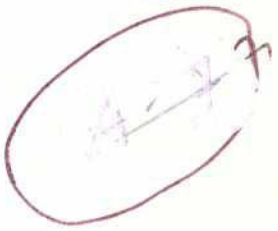
GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH
MINISTRY OF IRRIGATION, WATER DEVELOPMENT AND FLOOD CONTROL
BANGLADESH WATER DEVELOPMENT BOARD

DHAKA INTEGRATED FLOOD PROTECTION PROJECT

MID-TERM CONSULTANCY SERVICES

ADB LOAN - 1124-BAN (SF)

FINAL REPORT



VOLUME - IV

ANNEXURE - IV : QUALITY CONTROL MEASURES
ANNEXURE - V : O & M GUIDELINES
ANNEXURE - VI : IMPLEMENTATION GUIDELINES FOR COMMUNITY DEVELOPMENT ASPECT
ANNEXURE - VII: STRENGTHENING OF ACCOUNTING PROCEDURES OF PMO

TECHNOCONSULT INTERNATIONAL LIMITED, BANGLADESH
in association with
ASSOCIATED CONSULTING ENGINEERS LIMITED, BANGLADESH
DESH UPODESH LIMITED, BANGLADESH
and
Individual Consultants from LOUIS BERGER INTERNATIONAL, INC., USA

MAY 1993

ANNEXURE - IV

QUALITY CONTROL MEASURES

QUALITY CONTROL MEASURES

Contents **page**

C. **Remedial Works at Different Locations of the Western Flood Embankment from Tongi Railway Bridge to Kellarmorh:**

D. **Quality Control Measures for Construction of Storm Sewers:**

QUALITY CONTROL MEASURES

INTRODUCTION

Quality control is one of the important factors which needs proper attention in execution of works. Measure which are to be adopted and procedures which are to be followed for maintaining quality of works vary with the type and location of work as well as with the purpose intended to be served by them. For each type of work, there should be well defined quality control measures and procedures. The mid-term consultants for the DIFP Project have formulated measures and procedures for quality control in execution of different types of work on construction of the main physical components under the project. The formulated measures and procedures are consistent with the international practice and they will help the field engineer in ensuring quality of works. The quality control measures and procedures are furnished in this Annexure to the Assignment Completion Report.

A: Construction of Sluices on the Western Flood Embankment.

Sl. No.	Items of work	Quality Control Measures to be Adopted	
01.	Excavation of Foundation Trench	i)	Working space as shown in the drawing shall be kept between the ring bundh and foundation trench.
		ii)	Centre line of trench, side width (width of land between the edge of trench and toe of ring bundh) etc. are to be correctly marked out on the ground. The longitudinal and the cross centre lines shall be marked by brick masonry pillars which shall be sufficiently away from the edge of the foundation trench. Each pillar shall have nail or rod fixed at its top. A temporary B.M. is to be set up at the work-site.
		iii)	Foundation trench shall have to be dug truly to the level as shown on the drawing. Shoring, if necessary, shall have to be done with the approval of the Engineer in-Charge.
		iv)	Bottom of the foundation trench shall be perfectly levelled both longitudinally and transversely.
		v)	Spoil earth shall not be dumped on the berm between the ring bundh and the edge of foundation trench.

Sl. No.	Items of work	Quality Control Measures to be Adopted	
	Excavation of Foundation Trench (contd.)	vi)	Before construction is commenced, the foundation trench shall be inspected by the Engineer-in-Charge to see if it has been dug true to depth, form and length. If there is any soft spot in the bed of the trench, the soft earth shall be removed and replaced with sand or lean concrete. The sand shall be properly compacted.
		vii)	The bed of the foundation trench must not be muddy. It must be kept dry.
		viii)	Any over excavation in the bed of foundation trench shall be filled up with sand which shall be properly compacted.
02.	Dewatering of Foundation Trench	i)	No surface dewatering, except for rain water, shall be allowed.
		ii)	Sub-surface dewatering, if found necessary, shall be done through any recognized method of dewatering (to be approved by the Engineer-in-Charge). Dewatering shall be continuous and it shall be continued till construction of parts of the structure situated below G.W.T. is completed.
03.	Centering and Shuttering for Concreting	i)	Centering and shuttering for concreting shall be done with the materials as specified in the schedule or as specified by the Engineer-in-Charge.
		ii)	All shuttering shall be water tight and true in every respect to the required shape and size and shall be of sufficient strength and rigidity to maintain their position and shape under loads and operations incidents to placing, ramming and vibration of concrete. All planks of shuttering shall be plained and smoothened to make internal faces perfectly plain and free from irregularities.
		iii)	Suitable means for removing the shuttering shall be adopted to avoid any injury to the surface of the finished concrete. The internal surface of shuttering shall be thoroughly cleaned and oiled with a form oil to prevent sticking of the concrete with shuttering and to avoid any stain on the concrete. In applying form oil care shall be taken to avoid contact with re-enforcing bars.
		iv)	Before commencing concreting, the Engineer-in-Charge shall inspect the shuttering and satisfy himself about its stability, water tightness, levels and dimensions.

Sl. No.	Items of work	Quality Control Measures to be Adopted	
	Centering and Shuttering for Concreting (contd.)	v)	Shutters from the horizonal face of concrete shall not be removed before elapse of 14 days from the date of concreting.
04.	RCC and Cement Concrete Works		
	a) Materials		
	- Cement	i)	Cement shall conform in all respects to the requirements of the British Standard specifications for portland cement (BSS-12).
		ii)	Cement shall be of approved manufacture and be delivered in strong well-made sealed paper or jute packages.
		iii)	Cement must be free from clod. Caked or partly caked cement must not to be used.
		iv)	Samples of cement (one for each lot and brand) shall be sent to the laboratory for tests before use. Cement which does not give satisfactory test result must not be used.
		v)	Field test for determining adulteration, if any, in the cement should be made (a sample of doubtful cement is heated on a steel plate for about 20 minutes. Adulterated cement changes its colour on heating)
	- Sand	i)	Sand must be clean and free from organic impurities. Sand containing organic impurities shall not be used unless they are washed out.
		ii)	Sand containing more than 3% of loam or clay (by wt) and more than 1% of mica (by wt) shall not be used.
		iii)	Sand must be screened before use.
	- Coarse aggregate	i)	Aggregate shall be stone chips as stipulated in the schedule.
		ii)	Aggregate shall be hard, tough and free from organic matters. It shall be well graded.
		iii)	The size of the aggregate shall be as specified in the schedule. Flat and elongated particles should not be used.

Sl. No.	Items of work		Quality Control Measures to be Adopted
	- Coarse aggregate (contd.)	iv)	Aggregate must be screened and washed before use. The method of washing shall be prescribed by the Engineer-in-Charge.
	- M.S. rods	i)	The reinforcing steel bars shall be made from billet (source of manufacture to be intimated with supporting documents) and shall possess the tensile strength as specified in the design.
		ii)	Samples of reinforcing steel bars procured for use in the work shall be sent to the laboratory for test. The steel bars which give satisfactory test results shall only be used.
		iii)	Reinforcing steel bars shall be clean and free from rust or mill scale. Any coatings of hardened mortar shall have to be removed from the steel bars.
		iv)	The clear cover for the bottom reinforcing bars shall be maintained by placing sand-cement blocks below the reinforcing bars.
		v)	The re-enforcing bars shall be placed as shown in the drawings. The lap length shall be 40 dia of bars. The laps should be staggered.
	b) Mixing of Concrete	i)	Mixing of concrete shall be done by mixer machine (No hand mixing shall be allowed)
		ii)	The mixer machine with worn out blades shall not be used.
		iii)	The quantity of ingredients to be put into the mixer machine shall not normally exceed the rated capacity of the machine.
		iv)	Clean water suitable for drinking shall be used. Part of water needed shall be poured into mixture machine before pouring the ingredients of concrete and total quantity of water shall be poured into the mixer machine before 25% of the mixing period has elapsed.
		v)	Water cement ratio by weight should be 0.4 to 0.54; but the optimum ratio shall be ascertained through mix design.
		vi)	The time of mixing shall be 1½ minutes to 2 minutes for machine of 0.75 m^3 capacity. The time of mixing should be increased for mixer machine of higher capacity (by ½ min for each 0.75 m^3 above 0.75 m^3). The mixture of concrete shall exhibit a uniform colour.

Sl. No.	Items of work	Quality Control Measures to be Adopted	
	c) Placing of Concrete	i)	Before placing concrete, the Engineer-in-Charge shall inspect the shuttering, re-enforcements, materials and equipment finally and issue a certificate in the line as shown in Appendix A attached before pouring of concrete.
		ii)	Concrete shall be handled from the mixing platform to the place of deposit as rapidly as practicable by methods which shall prevent segregation or loss of the ingredients.
		iii)	Concrete shall be placed in the forms as near as possible to its final position to avoid rehandling. It shall in no case be dropped from a height greater than 1.20 m.
		iv)	The concrete shall be placed before initial setting. Additional water shall not be added to concrete to improve its workability. The set concrete shall not be disturbed.
		v)	Placing of concrete shall be done in continuous operation till the predetermined position of construction joint is reached.
		vi)	The thickness of a layer of concrete in one operation of casting shall not be more than 305 mm for base slab and 1 metre for vertical walls.
		vii)	Each subsequent layer of concrete shall be cast whilst the previous layer is soft. Before placing fresh concrete, if the old concrete (concrete in the previous layer) has not set for more than three hours, the poor materials and laitance collected at the top of the layer shall be removed by striking off a layer 10 mm thick. Under no circumstances, shall this be done, if the concrete has set for more than three hours. Where it is anticipated that the new concrete will be placed after more than three hours but not more than three days after the old concrete has been placed, the top 10 mm layer of the old concrete shall be removed as soon as it has been laid and compacted. Immediately before placing the new concrete, the surface of the old concrete shall be scrubbed with steel wire brush and thoroughly washed. A 13 mm thick layer of mortar having 1 part of cement and 2 parts of coarse sand then be applied to the old surface before laying new concrete.
		viii)	Horizontal flow of concrete shall be avoided.
		ix)	In sloping members, casting of concrete shall be started from the lower end of the slope.

Sl. No.	Items of work	Quality Control Measures to be Adopted	
	Placing of Concrete (contd.)	x)	Laitance must be prevented on horizontal layers of concrete when stopping work. Where laitance has formed and hardened, it shall be removed by chipping gently so as not to disturb the partially set concrete.
		xi)	Before placing fresh concrete over or against hardened concrete of construction joints, the hardened surface shall be roughened and cleaned by wire brush or by sand blasting. A thin layer of mortar of the same proportion as in the concrete shall be applied to the surface just before placing fresh concrete.
	d) Compaction of Concrete	(i)	Concrete shall be thoroughly compacted as it is placed. Concrete shall be worked well around the reinforcing bars and embedded fixtures and into corners of the forms. Compaction shall not be over-done as to cause segregation of coarse aggregate and water and fine aggregates moving towards the surface. Sufficient number of equipment and operators shall be provided to complete compaction of concrete before it has stiffened.
		ii)	Compaction of concrete shall be done through vibrator.
		iii)	Vibration shall be continued until the concrete is thoroughly compacted and the voids are filled as indicated by appearance of paste of mortar at the exposed surface.
		iv)	Vibration shall be secured within 5 to 15 seconds with vibrators inserted at points 457 mm to 762 mm apart rather than for longer periods of vibration at wider intervals.
		v)	Vibrators shall be inserted into the concrete vertically to the full depth of concrete layer, slowly, and withdrawn slowly while being operated continuously during withdrawal. In no case vibrators to be used for horizontal movement of concrete.
	e) Finishing the Top Exposed Surface of Concrete	i)	The top surface, if exposed and not subject of wear, shall be smoothened with a wooden float
		ii)	Dry cement or a dry mixture of cement and sand shall not be sprinkled on the surface to absorb the excess water that may have come to the surface during smoothening by wooden float.
	f) Testing of Concrete	i)	The concrete shall be tested daily for the consistency test at the field with slump cone. Slump for the RCC and the plain concrete shall be limited to 75 mm and 50 mm respectively.

Sl. No.	Items of work	Quality Control Measures to be Adopted	
	Testing of Concrete (contd.)	ii)	Daily samples (minimum 3 but not less than one sample for 50 m^3) in 15 cm cube shall be taken from fresh concrete and tested at the laboratory following the normal procedures and methods. The concrete not developing the requisite strength as specified in the drawing will not be acceptable.
	g) Curing of Concrete	i)	The concrete shall be protected from the sun and the dry wind by soaked jute sack or by any other suitable means.
		ii)	The concrete shall be cured for 14 days.
		iii)	Care shall be taken to protect the concrete from all sorts of shaking, jarring and other disturbances during the period of curing.
		iv)	No load shall be imposed upon the structure in any way for at least 28 days from the date of casting of concrete in roof slab.
05.	Back Filling	i)	Back filling shall not be started before 14 days from the date of concreting.
		ii)	Selected soil approved by the Engineer-in-Charge shall be used in the backfilling as per specifications.
		iii)	Before back filling is commenced, the area shall be cleared of all undesirable materials, debris, etc.
		iv)	The back filling material shall be compacted properly in layers.

Note: 1. The S.D.E. should issue a clearance certificate for pouring concrete as shown in appendix-I attached.

2. The inspecting officers may follow the schedule of inspection as shown in appendix-II attached.

B: Slope Protection Work of the Western Flood Embankment

Sl. No	Items of Work	Quality Control Measures to be Adopted	
01.	Earthwork in Repair of the R/S Slope of the Western Flood Embankment	i)	The surface of the slope shall be cleared of debris, grass, and other growths, and ploughed and compacted before placing fresh earth.
		ii)	Hard clay, humus, organic soil and peat shall not be used.
		iii)	Earth shall be placed in layers of 225 mm and clods bigger than 50 mm shall be broken. Each layer of earth shall be compacted mechanically or manually by wooden, concrete or cast iron rammers of requisite weight, pattern and size approved by the Engineer-in-Charge. If needed, water shall be added to the earth to attain the degree of compaction as mentioned in the schedule of items of work. Field as well as laboratory tests shall be carried out by the executing agency.
		iv)	In case of manual compaction, the rammers shall always be available in sufficient number and in good working condition at all work-sites. The contractor shall employ on ramming the required number of labourers for thorough compaction of each layer of earth.
		v)	If any part of the earth filling is not adequately compacted as determined by test, fresh earth filling shall remain suspended until the specified degree of compaction is reached.
		vi)	After completion of earthwork, the surface shall be properly dressed to the specified slope.
02.	Supply and Placing Geo-textile Filter in Position	i)	The geo-textile filter shall be of the specifications as mentioned in the relevant drawing. Samples of geo-textile filter shall be sent to the BUET for laboratory tests. The geo-textile filter which will meet the specifications on laboratory tests, shall only be used.
		ii)	The geo-textile filter placed on the slope shall have no folding in it. The upper and the lower ends of the filter shall be anchored in the ground as shown in the relevant drawings. No deviation from the drawing shall be allowed. The filter at its both sides shall have overlapping of 300 mm as mentioned in the drawings. The torn off or damaged filter shall not be used.

Sl. No	Items of Work	Quality Control Measures to be Adopted	
03.	Supply and Placing of Khoa Filter	i)	The Khoa for filter shall be made from first class jhama bricks/bats. The khoa shall be of the specified size and well graded.
		ii)	The khoa shall be screened properly before they are placed in position.
		iii)	The khoa shall be placed on the slope and at the toes with thickness as shown on the relevant drawing.
04.	Forms for C.C. Blocks	i)	Forms for C.C. blocks shall be made with the materials as specified in the schedule of items of work. They shall be made true to the dimensions as specified and shall be watertight.
		ii)	The forms shall be of sufficient strength and rigidity to maintain shape under the loads and operations incident to placing and vibration of concrete.
05.	Manufacture and Placement of Cement Concrete Blocks in Position		
	a) Materials		
	- Cement	i)	Cement shall conform in respect to the requirements of the British Standard Specifications No. 12 for Portland Cement.
		ii)	Cement shall be of approved manufacture and be delivered in strong well-made sealed paper or jute packages.
		iii)	Cement must be free from clods. Caked or partly caked cement shall not be used.
		iv)	Samples of cement (one for each lot and brand) shall be sent to laboratory for tests before use. Cement which does not give satisfactory test results must not be used.
		v)	Field test for determining adulteration if any, in the cement should be made (a sample of doubtful cement is heated on a steel plate. Adulterated cement changes its colour on heating).
	- Sand	i)	Sand must be clean and free from organic impurities. Sand containing organic impurities shall not be used unless they are washed out.

Sl. No	Items of Work		Quality Control Measures to be Adopted
	- Sand (contd.)	ii)	Sand containing more than 3% of loam or clay (by wt) and more than 1% of mica (by wt) shall not be used.
		iii)	Sand must be screened before use.
	- Coarse aggregate	i)	Aggregate shall be brick chips (khoas). The chips shall be made from first class jhama bricks/bats.
		ii)	Aggregate shall be hard and free from organic matters.
		iii)	The size of the aggregate shall be as specified in the schedule of items of works. Flat and elongated particles should not be used.
		iv)	Aggregate must be screened and washed before use. The method of washing shall be approved by the Engineer-in-Charge.
	b) Mixing of Concrete	i)	Mixing of concrete shall be done by mixer machine. Hand mixing shall not be allowed.
		ii)	Mixer machine with worn out blades shall not be used.
		iii)	The quantity of ingredients to be put into the mixer machine shall not normally exceed the rated capacity of the machine.
		iv)	Clean water suitable for drinking shall be used. Part of water shall be poured into the mixer machine before pouring ingredients of concrete and total quantity of water shall be poured into the mixer machine before 25% of the mixing time has elapsed.
		v)	Water cement ratio by weight shall be 0.4 to 0.5; but optimum ratio should be ascertained through mix design.
		vi)	The time of mixing shall be 1½ minutes to 2 minutes for machine of 0.75 m^3 capacity. The time of mixing should be increased for mixer machine of higher capacity (by ½ minute for each 0.75 m^3 above 0.75 m^3). The concrete mixture shall exhibit a uniform colour.
	c) Placement of Concrete	i)	Forms shall be oiled prior to placing of concrete.

Sl. No	Items of Work	Quality Control Measures to be Adopted
	Placement of Concrete (contd.)	ii) Concrete shall be handled from the mixing platform to the forms as rapidly as practicable by methods which shall prevent segregation or loss of ingredients.
		iii) Concrete shall in no case be dropped into the forms from a height greater than 0.5 m.
		iv) The concrete shall be placed before initial setting. The set concrete shall not be disturbed.
		v) Additional water shall not be added to concrete to improve its workability.
	(d) Compaction of Concrete	i) Concrete shall be thoroughly compacted so that it enters well into corners of the forms. Compaction shall not be over-done as to cause segregation of coarse aggregates and water and fine aggregates moving towards the surface. Compaction should be adequate to avoid air-voids.
		ii) Sufficient number of equipment and operators shall be provided to complete compaction of concrete before it has stiffened.
		iii) Compaction of concrete shall be done through suitable vibrator. Vibration shall be continued until the concrete is thoroughly compacted and voids are filled as indicated by appearance of paste of mortar at the exposed surface.
		iv) Vibration shall be secured within 5 to 15 seconds with vibrator inserted into the concrete to the full depth slowly and withdrawn slowly while being operated continuously during withdrawal.
	(e) Finishing the Top Surface of the Block	The top surface of block shall be made plain by steel trowel. The date of casting shall be marked on the surface of each block.
	(f) Testing of Concrete	(i) Concrete shall be tested daily at the field for consistency with slump cone. Slump shall be limited to 50 mm

Sl. No	Items of Work	Quality Control Measures to be Adopted	
	Testing of Concrete (contd.)	(ii)	Daily samples (minimum 3 Nos. for each site but not less than one sample per 50 m^3) in 15 cm cube shall be taken from the fresh concrete and tested at the laboratory following the normal procedures and methods. The concrete not developing the required strength as mentioned in the drawing will not be acceptable.
	(g) Curing of Blocks	(i)	The blocks shall be protected from the sun and the dry wind by covering them with wet jute sacks or by any other suitable means.
		(ii)	The blocks shall be cured for 14 days. Care shall be taken to protect the blocks from shaking and other disturbances during the first 7 days of curing.
	(h) Placement of Blocks on the Slope	(i)	The blocks may be transported from the place of casting to the embankment slope for placing in position after 7 days from the date of their casting and curing should be continued for another 7 days.
		(ii)	The blocks shall be placed in position without dropping from any height or sliding along the embankment.
		(iii)	In the process of placing the blocks in position on the embankment slope, extreme care shall be taken to protect the geotextile filter below from being torn off or damaged.

Note: The Inspecting Officers may follow the schedule of inspection as shown in appendix - III attached.

C: **Remedial Works (Earthwork with Geo-Jute and Sod Protection) at Different Locations of the Western Flood Embankment from Tongi Railway Bridge to Kellarmorh.**

Sl. No.	Items of work	Quality Control Measures to be Adopted	
01.	Earthwork in Patch Repair, Berm Building and Re-Sectioning of Embankment	i)	The embankment surface requiring earth filling shall be stripped, cleared of debris, grass weeds and other growth before starting the earth filling work.
		ii)	Hard clay, humus, organic soil and peat shall not be used.
		iii)	Profiles shall be erected with bamboo, string and pegs. No earth shall be placed without erecting profile.
		iv)	Earth shall be placed true to profiles in layers of 225 mm and clods bigger than 50 mm shall be broken. Each layer of earth shall be compacted mechanically or manually by wooden, concrete or cast iron rammers of requisite weight, pattern and size approved by the Engineer-in-Charge. If needed water shall be added to the earth to attain the degree of compaction as mentioned in schedule of item of work. Field as well as laboratory tests shall be carried out by the executing agency.
		v)	In case of manual compaction, rammers shall always be available in sufficient number and in good condition at all work-sites. The contractor shall employ on ramming, the number of labours required for thorough compaction of each layer of earth.
		vi)	If any part of the earth filling is not adequately compacted as determined by tests, subsequent earth filling shall remain suspended until the specified degree of compaction is reached.
		vii)	After compaction of earth in filling, the surface shall be properly dressed to the specified slope.
02.	Geo-Jute and Sod Protection	i)	The geo-jute manufactured by Adamjee Jute Mills Ltd. having the specifications as mentioned in the relevant drawing shall be used. Samples of geo-jute will have to be submitted to the Engineer-in-charge for approval before laying the same on embankment slope.

Sl. No.	Items of work	Quality Control Measures to be Adopted	
	Geo-Jute and Sod Protection (contd.)	ii)	While placing geo-jute on the slope of embankment, the upper and lower ends of geo-jute shall be anchored on the ground with pegs of 0.3 to 0.5 meter length driven into the ground. The spacing of pegs shall not ordinarily be more than 1.5 metre. The geo-jute shall be properly tied with the pegs.
		iii)	Geo-jute shall have a minimum overlapping of 150 mm.
		iv)	The turf shall of Durba/Charkanta grass sods of size 30 cm x 30 cm x 8 cm and shall be closely placed on the slope and pressed properly so that the sods do not slide or move laterally.
		v)	The grass shall be properly watered so that the turf grows quickly.

Note: The Inspecting Officers may follow the schedule of inspection as shown in appendix - IV attached.

D. Quality Control Measures for Construction of Storm Sewers

Sl. No.	Item of work	Quality Control Measures to be Adopted	
01.	Site Clearing	The alignment of the proposed storm sewer shall be cleared of all sorts of organic matters, sludge, debris, bricks, khoa, stone chips, trees, etc.	
02.	Foundation Trench		
	a) Excavation of Foundation Trench	i)	Prior to starting of earth cutting, alignment of the trench shall be demarketed and sight-rails shall be provided. The sight rails shall remain undisturbed during the course of earth work in excavation and subsequent construction of storm sewer.
		ii)	Trenches shall be excavated as per specified width but 150 mm (300 mm in the case of piling) less than the designed depth at the initial stage. This depth shall be dug out carefully during the final dressing after checking the bed level. If any portion of foundation trench is excavated to a greater depth than specified, the excess depth shall be filled-up with khoa, sand or gravel, or with a proper admixture of the above ingredients, which shall be well compacted. If foundation bed gets wet due to rains or seepage of water, care shall be taken to dry it up before the foundation is laid. The excavated earth shall be kept sufficiently away from the trench to avoid collapse of the trench due to surcharged earth pressure. The earth shall be kept at place(s) in such a manner that it does not interfere with traffic or approach to private or public properties. The excavated earth shall be removed from the site within 24 hours of excavation as per direction of the Engineer-in-charge.
		iii)	Piling may have to be done in the foundation bed where the soil does not have the required bearing capacity. When piling is necessary at least 300 mm earth over the invert level shall be kept uncut. After driving the piles upto the required depth, last layer of earth shall be excavated and lastly that the top portions of the piles shall be sawed off at the required levels.

Sl. No.	Item of work	Quality Control Measures to be Adopted
	Excavation of Foundation Trench (contd.)	iv) Tunnelling or jacking through earth for making connection with the existing storm sewer under pavement may be necessary during construction. While executing this type of work, adequate boxing, shoring, etc., shall be made so that there may not be any disturbance in the surrounding soil or any subsidence from the top.
	b) Trench Width	i) The trench width at the top for pipe sewer shall be just wide enough to permit the proper bedding and placing of the pipe and construction of the joints.
		ii) From the bottom of the trench to a level 300 millimeters above the crown of the pipe trench width shall not be less than the minimum or greater than the maximum figures shown in Appendix - V.
	c) Shoring and boxing	Shoring and boxing shall be done in the trench which is excavated in loose soil. Appropriate measures shall be taken to prevent collapse of the trench whose depth exceeds 2 m and which runs close to building or utility structure. Boxing works should be done simultaneously with digging of trench. Boxing and shoring shall have to be continued till the excavation reaches the required depth of cutting in the trench. Boxing and shoring should be done with planks and runners of gorjan wood/any other specified wood and Salballah struts. The thickness of planks shall be 37 mm to 50 mm and size of runners shall be 100 mm x 75 mm. All the boxing and shoring materials such as planks, runners and struts have to be removed from the trenches prior to completion of backfilling.
	d) De-watering of Foundation Trenches	All trenches shall have sufficient clearance on either sides for the purpose of making sump for de-watering and boxing arrangement. Sump shall be made in such a way that water level remains below the bed of the concrete during casting. Bailing out of water from the sump should be continuous. Where necessary, sump may be made away from the trenches and connected by laying pipes. Water may be removed by direct pumping from drainage sump. In case of high ground water level dewatering shall be done through well points.
03.	Diversion Channels	i) During the construction of storm sewer, the existing water courses or flow of drain might have to be diverted through pipes or open channels so that no water can seep into the trench and interfere with the work, or cause collapse of the trench walls. The size of diversion channels should be large enough to take the load of rains also. To ensure dry condition of soil in the trenches the diversion channels should be leak-proof.

Sl. No.	Item of work	Quality Control Measures to be Adopted
	Diversion Channels (contd.)	ii) The diversion arrangement should be continuous from section to section and slope of diversion channel shall be such that it maintains a gravity flow. In the case the soil on which the diversion pipes are to be laid is not suitable for the purpose and the diversions are still to be run, the diversion pipes should be laid on proper staging as may be instructed by the Engineer-in-charge. All diversion lines shall be maintained till completion of the work as a whole. It is not allowed to put up bunds which may cause stagnation of water either on the upstream or the downstream of trench.
04.	Brick Sewer	
	a) Preparation of Foundation Bed	Where the soil in bed is soft, the foundation bed shall have to be prepared with admixture of first class picked jhama chips of size 25 mm to 50 mm and sand. The admixture in the proportion of 1:2 (Sand: Chips) shall be laid on the bed in 150 mm layers, watered and well compacted, till a consolidated foundation bed is obtained.
	b) Brick Work	i) Unless otherwise specified, kiln burnt first class bricks of standard size shall be used in the work. Bricks should be uniform in size and colour, thoroughly and evenly burnt. They shall emit metallic sound when struct together. They shall be well shaped with even surfaces and without cracks, rain spots or flaws of any kind. They should not absorb more then one-sixth of their weight of water during 12 hours of immersion.
		ii) Bricks must not be used until they have been thoroughly soaked in soaking tank for at least 12 hours in clear water. Soaking of bricks in water is essential as otherwise they would absorb water from the mortar making it dry and causing weak bond between bricks.

Sl. No.	Item of work	Quality Control Measures to be Adopted	
	Brick Work (contd.)	iii)	Unless otherwise specified, mortar for brick work shall be prepared in the proportion of 1:4. Sand and cement shall be thoroughly mixed dry until uniform colour is obtained and then water (0.4 to 0.5 by wt.) shall be added to the mortar mix. Under no circumstances additional water shall be added to mortar to maintain its workability. The mortar shall be used within half an hour of its preparation. Care must be taken so that each course of bricks is laid level and perfect in bond with faces on top, and that each brick is well bedded and flushed with mortar joints. The vertical joints must be filled thoroughly with mortar, leaving no gap. Thickness of mortar joints shall not exceed 5 mm. Unless otherwise specified the bond should be English.
		iv)	The brick work should always be carried out at regular heights for one entire length of a section and throughout the construction. The maximum height of work that should be permitted to be done in one day is 0.9 m for 0.25 m thick wall, and 0.6 m for 0.125 m thick wall. Before jointing the new with the old work, the old work shall be well cleaned and thoroughly watered.
		v)	At frequent intervals, the wall surface should be checked with the straight edge (Para) and the sides with plumb bob to see that the wall is in correct vertical plane and there is no depression on the surface.
		vi)	The bottom half section of sewer shall be built on templates or forms accurately made according to the dimensions of the sewer, keeping the levels and gradients the same as shown on drawing. This section of the sewer shall be finished with sand-cement plaster of specified proportion.
		vii)	The top half section of the sewer (arch) shall be built on a rigid frame to the shape of the arch of the sewer. The frame shall be so built that it can be removed after construction and curing without disturbing the arch. A layer of 25 mm thick cement-sand mortar (1:3) core plaster in between two layers of bricks shall have to be provided. After removal of the frame, the inner side of the arch shall be finished with flush pointing, and the outside of the arch shall be plastered with mortar as specified.
		viii)	Proper care must be taken to see that the brick work is kept moist constantly at least for 7 days following the construction.

Sl. No.	Item of work	Quality Control Measures to be Adopted
05.	R.C.C. Pipe Sewer	
	a) Setting Out Pipe Line/Box Line	The centre-line of the pipeline to be laid shall be marked with suitable iron or wooden pegs and the trenches should be set-out in accordance with plans and sections. Then sight rails shall be fixed at reasonable distance, not more than 50 m a part, along the proposed alignment of the sewer and at places where it changes its direction and greade. The vertical sight rail shall be of hard seasoned wood of 10 x 10 cm.sq. and in length 200 cm. (approx.) and shall be firmly fixed in to the ground atleast 50 cm away from the edges of the trench. The sight rail shall also be of hard seasoned plank of 15 x 2 sq.cm. in section with a length depending on the width of the trench plus 150 cm. allowance on either side of the trench. The sides of the sight rails shall be perfectly made plain and fixed in true horizontal line with the two side posts. The rails shall be distinctly painted both at front and back with centre line of the sewer, the rail to the left of the centre line being painted black and that to the right being painted white. The travelling or boning rod for use with the sight rails shall be made of timber also according to the true lengths required with tee-head plained true and at right angels to the centre line of the pipe line. The lower end of the travelling rod shall be provided with a bracket of sufficient projection to rest on the centre of the last pipe so that each other pipe can be correctly boned in. Before excavation is commenced both series of reference marks (permanent bench mark levels and plans and sectional levels) shall be approved by the Engineer-in-Charge.
	b) Quality of Pipe	Pipes shall be of approved specifications. Pipes with cracks or any other defects shall not be used. Before taking delivery, the pipes shall be tested to see whether they meet the specifications.
	c) Laying of Pipe	i) Pipes shall be laid on sand cushion as shown on the drawing. Each pipe shall be placed correctly to line and grade and in close control with the adjoining pipe. The bell end of bell-and-spigot pipe and groove end of tongue-and-groove pipe shall be at upstream. Small pipes may be pushed with a crow or pry bar, using a wooden block, to protect the pipe end. Winch should be used for pulling big pipes. During the process of pulling pipes, the pipe shall remain partially suspended from crane. Bedding material should be available at site for use in the event the pipe settles below the grade when its weight is released. The bed material shall be placed uniformly below the entire length of pipe.

Sl. No.	Item of work	Quality Control Measures to be Adopted
	Laying of Pipe (contd.)	ii) Pipes and collars shall be laid in such away that the design invert level of sewer is maintained. Care shall be taken to make the collar joints leak proof. Collars shall be fixed first with gasket and properly packed, and then cement mortar (1:2) shall be applied to the joint and neatly finished.
	d) Pipe Jointing	In jointing bell-and-spigot pipes, the joint ends shall be well cleaned and thoroughly soaked with water before the joint is made. Thick mortar is then placed in the lower portion of the bell end of the pipe already laid. The spigot end of the next pipe, after the top portion is coated with mortar, is inserted into the bell of the first laid pipe. Care shall be taken to see that the inner surface of the abutting sections are flush and even. The annular space remaining in the joint shall then be filled with cement mortar. All mortar on the inside of the pipe shall be removed. In joining tongue-and-groove pipe, a shallow excavation shall be made under the pipe at the groove end. This space shall be filled with mortar. The ends of the pipe shall be cleaned and thoroughly soaked with water just before the joint is made. Cement mortar shall then be applied to the lower portion of the groove end of the pipe already laid and to the upper portion of the tongue of the pipe being laid. The tongue shall then be inserted into the groove end of first pipe until mortar is squeezed out on the interior and the exterior surfaces. The remaining annular space shall be filled with mortar. The interior surface of the pipe shall be cleaned of all extruded mortar.
	e) Cutting of Pipe	As far as practicable , cutting of pipe should be avoided. When cutting is unavoidable in the interest of work, the pipe shall be cut with round chisel or diamond/carbide very carefully so the pipe does not crack or break.
06.	R.C.C. Box Sewer	
	a) Centering and Shuttering for concreting	The same measures as furnished for the item under the heading Construction of sluices on the western Embankment in page 2
	b) R C.C. Work	
	i) Materials	
	- Cement	The same measures as furnished for the item under the heading - Construction of sluices on the western Embankment in page 2
	- Sand	-do-

Sl. No.	Item of work	Quality Control Measures to be Adopted
	- Coarse Aggregates	-do-
	- M.S. Rods	-do-
	ii) Mixing of Concrete	-do-
	iii) Placing of Concrete	-do-
	iv) Compaction of Concrete	-do-
	v) Testing of concrete	-do-
	vi) Curing of concrete	-do-
	vii) Sand-Cement mortar	Water Cement ratio by weight should be 0.4 to 0.50.
07.	Back Filling of Structures	Back filling shall be done with local sand of approved quality Filling shall be done in layers of 150 mm, and each layer of sand shall be watered and rammed to achieve the degree of compaction as specified. Care shall be taken to prevent tractors, bull dozers and other heavy vehicles from moving over the pipe line until the backfilling has been done to a sufficient height above the sewer structure, when the effect of live load on the structure is insignificant. The method of back filing in sheeted trench shall be carefully worked out to avoid transferring excessive load to the sewer structure. In the case of R.C.C. box sewer, back filling shall be started after 14 days of concreting.

Note : Concreting shall not be under taken before a clearance certificate for the purpose as per appendix - I is obtained from the SDE.

CLEARANCE CERTIFICATE FOR POURING CONCRETE

01. The bed of foundation trench is completely dry and suitable for pouring concrete.

02. Shutters are water tight, the surfaces are smooth and are true to the required shape and size.

03. The internal surfaces of the shuttering have been thoroughly cleaned and oiled with form oil.

04. Required quantity of sand have been screened and stacked at the proper location.

05. The coarse aggregates have been screened, washed and made moisture saturated.

06. The mixer machine and vibrators are in running condition.

07. Arrangements for adequate supply of water suitable for mixing concrete have been made.

08. The blade of the mixer machine have been cleaned.

09. The M.S. rods have been properly fabricated, hooked, placed with proper laps and staggers and bound with G.I. wire true to specifications, dimensions, spacings as per drawings.

10. The top and bottom layers of re-enforcing net have been spaced properly by placing sand-cement blocks & M.S. Chairs.

11. Adequate arrangement for protecting raw concrete against rain has been made.

Checked by

S. D. E., BWDB

EE/BWDB - Division II, Dhaka

Remarks if any :

By

1) S.E., Dhaka O & M Circle

2) P.D., PMO

3) Consultants

Appendix - II

SLUICE CONSTRUCTION INSPECTION SCHEDULE

Sl. No.	Item of work	Designation of the inspecting officers			
		Superintending Engineer	Executive Engineer	Sub-divisional Engineer	Consultants' Construction Supervision Engineer
01.	Layout of the structure		*	*	*
02.	Excavation of the foundation trench		*	*	*
03.	Dewatering of foundation trench	*	*	*	*
04.	Lean concrete	*	*	*	*
05.	Centering & shuttering		*	*	*
06.	Sand, cement & coarse aggregate		*	*	*
07.	Reinforcement		*	*	*
08.	Embedded metal	*	*	*	*
09.	Concreting	*	*	*	*
10.	Curing		*	*	*
11.	Back filling		*	*	*
12.	Installation of gate	*	*	*	*
13.	Testing of gate	*	*	*	*

Note: Instructions/orders given in the site order book shall be incorporated in the monthly progress report.

* Indicates responsibility

Appendix - III

INSPECTION SCHEDULE OF SLOPE PROTECTION WORK ON WESTERN EMBANKMENT

Sl. No.	Item of work	Designation of the inspecting officers			
		Superintending Engineer	Executive Engineer	Sub-divisional Engineer	Consultants' Construction Supervision Engineer
01.	Earth work in excavation		*	*	*
02.	Earth work in filling with carried earth	*	*	*	*
03.	Compaction of earth filling	*	*	*	*
04.	Manufacture and placing of block	*	*	*	*
05.	Supply and placing of 1½ " PVC pipe	*	*	*	*
06.	Supply and laying of geo-textile	*	*	*	*
07.	Supply and placing of brick khoa		*	*	*
08.	Geo-jute placing and turfing		*	*	*

Note: Instructions/orders given in the site order book shall be incorporated in the monthly progress report.

* Indicates responsibility

INSPECTION SCHEDULE OF REMEDIAL WORKS (EARTH WORK WITH GEO-JUTE AND SOD PROTECTION) ON WESTERN EMBANKMENT

Sl. No.	Item of work	Designation of the inspecting officers			
		Superintending Engineer	Executive Engineer	Sub-divisional Engineer	Consultants' Construction Supervision Engineer
01.	Earth work in				
	a) Patch Repair of embankment		*	*	*
	b) Berm Building	*	*	*	*
	c) Embankment re-sectioning		*	*	*
02.	Compaction of earth	*	*	*	*
03.	Geo-jute placing and turfing	*	*	*	*

Note: Instructions/orders given in the site order book shall be incorporated in the monthly progress report.

* Indicates responsibility

COD

Appendix - V

TRENCH WIDTH

Nominal Internal Diameter (mm)	Minimum Trench Width (mm)	Maximum Trench Width (mm)
100	430	630
150	490	790
225	580	880
300	680	880
375	950	1150
450	1030	1230
525	1120	1320
600	1240	1440
675	1330	1530
750	1400	1600
825	1490	1690
900	1920	2120
1050	2100	2300
1200	2290	2490
Above 1200	Outside Director	Outside Director

ANNEXURE - V
O & M GUIDELINES

O & M GUIDELINES

1. INTRODUCTION

Operation & Maintenance Manual is an essential guide for proper and efficient operation of flood control and drainage projects. It has been seen that operation of such projects without following any set rules and procedures invites problems resulting in damage to the different components of infrastructures. The benefits as planned from the projects cannot be fully achieved without their proper operation, and systematic and regular maintenance.

Dhaka Integrated Flood Protection Project is under implementation and some of the infrastructures have already been built. Implementation of the project will continue for the next four/five years when the remaining infrastructures will be built. Though the project is in implementation stage, necessity of operation and maintenance of the existing infrastructure is keenly felt. O&M Manual for the project will be prepared during the final stage of its implementation. Before O&M Manual is prepared, some guidelines should be formulated for operation and maintenance of the project during the period of its implementation.

It is hoped that the O&M guidelines will help the project authority in proper and efficient operation and maintenance of the different physical components of the projects during the period of implementation. The guidelines are in general form and need up dating to meet the changed condition. They may also be elaboration to meet any critical situation.

2. THE PROJECT

2.1 General

Dhaka Integrated Flood Protection Project, Phase-I covers the western part of the Dhaka City and comprises an area of 136 Km^2. It is bordered on the north by the Tongi Khal, on the west by Turag river and it is shoot channel, on the south by Buriganga river and on the east by the Central Spine Road and the Railway. The Project area is shown in Fig. 1. attached.

The project consists of the following 4 (four) parts:

(i) Part A - Flood control (under BWDB)

(ii) Part B - Drainage (under DWASA)

(iii) Part C - Environmental Improvement Programme (under DCC)

(iv) Part D - Implementation assistance

2.2 Project Planning

2.2.1 Flood Control

- Provide flood embankment along the river bordering on the north and the west of the project.
- provide flood embankment, flood wall, and sheet piling along the left bank of Buriganga river
- raising of Central Spine Road and flood proofing of the C.S. Road and Railway
- provide a pump house on the western embankment
- provide drainage sluices in the western flood embankment

2.2.2 Drainage

- Rehabilitation and upgrading of the existing priority drainage channels
- Rehabilitations of the existing pipe drain and construction of pipe drain.

2.2.3 Environmental Improvement Programme

- Improvement of slum of squatter area
- Management of solid waste disposal
- Improvement of sanitation

2.2.4 **The existing and the proposed major physical components under the DIFP Project, Phase-I are as follows:**

Physical Components	Quantity		
	Total	Existing	Proposed
Part A : Flood Protection			
1. Western Flood Embankment	29.7 km	29.3 km	0.4 km
2. Flood Wall	4.8 km	4.8 km	Nil
3. Flood Wall/Embankment along the left bank of Buriganga	0.8 km	Nil	0.8 km
4. Sheet Piling/Embankment (along left bank of Buriganga)	0.8 km	Nil	0.8 km
5. Sluices			
a) on the western embankment	11 Nos.	6 Nos.	5 Nos.
b) on the central spine road	13 Nos.	Nil	13 Nos.
6. Pump House	1 No.	Nil	1 No.
7. Central Spine Road raising	8.0 km	-	8.0 km
Part B : Drainage			
1. Khals	78.6 km	78.6 km	-
2. Piped Drains	50.7 km	Nil	50.7 km
Part C : Environmental Improvement Programme			
1. Slum and Squatte Area Improvement	1 item for 8725 families	-	1 item
2. Public Toilet	35 Nos.	Nil	35 Nos.
3. Low Cost Sanitary Latrine	5500 Nos.	Nii	5500 Nos.

2.3 Design Considerations

2.3.1 Flood Embankment

-	Top elevation	:	1 in 100 yr flood level of the peripheral rivers (Tongi river and Turag river) plus free board of 1.2 m.
-	Crest width	:	4.25 m
-	Side slope	:	R/s 3.1 (H:V) & C/s 2:1 (H:V)

2.3.2 Sluice

-	Drainage characteristics	:	Gravity
-	Drainage period	:	Pre-monsoon & post-monsoon.
-	Run off criteria	:	Run off from one day rainfall, presumed to occur in 6 hours, of 1:2 yr return period.

2.3.3 Flood Embankment slope Protection by hard materials against wave action

-	Top level of slope protection	:	1 in 100 year flood level of Turag river.
-	Fetch length	:	5 Km
-	Wind speed	:	20 Knots/hour

2.3.4 Flood Embankment Slope and Toe Protection with Hard Materials against Water Current

-	Top level of slope protection	:	1 in 100 year flood level of Turag river
-	Design discharge of river (dominant discharge)	:	326 cum (70% of the maximum)

2.3.5 RCC Flood Wall

-	Top Level	:	1 in 100 year flood level of Buriganga river plus free board of 0.6 m
-	Head Difference	:	Maximum 1.8m (at the location of lowest ground level) and Minimum 0.6m (at the location of highest ground level)

2.3.6 Raising and Flood Proofing of Central Spine Road

-	Top level of the road	:	1 in 50 year flood level of Lakhya-Balu river.
-	Head difference for flood proofing measure	:	2.25 m

2.3.7 Covered Drains and Piped Drains

-	Run off criteria	:	Run off from rainfall intensity of 5 year return period with corresponding intensity for a maximum period of 120 minutes (Discharge calculated by the Rational formula).

2.3.8 Pump House

-	Period of operation	:	Flood season
-	Pump capacity	:	Ultimate - 65.2 m^3/sec 1st phase - 22 m^3/sec
-	Retarding pond level	:	Maximum 3.9m for 50 year storm frequency with pumping capacity of 22 m^3/sec and Maximum 3.53m for 50 year storm frequency with pumping capacity of 65.2 m^3/sec.

2.3.9 Slum and Squatter Area : Design criteria not yet fixed.

2.3.10 Public Toilet and Low Cost Sanitary Latrine : Design criteria not yet fixed.

3. OPERATION

3.1 Sluices on the Western Flood Embankment

Sluices have been provided on the embankment for drainage of the project area during the pre-monsoon and the post-monsoon period when the peripheral river water level will permit gravity drainage. Therefore, the sluices will generally be operated twice a year. During the post-monsoon period the sluice gates shall be kept open till the peripheral river water level permits gravity drainage. During the flood season the sluice gates shall be kept closed. The gates shall be opened when river side water level falls below the inside water level at the end of flood season. Operation of the gated embankment structures is quite simple, but their operational parameters are varied. All gates should be operated in multiple steps to achieve uniformity of flow across the whole width of structure opening and the range of such step should be between 15 cms and 30 cms. This rule may be varied if the initial opening of the said range tends to induce vibration of gates and in that case the size of the vibration free initial opening shall be determined at individual sites. Care should be taken so that the released jet of water does not sweep over the low tail water level. And the next step for opening gate should be taken up till the tail water level builds up sufficiently to develop hydraulic jump within the floor. If there are more than two gates, it is desirable to open them from the centre in steps and to move on to either side till all the gates are opened equally.

Generally, the gate operators have little education. As such they need on-the-job training for considerable period of time for learning the gate operation procedures under different conditions.

Water level gauge should be installed both at the upstream and the downstream of all the sluices. The upstream and the downstream water levels at the sluices shall be taken at least twice a day and recorded in the gauge register by the gate operator.

3.2 Monitoring the Operation

A monitoring cell should be set up in the PMO's office for management of operation and for collecting, compiling and collating information on performance of the different FCD components during the implementation phase of the project. The cell will also check the field data/information on (i) flood embankment erosion, (ii) performance of sluices, and (iii) inundation characteristic in the project area during monsoon.

3.2.1 Inspection During Operation

Problems and constraints in operation of FCD infrastructures can better be identified through visual observation of their performance. The higher level project engineers should inspect some of the infrastructures during the period of their operation. It should be made mandatory for the Chief Engineer and the Superintending Engineer to inspect the major infrastructures each year and record their observation in respect of serviceability of the infrastructures. The Chief Engineer should annually review the security of the project system and take necessary steps for remedies thereof, if any.

It should be made mandatory for the Executive Engineer and the Sub-Divisional Engineers to inspect all the infrastructures at the advent of flood each year and during flood and prepare a report on their performance. The report shall include, among others, the remedial measures, if any, needed for them. The Executive Engineer shall submit the report to the Superintending Engineer who in turn will submit it to the Chief Engineer with his observations. On perusal of the report the Chief Engineer will issue necessary instructions, which shall be carried out by the Executive Engineer in time. Before the on set of monsoon, the Sub-Divisional Engineer will inspect all the infrastructures to see that they are in operable condition and will submit a report on their condition to the Executive Engineer. The Executive Engineer will satisfy himself before monsoon about the serviceability of the infrastructures.

4. MAINTENANCE

4.1. General

The FCD infrastructures are generally costly and are designed to last long. Maintenance of the infrastructures is necessary for keeping FCD system in a good operational condition. The functions involved in the maintenance of the system are:

(i) Assessment of maintenance work

(ii) Planning of maintenance work

(iii) Implementation of the planned maintenance work

(iv) Monitoring of maintenance activities

Assessment and planning of maintenance work are directly related with the in-depth knowledge of the project planning, construction quality of infrastructures and budget provision.

The Executive Engineer shall inspect the FCD infrastructures every year immediately after recession of flood and will submit a technical report on their condition including estimate of maintenance work to the Superintending Engineer. The Superintending Engineer will submit a consolidated report to the Chief Engineer. The report shall be prepared in a proforma to be prescribed by the Chief Engineer.

4.2 Flood Embankment

Maintenance of embankment falls into two categories, viz (i) normal maintenance during dry season and (ii) maintenance and emergent measures during flood.

Measures that should be taken under the normal maintenance programme are :

- Random check survey of cross-section of embankment.
- Condition survey of the embankment.
- Restoring the reduced section of embankment, if any, to design section.
- Rebuilding of berm eroded by wave/current.
- Filling up rain cuts, depressions, ghogs and rat holes.
- Mending of turf washed out by wave or damaged by any other agents.

Activities to be carried out and emergent protective measures to be taken during flood are :

- Round the clock patrolling of embankment.
- Frequent inspection of embankment by the Sub-Divisional Engineer and the Executive Engineer.

- Collection of flood precautionary materials at suitable places on the embankment. Flood precautionary materials are :

(i)	Gunny bags
(ii)	Bamboo pins
(iii)	Baskets
(iv)	Sutli
(v)	Needles
(vi)	Brick bats
(vii)	Brush wood
(viii)	Rope
(ix)	Spade
(x)	Axe
(xi)	Dau
(xii)	Hand saw
(xiii)	Nail
(xiv)	Wooden mollet
(xv)	Tarja matting

- Detection of ghogs, rat holes, leaks, slips, heavy seepage and piping, if any, in the embankment.

- Adoption of measure for filing up ghogs, holes and depressions, stopping of leaks, and piping, prevention of slips, seepage and erosion.
Grazing of cattle, tree plantation and erecting of house on the embankment and borrowing of earth form embankment shall be prohibited.

4.3 Flood Wall

The flood wall passes along the left bank of the Buriganga river, which is the most densely populated and busy area of the city. The flood wall is vulnerable to damage because of human activities and unfavourable site condition. Within a few years of its construction, the wall has been damaged and breached at some points. The wall has collapsed at few places because of undermining of the foundation soil. The river bank erosion at some points also threatens the stability of the wall at the said points. Under such a situation, close watch on the wall, particularly during the flood season, and timely and regular maintenance of wall are essential.

The measures necessary for keeping the wall in good serviceable condition shall include the following :

- Detailed condition survey of the wall immediately on recession of flood.
- Determination of the extent and cause(s) of damage, if any, to the wall.
- adoption of measure for removal of the cause(s) of damage.
- Completion of maintenance work well ahead of flood season.
- The sliding gates for the openings in the wall shall be examined before monsoon to see whether they are in operable condition. The sealing arrangement and the roller system shall be checked thoroughly.
- The gates after their use during flood shall be rolled back to the position where they will be secured with the flood wall.
- The gates shall be firmly secured with the wall and they shall be kept free from disturbances.
- The gates shall be cleaned and painted at regular intervals. The cycle of maintenance shall be decided on the basis of practical experience.

4.4 SLUICE

The annual maintenance work shall include the following :

- Inspection of the structural components of the structures and assessment of their condition.
- Repair of the damaged components of the structures.
- Inspection of the different parts of gate hoisting and assessment of their condition.
- Cleaning and greasing of the relevant parts of hoisting system.
- Cleaning and painting of gate shutters.
- Cleaning of gate grooves.
- Clearing of debris and mud from the barrel of sluice.
- Checking of the seals of the gates for assessment of their conditions. Adjustment or replacement of the seals as and when necessary.

- Providing stop logs with lowering and lifting devices.

- Repainting of W.L. gauges on the body of the structures.
  A register shall be maintained for each sluice. The sluice operator shall not only record the daily water levels at the sluice sites but also record the gate operation (date of opening/closing, width of vertical opening). He will also record in the register any accident that may occur in operation of sluice. The cause and effect of accident shall also be recorded by the operator.

4.5 Sewer

Maintenance of sewer involves principally removal or prevention of stoppage, cleaning of sewers, some repair work, and cleaning of catch basins, if any. Good maintenance requires adequate knowledge as to the sewer location and a competent working force that is properly equipped and on call at all times.

In attaining good maintenance of sewers, up-to-date maps of the sewer system are essential. The maps should show the exact locations of manholes, direction of flow and house sewers. Regular inspections followed by prompt and appropriate maintenance are necessary to keep the system in good operating condition. Frequency of inspection depends on factors such as grade of sewer line, nature of troubles encountered in the sewers, type of components of the system, etc. Storm water outflows shall be inspected during and after every heavy rainfalls. The City Corporation should have a fleet of trained crew. They shall follow an inspection routine, make repairs to and or cleaning of the different components of the systems according to a pre-arranged schedule, and make records of the condition found and the works done. The cost of the maintenance works should be recorded in the appropriate register by the concerned field officials. Inspection of industrial plants might be necessary to discover the conditions which cause undesirable accumulations in the sewers.

The City Corporation should pass ordinances designed to protect the sewers against injury and stoppage. Water from kitchen, sinks and floor drains of restaurant, hotels, packing houses, creameries, bakeries, launders, garages and stables may be required by ordinance to pass through grease tanks before entering the sewers. The typical equipment to be carried by a full-time maintenance crew are as follows.

Major equipment:

- Medium size truck
- Power winch
- Portable manually operated winch
- 300 m flexible steel cable
- 300 m fire hose
- About 225 m flexible steel rods
- Root cutters of assorted sizes
- Sewer brushes of assorted sizes
- Sand buckets, scopes and drags of assorted sizes
- Turbine flushing heads
- Steel sewer tapes and heavy wire
- Sewer flushing bags

Minor equipment:

- Shovels, picks and mattocks
- Assorted wrenches
- Hydrant and manhole tools
- Flashlight (explosion proof)
- Rubber boots, coats and gloves
- Buckets and ropes

Safety equipment:

- Hydrogen sulphide detector
- Combustible gas detector
- Carbon monoxide detector
- Wall safety lamp
- Hose musk with safety harness
- Safety belt with 7.5 m of rope (20 mm)
- Manhole guard rails
- Complete first aid kit
- Traffic signs, flags, oil lamps and flares

Sewers should invariably be inspected during low flow. Inspection should not be confined to period of low flow. The sewers shall be inspected whenever a house connection is made. Inspection through television camera permits precise location of leaks, intrusions failures, etc. and accurate estimation of the repair required.

Large brick sewer requires some repairs, pointing of joints, and replacement of arch brick that fall out. Guniting of large sewer requiring extensive repair is sometimes done. Manhole may need similar treatment. Manhole frame covers brake or wear and become noisy. This nuisance can be eliminated by placing a gasket or cushion made for the purpose between the rim of the lid and the seat. The cracked or the crushed lengths of pipe must be replaced.

Catch basins should be cleaned regularly. Several cleaning procedures may be used. Hand methods are employed mainly where catch basins are not accessible to machines. The cleaning methods employed are (1) a three-leg derrick method, (2) educator method and (3) Orange-peel bucket method.

Explosion in sewers are not uncommon. Manhole covers are sometimes blown into the air with danger to traffic. Gas explosion occasionally destroy and damage the sewer lines. Prevention of accumulation of explosive mixtures in the sewers can be accomplished in part by the following methods :

- providing traps in the waste lines for garages, cleaning establishment, etc.
- Tracing and prevention of leaks.
- Inspecting and investigating the sources of all combustible materials that appear in the sewer.

Accidents may be prevented by testing the air of sewer before bringing an open flame into them. Appliances that test air for its explosiveness and also for its toxic and asphyxiating properties have been devised by manufacturers of first aid apparatus. They should be available for use under suspicious circumstances. The tester should wear a hose mask or a safety belt with a rope attached, with the other workmen outside the manhole to pull him out if he is overcome by gas.

5. MAINTENANCE SCHEDULE

The Superintending Engineer should prepare a detailed maintenance schedule of FCD infrastructures taking their deficiencies, if any, into account. The maintenance schedule shall be incorporated in the annual Operation and Maintenance Report. It will be useful in obtaining better performance in the field maintenance activities. All routine maintenance work should be completed well ahead of monsoon.

6. MONITORING THE MAINTENANCE ACTIVITIES

Problems are quite often encountered in maintenance of infrastructures. Proper budgeting and financing, correct decision in time, hard work of the project field staff, maintenance of better human relation by the field staff and technical know-how of the project personnel play a great role in the proper maintenance of project and are the key factors for solving field problems and overcoming the practical difficulties that are generally faced. Correct decision followed by proper and timely action invariably produce better output at reasonable cost. Regular vigilance on the field activities by the key project personnel is a must for proper maintenance of project. The Superintending Engineer and the Executive Engineer being the key personnel of project will supervise the field activities, identify field problems and solve them as quickly as possible. The Executive Engineer will submit regular reports and special report, if needed, to the Superintending Engineer. The reports will be reviewed and summarized in the Monitoring Cell of the Superintending Engineer's office. The Monitoring Cell will submit the summarized reports along with observations/comments to the Superintending Engineer and the Chief Engineer for their perusal.

The Chief Engineer should review the annual maintenance activities in the office as well as in the field. The annual maintenance report of project should be prepared in the Superintending Engineer's office, printed, bound in book form and circulated to the concerned offices.

Work register shall be maintained at all sites of major maintenance work and it shall be made available to the visiting officials who will record their observations and instructions regarding the work. Copies of the instructions recorded in the register shall be sent to the Executive Engineers by the Sub-divisional Engineers for taking necessary action by the former in respect of the instructions.

7. CYCLE OF MAINTENANCE

The optimum cycle of maintenance of a erected physical component is the time that can safely pass between two consecutive maintenance activities of the component without that component failing and hampering the efficient operation of the project. Of course, a certain degree of malfunctioning of any component is generally acceptable during the period between two consecutive maintenance activities. For each maintenance activity the optimum maintenance cycle should be determined. Quality of construction, socio-political environment, climate, etc. are taken into consideration in determining the maintenance cycle. Monitoring cell should be entrusted with task of formulating parameters for determining the optimum cycle of maintenance on collection of data and information from relevant sources.

8. INSPECTION DURING MAINTENANCE

Absence of strict quality control measures results in poor quality work. Besides, non-exercise of authority by the concerned project personnel, lack of proper supervision, poor estimate, and insincerity and incompetence of contractors results in work of unacceptable standard. Frequent inspection of maintenance work by the key project personnel is essential for achieving work of reasonable standard.

The Chief Engineer should inspect the maintenance work of some of the major structures during execution and record his observation and instructions in the inspection notes. He will cause circulation of his inspection notes among the Superintending & Executive Engineers for compliance of his instructions. The Superintending Engineer should inspect the maintenance work of all major structures during execution and record his observations and instructions in his inspection notes. He will circulate his inspection notes to the Executive Engineers and Sub-divisional Engineers for compliance of his instructions. He will send a copy of his inspection notes to the Chief Engineer for perusal. The Executive Engineers and the Sub-divisional Engineers shall inspect the maintenance work of all FCD components during execution.

9. INVENTORY OF THE FCD INFRASTRUCTURES

Inventory of all infrastructures should be prepared. It is necessary for maintaining detailed records of the FCD system. It helps in identifying the different FCD components and furnishes information on their type, size, location, etc. The inventory is also helpful for maintaining records of maintenance work of the different components.

ANNEXURE - VI

IMPLEMENTATION GUIDELINES FOR COMMUNITY DEVELOPMENT ASPECT

IMPLEMENTATION GUIDELINES FOR COMMUNITY DEVELOPMENT ASPECT

Contents **Page**

a. Introduction

Slum and squatter area development forms a major component of the Dhaka Integrated Flood Protection Project. One of the most significant aspects of the project is the high priority placed on motivation and community participation which will be coordinated through the proposed Slum Improvement Cell to be established later.

This paper is basically a conceptual framework about various aspects that will come under the purview of DIFPP. The paper discusses steps and methods that may be helpful during project implementation. The main objective of this discourse is to provide the project implementer with some basic guidelines on the non-material aspects of project implementation. The discussion covers such areas as community mobilization (in this case the slump community), community participation, awareness raising, institution building etc. It also covers educational, motivational, communication and information strategies that will greatly help the implementation process. These are some of the important preconditions for any worthwhile changes in the community which has been targetted for development either by the government or by any development agency. To more precise, it deals with some methods and methodologies on the non-physical aspects of project implementation. And these methods and methodologies and some of the pre-requisites for development have been briefly discussed in the pages that follow.

b. The Concept of Community Development

Community Development is identified with almost any form of local betterment which is in some way achieved with the willing cooperation of the people. It has been one of the most significant social forces in the process of planned change.

A conference held in Cambridge in 1948 viewed community development as a movement to promote better living for the whole community, with the active participation and, if possible, on the initiative of the community, but if this initiative is not forthcoming, by the use of technique for arousing and stimulating it in order to secure its active and enthusiastic response to the movement.

Many Community Development practitioners consider community development as a composite of process and program objectives which aim at educating and motivating people for : self-help, developing responsible local leadership, inculcating sense of citizenship, introducing and strengthening democracy at the grassroots, creating local institutions, initiating self generative and enduring process of growth, enabling people to establish and maintain cooperative and harmonious relationship, bringing about gradual and self-chosen changes in the community's life with a minimum of stress and disruption.

There are some who consider community development as a program of social service where such services as health, education, housing, nutrition, general community welfare are provided to the people.

In any community development effort, the locality is the key unit around which people are mobilized for community development. Community development practitioners maintain that outside agencies may help, but insiders must do the job.

The elements that are considered important in any community development endeavour may be listed as follows:

(i) Community mobilization
(ii) Organizing the community people
(iii) Awareness raising
(iv) Motivation
(v) Education
(vi) Changing attitude and patterns of behavior
(vii) Change in values
(viii) Breaking images, taboos, beliefs etc.

Note: This implementation guideline does not discuss issues related to physical aspects of the DIFPP. It discusses those steps and methods that may be helpful for the implementation of the physical aspects. It covers such areas as community mobilization, community participation, awareness raising, institution building and the various educational, motivational, information and communication strategies, methods and procedures that will help the total implementation process.

The above elements are some of the preconditions for any worthwhile changes in the community which has been targetted for development. Community development follows rather a soft strategy. It has a tendency for delaying structural changes in the basic institutions and ways of life of a community.

The objective of the Dhaka Integrated Flood Protection Project is to undertake an integrated urban development program consisting of (i) flood control and drainage work (ii) complementary environment programs in low cost water supply and sanitation for the low income residents, solid waste management and slum squatter area development and (iii) institutional support for efficiencies in urban management and revenue generation.

The Project will have provisions for slum dwellings, footpaths, street lights, access roads, drains and sewers, water supply, electricity, waste disposal, health clinics, community centers, schools, etc.

The project has a slum and squatter improvement component and it covers about 8,725 beneficiary families.

The long-term objective of the project is to provide a flood-free and secured living environment and to improve the urban efficiencies and environmental conditions (particularly for the poor) in Dhaka City for promotion of sustainable long term economic development.

One of the main obstacles to the sustainability of many community- based public utilities such as water supply, sanitation, drainage, electricity, garbage bins, access roads, community centres, schools, recreational facilities, places of worship, etc., is their maintenance. In many cases, they have been found to be very badly managed and maintained by the community. However, according to recent UNICEF studies in several countries, it has been found that an increasing number of communities have improved their capacity through community involvement, cost-sharing mechanisms and the training of women caretakers drawn mostly from the community itself. They report varying degrees of success with active user involvement, mostly through management committees which act for the community at large in the areas of planning, maintenance and cost-sharing. For instance, streamlined water supply

projects and capacity building activities can substantially cut the per capita cost of water supply projects.

It is essential for the success of any community development scheme that the intended beneficiaries be fully involved in the project design and implementation. This is essential because they are fully aware of all the social, cultural and political factors which can affect the project. Without their participation in the decision-making process, the project is likely to be largely irrelevant to the recipients and is not likely to be maintained by them after the project implementers have left.

There are many instances in many Third World countries where slum settlements are littered with the remains of unsuitable low-cost dwellings and other utilities which were planned, designed and constructed by government departments without consultation with the beneficiary community and are now lying unused and derelict.

There are other reasons for involving the recipients in a project apart from insuring its proper design and implementation and this has to do with the social development which results after project implementation.

Historically, poor communities are often characterized by social degradation-by low self-esteem and hopelessness, generated by a life-time of failure, oppression and powerlessness. This can lead to many social ills such as quarrelling and fighting within the community, and to alcoholism, excessive gambling, wife beating and prostitution. One outcome of involving the beneficiaries in decision making process is an increase in their self-esteem and self-confidence.

Increased self- respect and a sense of purpose can mean that people begin to interact more constructively with others, inter-group hostilities and prejudices are reduced and renewed sense of hope can be generated. This participatory process encourages people to be more assertive of their rights. This can give them the strength to resist traditional forms of exploitation. Bringing about these social changes in a community is just as important as improving its economic or material conditions. Indeed, if social developments of this type do not take place

and people remain apathetic and divided, then any economic development which occurs in the community will probably not be sustainable. Participatory development projects help bring about social development. Non-participatory ones, (designed and implemented by outsiders) do not.

Unfortunately, most governments in the third world countries are reluctant to employ the participatory approach. This is mainly because they do not trust the judgement of people who are poor and ill-educated, or because their bureaucracies are unwilling or unable to handle participation in decision-making by outsiders.

Community development through community participation greatly increases the people's role in development.

c. Social Mobilization

To ensure genuine community participation, there is a strong need for social mobilization. The most important pre-requisite for mobilizing participation is that the project implementer must take the issue of "Knowing the Audience" very seriously. This means that the implementer must understand and analyse the current conditions - needs, constraints, beliefs, strengths and weaknesses of the people whose behaviour and attitude towards the project will decide the success or otherwise of the project. There is also a need to know the existing factors and circumstances which would prevent, permit or promote people's participation. In communication terms this is known as "audience orientation". Here the implementer is concerned with "creating demand" for the development programs. Here the implementer is also concerned with shaping the programs to that demand. It is not at all wise for the implementer to unload to the community people whatever supplies the implementer has in its stores.

The strength for most successful development programs specially at the community level lies in their involving the community people from the very beginning and learning from them and with them.

Social mobilization takes time. Developing credibility and changing behavior are not to be

expected to take place overnight. It is a continuous process and takes root slowly.

d. Institution Building

A critical component of the Dhaka Integrated Flood Protection Project is slum area improvement. This being so the establishment of institutions for the slum dwellers is viewed as a corollary critical element as this will provide the foundation for subsequent activities that will be initiated in the slum community. The idea of having such institutions is to stimulate the slum dwellers to define their needs, formulate plans and to act collectively in improving their living conditions. A further idea is to support the development of the human potential of the slum people by encouraging the creation of an institutional framework and awareness through functional education, training and guidance. Fundamental to the idea of institutional building is the mobilization of the slum dwellers into men and women cooperatives who will plan, manage and control collective activities and at the same time facilitate individual endeavours. The basic strategy is to form male and female groups in each slum community, assist them with functional education and consciousness raising activities, provide training in leadership management and income generation skills.

The project staff will motivate, guide and train the slum dweller to organize themselves into groups and help them set up their organizational systems. During the formative stage the project staff will motivate and encourage all participants to attend the weekly group meetings and participate in the savings and functional education activities.

e. Functional Education

Since learning is fundamental to progress and modernization, education is the most basic of all development tools. An essential component of the Slum Improvement Project should be non-formal functional education for the slum people. There are a variety of courses employed to impart such education. But the most widely used is the one developed by the Bangladesh Rural Advancement Committee (BRAC). It is based on the psycho-social method pioneered by Paolo Freire, a renowned Brazilian educationist. It uses a need-based problem solving approach and the course contents are built around the life of the community people, their

problems and opportunities. The course is 60 lessons, two hour classes a day, 6 days a week and runs for three and a half months. The teaching method combines active and open participation with guided discussion based on flip chart and student manuals. Classes can be held outdoors and can be taught by slump people specially trained as functional education teachers. Initially, however, these classes can be conducted by the project staff or FE teachers employed for the purpose. Classes can be held in houses owned by the community.

The functional education classes have proved to be an excellent forum for group information and motivation. The classes are designed to raise the participant's consciousness while imparting basic literacy and numeracy skills.

The functional education component will work to make people aware of their hidden potentials. It will seek to create in the people an ambition for better life through education, self-help and mutual aid.

As the groups develop, the project staff will consult with the groups to take up various income generating activities and help them make good investment choices. In terms of group dynamics, the project staff will train the groups to set up rules, regulations, disciplines, norms, regular rotation of leadership, etc. A critical awareness on issues and problems relating to their lives and sense of group solidarity will be fostered.

f. Communication as a Powerful Development Tool

It is now universally recognized that communication is capable of serving as a powerful tool for any development effort. It is more so in the case of development projects meant for low income, backward and illiterate communities - both in the rural and urban areas. This use of communication tools have now become a practical possibility for many communities of many developing countries. This capability can be adapted to contribute to the fundamental, work of development - in education, health, sanitation, family planning, nutrition, breast feeding, safe water, Oral Rehydration Therapy (ORT), personal hygiene, environmental protection, economic enterprises and many more.

Improvement of life and living conditions of the people living in the slum communities as in other low income communities in Bangladesh can be achieved by developing their ability to organize themselves to mobilize, manage and control both local and external resources.

Awareness of the people can be built up through a carefully planned program of education, motivation and communication. In the first place, education must be used as an agent of basic change in the status of the slum dwellers.

Direct interpersonal communication is at the heart of many successful community development programs in many low income and backward communities.

During project implementation, development of a Coordinated Public Information/Public Education/Communication and Motivation campaign is envisaged. This campaign will be sustained throughout the implementation period and may be beyond. It will focus on encouraging active community participation (including payment of fees and charges as well as assistance in the maintenance of community facilities) in the implementation of the project. The campaign will focus on the proper use of the project facilities.

Communication and information campaigns for awareness raising and behavioral change is effective if it is "two-way" i.e., if it is conducted through a channel or combination of channels which allows the audience to discuss and question. Effective communication in development programs has been achieved when the messages have been received and comprehended by the intended audience.

Educational, motivational and communication Message Development are required in the following areas:

1. Most of the diseases which kill thousands of children every year have environmental causes: unsafe water, polluted air, hazardous chemicals. This calls for keeping the environment clean. Educational, motivational and awareness messages through leaflets and posters can be developed addressing these issues - TV and Radio can also be used.

2. Water is used for a variety of purposes such as showering, bathing, cooking, drinking, washing dishes, cleaning, flushing toilets.

Messages can be developed on the efficient use of water sources and at the same time emphasize the need for use of clean and safe water and also how to make water safe and clean.

3. Many children in the slum communities live and play amid garbage near the house or on the street. Thousands of children spend their days delving through such garbage.

Motivational, educational and awareness messages can be developed and persistently addressed to these issues. Various media such as television, radio, leaflets, poster and video can be used.

4. It is a common scene in many low income communities where women wash cooking utensils in open air. Clean water is a survival issue, every day, for any community. When such is the need, water must be used judiciously and at the same time it must be used clean.

Television and radio messages and leaflets can be developed addressing the women on the importance of judicious use of water and efficient water management.

5. It is also a common scene in many low income urban communities where women wash their clothes in the contaminated waters in nearby polluted water bodies and silently become the victims of serious diseases.

Television and radio messages and leaflets can be developed warning them about serious consequences of such practices.

6. Development of TV and Radio messages, leaflets and conduct interpersonal communication to promote safe excreta disposal and personal hygiene for control of diarrhoeal disease and towards better health for all.

7. Development of messages to increase awareness of the community dwellers on the proper use and benefits of sanitation, to promote proper use of hygienic latrine by every family in the project area; including mobilization of all potential partners and persuaders for sanitation.

8. Enhancement of inter-personal communication at the family and community level; promote sanitation via other community level media. Development of pictorials to support grassroots communication.

9. Development of video films on water use, water management, use of sanitary latrines, how to keep environment clean and safe, garbage disposal, drainage maintenance and overall community living. If development/production of such video films proves expensive they can be hired from other sources and arrangements made for their showing at the community level.

   (Role of Video: Video has power to motivate and educate. It has proved to be an effective way to promote health and literacy training. Video films featuring lessons on water, sanitation, waste management, sewage, environment protection and overall community living can be produced and shown at community places. Such films will contain prescriptions in vital areas of community facilities and community living).

10. Development of communication, information and educational materials to promote greater community awareness of environmental issues. Holding of dialogues with decision-makers in the media to give greater emphasis on environmental issues.

11. Development of specific messages for use in radio and television highlighting : open defecation and unsanitary human waste facilities constitute one of the major public health hazards in the community environment. Development of messages advising slum dwellers not defecate in the open-use latrines. Sanitary disposal methods are essential to the health of the slum community.

12. Persistent interpersonal communication and motivational drive through the deployment of project workers at the community level will be necessary to increase the acceptance level, first for the project and subsequently for the project facilities and the cost-sharing.

13. Development of a pack of messages on personal hygiene, food handling and food protection.

g. Role of Community Workers:

Experience in Community development in other countries has shown that it is only through frequent, varied repetition of carefully designed messages on various aspects of urban community life through many channels and over a long period of time that a change in behaviour and attitude is fully accepted and acted upon by the majority. The messages may also need to be adjusted as people's knowledge, behaviour and attitude change over time.

Living within the community and being familiar with local customs and perceptions of health and diseases, environment, water and sanitation practices, garbage disposal, community health workers and volunteers can be extremely effective health communicators.

Community health volunteers can teach slum families the importance of three basic hygienic measures:

- Washing hands with soap before eating or preparing food
- Safe disposal of garbage and faeces.
- Defecating in the latrine.

Using teaching aids, the volunteers can explain the importance of these measures to slum families and slum community leaders through group discussions and individual meetings.

Every health worker working in the community should also be an effective communicator.

Every Govt. Dept. and institution also has the potential to raise public awareness of health, environmental, sanitation and water issues and to help communicate knowledge on these subjects.

h. Local Govt. and community Leaders:

Local govt. leaders can also be key links in the communication process. Community heads and traditional leaders, because of their official position or personal standing,

are often respected sources of information about health, sanitation, general hygiene, safe water and safe environment. In many countries, members of political parties also play a leading role in health and health related development programs. They have considerable influence on people's attitude towards health, sanitation, water, environment, garbage management etc.

In countries where the mass media have limited outreach, local government leaders can be key allies in promoting new knowledge on health, sanitation, water use, hygienic environment and so on.

In the struggle to reach the almost illiterate slum dwellers, face-to-face communication is increasingly the preferred means of influencing the behavioural changes of the slum dwellers. There should be training of front-line workers in interpersonal communications.

i. Selecting the Communication Channels

A mix of Communication channels and media to create awareness, motivate and educate the slum dwellers to bring about the desired change in attitudes and behaviour will be necessary. They are:

- Interpersonal Channels: health professionals, community health workers, religious and community leaders, traditional health practioners, women and youth organizations, school teachers, development workers, women workers selected from the community to perform the task of motivation and training. Government officials can also be used.

- Mass Media: radio, television, newspapers, magazines, cinema, video.

- Small media: Posters, leaflets.

In the communication and media campaign it will be wise to use a mix of various channels and media so that the target audience receive the message from all sides and in many variations.

It is suggested that communication and information personnel involved in project implementation should design messages and select the most suitable media after studying the target audiences present attitudes, beliefs and behaviour on health, knowledge and practice of sanitation and water uses, practice on garbage disposal, overall attitude to health and hygiene and environment management.

Changing the attitude of the slum people will form a critical element in the Slum Improvement component of DIFPP. And this change in attitude is often considered a great factor in development, in most illiterate and tradition-bound communities.

Key Recommendations:

1. For the success of the Slum Improvement Project under DIFPP, it is essential that the intended beneficiaries (the slum dwellers) be involved in the project design and implementation. This is essential because they are fully aware of the social, cultural and political factors which can affect the project (Refer to page 3 and 4 of the text).

2. To ensure genuine community participation the project implementer must understand and analyse the current conditions of the slum community - needs, constraints, beliefs, strengths and

   weaknesses of the slum dwellers. The project implementer must take the issue of "Knowing the project beneficiaries" very seriously. There will be a strong need for social mobilization (Refer to "Social Mobilization" in the text).

3. Establishment of institutions of the slum dwellers should be a critical element as this will provide the formulation for subsequent activities that will be initiated in the slum community. The basic strategy will be to form male and female groups in each slum community, assist them with functional education and consciousness raising activities, provide training in leadership and income generation skills. (Refer to "Institution Building" in the text).

4. An essential component of the slum Improvement Project should be the functional education for the slum people. There are a variety of functional education courses currently available to import such education. Most of the courses use a need-based, problem solving approach and the course contents are built around the community people, their problems and opportunities. The proposed course will consist of 60 lessons, two hour classes a day, 6 days a week and runs for three and a half months. (Refer to "Functional Education" in the text).

5. During Project implementation, development of a coordinated public information/ Communication and motivation campaign is envisaged. This campaign has to be sustained throughout the implementation period. (Refer to page 7 under "Communication As a powerful Development Tool" in the text.)

6. Persistent interpersonal communication and motivational drive through the deployment of project works at the community level will be necessary to increase the acceptance level, first for the project and subsequently for the project facilities and the cost-sharing as well as maintenance. (Refer to page 10 under "Communication As a Powerful development Tool" in the text).

7. A mix of communication channels and medium to create awareness, motivate and educate the slum dwellers to bring about the desired changes in community people's attitudes and behaviour will be necessary. (Refer to page 11 and 12 under "Selecting the Communication channels" in the text).

ANNEXURE - VII

STRENGTHENING OF FINANCIAL MANAGEMENT PROCEDURES OF PROJECT MANAGEMENT OFFICE

Dhaka Integrated Flood Protection Project (Bridging Period):

Strengthening of Financial Management Procedure of the P.M.O.

Table of Contents

STRENGTHENING OF FINANCIAL MANAGEMENT PROCEDURE OF THE PROJECT MANAGEMENT OFFICE

1. INTRODUCTION:

The project, an integrated flood protection and drainage programme for Dhaka City, is a priority component of the Bangladesh Flood Action Plan (FAP).

The Project is designed to constitute the initial phase for the implementation of a longer term program for flood protection of Dhaka over a period of ten to fifteen years.

The objectives of the project are to provide a flood free and secure living environment and improve the urban efficiencies and environmental conditions in Dhaka City for promotion of sustainable long term economic development. To achieve these objectives, the project provides: (i) flood control and drainage works; (ii) complementary environment improvement programs covering slum improvement, sanitation and solid waste management for low income residents; and (iii) implementation assistance.

2. SCOPE OF THE WORK:

Scope of works delineates the responsibility of the consultants 'Financial Advisor' to work closely with accounting counterparts from each of the executing/implementing agencies with the object of strengthening the financial accounting procedures, budgetary control and reporting system. The consultant 'Financial Advisor' requires also to provide formal and on-the job training to accounting and managerial staff on the implementation of the financial accounting procedures associated with ADB.

In view of the time Constraint this study has been restricted within the scope of the analysis of the works of the Accounts of the PMO and making recommendations to strengthen the Financial Management Procedure of the PMO keeping the future activities in view.

3. ANALYSIS OF THE PRESENT POSITION OF ACCOUNTS/FINANCE SECTION OF PMO

3.1 Organisation Chart:

(a)	As per Loan Agreement	-	Annex - A
(b)	Existing structure	-	Annex - B

3.2 Qualifications, experience and know-how of the personnel with their job-specification and responsibilities.

- For details please refer Annexure - C

3.3 Present System of Accounting & Keeping:

3.3.1 **The Accounting year of BWDB, DCC & DWASA is from 1st July to 30th June.**

3.3.2 **Expenditure**

- Expenditure to-date has all been in Taka. FOREIGN CURRENCY payment are yet to be commenced; and the ADB representative and PMO will require to agree payment procedures.

- Payment to contractors also follow standard procedures of the agencies concerned and shall be recorded within PMO as and when effected.

- Salaries and wages schedules of the PMO staff are prepared within PMO and paid by BWDB. A record is kept in PMO by the Accounts Officer.

- It must be emphasized that should PMO use BWDB facilities such as Stores, Vehicles, Workshops and the Public Works Department for some contracts, these need not be accounted for by journal transfer. Instead ADB should then pay BWDB by cheque from the relevant bank account. This will keep all expenditure in local currency by strictly on a cash basis.

3.3.3 Withdrawal Claims:

During the reporting period on transaction was effected. No Imprest Account was opened. No withdrawal claim was made. It is understood that PMO office has received some advice and assistance from the local ADB office on claim preparation procedure.

3.3.4 Contents and preparation of vouchers:

Printed voucher format as used by commercial house is not being maintained by this PMO. All payments were made through the voucher forms. The design and specification of such forms are as per approved Government Books & Forms. Particulars of payee & mode of payment together with the approval of the authorised officers were also accommodated therein. The voucher forms and other supporting documents are kept in file. The system of filling of documents are as prevalent in the Government Office.

3.3.5 Cash Book

Only one Financial Cash Book is maintained in double column form in the PMO. Entries are made in this Cash Book in terms of the Vouchers file and other records.

3.3.6 Ledger and Register Maintenance

Only one Contractors Ledger is maintained in the PMO No other ledger was found to be maintained by them. A Cash Abstract Sheet is maintained instead of Ledger for summarising the various entries headwise. The cash abstract sheet is maintained in loose from and is compiled monthly for financial reporting purpose. A Cheque Issue Register is also maintained in the PMO.

3.3.7 Preparation of Financial Account

The final account of the PMO is prepared monthly basis and submitted to the Directorate office of BWDB.

3.3.8 System of Internal Checking & Internal Control

The system of Internal Check and internal control seems to be present partially.

4. Budgets.

At the moment establishment budget is prepared by the Accounts section of the PMO & sent to the Finance Directorate of the Water Development Board for approval. Budget other than establishment i.e. ADP is prepared on the basis of approved PP & ADP allocation made by Planning Commission.

ADP is submitted to the Ministry of Irrigation, WD & FC through Water Development Board for approval of the National Committee for Flood Central as the project is executed by the executing agencies (WDB, WASA, & D.C.C). PMO is required to prepare an Annual Budget for inclusion in related agencies's Annual Budget.

PMO will need to ensure that each related agency receives necessary information for inclusion in their relevant budgets and forecasts.

5. Staffing:

The establishment of one Accounts officer, one Asst. Accountant, an one Sr. Account Assistant although considered adequate for the time being shall have to be strengthened when the implementation work of the project gathers momentum. Existing staff strength & organogramm of P.M.O. is in annexure.

6. Working Environments:

At Present there is no compute in the PMO Office and accounting staffs are not acquainted to use compute for Book Keeping purpose. Accounting staff are not also acquainted with Double Entry Book Keeping system.

7. **Operation of Imprest Account:**

From our visits and discussions with Project Management Office functionaries, it was gathered that so far no tangible transaction in the Accounts have taken place requiring reporting of transactions from the different agencies. It further appeared that Project Management Office will continue to follow the existing procedure of record keeping as practiced by the Water Development Board in order to meet the requirements of GOB Audit.

There is little that we can do to change the existing system. Moreso, during the bridging period the consultants will not have scope to assist maintaining the actual accounting system since virtually there will be hardly any transaction from the loan account for actual operation.

8. **Covenants of Credit:**

Under the covenants of the ADB Credit, PMO, among others, shall submit to the Bank consolidated quarterly progress reports based on a compilation of progress reports prepared by each of the Executing Agencies. The progress reports shall be in such form and detail as the Bank may reasonably request and shall include information on the physical progress of the works and the relate d coordinating, monitoring, organizational and financial issues. Each report shall summarize all relevant decisions or actions taken by the Project Steering Committee and the Project Technical Committee.

PMO shall also submit to the Bank within six (6) of physical completion of the project a project completion report covering details of project implementation, costs, benefits, monitoring & evaluation activities and such other information as may be requested by the Bank.

PMO shall further coordinate in the provision of budgetary requirements for the Executing Agencies in respect of the Project, centralize record keeping, and submit to the Bank consolidated unaudited Project accounts, by auditors acceptable to the Bank, within nine (9) months of the close of each Fiscal Year, and audited Project accounts, by auditors acceptable to the Bank, within twelve (12) months of the close of each Fiscal Year.

9. Recommendations:

Keeping the above discussions in view it is proposed that:

9.1 Book Keeping:

PMO should move to a Double-Entry Book-Keeping system based on a Single General Ledger Backed up by Subsidiary Books of Accounts. The system will remain manual.

9.2 Recording Expenditure and Income:

Improvements to the basic forms and the introduction of proper payments vouchers seems essential which should assist PMO in maintaining Project Books of Accounts.

9.3 Use of Computers:

Computer and computer training need be introduced as a supplement to the General Ledger.

9.4 Training:

Formal on the job training of Accounting staff has to be introduced.

9.5 Coding System

A coding system which properly defines the service provision activities and gives basic classification of types of capital expenditure need be introduced. The new code list as furnished in the letter part of this report, if introduced, will case problems in regular production of budgetary control reports and overall financial statements.

Problems may be encountered in matching PMO's own information needs to the proposed code structure and must be resolved by consultation between the PMO Accounts officer and Accounts Department of relevant agencies.

The intention of the consultants shall be to assist PMO in ensuring that these requirements and objectives as covenanted in the Credit Agreement are met.

9.5.1 Limitations to the Systems:

The systems should not be regarded as a complete accounting and financial control package. Due to limitations on computer facilities available, the prime financial records are still in manual ledgers. This system is proposed to assist in managing the finances of the project, and in preparing a revised project proforma annually.

9.5.2 Extent of the Systems:

The systems is designed to accept data from the manual general regarding expenditure and receipts to date & match it against budgets contained in the project pro-forma database. This allows a large potential in producing financial management reports. The system is also specifically designed to allow the financial elements of the project pro-forma to be created from detailed data input into the computer.

9.5.3 Main Report Types:

The accountancy code structure & the data bases are specifically designed to allow the production of reports at various levels of detail according to the following criteria:

- sources of finance
- projects component or sub-component,
- base estimate. cost contingencies and physical contingency,
- type of expenditure.

These reports can either report by total budgets and expenditures, phased over years.

9.5.4 The Future of Coding System:

Depending on wether the systems are maintained and used by PMO management, it would be possible to go to at last partial computerisation of all financial records.

9.5.5 CONSOLIDATED CODE OF ACCOUNTS OF PROJECT MANAGEMENT OFFICE

CODE NO. DIGT	HEADS OF ACCOUNTS
1 23 45 678	
1	CURRENT ASSETS
1.01.00.000	Cash in hand
1.01.11.000	**DCC Office**
1.01.11.100	Petty Cash/Imprest
1.01.11.200	
1.01.22.000	**BWDB Office**
1.01.22.100	Petty Cash/Imprest
1.01.22.200	
1.01.33.000	**DWASA Office**
1.01.33.100	Petty Cash/Imprest
1.01.33.200	
1.02.00.000	Cash at Bank
1.02.11.000	**DCC Office**
1.02.11.100	Sonali Bank
1.02.22.000	**BWDB Office**
1.02.22.100	Sonali Bank
1.02.22.200	

1.02.33.000	**DWASA Office**
1.02.33.100	Sonali Bank
1.02.33.200	
1.03.00.000	Stores
1.03.11.000	**DCC Office**
1.03.11.100	
1.03.22.000	**BWDB Office**
1.03.22.100	
1.03.33.000	**DWASA Office**
1.03.33.100	
1.04.00.000	Debtors (Accounts Receivables)
1.04.11.000	**DCC Office**
1.04.11.100	
1.04.22.000	**BWDB Office**
1.04.22.100	
1.05.33.000	**DWASA Office**
1.05.33.100	
1.05.00.000	Loan, Advance, Deposit & Prepayments
1.05.11.000	**DCC Office**
1.05.11.100	Loan
1.05.11.200	Advance
1.05.11.300	Deposit
1.05.11.400	prepayments
1.05.22.000	**BWDB Office**
1.05.22.100	Loan
1.05.22.200	Advance
1.05.22.300	Deposit
1.05.22.400	prepayments

1.05.33.000	**DWASA Office**
1.05.33.100	Loan
1.05.33.200	Advance
1.05.33.300	Deposit
1.05.33.400	prepayment
1.06.00.000	Short Term Investment
1.06.11.000	**DCC Office**
1.06.22.000	**BWDB Office**
1.06.33.000	**DWASA Office**
1.07.00.000	Miscellaneous (if any)
1.07.11.000	**DCC Office**
1.07.22.000	**BWDB Office**
1.07.33.000	**DWASA Office**
2.	CURRENT LIABILITIES
2.01.00.000	GOB, Loan Current Portion
2.01.11.000	**DCC Office**
2.01.22.000	**BWDB Office**
2.01.33.000	**DWASA Office**
2.02.00.000	ADB Loan Current Portion
2.02.11.000	**DCC Office**
2.02.22.000	**BWDB Office**
2.02.33.000	**DWASA Office**
2.03.00.000	Individual Agency
2.03.11.000	**DCC Office**
2.03.22.000	**BWDB Office**
2.03.33.000	**DWASA Office**
2.04.00.000	Other (in any)
2.04.11.000	**DCC Office**
2.04.22.000	**BWDB Office**
2.04.33.000	**DWASA Office**

3.	**LONG TERM ASSETS**
3.01.00.000	(Transfer from Balance Sheet categories)
3.01.11.000	**DCC Office**
3.01.22.000	**BWDB Office**
3.01.33.000	**DWASA Office**
4.	**INTANGIBLE ASSETS**
4.01.00.000	Deferred Expenditure
4.01.11.000	**DCC Office**
4.01.22.000	**BWDB Office**
4.01.33.000	**DWASA Office**
4.02.00.000	Fictitious Assets
4.02.11.000	**DCC Office**
4.02.22.000	**BWDB Office**
4.02.33.000	**DWASA Office**
5.	**SUSPENSE ACCOUNT/ADJUSTMENT ACCOUNT**
5.01.00.000	
5.01.11.000	**DCC Office**
5.01.22.000	**BWDB Office**
5.01.33.000	**DWASA Office**
6.	**LONG TERM LIABILITIES**
6.01.00.000	GOB Loan
6.01.11.000	**DCC Office**
6.01.22.000	**BWDB Office**
6.01.33.000	**DWASA Office**
6.02.00.000	**ADB Loan**
6.02.11.000	**DCC Office**
6.02.22.000	**BWDB Office**
6.02.33.000	**DWASA Office**
6.03.00.000	Individual Agency Loan
6.03.11.000	**DCC Office**
6.03.22.000	**BWDB Office**

6.03.33.000	**DWASA Office**
6.04.00.000	Others Liabilities
6.04.11.000	**DCC Office**
6.04.22.000	**BWDB Office**
6.04.33.000	**DWASA Office**
7.	**EQUITY, RESERVE AND SURPLUS**
7.01.00.000	Equity
7.01.11.000	**DCC Office**
7.01.22.000	**BWDB Office**
7.01.33.000	**DWASA Office**
7.02.00.000	Reserve
7.02.11.000	**DCC Office**
7.02.22.000	**BWDB Office**
7.02.33.000	**DWASA Office**
7.03.00.000	Surplus
7.03.11.000	**DCC Office**
7.03.22.000	**BWDB Office**
7.03.33.000	**DWASA Office**
8.	**INCOME**
8.01.00.000	GOB Grant
8.01.11.000	**DCC Office**
8.01.22.000	**BWDB Office**
8.01.33.000	**DWASA Office**
8.02.00.000	ADB Grant
8.02.11.000	**DCC Office**
8.02.22.000	**BWDB Office**
8.02.33.000	**DWASA Office**
8.03.00.000	Individual Agency Grant
8.03.11.000	**DCC Office**
8.03.22.000	**BWDB Office**
8.03.33.000	**DWASA Office**

8.04.00.000	others (if any)
8.04.11.000	**DCC Office**
8.04.22.000	**BWDB Office**
8.04.33.000	**DWASA Office**
9.	**EXPENDITURE**
9.01.00.000	Pre-construction Expenditure
9.01.11.000	**DCC Office**
9.01.11.100	Land Acquisition
9.01.11.200	Borrow Area for stage
9.01.11.300	Sluice Pump Station and Diversion Khal
9.01.11.400	Flood Wall/Embankment
9.01.22.000	**BWDB Office**
9.01.22.100	Land Acquisition
9.01.22.200	Borrow Area for stage
9.01.22.300	Sluice Pump Station and Diversion Khal
9.01.22.400	Flood Wall/Embankment
9.01.33.000	**DWASA Office**
9.01.33.100	Land Acquisition
9.01.33.000	Borrow Area for Stage
9.01.33.000	Sluice Pump Station and Diversion Khal
9.01.33.400	Flood Wall/Embankment
9.02.00.000	Construction work
9.02.11.000	**DCC Office**
9.02.11.100	Completion work for City Pallies.
9.02.11.101	
9.02.11.200	Integrated Slum Improvement Programme
9.02.11.201	
9.02.11.300	Rehabilitated Existing Collection Bins
9.02.11.301	
9.02.11.400	Construction of New Collection Bins
9.02.11.401	
9.02.11.500	Construction of Public Toilet/Wash House
9.02.11.501	
9.02.11.600	Twin pit Sanitary Latrines
9.02.11.601	
9.02.11.700	Single Pit Sanitary Latrines
9.02.11.701	
9.02.11.800	Sanitary Latrines Shelters

9.02.11.801	
9.02.11.900	Instal Public Stand Pipes/Tubewells
9.02.11.901	
9.02.11.900 A	Clean & Rehabilitate Local Storm Drains
9.02.11.900 A1	
9.02.11.900 B	Minor Drain Extension
9.02.11.900 B1	
9.02.11.900 C	Surface Drain Rehabilitation
9.02.11.900 C1	
9.02.22.000	**BWDB Office**
9.02.22.100	Intensive Remedial Work Class 1
9.02.22.101	
9.02.22.200	Moderate Remedial Works Class 2
9.02.22.201	
9.02.22.300	Minor Remedial Works/Borrow Pit Filling
9.02.22.301	
9.02.22.400	Minor Remedial Works-Jute and Sod
9.02.22.401	
9.02.22.500	Slope Protection with C.C. Blocks
9.02.22.501	
9.02.22.600	Sluice
9.02.22.601	
9.02.22.700	New Flood Wall/Embankment
9.02.22.701	
9.02.22.800	Remediation of Existing Flood Wall
9.02.22.801	
9.02.22.900	Central Road Flood Proofing (at 13 Locations)
9.02.22.901	
9.02.22.900 A	Central Road Flood Proofing (at 13 Locations)
9.02.22.900 A1	
9.02.22.900 B	Pump Station
9.02.22.900 B1	
9.02.22.900 C	Functional Building
9.02.22.900 C1	
9.02.33.000	**DWASA Office**
9.02.33.100	Rehabilitation & Development of Main Khal
9.02.33.101	
9.02.33.200	Rehabilitation & Development of Secondary Khal
9.02.33.201	
9.02.33.300	Rehabilitation & Development of Tertiary Khal

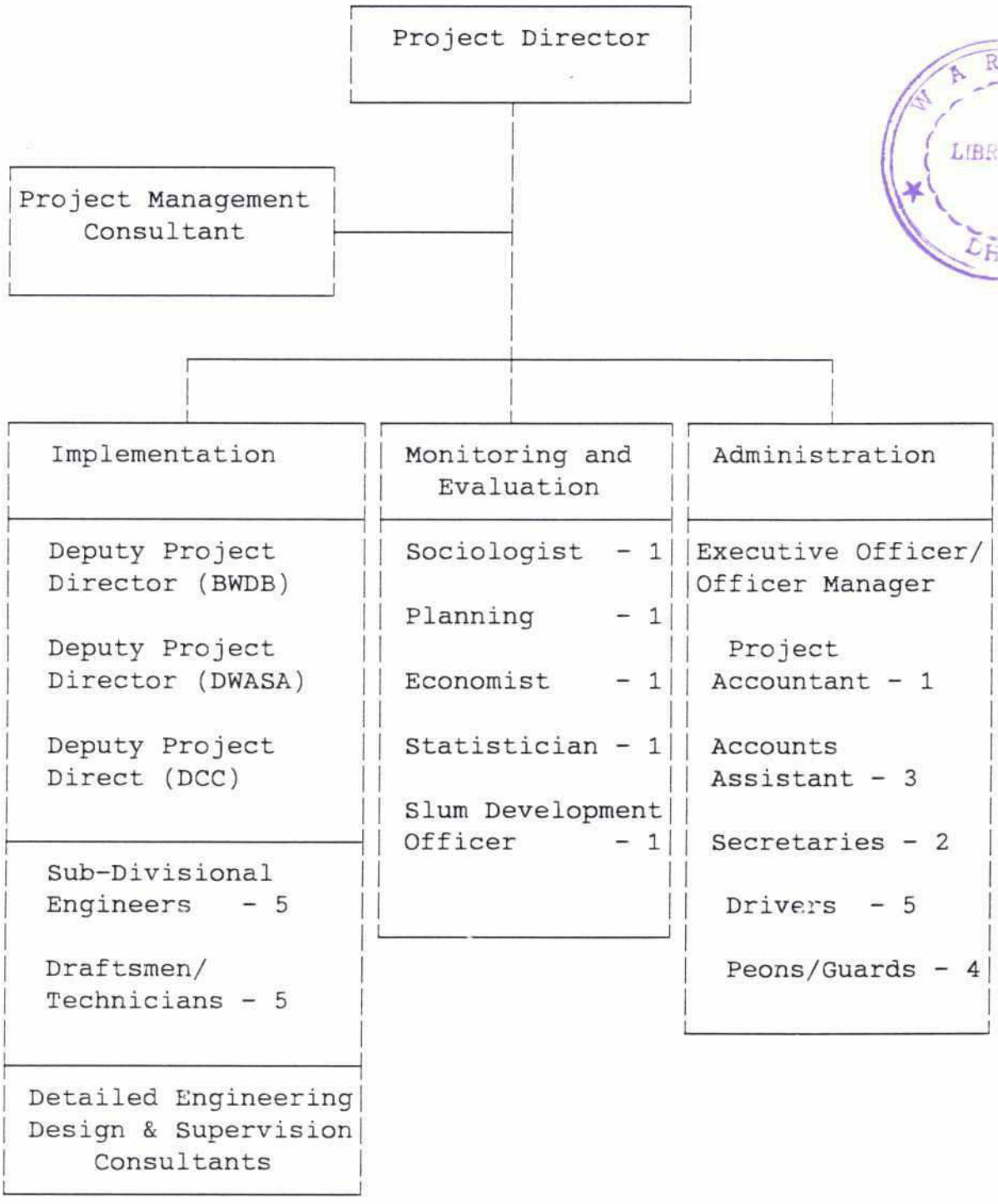
9.02.33.301	Material
9.02.33.400	Man Power
9.02.33.401	
9.02.33.500	Construction & Rehabilitation of pipe Drain
9.02.33.501	Material
9.02.33.502	Man Power
9.02.33.503	Other Cost
9.03.00.000	Machinery & Equipment
9.03.11.000	**DCC Office**
9.03.11.100	Imported Machinery & Equipment
9.03.11.101	CIF Cost
9.03.11.102	Taxes & Duties
9.03.11.103	Landing Charges & Transportation Cost
9.03.11.200	Locally produced
9.03.11.201	Ex-Factory Cost
9.03.11.202	Duties & Taxes
9.03.11.203	Transportation Cost to Site.
9.03.22.000	**BWDB Office**
9.03.22.100	Imported Machinery & Equipment
9.03.22.101	CIF Cost
9.03.22.102	Taxes & Duties
9.03.22.103	Landing Charges & Transportation Cost
9.03.22.200	Locally Produced
9.03.22.201	Ex-Factory Cost
9.03.22.202	Duties & Taxes
9.03.22.203	Transportation Cost to Site
9.03.33.000	**DWASA Office**
9.03.33.100	Imported Machinery & Equipment
9.03.33.101	CIF Cost
9.03.33.102	Taxes & Duties
9.03.33.103	Landing Charges & Transportation Cost
9.03.33.200	Locally produced
9.03.33.201	Ex-Factory Cost
9.03.33.202	Duties & Taxes
9.03.33.203	Transportation Cost Site
9.04.00.000	Transport Vehicles
9.04.11.000	**DCC Office**
9.04.11.100	Imported

9.04.11.101	CIF Cost
9.04.11.102	Taxes & Duties
9.04.11.103	Landing Charges & Transportation Cost
9.04.11.200	Locally Produced
9.04.11.201	Ex-Factory Cost
9.04.11.202	Duties & Taxes
9.04.11.203	Transportation Cost to site
9.04.22.000	**BWDB Office**
9.04.22.100	Imported
9.04.22.101	CIF Cost
9.04.22.102	Taxes & Duties
9.04.22.103	Landing Charges & Transportation Cost
9.04.22.200	Locally Produced
9.04.22.201	Ex-Factory Cost
9.04.22.202	Duties & Taxes
9.04.22.203	Transportation Cost to Site
9.04.33.000	**DWASA Office**
9.04.33.100	Imported
9.04.33.101	CIF Cost
9.04.33.102	Taxes & Duties
9.04.33.103	Landing Charges & Transportation Cost
9.04.33.200	Locally Produced
9.04.33.201	Ex-Factory Cost
9.04.33.202	Duties & Taxes
9.04.33.203	Transportation Cost to Site
9.05.00.000	Man Power Cost
9.05.11.000	**DCC Office**
9.05.11.100	Foreign Personnel
9.05.11.101	Technical/Managerial
9.05.11.102	Others
9.05.11.200	Local personnel
9.05.11.201	Managerial/Technical
9.05.11.202	Skilled
9.05.11.203	Un-skilled
9.05.22.000	**BWDB Office**
9.05.22.100	Foreign Personnel
9.05.22.101	Technical/Managerial
9.05.22.102	Others

9.05.22.200	Local personnel
9.05.22.201	Managerial/Technical
9.05.22.202	Skilled
9.05.22.203	Un-skilled
9.05.33.000	**DWASA Office**
9.05.33.100	Poreign Personnel
9.05.33.101	Technical/Managerial
9.05.33.102	Others
9.05.33.200	Local personnel
9.05.33.201	Managerial/Technical
9.05.33.202	Skilled
9.05.33.203	Un-skilled
9.06.00.000	Other Cost
9.06.11.000	**DCC Office**
9.06.11.100	Overhead Cost
9.06.11.101	Project Overhead
9.06.11.102	Head Office Overhead
9.06.11.103	Allowance for Unforseen Cost
9.06.11.104	DSL for Bank Loans
9.06.11.200	Operation & Maintenance Cost/Incremental
9.06.11.201	
9.06.22.000	**BWDB Office**
9.06.22.100	Overhead Cost
9.06.22.101	Project Overhead
9.06.22.102	Head Office Overhead
9.06.22.103	Allowance for Unforeseen Cost
9.06.22.104	DSL for Bank Loans
9.06.22.200	Operation & Maintenance Cost/Incremental
9.06.22.201	
9.06.33.000	**DWASA Office**
9.06.33.100	Overhead Cost
9.06.33.101	Project Overhead
9.06.33.102	Head Office Overhead
9.06.33.103	Allowance for Unforseen Cost
9.06.33.104	DSL for Bank Loans
9.06.33.200	Operation & Maintenance Cost/Incremental
9.06.33.201	

Annexure - A

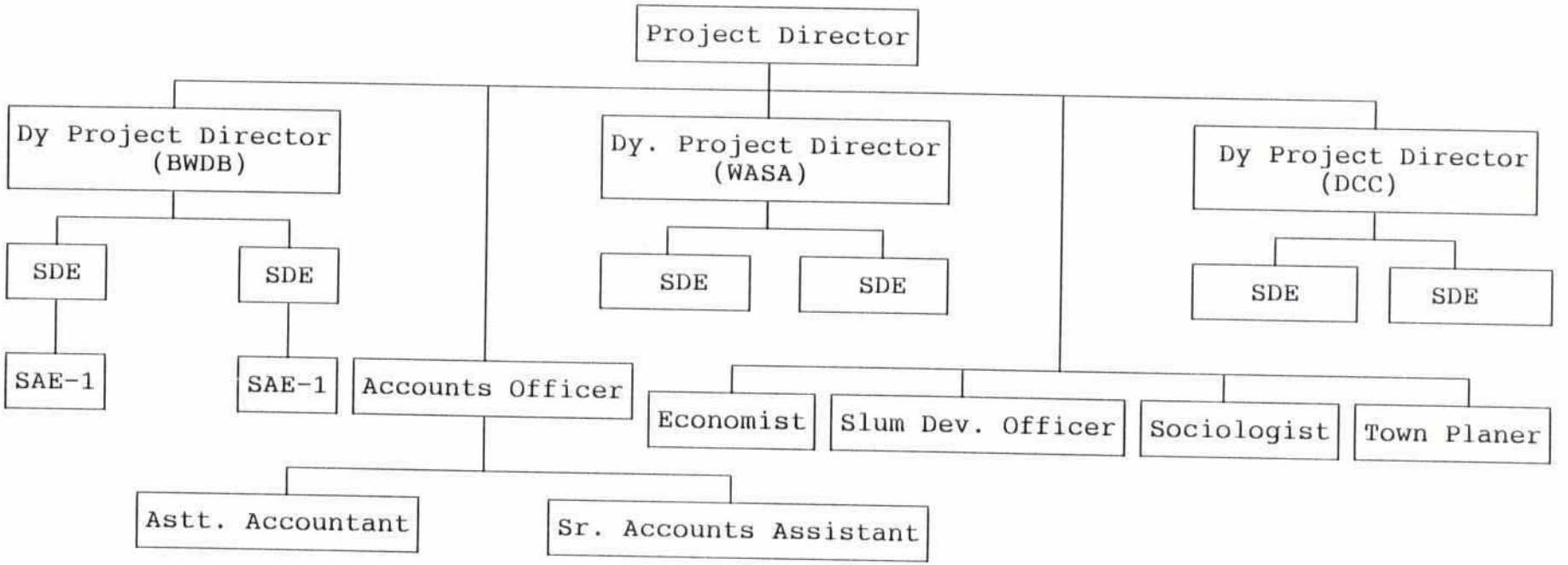
Structure and Staffing of the Project Management Office as per loan Agreement



Annexure - B

DHAKA INTEGRATED FLOOD PROTECTION PROJECT

Organization Chart of Project Management Office



CURRICULA VITAE OF PERSONNEL OF FINANCE SECTION OF PMO

Annexure - C

1.	NAME	:	SYED FAZLUL KARIM
2.	Designation	:	Accounts Officer
3.	Educational Qualification	:	B.Com. 1961
4.	Professional Qualification	:	S.A.S. Part I and Part II.
5.	Training	:	Accounts Training at Kaptai Academy at various times.
6	Year of Joining	:	1962
7.	Experience Record	:	(Starting from the Current Position) April 1992 till-date.

Accounts Officer, PMO, DIFPP, Dhaka.

Job Description

Overall supervision of the Accounts and Budget of the PMO.

Accounts Officer

Moulavi Bazar O&M Circle and Khulna Circle, Directorate of Audit.

Job Description

Supervision of Accounts & Audit Works.

1969 to 1986

Accountant

At various offices of Water Development Board.

Job Description

Maintenance and supervision of accounts and audit.

1961 to 1969

Asstt. Accountant at various offices of WAPDA.

Maintenance and supervision of Accounts and Audit Works.

(SYED FAZLUL KARIM)

CURRICULA VITAE
OF
MD. ANWAR HUSSAIN BHUIYAN

Annexure - C

1.	NAME	:	MD. ANWAR HUSSAIN BHUIYAN
2.	Designation	:	Sr. Accounts Assistant
3.	Educational Qualification	:	Matriculation
4.	Professional Qualification	:	Nil
5.	Training	:	Nil
6.	Year of Joining	:	26.10.1961
7.	Experience Received	:	**May 1992 to till date**

Senior Accounts Assistant

Responsibility

Maintenance of Cash book and compilation of monthly accounts.

Preparation and passing of miscellaneous bills and compilation of re-imbursement of current bills.

1977 to April 1992

Senior Accounts Assistant

At Sylhet Moulvi Bazar Monu River project and P.M.U., B.B. Avenue, Dhaka.

Responsibility:

Maintenance of Cash book and compilation of monthly accounts.

Preparation and passing of miscellaneous bills and compilation of re-imbursement of current bills.

1961 to 1977

As Junior Accounts Assistant at Barisal CEP project and VIP Project.

Responsibility:

Maintenance of Cash book and compilation of monthly accounts.

Preparation and passing of miscellaneous bills and compilation of re-imbursement of Current Bills.

(MD. ANWAR HUSSAIN BHUIYAN)

CURRICULA VITAE
OF
MD. SHAMSUL HOQUE

Annexure - C

1.	NAME	:	MD. SHAMSUL HOQUE
2.	Designation	:	Assistant Accountant
3.	Educational Qualification	:	B.Com. 1972 (held in 1973)
4.	Professional Qualification	:	Training in Captai Engineering Academy.
5.	Training	:	Attended in various workshop and seminar
6.	Year of Joining	:	On various dates
7.	Experience Received	:	(Starting from the present assignment)

- December 1991 to till date at PMO DIFP Dhaka as Assistant Accountant.

Responsibility:

Miscellaneous work in connection with Accounts, Bills & Administration.

1982 to December 1991

Assistant Accountant.

Dredger Organisation Maintenance of Accounts.

1977 to 1982

Sr. Accounts Assistant. Directorate of Accounts of BWDB. Maintenance of Accounts.

(MD. SHAMSUL HOQUE)