

**GOVERNMENT OF ORISSA,
DEPARTMENT OF WATER RESOURCES,
INVITATION FOR EXPRESSION OF INTEREST
Identification No.PMU-07/2011-12 dated 02.12.2011.**

Loan 2444-IND / OFID Loan 8240-IND: Orissa Integrated Irrigated Agriculture and Water Management Investment Programme (OIIAWMIP), Project-1.

Expression of Interest for Survey and design of canals and structures on main and distributary canals of Pattamundai, Machhagaon, High Level Canal R-1 and Kansbahal.

1. The Government of Orissa through the Water Resource Department is implementing the Orissa Integrated Irrigated Agriculture and Water Management Investment Program (OIIAWMIP) under ADB's Multitranchise Financing Facility. The investment program, aims to reduce rural poverty levels in the State by improving agriculture sector productivity and enhancing rural incomes. Resources under OIIAWMIP will be available tentatively in four tranches for projects located in northern and eastern parts of the State. Implementation of Project 1 under the first tranche is ongoing.

2. Department of Water Resources Government of Orissa is the Executing Agency for the aforesaid project. The Project Management Unit (PMU) under DoWR, Government of Orissa intends to utilize part of the proceeds of Project-1 for payment for Survey, Design and Related Services for main and distributary canals and structures on the Pattamundai, Machhagon, High Level Canal R-1 and Kansbahal sub-projects for their execution in Tranche-II. For additional information on the program and the separate sub-project request for Eol notices please visit website: www.dowrorissa.gov.in and <http://cms-csrn.adb.org>.

3. For the above purpose, the Chief Engineer-cum-Project Director (PD), Project Management Unit (PMU) invites applications from reputed national Firms/Consultants to submit their 'Expression of Interest'.

4. There are four sub-projects. The Consultants/Firms should submit separate Eols for each sub-projects in individual sealed covers they are interested in bidding. Details of the four sub-projects are summarised below:

Sl.	Sub-project	Length of main and distributary canals	No of new or reconstructed structures	No of structures to be renovated	Estimated cost of services including service taxes
1	Pattamundai Main & Disty. Canal	160km	26	635	INR 9.12 million
2	Machhagon Main & Disty. Canal.	240km	26	978	INR 8.39 million
3	High Level Canal R1 Main & Disty.Canals.	113km	46	295	INR 7.77 million
4	Kansbahal Main/ Disty. Canal.	29km	16	91	INR 1.78 million

The services to be undertaken at each scheme include: (i) topographic and condition survey of the canals and associated structures; (ii) limited geotechnical investigations; (iii) detailed design and preparation of drawings for new/rebuilt structures and those identified for major repairs; (iv) preparation of drawings, BoQ, engineer's estimate and tender documents.

5. Consultants may submit their 'Expression of Interest' in joint venture with other Consultants or a consortium of firms to comply with aforesaid requirements. All consultants and experts must be from ADB member countries and be eligible to participate in ADB financed projects under the provision of ADB's Procurement and Consulting Guidelines.

6. Interested Firms/Consultants should submit separate amplified “*Expressions of Interest, EoI*” which contain the following information for each of the sub-projects they are interested in bidding in the prescribed format of the EoI:

- i Consultants Profile and Registration
- ii Project Experience in last 3 years
- iii Consultant's Professional Personnel
- iv Financial Statements of the Firm/Consultant in last 3 years

7. The Consulting Firm/Consultant will be selected and engaged under Consultant's Qualification Selection (CQS) procedures in accordance with the guidelines on the Use of Consultants by Asian Development Bank and its Borrowers (April 2010). Selection of a Firm/Consultant shall be decided on the basis of the EOI and the only selected Firm/Consultant will be asked to submit a combined technical-financial proposal in prescribed RFP and then invited for contract negotiation.

8. The submitted amplified EoIs will be evaluated in accordance with the criteria mentioned in ToR. Only the Firm/Consultant that submitted the highest ranked EoI will be invited to submit a technical and financial proposal. The technical proposal will confirm the professional staffing given in the amplified EoI (or propose equivalent or better staff), as well as providing a methodology statement and work plan with detailed schedule to complete the assignment. The financial proposal will state a lump sum amount for the assignment substantiated by staffing costs and expenses. Subject to a satisfactory technical proposal contract negotiations will be initiated and, if successful, culminate in contract signing.

9. Interested Firms/Consultants may obtain more information, by attending Pre-Submission Meeting to be held on **15 December 2011 at 11 A.M.** in the Conference hall of the office of the Chief Engineer-cum-Project Director, PMU (OIIAWMIP).

10. The sealed Expression of Interest are to be submitted in the sealed tender box kept at either of two addresses indicated below, in hard and soft (electronic-CD) copy by **03 January 2012 up to 1:00 pm** during office hours. The name of the sub-project shall be clearly indicated on the outer envelope. Any EoIs received late through post will not be considered for opening (the Department will not be responsible for any lapses or delays in postal delivery). The Expressions of Interest so received shall be opened on **03 January 2012 at 4:00 pm** in the office of the undersigned in presence of the Firms/Consultants or their authorised representatives, who wish to attend. In the event of the office being closed on the last date of submission and opening of Expression of Interest (EOI), the EoIs will be received and opened on the next working day at the same time and same venue.

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11. The undersigned reserves the right to accept or reject any or all EoIs or cancel the invitation of EoI without assigning any reason thereof.

Sd/-
Chief Engineer-cum-Project Director
PMU, OIIAWMIP



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**ORISSA INTEGRATED IRRIGATED AGRICULTURE AND WATER MANAGEMENT
INVESTMENT PROGRAMME (OIIAWMIP) – PROJECT 1**

**REQUEST FOR EXPRESSION OF INTEREST FOR RECRUITMENT OF FIRM /
CONSULTANT FOR SURVEY, DESIGN AND RELATED SERVICES FOR MAIN CANAL
AND DISTRIBUTARIES OF MACHHAGAON SUBPROJECT**

**CE-CUM-PROJECT DIRECTOR,
PROJECT MANAGEMENT UNIT (PMU)
ORISSA INTEGRATED IRRIGATED AGRICULTURE
AND WATER MANAGEMENT INVESTMENT PROGRAMME (OIIAWMIP)**

November 2011

CONTENTS

Section	Description
Section I	Request for Expressions of Interest (Eol)
Section II	Terms of Reference
Section III	Format for Eol Submission: (i) Profile and Registration; (ii) Project Experience, (iii) Consultant's Professional Personnel; and (iv) Financial Statements
Section IV	Criteria for Evaluation of Eols

SECTION I

REQUEST FOR EXPRESSION OF INTEREST

12. The Govt. of Orissa through the Water Resource Department is implementing the Orissa Integrated Irrigated Agriculture and Water Management Investment Program (OIIAWMIP) under ADB's Multitranchise Financing Facility. The investment program, aims to reduce rural poverty levels in the State by improving agriculture sector productivity and enhancing rural incomes. Resources under OIIAWMIP will be available tentatively in four tranches for projects located in northern and eastern parts of the State. Implementation of Project 1 under the first tranche is ongoing.

13. Department of Water Resources Government of Orissa is the Executing Agency for the aforesaid project. The Project Management Unit (PMU) under DoWR, Government of Orissa intends to utilize part of the proceeds of Project-1 for payment for Survey, Design and Related Services for the Main and distributary canals of the Machhagaon Major Irrigation System (District of Jagatsinghpur), which is one of the OIIAWMIP subprojects. For additional information on the project please visit website: www.dowrorissa.gov.in and <http://cms-csrn.adb.org>.

14. For the above purpose, the Chief Engineer-cum-Project Director (PD), Project Management Unit (PMU) invites applications from reputed national Firms/Consultants to submit their 'Expression of Interest'.

15. The services will cover 240km of Main and Distributary canal systems. This includes: (i) topographic and condition survey of the canals and associated structures; (ii) limited geotechnical investigations; (iii) detailed design and preparation of drawings for 26 new or rebuild structures and 181 existing major structures, which are to be repaired / renovated; (iv) preparation of drawings, BOQ, engineer's estimate and tender documents.

16. Consultants may submit their '*Expression of Interest*' in joint venture with other Consultants or a consortium of firms to comply with aforesaid requirements. All consultants and experts must be from ADB member countries and be eligible to participate in ADB financed projects under the provision of ADB's Procurement and Consulting Guidelines.

17. Interested Firms/Consultants should submit an amplified "*Expressions of Interest, EoI*" which contains the following information, all in the format as given in this Document:

- v Consultants Profile and Registration
- vi Project Experience
- vii Consultant's Professional Personnel
- viii Financial Statements

18. The Consulting Firm/Consultant will be selected and engaged under Consultant's Qualification Selection (CQS) procedures in accordance with the guidelines on the Use of Consultants by Asian Development Bank and its Borrowers (April 2010). Selection of a Firm/Consultant is on the basis of the EOI and the selected firm will be asked to submit a combined technical-financial proposal and then invited for contract negotiation.

19. The submitted amplified EoIs will be evaluated in accordance with the criteria given in this Document. Only the Firm/Consultant that submitted the highest ranked EOI will be invited to submit a technical and financial proposal. The technical proposal will confirm the professional staffing given in the amplified EoI (or propose equivalent or better staff), as well as providing a methodology statement and work plan with detailed schedule to complete the assignment. The financial proposal will state a lump sum amount for the assignment

substantiated by staffing costs and expenses. Subject to a satisfactory technical proposal contract negotiations will be initiated and, if successful, culminate in contract signing.

20. Interested Firms/Consultants may obtain more information, by attending Pre-Submission of EOI Meeting to be held on **15th December 2011 at 11 A.M.** in the Conference hall of the office of the Chief Engineer-cum-Project Director, PMU (OIIAWMIP).

21. The sealed Expression of Interest from the eligible experienced and competent Firms/Consultants are to be submitted at one of two addresses indicated below, in hard and soft (electronic-CD) copy by **3rd January 2012 up to 1:00 pm** during office hours. The name of the sub-project shall be clearly indicated on the outer envelope. Any Eols received late through post will not be considered for opening (the Department will not be responsible for any lapses or delays in postal delivery). The Expressions of Interest so received shall be opened on **3rd January 2012 at 4:00 pm** in the office of the undersigned in presence of the Firms/Consultants or their authorised representatives who wish to attend. In the event of the office being closed on the last date of submission and opening of Expression of Interest (EOI), the Eols will be received and opened on the next working day at the same time and same venue.

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22. The undersigned reserves the right to accept or reject any or all Eols or cancel the invitation of Eol without assigning any reason thereof.

**Chief Engineer-cum-Project Director
PMU, OIIAWMIP**

SECTION II

**TERMS OF REFERENCE FOR
SURVEY, DESIGN AND RELATED SERVICES FOR MAIN AND DISTRIBUTARIES OF
MACHHAGAON CANAL SYSTEM**

Contents

I.	INTRODUCTION	1	
	A.	Subproject Location	1
	B.	Description of Existing Irrigation System	2
	1.	Existing Irrigation System	2
	2.	Main Canal	2
	3.	Distributary and Minor Canal Systems	3
	4.	Main Canal Structures	3
	5.	Distributary System Structures	4
	C.	Envisaged Scope of Rehabilitation and Upgrading Works	4
II.	DETAILED TERMS OF REFERENCE	6	
	A.	Introduction	6
	B.	Liaison, Monitoring and Assistance by the Project Management Unit	6
	C.	Topographic and Condition Surveys	7
	1.	General	7
	2.	Permanent Benchmarks	7
	3.	Canal Strip Surveys and Longitudinal Sections	7
	4.	Site Topographic Surveys for New Structures	8
	5.	Existing Structure Topographic and Condition Surveys	8
	6.	Plotting of Site Surveys	8
	7.	Accuracy of Topographic Surveys	9
	D.	Geotechnical Investigations	9
	1.	Introduction	9
	2.	Investigations at new structure sites	9
	3.	Investigations along canal	10
	4.	Recommendations for additional Investigations	10
	E.	Detailed Design	10
	1.	Design Criteria, Priority for Infrastructure Works and Standardization	10
	2.	Design of Main Canal and Distributaries	12
	3.	Design of Cross Regulators	13
	4.	Design of Head Regulators	14
	5.	Design of Bridges	14
	6.	Measuring Flumes	14
	7.	Outlets	14
	8.	Other Structures	14
	F.	Drawings	14
	G.	Bills of Quantities	15
	H.	Packaging of Civil Works Contracts	15
	I.	Contract Documents	15
	J.	Engineer's Estimate	16
	K.	Quality Assurance	16
III.	REPORTING, PERSONNEL, CONTRACT AMOUNT AND PAYMENT SCHEDULE	17	
	A.	Sequence of Survey and Detailed Design Work	17
	B.	Reporting	17
	C.	Personnel, Equipment and Facilities	20
	1.	Personnel	20

2. Equipment and Facilities	20
D. Contract Amount and Payment Schedule	21

ANNEXES

- ANNEX A: MAIN CANAL AND DISTRIBUTARIES OF MACHHAGAON CANAL SYSTEM
- ANNEX B: LIST OF STRUCTURES FOR MACHHAGAON CANAL SYSTEM
- ANNEX C: MINIMUM PROFESSIONAL CONSULTANTS QUALIFICATIONS AND EXPERIENCE

NOTE: The bidder must sign all pages of this ToR (downloaded from the cited DoWR website) to signify a full and clear acceptance and understanding of this document, which shall form part of the contract.

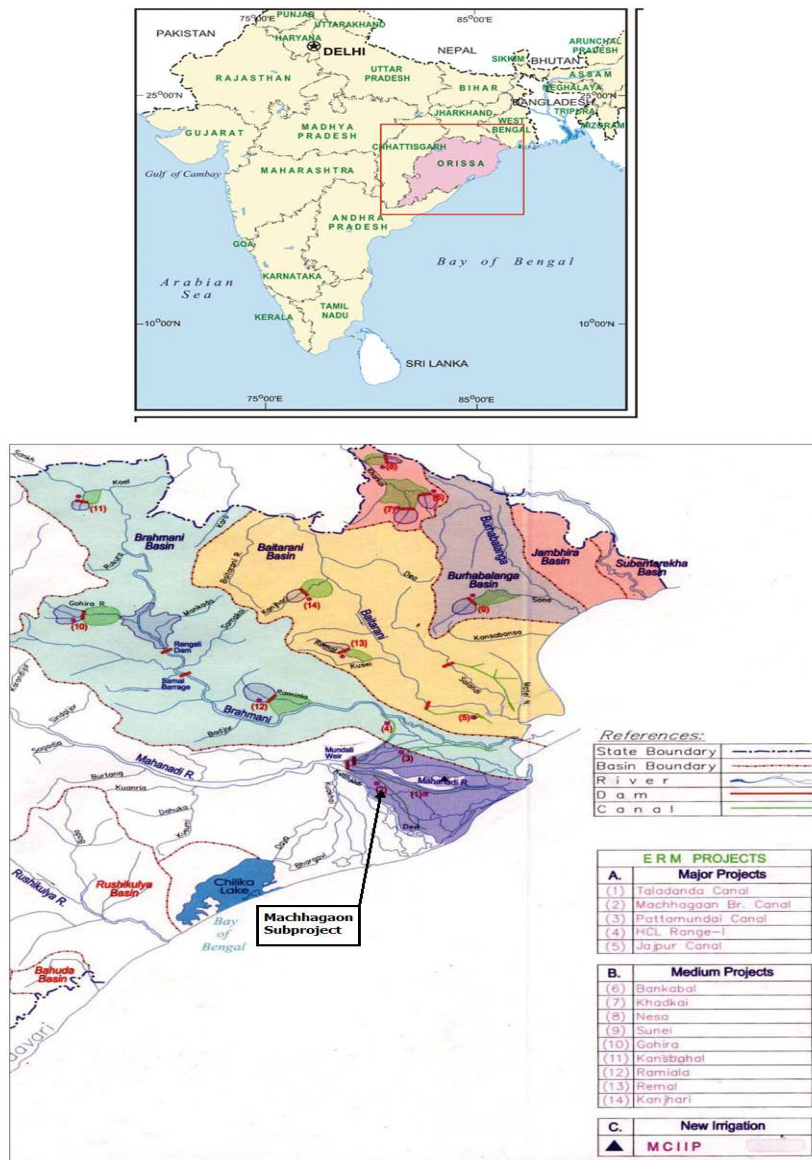
TERMS OF REFERENCE FOR SURVEY, DESIGN AND RELATED SERVICES FOR MAIN AND DISTRIBUTARIES OF MACHHAGAON CANAL SYSTEM

I. INTRODUCTION

A. Subproject Location

The Government of Orissa through the Government of India has availed a Multi-tranche Financing Facility (MFF) loan from the Asian Development Bank (ADB) approved in Sept. 2008 to partly finance the implementation of the Orissa Integrated Irrigated Agriculture and Water Management Investment Program (OIIAWMIP). It intends to apply part of the proceeds of this loan for payments for survey, design and related services for Main and Distributary canals of the Machhagaon Major Irrigation System, which is one of the OIIAWMIP subprojects. The executing agency for the project is the Department of Water Resources (DOWR), Government of Orissa. The location of the scheme is shown on Figure 1 along with the locations of other subprojects included in the program.

Figure 1: Location of Subproject



The Machhagaon Irrigation Scheme is located in the flat, low-lying delta of the Mahanadi River basin. The scheme is supplied by the Taladanda canal which offtakes from the Mahanadi Barrage at Cuttack at 20°28' 46"N, 85°54'76"E. The canal bifurcates at RD 11.75km, with one branch serving the Machhagaon scheme and the other the Taladanda sub-project. The command area is bounded by the Kathjori (Biluakhai, Devi) river to the south and west, the Hansua nullah to the north and the Saluan nullah to the east.

The canal command area is about 34,870ha and extends over seven blocks in two districts. In the kharif season the canal provides supplementary irrigation to about 90 percent of the area and the main crop is paddy. In the rabi season there is only sufficient water to irrigate between 25 and 30 percent of the area and the principle crops are pulses and mixed vegetables and spices. In addition to canal water, groundwater is used to irrigate between 3,000 and 4,000ha in the rabi season.

B. Description of Existing Irrigation System

1. Existing Irrigation System

The Machhagaon Canal dates back to the mid-19th century and was built primarily for navigation, but over the time irrigation has become more important and when the locks fell into disrepair navigation ceased.

The condition of the main canal, distributaries and ancillary structures has gradually deteriorated, resulting in reduced flows, distribution problems and increased maintenance.

The 52.425km long Machhagaon main canal takes off from the Taladanda main at the bifurcation structure at RD 11.75km. Salient features of the canal system are tabulated below.

Table 1: Machhagaon Canal Scheme

No	Description	
1	Original Command area	51,460 ha
2	Revised (2008) command area	34,870 ha
3	Revised Design Discharge (2008)/2011	38.1m ³ /s / 39m ³ /s
4	Length of Main canal	52.425 km
5	Distributary Canals off taking from Main canal	10
6	Minors off taking from Main canal	8
7	Sub-minors off taking from Main canal	32
8	Field channels offtaking from main canal	34
9	No. of locks (cross regulator falls)	4
10	No. of Escapes	3
11	Total number of outlets in command area	1863
12	Average command area per outlet	18 ha

2. Main Canal

The 52.425km long main canal is aligned along or quite close to the left bank of Kathjori and Devi rivers, following high ground, and its right bank forms the left bank embankment of the Kathjori river in its middle reaches. It is largely unlined. Some reaches pass through coarse sandy material and seepage and canal bank stability is threatened.

The canal appears to have been originally designed according to regime principal and its long section slope is close to the Lacey slope. The original design widths are also close to the Lacey regime width in the upper reaches, but downstream of Chatra weir at RD 32.99km a minimum width for navigation of 40ft (12.2m) was adopted leaving the lower reaches over wide.

3. Distributory and Minor Canal Systems

There are 10 (13) distributory canals and 8 minor canals and 32 sub-minor canals off-taking from the Main canal. These feed the command area.

For many decades the distributaries have operated below design flow and consequently many have silted up and lost prism shape. Also vehicle access along most of the distributaries is poor due to bank erosion and farmer cuts.

4. Main Canal Structures

Existing main canal structures are tabulated and described below.

Table 2: Main Canal Structures

No	Type of structure	No of structures
1	Cross regulators	1
2	Escapes	3
3	Cross drain structure	4
4	Head regulators	32
5	Road bridges	34
6	Field outlets	52
7.	VRB cum cross regulator	4

a. Biribati Head Regulator and Cross Regulators

The Biribati head regulator at RD 0 km comprises a 3-span bridge / 1.6m drop with adjacent disused lock. Upstream of the structure three small gates have been fitted to each span, giving a total of 9 gates (1.82 x 2.74 m). These gates are manually operated. Upstream and downstream are abrupt right angle return walls, and eddies circulate downstream catching trash.

The existing four VRBs/cross regulators are: (i) Kaijanga (RD 8.11km); (ii) Nawada (RD 24.38km), (iii) Chatra (RD 32.99km); and (iv) Padmapur (RD 41.72km). There are defunct lock chambers adjacent to the Kaijanga, Nawada and Padmapur weirs. There is also a check structure below the Biluakhai Syphon offtake with open bays.

The Biribati head regulator and the four cross regulators (with VRB) are similar in design. The piers, abutment and wing walls were all constructed from laterite blocks. Over the years gates have been provided, the steel joist supported timber deck bridges replaced / strengthened with RCC, and the downstream cistern (apron) floor of stone masonry covered with concrete. In all cases the laterite blocks are in admirable condition except some minor damage.

b. Head Regulators

There are 32 head regulators supplying distributary and minor canals. Most were constructed of brick with manually operated vertical lift steel gates or stop logs to close off orifice flow through the structure. None have gauges in working order and offtake flows are not measured. The largest head regulator is for distributary Nr 19 (original design flow 9.9 m³/s). This is a two span-gated orifice structure.

While the brickwork for these structures remains sound, the overall condition is poor, particularly with respect to gates, gauges and flow measurement ability.

c. Escapes

Existing main canal escape locations are: (i) Dhanipur at RD 24.20 km (1 nr gate: 1.25x2.0m), left to the Alaka river; (ii) Chatra at RD 30.974 km, also to Alaka river; and (iii) at RD 50.633 km left to a drainage nullah.

d. Cross Drainage Structures

There are 4 cross drainage siphons at 2.00 km, 4.6 km and 17.9 km. These are old concrete Hume pipe constructions and need replacement.

e. Road Bridges

In addition to the 5 bridges over the regulating structures, and one railway bridge at RD 470, there are 34 bridges along the main canal. Five of these bridges are wooden constructions and will be replaced with RCC bridges.

f. Field Outlets

There are 55 direct field outlets from the main canal. Where possible these should be closed off to facilitate equitable supply of measured flows to PPs.

5. Distributary System Structures

Distributary system structures are mostly brick constructions and most are in need of major repair or replacement.

C. Envisaged Scope of Rehabilitation and Upgrading Works

The project / program has completed initial studies and prepared a Feasibility Report and a Detailed Project Report (DPR) for the Machhagaon subproject. The scope of the proposed rehabilitation and improvement works have been determined from these studies and includes the rehabilitation of 52.4km of Main and 187.5km of distributary canal and the repair / up-grading of many of the associated structures as well as construction of some new structures.

Survey and detailed design has been initiated by the Department with long and cross survey completed for the Main and Distributary canals along with benchmark pillar establishment. The Design Statement and long section for the Main Canal has been completed and was approved by the Chief Engineer D&R in March 2011. Design Statements are being prepared for the distributaries. No structure surveys, detailed designs or drawings have been completed / finalized.

Under this contract it is required to: (i) check benchmark pillars elevations / coordinates and confirm the validity of completed long section designs; (ii) carry out topographic and condition surveys of all structures along the main canal and distributaries; (iii) carryout limited geotechnical investigations for new structures and also along sections of canal embankment where seepage is known to be problematic; (iv) prepare detailed designs and drawings for canals and associated structures – designs for canals are not expected to change from those already prepared / approved except as agreed with the PMU; (v) package the works into contracts and prepare contract documents including quantities for each contract along with engineers estimates.

For the distributaries, efforts to restore prism regime and embankment shape may be prioritized for the larger of the distributaries: (i) Distributary 19(R); (ii) Distributary 10(L); and (iii) Distributary 13(R).

Details of the scope of works are tabulated in Annexes A and B and summarized in Table 3. The detailed terms of reference are given in Section II: Detailed Terms of Reference.

The total number of structures is 1,336 but 923 of these are small (pipe) irrigation outlets. Of the 413 larger structures (ie excluding the irrigation outlets), 181 are thought to require substantial repair/ upgrading. In addition 26 new structures are envisaged comprising 25 new village road bridges (VRBs) and one new cross regulator (CR).

For the main canal one new cross regulator is required at Baluakai, RD 14+520. The structure will be similar to the existing structures, provided with vertical lift gates, operating platform and a separate bridge.

The rehabilitated and up-grading of these structures will improve water distribution and communications across the canal.

Table-3: Summary of Canal Structure Works

Sl. No.	Type of Structure	Existing structures	Structures to be rebuilt or new construction	Existing structures to be repaired
1	HR	125	0	51
2	VRB	168	25	55
3	Aqueduct	2	0	0
4	DS	52	0	40
5	Escape	3	0	3
6	CR	47	1	28
8	VRB cum CR	16	0	4
9	Outlets	923	0	797
	Total	1,336	26	978

II. DETAILED TERMS OF REFERENCE

A. Introduction

The Department of Water Resources is intending to out-source to a reputable competent firm the survey and detailed design work for intended rehabilitation and upgrading works for the main and distributary irrigation systems. The consultancy services are to cover: (i) topographic and condition surveys for the canals and structures, except where this has already been carried out by the Department; (ii) geotechnical investigations for new structures; (iii) detailed design and preparation of drawings; and (iv) preparation of bills of quantities, contract documents and the “engineer’s estimate” for each contract.

The detailed Terms of Reference for the contract are given below.

This contract covers the main and distributary canals and structures listed in Annex A and B.

The surveying and detailed design of the rehabilitation works for minors, sub-minors and field channels will be undertaken separately and is outside the scope of this contract.

B. Liaison, Monitoring and Assistance by the Project Management Unit

This survey and design contract will be one of several awarded for each of the subprojects where rehabilitation and upgrading is planned under the Project / Program and each of the survey and detailed design firms will be required to set up a design office in Orissa and maintain a close working relationship with the Project Management Unit (PMU) and its design staff. Close coordination will be required, inter-alia, for the following:

- i To prioritise the design and rehabilitation / upgrading works to ensure that the engineer’s estimates are broadly within the estimated budget for the infrastructure works.
- ii To agree on the packaging of the rehabilitation and upgrading civil works contracts.
- iii To ensure adoption of standard design criteria, survey and design procedures, standard drawings including standardisation of scales, title box, etc, bill item descriptions; contract specifications, etc for all subprojects.
- iv To confirm accuracy of existing surveys carried out by the Department, and specifically the Department Benchmarks.

The PMU will monitor progress and performance of the study in order to ensure that the services are undertaken in a professional manner and that all out-puts are to a high standard. Specifically it is envisaged that specialist design staff appointed to a Project Design Cell will be appointed to liaise and monitor activities and deliverables of all the survey and detailed design firms.

The PMU / Irrigation Department will make available to the consultant, at no charge, all topographic survey data it has. In addition the PMU will assist the consultant to procure maps and aerial photographs from the Survey of India office, though the consultant will be responsible for any payments required. Similarly, if required the Department will provide supporting letters to enable the consultant to procure satellite imagery from the commercial sector, but again any payments would be the consultant’s responsibility.

C. Topographic and Condition Surveys

1. General

The consultant shall undertake the topographic surveys using GPS instruments and/or total survey stations, with the data being stored digitally for download, reducing and plotting using approved DGM (digital ground model) software. The instruments shall be calibrated and the accuracy checked prior to commencing the surveys.

The Department has already completed longitudinal and cross section surveys along the main canal and distributaries. The consultant shall undertake surveys of all the existing major structures and detailed site surveys for the proposed new structure locations. Detailed surveys of outlets to minors, sub-minors and field channels are excluded, though the outlet invert, pipe diameter and length shall be recorded.

The datum for the surveys shall be the India National Datum and the consultant shall undertake the necessary surveys to transfer the datum to the site from two GTA Benchmarks. The consultant shall establish new benchmarks, where required to supplement those already taken by DoWR. The new and existing benchmarks shall be included in a comprehensive closed survey to confirm the level and co-ordinates of all the subproject benchmarks.

All survey drawings shall be on A3 paper, plotted at an approved scale, with a standard title box, notes, scale bar and revision history layout

2. Permanent Benchmarks

The consultant shall establish new permanent bench-marks (BM) where required at a maximum spacing of 500m, these shall be clearly visible from at least two others to facilitate reinstatement in the event of one being damaged or lost. The new BMs may be located on existing immovable structures or rocks, with a concrete nail driven into the object to indicate the exact point and the position clearly marked with permanent red paint. If no such hard point exists, a 600mm long, 200mm diameter concrete benchmark shall be provided that protrudes 150 mm above ground level. A nail shall be set in the center of the benchmark. The benchmark shall be set in concrete to prevent removal.

Each new BM shall be clearly numbered in red paint or in the case of a concrete block, etched into the top whilst the concrete is still wet. A register of the new and existing benchmarks shall be set-up and a separate site plan for each new BM shall be prepared giving the co-ordinates, a description of the point and a sketch map.

3. Canal Strip Surveys and Longitudinal Sections

The longitudinal and cross section surveys for the main canal and the 13 distributaries have been completed and are available from the PMU / concerned Executive Engineer. The consultant shall review the survey data and also the existing longitudinal section designs and drawings prepared by others. Any concerns regarding the accuracy of the completed surveys or the designs shall be immediately discussed with the PMU and the modality (including payment) of any necessary additional survey or design discussed.

The following survey cross section details will be provided in boxes under the long-section plot:

- Reduce distance (RD) from head of the canal
- Design discharge (m³/s)

- Existing top right bank level (RL m)
- Existing top left bank level (RL m)
- Existing bed level (RL m)
- Existing bed width (m)
- Bed slope (as a decimal, ie 0.0001)
- Canal section type (these will be defined once the different sections are identified)
- Outlet pipe invert, diameter and length

4. Site Topographic Surveys for New Structures

The topographic survey shall comprise a site plan extending the full width of the canal plus about 30m from the bank or from the outer limit of the proposed / existing permanent structure. Spot heights shall be taken at 10m centers, and more frequently along the canal banks or where there is change in slope. The position, size and elevation of all salient features including: (i) benchmarks, (ii) embankments; (iii) canals; (iv) buildings; (v) roads / tracks; (vi) power and telephone lines; (vi) existing permanent or semi-permanent (irrigation) structures, etc, shall be clearly shown.

In addition to the spot heights, five cross-sections of the canal are required at the structure, two upstream and two downstream as well as at the structure. The distance of the nearer cross-sections from the structure upstream and downstream will be about 10m and that of the further cross section shall be about 30-100m. The cross sections should extend across the full width of the canal plus about 20m from the bank either side.

If the new structure is replacing an existing one, this shall be surveyed in order to determine the quantities for demolition.

5. Existing Structure Topographic and Condition Surveys

The consultant shall survey the existing major structures (ie excluding outlets) along the main and distributary canals. Survey shall comprise topographic and condition surveys.

Topographic surveys shall record key levels and dimensions in sufficient detail to prepare accurate drawings of the existing structures, plus the surrounding area. The existing structure survey shall include: (i) existing plan dimensions of structure; (ii) levels of key walls, bridge decks, upstream and downstream bed and apron levels, and sill level, and other structural elements; (iii) dimensions and elevations for at least two cross sections across the structure, at right angles to each other.

Condition surveys shall clearly indicate the condition of the structure, the components requiring repair/renovation and the extent of the work, with at least one, and typically 3-4, photographs of each structure to illustrate the condition. For the condition surveys standard pro-forma(s) shall be developed and approved by the PMU prior to start of the surveys.

For the outlets the consultant shall survey the invert level, diameter of the pipe or box section dimensions and the length for outlet barrels, as well as its condition.

6. Plotting of Site Surveys

The structure/site drawings shall be plotted on A3 paper, at an appropriate scale with all the key dimensions shown and the north point indicated on the plan. Drawing scales shall generally be as follows:

- Detailed topographic (structure) drawings: 1:50; 1 :100; 1 :200; 1:500
- Sections: (i) vertical: 1 :20 ; 1 :50 ; 1 :100 (ii) horizontal 1 :50 ; 1 :100, 1:200

Adjacent features, such as a canal embankment shall be included in the survey, together with spot heights in the immediate vicinity and any additional features. The existing DoWR nomenclature shall be used to identify the type and number of each canal and structure.

7. Accuracy of Topographic Surveys

The permanent bench marks shall be reduced to the India National Datum and the field survey shall connect to a minimum of two national benchmarks. The maximum closing error between two adjacent bench marks shall be $\pm 5\text{mm}$ for elevation and $\pm 20\text{mm}$ for the horizontal coordinates and the overall closing error through all the benchmarks shall not exceed $\pm 10\text{mm}$ for elevation and $\pm 50\text{mm}$ in the horizontal.

D. Geotechnical Investigations

1. Introduction

Preliminary geotechnical investigations shall be carried out: (i) at new structures primarily to enable design of foundations; and (ii) along selected lengths of the canal where seepage is significant and / or embankment stability of concern.

2. Investigations at new structure sites

a. Soil Boring

Geotechnical investigations at the 26 new structures shall comprise soil boring to depths of 10 m (main canal structures) and 8 m (distributaries). Three (main canal structures) and two (distributary structures) boreholes shall be drilled at each structure. The diameter of borings shall be 150 mm.

Digital photographs shall be taken of the site and the borehole locations. They shall be taken with a camera of minimum resolution 6 megapixels.

The various types of soil, the variations in consistency, the sequence, the depths to changes in strata and the information shall be recorded as boring procedures and be compiled as a Daily Report and a Preliminary Log.

Sampling will consist of small disturbed samples of not less than 0.7 kg with at least 3 samples per borehole.

The depths from which all samples are taken shall be recorded to an accuracy of 0.10m.

b. In-situ Standard Penetration Tests

All in-situ testing is to be carried out by personnel who have been trained and are experienced in the use of the equipment, the test methods and the recording of results.

The penetration resistance may be measured using the test equipment and procedures as described in BS 1377 or equivalent Indian Standard and used for computation of the bearing capacity of the soil.

c. Laboratory testing

Laboratory testing shall be in accordance with BS1377 or equivalent Indian Standard. The tests to be carried out on each sample shall comprise:

- Classification / particle size distribution.
- Moisture content.
- Liquid limit, plastic limit and plasticity index.

d. Reporting

The consultant's geotechnical report for new structure site shall contain the borehole logs, depths of sampling, SPT test results, laboratory test results and site plans showing borehole locations. Levels for borehole logs will be given with reference to the India national datum.

3. Investigations along canal

The consultant shall undertake geotechnical investigations at selected locations along the canals where seepage is significant and / or embankment stability of concern. For the Machhagaon subproject "canal investigations" shall be carried out along the Main canal embankments for a total length of about 10 km (one bank). The most critical location occurs in the reach near RD 10.115 km.

For a total length of about 10 km, 3 No 2.0 m deep holes shall be augured at typically 50m intervals in the canal and adjacent embankment. The soil type at various depths in the auger hole shall be recorded in standard logs. Soil samples shall be taken from a representative small (10%) of auger holes for laboratory testing, specifically for:

- Classification / particle size distribution.
- Moisture content.
- Liquid limit, plastic limit and plasticity index.

The consultant shall estimate the likely seepage losses and shall recommend / identify appropriate and cost effective remedial measures for inclusion in the scope of civil works (eg full of partial canal prism lining, embankment strengthening, etc).

The consultant's geotechnical report for investigations along canal shall contain the auger hole logs, location and depths of sampling, laboratory test results and canal plans showing borehole locations. Levels for auger-hole logs will be given with reference to the India national datum. Recommendations for remedial works shall also be given.

4. Recommendations for additional Investigations

The consultant shall include in his geotechnical report recommendations for any additional investigations. These may be done under the SDD contract, or if this is beyond the scope, included in the main civil works contract.

E. Detailed Design

1. Design Criteria, Priority for Infrastructure Works and Standardization

a. Criteria for Engineering Designs

The design of the rehabilitation and upgrading works for the canals and hydraulic structures and the new village road bridges will be in accordance with the "*Criteria for Engineering Design*" prepared for the Project / Program, which will be made available to the consultant on award of contract. These design criteria are based on internationally accepted standards, amended as required for consistency with Indian Standards. Structural design work shall be in accordance with the relevant Indian Standard.

b. Priority for Infrastructure Works

In accordance with the “*Criteria for Engineering Design*”, priority for infrastructure works for both major and medium schemes is as follows:

- i. Any vital works to ensure safety / integrity of irrigation system, such as structures and canal banks where seepage may lead to earthworks failure.
- ii. Hydraulic control structures for improved flow control and flow measurement for the main and distributary canal systems to the heads of minor canals.
- iii. Additional escapes if required.
- iv. Bridges for improved access across canals (and drains in the command area).
- v. Selective lining of canal reaches where seepage losses are high.
- vi. Improved access along inspection / patrol roads.

Extensive canal lining without (benefit/cost) justification will not be supported under the Project.

The design firm shall adopt standards to speed up the design process and ensure a common / consistent approach for all subprojects. Standards to be adopted with prior approval by the PMU are outlined below. The PMU will provide guidance on acceptable standards.

c. Standard Drawings

Standards for drawings shall comprise:

- Standard drawing template with project title box
- Standard drawing notes
- Agreed drawing numbering system
- Agreed standard drawing styles and layers
- Agreed grades of concrete
- Typical canal cross sections
- Standard designs / drawings for, inter-alia, bank protection, patrol road cross sections, reinforced / masonry / mass concrete wall cross sections, expansion and contraction joints, concrete bridge decks, culvert crossings, hand railing, water level gauges, etc

d. Standard Design Tools

The creation and use of standard design tools and procedures to speed up the design calculations is envisaged. Standard calculation spreadsheets for typical structures will be adopted by the design firm (eg cross and head regulators, bridges, flow measurement structures, etc). These shall be filed in an orderly fashion and be available for review by the DoWR at any time. All calculations shall be checked. Each sheet shall show the name of the project and the component being designed at the top and in the top right corner there should be a box with the name of the originator, date, sheet number, the name of the checker and date checked.

e. Use of Utilities to Speed up Drawings

Drawings will be prepared using CAD software. The process may be improved by:

- Scripts and AutoLISP routines for long and cross section drawings.
- Use of Xrefs to embed standard base information and details into drawings.
- Data tables shall be prepared as spreadsheets and embedded in drawings.
- Standard drawing template, styles and layers.
- Use of high resolution satellite imagery as base maps and digital photos for illustrating structure rehabilitation.

f. Standardization of Bidding Documents

One or more sets of standard bidding documents shall be prepared to cover the range of contract types and sizes. They shall be based on the ADB standard bidding documents and include standard technical specifications, preambles and methods of measurement so these only have to be prepared and agreed once.

g. Standardization of Bill of Quantity Production

Speed, quality and consistency of BoQ production can be achieved using standard spreadsheet(s) containing a table of standard work items and the relevant units. The process can also use standard unit rates to quickly produce consistent cost estimates.

2. Design of Main Canal and Distributaries

Hydraulic calculations undertaken during the feasibility study found that the bed slope and width of the main canal as far as Chatra weir (RD 32.99km) are very close to Lacy regime. However, downstream of the weir the requirements for navigation meant that the canal section was over-sized.

It is considered a waste of money to fill in the canal prism, so the tail reach will be left over-wide. Small changes in full supply level are proposed, for example a drop of 0.15m for the new Bilukhai cross regulator structure at RD 14+520.

The Feasibility Report proposed a modest length of full and bank lining for the Main canal.

Following the feasibility study survey and detailed design of the canals was initiated by the Department with long and cross surveys completed for the Main and Distributary canals along with benchmark pillar establishment. The Design Statement and long section for the Main Canal has been completed and was approved by the Chief Engineer D&R in March 2011. Design Statements are being prepared for the distributaries. No structure surveys, detailed designs or drawings have been completed / finalized.

Under this contract the benchmarks will be checked and the canal design statement and long section reviewed and confirmed with the PMU. For the purposes of bidding it may be assumed that the completed canal surveys are accurate and no additional canal survey is required except in the vicinity of structures as part of structure surveys (see below).

The canal detailed design review will entail the following:

- i Ensure that stable (regime) canal designs are adopted, and that command of offtakes is maintained at low flows (typically 60-75% of design flow).
- ii Checks that: (i) sufficient head loss is allowed over structures for flow control and measurement; and (ii) that canal bank freeboard is sufficient and in accordance with the Project Design Criteria.
- iii Sections of high fill where seepage is occurring shall be investigated and remedied by canal lining and/or bank stability measures.

3. Design of Cross Regulators

The entire Main canal is an unlined earthen channel, in places running through coarse material. Originally there were five reaches separated by control (weir) structures:

- (i) Birbati to Kaijanga (RD 0 to 8+107)
- (ii) Kaijanga to Nowarda (RD 8+107 to 24+383)
- (iii) Nowarda to Chatra (RD 24+383 to 32+990)
- (iv) Chatra to Padmapur (RD 32+990 to 41+719)
- (v) Padmapur to Tail at Disty 15 (RD 41+719 to RD 52+353).

A non-gated regulatory structure was subsequently built at RD 14+520 to help maintain levels in the main canal for flow through the Biluakhai head regulator, making six reaches.

The existing cross regulator, and the Machhagaon main canal head regulator, structures are either laterite block (as at Biribati) or more commonly red-brick constructions (as at Kaijanga and Nuada weirs at RD 8+107 and 24+380). Bridges mostly comprise concrete decks placed over steel girders, replacing timber decks, or more modern RCC slab bridge constructions.

Vertical steel sections have been driven into the bed of the structure just upstream of the roadway bridges, and these are either provided with steel gates (Biribati), or with stoplogs (Kaijanga and Nuada). Gauges are provided to measure water levels upstream and downstream of structures, and also gate openings. Some of these gauges are in poor condition however and difficult to read.

Transition wall both upstream and downstream are quite sharp, and terminate after a short distance with vertical returns into the canal bank.

The laterite and bricks constructions appear sound, though in need of re-pointing to replace surface damage.

Proposed works to cross regulators are summarized below.

Nr	RD (km)	Name	Recommendations
1	0	Biribati	Retain and rehabilitate /upgrade
2	8.110	Kaijanga	Retain and rehabilitate / upgrade
3	14.520	Biluakhai	Substantial rebuilding
4	24.380	Nuada	Retain and rehabilitate / upgrade
5	32.968	Chatra	Retain and rehabilitate / upgrade
6	41.721	Padmapur	Retain and rehabilitate / upgrade

Rehabilitation works to existing cross regulators will typically comprise:

- (i) Walls to be heightened and strengthened as required for the new FSLs, with provision of a minimum structure freeboard of 1.0 m
- (ii) Extension of downstream apron for improved energy dissipation.
- (iii) Downstream transition walls extended at a shallow angle to reduce eddying of flow downstream.
- (iv) Provision of new, easy to operate gates complete with gate operating platform, and gauges.
- (v) Provision of new RCC bridge deck, adopting a clear width of 5.5m for village road bridges.

- (vi) In some cases provision of deeper (steel sheet pile) cutoffs to control seepage gradient and uplift.
- (vii) Repair of damage to existing retained portions of the structure.

New cross regulators along the distributaries are not envisaged. However about 28 are likely to require significant rehabilitation / upgrading. Many of these may be provided with a duckbill weir arrangement, or at least a spill-weir section, to provide better control of upstream water levels and facilitating operations thereby enhancing water distribution.

4. Design of Head Regulators

The scope of designs shall be the similar to that for cross regulators. In addition, if the head regulator cannot be modified to also serve as a measuring structure a measuring flume will be required a short distance downstream. All offtakes from the main canal shall be gated to provide enhanced regulation, particularly during the rabi season.

5. Design of Bridges

25 new bridges will be designed to replace existing wooden or badly damaged RCC bridges. In addition a further 20 village road bridges (VRB) on the main canal and 35 on the distributaries will require renovation.

6. Measuring Flumes

Flow measurement is proposed, immediately downstream of the head regulators on the ten distributaries offtaking from the main canal. Where sufficient head is available it is recommended that trapezoidal Parshall flumes or triangular/trapezoidal profile flat weirs are used. Where no head loss is possible a straight lined section of canal, with staff gauge would suffice, but this will have to be calibrated, using a flow meter.

7. Outlets

The consultant shall check the condition of outlets to minor, sub-minor and field channels. Where repairs are required the scope of work, together with a sketch and the quantities shall be calculated. A standard pro-forma shall be developed for the purpose.

8. Other Structures

The design of cross drainage structures, escapes and social structures (washing points and cattle drinking points) shall comply with the *Criteria for Engineering Design* and the relevant Indian Standards and codes.

F. Drawings

All contract drawings shall be plotted on A3 paper. A general notes page shall be included at the beginning of a "set" of drawings for a structure / canal to avoid repetition of notes on all drawings. The layout of the sheet, contents of title box, scales, revision boxes, etc, shall comply with DoWR practice and any deviation must be approved by the authorised representative. The detailing of the works shall comply with the relevant IS, ie IS 5525: 1968 (reaffirmed 1999) recommendations for detailing reinforcement in reinforced concrete works.

Drawing scales for structures shall generally be as follows:

- Detailed topographic (structure) drawings: 1:50; 1:100; 1:200; 1:500
- Sections: (i) vertical: 1:20 ; 1:50 ; 1:100 (ii) horizontal 1:50 ; 1:100, 1:200

G. Bills of Quantities

The Consultant shall prepare Bills of Quantities for the works. It is recommended that the bills for individual structures and canals are initially kept separate to facilitate the preparation of the BoQ for each of the separate construction packages (see below).

All measurements shall be in accordance with IS 1200: 1974, Method of measurement of building and engineering works.

The earthworks quantities for the main and distributary canals shall be calculated in reaches between major structures, not exceeding 3km in length. This information shall be consolidated for the BoQ, but a separate schedule shall be prepared and submitted to PMU to facilitate the monitoring of earthworks progress and identifying excessive variations.

H. Packaging of Civil Works Contracts

The size (estimated cost) of the civil works contracts shall be discussed and agreed with the PMU in the first month of the assignment. Each package should be “stand-alone” and not be dependent on the progress or work output of other contracts. The consultant shall assess the scope of work, recommend the number of packages and determine the most appropriate way to divide the work. It is anticipated that the works will be divided according to canal reaches, with the same contractor undertaking the canal re-profiling and the rehabilitation of the associated structures.

Where possible the packaging of works should aim to maximize the number of contractors interested in bidding to ensure a competitive tendering process.

I. Contract Documents

Following PMU approval to the packaging and boundaries for each civil works contract, the consultant shall prepare separate contract documents for each package. None of the packages are expected to exceed USD 10 million; consequently the ADB’s standard bidding documents for small works shall be used with minor amendments by the GoO. The bidding shall be QCBS with post-qualification, ie separate technical and financial envelopes.

The documents shall comprise:

PART I, Bidding Procedures

- Section 1, Instructions to bidders (ITB)
- Section 2, Bid data sheet (BDS)
- Section 3, Evaluation and qualification criteria (EQC)
- Section 4, Bidding forms (BDF)
- Section 5, Eligible countries (ELC)

Part II, Requirements

- Section 6, Works requirement (WRQ)

Part III, Conditions of contract and contract forms

- Section 7, General conditions of contract (GCC)
- Section 8, Particular conditions of contract (PCC)
- Section 9, Contract forms (COF)

Section 4 includes the bill-of-quantities and Section 6 comprises the specifications, drawings and any supplementary information that describe the scope of works. The drawings shall be A3 size and attached as a separate bound volume to the contract.

The specifications shall be based on the Government of Orissa, Department of Water Resources: Technical Specification for Construction of Canal Works for ADB Assisted Schemes. If a particular item is not covered by these specifications the consultant shall prepare the specifications and submit to the PMU for approval, prior to incorporating in the bid documents.

J. Engineer's Estimate

The latest available GoO, Works Department schedule of rates shall be used to determine the "engineer's estimate". In accordance with the GoO regulations the rates given in the latest schedule (currently 2010) shall be up-dated using the most recent basic material, labour and equipment costs, published annually by the Works Department. The engineer's estimated is highly confidential and shall under no circumstances be disclosed to a third-party.

K. Quality Assurance

The consultant shall include in the Inception Report details of the quality assurance procedures to be adopted whilst implementing the consultancy services. This report shall include, inter-alia, the procedures for carrying out the survey and design assignment, standards to be adopted, and level and scope for checking of calculations, drawings and all other contract out-puts.

III. REPORTING, PERSONNEL, CONTRACT AMOUNT AND PAYMENT SCHEDULE

A. Sequence of Survey and Detailed Design Work

The sequencing of survey and detailed design work shall be discussed and agreed with PMU prior to the commencement of field survey work. It is tentatively proposed that the work will proceed as follows:

- i. Main canal.
- ii. Tributaries working from upstream in a downstream direction.

B. Reporting

The consultant shall prepare the following reports during the course of the studies. Where indicated separate reports shall be prepared for the main canal and tributaries. The preparation of draft and final reports is not envisaged, however to facilitate approval of the reports the survey and detailed design firm should gain prior approval from the PMU to the content and scope of each report. 0.5 months is allowed for review / approval by the PMU of each report.

Report	Nr of Hard Copies	Indicative Submission Dates		Remarks
		Main Canal	Tributaries	
Inception Report	6	+ 1 month		
Monthly Reports	6	Each month		Summary of monthly progress
Survey Reports	4 x 2 = 8	+ 2 months	+ 4 months	Topographic and Condition Surveys
Geotechnical Report	6	+ 3 months		For new structures, including borehole logs and test results, as well as auger holes along critical canal sections
Design Statements	4 x 2 = 8	+ 2 months	+ 4 months	Spreadsheets for each canal
Design Reports	4 x 2 = 8	+ 3 months	+ 5 months	Including drawings, calculations and quantities
Packaging Intent Report	6	+ 5 months		This report must be approved before commencing work on the contract documents
Contract Documents	4 x 2 = 8	+ 4 months	+ 6 months	Separate stand-alone contract documents shall be prepared for each civil works contract
Final Report	6	+ 6 months		Summarizes the work carried out under the assignment

Submission dates are the number of months from the date of mobilization

Hard copies of the above reports and documents shall be submitted to the PMU before the submission deadline. In addition the consultant shall submit six electronic copies on clearly labeled CD or DVD or other approved media, conforming to the following requirements:

- i Where appropriate, the consultant shall compress (ZIP) files, so that the entire report (or volume) is stored on a single CD or DVD.
- ii The report contents shall be clearly indexed and stored in Adobe PDF format. Where MS EXCEL has been used in preparation of lists, calculations, etc, the complete MS EXCEL files shall also be submitted to facilitate verification by DoWR.

- iii In general only standard commercially available software shall be used in the work and the consultant shall list the software they propose to use. Under certain circumstances, and with the approval of the authorized representative, the consultant may use non-standard software to perform part of the work, provided he makes provision for the handover of the software to the DoWR, so it is available for use at a later date to update or revise the designs.

All reports and other study documents shall be in the English language. Printing and binding shall be of high quality, suitable for presentation to government and international funding agencies. All reports shall be in A4 paper format (with fold out A3 sheets where required), except for the drawings which should be A3. Metric units according to the International System of Units are to be used throughout.

a. Inception Report

This report shall list the documents reviewed and shall up-date and elaborate on the methodology of the proposed project. The quality assurance procedures being adopted by the consultant shall be described. Special emphasis shall be placed on identifying staffing and other deficiencies and shall propose measures to address any such shortfalls.

b. Monthly Reports

The consultant shall submit monthly progress reports (six hard copies) throughout the duration the contract, not later than the 14th day of the following month. The progress reports shall (i) detail the activities undertaken during the previous month; (ii) monitor progress against the consultant's work plan provided in their proposal; (iii) identify potential problems and recommend remedial actions to avoid delaying the completion of the contract; (iv) provide a schedule of staff inputs for the month under review and cumulative inputs; and (v) detail forthcoming and planned activities.

c. Survey Reports

This report shall cover both the topographic and condition assessment surveys. For the survey component the report shall summarize the methodology adopted, assess the level of accuracy achieved and a list the permanent benchmarks with coordinates and a description of the mark. The longitudinal sections for the main canal and 13 distributaries and the site plans for existing and new structures shall be presented in the required format. The benchmark records and the structure condition survey sheets shall be attached as an annex. The cross section details shall be submitted separately in approved digital format.

d. Geotechnical Report

The geotechnical report shall detail the results, findings and recommendations of the geotechnical investigations from: (i) boreholes drilled at sites of (new) structures pertaining to foundation conditions; and (ii) auger-holes along selected critical (high seepage) reaches of canal embankment.

If additional explorations are necessary the report should include a detailed statement on the scope of the additional investigations.

e. Design Statements

In accordance with Government procedures, the consultant shall prepare a summary design statement for each canal detailing the type and location of proposed structures together with the key design characteristics of each.

f. Design Reports

The Main Design Report shall detail the procedures and criteria used in the design process along with tabulated data, including the design statements and abstract of quantities.

Attached annexes to the report shall comprise: (i) A3 drawings for canal long and cross sections and for all new structures as well as structures requiring significant rehabilitation / upgrading; (ii) calculations; and (iii) priced bills of quantities.

g. Packaging Intent Report

This short (5-10 pages) report shall recommend, with justifications, the proposed division of the required civil (infrastructure) works into discrete contract packages, along with estimated costs of each package, construction period and sequencing. This report shall be prepared following consultation with concerned Department staff and the PMU.

h. Contract Documents

Following PMU approval of the Packaging Intent Report the consultant shall prepare separate bidding documents for each civil works package. These shall be based on the ADB small civil works format, with minor changes to comply with GoO regulations. The bidding process shall be QCBS with a two envelope evaluation procedure.

i. Final Report

This short (5-10 page) report should summarize the work undertaken and the contract outputs/ deliverables.

C. Personnel, Equipment and Facilities

1. Personnel

The total indicative professional consultant staff input is 59 months. In addition there are 45 months of technical and administrative staff and the consultant shall provide for these posts in the Financial Proposal. The key consultancy staff are listed in the following table, together with the tentative input for each position.

Key consultancy staff and indicative Inputs

Staff		Input (sm)
Professional staff		
P-1	Team leader/project manager	6
P-2	Mapping / GIS specialist / Snr Surveyor	4
P-3	Land Surveyors x 4	14 (4 x 3.5)
P-4	Geotechnical engineer	3
P-5	Senior irrigation design engineer	6
P-6	Design engineers x 4	16 (4 x 4)
P-7	Junior/assistant engineers x 2	8 (2 x 4)
P-8	Procurement/contract specialist	2
Total		59
Technical and administrative staff		
T-1	Survey technicians x 4	14 (4 x 3.5)
T-2	Geotechnical technician	3
T-3	AutoCAD technicians x 4	16 (4 x 4)
A-1	Office manager/accountant	6
A-2	Project secretary	6
Total		45

The consultant may wish to adjust staffing inputs to suit his work program and methodology.

A summary of the minimum qualifications and experience for each of the key professional position is given in Annex C.

2. Equipment and Facilities

The consultant shall make provision in his bid for the following items:

- i. Domestic airfares and related costs
- ii. All costs related to accommodation and subsistence of staff
- iii. Travel in Orissa, vehicle hire, etc
- iv. Rental of suitable office accommodation in Orissa, maintenance and utilities
- v. Provision or hire of office furniture, computers, printers, etc
- vi. Office running costs (stationary, office consumables, clerks, cleaners, guards, etc)
- vii. Field staff costs (chainmen, labourers, etc)
- viii. Communications (telephone, courier, internet, etc) for the execution of the services only. Private telephone calls, etc, shall be the consultant's responsibility
- ix. Hire or procurement of field equipment, ie survey equipment, software, drilling machine, augers, etc.

- x. Printing and binding of reports and drawings.
- xi. Any other expenses for completion of the assignment.

D. Contract Amount and Payment Schedule

In accordance with procurement under CQS (Consultant’s Qualification Selection) the firm selected to submit a bid on the basis of the EOI submission shall submit a technical and financial proposal.

The financial proposal shall comprise a lump sum amount for the contract with supporting data to justify the amount based on proposed staffing and equipment and facilities costs.

The contract shall be lump-sum with the following staged payments.

	Payment Milestone	Percent payment
1	Advance payable on contract signing	10
2	Submission and approval of Inception Report	5
3	Submission and approval of Survey Reports	10
4	Submission and approval of Geotechnical Report	10
5	Submission and approval of Design Statement and Design Report for Main Canal	20
6	Submission and approval of Design Statement and Design Report for Distributaries	20
7	Submission and approval of Packaging Intent Report and Contract Documents	20
8	Submission and approval of Final Report	5
	Total	100

ANNEX A: MAIN CANAL AND DISTRIBUTARIES OF MACHHAGAON CANAL SYSTEM.

Classification Criteria:

Main Canal: Q = More than 10 cumecs

Distributaries: Q = between 1 to 10 cumecs

Sl.	Canal System as per existing Nomenclature	Offtaking R.D. In Km	Command Area (CCA) In Ha.	Designed Discharge of Canal in Cumecs as per approved D.S.	Length of Canal In Km	Identification as per Q & CCA Criteria
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1.	Machhagaon	11.75 of Taladanda Canal	34870	40.998	52.425	Main Canal
2.	Distributary No.2	7.798 of Machhagaon Canal	1359	1.059	8.120	Distributary
3	Bhagalpur Disty.	14.500	1649	1.282	12.170	-do-
4.	Distributary No.19	19.940	5423	4.230	31.905	-do-
5.	Distributary No.7	25.415	1864	1.450	18.960	-do-
6.	Distributary No.8	26.034	2300	1.790	15.685	-do-
7.	Distributary No.10	31.660	5910	4.610	15.000	-do-
8.	Distributary No.16	40.415	1508	1.176	5.242	-do-
9.	Distributary No.13	41.721	4070	3.175	12.134	-do-
10.	Distributary No.15A	52.376	1816	1.416	12.560	-do-
11.	Distributary No.15	52.425 of Machhagaon	1881	1.467	7.690	-do-
12.	Distributary No.19A	1.274 of Disty.19	2123	1.656	22.240	-do-
13.	Distributary No.13C	5.135 of Disty.13	1797	1.256	13.052	-do-
14.	Distributary No.10H	6.200 of Disty.10	1482	1.156	12.739	-do-
					239.922	

Notes: (i) As per classification criteria at head of table.
One Main Canal (52.425km) and 13 Distributaries (187.497km) with total length of 239.922km. (Say 240km.) is covered under the scope.

(ii) Field survey, establishment of Benchmark pillars, preparation of L.S. and D.S. and computation of earthwork quantity has been outsourced to another agency for the Main Canal and all the Distributaries.

(iii) Field survey, establishment of Benchmark pillars and initial level section, plotting for all Distributaries completed. D.S. is under preparation.

(iv) L.S. and D.S. of Main Canal was approved by the Chief Engineer, D&R in March 2011.

LIST OF STRUCTURES

Sl. No.	Canal System	As per Inventory Nos. of Structures / Repairing / Replacement or New Constructions										Total
		HR	VRB	Fall	Aque-duct	DS	Escape	CR	CR cum VRB cum Fall	VRB cum CR	Outlets	
1	2	3	4	5	6	7	8	9	10	11	12	13
1	Machhagaon	32	34	0	0	4	3	1	4	0	52	130
		32	20	0	0	3	3	0	4	0	51	113
		0	12	0	0	0	0	1	0	0	0	13
2	Disty.No.2	4	11	0	0	5	0	2	0	0	44	66
		4	1	0	0	4	0	2	0	0	34	45
		0	0	0	0	0	0	0	0	0	0	0
3	Bagalpur Disty.	9	15	0	0	0	0	4	0	0	23	51
		1	4	0	0	0	0	1	0	0	20	26
		0	3	0	0	0	0	0	0	0	0	3
4	Disty.No.19	14	9	0	0	1	0	4	0	0	86	114
		4	1	0	0	1	0	4	0	0	70	80
		0	1	0	0	0	0	0	0	0	0	1
5	Disty.No.7	6	13	0	0	2	0	6	0	0	96	123
		0	3	0	0	1	0	4	0	0	84	92
		0	2	0	0	0	0	0	0	0	0	2
6	Disty.No.8	3	9	0	0	2	0	0	0	8	70	92
		0	2	0	0	1	0	0	0	0	55	58
		0	0	0	0	0	0	0	0	0	0	0
7	Disty.No.10	16	17	0	0	4	0	8	0	3	86	134
		1	2	0	0	4	0	4	0	0	86	97
		0	1	0	0	0	0	0	0	0	0	1
8	Disty.No.16	3	3	0	0	6	0	1	0	0	12	25
		3	0	0	0	4	0	1	0	0	12	20
		0	0	0	0	0	0	0	0	0	0	0
9	Disty.No.13	10	11	0	2	3	0	4	0	1	64	95
		0	5	0	0	2	0	3	0	0	51	61
		0	1	0	0	0	0	0	0	0	0	1
10	Disty.No.15A	7	14	0	0	6	0	2	0	0	50	79
		1	8	0	0	1	0	1	0	0	40	51
		0	2	0	0	0	0	0	0	0	0	2

Sl. No.	Canal System	As per Inventory Nos. of Structures / Repairing / Replacement or New Constructions										Total
		HR	VRB	Fall	Aque-duct	DS	Escape	CR	CR cum VRB cum Fall	VRB cum CR	Outlets	
1	2	3	4	5	6	7	8	9	10	11	12	13
11	Disty.No.15	2	10	0	0	7	0	2	0	0	37	58
		1	0	0	0	7	0	2	0	0	30	40
		0	3	0	0	0	0	0	0	0	0	3
12	Disty.No.19A	8	1	0	0	4	0	2	0	0	122	137
		2	0	0	0	4	0	2	0	0	122	130
		0	0	0	0	0	0	0	0	0	0	0
13	Disty.No.13C	8	12	0	0	5	0	4	0	0	88	117
		1	4	0	0	5	0	2	0	0	68	80
		0	0	0	0	0	0	0	0	0	0	0
14	Disty.No.10H	3	9	0	0	3	0	7	0	0	93	115
		1	5	0	0	3	0	2	0	0	74	85
		0	0	0	0	0	0	0	0	0	0	0
Total	Total	125	168	0	2	52	3	47	4	12	923	1336
		51	55	0	0	40	3	28	4	0	797	978
		0	25	0	0	0	0	1	0	0	0	26

ANNEX C: DESIRED PROFESSIONAL CONSULTANTS QUALIFICATIONS AND EXPERIENCE

	Team Member	Indicative Qualifications	Experience Required
P-1	Team Leader/Project Manager	M Tech / ME	10 yrs experience in water resources engineering or related field 3 relevant project manager or deputy project manager assignments Knowledge of computer based design and drawing production
P-2	Mapping / GIS Specialist / Senior Surveyor	Diploma	10 yrs experience in mapping and development of GIS related to survey Minimum of 3 relevant assignments
P-3	Land Surveyors	Diploma	8 yrs experience in GPS and / or total station topographic surveys and the digital reducing and plotting of data Minimum of 3 relevant assignments
P-4	Geotechnical Engineer	B Tech / BE / BSc	10 yrs experience in geotechnical investigations and interpretation of results. Minimum of 3 relevant assignments
P-5	Senior Irrigation Design Engineer	M Tech / ME	10 yrs experience in planning and design of large scale irrigation projects Minimum of 3 relevant assignments Knowledge of computer based design and drawing production
P-6	Irrigation Design Engineers	B Tech / BE	5 yrs experience in the planning and design of large scale irrigation schemes Minimum of 2 relevant assignments Knowledge of computer based design and drawing production
P-7	Junior / Sub-Assistant Engineers	Diploma	3 yrs experience in irrigation and water resources Minimum of 2 relevant assignments
P-8	Procurement / Contract Specialist	M Tech, ME or similar	10 yrs experience in the bidding process for civil works, preferably with experience of donor funded procurement procedures Minimum of 3 relevant assignments

SECTION III

FORMAT FOR EOI SUBMISSION: (I) PROFILE; (II) PROJECT EXPERIENCE, (III) PERSONNEL; AND (IV) FINANCIAL STATEMENTS

This section comprises guidelines and format for submission of the Eoi, specifically:

- Consultants Profile and Registration
- Project Experience
- Professional Personnel
- Financial Statements

A. CONSULTANTS PROFILE AND REGISTRATION

The Consultants profile shall comprise a brief (max 4 pages for each firm / sub-consultant / partner) description of the background and organization of the firm and, if applicable, Sub-Consultant and each joint venture partner for this assignment. Specifically the profile(s) shall document:

- Name of the Firm/Consultant, year of establishment and registration, location of the headquarters office, correspondence address, telephone number and e-mail address.*
- Professional Staff numbers.*
- Firm/Consultant's registration status (registration legal documents to be attached). Registration with the National Remote Sensing Agency is an advantage.*
- Certificates from the competent authorities for completed assignments.*
- Relevant factors relating to background and organization that focuses on handling projects similar to the proposed assignment. Of specific interest are: (i) innovative technologies/methods/equipment for surveys and designs; and (ii) quality control and back-stopping support arrangements for assignments.*

B. PROJECT EXPERIENCE

Using the format below, provide information on each assignment for which your firm, and each joint venture partner or sub-consultant for this assignment, was legally contracted either individually as a corporate entity or as one of the major companies within a joint venture or sub-consultancy, for carrying out consulting services similar to the one requested under this assignment. Use a maximum of 10 pages—generally not more than one page per project / assignment.

Assignment name:	Approx. value of the contract (in current INR):
Country: Location within country:	Duration of assignment (months):
Name of Client:	Total N ^o of person-months of the assignment:
Address, email and phone contacts:	Approx. value of the services provided by your firm under the contract (in current INR):
Start date (month/year):	N ^o of professional person-months provided by the

Completion date (month/year):	joint venture partners or the Sub-Consultants:
Name of joint venture partner or sub-Consultants, if any:	Name of senior regular full-time employees of your firm involved and functions performed (indicate most significant profiles such as Project Director/Coordinator, Team Leader):
Narrative description of Project—in what ways similar to the current assignment:	
Description of actual services provided in the assignment in what ways similar to the current assignment:	

Consultant's Name: _____

C. CONSULTANT'S PROFESSIONAL PERSONNEL

Tabulated data are to be provided for each firm / firm / sub-consultant / partner) for their relevant full time professional staff that may be made available for the assignment. The required tabulated data are listed below:

- i *Survey / GIS / Mapping staff: names, date of birth, nationality, period with firm, qualifications, years of experience*
- ii *Design Staff: names, date of birth, nationality, period with firm, qualifications, years of experience*
- iii *Geotechnical staff: names, date of birth, nationality, period with firm, qualifications, years of experience*

D. FINANCIAL STATEMENTS

The Bidder and its parties shall provide the audited financial statements to reflect the financial situation of the bidder or partner to a JV. These financial statements shall provide the following information.

1. Total value of work performed in each of the last three financial years.

- i. 2008/09 _____
- ii. 2009/10 _____
- iii. 2010/11 _____

2. Work performed as prime contractor (in the same name) on works of a similar nature over the last three years.

Project Name	Name of Employer	Description of work	Value of contract (INR)	Commencement date	Stipulated period of completion	Actual date of completion	Remarks
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)

3. Existing commitments and on-going works:

Description of Work	Place	Contract No. & Date	Value of Contract (ETB)	Stipulated period of completion	Value of works remaining to be completed (ETB)	Anticipated date of completion
(1)	(2)	(3)	(4)	(5)	(6)	(7)

4. Information on litigation history in which the Bidder is involved.

Other party(ies)	Employer	Cause of dispute	Amount involved	Remarks showing present status
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SECTION IV

CRITERIA FOR EVALUATION OF EXPRESSIONS OF INTEREST

The submitted Eols will be checked, evaluated and compared as follows:

- i. Completeness and conformity to the requirements of the Eol without material deviation. In this regard the firm / joint venture shall also demonstrate: (a) legal registration status; (b) an annual average turnover of at least INR 10 million; and (c) participation in at least one contract similar in scope, nature and size within the last three years. Eols which are not complete or responsive shall be excluded from further consideration.
- ii. Technical evaluation of complete and responsive Eols shall be evaluated and ranked as shown below. The highest ranked consultant / joint venture will be invited to submit a technical and financial proposal.

	Criteria	Points
1	Consultancy Profile	
	Certification with the National Remote Sensing Agency	5
	Use of innovative and appropriate technologies (GIS, CAD, etc) for similar assignments	10
	Quality control and back-stopping support arrangements for assignments	10
	Sub-total	25
2	Experience of the consultancy / joint venture	
2.1	Topographic survey	15
2.2	Geotechnical investigation	10
2.3	Detailed design	15
	Sub-total	40
3	Consultants professional staff qualifications and experience	
3.2	Survey / GIS / Mapping Staff	10
3.3	Irrigation / Hydraulic Design Staff	15
3.4	Geotechnical Staff	10
	Sub-total	35
	Total	100