

## Hiring of Consulting Firm for Resident Supervision & Monitoring

### **Amendment to the Shortlisting Criteria, Paragraph (ii)**

(ii) The Firm should have successfully completed at least 03 assignments of similar scale and size in last 05 years focusing on these assignments in areas of design, supervision, monitoring, procurement, contract administration, quality assurance, social, environment, management planning , implementation of resettlement action plan.

## Terms of Reference (TORs)

# Hiring of Consulting Firm for Resident Supervision & Monitoring

[Activity Reference No: PK-POSID-464120-CS-QCBS](#)

### 1. PROJECT BACKGROUND

Pakistan is exposed to a number of adverse natural events and has experienced a wide range of disasters over the past 40 years, including floods, earthquakes, droughts, cyclones and tsunamis. Exposure and vulnerability to hazards are further exacerbated by rapid population growth, growing urbanization, environmental degradation and shifting climatic patterns that can result in the occurrence of increasingly severe natural disasters.

Over the past decade, damages and losses resulting from natural disasters in Pakistan have exceeded USD 18 billion; as the population and asset base of Pakistan increases, so does its economic exposure to natural disasters. Sindh experienced major floods in 1973, 1976, 1992, 1994, 1995, 2003, 2005, 2007, 2010, 2011, 2012 and 2013. Besides riverine floods, primarily involving the River Indus, torrential flash floods have also severely impacted parts of Sindh. Floods in 2010 and 2011 were amongst the most devastating in the history of the region. Floods in 2010 displaced 7.2 million people and affected 11,992 villages. The impact on the economy of Sindh was estimated at PKR. 372 billion (USD 4.4 billion), with agriculture, livestock and housing contributing to major losses. The floods in 2011 inundated 38,347 villages, displacing 9.3 million people and human loss stood at 497 lives. The 2011 flood-affected districts constitute 86 percent of geographical area and house 54% of the total population of the province.

Flood 2022 in Sindh is a historic event. Record breaking precipitation was observed in most parts of the province. Due to various human and natural causes dewatering process in province is slow. The rain water accumulation was further aggravated due to coincided water flows from Balochistan and flooding in river Indus. Overloaded irrigation and drainage networks breached and dewatering process became more difficult. Cumulative effects caused large tract of most populated lands of the province went under water and the population and livestock in millions and crops in thousands of acres affected. The emergency was declared in 24 out of 30 districts of the province and large rescue and recovery operation with assistance of relevant stakeholders were initiated. *(Source Sindh PDMA)*

Besides floods, Sindh province faces drought in northern and south eastern region on recurring basis. The drought from 1998 - 2002 affected 1.4 million people, 5.6 million cattle head and 12.5 million acres cropped area, triggering spread of malnutrition-based diseases in the population and food scarcity in the province due to poor overall crop

production. On the request of the Government of Sindh, the World Bank approved the project and provided the funds for emergency rehabilitation of flood affected areas and damaged infrastructure of Irrigation sector after flood of 2022.

For the rehabilitation of the damages caused due to the floods of 2022, a meeting between The Country Director World Bank and Hon'ble Chief Minister Sindh was held on September 5, 2022 wherein on the request of Hon'ble CM Sindh, the World Bank offered financial assistance for the rehabilitation through Sindh Flood Emergency Rehabilitation Project (SFERP) for Irrigation and Drainage Network and flood protection infrastructure and construction of cascade of flood-detention dams on high-risk streams to cater for urban flooding

Following the World Bank's concept of "Build Back Better", the project is effective since January 10, 2023 with planned closing on December 31, 2027. Owing to its fast-paced progress, the Infrastructure Rehabilitation Component of the project is expected to be completed by October-2024. It is worth to mention that there are several high-priority works, which couldn't be taken up in SFERP (Phase-I) due to financial constraints from Donor Agency.

In the Portfolio Review for World Bank Financed Projects in Sindh, Hon'ble Chief Minister Sindh requested Country Director World Bank for additional financing to carry out these left-over works damaged during floods 2022 in the irrigation and drainage network of Sindh.

Flood-2022 played havoc to Irrigation & Drainage Network of Sindh. The initial damage assessment by the Sindh Irrigation Department grossed over Rs. 200 Billion (~USD 870 Million) which Government of Sindh couldn't finance alone. On the request of Hon'ble CM Sindh, World Bank agreed for financial assistance. The PC-I of Sindh Flood Emergency Rehabilitation Project - SFERP (Irrigation Component) included only the most severely damaged works that are critical to Irrigation Supplies, Drainage Network, and flood protection to Sindh, keeping in view the available financing of USD 212 Million. But there are several critical works left to be undertaken/ rehabilitated in the first phase of SFERP due to financial limitations. These works are included in SFERP Phase-II with Additional Financing.

It is also to be noted that the works included in the project are rehabilitation of already existing Irrigation & Drainage Infrastructure of Sindh which is well documented and details are available on the website of Sindh Irrigation Department.

However, the Design Consultant of these works has prepared a condition assessment report that is available on the website of the project and prospective Supervision Consultant may review the report during proposal preparation.

## **2. OBJECTIVE**

The main objective is to hire a consulting firm to supervise and monitoring of the sub-projects of SFERP Phase-II under additional financing in all aspects. These Sub-Projects

are scattered throughout the Sindh Province and the resident supervision consulting firm will be responsible for monitoring the construction work and implementing of Environmental and Social Management Plan (ESMP) under the World Bank's E&S and Sindh Environmental Protection Agency (SEPA) policies. The drawing, design, and contract awarding will be completed by another consulting firm. Hence, the resident supervision consulting firm will revisit the drawing & design and if there are any changes then before execution of work at a site it will discuss with the client.

The firm will develop a methodology for conducting the work and present it to the client for approval. The staffing requirements, including key and non-key staff, and the required man-months are provided below. Firm will also ensure in their staff mobilization that staff will be mobilized as per quantum of work. This office has segregated the staff year-wise hence during the execution of sub-projects changes may be made in the mobilization of staff. However, the total man months and quantity of staff will be consistent with the staffing schedule and remuneration will be calculated from the day of mobilization of staff.

### **3. SCOPE OF SERVICES**

The Services of Consultant are, but not limited to, carry out the following scope of work:

#### **3.1. Validation of Design and Detailed Drawings**

1. Consultant will review and validate the existing design and prepare detailed design and engineering drawings. Where needed, Consultant will modify design to conform to standards and specification with approval of the Client.
2. Review detailed Engineer's Cost Estimates prepared by the Design Consultants.

*Note: The shortlisted Supervision Consultant(s) after EoI can have access to the design, feasibility, and conceptual designs which have been prepared by the already on-board Design Consultant of the works.*

#### **3.2. Procurement Assistance**

Consultant will assist the Client in the procurement process:

1. Assist Procurement Committee in preparation of Bid Evaluation Report with Recommendation of award of contract
2. Assist Procurement Committee in identification and treatment of Abnormally Low Bids.
3. Assist the client in prequalification (if applicable) process starting from preparation of Pre-Qualification (PQ) Documents
4. Assist Client in responding to queries raised by prospective bidders, assist in pre-bid meetings
5. Consultant Should review / finalize the prequalification and bidding documents and provide assistance in the procurement / tendering process

Deliverables of this item of work will be as under:

1. Pre/ Post qualification Documents
2. Finalized bidding documents

3. Minutes of pre-bid meetings
4. Bid Evaluation Reports with recommendations
5. Verify and Examine Performance Security
6. Contract Documents

### **3.3. Environment, Social Safeguards & Gender Management**

Under this item of work, the consultant will be required to perform the following functions:

1. Evaluate preparation of Land Acquisition & Resettlement Plans and ESMPs.
2. Assist PMT and field staff in the implementation of RAPs and ESMPs.
3. Ensure compliance with World Bank Environmental, Social Safeguards & Gender operational policies / guidelines and national laws and regulations.

### **3.4. Preparation of Construction Drawings**

The Consultant is required to prepare and submit detailed construction drawings for all components of the project works. Such construction drawings/ documents may inter alia comprise.

1. Reviewed design construction drawings
2. Prepare any amended/ modified designs and drawings as may be necessary during execution of works at site
3. Review and recommend all designs, drawings sketches, proposed by the contractors, if any, under the terms of the Contract Agreement.
4. The Consultant shall during the construction period maintain a record of changes/ amendments to the Construction Drawings.

### **3.5. Resident Construction Supervision**

Consultant will carry out the following activities as “Engineer” defined in the construction contract.

1. The Consultant shall be responsible to check all surveys and benchmarks established by the contractors at each site of work and ensure accuracy of surveys and benchmarks before start of work.
2. Check the quality of material brought to the site of works by the contractors and ensure that it corresponds to the prescribed specifications/ quality.
3. Supervise the works under execution by contractor with respect to quality and quantity as per specifications laid down in contracts and point out defects/ deficiencies if any for their timely correction / rectification.
4. Review contractor’s day to day progress of work, prepare and submit to the Client, the fortnightly progress reports (physical and financial), ensure implementation of site safety standards.
5. Monitoring the implementation of ESMPs and assessment as provided in the construction contract.
6. Submit monthly progress report on environmental, social, occupational health and safety management plans, pointing out the deficiencies in the work and suggestions

for its remedial measures.

7. Advise, manage and supervise, required tests and surveys including joint inspections with the Client, of under construction works and maintain systematic record of these activities/tests performed in the field and laboratory.
8. The Consultant will assist the Client to administer the contracts of civil works contractors', in order to make engineering decisions and watch that all clauses of the Contract Agreement between the Client and the Contractor are being followed.
9. The Consultant will evaluate and finalize contractor's work programs, method statements, material sources, working / shop drawings, setting out of works, etc. and recommend approval thereof from Client.
10. The Consultant will regularly evaluate the contractor's resource requirements regarding construction machinery, manpower, materials, office/site staff establishment and laboratory facilities to ensure their compliance with respect to the approved construction schedule.
11. The Consultant shall provide general guidance, furnish timely assistance to the contractor in all matters relating to the execution of works and facilitate the contractor by providing necessary details of minor design changes as and when required during construction of the project.
12. The Consultant will keep a record of the running / Interim Payment Certificates & certify the quantities of work done for progressive payments based on approved / tendered rates and final payment to the contractor.
13. Prepare Variation Orders, if necessitated, under the provisions of construction contracts and submit to the Project Director.
14. Assist the Client in processing the claims of the contractors, if any, as per procedures laid down in the Construction Contract.
15. The Consultant will, with the approval of Client, give notice to the contractor of any defects and deficiencies, and if required, other suspension of the work (s), and ensure removal and substitution of the improper works, and recommend any additional appropriate action against the contractor.
16. The Consultant will assist Client in settling disputes (if any) with the contractor and make recommendations to Client for resolving the contractor's claims regarding time extensions and additional cost, if any.
17. The Consultant will set up a computerized project control system for monitoring the progress of implementation for each package of civil works as per planned schedules on Primavera (or any other) Software and update/modify these as and when required.
18. The Consultant will provide the Client with complete records, reports and review "As built" drawings & plans prepared by the contractor and provide a final completion report on the prescribed format testifying to the satisfactory completion of the works including the measurement of final quantities and certification of final payment due to the contractor.
19. Inspect the completed works periodically during the defect liability period, prepare list of deficiencies (if any), and plan remedial works and carry out their supervision and issue the defect liability certificates after the rectification of defects by the contractor.

#### **4. REPORTING REQUIREMENTS**

The Consultant will prepare the following reports and submit to the Client each in ten

copies along-with soft record.

#### **4.1. Fortnightly Report**

Fortnightly report will include work-wise milestone based physical and financial progress both during the corresponding reporting period as well as the updated cumulative progress till the reporting date.

#### **4.2. Monthly Report**

Monthly reports are to include works accomplished, status of payment made, claims for cost or time extensions, changes in scope, variation orders, graphical representation of progress against approved program, charts of physical progress for major items, relevant photographs, detail of impediments to the works, actions required by Client and give recommendations on how these problems may be overcome. At the initial instance, draft contents of such report are to be prepared and got approved from the Client.

#### **4.3. Quarterly & Periodic Report**

The Consultant will prepare a comprehensive report summarizing all activities under the services at the end of each quarter and also at other times when warranted by either party. Such reports shall summarize not only the activities of the “Engineer In- charge” but also the progress of the contract including all variations and change orders, the status and brief description of the contractor’s claims (if any), technical & contractual problems being encountered and other relevant information. At the initial instance, draft contents of such report are to be prepared and got approved from the Client.

#### **4.4. Technical Reports**

The Consultant will produce as necessary technical reports and position papers dealing with technical matters arising during the life-cycle of the project.

#### **4.5. PC-IV and Final Completion Report**

The Consultant will prepare a comprehensive Completion Report once the project reaches the stage of substantial completion. The Report must be submitted soon after the “handing-over” of the completed works and shall include the key information which includes, but not limited to the following:

1. Summarize the method of construction
2. “As-built” drawings and designs with other related record showing the location & details of all works carried out
3. The construction management performed
4. Recommendations for future projects of similar nature to be undertaken by the Client
5. Project Archives
6. Lessons learned

### **5. LOCATION**

The Sub-projects are in located in Sindh Province including Karachi, Jamshoro, Hyderabad, Dadu, Larkana, Shaheed Benazirabad, Naushahro Feroze, Matiari, Sanghar, Khairpur, Shikarpur, Mirpurkhas, Umerkot, Thatta, Sujawal, Jacobabad and Kamber Shahdadkot. The list of works is attached at Annexure-I.

## 6. TIMEFRAME OF THE PROJECT

The project is expected to start by December 2024 with an expected duration of 36 months and completion of the project is expected by December 2027.

## 7. STAFFING SCHEDULE

<b>Total Length of the Activity is 36 Months but Staff will mobilized as per quantum of work.</b>							
Sr.No:	Item	No. of Person(s)	Year 1	Year 2	Year 3	Man Months	Quantity
<b>A. Supervision Team</b>							
<b>i. KEY STAFF</b>							
1	Team Leader/ Chief Resident Engineer	1	12	12	3	27	27
2	Procurement and Contract Management Specialist	1	6	6	3	15	15
3	Environmental Specialist	1	12	12	0	24	24
4	Social Safeguards/ Resettlement Specialist	1	12	12	0	24	24
5	Gender Specialist	1	12	12	0	24	24
6	Structural/ Dam Design Engineer	1	6	0	0	6	6
7	Hydrology/ Hydraulic Design Engineer	1	6	6		12	12
<b>ii. NON-KEY STAFF</b>							
1	Resident Engineer (Dams)	1	12	0	1	13	13
2	Resident Engineer	4	12	6	3	21	84
3	Assistant Resident Engineer	10	12	6	3	21	210
4	Materials/ Quality Control Engineer	1	12	6		18	18
5	Engineering Geologist	1	12	6		18	18
6	Site Inspectors	20	12	6		18	360
7	Site Surveyors	6	12	6		18	108
8	Quantity Surveyor	5	12	6	3	21	105
9	AutoCAD Operator	2	6	6		12	24
10	Environmental Officer	3	12	6		18	54
11	Social Safeguard Officer	3	12	6		18	54
12	Monitoring and Evaluation Officer	2	12	12	2	26	52
<b>Total</b>						<b>354</b>	<b>1232</b>

### I. KEY STAFF

#### 7.1. Team Leader/ Chief Resident Engineer

The individual will have a Master's degree in Civil Engineering with preferably 25 years of experience in design, and construction management of dams/embankment and irrigation infrastructures and team leadership of similar projects. The Team Leader must have demonstrated ability to lead teams. Prominent experience in reviewing designs, drawings of Irrigation Infrastructure.

The responsibilities of the Team Leader/ Chief Resident Engineer will be but not limited to the following:



- Provide overall day-to-day coordination between the consultant team members in delivering the tasks under this consultancy service assignment.
- Review the design and drawings then composed the teams for site work.
- Suggest modifications, if required as per actual site conditions.
- Obtain related approvals from concerned authorities for any redesign and modifications.
- Assist the PIU in any project issue whenever required.
- Monitor progress against project implementation schedule (on any planning software tool preferably Primavera) and coordinate preparation and submission of monthly, quarterly and yearly progress reports with physical, financial and procurement progress, and technical reports.
- Carry out monthly aerial photography through drone cameras of the project sites in progress and submit the same (in high resolution) to PIU via USB and email monthly.
- Submit milestone-based fortnightly progress reports of the individual works/ sub-projects
- Monitor the construction work on site.
- Assist PIU in contract management.
- Will be responsible for the site work implemented in accordance with design and drawing.
- Review and issue construction drawings.
- Inform the client timely or before issuing instructions to the contractor, if any modifications.
- Present the overall progress of the project during the meeting with the World Bank team and Sindh P&D Department.
- Provide guidance to the team to ensure that the quality of work meets a required standard.
- Review & determine the Contractor's Claims.
- In coordination with relevant consultant team members, interpret the Technical Specifications and Contract Documents.
- Review the contractor's securities being in approved format.
- Ensure receipt of requisite insurances as per contract requirement.
- Review documentations and advance actions for handing over of site and advise on issuing notice to set the commencement date.
- Issue approval to the contractor's detailed work programme, suggest modifications if any, and ensure.
- Contractor compliance with the work programme.
- Scrutinize contractor's mobilization of equipment in accordance with the contractor's program.
- Issue to contractor amended alignment plan and profile drawings based on review of tender drawings and updated topographic surveys.
- In coordination with relevant team members, monitor supervision of all works and ensure proper supervision as per contract requirement.
- Monitor closely and regularly the progress of work and advise the contractor about corrective measures.
- Monitor the status of contractor's equipment, plant, machinery installations, housing and medical facilities.
- Direct and/or advise the contractor to avoid and/or reduce the risk in case of any emergency.

- Advise contractor in all matters covering safety and care of work, environmental aspects and labour welfare.
- Inspect the works on completion of each milestone before accepting the work and report to the PIU.
- Inspect works at appropriate intervals during the Defect Notification Period and advise the PIU.
- Submit PC-IV of the project upon completion.
- Any task assigned by the Project Director.

## **7.2. Procurement & Contract Management Specialist**

The Procurement & Contract Management Specialist will have a Master's Degree (sixteen years of education) in Engineering/ Management/ Procurement with 10 years of experience in procurement of works, goods and services, the expert should have demonstrated experience with managing FIDIC contracts for large works and have experience in foreign-funded projects. The expert must have knowledge and experience in managing contract management of civil work.

The responsibilities of the Procurement & Contract Management Engineer will be but not limited to the following:

- Ensure the contractor's compliance in accordance with the contract agreement.
- Assist PIU in resolving the contract issues.
- Assist PIU in reviewing and determining contractor's claims.
- Assist PIU in bid evaluation reports.
- Assist PIU in preparation of Contract Agreements.
- Ensure the Contract Management of the contract is carried out effectively.
- Reviewing of payment forecast from the contractor.
- Intimate to PIU about any needful modifications.
- Analyzing of submitted IPC by the contractor.
- Analyzing of bill according to the BOQ of the contract.
- Proper execution of the modifications in the contract.
- Attend the Bid opening meetings and endorse the Minutes of the meeting.
- Monthly progress reports are to be submitted to PIU.
- Update the schedule plan of work as per need.
- Examine and Verify Interim Payment Certificates received from the contractor.
- Maintain a permanent record of all measurements for the work quantities.
- In coordination with the team leader, assist the employer and the Engineer in the administration of civil works contracts.
- In coordination with the team leader, interpret the technical specifications and contract documents.
- In coordination with the team leader, review and ensure conformity of contractor's securities in approved formats.
- Ensure compliance of contractor in renewal of securities (Bank Guarantees).
- In coordination with the team leader, ensure requisite insurance furnished by the contractor is contract compliant.
- In coordination with the team leader, assist PIU in dispute resolution activities, if necessary, during the pendency of the contract.
- Any task assigned by the Project Director.

### **7.3. Environment Specialist**

The expert will have a Master's degree in environmental engineering/ sciences with 10 years or more professional experience in conducting environmental screening and assessment and monitoring and implementation of environment and social management plan of major flood & irrigation sector projects. He/she will have experience of working on similar projects should be fully familiar with the relevant national and provincial legislation and international environmental safeguards policies, and demonstrated ability to work in a multidisciplinary team.

The responsibilities of the Environment Specialist will be but not limited to the following:

- Scrutinize contractor's construction method statement for its being compliant to environmental aspects.
- Supervise the contractor in all matters concerning environmental aspects.
- Monitor compliance with the ESMP/ESIA by the contractor.
- Assist PIU in undertaking and monitoring of environmental safeguards.
- Identify and report any environmental issues that may arise during construction to the team leader and the employers.
- Perform regular coordination with the PIU team for any matters related to implementation, monitoring and reporting of World Bank safeguard policy.
- Review of ESMP/IEE/EIA/EMP/EMMP and revise or update if required.
- Carrying out frequent field visits and conduct monitoring for ESMP implementation.
- Ensure compliance with World Bank's environmental safeguards and continuing improvement of the project's environmental safeguards performance.
- Implementation of ESMPs /EMP/EMMP and prepare monitoring reports for submission to the World Bank.
- Develop monthly field visit plan for monitoring the ESMP implementation in consultation with the PIU.
- Prepare fortnightly, monthly, quarterly, and annual compliance reports on the implementation of ESMPs/ESIAs.
- Collection and review of Contractor's Environmental and Social Management Plans (CESMP) and ensure timely submission.
- Ensure all Health and Safety parameters at the sub-project sites according to the World Bank ESS Standards.
- Prepare fortnightly, monthly, quarterly, and annual compliance reports on the implementation of ESMPs/ESIAs.
- Participate in Progress Review Meetings and provide support for organizing site visits of World Bank Support Missions.
- Perform any other tasks as assigned.

### **7.4. Social Safeguards/ Resettlement Specialist**

The expert will have Master's degree in Sociology, Anthropology or other Social Sciences with preferably 10 years of relevant work experience including experience of social surveys and monitoring and implementation of social safeguards and resettlement plans. Good Understanding of the World Bank's safeguard policies and processes

The responsibilities of the Social Safeguards/ Resettlement Specialist will be but not limited to the following:

- Ensure that the project design has incorporated social safeguards to be undertaken during construction.
- Coordinating with the PIU, field implementation units, LARR field units, LARR Implementation and Monitoring consultants and preparing (a) the Social Monitoring reports (SMR) to be submitted to World Bank every month; (b) resettlement plans Updates or Addendums when necessary, and (c) the resettlement plans' completion reports.
- Ensuring compliance with the policies and acts listed in entitlement matrix and World Bank Safeguard Policy and propose corrective actions when necessary.
- Supervise construction to ensure implementation of social safeguards in accordance with ESMPs.
- Ensure implementation of RAP.
- Develop monthly field visit plan for monitoring the ESMP implementation in consultation with the PIU.
- Ensure that all resettlement issues have been settled prior to construction.
- Monitor GRM and effective compliance.
- Support the client in matters relating to land acquisition and resettlement.
- Supporting the engineering team during construction in minimizing social and resettlement impacts.
- Participating, documenting and monitoring the GRM.
- Provide expert advice in all matters relating to acquisition and resettlement.
- Prepare fortnightly, monthly, quarterly, and annual compliance reports on the implementation of ESMPs/ESIAs.
- Participate in Progress Review Meetings and provide support for organizing site visits of World Bank Support Missions.
- Perform any other tasks as assigned.

### **7.5. Gender Specialist**

The expert will have a Master's degree in Gender studies, Social Sciences, or Sociology, with preferably 10 years of relevant experience including case management and GBV monitoring and implementation of gender action plans and World Bank SEA/SH safeguard policies and procedures.

The responsibilities of the Gender Specialist will be but not limited to the following:

- Conduct a desk review of any available studies concerned with gender in the project sites and develop the methodology for the Gender assessment and design the data collection tools.
- Active Coordination with PIU, Gender action committee, field implementation unit, Third-party Gender monitoring, reports submit to every month.
- Ensuring compliance with policies acts listed in world bank SEA/SH policies and propose corrective actions when needed.
- Ensure implementation of GAP gender Action Plan and responsible to attend GAC meetings and reporting.
- Develop Monthly work plan for visit and monitoring of ESMP, GAP implementation in consultation with PIU.
- Monitor GBV GRM with confidentiality with responsive measures and report effectively.
- Support the client in matters relating to any GBV case management, visits, consultations.

- GBV Sensitization weekly, monthly to all site staff with monthly reporting.
- Responsible to reporting and monitoring of GBV GRM at site and community level.
- Prepare daily, weekly, monthly, quarterly, and annual reports on ESMPs/GAP/GBV-GRM.
- Conduct FGDs in vicinity of works sites in community and deliver training to local counterparts or local consultants on reporting mechanisms and FGDs with the sensitization on GBV/SEA/SH.
- Participate in Progress Review Meetings, GAC meetings and provide support for organizing site visits of World Bank Support Missions,
- Perform any other tasks as assigned.

### **7.6. Structural/ Dam Design Engineer**

The individual will have a Master's degree in Civil/ Structural Engineering with preferably 15 years of experience in structural design of small and large dams, regulators, aqueducts, pumping schemes and stations, embankment, irrigation infrastructures, and works of similar kind.

The responsibilities of the Structural/ Dam Design Engineer will be but not limited to the following:

- Review of detailed designs of dams, spillways, and other related structures.
- Conduct structural analysis using computational tools to ensure safety and stability under various load conditions (e.g., water pressure, seismic activity, and environmental factors).
- Perform hydrological and hydraulic analysis to assess the dam's capacity and efficiency in flood control, and water storage.
- Conduct risk assessments and ensure that dam/regulators/drains/embankment/canals comply with local, national, and international safety standards and regulations
- Supervise the construction of dam/regulators/drains/flood protection embankment/canals structures to ensure compliance with engineering designs and safety protocols.
- Collaborate with project managers, contractors, and other engineers to ensure projects are completed on time, within budget, and according to specifications.
- Review construction materials and methods to ensure they meet safety and quality standards.
- Review of conceptual designs for dams, including embankment, gravity, arch, and roller-compacted concrete (RCC) dam types.
- Review of detailed engineering designs, including spillways, outlet works, and associated hydraulic structures.
- Perform structural analysis of dam/regulators/drains/embankment/canals components to ensure safety under various loading conditions (hydrostatic, seismic, thermal).
- Utilize structural analysis tools and software (e.g., AutoCAD, STAAD Pro) to review of design safe and durable dam structures.
- Analyze hydrological data to determine appropriate reservoir capacity, flood levels, and spillway requirements.
- Conduct hydraulic modeling to optimize water flow through the dam/regulators/drains, ensuring efficiency and safety in operation.
- Review of Design flood protection features and ensure the dam/regulators/drains/embankment/canals can withstand extreme weather events.

### **7.7. Hydrology/ Hydraulic Design Engineer**

The individual will have a Master's degree in Civil/ Irrigation/ Hydraulics Engineering with preferably 15 years of experience in hydraulics design of small and large dams, canals, drains, embankments, regulators, aqueducts, pumping schemes and stations, irrigation infrastructures, and works of similar kind.

The responsibilities of the Structural/ Dam Design Engineer will be but not limited to the following:

- Conduct hydrological assessments to analyze rainfall patterns, surface runoff, groundwater flow, and evaporation.
- Use hydrological models and software (e.g., HEC-RAS, SWMM, MIKE HYDRO) to simulate water flow, predict floods, and manage water resources.
- Develop watershed models to assess how changes in land use, vegetation, and climate impact water systems.
- Assess the impact of climate change on water resources, including changes in rainfall patterns, rising sea levels, and the frequency of extreme weather events.
- Review of adaptive strategies to manage water resources in response to climate variability and ensure resilience in water infrastructure.
- Monitor and assess groundwater levels and recharge rates to ensure long-term water availability.
- Gather and analyze hydrological data using remote sensing, GIS, and field surveys.
- Analyze rainfall, runoff, river flow, and groundwater data to support hydrological models and design decisions.
- Review of hydraulic systems such as canals, dams, drainage networks, flood protection embankments and regulators and water distribution systems.
- Conduct fluid flow analysis using software (e.g., HEC-RAS, EPANET, ANSYS Fluent) to simulate water movement and pressure in channels, and other water systems.
- Review of design of spillways, weirs, culverts, sluices, and other hydraulic structures for dams, canals, regulators, reservoirs, and flood control systems (embankments).

## **II. NON-KEY STAFF**

### **7.8. Resident Engineer (Dams)**

The Resident Engineer will have at least a degree in Civil Engineering and a minimum of Ten (10) years' experience in the construction of small and large dams.

The responsibilities of the Resident Engineer (Dams) will be but not limited to the following:

- In-charge of site supervision as per design, drawings and specifications as per instructions of Team Leader/Chief Resident Engineer.
- Report progress of work as per schedule periodically.
- Assist Team Leader/ Chief Resident Engineer in verification of work for payment to contractors.
- Will ensure that quality control tests are performed regularly at sites.
- Verify and recommend for approval to the contractors detailed work programme, suggest modifications if any and ensure the contractor compliance with the programme.

- Scrutinize and recommend to finalized or revised Construction drawings and additional detailed drawings required for the execution of the work.
- Verify and recommend, the contractor's working drawings based on setting out details.
- Monitor supervision of all works and ensure proper supervision as per contract requirement.
- Monitor closely and regularly the progress of work and advise the contractor about corrective measures.
- Maintain a permanent record of all payments made to the contractor.
- Inspect the works on completion of each milestone before accepting the work and report to the PIU.
- Verify the entire measurements recorded by the cost and contract engineer and keep the track of BOQ in line with the contract agreement.

### **7.9. Resident Engineer**

The Resident Engineers will have at least a Bachelors' degree in Civil Engineering and a minimum of Ten (10) year experience in the construction & rehabilitation of embankments and other Irrigation Infrastructure.

The responsibilities of the Resident Engineer will be but not limited to the following:

- To ensure high standards of quality assurance in the execution of work and completion of the works within stipulated time limit.
- Comprehensive supervision of project implementation activities carried out by the Civil Works Contractor to ensure complete compliance with the drawings, technical specifications and various stipulations contained in the Contract Documents, with high standards of quality assurance in supervision and in the execution of work.
- Efficient construction supervision by personnel who are experienced in modern methods of construction supervision.
- To monitor the preconstruction activities.
- To assist in Team Leader in taking remedial actions to avoid slippages, cost over runs, delays by the civil works contractor.

### **7.10. Assistant Resident Engineer**

The Assistant Resident Engineer will have at least a Bachelor's Degree or DAE Civil or relevant discipline. Minimum 07 years of overall professional experience in project execution, construction supervision and project management. Must be familiar with procedure of World Bank/Foreign Funded Projects.

The responsibilities of the Assistant Resident Engineer will be but not limited to the following:

- Maintain coordination of project activities related to civil works and be responsible for the following up with Civil Engineer in the achievement of infrastructure related targets.
- Responsible for effective execution of Annual Work Plan in consultation with Resident Engineer and others.
- To execute the civil works as per approved scope, technical sanctions and specifications.
- Monitor Contractors traffic management and safety plans on the project sites and ensure their compliance as per standardized operating procedure (SOP).
- Preparing reports, briefs and monitoring progress.

- Any other duty assigned by the officer in charge.

### **7.11. Material/ Quality Control Engineer**

The experts will have a Bachelor's degree in Civil Engineering/ Master Degree in Geology with preferably 10 years' experience in quality control of similar projects. Their task will be to ensure the quality of construction is as per the design specifications.

The responsibilities of the Material/ Quality Control Engineer will be but not limited to the following:

- Assist the team leader and to finalize sampling methods and criteria and acceptance criteria for quality control and assurance.
- Examine the contractor's preparation and completed portion of work as per "Request for Inspection" and advise the contractor promptly.
- Keeps the Team Leader well informed regarding the QA / QC aspects of all works.
- Responsible for carrying out Mix Design for concrete and review of contractor's design.
- Responsible for strict compliance of quality assurance / control standards and contract provisions.
- Ensure and witness sampling and testing being carried out by the contractor and undertake additional tasks as necessary to ensure quality of works.
- Monitor closely and regularly the progress on materials procurement and quality and report to the team leader.
- Carry out inspection of the contractor's laboratory equipment and report to the team leader.
- Scrutinize test results/certification of all construction materials and/or sources of materials and undertake additional tests if necessary and report to the resident engineer and the team leader.
- Maintain a permanent record of all tests carried out for monitoring the quality of works.
- Monitor and maintain quality of construction materials in all aspects.

### **7.12. Engineering Geologist**

An Engineering Geologist will have a Master's Degree in Geotechnical Engineering or Engineering Geology with a minimum 10 years' of professional experience in the relevant field (geotechnical investigations, testing etc. Must be thoroughly familiar with all the standard laboratory and field-testing procedures adopted in case of landslide and flood studies, particularly followed for the construction of retaining and drainage structures.

The responsibilities of the Engineering Geologist will be but not limited to the following:

- Undertake all geotechnical investigation works.
- Review all reports related to, geological and geotechnical investigations, carried out for design.
- Recommend additional investigations if required and supervise these investigations/ field data collection and analysis.
- Assessing geological features to plan and execute sub-projects safely and sustainably.
- Overseeing the construction work and transportation of materials to and from the site to ensure compliance with safety regulations and that all processes mitigate risk.



- Work closely with other engineers and professionals.

### **7.13. Site Inspectors**

Site Inspectors need to have a degree in civil engineering/diploma of Civil Technology with preferably at least 5 years of experience.

The responsibilities of the Site Inspectors will be but not limited to the following:

- Carrying on site supervision of works as per instructions of ARE/ RE.
- To execute the civil works as per approved drawing and specifications.
- Promptly report progress of work and ensure timely, supply of materials, labor and deployment of machinery by contractor.

### **7.14. Site Surveyors**

The Survey will have diploma of Civil Technology with experience of 5 years' experience in surveying and marking layouts of major hydraulic structures.

The responsibilities of the Site Surveyors will be but not limited to the following:

- Supervise all additional surveys where required.
- Check the layout of various components of the Project.
- Assist the Measurement Engineer when help is needed for measurements of quantities.

### **7.15. Quantity Surveyors**

The Surveyor will have at least a Minimum Three-year DAE (Civil) degree from a recognized institute or relevant discipline. A minimum of five years of working experience in the field of civil construction, supervision, and project management is required, along with computer literacy. Must be familiar procedure of World Bank/Foreign Funded Projects.

The responsibilities of the Quality Surveyor will be but not limited to the following:

- Preparation and verification of engineering cost estimates and bill of quantities.
- Assist the PIU and also check the bill of quantities during the preparation of IPCs.
- Verification of contactor's (Interim Payment Certificates) IPCs.
- Preparation and verification of price adjustments/variation orders according to conditions of contract / Technical specifications.
- Preparation of weekly and monthly progress reports.
- Any other duty assigned by the Officer In-charge.

### **7.16. AutoCAD Operator**

The Operator will have at least an associate degree in Computer-Aided Design, Engineering Technology, or a related field. A minimum of five years of working experience in the field is required. Must know the detailed 2D or 3D designs using CAD software.

The responsibilities of the AutoCAD Operator will be but not limited to the following:

- Revising models and drawings to comply with changes during the construction process.
- Maintaining accurate records and managing drawing archives.
- Ensuring compliance with regulations and quality standards.

- Conducting site visits when necessary to better understand project dynamics and requirements.
- Updating software, drawings, and other documents.
- Communicating potential design issues to engineers.
- Review the design & drawing using the CAD software.
- Ensuring product designs meet required safety and structural standards.

#### **7.17. Environment Officer**

The Environmental Officer plays a vital role in formulating and executing environmental plans, which consist of legal guidelines aimed at minimizing environmental harm during the construction work on site. Masters/Bachelors in Environmental Science or Environmental Engineering with at least 5 years' experience. Must be familiar procedure of World Bank/Foreign Funded Projects.

The responsibilities of the Environment Officer will be but not limited to the following:

- Reporting to Environment Specialist for the implementation of environment policies under World Bank Policies as well as for the implementation of the SEPA standards.
- Assist, implement, monitor and coordinate all activities.
- Will conduct all necessary field surveys, proforma fillings, site examinations and necessary evaluations under World Bank as well as SEPA standards.
- The Environmental Officer is responsible for participating in the formulation of Smart Environmental Management Practices (SEMPs).
- Assisting in developing an integrated framework and local environmental laws/regulations.
- Will ensure the mainstreaming of project management and execution.
- Carry out any other tasks assigned by the Environment Specialist or Team Leader and top management.

#### **7.18. Social Safeguard Officer**

The Officer should have a Master's/Bachelor's degree in sociology, anthropology, gender studies or other social sciences. A minimum of 5 years of relevant experience and proven track record in working on projects covering a broad range of resettlement and social development issues. Good understanding of the World Bank's operational policies, processes and procedures including its safeguard policies.

The responsibilities of the Social Safeguard Officer will be but not limited to the following:

- Oversee the implementation of social aspects under ESMPs and resettlement aspects under RAPs. This will include guiding in the conduct of resettlement planning and implementation of RAPs in sub-projects and ensuring that mitigation measures on social safeguards are adequately implemented.
- Guide the monitoring process of social aspects (resettlement, social safeguards, gender, community participation etc) in all sub-projects. Develop and guide implementation of tools for monitoring of social safeguard aspects.
- Guide from a social perspective to any information campaigns undertaken by the Project.
- Oversee the implementation of the Grievance Redress Mechanism.
- Prepare monitoring reports on RAP and ESMPs for submission to the World Bank.
- Identify gender gaps and propose recommendations.
- Provide support on any additional tasks/support related to social analysis, economic and sector work.

- Work under the supervision and instruction of the Social Safeguard Specialist.
- Any other task assigned by the Team Leader and Social Safeguard Specialist.

### **7.19. Monitoring and Evaluation Officer**

The M&E Specialist is responsible for collecting, analyzing, and reporting data to help the PIU assess the effectiveness of work. They must be able to work independently and in teams, as well as have excellent communication, problem-solving, and project management skills. At least, a Masters degree or equivalent (sixteen (16) years of education) in Statistics/ Demographics/ Public Policy/ International Development/ Economics/Public Health, from a foreign or local university, duly recognized by the Higher Education Commission (HEC) of Pakistan. At least, Five (05) years of documentary verifiable experience; after acquiring stipulated qualification, in M&E for development projects in developing and implementing of monitoring & evaluation tools and result framework.

The responsibilities of the Monitoring and Evaluation Officer will be but not limited to the following:

- Assist the Team Leader and PIU in planning, designing, and developing of the M&E framework and procedures.
- Define the structure, data collection frequency, and data collection methodology for the M&E framework indicators.
- Prepare monthly, quarterly, biannual and annual progress reports.
- Submit the fortnightly report about progress to the client with the consent of the Team Leader.
- Provide Support to Field monitors in the implementation of the result framework.
- Ensure M&E indicators for the project are uniformly communicated to all project staff as well as PIU.

## **8. VEHICLES**

The Project Implementation Unit (PIU) has enough vehicles available, so the vehicles will be provided to the Consulting Firm by the PIU. The firm will only be able to claim the cost of fuel on a consumption basis by submitting a purpose dairy along with the original fuel receipts.

## **9. OFFICES**

One office will be located in Karachi near the PIU Office for frequent communication and one office will be opened as per requirement and near the construction site for easy access to all construction sites.

## **10. SELECTION PROCESS**

A Consulting Firm will be selected in accordance with the procedures set out in the "World Bank Procurement Regulations for IPF Borrowers Goods, Works, Non-Consulting and Consulting Services fifth Edition September 2023 and Consultants Quality and Cost Based Selection. This is a Time-based Contract.

## Annexure-I

S. No:	Name of Works	Location	Description of Work
1.	Rehabilitation of Suprio Bund (RD 0+000 to RD 164+000) Remaining Work.	Dadu	Suprio Bund is second line of defense after Flood Protection (F.P) Bund from the hill torrents of Kirther Range for the Right Bank of Sindh especially district Dadu, including KN Shah and Mehar, and Kamber Shahdadkot. The bund needs immediate rehabilitation w.r.t HFL-2022 keeping in view Build Back Better considerations
2.	Remodeling / Rehabilitation of Sehwan Protection (SP) Bund to accommodate the flow of Aral Wah.	Sehwan/ Jamshoro	The drainage capacity enhancement works, undertaken at Manchar Lake in first phase of SFERP, included remodeling of Aral Wah and its Head Regulator from previous 10,500 cfs to 52,500 cfs. This has put pressure to the Sehwan Protection (S.P) bund located at downstream of Aral Head Regulator. This embankment also need reinforcement to safely pass this enhanced discharge of flood water from Manchar Lake to Indus River.
3.	Rehabilitation of Larkana Sehwan (LS) Bund Mile 36 to 38, Mile 42 to 45, Mile 47 to 52, & Reconstruction of Road of LS Bund (37.61 RDs).	Dadu	The Larkana-Sehwan Bund is the river protection embankment which received heavy on-slaught during Flood-2022 in portions of bund lying in Dadu and Sehwan. The bund was also severely damaged due to relief cuts that were provided to evacuate flood water from Sehwan to River Indus.
4.	Rehabilitation of Larkana-Sehwan (LS) Bund Mile 55 to 58, Mile 91 to 97.7, Construction of Village Ring Bund (4 RDs).	Sehwan/ Jamshoro	
5.	Rehabilitation of KN Shah Main Drain and Leading Channel.	Dadu	The already dilapidated and stressed drainage system of the Right Bank received hefty blows during the Flood-2022. The deadly hill torrents from Kirthar Range and Bugti Range of Koh-Suleman that entered Sindh province thorough North-western border, in shape of flash floods, breaching Flood Protection (F.P) Bund, Suprio Bund, Main Nara Valley Drain, and ravaged every infrastructure that came along their way including the already stressed and swollen surface drainage network of Right Bank in Dadu, KN Shah, Mehar, Kambar Shahdadkot, Larkana, and Shikarpur.
6.	Rehabilitation of Shikarpur Drainage Network and Tube wells of Tube well Division Ratodero.	Shikarpur	
7.	Rehabilitation of Mehar Main Drain and Leading Channel, Sunhari Branch Drain, Kakol Branch Channel, Radhan Branch Drain, and Radhan Branch B Drain.	Dadu	
8.	Rehabilitation of Miro Khan Main Drain RD 0 to 164, Naudero Branch Drain RD 0 to	Larkana	

S. No:	Name of Works	Location	Description of Work
	71, Zakria Branch Drain RD 0 to 40, SKT Branch Drain from RD 85 to 175, 6R Sub Drain SKT System RD 0 to 62, Larkana South Branch Drain RD 0 to 25, and Rehabilitation/ Reconstruction of their Structures.		This rehabilitation of drainage system not only provides drainage for agriculture but also disposing-off flood water in MNV Drain which then disposes in Manchar Lake. The rehabilitation is necessitated since this drainage system is not performing its primary intended function at present while in case of any flood like that of 2022 will again cause inundation of the Right Bank.
9.	Rehabilitation/ Remodeling of Keti Bandar Ring Bund.	Thatta	Keti Bunder Ring Bund is the protection bund for Keti Bunder village. The village regularly comes under inundation during floods or when the water level at the downstream of Kotri Barrage is high in nearby creeks and the bund comes under on-slaught of erosion due to water. The rehabilitation of bund will help preserve safety of public and property.
10.	Rehabilitation of Regulators of KB Feeder Lower at RD 22, RD 77 Group Regulator, Rehabilitation of KB Feeder Lower Canal from RD 0 to RD 103.	Thatta	The downstream of Kotri Barrage has been at the lowest ebb when it comes to flood protection as the area also faces the problems of sea intrusion. The regulators, structures, and canals, which were already in dilapidated condition, received hefty blows in Flood-2022. The rehabilitation of regulators, structures, and canals is necessitated to ensure irrigation water supply for agriculture which is the back bone of economy of Sindh.
11.	Rehabilitation of Darro Branch and its Head Regulator and various allied works and regulators.	Sujawal	The rehabilitation of regulators, structures, and canals is necessitated to ensure irrigation water supply for agriculture which is the back bone of economy of Sindh.
12.	Rehabilitation of Thatta Drainage System.	Thatta	The downstream of Kotri Barrage has been at the lowest ebb when it comes to flood protection as the area also faces the problems of sea intrusion.
13.	Rehabilitation of Sujawal Branch Drain System.	Sujawal	The rehabilitation is necessitated since this drainage system is not performing its primary intended function at present while in case of any flood like that of 2022 will again cause inundation of downstream of Kotri Barrage. The drainage system on both the Right Bank and Left Bank on the downstream of Kotri Barrage, i.e. Thatta Drainage System and Sujawal Branch Drainage System respectively are in jeopardy and require immediate rehabilitation.
14.	Remodeling of Dhoro Puran Outfall Drain & Cross Regulator (RD 107 to RD 100).	Mirpurkhas	The rehabilitation of dhoros (abandoned water-ways) is an effective way to divert flood water. The construction of Spinal

S. No:	Name of Works	Location	Description of Work
15.	Remodeling of Head Regulator and Cross Regulator/ Weir at RD 297 of Dhoro Puran, its allied earthwork.	Mirpurkhas	<p>Drain was intended for providing drainage on the left bank of Sindh. But this construction has cut-off the natural dhoro/ waterways on the left bank and with no disposal system, the flood water used to inundate adjacent areas. These dhoro historically become effective during floods, hence if converted to proper engineered channel of water, they are an effective way to drainage to the left bank which essentially requires drainage. With this idea, the Rehabilitation of Dhoro Puran, in first phase of SFERP, from RD 110 to RD 222 along with construction of regulator at RD 210 has shown immense benefit in Monsoon-2024. This saved the Badin and Tharparkar districts from inundation despite rainfall of 384.9 mm in the area.</p> <p>The works included in this phase of SFERP will eliminate further bottlenecks and choking points between Dhoro Puran and Spinal Drain.</p>
16.	Provision of Drainage facility from Darya Khan Pumping Station to New Darya Khan Branch Drain, Hyderabad city RD 0 to RD 14.	Hyderabad	The low-lying areas of Hyderabad cannot evacuate flood water and require flood drainage facility. Presently the Darya Khan Pumping Station is being used to evacuate flood water. This pumping station being in the vicinity of human settlement is an environment hazard. Moreover, the pumping machine will need power supply to function which at times of floods is difficult to arrange. The construction of RCC drain is a permanent solution for this menace. The flood drainage scheme of Fasadi Wah will include mechanical pumping since it is near Indus River and will drain the flood water directly in the river. Flood-2022 exposed the vulnerability and need for additional and permanent drainage scheme for the area to help mitigate future floods.
17.	Flood Drainage Scheme from Wadhu Wah: Fasadi Wah.	Hyderabad	The design discharge of Rohri Canal is around 11,000 cusecs which tends to increase during fluvial floods as water level starts to elevate in River Indus or in pluvial floods as the water in the adjacent areas is disposed-off in the
18.	Rehabilitation of Kandiaro Escape Channel and Pumping Station.	Naushahro Feroze	
19.	Rehabilitation of Chanesar Escape Channel and Pumping Station.	Shaheed Benazirabad	

S. No:	Name of Works	Location	Description of Work
20.	Rehabilitation of Oderolal Pumping Station and Operator Room.	Matiari	<p>Rohri Canal. To control this increase in discharge, various escapes which are situated along the Rohri Canal can be used to decrease the discharge. Due to difference in elevation, these escapes require permanent mechanical pumping facility to effectively dispose-off water. The escapes are also to be re-sectioned for carrying the design discharge of pumping machine sets proposed at each location.</p> <p>As such as 15% increase in the discharge of Rohri Canal can be managed through these proposed works during floods. Rohri Canal is major canal on the Left Bank of Sindh and if this increase in discharge is not controlled, it can result in breach in the Canal and inundation of command area which comprised of Nausharo Feroz, Shaheed Benazirabad, and Matiari</p>
21.	Construction of Flood Detention Dam at Malir Nai.	Malir	<p>Based on the success story of first phase of SFERP where cascade of flood detention dams is constructed on high-streams near Karachi. Malir River, one of the major rivers of Karachi, starts its journey from Pipre-Baricha which is at the North East of Karachi and flows to the center and drains into the Arabian Sea. It is one of the two major Rivers that flows in Karachi. Mole and Khadeji are the major tributaries of Malir Basins which joins to form Malir River at upstream of the Jamali Bridge, Karachi. The other major streams of the basin are Jhanjhoo, Bazar, Thado, Sari, Konkar, Lat and Sukkan Nadi. 11 nos. flood detention dams are constructed on Lat and Mole Nai in first phase of SFERP. The dam, proposed in SFERP Phase-II, will add itself to the series of dams constructed on the Malir River for flood mitigation and detention and minimize urban flooding in sub-urban areas of Karachi. It is proposed on the downstream where Khadeji joins Malir River.</p>
22.	Rehabilitation of M.S Bund (Kot Almo) from Mile 15/0 to 24/7 along with Loop Bunds.	Sujawal	<p>MS Kot Almo Bund is a River Protection embankment situated at the downstream of Kotri Barrage. The meandering of River Indus over the years has created a sharp curvature</p>

S. No:	Name of Works	Location	Description of Work
			portion for which loop bunds are provided to avoid any catastrophe. These loop bunds underwent rigorous erosion during Flood-2022 and afterwards, hence the rehabilitation is warranted to avoid any untoward situation during future floods.
23.	Rehabilitation/ Reconstruction of Bridge structures along Danister Canal.	Jamshoro	In wake of Flood-2022, the drainage capacity enhancement works, undertaken at Manchar Lake in first phase of SFERP, included remodeling of Aral Wah and its Head Regulator and Danister Canal and its Tail Regulator.
24.	Stone pitching of Left-over portions of Aral Wah (RD 0+000 to RD 14+000).	Jamshoro	The Danister Canal was rehabilitated with discharge capacity enhanced from 1,500 cfs to 3,500 cfs. There are various VRBs crossing Danister Canal which have been affected through this capacity enhancement works at Danister Canal.
25.	Repair of Bund Sluices, Road Bridges, and allied structures along FP Bund.	Jamshoro/ Dadu/ Larkana	These VRBs have become bottlenecks in flow of Danister Canal to its full capacity. The Aral Wah is the major carrier of water from Manchar Lake to Indus River. The Wah has been rehabilitated and the discharge capacity is enhanced from 10,500 cfs to 52,500 cfs in first phase of SFERP but there are certain portions of the channel where stone pitching is still required to effectively carry the huge discharge without damaging the profile of channel. Rehabilitation of Flood Protection (F.P) Bund has necessitated modifications in the allied structures along and across the bund including, bridges, bund sluices, and other structures. These structures need rehabilitation to ensure efficacy of the project implementations. During first phase, various interventions were carried out at Manchar Lake, Sehwan due to its pivotal role in preserving Right Bank
26.	Rehabilitation of Pumping Stations including Pumping Machines along Right Bank of Sindh.	Larkana	The low-lying areas on the Right Bank lacks the gravity flow to evacuate flood water. This can only be carried out through mechanical pumping. Moreover, various drains become dysfunctional during flood since the cannot work for their design gravity flow. Hence additional mechanical pumps are required to carter for future need of



S. No:	Name of Works	Location	Description of Work
			flood mitigation. Flood-2022 played havoc specially to the Right Bank of Sindh where the water was received in huge quantum. In such scenario, where there is paucity of drainage beforehand and the problem of waterlogging looms large, this additional water creates prolonged inundation aggravating the inherit debility of the Right Bank. In first phase of SFERP, additional pumping machine sets were provided at different pumping stations of Larkana and Dadu. There is still requirement for installation/ replacement of pumping machines sets on the pumping stations of Right Bank.
27.	Remodeling of Aral Tail Regulator	Sehwan, Jamshoro	In first phase of SFERP, the drainage capacity enhancement works were undertaken at Manchar Lake, keeping in view the lessons learnt in Flood-2022. Two of the three outlets on Manchar Lake namely Aral Head and Danister Tail Regulators are remodeled which increase the flood water drainage capacity from 37,000 cusecs to 83,500 cusecs. The remodeling of Aral Tail Regulator is on the same lines and will augment the discharge capacity enhancement of Manchar Lake to Indus River
28.	Providing Drainage facility to Khair Wah Dhoro and other along Right Side of Rohri Canal of District Naushahro Feroz.	Naushahro Feroz	Built on the success story of Rehabilitation of Dhoro Puran, in the first phase of SFERP, which has proved to be an effective way to dispose-off flood water. Since these natural water-ways are already existing and by making them controlled and more engineered will serve the overall purpose of protection from flood/ rain water. The Khair Wah Dhoro is located on the Left Bank of Sindh where drainage is the main issue when it comes to flood due to excessive rainfall.