

STUDY ON URGENT ESTABLISHMENT OF TOPOGRAPHIC MAPPING IN EAST TIMOR – CREATION OF TOPOGRAPHIC INFORMATION FOR ESTABLISHMENT OF CADASTRE IN EAST TIMOR

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- *The first digital topographic mapping in East Timor after the violence following the independence vote in September 1999.*
- *Cadastral and other necessary data for mapping were lost during the violence.*
- *Many houses and buildings were destroyed or burned out.*
- *Complications in land ownership and use of public facilities and buildings.*
- *Public facilities data using GIS.*

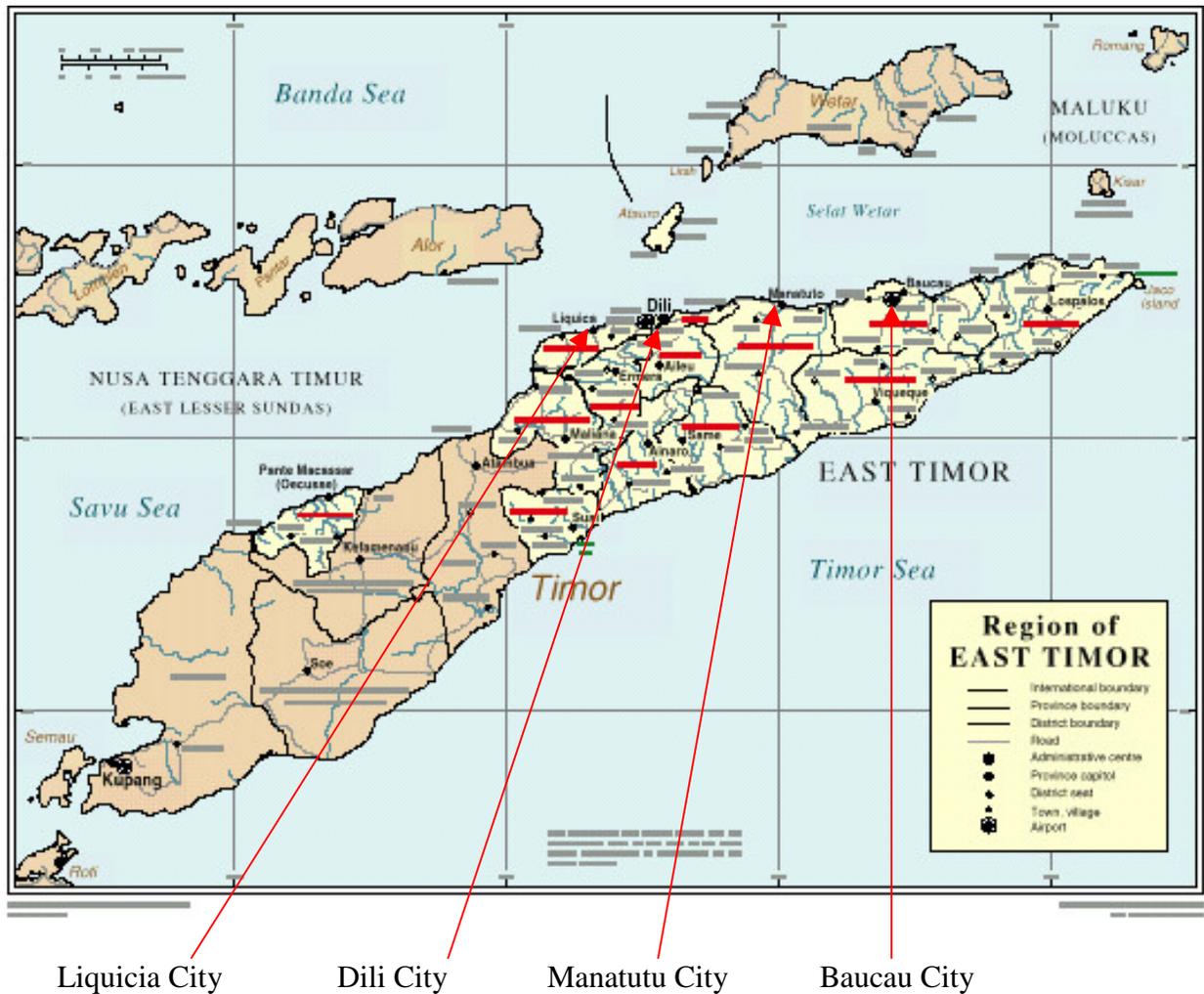
1. BACKGROUND OF THE PROJECT

In response to a request from the United Nations Transitional Administration in East Timor (UNTAET), the Government of Japan decided to conduct a “Study on the Urgent Establishment of Topographic Mapping in East Timor” (“the Study”).

This Study was carried out by the Japan International Cooperation Agency, the official agency responsible for the implementation of the technical cooperation programs of the Government of Japan. Asia Air Survey Co., Ltd. sent a Study Team to East Timor under contract with JICA and carried out field work in East Timor and office work in Japan.

The Study area covers Dili City and its surrounding area in East Timor. The total study area is 107 square km for 1:2,000 scale digital topographic mapping and digital GIS data preparation. The Study was started in February 2000 and ended September 2000, and was the first digital topographic mapping carried out in East Timor after the violence following the independence vote in September 1999.

Location Map of East Timor



The Study Area

1. Aerial photography area

- | | |
|------------------|---------------|
| 1) Dili City | 107 square km |
| 2) Manatutu City | 50 square km |
| 3) Baucau City | 72 square km |
| 4) Liquicia City | 28 square km |

2. Digital topographic mapping and GIS data preparation area

- | | |
|--------------|---------------------------|
| 1) Dili City | 107 square km (83 sheets) |
|--------------|---------------------------|

Aerial Photo of the Center of Dili City



Dili Port Roofless building
(Destroyed / burned out building) UNTAET Central Office Container Open Market

Date of aerial photography: 12:15 PM, 11 April 2000
Photo scale: Approx. 1:4,000

Field Photo



Panoramic view of Dili City



Houses destroyed / burnt in September 1999 in Dili City

2. PROBLEMS IN EAST TIMOR

East Timor and Dili City have the following serious problems related to topographic maps at present.

- 1) The only available topographic maps of East Timor were basically the 1:25,000 scale topographic maps put together by BAKOSURTANAL (Indonesian Survey and Mapping Authority) of the Republic of Indonesia in the 1990's (aerial photos taken in the 1980's and 1990's were used for 1:25,000 scale topographic mapping). In addition, other partial topographic maps of larger scale were also available, but those maps had been expanded and compiled from the 1:25,000 scale topographic maps.
- 2) The leveling network and GPS points network had been established by BAKOSURTANAL during the Indonesian period. The concrete monuments of benchmarks and GPS points still exist in East Timor. However, documentary descriptions of benchmarks and GPS points, coordinates lists etc., were lost during the violence following the independence vote in September 1999.
- 3) The Indonesian Government's documents (statistic data, land registration data, resident registration data etc.) were also lost during the violence following the independence vote in September 1999.
- 4) Since land use data were destroyed during the violence after September 1999, many disputes have arisen in connection with land ownership within Dili City. In order to settle these disputes, there is an urgent need to develop large scale topographic maps, to conduct a land-use survey and to build a database system ensuring that the results of the land use survey are properly arranged on the newly developed large scale topographic maps.
- 5) The facilities and buildings owned by the former Indonesian Government will belong to East Timor after its independence, but what facilities and buildings exist in which areas is not accurately known, because of the loss of the Indonesian Government data. Therefore, it is necessary for these facilities and buildings to be clearly defined as the national property of East Timor, before UNTAET turns over the reins to the future Government of East Timor.
- 6) A number of public facilities, buildings and houses within Dili City were damaged / burned out during the violence after September 1999. Therefore, it is necessary for a survey to be carried out to determine what level of damage buildings and houses in each area were subjected to, and to prepare a survey report so that planning for the reconstruction of Dili City can begin promptly.

3. USE OF PUBLIC FACILITIES AND BUILDINGS

Many houses and buildings in Dili City were destroyed / burned out during the violence following the independence vote in 1999, and most of them remained damaged at the time of map creation.

There were over 450 public facilities and buildings and approximately 50 schools in the mapping area. Most of the facilities and buildings were owned by the Indonesian Administration. Some of them were burnt / destroyed and closed down, while others were not burnt but simply closed down, or used for other purposes.

The ownership and use of public facilities and buildings is a complicated matter compared with other areas. The use of public facilities and buildings is classified into three types, as follows:

- 1) Public facilities and buildings from the Indonesian period that remain damaged and unused after being damaged during the violence following the independence vote of September 1999.

Example:

Indonesian Period: Office of Ministry of Public Works of Indonesia

Present time: Remains damaged and abandoned

- 2) Public facilities and buildings from the Indonesian period that were damaged or undamaged, but that have been restored by a UN organization and are now in use.

Example:

Indonesian Period: Indonesian Provincial Government Office

Present time: Central Office of UNTAET

- 3) Public facilities and buildings from the Indonesian period that were damaged or undamaged, but are now used for the same purposes as during the Indonesian period.

Example:

Indonesian Period: Elementary school

Present time: Still used as an elementary school.

4. CHARACTERISTICS OF DIGITAL TOPOGRAPHIC MAPS

In view of the background described above, the Study Team determined that the 1:2,000 scale digital topographic maps to be created under this Study should be different from the general topographic maps for other areas, and decided to create these maps by the following method:

- Method used for creation of 1:2,000 scale digital topographic maps

1) Damaged and undamaged buildings and houses

It is necessary to classify the damaged and undamaged buildings and houses on the 1:2,000 scale digital topographic maps to be created. For this purpose, the following methods were applied

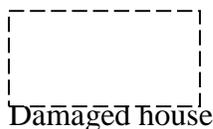
a) Ordinary houses

Ordinary houses are classified by photo interpretation in plotting, based on whether the house has a roof or not, as follows:

Example:

Ordinary house with roof: Undamaged house – drawn in unbroken lines

Ordinary house without roof: Damaged house – drawn in broken lines



b) Public facilities and buildings

Damaged or undamaged public facilities and buildings are determined basically in the same way as ordinary houses, using photo interpretation in plotting. However, many of those public facilities and buildings have been restored and are now being used by UNTAET or PKF.

Therefore, in addition to the ordinary field identification, further detailed data and information were required for 1:2,000 scale digital topographic maps. Inventory study data sheets were prepared to verify each of the public facilities and buildings on the spot and check whether it has a roof or not, whether it is burnt or not, its restored status and whether it is in use or unused.

These inventory data sheets were attached to each public facility and building as attribute data on the 1:2,000 scale digital topographic maps, using GIS.

2) Representation of symbols for public facilities and buildings

As mentioned previously, ownership and use of public facilities and buildings takes three forms. Therefore, it is necessary for the form of ownership / use of the facility or building to be represented on the map. In the 1:2,000 digital topographic maps, the following symbols were adopted in representing public facilities and buildings.

- a) If the current ownership and use of a public facility or building is the same as during the Indonesian period, the symbol for the current use is adopted.

Example:

Indonesian Period: Elementary school

Present time: Elementary school – Use the symbol for elementary school

- b) If the current ownership and use of a public facility or building is different from what it was during the Indonesian period, the symbol for the currently use of the public facility or building is adopted.

Example:

Indonesian Period: Indonesian Government Office

Present time: UNTAET – Use the symbol for UNTAET

- c) If a public facility or building from the Indonesian period remains damaged and unused, the symbol for the public facility or building during the Indonesian period is used. However, bold lines are used to represent the building, to indicate that it is not classified according to its present ownership and use.

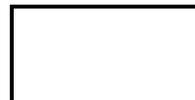
Example:

Indonesian Period: Office of the Ministry of Public Works of Indonesia – Use the symbol for Government office.

Present time: Unused and abandoned



Ordinary building



Building with the symbol used during the Indonesian period, but not in use now

- d) For buildings and facilities owned by or connected with the Indonesian military, symbols for Indonesian military facilities were created.

5. CONCLUSION

One of the important objectives in the creation of 1:2,000 scale topographic maps in this Study was that the maps should be prepared as soon as possible so that they may be used in preparation for the soon-to-be-commenced reconstruction of urban facilities in Dili City and in tackling the problems (especially land ownership disputes) faced by Dili City, the largest city in East Timor.

However, most of the materials necessary for the creation of digital topographic maps were lost during the violence after September 1999. Thus, the Study Team had to collect through field identification the various types of information necessary for the creation of digital topographic maps.

In addition, many of the urban facilities, buildings and ordinary houses had been damaged during the violence after September 1999 in the areas to be covered in the digital topographic maps created in this Study. Some of the governmental facilities and buildings used in the Indonesian period are now used by UNTAET and PKF, but others have been abandoned.

Therefore, the specific circumstances in which Dili City is currently placed, and many other conditions, had to be considered with regard to the application of the topographic maps to be created. The Study also involved much trial and error in determining how the information regarding these new conditions should be represented on the digital topographic maps.

As described above, in comparison with work for other areas the Study faced many difficulties in the creation of digital topographic maps, in terms of the time required and the content of the work. It is also anticipated that the topographic maps will be subject to on-going changes as progress is made in the reconstruction of Dili City.

Dili City is undergoing rapid restoration after the troubles of September 1999, thanks to assistance from many countries and investment by the private sector. However, the 1:2,000 digital topographic maps created in the Study are based on information from aerial photos taken over a short period of time, from the beginning to the end of April 2000 and the results of the field survey carried out over a period lasting from the middle of April to the end of May 2000.

The restoration of Dili City is now proceeding at a faster pace than it was at the time the Study Team started the Study in East Timor. Therefore, the digital topographic maps will soon contain many discrepancies from actual conditions unless they are modified continuously.

In particular, the following data should be modified continuously:

1) **Symbols for public facilities, etc.**

The buildings and facilities marked with symbols indicating that they are the facilities of UN organizations such as UNTAET and PKT will have to be modified when use of UNTAET or PKF, etc. terminates.

2) **Symbols for damaged buildings and houses**

As the damaged buildings and houses are represented by broken lines, the

representations of these buildings and houses should be changed into the symbol (unbroken lines) for undamaged buildings and houses when they are repaired or rebuilt.

3) Symbols for facilities and buildings of the Indonesian military

Facilities and buildings of the Indonesian military are marked with the symbol () on the topographic maps. The basic principle of topographic maps is that the current purpose or status of use of the facilities and buildings should be represented on the maps.

On the topographic maps created in the Study, facilities and buildings used by the Indonesian military are marked with the symbol (). However, these facilities and buildings will be used for other purposes in future, and the symbol for those facilities will have to be changed accordingly.

4) Representation and symbols for governmental facilities and buildings from the Indonesian period that are not currently used

Governmental facilities and buildings from the Indonesian period that are not currently in use are represented with bold lines and marked with symbols indicating their use during the Indonesian period. The representations and symbols for these facilities and buildings will also have to be changed if they come to be used for other purposes.

REFERENCES

- WATANABE Toru, August 2000, Final Report for the Study on Urgent Establishment of Topographic Mapping in East Timor, Tokyo, Japan International Cooperation Agency
- WATANABE Toru, August 2000, Summary of Final Report for the Study on Urgent Establishment of Topographic Mapping in East Timor, Tokyo, Japan International Cooperation Agency

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BIOGRAPHICAL NOTE

Toru Watanabe (born 1951)

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Manager, Survey and Mapping Expert

Overseas Operation Division, Asia Air Survey Co., Ltd.

Projects undertaken recently

1. Study of National Topographic Mapping of the Kita Area in the Republic of Mali (December 2000 – March 2001)
2. Way Sekampong Irrigation Project in the Republic of Indonesia (July 2000)
3. Study on Urgent Establishment of Topographic Mapping in East Timor (February 2000 – September 2000)
4. Detailed Design of the Gilirang Irrigation Project in the Republic of Indonesia (May 1999 – January 2000)
5. Yangze River Civilization Project in China (October 1998 – November 1998)
6. Development Study on the Nationwide Ferry Service Routes in the Republic of Indonesia Phase II (April 1997 – March 1998)
7. Contact Mission for National GIS Project in Angora (December 1996)
8. Scope of Work Mission for Topographic Mapping, Angkor Archaeological Area in the Siem Reap Region in Cambodia (September 1996 – October 2000)
9. Project Formation Mission in the Kingdom of Cambodia (February 1996 – March 1996)
10. Detailed Design on the Batang Hari Irrigation Project in the Republic of Indonesia (January 1995 – May 1995)