Project Design Advance
Project Administration Manual

Project Number: 46528-003
Loan Number: PDA6006
January 2016

Pakistan: Jalalpur Irrigation Project

CONTENTS

Project Administration Manual for the Project Design Advance: Purpose and Process

The project administration manual (PAM) for the Project Design Advance (PDA) is an abridged version of ADB's regular PAM and describes the essential administrative and management requirements to implement the PDA on time, within budget, and in accordance with Government and Asian Development Bank (ADB) policies and procedures. The PDA PAM should include references to all available templates and instructions either through linkages to relevant URLs or directly incorporated in the PAM.

The Punjab Irrigation Department (PID) and Project Management Unit (PMU) are wholly responsible for the implementation of ADB financed PDA projects, as agreed jointly between the borrower and ADB, and in accordance with Government and ADB's policies and procedures. ADB staff is responsible to support implementation including compliance by PID and PMU of their obligations and responsibilities for PDA project implementation in accordance with ADB's policies and procedures.

At PDA Loan Negotiations, the borrower and ADB shall agree to the PDA PAM and ensure consistency with the PDA Loan Agreement. Such agreement shall be reflected in the minutes of the PDA Loan Negotiations. In the event of any discrepancy or contradiction between the PDA PAM and the PDA Loan Agreement, the provisions of the PDA Loan Agreement shall prevail.

After ADB's approval of the PDA proposal, changes in implementation arrangements are subject to agreement and approval pursuant to relevant Government and ADB administrative procedures (including the Project Administration Instructions), and upon such approval they will be subsequently incorporated in the PDA PAM.

Abbreviations

ADB	=	Asian Development Bank
ADF	=	Asian Development Fund
AFS	=	audited financial statements
CQS	=	consultant qualification selection
Cumecs	=	Cubic meters per second
ICB	=	international competitive bidding
LIBOR	=	London interbank offered rate
NCB	=	national competitive bidding
NGO	=	nongovernment organization
PAI	=	project administration instructions
PAM	=	project administration manual
PIU	=	project implementation unit
QBS	=	quality based selection
QCBS	=	quality- and cost based selection
SBD	=	standard bidding documents
TOR	=	terms of reference

I. PROPOSED PROJECT DESCRIPTION

1. The proposed Jalalpur Irrigation Project (JIP) is located in Punjab, Pakistan. The project will provide non-perennial irrigation supplies to about 65,000 ha and will increase agricultural production in two districts of Jhelum and Khushab. The project will (i) construct over 200 km new irrigation canals, (ii) introduce participatory irrigation management structure, and (iii) build the farmers capacity. It will directly benefit over 200,000 rural people, mostly poor. The Project Design Advance (PDA) and the ensuing project are listed in the country operations business plan (COBP: 2016-2018) and will be financed from ADB ordinary capital resources (OCR). The project follows the priorities set in the Country Partnership Strategy (CPS; 2015-2019). The Province of Punjab, acting through the Punjab Irrigation Department (PID), will be the executing agency (EA) for the PDA and the ensuing loan.

2. The project impact will be the increased agricultural production in the project area (Jhelum and Khushab districts). The project outcome will be irrigation water supplies and agricultural support services available in the project area. The project outputs will be (i) new irrigation canals and appurtenant structures constructed, (ii) farmers organizations established, (iii) private agriculture support services (PASS) functional, and (iv) capacity of the farmers and the staff from PID and Punjab Irrigation and Drainage Authority (PIDA) improved.

3. The PDA is required to achieve better project readiness and is listed in the COBP 2015-2017 for $5 million from the OCR. The ensuing project is also listed in the COBP 2016-2018 in the year 2017, estimated to cost $100 million (ADB's share). Indus River System Authority (IRSA) has already issued a no objection to this project on 9 September 2014 following para. 8 and 14(d) of the Water Apportionment Accord 1991 for the allocated share for the provinces.[1]

4. The project's feasibility study was prepared under ADB project preparatory technical assistance (TA 8404-PAK). The feasibility study, including technical assessment, preliminary design and cost estimates, a project-level draft land acquisition and resettlement plan (LARP) and agricultural and social studies, is available. The project will construct about 110 km of main canal, 176 km of distributary canals and 59 cross drainage structures for safe disposal of floodwater from the nearby hill torrents. The main canal will be designed for a discharge capacity of 38.2 cubic meters per second (cumecs) at the Rasul Barrage. The main canal will run along the right bank of river Jhelum from Rasul Barrage to Khushab town. No modification to the Rasul Barrage will be made as it already has a provision for canal head regulator.

II. IMPLEMENTATION PLANS

A. PDA Readiness Activities

5. The existing project management unit (PMU) of the Lower Bari Doab Canal Improvement Project (LBDCIP) has experienced and qualified staff and will be responsible for procurement and administration of PDA. The consultant selection process was initiated in March 2015 and is substantially completed: shortlisting is complete and technical and financial proposals evaluated. The consultancy contract agreement will be ready for signing upon effectiveness of the PDA agreement.

[1] For development of new irrigation systems that divert more than the existing flows from Indus rivers system, IRSA's permission is required to ensure that each province draws its allocated share of water as defined in the Water Apportionment Accord, 1991.

6. The existing PMU has qualified staff for its technical, safeguards and financial management departments. For PDA implementation, the PMU will be further strengthened by support consultants for procurement, safeguards and engineering matters. The EA ensured that PMU has adequate capacity to implement both LBDCIP and JIP and that PMU will continue to implement JIP after completion of LBDCIP on 30 September 2016. The Consultants under the PDA will update the safeguards and other technical documents for the project. Overall PDA and project implementation plan is hereunder.

B. Overall PDA Project Implementation Plan

Activities	Advance Actions (2015)				PDA (2016)				PDA (2017)			
	Jan-Mar	April-Jun	Jul-Sep	Oct-Dec	Jan-Mar	April-Jun	Jul-Sep	Oct-Dec	Jan-Mar	April-Jun	Jul-Sep	Oct-Dec
A. Implementation												
Consultants selection under PDA												
Advertisement												
Selection												
Contract award												
Mobilization												
Output 1: Survey and Design												
Activity 1-1: Conduct Topographic Survey												
Activity 1-2: Conduct Geotechnical Investigations												
Activity 1-3: Conduct On Farm Water Management Surveys												
Activity 1-4: Conduct Detail Design												
Activity 1-5: Estimated Costs												
Activity 1-6: Model Study												
Output 2: Safeguards Plans												
Activity 2-1: Updated LARP												
Activity 2-2: Updated EIA												
Activity 2-3: Climate Change Assessment												
Output 3: Reports, Documents and Drawings												
Activity 3-1: Updated PC-1												
Activity 3-2: Procurement Plan and Bidding Documents												
Activity 3-3: Updated Economic and Financial Analysis												
Output 4: Institutional Mechanisms												
Activity 4-1: Review of Proposed Reforms												
Activity 4-2: Final Report on Institutional Mechanism												
Output 5: Design Quality Assurance												
Activity 5-1: Review of plans, design and drawings												
B. Management Activities												
Submission of quarterly progress report												
Provide guidance and review interim reports												
Submission of annual report												
Submission of AFS												
Support to loan processing and effectiveness												

III. PDA PROJECT MANAGEMENT ARRANGEMENTS

A. PDA Project Implementation Organizations – Roles and Responsibilities

PDA Project implementation organizations	Management Roles and Responsibilities
Oversight body **Government of Punjab**	• ensure fairness and transparency in loan utilization; • ensure quality and timely completion of the project; • oversee the PDA project implementation progress by the EA and PMU LBDCIP; • ensure timely availability of counterpart funds; • approve institutional mechanism for JIP agreed during PDA implementation; • ensure timely approval of project cost, financing and other documents; • share with ADB major policy related changes in the sector on time; • ensure compliance with resettlement and environmental safeguard implemented as per EPA rules and regulations and ADB safeguard policy.
Executing agency Punjab Irrigation Department	• overall management of PDA • appoint Director Procurement in LBDCIP • monitor implementation progress periodically • timely provision of agreed counterpart funds for project activities; • timely internal government approvals (PC-II/PC-I).
PDA Project specific management body (IA) PMU LBDCIP (which is existing arrangements within EA)	• implementation of PDA with existing; • recruiting design consultants; • reviewing detailed design, bidding documents, and advance contracting; • monitoring and evaluation of PDA project activities and outputs, including periodic review, preparation of review reports reflecting issues and time-bound actions; • public disclosure of PDA project outputs; • establishing strong financial management system and submitting timely withdrawal applications to ADB; • conducting timely financial audits as per agreed timeframe and taking recommended actions; • complying with PDA loan covenants; • preparing periodic progress reports, and ensure their timely submission to ADB.

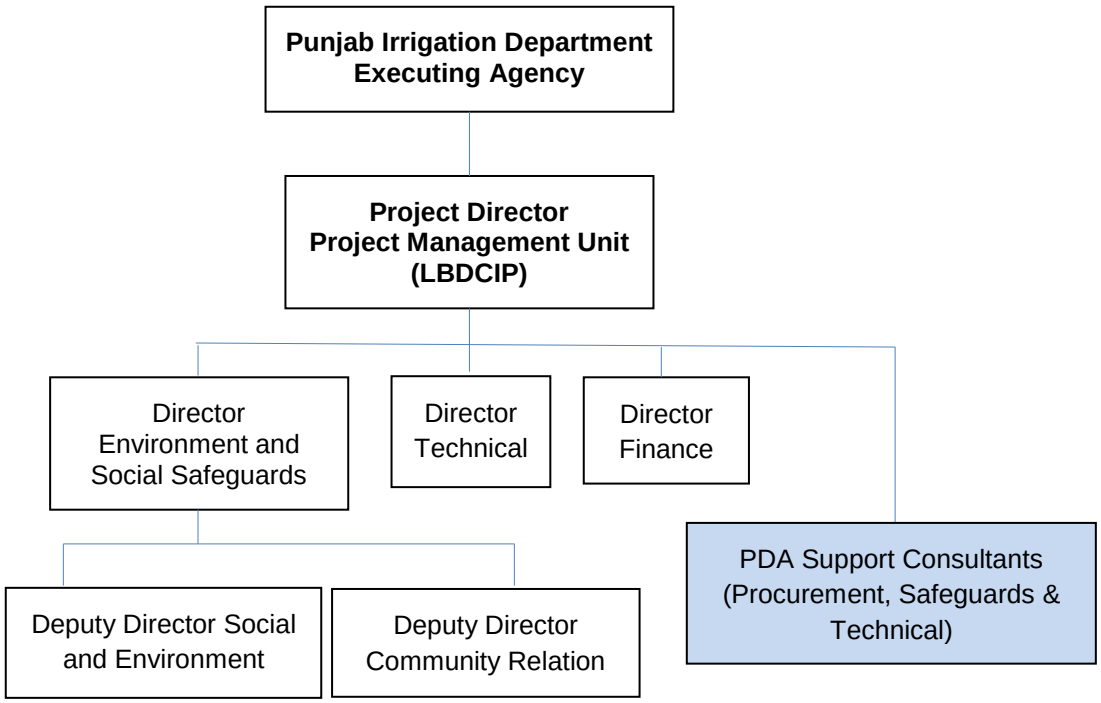
Economic Affair Division of Ministry of Economic Affairs and Statistics	• signing the PDA Loan Agreement; • endorsing to ADB the authorized staff with approved signatures for WAs processing; and processing and submitting to ADB any request, when required, for reallocating the PDA loan proceeds.
ADB	• assist the EA and PMU LBDCIP in providing timely guidance at each stage of the project for smooth implementation in accordance with the agreed implementation arrangements; • review all the documents that require ADB's approval; • conduct PDA loan review missions; • ensure compliance with PDA loan covenants; • timely process withdrawal applications and release eligible funds; • ensure compliance with financial audit recommendations; • regularly update the project performance review reports with the assistance of the project management office; • regularly post on ADB web the updated project information documents for public disclosure.

B. Key Persons Involved in Implementation

Executing Agency Punjab Irrigation Department (PID)	Mr. Saif Anjum Secretary, Irrigation Department Government of Punjab, Irrigation Secretariat, Old Anarkali Lahore, Pakistan Tel No: +92 42 9921 2117-18 Email: sec_ipd@yahoo.com
Implementing Agency (PDA Project specific management body) PMU LBDCIP	Mr. Khalid Hussain Qureshi PMU LBDCIP. Government of Punjab, Irrigation Department, Lahore, Pakistan Tel No.: +92 42 9925 0362 Email: pd_lbdcip@yahoo.co.uk
ADB CWER	Mr. Akmal Siddiq Director, Environment, Natural Resources and Agriculture, Central and West Asia Department, 6 ADB Avenue, Mandaluyong City, 1550 Metro Manila, Philippines Tel No. +63 2 632 5796 Email: asiddiq@adb.org
Mission Leader	Akhtar Ali Principal Water Resources Specialist, Environment, Natural Resources and Agriculture, Central and West Asia Department

6 ADB Avenue, Mandaluyong City, 1550 Metro Manila, Philippines
Tel No. +63 2 632 6146
Email: aali@adb.org

C. PDA Project Organization Structure



IV. COSTS AND FINANCING

7. Total PDA cost is estimated at $6.5 million. The amount of $5 million is proposed from ADB's OCR. A repayment date is indicated to be 15 December 2017 or the date of effectiveness of the ensuing loan as may be agreed between ADB and the Borrower.

Table 1: PDA Project Investment and Financing Plan[a]
($ million)

Item		Total Cost[b]	ADB		Government[e]	
			Cost	Percentage	Cost	Percentage
A.	**Base Cost[c]**					
	1. Survey and Design	4.00	3.20	80%	0.80	20%
	2. Safeguards Plans	0.40	0.32	80%	0.08	20%
	3. Reports, Training and Maps	0.20	0.16	80%	0.04	20%
	4. Institutional Arrangements	0.24	0.19	80%	0.05	20%
	5. Design Quality Assurance	0.61	0.49	80%	0.12	20%
	Subtotal (A)	**5.45**	**4.36**	**80%**	**1.09**	**20%**
B.	**PMU Incremental Cost**	**0.25**	**0.00**	**0%**	**0.25**	**100%**
C.	**Contingencies[d]**	**0.80**	**0.64**	**80%**	**0.16**	**20%**
	Total (A+B)	**6.50**	**5.00**	**77%**	**1.50**	**23%**

[a] A PDA loan carries interest and commitment charges where applicable, and these charges is deferred until the PDA is repaid from the ensuing financing or other repayment terms take effect. Commitment charges are waived for a period of 2 years from PDA signing. If the ensuing financing does not become effective within that period, commitment charges accrue thereafter.
[b] Includes taxes and duties of $1.25 million to be financed from government resources.
[c] In mid-2015 prices.
[d] Physical contingencies computed at 5% for consulting services. Price contingencies computed at 1.5% on foreign exchange costs and 5.5% on local costs incurred during the first year and 5.8% on local costs incurred during the second year; includes provision for potential exchange rate fluctuation under the assumption of a purchasing power parity exchange rate. The foreign exchange cost was estimated at $100,000.
[e] The government financing includes financing for taxes and duties related to project expenditures.
Source: Asian Development Bank.

A. Cost Categories and Assumptions

8. ADB will finance consulting service costs of detailed design and the Government will finance taxes and duties and PMU's incremental management cost. Cost categories are as follows:

Table 2: Detailed Cost Estimates by Expenditure Category

($ million)

	Item	Foreign Exchange	Local Currency	Total Cost	% of Total Base Cost
A.	**Investment Costs**				
1	Consultant				
a	Remuneration and Out of Pocket Expenses	0.08	4.00	4.08	71.6%
b	Surveys and Investigations	0.03	0.40	0.43	7.5%
c	Vehicles and Equipment	0.04	0.30	0.34	6.0%
d	Direct Cost		0.60	0.60	10.5%
	Subtotal (A)	**0.15**	**5.30**	**5.45**	**95.6%**
B.	**Other Costs**				
1	PMU Incremental Management Cost	0.00	0.25	0.25	4.4%
	Subtotal (B)	**0.00**	**0.25**	**0.25**	**4.4%**
	Total Base Cost	**0.15**	**5.55**	**5.70**	**100.0%**
C.	**Contingencies**				
1	Physical	0.01	0.31	0.32	5.6%
2	Price	0.01	0.47	0.48	8.4%
	Subtotal (C)	**0.02**	**0.78**	**0.80**	14.0%
Total PDA Project Cost (A+B+C)		**0.17**	**6.33**	**6.50**	

Note: Numbers may not sum precisely because of rounding.
(i) Exchange rate: PRs101.83 = $1.00 (as of 15 August 2015).
(ii) All costs are in mid-2015 prices.
(iii) Physical contingencies are computed at 5% for surveys, investigations, and support services.
(iv) Price contingencies based on expected cumulative inflation over the implementation period are as follows for domestic rate of price inflation (%/year): 5.5% (2016), 5.8% (2017), 5.65% (Average). Foreign rate of price escalation is assumed to be 1.5% (average).

Table 3: Allocation and Withdrawal of PDA Loan Proceeds

CATEGORY			ADB FINANCING
Number	**Item**	**Total Amount Allocated for ADB Financing Category ($)**	**Percentage and Basis for Withdrawal from the PDA Loan Account**
1	Consulting Services	5,000,000	80% of total expenditures claimed
	Total	**5,000,000**	

B. Cost Estimates Revisions (as applicable)

9. Revisions: The estimates will be revised at the time of awarding of contract to the consulting firm and at the midterm review by EA and ADB.

V. FINANCIAL MANAGEMENT

A. Financial Management Assessment

10. A financial management assessment (FMA) and a risk assessment of country level systems were conducted by ADB in 2014 focusing on financial accounting, auditing, and mitigation measures. Final risk rating of financial risk management arrangements for the project is assessed as substantial. The financial management risks for PID identified during the earlier assessment for Trimmu and Panjnad Barrages Improvement Project in 2014 included the lack of an internal audit function, vacant financial management positions in the project management office, required development of accounting and financial management manuals, etc. It was

assessed that PID has satisfactory financial management capacity to record financial transactions and balances, maintain regular records and monitoring reports, and safeguard assets. The assessment was conducted in accordance with the financial management guidelines and financial due diligence methodology note. PID ensured to fill the vacant position of financial management expert and arrange the internal audit by 31 January 2016 and accounting and finance manual will be available by 30 June 2016.

B. Disbursement

11. The PDA loan proceeds will be disbursed in accordance with ADB's Loan Disbursement Handbook (2015, as amended from time to time),[2] and detailed arrangements agreed upon between the Government and ADB. Online training for project staff on disbursement policies and procedures is available at: http://wpqr4.adb.org/disbursement_elearning. Project staff is encouraged to avail this training to help ensure efficient disbursement and fiduciary control. Direct payments procedures will be used for consulting services. Before submitting the first withdrawal application, EAD should submit to ADB sufficient evidence of the authority of the person(s) who will sign the withdrawal applications on behalf of the government, together with the authenticated specimen signatures of each authorized person. The minimum value per withdrawal application is US$100,000 equivalent. Individual payments below this amount should be paid by the EA or IA and subsequently claimed to ADB through reimbursement, unless otherwise approved by ADB.

C. Accounting

12. PMU will maintain separate PDA project accounts and records by funding source for all expenditures incurred on the PDA project. PID will use the International Public Sector Accounting Standards by International Federation of Accountants and consolidates project financial statements accordingly.

D. Auditing

13. PID will cause the detailed consolidated project financial statements to be audited in accordance with International Standards on Auditing and with the Government's audit regulations, by an independent auditor acceptable to ADB. The audited project financial statements will be submitted in the English language to ADB within six months of the end of the fiscal year by the PID.

14. The annual audit report for the project accounts will include an audit management letter and audit opinions which cover (i) whether the project financial statements present a true and fair view or are presented fairly, in all material respects, in accordance with the applicable financial reporting framework; (ii) whether PDA loan proceeds were used only for the purposes of the project or not; and (iii) the level of compliance for each financial covenant contained in the legal agreements for the PDA project.

15. Compliance with financial reporting and auditing requirements will be monitored by review missions and during normal program supervision, and followed up regularly with all concerned, including the external auditor.

[2] Available at: http://www.adb.org/documents/loan-disbursement-handbook.

16. The Government, PID, and PMU have been made aware of ADB's policy on delayed submission, and the requirements for satisfactory and acceptable quality of the audited project financial statements.[3] ADB reserves the right to require a change in the auditor (in a manner consistent with the constitution of the borrower), or for additional support to be provided to the auditor, if the audits required are not conducted in a manner satisfactory to ADB, or if the audits are substantially delayed. ADB reserves the right to verify the project's financial accounts to confirm that the share of ADB's financing is used in accordance with ADB's policies and procedures.

17. Public disclosure of the project financial statements, including the audit report on the project financial statements, will be guided by ADB's Public Communications Policy (2011).[4] After review, ADB will disclose the project financial statements for the project and the opinion of the auditors on the financial statements within 30 days of the date of their receipt by posting them on ADB's website. The Audit Management Letter will not be disclosed.

VI. PROCUREMENT AND CONSULTING SERVICES

A. Advance Contracting, as applicable

18. All advance contracting will be undertaken in conformity with ADB's *Procurement Guidelines* (2015, as amended from time to time) (ADB's *Procurement Guidelines)*[5] and ADB's *Guidelines on the Use of Consultants* (2013, as amended from time to time) (ADB's *Guidelines on the Use of Consultants).*[6] The issuance of invitations to bid under advance contracting will be subject to ADB approval. The borrower, EA and IA have been advised that approval of advance contracting does not commit ADB to finance the PDA project.

19. Advance contracting. The advance contracting for selection of consultant will include invitation for expression of interests, evaluation of technical and financial proposals and contract negotiation and award. Government has not requested for retroactive financing as PDA loan does not allow it.

B. Procurement of Consulting Services

20. An 18-month procurement plan indicating threshold and review procedures and consulting service is in Section C. All consultants will be recruited according to ADB's *Guidelines on the Use of Consultants*.[7] The terms of reference for all consulting services are

[3] ADB Policy on delayed submission of audited project financial statements:
- "When audited project financial statements are not received by the due date, ADB will write to the executing agency advising that (i) the audit documents are overdue; and (ii) if they are not received within the next six months, requests for new contract awards and disbursement such as new replenishment of imprest accounts, processing of new reimbursement, and issuance of new commitment letters will not be processed."
- When audited project financial statements have not been received within 6 months after the due date, ADB will withhold processing of requests for new contract awards and disbursement such as new replenishment of imprest accounts, processing of new reimbursement and issuance of new commitment letters. ADB will (i) inform the executing agency of ADB's actions; and (ii) advise that the loan may be suspended if the audit documents are not received within the next six months.
- When audited project financial statements have not been received within 12 months after the due date, ADB may suspend the loan.

[4] Available at: http://www.adb.org/documents/pcp-2011?ref=site/disclosure/publications.
[5] Available at: http://www.adb.org/Documents/Guidelines/Procurement/Guidelines-Procurement.pdf
[6] Available at: http://www.adb.org/Documents/Guidelines/Consulting/Guidelines-Consultants.pdf
[7] Checklists for actions required to contract consultants by method available in e-Handbook on Project Implementation at: http://www.adb.org/documents/handbooks/project-implementation/

detailed in Section D. The three consultancy services with an estimated 823 person-months including 4 person-months of international and 819 person-months of national experts are required to (i) facilitate PDA project management and implementation, (ii) strengthen the institutional and operational capacity of the implementing agency, and (iii) design review for quality assurance and efficiency.[8] The national consulting services will be used due to adequate in-country capacity of similar assignments, lack of availability of quality international experts due to security reasons and cost effectiveness. Consulting firm for the detailed design will be engaged using the quality- and cost-based selection (QCBS) method with a quality: cost ratio of 90:10. The Consultant will field their core staff for all key components. The consultants, who were involved in the upstream work such as feasibility study of this project, will be considered eligible to compete for detailed design, should they express interest in doing so, their current activities do not grant them an unfair competitive advantage (see para. 1.12 of the ADB's *Guidelines on the Use of Consultants; 2013).*

C. Procurement Plan

Basic Data

Project Name: PDA for Jalalpur Irrigation Project (JIP)	
PDA Loan Amount: $5.0 million	**Executing Agencies**: Punjab Irrigation Department
Date of first Procurement Plan: August 2015	**Date of this Procurement Plan**:

Recruitment of Consulting Firm		
Type	**Prior / Post**	**Comments**
Quality- and Cost-Based Selection (QCBS) with FTP	Prior	90:10

List of Consulting Services

Ref	Contract Description	Estimated Cost ($)	Selection Method	Expected Date of Advertisement	Prior Review Y/N
1	Detail Design Consultant	4,660,000	QCBS (90:10)	April 2015	Y
2	Institutional Mechanism Consultant	240,000	Specialized Agencies or/and NGO (SSS) or Individual Consultants[a]	Nov 2015	N
3	Design Review and Quality Assurance	620,000	3 Individual Consultants	Nov 2015	N

[a] The procurement method will be finalized by the EA and ADB after completion of the feasibility study under PPTA and agreeing on the scope and methodology of consultants required for proposing institutional mechanism for JIP.

Note: ADB will review contract variations/modifications in accordance with procedures set forth in the loan agreement between the Borrowers and ADB.

D. Consultant's Terms of Reference

21. The consultants for detail design are required to update safeguards, costs and economic analysis, conduct detail field surveys, investigations and studies, prepare reports on engineering design, cost, social, environmental, economic and climate change. The consultants will prepare project documents for approval by ADB and EA, construction drawings and bidding documents. The consultant will perform model studies for flood protection and river training works of main

[8] The consultancy services will be provided through three consultancy packages for design, institutional mechanisms and quality assurance. A breakup of consulting services inputs is given in the following section.

channel on the right bank of the river. The consultant will support PMU for PDA management. Other than this, services of institutional reforms experts will additionally be hired to review the studies and reports conducted under PPTA, conduct independent studies and propose institutional mechanism for a viable and sustainable Jalalpur Irrigation system.

22. About 135 person-months of the key experts will be provided by a consulting firm for detail design of the ensuing project. Also, 654 person-months of other staff and PMU support staff will be provided. For Institutional Mechanisms, 22 person-months of international and national key experts will be provided. A Design Review and Quality Assurance Panel (DRQAP) consisting of three individual consultants for 12 person-months to plan, review and monitor the quality of the design is also provided for reliable, cost-effective and efficiency in approval of design at its different stages. The person-months are given in the table and detailed TORs are attached (Appendix A).

Consultants		Number	Person Months
A. Detail Design (Key Experts - National)			
Water Resource Management Specialist (Team Leader)		1	18
Irrigation Engineering Specialist (Deputy Team Leader)		1	18
Hydraulic Design Engineering Specialist		1	18
Structural Design Engineering Specialist		1	18
Hydrological Specialist		1	6
Geotechnical Engineering Specialist		1	12
Mechanical Engineering Specialist		1	6
Ground Water Engineering Specialist		1	6
Agricultural Agronomist		1	6
Environmental Specialist		1	6
Social Safeguard Specialist		1	12
Procurement and Contract Specialist		1	6
Economic/Financial Analyst		1	3
	Subtotal	**13**	**135**
Detail Design (Other Staff)			
Senior Engineers		15	192
Junior Engineers		26	360
Others		8	48
PMU Consultants		3	54
	Subtotal	**52**	**654**
Total of Design (A)		**65**	**789**
B. Institutional Mechanisms Consultant			
International Expert		1	4
National Experts		3	18
	Total	**4**	**22**
C. Design Review and Quality Assurance Panel			
Hydraulic/Irrigation Infrastructure Expert		1	5
Mechanical/Instrumentation Expert		1	3
Structural Design and Drawings Expert		1	4
	Total	**3**	**12**

VII. SAFEGUARDS

23. The ensuing project is expected as category A for involuntary resettlement and environment and C for indigenous peoples. Draft LARP indicates 927 structures within the canals right of way (ROW). These include 770 houses at farms, 6 shops, 6 mosques, 4 graveyards, 5 shrines, 3 schools and 133 other structures such as tubewells, check posts, waiting sheds etc. Most of these structures are permanent or semi-permanent in nature. However, detailed design will confirm the exact ROW and the PDA will update the draft LARP, EIA and EMP prepared under the feasibility study.

24. **Prohibited investment activities.** Pursuant to ADB's Safeguard Policy Statement (2009) (SPS), ADB funds may not be applied to the activities described on the ADB Prohibited Investment Activities List set forth at Appendix 5 of the SPS.

VIII. GENDER AND SOCIAL DIMENSION

25. Gender and social assessment has been carried out under the PPTA which adequately covers the issues. Therefore, no further study is required under the PDA.

IX. PERFORMANCE MONITORING, EVALUATION, REPORTING AND COMMUNICATION

A. Monitoring and Evaluation

26. **PDA Project performance monitoring.** PDA Project performance will be monitored based on quarterly and consolidated reports provided by PID as agreed. These reports will include: (i) progress achieved by activity as measured against the Implementation Schedule (Section II.A), (ii) key implementation issues and solutions, (iii) updated procurement plan and (iv) updated implementation plan for the next 12 months. To ensure PDA projects continue to be both viable and sustainable, PDA project financial statements, together with the associated auditor's report, should be adequately reviewed. Only in the event that an ensuing loan is not approved, PID will submit a PDA project completion report to ADB within 6 months of physical completion of the PDA project.[9]

27. **Compliance monitoring.** A compliance monitoring system, satisfactory to ADB will be established, based on the key indicators and targets agreed during the inception report of the consulting services. EA's quarterly progress reports will provide basis for all type of monitoring including compliance monitoring.

28. **Safeguards monitoring**. PMU will carry out the internal monitoring (IM) and will report the progress on the IM indicators on a quarterly basis. This will help to assess the progress on updating LARP and EIA. PMU's safeguard staff will ensure that LARP and EIA are updated as per changes in the design.

B. Reporting

29. PID will provide ADB with:

(i) PDA project's quarterly progress reports in a format consistent with ADB's project performance reporting system;

(ii) consolidated annual reports including (a) progress achieved by output as measured through the performance targets, (b) key implementation issues and solutions; (c) updated procurement plan, and (d) updated implementation plan for the next 12 months;[10] and

(iii) PDA project accounts and the executing agency AFSs, together with the associated auditor's report.

C. Stakeholder Communication Strategy

30. A nongovernment organization (NGO) recruited under TA 8404 assisted the EA in communication and consultation with the stakeholders.[11] At feasibility stage during 2014-2015, the stakeholders were involved through (i) interviews and small corner meetings, (ii) presentations and distribution of pamphlet in local language, and (iii) two stakeholders' consultation workshops attended by community leaders, government officials, consultants, academicians and project's beneficiaries/affected from the project area. Project scope, intended benefits, project implementation arrangements and implementation plan were discussed with

[9] Project completion report format is available at: http://www.adb.org/sites/default/files/pai-6-07-a.pdf

[10] The regional departments will present the performance of the completed PDA in the project completion report of the ensuing loan. See para. 51 of ADB. 2013. Project Design Advance. *Staff Instruction*. Manila.

[11] National Rural Support Program (NRSP) is working in this area since more than 10 years as NGO and it has already established two field offices in the project area.

the communities. The consultation resulted in practical suggestions that were incorporated in the project documents.

31. At detailed design stage, the Consultant under PDA will closely work with the communities in identification, planning and design of distribution canals to be implemented under community contracting. The PDA will help determining dimensions and extent of the canals and appurtenant structures and updating the list of affected persons and the LARPs accordingly. The communities in general and affected persons in particular. PID will announce the award of consultancy services and disclosed draft LARPs and EIA on their website.

32. At project implementation stage for safeguards, PID will publicly disclose the EIA and ensure that meaningful public consultations (including both men and women) are undertaken with affected groups and local NGOs. The list of people attending the consultation, time, locations, and subjects discussed during consultation will be recorded in a systematic manner. The updated and final LARPs will be translated into local languages and disclosed through public notices posted at the PID offices, published in newspapers, and posted on ADB's website. Affected people will be consulted in all aspects of LAR as required.

X. ANTICORRUPTION POLICY

33. ADB reserves the right to investigate, directly or through its agents, any violations of the Anticorruption Policy relating to the PDA project.[12] All contracts financed by ADB shall include provisions specifying the right of ADB to audit and examine the records and accounts of the executing agency and all PDA project contractors, suppliers, consultants and other service providers. Individuals/entities on ADB's anticorruption debarment list are ineligible to participate in ADB-financed activity and may not be awarded any contracts under the PDA project.[13]

34. To support these efforts, relevant provisions are included in the loan agreement/regulations and the bidding documents for the PDA project. The government and PID have assured ADB that implementation of the project shall conform to all applicable ADB policies including those concerning anticorruption measures, safeguards, gender, procurement, consulting services, and disbursement.

XI. ACCOUNTABILITY MECHANISM

35. People who are, or may in the future be, adversely affected by the PDA project may submit complaints to ADB's Accountability Mechanism. The Accountability Mechanism provides an independent forum and process whereby people adversely affected by ADB-assisted PDA projects can voice, and seek a resolution of their problems, as well as report alleged violations of ADB's operational policies and procedures. Before submitting a complaint to the Accountability Mechanism, affected people should make a good faith effort to solve their problems by working with the concerned ADB operations department. Only after doing that, and if they are still dissatisfied, should they approach the Accountability Mechanism.[14]

[12] Available at: http://www.adb.org/Documents/Policies/Anticorruption-Integrity/Policies-Strategies.pdf
[13] ADB's Integrity Office web site is available at: http://www.adb.org/integrity/unit.asp
[14] For further information see: http://www.adb.org/Accountability-Mechanism/default.asp.

XII. RECORD OF PAM CHANGES

36. All revisions/updates during the course of implementation should be retained in this Section to provide a chronological history of changes to implemented arrangements recorded in the PAM.

Appendix A: Consultants Terms of Reference

Country:	PAKISTAN
Project Name:	Jalalpur Irrigation Project (JIP)
Consulting Service:	Preparation of Detailed Design, Construction Drawings and Bidding Documents for JIP
Executing Agency:	Punjab Irrigation Department (PID)
Implementing Agency:	Project Management Unit (PMU) for Lower Bari Doab Canal Improvement Project (LBDCIP), Lahore

I. INTRODUCTION

1. The Islamic Republic of Pakistan has applied for financing for project design advance (PDA) from Asian Development Bank (ADB) towards the cost of preparing detailed design, drawings and bidding documents for Jalalpur Irrigation Project (JIP) in Punjab Province. The project will construct new canals and appurtenant structures and on-farm irrigation and drainage system for 64,000 ha in Pind Dadan Khan and Khushab districts. The main Jalalpur canal will offtake from the right bank of River Jhelum at Rasul Barrage and will provide non-perennial irrigation supplies improving crop production. Punjab Irrigation Department (PID) is the executing agency (EA) for the project.

2. The proposed financing will be used for procurement of Consulting Services for preparing detailed design, drawings and bidding documents for JIP. The Consultant will be selected in accordance with the procedures set out by ADB. The duration of the assignment is 18 months.

3. Feasibility studies for Jalalpur Irrigation Project are currently under preparation through an ADB PPTA (8404 PAK). The feasibility will be available in October 2015. After the completion of the feasibility studies, detailed design of the project and preparation of bidding documents is required. These TORs are for the consulting firm for “Preparation of Detail Engineering Design and Preparation of Bidding Documents for Jalalpur Irrigation Project.” The firm will be recruited in accordance with ADB’s latest guidelines on the use of the consultants through Quality-Cost-Based-System (QCBS) method (90:10).

4. The tentative list and detail of structures as identified under the feasibility study are:

Sr. No.	Description	Main Canal	Distributaries and Minor Canals	Total
1	Intake structure at Rasul Barrage	1	-	1
2	Disty & Minor Head Regulators	18	3	21
3	Cross Regulators & Falls	7	102	109
4	Escape Structures	2	-	2
5	Railway Bridges	4	1	5
6	Road Bridges/culverts	32	64	96
7	Cross Drainage Structure	59	25	84
8	Outlets	48	313	361
9	Tail Cluster	-	21	21
Total:		171	529	700

5. The Consultant experts’ team is assumed to comprise national experts with estimated input of 135 person-months. Following is the client’s estimate of the consultant experts’ team:

Experts		No.
1	Water Resource Management Specialist (Team Leader)	1
2	Irrigation Engineering Specialist (Deputy Team Leader)	1
3	Hydraulic Design Engineering Specialist	1
4	Structural Design Engineering Specialist	1
5	Hydrological Specialist	1
6	Geotechnical Engineering Specialist	1
7	Mechanical Engineering Specialist	1
8	Ground Water Engineering Special	1
9	Agronomist	1
10	Environmental Specialist	1
11	Social Safeguard Specialist	1
12	Procurement and Contract Specialist	1
13	Economic/Financial Analyst	1

II. BACKGROUND INFORMATION

6. The proposed Jalalpur Irrigation Project is located between longitude from 72^{o}-20' to 73^{o}-31' (east) and latitude from 32^{o}-25 to 32^{o}-43' (north) along right bank of River Jhelum in Punjab, Pakistan. The project area is bounded by the salt range hills in the northwest and the River Jhelum in the southwest. The groundwater is mainly recharges by the nearby hill torrents and is largely saline. The project area is assessable through a six lane motorway and a National Highway and at a two hour drive from the Capital Islamabad and three hour drive from the provincial capital, Lahore.

7. The Government of Punjab planned Jalalpur Irrigation Project, a new non-perennial irrigation system to enhance the agricultural production in Districts Jhelum and Khushab. The irrigation system to be developed shall irrigate about 65,000 hectares of land located in Tehsil Pind Daden Khan and Khushab of the two districts. Indus River System Authority (IRSA) has issued a no objection to the subject project on 9 September 2014 following paras. 8 and 14(d) of Water Apportionment Accord 1991.

8. The area is located between river Jhelum and Salt range from Shahpur to Khushab town. Presently, irrigation is practiced only on edge of river Jhelum and remaining area of about 65,000 hectares is rainfed or tubewell irrigation, which is largely saline. Under the proposed JIP, a new non-perennial irrigation system will be constructed. The main canal of about 110 km will start from Rasul Barrage and will follow along the right bank of Jhelum River. The main canal will have a discharge of about 38.2 cubic meters per second (cumecs) (1350 cusec) at Rasul Barrage. Space for the canal Head regulator is already available at the existing Rasul Barrage.

9. The command area of JIP is in the form of a long strip of land bounded by the salt range hills on northern side and Jhelum River (right bank) on southern side. The distribution system about 176 km comprising of distributaries and minors extends up to the right bank of Jhelum River. There are about 59 hill torrents of varying catchment size which flow across the project area and ultimately fall in Jhelum River. The climate in the project area is hot and arid. Summer (May-August) temperatures vary from 18^{0} C to 46^{0} C and winter (November-February from 0^{0} C to 24^{0} C). In spring and autumn, temperatures are moderate. The rainfall is low and erratic and the pan evaporation is three times of average yearly rainfall, requiring irrigation essential for crop production.

10. Presently, farmers in the project area are practicing mainly rain fed agriculture

associated with tube well farming. Dominant crops in the area are wheat, cotton, rice, sugarcane, maize, fodder, potatoes, vegetables, citrus and onion crops. Farmers in the project area face low agricultural production and low farm incomes as the result of frequent crop failure, low crop yields, low farm profitability and secondary salinization.

11. The project is expected to increase crop production and reduce the land degradation by minimizing the marginal quality groundwater use. The project will (i) construct main canal, distribution system and appurtenant structures; (ii) introduce institutional reforms and establish farmer's organizations (FOs); and (iii) build capacity of the farmers, FOs, and staff from the Punjab Irrigation Department (PID) and Punjab Irrigation and Drainage Authority (PIDA).

12. The Government of Punjab has approached Asian Development Bank (ADB) for providing facility of Project Design Advance (PDA) for carrying out detailed design, drawings and bidding documents preparation of Jalalpur Irrigation Project. This PDA equivalent to US$5.0 million will be used for procurement of Consulting Services for JIP.

III. OBJECTIVE OF THE ASSIGNMENT

13. The objective of the consultancy services is to prepare an implementation project including detailed engineering design, construction drawings, PC-I and bidding documents of JIP and assist the EA in loan processing.

14. The consultants selected for detail design will be responsible for:

(i) detailed design and construction drawings of the irrigation system including bridges, canal falls, cross regulators, head regulators, aqueducts, outlets and drainage works including gates and gearing system;
(ii) preparation of engineer's estimate for civil, electrical and mechanical works, packaging the contracts and updating the PC-1;
(iii) update land acquisition and resettlement plans (LARPs) and environmental impact assessment (EIA) environmental management plan (EMP) as required by the detailed design following ADB's Safeguard Policy Statement (2009, as amended from time to time);
(iv) update/prepare bidding documents incorporating EMP and gender action plan (GAP) in the works contracts, if any and assist in evaluation of bids under advance actions; and
(v) assist the EA in loan processing.

IV. SCOPE OF SERVICES

15. The general scope of services for the consultants comprises but not limited to:

(i) Based on the fresh topographic surveys, investigations and studies carried out under TA 8404, prepare layouts of the irrigation and drainage system for the project area;
(ii) Prepare recommendations of water allowance, irrigation intensity and cropping pattern;
(iii) To carry out surveys, geotechnical investigations, hydrological analysis and other such activities where necessary to provide a basis for design of all the hydraulic structures;

(iv) Prepare capacity and command statements for the watercourse, minor, distributary and main canal; determination of location of each hydraulic structure including outlets;
(v) Prepare Chakbandi plan of each outlet showing field levels, location of nakkas;
(vi) Design and prepare longitudinal profiles and cross sections for irrigation and drainage channels;
(vii) Prepare hydraulic, structural, electro-mechanical and geotechnical design criteria;
(viii) Identify various hydraulic structures for efficient conveyance of irrigation and drainage flows;
(ix) Design of flood protection works for initial reach of main canal, distribution systems and other project works as required;
(x) Carry out physical model studies for protection works for main canal and distribution system, when needed;
(xi) Undertake detailed design of all proposed project works with complete drawings. The conveyance and distribution system including the canals, control structures, bridges, falls, outlets and all associated cross drainage works for the Hill torrents emanating from Salt Range etc. including electro-mechanical works will be designed in strict accordance with accepted state of the art methods of irrigation science, hydraulics, soil mechanics and structural engineering;
(xii) Analyze all hydraulic design options for ensuring satisfactory sediment transport and minimizing cost requirements without sacrificing system performance or control required for efficient and equitable distribution of irrigation water;
(xiii) Prepare rules for optimal sediment control into head regulator and amend Operation and Maintenance Rules of Rasul Barrage accordingly;
(xiv) Identify minor and distributary canals those involve community participation in design and construction, conduct walk-thorough predesign exercise with the community and consider related resettlement and environmental issues in the design;
(xv) Ensuring that all the designs consider optimal solution of technical, environmental and social issues;
(xvi) Divide the project works into suitable number of contract packages, prepare Bill of Quantities, cost estimate and update PC-I prepared by TA Consultants and prepare/update bidding documents incorporating EMP and GAP for different contract packages;
(xvii) Ensure that the design adequately consider the climate change impacts and is stable against factors such as frequent and excessive flows and sedimentation;
(xviii) Update Environmental Impact Assessment, environmental management plan land acquisition and resettlement framework (LARF) and LARPs with associated cost;
(xix) Advise on soil reclaiming, consumptive water uses of ground and surface flows and identification of crops suitable for canal command;
(xx) Review the Climate Change Risk Assessment study and incorporate its impact on Agriculture and cross drainage flows for the Project;
(xxi) Prepare viability of the hydropower generation in project works and provide necessary provisions of interface where necessary while designing such structures. The design of head regulator at Rasul Barrage should be done in such a way that hydropower unit may be installed at later stage;
(xxii) Rectification, modifications, improvement of the documents resultant to review of any or all project documents by the Irrigation Department, allied sister

departments of the Government of Punjab, Government of Pakistan, panel of experts and financers/donors;

(xxiii) Prepare responses to audit observations and paras. in respect of the payments made to consultants and assist the Employer in getting them resolved;

(xxiv) Attend project level meeting with Steering Committee, ADB Missions as required;

(xxv) Prepare all the supporting documents and provide legal support to Employer and attend court /hearing, if required;

(xxvi) As instructed by the client, supervising engineering or other studies associated with the project and its components;

(xxvii) Update Operational Manuals for all the major structures, main canal and each branch and distributary canal in the command ensuring optimization of water deliveries using the existing or newly constructed facilities; and

(xxviii) Support PMU and ADB missions, as needed.

16. The specific scope of services is below:

17. **Inception Report.** It will cover review of all existing surveys, field investigations, reports/documents available from or through PID including feasibility report prepared by the PPTA Consultants. Based on the findings of the review and additional work done by the consultants within the first two months of assignment, the inception report will be produced discussing alternatives, if any, for structures and layouts including infrastructures for implementation and operation stage of the project. The report will also include the detail of additional field investigations / survey / studies required for accomplishing the assignment and social and environmental impact assessment, staffing status detailed work program for the study and any other findings / recommendations for review and appraisal by the Client, giving particular attention to water benefits in terms of irrigation, agriculture, municipal uses and envisaged remedial drainage measures.

18. **Midterm Report.** In order to support the conclusions under:

(i) Additional field surveys / investigations / model studies will be conducted under the supervision of the consultants. Optimization study of each alternative will be carried out;

(ii) Project layout for the different locations of structures and infrastructures for implementation and operation stage of the project shall be developed to the degree of detail necessary to provide a fair comparison between the alternatives. Aspects considered will be adequate remedial drainage measures and maximum water benefits from the project;

(iii) The population resettlement and environmental aspects of the project shall be reassessed at this stage of the study and quantified. The cost of resettlement and environmental aspects and proposed design shall be assessed for the economic and financial viability of the project; and

(iv) The Consultants shall present their conclusions and recommendations to the above effects in the shape of Midterm Report, for review and concurrence by the Client.

19. **Detailed Engineering Designs.** The Consultants shall proceed with and complete the detailed engineering designs of all the structures for the selected alternatives of the project components i.e. main canal, distribution system, crossings of Hill torrents and drainage measures including electro-mechanical works. For the purpose of cost estimating:

(i) All unit prices for major quantities of work shall be established by the latest methods. These methods will simulate each construction activity in such a way as to fit it into the available time span in the proposed construction schedule. Construction equipment, crews, materials and other resources would be adjusted to accomplish the work within the required time span. The computations of unit prices shall be supported by detailed sets of financial prices with source;

(ii) Indirect cost of construction for all major items, into which the construction work is subdivided for cost estimating purpose, should be established separately. Total cost of each construction item shall then be obtained by multiplying the direct cost of construction by a bid factor representing the influence of indirect cost;

(iii) Preparation of cost estimates of the project broken into local and foreign components. These shall include:

a) Reasonable breakdown by major items of electro-mechanical and civil works of canal / irrigation network. Price for major civil works and permanent equipment shall be estimated on the basis of ICB.
b) Environmental Impact Assessment and Resettlement Action Plan with cost estimation.
c) Project engineering and management expenses and an adequate allowance of physical contingencies.
d) Import duties, taxes and interest during construction (to be assessed separately and not be included in the base cost estimate).

(iv) Preparation of a construction schedule using CPM analysis and schedules for annual construction expenditures, both for local and foreign currency components, throughout the construction period as well as a schedule of annual expenditures for resettlement Action Plan and other item; and

(v) Task shall culminate at the production by the consultants of a design report with the cost estimate to be discussed in PMU, PID, Steering Committee and ADB.

20. **Tender/Construction Drawings and Documents**

(i) Preparation of tender drawings with sufficient details for the purpose of international competitive bidding; and

(ii) Preparation of tender documents (BOQ, special provisions and technical specifications) in line with FIDIC, Government of Punjab guidelines and standard practice for donor funded projects. The tender documents shall cover the civil / electro-mechanical works of the project and its components;

(iii) Preparation of construction drawings complete in all respect for civil, electrical and mechanical works; and

(iv) Preparation of Bid Evaluation reports and responses/replies to the quarries if any by approving authority.

V. DELIVERABLES REPORTS AND DOCUMENTS

21. **Reporting Requirements.** The Consultants will prepare the following reports in English with Arial font (12 for headings and 11 for body text). The tables should use 10 Arial. The consultants will submit Table of Content (TOC) for each report for prior approval of the Client. The consultants will provide these reports as per agreed program given below. Soft copies of all the reports either in Excel (with formulae format), Auto Cad, or any other software will also be submitted.

(i) **Inception Report.** Ten copies at the end of first two months covering each subproject;

(ii) **Midterm Report.** Ten copies at the end of first six months covering each subproject;

(iii) **Monthly Progress report.** Monthly progress shall be prepared on regular basis. The report shall indicate progress in the designing of structures required under the consultancy agreement. The issues that may hinder the planned progress shall be flagged along with the suggested solutions;

(iv) **Updated Resettlement Plans.** The project is "Category A" under ADB's resettlement guidelines meaning there may be likely be certain impacts due to the project. The consultants would assist PMU in updating the Land Acquisition and Resettlement Plan (LARP) and assist PMU in preparing LARP to meet ADB requirements;

(v) **Updated EIA and EMP.** The consultant will be responsible for defending the EIA at public hearings as and when held by the environmental protection agency;

(vi) Updated PC-1;

(vii) **Detailed Design Report.** Both the draft and final version of Detailed Design Report shall be prepared separately. The Report shall consist of detailed design after incorporating comments of the Client, POE and Advisory Group of PID. The reference of the formulae used in calculations will be mentioned in the calculation sheets in the remarks column for ease of review. Soft copy of the design calculations in Excel with formula format or any other software used will be submitted with the design reports;

(viii) **Engineer's Estimate.** Prepare the Engineer's Estimate of the expected cost of construction immediately prior to the issue of a bid documents. This estimate shall be based on the construction drawings and up to the date of assessment of unit price of the items prevailing at the time, and shall include all items as mentioned above. Engineer's Estimate shall be issued to the Client and the contents therein shall be treated with utmost confidentiality; and

(ix) Bidding documents separate for each contract package.

Reports	**No. of copies**	**Submission dead lines**
Draft Inception Report	5	Sixty (60) days after the effectiveness of Consulting Services Agreement
Final Inception Report	10	One (01) week after the review of Draft Inception Report by the Client
Updated LARF, LARP and LAR action plan		After 270 days of the effectiveness of Consulting Services Agreement
Updated EIA and EMP		After 270 days of the effectiveness of Consulting Services Agreement
Draft Mid Term Report	10	After 270 days of the effectiveness of Consulting Services Agreement
Final Mid Term Report	10	One (01) week after the review of Draft midterm Report by the Client
Monthly Progress report	10	10^{th} of the following month
Draft Design report	25	16 months after the consultants mobilization
Final Design reports including drawings	25	Two weeks after the review of Draft Design report by the Client
Draft Planning Commission Proforma -I (PC-I)	5	one week after Final design Report

Final Planning Commission Proforma -I (PC-I)	50	One week after the review of Draft PC-I by the Client
Engineer's Estimate	3	One week after review of Draft PC-1 by the Client
Bidding Documents with quantities and drawings	25	One week after clearance of Draft Bidding Documents by the Client
Operation and Maintenance Rules	10	2 weeks after final design report

Outputs:

a. Survey, Engineering Design and construction Drawings;
b. Cost estimate, Financing Plan, Engineer's Estimate and PC-I;
c. Procurement Plan, Implementation Plan and Implementation arrangement;
d. Financial management Assessment and EA's Procurement Capacity Assessment;
e. Contract Packages, Bidding Documents, bid evaluation and award of contracts;
f. Safeguards Plans and Climate Change Impact Assessment;
g. Design and Monitoring Framework;
h. Contract Award and Disbursement Projections; and
i. Funds Flow Diagram.

VI. ORGANIZATION OF CONSULTANTS TEAM

22. **Design Office.** The Consultants will establish the Design Office at Lahore. The cost of renting, furnishing and maintaining the office will be included in Consultants' financial proposal.

23. **Field Office.** The Consultants would be responsible for establishing, furnishing and maintaining any field office required for the purpose of survey, geotechnical investigation etc. in the project area. The cost of renting, furnishing, equipping and maintaining the field office will be included in Consultants' financial proposal.

24. **Security Arrangement.** The Consultants should note that the security risks at Lahore and in the project area is low to medium. The Consultants should review the security situation and identify any specific requirements at Lahore and in the project area as deemed necessary and include the details of security arrangement in their proposal. The cost of these arrangements should be included in the financial proposal.

VII. STAFFING REQUIRMENTS FOR DETAILED DESIGN OF THE JIP PROJECT

25. Following is the Client 's estimation of the composition of the Consultants' design team for the project but the prospective consultants should propose their own breakdown of staffing and level of effort / staff work based on their own evaluation of the proposed services. The consultants should propose a realistic deployment schedule for all positions depending on design requirements as all positions listed below would have inputs for different durations.

26. About 135 person-months of key experts and 654 person-months of other staff and PMU support staff will be provided by the consultants for detailed design of the project.

Staffing requirement for Detailed Design of Jalalpur Irrigation Project

Sr. No.	Position	Qualification	General / Overall experience (years)	Job Specific experience	Input in months of Experts (months)
Key Experts					
1	Water Resource Management Specialist (Team Leader)	The Team Leader will be a graduate Civil Engineer. A master's degree or PhD or foreign post graduate diploma in water Resources / Hydraulic Engineering is preferable and would be scored higher.	15	10 years relevant experience in the planning, construction and design of large scale Irrigation infrastructure. A minimum of 5 years specific experience as a Team Leader of similar projects.	18
2	Irrigation Engineering Specialist (DTL)	He/she will be a graduate Civil Engineer. A master's degree or PhD in Water Resources/Hydraulic Engineering/Irrigation Engineering is preferable and would be rated higher.	15	10 years professional experience in the planning of large scale Irrigation systems, including those where conjunctive use is an important aspect. At least five years of the experience will have been related to large scale Irrigation systems.	18
3	Agronomist	He/she will have a Master's degree in agriculture or irrigation agronomy and at least 15 years professional experience in planning major irrigated agriculture developments. PhD in agriculture or irrigation agronomy is preferable and would be rated higher.	10	7 years of the experience will have been on major irrigated agriculture projects.	6
4	Hydrological Specialist	He/she will be a graduate civil engineer. A Master's degree or PhD in Water Resources Engineering/Hydrology is preferable and would be rated higher.	10	7 years professional experience in hydrological analysis 3 years of which will have been on major rivers.	6
5	Hydraulic Design Engineering Specialist	He/she will be a graduate Civil Engineer. A master degree or PhD or foreign post graduate diploma in Water	10	7 years of professional experience in design of civil works for major hydraulic	18

Sr. No.	Position	Qualification	General / Overall experience (years)	Job Specific experience	Input in months of Experts (months)
		Resources/Hydraulic Engineering is preferable and would be rated higher.		structures and a minimum of five years, specific experience in design/rehabilitation of barrages/head-works and canal head regulators.	
6	Structural Design Engineering Specialist	He/she will be a graduate Civil Engineer. A master degree or PHD in Structural Engineering is preferable and would be rated higher..	10	7 years of professional experience in design of major hydraulic structures and a minimum of five years specific experience in design/rehabilitation of barrages/head-works and canal head regulators.	18
7	Mechanical Engineering Specialist	He/she shall have a Bachelor's Degree in Mechanical Engineer	10	7 years' experience in the design/fabrication and operation of gates, hoists and mechanical equipment for irrigation and drainage project.	6
8	Ground Water Engineering Specialist	He/she will be a graduate Civil Engineer. A Master's degree or PHD in groundwater engineering/geohydrology is preferable and would be rated higher.	10	7 years' experience in the groundwater engineering for irrigation and drainage project.	6
9	Geotechnical Engineering Specialist	He/she will be a graduate Civil Engineer. A master's degree or PHD in Geotechnical Engineering is preferable and would be rated higher.	10	7 years' of professional experience in design of civil works for major hydraulic structures and a minimum of five years specific experience in design/rehabilitation of barrages/head-works and canal head regulators.	12
10	Social Safeguards Specialist	Master degree in Sociology.	10	7 years' experience on resettlement /	12

Sr. No.	Position	Qualification	General / Overall experience (years)	Job Specific experience	Input in months of Experts (months)
				social studies for large water sector projects. Should have been involved with at least 2 projects funded by ADB or World Bank.	
11	Environmental Specialist	Master Degree in Environmental Science / Environmental Engineering	10	7 years' professional experience in conducting environmental screening/ Assessment of major water resources projects. Also 5 years' specific experience in similar position on water resources projects in accordance with GoP and ADB's Environmental Guidelines.	6
12	Procurement and Contract Specialist	He/she shall have at least a BSc Engineering in (Civil/Mechanical)	10	7 years' experience in the procurement of civil works and contract management. At least three years of this experience will have been specially related to Procurement under ADB/World Bank Projects using international and rational competitive bidding procedures.	6
13	Economic/Financial Analyst	Master in Economic or related disciplines	10	At least 7 years relevant experience in economic and financial analysis of irrigation projects	3

VIII. JOB DESCRIPTION AND QUALIFICATION OF CONSULANTS' STAFF

27. **Water Resource Management Specialist (Team Leader)**

(i) Provide overall direction of all specialists making up the consulting team and appropriately group individuals into work units responsible for a particular feasibility study and/or detailed design undertaking;
(ii) Manage relationships with PMU, PID, Government of Punjab and ADB as well as with other stakeholders including farmers, KPs and FOs;
(iii) Ensure timely delivery and quality control of all required outputs including detailed designs and tender documents for all the civil works involved;
(iv) Prepare detailed, time bound work plans for the design and tendering of all civil works contract packages envisaged for the works assigning various team members to each key task;
(v) Provide technical support and guidance in all aspects of headwork (if applicable), canal and distribution system design and tendering;
(vi) Coordinate and supervise the preparation of tender documents for headwork's (if applicable), Main canal and distribution systems;
(vii) In close coordination with PMU, supervise the tendering process and subsequent evaluation of bids and preparation of award recommendations for the initial contracts Main canal and distribution system;
(viii) Provide coordination and oversight to ensure that monitoring and evaluation, resettlement, environmental, agricultural, on-Farm water management, groundwater resource management and institutional aspects of the studies appropriately address the situation identified on the ground;
(ix) Work with the Project team to develop innovative assurance mechanisms to ensure institutional reforms remain the key element driving all project activities; and
(x) Monitor the progress of all planning and design work ensuring that deadlines relating to delivery dates are met.

28. **Irrigation Engineering Specialist (Deputy Team Leader).** His/her duties will include but not limited to the following:

(i) Based on both current and future cropping patterns, and determining the crop water requirements for each crop included and based on current and improved future conveyance efficiencies, determine the irrigation requirements at the main canal, branch canal, distributary/minor canal and the watercourse heads;
(ii) Prepare comprehensive plans for construction of main, branch, distributary and minor canals including control structures and required supporting infrastructure including cross drainage, emergency escapes, bridges etc. for the command of project area;
(iii) Adopt and recommend innovations into the command area designs that will improve irrigation efficiency and delivery flexibility and ensure equitable distribution of surface water throughout the command;
(iv) In consultation with the hydraulic and structural Engineer, confirm both functional and structural requirements of main canal and distribution system structures;
(v) Recommend any supply arrangements from the main, distributary and minor canals to watercourses to improve either efficiency or equity of distribution;

(vi) In consultation with the groundwater specialists and agronomist develop effective conjunctive use strategies for optimal use of the limited canal supplies and local groundwater resources;
(vii) Ensure that adequate flow measurement sites are provided throughout the system to facilitate both system management and monitoring of system performance;
(viii) Work with the agronomist in making adequate provision for the water requirements of higher value crops which may be introduced into the cropping pattern in the future;
(ix) Use focus groups and stakeholder consultation to develop a construction process for distributary and minor canals that fully involves KPs, FOs and farmers in general in both the detailed design and implementation of the system improvement;
(x) Develop operation and maintenance strategies for the irrigation infrastructure by the FOs, PID/AWB; and
(xi) Develop monitoring and evaluation parameters for the project and identify related research needs to ensure achievement of project objectives.

29. **Agronomist.** His/her duties will include but not limited to the following:

(i) Identify the major constraints to be faced by the farming communities in the Jalapur canal commands which would affect agricultural productivity including provision of inputs, post-harvest and marketing of produce, availability and dependability of the irrigation water supply and soil salinity and sodium problems;
(ii) Review the farming systems in place in the command area with particular emphasis on improved wheat and cotton production technology, annual horticulture crops (vegetables) and perennial horticultural crops including orchards and vineyards. Assist the irrigation specialists in a review of both current and future cropping patterns with respect to water requirements with an objective to develop optimal strategies for cropping systems considering the improvements in water availability, dependability and distribution to result from the rehabilitation and upgrading of the irrigation system;
(iii) Provide the economist with present, future without and future with cropping patterns (fully indicative of intensity), yields and production for the project areas;
(iv) Work with the monitoring and evaluation specialist in developing agriculture related monitoring and evaluation parameters for the projects;
(v) Assess the linkages between rural poverty in the project area and irrigated agriculture; and
(vi) Advise on soil reclaiming, consumptive water uses of ground and surface flows and identification of crops suitable for canal command.

30. **Hydraulic Design Engineering Specialist.** His/her duties will include but not limited to the following:

(i) Organize and supervise topographic surveys and any other investigations required to provide necessary input data for detailed design preparation for Jalalpur main canal and its distribution system;
(ii) Work with the Hydrologist Specialist in predicting likely water levels at the barrage for flood flows of different return intervals and during normal operation;

(iii) Use mathematical modeling results as appropriate to refine both design proposal and operating rules for each of the barrages by simulating the effects of varying design parameters;

(iv) Analyze hydraulic design options for all barrage features with a view to cost effective rehabilitation;

(v) Coordinate and supervise detailed design of all hydraulic aspects of the barrage rehabilitation works including preparation of relevant construction drawings and specifications as well as contributing as required to the preparation of the final tender documents;

(vi) Draft relevant portions of the Operational Manuals for Head Regulators, X-regulators and Hill Torrent crossing with emphasis on operating rules based upon water level observations, available flood prediction information and the irrigation demand on the system;

(vii) Undertaken the design of project works including but not limited to (a) cross regulator and distributary head regulator replacement/rehabilitation, (b) Main canal sectioning grading and rerouting if required for the Jalalpur main canal and its distribution system, (c) cross canal structures such as inverted siphons, aqueducts, etc., (d) required bridges and culverts, (e) outlets (watercourse outlets) as appropriate, (f) escape facilities and associated channels, and (g) associated flood and erosion control measure;

(viii) Special attention will be given to identifying reaches of the Main, Branch, Distributary, minor canals in the Jalalpur canal command where the porous nature of the in-situ soil materials is such that impermeable lining is required;

(ix) The conveyance and distribution system including the canals, control structures and all associated works will be designed in strict accordance with accepted fundamental of irrigation science, hydraulics, soil mechanics and structural engineering;

(x) In the design of all structures and features of repetitive nature, standard designs, pre-approved by the Team Leader and PMU should be used as appropriate to minimize duplicity of design inputs;

(xi) Analyze all design and construction methodology options for the canals and associated structures with a view to cost-effective of the project works;

(xii) Analyze all hydraulic design options for cross regulators, drop structures, measurement structures, road bridges, Distributary and minor head regulators and lined reaches ensuring satisfactory sediment transport and minimizing cost requirements without sacrificing system performance or control required for efficient and equitable distribution of irrigation water throughout project area;

(xiii) Ensure that all design teams involved in the design of the Jalalpur Distributary and minor canals participate in the walk-through pre design exercise enabling farmer's concerns to be addressed and identifying items of technical demanding work suitable for community contracting;

(xiv) Coordinate and supervise the detailed design of all canals and associated structures and works including the preparation of all required construction drawings, technical specifications and bills of quantities and contribute as necessary in the preparation of the final tender documents;

(xv) Draft relevant portions of the Operation Manuals for the Jalalpur canal and its distribution system command ensuring optimization of water deliveries using the newly constructed facilities;

(xvi) Prepare viability of the hydropower generation in project works and provide necessary provisions of interface where necessary while designing such

structures. The design of head regulator at Rasul Barrage should be done in such a way that hydropower unit may be installed at later stage; and

(xvii) Update Operational Manuals for all the major structures, main canal and each branch and distributary canal in the command ensuring optimization of water deliveries using the existing or newly constructed facilities.

31. **Hydrological Specialist.** His/her duties will include but not limited to the following:

(i) Update flood frequency analyses of all the Hill Torrents which are crossing alignment of Jalalpur canal and its system;
(ii) Provide a technical overview of the design discharge to be passed through each crossing structure;
(iii) As directed by the irrigation design engineers establish flood frequency analyses for all cross drainages for which cross drainage facilities are to be provided on any of the main, branch or Distributary canals; and
(iv) During the design stages assist the hydraulic design specialist and others in assessing water levels upstream, downstream and at the sites corresponding to flood of various return intervals for the cross drainage facilities.

32. **Structural Design Engineering Specialist.** His duties will include but not limited to the following:

(i) Organize and undertake a critical examination targeted to establishing the overall structural and geotechnical (foundation) integrity of the barrage keeping in view the placing of new head regulator of Jalalpur main canal;
(ii) Analyze structural design options for all structures to be constructed in a cost-effective manner;
(iii) Coordinate, supervise and undertake preparation of detailed structural design, bills of quantities and technical specifications for all required project works;
(iv) Assist in drafting relevant portions of the Operational Manual for the Jalalpur Canal system with emphasis on procedures/practices to ensure the long term structural integrity of the structures;
(v) Organize and undertake a critical examination targeted to establish the overall structural integrity of major main canal structures to be constructed;
(vi) Analyze structural design options for cross regulators, distributary and minor canal head regulators, escapes, and road bridges with a view to cost-effective, but sustainable rehabilitation;
(vii) Coordinate, supervise and undertake preparation of detailed structural design, bills of quantities and technical specifications for cross regulators, falls, distributary and minor canal head regulators, escapes, siphons, aqueducts, outlets, and road and foot bridges as well as any other features identified requiring structural input and treatment and contributes as required to preparation of the final tender documents; and
(viii) Assist in drafting relevant portions of the Operational Manual for the main and distributary canals with emphasis on procedures/practices to ensure the long term structural integrity of the canal structures.

33. **Mechanical Engineering Specialist.** His duties will include but not limited to the following:

(i) Prepare detailed designs including drawing, specifications and costs for gates required for Jalalpur canal and its system;
(ii) Prepare detailed designs including drawing, specifications and costs for the motorization of all gates;
(iii) Coordinate and supervise detailed design of all mechanical and electrical aspects of the rehabilitation works including preparation of relevant construction drawing and specification as well as contributing as required to the preparation of the final tender documents;
(iv) Draft relevant portion of the Operational Manual for the X-regulators, Head Regulators etc. with particular emphasis on operation and maintenance of the gates and associated hoisting equipment;
(v) Coordinate and supervise detailed design of all mechanical aspects of the canal rehabilitation works including preparation of relevant construction drawing technical specification and bills of quantities as well as contributing as required to the preparation of the final tender documents; and
(vi) Draft relevant portion of the Operation Manual for the main and distributary canal with emphasis on operation and maintenance of the gates, associated hoisting equipment and other mechanical features.

34. **Geotechnical Engineering Specialist.** His/her duties will include but not limited to the following:

(i) Carry out (organize and oversee) a comprehensive review of foundation conditions at all type of hydraulic structures;
(ii) Identify any remedial foundation stabilization work to be included in the packages of works for the rehabilitation and upgrading of the barrages;
(iii) Formulate plans for and carry out detailed foundation investigations for the Project works;
(iv) Supervise the work of the sub-contracted drilling, sampling and testing services to ensure compliance with best geotechnical practice;
(v) Subsequent to the required Sub-surface investigations and required laboratory testing work with the principal Structural Engineer in preparing detailed designs and specifications for the foundation treatment/features of the new barrage works and any identified remedial work required with respect to the existing structures;
(vi) Assist in the preparation of the tender documents for the Jalalpur canal and its system as required;
(vii) Carry out (organize and supervise) a review of foundation conditions at the sites of major structures on the Jalalpur main canal and its system;
(viii) Formulate plans for and carry out required foundation investigations and associated materials testing for the canals; and
(ix) Assist in the preparation of tender documents for canal works as required.

35. **Social Safeguards Specialist.** His/her duties will include but not limited to the following:

(i) Assess all potential; resettlement impacts from the range of interventions proposed under the detailed design for Jalalpur canal and its distribution system within the Umbrella of ADB's resettlement policy;
(ii) Produce a Land Acquisition and Resettlement Framework (LARF) for the project to ensure consistency with ADB's Safeguard Policy Statement (SPS), 2009;
(iii) In collaboration with Resettlement Unit established in the PMU for LBDCIP and relevant PID staff, and on the basis of the detailed design, update preliminary

Land Acquisition and Resettlement Plan (LARP) required under all components of the Jalalpur Canal project;

(iv) Based on the detailed design and proposed schedule of construction contracts, split the overall LARP into stand-alone contract specific LARPs, each aligned with the corresponding contract package;

(v) Develop detailed implementation arrangements and schedule to carry out resettlement activities under the project;

(vi) Assess the capacity within PIPD, PIDA and other relevant agencies with respect to resettlement, and prepare detailed capacity development programs to strengthen PID's ability in the planning and implementation of resettlement activities under the project;

(vii) Assist PMU and PID and PIDA staff in complying with all requirements of ADBs SPS 2009;

(viii) Assist the PTL, PMU and PID and PIDA staff to address any comments received on updated LARF and LARPs in a manner satisfactory to ADB;

(ix) In addition to preparation of a detailed capacity building program per (vi) above, provide on the job training for selected PID staff during preparation and implementation of the LARPs;

(x) Assist the EA in developing a plan to publically disclose the proposed project and to conduct meaningful public consultations with affected communities - consultation should include but not necessarily be limited to public meetings, focus group discussions, and interviews, both structured and unstructured; and

(xi) Draft all relevant sections of project reports relevant to on resettlement as directed by the Team Leader.

36. **Environmental Specialist.** His/her duties will include but not limited to the following:

(i) Review all relevant documents, particularly the Environmental Impact Assessment study;

(ii) Prepare/update a cost effective environmental management and monitoring plan for the rehabilitation of the barrage which is in line with IEE/EMP recommendations so as to ensure minimal environmental effects both during and following the construction period;

(iii) Review the site specific environmental management plan (SSEMP) for all the contracts in the project, and ensure its implementation;

(iv) Prepare and execute required appropriate actions to mitigate any negative environmental impacts associated with construction activities in collaboration with PMU LBDCIP and all concerned stakeholders;

(v) Prepare a detailed reforestation plan for the Project and following construction oversee its implementation as required in the IEE/ EMP;

(vi) Develop training materials for PID, and PMU LBDCIP staff to support environmental protection measures and to monitor and mitigate potential environmental impacts;

(vii) Ensure that any environmental impact assessments, if required, fully comply with ADB guidelines safeguards policy statement(SPS, 2009) and ensure, that all required mitigation measures are identified and acceptable environmental management and monitoring plans reflecting full details regarding the estimated mitigation costs are in place through the SSEMP; and

(viii) Besides assisting in finalizing the biannual environmental monitoring report, he/ she will also assist the PMU in finalization of quarterly progress report, annual progress report and any specific report asked by PMU.

37. **Procurement and Contract Specialist.** His/her duties will include but not limited to the following:

(i) Prepare detailed Procurement plans and packages and determine realistic time bound schedules for Procurement, including parallel and sequential steps for Procurement of civil works from initial steps to the delivery of the services under the contract;
(ii) Develop, in consultation with PMU, the prequalification criteria, prepare notices of pre-qualification and prequalification documents and conduct the prequalification of international contractors in accordance with both PID procedures and ADB guidelines for the Jalalpur main canal and its distribution system;
(iii) Under the direction of the Team Leader/Design and using input from various specialists of the team prepare the international tender documents for the Jalapur main canal and its distribution system in FIDIC format agreeable to PMU, PID and ADB;
(iv) The documents to be prepared under (iii) above will include (a) invitation to bid, (b) instruction to bidders, (c) form of bid, (d) form of contract, (e) special and general conditions of contract, (f) drawing and specifications, (g) bill of quantities, (h) schedule of completion, and (i) all necessary addenda;
(v) In collaboration with the team leader and PMU, familiarize PID staff with the Procurement procedures to be followed under ADB's Guidelines for procurement and contracting to enhance the capacity of PID staff;
(vi) Invite the Pre-qualified bidders to submit bid and advise the committee established for evaluation regarding bid opening and technicalities of the evaluation process and ADB'S guidelines and requirements pertaining thereto;
(vii) Advise on preparation of the summery of evaluation and recommendation for award;
(viii) undertake project procurement risk assessment and prepare Project Procurement Risk Assessment and Management Plan (P-RAMP), including procurement capacity assessment of the EA;
(ix) based on P-RAMP, prepare the capacity building program to strengthen EA's capacity in undertaking procurement and address other risks identified;
(x) prepare draft procurement plan; and
(xi) prepare master bidding documents for different types of contracts under the project, including an RFP for selection of implementation consultant.

38. **Groundwater Specialist.** His/her duties will include but not limited to the following:

(i) Review all relevant studies on groundwater and drainage in the Jalalpur canal commands and surrounding areas with regard to sources, recharge quantity, quality, and all aquifer characteristics require to satisfactorily project safe aquifer yields;
(ii) Review and investigate the canal command in question with regard to salinization and sodification of project area soils and assess the need for conjunction use of surface water if groundwater of marginal quality is to be used for irrigation purposes;
(iii) Review prior groundwater monitoring activities which establish the number and location of existing tube-wells in the command area;

(iv) Estimate the long term changes in groundwater levels and quality under various future cropping intensities and the potential for long term environmental soil degradation under various conjunctive use scenarios in the command area being studied;
(v) For the command area develop a program of enhanced and regularized monitoring of ground water levels and quality to serve as a data base for development of finite difference groundwater model to serve as a tool for groundwater management in the command area;
(vi) For the command area identify and cost require for improvements in/additions to the surface water drainage system to complement irrigation flows; and
(vii) Provide input to and recommendations for a regulatory framework to be implemented in the Jalalpur commands suitable for other irrigation commands in Punjab and forming the basis for a Province wide regulatory undertaking.

39. **Economic/Financial Analyst.** With Master's degree in economics or related disciplines and a minimum of 10 years of overall experience and 7 years of relevant experience, the expert will:

(i) review the revised cost and benefits;
(ii) analyze relevant investment scenarios for the project;
(iii) update the economic and financial returns of the investments;
(iv) prepare the cost tables on standard format requires for project processing;
(v) advise on baseline data and update design and Monitoring Framework'; and
(vi) update Financial Management assessment of the executing agency.

TERMS OF REFERENCE FOR INSTITUTIONAL MECHANISMS

1. Institutional Reform Experts (1 = International for 4 Person-months and 34 = National for 18 person-months): The national experts will support the international expert to carry out, but not limited to, the following:

(i) review the study, finding and recommendations of the PPTA's consultants
(ii) discuss the PPTA's findings and recommendations with PID;
(iii) Independent assessment of the PIDA Act and its implementation including considerations such as roles, functions, membership. Equity, gender, geographic coverage effectiveness, resource flows and leadership as it relates to the Jalalpur canal commands;
(iv) study the existing irrigation system management practices at both the main and distributary canal level with a view to transfer of operations, maintenance and management of the system from the distributary head regulator downstream;
(v) conduct field assessment in regard to the Jalalpur canal command, liaise with PID, PIDA, designers and farmers on the possible models for Jalalpur Irrigation system;
(vi) develop a mechanism for sustainable and viable operations and management of Jalapur Irrigation system upon completion of project; and
(vii) National experts will assist the international expert in reviewing previous reforms, institutional and legal frameworks and lesson learned.

TERMS OF REFERENCE OF THE INDIVIDUAL CONSULTANTS FOR DESIGN REVIEW AND QUALITY ASSURANCE PANEL

1. **Hydraulic/Irrigation Infrastructure Expert (1 = National; 5 person-months on intermittent basis).** The expert should have bachelor degree in civil engineering and 25 years of experience in irrigation canals and drainage system design and management. A master degree in hydraulic, irrigation or related field is preferred. The expert will perform but not limited to the following tasks:

(i) Develop plan for design of irrigation and drainage system with the consultant team and the PMU;
(ii) Review design criteria, assumptions and methodologies;
(iii) Review water allocation in the light water delivery from upstream to downstream along the canals;
(iv) Advise the consultant on most efficient water conveyance and irrigation systems, which reduces non-beneficial water flow and maximize water productivity;
(v) Review irrigation and drainage system designs and agree with the consultant team and PMU on most cost-effective and reliable designs;
(vi) Advises on the sustainable operational management arrangements of the irrigation and drainage system;
(vii) Review drawings and specifications;
(viii) Prepare design review report; and
(ix) Any other review task requested by the PMU.

2. **Structural Design Expert (1 = National; 4 person-months on intermittent basis).** The expert should have bachelor degree in civil engineering and 20 years of experience in structural design, drawings and specifications of water, hydraulic or irrigation related projects. A

master degree in structural engineering is preferred. The expert will perform but not limited to the following tasks:

(i) Develop plans for design, construction drawings and specifications of the structures with the consultant team and the PMU;
(ii) Review structural design criteria, assumptions and methodologies;
(iii) Advise on appropriate computational and structural design model for efficient working;
(iv) Review structural design of regulators, bridges, canal head regulator, cross drainage structures and flood protection works;
(v) Review construction drawings and technical specifications;
(vi) Review quantity and cost estimates prepared by the consultant team;
(vii) Review contract packages in line with the capacity of construction industry and project implementation plan;
(viii) Review foundation designs; and
(ix) Any other review task requested by the PMU.

3. **Mechanical and Instrumentation Expert (1 = National; 3 person-months on intermittent basis).** The expert should have bachelor degree in mechanical engineering and 20 years of experience in design of gates and gearing system and instrumentation. A master degree in related field is preferred. The expert will perform but not limited to the following tasks:

(i) Develop plan for design of gates, gear and instrumentation system with the consultant team and the PMU;
(ii) Review design criteria, assumptions and methodologies for the gates and gearing system;
(iii) Review detailed design, construction drawings and specifications for gates and gearing system and instrumentation;
(iv) Assess capacity of local industry and advise the consultant the best design options;
(v) Identify best manufacturing and installation experts local and abroad (desk study only);
(vi) Review operation manual and advise on post-project operational management for better performance of the mechanical system;
(vii) Prepare review report; and
(viii) Any other review task requested by the PMU.