



**DELHI METRO RAIL CORPORATION LTD.**  
*(A Joint Venture of Govt. of India & GNCTD)*

**DETAILED TOPOGRAPHICAL SURVEY WORK FOR PROPOSED JANAKPURI TO  
MAJLIS PARK (INCLUDING) DELHI MRTS CORRIDOR OF PHASE-IV PROJECT**

**CONTRACT NO: DMRC/CPM-1/PH-IV/JANAKPURI-MAJLIS PARK/SURVEY/1**

**TENDER DOCUMENTS**

**NOTICE INVITING TENDER**

**DELHI METRO RAIL CORPORATION LTD.**  
**OFFICE OF- CPM-1, 9/11, MALL ROAD, DELHI-110054**

## CONTENTS

<b>CLAUSE PAGE</b>	<b>DESCRIPTION</b>	
<b>SECTION-1- NOTICE INVITING TENDER</b>		
1.1	GENERAL	3
1.1.1	Name of Work	3
1.1.2	Key Details	3
1.1.3	Qualification Criteria	4
1.2	POINTS TO BE NOTED	10
<b>SECTION-2- SCOPE OF WORK</b>		
2.0	GENERAL	13
2.1	Brief Scope	13
2.2	Work Content	13
2.3	General Instruction	18
2.4	Material & Other Instruction	18
2.5	Time Schedule	19
2.6	Work Site	19
<b>SECTION-3- TENDER PRICES AND SCHEDULE OF PAYMENT</b>		
3.1.1	Tender Prices	20
3.1.2	Schedule of Payment	20

**NOTICE INVITING TENDER (NIT)**  
**(e-Tender)**

**1.1 GENERAL**

**1.1.1 Name of Work:**

Delhi Metro Rail Corporation (DMRC) Ltd. invites online Open e-tenders from eligible shortlisted applicants, who fulfil qualification criteria as stipulated in Clause 1.1.3 of NIT, for the work **“Contract-DMRC/CPM-1/Ph-IV/Janakpuri-Majlis Park/Survey/1: Detailed topographical Survey Work for proposed Janakpuri to Majlis Park(Including) Delhi MRTS corridor of Ph-IV Project”**.

The brief scope of the work is provided in Section-2 of NIT

**1.1.2 Key Details:**

Approximate cost of work	<b>INR 30,02,864.00</b> (Rupees Thirty Lacs two thousand eight hundred sixty four Only).
Tender security amount	<b>INR 60,057.00</b> (EMD in original IN FAVOUR OF DMRC LTD, to be submitted in the office mentioned below before last date & time of submission of tender document)
Completion period of the Work	<b>04 (Four) Months</b>
Tender Documents on sale	From 24.11.2016 to 15.12.2016 (up to 1500 hrs) on e-tendering website <a href="https://eprocure.gov.in/eprocure/app">https://eprocure.gov.in/eprocure/app</a> . <b>Tender document can only be obtained after registration of tenderer on the website</b> <a href="https://eprocure.gov.in/eprocure/app">https://eprocure.gov.in/eprocure/app</a>
Cost of Tender Documents	INR 5,250/- (inclusive of 5% DVAT) Non-Refundable (Demand Draft/Banker's cheque) drawn on a Scheduled Commercial bank based in India and should be in favour of “Delhi Metro Rail Corporation Ltd.” payable at New Delhi.) Cost of tender documents i.e., D.D./Banker's cheque, in original, shall be accepted only up to 1500 hours on 13.12.2016 in the office of Chief Project Manager/1, 9/11, Mall Road Office, Delhi-110054.
Last date of seeking clarifications	01.12.2016 up to 17:30 hrs. Queries/clarifications from bidders after due date and time shall not be acknowledged

Last date of issuing addendum	02.12.2016
Last Date & Time of Submission of Tender Document	15.12.2016 up to 1500 hrs.
Date & time of opening of Technical Bid online	15.12.2016 @ 16:30 Hrs at Metro Bhawan, 5 <sup>th</sup> Floor, A- Wing, Barakhamba Road, Delhi -110001
Date & time of opening of Financial Bid Online	Shall be informed after evaluation of technical bid through website <a href="https://eprocure.gov.in/eprocure/app">https://eprocure.gov.in/eprocure/app</a> .
Authority and place for submission of tender cost, tender security, required documents (if any), seeking clarifications etc.	Chief Project Manager/1, 9/11, Mall Road Office, Delhi-110054. Ph.011-23813675.
<p><b>NOTE:</b> The tender documents (non-transferable) can only be obtained after registration of tenderer on the website <a href="http://www.eprocure.gov.in/eprocure/app">www.eprocure.gov.in/eprocure/app</a>. Downloaded tender document will not be entertained in office in physical form. All D.D. should be drawn in favour of “Delhi Metro Rail Corporation Ltd.”, payable at New Delhi. The bidder who fails to submit the tender cost &amp; tender security (in original) within stipulated scheduled deemed to be rejected. Any corrigendum, addendum etc issued shall be part of this tender document and shall be made available on DMRC website <a href="https://eprocure.gov.in/eprocure/app">https://eprocure.gov.in/eprocure/app</a>. <b>Bidder under MSME Registered Company shall submit a reference letter with all supporting documents to above mention addressee of Chief Project Manager/1, before 15.12.2016.</b></p>	

### 1.1.3 Qualification Criteria:

#### 1.1.3.1 Eligible Applicants :

- i. The tenders for this contract will be considered only from those tenderers (proprietorship firms, partnerships firms, companies, corporations, consortia or joint ventures) who meet requisite eligibility criteria prescribed in the sub-clauses of clause 1.1.3 of NIT. In the case of a JV or Consortium, all members of the Group shall be jointly and severally liable for the performance of whole contract.
- ii. (a) A non-Indian firm is permitted to tender only in a joint venture or consortium arrangement with any other Indian firm having minimum participation interest of 26% or their wholly owned Indian subsidiary registered in India under Companies Act-1956 with minimum 26% participation
- (b) A tenderer shall submit only one bid in the same tendering process, either individually as a tenderer or as a partner of a JV. A tenderer who submits or participates in, more than one bid will cause all of the proposals in which the tenderer has participated to be disqualified. No tenderer can be a subcontractor while submitting a bid individually or as a partner of a JV in the same bidding process. A tenderer, if acting in the capacity of subcontractor in any bid, may participate in more than one bid, but only in that capacity.

- iii. Tenderers shall not have a conflict of interest. All Tenderers found to have a conflict of interest shall be disqualified. Tenderers shall be considered to have a conflict of interest with one or more parties in this bidding process, if:
  - (a) a tenderer has been engaged by the Employer to provide consulting services for the preparation related to procurement for on implementation of the project;
  - (b) a tenderer is any associates/affiliates (inclusive of parent firms) mentioned in subparagraph (a) above; or
  - (c) a tenderer lends, or temporarily seconds its personnel to firms or organizations which are engaged in consulting services for the preparation related to procurement for on implementation of the project, if the personnel would be involved in any capacity on the same project.
- iv. A firm, who has purchased the tender document in their name, can submit the tender either as individual firm or in joint venture/Consortium. However, the lead partner in case of JV shall be one who has experience of similar work.
- v. Any Central / State government department / public sector undertaking / other government entity or local body must not have banned business with the tenderer (any member in case of JV) as on the date of tender submission. Also no contract of the tenderer should have been rescinded / terminated by DMRC / Central or State Govt. Department/ Public Sector undertaking/Other Govt. Entity or local body after award during last 5 years due to non-performance of the tenderer or any of JV/Consortium members. The tenderer should submit undertaking to this effect in **Appendix-K** of Form of Tender.

The overall performance of the tenderer (all members in case of JV/Consortium) shall be examined for all the ongoing Similar works and works completed within last one year, of value more than 40% of NIT cost of work. The tenderer shall provide list of all such works in the prescribed Performa given in **Appendix-L** of the Form of Tender. In addition the tenderer shall also submit certificate issued by the client/Employer for satisfactory performance for all these works with respect to completion of work/execution of work (for running works) failing which their tender submission shall not be evaluated and the tenderer shall be considered non-responsive and non-compliant to the tender conditions. The performance certificate issued by the client should not be older than one month from the last day of the previous month of tender submission.

If the tenderer or any of the constituent 'substantial member(s)' of JV/Consortium does not meet the criteria stated in the **Appendix-L**, the tenderer including the constituent 'substantial member(s)' of JV/Consortium shall be

considered ineligible for participation in tender process and they shall be considered ineligible applicants in terms Clause 1.1.3.1 of NIT.

vi. Tenderer (any member in case of JV/consortium) must not have paid liquidated damages of 10% (or more) of the contract value in a contract due to delay or penalty of 10% (or more) of the contract value due to any other reason during last five years. The tenderer should submit undertaking to this effect in **Appendix-N** of Form of Tender.

vii. Tenderer (any member in case of JV/consortium) must not have suffered bankruptcy/ insolvency during the last 5 years. The tenderer should submit undertaking to this effect in **Appendix-O** of Form of Tender.

viii. LEAD PARTNER/ NON SUBSTANTIAL PARTNERS/ CHANGE IN JV/ CONSORTIUM

a. Lead partner must have a minimum of 26% participation in the JV/Consortium.

b. Partners having less than 26% participation will be termed as non-substantial partner and will not be considered for evaluation which means that their financial soundness and work experience shall not be considered for evaluation of JV/Consortium.

c. In case of JV/Consortium, change in constitution or percentage participation shall not be permitted at any stage after their submission of application otherwise the applicant shall be treated as non-responsive.

d. The tenderer, in case of JV/Consortium, shall clearly and unambiguously define the role and responsibilities for each substantial/non-substantial partner in the JV agreement/ MOU submitted vide foot note (d) of **Appendix-M** of Form of Tender, providing clearly that any abrogation/subsequent re-assignment of any responsibility by any substantive/non-substantive partner of JV/Consortium in favour of other JV/Consortium partner or any change in constitution of partners of JV/Consortium (without written approval of Employer) from the one given in JV agreement /MOU at tender stage, will be treated, as 'breach of contract condition' and/or 'concealment of facts' (as the case may be), vide GCC clause 4.33.1 [a (ii) and (iii)] and acted accordingly.

The Employer in such cases, may in its sole discretion take action under clause 4.33.1 (b) and/or under clause 4.33.1(c) of GCC against any member(s) for failure in

tenderer's obligation and declare that member(s) of JV/Consortium ineligible for award of any tender in DMRC or take action to terminate the contract in part or whole under clause 13 of GCC as the situation may demand and recover the cost/damages as provided in contract.

#### 1.1.3.2 Minimum Eligibility Criteria:

**A. Work Experience:** The tenderers will be qualified only if they have completed work(s) during last seven years ending **30.10.2016** as given below:

- (i) At least one work of any Similar work of value of **Rs. 24.02 lakhs** or more.

If the above work of **Rs. 24.02 lakhs** has been done by the foreign partner of JV and the work was done in the country of the foreign partner then in addition to this, the foreign partner must have done works equal to **Rs. 12.01 lakhs** outside the country of the foreign partner.

OR

- (ii) Two works of any Similar work each of value of **Rs. 15.01 lakhs** or more.

If the above work of **Rs. 15.01 lakhs** has been done by the foreign partner of JV and the work was done in the country of the foreign partner then in addition to this, the foreign partner must have done works equal to **Rs. 7.50 lakhs** outside the country of the foreign partner.

OR

- (iii) Three works of any Similar work each of value of **Rs. 12.01 lakhs** or more.

If the above work of **Rs. 12.01 lakhs** has been done by the foreign partner of JV and the work was done in the country of the foreign partner then in addition to this, the foreign partner must have done works equal to **Rs. 6.05 lakhs** outside the country of the foreign partner.

#### **Notes:**

- The tenderer shall submit details of works executed by them in the Performa of **Appendix of FOT- H** for the works to be considered for qualification of work experience criteria. Documentary proof such as completion certificates from client clearly indicating the nature/scope of work, actual completion cost and actual date of completion for such work should be submitted. The offers submitted without this documentary proof shall not be evaluated. In case the work is executed for private client, copy of work order, bill of quantities, bill wise details of payment received certified by C.A., T.D.S certificates for all payments received and copy of final/last bill paid by client shall be submitted.
- Value of successfully completed portion of any ongoing work up to **30.10.2016** will also be considered for qualification of work experience criteria.
- For completed works, value of work done shall be updated to **30.10.2016** price

level assuming 5% inflation for Indian Rupees every year and 2% for foreign currency portions per year. The exchange rate of foreign currency shall be applicable 28 days before the submission date of tender.

- In case of joint venture / Consortium, full value of the work, if done by the same joint venture shall be considered. However, if the qualifying work(s) were done by them in JV/Consortium having different constituents, then the value of work as per their percentage participation in such JV/Consortium shall be considered.

**B. Financial Standing:** The tenderers will be qualified only if they have minimum financial capabilities as below:

- (i) **T1 – Liquidity:** It is necessary that the firm can withstand cash flow that the contract will require until payments received from the Employer. Liquidity therefore becomes an important consideration.

This shall be seen from the balance sheets and/or from the banking reference. Net current assets and/or documents including banking reference, should show that the applicant has access to or has available liquid assets, lines of credit and other financial means to meet cash flow of **Rs. 12.87 lakhs** for this contract, net of applicant's commitments for other Contracts. Banking reference should contain in clear terms the amount that bank will be in a position to lend for this work to the applicant/member of the Joint Venture/Consortium. In case the Net Current Assets (as seen from the Balance Sheets) are negative, only the Banking references will be considered. Otherwise the aggregate of the Net Current Assets and submitted Banking references will be considered for working out the Liquidity.

The banking reference should be from a Scheduled Bank in India or (in case of foreign parties) from an international bank of repute acceptable to DMRC **as per standard performa provided in ITT as Appendix-I** and it should not be more than 3 months old as on date of submission of bids.

In Case of JV- Requirement of liquidity is to be distributed between members as per their percentage participation and every member should satisfy the minimum requirement.

Example: Let member-1 has percentage participation= $M$  and member-2 has percentage participation= $N$ . If minimum liquidity required is ' $W$ ' then liquidity of member-1  $\geq \frac{W \cdot M}{100}$  and liquidity of member-2  $\geq \frac{W \cdot N}{100}$ .

- (ii) **T2 - Profitability:** Profit before Tax should be Positive in at least 2(two) year, out of the last five audited financial years.

In Case of JV: - The profitability of only lead member shall be evaluated.

- (iii) **T3 - Net Worth:** Net Worth of tenderer during last audited financial year should be  $\geq$  **Rs 18.02 lakh**

In Case of JV- Net worth will be based on the percentage participation of each Member.



Example: Let Member-1 has percentage participation = M and Member-2 has =N. Let the Net worth of Member-1 is A and that of Member-2 is B, then the Net worth of JV will be

$$\frac{=AM+BN}{100}$$

**(iv) T4 - Annual Turnover:** The average annual turnover from any Similar Survey work of last five financial years should be **≥Rs. 72.07 Lacs.**

The average annual turnover of JV will be based on percentage participation of each member.

Example: Let Member-1 has percentage participation = M and Member - 2 has =N. Let the average annual turnover of Member-1 is 'A' and that of Member-2 is 'B', then the average annual turnover of JV will be

$$\frac{=AM+BN}{100}$$

Notes :

- Financial data for latest last five audited financial years has to be submitted by the tenderer in **Appendix of FOT-J** along with audited balance sheets. The financial data in the prescribed format shall be certified by Chartered Accountant with his stamp and signature. In case audited balance sheet of the last financial year is not made available by the bidder, he has to submit an affidavit certifying that 'the balance sheet has actually not been audited so far'. In such a case the financial data of previous '4' audited financial years will be taken into consideration for evaluation. If audited balance sheet of any year other than the last year is not submitted, the tender may be considered as non-responsive.
- Where a work is undertaken by a group, only that portion of the contract which is undertaken by the concerned applicant/member should be indicated and the remaining done by the other members of the group be excluded. This is to be substantiated with documentary evidence.

#### 1.1.3.3 Bid Capacity Criteria:

**Bid Capacity:** The tenderers will be qualified only if their available bid capacity is more than the approximate cost of work as per NIT. Available bid capacity will be calculated based on the following formula:

$$\text{Available Bid Capacity} = 2 * A * N - B$$

Where,

A = Maximum of the value of construction works executed in any one year during the last five financial years (updated to **30.10.2016** price level assuming 5% inflation for Indian Rupees every year and 2% for foreign currency portions per year).

N = No. of years prescribed for completion of the work

B = Value of existing commitments (**as on 30.10.2016**) for on-going

construction works.

Notes:

- Financial data for latest last five financial years has to be submitted by the tenderer in **Appendix of FOT-J** along with audited financial statements. The financial data in the prescribed format shall be certified by the Chartered Accountant with his stamp and signature in original.
- Value of existing commitments for on-going construction works has to be submitted by the tenderer in **Appendix of FOT-G**. These data shall be certified by the Chartered Accountant with his stamp and signature.
- In the case of a group, the above formula will be applied to each member to the extent of his proposed participation in the execution of the work. If the proposed % participation is not mentioned then equal participation will be assumed.

#### **Example for calculation of bid capacity in case of JV / Group**

Suppose there are 'P' and 'Q' members of the JV / group with their participation in the JV / group as 70% and 30% respectively and available bid capacity of these members as per above formula individually works out 'X' and 'Y' respectively, then Bid Capacity of JV / group shall be as under:

**Bid Capacity of the JV / group = 0.7X + 0.3Y**

1.1.3.4 The tender submission of tenderers, who do not qualify the minimum eligibility criteria & bid capacity criteria stipulated in the clauses 1.1.3.2 to 1.1.3.3 above, shall not be considered for further evaluation and therefore rejected. The mere fact that the tenderer is qualified as mentioned in sub clause 1.1.3.2 to 1.1.3.3 shall not imply that his bid shall automatically be accepted. The same should contain all technical data as required for consideration of tender prescribed in the ITT.

## **1.2 POINTS TO BE NOTED**

1.2.1 Works envisaged under this contract are required to be executed in all respects up to the period of completion mentioned above.

1.2.2 Tender document consists of the following:

- a. Notice Inviting Tender - consisting of
  - Section 1.** Notice Inviting Tender.
  - Section 2.** Scope of Work.
  - Section 3.** Tender prices & Schedule of Payment.
- b. Instructions to Tenderers
- c. Special Conditions of Contract
- d. Bill of Quantities.
- e. Index Plan of Alignment

1.2.3 The contract shall be governed by DMRC's General Conditions of Contract (GCC) with latest corrections slips and the documents listed in Para 1.2.2 above.

- 1.2.4 Following documents even though not attached as a part of tender documents will be form integral part of the same. The work is to be carried out in accordance with General Condition of Contract (GCC) of DMRC
- 1.2.5 All Tenderers are hereby cautioned that the tender containing any material deviation or reservation as described in Clause 24.0 of “Instructions to Tenderers” and / or minor deviation without quoting the cost of withdraws shall be considered non-responsive & shall be summarily rejected.
- 1.2.6 The intending shortlisted tenderers must be registered on e-tendering portal <https://eprocure.gov.in/eprocure/app>. Those who are not registered on the e-tendering portal shall be required to get registered beforehand. After registration, the tenderer will get user id and password. On login, tenderer can participate in tendering process and can witness various activities of the process
- 1.2.7 The authorized signatory of intending tenderer, as per Power of Attorney (POA), must have valid **class-II** or **class-III** digital signature. The tender document can only be downloaded from e- tendering portal using class-II or class-III digital signature. However, the tenderer shall upload their tender on <https://eprocure.gov.in/eprocure/app> using class-II or class-III digital signature of the authorized signatory only.
- 1.2.8 Tender submission will be made on line after uploading the mandatory scanned documents towards cost of tender documents such as Demand Draft or Pay Order or Banker’s cheque from a scheduled commercial bank based in India and towards Tender Security such as Bank Guarantee or Demand Draft or Pay Order or Banker's cheque from a scheduled commercial bank based in India and other documents as stated in the tender documents.
- 1.2.9 Submission of Tenders shall be closed on e-tendering website of DMRC at the date & time of submission prescribed in NIT after which no tender shall be accepted.
- It shall be the responsibility of the bidder / tenderer to ensure that his tender is submitted online on e-tendering website <https://eprocure.gov.in/eprocure/app> before the deadline of submission. DMRC will not be responsible for non-receipt of tender documents due to any delay and/or loss etc.
- 1.2.10 Tenders shall be valid for a period of 120 days (both days inclusive i.e. the date of submission of tenders and the last date of period of validity of the tender) from the date of submission of Tenders and shall be accompanied with a tender security of the requisite amount as per clause 12 of ITT.
- 1.2.11 DMRC reserves the right to accept or reject any or all proposals without assigning any reasons. No tenderer shall have any cause of action or claim against the DMRC for rejection of his proposal.
- 1.2.12 Tenderers are advised to keep in touch with e-tendering portal <https://eprocure.gov.in/eprocure/app> for updates.

**Project Manager/1C**  
**Delhi Metro Rail Corporation Ltd**

## SECTION 2

### SCOPE OF WORK

**2.0** The contractor will execute the work i.e. “**Contract-DMRC/CPM-1/Ph-IV/Janakpuri-Majlis Park/Survey/1: Detailed topographical Survey Work for proposed Janakpuri to Majlis Park (Including) Delhi MRTS corridor of Ph-IV Project**”.

#### **2.1 Brief Scope**

The Brief scope of work shall cover the following:

The work mainly comprises of Survey of about **18.23 km length (approx) along Janakpuri to Majlis Park (Including) corridor of Phase IV of Delhi MRTS with Sixteen proposed MRTS stations and one Peeragari Depot**. Activities to be performed are as follows:

- Topographical survey with Total Station Instrument of Running Section and Station Areas.
- Triangulation survey of Section (including fixing of control points)
- Precise leveling of control points
- Profile leveling
- Final Location Survey
- Boundary Wall marking with Pegs
- Tree identification with number.
- List of infringing/adjacent structures & utilities along with their identification number & owner details.

#### **2.2 Work Content**

##### **2.2.1 Topographical Survey**

The work involves carrying out detailed engineering topographic survey in X,Y,Z coordinate along the alignment, on Janakpuri to Majlis Park corridor of Phase IV of Delhi MRTS with sixteen MRTS station or as required / directed by engineer-in-charge. The survey to cover all visible utilities (i.e. All types of drains, H.T./L.T. Transmission Lines, CNG Pipelines, water pipelines if visible, distribution box for electricity and telephone, level crossing, traffic signal, fire and water hydrant etc), Bye lanes, roads, Fly-Over, Bridge, Culvert, Underpass, cycle-track, green belt, property lines, pedestrian way sudden change of levels and other distinct features etc as directed by the engineer in charge.

- Before the commencement of topographical survey, the permanent control points shall be fixed all along the section by triangulation. Each triangulation

point will be finalized after taking mean value of observed co-ordinates from 3 successive triangulation control point and minimum two sets of observation shall be taken and the accuracy of control point should be +/- 2mm.

- All levels shall be taken with respect to benchmarks fixed over all triangulation points.
- Preparation of survey drawing on 1:1000 scale and plotting of spot / ground levels at 25 m intervals (with grid) and at sudden changes in elevation and all features. Print-outs shall be taken on 75-micron thick double matt transparent sheet.
- List of trees to be prepared in tabular form showing serial no., identification no., species, girth measured at 1.3m from ground level and location with respect to nearest prominent feature (for the trees having girth more than 15cm at a height 30cm above ground level). The location along with identification number is to be shown in drawing and made on separate Autocad layer. The Identification number is also to be marked at site with paint as directed by Engineer-in charge.
- Marking outer dimension of all built-up areas with plot numbers and ownership and type within survey limits.
- All drawings shall be prepared on Autocad, having layers as instructed by the Engineer-in Charge (e.g. road, spot/ground level, drain, building, boundary wall tree, control point, ROB/RUB etc). X, Y, Z co-ordinates of all control points shall be provided in ASCII file format as directed by Engineer-In-Charge with point numbers and feature coding with all field books and other documents including all data recorded in Total Station on CD.
- Drains and Nallahs and pipelines shall be shown with bed levels and HFLs
- Type of building such as temporary/permanent, no. of stories, and basement details.
- Level crossings with their numbers, class, manned/unmanned, ROB, RUB, FOBs and Railway bridges with their structural details, angle of crossing and road/rail level to be marked on drawings.
- Religious structures such as Temples, Gurudwaras, Mosque, Church, Monuments, Tombs, Mazars etc to be provided in details with their brief description.
- Name of all the adjacent colonies including house no. jhuggies clusters with numbers along with the route of survey.

- Details of northern railway tracks near the proposed alignment including take off points, curves, transitions, crossings, switches, and other details including electrical structures with their distances from the existing tracks.
- Vertical clearance to power lines or telephone/telegraph line at crossing of road/railway line.
- Levels at important locations like road junction, or areas having sudden change of elevation.
- Any other structure, utility or detail that may seem important or as advised by the Engineer in Charge.

### **2.2.2 Precise Leveling of Control Points**

The work involves carrying out leveling as mentioned in description of works. The survey should cover all the control points and connecting them to GTS benchmarks. Leveling should be carried out by double territory method to obtain precision in the job.

- Leveling must be carried out by a precision digital level with accuracy of better than 1 mm per km.
- Reduced level of all traverse stations shall be taken by Double Territory Method.
- Leveling must be started from a GTS Benchmark or benchmark given by DMRC and must be closed at the same after carrying out leveling of traverse stations.
- All leveling calculations must be submitted in a register along with all field data book and finally all calculations to be done in Excel format and the file is to be submitted.

### **2.2.3 Final Location Survey**

- The pegging of the alignment will be done along the centre-line of the alignment (i.e. centre line of both up and down MRTS tracks). The pegging is to be done at an interval of 25m c/c on straight profile and 15m c/c on curved area, marking the tangent points, apexes, ST, TC, CC, CT and TS points on the corridor or as directed by the engineer in charge.
- Any discrepancies with the topographical drawing and the proposed alignment as laid out on ground must be intimated to Engineer-in Charge/DMRC and any modification/ Suggestion for modification will be carried out only after consulting engineer-in-charge/DMRC.

- Providing land boundary pillars along running section at 100m interval on either side and at corners where land width is changing (only where the alignment is not following the road) as well as for station areas as per drawing.
- Specifications of pillars to be constructed and fixed at site shall be of following sizes (in LxBxH form)

<b>I</b>	On straight alignment at 50m interval	300mm x 300mm x 400mm Square Section (or as per BOQ)
<b>II</b>	Curve Points	300mm Dia x 400mm deep Circular in Section (OR As per BOQ)
<b>III</b>	At Apex Points	300mm Triangular x 400mm Deep (Or As per BOQ)
<b>IV</b>	Land Pillars	150mm x 150mm x 1200mm (Or As per BOQ)
<b>V</b>	Reference Pillar / Control Points	300mm x 300mm x 400mm (Or As per BOQ)

- All the pillars shall be first casted (as per Indian Railway Standard) at site and then alignment / Pier Points to be fixed in order to achieve better accuracy. While casting the reference pillars, a MS Plate of size 100mm x 100mm x 3mm shall be fixed on top of pillar. Suitable arrangement to be made to ensure the plate will be firmly held with pillar till the completion of construction. In case of pillars for triangulation control points a 350mm long MS Rod (min.) of 20mm dia shall be used in cast in situ pillar for marking survey point. The top end of rod shall be punched at the centre to mark the point and the bottom end to be welded with two cross 250mm long MS Rod (10mm dia). Engineer-in Charge can make changes in the arrangement to obtain better results. Mix to be used for casting of reference/alignment pillars shall be M-15 grade PCC and that for Boundary pillar M15 grade RCC. All details of pillars are to be done with prior approval from Engineer-In-Charge.
- In order to fix alignment point on road, 3mm thick steel plate of size 100mm x 100mm shall be used. The plate shall have a hole at centre to fix survey nail for alignment point and the nail shall be of minimum 6 inches long.
- Each alignment/pier points shall be established by taking mean out with respect to minimum three triangulation control points. These control points shall be fixed along the alignment in the triangulation form with the accuracy of +/- 2mm. All the three co-ordinates (X, Y, Z) of each central point and each pier location shall be located.

- Locations of all the alignment, boundary and reference points shall be marked correctly on drawings in AutoCAD.
- X, Y, Z co-ordinates of each triangulation control point should be written on the pillar by paint.
- Any deviation from the paper alignment found at site, the alignment parameters (i.e. deflection angles, radius of curve, transition length etc) shall be changed in consultation with the Engineer in Charge and Chief Project Manager-3 keeping the obligatory points in view.
- Two hard copies and one soft copy of detailed report containing following contents shall be submitted :
  - (a) Introduction
  - (b) Detailed methodology
  - (c) List of curves with related parameters finally laid out at site
  - (d) Tables showing description of location, chainage, co-ordinates of all the alignment, boundary and reference points, Sketches showing distance and angles of triangulation points with respect to three prominent locations.
  - (e) Drawing showing all the alignment, boundary and reference points.
  - (f) Trees list
  - (g) List of infringing/adjacent structures & utilities along with their identification number & owner details
  - (h) Recommendations.

#### **2.2.4 Profile Leveling**

The work involves carrying out of longitudinal sectioning along centre line of proposed alignment. Following guidelines must be adopted while carrying out this work.

- Leveling must be carried out by a precision digital level only.
- Levels shall be taken at an interval of 25m along the proposed alignment as shown in the plan. In addition, reduced levels have to be taken at every important locations e.g. road intersections, drain bed level, bridge level, rail level etc. moreover, the heights of buildings falling in the alignment area shall also be taken.
- Control points established along the alignment shall be referred as temporary bench marks.
- All the ground levels shall be plotted in the form of L-section in AutoCAD with scale 1:1000 horizontal and 1:100 vertical.



### **2.3 General Instructions**

- All the survey work (barring leveling work) shall be carried out using Total Station of One Second accuracy. The leveling work shall be carried out by Digital Level of better than 1mm per km accuracy.
- Minimum of three survey teams with their required instruments such as total station etc. shall be engaged to execute the work
- All control points must be fixed in consultation with the Engineer-In-Charge
- The legends for surveying and preparation of plans shall conform to that of Survey of India
- Weekly progress report including planning for the next week shall be sent to Engineer-in-charge every week.
- All field books, note books, floppies, CDs, drawings and other documents containing field data gathered during traverse survey shall be handed over to DMRC and contractor shall have no claim or use whatsoever. The contractor shall not reproduce any data collected from the work in any form.
- The quoted rates shall be inclusive of all the cost of labour, materials, equipments, preparation of drawings and reports etc. and any other charges in whatsoever form shall not be entertained in any circumstances.
- The engineer in charge or his representative will be visiting the site and the staff engaged in work shall extend co-operation and explain methodology adopted and satisfy them for accuracy of work.
- The equipment shall be accessible to the engineer in charge or his representative for inspection to ensure their suitability for the job.
- X, Y, Z co-ordinates of all triangulation points are to be carried forward with respect to the co-ordinates of control points at the end of Corridor.
- For final location survey, the contractor shall depute at least one senior surveyor having minimum 5 years in setting out of Railway Alignment. The contractor has to submit bio-data of such person to DMRC for approval. After the award of work, if contractor fails to follow this instruction, his contract will be terminated.

### **2.4 Materials and other General Instructions**

- All materials used in the work shall be of the best quality of their respective kinds as specified herein, obtained from sources and suppliers approved by the Engineer and shall strictly comply with the specification / codes of practice.

- Any material found not conforming shall be summarily rejected and shall have to be removed from the site by the contractor at his own cost.
- Any work not to the satisfaction of the engineer or his representative will be rejected and the same is to be rectified or removed and replaced with work of required standard of workmanship at no extra cost.
- The Tenderer / Contractor shall provide free of cost temporary covered sitting space at the site where the work is in progress.

## **2.5 Time Schedule**

The contractor will submit with tender “Time Schedule” for completion of the various activities of Surveying. This schedule is to be within the overall completion period of **04 Months**.

## **2.6 Work Site**

- The project site is located in the National Capital Territory of Delhi.
- The area covered by this work falls between Janakpuri to Majlis Park (Including) corridor of Delhi MRTS.
- Contractor shall plan his works keeping in view restriction of approach and availability of space and time.
- Alignment Index Plan (Drg. No.-DMRC/CPM-1/Ph-IV/Janakpuri-Majlis Park/01(01 Sheets) is provided.

### **SECTION 3**

#### **TENDER PRICES AND SCHEDULE OF PAYMENT**

##### **3.1 Tender Prices**

- 3.1.1 a. Unless explicitly stated otherwise in the Tender Documents, the contractors shall be responsible for the whole works, based on the work orders issued by the Competent Authority and payment shall be as per accepted rates based on the items carried out as per the work orders issued by the competent authority as and when required.
- b. The Contractor should/ must quote all inclusive of all taxes, duties, fees levies. No reimbursement over and above quoted amount shall be made to contractor. Further, while quoting for above bid may please separately mention the amount of Service tax including in quoted price,. The reimbursement of amount of service tax included in quoted price will be made on submission of documentary proof.

##### **3.2 Schedule of Payment**

The payment will be made on actual basis as per the accepted rates based on the activities carried out as per the work orders issued by the competent authority as and when required. The contractor has to submit all the tax invoices along with their return duly filed before raising of final bill.