

Infrastructures Design Activities in LGED

Presented by :

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INFRASTRUCTURE DESIGN ACTIVITIES IN LGED

1. Introduction

LGED, a vibrant Government Department in Bangladesh, is implementing 62 projects in Rural-Urban Development Sector. Of these only 6 projects are of TA type and the rest 56 projects involve infrastructure development. The following types of infrastructure are usually involved :

- a. Road Infrastructures : Roads and Road Pavements, Bridges, Culverts, Causeways, Abutment/Road Side-slope protection etc.
- b. Water Infrastructures : Embankments, Drainage/Irrigation Canals, Regulators, Sluices, Water Retention Structures, Rubber Dams, Erosion Protection at River Banks etc.
- c. Building and other Structures : Functional and Community Buildings of LGED and Local Governments, Markets, Cyclone Shelters, School Buildings, Health Complex, Bus Terminals, Auditoriums, Low Cost Houses, Biogas Plants etc.

Design of all infrastructures of the Projects are done in LGED. It is thus evident that LGED's design responsibility is very vital.

2. Design Management in LGED

The projects which are donor-supported usually have Project Consultants. Design of infrastructures of these projects are taken care of by the Concerned Projects. However, LGED carries the overall design management responsibility. Some recent donor-supported projects have vested the responsibility of design of project infrastructures to LGED. Projects which are financed by the GOB, some quarter of the projects by number, Food-Aided projects do not have Project Consultants. All activities related to planning & design of infrastructures involved in there Projects are, therefore, done directly by LGED.

Having continued in the Status of a Bureau (the Local Government Engineering Bureau) since 1984, LGED established itself as a Government Department in 1992. Being one of the latest Departments created, the principle of decentralization of functions and, consequently, organizational structure of decentralized staffing has been more closely followed for LGED. It has only 84 staff at the headquarter level out of the total staff strength of 9548 in the Revenue Budget. This is one of the reasons why there is no central planning and design office in LGED. Nevertheless, LGED undertook active measures to enhance its institutional capacity through the Institutional Support Project (ISP) in 1993 with assistance from Swedish International Development Authority (SIDA). The ISP included, along with several other Units, the Technical Design Unit with the objective of enhancing capacity of LGED engineers in design management in one hand and to act as a centre of design support to various projects of LGED in general and to the GOB-financed projects and projects with no Project Consultant support in particular.

3. Plan of Operation of Design Unit

The Design Unit is **organized** with the Superintending Engineer (Design), LGED at the HQ and has 3 functional Sections viz Road Infrastructure Design Section, Water Structures Design Section and Buildings Design Section, each section being headed by 1 Senior Consultant with 2-3 specialist professionals, 2 Assistant Engineer (LGED) and a few support staff. Subsequently, 6 regional Superintending Engineers (Design) with 1 Assistant Engineer attached to each have been installed.

Operationally, the Design Unit follows the general Plan of Operation (POP) which has been drawn from the principle of enhanced capacity development in a decentralized fashion within the whole of LGED in the context of its staff organization. Accordingly, activities of the Design Unit is divided into 3 major directions. The **First** is to develop methods and methodology and train and accustom engineers and technical staff of LGED to use the developed methods in performing and managing design functions and responsibilities. Preparation of Manuals, Guidelines, Standard Designs, Technical Specifications, development of Computer Programmes for designing often-needed structures and their component elements, etc. are the activities done for this purpose. The **Second** direction takes care of specific structure design works that is needed by LGED's different projects, particularly the projects having no Project Consultant support. The **Third** kind of activities are to provide technical advisory support to the management of LGED and to other projects as deemed necessary.

4. Activities

Survey and Investigation

Detail engineering survey, field investigations, sub-soil investigations, hydrological data collection etc. for design of structures under most of the projects are undertaken by LGED's Technical Staff at field level following Guidelines, Proforma etc. developed by the Design Unit. Survey and investigation of structures involving larger rivers are usually done by Project Consultants under contracting arrangements.

Manuals & Standard Designs

LGED has prepared the following Manuals, Guidelines, Standard Designs etc. for extensive use by LGED-engineers at the District and Thana levels in managing simpler and regular/routine design needs.

- a. Road Structure Manual (Part A) : Design Procedure & Guidelines
- b. Road Structure Manual (Part B) : Standard Designs (in 3 volumes)
- c. Manual on Prestressed Concrete Bridges (Part A) : Design Procedure & Guidelines
- d. Manual on Prestressed Concrete Bridges (Part B) : Standard Designs
- e. Manual on Prestressed Concrete Bridges (Part C) : Standard Designs
- f. Standard Specifications for Feeder Road Type-B & Rural Road Type R1
- g. Road Pavement Design Manual
- h. Operation & Maintenance of Small Scale Flood Control & Drainage Schemes : O&M Manual
- i. Design Manual for Small Scale Water Resource (SSWR) Schemes (Part-1) : Design Procedure
- j. Design Manual for SSWR Schemes (Part-2) : Standard Designs
- k. O&M Manual for WR schemes under the Canal Digging Programme
- l. Bio-gas Plant Manual

Larger and Complicated Structures Design

Design of larger structures like bridges of spans beyond the 20m limit of the standard designs, sluices/regulators of more than 2-3 vents and Structures with complicated alignment, hydraulic and sub-soil conditions (multiple span bridges in flowing rivers, poor foundation condition etc) are usually

designed from the Design Unit at the HQ. List of structures designed in 1996-97 and in 1998-99 are summarised below :

	<u>1996-97</u>	<u>1998-99</u>
Design of Infrastructures	100 nos.	98 nos.
Feasibility Study of Rubber- dams	1 no.	2 nos.
Design of Rubber-dams	1 no.	1 no.

Appropriate Alternatives Development

Being involved in local level development, LGED takes interest in development of innovative and appropriate technologies and has developed the following low cost alternatives designs and methods.

- a. Biogas Plant
- b. Low-cost house
- c. Low cost RCC Pile
- d. Twin-pit latrine
- e. Low cost mud house
- f. Single and twin pit sanitary septic tank
- g. Low cost light traffic bridge
- h. RCC sheet piles
- i. Replacement of poor foundation soil through wash boring
- j. Low cost in-situ RCC piles for low depth applications
- k. Submersible roads for deeply flooded Haor areas

New Technology Introduction

Design Unit has provided support to LGED's pioneering introduction of Rubber Dam technology in the country to utilize lean season low level flow of small and medium rivers to enhance irrigation water availability for winter cropping. Introduction of Rubber Dam technology has raised the image of LGED as a forward looking engineering organization in the country. Three Rubber Dam Projects have been implemented, one is planned this year and others are in the plan for the near future.

5. Design Aids & Logistics

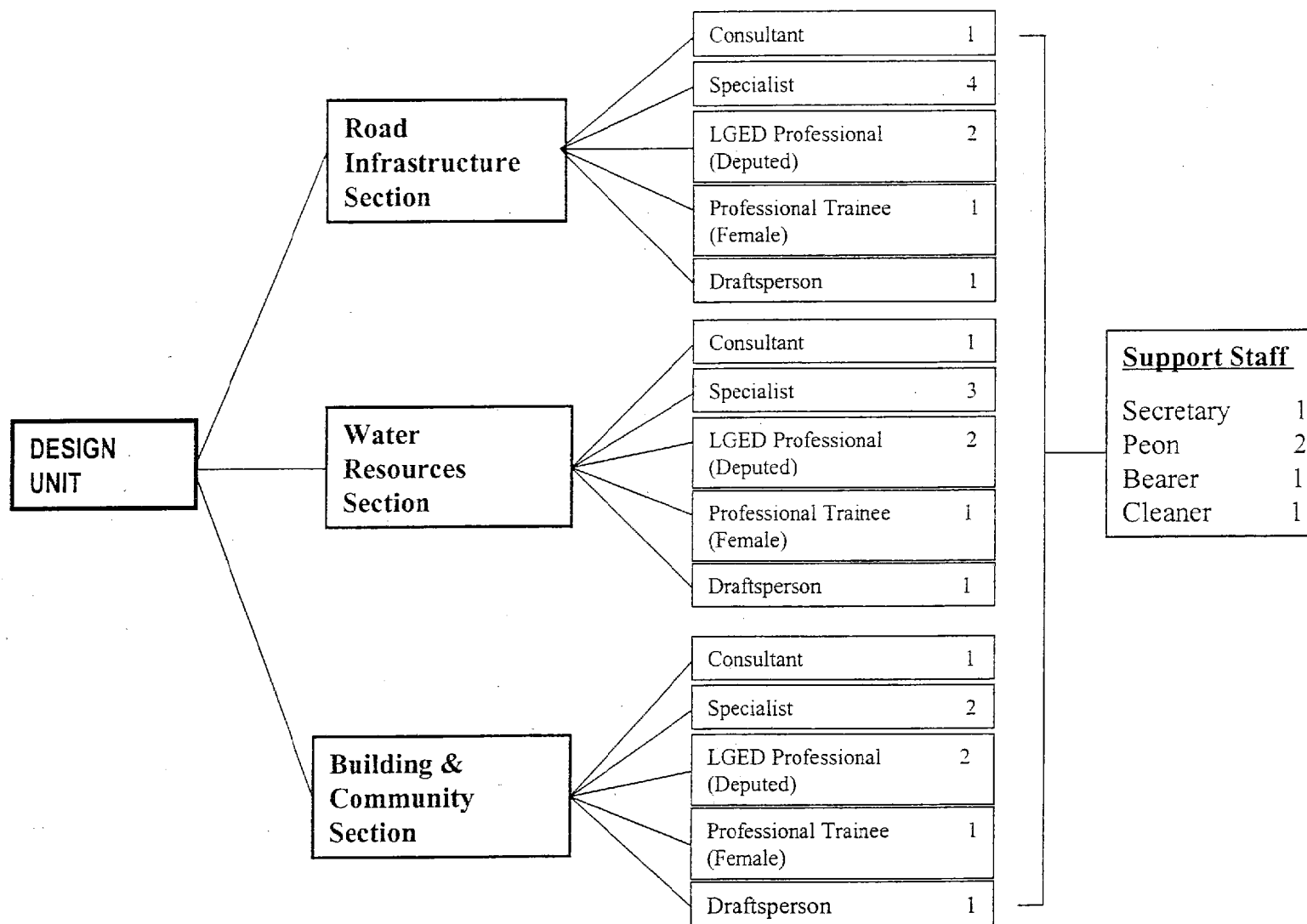
LGED has developed a well organized computer based design system using STAAD-III and AutoCAD packages and NT-based workstations for Design Engineers. A good number of design-programmes related to hydrological and hydraulic design, structural design, quantity estimation etc. have been developed in-house. The Design Unit uses planning tools like digitized maps, data base etc. developed in the GIS Unit of LGED.

6. Conclusion

With the present level of competence in LGED and in consideration of its sustainability and further enhancement, the proposed RDEC should act as an excellent technical support and expertise provider centre to LGED and the LGIs to achieve comprehensive development for the rural people. In view of this and to effect integration of LGED's design activities in RDEC for further upgrading and modernization, the annexed organization chart may be appropriate which the Mission and others concerned may consider.

A PROPOSED ORGANIZATION FOR INTEGRATION OF DESIGN ACTIVITIES IN RDEC

(Functional linkages with LGED counterparts and Foreign Adviser will be incorporated as would be decided)



Quality Control Activities At a Glance in LGED

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1. Introduction

Quality is usually defined as the ability of a product or service to satisfy a given need and hence "fitness for use". In other words, quality indicates conformity to specified requirements. Quality control (QC) is an important requirement for implementation of any construction/reconstruction project for creating durable national assets. Inadequate attention to quality control in design and construction, particularly in connection with durability, can result in failure of engineering structures. Therefore "quality consciousness" is no longer a matter of choice, it is an unavoidable necessity.

2. Pre-requisite for QC

The prerequisite for effective quality control of Infrastructure development projects are as follows :

- *Standard construction specification for all items of works should be provided for effective quality control. The specification should be clearly stated and methods of construction should also be written as the contractors may have little qualified technical and skilled personnel.*
- *Well-equipped laboratory for quality control activities should be set up with adequately trained staff*
- *Periodic appraisal of the quality control data should be prepared and reviewed not only for implementation during construction but also for effective possible improvements in quality control and construction techniques in future.*
- *To impart training to the site supervision staff and contractor's staff continuously before the start of each individual section of the project.*
- *Provision for the cost of QC activities should be duly incorporated in the estimates and specifications.*

3. Objective of QC

The objectives of Quality Control Activities are :

- *To establish accountability as well as to justify the feasibility of investment.*
- *To have technically sound and durable structure.*
- *To have economic and safe structural design.*
- *To reduce maintenance cost.*

4. Laboratory facilities of LGED

Local Government Engineering Department (LGED) has an effective quality assurance programme by implementing structured systematic approaches to

managing quality just not only to achieve present levels of quality, but to drive for continuous improvement.

So keeping this in view LGED has established 65 material testing laboratories at all the district head quarters of Bangladesh and the central laboratory at LGED Head Quarters to achieve a good network of laboratories and quality control activities. These laboratories have been classified into three categories depending on the capabilities and facilities which are made available in each laboratories. These are central, regional and district laboratories. The location of laboratories are shown in Annexure-I.

The central laboratory which is located at LGED Bhaban has got the maximum facilities of all necessary tests including sub-soil investigation. This laboratory is also equipped with a facility of calibration of compression testing machines and proving rings of different capacities.

The regional laboratories located at the old district head quarters (20 Nos.) have got less testing facilities than the central laboratory. The permeability test of soil, direct shear test and consolidation test of soil, core drilling equipment for in-situ test of concrete etc. have not been made available with the regional laboratories. All the remaining 44 district laboratories have been provided with essential testing facilities and those are the minimum requirement for quality control.

The test facilities available in different categories of laboratory are shown in Annexure-II.

5. Management of Quality control activities in Infrastructure Development Project of LGED

In the District the Executive Engineer (EE) is supported by 2 Assistant Engineers and in each Thana, the Thana Engineer is the head of site supervision team who is supported by 3 Sub-Assistant Engineers. The Thana Engineers report to the Executive Engineers who in turn report to the Chief Engineer who is supported by the 2 Additional Chief Engineer and 14 Superintending Engineer. The job description defining duties and functions for all levels of staff is issued.

The Central Laboratory at LGED Head Quarters is now managed by Institutional support project of LGED and headed by one Laboratory Consultant. He is assisted by one Laboratory Specialist and One Assistant Laboratory Specialist of ISP. One Assistant Engineer from LGED is also working in the Central Laboratory. Other support staff are one Laboratory Technician from ISP, one Laboratory Technician from LGED, One Senior Secretary, one Laboratory Assistant and one Peon from ISP.

The major activities of the Central Laboratory are

- *Coordination among all the laboratories*
- *Staff development*
- *Research and development*
- *Normal testing activities*

The central laboratory also cover the testing of some materials testing facilities of which are not available in the neighbouring districts in addition to the major activities. The central laboratory also assists the regional Design Engineer/ Superintending Engineer in his quality control activities.

Coordination among all Laboratories

Coordination activities of the central laboratory are :

- *Maintaining the Data Bank of the laboratories*
- *Assisting in reviewing the set up of laboratory*
- *Establishing standards and specification of equipment for all laboratories*
- *Assisting in procurement of equipment and spare parts for the laboratories to ensure that the quality is maintained*
- *Assisting in operation and maintenance of laboratory equipment of regional and district laboratories*
- *Assisting other laboratories in major repairing of the equipment if necessary*
- *Arranging quarterly discussion/meeting at each division with staff for getting views on ongoing laboratory activities.*
- *Submitting quarterly reports on monitoring, evaluation and achievements of the quality control activities.*
- *Assisting in technical back stopping in regional and district laboratories.*

Staff Development

- *Through formal and informal training*
- *Through workshops and seminars*
- *On the job training*

Research and Development

- *Identifying action research activities of rural application*
- *Research activities in respect of testing*
- *Solving unconventional problems*
- *Preparation and reviewing of manuals, formats and data sheets required for laboratory activities.*

The district laboratories are headed by the concerned Executive Engineer. All the testing activities are run by an Assistant Engineer who is supported by one Lab. Technician and Lab. Helper. Every laboratory is provided with transport to facilitate sampling and testing. The Assistant Engineer (Mech.) at the district also assist the Executive Engineer in procurement, operation and maintenance of the laboratory equipment.

The Executive Engineer designated the Assistant Engineer to act as "Quality Assurance Manager" whose duties includes :

- *Responsibility for implementation of the "Quality Control" activities.*
- *continually reviewing the quality control test results*
- *Persuade revisions where shortcomings existed in terms of quality;*
- *Making improvements where appropriate*

There is a charging system for both field and laboratory tests done for the contractors and other customers. Other organization can also have their material tested in these laboratories on payment of testing charges.

The Executive Engineer at districts submits the monthly progress report on laboratory activities to SE (Admin.), LGED Head Quarters by the 5th of the following month with a copy to the Regional Superintending Engineer.

The monthly report on the schemes of project are sent to the SE (Admin.), LGED within the stipulated time with a copy to the Regional Superintending Engineer and the respective Project Directors.

6. Implementation of QC before and during construction

Just learning that a specific material or product meets an appropriate standards is not enough. This applies to all gradients whether it be Portland cement and admixtures, or aggregates, in concrete. It is extremely important during the design stage itself to specifically check the materials necessary for concrete and determine if they are actually available in the immediate area of the job site. The capabilities of the available ready mixed concrete plants should also be determined. However, LGED has taken following measures for ensuring quality control.

- *LGED made it mandatory that all the construction work must be tested before giving approval of further work.*
- *Deformed bar reinforcement are generally used instead of plain bar reinforcement to maintain proper material specification*
- *Cost for testing must be included in the estimate*
- *Regular field checking*
- *Mix design*
- *Monitoring*

In order to ensure that works are carried out to specifications, it is essential that strict procedures are followed whereby written requests for inspection are submitted by the contractor before execution of each part of the works and written approvals are obtained before works proceed. The Inspection would not only cover the particular part of the works requested for approval (for example pier shutters, reinforcement etc.) but also that the arrangements made for execution of the works in accordance with the approved method, statements of plants, labour, materials and temporary works.

7. Guidelines and Manuals in QC

LGED has published the following manuals to help the Engineers to maintain standard quality control. These have been prepared based on the standards like BSTI, ASTM, AASHTO, BS and ACI.

- *Quality Control Manual*
- *Specification of laboratory equipment*
- *Frequency of testing in the field*
- *Draft Guidelines of Management and Operation of LGED Laboratory*

The manuals which are under preparation :

- *Concrete Mix Design*
- *Asphalt Concrete Mix Design*
- *Quality Assurance Plan*

8. Quality Control Manual

To facilitate the quality control and testing activities, a manual named as Quality Control Manual has been prepared. The aim of this manual is to give information

on quality control tests, specification of material testing equipment, sampling and test procedures and testing frequencies. This shall facilitate the personnel who are involved in civil engineering construction as stated below.

- *Preparation of specification of materials*
- *Sub-soil investigation required for designing the foundation of structures*
- *Quality control tests and procedures*
- *Preparation of the specification of material testing equipment*
- *Preparation of the course material for training*

9. Training/Staff development

Giving the quality control to the top priority, the Training Unit of LGED organizes regular training course on testing of materials for the Laboratory Technicians, Sub-Assistant Engineers and the Engineers of LGED. This training course involves theoretical and practical studies. On the job training on material testing are also regularly, conducted for the engineers and laboratory staff. Moreover contractors are also given training on quality and management of construction works.

To make the training effective and fruitful the courses are categorized into three groups depending upon the job responsibilities. they are given below with relevant topics.

The Laboratory Technicians and Assistant Engineer (Lab) should be given training on -

- *Field and Laboratory Testing procedures*
- *Concrete Mix Design*
- *Marshall Mix Design*
- *Sub-Soil Investigation*
- *Equipment Maintenance*
- *Documentation on Quality Control Activities*

The training courses for the Thana Engineers, Assistant Engineers and Sub-Assistant Engineers should be on -

- *Orientation on different Laboratory Tests*
- *Details on different field tests*
- *Sampling of Materials for Testing*
- *Sub-soil Investigation*
- *Handling of concrete and Bituminous Mixes*
- *Preservation and Transportation of samples*

Training courses for Work Assistants and Contractors should be on -

- *Orientation on quality Control activities*
- *Sampling of materials for testing*

10. Study to be taken up

The central laboratory should take up the following studies

- *Develop a plan/guide line for Quality Control Assurance in field level construction.*
- *Study and documentation on the variety on soil characteristics and availability of materials like coarse aggregates spread around the country.*
- *Develop or introduce new technologies in infrastructure construction materials and construction methods.*

11. Plans for Increasing the Testing and Quality Control Capability

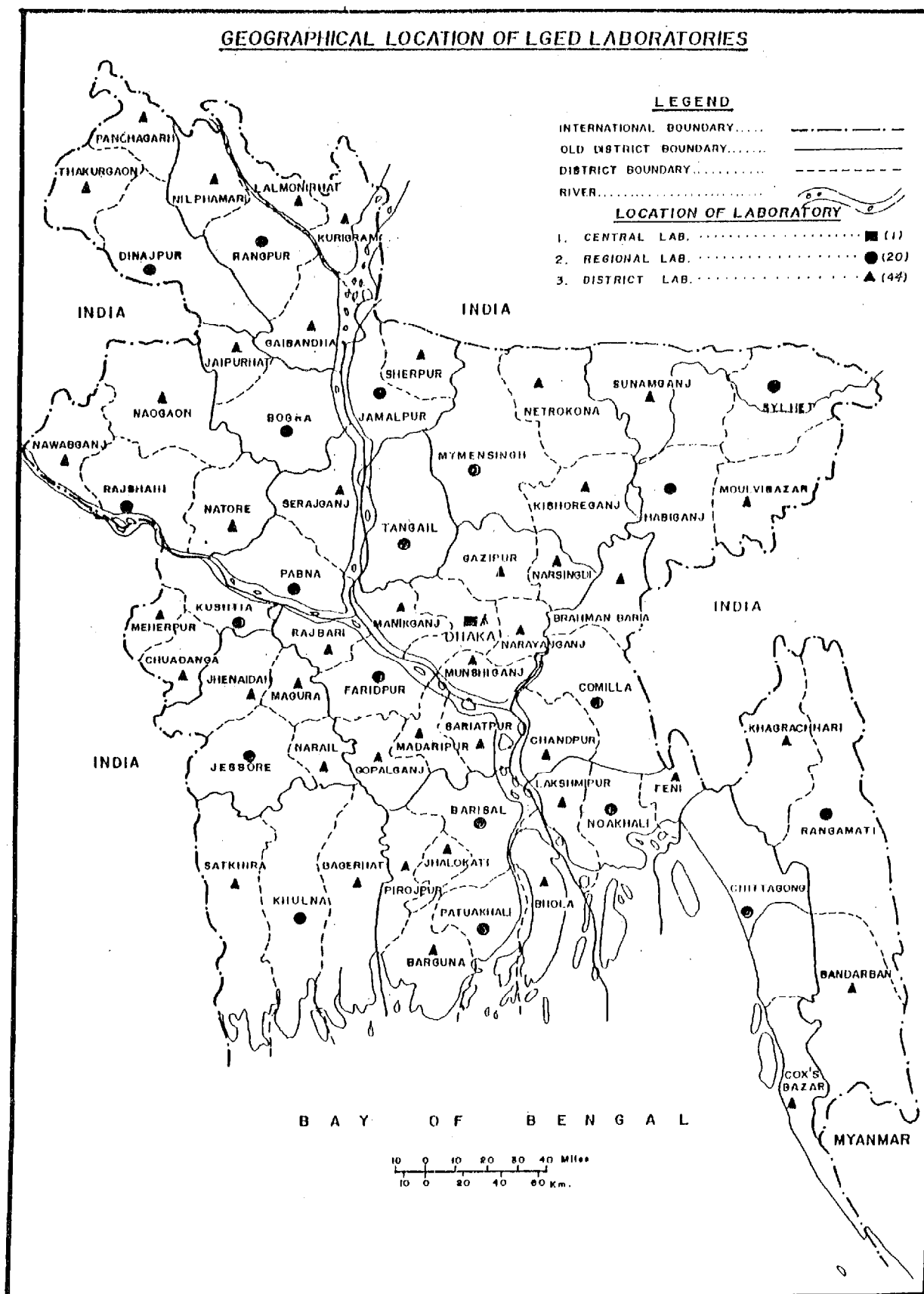
- *Introducing some systems for evaluation of different test results and documentation.*
- *Review of the existing standards and specifications to make it uniform and practical.*
- *Introducing in-situ soil testing for foundation design like Pressure-Meter, Dutch Cone Penetrometer etc.*
- *Introducing Pile Integrity Tester to check length, diameter and other physical properties of cast-in-situ piles.*

12. Concluding Remarks

Quality control is no more a choice but is a reality to safe guard the national assets. The Engineers responsible for infrastructure development should have sufficient skill, knowledge and training in order to maintain proper quality of the infrastructure. This quality control aspect needs to be considered during design and also during implementation process.

Quality can be achieved using much involvement by cash as well as by skilled or unskilled man power. LGED's view is totally different in this respect. If someone go through this write-up should easily feels that LGED is planning to get a quality work with economical but actual involvement.

GEOGRAPHICAL LOCATION OF LGED LABORATORIES



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18F/OCU JANUARY 1997

Table 1.1: Set up of Laboratory and Testing Capabilities

Sl. No.	Equipment	Type of Test	Central	Regional	District
01	Balance (2 type) volume measuring apparatus & hand tools etc.	General laboratory test	Λ	Λ	Λ
02	Oven	Drying and moisture content determination	Λ	Λ	Λ
03	Sieves, sieve shaker & hydrometer	Grain size analysis and classification of soil & aggregates	Λ	Λ	Λ
04	Atterberg Limit Apparatus	Soil classification	Λ	Λ	Λ
05	Permeability Test Set	Permeability character of soil	Λ	NA	NA
06	Proctor Density equipment	Laboratory compaction test	Λ	Λ	Λ
07	Sand Cone & Core Cutter	In-situ density test for field compaction control	Λ	Λ	Λ
08	Penetration Test equipment	Penetration test of soil/ Penetration test of bitumen	Λ	Λ	Λ
09	Comp. Testing Machine, cylinder & cube moulds	For compressive strength determination of brick, concrete and cement	Λ	Λ	Λ
10	Slump Cone	Workability and control of water in concrete casting	Λ	Λ	Λ
11	Vicat Apparatus	Setting time determination of cement	Λ	Λ	Λ
12	Laboratory CBR/ Marshall equipment	Determination of strength of road pavement and road layers	Λ	Λ	Λ
13	Dynamic Cone Penetration (DCP) test equipment	Determination of strength of road pavement and road layers	Λ	Λ	Λ
14	SPT equipment	Boring, sampling and soil strength test	Λ	Λ	Λ
15	Hand Auger	Boring, Sampling of Soil (shallow depth)	Λ	Λ	Λ
16	Concrete Test Hammer	Non-destructive testing of concrete (strength and uniformity)	Λ	Λ	Λ
17	Unconfined Compression Testing Machine	Determination of shear strength of cohesive soil	Λ	Λ	NA
18	Direct Shear Test equipment	Determination of angle of internal friction of soil	Λ	NA	NA
19	Consolidation Test equipment	Determination of settlement/ compressibility of soil	Λ	NA	NA
20	Los Angeles Abrasion Test equipment	Strength of coarse aggregates	Λ	Λ	Λ
21	AIV, ACV equipment	Strength of coarse aggregate	Λ	Λ	Λ
22	Core Drilling equipment	In-situ test of concrete	Λ	NA	NA
23	Bitumen test equipment	Softening point of bitumen	Λ	Λ	Λ
24	Bitumen test equipment	Penetration test of bitumen	Λ	Λ	Λ
25	Flush and Fire point test	Flush and Fire point of bitumen	Λ	Λ	NA
26	Float test equipment	Saybolt viscosity of bitumen	Λ	NA	NA
27	Calibration Device	Calibration of CTM and Proving Ring	Λ	NA	NA

Note: Λ = Indicate facility should be available
 NA = Indicate facility may not be available now

Specific Tasks :

Specially the expert should assist the Central Laboratory in carrying out the following activities :

1. Inspect the existing LGED laboratories, and determine additional equipment requirements and improvement in operational procedures and staffing to meet the needs.
2. Improving the existing database/inventory for all laboratory equipment at the central and district laboratories.
3. Define training requirements for LGED laboratories and field supervisions and field supervising staff preparation of training materials in light with the existing Quality Control Manual and organize training courses.
4. Reviewing of the existing formats of different tests.
5. To establish mobile testing laboratory in each region for random sampling and testing to check the activities of district laboratories.
6. Monitor and check on a continuous basis, through regular visits and inspections, the performance of laboratories and in situ testing and advice on remedial actions.
7. To develop a system for repairing and periodic maintenance of laboratory equipment.
8. Develop a system for regular calibration of proving rings as well as calibration and dial adjustment of the compression testing machines.
9. Introducing some systems for evaluation of different test results and documentation.
10. Review of the existing standards and specifications to make it uniform and practical.
11. Introducing in situ soil testing for foundation design like Pressure-Meter, Dutch Cone Penetrometer etc.
12. Introducing Pile Integrity Tester to check length, diameter and other physical properties of cast in situ piles.
13. Provide continuous advisory support to LGED field projects in quality control procedures.
14. Develop a plan/guide lines for Quality Control Assurance in field level constructions.
15. Study and documentation on the variety on soil characteristics and availability of materials spread around the country.
16. Develop or introduce new technologies in infrastructure construction materials and construction methods.
17. Arranging quarterly discussion/meeting at each division with staff for getting views on ongoing laboratory activities.
18. Submitting reports quarterly on monitoring, evaluation and achievements of the quality control activities.
19. Assist LGED to create a CORE-TEAM comprising with LGED officials that will take the control of Central Laboratory in future.

Institutional Support Project
Technical Design Unit

OBJECTIVES

To support LGED in developing its technical capabilities for better planning, design and implementation of projects.

Supporting LGED in developing its technical capabilities for better planning, design and implementation of projects.

RESPONSIBLE SECTIONS

- ◇ Road Infrastructure Design Section
- ◇ Water Structure Design Section
- ◇ Building Infrastructure Design Section

Technical Design Unit,

1. Introduction

While Swedish International Development Authority (SIDA) has played a great role in raising the capacity and image of LGED from its involvement in Bangladesh in early 1980s, the need for increased assistance in building capacity of LGED to cope up with increasing responsibilities and work load was noted both by LGED and SIDA in early 90s. This led to creation of ISP in 1993 with the objective of enhancing LGED's capacity, particularly in forward methods, procedures and technologies. ISP has been contributing immensely through 9 units towards development and upgrading of LGED's capacity, leading to the status that LGED is now considered as the most advanced Government Department in the country.

2. Activities of the Technical Design Unit

Development of Manuals & Standard Designs

- i. Technical Design Unit has involved in developing following design methodologies and tools :
 - a. Road Structure Manual (Part A) : Design Procedure & Guidelines
 - b. Road Structure Manual (Part B) : Standard Designs (in 3 volumes)
 - c. Manual on Prestressed Concrete Bridges (Part A) : Design Procedure & Guideline
 - d. Manual on Prestressed Concrete Bridges (Part B) : Standard Designs
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 - f. Standard Specifications for Feeder Road Type-B & Rural Road Type R1
 - g. Road Pavement Design Manual
 - h. Operation & Maintenance of Small Scale Flood Control & Drainage Schemes : O&M Manual
 - i. Design Manual for Small Scale Water Resource Schemes (Part-1) : Design Procedure
 - j. Design Manual for SSWRDSP Schemes (Part-2) : Standard Designs
 - k. O&M Manual for schemes under the Canal Digging Programme
 - l. Bio-gas Plant Manual

Appropriate Innovative Alternatives Development

Following innovative, appropriate and cost effective alternative methods and technologies through research and development initiatives have been developed :

- a. Low-cost house
- b. Low cost RCC Pile
- c. Twin-pit latrine
- d. Low cost mud house
- e. Single and twin pit sanitary septic tank
- f. Low cost light traffic bridge
- g. RCC sheet piles
- h. Replacement of poor foundation soil through wash boring

New Technology Introduction

Providing Support to LGED's pioneering introduction of Rubber Dam technology in the country to utilize lean season low level flow of small and medium rivers to enhance irrigation water availability for winter cropping.

Design Support to Projects without Consultants

Continuous design support to various structures like pavements, bridges, culverts, regulators, sluices, erosion and scour protection works, LGED functional buildings, Union Parishad buildings, bus terminals, community buildings of Local Governments etc. particularly of GOB's own funded projects and projects having no consultant are being provided.

Technical Advisory Support to Projects

Technical advisory support to Project Managements, in reviewing designs of large structures and structures having hydrological and subsoil complications in projects having or not having consultant support are being provided.

Training Support to LGED Engineers

Technical Design Unit providing Support to LGED Engineers on different Manuals, Computer based programmes etc.

Support to Local Governments

Technical support to Local Governments throughout the country whenever asked in infrastructure developments. Some activities are given below :

- Development of municipal facilities like Park, Auditorium, Market, Office building, Rest house which are funded by the Ministry
- Local Government Typical Building Structures like Union Parishad Complex, Municipal Office Building for 'A', 'B' 'C' Category Municipality.
- Technical Support services to Building Structures and Environment Components during LGED project preparation and implementation.

Technical Support to Infrastructure of Other Ministries/Agencies Referred to LGED

Departments/Agencies of different Ministries have entrusted LGED to provide planning/design support for their civil infrastructure works. Technical Design Unit, ISP provided the following design support under this type of activities:

- Cultural buildings at Central and Local level under M/O. Cultural Affairs.
- Thana and Union level Tahsil Office building under M/O Land.
- Community Clinic at WARD level throughout the Country under M/O Health.
- Local level Godown throughout the Country under Cotton Development Board.
- Review of Design of Large Building Structure of Different Universities (Khulna University, Islamic University).
- Design of Hotel and Motel under M/O Tourism. (at Tungipara)
- Design of Clinic and Hospital under different Health Institutions.
- Design Social Buildings.
- Design of 12-storied office building of Jatiya Mahila Sangstha (National Women's Forum) under M/O Women Affairs.

STAFFING

A. Headquarter

- **GOB Professional**

Superintending Engineer (Design)	: 1 no.
Assistant Engineer (Design)	: 2 nos.
Draftsman	: 3 nos.

- **TA Professional**

Consultants	: 2 nos.
Sr. Specialist/Specialist	: 3 nos.
Sr. Asstt. Specialist/Asstt. Specialist	: 6 nos.

- **Support Staff**

Drafting	: 3 nos.
Others	: 3 nos.

B. Field Level (at Divisional Headquarters)

- **GOB Professionals**

Superintending Engineer (Design)	: 6 nos.
Assistant Engineer	: 6 nos.

Design Aids & Logistics

A. Computers

- * 10 work-stations NT based for the Design Engineers

- * *Programmes developed In-house for :*
 - Hydrological analysis of water resources development projects/schemes and road projects (drainage, HFL etc.)
 - Hydraulic Design of Water regulator/control structures, Bridges/ Culverts
 - Structural Design of hydraulic Structures, Bridge/Culverts and Buildings
 - Programme for Bill of Quantities
 - Programme for Reinforcement Scheduling

- * *Package Programme :*
 - STAAD - III for structural analysis and design
 - AutoCAD-14 for drafting

B. Drafting Equipments : 6 sets

Output during July 1996 - June 1997

Design of Bridge/Culvert	50	Nos.
Design of Water Control Structures	15	Nos.
Design of Building Structures	35	Nos.
Design of Rubber Dam-Cum-Bridge	1	No.

Output during 1997 - June 1998

Design of Bridge/Culvert	68	Nos.
Design of Water Control Structures	20	Nos.
Design of Building Structures	48	Nos.

Output during July 1998 - June 1999

Design of Bridge/Culvert	48	Nos.
Design of Water Control Structures	16	Nos.
Design of Building Structures	34	Nos.

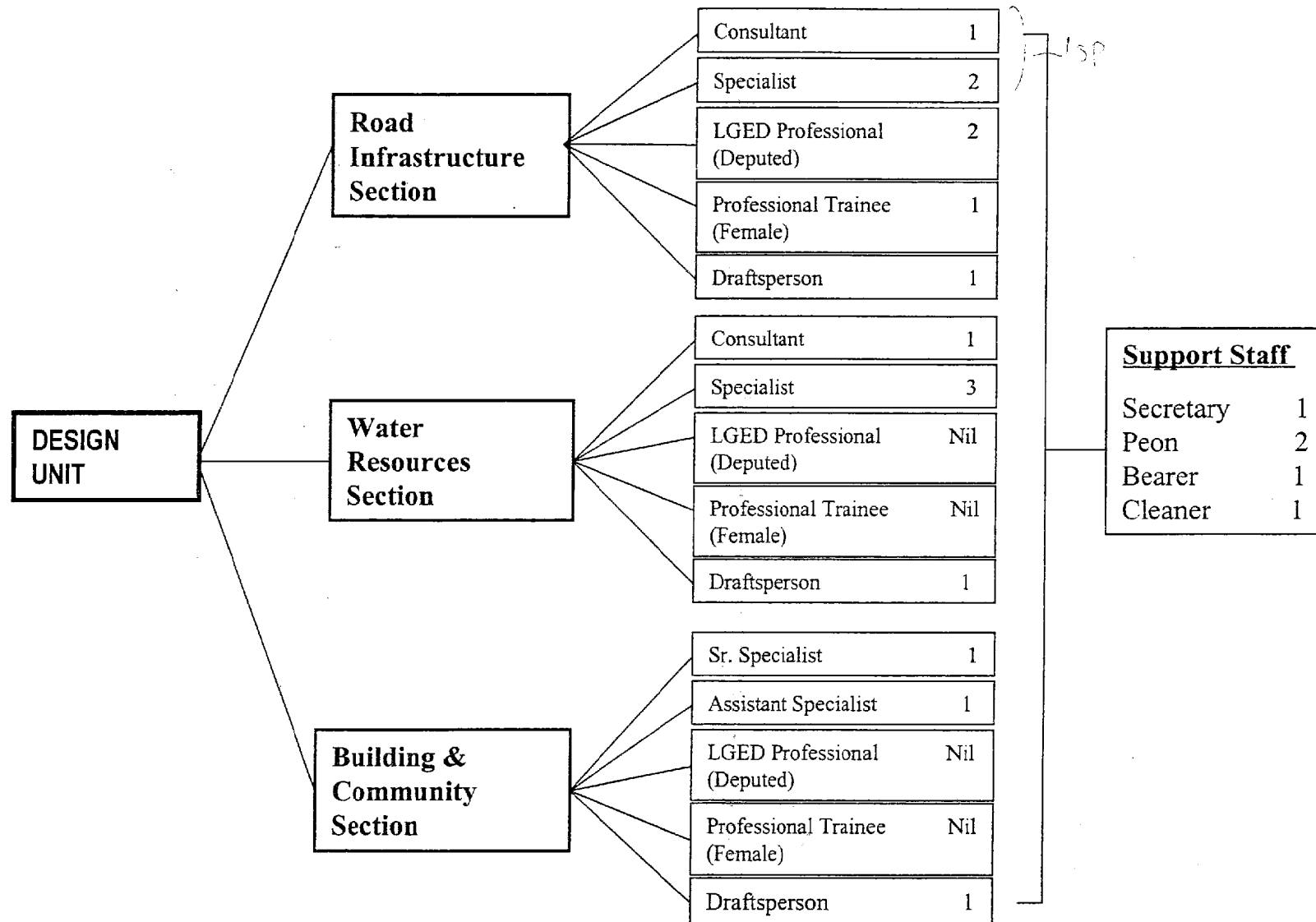
DISPLAY

1. Manuals, Guidelines, Standard Drawings, Publications

- o A set of Standard Drawings of Bridge using AutoCAD
- o A set of Standard Drawings of Regulator using AutoCAD
- o A set of Standard Drawings of Building using AutoCAD
- o Programme for Analysis and Design of Bridge using MS EXCEL
- o Programme for Analysis and Design of Regulator using MS EXCEL
- o Programme for Analysis, Design and Drafting of Building using AutoLISP
- o Analysis of a Truss using STAAD-III
- o Analysis and Modelling of a Building using STAAD-III
- o Sample Work Plan prepared by MS Project
- o Research Bulletin - 10; Low Cost Model House
- o Research Bulletin - 19; Twin Pit Sanitary System for Bangladesh.
- o Research Bulletin - 33; Low Cost Pile-I
- o LGED Biogas Plant Models Album
- o Road Structure Manual Part-A
- o Road Structure Manual Part-B (Volume 1, 2 & 3)
- o Manual on Prestressed Concrete Bridges (Part-A, & B)
- o Standard Specifications for Feeder Road Type-B & Rural Road Type R1 under LGED
- o Road Pavement Design Manual
- o Operation & Maintenance of Small Scale Flood Control and Drainage Schemes
- o Small Scale Water Resources Schemes-Draft Design Manual Part-1
- o Operation and Maintenance (O & M) Manual for Canal, Embankment & Water Structure under the “Canal Digging Programme”.

- o Brochure for Water Resource Development in LGED
- o Brochure for Small Scale Water Resources Development Sector Project (SSWRDSP)

PRESENT ORGANIZATION OF TECHNICAL DESIGN UNIT



Discussion Meeting with

JICA Basic Study Mission in connection
with Rural Development Engineering Centre

21 November 1999

A Presentation on :

Human Resources Development in LGED

By :

**Md. Mustafa Hossain, Training Consultant
Institutional Support Project**

and

**Abul Quasem, Team Leader
Institutional Support Component, RDP-21**

Short History of the LGED Training Unit

- o **1982** : Training activities started under Works Programme Wing (WPW)
- o **1984** : LGED was created out of WPW. A Training Unit was established under Intensive Rural Works Programme (IRWP : 1981-86). A long term strategy and plan for training was formulated.
- o **1986** : Training started functioning in Infrastructure Development Project (IDP) under Rural Employment Sector Programme (RESP : 1986-90) covering 75% of Bangladesh.
- o **1990** : Training was brought under Institutional Support Project (ISP) of RESP with nation-wide coverage through 15 DTCs and a strong TUHQ.
- o **1997** : District Training Centres were reduced to 13.
- o **1998 (July)** : DTCs were further reduced to 10. A strong TUHQ and 10 DTCs would continue to cater LGED's Training Needs and would gradually be brought under the permanent set up of LGED.

Training Unit Objectives

The overall objective of the LGED Training Unit is to enhance the technical and managerial capabilities of all staff under LGED. The main activities are :

- o development of an overall training policy
- o assessment of the training needs of different categories of LGED staff
- o development of training materials for trainees & trainers
- o implementation of various training programmes/courses at HQ & Districts
- o conducting on-the-job training during project preparation & implementation of the schemes
- o co-ordination & liaison with other projects under LGED and providing assistance for project specific training
- o co-ordination of local & overseas training.

LGED's Approach To Training

- o Training is based on Need Assessment
- o Decentralized Course Programmes
- o Uniform Curriculum Throughout Bangladesh
- o Utilization of In-house Resources as much as possible
- o Coverage of all LGED's Staff Groups
- o Training Methods are Participatory in nature
- o High Quality of the Training is maintained

Target Groups for Training

- o LGED Officials and Staff
 - Executive Engineers
 - Sub-Assistant Engineers
 - Surveyors
 - Accountants
 - Office Assistants
 - Thana/Assistant Engineers
 - Draftsmen
 - Work Assistants
 - Accounts Assistants
 - Community Organizer
- o Contractors
- o Representatives of the LGIs (Union Parishad Chairmen, Secretaries)
- o Beneficiary Groups (PIC/SIC, LCS, WMCA, MMC, GMC etc.)

Present Training Programme

A) Training Courses for LGED Officials

- o *Planning*
 - Course on Thana Plan Book
 - Course on Union Plan Book
 - Course on Growth Centre Planning
 - Course on Land and Water Use Planning
- o *Management*
 - Foundation Course
 - Orientation Course
 - Office Management
 - Financial Management
 - General Management including Project Management

o Technical Training

- Road and Road Structure
- Road Pavement
- Maintenance of Rural Infrastructure
- Pre-stressed Concrete
- Road Construction Training
- Drawing & Estimating
- Land Surveying
- Level Surveying
- Quality Control
- Sub Soil Investigation
- Concrete

o Food Assisted Development Projects

- Maintenance, Community Participation, Gender & Environmental Issues in GCCR Schemes
- Project Implementation, Quality Control, Monitoring & Reporting of GCCR Schemes

o Other Training

- Training of Trainers (TOT)
- Computer Training on Software Use

B) Training Courses for CONTRACTORS

o Training for Contractors

- Contractors Training (Pre-Tendering)
- Contractors Training (Management & Quality Control)

C) Training Courses for Beneficiaries/Target Groups

- Training for Project/Scheme Implementation Committee (PIC/SIC)
- Training for Water Management Co-operative Association, Market Management Committee, Ghat Management Committee etc.

D) Training for Representatives of Local Govt. Institutions

- Training/Workshop on Union Plan Book
- Training for Scheme selection, Implementation & Maintenance

Rationale for Continued Technical Assistance

LGED put strong emphasis on HRD from the very beginning. Because of change of technology and need for adoption of latest/modern system, new fields of training, training need is changing continuously and there is a very strong need for implementing training on a continuous basis.

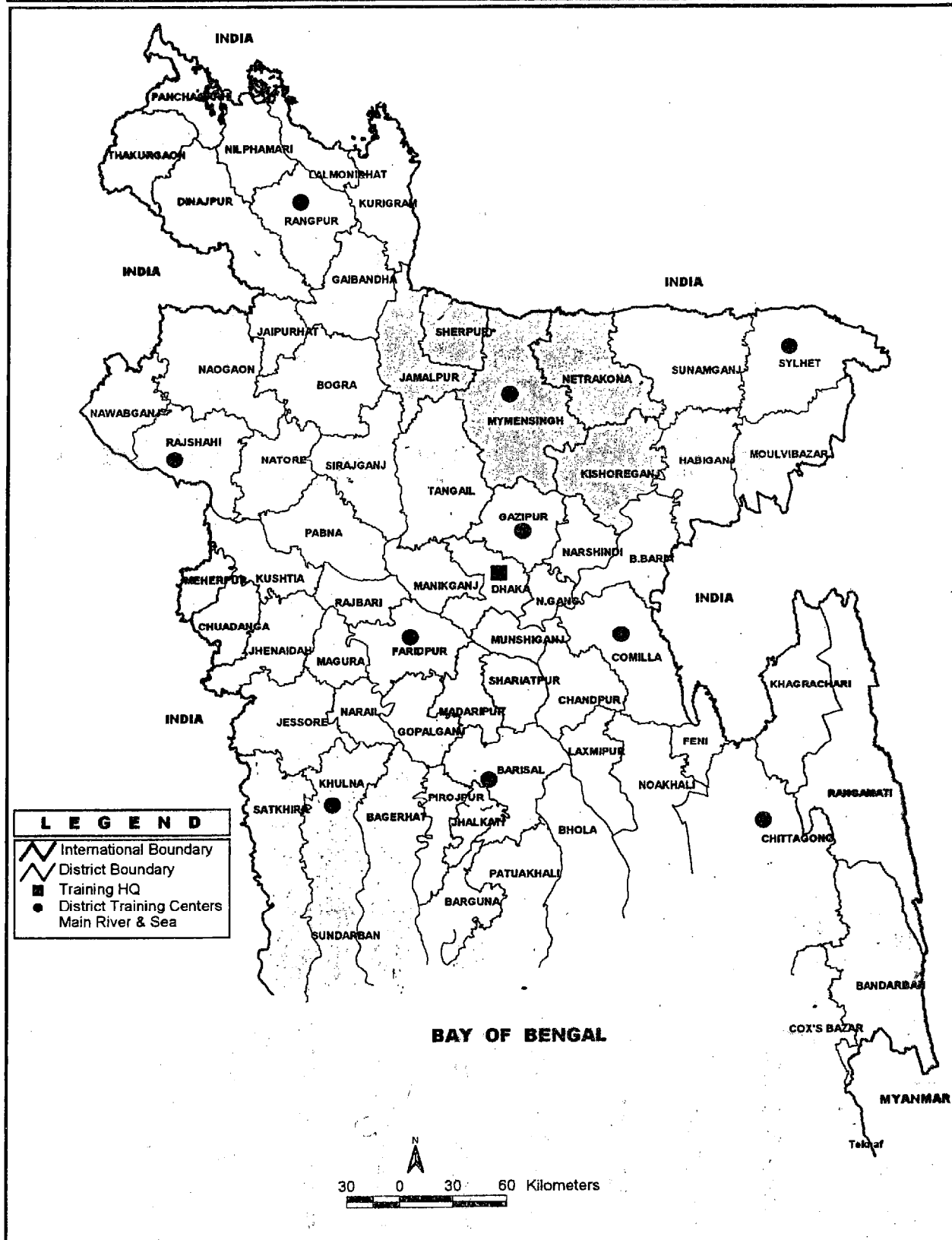
The fields like environmental issues, socio-economic issues, gender and development, participatory development, computer use and applications etc. are some of the new fields of training for LGED. The training of public representatives in the local govt. institutions (LGIs) is becoming very crucial especially in the future. The important fields for LGIs are planning, implementation and O&M of infrastructure development, local resources mobilization, participation, financial management etc. LGED, in future, will have to take care of all these new courses.

As per Plan of Operation, ISP was supposed to be phased out and taken over by LGED as from 1st July, 2000. For the transition period from ISP to Government (revenue) positions of LGED, RDP-21 would be financing the professional manpower need for this arrangement. But there was no indication who would bear the cost of training implementation.

Very recently it has been assessed that LGED would not be in a position to take-over the responsibilities of training function as stipulated earlier. That is why, LGED has already approached SIDA for continuation of their assistance till the time LGED is ready for taking over.

Now that training areas are expanding day by day, clientele group is increasing with the inclusion of local bodies and beneficiary groups, present TA support to training is supposed to cease as from 1st July 2000, LGED does not have the required capacity to cope up with the new training scenario. Therefore, it is very much essential to exploit technical assistance in the form of equipment and expert services.

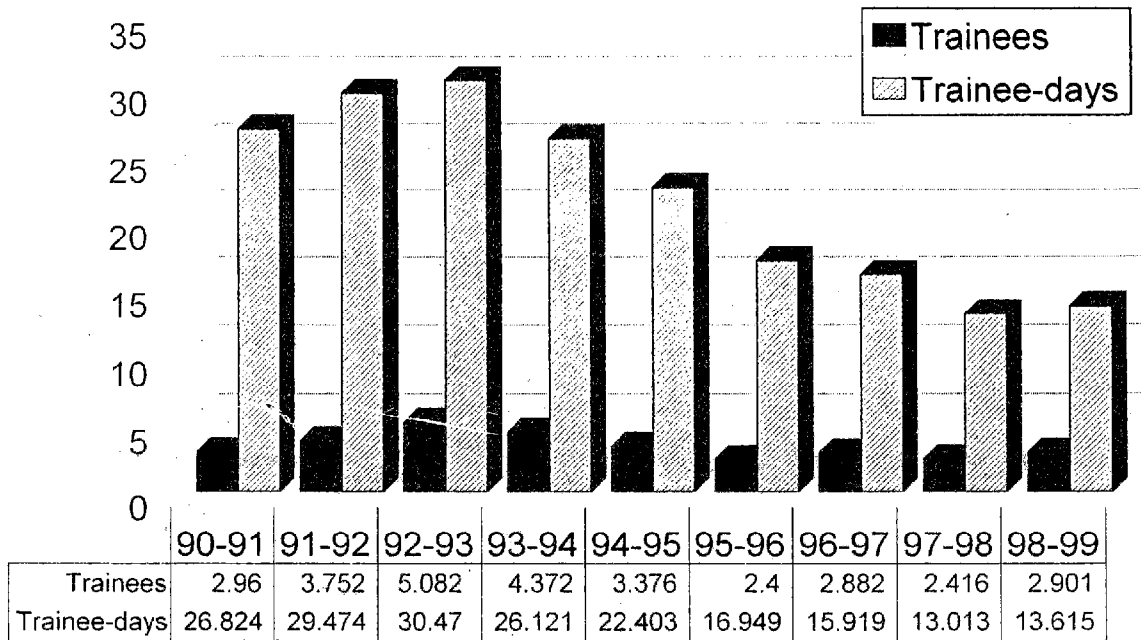
LOCATIONS OF LGED TRAINING CENTERS



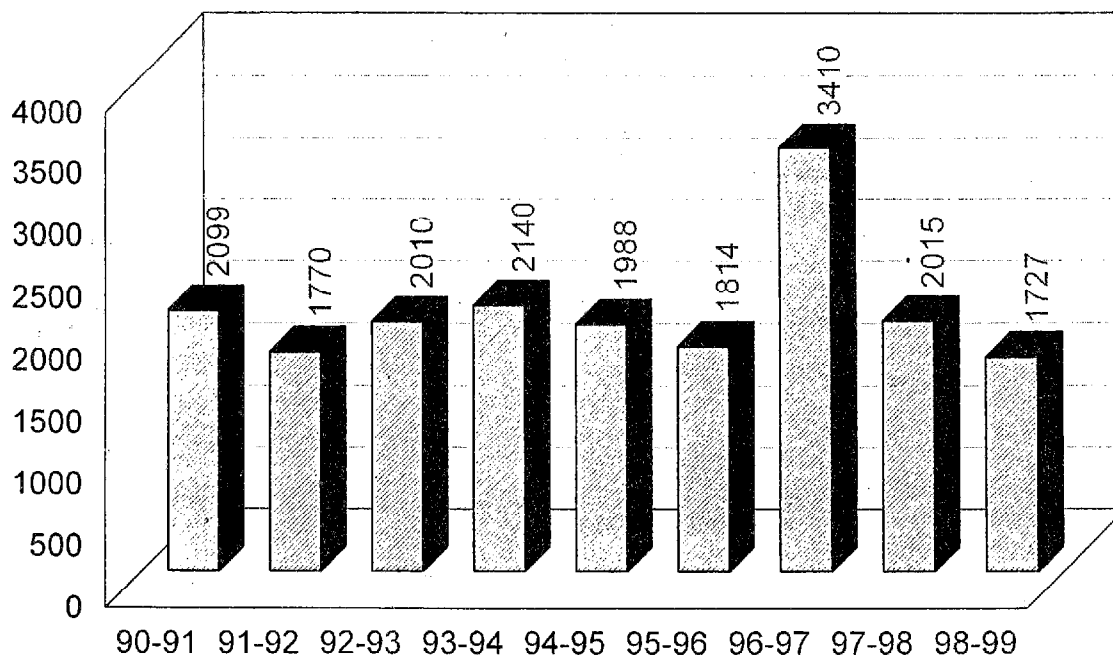
D:\LGED-Bangladesh\Project Work.april\Location of LGED Training Center

TRAINING ACHIEVEMENT : 1990-99

Thousands



ON-THE-JOB TRAINING ACHIEVEMENT: 1990-99



LGED TRAINING UNIT

TRAINING CALENDAR, 1999-2000

July to December
Version 1: 28-06-99
Version 2: 30-09-99

Trg. Venue	JULY				AUGUST				SEPTEMBER				OCTOBER				November					December							
	4	11	18	25	1	8	15	22	29	5	12	19	26	3	10	17	24	31	7	14	21	28	5	12	19	26			
HQ	STI		SSW					SSW	STI	STI				STI	TGS	FOU	SAI	TGS	STI	GCP	ENV	STI	RRM	TUP	LWU		POU	SAI	RRM
Barisal							CT2		SSW				BIO	BIO	MIS	RC		FTC	FAM	LEV	Gaz		PQM	Khu					
Chittagong				Myn			CT2		BIO		DRA				PAV		MIS	MIS	LEV	EST	FAM		PQM	Syl					
Comilla			STI	STI		CT1		CT2		BIO	FAM	TBC		RC	FTC			LEV	Myn	STI	Fad		PQM	Gaz					
Faridpur				DRA			SSW	CT2						EST	FTC	MIS		RC	LEV	MIS	Khu	PQM	BIO	PAV	LAN				
Gazipur							CT2	DRA						FTC		BIO	RC		EST	LEV	Khu	MT		FAM	PQM				
Khulna							CT1		SSW	SSW		SSW	SSW		CT2	Ctg		BIO		LEV	RC	PAV			Bar	MT			
Mymensingh				TOT		TRI	CT1			TRI	CT2				RC		TRI	PMS,CT2	BIO		LEV	PAV		Ran	TBC	PQM	TRI	MT	
Rajshahi				Myn				CT2		SSW					Ctg.				MIS	FTC	LEV	MIS		Fad	RC				
Rangpur				TRI	CT1		TRI	CT1		BIO		SSW	SSW	SSW	TRI	FAM		TRI	CT2	TRI									
Sylhet				Myn		DRA	CT2			TBC	BIO				MIS	EST		RC	Myn	MIS	FTC	PQM		LEV	PAV				
DHAKA				STI	STI	STI	STI	STI	TBC	STI	STI		STI	MIS				MIS		STI									
Bogra					STI			SSW	STI	STI				MIS						MIS				RRM					
Dinajpur																													
Jamalpur												STI									TBC								
Jessore		SSW				STI						SSW		STI			STI		MIS		MIS			TBC					
NILG								STI	STI			STI	STI		STI														
NGO	STI			STI		STI			STI			STI			STI			STI			STI								
Other Centres			SSW																										

LEGEND

National Training Courses

CON = 5-d Concrete course (for WA) = 3
CT1 = 4-d Contractors' Training (pretendering) = 2
CT2 = 4-d Contractors' Training (quality & mangt.) = 8
DRA = 5-d Drawing Course (for D/M) = 4
ENV = 2-d Environmental Promotion (for TE, SAE) = 2
EST = 5-d Estimating Course (for D/M) = 4
FAM = 5-d Course on Financial & Accounts manual (for TE, Acctt., A. Asstt.) = 10
FTC = 5-d Field Testing Course (for SAE) = 8
GCP = 2-d Growth Centre Planning (TE, SAE) = 2
GPL = GIS use in Planning (for TE, AE) = 2

IIM = 5-d Implementation of Infrastructure Maintenance Activities (for WA) = 10
LAN = 5-d Land Surveying Course (for AE, SAE, SUR) = 3
LEV = 5-d Level Surveying course (for SUR, SAE) = 10
LWU = 1-d TOT on Land & Water Use Manual (TE, AE) = 2
MIS = Trg. on management information system
MGT = 5-d Management Development course (for PD, XEN, TE, AE) = 1
MT = 5-d Maintenance of infrastructure (AE, SAE) = 2
PAV = 5-d Road Pavement Course (for TE, AE) = 5
POU = 3-d Pourashava Planning (for XEN, AE) = 4

RC = 5-d Road Construction course (for WA) = 10
RDM = 1-d Road Database Management (for AE, com. operator) = 10
RSM = 5-d Course on new Road Structure Manual (TE, AE) = 4
SAI = 1-d Small Area Improvement (for XEN, AE) = 4
SIC = 5-d Supervision of Infrastructure construction (for SAE) = 8
TOT = 5-d Training of Trainers (for TE, AE) = 1
TBC = 5-d TOT on Basic Computer course = 8
TUP = 4-d TOT on Thana & Union Plan Book (TE, AE) = 4
QC = Quality control course from Lab. (AE, TE, SAE) = 6

Project Specific Training

BIO = Courses from BIO-Gas project = 14
RRM = Courses from RRMIMP-2
SSW = Courses from SSWRDSP
STI = Courses from STIDP-2
TIDP = Courses from TIDP
TRI = Courses from TRIDP(RDP-21)
PQM = Proj Impl qc. monitoring & reporting of GCCR scheme (XEN, TE, AE) = 7
MGC = Maint Com part & Gender issues in GCCR schemes (for SAE, D-M) = 14
MWP = W/ship on Maint and Women parti in GCCR schemes (for XEN, NGOs) = 2
TGS = Trainer's Group Session (XEN, TE, AE) = 1
= station DTOs moves to other station

Version 1: 28-06-99
Version 2: 30-09-99

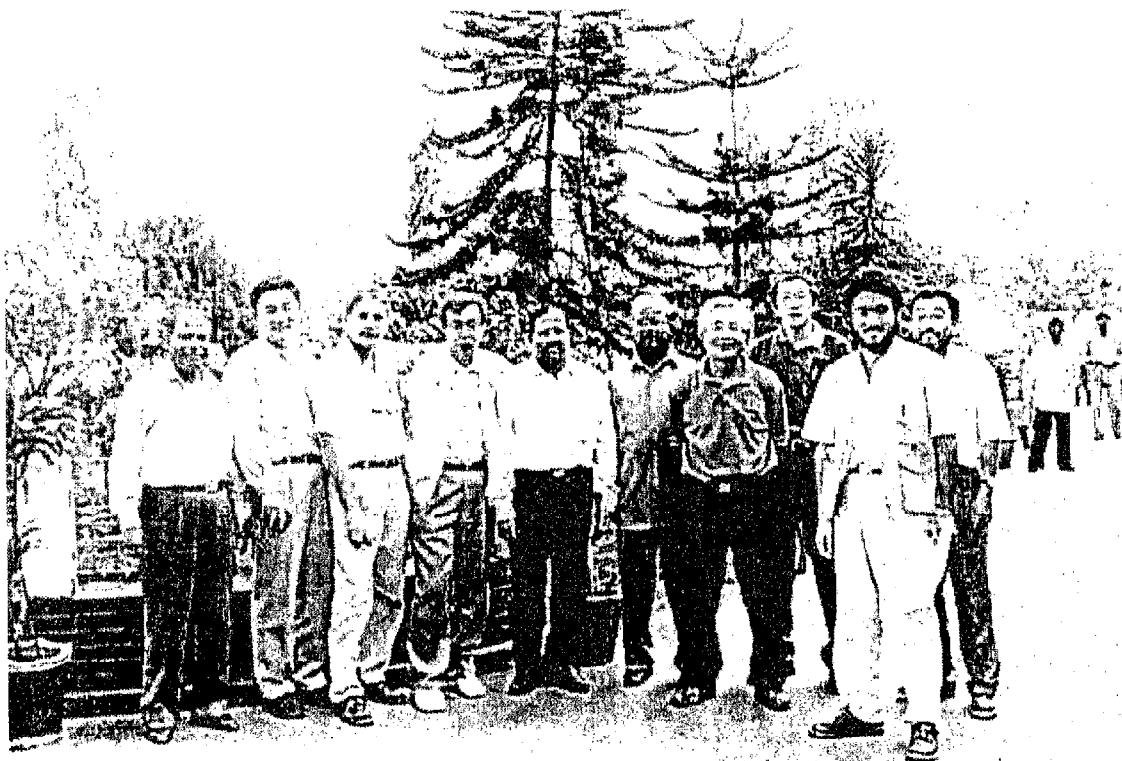
— 228 —

GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH
LOCAL GOVERNMENT ENGINEERING DEPARTMENT

**THIRD RURAL INFRASTRUCTURE DEVELOPMENT PROJECT
(RDP-21)**

JICA Group Visit -Mymensingh ZONE

22nd November 1999



The JICA Mission together with representatives from the LGED and consultant in Mymensing RDP 21 Zonal Office.



The JICA group visit start up activities on Gaffargaon FRB improvement work.



Discussion on work execution procedures between JICA and LGED. The project is upgrading 1250 km of this type of FRB's.



The group is visiting an old design type of Union Parishad Complex and discussing with local elite and LGED officials.



The above left side picture shows Barabari Union Parishad Complex . The new design type is implemented by RDP 21. The project is constructing 105 of these UPC's. One UPC is planned to be constructed for each of the 105 Thana in the project area. The cost of a typical UPC is 27.5 It.

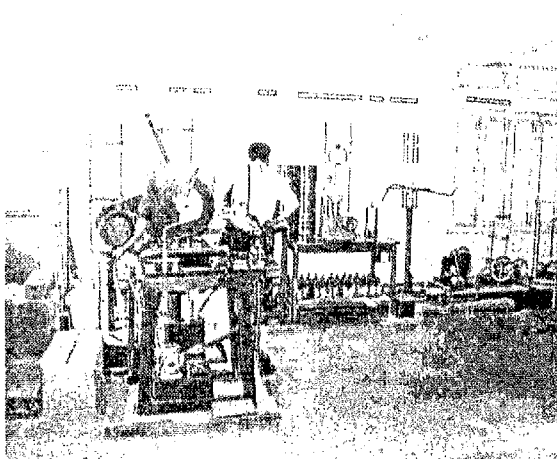
In the above right side picture JICA representatives are discussing with the Baradari Union Chairman and other officer present at the time of the site visit.



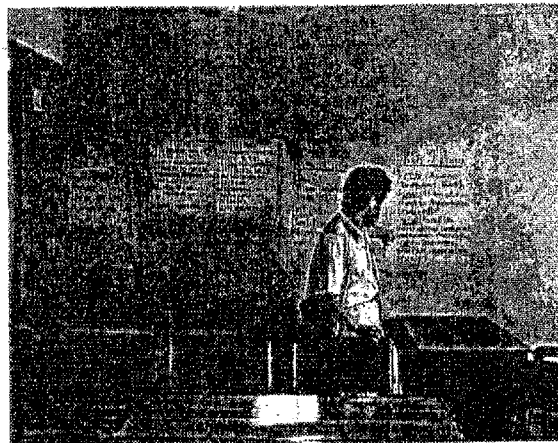
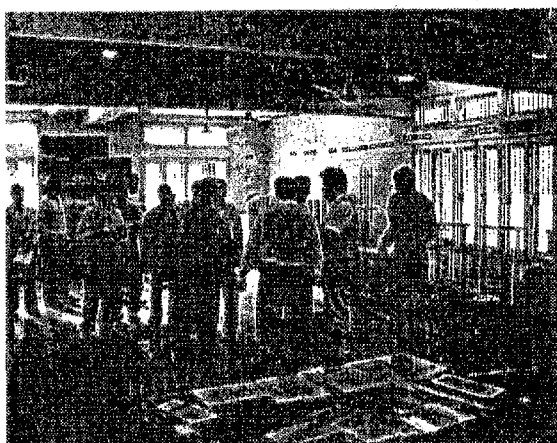
Work is about to start on the Baradari Growth Center Market. RDP 21 is developing 173 nos of this type of markets in the project 13 district The development cost for each of the markets is between 17 and 40 lac taka.



These markets will be fitted with sale platforms, sheds, water supply, internal roads, sanitary facilities, administration office, women corners etc..



JICA visits the LGED's laboratory in Mymensingh District. The laboratory in Mymensing is a typical district laboratory within LGEDs laboratory set up.



LGED's lab technician is answering questions from the JICA Group. JICA is shown the conference room for training activities at the Mymensing District Office.



A brief wrap up meeting at the XEN's office in Mymensingh before the team leaves for Dhaka. The Project Director and LGED District office staff is answering to questions asked by the JICA group. Issues in the meeting were management of the laboratories, training activities, contract management and implementation, planning of projects, approval etc.



The team is ready to go back to Dhaka after visiting projects, XEN office and RDP 21 Zonal office in Mymensing District.