Government of West Bengal
Irrigation & Waterways Directorate
Burdwan Investigation & Planning Division
Purta Bhawan, 3rd Floor
Purba Burdwan-713103, West Bengal

NOTICE INVITING QUOTATION
NIQ NO.: WBIW/NHP/NIQ-05/2019-20

Memo No. 110/NHP-02/02 **Dated. 24.03.2020**

Sealed quotations for rates are hereby invited by the Executive Engineer, Burdwan Investigation and Planning Division, Irrigation and Waterways Directorate,Govt. of West Bengal,Purta Bhwan 3rd Floor, Purba Burdwan-713103 from the bonafied and resourceful agencies to ascertain unit rate (budget quote)in connection to the work: **Conducting Hydrographic & Topographic Survey of reservoir area and dams/weirs of ten nos. of irrigation schemes in Purulia District under NHP of I&W Deptt.,G0WB.** as per enclosed schedule.

Eligibility Criteria:

Interested quotationers are required to apply for quotation papers to the undersigned enclosing all papers satisfying the eligibility criteria as given below:

- The quotationer having experience of dealing with similar type of work in any Government/Government undertaking/Public sector,Zila Parishad etc (Agency has to furnish self attested copy of such supply order/completion certificate) will be preferable.
- The intending quotationer should apply for quotation papers in respective Letter Heads enclosing self attested photocopies of valid Trade License, PAN, valid PT,GST,IT etc. as applicable.

Time Schedule of Quotation:

1. Last date and time of receiving quotation paper: 27/04/2020 at 15.00 Hrs.
2. Date and time of opening quotation: 27/04/2020 at 15.30 Hrs.

Terms and Conditions:

1. The schedule of items and other documents are to be collected by the eligible quotationers free of cost from the office of the Executive Engineer, Burdwan Investigation and Planning Division, Irrigation and Waterways Directorate, Govt. of West Bengal,Purta Bhwan 3rd Floor, Purba Burdwan-713103 and can be downloaded from the Departmental website : **wbiwd.gov.in**
2. The intending agencies should submit budgetary quotes in closed envelope in tender box at i. Office of the Superintending Engineer,I & P Circle-II, Jalsampad Bhavan, Saltlake, Kolkata – 91

ii. Office of the Executive Engineer, Burdwan Investigation and Planning Division, Irrigation and Waterways Directorate, Govt. of West Bengal, Purta Bhwan 3rd Floor, Purba Burdwan-713103

3. The eligible quotationers should quote their rates both in figures and in words.Any correction in the rates must be duly signed by the quotationer and each page of the schedule are to be signed by the quotationer along with his seal.
4. Quotation papers will not be submitted by post/e-mail/fax.
5. No quotation paper will be issued after expiry of date and time mentioned above.
6. Duly filled up sealed quotation as supplied from this office is to be submitted with a forwarding letter to the office of the undersigned.
7. Accepting authority i.e. the Superintending Engineer, I & P Circle-II, Jalsampad Bhavan, Saltlake reserves the right to accept or reject any or all quotations without assigning any reasons whatsoever.
8. Informal/conditional quotation is liable to summarily rejected.
9. Any letter or other instrument submitted separately in modification of sealed quotation may not be entertained.
10. **This rate is to ascertain unit rate (budget quote) for official purpose only.**

Sd/-
Executive Engineer
Burdwan Investigation & Planning Division
Purta Bhawan, 3rd Floor
Purba Burdwan-713103, West Bengal

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NIQ NO.:WBIW/NHP/NIQ-05/2019-20
Schedule of Items

Sealed quotations for rates are hereby invited by the Executive Engineer, Burdwan Investigation and Planning Division, Irrigation and Waterways Directorate, Govt. of West Bengal,Purta Bhwan 3rd Floor, Purba Burdwan-713103 from the bonafied and resourceful agencies to ascertain unit rate (budget quote)in connection to the work: **Conducting Hydrographic & Topographic Survey of reservoir area and dams/weirs of ten nos. of irrigation schemes in Purulia District under NHP of I&W Deptt.,G0WB.**as per enclosed schedule.

1	2	3	4	5	6	7
Sl No	**Description of items**	**Qty**	**Unit**	**Unit Rate with all taxes and all incidental charges (Rs) (Excluding GST)**	**Amount (without GST) (3 x 5)**	**GST payable per item.**
1.	Conducting Hydrographic & Topographic Survey of reservoir area and dams/weirs of ten nos. of irrigation schemes in Purulia District.	180.567	Ha			
Total Amount (Rs.)						
Total Amount with GST (Rs.)						

Note 1: Unit rates should be quoted inclusive of all taxes(IT,Cess) and all incidental charges like engagement of manpower, machinery, mobilization charges etc.
Note 2: Unit rates should be quoted after observing all terms and conditions as mentioned in the enclosed **TOR.**

Sd/-
Executive Engineer
Burdwan Investigation & Planning Division

Terms of Reference

For

Conducting Hydrographic & Topographic Survey of reservoir area and dams/weirs of ten nos. of irrigation schemes in Purulia District under NHP of I & W Deptt.,G0WB.

NIQ NO.:WBIW/NHP/NIQ-05/2019-20

1. OBJECTIVES OF PROPOSAL:-

The main objectives of the proposal are:
i) To estimate and study the sedimentation behavior of reservoirs in different zones including **horizontal** zones throughout the reservoirs as well as **vertical** zones namely (a) dead storage (b) live storage (c) flood storage, if any.

ii) To develop contour map of reservoir beds.

iii) To **upgrade** Elevation-Area-Capacity tables /curves of reservoirs at regular intervals.

iv) To assess and review life expectancy of reservoirs, particularly in view of some apprehensions from certain quarters about the higher rate of sedimentation in reservoirs.

v) To recommend suitable measures for increased benefits and enhanced life of a reservoir, specific measures for Soil conservation, Catchment area treatment, Watershed details etc. should include in the report.

vi) To create database for developing regional sediment indices and facilitate Rational Sedimentation Planning of future reservoirs. To emphasize on the State Govt/Project Authorities on the importance of conducting systematic hydrographic surveys at regular intervals for better operation and management of existing reservoirs

2. *SCOPE OF PROPOSAL:-*

A. CAPACITY SURVEY:-
Under this request for proposal, the consultant is expected to perform the following assignments and studies:-

a. Mobilization of personnel, equipment, instruments, establishment of site camp etc.

b. Lay out of Ground Control Stations including reconnaissance/preliminary surveys, if any.

c. *Hydrographic survey*

Computer based Hydrographic survey shall be carried out within the water spread area so that reservoir area under water is covered at 50 m.x50m grid. For large reservoirs grid of **100 m x 100 m** shall be adopted.

d. *Topographic Survey*

The area not covered under Hydrographic survey up to MWL shall be surveyed by taking levels at 100 m. interval along range lines laid at 100 m interval. (50 m x 50 m grid). For large reservoirs grid of 100 m x 100 m shall be adopted.

e. *Collection of bed material samples*

Not less than 10 samples of the bed material shall be collected as per standard methods prescribed in APHA 1989 (American Public Health Association) covering the entire area of the reservoir to obtain sediment sizes, density, specific gravity, moisture content etc. Depth and location of sample collection are to be mentioned.

f. Collection of information from project authorities/any other agency including data on sediment yield from the upstream free catchment of the reservoir as well as accounting for the effect of upstream reservoirs, if any and incorporating of the same while writing the report.

g. Analysis of data to obtain ***elevation-area-capacity table/curves, contour plots, balance life of reservoir, cross sections, L-sections, vertical sediment distribution curve/table, estimation of sedimentation in different zones of reservoirs.***

h. Preparation of report containing general information about the reservoir, catchment characteristics, details of capacity survey performed including methodology of data collected, analysis of data with standard guidelines/ procedures, finding of results, conclusion and recommendations keeping in view the objective of the study to the satisfaction of the Department.

i. Any difficulties/special problem encountered during the course of the study and how they were overcome may be included in the report.

B. DATA ANALYSIS /PREPARATION OF TABLES/ CHARTS/ DRAWINGS/REPORT:-

After completion of the capacity survey, the survey data shall be analyzed by the Consultant to obtain the following:

i) Elevation-Area-Capacity curves as well as table
Elevation-Area-Capacity curve along with table will be prepared from the lowest elevation up to MWL **at 1.0m or less interval**.

ii) Assessment of effects of sedimentation on performance of reservoir and balance life of reservoir.

Assessment of sediment and its distribution in the reservoir shall be made and likely effects of such sedimentation on the performance of the reservoir shall be assessed. While analyzing the reservoir data, the validity of Empirical Area Reduction method using data of silt deposition collected during survey may also be checked out. The Consultant may refer to various standards/references including **I.S. 12182-1987***"Guidelines for Determination of Effects of Sedimentation in Planning and Performance of Reservoirs"*, C.B.I. & P Publication on the subject and **I.S. 5477 Part-II** "Fixing Capacities of Reservoirs – Dead Storage".

Separate chapters are to be included in the report for "Sedimentation Analysis",

iii) Estimation of Sedimentation in different zones of reservoir

Loss of storage capacity and rate of sedimentation shall be worked out in each **vertical** zone separately viz. dead storage, live storage and flood storage, if any. An assessment of the sedimentation behaviors in different **horizontal** zones throughout the reservoirs may also be made.

iv) Analysis of bed material samples

Laboratory analysis of the bed material samples collected from the reservoir bed be carried out to obtain sediment sizes, density, specific gravity, moisture content etc.

Analysis of samples should also be aimed to evaluate geometric standard deviation to know whether the sediment is uniform or non-uniform (Melville et al.). Kramer's coefficient shall also be evaluated. Method of calculation of bulk density (Lane's method or Miller's method or some other method) is to be mentioned.

v) Cross-Sections

Cross Sections showing the original bed profile, if available, and subsequent repeat surveys at every 1 km shall be provided. Raw data of cross sections at every survey line (100 m interval) **shall be provided as soft copy in CD to Department**.

Officers of Department shall be trained on the relevant software at Consultants' Office for conversion of raw data into analog form during Stage 3, analysis part of the survey.

vi) L-Section

L-Section of the reservoirs may be prepared with the lowest bed levels at every survey line.

vii) Vertical Sediment Distribution

Vertical sediment distribution curve/table shall be provided. Plot between Percent Reservoir Depth and Percent Sediment Deposited is to be plotted as per IS 5477 PARTII 1994. "Fixing Capacities of Reservoirs – Dead Storage".

viii) Contour map of the reservoir

The contour map shall be prepared in appropriate size preferably in **A0 size** with contour at suitable interval from the lowest bed level to MWL.

ix) Trap Efficiency of Reservoir

The trap efficiency of reservoir is to be calculated according to Brune's trap efficiency curve as per **I.S. 12182-1987***"Guidelines for Determination of Effects of Sedimentation in Planning and Performance of Reservoirs"*.

x) Charts/drawings for the report

All charts/drawings shall be appropriately reduced for inclusion in the report.

xi) The entire data observed during hydrographic survey by the consultant and the subsequent report prepared by him shall be the **exclusive property of concerned Department** and the consultant has no right whatsoever to divulge the information/data to others without
the specific written permission of Department .

C. PROJECT TERMS:-

I. **Period of Completion:** Three (3) months including rainy and festive season.

II. **Mode of Payment:** Payment will be made after successful completion of the work (as specified in the scope of work) on certification of the invoice (raised by the agency) by the competent authority.

2. *TECHNICAL SPECIFICATIONS:-*

1. Hydrographic Surveys:

The Scope of work shall cover all technical aspects of hydrographic and topographic survey at par with standards including the following:-

1.1 The detailed hydrographic survey is to be carried out by using Automated Hydrographic Survey System (using ADCP). Differential GPS and Robotic Total Station to be deployed for off shore positioning. The survey is to be conducted in WGS‟‟84 datum.

The dam details are enumerated below:-

Sl	Name of Dam	Area (Ha)	Name of Block	Location
1	Kestobazar Dam	17.6	Baghmundi	Purulia, W.B
2	Kulbera Dam	12.75	Baghmundi	Purulia, W.B
3	Tara Dam	60.72	Purulia	Purulia, W.B
4	Sankha Dam	21.76	Balarampur	Purulia, W.B
5	Kansai Dam	1.287	Jhalda - II	Purulia, W.B
6	Buridumur Dam	6.47	Arsha	Purulia, W.B
7	Majra Dam	32.82	Kashipur	Purulia, W.B
8	Bandajore Dam	12	Raghunathpur - II	Purulia, W.B
9	Fuljore Dam	7.16	Arsha	Purulia, W.B
10	Bandhu Dam	8.00	Arsha	Purulia, W.B

- Establishing vertical control (accuracy +0.1m) and establishing bench mark (accuracy + 10mm/ per Km.) at suitable interval. [Transfer of Bench Mark/datum w.r.t. MSL]
- Establishing horizontal control and marking selected points on the shore at suitable intervals. (accuracy +20mm/per Km.)
- HTL and LTL should be clearly marked. Special features like ghats, embankments, spurs, rock outcrops, shoals, hard clay banks, etc. should also be marked when encountered. Soundings shall be reduced to chart datum (C.D.)
- Preparation and supply of charts and survey reports in hard copies as well in electro-magnetic form. The survey charts shall be digitized contour map (with interval of 10.00 m or +/- and minor interval of 2.00m or +/-).
- To provide any clarifications/justification required by client during the acceptance of report for the work carried out by the bidders.

1.1.1 Details to be collected [other than soundings Depth]

Water Level observations during the period of survey

Apart from the above the contractor shall also carry out 24 hrs. Tide level observations for the period of survey to reduce the soundings to Chart Datum (CD).

1.1.2 Technical Specifications

1.2.1.1 Establishment of Bench Mark

The levels shall be on the basis of GTS benchmarks in the vicinity. The contractor shall transfer the benchmark to the site. All levels shall be related to MSL. New Benchmark shall be established either on existing abutments, jetties or other monoliths which shall meet the stability requirement for benchmarks specified by Survey of India. Alternatively new benchmark of suitable type shall be built to survey of India standards. Value of benchmarks shall be established to accuracy better than + 5 millimetres.

1.3.2 Establishment of Horizontal control and marking the selected points on shore

Horizontal control established shall be properly connected to nearby G.T.S. or other points approved by Engineer-in-Charge.

1.3.3 Establishment of Vertical Control

The vertical control shall be established with suitable water level gauges and/or GTS Bench Marks within or near the survey area and simultaneous tidal observations shall be taken to reduce the soundings to a recoverable or approved Chart Datum (C.D.). Sites of water level gauges should be carefully selected to ensure the free flow of water levels to and from the gauge locations. Approval of the site engineer should be obtained for the location(s) of the water level gauge(s). The C.D. of the survey shall be same as the C.D. of the existing largest scale Naval Hydrographic Chart of the area. The C.D. shall also be verified with previous surveys undertaken in the area. C.D. shall be connected with the Bench Mark established at the site. For vertical control and determination of Chart Datum, levelling between benchmarks and to determine water level gauge zero etc. The levelling accuracy shall be + 0.10 m. For recording of water levels, water level gauges shall be erected at approved locations. The water levels shall be recorded at interval not more than 15 minutes. However, time and height of low water shall be accurately determined.

1.3.4 Carrying out Soundings

The sounding data shall be recorded and reported at an interval of 50m grid.

Soundings shall be carried out using suitable equipment which yield accuracy of +0.10 m or better and maximum range should be 3000m. Relevant environmental parameters which effect accuracy of echo sounding shall be measured regularly and appropriate correction shall be applied. 'Bar Checks' shall be carried out daily before commencement and after completion of days work. Bar Check equipment / tackle and its calibration shall be got approved from Engineer-in-Charge.

1.3.5 Position Fixing

For position fixing the contractor shall use a suitable position fixing equipment with horizontal positional accuracy of + 1 m. The contractor may however propose alternative position fixing system that meets above mentioned positional accuracy, provided at least 3 lines of position can be used to determine position. The position fixing system shall be calibrated against a most accurate system or a fixed base line before deployment to the satisfaction of Engineer-in-Charge. While taking soundings vessel shall be moved at a slow speed (not greater than 3 knots).

1.3.6 Reporting

(i) A survey report in triplicate describing the conduct of the survey along with a soft copy and all observed data, alongwith original records viz. calculations field books, measurement books etc. shall be submitted to Department. The data furnished shall be adequate to re-plot the survey chart independently on the basis of these documents.

(ii) The charts shall be plotted at 1:5000 scale or any other scale as directed by Engineer-in-Charge showing soundings at 5.0m intervals. U.T.M. grid and geographical grid shall be

marked on the chart as per normal cartographic practice. Soundings shall be shown in meter (m) and decimeters and shall be reduced to Chart Datum. On the chart the soundings shall be marked duly showing high water and low water lines, delineation of shoals, symbols and legends, Northline etc. As the area covered shall be in more than one chart, the contractor shall provide a single chart (Index Map) in triplicate. All charts/maps should display reference to the ground station and datum based on which the controls are fixed and shall indicate date/time of surveys and name of person in-charge carrying out the surveys.

(iii) Master copy of the each chart/map shall be provided along with three hard copies and one soft copy on Compact Disc in a format compatible with AUTOCAD.

2 **Topographic Survey:**

2.1 Brief Scope of Work -Topographic Survey

i. Establishing Bench Mark
ii. Establishing horizontal and vertical controls
iii. Carrying out leveling/ traversing and mapping
iv. Reporting and charting
v. Furnishing any clarifications required by client during the process of acceptance of the reports
vi. Topographic surveys of the area

2.2 Topographic Survey map preferably to a scale of 1:5000, of the land adjacent to harbors area should be prepared. The plan should clearly show dry weather channels, with shoals and channels, embankments, shoreline, buoys, creeks, etc. Plan should also show all important structures like bridges, culverts, weirs, etc. Important towns/ villages located in the area covered in the plan may also be marked in the same plan. The contractor shall deploy a suitable traversing equipment to undertake survey with vertical accuracy of + 10mm./per km and horizontal accuracy of + 20mm / per km. However, at least 3 lines of position should be used to determine location.

2.3 The contractor shall accurately delineate the various existing physical features such as high water and low water line creeks, buoys, existing structures and road, hillock, houses, important town, villages en-route, roads, embankments, bridges, landmarks, location of gauge discharge stations, rain gauge stations, critical locations to be protected, location of bed/suspended sampling points etc. within the survey area and also mark important physical features which are adjacent to the survey area; important for orientation at the site as per directions of Engineer-in-charge. An index map covering all these features shall be included in the report.

2.4 Reporting

i. The contractor shall submit survey reports as per specification laid down. However, the contour shall be marked at an interval 1 m on the survey charts.
ii. Survey maps shall be plotted at 1:5000 scale showing GTS bench marks and other important land marks with a contour interval of 2.0 m along shore area and 10.0 m intervals in the hilly area. An Index Map (Single Chart) showing entire area of survey and the physical features mentioned above shall also be prepared and submitted in triplicate along with soft copy as specified.
iii. The contractor shall also integrate the topographic survey map with hydrographic survey.

3. SPECIAL TERMS & CONDITION FOR SURVEY WORK

The bidder shall furnish the technical compliance sheet as a part of his bid with supporting documents; which establishing the bidder's eligibility to bid and his qualification to participate in the bid, without fulfilling the following parameter the bidder is liable for rejection without arising any reason.

The bidder is qualified only when he is the actual service provider and meets the required norms as specified below and all original evidences to be produced in due course of time as & when asked by the Tender Inviting Authority :-

TECHNICAL COMPLIANCE SHEET

No	Item	Yes/No
1	The bidder should have completed at-least one "Sedimentation Survey using High technology equipments like Integrated Hydrographic Survey System which should including Echo Sounder with Hypack software / Acoustic Doppler Current Profiler (ADCP) under any Govt. department.	
2	Having experienced manpower in hydrographic & topographical survey and equipment for the required of the job	
2.a	Having the following equipment required for the job, as explained in the specifications:-	
2.b	Echo-sounder (dual frequency) interfaced with HYPACK Max Software.	
2.c	Marine Radio Beacon receiver Or Satellite based correction Receiver (OMNISTAR) to receive the Pseudo range corrections through Echo sounder and Hypack Software.	
2.d	Differential GPS for Off shore positioning (Leica, Trimble or Equivalent)	
2.e	ADCP - Acoustic Doppler Current Profilers to determine others bathymetric parameters if any as required by Engineer-in-Charge.	
2.f	Motorized inflatable boat with GPS tracking system	
3	DGPS Software for downloading, processing & preparation of bathymetry chart, and contour map such as Hypack and Hydasproi or equivalent.	
4	Should provide a valid bench mark as described in the attached specifications at each of the sites	
5	Should carry the survey work as described in the specifications.	
6	Should provide the final processed data as described in the specifications.	

I. **Period of Completion:** Three (3) months including rainy and festive season.

II. **Mode of Payment:** Payment will be made after successful completion of the work (as specified in the scope of work) on certification of the invoice (raised by the agency) by the competent authority.

Sd/-
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