

UNOCAL GIS AND DATABASE SOFTWARE

TECHNICAL PROPOSAL SUBMITTED TO UNOCAL

*This paper is intended to be used as a reference of
Pemrograman Skala Besar I and II course.*

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JURUSAN ILMU KOMPUTER
FAKULTAS MATEMATIKA DAN ILMU PENGETAHUAN ALAM
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CHAPTER I

INTRODUCTION

1.1 Background

One necessary thing that needs to be provided in order to increase the productivity and efficiencies of a large company, such as UNOCAL, is by giving the employees an easy and quick access to the information they need. This can be achieved by storing and managing the information in computers. Especially for UNOCAL, which operates in the field of oil exploration on the offshore, the information needed would be data of tidal stream, wave, scheme of existing facilities, etc. This information could be integrated and managed by an application software which is developed base on database and Geographical Information System (GIS) processing. By operating this application software, then users can speed up the search of the information they need.

1.2 Aim of Work

The proposed Work is intended to develop information system software which would help the UNOCALs get the information needed, such as schemes of existing facilities and data of various measurements, easily and quickly. It says easily and quickly, because the software and the information would be installed in a computer, and the users would just need to pop up menus to get the information, view them or even make the hard copies.

1.3 Scope of Work

In developing the UNOCAL GIS and Database Software, CONSULTANT would also conduct the data survey, and data entry. Measurements (such as wave measurement) and processing data would be excluded.

To be more detail, the scope of work would be broken into the following :

- a. Interviewing/discussing the UNOCALs to get the overview of user requirements.
- b. Searching and collecting data related to the users requirements from UNOCAL and related instances, and proposing its format to be used.
- c. Developing the UNOCAL GIS and database Software with the following specifications:
 - the Software would be able to show and print the information both in text and picture/graphical form
 - data used by the Software can be updated as needed
 - the Software can be develop furthermore
- d. Preparing the Software manual such that it would be easy to be learned.
- e. Conducting the Software training for the users.

CHAPTER II

THE PROPOSED APPLICATION SOFTWARE

2.1 Understanding the work

As UNOCAL operates in offshore oil exploration, characteristic data which represents its field operation will always be needed. A few of the data are wave, current, climate, wind and sea depth. These are required in managing UNOCAL's field as well as in planning its future expansion.

Currently, such data can be found in paper archives and computer files in various format. Managing data has been found to be difficult, and searching/accessing data will take considerably a lot of time.

To resolve these problems, CONSULTANT proposes to develop an application software which would be based on database and GIS processes, named UNOCAL Database and GIS Software. By using this application, UNOCAL's staffs would gain many advantages, such as data can be searched quickly, data format is uniform so that it can be managed easily and be updated whenever necessary.

2.2 Description of UNOCAL Database and GIS Software

The description of the proposed software mentioned here under is based on CONSULTANT knowledge and information that has been searched so far. Later on, if CONSULTANT is given the contract to really develop the application, CONSULTANT would do a thorough survey related to the software development, and therefore would update the design to meet the user's requirements.

The proposed Application Software would contain and manage the information necessary for UNOCAL, and the information would be presented to users in either texts, graphical maps, or both. To be more specific, some more explanations regarding the information would be given here under.

One kind of information would be oil and Gas Activity and Concession Map. UNOCAL concession area can be seen among other corporations operated in similar field. This kind of information is needed in planning future UNOCAL developments or expansions.

The Existing UNOCAL's Facilities, which details the platform, piping network, etc. would also be prevented. For detailing the platform, data of its platform type, platform dimension, well depth, well capacity will be shown. For piping network, scheme of the piping network, pipe dimension, etc. would be given. These existing facilities are necessary to be learned for managing and maintaining the facilities, as well as for designing new ones.

One other important information would be the characteristic of UNOCAL's operation area. This is represented by data of wind, wave, tidal stream, sea depth and climate. These data would be searched and collected from UNOCAL and other related instances, such as BMG and BAKOSURTANAL. For data of wind, current and climate, CONSULTANT would use data recorded at the stations which close to the UNOCAL's operation area. These various of data would be needed in maintaining the existing facilities, and as well as for designing new ones.

Data managed by the Application Software would not be limited to these mentioned here above, if the contract given, and if others are needed, CONSULTANT would discuss the matter with UNOCAL.

2.2.1 System Context Diagram

The context diagram of the system can be seen on Figure 2.1. Users would give input either in the form of command or data. The Software would consult files (project files) which store the necessary data. These files would be read and updated by the software according to the processes being run. The output information would be presented on screen as well as printed on printers.

2.2.2 UNOCAL Database and GIS Software Features

The features that would operate on data and be given by the Software are as follows:

- updating and storing
- presenting or printing in the form of texts and graphical maps either to the screen or printers.

To access and operate the features, users would need to select the menus as would be described here under (the menus can be changed as necessary later on).

2.2.3 UNOCAL Database and GIS Software Menus

The menu organization is shown on figure 2.2, while each of the menus would be detailed as the following:

a. Menu File

This menu is further divided into submenus *Concession Area*, *Existing Facilities*, *Bathymetry*, *Climatology*, *Tidal Stream*, *Print and Exit*.

- Submenu Concession Area

By selecting File>Concession Area, users will be shown oil and gas activity and Concession Map on a pop up window, as can be seen on figure 2.3. On the window, there are button pad which can be used to select and object, zoom-in, zoom-out, and shift the map. By using the button to select an object (arrow

symbol) and clicking UNOCAL operation area, Existing UNOCAL's Facilities would be shown (see figure 2.4). As CONSULTANT have no Existing UNOCAL's Facilities scheme at this moment, ARCO's existing facilities is used as an example. By using the same button and clicking LIMA Platform area, this platform would be presented in more detail (see figure 2.5)

- Submenu Existing Facilities
The Existing Facilities can also be shown by selecting menu File>Existing Facilities. Included in Existing Facilities are platform data and piping network.
 - Submenu Bathymetri
By selecting File>Bathymetri, bathymetri data of Makasar Strait where UNOCAL operates would be presented as can be seen on figure 2.6. by using the button to select object, the bathymetri map of UNOCAL operations would be shown.
 - Submenu Climatology
By selecting File>Climatology, the maps of climate stations in Indonesia would be presented. There would also be listed the name of the stations, as can be seen Figure 2.7. By using the button to select an object, the data measured at the stations can be shown (see Figure 2.8)
 - Submenu Tidal Stream
By selecting File>Tidal Stream, the map of tidal stream measurements stations in Indonesia would be presented. There would also be listed the name of the stations, as can be seen on Figure 2.9. By using the button to select an object, the data measured at the stations can be shown (see Figure 2.10)
 - Submenu Print
By selecting this submenu, users can print the information the need.
 - Submenu Exit
By selecting this submenu, users can exit from the Software.
- b. Menu Edit
This menu consist of submenu *Edit*, *Add*, and *Save*. By using these submenus, users can add and/or update the data or records saved in database.
- c. Menus Help
By selecting this menu, users will be able to read guidance of how to operate the Software as well as get necessary information regarding the Software operations.

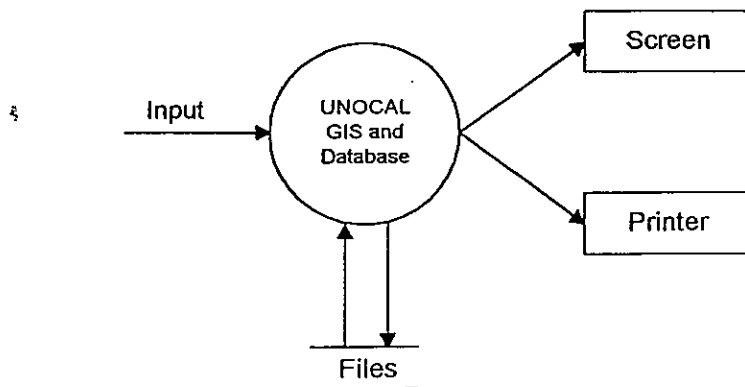


Figure 2.1. System Context Diagram

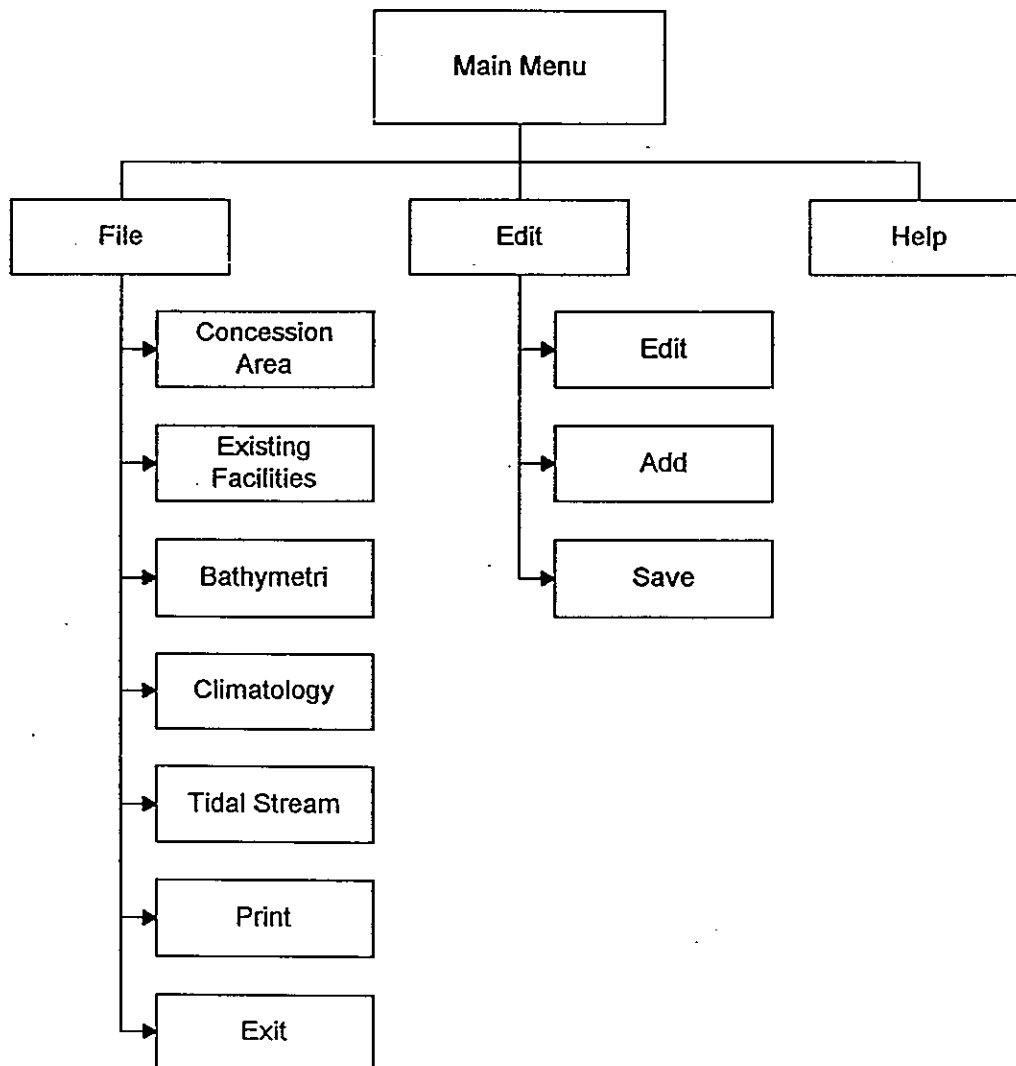


Figure 2.2. UNOCAL GIS and Database Menu Organization

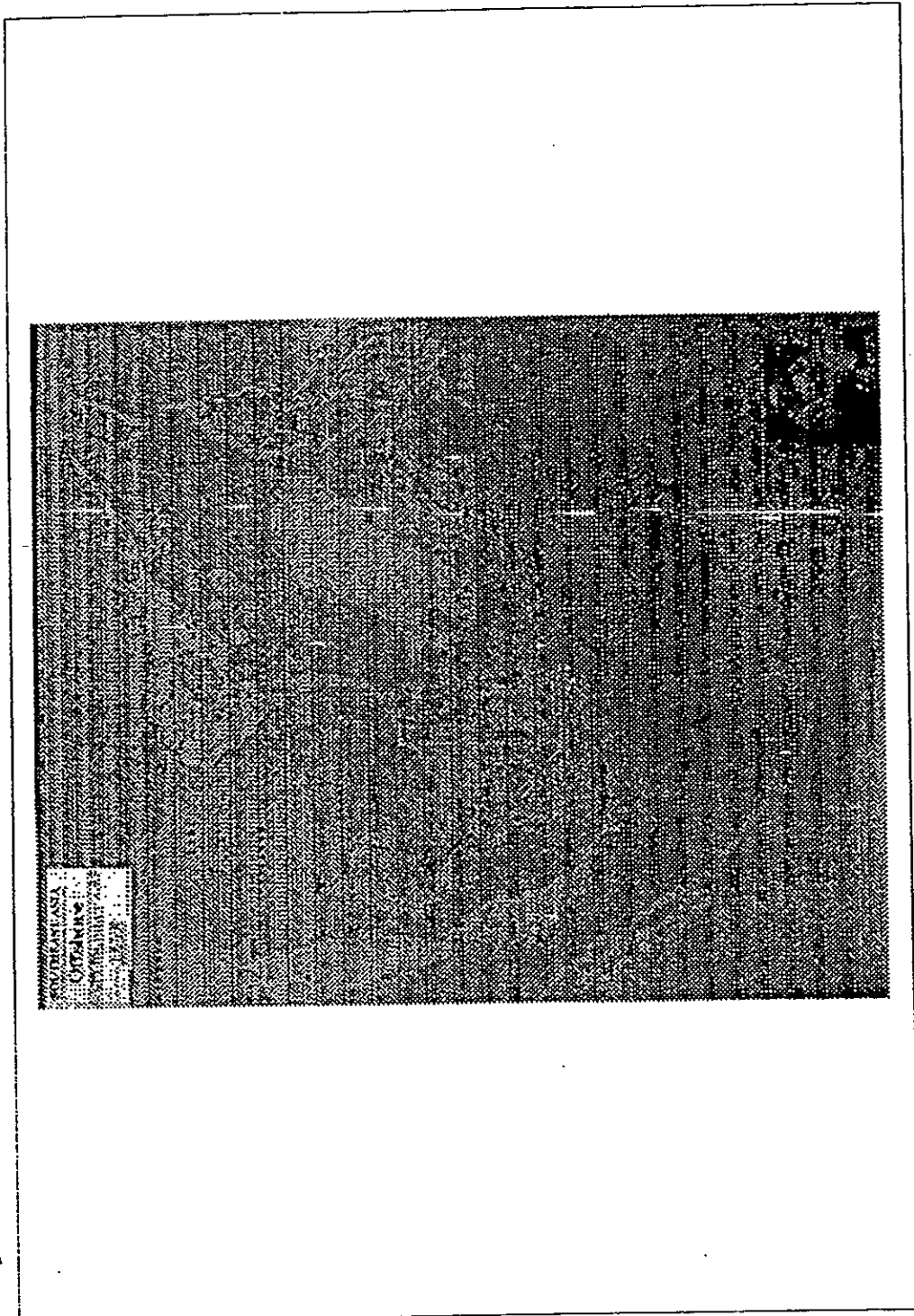


Figure 2.3. Oil and Gas Activity and Concession Map.

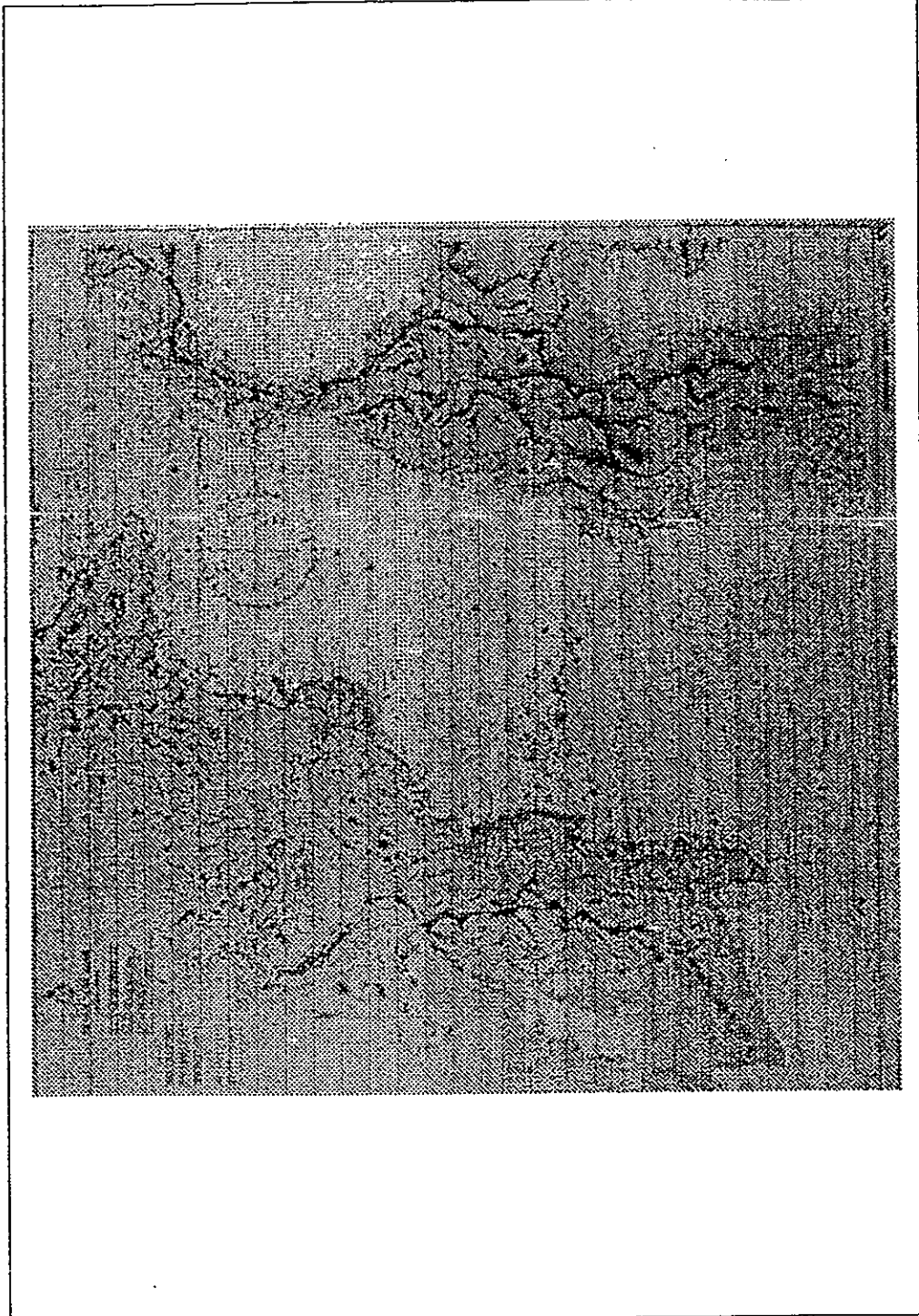
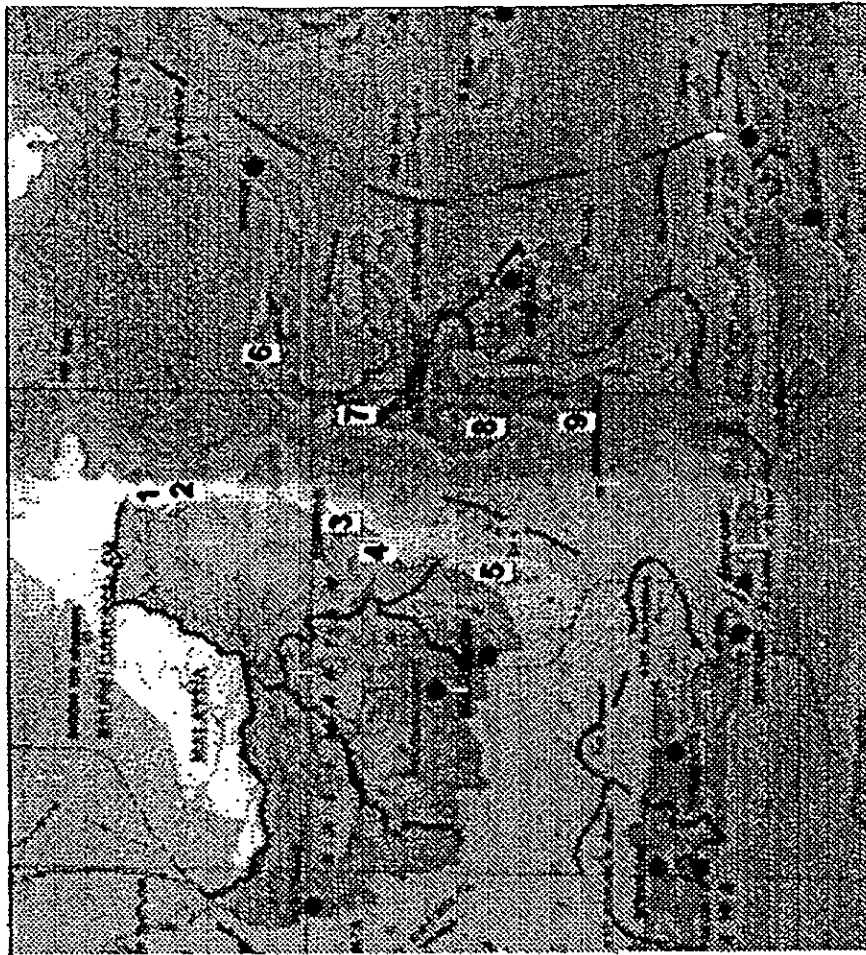


Figure 2.6. Bathymetri Map of Makassar Strait.



No	Climatological_Station
1	TARAKAN
2	TANJUNG SELOR
3	SEI KUNJANG
4	BALIKPAPAN
5	STAGEN
6	TOLITOLI
7	MUTIARA-PALU
8	MAJENE
9	UJUNG PANDANG

Figure 2.7. Climate Station in Indonesia.

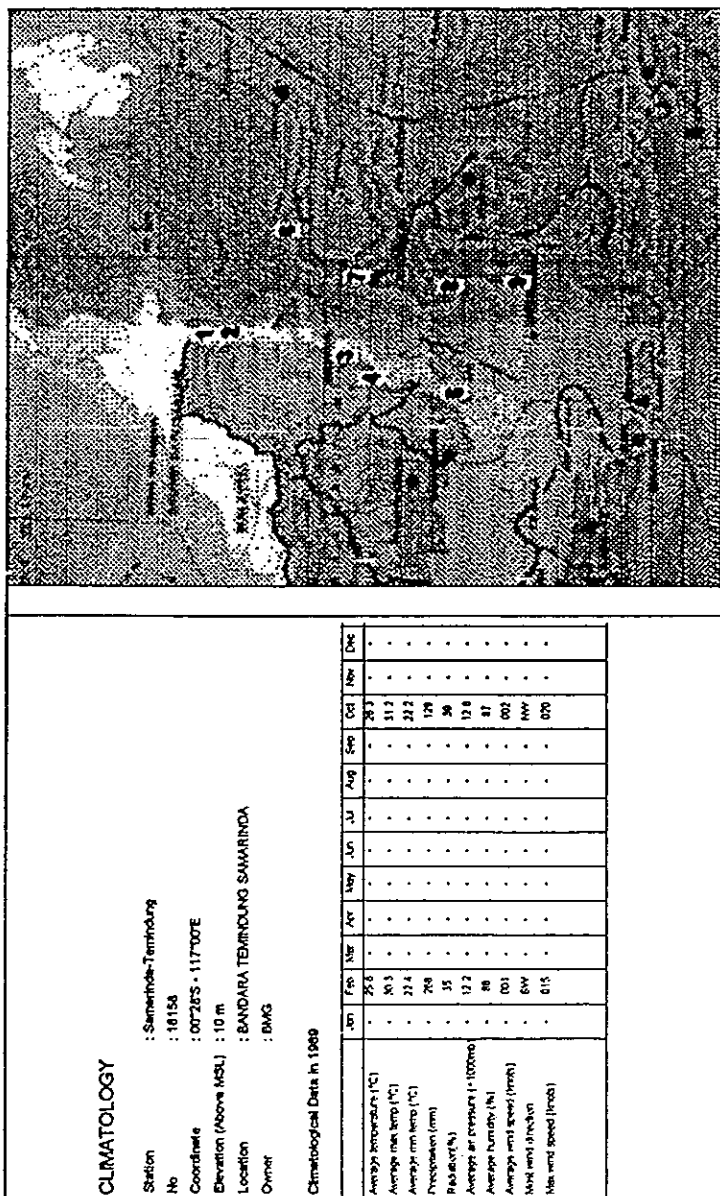


Figure 2.8. Climate Data Measured at the Climate Station.



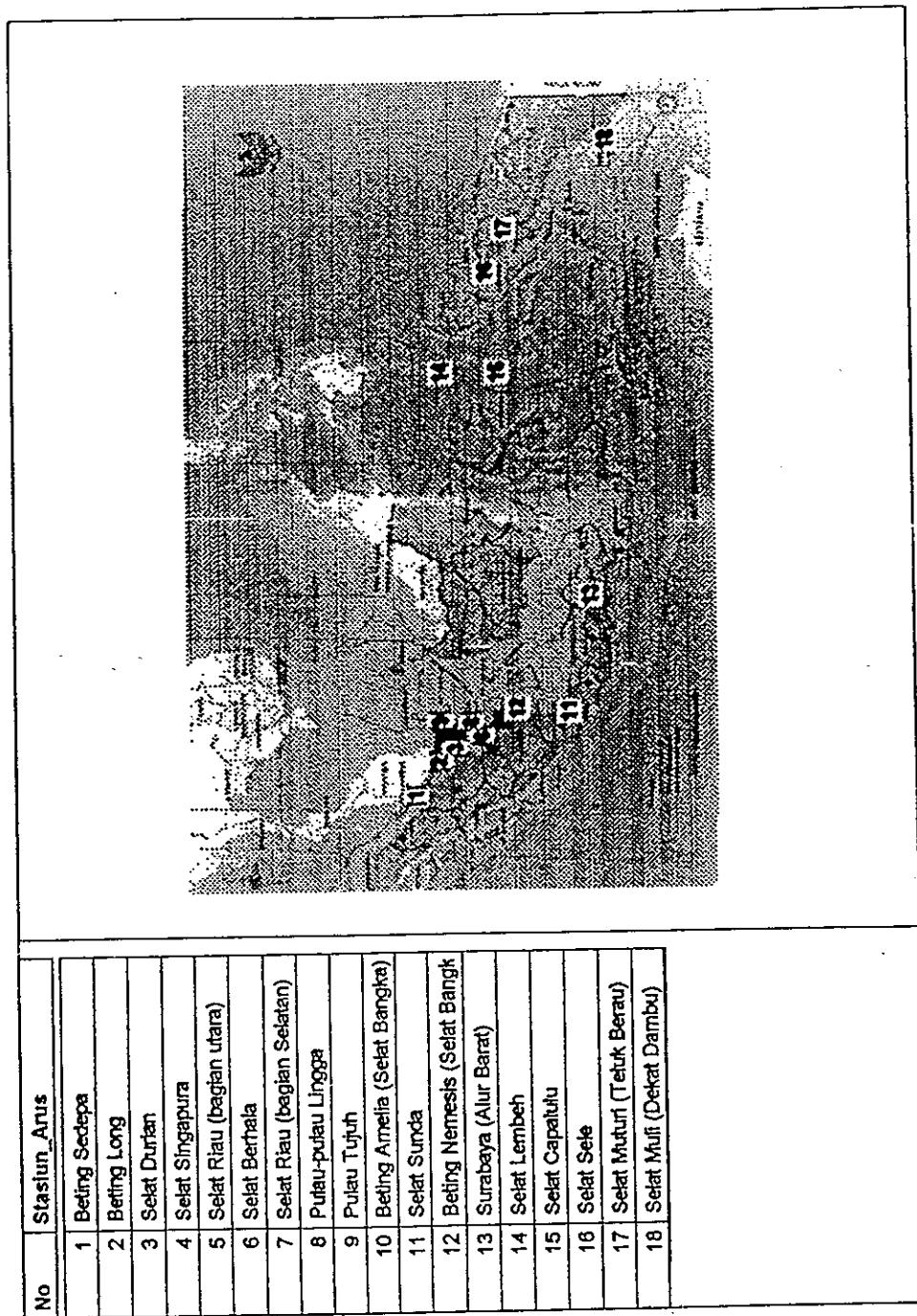


Figure 2.9. Tidal Stream Station in Indonesia.

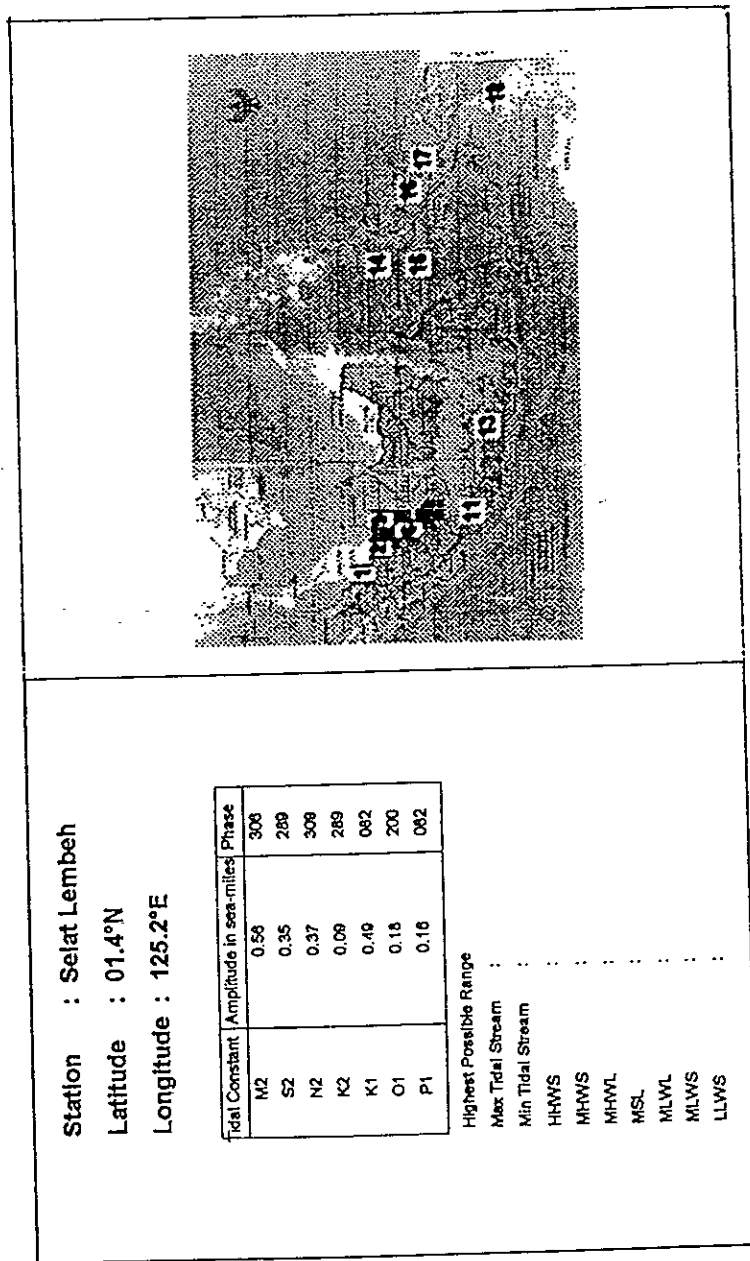


Figure 2.10. Tidal Stream Data at the Tidal Stream Station.

CHAPTER III WORK EXECUTION

Consultant will divide the Work Execution into initiation, analysis, design, implementation, installation and training, and maintenance phase. Each of the phase will be described hereunder.

3.1. Initiation Phase

The following job would be done during this phase:

- a) Administration completion.
- b) Hardware and software procurement.

3.2. Analysis Phase

At this phase the following jobs would be executed:

a. Data Survey

Data will be searched from UNOCAL and other instances as mentioned in Chapter 2.

The survey will be conducted by:

1. Studying references

Data such as the following will be collected from references:

- documents related to the Work
- data will be presented on the UNOCAL GIS and Database Software, such as wave, current pattern, wind, wave tidal, seismic, batimetry, topography, geology and existing facility, etc.
- hardware specification, including the peripherals needed to operate the Software.
- specification of current Geographical Information System, if exists

2. Interviewing related personal

This interview is especially needed to:

- get the overview of related information to be produced and presented to the users, and current constraints overcome in order to obtain these information which would be resolved by implementing the database software,
- get the idea of how far the users understand the related software and hardware.

b. Problem Identification

In order to identify the problems, the following tasks would be performed:

1. Defining the information domain of UNOCAL GIS and Database Software. All of the information for the inputs and outputs would be defined. These information can be concluded after the survey.
2. Defining the functions and processes. By understanding the information domain, then the functions/processes needed can be determined.
3. Estimating the performance. By knowing the hardware and user requirements, the appropriate development tool (other than MapBasic, MapInfo and FoxPro, if needed) will be selected so that the optimum software performance can be achieved.
4. Defining software interface. In this analysis phase, only human interface would be defined as there will be no other system involved.

3.3. Design Phase

The following activities would be performed during this phase:

- a) Designing the internal and external data structure.
The internal structure is the form of the data stored in computer memory, while the external is the form of database file.
- b) Designing the software architecture.
By finishing the analysis phase, the following things can be design:
 - modules which would be implement
 - module hierarchy, stating how the modules would be arranged and integrated.By breaking the software into modules, the software could be maintained and developed easily in the future.
- c) Refining of each modules.
The modules then would be refined and broken into procedures. This procedures would be in form of flow-chart, algorithm and data flow diagram.
- d) Testing the software.
This activity is necessary in order to verify that:
 - The functions have been properly designed.
 - The ease of use has been considered.
 - The ease of maintain and develop have been designed.
 - File integrity has been design properly.
 - Back-up system (i.e. power failure) has been designed.

3.4. Implementation Phase

In this phase, software design would be implemented using the selected development tool. Activities included in this phase are:

- a. Developing prototype.
If clarifications to users' requirements are needed, prototype would be developed and demonstrated.

b. Coding.

Base on the design and demonstration feedback, each procedure would be coded accordingly.

c. Testing for each procedure and module, including:

- Testing each procedure which has been developed. White box testing (tracking the algorithm) and black box testing (by executing the procedure) method would be applied.
- Testing each module. After procedures be integrated into module, each module would be tested (by applying white box and black box testing method). After modules integration, the software would be tested by using applying data obtained from survey as well as created testing data.

3.5 Installation and Training Phase

Installation on UNOCAL computers will be held, after the Database Software has been fully developed. At this phase, training would be given to the users so that users would be able to operate and troubleshoot it.

3.6. Maintenance Phase

- Maintenance would be given for 60 days, after the installation. Maintenance service is to correct problems regarding:
 - design error
 - coding error
 - hardware adaptation

3.7. Report and Discussion

There are 3 reports which would be submitted:

- a. Preliminary Report. This report will describe the analysis and design of the Software, as well as work execution planing. Submission would be after analysis and design phase completed.
- b. Interim Report. This report would detail the progress of the work execution. Submission would be at the middle of implementation phase.
- c. Final Report.
 - This report consists of:
 - Main Report
 - Manual of the UNOCAL GIS and Database Software
 - UNOCAL GIS and Database Software diskettes.

There would be 3 session of discussion:

- a. Preliminary Discussion.
During this discussion, analysis and design of the Software, as well as work execution planing would be presented and discussed.
- b. Interim Discussion.
During this discussion, progress of the work execution would be presented and discussed, and prototype of the Software would be demonstrated
- c. Final Discussion.
During this discussion, the Software would be demonstrated.

3.8. Related Equipment, Operating System and Development Tool

The following are the equipment, operating system and development tools needed to develop the UNOCAL GIS and Database Software:

Equipments	Quantity
A. Hardwares	
1. Personal Computer (PC)	4 unit
2. HP Laser Printer	1 unit
3. HP Deskjet Printer	1 unit
4. Epson Printer	1 unit
5. Scanner	1 unit
6. Digitizer	1 unit
B. Softwares	
1. MS Fox Pro v3.00	1 set
2. Map Info v4.1	1 set
3. Map Basic v4.1	1 set
4. MS Visual Basic v4.1	1 set
5. MS Windows 95	1 set
6. Autocad v12.0	1 set
7. Photostyler	1 set

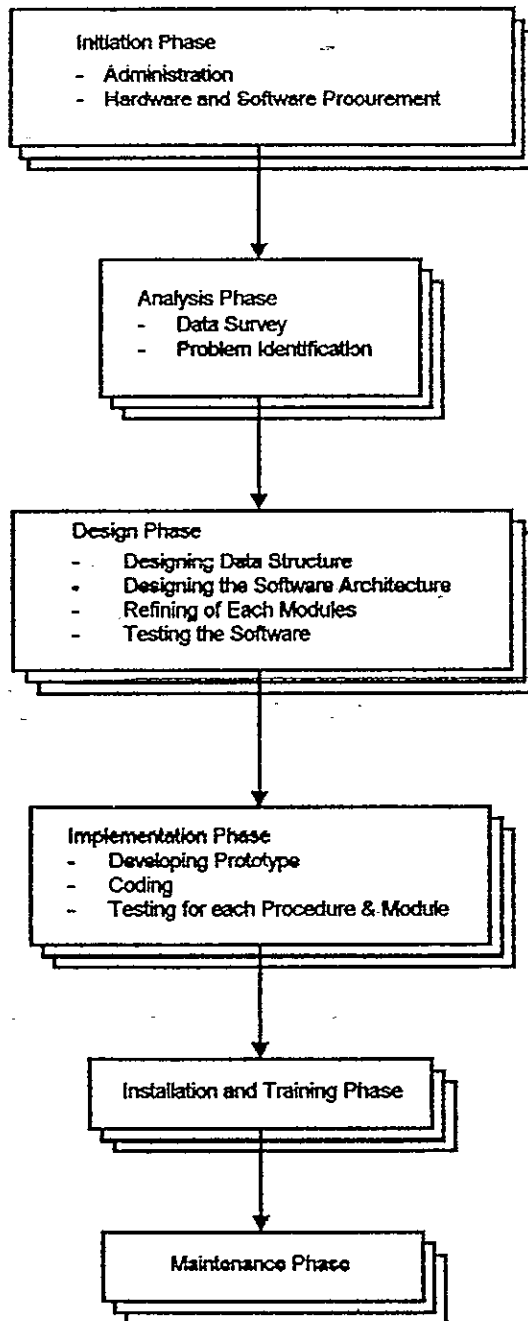


Figure 3.1 Work Execution Flow Chart

Chapter 4 Work Execution Organization

4.1. Organization Structure

- To execute the work of developing UNOCAL GIS and Database Software efficiently and effectively, all personal involved need to be organized properly. This organization is shown at Figure 4.1.

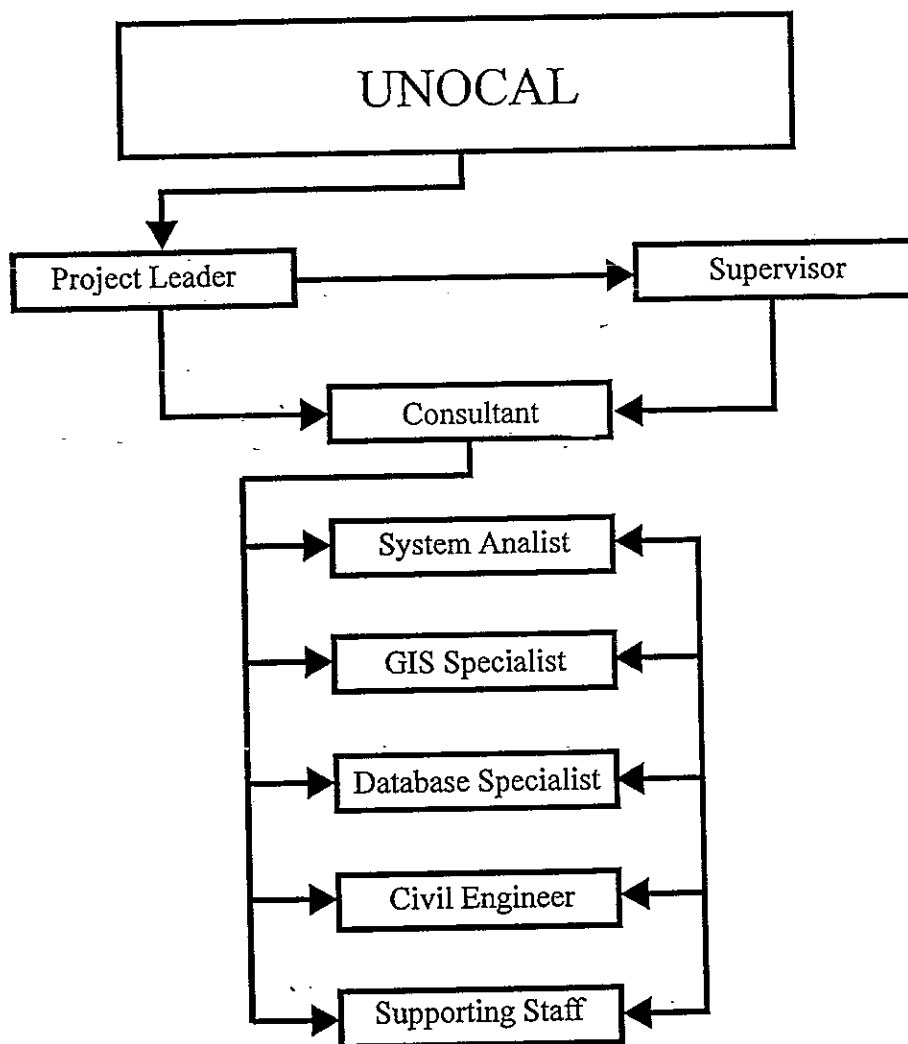


Figure 4.1. Work Execution Organization Structure.

4.2. Experts Executing the Work

Consultant has prepared a team of personal who have qualifications, expertises and extensive experiences related to the Work. The following is the list of the positions and the experts who fill them:

System Analyst: Ir. V. Sri Moertini
 Geographical Information System (GIS) Specialist: Ir. Rendro E. Wibowo
 Database Specialist: Ir. Abinhot Sitohang
 Civil Engineer: Dr. Andojo Wurtanto

In executing their jobs, they will be helped by computer operators, drafters, technicians and secretaries.

4.3. Description of Jobs and Responsibilities

a. System Analyst

This position would be filled by Ir. Veronica Sri Moertini. She would conduct following tasks:

- Analyzing, designing and testing UNOCAL GIS and Database Software.
- Organizing and managing the whole work, including:
 - breaking the Work into small tasks, setting the schedule, and assigning a team responsible for each task.
 - Monitoring the execution of each task.
 - Coordinating the teams.

b. Geographical Information System (GIS) Specialist

This position would be filled by Ir. Rendro E. Wibowo. The GIS Specialist would do the following task:

- Collecting the maps necessary for the GIS.
- Coding the procedures and integrating them into modules related to GIS by using MapBasic development tool.
- Conducting the testing of the procedures as well as the modules.
- Integrating the modules of GIS and database into one integrated of software.
- Installing UNOCAL GIS and Database Software and setting it up into operational.
- Preparing and conducting training, giving material especially related to GIS, to users.
- Maintaining UNOCAL GIS and Database Software for a period of 2 months.

b. Database Specialist

This position would be filled by Ir. Abinhot Sitohang. The Database Specialist would do the following task:

- Preparing the database.

- Coding the procedures, and integrating them into modules related to database.
- Conducting the testing of the procedures as well as the modules.
- Installing UNOCAL GIS and Database Software and setting it up into operational.
- Preparing and conducting training, giving material especially related to database, to users.
- Maintaining UNOCAL GIS and Database Software for a period of 2 months.

c. Civil Engineer

This position would be filled by Dr. Andoyo Wurjanto. The Civil Engineer would do the following task:

- Searching the data which would be needed for UNOCAL GIS and Database Software, such as data of wind, wave, current, tidal, etc.
- Reviewing and preparing the data mentioned here above so that they would be ready to be integrated into the software.

4.5 Time Schedule

Time Schedule
UNOCAL GIS and Database Software

No.	Activities	Month																							
		1				2				3				4				5				6			
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
1	Initiation Phase																								
	- Administration Completion																								
	- Hardware and Software Procurement																								
2	Analysis Phase																								
	- Data Survey																								
	- Problem Identification																								
3	Design Phase																								
	- Designing the data structure																								
	- Designing the software architecture																								
	- Refining of each modules																								
	- Testing the software																								
4	Implementation Phase																								
	- Developing Prototype																								
	- Coding																								
	- Testing for each procedure and module																								
5	Installation and Training Phase																								
6	Report and Discussion																								
	- Inception Report																								
	- Interim Report																								
	- Final Report																								
	- Inception Discussion																								
	- Interim Discussion																								
	- Final Discussion																								