Government of the Peoples' Republic of Bangladesh

Ministry of Water Resources

Water Resources Planning Organization (WARPO)

RIVER SURVEY PROJECT
FAP-24: TRAINING PROGRAMME

Financed by : Commission of the European Community (CEC)

INCEPTION REPORT

(DRAFT)

January, 1999

Bangladesh Engineering & Technological Services Ltd. (BETS)

in association with

Design, Planning & Management Consultants Ltd. (DPM)

Hydroland Survey Ltd.

2

Ref: RSP-8

Dated : 7th January, 1999

To
The Director General
WARPO
House # 450, Road # 31
New DOHS, Mohakhali
Dhaka-1206

Subject : **River Survey Project FAP-24 : Training Programme**
- ***Submission of Inception Report***

Dear Sir,

In accordance with Article 4.3 of specific conditions of the contract 20 (twenty) copies of the Draft Inception Report are being submitted herewith for your kind perusal.

With best regards,

MFW-2392
24-02

(M.A. Matin)
Team Leader
River Survey Project FAP-24 : Training Programme
72, Green Road,
Dhaka.

CC: PMU
72, Green Road, Dhaka.

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ACKNOWLEDGEMENT

"This text has been drafted with financial assistance from the Commission of the European Communities. The views expressed herein are those of the beneficiary and therefore in no way reflect the official opinion of the commission."

RIVER SURVEY PROJECT FAP-24 : TRAINING PROGRAMME (ALA/90/04/A4-3e)

INCEPTION REPORT

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Line 5	data a needs	data needs
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Line 4	and 20 trainees	and 20 trainees)

1. INTRODUCTION

The River Survey Project (RSP) FAP24 is one of the supporting activities of the Flood Action Plan. The Commission of the European Community (CEC) is financing the project and the Water Resources Planning Organisation (WARPO) is the Implementing Agency, Implementation of the project is assisted by a Project Management Unit (PMU), with an expatriate Project Adviser.

The project comprises of two units. First one; the study part has the following three components:

- a survey component, comprising a comprehensive field survey programme of river hydrology sediment transport, and river morphology;
- a study component, comprising investigations of processes and effects within river hydrology, sediment transport and river morphology; and
- a training component

Second unit comprises of

- Project Management

The project started on 8 June 1992 and was supposed to be completed in four years. The Consortium of Delft Hydraulics - Danish Hydraulic Institute (DHI) was appointed to conduct the studies. The survey, the studies and a limited on the job training of mainly own staff were completed almost as per schedule and the consultant submitted the final report in January, 1997.

The reports (Appendix-A : List of Reports of FAP24) contain recommendations for expanding and strengthening the collection of hydrological and morphological data, and for further developing and understanding of the behaviour of the main rivers of Bangladesh. Only limited on-the-job-training was provided mainly to contractors local staff.

An extension up to 31st December, 1998 for the Financing Memorandum was agreed between CEC and GoB. A next extension requested by ERD on 30th August, 1998, was agreed on by the EC in November, 1998 up to 31st December, 1999. Funds are allocated in the budget of the River Survey Programme to acquire special survey equipment and instruments in view of implementing the recommendations made in the project, for further surveys and studies on the major rivers in Bangladesh. The Commission of the European Community and Bangladesh agreed to allocate these funds for procurement of special survey equipment and instruments for refurbishment of survey vessels.

In 1995, a proposal was worked out for utilizing the budget remaining available for the component 4 of part A "procurement of special equipment and instruments". Instead of limiting the action to the supply of equipment, a

through capacity building programme was set p and accepted by GoB and the donor. It includes besides the procurement of equipment and instruments the refurbishment of 4 BWDB survey vessels to be equipped with the next technology and a training of a limited number of selected BWDB personnel, mainly through applications in relation to present data a needs. In this way, the further use of methods and techniques recommended under the FAP-24 project could be ensured and their sustainability some low guaranteed.

The PMU and WARPO decided to sub-contract the training component of the project and with that intent shortlisted a number of contractors and issued call of tenders ALA/90/04/A4-3e Training Programme for the River Survey Project FAP24 vide Memo No. WARPO/A-024/90/726 dated 21 June 1998 and after evaluation of the offers awarded the contract to the Consortium of BETS-DPM-Hydroland Consortium.

The Consortium started the work on 15/12/1998. This is the Inception Report of the Contract. The TOR of the contract is attached herewith as Appendix-B

For various reasons the programme is starting late than originally anticipated. The programme will now come to an end by mid June, 1999. As such the training under monsoon condition cannot be given.

During evaluation of limited number of CVs available, it was observed that as the participants are now. The time for various modules may not be sufficient. This has again been dealt in Section-8.

2. MOBILIZATION

2.1 Joining of Experts and Other Support Personnel

On signature of contract on 13/12/1998; the Team Leader Mr. M.A. Matin joined to duties on 15/12/98 (fore-noon) and had a courtesy call on the following management officials the same day:

1. Mr. A.K.M Halimur Rahman	DG WARPO
2. Mr. A.K.M. Shamsul Islam	Superintending Engineer Processing & Flood Forecasting Circle
3. Prof. J.J. Peters	Adviser PMU
4. Mr. A.N.H. Akhter Hossain	Local Expert PMU

2.2 Mobilization of Office, Office Equipment and Computers

BWDB has put in 7 rooms at 72, Green Road, at the disposal of the FAP -24 Project. 3 rooms are allocated for housing the Project Management Unit and 3 rooms along with 1 hall room for the Consultant; for training activities.

The office is in the process of mobilization in the BWDB Hydroiogy Building (1st building) in the Hydrology compound at the Green Road. The address of the office is as follows:

Team Leader
FAP-24 : Training Programme
Main Building, 2nd floor
Hydrology Compound
72/73 Green Road
Dhaka 1200

The office is being set up in a space of 3 rooms and 1 hall room. The hall room is being organized for class room lectures. The project adviser along with two Local Expert of PMU will use three rooms.

The space allocated to the consultant is not sufficient for 7 experts. The experts however will have to spend a substantial part of their time in the field at Bhagyakul and Bahadurabad and the space will thus be manageable but may need some additional make shift arrangement during last 2 weeks of the project when the office training will be given and all the experts will be at Dhaka.

One file server and nine Pentium Computers are in the procurement pipe line. A LAN will be implemented with these computers for use by the participants, PMU personnel and Consultants. The project LAN will ultimately be integrated with the existing LAN of Hydrology.

2.3 Support Staff for Field Training

In the ToR of the Project there was no mention of mid level professional and technicians. Management of trainees in the field (4 teams envisaged of which 2 teams on 2 vessels and 2 teams in computer laboratory and sediment laboratory) will need the following support staff.

1. Supporting Hydrologist	from 01/02/99 to 30/04/99
2. Supporting Hydrographer	-do-
3. Sediment Laboratory Technician.	-do-
4. Office/Messenger Peon	from 15/12/98 to 14/05/99

One attendant at the reference station on shore and 2 skilled labours in each vessel for operating current meter and sediment sampler winches and assisting shore survey activities will be necessary during the field survey works.

1. Reference Station Attendant	01/02/99 to 30/04/99
2. Skilled Labour Vessel-A	-do-
3. Skilled Labour Vessel-B	-do-

Since these items have not been provided in the ToR, cost for these items are to be provided by PMU.

Logistics for Field Training

During field survey training there shall be requirement of logistics such as heavy duty battery (6 nos), battery charger (3 nos), weighing balance, bamboo, flags, water sediment sampling bottles (100 nos), bottle carrying crates, iron clamp (3 nos) for reference station, ropes, wires nails etc and casual labours for carrying. This is likely to cost Tk 300,000. Since costs have not been provided in the ToR, these cost are to be provided by PMU.

Daily allowance

ToR has a provision of a sum of Take 459,000 for 1500 man days @ Tk. 300. This provision is intended to cater the needs of local trainers, trainees and RSPMU personnel. The field training has been planned for 71 days (from 07/02/99 to 18/04/99). Field work for the trainers are estimate as:

PMU

L.S.	45 days

Professionals:

1. Team Leader	18 days
2. Dy Team Leader	71 days
3. Hydrographer	71 days
4. Morphologist	10 days
5. Sedimentologist	15 days
6. System Manager	07 days
	Total 192 man days

Sub-professionals:

1. Support Hydrologist	71 days
2. Support Hydrographer	71 days
3. Sediment Technician	71 days
	213 man days.

Participants:

1. 8 Engineers	71x8 =	568
2. 12 Surveyors	71X12 =	852
		1420 Man days

Thus the total man days:

1. PMU	45 Man days
2. professionals	192 man days
3. Sub-Professions	213 man days
4. Participants	1420 man days
	1870 Man days

So the shortfall of 370X300 = Tk. 1,1100 has to be made up by adjustment of expenditure in other heads of accounts.

2.4 Vehicle

The project has received a rented microbus in December 1998 and renting of another vehicle is in process.

3. Review of Existing Situation

3.1 Hydrological Network & Institutional Setup

Hydrological Network

The present hydrological network of Bangladesh was expanded and upgraded in mid sixties through FAO-SF Hydrological Project and this network was further reviewed by two other UNDP supported projects; the last one being BGD/88/054. Data prior to mid sixties for some stations are also available but the hydrological stations were not organised in a network concept. Table 3.1 Hydrological Monitoring Stations furnished below shows the present hydrological network.

Table 3.1 : Hydrological Monitoring Stations

Sl	Monitoring Parameters	No. of Stations	Frequency of Observation	Remark
1.	Water Level	314	5 & 7 times a day	
2.	Discharge	104	Weekly, Fortnightly and Monthly	
3.	Sediment	27	-do-	
4.	River Cross Section	599	At intervals of 1/2/3 years	See Table-3.3
5.	Rainfall	256	Daily	
6.	Evaporation	39	Daily	
7.	Climatological data	3	Daily	
8.	Salinity	65	Fortnightly	
9.	Ground Water Obs. Well	1224	Weekly	
10.	GW Quality	117	Annual	

In addition the following Ground Water (GW) exploration works (Table 3.2 GW Exploration Works) have so far been done and the network information have been computerised.

Table 3.2 : GW Exploration Works

Sl.	Exploration Type	Obs. Wells Done
1.	Deep test drilling (305 to 457 meter) for lithological survey of aquifer	108
2.	Shallow test drilling (51 to 213 meter) for lithological survey of aquifer	409
3.	Pump Test for aquifer characteristics	233

River cross section survey is done under the River Morphology Research and Training Directorate. Depending upon availability of fund, 28 rivers including the major rivers are surveyed at fixed cross-sections. A set of 3 maps is available which shows the location of SW Hydrology, GW Hydrology, and River Morphology monitoring stations while a 3rd map shows the location of GW exploration wells. These maps have been published under UNDP Project: BGD/88/054 Water Resources Information System.

Table 3.3 : No of Sections by River and Frequency of Survey

Sl	River	From	To	Length	Interval	x-sections	Frequency	Remark
1	Brahmaputra	Border	Aricha	163	4	34	yearly	Length
2	Ganges	Border	Aricha	82	4	18	yearly	&
3	Padma	Aricha	Chandpur	65	4	15	yearly	interval
4	Meghna	Markuli	Chandpur	158	4	45	yearly	in miles
5	Gorai-Modhumati	Offtake	Outfall	124	4	32	yearly	
				yearly Sub-total	144			
6	Buriganga	Offtake	Outfall	25	4	8	2 yearly	
7	Dhaleswari	Offtake	Outfall	90	4	23	2 yearly	
8	Arial Khan	Offtake	Outfall	72	4	32	2 yearly	
9	Surma	Offtake	Outfall	124	4	42	2 yearly	
10	Mohananda	Border	Outfall	55	4	14	2 yearly	
				2 yearly Sub-total	119			
11	Old Brahmaputra	Offtake	Outfall	145	4	36	3 yearly	
12	Baral-Gumani	Offtake	Outfall	180	4	38	3 yearly	
13	Lakhya	Offtake	Outfall	70	4	19	3 yearly	
14	Bangshi	Offtake	Outfall	80	4	26	3 yearly	
15	Kaliganga	Offtake	Outfall	40	4	10	3 yearly	
16	Karatoa-Atrai-Gum	Border	Outfall	180	4	45	3 yearly	
17	Teesta	Border	Outfall	65	4	20	3 yearly	
18	Bishkhali	Offtake	Outafall	52	4	19	3 yearly	
19	Tulshiganga	Source	Outfall	56	2.5	27	3 yearly	
20	Haribar Bhadra	Offtake	Outfall	67	4	13	3 yearly	
21	Lower Meghna	Offtake	Outfall	44	4	13	3 yearly	
22	Bibiana	Sherpur	Markuli	32	4	9	3 yearly	
23	Kushiyara	Border	Sherpur	62	4	15	3 yearly	
24	Barak	Offtake	Outfall	16	4	5	3 yearly	
25	Turag	Offtake	Outfall	44	4	12	3 yearly	
26	Nabaganga	Offtake	Outfall	28	4	8	3 yearly	
27	Banar	Offtake	Outfall	100	4	21	3 yearly	
				3 yearly Sub-total	344			
				Grand Total	559			

[1]Note

Institutional Setup:

Hydrological survey of Bangladesh has been organized under a Chief Engineer called Chief Engineer Hydrology. The Hydrology Organization under BWDB has recently been reorganized with 4 Directorates in place of 5 Directorates. In order to understand the training requirement for the organisation a hydrological administrative database has been established with the available information. SW Hydrology Circle is headed by a Superintending Engineer and is divided into 4 Divisions headed by Executive Engineers, 13 Sub-divisions headed by Sub-divisional Engineers and 39 Section offices headed by Sub-Asstt. Engineers/SO incharge of Section offices. Five major river sections (Bahadurabad, Hardinge Bridge, Goalundo, Mawa and Bhairab Bazar) are however headed by Asstt. Engineers.

Note:[1] Tables 3.1 to 3.3 recompiled from GAUGING METHODS IN BANGLADESH by AKM Shamsul Hoque CE(H) (now Chairman, BWDB) published in the proceedings of the International Workshop on "Morphological Behaviour of the Major Rivers in Bangladesh" in Nov 6-9, 1993 under the River Survey Project FAP-24.

GW Hydrology Circle is headed by Director (Geologist) and is divided into two field divisions at Dhaka headed by Deputy Directors (Geologist) and 5 Sub-divisions headed by Geologists.

The River Morphology Research and Training Circle is headed by a Superintending Engineer and is divided into 2 field divisions at Mymensingh and Kushtia and these divisions are further subdivided into 6 Sub-divisions headed by Sub-divisional Engineers.

The number of sanctioned offices under the CE and each Directorate and also sanctioned posts are as follows:

Table 3.4 Sanctioned Offices

Sl	CE's Office & Directorate	Sub-ordinate offices	Sanctioned posts	Remark
1	CE Hydrology	88	1080	Includes CE' office
2	SW Hydrology	57	522	Includes Circle
3	GW Hydrology	10	136	Includes Dte.
4	RM R&T Directorate	9	145	Includes Circle office
5	P&F Directorate	11	257	-do-

It is to be noted that the sanctioned posts includes all regular posts starting from the Chief Engineer down to the lowest post of MLSS. The list however does not include the part time Raingauge observers and GWT well observers.

So far the FAP24 Training programme is concerned, the relevant target groups are Engineers, Surveyors and Operators. The Engineers (graduate Engineers) are:

1) Executive Engineers,
2) Sub-divisional Engineers and
3) Asstt. Engineers

while the Surveyors are:

1) Sub-Asstt. Engineers (Sectional Officer)
2) Sub-Asstt. Engineers and
3) Surveyors

It may be noted that no specific groups can be identified as operators but the vessel staff and the MLSS handling the equipment are important members of field measurement and may be called operators. In the following list the MLSS posted in the section offices have been listed as Operators. So according to the sanctioned posts, the numerical size of the target groups are:

Table 3.5 : Estimated Potential Trainees

Target Groups	Hydrology designation	Number
Engineers Numbers-71	Executive Engineers	11
	Sub-divisional Engineers	21
	Asstt. Engineers	39
Surveyors Numbers- 135	Sub-Asstt. Engineers /SO	40
	Sub-Asstt. Engineers	25
	Surveyors	70
Operators Number- 63	Launch and Catamaran drivers	24
	MLSS attached with sections	39

So adding the number of Engineers, Sub-Asstt. Engineers and Surveyors a total of 206 of them if trained @ 20 Engineers/Surveyors per year will need about 10 years. So this is a long term perspective training requirement of SW Hydrology. In the years to come new recruits will enter in the Hydrology Department and these new recruits will also need training. Thus a capacity of training 20 participants annually if built up will serve the need of the Hydrology Department.

3.2 Existing Field Methods & Equipment and Evaluation

Surface Water Circle at the moment monitors the following hydrological parameters:

Water level
Discharge
Sediment
Salinity incursion from the sea
Rainfall
Evaporation
Climatological data

River Morphology Research and Training Circle collects:
River Cross-section data.

The number of various stations and the Organisation doing this survey has been briefly described in section 3.1 above. During the UNDP Hydrological Survey Project BGD/88/054 a computerised equipment inventory was established. From the review it is found that the computerised equipment inventory has neither been updated nor been used since 1996, when it was established. However the database has been found operational and it is found that there are 87 different types of equipment. Each of the equipment has been serially numbered and classified as equipment 'TYPE". The database table "EQUIPMENT" describes each equipment by "TYPE", "MODEL" and location by "OFFICE" and also a few other parameters. The most relevent equipment for the present project are:

Leveling instrument, staff-gauge and auto gauge for water level measurement
Handline, winch and echo-sounder for depth measurement
Sextant, theodolite and 2 sets of Trimble DGPS for position measurement.
Current meter and accessories for velocity measurement
Binckley suspended sediment sampler, Grab-bucket and Grab van Veen Bottom Sampler for sediment measurement

During FAO-UNDP Survey Project in mid-sixties, standards of discharge measurements were set up which were further consolidated during the implementation of the project BGD/88/054. Present random check revealed that the following methods are not being followed:

i. During high monsoon flows, discharge measurement in the major rivers (Bahadurabad, Hardinge Bridge, Goalundo, Bhagyakul and Bhairab bazar) is very difficult by catamarans. Survey launches should be used for these measurements. Even in peak flood stage of 1988 and 1998, catamarans were used and no body has investigated the errors that could have crept in. However in 1995 FAP 24 made flood measurement.

ii. Ground feelers of most of the current meters are not in operational condition. More over, at and near peak stage it is not safe to put the ground feeler near to the river bed. Echo sounder is therefore a must for discharge measurement in the major rivers. But all the major stations do not have echo sounder.

iii. In the major rivers, direction of the flow normal to the measuring transect cannot always be expected. In is therefore a normal practice to measure flow direction by floats with submerged vanes in which length of submersion may be adjusted. It was learnt from random check that surface floats instead of standard floats with submerged vanes are being used.

iv. Optimization of number and location of velocity vertical is an important issue for the major rivers in general and the braided channel at Bahadurabad in particular. A random check at Bahadurabad during field visit (29-30 December) revealed that at present the gauging party is using 63 verticals over a period of 3 days. Severe error may creep in the observed discharge for such a long duration of measurement. A false sense of increased accuracy due to increased velocity which might have instigated for taking such a large number of verticals over 3 days.

Optimization technique for the number and location of velocity vertical introduced by the Project BGD/88/054 does not seem to be practiced is the field and there does not seem to be qualified checks and supervision not Sub-division, Division or higher level.

v. Sediment sampling by Binkley : It is a normal practice that in the major stations , sediment samples are collected during discharge measurement by Binckley sampler. The sand fraction is analysed in the field laboratory while the fine fraction is sent to RRI for analysis. When the result of the analysis is available from RRI the two results are combined to produce suspended sediment discharge.

It is apprehended that sediment data compilation is not up to date.

3.3 Existing Field Methods, Evaluation and Recommendation:

Water Level:

A full time gauge reader reads the river station staff gauge during day time at intervals of 3 hours i.e at 06:00, 09:00, 12:00, 15:00 and 18:00 hours. If the station is tidal two additional readings are taken. These are time and heights of high and low tides.

Some of the stations are equipped with automatic recorders where a continuous day and night records are available. It has been gathered that there are 28 automatic water level recorders where a continuous records are available and there are 9 Telemetry Water Level Recorder Stations.

A standard Bench Mark (BM) is established at a short distance from the gauge. If a river has unstable river bank the BM is installed at a reasonably safe distance and a temporary BM (TBM) is installed near the gauge.

Most gauges are installed on a well driven wooden post and properly fenced and a signboard and a red flag is attached as a warning to the passing boats. There are a few gauges permanently fixed on available structures such as bridge piers etc. The gauge datum installed on wooden post are regularly surveyed immediately after any disturbance or shifting, or during each discharge measurement or atleast once in a month.

Evaluation and Recommendation:

As a part of validation of staff gauge bench marks (BM) River Survey Project FAP24 carried out a limited survey and published the report "Special Report No. 1 : Validation of staff gauge bench marks October 1996". The report has a number of recommendation (page -3 and page-9) worth pursuing. As it seems now Bangladesh has a network of bench marks : BWDB, FINMAP north, FINMAP south, FAP6 network and SoB/JICA. The report pointed out that the compatibility among these network is still open.

Special Report No.1 contains inspection report for 47 gauges and it will be useful to establish a database for the BWDB gauge bench marks along with the reference BM. During the training period the each of the participants may be asked to verify some of the inspection reports so that they learn how to prepare inspection report of BMs.

Validation of water level data and for that matter any time series is an important part of data collection. Water level data quality control and validation will be introduced to the participants based on the following reports:

Validation of staff gauge bench marks :Special Report No.1	- by FAP24
Water Level Gauging :Stations :Special Report No.2	- by FAP24
Water level measuring devices ISO 4373	- by ISO
Manual of Stream Gauging Vol. I	- by WMO
Field Proceedures and Quality Control: SW Hydrology	- by BGD/88/054
Data Processing and Quality Control: SW Hydrology	- by BGD/88/054

3.4 Discharge measurement, Evaluation and Re-commendation

Discharge measurement is done by velocity area method. The discharge measurement section in the field is identified by cross-section pillars on both banks. For discharge measurement the section is divided into a number of pockets by 15 to 20 verticals. For major river stations like Bahadurabad, the number of verticals are raised to about 30 or more. The verticals are so spaced that discharge between two verticals do not exceed 10% of the total discharge. Velocity measurement is done by current meter at each vertical at .2 and .8 depth if depth permits. Other wise a single measurement is made at .6 depth or at the surface.

Current meter is exposed for a minimum of 40 seconds if the boat is anchored or for 100 seconds if the measuring vessel is on power. If the direction of flow is not normal to the measuring section, direction of flow is measured by float. If high velocity causes drift of the current meter, then wet line correction is made.

Evaluation and Recommendation:

Discharge measurement in the major rivers in Bangladesh particularly during flood time is a major task that need an elaborate design of survey spreads and a competent gauging team who has developed their skill by repeated survey in the river. In comparison to gauging a smaller stream the same number of hydaulic parameters, the velocity, depth and width are to be measured. But positioning the survey vessel at the desired point in the transect in a fast flowing river at times with waves and measuring the distance, depth and velocity need not only the required tools but also the required skill of the team that can only be obtained through repeated practice.

The participants will be given this training onboard at Bahadurabad on the river Brahmaputra-Jamuna having a flood time width of about 13 km encompassing 5 to 7 Channels. Initially the training will be given in traditional method and gradually GPS will be introduced for position fixing. Depth will be measured by both gauging winch and echo-sounder. The participants will do optimization in selecting and locating the velocity verticals and selecting points of velocity measurement in each velocity vertical. The alignment of present transect will be verified and if required re-aligned by float tracking.

The field training will be based on the following documents:

Optimization of hydraulic measurements :Special Report No.11	- by FAP24
Sustainable Survey Techniques: Final Report Annex 2	- by FAP24
Liquid flow measurement in open channels -Velocity area methods	- by ISO748
Manual of Stream Gauging Vol. I	- by WMO
Triangulation survey in the major rivers (Extract from Admiralty Manual of Hydrographic Survey)	- by BGD/88/054
Field Proceedures and Quality Control: SW Hydrology	- by BGD/88/054
Optimization of location of velocity vertical in large rivers	- by BGD/88/054

3.5 Sediment Discharge Measurement, Evaluation and Recommendation

In some of the specified stations suspended sediment sampling is done along with discharge measurement. Water sediment sample of 1 litre is collected from each of .2 depth and .8 depth of the sampling vertical. Every alternate vertical of velocity measurement is sampled for sediment measurement. In the field sand and finer sediment is separated by elutriation. Sand from each sample is collected in a fine bore glass tube and properly marked for the location and depth. The water sediment after separation of sand from alternate sediment vertical is collected together as bulk sample.

Dry weight of sand sample is weighed in a balance and concentration and coarse sediment discharge is computed. The bulk sample collected is allowed to settle overnight, decanted to reduce the volume, properly labeled and sent to River Research Institute to find the concentration.

Evaluation and Recommendation:

The present BWDB method determines the suspended sediment in two parts, the coarse or the sand fraction and the fine or the wash loads. Mean concentration in the vertical is computed by two-point sampling and the computation is based on an assumed distribution of sand concentration by Mr. Straub. But the present training programme will introduce measurement of bed load and a more pragmatic measurement of suspended sediment by using Delft bottle for measuring near bed sediment concentration.

An appropriate sediment laboratory will be established for measuring concentration of coarse and fine fraction of sediments as well as grain size distribution.

The field measurement and computations will be based on the following documents:

1.	Water Supply Paper - 361	- BWDB
2.	Optimization of sediment measurement. Special Report No. 12	- FAP-24
3.	Sediment Rating Curves and balances. Special Report No. 18	- FAP-24
4.	Sustainable Survey Techniques. Final Report - Annex-2	- FAP-24
5.	Sedimentology, Final Report, Annex-4	- FAP-24
6.	Morphological Characteristics, Final Report, Annex-5	- FAP-24
7.	Sediment Transport Measurement and Data Elaboration in the Ganges - Brahmaputra River System	- FAP-24
8.	Guidance for Hydrographic and Hydrometric Surveys by f.ch. hayes, Publication No. 200	- Delft Hydraulics
9.	Soil Testing for Engineers	- T.W. Lambe
10.	Hydrological Data Collection Field Procedures and Quality Control Steps : SW Hydrology	- BGD/88/054
11.	Technical Note on Computation of Suspended Sediment Transport SW Hydrology	- BGD/88/054
12.	Small Basin Sediment Transport Study	- BGD/88/054
13.	Determination of Concentration and particle size distribution	- ISO-4363
14.	Measurement of suspended sediment discharge	- ISO 4363
15.	Measurement of Bed material	- ISO 4363

3.6 Salinity Incursion from the Sea

BWDB monitors salinity into the inland water from the sea by collecting water samples from about 65 stations periodically. The collected samples are tested for conductivity by conductivity meter and for chlorides by titration.

3.7 Rainfall

BWDB monitors daily rainfall from 256 stations and evaporation from 39 stations. Daily rainfall is read from bucket raingauge and evaporation from a modified Class-A pan.

3.8 Existing Computer Hardware & Software, Evaluation and Recommendation

Status of Equipment

The equipment procured in 1994 under the Project BGD/88/054 funded by UNDP are as follows:

Equipment	Quantity
1. Server	3
2. Micro Computer / PC	30
3. Terminal	1
4. Laser Printer	1
5. Inkjet Printer	1
6. Dot Matrix Printer	11
7. Plotter	1
8. Scanner	1
9. UPS of various capacity	21
10. LAN accessories	

Initial Observation on these equipment and situation are:

(a) Only 7 Microcomputers are being worked in the Computer Cell of Hydrology building in stand-alone mode. Mainly PCs are used for word processing and Hydrological Data processing in DOS mode using the programme written under BASIC programming language.

(b) No Server is functional.

(c) There no Net work whatsoever is working among the PCs.

(d) All equipment in the north side of 1st floor of the Hydrology building where the Servers are placed, are covered with a plenty of dust, which definitely a harmful situation for Electronic device.

(e) Rooms are damp, which is not recommendable for Computer room.

(f) Most of the UPSs are out of order.

(g) Most of the Software cannot be located and cannot be tested because respective equipment and LAN are not operational.

(h) Electrical fitting and fixtures are not properly arranged for Computer System.

(i) The rooms were unused and locked for more than 2 years.

What is to be done to make them Operational

I. Renovation of the rooms is required so that they will be damp free and also electrical fitting & fixture are needed to moderate for Computer system.

II. All rooms should be cleaned in the direction of making them good environment condition, which is essentially required for computer system.

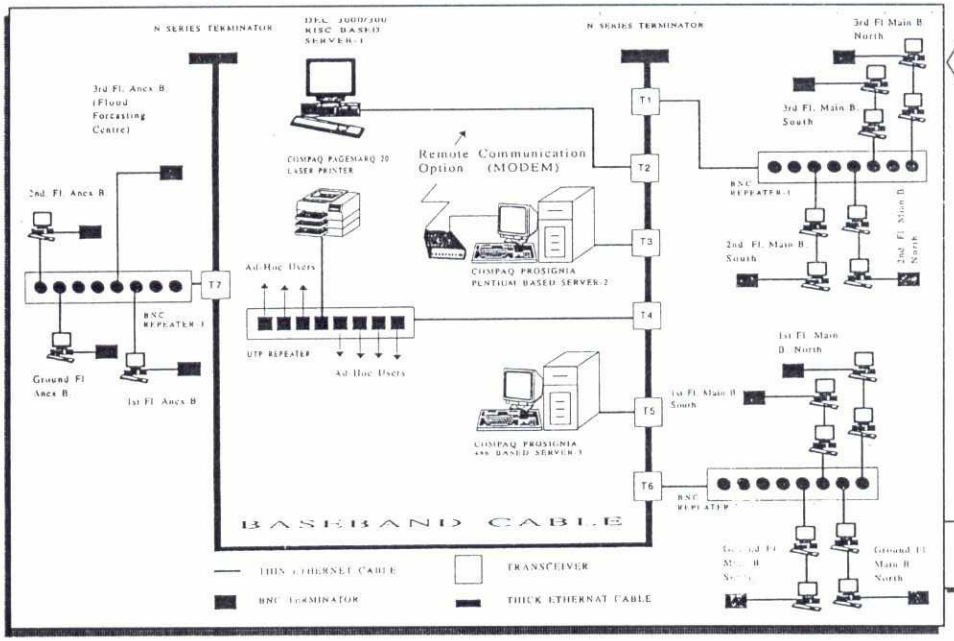
III. Servicing is required for all equipment through which they will be workable. This can be done through subcontracting. For this work Vendor(s) / Supplier(s) of the equipment, Software and LAN may be requested.

IV. If the old LAN equipment and software seem to be outdated or backward to get support service, the issue may arise to upgrade / change / replace of those components. This will be identified after thorough checking of the equipment and systems as stated is section III above.

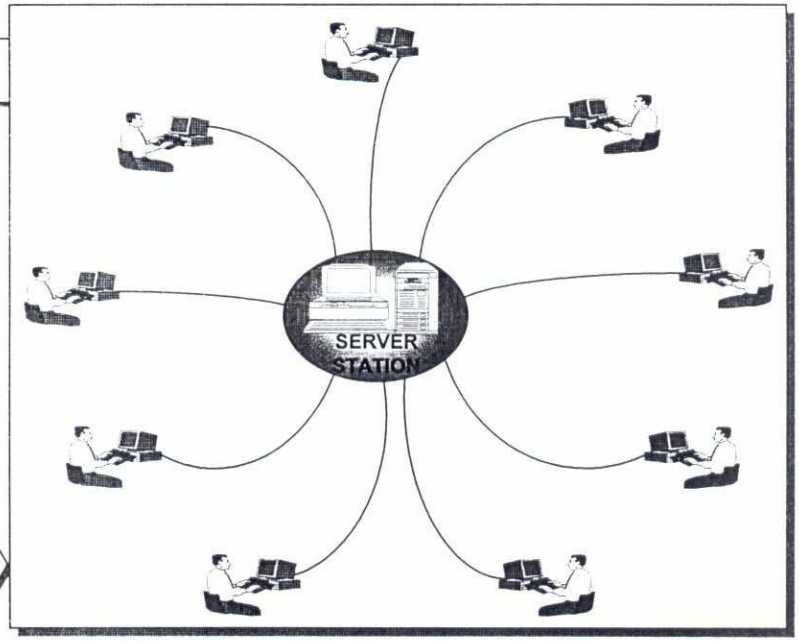
Computer under this project

9 Pentium based PCs with a Server are going to be procured. This system will be arranged under LAN. Some latest software are also be procured. This LAN initially will work exclusively for the project. This LAN will however be integrated with the existing LAN of Hydrology. A diagram is attached herewith about the joining of new LAN with old LAN. The training will be conducted with the new computer system.

EXISTING LAN



NEW LAN



4. NEED ASSESSMENT FOR THE ORGANIZATION

4.1 Hydrology Training Institute

Hydrology organization is primarily manned by graduate engineers, diploma engineers and surveyors at professional and technician level. Prior to the present ongoing re-organization of BWDB and as also Hydrology, professionals of scientific background both in the field measurement and data processing were an important component. During the first FAO-SF/UNDP project in mid-sixties, a Hydrology Training Institute was established at Bhagyakul on the left bank of the Ganges-Padma some 40 km from Dhaka for the training of all professionals and technicians in Hydrology.

It was recognised at that time that for the type of field works and measurements required for the major rivers in Bangladesh, necessary training facilities is not available in any educational or training institute. So the Hydrology Training Institute at Bhagyakul was established in the year 1968 and provided training in field measurement, data processing for the major rivers as also the other requirement of Hydrology in Bangladesh. Roughly speaking the Institute provided very good services for about 10/15 years. Afterwards budgetary problems in Hydrology along with complication in organisational set up made the training Institute completely ineffective and during most of the time the Institute was either sitting idle or doing some courses intermittently.

During implementation of the System Rehabilitation Project (SRP) training requirement in BWDB as a whole was re-assessed and BWDB decided and established a training academy at Bhagyakul adjacent and by the side of the site of the Hydrology Training Institute and the Institute has also been placed under the academy. The academy is being built under BWDB System Rehabilitation Project financed by CEC. Buildings and other facilities have been greatly expanded and upgraded.

Consultants along with Mr. Akhter Hossain PMU visited the academy on 1/1/99. The newly built academy complex consists of a two storied building with office space for the principal and his administrative staff, 2 training classes, 1 computer centre, 1 library, 3 syndicate rooms, 4 rooms for visiting lecturers, 25 double seated rooms for trainees, kitchen, dining and recreation rooms. Added to these are 1 class room, 1 laboratory room, 7 double seated room for the participants and a class-I Inspection Bungalow with 4 bed rooms of the Hydrology Training Institute will also be available.

It is now presumed that in a new environment under BWDB Training Academy the Hydrology Training Institute at Bhagyakul will get a new life and will be able to absorb the modern equipment and methods in Hydrological and Morphological survey. The training in traditional methods of survey will be revitalized and modern methods will be accessible to all professionals and technicians in the Hydrology Organization.

4.2 Meeting with the Chief Engineer Hydrology

Mr. A. M. Sadeq Ahmed is the Chief Engineer Hydrology and in that capacity is the administrative and technical head of the Hydrological Survey of Bangladesh. He is responsible to get the works done by the following Circles/Directorates:
SW Hydrology Circle
GW Hydrology Directorate
River Morphology, Research and Training Circle
Processing and Flood Forecasting Circle

The first meeting with the Chief Engineer Hydrology was held on 29-11-98 before the start of the project. In that meeting, Mr. Ahmed said that the primary aim of the training is for the introduction of modern methods and equipment based on experience of FAP-24 River Survey Project. But we should not forget the importance of training in traditional methods which is being extensively used for measurements throughout the country. He particularly said that due to re-organization a good member of engineers are joining hydrology. They should therefore be trained in the traditional methods side by side with the modern methods. Mr. Ahmed also expressed his concern regarding how to retain the trained staff is hydrology. He said, quite often trained staff is transferred out side hydrology on administrative ground without meeting the needs of hydrology.

4.3 Meeting with the Superintending Engineer, River Morphology, Research and Training Circle

Mr. Moharram Ali, SE is in-charge of the Circle. He is responsible for morphological survey of the rivers in Bangladesh and has 2 Divisions under him headed by Executive Engineers and 4 Sub-divisions headed by Sub-divisional Engineers. They are specifically doing cross-section survey of different rivers according to a listed network of cross-sections.

The survey is done at intervals of 1 to 4 years. After the survey is done, the survey data are computerized and subjected to a number of quality control steps and the data is stored in an MSACCESS database. Data entry and quality control works are often hampered as a result of shortage of trained personnel due to transfer.

During the discussion with the SE, M/s AHM Kausher EE and Md. Abul Kauser SDE also participated in the discussion. Mr. Kausher E.E. said that their surveyors are well conversant with the traditional methods of c/s survey. Each cross-section is already marked by monuments on two banks and magnetic bearing is already known. The actual survey is done by sounding the depth by echo-sounder and positioning of sounding is done by inboard position fixing by sextants. The shore mark targets are setup by perpendicular base line on the bank. In some cases shore based positioning by theodolites are also done.

Mr. Kausher suggested that the traditional methods of survey may be evaluated for its level of accuracy, and the participants should be trained in the use of computers for quality control and database management. The modern equipment such as:

- Digital level
- Total station
- Global Positioning system and data acquisition by software such as hydro (already available with BWDB)

should be introduced. The participants should be trained by using modern equipment in the following sequence of survey:

a) BM survey and gauge connection
b) Establishing horizontal and vertical controls by GP survey
c) Topographic survey
d) Cross-section profiling by DGPS and
e) Hydrographic survey and river chart production

4.4 Meeting with the S.E. Processing and Flood Forecasting Circle

Mr. Shamsul Islam S.E. is in-charge of the circle and is responsible for:

- data processing of SW Hydrology
- data processing of River Morphology
- data processing of Ground Water Hydrology
- maintenance of integrated database
- operation of Flood Forecasting Centre
- instrumentation and field installation through C&I Division

During a discussion dated 30/11/98 Mr. Islam recommended the following training activities:

- participants should be given a strong background in the basic knowledge in computer operation
- data processing should be well covered so that they can do it independently
- participants should be able to develop rating curve independently
- participants should be able to use BUET software for flood frequency analysis
- field measurement participation should be up to Superintending Engineer level
- some ground water people should also be involved in the training particularly in GP survey

5. FIELD VISITS

5.1 General Considerations

For smooth conduction of training, the followings are considered important:

(1) Accommodation at Site for 25 persons (5 Trainers and 20 trainees at a single site.

(2) Housing for Sediment laboratory, class room for lectures and computer room.

(3) Good communication between Dhaka and the Training site to facilitate easy movement of the Trainers and the visitors.

(4) A good Training environment .

(5) Availability of Traditional instrument (in case import of project equipment is delayed).

5.2 Visit to Possible Training Sites:

Visits were made to Bahadurabad, Dewanganj and Bhagyakul. During these visits Mr.Akhter Hossain, local Expert, PMU was present.

Visit to Bahadurbad:

Visited Bahadurbad on Dec.29-30, 1998. The site of FAP 21 at Bahadurbad has 6 (six) sheds.5 sheds were being utilised as accommodation and lounges for expatriate and local project engineers, stores, office and etc. Thus only 1(one) shed having 4 rooms was indicated as available for trainees of FAP 24. Additional 1 room could be made available by shifting and vacating. Accommodation for Classroom for lectures, computer room and sediment laboratory was not available.

Visit to Dewanganj BWDB Section office:

Visited Dewanganj the same day, ie. on Dec. 29-30.1998.In the guest house , 3 rooms, each with 2 beds are available. Thus 12 trainers could be housed there.

It was informed that another building of the same capacity as the guest house is vacant and may be available . But this needs substantial renovation work including water proofing of the roof and etc. It was roughly estimated that an amount of TK 2.00 lacs will be necessary for this renovation work.

There is a small sediment laboratory room furnished with Sediment Balance etc. Accommodation for class room and computer room will also be available .

The road linking Bahadurbad and Dewanganj is mostly unmetalled. However on checking it is found that microbus(capacity 9) is available for such transportation on rent. The rental charge is about Tk. 1000.00 per day. Alternatively train communication is available.

Visit to Bhagyakul BWDB Training Institute.

To check whether any better alternative is available, visit was made to Bhagyakul on 1.1.1999. Discussed with officer in charge of construction of the new buildings. It was informed that the new building is almost completed excepting soft logistics and

commissioning of electric sub station. The accommodation was found adequate for all 20 trainees and 5 trainers and any number of visitors. Accommodation is sufficient to house sediment laboratory, class room and computer room. Further accommodation is available in the Hydrology Training Institute at Bhagyakul located in the same compass.

5.3 Discussions

In order to evaluate the advantages and disadvantages of the two sites for holding the training workshop the following comparison may be of interest:

Bhagyakul	Bahadurabad
Construction of BWDB training academy at Bhagyakul is fast nearing completion. The Hydrology Training Institute at Bhagyakul, now a component of the BWDB Training Academy is also under renovation. So the accommodation for 20 participants and 4 instructors will be available.	At FAP21/22 campsite, 4 rooms in one shed and another room in a nearby shed seems available. Each of these rooms, at present good for one person, can be furnished for two persons with difficulty. Leaving 3 rooms for trainers, this accommodation can accommodate 4 participants and 3 instructors. Remaining participants (16) shall have to be accommodated at Dewanganj BWDB compound 10 km away.
Accommodation at Bhagyakul will be fully ready for occupation by first week of February and the consultant responsible for the work has confirmed this.	To accommodate 16 participants two dilapidated buildings will have to be renovated which may cost some Tk. 250,000/- and may not be ready before 3rd week of February.
In addition to the accommodation, 2 modern classrooms, 1 computer room, space for a small sediment laboratory and many other facilities such as recreation hall etc. are available.	No suitable class room facilities, computer room or space for sediment laboratory will be available.
Communication to the work site (survey boat) is by 3 km unmetalled motorable road. Rickshaws are also available.	Communication from Dewanganj to work site (survey boat) is by 10 km unmetalled road, which becomes risky after each rain.
GPS reference station for the work site is available within academy compound and will be under effective control of the Survey team.	GPS reference station for the work site is on the other bank of Bahadurabad and cannot be easily controlled by the Survey team.
One way journey by car from Dhaka takes 2 hours.	One way journey by car from Dhaka takes 7 hours.
Traditional equipment will be available from Training Institute for any stop gap arrangement.	Daily discharge measurement at Bahadurabad starts in January and as such no equipment will be available for any stop gap arrangement.
Productive survey can easily be done using academy facilities.	Productive survey can be done by using FAP21/22 facilities as at that time survey party size can be reduced to 1 instructor and 5/6 participants and after each field trips of about 7 days the party can go to Dhaka for post processing.

Accommodation

Only 5(five) rooms being available, the accommodation is found inadequate for group accommodation of trainers and trainees. The accommodation need is 4 rooms for five trainers and 10 rooms for 20 trainees (considering 2 trainees in each room). The housing for class room, sediment laboratory and computer room was totally wanting.

If however the trainees including the trainers is split between Bahadurabad and Dewanganj, 14 trainees could be accommodated. In that case the problem and the cost of transportation between Dewanganganj will be there. By being split in two places, drawing smooth programme of training will be difficult. The progress of training will thus hamper.

All these problems will be absent at Bhagyakul.

Communication between Dhaka and the training site.

Better communication between Dhaka and the training site is also considered of importance as this will ease movement of trainers and visitors.

From this view point also, Bhagyakul is a better place. It is only 2 hours journey by road from Dhaka to Bhagyakul whereas the road or train journey to Bahadurabad takes about 7 hours.

Training environment:

Housing of all trainees, class room, sediment laboratory, and computer room in a single place could much improve the training environment at Bhagyakul. Moreover, Bhagyakul being a training institute for the last few years, some sort of training environment is already existing there. Apart from accommodation problem at Bahadurabad, this environment is wanting there.

Availability of traditional instruments(in case import of project equipment is delayed)

At Bahadurabad site, BWDB will start daily gauging from early January. Thus traditional instruments of BWDB will not be available for FAP 24 training. On the other hand ,at Bhagyakul (Mawa) BWDB has plan of fortnightly gauging and as such ,traditional instruments like sextants, binkley sampler and etc. will be available.

5.4 Recommendations and Proposals

In the circumstances, it is strongly recommended that Bhagyakul be selected as the training site. Placement of one transport at Bhagyakul for movement of trainees from the institute to river site will be necessary. Only in case that this could not be done, training will be conducted at Bahadurabad and Dewanganj by bringing changes in the training schedules. In this case an amount of tk 2,50,000 will be necessary for renovation of building at Dewanganj and supplying furniture and logistics to Bahadurabad and Dewanganj.

5.5 Production Survey at Bahadurabad:

After initial and substantial training at Bhagyakul by which trainees will be skilled enough in all types of surveying including bathymetry, sedimentary and topography. The trainees will then be split in to two groups. One group will be trimmed down to such strength so as to accommodate in 4 rooms (1 room being set aside for the trainer) at the FAP 21 camp office will be sent to Bahadurabad to take up productive survey as per suggestion of FAP 21 team. The other group will then undergo training in Dhaka in post processing works.

6. Need Assessment for the Participants

6.1 Design of CV Form

A simple CV form was designed to collect some relevant information to make an assessment of the level of skill the prospective participants has in the field of Hydrological survey. The form was intentionally made simple so that the participants can fill up the form from their memory. The sample CV form is shown as Appendix-C.

6.2 Obtain CV of the Prospective Participants

The CV form was sent to DG WARPO for circulation. Till 4/1/99 the CVs of the following prospective participants only were recovered:

1. Md. Rafiqul Islam M.Sc. Eng SDE
2. Mr. Mohammed Ali, M.Sc. Engg. SDE
3. Md. Monjurul Hoque SAE
4. Mr. Dilip Kumar Bala SAE
5. Mr. Mahmud Ilias SAE AMIE
6. Mr. Kazi Azad Hossain SAE
7. Md. Humayun Kabir SAE

These CVs are attached here with as Appendix-C

So far CV form from only one Graduate engineer has been received. In this case Mr. Islam Choudhury has joined to Hydrology only for few months. Although he is new in Hydrology, he has Masters in W.R. Engineering and as such has a very good grounding in river engineering. It is expected that he will rapidly pick up the knowledge and skill of the river survey technique and the data processing.

CV from 5 SAEs have so far been received. Out of these only one SAE has a half year experience of river gauge maintenance and BM survey. All of them however have some experience of data processing mainly limited to use of GWBASIC programs. But they are not conversant even with the spread sheet analysis, or MSACCESS database of Hydrology or survey of major rivers of Bangladesh by traditional methods. As such they cannot be considered as "already skilled surveyors and engineers" as mentioned in the TOR under SCOPE OF WORK in page 19.

In all of these cases, it is assumed that full training will be required in all the traditional methods of field survey, computer basics, modern methods of survey including GPS/DGPS survey. If most of the participants are of this skill it may be difficult to attain necessary skill within 5 months for surveying major rivers like the Brahmaputra.

6.3 Assessments of Meetings with DG/CEs and Directors

Chief Engineer Hydrology as also SE Processing and Flood Forecasting have stressed the need for full training in the traditional method. Whether it is discharge measurement or sediment sampling in the major rivers in Bangladesh it is the skill required to position a survey vessel by guiding the Vessel Master based on sextant

angles is of paramount importance. This skill, confidence and trust can only be attained by repeated trials. During the monsoon, when the river is deep and fast and some times rolling due to winds and visibility of shore marks are affected only a skilful maneuvering of the vessel and the survey equipment will enable doing the job. There is no replacement of repeated exercise under the monsoon condition. As the project will come to an end by mid-May the present programme cannot train the participants under monsoon condition.

Modern equipment such as GPS/DGPS positioning system, field survey software for data acquisition and their subsequent post processing will also need ample time to make the participants capable of under taking productive survey in the major rivers under extreme climatic and hydraulic condition. Modern equipment for field survey and post processing is computer based and as such (also suggested by SE/ Data Processing and SE/ River Morphology) the participants has to be given a very good grounding in computer operations and manipulations by computer. These need time for a good grounding.

It is therefore recommended that the training period is extended till mid-September in which case training can be extended through the monsoon period of 1999 and productive survey can be done for some of the major interventions on the Brahmaputra.

6.4 Training modules

The requirement of training under this programme have been divided into smaller and more or less homogeneous components having some objective and outputs. These smaller components have been named modules. The modules have been framed on the basis of experience of the consultants and time has also been estimated for each of the modules. These estimated time are based on the available project period. The module time is not sufficient as the participants are almost new in the trade.

In all 15 modules have been formulated. As the training proceeds, the duration of modules may need adaptation or some modified modules may have to formulated.

The training modules are shown below in Appendix-D. The details of Computer Training Programme has been given in Appendix-E.

List of lectures in the TOR

1. Basics in fluvial hydraulics and river morphology needed for organizing and implementing hydrological and morphological surveys.

2. Fundamentals in river survey methods and techniques applicable to the major rivers in Bangladesh, focussed on those applied in the RSP training programme.

3. Recent findings and improvements in the survey techniques applied in large rivers based primarily on the outcome on the RSP's surveys and study techniques of FAP - 24.

4. Organisation of river surveys, including: general planning, selection and optimization of survey techniques and instruments, troubleshooting.

5. Assessment of the accuracy required in survey operations.

6. Quality control of river data and methods for assessing measurement errors

Some of these lectures might be open to a larger audience e.g. universities and other consultants. The list of external lecturers as well as the schedule of lectures must be approved by the PMU.

Training Workshops

The consultant will organise in the BWDB Bhagyakul Training Centre and in Dhaka a series of practical training workshops on basic topics:

- Use and maintenance of the survey equipment utilized in the training programme
- Methods and instruments for analysis of sediment in laboratory
- River survey data processing, including validation techniques
- River survey data storage, retrieval and editing

On-the-job training

The on the job training will be organised through applications, executing survey programmes set up by BWDB and PMU, possibly in the frame of ongoing projects.

The consultant will organise and conduct the training on the river in the following domains (non exhaustive list):

Positioning, with traditional and modern methods and instruments

Leveling

Water level gauging with traditional and modern methods and instruments

Slop measurement

Flow velocity measurements, in fixed station

Flow velocity and flow paths, with drogue

Depth measurement, with traditional and modern methods and instrument

Suspended sediment transport measurement

Near-bed sediment transport measurement

Bed load measurement

Bed material samplin

Sediment analysi

Flow discharge measurements with traditional and modern methods and

Sediment discharge measurement

Topographic and bathymetric surveys for production of river bed chart

Bed form tracking and survey

Stream flow and sediment transport distribution between channels

On the job training in sediment laboratory

The on-the-job-training in the sediment analysis techniques will be initially organised in the BWDB Bhagyakul Training Centre, or in the consultant's premises if the facilities are there available. During the monsoon surveys on-the-job training will continue on the gauging sites.

The training will concentrate on:

- Determination of sediment concentration of suspended sediment
- Size analysis for sand fraction
- Size analysis for silt fraction

On-the-job training in the Office

The on-the-job training in the processing, storage and retrieval of river data will be organised in the consultant premises.

The tasks include the processing, storage and retrieval of river data, including validation of data and assessment of errors and uncertainities

Water level
Water discharge
Sediment discharge
Sediment characteristics
Topography and bathymetry
Bed features

Training Modules

1. Dhaka lectures (details in Table-1)	TL
2. Introduction to computers DOS Windows Word Processing (MSWORD) Spread sheet computation (MSEXCEL)	SYSTEM_A+PROG
3. Horizontal and vertical controls in a survey area Traditional methods Positioning and Geodetic reference Global Positioning System	HYD Triangulation Survey & Second FAP24 final report Annex1 Surveys
4. Geographical Information System(GIS)	TL+MORPH+SYSTEM_A+PROG
5. Velocity measurement Calibration of current meter Current meter drift -airline and wetline Correction Mean velocity at a vertical by various methods Velocity profile	DTL
6. Sediment sampling and laboratory works	SED+MORPH

Suspended sediment sample	
Near bed suspended sample	
Bed load measurement	
Bed material sampling	
Concentrations	
Grainsize distribution	
7. Hydrographic Survey Traditional Methods	HYD
Cross-section survey	
River chart production	
8. Hydrographic Survey by DGPS	HYD+MORPH+SYSTEM_A+PROG
and river chart production	
9. Discharge measurement -Traditional	DTL
methods & computation	
10. Discharge measurement Hi-Tech	HYD+SYSTEM_A+PROG
methods & computation	
11. Sediment discharge measurement	SED
12. Salinity measurement	DTL
13. Dataprocessing and analysis	
DTL+HYD+SED+SYSTEM_A+PROG	
Quality control general	
Quality control and validation of water level data	
Quality control and validation of cross-section survey data	
Development stage-discharge rating	
Development of sediment-discharge rating	
Development of time series (MDD etc)	
14. DATABASE	SYSTEM_A+PROG+MORPH
MSACCESS database	use UNDP report System Specification WRIS
	Hydrological Network Database (Integrated
database)	
Surface Water Database	
Morphology Database	
Climatogical Database	
Equipment Inventory Database	

7. Training Plan

Participants join on 24th January at the project office for the training. The entire training is broken down into the following components:

Training Workshop at Dhaka

Class room lectures	3 days	24/1/99 to 26/1/99
Initial Training at Dhaka	7 days	27/1/99 to 4/2/99
Introduction of GPS equipment at Dhaka	5 days	

Training Workshop at Bhagyakul

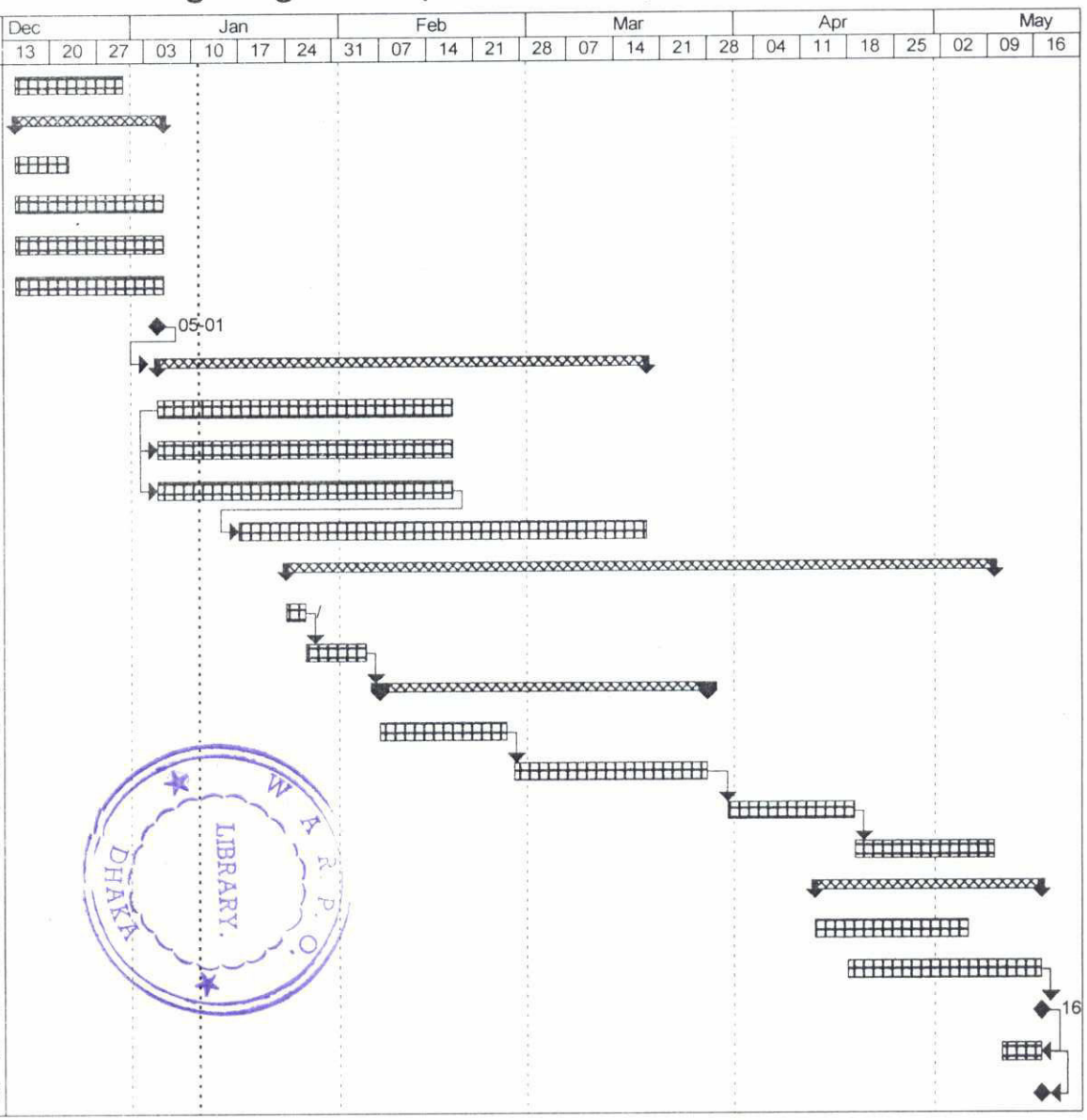
Traditional Measurement	16 days	4/2/99 to 25/2/99
Modern equipment	24 days	7/2/99 to 27/3/99
Productive survey	14 days	31/3/99 to 18/4/99
Office training	12 days	19/4/99 to 9/5/99

Days shown above are working days. While at Dhaka weekly holidays are Fridays and Saturdays in the field at Bhagyakul and Bahadurabad only Fridays are weekly holidays. All gazetted Government holidays are however non-working holidays. Exhibit-1 shows the Gannt Chart and Exhibit-2 shows the Pert Chart of the various activities of Project including the Training. Exhibit-3 shows the Manning Schedule of the professionals.

Exhibit-1 : Gantt Chart

River Survey Project FAP24: Training Programme (WARPO-CEC)

ID	Task Name	Duration	Start	Finish
1	**Mobilization**	11 days	Tue 15-12-98	Wed 30-12-98
2	**Inception Report**	15 days	Tue 15-12-98	Tue 05-01-99
3	Meet key persons	5 days	Tue 15-12-98	Tue 22-12-98
4	Review BWDB hard & softw	15 days	Tue 15-12-98	Tue 05-01-99
5	Review vessels & survey spi	15 days	Tue 15-12-98	Tue 05-01-99
6	Draft Training Plan	15 days	Tue 15-12-98	Tue 05-01-99
7	Submit Inception Report	0 days	Tue 05-01-99	Tue 05-01-99
8	**Draft Training Manuals**	53 days	Tue 05-01-99	Thu 18-03-99
9	Review BWDB/UNDP Manu	30 days	Tue 05-01-99	Wed 17-02-99
10	Review FAP24 Reports	30 days	Tue 05-01-99	Wed 17-02-99
11	Review ISO and WMO stan	30 days	Tue 05-01-99	Wed 17-02-99
12	Prepare and test Manuals th	45 days	Sun 17-01-99	Thu 18-03-99
13	**Implement Training Program**	78 days	Sun 24-01-99	Sun 09-05-99
14	Class lectures at Dhaka	3 days	Sun 24-01-99	Tue 26-01-99
15	Initial Training at Dhaka	7 days	Wed 27-01-99	Thu 04-02-99
16	**Training Workshop at Bha**	**40 days**	**Sun 07-02-99**	**Sat 27-03-99**
17	Traditional measuremer	16 days	Sun 07-02-99	Thu 25-02-99
18	Modern Equipment	24 days	Sat 27-02-99	Sat 27-03-99
19	**Productive Survey at Baha**	**14 days**	**Wed 31-03-99**	**Sun 18-04-99**
20	**Office work**	**14 days**	**Mon 19-04-99**	**Sun 09-05-99**
21	**Final Report**	**22 days**	**Tue 13-04-99**	**Sun 16-05-99**
22	Prepare Final Report	15 days	Tue 13-04-99	Wed 05-05-99
23	Print Final Report	20 days	Sun 18-04-99	Sun 16-05-99
24	Submit Final Report	0 days	Sun 16-05-99	Sun 16-05-99
25	Demobilization	4 days	Tue 11-05-99	Sun 16-05-99
26	Project Closed	0 days	Sun 16-05-99	Sun 16-05-99



Project: FAP24 Training Program Propc
Date: Mon 11-01-99

Task ▬▬▬▬▬▬▬▬ Milestone ◆ Summary ▬▬▬▬▬▬▬▬

Exhibit-2 : PERT Chart

River Survey Project FAP24: Training Programme (WARPO-CEC)

Mobilization	
1	11 days
Tue 15-12-9	Wed 30-12-9

Inception Report	
2	15 days
Tue 15-12-9	Tue 05-01-99

Meet key persons	
3	5 days
Tue 15-12-9	Tue 22-12-98

Review BWDB hard & software system	
4	15 days
Tue 15-12-9	Tue 05-01-99

Review vessels & survey spreads	
5	15 days
Tue 15-12-9	Tue 05-01-99

Draft Training Plan	
6	15 days
Tue 15-12-9	Tue 05-01-99

Submit Inception Report	
7	0 days
Tue 05-01-9	Tue 05-01-99

Draft Training Manuals	
8	53 days
Tue 05-01-9	Thu 18-03-99

Review BWDB/UNDP Manuals	
9	30 days
Tue 05-01-9	Wed 17-02-9

Review ISO and WMO standards	
11	30 days
Tue 05-01-9	Wed 17-02-9

Review FAP24 Reports	
10	30 days
Tue 05-01-9	Wed 17-02-9

Prepare and test Manuals throughout the course	
12	45 days
Sun 17-01-9	Thu 18-03-99

Implement Training Program	
13	78 days
Sun 24-01-9	Sun 09-05-99

Class lectures at Dhaka	
14	3 days
Sun 24-01-9	Tue 26-01-99

Initial Training at Dhaka	
15	7 days
Wed 27-01-9	Thu 04-02-99

Training Workshop at Bhagyakul	
16	40 days
Sun 07-02-9	Sat 27-03-99

Traditional measurement	
17	16 days
Sun 07-02-9	Thu 25-02-99

Modern Equipment	
18	24 days
Sat 27-02-99	Sat 27-03-99

Productive Survey at Bahadurabad	
19	14 days
Wed 31-03-9	Sun 18-04-99

Office work	
20	14 days
Mon 19-04-9	Sun 09-05-99

Final Report	
21	22 days
Tue 13-04-9	Sun 16-05-99

Prepare Final Report	
22	15 days
Tue 13-04-9	Wed 05-05-9

Print Final Report	
23	20 days
Sun 18-04-9	Sun 16-05-99

Submit Final Report	
24	0 days
Sun 16-05-9	Sun 16-05-99

Demobilization	
25	4 days
Tue 11-05-9	Sun 16-05-99

Project Closed	
26	0 days
Sun 16-05-9	Sun 16-05-99

Project: &&[FAP241Training Program P
Date: Sat 09-01-99

Name	
ID	Duration
Start	Finish

Critical | Noncritical
Critical Milestone | Noncritical Milestone
Critical Summary | Noncritical Summary
Critical Subproject | Noncritical Subproject
Critical Marked | Noncritical Marked

Exhibit-3

River Survey Project FAP-24 : Training Programme (WARPO-CEC)

MANNING SCHEDULE

Sl. No	Designation / Month / Week	December		January				February				March				April				May		Total
		1	2	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	
1	Team Leader																					5
2	Deputy Team Leader																					5
3	Hydrographer																					5
4	Morphhologist																					2.5
5	Sedimentologist																					5
6	Data Processing Specialist																					2.5
7	System Manager																					4
Total																						29

Support Hydrologist																		
Support Hydrographer																		
Technician Sed. Lab.																		

7.1 Dhaka Lectures

After Eid holidays, offices will be opening on 24 January 1999. The same day the participants will report to the Consultants office for registration and participation in the training course. The participants will be given an induction course for the training programme. PMU, the Consultant and the participants will prepare for the opening of the training course on 25/1/1999.

The following day the course will be formally opened by the Secretary MOWR, Govt. of Bangladesh and the ceremony will take time from 10:00 hours to 12:00 hours. PMU will make necessary arrangement of the opening ceremony. The participants will re-assemble for the class room lectures at 13:15 hours. In all the subsequent days and for the rest of the time on the opening day the following sessions will be held:

25/1/1999	Session-1	13:15 to 14:15
	Lunch & prayer	14:15 to 15:15
	Session-2	15:15 to 16:15
	Tea break	16:15 to 16:30
	Session-3	16:15 to 17:15
26/1/1999	Session-4	10:00 to 11:00
	Tea break	11:00 to 11:15
	Session-5	11:15 to 12:15
	Session-6	12:15 to 13:15
	Session-7	13:15 to 14:15
	Lunch & prayer	14:15 to 15:15
	Session-8	15:15 to 16:15
	Tea Break	16:15 to 16:30
	Session-9	16:30 to 17:30
27/1/1999	Session-4	10:00 to 11:00
	Tea break	11:00 to 11:15
	Session-5	11:15 to 12:15
	Session-6	12:15 to 13:15
	Session-7	13:15 to 14:15
	Lunch & prayer	14:15 to 15:15
	Session-8	15:15 to 16:15
	Tea Break	16:15 to 16:30
	Session-9	16:30 to 17:30

Dhaka lectures

Title	units	Lecturers
Basics in fluvial hydraulics and river morphology needed for organizing and implementing hydrological and morphological surveys	3	Dr. JU Choudhury and Dr. Monwar Hossain of BUET
Fundamentals in river survey methods and techniques applicable to the major rivers in Bangladesh, focussed on those applied in the RSP training programme	1	Mr. Mohammad Alam Mia Deputy Team Leader (Consultant)
Recent findings and improvements in the survey techniques applied in large rivers based primarily on the outcome on the RSP's surveys and studies	1	Mr. A.N.H. Akhter Hossain, Local Expert, WARPO
Organisation of river surveys, including: general planning, selection and optimization of survey techniques and instruments, troubleshooting	1	Mr. Mosharraf Hossain, Hydrographer (Consultant)
Assessment of the accuracy required in survey operations	1	Prof. J.J. Peters, Project Advisor, RSPFAP-24
Quality control of river data and methods for assessing measurement errors	1	Prof. J.J. Peters, Project Advisor, RSPFAP-24
Database of SW Hydrology of BWDB	1	Mr. M.A. Matin, Team Leader (Consultant)
Data processing	1	Mr. Ali Hosain, Deputy Director, BWDB
Remote Sensing and Satellite Imagery	1	Dr. A.M. Chowdhury, Director, SPARSO
Geographical Information System	1	Dr. Quader, PSO, SPARSO
Introduction to Global Positioning System	1	Mr. Nizamuddin, SDE, BWDB

7.2 Training Workshop at Bhagyakul

The Training Workshop at Bhagyakul will have two components i.e. Traditional measurements and Measurements by modern equipment.

7.2.1 Traditional Measurement

Traditional Measurement training will be conducted for 16 working days from 07-02-99 to 25-02-99. In this programme the participants will learn handling of all traditional equipment such as current meter, echo-sounder, position fixing by sextants, full discharge and sediment measurements. However, it is intended to introduce GPS/DGPS equipment also during this period.

7.2.2 Modern Equipment

It is expected that the PMU will receive modern equipment; and refurbished launches equipped with the modern equipment will be available for the training. For a period of 24 working days from 27-02-99 to 27-03-99, the participants will be trained for the survey by using modern vessel and equipment so that they are ready for the productive survey.

7.3 Visit to Sediment Laboratory

During the period of Training Workshop at Bhagyakul, a one day visit to Sediment Laboratory at RRI Faridpur will be arranged in two batches.

7.4 Productive Survey

As per ToR, the subject of productive survey will be planned as per discussion with WARPO and PMU. However, the team of productive survey will consist of not more than 5 persons and only 2 teams will work in the field at a time and the other teams will work at Dhaka covering data processing, data bank and chart production.

7.5 Evaluation of Training

A two stage evaluation will be made of the participants: one immediately after the initial training and the other towards the end of the training programme. The evaluation will be made based on the performance of the participants during the training programme, actual output of field and data processing works done by them; human relations and communications skill with the trainers, colleagues and juniors.

8. DURATION OF TRAINING AND TIME FRAME

During the project preparatory analysis the duration of training has been found to be insufficient. In the ToR it was envisaged that already skilled BWDB Engineers and Surveyors will be sent for training.

Analysis of the limited number of available CVs show that most of the participants do not have experience of gauging major rivers nor skilled to the extent indicated in ToR. As such it is apprehended that more time is going to be required than indicated for the various modules of training.

For various reasons, the training programme had to be started late and will come to an end by Mid-June 1999. Because of reasons mentioned above no training could be provided covering monsoon condition.

Under such circumstances, the training duration is necessary to be extended to cover the monsoon period.

Appendix-A

List of Reports of FAP-24

APPENDIX-A

List of Reports of FAP-24

TITLE	SUB_TITLE
Final Report	Main Volume
Final Report - Annex 1	Surveys
Final Report - Annex 2	Sustainable Survey Techniques
Final Report - Annex 3	Hydrology
Final Report - Annex 4	Sedimentology
Final Report - Annex 5	Morphological Characteristics
Special Report No. 1	Validation of staff gauge bench marks
Special Report No. 2	Water level gauging stations
Special Report No. 3	Bathymetric surveys
Special Report No. 4	Stage Discharge relationship for the Jamuna at Bahadurabad
Special Report No. 5	Qualitative assessment of possible morphological impacts of FAP implementation
Special Report No. 6	Floodplain levels and bankfull discharge
Special Report No. 7	Geomorphology and channel dimensions
Special Report No. 8	Bed material sampling in Ganges, Padma Old Brahmaputra and Jamuna
Special Report No. 9	Bedform and Bar Dynamics in the Main Rivers of Bangladesh
Special Report No. 10	Morphology of Gorai offtake
Special Report No. 11	Optimization of hydraulic measurements
Special Report No. 12	Optimization of sediment measurements
Special Report No. 13	Sediment transport predictors
Special Report No. 14	Minerological and physical properties of river sediments
Special Report No. 15	Overland flow and floodplain sedimentation
Special Report No. 16	Secondary currents and morphological evolution in a bifurcated channel
Special Report No. 17	Spatial representation and analysis of hydraulic and morphological data
Special Report No. 18	Sediment rating curves and balances
Special Report No. 19	Joint measurements BWDB/RSP hydrology
Special Report No. 20	Joint measurements BWDB/RSP morphology
Special Report No. 21	Guide to RSP databases
Special Report No. 24	Morphological processes in the Jamuna River

Appendix-B

Terms of Reference (ToR)

BACKGROUND OF THE RIVER SURVEY PROGRAMME

The River Survey Programme FAP 24 (RSP) is one of the supporting activities of the Flood Action Plan. It is supposed to constitute the first phase of a longer term effort aimed at expanding and strengthening the collection of hydrological and morphological data, and further developing understanding of the behaviour of the main rivers in Bangladesh. The main objectives of the project are to collect reliable all season data on the hydrology and morphology of the country's main river systems, undertake special studies regarding the behaviour of the rivers, provide on-the-job training to Bangladesh professionals, and provide benchmarks against which to assess changes in river morphology and hydrology.

The TOR. of the project stated that although hydrological, morphological and hydrographic data are routinely collected by concerned Bangladeshi organizations (BWDB and BIWTA) the limitations of existing boats and survey equipment mean that some essential data needed for the planning of Action Plan projects are either insufficiently accurate or are not collected. The River Survey Programme would carry out necessary surveys using modern equipment and technology, undertake special studies of the behaviour of the river system and provide specialised training in river survey techniques to Government staff.

The Commission of the European Union (EC) is financing the project and the Water Resources Planning Organization (WARPO) is the Implementing Agency, assisted by a Project Management Unit (PMU), with an expatriate Project Adviser.

The programme comprises four components:

1. Hydrological and morphological data collection
2. River behaviour studies
3. Training
4. Project Management

It started on 8 June 1992 and was supposed to be completed in four years. A programme extension till 31 December 1998 was agreed between the Government of Bangladesh (GOB) and the EC.

Components 1 and 2 of the programme have been completed and the final report submitted in January 1997 by the Contractor (Consortium Delft Hydraulics - Danish Hydraulic Institute DHI) was approved. This reports contains recommendations for expanding and strengthening the collection of hydrological and morphological data, and for further developing understanding of the behaviour of the main rivers in Bangladesh. Only limited on-the-job training was provided, mainly to own staff.

Funds are allocated in the budget of the River Survey Programme to acquire special survey equipment and instruments in view of implementing the recommendations made in the project for further surveys and studies on major rivers in Bangladesh. The European Commission and Bangladesh agreed to allocate these funds for procurement of special survey equipment and instruments, for refurbishment of survey vessels and for a comprehensive on-the-job training using the procured equipment on the refurbished vessels.

The River Survey Programme covers locations on selected main rivers of the country: the Brahmaputra/Jamuna, the Ganges and Padma, the Meghna, and the main tributaries and off-takes of these rivers.

The on-the-job field training will be conducted on two or three of the major rivers:
1 the Jamuna river, mainly in the area of Bahadurabad (main area)
2 the Padma, in the area of Mawa, with tidal influence (for initial training)
3 the Ganges, in the area of Hardinge Bridge (if time allows)
with the main part during the 1998 monsoon season (June to September)

The training workshops, with lectures and on-the-job data processing, storage and retrieval, will take place in the BWDB Bhagyakul Training Center and in Dhaka, normally in the premises of the Consultant.

SCOPE OF WORK

The objectives of the training programme are:
- to strengthen BWDB by providing on-the-job training to professional staff numbering 15-20 consisting of surveyors, SAE, AE, to SDE, E.E from BWDB Surface Water Hydrology (SW-H) and River Morphology so that they can continue the data collection programme in the long term and implement new survey techniques elaborated in the RSP.
- to organize during the training specific survey programmes, which output would be of practical use for BWDB, for other Bangladeshi organizations or for projects going on in the surveyed areas (Atraining-through-applications")
- to upgrade the institutional capability in Bangladesh for river hydrological and morphological data collection

The training will be organized for a limited number of BWDB already skilled surveyors and engineers, who would become later themselves the trainers ("training-the-trainers"). These trainees will be selected by BWDB, assisted by the Project Management Unit WARPO-EC, on the basis of their technical capabilities as well as on their ability to conduct training.

The on-the-job training in river surveys will take place on the refurbished BWDB vessels - or as long as these vessels are not ready - on other BWDB vessels. The running costs of the vessels, including crew, will be at the expenses of BWDB. All the survey equipment and instruments will be made available by BWDB: special equipment and instruments procured under the project and other equipment needed.

A tentative programme of survey activities in the training programme is given in section 4. It will be adapted during implementation, taking into account the uncertainty on the schedule for refurbishment of the vessels and the uncertainty on flow and weather conditions on the river.

A tentative programme of lectures and training workshops is also given in the "Details of Training". Their scheduling is independent of the field activities, except for the initial training in the BWDB Bhagyakul Training Center, for which some training workshops on surveys will be complemented by measurements on the river.

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General

The training will be organised in a short period, leaving little room for adaptation of the schedule. The consultant is supposed to carry out his duties with the necessary skills and efficiency. All programmes, personnel and tasks have to be agreed on by the PMU in advance. Monthly work programmes will be established in collaboration between BWDB, PMU and the consultant.

Lectures

The consultant will organise in the BWDB Bhagyakul Training Centre or in Dhaka for special topics - a series of lectures on basic topics:

- basics in fluvial hydraulics and river morphology needed for organizing and implementing hydrological and morphological surveys
  fundamentals in river survey methods and techniques applicable to the major rivers in Bangladesh, focussed on those applied in the RSP training programme
- recent findings and improvements in the survey techniques applied in large rivers, based primarily on the outcome of the RSP's surveys and studies
- organization of river surveys, including: general planning, selection and optimization of survey techniques and instruments, troubleshooting
- assessment of the accuracy required in survey operations
- quality control of river data and methods for assessing measurements errors

Some of these lectures might be open to a larger audience, e.g. universities and other consultants. The list of external lecturers must be approved by the PMU, as well as the schedule of lectures.

Training Workshops

The consultant will organise in the BWDB Bhagyakul Training Centre and in Dhaka a series of practical training workshops on basic topics:

- use and maintenance of the survey equipment utilized in the training programme
- methods and instruments for analysis of sediment in laboratory
- river survey data processing, including validation techniques
- river survey data storage, retrieval and editing

Attendance to these training workshops will be limited to the target group of selected trainees, possibly differentiated for engineers and surveyors.

On-the-job training

The on-the-job training will be organised through applications, executing survey programmes set up by BWDB and PMU, possibly in the frame of ongoing projects.

The consultant will organise and conduct the training on the river in the following domains (non exhaustive list):

- positioning, with traditional and modern methods and instruments
  leveling
- water level gauging with traditional and modern methods and instruments
- slope measurements
- flow velocity measurements, in fixed station
- flow velocity and flow paths, with drogues
- depth measurements, with traditional and modern methods and instruments
- suspended sediment transport measurements
- near-bed sediment transport measurements
- bed load measurements
- bed material sampling
- sediment analysis
- flow discharge measurements, with traditional and modern methods and instruments
- sediment discharge measurements
- topographic and bathymetric surveys for production of river bed charts
- bed form tracking and surveys
- stream flow and sediment transport distribution between channels

On-the-job training in sediment laboratory

The on-the-job training in sediment analysis techniques will be initially organised in the BWDB Bhagyakul Training Centre, or in the Consultant s premises if the facilities are there available. During the monsoon surveys, on-the-job training will continue on the gauging sites.

The training will concentrate on:

- determination of sediment concentration of suspended sediment
- size analysis for sand fraction
- size analysis for silt fraction

On-the-job training in the office

The on-the-job training in the processing, storage and retrieval of river data will be organised in the consultant s premises.

The tasks include the processing, storage and retrieval of river data, including validation of data and assessment of errors and uncertainties

- water level
- water discharge
- sediment discharge
- sediment characteristics
- topography and bathymetry
- bed features

CD

The consultant will prepare manuals specific to each part of the training. The manuals will be made according to the following target groups:

- engineers
- surveyors
- operators

The manuals will be practice-oriented and not duplicate existing manuals (international or local). The content and presentation of the manuals will be presented to, discussed with and approved by the PMU.

Project Management Unit

The PMU will be actively involved in the training programme. Members of the PMU will participate in the preparation of lectures and training workshops, especially in those matters in which they have particular skills.

The Project Adviser will assist the consultant in several domains, among which:

- sediment measurements
- sediment analysis
- bed form identification and tracking
- flow and sediment gauging network and station design
- adaptation of flow and sediment gauging stations to morphological changes
- selection and optimization of flow gauging methods
- topographic-bathymetric surveys for morphological studies
- data quality control

Reports

The consultant shall prepare and submit to WARPO/PMU the following reports:

- an inception report (2nd week) with a work plan
- Monthly Progress Report starting from the end of the 2nd month summarizing the results of the training completed and a detailed work plan for the remaining training during the monsoon season
- a draft final report presenting the results of the training, his findings and the lessons of the programme. The final report will have annexed the training manuals and the data books with the results of the measurements performed during the training

DURATION AND TIME SCHEDULE

The training programme will be carried out between the date of signature of the contract and 15 December 1998. No extension will be allowed, as the Memorandum of Understanding between the EC and GOB expires on 31 December 1998.

A tentative time schedule shall be given with the activities. The schedule will be adapted continuously in agreement between BWDB, PMU and the consultant. All deviations from the agreed time schedule must be proposed to and agreed by the PMU.

In his offer, the consultant may suggest some amendments, with his justification for each of these amendments.

ANNEX I - FINANCIAL PROVISIONS

Contract between : The Water Resources Planning Organization and
Project = River Survey Project – Training Programme

COSTS	Unit	Nr. Unit	Rates Per Unit (Taka)	TOTAL (TAKA)
A. HONORARIA (1) :				
A.1. Team Leader – Hydrologist	Man-month	5		
A.2. Hydrologist Deputy Team Leader	Man-month	5		
A.3. Hydrographer	Man-month	4		
A.4 River morphologist	Man-month	3		
A.5. Sedimentologist	Man-month	4		
A.6. Data processing specialist	Man-month	4		
A.7. System manager	Man-month	4		
B. DIRECT COSTS :				
B.1. Secretary – Typist	Man-month	5		
B.2. Car journeys				
B.2.1. – Rental or Depreciation	Veh-month	10		
B.2.2. – maintenance, fuel, insurance etc.	Veh-month	10		
B.3. Office expenses	Month	5		
C. REIMBURSABLE (2)				
C.1. Daily allowances (local trainers, trainees & RSPMU personnel) (3)	Man-day	1,500	300 (average)	450,000
C.2. Transport costs for trainers & trainees (4)	Man-trip	500	300	150,000
C.3. Fees for external lecturers	Man-hour	50	500	25,000
C.4. Fuel costs for vessels during training	Vessel-day	120	7500	900,000
C.5. Office furnishing (5)	Lump-sum			150,000
C.6. Equipment for workshop & lectures	Lump-sum			10,000
C.7. Production of reports, lecture & training manuals	Lump-sum			200,000
TOTAL maximum COST of contract				

(1) Including overheads and all other costs of a similar nature

(2) Payable only upon receipt by the WARPO of satisfactory documents

(3) Daily allowances for work on the sites

(4) Estimated. Payable upon receipt by the WARPO of justifying documents : for travel : railway tickets and air agency invoices ; for other expenses : original invoices

(5) Refurbishing of BWDB facilities for use by the training consultants; these items will be the property of BWDB Surface Water Hydrology on completion of the project

GENERAL OBLIGATIONS OF THE CONSULTANTS

1. The Consultant shall carry out the duties entrusted to him by the present contract loyally and impartially and in accordance with the best professional practises.

2. He shall maintain complete independence in relation to all individuals, organisations or government bodies.

3. He shall observe the strictest neutrality with regard to views and opinions, particularly in the field of politics and religion, held in Bangladesh.

4. He shall respect all laws and regulations in force in Bangladesh.

5. Confidentiality :

The consultant undertakes to treat as strictly confidential all information of whatever kind relating to performance of this contract. 'Information' means - among other things - the facts, figures and other data, from whatever source and howsoever obtained, directly or indirectly available to the consultant in, or because of, performance of its contractual obligations.

The use of such information for any purpose other than performance of the contract for the sole benefit of WARPO shall require the explicit prior authorization of WARPO.

The consultant shall take all necessary and relevant measures to ensure full compliance with its undertakings of confidentiality. These shall include:

- a specific formal undertaking from its services, employees and agents;

- the adoption of suitable working procedures;

- the implementation of security measures regarding access to information (security of premises and data, etc.).

WARPO and the Commission for their part may at any time check that these measures are being properly implemented and may require the consultant to take other security measures. Confidentiality rules shall continue to apply on expiry of this contract.

6. The Consultant shall supply WARPO with whatever information relating to the execution of the present contract that the latter may reasonably request.

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ANNEX D : Financial Identification

A/ ACCOUNT HOLDER.

Name :	
Address :	
City :	
Postal Code :	
Contact Person :	
Telephone :	
Telefax :	
VAT Number :	

B/ BANK (FINAL).

Name :	
Code :	
Address :	
City :	
Postal Code :	
Register + Account	
Currency :	

C/ BANK (IN CASE OF AN INTERMEDIATE BANK).

Name :	
Code :	
Address :	
City :	
Postal Code :	
Register + Account	
Currency :	

D/ BENEFICIARY (ONLY IF DIFFERENT FROM ACCOUNT HOLDER).

Name :	
Address :	
City :	
Postal Code :	

ANNEX-B

LETTER OF INTENT

FROM :

TO :

Director General WARPO

House 450, Road 31, New DOHS

Mohakhali, Dhaka 1206

Sir :

Subject : **Hiring of Consultancy Service for**

Conducting a Training Programme

Under the River Survey Project (FAP-24)

I/We ---------- Consultant/Consultancy firm herewith accept the conditions for implementation of the contract pertaining to this call for tenders and present herewith the Technical Proposal for selection of my/our firm/ organization as Consultant for the Training Programme of the River Survey Project.

Yours faithfully,

Signature ----------

Full Name ----------

Designation ----------

Address ----------

(Authorized Representative)

ANNEX F

APPROACH AND METHODOLOGY

Briefly Describe the Approach and methdology for Conducting the Training Programme in 10 pages (please use separate sheet) as per Art 3 A 2 of the specificatiobn.

Brief Comments on Terms of Reference (Comments should preferably be made parawise and in sentences (please use separate sheet) as per Art. 3A2 of the specification.

Appendix-C

Sample of CV Form

CV of Individual Prospective Participants

1. Name
2. Date of Birth
3. Date of Joining BWDB
4. Present Position
5. Academic Qualification
6. Experience

Post	Period	Work

7. Training

7.1 In country

Course Title	Duration (days/months)	Year

7.2 Abroad

Course Title	Duration (days/months)	Year	Country

8. List (Title of Publication if any

_____

Signature

CV of Individual Prospective Participants

1. Name — Md. Rafiqul Islam Choudhury.
2. Date of birth — 31-12-52
3. Date of joining BWDB — 26-8-80
4. Present position — Sub-Divisional Engineer.
5. Academic Qualification — B.Sc Engineering (Civil), M.Sc. Engineering (WRE
6. Experience

Post	Period	Work
Civil Engineer.	15-12-79 to 25/8/80	worked on design of water supply distribution sys. of Khulna water Supply Scheme.
Assistant Engineer	26-12-80 to 26-12-84	worked on planning of Barisal-Patuakhali Agriculture Development Project and also IDA & IFAD project.
Sub-Divisional Engineer	26-12-84 to till date	working in Hydrology, collection of data from discharge measurement of different river, rainfall, soil investigation, & supervision of construction work of Training Institute of Bygary Munshiganj.

7. Training

7.1 Incountry

Course Title	Duration (days/months)	Year
Induction training course	1 (one) month.	1980
Re-orientation course	18 days.	1984
ToT Course	3 Phases.	1993

7.2 Abroad

Course Title	Duration (days/months)	Year	Country
NIL	—	—	—

8. List (Title) of publication if any :

Signature

(C7)

CV of Individual Prospective Participants

1. Name — MOHAMMAD ALI.
2. Date of birth — 01-03-1955
3. Date of joining BWDB — 21-07-1981.
4. Present position — Sub Divisional Engineer PFFC, Dhaka.
5. Academic Qualification — B.Sc. Engg (Civil) P.G. Diploma (WRD) M.E (WRD)
6. Experience

Post	Period	Work
Assistant Engineer	From Date of Joining to middle of 1986	Design office Dhaka, L.R.P. Ctg. Noakhali.
Sub Divisional Engineer	From 1986 to till to day.	Ground water sub Div. Comilla. Cox's bagar, Chandpur C.I.P. Noakhali etc.

7. Training

7.1 Incountry

Course Title	Duration (days/months)	Year
Induction Training Course, Kaptai Academy Rag Rangamati Hill district	17-11-84 to 13/12/84	1984.

7.2 Abroad

Course Title	Duration (days/months)	Year	Country
P.G. Diploma (WRD) & M.E (WRD) under Financed by C.F.T.C Jduring 1990-91	12-6-90 to 4-12-91 16½ month.	1990-91.	University of Roorkee. INDIA.

8. List (Title) of publication if any :

6/1/99.

Signature

CV of Individual Prospective Participants

1. Name MD. MANJURUL HOQUE
2. Date of birth 01-01-1965.
3. Date of joining BWDB 03-08-1998.
4. Present position SUB-ASSISTANT ENGINEER
5. Academic Qualification DIPLOMA-IN-CIVIL ENGINEERING.
6. Experience

Post	Period	Work
S.A.E / Surveyor	01/01/1992 to 30/06/1993	Gauge Connection, BM Check & Cross-sectional Survey work.
S.A.E / Contract Basis	15/10/1994 to 30/06/1996	Hydrological data processing works.
S.A.E/ Regular	03/08/1998 to date	Data processing WL/Rainfall/Evaporation Obs. Discharge data entry. MS DOS & SW basic Program.

7. Training

7.1 Incountry

Course Title	Duration (days/months)	Year
On service informal training.	—	—

7.2 Abroad

Course Title	Duration (days/months)	Year	Country

8. List (Title) of publication if any :

03/01/99.
Signature

CV of Individual Prospective Participants

1. Name DILIP KUMAR BALA
2. Date of birth 04-05-1968
3. Date of joining BWDB 03/08/1998
4. Present position SUB-ASSISTANT ENGINEER
5. Academic Qualification DIP.-in-Civil Engineering
6. Experience

Post	Period	Work
SAE / Contractual	Oct/94 to June/96	data proceping WL/rain fall/evaporation/obs. dis data entry.
SAE / Regular.	3/8/98 to date.	MS DOS & B.W basic profram.
		- do -

7. Training

7.1 Incountry

Course Title	Duration (days/months)	Year
In service informal training	—	—
	—	—

7.2 Abroad

Course Title	Duration (days/months)	Year	Country

8. List (Title) of publication if any :

03/01/99
Signature

CV of Individual Prospective Participants

1. **Name** MAHMUD ILIAS
2. **Date of birth** 01-06-1967
3. **Date of joining BWDB** 03-08-1998
4. **Present position** S.A.E (Civil)
5. **Academic Qualification** SSC./Diploma-in-Engg(Civil)/AMIE(B)(Civil)
6. **Experience**

Post	Period	Work
SAE (Civil) / Contract	OCT/94 to JUNE/96	Data processing WL/R.F/EVP
SAE (Civil) / Regular	03/08/98 to date	Obs. discharge entry DO

7. **Training**

7.1 **Incountry**

Course Title	Duration (days/months)	Year
WORDPERFECT 5.1		
LOTUS 1-2-3, dBASE III+	1st JANUARY '95 to 15th APRIL '95	1995
Inservice informal Training	—	—

7.2 **Abroad**

Course Title	Duration (days/months)	Year	Country

8. **List (Title) of publication if any :**

Signature
03-01-1999

CV of Individual Prospective Participants

1. Name KAZI AZAD HOSSAIN.
2. Date of birth 25-05-1964
3. Date of joining BWDB 03/08/1998
4. Present position Sub-Assistant Engineer.
5. Academic Qualification Diploma-in-Civil Engineering.
6. Experience

Post	Period	Work
SAE/Contract	Oct/94 to June/96	Data processing, WL, Rainfall, Evaporation, obs. discharge entry - MS DOS, GW basic Program.
SAE/Regular	03/08/98 to date	-do-

7. Training

7.1 In country

Course Title	Duration (days/months)	Year
In service informal training.		

7.2 Abroad

Course Title	Duration (days/months)	Year	Country

8. List (Title) of publication if any :

03/01/99
Signature

CV of Individual Prospective Participants

1. Name : MD. HUMAYUN KABIR.
2. Date of birth : 31 ST. DECEMBER, 1965
3. Date of joining BWDB : 3Rd. August, 1998
4. Present position : Sub - Assistant Engineer (Civil).
5. Academic Qualification : Dip. in Civil Engineereing. A.M.I.E. Part 'A' and M.A. (Dhaka University) in Islamic History & Culture
6. Experience

Post	Period	Work
S.A.E/Contract Basis.	Oct 94 to June '96	Data Processing - WL/Rainfall/Evaporation/ observed Discharge entry, MS DOS & S.W. Basic Progr
S.A.E/Regular	3rd August, 1998 to date.	— DO —

7. Training

7.1 Incountry

Course Title	Duration (days/months)	Year
In service Informal training.	—	—
	—	—

7.2 Abroad

Course Title	Duration (days/months)	Year	Country

8. List (Title) of publication if any :

03-01-1999.

Signature

Appendix-D

Training Modules

APPENDIX-D

Training Plan Summary

sheet 1

Training Phase	Training module	Duration Working Days	Result to be achieved
Dhaka Training 3 working days	Module-1: Introductory Lecture	3	Hydraulic parameters to be surveyed - Inter-relationship of fluvial-hydraulic parameters in shaping the alluvial river system in its planform and section properties.
Training Workshop 70 working days Note: On all field Working days 5 computers will be available for the participants for practice in the afternoons and also at nights	Module-2: Introduction to computers	6	Can switch on computer, can work with word processing and excel files in widows environment
	Module-3 Elementary seamanship, inland navigation and safety on board a survey vessel.	1	Can take charge of a survey vessel. Survey spreads on a vessel introduced
	Module-4: Horizontal and vertical controls	5	Can establish shore marks by triangulation survey (Traditional method). Can establish GPS reference station. Can establish Bench Marks (BM)
	Module-5: Water Level Measurement	2	Can establish staff gauge and can determine river slope. Can inspect Automatic WL Recorders/Telemetry recorder and can set the recorder to correct record.
	Module-6:GP Survey	3	Can provide Horizontal and Vertical Controls by GP Survey
	Module-7: Positioning of gauging craft	5	By sextant and by DGPS with the vessel on anchor and on power
	Module-8: Depth Measurement	1	Can make depth measurement by traditional methods and by Echo sounder.
	Module-9: Velocity measurement by current meter	3	Can make velocity measurement by single point, 2 point and multiple point method, with vessel on anchor or on power and establish velocity profile
	Module-10: Sediment sampling in the field	4	Can collect water sediment sample from various depth by Binckley sampler, pump sampler and also collect near bed sediments by Delft bottle and bed sample by bed load sampler

33 Days

Training Plan Summary

sheet 2

Training Phase	Training module	Duration Days	Result to be achieved
	Module-11: Laboratory nalysis of sediments	5	Can make laboratory analysis for concentration and grain size analysis
	Module-12: Discharge Measurement and computation	1	Can make a full discharge measurement in a major river station and can do the necessary computation, dataentry into database and validation.
	Module-13: Sediment discharge measurement and computation	1	Can make a full sediment discharge measurement by Binckley sediment sampler and also by a combination of pump sampler, by Delft bottle sampler, Helly Smith bed load sampler and analysis for concentration and grainsize distribution.
Training Workshop 70 working days	Module-14: Hydrographic Survey & chart production	7	Cross-section survey in water area, extending the cross section from water edge to high bank and produce charts
	Module-15: Float and dune Tracking	2	Can track floats and find flow patterns and can also do dune tracking.
Productive Survey at ite1 21 working days	Undertake productive Survey as agreed upon	0	The desired output of the productive survey
Productive Survey at Site2 (Bahadurabad) 21 working days	Undertake productive Survey as agreed upon	14	The desired output of the productive survey
Office Training at Dhaka 23 working days	Complete data processing and finalise the output including hydrographic charts of two productive survey	14	Can finalise river chart along with depth contours
	Compilation of all productive survey data in a data book/database		
	Module-12: MSACCESS database		

77 Days

Appendix-E

Computer Training Programme

APPENDIX-E

Elaboration of Training Programme on Computer Application

Training Room : Room should be spacious enough so that 20 trainees can accommodate with chairs & tables. Room should be Air conditioned,

Training Equipment : One white board with multiple coloured water marker pens and dusters. Pointer. One Overhead Projector, Transparent Sheets, Pens for Transparent Sheet. One Multimedia Projector, One Micro Computer preferably LapTop for trainer, 10 Micro Computers for trainees

Detail Training Schedule for Proposed Training Program

PACKAGES	DAY	TOPICS
COMPUTER INTRODUCTION WINDOWS '95	1st class	**OPENING CEREMONY :**
	2nd class	**INTRODUCTION TO COMPUTER :** What is computer, Function of Computer, History of computer, Generation of Computer, Advantages of computer, Computer in Bangladesh, Use of Computer, Classification of Computer, Computer Hardware and Software.
	3rd class	**INTRODUCTION TO OPERATING SYSTEM :** Types of Operating System, Function of Windows '95 as an Operating System and relation with other application program, Introduction to Windows 95, Concept of Desktop, Brief Description on Desktop icon in windows 95. How files are organized in a Folder, Use of Windows Explorer and utilities, Use of Recycle Bin.
	4th class	**FEATURES OF WINDOWS 95** User Interface, Backwards compatibility, Plug and play support, Long file name, Multitasking, etc.
MS-WORD	1st class	**INTRODUCTION TO MS-WORD AND ITS FUNDAMENTALS :** Create a document (Type Bio-Data), Save a document as a file, Closing a file, Open file, Print preview and print file, searching a file, Protecting a file.
	2nd class	**MODIFYING AND VIEWING OF DOCUMENTS :** Text editing (selecting, Cut, copy, paste, move, undo-redo, find, replace, goto.) Document viewing in different form and customized toolbar.
	3rd class	**WORD PROCESSING TOOLS :** Insert page breaks, Page number, Header-footer, Footnote, Picture, Different objects, others files to your document. Formatting Table : Table creation and editing,
	4th class	**FORMATTING TEXT :** Formatting Fundamentals (Character and fonts, Paragraph, Line spacing, boarder and shading, Tabs, layout and Viewing, Graphics work in a file.

PACKAGES	DAY	TOPICS
MS-EXCEL	1st class	**INTRODUCTION TO MS-EXCEL :** Why Excel and what excel can do? Division of Excel, Description of Excel Screen Comparing with Word Screen and also find its similarities with word, Describe the Excel Environment(Workbook, Worksheet and Windows), Working inside Worksheets(Creating a worksheet as your related job, Different techniques of entering, editing, clearing cell copying and moving data and understanding parts of the workbook).
	2nd class	**FORMATTING AND DATA MANIPULATION :** Cut-paste, Copy-paste, Move. Select any cell, Row, Column and Entire Sheet. Hide & unhide Column-Row. Inserting rows, Columns, Deleting Rows, Columns, Clearing Data, Changing Column-width and Row-Height, Formatting Numbers, Characters and Data, Convert Row to Column. Basic skills (Formatting cells, Printing)
	3rd class	**FUNCTIONS** Summation, Percentage, Sorting (Single, Two Column & 3 Column) and Essential Worksheet functions **RESULT SHEET ANALYSIS:** If function (pass, Fail), Grade determination, Merit list, Count, Countif, Max, Min, Average.
	4th class	**DATA MANAGEMENT AND GRAPHICS & CHARTS :** Setting, Sorting, filtering and built-in form using, Accessing external database, Graphics & Chart

Detailed training schedule on database management system will be furnished in due time incorporating the trainees absorption environment and developments.