

**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](http://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.Canal.	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**

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

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

**November 2011**

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## 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 Pattamundai Major Irrigation System (districts of Kendrapada, Cuttack and Jajpur), which is one of the OIIAWMIP subprojects. For additional information on the project please visit website: [www.dowrorissa.gov.in](http://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 160km 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 structures and for 635 (including 436 pipe outlets) existing 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 **15<sup>th</sup> 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 **3<sup>rd</sup> 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 **3<sup>rd</sup> 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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22. The undersigned reserves the right to accept or reject any or all EoIs or cancel the invitation of EoI 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**  
**PATTAMUNDAI CANAL SYSTEM**

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*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.*

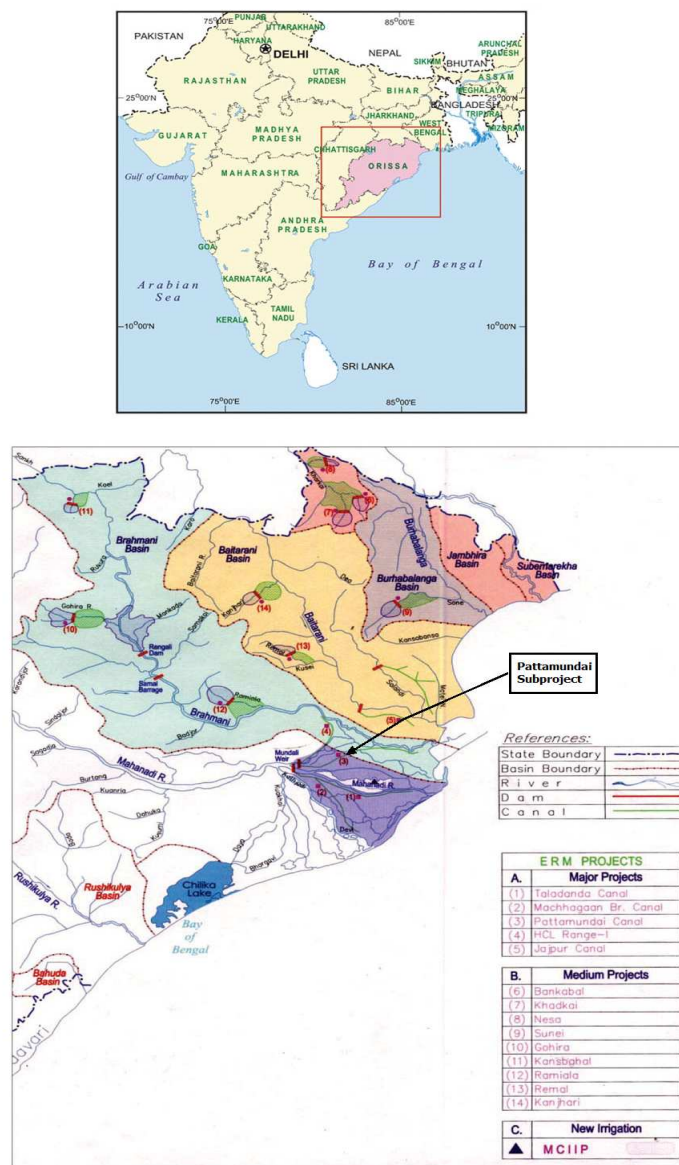
# TERMS OF REFERENCE FOR SURVEY, DESIGN AND RELATED SERVICES FOR MAIN AND DISTRIBUTARIES OF PATTAMUNDAI CANAL SYSTEM

## I. INTRODUCTION

### A. Sub-project 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 Pattamundai 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 sub-projects included in the programme.

Figure 1: Location of Sub-project



The Pattamundai Irrigation Scheme is located in the flat, low-lying delta of the Mahanadi River. The scheme is supplied by the Kendrapada main canal, which offtakes from the Mahandi Barrage at Cuttack. The command area is bounded by the Birupa-Brahmani rivers to the north and west, the Gobari nullah to the south and the Saluan nullah to the east. The 80.5km long Pattamundai Canal runs parallel to the Birupa River for much of its length and inspection is facilitated by National Highway 5A and the Cuttack-Pattamundai road.

The canal command area is 32,693ha, though this includes the 2,778ha Birupa Gentuti Island Irrigation Scheme, which is not included under the proposed rehabilitation project.

## **B. Description of Existing Irrigation System**

### **1. Existing Irrigation System**

The Pattamundai Canal dates back to the mid-19<sup>th</sup> century and was originally built for both irrigation and navigation. However, when the locks fell into disrepair, navigation ceased and the canal is now used exclusively for irrigation. The design capacity of the canal at the headworks is 36 m<sup>3</sup>/s. In the kharif season, canal water is used for supplementary irrigation and between 70 and 80 percent of the command area is cultivated mainly under paddy. In the rabi season only 25 to 30 percent of the command area can be irrigated and the main crop is pulses. The salient features of the scheme are given below:

Original command area	51,460ha
Revised (2008) command area	32,693ha
Revised design discharge (app 2011)	36 m <sup>3</sup> /s
Length of main canal	80.5km
Distributary canals off taking from main canal	8
Minors off taking from main canal	16
Sub-minors off taking from main canal	21
Field channels offtaking from main canal	133
Locks (cross regulator falls)	9
Escapes	1
Total number of outlets in command area	2,065
Average command area per outlet	16ha

The condition of the main canal, distributaries and ancillary structures has deteriorated, resulting in reduced flows, distribution problems and increased maintenance. The scope of the proposed works include the rehabilitation of 159.97km of main and distributary canal and the repair/up-grading of structures, comprising 80 head regulators (HR), 41 village road bridges, 2 falls/CR, 51 cross drainage structures (DS), 3 escapes, 20 cross regulators (CR) and 436 outlets. In addition 25 new or to be rebuilt village road bridges and one cross drainage structure have been identified.

A summary of the main canal and eight distributaries included in the sub-project are given in Table 1. A schedule of the number of structures by type on each canal, together with the number identified for repair/up-grading and new structures are given in Table 2.

### **2. Main Canal**

The 80.5km long main canal is aligned along or quite close to the left bank of Birupa (Asila) and Brahmani (and Kelua) rivers, following high ground, and its left bank frequently forms the river flood protection embankment. 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 principles and its long section slope is close to the Lacey slope. The original design widths are also close to the Lacey regime width (width factor 0.85) in the upper and middle reaches, but downstream of Pattamundai weir at RD 76.44km 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 eight distributory, 16 minor and 21 sub-minor canals off-taking from the main canal supplying the command area.

For some 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 1: Main canal structures**

Type of structure	Number
Cross regulators	5
Head regulators	49
Escapes	2
Cross drain structure	12
Road bridges	29
Fall with cross regulator	2
VRB with cross regulator	2
Field outlets	140

#### a. Cross Regulators

The existing nine cross regulators are: (i) Rameswar (RD 15.30km); (ii) Triveniswar (RD 24.05km); (iii) Nrutanga (RD 26.295km); (iv) Balichandrapur (RD 36.85km); (v) Benipur C/R(RD 48.875km); (vi) Charpada (RD 56.007km); (vii) Dist-12 cross regulator (RD 63.648km); (viii) Pattamundai (RD 76.44km); and (ix) Alava Lock (RD 80.500km).

The Pattamundai main canal head regulator at the bifurcation with the Kendrapara canal and the nine cross regulators are similar in construction. The piers, abutments 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 for minor damage.

#### b. Head Regulators

There are 49 head regulators along the main canal supplying water to distributory 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 16 (original design flow 3.8 m<sup>3</sup>/s). This is a two span-gated orifice structure.

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

**c. Escapes**

There is only one escape along the main canal at about RD 24.0km discharging into the Birupa river, just upstream of the Birupa Genguti Island Irrigation offtake.

There is a second canal escape at RD 8.25 km of the Gobari Extension Canal at the tail of the canal system.

**d. Cross Drainage Structures**

There are twelve cross drainage siphons. These are old concrete hume pipe constructions and need replacement.

**e. Road Bridges**

There are 29 bridges and 2 VRB Cum CR on the main canal. 17 of these bridges are wooden constructions and will be replaced with RCC bridges.

**f. Field Outlets**

There are 140 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 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 Pattamundai sub-project. The scope of the proposed rehabilitation and improvement works have been determined from these studies and includes the rehabilitation of 60.5km of Main and 79.47km 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 Distributaries 8 and 11 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 May 2011. 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 surveys for those distributaries not included in the DoWR surveys; (iii) topographic and condition surveys of all structures along the main canal and distributaries; (iv) carryout limited geotechnical investigations for new structures and also along sections of canal embankment

where seepage is known to be problematic; (v) 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; (vi) 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-8; (ii) Distributary-16; and (iii) the Gobari Extension Canal.

Details of the scope of works are tabulated in Annexes A and B and summarized in Table 2. The detailed terms of reference are given in Section II: Detailed Terms of Reference.

The total number of structures is 811, but 516 of these are small (pipe) irrigation outlets. Of the 295 larger structures (ie excluding the irrigation outlets), 199 are thought to require substantial repair/ upgrading. In addition 26 new structures are envisaged comprising 25 new village road bridges (VRB) and one cross drainage structure.

For the main canal the two cross regulators at Charapada RD 14.2km and Pattamundai RD 76.55km will be extensively renovated and up-graded to provide 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-2: Summary of Canal Structure Works**

SI No	Type of Structure	Total number of structures	Structures to be replaced or new construction	Existing structures to be repaired
1	Head regulator (HR)	101	0	80
2	Village road bridge (VRB)	95	25	41
3	Aqueduct	1	0	0
4	Cross drainage structure (DS)	64	1	51
5	Escape	3	0	3
6	Cross regulator (CR)	23	0	20
7	Village road bridge with fall	2	0	2
8	Village road bridge with cross regulator	6	0	2
9	Outlets	516	0	436
	Total	811	26	635

## **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 sub-projects where rehabilitation and upgrading is planned under the Programme 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’s 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 to hand. 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 two distributaries. The consultant shall survey the remaining six distributaries and 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 centre 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 two 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.

For the six distributaries not previously surveyed by the Department, the consultant shall survey a 40m wide strip along the alignment of each distributary. Sections shall be surveyed at 30m intervals along the canal alignment and at each structure. The survey shall record the horizontal co-ordinates and level at the following points for canals in "fill":

Edge of survey strip on both sides

Toe of both canal embankments

Top right and top left of both canal embankments

Right and left side and centre of the canal bed for main canal and centre only for distributaries plus bed width

Where the canal is in “cut” the following points shall be surveyed:

Edge of survey strip on both sides

Top right and top left of both canal banks

Right and left side and centre of the canal bed for main canal and centre only for distributaries plus bed width

In addition any existing berms or ledges and inspection roads shall be surveyed in sufficient detail for plotting accurately on the cross section and plan. At outlets, not scheduled for site surveys, the invert level of the outlet pipe and the pipe diameter and length shall be recorded.

Where the embankment toe extends beyond the survey strip, the width of the survey shall be increased to 10m from the edge of the toe.

The plan and corresponding long section shall be plotted together on the same A3 sheet with the plan above the section. Match-lines shall be clearly indicated on the plan to enable adjacent sheets to be correctly orientated. The plan shall be contoured at an appropriate interval and shall include a north point, the location of BMs and any villages or other notable manmade or natural features shall also be plotted and annotated.

The plan and longitudinal section scale shall be 1:5,000 unless directed otherwise by the authorised person. The vertical exaggeration, which shall be the same for all long-section drawings, shall be determined to allow the vertical scale to fit on the sheet, together with the plan and data boxes below the section.

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 (m<sup>3</sup>/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 centres, 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, two downstream and one at the structure site. The upstream and downstream sections shall be at 10m and 50m from the structure. The cross sections should extend across the full width of the canal plus a minimum of 20m from the bank on 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 three or four 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 the 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  $\pm 5$ mm for elevation and  $\pm 20$ mm for the horizontal coordinates and the overall closing error through all the benchmarks shall not exceed  $\pm 10$ mm for elevation and  $\pm 50$ 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 **average 10m** (main canal structures) and **average 8m** (distributaries). Three (main canal structures) and two (distributary structures) boreholes shall be drilled at each structure. The diameter of borings shall be 150mm.

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 0.7kg with at least three samples per borehole.

The depths from which all samples are taken shall be recorded to an accuracy of 0.1m.

#### **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 canals**

The consultant shall undertake geotechnical investigations at selected locations along the canals where seepage is significant and/or where embankment stability is threatened. For the Pattamundai sub-project “canal investigations” shall be carried out along the Main Canal embankments for a combined length of about 15km (one bank). Previous studies had indicated that approximately 4.025m (5%) of the main canal would be fully lined and a further 8,000m would be lined on one bank only.

For a total length of about 15km, 3 number, 2.0m 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 or 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 Programme, 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 and consistent approach for all sub-projects. 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:

- i Standard drawing template with project title box
- ii Standard drawing notes
- iii Agreed drawing numbering system
- iv Agreed standard drawing styles and layers
- v Agreed grades of concrete
- vi Typical canal cross sections
- vii Standard designs and 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 standard design tools and procedures to speed up 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:

- i Scripts and AutoLISP routines for long and cross section drawings.
- ii Use of Xrefs to embed standard base information and details into drawings.
- iii Data tables shall be prepared as spreadsheets and embedded in drawings.
- iv Standard drawing template, styles and layers.
- v 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 existing main canal is very close to regime flow and thus major re-profiling of the canal is not required. Where the section exceeds that required to carry the design flow, no filling is envisaged.

Following the feasibility study survey and detailed design of the main and two distributary 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 May 2011. No structure surveys, detailed designs or drawings have been completed.

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 review of the existing survey and designs and the detailed design of those distributaries nor previously considered will entail the following:

- i Ensure regime flow in the main canal is maintained after modifying levels at cross regulators. On the distributaries the canal modelling shall be designed to restore the regime prism.
- ii Allow nominal 0.05m head loss across the main structures such as bridges and other structures that constrict the flow and, 0.2 to 0.4 at cross regulators that also serve as measurement structures.
- iii Raise canal banks and where necessary widen the embankments to provide a minimum freeboard of 0.75m for the main canal, 0.6m along Gobari Extension Canal and Distributary-16, and 0.5m for the other distributaries
- iv Ensure all outlets are commanded, even when the flow is only 50 percent of the design discharge.
- v Sections of high fill where seepage is occurring shall be investigated and remedied by canal lining and/or bank stability measures.
- vi The left bank also serves as a flood protection bund for the Birupa (Asila), Kelua and Brahmani rivers, and the embankment requires raising and strengthening.

### 3. Design of Cross Regulators

The nine existing cross regulators all require rehabilitation and two will require substantial modifications to incorporate gates, an operating platform and a bridge. The nine cross regulators are listed below:

RD (km)	Name	Recommendations
15.3	Rameswar CR/Fall	Retain and rehabilitate and upgrade
24.05	Triveniswar CR/VRB	Retain and rehabilitate and upgrade
26.295	Nrutanga CR/VRB/Fall	Retain and rehabilitate and upgrade
36.85	Balichandrapur CR/Fall	Retain and rehabilitate and upgrade
48.889	Benipur CR	Retain and rehabilitate and upgrade
56.007	Chatapada weir	Substantial re-building
63.648	Dist 12 CR	Retain and rehabilitate and upgrade
76.44	Pattamundai weir	Substantial re-building
80.5	Alava Lock	Retain and rehabilitate and upgrade

The scope of the designs shall include:

- i Raising and strengthening of the walls as necessary
- ii Structure capacity to be design discharge plus 15 percent surcharge
- iii Refurbishing existing or provision of new gates, provide safe operating platforms
- iv Design of upstream and downstream transitions to improve flow characteristics
- v For each structure, check percolation and where necessary provide additional cut-offs and seepage apron
- vi Check effectiveness of existing stilling basin for energy dissipation and modify if necessary
- vii Design of water level gauges, hand rails, etc
- viii Four selected CRs located on distributaries shall include a duckbill weir arrangement to provide better control of upstream water levels, 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 along the main canal. In addition a further 10 village road bridges (VRB) will require renovation. On the distributaries 31 village road bridges have been identified for rehabilitation.

## **6. Measuring Flumes**

Flow measurement is proposed, immediately downstream of the head regulators on the ten distributaries off-taking 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. Distributaries 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 distributaries. 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	Distributaries	
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 labelled 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 person, 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 14<sup>th</sup> 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 eight 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 page) 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 54 months. In addition there are 43 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)
<b>Professional staff</b>	
P-1 Team leader/project manager	6
P-2 Mapping / GIS specialist / Snr Surveyor	4
P-3 Land Surveyors x 4	12 (4 x 3)
P-4 Geotechnical engineer	3
P-5 Senior irrigation design engineer	6
P-6 Design engineers x 3	12 (3 x 4)
P-7 Structural engineer	2.5
P-8 Junior/assistant engineers x 2	8 (2 x 4)
P-9 Procurement/contract specialist	0.5
<b>Total</b>	<b>54</b>
<b>Technical and administrative staff</b>	
T-1 Survey technicians x 4	12 (4 x 3)
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
<b>Total</b>	<b>43</b>

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.

	<b>Payment Milestone</b>	<b>Percent payment</b>
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 Tributaries	20
7	Submission and approval of Packaging Intent Report and Contract Documents	20
8	Submission and approval of Final Report	5
	<b>Total</b>	<b>100</b>

**Main Canal - Distributary : Pattamundai Canal System****Classification Criteria:****Main Canal: Q = More than 10 Cumecs (Q Criteria).****Distributary:Q = Between 1 to 10 Cumecs**

Sl.No.	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	Pattamundai Main	Kendrapara Main Canal	32693 (including 2778 ha. for BGIP)	36.0000	80.50	Main Canal
2	Distributary -2	15.078 of PMC	1697	1.4559	6.84	Distributary
3	Distributary-7A	3.269 of PMC	1422	1.2201	8.50	-do-
4	Distributary-8	48.668 of PMC	4185	3.5908	19.87	-do-
5	Distributary-11	55.973 of PMC	2162	1.8550	11.58	-do-
6	Distributary-12	63.638 of PMC	3274	2.8092	6.96	-do-
7	Distributary-15	75.050 of PMC	1168	1.0022	8.31	-do-
8	Gobari Extn. Canal	79.680 of PMC	3654	3.1352	9.71	-do-
9	Distributary-16	80.500 of PMC	4052	3.4596	7.70	-do-
					<b>159.97</b>	

**Note:**

1. LS / DS for Main Canal approved by C.E., (Design & Research) on 21.05.2011.
2. Survey, LS/DS for Distributary No.8 and 11 completed and will be provided by the  
EE in-  
Charge.

**LIST OF STRUCTURES**  
**In Main Canal & Distributaries of Pattamundai Canal System**

Sl. No.	Canal System	As per Inventory Nos. of Structures / Repairing / Replacement or New Constructions										Total
		HR	VRB	Fall with CR	Aque-duct	DS	Escape	CR	CR cum HR	VRB cum CR	Outlets	
1	2	3	4	5	6	7	8	9	10	11	12	13
1	Pattamundai Canal	49	29	2	0	12	2	4	1	2	140	<b>241</b>
		38	10	2	0	11	2	4	1	2	82	<b>152</b>
		0	25	0	0	1	0	0	0	0	0	<b>26</b>
2	Disty.No.2	3	9	0	0	8	0	0	0	0	38	<b>58</b>
		1	2	0	0	4	0	0	0	0	35	<b>42</b>
		0	0	0	0	0	0	0	0	0	0	<b>0</b>
3	Disty.No.7(A)	3	2	0	0	4	0	1	0	0	20	<b>30</b>
		3	2	0	0	4	0	1	0	0	20	<b>30</b>
		0	0	0	0	0	0	0	0	0	0	<b>0</b>
4	Disty.No.8	14	18	0	0	19	0	2	0	3	103	<b>159</b>
		12	8	0	0	19	0	2	0	0	101	<b>142</b>
		0	0	0	0	0	0	0	0	0	0	<b>0</b>
5	Disty.No.11	4	17	0	0	10	0	6	0	0	79	<b>116</b>
		4	4	0	0	6	0	3	0	0	62	<b>79</b>
		0	0	0	0	0	0	0	0	0	0	<b>0</b>
6	Disty.No.12	7	7	0	1	4	0	4	0	0	46	<b>69</b>
		4	5	0	0	1	0	4	0	0	46	<b>60</b>
		0	0	0	0	0	0	0	0	0	0	<b>0</b>
7	Disty.No.15	6	3	0	0	2	0	4	0	0	20	<b>35</b>
		6	3	0	0	2	0	4	0	0	20	<b>35</b>
		0	0	0	0	0	0	0	0	0	0	<b>0</b>
8	Gobari Extn. Canal	11	4	0	0	1	1	0	0	1	31	<b>49</b>
		8	1	0	0	0	1	0	0	0	31	<b>41</b>
		0	0	0	0	0	0	0	0	0	0	<b>0</b>
9	Disty.No.16	4	6	0	0	4	0	1	0	0	39	<b>54</b>
		4	6	0	0	4	0	1	0	0	39	<b>54</b>
		0	0	0	0	0	0	0	0	0	0	<b>0</b>
<b>Total</b>		<b>101</b>	<b>95</b>	<b>2</b>	<b>1</b>	<b>64</b>	<b>3</b>	<b>22</b>	<b>1</b>	<b>6</b>	<b>516</b>	<b>811</b>
		<b>80</b>	<b>41</b>	<b>2</b>	<b>0</b>	<b>51</b>	<b>3</b>	<b>19</b>	<b>1</b>	<b>2</b>	<b>436</b>	<b>635</b>
		<b>0</b>	<b>25</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>26</b>

## ANNEX C: 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	Structural Engineer	B Tech / BE	7 yrs experience in the detailed design of hydraulic structures Minimum of 3 relevant assignments
P-8	Junior / Sub-Assistant Engineers	Diploma	3 yrs experience in irrigation and water resources. Minimum of 2 relevant assignments
P-9	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:*

- i *Name of the Firm/Consultant, year of establishment and registration, location of the headquarters office, correspondence address, telephone number and e-mail address.*
- ii *Professional Staff numbers.*
- iii *Firm/Consultant's registration status (registration legal documents to be attached). Registration with the National Remote Sensing Agency is an advantage.*
- iv *Certificates from the competent authorities for completed assignments.*
- v *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 <sup>o</sup> 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): Completion date (month/year):	N <sup>o</sup> of professional person-months provided by the 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.**

2008/09 \_\_\_\_\_  
 2009/10 \_\_\_\_\_  
 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 EOIs will be checked, evaluated and compared as follows:

- i. Completeness and conformity to the requirements of the Eoi 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. Eois which are not complete or responsive shall be excluded from further consideration.
- ii. Technical evaluation of complete and responsive Eois shall be evaluated and ranked as shown below. The highest ranked consultant / joint venture will be invited to submit a technical and financial proposal.

Ref	Criteria	Points
<b>1</b>	<b>Consultancy Profile</b>	
	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
	<b>Sub-total</b>	<b>25</b>
<b>2</b>	<b>Experience of the consultancy / joint venture</b>	
2.1	Topographic survey	15
2.2	Geotechnical investigation	10
2.3	Detailed design	15
	<b>Sub-total</b>	<b>40</b>
<b>3</b>	<b>Consultants professional staff qualifications and experience</b>	
3.2	Survey / GIS / Mapping Staff	10
3.3	Irrigation / Hydraulic Design Staff	15
3.4	Geotechnical Staff	10
	<b>Sub-total</b>	<b>35</b>
	<b>Total</b>	<b>100</b>