

**GOVERNMENT OF INDIA
SOCIETY OF INTEGRATED COASTAL MANAGEMENT (SICOM)
MINISTRY OF ENVIRONMENT & FORESTS**

**BID DOCUMENT FOR
PROVISION OF GROUND CONTROLS
AND
DIGITAL PHOTOGRAMMETRY**

**IFB No. Proc/SICOM/SOI/2011/01
Dated.: 19/10/2011.**

**PROCUREMENT OF WORKS UNDER
NATIONAL COMPETITIVE BIDDING (NCB)**

GOVERNMENT OF INDIA
SOCIETY OF INTEGRATED COASTAL MANAGEMENT (SICOM)
MINISTRY OF ENVIRONMENT & FORESTS
INTEGRATED COASTAL ZONE MANAGEMENT (ICZM) PROJECT

CREDIT AGREEMENT NO. 4765-0 I N

NATIONAL COMPETITIVE BIDDING
(WORKS)

NAME OF WORK : **“Provision of Ground Controls and Digital Photogrammetric Work of approximately 7 km. wide coastal belt of Indian mainland including major deltaic areas and back waters, for delineation of hazard line”.**

PERIOD OF SALE OF BIDDING DOCUMENT : FROM : **28/10/2011**
TO : **07/12/2011**

TIME AND DATE OF PRE-BID CONFERENCE : DATE: **11/11/2011** TIME: **1000** HOURS

LAST DATE AND TIME FOR RECEIPT OF BIDS : DATE: **08/12/2011** TIME: **1030** HOURS

TIME AND DATE OF OPENING OF BIDS : DATE: **08/12/2011** TIME **1100** HOURS

PLACE OF OPENING OF BIDS : SICOM OFFICE
Ministry of Environment & Forest,
No.9, First Floor,
Institutional Area,
Lodhi Road, New Delhi -110003.

OFFICER INVITING BIDS : National ICZM Project Director, SICOM
Ministry of Environment & Forest
No.9, First Floor,
Institutional Area,
Lodhi Road, New Delhi -110003

INVITATION FOR BID

(IFB)

GOVERNMENT OF INDIA
SOCIETY OF INTEGRATED COASTAL MANAGEMENT (SICOM)
MINISTRY OF ENVIRONMENT & FORESTS
INTEGRATED COASTAL ZONE MANAGEMENT (ICZM) PROJECT

INVITATIONS FOR BIDS (IFB)
NATIONAL COMPETITIVE BIDDING

IFB No.: **Proc/SICOM/SOI/2011/01**

Date: **19/10/2011.**

1. The Government of India has received a credit from the International Development Association (IDA) towards the cost of ICZM Project and intends to apply a part of the funds to cover eligible payments under the contracts for **Provision of Ground Controls and Digital Photogrammetric Work** of approximately 7 km. wide coastal belt of Indian mainland including major deltaic areas and back waters using digital stereo aerial photographs of 9 cm GSD for delineation of hazard line as detailed below in the TABLE 1 of IFB. Bidding is open to all bidders from eligible source countries as defined in the IBRD Guidelines for Procurement.

Bidders are advised to note the minimum qualification criteria specified in Clause 4 of the Instructions to Bidders to qualify for the award of the contract. They are also advised to get conversant with the Mapping Policy of Government of India. **The guidelines regarding National Map Policy is available in SOI website www.surveyofindia.gov.in**

2. **The National ICZM Project Director, SICOM, Ministry of Environment and Forests, New Delhi** invites bids for the work divided into 8 (eight) Zones, as detailed in the TABLE 1 of IFB. The bidders may submit bids for any or all of the works detailed in Table 1 of IFB. The bidder may offer cross discounts while quoting for two or more Zones, in which case award of work would be decided in a manner which is financially beneficial to the **The National ICZM Project Director**.
3. Bidding documents (and additional copies) may be purchased from the office of **National ICZM Project Director, SICOM, Ministry of Environment & Forest, No. 9, First Floor, Institutional Area, Lodhi Road, New Delhi -110003 from 28/10/2011 to 07/12/2011** for a non-refundable fee (three sets) of Rs. 2,000 (Rupees Two Thousand), in the form of Demand Draft on any Nationalized/Scheduled bank payable **at New Delhi** in favour of **Accounts Officer, SICOM**. Interested bidders may obtain further information at the same address. The bidding document can also be downloaded from **MoEF website www.moef.nic.in**, in which case, while submitting the bid, a demand draft for Rs. 2,000 (Rupees Two Thousand Only) towards the cost of bid document shall be enclosed along with the bid. The Bidder who downloads the bid documents should regularly access the same website for clarifications, amendments and pre-bid meeting minutes. Bidding documents requested by mail will be despatched by registered/speed post on payment of an extra amount of Rs.500. The **National ICZM Project Director** will not be held responsible for the postal delay if any, in the delivery of the documents or non-receipt of the same.
4. Bids must be accompanied by Bid security of the amount specified for the work in the TABLE 1 of IFB below, drawn in favour of **Accounts Officer, SICOM**. Bid security will have to be in any one of the forms as specified in the bidding document and shall have to be valid for 45 days beyond the validity of the bid.
5. Bids must be delivered to **National ICZM Project Director, SICOM, Ministry of Environment & Forest, No. 9, First Floor, Institutional Area, Lodhi Road, New Delhi -110003, on or before 10:30 HOURS on 08/12/2011 and will be opened on the same day at 1100 HOURS, at the Conference Hall, SICOM, Ministry of Environment & Forest, No. 9, First Floor, Institutional Area, Lodhi Road, New Delhi -110003**, in the presence of the bidders who wish to attend. If the office happens to be closed on the date of receipt of the bids as specified, the bids will be received and opened on the next working day at the same time and venue.
6. A prebid meeting will be held on **11/11/2011 at 1000 hrs at the Conference Hall, SICOM, Ministry of Environment & Forest, No. 9, First Floor, Institutional Area, Lodhi Road, New Delhi -110003**, to clarify the issues and to answer questions on any matter that may be raised at that stage as stated in Clause 9.2 of 'Instructions to Bidders' of the bidding document.
7. Other details can be seen in the bidding documents.

TABLE 1

<u>Zone No.</u>	<u>Name of work</u>	<u>Approximate value of work (Rs.)</u>	<u>Bid security (Rs.)</u>	<u>Cost of document (Rs.)</u>	<u>Period of completion #</u>
1	2	3	4	5	6
Zone-I	Provision of Ground Controls and Digital Photogrammetric Work of approximately 7 km. wide –Zone I From :International boundary of Pakistan To :Somnath Railway Line Area above HTL (mainland): 8024 sq km Area in Inter Tidal Zone : 5349 sq km Area of islands : 67 sq km Production site : Survey of India, Bangalore	55 million 5.5 (Cr)	Rs.0.55 million (5.5 lakhs)	➤ Rs.2000	2 (Two) years
Zone-II	Provision of Ground Controls and Digital Photogrammetric Work of approximately 7 km. wide – Zone II From : Somnath Railway Line To : Ullas River Area above HTL (mainland): 9065 sq km Area in Inter Tidal Zone : 3408 sq km Area of islands :293 sq km Production site : Survey of India, Bangalore	55 million 5.5 (Cr)	Rs.0.55 million (5.5 lakhs)		2 (Two) years
Zone-III	Provision of Ground Controls and Digital Photogrammetric Work of approximately 7 km. wide – Zone III From : Ullas River To : Sharavathi River Area above HTL (mainland): 6091 sq km Area in Inter Tidal Zone : 379 sq km Area of islands : 7 sq km Production site : Survey of India, Bangalore	33 million 3.3 (Cr)	Rs.0.33 million (3.3 lakhs)		2 (Two) years
Zone-IV	Provision of Ground Controls and Digital Photogrammetric Work of approximately 7 km. wide – Zone IV From : Sharavathi River To : Cape Comorin Area above HTL (mainland):7875 sq km Area in Inter Tidal Zone : 55 sq km Area of islands :1 sq km Production site : Survey of India, Bangalore	42 million 4.2 (Cr)	Rs.0.42 million (4.2 lakhs)		2 (Two) years
Zone-V	Provision of Ground Controls and Digital Photogrammetric Work of approximately 7 km. wide – Zone V From : Cape Comorin To : Ponnipur River Area above HTL (mainland): 4537 sq km Area in Inter Tidal Zone : 31 sq km Area of islands : 30 sq km Production site : Survey of India, Hyderabad	25 million 2.5 (Cr)	Rs.0.25 million (2.5 lakhs)		2 (Two) years

Zone-VI	Provision of Ground Controls and Digital Photogrammetric Work of approximately 7 km. wide – Zone VI From: Ponnipur River To: Krishna (Devi Point) River Area above HTL (mainland):4976 sq km Area in Inter Tidal Zone : 52 sq km Area of islands : 3sq km Production site : Survey of India, Hyderabad	25 million 2.5 (Cr)	Rs.0.25 million (2.5 lakhs)	2 (Two) years
Zone-VII	Provision of Ground Controls and Digital Photogrammetric Work of approximately 7 km. wide – Zone VII From: Krishna (Devi Point) River To: Chhatrapur Road Junction Area above HTL (mainland):6200 sq km Area in Inter Tidal Zone : 73 sq km Area of islands : 0 sq km Production site : Survey of India, Hyderabad	33 million 3.3 (Cr)	Rs.0.33million n (3.3 lakhs)	2 (Two) years
Zone-VIII	Provision of Ground Controls and Digital Photogrammetric Work of approximately 7 km. wide – Zone VIII From: Chhatrapur Road Junction To: Bangladesh Border Area above HTL (mainland): 8674 sq km Area in Inter Tidal Zone : 294 sq km Area of islands :2546 sq km Production site : Survey of India, Hyderabad	52 million 5.2 (Cr)	Rs.0.52 million (5.2 lakhs)	2 (Two) years

**National ICZM Project Director,
SICOM, Ministry of Environment & Forest,
No. 9, First Floor, Institutional Area,
Lodhi Road, New Delhi -110003**

SECTION 1: INSTRUCTIONS TO BIDDERS
(ITB)

Section 1: Instructions to Bidders

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A. General

1. Scope of Bid

The National ICZM project Director, SICOM, Ministry of Environment and Forests, New Delhi (referred to as Employer in these documents), invites bids for **Provision of Ground Controls and Digital Photogrammetric Work** of approximately 7 km. wide coastal belt of Indian mainland including major deltaic areas and back waters using digital stereo aerial photographs of 9 cm GSD for delineation of hazard line, divided into **Eight** zones (as defined in these documents and referred to as "the works") detailed in the TABLE 1 given in IFB. The bidders may submit bids for any **one or more than one** or all of the **zones** detailed in Table 1 given in IFB.

1.1 The works include:-

- Preparation of site and setting up of Production facility.
- Planning and Provision of Planimetric ground control points by dual frequency GNSS/GPS receivers in relative static positioning mode and heights by differential Spirit **Levelling (Total Station / GPS Leveling in Hilly/difficult areas)** required for Photogrammetric Block control. It includes field work, processing and computation
- Planning and execution of Photogrammetric Work
 - Aerial triangulation,
 - Feature Extraction in Stereo mode as per the Data Model Structure (DMS)
 - DTM and TIN generation and editing
 - Contour generation and editing
 - Ortho-rectification , Ortho-mosaic.
 - Integration of important attribute information into the spatial database from the annotations of existing SoI maps
- Inundation Modeling and digitization of Flood line and determining areas of inundation by the estimated flood of 100 years return period.
- Digital shoreline Analysis of time series coastline data (3 nos.) to study the trends of shore-line change and arithmetically project the shoreline for next 100 years.
- Preparation of digital maps on the base of ortho-imagery and depicting contours at 0.5m (2.5m for hills) V L, final composite line and vector - as per approved layout and content .
- QA/QC at each stage of work and for the whole work
- Data management including daily incremental backup, monthly full backup of data as per the back-up plan submitted by the Contractor and approved by the Engineer.
- Training of 20 SOI staff for 1 month in the software, systems and processes being used by the contractor.
- Delivery of products (hardcopy & softcopy) as per list of deliverables and delivery instructions.

1.2 The successful bidder will be expected to complete the works by the intended completion date specified in the Contract data.

2. Source of Funds

2.1 The Government of India has received a credit from the International Development Association (hereinafter called "the Bank") towards the cost of Integrated Coastal Zone Management (ICZM) Project and intends to apply a part of the funds to cover eligible payments under the contract for the Works. Payments by the Bank will be made only at the request of the borrower and upon approval of the Bank in accordance with the *Credit Agreement*, and will be subject in all respects to the terms and conditions of that Agreement. Except as the Bank may specifically otherwise agree, no party other than the borrower shall derive any rights from the *Credit Agreement* or have any rights to the credit proceeds.

2.2 The credit agreement prohibits a withdrawal from the credit account for the purpose of any payment to persons or entities, or for any import of goods, if such payment or import, to the knowledge of the Bank, is prohibited by a decision of the United Nations Security Council, taken under Chapter VII of the Charter of the United Nations.

3. Eligible Bidders

3.1 This *Invitation for Bids* is open to all bidders from the eligible countries as defined under the *IBRD Guidelines for Procurement*. Any materials, equipment, and services to be used in the performance of the Contract shall have their origin in the eligible source countries.

- 3.2 All bidders shall provide in Section 2, Forms of Bid and Qualification Information, a statement that the Bidder is not associated, nor has been associated in the past, directly or indirectly, with the Consultant or any other entity that has prepared the design, specifications, and other documents for the Project or being proposed as Project Manager for the Contract. A firm that has been engaged by the Borrower to provide consulting services for the preparation or supervision of the works, and any of its affiliates, shall not be eligible to bid.
- 3.3 Government-owned enterprises in the Employer's country may only participate if they are legally and financially autonomous, operate under commercial law and are not a dependent agency of the Borrower or Sub-borrower.
- 3.4 Bidders shall not be under a declaration of ineligibility for corrupt and fraudulent practices issued by the Bank in accordance with sub-clause 37.1.

4. Qualification of the Bidder

4.1 All bidders shall provide in Section 2, Forms of Bid and Qualification Information, a preliminary description of the proposed work method and schedule, including charts, as necessary.

4.2 Deleted.

4.3 All bidders shall include the following information and documents with their bids in Section 2:

- (a) copies of original documents defining the constitution or legal status, place of registration, and principal place of business; written power of attorney of the signatory of the Bid to commit the Bidder;
- (b) total monetary value of the work performed for each of the last five years;
- (c) experience in works of a similar nature and size for each of the last five years, and details of works under way or contractually committed; and clients who may be contacted for further information on those contracts;
- (d) major items of equipments proposed to carry out the Contract;
- (e) qualifications and experience of key management and technical personnel (photogrammetric professionals) proposed for the Contract.
- (f) reports on the financial standing of the Bidder, such as profit and loss statements and auditor's reports for the past five years;
- (g) evidence of adequacy of working capital for this contract (access to line(s) of credit and availability of other financial resources);
- (h) authority to seek references from the Bidder's bankers;
- (i) information regarding any litigation or arbitration resulting from contracts executed by the Bidder in the last five years or currently under execution. The information shall include the names of the parties concerned, the disputed amount, cause of litigation, and matter in dispute;
- (j) proposals for subcontracting components of the works as mentioned below (for each, the qualifications and experience of the identified sub contractor in the relevant field should be annexed; no vertical splitting of complete work for subcontracting is acceptable).

Subcontracting the following components of work shall be allowed .

- Provision of Planimetric Control component of work (maximum one sub-contractor in each zone)
- Provision of Height Control component of work. (maximum one sub-contractor in each zone)
- Site Preparation

However, sub-contracting the Photogrammetric component of work is not allowed.

- (k) the proposed methodology and program of the works for all components of work mentioned in Clause 1.1 of ITB, including execution and management, backed with equipment and manpower planning and deployment, duly supported with broad calculations and quality control procedures proposed to be adopted,

justifying their capability of execution and completion of the work as per technical specifications within the stipulated period of completion as per milestones;

4.4 Bids from Joint ventures are not acceptable.

4.5 A. To qualify for award of the contract for one Zone, each bidder in its name should have in the last five years *i.e.* 2006-07, 2007-08, 2008-09, 2009-10 and 2010-11.

- (a) achieved in, at least two financial years, a minimum annual financial turnover (in digital photogrammetric related work viz. AT, DTM generation, Orthophoto generation, Contour generation and Feature extraction) of value not less than given in **TABLE 2** below.

TABLE 2

Zone#	Clause 4.5 A (a) (Rs in million)
I	55*
II	55*
III	33*
IV	42*
V	25*
VI	25*
VII	33*
VIII	52*

- (b) satisfactorily completed, as a prime contractor, (or as subcontractor duly certified by the employer/main contractor) :

- (i) At least **one** similar work, of value not less than as per **column 2 of Table 3** given below, from photogrammetric related work (excluding field work) which necessarily includes all components of work viz. aerial triangulation, DTM creation, contour generation, feature extraction in Stereo mode and ortho generation over the last five years (2006-07 to 2010-11).

OR

- (ii) At least **two** similar works, **each of value** not less than as per **column 2 of Table 3** given below, from photogrammetric related work (excluding field work), in which case each of the work should include one or more components of work viz. AT and/or DTM generation and/or orthophoto generation and/or feature extraction in Stereo mode. However the **two** works taken together should necessarily include all components viz. aerial triangulation, DTM creation, contour generation, feature extraction in Stereo mode and ortho generation over the last five years (2006-07 to 2010-11).

TABLE 3

Zone#	Clause 4.5 A (b)(i) Or 4.5 A (b)(ii) (Rs in million)
I	44*
II	44*
III	26*
IV	34*
V	20*
VI	20*
VII	26*
VIII	42*

*at 2011-2012 price level. Financial turnover and cost of completed works of previous years shall be given weightage of 5% per year based on rupee value to bring them to 2011-2012 price level.

- (c) The bidder or his identified sub-contractors should have executed, in any one year, GNSS/GPS related survey works in relative static positioning mode / differential mode for an amount aggregating to at least Rs.5 (five) million, **for each Zone.**
- (d) The bidder or his identified sub-contractors should have executed, in any one year, Spirit Leveling work for an amount aggregating to at least Rs.5 (five) million, **for each Zone.**

4.5 B. Each bidder should further demonstrate:

- (a) Minimum availability (either owned or leased or by procurement against mobilization advances) of the following key and critical equipment for this work - for each Zone:

- GNSS/GPS (Dual frequency) receivers* : 6 Nos.
- Digital */Auto level* : 10 Nos.
- Lap Top (for post-pointing /field computation) : 20 Nos.
- Total stations * : 2 Nos.

- Digital Photogrammetric Workstation : 35 nos.
- Software for
- Aerial Triangulation : 2 nos.
- DTM generation and editing : 25 nos.
- Orthophoto generation : 5 nos.
- Feature extraction in Stereo Mode : 10 nos.
- GIS software : 5 nos.
- Inundation Modelling : 3 nos.
- Software for Analysis of Different Time Series of Shore Lines : 3 nos.
- A0 size Scanner : 1 no.
- A0 size plotter : 2 nos.
- Storage System with OS, Domain Controller LAN, Server, back up systems and other accessories etc..) : 1 no

* Digital/Auto Level, Total Station, GNSS/GPS (DF/SF) Receivers should be from well reputed brands like Trimble, Leica, Ashtech, Topkon etc with capability to achieve the accuracies laid down in Specifications

- (b) Availability for **field** work a Project Manager with experience in providing control points by GNSS/GPS in relative static positioning mode / differential mode and provision of heights by Spirit **Levelling (Total Station / GPS leveling in Hilly/difficult areas)** and other key personnel with the main contractors or identified sub-contractors having experience as given below for one zone.

Also, Availability for **Photogrammetric** work a Project Manager with experience in Digital Photogrammetry and other key personnel with the main contractor having minimum experience as given below for one zone:

Sl. No.	Position/ Functional Expertise	Nos.	Total Experience (in years)	Experience in specified work (in years)
1	Project Manager- Photogrammetry	1	10	10
2	Expert - Aerial Triangulation	1	8	8
3	Expert – DTM Generation	1	8	8
4*	Team Leader -Aerial Triangulation	1	5	5
5*	Team Leader - DTM Generation and Feature Extraction	3	5	5
6*	Team Leader - Orthophoto Generation	1	5	5
7	System Manager for managing	2	5	5

	production data in networked environment.			
8	Project Manager-Field surveying	1	15	10
9	Expert - GNSS/GPS observations & processing	1	10	5
10	Expert - Spirit Levelling, Total Station & computations	1	10	5
11	Team Leader -GNSS/GPS	1	5	3
12	Team Leader – Spirit Levelling , Total Station & computations	2	5	3

* At least one of the Team Leaders among Sl. No. 4,5,6 should have expertise in Inundation Modeling. Else a separate Team Leader with requisite expertise should be available with Contractor

*At least one of the Team Leaders among Sl. No. 4,5,6 should have expertise in Shore line analysis. Else a separate Team Leader with requisite expertise should be available with Contractor

- (c) Liquid assets and/or availability of credit facilities of not less than the value given in TABLE 4 below, in the format given in Section 2.
(Credit lines/letter of credit/certificates from Banks for meeting the funds requirement etc.)

TABLE 4

Zone#	Clause 4.5 B (c) (Rs in million)
I	11
II	11
III	5
IV	7
V	4
VI	4
VII	5
VIII	8

- 4.5 C. To qualify for a package of contracts (Zones) made up of this and other contracts for which bids are invited in the IFB**, the bidder must demonstrate having experience and resources sufficient to meet the aggregate of the qualifying criteria for the individual contracts.
- 4.6** Sub-contractors' experience and resources shall not be taken into account in determining the bidder's compliance with the qualifying criteria except to the extent stated in 4.5 (A) (c and d) above.
- 4.7** Bidders who meet the minimum qualification criteria will be qualified only if their available bid capacity is more than the total bid value. The available bid capacity will be calculated as under:

$$\text{Assessed Available Bid capacity} = (A * N * 1.5 - B)$$

where

A = Maximum value of similar Photogrammetric mapping works executed in any one year during the last five years by the bidder (updated to 2011-12 price level) taking into account the completed as well as works in progress.

N = 2 (Number of years prescribed for completion of the works for which bids are invited).

B = Value, at 2011-12 price level, of existing commitments and on-going works to be completed during the next two years (period of completion of the works for which bids are invited)

Note: The statements showing the value of existing commitments and on-going works as well as the stipulated period of completion remaining for each of the works listed should be countersigned by the representative of respective Employer, not below the rank of Project Manager/Executive Engineer or equivalent. If it is not feasible, the same should be stated with the reasons thereof.

4.8 Even though the bidders meet the above qualifying criteria, they are subject to be disqualified if they have:

- made misleading or false representations in the forms, statements and attachments submitted in proof of the qualification requirements; and/or
- record of poor performance such as abandoning the works, not properly completing the contract, inordinate delays in completion, litigation history, or financial failures etc.
- participated in the previous bidding for the same work and had quoted unreasonably high bid prices and could not furnish rational justification to the employer.

5. One Bid per Bidder

5.1 Each bidder shall submit only one bid for one contract. A bidder who submits or participates in more than one Bid (other than as a subcontractor or in cases of alternatives that have been permitted or requested) will cause all the proposals with the Bidder's participation to be disqualified.

6. Cost of Bidding

6.1 The bidder shall bear all costs associated with the preparation and submission of his Bid, and the Employer will in no case be responsible and liable for those costs.

7. Site of work and site visit:

7.1 The Bidder, at the Bidder's own responsibility and risk is encouraged to visit and examine the Site of works in secure premises of Survey of India (SoI) sites mentioned at TABLE 1 of IFB for estimation of cost involved in site preparation. The costs of visiting the site shall be at the Bidder's own expense. They are also encouraged to collect and analyze all information pertaining to the terrain such as a mountainous area or a complex coastline etc., that may be necessary for preparing the Bid and entering into a contract for Provision of Ground Controls and Digital Photogrammetric Work. Failure on the part of a Bidder to obtain all relevant information shall not be considered a reason for any additional payments nor shall it relieve them from any risks or liabilities or from the responsibility of completing the works.

B. Bidding Documents

8. Content of Bidding Documents

8.1 The set of bidding documents comprises the documents listed in the table below and addenda issued in accordance with Clause 10:

Invitation for Bids

Section	1	Instructions to Bidders
	2	Forms of Bid, Qualification Information and Letter of Acceptance
	3	Conditions of Contract
	4	Contract Data
	5	Specifications
	6	Drawings
	7	Bill of Quantities
	8	Forms of Securities

8.2 Two sets of the bidding document should be completed and returned with the bid.

9. Clarification of Bidding Documents

9.1 A prospective bidder requiring any clarification of the bidding documents may notify the Employer in writing to **The National ICZM Project Director, SICOM, Ministry of Environment & Forest, No. 9, First Floor, Institutional Area, Lodhi Road, New Delhi -110003** or by e-mailing at senthil.vel@nic.in and proc.sicom@gmail.com. The Employer will respond to any request for clarification which he receives earlier than 15 days prior to the deadline for submission of bids. The Employer's response to important

queries/clarifications shall be published on **MoEF website www.moef.nic.in** and also copies of the Employer's response will be forwarded to all purchasers of the bidding documents including a description of the enquiry but without identifying its source, for the benefit of all bidders.

9.2 Pre-bid meeting

9.2.1 The bidder or his official representative is invited to attend a pre-bid meeting which will take place at the **Conference Hall, National ICZM Project Director, SICOM, Ministry of Environment & Forest, No. 9, First Floor, Institutional Area, Lodhi Road, New Delhi -110003** on **11/11/2011 at 10:00 hrs**

9.2.2 The purpose of the meeting will be to clarify issues and to answer questions on any matter that may be raised at that stage.

9.2.3 **The bidder is requested to submit any questions in writing or by e-mail (senthil.vel@nic.in and proc.sicom@gmail.com) to reach the Employer not later than one week before the meeting.**

9.2.4 Minutes of the meeting, including the text of the questions raised (without identifying the source of enquiry) and the responses given will be transmitted without delay to all purchasers of the bidding documents and also published on **MoEF website www.moef.nic.in** . Any modification of the bidding documents listed in Sub-Clause 8.1 which may become necessary as a result of the pre-bid meeting shall be made by the Employer exclusively through the issue of an Addendum pursuant to Clause 10, which shall be transmitted without delay to all purchasers of the bidding documents and also published on websites mentioned above and not through minutes of the pre-bid meeting.

9.2.5 Non-attendance at the pre-bid meeting will not be a cause for disqualification of a bidder.

10. Amendment of Bidding Documents

10.1 Before the deadline for submission of bids, the Employer may modify the bidding documents by issuing addenda.

10.2 Any addendum thus issued shall be part of the bidding documents and shall be published on **MoEF website www.moef.nic.in** and shall be communicated in writing to all the purchasers of the bidding documents. Prospective bidders who purchased bid documents shall acknowledge receipt of each addendum in writing to the Employer.

10.3 To give prospective bidders reasonable time in which to take an addendum into account in preparing their bids, the Employer shall extend as necessary the deadline for submission of bids, in accordance with Sub-Clause 20.2 below.

C. Preparation of Bids

11. Language of the Bid

11.1 All documents relating to the bid shall be in the English language.

12. Documents comprising the Bid

12.1 The bid submitted by the bidder shall comprise the following:

- (a) The Bid (in the format indicated in Section 2).
- (b) Bid Security;
- (c) Priced Bill of Quantities;
- (d) Qualification Information Form and Documents;

and any other materials required to be completed and submitted by bidders in accordance with these instructions. The documents listed under Sections 2, 4 and 7 of Sub-Clause 8.1 shall be filled in without exception.

12.2 Bidders bidding for this contract together with other contracts stated in the IFB to form a package will so indicate in the bid together with any discounts offered for the award of more than one contract. Such discounts should be clearly mentioned in the Bid.

12.3 Bids for one or more zones shall be submitted in the same bid.

13. Bid Prices

13.1 The contract shall be for the whole works as described in Sub-Clause 1.1, based on the priced Bill Quantities submitted by the Bidder.

13.2 The bidder shall fill in rates and prices and line item total (both in figures and words) for all items of the Works described in the **Bill of Quantities** alongwith total bid price (both in figures and words). *Items for which no rate or price is entered by the bidder will not be paid for by the Employer when executed and shall be deemed covered by the other rates and prices in the Bill of Quantities.* Corrections, if any, shall be made by crossing out, initialing, dating and rewriting.

13.3 All duties, taxes, and other levies payable by the contractor under the contract, or for any other cause shall be included in the rates, prices and total Bid Price submitted by the Bidder.

Note: *“Bidders may like to ascertain availability of excise/custom duty exemption benefits available in India to the contracts financed under World Bank loan/credits. They are solely responsible for obtaining such benefits which they have considered in their bid and in case of failure to receive such benefits for reasons whatsoever, the employer will not compensate the bidder (contractor). Where the bidder has quoted taking into account such benefits, he must give all information required for issue of certificates in terms of such notifications as per form attached to the Qualification Information in the bid. To the extent the employer determines the quantity indicated therein are reasonable keeping in view the bill of quantities, construction programme and methodology, the certificates will be issued within 60 [sixty] days of signing of contract and no subsequent changes will be permitted. No certificate will be issued for items where no quantity, make and model of equipment is indicated in the statement. The bids which do not conform to the above provisions will be treated as non responsive and rejected. Any delay in procurement of the equipment /machinery including hardware or software as a result of the above shall not be a cause for granting any extension of time.”*

13.4 The rates and prices quoted by the bidder are subject to adjustment during the performance of the Contract in accordance with the provisions of Clause 47 of the Conditions of Contract.

14. Currencies of Bid and Payment

14.1 The unit rates and the prices shall be quoted by the bidder entirely in Indian Rupees.

15. Bid Validity

15.1 Bids shall remain valid for a period not less than one hundred eighty days after the deadline date for bid submission specified in Clause 20. A bid valid for a shorter period shall be rejected by the Employer as non-responsive.

15.2 In exceptional circumstances, prior to expiry of the original time limit, the Employer may request that the bidders may extend the period of validity for a specified additional period. The request and the bidders' responses shall be made in writing or by cable. A bidder may refuse the request without forfeiting his bid security. A bidder agreeing to the request will not be required or permitted to modify his bid except as provided in 15.3 hereinafter, but will be required to extend the validity of his bid security for a period of the extension, and in compliance with Clause 16 in all respects.

15.3 Deleted

15.4 Bid evaluation will be based on the bid prices without taking into consideration the above correction.

16. Bid Security

16.1 The Bidder shall furnish, as part of his Bid, a Bid security in the amount as shown in column 4 of the table 1 of IFB for this particular work. *Bidder is advised to submit bid securities separately for each Zone e.g. a bidder submitting bid for more than one Zones shall submit bid security for each of the Zones separately.* This bid security shall be in favour of **Accounts Officer, SICOM** and may be in one of the following forms:

- A bank guarantee issued by a nationalized / scheduled bank located in India; or a reputable bank located abroad in the form given in Section 8; or
- Certified cheque, Bank draft or Letter of Credit in favour of **Accounts Officer, SICOM**, payable at New Delhi.

- 16.2** Bank guarantees issued as Security for the bid shall be unconditional and be in the Form at Annex A of Section 8 and valid for 45 days beyond the validity of the bid.
- 16.3** Any bid not accompanied by an acceptable Bid Security and not secured as indicated in Sub-Clauses 16.1 and 16.2 above shall be rejected by the Employer as non-responsive.
- 16.4** The Bid Security of unsuccessful bidders will be returned within 28 days of the end of the bid validity period specified in Sub-Clause 15.1.
- 16.5** The Bid Security of the successful bidder will be discharged when the bidder has signed the Agreement and furnished the required Performance Security.
- 16.6** The Bid Security may be forfeited
- (a) if the Bidder withdraws the Bid after Bid opening during the period of Bid validity;
 - (b) if the Bidder does not accept the correction of the Bid Price, pursuant to Clause 27; or
 - (c) in the case of a successful Bidder, if the Bidder fails within the specified time limit to
 - (i) sign the Agreement; or
 - (ii) furnish the required Performance Security.

17. Alternative Proposals by Bidders

- 17.1** Bidders shall submit offers that comply with the requirements of the bidding documents, including the basic technical design as indicated in the drawing and specifications. Alternatives will not be considered.

18. Format and Signing of Bid

- 18.1** The Bidder shall prepare one original and one copy of the documents comprising the bid as described in Clause 12 of these *Instructions to Bidders*, bound with the volume containing the Form of Bid, and clearly marked "ORIGINAL" and "COPY" as appropriate. In the event of discrepancy between them, the original shall prevail.
- 18.2** The original and copy of the Bid shall be typed or written in indelible ink and shall be signed by a person or persons duly authorized to sign on behalf of the Bidder, pursuant to Sub-Clauses 4.3. **All pages of the bid where entries or amendments have been made shall be initialed by the person or persons signing the bid.**
- 18.3** The Bid shall contain no alterations or additions, except those to comply with instructions issued by the Employer, or as necessary to correct errors made by the bidder, in which case such corrections shall be initialed by the person or persons signing the bid.
- 18.4** The Bidder shall furnish information as described in the Form of Bid on commissions or gratuities, if any, paid or to be paid to agents relating to this Bid, and to contract execution if the Bidder is awarded the contract.

D. Submission of Bids

19. Sealing and Marking of Bids

- 19.1** The Bidder shall seal the original and copy of the Bid in separate envelopes, duly marking the envelopes as "ORIGINAL" and "COPY". These envelopes (called as inner envelopes) shall then be put inside one outer envelope.
- 19.2** The **inner and outer** envelopes shall
- (a) be addressed to Employer at the following address:

National ICZM Project Director, SICOM

(b) bear the following identification:

**BID FOR PROVISION OF GROUND CONTROLS AND DIGITAL PHOTOGRAMMETRIC
WORK OF APPROXIMATELY 7 KM. WIDE COASTAL BELT OF INDIAN MAINLAND**

Bid Reference No
DO NOT OPEN BEFORE 1100 Hrs on _____

- 19.3** In addition to the identification required in Sub-Clause 19.2, the inner envelopes shall indicate the name and address of the bidder to enable the bid to be returned unopened in case it is declared late, pursuant to Clause 21.
- 19.4** If the outer envelope is not sealed and marked as above, Employer will assume no responsibility for the misplacement or premature opening of the bid.
- 20. Deadline for Submission of the Bids**
- 20.1** Bids must be received by the Employer at the address specified above not later than **1030** hours on **08/12/2011**. In the event of the specified date for the submission of bids declared a holiday for the Employer, the Bids will be received up to the appointed time on the next working day.
- 20.2** The Employer may extend the deadline for submission of bids by issuing an amendment in accordance with Clause 10, in which case all rights and obligations of the Employer and the bidders previously subject to the original deadline will then be subject to the new deadline.
- 21. Late Bids**
- 21.1** Any Bid received by the Employer after the deadline prescribed in Clause 20 will be returned unopened to the bidder.
- 22. Modification and Withdrawal of Bids**
- 22.1** Bidders may modify or withdraw their bids by giving notice in writing before the deadline prescribed in Clause 20.
- 22.2** Each Bidder's modification or withdrawal notice shall be prepared, sealed, marked, and delivered in accordance with Clause 18 & 19, with the outer and inner envelopes additionally marked "**MODIFICATION**" or "**WITHDRAWAL**", as appropriate.
- 22.3** No bid may be modified after the deadline for submission of Bids.
- 22.4** Withdrawal or modification of a Bid between the deadline for submission of bids and the expiration of the original period of bid validity specified in Clause 15.1 above or as extended pursuant to Clause 15.2 may result in the forfeiture of the Bid security pursuant to Clause 16.
- 22.5** Bidders may offer discounts to, or modify the prices of their Bids only by submitting Bid modifications in accordance with this clause, or included in the original Bid submission.

E. Bid Opening and Evaluation

23. Bid Opening

- 23.1** The Employer will open all the Bids received (except those received late), including modifications made pursuant to Clause 22, in the presence of the Bidders or their representatives who choose to attend at **1100 Hrs on 08/12/2011 at Conference Hall, SICOM, Ministry of Environment & Forest, No. 9, First Floor, Institutional Area, Lodhi Road, New Delhi -110003**. In the event of the specified date of Bid opening being declared a holiday for the Employer, the Bids will be opened at the appointed time and location on the next working day.

- 23.2 Envelopes marked "**WITHDRAWAL**" shall be opened and read out first. Bids for which an acceptable notice of withdrawal has been submitted pursuant to Clause 22 shall not be opened. Subsequently all envelopes marked "Modification" shall be opened and the submissions therein read out in appropriate detail.
- 23.3 The Bidders' names, the Bid prices, the total amount of each Bid and of any alternative Bid (if alternatives have been requested or permitted), any discounts, Bid modifications and withdrawals, the presence or absence of Bid security, and such other details as the Employer may consider appropriate, will be announced by the Employer at the opening. No bid shall be rejected at bid opening except for the late bids pursuant to Clause 21. Bids [and modifications] sent pursuant to Clause 22 that are not opened and read out at bid opening will not be considered for further evaluation regardless of the circumstances. Late and withdrawn bids will be returned un-opened to bidders.
- 23.4 The Employer shall prepare minutes of the Bid opening, including the information disclosed to those present in accordance with Sub-Clause 23.3.
- 24. Process to Be Confidential**
- 24.1 Information relating to the examination, clarification, evaluation, and comparison of Bids and recommendations for the award of a contract shall not be disclosed to Bidders or any other persons not officially concerned with such process until the award to the successful Bidder has been announced. Any effort by a Bidder to influence the Employer's processing of Bids or award decisions may result in the rejection of his Bid.
- 25. Clarification of Bids**
- 25.1 To assist in the examination, evaluation, and comparison of Bids, the Employer may, at his discretion, ask any Bidder for clarification of his Bid, including breakdowns of the unit rates. The request for clarification and the response shall be in writing or by cable, but no change in the price or substance of the Bid shall be sought, offered, or permitted except as required to confirm the correction of arithmetic errors discovered by the Employer in the evaluation of the Bids in accordance with Clause 27.
- 25.2 Subject to sub-clause 25.1, no Bidder shall contact the Employer on any matter relating to its bid from the time of the bid opening to the time the contract is awarded. If the Bidder wishes to bring additional information to the notice of the Employer, it should do so in writing.
- 25.3 Any effort by the Bidder to influence the Employer in the Employer's bid evaluation, bid comparison or contract award decisions may result in the rejection of the Bidders' bid.
- 26. Examination of Bids and Determination of Responsiveness**
- 26.1 Prior to the detailed evaluation of Bids, the Employer will determine whether each Bid (a) meets the eligibility criteria defined in Clause 3; (b) has been properly signed; (c) is accompanied by the required securities and; (d) is substantially responsive to the requirements of the Bidding documents.
- 26.2 A substantially responsive Bid is one which conforms to all the terms, conditions, and specifications of the Bidding documents, without material deviation or reservation. A material deviation or reservation is one (a) which affects in any substantial way the scope, quality, or performance of the Works; (b) which limits in any substantial way, inconsistent with the Bidding documents, the Employer's rights or the Bidder's obligations under the Contract; or (c) whose rectification would affect unfairly the competitive position of other Bidders presenting substantially responsive Bids.
- 26.3 If a Bid is not substantially responsive, it will be rejected by the Employer, and may not subsequently be made responsive by correction or withdrawal of the non-conforming deviation or reservation.
- 27. Correction of Errors**
- 27.1 Bids determined to be substantially responsive will be checked by the Employer for any arithmetic errors. Errors will be corrected by the Employer **as follows**:

- (a) where there is a discrepancy between the rates in figures and in words, the rate in words will govern; and

(b) where there is a discrepancy between the unit and the line item total resulting from multiplying the unit rate by the quantity, the unit rate as quoted will govern.

27.2 The amount stated in the Bid will be adjusted by the Employer in accordance with the above procedure for the correction of errors and, with the concurrence of the Bidder, shall be considered as binding upon the Bidder. If the Bidder does not accept the corrected amount the Bid will be rejected, and the Bid security may be forfeited in accordance with Sub-Clause 16.6 (b).

28. Deleted

29. Evaluation and Comparison of Bids

29.1 The Employer will evaluate and compare only the Bids determined to be substantially responsive in accordance with Clause 26.

29.2 In evaluating the Bids, the Employer will determine for each Bid the evaluated Bid Price by adjusting the Bid Price as follows:

- (a) making any correction for errors pursuant to Clause 27; or
- (b) making an appropriate adjustments for any other acceptable variations, deviations; and
- (c) making appropriate adjustments to reflect discounts or other price modifications offered in accordance with Sub Clause 22.5.

29.3 The Employer reserves the right to accept or reject any variation, deviation, or alternative offer. Variations, deviations, and alternative offers and other factors which are in excess of the requirements of the Bidding documents or otherwise result in unsolicited benefits for the Employer shall not be taken into account in Bid evaluation.

29.4 The estimated effect of the price adjustment conditions under Clause 47 of the *Conditions of Contract*, during the period of implementation of the Contract, will not be taken into account in Bid evaluation.

29.5 If the Bid of the successful Bidder is seriously unbalanced in relation to the Employer's estimate of the cost of work to be performed under the contract, the Employer may require the Bidder to produce detailed price analyses for any or all items of the Bill of Quantities, to demonstrate the internal consistency of those prices with the methods, technology, schedule and resources proposed to be deployed. After evaluation of the price analyses, the Employer may require that the amount of the performance security set forth in Clause 34 be increased at the expense of the successful Bidder to a level sufficient to protect the Employer against financial loss in the event of default of the successful Bidder under the Contract.

30. Deleted

F. Award of Contract

31. Award Criteria

31.1 Subject to Clause 32, the Employer will award the Contract to the Bidder whose Bid has been determined to be substantially responsive to the Bidding documents and who has offered the lowest evaluated Bid Price, provided that such Bidder has been determined to be (a) eligible in accordance with the provisions of Clause 3, and (b) qualified in accordance with the provisions of Clause 4.

31.2 If, pursuant to Clause 12.2 this contract is being let along with other contracts, the lowest evaluated Bid Price will be determined when evaluating this contract in conjunction with other contracts to be awarded concurrently, taking into account any discounts offered by the bidders for the award of more than one contract.

32. Employer's Right to Accept any Bid and to Reject any or all Bids

32.1 Notwithstanding Clause 31, the Employer reserves the right to accept or reject any Bid, and to cancel the Bidding process and reject all Bids, at any time prior to the award of Contract, without thereby incurring any liability to the affected Bidder or Bidders or any obligation to inform the affected Bidder or Bidders of the grounds for the Employer's action.

33. Notification of Award and Signing of Agreement

33.1 The Bidder whose Bid has been accepted will be notified of the award by the Employer prior to expiration of the Bid validity period by cable, telex or facsimile confirmed by registered letter. This letter (hereinafter and in the Conditions of Contract called the "Letter of Acceptance") will state the sum that the Employer will pay the Contractor in consideration of the execution, completion, and maintenance of the Works by the Contractor as prescribed by the Contract (hereinafter and in the Contract called the "Contract Price").

33.2 The notification of award will constitute the formation of the Contract, subject only to the furnishing of a performance security in accordance with the provisions of Clause 34.

33.3 The Agreement will incorporate all agreements between the Employer and the successful Bidder. It will be kept ready for signature of the successful bidder in the office of Employer within 21 days following the notification of award along with the Letter of Acceptance. Within 21 days of receipt, the successful Bidder will sign the Agreement and deliver it to the Employer.

33.4 Upon the furnishing by the successful Bidder of the Performance Security, the Employer will promptly notify the other Bidders that their Bids have been unsuccessful.

34. Performance Security

34.1 Within 21 days of receipt of the Letter of Acceptance, the successful Bidder shall deliver to the Employer a Performance Security in any of the forms given below for an amount equivalent to 5% of the Contract price plus additional security for unbalanced Bids in accordance with Clause 29.5 of ITB and Clause 52 of Conditions of Contract:

- an unconditional bank guarantee in the form given in Section 8; or
- Certified cheque/Bank draft, in favour of **Accounts Officer, SICOM payable at New Delhi.**

34.2 If the performance security is provided by the successful Bidder in the form of a Bank Guarantee, it shall be issued either (a) at the Bidder's option, by a Nationalized/Scheduled Indian bank or (b) by a foreign bank located in India and acceptable to the Employer or (c) by a foreign bank through a correspondent Bank in India [scheduled or nationalized].

34.3 Failure of the successful bidder to comply with the requirements of sub-clause 34.1 shall constitute a breach of contract, cause for annulment of the award, forfeiture of the bid security, and any such other remedy the Employer may take under the contract, and the Employer may resort to awarding the contract to the next ranked bidder.

35. Advance Payment and Security

35.1 The Employer will provide an Advance Payment on the Contract Price as stipulated in the Conditions of Contract, subject to maximum amount, as stated in the Contract Data.

36. Adjudicator

36.1 The Employer proposes that **Shri Ram Prasad, Dehradun** be appointed as Adjudicator under the Contract, at a daily fee of Rs. 3000/- (three thousand only) plus reimbursable expenses. If the Bidder disagrees with this proposal, the Bidder should so state in the Bid. If in the Letter of Acceptance, the Employer has not agreed on the appointment of the Adjudicator, the Adjudicator shall be appointed by Institution of Engineers, New Delhi at the request of either party.

37. Corrupt or Fraudulent Practices

37.1 It is the Bank's policy to require that Borrowers (including beneficiaries of Bank loans), as well as bidders, suppliers, and contractors and their agents (whether declared or not), personnel, subcontractors, sub-consultants,

service providers and suppliers, under Bank-financed contracts, observe the highest standard of ethics during the procurement and execution of such contracts.¹ In pursuance of this policy, the Bank:

- (a) defines, for the purposes of this provision, the terms set forth below as follows:
 - (i) “corrupt practice” is the offering, giving, receiving or soliciting, directly or indirectly, of anything of value to influence improperly the actions of another party²;
 - (ii) “fraudulent practice” is any act or omission, including a misrepresentation, that knowingly or recklessly misleads, or attempts to mislead, a party to obtain a financial or other benefit or to avoid an obligation³;
 - (iii) “collusive practice” is an arrangement between two or more parties⁴ designed to achieve an improper purpose, including to influence improperly the actions of another party;
 - (iv) “coercive practice” is impairing or harming, or threatening to impair or harm, directly or indirectly, any party or the property of the party to influence improperly the actions of a party⁵;
 - (v) "obstructive practice" is
 - (aa) deliberately destroying, falsifying, altering or concealing of evidence material to the investigation or making false statements to investigators in order to materially impede a Bank investigation into allegations of a corrupt, fraudulent, coercive or collusive practice; and/or threatening, harassing or intimidating any party to prevent it from disclosing its knowledge of matters relevant to the investigation or from pursuing the investigation; or
 - (bb) acts intended to materially impede the exercise of the Bank’s inspection and audit rights provided for under sub-clause 37.2 below.
- (b) will reject a proposal for award if it determines that the bidder recommended for award has, directly or through an agent, engaged in corrupt, fraudulent, collusive, coercive or obstructive practices in competing for the contract in question;
- (c) will cancel the portion of the loan allocated to a contract if it determines at any time that representatives of the Borrower or of a beneficiary of the loan engaged in corrupt, fraudulent, collusive, or coercive practices during the procurement or the execution of that contract, without the Borrower having taken timely and appropriate action satisfactory to the Bank to remedy the situation; and
- (d) will sanction a firm or an individual, at any time, in accordance with prevailing Bank’s sanctions procedures^a, including by publicly declaring such firm or individual ineligible, either indefinitely or for a stated period of time: (i) to be awarded a Bank-financed contract; and (ii) to be a nominated^b sub-

¹ *In this context, any action taken by a bidder, supplier, contractor, or any of its personnel, agents, sub-consultants, sub-contractors, service providers, suppliers and/or their employees to influence the procurement process or contract execution for undue advantage is improper.*

² *“Another party” refers to a public official acting in relation to the procurement process or contract execution]. In this context, “public official” includes World Bank staff and employees of other organizations taking or reviewing procurement decisions.*

³ *“Party” refers to a public official; the terms “benefit” and “obligation” relate to the procurement process or contract execution; and the “act or omission” is intended to influence the procurement process or contract execution.*

⁴ *“Parties” refers to participants in the procurement process (including public officials) attempting to establish bid prices at artificial, non competitive levels.*

⁵ *“Party” refers to a participant in the procurement process or contract execution.*

^a *A firm or an individual may be declared ineligible to be awarded a Bank-financed contract upon completion of the Bank’s sanctions proceedings as per its sanctions procedures, including inter alia: (i) temporary suspension in connection with an ongoing sanctions proceeding; (ii) cross-debarment as agreed with other International Financial Institutions, including Multilateral Development Banks; and (iii) the World Bank Group corporate administrative procurement sanctions procedures for fraud and corruption.*

^b *A nominated sub-contractor, consultant, manufacturer or supplier, or service provider (different names are used depending on the particular bidding document) is one which either has been: (i) included by the bidder in its pre-qualification application or bid because it brings specific and critical experience and know-how that are accounted for in the evaluation of the bidder’s pre-qualification application or the bid; or (ii) appointed by the Borrower.*

contractor, consultant, manufacturer or supplier, or service provider of an otherwise eligible firm being awarded a Bank-financed contract

37.2 In further pursuance of this policy, Bidders shall permit the Bank to inspect any accounts and records and other documents relating to the Bid submission and contract performance, and to have them audited by auditors appointed by the Bank.

37.3 Furthermore, bidders shall be aware of the provision stated in GCC Sub-Clauses 23.2 and 56.2 (h).

SECTION 2: FORMS OF BID, QUALIFICATION INFORMATION AND LETTER OF ACCEPTANCE

Table of Forms:

- **CONTRACTOR'S BID**
- **QUALIFICATION INFORMATION**
- **LETTER OF ACCEPTANCE**
- **NOTICE TO PROCEED WITH THE WORK**
- **AGREEMENT FORM**

Contractor's Bid

Description of the Works: **Provision of Ground Controls and Digital Photogrammetric Work of approximately 7 km. wide coastal belt of Indian mainland including major deltaic areas and back waters using digital stereo aerial photographs of 9 cm GSD for delineation of hazard line**

BID

To : National ICZM Project Director, SICOM
Address: Ministry of Environment & Forest
 No. 9, First Floor, Institutional Area,
 Lodhi Road, New Delhi -110003.

GENTLEMEN,

1. Having examined the bidding documents including addendum, we offer to execute the Works described above in accordance with the Conditions of Contract, Specifications etc. accompanying this Bid for the contract price as follows.

Zone No.	Detail of work	Contract Price.	
		In figures in Rupees	In words in Rupees
Zone-I	Provision of Ground Controls and Digital Photogrammetric Work of approximately 7 km. wide –Zone I From : International boundary of Pakistan To : Somnath Railway Line Area above HTL (mainland): 8024 sq km Area in Inter Tidal Zone : 5349 sq km Area of islands : 67 sq km Production site : Survey of India, Bangalore		
Zone-II	Provision of Ground Controls and Digital Photogrammetric Work of approximately 7 km. wide – Zone II From: Somnath Railway Line To: Ullas River Area above HTL (mainland): 9065 sq km Area in Inter Tidal Zone : 3408 sq km Area of islands : 293 sq km Production site : Survey of India, Bangalore		
Zone-III	Provision of Ground Controls and Digital Photogrammetric Work of approximately 7 km. wide – Zone III From: Ullas River To: Sharavathi River Area above HTL (mainland): 6092 sq km Area in Inter Tidal Zone : 379 sq km Area of islands : 7 sq km Production site : Survey of India, Bangalore		
Zone-IV	Provision of Ground Controls and Digital Photogrammetric Work of approximately 7 km. wide – Zone IV From: Sharavathi River To: Cape Comorin Area above HTL (mainland): 7875 sq km Area in Inter Tidal Zone : 55 sq km Area of islands : 1 sq km Production site : Survey of India, Bangalore		

Zone V	Provision of Ground Controls and Digital Photogrammetric Work of approximately 7 km. wide – Zone V From: Cape Comorin To: Ponnaiyur River Area above HTL (mainland): 4537 sq km Area in Inter Tidal Zone : 31 sq km Area of islands : 30 sq km Production site : Survey of India, Hyderabad		
Zone VI	Provision of Ground Controls and Digital Photogrammetric Work of approximately 7 km. wide – Zone VI From: Ponnaiyur River To: Krishna (Devi Point) River Area above HTL (mainland): 4976 sq km Area in Inter Tidal Zone : 52 sq km Area of islands : 3sq km Production site : Survey of India, Hyderabad		
Zone VII	Provision of Ground Controls and Digital Photogrammetric Work of approximately 7 km. wide – Zone VII From: Krishna (Devi Point) River To: Chhatrapur Road Junction Area above HTL (mainland): 6200 sq km Area in Inter Tidal Zone : 73 sq km Area of islands : 0 sq km Production site : Survey of India, Hyderabad		
Zone VIII	Provision of Ground Controls and Digital Photogrammetric Work of approximately 7 km. wide – Zone VIII From: Chhatrapur Road Junction To: Bangladesh Border Area above HTL (mainland): 8674 sq km Area in Inter Tidal Zone : 294 sq km Area of islands : 2546 sq km Production site : Survey of India, Hyderabad		

2. Discounts, if any (refer Para 31.2 of Section 1) :

3. The advance payment required is

- (i) For Zone 1: Rupees
- (ii) For Zone 2: Rupees.....
- (iii) For Zone 3: Rupees.....
- (iv) For Zone 4: Rupees.....
- (v) For Zone 5: Rupees.....
- (vi) For Zone 6: Rupees.....
- (vii) For Zone 7: Rupees.....
- (viii) For Zone 8: Rupees.....

4. We accept the appointment of _____ as the Adjudicator.

(OR)

We do not accept the appointment of _____ as the Adjudicator and propose instead that _____ be appointed as Adjudicator whose daily fees and biographical data are attached.

5. This Bid and your written acceptance of it shall constitute a binding contract between us. We understand that you are not bound to accept the lowest or any Bid you receive.
6. We hereby certify that we have taken steps to ensure that no person acting for us or on our behalf will engage in bribery.
7. We also undertake that, in competing for (and, if the award is made to us, in executing) the above contract, we will strictly observe the laws against fraud and corruption in force in India namely "Prevention of Corruption Act 1988".
8. Commissions or gratuities, if any, paid or to be paid by us to agents relating to this Bid, and to contract execution if we are awarded the contract, are listed below :

<u>Name and address of agent</u>	<u>Amount</u>	<u>Purpose of Commission or gratuity</u>
_____	_____	_____
_____	_____	_____
(if none, state "none")		

9. We hereby confirm that this Bid complies with the Eligibility, Bid Validity and Bid Security required by the Bidding documents.
10. We hereby confirm that we are willing to execute the work in the secure premises of Survey of India as laid down under Table 1 of IFB.

Yours faithfully,

Authorized Signature:

Name & Title of Signatory: _____

Name of Bidder : _____

Address : _____

Phone No. : _____

Fax No. : _____

E-mail : _____

Qualification Information

The information to be filled in by the Bidder in the following pages will be used for purposes of qualification as provided for in Clause 4 of the Instructions to Bidders. This information will not be incorporated in the Contract.

1. For Individual Bidders

1.1 Name of bidder/firm,
Constitution or legal status of Bidder
[Attach copy]

Place of registration: _____

Principal place of business: _____

Power of attorney of signatory of Bid
[Attach]

1.2 Total value of any kind of photogrammetric related work executed and payments received in the last five years** (in Rs Million). Refer for 4.5 A (a) of ITB.

Table 1.2

Year	Total Turnover	Total value of photogrammetric related work	Remarks
2006-07*			β
2007-08*			β
2008-09*			β
2009-10*			β
2010-11*			β

**at 2011-2012 price level. Financial turnover and cost of completed works of previous years shall be given weightage of 5% per year based on rupee value to bring them to 2011-2012 price level.*

(β - Attach certificate from Chartered Accountant for payments received for contracts in progress or completed)

1.3.1 Value of **one similar work** of value not less than Rs. 30 million* from photogrammetric related work (excluding field work) which necessarily includes aerial triangulation, DTM creation, contour generation, feature extraction in Stereo mode and ortho generation over the last five years **(2006-07 to 2010-11)**

OR

Value of at least **two similar works** of value not less than Rs. 15 million* each from photogrammetric related work (excluding field work), in which case each of the work should include one or more components of work viz. AT and/or DTM generation and/or orthophoto generation and/or feature extraction in Stereo mode. However the two works taken together should necessarily include aerial triangulation, DTM creation, contour generation, feature extraction in Stereo mode and ortho generation over the last five years **(2006-07 to 2010-11)**

**at 2011-2012 price level. Financial turnover and cost of completed works of previous years shall be given weightage of 5% per year from the year of completion based on rupee value to bring them to 2011-2012 price level.*

Table 1.3.1

<u>Sl No</u>	<u>Project Name</u>	<u>Contract No.</u>	<u>Value of contract (Rs. Million)</u>	<u>Date of issue of work order</u>	<u>Stipulated period of completion</u>	<u>Actual date of completion</u>	<u>Reasons for delay</u>
1							
2							

Project Details for SI No.1:

- a) Scale of survey / accuracy standards :
b) Area of survey :
c) Project includes AT : Yes / No Area of AT :
d) Project includes DTM generation : Yes / No Area of DTM generation :
e) Project includes Ortho generation : Yes / No Scale of ortho photo :
Area of ortho photo :
f) Project includes Feature extraction in Stereo mode : Yes / No Area of feature extraction :

g) Name of the Employer / Main Contractor :
Address:

Telephone: Fax : e-mail :

Project Details for SI No.2:

- a) Scale of survey / accuracy standards :
b) Area of survey :
c) Project includes AT : Yes / No Area of AT :
d) Project includes DTM generation : Yes / No Area of DTM generation :
e) Project includes Ortho generation : Yes / No Scale of ortho photo :
Area of ortho photo :
f) Project includes feature extraction in Stereo mode : Yes / No Area of feature extraction :

g) Name of the Employer / Main Contractor :
Address:

Telephone: Fax : e-mail :

(Attach notarized copy of certificate(s) from the Engineer(s)-in-Charge or equivalent, certifying the details furnished in table above.)

1.3.2 Total value of GPS related work in relative static positioning mode / differential mode executed during last five years completed by the contractor along with sub-contractors.

Table 1.3.2

Year	Value of GPS related works in relative static positioning mode / differential mode (in million Rs)					Total value
	Main Contractor	Sub-contractor 1	Sub-contractor 2	Sub-contractor 3	Sub-contractor 4	
2006-07						
2007-08						
2008-09						
2009-10						
2010-11						

(Attach notarized copy of certificate(s) from the Engineer(s)-in-Charge or equivalent, certifying the details furnished in table above.)

1.3.3 Total value of Leveling related work (ST/DT) executed during last five years completed by the contractor along with sub-contractors.

Table 1.3.3

Year	Value of Leveling works (in million Rs)					Total value
	Main Contractor	Sub-contractor 1	Sub-contractor 2	Sub-contractor 3	Sub-contractor 4	
2006-07						
2007-08						
2008-09						
2009-10						
2010-11						

(Attach notarized copy of certificate(s) from the Engineer(s)-in-Charge or equivalent, certifying the details furnished in table above.)

1.4 **Information on Bid Capacity (works for which bids have been submitted and works which are yet to be completed) as on the date of this bid.**

(A) **Existing commitments and on-going works:**

Table 1.4(A)

Description of Work (1)	Place & State (2)	Contract No. & Date (3)	Name of Employer / Main Contractor (4)	Value of Contract (Rs. million) (5)	Stipulated period of completion (6)	Value of works to be completed (Rs. million) (7)	Anticipated date of completion (8)

(i) Attach notarized copies of the certificate(s) from the Engineer(s)-in-Charge or equivalent, certifying the details furnished in table above.)

(ii) Provide address, telephone, FAX, e-mail of the Employer/Main Contractor

(B) **Works for which bids already submitted**

Table 1.4(B)

Description of Work (1)	Place & State (2)	Name and address of Employer (3)	Estimated value of work (Rs. million) (4)	Stipulated period of completion (5)	Date when decision is expected (6)	Remarks if any (7)

(i) Attach notarized copies of the certificate(s) from the Engineer(s)-in-Charge or equivalent, certifying the details furnished in table above.)

(ii) Provide address, telephone, FAX, e-mail of the Employer/Main Contractor

1.5 The following items of Contractor's Equipment are essential for carrying out the Provision of Ground Controls and Digital Photogrammetric Work for one zone. The Bidder should list all the information requested below. Refer also to Sub Clause 4.3 (d) of the Instructions to Bidders.

Table 1.5

Item or Equipment	Minimum Requirement (in Nos.)	Availability Proposal				Remarks (From whom to be leased/ purchased)
		Make & Model of Equipment/ Name of software	Owned/ Leased/ To be Procured	Nos.	Age/Condition	
(a) Digital Photogrammetric Workstation *	35					
(b) Softwares • Aerial Triangulation • DTM generation and editing • Orthophoto generation • Feature extraction in stereo mode • GIS software • Inundation Modelling • Software for Analysis of different Time Series of Shore lines	02 25 05 10 05 03 03					
(c) Appropriate Storage System * #(entire Storage with OS, Controller, LAN, Server, back up systems and other accessories etc..)	01					
(d) A0 size Scanner	01					
(e) A0 size plotter	02					
(f)GNSS/GPS (Dual frequency) Receivers	06					Including sub-contractors
(h) Laptop	20					Including sub-contractors
(i)Digital/Auto levels	10					Including sub-contractors
(j) Total stations	02					Including sub-contractors

Note :- i) * Attach Product Specifications from OEM for items above.

ii) # The bidder shall also submit the complete detailed architecture of the systems proposed to be deployed for production.

iii) Above number of items are the minimum requirement. However the required numbers of each equipment will have to be provided by the vendor which may be much more for completing the task in time.

1.6 (a) Qualifications and experience of key personnel proposed for administration and execution of the Contract. Attach biographical data. Refer also to Sub Clause 4.3 (e) and 4.5 (B) (b) of instructions to Bidders and Sub Clause 9.1 of the Conditions of Contract.

Table 1.6(a)

Sl. No.	Title of position	Minimum required for one zone	No of persons proposed
1	Project Manager (Field work)	1	
2	Project Manager (Photogrammetry work)	1	
3	System Manager	2	
4	Expert- GNSS/GPS	1	
5	Expert- Spirit Levelling , Total Station Survey & computations	1	
6	Expert - Aerial Triangulation	1	
7	Expert - DTM	1	
8	Team leader – GNSS/GPS	1	
9	Team leader – Spirit Levelling , Total Station Survey & computations	2	
10	Team Leader -Aerial Triangulation	1	
11	Team Leader – DTM Generation and editing	3	
12	Team Leader - Orthophoto Generation	1	
13	Team leader - Inundation Modelling	1	
14	Team leader - Shoreline Analysis	1	

b) Details of Proposed Positions (Names):

Table 1.6(b)

1	Title of Position : Project Manager (Field work)
	Name (Zone I) :
	Name (Zone II) :
	Name (Zone III):
	Name (Zone IV):
	Name (Zone V):
	Name (Zone VI):
	Name (Zone VII):
	Name (Zone VIII):
2	Title of Position : Project Manager (Photogrammetric work)
	Name (Zone I) :
	Name (Zone II) :
	Name (Zone III):
	Name (Zone IV):
	Name (Zone V):
	Name (Zone VI):
	Name (Zone VII):
	Name (Zone VIII):
3	Title of Position : Expert - GNSS/GPS / Total Station Survey & computations
	Name (Zone I) :
	Name (Zone II) :
	Name (Zone III):
	Name (Zone IV):
	Name (Zone V):
	Name (Zone VI):
	Name (Zone VII):
	Name (Zone VIII):
4	Title of Position : Expert - Spirit Levelling

	Name (Zone I) :
	Name (Zone II) :
	Name (Zone III):
	Name (Zone IV):
	Name (Zone V):
	Name (Zone VI):
	Name (Zone VII):
	Name (Zone VIII):
5	Title of Position : Expert - Aerial Triangulation
	Name (Zone I) :
	Name (Zone II) :
	Name (Zone III):
	Name (Zone IV):
	Name (Zone V):
	Name (Zone VI):
	Name (Zone VII):
	Name (Zone VIII):
6	Title of Position : Expert - DTM
	Name (Zone I) :
	Name (Zone II) :
	Name (Zone III):
	Name (Zone IV):
	Name (Zone V):
	Name (Zone VI):
	Name (Zone VII):
	Name (Zone VIII):
7	Title of Position: Team Leader -GNSS/GPS
	Name (Zone I) :
	Name (Zone II) :
	Name (Zone III):
	Name (Zone IV):
	Name (Zone V):
	Name (Zone VI):
	Name (Zone VII):
	Name (Zone VIII):
8	Title of Position: Team Leader - Spirit Levelling , Total Station Survey & computations
	Name (Zone I) : i) ii)
	Name (Zone II) : i) ii)
	Name (Zone III): i) ii)
	Name (Zone IV): i) ii)
	Name (Zone V): i) ii)
	Name (Zone VI): i) ii)
	Name (Zone VII): i) ii)
	Name (Zone VIII): i) ii)
9	Title of Position: Team Leader -Aerial Triangulation
	Name (Zone I) :
	Name (Zone II) :
	Name (Zone III):
	Name (Zone IV):
	Name (Zone V):
	Name (Zone VI):
	Name (Zone VII):
	Name (Zone VIII):
10	Title of Position: Team Leader – DTM Generation and editing

	Name (Zone I) : i	ii	iii
	Name (Zone II) : i	ii	iii
	Name (Zone III) : i	ii	iii
	Name (Zone IV) : i	ii	iii
	Name (Zone V) : i	ii	iii
	Name (Zone VI) : i	ii	iii
	Name (Zone VII) : i	ii	iii
	Name (Zone VIII) : i	ii	iii
11	Title of Position: Team Leader – Orthophoto Generation		
	Name (Zone I) :		
	Name (Zone II) :		
	Name (Zone III):		
	Name (Zone IV):		
	Name (Zone V):		
	Name (Zone VI):		
	Name (Zone VII):		
	Name (Zone VIII):		
12	Title of Position: Team Leader – with expertise in Inundation Modelling		
	Name (Zone I):		
	Name (Zone II):		
	Name (Zone III):		
	Name (Zone IV):		
	Name (Zone V):		
	Name (Zone VI):		
	Name (Zone VII):		
	Name (Zone VIII):		
13	Title of Position: Team Leader – with expertise in Shore Line Analysis		
	Name (Zone I):		
	Name (Zone II):		
	Name (Zone III):		
	Name (Zone IV):		
	Name (Zone V):		
	Name (Zone VI):		
	Name (Zone VII):		
	Name (Zone VIII):		

(c) **Resume of every Proposed Personnel should be enclosed as per format given below:**

Table 1.6(c)

Reference No. as per Table 1.6 (b) : _____ [e.g. 6(Zone I) or 10(Zone IV)(iii)]

Name of Bidder:		
Position:		
Personnel Information	Name :	Date of Birth :
	Professional Qualification :	
	Experience in specified work:	
	Miscellaneous if any :	
Present Employment (Contractor / sub-contractor)	Name of Employer :	
	Address of Employer :	
	Telephone :	Contact (Manager/ Personnel officer) :
	FAX :	e-mail :
	Job Title :	Years with present employer:

Summarize professional experience over the last 10 years, in reverse chronological order. Indicate particular technical and managerial experience relevant to the project.

Sl.No.	Period (From – to)	Details of experience in specified work as per clause 4.5 B (b) of Section I (ITB)
--------	--------------------	------------------------------------------------------------------------------------

1.		Company :
		Project Name :
		Brief description of project :
		Position (in which worked) :
		Details of work handled :
2.		Company :
		Project Name :
		Brief description of project :
		Position (in which worked) :
		Details of work handled :
3.		Company :
		Project Name :
		Brief description of project :
		Position (in which worked) :
		Details of work handled :

1.7 Proposed Works for sub-contracts :

1.7.1 GPS related work in relative static positioning mode :

Sections of the Works	Value of Sub-contract	Sub-contractor (name/address/e-mail/telephone)	Experience in similar work

1.7.2 Spirit Leveling related work (ST / DT) :) (Total Station /GPS leveling in hilly/difficult areas) :

Sections of the Works	Value of Sub-contract	Sub-contractor (name/address/e-mail/telephone)	Experience in similar work

- 1.8 Financial reports for the last five years: balance sheets, profit and loss statements, auditors' reports (in case of companies/corporation), etc. List them below and attach copies.
- 1.9 Evidence of access to financial resources to meet the qualification requirements: cash in hand, lines of credit, etc. List them below and attach copies of support documents [*sample format attached*].
- 1.10. Name, address, and telephone, telex, and fax numbers of the Bidders' bankers and authority [Refer 4.3(h) Section I (ITB)] who may provide references if contacted by the Employer.
- 1.11 Information on litigation history in which the Bidder is involved.

Other party(ies)	Employer	Cause of dispute	Amount involved	Remarks showing Present status
------------------	----------	------------------	-----------------	--------------------------------

- 1.12 Statement of compliance under the requirements of Sub Clause 3.2 of the instructions to Bidders.

- 1.13 Proposed work method and schedule. The Bidder should attach descriptions, drawings and charts as necessary to comply with the requirements of the Bidding documents. [Refer ITB Clause 4.1 and 4.3 (k)].

2. Joint Ventures - Deleted

3. Additional Requirements

- 3.1 Bidders should provide any additional information required to fulfill the requirements of Clause 4 of the Instructions to the Bidders, if applicable.

SAMPLE FORMAT FOR EVIDENCE OF ACCESS TO OR AVAILABILITY OF CREDIT FACILITIES –*
CLAUSE 4.5 [B] [c] OF ITB

BANK CERTIFICATE

This is to certify that M/s.is a reputed company with a good financial standing.

If the contract for the work, namely **Provision of Ground Controls and Digital Photogrammetric Work of approximately 7 km. wide coastal belt of Indian mainland including major deltaic areas and back waters using digital stereo aerial photographs of 9 cm GSD for delineation of hazard line for Zone(s).....**[funded by the World Bank] is awarded to the above firm, we shall be able to provide overdraft/credit facilities to the extent of Rs_____ (Rupees_____) to meet their working capital requirements for executing the above contract.

__ Sd. __

Name of Bank

Senior Bank Manager

Address of the Bank

Form

**Integrated Coastal Zone Management
(Declaration regarding customs/excise duty exemption for materials/
Photogrammetric equipments bought for the work)**

(Bidder's Name and Address)

To:
**National ICZM Project Director, SICOM
Ministry of Environment & Forest
No. 9, First Floor, Institutional Area,
Lodhi Road, New Delhi -110003.**

Dear Sir:

Re: Provision of Ground Controls and Digital Photogrammetric Work of approximately 7 km. wide coastal belt of Indian mainland including major deltaic areas and back waters using digital stereo aerial photographs of 9 cm GSD for delineation of hazard line.

Certificate for Import/Procurement of Equipment

1. We confirm that we are solely responsible for obtaining customs/excise duty waivers which we have considered in our bid and in case of failure to receive such waivers for reasons whatsoever, the Employer will not compensate us.
2. We are furnishing below the information required by the Employer for issue of the necessary certificates in terms of the Government of India Central Excise Notification No. 108/95 and Customs Notification No. 85/99.
3. The goods /equipment for which certificates are required are as under:

Items	Make/ Brand Name	Capacity [where applicable]	Quantity	Value	State whether it will be procured locally or imported [if so from which country]	Remarks regarding justification for the quantity and their usage in works
Equipment/Software						
[a]						
[b]						
[c]						
[d]						

4. We agree that no modification to the above list is permitted after bids are opened.
5. We agree that the certificate will be issued only to the extent considered reasonable by the Employer for the work, based on the Bill of Quantities and the programmes and methodology as furnished by us along with the bid.
6. We confirm that the above goods will be exclusively used for the above work and equipment will not be sold or otherwise disposed of in any manner for a period of five years from the date of acquisition.

Date: _____
Place: _____

(Signature) _____
(Printed Name) _____
(Designation) _____
(Common Seal) _____

This certificate will be issued within 60 days of signing of contract and no subsequent changes will be permitted.

Letter of Acceptance
(letterhead paper of the Employer)

To: _____ [name and address of the Contractor]

Dear Sirs,

This is to notify you that your Bid dated _____ for execution of the _____ [name of the contract and identification number, as given in the Instructions to Bidders] for the Contract Price of Rupees _____ (_____) [amount in words and figures], as corrected and modified in accordance with the Instructions to Bidders¹ is hereby accepted by our Agency.

We accept/do not accept that _____ be appointed as the Adjudicator².

We note that as per bid, you do not intend to subcontract any component of work.

[OR]

We note that as per bid, you propose to employ following firms as sub-contractors for

- i) M/sfor executing
- ii) M/sfor executing
- iii) M/sfor executing
- iv) M/sfor executing
- v) M/sfor executing

[Delete whichever is not applicable]

You are hereby requested to furnish Performance Security, plus additional security for unbalanced bids in terms of ITB clause 29.5, in the form detailed in Para 34.1 of ITB for an amount of Rs. _____ within 21 days of the receipt of this letter of acceptance valid up to 28 days from the date of expiry of Defects Liability Period i.e. up to _____ and sign the contract, failing which action as stated in Para 34.3 of ITB will be taken.

We have reviewed the methodology submitted by you along with the bid in response to ITB Clause 4.3[k] and our comments are given in the attachment. You are requested to submit a revised Program including management plan as per Clause 27 of General Conditions of Contract within 14 days of receipt of this letter.

Yours faithfully,

Authorized Signature

Name and Title of Signatory

Name of Agency

1 Delete "corrected and" or "and modified" if only one of these actions applies. Delete "as corrected and modified in accordance with the Instructions to Bidders" if corrections or modifications have not been effected.

2 To be used only if the Contractor disagrees in his Bid with the Adjudicator proposed by the Employer in the "Instructions to Bidders."

Issue of Notice to proceed with the work
(letterhead of the Employer)

_____ (date)

To

_____ (name and address of the Contractor)

Dear Sirs:

Pursuant to your furnishing the requisite security as stipulated in ITB clause 34.1 and signing of the contract agreement for the construction of _____ @ a Bid Price of Rs. _____, you are hereby instructed to proceed with the execution of the said works in accordance with the contract documents.

Yours faithfully,

(Signature, name and title of
signatory authorized to sign on
behalf of Employer)

Agreement Form

Agreement

This agreement, made the _____ day of _____ 20_____,
between _____
_____ [name and address of Employer]
(hereinafter called “the Employer”) of the one part and _____

_____ [name and address of contractor] (hereinafter called “the
Contractor”) of the other part.

Whereas the Employer is desirous that the Contractor execute _____

_____ [name and
identification number of Contract] (hereinafter called “the Works”) and the Employer has accepted the Bid by the
Contractor for the execution and completion of such Works and the remedying of any defects therein, at a contract price
of Rs.....

NOW THIS AGREEMENT WITNESSETH as follows:

1. In this Agreement, words and expression shall have the same meanings as are respectively assigned to them in the Conditions of Contract hereinafter referred to, and they shall be deemed to form and be read and construed as part of this Agreement.
2. In consideration of the payments to be made by the Employer to the Contractor as hereinafter mentioned, the Contractor hereby covenants with the Employer to execute and complete the Works and remedy any defects therein in conformity in all aspects with the provisions of the Contract.
3. The Employer hereby covenants to pay the Contractor in consideration of the execution and completion of the Works and the remedying the defects wherein the Contract Price or such other sum as may become payable under the provisions of the Contract at the times and in the manner prescribed by the Contract.
4. The following documents shall be deemed to form and be read and construed as part of this Agreement, viz.:
 - i) Letter of Acceptance;
 - ii) Notice to proceed with the works;
 - iii) Contractor’s Bid;
 - iv) Contract Data;
 - v) Conditions of contract (including Special Conditions of Contract);
 - vi) Specifications;
 - vii) Drawings;
 - viii) Bill of Quantities; and
 - ix) Any other document listed in the Contract Data as forming part of the contract.

In witness whereof the parties thereto have caused this Agreement to be executed the day and year first before written.

The Common Seal of _____

was hereunto affixed in the presence of:

Signed, Sealed and Delivered by the said _____

in the presence of:

Binding Signature of Employer _____

Binding Signature of Contractor _____

SECTION 3: CONDITIONS OF CONTRACT

Conditions of Contract

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Conditions of Contract

A. General

1. Definitions

1.1 Terms which are defined in the Contract Data are not also defined in the Conditions of Contract but keep their defined meanings. Capital initials are used to identify defined terms.

The **Adjudicator** is the person appointed jointly by the Employer and the Contractor to resolve disputes in the first instance, as provided for in Clauses 24 and 25. The name of the Adjudicator is defined in the Contract Data.

Bill of Quantities means the priced and completed **Bill of Quantities** forming part of the Bid.

Compensation Events are those defined in Clause 44 hereunder.

The **Completion Date** is the date of completion of the Works as certified by the Engineer in accordance with Sub Clause 55.1.

The **Contract** is the contract between the Employer and the Contractor to execute, complete and maintain the Works. It consists of the documents listed in Clause 2.3 below.

The **Contract Data** defines the documents and other information which comprise the Contract.

The **Contractor** is a person or corporate body whose Bid to carry out the Works has been accepted by the Employer.

The **Contractor's Bid** is the completed Bidding document submitted by the Contractor to the Employer.

The **Contract Price** is the price stated in the Letter of Acceptance and thereafter as adjusted in accordance with the provisions of the Contract.

Days are calendar days; **months** are calendar months.

A **Defect** is any part of the Works not completed in accordance with the Contract.

The **Defects Liability Period** is the period named in the Contract Data and calculated from the Completion Date.

The **Employer** is the party who will employ the Contractor to carry out the Works.

The **Engineer** is the person named in the Contract Data (or any other competent person appointed and notified to the contractor to act in replacement of the Engineer) who is responsible for supervising the execution of the works and administering the Contract.

Equipment is the Contractor's machinery and vehicles brought temporarily to the Site to construct the Works.

The **Initial Contract Price** is the Contract Price listed in the Employer's Letter of Acceptance.

The **Intended Completion Date** is the date on which it is intended that the Contractor shall complete the Works. The Intended Completion Date is specified in the Contract Data. The Intended Completion Date may be revised only by the Engineer by issuing an extension of time.

Materials are all supplies, including consumables, used by the contractor for incorporation in the Works.

Plant is any integral part of the Works which is to have a mechanical, electrical, electronic or chemical or biological function.

The **Site** is the area defined as such in the Contract Data.

Site Investigation Reports are those which were included in the Bidding documents and are factual interpretative reports about the surface and sub-surface conditions at the site.

Specification means the Specification of the Works included in the Contract and any modification or addition made or approved by the Engineer.

The **Start Date** is given in the Contract Data. It is the date when the Contractor shall commence execution of the works. It does not necessarily coincide with any of the Site Possession Dates.

A **Subcontractor** is a person or corporate body who has a Contract with the Contractor to carry out a part of the work in the Contract which includes work on the Site.

Temporary Works are works designed, constructed, installed, and removed by the Contractor which are needed for construction or installation of the Works.

A **Variation** is an instruction given by the Engineer which varies the Works.

The **Works** are what the Contract requires the Contractor to construct, install, and turn over to the Employer, as defined in the Contract Data.

2. Interpretation

- 2.1** In interpreting these Conditions of Contract, singular also means plural, male also means female or neuter, and the other way around. Headings have no significance. Words have their normal meaning under the language of the Contract unless specifically defined. The Engineer will provide instructions clarifying queries about the Conditions of Contract.
- 2.2** If sectional completion is specified in the Contract Data, references in the Conditions of Contract to the Works, the Completion Date, and the Intended Completion Date apply to any Section of the Works (other than references to the Completion Date and Intended Completion date for the whole of the Works).
- 2.3** The documents forming the Contract shall be interpreted in the following order of priority:
- (1) Agreement
 - (2) Letter of Acceptance, notice to proceed with the works
 - (3) Contractor's Bid
 - (4) Contract Data

- (5) Conditions of Contract including Special Conditions of Contract
- (6) Specifications
- (7) Drawings
- (8) **Bill of Quantities** and
- (9) any other document listed in the Contract Data as forming part of the Contract.

3. Language and Law

3.1 The language of the Contract and the law governing the Contract are stated in the Contract Data.

4. Engineer's Decisions

4.1 Except where otherwise specifically stated, the Engineer will decide contractual matters between the Employer and the Contractor in the role representing the Employer.

5. Delegation

5.1 The Engineer may delegate any of his duties and responsibilities to other people except to the Adjudicator after notifying the Contractor and may cancel any delegation after notifying the Contractor.

6. Communications

6.1 Communications between parties which are referred to in the conditions are effective only when in writing. A notice shall be effective only when it is delivered (in terms of Indian Contract Act).

7. Subcontracting

7.1 The Contractor may subcontract with the approval of the Engineer but may not assign the Contract without the approval of the Employer in writing. Subcontracting does not alter the Contractor's obligations.

8. Other Contractors

8.1 The Contractor shall cooperate and share the Site with other contractors, public authorities, utilities, and the Employer between the dates given in the Schedule of Other Contractors. The Contractor shall as referred to in the Contract Data, also provide facilities and services for them as described in the Schedule. The employer may modify the schedule of other contractors and shall notify the contractor of any such modification.

9. Personnel

9.1 The Contractor shall employ the key personnel named in the Schedule of Key Personnel as referred to in the Contract Data to carry out the functions stated in the Schedule or other personnel approved by the Engineer. The Engineer will approve any proposed replacement of key personnel only if their qualifications, abilities, and relevant experience are substantially equal to or better than those of the personnel listed in the Schedule.

9.2 If the Engineer asks the Contractor to remove a person who is a member of the Contractor's staff or his work force stating the reasons the Contractor shall ensure that the person leaves the Site within seven days and has no further connection with the work in the Contract.

10. Employer's and Contractor's Risks

10.1 The Employer carries the risks which this Contract states are Employer's risks, and the Contractor carries the risks which this Contract states are Contractor's risks.

11. Employer's Risks

11.1 The Employer is responsible for the excepted risks which are (a) in so far as they directly affect the execution of the Works in the Employer's country, the risks of war, hostilities, invasion, act of foreign enemies, rebellion, revolution, insurrection or military or usurped power, civil war, riot commotion or disorder (unless restricted to the Contractor's employees), and contamination from any nuclear fuel or nuclear waste or radioactive toxic explosive, or (b) a cause due solely to the design of the Works, other than the Contractor's design.

12. Contractor's Risks

12.1 All risks of loss of or damage to physical property and of personal injury and death which arise during and in consequence of the performance of the Contract other than the excepted risks are the responsibility of the Contractor.

13. Insurance

13.1 The Contractor shall provide, in the joint names of the Employer and the Contractor, insurance cover from the Start Date to the end of the Defects Liability Period, in the amounts and deductibles stated in the Contract Data for the following events which are due to the Contractor's risks:

- (a) loss of or damage to the Works, Plant and Materials;
- (b) loss of or damage to Equipment;
- (c) loss of or damage of property (except the Works, Plant, Materials and Equipment) in connection with the Contract; and
- (d) personal injury or death.

13.2 Policies and certificates for insurance shall be delivered by the Contractor to the Engineer for the Engineer's approval before the Start Date. All such insurance shall provide for compensation to be payable in the types and proportions of currencies required to rectify the loss or damage incurred.

13.3 If the Contractor does not provide any of the policies and certificates required, the Employer may effect the insurance which the Contractor should have provided and recover the premiums the Employer has paid from payments otherwise due to the Contractor or, if no payment is due, the payment of the premiums shall be a debt due.

13.4 Alterations to the terms of an insurance shall not be made without the approval of the Engineer.

13.5 Both parties shall comply with any conditions of the insurance policies.

14. Site Investigation Reports

14.1 The Contractor, in preparing the Bid, shall rely on any site Investigation Reports referred to in the Contract Data, supplemented by any information available to the Bidder.

15. Queries about the Contract Data

15.1 The Engineer will clarify queries on the Contract Data.

16. Contractor to Construct the Works

16.1 The Contractor shall construct and install the Works in accordance with the Specification and Drawings, and as per instructions of Engineer.

17. The Works to Be Completed by the Intended Completion Date

17.1 The Contractor may commence execution of the Works on the Start Date and shall carry out the Works in accordance with the program submitted by the Contractor, as updated with the approval of the Engineer, and complete them by the Intended Completion Date.

18. Approval by the Engineer

18.1 The Contractor shall submit Specifications and Drawings showing the proposed Temporary Works to the Engineer, who is to approve them if they comply with the Specifications and Drawings.

18.2 The Contractor shall be responsible for design of Temporary Works.

18.3 The Engineer's approval shall not alter the Contractor's responsibility for design of the Temporary Works.

18.4 The Contractor shall obtain approval of third parties to the design of the Temporary Works where required.

18.5 All Drawings prepared by the Contractor for the execution of the temporary or permanent Works, are subject to prior approval by the Engineer before their use.

19. Safety

19.1 The Contractor shall be responsible for the safety of all activities on the Site.

20. Discoveries

20.1 Anything of historical or other interest or of significant value unexpectedly discovered on the Site is the property of the Employer. The Contractor is to notify the Engineer of such discoveries and carry out the Engineer's instructions for dealing with them.

21. Possession of the Site

21.1 The Employer shall give possession of all parts of the Site to the Contractor. If possession of a part is not given by the date stated in the Contract Data the Employer is deemed to have delayed the start of the relevant activities and this will be Compensation Event.

22. Access to the Site

22.1 The Contractor shall allow the Engineer and any person authorized by the Engineer access to the Site, to any place where work in connection with the Contract is being carried out or is intended to be carried out and to any place where materials or plant are being manufactured / fabricated / assembled for the works.

23. Instructions

23.1 The Contractor shall carry out all instructions of the Engineer which comply with the applicable laws where the Site is located.

23.2 The Contractor shall permit, and shall cause its Subcontractors and subconsultants to permit, the Bank and/or persons appointed by the Bank to inspect the Site and/or the accounts and records of the Contractor and its sub-contractors relating to the performance of the Contract and the submission of the bid, and to have such accounts and records audited by auditors appointed by the Bank if requested by the Bank. The Contractor's and its Subcontractors' and subconsultants' attention is drawn to Sub-Clause 64.1 which provides, inter alia, that acts intended to materially impede the exercise of the Bank's inspection and audit rights provided for under Sub-Clause 23.2 constitute a prohibited practice subject to contract termination (as well as to a determination of ineligibility pursuant to the Bank's prevailing sanctions procedures).

24. Disputes

- 24.1** If the Contractor believes that a decision taken by the Engineer was either outside the authority given to the Engineer by the Contract or that the decision was wrongly taken, the decision shall be referred to the Adjudicator within 14 days of the notification of the Engineer's decision.

25. Procedure for Disputes

- 25.1** The Adjudicator shall give a decision in writing within 28 days of receipt of a notification of a dispute.
- 25.2** The Adjudicator shall be paid daily at the rate specified in the Contract Data together with reimbursable expenses of the types specified in the Contract Data and the cost shall be divided equally between the Employer and the Contractor, whatever decision is reached by the Adjudicator. Either party may refer a decision of the Adjudicator to an Arbitrator within 28 days of the Adjudicator's written decision. If neither party refers the dispute to arbitration within the above 28 days, the Adjudicator's decision will be final and binding.
- 25.3** The arbitration shall be conducted in accordance with the arbitration procedure stated in the Special Conditions of Contract.

26. Replacement of Adjudicator

- 26.1** Should the Adjudicator resign or die, or should the Employer and the Contractor agree that the Adjudicator is not fulfilling his functions in accordance with the provisions of the Contract, a new Adjudicator will be jointly appointed by the Employer and the Contractor. In case of disagreement between the Employer and the Contractor, within 30 days, the Adjudicator shall be designated by the Appointing Authority designated in the Contract Data at the request of either party, within 14 days of receipt of such request.

B. Time Control

27. Program

- 27.1** Within the time stated in the Contract Data the Contractor shall submit to the Engineer for approval a Program including Environmental Management Plan showing the general methods, arrangements, order, and timing for all the activities in the Works along with monthly cash flow forecast.
- 27.2** An update of the Program shall be a program showing the actual progress achieved on each activity and the effect of the progress achieved on the timing of the remaining work including any changes to the sequence of the activities.
- 27.3** The Contractor shall submit to the Engineer, for approval, an updated Program at intervals no longer than the period stated in the Contract Data. If the Contractor does not submit an updated Program within this period, the Engineer may withhold the amount stated in the Contract Data from the next payment certificate and continue to withhold this amount until the next payment after the date on which the overdue Program has been submitted.
- 27.4** The Engineer's approval of the Program shall not alter the Contractor's obligations. The Contractor may revise the Program and submit it to the Engineer again at any time. A revised Program is to show the effect of Variations and Compensation Events.

28. Extension of the Intended Completion Date

- 28.1** The Engineer shall extend the Intended Completion Date if a Compensation Event occurs or a Variation is issued which makes it impossible for Completion to be achieved by the Intended Completion Date without the Contractor taking steps to accelerate the remaining work and which would cause the Contractor to incur additional cost.
- 28.2** The Engineer shall decide whether and by how much to extend the Intended Completion Date within 21 days of the Contractor asking the Engineer for a decision upon the effect of a Compensation Event or Variation and

submitting full supporting information. If the Contractor has failed to give early warning of a delay or has failed to cooperate in dealing with a delay, the delay by this failure shall not be considered in assessing the new Intended Completion Date.

29. Deleted

30. Delays Ordered by the Engineer

30.1 The Engineer may instruct the Contractor to delay the start or progress of any activity within the Works.

31. Management Meetings

31.1 Either the Engineer or the Contractor may require the other to attend a management meeting. The business of a management meeting shall be to review the plans for remaining work and to deal with matters raised in accordance with the early warning procedure.

31.2 The Engineer shall record the business of management meetings and is to provide copies of his record to those attending the meeting and to the Employer. The responsibility of the parties for actions to be taken is to be decided by the Engineer either at the management meeting or after the management meeting and stated in writing to all who attended the meeting.

32. Early Warning

32.1 The Contractor is to warn the Engineer at the earliest opportunity of specific likely future events or circumstances that may adversely affect the quality of the work, increase the Contract Price or delay the execution of works. The Engineer may require the Contractor to provide an estimate of the expected effect of the future event or circumstance on the Contract Price and Completion Date. The estimate is to be provided by the Contractor as soon as reasonably possible.

32.2 The Contractor shall cooperate with the Engineer in making and considering proposals for how the effect of such an event or circumstance can be avoided or reduced by anyone involved in the work and in carrying out any resulting instruction of the Engineer.

C. Quality Control

33. Identifying Defects

33.1 The Engineer shall check the Contractor's work and notify the Contractor of any Defects that are found. Such checking shall not affect the Contractor's responsibilities. The Engineer may instruct the Contractor to search for a Defect and to uncover and test any work that the Engineer considers may have a Defect.

33.2 The contractor shall permit the Employer's Technical auditor to check the contractor's work and notify the Engineer and Contractor of any defects that are found. Such a check shall not affect the Contractor's or the Engineer's responsibility as defined in the Contract Agreement.

34. Tests

34.1 If the Engineer instructs the Contractor to carry out a test not specified in the Specification to check whether any work has a Defect and the test shows that it does, the Contractor shall pay for the test and any samples. If there is no Defect the test shall be a Compensation Event.

35. Correction of Defects

35.1 The Engineer shall give notice to the Contractor of any Defects before the end of the Defects Liability Period, which begins at Completion and is defined in the Contract Data. The Defects Liability Period shall be extended for as long as Defects remain to be corrected.

35.2 Every time notice of a Defect is given, the Contractor shall correct the notified Defect within the length of time specified by the Engineer's notice.

36. Uncorrected Defects

36.1 If the Contractor has not corrected a Defect within the time specified in the Engineer's notice, the Engineer will assess the cost of having the Defect corrected, and the Contractor will pay this amount.

Note: Where in certain cases, the technical specifications provide for acceptance of works within specified tolerance limits at reduced rates, Engineer will certify payments to Contractor accordingly.

D. Cost Control

37. Bill of Quantities

37.1 The Bill of Quantities shall contain items for the construction, installation, testing, and commissioning work to be done by the contractor.

37.2 The Bill of Quantities is used to calculate the Contract Price. The Contractor is paid for the quantity of the work done at the rate in the Bill of Quantities for each item.

38. Changes in the Quantities

38.1 If the final quantity of the work done differs from the quantity in the Bill of Quantities for the particular item by more than 25 percent, provided the change exceeds 1% of Initial Contract Price, the Engineer shall adjust the rate to allow for the change.

38.2 The Engineer shall not adjust rates from changes in quantities if thereby the Initial Contract Price is exceeded by more than 15 percent, except with the Prior approval of the Employer.

38.3 If requested by the Engineer, the Contractor shall provide the Engineer with a detailed cost breakdown of any rate in the Bill of Quantities.

39. Variations

39.1 All Variations shall be included in updated Programs produced by the Contractor.

40. Payments for Variations

40.1 The Contractor shall provide the Engineer with a quotation (with breakdown of unit rates) for carrying out the Variation when requested to do so by the Engineer. The Engineer shall assess the quotation, which shall be given within seven days of the request or within any longer period stated by the Engineer and before the Variation is ordered.

40.2 If the work in the Variation corresponds with an item description in the Bill of Quantities and if, in the opinion of the Engineer, the quantity of work above the limit stated in Sub Clause 38.1 or the timing of its execution do not cause the cost per unit of quantity to change, the rate in the bill of Quantities shall be used to calculate the value of the Variation. If the cost per unit of quantity changes, or if the nature or timing of the work in the Variation does not correspond with items in the Bill of Quantities, the quotation by the Contractor shall be in form of new rates for the relevant items of work.

40.3 If the Contractor's quotation is unreasonable (or if the contractor fails to provide the Engineer with a quotation within a reasonable time specified by the engineer in accordance with Clause 40.1), the Engineer may order the Variation and make a change to the Contract Price which shall be based on Engineer's own forecast of the effects of the Variation on the Contractor's costs.

40.4 If the Engineer decides that the urgency of varying the work would prevent a quotation being given and considered without delaying the work, no quotation shall be given and the Variation shall be treated as a Compensation Event.

40.5 The Contractor shall not be entitled to additional payment for costs that could have been avoided by giving early warning.

41. Cash flow forecasts

41.1 When the Program is updated, the contractor is to provide the Engineer with an updated cash flow forecast.

42. Payment Certificates

- 42.1** The Contractor shall submit to the Engineer monthly statements of the estimated value of the work completed less the cumulative amount certified previously alongwith details of measurement of the quantity of works executed in a tabulated form as approved by the Engineer.
- 42.2** The Engineer shall check the details given in the Contractor's monthly statement and within 14 days certify the amounts to be paid to the Contractor after taking into account any credit or debit for the month in question in respect of materials for the works in the relevant amounts and under conditions set forth in sub-clause 51(3) of the Contract Data (Secured Advance).
- 42.3** The value of work executed shall be determined by the Engineer after due check measurement of the quantities claimed as executed by the contractor.
- 42.4** The value of work executed shall comprise the value of the quantities of the items in the Bill of Quantities completed..
- 42.5** The value of work executed shall include the valuation of Variations and Compensation Events.
- 42.6** The Engineer may exclude any item certified in a previous certificate or reduce the proportion of any item previously certified in any certificate in the light of later information.

43. Payments

- 43.1** Payments shall be adjusted for deductions for advance payments, retention, other recoveries in terms of the contract and taxes, at source, as applicable under the law. The Employer shall pay the Contractor the amounts certified by the Engineer within 28 days of the date of each certificate. If the Employer makes a late payment, the Contractor shall be paid interest on the late payment in the next payment. Interest shall be calculated from the date by which the payment should have been made upto the date when the late payment is made at 8% per annum.
- 43.2** If an amount certified is increased in a later certificate or as a result of an award by the Adjudicator or an Arbitrator, the Contractor shall be paid interest upon the delayed payment as set out in this clause. Interest shall be calculated from the date upon which the increased amount would have been certified in the absence of dispute.
- 43.3** Items of the Works for which no rate or price has been entered in will not be paid for by the Employer and shall be deemed covered by other rates and prices in the Contract.

44. Compensation Events

- 44.1** The following are Compensation Events unless they are caused by the Contractor:
- (a) The Employer does not give access to a part of the Site by the Site Possession Date stated in the Contract Data.
 - (b) The Employer modifies the schedule of other contractors in a way which affects the work of the contractor under the contract.
 - (c) The Engineer orders a delay or does not issue drawings, specifications or instructions required for execution of works on time.
 - (d) The Engineer instructs the Contractor to uncover or to carry out additional tests upon work which is then found to have no Defects.
 - (e) The Engineer unreasonably does not approve for a subcontract to be let.
 - (f) Ground conditions are substantially more adverse than could reasonably have been assumed before issuance of Letter of Acceptance from the information issued to Bidders (including the Site Investigation Reports), from information available publicly and from a visual inspection of the Site.
 - (g) The Engineer gives an instruction for dealing with an unforeseen condition, caused by the Employer, or additional work required for safety or other reasons.
 - (h) Other contractors, public authorities, utilities or the Employer does not work within the dates and other constraints stated in the Contract, and they cause delay or extra cost to the Contractor.

- (i) The advance payment is delayed.
- (j) The effect on the Contractor of any of the Employer's Risks.
- (k) The Engineer unreasonably delays issuing a Certificate of Completion.
- (l) Other Compensation Events listed in the Contract Data or mentioned in the Contract.

44.2 If a Compensation Event would cause additional cost or would prevent the work being completed before the Intended Completion Date, the Contract Price shall be increased and/or the Intended Completion Date is extended. The Engineer shall decide whether and by how much the Contract Price shall be increased and whether and by how much the Intended Completion Date shall be extended.

44.3 As soon as information demonstrating the effect of each Compensation Event upon the Contractor's forecast cost has been provided by the Contractor, it is to be assessed by the Engineer and the Contract Price shall be adjusted accordingly. If the Contractor's forecast is deemed unreasonable, the Engineer shall adjust the Contract Price based on Engineer's own forecast. The Engineer will assume that the Contractor will react competently and promptly to the event.

44.4 The Contractor shall not be entitled to compensation to the extent that the Employer's interests are adversely affected by the Contractor not having given early warning or not having cooperated with the Engineer.

45. Tax

45.1 The rates quoted by the Contractor shall be deemed to be inclusive of the sales and other taxes that the Contractor will have to pay for the performance of this Contract. The Employer will perform such duties in regard to the deduction of such taxes at source as per applicable law.

46. Currencies

46.1 All payments shall be made in Indian Rupees.

47. Price Adjustment

47.1 Contract price shall be adjusted for increase or decrease in rates and price of labour, materials, fuels and lubricants in accordance with the following principles and procedures and as per formula given in the contract data:

- (a) The price adjustment shall apply for the work done from the start date given in the contract data upto end of the initial intended completion date or extensions granted by the Engineer and shall not apply to the work carried out beyond the stipulated time for reasons attributable to the contractor.
- (b) The price adjustment shall be determined during each quarter from the formula given in the contract data.
- (c) Following expressions and meanings are assigned to the work done during each quarter:

R = Total value of work done during the quarter. It would include the amount of secured advance for materials paid for (if any) during the quarter, less the amount of the secured advance recovered, during the quarter. It will exclude value for works executed under variations for which price adjustment will be worked separately based on the terms mutually agreed.

47.2 To the extent that full compensation for any rise or fall in costs to the contractor is not covered by the provisions of this or other clauses in the contract, the unit rates and prices included in the contract shall be deemed to include amounts to cover the contingency of such other rise or fall in costs.

48. Retention

- 48.1** The Employer shall retain from each payment due to the Contractor the proportion stated in the Contract Data until Completion of the whole of the Works.
- 48.2** On Completion of the whole of the Works half the total amount retained is repaid to the Contractor and half when the Defects Liability Period has passed and the Engineer has certified that all Defects notified by the Engineer to the Contractor before the end of this period have been corrected.
- 48.3** On completion of the whole works, the contractor may substitute retention money (*balance half*) with an “on demand” Bank guarantee.

49. Liquidated Damages

- 49.1** The Contractor shall pay liquidated damages to the Employer at the rate per day stated in the Contract Data for each day that the Completion Date is later than the Intended Completion Date (for the whole of the works or the milestone as stated in the contract data). The total amount of liquidated damages shall not exceed the amount defined in the Contract Data. The Employer may deduct liquidated damages from payments due to the Contractor. Payment of liquidated damages does not affect the Contractor's liabilities.
- 49.2** If the Intended Completion Date is extended after liquidated damages have been paid, the Engineer shall correct any overpayment of liquidated damages by the Contractor by adjusting the next payment certificate. The Contractor shall be paid interest on the over payment calculated from the date of payment to the date of repayment at the rates specified in Sub Clause 43.1.

50. Deleted

51. Advance Payment

- 51.1** The Employer shall make advance payment to the Contractor of the amounts stated in the Contract Data by the date stated in the Contract Data, against provision by the Contractor of an Unconditional Bank Guarantee in a form and by a bank acceptable to the Employer in amounts and currencies equal to the advance payment. The guarantee shall remain effective until the advance payment has been repaid, but the amount of the guarantee shall be progressively reduced by the amounts repaid by the Contractor. Interest will not be charged on the advance payment.
- 51.2** The Contractor is to use the advance payment only to pay for Equipment, Plant and Mobilization expenses required specifically for execution of the Works. The Contractor shall demonstrate that advance payment has been used in this way by supplying copies of invoices or other documents to the Engineer.
- 51.3** The advance payment shall be repaid by deducting proportionate amounts from payments otherwise due to the Contractor, following the schedule of completed percentages of the Works on a payment basis. No account shall be taken of the advance (mobilization and equipment only) payment or its repayment in assessing valuations of work done, Variations, price adjustments, Compensation Events, or Liquidated Damages.
- 51.4 Secured Advance:**
- The Engineer shall make advance payment in respect of materials intended for but not yet incorporated in the Works in accordance with conditions stipulated in the Contract Data.

52. Securities

- 52.1** The Performance Security shall be provided to the Employer no later than the date specified in the Letter of Acceptance and shall be issued in an amount and form and by a bank or surety acceptable to the Employer, and denominated in Indian Rupees. The Performance Security shall be valid until a date 28 days from the date of expiry of Defects Liability Period and the additional security for unbalanced bids shall be valid until a date 28 days from the date of issue of the certificate of completion.

53. Deleted

54. Cost of Repairs

54.1 Loss or damage to the Works or Materials to be incorporated in the Works between the Start Date and the end of the Defects Correction periods shall be remedied by the Contractor at the Contractor's cost if the loss or damage arises from the Contractor's acts or omissions.

E. Finishing the Contract

55. Completion

55.1 The Contractor shall request the Engineer to issue a Certificate of Completion of the Works and the Engineer will do so upon deciding that the Work is completed.

56. Taking Over

56.1 The Employer shall take over the Site and the Works within seven days of the Engineer issuing a certificate of Completion.

57. Final Account

57.1 The Contractor shall supply to the Engineer a detailed account of the total amount that the Contractor considers payable under the Contract before the end of the Defects Liability Period. The Engineer shall issue a Defect Liability Certificate and certify any final payment that is due to the Contractor within 56 days of receiving the Contractor's account if it is correct and complete. If it is not, the Engineer shall issue within 56 days a schedule that states the scope of the corrections or additions that are necessary. If the Final Account is still unsatisfactory after it has been resubmitted, the Engineer shall decide on the amount payable to the Contractor and issue a payment certificate, within 56 days of receiving the Contractor's revised account.

58. Operating and Maintenance Manuals

58.1 If "as built" Drawings and/or operating and maintenance manuals are required, the Contractor shall supply them by the dates stated in the Contract Data.

58.2 If the Contractor does not supply the Drawings and/or manuals by the dates stated in the Contract Data, or they do not receive the Engineer's approval, the Engineer shall withhold the amount stated in the Contract Data from payments due to the Contractor.

59. Termination

59.1 The Employer or the Contractor may terminate the Contract if the other party causes a fundamental breach of the Contract.

59.2 Fundamental breaches of Contract include, but shall not be limited to the following:

- (a) the Contractor stops work for 28 days when no stoppage of work is shown on the current program and the stoppage has not been authorized by the Engineer;
- (b) the Engineer instructs the Contractor to delay the progress of the Works and the instruction is not withdrawn within 28 days;
- (c) the Employer or the Contractor is made bankrupt or goes into liquidation other than for a reconstruction or amalgamation;
- (d) a payment certified by the Engineer is not paid by the Employer to the Contractor within 56 days of the date of the Engineer's certificate;

- (e) the Engineer gives Notice that failure to correct a particular Defect is a fundamental breach of Contract and the Contractor fails to correct it within a reasonable period of time determined by the Engineer;
- (f) the Contractor does not maintain a security which is required;
- (g) the Contractor has delayed the completion of works by the number of days for which the maximum amount of liquidated damages can be paid as defined in the Contract data; and
- (h) if the Contractor, in the judgment of the Purchaser has engaged in fraud and corruption, as defined in GCC Clause 64, in competing for or in executing the Contract.

59.3 When either party to the Contract gives notice of a breach of contract to the Engineer for a cause other than those listed under Sub Clause 59.2 above, the Engineer shall decide whether the breach is fundamental or not.

59.4 Notwithstanding the above, the Employer may terminate the Contract for convenience.

59.5 If the Contract is terminated the Contractor shall stop work immediately, make the Site safe and secure and leave the Site as soon as reasonably possible.

60. Payment upon Termination

60.1 If the Contract is terminated because of a fundamental breach of Contract by the Contractor, the Engineer shall issue a certificate for the value of the work done less advance payments received up to the date of the issue of the certificate, less other recoveries due in terms of the contract, less taxes due

to be deducted at source as per applicable law and less the percentage to apply to the work not completed as indicated in the Contract Data. Additional Liquidated Damages shall not apply. If the total amount due to the Employer exceeds any payment due to the Contractor the difference shall be a debt payable to the Employer.

60.2 If the Contract is terminated at the Employer's convenience or because of a fundamental breach of Contract by the Employer, the Engineer shall issue a certificate for the value of the work done, the reasonable cost of removal of Equipment, repatriation of the Contractor's personnel employed solely on the Works, and the Contractor's costs of protecting and securing the Works and less advance payments received up to the date of the certificate, less other recoveries due in terms of the contract and less taxes due to be deducted at source as per applicable law.

61. Property

61.1 All materials on the Site, Plant, Equipment, Temporary Works and Works are deemed to be the property of the Employer, if the Contract is terminated because of a Contractor's default.

62. Release from Performance

62.1 If the Contract is frustrated by the outbreak of war or by any other event entirely outside the control of either the Employer or the Contractor the Engineer shall certify that the Contract has been frustrated. The Contractor shall make the Site safe and stop work as quickly as possible after receiving this certificate and shall be paid for all work carried out before receiving it and for any work carried out afterwards to which commitment was made.

63. Suspension of World Bank Loan or Credit

63.1 In the event that the World Bank suspends the Loan or Credit to the Employer, from which part of the payments to the Contractor are being made:

- (a) The Employer is obligated to notify the Contractor of such suspension within 7 days of having received the World Bank's suspension notice.

- (b) If the Contractor has not received sums due to it upon the expiration of the 28 days for payment provided for in Sub-Clause 43.1, the Contractor may immediately issue a 14-day termination notice.

64. Fraud and Corruption

- 64.1** If the Employer determines that the Contractor and/or any of its personnel, or its agents, or its Subcontractors, subconsultants, services providers, suppliers and/or their employees has engaged in corrupt, fraudulent, collusive, coercive or obstructive practices, in competing for or in executing the Contract, then the Employer may, after giving 14 days notice to the Contractor, terminate the Contractor's employment under the Contract and expel him from the Site, and the provisions of Clause 59 shall apply as if such expulsion had been made under Sub-Clause 59.5 [Termination by Employer].
- 64.2** Should any employee of the Contractor be determined to have engaged in corrupt, fraudulent, collusive, coercive, or obstructive practice during the execution of the Works, then that employee shall be removed in accordance with Clause 9.
- 64.3** For the purposes of this Sub-Clause:
- (i) “corrupt practice” is the offering, giving, receiving or soliciting, directly or indirectly, of anything of value to influence improperly the actions of another party⁶;
 - (ii) “fraudulent practice” is any act or omission, including a misrepresentation, that knowingly or recklessly misleads, or attempts to mislead, a party to obtain a financial or other benefit or to avoid an obligation⁷;
 - (iii) “collusive practice” is an arrangement between two or more parties⁸ designed to achieve an improper purpose, including to influence improperly the actions of another party;
 - (iv) “coercive practice” is impairing or harming, or threatening to impair or harm, directly or indirectly, any party or the property of the party to influence improperly the actions of a party⁹;
 - (v) “obstructive practice” is
 - (aa) deliberately destroying, falsifying, altering or concealing of evidence material to the investigation or making false statements to investigators in order to materially impede a Bank investigation into allegations of a corrupt, fraudulent, coercive or collusive practice; and/or threatening, harassing or intimidating any party to prevent it from disclosing its knowledge of matters relevant to the investigation or from pursuing the investigation; or
- (bb) acts intended to materially impede the exercise of the Bank’s inspection and audit rights provided for under Sub-Clause 23.2.

⁶ “Another party” refers to a public official acting in relation to the procurement process or contract execution]. In this context, “public official” includes World Bank staff and employees of other organizations taking or reviewing procurement decisions.

⁷ “Party” refers to a public official; the terms “benefit” and “obligation” relate to the procurement process or contract execution; and the “act or omission” is intended to influence the procurement process or contract execution.

⁸ “Parties” refers to participants in the procurement process (including public officials) attempting to establish bid prices at artificial, non competitive levels.

⁹ “Party” refers to a participant in the procurement process or contract execution.

F. Special Conditions of Contract

1. Additions and Modifications to Conditions of Contract

- 1.1 The sub-clause A 13.1 of Conditions of Contract, damage to works shall include all data and deliverables generated during the work.
- 1.2 The sub-clause A 18.1 of Conditions of Contract, the Drawings and Charts shall refer to the planning of ground control points, GPS observation plan and schedule, **Levelling (Total Station/ GPS leveling in Hilly /difficult areas)** observation plan and schedule, aerial triangulation, site preparation plan and architecture, photogrammetric mapping plan and schedule, delineation of hazard line plan and schedule etc. The contractor shall also furnish all manpower, resources and materials required to execute and deliver the job. A work flow may be given for the complete job.
- 1.3 All the requirements/parameters given in this bid document are for one zone only unless otherwise stated.
- 1.4 The Start Date of a Zone shall be the date on which the Engineer hands over the input Digital Aerial Photographs (9cm GSD) for the first photogrammetric block pertaining to the Zone.
- 1.5 The Intended date of completion shall count from the date the Engineer hands over the input Digital Aerial Photographs (9 cm GSD) for the first photogrammetric block pertaining to the Zone.
- 1.6 Equipment shall include the hardwares,softwares and instruments brought temporarily to the Site by the Contractor to execute the Works.
- 1.7 Materials shall include all the storage disks/media used by the Contractor for carrying out the Works.
- 1.8 The Works are what the Contract requires the Contractor to execute and deliver to the Employer /Engineer, as defined in the Contract Data.
- 1.9 The Production Site for Digital Photogrammetry Work is mentioned in TABLE 1 of IFB. However, the Engineer, referred in the Bid Document, reserves the right to change the location of Production sites to any other Survey of India premises.

2. The sub-clause B 27.1 of Conditions of Contract, Program shall include Plan for all key activities like

- Preparation of site and setting up of Production facility (including networking and appropriate Storage System), their maintenance & management during Production .
- Planning and Provision of Planimetric ground control points by dual frequency GNSS/GPS receivers in relative static positioning mode and heights by differential Spirit **Levelling (Total Station / GPS Leveling in Hilly/difficult areas)** required for Photogrammetric Block control. It includes field work, processing and computation
-
- Planning and execution of Photogrammetric Work
 - Aerial triangulation
 - Feature Extraction in Stereo mode as per the Data Model Structure (DMS)
 - DTM and TIN generation and editing
 - Contour generation and editing
 - Ortho-rectification, Ortho-mosaic
 - Integration of important attribute information into the spatial database from the annotations of existing SoI maps
- Inundation Modeling and digitization of Flood line and determining areas of inundation by the estimated flood of 100 years return period.
- Digital shoreline Analysis of time series coastline data (3 nos.) to study the trends of shore-line change and arithmetically project the shoreline for next 100 years.
- Preparation of digital maps on the base of ortho-imagery and depicting contours at 0.5m (2.5m for hills) V L, final composite line and vector - as per approved layout and content.
- QA/QC at each stage of work and for the whole work.

- Data management including daily incremental backup, monthly full backup of data as per the back-up plan submitted by the Contractor and approved by the Engineer.
- Training of SOI staff for 1 month in the software, systems and processes being used by the contractor.
- Delivery of products (hardcopy & softcopy) as per list of deliverables and delivery instructions.

2.1 The sub-clause D 37.1 of Conditions of Contract, execution of work shall include the following items of work :

- Preparation of site and setting up of Production facility (including networking and appropriate Storage System), their maintenance & management during Production .
- Planning and Provision of Planimetric ground control points by dual frequency GNSS/GPS receivers in relative static positioning mode and heights by differential Spirit **Levelling (Total Station / GPS Levelling in Hilly/difficult areas)** required for Photogrammetric Block control. It includes field work, processing and computation
-
- Planning and execution of Photogrammetric Work
 - Aerial triangulation,
 - Feature Extraction in Stereo mode as per the Data Model Structure (DMS)
 - DTM generation and editing
 - Contour generation and editing
 - Ortho-rectification, Ortho-mosaic
 - Integration of important attribute information into the spatial database from the annotations of existing SoI maps
- Inundation Modeling and digitization of Flood line and determining areas of inundation by the estimated flood of 100 years return period.
- Digital shoreline Analysis of time series coastline data (3 nos.) to study the trends of shore-line change and arithmetically project the shoreline for next 100 years.
- Preparation of digital maps on the base of ortho-imagery and depicting contours at 0.5m VI, final composite line and vector - as per approved layout and content .
- QA/QC at each stage of work and for the whole work
- Data management including daily incremental backup, monthly full backup of data as per the back-up plan submitted by the Contractor and approved by the Engineer.
- Training of SOI staff for 1 month in the software, systems and processes being used by the contractor.
- Delivery of products (hardcopy & softcopy) as per list of deliverables and delivery instructions.

2.2 The sub-clause C 42.1 of Conditions of Contract, in addition the Contractor shall also submit all the deliverables pertaining to the completed work as given in the Contract Data.

2.3 The sub-clause C 56.1 of Conditions of Contract, Works shall include all the data/drawings/deliverables generated by the works carried out by Contractor as well as the data supplied to him earlier by the Employer. All the data/deliverables generated as an outcome of the work shall be sole property of Survey of India (SoI). However, it shall be the responsibility of the Contractor to facilitate the handing over/ taking over of all the data/drawings/deliverables by proper listing and accounting.

3. Security

- (a) The Digital Photogrammetric component of work will be carried out **inside the** secured premises of **Survey of India** to be decided by the Engineer. Necessary equipments/infrastructure should be installed at the agreed premises by the successful bidder. The aerial images/ products and other restricted data will not be permitted to be taken out. Proper account of daily production and distribution should be maintained.
- (b) No internet enabled device, mobile, Bluetooth, Wi Fi, camera, Pen drive, external data storage device etc. will be allowed inside the secured premises. All the security guidelines/instructions issued by the engineer shall be adhered to and enforced by the contractor on his employees and subcontractors.
- (c) After the completion of project storage media of Network Storage / hard-disk used for production will not be allowed to be taken out of SoI premises due to security reasons.
- (d) During or after completion of the allotted works, computer system of the Contractor (photogrammetric workstations etc.) will be allowed to be taken out of SoI premises only after removal of hard-disk from the system.

- (e) The Contractor shall obtain security clearance as necessary from Ministry of Defence (GOI) for foreigners if engaged for handling the classified data.

4. Labour :

The Contractor shall, unless otherwise provided in the Contract, make his own arrangements for the engagement of all staff and labour, local or other, and for their payment, housing, feeding and transport.

The Contractor shall, if required by the Engineer, deliver to the Engineer a return in detail, in such form and at such intervals as the Engineer may prescribe, showing the staff and the numbers of the several classes of labour from time to time employed by the Contractor on the Site and such other information as the Engineer may require.

5. Compliance with Labour Regulations:

During continuance of the contract, the Contractor and his sub contractors shall abide at all times by all existing labour enactments and rules made there under, regulations, notifications and bye laws of the State or Central Government or local authority and any other labour law (including rules), regulations, bye laws that may be passed or notification that may be issued under any labour law in future either by the State or the Central Government or the local authority. Salient features of some of the major labour laws that are applicable to construction industry are given below. The Contractor shall keep the Employer indemnified in case any action is taken against the Employer by the competent authority on account of contravention of any of the provisions of any Act or rules made there under, regulations or notifications including amendments. If the Employer is caused to pay or reimburse, such amounts as may be necessary to cause or observe, or for non-observance of the provisions stipulated in the Notifications/Byelaws/Acts/Rules/Regulations including amendments, if any, on the part of the Contractor, the Engineer/Employer shall have the right to deduct any money due to the Contractor including his amount of performance security. The Employer/Engineer shall also have right to recover from the Contractor any sum required or estimated to be required for making good the loss or damage suffered by the Employer.

The employees of the Contractor and the Sub-Contractor in no case shall be treated as the employees of the Employer at any point of time.

**SALIENT FEATURES OF SOME MAJOR LABOUR LAWS APPLICABLE TO ESTABLISHMENTS
ENGAGED IN BUILDING AND OTHER CONSTRUCTION WORK**
(The law as current on the date of bid opening will apply)

- a) Workmen Compensation Act 1923: The Act provides for compensation in case of injury by accident arising out of and during the course of employment.
- b) Payment of Gratuity Act 1972: Gratuity is payable to an employee under the Act on satisfaction of certain conditions on separation if an employee has completed 5 years service or more or on death the rate of 15 days wages for every completed year of service. The Act is applicable to all establishments employing 10 or more employees.
- c) Employees P.F. and Miscellaneous Provision Act 1952 (since amended): The Act Provides for monthly contributions by the employer plus workers @ 10% or 8.33%. The benefits payable under the Act are :
- (i) Pension or family pension on retirement or death, as the case may be.
 - (ii) Deposit linked insurance on the death in harness of the worker.
 - (iii) Payment of P.F. accumulation on retirement/death etc.
- d) Maternity Benefit Act 1951: The Act provides for leave and some other benefits to women employees in case of confinement or miscarriage etc.
- e) Contract Labour (Regulation & Abolition) Act 1970: The Act provides for certain welfare measures to be provided by the Contractor to contract labour and in case the Contractor fails to provide, the same are required to be provided, by the Principal Employer by Law. The Principal Employer is required to take Certificate of

Registration and the Contractor is required to take license from the designated Officer. The Act is applicable to the establishments or Contractor of Principal Employer if they employ 20 or more contract labour.

- f) Minimum Wages Act 1948: The Employer is supposed to pay not less than the Minimum Wages fixed by appropriate Government as per provisions of the Act if the employment is a scheduled employment. Construction of Buildings, Roads, Runways are scheduled employments.
- g) Payment of Wages Act 1936: It lays down as to by what date the wages are to be paid, when it will be paid and what deductions can be made from the wages of the workers.
- h) Equal Remuneration Act 1979: The Act provides for payment of equal wages for work of equal nature to Male and Female workers and for not making discrimination against Female employees in the matters of transfers, training and promotions etc.
- i) Payment of Bonus Act 1965: The Act is applicable to all establishments employing 20 or more employees. The Act provides for payments of annual bonus subject to a minimum of 8.33% of wages and maximum of 20% of wages to employees drawing Rs.3500/-per month or less. The bonus to be paid to employees getting Rs.2500/- per month or above upto Rs.3500/- per month shall be worked out by taking wages as Rs.2500/-per month only. The Act does not apply to certain establishments. The newly set-up establishments are exempted for five years in certain circumstances. Some of the State Governments have reduced the employment size from 20 to 10 for the purpose of applicability of this Act.
- j) Industrial Disputes Act 1947: The Act lays down the machinery and procedure for resolution of Industrial disputes, in what situations a strike or lock-out becomes illegal and what are the requirements for laying off or retrenching the employees or closing down the establishment.
- k) Industrial Employment (Standing Orders) Act 1946: It is applicable to all establishments employing 100 or more workmen (employment size reduced by some of the States and Central Government to 50). The Act provides for laying down rules governing the conditions of employment by the Employer on matters provided in the Act and get the same certified by the designated Authority.
- l) Trade Unions Act 1926: The Act lays down the procedure for registration of trade unions of workmen and employers. The Trade Unions registered under the Act have been given certain immunities from civil and criminal liabilities.
- m) Child Labour (Prohibition & Regulation) Act 1986: The Act prohibits employment of children below 14 years of age in certain occupations and processes and provides for regulation of employment of children in all other occupations and processes. Employment of Child Labour is prohibited in Building and Construction Industry.
- n) Inter-State Migrant workmen's (Regulation of Employment & Conditions of Service) Act 1979: The Act is applicable to an establishment which employs 5 or more inter-state migrant workmen through an intermediary (who has recruited workmen in one state for employment in the establishment situated in another state). The Inter-State migrant workmen, in an establishment to which this Act becomes applicable, are required to be provided certain facilities such as housing, medical aid, travelling expenses from home upto the establishment and back, etc.
- o) The Building and Other Construction workers (Regulation of Employment and Conditions of Service) Act 1996 and the Cess Act of 1996: All the establishments who carry on any building or other construction work and employs 10 or more workers are covered under this Act. All such establishments are required to pay cess at the rate not exceeding 2% of the cost of construction as may be modified by the Government. The Employer of the establishment is required to provide safety measures at the Building or construction work and other welfare measures, such as Canteens, First-Aid facilities, Ambulance, Housing accommodations for workers near the work place etc. The Employer to whom the Act applies has to obtain a registration certificate from the Registering Officer appointed by the Government.
- p) Factories Act 1948: The Act lays down the procedure for approval at plans before setting up a factory, health and safety provisions, welfare provisions, working hours, annual earned leave and rendering information regarding accidents or dangerous occurrences to designated authorities. It is applicable to premises employing 10 persons or more with aid of power or 20 or more persons without the aid of power engaged in manufacturing process.

6. Sub-contracting (GCC Clause 7)

Please add the following as Clause 7.2:

The contractor shall not be required to obtain any consent from the employer for:

- a) the sub-contracting of any part of the works for which the Sub-contractor is named in the contract;
- b) the provision of labour; and
- c) the purchase of materials which are in accordance with the standards specified in the Contract.

Beyond this if the contractor proposes sub-contracting any part of the work during execution of works, because of some unforeseen circumstances to enable him to complete the work as per terms of the contract, the Engineer will consider the following before according approval:

- The contractor shall not sub-contract the whole of the Works.
- The contractor shall not sub-contract any part of the work without prior consent of the Engineer. Any such consent shall not relieve the contractor from any liability or obligations under the contract and he shall be responsible for the acts, defaults and neglects of any sub-contractor, his agents or workmen as fully as if they were the acts, defaults or neglects of the contractor, his agents or workmen.
- The Engineer should satisfy whether (a) the circumstances warrant such sub-contracting; and (b) the sub-contractors so proposed for the Work possess the experience, qualifications and equipment necessary for the job proposed to be entrusted to them in proportion to the quantum of work to be sub-contracted.
 - If payments are proposed to be made directly to that sub-contractor, this should be subject to specific authorization by the prime contractor so that this arrangement does not alter the contractor's liability or obligation under the contract.

Note: 1. All bidders are expected to indicate clearly in the bid, if they proposed sub-contracting elements of the works amounting to more than 20 percent of the Bid Price. For each such proposal the qualification and the experience of the identified sub-contractor in the relevant field should be furnished along with the bid to enable the employer to satisfy himself about their qualifications before agreeing for such sub-contracting and include it in the contract. In view of the above, normally no additional sub-contracting should arise during execution of the contract.

2. However, [a] sub contracting for certain specialized elements of the work is not unusual and acceptable for carrying out the works more effectively; but vertical splitting of the works for subcontracting is not acceptable. [b] In any case, proposal for sub-contracting in addition to what was specified in bid and stated in contract agreement will not be acceptable if the value of such additional sub-contracting exceeds 25% of value of work which was to be executed by Contractor without sub-contracting.

3. Assignment of the contract may be acceptable only under exceptional circumstances such as insolvencies/liquidation or merger of companies etc.

7. Arbitration (GCC Clause 25.3)

The procedure for arbitration will be as follows :

- (a) In case of Dispute or difference arising between the Employer and a domestic contractor relating to any matter arising out of or connected with this agreement, such disputes or difference shall be settled in accordance with the Arbitration and Conciliation Act, 1996. The arbitral tribunal shall consist of 3 arbitrators one each to be appointed by the Employer and the Contractor. The third Arbitrator shall be chosen by the two Arbitrators so appointed by the Parties and shall act as Presiding arbitrator. In case of failure of the two arbitrators appointed by the parties to reach upon a consensus within a period of 30 days from the appointment of the arbitrator appointed subsequently, the Presiding Arbitrator shall be appointed by the President of the **Institution of Engineers (India), New Delhi**.
- (b) In the case of dispute with a Foreign contractor the dispute shall be settled in accordance with provisions of UNCITRAL Arbitration Rules. The Arbitral Tribunal shall consist of three Arbitrators one each to be appointed by the Employer and the Contractor. The third Arbitrator shall be chosen by the two Arbitrators so appointed by the Parties, and shall act as presiding arbitrator. In case of failure of the two arbitrators appointed by the parties to reach upon a consensus within a period of 30 days from the appointment of the arbitrator appointed subsequently, the Presiding arbitrator shall be appointed by the President of the **Institution of Engineers (India), New Delhi**.

- (c) If one of the parties fails to appoint its arbitrator in pursuance of sub-clause (a) and (b) above within 30 days after receipt of the notice of the appointment of its arbitrator by the other party, then the President of the **Institution of Engineers (India), New Delhi**, both in cases of the Foreign Contractor as well as Indian Contractor, shall appoint the arbitrator. A certified copy of the order of the President of the **Institution of Engineers (India), New Delhi**, making such an appointment shall be furnished to each of the parties.
- (d) Arbitration proceedings shall be held at the office of the Presiding arbitrator or in any other office of Govt. India so chosen by the Presiding arbitrator and the language of the arbitration proceedings and that of all documents and communications between the parties shall be English.
- (e) The decision of the majority of arbitrators shall be final and binding upon both parties. The cost and expenses of Arbitration proceedings will be paid as determined by the arbitral tribunal. However, the expenses incurred by each party in connection with the preparation, presentation etc. of its proceedings as also the fees and expenses paid to the arbitrator appointed by such party or on its behalf shall be borne by each party itself.
- (f) Where the value of the contract is Rs.50 millions and below, the disputes or differences arising shall be referred to the Sole Arbitrator. The Sole Arbitrator should be appointed by agreement between the parties, failing such agreement the sole Arbitrator should be appointed by the appointing authority, namely the President of the Institution of Engineers (India), New Delhi.
- (g) Performance under the contract shall continue during the arbitration proceedings and payments due to the contractor by the owners shall not be withheld, unless they are the subject matter of the arbitration proceedings.

8. Protection of Environment:

Add the following as GCC Clause 16.2:

The contractor shall take all reasonable steps to protect the environment on and off the Site and to avoid damage or nuisance to persons or to property of the public or others resulting from pollution, noise or other causes arising as a consequence of his methods of operation.

During continuance of the contract, the contractor and his sub-contractors shall abide at all times by all existing enactments on environmental protection and rules made there under, regulations, notifications and bye-laws of the State or Central Government, or local authorities and any other law, bye-law, regulations that may be passed or notification that may be issued in this respect in future by the State or Central Government or the local authority.

Salient features of some of the major laws that are applicable are given below :

The Water (Prevention and Control of Pollution) Act, 1974 :- This provides for the prevention and control of water pollution and the maintaining and restoring of wholesomeness of water. 'Pollution' means such contamination of water or such alteration of the physical, chemical or biological properties of water or such discharge of any sewage or trade effluent or of any other liquid, gaseous or solid substance into water (whether directly or indirectly) as may, or is likely to, create a nuisance or render such water harmful or injurious to public health or safety, or to domestic, commercial, industrial, agricultural or other legitimate uses, or to the life and health of animals or plants or of aquatic organisms.

The Air (Prevention and Control of Pollution) Act, 1981 :- This provides for prevention, control and abatement of air pollution. 'Air Pollution' means the presence in the atmosphere of any 'air pollutant', which means any solid, liquid or gaseous substance (including noise) present in the atmosphere in such concentration as may be or tend to be injurious to human beings or other living creatures or plants or property or environment.

The Environment (Protection) Act, 1986 :- This provides for the protection and improvement of environment and for matters connected therewith, and the prevention of hazards to human beings, other living creatures, plants and property. 'Environment' includes water, air and land and the inter-relationship which exists among and between water, air and land, and human beings, other living creatures, plants, micro-organism and property.

The Public Liability Insurance Act, 1991 :- This provides for public liability insurance for the purpose of providing immediate relief to the persons affected by accident occurring while handling hazardous substances and

for matters connected herewith or incidental thereto. Hazardous substance means any substance or preparation which is defined as hazardous substance under the Environment (Protection) Act 1986, and exceeding such quantity as may be specified by notification by the Central Government.

9. Changes in Quantities

Add the following to GCC 38 as sub-clause 38.4 :‘ The areas given above exclude areas covered under sea and are approximate . The Employer reserves the right to modify the area to be mapped i.e. some of the states/areas may be included/excluded or to increase or decrease the quantity of work by addition or cancellation of full or part of work in the project area. Payment will be adjusted as per sub clause 38.1’.

10. Payment Certificates

In sub-clause 42.3 of GCC add the following at the end ‘The Ortho imagery (UTM Projection), generated by the Contractor shall be used to check the measurement of all quantities claimed as executed by the Contractor’. However, areas covered by sea will be excluded from the areas measured on the orthoimagery.

In sub-clause 42.6 of GCC add the following at the end ‘The QC carried out by the Engineer as per Clause 33.1 shall be used to confirm the Interim Certification issued by the Engineer’. The interim certificate shall be issued by the Engineer block-wise, only after completion of all components of work related to a Block.

11. Secured Advances

Sub-clause 51.4 shall not be applicable for this contract and is to be treated as ‘Deleted’.

12. Liquidated Damages:

Sub-clause 49.1:

Please substitute the last sentence with the following:

“Time is the essence of the contract and payment or deduction of liquidated damages shall not relieve the contractor from his obligation to complete the work as per agreed Execution program and milestones or from any other of the contractor’s obligations and liabilities under the contract.”

13. Termination (GCC Clause 59)

Add the following to Sub-Clause 59.2:

(h) the Contractor does not follow the security instructions .

14. Program (Clause 27 of GCC)

Please substitute Sub-Clause 27.1 of GCC with the following :‘ Within the time stated in the Contract Data the Contractor shall submit to the Engineer for approval a Program including **Work Execution Plan** showing the general methods, arrangements, order, and timing for all the activities in the Works along with monthly cash flow forecast.’

Add as Sub-Clause 27.5: Each Zone may be divided into manageable Photogrammetric Blocks and input material will be supplied Block wise by the Engineer in a phased manner The Programs and their updates shall be submitted for every Photogrammetric Block for approval by the Engineer.

15. Payment Certificates (Clause 42 of GCC)

Add as Sub-Clause 42.7: “Areas falling in sea will not count towards measurement of the quantity of work even if such areas were included in Aerial Triangulation, DTM creation etc. However, backwaters shall be considered as inland water and shall not be excluded from measurements.”

16. Bill of Quantities: (Clause 37 of GCC)

Substitute Sub-Clause 37.1 with the following: ‘The Bill of Quantities shall contain items for the execution of works, testing, and commissioning work to be done by the contractor.’

Add as Sub –Clause 37.3: “ Zone I to Zone VIII have been further sub-divided into sub-zones I-A, I-B, II-A, II-B,VIII-A, VIII-B in the Bill of quantities based on the categorization of areas into Mainland, Inter-Tidal Zone/Islands. The rates quoted by the Contractor for sub-zone I-A, I-B, II-A, II-B,VIII-A, VIII-B in the Bill of Quantities shall be used for making payment to the Contractor for the quantity of work done in the respective sub-zones.”

17. Contractor to Construct the Works : (Clause 16 of GCC)

Substitute ‘Contractor to Construct the Works’ in Clause 16 with ‘Contractor to Execute the Works’.

Sustitute Sub-Clause 16.1 with ‘The Contractor shall execute the Works in accordance with the Specification and Drawings, and as per instructions of Engineer.’

18. Access to the Site: (Clause 22 of GCC):

Add Sub-Clause 22.2: “ The contractor will make at least two systems in the Network available to the Engineer or his representatives for online QC, as and when required by the Engineer.”

SECTION 4: CONTRACT DATA

Contract Data

Items marked "N/A" do not apply in this Contract.

The following documents are also part of the Contract:

Clause Reference

- | | |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| · The Schedule of Operating and Maintenance Manuals | [58] N/A |
| · The Schedule of Other Contractors | [8] N/A |
| · The Schedule of Key Personnel | [9] |
| · The Methodology and Program of Work & Work Execution Plan | [27] |
| · The Schedule of Key and Critical equipment to be deployed on the work as per agreed program of Provision of Ground Controls and Digital Photogrammetric Work | [27] |
| · Site Investigation reports | [14] N/A |

The Borrower is Government of India

The World Bank means International Development Association [1.1, 63]

IDA Credits No is **4765-0 IN**

The Employer is [1.1]

Name: **The National ICZM Project Director**

Address: **SICOM, Ministry of Environment & Forest
No. 9, First Floor, Institutional Area,
Lodhi Road, New Delhi -110003.**

Name of authorized Representative: **Dr. A. Senthil Vel**

The Engineer is: [1.1]

Name: **Project Director, ICZM, SOI,
Additional Surveyor General, Southern Zone,**

Address: **Sarjapur Road, Koramangala, 2nd Block, Bangalore -560034,
KARNATAKA**

Name of Authorized Representative: **Shri M. Dharma Raj**

The Adjudicator appointed jointly by the Employer and Contractor is: [1.1]

*Name : _____

*Address : _____

(*to be filled in after the Adjudicator has been appointed)

The name and identification number of the Contract is : [1.1]

Provision of Ground Controls and Digital Photogrammetric Work of approximately 7 km. wide coastal belt of Indian mainland including major deltaic areas and back waters using digital stereo aerial photographs of 9 cm GSD for delineation of hazard line. **IFB No. Proc/SICOM/SOI/2011/01 Dated.: 19/10/2011.**

The Works consists of :

The work consists of the items given under Para 5.1 of Section 5 : Specifications [1.1]

The **Start Date** shall be the date on which the Input Digital Aerial Photographs pertaining to the first Photogrammetric Block is handed over to the Contractor [1.1]

The **Intended Completion Date** for the whole of the Works is **24 months from the Start Date** with the following milestones: [17, 28]

<u>Milestone dates:</u>	<u>Physical works to be completed</u>	<u>Period from the date of issue of notice to proceed with the work</u>
Milestone 1	i.e. Preparation of Site	1 (one) month
Milestone 2	i.e. Handing over deliverables pertaining to 30% of work	12 (twelve) months.
Milestone 3	i.e. Handing over deliverables pertaining to 60% of work**	18 (eighteen) months.
Milestone 4	i.e. Handing over deliverables pertaining to 100% of work	24 (twenty four) months.

The following documents also form part of the Contract: NIL [2.3]

The Site Possession Dates : shall be immediately after the issue of letter to proceed with work. [21]

The **site** is as per table in the IFB, [1]

The Defects Liability Period is **365** days from the date of certification of completion of works. [35]

Insurance requirements are as under: [13]

		Minimum Cover for Insurance	Maximum deductible for Insurance
(i)	Works and Plants and Materials	[Contract Price]	[10% of Contract Price]
(ii)	Loss or damage to Equipment a) Photogrammetric Workstations b) Appropriate Storage System along with OS, Controller, LAN, Server and other accessories etc..	a) Price of Photogrammetric workstations b) Price of Appropriate Storage System along with OS, Controller, LAN, Server and other accessories etc..	a) [10 % of Price of Photogrammetric workstations] b) [10% of Price of Appropriate Storage System along with OS, Controller, LAN, Server and other accessories etc..]
(iii)	Other Property	20 (twenty lakhs)	NIL
(iv)	Personal injury or death insurance for Contractor's Employees	In accordance with the statutory requirements applicable to India	

The following events shall also be Compensation Events: Nil [44]

The period between Program updates shall be 15 days. [27]

The amount to be withheld for late submission of an updated Program shall be Rs. 1,00,000/- per occurrence [27]

The language of the Contract documents is English [3]

The law which applies to the Contract is the laws of Union of India [3]

The currency of the Contract is Indian Rupees. [46]

Fees and types of reimbursable expenses to be paid to the Adjudicator [25]

Fee of Rs. 3000/- per day.

TA & DA as per Actuals as admissible to senior Group 'A' officers of Government of India.

Appointing Authority for the Adjudicator [26]

The Chairman Institution of Engineers, New Delhi

The formula(e) for adjustment of prices are: [47]

R = Value of work as defined in Clause 47.1 of Conditions of Contract.

Adjustment for labour component

- (i) Price adjustment for increase or decrease in the cost due to labour shall be paid in accordance with the following formula:

$$V_L = 0.10 \times R \times (L_i - L_o) / L_o$$

V_L = increase or decrease in the cost of work during the quarter under consideration due to changes in rates for local labour.

L_o = the average consumer price index for industrial workers for the Production Site/ centre for the quarter preceding the date of opening of Bids as published by Labour Bureau, Ministry of Labour, Government of India.

L_i = The average consumer price index for industrial workers for the Production Site/ centre for the quarter under consideration as published by Labour Bureau, Ministry of Labour, Government of India.

The proportion of payments retained (retention money) shall be 6% from each bill subject to a maximum of 5% of final contract price [48]

The liquidated damages for the whole of the work and that for the milestones are as under [49]

Zone	Liquidated damage per day				
	Whole work (Rs)	Milestone 1 (Rs)	Milestone 2 (Rs)	Milestone 3 (Rs)	Milestone 4 (Rs)
#1	27,500	500	8250	8250	10500
#2	27,500	500	8250	8250	10500
#3	16,500	500	4800	4800	6400
#4	21,000	500	6300	6300	7900
#5	12,500	500	3750	3750	4500
#6	12,500	500	3750	3750	4500
#7	16,500	500	4800	4800	6400
#8	26,000	500	7750	7750	10000

The maximum amount of liquidated damages for the whole of the works is ten percent of final contract price. [49]

The amounts of the advance payment are: [51]

<u>Nature of Advance</u>	<u>Amount (Rs.)</u>	<u>Conditions to be fulfilled</u>
1. Mobilization Advance	5 % of Contract Price.	On submission of un-conditional Bank Guarantee (to be drawn before end of 20% of Contract period)

2. Equipment 90% for new and 50% of depreciated value for old equipment. Total amount will be subject to a maximum of 15% of the Contract price. After equipment is brought to site as per work execution program (provided the Engineer is satisfied that the equipment is required for performance of the contract) and on submission of unconditional Bank Guarantee for amount of advance.

(The advance payment will be paid to the Contractor no later than 30 days after fulfillment of the above conditions).

Repayment of advance payment for mobilization and equipment : [51]

The advance shall be repaid with percentage deductions from the interim payments certified by the Engineer under the Contract. Deductions shall commence in the next Interim Payment Certificate following that in which the total of all such payments to the Contractor has reached not less than 15% of the Contract Price or 3 months from the date of payment of first installment of the advance, whichever period concludes and shall be made at the rate of 7.5 % of the amounts of all Interim Payment Certificates until such time as the advance has been repaid, always provided that the Advance shall be completely repaid prior to the expiry of the original time for completion.

The Securities shall be for the following minimum amounts equivalent as a percentage of the Contract Price: [52]

Performance Security for 5 per cent of contract price plus Rs..... as additional security for unbalanced bids [in terms of ITB Clause 29.5].

The standard form of Performance Security acceptable to the Employer shall be an unconditional Bank Guarantee of the type as presented in Section 8 of the Bidding Documents.

The date by which “as-built” drawings (in scale 1 in 10) in 2 sets are required is within 28 days of issue of certificate of completion of whole or section of the work, as the case may be. [58] N/A

The amount to be withheld for failing to supply “as built” drawings and/or operating and maintenance manuals by the date required is Rs..... [58] N/A

The following events shall also be fundamental breach of contract: [59.2]

1. The Contractor has contravened Sub-clause 7 of GCC read with Clause 7 of SCC and Clause 9.0 of GCC
2. The contractor does not adhere to the agreed Program (Clause 27 of GCC) and also fails to take satisfactory remedial action as per agreements reached in the management meetings (Clause 31) for a period of 60 days.
3. The contractor fails to carry out of the instructions of Engineer within a reasonable time determined by the Engineer in accordance with GCC Clause 16.1 and 23.1.
4. The Contractor has contravened Security Guidelines given in Clause 3 of SCC

The percentage to apply to the value of the work not completed representing the Employer's additional cost for completing the Works shall be 20 percent. [60]

Deliverables required to be submitted by the Contractor to the Engineer [2.2 SCC]

a) DELIVERABLES

As per para 5.6 of Section 5: Specifications

b) Delivery Instructions:

As per para 5.7 of Section 5 : Specifications

SECTION 5 : SPECIFICATIONS

SPECIFICATIONS

5.1 BRIEF SCOPE OF WORK

A brief scope of works for Zones I to VIII, as referred to in Table 1 of IFB, is given below:

- Preparation of site and setting up of Production facility (including networking and appropriate Storage System), their maintenance & management during Production .
- Planning and Provision of Planimetric ground control points by dual frequency GNSS/GPS receivers in relative static positioning mode and heights by differential Spirit **Levelling (Total Station / GPS Leveling in Hilly/difficult areas)** required for Photogrammetric Block control. It includes field work, processing and computation
-
- Planning and execution of Photogrammetric Work
 - Aerial triangulation,
 - Feature Extraction in Stereo mode as per the Data Model Structure (DMS)
 - DTM and TIN generation and editing
 - Contour generation and editing
 - Ortho-rectification, Ortho-mosaic
 - Integration of important attribute information into the spatial database from the annotations of existing SoI maps
- Inundation Modeling and digitization of Flood line and determining areas of inundation by the estimated flood of 100 years return period.
- Digital shoreline Analysis of time series coastline data (3 nos.) to study the trends of shore-line change, **compute the rate of coastal erosion/accretion along perpendicular transects at every 500m along the coast line** and arithmetically project the shoreline for next 100 years.
- Preparation of digital maps on the base of ortho-imagery and depicting contours at 0.5m (2.5m for hills) VI, final composite line and vector - as per approved layout and content .
- QA/QC at each stage of work and for the whole work
- Data management including daily incremental backup, monthly full backup of data as per the back-up plan submitted by the Contractor and approved by the Engineer.
- Training of SOI staff for 1 month in the software, systems and processes being used by the contractor.
- Delivery of products (hardcopy & softcopy) as per list of deliverables and delivery instructions.

5.2 INPUT MATERIAL: The following input material/data will be supplied by the Engineer to the selected contractors:

5.2.1 MSL height and descriptions and approximate co-ordinates of Bench Marks @ 1 km to 3 km along two parallel Double Tertiary Leveling Lines in the 7 (seven) km belt along the coastline, **except in Water bodies, Marshy, hilly and other inaccessible areas**. However, Heights of these Bench marks shall be provided by the Engineer only at the time of carrying out the leveling computations (**Total Station / GPS leveling in Hilly/difficult areas**) inside the secured premises of Survey of India.

5.2.2 Description and co-ordinates of pairs of planimetric ground control points within the Project area on WGS 84 datum @ 10 km to 50 km apart

5.2.3 Aerial Imagery (Pan- sharpened, R, G, B, NIR bands - 9 cm GSD) with forward and lateral overlaps in hardcopy and softcopy (TIFF format) - captured with Large format Frame Digital Aerial Camera (DMC) of approximately 9 cm GSD (PAN) and numbered uniquely as per standard naming scheme .

5.2.4 Differentially corrected X, Y, Z, k, Φ , Ω of all exposure stations associated with each frame.

5.2.5 Preliminary ortho-photos (frame-wise) as available.

5.2.6 Photo-index in softcopy and hardcopy

5.2.7 Camera calibration certificate and **.cam** files

- 5.2.8 Maps/proofs of the area on 1:50,000 scale or 1:25,000 scale (as available)
- 5.2.9 100 year return period flood level along the coastline @ every 30 km (approx)
- 5.2.10 Scanned aerial imagery from old 1:25K/1:40K/1:50K scale photographs / satellite imagery from archives pertaining to the coastline - of two different old vintages.

5.3 SALIENT POINTS:

5.3.1 Spatial Coverage of Input: The spatial coverage of Digital Aerial Photographs, pertaining to the Works related to Zones I to VIII is detailed in Table 1 of IFB. The Aerial Imageries shall not only cover 7 km wide coastal belt of Indian mainland beyond the High Water Line, but shall also extend beyond 7 km to include inter-tidal zone and major Deltaic areas and back waters. The areas given in Table I of IFB is only approximate and will also depend on the 'No-fly zones' which may be falling in the respective Zones.

5.3.2 Supply of Inputs in Batches : Aerial Imagery will be supplied to the Contractor by the Engineer batch-wise, in a phased manner.

The work execution plan and schedule is to be submitted by the Contractor for approval by the Engineer, accordingly. Description & approximate co-ordinates of DT BMs & co-ordinates of Frame-work GPS controls (for field work) will be provided to the Contractor in batches as per the approved plan .

5.3.3 Checking stability of GPS Control/BM by employing suitable checking procedures and correctly locating/identifying monuments on the ground shall be the responsibility of the contractor. In case of any doubt, alternative near-by GPS Control/BM provided by the Engineer shall be used by the Contractor. Any such difficulty or deficiency shall also be brought to the notice of the Engineer immediately.

Engineer shall not be liable for any delay in completion or inaccuracy in the deliverables at a later stage, for failure of Contractor on this count.

5.4 SCOPE OF WORKS IN DETAIL

5.4.1 Site Preparation

The Production sites mentioned in TABLE 1 of IFB will be handed over to the contractor on as-is-where-is basis. The contractor is advised to visit the site for estimating the cost for site preparation before submission of bid. The Contractor will be responsible for all site preparatory works such as data & electric networking in the secured premises of Survey of India, provision of appropriate Storage System along with Controller and OS, servers, back-up devices, computer hardware, softwares, networking in the sites, plotters, Air Conditioners with the required internal electric wiring, furniture, UPS, Generators etc The Contractor should set up processing centers with appropriate space to handle input data and process it efficiently. After the completion of project storage media/hard disks used for production will not be allowed to be taken out of SoI premises due to security reasons. However, the other equipments will be taken back by the Contractor after completion of the work. Hence, only the cost of installation, fixtures, storage-media etc (and not the cost of equipments like Photogrammetric workstations) should be quoted by the Bidder against the Item 'Preparation of Site' in Section 7 (Bill of Quantities).

5.4.2 QA/QC Of Digital Aerial Photographs, GCPs etc provided by the Engineer

Pan- sharpened, R, G, B, NIR bands - 9 cm GSD provided by the Engineer shall be used for photogrammetric processes.

Quality checking of this input data will be carried out by the Contractor immediately (within 3 months of receiving a batch of data) to satisfy himself about the suitability of all input data for photogrammetric processing. Any complaint in this regard received at a later date will not be entertained.

The Contractor should satisfy himself regarding:

- Gaps in stereo coverage.
- Differentially corrected GNSS/GPS and IMU data of exposure stations.
- Imaging of pre-pointed targets on aerial digital photographs.
- Differentially corrected GNSS/GPS data of pre-pointed controls.
- Image characteristics including ground sampling distance of aerial digital photography data.

5.4.3 Post-Pointed Ground Control Points for Block Control (for the mainland including Sagar Island and Rameshwaram)

5.4.3.1 Planning :

Planning for provision of GCPs for block control shall be done by the contractor and got approved by the Engineer. It shall be the responsibility of the Contractor to prepare and submit the Plan for approval by the Engineer. The plan should clearly indicate the Framework Controls (GPS Controls/BMs/Pre-pointed Controls) supplied by Engineer, the outline of photographs showing the overlap areas, Principal Point of each photograph, location and type of planned post-pointed control. The Plan should be submitted in a shape-file in which all the essential attributes pertaining to the number/unique-ID of photographs and controls should be incorporated.

The Contractor should make use of Preliminary Ortho-Photo (supplied to him by the Engineer for the purpose), wherever available. An A0 size hard-copy plot of the Plan, on a suitable scale, shall also be submitted to the Engineer. While preparing the Plan the following guide-lines should be kept in mind

5.4.3.2 Provision of Post-Pointed Horizontal Control

Post-Pointed Horizontal Control for Photogrammetric Block Control, as per approved plan, shall be provided in WGS-84 co-ordinate system with the help of GNSS/GPS.

GPS network observation-plan should be submitted in soft-copy (shape file) and hard-copy for obtaining the approval of the Engineer, before starting the field work. The GPS Controls shall be provided by the technique of static relative positioning using carrier phase measurements. In case, the requisite accuracy, as laid down in Clause 5.5.1 of Section 5, is not achieved, the points/vectors shall be re-observed.

Weekly progress report should be submitted to the Engineer, using the shape-file of approved plan as base, in which latest status of observation & computation of post-pointed horizontal control shall be depicted.

5.4.3.3 Provision Post-Pointed Vertical Control

Post-Pointed Vertical Control shall be provided in MSL terms by using differential spirit leveling technique technique (**Total Station / GPS leveling in Hilly/difficult areas**). **Provision heights by Total Station/ GPS leveling (in hilly/difficult terrain) should only be after express approval by the Engineer of the detailed proposal submitted by the contractor. The decision of the Engineer for categorization of terrain as difficult/hilly shall be final. Control points having both MSL as well as WGS-84 heights shall be used to provide heights by GPS leveling. Such heights should be provided by a maximum offset of 5 (km) from at least two such controls(known BMs) and should not be carried forward.**

The Plan for provision of Post-Pointed vertical control should be submitted by the Contractor in soft-copy (shape-file) and hardcopy for approval by the Engineer before commencement of field work.

The ST leveling work (**Total Station / GPS leveling in Hilly/difficult areas**) is to start from a known Bench Mark and to be closed on another known Bench Mark supplied by the Engineer. Before the start of field-work, the description of these Bench Marks & approximate GPS-co-ordinates shall be provided to the Contractor **but not their heights**. Heights in the field shall be reduced heights from zero datum. The actual heights shall be computed inside the secured premises of Survey of India .

Immediately after the computation of leveling line (**Total Station / GPS leveling in Hilly/difficult areas**) is complete, it should be checked whether the line has passed – as per the accuracy standards mentioned in Clause 5.5.1 of Section 5. Heights of post-pointed controls obtained by **Levelling (Total Station / GPS leveling in Hilly/difficult areas)**, which do not meet the permissible accuracy, should be rejected and provided afresh.

Weekly progress report of **Levelling (Total Station / GPS leveling in Hilly/difficult areas)** work should be submitted to the Engineer, using the shape-file of approved plan as base, in which latest status of **Levelling (Total Station / GPS leveling in Hilly/difficult areas)** work, connection to post-pointed controls & final-computation shall be depicted. The accuracy achieved, permissible accuracy of each line, pass/fail result of each line should be clearly built into the status report as an attribute of leveling line (**Total Station / GPS leveling in Hilly/difficult areas**). The post-pointed points, for which vertical control had to be provided afresh, should also be reported as an attribute.

5.4.3.4 Controls in Inter-Tidal Zone and Islands (excluding Sagar Island and Rameshwaram)

Very few GCPs or no GCPs may be feasible to be provided in the inter-tidal zone/ Marshy areas (like Sunder Bans)/islands by the contractor. Relaxed standards will be used for Aerial Triangulation of such areas. The Aerial Triangulation in this region is to be carried out by Integrated Sensor Orientation, which includes refinement of Air-borne GNSS/GPS/IMU data with photo measurements only. The strips of aerial imageries in these regions will also be cantilevered by adjacent strips, which will be block adjusted with Air-borne GNSS/GPS/IMU data, GCPs and photo-measurements.

5.4.4 Photogrammetric Work

5.4.4.1 Aerial Triangulation / Block Adjustment

This component of work includes following sub-activities

- a) Getting the Block, Strip, Block Photo and Point numbering systems approved by the Engineer.
- b) Interior Orientation (IO).
- c) Identification and Measurement of GCPs (Plan, Height, PH) . The GCPs have to be transferred and measured in all the photographs in which they appear, preferably in stereo mode.
- d) Automatic Tie-Point extraction followed by a verification and editing stage carried out by a human operator. Manual measurements shall be made wherever required. Manual/conventional point measurements shall be resorted to in some parts of AT block if terrain type (forest, water, large height variation within block of photos etc.) do not permit reliable AT solution by auto-tie point generation.
- e) GNSS/GPS/IMU assisted Auto Aerial Triangulation (AAT), using robust Bundle Block Adjustment program, assigning appropriate apriori standard deviations (or weights) for all groups of observations (photogrammetric observations, terrain measurements of control points, Air-borne GNSS/GPS/IMU data) and also within each group of observations.
- f) Editing of the AAT results. This shall include analysis and manual stereo measurements in order to satisfy reliability and stability of the AT block as well as the required precision – accuracy of the measurements. Sufficient iterations shall be done to achieve the required accuracy.
- g) Final AT solution will be submitted to the Engineer with detailed triangulation report for obtaining go ahead approval.
- h) Sufficient controls shall be taken from adjacent block to ensure adjustment at edges. All successive blocks shall have an overlap of two models in strip direction

5.4.4.2 Feature Extraction in Stereo mode

Feature Extraction in Stereo mode of Topographical features as per Data Model Structure (DMS) given in Table 5.1 of Section 5. The topographical features captured which are to be used as hard or soft break lines shall be digitized with utmost care so as to ensure the accuracy of DTM subsequently.

5.4.4.3 DTM Generation And Editing

- a) DTM generated should exactly fit with the bare ground surface as per quality requirements specified in Clause 5.5.2 Of Section 5 (Specifications). Mass points falling on trees, bushes, buildings etc. should be corrected/shifted to corresponding ground surface or deleted.
- b) Apart from the topographic features captured during feature extraction in Stereo mode stage (streams, drainage, embankments, raised field bunds, roads, railways, water-bodies etc.), break lines shall also be captured comprehensively wherever slope changes are visible in stereo model due to complicated terrains or man-made structures. Proper use of hard and soft break lines will be made in DTM editing. Sufficient number of mass points will be captured from the stereo model @ 2 m interval for plains and @ 10 m for

hills. Density can be adjusted so as to best characterize the actual terrain & achieve the desired quality requirements.

- c) DTM points shall be captured automatically, semi-automatically or manually, as per the condition of the terrain and landuse/landcover.
- e) Rigorous checking of height points in stereo models, to check their consistency and accuracy and editing as required.
- f) A TIN model will be created from mass points and break-lines.
- g) A seamless DEM with pixel size 0.5 m shall be prepared for entire block in .IMG and ASCII format.
- h) DEM in .IMG and ASCII shall also be prepared as per the extent of 1:10 K sheet.

5.4.6 Generation of Contours

- a) Contours will be automatically generated at 0.5m V.I. for plains and 2.5m V.I for hills - from the DTM/TIN – 1: 10K sheet-wise.
- b) Contours will be thoroughly checked & corrected with the help of DTM/TIN to ensure that they are falling on bare ground surface.
- c) Spot heights will also be collected at hill tops and important land marks.
- d) In certain cases, contours may have to be traced manually in stereo mode to achieve better accuracy.

5.4.7 Ortho-Photo Creation:

This component of work shall include

- a) Ortho rectification
- b) Ortho-mosaic: Seamless for entire block and also as per 1:10K sheet.

5.4.8 Attribute Information

Important attribute information like the names of the villages, major water bodies, important roads, important land-marks, landforms, descriptive remarks etc. should be integrated into the spatial database from the annotations of existing SoI maps.

5.4.9 Inundation Modelling

Inundation Modelling to map 100 year return period flood line and inundated areas shall be carried out by the Contractor with the help of DEM generated by the Contractor and predicted flood level of 100 years return period **of Primary and Secondary Ports**, provided by the Engineer all along the coast-line, **as available** (~~@ every 30 km~~ from historic port data). The flood level shall be interpolated between the ports using the principle of linear interpolation.

Appropriate software shall be used for Inundation Modelling, to generate flood level maps and scenarios between two adjacent ports.

Submit a report on flood mapping providing details of method, results and problems/ issues arising.

5.4.10 Shoreline Analysis

This component of work shall include:

- Aerial Triangulation (AT) of 2 (two) old vintages of aerial/satellite imagery on scale 1:25K/1:40K/1:50K that shall be supplied by the Engineer from the archives of SoI. The read-outs of sharp points from the models of the photogrammetric work to be carried out by the Contractor using high-resolution (9 cm GSD) digital aerial imagery, which can also be identified on the older photographs shall be used as controls for carrying out AT for old vintages of photographs/Satellite Imagery.
- Automatic DTM and ortho-imagery shall be generated from the old photographs of two different old vintages

- Two different time series of coastlines shall be extracted in 2D mode from the ortho-imageries mentioned above. Extraction by Stereo mode may be resorted to wherever necessary.
- Scanned topographic map of coastal area for 1967 (or years close to 1967) may also be provided for reference.
- Digital shoreline Analysis of the three time series coastline data (2 old and 1 current) shall be carried out using appropriate software, to study the trends of shore-line change and arithmetically project the shoreline for next 100 years (erosion line). Special care has to be taken to analyse the coastal erosion at river mouths or wherever hard defences are present along the coast.
- **Only the overlapping Aerial Photographs/stereo models/Strips or Topo sheets or Satellite imagery containing the coastline all along the mainland coast(including Rameshwaram and Sagar Island but excluding other Islands/Sundarbans), provided by the Engineer shall be processed for Digital Shoreline Analysis. No other Aerial photographs, which do not contain the coast line and which fall in the remaining areas of the project need to be processed for Digital Shoreline Analysis.**
- Submit a report describing all anomalies noted. Special care should be taken to study major shifts of shoreline at river mouths or the presence of hard defenses. Digital database showing erosion and accretion rates shall be provided.

5.4.10 Preparation of output data as per Layout

Output data depicting contours with 0.5m VI (2.5 m for hills) , Flood level with 100 years return period, predicted shoreline of 100 years, composite hazard line (the most landward of the 100 years flood line & erosion line) ,important annotations, vectors on base of ortho-photo data shall be prepared by the Contractor.

Layout of such composite output on 1:10K scale should also be prepared and submitted for Engineer's approval.

The existing symbol and font library of SoI in Microstation/Geomeia/ArcGIS platforms shall be made available to the Contractor by the Engineer. Migration to the platform used by the Contractor and additions or modifications specifically required for the work shall be done by the Contractor and got approved by the Engineer.

Digital map as per the approved content and layout on 1:10,000 scale **on WGS 84 datum and UTM Projection** shall be prepared by the Contractor.

Hard copy output depicting the hazard line shall also be prepared as per delivery instructions contained in Clause 5.6 of Section 5.

5.5 SPECIFICATIONS AND QUALITY REQUIREMENTS

5.5.1 Ground control

5.5.1.1 Density & Distribution

- Every fourth model should have a post-pointed height control point (BM).
- Plan & Height control points should be provided along the perimeter of the block at every fifth model.
- A pair of plan & height points should be provided at the corners of the block or at the bends in the periphery.
- If it is not possible to provide GCP at the planned location in any model, it may be provided in the immediate next / previous model.
- Forty to Fifty additional plan & height control should be provided at well-identified locations inside the block.

5.5.1.2 Accuracy

- The planimetric accuracy of control points is to be within ± 5 cm

- The height accuracy of control points **in plain areas** should be within ± 10 cm. The permissible error in heights between two Bench Marks in ST leveling is $24\sqrt{k}$ mm where 'k' is the distance between the two Bench Marks in kilometers. If the length of level lines between two start/end bench marks is more than 16 km then DT leveling has to be carried out by the Contractor. Heights of post-pointed controls obtained by leveling lines, which do not meet the permissible accuracy, should be rejected and provided afresh.
- The height accuracy of control points provided in hilly areas using Total Station/GPS leveling should be within ± 50 cm.

5.5.1.3 Quality Requirements:

5.5.1.3.1 GPS Observations

- Ground control points should be well-identifiable on photograph as well as ground.
- Sharp intersections/ corners of features should be selected for planimetric control. (e.g. sharp corner of road/track/field bund junctions should be selected instead of centre of road intersection.)
- Well identifiable points on flat surface and preferably at ground level should be selected as Vertical Control. (Features above ground level where small errors in GCP measurements can lead to substantial errors in height, such as parapet walls, boundary walls, bund junctions, distance stones etc should not be used as height points.)
- The points which are to act as PH (planimetry as well as height) control should be so selected that they are suitable for planimetry as well as height. If unavoidable, separate Plan and Height control may be provided at nearby locations.
- GDOPs should not exceed five in any case. Normally this condition is achieved when 5(five) or more satellites above 20° (in some cases above 15°) of altitude are available. GPS observation schedule should be prepared by proper Mission Planning accordingly.
- Clear visibility of sky above 20° (in some cases above 15°) of altitude all around the site.
- No planimetric point should be selected near high tension power lines.
- Multi-path to be avoided. Multipath is the effect of unwanted reflected satellite signals that are received by the antenna. This problem is most severe when the antenna is placed near a chain link fence or another metal structure or a nearby parked vehicle.
- Table given below is suggested as a general guide to plan the session length when four to six good satellites are available and the ionospheric conditions are normal.

Table 5.1

Baseline [km]	Session [min]
1	20-35
5	25-45
10	35-60
20	55-90

- Minimum monumentation in the form of iron-pin driven into the ground iron-nail driven into the pavement should be provided wherever possible, to enable subsequent check, if necessary. The main consideration is the mark should be found easily, at least for the duration of the survey.
- GPS observations by radial/offset methods shall not be allowed (except in exceptional cases it may be permitted by the Engineer). Observations shall be made by approved network Plan. Use of well-conditioned figures in the network plan is essential. The network should contain figures of braced quadrilaterals or simple triangles. If more than 4 GPS receivers are used for observations in nearby locations simultaneously, it is important to use only the vectors as per the approved network plan during computation.

5.5.1.3.2 Guidelines for provision of heights by Spirit leveling :-

- MSL height and descriptions and approximate co-ordinates of Bench Marks @ 1 km to 3 km along two parallel Double Tertiary Leveling Lines in the 7 (seven) km belt along the coastline **will be provided by the Engineer to the contractor, except in Water bodies, Marshy, hilly and other inaccessible areas**. The Vertical Controls shall be provided by running Single Tertiary (ST) Leveling (**Total Station / GPS leveling in Hilly/difficult areas**) connecting these locations with BMs supplied by the Engineer. The heights of the existing Bench Marks will not be given to the field workers of the Contractor. They will reduce heights from zero datum. The actual heights will be calculated inside the secured premises of Survey of India under the supervision of the Engineer or his representative.

- If a leveling line/**Total Station Survey** fails, it is the responsibility of the contractor / sub-contractor to repeat it.
- Precautions to be followed in Leveling :-
The following precautions have to be taken by the observer, in order to minimize errors in leveling in Auto/digital levels as applicable:
 - i. The collimation error of each level should be checked daily in the morning before commencement of leveling work of the day. The instrument is to be kept midway between staves in order to minimize collimation errors and errors due to earth's curvature.
 - ii. Leveling should be done either with Digital level or Auto level of reputed brands. In sloping ground keep staff distances shorter, and avoid wire reading below 15 cm mark in order to avoid atmospheric refraction.
 - iii. Avoid observations when there are rapid changes of refraction due to high variation in temperature.
 - iv. All 3 wires must be read. The mean of the three readings should agree with the middle wire reading within 0.001m.
 - v. Even number of stations to be made between two Bench Marks.
 - vi. One particular foot screw of the instrument will be kept on one particular leg of the stand and this leg will face one particular staff throughout the line.
 - vii. Maximum shot (The distance from instrument to either of the staff) should not be more than 60 m.
 - viii. If any reading is wrongly entered or an observation is rejected it should be cut neatly and the observer has to put his initial near the cutting. Overwriting is to be avoided as far as possible.

5.5.1.4 Numbering Scheme

- Every control point should have a unique station ID number closely related to the photo-numbering scheme. The scheme of ID numbering should be got approved from the Engineer.

5.5.1.5 Post Pointing

Each Block control point should be post-pointed on an image and labeled with unique point identifier – as per approved AT Plan and nomenclature scheme. Post-pointing shall necessarily be done in the field at the time of survey, preferably on the digital images (or full resolution hardcopy extracts from them). A description of post-pointed control point (macro-level for approach and micro-level for post-pointing) shall also be recorded. A detailed sketch of the post-pointed point shall be drawn on 1-Phot form, a sample of which shall be collected by the Contractor from the Engineer.

Each field squad engaged in planimetric or vertical block control, shall be equipped with a lap-top by the Contractor, to store the digital images to be used for post-pointing. These lap-tops housing the digital images (or their full resolution hard copy extracts) shall be placed in the safe custody of Engineer's representative and returned to the Contractor after low-level formatting, only after the completion of Field work. One representative of Engineer shall be attached with each of Contractor's squad, mainly for this purpose. The Engineer's representative shall also quality check the post-pointing and field work by the Contractor, but the final responsibility for correctness of work shall rest with the Contractor.

The Contractor shall ensure co-ordination with Engineer's representative for the submission of post-pointed digital images with submission of corresponding GPS/leveling/**Total Station** data by him. The Contractor shall also co-ordinate with the Engineer's representative, for collection of fresh digital images as per his approved plan.

The Ground Control Points (GCPs and check points) must be well documented and suitably archived by the Contractor, in order to provide traceability. In essence, this documentation is a vital QCR to be created by the Contractor – that shall be used for Quality Audit by the Engineer during Block Adjustment component of Photogrammetric work.

A list should be maintained showing:

Point identifier (unique to project)

- Lat, Long, Ellipsoidal Height (WGS 84 geodetic system) and MSL height

- X, Y, Ellipsoidal Height (UTM/WGS 84 projected co-ordinate system)and MSL height
- Planimetric quality of the point in meters (RMSE_x, RMSE_y)
- Vertical quality of the point in meters (RMSE_z)
- Description of Control Points
- 1-Phot sketch

The entire dataset should be archived with a image extracts (hardcopy and softcopy) clearly marked with precise GCP locations and identifiers. The Contractor shall also archive these data is in a GIS environment linked to the final ortho-image dataset.

5.5.1.6 Records to be maintained for Provision of GCP

(A)Observation Schedule (Plan)

The Contractor shall prepare GPS Observation Schedule by proper Mission Planning in which the session-wise occupation schedule of each field squad shall be detailed. This should be meticulously planned 15 days in advance and should be rigorously followed. However, deviation from plan due to unavoidable reasons should be immediately notified to all the field squads. Upto-date planned GPS Observation schedule should be readily available with the leaders of all the field squads and should be produced by them to the Engineer or his representatives – on demand.

A sample of Planned Observation Schedule is given below:

Table 5.2

Receiver	Date (day)	Session					
		a	b	c	d	e	f
A	1-Feb-12 (32)	P2	P4	P4	P6	P7	P1
B	1-Feb-12 (32)	P5	P5	P1	P3	P8	P2
C	1-Feb-12 (32)	P8	P6	P7	P9	P9	P3
A	2-Feb-12 (33)	P10	P10	P11	P11	P12	P12
B	2-Feb-12 (33)	P13	P13	P14	P14	P15	P16
C	2-Feb-12 (33)	P17	P17	P17	P18	P19	P19

(B) Site Occupation Sheet (GPS Observation):

The specific time period chosen for an observation is called a session. The first observation of the day would be designated session “a”, the second “b”, and so on. Normally, the session designator begins with “a” again each day, and days are expressed as the consecutive calendar day (1 to 365 or, in leap years, 366). For example, session 105c means the third session of day 105.

At the completion of a session, a site occupation sheet shall be prepared. This sheet should contain at least the following information:

- project and station name,
- date and session number,
- start and stop times,
- station identifier used for file name,
- name of observer,
- receiver and antenna serial number,
- height of antenna from the station mark and eccentricities in position,

- relative height of the station mark (if not at ground level) from the ground level,
- meteorological data,
- problems experienced.

(C) Abstract of Actual Observation Schedule

An abstract of observation schedule, antenna height should be maintained and submitted by the Team Leader of GPS Field Observation teams during submission of GPS Observation data to prevent errors in file-naming and antenna heights during the data transfer stage. A sample of such abstract is given below:

Table 5.3

Abstract of Actual Observation Schedule

Session	Receiver						Time (UT)	
	A		B		C		Start	Stop
	Site	Height	Site	Height	Site	Height		
a								
b								
C								
d								
e								

(D) The field observation book in which the leveling/**Total Station** observations are systematically recorded and the rise-fall computation run down.

5.5.1.7 Data Transfer

- The First Step in Processing is to Transfer the data from the receiver to a computer hard disk. Observation files for a given session contain the phase & other observables. In addition, the broadcast ephemerides & site data consisting of station identifier, antenna height, and possibly navigation position may be contained in other files.
- The main task in transferring files is to make sure the files are named correctly and that the antenna height is correct.
- The abstract form submitted by the Team Leader of GPS Field Observation team should be carefully scrutinized for consistency with other records submitted by them and invariably made use of.
- As soon as all files have been corrected for antenna heights and file names, the observed data should be backed up on at least two sets of storage medium. A good practice is to keep one set of original data at a different secure location.
- To avoid complexities due to large time-lag between observation & processing and in order to receive timely feed-back regarding quality from the Computation and Digital Photogrammetry Team, the observed data shall be submitted at short-regular intervals (say every week).

5.5.1.8 Data Processing

In the case of GPS surveys, the observed data should be downloaded daily and field-computation carried out as a part of Quality Assurance. This should include preliminary computations of baseline vectors in the field before leaving the survey area.

5.5.1.9 Processing of static surveys

5.5.1.9.1 Baseline Computation

The vector-by-vector or single-baseline solution type is presently the most common and in any case should be used prior to processing multiple vectors together. In some instances one of the points in an observation session might be corrupted

and if all vectors are processed together, the errors from the bad point are disturbed among the computed vectors and the error is masked.

The single vector software provides a better check on bad lines or points. The bad point can be more easily isolated by noting that the statistics (i.e., root mean square error, standard error) of lines leading to this one point are worse than the statistics for the other lines.

Single Baseline Vectors There are various quality numbers that differentiate a good vector from a bad vector.

- The first analysis involves inspecting the statistics of individual vectors. The key for determining which vectors are bad is to compare the statistics of a good line with those of bad line.
- The ratio between the chosen fixed bias solution and the next best solution - is the single most important number in the solution output. This number is a strong indicator of both good and bad lines, and should be greater than three. If the RMS of a line jumped from 0.007 to 0.052, a seven fold increase, as opposed to the normal slight increase of the three types of solutions, it indicates that the observations do not fit the solution model
- The other most important number is the root mean square (RMS) error of fit. The standard error of each the vector component should not be more than 5 mm.
- Additionally, the vectors can be summed for the lines in the session, and if the sum around the perimeter is not small value (e.g., 1ppm), this indicates that one of the points in the session is bad.

5.5.1.9.2 Networks

- For networks the best single tool for finding problem lines is to use loop closure software that sums the vector components around a loop to determine mis-closures. These mis-closures should not be more than 2cm in case of each loop. The bad lines within the loop should be identified and corrected or re-measured.
- The second quality control procedure in a network is to compute a minimally constrained least squares adjustment using one of numerous adjustment programs available today. This adjustment should normally be performed only after bad lines have been eliminated using loop closure programs. A single loop would provide the minimum required information needed for network analysis and this value should not be more than 2 cm.
- Another method for checking the quality of the GPS network is to inspect the residuals which result from adjustment. This comprises the actual amounts that vector components have been corrected to achieve (exact) closure of the network. These residuals should not be more than 2 Cm.

5.5.1.9.3 Network Adjustment:

After having successfully isolated and eliminated bad lines, the coordinates of points in the network can be computed. The first such computation is the final minimally constrained adjustment using all good vectors.

The tie of GPS surveys to existing triangulation monuments enables the transformation of GPS results into the national datum. In most cases, the fixed control agrees quite well and the final adjustment is then performed. The constrained (fixed) adjustment results when two or more horizontal control points are held fixed.

Horizontal datum

Proper datum/ellipsoidal parameters should be used when performing the least squares adjustment. The datum to be adopted for ICZM Project is WGS84.

5.5.1.9.4 Survey report (GPS):

A final report serves as an “audit trail” for the survey. The project report to be submitted by the Contractor should address following topics:

1. Location of the survey and a description of the project area. A general map showing the locality is recommended.

2. A description of the monumentation used: It should be specifically noted if underground as well as surface marks are used . A section of the report should explain which existing monuments were searched for and which ones were found. A list of all control searched for, control found, and control used shall be provided.
3. A description of the instrumentation used: Should include both the GPS equipment and conventional equipment along with serial numbers. An explanation of how the tribraches or bipods were tested for plumb should be given.
4. The computation scheme for the project should be described including which version of the processing software was used and which least square adjustment was applied.
5. A detailed occupational schedule (Table 5.3 of Section 5) and vector statistics (as per Clause **5.5.1.9** of Section 5) for each line should be enclosed along with the report.
6. The satellites tracked during each session should be included as part of the report.
7. All problems encountered should be discussed and equipment failures listed. Unusual solar activity should be mentioned as well as multipath problems and other factors affecting the survey.
8. Thus the following lists should be included in the report with proper work responsibility and dates incorporated suitably:
 - Project sketch showing all points and controls (with unique id) vectors, adjustment network with a title box , scale, and projection tic marks in hard copy and soft copy (shape files)
 - Project statistics
 - Instruments and softwares used.
 - Planned Occupation Schedule (Table 5.2)
 - Occupation schedule (Table 5.3)
 - Vector statistics (Clause 5.5.1.9 of section 5) including
 - List of loop closures,
 - Free least square adjustment
 - Constrained adjustment showing rotation angles and statistics,
 - List of adjusted co-ordinates (x, y, ellipsoidal height in WGS84 geodetic co-ordinate system and UTM – WGS84 projected co-ordinate system.
 - Copies of “original” site occupation logs (as per Clause 5.5.1.6 B of Section 5)
 - Equipment malfunction logs,
 - A clip showing post pointed vertical control with unique number for each point in hard copy / and soft copy (properly indexed, and organized in GIS)
9. Finally, a copy of the original observations and translated RINEX data should be supplied as a part of deliverables. Copies of the adjustment input file and adjusted output file also should be supplied.

5.5.1.9.5 Survey report (Leveling/Total Station):

Upon completion of all the leveling **and Total Station** lines for a block, the Contractor shall submit the following records to the engineer as described below(for Auto / digital level as applicable):

- The Framework data supplied by the Engineer and used for provision of vertical control.
- A sketch showing the framework controls used, the alignment of **Levelling (Total Station Survey in Hilly areas)** lines and the photogrammetric vertical controls provided by the contractor in hard copy and soft copy (Shape files)
- An abstract of the **Levelling (Total Station Survey in Hilly areas)** lines and their accuracies.
- A list of adjusted vertical control points with MSL heights and description.
- A clip showing post pointed vertical control with unique number for each point in hard copy / and soft copy (properly indexed, and organized in GIS)

- Field notebooks - carefully and neatly prepared, and properly indexed, line-wise.
- Soft copy and Hard copy of observation data.
- Work Responsibility should be suitably incorporated in all the documents maintained with date.
- Each field notebook must be numbered and marked with a brief description of the contents on the cover, carefully indexed, and each page numbered.
- Each vertical control line must be identified by a unique number and brief description in the field book.
- Each field notebook must be free of erasures; any line of horizontal and vertical control may be rejected by the Engineer if any erasure is made in recording the data for that line.

The Contractor shall furnish a schematic control diagram of the survey records on a photo index for all basic horizontal and vertical control pertinent to the project. The schematic diagram must show all existing and established control points properly identified in their approximate location. The schematic diagram also must show all traverse lines with their designations to include the beginning and end points.

5.5.2 Aerial Triangulation / Block Adjustment

5.5.2.1 Salient features of Aerial Triangulation / Block Adjustment

- Permissible errors at Control Points : RMSE 10 cm
- Maximum error at Control Point : 30 cm
- Permissible errors at Check Points : RMSE 12 cm with 95% confidence(for check points of same accuracy as Control Points)
- Maximum errors at Check Points : 36 cm (for check points of same accuracy as Control Points)
- Standard deviation of AT Block adjustment in relative mode = 0.5 * input pixel size
- Maximum residuals in image space = 1.5 * input pixel size
- Projection : UTM
- Datum : WGS 84
- Height : Above MSL
- It is important to have a detailed correct definition of the sensor to avoid bad triangulation results. Some of the important parameters are focal length, pixel reference, sensor size, pixel size, orientation of the image co-ordinate system during IO.
- All parameters from the calibration report that define the digital camera geometry have to be determined and entered in the process of AT to remove any possible deformations such as CCD sensor deviations from flatness.
- All single observation points shall be removed and not be present in the final set of photogrammetric measurements. The 2-ray tie points shall be absolute minimum, generally at corners of blocks. 3-ray points shall also be kept to a minimum, generally in the perimeter images which do not fall in lateral overlaps. Most of the tie points should be 4, 5 or 6 ray points. The total no. of #-ray points (measured in 2,3,4,...# photos) shall be delivered in tabular format in the AT report with the following header definitions:
#-ray - points measured in 2,3,4,...# photos
Number of points – number of points for each #-ray group
Percentage – Percentage of points for each #-ray group

Table 5.4

#-ray	Number of points	Percentage
Total		

Average rays/point		
Average points / photo		

- There should be sufficient density and proper distribution of tie-points in von Guber Areas, which is pre-requisite for stability of block.
- Tie points on tree-tops, shadow points, middle of lakes, moving objects etc. should be deleted.
- Position and altitude information of exposure stations provided by the Engineer should be used as initial approximate values for exterior orientation parameters. This would increase the quality of tie point matching and improve the overall stability and reliability of the Block.
- Appropriate weighting system shall be used for photogrammetric measurements, GCPs, GNSS/GPS and IMU data in order to meet specified tolerances of AT solution. If the assumed values of apriori standard deviations cannot be confirmed by block adjustment, they should be modified according to preliminary result and adjustment repeated.
- All successive blocks shall have an overlap of two models in strip direction.
- The Aerial Triangulation in the inter-tidal zone, where controls are insufficient at the edge towards the low-water line, is to be carried out by Integrated Sensor Orientation, which includes refinement of A GNSS/GPS/IMU data with Photo measurements only. The strips of aerial imageries in these regions will also be cantilevered by adjacent strips, which will be block adjusted with A GNSS/GPS/IMU data, adequate GCPs and photo-measurements.
- One free net adjustment, without GCPs or A GNSS/GPS/IMU shall be carried out and submitted with AT report to check the accuracy of image measurements and delivered in tabular format

Table 5.5

	X microns	Y microns
RMS value		
Max value		

The residuals of all measured points shall also be delivered along with AT report.

- During the AT process following corrections should be applied: lens distortion, earth curvature, refraction, self calibration, GNSS/GPS shift and drift, IMU shift and drift

5.5.2.2 Features of AT software: Software should be able to handle at least five thousand photographs in a single block.

5.5.2.3 DTM Generation and Editing

- DTM grid spacing : 5 metre (10 m in hills)
- DTM height accuracy : 25 cm with 90% confidence interval.
- Projection : UTM
- Datum : WGS 84
- Height : Above MSL
- No holes in DTM. Water bodies like lakes and oceans will also be interpolated across their surface at even 2m interval.
- Elevations will be stored in signed 16-bit integer binary format. Negative values are valid.
- Invalid values (say beyond boundary) shall be indicated by -9999 metres.
- Hypsographic break lines, hydrographic break lines, transportation break lines, round break lines and sharp break lines shall be comprehensively captured.
- DTM should be rigorously corrected for vegetation, built-up areas etc. so as to fit the bare earth.

5.5.2.4 Generation of Contours :

- 0.5 metre Vertical Interval (2.5 m in hills)
- Every fifth contour shall be index contour i.e. multiple of 2.5 metre (multiple of 12.5 m in hills).
- The contours should be thoroughly checked at crossing of streams, roads, forested and built-up areas.

5.5.2.5 Ortho-Photo Creation

- Ortho Imagery of Pan- sharpened, R, G, B, NIR bands - 9 cm GSD provided by the Engineer.
- 0.10 m spatial resolution (GSD)
- Projection : UTM
- Datum : WGS 84
- A Gaussian-like histogram with grey levels spreading at least 85% of (0, 255)

- A minimum of 100-pixel over edge
- Seam lines should not run along linear features and should be edited in a manner so as not to introduce visible flaws at the viewing scale of 1:2,000
- No visible geometric flaws at viewing scale of 1:2,000
- No visible colour unbalancing at viewing scale of 1:2,000
- Primary land covers of interest appear in their natural colours
- The imagery closest to the nadir view should be used for ortho mosaic to minimize the effects of relief displacement
- 2.5m positional accuracy at the 95% confidence level
- No visible graphic imperfections at viewing scale of 1:2,000
- Ortho-image format : GeoTIFF with the specified geo-keys and tags included
- File naming : International Numbering System for 1:10,000
- Metadata embedded in the GeoTIFF header : pixel size, datum, projection , projection parameters, linear unit, coordinates of scene center and four corners
- Metadata embedded in the ASCII file : as per NSDI standards
- Completeness of auxiliary files: ASCII metadata file, mosaic seam line shape file, and positional accuracy report

5.5.2. Feature Extraction

- List of features and their modes of digitization are given in Clause 5.5.3 to give an idea of the work involved.
- Projection : UTM
- Datum : WGS 84
- Height : Above MSL
- Precision : meter with 3 decimal places
- Sheet numbering & layout : 1:10 K international sheet numbering
- Scale of ortho plot : 1:10,000
- **Ortho Photo Tiles : 5 km X 5 km UTM Projection Tiles appropriately numbered for each zone.**
- Sheet size : 3' x 3'
- Graticule Lines : 1' x 1' spacing
- Grid lines : 500m x 500m (on UTM Grid)
- Annotation : In English
- Units of precision : mm (meter with 3 decimal places)
- Weed tolerance : 25 cm
- Sliver Tolerance : Nil
- Symbology : As per Survey of India standard
- Undershoots / Overshoots : Nil

5.5.3 List for Feature Extraction in Stereo mode

** All features will be captured during Photogrammetry in Stereo mode which are extractable from 9cm gsd photographs and will be depicted on 1:10,000 scale map /sheet. Implementation Level Data Model Structure will be provided by the Engineer. Major features are as below :

- BUILDINGS**
 - Various types of Buildings/Building Blocks (Foot prints) - Stereo Mode
- HYDROGRAHPY**
 - Streams (Perennial & Non-perennial)
 - River (Centre line)
 - River (Banks)
 - Other River features
 - Canals (Centre line)
 - Canals (Banks)
 - Ponds / Tanks & Lakes
 - Protective Embankments
 - Other Irrigation structures

- Other Water features including wells, drains, waterfalls etc.
- COASTAL FEATURES**
 - Multiple Coast lines of different time series
 - Erosion line
 - Flood Line
 - Final Hazard line
 - Hard defenses along coast
 - Cliff along coast
 - Broken ground along coast
 - Mangroves, swamp etc.
 - Various types of tidal rivers
 - Flat sand along coast
 - Land water line
 - Submerged sand limit
 - Other coastal landforms
- ROADS**
 - Various types of major Roads
 - Other Roads
 - Tracks / Paths
 - Bridges and culverts
 - Toll Gates
 - Structures
- RAILWAYS**
 - Various types of Railway Lines
 - Bridges on Railway lines
 - Level crossings
 - Railway tunnels
 - Embankments along Railway line
 - Structures
- AIRWAYS**
 - Limit
 - Structures
- LAND USE /LAND COVER**
 - Cultivation
 - Various types of trees
 - Various types of forest
 - Forest fire line
 - Grassland
 - Scrub
 - Orchard / Plantation / Vegetable garden
 - Betel or vine on trellis
 - Tea or coffee garden
 - Stony Waste / Rocky ground
 - Quarry / Brick line kiln
 - Oil well / Oil tank
 - Grave / Burial ground
 - Salt panes
 - Barren / Fallow land
 - Park
 - Stadium
 - Marsh / Swamp
 - Sand features
 - Topographical Land Forms (Desert, Coastal, Mountain features)
- TRANSMISSION LINES**
 - Power Grid Stations / Sub Stations

- Pylons
- Various types of power lines
- Towers (Microwave, Mobile, TV)
- Pipe lines (Water, Oil)
- Other utilities

HYPISOGRAPHY

- Contours
- Break Lines
- Ground Control Points
- Bench Marks
- Spot Heights
- Other hypsographic features such as cliff, broken ground, depression, boulders etc..

Note :

i) The administrative boundaries i.e. State , District & other boundaries and Annotations etc are to be transferred from existing maps / data supplied by the Engineer .

ii) The above list is only indicative. Implementation level Data Model Structure will be supplied by the Engineer to the contractor after award of work.

5.6 DELIVERABLES

- a) SOPs for all the components of work, specific to the instruments and softwares to be used by the contractor should be submitted by the contractor for approval by the Engineer before the commencement of each task
 - Provision of horizontal control
 - Provision of vertical control
 - Aerial Triangulation
 - DTM and TIN generation and editing
 - Ortho photo generation, Ortho mosaic
 - Feature extraction in stereo mode
 - Inundation modelling
 - Digital Shoreline analysis
- b) Survey reports for Horizontal and Vertical controls.
- c) All QCRs pertaining to Photogrammetry work in Clause 5.5.2 and Table 5.4 of Section 5
- d) Following data pertaining to each AT Block:
 - Adjusted Block file (in native format as well as PAT B compatible format)
 - Vector DTM in 3D Shape File/ Geodatabase (Mass points and break lines) , TIN, DEM in geotiff format – seamless. If the file size is too large to create/manage, it may be broken up in two or more tiles with the permission of the Engineer;
 - Ortho imagery (**5 km X 5 km UTM Projection** tile wise, in GeoTiff format and seamless in .ecw format)
 - Vector data (3D Shape File/ Geodatabase) as per Data Model Structure - seamless.
 - Final composite digital output (3D Shape File/ Geodatabase) containing contours at 0.5 m (2.5 m for hills) V I, annotations, vector data including Composite Hazard line, Erosion line, Flood line and Ortho images as per approved layout and content in mxd format.
- e) Following data pertaining to each state:
 - ❖ Statewise Final composite digital output (3D Shape File/ Geodatabase) containing contours at 0.5 m (2.5 m for hills) V I, annotations, vector data including Composite Hazard line, Erosion line, Flood line and Ortho images as per approved layout and content in mxd format. If the file size is too large to create/manage the file it may be broken in two or more tiles with the prior permission of the Engineer.

- ❖ Statewise Final report on Erosion line mapping describing all anomalies (e.g. major shifts of shoreline at river mouths or presence of hard defences) and provide digital database showing erosion and accretion rates.
- ❖ Statewise 1:50,000 hard copy map sheets (color – 3 copies in A3), depicting composite hazard line and major features as per approved layout and content. Soft copies of these map sheets will also be provided in PDF format.

5.7 Delivery Instructions:

- All products mentioned in para 5.6 above (“DELIVERABLES”) shall be delivered incrementally as per the approved plan and time schedule.
- All soft copies (Block Files, Vector Data, Image Data, Digital data etc.) mentioned in para 5.6 above (“DELIVERABLES”) should be delivered in reliable USB port external hard disk media in three copies.
- All hard copies mentioned in para 5.6 above (“DELIVERABLES”) should be submitted in three copies.

5.8 QA/QC Mechanism

5.8.1 Quality Assurance - Principles

5.8.1.1 Quality assurance (QA) in this document will refer to a set of approaches which is to be consciously applied and, when taken together, will tend to lead to a satisfactory outcome for a particular process. Quality controls (QC) and Quality Audits shall be important checks within a QA system.

5.8.1.2 Quality Control

A quality control (or check) is a clearly specified task that scrutinizes all, or a sample, of the items issuing during, or at the end of, the geometric correction process in order to ensure that the final product is of satisfactory quality. The scrutiny involves review, inspection or quantitative measurement, against well defined pass/fail criteria which are set out in these guidelines.

5.8.1.3 Quality Audits

A quality audit is a qualitative quality control that covers an area of activity as a whole. Representative of the Engineer shall be nominated as independent quality auditor to inspect the work in progress at the contractor’s site. Quality audits will be carried out by comparison of actual practice with the applicable quality assurance guidelines.

Two degrees of Quality Audits

- Normal
- Tightened

“Normal” audit checks which are carried out ‘Once’ will be repeated again if a corrective measure is requested. “Tightened” audit checks will follow an audit trail for suspect products or regions and will be introduced if

- earlier audits result in doubts about performance
- results from QC do not meet the specifications given in previous sections
- results from external QC do not meet the tolerances in the ITT.

5.8.1.4 Quality Control Records (QCR)

The information used in a Quality Audit will mainly be provided by quality control records (QCRs) which are generated during the work, by the people doing the work. QCRs take a variety of formats, such as paper forms completed manually, printouts or computer files recording the result of a particular procedure, or just simply hand-written records in log books.

The key features of any QCR are that it

- is marked with a date
- uniquely identifies the item, operation or product to which it relates
- identifies the operator who generated the QCR
- may be countersigned by a supervisor or other independent inspector (only for the most important records)
- is stored in a well defined and predictable location so that it can be found easily by others.

5.8.2 QA Plan for Digital Photogrammetry – Work done by out-sourcing

- i) Specifications, tolerances, QA/QC mechanism spelt out in the bid document shall be complied with. Any deviation is to be reported to the Engineer immediately.
- ii) The SOPs and workflow, specific to the instrument and software used by the Contractor, shall be prepared and submitted to Project Director.
- iii) Stage approval from the Engineer is required at following stages
 - a. Completion of AT for each block to start the process of DEM extraction
 - b. Completion of DEM to start the process of ortho-photo generation
- iv) While the Quality Audit will be carried out by the Engineer or his representative, full responsibility for carrying out Quality Control shall rest with the Contractor.
- v) The minimum QCRs that will be generated during execution of work is listed at Table 5.1 below
- vi) The deliverables submitted by the Contractor shall be subjected to Final Check for Acceptance. The exact sample size and the method of sampling will be decided by the Project Director. The methodology, that shall be adopted for Final Check, is elaborated at 5.8.3.

TABLE 5.6

	QCR	Format of QCR	Contractor Production Level	Engineer's Inspection level	Normal Engineer's Audit Stage
1	CV/Training certificate for DPWS operators	Paper	-	Normal (100%)	During Tender Evaluation Stage / Start of AT
2	QA/QC of photographs supplied by Engineer	Report in hardcopy/softcopy	100%	0%	On supply of digital image to the Contractor in a phased manner
5	Numbering scheme of photographs and Control Points	Proposal in hardcopy and softcopy	100%	100%	Before commencement of AT Planning
3	Plan for provision of GCPs for Block Control	GIS and hardcopy	100%	100%	Before commencement of GCP provision for each block
4	Status of Vertical Control	GIS form	100%	100%	Every week
5	Status of Horizontal Control	GIS form	100%	100%	Every Week
5	GPS Survey Report, including computation	Hardcopy and soft-copy	100%	100%	End of GPS computation for a block
6	Leveling Report	Hardcopy and soft-copy	100%	100%	End of Leveling computation for a block
7	Ground Control Points (GCPs)in tabular and GIS form	Tabular and GIS form integrated with ortho-photo	100%	Normal (100%)	End of AT
8	Free net adjustment	ASCII	100%	Normal (100%)	End of AT

9	Check for stability of block (distribution and density of tie points in von Guber areas)	Graphical display in software	100%	Normal (first few) Tightened (trail)	End of AT
10	Interior and exterior orientation results including # - Ray table	Paper or ASCII Files	100%	Normal (first few)	End of AT
11	RMSE of Control Points used for Block Adjustment	Paper or digital, software reports	100%	Normal (Once) Tightened	End of AT
12	RMSE of check points provided by the Engineer	Paper or digital, software	100%	Normal (100% of blocks)	End of AT
13	GCPs rejected during Block Adjustment, with reasons recorded thereof	Paper or digital software reports	100%	Normal (Once) Tightened (Trail)	End of AT
14	Number of items rejected/reprocessed at each stage of internal QC	Progress report	Complete list	Normal (monthly)	N/A
15	Visualisation of the DEMs: Preferably digital stereo image with DEM data overlain	Paper or digital	100%	Normal (Once) Tightened (trail)	End of DEM
16	Comparison of DEMs with vertical checkpoints and AT vertical points)	Software report	100%	Normal (Once) Tightened (Trail)	End of DEM
17	Ortho-image metadata	Database	100%	Normal (10%) Tightened	Start of Orthomosaic production
18	Ortho-images (inspection result)	Paper or metadata	100%	Normal (10%)	Orthoimage production
19	Feature extraction in Stereo mode	Softcopy	100%	Normal (10%)	End of feature extraction
20	Inundation Modelling and digitization of Flood Line and Inundated area	Graphical display in s/w	100%	Normal 10% Tightened 100%	Inundation modeling-model wise
21	Report of Inundation Modelling	In Report form with Soft copy and hard copy	100%	100%	After Inundation modelling of each block
22	AT of old vintage of Photographs	1) Selection of GCPs 2)AT Report	100%	100%	1) Before / during AT 2) After AT
23	Digitization of Shore line of various time series	Graphical display in s/w	100%	10% (Tightened at the Hard defenses and river mouths)	During Digitization

24	Digital Shoreline Analysis by use of soft ware	Software generated report	100%	10%	At the end of Shore line analysis of a block.
25	Composite Output	Inspection Report	100%	Normal (10%) Tightened (100%)	Output production
26	Training of SOI Officers	Feed back from trainees	---	100%	During and on completion of training
27	Final Acceptance Test	Inspection Report -Paper		5%. Resampling and re-delivery in case product fails the specifications	On delivery of product

5.8.3 Method for Final Quality Check for Acceptance

5.8.3.1 Introduction

The check is **intended to be carried out independently by the Engineer** (or a separate contractor, or in collaboration with the original contractor) using a sample of the final products provided by the contractor carrying out the work. It may, however, depend on products from the original contractor.

5.8.3.2 Final Quality check

Around 5-10% of output data delivered by the Contractor will be subjected to Final Quality Check. Product files will be selected on a systematic basis to ensure that QC covers all the block/site area. Deliverables will be selected possibly on a random basis but also potentially to provide closer inspection in areas where problems are anticipated (e.g. known quality problems with specific batches of original photos or significant terrain variation, high view angles, etc.). Engineer may also carry out sample examination of the deliverables on ground.

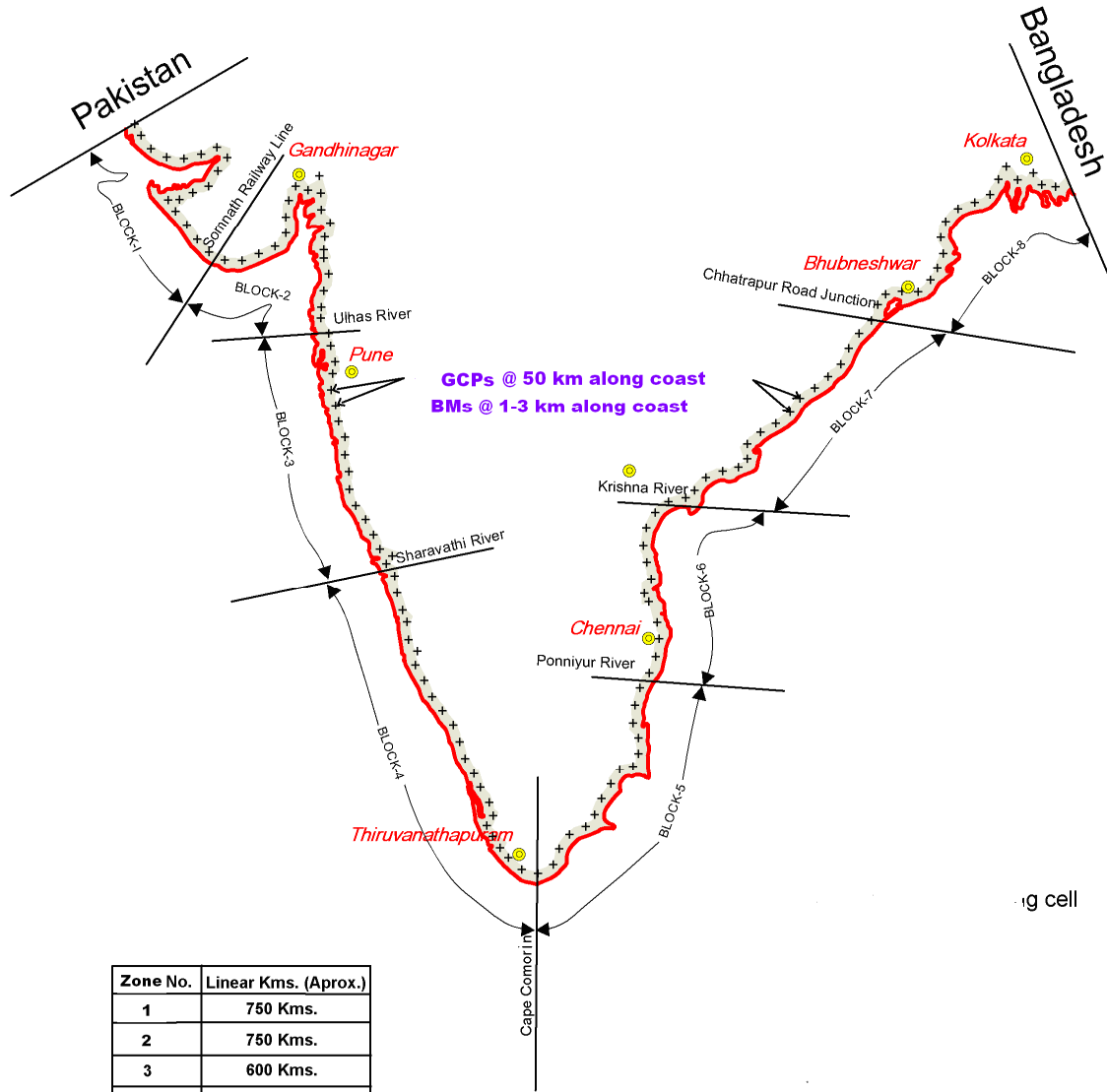
Should more than 5% of the blocks that are subjected to external QC fail to meet the specifications laid down in Tender Document, all products will be returned to the contractor for further QA. In effect, Engineer will pass responsibility to the contractor to provide adequate and clear internal Quality Audits to identify the extent and cause of the problems so established. The contractor will be expected to rectify these problems, and (where necessary to comply with the specification) make new products at his own cost.

Redelivery of products will be followed by a further independent check on a new sample of the products. This procedure will continue until the products become finally acceptable under the terms above. The acceptance report (Pass /Fail) shall be given by the Engineer within 12 weeks of each delivery/re-delivery of the data made by the contractor.

SECTION 6: DRAWINGS

ICZM PROJECT

Index to Zones (as per Table 1 of IFB)



Note: "GCPs @ 50 km" mentioned above may be read as "GCPs @ 10 to 50 km".

SECTION 7: BILL OF QUANTITIES

Bill of Quantities (Zone I)
7 km-mainland belt above HTL with GCP Control Provision and rigorous Photogrammetric Works
Sub-zone I-A (above HTL)

Sl. No.	Description of item (with brief specification and reference to Book of specification)	Area** (in sq.km.)	Unit	Unit Rate in Rs. (per sq.km.)		Amount in figures Rs.
				In figures	In words	
1	Site preparation for the entire Zone I	--	Lump sum			
2	Provision of Ground control points by GNSS/GPS (for Photogrammetric Block control)	8024 sq km	Sq. km.			
3	Height Control by ST (Single Tertiary) Leveling (for Photogrammetric Block control)	8024 sq km	Sq. km.			
4	Aerial Triangulation / Block Adjustment	8024 sq km	Sq. km.			
5	DTM and TIN generation & editing	8024 sq km	Sq. km.			
6	Generation of Contours at 0.5 m V.I. (2.5 m in hills)	8024 sq km	Sq. km.			
7	Ortho photo generation and ortho Mosaicing	8024sq km	Sq. km.			
8	Feature Extraction in Stereo mode	8024 sq km	Sq. km.			
9	Inundation Modeling and digitization of Flood Line and inundated area	8024 sq km	Sq. km			
10	Extraction of 'Shoreline' from two time-series of vintage photographs/Satellite Imagery	8024 sq km	Sq. km			
11	Digital Shore line analysis using three Time series of coast lines (1 current + 2 vintage)	1962 km of Arc Length of coast line @	Km			
12	Delivery of outputs (hard copy / soft copy) for the entire Zone 1	8024 sq km	Sq. km.			
13	Training of 20 SOI staff for 1 month in the software, systems and processes being used by the contractor.	-	Lump sum			
14	Misc. if any (Specify details)					
Total Bid Price of Sub-zone I-A (in figures) :						
Total Bid Price of Sub-zone I-A (in words) :						

Note:

- (1) Item for which no rate or price has been entered in will not be paid for by the Employer when executed and shall be deemed covered by the other rates and prices in the **Bill of Quantities** (refer: ITB Clause 13.2 and GCC Clause 43.3).
- (2) Unit rates and prices shall be quoted by the bidder in Indian rupee [ITB Clause 14.1].
- (3) Where there is a discrepancy between the rate in figures and words, the rates in words will govern. [ITB Clause 27.1(a)]
- (4) Where there is a discrepancy between the unit rate and the line item total resulting from multiplying the unit rate by quantity, the unit rate quoted shall govern [ITB Clause 27.1 (b)].
- (5) **: The "Area (in sq. km)" mentioned in column 3 above refers to Area of Land and other water bodies only but excluding Sea Area. Accordingly, while checking measurement of quantities using the orthoimages as mentioned in clause 10 of Special Conditions of contract under Section 3, areas covered by sea will be excluded from the area measurements made on the orthoimages. The areas and Arc lengths mentioned above are approximate.
- (6) @: Only the overlapping Aerial Photographs/stereo models/Strips or Topo sheets or Satellite imagery containing the coastline all along the mainland coast in the zone, provided by the Engineer will be processed for Digital Shoreline Analysis. No other Aerial photographs, which do not contain the coast line and which fall in the remaining areas of the project need to be processed for Digital Shoreline Analysis.

Bill of Quantities (Zone I)

**Inter Tidal Zone below HTL and Islands with GCP Control Provision and Photogrammetric Works
Sub-zone I-B(Inter Tidal Zone below HTL and Islands)**

Sl. No.	Description of item (with brief specification and reference to Book of specification)	Area** (in sq.km.)	Unit	Unit Rate in Rs. (per sq.km.)		Amount in figures Rs.
				In figures	In words	
1	Aerial Triangulation / Block Adjustment as per clause 5.4.3.4 of Section 5, using Integrated Sensor Orientation, relaxed standards /Cantilever method.	5416 sq. km	Sq. km.			
2	DTM and TIN generation & editing	5416 sq. km	Sq. km.			
3	Ortho photo generation and ortho Mosaicing	5416 sq. km	Sq. km.			
4	Limited, Skeletal Feature Extraction, of available features as per DMS , in Stereo mode.	5416 sq. km	Sq. km.			
5	Misc. if any (Specify details)					
Total Bid Price of Sub-zone I-B (in figures) :						
Total Bid Price of Sub-zone I-B (in words) :						
GRAND TOTAL of Zone I (Sub-zone I-A + Sub-zone I-B):						
(in figures) :						
(in words) :						

Note:

- (1) Item for which no rate or price has been entered in will not be paid for by the Employer when executed and shall be deemed covered by the other rates and prices in the **Bill of Quantities** (refer: ITB Clause 13.2 and GCC Clause 43.3).
- (2) Unit rates and prices shall be quoted by the bidder in Indian rupee [ITB Clause 14.1].
- (3) Where there is a discrepancy between the rate in figures and words, the rates in words will govern. [ITB Clause 27.1(a)]
- (4) Where there is a discrepancy between the unit rate and the line item total resulting from multiplying the unit rate by quantity, the unit rate quoted shall govern [ITB Clause 27.1 (b)].
- (5) The price quoted at Grand Total of **Zone I (Sub-zone I-A + Sub-zone I-B):** will be considered for the purpose of computing evaluated Bid Price for a Zone.
- (6) **: The “Area(in sq. km)” mentioned in column 3 above refers to Area of Land and other water bodies only but excluding Sea Area. Accordingly, while checking measurement of quantities using the orthoimages as mentioned in clause 10 of Special Conditions of contract under Section 3, areas covered by sea will be excluded from the area measurements made on the orthoimages. The areas and Arc lengths mentioned above are approximate.

Bill of Quantities (Zone II)
(7 km-mainland belt above HTL with GCP Control Provision and rigorous Photogrammetric Works)
Sub-zone II-A (above HTL)

Sl. No.	Description of item (with brief specification and reference to Book of specification)	Area** (in sq.km.)	Unit	Unit Rate in Rs. (per sq.km.)		Amount in figures Rs.
				In figures	In words	
1	Site preparation for the entire Zone II	--	Lump sum			
2	Provision of Ground control points by GNSS/GPS (for Photogrammetric Block control)	9065 sq km	Sq. km.			
3	Height Control by ST (Single Tertiary) Leveling (for Photogrammetric Block control)	9065 sq km	Sq. km.			
4	Aerial Triangulation / Block Adjustment	9065 sq km	Sq. km.			
5	DTM and TIN generation & editing	9065 sq km	Sq. km.			
6	Generation of Contours at 0.5 m V.I. (2.5 m in hills)	9065 sq km	Sq. km.			
7	Ortho photo generation and ortho Mosaicing	9065 sq km	Sq. km.			
8	Feature Extraction in Stereo mode	9065 sq km	Sq. km.			
9	Inundation Modeling and digitization of Flood Line and inundated area	9065 sq km	Sq. km			
10	Extraction of 'Shoreline' from two time-series of vintage photographs/Satellite Imagery	9065 sq km	Sq. km			
11	Digital Shore line analysis using three Time series of coast lines (1 current + 2 vintage)	3018 km of Arc Length of coast line @	Km			
12	Delivery of outputs (hard copy / soft copy) for the entire Zone 1	9065 sq km	Sq. km.			
13	Training of 20 SOI staff for 1 month in the software, systems and processes being used by the contractor.	-	Lump sum			
14	Misc. if any (Specify details)					

Total Bid Price of Sub-zone II-A (in figures):

Total Bid Price of Sub-zone II-A (in words):

Note:

- (1) Item for which no rate or price has been entered in will not be paid for by the Employer when executed and shall be deemed covered by the other rates and prices in the **Bill of Quantities** (refer: ITB Clause 13.2 and GCC Clause 43.3).
- (2) Unit rates and prices shall be quoted by the bidder in Indian rupee [ITB Clause 14.1].
- (3) Where there is a discrepancy between the rate in figures and words, the rates in words will govern. [ITB Clause 27.1(a)]
- (4) Where there is a discrepancy between the unit rate and the line item total resulting from multiplying the unit rate by quantity, the unit rate quoted shall govern [ITB Clause 27.1 (b)].
- (5) **: The "Area(in sq. km)" mentioned in column 3 above refers to Area of Land and other water bodies only but excluding Sea Area. Accordingly, while checking measurement of quantities using the orthoimages as mentioned in clause 10 of Special Conditions of contract under Section 3, areas covered by sea will be excluded from the area measurements made on the orthoimages. The areas and Arc lengths mentioned above are approximate.
- (6) @: Only the overlapping Aerial Photographs/stereo models/Strips or Topo sheets or Satellite imagery containing the coastline all along the mainland coast in the zone, provided by the Engineer will be processed for Digital Shoreline Analysis. No other Aerial photographs, which do not contain the coast line and which fall in the remaining areas of the project need to be processed for Digital Shoreline Analysis.

Bill of Quantities (Zone II)

(Inter Tidal Zone below HTL and Islands with GCP Control Provision and Photogrammetric Works)

Sub-zone II-B- Inter Tidal Zone below HTL and Islands

Sl. No.	Description of item (with brief specification and reference to Book of specification)	Area** (in sq.km.)	Unit	Unit Rate in Rs. (per sq.km.)		Amount in figures Rs.
				In figures	In words	
1	Aerial Triangulation / Block Adjustment as per clause 5.4.3.4 of Section 5, using Integrated Sensor Orientation, relaxed standards /Cantilever method.	3701 sq. km	Sq. km.			
2	DTM and TIN generation & editing	3701 sq. km	Sq. km.			
3	Ortho photo generation and ortho Mosaicing	3701 sq. km	Sq. km.			
4	Limited, Skeletal Feature Extraction of available features as per DMS, in Stereo mode	3701 sq. km	Sq. km.			
5	Misc. if any (Specify details)					
Total Bid Price of Sub-zone II-B (in figures):						
Total Bid Price of Sub-zone II-B (in words):						
GRAND TOTAL Zone II (Sub-zone II-A + Sub-zone II-B):						
(in figures) :						
(in words) :						

Note:

- 1) Item for which no rate or price has been entered in will not be paid for by the Employer when executed and shall be deemed covered by the other rates and prices in the **Bill of Quantities** (refer: ITB Clause 13.2 and GCC Clause 43.3).
- 2) Unit rates and prices shall be quoted by the bidder in Indian rupee [ITB Clause 14.1].
- 3) Where there is a discrepancy between the rate in figures and words, the rates in words will govern. [ITB Clause 27.1(a)]
- 4) Where there is a discrepancy between the unit rate and the line item total resulting from multiplying the unit rate by quantity, the unit rate quoted shall govern [ITB Clause 27.1 (b)].
- 5) The price quoted at Grand Total of **Zone II (Sub-zone II-A + Sub-zone II-B):** will be considered for the purpose of computing evaluated Bid Price for a Zone.
- 6) **: The “Area(in sq. km)” mentioned in column 3 above refers to Area of Land and other water bodies only but excluding Sea Area. Accordingly, while checking measurement of quantities using the orthoimages as mentioned in clause 10 of Special Conditions of contract under Section 3, areas covered by sea will be excluded from the area measurements made on the orthoimages. The areas and Arc lengths mentioned above are approximate.

Bill of Quantities (Zone III)
(7 km-mainland belt above HTL with GCP Control Provision and rigorous Photogrammetric Works)
Sub-zone III-A - above HTL

Sl. No.	Description of item (with brief specification and reference to Book of specification)	Area** (in sq.km.)	Unit	Unit Rate in Rs. (per sq.km.)		Amount in figures Rs.
				In figures	In words	
1	Site preparation for the entire Zone III	--	Lump sum			
2	Provision of Ground control points by GNSS/GPS (for Photogrammetric Block control)	6092 sq km	Sq. km.			
3	Height Control by ST (Single Tertiary) Leveling (for Photogrammetric Block control)	6092 sq km	Sq. km.			
4	Aerial Triangulation / Block Adjustment	6092 sq km	Sq. km.			
5	DTM and TIN generation & editing	6092 sq km	Sq. km.			
6	Generation of Contours at 0.5 m V.I. (2.5 m in hills)	6092 sq km	Sq. km.			
7	Ortho photo generation and ortho Mosaicing	6092 sq km	Sq. km.			
8	Feature Extraction in Stereo mode	6092 sq km	Sq. km.			
9	Inundation Modeling and digitization of Flood Line and inundated area	6092 sq km	Sq. km			
10	Extraction of 'Shoreline' from two time-series of vintage photographs/Satellite Imagery	6092 sq km	Sq km			
11	Digital Shore line analysis using three Time series of coast lines (1 current + 2 vintage)	1566 km of Arc Length of coast line @	Km			
12	Delivery of outputs (hard copy / soft copy) for the entire Zone 1	6092 sq km	Sq. km.			
13	Training of 20 SOI staff for 1 month in the software, systems and processes being used by the contractor.	-	Lump sum			
14	Misc. if any (Specify details)					
Total Bid Price of Sub-zone III-A (in figures):						
Total Bid Price of Sub-zone III-A (in words):						

Note:

Note:

- (1) Item for which no rate or price has been entered in will not be paid for by the Employer when executed and shall be deemed covered by the other rates and prices in the **Bill of Quantities** (refer: ITB Clause 13.2 and GCC Clause 43.3).
- (2) Unit rates and prices shall be quoted by the bidder in Indian rupee [ITB Clause 14.1].
- (3) Where there is a discrepancy between the rate in figures and words, the rates in words will govern. [ITB Clause 27.1(a)]
- (4) Where there is a discrepancy between the unit rate and the line item total resulting from multiplying the unit rate by quantity, the unit rate quoted shall govern [ITB Clause 27.1 (b)].
- (5) **: The "Area (in sq. km)" mentioned in column 3 above refers to Area of Land and other water bodies only but excluding Sea Area. Accordingly, while checking measurement of quantities using the orthoimages as mentioned in clause 10 of Special Conditions of contract under Section 3, areas covered by sea will be excluded from the area measurements made on the orthoimages. The areas and Arc lengths mentioned above are approximate.
- (6) @: Only the overlapping Aerial Photographs/stereo models/Strips or Topo sheets or Satellite imagery containing the coastline all along the mainland coast in the zone, provided by the Engineer will be processed for Digital Shoreline Analysis. No other Aerial photographs, which do not contain the coast line and which fall in the remaining areas of the project need to be processed for Digital Shoreline Analysis.

Bill of Quantities (Zone III)

(Inter Tidal Zone below HTL and Islands with GCP Control Provision and Photogrammetric Works)

Sub-zone III-B- Inter Tidal Zone below HTL and Islands

Sl. No.	Description of item (with brief specification and reference to Book of specification)	Area** (in sq.km.)	Unit	Unit Rate in Rs. (per sq.km.)		Amount in figures Rs.
				In figures	In words	
1	Aerial Triangulation / Block Adjustment as per clause 5.4.3.4 of Section 5, using Integrated Sensor Orientation, relaxed standards /Cantilever method.	386 sq. km	Sq. km.			
2	DTM and TIN generation & editing	386 sq. km	Sq. km.			
3	Ortho photo generation and ortho Mosaicing	386 sq. km	Sq. km.			
4	Limited, Skeletal Feature Extraction of available features as per DMS, in Stereo mode	386 sq. km	Sq. km.			
5	Misc. if any (Specify details)					
Total Bid Price of Sub-zone III-B (in figures):						
Total Bid Price of Sub-zone III-B (in words):						
GRAND TOTAL Zone III (Sub-zone III-A + Sub-zone III-B):						
(in figures) :						
(in words) :						

Note:

- 1) Item for which no rate or price has been entered in will not be paid for by the Employer when executed and shall be deemed covered by the other rates and prices in the **Bill of Quantities** (refer: ITB Clause 13.2 and GCC Clause 43.3).
- 2) Unit rates and prices shall be quoted by the bidder in Indian rupee [ITB Clause 14.1].
- 3) Where there is a discrepancy between the rate in figures and words, the rates in words will govern. [ITB Clause 27.1(a)]
- 4) Where there is a discrepancy between the unit rate and the line item total resulting from multiplying the unit rate by quantity, the unit rate quoted shall govern [ITB Clause 27.1 (b)].
- 5) The price quoted at Grand Total of **Zone III (Sub-zone III-A + Sub-zone III-B)**: will be considered for the purpose of computing evaluated Bid Price for a Zone.
- 6) **: The “Area(in sq. km)” mentioned in column 3 above refers to Area of Land and other water bodies only but excluding Sea Area. Accordingly, while checking measurement of quantities using the orthoimages as mentioned in clause 10 of Special Conditions of contract under Section 3, areas covered by sea will be excluded from the area measurements made on the orthoimages. The areas and Arc lengths mentioned above are approximate.

Bill of Quantities (Zone IV)

(7 km-mainland belt above HTL with GCP Control Provision and rigorous Photogrammetric Works)

Sub-zone IV-A - above HTL

Sl. No.	Description of item (with brief specification and reference to Book of specification)	Area** (in sq.km.)	Unit	Unit Rate in Rs. (per sq.km.)		Amount in figures Rs.
				In figures	In words	
1	Site preparation for the entire Zone IV	--	Lump sum			
2	Provision of Ground control points by GNSS/GPS (for Photogrammetric Block control)	7875 sq. km	Sq. km.			
3	Height Control by ST (Single Tertiary) Leveling (for Photogrammetric Block control)	7875 sq. km	Sq. km.			
4	Aerial Triangulation / Block Adjustment	7875 sq. km	Sq. km.			
5	DTM and TIN generation & editing	7875 sq. km	Sq. km.			
6	Generation of Contours at 0.5 m V.I. (2.5 m in hills)	7875 sq. km	Sq. km.			
7	Ortho photo generation and ortho Mosaicing	7875 sq. km	Sq. km.			
8	Feature Extraction in Stereo mode	7875 sq. km	Sq. km.			
9	Inundation Modeling and digitization of Flood Line and inundated area	7875 sq. km	Sq. km			
10	Extraction of 'Shoreline' from two time-series of vintage photographs/Satellite Imagery	7875 sq. km	Sq. km			
11	Digital Shore line analysis using three Time series of coast lines (1 current + 2 vintage)	852 km of Arc Length of coast line @	Km			
12	Delivery of outputs (hard copy / soft copy) for the entire Zone 1	7875 sq. km	Sq. km.			
13	Training of 20 SOI staff for 1 month in the software, systems and processes being used by the contractor.	-	Lump sum			
14	Misc. if any (Specify details)					
Total Bid Price of Sub-zone IV-A (in figures):						
Total Bid Price of Sub-zone IV-A (in words):						

Note:

- (1) Item for which no rate or price has been entered in will not be paid for by the Employer when executed and shall be deemed covered by the other rates and prices in the **Bill of Quantities** (refer: ITB Clause 13.2 and GCC Clause 43.3).
- (2) Unit rates and prices shall be quoted by the bidder in Indian rupee [ITB Clause 14.1].
- (3) Where there is a discrepancy between the rate in figures and words, the rates in words will govern. [ITB Clause 27.1(a)]
- (4) Where there is a discrepancy between the unit rate and the line item total resulting from multiplying the unit rate by quantity, the unit rate quoted shall govern [ITB Clause 27.1 (b)].
- (5) **: The "Area(in sq. km)" mentioned in column 3 above refers to Area of Land and other water bodies only but excluding Sea Area. Accordingly, while checking measurement of quantities using the orthoimages as mentioned in clause 10 of Special Conditions of contract under Section 3, areas covered by sea will be excluded from the area measurements made on the orthoimages. The areas and Arc lengths mentioned above are approximate.
- (6) @: Only the overlapping Aerial Photographs/stereo models/Strips or Topo sheets or Satellite imagery containing the coastline all along the mainland coast in the zone, provided by the Engineer will be processed for Digital Shoreline Analysis. No other Aerial photographs, which do not contain the coast line and which fall in the remaining areas of the project need to be processed for Digital Shoreline Analysis.

Bill of Quantities (Zone IV)

(Inter Tidal Zone below HTL and Islands with GCP Control Provision and Photogrammetric Works)

Sub-zone IV-B- Inter Tidal Zone below HTL and Islands

Sl. No.	Description of item (with brief specification and reference to Book of specification)	Area** (in sq.km.)	Unit	Unit Rate in Rs. (per sq.km.)		Amount in figures Rs.
				In figures	In words	
1	Aerial Triangulation / Block Adjustment as per clause 5.4.3.4 of Section 5, using Integrated Sensor Orientation, relaxed standards /Cantilever method.	56 sq. km	Sq. km.			
2	DTM and TIN generation & editing	56 sq. km	Sq. km.			
3	Ortho photo generation and ortho Mosaicing	56 sq. km	Sq. km.			
4	Limited, Skeletal Feature Extraction of available features as per DMS , in Stereo mode	56 sq. km	Sq. km.			
5	Misc. if any (Specify details)					
Total Bid Price of Sub-zone IV-B (in figures):						
Total Bid Price of Sub-zone IV-B (in words):						
GRAND TOTAL Zone IV (Sub-zone IV-A + Sub-zone IV-B):						
(in figures) :						
(in words) :						

Note:

- 1) Item for which no rate or price has been entered in will not be paid for by the Employer when executed and shall be deemed covered by the other rates and prices in the **Bill of Quantities** (refer: ITB Clause 13.2 and GCC Clause 43.3).
- 2) Unit rates and prices shall be quoted by the bidder in Indian rupee [ITB Clause 14.1].
- 3) Where there is a discrepancy between the rate in figures and words, the rates in words will govern. [ITB Clause 27.1(a)]
- 4) Where there is a discrepancy between the unit rate and the line item total resulting from multiplying the unit rate by quantity, the unit rate quoted shall govern [ITB Clause 27.1 (b)].
- 5) The price quoted at Grand Total of **Zone IV (Sub-zone IV-A + Sub-zone IV-B)**: will be considered for the purpose of computing evaluated Bid Price for a Zone.
- 6) **: The “Area(in sq. km)” mentioned in column 3 above refers to Area of Land and other water bodies only but excluding Sea Area. Accordingly, while checking measurement of quantities using the orthoimages as mentioned in clause 10 of Special Conditions of contract under Section 3, areas covered by sea will be excluded from the area measurements made on the orthoimages. The areas and Arc lengths mentioned above are approximate.

Bill of Quantities (Zone V)
(7 km-mainland belt above HTL (Including Rameshwaram Island)with GCP Control Provision and rigorous Photogrammetric Works)
Sub-zone V-A - above HTL

Sl. No.	Description of item (with brief specification and reference to Book of specification)	Area** (in sq.km.)	Unit	Unit Rate in Rs. (per sq.km.)		Amount in figures Rs.
				In figures	In words	
1	Site preparation for the entire Zone V	--	Lump sum			
2	Provision of Ground control points by GNSS/GPS (for Photogrammetric Block control)	4537 sq km	Sq. km.			
3	Height Control by ST (Single Tertiary) Leveling (for Photogrammetric Block control)	4537 sq km	Sq. km.			
4	Aerial Triangulation / Block Adjustment	4537 sq km	Sq. km.			
5	DTM and TIN generation & editing	4537 sq km	Sq. km.			
6	Generation of Contours at 0.5 m V.I. (2.5 m in hills)	4537 sq km	Sq. km.			
7	Ortho photo generation and ortho Mosaicing	4537 sq km	Sq. km.			
8	Feature Extraction in Stereo mode	4537 sq km	Sq. km.			
9	Inundation Modeling and digitization of Flood Line and inundated area	4537 sq km	Sq. km			
10	Extraction of 'Shoreline' from two time-series of vintage photographs/Satellite Imagery	4537 sq. km	Sq. km			
11	Digital Shore line analysis using three Time series of coast lines (1 current + 2 vintage)	792 km of Arc Length of coast line @	Km			
12	Delivery of outputs (hard copy / soft copy) for the entire Zone 1	4537 sq km	Sq. km.			
13	Training of 20 SOI staff for 1 month in the software, systems and processes being used by the contractor.	-	Lump sum			
14	Misc. if any (Specify details)					
Total Bid Price of Sub-zone V-A (in figures):						
Total Bid Price of Sub-zone V-A (in words):						

Note:

- (1) Item for which no rate or price has been entered in will not be paid for by the Employer when executed and shall be deemed covered by the other rates and prices in the **Bill of Quantities** (refer: ITB Clause 13.2 and GCC Clause 43.3).
- (2) Unit rates and prices shall be quoted by the bidder in Indian rupee [ITB Clause 14.1].
- (3) Where there is a discrepancy between the rate in figures and words, the rates in words will govern. [ITB Clause 27.1(a)]
- (4) Where there is a discrepancy between the unit rate and the line item total resulting from multiplying the unit rate by quantity, the unit rate quoted shall govern [ITB Clause 27.1 (b)].
- (5) **: The "Area(in sq. km)" mentioned in column 3 above refers to Area of Land and other water bodies only but excluding Sea Area. Accordingly, while checking measurement of quantities using the orthoimages as mentioned in clause 10 of Special Conditions of contract under Section 3, areas covered by sea will be excluded from the area measurements made on the orthoimages. The areas and Arc lengths mentioned above are approximate.
- (6) @: Only the overlapping Aerial Photographs/stereo models/Strips or Topo sheets or Satellite imagery containing the coastline all along the mainland coast in the zone, provided by the Engineer will be processed for Digital Shoreline Analysis. No other Aerial photographs, which do not contain the coast line and which fall in the remaining areas of the project need to be processed for Digital Shoreline Analysis.

Bill of Quantities (Zone V)
(Inter Tidal Zone below HTL and Islands(Excluding Rameshwaram Island) with GCP Control
Provision and Photogrammetric Works)
Sub-zone V-B- Inter Tidal Zone below HTL and Islands

Sl. No.	Description of item (with brief specification and reference to Book of specification)	Area** (in sq.km.)	Unit	Unit Rate in Rs. (per sq.km.)		Amount in figures Rs.
				In figures	In words	
1	Aerial Triangulation / Block Adjustment as per clause 5.4.3.4 of Section 5, using Integrated Sensor Orientation, relaxed standards /Cantilever method.	61 sq. km	Sq. km.			
2	DTM and TIN generation & editing	61 sq. km	Sq. km.			
3	Ortho photo generation and ortho Mosaicing	61 sq. km	Sq. km.			
4	Limited, Skeletal Feature Extraction of available features as per DMS , in Stereo mode	61 sq. km	Sq. km.			
5	Misc. if any (Specify details)					
Total Bid Price of Sub-zone V-B (in figures):						
Total Bid Price of Sub-zone V-B (in words):						
GRAND TOTAL Zone V (Sub-zone V-A + Sub-zone V-B):						
(in figures) :						
(in words) :						

Note:

- 1) Item for which no rate or price has been entered in will not be paid for by the Employer when executed and shall be deemed covered by the other rates and prices in the **Bill of Quantities** (refer: ITB Clause 13.2 and GCC Clause 43.3).
- 2) Unit rates and prices shall be quoted by the bidder in Indian rupee [ITB Clause 14.1].
- 3) Where there is a discrepancy between the rate in figures and words, the rates in words will govern. [ITB Clause 27.1(a)]
- 4) Where there is a discrepancy between the unit rate and the line item total resulting from multiplying the unit rate by quantity, the unit rate quoted shall govern [ITB Clause 27.1 (b)].
- 5) The price quoted at Grand Total of **Zone V (Sub-zone V-A + Sub-zone V-B):** will be considered for the purpose of computing evaluated Bid Price for a Zone.
- 6) **: The “Area(in sq. km)” mentioned in column 3 above refers to Area of Land and other water bodies only but excluding Sea Area. Accordingly, while checking measurement of quantities using the orthoimages as mentioned in clause 10 of Special Conditions of contract under Section 3, areas covered by sea will be excluded from the area measurements made on the orthoimages. The areas and Arc lengths mentioned above are approximate.

Bill of Quantities (Zone VI)

**(7 km-mainland belt above HTL with GCP Control Provision and rigorous Photogrammetric Works)
Sub-zone VI-A - 7 km-above HTL**

Sl. No.	Description of item (with brief specification and reference to Book of specification)	Area** (in sq.km.)	Unit	Unit Rate in Rs. (per sq.km.)		Amount in figures Rs.
				In figures	In words	
1	Site preparation for the entire Zone VI	--	Lump sum			
2	Provision of Ground control points by GNSS/GPS (for Photogrammetric Block control)	4976 sq. km	Sq. km.			
3	Height Control by ST (Single Tertiary) Leveling (for Photogrammetric Block control)	4976 sq. km	Sq. km.			
4	Aerial Triangulation / Block Adjustment	4976 sq. km	Sq. km.			
5	DTM and TIN generation & editing	4976 sq. km	Sq. km.			
6	Generation of Contours at 0.5 m V.I. (2.5 m in hills)	4976 sq. km	Sq. km.			
7	Ortho photo generation and ortho Mosaicing	4976 sq. km	Sq. km.			
8	Feature Extraction in Stereo mode	4976 sq. km	Sq. km.			
9	Inundation Modeling and digitization of Flood Line and inundated area	4976 sq. km	Sq. km			
10	Extraction of 'Shoreline' from two time-series of vintage photographs/Satellite Imagery	4976 sq. km	Sq. km			
11	Digital Shore line analysis using three Time series of coast lines (1 current + 2 vintage)	700 km of Arc Length of coast line @	Km			
12	Delivery of outputs (hard copy / soft copy) for the entire Zone 1	4976 sq. km	Sq. km.			
13	Training of 20 SOI staff for 1 month in the software, systems and processes being used by the contractor.	-	Lump sum			
14	Misc. if any (Specify details)					
Total Bid Price of Sub-zone VI-A (in figures):						
Total Bid Price of Sub-zone VI-A (in words):						

Note:

- (1) Item for which no rate or price has been entered in will not be paid for by the Employer when executed and shall be deemed covered by the other rates and prices in the **Bill of Quantities** (refer: ITB Clause 13.2 and GCC Clause 43.3).
- (2) Unit rates and prices shall be quoted by the bidder in Indian rupee [ITB Clause 14.1].
- (3) Where there is a discrepancy between the rate in figures and words, the rates in words will govern. [ITB Clause 27.1(a)]
- (4) Where there is a discrepancy between the unit rate and the line item total resulting from multiplying the unit rate by quantity, the unit rate quoted shall govern [ITB Clause 27.1 (b)].
- (5) **: The "Area(in sq. km)" mentioned in column 3 above refers to Area of Land and other water bodies only but excluding Sea Area. Accordingly, while checking measurement of quantities using the orthoimages as mentioned in clause 10 of Special Conditions of contract under Section 3, areas covered by sea will be excluded from the area measurements made on the orthoimages. The areas and Arc lengths mentioned above are approximate.
- (6) @: Only the overlapping Aerial Photographs/stereo models/Strips or Topo sheets or Satellite imagery containing the coastline all along the mainland coast in the zone, provided by the Engineer will be processed for Digital Shoreline Analysis. No other Aerial photographs, which do not contain the coast line and which fall in the remaining areas of the project need to be processed for Digital Shoreline Analysis.

Bill of Quantities (Zone VI)

(Inter Tidal Zone below HTL and Islands with GCP Control Provision and Photogrammetric Works)

Sub-zone VI-B- Inter Tidal Zone below HTL and Islands

Sl. No.	Description of item (with brief specification and reference to Book of specification)	Area** (in sq.km.)	Unit	Unit Rate in Rs. (per sq.km.)		Amount in figures Rs.
				In figures	In words	
1	Aerial Triangulation / Block Adjustment as per clause 5.4.3.4 of Section 5, using Integrated Sensor Orientation, relaxed standards /Cantilever method.	55 sq. km	Sq. km.			
2	DTM and TIN generation & editing	55 sq. km	Sq. km.			
3	Ortho photo generation and ortho Mosaicing	55 sq. km	Sq. km.			
4	Limited, Skeletal Feature Extraction of available features as per DMS , in Stereo mode	55 sq. km	Sq. km.			
5	Misc. if any (Specify details)					
Total Bid Price of Sub-zone VI-B (in figures):						
Total Bid Price of Sub-zone VI-B (in words):						
GRAND TOTAL Zone VI (Sub-zone VI-A + Sub-zone VI-B):						
(in figures) :						
(in words) :						

Note:

- 1) Item for which no rate or price has been entered in will not be paid for by the Employer when executed and shall be deemed covered by the other rates and prices in the **Bill of Quantities** (refer: ITB Clause 13.2 and GCC Clause 43.3).
- 2) Unit rates and prices shall be quoted by the bidder in Indian rupee [ITB Clause 14.1].
- 3) Where there is a discrepancy between the rate in figures and words, the rates in words will govern. [ITB Clause 27.1(a)]
- 4) Where there is a discrepancy between the unit rate and the line item total resulting from multiplying the unit rate by quantity, the unit rate quoted shall govern [ITB Clause 27.1 (b)].
- 5) The price quoted at Grand Total of **Zone VI (Sub-zone VI-A + Sub-zone VI-B)**: will be considered for the purpose of computing evaluated Bid Price for a Zone.
- 6) **: The “Area(in sq. km)” mentioned in column 3 above refers to Area of Land and other water bodies only but excluding Sea Area. Accordingly, while checking measurement of quantities using the orthoimages as mentioned in clause 10 of Special Conditions of contract under Section 3, areas covered by sea will be excluded from the area measurements made on the orthoimages. The areas and Arc lengths mentioned above are approximate.

Bill of Quantities (Zone VII)

(7 km-mainland belt above HTL with GCP Control Provision and rigorous Photogrammetric Works)

Sub-zone VII-A - above HTL

Sl. No.	Description of item (with brief specification and reference to Book of specification)	Area** (in sq.km.)	Unit	Unit Rate in Rs. (per sq.km.)		Amount in figures Rs.
				In figures	In words	
1	Site preparation for the entire Zone VII	--	Lump sum			
2	Provision of Ground control points by GNSS/GPS (for Photogrammetric Block control)	6200 sq. km	Sq. km.			
3	Height Control by ST (Single Tertiary) Leveling (for Photogrammetric Block control)	6200 sq. km	Sq. km.			
4	Aerial Triangulation / Block Adjustment	6200 sq. km	Sq. km.			
5	DTM and TIN generation & editing	6200 sq. km	Sq. km.			
6	Generation of Contours at 0.5 m V.I. (2.5 m in hills)	6200 sq. km	Sq. km.			
7	Ortho photo generation and ortho Mosaicing	6200 sq. km	Sq. km.			
8	Feature Extraction in Stereo mode	6200 sq. km	Sq. km.			
9	Inundation Modeling and digitization of Flood Line and inundated area	6200 sq. km	Sq. km			
10	Extraction of 'Shoreline' from two time-series of vintage photographs/Satellite Imagery	6200 sq. km	Sq. km			
11	Digital Shore line analysis using three Time series of coast lines (1 current + 2 vintage)	734 km of Arc Length of coast line @	Km			
12	Delivery of outputs (hard copy / soft copy) for the entire Zone 1	6200 sq. km	Sq. km.			
13	Training of 20 SOI staff for 1 month in the software, systems and processes being used by the contractor.	-	Lump sum			
14	Misc. if any (Specify details)					
Total Bid Price of Sub-zone VII-A (in figures):						
Total Bid Price of Sub-zone VII-A (in words):						

Note:

- (1) Item for which no rate or price has been entered in will not be paid for by the Employer when executed and shall be deemed covered by the other rates and prices in the **Bill of Quantities** (refer: ITB Clause 13.2 and GCC Clause 43.3).
- (2) Unit rates and prices shall be quoted by the bidder in Indian rupee [ITB Clause 14.1].
- (3) Where there is a discrepancy between the rate in figures and words, the rates in words will govern. [ITB Clause 27.1(a)]
- (4) Where there is a discrepancy between the unit rate and the line item total resulting from multiplying the unit rate by quantity, the unit rate quoted shall govern [ITB Clause 27.1 (b)].
- (5) **: The "Area(in sq. km)" mentioned in column 3 above refers to Area of Land and other water bodies only but excluding Sea Area. Accordingly, while checking measurement of quantities using the orthoimages as mentioned in clause 10 of Special Conditions of contract under Section 3, areas covered by sea will be excluded from the area measurements made on the orthoimages. The areas and Arc lengths mentioned above are approximate.
- (6) @: Only the overlapping Aerial Photographs/stereo models/Strips or Topo sheets or Satellite imagery containing the coastline all along the mainland coast in the zone, provided by the Engineer will be processed for Digital Shoreline Analysis. No other Aerial photographs, which do not contain the coast line and which fall in the remaining areas of the project need to be processed for Digital Shoreline Analysis.

Bill of Quantities (Zone VII)

(Inter Tidal Zone below HTL and Islands with GCP Control Provision and Photogrammetric Works)

Sub-zone VII-B- Inter Tidal Zone below HTL and Islands

Sl. No.	Description of item (with brief specification and reference to Book of specification)	Area** (in sq.km.)	Unit	Unit Rate in Rs. (per sq.km.)		Amount in figures Rs.
				In figures	In words	
1	Aerial Triangulation / Block Adjustment as per clause 5.4.3.4 of Section 5, using Integrated Sensor Orientation, relaxed standards /Cantilever method.	73 sq. km	Sq. km.			
2	DTM and TIN generation & editing	73 sq. km	Sq. km.			
3	Ortho photo generation and ortho Mosaicing	73 sq. km	Sq. km.			
4	Limited, Skeletal Feature Extraction of available features as per DMS , in Stereo mode	73 sq. km	Sq. km.			
5	Misc. if any (Specify details)					
Total Bid Price of Sub-zone VII-B (in figures):						
Total Bid Price of Sub-zone VII-B (in words):						
GRAND TOTAL Zone VII (Sub-zone VII-A + Sub-zone VII-B):						
(in figures) :						
(in words) :						

Note:

- 1) Item for which no rate or price has been entered in will not be paid for by the Employer when executed and shall be deemed covered by the other rates and prices in the **Bill of Quantities** (refer: ITB Clause 13.2 and GCC Clause 43.3).
- 2) Unit rates and prices shall be quoted by the bidder in Indian rupee [ITB Clause 14.1].
- 3) Where there is a discrepancy between the rate in figures and words, the rates in words will govern. [ITB Clause 27.1(a)]
- 4) Where there is a discrepancy between the unit rate and the line item total resulting from multiplying the unit rate by quantity, the unit rate quoted shall govern [ITB Clause 27.1 (b)].
- 5) The price quoted at Grand Total of **Zone VII (Sub-zone VII-A + Sub-zone VII-B)**: will be considered for the purpose of computing evaluated Bid Price for a Zone.
- 6) **: The “Area(in sq. km)” mentioned in column 3 above refers to Area of Land and other water bodies only but excluding Sea Area. Accordingly, while checking measurement of quantities using the orthoimages as mentioned in clause 10 of Special Conditions of contract under Section 3, areas covered by sea will be excluded from the area measurements made on the orthoimages. The areas and Arc lengths mentioned above are approximate.

Bill of Quantities (Zone VIII)
(7 km-mainland belt above HTL(Including Sagar Islands) with GCP Control Provision and rigorous
Photogrammetric Works)
Sub-zone VIII-A - above HTL(Including Sagar Islands)

Sl. No.	Description of item (with brief specification and reference to Book of specification)	Area** (in sq.km.)	Unit	Unit Rate in Rs. (per sq.km.)		Amount in figures Rs.
				In figures	In words	
1	Site preparation for the entire Zone VIII	--	Lump sum			
2	Provision of Ground control points by GNSS/GPS (for Photogrammetric Block control)	8674 sq. km	Sq. km.			
3	Height Control by ST (Single Tertiary) Leveling (for Photogrammetric Block control)	8674 sq. km	Sq. km.			
4	Aerial Triangulation / Block Adjustment	8674 sq. km	Sq. km.			
5	DTM and TIN generation & editing	8674 sq. km	Sq. km.			
6	Generation of Contours at 0.5 m V.I. (2.5 m in hills)	8674 sq. km	Sq. km.			
7	Ortho photo generation and ortho Mosaicing	8674 sq. km	Sq. km.			
8	Feature Extraction in Stereo mode	8674 sq. km	Sq. km.			
9	Inundation Modeling and digitization of Flood Line and inundated area	8674 sq. km	Sq. km			
10	Extraction of 'Shoreline' from two time-series of vintage photographs/Satellite Imagery	8674 sq. km	Sq. km			
11	Digital Shore line analysis using three Time series of coast lines (1 current + 2 vintage)	1060 km of Arc Length of coast line @	Km			
12	Delivery of outputs (hard copy / soft copy) for the entire Zone 1	8674 sq. km	Sq. km.			
13	Training of 20 SOI staff for 1 month in the software, systems and processes being used by the contractor.	-	Lump sum			
14	Misc. if any (Specify details)					
Total Bid Price of Sub-zone VIII-A (in figures):						
Total Bid Price of Sub-zone VIII-A (in words):						

Note:

- (1) Item for which no rate or price has been entered in will not be paid for by the Employer when executed and shall be deemed covered by the other rates and prices in the **Bill of Quantities** (refer: ITB Clause 13.2 and GCC Clause 43.3).
- (2) Unit rates and prices shall be quoted by the bidder in Indian rupee [ITB Clause 14.1].
- (3) Where there is a discrepancy between the rate in figures and words, the rates in words will govern. [ITB Clause 27.1(a)]
- (4) Where there is a discrepancy between the unit rate and the line item total resulting from multiplying the unit rate by quantity, the unit rate quoted shall govern [ITB Clause 27.1 (b)].
- (5) **: The "Area(in sq. km)" mentioned in column 3 above refers to Area of Land and other water bodies only but excluding Sea Area. Accordingly, while checking measurement of quantities using the orthoimages as mentioned in clause 10 of Special Conditions of contract under Section 3, areas covered by sea will be excluded from the area measurements made on the orthoimages. The areas and Arc lengths mentioned above are approximate.
- (6) @: Only the overlapping Aerial Photographs/stereo models/Strips or Topo sheets or Satellite imagery containing the coastline all along the mainland coast in the zone, provided by the Engineer will be processed for Digital Shoreline Analysis. No other Aerial photographs, which do not contain the coast line and which fall in the remaining areas of the project need to be processed for Digital Shoreline Analysis.

Bill of Quantities (Zone VIII)

(Inter Tidal Zone below HTL and Islands(Excluding Sagar Islands) with GCP Control Provision and Photogrammetric Works)

Sub-zone VIII-B - Inter Tidal Zone below HTL and Islands(Excluding Sagar Islands)

Sl. No.	Description of item (with brief specification and reference to Book of specification)	Area** (in sq.km.)	Unit	Unit Rate in Rs. (per sq.km.)		Amount in figures Rs.
				In figures	In words	
1	Aerial Triangulation / Block Adjustment as per clause 5.4.3.4 of Section 5, using Integrated Sensor Orientation, relaxed standards /Cantilever method.	2840 sq. km	Sq. km.			
2	DTM and TIN generation & editing	2840 sq. km	Sq. km.			
3	Ortho photo generation and ortho Mosaicing	2840 sq. km	Sq. km.			
4	Limited, Skeletal Feature Extraction of available features as per DMS , in Stereo mode	2840 sq. km	Sq. km.			
5	Misc. if any (Specify details)					
Total Bid Price of Sub-zone VIII-B (in figures):						
Total Bid Price of Sub-zone VIII-B (in words):						
GRAND TOTAL Zone VIII (Sub-zone VIII-A + Sub-zone VIII-B):						
(in figures) :						
(in words) :						

Note:

- 1) Item for which no rate or price has been entered in will not be paid for by the Employer when executed and shall be deemed covered by the other rates and prices in the **Bill of Quantities** (refer: ITB Clause 13.2 and GCC Clause 43.3).
- 2) Unit rates and prices shall be quoted by the bidder in Indian rupee [ITB Clause 14.1].
- 3) Where there is a discrepancy between the rate in figures and words, the rates in words will govern. [ITB Clause 27.1(a)]
- 4) Where there is a discrepancy between the unit rate and the line item total resulting from multiplying the unit rate by quantity, the unit rate quoted shall govern [ITB Clause 27.1 (b)].
- 5) The price quoted at Grand Total of **Zone VIII (Sub-zone VIII-A + Sub-zone VIII-B)**: will be considered for the purpose of computing evaluated Bid Price for a Zone.
- 6) **: The “Area(in sq. km)” mentioned in column 3 above refers to Area of Land and other water bodies only but excluding Sea Area. Accordingly, while checking measurement of quantities using the orthoimages as mentioned in clause 10 of Special Conditions of contract under Section 3, areas covered by sea will be excluded from the area measurements made on the orthoimages. The areas and Arc lengths mentioned above are approximate.

SECTION 8: FORMS OF SECURITIES

Forms of Securities

Acceptable forms of securities are annexed. Bidders should not complete the Performance and Advance Payment Security forms at this time. Only the successful Bidder will be required to provide Performance and Advance Payment Securities in accordance with one of the forms, or in a similar form acceptable to the Employer.

- Annex A:** Bid Security (Bank Guarantee)
- Annex B:** Performance Bank Guarantee
- Annex B1:** Performance Bank Guarantee for Unbalanced Items
- Annex C:** Deleted
- Annex D:** Bank Guarantee for Advance Payment
- Annex E:** Undertaking For Data Security

BID SECURITY (BANK GUARANTEE)

WHEREAS, _____ [name of Bidder] (hereinafter called "the Bidder") has submitted his Bid dated _____ [date] for the **“Provision of Ground Controls and Digital Photogrammetric Work of approximately 7 km. wide coastal belt of Indian mainland including major deltaic areas and back waters, for delineation of hazard line”**, of Block.....[name of Contract] (hereinafter called "the Bid").

KNOW ALL PEOPLE by these presents that We _____ [name of bank] of _____ [name of country] having our registered office at _____ (hereinafter called "the Bank") are bound unto _____ [name of Employer] (hereinafter called "the Employer") in the sum of _____¹ for which payment well and truly to be made to the said Employer the Bank binds itself, his successors and assigns by these presents.

SEALED with the Common Seal of the said Bank this _____ day of _____ 20__.

THE CONDITIONS of this obligation are:

- (1) If after Bid opening the Bidder withdraws his bid during the period of Bid validity specified in the Form of Bid;
- or
- (2) If the Bidder having been notified of the acceptance of his bid by the Employer during the period of Bid validity:
 - (a) fails or refuses to execute the Form of Agreement in accordance with the Instructions to Bidders, if required; or
 - (b) fails or refuses to furnish the Performance Security, in accordance with the Instruction to Bidders; or
 - (c) does not accept the correction of the Bid Price pursuant to Clause 27;

We undertake to pay to the Employer up to the above amount upon receipt of his first written demand, without the Employer having to substantiate his demand, provided that in his demand the Employer will note that the amount claimed by him is due to him owing to the occurrence of one or any of the three conditions, specifying the occurred condition or conditions.

This Guarantee will remain in force up to and including the date _____² days after the deadline for submission of Bids as such deadline is stated in the Instructions to Bidders or as it may be extended by the Employer, notice of which extension(s) to the Bank is hereby waived. Any demand in respect of this guarantee should reach the Bank not later than the above date.

DATE _____ SIGNATURE OF THE BANK _____
 WITNESS _____ SEAL _____

 [signature, name, and address]

1 The Bidder should insert the amount of the guarantee in words and figures denominated in Indian Rupees. This figure should be the same as shown in Clause 16.1 of the Instructions to Bidders.
 2 45 days after the end of the validity period of the Bid.

PERFORMANCE BANK GUARANTEE

To: _____ [name of Employer]
_____ [address of Employer]

WHEREAS _____ [name and address of Contractor] (hereinafter called "the Contractor") has undertaken, in pursuance of Contract No. _____ dated _____ to execute _____ [name of Contract and brief description of Works] (hereinafter called "the Contract");

AND WHEREAS it has been stipulated by you in the said Contract that the Contractor shall furnish you with a Bank Guarantee by a recognized bank for the sum specified therein as security for compliance with his obligations in accordance with the Contract;

AND WHEREAS we have agreed to give the Contractor such a Bank Guarantee;

NOW THEREFORE we hereby affirm that we are the Guarantor and responsible to you, on behalf of the Contractor, up to a total of _____ [amount of guarantee] ¹ _____ [in words], such sum being payable in the types and proportions of currencies in which the Contract Price is payable, and we undertake to pay you, upon your first written demand and without cavil or argument, any sum or sums within the limits of _____ [amount of guarantee]¹ as aforesaid without your needing to prove or to show grounds or reasons for your demand for the sum specified therein.

We hereby waive the necessity of your demanding the said debt from the Contractor before presenting us with the demand.

We further agree that no change or addition to or other modification of the terms of the Contract or of the Works to be performed thereunder or of any of the Contract documents which may be made between you and the Contractor shall in any way release us from any liability under this guarantee, and we hereby waive notice of any such change, addition or modification.

This guarantee shall be valid until (i.e.) 28 days from the date of expiry of the Defects Liability Period.

Signature and seal of the Guarantor _____
Name of Bank _____
Address _____
Date _____

1 An amount shall be inserted by the Guarantor, representing the percentage of the Contract Price specified in the Contract and denominated in Indian Rupees.

PERFORMANCE BANK GUARANTEE (for unbalanced items)

To: _____ [name of Employer]
_____ [address of Employer]

WHEREAS _____ [name and address of Contractor] (hereinafter called "the Contractor") has undertaken, in pursuance of Contract No. _____ dated _____ to execute _____ [name of Contract and brief description of Works] (hereinafter called "the Contract");

AND WHEREAS it has been stipulated by you in the said Contract that the Contractor shall furnish you with a Bank Guarantee by a recognized bank for the sum specified therein as security for compliance with his obligations in accordance with the Contract;

AND WHEREAS we have agreed to give the Contractor such a Bank Guarantee;

NOW THEREFORE we hereby affirm that we are the Guarantor and responsible to you, on behalf of the Contractor, up to a total of _____ [amount of guarantee] ¹ _____ [in words], such sum being payable in the types and proportions of currencies in which the Contract Price is payable, and we undertake to pay you, upon your first written demand and without cavil or argument, any sum or sums within the limits of _____ [amount of guarantee]¹ as aforesaid without your needing to prove or to show grounds or reasons for your demand for the sum specified therein.

We hereby waive the necessity of your demanding the said debt from the Contractor before presenting us with the demand.

We further agree that no change or addition to or other modification of the terms of the Contract or of the Works to be performed thereunder or of any of the Contract documents which may be made between you and the Contractor shall in any way release us from any liability under this guarantee, and we hereby waive notice of any such change, addition or modification.

This guarantee shall be valid until (i.e.) 28 days from the date of issue of the certificate of completion of works.

Signature and seal of the Guarantor _____
Name of Bank _____
Address _____
Date _____

1 An amount shall be inserted by the Guarantor, representing additional security for unbalanced Bids, if any and denominated in Indian Rupees.

BANK GUARANTEE FOR ADVANCE PAYMENT

To: _____ [name of Employer]
 _____ [address of Employer]
 _____ [name of Contract]

Gentlemen:

In accordance with the provisions of the Conditions of Contract, sub clause 51.1 ("Advance Payment") of the above-mentioned Contract, _____ [name and address of Contractor] (hereinafter called "the Contractor") shall deposit with _____ [name of Employer] a bank guarantee to guarantee his proper and faithful performance under the said Clause of the Contract in an amount of _____ [amount of guarantee]¹ _____ [in words].

We, the _____ [bank or financial institution], as instructed by the Contractor, agree unconditionally and irrevocably to guarantee as primary obligator and not as Surety merely, the payment to _____ [name of Employer] on his first demand without whatsoever right of objection on our part and without his first claim to the Contractor, in the amount not exceeding _____ [amount of guarantee]¹ _____ [in words].

We further agree that no change or addition to or other modification of the terms of the Contract or of Works to be performed thereunder or of any of the Contract documents which may be made between _____ [name of Employer] and the Contractor, shall in any way release us from any liability under this guarantee, and we hereby waive notice of any such change, addition or modification.

This guarantee shall remain valid and in full effect from the date of the advance payment under the Contract until _____ [name of Employer] receives full repayment of the same amount from the Contractor.

Yours truly,

Signature and seal: _____
 Name of Bank/Financial Institution: _____
 Address: _____
 Date: _____

¹ An amount shall be inserted by the bank representing the amount of the Advance Payment, and denominated in Indian Rupees.

UNDERTAKING FOR DATA SECURITY TO BE SUBMITTED BY THE CONTRACTOR

I / We shall be responsible for security/safe custody of data during Provision of Ground Controls and Digital Photogrammetric Work. I/We also undertake that all the input data including digital aerial photographs, restricted topo-maps (hard copy), and/or control point's coordinates and/or digital topographical data given to me/us or generated by me/us in full or part will not be taken out from the site within the secured premises of SOI on any media or by any means, and shall not be reproduced by me/us in any form. I/We also undertake that after completion of the allotted project work I/We will handover the entire input and output data to the Engineer. **I/We also understand that after the completion of project storage media of Network Storage / hard-disk used for production will not be allowed to be taken out of SoI premises due to security reasons. I/We also understand that during or after completion of the allotted works, computer systems of the Contractor (photogrammetric workstations etc.) will be allowed to be taken out of SoI premises only after removal of hard-disks from the systems.** I/We understand that violation of above clause shall attract criminal prosecution under Government Copy right Act 1957 and the Official Secrets Act 1923.

Signature of the Contractor with date

Name of the firm with Seal
