

# **GOVERNMENT OF KHYBER PAKHTUNKHWA IRRIGATION DEPARTMENT**



**ADP No. 2266 (2021-22)  
210453-UPDATION OF FEASIBILITY STUDY & DETAILED DESIGN  
OF TANK ZAM DAM, CHAUDWAN ZAM & DARABAND ZAM  
DAMS DISTRICT TANK & D.I.KHAN**

## **RFP/TORs**

**UPDATION OF FEASIBILITY STUDY, DETAILED ENGINEERING DESIGN &  
PREPARATION OF TENDER DOCUMENTS & PC-I  
OF  
DARABAN ZAM DAM, DISTRICT D.I. KHAN  
CHAUDWAN ZAM DAM, DISTRICT D.I. KHAN  
KORA NULLAH DAM, DISTRICT D.I. KHAN**

**DIRECTORATE GENERAL SMALL DAMS**

**October 2021**

  
**Deputy Director  
Small Dams Merged Area  
Irrigation Deptt.**

### DETAILS OF SITES

S.No	Name of Dam	Location	Catchment (Sq-M)	Storage Capacity (Acre-Ft)	Height of Dam (ft)	CCA (Acres)
1	Chaudwan Zam Dam	D.I.Khan	394	90,680	200	17376
2	Daraan Zam Dam	D.I.Khan	410	67,581	154	15345
3	Kora Nullah	D.I.Khan	192.75	15,733	120	6500

### INSTRUCTION REGARDING SUBMISSION OF PROPOSALS

1. Three copies of the technical and one copy of financial proposals in stippled/fixed binded form are required to be submitted. Proposal should be in a sealed envelop indicating original or copy on each enclosure, as appropriate.
2. The proposals shall be valid for a period of 180-days after the last date of submission, which is extendable on the expiry of above period through mutual agreement.
3. The technical and financial proposals of the consultants will be evaluated according to criteria for procurement of consultancy services of the Government of Khyber Pakhtunkhwa, applying weight-age formula of 80:20 for technical and financial proposals respectively.
4. Financial proposals "Technically Qualified" consulting firm will be considered and opened by competent forum in presence of the competitive firms representatives. The contract agreement will be governed by laws and regulations of the Govt. of Khyber Pakhtunkhwa.
5. Any observation on the TOR and LOI must be brought into the notice of the department before last date of submission of the proposals. No objection will be entertained after the submission of Technical and Financial proposals.
6. The employer reserves the right for any addition alteration or amendment in the TOR of the Project.



7. Consultants shall be responsible for payment of all taxes in vogue time to time by Govt in respect of personnel and other activities with no liability to the client.
8. Originally signed CVs of the proposed personnel having contact number and postal address along with availability certificate of the personnel for the Project shall be annexed in the Technical proposal.
9. The consultants shall quote the fee including detailed breakup cost and unit cost of all type of studies/investigations including review of previous studies, topographic surveys, Hydrological, Geological, Geo-technical, Environmental, Social and all other surveys, studies required for the assignment.
10. Payment for the personnel will be made as per actual time consumed on the Project but not in excess of the provision of man months made in the T.O.R. of consultancy.
11. Payment to the consultants for the survey and Geo-technical investigation and other investigation will be made as per actual work done at the site on the unit cost quoted by the consultant.
12. On the satisfactory performance of the services, the payment to the consultants shall be made as per actual inputs, while in case of incomplete assignment; the payment will be made for the work done in accordance with the breakup of the services submitted by the consultants.

**Other Conditions: -**

- 1) Security deposit and income tax/sale tax etc will be deducted as per the prevailing Government rules notified during period of agreement.
- 2) The consultant shall establish Project Manager Office at Peshawar.
- 3) Consultants shall appear in Project meetings and site visits and shall also make presentation if so directed by the department for which no TA/DA, boarding, lodging and claim for incidental charges etc, shall be entertained.
- 4) The consultant except with prior approval of the department shall not sublet the study or any part thereof.
- 5) The consultancy charges shall be inclusive of all costs of topographic survey, subsurface investigations, geophysical surveys and construction materials investigations etc.

- 6) The consultants will provide undertaking for the effect that the key staff would not be employed on the other projects during the currency of this agreement. Any violation will liable the contract for termination.
- 7) If the consultant fails to complete any activity or part of activity the client reserve the right to execute the same at the consultant risk & cost.
- 8) If a project or part of project is dropped due to any reason, man months of the consultant key staff and logistics will be curtailed proportionally.
- 9) In case, the consultant, without sound reason fail to complete the assignment according to the TORs/Time schedule, the consultant shall pay compensation & damage to the department equal to 1% of the consultancy fee per day to maximum of 10%

### **EVALUATION CRITERIA OF PROPOSALS**

Proposals of the consultancy firms will be evaluated as under

S.No	Description	Maximum Marks
A	Qualification & Experience of Technical Key Personnel	50
B	Experience of firm in undertaking Projects of dam & Hydraulic structures of similar nature & complexity	30
C	Work Plan/Manning Schedule & Methodology	20
	<b>Total</b>	<b>100</b>

Note.

- Each page of the proposal must be numbered, sealed & signed by the owner of firm
- Passing marks in each category will be 60%
- Proposals must be stippled binded. Ring binding will not be considered.
- Client reserves the right to make any change in TORs & marking criteria which is commonly applicable to all proposals
- Any observation/clarification required should be brought in notice of the Client / Employer before submission of the proposal during clarification meeting.
- Proposals shall be submitted in two copies (Marked as Original & Copy)
- Any mis-statement or false information provided in the technical or financial proposal will render the proposal as non-responsive and shall make the firm liable for punitive action under the relevant rules.



## A. Qualification & Experience of Technical Key Personnel

### ii. Marking criteria of Personnel

S.No	Description	Marks	Criteria
1	Qualification	20	B.Sc. Eng. or M.Sc. (16 Years Education)=80%, MS or M.Phil.=90%, Ph.D=100%
2	Languages	05	Pashto=2 (R W S) Urdu=1.5 (R W S) English=1.5 (R W S)
3	Experience	30	
	General Experience	7.5	Experience after completion of 16 Years education (15 years of general experience will carry full marks)
	Relevant Experience	15	Experience of particular discipline (10 years of general experience will carry full marks)
	Similar (DAM) Projects	7.5	Full marks for 10 Projects
4	Experience of Local Environment	05	Khyber Pakhtunkhwa=03 Pakistan=02
	<b>Total</b>	<b>60</b>	<b>Will be adjusted to 50</b>

iii. This proforma must be available on top of each CV in addition to the information to be provided as per standard format, Otherwise will not be considered.

1	2	3	4	5	6		
S#	Position	Proposed Personnel	Qualification	Knowledge of Languages	Experience		
					General	Relevant	Dam Projects
7	8	9					
Working Environme nt/Location	Cell No	Duration with firm					

#### Note.

- The proposals must contain salary details, last degree, PEC registration certificates of the key staff
- Each CV must be signed in Original by the Personnel & owner of the firm.
- Personnel above the age of 70 will be in eligible

## B. EXPERIENCE OF FIRM.

S.No	Description	Maximum Marks
1	Relevant/Specific Experience of Firm (Completed/In progress Dam Projects in last 10 Years)	18 Feasibility Study= 25% marks, Detailed Design= 40% Marks, Procurement= 10% Marks Construction supervision= 25% Total= 100%
2	General Experience of Firm (Any completed Project of Hydraulic Structures in last 10 Years)	12 Feasibility Study= 25% marks, Detailed Design= 40% Marks, Procurement= 10% Marks Construction supervision= 25% Total= 100%

### Note

- Five (05) Projects in each category will entitle the firm for full marks as per details stated below
- Consultancy Services of the Projects with cost less than Rs 1000 million will not be considered.
- Award & completion documents must be available in support of projects claimed as experience
- Below proforma & all required documents must be attached for any projects of Sr No 1 & 2 in addition to standard format.

1	2	3	4	5	6	7
S#	Name of Project	Location with Province & Country	Client	Address, Phone & Fax No of Client	Handled as: • Single Firm/ : • Lead Firm/ : • Joint Venture : Partner	Cost of Project
8	9	10		11		
Cost of Services	Scope of services <ul style="list-style-type: none"> <li>• Feasibility</li> <li>• Detailed design</li> <li>• Procurement</li> <li>• Construction Supervision</li> </ul>	Scope of Work				

## UNDERTAKING

It is hereby certified that the above are true statements based on facts and we take full responsibility for the correctness and accuracy of the information supplied herein to the

best of our knowledge and belief. This is also to certify that the owner/partners/directors working solely for the consulting engineering profession. This is further to certify that we are independent consulting engineer and have no interest in any construction and conflicting commercial industrial and business activities which are likely to influence our professional independence and neutrality. We also undertake to fully abide by KPPRA act/rules & the Pakistan Engineering Council (Conduct and Practice of Consulting Engineers) Byelaws 1986 & registered with Khyber Pakhtunkhwa Revenue Authority

#### **TERMS OF REFERENCE FOR UPDATION OF FEASIBILITY STUDY & DETAIL DESIGN**

1. Carry out additional topographic Geodetic, Geophysical surveys (if required and with approval of the client) for the detailed design of dam, appurtenant structures, command area, reservoir area, irrigation system and access road at appropriate scales for construction of the dam project.
2. Carry out additional sub-surface geo-technical investigation (if required and with approval of the client) at dam site and appurtenant structures, reservoir area, CCA and Irrigation network. The investigation will include necessary drilling of bore holes (core drilling) and collection of core samples excavation of test pits, trenches, collection of surface and sub-surface sampling field and laboratory analysis & testing. Complete in all respects as per Annex-I.
3. Carry out detailed design of the Project components including dam embankment, spillway, irrigation conduit, intake and outlet structures, irrigation network, intake structure for drinking water supply, road and buildings etc including the prospects & validity of future rising of the Dam.
4. Physical investigation of dam & reservoir periphery within 500 meter proximity of reservoir / Dams for studying and reporting behavior of seepage through dam/ reservoir



5. Sediment Study & modeling for estimation of appropriate sedimentation & life of reservoir
6. Seismic criteria for resistance against earthquake on Dams and all ncillary components shall be applied in the design.
7. Prepare and submit draft design report, specifications, tender drawings and tender documents.
8. Prepare and submit Final Design Report, specification, tender drawings and tender documents.
9. Revision of PC-I due to cost overruns, change in design approach with time or change in physical scope of work & submission of Revised PC—I in required number.
10. Prepare and submit construction drawings.
11. Periodic review of the construction drawings in accordance with latest site situation & requirements as proposed by the consultants/client from time to time.
12. Carry out Detail Command Survey & layout of canal network
13. Preparation of chakbandi & warabandi system for Irrigation system
14. Submission of complete Detail design calculations of all component of Dam in separate chapters.
15. Backup data for all design calculation will be provided in Design report.
16. Keep provision of future rising of Dam in design if required/possible.
17. Determine capital cost, recurrent cost estimate of various components of the project using current schedule of rates (MRS 2021 Khyber Pakhtunkhwa or any other approved by Government of Khyber Pakhtunkhwa). Relocation requirement if any (Road, HT & LT Power line, Water supply line etc) must be included in project cost estimation
18. Preparation of construction Schedule, CPM and Cash Flows.
19. Separate updated feasibility report & Separate design report will be framed & submitted.



## REPORTING AND DOCUMENTATION FOR

### DETAIL DESIGN

- i. Review Report & Inception Report (20 Copies each)
- ii. Land Acquisition PC-I (20 Copies)
- iii. Preparation of draft design report (03 copies), draft tender drawings (03 copies) and draft specifications and tender documents (03 copies).
- iv. Preparation of Updated feasibility report (25 copies)
- v. Preparation of final design report (including complete design calculation) in (25 copies), tender drawings (as required by client) and specification tender documents (as required by client).
- vi. Preparation and submission of construction drawings (As required).
- vii. Preparation and submission of command and capacity statement of the outlets and canal (As required).
- viii. Preparation of draft revised PC-I Proforma in (05 copies) and final revised PC-I Proforma in required numbers if required as directed by the client.
- ix. Preparation of regular monthly progress report (15 copies).

**MODE OF PAYMENT.** Mode of Payment will be on deliverables as per given details excluding cost of investigation from total approved cost, which will be paid as per actual.

S#	Description/Activity	%age payment of approved Cost
1	Upon Signing of Contract & establishment of offices	10%
2	Upon Submission of review report	10%
3	Upon Submission of Inception report	10%
4	Submission of Land Acquisition PC-I	10%
5	Submission of LARP	10%
6	Submission of Draft Design Report,	10%
7	Submission of Draft bidding documents & Draft PC-I	10%
8	Submission of Final Updated feasibility Report	10%
9	Submission of Final Design Report,	10%
10	Submission of final bidding documents & final PC-I	10%

The mode of payment indicated is tentative subject to alteration and is not to be considered as the cost of any activity but it is progressive payment for the facilitation of the consultants.

### PROFESSIONALS/ KEY PERSONNELS REQUIRMENTS

Consultant Bid Cost will be sum of Key Personnel's & Logistic requirement as per below details. Payment of survey, other investigation & vehicle (Running & maintenance) will be made as per actual inputs & will be adjusted in the end of study

#### A. DETAIL DESIGN OF SMALL DAMS. (12 Months)

S.No	Position	No of Personnel	Man Months	Billing Rate (Rs)	Total Amount
1	Project Manager/Dam/Structure Engineer	1	12.0		
2	Principal Hydrologist	3	24.0		
3	Principal Hydraulic Engineer	3	18.0		
4	Principal Geo technical Engineer	3	18.0		
5	Principal Soil Specialist	3	6.0		
6	Principal Irrigation Engineer	3	18.0		
7	Principal Economist	3	9.0		
8	Principal Geologist	3	18.0		
9	Seismic Specialist	3	6.0		
10	Principal Environmental Engineer	3	18.0		
11	Principal Contract Engineer	3	18.0		
Support Staff					
1	Autocad Operator	3	30.0		
2	Computer Operator	3	30.0		



3	Peon Chowkidar	6	12.0		
4	Driver	3	12.0		
Total			249.0		

S.No	Description	No	Months/Job	Rate	Total
I	Design Office				
1	Furnished Office Accommodation	1	12		
2	Electricity, Water & Gas Charges	1	12		
3	Office Supplies & Stationary	1	12		
4	Printing & Photocopying Charges	1	12		
5	Fax, Postage, Courier & Telephone Charges	1	12		
6	Transport Including running & Maintanance	1	10		
Sub-Total-I					3360000
II	Site Office & Camp	Sites			
1	Furnished Office & Camp Accommodation	3	18		
2	Electricity, Water & Gas Charges	3	18		
3	Office Supplies & Stationary	3	18		
4	Fax, Postage, Courier & Telephone Charges	3	18		
5	Transport Including running & Maintenance & Driver (4*4)	3	18		

6	Drilling by diamond drilling, holes of minimum 75 mm dia. vertical or at specified inclination using diamond core drilling bit, double barrel tube in masonry, concrete or rock including cost of all materials, machinery, labour, water, collection of core samples, logging & labelling samples, supplying wooden core box and re-drilling in case of collapse of sides etc. complete. excluding cost of mobilization & demobilization. (For depth 0 to 50 m and inclined at 0o to 10o vertically downward)	3	1800		
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7	Topographic and cadastral survey for head works/Dams & other irrigation projects by using Total station GPS, etc. with minimum 30 number of point reading per acre, to generate 15mx15m grid and 0.5 m interval contours including transfer of entire data to computer system in different geo-referenced layers / themes using features of standard software, compatible with design software packages, including supply of soft and hard copies of point readings, including digitizing village maps and super imposing the contours on village map (scale 1 in 4000) including marking all permanent features like roads, cart tracks, existing canals, mosques, tanks, forest boundary and electric poles, etc. including marking of ridges and valleys on survey sheet including supply of 4 soft copies and 4 hard copies after approval of competent authority, preparation & submission of grid and L-section nalla etc. complete	3	500		
8	Other Field Tests	3	Lumpsum		

#### **Qualifications and Experience of consultant's key personnel.**

Consultants will assign adequately qualified key personnel to carry out the implementation of the Project as described in TOR, man-month inputs for which are indicated above. The key personnel should possess the qualifications and experience as indicated against each position.

#### **Project Manager/Team Leader**

He/ She should at least be Master's Degree in Civil Engineering from a HEC / PEC recognized university. Ph.D. qualification in related engineering discipline shall be given additional

weightage. The incumbent should have specific experience of working in senior techno-managerial position with at least 10 years as team leader on similar Projects. The incumbent should have minimum experience of 15 years with at least 8 years on similar assignments. The incumbent should be able to lead the team of Consultants and assist Irrigation Department in timely completion of the services with a quality output.

### **Hydrologist**

He/ She should have at least Master's Degree in Civil / Hydrology or Water Resources Engineering from a HEC/ PEC recognized university. Ph.D. qualification in related disciplines will be given additional weightage. The incumbent should have at least 15 years overall experience with minimum of 10 years in Hydrological calculations of big catchments.

### **Irrigation Engineer**

He/ She should have at least Master's Degree in Civil / Water Resources Engineering from a HEC/ PEC recognized university. Ph.D. qualification in related disciplines will be given additional weightage. The incumbent should have at least 15 years overall experience with minimum of 10 years in tunneling. The incumbent should have at least 7 years of working experience.

### **Dam Specialist**

He/ She should have at least Master's Degree in Civil / Dam or Geotechnical Engineering from a HEC / PEC recognized university. Ph.D. qualification in related disciplines will be given additional weightage. The incumbent should have at least 15 years overall experience with minimum of 10 years on the similar projects / assignments. The incumbent should have at least 7 years of working experience as Expert (Dam Design).

### **Hydraulics Engineer**

He/ She should have at least Master's Degree in Hydraulic / Water Resource Engineering from a HEC / PEC recognized university. Ph.D. qualification in related disciplines will be given additional weightage. The incumbent should have at least 15 years overall experience with minimum of 10 years on the similar projects / assignments. The incumbent should have at least 7 years of working experience as Expert (Hydraulic Design)



### **Geo-tech Engineer**

He/ She should have Master's Degree in Civil Engineering (Geo Technical Engg) from HEC recognized University. The incumbent should have at least three (15) years of General experience & 07 years relevant experience.

### **Geologist**

He/ She should have Master's Degree in Geology / Rock Mechanics from a recognized university. Higher qualification in related disciplines will be given additional weightage. The incumbent should have at least 15 years overall experience with minimum of 10 years' experience in related assignments.

### **Economist**

He/ She should have at least Master's Degree in Economics or statistics from a recognized university. Higher qualification in related disciplines will be given additional weightage. The incumbent should have at least overall experience of 15 years with minimum 10 years exposure to financial analysis / evaluation /projects monitoring in public sector.

### **Environmental Engineer**

He/ She should have Master's Degree in Environmental Engineering/ Environmental Sciences from a HEC/ PEC recognized university. Ph.D. qualification in related disciplines will be given additional weightage. The incumbent should have at least overall experience of 15 years with 10 years working on similar assignments / projects. The incumbent should have at least 7 years of working experience as Expert (Environment).

### **Agriculture Engineer**

- ❖ He/ She should have Master's Degree in Environmental Engineering/ Environmental Sciences from a HEC/ PEC recognized university. Ph.D. qualification in related disciplines will be given additional weightage. The incumbent should have at least overall experience of 15 years with 10 years working on similar assignments / projects. The incumbent should have at least 7 years of working experience as Expert Agronomist).

**I. DETAIL FOR (GEO-TECHNICAL INVESTIGATION)****1. DRILLING**

Core drilling in all kind sub-surface formation, vertical and angle hole (at five locations).

- a. Abutments & Nullah Bed = As per requirement
- b. Spillway = As per requirement
- c. Upstream of main Dam axis in Nullah bed, As per requirement

**NOTE:**

All the bore holes shall be selected in consultation with the Engineer for the project. All kind of drilling activities/sub-surface investigations should be supervised by an experienced Geologist.

**DRILLING MACHINE**

Straight rotary rig (Portable)

**HOLE DIA**

N-Q size (76 mm inner dia)

**CASING**

Drilling through casing in overburden materials, using casing shoe bit (101 mm inner dia)

**DRILLING DEPTH**

- a. Both Abutments: - Height of dam.
- b. Nullah bed: - Up to top bed rock +5 meter penetration in bed rock or equal to Dam Height or at least 1-1/2 times the base width of Dam.
- c. Spillway: - At least 5 Meter penetration in bed rock.
- d. U/s of Dam body: At least 20 meter deep & if rock encountered at shallow depth then 6 meter penetration in bed rock.

**DRILLING FLUID**

Plain water is allowed whereas bentonit is not allowed as a drilling fluid however cement can be used as per site condition and as per instructions by the client.



## **FIELD TEST**

- (a) At constant head (03-meters interval depth)
- (b) At falling head(03-meters interval depth)

## **Calculation of K Values**

- ii. Water pressure test/LUGEON test at 03-meters interval.
- iii. Collection of UDS by Shelby/Denison/Pitcher sampler.
- iv. Standard penetration tests SPT using split spoon sampler.
- v. Assessment of %age core recovery.
- vi. RQD assessment.
- vii. Water samples collection.
- viii. Preservation of core samples in core boxes.
- ix. Preservation of soil samples in plastic jars.
- x. SPT, CPT or Denison test as per encountered sub-surface formation at 1-1.5 meters interval depth or as directed by the site Engineer/Geologist.

**Preservation of rock core samples in core boxes, labeling packing and storage along with transportation of core boxes to core shed Small Dams Organization, Kohat or as directed by Engineer.**

Transportation of selected rock core samples for testing to CMTL Laboratory WAPDA Lahore for the required test.

Taking of water samples from the bore hole and transportation to CMTL Laboratory WAPDA Lahore for chemical analysis.

Installation of 1-inch dia PVC pipe in line the drilled hole as a pizometer.

Excavation f test pits at 4-locations 6×6 feet up to maximum 15-feet deep below ground level or up to the bed rock/ground water, including back filling of pits to original ground level.

Collection of composite bulk samples from test pits including their labeling, packing, storage and transportation to testing Lan, CMTL, WAPDA Lahore.

Excavation of trenches 3-5 feet/up to bed rock and 10-feet long including backfilling of the trenches to original ground condition.

Collection of disturbed samples from trenches including their labeling, packing, storage and transportation to testing lab, CMTL, WAPDA Lahore.  
Providing photographs of core and core boxes.

**J. LABORATORY TESTING CONSTRUCTION MATERIAL STUDIES.**

S.NO	DESCRIPTION	QTY
1	Sieve Analysis/Gradation of coarse & fine Aggregates	75
2	Flakiness and Elongation Index	40
3	Atterberg Limits (LL, PL, PI)	40
4	Specific Gravity wet and dry	10
5	Sodium sulphate soundness test	10
6	Los Angeles Abrasion Test (Coarse Aggregate)	30
7	Un-confined compression and direct shear tests of clay samples	30
8	Crushing Strength of rock and rip rap some samples	25
9	Direct shear (rock and soil)	30
10	Swell potential of soil samples	30
11	Uniaxial Compressive strength test with Modulus of Elasticity	30
12	Water Absorption test of coarse and fine aggregates	20
13	Alkali Silica Reaction tests	10
14	Organic impurity test	10
15	Complete chemical analysis of water sample i/c TDC, Cl, SO <sub>4</sub> and pH	10
16	Coefficient of permeability	30
17	Abrasion test	15

**K. LABORATORY TESTING CONSTRUCTION MATERIAL STUDIES.**

S.NO	DESCRIPTION		QTY
1	Grain Size Analysis		45
2	Hydrometer Analysis		45
3	Atterberg Limits (LL, PL, PI)		25
4	NMC		30
5	Un-confined compression test	Dry condition	30
		Saturated condition	30
6	Unconsolidated Un-drained Traixial Test (UU0		10
7	Consolidated Un-drained Test (CU)		15
8	Consolidation Characteristics		15
9	Swell Potential of Dam Core Materials		15

10	Standard Proctor Compaction	25
11	Modified Proctor Compaction	25

- 11 Geo physical survey(refraction survey) parallel to Dam axis & at least 2 cross section at the valley floor perpendicular to Dam axis (300-500 meter in depth)
12. Providing photographs of core & core boxes.