

## Invitation for Limited Tender

IIT Madras invites quotations on a limited tender basis to carry out ground surveys using DGPS and Total Station for a research study on floods in Chennai. The Ground Survey has three components:

1. River Cross Section Survey
2. Major canal/waterways Cross Section Survey
3. Spot Level on Road with invert level of Storm Water Drains

Details of work	
1	River Cross Section Survey <ol style="list-style-type: none"> <li>a. Adyar River (~25km)</li> <li>b. Cooum River (~25km)</li> <li>c. Kosasthaliayr River (~15km)</li> </ol>
2	Major Canal / Water ways Cross Section Survey <ol style="list-style-type: none"> <li>a) Buckingham Canal (50km)</li> <li>b) Puzhal Surplus canal (15.13km)</li> <li>c) Kollatur surplus canal (2.84 km)</li> <li>d) Korattur surplus canal (4.55 km)</li> <li>e) Ambattur Surplus Canal (5.41 km)</li> <li>f) Kodungaiyur Drain (3.02 km)</li> <li>g) Virugambakkam - Arugambakkam Canal (1.17 km)</li> <li>h) Manapakkam canal (4.38 km)</li> <li>i) Kolapakkam canal (1.74 km)</li> <li>j) Otteri Nullah (38.4km)</li> <li>k) Captain Cotton Canal (4km)</li> <li>l) Mambalam Drain (9.4km)</li> <li>m) Veerangal Odai (3.38 km)</li> <li>n) Velacheri Drain (2.14km)</li> <li>o) Keelkattalai canal (4.15 km)</li> <li>p) Arasankazhani canal (4 km)</li> </ol> <p><b><u>Extent: within Greater Chennai Corporation Limits</u></b></p>
<ul style="list-style-type: none"> <li>• Cross-sections are to be surveyed normal to the centre line of the river / channel @ 1000m interval</li> <li>• Cross-sections also have to be surveyed where the channel significantly changes width in between the specified interval, bends, at bridge locations, check dams etc.,</li> <li>• Where it is not practical to survey a section at the prescribed position or interval the position of</li> </ul>	

the section may be moved. However, the interval between two adjacent sections shall not exceed the prescribed interval (1000 m)

- Where a flood defense is present on the cross-section, this should be surveyed as a separate string
- In addition to cross-sections through the channel, cross-sections should extend from the channel to the true land level on either side and extend at least 50m beyond the river / canal bank top or up to flood defense structure. If this is not possible due to compound walls etc., capture the base and top elevations of the compound wall in the same cross section.
- For open channel sections, the drawn line of the cross-section shall be correct to better than  $\pm 0.1$ m in height
- Points along the cross-section are to be surveyed at an interval which accurately depicts the shape of the channel.
- Bed levels will be measured directly whenever and wherever possible. Where direct measurement is impossible, for instance the water depth is too great or other causes make it impractical, then it will be sufficient to read the depth of water against a staff or to use echo sounding and to relate these readings to a measured water level.
- The surveyor shall use an appropriate surveying method for the section concerned. If the cross-section is surveyed using total station techniques the base point/s shall be used for the total station set up.
- If there is a clear sky view and the accuracy specification can be met, GNSS RTK or network RTK detail survey methods may be used.
- Observations must be checked for gross errors (eg instrument or pole height errors). The checking method(s) used shall be documented in the survey report.
- A complete elevation of the upstream side is to be taken with particular attention paid to the measurement of the bridge openings and flood arches. Surveyor shall survey the bed level where the structure enters the bed. Details of any bridge piers will also be shown. Soffit, invert and springing levels will be added as labels. The structure section shall include banks behind the structure.
- All Structures / Cross Drainage Structures/Diversion Structures are to surveyed with detailed dimensions of structural components.(i.e. with its critical levels (soffit, invert, deck, crest etc.))
- Presentation of Longitudinal Section: It will show the following: (i) The deepest bed level at each section (ii) The water level at each section. (iii) The bank crest levels derived from crest point levels shown on the cross sections. (iii) The section number and chainage of each section and the altitudes of each of the plotted points. The chainage shall be quoted to the nearest metre.
- At each section minimum of one photograph is to be shown along with measurement details.

3.	Spot Levels on Road with invert level of Storm Water Drains ( Only Bus Route roads)	1000m interval	388 (bus route roads)	Spot levels of Roads and invert level (with respect to MSL) of Storm Water Drain(SWD) along the Bus Route with SWD Dimensions
<ul style="list-style-type: none"> <li>• All Bus Routes within Greater Chennai Corporation (not the routes covered by Mini Bus) shall be surveyed.</li> <li>• Spot Level of Road (Left, Centre and Right) at every 1000m interval shall be determined referenced to MSL (Spot levels of roads on elevated bridge sections need not be taken)</li> <li>• At each section where spot level is measured, the invert level of the Storm Water Drain provided on the sides of the road is to be measured</li> <li>• The dimensions of SWD in terms of width and height is to be measured</li> <li>• At each section, a minimum of one photograph is to be provided showing the location with measurement details (Photos should be geotagged)</li> </ul>				

Instruments to be used: Total Station /DGPS as appropriate

Accuracy: DGPS Altimetric Accuracy - better than 10 Cm

All Levels/Heights : Shall be referenced to Mean Sea Level (MSL)

Field Survey Duration: 7 Weeks

Deliverables: 8 weeks from the date of issue of Work Order

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Total Length of Bus Route Roads maintained by Greater Chennai Corporation	- 387.35 Km
Total Length of Interior Roads maintained by Greater Chennai Corporation	- 5623.00 Km
Total Length of cement concrete Roads in Interior Roads	- 1292.54 Km

**Please send your quotations as 1) Technical and 2) Financial components separately in sealed envelopes and send to the address below latest by close of **June 20, 2017**:**

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The Technical component of the bid should contain the following:

1. Whether only DGPS or total station or a combination of them would be used for field survey.  
Give a detailed methodology for each of the three components of the field survey.
2. Total number of equipment and specification of the equipment (DGPS and Total station) and number of teams and field personnel that will be deployed for the survey
3. Clear work plan and timeline to complete the survey within a span of 7 weeks and deliverables by 8 weeks from the date of issue of work order
4. Accuracy that would be achieved by the DGPS and Total station survey

The financial components of the bid should contain the following:

1. Itemized lump sum cost for each of the three components of the survey (cost per unit length is not acceptable)
2. Any applicable taxes