS Tool) for the Study Team members, which are utilizable on ArcGIS (8.3 and later).

The ARRIS Tool enables not only the Study Team members but also other ArcGIS users to create buffer polygon features with ArcGIS, easily. Actually, buffer polygons were often created and used to plan public facilities/service areas through the JICA Study; e.g., schools, escape buildings/towers, case studies for micro land use plans. The tool can be customized by users who understand Visual Basic for Application (VBA) open source code.

7.1 OVERVIEW OF ARRIS TOOL

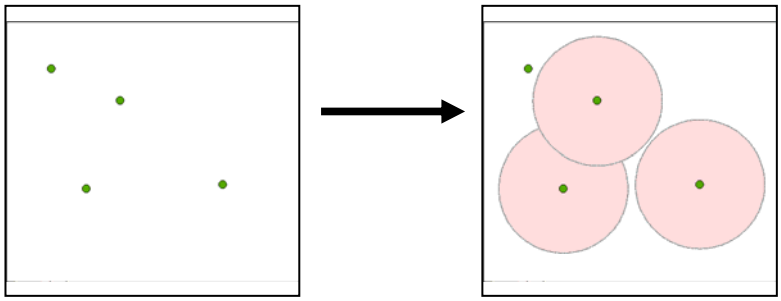
7.1.1 Main Functions

ARRIS Tool enables the users to support for four (4) city planning and disaster mitigation functions:

- Escape Building Planning
- Road Planning
- Health/Medical Planning
- Education Planning
- Creation of buffer zones from the user's original point data.

7.1.2 Core Functions

The "Create Buffer" utility is a core function of the ARRIS Tool. This function generates buffer polygons using the planning base data or the user's original point data (Figure 7.1.1).



User's point Buffer polygons

Source: JICA Study Team

Figure 7.1.1 Concept on Creation of Buffer Polygons from User's Points

7.2 SYSTEM SUMMARY

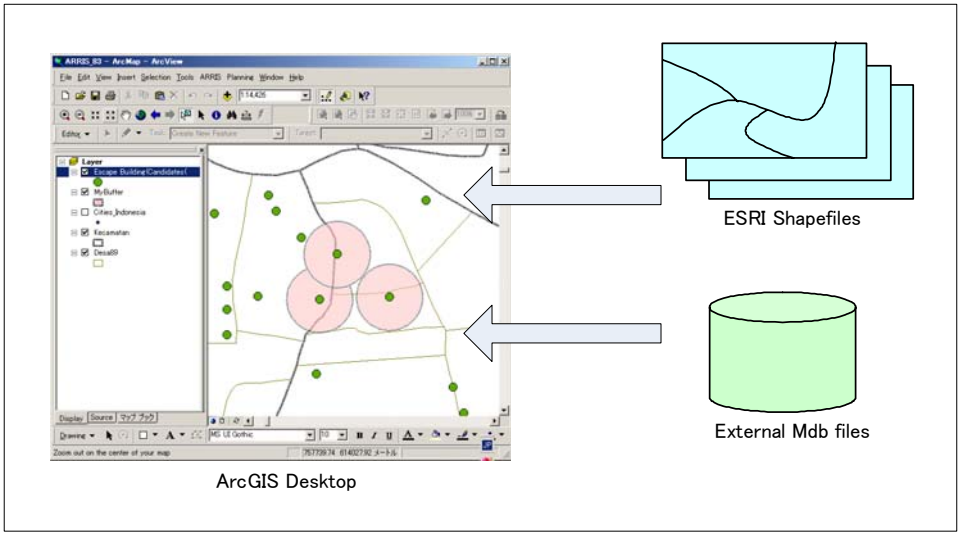
7.2.1 System Requirements

An ARRIS thematic map consists of an ESRI ArcMap Document file (*.mxd). Either ArcGIS Desktop version 8.3 or 9.0 (and later) can be used to run ARRIS Tool. The user must use either ARRIS_83.mxd for ArcGIS version 8.3 or ARRIS_90.mxd for ArcGIS version 9.0 and later. The

same ESRI ArcMap Document file can not be shared by both versions. When a user runs ARRIS Tool, the user must ensure that the user uses the correct version of ArcGIS (8.3 or 9.0) with the matching ArcMap Document file.

7.2.2 System Architecture

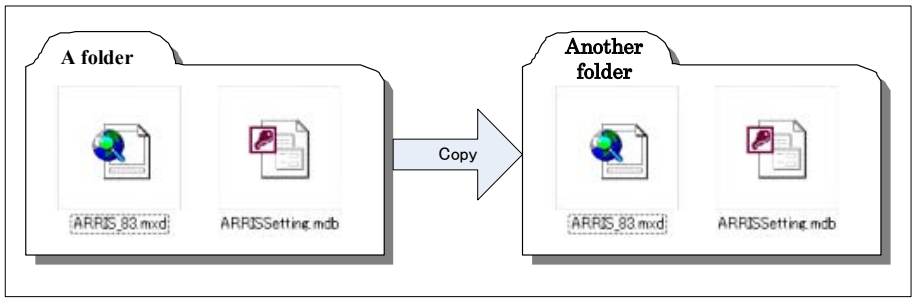
ARRIS Tool are developed for ArcGIS Desktop. The tool requires ESRI Shapefiles for layers and an external Microsoft Access database (*.MDB) file for storing data settings (Figure 7.2.1).



Source: JICA Study Team

Figure 7.2.1 Basic System Architecture

The data setting file (i.e. the external Microsoft Access database MDB file) used for ARRIS Tool must be always named "ARRISSetting.mdb". This file can not be shared by different versions of the ARRIS ArcMap Document files (i.e. ARRIS_83.mxd or ARRIS_90.mxd) as mentioned above. In addition, when the user wants to make copies of the ARRIS "mxd" file, the user must copy the whole folder that includes both the ARRIS "mxd" file and the corresponding data setting file (ARRISSetting.mdb), as shown in Figure 7.2.2. If this is not done, the copied data will not work correctly in ARRIS.



Source: JICA Study Team

Table 7.2.2 How to Make Copy of Folder and Files for Tools

7.3 OPERATION OF ARRIS TOOL (PART 1)

First of all, the user must place both ARRIS_83.mxd (or ARRIS_90.mxd) and ARRISsetting.mdb within a same folder as mentioned above.

7.3.1 Starting ARRIS Tool

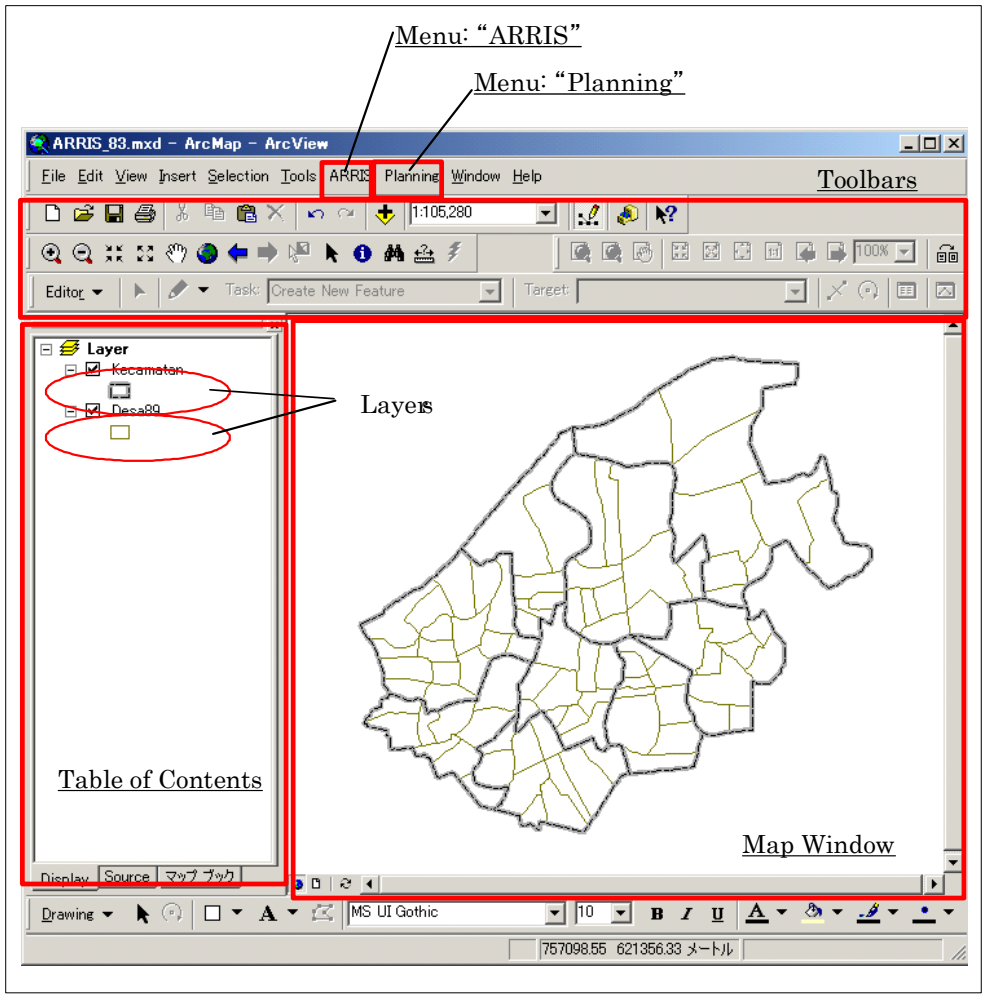
The user must double click the icon (ARRIS_83.mxd or ARRIS_90.mxd) displayed in a computer window to activate the tools.

Source:JICA Study Team

Figure 7.3.1 ARRIS_83.mxd (ARRIS_90.mxd) Icon

7.3.2 ARRIS Tool Screen Contents

Figure 7.3.2 shows a screen view appears when the user opens ARRIS_83.mxd or ARRIS_90.mxd.



Source: JICA Study Team

Figure 7.3.2 Screen Contents of ARRIS_83 (90).mxd

7.3.3 Items in Menu

When ARRIS_83.mxd or ARRIS_90.mxd is opened by the user, two (2) menu items ([ARRIS] and [Planning]) are automatically added to the ArcGIS Desktop menu bar.

Table 7.3.1 shows the descriptions on the contents of the additional menu for the tools.

Table 7.3.1 Additional Menu Items for Tools

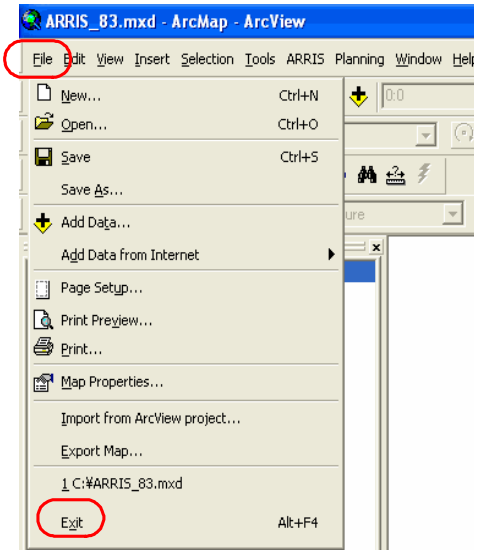
[ARRIS] Menu	
Set Escape Building Data Set Road Data Set Health/Medical Data Set Education Data	Menu items for setting data for each tool.
Save Settings Load Settings	Menu items for saving/loading settings.
Administrative Boundary Selector	Menu item for starting the Administrative Boundary Selector tool.
[Planning] Menu	
User's Point Layer ▸	Menu item for adding a User's point layer. (It has sub-menu items.)
Escape Building Planning Road Plannning Health/Medical Planning Education Planning	Menu items for the Planning Tools.

Source: JICA Study Team

7.3.4 Closing ARRIS Tool

Table 7.3.2 shows how to finish the utilization of the tools.

Table 7.3.2 How to Close Tools



a) Click on [File] on the main tool bar.

b) Select [Exit] on the File sub-menu.

NOTE: The system can be finished with or without saving the ArcMap Document file (*.mxd).

Source: JICA Study Team

7.4 OPERATION OF ARRIS TOOL (PART 2)

ARRIS Tool includes the three (3) modules as follows:

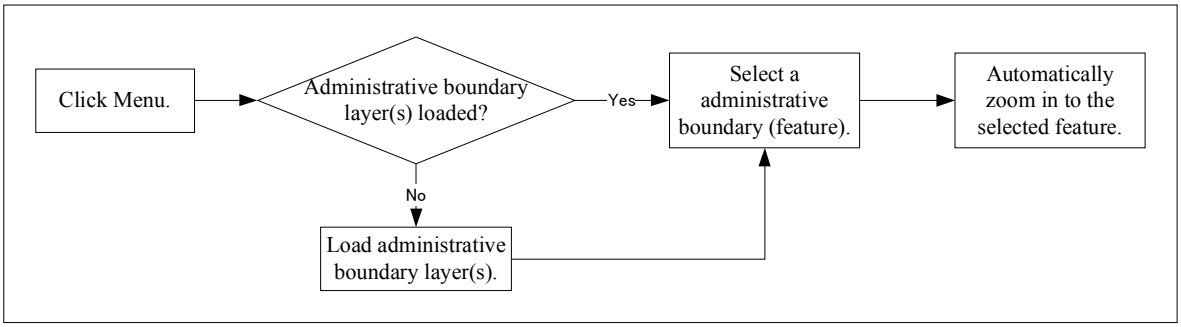
- Administrative Boundary Selector Tool
- Sector Planning Tool
- Create Buffer Polygon Tool (using the user's specifying points)

7.4.1 Administrative Boundary Selector Module

There are administrative boundaries like "*desa*" and "*kecamatan*" within Banda Aceh City. When using ArcGIS, many steps are required to select and zoom in to a specified boundary feature. With ARRIS Tool, this task is simplified by using the Administrative Boundary Selector module. This module allows easy selection and zooming to a user-specified administrative boundary.

(1) Operation Flow

Figure 7.4.1 shows the operation flow of the Administrative Boundary Selector module.

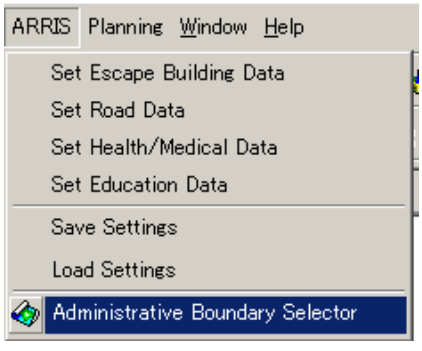


Source: JICA Study Team

Figure 7.4.1 Operation Flow of Administrative Boundary Selector

(2) Zooming to an Administrative Boundary (Kecamatan / Desa)

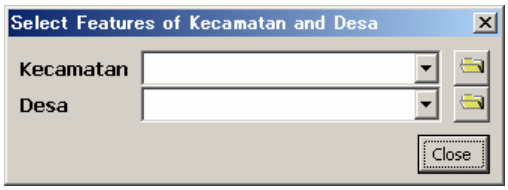
1) Selecting "Administrative Boundary Selector" in [ARRIS] menu.



Source: JICA Study Team

Figure 7.4.2 Administrative Boundary Selector in [ARRIS] Menu

2) Then a dialog window is shown as Figure 7.4.3.



Source: JICA Study Team

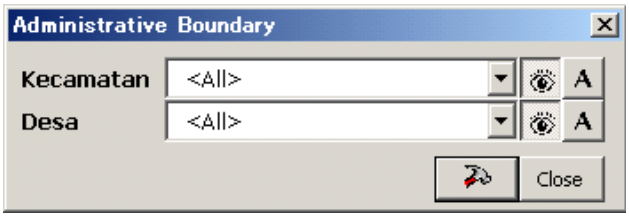
Figure 7.4.3 Administrative Boundary Layer Selection Dialog (Window)

If both a *kecamatan* and a *desa* layer are not already in the TOC, a warning message appears. The "Administrative Boundary Layer Selection" dialog will open after this warning message is dismissed. (This dialog will not appear if both a Kecamatan and a Desa layer are already present in the TOC.)

3) To load a *kecamatan* layer, click on the Open Folder button ( ) and choose a Kecamatan layer (Shapefile).

Repeat this for the *desa* layer (Shapefile). After choosing the required layers, click on the "Close" button.

4) If both a kecamatan and a desa layer are present in the TOC, the "Zoom to a Specific *kecamatan* and Desa" window will open (Figure 7.4.4). This window allows a specific *kecamatan* and *desa* to be selected (NOTE: The list of available *desa* is dependent upon the *kecamatan* that is selected. (The required *desa* must be located in the selected *kecamatan*.)).



Source: JICA Study Team

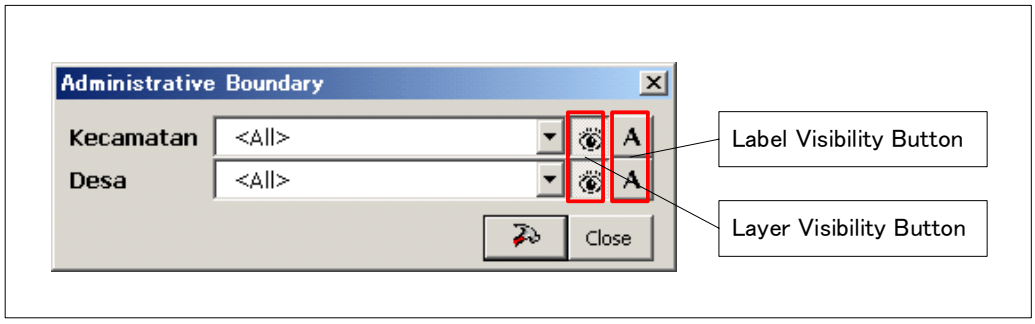
Figure 7.4.4 Zoom to a Specific *Kecamatan* and *Desa* Dialog (Window)

5) The map window will automatically zoom to the full extent of the selected *kecamatan* (polygon feature). The *desa* list will also be updated. This list will show all *desa* names in the selected *kecamatan*.

(3) Other Functions – Layer and Label Visibility

The Administrative Boundary dialog has functions for changing the visibility of layers and labels of the features (Figure 7.4.5).

1) By clicking the Layer Visibility button to toggle the layer visibility on or off
2) By toggling the Label Visibility button turns the labels on or off



Source: JICA Study Team

Figure 7.4.5 Label Visibility Button and Layer Visibility Button

To show labels, the user is required to set a field (attribute) to use for the label before enabling the Label Visibility function as follows:

1) Double click on the layer in the TOC window;
2) Click on the Labels tab on Layer Properties dialog;
3) Choose a field name in the Label Field list; and
4) Click the OK button.

7.4.2 Sector Planning Modules (Data Setting)

In order to create buffer polygons for some sector plans, the base data have to be loaded before the tool will work. The main function of the tools is to create buffers for the base data.

Table 7.4.1 Tools for Creation of Buffer Polygons

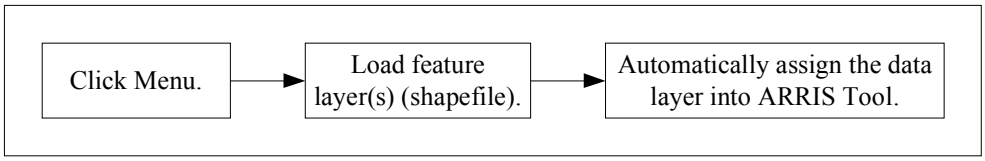
Sector Planning Module	Base Data Examples	Feature Layer Type
Escape Building Planning Module	-Candidate building(s) -Existing escape building(s)	Point
Road Planning Module	-Existing road(s) -Planned road(s)	Polyline
Health/Medical Planning Module	-Hospital(s) -Medical Center(s)	Point
Education Planning Module	-Elementary school(s) -Junior high school(s) -Senior high school(s)	Point

Source: JICA Study Team

In addition, settings can be stored in an external database (*.mdb) file. The following steps describe how to set the base data for the tools for creation of buffer polygons, and how to save/load the settings stored in the external database file.

(1) Operation Flow

Figure 7.4.6 shows the operation flow of the data setting for the Sector Planning Modules.



* Loading a feature layer from the existing layers in the TOC is not supported.

Source: JICA Study Team

Figure 7.4.6 Operation Flow for Sector Planning Modules

(2) Setting Base Data for Sector Planning Modules

Below describes how to set the base data for the Escape Building Planning Module. The procedure for setting all four (4) planning modules works in the same way.

1) Clicking on "Set Escape Building Data" in the Planning menu:
   "Open Point Layer" dialog will be displayed. The Open Point Layer dialog will also be displayed when setting the Health/Medical Planning Tool and the Education Planning Tool, as these are also point feature layers. However, an "Open Polyline Layer" dialog will be displayed when setting the Road Planning Tool, as the roads are polyline feature layers.
2) Loading the Feature Layer (Shapefile)
   Choosing a point feature layer (Shapefile) as the base data for the Escape Building Planning Tool. After choosing it, click the "Add" button in the dialog window.
3) Assigning the Data Layer to the Planning Tool automatically
   The selected layer will automatically be assigned to the Escape Building Planning Tool. The user can set the symbols for the selected layer as desired.

(3) Save/Load Data Settings

The sector planning modules allow the user to save the current planning data settings in an external file, and load the settings again at another time. This is done as follows:

1) Clicking on "Save Settings" in the ARRIS menu;
   A confirmation message will appear (and by clicking on the "OK" button to continue; Figure 7.4.7).

Source: JICA Study Team

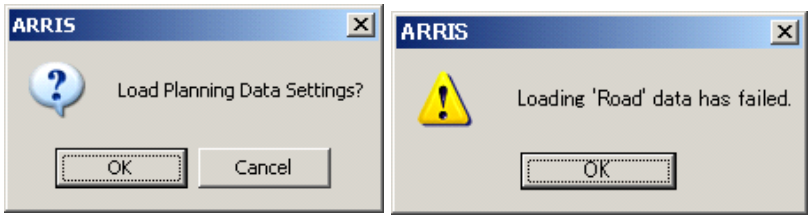
Figure 7.4.7 Confirmation and Error Message Windows in Saving Data Settings

2) Settings are stored;

The settings are stored in an external MDB file. If one or more planning tool(s) has no base data, an error message will appear (Figure 7.4.7).

3) Clicking on "Load Settings" in the ARRIS menu;

A Confirmation message will appear (and by clicking on "OK" to continue; Figure 7.4.8).



Source: JICA Study Team

Figure 7.4.8 Confirmation and Error Message Windows in Loading Data Settings

4) Settings are loaded;

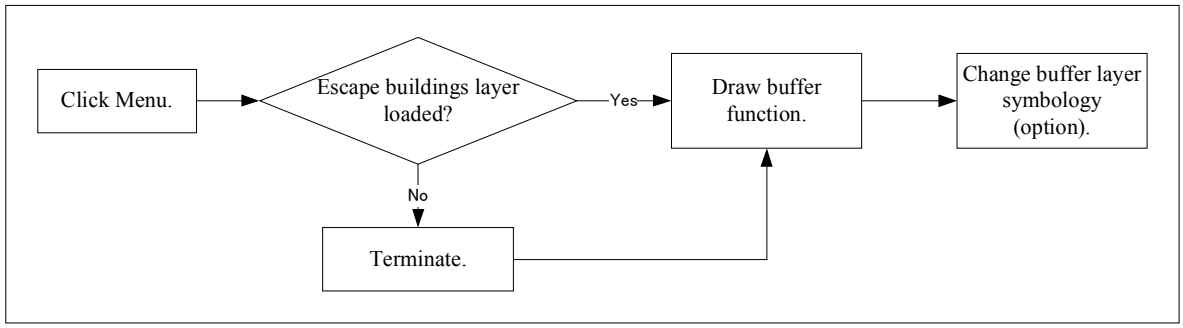
The settings are loaded from an external MDB file. If the external MDB file does not contain setting for one or more planning tools, an error message will appear (Figure 7.13).

7.5 SECTOR PLANNING MODULE (Manipulation)

7.5.1 Escape Building Planning Module

(1) Operation Flow

Figure 7.5.1 shows the operation flow for Escape Building Planning Module.



Source: JICA Study Team

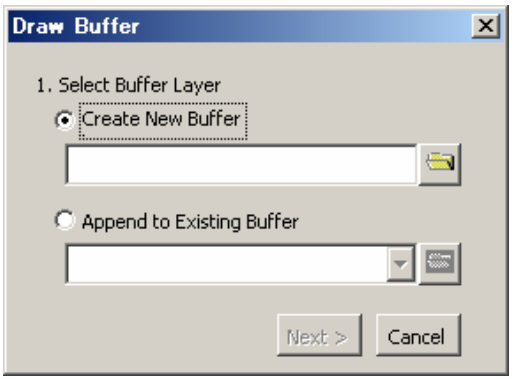
Figure 7.5.1 Operation Flow for Sector Planning Modules

(1) Manipulation of Escape Building Planning Module

(2) Clicking on "Escape Building Planning" in the Planning menu;

"Draw Buffer" dialog opens (Figure 7.5.2). To create a new buffer feature layer (Shapefile), choose "Create New Buffer" and specify the new shapefile name in the "Save Shapefile" dialog. This dialog is opened by clicking on the Open Folder button ( ).

To load an existing feature layer (Shapefile), choose "Append to Existing Buffer" and specify the existing Shapefile name in the "Open Polygon Layer" dialog. This dialog is opened by clicking on the Open Folder button ( ). Alternatively, choose the polygon layer from the combo box. By clicking on the "Next>" button, the user can proceed to the next step.



Source: JICA Study Team

Figure 7.5.2 "Draw Buffer" Dialog Window

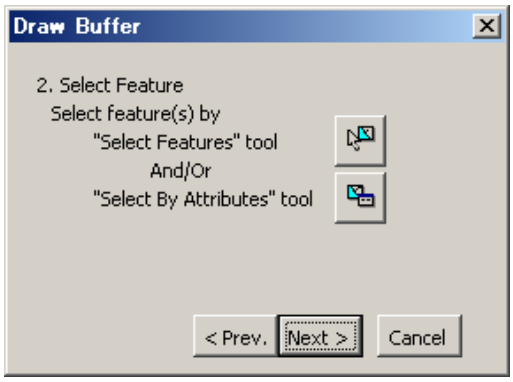
If the Escape Building Planning module has no base data, an error message appears (Figure 7.5.3).

Source: JICA Study Team

Figure 7.5.3 "Error Message" Dialog Window

2) Selecting features for buffering;

The user selects feature(s) for generating buffers. The "Select Features" tool and "Select By Attributes" tool are available for selecting features (Figure 7.5.4), if required (for details about using the "Select Feature" tools, please refer to the ArcGIS on-line Help). By clicking on the "Next>" button, the user can proceed to the next step.

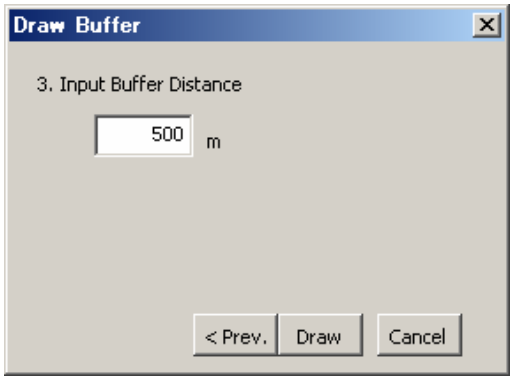


Source: JICA Study Team

Figure 7.5.4 "Select Features" and "Select by Attributes" Dialog Window

3) Inputting a buffer distance;

The user input the buffer distance value (m). The value must be a numerical value. By clicking on the "Draw" button, the user can draw the buffers (Figure 7.5.5).

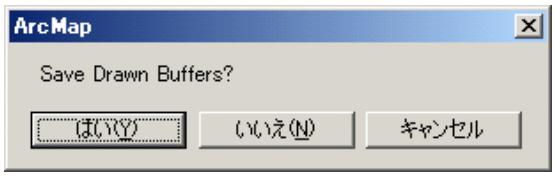


Source: JICA Study Team

Figure 7.5.5 "Input Buffer Distance" Dialog Window

4) Choosing "save" or "discard" the generated buffer;

The user clicks on the "Yes" button to store the generated buffer in the buffer feature layer. If the user clicks on the "No" button, the generated buffer is discarded (Figure 7.5.6).

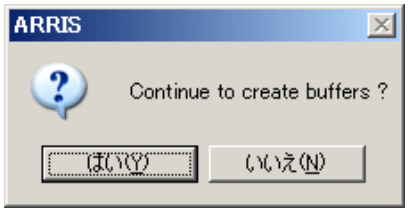


Source: JICA Study Team

Figure 7.5.6 "Save Drawn Buffers" Dialog Window

5) Continuing creation of buffer polygons;

By clicking on the "Yes" button, the user can continue creating buffers. This will allow you to add more buffer polygons by repeating the Create Buffer procedure. Alternatively, if the user wants to finish creating buffer polygons, the user may click on the "No" button to terminate the generation of the buffer polygons (Figure 7.5.7).



Source: JICA Study Team

Figure 7.5.7 "Continue to Create Buffers?" Dialog Window

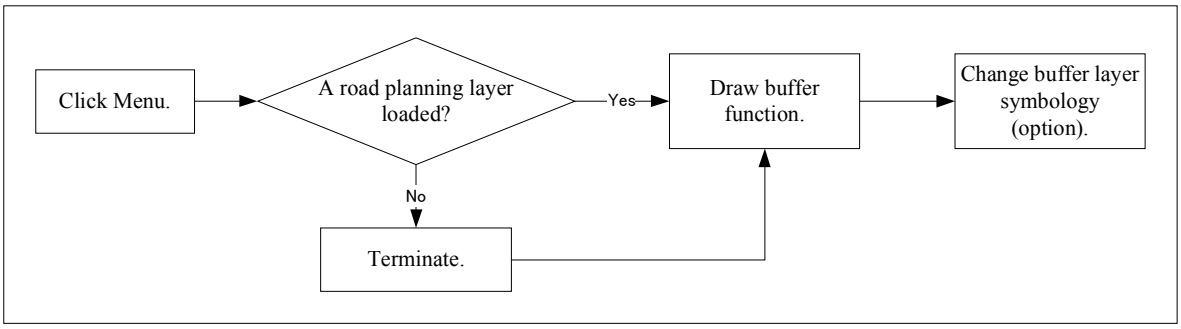
6) Changing the buffer layer symbology (option);

If desired, the user can change layer symbol for a better appearance. For details about changing the layer symbology, please refer to the ArcGIS on-line Help.

7.5.2 Road Planning Module

(1) Operation Flow

Figure 7.5.8 shows the operation flow for Road Planning Module.



Source: JICA Study Team

Figure 7.5.8 Operation flow for Road Planning Module

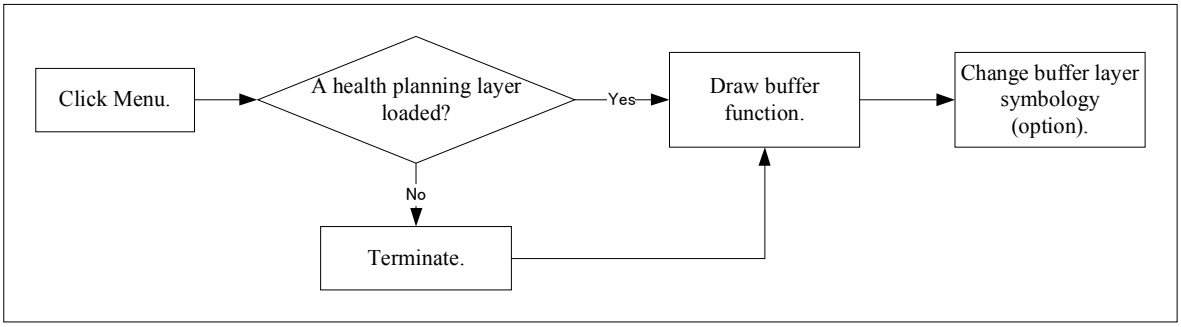
(2) Manipulation of Road Planning Module

The Road Planning Module is used in a very similar way to the Escape Building Planning Tool mentioned above. However, because the roads are represented as polylines, a buffer is drawn parallel to the road. The buffer is formed as a series of merged circles, so the buffer is not exactly parallel to the road (line) that is being buffered.

7.5.3 Health/Medical Planning Module

(1) Operation Flow

Figure 7.5.9 below shows the operation flow for Health/Medical Planning Module.



Source: JICA Study Team

Figure 7.5.9 Operation Flow for Road Planning Module

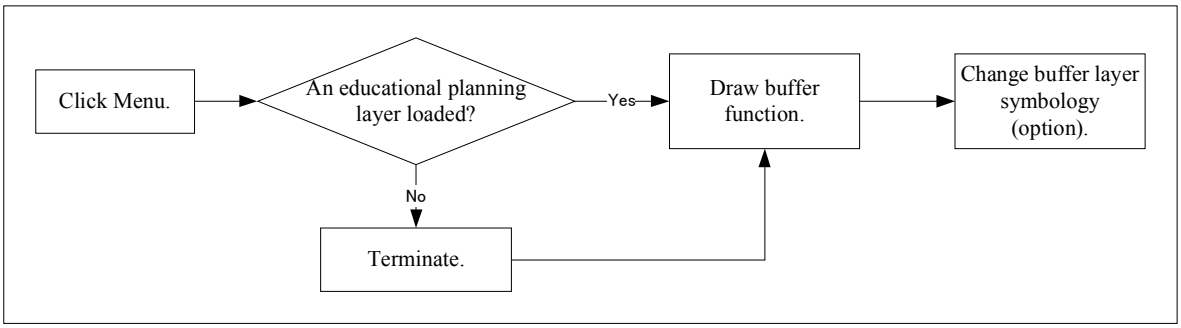
(2) Manipulation of Health/Medical Planning Module

The Health/Medical Planning Module is used in a very similar way to the Escape Building Planning Tool.

7.5.4 Education Planning Module

(1) Operation Flow

Figure 7.5.10 below shows the operation flow for the Education Planning Module.



Source: JICA Study Team

Figure 7.5.10 Operation flow for Education Planning Module

(2) Manipulation of Education Planning Module

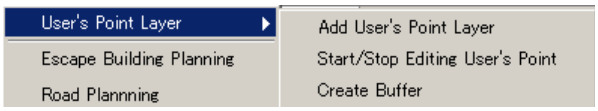
The Education Planning Module is used in a very similar way to the Escape Building Planning Tool.

7.6 CREATE BUFFER POLYGON MODULE

7.6.1 User Point Layer Tool

The "User's Point Layer Tool" contains three functions (Figure 7.6.1)

- Add User's Point Layer
  To add a User's point feature layer (Shapefile) from an existing file, or create a new Shapefile.
- Start/Stop Editing User's Point:
  To start/stop editing the User's point feature layer; this function acts in the same way as the "Start Editing" and "Stop Editing" tool on the standard ArcGIS Edit toolbar.
- Create Buffer
  To create buffers for the User's point feature layer.



Source: JICA Study Team

Figure 7.6.1 Items in "User's Point Layer" Sub-menu

7.6.2 Add User's Point Layer

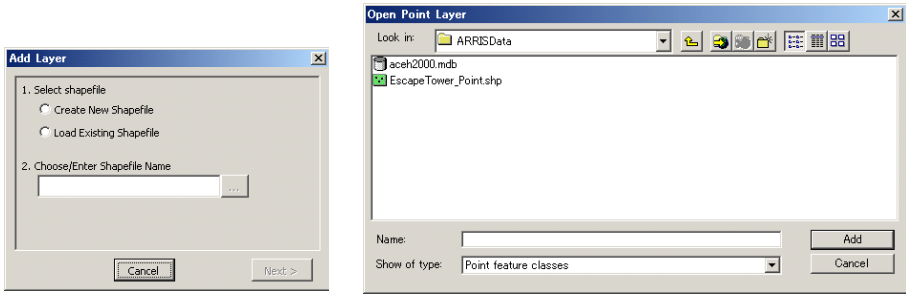
This function is used to add a user's point feature layer (Shapefile) from existing Shapefile, or create a new Shapefile.

1) Clicking on "Add User's Point Layer" in "User's Point Layer" menu (Figure 7.6.2);

The Add Layer dialog will open. The user must choose "Create New Shapefile" if the user wants to create a new Shapefile, or the user must choose "Load Existing Shapefile" if the user already has a shapefile that the wants to use as a User's point feature layer.

Next, the user specifies the shapefile name. In order to specify the shapefile, the user clicks on the "…" button. The Open Point Layer dialog will be displayed. After choosing the desired shapefile, the user clicks on the "Add" button.

If the users chooses "Load Existing Shapefile" (see above), this procedure is finished. However, if the user chooses "Create New Shapefile", the user proceeds to the next step.



Add Layer dialog　　Open Point Layer dialog

Source: JICA Study Team

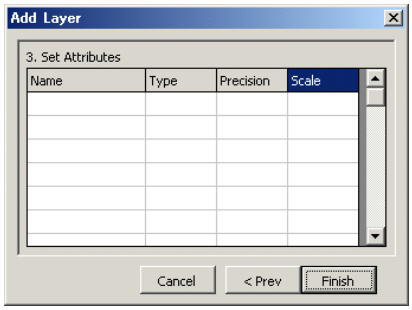
Figure 7.6.2　"Add Layer" Dialog and "Open Point Layer" Dialog Windows

2) Creating attribute fields for a new shapefile;

Each Shapefile must have at least one attribute field. Some examples of typical attributes are as follows:

- Data Name
  Type: String
  Precision: Number of characters (for text field width)
- Buffer Distance
  Type: Integer or Long Integer
  Precision: Number of digits (for integer number size)

After creating attribute fields, the user clicks on the "Finish" button (Figure 7.6.3). A new Shapefile will be created and automatically loaded into the TOC of ArcGIS.



Source: JICA Study Team

Figure 7.6.3　User Dialog for Specifying Attributes of a New Shapefile

7.6.3 Add User's Point Layer

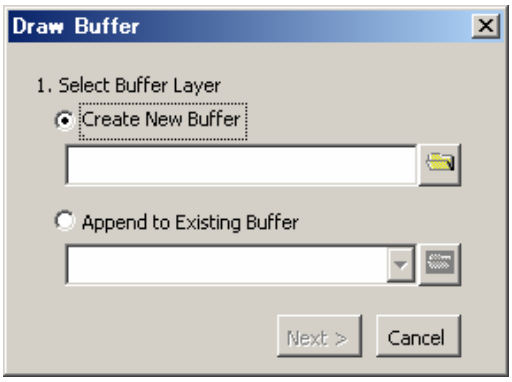
A User's point feature layer can be edited by the user. To start or stop an editing task, the user clicks on "Start/Stop Editing User's Point" in the User's Point Layer menu (a Planning menu option).

For details about point feature editing, please refer to the ArcGIS on-line Help.

7.6.4 Creating Buffer Polygons for a User's Point Layer

1) The user clicks on "Create Buffer" in the "User's Point Layer" menu;

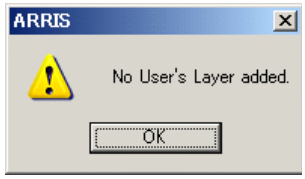
The Draw Buffer dialog will open (Figure 7.6.4). To create a new buffer feature layer (Shapefile), the user chooses "Create New Buffer" and specifies the new shapefile name in the "Save Shapefile" dialog. This dialog is opened by clicking on the Open Folder button ( ).



Source: JICA Study Team

Figure 7.6.4 "Draw Buffer" Dialog Window

To load an existing feature layer (Shapefile), the user chooses "Append to Existing Buffer" (Figure 7.6.4) and specify the existing shapefile name by selecting it from the "Open Polygon Layer". The dialog is opened by clicking on open folder button (see above). Alternatively, the user can chooses the polygon layer from the combo box. By clicking on the "Next>" button, the user can proceed to the next step. If no user's point layer is added, an error message will appear (Figure 7.6.5).

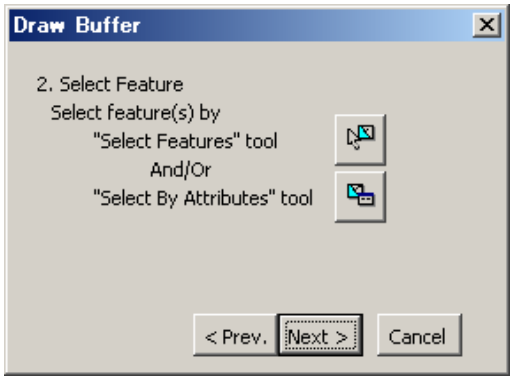


Source: JICA Study Team

Figure 7.6.5 "Error Message" Dialog Window

2) Select features for buffering;

The user selects the point feature(s) for use in generating a buffer. The "Select Features" tool and "Select By Attributes" tools are available for selecting features (Figure 7.6.6).



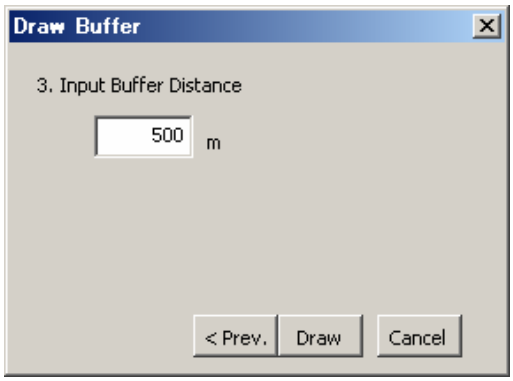
Source: JICA Study Team

Figure 7.6.6 "Select Feature(s)" Dialog Window

For details about using the "Select Feature" tools, the user should refer to the ArcGIS on-line Help. By clicking on the "Next>" button, the user proceeds to the next step.

3) Inputting the buffer distance;

The user enters a buffer distance value (meters). The value must be numerical value. By clicking on the "Draw" button, the user can draw the buffers (Figure 7.6.7).



Source: JICA Study Team

Figure 7.6.7 "Input Buffer Distance" Dialog Window

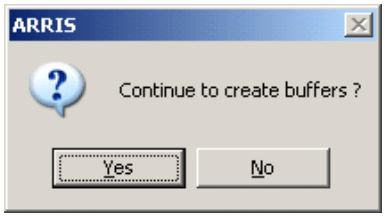
4) Clicking on the "Yes" button to store the generated buffer in the buffer feature layer.

Alternatively, the user can click on the "No" button to discard the generated buffer (Figure 7.6.8).

Source: JICA Study Team

Figure 7.6.8 "Input Buffer Distance" Dialog Window

5) By clicking on the "Yes" button, the user can continue creating buffers. This will allow the user to add more buffers by repeating the Create Buffer procedure mentioned above. Alternatively, if the user have finished creating buffers, the user can click on the "No" button to terminate the Create Buffer function (Figure 7.6.9).



Source: JICA Study Team

Figure 7.6.9 “Continue to create buffers?” Dialog Window

CHAPTER 8 PRESENTATION AND DEMONSTRATION OF ARRIS

Presentation and demonstration of ARRIS were conducted in the course of the Study as follows:

I.	(1) Date: April 21, 2005 (2) Venue: BAPPEDA Province Office, NAD. (3) Who/Presenter: GIS Expert (JICA Study Team). (4) What: Basics of ArcGIS Software: Basic skills for ArcGIS users (manipulation of menus and tools in ArcGIS, registration of base map image data, digitization of spatial data, questions and answers). (5) Why: The training was requested by BAPPEDA Province because ArcGIS has never been used in BAPPEDA Province. (6) Participants (to whom): Mr. Chandler (Staff member responsible for GIS in BAPPEDA Province, NAD). (7) How: Man-to-man training using ArcGIS software (seven hours).
II.	(1) Date: April 28, 2005 (2) Venue: City Office, Banda Aceh City. (3) Who/Presenter: GIS Expert (JICA Study Team). (4) What: Basic Version of ARRIS: Plans for ARRIS, introduction of GIS technology, contents of the GIS database for the Basic Version of ARRIS, questions and answers about the presentation. (5) Why: To inform the stakeholders working in Banda Aceh City about the content of the Basic Version of ARRIS. (6) Participants (to whom): Governmental officers and international organizations/donors were invited (about 30 participants). (7) How: Presentations using PowerPoint, and demonstration of ARRIS using GIS software (approximately 30 minutes).
III.	(1) Date: May 3, 2005 (2) Venue: BAPPENAS, Jakarta. (3) Who/Presenter: GIS Expert (JICA Study Team). (4) What: Basic Version of ARRIS: Plans for ARRIS, introduction of GIS technology, contents of the GIS database for the Basic Version of ARRIS, and questions and answers about the presentation. (5) Why: To inform the stakeholders working in Banda Aceh City about the contents of the Basic Version of ARRIS. (6) Participants (to whom): Governmental officers (BAPPENAS, BPN, BAKOSURTANAL, Ministry of Public Works), UNDP, ADB, JICA Indonesia

	Office, etc. (approximately 20 participants). (7) How: Presentation using PowerPoint, and demonstration of ARRIS using GIS software (approximately 90 minutes).
IV.	(1) Date: December 22, 2005 (2) Venue: Syiah Kuala University (SKU), Banda Aceh City. (3) Who/Presenter: GIS Expert (JICA Study Team). (4) What: Complete Version of ARRIS: Objectives and overview of ARRIS, thematic maps and (GIS) layers in ARRIS, GIS database in ARRIS, trial use of ARRIS data with digital maps of Banda Aceh City, customized tools for ARRIS, announcement about ARRIS data distribution, questions and answers. (5) Why: To inform the stakeholders working in Banda Aceh City about the contents of the complete version of ARRIS, including the digital maps of Banda Aceh City which have a nominal scale of 1:2,000. (6) Participants (to whom): Governmental officers (BAPPEDA, BRR, BAPPEADALDA, Dinas Tata Kota), international organizations/donors, NGO, SKU students, and residents in Banda Aceh City (approximately 50 participants). (7) How: Presentation using PowerPoint and posters, demonstration of ARRIS using GIS (approximately 180 minutes).
V.	(1) Date: January 18, 2006 (2) Venue: BAPPENAS, Jakarta. (3) Who/Presenter: GIS Expert (JICA Study Team), Mr. Luky Eko W. (BAPPENAS). (4) What: Complete Version of ARRIS: Introduction of the JICA Study for URRP, objectives and overview of ARRIS, thematic maps and (GIS) layers in ARRIS, GIS database in ARRIS, customized tools for ARRIS, announcement about ARRIS data distribution, questions and answers. (5) Why: To inform the stakeholders working in Banda Aceh City about the contents of the complete version of ARRIS, including the digital maps of Banda Aceh City which have a nominal scale of 1:2,000. (6) Participants (to whom): Governmental officers (BAPPENAS, BRR, BAKOSURTANAL, the line ministries), international organizations/donors, JICA Indonesian Office (approximately 25 participants). (7) How: Presentation using PowerPoint and posters, demonstration of ARRIS using GIS (approximately 90 minutes).
VI.	(1) Date: January 27, 2006 (2) Venue: Syiah Kuala University, Banda Aceh City. (3) Who/Presenter: GIS Expert (JICA Study Team), Mr.Eddy Purwanto (BRR), and Mr. Mr.Muzailin (SKU). (4) What: Complete Version of ARRIS: Introduction of the JICA Study for URRP,

	objectives and overview of ARRIS, thematic maps and (GIS) layers in ARRIS, GIS databases in ARRIS, announcement about ARRIS data distribution, questions and answers. (5) Why: To inform the stakeholders working in Banda Aceh City about the content of the complete version of ARRIS, including the digital maps of Banda Aceh City which have a nominal scale of 1:2,000. (6) Participants (to whom): Governmental officers (BRR, BAPPEDA, BAPPEDALDA, Dinas Tata Kota, etc.), international organizations/donors (World Bank, ADB, WHO, GTZ, etc.), NGOs, JICA (approximately 60 participants). (7) How: Presentation using PowerPoint and posters, demonstration of ARRIS using GIS (approximately 90 minutes).