

# Terms of reference (ToR) for the procurement of services for undertaking topographical survey in Bhubneshwar

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## General information

### a. Brief information on the project

The objective of the Climate Smart Cities project is that climate friendly solutions for urban infrastructure supply and urban development are anchored in the planning and implementation of projects within the framework of the Indian government's Smart Cities Programme. The project contributes to the New Urban Agenda (Habitat III) as well as the Sustainable Development Goals (SDG).

The project primarily has focus in the sectors of Solid Waste Management, C&D waste management, Storm water Management, Building Energy Efficiency/Green Buildings and Urban Green Cover. The project is supporting the city of Bhubaneswar in implementing urban stormwater measures

### b. Context

#### 2.1 General Terms of Reference:

The consultant is responsible for the tasks as described below in the "Scope of work". The consultant should have experience in handling work of similar nature as mentioned in the "Scope of work".

#### 2.2 Objective of the contract

The Objective of the contract is to undertake the Topographical survey comprising of taking levels for all main / internal / connecting storm water drains within the identified area of Bhubaneswar City using Total Station.

Topographical Survey shall be carried out using Differential Global Positional System, Total Station and Digital level etc. and preparation of drawing in Auto cadd format.

The total area to be surveyed is approximately 2.5 sq.km (road length of approximately 80km) in Bhubaneswar city (Distributed in two different locations: Nayapalli and Forest Park area).

Boundary of identified area shall be provided to the survey team for conducting Topo-survey. The contractor shall fulfil any changes required in Topo-survey during the design stage. In case the area gets increased based on client requirements, the same will be informed before commencing or during the survey.

As the road length/area is approx. the contractor shall quote his/her rate on per km/per unit basis and the actual payment will be based on the road length/area covered

The detailed scope of work for the consultant is defined in section 'd'

- c. GIZ shall hire the contractor for the anticipated contract term, from **July 2021** to **September 2021**.

**d. The contractor shall provide the following work/service:**

The topographic survey shall be carried out strictly as per the procedure given below. The surveyor shall maintain a field book. All relevant observations shall be noted, and field sketches prepared in field book only. This field book will form part of the report submission.

All survey instruments shall be checked for errors and got approved by the client representative at site before the start of survey. Last calibration certificate for the instrument shall be produced by the survey agency for verification. Traverse should be carried out using 1 sec Total Station and detailed topographic survey shall be carried out using only Total Station of 5-sec accuracy. Only Digital Level of standard make shall be used for establishing benchmarks.

Only qualified and trained surveyors shall be deployed for carrying out survey work.

**i. Fixing of Primary Survey Control Point (PSCP)**

Before commencing the Survey, Pairs of Primary Survey Control Points (PSCP) shall be fixed approximately (to suit the site conditions) at 1 Km radius by static method. PSCPs will be fixed using Neil and washer and marked with yellow enamel paint and sequentially numbered on permanent structures at site.

Digital photographs of these points will be taken from various directions. The measurements from identifiable and permanent features nearest to the point will also be taken and furnished for approval by the competent authority for commencing the DGNSS/DGPS survey.

The PSCPs shall be established at such a location so that it may not be disturbed by local people. Also, these Points shall be established in such a way that further surveys can be carried out in the same coordinate system.

**ii. Observation of PSCP by DGNSS/DGPS survey**

Once the fixing and marking of PSCP completed in the field, the DGNSS survey shall be commenced using differential GNSS with multi frequency receivers by static method. The observation by DGNSS at the PSCP will be done for a period of 1 hour for tracking the signals from the satellite. The raw data in Receiver Independent Exchange Format (RINEX) format (9 decimal places in degrees for Latitude and Longitude) shall be post-processed with network adjustment based on the Survey of India coordinate system (Geographic) in ITRF2008/ WGS 84 as a datum and UTM/TM as a projection with specified semi major axis, semi minor axis and flattening 1/f values calculated and coordinates will be submitted. The triangles shall be well formed and preferably not too acute nor obtuse, with sufficient redundancy so that a base line could be confirmed by observations from multiple control points. The accuracy of network adjustment will be 1: 2,00,000.

And the following survey parameters for transformation shall be submitted along with the survey report.

- Semi major axis
- Semi minor axis
- Flattening 1/f values
- Central Meridian
- Scale factor at Central Meridian
- Zone code for the surveyed area

The topographical survey shall be carried out with reference to ITRF/WGS84 and UTM/TM co- ordinate system.

DGNSS/DGPS field survey shall be conducted with unobstructed view of the sky for at least 15 degrees or greater above the horizon.

### **iii. Precise Levelling**

After completion of DGNSS, control levelling shall be carried out for fixing the Temporary benchmark (TBM) shall be established within each town and connecting all the PSCPs. For the purpose of height control, PWD or Survey of India Benchmarks/Reference benchmark will be used for starting and closing of level lines.

A closed-circuit levelling will be run along the major roads. Temporary benchmark will also be established on Permanent structures at every 1 Km along the road. Digital Level Instrument will be used for levelling. Fore sight and back sight distances will be equal. All levelling data and calculation work will be done in the Excel Package of computer.

The closing error on a level circuit will not exceed  $12\sqrt{K}$  in mm, where K is distance in km. The closing error shall be distributed to all the PSCPs/ Benchmarks in network. In case the closing error is more than the above-specified limit, the control levelling shall be repeated.

The benchmark shall be painted in yellow and details such as location, BM number etc., shall be clearly marked.

All TBM shall be numbered sequentially as per the instruction of site-in-charge and the same shall be documented and submitted to Client

### **iv. Survey of Planimetric and Utility details**

Topographic survey shall start only after all PSCPs, Benchmarks and co-ordinate system (XYZ) are established and approval by the Engineer-in-Charge.

The following points will be followed during the survey.

1. The work involves carrying out a detailed engineering survey along the proposed existing roads and streets. The survey shall also cover major and important features, if any, within existing boundary.
2. Total stations shall be used for this purpose. Collection of DTM data shall begin from two known station points and close at a third known station but not the

back-sight station i.e. compulsory check shots would be taken at known points before changing the occupied station or at the end of days' work i.e. stopping the survey work. Point data collected will be strictly as per a uniform code list.

The topographical survey shall be carried out as per the instructions provided and shall be mapped based on the requirement. The following features should be mapped during the survey:

- Taking details of building line/boundary wall, utility services such as electric lines, telephone lines, manhole details, etc., if any. Location of approach roads, main roads, lanes etc. showing road / lane name, carriageway, footpaths, central verge, drains and the widths of all the main and approach roads and at locations where there is a sudden change in widths of alignment shall be measured physically and marked on the drawings.
- Sufficient road centre points and both edge points shall be taken to define the existing layout of the road.
- The length, width, type and name of the road to be surveyed and marked on the map.
- Special emphasis shall be laid in identifying all religious places – temple, mosque, church; its locations, boundary lines and dimensions of compound walls & entrances.
- Details of open river, canal and drains, nallahs will be taken as per the scope of the work.
- Survey of Road-Over-Bridges (ROBs) and Foot-Over Bridges (FOBs), Railway bridges.
- Traffic signals, light posts, bus stops, junction boxes (telephone and power), transformers telephone posts etc.
- Location and list of trees with girth more than 30 cm (measured at 1 m height from ground level).
- Levels at important locations like road junctions, area where there are major undulations of the ground etc.
- Any other structure or details which may feel important and or as instructed by Engineer-in-charge.

#### **v. Longitudinal Section**

Collection of existing ground level Points for the roads and streets shall be 25m apart from this, in case of sudden change, road turnings, road edges in ground profile and at junctions will be captured in such a fashion by which the crest and bottom most points of the ground shall also be taken.

#### **vi. Cross Sections**

Points on the natural surface will be taken not exceeding 50m intervals or at every grade change apart. Cross Section levels will be taken at road centre, BT edges, Drains top and down and edge of the boundaries in transverse direction of the roads/streets. All structure details with invert level will be picked up and contours will be plotted at 1m interval. Total stations will be used for this purpose.

#### **vii. Preparation of drawings**

- Preparation of survey drawing on cad scale 1:1000 and Drawing scale 1:3000 and plotting of spot / ground levels and all features.
- Drawing entities shall be prepared in fonts, letter sizes etc., as specified in the legend drawing. Output shall be on electronic version in AutoCAD 2004/2010 (2 copies) will be provided. All drawings shall be produced in digital format.
- All drawings shall be prepared on Auto CAD. The Auto CAD drawings will have different layers for different entities like Road, Spot/ Ground levels, Drain, Building line, Boundary Wall,
- Traverse Station, ROB / RUB etc. as instructed by Engineer In charge. X, Y, Z co-ordinates of all spot / ground points shall be provided in CSV file as directed by Engineer-in-charge with point numbers and feature coding as per list of codes.
- A list of layers to be used for preparation of drawings is enclosed. The legends for surveying and preparation of plans shall conform to the Survey of India.
- On completion of detail survey and further plotting the same on mapping software, with a check plot all details will be verified on ground before the finalization of prepared drawings.

#### **MAP CONTENT**

**Co-ordinate grid:** Drawing will be in metric system and ITRF/WGS 84 reference frame on UTM projection system will be properly maintained and spacing the grids at 100m and East & West value in bottom and North & south value in left side.

**Control:** All horizontal and vertical ground control points will be shown on the maps in plan and tabulated.

**Planimetric:** The maps shall contain all surface – visible features, structures, planimetric features and utility details which are visible and identifiable

#### **DELIVERABLES:**

1. List of PSCP and Traverse Survey Control points by end of the assignment.
2. List of Temporary benchmark, by end of the assignment.
3. Furnish CSV file – containing all data in the format of x, y, z with proper coding and Descriptions, by end of the assignment.
4. Soft copy of drawing files in Auto CADD 2010 with reference to the UTM co ordinates, by end of the assignment.

**SAFETY PRECAUTIONS**

Contractor is responsible for the safety of his / her staffs and equipment's deployed at site during survey work. Adequate safety precautions shall be taken for working providing necessary safety jackets with reflectors etc.

**OTHER CONDITIONS**

- The survey agency will be responsible for the safety and security of all your personnel working at site including all equipment deployed and GIZ will not be liable for any loss
- The organization shall be wholly liable to pay damages for all losses, injuries or death, including consequential damages or economic loss caused to third parties owing to negligent and/or improper methods of working. You shall therefore take out, at your cost, such third party, workmen's compensation and other insurance, as it deems necessary for the purpose. There will be no liability on GIZ
- Your liability to pay damages for all losses, including consequential damages or economic loss, or failure, savings or other benefits, incurred by us as a direct result of breach of contract or negligence of any other sort by you in connection with or arising out of this engagement or any addition or variation thereto shall be limited to re-performing at its own expense professional services comprising all or part of the services. There will be no liability on GIZ.
- In case, we find errors and inadequate data in survey which are not in compliance with our specifications and/or as per instructions issued by client representative at site, you shall re do the surveys as instructed without any extra payment.
- In case of extension of scope, additional work will be paid as per the rates agreed. The final payment will be based on the actual survey done on the field as per the quoted rate and as approved by the GIZ Representative.

**Tender Requirements****1. Qualifications of proposed staff****1.1 Expert 1: Lead Surveyor (Required No's - 2) Total 20 man days for each lead surveyor****1.1.1 General qualifications**

**Education:** Must be a registered surveyor and possess a surveyor licence issued by competent authority

**Professional experience:** At least 5 years' experience in undertaking topographic

survey using Total Station with at least 2 surveys undertaken for urban infrastructure like water supply, stormwater etc. at city level

**1.1.2 Experience in the region/knowledge of the country** 5 years of experience in undertaking city level topographic survey for stormwater drains and having worked in Bhubaneswar will be an advantage

**1.1.3 Language skills: business fluency in** Knowledge of local language (Odiya) and Hindi/English is required.

**1.2 Expert 2: Support staff (Required No's – 2) Total 20 man days for each support staff**

### **1.2.1 General qualifications**

**Education:** Basic elementary education is required.

**Professional experience: At least 2 years' experience in** undertaking topographic survey using Total Station with at least 1 survey undertaken for urban infrastructures like water supply, stormwater etc.

**1.2.2 Experience in the region/knowledge of the country** 2 years of experience in undertaking city level topographic survey for stormwater drains and having worked in Bhubaneswar will be an advantage

**1.2.3 Language skills: business fluency in** local language (Odiya) and Hindi/English is required.

## **2. *Appropriateness of proposed concept***

- Understanding of the objectives
- Proposed methodology for the survey
- Proposed methodology for monitoring the overall activity

**Eligibility Requirements for the Firms Participating in the Tender (please see the enclosed sheet of “Grid for assessing eligibility of consulting firms” for weightage)**

### **I. Commercial Assessment**

- Please provide the legal status of your firm.
- Average annual turnover of the agency or consortium for the last three financial years: at least Euro 15000.
- The number of employees of the agency or consortium as at 31.12.20 of the previous year: at least 5 persons.

### **IIA. Technical Assessment**

- The bidder shall have reference projects with a minimum commission value of 5,000 EUR



- At least 3 reference projects in the technical in the field of survey related in India.
- At least 1 reference projects in “India” in last three years

## II B.1 Technical Experience

At least 5 years of experience in carrying out survey.

At least 5 years of experience in using total station survey tools

At least 3 years of experience in urban infrastructure related projects like water supply and stormwater.

## II B.2 Regional Experience

- Experience of projects in Southern Asia region.

*Bidders must submit the documentary evidence of above-mentioned requirements.*

**Please note the organization must provide a qualified surveyor with a valid surveyor licence issued by competent authority**

## 3. Specification of inputs

Fee days	Number of experts	Number of days per expert	Comments
• Preparation/debriefing	4	1	1 day x 2 – 2 days Lead Surveyor 1 day X 2 – 2 days Support staff
• Implementation	4	15	15 days X 2 – 30 days Lead Surveyor 15 days X 2 – 30 days Support staff
• Final submission	4	4	4 days X 2 – 8 days Lead Surveyor 4 days X 2 – 8 days Support staff
Travel expenses	Number of experts	Number of days/nights per experts	Comments
• Per-diem allowance in country of assignment	NA	NA	
• Overnight allowance in country of assignment	NA	NA	
• Local Travel	2	15	15 days * 2 vehicle – 30 Days
Flights	Number of experts	Number of flights per experts	Comments
• International flights	NA	NA	
• Domestic flights	NA	NA	
Other costs	Number of experts	Amount per experts	Comments
• Hard Drive	1 Unit		

*Calculate your financial bid exactly in line with the quantitative requirements of the specification of inputs above. There is no contractual right to use up the full days/travel or workshops or budgets. The number of days/travel/workshops and the budgets will be contractually agreed as **maximum amounts**. The regulations on pricing are contained in the price sheet.*

**Note:**

If restrictions are introduced to combat coronavirus/COVID-19 (restrictions on air travel and travel in general, entry restrictions, quarantine measures, etc.), GIZ and the contractor are obliged to make adjustments to their contractual services to reflect the changed circumstances on the basis of good faith; this may involve changes to the service delivery period, the services to be delivered and, if necessary, to the remuneration.

#### **4. Specific conditions pertain to COVID-19 measures**

**The specific conditions pertain to Covid- 19 measures are integral part of contract and shall act as binding document under special agreement and interpreted along with GTCC.**

In addition to the provisions as detailed in **clause 09** of The General Terms of Contract governing the delivery of works and services commissioned by **Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH (local)**, the Consultant confirms that he/she accepts the Consulting engagement with full knowledge and understanding of the travel and other requirements of the engagement including specifically the need, on the part of the Consultant, to take all required precautions (including prevention and risk mitigation measures) against the risks arising from the ongoing Novel Corona Virus (CoVid - 19) Pandemic

The Consultant shall provide to the GIZ an RT-PCR Negative Test Report for Novel Corona Virus (CoVid - 19) prior to starting the Consulting Engagement and shall additionally comply with the following at all times in the course of the Consulting Engagement:

1. Obtain Medical and other Insurance Cover in respect of the Novel Corona Virus (CoVid - 19) Infection/Disease and consequences thereof – (GIZ will reimburse the insurance cover up to 5000 Indian Rupees)
2. Strictly follow and comply with the prescribed Mask, Hand Washing/Sanitization and Social Distancing Protocols.
3. Take safe and secure mode of transportation.
4. Observe all local restrictions/precautions as applicable for the specific areas of travel covered by the Consulting Engagement.
5. If eligible, get vaccinated against the Novel Corona Virus (CoVid - 19).
6. Install and maintain as active at all times the Government of India's Arogya Setu App.
7. If exposed to any active case of Novel Corona Virus (CoVid - 19) to take all steps as advised by the Government of India's advisories in such case.

8. If feeling unwell and experiencing any of the symptoms of Novel Corona Virus (CoVid - 19) infection - to take all steps as advised by the Government of India's advisories in such cases including but not limited to getting an RT-PCR Test for Novel Corona Virus (CoVid - 19), self-isolation, notifying the GIZ and also the concerned local Novel Corona Virus (CoVid - 19) isolation/treatment facility.
9. Other compliance as may be notified by the GIZ and the Government of India from time to time in relation to Novel Corona Virus (CoVid - 19) infection/disease.

Furthermore, The Consultant accepts the Consulting Engagement on a best and informed judgement basis with full knowledge of the tasks to be performed, the place of performance and the precautions and safeguards to be reasonably taken by the Consultant to mitigate all types of risks associated with the said Consulting Engagement. The Consultant undertakes the Consulting Engagement at his/her own risk and responsibility and shall not, under any circumstances, and at any time, be entitled to assert any liability or other claims whatsoever against the GIZ, its Management, Officers and Employees for any consequences or risks or harm that may arise to the Consultant in the course of or as a consequence of undertaking the Consulting Engagement or any actions or consequences arising in relation to such Consulting Engagement.