REPUBLIC OF INDIA
HYDERABAD METROPOLITAN DEVELOPMENT AUTHORITY/
HYDERABAD GROWTH CORRIDOR LIMITED

JICA SPECIAL ASSISTANCE FOR PROJECT IMPLEMENTATION (SAPI) FOR THE ASSISTANCE FOR THE INTRODUCTION OF ITS ON ROAD NETWORK IN HYDERABAD METROPOLITAN AREA IN INDIA

PRE-QUALIFICATION DOCUMENT TENDER DOCUMENT

March 2014

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)
JICA STUDY TEAM Consisted by

N I P P O N K O E I C O . , L T D .
EAST NIPPON EXPRESSWAY CO., LTD.
METROPOLITAN EXPRESSWAY CO., LTD.

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PRE-QUALIFICATION DOCUMENT

HYDERABAD
GROWTH CORRIDOR LIMITED

HYDERABAD OUTER RING ROAD PROJECT
(HYDERABAD CITY INTELLIGENT TRANSPORT SYSTEM)

(Bid Notice No.)

Pre-Qualification Document For

Design, Supply, Installation, Testing, Commissioning, Training, Warranty and Remedying Defects of Equipments and Related Facilities of Hyderabad City Intelligent Transport System (Hyderabad City ITS) in the state of Andhra Pradesh, India being taken up with the loan of assistance of Japan International Cooperation Agency under Phase-2 program, and Operation and Maintenance of Hyderabad City ITS and Related Facilities being taken up with a separate fund provided by Hyderabad Growth Corridor Limited for a period of Five years from the date of the Commissioning Certificate.

_____ , 2014

PREQUALIFICATION DOCUMENTS

for

Design, Supply, Installation, Testing, Commissioning, Training, Warranty and Remedying Defects of Equipments and Related Facilities of Hyderabad City Intelligent Transport System (Hyderabad City ITS) in the state of Andhra Pradesh, India being taken up with the loan of assistance of Japan International Cooperation Agency under Phase-2 program, and Operation and Maintenance of Hyderabad City ITS and Related Facilities being taken up with a separate fund provided by Hyderabad Growth Corridor Limited for a period of Five years from the date of the Commissioning Certificate.

Issued on: _____

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Invitation for Prequalification (IFP)

____, 2014

REPUBLIC OF INDIA

Bid Notice No: _____

Date: _____ 2014

1. **Design, Supply, Installation, Testing, Commissioning, Training, Warranty and Remedying Defects of Equipments and Related Facilities of Hyderabad City Intelligent Transport System (Hyderabad City ITS) in the state of Andhra Pradesh, India being taken up with the loan of assistance of Japan International Cooperation Agency under Phase-2 program, and Operation and Maintenance of Hyderabad City ITS and Related Facilities being taken up with a separate fund provided by Hyderabad Growth Corridor Limited for a period of Five years from the date of the Commissioning Certificate** The HYDERABAD GROWTH CORRIDOR LIMITED (HGCL), Joint venture Company of Hyderabad Metropolitan Development Authority (HMDA) and Infrastructure Corporation of Andhra Pradesh (INCAP) has received a Loan from Japan International Cooperation Agency (hereinafter referred to as JICA) in the amount of 42,027 Million Yen towards the cost of Hyderabad Outer Ring Road Project (hereinafter called as "Project"), as per the Loan Agreement signed on 21st November 2008.It is intended that part of the proceeds of this Loan will be applied to eligible payments for which this Invitation for Prequalification is issued. Bidding will be governed by JICA's eligibility rules and procedures.
2. The Hyderabad Growth Corridor Limited (HGCL), (hereinafter referred to as "the Employer") intends to prequalify contractors and/or firms for Design, Supply, Installation, Testing, Commissioning, Training, Warranty and Remedying Defects of Equipments and Related Facilities of Hyderabad City Intelligent Transport System (Hyderabad City ITS) in the state of Andhra Pradesh, India being taken up with the loan of assistance of Japan International Cooperation Agency under Phase-2 program and Operation and Maintenance of Hyderabad City ITS and Related Facilities being taken up with a separate fund provided by Hyderabad Growth Corridor Limited for a period of Five years from the date of the Commissioning Certificate..
3. It is expected that Invitation for Tender will be made in _____,2014.
4. Prequalification will be conducted through prequalification procedures specified in the Guidelines for Procurement under Japanese ODA Loans, March 2009, and is open to all bidders from eligible source countries, as defined in the guidelines.
5. Interested eligible Applicants may obtain further information from and inspect the Prequalification Documents at the address given below; at end of this IFP from 10:30 Hours to 17:30 Hours on all working days after _____, 2014.
6. A complete set of the Prequalification Document may be purchased by interested Applicant(s) on the submission of a written application to the address below and upon payment of a non refundable fee of INR 25,000 in the form of Cash or Demand Draft drawn in Favour of the Hyderabad Growth Corridor Limited (HGCL), payable at Hyderabad, Andhra Pradesh, India.
7. The Prequalification Documents are also available on the website. Applicants who download the Prequalification Document from the website will be required to pay the non-refundable fee of INR 25,000 in the form of Cash or Demand Draft drawn in favour of the Hyderabad Growth Corridor

Limited (HGCL), payable at Hyderabad, Andhra Pradesh, India, at the time of submission of Application for Prequalification.

Applications for prequalification should be submitted in sealed envelopes, delivered to the address below by _, 2014, and be clearly marked "Application to Prequalify for Design, Supply, Installation, Testing, Commissioning, Training, Warranty and Remedying Defects of Equipments and Related Facilities of Hyderabad City Intelligent Transport System (Hyderabad City ITS) in the state of Andhra Pradesh, India being taken up with the loan of assistance of Japan International Cooperation Agency under Phase-2 program, and Operation and Maintenance of Hyderabad City ITS and Related Facilities being taken up with a separate fund provided by Hyderabad Growth Corridor Limited for a period of Five years from the date of the Commissioning Certificate Organization:

Hyderabad Growth Corridor Limited (HGCL),

Attention:	Managing Director,
Address:	2nd Floor, HMDA Complex, Tarnaka,
	Secunderabad, 500 007. Andhra Pradesh, India.
Telephone:	+91 40 2700 2913
Facsimile number:	+91 40 2700 3271
Electronic mail address:	_____

PART 1 – Prequalification Procedure

Section I. Instructions to Applicants

A. General

1. Scope of Application

1.1 In connection with the Invitation for Prequalification indicated in Section II, Prequalification Data Sheet (PDS), the Employer, as **defined in the PDS**, issues these Sample Prequalification Documents (SPD) to Applicants interested in bidding for the Works described in Section VI, Scope of Works. The reference identification number of the contract, if any, is **provided in the PDS**.

2. Source of Funds

2.1 The Borrower **indicated in the PDS** has received a Japanese ODA Loan from Japan International Cooperation Agency (hereinafter referred to as "JICA"), with the number, in the amount, and on the signed date of the Loan Agreement **indicated in the PDS**, towards the cost of the project named in the PDS. The Borrower intends to utilise a portion of the proceeds of the loan to eligible payments under the contract(s) resulting from the bidding for which this prequalification is conducted.

2.2 Disbursement of a Japanese ODA Loan by JICA will be subject, in all respects, to the terms and conditions of the Loan Agreement, including the disbursement procedures and "Guidelines for Procurement under Japanese ODA Loans". No party other than the Borrower shall derive any rights from the Loan Agreement or have any claim to loan proceeds.

2.3 The above Loan Agreement will cover only part of the project cost. As for the remaining portion, the Borrower will take appropriate measures for finance.

3. Fraud and Corruption

3.1 In this ITA 3.1, "Bidder" and "Contractor" are used as synonyms of "Applicants."

3.2 It is JICA's policy to require that Bidders and Contractors, as well as Borrowers under contracts funded with Japanese ODA Loans and Other Japanese ODA, observe the highest standard of ethics during the procurement and execution of such contracts. In pursuance of this policy, JICA:

(a) will reject a proposal for award if it determine that the Bidder recommended for award has engaged in corrupt or fraudulent practices in competing for the contract in question;

(b) will recognise a Bidder or Contractor as ineligible, for a period determined by JICA, to be awarded a contract funded with Japanese ODA Loans if it at any time determines that the Bidder or the Contractor has engaged in corrupt or fraudulent practices in competing for, or in executing another contract

(c) will recognise a Contractor as ineligible to be awarded contract funded with Japanese ODA Loans if the Contractor or subcontractor, who has a direct contract with the Contractor, is debarred under the cross debarment decisions by the Multilateral Development Banks. Such period of ineligibility shall not exceed three (3) years from (and

including) the date on which the cross debarment is imposed.

3.3 "Cross debarment decisions by the Multilateral Development Banks" is a corporate sanction in accordance with the agreement among the African Development Bank Group, Asian Development Bank, European Bank for Reconstruction and Development, Inter-American Development Bank Group and the World Bank Group signed on 9 April, 2010 (as amended from time to time). JICA will recognize the World Bank Group's debarment of which period exceeds one year, imposed after 19 July, 2010, the date on which the World Bank Group started cross debarment, as "cross debarment decisions by the Multilateral Development Banks." The list of debarred firms and individuals is available at the electronic address **specified in the PDS**.

3.4 JICA will recognize a Bidder or Contractor as ineligible to be awarded a contract funded with Japanese ODA Loans if the Bidder or Contractor is debarred by the World Bank Group for the period starting from the date of advertisements for Prequalification up to the signing of the contract, unless (i) such debarment period does not exceed one year, or (ii) three (3) years have passed since such debarment decision.

3.5 If it is revealed that the Contractor was ineligible to be awarded a contract according to above, JICA will, in principle, impose sanctions against the Contractor.

3.6 If it is revealed that the subcontractor, who has a direct contract with the Contractor, was debarred by the World Bank Group on the subcontract date, JICA will, in principle, require the Borrower to have the Contractor cancel the subcontract immediately, unless (i) such debarment period does not exceed one year, or (ii) three (3) years have passed since such debarment decision. If the Contractor refuses, JICA will require the Borrower to declare invalidity or cancellation of the contract and demand the refund of the relevant proceeds of the loan or any other remedies on the grounds of contractual violation.

4. Eligible Applicants

4.1 An Applicant may be a single entity or any combination of entities in the form of joint venture or association (JVA) with the formal intent, as evidenced by a letter of intent, to enter into an agreement or under an existing agreement. In the case of a JVA, **unless otherwise specified in the PDS**, all partners shall be jointly and severally liable for the execution of the Contract in accordance with the Contract terms. The JVA shall consist of not more than 3 partners, and the JVA shall nominate a Representative who shall have the authority to conduct all business for and on behalf of any and all the partners of the JVA during the prequalification process and, in the event the JVA is prequalified, during the bidding process, and in the event the JVA is awarded the Contract, during contract execution.

4.2 An Applicant and all partners constituting the Applicant shall be from an eligible source country as listed in Section V, List of Eligible Countries of Japanese ODA Loans.

4.3 An Applicant shall not have a conflict of interest. All Applicants found to have a conflict of interest shall be disqualified from participating in this prequalification process. An Applicant may be considered to have a conflict of interest with one or more parties in

this prequalification process if:

(a) an Applicant has been engaged by the Employer to provide consulting services for the preparation related to procurement for or implementation of the project;

(b) an Applicant and/or any of its associates/affiliates (inclusive of parent firms) mentioned in subparagraph (a) above; or

(c) an Applicant lends, or temporarily sends its personnel to firms or organizations which are engaged in consulting services for the preparation related to procurement for or implementation of the project, if the personnel would be involved in any capacity on the same project.

4.4 An Applicant shall submit only one application in the same Prequalification process, either individually as an Applicant or as a partner of a JVA. An Applicant who submits, or participates in, more than one application will cause all the applications in which the Applicant has participated to be disqualified. No Applicant can be a subcontractor while submitting an application individually or as a partner of a JVA in the same Prequalification process. A subcontractor in any application may participate in more than one application, but only in that capacity.

4.5 An Applicant, that has been determined to be ineligible by JICA in accordance with ITA 3, shall not be eligible to be awarded a contract.

4.6 Applicants shall provide such evidence of their continued eligibility satisfactory to the Employer, as the Employer shall reasonably request.

5. Eligible Goods and Related Services

5.1 All Goods and related services to be supplied under the Contract to be financed by JICA shall have their origin in any country in accordance with Section V, List of Eligible Countries of Japanese ODA Loans.

B. Contents of the Prequalification Documents

6. Sections of Prequalification Documents

6.1 The documents for the prequalification of Applicants (hereinafter referred to as "Prequalification Documents") consist of parts 1 and 2 which comprise all the sections indicated below, and should be read in conjunction with any Addendum issued in accordance with ITA 8.

PART 1 Prequalification Procedures

- Section I. Instructions to Applicants (ITA)
- Section II. Prequalification Data Sheet (PDS)
- Section III. Qualification Criteria and Requirements
- Section IV. Application Forms
- Section V. List of Eligible Countries of Japanese ODA Loans

PART 2 Works Requirements

- Section VI. Scope of Works

6.2 The "Invitation for Prequalification" issued by the Employer is not part of the Prequalification Documents. Forms are provided as an attachment to these Prequalification Documents.

6.3 The Employer accepts no responsibility for the completeness of the Prequalification Documents and its addenda unless they were obtained directly from the Employer.

6.4 The Applicant is expected to examine all instructions, forms, and terms in the Prequalification Documents and to furnish all information or documentation required by the Prequalification Documents.

6.5 General information on the climate, hydrology, topography, access to site, transportation and communications facilities, medical facilities, project layout, expected period, and other services and facilities to be provided by the Employer is furnished in Section VI, Scope of Works.

7. Clarification of Prequalification Documents

7.1 A prospective Applicant requiring any clarification of the Prequalification Documents shall contact the Employer in writing at the Employer's address **indicated in the PDS**. The Employer will respond in writing to any request for clarification provided that such request is received no later than fourteen **(14) days prior to the deadline for submission of applications.** The Employer shall forward copies of its response to all Applicants who have acquired the Prequalification Document directly from the Employer including a description of the inquiry but without identifying its source. Should the Employer deem it necessary to amend the Prequalification Document as a result of a clarification, it shall do so following the procedure under ITA 8 and in accordance with the provisions of ITA 17.2.

8. Amendment of Prequalification Documents

8.1 At any time prior to the deadline for submission of applications, the Employer may amend the Prequalification Documents by issuing addenda.

8.2 Any addendum issued shall be part of the Prequalification Documents and shall be communicated in writing to all who have obtained the Prequalification Documents from the Employer.

8.3 To give prospective Applicants reasonable time to take an addendum into account in preparing their applications, the Employer may, at its discretion, extend the deadline for the submission of applications.

C. Preparation of Applications

9. Cost of Applications

9.1 The Applicant shall bear all costs associated with the preparation and submission of its application. The Employer shall in no case be responsible or liable for those costs, regardless of the conduct or outcome of the prequalification process.

10. Language of Application

10.1 The application as well as all correspondence and documents relating to the prequalification exchanged by the Applicant and the Employer, shall be written in the language **specified in the PDS**. Supporting documents and printed literature that are part of the application may be in another language, provided they are accompanied by an accurate translation of the relevant passages in the language **specified in the PDS**, in which case, for purposes of interpretation of the application, the translation shall govern.

11. Documents Comprising the Application

11.1 The application shall comprise the following:

(a) Application Submission Form, in accordance with ITA 12;

(b) documentary evidence establishing the Applicant's eligibility to prequalify, in accordance with ITA 13;

(c) documentary evidence establishing the Applicant's qualifications, in accordance with ITA 14;

11.2 The Applicant shall also submit a soft copy on CD in MS Office software format of Forms ELI-1.1 through PER – 5.1b. In case of any discrepancy, the hard copy shall prevail.

12. Application Submission Form

12.1 The Applicant shall prepare an Application Submission Sheet using the form furnished in Section IV, Application Forms. This Form must be completed without any alteration to its format.

13. Documents Establishing the Eligibility of the Applicant

13.1 To establish its eligibility in accordance with ITA 4, the Applicant shall complete the eligibility declarations in the Application Submission Form and Forms ELI (eligibility) 1.1 and 1.2, included in Section IV, Application Forms.

14. Documents Establishing the Qualifications of the Applicant

14.1 To establish its qualifications to perform the contract(s) in accordance with Section III, Qualification Criteria and Requirements, the Applicant shall provide the information requested in the corresponding forms included in Section IV, Application Forms.

15. Signing of the Application and Number of Copies

15.1 The Applicant shall prepare one original of the documents comprising the application as described in ITA 11 and clearly mark it "ORIGINAL". The original of the application shall be typed or written in indelible ink and shall be signed by a person duly authorized to sign on behalf of the Applicant.

15.2 The Applicant shall submit copies of the signed original application, in the number **specified in the PDS**, and clearly mark them "COPY". In the event of any discrepancy between the original and the copies, the original shall prevail.

D. Submission of Applications

16. Sealing and Identification of Applications

16.1 The Applicant shall enclose the original and the copies of the application in a sealed envelope that shall:

(a) bear the name and address of the Applicant;

(b) be addressed to the Employer, in accordance with ITA 17.1; and

(c) bear the specific reference identification number of this prequalification process, if any, **indicated in PDS** 1.1.

16.2 The Employer will accept no responsibility for not processing any envelope that was not identified as required.

17. Deadline for Submission of Applications

17.1 Applicants may always submit their applications by mail or by hand. Applications shall be received by the Employer at the address and no later than the **deadline indicated in the PDS**. A receipt will

be given for all applications submitted.

17.2 The Employer may, at its discretion, extend the deadline for the submission of applications by amending the Prequalification Documents in accordance with ITA 8, in which case all rights and obligations of the Employer and the Applicants subject to the previous deadline shall thereafter be subject to the deadline as extended.

18. Late Applications

18.1 The Employer reserves the right to accept or reject late applications.

19. Opening of Applications

19.1 The Employer shall prepare a record of the opening of applications that shall include, as a minimum, the name of the Applicant. A copy of the record shall be distributed to all Applicants.

E. Procedures for Evaluation of Applications

20. Confidentiality

20.1 Information relating to the evaluation of applications, and recommendation for prequalification, shall not be disclosed to Applicants or any other persons not officially concerned with such process until the notification of prequalification is made to all Applicants.

20.2 From the deadline for submission of applications to the time of notification of the results of the prequalification in accordance with ITA 28, any Applicant that wishes to contact the Employer on any matter related to the prequalification process, may do so but only in writing.

21. Clarification Of Applications

21.1 To assist in the evaluation of applications, the Employer may, at its discretion, ask any Applicant for a clarification of its application which shall be submitted within a stated reasonable period of time. Any request for clarification and all clarifications shall be in writing.

21.2 If an Applicant does not provide clarifications of the information requested by the date and time set in the Employer's request for clarification, its application may be rejected.

22. Responsiveness of Applications

22.1 The Employer may reject any application which is not responsive to the requirements of the Prequalification Documents.

23. Subcontractors

23.1 Applicants planning to subcontract any of the key activities indicated in Section III, Qualification Criteria and Requirements, shall specify the activity(ies) or parts of the Works to be subcontracted in the Application Submission Form. Applicants shall clearly identify the proposed specialist subcontractor(s) in Forms ELI-1.2 and EXP (experience)-4.2(b) in Section IV, Application Forms. Such proposed specialist subcontractor(s) shall meet the corresponding qualification requirements specified in Section III, Qualification Criteria and Requirements.

23.2 At this time, the Employer does not intend to execute certain specific parts of the Works by subcontractors selected in advance by the Employer (Nominated Subcontractors) unless **otherwise stated in the PDS.**

F. Evaluation of Applications and Prequalification of Applicants

24. Evaluation of Applications

24.1 The Employer shall use the factors, methods, criteria, and requirements defined in Section III, Qualification Criteria and Requirements to evaluate the qualifications of the Applicants. The use of other methods, criteria, or requirements shall not be permitted. The Employer reserves the right to waive minor deviations in the qualification criteria if they do not materially affect the capability of an Applicant to perform the contract.

24.2 Only the qualifications of subcontractors that have been identified in the application may be considered in the evaluation of an Applicant. However, the general experience and financial resources of subcontractors may not be added to those of the Applicant for purposes of prequalification of the Applicant.

24.3 Unless **otherwise indicated in the PDS**, this prequalification shall be for a single contract.

24.4 All Applicants might as well utilize experience of subsidiary company which is held by 100% shares as Applicants' experience.

24.5 All Applicants might as well utilize human resources of subsidiary company which is held by 100% shares as project team personnel.

25. Employer's Right to Accept or Reject Applications

25.1 The Employer reserves the right to accept or reject any application, and to annul the prequalification process and reject all applications at any time, without thereby incurring any liability to Applicants.

26. Prequalification Of Applicants

26.1 All Applicants, whose applications have been determined to be substantially responsive to the requirements of the Prequalification Documents and who have met or exceeded ("passed") the specified threshold criteria, shall be prequalified by the Employer.

27. Notification of Prequalification

27.1 Once the Employer has completed the evaluation of the applications, it shall notify all Applicants in writing of the names of those Applicants who have been prequalified.

28. Invitation for Tender

28.1 Promptly after the notification of the results of the prequalification, the Employer shall invite bids from all the Applicants that have been prequalified.

28.2 Bidders may be required to provide a Bid Security acceptable to the Employer in the form and an amount to be specified in the Bidding Documents, and the successful Bidder shall be required to provide a Performance Security to be specified in the Bidding Documents.

29. Changes in Qualifications of Applicants

29.1 Any change in the structure or formation of an Applicant after being prequalified in accordance with ITA 26 and invited to bid shall be subject to a written approval of the Employer prior to the deadline for submission of bids. Any such changes shall be submitted to the Employer not later than fourteen (14) days after the date of the Invitation for Bids. Such approval shall be denied if as a consequence of the change;

29.2 the prequalified Applicant, after the change, no longer substantially meets the qualification criteria set forth in Section III, Qualification Criteria and Requirements; or

29.3 in the opinion of the Employer, a substantial reduction in competition may result.

Section II. Prequalification Data Sheet

A. General	
ITA 1.1	The reference identification number of this Invitation for Prequalification is: Bid Notice No: **Date: _____-_____-201**
ITA 1.1	The name of the Employer is: **The HYDERABAD GROWTH CORRIDOR LIMITED (HGCL)**.
ITA 2.1	The name of the Borrower is: **The HYDERABAD GROWTH CORRIDOR LIMITED (HGCL)**.
ITA 2.1	The number of the Loan Agreement is: **ID-P 198** The amount of a Japanese ODA Loan is: **42,027 Million Japanese Yen** The signed date of the Loan Agreement is: **21st November 2008.**
ITA 2.1	The name of the Project is: **HYDERABAD OUTER RING ROAD PROJECT**
ITA 3.1 (c)	A list of debarred firms and individuals is available at the World Bank's website: **www.worldbank.org/debarr**
ITA 4.1	All partners in a joint venture or association shall be jointly and severally liable.
B. Contents of the Prequalification Documents	
ITA 7.1	For **clarification purposes** only**,** the Employer's address is: **Chief General Manager,** **Hyderabad Growth Corridor Limited(HGCL),** **2nd Floor, HMDA Complex,** **Tarnaka, Secunderabad, 500 007,** **Andhra Pradesh, India.** **Tel: +91-40-27002913** **Fax: +91-40-27003271** **E-mail:**
C. Preparation of Applications	
ITA 10.1	The language of the application as well as of all correspondence is: **ENGLISH**
ITA 15.2	In addition to the original, the number of copies to be submitted with the application is: **2 (TWO)**

D. Submission of Applications	
ITA 17.1	For **application submission purposes** only, the Employer's address is: **Chief General Manager,** **Hyderabad Growth Corridor Limited(HGCL),** **2nd Floor, HMDA Complex,** **Tarnaka, Secunderabad, 500 007,** **Andhra Pradesh, India.** **Tel: +91-40-27002913** **Fax: +91-40-27003271** **E-mail:** **The deadline for application submission is:** Date: **_____** Time: **16:00Hrs.**
E. Procedures for Evaluation of Applications	
ITA 23.2	At this time the Employer does not intend to execute certain specific parts of the Works by subcontractors selected in advance (Nominated Subcontractors).
F. Evaluation of Applications and Prequalification of Applicants	
ITA 24.3	As stipulated in ITA 1.1, this prequalification exercise shall be for a single contract.

Section III: Qualification Criteria and Requirements

1. Eligibility

Eligibility and Qualification Criteria			Compliance Requirements				Documentation
No.	Subject	Requirement	Single Entity	Joint Venture or Association			Submission Requirements
				All Partners Combined	Each Partner	At Least One Partner	
1.1	**Nationality**	Nationality in accordance with ITA Sub-Clause 4.2	Must meet requirement	Existing or intended JVA must meet requirement	Must meet requirement	N/A	Forms ELI – 1.1and 1.2, with attachments
1.2	**Conflict of Interest**	No conflicts of interest in ITA Sub-Clause 4.3	Must meet requirement	Existing or intended JVA must meet requirement	Must meet requirement	N/A	Application Submission Form
1.3	**JICA Ineligibility**	Not having been declared ineligible by JICA, as described in ITA Sub-Clause 4.5	Must meet requirement	Existing JVA must meet requirement	Must meet requirement	N/A	Application Submission Form

2. Historical Contract Non-Performance

Eligibility and Qualification Criteria			Compliance Requirements				Documentation
No.	Subject	Requirement	Single Entity	Joint Venture or Association			Submission Requirements
				All Partners Combined	Each Partner	At Least One Partner	
2.1	**History of Non-Performing Contracts**	Non-performance of a contract did not occur within the last 2 years prior to the deadline for application submission based on all information on fully settled	Must meet requirement by itself or as partner to past or existing	N/A	Must meet requirement by itself or as partner to past or existing	N/A	Form CON-2

Eligibility and Qualification Criteria			Compliance Requirements				Documentation
No.	Subject	Requirement	Single Entity	Joint Venture or Association			Submission Requirements
				All Partners Combined	Each Partner	At Least One Partner	
		disputes or litigation. A fully settled dispute or litigation is one that has been resolved in accordance with the Dispute Resolution Mechanism under the respective contract and where all appeal instances available to the Applicant have been exhausted.	JVA		JVA		
2.2	**Pending Litigation**	All pending litigation shall in total not represent more than 60 % of the Applicant's net worth and shall be treated as resolved against the Applicant.	Must meet requirement by itself or as a partner to past or existing JVA	N/A	Must meet requirement by itself or as a partner to past or existing JVA	N/A	Form CON – 2
2.3	**Litigation History**	No consistent history of court/arbitral award decisions against the Tenderers since 1st January 2009	Must meet requirement	N/A	Must meet requirement	N/A	Form CON – 2

3. Financial Situation

Eligibility and Qualification Criteria			Compliance Requirements				Documentation
No.	Subject	Requirement	Single Entity	Joint Venture or Association			Submission Requirements
				All Partners Combined	Each Partner	At Least One Partner	
3.1	**Financial Performance**	Submission of audited financial statement or audited balance sheets acceptable to the Employer, for the last five (5)years to demonstrate the current	Must meet requirement	N/A	Must meet requirement	N/A	Form FIN – 3.1with attachments

Eligibility and Qualification Criteria			Compliance Requirements				Documentation
No.	Subject	Requirement	Single Entity	Joint Venture or Association			Submission Requirements
				All Partners Combined	Each Partner	At Least One Partner	
		soundness of the Applicant's financial position and its prospective long term profitability. As the minimum requirement, an Applicant's net worth calculated as the difference between total assets and total liabilities should be positive for three (3) years during the last five (5) years.					
3.2	**Average Annual Turnover**	Average annual turnover of US$ 37Million of transportation sector, calculated as total certified payments received for contracts in progress or completed-within the last five (5)years,	Must meet requirement	Must meet requirement	Must meet 25 % of the requirement	Must meet40 % of the requirement(*)	Form FIN – 3.2
3.3	**Financial Resources**	The tenderer must demonstrate access to, or availability of, financial resources such as liquid assets, unencumbered real assets, lines of credit, and other financial means, other than any contractual advance payments to meet: (i) The cash-flow of 50 crores and (ii) The overall cash flow requirements for this contract and its current commitments.	Must meet requirement	Must meet requirement	Must meet 25 % of the requirement	Must meet40 % of the requirement(*)	Form FIN – 3.1with attachments

4. Experience

Eligibility and Qualification Criteria			Compliance Requirements				Documentation
No.	Subject	Requirement	Single Entity	Joint Venture or Association			Submission Requirements
				All Partners Combined	Each Partner	At Least One Partner	
4.1	**General Experience**	Experience under Transport and Traffic Management System Project[2] contracts in the role of prime contractor for at least one project for the last Five (5) years prior to the application submission deadline.***	Must meet requirement	N/A	N/A	Requirement must be met by the Lead Partner	Form Exp – 4.1
4.2 (a-1)	**Specific Experience**	Experience exclusively in the role of prime contractor, in at least one (1) contract within the last ten (10) years, that have been successfully and substantially 90% of value of work completed and that are similar to in the following key activities: The similarity shall be based on the physical size, complexity, methods/technology or other characteristics as described in Scope of Works. The same shall be evidenced by a signed certificate from the client or the owner of the system or the prime contractor.	Must meet requirement	Must meet requirement	N/A	N/A	Form Exp – 4.2 (a-1)
4.2 (a-2)	**Specific Experience**	Experience in Operation & Maintenance of traffic control centre of City ITS/ Highway ITS comprising data collection, processing and dissemination functions and human machine interface	Must meet requirement	N/A	N/A	Must meet requirement	Form Exp – 4.2 (a-2)

Eligibility and Qualification Criteria			Compliance Requirements				Documentation
No.	Subject	Requirement	Single Entity	Joint Venture or Association			Submission Requirements
				All Partners Combined	Each Partner	At Least One Partner	
		through video wall map display, and monitoring and control through Roadside Equipment comprising of ATCC, CCTV, VMS, FLD etc. in the role of Prime Contractor/ Sub Contractor for at least 2 Years in the Last Ten Years that have been successfully completed or 75% value of work was completed.					
4.2 (b)		For the above or other contract executed during the period stipulated in 4.2 (a) above, a minimum experience, as prime contractor or partner in joint venture or subcontractor, in the following key activities:***					
	(1)	System integration of traffic control centre system comprising information gathering, processing and dissemination functions and human machine interface throughmonitor, and monitoring and control console.	Must meet requirement	N/A	N/A	Requirement must be met by the Lead Partner	Form EXP – 4.2(b)
	(2)	Integration[4] of traffic surveillance system using minimum of 35 Automated Traffic Counter-cum-Classifier by image processing camera	Must meet requirement	N/A	N/A	Must meet requirement	Form EXP – 4.2(b)
	(3)	Integration[4] of traffic surveillance system consisting of minimum 28 CCTV Cameras.	Must meet requirement	N/A	N/A	Must meet requirement	Form EXP – 4.2(b)
	(4)	Integration[4] of variable message sign system consisting of minimum 15 units	Must meet requirement(can	N/A	N/A	Must meet requirement(can	Form EXP – 4.2(b)

Eligibility and Qualification Criteria			Compliance Requirements				Documentation
No.	Subject	Requirement	Single Entity	Joint Venture or Association			Submission Requirements
				All Partners Combined	Each Partner	At Least One Partner	
		of signboard and central control system	be a specialist subcontractor)			be a specialist subcontractor)	
	(5)	Integration[4] of Probe car system collecting minimum 1200 GPS devices.	Must meet requirements	N/A	N/A	Must meet requirements	Form EXP – 4.2(b)
	(6)	Integration[4] of flood monitoring system consisting of minimum 7 FLD stations	Must meet requirements (can be a specialist subcontractor)	N/A	N/A	Must meet requirements (can be a specialist subcontractor)	Form EXP – 4.2 (b)
	(7)	Establishing web-site of traffic information provision system	Must meet requirements	N/A	N/A	Requirement must be met by the Lead Partner	Form EXP – 4.2 (b)
4.2 (c)		A minimum experience, as prime contractor or partner in joint venture or subcontractor, in the following key activities					
	(1)	Experience of operation and maintenance of highway facilities [5/] city Intelligent Transport Systems including centre system and roadside equipment [6] of highway/city equivalent to or more than fifty (50) kilometres for at least two (2) years within the last five (5) years. The operation availability of the centre system shall be more than ninety nine (99) percent during the above period. [***] The operation availability of the roadside equipment shall be more than	Must meet requirement	N/A	N/A	Must meet requirement (can be a specialist subcontractor)	Form EXP – 4.2(c)

Eligibility and Qualification Criteria			Compliance Requirements				Documentation
No.	Subject	Requirement	Single Entity	Joint Venture or Association			Submission Requirements
				All Partners Combined	Each Partner	At Least One Partner	
		ninety (90) percent during the above period. ***					
	(2)	Experience of operation of highway/city facilities [5] including centre system and roadside equipment [6] of highway/city equivalent to or more than fifty (50) kilometres for at least two (2) years within the last five (5) years. ***	Must meet requirement	N/A	N/A	Must meet requirement (can be a specialist subcontractor)	Form EXP – 4.2(c)

[2]Transport and Traffic Management System: Centralized Control System for Transport and/or Traffic Management Systems such as data collection, managing and provision of information for systems such as road traffic or public transport (bus, train, metro, light-rail transit (LRT) and monorail).

[3]Hyderabad city intelligent transport system refers such systems and projects in which road and traffic information is collected through various devices, processed at the center and provided to the road users through various media such as variable message sign boards, broadcasting or Internet, or roadside devices is controlled for the safe and efficient operation of road traffic.

[4]Integration here means a work to connect the number of field equipment to the central control system and to construct a system that performs intended functions, and not necessarily means the provision of field equipment.

[5]Highway facilities mean a centralized control system for highway traffic management such as data collection, information provision and highway management.

[6]Roadside equipment means such equipment as closed-circuit television (CCTV), variable message sign board (VMS), and meteorological measurement terminal (MET).

***The same shall be evidenced by a signed certificate from the client/employer、authorized organization or the owner of the system. Signing the certificate shall not be issued by Applicants.

5. Personnel Capability

Eligibility and Qualification Criteria			Compliance Requirements				Documentation
No.	Subject	Requirement	Single Entity	Joint Venture or Association			Submission Requirements
				All Partners Combined	Each Partner	At Least One Partner	
5.1	**Personal capability**	The Applicant shall have suitably qualified personnel to fill the following positions. In Form 5, the Applicant shall supply information on a prime candidate and an alternative candidate for each position; both people should meet the experience requirements specified below.					
		Project manager: Experience in electrical, electronics and IT industries (year): 20 In similar works (year): 5 As manager of similar works (year): 3	Must meet requirement	N/A	N/A	Must meet requirement	Form PER – 5.1a and PER 5.1b
		ITS Chief Engineer: Experience as engineer in electrical, electronics and IT industries (year): 15 In similar works (year): 5 As chief engineer / manager of similar works (year): 2	Must meet requirement	N/A	N/A	Must meet requirement	Form PER – 5.1a and PER 5.1b
		Project Manager for Operation and Maintenance: Experience of traffic management project[7] (year): 15 The above experience shall include:	Must meet requirement	N/A	N/A	Must meet requirement (can be a specialist subcontractor)	

Eligibility and Qualification Criteria			Compliance Requirements				Documentation
No.	Subject	Requirement	Single Entity	Joint Venture or Association			Submission Requirements
				All Partners Combined	Each Partner	At Least One Partner	
		Experience of facility management or maintenance of server, workstation and network as team leader, project manager, chief engineer or equivalent position (year): 5					
		Traffic Management Chief: Experience of traffic management [7] (year): 10 The above experience shall include: Experience of facility management or maintenance of server, workstation and network (year): 5	Must meet requirement	N/A	N/A	Must meet requirement (can be a specialist subcontractor)	
		System Operator Experience of system administration, troubleshooting and networking (year):8	Must meet requirement	N/A	N/A	Must meet requirement (can be a specialist subcontractor)	
		Chief Maintenance Engineer Experience of similar project（years):10 Experience of similar project as team leader/project manager/Chief engineer or equivalent position (year): 5	Must meet requirement	N/A	N/A	Must meet requirement (can be a specialist subcontractor)	
		Electrical Engineer Experience of similar project (years):10 Experience in the maintenance of electronic and electrical device (year):5	Must meet requirement	N/A	N/A	Must meet requirement	

Eligibility and Qualification Criteria			Compliance Requirements				Documentation
No.	Subject	Requirement	Single Entity	Joint Venture or Association			Submission Requirements
				All Partners Combined	Each Partner	At Least One Partner	
		Information Technology Engineer Experience of similar project(year):10 Experience of facility management or maintenance of server (year)5	Must meet requirement	N/A	N/A	Must meet requirement	

[7] Traffic Management means operation or maintenance of facilities/systems for traffic monitoring or traffic control.

Section IV. Application Forms

Application Submission Form

Date: *[insert day, month, year]*

Reference ID No.: *[insert number, if any]*

To:

Hyderabad Growth Corridor Limited,
2nd Floor, HMDA Complex,
Tarnaka, Secunderabad, 500 007,
Andhra Pradesh, India.

We, the undersigned, apply to be prequalified for the contract of referenced number and declare that:

a. We have examined and have no reservations to the Prequalification Documents, including Addendum(s) No(s), issued in accordance with Instructions to Applicants (ITA) Clause 8: [insert the number and issuing date of each addendum].

b. We, including any subcontractors or suppliers for any part of the contract resulting from this prequalification process, have nationalities from eligible countries of Japanese ODA Loans, in accordance with ITA Sub-Clause 4.2: [insert the nationality of the Applicant, including that of all partners in case of a Joint Venture, and the nationality of each already identified subcontractor and supplier of related services, if applicable];

c. We, including any subcontractors or suppliers for any part of the contract resulting from this prequalification, do not have any conflict of interest, in accordance with ITA Sub-Clause 4.3;

d. We, including any subcontractors or suppliers for any part of the contract resulting from this prequalification, have not been declared ineligible by JICA, in accordance with ITA Sub-Clause 4.5;

e. We, in accordance with ITA Sub-Clause 23.1, plan to subcontract the following key activities and/or parts of the Works: [insert any of the key activities identified in Section III- 4.2 (b) which the Applicant intends to subcontract]

f. We understand that you may cancel the prequalification process at any time and that you are neither bound to accept any application that you may receive nor to invite the prequalified Applicants to bid for the contract subject of this prequalification, without incurring any liability to the Applicants, in accordance with ITA Clause 25.

Signed [insert signature(s) of an authorized representative(s) of the Applicant]

Name [insert full name of person signing the application]

In the capacity of *[insert capacity of person signing the application]*

Duly authorized to sign the application for and on behalf of:

Applicant's name *[insert full name of Applicant]*

Address *[insert street number/town or city/country address]*

Dated on *[insert day number] day of [insert month], [insert year]*

Form ELI - 1.1 - Applicant Information Form

Date: [insert day, month, year]

Reference ID No.: *[insert number, if any]*

Page *[insert page number]* of *[insert total number] pages*

Applicant's legal name *[insert full legal name]*
In case of Joint Venture (JV), legal name of each partner: *[insert full legal name of each partner in JV]*
Applicant's actual or intended country of constitution: *[indicate country of Constitution]*
Applicant's actual or intended year of constitution: *[indicate year of Constitution]*
Applicant's legal address in country of constitution: *[insert street/ number/ town or city/ country]*
Applicant's authorized representative information Name: [insert full legal name] Address: [insert street/ number/ town or city/ country] Telephone/Fax numbers: [insert telephone/fax numbers, including country and city codes] E-mail address: [indicate E-mail address]
Attached are copies of original documents of ☐ Articles of incorporation or documents of constitution, and documents of registration of the legal entity named above, in accordance with ITA 4.1 and 4.2. ☐ In case of JV, letter of intent to form JV or JV agreement, in accordance with ITA 4.1.

Form ELI - 1.2 - Applicant Partner Information Form

[The following form shall be filled in for the Applicant's partners including partner(s) of a joint venture, subcontractors, suppliers and other partners]

Date: *[insert day, month, year]*

Reference ID No.: [insert number, if any]

Page *[insert page number]* of *[insert total number]* pages

JV Applicant legal name: *[insert full legal name]*
Applicant Partner's legal name: *[insert full legal name of Applicant partners]*
Applicant Partner's country of registration: *[indicate country of registration]*
Applicant Partner's year of constitution: *[indicate year of constitution]*
Applicant Partner's legal address in country of constitution: *[insert street/ number/ town or city/ country]*
Applicant Partner's authorized representative information Name: *[insert full legal name]* Address: *[insert street/ number/ town or city/ country]* Telephone/Fax numbers: *[insert telephone/fax numbers, including country and city codes]* E-mail address: *[indicate E-mail address]*
Attached are copies of original documents of ☐ Articles of incorporation or documents of constitution, and registration documents of the legal entity named above, in accordance with ITA 4.1 and 4.2.

Form CON - 2 - Historical Contract Non-Performance

[The following table shall be filled in for the Applicant and for each partner of a Joint Venture]

Date: *[insert day, month, year]*

Applicant's Legal Name: *[insert full name]*

Applicant's Party Legal Name:*[insert full name]*

Reference ID No.: *[insert number, if any]*

Page *[insert page number]* of *[insert total number]* pages

1. History of Non-Performing Contracts

Non-Performing Contracts			
☐ Contract non-performance did not occur during the *[number]* years specified in Section III, Qualification Criteria and Requirements Sub-Factor 2.1. ☐ Contract(s) not performed during the *[number]* years specified in Section III, Qualification Criteria and Requirements, requirement 2.1			
Year	**Outcome as Percentage of Net Worth**	**Contract Identification**	**Total Contract Amount (current value, US$ equivalent)**
[insert year]	*[insert percentage]*	Contract Identification: *[indicate complete contract name, number, and any other identification]* Name of Employer: *[insert full name]* Address of Employer: *[insert street/city/country]* Reason(s) for non performance: *[indicate main reason(s)]*	*[insert amount]*

2. Pending Litigation

Pending Litigation			
☐ No pending litigation in accordance with Section III, Qualification Criteria and Requirements, Sub-Factor 2.2. ☐ Pending litigation in accordance with Section III, Qualification Criteria and Requirements, Sub-Factor 2.2 as indicated below.			
Year	**Outcome as Percentage of Net Worth**	**Contract Identification**	**Total Contract Amount (current value, US$ equivalent)**
[insert year]	[insert percentage]	Contract Identification: *[indicate complete contract name, number, and any other identification]* Name of Employer: *[insert full name]* Address of Employer: *[insert street/city/country]* Matter in dispute: *[indicate main issues in dispute]*	[insert amount]

3. Pending Litigation

Year	**Contract Identification**	**Total Contract Amount (current value, US $ equivalent)**
[insert year]	Contract Identification: *[indicate complete contract name, number, and any other identification]* Name of Employer: [insert full name] Address of Employer: *[insert street/city/country]*Matter in dispute: *[indicate main issues in dispute]* Party who initiated the dispute: *[indicate "Employer" or "Contractor"]* Status of dispute: *[indicate if it is being treated by the Adjudicator, under Arbitration or being dealt with by the Judiciary]* Matter in dispute: *[indicate main issues in dispute]*	[insert amount]

Form FIN - 3.1 - Financial Situation

[The following table shall be filled in for the Applicant and for each partner of a Joint Venture]

Date: *[insert day, month, year]*

Applicant's Legal Name: *[insert full name]*

Applicant's Party Legal Name: *[insert full name]*

Reference ID No.: *[insert number, if any]*

Page *[insert page number]* of *[insert total number]* pages

1. Financial data

Historic Information for Previous*[insert number] years,[insert in words]* **(US$ Equivalent)**				
Year 1	Year 2	Year 3	Year…	Year n

Information from Balance Sheet

Total Assets (TA)					
Total Liabilities (TL)					
Net Worth (NW)					
Current Assets (CA)					
Current Liabilities (CL)					

Information from Income Statement

Total Revenue (TR)					
Profits Before Taxes (PBT)					
Profits After Taxes (PAT)					

2. Financial documents

The Applicant and its partners shall provide copies of the audited financial statement or audited balance sheet for the last 5 years pursuant to Section III, Qualifications Criteria and Requirements, Sub-factor 3.1. The financial statements shall:

(a) reflect the financial situation of the Applicant or partner to a JV, and not sister or parent companies.

(b) be audited by a certified accountant.

(c) be complete, including all notes to the financial statements.

(d) correspond to accounting periods already completed and audited (no statements for partial periods shall be requested or accepted).

 Attached are copies of financial statements (balance sheets including all related notes, and income statements) for the 5years, as indicated above, and complying with the requirements.

2. Financial Resources

Specify proposed sources of financing, such as liquid assets, unencumbered real assets, lines of credit, and other financial means, net of current commitments, available to meet the total construction cash flow demands of the subject contract or contracts as indicated in Qualification Criteria and Requirements.

Financial Resources		
S No	Source of function	Amount (US$ equivalent)
1		
2		

Form FIN - 3.2 - Average Annual Turnover

[The following table shall be filled in for the Applicant and for each partner of a Joint Venture]

Date: *[insert day, month, year]*

Applicant's Legal Name: *[insert full name]*

Applicant's Party Legal Name: *[insert full name]*

Reference ID No.: *[insert number, if any]*

Page *[insert page number]* of *[insert total number]* pages

Annual Turnover Data (Traffic And Transport Systems only)			
Year	**Amount and Currency**	**Exchange Rate**	**US$ Equivalent**
[indicate year]	*[insert amount and indicate currency]*	*[insert applicable exchange rate]*	*[insert amount in US$ equiv.]*
	Average Annual Turnover *		

* Average Annual Turnover calculated as total certified payments received for work in progress or completed, divided by the number of years specified in Section III, Qualification Criteria and Requirements, Sub-Factor 3.2.

Form EXP - 4.1 - General Experience

[The following table shall be filled in for the Applicant and for each partner of a Joint Venture]

Date: *[insert day, month, year]*

Applicant's Legal Name: *[insert full name]*

Applicant's Party Legal Name: *[insert full name]*

Reference ID No.: *[insert number, if any]*

Page *[insert page number]* of *[insert total number]* pages

[Identify contracts that demonstrate continuous work over the past [number] years pursuant to Section III, Qualification Criteria and Requirements, Sub-Factor 4.1. List contracts chronologically, according to their commencement (starting) dates.]

General Experience			
Starting Month /Year	**Ending Month /Year**	**Contract Identification**	**Role of Applicant**
[indicate month/year]	*[indicate month/year]*	Contract name: *[insert full name]* Brief description of the Works performed by the Applicant: *[describe Works performed briefly]* Name of Employer: *[indicate full name]* Address: *[indicate street/number/town or city/country]*	*[insert "Contractor" or "Partner of Joint Venture" or "Subcontractor"]*

Form EXP - 4.2(a-1) - Specific Experience

[The following table shall be filled in for the Applicant and for each partner of a Joint Venture]

Date: *[insert day, month, year]*

Applicant's Legal Name: *[insert full name]*

Applicant's Party Legal Name: *[insert full name]*

Reference ID No.: *[insert number, if any]*

Page *[insert page number]* of *[insert total number]* pages

Fill up one (1) form per contract.

Contract of Similar Size and Nature		
Similar Contract No. *[insert number]* of *[insert number of similar contracts required]*	**Information**	
Contract Identification	*[insert contract name and Reference ID number, if*	
Award Date	*[insert day, month, year, i.e., 15 June, 2015]*	
Completion Date	*[insert day, month, year, i.e., 03 October, 2017]*	
Role in Contract	**Prime Contractor Only**	
Total Contract Amount	*[insert total contract amount in US$]*	
If partner in a JV, specify participation in total contract amount	*[insert a percentage amount*]	*[insert total contract amount in US$]*
Employer's Name:	*[insert full name]*	
Address: Telephone/Fax Number: E-mail:	*[indicate street / number / town or city / country]* *[insert telephone/fax numbers, including country and city area codes]* *[insert E-mail address, if available]*	

Form EXP - 4.2(a-1) - Specific Experience (cont.)

PART - B

Similar Contract No. [*insert number*] of [*insert number of similar contracts required*]	**Information**
Description of the similarity in accordance with Sub-Factor 4.2(a) of Section III:	
1. Amount	*[insert amount in US$]*
2. Physical Size	*[Length of the road, no. of Interchanges, etc.]*
3. System Size	*[Capacity of the System in terms of no of user(vehicles)being served per day]*
4. Complexity	*[no of equipments for each type of for information collection and distribution]*
5. Communication Methods/Technology	*[insert specific aspects of the methods/ technology Used for Communication System]*
6. Other Characteristics	*[insert other characteristics as described in Section VI, Scope of Works]*

Form EXP - 4.2(a-2) - Specific Experience
Specific Experience (O & M)

[The following table shall be filled in for the Applicant and for each partner of a Joint Venture]

Date: *[insert day, month, year]*

Applicant's Legal Name: *[insert full name]*

Applicant's Party Legal Name: *[insert full name]*

Reference ID No.: *[insert number, if any]*

Page *[insert page number]* of *[insert total number]* pages

Fill up one (1) form per contract.

Experience in Operation & Maintenance of traffic control centre of city ITS/ Highway ITS comprising data collection, processing and dissemination functions and human machine interface through video wall map display, and monitoring and control through Roadside Equipment comprising of ATCC, CCTV, VMS, FLD etc

Contract of Similar Size and Nature		
Similar Contract No. *[insert number]* of *[insert number of similar contracts required]*	**Information**	
Contract Identification	*[insert contract name and Reference ID number, if*	
Award Date	*[insert day, month, year, i.e., 15 June, 2015]*	
Completion Date	*[insert day, month, year, i.e., 03 October, 2017]*	
Role in Contract	**Prime Contractor Only**	
Total Contract Amount	*[insert total contract amount in US$]*	
If partner in a JV, specify participation in total contract amount	*[insert a percentage amount*]	*[insert total contract amount in US$]*
Employer's Name:	*[insert full name]*	
Address: Telephone/Fax Number: E-mail:	*[indicate street / number / town or city / country]* *[insert telephone/fax numbers, including country and city area codes]* *[insert E-mail address, if available]*	

Form EXP - 4.2(a-2) - Specific Experience (cont.)

Specific Experience (O & M) (contd…)

PART - B

Similar Contract No. [*insert number*] of [*insert number of similar contracts required*]	**Information**
Description of the similarity in accordance with Sub-Factor 4.2(a) of Section III:	
1. Amount	*[insert amount in US$]*
2. Physical Size	*[Length of the road, no. of Interchanges, etc.]*
3. System Size	*[Capacity of the System in terms of no of user(vehicles)being served per day]*
4. Complexity	*[no of equipments for each type of for information collection and distribution]*
5. Communication Methods/Technology	*[insert specific aspects of the methods/ technology Used for Communication System]*
6. Other Characteristics	*[insert other characteristics as described in Section VI, Scope of Works]*

Form EXP - 4.2(b) - Specific Experience in Key Activities

Date: *[insert day, month, year]*

Applicant's Legal Name: *[insert full name]*

Applicant's Party Legal Name: *[insert full name]*

Subcontractor's Legal Name (as per ITA 23.1) *[insert full name]*

Reference ID No.: *[insert number, if any]*

Page *[insert page number]* of *[insert total number]* pages

Fill up one (1) form per Key Activity.

1. Key Activity No. (1)System integration of traffic control centre system comprising information gathering, processing and dissemination functions and human machine interface through wall map display, and monitoring and control console.:*[Insert brief description of the Activity, emphasizing its specificity]*

Contract with Similar Key Activities			
Item	Information		
Contract Identification	*[insert contract name and number, if applicable]*		
Award Date	*[insert day, month, year, i.e., 15 June, 2015]*		
Completion Date	*[insert day, month, year, i.e., 03 October, 2017]*		
Role in Contract *[check the appropriate box]*	Prime Contractor ☐	Partner of a Joint Venture ☐	Subcontractor ☐
Total Contract Amount	*[insert total contract amount in US$]*		
If partner in a JV or sub contractor, specify participation of total contract amount	*[insert a percentage amount*	*[insert total contract amount in US$]*	
Employer's Name:	*[insert full name]*		
Address: Telephone/Fax Number: E-mail:	*[indicate street / number / town or city / country]* *[insert telephone/fax numbers, including country and city area codes]* *[insert E-mail address, if available]*		

2. Key Activity No. (2)Traffic Surveillance system using Automatic Traffic Counters-cum-Classifier (ATCC):*[Insert brief description of the Activity, emphasizing its specificity]*

Contract with Similar Key Activities			
Item	Information		
Contract Identification	*[insert contract name and number, if applicable]*		
Award Date	*[insert day, month, year, i.e., 15 June, 2015]*		
Completion Date	*[insert day, month, year, i.e., 03 October, 2017]*		
Role in Contract *[check the appropriate box]*	Prime Contractor ☐	Partner of a Joint Venture ☐	Subcontractor ☐
Total Contract Amount	*[insert total contract amount in US$]*		
If partner in a JV or sub contractor, specify participation of total contract amount	*[insert a percentage amount*	*[insert total contract amount in US$]*	
Employer's Name:	*[insert full name]*		
Address: Telephone/Fax Number: E-mail:	*[indicate street / number / town or city / country]* *[insert telephone/fax numbers, including country and city area codes]* *[insert E-mail address, if available]*		

3. Key Activity No. (3)Traffic Surveillance system using vehicle detector CCTV Cameras:*[Insert brief description of the Activity, emphasizing its specificity]*

Contract with Similar Key Activities			
Item	Information		
Contract Identification	*[insert contract name and number, if applicable]*		
Award Date	*[insert day, month, year, i.e., 15 June, 2015]*		
Completion Date	*[insert day, month, year, i.e., 03 October, 2017]*		
Role in Contract *[check the appropriate box]*	Prime Contractor ☐	Partner of a Joint Venture ☐	Subcontractor ☐
Total Contract Amount	*[insert total contract amount in US$]*		
If partner in a JV or sub contractor, specify participation of total contract amount	*[insert a percentage amount*	*[insert total contract amount in US$]*	
Employer's Name:	*[insert full name]*		
Address: Telephone/Fax Number: E-mail:	*[indicate street / number / town or city / country]* *[insert telephone/fax numbers, including country and city area codes]* *[insert E-mail address, if available]*		

4. Key Activity No. (4)Experience of implementation of variable message sign system:*[Insert brief description of the Activity, emphasizing its specificity]*

Contract with Similar Key Activities			
Item	Information		
Contract Identification	*[insert contract name and number, if applicable]*		
Award Date	*[insert day, month, year, i.e., 15 June, 2015]*		
Completion Date	*[insert day, month, year, i.e., 03 October, 2017]*		
Role in Contract *[check the appropriate box]*	Prime Contractor ☐	Partner of a Joint Venture ☐	Subcontractor ☐
Total Contract Amount	*[insert total contract amount in US$]*		
If partner in a JV or sub contractor, specify participation of total contract amount	*[insert a percentage amount*	*[insert total contract amount in US$]*	
Employer's Name:	*[insert full name]*		
Address: Telephone/Fax Number: E-mail:	*[indicate street / number / town or city / country]* *[insert telephone/fax numbers, including country and city area codes]* *[insert E-mail address, if available]*		

5. Key Activity No. (5)Probe car system:*[Insert brief description of the Activity, emphasizing its specificity]*

Contract with Similar Key Activities			
Item	Information		
Contract Identification	*[insert contract name and number, if applicable]*		
Award Date	*[insert day, month, year, i.e., 15 June, 2015]*		
Completion Date	*[insert day, month, year, i.e., 03 October, 2017]*		
Role in Contract *[check the appropriate box]*	Prime Contractor ☐	Partner of a Joint Venture ☐	Subcontractor ☐
Total Contract Amount	*[insert total contract amount in US$]*		
If partner in a JV or sub contractor, specify participation of total contract amount	*[insert a percentage amount*	*[insert total contract amount in US$]*	
Employer's Name:	*[insert full name]*		
Address: Telephone/Fax Number: E-mail:	*[indicate street / number / town or city / country]* *[insert telephone/fax numbers, including country and city area codes]* *[insert E-mail address, if available]*		

6. Key Activity No. (8)Flood monitoring system:*[Insert brief description of the Activity, emphasizing its specificity]*

Contract with Similar Key Activities			
Item	Information		
Contract Identification	*[insert contract name and number, if applicable]*		
Award Date	*[insert day, month, year, i.e., 15 June, 2015]*		
Completion Date	*[insert day, month, year, i.e., 03 October, 2017]*		
Role in Contract *[check the appropriate box]*	Prime Contractor ☐	Partner of a Joint Venture ☐	Subcontractor ☐
Total Contract Amount	*[insert total contract amount in US$]*		
If partner in a JV or sub contractor, specify participation of total contract amount	*[insert a percentage amount*	*[insert total contract amount in US$]*	
Employer's Name:	*[insert full name]*		
Address: Telephone/Fax Number: E-mail:	*[indicate street / number / town or city / country]* *[insert telephone/fax numbers, including country and city area codes]* *[insert E-mail address, if available]*		

7. Key Activity No. (9)Establishing web-site of traffic information provision:*[Insert brief description of the Activity, emphasizing its specificity]*

Contract with Similar Key Activities			
Item	Information		
Contract Identification	*[insert contract name and number, if applicable]*		
Award Date	*[insert day, month, year, i.e., 15 June, 2015]*		
Completion Date	*[insert day, month, year, i.e., 03 October, 2017]*		
Role in Contract *[check the appropriate box]*	Prime Contractor ☐	Partner of a Joint Venture ☐	Subcontractor ☐
Total Contract Amount	*[insert total contract amount in US$]*		
If partner in a JV or sub contractor, specify participation of total contract amount	*[insert a percentage amount*	*[insert total contract amount in US$]*	
Employer's Name:	*[insert full name]*		
Address: Telephone/Fax Number: E-mail:	*[indicate street / number / town or city / country]* *[insert telephone/fax numbers, including country and city area codes]* *[insert E-mail address, if available]*		

Form EXP - 4.2(c) – Technical Support From Subcontractor

From

_____

_____

_____

_____

To

Managing Director

Hyderabad Growth Corridor Limited

2nd Floor, HMDA Complex, Tarnaka

Secunderabad

Subject: Design, Supply, Installation, Testing, Commissioning, Training, Warranty and Remedying Defects of Equipments and Related Facilities of Hyderabad City Intelligent Transport System (Hyderabad City ITS) in the state of Andhra Pradesh, India being taken up with the loan of assistance of Japan International Cooperation Agency under Phase-2 program, and Operation and Maintenance of Hyderabad City ITS and Related Facilities being taken up with a separate fund provided by Hyderabad Growth Corridor Limited for a period of Five years from the date of the Commissioning Certificate.

Dear sir/Madam,

We, M/s_____, hereby confirm that we are a manufacture/supplier of *[name of product, system or service]*. We further certify that, if the tender is accepted and the contractor is awarded, we will provide the technical support by supplying product, system or service for the project including the defect liability and maintenance as set forth in the contract.

Yours Sincerely,

Authorized Signatory Details

Company Info

Seal:

Form PER - 5.1a – Candidate Summary

[The following table shall be filled in for prime and alternate candidates for the positions specified.]

Date: *[insert day, month, year]*

Applicant's Legal Name: *[insert full name]*

Applicant's Party Legal Name: *[insert full name]*

Reference ID No.: *[insert number, if any]*

Page *[insert page number]* of *[insert total number]* pages

For specific positions essential to contract implementation, applicants should provide the names of at least two candidates qualified to meet the specified requirements stated for each position. The data on their experience should be supplied in separate sheets using Form PER - 5.1bfor each candidate using separate sheets.

1.	Project Manager
	Name of prime candidate
	Name of alternate candidate
2.	ITS Chief Engineer
	Name of prime candidate
	Name of alternate candidate

Form PER - 5.1b – Curriculum Vitae

[The following table shall be filled in for prime and alternate candidates for the positions specified.]

Date: *[insert day, month, year]*

Applicant's Legal Name: *[insert full name]*

Applicant's Party Legal Name: *[insert full name]*

Reference ID No.: *[insert number, if any]*

Page *[insert page number]* of *[insert total number]* pages

<table>
<tr><td colspan="2">Position</td><td>Candidate
☐ Prime ☐ Alternate</td></tr>
<tr><td rowspan="2">Candidate information</td><td>1. Name of candidate</td><td>2. Date of birth</td></tr>
<tr><td colspan="2">3. Professional qualifications</td></tr>
<tr><td rowspan="5">Present employment</td><td colspan="2">4. Name of employer</td></tr>
<tr><td colspan="2">Address of employer</td></tr>
<tr><td>Telephone</td><td>Contact (manager/personnel officer)</td></tr>
<tr><td>Fax</td><td>Email address</td></tr>
<tr><td>Job title of candidate</td><td>Years with present employer</td></tr>
</table>

[Summarize professional experience over the last 20 year or 15 years as appropriates, in reverse chronological order. Indicate particular technical and managerial experience relevant to the Project.]

From	To	Company/Project/Position/Relevant technical and management experience

Section V. List of Eligible Countries of Japanese ODA Loans

The eligible source countries for procurement of all goods and services to be financed out of the proceeds of the JICA ODA Loan are all countries and areas.

PART 2 – Works Requirements

Section VI. Scope of Works

1 Description of the Works

1-1 General

The work includes Design, Supply, Installation, Testing, Commissioning, Training, Warranty and Remedying Defects of Equipments and Related Facilities of Hyderabad City Intelligent Transport System (Hyderabad City ITS) in the state of Andhra Pradesh, India being taken up with the loan of assistance of Japan International Cooperation Agency under Phase-2 program, and Operation and Maintenance of Hyderabad City ITS and Related Facilities being taken up with a separate fund provided by Hyderabad Growth Corridor Limited for a period of Five years from the date of the Commissioning Certificate.

1-2 Outline of Hyderabad City ITS

Hyderabad City Intelligent Transport System (hereinafter referred as Hyderabad City ITS) is a comprehensive traffic control and management system for the road network in HMA. It comprises ATCC System, Probe Car System, CCTV Camera System, MET System, FLD System, VMS System and ITSC System. These systems shall function as a component of the system. They shall cooperate one another by exchanging data amongst the systems to achieve the intended functions of the total system.

The future objective of the Hyderabad City ITS is to achieve a unified view across concerned transportation agencies - HMDA, Traffic Police, Traffic Control Centre of ORR, Control Centre of APSRTC and Road Administration Agencies such as GHMC. It enables real-time communication and collaboration to take necessary actions and solve issues in efficient manner.

Hyderabad City ITS shall be capable of continuous operation for 24 hours a day, 365 days a year under the environmental conditions prevailing in Hyderabad.

Hyderabad City ITS is composed of the following servers, equipment, facilities and Sub-Systems:

- Equipment and facilities installed in ITS Centre (hereinafter referred as ITSC) such as ITSC Server, WEB & MSG Server, Operator Consoles, Video Wall, network equipment
- Four Sub-Systems comprising servers installed in ITSC and Roadside Equipment as follows:
    1. Automatic Traffic Counter cum Classifier System (hereinafter referred as ATCC System)
    2. Flood Monitoring System (hereinafter referred as FLD System)
    3. Variable Message Sign System (hereinafter referred as VMS System)
    4. CCTV Camera System

- Three other Sub-Systems comprising servers installed in ITSC and equipment installed in other related agencies to transmit data from other agencies to ITSC as follows:
    5. Meteorological Monitoring System (hereinafter referred as MET System)
    6. Probe Data Processing System (hereinafter referred as Probe Car System)
    7. Highway Traffic Management System of Hyderabad Outer Ring Road (hereinafter referred as HTMS)
- Necessary hardware and software of all above as part of Hyderabad City ITS

1-3 Scope of Work

The Contractor shall conduct "Design, Supply, Installation, Testing, Commission, Training, Warranty, Remedying Defects, Operation and Maintenance" for the Equipment and facilities of Hyderabad City ITS as specified in the Employer's Requirements (hereinafter referred as "the Works").

Items of the Works consist of the following four (4) major works: 1) ITSC System, 2) Subsystem, 3) Procurement and Supply of Equipment to Related Agencies and 4) Toll Free Number for ITSC Call Centre. The details are described in the subsequent sections.

Operation and Maintenance works are also included in the Contract. The Operation & Maintenance Specification in the Employer's Requirements shall be referred.

1-3-1 ITSC System

ITSC System (also referred as ITS Centre System) means equipment and facilities installed in ITSC. It comprises the following components:

Table 1 ITSC System Components

No.	Item	Quantity	Remarks
1	ITSC Server and Related Software	1 set	Redundant configuration along with OS, required software, utility software and network equipment
2	Web & MSG Server and Related Software	1 set	Redundant configuration along with OS, required software, utility software and network equipment
3	Video wall	1 set	15 units of 55' HDTVs and controllers along with video switch (video controller) and UPS
4	Operator Consoles with Related Software	11 set	Each console shall be equipped with minimum two monitors, UPS, OS and utility software.
5	Digital Road Map	1 set	To displays a map on the video wall, consoles and website for monitoring, analysis and provision.
6	Server racks	Required number	Robust server racks to keep servers and network equipments. UPS equipped or all servers
10	Others	-	Distribution boards, switch boards, cable and wiring works, cabinets, printers, firewall and network equipment.

The Works also includes the following items:

- Equipment such as cables (metal cable and fibre optic cable), wiring bracket, mounting bracket, cable protection equipment required for the whole computer system to function, and installation works

- Interior works of ITSC including furniture and equipment such as desks, chairs, lockers, copy machine, fax machine, air conditioner, air circulation fan, curtain, lighting, white-board, projector screen, power outlets, refrigerator, water server, etc. require for proper operation of ITSC.
- Application to the communication service provider for communication network to be supplied to ITSC, and necessary installation works of the network equipment

The Employer will perform all the necessary application procedures to the power supply companies for supplying the power.

1-3-2 Subsystems

Subsystem comprises the following components:

- Centre-side servers installed in ITSC. These servers are connected to Roadside Equipment and equipment installed in other agencies
- Roadside Equipment
- Equipment installed in other agencies

(1) Centre-Side Servers

Centre-side servers are as follows:

Table 2 Centre-side Servers

No.	Item	Quantity	Remarks
1	ATCC Server & Related Software	2	Connected to ATCC road-side equipment
2	CCTV Server & Related Software	2	Connected to CCTV road-side equipment
3	VMS Server & Related Software	2	Connected to VMS road-side equipment
4	FLD Server & Related Software	2	Connected to FLD road-side equipment
5	Probe Server & Related Software	2	Connected to APSRTC Server in Data Centre
6	MET Server & Related Software	2	Connected to APSDPS MET Server

(2) Roadside Equipment

Roadside Equipment are ATCC, CCTV, FLD and VMS. Number of the Roadside Equipment is shown in table below.

Table 3 Number of Roadside Equipment to be Installed

No.	Sub System (Roadside Equipment)	Number of Locations	Number of Equipment	Basic Condition
1	ATCC System	35	70	Two (2) cameras at one location to monitor both directions
2	CCTV Camera	49	56	One (1) camera at 42 locations and two (2) cameras at seven (7) locations to

	System			monitor both directions
3	FLD System	14	14	One equipment at one location
4	VMS System	28	28	One equipment at one location

The requirements and work items for the Roadside Equipment are as follows:

- The Roadside Equipment shall have structures which are suitable for outdoors.
- The Roadside Equipment shall be supported by robust structures such as cantilever, gantry or pole which are suitable for the equipment and their objectives.
- Civil works for installation are included in the scope of work.
- Equipment such as cables, wiring bracket, mounting bracket, cable protection equipment, etc and installation works for the equipment from the power supplier's poles/junction boxes to the Roadside Equipment are included in the scope of work.
- Application to the communication service provider for communication network to be supplied to all sites shall be conducted by the Contractor. Necessary installation works for the network equipment from junction box of the communication service provider to the Roadside Equipment is included in the scope of work.
- Safety measures for vehicles and pedestrians, anti-theft measures and easy maintenance measure shall be taken.
- Appropriate measures for lightning protection and grounding shall be taken.
- Necessary software for data collection, processing and transmission from the Roadside Equipment to ITSC shall be prepared.

The Employer will perform all the necessary application procedures to the power supply companies for supplying the power.

(3) Equipment in Related Agencies

1) Equipment in Andhra Pradesh State Development Planning Society (APSDPS)

The connection between APSDPS and ITSC, data retrieval of meteorological data from ASPDPS and transmission to ITSC are included in this project.

The Contractor shall arrange and prepare the following items in APSDPS:

Table 4 Equipment in APSDPS

No.	Item	Quantity	Remarks
1	MET Workstation & Related Software	1	Along with network equipment and software
2	UPS	1	Power backup for workstation and network equipment
3	Communication Network	1	Transmit data from APSDPS Server to MET Server in ITSC
4	Others	-	Cabinet, network equipment, cables, wiring bracket, mounting bracket and installation works in APSDPS

The required power supply will be provided by APSDPS.

2) Equipment in Andhra Pradesh State Road and Transport Corporation (APSRTC)

The connection between APSRTC and ITSC, data retrieval of probe data from probe data system of APSRTC and transmission to ITSC are included in this project.

The Contractor shall arrange and prepare the following items in APSRTC:

Table 5 Equipment in APSRTC

No.	Item	Quantity	Remarks
1	UPS	1	Power backup for network equipment
2	Communication Network	1	Transmit data from APSRTC Server to Probe Server in ITSC
3	Others	-	Cabinet, network equipment, cables, wiring bracket, mounting bracket and installation works in APSRTC

The required power supply will be provided by APSRTC.

3) Equipment in Traffic Control Centre (TCC) for Outer Ring Road (ORR) of Hyderabad Growth Corridor Limited (HGCL)

Highway Traffic Management System (HTMS) will be prepared in TCC for ORR of HGCL. The connection between HTMS for ORR of HGCL and ITSC, data retrieval from HTMS server in TCC and transmission to ITSC are included in this project.

The Contractor shall arrange and prepare the following items in TCC of ORR:

Table 6 Equipment in TCC of ORR

No.	Item	Quantity	Remarks
1	UPS	1	Power backup for network equipment
2	Communication Network	1	Transmit data from TCC of ORR to ITSC
3	Others	-	Cabinet, network equipment, cables, wiring bracket, mounting bracket and installation works in APSRTC

1-3-3 Procurement and Supply of Equipment to Related Agencies

The Contractor shall conduct "Procurement, Factory Testing, Supplying, Warranty and Remedying Defects" of the following equipment:

Table 7 Supply of Other Equipment

No.	Item	Quantity	Remarks
1	GPS Units	2400	GPS On-Board Unit (OBU) as per the requirement specified by the APSRTC

Installation works will be conducted by APSRTC.

1-3-4 Toll Free Number for ITSC Call Centre

The Contractor shall arrange toll free number for the call centre including the necessary hardware, software and other required items.

The Employer will arrange for the necessary government approvals.

2 Construction Period

It is expected that the project will take 18 months from the commencement to the completion.

3 Operation and Maintenance

The Operation and Maintenance of the Hyderabad City ITS and Related Facilities will be for a period of Five years from the date of the Commissioning Certificate.

The Employer's requirement, 7C: Operation and Maintenance Specifications shall be referred.

4 Site and Other Data

Hyderabad City ITS is covering major road of inside of Outer Ring Road. Locations of all equipments which shall be installed are as in table below. ATCC, CCTV, VMS, and FLD shall be installed on the roads as specified in below tables. Probe data shall be collected from GPS devices installed on city buses through router at APSRTC control centre of in Musheerabad, RTC Cross Road, Hyderabad – 500020. MET data shall be collected from APSDPS, Secretariat building, Basheerbagh, Hyderabad – 500022.

4-1 ATCC Locations

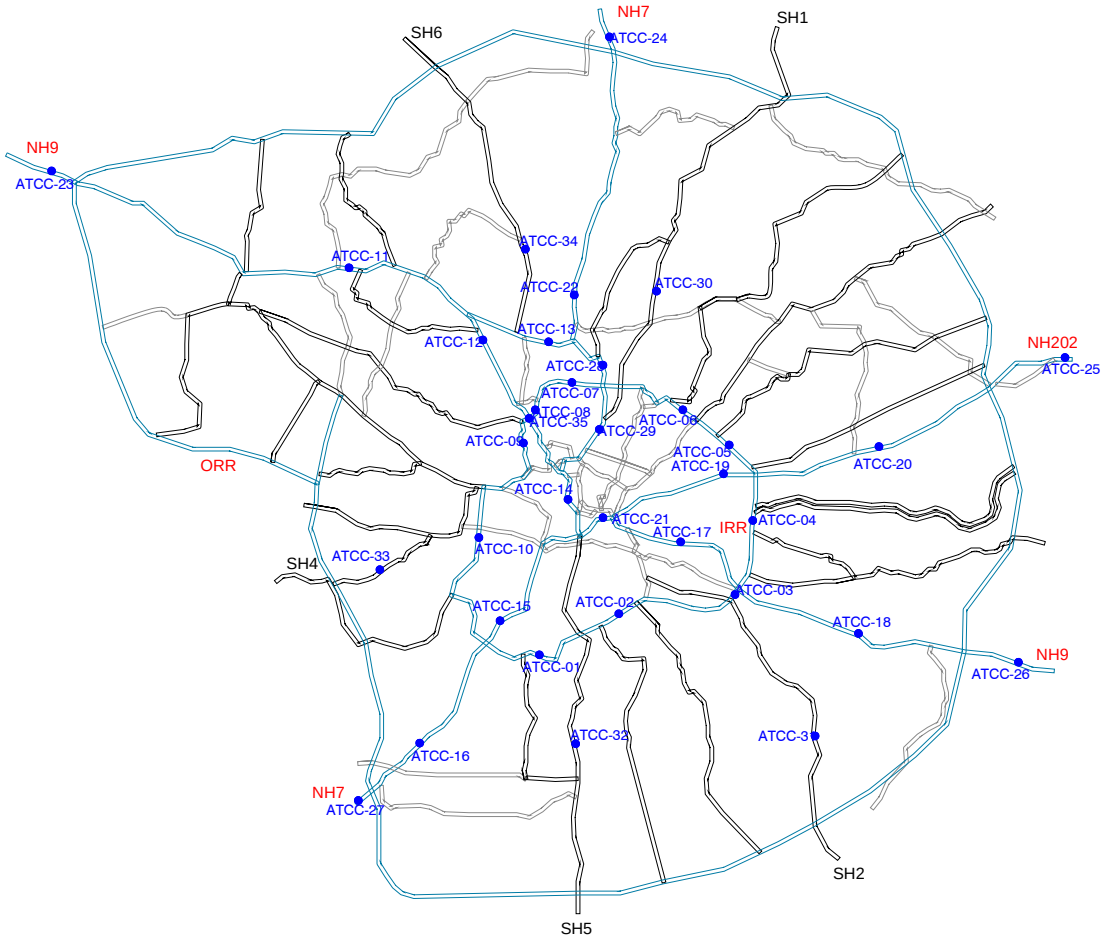

Figure 1 Location Map of ATCC Roadside Equipment

Table 8 ATCC Location Address

ATCC No.	Road	Location/Landmark
ATCC-01	IRR	Chandrayanagutta,near Palle Cheruvu road
ATCC-02	IRR	DRDL, Kanchanbagh
ATCC-03	IRR	LB Nagar Ring road
ATCC-04	IRR	Nagole Junction
ATCC-05	IRR	Genpact, Habsiguda
ATCC-06	IRR	Railway Golf Course, Mettuguda
ATCC-07	IRR	ACP Office, Begumpet
ATCC-08	IRR	Green Lands,CM Office
ATCC-09	IRR	Taj Banjara, Banjara Hills
ATCC-10	IRR	Spencers Stores, Attapur
ATCC-11	NH9	Miyapur, near Prajay City

ATCC No.	Road	Location/Landmark
ATCC-12	NH9	Hyderabad Industries Ltd, Moosapet
ATCC-13	NH9	Air Force Station, Bowenpally Junction
ATCC-14	NH9	Nampally, near Gandhi Bhavan
ATCC-15	NH7	National Police Academy,Shivarampalli
ATCC-16	NH7	Airport Road, near Shamshabad town
ATCC-17	NH9	Dilsukhnagar, near Chandnabrothers
ATCC-18	NH9	Hayathnagar, near All India Radio Station
ATCC-19	NH202	Ramanthapur, near HPS & Cheruvu
ATCC-20	NH202	Boduppal, near Central Power Research Institute (CPRI)
ATCC-21	NH9	Esama Bazar Road, near MGBS
ATCC-22	NH7	Medchal Road, near Dairy farm road turn
ATCC-23	NH9	Muthangi village after Patancheru
ATCC-24	NH7	Medchal, near CMR Engineering College
ATCC-25	NH202	HP Petroleum Tanks, Ghatkesar
ATCC-26	NH9	Inamguda near Ramoji Film City
ATCC-27	NH7	Thondapally village
ATCC-28	NH7	Tarbond near JBS
ATCC-29	NH7	Tankbund, at Makhdum Mohiuddin Statue
ATCC-30	Siddipet Rd (SH1)	Military College, Siddipet Road, Alwal
ATCC-31	Nagarjuna Sagar Rd (SH2)	Nagarjuna Sagar Road, Turkayamjal
ATCC-32	Srisailam Highway (SH5)	Pahadisharif, near RCI
ATCC-33	Chevella Rd (SH20)	Chevella Road, near Shadan College
ATCC-34	HMT Rd (SH6)	Medak Road, near HMT
ATCC-35	IRR	Under Punjagutta Flyover

4-2 CCTV Locations

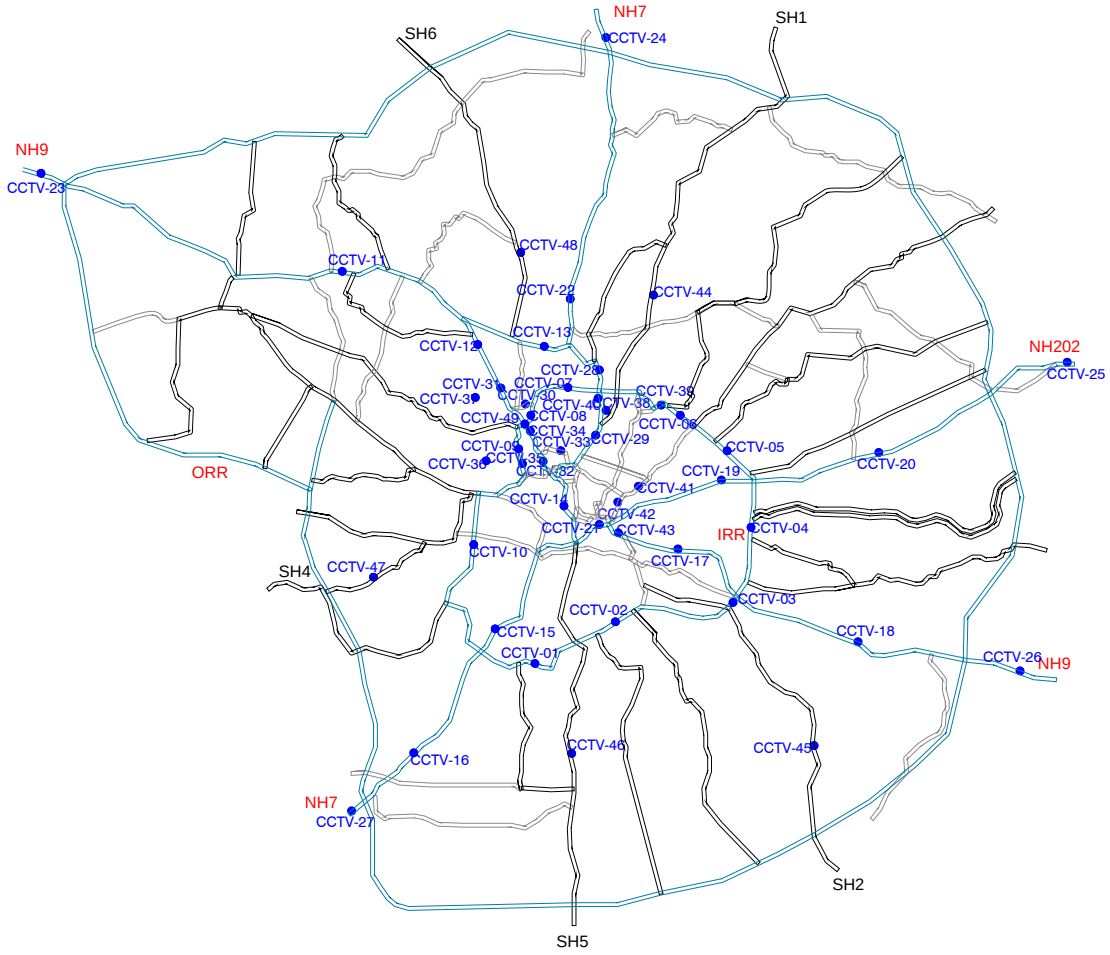

Figure 2 Location Map of CCTV Roadside Equipment

Table 9 CCTV Location Address

CCTV No.	Road	Location/Landmark
CCTV-01	IRR	Chandrayanagutta,Near Palle Cheruvu road
CCTV-02	IRR	DRDL, Kanchanbagh
CCTV-03	IRR	LB Nagar Ring road
CCTV-04	IRR	Nagole Junction
CCTV-05	IRR	Genpact, Habsiguda (2 cameras)
CCTV-06	IRR	Railway Golf Course, Mettuguda (2 cameras)
CCTV-07	IRR	ACP Office, Begumpet (2 cameras)
CCTV-08	IRR	Green Lands,CM Office
CCTV-09	IRR	Taj Banjara, Banjara Hills
CCTV-10	IRR	Spencers Stores, Attapur (2 cameras)
CCTV-11	NH9	Miyapur, near Prajay City

CCTV No.	Road	Location/Landmark
CCTV-12	NH9	Hyderabad Industries Ltd, Moosapet (2 cameras)
CCTV-13	NH9	Air Force Station, Bowenpally Junction
CCTV-14	NH9	Nampally, near Gandhi Bhavan (2 cameras)
CCTV-15	NH7	National Police Academy,Shivarampalli
CCTV-16	NH7	Airport Road, near Shamshabad town
CCTV-17	NH9	Dilsukhnagar, near Chandnabrothers (2 cameras)
CCTV-18	NH9	Hayathnagar, near All India Radio Station
CCTV-19	NH202	Ramanthapur, near HPS & Cheruvu
CCTV-20	NH202	Boduppal, near Central Power Research Institute (CPRI)
CCTV-21	NH9	Esama Bazar Road, Near MGBS
CCTV-22	NH7	Medchal Road, near Dairy farm road turn
CCTV-23	NH9	Muthangi village after Patancheru
CCTV-24	NH7	Medchal, near CMR Engineering College
CCTV-25	NH202	HP Petroleum Tanks, Ghatkesar
CCTV-26	NH9	Inamguda near Ramoji Film City
CCTV-27	NH7	Thondapally village
CCTV-28	NH7	Tarbond near JBS
CCTV-29	NH7	Tankbund, at Makhdum Mohiuddin Statue
CCTV-30	Ameerpet Rd (City Road)	Greenland to Ameerpet Road, near LalBunglow
CCTV-31	NH9	Ameerpet Junction at Maitrivanam
CCTV-32	NH9	Erramanzil T Junction near RTA office
CCTV-33	Raj Bhavan Road (City Road)	TSR Towers, Somajiguda
CCTV-34	NH9	Panjagutta, near Model House
CCTV-35	IRR	Road No 1 Banjara Hills, near Masab Tank Flyover Rd
CCTV-36	Road No. 12 (City Road)	Road No 12, Banjara Hills Traffic Police
CCTV-37	Krishna Nagar Main Rd (City Road)	Yousufguda, Near KVBR Indoor Stadium
CCTV-38	NH7 (NH9)	Ministers Road Jn, near James Street Rly Station, Ranigunj
CCTV-39	IRR	Road Under RailBridge, near Railnilayam Secunderabad
CCTV-40	NH7 (NH9)	Ranigunj to Paradise road, near Park Lane Y Jn
CCTV-41	Tilak Nagar Rd (City Road)	Road Under Rail Bridge Nallakunta, near Fever Hospital,
CCTV-42	Barkatpura Rd (City Road)	Barkatpura Circle Road, near EPF Office
CCTV-43	NH9	Malakpet Road, Under Rail Bridge
CCTV-44	Siddipet Rd (SH1)	Military College, Siddipet Road, Alwal
CCTV-45	Nagarjuna Sagar Rd (SH2)	Nagarjuna Sagar Road, Turkayamjal
CCTV-46	Srisailam Highway (SH5)	Pahadisharif, near RCI
CCTV-47	Chevella Rd (SH20)	Chevella Road, near Shadan College
CCTV-48	HMT Rd (SH6)	Medak Road, near HMT
CCTV-49	IRR	Under Punjagutta Flyover

4-3 FLD Locations

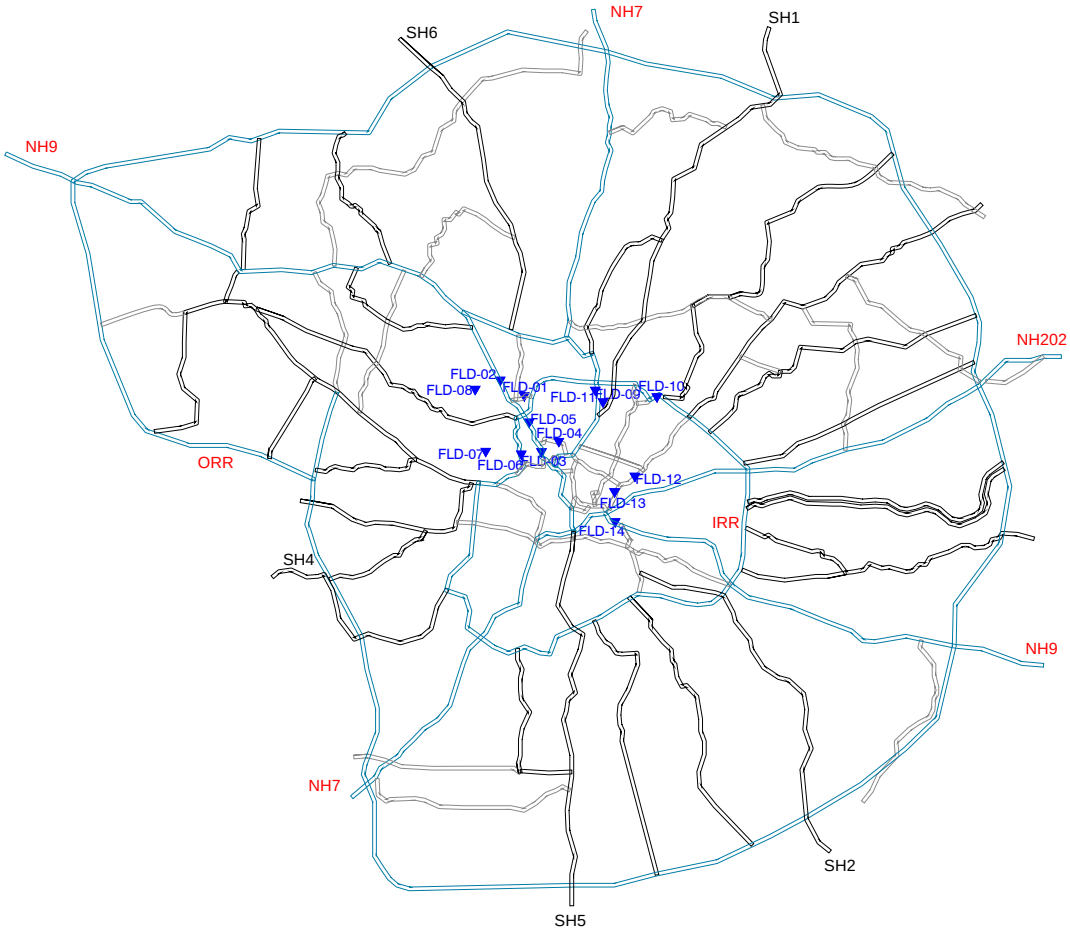

Figure 3 Location Map of FLD Roadside Equipment

Table 10 FLD Location Address

FLD No.	Road	Location/Landmark
FLD-01	Ameerpet Rd. (City Road)	Greenland to Ameerpet Road, near LalBunglow
FLD-02	NH9	Ameerpet Junction at Maitrivanam
FLD-03	NH9	Erramanzil T Junction, near RTA office
FLD-04	Raj Bhavan Rd (City Road)	TSR Towers, Somajiguda
FLD-05	NH9	Panjagutta, near Model House
FLD-06	IRR	Road No 1 Banjara Hills, near Masab Tank Flyover Road
FLD-07	Road No. 12 (City Road)	Road No 12, Banjara Hills Traffic Police
FLD-08	Krishna Nagar Main Rd. (City Road)	Yousufguda, near KVBR Indoor Stadium
FLD-09	NH7 (NH9)	Ministers Road Junction, near James Street Rly Station,Ranigunj

FLD No.	Road	Location/Landmark
FLD-10	IRR	Road Under RailBridge, near Railnilayam Secunderabad
FLD-11	NH7 (NH9)	Ranigunj to Paradise rd, near Park Lane Y Junction
FLD-12	Tilak Nagar Rd (City Road)	Road Under Rail Bridge Nallakunta, near Fever Hospital,
FLD-13	Barkatpura Rd (City Road)	Barkatpura Circle Road, near EPF Office
FLD-14	NH9	Malakpet Road, Under Rail Bridge

4-4 VMS Locations

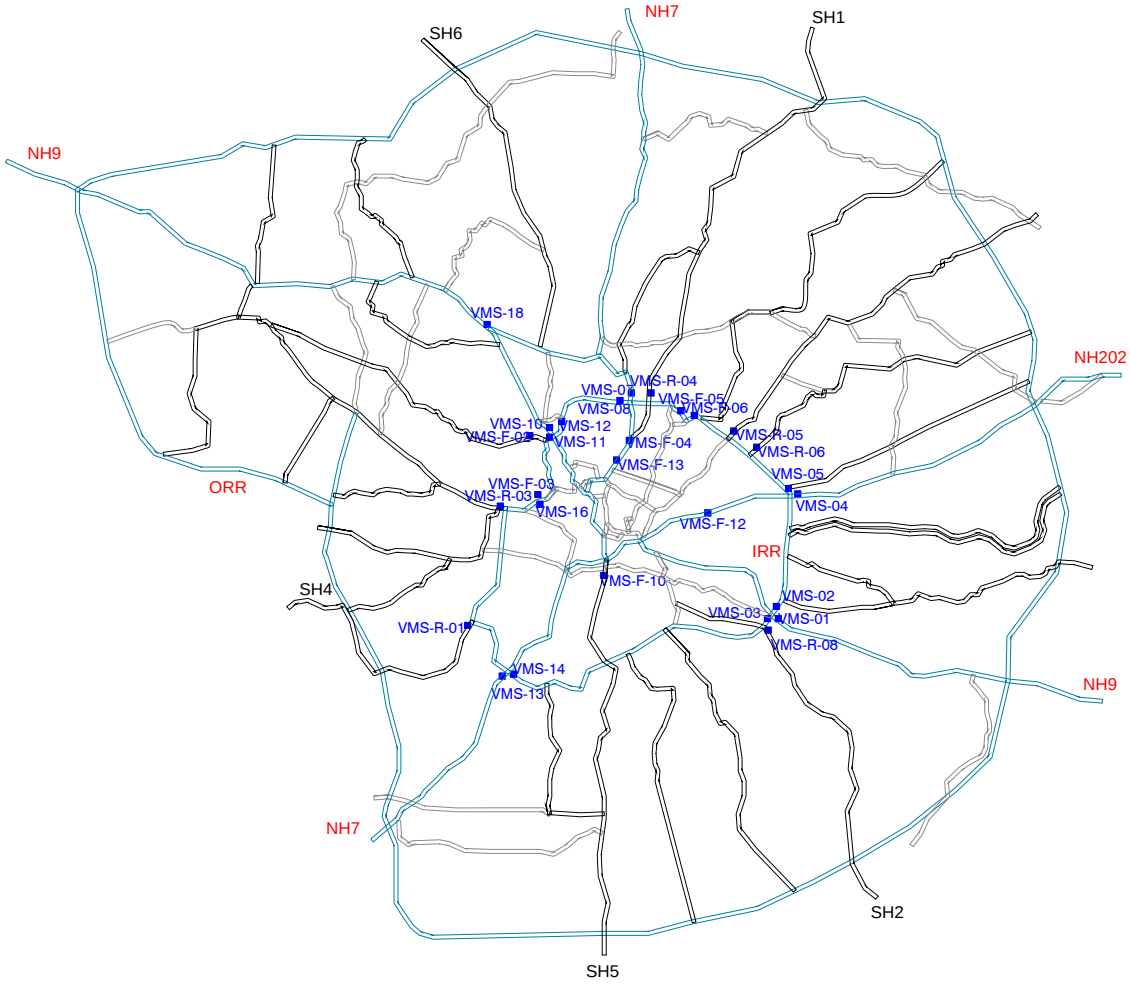

Figure 4 Location Map of VMS Roadside Equipment

Table 11 VMS Location Address

VMS No.	Road	Location/Landmark
VMS-01	NH9	LB Nagar Ring Road
VMS-02	IRR	LB Nagar Ring Road

VMS No.	Road	Location/Landmark
VMS-03	IRR	Uppal Ring Road
VMS-04	NH202	Uppal Ring Road
VMS-05	IRR	Uppal Ring Road
VMS-07	NH7 (NH9)	Secunderabad, MG Road Flyover Junction
VMS-08	IRR	MG Road Sec'bad, near Anand Theatre
VMS-10	NH9	Khairatabad road near Panjagutta Flyover
VMS-11	IRR	Nagarjuna Circle Road, near Brisah, Flyover Towards Greenlands
VMS-12	IRR	ITC Kakatiya Sheraton, Greenlands
VMS-13	NH7	Rajendra Nagar, near PVNR Expressway entry
VMS-14	IRR	Sivarampalli Junction, towards Mehdipatnam
VMS-16	IRR	Mehdipatnam Road, near Sarojinidevi Eye Hospital
VMS-18	NH9	IDA Kukatpally, near Metro Mall
VMS-F-02	Road No.2 (City Road)	Road No 2, Banjara Hills, near Sultan-Ul-Uloom College
VMS-F-03	IRR	Mehdipatnam Road, near Sarojinidevi Eye Hospital & Entry to PVNR Expressway
VMS-F-04	NH7 (NH9)	Tank Bund, near Secunderabad Sailing Club-Marriott Hotel
VMS-F-05	IRR	Railnilayam, Secunderabad
VMS-F-06	IRR	Secunderabad-Tarnaka Main Road, near Alugadda Bavi
VMS-F-10	NH7	Charminar Road near Madhina Circle
VMS-F-12	NH202	Moosram bagh Junction
VMS-F-13	NH7 (NH9)	Tank Bund, near Vemana Statue
VMS-R-1	Himayat Sagar Rd (Radial Road 2)	Himayat Sagar Road, near Sri Venkateswara Veterinary College
VMS-R-3	Mumbai Road (Radial Road 5)	Nanalnagar Junction, near Mehdipatnam
VMS-R-4	Club Rd (SH1)	Secunderabad Club Road, near Gymkhana Grounds
VMS-R-5	Tarnaka Main Rd	Osmania University road, at Lalapet Flyover
VMS-R-6	Nacharam Mallapur Rd	Nacharam Mallapur Road, near IICT Colony (Habsiguda)
VMS-R-8	Nagarjina Sagar Rd	Bairamalguda Bypass Road, near Mallikarjuna Nagar Colony

END

TENDER DOCUMENT

Volume I

Volume I	
Section I	· Invitation for Tender (IFT)
Section II	· Instruction to Tenderer (ITT)
Section III	· Form of Tender and Appendix to Tender (FOT)
Section IV	· Pricing Document (PRD)
Section V:	· Conditions of Contract
Part I	· General Conditions (COC-GC)
Part II	· Conditions of Particular Specifications (COC-PA)

SECTION I. INVITATION FOR TENDER

INVITATION FOR TENDER

HYDERABAD OUTER RING ROAD PROJECT

(HYDERABAD CITY INTELLIGENT TRANSPORT SYSTEM)

for

Design, Supply, Installation, Testing, Commissioning, Training, Warranty and Remedying Defects of Equipments and Related Facilities of Hyderabad City Intelligent Transport System (**Hyderabad City ITS**) in the state of Andhra Pradesh, India being taken up with the loan of assistance of Japan International Cooperation Agency under Phase-2 program and Operation and Maintenance of Hyderabad City ITS and Related Facilities a separate fund provided by Hyderabad Growth Corridor Limited for a period of Five years from the date of the Commissioning Certificate.

Date: XXXXXXXX

Loan No: ID-P 198

Bid Notice No. XXXXXXXXXXXXXX

1. The Hyderabad Growth Corridor Limited ("**the Employer**"), a joint venture company of Hyderabad Metropolitan Development Authority (**HMDA**) and Infrastructure Corporation of Andhra Pradesh (**INCAP**) has received a loan from the Japan International Cooperation Agency (**JICA**) in the amount of 42,027 Million Yen toward the cost of Hyderabad Outer Ring Road Project (hereinafter referred as "**the Project**") and it intends to apply part of the proceeds of this loan to payments under the contract "Design, Supply, Installation, Testing, Commissioning, Training, Warranty and Remedying Defects of Equipments and Related Facilities of **Hyderabad City ITS** in the state of Andhra Pradesh, India being taken up with the loan of assistance of **JICA** under Phase-2 program, and Operation and Maintenance of **Hyderabad City ITS** and Related Facilities being taken up with a separate fund provided by **the Employer** for a period of Five years from the date of the Commissioning Certificate." ("**the Works**"). Disbursement of an ODA Loan by **JICA** will be subject, in all respects, to the terms and conditions of the Loan Agreement, including the disbursement procedures and the "Guidelines for Procurement under **JICA** ODA Loans - April 2012 edn". No party other than **the Employer** shall derive any rights from the Loan Agreement or have any claim to loan proceeds.

2. **JICA** requires that tenderers and contractors, as well as **the Employer**, under contracts funded with **JICA** ODA Loans and other Japanese ODA, observe the highest standard of ethics during the procurement and execution of such contracts. In pursuance of this policy, **JICA**;

   (a) will reject a proposal for award if it determines that the tenderer recommended for award has engaged in corrupt or fraudulent practices in competing for the contract in question;

   (b) will recognize a contractor as ineligible, for a period determined by **JICA**, to be awarded a contract funded with **JICA** ODA Loans if it at any times determines that the contractor has engaged in corrupt or fraudulent practices in competing for, or in executing, another contract funded with **JICA** ODA Loans or other Japanese ODA.

3. **The Employer** invites sealed tenders from the prequalified eligible tenderers for **the Works**, which is described in the Employer's Requirements of the Tender Documents. **The Works** generally consist of design, supply, installation, testing, commissioning, training, warranty, remedying defects, operation and maintenance of various equipment and apparatus incorporated in **the Works** in accordance with the Contract, which do not include building construction.

4. The Tender will be called for the execution of **the Works** through the international competitive tendering procedures specified in the Guidelines for Procurement under **JICA** ODA Loans – April

2012 edn., and are open to prequalified Tenderers from eligible source countries as defined in the loan agreement. It may be noted that under the Loan Agreement that "all countries and all areas" are eligible to participate in the Tender.

5. Interested prequalified Tenderers may obtain further information from the office of the Managing Director, Hyderabad Growth Corridor Limited and inspect the Tender documents at the address given below at the end of this invitation, from 10:30 am to 5:00 pm on any working day between _____ and _____.

6. A complete set of Tender Documents may be purchased by prequalified Tenderers on the submission of a written application to the address below at the end of this invitation and upon payment of a non-refundable fee of Rs. 61,000/- (Rupees Sixty One thousand only) or US$ 1000/- (United States Dollars One thousand only) in the form of a demand draft from an Indian Scheduled Bank or from a scheduled foreign bank as defined in Section 2(e) of Reserve Bank of India (RBI) Act 1934 (as modified up to 7 January 2013 or latest edition if available) read with Second Schedule in favour of Managing Director, Hyderabad Growth Corridor Limited, Hyderabad, payable at any Scheduled Bank in Hyderabad, India, from 10:30 am to 5:00 pm on any working day between _____ and _____.

   Two sets of Tender documents will be issued out of which one set of Tender Documents is to be submitted with the Tender submittal untampered, duly signed and stamped on each page.

7. Tenders shall be valid 120 days from the latest date of submission of Tender and shall be accompanied by a tender security for the amount Rs. 24,000,000/- (Rupees Twenty Four Million) or US$ 380,000/- (United States Dollars Three hundred Eighty thousand). One original and two copies of Tender must reach the address below at the end of this invitation at or before 1:00 pm, _____. In the event of the specified date of Tender submission/opening being declared a holiday for the Employer, the Tenders shall be received/opened on the next working day at the same place and time.

8. Tenders will be opened at 3:30 pm on the same day of submission of Tenders thereafter in the presence of Tenderers' representative who choose to attend. Late or delayed Tenders will not be accepted.

9. Tender security shall be released to unsuccessful Tenderers as soon as possible after the contract has been signed with the successful Tenderer.

10. Tender security of the successful Tenderer shall be released as soon as possible after submission of a performance security in accordance with Sub-Clause 4.2 of the Conditions of Contract.

Managing Director
Hyderabad Growth Corridor Limited
Block A, HMDA Complex Tarnaka,
Hyderabad 500 007
Andhra Pradesh, INDIA
Tel: +91-40-27002913
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E-mail: cgmhgcl@gmail.com

SECTION II: INSTRUCTION TO TENDERERS

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INSTRUCTION TO TENDERERS

General

1. Scope of Tender

1.1 The Managing Director, Hyderabad Growth Corridor Limited (hereinafter referred to as "HGCL" or "**the Employer**"), a joint venture company of Hyderabad Metropolitan Development Authority (HMDA) and Infrastructure Corporation of Andhra Pradesh (INCAP), invites Tenders for the works (hereinafter referred to as "**the Works**") of Design, Supply, Installation, Testing, Commissioning, Training, Warranty and Remedying Defects of Equipments and Related Facilities of Hyderabad City Intelligent Transport System (Hyderabad City ITS) in the state of Andhra Pradesh, India being taken up with the loan of assistance of Japan International Cooperation Agency under Phase-2 program, and Operation and Maintenance of Hyderabad City ITS and Related Facilities being taken up with a separate fund provided by **the Employer** for a period of Five years from the date of the Commissioning Certificate.

1.2 **The Works** generally comprise Design, Supply, Installation, Testing, Commissioning, Training, Warranty, Remedying Defects, Operation and Maintenance, of the Equipments and Related Facilities incorporated in **the Works** as indicated in Volume I Section IV Pricing Documents. **The Works** does not include building construction. The Contractor shall check and review **the Employer**'s Requirements included in the Tender Documents, and execute the detailed design work at the Contractor's cost and time, so that the Contractor will be able to supply and deliver **the Works** in conditions to fit for the intended purpose when completed.

1.3 The successful Tenderer is required to complete the whole of Works within 18 (eighteen) calendar months from the date of commencement of **the Works** as specified in the Contract.

1.4 The successful Tenderer shall establish a liaison office in Hyderabad, Andhra Pradesh, India, immediately after receiving the Letter of Acceptance from **the Employer**, if he has no such office in Hyderabad.

2. Source of Funds

2.1 **The Employer** has received an ODA loan (Loan Agreement No. ID-P198 signed on 21 November, 2008) from Japan International Cooperation Agency (hereinafter referred to as "JICA") in the amount of 42,027 Million Japanese Yen toward the cost of the Hyderabad Outer Ring Road Project, and intends to apply a portion of the proceeds of this loan to the payments under this contract. Disbursement of an ODA Loan by JICA will be subject, in all respects, to the terms and conditions of the Loan Agreement, including the disbursement procedures and the "Guidelines for Procurement under JICA ODA Loans – April 2012 edn". No party other than **the Employer** shall derive any rights from the Loan Agreement or have any claim to loan proceeds. The above Loan Agreement will cover only a part of the project cost. As for the remaining portion, **the Employer** will take appropriate measures for finance. It may be noted that under the Loan Agreement "all countries and all areas" are eligible to participate in the Tender.

3. Eligible Tenderers

3.1 The Tenders for this Contract will only be considered from those companies, corporation, consortium and joint ventures that have been prequalified and invited to the Tender following assessment of information supplied during the prequalification process. This invitation for Tenders is open to prequalified Tenderers from all countries and areas.

3.2 Any change in the prequalified consortium or joint venture, shall be subject to the written approval of **the Employer** prior to the deadline for submission of Tenders. Any such change shall be submitted to **the Employer** not later than 14 (fourteen) days after the date of the Invitation for Tender. Such approval may be denied if:

(a) members withdraw from a joint venture or consortium and the remaining members do not meet the qualifying requirements, or

(b) the new members to a joint venture or consortium are not qualified, individually or as another joint venture, or

(c) in the opinion of **the Employer**, a substantial reduction in competition may result.

4. Eligible Materials, Equipment, and Services

4.1 For the purpose of these Tender documents, the words "Works", "Plant", "Materials", etc., shall be construed in accordance with the respective definitions given to them in the Conditions of Contract.

4.2 There are no restrictions on the country of origin of Plant, Materials and Services to be provided under the Contract. However, all Plant, Materials and Services shall be to the satisfaction of **the Employer**. All Plant, Equipment and Services included in **the Tenderer**'s proposal and incorporated into the Contract Document as accepted by **the Employer** shall be construed as the Contractor's Proposal.

4.3 For the purpose of this clause, "origin" means the place where the Plant, Materials, Services or component parts thereof are manufactured, produced or developed. Plant, Materials and Services are produced when, through manufacturing, processing, development or substantial and major assembling of components, a commercially recognized product result that is substantially different in basic characteristics or in purpose or utility from its components.

5. Qualification of the Tenderer

5.1 To be qualified for award of Contract, Tenderers shall:

(a) submit a written power of attorney (POA) authorizing the signatory of the Tender to commit **the Tenderer**.

(b) submit documentary evidence which establishes that **the Tenderer** has adequate experience, financial capacity and technical capability to undertake the Contract. An assessment of Tenderer's proposals regarding work methods, scheduling and resourcing which shall be provided in sufficient detail to confirm **the Tenderer**'s capability to complete **the Works** in accordance with **the Employer**'s Requirements and within the Time for Completion.

5.2 **The Tenderer** shall continue to meet the minimum threshold criteria for prequalification. Non-conformance with the minimum threshold criteria for prequalification shall be justifiable grounds for rejection of a Tender.

5.3 Where the Tender is submitted by a consortium or joint venture of two or more firms as members, the Tender shall continue to comply with the following requirements for prequalification:

(a) the Tender, and in the case of the successful Tenderer, the Form of Contract Agreement, shall be signed by each authorized representative of each member so as to be legally binding on all members;

(b) one of the members shall be authorized to be in charge (Leader) and this authorization shall be evidenced by submitting a power of attorney signed by legally authorized signatories of all the members;

(c) the member in charge (Leader) shall be authorized to incur liabilities, receive payments and

receive instruction for and on behalf of any or all members of the consortium/joint venture;

(d) details of the intended percentage financial participation of each member shall be provided in the form of Pricing Schedule indicating the responsibility for each item therein without any financial information and reconfirmed and expanded with complete details of the proposed division of responsibilities and corporate relationships among the individual members:

(e) all members of the consortium/joint venture shall be jointly and severally liable for the execution of the Contract in accordance with the Contract terms, and a relevant statement to this effect shall be included in the authorization mentioned under (b) above as well as in the Tender Form and the Form of Contract Agreement (in case of a successful Tender); and

(f) a copy of the agreement entered into by the consortium members or the joint venture members who shall be the same members of as that of the consortium/joint venture agreement accepted at the time of prequalification, shall be submitted with the Tender.

5.4 **The Tenderer** (including all members of a consortium/joint venture) shall not be one of the following:

(a) A firm or an organization which has been engaged by **the Employer** to provide consulting services for the preparation related to procurement for or implementation of this Work;

(b) Any association/affiliates (inclusive of parent firm) or an organization mentioned in sub-paragraph (i) above.

(c) A firm or an organization who lends or temporarily seconds its personnel to firms or organizations which are engaged in consulting services for the preparation related to procurement for or implementation of the Work, if the personnel would be involved in any capacity on the same Work .

5.5 **The Tenderer** shall not be under a declaration of ineligibility for corrupt or fraudulent practice.

6. One Tender per Tenderer

6.1 Each Tenderer shall submit only one Tender either by himself or as a member in a consortium/joint venture. A Tenderer who submits or participates in more than one Tender will cause all of Tenders in which **the Tenderer** has participated to be disqualified. No firm can be a sub-contractor while submitting a Tender individually or as a member of a consortium/joint venture in the same tendering process. A firm, if acting in the capacity of sub-contractor in any Tender, may participate in more than one Tender, but in only in that capacity.

7. Cost of Tendering

7.1 **The Tenderer** shall bear all costs associated with the preparation and submission of its Tender and **the Employer** will in no case be responsible or liable for those costs, regardless of the conduct or outcome of the tendering process.

8. Site Visit

8.1 **The Tenderer** is advised to visit and examine the Site of Works and its surroundings and obtain for itself on its own responsibility, all information that may be necessary for preparing the Tender and entering into a Contract for **the Works**. The costs of visiting the Site shall be at **the Tenderer**'s own expense.

8.2 **The Tenderer** and any of its personnel or agents will be granted permission by **the Employer** to enter upon its premises and lands for the purpose of such inspection, but only upon the express condition that **the Tenderer**, its personnel and agents, will release and indemnify **the Employer** and his personnel and agents from and against all liability in respect thereof and will be responsible for death or personal injury, loss of or damage to property and any other loss, damage,

costs and expenses incurred as a result of the inspection. Upon entering **the Employer**'s premises and lands, **the Tenderer** hereby agrees that such release and indemnity is so provided.

8.3 **The Employer** may conduct a Site visit concurrently with the Pre-Tender Meeting referred to in ITT Clause 19.

Tender Documents

9. Content of Tender Documents

9.1 The Tender Documents have been prepared for the purpose of inviting Tender for **the Works** as defined in IFT Clause 1. The Tender Documents are those stated below, and shall be read in conjunction with any Addenda issued in accordance with ITT Clause 11:

Volume	Description	
I	Section I	Invitation for Tender (IFT)
	Section II	Instructions to Tenderers (ITT) including Annexure
	Section III	Form of Tender* and Appendix to Tender including Schedules *
	Section IV	Pricing Documents *
	Section V	Conditions of Contract Part I General Conditions (COC-GC)
	Section VI	Conditions of Contract Part II Conditions of Particular Applications (COC-PA) including Annexes
II	Section VII	Employer's Requirements Part A General Technical Specification (GTS)
	Section VII	Employer's Requirements Part B Particular Technical Specification (PTS)
	Section VII	Employer's Requirements Part C Operation and Maintenance Specification (OMS) including Attachment.
III	Section VIII	Employer's Requirement - Drawings

* required to be completed by **the Tenderer**.

9.2 **The Tenderer**s is expected to examine carefully the contents of all the Tender Documents. Failure to comply with the requirements of Tender Submission will be at **the Tenderer**'s own risk. Pursuant to ITT Clause 28, Tenders which are not substantially responsive to the requirements of the Tender Documents will be rejected.

9.3 **The Tenderer** shall not make or cause to be made any alteration, erasure or obliteration to the text of the Tender Documents.

10. Clarification of Tender Documents

10.1 **The Tenderer** shall check the pages of all documents against page numbers given in indexes and summaries and, in the event of discovery of any discrepancy **the Tenderer** shall inform **the Employer** forthwith for clarification.

10.2 A prospective Tenderer requiring any clarification of the Tender Documents may notify **the Employer** in writing or by fax (hereinafter, the term "fax" is deemed to include electronic transmission such as facsimile, cable and e-mail) at **the Employer**'s address indicated in the Invitation for Tenders. **The Employer** will respond to any request for clarification or modification that it receives earlier than 42 (forty two) days prior to the deadline for submission of Tenders.

Written copies of **the Employer**'s response will be forwarded to all purchasers of the Tender Documents including a description of the inquiry, but without disclosing the identity of Tenderer seeking clarification, at least 14 (fourteen) days before the deadline for the Tender submission.

10.3 Except for any such written clarification by **the Employer** which is expressly stated to be by way of an addendum to the documents referred to in ITT Sub-Clause 9.1 above and/or for any other document issued by **the Employer** which is similarly described, no written or verbal communication, representation or explanation by any employee of **the Employer** shall be taken to bind or fetter **the Employer** under the Contract.

11. Amendment of Tender Documents

11.1 At any time prior to the deadline for submission of Tenders, **the Employer** may, for any reason, whether at its own initiative or in response to a clarification requested by a prospective Tenderer, modify the Tender Documents by issuing an Addendum or Addenda to Tender Documents.

11.2 Any Addendum thus issued shall be part of the Tender Documents pursuant to ITT Sub-Clause 9.1, and shall be communicated in writing or by fax to all purchasers of the Tender Documents. Without prejudice to the general order of precedence prescribed by Sub-Clause 1.6 of the Conditions of Contract, the provisions in any such Addendum or Addenda to Tender Documents shall take priority over the Tender Documents previously issued. Prospective Tenderers shall immediately acknowledge receipt of each Addendum by fax to **the Employer**, and it will be assumed that the information contained therein will have been taken into account by **the Tenderer** in its Tender. **The Tenderer**s shall also confirm receipt such documents and list them in the Tender Submittal.

11.3 To afford prospective Tenderers reasonable time in which to take an Addendum into account in preparing their Tenders, **the Employer** may, at its discretion, extend the deadline for submission of Tenders, in accordance with ITT Clause 22.

11.4 **The Tenderer** should note that there might be aspects of his Tender and/or the documents submitted with the Tender that will necessitate clarification. It is intended that any aspect of the said documents and any amendments or clarification which are to have contractual effect will be incorporated into the Contract either:

(a) by way of Conditions of Contract-Conditions of Particular Application to be prepared on behalf of **the Employer** and agreed in writing by **the Tenderer** prior to and conditional upon acceptance of the Tender; or

(b) by **the Tenderer** submitting, at the written request of **the Employer**, documents which are expressly stated to form part of the Tender, whether requested before or after submission of the documents forming part of the Tender, identified in ITT Clause 13 below, and whether as supplements to, or amended versions of such documents.

Save as aforesaid, all such amendments or clarifications shall not have contractual effect.

Preparation of Tenders

12. Language of Tender

12.1 The Tenders, and all correspondence and documents related to the Tender, exchanged by **the Tenderer**s and **the Employer** shall be written in the English language. Supporting documents and printed literature furnished by **the Tenderer** may be written in another language, provided they are accompanied by a translation of its pertinent passages in the English language authenticated

by an authorized translator, in which case, for purposes of interpretation of the Tender, the English translation shall prevail.

13. Documents Comprising the Tender

13.1 **The Tenderer** shall, on or before the date and time specified in ITT Clause 22, submit his Tender in four separate sealed envelopes clearly marked with the name of **the Tenderer** and with:

(a) Hyderabad City Intelligent Transport System: Tender Security

(b) Hyderabad City Intelligent Transport System: Technical Package

(c) Hyderabad City Intelligent Transport System: One set of complete Tender Documents

(d) Hyderabad City Intelligent Transport System: Financial Package

These shall be addressed to the Managing Director, Hyderabad Growth Corridor Limited and submitted at the address given ITT Sub-Clause 21.2. **The Tenderer** may obtain receipt for the submission of his Tender, such receipt being issued free of charge.

13.2 **The Tenderer** shall submit the following document duly completed with the "Tender Security" package of his Tender submission:

(a) Original Tender Security furnished in accordance with ITT Clause 17.

13.3 **The Tenderer** shall submit the following documents duly completed with the "Technical Package" of his Tender submission:

(a) Form of Tender together with Appendix to Tender (see ITT Sub-Clause 13.6);

(b) Schedule FT-1 Power of Attorney: Duly notarised, irrevocable Power of Attorney indicating that the person(s) signing the Tender has(ve) the authority to sign the Tender and thus that the Tender is binding upon **the Tenderer** during the full period of its validity in accordance with ITT Clause 16. (see ITT Sub-Clause 5.1);

In case of **the Tenderer** being a Consortium/Joint Venture (see ITT Sub-Clause 5.3):

- Duly notarized, irrevocable Power of Attorney indicating that the person(s) signing the Tender has(ve) the authority to sign the Tender and thus that the Tender is binding upon each member of Consortium/Joint Venture during the full period of its validity in accordance with ITT Clause 16, and
- Duly notarized, irrevocable Power of Attorney issued by each member of Consortium/Joint Venture indicating that the member in charge (Leader) shall be authorized to incur liabilities, receive payments and receive instruction for and on behalf of any or all members of the consortium/joint venture .

(c) Schedule FT-2: Copy of Consortium/Joint Venture Agreement, if applicable. (see ITT Sub-Clause 5.3);

(d) Schedule FT-3: Updated Prequalification Forms (see ITT Sub-Clause 5.2 and 13.7);

(e) Schedule FT-4: Proposed Work Programme (see ITT Sub-Clause 13.8);

(f) Schedule FT-5: Technical Proposal (see ITT Sub-Clause 13.9);

(g) Schedule FT-6: Structure of Tenderer including Details of Ownership and Control of Tenderer (see ITT Sub-Clause 13.10);

(h) Schedule FT-7: Project Management Organization and Proposed Key Personnel (see ITT Sub- Clause 13.11);

(i) Schedule FT-8: Technical Information of Equipment (see ITT Sub-Clause 13.12);

(j) Schedule FT-9: Statement of a Clause by Clause Commentary and Statement of Deviation (See ITT Sub-Clause 13.13);

(k) Schedule FT-10: Subcontractors proposed by **the Tenderer** (See ITT Sub-Clause 13.14 and Clause

(l) Schedule FT-12: Acknowledgement of Compliance with Guidelines for Procurement under Japanese ODA Loan in the form given in Annexure ITT-2 to the Instruction to Tenderers. The form shall be completed by **the Tenderer** and dully signed by the authorized representative of **the Tenderer**;

(m) Schedule FT-13: Certificate confirming receipt of all Tender Addenda in the form provided in Schedule FT-13 to the Form of Tender. (see ITT Sub-Clause 11.2);

(n) Schedule FT-14: Declaration for Non-engagement of any Agent, Middleman or Intermediary in the form provided in Schedule FT-14 to the Form of Tender;

(o) Schedule FT-15: Undertaking to confirm that the Tender documents and drawings prepared by **the Employer** will be used solely for the preparation of the Tender. (see ITT sub-clause 26.3); and,

(p) Any further documents which are requested in writing by **the Employer** before submission of the Tender (see ITT Sub-Clause 13.17).

The "Technical Package" shall not contain any financial proposal.

The Tenderer shall also submit a soft copy in CD in MS Office Software or searchable Portable Document File format of Item (d) Schedule FT-3 through Item (l) Schedule FT-11 to the Form of Tender above. No signature, initial and seal are required for the soft copy. In case of any discrepancy between hard copy and soft copy, the hard copy shall prevail.

13.4 **The Tenderer** shall submit the following document duly completed with the "One set of complete Tender Documents" package of his Tender submission:

(a) One set of complete Tender Documents (including all Addenda) untampered, signed and stamped on right hand bottom corner of each page.

13.5 **The Tenderer** shall submit the following document duly completed with the "Financial Package" of his Tender submission:

(a) Completed Pricing Documents including Tender Total, Price Schedule (Breakdown of Tender Total) (see ITT Sub-Clause 13.16).

(b) Any further documents which are requested in writing by **the Employer** before submission of the Tender (see ITT Sub-Clause 13.17).

The "Financial Package" is to contain only price proposal, duly completed as per the prescribed format, and any discount, if offered. There shall be no other conditions, whatsoever.

The Tenderer shall also submit a soft copy in CD-in MS Office Software or searchable Portable Document File format of the completed Pricing Documents. No signature, initial and seal are required for the soft copy. In case of any discrepancy between hard copy and soft copy, the hard copy shall prevail.

13.6 Form of Tender:

The Form of Tender shall be completed and signed by a duly authorized and empowered representative of **the Tenderer**. If **the Tenderer** comprises a consortium or a joint venture, the Form of Tender shall be signed by a duly authorized representative of each member or participant thereof. Signatures on the Form of Tender shall be witnessed and dated. The Appendix to Tender including Attachments thereto shall be dully signed by the representative of Tenderer or representative of each member of a consortium/joint venture and submitted as part of the form of Tender.

13.7 Updated Prequalification Forms:

The Tenderer shall update and re-submit the following Prequalification Application Forms. **The Tenderer** shall continue to meet the minimum threshold criteria for prequalification. Non-conformance with the minimum threshold criteria for prequalification shall be justifiable grounds for rejection of a Tender.

No.	Form No.	Description
1.	ELI-1.1	Applicant Information Form
2.	ELI-1.2	Applicant Partner Information Form
3.	CON-2	Historical Contract Non-Performance
4.	FIN-3.1	Financial Situation
5.	FIN-3.2	Average Annual Turnover
6	EXP - 4.1	General Experience
7	EXP - 4.2(a)	Specific Experience
8	EXP - 4.2(b)	Specific Experience in Key Activities
9.	EXP-4.2 c	Technical Support Form From Subcontractor
10	PER - 5.1a	Candidate Summary
11	PER - 5.1b	Curriculum Vitae

13.8 Proposed Work Programme

The Tenderer shall submit with his Tender, a Works Programme which shall indicate how **the Tenderer** intends to organize and carry out **the Works** and achieve Stages and complete the whole of **the Works** by the appropriate Key Dates. Detailed requirements for **the Works** Programme are set out in Schedule FT-4 to Form of Tender.

The Works Programme given in the Tender shall not in any event be construed as a submission of **the Works** Programme as required to be furnished according to **the Employer**'s Requirements and the Conditions of Contract.

The Tenderer's attention is drawn to Sub-Clause 1-4-5 Work Programme of **the Employer**'s Requirements. **The Tenderer** shall note that he may be required to amplify, explain and develop his proposed Works Programme prior to award of Contract.

13.9 Technical Proposal

The Tenderer shall describe the proposed works in sufficient detail in his Technical Proposal to enable **the Employer** to evaluate the technical adequacy of the proposed system and to judge whether the proposal is sufficiently responsive or not.

The Technical Proposal shall include the statement of compliance with **the Employer**'s Requirements whether the proposed system and Equipment comply with the specified configuration, function, performance, capacity, and other requirements. If the proposed system does not comply with **the Employer**'s Requirements, the details of differences shall be described together with the alternative features of the facilities offered.

The design, such as which type, procedure, method or configuration, is left to **the Tenderer**.

If **the Tenderer** wishes, an alternative may be proposed in addition to the proposal that complies with **the Employer**'s Requirements, if it is advantageous to **the Employer** either functionally or

economically in the opinion of **the Tenderer**. However, **the Employer** reserves the right to accept or reject such alternative proposal.

Where the supporting documents such as brochure, article, report, or paper are provided, they shall be attached at the end of the proposal or in a separate volume and a cross reference shall be prepared. The Technical Proposal shall be written in English.

The Tenderer shall clearly state in the Technical Proposal that the proposed system has sufficient capacity, expandability and upgradability to meet the future requirement of the system as mentioned in **the Employer**'s Requirements.

The Tenderer shall submit with his Tender his Technical Proposal as described in Schedule FT-5 of the Form of Tender.

Non-conformance with **the Employer**'s Requirements shall be justifiable grounds for rejection of a Tender. The information submitted in the Technical Proposal will be assessed as part of the Tender evaluation, and may result in a Tender being rejected by **the Employer** if found unsatisfactory. The information shall be sufficient for **the Employer** to evaluate the compliance and quality of the Tender, and shall be used by the Parties for this purpose only.

The inclusion by the successful Tenderer of any information in the Technical Proposal shall not relieve the Contractor of any of its obligations under the Contract, and acceptance of a Tender does not infer any approval of information submitted herewith.

The Tenderer may be required to amplify, explain and develop the Contractor's Technical Proposals in substantially greater detail during the Tender evaluation period such that they may be confirmed as complying clearly with **the Employer**'s Requirements and can be incorporated into the Contract. Only those aspects of the Contractor's Technical Proposal that **the Employer** (at his sole discretion) considers clearly conforming will form part of the Contract.

13.10 Structure of Tenderer including Details of Ownership and Control of Tenderer

The Tenderer shall provide full details of his ownership and control or, if **the Tenderer** is a consortium or joint venture, full details of ownership and control of each member thereof and control of the consortium or joint venture as described in Schedule FT-6 to the Form of Tender.

13.11 Project Management Organization and Proposed Key Personnel

The Tenderer shall submit with his Tender a Project Management Organization and Proposed Key Personnel (Prime and Alternative Candidates) as prescribed in Schedule FT-7 to the Form of Tender and **the Employer**'s Requirements, inter-alia, indicating names, qualifications, professional experience and corporate affiliation of all proposed key management and engineering personnel and specialists.

13.12 Technical Information of Equipment

The Tenderer shall submit with his Tender, the technical information for justifying the performance of the equipment proposed by **the Tenderer** in the format prescribed in Schedule FT-8 to the Form of Tender. The technical information given by **the Tenderer** will be analysed during technical evaluation and shall be in sufficient detail to allow full appreciation of **the Tenderer**'s Proposal in relation to **the Works**.

13.13 Statement of a Clause by Clause Commentary and Statement of Deviation

The Tenderer shall provide a valid and fully compliant proposal for **the Works** as detailed in **the Tenderer**'s Requirements. **The Tenderer** shall submit a clause by clause commentary on all the clauses of **the Employer**'s Requirements in the form of Statement of a Clause by Clause Commentary given in Schedule FT-9 to the Form of Tender.

Tenderers shall note that their comments to the clause by clause commentary wherever given shall only be in the following form:

- Complied: "Complied" shall be indicated by **the Tenderer** where **the Tenderer** is able to comply fully with the clause.
- Noted: Where a clause merely provides information, and no other comment is necessary, "Noted" will suffice.
- Not Complied: Where **the Tenderer** is not able to comply fully with certain clauses or has any observation or proposes an alternative design, "Not Complied" shall be indicated and comments, if any, of **the Tenderer** shall be indicated in detail. All Clauses with status as "Not Complied" shall be included in the form of statement of Deviations given in Schedule FT-9 to the Form of Tender and shall be priced in the Price Schedule No. 8 of Pricing Document for unconditional withdrawal of the deviation.

Tenderers shall also note that:

- Any comment by **the Tenderer** in the Clause by Clause Commentary, other than either of "Complied", "Noted" or "Not Complied" shall be treated as "Not Complied". Unless Tenderer includes such clauses in the form of statement of Deviation given in Schedule FT-9 to the Form of Tender and prices against such clauses in the Price Schedule No. 8 of Pricing Document, the comment shall be considered as unconditionally withdrawn with no financial and time implications.
- Any "Not Complied" comment by **the Tenderer** in the Clause by Clause Commentary which has not been included in the form of Statement of Deviations given in Schedule FT-9 to the Form of Tender shall be treated as "Complied" with no financial and time implications.
- Any "Not Complied" comment by **the Tenderer** in the Clause by Clause Commentary which has also been included in the Statement of Deviations given in Schedule FT-9 to the Form of Tender but has not been priced in the Price Schedule No. 8 of Pricing Document shall be treated as null and void and deemed to have been unconditionally withdrawn with no financial and time implications.

However, the attention of **the Tenderer**s is drawn to the provisions of ITT Sub-Clause 28.6 regarding the rejection of Tenders that are not substantially responsive to the requirements of the Tender Documents.

All implicit and explicit deviations, remarks and comments mentioned elsewhere in **the Tenderer**'s proposal shall be treated as NULL and VOID and considered withdrawn unconditionally. A Tender without a Clause by Clause Commentary as stated above, is liable to be treated as unresponsive and be rejected.

13.14 Subcontractors proposed by **the Tenderer**

The Tenderer shall include in its Tender details of all major items of supply or services specified in the Pricing Schedule that it proposes to purchase or sublet, and shall give details of the name and nationality of the proposed Subcontractor, including vendors, for each of those items. Tenderers are free to list more than one Subcontractor against each item of the facilities. Quoted rates and prices will be deemed to apply to whichever Subcontractor is appointed, and no adjustment of the rates and prices and Tender Total will be permitted.

The Employer reserves the right to delete any proposed Subcontractor from the list prior to award of contract, without protest by **the Tenderer**.

13.15 Pricing Documents

The Tenderer shall complete the Pricing Documents including Tender Total and the appropriate Price Schedules furnished in Pricing Documents of the Tender Documents as indicated therein

following the requirements of ITT Clauses 14 and 15. **The completed Pricing Documents shall be submitted in the "Financial Package" only.**

13.16 Should any further document be required in pursuance to paragraph 13.3 (q)/13.5(b), **the Tenderer** will be instructed by **the Employer** which package of the Tender's submission is to contain such document.

13.17 The Tender shall provide a valid and fully compliant proposal for **the Works** as detailed in **the Employer**'s Requirements. Tenderer wishing to offer technical alternative in accordance with ITT Sub-Clause 18.1, must first price **the Employer**'s design described in **the Employer**'s Requirements.

14. Tender Prices

14.1 Unless stated otherwise in the Tender Documents, the Contract shall be for the whole Works as described in the Tender Documents. **The Tenderer** shall quote for the entire system and facilities on a "single responsibility" basis including the operation and maintenance for 5 years such that the Tender Total, which shall be fixed lump sum price subject to adjustment only in accordance with the provisions of Sub-Clause 13.16 "Change in Legislation" the Conditions of Contract: Part I and Sub-Clause 13.17 "Adjustment in Changes in Cost" of the Conditions of Contract: Part II, covers all Contractor's obligations mentioned in or to be reasonably inferred from the Tender Documents in respect of the Design, Supply, Installation, Testing, Commissioning, Training, Warranty and Remedying Defects of Equipments and Related Facilities of **Hyderabad City ITS** in the state of Andhra Pradesh, India being taken up with the loan of assistance of **JICA** under Phase-2 program, and Operation and Maintenance of **Hyderabad City ITS** and Related Facilities being taken up with a separate fund provided by **the Employer** for a period of Five years. This includes all requirements under the Contractor's responsibilities for testing, pre-commissioning and commissioning of the systems and facilities, and where so required by the Tender Documents, the acquisition of all permits, approvals and licence, etc; the operation, maintenance and training services and such other items and services as may be specified in the Tender Documents and all in accordance with the requirements of the Tender Documents.

14.2 Tenders are required to quote the price for the commercial, contractual and technical obligations outlined in the Tender Documents. If a Tenderer wishes to make a deviation in respect of **the Employer**'s Requirements, such deviation shall be listed in Schedule FT-9 to the Form of Tender and priced in the Price Schedule No. 8 of Pricing Document for unconditional withdrawal of the deviations in accordance with ITT Sub-Clause 13.13.

14.3 Tenderers shall give a breakdown of the fixed lump sum price in the manner and detail called for in the Price Schedules.

Price Schedule No.	Description
1.	Design, Manufacture and Supply of Plant and Equipment supplied from abroad
2.	Design, Manufacture and Supply of Plant and Equipment supplied from within India
3.	Port handling, Port clearance, Local transportation, Insurance and other incidental Services (including customs taxes and duties and other charges for Plant and Equipment supplied from abroad)
4.	Installation Services including Testing
5.	Operation and Maintenance Manuals, As-built Drawings and Other Documentations

6.	Training
7.	Operation and Maintenance Services (includes all the expenditure towards spare parts, maintenance equipments, replacements, operation and maintenance personnel etc. to meet the service level requirements of employer)
8.	Price quoted for unconditional withdrawal of the Deviations given in Schedule FT-9 to Form of Tender

Tenderer shall note that the materials used for civil, building and other construction work, if any, shall be included and priced under Price Schedule No.4 Installation services.

In the Schedules, Tenderers shall give the required details and a breakdown of their prices as follows:

(a) Plant and Equipment to be supplied from abroad shall be quoted on CIF at Indian port.

(b) Plant and Equipment manufactured or fabricated within **the Employer**'s country shall be quoted on an EXW (ex factory, ex works, ex warehouse or off-the-shelf, as applicable) basis, and shall be inclusive of all costs as well as duties and taxes paid or payable on components and raw materials incorporated or to be incorporated in the system and facilities.

All taxes, duties, levies and charges payable in **the Employer**'s country for the design, manufacture and supply of Plant and Equipment as of twenty-eight (28) days prior to the deadline for submission of Tender shall be also included in Price Schedule No.2.

(c) Customs clearance, handling charge, local transportation, insurance and other services incidental to delivery of the plant and equipment, including import duties and taxes, any other local taxes payable in **the Employer**'s country as of twenty-eight (28) days prior to the deadline for the submission of Tenders, shall be included and priced under Price Schedule No.3.

(d) Installation Services and Tests shall be quoted separately (Price Schedule No. 4) and shall include rates or prices for all labour, contractor's equipment, temporary works, materials, consumables and all matters and things of whatsoever nature, as necessary for the proper execution of the Installation Services and Tests, including all taxes, duties, levies and charges payable in **the Employer**'s country as of twenty-eight (28) days prior to the deadline for submission of Tenders.

(e) The provision of training, operations and maintenance manuals, as-built drawings and other documentations and Operation and Maintenance services shall be quoted separately (Price Schedules No.5, 6 and 7) and shall include rates or prices for all labour, contractor's equipment, temporary works, materials, consumables and all matters and things of whatsoever nature, as necessary to comply with the scope of Works, including all taxes, duties, levies and charges payable in **the Employer**'s country as of twenty-eight (28) days prior to the deadline for submission of Tenders.

(f) In order to facilitate evaluation of Tenders, deviations, if any, from **the Employer**'s Requirements shall be listed in Schedule FT-9 to the Form of Tender. **The Tenderer** shall also provide the additional price, for unconditional withdrawal of the deviations in Price Schedule No. 8. However, the attention of **the Tenderer**s is drawn to the provisions of ITT Sub-Clause 28.6 regarding the rejection of Tenders that are not substantially responsive to the requirements of the Tender Documents. **The Employer** reserves the right to accept or reject any deviation proposed by **the Tenderer**s. Then the Contract Price will be adjusted, if its Tender will be accepted by **the Employer**.

14.4 The terms EXW, CIF, CIP, etc., shall be governed by the rules prescribed in the current edition of

Incoterms, published by the International Chamber of Commerce, 38 Cours Albert 1er, 75008 Paris, France.

14.5 All duties, taxes and other charges imposed outside **the Employer**'s country shall be included in the rates and prices and the Tender Total offered in the Pricing Documents by **the Tenderer**.

All duties, taxes and other levies payable by the Contractor under the Contract or for any other cause, as of the date 28 days prior to the deadline for submission of Tenders in **the Employer**'s country and state shall be included in the rates and prices and the Tender Total offered in the Pricing Documents by **the Tenderer**. **The Tenderer** shall be familiar with the tax laws of **the Employer**'s country and state.

Presently there is 'NO' waiver and exemption from the Government of Customs Duty, Excise Duty, Taxes, other royalties, Duties, Cess, Octroi/Entry Tax and levies payable to various authorities. Should **the Employer** be granted the exemption from payment of any duties, taxes and levies, etc., the Contractor will be advised on the process to be followed to obtain the exemption from the concerned authorities. The Contractor shall maintain complete records of duties, taxes and levies, etc. payable to various authorities in relation to **the Works** and submit the receipts/records for verification as and when demanded in writing by **the Employer**.

14.6 Prices quoted by **the Tenderer** shall be subject to adjustment during the performance of the Contract in accordance with the provisions of Sub-Clause 13.16 "Changes in Legislation" and Sub-Clause 13.17 "Adjustments for Changes in Cost" of the Conditions of Contract. The price adjustment provision will not be taken into consideration of Tender evaluation. A Tender submitted with an adjustable price proposal other than those provided in the Tender Documents will be treated as nonresponsive and rejected.

14.7 Application of Any Discount

If Tenderer wants to offer any discount in his Tender, it shall be a percentage discount and shall not be a Lump sum discount. **The Tenderer**'s discount offer shall be included only in the "Financial Package" envelop. The percentage discount shall be applied for the fixed lump sum price Tender Total and Pricing Schedules No. 1 through 7. All payments due to the Contractor will be calculated on this basis.

15. Currencies of Tender and Payment

15.1 The rates and prices and the Tender Total shall be quoted by **the Tenderer** separately in the following manner:

(a) For inputs to the Contract, which are expected to be supplied from within India including taxes, royalties, duties and other levies payable to various authorities in India to be quoted in Indian Rupees.

(b) For those inputs to the Contract, which are expected to be supplied from outside India, in any freely convertible currencies which are Japanese Yen, US Dollars and Euro.

(c) Maximum number of currencies of payment shall not be more than four including local currency, Indian Rupees.

15.2 For the purpose of comparative evaluation of the offers, all Tender Prices will be converted to Indian Rupees by using the selling exchange rates officially prescribed for similar transactions as established by the Reserve Bank of India on the last working day 28 (twenty eight) days prior to the latest date of submission of Tenders.

15.3 Tenderers may, in their foreign currency requirements in the rate and prices and the Tender Total, include the specific requirements for

(a) expatriate staff and labour employed directly on **the Works**;

(b) social, insurance, medical and other charges relating to such expatriate staff and labour, and foreign travel expenses;

(c) imported materials, both temporary and permanent, including fuels, oil and lubricants required for **the Works**;

(d) depreciation and usage of imported Plant and Contractor's Equipment, required for **the Works**;

(e) foreign insurance and freight charges for imported materials, equipment, plant and Contractor's equipment; and

(f) overhead expenses, fees, profit, and financial charges arising outside India in connection with **the Works**.

15.4 Tenderers may be required by **the Employer** to clarify their foreign currency requirements, and to substantiate that the amounts included in the rates and prices quoted in the Price Schedules and the Tender Total quoted in the Pricing Documents are reasonable and responsive to ITT Sub-Clauses 15.1 and 15.3, in which case a detailed breakdown of its foreign currency requirements shall be provided by **the Tenderer**.

16. Tender Validity

16.1 Tender shall remain valid for a period of 120 (One Hundred and Twenty) days after the latest date of submission of the Tender specified in ITT Clause 22. A Tender valids for a shorter period shall be rejected by **the Employer** as being nonresponsive.

16.2 In exceptional circumstances, prior to expiry of the original/amended Tender validity period, **the Employer** may request that **the Tenderer**s to extend the period of validity for a specified additional period. The request and the responses thereto shall be made in writing or by fax. A Tenderer may refuse the request without forfeiting his Tender Security. A Tenderer agreeing to the request will not be required or permitted to modify his Tender, but will be required to extend the validity of his Tender Security for the period of the extension, and in compliance with ITT Clause 17 in all respects. Only one communication either extending the validity or refusing to extend the validity would be entertained. If the validity is not extended, no further representation, if any, to revive the Tender at a late date will be entertained.

16.3 The Tender Total shall be adjusted, if the Tender validity period is extended beyond Sixty (60) days of the original validity period. In addition, the amount payable in the foreign currencies and the local currency shall be adjusted as follows;

The local currency portion of the Contract Price shall be adjusted by a factor reflecting local inflation during the period of extension, and the foreign currency portion of the Contract Price shall be adjusted by a factor reflecting the inflation in the country(ies) of the foreign currency(ies) during the period of extension..

17. Tender Security

17.1 **The Tenderer** shall furnish, as part of his Tender, a Tender Security in the amount of Twenty Four Million Indian Rupees (Rs.24,000,000/-) or Three Hundred Eighty thousands United States Dollars (US$380,000/-).

17.2 The Tender Security shall be in the form of a certified check or bank draft or bank guarantee issued from an Indian Schedule Bank (excluding Cooperative Banks) or from a Schedule Foreign Bank as defined in Section 2(e) of RBI Act 1934 (as modified up to January 7, 2013 or latest edition if available) read with Second Schedule. The format of the bank guarantee for Tender Security shall be in accordance with the sample form of Tender Security included in Annexure

ITT-1 to the Instructions to Tenderers. Other formats may be permitted, subject to the prior approval of **the Employer**. Bank guarantees issued, as surety for the Tender shall be valid for Thirty-five (35) days beyond the validity of the Tender.

17.3 Any Tender not accompanied by an acceptable Tender Security shall be rejected by **the Employer** as non-compliant. The Tender Security of a joint venture must be in the name of the joint venture submitting the Tender. If the joint venture has not been legally constituted at the time of Tender, the Tender Security shall be in the names of all members of the joint venture.

17.4 The Tender Securities of unsuccessful Tenderer will be returned as promptly as possible, but not later than Thirty-five (35) days after the expiration of the period of Tender validity, or any extension made thereto pursuant to ITT Clause 16.

17.5 The Tender Security of the successful Tenderer will be returned upon the signing of the Contract Agreement in accordance with ITT Clause 35, the receipt by **the Employer** of Performance Security in accordance with ITT Clause 36 and the receipt by **the Employer** of Guarantee in accordance with ITT Clause 32, if applicable.

17.6 The Tender Security may be forfeited

(a) if **the Tenderer** withdraws his Tender during the period of Tender validity specified in ITT Clause 16; or

(b) if **the Tenderer** does not accept the correction of his Tender Price, pursuant to ITT Clause 29; or

(c) in the case of a successful Tenderer, if **the Tenderer** fails within the specified time limit (i) to sign the Contract Agreement in accordance with ITT Clause 35, (ii) to furnish the required Performance Security in accordance with ITT Clause 36.

18. Alternative Proposals by Tenderers

18.1 Tenderers wishing to offer technical alternatives to the requirements of the Tender Documents must first price **the Employer**'s design as described in the Tender Documents and shall further provide all information necessary for a complete evaluation of the alternative by **the Employer**, including drawings, design calculations, technical specifications, quantities, breakdown of prices, and proposed construction methods. Only the technical alternatives, if any, of the lowest evaluated Tenderer conforming to the requirements of the Tender Documents shall be considered by **the Employer**. The alternative Tender sum shall be smaller than the original one. **The Employer** will inform the successful Tenderer in the Letter of Acceptance which original designs and which alternative designs have been accepted. If **the Employer** accepts an alternative design, the alternative design and associated Tender Price incorporating that design shall be used for the performance of **the Works** instead of the original one for **the Employer**'s design.

18.2 **The Tenderer** shall also fully price the alternative design which shall be placed in separate sealed envelopes containing the original and two copies, which clearly describe "ALTERNATIVE TENDER" on the outside. The envelope of "ALTERNATIVE TENDER" of the lowest evaluated Tenderer only will be opened by **the Employer** after establishing the lowest evaluated Tenderer. The "ALTERNATIVE TENDER" will not be considered in the process of Tender evaluation.

19. Pre-Tender Meeting

19.1 **The Tenderer** or his official representative is invited to attend a pre-Tender meeting as follows:

Pre-Tender Meeting

Time : at 11:00 am on _____.

Venue : Conference room, Hyderabad Growth Corridor Limited, Block A, HMDA Complex, Tarnaka, Hyderabad 500 007, Andhra Pradesh, India.

Site Visit

Time : at 03:00 pm on _____.

Location : Nanakramguda Interchange

19.2 The purpose of the meeting will be to clarify issues and to answer questions on any matter that may be raised at that stage to enable **the Tenderer**s to submit Tenders without conditions/qualifications.

19.3 **The Tenderer** is requested to submit any questions in writing or by fax, to reach **the Employer** not later than one week before the meeting. It may not be practicable at the meeting to answer questions received late, but questions and responses will be transmitted as indicated hereafter.

19.4 Minutes of the pre-Tender meeting will not be issued by **the Employer**, and any verbal information provided by **the Employer** at the meeting should not be relied upon by the Contractor. The text of the questions raised and the responses given, together with any responses prepared after the meeting, will be transmitted without delay to all purchasers of the Tender Documents. Any modification of the Tender Documents listed in ITT Sub-Clause 9.1, which may become necessary as a result of the pre-Tender meeting and written questions by Tenderers shall be made by **the Employer** exclusively through the issue of an Addendum pursuant to ITT Clause 11.

19.5 Tenderers are advised to attend the pre-Tender meeting. However, non-attendance at the pre-Tender meeting will not be a cause for disqualification of a Tender. Tenderers who do not attend the pre-Tender meeting assume the responsibility to comply with modifications to the Tender Documents mentioned in ITT Sub-Clause 19.4 above and which are communicated through an Addendum pursuant to ITT Clause 11.

20. Format and Signing of Tender

20.1 **The Tenderer** shall prepare one original and two (2) copies of the Tender documents for “Technical Package” and “Financial Package” comprising the Tender as described in ITT Clause 13, and clearly marked "ORIGINAL", "COPY 1" and "COPY 2" as appropriate. In the event of discrepancy between them, the original shall prevail.

Any alternative Tender which is submitted by **the Tenderer** in accordance with ITT Clause 18 shall be clearly endorsed **“ALTERNATIVE TENDER”** and shall comply with instructions in all respects as a complete stand-alone Tender and enclosed in the outermost envelop.

20.2 The original and all copies of the Tender shall be typed or written in indelible ink (in the case of copies, photocopies are also acceptable) and shall be signed by a person or persons duly authorized to sign on behalf of **the Tenderer**, pursuant to ITT Sub-Clauses 5.1 (a) or 5.3 (a), as the case may be. All pages of the Tender except for un-amended printed literature shall be initialled by person or persons signing the Tender.

20.3 The Tender shall contain no alterations, omissions or additions, except those to comply with instructions issued by **the Employer**, or as necessary to correct errors made by **the Tenderer**, in which case such corrections shall be initialled and dated by the person or persons signing the Tender.

20.4 All witnesses and sureties shall be persons of status and probity and their full names, occupations and addresses shall be printed below their signatures.

20.5 All the Package of Tender except for the “One set of complete Bidding Documents” package will have to be submitted ONLY in HARD BOUND form (Hard bound implies such binding between two covers through stitching or otherwise whereby it may not be possible to replace any paper

without disturbing the document) with all pages sequentially numbered at the bottom right corner of each page. It should also have an index giving page-wise information of above documents. Incomplete Tender or those received without hard bound may summarily be rejected. Where the Packages of Tender are being submitted in multiple volumes, each volume is to be super-scribed in the manner indicated above and further identified as Vol. X of Y where Y is the total number of volumes the Package comprising the Tender. In the absence of such identification, **the Employer** shall not be responsible in event of one or more volumes not having been taken into consideration during Tender evaluation.

Submission of Tenders

21. Sealing and Marking of Tenders

21.1 **The Tenderer** shall submit the original Tender Security in a separate envelope. **The Tenderer** shall seal the Original and each copy of the Technical Package in separate envelopes, duly marking the envelopes as "Original", "Copy 1" and "Copy 2". Likewise, **the Tenderer** shall seal the Original and each copy of the Financial Package in separate envelopes duly marking the envelopes as "Original", "Copy 1" and "Copy 2". **The Tenderer** shall also submit one set of complete Tender Documents (including all Addenda) in a separate envelope. The envelopes of all the Technical Package and all the Financial Package shall be sealed in an outer envelope separately and marked as “Technical Package” or “Financial Package”. Thus there will be one outermost envelope containing one Tender Security envelope, two outer envelopes and one Tender Documents envelope inside, totally in all shall be eleven envelops.

21.2 All the inner and outer envelopes shall

(a) be addressed to **the Employer** at the following address:

Managing Director
Hyderabad Growth Corridor limited
Block A, HMDA Complex, Tarnaka,
Hyderabad 500 007, Andhra Pradesh, India
and

(b) bear the following identification:

(i) for Tender Security:
TENDER SECURITY
TENDER FOR HYDERABD CITY INTELLIGENT TRANSPORT SYSTEM OF HYDERABAD OUTER RING ROAD PROJECT (Bid Notice No. XXXXXXXXX)
DO NOT OPEN BEFORE 3:30 PM ON _____, 2014.
Name and address of **the Tenderer** to enable the Tender to be returned unopened in case it is declared late pursuant to ITT Clause 23,
and

(ii) for Technical Package:
TECHNICAL PACKAGE
TENDER FOR HYDERABD CITY INTELLIGENT TRANSPORT SYSTEM OF HYDERABAD OUTER RING ROAD PROJECT (Bid Notice No. XXXXXXXXX)
DO NOT OPEN BEFORE 3:30 PM ON _____, 2014.
Name and address of **the Tenderer** to enable the Tender to be returned unopened in case it is declared late pursuant to ITT Clause 23,

and

(iii) for one set of complete Tender Documents (including all Addenda)
TENDER DOCUMENTS
TENDER FOR HYDERABD CITY INTELLIGENT TRANSPORT SYSTEM OF HYDERABAD OUTER RING ROAD PROJECT (Bid Notice No. XXXXXXXXX)
DO NOT OPEN BEFORE 3:30 PM ON _____, 2014.
Name and address of **the Tenderer** to enable the Tender to be returned unopened in case it is declared late pursuant to ITT Clause 23,
and

(iv) for Financial Package:
FINANCIAL PACKAGE
TENDER FOR HYDERABD CITY INTELLIGENT TRANSPORT SYSTEM OF HYDERABAD OUTER RING ROAD PROJECT (Bid Notice No. XXXXXXXXX)
DO NOT OPEN
Name and address of **the Tenderer** to enable the Tender to be returned unopened in case it is declared late pursuant to ITT Clause 23 or deemed unresponsive in accordance with ITT Sub-Clause 28.3 or other reason(s).

(v) for outermost envelop;
TENDER FOR HYDERABD CITY INTELLIGENT TRANSPORT SYSTEM OF HYDERABAD OUTER RING ROAD PROJECT (Bid Notice No. XXXXXXXXX)
DO NOT OPEN BEFORE 3:30 PM ON _____, 2014

21.3 In addition to the identification required in ITT Sub-Clause 21.2, the outermost envelope and inner envelops shall indicate the name and address of **the Tenderer** to enable the Tender to be returned unopened in case it is declared "late" pursuant to ITT Clause 23.

21.4 If the outermost envelope referred to ITT Sub-Clause 21.1 is not sealed and marked as above, **the Employer** will assume no responsibility for the misplacement or premature opening of the Tender.

22. Deadline for Submission of Tender

22.1 Tenders must be received by **the Employer** at the address specified above not later than 1:00 pm on _____.

22.2 **The Employer** may, at his discretion, extend the deadline for submission of Tenders by issuing an addendum in accordance with ITT Clause 11, in which case all rights and obligations of **the Employer** and **the Tenderer**s previously subject to the original deadline will thereafter be subject to the deadline as extended.

23. Late Tenders

23.1 Any Tender received by **the Employer** after the deadline for submission of Tenders prescribed in ITT Clause 22 will be rejected and returned unopened to **the Tenderer**.

24. Modification and Withdrawal of Tenders

24.1 **The Tenderer** may modify or withdraw his Tender after Tender submission, provided that written notice of the modification or withdrawal is received by **the Employer** prior to the deadline for submission of Tenders.

24.2 **The Tenderer**'s modification shall be prepared, sealed, marked and dispatched as follows:

(a) **The Tenderer**s shall provide an original and two copies of any modifications to his Tender, clearly identified as such, in three inner envelopes duly marked "**TENDER MODIFICATION–ORIGINAL**" and "**TENDER MODIFICATION-COPY 1**" and "**TENDER MODIFICATION-COPY 2**". The inner envelopes shall be sealed in an outer

envelope, which shall be duly marked "**TENDER MODIFICATION**".

(b) Other provisions concerning the marking and submission of Tender shall be in accordance with ITT Clauses 21, 22 and 23.

24.3 **The Tenderer** wishing to withdraw his Tender shall notify **the Employer** in writing prior to the deadline for submission of Tenders. The notice of withdrawal shall (a) be addressed to **the Employer** prescribed in ITT Sub-Clause 21.2, and (b) bear the contract name and the contract No. and words "**TENDER WITHDRAWAL**". Tender withdrawal notice received after the Tender submission deadline will be ignored, and the submitted Tender will be deemed to be a validly submitted Tender.

24.4 No Tender may be modified by **the Tenderer** after the deadline for submission of Tenders.

24.5 Withdrawal of a Tender during the interval between the deadline for submission of Tenders and the expiration of the period of Tender validity specified in ITT Clause 16 will result in the forfeiture of the Tender Security pursuant to ITT Clause 17.

Tender Opening and Evaluation

25. Tender Opening

25.1 **The Employer** will open the outer envelope of Tenders, including withdrawals and modifications made pursuant to ITT Clause 24, in the presence of Tenderers' designated representatives who choose to attend, at 3:30 pm on _____, 2014 at the following location:

Hyderabad Growth Corridor limited,
Block A, HMDA Complex, Tarnaka,
Hyderabad 500 007, Andhra Pradesh, India

The Tenderers' representatives who are present shall sign a register evidencing their attendance.

In the event of specified date of Tender opening being declared as a holiday for **the Employer**, the Tenders will be opened at the appointed time and location on the next working day.

25.2 Envelopes marked "TENDER WITHDRAWAL" shall be opened first and the name of **the Tenderer** shall be read out. Tender for which an acceptable notice of withdrawal has been submitted pursuant to ITT Clause 24 shall not be opened and will be returned to **the Tenderer**. Subsequently, envelops marked "TENDER MODIFICATION" shall be opened and the submissions therein read out in appropriate detail.

25.3 The envelopes of the Tender Security, Technical Package, Tender Documents of Tender will be opened and **the Tenderer**'s name, Tender modification and withdrawals, the presence or absence of Tender Security, and such other details as **the Employer** may consider appropriate, will be announced and recorded by **the Employer** at the opening. **The Tenderer**s' representatives will be required to sign the record. No Tenders shall be rejected at opening except for late Tenders pursuant to ITT Clause 23. The Financial Package of Tender will not be opened at this time. **The Tenderer** is advised that **the Employer**'s policy in respect of comparison of Tenders is that the Technical Package will be opened and reviewed to determine their acceptability and responsiveness to the requirements of the Contract. Unacceptable and unresponsive Tenders will be rejected and the corresponding Financial Package will be returned unopened.

25.4 **The Tenderer** is to note that Financial Package of Tender submissions of which Technical Package has satisfied the review in ITT Sub-Clauses 28.1, 28.2, 28.3 and 28.5 will be opened with the Tender sums posted. The date, time, and place of opening of the Financial Package will be

advised to Tenderers, who's Technical Package have been found acceptable so that they can be present at the stipulated time of opening of Financial Package.

25.5 Tenders which are not accompanied by a valid Tender Security, or are accompanied by an unacceptable or fraudulent Tender Security shall be considered as non-compliant and rejected.

25.6 Tenders not opened and read out at Tender opening shall not be considered further for evaluation, irrespective of the circumstances.

25.7 All decisions whether a Tender is non-responsive, unacceptable or whether a Tender Security is fraudulent or unacceptable or non-compliant, will be that of **the Employer**.

26. Process to be Confidential

26.1 Information relating to the examination, clarification, evaluation and comparison of Tenders and recommendations for the award of a contract shall not be disclosed to Tenderers or any other persons not officially concerned with such process. Any effort by a Tenderer to influence **the Employer**'s processing of Tenders or award decisions may result in the rejection of **the Tenderer**'s Tender.

26.2 Unless otherwise required under the Instructions to Tenderers, no Tenderers shall contact **the Employer** on any matter relating to his Tender from the time of Tender opening to the time of contract award. Any effort by the a Tenderer to influence **the Employer** in **the Employer**'s Tender evaluation, Tender comparison or contract award decisions may result in rejection of **the Tenderer**'s Tender.

26.3 The Tender Documents and any addenda thereto, together with any further communications, are issued for the purpose of inviting Tenders only. **The Tenderer** shall not disclose any information contained in the documents or otherwise supplied in connection with this Tender invitation to any third party except for the purpose of preparing its Tender. **The Tenderer** shall submit the undertaking in the form provided in Schedule FT-15, with its Tender.

27. Clarification of Tenders

27.1 To assist in the examination, evaluation and comparison of Tenders, **the Employer** may, at his discretion, ask any Tenderer for clarification of his Tender or authentication of information/details furnished therein, including breakdowns of Tender Total, rates and/or prices. The request for clarification or authentication and the response shall be in writing or by fax, but no change in the Tender Total or substance of the Tender 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 Tenders in accordance with ITT Clause 29.

28. Examination of Tenders and Determination of Responsiveness

28.1 Prior to the detailed evaluation of Tenders, **the Employer** will determine whether each Tender (i) meets the eligibility criteria of JICA ODA Loans; (ii) has been properly signed and accompanied by the required Power of Attorney and ; (iii) is accompanied by the required Tender Security; (iv) **the Tenderer** of which has earlier passed in prequalification and has not contained unauthorized change to the consortium/joint venture accepted for prequalification: (v) is substantially responsive to the requirements of the Tender Documents; and (vi) provides any clarification and/or substantiation that **the Employer** may require pursuant to ITT Clause 27.

28.2 If the Tender Security furnished does not conform to the amount and validity period as specified in the ITT Clause 17 and has not been furnished in the form specified in Annexure ITT-1, the Tender shall be rejected by **the Employer** as non-responsive as per ITT Clause 17 and the Technical Package and the sealed Financial Package will be returned to **the Tenderer**. Subject to

confirmation of the Tender Security by the issuing bank, the Technical Package accompanied with valid Tender Security will be taken up for further evaluation. In case, the Bank does not confirm the Tender Security, the Tender shall be rejected as non-responsive and no further evaluation carried out.

28.3 A substantially responsive Tender is one which conforms to all the terms, conditions and specifications of the Tender Documents, without material deviations, objections, conditionality or reservation. A material deviation, objection, conditionality or reservation is one (i) which affects in any substantial way the scope, quality or performance of the Contract; (ii) which limits in any substantial way, inconsistent with the Tender Documents, **the Employer**'s rights or the successful Tenderer's obligations under the Contract; (iii) whose rectification would unfairly affect the competitive position of other Tenderers who are presenting substantially responsive Tender; or (iv) which fails to commit to the dates specified for the Completion of **the Works**.

28.4 **The Employer** may waive any minor informality, nonconformity or irregularity in a Tender that does not constitute a material deviation, whether or not identified by **the Tenderer** in Schedule FT-9 Statement of Deviations to the Form of Tender, and that does not prejudice or affect the relative ranking of any Tenderer as a result of the technical and financial evaluation.

28.5 **The Employer** will carry out a detailed evaluation of the Tenders previously determined to be substantially responsive in order to determine whether the technical aspects are in accordance with the requirements set forth in the Tender Documents. In order to reach such a determination, **the Employer** will examine and compare the technical aspects of the Tenders on the basis of the information supplied by **the Tenderer**s, taking into account the following factors:

(a) Overall completeness and compliance with **the Employer**'s Requirements; deviations from **the Employer**'s Requirements as identified in Schedule FT-9 to the Form of Tender and those deviations not so identified. The Tender that does not meet minimum acceptable standards of completeness, consistency and detail will be rejected for non-responsiveness.

(b) Achievement of specified performance criteria by the Plant.

(c) Any other relevant factors that **the Employer** deems necessary or prudent to take into consideration.

28.6 If a Tender is not substantially responsive, it will be rejected by **the Employer**, and may not subsequently be made responsive by correction or withdrawal of the nonconforming deviation, objection, conditionality or reservation. The Financial Package of such Tender shall be returned unopened. **The Employer**'s decision of a Tender's responsiveness is to be based on the contents of the Tender itself without recourse to extrinsic evidence. The decisions whether a Tender is responsive or not, will be that of **the Employer**.

28.7 The Financial Package of only those that comply with the requirement as per ITT Sub-Clauses 28.1 and 28.2 above and whose Technical Package is found compliant as per ITT Sub-Clauses 28.3 and 28.5 above, will be evaluated.

29. Correction of Errors

29.1 The Financial Packages of those that are determined to be substantially responsive will be checked by **the Employer** for any arithmetic errors. Arithmetic errors will be rectified by **the Employer** on the following basis. Where there is a discrepancy between the amount in figures and in word, the amount in words will govern. The Tender Total, which shall be the fixed lump sum price, stated by **the Tenderer** in word in the Pricing Documents shall prevail. If arithmetical errors are discovered in the Price Schedules, corrections will be made by **the Employer** proportionately to the amounts shown against the relevant Price Schedules so that the sum total of Price Schedules

No.1 through No. 8 is equal to the Tender Total stated in words.

If **the Tenderer** does not accept the corrected Tender, his Tender will be rejected and the Tender Security will be forfeited.

29.2 If the same item of plant, equipment, materials and services is appearing in different sub-items of Price Schedules, the rate and price of the plant, equipment, materials and works shall be same at all places in principle unless otherwise such difference will be reasonably justifiable and acceptable to **the Employer**.

30. Conversion to Single Currency for Comparison of Tenders

30.1 Tenders will be compared in Indian Rupees only. This will be achieved by converting the Foreign Currency portion into Indian Rupees at the selling exchange rates officially prescribed for similar transactions as established by the Reserve Bank of India on the latest working day 28 (twenty-eight) days prior to the last date of Tender submittal, and then adding the same to the Indian Rupee portion of the Tender.

31. Evaluation and Comparison of Tenders

31.1 **The Employer** will evaluate and compare only the Tenders determined to be substantially responsive in accordance with ITT Clause 28 and qualified for award of Contract in accordance with ITT Clause 5.

31.2 The comparison shall be on the Tender Total for the Fixed Lump Sum Price of this Contract. In evaluating the Tenders, **the Employer** will determine for each Tender the Evaluated Tender Total by adjusting the Tender Total as follows:

(a) making any correction for errors pursuant to ITT Clause 29;

(b) converting the amount resulting from applying (a) above to a single currency in accordance with ITT Clause 30; and,

(c) applying any discounts offered by **the Tenderer** for the award in accordance with ITT Sub-Clause 14.7.

This procedure will additionally be carried out by **the Employer** to determine the alternative Evaluated Tender Total should any technical alternative be offered by the lowest Evaluated Tenderer and assessed pursuant to ITT Clause 18.

Any discounts offered by **the Tenderer** shall be expressed as a percentage and not as a lump sum. If a Tenderer offers a lump sum discount, his Tender will be determined as non-responsive by **the Employer**.

31.3 **The Employer** reserves the right to accept or reject any variation, deviation or alternative offer. Variations, deviations, alternative offers and other factors which are in excess of the requirements of the Tender Documents or otherwise result in the accrual of unsolicited benefits to **the Employer** shall not be taken into account in Tender evaluation

31.4 If the Tender of the successful Tenderer 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 Tenderer** to produce detailed price analyses for any or all items of the Price Schedules, to demonstrate the internal consistency of those prices with the construction methods and schedule proposed. After evaluation of the price analysis and unless otherwise those price will be reasonably justifiable and accepted by **the Employer**, **the Employer** may require the successful Tenderer that the Price Schedule shall be revised without changing the Tender Total referring to **the Employer**'s estimate or that the amount of the Performance Security set forth in ITT Clause 36 be increased at the expense of the successful Tenderer to a level sufficient to protect **the**

Employer against financial loss in the event of default of the successful Tenderer under the Contract.

Award of Contract

32. Award

32.1 Subject to ITT Clauses 33 and 18, **the Employer** will award the Contract to **the Tenderer** whose Tender has been determined to be substantially responsive to the Tender Documents and who has offered the Lowest Evaluated Tender Total **for the Fixed Lump Sum Price of this Contract**, provided that such Tenderer has been determined to be (i) eligible in accordance with the provisions of ITT Clauses 3 and 4; and (ii) qualified in accordance with the provisions of ITT Clause 5.

32.2 The capabilities of the vendors and subcontractors proposed in Schedule FT-10 to the Form of Tender to be used by the lowest evaluated Tenderer will also be evaluated for acceptability. Their participation should be confirmed with a letter of intent between the parties, as needed. Should a vendor or subcontractor be determined to be unacceptable, the Tender will not be rejected, but **the Tenderer** will be required to substitute an acceptable vendor or subcontractor and after approval by **the Employer**, the corresponding Schedule listing the accepted Subcontractors for each item concerned shall be completed and attached to the Form of Contract Agreement.

32.3 Similarly, the suitability of the Key Personnel proposed in Schedule FT-7 to the Form of Tender to be deployed by the lowest evaluated Tenderer will also be evaluated for acceptability. Should the proposed candidates be determined to be unacceptable, the Tender will not be rejected, but **the Tenderer** will be required to substitute acceptable candidates and after approval by **the Employer**, the corresponding Schedule listing the acceptable candidates for each position shall be completed and attached to the Form of Contract Agreement.

32.4 **The Employer** may request **the Tenderer** to withdraw any of the deviation listed in Schedule FT-9 to the successful Tenderer, at the price shown in the Price Schedule No.8 Unconditional Withdrawal of the Deviation in the Pricing Documents after corrected in accordance with ITT Clause 29. And the Tender Total for the successful Tenderer and thus the Contract Price shall be adjusted accordingly.

33. Employer's Right to Accept any Tender and to Reject any or all Tenders

33.1 Notwithstanding ITT Clause 32, **the Employer** reserves the right to accept or reject any Tender, and to annul the tendering process and reject all Tenders, at any time prior to award of Contract, without thereby incurring any liability to the affected Tenderer or Tenderers or any obligation to inform the affected Tenderer or Tenderers of the grounds for **the Employer**'s action, by notice in writing to **the Tenderer**s, terminate the tendering process.

33.2 **The Tenderer** should note in particular that without prejudice to **the Employer**'s other rights under the Contract and the Tender Security, **the Employer** may terminate the Contract under Clauses 4.2 of the Conditions of Contract in the event that the Tender is accepted but **the Tenderer** fails to supply the Performance Security or fails to execute the Contract Agreement or fails to submit the Guarantee, if applicable.

34. Notification of Award

34.1 Subject to ITT Clause 33, prior to expiration of the period of Tender validity prescribed by **the Employer**, **the Employer** will notify the successful Tenderer by fax confirmed by letter

transmitted by courier that its Tender has been accepted. This letter (hereinafter and in the Conditions of Contract called the "Letter of Acceptance") shall name the sum which **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 Conditions of Contract called "the Contract Price"), including any annexed memoranda comprising agreements between **the Employer** and Tenderer.

34.2 The notification of award will constitute the formation of the Contract.

34.3 Upon the furnishing by the successful Tenderer of Performance Securities, the execution of the Contract Agreement and the submission of the Guarantee, if applicable, **the Employer** will promptly notify the other Tenderers that their Tenders have been unsuccessful.

35. Signing of Agreement

35.1 Within 28 (twenty eight) days or within the period agreed by **the Employer** from the date of issuing the Letter of Acceptance by **the Employer**, the successful Tenderer will be required to execute the Contract Agreement in the form provided in the Annex COC-1 to the Conditions of Contract with such modifications as may be considered necessary to incorporate all agreements between the Parties. **The Employer** will advise the successful Tenderer the date upon which the Parties shall convene to sign the Contract Agreement. In case of the successful Tenderer being consortium or joint venture, all members of the consortium or joint venture shall sign the Contract Agreement.

36. Performance Security

36.1 Within 21 (twenty one) days of receipt of the Letter of Acceptance from **the Employer**, the successful Tenderer shall furnish to **the Employer** Performance Securities in the form of a bank guarantee given in Annex COC-2 to the Conditions of Contract for the amount of ten (10) percent of the Contract Price plus additional security for unbalanced Tender in accordance with ITT Sub-Clause 31.4 and relevant Conditions of Contract, from a Indian Schedule bank (excluding Cooperative Banks) or from a schedule Foreign Bank as defined in Section 2(e) of RBI Act 1934 (as modified up to January 7, 2013 or latest edition if available) read with Second Schedule and approved by **the Employer**. The performance security of a joint venture shall be in the name of the joint venture. If the joint venture has not been legally constituted, the performance security shall be in the names of all members of the joint venture.

36.2 Failure of the successful Tenderer to comply with the requirements of ITT Clauses 35 or 36shall constitute sufficient grounds for the annulment of the award and forfeiture of the Tender Security, in which event **the Employer** may make the award to the next lowest evaluated Tenderer or call for new Tenders.

37. Fraud and Corruption

37.1 JICA requires that Tenderers and Contractors, as well as **the Employer**, under contracts funded with JICA ODA Loans and other Japanese ODA, observe the highest standard of ethics during the procurement and execution of such contracts. In pursuance of this policy, JICA;

(a) will reject a Tender for award if it determines that **the Tenderer** recommended for award has engaged in corrupt or fraudulent practices in competing for the contract in question;

(b) will recognize a Tenderer or a Contractor as ineligible, for a period determined by JICA, to be awarded a contract funded with JICA ODA Loans if it at any times determines that **the Tenderer** or the Contractor has engaged in corrupt or fraudulent practices in competing for, or in executing, another contract funded with JICA ODA Loans or other Japanese ODA.

37.2 Furthermore, Tenderers shall be aware of the provision stated in Sub-Clause 15.6 of the Conditions of Contract.

Annexure to Instruction to Tenderers

Annexure ITT-1 Form of Bank Guarantee of Tender Security

Annexure ITT-2 Form of Acknowledgement of Compliance with Guidelines for Procurement under Japanese ODA Loan

ANNEXURE ITT-1

FORM OF BANK GUARANTEE FOR TENDER SECURITY

(Reference Clause 17 of Instructions to Tenderers)

To: Hyderabad Growth Corridor Limited
Block A, HMDA Complex, Tarnaka,
Hyderabad 500 007,
Andhra Pradesh, India

WHEREAS, _____ (hereinafter called "**the Tenderer**") has submitted his Tender dated _____ for the execution of Design, Supply, Installation, Testing, Commissioning, Training, Warranty and Remedying Defects of Equipments and Related Facilities of **Hyderabad City ITS** in the state of Andhra Pradesh, India being taken up with the loan of assistance of **JICA** under Phase-2 program, and Operation and Maintenance of **Hyderabad City ITS** and Related Facilities being taken up with a separate fund provided by **the Employer** for a period of Five years **(Bid Notice No. XXXXXXXXXX1)** (hereinafter called "the Tender").

KNOW ALL MEN by these presents that We _____ [Name of Bank] having our registered office at _____ [Address of the Bank] (hereinafter called "the Bank") are bound unto **HYDERABAD GROWTH CORRIDOR LIMITED** (hereinafter called "**the Employer**") in the sum of *[Rs. 24,000,000 (Indian Rupees Twenty Four Millions only) or US$ 380,000 (United States Dollar Three Hundred Eighty Thousand only)] for which payment well and truly to be made to the said Employer the Bank binds himself, his successors and assigns by these presents.

SEALED with the Common Seal of the said Bank this _____ day of_____ 2011.

THE CONDITIONS of this obligation are:

(1) If **the Tenderer** withdraws his Tender during the period of Tender validity specified in the Form of Tender; or

(2) If **the Tenderer** does not accept the correction of arithmetical errors of his Tender price in accordance with the Instructions to Tenderers; or

(3) If **the Tenderer** having been notified of the acceptance of his Tender by **the Employer** during the period of Tender validity:
   (a) fails or refuses to execute the Form of Contract Agreement, in accordance with Clause 35 of Instructions to Tenderers; or
   (b) fails or refuses to furnish the Performance Security, in accordance with Clause 36 of the Instruction to Tenderers; or
   (c) fails or refuse to submit the Guarantee, in accordance with Clause 32 of the Instruction to Tenderers,

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 any one or more of the conditions mentioned above, specifying the occurred condition or conditions.

We further agree that **the Employer** may without affecting this guarantee negotiate further with **the Tenderer** in

regard to the conditions contained in the said Tender and thereby modify these conditions or add thereto any further conditions as may be mutually agreed upon between **the Employer** and **the Tenderer**, that the guarantee herein before contained shall not be affected by any change in constitution of our Bank or in the constitution of **the Tenderer**, and that the expression "**the Tenderer**" and "the Bank" herein used shall, unless such an interpretation is repugnant to the subject or context, include their respective successors and assigns.

This Guarantee commences from the date hereof and shall remain in force up to and including the date 155 (one hundred and fifty five) days after the deadline for submission of Tenders as such deadline is stated in the Instructions to Tenderers or as it may be extended by **the Employer** pursuant to the Instructions to Tenderers, 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.

Notwithstanding anything contained herein before, our liability under this guarantee is restricted to *[Rs. 24,000,000 (Indian Rupees Twenty Four Millions only) or US$ 380,000 (US Dollar Three Hundred Eighty Thousands only)] and the guarantee shall remain valid until _____. Unless a claim or a demand in writing is made upon us on or before _____, all our liability under this guarantee shall cease.

This guarantee is subject to the Uniform Rules for Demand Guarantees, published as number 458 by the International Chamber of Commerce, except as stated above.This Guarantee is enforceable and construed under the applicable laws of India.

Courts at Hyderabad, Andhra Pradesh State, India will have exclusive jurisdiction for contesting legal cases arising out of encashment of the Guarantee.

DATE: _____

SIGNATURE OF AUTHORIZED OFFICIAL OF THE BANK:

_____

Name of Official: _____

DESIGNATION: _____

STAMP/SEAL OF BANK

SIGNATURE OF WITNESS: _____

NAME OF WITNESS: _____

ADDRESS OF WITNESS: _____

Note: (for preparation of but not for inclusion in the Bank Guarantee)

* Tenderers may select the currency either Indian Rupees or US Dollar.

ANNEXTURE ITT-2

FORM OF ACKNOWLEDGEMENT OF COMPLIANCE WITH GUIDELINES FOR PROCUREMENT UNDER JAPANESE ODA LOANS

(Reference Item (m) of Sub-Clause 13.3 of Instructions to Tenderers)

Hyderabad Growth Corridor Limited
Block A, HMDA Complex, Tarnaka,
Hyderabad 500 007,
Andhra Pradesh, India

Subject: ACKNOWLEDGEMENT OF COMPLIANCE WITH GUIDELINES FOR PROCUREMENT UNDER JAPANESE ODA LOANS

A) I, _____ (name and position of authorized signatory) duly authorized by _____ (name of Tenderer/member of joint venture or association (JVA)) ("Tenderer") hereby certify on behalf of **the Tenderer** and myself that information provided in the Tender submitted by **the Tenderer** for (Loan No and name of the Project) is true, correct and accurate to the best of my knowledge and belief. I further certify that on behalf of **the Tenderer** that;
   (i) the Tender has been prepared and submitted in compliance with the terms and conditions set forth in Guidelines for Procurement under Japanese ODA Loans ("Guidelines"); and
   (ii) **the Tenderer** has not taken any action which is or constitutes a corrupt, fraudulent, collusive or coercive practice and is not subject to any conflict of interest as stipulated in the relevant section of the Guidelines.

B) I certify that neither **the Tenderer** nor any subcontractor, or expert nominated by **the Tenderer** in the Tender has been sanctioned by any development assistance organizations*.

C) I further certify on behalf of **the Tenderer** that, if selected to undertake services in connection with the Project, we shall carry out such services in continuing compliance with the terms and conditions of the Guidelines.

_____
Authorized SIGNATORY

For and on behalf of the Tenderer
Date: _____

* If **the Tenderer** or any subcontractor or expert nominated by **the Tenderer** has once been or once constituted a corrupt, fraudulent, or coercive practice and has been sanctioned by any development assistance organizations in the past five years, it shall modify the Clause B) accordingly and shall provide the following information;
(a) The name of the organization which sanctioned **the Tenderer** or subcontractor or JVA partner, or expert nominated by **the Tenderer**.
(b) The period of the sanction.
However, the Borrower shall not disqualify such a Tenderer only because of this matter.

SECTION III: FORM OF TENDER

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FORM OF TENDER

HYDERABAD CITY INTELLIGENT TRANSPORT SYSTEM

for

Design, Supply, Installation, Testing, Commissioning, Training, Warranty and Remedying Defects of Equipments and Related Facilities of Hyderabad City Intelligent Transport System (Hyderabad City ITS) in the state of Andhra Pradesh, India, being taken up with the loan of assistance of Japan International Cooperation Agency under Phase-2 program, and Operation and Maintenance of Hyderabad City ITS and Related Facilities being taken up with the separate fund provided by Hyderabad Growth Corridor Limited for a period of Five years from the date of the Commissioning Certificate.

(Bid Notice No. XXXXXXXXXX) Date: _____

To **Managing Director,**
Hyderabad Growth Corridor Limited
Block A, HMDA Complex, Tarnaka,
Hyderabad 500 007,
Andhra Pradesh, INDIA

1. Having examined the Employer's Requirements, Conditions of Contract, Pricing Documents, Instruction to Tenderers provided by the Employer and Addenda Nos. _____ as furnished with the Tender Documents for the execution of the above-named Works we, the undersigned, hereby offer to execute and complete such Works and remedy any defects therein in full conformity with the Employer's Requirements, Conditions of Contract, Pricing Documents (priced) and Addenda for the sum stated in the Pricing Documents as completed by us and appended hereto or such other sums as may be agreed in accordance with the said Contract.
2. We undertake, if our Tender is accepted, to commence the Works as soon as reasonably possible after the receipt of the Employer's Representative's notice to this effect, and to complete and deliver the whole of the Works within the period stated in the Appendix to Tender.
3. If our Tender is accepted we will, within twenty one (21) days after receipt of the Letter of Acceptance, obtain and furnish Performance Security meeting the requirements set forth in the Contract and acceptable to the Employer, executed by us and by banks acceptable to the Employer, and conforming in substance, where applicable, to the sample bank guarantee included in the Tender Documents. In addition we will sign the Form of Contract Agreement when called upon to do so.
4. We undertake to keep this Tender open for acceptance without unilaterally varying or amending its terms for the period of 120 (one hundred twenty) days from the date fixed for receiving the same, and it shall remain binding upon us and may be accepted at any time before the expiration of that period or any extension thereof to which we may agree.
5. Unless and until a Form of Contract Agreement is prepared and executed, this Tender together with your written acceptance thereof, shall constitute a binding Contract between us.
6. We understand that you are not bound to accept the lowest or any Tender you may receive.
7. We enclose with the Tender, as attachments to this Form of Tender, the following completed documentation:

(1) Appendix to Tender together with Attachments 1, 2 and 3
(2) The Tender Security
(3) Schedule FT-1: Power of Attorney
(4) Schedule FT-2: Copy of Consortium/Joint Venture Agreement, if applicable
(5) Schedule FT-3: Updated Pre-qualification Forms
(6) Schedule FT-4: Proposed Work Programme
(7) Schedule FT-5: Technical Proposal
(8) Schedule FT-6: Structure of Tenderer including Details of Ownership and Control of Tenderer
(9) Schedule FT-7: Project Management Organization and Proposed Key Personnel
(10) Schedule FT-8: Technical Information of Equipment
(11) Schedule FT-9: Statement of a Clause by Clause Commentary and Statement of Deviation
(12) Schedule FT-10: Subcontractors proposed by the Tenderer
(13) Schedule FT-12: Acknowledgement of Compliance with Guidelines for Procurement under Japanese ODA Loan
(14) Schedule FT-13: Certificate confirming receipt of all Tender Addenda
(15) Schedule FT-14: Declaration for Non-Engagement of any Agent, Middleman or Intermediary
(16) Schedule FT-15: Undertaking to confirm that the Tender Documents prepared by the Employer shall be used solely for the preparation of the Tender
(17) The Pricing Documents (priced)
(18) One set of complete Tendering Documents (including All Addenda)
(19) Alternative Tender (if any)
(20) Other documents (if any)

8. We submit with the Tender a duly executed Tender Security in respect of our obligations under this Tender.
9. This Tender shall be governed by and construed in all respects according to the law currently in force in India **and shall be subject to the Uniform Rules for Demand Guarantees, published as number 458 by the International Chamber of Commerce.**

Dated this _____ day of _____2014

Signature_____

(Name: _____)

in the capacity of _____

duly authorized to sign Tender for and on behalf of

_____

Address: _____

Witness: _____

Address: _____

Position and Company: _____

Notes: (1) Signature on the Form of Tender must be witnessed and dated.

(2) If the Tenderer comprises a joint venture or consortium, all undertakings shall apply jointly and severally to the members of the joint venture or consortium, an authorized representative of each member must sign the Form of Tender. Furthermore, the withdrawal of any member or any other changes in the consortium/joint venture on whose behalf this Tender is submitted may be considered to be a breach of these undertakings.

(3) If the foreign Tenderer proposes an Assignee in its Tender to execute the Second Contract, the Assignee shall, if accepted by the Employer, submit a written Guarantee to guarantee the performance of the Contract.

APPENDIX TO TENDER

SALIENT CONTRACT CONDITIONS

No.	Reference Contract Clauses	Description
1.	Sub-Clause 1.1.2.1: Employer	The Employer is: **Hyderabad Growth Corridor Limited (HGCL),** **Block A, HMDA Complex, Tarnaka,** **Hyderabad 500 007, Andhra Pradesh, India.**
2.	Sub-Clause 1.1.2.3: Employer's Representative	The Employer's Representative is any person working as an Employee of Hyderabad Growth Corridor Limited (HGCL) or Hyderabad Metropolitan Development Authority (HMDA) or any consultant or consultancy firm, appointed by the Employer and notified as such to the Contractor.
3.	Sub-Clause 1.1.3.4: Time for Completion	The whole of the Works shall be completed and delivered in stages within 18 (eighteen) calendar months.
4.	Sub-Clause 1.1.3.8 (Part II Conditions of Particular Application): Defects Liability Period	The Defects Liability Period shall be two (2) years from the date stated in the Commissioning Certificate issued in accordance with Clause 10 of the Conditions of Contract, subject to the provisions of Sub-Clause 12.3 of the Conditions of Contract.
5.	Sub-Clause 1.1.5.3: Foreign Currency	Japanese Yen, US Dollars and Euros.
6.	Sub-Clause 1.1.6.9: Section	The Works are not divided into Sections
7.	Sub-Clause 1.4: Law and Language	Governing Law : India Ruling Language : English Language for Communication : English
8.	Sub-Clause 1.8: Electronic Transmission	Any Electronic Transmission shall be followed by the written letter. E-mail address of the Employer and the Employer's Representative will be notified by the Employer after award of the Contract. The Contractor shall notify the Employer of his E-mail address within 7 days after receipt of the Letter of Acceptance.
9.	Sub-Clause 1.8: Address	**The Employer**: Managing Director, Hyderabad Growth Corridor limited Block A, HMDA Complex, Tarnaka, Hyderabad 500 007, Andhra Pradesh, India Tel: +91-40-2700 2913 Fax: +91-40-2700 3271 **The Employer's Representative**: The Employer will notify the Contractor of the Employer's Representative's address within 7 days after issuing the Letter of Acceptance. **The Contractor** : The Contractor shall notify the Employer of his address within 7 days after receipt of the Letter of Acceptance.
10.	Sub-Clause 1.12: Confidential Details	Refer Conditions of Contract Part II Conditions of Particular Application.
11.	Sub-Claus 2.2: Time for granting right of access to and possession of the Site	(i) The Employer shall grant the Contractor right of access to and possession of the Site within time stated in Attachment-2 to Appendix to Tender attached hereto. (ii) The Employer shall grant the Contractor right of access to the Site (construction site for terminal equipment and conduit for fibre optic cable network) within time stated in Attachment-

		3 to Appendix to Tender attached hereto.
12.	Sub-Clause 4.2: Amount and Currency of Performance Security	Ten percent (10%) of the Contract Price in respective currencies, in which the Contract Price is payable.
13.	Sub-Clause 4.14: Programme to be Submitted	Within twenty-eight (28) days from the Commencement Date.
14.	Sub-Clause 6.5: Normal Working Hours	08:00 to 12:00 and 13:00 to 17:00 from Monday to Friday inclusive and 08:00 to 13:00 on Saturdays, and no working on the normal public and locally recognized holidays in Hyderabad, Andhra Pradesh, India and the gazette holidays which is observed by the Employer as a gazette holiday.
15.	Sub-Clause 8.1: Time for Issue of the Notice to Commence	Within twenty-eight (28) days after the Effective Date on which the Contractor receives the Letter of Acceptance.
16.	Sub-Clause 8.6: Amount of Liquidated Damages No. 3 of Appendix to Tender	Amount per week : 0.5% of the Contract Price
17.	Sub-Clause 8.6: Limit of Liquidated Damages	Maximum limit for cumulative Liquidated Damages for the Contract shall not exceed Ten percent (10 %) of the Contract Price payable to the Contractor under the Contract.
18.	Sub-Clause 11.4: Liquidated Damages for Failure to Pass Tests after Completion	Not applicable.
19.	Sub-Clause 13.2: Advance Payment - Rate of Interest	Maintain Sub-Clause 13.2 of Conditions of Contract Part 1General Conditions in Volume I, Section V of the Tender Documents. **The Advance Payment is provided interest-free.**
20.	Sub-Clause 13.2: Number of Instalments and Amount of Advance Payment	One instalment of Ten percent (10 %) of the original Contract Price in respective currencies, in which the Contract Price is payable.
21.	Sub-Clause 13.2: Start Repayment of Advance Payment	When accumulate amounts of Interim Payment Certificates (excluding the advance payment and deductions and repayment of retention) in types of currencies of the advance payment reaches Twenty percent (20%) of respective currencies of the Contract Price.
22.	Sub-Clause 13.2: Monthly Repayment of Advance Payment	For the first repayment of the advance payment in the respective currencies, Twenty (20%) of the amount equal to the accumulated amounts of Interim Payment Certificates (excluding the advance payment and deductions and repayment of retention) minus Twenty percent (20%) of the Contract Price in the respective currencies, will be deducted from the payment due. Thereafter Twenty percent (20%) of the amount of all Interim Payment Certificate (excluding the advance payment and deductions and repayment of retention) in types and proportionate amounts of currencies of the advance payment, until such time as the advance payments including interests thereon has been fully repaid.
23.	Sub-Clause 13.3: Retention Money	Ten percent (10%) of Interim Payment Certificate.
24.	Sub-Clause 13.3: Limit of Retention Money	Five percent (5%) of the original Contract Price in respective currencies, in which the Contract price is payable. In the event of variations during the execution of the Contract which result in payments to the Contractor over and above more than Twenty-five percent (25%) of the portion of the Contract Price payable in a specific currency, the Limit of Retention Money shall be suitably adjusted by the Employer's Representative.
25.	Sub-Clause 13.6:	Equivalent to Rs. 10,000,000- (Indian Rupees one Crore) until

	Minimum Amount of Interim Payment Certificate	the issuance of the Commissioning Certificate. Thereafter there will be no minimum amount of Interim Payment Certificate and the payment will be made on a quarterly basis irrespective of the amount to be paid. For the purpose of this Sub-Clause, the exchange rate to be employed for currency conversion shall be the selling exchange rates officially prescribed for similar transactions as established by the Reserve Bank of India on the last working day 28 (twenty eight) days prior to the latest date of submission of Tenders.
26.	Sub-Clause 13.8 (Part II Conditions of Particular Application): Delayed Payment - Rate of Interest	No alteration.
27.	Sub-Clause 13.9: Percentage Value of the Section Sub-Clause 4.2: Performance Security	Percentage value of the Section is not applicable.
28.	Sub-Clause 13.15: Calculation of Payments in Foreign Currency	Exchange rate to be employed for conversion : The selling exchange rates officially prescribed for similar transactions as established by the Reserve Bank of India on the last working day 28 (twenty eight) days prior to the latest date of submission of Tenders.
29.	Sub-Clause 14.5: Provisional Sums/ Sub-Paragraph (b) (ii)	A percentage of the actual price paid (or due to be paid), to cover all other costs, charges and profit: Ten percent (10 %)
30.	Sub-Clause 18.1: Professional Indemnity Insurance	Not less than Ten percent (10 %) of the original Contract Price.
31.	Sub-Clause 18.3: Amount of Third Party Insurance	Not less than Indian Rupees Four Million (Rs.4,000,000-) for any one occurrence, with the number of occurrences being unlimited.
32.	Sub-Clause 18.5: Period in which copy of insurance policy, to be submitted.	Within four (4) weeks from the Commencement Date.
33.	Sub-Clause 20.3: Number of Members of Dispute Adjudication Board	Three (3).
34.	Sub-Clause 20.3: Appointing Authority of Members of Dispute Adjudication Board (when the parties fail to nominate)	**President of Indian Road Congress.**
35.	Sub-Clause 20.6: Arbitration	Refer Sub-Clause 20.6 of Part II Conditions of Particular Application.

ATTACHMENT-1 TO APPENDIX TO TENDER

SCHEDULE OF KEY DATES

*All numbers refer to months from the Commencement Date of the Works.

Key Dates	**Stage**	**Months***
KD 1	Completion and delivery of the whole of the Works	Eighteen (18) months

ATTACHMENT-2 TO APPENDIX TO TENDER

TIME FOR GRANTING RIGHT OF ACCESS TO AND POSSESSION OF THE SITE

*All numbers refer to months from Commencement Date of the Works.

Access Dates	**Site**	**Months***
AD 1	ITS Centre (ITSC) at Nanakramaguda	_____ Months
AD 2	APSRTC Control Centre, Jublee Bus Station, Secunderabad	_____ Months
AD 3	Traffic Control Centre of the Hyderabad Outer Ring Road at Nanakramaguda	_____ Months
AD4	APSDPS MET Centre, L Block, 5th Floor, AP Secretariat, Basheebagh, Hyderabad - 500022	_____ Months

ATTACHMENT-3 TO APPENDIX TO TENDER

TIME FOR GRANTING RIGHT OF ACCESS TO SITE
(Construction Site of Roadside Equipment, Power and Communication Equipment)

* Note: All numbers refer to months from Commencement Date of the Works.

Access Dates	Construction Site	Months*
CD1	Roadside Equipment, Power and Communication Equipment	Months
CD 1		___ Months
CD 2		___ Months
CD 3		___ Months
CD 4		___ Months
CD 5		___ Months
CD 6		___ Months
CD 7		___ Months
CD 8		___ Months
CD 9		___ Months
CD 10		___ Months
CD 11		___ Months
CD 12		___ Months
CD 13		___ Months
CD 14		___ Months
CD 15		___ Months
CD 16		___ Months
CD 17		___ Months
CD 18		___ Months
CD 19		___ Months

SCHEDULE FT-1

POWER OF ATTORNEY

(Reference ITT Sub-Clause 5.1 and 5.3 of Instructions to Tenderers)

The Tenderer shall submit a written power of attorney (POA) authorizing the signatory of the Tender to commit the Tenderer.

1. Duly notarised, irrevocable Power of Attorney indicating that the person(s) signing the tender has(ve) the authority to sign the tender and thus that the tender is binding upon the Tenderer during the full period of its validity in accordance with ITT Clause 16. (See ITT Sub-Clause 5.1).
2. In case of the Tenderer being a Consortium/Joint Venture (see ITT Sub-Clause 5.3):
   - Duly notarised, irrevocable Power of Attorney indicating that the person(s) signing the tender has(ve) the authority to sign the tender and thus that the tender is binding upon each member of Consortium/Joint Venture during the full period of its validity in accordance with ITT Clause 16, and
   - Duly notarized, irrevocable Power of Attorney issued by each member of Consortium/Joint Venture indicating that the member in charge (Leader) shall be authorized to incur liabilities, receive payments and receive instruction for and on behalf of any or all members of the consortium/joint venture .

SCHEDULE FT-2

COPY OF CONSORTIUM/JOINT VENTURE AGREEMENT, IF APPLICABLE
(Reference Item ITT Sub-Clause 5.3 of Instructions to Tenderers)

The Tenderer shall submit copy of Consortium/Joint Venture Agreement entered by the consortium members or the joint venture members who shall be same members of as that of the consortium/joint venture agreement accepted at the time of pre-qualification, unless otherwise approved by the Employer in accordance with ITT Sub-Clause 3.2 of the Instructions to Tenderers.

The joint venture or consortium agreement should reflect the joint and several liabilities of the members to the Employer in the event that the Contract is awarded to them and provide “deadlock” provisions in the event that decisions of the joint venture or consortium cannot be reached by unanimous agreement. The joint venture or consortium agreement should also describe the responsibility of each member and the percentage financial participation in the joint venture or consortium.

SCHEDULE FT-3

UPDATED PREQUALIFICATION FORMS
(Reference Item ITT Sub-Clause 5.2 and 13.7 of Instructions to Tenderers)

The Tenderer shall up-date and re-submit the following Prequalification Application forms.

Sr. No.	Form No.	Description
1	ELI -1.1	Applicant Information Form
2	ELI -1.2	Applicant Partner Information Form
3	CON -2	Historical Contract Non-Performance
		1. History of Non-Performing Contracts
		2. Pending Litigation
4	FIN-3.1	Financial Situation
		1. Financial data
		2. Financial documents
5	FIN -3.2	Average Annual Turnover
6	EXP - 4.1	General Experience
7	EXP - 4.2(a)	Specific Experience
8	EXP - 4.2(b)	Specific Experience in Key Activities
9	EXP -4.2(c)	Technical Support from Subcontractor
10	PER - 5.1a	Candidate Summary
11	PER - 5.1b	Curriculum Vitae

SCHEDULE FT-4

PROPOSED WORK PROGRAMME
(Reference Item ITT Sub-Clause 13.8 of Instructions to Tenderers)

1. The Tenderer shall submit with his Tender, a Works Program which shall indicate how the Tenderer intends to organize and carry out the Works and achieve Stages and complete the whole of the Works by the appropriate Key Dates.
2. The proposed Works Program given in the Tender shall not in any event be construed as a submission of the Works Program as required to be furnished according to the Employer's Requirements and the Conditions of Contract.
3. The proposed Works Program shall include design, procurement period of major materials, off-shore production, production in India, dispatch, transport, installation, testing and commissioning.
4. The Proposed Works Program shall be developed as a critical path network using the Precedence Diagrams Method and be presented in bar chart and time scaled logic network format and shall clearly show the start and completion dates for each activity and their inter-relationships, and Key Dates.
5. The proposed Work Program shall be accompanied by a narrative statement that shall describe program activities, assumptions and logic, and highlight of the Tenderers perception of the major constraints and critical areas of concern in the organization, design, manufacture, installation, testing and commissioning of Hyderabad City Intelligent Transport System and Training. This narrative statement shall also indicate which element of the Works the Tenderer intends to carry out off-share and/or in India.
6. The proposed Work Program shall contain sufficient detail to assure the Employer of the feasibility or the plan and approach proposed by the Tenderer.
7. The Contractor specifically agrees that it shall have no entitlement to any claim which relies upon information provided herein.

SCHEDULE FT-5

PROPOSED TECHNICAL PROPOSAL
(Reference Item ITT Sub-Clause 13.9 of Instructions to Tenderers)

1. The Tenderer shall submit with his Tender his Technical Proposals in accordance with the Employer's Requirements. The Tenderers Technical Proposal shall comply or, subject to reasonable development, be capable of complying with the Employer's Requirements in all respects. The Tenderers Technical Proposal shall demonstrate such compliance.
2. The presentation of the information and data required shall be detailed enough to demonstrate that the proposed equipment, software and installation works fully conform to the Employer's Requirements. Lack of information and insufficient or partial data required, and inadequate and partial presentation in the opinion of the Employer shall be justifiable grounds for rejection.
3. The Contractor specifically agrees that it shall have no entitlement to any claim which relies upon information provided herein.
4. The Technical Proposal shall be described and submitted in accordance with the directions provided table below.
5. The Technical Proposal shall be written in the same sequence as table below to enable the Employer to understand and evaluate the technical adequacy of the Tenderers proposal.
6. The Tenderer shall clearly indicate in the proposal the type, procedure, method or configuration that he chooses with reason.
7. The description of the proposal for each item in table below shall be within one A4 sized paper in principle excluding below supporting materials.
8. The Technical Proposal shall describe in detail how the system requirements defined in the Tender Documents will be achieved with supporting materials such as block diagram, data flow, timing chart, calculation or others.
9. The Contractor shall ensure to execute proposed matters described in his proposal.

Table Items to be Proposed by the Tenderer

No.	Items	Direction for the Contractor
1	Safety Plan for the Work	The Tenderer shall describe the safety plan and policy that the Tenderer intends to adopt for the Works at site.
2	Software Quality Assurance	The Tenderer shall describe the Software Quality Assurance program that he adopts for developing and/or integrating the software.
3	Location of Factory Test and Environment	The Tenderer shall describe the location of the factory test of the Equipment and facilities in accordance with Price Schedule No.1 and No.2 in the Pricing Documents, and the details of the testing method, facilities and environment that will be available and used during the factory test at the proposed Location.
4	Development Policy for Hyderabad City ITS	The Tenderer shall describe the policy for development of each Sub-System of Hyderabad City ITS, such as developing platform, developing language, the technical architecture, API, SDK, RDBMS,

		GIS platform and special remarks, that he intends to use in the Work.
5	Design Life of the Equipment and facilities	The Tenderer shall describe the Design Life of the Equipment and facilities in accordance with Price Schedule No.1 and No.2 in the Pricing Documents. The Tenderer shall describe the alternatives to meet the specified Design Life if equipment proposed does not satisfy the specified Design Life. The Tenderer shall describe the replacement schedules/intervals of equipment in case that periodic replacement is required
6	Reliability of the Sub-System	The Tenderer shall describe the development policy to ensure the reliability of the computer system such as fault tolerance, data back-up and others that should be noted in order to improve the reliability of the equipment
7	Reliability of the Equipment and facilities	The Tenderer shall describe the expected MTBF and MTTR of the Equipment and facilities in accordance with Price Schedule No.1 and No.2 in the Pricing Documents. The Tenderer shall also describe the supporting system, such as base of the repair, personnel, operation time and response time to comply with the expected MTTR.
8	Third Party Software	The Tenderer shall describe the third party software that the Tenderer intends to use with the reason of using it.
9	Copyright and License	The Tenderer shall propose, that he intends to (a) use existing software owned by the Tenderer, (b) use and customize existing software owned by the Tenderer, (c) use existing software owned by the third party, (d) use and customize existing software owned by the third party, (e) newly develop software or (f) combine above in accordance with Price Schedule No.1 and No.2 in the Pricing Documents. If software development and/or customization are included in the Works of the Tenderer, the Tenderer shall clearly state about owner of the copyright and/or the license of the software, and contents of the license to be owned by the Employer. If the Tenderer intends to use existing software, the Tenderer shall clearly state in the Technical Proposal about contents of the license to be owned by the Employer. Copyright of all the developing software and customizing software shall be basically handed over to the Employer from the Contractor. The Tenderer shall resolve the copyright issue, if occurred in a joint venture, consortium or sub-contractor.
10	Contents of Sub-Systems	The Tenderer shall describe the table of contents of Sub-System, Operation Console and Website. Outline and items intended to display in each content shall be also stated. The Tenderer shall also state the details of the schematic map based interface and the contents to be displayed on the schematic map.
11	Diagnosis Function of Sub-System	The Tenderer shall describe the diagnosis functions of each Sub-System, such as types and contents of error or malfunction that can be diagnosed.
12	ITSC System	The Tenderer shall describe the design concept, design policy and special remarks to develop the ITSC System.

13	Video Wall in ITSC	The Tenderer shall describe the design concept, design policy and special remarks to develop the Video Wall.
14	Inertia Works for ITSC	The Tenderer shall describe the design concept, design policy and special remarks to make the interior works of ITSC. The layout plan of the operation room shall be submitted for reference.
15	Communication Networks	The Tenderer shall describe the logical and physical network configurations and network security policy. The Tenderer shall also describe the image of transmission changeover mechanism of the communication line from optical fibre network to mobile network and vice-versa.
16	Design Policy of ATCC System	The Tenderer shall describe the design concept, design policy and special remarks to develop the ATCC System.
17	Performance of ATCC	The Tenderer shall describe measurement items, accuracy to be guaranteed and classifier performance of ATCC. The performance to classify general vehicle, large size vehicle, auto-rickshaw and motorbike by ATCC is mostly appreciated.
18	Installing Policy of ATCC	The Tenderer shall describe optimum position and number of ATCC devices to be installed to accurately measure the counting and classifying.
19	Demonstration of ATCC	The Tenderer shall demonstrate the accuracy of ATCC proposed under the test conditions defined by the Employer during technical evaluation. The following vehicles and conditions shall be excluded for measurement Vehicles running in the opposite direction Hidden vehicles due to overlapping with the vehicles in front.
20	Design Policy of Probe Car System	The Tenderer shall describe design concept, design policy and special remarks to develop the Probe Car System.
21	Data Elimination Function of Probe Car System	The Tenderer shall describe the type of data to be excluded from the probe data collected from bus probe system when processing and its procedure or algorithm.
22	Design Policy of VMS System	The Tenderer shall describe the design concept, design policy and special remarks to develop the VMS System.
23	Certified Performance Data of LED	The Tenderer shall submit the certified optical performance data of the VMS proposed as measured by the test method described in EN 12966-1 showing that the VMS complies with the Employer's Requirements.
24	Anticorrosive Treatment of VMS	The Tenderer shall describe the details of the anticorrosive treatment and painting.
25	Power Consumption of VMS	The Tenderer shall describe the calculation of power consumption of the VMS proposed for two cases; when all pixels are ON with the highest brightness and when only 25% of the pixels are ON with the highest brightness. The former case shall be the maximum power consumption of VMS signboard with all fans and other components in operating status.
26	Information Dissemination through	The Tenderer shall describe the mechanism of automatic generation of the recommended message and zoning function that selects

	VMS System	particular VMS board for message display.
27	Design Policy of FLD System	The Tenderer shall describe the design concept, design policy and special remarks to develop the FLD System.
28	Design Policy of MET System	The Tenderer shall describe the design concept, design policy and special remarks to develop the MET System.
29	Installation Policy of Roadside Equipment	The Tenderer shall describe the installation policy or Roadside Equipment.
30	Cabinet of the Roadside Equipment	The Tenderer shall describe the anticorrosive treatment of the cabinet of the Roadside Equipment.
31	Condensation Problem inside the Cabinet	The Tenderer shall describe how the Tenderer overcomes condensation problem. Past experience has indicated that, even when an outdoor cabinet with underground conduit is completely enclosed and the conduit is sealed by foamed sealant, condensation may develop inside due to breathing effect which is caused by a change in ambient temperature.
32	Power Supply in the ITSC	The Tenderer shall describe the calculation results of power consumption of equipment in ITSC and capacity of UPS batteries to be used for the Equipment and facilities in the ITSC in accordance with Price Schedule No.1 and No.2 in the Pricing Documents.
33	Power Supply for Roadside Equipment	To describe the calculation results of power consumption of the Roadside Equipment and capacity of UPS batteries to be used for the Roadside Equipment in accordance with Price Schedule No.1 and No.2 in the Pricing Documents.
34	Operation & Maintenance Service Proposal	The Tenderer shall describe methodology to execute operation and maintenance services in accordance with “2 Operation & Maintenance Service Proposal” of OMS
35	Service Level Requirements	The Tenderer shall describe details of tools to measure availability of service level parameters.
36	DRM	The Tenderer shall describe the outline of items and contents of DRM that the Tenderer intends to use for Hyderabad City ITS. The Tenderer shall also describe the data maintenance procedure and its tools for DRM.

10. Note: If the Tenderers Proposal is judged as it does not satisfy the Employer’s Requirement, is not practical or not sufficient for the Employer to understand, it will be rejected. The rejected items will not be disclosed.

SCHEDULE FT-6

STRUCTURE OF TENDERER INCLUDING DETAILS OF OWNERSHIP AND CONTROL OF TENDERER
(Reference Item ITT Sub-Clause 13.10 of Instructions to Tenderers)

1. The Tenderer shall provide full details of his ownership and control or, if the Tenderer is a joint venture or consortium, full details of ownership and control of each member thereof.
2. The Tenderer shall supply a chart particularizing the structure of the Tenderer (identifying all companies comprising the Tenderer in the event that the Tenderer is a joint venture or consortium) and the ownership of each of the companies comprising the Tenderer, identifying all respective intermediate and ultimate holding companies.
3. For guidance, if the Tenderer is a joint venture or consortium then copy of the joint venture or consortium agreement is to be submitted by the Tenderer in Schedule FT-2. Should the Tenderer be an entity established or to be established to tender for this Contract, copy of the shareholders' agreement or proposed shareholders' agreement shall be supplied together with the percentage participation and percentage equity in the agreements in Schedule FT-2.
4. The information hereto must, as a minimum, include the information on all members or participants involved, their respective participation in the Tenderer, the management structure, ownership and control of the members or participants comprising the Tenderer and the name of the member or participant who would have overall lead management responsibility for the Works, the registered addresses of all parties and the names of their respective senior partners, chairman or managing directors as appropriate.
5. The Tenderer that does not conduct business in India shall submit evidence/proposal that it will be represented by an agent or otherwise in the country equipped and able to carry out the Tenderers maintenance, repair obligations prescribed in the Contract.

SCHEDULE FT-7

PROJECT MANAGEMENT ORGANIZATION AND PROPOSED KEY PERSONNEL (PRIME & ALTERNATIVE CANDIDATES) (Reference Item ITT Sub-Clause 13.11 of Instructions to Tenderers)

1. The Tenderer shall submit with his Tender a Project Management Organization together with proposed key personnel (both prime and alternative candidates).
2. Project management organization chart shall be submitted. The chart shall show the key personnel and other persons responsible for procurement, manufacturing, quality control, installation, work area safety and project accounting.
3. Key personnel shall include Project Manager as the Contractor's Representative and Hyderabad City Intelligent Transport System Chief Engineer. Those key personnel shall have adequate knowledge of the operations to be carried out (including the methods and techniques required, the hazards likely to be encountered and methods of preventing accidents) for satisfactory and safe execution of the Works, and be able to communicate in English.
4. The Tenderer shall submit a list of Key Personnel for prime and alternative candidates and details of proposed key personnel in the form attached hereto.
5. The suitability of the proposed Key Personnel to be deployed by the lowest evaluated Tenderer will be evaluated for acceptability. Should the proposed candidates be determined to be unacceptable, the Tenderer will be required to substitute an acceptable candidate and after discussion between the Employer and the Tenderer, the corresponding Appendix listing the acceptable candidates for each position shall be completed and attached to the Form of Contract Agreement.

ATTACHMENT-1 TO SCHEDULE FT-7

LIST OF PROPOSED KEY PERSONNEL
1. PRIME CANDIDATE

Position to be held	Name	Nationality	Age	Education (1)	Years of Services in Company	Years of Experience in ITS System	Years of Experience in Similar Position
Project Manager for DB Period (the Contractor's Representative)							
Chief Engineer for DB Period							
Quality Manager for DB Period							
Accident Prevention Officer for DB Period							
Electrical Engineer for DB Period and O&M Period							
Information Technology Engineer for DB Period and O&M Period							
Project Manager for O&M Period (the Contractor's Representative)							
Traffic Management Chief for O&M Period							
Chief Maintenance Engineer for O&M Period							
System Operator for O&M Period							

Note:

1. Insert University/Academy, High School or Secondary School and year of finishing.
2. Copies of educational qualification and experience certificate of above listed personnel should be attached.
3. Notwithstanding that the Tenderer has proposed the above personnel to be utilized in the performance of the Works; the Contractor agrees that it is his responsibility to provide whatever personnel may be required to fulfil his obligations under the Contract.

Date: _____ _____

SIGNATURE OF TENDERER

ATTACHMENT-2 TO SCHEDULE FT-7

LIST OF PROPOSED KEY PERSONNEL
2. ALTERNATIVE CANDIDATE

Position to be held	Name	Nationality	Age	Education (1)	Years of Services in Company	Years of Experience in ITS System	Years of Experience in Similar Position
Project Manager for DB Period (the Contractor's Representative)							
Chief Engineer for DB Period							
Quality Manager for DB Period							
Accident Prevention Officer for DB Period							
Electrical Engineer for DB Period and O&M Period							
Information Technology Engineer for DB Period and O&M Period							
Project Manager for O&M Period (the Contractor's Representative)							
Traffic Management Chief for O&M Period							
Chief Maintenance Engineer for O&M Period							
System Operator for O&M Period							

Note:

1. Insert University/Academy, High School or Secondary School and year of finishing.
2. Copies of educational qualification and experience certificate of above listed personnel should be attached.
3. Notwithstanding that the Tenderer has proposed the above personnel to be utilized in the performance of the Works; the Contractor agrees that it is his responsibility to provide whatever personnel may be required to fulfil his obligations under the Contract.

Date: _____ _____

SIGNATURE OF TENDERER

ATTACHMENT-3 TO SCHEDULE FT-7

DETAILS ON CONTRACTOR'S KEY PERSONNEL

1. Proposed Position _____

2. Name of Staff _____

3. Name and Address of Firm _____

4. Profession _____

5. Date of Birth _____

6. Years with Firm/entity _____

7. Nationality _____

8. Languages _____

9. Membership in Professional Societies _____

10. Full details of qualifications _____

    (giving dates, places, effective period, organization issued, etc.) _____

    _____

    _____

11. Full details of past experience with particular reference to work on similar projects.

    _____

    _____

12. Employment Record _____

    _____

    _____

Date: _____ _____

SIGNATURE OF TENDERER

SCHEDULE FT-8

TECHNICAL INFORMATION OF EQUIPMENT
(Reference Item ITT Sub-Clause 13.12 of Instructions to Tenderers)

The Tenderer shall submit with his Tender, the Technical Information for justifying the performance of the equipment proposed by the Tenderer in the format attached hereto. The Technical Information given by the Tenderer will be analysed during technical evaluation and shall be in sufficient detail to allow a full appreciation of the Tenderers proposals in relation to all aspects of the Works.

Item listed in Attachment to Schedule FT-8 may be divided into sub-items if the item comprises two or more component products.

Unless required otherwise in the Employer's Requirements, the Technical Information of Equipment shall be provided for only one product for each item in the list and no alternative product shall be included. The terms like "or equivalent" shall not be accepted.

The Tenderer is also requested to attach catalogue, drawings or any presentation paper for the proposed Equipment, if available.

ATTACHMENT TO SCHEDULE FT-8

SCHEDULE OF EQUIPMENT (1)

ITSC System Equipment

	Description	Country of origin	Manufacturer	Brand, type or make	Remarks
1.	ITSC server				
3.	Web & MSG server, Internet server and workstation				
4.	Video wall (LCD) *20 set				
5.	Video switches				
6.	Operator consoles				
7.	Laser printer (colour)				
8.	Laser printer (B/W)				
9.	Firewall and Network equipment				
10.	UPS power supply systems for server racks and consoles				
11.	Power Distribution Board				
12.	Probe car server				
13.	Probe server related network equipment and other necessary equipment				
14.	ATCC server				
15.	ATCC server related network equipment and other necessary equipment				
16.	CCTV server				
17.	CCTV server related network equipment and other necessary equipment				
18.	FLD server				
19.	FLD server related network equipment and other necessary equipment				
20.	MET server				
21.	MET server related network equipment and other necessary equipment				
22.	VMS server				
23.	VMS server related network equipment and other necessary equipment				

24.	ITSC software (server software, web & MSG server software, Database server, console software, anti-virus) including all required software to meet the specification				
25.	Third party tools such as DRM				

Date: _____ _____

SIGNATURE OF TENDERER

ATTACHMENT TO SCHEDULE FT-8
SCHEDULE OF EQUIPMENT (2)

Closed Circuit Television (CCTV) Roadside Equipment

	Description	Country of origin	Manufacturer	Brand, type or make	Remarks
1.	CCTV camera (including CCTV controller)				
2.	Processing unit				
3.	UPS power supply system				
4.	Pole (including manufacturing and galvanizing)				

Automatic Traffic Counters-cum-Classifier (ATCC) Roadside Equipment

	Description	Country of origin	Manufacturer	Brand, type or make	Remarks
1.	Sensor unit				
2.	Processing unit				
3.	Cabinet				
4.	UPS power supply system				
5.	Pole (including manufacturing and galvanizing)				

Flood Monitoring (FLD) Roadside Equipment

	Description	Country of origin	Manufacturer	Brand, type or make	Remarks
1.	Sensor unit				
2.	Processing unit				
3.	UPS power supply system				
4.	Pole (including manufacturing and galvanizing)				

Date: _____ _____

SIGNATURE OF TENDERER

ATTACHMENT TO SCHEDULE FT-8
SCHEDULE OF EQUIPMENT (3)

Variable Message Sign (VMS) Roadside Equipment

	Description	Country of origin	Manufacturer	Brand, type or make	Remarks
1.	VMS				
2.	VMS controller				
3.	UPS power supply system				
4.	Pole (including manufacturing and galvanizing)				

Digital Transmission System and Other Equipment

	Description	Country of origin	Manufacturer	Brand, type or make	Remarks
1.	Video switches				
3.	Media Convertors				
4.	Server Racks				

Date: _____ _____

SIGNATURE OF TENDERER

SCHEDULE FT-9

STATEMENT OF A CLAUSE BY CLAUSE COMMENTARY AND STATEMENT OF DEVIATION

(Reference Item ITT Sub-Clause 13.13 of Instructions to Tenderers)

The Tenderer shall submit a clause by clause commentary on all the clauses of the Employer's Requirements in the form attached herewith.

Tenderers shall note that their comments to the clause by clause, and commentary wherever given shall only be in the following form:

- Complied: "Complied" shall be indicated by the tenderer where the tenderer is able to comply fully with the clause.
- Noted: Where a clause merely provides information, and no other comment is necessary, "Noted" will suffice.
- Not Complied: Where the tenderer is not able to comply fully with certain clauses or has any observation or proposes an alternative design, "Not Complied" shall be indicated and comments, if any, of the Tenderer shall be indicated in detail. All Clauses with status as "Not Complied" shall be included in the form of statement of Deviations attached herewith and shall be priced in the Price Schedule 8 of Pricing Document for unconditional withdrawal of the deviation.

Tenderer shall also note that:

- Any comment by the tenderer in the Clause by Clause Commentary, other than either of "Complied", "Noted" or "Not Complied" shall be treated as "Not Complied". Unless Tenderer includes such clauses in the statement of Deviation attached herewith and prices against such clauses in the Price Schedule 8 of Pricing Document, the comment shall be considered as unconditionally withdrawn with no financial and time implications.
- Any "Not Complied" comment by the tenderer in the Clause by Clause Commentary which has not been included in the form of Statement of Deviations attached herewith shall be treated as "Complied" with no financial and time implications.
- Any "Not Complied" comment by the Tenderer in the Clause by Clause Commentary which has also been included in the Statement of Deviations given in Form attached herewith but has not been priced in the Price Schedule 8 of Pricing Document shall be treated as null and void and deemed to have been unconditionally withdrawn with no financial and time implications.

ATTACHMENT-1 TO SCHEDULE FT-9

STATEMENT OF A CLAUSE BY CLAUSE COMMENTARY

Clause Number	Heading/Title/Brief Description	Commentary		
		Complied	Noted	Not Complied

Note:

1. We hereby confirm that all implicit and explicit deviations, comments and remarks mentioned elsewhere in our proposal shall be treated as NULL and VOID and stand withdraw with no financial and time implications.
2. We hereby confirm that any comment by us in the Clause by Clause Commentary above, other than either of “Complied”, “Noted” or “Not Complied” shall be treated as “Not Complied.” And we further confirmed that unless we include such clauses in the Statement of Deviation attached herewith and prices against such clauses in the Price Schedule 8 of Pricing Document, the comment shall be considered as unconditionally withdrawn with no financial and time implications.
3. We hereby confirm that but for deviation noted in the form of the Statement of Deviation attached herewith, our proposal is fully and truly compliant.

Date: _____ _____

SIGNATURE OF TENDERER

ATTACHMENT-2 TO SCHEDULE FT-9

STATEMENT OF DEVIATION

Item Nos.	Clause Number	Details of Deviations (Original/Proposal)	Remarks explain reasons for deviations and why it may be considered by the Employer.	Check whether priced in the Pricing Documents

Note:

1. We hereby confirm that the pricing for unconditional withdrawal of the above deviations has been given in the Price Schedule 8 of Pricing Documents.
2. We hereby confirm that any comment by us in the form of a Clause by Clause Commentary but are not mentioned in the Form of Statement of Deviation above shall be treated as NULL and VOID and stand withdrawn with no financial and time implications.
3. We hereby confirm that the deviation mentioned in the form of the Statement of Deviation above but are not priced in the Price Schedule 8 of Pricing Documents; such deviations shall be considered as unconditionally withdrawn with no financial and time implications.

Date: _____ _____

SIGNATURE OF TENDERER

SCHEDULE FT-10

SUBCONTRACTORS PROPOSED BY THE TENDERER

(Reference Item ITT Sub-Clause 13.14 of Instructions to Tenderer and Sub-Clause 4.5 of the Conditions of Contract)

1. For sub-contractor and vendors for supply of major items, it will be obligatory for the Contractor to obtain consent from the Employer, to the identity of the sub-contractor and vendor.
2. The Contractor shall not sub-contract the whole of the Works.
3. The Tenderer shall provide the details of all major items of supply or services that it proposes to purchase or sublet, and shall give details of the name and nationality of the proposed subcontractor, including vendors, for each of those items. The Tenderer shall also provide adequate information about the sub-contractors and vendors to enable the Employer to assess the capability and suitability of the proposed sub-contractor and vendors. The Tenderers are free to list more than one subcontractor and vendors against each item of the facilities. The rates and prices and the Tender Total quoted by the Tenderer in the Pricing Documents will be deemed to apply to whichever Subcontractor is appointed, and no adjustment of the rates and prices shall be permitted.
4. The Employer reserves the right to delete any proposed Subcontractor or vendors from the list prior to award of contract, and after discussion between the Employer and the Tenderer, the corresponding Appendix to the form of Contract Agreement shall be completed, listing the approved Subcontractors for each item concerned.

ATTACHMENT TO SCHEDULE FT-10

LIST OF PROPOSED SUB-CONTRACTORS

Element of Works	Name and Address of Sub-contractor or Vendors	Statement of Similar Works Previously Executed*

*The Tenderer shall provide a statement of similar work previously executed by the sub-contractor/vendors, including description, location and value of work, year completed, and name and address of the employer/engineer.

Date: _____ _____

SIGNATURE OF TENDERER

SCHEDULE FT-12

ACKNOWLEDGEMENT OF COMPLIANCE WITH GUIDELINES FOR PROCUREMENT UNDER JAPANESE ODA LOAN

The Tenderer shall submit with its Tender the form of Acknowledgement of Compliance with Guidelines for Procurement under Japanese ODA Loan given in Annexure ITT-2 to the Instruction to Tenderers. The form shall be completed by the Tenderer and dully signed by the authorized representative of the Tenderer.

SCHEDULE FT-13

CERTIFICATE CONFIRMING RECEIPT OF ALL TENDER ADDENDA

(Reference Item ITT Sub-Clause 11.2 of Instructions to Tenderers)

This is to certify that we, M/S _____ [Name of the Tenderer] have received all Tender Addenda to Tender for the Design, Supply, Installation, Testing, Commissioning, Training, Warranty and Remedying Defects of Equipments and Related Facilities of Hyderabad City Intelligent Transport System (Hyderabad City ITS) and Operation and Maintenance of Hyderabad City ITS and Related Facilities (Bid Notice. No. XXXXXXXXXXX), as listed below:

Addendum No._____

_____

_____

_____

Date: _____ _____

SIGNATURE OF TENDERER

Note: The form shall be completed by the Tenderer and dully signed by the authorized representative of the Tenderer.

SCHEDULE FT-14

FORM OF DECLARATION FOR NON-ENGAGEMENT OF ANY AGENT, MIDDLEMAN OR INTERMEDIARY

We hereby jointly and severally declare that the submission of this Tender confirms that no agent, middleman or any intermediary has been, or will be engaged to provide any services, or any other item or work related to the award and performance of this Contract. We further confirm and declare that no agency commission or any payment which may be construed as an agency commission has been, or will be paid and that the rate ant price and the Tender Total quoted by us in the Pricing Documents do not include any such amount. We acknowledge the right of the Employer, if he finds to the contrary, to declare our Tender to be non-compliant and if the Contract has been awarded to declare the Contract null and void.

Date: _____ _____

SIGNATURE OF TENDERER

SCHEDULE FT-15

FORM OF UNDERTAKING TO CONFIRM THAT THE TENDER DOCUMENTS PREPARED BY THE EMPLOYER SHALL BE USED SOLELY FOR THE PREPARATION FOR TENDER

(Reference Item ITT Sub-Clause 26.3 of Instructions to Tenderers)

We, (name of individual tenderer/joint venture/consortia), hereby undertake that the tender documents purchased as a necessary part of our preparation of this tender shall be used solely for the preparation of the tender and that if the tender is successful, shall be used solely for the Design, Supply, Installation, Testing, Commissioning, Training, Warranty and Remedying Defects of Equipments and Related Facilities of Hyderabad City Intelligent Transport System (Hyderabad City ITS) and Operation and Maintenance of Hyderabad City ITS and Related Facilities We further undertake that the aforesaid tender documents shall not be used in whole, in part or in any altered form for any other project.

Date: _____ _____

SIGNATURE OF TENDERER

SECTION IV: PRICING DOCUMENTS

PRICING DOCUMENTS

TABLE OF CONTENTS

Pricing Documents

1. Preamble

1.1 General

1.1.1 This Contract is a fixed Lump Sum price for the execution of Design, Supply, Installation, Testing, Commissioning, Training, Warranty, Remedying Defects, Operation and Maintenance of Equipments and Related Facilities of the Hyderabad City Intelligent Transport System as specified in the Contract. Tenderers shall quote a fixed lump sum price ("Tender Total") for the entire system and facilities on a turnkey basis and inclusive of all taxes, levies, duties and other charges leviable and payable to the authorities. The Contractor shall be solely responsible for payment of all custom taxes and duties, custom clearances, port handling charges, etc., of all the imports. The Contractor shall be solely responsible for all the statutory clearances including customs, excise, taxes, levies, octroi, transportation, etc. required for successful execution of this Contract. "Equipment" means Intelligent Transport System equipment intended to form or forming part of the Permanent Works as specified in the Contract unless otherwise expressly mentioned.

1.1.2 The Tenderer shall also furnish the breakdown of his fixed Lump Sum price (Tender Total) in the form of Price Schedules attached herewith. Price Schedules shall be read and interpreted in conjunction with the Conditions of Contract (Part I: General Conditions of Contract and Part II Conditions of Particular Application), the Employer's Requirements (Part A: General Technical Specifications, Part B: Particular Technical Specifications, Part C: Operation and Maintenance Specifications and Part D: Drawings) and other Tender Documents. Items not explicitly specified in the Price Schedules but necessary for the completion and efficient operation of the Hyderabad City Intelligent Transport System shall be considered included in the Tender Total. The preamble shall serve as a definitive guide to the Tenderers in the interpretation of the Price Schedule, and later at the stage of contract, for the preparation of Interim Payment Certificates and payment thereof.

1.1.3 The Tenderer shall be deemed to have taken full account of all requirements, liabilities, obligations and risks, whether expressed or implied, and to have included in the Tender Total offered by the Tenderer. The items in the Price Schedules are the only items against which amount will become due under the Interim Payment Certificate. The rate and price of any item of work not specifically described or presented in the Price Schedule but required for the execution of the Contract shall be included in the rates and prices for the other items in the Price Schedule. The Tender Total shall therefore include for all incidental and contingent expenses and risks of every kind necessary to supply, install, test and commission, complete, maintain and remedy any defects in the whole of the Works in accordance with the Contract.

1.1.4 If Tenderers are unclear or uncertain as to the scope and extent of any item, they shall seek clarification in accordance with the Instruction to Tenderers in the Tender Documents prior to submitting their Tender.

1.2 Construction Package

1.2.1 The Tenders are invited for the complete system to be implemented on the Hyderabad City Intelligent Transport System and completed and passed the Tests on Completion within the period specified in the Appendix to Tender.

1.3 Tender Total

1.3.1 All duties, taxes and other charges imposed outside the Employer's country shall be included in the Tender Total offered in the Pricing Documents by the Tenderer.

All duties, taxes and other levies payable by the Contractor under the Contract or for any other cause, as of the date 28 days prior to the deadline for submission of Tenders in the Employer's country and State shall be included in the Tender Total offered in the Pricing Documents by the Tenderer. The Tenderer shall be familiar with the tax laws of the Employer's country and State.

Presently there is 'NO' waiver and exemption from the Government of Customs Duty, Excise Duty, Taxes, other royalties, Duties, Cess, Octroi/Entry Tax and levies payable to various authorities. Should the Employer be granted the exemption from payment of any duties, taxes and levies, etc., the Contractor will be advised on the process to be followed to obtain the exemption from the concerned authorities. The Contractor shall maintain complete records of duties, taxes and levies, etc. payable to various authorities in relation to the Works and submit the receipts/records for verification as and when demanded in writing by the Employer.

1.3.2 The Tender Total offered by the Tenderer and accepted by the Employer shall be subject to adjustment during the Contract in accordance with the provisions of Sub-clause 13.16 Change in Legislation and Sub-clause 13.17 Adjustment for Changes in Cost.

1.4 Price Schedules

1.4.1 The Tender Total shall be broken down into the following Price Schedules:

Price Schedule No.	Description
1	Design, Manufacture and Supply of Plant and Equipment supplied from abroad
2	Design, Manufacture and Supply of Plant and Equipment supplied from within India
3	Port handling, Port clearance, Local transportation, Insurance and other incidental Services (including customs taxes and duties and other charges for Plant and) supplied from abroad
4	Installation Services including Testing
5	Operation and Maintenance Manuals, As-built Drawings and Other Documentations
6	Training
7	Operation and Maintenance Services (this includes all the expenditures towards spare parts, maintenance equipments, replacements, operation and maintenance personnel etc. to meet the service level requirements of employer)
8	Price quoted for unconditional withdrawal of the Deviations given in Schedule FT-9 to Form of Tender

Each Price Schedule will be further subdivided into various work items included in the Price Schedules attached herewith.

1.4.2 The schedules do not generally give the full description of the plant, equipment and software to be supplied and the services to be performed under each item. Tenderers shall be deemed to have read the Employer's Requirements and other sections of the Tender Documents and reviewed the Drawings to ascertain the full scope of the requirements included in each item and in the Tender

Total. Items for which no rate or price is entered by the Tenderer, whether quantities are stated or not, shall be regarded as covered by other rates or prices in the Pricing Schedule. The rates and prices quoted in the Price Schedules and the Tender Total offered by the Tenderer shall be deemed to include for the full scope as aforesaid, including overheads and profits. No items shall be added to the Pricing Schedule. The Tender with the additional item not indicated in the Pricing Schedule issued by the Employer may result in the disqualification of the Tender.

1.4.3 In the Price Schedules, Tenderers shall give the required details and a breakdown of their prices as follows:

(a) Plant and Equipment to be supplied from abroad shall be quoted on CIF at Indian port, in Price Schedule No.1.

(b) Plant and Equipment manufactured or fabricated or supplied within the Employer's country shall be quoted on an EXW (ex factory, ex works, ex warehouse or off-the-shelf, as applicable) basis, and shall be inclusive of all costs as well as duties and taxes paid or payable on components and raw materials incorporated or to be incorporated in the system and facilities, in Price Schedule No.2.

All taxes, duties, levies and charges payable in the Employer's country for the design, manufacture and supply of Plant and Equipment as of twenty-eight (28) days prior to the deadline for submission of Tender shall be also included in Price Schedule No.2

(c) Customs clearance, handling charge, local transportation, insurance and other services incidental to delivery of the plant and equipment including import duties and taxes, any other local taxes payable in the Employer's country for imported Plant and Equipment and all taxes, duties, levies and charges payable in the Employer's country as of twenty-eight (28) days prior to the deadline for the submission of tenders, shall be included and priced under Price Schedule No.3

(d) Installation Services and Tests shall be quoted separately (Price Schedule No.4) and shall include rates or prices for all labour, contractor's equipment, temporary works, materials, consumables and all matters and things of whatsoever nature, as necessary for the proper execution of the Installation Services and Tests, including all taxes, duties, levies and charges payable in the Employer's country as of twenty-eight (28) days prior to the deadline for submission of tenders.

(e) The provision of training, operations and maintenance manuals, as-built drawings and other documentations and operation and maintenance services shall be quoted separately (Price Schedule No.5, 6 and 7) and shall include rates or prices for all labour, contractor's equipment, temporary works, materials, consumables and all matters and things of whatsoever nature, as necessary to comply with the scope of Works, including all taxes, duties, levies and charges payable in the Employer's country as of twenty-eight (28) days prior to the deadline for submission of tenders.

(f) In order to facilitate evaluation of tenders, deviations, if any, from the Employer's Requirement shall be listed in Schedule FT-9 to the Form of Tender. The Tenderer shall also provide the additional price, for unconditional withdrawal of the deviations in Price Schedule No.8. The Employer reserves the right to accept or reject any deviation proposed by the Tenderers. Then the Contract Price will be adjusted, if its Tender will be accepted by the Employer.

(g) The terms EXW, CIF, CIP, etc., shall be governed by the rules prescribed in the current edition of Incoterms, published by the International Chamber of Commerce, 38 Cours Albert 1er, 75008 Paris, France.

1.4.4 Except otherwise specifically described in the Tender Documents, the rates and prices quoted in the Price Schedules and the Tender Total offered by the Tenderer shall cover and include all allowances. The itemized list below shall not be exhaustive and the Tenderer shall take all costs involved while quoting the rates and prices and the Tender Total for:

(a) All setting out and survey of the site;

(b) Application and securing of permit from the authorities;

(c) Paying charges and fees to the authorities;

(d) Royalties and patent rights;

(e) Fencing, watching, lighting and security guard;

(f) Traffic guidance and safety measures;

(g) Prevention of fire and other hazards;

(h) Reinstatement of the site;

(i) Protection of the facilities in the vicinity of the site;

(j) Supplying, maintaining, and removing on completion, the Contractor's own accommodation, offices, depots, stores, workshops, transport, welfare services and other facilities including telephone and Internet and all charges in connection therewith;

(k) Supply, inspection, testing, packaging and transportation of equipment and materials for the Works as specified including the provision and use of the equipment and arrangements for the Employer's Representative;

(l) Maintaining public thoroughfares and footpaths and maintaining access upon existing recognized routes;

(m) Providing, transporting to the site, operating (including fuel and consumables), maintaining and removing from the site upon completion, all Contractor's equipment necessary for the execution of the Works;

(n) Arranging and providing electricity for the installation work and testing;

(o) Insurance including all risks in supply, transport, storage, installation, third party and workmen's compensation throughout the Contract period;

(p) Custom clearance;

(q) All tools, equipment, measuring instrument, cables, data and manuals required for tests at factory and on site;

(r) Computer, peripherals, software and database necessary for software and database development and testing;

(s) Various bank guarantees and securities;

(t) Travelling and accommodation expenses of the Contractor's staff between their base and the site; and

(u) Maintaining and operating Contractor's project office at site.

1.5 Currencies

1.5.1 The Tender Total and the rates and prices in Price Schedules shall be quoted separately in the following currencies:

(a) For inputs to the Works, which are expected to be supplied from within India including taxes,

royalties, duties and other levies payable to various authorities in India, in Indian Rupees.

(b) For those inputs to the Works, which are expected to be supplied from outside India, in foreign currencies which are Japanese Yen, United States Dollars and Euros.

(c) Total number of currencies shall not exceed four (4) including the local currency Indian Rupees.

1.6 Quantities

1.6.1 All quantities indicated in the Price Schedule are the estimated quantities of the Works to be executed by the Tenderer and are presented for information of Tenderers. The Tenderers shall examine the Tender Documents and check the quantities by himself. The accuracy or reliability of the quantities indicated in the Price Schedules by the Employer is not warranted with respect to the viability of his design and execution of the Works. They are intended to provide a common basis for Tendering and Tender evaluation. The Tenderer shall not alter the quantities indicated in the Price Schedules in preparing the Tender, but if the Tenderer will consider necessary to change the quantities indicated by the Employer to comply with the Scope of Works, the Tenderer shall propose such change in the Technical Proposal and submit them with the Tender. Any adjustment of price shall be made under the items entitled as "Any other item(s) considered necessary to comply with the Scope of Works" in Price Schedules. Any change in the quantities considered necessary to comply with the Scope of Works if found at any stage, will not constitute ground for any claim for extra time and costs.

1.6.2 The Tenderer shall make himself completely acquainted with all conditions, obligations, specifications, drawings and other requirements under the Contract before quoting his rate and prices and Tender Total. He shall have no right to claim any revision to the rate and prices and Tender Total offered by him on the basis of ignorance of the Tender Documents or location conditions, or to make any claim with regard to the rate and price and Tender Total.

1.6.3 All quantities entered in the Pricing Schedule are in metric units.

1.7 Unit

1.7.1 Lump Sum or "LS" that appears in the unit column of the Pricing Schedule shall be construed as the item being unquantifiable and not be counted or measured for valuation. It shall be understood that the payment is valued at one time. The payment for the item shall be valued according to the terms of valuation and payment set forth hereunder.

1.7.2 The items for which unit of "set", "no.", or "Mtr" is specified, it shall mean a complete set, discrete number and meters, respectively. The payment for these items shall be valued in accordance with the quantities certified by the Employer's Representative for the purpose of issuing Interim Payment Certificate.

1.8 Valuation and Payment

1.8.1 The measurement and valuation described herein is for the purpose of making a valuation of the Works acceptable to the Employer's Representative for issuing the Interim Payment Certificates and interim payments thereof to the Contractor, as the Works proceed. The Works executed shall be measured for the assessment of progress for interim payments in accordance with the method specified in the Employer's Requirements, the Price Schedule and other Contract Documents as set forth notwithstanding any custom to the contrary.

1.8.2 The payment will be made to the Contractor in the currency or currencies indicated for each respect item of Price Schedules. Retention money and repayment of the advance payment will be deducted from the payments due in accordance with the Conditions of Contract. Notwithstanding anything stated herein, the Employer's Representative retains the right to withhold payment on

any pay item due for payment when the Works to be performed are not performed, or are not carried out to the Employer's Representative's satisfaction in accordance with the Employer's Requirements, Drawings and other Contract documents.

Total price of the items 1 to 6 mentioned in the price schedule 1.4.1 shall not exceed 75% of the total contract price (total price of the items 1 to 7 mentioned in the price schedule 1.4.1).

1.8.3 Price Schedule No.1 Design, Manufacture and Supply of Plant and Equipment supplied from abroad, and Price Schedule No.2 Design, Manufacture and Supply of Plan and Equipment supplied from within India

(a) 100% prices of the System Design shall become due after obtaining the approval of the System Design from the Employer's Representative and upon the submission of the copy of the Design Approval Certificate of the Employer's Representative.

(b) The payment for the Factory Acceptance Test shall be made upon successful completion of the test and the submission of copy of the certificate of the respective tests duly signed by the Employer's Representative. The amount due to the Contractor in the respective Interim Payment Certificates shall be valued in proportion to the value of plant and equipment which is successfully completed the test against the total values of corresponding plant and equipment to be supplied.

(c) The payment of Plant and Equipment will be made in following manner:

(c-1) For Plant and Equipment supplied from abroad.

(i) Eighty percent (80%) of the CIF price of each Plant and Equipment upon delivery to the port of destination and delivery of the following documents to the Employer's Representative.

- Bill of lading
- Packing list
- Proof of insurance
- Certificate of factory test, if test is required

(ii) Ten percent (10%) of the CIF price of each Plant and Equipment upon delivery at the Site.

(iii) Five percent (5%) of the CIF price of each Plant and Equipment upon issue of the certificate of the respective Test on Completion for a portion of Works by the Employer's Representative.

(iv) Five percent (5%) of the CIF price of each Plant and Equipment upon issue of the certificate of the respective Test on Completion for the Works by the Employer's Representative.

(c-2) For Plant and Equipment supplied from within India.

(i) Eighty percent (80%) of the EXW price of each Plant and Equipment upon loading on to the mode of transport to be used to convey and delivery of the following documents to the Employer's Representative.

- Proof of dispatch
- Packing list
- Proof of inland transport insurance
- Certificate of factory test, if test is required

(ii) Ten percent (10%) of the EXW price of each Plant and Equipment upon delivery at the Site.

(iii) Five percent (5%) of the EXW price of each Plant and Equipment upon issue of the certificate of the respective Test on Completion for a portion of Works by the Employer's Representative.

(iv) Five percent (5%) of the EXW price of each Plant and Equipment upon issue of the certificate of the respective Test on Completion for the Works by the Employer's Representative.

(c-3) The payment for the intelligent traffic system software shall be made up to eighty percent (80%) of the price upon successful completion of the factory test of the Works that includes the intelligent traffic system software.

The balance of twenty percent (20%) shall be made upon completion of the Test on Completion for a portion of the Works for the software for Variable Message Sign (VMS) System, CCTV Camera System, Automatic Traffic Counter-cum-Classifier (ATCC) system, Probe Car system, Flood Monitoring system and Meteorological (MET) Monitoring system but not for the audit & reporting software module, incident management software, all ITSC software, utility software and operation and maintenance activity tracking and logging software.

The balance of twenty percent (20%) of audit & reporting software module, incident management software, all ITSC software, utility software and operation and maintenance activity tracking and logging software shall be made upon completion of the Test on Completion for the whole Works.

(c-4) The payment for the third party software shall be made in full upon successful completion of the Factory Test of the Works that includes the server or computer in which the third party software is installed.

(c-7) The payment for the Interior works at Operation and Server Rooms shall be made in full upon the completion of the Works and inspection and acceptance by the Employer's Representative.

1.8.4 Price Schedule No.3 Port handling, Port clearance, Local transportation, Insurance and other incidental Services (including customs taxes and duties and other charges for Plant and Equipment (supplied from abroad)

(a) The payment for the performance securities and insurances shall be made in the manner stated below.

(i) Twenty percent (20%) of the price for the performance security and the various insurances specified in the Price Schedule shall be paid upon submission of performance security and the copy of the insurance policies.

(ii) Eighty percent (80%) of the price shall be paid in the quarterly instalments of equal amount obtained by dividing the price by the number of months allowed for the completion of the whole of the Works.

(b) The payment for the Customs Duties and Taxes and Other Charges for Plant and Equipment supplied from abroad shall be made after the delivery of them to the Site or any other place as instructed by the Employer's Representative, and inspection and acceptance by the Employer's Representative. The amount due to the Contractor in the respective Interim Payment Certificates shall be valued in proportion to the value of plant and equipment which are delivered to the Site or any other place as instructed by the Employer's Representative

against the total values of plant and equipment to be supplied from abroad.

(c) The payment for the Port Handling, Port Clearance, Local Transportation, Insurance during Transit for both Plant and Equipment supplied from abroad and from within India, shall be made in full, after the delivery of them to the Site or any other place as instructed by the Employer's Representative, and inspection and acceptance by the Employer's Representative. The amount due to the Contractor in the respective Interim Payment Certificates shall be valued in proportion to the value of plant and equipment which are delivered to the Site or any other place as instructed by the Employer's Representative against the total values of plant and equipment to be supplied from abroad or from within India.

(d) The payment for Other Incidental Services not specifically described in Price Schedules but considered necessary to comply with the Scope of Works shall be made in full, after the delivery of all Plant and Equipment supplied from abroad and from within India to the Site or any other place as instructed by the Employer's Representative, and inspection and acceptance by the Employer's Representative.

1.8.5 Price Schedule No.4 Installation Services including Testing

Ninety percent (90%) of the price for the installation services of each item shall be paid upon completion of the installation work and the inspection of the installation works to the satisfaction of the Employer's Representative. Five percent (5%) of the relevant price shall be paid upon issue of the certificate of the respective Test on Completion for a portion of Works by the Employer's Representative. The remaining five percent (5%) of the relevant price shall be paid upon issue of the certificate of the respective Test on Completion for the Works by the Employer's Representative. The payment shall be made in units of lane, PCS and TCC as the case may be and no partial payment shall be made for the installation of the equipment comprising these units.

The payment for the Test on Completion for a portion of Works and the Test on Completion for the Works shall be made upon successful completion of the tests and submission of copy of the certificate of the respective tests duly signed by the Employer's Representative.

1.8.6 Price Schedule No.5 Operation and Maintenance Manuals, As-built Drawings and Other Documentations

The payment of the line item for Operation and Maintenance Manuals, As-built Drawings and Other Documentations shall be made upon delivery to and acceptance by the Employer's Representative and submission of copy of the certificate of the Employer's Representative to that effect.

1.8.7 Price Schedule No.6 Training

The payment of the line item for Training shall be made upon completion of the respective trainings to the satisfaction of the Employer's Representative and submission of the Employer's Representative's certificate to that effect.

1.8.8 Price Schedule No.7 Operation and Maintenance Services

This includes all the expenditures towards spare parts, maintenance equipments, replacements, operation and maintenance personnel etc. to meet the service level requirements of the employer.

The payment of the line item for Operation and Maintenance Service during Defect Liability Period the Operation and Maintenance Period shall be made in the quarterly instalments basis after submission of the maintenance reports which shall include the preventive maintenance activities, corrective maintenance activities for defects liability or damages as the case may be, and incident reports. The submission of the reports shall be made after delivering the services for each month.

Payment for the Operation and maintenance Services will be subject to the achievement of the service levels stipulated in Section VII, Part C: Operation and Maintenance Specifications.

1.8.9 Price Schedule No.8 Price quoted for unconditional withdrawal of the Deviations given in Schedule FT-9 to Form of Tender

The price of the line item which the Employer rejects will be apportioned to the appropriate items in Price Schedules by the Employer's Representative in consultation with the successful Tenderer and the payment of price for such line item will be followed by the terms of payment for the apportioned item.

2. Tender Total

(This Document is to be prepared and completed by the Tenderer.)

2.1 Fixed Lump Sum Contract Price

Tender total for the Fixed Lump Sum Price of this Contract is:

Indian Rupees: _____ (in figures)

_____ (in words)

and

Foreign Currency: _____ (in figures)

_____ (in words)

Breakdown of the above Fixed Lump Sum Price into Price Schedules:

Price Schedule No.	Description	Amount	
		Foreign Currency (*)	Indian Rupees (Rs)
(1)	(2)	(3)	(4)
1	Design, Manufacture and Supply of Plant and Equipment Supplied from Abroad		
2	Design, Manufacture and Supply of Plant and Equipment Supplied from within India		
3	Port Handling, Port Clearance, Local Transportation, Insurance and other Incidental Services (including Customs Taxes and Duties and Other Charges for Plant and Equipment Supplied from Abroad)		
4	Installation Services including Tests		
5	Operation and Maintenance Manuals, As-built Drawings and Other Documentation		
6	Training		
7	Operation and Maintenance Services for a period of five years from the date of Commissioning Certificate (includes all the expenditures towards spare parts, maintenance equipments, replacements, operation and maintenance personnel etc. to meet the service level requirements of employer)		
8	Price Quoted for Unconditional Withdrawal of the Deviations given in Schedule FT-9 to Form of Tender		
	Total for the Fixed Lump Sum Price		

_____ _____ _____

Name of Tenderer Signature of Tenderer Date

3. Price Schedules

3.1 Price Schedule No. 1 Design, Manufacture and Supply of Plant and Equipment supplied from abroad

3.2 Price Schedule No. 2 Design, Manufacture and Supply of Plant and Equipment supplied from within India

Item No.	Description	Unit	Qty	The County of Origin (Code)	Price Schedule No. 1 Design, Manufacture and Supply of Plant and Equipment supplied from abroad			Price Schedule No. 2 Design, Manufacture and Supply of Plant and Equipment supplied from within India		
					Qty	Foreign Currency(*):CIF		Qty	Indian Rupees (Rs):EXW	
						Rate	Amount		Rate	Amount
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
A	System Design									
A1	Complete System Design and Obtain Approval from the Employer's Representative	LS	1							
	Sub-total for A									
B	Factory Acceptance Test									
B1	Factory Acceptance tests at Place of manufacture including travel and subsistence costs of Employer/Employer's Representative in attending the	LS	1							

Name of Tenderer _____ Signature of Tenderer _____ Date _____

Item No.	Description	Unit	Qty	The County of Origin (Code)	Price Schedule No. 1 Design, Manufacture and Supply of Plant and Equipment supplied from abroad			Price Schedule No. 2 Design, Manufacture and Supply of Plant and Equipment supplied from within India		
					Qty	Foreign Currency(*):CIF		Qty	Indian Rupees (Rs):EXW	
						Rate	Amount		Rate	Amount
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	test									
B2	Factory Acceptance Test for integration test of all Roadside Equipment and sub-systems of the ITSC	LS	1							
	Sub-total for B									
C	ITSC System and Roadside Equipment									
C-1 & C-2	For ITSC System and Roadside Equipment supplied from abroad and within India									
	ITSC System Equipment									
	ITSC server	No	2							
	Web & MSG Server, Internet server and workstation	No	2							
	Video Wall (LCD 55inch) *20set	No	1							
	Video Switches	No	1							
	Operator Console for Traffic	No	1							

Name of Tenderer Signature of Tenderer Date

Item No.	Description	Unit	Qty	The County of Origin (Code)	Price Schedule No. 1 Design, Manufacture and Supply of Plant and Equipment supplied from abroad			Price Schedule No. 2 Design, Manufacture and Supply of Plant and Equipment supplied from within India		
					Qty	Foreign Currency(*):CIF		Qty	Indian Rupees (Rs):EXW	
						Rate	Amount		Rate	Amount
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	Management Chief (Three Monitors)									
	Operator Console for Call Centre (Two Monitors)	No	1							
	Operator Console for CCTV (Two Monitors)	No	1							
	Operator Console for Video Wall (Two Monitors)	No	1							
	Operator Console for VMS (Two Monitors))	No	1							
	Operator Console for Flood/MET (Two Monitors)	No	1							
	Operator Console for ATCC/Probe/Static Data Analyzer (Two Monitors)	No	1							
	Operator Console for System Operator (Two Monitors)	No	1							
	Operator Console as spare (Two Monitors)	No	1							

Name of Tenderer Signature of Tenderer Date

Item No.	Description	Unit	Qty	The County of Origin (Code)	Price Schedule No. 1 Design, Manufacture and Supply of Plant and Equipment supplied from abroad			Price Schedule No. 2 Design, Manufacture and Supply of Plant and Equipment supplied from within India		
					Qty	Foreign Currency(*):CIF		Qty	Indian Rupees (Rs):EXW	
						Rate	Amount		Rate	Amount
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	Operator Console for HMDA (Two Monitors)	No	1							
	Operator Console for Traffic Police (Two Monitors)	No	1							
	Operations Laser Printer (Colour)	No	1							
	Operations Laser Printer (Black)	No	1							
	Firewall and Network Equipment	LS	1							
	Uninterruptible Power Supply (UPS) For Server Rack	No	5							
	Uninterruptible Power Supply (UPS) For Operator Consoles (0.5KVA)	No	11							
	Uninterruptible Power Supply (UPS) For Operator Consoles (1.0KVA)	No								
	Uninterruptible Power Supply (UPS) For Operator Consoles	No								

Name of Tenderer Signature of Tenderer Date

Item No.	Description	Unit	Qty	The County of Origin (Code)	Price Schedule No. 1 Design, Manufacture and Supply of Plant and Equipment supplied from abroad			Price Schedule No. 2 Design, Manufacture and Supply of Plant and Equipment supplied from within India		
					Qty	Foreign Currency(*):CIF		Qty	Indian Rupees (Rs):EXW	
						Rate	Amount		Rate	Amount
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	(1.5KVA)									
	Uninterruptible Power Supply (UPS) For Video Wall （10.0KVA）	No	1							
	Power Distribution Board (PDB)	No	1							
	Any other item(s) considered necessary to comply with the Scope of Works in ITSC System	LS	1							
	Probe Car System Equipment									
	Probe Server	No	2							
	Network Equipment	No	1							
	Any other item(s) considered necessary to comply with the Scope of the Works	LS	1							
	Meteorological Monitoring System Equipment									
	MET Server	No	2							
	MET Server Software	No	2							

Name of Tenderer Signature of Tenderer Date

Item No.	Description	Unit	Qty	The County of Origin (Code)	Price Schedule No. 1 Design, Manufacture and Supply of Plant and Equipment supplied from abroad			Price Schedule No. 2 Design, Manufacture and Supply of Plant and Equipment supplied from within India		
					Qty	Foreign Currency(*):CIF		Qty	Indian Rupees (Rs):EXW	
						Rate	Amount		Rate	Amount
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	Network Equipment	No	1							
	Any other item(s) considered necessary to comply with the Scope of Works	LS	1							
	Automatic Traffic Counters-cum-Classifier System Equipment									
	ATCC Server	No	2							
	Image recognition detector (including Processing unit)	No	70							
	Network Equipment	No	1							
	Media Converter	No	14							
	Cabinet	No	44							
	Pole TYPE-A (including manufacturing and galvanizing)	No	26							
	Pole TYPE-B (including manufacturing and galvanizing)	No	15							
	Pole TYPE-C (including manufacturing and galvanizing)	No	1							

Name of Tenderer Signature of Tenderer Date

Item No.	Description	Unit	Qty	The County of Origin (Code)	Price Schedule No. 1 Design, Manufacture and Supply of Plant and Equipment supplied from abroad			Price Schedule No. 2 Design, Manufacture and Supply of Plant and Equipment supplied from within India		
					Qty	Foreign Currency(*):CIF		Qty	Indian Rupees (Rs):EXW	
						Rate	Amount		Rate	Amount
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	Pole TYPE-D (including manufacturing and galvanizing)	No	2							
	Any other item(s) considered necessary to comply with the Scope of Works	LS	1							
	Closed Circuit Television Camera System Equipment									
	CCTV Server	No	2							
	CCTV Camera (including CCTV Controller)	No	56							
	Network Equipment	No	14							
	Media Converter	No	14							
	Cabinet	No	14							
	Pole (including manufacturing and galvanizing)	No	14							
	Any other item(s) considered necessary to comply with the Scope of Works	LS	1							

Name of Tenderer Signature of Tenderer Date

Item No.	Description	Unit	Qty	The County of Origin (Code)	Price Schedule No. 1 Design, Manufacture and Supply of Plant and Equipment supplied from abroad			Price Schedule No. 2 Design, Manufacture and Supply of Plant and Equipment supplied from within India		
					Qty	Foreign Currency(*):CIF		Qty	Indian Rupees (Rs):EXW	
						Rate	Amount		Rate	Amount
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	Flood Monitoring System Equipment									
	FLD Server	No	2							
	Flood Monitoring Detector	No	14							
	Processing Unit	No	14							
	Pole (including manufacturing and galvanizing)	No								
	Any other item(s) considered necessary to comply with the Scope of Works	LS	1							
	Variable Message Sign Equipment									
	VMS Server	No	2							
	VMS Board	No	28							
	VMS Controller	No	28							
	Network Equipment	No	28							
	TYPE-A Gantry TYPE (including manufacturing and galvanizing)	No	3							

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Item No.	Description	Unit	Qty	The County of Origin (Code)	Price Schedule No. 1 Design, Manufacture and Supply of Plant and Equipment supplied from abroad			Price Schedule No. 2 Design, Manufacture and Supply of Plant and Equipment supplied from within India		
					Qty	Foreign Currency(*):CIF		Qty	Indian Rupees (Rs):EXW	
						Rate	Amount		Rate	Amount
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	TYPE-B Cantilever support (including manufacturing and galvanizing)	No	7							
	TYPE-C Cantilever support (including manufacturing and galvanizing)	No	18							
	Any other item(s) considered necessary to comply with the Scope of Works	LS	1							
	Sub-total for C1									
	Sub-total for C2									
C-3	Software									
	ITSC Server Software	No	2							
	Web & MSG Server Software	No	2							
	Database Software	No	2							
	Operating System software (Servers and Consoles)	No	18							

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Item No.	Description	Unit	Qty	The County of Origin (Code)	Price Schedule No. 1 Design, Manufacture and Supply of Plant and Equipment supplied from abroad			Price Schedule No. 2 Design, Manufacture and Supply of Plant and Equipment supplied from within India		
					Qty	Foreign Currency(*):CIF		Qty	Indian Rupees (Rs):EXW	
						Rate	Amount		Rate	Amount
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	Anti Virus and Firewall (covering all servers and systems of ITSC)	No	2							
	Probe Server Software	No	2							
	MET Server Software	No	2							
	ATCC Server Software	No	2							
	CCTV Server Software	No	2							
	FLD Server Software	No	2							
	VMS Serve Software	No	2							
	Any other item(s) considered necessary to comply with the Scope of Works such as Data analyzer, error diagnosis software, utility software etc.	LS	1							
	Sub-total for C-3									
C-4	Third Party Software including Digital Road Map (DRM)									

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Item No.	Description	Unit	Qty	The County of Origin (Code)	Price Schedule No. 1 Design, Manufacture and Supply of Plant and Equipment supplied from abroad			Price Schedule No. 2 Design, Manufacture and Supply of Plant and Equipment supplied from within India		
					Qty	Foreign Currency(*):CIF		Qty	Indian Rupees (Rs):EXW	
						Rate	Amount		Rate	Amount
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	Sub-total for C-4									
C-7	Interior works at Operation and Server Rooms at ITSC	LS	1							
	Sub-total for C-7									
	Total for Price Schedule No.1 (Design, Manufacture and Supply of Plant and Equipment supplied from abroad)									
	Total for Price Schedule No.2 (Design, Manufacture and Supply of Plant and Equipment supplied from within India)									

Code	Country

Tenderers shall enter a code representing the county of origin all imported Plant and Equipment

Note: 1. Tenderers shall identify the country of origin of Plant and Equipment to be supplied under the Contract. If Tenderers choice to supply Plant and Equipment

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from both abroad and within India, then the quantities to be supplied from abroad and the quantities supplied from within India shall be clearly indicated in the relevant columns. Total quantities of Plant and Equipment to be supplied from abroad and from within India shall be equal to the quantities specified by the Employer in Price Schedule.

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Name of Tenderer	Signature of Tenderer	Date

3.3 Price Schedule No. 3 Port handling, Port Clearance, Local Transportation, Insurance and Other Incidental Services (including Customs Taxes and Duties and Other Charges for Plant and Equipment supplied from Abroad)

Item Nos	Description	Unit	Quantity	Rate		Amount	
				Foreign Currency(*)	Indian Rupees(Rs)	Foreign Currency(*)	Indian Rupees(Rs)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
A	Preliminary						
A1	Provision of Performance Security	LS	1				
A2	Insurance						
A2.1	Insurance for Works and Contractor's Equipment	LS	1				
A2.2	Insurance against Injury to Persons and Damage to Property	LS	1				
A2.3	Insurance for Workers	LS	1				
	Sub-total for Item A						
B	Customs Duties and Taxes and Other Charges for Plant and Equipment supplied from Abroad						
B1	ITS Centre (ITSC) Equipment	LS	1				
B2	Software	LS	1				
B3	Probe Car System Equipment	LS	1				
B4	Meteorological Monitoring (MET) System	LS	1				
B5	Automatic Traffic Counters-cum-classifier (ATCC)	LS	1				

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Name of Tenderer Signature of Tenderer Date

Item Nos	Description	Unit	Quantity	Rate		Amount	
				Foreign Currency(*)	Indian Rupees(Rs)	Foreign Currency(*)	Indian Rupees(Rs)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Equipment						
B6	Closed Circuit Television (CCTV) Camera System Equipment	LS	1				
B7	Flood Monitoring System (FLD) Equipment	LS	1				
B8	Variable Message Sign (VMS) Equipment	LS	1				
	Sub-total for Item B						
C	Port Handling, Port Clearance, Local Transportation, Insurance during Transit and other Incidental Services						
C1	Plant and Equipment supplied from abroad	LS	1				
C2	Plant and Equipment supplied from within India	LS	1				
	Sub-total for Item C						
D	Other Incidental Services not specifically described in Price Schedules but considered necessary to comply with the Scope of Works	LS	1				
	Total for Price Schedule No.3 Port handling, Port Clearance, Local Transportation, Insurance and Other Incidental Services including Customs Taxes and Duties and Other Charges for Plant and Equipment (supplied from Abroad						

Name of Tenderer Signature of Tenderer Date

3.4 Price Schedule No. 4 Installation Services including Tests

Item Nos	Description	Unit	Quantity	Rate		Amount	
				Foreign Currency(*)	Indian Rupees(Rs)	Foreign Currency(*)	Indian Rupees(Rs)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
A	Installation Services						
A1	ITS Centre (ITSC) System complete with ITSC Server with External Storage Device, Web & MSG Server, Video Wall, Video Switches, Operator Consoles for Traffic Management Chief, Operator Console for Call Centre, Operator Console for Video Wall, Operator Console for FLD/MET, Operator Console for ATCC/Probe/Static Data Analyzer, Operator Console for System, Operator Console for Traffic Police, Operator Console for HGCL, Operations Laser Printer (Colour), Operations Laser Printer (Black), Firewall and Network Equipment, Uninterrupted Power Supply (UPS) For Servers Rack, Uninterrupted Power Supply For Operator Consoles, Uninterrupted Power Supply For Video Wall, Power Distribution Board (PDB), power and data cable, cable laying and termination, grounding and interior works.	Set	1				
A2	Probe Car System complete with Probe Server, Network Equipment, power and data cable, cable laying and termination, grounding and interior works.	Set	1				

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Name of Tenderer Signature of Tenderer Date

Item Nos	Description	Unit	Quantity	Rate		Amount	
				Foreign Currency(*)	Indian Rupees(Rs)	Foreign Currency(*)	Indian Rupees(Rs)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
A3	MET System equipment complete with MET Server, Network Equipment, power and data cable, cable laying and termination, for MET and control software.	Set	1				
A4	ATCC System equipment complete with ATCC Server, Image recognition detector and processing unit, Network Equipment, Media Converter, Cabinet, power and data cable, cable laying and termination, grounding, for ATCC and control software.	Set	70				
A5	Construction of foundation and erection of pole for TYPE-A	No	26				
A6	Construction of foundation and erection of pole for TYPE-B	No	15				
A7	Construction of foundation and erection of pole for TYPE-C	No	1				
A8	CCTV Camera System equipment complete with CCTV Server, Operator Console for CCTV, CCTV Camera and Controller, Network Equipment, Media Converter, Cabinet, power and data cable, cable laying and termination, grounding, for CCTV and control software.	Set	56				
A9	Construction of foundation and erection of pole	No	1				

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Name of Tenderer Signature of Tenderer Date

Item Nos	Description	Unit	Quantity	Rate		Amount	
				Foreign Currency(*)	Indian Rupees(Rs)	Foreign Currency(*)	Indian Rupees(Rs)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
A10	FLD System equipment complete with FLD Server, Flood Monitoring Detector, Processing Unit, Network Equipment, power and data cable, cable laying and termination, grounding, for FLD and control software.	Set	14				
A11	Construction of foundation and erection of pole	No	13				
A12	VMS System equipment complete with VMS Server, Operator Console for VMS, VMS Board, VMS Controller, Network Equipment, power and data cable, cable laying and termination, grounding, for VMS and control software.	Set	28				
A13	Construction of foundation and erection of gantry for TYPE-A	No	3				
A14	Construction of foundation and erection of gantry for TYPE-B	No	7				
A15	Construction of foundation and erection of gantry for TYPE-C	No	18				
	Sub-total for Item Nos. A1 to A15						
B	Test on Completion for a Portion of Works						
B1	Acceptance test of ITSC system	No	1				
B2	Acceptance test of Probe Car system	No	1				

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Item Nos	Description	Unit	Quantity	Rate		Amount	
				Foreign Currency(*)	Indian Rupees(Rs)	Foreign Currency(*)	Indian Rupees(Rs)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
B3	Acceptance test of MET system	No	1				
B4	Acceptance test of ATCC systems	No	70				
B5	Acceptance test of CCTV system	No	56				
B6	Acceptance test of FLD system	No	14				
B7	Acceptance test of VMS system	No	28				
	Sub-total for Item Nos. B1 to B7						
C	Test on Completion for the Works						
C1	Test on Completion for the Works	LS	1				
	Total for Price Schedule No.4 Installation Services including Tests						

Note: 1. The cost of any construction materials such as cement, aggregate, steel bars, steel, concrete block, etc. used for civil, building and other construction, if any, shall be included and priced under this Price Schedule No.4 Installation Services including Tests.

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Name of Tenderer Signature of Tenderer Date

3.5 Price Schedule No. 5 Operation and Maintenance Manuals, As-built Drawings and Other Documentations

Item Nos	Description	Unit	Quantity	Rate		Amount	
				Foreign Currency(*)	Indian Rupees(Rs)	Foreign Currency(*)	Indian Rupees(Rs)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	Manager's manual	LS	1				
2	Operator's manual	LS	1				
3	System Operation’s Manual	LS	1				
4	Maintenance Manual	LS	1				
5	Design Manual	LS	1				
6	Software Manual	LS	1				
7	Hardware Manual	LS	1				
8	As-Built Drawings	LS	1				
9	Other Documentation considered necessary to comply with the Scope of Works	LS	1				
	Total for Price Schedule No.5 Operation and Maintenance Manuals, As-built Drawings and Other Documentations						

Name of Tenderer _____ Signature of Tenderer _____ Date _____

3.6 Price Schedule No. 6 Training

Item Nos	Description	Unit	Quantity	Rate		Amount	
				Foreign Currency(*)	Indian Rupees(Rs)	Foreign Currency(*)	Indian Rupees(Rs)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	Management and Operations Training	LS	1				
2	Maintenance Training	LS	1				
	Total for Price Schedule No.6 Training						

Name of Tenderer Signature of Tenderer Date

3.7 Price Schedule No. 7 Operation and Maintenance Services (includes all the expenditures towards spare parts, maintenance equipments, replacements, operation and maintenance personnel etc. to meet the service level requirements of employer)

Item Nos	Description	Unit	Quantity	Rate		Amount	
				Foreign Currency(*)	Indian Rupees(Rs)	Foreign Currency(*)	Indian Rupees(Rs)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	Total cost of Operation and Maintenance Services for the Hyderabad City Intelligent Transport System during the Operation and Maintenance Period (includes all the expenditures towards spare parts, maintenance equipments, replacements, operation and maintenance personnel etc. to meet the service level requirements of employer)	LS	1				

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3.8 Price Schedule No. 8 Price Quoted for Unconditional Withdrawal of the Deviations Given in Schedule FT-9 to Form of Tender

Item Nos	Clause No.	Details for Deviation	Increase or Decrease for Unconditional Withdrawal of each Deviation	
			Foreign Currency(*)	Indian Rupees(Rs)
(1)	(2)	(3)	(4)	(5)
	Total for Price Schedule No.8 Prices Quoted for Unconditional Withdrawal of the deviation Given in Schedule FT-9 to Form of Tender			

Note:
1. The Tenderer shall quote the price for unconditional withdrawal of each deviation given in the Attachment-2 to Schedule FT-9 to Form of Tender.
2. The deviation mentioned in the form of the Statement of Deviation (Attachment-2 to Schedule FT-9 to Form of Tender), but not quoted the price in Price Schedule No.8 above for unconditional withdrawal of such deviation, shall be considered as unconditionally withdraw with no financial and time implications.
3. The Employer reserves the right to accept or reject any deviation proposed by the Tenderer at the price quoted by the Tenderer above. Then the Contract price will be adjusted accordingly.

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SECTION V. CONDITIONS OF CONTRACT

PART I GENERAL CONDITIONS

The General Conditions governing this Contract shall be Conditions of Contract for Design-Build and Turnkey (1st Edition, 1995). The General Conditions are available on the website shown below:

http://fidic.org/books/design-build-and-turnkey-1995-orange-book-guide-1st-ed-1996

This Section does not contain a copy of these General Conditions. Tenderers are required to obtain their own copies at their cost.

SECTION VI: CONDITIONS OF CONTRACT

PART II CONDITIONS OF PARTICULAR APPLICATION

CONDITIONS OF CONTRACT: PART II CONDITIONS OF PARTICULAR APPLICATIONS

TABLE OF CONTENTS

Part II Conditions of Particular Application

The following Part II Conditions of the Contract of Particular Application (COC-PA) shall supplement Part I General Conditions (COC-GC). Whenever there is a conflict, the provisions herein shall prevail over those in the COC-GC. The corresponding clause number of the COC-GC is indicated in parentheses.

No	Reference COC-GC Claus	Description
1	**1.1.1.2 Definitions/ Employer Requirement**	**Delete Sub-Clause 1.1.1.2 in its entirety, and replaced with the following:** 1.1.1.2 "Employer's Requirement" means the document(s) entitled as General Technical Specifications (GTS), Particular Technical Specifications (PTS), Maintenance specifications (MS) and/or Drawings, describing the scope, standard, design criteria (if any) and programme of works, as included in the Contract, and any alterations and modifications thereto in accordance with the Contract."
2	**1.1.1.5 Definitions/ Contractor's Proposal**	**Delete Sub-Clause 1.1.1.5 in its entirety, and replace with the following:** 1.1.1.5 "Contractor's Proposal" means the proposal submitted by the Contractor with the Tender, as modified and accepted by the Employer and included in the Contract. Such documents may include the Contractor's preliminary design."
3	**Additional Sub-Clause 1.1.2.7 Definition/ JBIC**	**Add the following Sub-Clause 1.1.2.7:** 1.1.2.7 "JBIC" means Japan Bank for International Cooperation."
4	**Additional Sub-Clause 1.1.2.8 Definition/ JICA**	**Add the following Sub-Clause 1.1.2.8:** 1.1.2.8 "JICA" means Japan International Cooperation Agency. Official Development Assistance (ODA) operation of JBIC was transferred to JICA as of 1st October 2008 and therefore Japan Bank for International Cooperation or JBIC referred in the documents should be read as Japan International Cooperation Agency or JICA."
5	**1.1.3.2 Definitions/ Effective Date**	**Delete Sub-Clause 1.1.3.2 in its entirety, and replace with the following:** 1.1.3.2 "Effective Date" means the date on which the Contractor receives the Letter of Acceptance and the Contract entered into legal force and effect."
6	**1.1.3.5 Definitions/ Contract Period**	**Delete Sub-Clause 1.1.3.5 in its entirety, and replace with the following:** 1.1.3.5 "Contract Period" means the period from the Commencement Date to the end of the Operation and Maintenance Period."
7	**Additional Sub-Clause 1.1.3.7 Definition/ Week and Month**	**Add the following Sub-Clause 1.1.3.7:** 1.1.3.7 "week" means 7 (seven) calendar days and "month" means calendar month of the Gregorian Calendar."
8	**Additional Sub-Clause 1.1.3.8 Definition/**	**Add the following Sub-Clause 1.1.3.8:** 1.1.3.8 "Defects Liability Period" means the defects liability period stated in the Appendix to the Tender calculated from the date of commissioning of the

	Defects Liability Period	whole of the Works or a Section (as the case may be).
9	**Additional Sub-Clause 1.1.3.9 Definition/ Key Date**	**Add the following Sub-Clause 1.1.3.9:** 1.1.3.9 "Key Date" means a date identified as such in the Contract."
10	**Additional Sub-Clause 1.1.3.10 Definition/Stage**	**Add the following Sub-Clause 1.1.3.10:** 1.1.3.10 "Stage" means level of progress of the works identified as such and more particularly described in the Employer's Requirements for which a Key Date for the achievement thereof is stipulated in the Contract."
10a	**Additional Sub-Clause 1.1.3.11** **Operation and Maintenance Period**	**Add the following Sub-Clause 1.1.3.11** **1.1.3.11 "Operation and Maintenance Period" means the period from the date stated in the Commissioning Certificate until the date stated in the Contract Completion Certificate**
11	**1.1.5.2 Definition/ Local Currency**	**Delete Sub-Clause 1.1.5.2 in its entirety, and replace with the following:** "1.1.5.2 "Local Currency" means Indian Rupees."
12	**1.1.6.11 Definition/ Country**	**Delete Sub-Clause 1.1.6.11 in its entirety, and replace with the following:** "1.1.6.11 "Country" means India in which the Works are to be executed and to which Plant and Materials are to be delivered."
13	**Additional Sub-Clause 1.1.6.12 Definitions/ Project**	**Add the following Sub-Clause 1.1.6.12:** "1.1.6.12 "Project" means Hyderabad Outer Ring Road Project or a scheme to be implemented in accordance with the Employer's requirement described in the individual contract under Hyderabad Outer Ring Road Project"
14	**1.3 Interpretation**	**After the existing paragraph, add the following paragraph:** "In these Conditions, provisions including the expression "Cost plus reasonable profit" require this profit to be one-twentieth (5%) of this Cost unless otherwise indicated in the Appendix to Tender."
15	**1.5 Contract Agreement**	**Delete Sub-Clause 1.5 in its entirety, and replace with the followings** "1.5 The Employer and the Contractor shall execute a Contract Agreement, in the form annexed hereto with such modifications as may be necessary to record the Contract within 28 (twenty-eight) days or within a period agreed by the Employer from the date of issue of Letter of Acceptance by the Employer. The costs of stamp duties and similar charges imposed by law shall be borne by the Employer."
16	**1.6 Priority of Documents**	**Delete the documents listed (a) – (h) and substitute:** (1) the Contract Agreement (when completed); (2) the Letter of Acceptance; (3) the Addenda (if any, in reverse chronological order)

		(4) the Employer's Requirement (General Technical Specifications, Particular Technical Specifications, Operation and Maintenance Specifications and Drawings) ; (5) the Tender together with Appendix to Tender including priced Pricing Document : (6) the Conditions of Contract Part II – Conditions of Particular Application: (7) the Conditions of Contract Part I – General Conditions; (8) the Schedules; (9) the Contractor's Proposal; (10) any other documents forming part of the Contract.
17	**1.7 Documents on Site**	**At the end of Sub-Clause 1.7, add the following paragraph:** "On discovery of any technical error or defect in a document intended to be used for the purpose of Contract, the Contractor shall promptly give notice to the Employer's Representative of such error or defect."
18	**1.12 Confidential Details**	**Delete Sub-Clause 1.12 in its entirety, and replace with the following:** "**1.12** The Contractor shall disclose all such confidential and other information as the Employer's Representative may reasonably require in order to verify the Contractor's compliance with the Contract. The Contractor shall treat the details of the Contract as private and confidential, save insofar as may be necessary for the purposes thereof, and shall not publish or disclose the same or any particulars thereof in any trade or technical paper or elsewhere without the previous consent in writing of the Employer or the Employer's Representative. However, the Contractor shall be permitted to disclose any publicly available information, or information otherwise required to establish his qualifications to complete for other projects. If any dispute arises as to the necessity of any publication or disclosure for the purpose of the Contract the same shall be referred to the decision of the Employer whose award shall be final."
19	**1.13 Compliance with Statutes, Regulations and Laws**	**At the end of Sub-Clause 1.13, add the following paragraph:** "Ignorance of rules, regulations and by-laws shall not constitute a basis for any claim by the Contractor at any stage of work. The Contractor shall indemnify the Employer against all penalties and liabilities of every kind of breach of any such enactment, laws, regulations, by-laws or rules, and the like."
20	**Additional Sub-Clause 1.15 Inspections and Audit by JICA and Government of India**	**After Sub-Clause 1.14, add the following sub-clauses 1.15:** "1.15 The Contractor shall permit the JICA and/or the Government of India including local Government to inspect the Contractor's accounts and records relating to the performance of the Contract and to have them audited by auditors appointed by the JICA and/or, the Government of India including local Government, if so required by JICA and the Government of India including local Government. JICA and the Government of India including local Government mean their authorized officers."
21	**Additional Sub-**	**After Sub-Clause 1.15, add the following sub-clauses 1.16:**

	Clause 1.16 Severability	"**1.16** If any clause, provision, section or part of the Contract is ruled invalid by a court of competent jurisdiction, then the parties shall: (a) promptly meet and negotiate a substitute for such clause, provision, section or part, which shall, to the greatest extent legally permissible, effect the original intent of the parties, and (b) if necessary or desirable, apply to the court which declared such invalidity for a judicial construction of the invalidated portion to guide the negotiations. The invalidity or enforceability of any such clause, provision, section or part shall not affect the validity or unenforceability of the balance of the Contract, which shall be construed and enforced as if the Contract did not contain such invalid or unenforceable clause, provision, section or part."
22	**Not used**	**----------**
23	**2.3 Permits, Licenses or Approvals**	**Add the following paragraphs to Sub-Clause 2.3:** "It shall be Contractor's responsibility to get approvals, permits or license required for the Contract. However, the Employer may (where he is in a position to do so) provide reasonable assistance to the Contractor at the request and cost of the Contractor in getting permits, license or approvals required during the Contract. The rendering of such assistance by the Employer shall not be interpreted as a pretext by the Contractor as condoning of any delay or non-performance of any of the Contractors obligations. The following-up of all such applications shall be the responsibility of the Contractor."
24	**Additional Sub-Clause 2.5 Inspection of work and Review of Progress by the Employer**	**After Sub-Clause 2.4, add Sub-Clause 2.5**: "The Employer or his representative may inspect and review the progress of works and may issue appropriate directions to the Employer's Representative for taking necessary action. The Employer or his representative may also check the quality of Plant and Materials brought to the Site for incorporating in the Permanent Works and may also test and check the quality and workmanship of the Works executed in the presence of the Employer's Representative and the Contractor."
25	**3.1 Employer's Representative's Duties and Authorities**	**The following provisions shall apply:** "The Employer's Representative shall obtain the specific approval of the Employer before taking action under the-following Sub-Clauses of these Conditions: (a) Sub-Clause 4.5: Granting the consent to the Subcontractors proposed by the Contractor. (b) Sub-Clause8.1: Issuing the notice to commence the Work to the Contractor. (c) Sub-Clause 8.7: Instructing the suspension of progress of part or all of the Works. (d) Sub-Clause 8.10: Permitting the resumption of work suspended. (e) Sub-Clause 12.9: Issuing Contract Completion Certificate (f) Sub-Clause 14.1: Instructing a Variation, except;

		(i) in an emergency situation as determined by the Employer's Representative, or (ii) where (a) the estimated gross value of any single Variation (whether this is an addition or a deduction from the accepted Contract Price) does not exceed Rs 500,000 (five hundred thousand Rupees), or (b) the estimated value of all known Variations does not exceed Rs 25,000,000 (twenty five million Rupees). (g) Sub-Clause 14.2: Approving a proposal for Variation submitted by the Contractor. (h) Sub-Clause 14.5: Instructing the works under Provisional Items and Provisional Sums (if any). Notwithstanding the obligation, as set out above, to obtain approval, if, in the opinion of the Employer's Representative, an emergency occurs affecting the safety of life or of the Works or of adjoining property, he may, without relieving the Contractor of any of his duties and responsibility under the Contract, instruct the Contractor to execute all such work or to do all such things as may, in the opinion of the Employer's Representative, be necessary to abate or reduce the risk. The Contractor shall forthwith comply, despite the absence of approval of the Employer, with any such instruction of the Employer's Representative. The Employer's Representative shall determine an addition to the Contract Price, in respect of such instruction, in accordance with Clause 14 and shall notify the Contractor accordingly, with a copy to the Employer."
26	**3.2 Requirement of Employer's Representative**	**Delete Sub-Clause 3.2 in its entirety, and replace with the following:** "The Employer's Representative shall be a suitably qualified engineer or other appropriate professional appointed by the Employer from time to time during the Contract and notified as such to the Contractor."
27	**3.4 Employer's Representative's Instruction**	**After the existing paragraph, add the following paragraphs:** "The Contractor shall give reasonable notice to the Employer's Representative of any instruction, which he considers necessary for the execution of the Works, to enable the Employer's Representative to issue the instruction so that progress of the Works is not delayed. The Employer's Representative shall not, however, be bound to issue any instruction which, in his opinion, is unnecessary. No act or omission by the Employer's Representative/assistants in the performance of any of the Employer's Representative's duties or the exercise of any of the Employer's Representative's powers under the Contract shall, in any way, operate to relieve the Contractor of any of the duties, responsibilities, obligations or liabilities imposed upon the Contractor by any of the provisions of the Contract."
28	**3.5 Employer's Representative's to Attempt Agreement**	**At the end of Sub-Clause 3.5, add the following new sentence:** "When the Employer's Representative is required to determine value, Cost or extension of time, he shall obtain concurrence from the Employer.

29	**4.1 Contractor's General Obligations**	**At the end of the Sub-Clause 4.1, add the following paragraph:** "The Contractor shall be deemed to have satisfied himself before submitting his Tender as to the correctness and sufficiency of his Tender to cover all his risks, liabilities and obligations set out in or implied by the Contract and all matters and things necessary for the proper design, execution and completion of the Works and remedying of the defects therein. The Contractor shall whenever required by the Employer's Representative, submit details of the arrangement and methods which the Contractor proposed to adopt for the execution of the Works. No alteration to these arrangements or methods shall be made without the approval of the Employer's Representative." The work programme, site organization chart, method statement and any other documents submitted as per requirements of the Tender Documents along with the Tender shall not in any event be construed as a submission of the work programme, site organization chart, method statement and any other documents under the Contract."
30	**4.2 Performance Security**	Delete Sub-Clause 4.2 in its entirety, and replace with the following: "4.2 The Contractor shall obtain (at his cost) a Performance Security for proper performance, in the amount and currencies stated in the Appendix to Tender. The Contractor shall deliver the Performance Security to the Employer within 21 days after receiving the Letter of Acceptance, and shall send a copy to the Employer's Representative. The Performance Security shall be in the form of an on-demand bank guarantee, from an Indian Scheduled bank (excluding Cooperative Banks) or from a scheduled Foreign Bank as defined in Section 2(e) of RBI Act 1934 (as modified up to 7 January 2013 or latest edition if available) read with Second Schedule. In both cases, the banks shall be those acceptable to the Employer. When delivering such security to the Employer, the Contractor shall notify the Employer's Representative of so doing. Such security shall be in the form annexed to these Conditions or such other form as may be accepted by the Employer. The Contractor shall ensure that the Performance Security is valid up to 56 days after the expiry of the Contract Period. If the terms of the Performance Security specify its expiry date, and the Contractor has not become entitled to receive the Contract Completion Certificate by the date 28 days prior to the expiry date, the Contractor shall extend the validity of the Performance Security accordingly. After completion of the Works, one half of the amount stated in the Performance Security shall be reduced on issue of a Commissioning Certificate. The Employer shall return the Performance Security to the Contractor within 28 days after issuing the Contract Completion Certificate by the Employer's Representative in accordance with Sub-Clause 12.9, provided that the Contractor has furnished documentary proof of compliance with the regulations of the Indian Customs Department regarding temporary exemption on initial importation of the Contractor's Equipment, associated with the Works. Without limitation to the provisions of the preceding paragraph, whenever the

		Employer's Representative determines an addition to or deduction from the initial Contract Price as a result of a change in legislation or as a result of a variation amounting to more than twenty five (25) percent of the portion of the Contract Price payable in a specific currency, the Contractor, at the Employer's Representative's written request, shall, within twenty-eight (28) days from such request, increase or decrease the value of the Performance Security at the Contractor's cost, in that currency by an equal percentage. The Performance Security of a joint venture shall be in the name of the joint venture. If the joint venture has not been legally constituted at the time of award of contract, the Performance Security shall be in the names of all members of the joint venture." Prior to making a call under the Performance Security, the Employer shall in every case, notify the Contractor stating the nature of the default for which the claim is to be made. The Employer shall indemnify and hold the Contractor harmless against and from all damages, losses and expenses (including legal fees and expenses) resulting from a claim under the Performance Security to the extent to which the Employer was not entitled to make the claim.
31	**4.4 Co-ordination of the Works**	**(1) Delete the words "to the extent specified in the Employer's Requirements", and add the words "who are carrying out works for the Project" in the first sentence of first paragraph.** **(2) Delete the words ", as specified in the Employer's Requirement, "in the second sentence of first paragraph.** **(3) Delete the sub-paragraph (a) and replace with:** "(a) any other contractor (whether employed by the Employer or not) and their workmen who are carrying out works not included in the Contract but forming part of the Project."
32	**4.5 Subcontractors**	**At the end of Sub-Clause 4.5, add the following paragraph:** "Notwithstanding any consent to sub-contract given by the Employer's Representative, if in his opinion he considers it is necessary, the Employer's Representative shall have full power to order the removal of any sub-contractor from the Site or off-Site place of manufacture or storage, which power shall not be exercised unreasonably."
33	**4.6 Assignment of Subcontractor's Obligations**	**(1) Delete the words "at the request and cost of the Employer" at the end, and replace with the words "at the request of the Employer".** **(2) After existing paragraph, add the following paragraph:** "The Contractor shall not assign a right or benefit under the Contract without first obtaining Employer's prior written consent, otherwise than by: (a) a charge in favour of the Contractor's bankers of any money due or to become due under the Contract, or (b) assignment to the Contractor's insurers (in cases where the insurers have discharged the Contractor's loss or liability) of the Contractor's right to obtain relief against any other party liable.
34	**4.14 Programme**	**(1) Delete the words "for information" in the first sentence of the first paragraph, and replace with the words "for consent".**

		(2) Delete the words "for information" in the first sentence of the third paragraph, and replace with the words "for consent". **(3) Delete the words "without informing" in the second sentence of the third paragraph, and replace with the words "without obtaining consent of".** **(4) At the end of the Sub-Clause 4.14, add the following paragraph:** "Consent by the Employer's Representative to Programme shall not relieve the Contractor of any his responsibilities or obligations under the Contract. If the Programme indicate that the Time for Completion has not, or will not be met, it shall not, by itself entitle the Contractor to an extension of time in relation to the Time for Completion. The Contractor shall, within 28 (twenty-eight) days from the Commencement Date, provide to the Employer's Representative for his information a detailed cash flow estimate, in quarterly period, of all payments to which the Contractor will be entitled under the Contract and the Contractor shall subsequently supply revised cash flow estimates at quarterly intervals, if required to do so by the Employer's Representative."
35	**4.15 Progress Report**	**At the end of the Sub-Clause 4.15, add the following paragraph:** "If requested by the Employer's Representative, the Contractor shall submit to the Employer's Representative, at weekly intervals, a written report as to the progress of off-Site manufacture of Plant and Materials. The Contractor shall also submit to the Employer's Representative such other reports as may reasonably be required by him or any relevant authority or public body."
36	**4.17 Safety Precaution**	**At the end of the Sub-Clause 4.17, add the following paragraph:** "The Contractor shall ensure that all light provided by the Contractor shall be screened so as not to interfere with any signal light on the road or with any traffic or signal lights of any local or other authority."
37	**4.18 Protection of the Environment**	**At the end of the Sub-Clause 4.18, add the following paragraph:** "The Contractor shall ensure that during continuance of the Contract, the Contractor and his sub-contractor shall abide at all times by all existing enactments on environmental protection and rules made thereunder, regulations, notifications and by-laws of the State or Central Government, or local authorities and any other law, by-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 and also the JICA guidelines in this regard. He shall ensure that air emission; surface discharge and effluents from the Site shall not exceed the value, if any, indicated in the Employer's Requirements and shall in no case exceed the value prescribed by Applicable Law. The Contractor shall indemnify and keep indemnified the Employer, the Employer's Representative, their contractors, agents and employees from and against any liability for damages on account of pollution, noise or other disturbance created while or in carrying out the Works and from and against all claims, demands, proceedings, damages, costs, charges and expenses whatsoever in regard or in relation to such liability."

38	**4.19 Electricity, Water and Gas**	**The following provisions shall apply:** "The Employer shall provide electricity free of charge to the Contractor only after permanent Electrical Power is "switched ON" as stipulated in the Employer's Requirements for the purpose of Test on Completion. Otherwise, the Contractor shall make his own arrangement for electricity, water, gas and other services."
39	**4.20 Employer's Supplied Machinery and Materials**	**The following provisions shall apply:** "No machinery and material will be supplied by the Employer. The Contractor shall be fully responsible for all machinery, material, plants and equipment required for the performance of the Contract."
40	**Additional Sub-Clause 4.25 Work by persons Other than Contractor**	**After Sub-Clause 4.24, add the following sub-clauses 4.25:** "4.25 If the Contractor shall fail to carry out any work required under the Contract or refuse to comply with any instruction or order given by the Employer's Representative in accordance with the Contract within a reasonable time, the Employer's Representative may give the Contractor 14 days' notice in writing to carry out such work or comply with such instruction. If the Contractor fails to comply with such notice, the Employer shall be entitled to carry out such work or instruction by his own workmen or by other contractors. Without prejudice to any other right or remedy, all additional expenditure properly incurred by the Employer in having such work or instruction carried out shall be recoverable by the Employer from the Contractor. If by reason of any accident or failure or other event occurring to, in, or in connection with the Works any remedial or other work shall, in the opinion of the Employer's Representative, be urgently necessary and the Contractor is unable or unwilling at once to do such remedial or other work, the Employer's Representative may authorize the carrying out of such remedial or other work by a person other than the Contractor. If the remedial or other work so authorized by the Employer's Representative is work, which, in the Employer's Representative's opinion, the Contractor was liable to do under the Contract, all expenses properly incurred in carrying out the same shall be recoverable by the Employer from the Contractor. Provided that the Employer's Representative shall, as soon after the occurrence of any such emergency as may be reasonably practicable, notify the Contractor thereof in writing."
41	**5.3 Contractor's Undertaking**	**Delete the words ", if legally and physically possible," at the first line of the existing paragraph.**
42	**5.6 As-Built Drawings**	**At the end of Sub-Clause 5.6, add the following paragraph:** "The As-Built Drawings submitted by the Contractor shall, if required, be updated by him during the Defects Liability Period and re-submitted for review by the Employer's Representative. And after accepted by the Employer's Representative, the Contractor shall resubmit to the Employer's Representative one microfiche copy, one full-size original copy and six printed copies of the relevant updated As-Built Drawings."

43	**5.7 Operation and Maintenance Manuals**	**At the end of Sub-Clause 5.7, add the following paragraph:** "The Operation and Maintenance Manuals and As-Built Drawings submitted by the Contractor shall, if required, be updated by him during the Defects Liability and Operation and Maintenance Period and re-submitted for review by the Employer's Representative."
44	**6.1 Engagement of Staff and Labour**	**At the end of Sub-Clause 6.1, add the following Paragraph:** "The Contractor is encouraged, to the extent practicable and reasonable, to employ staff and labour with appropriate qualifications and experience from sources within the Country."
45	**6.3 Persons in the Service of Others**	**At the end of Sub-Clause 6.3, add the following Paragraph:** "The Contractor either at the tendering stage or during construction stage will not employ any retired employee of the Employer or the Employer's Representative in any capacity unless such employee has completed at least two years post retirement period or has obtained the no-objection certificate from the Employer for being employed with the Contractor. It will be responsibility of the Contractor to collect the Employer's no objection certificate from such retired employee and submit the same back to the Employer."
46	**6.4 Labour Laws**	**At the end of Sub-Clause 6.4, add the following Paragraph:** "During continuance of the Contract, the Contractor and his sub-contractors shall abide at all times by all existing labour enactments and rules made thereunder, regulations, notifications and by-laws of the State and Central Government or local authority and any other labour law (including rules), regulations, by-laws that may be passed or notification that may be issued under any labour law in future either by the State and Central Government or local authority. 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 thereunder, 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, by-laws, acts, rules or regulations including amendments, if any, on the part of the Contractor, the Employer 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 his sub-contractors shall in no case be treated as the employees of the Employer at any point of time.
47	**6.6 Facilities for Staff and Labour**	**The following provisions shall apply:** "No facilities for the Employer's and Employer's Representative personnel are required."
48	**7.1 Manner of Execution**	**At the end of Sub-Clause 7.1, add the following Paragraph:** "The Contractor is encouraged, to the extent practicable and reasonable, to use Plant and materials from sources within India."

49	**7.4 Testing**	**At the end of Sub-Clause 7.4, add the following paragraph:** "The expense of conducting such Tests shall be borne by the Contractor. No such testing shall relieve the Contractor from any obligation or responsibility."
50	**7.5 Rejection**	**At the end of Sub-Clause 7.5, add the following paragraph:** "If the Contractor persistently causes testing referred to in this clause to be repeated, it will be considered to be a failure on behalf of the Contractor to comply with a notice issued pursuant to this clause by the Employer's Representative."
51	**7.6 Ownership of Plant and Materials**	**At the end of Sub-Clause 7.6, add the following paragraph:** "The Contractor shall however continue to bear the risk in respect of such items which continue to remain in his custody."
52	**Additional Sub-Clause 7.7 Liability after Inspection and Testing**	**After Sub-Clause 7.6, add the following Sub-Clause 7.7:** "7.7 The Contractor shall not be released from any liability or obligation under the Contract by reason of any such inspection or testing or witnessing of testing, or by the submission of reports of inspection or testing to the Employer's Representative."
53	**Additional Sub-Clause 7.8 Method of Construction Affecting Others**	**After Sub-Clause 7.7, add the following Sub-Clauses 7.8**: "**7.8** Where, in the opinion of the Employer's Representative, any particular aspect of the Works is of such a nature that its manner of execution may affect the safety of, or interfere with, the activities of the Employer or any third party then the Employer's Representative may request, and the Contractor shall submit at such times and in such detail as the Employer's Representative may reasonably require, such information pertaining to the methods of construction (including Temporary Works and the use of Contractor's Equipment) which the Contractor proposes to use so as to enable the Employer's Representative to decide whether, if these methods are adhered to, the Works can be constructed in accordance with the Contract and without unduly disturbing the activities of the Employer or the affected party."
54	**Additional Sub-Clause 7.9 Restrictions on Eligibility**	**After Sub-Clause 7.8, add the following Sub-Clauses 7.9:** "**7.9** There are no restrictions on eligibility of origin or nationality for the supply of any plant, materials or services to be incorporated into or used for the performance of the Works."
55	**8.3 Extension of Time for Completion**	**At the end of the Sub-Clause 8.3, add the following paragraph:** "However, the Contractor shall not be entitled to any extension of time where the instructions or acts of the Employer or the Employer's Representative are necessitated by or intended to cure any default of or breach of Contract by the Contractor or where any delay is due to (a) the failure of sub-contractor, to commence or to carry out work in due time, or (b) non-availability, or shortage of Contractor's equipment, labour, utility services, Plant and Materials. The application shall include the following detailed particulars:

		(i) a full description of the facts relating to the events or circumstances which the Contractor considers entitles him to an extension to the Time for Completion, and (ii) the contractual basis upon which an extension of Time for Completion is sought, and (iii) a full description of how the Contractor has identified the consequences of the events or circumstances referred to in (i) above upon the Time for Completion for which an extension is sought, and (iv) the records relevant to (iii) above."
56	**8.9 Payment for Plant and Materials in Event of Suspension**	**Delete the second (last) paragraph , and replace with:** "The Contractor shall however continue to be responsible for protection, storage, security and insurance of such suspended Plant and/or Materials; the risk of loss or damage to the suspended work shall be remained in the Contractor."
57	**8.11 Resumption of Work**	**Delete the second (last) paragraph.**
58	**9.1 Contractor's Obligations**	**The first sentence of first paragraph of Sub-Clause 9.1 is amended to read as follows:** "The Contractor shall carry out the Tests on Completion in accordance with this Clause**,** Sub-Clause 7.4 of the Conditions of Contract **and the Employer's Requirements**, after providing the documents in accordance with Sub-Clauses 5.6 **and** 5.7 of the Conditions of Contract **and the Employer's Requirements**."
59	**11 Tests after Completion**	**This Clause 11 will not be applicable.**
60	**12.3 Extension of Contract Period**	**Change the title to "12.3 Extension of Defects Liability Period" and replace the first paragraph with the following.** The Defects Liability Period shall be extended, in respect of the whole of the Works or a Section or part thereof as the case may be, by a period equal to the sum of any periods, after the Works are taken-over, during which the Works or sub-system or component thereof cannot be used for the purposes for which they are intended, by reason of replacement, renewal or repair to rectify critical or major defect or damage as defined in Section VII, Employer's Requirements Part C: Maintenance Specifications. However, a Defects Liability Period shall not be extended by more than two years.
61	**13.1 The Contract Price**	**(1) Delete the words "a Schedule" in the Sub-Paragraph (d) and (e), and replace with the words "a Priced Schedule of Pricing Document".** **(2) At the end of Sub-Clause 13.1, add the following paragraph:** "Disbursement procedures of JICA ODA Loans shall be applied for disbursement of the proceeds of JICA ODA Loans for eligible payment under this contract. The Contract Price shall be quoted separately in the following currencies:

		(a) For inputs to the Works, which are expected to be supplied from within India including taxes, royalties, duties and other levies payable to various authorities in India, in Indian Rupees. (b) For those inputs to the Works, which are expected to be supplied from outside India, in foreign currencies which are Japanese Yen, United States Dollars and Euro. Total number of currencies shall not exceed four (4) including the local currency Indian Rupees. The Contract Price shall be inclusive of all taxes, duties, levies, cess and any other charges leviable, including tax to be deducted at source. The Contractor shall maintain complete records of Custom duty, Excise duty, VAT, Work contract tax, Octroi/Entry tax (if any) and other levies/cess etc. as applicable and payable to various authorities and submit the receipts/records as and when demanded in writing by the Employer for verification."
62	**13.2 Advance Payment**	**(1) The first sentence of first paragraph of Sub-Clause 13.2 is amended to read as follows:** "The Employer will make, at the request of the Contractor, an interest bearing advance payments to the Contractor for his mobilization and design. The rate of these interests shall be as stated in the Appendix to Tender." **(2) The third sentence of first paragraph of Sub-Clause 13.2 is amended to read as follows:** "The Employer's Representative shall issue an Interim Payment Certificate for **the advance payment** after the Contractor has delivered, to the Employer, the Performance Security in accordance with Sub-Clause 4.2, bank guarantee(s) in the form **annexed to the Conditions of Contract or in another form approved by the Employer and from a Indian Schedule Bank (excluding cooperative Banks) or from a schedule Foreign Bank as defined in Section 2(e) of RBI Act 1934 (as modified up to 7 January 2013 or latest edition if available) read with Second Schedule** approved by the Employer in amounts and currencies equal to the advance payment, and execution of Contract Agreement in accordance with Sub-Clause 1.5." **At the end of Sub-Clause 13.2, add the following new paragraph:** "The advances shall be used by the Contractor strictly for the purpose of the Contract, and for the purpose for which they are paid. Under no circumstances, shall the advances be diverted for other purposes."
63	**13.5 Plant and Materials for the Permanent Works**	**This Sub-Clause13.5 will not be applicable.**
64	**13.6 Issue of Interim Payment Certificate**	**The first sentence of first paragraph of Sub-Clause 13.6 is amended to read as follows:** "No amount will be certified or paid until the Employer has received, and approved, the Performance Security in accordance with Sub-Clause 4.2 **and the execution of Contract Agreement in accordance with Sub-Clause 1.5**."

65	**13.7 Payment**	**Sub Clause 13.7 (a) -** line 2 shall read as 60 days instead of 56 days **Sub Clause 13.7 (b) -** line 2 shall read as 60 days instead of 56 days **(1) At the end of second paragraph, add the following sentence:** "All bank charge shall be borne by the Contractor." **(2) At the end of Sub-Clause 13.7, add the following paragraph:** Tax deductions will be made at source as per statutory requirement from every payment made to the Contractor at rates notified from time to time.
66	**13.9 Payment of Retention Money**	**At the end of Sub-Clause 13.9 add the following new Paragraph:** "At the request of the Contractor, the second half of the Retention Money may also be released at the issue of the Commissioning Certificate provided a bank guarantee is provided by the Contractor for amounts and currencies equal to half the Retention Money for the period from the issue of the Commissioning Certificate to Thirty (30) days after the expiry of the Defects Liability Period. The bank guarantee shall be in the form annexed to the Conditions of Contract or in another form approved by the Employer and from a Indian Schedule Bank (excluding cooperative Banks) or from a schedule Foreign Bank as defined in Section 2(e) of RBI Act 1934 (as modified up to 7 January 2013 or latest edition if available) read with Second Schedule approved by the Employer"
67	**13.15 Calculation of Payments in Foreign Currency**	**Delete Sub-Clause 13.15 in its entirety, and replace with the following:** "**13.15** All payments made by the Employer pursuant to the terms of the Contract shall be in the currency or currencies specified in the Contract. Wherever any sum in a foreign currency has to be converted into Indian Rupees for any purpose, the exchange rate to be employed for such conversion shall be the rate as stated in the Appendix to Tender."
68	**Additional Sub-Clause 13.17 Adjustments for Changes in Cost**	**After Sub-Clause 13.16, add the following Sub-Clauses 13.17:** **13.17** Only amount of local currency component of Installation Services including Testing, payable to the Contractor shall be adjusted for rises or falls in the index cost of labour, materials, plant and machinery, and fuel and lubricants to the Works, by the addition or deduction of the amount determined by the formula prescribed in this Sub-Clause. No price adjustment shall apply to the foreign currency component and other work items payable under the Contract. To the extent that full compensation for any rise or fall in the costs to the Contractor is not covered by the provisions of this or other clauses in the Contract, the rates and prices and the Contract Price included in the Contract shall be deemed to include amounts to cover the contingency of such other rise or fall of costs. **(1) Adjustment Formula** The adjustment to be applied to the amount of local currency component of Installation Service including Testing, payable to the Contractor, as valued referring to the Price Schedule Nos. 4 and 7 and certified in any Interim Payment Certificates issued by the Employer's Representative pursuant to Clause 13 of these Conditions of Contract, shall be determined by the formulae. No adjustment is to be applied to work valued on the basis of Cost

		or current prices. Price Adjustment shall apply only for work carried out within the stipulated time or extension granted by the Employer's Representative and shall not apply to work carried out beyond the stipulated time. Price adjustment for extensions for reasons attributable to the Contractor shall be paid in accordance with Sub-Paragraph (3) below. Price adjustment shall be calculated as per formula given below. The following expressions and meanings are assigned to the value of the work done during the relevant period: R = Value of local currency component of Installation Services including Testing, duly executed during the valuation period and certified for the purpose of Interim Payment Certificate by the Employer's Representative. (a) Adjustment for Labour Component Price Adjustment for increase or decrease in the cost due to labour shall be paid in accordance with the following formula: Vl = 0.85 x Pl/100 x R x (Li-Lo)/Lo Vl = increase or decrease in the cost of Installation Services including Testing, during the valuation period under consideration due to changes in rates for local labour. Lo = the average consumer price index for industrial workers for the area of Hyderabad, Andhra Pradesh, prevailing on the day 28 (twenty-eight) days prior to the latest date of submission of Tender as published by Labour Bureau, Ministry of Labour, Government of India. Li = the average consumer price index for industrial workers for the area of Hyderabad, Andhra Pradesh, prevailing on the day 28 (twenty-eight) days prior to the last day of the period to which a particular Interim Payment Certificate is related as published by Labour Bureau, Ministry of Labour, Government of India. Pl = percentage of labour component of Installation Services including Testing,. Note: For the application of this clause, index of Industrial Workers has been chosen to represent the labour component. (b) Adjustment for Plant and machinery Price Adjustment for increase or decrease in the cost due to plant and machinery shall be paid in accordance with the following formula: Vp = 0.85 x Pp/100 x R x (Pi-Po)/Po Vp = increase or decrease in the cost of Installation Services including Testing, during the valuation period under consideration due to changes in rates for plant and machinery . Po = the all India average wholesale price index for heavy machinery and parts prevailing on the day 28 (twenty-eight) days prior to the latest date of submission of Tender as published by Ministry of Commerce & Industry, Government of India. Pi = the all India average price index for heavy machinery and parts prevailing on the day 28 (twenty-eight) days prior to the last day of

		the period to which a particular Interim Payment Certificate is related as published by Ministry of Commerce & Industry, Government of India. Pp = percentage of plant and machinery of Installation Services and Maintenance Services. Note: For the application of this clause, index of heavy machinery and parts has been chosen to represent the plant and machinery . (c) Adjustment for Local Materials Component Price Adjustment for increase or decrease in the cost of local materials procured by the Contractor shall be paid in accordance with the following formula: Vm= 0.85 x Pm/100 x R x (Mi-Mo)/Mo Vm = increase or decrease in the cost of Installation Services including Testing, during the valuation period under consideration due to changes in rates for of local materials. Mo = the all India average wholesale price index (all commodities) prevailing on the day 28 (twenty-eight) days prior to the latest date of submission of Tender as published by Ministry of Commerce & Industry, Government of India. Mi = the all India average wholesale price index (all commodities) prevailing on the day 28 (twenty-eight) days prior to the last day of the period to which a particular Interim Payment Certificate is related as published by Ministry of Commerce & Industry, Government of India. Pm = percentage of local material component of Installation Services and Maintenance Services. Note: For the application of this clause, index of all commodities has been chosen to represent the local materials component. (d) Adjustment for Fuel and Lubricants Component Price Adjustment for increase or decrease in the cost of fuel and lubricants shall be paid in accordance with the following formula: Vf = 0.85 x Pf/100 x R x (Fi-Fo)/Fo Vf = increase or decrease in the cost of Installation Services including Testing, during the valuation period under consideration due to changes in rates for fuel and lubricants. Fo = the average official retail price of High Speed Diesel (HSD) oil at the nearest petrol pump for supply of fuel of IOC at Hyderabad, prevailing on the day 28 (twenty-eight) days prior to the latest date of submission of Tender. Fi = the average retail price of High Speed Diesel (HSD) oil at the nearest petrol pump for supply of fuel of IOC at Hyderabad, prevailing on the day 28 (twenty-eight) days prior to the last day of the period to which a particular Interim Payment Certificate is related. Pf = percentage of fuel and lubricants component of Installation Services and Maintenance Services. Note: For the application of this clause, the price of High Speed Diesel (HSD) oil at the IOC pumps has been chosen to represent the fuel

		and lubricants component. (e) Percentage of Components The following percentages will govern the price adjustment of the Contract, irrespective of the actual proportionate percentage of works for Installation Services including Testing,. 1. Labour Component – Pl 40% 2. Plant and Machinery – Pp 30% 3. Local Materials Component – Pm 25% 4. Fuel and Lubricants Component – Pf 5% Total 100% (2) Base, Current and Provisional Indices The base indices shall be those indices prevailing on the day 28 (twenty-eight) days prior to the latest date of submission of Tender. The current indices shall be those indices prevailing on the day 28 (twenty-eight) days prior to the last day of the period to which a particular Interim Payment Certificate is related. If at any time the current indices are not available, while making payment towards Interim Payments, payment towards the price adjustment will be made on provisional basis based on the indices available, to be adjusted in subsequent payment as and when the final indices figure becomes available. (3) Adjustment after the Date of Completion If the Contractor fails to complete the work within Time for Completion under Sub-Clause 8.2, thereafter and until the completion of the Works or a Section, price adjustment shall be made based upon (i) the indices pertaining at the day 28 (twenty-eight) days prior to the due date for Completion as may be adjusted pursuant to Sub-Clause 8.3 or (ii) the current indices, whichever is more favourable to the Employer. (4) Non Adjustable Elements The following items shall not be included in the price adjustment calculation: (i) Liquidated damages (ii) Retention withheld and released (iii) Advance payment and its repayments (iv) The value of any additional or varied work valued at current prices. (5) Adjustment to be made in Interim Payment Adjustment on account of price variation shall be calculated separately, for each period, between two successive dates of measurements for payments and paid along with each Payment. Any amount due from Contractor on account of negative adjustment shall be recovered from his pending or other payments at the earliest.
69	**Additional Sub-Clause 13.18 Withholding For**	**After Sub-Clause 13.17, add the following Sub-Clauses 13.18:** "**13.18** Unless the Contractor pays and clears immediately on demand any claim of the Employer, the Employer shall at all times be entitled to deduct

	Sums Claimed	the amount of the said claim from the moneys, securities and/or deposits which may have become or will become payable to the Contractor under these present, or under any other Contract or transaction whatsoever between the Employer and the Contractor even if the matter stands referred to Arbitration. The Contractor shall have no claim for any interest or damage whatsoever in respect of any amounts withheld or treated as withheld and duly notified as such to the Contractor."
70	**Additional Sub-Clause 13.19 Recovery of Money due to Employer**	**After Sub-Clause 13.18, add the following Sub-Clauses 13.19:** "**13.19** All damages (including, without limitation, liquidated damages), costs, charges, expenses, debts, or sums for which the Contractor is liable to the Employer under any provision of the Contract may be deducted by the Employer from monies due to the Contractor under the Contract. When the Contractor has assigned to a third party the right to receive monies due, or, to become due, under the Contract to the Contractor or charged such monies in favour of a third party, the Employer's right to deduct damages (including without limitation liquidated damages), costs, charges, expenses, debts or sums for which the Contractor is liable to the Employer from monies due to the Contractor under the Contract shall be limited to the right expressed above."
71	**15.2 Termination**	**(1) At the end of first paragraph, add the following sentence:** "However, in case of Sub-Paragraph (d) above, the Employer may by notice terminate the Contractor's employment under the Contract immediately." **(2) At the end of Sub-Clause 15.2, add the following paragraph:** "On termination of Contract, the Employer shall be entitled to (a) forfeit the whole or such portion of the Performance Security amounts as he may consider fit, subject to the provisions of Sub-Clause 4.2 hereof, and (b) recover from the Contractor the cost of carrying out the balance work in excess of the sum which he would have been paid according to certificate of the Employer's Representative, if the works had been carried out and completed by the Contractor under the terms of Contract. The amount to be recovered may be deducted by the Employer from any money then due or which, at any time thereafter, may become due to the Contractor or otherwise."
72	**15.4 Payment after Termination**	**At the end of second paragraph of Sub-Clause 15.4, add the following sentence:** "If the Employer's Representative determines that a sum is payable to the Contractor, he will then be entitled to receive such sum from the Employer. If the Employer's Representative determines that a sum is due from the Contractor and payable to the Employer, it shall be deemed a debt due by the Contractor to the Employer and shall be recoverable accordingly."
73	**Additional Sub-Clause 15.6 Corrupt or Fraudulent**	**After Sub-Clause 15.5, add the following sub-clauses 15.6:** "**15.6** If the Employer determines that the Contractor 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

	Practice	the Contractor, terminate the Contractor's employment under the Contract and expel him from the Site, and the provisions of Clause 15 shall apply as if such expulsion had been made under Sub-Clause 15.2. 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 Sub-Clause 6.9."
74	**16.1 Contractors entitlement to suspend work**	Line 3 shall read as 28 days instead of 21 days
75	**16.2 Termination**	**(1) Sub-Paragraph (c) of Sub-Clause 16.2 is amended to read as follows:** "(c) consistently fails to meet the Employer's obligations under the Contract in such manner as to materially and adversely affect the economic balance of the Contract to perform the Contract, or"
76	**17.1 Indemnity**	**Delete Sub-Clause 17.1 in its entirety, and replace with the following:** "17.1 The Contractor shall indemnify and hold harmless the Employer, the Employer's Representative, their contractor, agent and employees, against and from all claims, damages, losses and expenses (including legal fees and expenses) in respect of : (a) bodily injury, sickness, disease or death, of any person whatsoever arising out of or in the course of or by reason of the Contractor's design, the execution and completion of the Works and the remedying of any defects, unless attributable to any negligence, willful act or breach of the Contract by the Employer, the Employer's Representative, their contractor, agent and employees, and (b) damage to or loss of any property, real or personal (other than the Works), to the extent that such damage or loss arises out of or in the course of or by reason of the Contractor's design, the execution and completion of the Works and the remedying of any defects, unless and to the extent that any such damage or loss is attributable to any negligence, willful act or breach of the Contract by the Employer, the Employer's Representative, their contractor, agent and employees . The Employer shall indemnify and hold harmless the Contractor against and from all claims, damages, losses and expenses (including legal and expenses) in respect of bodily injury, sickness, disease or death, which is attributable to any negligence, willful act or breach of the Contract by the Employer, the Employer's Representative, their contractor, agent and employees. "
77	**17.3 Employer's Risk**	**(1) The beginning of Sub-Clause 17.3 is amended to read as follows:** "The Employer's risk are, **insofar as they directly affect the execution of the Works in the County where the Permanent Works are to be executed and Plant and Materials are to be delivered:**" **(2) The Sub-Paragraph (g) of Sub-Clause 17.3 is amended to read as follow:** "(g) any operation of the force of nature **(insofar as it occurs on the Site),** against which an experienced contractor could not reasonably have been

		expected to take precautions."
78	**18.2 Insurance for Works and Contractor's Equipment**	**(1) The fourth sentence of first paragraph is amended to read as follows:** "Such insurance shall be in such a manner that the Employer and the Contractor are covered from the Commencement Date until the date of issue of the Commissioning Certificate for the Works." **(2) At the end of first paragraph, add the following sentence:** "It shall be the responsibility of the Contractor to notify the insurance company of any change in the nature and extent of the Works and to ensure the adequacy of the insurance coverage at all times during the period of the Contract." **(3) At the end of Sub-Clause 18.2, add the following paragraph:** "If the Contractor receives instructions from Employer's Representative to insure against War risk, such insurance, if available, shall be effected, at the cost of the Employer, with an insurance company acceptable to the Employer and shall be in the joint names of the Employer, the Contractor and Subcontractors."
79	**18.5 General Requirements for Insurances**	**(1) At the end of sixth paragraph, add the following sentence:** "In such case, the premium paid by the Employer plus overheads shall be recoverable from the Contractor by the Employer. The Contractor shall not dispute the amount of premium paid by the Employer or the overhead charges thereon." **(2) At the end of Sub-Clause 18.5, add the following paragraph:** "If a policy is required to indemnify joint insured, the cover shall apply separately to each insured as though a separate policy had been issued for each of the joint insured. The Contractor shall submit to the Employer's Representative, the details of all claims made with the insurer and claims accepted by the insurer or any other details as required by the Employer's Representative on a monthly basis." The insurance shall be issued by an insurance company which has been determined by the Contractor to be acceptable to the Employer."
80	**19.6 Optional Termination, Payment and Release**	**The word "182 days" on the second line of first paragraph is replaced with the word "120 (one hundred twenty) days".**
81	**Additional Sub-Clause 19.8 Resumption of Works**	**After Sub-Clause 19.7, add the following sub-clause 19.8:** "**19.8** Unless otherwise the Contract or a part of the Contract will be terminated under Sub-Clause 19.7 above, the obligations under the Contract shall be resumed as soon as practicable after the event has come to an end or ceased to exist.
82	**20.3 Dispute Adjudication**	**(1) Delete first paragraph in Sub-Clause 20.3, and replace with the following:**

	Board	"If a dispute arises between the Employer and Contractor in connection with, or arising out of, the Contract or the execution of the Works, including any dispute as to any opinion, instruction, determination, certification or valuation of the Employer's Representative, the dispute shall initially be referred to a Dispute Adjudication Board (herein after called as "DAB") for decision in accordance with Sub-Clause 20.4. The Party wishing to refer the dispute to DBA shall notify its intention to the other Party with copy to the Employer's Representative, together with particulars. The Parties shall appoint a DAB within 28 (twenty-eight) days after the Party wishing to refer the dispute to DAB has notified its intention to the other Party. The DAB shall comprise three suitably qualified persons (hereinafter called as "the members"), each of whom shall be fluent in the English language and shall be a professional experienced in the type of works involved in the Works and with the interpretation of contractual documents. Each Party shall nominate one member for the approval of the other Party. The first two members shall recommend and the Parties shall agree upon the third member, who shall act as chairman. However, if a list of potential members has been agreed by the Parties and is included in the Contract, the members shall be selected from those on the list, other than anyone who is unable or unwilling to accept appointment to the DAB." **(2) Delete second paragraph in Sub-Clause 20.3, and replace with the following:** "The terms of appointment of the DAB shall be in the form annexed hereto with such modification as are agreed among the parties. **(3) The Sub-Paragraph (a), (b) and (c) of seventh (last) Paragraph in Sub-Clause 20.3 are amended to read as follows:** "(a) **not used**. (b) either Party fails to nominate an acceptable member, for the DAB of three members, within 28 days **after the Party wishing to refer the dispute to DAB has notified its intention to the other Party**, (c) the Parties fail to agree upon the appointment of the third member (to act as chairman) within 28 days **after the Party wishing to refer the dispute to DAB has notified its intention to the other Party**, or"
83	**20.6 Arbitration**	**Delete Sub-Clause 20.6 in its entirety, and replace with the following:** "**20.6** Any dispute in respect of which: (a) the decision, if any, of the Dispute Adjudication Board has not become final and binding pursuant to Sub-Clause 20.4, and (b) amicable settlement has not been reached, shall be referred to and finally settled by the arbitration. At the end of the period allowed for amicable settlement in Sub-Clause 20.5, any party desiring to proceed arbitration shall give notice to the other party of its intention to commence arbitration, as hereinafter provided, as to the matter

		in dispute, and no arbitration in respect of this matter may be commenced unless such notice is given. Arbitration may be commenced prior to or after completion of the Works provided that the obligations of the Employer, the Contractor, the Employer's Representative and the DAB shall not be altered by reason of the arbitration being conducted during the performance of the Contract. Arbitration proceedings shall be conducted in accordance with the rules of procedure set forth below: (a) Contracts with Indian contractor Any disputes between the Employer and an Indian Contractor arising in connection with this Contract shall be finally settled by arbitration in accordance with the Arbitration & Conciliation Act, 1996 of India, or any statutory amendment thereof. The arbitral tribunal shall consist of 3 (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 28 (twenty-eight) days from the appointment of the Arbitrator appointed subsequently, the Presiding Arbitrator shall be appointed by the President of Indian Road Congress. If one of the parties fail to appoint its arbitrator in 28 (twenty-eight) days after receipt of the notice of the appointment of its Arbitrator by the other party, then the President of Indian Road Congress shall appoint the Arbitrator. The arbitration proceedings shall be held in HYDERABAD, ANDHRA PRADESH, INDIA only. The language of arbitration proceedings and that of documents and communication between parties shall be English. For the purpose of this Sub-Clause, the term "Indian Contractor" means a contractor who is registered in India and is a juridical person created under Indian Law as well as a joint venture/consortium between such an Indian contractor and a Foreign contractor. (b) Contract with Foreign contractor Any disputes, controversy or claim between the Employer and an Foreign Contractor arising out of or relating to this Contract, or breach, termination or invalidity thereof, shall be finally settled by arbitration in accordance with the UNCITRAL Arbitration Rules or **Rules of Arbitration of the International Chamber of Commerce** as at present in force. The arbitral tribunal shall consist of 3 (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 28 (twenty-eight) days from the appointment of the Arbitrator appointed subsequently, the Presiding Arbitrator shall be appointed by the **Secretary-General of the Permanent Court of Arbitration**. If one of the Parties fail to appoint its arbitrator in 28 (twenty-eight) days after receipt of the notice of the appointment of its Arbitrator by the other party, then the President of Indian Road Congress shall appoint the Arbitrator. The arbitration proceedings shall be held at third party country agreed by both Parties. The language of arbitration proceedings and that of documents and communication between parties shall be English. For the purpose of this Sub-

		Clause, the term "Foreign Contractor" means a contractor who is not registered in India and is not a juridical person created under Indian Law. The arbitral tribunal shall have full power to open up, review and revise any decision, opinion, instruction, determination, certificate or valuation of the Employer, the Contractor or the Employer's Representative and any decision of the DAB. Neither party shall be limited in the proceedings before the arbitrators to evidence or arguments previously put before the DAB to obtain its decision, or to the reasons for dissatisfaction given in its notice of dissatisfaction. Any decision of the DAB shall be admissible in evidence in the arbitration. No decision by the DAB shall disqualify any DAB Member from being called as a witness and giving evidence before the Arbitrators on any matter whatever relevant to the dispute. The decision of a majority of arbitrators, or of the chairman of the arbitrators if there is not such majority, shall be final and binding upon both parties and shall be enforceable in any court of competent jurisdictions, and the parties hereby waive any objections to or immunity in respect of such enforcement. 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 its behalf shall be borne by each party itself. Where the arbitral decision is for the payment of money, no interest shall be payable on whole or any part of the money for any period, till the date on which the arbitral decision is made. The reference to the arbitration shall proceed notwithstanding that the Works shall not then be or be alleged to be complete, provided always that the obligations of the Employer, the Employer's Representative and the Contractor shall not be altered by reasons of arbitration being conducted during the progress of the Works. Neither party shall be entitled to suspend the work or part of the work to which the dispute relates on account of arbitration and payments to the Contractor shall continue to be made in terms of the Contract.
84	**Additional Sub-Clause 20.9 No Legal Action till Dispute Settlement Procedure is Exhausted**	**After Sub-Clause 20.8, add the following Sub-Clause 20.9:** "**20.9** Any and all disputes shall be settled in accordance with the provisions of Clause 20. No action at law concerning or arising out of any dispute shall be commenced unless and until all applicable dispute resolution procedures set out in this Clause 20 shall have been finally exhausted in relation to that dispute or any dispute out of which that dispute shall have arisen with which it may be or may have been connected."
85	**Additional Sub-Clause 20.10 Jurisdiction of Court**	**After Sub-Clause 20.9, add the following Sub-Clause 20.10:** "**20.10** Where recourse to a Court is to be made in respect of any matter, the court at HYDERABAD, ANDHRA PRADESH, INDIA shall have the exclusive jurisdiction to try all disputes between the Parties."
86	**Additional Clause**	**Clause 21 Survival**

	21 Survival	**21.1 Survival** Termination of this Contract shall not relieve the Contractor or the Employer of any obligations already incurred hereunder which expressly or by implication survives Termination hereof, and except as otherwise provided in any provision of this Contract expressly limiting the liability of either party, shall not relieve either party of any obligations or liabilities for loss or damage to the other Party arising out of or caused by acts or omissions of such Party prior to the effectiveness of such Termination or arising out of such Termination.
87	**Additional Clause 22 Taxation**	**Clause 22 Taxation** **22.1 Foreign Taxation** The Contract Price shall include all taxes, duties and other charges imposed outside the Employer's country on the production, manufacture, sale and transport of the Contractor's Equipment, Plant, materials and supplies to be used on or furnished under the Contract, and on the services performed under the Contract. **22.2 Local Taxation** The Contract Price shall include all customs duties, import duties, business taxes, income and other taxes that may be levied in accordance with the laws and regulations in being as of the date 28 days prior to the latest date for submission of Tender in the Employer's country on the Contractor's Equipment, Plant, materials and supplies (permanent, temporary and consumable) acquired for the purpose of the Contract and on the services performed under the Contract. Nothing in the Contract shall relieve the Contractor from his responsibility to pay any tax that may be levied in the Employer's country on profits made by him in respect of the Contract. The Contractor shall be deemed to be familiar with the tax laws in the Employer's country. **22.3 Income Tax on Contractor's Employees** The Contractor's employees both local and foreign will be liable to pay personal income tax in India in respect of such of their salaries and wages as are chargeable under the laws and regulations for the time being in force, and the Contractor shall perform such duties in regard to such deductions thereof as may be imposed on him by such laws and regulations. **22.4 Duties on Contractor's Equipment** Notwithstanding the provision of Sub-Clause 22.2, Contractor's Equipment, imported by the Contractor for the sole purpose of executing the Contract shall be temporarily exempt from the payment of import duties and taxes upon initial importation, provided the Contractor shall post with the customs authorities at the port of entry an approved export bond or bank guarantee, valid until the time of completion of the Contract plus six months, in an amount equal to the full import duties and taxes which would be payable on the assessed imported value of such Contractor's Equipment , and callable in the event that the Contractor's Equipment is not exported from India on completion of the Contract. A copy of the bond or bank guarantee endorsed by the customs authorities shall be provided by the Contractor to the Employer upon the importation of individual items of Contractor's

		Equipment . Upon export of individual items of Contractor's Equipment , or upon completion of the Contract, the Contractor shall prepare, for approval by the customs authorities, an assessment of the residual value of the Contractor's Equipment to be exported, based on the depreciation scale(s) and other criteria used by the customs authorities for such purposes under the provisions of the applicable law. Import duties and taxes shall be due and payable to the customs authorities by the Contractor on (a) the difference between the initial imported value and the residual value of the Contractor's Equipment to be exported; and (b) on the initial imported value of that Contractor's Equipment remaining in India after completion of the Contract. Upon payment of such dues within 28 days of being invoiced, the bond or bank guarantee shall be reduced or released accordingly; otherwise the security shall be called in the full amount remaining. **22.5 Advance Deduction of Tax** Advance deduction of taxes shall be made from each Interim Payment Certificate in accordance with the relevant provisions of all prevailing Acts and Regulations in India. **22.6 Customs and Security Requirements** The Contractor shall comply with all regulations for the time being imposed by the Customs and Port Security Authorities in respect of the passage of plant, vehicles, materials and personnel through Customs and National Security barriers.
88	**Additional Clause 23 Spare Parts**	**Clause 23 Spare Parts** The Contractor shall maintain necessary spare parts, OEM parts and consumables at all the time during Operation and Maintenance period for operating and maintaining the Hyderabad City ITS and to meet the Service Level requirements. All the cost that the Contractor will incur in connection with the Operation and Maintenance including replacements, spare parts and maintenance equipment for O&M services shall be considered as included in the Price Schedule No. 7 : Operation and Maintenance in the Pricing Document.
89	**Additional Clause 24 Operation and Maintenance during Operation and Maintenance Period**	**Clause 24 Operation and Maintenance during Operation and Maintenance Period** **24.1 Operation and Maintenance during Operation and Maintenance Period** The Contractor shall carry out the operation and maintenance services of the Hyderabad City Intelligent Transport System during the Operation and Maintenance Period in accordance with the Employer's Requirements. The Operation and Maintenance Services shall end when the Contract Completion Certificate is issued. The contractor shall provide qualified operators, maintenance engineers and technicians, maintenance equipment, tools, transportation and other facilities to effectively perform the operation and maintenance work. The qualification and experience of the key personnel to be deployed by the Contractor shall be as prescribed in the Employer's Requirements. Prior approval of the Employer

		shall be obtained before the key personnel are deployed for carrying out their duty. The Contractor shall replace promptly, Contractor's key personnel if the Employer's Representative requires the Contractor to do so in accordance with the Contract.
90	**Annexes to Conditions of Contract**	Annex COC-1: Form of Contract Agreement Annex COC-2: Form of Bank Guarantee for Performance Security Annex COC-3: Form of Bank Guarantee for Advance Payment Annex COC-4: Form of Dispute Adjudication Agreement (Terms of Appointment for Dispute Adjudication Board of Three Members) Attachment to Annex COC-4: Procedural Rules of the Dispute Adjudication Board Annex COC-5: Form of Bank Guarantee for Retention Money Note: Forms attached to these Conditions of Contract may be modified as considered necessary at the time of finalization of the Contract.
91	**Sub-Clause 1.1.4.1**	**Delete "taken over by the Employer" and replace with "commissioned" at the end of the sentence.**
92	**Sub-Clause 1.1.4.2**	**Replace "Taking-Over Certificate" with "Commissioning Certificate".** **The same rule applied throughout the Prequalification/Tender/Contract Documents.**
93	**Sub-Clause 1.1.4.4**	**Replace "Performance Certificate with "Contract Completion Certificate".** **The same rule applied throughout the Prequalification/Tender/Contract Documents.**
94	**Sub-Clause 4.2**	**Delete the first sentence of the second paragraph and replace with;** **"The performance security shall be valid until the Works and Operation and maintenance Services have been completed and the Contractor has been entitled to receive the Contract Completion Certificate."**
95	**Sub-Clause 4.17**	**Delete "taking-over by the Employer" and replace with "commissioning" at the end of the first paragraph.**
96	**Sub-Clause 5.6**	**Delete "taking-over" and replace with "commissioning" at the third paragraph.**
97	**Sub-Clause 5.7**	**Delete "taking-over" and replace with "commissioning".**
98	**Clause 10**	**Delete the title "Employer's Taking Over" and replace with "Commissioning"**

99	**Sub-Clause 10.1**	**Delete "taking over" and replace with "commissioning" at the second paragraph.**
100	**Sub-Clause 10.2**	**Delete item (c).** **Delete "taking over" and replace with "commissioning" in item (a) and add "and" at the end of the sentence of item (a).** **Delete "and" at the end of item (b)** **Delete "before the expiry of the Contract Period" and replace with "within 90 days or as agreed by the Parties after the date stated in the Commissioning Certificate"**
101	**Sub-Clause 10.3**	**Delete "taken over" and replace with "commissioned" in the first sentence.** **Delete "before the expiry of the Contract Period" and replace with "within 90 days or as agreed by the Parties after the date stated in the Commissioning Certificate" in the second sentence.**
102	**Sub-Clause 17.2**	**Delete first and second paragraphs and replace with;** **"Unless the Contract is terminated in accordance with these Conditions, the Contractor shall take full responsibility for the care of the Works from the Commencement Date until the Commissioning Certificate for the whole of the Works is issued pursuant to Sub-Clause 10.1 [Commissioning Certificate]. If the Contract is terminated in accordance with these Conditions, the Contractor shall cease to be responsible for the care of the Works from the date of expiry of the notice of termination.** **The Contractor shall also be responsible for the care of the Permanent Works during the Operation and Maintenance Period in accordance with the requirements of the Operation and Maintenance Specifications.** **The Contractor shall also be responsible for the care of any part of the Permanent Works for which a Section Commissioning Certificate has been issued.** **The Contractor shall also take full responsibility for any outstanding work which he shall have undertaken to complete as soon as practicable or within 120 days or as agreed by the Parties after the date stated in the Commissioning Certificate until all such outstanding work is completed."**

ANNEX COC-1 TO CONDITIONS OF CONTRACT

FORM OF CONTRACT AGREEMENT

(Refer Sub-Clause 1.5)

This Agreement made this _____ day of _____200_ between **Hyderabad Growth Corridor Limited, 2nd Floor, HMDA Complex, Tarnaka, Hyderabad 500 007, Andhra Pradesh, INDIA** (hereinafter called the "Employer") of the one part and _____ of _____ (hereinafter called "the Contractor") of the other part.

Whereas the Employer is desirous that the Works known as Design, Supply Installation, Commissioning, Testing, Training, Warranty**, Remedying Defects, Operation** and Maintenance for Equipments and Related Facilities of **Hyderabad City Intelligent Transport System (Contract No._____)** should be executed by the Contractor, and has accepted a Tender by the Contractor for the execution of these Works and the remedying of any defects therein.

The Employer and the Contractor agree as follows:

Clause 1 Words and Expression

In this Agreement words and expressions shall have the same meanings as are respectively assigned to them in the Conditions of Contract hereinafter referred to.

Clause 2 The Contract Documents

The following documents shall be deemed to form and be read and construed as part of this Agreement. This Agreement shall prevail over all other Contract documents.

(1) the Letter of Acceptance;
(2) the Addenda (in reverse chronological order, if any)
(3) the Employer's Requirement (General Technical Specifications, Particular Technical Specifications, Maintenance Specifications and Drawings),
(4) the Tender together with Appendix to Tender including priced Pricing Document,
(5) the Conditions of Contract Part II – Conditions of Particular Application,
(6) the Conditions of Contract Part I – General Conditions,
(7) the Schedules,
(8) the Contractor's Proposal, and
(9) any other documents forming part of the Contract.

All of the foregoing documents, together with this Agreement, are referred to herein as the Contract. Also incorporated into the Contract, and made part hereof, are all codes, standard specifications, and similar requirements that are referred to therein. In the event of a conflict in consistency, ambiguity or discrepancy between the contents of the Contract, the order of precedence shall be according to the Conditions of Contract-Part II Conditions of Particular Application.

Clause 3 Obligation of the Contractor

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 respects with the provisions of the Contract.

Clause 4 Obligation of the Employer

The Employer hereby covenants to pay the Contractor in consideration of the execution and completion of the Works and the remedying of defects therein 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.

Clause 5 Contract Price and Completion Time

The Employer agrees to pay for the total cost of the Works and the Contractor agrees to accept the sums mentioned below in the following currencies, to be the total cost for the Work carried out by him as part of his obligations, responsibilities and liabilities under and according to the provisions and obligations imposed on him by the Contract.

Fixed Lump Sum Price:

(i) Indian Rupees _____ (_____ RS); and

(ii) in the foreign currency of _____ (_____)

(i) (_____)

Subject to adjustment in accordance with provisions of the Contract.

The above Contract Price is inclusive of all taxes, duties, levies, cess and any other charges leviable.

The Contractor shall complete whole of the Works within ……months from the Commencement Date and each Section within Time specified in the Contract.

Clause 6 Integration

The Employer and the Contractor agree that this Agreement, together with the other Contract Documents, expresses all of the agreements, understandings, promises, and covenants of the parties, and integrates, combines, and supersedes all prior and contemporaneous negotiations, understandings, and agreements, whether written or oral and no modification or alteration of the Contract Documents shall be valid or binding on either party, unless expressed in writing and executed with the same formality as this Agreement, except as may otherwise be specifically provided in the Contract Documents.

Clause 7 Governing Law

This Contract is enforceable and construed under the applicable laws of India.

Clause 8 Language

This Contract Agreement and the other Contract Documents are made in the English language.

In Witness whereof, the parties hereto have caused this Agreement to be executed the day and year first before written.

The Contractor:

_____

SIGNED, SEALED AND DELIVERED

The Employer:

HYDERABAD GROWTH CORRIDOR LIMITED

SIGNED, SEALED AND DELIVERED

BY:_____	BY:_____
Name: _____	Name: _____
Position:_____	Position:_____
on behalf of the Contractor	on behalf of the Employer
IN THE PRESENCE OF	IN THE PRESENCE OF
_____	_____
Name:_____	Name:_____
Address:_____	Address:_____
_____	_____

Notes: (for preparation of but not for inclusion in the engrossment of the Agreement)

(1) If the Contractor comprises a consortium or joint venture, liability will be joint and several, and each member thereof must be identified.

(2) If the Contractor comprises a consortium or joint venture, an authorized representative of each member thereof must execute.

(3) Duly notarized Power of Attorney issued in favour of authorized representative of the Contractor shall be attached.

(4) If the Contractor comprises a consortium or joint venture, duly notarized Power of Attorney issued in favour of authorized representative of each member of consortium or joint venture shall be attached.

(5) If the Contractor comprises a consortium or joint venture, duly notarized, irrevocable Power of Attorney issued by each member of consortium in favour of Leader of the consortium or joint venture, shall be attached.

(6) Power of Attorney of the authorized representative of each member of consortium or joint venture, with clear evidence that the person is authorized to issue such Power of Attorney shall be attached.

ANNEX COC-2 TO CONDITIONS OF CONTRACT

FORM OF BANK GUARANTEE FOR PERFORMANCE SECURITY

(Refer Sub-Clause 4.2)

To: Managing Director
Hyderabad Growth Corridor Limited
2nd[d] Floor, HMDA Complex, Tarnaka,
Hyderabad 500 007,
Andhra Pradesh, INDIA

This Guarantee is issued on the _____ day of _____ 200__ (state month and year) by _____ (name of bank) of _____ (address of bank) (hereinafter called "the Guarantor") in favour of **Hyderabad Growth Corridor Limited, 2nd Floor, HMDA Complex, Tarnaka, Hyderabad 500 007, Andhra Pradesh, INDIA** (hereinafter called "the Employer", which expression shall, unless repugnant to the context or meaning thereof include its successors, administrators and assignees).

WHEREAS

(1) _____ (Name and address of the Contractor) (hereinafter called "the Contractor", which expression shall, unless repugnant to the context or meaning thereof include it successors, administrators, executors and assignees), has undertaken, in pursuance of Contract No. _____ to execute, complete and remedy any defects in the Works of **the Design, Supply, Installation, Commissioning, Testing, Training, Warranty, Remedying Defects, Operation and maintenance for Equipments and Related Facilities of Hyderabad City Intelligent Transport System** (hereinafter called the "Contract")

(2) It has been stipulated by the Employer in the said Contract that the Contractor shall furnish the Employer with a Bank Guarantee by the bank acceptable to the Employer for the sum specified herein as security for compliance with the Contractor's obligations in accordance with the Contract.

(3) The Guarantor, which expression shall unless repugnant to the context of the meaning thereof, include its successors, administrators, executors and assignees, do hereby agree to give the Contractor such a Bank Guarantee:

(4) The Guarantor has agreed to guarantee the due performance of the Contract in the manner hereinafter appearing.

NOW, THEREFORE, the Guarantor here affirms as follows:

(a) If the Contractor (unless relieved from the performance by any clause of the Contract or by statute or by the decision of a tribunal of competent jurisdiction) shall in any respect fail to execute the Contract or commit any breach of his obligations thereunder then the Guarantor will indemnify and pay the Employer upon the Employer's first written demand and without cavil or argument and without notification to the Contractor or any other party any amount up to and including the aggregate sum of _____ (amount of Guarantee)[1] _____ (in words), such sum being payable in the types and amounts of currencies in which the Contract Price is payable, without the Employer having to prove or to show grounds or reasons for any such demand.

[1] An amount is to be inserted by the Guarantor, representing the percentage of the Contract Price specified in the Contract, and denominated in the currency(ies) of the Contract.

(b) The Employer shall have full rights whatsoever to encash this Bank Guarantee at any time during the validity of the guarantee and the Contractor shall have no right or claim whatsoever in the matter of encashment of the Bank Guarantee amount by the Employer and any disputes/claim whatsoever in this regard shall only be settled by means of arbitration as provided for in the Contract and the Employer's decision as to what amount is due to the Employer from the Guarantor against the guarantee and as to Contractor has committed breach of contract or not, shall be final and binding on the guarantor-bank and the Contractor shall have no right to interfere with the same except to agitate/claim/dispute the same before the arbitration and the Guarantor shall have full rights in terms of the guarantee to make immediate payments against the Bank Guarantee to the Employer without the consent of the Contractor and without referring the matter to the Contractor.

(c) The Guarantor shall not be discharged or released from his guarantee by an arrangement between the Contractor and the Employer, with or without the consent of the Guarantor, or by any alteration in the obligations undertaken by the Contractor, or by any forbearance on the part of the Contractor, whether as to payment, time, performance, or otherwise, and any notice to the Guarantor of any such arrangement, alteration, or forbearance is hereby expressly waived.

(d) After completion of the Works, one half of the amount of Guarantee shall be released to the Contractor, on issue of the Commissioning Certificate. The balance for the Works shall be released to the Contractor within 28 days after issuing the Contract Completion Certificate by the Employer's Representative for the Works.

~~(e) This Guarantee is enforceable and construed under the applicable laws of India.~~

~~(f) Courts at Hyderabad, Andhra Pradesh, India shall have exclusive jurisdiction for contesting legal cases arising out of encashment of the Guarantee~~

(g) This Guarantee shall be valid (i) up to 56 (fifty-six) days after the expiry of the Contract Period, or (ii) until the bank receives written notification from the Employer that the sum (or any remaining sum) is no longer required by the Employer, or (iii) until this Bank Guarantee is returned to the bank, or (iv) until payment has been made to the Employer of the whole of the sum.

Given under our hand on the date first mentioned above.

Signature and Seal of the Guarantor

SIGNED BY _____

for and on behalf of the

Guarantor in the presence of

(Witness)

ANNEX COC-3 TO CONDITIONS OF CONTRACT

FORM OF BANK GUARANTEE FOR ADVANCE PAYMENT

(Refer Sub-Clause 13.2)

To: Managing Director
Hyderabad Growth Corridor Limited
2nd Floor, HMDA Complex, Tarnaka,
Hyderabad 500 007,
Andhra Pradesh, INDIA

Dear Sir:

In consideration of **Hyderabad Growth Corridor Limited, 2nd Floor, HMDA Complex, Tarnaka, Hyderabad 500 007, Andhra Pradesh, INDIA** (hereinafter called "the Employer", which expression shall, unless repugnant to the context or meaning thereof include it successors, administrators and assignees), having awarded to _____ (hereinafter referred to as the "Contractor", which expression shall unless repugnant to the context of meaning thereof, include its successor, administrators, executors and assignees), a contract for **Design, Supply, Installation, Commissioning, Testing, Training, Warranty, Remedying Defects, Operation and Maintenance for Equipments and Related Facilities of Hyderabad City Intelligent Transport System** (Contract No. _____) (hereinafter called the "Contract") by issuing of Letter of Acceptance dated _____ and the same having been unequivocally accepted by the Contractor, and the Employer having agreed to make an advance payment to the Contractor for performance of the above Contract amount to _____ (in words and figures) as an advance against Bank Guarantee to be furnished by the Contractor.

We _____ (Name of the Bank) having its Head Office at _____ _____ (hereinafter referred to as "the Bank", which expression shall unless repugnant to the context of meaning thereof, include its successors, administrators, executors and assignees) do hereby unconditionally, irrevocably and without demur, guarantee and undertake to pay the Employer immediately on demand any or, all monies payable by the Contractor to the extent of _____ as aforesaid at any time during the validity of this Guarantee without any demur, reservation, context, recourse or protest and or without any reference to the Contractor. Any such demand made by the Employer on the Bank shall be conclusive and binding notwithstanding any difference between the Employer and the Contractor or any dispute pending before any Court, Tribunal, Arbitrator or any other authority. We agree that the Guarantee herein contained shall be irrevocable and shall continue to be enforceable till the Employer discharges this Guarantee.

The Employer shall have the fullest liberty without affecting in any way the liability of Bank under this Guarantee, from time to time to vary the advance or to extend the time for performance of the contract by the Contractor. The Employer shall have the fullest liberty without affecting this Guarantee, to postpone from time to time the exercise of any powers vested in them or of any right which they might have and to exercise the same at any time in any manner, and either to enforce or to forebear in enforce any convents, contained or implied, in the Contract between the Employer and Contractor any other course or remedy or security available to the Employer. The Bank shall not be relieved of its obligation under these presents by any exercise by the Employer of its liberty with reference to the matters aforesaid or any of them or by reason of any other act or forbearance or other acts of omission or commission on the part of the Employer or any other indulgence shown by the Employer or by any other matter or thing whatsoever which under law would but for this provision have the effect of relieving the Bank

The Bank also agrees that the Employer at his option shall be entitled to enforce this Guarantee against the Bank as a principal debtor, in the first instance without proceeding against the Contractor and notwithstanding any security or other guarantee that the Employer may have in relation to the Contractor's liabilities.

The outstanding liability of the bank under this guarantee will reduce by such amounts as may be notified to the Bank in the Employer's authorized writing and stated to be the reduction to this Guarantee required to be made in accordance with the Contract by reason of the repayments made by the Contractor.

The Bank further agree that no change or addition to or other modification of the terms of the Contract or of Work to be performed thereunder or of any of the Contract documents which may be made between the Employer and the Contractor, shall in any way release the Banks from any liability under this Guarantee, and the Bank hereby waive notice of any such change, addition or modification

This Guarantee is enforceable and construed under the applicable laws of India.

Courts at Hyderabad, Andhra Pradesh, India will have exclusive jurisdiction for contesting legal cases arising out of encashment of the Guarantee.

This Guarantee shall be valid until the Bank receives written notification from the Employer that the sum (or any remaining sum) is no longer required by the Employer, or until this Bank Guarantee is returned to the Bank, or until payment has been made to the Employer of the whole of the sum.

Dated this _____ day of _____ 20 ___ at _____

Signature and Seal of the Bank

WITNESS

_____	_____
(Signature)	(Signature)
_____	_____
(Name)	(Name)
_____	_____
_____	_____
(Office Address)	Designation (with Bank stamp)
	Attorney as Power of
	Attorney No._____
	Date _____

ANNEX COC-4 TO CONDITIONS OF CONTRACT

FORM OF DISPUTE ADJUDICATION BOARD

(Refer Sub-Clause 20.3)

TERMS OF APPOINTMENT FOR DISPUTE ADJUDICATION BOARD OF THREE MEMBERS

NOTE. Text in square brackets, viz. [ ], provides alternative wording for consideration of the signatories in the context and circumstance of the Project. The signatories should consider whether such alternatives are appropriate or require deletion or amendment.

These Terms of Appointment of a Member of Dispute Adjudication Board are made between:

(1) Hyderabad Growth Corridor Limited (HGCL)
2nd Floor, HMDA Complex, Tarnaka, Hyderabad 500 007,
Andhra Pradesh, INDIA
Tel: +91-40-2700 2913, Fax: +91-40-2700 3271,
e-mail: cgmhgcl@gmail.com or mdhgcl@gmail.com
(hereinafter called the "Employer")

(2) _____ (name of the Contractor) of
_____
_____(address of the Contractor) (hereinafter called the "Contractor").

(3) _____ (name of Member of Dispute Adjudication Board) of
_____
_____ (address of Member) (hereinafter called the "DAB Member")**.**

WHEREAS

(a) The Employer and the Contractor (hereinafter jointly referred to as the "Parties") have on the day of _____ entered into a Contract (hereinafter called the "Contract") for the Design, Supply, Installation, Commissioning, Testing, Training, Warranty, **Remedying Defects, Operation** and Maintenance for Equipments and Related Facilities of Hyderabad City Intelligent Transport System (Contract No. _____) (hereinafter called the "Works").

(b) By Sub-Clause 20.3 of the Conditions of Contract (hereinafter called the "Conditions") provision is made for the constitution of a Dispute Adjudication Board (hereinafter called the "DAB") which shall comprise three suitably qualified persons as stated in the Contract.

(c) The DAB Member has agreed to serve as [one of the members of] [chairman of] the DAB on the terms set out herein.

NOW IT IS HEREBY AGREED as follows:

(1) The DAB Member:

(a) hereby accepts this appointment to the DAB which is a personal appointment and agrees to be bound by these Terms of Appointment and Sub-Clauses 20.3 and 20.4 of the Conditions of Contract as if they were set out herein; and

(b) shall be entitled notwithstanding such acceptance to resign this appointment on giving reasonable notice to the Parties.

(2) These Terms of Appointment when executed by the Parties and the DAB Member shall take effect when the Parties and the last of the three members of the DAB have executed terms of appointment.

(3) The DAB Member shall be and remain impartial and independent of the Parties and shall be under a continuing duty to disclose in writing to each of them and to the other members of the DAB any fact or circumstance which might be such as to call into question his impartiality or independence.

Without prejudice to the generality of the foregoing, the DAB Member:

(a) shall have no interest financial or otherwise in either of the Parties or the Employer's Representative as described in the Contract, or financial interest in the Contract except for payment for the services on the DAB;

(b) shall not previously have been employed as a consultant or otherwise by either of the Parties or the Employer's Representative except in those circumstances which have been disclosed in writing to the Parties prior to this appointment.

(c) shall have disclosed in writing to the Parties and to the other members of the DAB, prior to this appointment and to his best knowledge and recollection, any professional or personal relationships with any director, officer or employee of the Parties or the Employer's Representative, and any prior involvement in the Project;

(d) shall not while a DAB Member be employed as a consultant or otherwise by either of the Parties or the Employer's Representative without the prior written consent of the Parties and the other members of the DAB;

(e) shall not give advice to either of the Parties or to the Employer's Representative concerning the conduct of the Project other than in accordance with the Procedural Rules annexed hereto as Attachment to Annex COC-4 (the "Rules"); and

(f) shall not while a DAB Member enter into discussions or make any agreement with either of the Parties or the Employer's Representative regarding employment by any of them whether as a consultant or otherwise after ceasing to be a DAB Member.

(4) The DAB Member warrants that he is experienced in the type of work involved in the Project and the interpretation of contract documents and is, as well, fluent in the language of English. The DAB Member shall :

(a) ensure his availability for site visits and hearings as are necessary and shall observe the provisions of the Rules;

(b) become conversant with the Contract and the progress of the Project by studying all documents received which shall be maintained in a current working file;

(c) treat the details of the Contract and all activities and hearings of the DAB as private and confidential and shall not publish or disclose the same without the prior written consent of the Parties;

(d) not assign, delegate or subcontract any of the tasks under these Terms of Appointment or the Rules;

(e) be available to give advice and opinions in conjunction with other members of the DAB on any matter relevant to the Project not being a dispute when requested so to do by the Parties.

(5) Neither the Employer, the Contractor nor the Employer's Representative shall seek advice from or consultation with the DAB Member regarding the Project otherwise than in the normal course of the DAB's activities under the Contract and the Rules. The only exception to this prohibition shall be where the Parties jointly agree to do so and the other DAB Members also agree. The Employer shall be responsible for ensuring the compliance by the Employer's Representative with this Clause.

(6) The Board Member will be paid as follows:

(a) a daily fee of _____ which shall be considered as payment in full for:

i. each day or part of a day up to a maximum of two days travel time in each direction for the journey between the DBA Member's home and the Site or other location of a Board meeting;

ii. each working day on site visits, hearings or preparing decisions;

iii. each day spent reading the Parties' submissions in preparation for a hearing;

iv. all office and overhead expenses such as secretarial services, photocopying and office supplies incurred in connection with his duties; and

v. all services performed hereunder except those referred to in Sub-Clauses (b) below.

(b) cost of telephone calls, courier charges, faxes and telexes incurred in connection with his duties; all reasonable and necessary travel expenses including [less than] _____ class air fare, subsistence and other direct travel expenses. These costs shall be reimbursed in the same currency as that in which fees are payable. Receipts shall be required for all expenses in excess of _____ percent of the daily fee referred to in Sub-Clause (a) above;

(c) any taxes properly levied in the Country of the Site on payments made to the DAB Member (unless a national or permanent resident of the country of the site) pursuant to this Clause 6. Such reimbursement will be in the same currency as that in which the fees are payable.

The daily fee shall remain fixed for the period of tenure of the DAB Member.

Payments to the DAB Member shall be shared equally by the Employer and the Contractor. The DAB Member shall submit invoices for payment of the daily fees and expenses at the beginning of the following month. All invoices shall be accompanied by a brief description of activities performed during the relevant period and shall be addressed to the Contractor and copied to the Employer.

The Contractor shall pay DAB Members' invoices within 56 calendar days after receipt of such invoices and shall invoice the Employer (through the application of interim payment certificate to be submitted in accordance with Sub-Clause 13.3 of the Conditions of Contract) for one-half of the amounts of such invoices.

The Employer shall pay such Contractor's invoices within the time period specified in the Contract for other payments to the Contractor by the Employer.

Failure of either the Employer or the Contractor to make payment in accordance with these Terms of Appointment shall constitute an event of default under the Contract, entitling the non-defaulting party to take the measures set forth, respectively, in Sub-Clause 15.2 or Sub-Clause 16.2 of the Conditions of Contract.

Notwithstanding such event of default, and without waiver of rights there from, in the event that either the Employer or the Contractor fails to make payment in accordance with these Terms of Appointment, the other party may pay whatever amount may be required to maintain the operation of the DAB. The party making such payment, in addition to all other rights arising from such default shall be entitled to reimbursement of all sums paid in excess of one-half of the amount required to maintain operation of the DAB, plus all costs of obtaining such sums and interest thereon.

In the event of non-discharge of DAB Members' invoices in accordance with the previous paragraphs the DAB Member may either suspend his services until the invoices are discharged or resign his appointment.

(7) The Parties may jointly terminate the DAB Member's appointment hereunder by reasonable notice in writing. Such termination shall be without prejudice to any accrued rights of either of the Parties or the Board Member.

(8) The Parties undertake to each other and to the DAB Member that the DAB Member shall in no circumstances:

(a) be appointed as an arbitrator in any arbitration between the Parties in connection with the Contract unless the Parties agree otherwise in writing;

(b) be called as a witness to give evidence concerning any dispute before an arbitrator appointed under the Conditions unless he accepts such assignment in writing addressed to both Parties; or

(c) be liable for any claims for anything done or omitted in the discharge of such DAB Member's functions unless the act or omission is shown to have been in bad faith.

The Parties hereby jointly and severally indemnify the DAB Member against all or any such claims.

(9) If the DAB Member shall breach any of the provisions of Clause 3 he/she shall not be entitled to any fees or expenses hereunder and shall reimburse each of the Employer and the Contractor for any fees and expenses properly paid to him/her and to any other DAB Member if as a consequence of such breach any proceedings or decisions of the DAB are rendered void or ineffective.

(10) These Terms of Appointment shall be governed by the law of India.

(11) Any dispute or claim arising out of in connection with these Terms of Appointment or the breach, termination or invalidity thereof, shall be finally settled in accordance with the procedure mentioned below:

(a) Contract with Indian Contractor

The provisions of the Arbitration & Conciliation Act, 1996 of India or any statutory amendment thereof by one arbitrator appointed in accordance with these Arbitration & Conciliation Act

(b) Contract with Foreign Contractor

The Rules of Arbitration of the International Chamber of Commerce by one arbitrator appointed in accordance with these Rules of Arbitration

……..……	……..……	……..……
SIGNED by	SIGNED by	SIGNED by
……..	……..	……..……..……
for and on behalf of the Employer in the presence of :	for and on behalf of the Contractor in the presence of :	by the DAB Member in the presence of :
Witness ……..	Witness …….	Witness ……
Name: ……..……..	Name: ……..…….	Name: ……..…….
Address: …… ……	Address: ……. ……..…….	Address: …… ……
Date: ……..……	Date: ……..……	Date: ……..……..

ATTACHMENT TO ANNEX COC-4 TO CONDITIONS OF CONTRACT

FORM OF DISPUTE ADJUDICATION BOARD AGREEMENT

Procedural Rules of the Dispute Board of three members

(12) The Employer and the Contractor shall furnish to each DAB Member one copy of all documents which the DAB may request, including Contract documents, progress reports, variation instructions, certificates and other documents pertinent to the performance of the Contract.

(13) When any dispute is referred to the DAB in accordance with Sub-clause 20.4 of the Conditions of Contract, the DAB shall proceed as described therein. The DAB may in its discretion, among other things, conduct a hearing on the dispute in which event it will decide on the date and place for the hearing and may request that written documentation and arguments from the Employer and the Contractor be presented to it prior to or at the hearing. Subject to the time allowed to the DAB to give notice of a decision and other relevant factors, the DAB shall afford to each of the Employer and the Contractor reasonable opportunity to present its case in relation to a dispute referred to the DAB for decision.

The DAB shall act as a DAB of impartial experts, not arbitrators, and shall have full authority to conduct any hearing as it thinks fit, not being bound by any rules or procedures other than those set out herein. Without limiting the foregoing, the DAB shall have power to adopt an inquisitorial procedure, to refuse admission to hearings or audience at hearings to any persons other than the Employer, the Contractor and the Employer's Representative and to proceed in the absence of any party who the DAB is satisfied received notice of the hearing.

The DAB shall not express any opinions during any hearing concerning the merits of any arguments advanced by the Parties. After a hearing is concluded the DAB shall convene in private to formulate its decision.

If a member fails to attend a meeting or hearing, or to fulfil any required function, the other two members may nevertheless proceed and make decisions unless the absent member is the chairman and instructs the other two members not to proceed, or the Parties otherwise agree.

(14) The DAB shall give notice of its decision in writing to the Employer and the Contractor in accordance with Sub-clause 20.4 of the Conditions of Contract or as otherwise agreed by the Employer and the Contractor in writing.

The DAB shall endeavour to reach decisions unanimously, but if this is impossible decisions shall be by a majority and the minority member may prepare a written report for submission to the Employer, the Employer's Representative and the Contractor.

(15) All communications between either of the Parties and a DAB Member and all hearings shall be in the English language. All such communications shall be copied to the other Party and to other members of the DAB.

ANNEX COC-5 TO CONDITIONS OF CONTRACT

FORM OF BANK GUARANTEE FOR RETENTION MONEY

(Refer Sub-Clause 13.9)

To: Managing Director
Hyderabad Growth Corridor Limited
2nd Floor, HMDA Complex, Tarnaka,
Hyderabad 500 007,
Andhra Pradesh, INDIA
(Hereinafter called "the Employer)

Whereas ---------- (Name and address of the Contractor) (hereinafter called "the Contractor") has undertaken, in pursuance of Contract No.---------- to design, execute and complete and remedy any defects in the Works of the Design, Supply, Installation, Commissioning, Testing, Training, Warranty, **Remedying Defects, Operation** and Maintenance for Equipments and Related Facilities of Hyderabad City Intelligent Transport System (hereinafter called the "Contract") .

Whereas it has been further stipulated the Employer agrees that the first half of the Retention Money will be released following the issue of a Commissioning Certificate and at the request of the Contractor, the second half of the Retention Money may be released at the issue of the Commissioning Certificate provided that a bank guarantee is provided by the Contractor for an amount equal to the second half of the Retention Money for the period from the issue of the Commissioning Certificate to thirty (30) days after the expiry of the Defects Liability Period and from the bank acceptable to the Employer.

. **And whereas** We, …… having our Head Office ……..……. (hereinafter referred to as "the Bank") have agreed to give the Contractor such a Bank Guarantee.

The expression "The Employer", "The Bank" and "The Contractor" herein before used shall include their respective successors and assignees.

Now therefore we hereby affirm that we are the Guarantor and responsible to you on behalf of the Contractor up to a total of …… and …… such sum being payable in the types and proportion of currencies in which the Retention Monies are held and we hereby unconditionally, irrevocably and without demur undertake to immediately pay you, upon your first written demand and without cavil or argument any sum or sums within the limits of …… and……. as aforesaid without you needing to prove or to show grounds or reasons for your demand for the sums specified therein.

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

(2) 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 any of the Contract documents which may be made between you and the Contractor shall in any way release us from any liability under the Guarantee and we hereby waive notice of any such change, addition or modification.

(3) The Bank shall pay to the Employer the amount thus demanded without requiring further evidence of proof of

(a) the default of the Contractor; or

(b) the Employer's entitlement to terminate the Contract of the employment of the Contractor under the Contract; or

(c) any termination of the Contract or the employment of the Contractor under the Contract; or

(d) the amount due and payable under this Bank Guarantee.

(4) The Bank shall pay to the Employer any money so demanded notwithstanding any dispute/disputes raised by the Contractor in any suit or proceedings pending before the court, Tribunal or Arbitrator/s relating thereto and the liability under this Guarantee shall be absolute and unequivocal.

The liability of the Bank under this Guarantee shall remain in full force and effect and shall not be affected or discharged in any way by and the Bank herby waives notice of:

(a) any suspension of the Works, variation to or amendment of the Contract (including without limitation on extension of the time for performance or adjustment to the tender total or other payment under the Contract) or any concession or waiver by the Employer in respect of the Contractor's obligations under the Contract;

(b) the Termination of the Contract or of the Employment of the Contractor under the Contract solely as a result of default by the Contractor under the Contract;

(c) any forbearance or waiver of any right of action or remedy the Employer may have against the Contractor or negligence by the Employer in enforcing any such right of action or remedy;

(d) any other security or Guarantee held or obtained by the Employer for any of the obligations of the Contactor under the Contract or any release or waiver thereof;

(e) any act or omission of the Contractor pursuant to any other arrangement with the surety.

The maximum liability of the Bank under this Guarantee shall be …… and …… representing the value of the second half of Retention Money.

The reduction in the maximum liability of the Bank under this Guarantee shall be effected on receipt of notification from the Employer to the Bank.

This Guarantee shall be valid until the bank receives written notification from the Employer that the sum (or any remaining sum) is no longer required by the Employer, or until this Bank Guarantee is returned to the bank, or until payment has been made to the Employer of the whole of the sum.

Dated this _____ day of _____ 20 ___ at _____

Signature and Seal of the Bank

WITNESS

_____	_____
(Signature)	(Signature)
_____	_____
(Name)	(Name)
_____	_____
_____	_____
(Office Address)	Designation (with Bank stamp)
	Attorney as Power of
	Attorney No._____
	Date _____

TENDER DOCUMENT

Volume II

Volume II	
Section VII	Employer's Requirements
Part A	· General Technical Specification (GTS)
Part B	· Particular Technical Specifications (PTS)
Part C	· Operation and Maintenance Specifications (OMS)

SECTION VII. EMPLOYER'S REQUIREMENTS

PART A: GENERAL TECHNICAL SPECIFICATIONS

Table of Contents

List of Tables

1 General Requirements

1-1 Definition

1. This document is a General Technical Specification (hereinafter referred as "**GTS**") of **the Employer's Requirements**.

2. In addition to this **GTS**, specifications which are stated in **the Employer's Requirements** shall be ensured to **the Equipment and facilities**. Whenever there is a conflict, priority of the document shall be followed as stated in the Condition of Contract Part II Condition of Particular Application (COC-PA).

Table 1 Definition of Words

Official Name	Definition
the Contract	As defined in the COC-GC and the COC-PA.
the Employer	As defined in the COC-GC and the COC-PA.
the Contractor	As defined in the COC-GC and the COC-PA.
the Employer's Representative	As defined in the COC-GC and the COC-PA.
Commencement Date	As defined in the COC-GC and the COC-PA.
Commissioning Certificate	As defined in the COC-GC and the COC-PA.
Contract Complete Certificate	As defined in the COC-GC and the COC-PA.
Contract Period	Period from Commencement Date to the date of issuance of Contract Complete Certificate
Design Build Period	Period from Commencement Date to the date of issuance of Commissioning Certificate
Operation and Maintenance Period	Period from the date of issuance of Commissioning Certificate to the date of issuance of Contract Complete Certificate
the Equipment and facilities	All equipment, facilities, devices, units and software required to supply in the Contract. Maintenance equipment and measurement apparatus for keeping a function and condition of them are also included.
Sub-system	Components of the Equipment and facilities
the Works	All works of "Design, Supply, Installation, Testing, Commission, Training, Warranty, Remedying Defects, Operation and Maintenance" for the Equipment and facilities.
the Project	Set of the Works to be executed and completed within the Contract Period

1-2 Contractor's Obligation and Responsibility

3. **The Contractor** has obligation to conduct the whole of **the Works** to fulfil **the Employer's Requirements** and to ensure the purpose as described in **the Employer's Requirements**.

4. The requirements stated in **the Employer's Requirements** shall be construed as minimum requirement. **The Contractor** shall undertake **the Works** that are not specifically mentioned in **the Employer's Requirements** but essential for efficient usage and operation of **the Equipment and facilities** required in **the Contract**.

5. **The Contractor** shall promptly notify **the Employer** and **the Employer's Representative** of any error, omission, fault, inconsistency or any other defect in **the Employer's Requirements** and **the Contract**, should he discover when reviewing or in the process of execution of **the Works**.

6. **The Contractor** shall undertake the whole of **the Works** on a single responsibility basis such that it covers all contractual obligations.

7. The information shown in the drawings in **the Employer's Requirements** is provided, as reference, for the purpose that **the Contractor** understands approximate locations and images of **the Equipment and facilities**. **The Contractor** shall design **the Equipment and facilities** after consultation and consent with stakeholders.

8. It is **the Contractor**'s responsibility to acquire all permissions, approvals and licenses that may be required for "Design, Supply, Installation, Testing, Commission, Training, Warranty, Remedying Defects, Operation and Maintenance" of **the Equipment and facilities**.

9. For the items which do not comply with **the Employer's Requirement**, **the Contractor** shall submit his proposal to **the Employer's Representative**. **The Contractor** shall explicitly inform, explain and obtain approval from **the Employer's Representative**. **The Contractor** shall be instructed to re-design/re-construct if the proposal of **the Contractor** does not satisfy **the Employer's Representative** and the approval is not obtained. The approval of **the Employer's Representative** may become void later, if the approval is obtained but the items which do not comply with **the Employer's Requirement** is not explicitly informed and explained. In this case, **the Contractor** shall be instructed to re-design/re-construct.

1-3 Abbreviations and Official Names

10. Abbreviations and official names are as shown table below;

Table 2 Official Name

Abbreviations	Official Name
COC-GC	Condition of Contract Part I General Conditions
COC-PA	Conditions of Contract Part II Conditions of Particular Application including Annexes
GTS	Employer's Requirement Part A General Technical Specification
PTS	Employer's Requirement Part B Particular Technical Specification
OMS	Employer's Requirement Part C Operation and Maintenance Specification including Attachment

1-4 Management

1-4-1 Consortium or Joint Venture

11. If **the Contractor** is **a Consortium or a Joint Venture** of two or more firms as members, **the Contractor** shall comply with the following requirements;

(a) One of the member firms shall be designated and authorized as a leader of **the Consortium or the Joint Venture**. Such authorization shall be evidenced by submitting a power of attorney signed by legally authorized signatories of the member firms;

(b) The leader firm shall be authorized to incur liabilities, receive payments and receive instructions for and on behalf of any or all members of **the Consortium or the Joint Venture**; and

(c) All members of **the Consortium or the Joint Venture** shall be jointly and severally liable for the execution of **the Contract** in accordance with **the Contract** terms. Relevant statements to this effect shall be included in the authorization mentioned in item (a) above.

1-4-2 Consortium

12. The leader of **the Consortium** shall be fully responsible for any fault of the other constituent firms of **the Consortium**. The leader shall undertake the entire obligations under **the Contract** just as though it had executed **the Contract** as one single contractor for **the Works**.

1-4-3 Joint Venture

13. The leader of **the Joint Venture** shall act on the execution of the obligations under **the Contract** just as the leader under the case of **Consortium** described above. The representative officers of such **Joint Venture** company shall concurrently be senior members of the leader firm.

14. Should **the Joint Venture** company become bankrupt or insolvent, or have a receiving order made against it, or compound with his creditors, or be a corporation commencing to be wound up, or be under any situation **the Employer** would feel uneasy to leave the execution of **the Contract** to their hands, then the leader shall take over the entire obligations independently under **the Contract** just as though it were the single Contractor under **the Contract**.

15. Should the leader of **the Joint Venture** become bankrupt or insolvent, or have a receiving order made against it, or compound with his creditors, or be a corporation commencing to be wound up, or be under any situation **the Employer** would feel uneasy to leave the execution of **the Contract** to his hand, a new leader shall be selected amongst the partner companies of **the Joint Venture**. The procedure of designating and authorising the leader shall be followed as stated in the clause 1-4-1 Consortium or Joint Venture, item (a), (b) and (c) in this **GTS**.

1-4-4 Organizational and Membership Changes

16. Should **the Consortium or the Joint Venture** which had been awarded **the Contract** ever undergo any membership or organizational changes or alterations, **the Employer** shall be advised beforehand for its consent on any changes or alteration.

1-4-5 Work Programme

17. **The Contractor** shall submit **a Work Programme** to **the Employer**. **The Work Programme** shall be prepared to complete the scope of work stipulated in **the Employer's Requirements**. The time required for design, procurement of parts and components, assembly, development, in-house testing, factory test, inland and overseas transportation, custom clearance, installation, adjustment, stand alone test, combination test, test on completion and commissioning shall duly be reflected. The timing of training and submission of documentation shall also be indicated in **the Work Programme**.

18. Safety plan, measures in emergency and health plan shall be included in **the Work Programme**.

19. **The Work Programme** shall clearly show the relationship between tasks and events that precede or follow a particular task and indicate the critical path that controls the total project period. **The Work Programme** shall also show the expected start and end date and period required in units of weeks.

20. **The Contractor** shall monitor the progress of **the Works** and shall update **the Work Programme** as an event occurs, a task is completed or delay is noticed for any event or task. **The Contractor** shall submit the updated **Work Programme** when there is a change in **the Work Programme**.

21. The submission of **the Work Program** shall not release **the Contractor** from **the Contractor**'s obligation to complete **the Works** within the time stipulated in **the Contract**.

1-4-6 Progress Meeting

22. **The Contractor** shall be available for **Progress Meetings** which will be called for by **the Employer's Representative**. The notice of such meetings shall be given by **the Employer's Representative** in writing, and delivered to **the Contractor**'s field office in Hyderabad at least seven (7) days in advance of the planned meeting date.

1-4-7 Progress Report

23. **The Contractor** shall prepare monthly **Progress Report** and submit three (3) printed copies and a soft copy to **the Employer** and **the Employer's Representative**. **The Progress Report** shall cover such topics as overall progress of work as against the schedule, list of items submitted to **the Employer's Representative** for approval, list of approval and instructions given by **the Employer's Representative**, major events occurred during the period covered, summary of tests conducted, issues encountered or expected to encounter, planned work schedule for the next period, amount claimed and disbursed, safety plan for construction works, measures for accident and emergency, health plan and other items that will be agreed upon by **the Employer** and **the Contractor**.

1-5 Contractor's Personnel and Their Responsibilities

24. **The Contractor** shall provide all personnel necessary for the execution of **the Works**, such as **the Project Manager**, **the Chief Engineer** and **the Senior Local Personnel** to fulfil **the Contractor**'s obligations under **the Contract**.

25. These personnel shall be capable of reading, writing and conversing in English.

26. **The Project Manager** and **the Chief Engineer** shall be either the prime or alternate candidate persons nominated in the prequalification. If **the Contractor** wishes to propose other persons to these positions, the proposed candidate shall have equivalent or better qualifications to/than those originally nominated. **The Contractor** shall submit **Curriculum Vitae** of the proposed candidate for **the Employer Representative**'s approval.

1-5-1 Project Manager

27. **The Contractor** shall assign **the Project Manager**.

28. **The Project Manager** shall be a full-time assignment during **Contract Period**. **The Project Manager** shall reside in Hyderabad during this period.

29. In case of absence of **the Project Manager** in Hyderabad, **the Contractor** shall assign a person staying in Hyderabad. The assigned person shall delegate the **Project Manager**'s authority and responsibility. The assigned personnel shall have capability equivalent to **the Project Manager. The Contractor** shall inform **the Employer** of this assignment and obtain approval of **the Employer**

30. **The Project Manager** shall be assigned at least on needed basis from the date of issuance of **the Commissioning Certificate** to the date of issuance of **the Contract Completion Certificate**.

31. **The Project Manager** shall be an engineer and well versed in **the Work** and, computer system or data communication system. **The Project Manager** shall also have sufficient experience in managing system construction project. **The Project Manager** shall be capable of conversing fluently in English.

32. **The Project Manager** shall act as **the Contractor**'s representative under the Conditions of Contract and shall be bestowed with authority to receive and carry out the directions and instructions from **the Employer** and/or **the Employer's Representative**. **The Project Manager** shall be given full responsibility to enter into negotiations regarding overall matters arising out of **the Contract**.

1-5-2 Chief Engineer

33. **The Contractor** shall assign **the Chief Engineer**.

34. **The Chief Engineer** shall be a full-time assignment during **Design Build Period**. **The Chief Engineer** shall reside in Hyderabad from the start of installation work until the date of issuance of **the Commissioning Certificate**.

35. **The Chief Engineer** shall have sufficient knowledge and experience in hardware, software, installation, testing and operation of **the Equipment and facilities**. **The Chief Manager** shall be capable of conversing fluently in English.

36. **The Chief Engineer** shall be responsible for the technical aspect of **the Works** and involve in technical discussions with **the Employer** and/or **the Employer's Representative**. **The Chief Engineer** shall supervise and be responsible for all the installation works, all the testing procedures and the training. **The Chief Engineer** shall be empowered to enter into negotiations regarding issues arising from **the Works**, so that **the Works** are carried out within the **Contract Period**.

1-5-3 Senior Accounting Officer

37. **The Contractor** shall assign Senior Accounting Officer.

38. **The Senior Accounting Officer** shall be a full time participant to **the Project** during **Contract Period**. **The Senior Accounting Officer** may be stationed in his home country, but shall be available in Hyderabad whenever the necessity arises.

1-5-4 Accident Prevention Officer

39. **The Contractor** shall assign the Accident Prevention Officer.

40. **The Accident Prevention Officer** shall be assigned during **Design Build Period**. **The Accident Prevention Officer** is not required to be present at work site all the time but he shall visit the site and inspect the safety condition on need basis.

41. **The Accident Prevention Officer** shall be responsible for monitoring and assessing hazardous and unsafe situations and develop measures to assure personnel safety and site safety. **The Accident Prevention Officer** shall correct unsafe acts of staff or conditions at work site. **The Accident Prevention Officer** shall also be responsible to prepare and implement a health plan.

42. **The Accident Prevention Officer** shall submit a safety plan report to **the Employer's Representative** and obtain the approval prior to the commencement of the construction works at sites. The safety plan report shall include safety measures, accident prevention measures, response to the accidents, measures for any other emergency, liaison structure and health plans.

43. **The Accident Prevention Officer** shall immediately take measures in cooperation with **the Project Manager** in case of accident or emergency, and shall report to **the Employer** and **the Employer's Representative** as soon as possible after the accident or emergency.

44. It is acceptable that one of the key personnel acts as **the Accident Prevention Officer** provided that he shall have sufficient knowledge of work site safety.

1-5-5 Quality Control Manager

45. **The Contractor** shall assign **the Quality Control Manager**.

46. **The Quality Control Manager** shall be assigned during **Design Build Period**.

47. **The Quality Control Manager** shall be an experienced personal in quality control and testing. **The Quality Control Manager** shall be responsible for preparing and conducting **the Quality Assurance Program** of **the Works**. **The Quality Control Manager** shall be an independent manager and directly communicate with **the Employer's Representative** for

status/progress of testing, and defects of the system if any. **The Quality Control Manager** shall act as a single contact point to **the Employer** and **the Employer's Representative**.

1-5-6 Electrical Engineer

48. **The Contractor** shall assign **the Electrical Engineer**.

49. The Electrical Engineer shall be assigned during **Contract Period**.

50. **The Electrical Engineer** shall be at least a graduate in electronics, electrical engineering, or systems engineering. **The Electrical Engineer** shall be well versed in the electronic and electrical devices such as those used in the facility management system, factory automation and other industrial process control or monitoring systems. **The Electrical Engineer** shall have a minimum 10 years of professional experience and minimum five (5) years of experience in the maintenance of electronic and electrical devices.

51. **The Electrical Engineer** shall be responsible for the install, operation and maintenance of all **the Equipment and facilities**. **The Electrical Engineer** shall be responsible for developing and implementing the work plan for the equipment. **The Electrical Engineer** shall also be responsible for locating the fault, identifying the defective part, and preparing and implementing the remedial plan for malfunction and damages to the equipment and cables.

1-5-7 Information Technology Engineer

52. **The Contractor** shall assign **the Information Technology Engineer**.

53. **The Information Technology Engineer** shall be assigned during **Contract Period**.

54. **The Information Technology Engineer** shall be at least a graduate in information technology, computer science, electronics, electrical engineering, or systems engineering. **The Information Technology Engineer** shall be well versed in the server network such as those used in the facility management system, factory automation and other industrial automation systems. **The Information Technology Engineer** shall have a minimum ten (10) years of professional experience and minimum five (5) years of experience in the facility management or maintenance of server, workstation and network.

55. **The Information Technology Engineer** shall be responsible for the install, operating and maintenance of the servers, workstations, local area network, wide area network, and software and database used in **the Equipment and facilities**. **The Information Technology Engineer** shall be responsible for developing and implementing the work plan for software and network. **The Information Technology Engineer** shall also be responsible for attending any software and network problems.

1-5-8 Senior Local Personnel

56. **The Contractor** shall employ at least one (1) **Senior Local Personnel** as deputy Project Manager.

57. **The Senior Local Personnel** shall be a full-time assignment during **Contract Period**, and shall reside in Hyderabad during this period.

58. **The Senior Local Personnel** shall be an engineer specialized in electrical engineering, electronics, computer network engineering or communication. **The Senior Local Personnel** shall be familiar with the local standards and regulations related to electrical works, electronics, and communication and information technology project.

59. **The Senior Local Personnel** shall participate in the technical discussions, testing procedures and engineering activities of the installation works, adjustment and testing and also be involved in all the maintenance activities.

1-5-9 Curriculum Vitae

60. Within fourteen (14) days after the date of **the Contract** execution, **the Contractor** shall submit to **the Employer's Representative** the detailed written statements including the names, duties, **Curriculum Vitae** of all key personnel to be assigned to **the Project**. Where subsequent replacement or additions of the personnel is proposed, replacements or additions shall have equivalent or better qualifications and experience to/than those originally assigned, and detailed written statements of their experience and qualifications shall be submitted to **the Employer's Representative** prior to their assignment.

1-6 Factory Tests, Inspection and Certification

1-6-1 General

61. All equipment, device, unit, components, parts, and software comprising **the Equipment and facilities** shall be tested, inspected and certified prior to the acceptance in accordance with **the Employer's Requirements**.

1-6-2 Quality Assurance System

62. **The Contractor** shall institute **a Quality Assurance System** to fulfil the requirements of **the Contract**. **The Contractor** shall submit the details of **the Quality Assurance System** including procedures and related documents to **the Employer's Representative** and obtain approval of **the Employer's Representative** before design and installation stage is commenced. It shall be duly signed by **the Contractor** before submission to **the Employer's Representative**. Fulfilment of **the Quality Assurance System** procedures shall not relieve **the Contractor** of any of his duties, obligations or responsibilities under **the Contract**.

1-6-3 Factory Test

63. For the off-the-shelf or routinely manufactured equipment, **Factory Test** with the attendance of **the Employer's Representative** may be exempted and replaced by submission of a test or inspection certificate issued by the original manufacturer. In addition, **the Contractor** shall submit the factory's routine testing procedures to **the Employer's Representative** for review if so requested.

64. For the equipment requiring special order or specifically designed and manufactured for this Project, **the Contractor** shall submit proposed factory test items and test procedures for review and approval of **the Employer's Representative** as soon as **the Design** is accepted. The test items shall include as a minimum the following:

- Power supply tests (sampling test),
- Input voltage fluctuation (sampling test),
- Instantaneous power interruption (sampling test),
- Environmental tests for temperature and humidity ranges as specified (sampling test),
- Insulation resistance (sampling test),
- Dielectric strength (sampling test),
- Rainproof test for field equipment (sampling test),
- Equipment power on/off tests,
- Equipment interface tests,
- Visual appearance tests of condition of equipment and its parts, and wiring,
- Dimensions tests (Test for all major equipment and sampling test for others) and
- Functional tests (Test for all major equipment and sampling test for others)

65. Where there is no appropriate apparatus for testing the target equipment, the test shall be executed by connecting to a simulator.

66. **The Contractor** shall prepare the necessary facilities, testing device, measuring apparatus, recording system, power supply, simulator and other arrangements to conduct the test.

67. **The Factory Test** shall be conducted in appropriate environment and the performance of equipment shall be able to evaluate correctly and easily.

68. **The Contractor** shall notify **the Employer's Representative** at least 14 days in advance of each factory test to be undertaken and shall make arrangement for **the Employer's Representative** to attend the test if requested. In case that **the Employer's Representative** or his designated representative decides not to attend any of the tests, the tests shall be carried out under the direction of **the Quality Control Manager**.

69. **The Quality Control Manager** shall provide duly certified copies of the test results to **the Employer's Representative** regardless of attendance of **the Employer's Representative**.

70. If **the Employer's Representative** is satisfied with the test results, he shall notify **the Contractor** in writing to that effect, and **the Contractor** may then ship the equipment. If **the Employer's Representative** judges that equipment is defective or produced not in accordance with **the Contract**, he may reject the equipment, and will inform **the Contractor** of the reasons in writing. In both cases, the approval or disapproval of the test results shall be notified within 14 days after receiving the duly certified copies of the test results from **the Quality Control Manager**.

1-6-4 Defects

71. In case of defects detected during any of the tests, the cause of the defect shall be ascertained and documented. For minor defects that do not substantially degrade the quality or performance of the items being tested and do not require re-design of the equipment, the defect shall be rectified and the test be repeated. For major defects that substantially degrade the quality or performance, or in case that **the Employer's Representative** instructs to re-design the equipment, **the Contractor** shall re-design the equipment. Should a design change be required, **the Employer's Representative** shall be informed and the revised

design shall be submitted to **the Employer's Representative** for his review and approval. In case of the design change, the tests for the equipment shall be conducted again.

1-6-5 Sampling Test

72. **Sampling Test** shall be performed for one (1) or several units of each type of equipment. **The Sampling** shall be selected amongst the same type of units by **the Employer's Representative**.

73. During **the Sampling Test**, if any defect is detected in any of the samples, the entire lot shall be tested and the results shall be reported to **the Employer's Representative** for his review and approval. If not complied with this requirement, the equipment manufactured in the same lot shall not be regarded as having passed the test.

1-6-6 Inspection

74. All equipment shall be **inspected** before delivery and upon arrival at site. **The Quality Control Manager** shall submit a report which states that all equipment and/or its parts are duly delivered and arrive at the site to **the Employer's Representative. The inspection** shall be performed for the following:

- Painted surfaces and colour
- Condition of assembling
- Design and dimensions
- Parts arrangement
- Wiring within the cabinet
- Damage during transportation

1-6-7 Cost of Test and Inspection

75. **The Contractor** shall bear the cost required for conducting the inspections and tests at factory or on the premises of manufacture. The cost required for conducting the inspections and tests means facilities, tools, labours, consumable parts, measurement apparatus and appliances which are required.

76. **The Contractor** shall bear the travel cost for attendance of **the Employer's Representative** on the inspections and tests which are conducted inside or outside of India. The travel cost for attendance means domestic or international flight, transportation within the country where the factory test is held, hotel accommodation and daily allowance.

77. **The Employer** shall bear the travel cost for attendance of the staff of **the Employer** on the inspections and tests, regardless of inside or outside of India.

1-6-8 Location of Test

78. **The Contractor** shall notify **the Employer's Representative** of location of factory test at least one (1) month before in case that the factory test is held in India and two (2) months before in case that the factory test is held in foreign countries.

1-7 Tests on Completion

1-7-1 General

79. **Tests on Completion** shall be applied to **the Equipment and facilities** including software, network equipment, communication and power cables, and power conditioning equipment after they are installed at the specified location, and adjusted and tested by **the Contractor**. **Test on Completion** shall be conducted at three levels; 1) **Test on Completion for a Portion of the Works** and 2) **Test on Completion for the Works**.

80. **Test on Completion for a Portion of the Works** shall be conducted for testing a group of equipment, at site, that functions as a sub-system and achieves part of the system functions.

81. **Test on Completion for the Works** shall be conducted for assuring that the whole of **the Equipment and facilities** including supporting systems, such as network equipment, power conditioning equipment and maintenance equipment, comply with the purposes and descriptions of **the Employer's Requirements** under the real environment.

82. Above **Test on Completion** shall be conducted in the presence of **the Employer's Representative**.

83. **The Contractor** shall keep a clear record of all tests conducted. The record shall include time, place, equipment, procedure, functions, persons attending, and faults or problems encountered. The test results, even if they are not satisfactory, shall be documented and submitted to **the Employer's Representative** for review.

84. **The Contractor** shall prepare or arrange the test apparatus and equipment, temporary connection, testing software, test data, test vehicle, tools and other items required for conducting **Test on Completion**. **The Contractor** shall also arrange necessary environment such as electricity, water, gas, communication, computer network and internet required for **Test on Completion**. The cost of such items shall be included in the cost of test in the Pricing Document and no separate payment shall be made.

85. If permanent electrical supply is available, **the Employer** will provide electricity free of charge to **the Contractor** for the purpose of conducting **Test on Completion**.

1-7-2 Test on Completion for a Portion of Works

1) General

86. **Test on Completion for a portion of Works** shall be conducted to confirm that **the Equipment and facilities** comply with **the Employer's Requirements** and are approved by **the Employer's Representative**.

2) Procedure

87. **The Contractor** shall give due notice to **the Employer's Representative** seven (7) days in advance of the proposed date and request the attendance of **the Employer's Representative**. The due notice shall be given together with contents of **Test on Completion for a portion of Works**, including test items, test procedures, criteria for judging the test results, and test schedule.

88. **Test on Completion for a portion of works** shall be performed in units of **the Works** in accordance with the Price Schedule No.4 in Pricing Document.

89. Should **the Employer's Representative** judge the test results satisfactory in accordance with **the Employer's Requirements,** he shall notify **the Contractor** in writing that the equipment is ready for **Test on Completion for the Works**. Should **the Employer's Representative** judge the test results unsatisfactory in accordance with **the Employer's Requirements,** he may reject the approval of **Test on Completion** and he shall inform **the Contractor** in writing within a reasonable time as to the reasons why the test results were rejected. **The Contractor** shall remedy the defects pointed out by **the Employer's Representative** as soon as possible.

1-7-3 Test on Completion for the Works

1) General

90. **Test on Completion for the Works** shall be conducted to confirm that **the Equipment and facilities** comply with **the Employer's Requirements** and are approved by **the Employer's Representative**. Should there be any specifications or drawings which have been approved by **the Employer's Representative** during **the Works** carried out till this time, **the Equipment and facilities** shall also comply with these specifications or drawings.

91. During **the Test on Completion for the Works**, all functions of the Equipment and facilities shall be tested.

2) Procedure

92. **The Contractor** shall give due notice to **the Employer's Representative** at least 21 days in advance of the proposed date and request the attendance of **the Employer's Representative.** The due notice shall be given together with contents of **Test on Completion for the Works**, including test items, test procedures, criteria for judging the test results, and test schedule.

93. **Test on Completion for the Works** shall be performed in accordance with the Price Schedule No.4 in Pricing Document.

94. **The Contractor** shall forward duly certified copies of the test results to **the Employer's Representative** when the tests are successfully completed. Should **the Employer's Representative** judge the test results satisfactory, he shall notify **the Contractor** in writing that **the Works** are ready for **Trial Operation**.

95. Should the major defects not be covered during **Test on Completion**, **the Contractor** shall prepare a proposal to remedy the defects and submit to **the Employer's Representative** for review and approval. **The Contractor** shall not take corrective actions before the proposed remedies are approved by **the Employer Representative.**. Minor faults and defects detected during **the Tests on Completion** may be corrected during the trial operation period.

96. The major defect shall be defined as defects that they would cause the following results, but not limited to, and be instructed by **the Employer's Representative**:

- Failure to start up,
- Failure to connect to network,
- Failure to communicate with related equipment,

- Failure to monitor and control related equipment,
- Failure to shut down,
- Unexpected shutdown or halt,
- Loss of data, erroneous data or inconsistency of data,
- Low quality of image,
- Failure to changeover to backup server (in case of redundant system),
- Failure to restart and resume operation after power recovery and
- Performance not meeting the purpose described in **the Employer's Requirements.**

1-7-4 Trial Operation

97. **Trial Operation** shall be conducted for two (2) months after **Test on Completion for the Work**. The operation of the system will be carried out by **the Contractor** under direct control of **the Employer**. In case of any critical or major defect found during **the Trial Operation**, **the Trial Operation** shall restart after remedying the defects. In this case, the date of **the Trial Operation** shall be counted again from the date of approval of resolving the remedy by **the Employer's Representative**, and **the Trial Operation** shall be conducted for another two (2) months. In case of a minor defect, **the Contractor** shall remedy it to the satisfaction of **the Employer's Representative** and the trial operation shall continue.

98. **The Commissioning Certificate** shall be issued when **the Employer** and **the Employer's Representative** judge the results of the Trial Operation satisfactory.

1-7-5 Test Items

99. The following items, but not be limited to, shall be tested, except the items which are not applicable, for **the Test on Completion for a Portion of Works**, **Test on Completion for the Works** and **Trial Operation**.

100. Test Items for Power Supply Equipment:

- Power failure and recovery
- Voltage and frequency
- Bypassing function.

101. Test Items for Equipment:

- Power-on and power-off
- Power failure and recovery function in conjunction with UPS
- Log-on and Log-out
- Operation log and retrieval
- Self diagnosis
- Fault status and alarm detection, recording and retrieval
- Screen display
- Network connection
- Data or message communication between related equipment and facilities
- It shall include: Test for checking continuity of data exchange for the case of interruption and recovering of the communication line during data exchange.

- Functions required in **the Employer's Requirement** such as data receiving, processing, storing to files and database
- Screen display and reporting of processed data
- Retrieval of past data from files and database
- Remote monitoring and diagnosis of related equipment and facilities
- Automatic changeover to standby server and recovery (in case of redundant system)

102. Test Items for Video Related Equipment:

- Power-on and power-down
- Power failure and recovery
- Camera selection and control
- Video recording
- Video search and retrieval
- Video display
- Fault status and alarm detecting, displaying and recording
- Data communication between upper side servers

1-7-6 Testing of Optical Fibre Cable Installation

103. **The Contractor** shall measure the attenuation of the light source after each splicing of optical fibre cable for all cores. The test shall be conducted with the calibrated measuring apparatus. The test results shall be compiled into a report and submitted to **the Employer's Representative** for his review and approval.

1-7-7 Testing Apparatus

104. **The Contractor** shall prepare and make available suitable types of testing and measuring **Apparatus** required for **Test on Completion**. **The Testing Apparatus** shall be suitable for the test in terms of test items, range, capacity, accuracy, and response time. If **The Testing Apparatus** requires periodic calibration, the calibrated **Apparatus** shall be used.

105. The cost for purchasing, leasing or depreciation such **Testing Apparatus** shall be included in the appropriate cost items of the price schedule and no separate payment shall be made.

1-7-8 Indicator and Test Interface

106. Each device and equipment to be supplied by **the Contractor** shall be provided together with indicator, lamp, monitor or other necessary associated apparatus to assure normal operation of the equipment. Suitable interface shall be provided to the equipment which is connected to the testing apparatus for control and monitoring of the equipment.

1-8 Power Supply and Communication Network

1-8-1 Power Supply

107. **The Employer** will perform all the necessary application procedures to the power supply companies for the power for permanent use for **the Equipment and facilities**. All the expenses charged by the power supply companies will be borne by **the Employer**. This clause does not apply to the electricity required for the execution of the installation works. **The Contractor** shall make his own arrangement for electricity required for the execution

of the installation works and testing, including the required charge for the electricity for **the Works**.

1-8-2 Communication Network

108. **The Contractor** shall perform all the necessary application procedures to the communication carriers for the communication network to be supplied to all sites. All the expenses charged by the communication carriers including the application fee and communication cost shall be borne by **the Contractor** until the date of issuance of **the Contract Completion Certificate**.

1-9 Work Area Safety and Traffic Control

1-9-1 General

109. **The Contract** shall pay utmost attention to the work area safety and traffic safety during the installation works. When working on or near the construction or installation work site, all persons shall wear the proper personal protective equipment including but not limited to hardhat and reflective safety vest. Open toe shoes shall not be allowed.

110. Obstructions and excavations in the work areas shall be adequately fenced and guarded at all times and proper traffic control equipment shall be installed to protect the workers and the public. Particular attention shall be paid to the positioning of traffic barriers and traffic cones. Unnecessary blocking of traffic lanes shall not be permitted. Roads shall not be used for the unnecessary storage of materials.

111. Adequate traffic control equipment shall be in place before work begins and all such equipment shall be removed immediately when the work is completed. As work progresses, warning devices which were appropriate at one time but are no longer applicable shall be removed immediately.

112. Signs, lights, barriers and other traffic control equipment shall be maintained in good order and in the correct position during day and night. Signs shall be neat, clear and legible at all times.

113. Should **the Employer's Representative** or relevant authorities request or **the Contractor** judge as necessary, **the Contractor** shall arrange the required personnel for assuring safety under **the Accident Prevention Officer**. The number of personnel for safety shall be sufficiently assigned. The number of personnel for safety to be assigned shall be approved by **the Employer's Representative**.

114. Compensation for meeting the requirements of this section shall be included in **the Contract** Price and no separate payments will be made therefore.

115. **The Contractor** shall also obtain necessary permissions from authorities related to use of the existing road in case that controlling traffic and/or works on the road are required for execution of **the Works**.

1-9-2 Warning Signs

116. All work area warning signs shall conform to the requirements in the relevant regulations in Hyderabad.

117. A "LANE CLOSED AHEAD" and a "LANE CLOSED" sign shall be placed upstream of the lane closure site at a distance of approximately 100 meters and 50 meters respectively when one lane of the roadway is closed. These signs shall be placed further upstream of the work area if more than one lane of the roadway is closed.

118. All work area warning signs shall be made of reflective sheet or material if the signs are to remain in place during hours of darkness.

1-9-3 Temporary Warning Flashers

119. Temporary warning flashers shall be used throughout a day if traffic cones, barricades or other barriers are to remain in position during day and night. Lamps shall be kept alight at all times. The flashers shall clearly mark the site of obstructions and delineate the transition zone.

1-9-4 Traffic Cones

120. Traffic cones shall be placed on the roadway upstream of the work site to form a transition taper. The length of the transition taper shall be at least 50 meters so as to guide traffic smoothly from the full width section to the narrowed down section. Spacing between the cones shall be no more than 10 meters.

1-9-5 Plant and Equipment

121. All equipment for installation works and obstruction on the roadway shall be removed at night in case that the traffic is allowed to use the roadway during the installation works and it is possible to remove the equipment and obstruction. In case of the equipment and/or obstruction located at 2 meters from the edge of the roadway, the installation works and obstructions on the roadway shall be demarcated with two red lights during nights for clear visibility to the road users for safety. The red lights shall be vertically suspended from the point of the obstruction. During the day, a red flag shall be projected on the roadway side beyond the equipment and obstruction

1-9-6 Vehicles for the Works

122. Vehicles that are used for **the Works** and that are required to travel slowly or to stop frequently shall be made as conspicuous as possible. This shall be achieved by painting them in a distinctive colour or painting the rear portion with diagonal stripes of a contrasting colour or providing flashing lights on the top of the vehicle. They shall also have a plate on the rear side with the words "SLOW MOVING".

1-9-7 Safety Plan

123. **The Contractor** shall prepare and submit a **Safety Plan** before commencement of **the Work** at site for approval of **the Employer's Representative**. **The Safety Plan** shall describe the precautions and measures to be followed by all members of **the Contractor** including the staff of subcontractors to prevent **the Contractor**'s staff and general public from accident during **the Work**. It shall also contain the emergency response measures in case of accident.

1-10 Documentation

1-10-1 General

124. The documentation shall contain complete details of how the system is actually built, and how it works, together with complete operating and maintenance information. The documentation shall consist of the following manuals and drawings:

- Manager's manual (including outline manual)
- Operator's manual (including outline manual)
- System operator's manual
- Maintenance manual (including outline manual)
- Design manual
- Software manual
- Hardware manual
- As-built drawing

125. The documentation shall be a detailed presentation with text and illustrations. All documentation shall be in English, and shall be subject to the approval by **the Employer's Representative**.

126. The documentation process shall include the preparation, editing, submittal for approval, publication, delivery and acceptance of the documentation in accordance with the requirements of **the Contract**.

127. The documentation as listed above shall be updated and re-submitted during the defect liability period if there is any change made to the system or if errors, omissions or inconsistencies are found in the manuals and drawings.

1-10-2 Preparation of Documentation

128. All documentation shall be prepared in a clear, concise manner with appropriate illustrations. Except otherwise specified by **the Employer's Representative**, all documentation except drawings shall be prepared on A4 size sheets with plastic protective covers. Drawings shall be printed on A3 size sheet, in principle, in a separate volume with plastic protective covers. All documentation shall have an issue number, revision number and date. A uniform style and format shall be followed as much as possible.

129. Five (5) printed copies and ten (10) sets of electronic files on CD-ROM or DVD of all documentation, manuals and as-built drawing shall be submitted. Electronic file shall be in the latest version of portable document format such as PDF file format. In addition, proposed drawings submitted at the time of tender in the latest version of AutoCAD shall be included on CD-ROM or DVD.

130. In order to maintain liaison between **the Contractor** and **the Employer's Representative**, documentations for each sub-system or equipment shall be submitted by **the Contractor** to **the Employer's Representative**. All system manuals shall be available at the beginning of training.

131. Should changes or modifications be required in any of the documents previously submitted, **the Contractor** shall fully describe the changes or modifications, and immediately submit them to **the Employer's Representative** for approval.

1-10-3 Standard Documentation

132. Standard documentation shall be provided for the computer and peripherals (hardware and software), programming manuals including the languages to be used, communication network equipment, uninterruptible power supplies, and other standard products manufactured by a third party, and to be supplied under **the Contract**.

1-10-4 Manager's Manual

133. **The Contractor** shall prepare and submit **Manager's Manual** to be used by **the Manager** for his daily operation. The manual shall include brief non-technical description of all **the Equipment and facilities**. It shall present the detail procedures for all operations associated with the management and supervision of **the Equipment and facilities**.

134. Non-technical explanations shall also be provided to the items which appear on the print-outs and displays.

135. Detail manual and outline manual shall be provided.

1-10-5 Operator's Manual

136. **The Contractor** shall prepare and submit operator's manual to be used by the operators for their daily operation. The manual shall explain the procedure to log-on and log-off for operator console and other procedures necessary for daily operation. In addition, the manual shall describe the operating procedure of **the Equipment and facilities** at all sites including field sites.

137. The description shall be plain and concise in a step-by-step manner using illustrations and photos as much as possible. The details of the internal mechanism are not required in the manual.

138. The manual shall also describe the action to be taken by operator in exceptional cases. The description shall be limited to the operation of **the Equipment and facilities**.

139. Likewise, the manual shall describe the actions to be taken when any of the devices comprising **the Equipment and facilities** becomes defective or malfunctions.

140. Detail manual and outline manual shall be provided.

1-10-6 System Operator's Manual

141. This manual shall consist of concise set of procedures with a minimum of detailed technical description in connection with internal works for various parts of the system. Cross references to the relevant manuals for the detailed technical descriptions shall be provided.

142. The manual shall list specific procedures of both hardware and software operations that may have to be followed either by programmers or hardware engineers. The descriptions shall therefore be basic and detailed.

143. The manual shall include a step-by-step procedure of operation for all components. The step-by-step procedure shall include, but not limited to, switching on/off power, starting up

and shutting down the system, loading the operating programs, checking that they are properly running, operation and control of roadside equipment and equipment at centre, system backup and restoration, software configuration, version up of the operating system and other software provided by the third party, update of software developed by the software supplier and use of utility programs through keyboard and monitor display. In addition to the routine operation, procedures shall be provided for fault diagnosis. Typical symptoms shall be listed, with corresponding corrective or emergency actions that need to be taken.

1-10-7 Maintenance Manual

144. Detail manual and outline manual shall be provided. The manual shall describe both preventive and corrective maintenance procedures in such detail that competent maintenance personnel can perform the proper maintenance work by reading this manual.

1) Preventive Maintenance

145. The manufacturer's recommended procedures for proper preventive maintenance shall be indicated to ensure reliable equipment operation. Specifications including defined tolerances for all electrical, mechanical and other applicable measurements and adjustments shall be listed. Periodical repainting and lubrication servicing shall also be described.

2) Corrective Maintenance

146. The information necessary for isolation and repair of failure and malfunctions shall be provided. Accuracies, limitations and tolerances for all electrical, physical and other applicable measurements shall be described. Instructions for disassembly, overhaul, replacement, testing and reassembly shall be provided.

147. Fully detailed step-by-step instructions shall be given where a failure to follow special procedures would result in danger to operating or maintenance personnel, damage to the equipment, improper operation, or other irrevocable results. Instructions and specifications shall be included for such maintenance work that may be accomplished by specialized technicians and engineers in a modern electro-mechanical workshop. Instructions concerning special test set-up, component fabrication, use of special tools, jigs and test equipment shall be included.

148. Maintenance procedures shall cover the routine check-up, diagnosis of faults, trouble shooting, testing, setting up, adjustments, cleaning, replacement of units and operation of test equipment or measuring apparatus.

1-10-8 Design Manual

149. The design manual is intended to provide an overall description of **the Equipment and facilities**. The design manual may be divided into sections to cover all and every aspect of the system. The description shall be plain. The details of operation shall be left to other manuals with adequate reference to them. The manual shall provide cross references to the relevant manuals of the system wherever it is necessary.

150. **The Design** manual shall completely describe all functions, inputs, and outputs. It shall include methods of inputs and obtaining outputs, data structure and its content, format, sequence, and timing. The system structure shall be described. The description of the system

structure shall include all the data flow paths through the system and all the data files in the system. The functional relationship of the system shall be clearly described. It shall include the description of the relationship of the computer programme modules amongst one another and with all peripherals, monitor displays, control desks, servers, transmission equipment, detectors, CCTV, and other equipment. An overall system flow diagram shall be also provided.

1-10-9 Software Manual

151. The software manual shall be project oriented. The software manual shall therefore include the application programs and database.

1) Structure

152. The manual shall describe the overall software structure with particular attention to the points at which further user programs can be interfaced. It is essential that the relationship of program modules, their priority, and their calling sequences are explained in such a manner that it may be clearly understood, especially by any competent programmer who wishes to specify or interface a new program into the system.

2) Program Logic/Function

153. Operational objectives for each program shall be described. All logic and transformations on the input data in order to generate output data and accomplish system functions shall be described, together with their interaction, sequencing and time requirements. Derivations of any mathematical equations shall be stated if appropriate.

3) Flowcharts

154. Each major section of the programming logic shall be presented in greater detail. The details shall be developed into a format of flowcharts or other graphical methods using statement and decision blocks to show the flow of information and processing. Sufficient information shall be presented within each statement and decision block to describe what is being accomplished. Mathematical or engineering terminology and equations shall be incorporated when necessary to fully describe the operations to be performed.

4) Output Formats

155. Sample output formats both printout and monitor display shall be provided from actual printer output and monitor display with explanation for each item on the output format. All outputs shall be in English.

5) Database

156. The format of all data in the database shall be given together with the structure, type, format, length, default value, and range of allowable value, if any. For constant file that contains system parameters and constants, their initial or default values shall also be shown.

6) Programs on CD/DVD

157. As part of the documentation, **The Contractor** shall provide a copy of all source programs that have been coded for the system on a CD-ROM or DVD in a ready for compilation status. The source programs shall be compatible with the flowcharts and program listings. In

addition, a copy of the operating system, utility programs and other programs used in the servers within the limit of copyright of the original developer shall be provided on a CD-ROM or DVD which can be readily loaded.

1-10-10 Hardware Manual

158. This manual shall provide a complete description of the hardware of all **the Equipment and facilities**. Documents regarding component systems shall be bound in separate volume for convenience of use. For off-the-shelf equipment and device, the standard manual provided by the manufacturer will be accepted.

159. The following information shall be provided for each applicable equipment or component:

1) Functional Descriptions

160. All information necessary to fully explain the basic function or use of the equipment shall be provided. It shall include a block diagram presentation of the equipment.

2) Operating Procedure

161. The operating procedure shall be fully described in a simple and clear language with appropriate illustrations. Explanation and usage shall be provided for the all keys and switches. Meaning of all meters and indicators shall also be explained.

162. A list of applicable test instruments and tools required to perform necessary measurements shall be included. Setup tests and calibration procedures shall also be described if applicable.

1-10-11 As-Built Drawings

163. **The Contractor** shall submit two (2) printed copies of as-built drawings to **the Employer's Representative** prior to the commencement of **the Test on Completion for a portion of Works**. In addition, **the Contractor** shall submit three (3) printed copies of as-built drawings and one (1) set of soft copy of all as-built drawings to **the Employer's Representative** prior to the issuance of **the Commissioning Certificate**.

164. As-built plans and drawings to be submitted by **the Contractor** shall include but not be limited to the following:

- System configuration diagram
- Equipment layout plan at all sites
- Communication cable and power cable layout plan and profile at all site
- Detail drawings of all equipment
- Detail drawings of supporting poles and gantries and basement
- Data connection diagram for each sub-system
- Communication cable and power cable connection diagram
- Power distribution diagram
- Physical and logical communication network diagram with network address
- Conduit, pull box, junction box and manhole layout

165. These plans and drawings shall incorporate changes made during the installation. A uniform legend shall be used throughout the documentation.

1-10-12 Submission Schedule

166. The initial version of the documentation shall be submitted as per the schedule presented below.

Table 3 Submission Schedule of the Documents

No.	Documentation	Submission
1	Manager's manual	30 days before the intended date of management and operations training
2	Operator's manual	
3	System operator's manual	30 days before the intended date of management and operations training
4	Maintenance manual	30 days before the intended date of maintenance training
5	Design manual	Prior to Test on Completion
6	Software manual	30 days before the intended date of maintenance training
7	Hardware manual	30 days before the intended date of maintenance training
8	As-built drawings	Prior to Test on Completion

1-11 Training

1-11-1 General

167. A training program as specified herein shall be provided for the management and operation of **the Equipment and facilities**. The subjects and contents of the training shall focus on the operation of **the Equipment and facilities**. The training on the administrative procedure will be provided separately. All trainings shall be conducted in Hyderabad.

168. **The Contractor** shall develop all materials required for training and furnish twenty (20) copies of each manual, class note, visual aid, and other instructional materials to **the Employer** for distribution to the attendants. The manuals, instructions, and training notes shall be in loose-leaf binder form. The materials for training shall be prepared based on Manager's Manual, Operator's Manual, System Operator's Manual and Maintenance Manual stated in previous section.

169. The outline of the lectures or demonstrations and a sample or description of all training aids shall be submitted to **the Employer's Representative** for review at least thirty (30) days prior to their proposed presentation or use. Written approval by **the Employer's Representative** of these materials shall be required prior to the scheduling of training sessions and/or the production in quantity of any training materials

170. The minimum content and duration (contact hours) of classroom training sessions shall be as specified herein, plus such other topics as are necessary, to ensure effective training. Notwithstanding the contact hours specified herein, all training shall be effective and shall be completed by **the Contractor** to the satisfaction of **the Employer**.

1-11-2 Management and Operations Training

171. The management and operations training shall include classroom instructions, on-site demonstrations, and follow-up reviews. The training shall be designed for **the Employer**'s engineers, equipment operators (up to 10 persons) or the staff of the party designated by **the**

Employer. The training shall cover all aspects of operations and procedures of **the Equipment and facilities**.

172. The initial classroom instructions and on-site demonstrations shall be completed after **the Test on Completion for a portion of Works** but before the issuance of **Commissioning Certificate.** The contents of this training shall include as a minimum the following:

- Roles and duties of manager and operator
- Outline and details of the Equipment and facilities
- Basic procedure (Power on and power off, Normal start-up and shut-down)
- Operation of the Equipment and facilities
- Outline and detail data flow diagram
- Mechanism of data processing
- Network configuration overview and details
- Operation of server and console
- Trouble shooting of the Equipment and facilities
- Interpretation and response to alarms and fault messages
- Communication and power cable connections and distribution
- Use of diagnostic programs and procedures

1-11-3 Maintenance Training

173. **The Contractor** shall provide maintenance training to **the Employer**'s staff or to the staff of the party designated by **the Employer** during the trial operation using maintenance manuals provided under **the Contract**. The training shall consist of system maintenance, software maintenance and hardware maintenance.

1) System Maintenance Training

174. The system maintenance training shall include but not be limited to the following:

- Modification of system parameters and version control
- System backup and restoration
- Switchover between prime and backup servers
- Use of diagnosis program

2) Software Training

175. The software maintenance training shall include but not be limited to the following:

- Software configuration
- Version up of the operating system and other software provided by the third party
- Updating of software developed by the software supplier
- Software backup and restoration
- Database backup and restoration
- Use of diagnosis programs

3) Hardware Training

176. The hardware maintenance training shall be provided for all **the Equipment and facilities**, and shall include but not be limited to the following:

- Preventive maintenance
- corrective maintenance
- Routine check-up, adjustment and cleaning
- Diagnosis of all equipment
- Identification of defective unit
- Disassembly and assembly procedure
- Replacement of unit, printed circuit and parts
- Test procedure and threshold
- Use of measuring apparatus

1-12 Operation and Maintenance Services

177. **The Contractor** shall provide Operation and Maintenance Services to the Equipment and facilities. The Operation and Maintenance Services shall be carried out in accordance with OMS of **the Employer's Requirement**.

178. **The Contractor** shall provide full operation service for all operation for **the Equipment and facilities** including reporting daily work and issue to **the Employer**, meeting and consultation with **the Employer**, narrow work for the ITSC operation. **The Contractor** shall provide personnel in accordance with **the Employer's Requirement: OMS**.

179. **The Contractor** shall provide full maintenance service for **the Equipment and facilities**. All the necessity works required properly maintaining **the Equipment and facilities** such as preventive maintenance, corrective maintenance, repairing failure, supplying and replacement of spare parts and/or equipment, daily inspections, periodic inspection, supply and replacement of daily use consumables, such as paper and toner for printers, are included in the maintenance service.

180. **The Contractor** shall provide maintenance personnel, maintenance equipment and tools, transportation and other facilities necessary for effectively carrying out the maintenance service.

181. All the expenditure towards spare parts, maintenance equipment, replacements, operation and maintenance personnel etc. to meet the service level requirements of employer shall be included as part of the in the Price Schedule No. 7 Operation and Maintenance Services of the Pricing Documents.

1-13 Spare Parts

1-13-1 General

182. **The Contractor** shall furnish the spare parts and equipment for prevention maintenance and corrective maintenance during the **Operation and Maintenance Period**.

1-13-2 Parts Supply Guarantee

183. **The Contractor**, his legitimate successor or his representative designate, shall guarantee supply of any parts, components or equipment incorporated in **the Equipment and facilities** for a period of ten (10) years after issuance of **the Commissioning Certificate** in order to satisfy the design life of **the Equipment and facilities**.

184. Should **the Contractor** fail to supply the requested parts, components or equipment because of discontinuation of production of such particular items or any other reasons beyond his control, **the Contractor** shall satisfy **the Employer**'s need by whatever appropriate substitutes with approval of **the Employer**. It shall always be in such a manner that the substitutes maintain or improve the system's performance or capabilities as a whole.

185. This clause shall not necessarily be construed that **the Contractor** be required to maintain the inventory to cover the entire items for anticipated requirement for such purpose through the 10 years' period.

186. **The Contractor** shall be paid for such supply duly made at such costs as he shall charge to his domestic customers on similar occasions at the time plus freight, insurance, import custom and duties, handling charge and other related expense actually paid.

1-14 Maintenance Equipment

187. The Contractor shall provide the maintenance equipment to conduct the suitable **Operation and Maintenance Service**.

188. Unless the details and specifications are specified in **the Employer's Requirements**, **the Contractor** shall select the types and model of the maintenance equipment that he considers adequate for the maintenance work of **the Equipment and facilities**. **The Contractor** shall include at least following equipment:

- Maintenance computer (Notebook computer)
- Digital multi meter
- Insulation resistant meter
- Dielectric strength meter
- Ground resistance meter
- Oscilloscope
- Network analyser

189. Maintenance computer shall be a notebook computer at least with the following minimum specifications:

Table 4 Minimum Specification of the Maintenance Computer

No.	Item	Specifications
1	Type	Notebook PC A4size
2	Processor	Latest mid range processor for notebook
3	Memory	4 G byte or more capacity
4	Hard disk	Serial ATA type, 2.5 inch 500 GB or more capacity
5	Display	15.6 inch size LCD or equivalent size, LED back light type, Full HD resolution display type
6	Interface	USB 2.0 , USB 3.0, Display port, LAN port
7	Peripheral	DVD multi disk, memory reader slot, Optical wireless mouse
8	Ethernet	10/100/1000BASE-T, Hi-speed WIFI
9	Operating	Latest Windows(c) OS

No.	Item	Specifications
	system	
10	Software	Microsoft Office Latest version AutoCAD Latest version The database access software to **the Equipment and facilities**

190. Operation, simulation and diagnosis software developed specifically for **the Equipment and facilities**, if any, shall be supplied in CD-ROM or DVD. They shall be also installed in the maintenance computer.

2 Design Requirements

2-1 Standards

2-1-1 General

191. All the **Equipment and facilities** that **the Contractor** supplies shall be new and subject to the acceptance test to the satisfaction of **the Employer's Representative**. Unless other standards are specifically required to be complied with herein or in **the Contract**, all materials and components used under **the Contract** and all design calculations and tests shall be performed in accordance with Indian standards.

192. In the absence of such standards in India, relevant clauses of international standards including but not limited to International Electro technical Commission (IEC), Institute of Electrical and Electronic Employer's Representatives (IEEE), International Organization for Standardization (ISO), International Telecommunication Union Telecommunication Standardization Sector (ITU-T) shall be applied.

193. In the absence of such standards in India and in the international standards mentioned above, industry standards generally accepted and approved in one of the major industrialized countries such as Great Britain, Japan, U.S.A, and Germany shall be applied.

194. Whenever reference is made in **the Employer's Requirements** to the British Standards (BS), Japanese Industrial Standards (JIS), American Association of State Highway Transportation Officials (AASHTO) standards, American Society for Testing and Materials (ASTM) standards, and American National Standards Institute (ANSI) standards, and the like, it shall be understood that equivalent internationally acknowledged standards will be accepted.

195. If **the Contractor** offers materials, equipment, design calculations or tests which conform to the standards other than those specified standards, full details of the differences between the proposed standard and the specified standards shall be submitted when required by **the Employer's Representative**.

2-1-2 Relevant Standards as Reference

Table 5 Relevant Standards as Reference for Digital Transmission

Item	Standards
BER/CER/DER	ISO/IEC 8825-1:1995 Information technology - ASN.1 encoding rules - Part 2: Specification of Basic Encoding Rules (BER), Canonical Encoding Rules (CER) and Distinguished Encoding Rules (DER)
Ethernet	8802-3:1995(ISO/IEC) [ANSI/IEEE Std 802.3, 1995 Edition] Information technology -- Telecommunications and information exchange between systems -- Local and metropolitan area networks -- Specific requirement -- Part 3: Carrier sense multiple access with collision detection (CSMA/CD) access method and physical layer specifications. 8802-3:1996(ISO/IEC) [ANSI/IEEE Std 802.3, 1996 Edition] Information technology -- Telecommunications and information exchange between system -- Local and Metropolitan area networks -- Specific requirement -- Part 3:

Item	Standards
	Carrier sense multiple access with collision detection (CSMA/CD) access method and physical layer specifications. EIA/TIA568B (AT and T-258A) Commercial Building Telecommunications Wiring Standard, 1991
Fast Ethernet	IEEE 802.3u-1995 IEEE Standards for Local and metropolitan area networks: Supplement to Carrier sense multiple access with collision detection (CSMA/CD) access method and physical layer specifications: Media access control (MAC) Parameters, Physical Layer, Medium Attachment Units, and Repeater for 100Mb/s Operation, Type 100BaseT (Clauses 21-30) (ANSI) EIA/TIA568B (AT and T-258A) Commercial Building Telecommunications Wiring Standard, 1991
FDDI	ANSI X3.166-1989 (R1995) Fiber Distributed Data Interface (FDDI) Physical Layer Medium Dependent (PMD) ANSI X3.148-1988 (R1994) Information Systems - Fiber Distributed Data Interface (FDDI) - Token Ring Physical Layer Protocol (PHY) ANSI X3.139-1987 (R1997) Information Systems - Fiber Distributed Data Interface (FDDI) - Token Ring Media Access Control(MAC) ISO/IEC 9314-3:1990 Information Processing systems - Fiber distributed Data Interface (FDDI) - Part 3: Physical Layer Medium Department (PMD) SO 9314-2:1989 Information processing systems - Fiber Distributed Data Interface (FDDI) - Part 2: Token Ring Media Access Control (MAC) ISO 9314-1:1989 Information processing systems - Fiber Distributed Data Interface (FDDI) - Part 1: Token Ring Physical Layer Protocol (PHY)
FTP	RFC 959 File Transfer Protocol, J. Postel, J.K. Reynolds, Oct-01-1985
Giga Ethernet	IEEE 802.3ab : Physical coding sublayer (PCS), physical medium attachment (PMA) sublayer and baseband medium, type 1000BASE-T IEEE 802.3z : Media Access Control(MAC) Parameters, Physical Layer, Repeater and Management Parameters for 1000 Mb/s Operation
G.703a	TTC JT-G703-a Leased Line Secondary Rate User-Network Interface Layer1
HTTP	RFC 1945 Hypertext Transfer Protocol -- HTTP/1.0. R. Fielding, H. Frystyk, T. Berners-Lee, May 1996 RFC 2068 Hypertext Transfer Protocol -- HTTP/1.1. R. Fielding, J. Gettys, J. Mogul, H. Frystyk, T. Berners-Lee, January 1997 (Status: PROPOSED STANDARD) RFC 2616 Hypertext Transfer Protocol /1.1 June 1999 RFC 2617 HTTP Authentication: Basic and Digest Access Authentication, June 1999
H.261	ITU-T Recommendation H.261 (1993),Video codec for audiovisual services at p x 64kbit/s
IP	RFC 791 Internet Protocol. J. Postel. Sep-01-1981
I.430	TTC JT-I430 ISDN Basic User-Network Interface Layer1

Item	Standards
I.431	TTC JT-I431-a ISDN Primary-Rate User-Network Interface Layer1
MPEG 2	ISO/IEC 13818-1:1996 Information technology - Generic coding of moving pictures and associated audio information: Systems ISO/IEC 13818-2:1996 Information technology - Generic coding of moving pictures and associated audio information: Video ISO/IEC 13818-3:1998 Information technology - Generic coding of moving pictures and associated audio information - Part 3: Audio ITU-T Recommendation H.222.0(07/95) - Information technology - Generic of moving pictures and associated audio information: Systems ITU-T Recommendation H.262(07/95) - Information technology - Generic of moving pictures and associated audio information: Video
MPEG 4	ISO/IEC 14496-1:2010 Information technology – Coding of audio-visual objects –Part 1: Systems ISO/IEC 14496-2:2004 Information technology – Coding of audio-visual objects –Part 2: Visual ISO/IEC 14496-3:2009 Information technology – Coding of audio-visual objects –Part 3: Audio
PER	ISO/IEC 8825-2:1996 Information technology - ASN.1 encoding rules - Part 2: Specification of Packed Encoding Rules (PER)
PPP	RFC 1661 The Point-to-Point Protocol (PPP), W. Simpson, July 1994
SNMP	RFC 1157 Simple Network Management Protocol (SNMP), J.D. Case, M. Fedor, M.L.Schoffstall, C. Davin, May-01-1990
TCP	RFC 793 Transmission Control Protocol. J. Postel. Sep-01-1981
TFTP	RFC 1350 The TFTP Protocol (Revision 2), K. Sollins, July 1992
UDP	RFC 768 User Datagram Protocol. J. Postel. Aug-28-1980
V.24/V.28	ITU-T Recommendation V.24(10/96) - List of definitions for interchange circuits between Data Terminal Equipment (DTE) and Data Circuit Terminating Equipment (DCE) ITU-T Recommendation V.28(03/93) - Electrical characteristics for unbalanced double - current interchange circuits
X.21	ITU-T Recommendation X.21(09/92) - Interface between Data Terminal Equipment and Data Circuit Terminating Equipment for synchronous operation on public data network

196.

Table 6 Relevant Standards as Reference for Digital Transmission

Item	Standards
ANSI/TIA/EIA-568B	Commercial Building Telecommunications Cabling Standard

Table 7 Relevant Standards as Reference for Cable Installation

Item	Standards
BS 2484	Specification for straight concrete and clayware cable covers

Item	Standards
BS 4121	Specification for mechanical glands for rubber and plastic insulated cables
BS 6121	Mechanical cable glands
BS CP 1013	Code of practice for maintenance of electrical switchgear and control gear for voltage up to and including 1 KV.
BS EN 12613	Plastic warning device for underground cables and pipelines with visual characteristics
ISO/IEC 14763	Information Technology: Implementation and operation of customer premises cabling

2-2 System Requirements

2-2-1 System Capacity

197. **The Equipment and facilities** shall have a sufficient capacity in terms of response time, data processing speed, data transmission bandwidth, and storage capacity to monitor and control all equipment connected to the system. The hardware, software and network shall be designed to perform the required function without excessive delay, lack of storage space or any other critical limitations for the system, even when the total number of controlling or monitoring equipment is four (4) times than the scale currently planning.

2-2-2 Reliability

198. The equipment comprising **the Equipment and facilities** shall have high reliability will be measured with following index; MTBF (Mean Time Between Failure), MTTR (Mean Time To Repair) and MTPD (Maximum Tolerable Period of Disruption) in accordance with Service Level Agreement (SLA) specified in O&M Specifications. Expected figures are as shown following;

199. Expected MTBF is a) more than five (5) years for redundant server and network equipment, b) more than three (3) years for general personal computers, and c) more than five (5) years for sensor equipment as a general policy.

200. Expected MTTR is less than 6 hours for each component as a general policy.

201. MTPD shall be less than 24 hours for each **Sub-system** and whole **the Equipment and facilities**.

202. Expected values are specified in **PTS** of **the Employer's Requirements**.

203. The MTBF and MTTR shall be either the calculated figure based on the reliability of components comprising the Equipment and facilities, or the actual MTBF achieved by the same or similar equipment.

204. For the off-the-shelf equipment supplied by the third party, the MTBF published by the manufacturer or supplier will be accepted.

205. **The Contractor** shall understand that equipment shall be replaced or re-designed if the expected figure is not observed and **the Employer** judge dissatisfactory to the results of above figures between commissioning and trial operation.

2-2-3 Design Life

206. All **the Equipment and facilities** shall have a design life of 10 years or longer unless otherwise specifically stated in **the Employer's Requirements**.

207. **The Contractor** shall propose alternatives to meet the specified design life in case that there is any equipment or component that do not have the specified design life. **The Employer's Representative** may approve **the Contractor**'s proposal if it is feasible and economical, and meets the specified design life.

208. If the replacement of equipment is periodically required, the replacement shall be possible without displacing other components and without stopping the whole system. **The Contractor** shall supply parts of equipment in case of fault despite that it is free of charge or it incurs the cost.

209. **The Contractor** may be requested to replace or re-design the equipment if the specified design life is not expected or **the Employer's Representative** judges unsatisfactory with the results of the above design life in the period from the date of **Commencement of the Work** to the date of issuance of **Commissioning Certificate**.

210. Design life shall be effective and counted from the date of issuance of **the Commissioning Certificate** and shall not be counted during the construction/installation period.

2-2-4 Support from OEM

211. A support letter from OEM (Hardware & Software) shall be provided by **the Contractor** stating that the supply and replacement of Hardware and Software patches, licenses, updates, upgrades and bug fixes during **the Contract Period** will be provided by the OEM.

2-3 Design

2-3-1 Design Briefing

212. Within 45 days from **Commencement Date** of **the Works**, **the Contractor** shall conduct a design briefing session at a place in Hyderabad which will be instructed by **the Employer**. **The design briefing** shall cover all the system components included in **the Employer's Requirements**. The main objective of the briefing is to acquaint **the Employer's Representative** and **the Employer** with the design concept and outlines of the proposed system, and to allow them to examine whether or not **the Contractor**'s design complies with **the Contract**.

213. **The Contractor** shall reflect instructions provided by **the Employer** or **the Employer's Representative** on the Design under **the Contract**.

2-3-2 Design and Approval

214. Within 60 days from the **Commencement Date** of **the Works**, **the Contractor** shall submit **a Design** to **the Employer's Representative** for his review and **approval**. **The Design** shall provide detailed information of the proposed system, including system configuration, system function, outline dimensions of equipment, block diagrams, input and output, flow charts, interface, design calculation and manufacturer's specification sheets and shall cover all necessary hardware, software, database and operating procedures. **The Contractor** shall

obtain the "Notice of No Objection" or "Notice of No Objection subject to....." from **the Employer's Representative** with regard to **the Design** within three (3) months from the **Commencement Date** of **the Works**. **The Contractor** shall reflect instructions provided by **the Employer** or **the Employer's Representative** on **the Design** under **the Contract**.

215. Delayed submission of **the Design** made beyond 60 days from the **Commencement Date** of **the Works** shall not allow the extension of **the Work** period.

216. **The Employer's Representative** may provide comments on the submitted **Design**. **The Contractor** shall reflect the comments and submit **the Design** again in such case. **The Contractor** shall assure sufficient time for **the Employer's Representative** to review the **Design** submitted again.

217. The extension of **the Work** period shall not be allowed in case that the issuance of the "Notice of No Objection" or "Notice of No Objection subject to....." is not made by **the Employer's Representative** within three (3) months from **the Commencement Date of the Works** due to insufficient time for **the Employer's Representative** to review and approve.

218. The submission of **the Design** shall be made in multiple timings to avoid the situation in which **the total design approval** is submitted in one time with many volumes of document. Individual submission shall be made in units of component of **the Equipment and facilities**.

219. **The Contractor** shall not, without specific **approval** in writing by **the Employer's Representative**, place any material, part or component on order, nor commence manufacturing of any equipment or software coding until **the Design** has been **approved** by **the Employer's Representative**. **The Contractor** shall not make any changes on the **approved the Design** without prior **approval** of **the Employer's Representative**.

220. The approval of the Design by **the Employer's Representative**, however, shall not relieve **the Contractor** from **the Contractor**'s obligation under **the Contract**.

221. **The Contractor** shall submit a design document including shop drawings or prototyping of Graphical User Interface (GUI) and obtain the approval of **the Employer's Representative** before **the Contractor** begins developing software using GUI. The design document shall state data input/edit method and procedure, and display screen image. The prototyping shall show the display screen image and assist easy understanding of the data input/edit method and procedure, and display items and their layouts.

222. **The Contractor** shall submit shop drawings and obtain the approval of **the Employer's Representative** before **the Contractor** begins civil works, metal works, electrical works and architectural works.

2-3-3 Software Design

223. Software portion of **the Design** shall include, as a minimum, description of module, identification of tasks, priority level, execution schedule, input and output, algorithms and parameters, database structure and contents, parameter update procedures, data flow, calling sequences, error detection, backup and recovery and programming languages.

2-3-4 Hardware Design

224. Hardware portion of **the Design** shall include among others the following:

- System configuration diagram (functional and physical system block diagram of the each component system),
- Design of all equipment (environmental and physical design specifications of the equipment considering functions, capacity, input, output, method of operation, response time, delay time, allowance, attenuation, loss and other figures as appropriate for applicable equipment),
- Equipment layout plan at all sites including power receiving point and connecting point with communication carrier,
- Communication cable and power cable layout plan at all sites
- Data connection diagram for each sub-system (Connection, interface and data flow between the blocks in the block diagram);
- Communication cable and power cable connection diagram
- Power distribution diagram;
- Physical and logical communication network diagram with network address,
- Conduit, pull box, junction box and manhole layout;
- Supporting poles and gantries and basement,
- Power consumption of equipment, and
- Manner of installation.

2-3-5 Fool Proof Mechanism

225. Fool proof mechanism shall be incorporated as much as possible in the operation procedure to prevent any inadvertent mistake to cause serious damage to the system, monitoring and control operation and safety. Frequently used operating sequences shall be described in a step by step manner in accordance with functions of **the Equipment and facilities**.

2-4 Software

2-4-1 Development Policy

226. Structure of software shall be simple and straightforward. All software shall be of modular bases. The interaction amongst the modules shall be minimised to prevent defect of the module from affecting other modules. Interdependency and interaction amongst the modules shall be clearly designed. The modules shall be designed to continuously function without periodical software maintenance. Data and parameters shall be separated from the program and kept in the database.

227. All software shall be designed in such a way that any error shall not cause damage to the system, loss of data nor system shut down.

228. All software shall be designed to assure comfortable response speed for interactive processes and easy-understand screen having features such as enlarging important items, characters and numbers, and using graphs and tables.

229. All software shall be designed to prevent mistakes and misunderstandings.

230. All software shall be tested under different conditions and cases including incorrect operation by the system operator and erroneous data.

2-4-2 Display Language

231. The language to be displayed on the display monitor and printed report shall be English.

2-4-3 Software to be Provided

232. **The Contractor** shall provide a set of software to operate on **the Equipment and facilities**. The software shall be operated as a system and provide functions required in **the Employers Requirements**.

233. **The Contractor** shall develop new software and/or modify the existing software to provide **the Equipment and facilities** to meet all functions specified in **the Employer's Requirements**.

234. The software to be provided shall include but not be limited to the following:

- Software that have the functions required in **the Employer's Requirements**
- Anti-virus software or countermeasure to virus
- Security software (safety measures against external threats)
- Utility software (diagnosis, backup, restore, operation log, fault log)
- Maintenance activity tracking and logging software

2-4-4 Operating System

235. The solution developed shall run on a Operating System (OS) that is provided by the world renowned manufacturer or organization and shall be compatible with industry leading web application servers.

2-4-5 Copyright

236. The software will be either the software that **the Contractor** has or the new software developed for **the Project**. The copyright of the software specifically developed for **the Project** or the customized portion of the software either by **the Contractor** or third party software for **the Project** shall remain with **the Employer**.

2-4-6 Expandability of Software

237. The applications shall be designed to have maximum flexibility to allow **the Employer** to make modifications or add new equipment which may become available or preferable during the design life of the system. **The Contractor** shall provide documentation of the software and source codes to t**he Employer.**

238. Software system shall be built on an open and industry standard architecture and provide a comprehensive API (Application Program Interface) or SDK (Software Development's Kit) to allow interfacing and integration with existing and new systems. The software system shall be capable of supporting the features, but not limited to, the following:

- It shall set and enforce password policies for logins used by directory server administrators
- It shall supports 64-bit and/or 32-bit server implementations
- It shall provide the capability to define global, group and individual password policies

- It shall support role-based access control
- It shall securely encrypt data that is transmitted using Secure Socket Layer (SSL) technology.

2-4-7 Standard Function

239. **The Contractor** shall ensure the following functions as a standard function in each **Sub-system** of **the Equipment and facilities**.

1) System Clock

240. The **Equipment and facilities** shall have a real-time clock that shall be used for the timing of monitoring, data transfer, device control, reports, and print-outs. The clock shall have an internal battery with automatic adjustment function using GPS, Internet, mobile phone or any other references and the clock shall remain accurate within one second. All sub-systems, equipment and devices of **the Equipment and facilities** shall synchronize with the real-time clock.

2) Operating Log

241. All operations performed by the system operator using the operator console shall be recorded as operation log containing the operator's ID and time.

3) Diagnosis Function

242. Each **Sub-system** shall have a diagnosis function to check **the Equipment and facilities** are alive or not by sending the diagnosis signal for every five (5) minute even if they are in a field or other agency. If the **Sub-system** receives a fault signal or there is no response from related equipment and facilities, the **Sub-system** shall issue an alarm and record a fault status in the log.

243. The server of each **Sub-system** shall also have self diagnosis function and shall conduct self diagnosis periodically and automatically without any affect to normal process. The results of self diagnosis shall be stored as server status in the log.

244. All malfunctions shall be recorded with time of occurrence, time of recovery and type of error in the log.

245. The results of diagnosis shall be sufficient to understand a place and course of error and malfunction easily for an equipment user, and be known next action to resolve a problem.

4) Stable Network Communication

246. Data exchange shall be stable even if interruption of the communication line occurs during data exchange. The interruption shall not cause any damage and loss of data.

5) Data Storage Function

247. The collected raw data and process data in the each **Sub-Systems** shall be stored in server storage for analysis and future usage. Status of each server, network equipment and field equipment, such as normal or malfunctioned, together with time stamp shall be stored in server storage.

248. Data retrieval function such as database management software and fault management system shall be provided in order to retrieve the stored data. Required minimum storage period of data is as shown in table below.

Table 8 Minimum Storage Period for Stored Data

Sub-system	Type	Storage Period
Each sub-system	Raw Data	Two (2) years at least
	Processed data	Five (5) years at least
	Status of field equipment (normal or malfunctioned)	Five (5) years at least
	Status of server (normal or malfunctioned)	Five (5) years at least
	Status of network equipment (normal or malfunctioned)	Five (5) years at least
	Operation log of each sub-system	Five (5) years at least
	Error log of each sub-system	Five (5) years at least

6) Test Operation Mode

249. **Equipment and facilities** shall have test operation mode. The test operation mode shall function independently from actual data processing. The mode of actual data processing shall be referred as actual operation mode in this clause.

250. The test operation mode and actual operation mode shall be switched over by switching function with privilege of system administrator. All sub-systems and centre system shall have the test operation mode and they shall be integrated.

251. The actual operation mode shall continuously function in background and the actual data processing shall not be affected during the test operation mode.

252. For carrying out the test operation, the system administrator shall select the roadside equipment which is tested. 'TEST OPERATION MODE' shall be clearly displayed on console/video wall during the test operation mode to differentiate from the actual operation mode.

253. The sub-systems for data collection shall generate test data. The test data shall contain multiple patterns. The sub-systems for data collection shall also have capability to read test data from external data file created by PC.

254. The sub-systems for information provision shall have capability to receive test data in parallel with the actual data and shall simulate the test data provision in the test operation mode.

7) Access Privileges

255. The System Administrator who is appointed by **the Employer** shall manage the entire system and the network. **The Contractor** shall design the system of **the Equipment and facilities** that provides the privileges to the System Administrator to ensure high availability and reliability of servers, consoles and all other network equipment.

256. The System Administrator shall be able to configure the user level privileges, access rights at module level, sub-system level and System level.

257. Usage of the server and consoles shall be controlled by log in/out procedure and different levels of access control shall be provided to restrict usage of certain software by unauthorized persons. All operations shall be recorded as log together with staff identification number.

2-4-8 Third Party Software

1) Third Party Software Generally Required

258. The third party software to be provided shall include but not be limited to the following:

- Operating System (OS) for servers, operator consoles and other equipments
- SQL based database management software
- WEB & Email server software
- SMS gateway software
- Firewall and antivirus program
- Required device drivers for suitable controlling of peripheral devices
- UPS notification utility in conjunction with OS when power shutdown and repair

259. If the third party software is provided in CD or DVD, the original CD or DVD shall be submitted as part of documentation. The requirement is not applicable to the software preinstalled in the server or operator console.

260. If the cost of the operating system is included in the server and operator console hardware, the same may not be mentioned in the schedule of prices.

261. Should **The Contractor** use the third party software, all third party programs shall be widely used and suitable for the application of the Equipment and facilities in terms of functions, capacity, speed, and interface with other software, maintenance and user friendliness.

262. Should **the Contractor** propose the third party program, he shall submit the reason of using it and obtain approval of **the Employer's Representative**.

2) License of Third Party Software

263. The set of the software to be provided shall consist of those provided by third party and those specifically developed for **the Project**. All third party software shall be legally licensed and there shall be no restriction on the use for **the Project**. They shall be registered under the name of **the Employer.** Support and service provided by the software developer including update and revision shall be available to **the Employer**.

2-4-9 Operating Procedures

264. The system operation shall cover the procedures that the system operator follows in monitoring, checking and diagnosing the system operation. The procedure shall include but not be limited to the monitoring of operating status of component devices, modification and updating of operation parameters, connection and disconnection of device, identifying the cause of failure, recovery of the system from failure, and display and printout of various reports.

265. The system operation procedure is the procedure that the operators perform in their daily work. The procedure shall cover the start and end of duty procedure and other procedures necessary for daily operation.

2-4-10 Software Quality Assurance

266. **The Contractor** shall prepare the Software Quality Assurance program that he adopts for developing and integrating the software.

267. The software to be specifically developed for **the Project** shall be fully tested and shall be free from bugs.

2-4-11 Software Installed by the Employer

268. It shall be acknowledged that **The Employer** may wish to install additional software packages to run concurrently with the software provided under **the Contract**. These packages may include, but will not be limited to, the following:

- Software for analysis and statistic to process data collected by the system.
- Software that offers new service to the public users through Internet.

269. The required spare memory and processing power shall be determined by discussion between t**he Employer and the Contractor**, and approved by **the Employer**.

2-5 Hardware

2-5-1 General

270. The following hardware specification shall be ensured in **the Equipment and facilities**.

271. **The Contractor** shall confirm that the hardware sizing meet the expected specification requirements of the various component of **the Equipment and facilities** and performance requirements. **The Contractor** shall submit a certificate in this regard from OEM stating that the sizing of hardware is sufficient and it can be scalable in future as specified in the specification documents.

2-5-2 Workmanship

272. All equipment shall be new and shall be designed and manufactured in soundest manner, using materials most suited to the particular services. All materials shall comply with the latest relevant authorized standards unless otherwise specified or permitted by **the Employer's Representative**.

273. All workmanship shall be of the highest class throughout to ensure smooth and vibration free operation under all possible operating conditions.

274. The design and materials of all parts shall be prepared in a way that does not cause any damage nor distortion under the most severe conditions encountered.

275. All parts shall be referred to the dimensions shown on **the Employer's Requirements – Drawings** and shall be built in accordance with approved drawings. All joints, datum surfaces, and mating components shall be machined and all castings shall be spot faced for nuts. All machined finishes shall be shown on the approved drawings. All screws, bolts,

studs & nuts and threads for pipe shall conform to the latest standards of the International Organization for Standardization and shall all conform to the standards for metric sizes.

2-5-3 Nameplate

276. All equipment supplied under **the Contract** shall have a nameplate. The nameplate shall indicate as a minimum, manufacturer's name, model, type or make, serial number, manufactured month and year. Other information such as input voltage, current, frequency, and complying standards shall be described. The information on the nameplate shall be printed or inscribed in indelible manner.

277. The nameplate shall be firmly attached to the cabinet at suitable position by screw, rivet or adhesive and shall not be easily removed.

2-5-4 Communication Networks and Power Supply

1) Local Area Network

278. A computer system shall have open network architecture. Servers, consoles for operation and network equipment shall be connected by standard Local Area Network (LAN) based on TCP/IP and UDP/IP.

2) Wide Area Network

279. **The Contractor** shall select proper provider service that provides highly reliable and safe network to protect from external threats if **the Contractor** uses Wide Area Network (WAN) for the connection between different two sites such as a central monitoring room and field sites or two difference agencies.

280. **The Contractor** shall design the communication network and ensure safety measures such as firewall at each site for protecting external threats.

3) Power Supply

281. The input power supply of equipment shall not be connected to any electric components except arresters without connecting first through fuses or equivalent device, power switches, earth leakage protection device and circuit breakers.

282. The power supply will be **230V AC** single phase 50 Hz. **The Contractor** shall supply an uninterruptible power supply of suitable capacity with the output of 230V AC single phase.

283. All equipment shall be provided with a clearly visible label indicating the input power supply type (AC or DC) and voltage. All equipment shall operate with the power supply of **230V** plus or minus 10 percent fluctuation, and 50 hertz plus or minus 3 percent fluctuation. All equipment shall operate normally under instantaneous power supply interruption of 20 millisecond or shorter.

284. The power supply voltage available in the field will be **230V AC.** Unless otherwise specified **in the Employer's Requirements**, all field equipment shall be designed to operate directly on **230V AC**. **The Contractor** shall be responsible for arranging the field equipments necessary to receive the power supply.

2-5-5 Environmental Conditions

1) Purpose

285. All equipment shall be designed to operate properly under the environmental conditions encountered at site in Hyderabad and shall conform to the requirements specified herein.

2) Environmental Conditions

286. Indoor equipment shall be designed to operate in the temperature range of 5 to 40 degree Celsius and relative humidity range of 5 to 85 percent. Outdoor equipment shall be designed to operate in the ambient temperature range of 5 to 60 degrees Celsius and relative humidity range of 40 to 95 percent. Adequate protection from moisture condensation, fungus, rust, insects, rodents and dust shall be provided.

3) Surface Treatment of the Hardware

287. Adequate surface treatment shall be provided to all equipment to prevent rust and corrosion due to high humidity or moisture condensation. Unless otherwise specifically directed by **the Employer's Representative** or he approves the proposal of **the Contractor**, all steel housing, pole, fittings and conduit shall be galvanized. All galvanized steel surface shall have a minimum plated zinc amount of 350 $g/m^{2.}$

288. Any signs of rust or corrosion occurred during the Defect Liability Period shall be deemed a defect. T**he Contractor** shall be responsible for correcting the defect, at his own expense, to the satisfaction of **the Employer's Representative**.

4) Wind

289. All outdoor equipment and their support shall withstand instantaneous wind velocity of at least 200 km/h.

2-5-6 Protection against Lightning

290. All outdoor equipment shall incorporate gap arresters or other suitable device approved by **the Employer's Representative** to prevent lightning damages which may enter through input AC lines, communication cables, signal cables, detector feeder cables or other metallic elements exposed to the open air. Likewise, surge arrester or other suitable protection device against lighting shall be provided at suitable points of the local area network and to the devices that could be subjected to the surge caused by the lightning.

291. Compensation for furnishing and installing lightning protection equipment shall be included in **the Contract** price and no separate payment shall be made.

2-5-7 Cabling

1) Type of Cable

292. **The Contractor** shall provide all power supply cable, optical fibre cable, LAN cable, signal cable and communication cable to the equipment that he supplies. The cables shall be of suitable rating for the use. All underground cable shall be placed inside steel, PolyVinyl Chloride (PVC) or High Density PolyEthylene (HDPE) of suitable size and unless otherwise specified no direct burial cable shall be used.

2) Cable Work Design

293. No cable shall be exposed to open air. The installation of non-protected cables on any structure shall not be permitted. All cables shall be placed in trunking or conduit.

294. All trunking, conduit, cables, wiring and earth conductors shall (except when laid in trenches or in ducts) be secured throughout their length and shall be supported on cleats, hangers, trays or racks. No permanent cabling, wiring or conductors shall be left lying loose in or on any part of the structure or buildings. Cables shall be fixed to trays etc. by purpose made fixing clamps or similar device.

295. Under no circumstances, joints in cables shall be made. Cable terminations and joints shall be made by methods and with such materials as are recommended by the makers of the cables and shall be approved by **the Employer's Representative**.

296. **The Contractor** shall supply and erect cable trays, hangers, brackets and supports for all the cables inside buildings. Trays shall be made from sheet steel of adequate thickness and all trays, supports, clamps, etc., shall be hot dipped galvanized after manufacture. Lengths of tray shall be bolted together with approved fish plates and webs. The arrangement of cables on trays shall avoid interference between power cables and communication or data cables.

297. Power cables shall be separated as necessary from control and communication cables by not less than 300 mm except where otherwise approved by **the Employer's Representative**.

3) Cable Delivery

298. Cables shall be of approved manufacture and chosen from Indian manufacturers in so far as is practicable. The cable shall be delivered to site with maker's seals intact and bearing the maker's original guarantee. Seals shall be retained for inspection and record in case of later faults. Short lengths of cable may be delivered out of seals, provided they are suitably packed and **the Employer's Representative**'s approval is obtained beforehand.

299. Unless agreed by **the Employer's Representative**, cables shall have been manufactured not more than 18 months before delivery to Site and the date of manufacture shall be indicated on all consignments. The permission of **the Employer's Representative** shall be obtained before any cables are installed or wrappings removed. Manufacturer's test certificates shall be submitted for all cables.

300. All cables shall be chosen to suit the ambient conditions and rated for the condition of installation. No cable of less than 1.5 square millimetre core section shall be used for power purposes. Cables laid in trunking and on trays shall be rated for multiple runs as appropriate.

301. All cables shall be delivered on robust cable drums with cable ends treated to form an effective seal. When a cable is cut from a drum the cable left on the drum shall be immediately sealed in an approved manner to prevent the ingress of moisture. All cables once they have been cut shall be either terminated in their final position immediately or effectively sealed in an approved manner.

302. No damaged or repaired sections of cable shall be used.

4) Cable Burying

303. In all cases where cables are to be buried in the ground, the work of trenching, backfilling, supply and lying of protective tiles etc. will be carried out under **the Contract**. Trenches shall be excavated in accordance with the requirements of this Clause. The depth of trench shall be such that the cable has a minimum cover of 600 mm.

304. All buried cables shall be armoured and suitably served for the soil conditions and laid on a 75mm deep bed of sand or sifted earth and then covered by the same depth of the same material as per the standard BS EN 12613. Protective tiles complying with BS2484, or alternative to the approval of **the Employer's Representative**, shall then be laid. During the back filling of all cable trenches, coloured polythene tapes 150 mm wide shall be laid at a depth of 150 mm in the trench for warning and cable tracing purposes. The tapes shall give identification by colour and legend, as appropriate, e.g. Yellow - "Power cable below" and Green - "Communications cable below" etc. Cables shall be laid at a minimum depth of 600 mm.

305. Immediately after backfilling, cable and joint markers shall be laid. These shall take the form of concrete slab markers or concrete marker.

306. Each cable run in open ground shall be marked at the point where it leaves the plinth, manhole, sub-station, supply feeder pillar or similar and shall be marked at approximately every 100m along the cable run with an additional marker at each change of direction of the cable run. Slab cable markers shall be installed flat in the ground immediately above the cable with wording e.g. "LV CABLE" or "COMM CABLE" which shall be impressed on each cable marker. **The Contractor** shall confirm and obtain approval of **the Employer's Representative** on the circuit symbols for cable marking to be used. –The letters shall be approximately 25mm high and 6.35 mm (1/4 in.) deep. Heavy duty armoured cable shall comply with BS6121.

5) Cable Pulling

307. All proposals for winching cables into ducts shall be submitted to **the Employer's Representative** for approval. A cable pulling eye shall be used in pulling the cable through conduit. Care shall be taken that no damaging stress shall occur to the cable sheaths.

6) Cable Installation

308. Arrangements for the routing etc., of all cable trunking and conduit runs shall be agreed by **the Employer's Representative** before the commencement of installation. The installation shall be completed to the highest standard of neatness with respect to the visible runs and the arrangement and alignment of apparatus and fittings. Reference should be made to IEC 14763.

309. The positions of equipment are indicated generally in **the Employer's Requirements**, but the exact locations shall be agreed with **the Employer's Representative** before the commencement of installation.

310. Throughout the cable installation care shall be taken to avoid damage from sharp edges, if necessary either by smoothing the edges or by providing fixed liners.

311. Cables on horizontal and vertical trays and racks shall be secured at sufficiently close intervals to ensure that they lie flat, and without crossovers. Cables installed vertically shall be held at sufficiently close intervals to ensure that their weight is taken without excessive clamping pressure. Every cable shall be neatly run vertically horizontal or parallel to adjacent walls, beams or structural members. All cables shall be either fixed to walls, ceilings and building structures or run in ducts and trenches. All cable hangers, cleats, saddles, brackets and similar supporting devices shall be of an approved type and of adequate strength for the cables they are supporting. Spacing of clips, saddles and cleats shall be such as to prevent sagging of the cables at all times during their installed life.

312. Cables shall not be installed with bend radius less than that laid down by the cable manufacturer.

313. Where a number of cables are terminated at any particular item of equipment, then special care shall be taken to ensure that the cables finally approach the equipment from a common direction and are individually terminated in an orderly and symmetrical fashion.

314. All cables shall be carefully unrolled in such a manner as to avoid loops and kinks and care shall be taken to avoid damage to outer sheaths by drawing over sharp obstacles, stones, etc.

315. Cables shall not normally be installed on external surfaces subject to direct solar radiation, but where this is necessary, suitable screens shall be provided to protect all such cables from the direct effect of the sun's radiation. These screens shall be of an approved design, and securely fixed to the structure.

316. Where it is necessary to remove the sheath of a cable, e.g., at a joint, the minimum length necessary shall be removed and the exposed conductor, sheath or armouring shall be adequately covered by tape, sleeve or other suitable means.

7) Trunking Systems

317. All cable trunking shall be made from mild steel sheet or rigid high impact heavy gauge PVC as approved by **the Employer's Representative**, of adequate thickness and stiffened as necessary to prevent distortion. Barriers shall be of at least the same gauge as the trunking, with right angle flanges fixed to the trunking in an approved manner.

318. Trunking shall have turned edges fitted with screwed insert bushes to receive screws for the trunking cover and the cover shall have flanged edges to overlap the trunking body. Steel trunking shall have the pieces and angle connections properly designed and neatly made for electrical continuity, with full protection of cables. The erected trunking shall be properly aligned during erection, neat in appearance and all joints shall butt tightly together.

8) Conduit Systems

319. Unless otherwise agreed, all conduit systems shall be galvanized steel, PolyVinyl Chloride (PVC) or High Density PolyEthylene (HDPE) of suitable size and rating. All fittings for steel conduit shall be galvanized.

320. The sizes of conduits used shall be determined by the number of cables to be drawn in and diameter of the cables, but in no case conduit smaller than 20 millimetres diameter shall be used.

321. Fixing to surfaces of walls shall be by means of spacer saddles securely fixed by screws. Where conduits are concealed or laid in construction floors they shall be held in position with substantial fixings of make and pattern to be approved by **the Employer's Representative**.

322. Where the conduit system terminates at any equipment requiring a non-rigid connection, a flexible conduit shall be installed of the PVC or PVC sheathed metallic type, fully watertight with purpose made connection adaptors as approved by **the Employer's Representative**. Each flexible connection shall include not less than 400 millimetre length of flexible conduit and a separate earth conductor shall be run within the conduit. The flexible conduit shall not be used as an earth continuity conductor.

9) Cable Identification

323. Cable and wire ends shall be prepared using only approved means which avoid damage to conductors and shall be clearly and indelibly marked in accordance with relevant diagrams for wiring up and circuit checking. Each cable shall have an indelible label securely fixed near each end, giving its reference number in the cable 'As-Built' schedules.

324. Throughout the installation, the arrangement of wire and terminal identities shall be consistently followed and shall be as approved by **the Employer's Representative**.

325. Any phase wires in power circuits used for distribution other than 240/415V shall have the phase voltage clearly marked at each end of the conductor.

10) Cable Termination

326. All cables ends into cabinet shall be grounded and sealing boxes shall be supplied when necessary to complete the installation. All materials used in the manufacture of the glands etc., shall have no deleterious effect on the cable core or armouring and shall be non-corrodible. Glands shall be to BS 4121 or an equivalent specification. Spare gland holes shall be fitted with blanking plugs.

11) Terminals

327. Wiring entries into all cabinets shall be made through compression type glands with all wires neatly arranged, securely located, preventing the access of vermin to the cabinet and relieving all terminals of the weight of cables. Terminals shall be coded and identified according to the diagrams and the cable and wire marked to assist in correct marrying of all connections. Terminals shall be of the anti-vibration type, using non-tracking moulded insulation, made by specialist manufacturers and having current ratings not lower than that of the cable or wire which they will receive. Live metal shall be recessed or protected to avoid accidental contact. Terminals used in control, alarm and communication cubicles and in associated cable junction boxes shall be bolted or clipped to carrier rails to permit the addition of extra terminals at a later date.

328. All equipment and junction boxes shall have a separate terminal for each wire including spare cores. Link type terminals shall be provided at the ends of long control, alarm and communication cable runs to facilitate the testing of cables.

329. Jumper leads and transition terminals shall be provided to avoid long runs of cable tails within desks and cubicles. Flexible cable harnesses shall be properly located and protected from chafing, pinching, and tension where they pass from doors or other movable positions.

330. All connections between main switchboards, distribution boards, plant and accessories shall ensure that the correct sequence of phase colours is preserved throughout the system.

12) Earthing and Bonding

331. All exposed metal work and metal not forming part of the electrical circuitry and including equipment cabinets and cable supports shall be bonded together and to earth in accordance with BS CP1013. This requirement shall apply irrespective of the operating voltage and purpose of the equipment. Particular care shall be taken where moving parts are involved that they are earthed in all normal positions. A suitable flexible connection shall be used so that hinges rollers or bearing surfaces are not used for continuity.

332. Substantial non- ferrous earthing lugs or studs shall be fitted for bonding to cable sheaths or other adjacent equipment. Where sections of cubicles are placed together to make a composite unit, a bonding strip shall be provided without break through the intermediate sections to provide bonding between all sections. Earthing and bonding connections shall be stud or clamp type.

333. **The Contractor** shall make all necessary arrangements and provide all necessary items for separate earthing for low level electric circuits if this is required by him. This equipotential grounding shall then be kept insulated from all other earthing or bonding work up to the point of connection to the earth ground electrode.

334. To minimize the induced voltages and currents created by a lightning strike in vicinity, the equipotential grounding and the normal earth rods shall be buried as close as possible to each other without touching. All earth conductors shall leave the building on the same side wall but not in contact with each other except where bonded together.

335. Resistivity tests on supplementary earth electrodes and on earth conductors shall be made as per the directions of **the Employer's Representative**. Earthing network constructed using earthing rods and chambers for frame or equipment body earthing shall be not more than five (5) ohms. The results shall be reported in writing.

336. All cable sheaths, conduits, trunking, trays and the like shall be bonded together and to structural work and connected to adequate earth electrodes. Particular attention shall be paid to the correct bonding and earthing of single core cable sheaths.

337. The design of all plant and ancillaries shall include protection against all effects of stray current, lightning and faults in adjacent circuits which may cause damage or incorrect performance of the equipment.

13) As built Drawing

338. The As-Built drawings shall show the spacing, location and identification of each cable at all major sections of trays, racks and trunking.

14) Insulation Resistance

339. Connection of insulated cable shall be made in such a way that the same insulation shall be achieved by winding insulation tape or applying insulation cover.

(1) Insulation Resistance of the Communication Cable

340. Insulation resistance between conductors and between conductors and ground of communication cable installed indoor shall be 5 mega ohm or larger for a circuit or a system using 250 volt insulation resistance meter. The portion that is not suitable for the test may be removed.

341. Insulation resistance between conductors and between conductors and ground of underground and aerial communication cable shall be 5 mega ohm-km or larger for the section longer than 1 km and shall be 5 mega ohm for the section shorter than 1 km. The portion that is not suitable for the test may be removed.

(2) Insulation Resistance and Dielectric Strength of Power Supply Cable

342. Insulation resistance between conductors and between conductors and ground of low voltage power cable installed indoor, outdoor, aerial and underground shall be 5 mega ohm or larger for the cable section separated by switch. If device is connected to the cable, however, the minimum insulation resistance shall be 1 mega ohm. The measurement shall be made with the voltage shown in table below.

Table 9 Measurement Voltage of Insulation Resistance

Supply Voltage	Measurement Voltage	
	No Equipment	Equipment connected
100 volt class		・ 125 volt
200 volt class	・ 500 volt	・ 250 volt
400 volt class		・ 500 volt

343. The voltage in the column of “Equipment connected” shall be applied to the case in which damage to the equipment is expected by insulation resistance measurement.

2-5-8 Cabinets

344. All equipment cabinets for outdoor uses shall have the protection code specified with smooth exterior and adequate protection against moisture condensation. The cabinet shall be made of hot-rolled mild steel plate complying with JIS G 3131 or equivalent having thickness of 2.3 t or stainless steel plates of adequate thickness. Steel plate cabinets shall be treated with abrasive blasting before zinc thermal painting complying with JIS H 8300 or equivalent. Then two coating of polyurethane resin enamels and varnishes shall be applied before the cabinet is painted in final colour.

345. Cabinet doors shall permit complete access to the interior of the cabinet and shall encompass essentially the whole area of the front surface of the cabinet. All door hinge pins shall be of stainless steel construction.

346. All outdoor equipment cabinets shall be equipped with a build-in lock. All cabinets for the same type of equipment shall have an identical lock. The specified number of keys for each type of cabinet shall be furnished to **the Employer's Representative**.

347. All outdoor equipment cabinets shall be designed to protect the equipment that is inside the cabinet from direct exposure to sunlight and any related damage.

348. All cabinet designs shall consider options such as cabinet size, installation location, mounting method, mounting position, mounting direction and direction of a door opening and closing for easy and safe maintenance.

2-5-9 Radio Interference

349. All data processing and transmission equipment shall be designed to prevent radio interference with the satisfactory operation of other equipment regardless of whether the interference is due to radiation, induction or conduction.

2-5-10 Metering

350. All electrical and electronic equipment shall be provided with waveforms, voltage test points or voltage meters as necessary for indicating circuit conditions.

2-5-11 Supporting Structure

351. **The Contractor** shall be responsible to design the structure and foundation to support field equipment in accordance with the site condition and the load required such as wind load and weight of the equipment. The structures shown in **the Drawings** of **the Employer's Requirements** are provided for reference purpose only.. **The Contractor** shall select the most suitable supporting structure in accordance with site condition, equipment weight and its shape, primarily meeting required purposes of equipment and suitability for conducting easy and safe maintenance.

352. **The Contractor** shall investigate sites where equipment shall be installed, and confirm the most suitable locations in consultation with **the Employer**, **the Employer's Representative** and other relevant authorities. Thereon, **the Contractor** shall prepare shop drawings, obtain approval by **the Employer's Representative**, and start the installation works at the sites..

2-5-12 Measures for Safety and Anti-Theft

353. **The Equipment and facilities** in outdoor field shall be designed to prevent theft or damage by securing the structure using fencing and/or barbed wiring. Measures such as laying the cable through inside of the supporting structure, installation of all units inside tough cabinets, installing ladders only if necessary and from high position and utilize mobile ladders for maintenance work wherever possible.

354. **The Equipment and facilities** in outdoor field shall be designed to secure safety for road users and pedestrians. Wherever necessary, collision avoidance facilities such as reflector, retractable pole and island on road shall be considered to avoid collision.

355. Any of these measures shall not inhibit normal operation and maintenance activities in any way.

356. **The Contractor** shall ensure the anti-theft measures and safety measures at site where the equipment is installed, and obtain approval by **the Employer's Representative**.

2-5-13 Unit of Measurement

357. In all documentations, correspondences, technical schedules and drawings, metric units of measurement shall be employed. On drawings where other units have been used, the metric equivalent shall be marked in addition.

END

SECTION VII. EMPLOYER'S REQUIREMENTS

PART B: PARTICULAR TECHNICAL SPECIFICATIONS

Table of Contents

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1 Definition

1-1 Definition of this document

1. This document is "SECTION VII. EMPLOYER'S REQUIREMENTS PART B: PARTICULAR TECHNICAL SPECIFICATIONS" (hereinafter referred as **PTS**). In addition to "SECTION VII. EMPLOYER'S REQUIREMENTS PART A: GENERAL TECHNICAL SPECIFICATIONS" (hereinafter referred as **GTS**), specifications stated in this **PTS** shall be ensured for **the Equipment and facilities** required in **the Contract**.
2. **The Contractor** shall refer "SECTION VII. EMPLOYER'S REQUIREMENTS PART C: OPERATION AND MAINTENANCE SPECIFICATIONS" (hereinafter referred as **OMS**) and "SECTION VII. EMPLOYER'S REQUIREMENTS PART D: DRAWINGS" (hereinafter referred as **DRAWINGS**) in addition to this **PTS**.
3. Whenever there is a conflict, priority of the document shall follow as stated in the Condition of Contract Part II Condition of Particular Application (COC-PA).

1-2 Definition of Words

4. Definitions of words are as shown in following table:

Table 1-1 Definition of Words

Official Name	Definition
the Contract	As defined in the COC-GC and the COC-PA.
The Employer	As defined in the COC-GC and the COC-PA.
The Contractor	As defined in the COC-GC and the COC-PA.
The Employer's Representative	As defined in the COC-GC and the COC-PA.
Commencement Date	As defined in the COC-GC and the COC-PA.
Commissioning Certificate	As defined in the COC-GC and the COC-PA.
Contract Complete Certificate	As defined in the COC-GC and the COC-PA.
The Project	Set of **the Works** to be executed and completed within **the Contract Period**
The Works	All works of "Design, Supply, Installation, Testing, Commission, Training, Warranty, Remedying Defects, operation and maintenance" for the Equipment and facilities.
Contract Period	Period from **Commencement Date** to the date of issuance of **Contract Complete Certificate**
Design Build Period	Period from **Commencement Date** to the date of issuance of **Commissioning Certificate**
Operation and Maintenance Period	Period from the date of issuance of **Commissioning Certificate** to the date of issuance of **Contract Complete Certificate**
The Equipment and	All equipment, facilities, devices, units and software required to

facilities	supply in **the Contract.** Maintenance equipment and measurement apparatus for keeping a function and condition of them are also included.
Sub-System	Components of **the Equipment and facilities**

1-3 Abbreviations and Official Names

5. Abbreviations and official names are as shown table below;

Table 1-2 Official Name

Abbreviation	Official Name
COC-GC	Condition of Contract Part I General Conditions
COC-PA	Conditions of Contract Part II Conditions of Particular Application including Annexes
GTS	Employer's Requirement Part A General Technical Specification
PTS	Employer's Requirement Part A Particular Technical Specification
OMS	Employer's Requirement Part C Operation and Maintenance Specification including Attachment
DRAWINGS	Employer's Requirement Part D: Drawings
Hyderabad City ITS	Hyderabad City Intelligent Transport System
ITSC	Intelligent Transport System Centre
ITSC System	Equipment and facilities installed in ITSC
Roadside Equipment	Equipment and facilities installed on roadside
ATCC System	Automatic Traffic Counter cum Classifier System
FLD System	Flood Monitoring System
VMS System	Variable Message Sign System
CCTV Camera System	Closed Circuit TeleVision Camera System
MET System	Meteorological Monitoring System
Probe Car System	Probe Data Processing System
Video Wall	Video Wall and related equipment
HMA	Hyderabad Metropolitan Area
HTMS	Highway Traffic Management System of Hyderabad Outer Ring Road
ORR	Outer Ring Road
HGCL	Hyderabad Growth Corridor Limited
TCC	Traffic Control Centre
APSDPS	Andhra Pradesh State Development Planning Society
APSRTC	Andhra Pradesh State Road and Transport Corporation

2 Outline of Hyderabad City ITS

6. Hyderabad City Intelligent Transport System (hereinafter referred as **Hyderabad City ITS**) is a comprehensive traffic control and management system for the road network in **HMA**. It comprises **ATCC System**, **Probe Car System**, **CCTV Camera System**, **MET System**, **FLD System**, **VMS System** and **ITSC System**. These systems shall function as a component of the system. They shall cooperate one another by exchanging data amongst the systems to achieve the intended functions of the total system.

7. The future objective of the **Hyderabad City ITS** is to achieve a unified view across concerned transportation agencies - HMDA, Traffic Police, Traffic Control Centre of **ORR**, Control Centre of APSRTC and Road Administration Agencies such as GHMC. It enables real-time communication and collaboration to take necessary actions and solve issues in efficient manner.

8. **Hyderabad City ITS** shall be capable of continuous operation for 24 hours a day, 365 days a year under the environmental conditions prevailing in Hyderabad.

9. **Hyderabad City ITS** is composed of the following servers, equipment, facilities and **Sub-Systems**:

- Equipment and facilities installed in ITS Centre (hereinafter referred as **ITSC**) such as **ITSC Server**, **WEB & MSG Server**, **Operator Consoles**, **Video Wall**, network equipment
- Four **Sub-Systems** comprising servers installed in **ITSC** and **Roadside Equipment** as follows:
  - Automatic Traffic Counter cum Classifier System (hereinafter referred as **ATCC System**)
  - Flood Monitoring System (hereinafter referred as **FLD System**)
  - Variable Message Sign System (hereinafter referred as **VMS System**)
  - **CCTV Camera System**
- Three other **Sub-Systems** comprising servers installed in **ITSC** and equipment installed in other related agencies to transmit data from other agencies to **ITSC** as follows:
  - Meteorological Monitoring System (hereinafter referred as **MET System**)
  - Probe Data Processing System (hereinafter referred as **Probe Car System**)
  - Highway Traffic Management System of Hyderabad Outer Ring Road (hereinafter referred as **HTMS**)
- Necessary hardware and software of all above as part of **Hyderabad City ITS**

3 Scope of Work

10. **The Contractor** shall conduct "Design, Supply, Installation, Testing, Commission, Training, Warranty, Remedying Defects, Operation and Maintenance" for the Equipment and facilities of **Hyderabad City ITS** as specified in **the Employer's Requirements** (hereinafter referred as "**the Works**").

11. Items of **the Works** consist of the following four (4) major works: 1) **ITSC System**, 2) **Sub-System**, 3) Procurement and Supply of Equipment to Related Agencies and 4) Toll Free Number for **ITSC** Call Centre. The details are described in the subsequent sections.

12. Operation and Maintenance works are also included in **the Contract**. The Operation & Maintenance Specification in **the Employer's Requirements** shall be referred.

3-1 ITSC System

13. **ITSC System** (also referred as **ITS Centre System**) means equipment and facilities installed in **ITSC**. It comprises the following components:

- **ITSC Server**, **WEB & MSG Server** - redundant configuration
- **Video Wall**
- **Operator Consoles** for operation, monitoring and analysis
- Network equipments
- Server racks
- Software required for all equipment and facilities
- Utility software
- Digital Road Map
- Distribution boards, switch boards, UPS, cable and wiring works required for power supply equipment

14. **The Works** also includes the following items:

- Equipment such as cables (metal cable and fibre optic cable), wiring bracket, mounting bracket, cable protection equipment required for the whole computer system to function, and installation works
- Interior works of **ITSC** including furniture and equipment such as desks, chairs, lockers, copy machine, fax machine, air conditioner, air circulation fan, curtain, lighting, white-board, projector screen, power outlets, refrigerator, water server, etc. require for proper operation of **ITSC**.
- Application to the communication service provider for communication network to be supplied to **ITSC**, and necessary installation works of the network equipment

15. **The Employer** will perform all the necessary application procedures to the power supply companies for supplying the power.

3-2 Sub-Systems

16. **Sub-System** comprises the following components:

- Centre-side servers installed in **ITSC**. These servers are connected to **Roadside**

Equipment and/or equipment installed in other agencies

- **Roadside Equipment**
- Equipment installed in other agencies

3-2-1 Centre-Side Servers

17. Centre-side servers are as follows:

- **ATCC Server** in **ITSC** connected to **ATCC Roadside Equipment**
- **CCTV Server** in **ITSC** connected to **CCTV Roadside Equipment**
- **VMS Server** in **ITSC** connected to **VMS Roadside Equipment**
- **FLD Server** in **ITSC** connected to **FLD Roadside Equipment**
- **Probe Server** in **ITSC** connected to Equipment installed in **APSRTC**
- **MET Server** in **ITSC** connected to Equipment installed in **APSDPS**

3-2-2 Roadside Equipment

18. **Roadside Equipment** are **ATCC**, **CCTV**, **FLD** and **VMS**. Number of the **Roadside Equipment** is shown in table below.

Table 3-1 Number of Roadside Equipment to be Installed

No.	Sub-System (Roadside Equipment)	Location Number	Equipment Number	Basic Condition
1	**ATCC System**	35	70	・ Two (2) cameras at one location to monitor both directions
2	**CCTV Camera System**	49	56	・ One (1) camera at 42 locations and two (2) cameras at seven (7) locations to monitor both directions
3	**FLD System**	14	14	・ One equipment at one location
4	**VMS System**	28	28	・ One equipment at one location

19. The general requirements and work items for **Roadside Equipment** are as follows:

- **Roadside Equipment** shall have structures which are suitable for outdoors.
- **Roadside Equipment** shall be supported by robust structures such as cantilever, gantry or pole which are suitable for the equipment and their objectives.
- Civil works for installation are included in the scope of work.
- Cables and materials such as wiring bracket, mounting bracket, cable protection equipment, etc and installation works from the power supplier's poles/junction boxes to **Roadside Equipment** are included in the scope of work.
- Application to the communication service provider for communication network to be supplied to all sites shall be conducted by **the Contractor**. Necessary installation works for the network equipment from junction box of the communication service provider to **Roadside Equipment** is included in the scope of work.
- Safety measures for vehicles and pedestrians, anti-theft measures and easy maintenance measure shall be taken.
- Appropriate measures for lightning protection and grounding shall be taken.

- Necessary software for data collection, processing and transmission from **Roadside Equipment** to **ITSC** shall be prepared.

20. **The Employer** will perform all the necessary application procedures to the power supply companies for supplying the power.

3-2-3 Equipment in Related Agencies

1) Equipment in Andhra Pradesh State Development Planning Society (APSDPS)

21. The connection between **APSDPS** and **ITSC**, data retrieval of meteorological data from ASPDPS and transmission to **ITSC** are included in **the Contract**. **The Contractor** shall arrange and prepare the following items in **APSDPS**:

- **MET Workstation** and network equipment in **APSDPS**
- Required software in the **MET Workstation** in **APSDPS**
- Cabinet for the **MET Workstation** and network equipment in **APSDPS**
- UPS for the **MET Workstation** and network equipment in **APSDPS**
- Communication network of a service provider to transmit the data from **APSDPS** to **MET Server** in **ITSC**. Application to the communication service provider for communication network to be supplied shall be conducted by **the Contractor**.
- Cables and materials such as wiring bracket, mounting bracket, cable protection equipment, etc and installation works in **APSDPS** are included in the scope of work.

22. The required power supply will be provided by **APSDPS**.

23. Data transmission program will be provided by **APSDPS**. **The Contractor** shall provide a program to receive the data from **APSDPS** according to their protocol provided by **APSDSP**.

2) Equipment in APSRTC

24. The connection between **APSRTC** and **ITSC**, data retrieval of probe data from probe data system of **APSRTC** and transmission to **ITSC** are included in **the Contract**. **The Contractor** shall arrange and prepare the following items in **APSRTC**:

- Network equipment in **APSRTC**
- Cabinet for the network equipment in **APSRTC**
- UPS for the network equipment in **APSRTC**
- Communication network of a service provider to transmit the data from **APSRTC** to **Probe Server** in **ITSC**. Application to the communication service provider for communication network to be supplied shall be conducted by **the Contractor**.
- Cables and materials such as wiring bracket, mounting bracket, cable protection equipment, etc and installation works in **APSRTC** are included in the scope of work.

25. The required power supply will be provided by **APSRTC**.

26. Data transmission program will be provided by **APSRTC**. **The Contractor** shall provide a program to receive the data from **APSRTC** according to their protocol provided by **APSRTC**.

3) Equipment in TCC for ORR of HGCL

27. **HTMS** will be prepared in **TCC** for **ORR** of **HGCL**. The connection between **HTMS** for **ORR** of **HGCL** and **ITSC**, data retrieval from **HTMS** server in **TCC** and transmission to **ITSC** are included in **the Contract**. **The Contractor** shall arrange and prepare the following items in **TCC**:

- Network equipment in **TCC**
- Cabinet for the network equipment in **TCC**
- UPS for the network equipment in **TCC**
- Communication network to transmit the data from **TCC** to **ITSC**.
- Required equipment such as cables, wiring bracket, mounting bracket and installation works in **TCC**
- Data transmission program will be provided by **TCC**. **The Contractor** shall provide a program to receive the data from **TCC** according to their protocol provided by **TCC**.

3-3 Procurement and Supply of Equipment to Related Agencies

28. **The Contractor** shall conduct "Procurement, Factory Testing, Supplying, Warranty and Remedying Defects" of the following equipment:

- GPS device to install on 2400 city buses of **APSRTC**.

29. Installation works will be conducted by **APSRTC**.

3-4 Toll Free Number for ITSC Call Centre

30. **The Contractor** shall arrange toll free number for the call centre including the necessary hardware, software and other required items.

31. **The Employer** will arrange for the necessary government approvals.

4 General

4-1 Location of ITSC

32. **ITSC** will be located in the building owned by **HGCL** at Nanakramaguda. The **ITSC** will be accommodated on the first floor. Traffic Control Centre of Outer Ring Road project will be accommodated on the second floor of the building.

4-2 Design Requirements

4-2-1 Relevant Standards as Reference

33. The relevant standards for reference are shown in the table below.

Table 4-1 Relevant Standards as Reference for Data Exchange

Item	Standards
ISO 14817:2002	Transport information and control systems – Requirements for ITS/TICS central data registry and ITS/TICS data dictionaries
ISO 14827-1:2005	Transport information and control systems – Data interfaces between centres for transport information and control system – Part1: message definition requirements
ISO 14827-2:2005	Transport information and control systems – Data interfaces between centres for transport information and control systems – Part 2: DATEX-ASN
ISO 15784-1:2008	Intelligent transport systems (ITS) – Data exchange involving roadside modules communication Part1: General principles and documentation framework of application profiles
ISO 15784-2:	Intelligent transport systems (ITS) – Data exchange involving roadside modules communication Part2:Application Profile-SNMP
ISO 15784-3:2008	Intelligent transport systems (ITS) – Data exchange involving roadside modules communication --- Part3: Application profile-data exchange (AP-DATEX)

4-2-2 General Policy

1) System Reliability

34. **Hyderabad City ITS** shall be capable of continuous operation for 24 hours a day, 365 days a year under the environmental conditions prevailing in Hyderabad.

35. **Hyderabad City ITS** shall have high reliability, accuracy and security in design. The system shall provide built-in fault tolerance, load balancing and high availability for the key components. Shutdown shall not be allowed under any circumstances to ensure the continuous operation. Data backup mechanism shall be used to prevent data loss. Operation log shall be kept to allow tracing of operation in case of any irregularity in the operation of the system.

36. In case that the design requires periodic replacement of any equipment or component, the replacement schedules of such equipment or component shall be described in the Design and in the maintenance manual.

2) System Capacity

37. **Hyderabad City ITS** shall have a sufficient capacity in terms of response time, data processing speed, data transmission bandwidth, and storage capacity to monitor and control all equipment connected to the system. The system, hardware and software shall be designed to perform the required function without excessive delay, lack of storage space or any other critical limitations for the system, even when the number of total **Roadside Equipment** and **Probe** data are four (4) times than the scale currently planned.

3) System Scalability

38. The number of **Roadside Equipment** such as **VMS**, **ATCC**, **CCTV**, **FLD** and **Probe Car** will be increased in the future. **Hyderabad City ITS** shall have system scalability, such as data storage and main memory, for a load to be increased in the future in addition to the capacity described in the clause above.

4) System Expandability

39. **Hyderabad City ITS** will be utilized by HMDA, Traffic Police, Traffic Control Centre of **ORR**, Control Centre of **APSRTC** and Road Administration Agencies such as GHMC in the future. Traffic related data will be shared with these agencies in the future. Therefore, the expandability to connect these agencies with **ITSC Server** shall be prepared in **Hyderabad City ITS**.

5) Development Policy

40. **Hyderabad City ITS** shall support multi-tier architecture and built on an open and industry standard architecture, and provide a comprehensive API (Application Program Interface) or SDK (Software Development's Kit) to allow interfacing with other applications/ systems

41. **Hyderabad City ITS** shall have built-in fault tolerance, load balancing and high availability

42. **Hyderabad City ITS** shall provide the ability for content files to be stored in standard file system and meta data in industry standard RDBMS Tools to retrieve, retrieve with filter, edit, save and display data that are saved as files or in database shall be provided.

4-2-3 ITSC Equipment

1) Power Supply in the ITSC

43. The electrical power supply system for **Hyderabad City ITS** shall consist of AC commercial power, UPS (Uninterruptible Power Supply) and DEG (Diesel Engine Generator).

44. The UPS shall be equipped with enough capacity of battery to supply power to equipment for the case of commercial power interruption. The UPS shall be able to shutdown equipment safely when UPS capacity becomes less in case of commercial power failure, and auto-recover safely on restoration of AC power. DEG shall be supplied by **the Employer**.

45. Each **Sub-System** shall operate under the condition of table below.

Table 4-2 Specification of the Power Supply in the ITSC

No.	Item	Specifications
1	Input voltage	・ AC 230 V / 50 Hz basically. ・ Commercial Power generally with condition of frequent power failure, instantaneous power failure and voltage fluctuation . ・ DEG power supply when Commercial Power failure.
2	UPS	・ 30 minutes or longer backup power supply for equipment in **ITSC.** ・ Ability to shutdown equipment safely when low battery. ・ Ability to start up equipment safely when restoration of AC power. ・ Protection for voltage fluctuation and voltage spike. ・ Output: AC 230 V / 50 Hz sine wave, constant voltage and constant frequency. ・ Long life battery to meet the Design Life. ・ Output condition shall meet equipment to be supplied by **the Contractor.**

2) General Environment in the ITSC

46. General environment in the **ITSC** is as shown below.

Table 4-3 Specification of General Environment in the ITSC

No.	Item	Specifications
1.	Ambient operating temperature	・ 5 - 40 degree Celsius
2.	Ambient operating humidity	・ 5 - 85 % or less (non-condensing)

3) Standard Specification of the Server

47. The server in the **ITSC** shall be a standard model manufactured by internationally reputed manufacturers. Custom built or non-standard equipment shall not be acceptable. The hardware shall comply with the industry open standards based products and should be supported on all platforms such as Dell, Compaq, Hitachi, Toshiba, HP, IBM etc. The computer hardware shall be readily available in Hyderabad, India. Full maintenance support services and availability of consumables, spare parts or replacement units shall also be assured from a third party, based in India. The servers in the **ITSC** shall be redundant servers with an operating server and a standby server. In the event of a failure of the operating server, the standby server shall automatically take over the operation. There shall be no loss of data and no abnormal operation of the system.

48. The servers shall support multi-tasking so that the various functions of the system can be simultaneously carried out without any delay. The load on the central processors of the server shall be of 50% capacity at maximum when all scheduled tasks are concurrently executed. A memory resident program shall be provided to measure the CPU time loading.

49. The servers shall be high-performance, highly reliable x64 system based on 64-bit architecture. **The Contractor** shall supply name of the manufacturer and name of the model,

and supporting service along with necessary document and certification from OEM.

50. The specifications of the server shown in below table are minimum requirement, but not limited to these. **The Contractor** shall provide servers which comply, at least, with these specifications. **The Contractor** shall submit the specification of servers with Design document for review and approval by **the Employer's Representative**.

Table 4-4 Standard Specification of the Server

No.	Item	Specifications
1.	Server configuration	・ Latest redundant server with automatic failover ability ・ Manufactured by internationally reputed manufacturers ・ 10 years hardware supporting warranty ・ Readily available in India ・ Rack mount type enclosure ・ Low energy consumption
2.	Processor	・ Latest stable multi core or multi CPU type processor ・ Having enough ability to process all required work without any delay. ・ X64 system base on 64-bit architecture. ・ Having enough ability to process all required work without any delay.
3.	OS	・ Provided by the world renowned manufacturers such as Microsoft, IBM, Sun, HP and Linux. ・ Multi-tasking operation supporting ・ 10 years supporting warranty
4.	Memory	・ ECC memory or equivalent function ・ Having enough ability to process all required work without any delay, and enough space in operation.
5.	Storage	・ Having more than at least four times of sufficient volume to process all required work and store all required data including temporary data by OS and application in operation. ・ Having latest stable and high speed interface for real-time operation. ・ Data recovery system like RAID.
6.	Back-up	・ High speed and large capacity device for periodical data backup ・ Software/hardware driven data mirroring mechanism to meet the availability criteria mentioned below in case of site outage
7.	Graphic card	・ Two or more video interfaces as RGB Analogue, DVI-D or HMDI to connect display devices. ・ Video interface shall meet the number of monitors and/or other output device connecting a server. ・ Video interface shall display pixel to pixel matching of full HD images.

8.	Peripheral	· DVD with high speed and high capacity multi drive supporting latest standard · High speed and large capacity device for periodical data backup
9.	Availability	· Hot-plug, redundant power supplies · Hot-plug, redundant FAN · Hot-plug drive bays
10.	Network	· 1000/100M Base LAN interface · Dual LAN interface
11.	Security	· Virus protection · Firewall
12.	Reliability	· Nonstop redundant server as a server · Expected MTBF > 5 years x 365 days x 24 hours = 43,800 hours as a redundant server · Expected MTTR < 6 hours · Ability to monitor temperature of CPU & inside casing, moving fan, hard disk status, memory status and peripheral device status · Alerting function when faults. · Latest SNMP supporting
13.	System availability	· Expected MTPD = 0 hours as a whole system · Expected rate of operation = 100% · System availability = MTBF / (MTBF + MTTR) > 99.98%
14.	Serviceability	· Onsite support service. · Automatically alert the service centre without human intervention when the system experiences a system fault.
15.	Power consumption	· 2KVA or less
16.	Server rack	· All Equipment is mounted in 19-inch type server rack.

4) Standard Specification of Operator Console

51. **The Operator Console** in the **ITSC** shall be a standard model manufactured by internationally reputed manufacturers. Custom built or non-standard Equipment shall not be acceptable. The computer hardware shall be readily available in Hyderabad, India. Full maintenance support services and availability of consumables, spare parts or replacement units shall also be assured from a third party, based in India.

52. The specifications of **the Operator Console** shown in table below are minimum requirement, but not limited to these. **The Contractor** shall provide **the Operator Console** that complies, at least, with these specifications. **The Contractor** shall submit the specification of **Operator Console** with Design document for review and approval by **the Employer's Representative**.

Table 4-5 Standard Specification of the Operator Console

No.	Item	Specifications
1.	PC configuration	· Latest compact type desktop PC · Manufactured by Internationally reputed manufacturers

		· 5 years hardware supporting warranty · Readily available in India · Space saving type enclosure · Low energy consumption
2.	Processor	· Latest stable multi core or multi CPU type processor · Having enough ability to process all required work without any delay.
3.	OS	· Latest Windows stable operating system or compatible OS with the server OS. · Multi-tasking operation supporting · 5 years supporting warranty
4.	Memory	· Having enough ability to process all required work without any delay, and enough space for operation.
5.	Storage	· Having at least four times of sufficient volume to process all required work and store all required data including temporally data by OS and application for operation. · Having latest stable and high speed interface as for smooth operation.
6.	Graphic card	· Three or more video interface as RGB Analogue, DVI-D or HMDI to connect display device. · The video interface must fit display monitors. · Video interface shall display pixel to pixel matching of full HD images.
7.	Display monitor	· Two or more monitors that are 22-inch or more size of LCD type widescreen monitor (Full HD) · RGB Analogue, DVI-D or HMDI required as input interface that should be fit video interface.
8.	Peripheral	· DVD with high speed and high capacity multi drive supporting latest standard · Full size keyboard and optical mouse.
9.	Network	· 1000/100M Base LAN interface
10.	Security	· Virus protection · Firewall
11.	Reliability	· MTBF > 3 years x 365 days x 24 hours = 26,280 hours · MTTR < 24 hours · Ability to monitor temperature of CPU & inside casing, moving fan and hard disk status · Alerting function when faults. · Latest SNMP supporting
12.	System availability	· Expected rate of operation > 99.90% · System availability = MTBF / (MTBF + MTTR)
13.	Serviceability	· Onsite support service.

14.	Power Consumption	・ 500VA or less

4-2-4 Roadside Equipment

1) General Requirement

53. **Roadside Equipment** shall have structures which are suitable for outdoors. **Roadside Equipment** shall be supported by robust structures such as cantilever, gantry or pole which are suitable for the equipment and their objectives. Civil works for installation are included in the scope of work. Equipment such as cables, wiring bracket, mounting bracket, cable protection equipment, etc and installation works for the equipment from the power supplier's poles/junction boxes to **Roadside Equipment** are included in the scope of work. Application to the communication service provider for communication network to be supplied to all sites shall be conducted by **the Contractor**. Necessary installation works for the network equipment from junction box of the communication service provider to **Roadside Equipment** is included in the scope of work. Safety measures for vehicles and pedestrians, anti-theft measures and easy maintenance measure shall be taken. Appropriate measures for lightning protection and grounding shall be taken. Necessary software for data collection, processing and transmission from **Roadside Equipment** to **ITSC** shall be prepared.

54. The locations of **Roadside Equipment** shown in **PTS** and **DRAWINGS** are tentative. T**he Contractor** shall examine each location of **Roadside Equipment** to be installed. **The Contractor** shall also confirm the exact proper location at site for installation of each **Roadside Equipment**. **The Contractor** shall coordinate with the relevant authorities and obtain approval of t**he Employer's Representative** for finalisation of exact proper location at site for installation of the **Roadside Equipment**.

2) Power Supply for Roadside Equipment

55. The electrical power supply system for **Roadside Equipment** of each **Sub-System** shall consist of AC commercial power and Uninterruptible Power Supply (UPS) backup system.

56. The UPS shall be equipped with enough capacity of battery to supply power to **Roadside Equipment** in case of commercial power interruption.

57. The UPS shall be equipped with enough capacity of battery to supply power to equipment for the case of commercial power interruption. The UPS shall be able to shutdown equipment safety when UPS capacity becomes less in case of commercial power failure, and auto-recover safety on restoration of AC power. DEG shall be supplied by **the Employer**.

58. Power receiving panel to feed the commercial power shall be supplied and installed in each location.

Table 4-6 Specification of the Power Supply for Roadside Equipment

No.	Item	Specifications
1	Input voltage	・ AC 230 V / 50 Hz basically ・ Commercial Power generally but with existing condition of power failure, instantaneous power failure and voltage fluctuation

		・ DEG power supply when Commercial Power failure
2	UPS	・ three (3) hours or longer backup power supply for equipment in **ITSC** ・ Ability to shutdown equipment safely when low battery. ・ Ability to start up equipment safely when restoration of AC power. ・ Protection for voltage fluctuation and voltage spike. ・ Output: AC 230 V / 50 Hz sine wave, constant voltage and constant frequency. ・ Long life battery to meet the Design Life. ・ Output condition shall meet equipment to be supplied by **the Contractor.** ・ Applying appropriate measures in order to be available even in severe environmental conditions outdoors.

3) General Environment for Roadside Equipment

59. Technical specification of General environment for **Roadside Equipment** is as shown below.

Table 4-7 Specification of General Environment for Roadside Equipment

No.	Item	Specifications
1.	Ambient operating temperature	・ 0 - 50 degree Celsius
2.	Ambient operating humidity	・ 90 % or less (non-condensing)
3.	Protection class	・ IP 55 or higher

4) Cabinet

60. **Roadside Equipment** shall be housed in a rugged cabinet. The specification of cabinet shall follow as stated in the **GTS** and include, but not be limited to, the following;

- ・ The cabinet shall be electrically and mechanically robust and shall have a degree of protection of IP55 or higher specified in "IEC60529 Degrees of Protection Provided by Enclosures (IP Code)".
- ・ The cabinet shall be provided with a ventilating fan for controlling internal temperature, wherever necessary. But the protection code requirements shall be met.
- ・ A right hinged door shall be provided on the front to realize easy maintenance work. The turning direction of the handle shall be counter clockwise.
- ・ The power supply including UPS shall be provided with a circuit breaker.
- ・ The anti-lightning and surge protection complying with the IEC61643-1 shall be provided.
- ・ The cabinet shall be finished with the anticorrosive treatment.

4-3 Tests on Completion

61. After the delivery and installation of **the Equipment** at the site, **Tests on Completion** shall be conducted for each of **the Equipment**.

62. Appearance of **the Equipment** and required operations in a standalone mode shall be examined in this test. Test items shall follow as stated in **GTS** and include, but not be

limited to, the following:

1) Test Items of Roadside Equipment of ATCC, CCTV, FLD and VMS

63. For **Roadside Equipment** of **ATCC**, **CCTV**, **FLD** and **VMS** the following operations test shall be examined:

- Standalone test of **Roadside Equipment**
- **ATCC** image output, image processing function, failure status output and auto power shutdown and recovery when power failure happens.
- **CCTV** image output, camera control function, alarm output, and power failure and recovery
- **FLD** measuring function, data output, self-diagnosis function and power failure and recovery
- **VMS** local operation, display function, self-diagnosis function and power failure and recovery
- Workmanship of anti-theft measures and safety measures of **Roadside Equipment** in accordance with approved drawings
- Workmanship of **Roadside Equipment** according with approved drawings

2) Test Items of FLD Server and MET Server

64. The following operation test shall be examined for the **FLD Server and MET Server** installed in **ITSC**:

- Connection between **Roadside Equipment** and corresponding server in **ITSC System**
- Data receiving, processing, and storing functions
- Retrieval of past data in storage
- Screen display and reporting of processed data
- Fault status detection and storing
- Automatic changeover to standby server and recovery
- Power failure and recovery function in conjunction with UPS.
- Data communication between respective server and **ITSC Server**.

3) Test Items of CCTV Camera Server

65. The following operation test shall be examined for **CCTV Camera Server** installed in **ITSC**:

- Connection between **Roadside Equipment** and corresponding server in **ITSC System**
- Camera selection and control function
- Split screen monitoring function
- Video Recording function
- Video Search and retrieval function
- Video display on the console and LDP
- Fault status and recording
- Automatic changeover to standby server and recovery
- Power failure and recovery function in conjunction with UPS.
- Data communication between server and **ITSC Server**.

4) Test Items of VMS Server

66. The following operation test shall be examined for **VMS Server** installed in **ITSC**:

- Connection between **Roadside Equipment** and corresponding servers in **ITSC System**
- Message creation and composition
- Remote monitoring and diagnosis
- Operation log and retrieval
- Screen display and reporting of operation data
- Alarm detection and recording
- Power failure and recovery function
- Data communication between server and **ITSC Server**.

5) Test Items of ITSC System

67. For **ITSC System** the following operation test shall be examined:

- System operation monitoring and logging
- Automatic changeover to standby server and recovery
- Power failure and recovery function
- Data communication between each server and **ITSC Server**.
- Message generation for e-mail and SMS
- **Video Wall** display and change video source
- Workmanship of server rack, interior, **Video Wall**, etc. According with approved drawings

6) Test Items of Comprehensive Connection Test

68. The comprehensive connection tests between related systems shall be examined:

- Connection between **ATCC System** and **ITSC System**
- Connection between **CCTV Camera System** and **ITSC System**
- Connection between **FLD System** and **ITSC System**
- Connection between **VMS System** and **ITSC System**
- Connection between **APSRTC** Bus Probe Server to **Probe Car System**
- Connection between **Probe Car System** and **ITSC System**
- Connection between **APSDPS** Meteorological Server and **MET Workstation** in **APSDPS**
- Connection between the **MET Workstation** in **APSDPS** and **MET System**
- Connection between **HTMS** server and **ITSC System**
- Comprehensive test with **ITSC System**

4-4 Trainings

69. The management and operation training shall include classroom instructions, on-site demonstrations, and follow-up reviews. The training shall be designed for **the Employer**‘s engineers (up to 10 persons) and shall cover all operations and procedures of **Hyderabad City ITS**.

70. The initial classroom instructions and on-site demonstrations shall be completed after **the Test on Completion for a portion of Works** but before the issuance of **Commissioning Certificate**. The contents of this training shall follow as stated in **GTS** and include, but not

limited to, the following:

1) System Management (Minimum of 8 contact hours)

71. Training shall be included at least following items:

- Roles and duties of system manager and **ITSC** personnel
- System configuration overview
- Network configuration detail
- Setting of network equipment including firewall
- **Sub-System** configuration detail
- Data flow diagram of each **Sub-System** and whole **Hyderabad City ITS**
- Operation of **Operator Console** for system status monitoring
- Operation of **Operator Console** for manager
- Interpretation and response to alarms and fault messages
- Preventive maintenance and corrective maintenance

2) ATCC System (minimum of 4 contact hours)

72. Training shall be included at least following items:

- System configuration
- Communication and power cable connections
- Network configuration
- Data flow diagram
- Mechanism of data processing
- Normal start-up and shut-down procedure
- Operation of **Roadside Equipment**
- Operation of **Operator Console** for **ATCC Server** in **ITSC**
- Interpretation and response to alarms and fault messages
- Preventive maintenance and corrective maintenance

3) Probe Data processing system (minimum of 4 contact hours)

73. Training shall be included at least following items:

- System configuration
- Communication and power cable connections
- Network configuration
- Data flow diagram
- Mechanism of data processing
- Normal start-up and shut-down procedure
- Operation of **Operator Console** for **Probe Server** in **ITSC**
- Interpretation and response to alarms and fault messages
- Preventive maintenance and corrective maintenance

4) CCTV Camera System (minimum of 4 contact hours)

74. Training shall be included at least following items:

- System configuration
- Communication and power cable connections

- Network configuration
- Data flow diagram
- Mechanism of **CCTV** data processing
- Normal start-up and shut-down procedure
- Operation of **Roadside Equipment**
- Operation of **Operator Console** for **CCTV**
- Interpretation and response to alarms and fault messages
- Preventive maintenance and corrective maintenance

5) MET System (minimum of 4 contact hours)

75. Training shall be included at least following items:

- System configuration
- Communication connections
- Network configuration
- Data flow diagram
- Mechanism of data processing
- Operation of **Operator Console** for MET Server in **ITSC**
- Interpretation and response to alarms and fault messages
- Preventive maintenance and corrective maintenance

6) FLD System (minimum of 4 contact hours)

76. Training shall be included at least following items:

- System configuration
- Communication and power cable connections
- Network configuration
- Data flow diagram
- Mechanism of data processing
- Normal start-up and shut-down procedure
- Operation of **Roadside Equipment**
- Operation of **Operator Console** for **FLD Server** in **ITSC**
- Interpretation and response to alarms and fault messages
- Preventive maintenance and corrective maintenance
- **VMS System** (minimum of 8 contact hours)
- System configuration
- Communication and power cable connections
- Network configuration
- Data flow diagram
- Mechanism of data processing
- Normal start-up and shut-down procedure
- Operation of **Roadside Equipment**
- Operation of **Operator Console** for **VMS**
- Interpretation and response to alarms and fault messages
- Preventive maintenance and corrective maintenance

7) ITSC System (minimum of 16 contact hours)

77. Training shall be included at least following items:

- System configuration
- Communication and power cable connections
- Power distribution and related Equipment
- Network configuration
- Data flow diagram of whole **Hyderabad City ITS**
- Mechanism of data processing
- Normal start-up and shut-down procedure
- Operation of **ITSC Server**
- Operation of Web & Message Server
- Operation of **Operator Console** for **Video Wall**
- Operation of **Operator Console** for call centre, system operator and static data analyser
- Interpretation and response to alarms and fault messages
- Preventive maintenance and corrective maintenance
- Normal start-up and shut-down procedure
- Server, **Operator Console**, and peripheral Equipment operations
- Interpretation of monitor displays and print-out reports
- Use of diagnostic programs and procedures
- Interpretation and response to alarms and fault messages

5 ITSC System

5-1 Purpose

78. This section states **ITSC System** to be installed as a central monitoring and control system of **Hyderabad City ITS**. **Hyderabad City ITS** is composed of several **Sub-Systems**. **ITSC System** is one of **Sub-System**, and it manages the total system with the exchange of data between **Sub-System** in order to achieve the overall objectives of the **Hyderabad City ITS** as described below;

- To collect all real time data related to road and traffic conditions, incidents, weather conditions and any other necessary data;
- To process and store the collected data for effective road planning, operation and maintenance;
- To disseminate the processed information to road users in order to take notice of road conditions and/or detour drivers' from travelling to the congested area or the hazardous area;
- To monitor the collected and processed information on real-time basis
- To provide the information to the road planning agency, road administrator and traffic police personal in the **ITSC**; and
- To manage the **Hyderabad City ITS** operation in the **ITSC**.

79. It is **the Contractor's** responsibility to furnish and install all necessary hardware, software, and database, integrate all system components and deliver a completely operational **Hyderabad City ITS**.

5-2 System Requirements

80. The system requirements of the **ITSC System** are as follows.

- The **ITSC System** shall collect all necessary information from following **Sub-System** component on real-time basis.
  - **ATCC System**
  - **Probe Car System**
  - **CCTV Camera System**
  - **MET System**
  - **FLD System**
  - **HTMS**
- The system shall automatically process the collected data into usable road traffic information including traffic flow data, adverse weather data, etc. The system shall also have capability of event data management such as, specific traffic regulation, traffic accident, incidents on city roads that may obstruct the free flow of the traffic on the roadway.
- The processed data shall be stored in the database of the system for necessary period so that each data can be utilized for future statistical analysis.
- The system shall provide the processed information to the road users through **VMS**

System, internet, e-mail and SMS.

- The collected and processed data shall be monitored on **Operator Console** and necessary data shall be displayed on **Video Wall** in the **ITSC**.
- The system shall receive the data from relevant stakeholders such as **TCC** of **ORR**, **APSDPS** for meteorological data and **APSRTC** for probe data. The system shall have functions to monitor and manage the operational status of all ITS **Sub-System**.
- The system shall have a reporting function in which various reports can be printed.
- The display and reporting function shall be scalable with the capability to include a unified view across concerned transportation agencies – HMDA, Traffic Police, Traffic Control Centre of **ORR**, Control Centre of **APSRTC**, road planning agencies and GHMC. The purpose is to enable real-time communication and collaboration necessary to coordinate actions and resolve issues in an efficient manner
- The system shall have built-in fault tolerance and high availability and operate continuously 24 hours a day and 7days a week with a redundant system configuration.

5-3 System Configuration

81. The **ITSC System** in the **ITSC** shall consist of the following component;

- **ITSC Server**,
- **WEB & MSG Server**
- **Video Wall** with Video Switches,
- **Operator Consoles** stated below:
  - **Operator Console** for Traffic Management Chief
  - **Operator Consoles** for Call Centre
  - **Operator Console** for **Video Wall** and **CCTV**
  - **Operator Console** for **CCTV**
  - **Operator Console** for **VMS**
  - **Operator Console** for **ATCC** / **Probe** / Static Data Analyzer
  - **Operator Console** for System operation
  - **Operator Console** for **FLD** and **MET**
  - **Operator Console** for Traffic Police
  - **Operator Console** for **HMDA**
  - **Operator Console** for backup operator
  - **Operator Console** for Spare
- Internet Connection with sufficient bandwidth
- Printers
- Firewall and network Equipment
- Power Supply Equipment

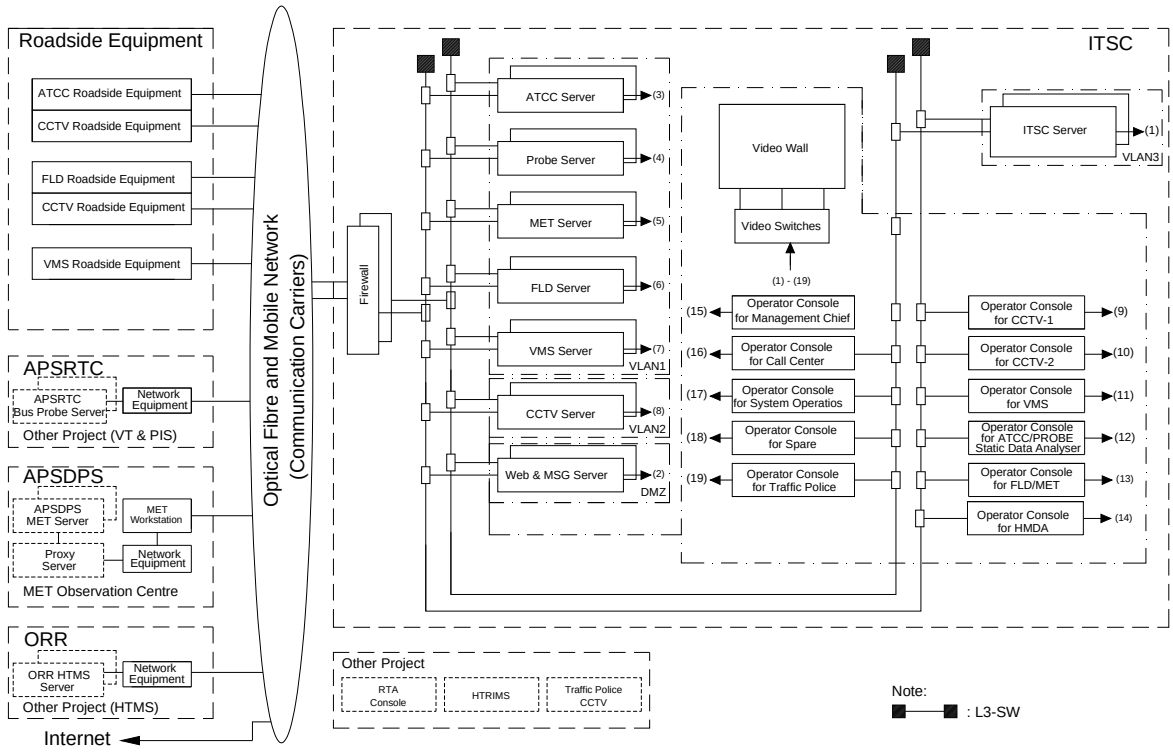


Figure 5-1 Scope of ITSC System Configuration

5-4 System Functions

82. The **ITSC System** shall have the functions as listed below.

1) ITSC Server

- Data collection from and exchange with all **Sub-Systems**
- Traffic data analysis
- Event data management
- Database management
- **Sub-System** management
- Network management and control
- Display and monitoring
- Parameter monitoring and management
- Data collection from stakeholders
- Information dissemination through **VMS System**
- Human-machine interface
- Report printing

2) WEB & MSG Server

- Information dissemination
- Report printing

5-4-2 ITSC Server

1) Data Collection

83. The **ITSC System** shall collect the road and traffic conditions, incidents, weather conditions and any other data from the respective **Sub-System** in specified periods as listed below.

Table 5-1 Data Collection and its Interval in ITSC Server

Sub-system	Types of Data	Interval	Remarks
ATCC System	・ Traffic volume	5 minutes	Data collection at every 1 minute interval for spot (multiple lanes) and sectional (single lane and multiple lanes) data
	・ Vehicle classification (at least large and small sized vehicle)		
	・ Time occupancy rate		
	・ Vehicle average speed		
	・ "n" minutes sectional average speed		Default "n" = 5 minutes
	・ Traffic congestion analysis results		
	・ Equipment operational status		
Probe Car System	・ 1 minute sectional average speed	5 minutes	
	・ "n" minutes sectional average speed		Default "n" = 5 minutes
	・ Traffic congestion analysis results		
	・ Travelling time in each link		
	・ Travelling time in particular section		
CCTV Camera System	・ **CCTV** still image	On real-time	
	・ Equipment operational status		
MET System	・ Instantaneous value of ambient temperature	5 minute	
	・ Hourly cumulative value of rainfall in last hour		
	・ Instantaneous rainfall detection		
	・ Maximum value of wind speed		
	・ Wind direction		
FLD System	・ Flood warning level I: 100 mm	1 minute	
	・ Flood warning level II: 200 mm		
	・ Flood warning level III: 500 mm		
	・ Equipment operational status		
VMS System	・ Manual input operation record	On real-time	
	・ Current message showing on		

	each **VMS**		
	・ Equipment operational status		

2) Traffic Data Analysis

84. The traffic data analysis is the process of analysing the traffic data collected from **ATCC System** and **Probe Car System** to calculate the average traffic speed and travel time, judge congestion section and aggregate traffic data. The traffic data is collected from **Roadside Equipment.**

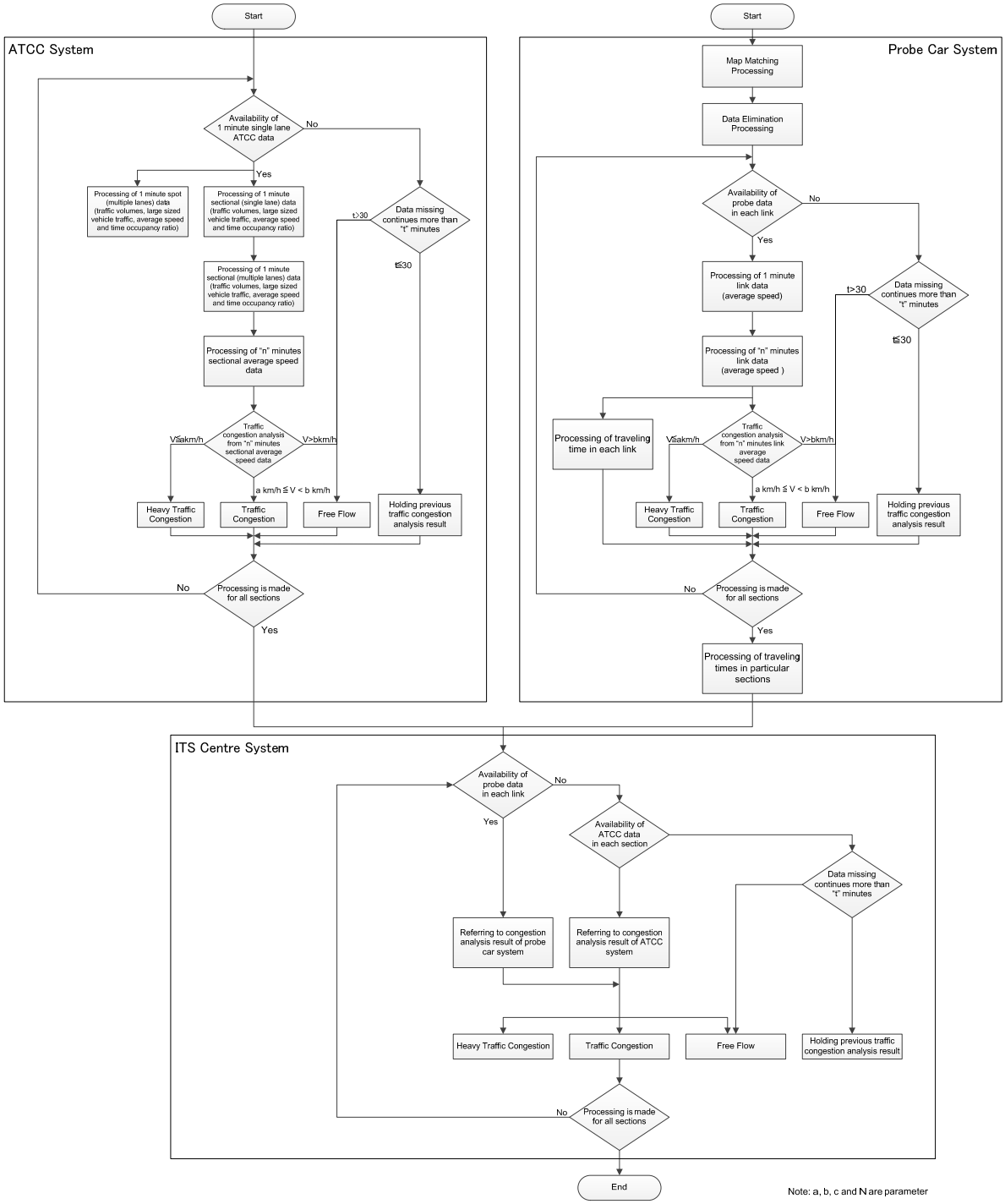


Figure 5-2 Process flow to compare and merge the congestion results

85. **ATCC** shall be installed in the middle of each section of the Principal Roads such as IRR, National Highway within **HMA** (NH-7, NH-9 and NH-202), and State Highways within **HMA** (SH-1, SH-2, SH-4, SH-5 and SH-6).

86. **Probe** data is collected by the Andhra Pradesh Public Transport Corporation (hereinafter referred as **APSRTC**) from the vehicle tracking devices i.e. GPS devices mounted on their city buses. The probe data is transmitted from **APSRTC** data centre to the **ITSC**.

87. The traffic data analysis shall be calculated in real time for both the **ATCC System** and the **Probe Car System** separately. **ATCC System** data shall be used as supplement data to **Probe Car System**'s vehicle tracking data while calculating the congestion section analysis in the **ITSC Server**.

88. The flow diagram shown in Figure 5-2 describes the overall process of the traffic data analysis for **ATCC System** and **Probe Car System** separately. The processed probe car data shall be prioritized over the processed **ATCC System** data while calculating the congestion section analysis.

3) Event Data Management

89. The **ITSC System** shall have event data management functions for the events that are automatically generated in each **Sub-System** component such as water logging, traffic congestion, and incidents or traffic regulations that may be reported by road administrators, traffic police and road users thorough verbal communication and manual input in to the system. The event data management functions shall be implemented with manual data input, editing, monitoring and printing, and these shall be easy to understand and easy to use.

90. The event data management system shall have the ability to collect data from multiple device types through a range of generic data collectors (probes) including SOA, SNMP, log, and socket. The probe should acquire data from any stable data source, including devices, databases, and log files.

91. The system shall handle but not limited to the following event data.

Table 5-2 Event Data Handled in ITSC Server

Event	Types of Data	Expected Source	Remarks
Incident	Fire Accident	Call Centre, Traffic Police, Fire Station, **CCTV**	Manual
	Traffic Accident	Call Centre, Traffic Police, Fire Station, **CCTV**	Manual
	Obstacle	Call Centre, Traffic Police, **CCTV**	Manual
	Broken-down Vehicle	Call Centre, Traffic Police, **CCTV**	Manual
	Natural Disaster	Call Centre, Traffic Police, **CCTV**	Manual
	Demonstration	Call Centre, Traffic Police, **CCTV**	Manual
	Festival	Call Centre	Manual
Traffic	Heavy Congestion	**Sub-System**	Automatic

Congestion	Congestion	**Sub-System**	Automatic
Adverse Weather	Heavy Rain	**Sub-System**	Automatic
	Strong Wind	**Sub-System**	Automatic
	Water Logging	**Sub-System**	Automatic
Construction Work	Construction Work	Road Operator	Manual
Traffic Regulation	Closure	Traffic Police	Manual
	Lane Closure	Traffic Police	Manual
	Speed Limitation	Traffic Police	Manual

4) Database Management

92. **The Contractor** shall provide the latest version of SQL based Relational Database Management System (**RDBMS**) such as Oracle, SQL Server, DB2 and/or equivalent as part of **the Contract**.

93. The **ITSC Server** shall store the processed data in **RDBMS** for future statistical usage in road planning. The system shall have one centralized database for managing the entire **Hyderabad City ITS**. Parameters such as type, quantity and time period of data to be stored in the database shall be configurable. All events which are stated in the clause "5-4-2 3) Event data management" of **PTS** shall be stored in the database with timestamp and shall be managed.

Table 5-3 Storage Data Managed by DBMS in ITSC Server

Sub-System	Storage Data		Type
ATCC System	Equipment operational status		Raw data
	1 minute spot multiple lanes) data	Traffic volume by vehicle classification	Processed data
		Large-sized vehicle traffic	
		Time occupancy rate	
		Vehicle average speed	
	1 minute sectional (single lane) data	Traffic volume by vehicle classification	Processed data
		Large-sized vehicle traffic	
		Time occupancy rate	
		Vehicle average speed	
	1 minute sectional (multiple lanes) data	Traffic volume by vehicle classification	Processed data
		Large-sized vehicle traffic	
		Time occupancy rate	
		Vehicle average speed	
	"n" minutes sectional average speed		Processed data
	Traffic congestion analysis results with Parameters		Processed data

Probe Car System	1 minute sectional (multiple lanes) data	Vehicle average speed	Processed data
	"n" minutes sectional average speed		Processed data
	Traffic congestion analysis results with Parameters		Processed data
	Travelling time in each link		Processed data
	Travelling time in particular section with location parameters		Processed data
CCTV Camera System	**CCTV** still image		Raw data
	Equipment operational status		Raw data
MET System	Instantaneous temperature (5minutes)		Processed data
	Moving total precipitation for previous 1hour		Processed data
	Total continuous precipitation		Processed data
	Instantaneous rainfall detection (5minutes)		Processed data
	Maximum value of wind velocity for previous 5 minute		Processed data
	Direction at maximum wind during previous 5 minute		Processed data
	Heavy rain analysis results with parameters		Processed data
	Strong wind analysis results with parameters		Processed data
FLD System	Flood warning level I: 100 mm		Raw data
	Flood warning level II: 200 mm		Raw data
	Flood warning level III: 500 mm		Raw data
	Equipment operational status		Raw data
VMS System	Recommended message automatically generated against event		Raw data
	Manual input operation record		Raw data
	Equipment operational status		Raw data
	Current message indicating on each **VMS**		Processed data
ITSC System	Input event data	Incident	Raw data
		Construction work	
		Traffic regulation	
	Received data from **ORR** project	Traffic congestion	Raw data
		meteorological data	
		Incident	
		Construction work	
		Traffic regulation	
	Equipment operational status		Raw data
	Traffic congestion analysis results in the system		Processed data
WEB & MSG Server	E-mail and SMS subscriber information		Raw data
	Access history of Web		Processed data
	Transmitting history of e-mail and SMS		Processed data

5) Sub-System Management

94. The **ITSC System** shall have a system management function to monitor the operational condition of **Roadside Equipment** and **ITSC System** Equipment. The system management function shall monitor the operation status of all the **Sub-System** components.

95. This function shall consolidate the status monitoring of each **Sub-System** component, present the status to operators and record the system operation. When any abnormality or malfunction is detected, the **ITSC Server** shall issue an alarm providing the type and location of the failure so that remedial action can be taken and shall store the record in a log.

6) Network Management and Control

96. The network management function shall be provided at the **ITSC System** and the function shall continuously monitor the Layer 2 switch and Layer 3 switch using Simple Network Management Protocol (SNMP). In case of identification of a malfunction, network management system shall issue an alarm to the **Operator Console** and shall store the record in a log.

7) Display and Monitoring

97. The **ITSC Server** shall have display and monitoring functions of schematic road map in the **HMA** (HMA) with various kinds of static and dynamic information. This helps the system operator understand the current condition through display devices such as **Operator Consoles** and **Video Wall** and take necessary action.

98. The information display shall be schematic map based interface and as well in the form of a list.

99. A schematic map based display interface shall display a consolidated view of the city traffic condition including the traffic status, **Roadside Equipment**, events and weather conditions, etc. It shall provide the ability to monitor and manage services and respond to events. The map based interface shall be an easy-to-use interface that is designed for multiple types of users, such as operators, managers and other authorized users of the system.

100. The schematic map based display shall cover the entire HMA and be able to enlarge individual locations on the map when selected. The enlarged view shall be able to display the details for each selected location. The details displayed shall cover the contents as described in the below table but not limited to.

101. The information to be displayed on the schematic map, the enlarged view and in the list shall include the following but not limited to.

Table 5-4 Information to be Displayed and Monitored in ITSC Server

Item	Contents on Schematic Map based Interface	Contents as a List
Equipment location and status	· Location and status of **ATCC Roadside Equipment** · Location and status of **CCTV** camera	· Location and status of **ATCC Roadside Equipment** · Location and status of **CCTV** camera

	· Location and status of **FLD Roadside Equipment** · Location of **VMS** · Status of **VMS** (working or not working) · Status of the Message (Message Displayed or not) · Message being displayed	· Location and status of **FLD Roadside Equipment** · Location of **VMS** · Status of **VMS** (working or not working) · Status of the Message (Message Displayed or not) · Message being displayed
Road, traffic and weather condition	· Traffic congestion · Weather condition (rain, wind velocity, wind direction, precipitation) · Waterlogged condition · Incident (traffic accident, broken-down vehicle, left obstacle, natural disaster) · Regulation (lane closure, road closure)	· List of traffic congested road · List of adverse weather area · List of waterlogged area · List of incident · List of regulation · Event List for **VMS** operation
CCTV video image	· Static and video image from the **CCTV** camera selected · Static and video image from the video recorder selected	
Event management	· Unplanned event and planned event	· Unplanned event and planned event · Screen form to edit all the parameters
HTMS data monitoring	· Meteorology data · Congestion data	· Events list for **VMS** operation
Server status of **Sub-System**		· Status of server of **Sub-System** (normal / error) in the form of list
Parameter setting		· Parameters in the form of list · Screen form to edit all the parameters
Operation log		· List of **Roadside Equipment** - those in operation and those not in operation · Error record
Date and Time	· Current date and time	· Current date and time

102. Figure below shows the example of schematic road map within the IRR.

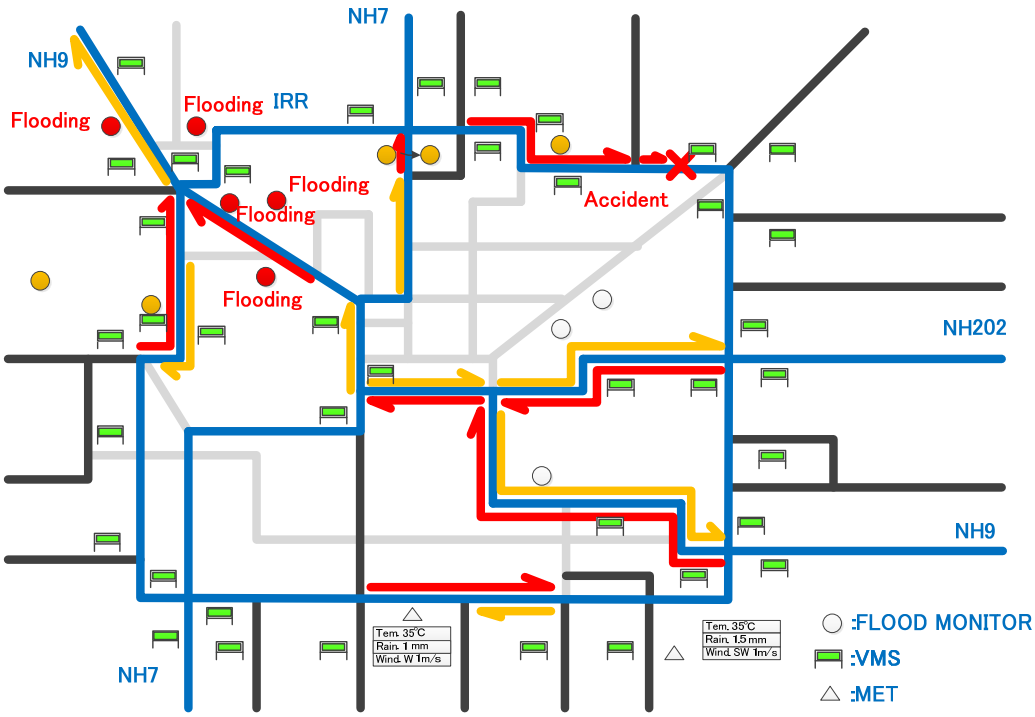


Figure 5-3 The Example of Schematic Road Map

8) Parameter Monitoring and Management

103. Some of **Sub-System** components have warning system to detect the traffic congestion or adverse weather condition based on the pre-defined threshold. The **ITSC System** shall monitor and manage such parameters. The parameters to be monitored and that are changeable in the **ITSC System** shall include at least followings;

- **ATCC System**: Two parameters of average speed recognition for "heavy congestion" and "congestion";
- **Probe Car System**: Two parameters of average speed judging for "heavy congestion" and "congestion", and locations for calculating the travel time in particular section;
- **MET System**: Parameters detecting heavy rain, strong wind.

9) Data Collection from Stakeholders

104. **Hyderabad City ITS** shall collect data from **HTMS** of **ORR**, **APSDPS** and the **APSRTC** The data exchange with **HTMS** of **ORR** is at five minute interval to collect the following data;

- Traffic Data (traffic congestion and travelling speed in each section)
- Weather and waterlogged conditions (rain, wind velocity, wind direction, precipitation, visibility, waterlogged)
- Event and incident information (traffic accident, broken-down vehicle, left obstacle, natural disaster)
- Regulation (lane closure, road or section closure)

105. Bus probe data collection from **APSRTC** is as specified in the **Probe Car System**.

106. Meteorological data collection from the **APSDPS** is as specified in the **MET Sub-System**.

107. The **ITSC** shall interface with various data collection Equipment using the Institute of Transportation Engineers (ITE) Traffic Management Data Dictionary (TMDD) Version 3.0 & above standard.

108. The data collection mechanism shall be robust, reliable and ensure the following objectives but not limited to:

- Shall provide support for industry standard Secure Sockets Layer (SSL)
- Shall support data encryption and compression.
- Shall be capable of handling failures without losing mission-critical information

10) Information Dissemination through VMS System

109. The road, traffic and weather condition information collected and processed in the **ITSC** shall be provided to the road users through **VMS** under **the Contract**.

110. **VMS System** provides road users with processed road, traffic and weather information through variable message sign boards. The **VMS** boards shall be controlled by console operator of **VMS Sub-System**. The **ITSC System** shall provide automatic message selection function based on the priority or severity of the events and coefficients that represent the importance of event. This function shall include;

- Automatic generation of the recommended message to be displayed on the **VMS** when an event occurs
- Zoning functionality that selects particular **VMS** boards for showing message when an event occurs at a particular location
- Information screening functionality that selects the prior message to be displayed on the **VMS** when several events occur at the same time.

111. Table below shows the type of the **VMS** messages as reference.

Table 5-5 Type of VMS messages

Event Type	Event
Incident	Fire Accident
	Traffic Accident
	Obstacle
	Broken-down Vehicle
	Natural Disaster
	Demonstration
	Festival
Traffic Congestion	Heavy Congestion
	Congestion
	Travelling time
Adverse Weather	Heavy Rain
	Strong Wind
	Water Logging
Construction Work	Construction Work

Traffic Regulation	Closure
	Lane Closure
	Speed Limitation
Other events input by operator	Other Events

11) Human-machine Interface

112. Two kinds of display devices shall be provided as human-machine interface; **Operator Console**'s display monitor and **Video Wall**.

113. Assignment of **Operator Console** is stated in the clause "4-2-3 4) **Operator Consoles**" of **PTS**.

114. The **Video Wall** shall have multiple screen display function where each display area shall be capable of displaying images from different sources. The **Video Wall** specification is stated in the clause "5-5-3 **Video Wall**" of **PTS**. The **Video Wall** shall be capable of displaying image from any **CCTV Camera System** and any **Operator Console**. The operation of **Video Wall**, such as selecting **Video Wall** layout pattern and assigning screen source to display area, shall be conducted from **Operator Console** of **Video Wall**.

115. The Human-machine interface shall support the below mentioned features or equivalent:

- Shall adhere to web 2.0 or higher standards
- Shall support JSR 168, JSR286 or equivalent standards
- Shall support all leading browsers such as Google Chrome, Internet Explorer, Firefox, and Safari etc.
- Shall support delivery to wireless devices that support wireless browsers on mobile phones and other hand held devices
- Shall support HTTP and HTTPS protocol & LDAP V3 directory server
- Shall be able to seamlessly integrate/interface with the third party payment gateways
- Shall use open standards based on XML for managing application data
- Shall support caching for performance. It should also store favourites, frequently types fields, etc in the cache.
- Shall be able to publish data from external systems strictly based on rights
- Shall support email integration with groupware (Lotus, MS Exchange, etc)
- Shall support all leading Operating Systems such as Linux, Windows, Solaris, AIX, HP-UX etc
- Shall support all leading Databases such as Oracle, IBM DB2, SQL Server or leading Database open sources.

12) Report Printing

116. The **ITSC Server** shall have a reporting functionality where various daily, monthly and annual reports can be printed.

117. The reports will be produced in two modes, automatic and on-demand. In automatic mode, each report shall be printed automatically at the specified time and in on-demand mode, report is printed when the operator requests for it. All reports shall be in English. It shall be possible to generate the report as a file in portable document file format:

118. The reports shall be printed as described in the reports section under each **Sub-System** in **PTS**. For reference purpose a brief summary of the reports produced by the **ITSC Server** is stated below, but not limited to these.

Table 5-6 Reporting Contents of ITSC Server

Item	Contents
Observation results	・ Traffic conditions and traffic analysis results ・ Weather conditions (**MET**) ・ Air pollution conditions ・ Waterlogged conditions ・ Variable message sign operation ・ Equipment malfunction and recovery
Analyzed Results	・ Historical graphical reports as a basis for understanding/ visualizing traffic condition and congestion levels ・ Traffic congestion report (graphical report) showing the traffic volume or the average speed of a selected road section ・ Historical peak hours report (graphical) showing the historical traffic volume and average speed during a selected time period ・ Historical trends report (graphical report) showing the volume of traffic events and a summary of the types of events that occurred during a specified time period.
Operation and error log	・ List of those in operation and those not in operation ・ Error record

5-4-3 WEB & MSG Server

1) Information Dissemination

119. The road, traffic and weather condition information collected and processed in the **ITSC** shall also be provided to the road users through website, e-mail and SMS under **the Contract**. Information dissemination system shall consist of **WEB & MSG Server**, firewall and application software. The basic information to be provided to the road users through these media shall include but not limited to the following:

(1) Internet

120. A map based and easy-to-use interface shall be provided. It shall display a consolidated view of city traffic condition including the traffic status, **Roadside Equipment**, events and weather conditions, etc.

121. The map based display shall cover the entire HMA and be able to enlarge individual locations on the map when selected. The enlarged view shall be able to display all the details for each selected location. The information to be displayed on the map and the enlarged view shall include but not limited to the following.

・ Traffic information on map
・ Weather and waterlogged conditions on map
・ Event information on map

- Traffic regulation on map

(2) E-Mail and SMS

- Weather and waterlogged conditions in the form of text message
- Event in the form of text message
- Traffic regulation in the form of text message

122. The system shall have subscriber management function to register and deregister the e-mail and SMS users. Firewall shall be provided to protect the Internet server against possible attacks from hackers.

2) Reporting Functions

123. The **WEB & MSG Server** shall produce the reports listed below, but not limited to these. The reports shall be generated as per the schedule or upon the system operator's request. It shall be possible to generate the report as a file in portable document file format.

124. **The Contractor** shall propose the detailed list of reports that are produced by the **WEB & MSG Server**.

Table 5-7 Reporting Functions of WEB & MSG Server

Item	Contents
Operation log of internet user	· Daily and monthly report of below · Operation records of **WEB & MSG Server**: · Operation records of SMS Gateway · Operation records of E-mail Server · Operation records of WEB Server
Operation and error log	· List of **Roadside Equipment** in operation or not · Error record

5-4-4 Operator Consoles

125. The **ITSC System** shall consist of a centre server and several **Operator Consoles** as specified herein. Each **Operator Console** shall have its own function and perform the tasks assigned to it. In the event of unavailability of an **Operator Console** due to malfunction or maintenance, it shall be possible to use any other **Operator Consoles** as substitute to perform the same function. The Operator shall be able to perform the same function on a device from any console over a web based tool. Access privilege control shall be applied in the same manner when the **Operator Console** is being replaced and include role-based administrative features to enable right level of security for different users of the system

126. The assignments of each console to user are as shown in table below. **The Contractor** shall design consoles and related **Sub-Systems** to fulfil the purpose required to the users who will use **Operation Consol** for their works.

Table 5-8 Assignment of Operator Consoles

No.	User of Operator Console	Roles of user
1.	Traffic Management Chief	· He has a responsibility for overall management of **ITSC**

		· Monitor all contents of all **Sub-Systems** · Instruct operators based on requirement · Provide information to related agencies if necessary · Report issues and problems occurred on daily basis · Having a meeting and consultation with **the Employer** · Make a daily report, and make monthly report
2.	Call centre operator	· He has a responsibility for operation of toll free number · Receive phone calls to get traffic related information from public and other agencies · Make phone calls to exchange traffic related information, such as VIP movement, road works, fire, etc., between **ITSC** and other agencies · Collect all necessary information to answer enquiries from public and other agencies · Record the call data and fill the appropriate forms · Make a daily report, and make monthly report
3.	**CCTV** operator 1 (**CCTV** / **Video Wall**)	· He has a responsibility for operation of **CCTV Camera System** and **Video Wall** · Monitor the **CCTV** images on the **Operator Console** and **Video Wall** · When **CCTV** sends serious incident image, use the PTZ function to view the situation and inform the manager and **VMS** operator. · Control the **Video Wall** contents · Search and play a stored video, if necessary · Make a daily report, and make monthly report
4	**CCTV** operator 2	· He has a responsibility to support **CCTV** operator 1 for operation of **CCTV** · Monitor the **CCTV** images on the **Operator Console** and **Video Wall** which cannot be covered by **CCTV** operator 1 · When **CCTV** sends the serious incident image, use the PTZ function to view the situation and inform the manager and **VMS** operator. · Check stored video · Search and play a stored video, if necessary · Make a daily report, and make monthly report
5.	**VMS** operator (**VMS**)	· He has a responsibility for operation of **VMS System** · Create and edit **VMS** messages to be displayed · Select information to be displayed on the **VMS** and location of the **VMS** as per the priority · Check **VMS** contents displaying according to the operation · Check operation record stored correctly

		・ Make a daily report, and make monthly report
6	**ATCC** operator (**ATCC** / **Probe** / Static Data Analyzer)	・ He has a responsibilityfor operation of **ATCC System** and **Probe System** ・ Monitor the traffic data and congestion judgement result to be collected and processed by **ATCC System** ・ Monitor the traffic data collect and congestion judgement result to be collected and processed by **Probe Car System** ・ Monitor traffic status ,such as traffic congestion, traffic volume and travel time, which are collected and processed. ・ Check the storage condition of collected/processed traffic data ・ Analyze the traffic data and prepare a report for traffic condition in Hyderabad ・ Make a daily report, and make monthly report
7	System operator	・ He has a responsibility for operation and maintenance of all equipment of **Hyderabad City ITS** and system upgrading ・ Monitor status of servers and consoles in the **ITSC** ・ Monitor status of **Roadside Equipment** ・ Monitor status of network equipment ・ Maintain Hyderabad City ITS ・ Make a daily report, and make monthly report
8.	Flood operator (**FLD** / **MET**)	・ He has a responsibility for monitoring **FLD System** and **MET System** ・ Monitor output results of **FLD System** and **MET System** ・ When alarm is issued by the **FLD System**, alert the **CCTV** operator to check the water logging spot. ・ When the **MET System** issues alarm, based on the meteorological data received from the **APSDPS**, alert the manager and **VMS** operator
9	Back-up Operator	・ Back-up console
10	(Spare Console)	・ A spare console in case of emergency
11	Traffic Police staff	・ Console for Traffic Police staff operate from **ITSC**
12	HMDA Operator	・ Console for HMDA staff operate from **ITSC**

5-5 Hardware Specifications

5-5-1 ITSC Server

127. **The Contractor** shall provide the redundant type server as shown below.

Table 5-9 Hardware Specification of ITSC Server

No.	Item	Specifications
1.	Server configuration	・ Same specification stated in clause "4-2-3 **ITSC** Equipment 3) Standard Specification of Server" of **PTS**.
4.	Database software	・ Latest version of reliable SQL Database server software of

		internationally reputed organization ・ Compatible with the OS ・ Stable and high speed for real-time operation ・ 10 years supporting warranty

5-5-2 WEB & MSG Server

128. **The Contractor** shall provide the redundant type server as shown below.

Table 5-10 Hardware Specification of WEB & MSG Server

No.	Item	Specifications
1.	Server configuration	・ Same specification stated in clause "4-2-3 **ITSC** Equipment 3) Standard Specification of Server" of **PTS**.
2.	Web Server software	・ Latest version of reliable HTTPS web server software of internationally reputed organization ・ Compatible with the OS ・ Stable and high secure with multi-level User Authentication ・ 10 years supporting warranty
3.	E-mail Messaging server software	・ Latest version of reliable E-mail server software of internationally reputed organization ・ Compatible with the OS ・ Stable and high speed ・ 10 years supporting warranty
4.	SMS Gateway software	・ Latest version of reliable SMS gateway server software of internationally reputed organization ・ Capable of sending huge number of multiple messages based on scheduled and / un-scheduled configuration settings ・ Compatible with the OS ・ Stable and high speed ・ 10 years supporting warranty

5-5-3 Video Wall

129. The specifications in this section are provided as reference. The **Video Wall** to be provided by **the Contractor** shall materially comply with these specifications and shall subject to the approval by **the Employer's Representative**.

130. Twenty (20) units of colour TFT LCD type monitors shall be used as **Video Wall**. The size of each display shall be 55 inch. The **Video Wall** shall be arranged in 5 units by 4 units configuration (5 column wise and 4 row wise). Two display modes are used to display content on the monitors. The two display modes are integrated mode and isolated mode. In integrated mode, video image from a single source shall be displayed on twenty LCDs as if they are one unit, while in isolated mode, each unit shall display video image from different sources independently. Malfunction of an individual LCD unit shall not prevent normal operation of other LCD units.

Table 5-11 Hardware Specification of Video Wall

No.	Item	Specifications
1.	Display Type	Colour TFT LCD
2.	Display Size	55 inch
3.	Number of pixels	1920×1080 (full HD)
4.	Contrast Ratio	3500:1 or higher
5.	Bezel-to-Bezel Width	5.7mm or less
6.	Input Signal	RGB Analogue, DVI-D or HMDI (Input interface shall be equivalent to output interface of Video Switches.)
7	Expected Power Consumption	7.2 KVA or less

5-5-4 Video Switches

131. The specifications in this section are provided as reference. The video switches to be provided by **the Contractor** shall materially comply with these specifications and shall subject to the approval by **the Employer's Representative**.

Table 5-12 Hardware Specification of Video Switches

No.	Item	Specifications
1.	Input Signal	· RGB Analogue, DVI-D or HMDI x30 or more; equivalent to PC video output interface.
2.	Output Signal	· RGB Analogue, DVI-D or HMDI x6 or more; equivalent to console display monitor interface.
3.	Controllable Number of pixels	· Equivalent to the number of pixels of large display panel. · Video interface must support PC and console display monitor to display pixel to pixel matching full HD images.
4.	Control Interface	· 10 BASE-T/100BASE-TX (RJ-45)
5.	Remark	· 19-inch server rack mounting

5-5-5 Operator Consoles

132. **The Contractor** shall provide the **Operator Consoles** as shown below. All the **Operator Consoles** shall be the same model and same configuration.

Table 5-13 Hardware Specification of Operator Consoles

No.	Item	Specifications
1.	PC configuration	· Same specification stated in clause "4-2-3 **ITSC** Equipment 4) Standard Specification of **Operator Console**" of **PTS**.
2.	Graphic card	· **Operator Console** shall be connected to video switch of **Video Wall**. Number of video interface shall be added one (1) to the number of **Operator Console**. · Video interface shall support video switches and console display monitor to display pixel to pixel matching full HD images.
3.	Console Display Monitor	· LCD widescreen monitor (Full HD), 22-inch or larger · Number of monitor shall be as follows:

		· **Operator Console** for Traffic Management Chief: Three (3) · **Operator Console** for call centre: Two (2) · Operator Console for CCTV: Two (2) · Operator Console for Video Wall Two (2) · Operator Console for VMS: Two (2) · **Operator Console** for Flood/**MET**: Two (2) · **Operator Console for ATCC**/**Probe**/Static Data Analyzer: Two (2) · **Operator Console** for System Operator: Two **(2)** · **Console for** Traffic Police (2) · Console for HMDA st**aff (2)** · **Addition**al co**nso**les (as spare): Two (2) · RG**B Analogue, DVI**-D or HMDI i**nput,** equivalent to graphic card video interface

5-5-6 Laser Printer (Colour)

133. The printers shall be a high-speed A3/A4 size colour laser printers connected to the network of the **ITSC**.

Table 5-14 Hardware Specification of Laser Printer (Colour)

No.	Item	Specifications
1.	Printing speed	· 30 ppm or higher (black, normal quality mode) · 30 ppm or higher (colour, normal quality mode)
2.	First page out	· Not more than 16 second (black, colour)
3.	Print resolution	· 600 dpi or higher (black) · 600 dpi or higher (colour)
4.	Paper trays	· 2 (standard)
5.	Media size	· A3 / A4
6.	Duplex (both sides) printing	· Automatic
7.	Interface	· 100M Base LAN interface

5-5-7 Laser Printer (Black)

134. The printers shall be a high-speed A3/A4 size black laser printers connected to the network of the **ITSC**.

Table 5-15 Hardware Specification of Laser Printer (Black)

No.	Item	Specifications
1.	Printing speed	· 35 ppm or higher
2.	First page out	· Not more than 10 second
3.	Print resolution	· 1200 dpi or higher
4.	Paper trays	· 2 (standard)
5.	Media size	· A3 / A4
6.	Duplex (both sides) printing	· Automatic

7.	Interface	・ 100M Base LAN interface

5-5-8 Firewall and Network Equipment

135. **The Contractor** shall provide equipment as shown below.

Table 5-16 Hardware Specification of Firewall and Network Equipment

No.	Item	Unit	Specification
1.	Internet provider	2	・ Dedicated IP network ・ Connect to 2 different providers service for redundancy
2.	Firewall	2	・ 3 ports; Connect to WAN 1, DMZ 1, Intranet ・ IEEE 802.3u: 100BASE-TX ・ RFC3768: VRRP ・ Supporting State full inspection
3.	L3 Switch	2	・ Redundancy by using stacking technology and 2 sets of L3 Switch. ・ LAN port: 24 ports, 100/1000BASE-T ・ Uplink: Connect to Firewall ・ Downlink: Connect to servers
4.	Load balancer	1	・ 3 ports or more ・ 2 ports connect to each firewall ・ 1 ports connect to **WEB & MSG Server** ・ Fail pass through
5.	L2 Switch	1	・ Link Aggregation ・ IEEE 802.1d: STP ・ IEEE 802.1w: RSTP ・ IEEE 802.3u: 100BASE-TX ・ IEEE 802.3ab: 1000BASE-T

5-5-9 Server Rack

136. **The Contractor** shall provide **Server Racks** in order to store equipment in **ITSC**.

Table 5-17 Hardware Specification of Server Rack

No.	Item	Specification
1.	Figure	・ 19’ server rack (“TIA/EIA-310-D Cabinets, Racks, Panels, and Associated Equipment”) ・ Front door with smoked glass ・ Removable rear and side panel
2.	Dimensions	・ Height : approx. 2,000 mm or higher ・ Depth : enough size to store servers to be procured and installed
3.	Display, keyboard and mouse	・ Tray type display monitor ・ Keyboard and optical mouse ・ KVM (Keyboard Video Mouse) switch
4.	Accessories	・ Server mounting bracket ・ Tray for small items

		・ Power outlets ・ Fan for air circulation
5.	Fixture	・ Rack shall be fixed to the floor to avoid falling.

5-5-10 Power Supply

137. The Equipment that needs to be supported by backup power supply systems is as listed in below table.

138. The UPS must be equipped in accordance with "4-2-3 ITSC Equipment 1) Power Supply in the ITSC".

139. The power supply from diesel generator (DEG) will be supplied by **the Employer**. The diesel generator installation, operation and maintenance are not part of this project scope.

Table 5-18 Hardware Specification of Power supply

No.	Equipment	Voltages	UPS	DEG
1.	The **ITSC Server**	1φ - 2W - 230V, 50Hz	✔	✔
2.	External storage device		✔	✔
3.	**WEB & MSG Server**		✔	✔
4.	**Video Wall**		✔	
5.	Video switches		✔	✔
6.	**Operator Console** for Traffic Management Chief		✔	✔
7.	**Operator Consoles** for call centre		✔	✔
8.	**Operator Console** for **CCTV**		✔	✔
9.	**Operator Console** for **Video Wall**		✔	✔
10.	**Operator Console** for **VMS**		✔	✔
11.	**Operator Console** for Flood/**MET**		✔	✔
12.	**Operator Console** for **ATCC**/**Probe**/Static Data Analyser		✔	✔
13.	**Operator Console** for System Operator		✔	✔
14.	**Operator Console** for Traffic Police		✔	✔
15.	**Operator Console** for HMDA		✔	✔
16.	Printers		✔	✔
17.	Firewall and network equipment		✔	✔
18.	**ATCC Server**		✔	✔
19.	**Probe Server**		✔	✔
20.	**MET Server**		✔	✔
21.	**FLD Server**		✔	✔
22.	**CCTV Server**		✔	✔
23.	**VMS Server**		✔	✔

5-5-11 Uninterruptible Power Supply (UPS)

1) UPS for Server Rack

140. The UPS for server rack shall be mounted on 19-inch server rack and supply power to each

equipment and unit installed in the server rack.

Table 5-19 Hardware Specification of UPS for Server Rack

No.	Item	Specifications
1.	General Requirement	· UPS must meet the general requirement stated in "4-2-4 **ITSC** Equipment 1) Power Supply in the **ITSC**"
2.	Capacity	· The UPS shall be equipped with enough capacity of battery to supply power to equipment for the case of commercial power interruption.
3.	Function	· The UPS shall be able to shutdown equipment safely when UPS capacity becomes less in case of commercial power failure, and auto-recover safely on restoration of AC power.
4.	Figure	· 19-inch server rack mounting · Install at each server rack

2) UPS for Operator Console

141. The UPS for **Operator Console** shall provide power to each **Operator Console**.

Table 5-20 Hardware Specification of UPS for Operator Console

No.	Item	Specifications
1.	General Requirement	· UPS must meet the general requirement stated in "4-2-4 **ITSC** Equipment 1) Power Supply in the **ITSC**"
2.	Capacity	· The UPS shall be equipped with enough capacity of battery to supply power to equipment for the case of commercial power interruption.
3.	Function	· The UPS shall be able to shutdown equipment safely when UPS capacity becomes less in case of commercial power failure, and auto-recover safely on restoration of AC power.
4.	Figure	· Portable type · Install with each **Operator Console**

3) UPS for Video Wall

142. The UPS for **Video Wall** shall provide power to the **Video Wall** and related equipment.

Table 5-21 Hardware Specification of UPS for Video Wall

No.	Item	Specifications
1.	General Requirement	· UPS must meet the general requirement stated in "4-2-4 **ITSC** Equipment 1) Power Supply in the **ITSC**"
2.	Capacity	· The UPS shall be equipped with enough capacity of battery to supply power to equipment for the case of commercial power interruption.
3.	Function	· The UPS shall be able to shutdown equipment safely when UPS capacity becomes less in case of commercial power failure, and auto-recover safely on restoration of AC power.

4.	Figure	・ Portable type or server rack

5-5-12 Power Distribution Board (PDB)

143. A Power Distribution Board (PDB) as detailed in the drawing shall be supplied and installed at the **ITSC**. **The Contractor** shall provide PDB at other locations, where necessary and the cost of such PDB shall be included in **the Contract** Price. All switchgears (MCCB / MCB / fuses/ measuring instruments / meters/ indicating lamps / relays / switches) rating, capacity, make, kA rating, dimension shall be as per the type of DB with quick make & break type operating mechanism suitable for rotary operation with suitable extended operating handles with capacity and position marking on door, flush mounted, with suitable spreaders / links for cable connection as per IS 1248, 2208, 4237, 8623, 10118 (Parts I to IV).

5-5-13 Communication Network

144. The communication network system shall connect the **ITSC** with each **Sub-System**, **Roadside Equipment** and other systems of relevant authority (**TCC** of **ORR**. **APSDPS** and the **APSRTC** centre). The optical fibre network and/or mobile network provided by communication carries shall be utilized in **the Hyderabad City ITS** as shown in table below.

Table 5-22 List of Communication Network

No.	Sub-System component	Communication system
1.	**ATCC System**	・ Combined network of Optical fibre (dedicated line service) and mobile
2.	**CCTV Camera System**	・ Combined network of Optical fibre (dedicated line service) and mobile
3.	Meteorological data collection from **APSDPS** Meteorological Server	・ Combined network of Optical fibre (dedicated line service) and mobile
4.	**FLD System**	・ Combined network of Optical fibre (dedicated line service) and mobile
5.	**VMS System**	・ Combined network of Optical fibre (dedicated line service) and mobile
6.	Internet/e-mail/SMS	・ Internet and mobile network
7.	Data collection from Outer Ring Road (**ORR**) project	・ Optical fibre network (IP-VPN or equivalent)
8.	Data collection from the **APSRTC** Bus Probe Server	・ Optical fibre network (IP-VPN or equivalent)

145. The network system consists of Layer 3 Switch (L3-SW), Layer 2 Switch (L2-SW), various types of Router, Firewall etc. The network system configurations are indicated on **the Employer's Requirement** Part D: Drawings. These drawings are tentative and **the Contractor** shall examine and configure suitable network system and obtain the approval from **the Employer's Representative**.

5-6 Digital Road Map (DRM)

5-6-1 Purpose

146. The Digital Road Map database (DRM database) is the standard national or regional digital road map that is used to support the ITS infrastructures. This database consists of digital cartographic data in which locations and other information are expressed in numeric form, so that computers can recognize roads, intersections and so on. The DRM Database allow the navigation and other traffic monitoring systems to display road maps on the **Video Wall** and computer screens and provide search facility on the DRM.

5-6-2 Specification of DRM

147. The **ITSC System** shall be equipped with Digital Road Map (DRM) with the following digital road information for map indication and monitoring of the congestion analysis results on the **Video Wall**, **CCTV Operator Consoles** and other devices at **ITSC**.

Table 5-23 Required Information of Digital Road Map (DRM)

Data Group	Type of Data	Data Item	Remark
Major Road Data	Node Data	Node number	
		Location coordinate	
		Number of connecting links	
		Connecting node number	
		Name of junction	
	Link Data	Link number (expressed by beginning and ending node number)	
		Code of road operator	
		Type of road	
		Number of road (E.G. NH7, SH1, etc.)	
		Particular information of road	
		Link distance	
		Traffic regulation in the link (threshold of regulation and type of regulation)	
		Number of lane	Future extension
		Lane width (width of carriage way)	Future extension
		Minimum lane width in the link	Future extension
		Median width	Future extension
		Maximum speed limit	Future extension
	Attribution Data in the Link	Location, name and length of bridge	
		Location, name and length of flyover	
		Location, name and length of tunnel	
		Location and name of railway crossing	
		Location, name and length of skywalk	
		Location, name and length of tollgate	Future extension
Minor Road	Node Data	Node number	

Data		Location coordinate	
		Number of connecting links	
		Connecting node number	
	Link Data	Link number (expressed by beginning and ending node number)	
		Code of road operator	
		Type of road	
		Link distance	
		Number of lane	Future extension
		Traffic regulation in the link	
		Link number of connecting major road	
		Name of junction	
	Attribution Data in the Link	Location and name of railway crossing	
Background Data	Riverine Data	Coastline	
		Lake	
		River (polyline or polygon data)	
		Municipality (polyline data)	
	Location of Railway	Railway	
	Location of Premise	Location, administrative district and name of prefectural government	
		Location, administrative district and name of municipal government	
		Location, administrative district and name of railway station	
		Location, administrative district and name of airport	

148. **The Contractor** shall supply the licensed DRM software as part of **the Contract**. The DRM software license must allow regular updates of the DRM software and supply all the necessary software patches and maintenance.

149. **The Contractor** shall offer a map data management utility to update the data items included in DRM.

5-7 Interior Work Installation Location

150. The **ITSC** shall be established in the building provided by the **HGCL** at Nanakramaguda along with the **TCC** of **ORR**.

151. **The Contractor** shall design the layout of the **ITSC**. The layout shall be designed taking into consideration the servers and **Operator Consoles** to be placed in the room, **Sub-System** components to be placed in the room, the role of the staff and operators stationed in the room, position of **Video Wall**, cable routes, view for visitors, other

equipment procured by the other projects, if any, and other factors to establish a functional **ITSC**. The layout shall be approved by **the Employer's Representative**.

152. **The Contractor** shall also execute the interior works including wiring works for power and communication cable connections based on his own design and requirements of the Equipment to be placed in the **ITSC**. All interior work designs shall be subjected to the prior approval by **the Employer's Representative**.

5-8 Furniture in ITSC

153. **The Contractor** shall provide the console desks, chairs, shelves, racks, lockers, white board, projector screen, curtain, etc. that are designed by **the Contractor**. The number of chairs to be provided shall be two (2) units more than the number of the consoles respectively. The console desk shall be of ergonomic design and neatly accommodate the consoles to provide efficient and pleasant working environment.

154. **The Contractor** shall also provide power outlets, lightings, air conditioners, air circulation fans, copy machine, fax, refrigerator, water server, etc. they are require for proper operation of **ITSC**.

155. It is left to **the Contractor**'s design to use one large size console desk that accommodates all consoles in the operations room or individual desks for each console.

156. All cables shall be connected to the console through the bottom of the console and shall not be exposed.

6 ATCC System

6-1 Purpose

157. This section states **ATCC System** to be installed as one of the **Sub-Systems** of **Hyderabad City ITS**. **ATCC System** shall be introduced with following objectives.

- To measure the traffic volume and vehicle speed on major roads in **HMA** including National Highways, Inner Ring Road (IRR) and State Highways to be used for planning on future road widening and additional road construction
- To measure the traffic volume, vehicle speed, road occupancy rate and vehicle type on major roads in **HMA** including National Highways, Inner Ring Road (IRR) and State Highways.
- To monitor the real-time status of major road in HMA by using measured traffic data.
- To calculate travel speed and judge road congestion by using measured traffic data.
- To store measured traffic data and use for planning and evaluation of road infrastructure improvement such as road widening, road construction, etc
- The **ATCC Roadside Equipment** shall detect, count and classify vehicles.
- To measure large-sized vehicle traffic for planning of future pavement repair or other road facility maintenance
- To share the measured and analysed traffic information with road planning agencies, road administrators and traffic police.

158. The traffic flow parameters measured by the **ATCC Roadside Equipment** shall be transmitted to the **ATCC Server** in the **ITSC**. The system shall operate on a 24-hour a day 7-day a week basis.

159. It shall be the responsibility of **the Contractor** to furnish all necessary hardware and software, install equipment at the specified location, provide necessary cabling, integrate all system components, and deliver a completely operational **ATCC System**.

6-2 System Requirements

160. System requirements of **ATCC System** are as follows.

- **ATCC System** shall measure and analyse following traffic information. The unit duration of measurement, detection and calculation shall be within one (1) minute interval.
  - Traffic Volume by vehicle classification (at least large and small sized vehicle)
  - Large-sized Vehicle Traffic
  - Vehicle Speed
  - Traffic Congestion
- **ATCC System** shall measure both inbound/outbound traffic volumes on the on major roads of IRR, National Highways, and State Highways in IRR between major junctions.
- **ATCC System** shall measure and detect required traffic information even under complex traffic and road conditions in Hyderabad.
- The traffic data shall be monitored in the **ITSC** on real-time basis and the data shall be stored for a certain period in order to utilize for road planning, road operation and

maintenance.

- The traffic data collected and analysed by **ATCC System** shall be provided to road users through **VMS System** and other information provision systems such as E-mail, Website and SMS.
- The **ATCC Roadside Equipment** shall be not be loop-coil and be easily installable at site with simple operation and maintenance. Supporting pole shall have a structure to avoid a maintenance work of the **ATCC Roadside Equipment** on the carriageway.
- Image recognition type for **ATCC** Equipment shall be adopted and it shall detect multiple lane/zone traffic.
- Two sets of detector for both bound detection shall be installed at each location.
- Wherever possible, the **ATCC Roadside Equipment** along with the **CCTV** camera shall be mounted either on a dedicated pole at road shoulder or on the pole at median.
- Required visible clearance shall be kept in the detection area of **ATCC** Equipment.
- The detection target of **ATCC** shall be vehicles passing through the sensor area at a speed not less than 1 km/h and not more than 160 km/h.
- **ATCC System** is expected to have at least 90% overall counting accuracy under the road conditions in the **HMA**.

6-3 System Configuration

161. **ATCC System** shall consist of the following components:

- **ATCC Server** in the **ITSC**
- **ATCC Roadside Equipment** consisting of image recognition detector, processing unit, network equipment and media converter, power supply equipment and peripheral
- Supporting structure and foundation for **ATCC Roadside Equipment** at site
- Communication network between the **ITSC** and **Roadside Equipment**
- Other necessary equipment, materials and required works to complete the **ATCC System** as an operable and practical system.

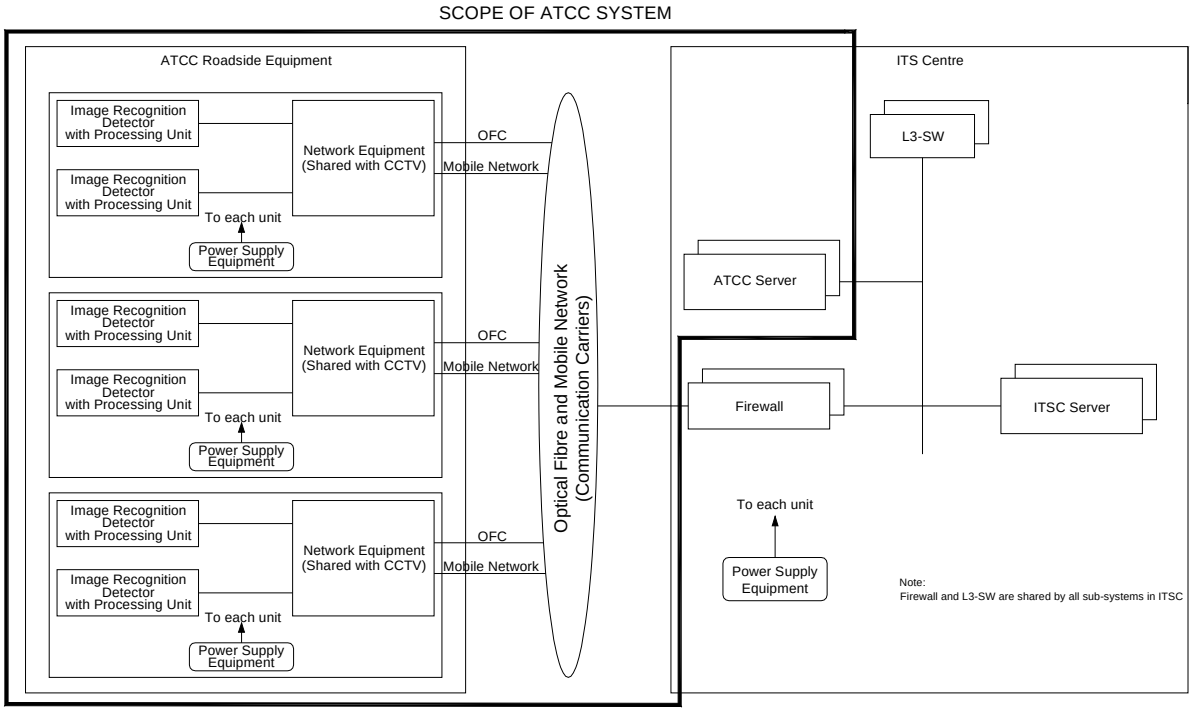


Figure 6-1 Scope of ATCC System configuration

162. **ATCC** equipment installed under **the Contract** may be a combined type or a separate type. The combined type is the one where the image recognition detector and processing unit are supplied together as a single unit. The separate type is the one where the image recognition detector and processing unit are installed as separate components. The interfacing between the image recognition detectors and processing unit shall be ensured by whichever the **ATCC** equipment type is installed.

163. No periodical manual adjustment shall be required for image recognition detector and processing unit.

164. The **ITSC** shall have an **ATCC Server** for receiving pre-processed data from the **ATCC Roadside Equipment**. IP based network equipment shall be provided to connect the **ATCC Roadside Equipment** with the **ATCC Server**. The communication network shall be composed of optical fibre network and mobile communication of Communication Service Provider.

6-4 Installation Location

165. The **ATCC Roadside Equipment** shall be installed at the locations listed below.

Table 6-1 Installation Location

ATCC No.	Coordinates		Road	Address	Position of Installation	Remarks
	Latitude	Longitude				
ATCC-01	17° 18 '55.55" N	78° 27' 25.42" E	IRR	Near Chandrayan Gutta, IRR	Median	
ATCC-02	17° 20' 8.01" N	78° 29' 41.32" E	IRR	Near Kendriya Vidyalaya, Kanchan Bagh, IRR	Median	
ATCC-03	17° 20' 35.91" N	78° 32' 51.83" E	IRR	Near LB Nagar Junction, LB Nagar to Karmanghat, IRR	Median	
ATCC-04	17° 22' 45.97" N	78° 33' 28.98" E	IRR	Near Nagole Junction, Uppal to LB Nagar, IRR	Median	
ATCC-05	17° 24' 49.25" N	78° 32' 52.36" E	IRR	Near Habsiguda Junction, Torsion Products, IRR	Roadside	Metro section
	17° 24' 48.82" N	78° 32' 51.38" E				
ATCC-06	17° 25' 51.06" N	78° 31' 28.77" E	IRR	Near Mettuguda Junction, Railway Golf Cource, IRR	Roadside	Metro section
	17° 25' 52.00" N	78° 31' 29.55" E				
ATCC-07	17° 26' 37.09" N	78° 28' 29.96" E	IRR	Footover Bridge Begumpet, ACP Office, IRR	Roadside	Metro section
	17° 26' 37.82" N	78° 28' 30.30" E				
ATCC-08	17° 25' 54.61" N	78° 27' 22.36" E	IRR	Green Lands Flyover, Near CM Office, IRR	Median	
ATCC-09	17° 24' 37.24" N	78° 26' 59.36" E	IRR	Taj Banjara, Karachi Bakery, Road No. 1, Banjara Hills	Median	
ATCC-10	17° 22' 10.84" N	78° 25' 44.79" E	IRR	Spencers Stores, Attapur, IRR	Roadside	Make island (both direction)
	17° 22' 10.86" N	78° 25' 45.60" E				
ATCC-11	17° 29' 43.49" N	78° 21' 22.61" E	NH9	NH 9 Near Miyapur, Prajay City	Median	
ATCC-12	17° 27' 31.15" N	78° 25' 58.80" E	NH9	Moosapet Road, Hyderabad Industries ltd, R&D Center, Sanathnagar	Roadside	Metro section, Make island (both direction)
	17° 27' 30.87" N	78° 25' 58.00" E				
ATCC-13	17° 27' 42.32" N	78° 27' 55.02" E	NH9	Near Bowenpally Junction, Air Force Hostel	Median	
ATCC-14	17° 23' 14.17" N	78° 28' 19.61" E	NH9	Near Gandhi Bhavan, Nampally, NH9	Roadside	Metro section
	17° 23' 14.92" N	78° 28' 20.37" E				
ATCC-15	17° 19' 58.55" N	78° 26' 22.85" E	NH7	Near National Police Academy, Shivarampally, NH7	Median	
ATCC-16	17° 16' 28.19" N	78° 24' 3.06" E	NH7	NH 7 Near Shamshabad	Median	
ATCC-17	17° 22' 6.63" N	78° 31' 16.34" E	NH9	Dilsukhnagar, Near Chandnabrothers Show Room, NH9	Roadside	Metro section, Make island (One direction)
	17° 22' 7.86" N	78° 31' 15.85" E				
ATCC-18	17° 19' 23.84" N	78° 36' 38.53" E	NH9	All India Radio station, Hayathnagar,	Median	
ATCC-19	17° 24' 1.29" N	78° 32' 24.36" E	NH202	Near Hyderabad Public School, Ramanthapur, NH 202	Median	
ATCC-20	17° 24' 47.43" N	78° 36' 55.13" E	NH202	CPRI, Boduppal (Narapally), NH 202	Median	
ATCC-21	17° 22' 50.27" N	78° 29' 17.17" E	NH9	Esama Bazar Road, Near MGBS, NH9	Median	
ATCC-22	17° 29' 3.74" N	78° 28' 22.95" E	NH7	Nandamurinagar Towards Suchitra,	Median	
ATCC-23	17° 32' 31.38" N	78° 13' 42.00" E	NH9	Muthangi village, NH9	Median	
ATCC-24	17° 36' 21.73" N	78° 29' 23.93" E	NH7	CMR Engineering College, Medchal,	Median	
ATCC-25	17° 27' 25.61" N	78° 42' 59.29" E	NH202	HP Petroleum, Ghatkesar, NH 202	Median	
ATCC-26	17° 18' 25.24" N	78° 42' 12.63" E	NH9	Inamguda (Ramoji Film City), NH 9	Median	
ATCC-27	17° 14' 1.62" N	78° 21' 22.94" E	NH7	Thondapally village, NH 7/NH 44	Median	
ATCC-28	17° 27' 16.12" N	78° 29' 8.02" E	NH7	Tarbond (JBS), NH 9	Median	
ATCC-29	17° 25' 12.57" N	78° 29' 0.70" E	NH7	Near Makhdoom Mohiuddin Statue, Tankbund, NH 9	Roadside	
	17° 25' 12.84" N	78° 29' 0.35" E				
ATCC-30	17° 29' 16.13" N	78° 30' 43.49" E	Siddipet Rd (SH1)	Military College, Siddipet Road, Alwal	Median	
ATCC-31	17° 16' 30.00" N	78° 35' 18.31" E	Nagarjuna Sagar Rd (SH2)	Nagarjuna Sagar Road, Turkayamjal	Median	
ATCC-32	17° 15' 55.46" N	78° 28' 33.46" E	Srisailam Highway (SH5)	Srisailam Highway, Pahadisharif, Near RCI	Median	
ATCC-33	17° 21' 22.83" N	78° 22' 54.85" E	Chevella Rd (SH20)	Chevella Road, Near Shadan College	Median	
ATCC-34	17° 30' 5.59" N	78° 27' 3.07" E	HMT Rd (SH6)	Medak Road, Near HMT	Median	
ATCC-35	17°25'38.15" N	78°27'9.77"E	IRR	Under Punjagutta Flyover	Under Flyover	

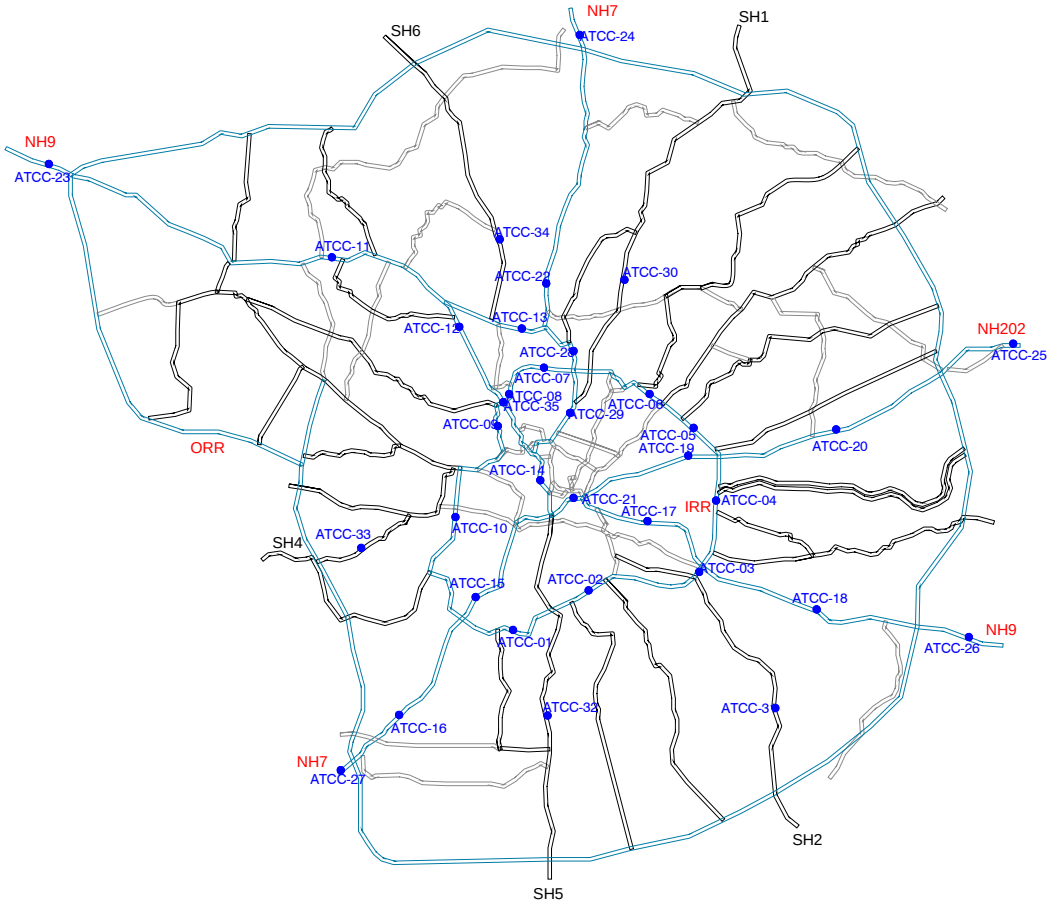


Figure 6-2 Location Map of ATCC Roadside Equipment

166. The locations shown above are tentative. T**he Contractor** shall examine each location and confirm the exact proper location at site for installation of each **Roadside Equipment**. **The Contractor** shall coordinate with the relevant authorities and obtain approval of t**he Employer's Representative**.

6-5 Installation policy

167. **ATCC** shall be placed in the middle of each section of the Principal Roads such as IRR, National Highway within **HMA** (NH-7, NH-9 and NH-202), and State Highways within **HMA** (SH-1, SH-2, SH-4, SH-5 and SH-6). The section means the division between the junctions of these major roads.

168. The **ATCC** shall be installed on a supporting steel pole to be supplied under **the Contract**. Two (2) sets of image recognition detectors for both bound detection shall be mounted on the same supporting steel pole at the median except locations where enough installation space is not available for supporting steel pole. In those locations where enough installation space is not available for supporting steel pole, the detectors shall be separately installed outside of road boundary or on the island at both sides of road. The supporting steel pole shall be equipped with steel ladder to ease the maintenance work of **ATCC** Equipment. In

all cases of installation, minimum clearance shall be secured from road surface.

169. The **ATCC** shall share the common supporting steel pole with **CCTV**.

6-6 System Functions (Software)

170. The following functions shall be equipped with **ATCC System**.

6-6-1 Traffic Data Collection and Processing Functions

171. The **ATCC Roadside Equipment** shall continuously measure. It shall be possible to adjust the angle and coverage area of the image recognition detector to maximize the detection accuracy.

172. Images taken by the **ATCC** Equipment shall be processed to obtain the required traffic data. The processing unit shall be capable of:

- Detecting vehicles going in any direction.
- Recognizing the shape or edge of the vehicle.
- Counting the number of vehicles that pass the sensing area during the unit measurement time on a lane basis.
- Classifying the vehicle into large and small size. The definition of the large and small size shall be made according to the vehicle length and the classification parameter shall be adjustable.
- Calculating the time occupancy rate per unit measurement time.
- Calculating an average speed per unit time which is an average of the speed of vehicles that are passed during one unit measurement time.

173. **ATCC System** shall detect vehicles, measure and calculate the traffic data for each lane. **ATCC System** is expected to have 90% or better vehicle counting accuracy.

174. Unit duration of detection, measurement and calculation shall be one (1) minute time interval.

6-6-2 Data Transmission Functions

175. The following data transmission functions between **ATCC Roadside Equipment** and **ATCC** Sever in **ITSC** shall be equipped:

- Measured data and processed data in the **Roadside Equipment** shall be sent from **ATCC Roadside Equipment** to **ATCC Server** for every one (1) minute. Data processing shall be also conducted within one minute.
- 1 minute spot (single lane), 1 minute spot (multiple lanes), sectional (single lane) and sectional (multiple lanes) data shall be sent to **ATCC Server**.
- Equipment failure status shall be sent to **ATCC Server** real-time base.
- **ATCC Roadside Equipment** shall response a request from **ATCC Server** real-time base.
- Other necessary data shall be on demand base, if necessary.
- Unit transmitting interval, also referred as unit measurement interval, shall be one (1) minute.
- Traffic volume for every 1 minute by vehicle classification (at least large and small sized vehicle)

- Large-sized vehicle traffic for every 1 minute
- Time occupancy rate for every 1 minute
- Vehicle average speed for every 1 minute
- Equipment operation and failure status
- Other necessary data
- Unit time period of data transmitting shall be of one (1) minutes interval.
- "n" minutes sectional average speed data (default "n" = 5 minutes)
- Traffic congestion analysis result with each parameters

6-6-3 Error Checking and Substitution Function

176. The data sent from **Roadside Equipment** shall be tested first for possible errors. The thresholds shall be defined and data received from **Roadside Equipment** shall be checked with the threshold. If the data is judged as abnormal or error signal is sent from **ATCC Roadside Equipment**, it shall be marked malfunctioned and an alarm shall be issued to the **ATCC Operator Console**. The faulty detector shall be recorded in the operation log. The data judged as abnormal shall not be used for further processing.

177. The data from the vehicle detector marked as malfunctioned shall be checked continuously for data abnormality. If data is judged normal, normal processing of the data shall be resumed automatically.

178. The following error-checking and substitution functions shall be equipped:

- The data sent from the **Roadside Equipment** shall be tested first by the **ATCC Server** for checking possible errors.
- The thresholds shall be defined.
- The **ATCC Server** shall check the collected data with the defined threshold.
- If the collected data is measured lower or higher than the threshold, the **ATCC Server** shall issue an alarm "ABNORMAL DATA TRANSMITTED" to the **ATCC Operator Console** and the collected data shall be marked as "Error".
- If an error signal is received from **ATCC Roadside Equipment**, the **ATCC Server** shall issue an alarm "ATCC Roadside Equipment FAULT" to the **ATCC Operator Console** and the collected data shall be marked as "Fault".
- The error and fault status shall be recorded in the operation log.
- The error data and the data from the faulted equipment shall not be used for further processing.

179. The error data and fault status shall be continuously checked. If the error data or fault status recovers to normal and they are judged normal by **ATCC Server**, the normal data processing shall be automatically resumed.

6-6-4 Data Collection Function

180. The **ATCC Server** shall collect the data from the **ATCC Roadside Equipment** per unit measurement interval.

181. The unit measurement time shall be a system parameter and shall be adjustable.

6-6-5 Data Processing Function

182. The **ATCC Server** shall process the traffic data collected from the **ATCC Roadside Equipment** and identify the congested section from average speed and time occupancy ratio data as described in below processing flow and algorithm.

183. Data processing shall be also conducted within one minute.

184. The algorithm for traffic congestion analysis shall be configured to handle the following factors and parameters.

- To avoid fluctuation of analysis results, the average speed data for certain period (n) shall be utilized in the processing. The default of the time period is initially set as five (5) minutes and this value shall be changeable as a parameter of **ITS Server**.
- The analysis result is classified into three (3) traffic congestion levels, they are, “Heavy Traffic Congestion”, “Traffic Congestion” and “Free Flow”.
- The thresholds of traffic congestion level, “a” and “b”, which are shownin the flow chart, are tentatively set as 10km/h and 15km/h respectively in initial stage.
- The thresholds shall be variable and determinable by each location since average speed may differ depending on the road conditions, alignment, etc. at the site. The threshold shall be optimized during operation after collecting enough volumes of traffic data.
- In case that any data is not available from the **ATCC Roadside Equipment**, previous analysis result shall be held for 30 minutes. In case of absence of data continuously for more than 30 minutes, previous data is reset and the traffic is processed as “Free Flow”.
- If the processed data at a lane or a section is lower or higher than the predetermined threshold, the server shall issue an alarm “abnormal traffic condition” to the **Operator Console**.
- The (n)-minute traffic flow data shall be accumulated and converted to hourly traffic data.
- It shall be possible for real-time monitoring of traffic flow data through **Operator Console** and printed report.
- Traffic flow data of single and multiple lanes can be specified for monitoring and both numerical and graphical presentation shall be provided. The data on the display shall be automatically updated for every processing interval.
- Real-time monitoring of operating condition of **ATCC Roadside Equipment** shall also be possible.
- The time occupancy rate to be detected in **ATCC System shall be for ref**erence. The accuracy of traffic congestion analysis can be improved by utilizing both average speed and occupancy data.

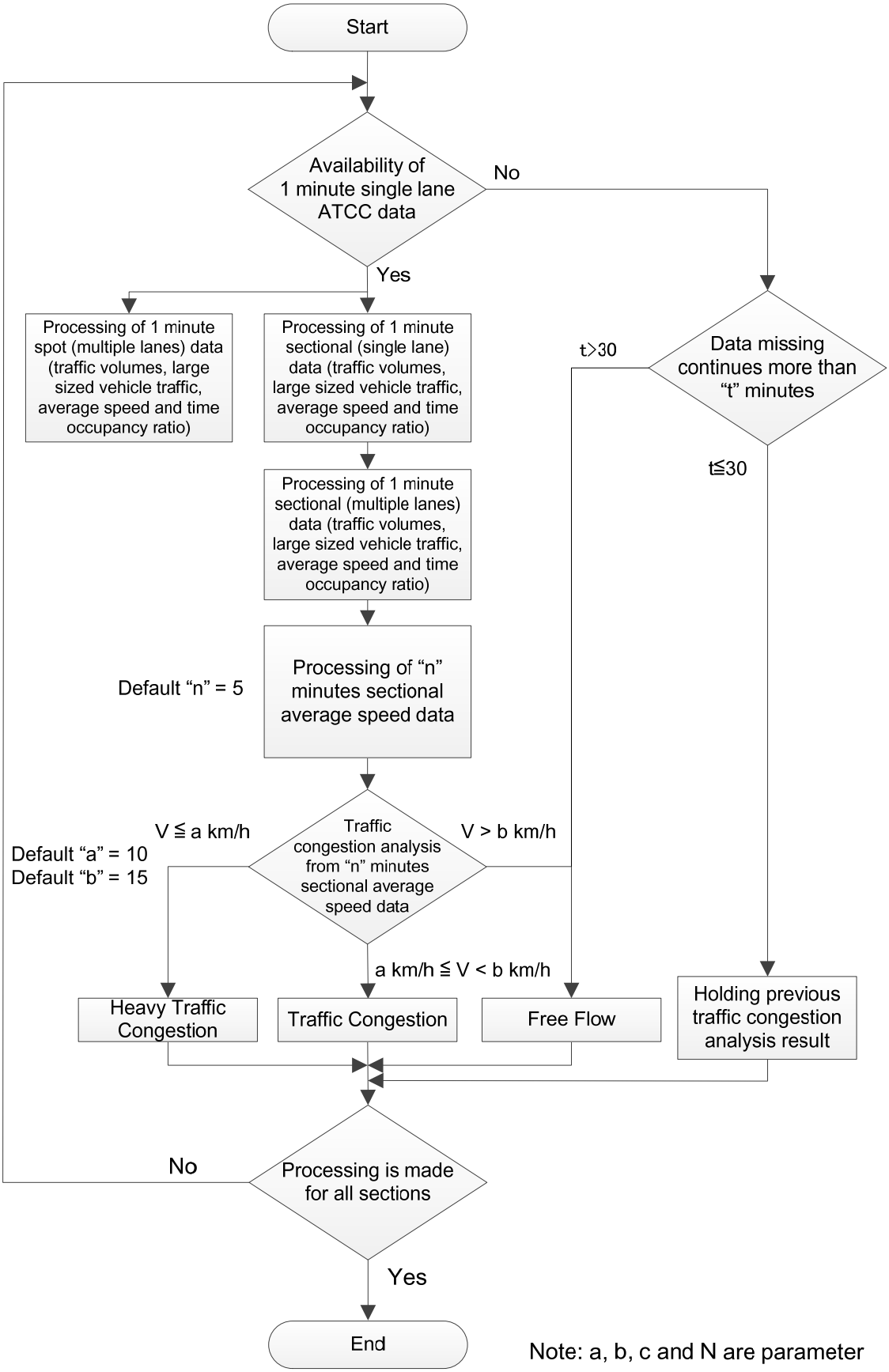

Start
Availability of 1 minute single lane ATCC data
No
Yes
Processing of 1 minute spot (multiple lanes) data (traffic volumes, large sized vehicle traffic, average speed and time occupancy ratio)
Processing of 1 minute sectional (single lane) data (traffic volumes, large sized vehicle traffic, average speed and time occupancy ratio)
t>30
Data missing continues more than "t" minutes
t≦30
Processing of 1 minute sectional (multiple lanes) data (traffic volumes, large sized vehicle traffic, average speed and time occupancy ratio)
Default "n" = 5
Processing of "n" minutes sectional average speed data
V ≦ a km/h
Default "a" = 10
Default "b" = 15
Traffic congestion analysis from "n" minutes sectional average speed data
V > b km/h
a km/h ≦ V < b km/h
Heavy Traffic Congestion
Traffic Congestion
Free Flow
Holding previous traffic congestion analysis result
No
Processing is made for all sections
Yes
End
Note: a, b, c and N are parameter

Figure 6-3 Traffic Data Processing and Congestion Analysis Flow and Algorism

6-6-6 Data Storage Function

185. Data shall be processed in the **ATCC Server** and stored in the database of **ITSC System** at an interval of 5 minutes for total system management.

186. All data transmitted from the **ATCC Roadside Equipment** and processed data in the **ITSC** shall be stored in the **ATCC Server** for analysis and future usage.

187. Data retrieval and presentation software shall be provided to show the traffic data and operating condition of the specified **Roadside Equipment** location at the specified time, hour or day.

188. Graphical presentation of historical traffic data such as hourly variation and daily variation shall also be provided..

189. Status of **ATCC Roadside Equipment** (normal or abnormal) shall be recorded in the **ATCC Server** as operation log with error code and time stamp for future reliability analysis.

Table 6-2 Minimum Storage Period of Stored Data of ATCC System

Sub-System	Storage Data		Type
ATCC System	1 minute spot (*2) (single lane) data	Traffic volume by vehicle classification (*1)	Raw data
		Large-sized vehicle traffic	
		Time occupancy rate	
		Vehicle average speed	
	1 minute spot (*2) (multiple lanes) data	Traffic volume by vehicle classification (*1)	Processed data
		Large-sized vehicle traffic	
		Time occupancy rate	
		Vehicle average speed	
	1 minute sectional (*2) (single lane) data	Traffic volume by vehicle classification (*1)	Processed data
		Large-sized vehicle traffic	
		Time occupancy rate	
		Vehicle average speed	
	1 minute sectional (*2) (multiple lanes) data	Traffic volume by vehicle classification (*1)	Processed data
		Large-sized vehicle traffic	
		Time occupancy rate	
		Vehicle average speed	
	“n” minutes spot average speed		Processed data
	“n” minutes sectional average speed		Processed data
	Traffic congestion analysis results		Processed data
	Equipment operational status		Raw data

- (*1): **ATCC** shall classify vehicles at least large and small.
- (*2) "Spot" means the location where the **ATCC Roadside Equipment** is installed. The traffic status on the road with a certain distance is estimated by "Spot" data. Thus, the "Spot" represents a certain distance of the road. "Section" consists of one or several "Spot".

6-6-7 Screen Display Function

190. The information display of **Operation Console** shall be schematic map based interface and as well in the form of a list.

191. The display of **Operation Console** shall have both schematic map based and list form based interfaces.

192. The schematic map based interface on the display shall cover the entire HMA and shall be able to enlarge individual locations on the map when selected by the user. The enlarged view shall be able to display the details for each selected location. The details displayed shall cover the contents as described in the below table but not limited to.

193. The **ATCC Server** shall be capable of creating the following screen contents, but not limited to:

Table 6-3 Required Screen Contents of ATCC System

Item	Contents on Schematic Map	Other Contents
Equipment location and status	· Location of **ATCC Roadside Equipment** and its status (Normal / Error)	· Location of **ATCC Roadside Equipment** and its status (Normal / Error) in the list
Observation (raw) data		· Observation record detail in the list and graph · Edit window to edit or remove an abnormal observation record
Processed data		· Processed data in tthe list and graph
Parameter setting		· Parameters in the list · Edit window to edit all the parameters
Traffic conditions	· Current traffic volume by vehicle type · Current traffic average speed · Hourly traffic volume variation in the graph · Hourly average speed variation in the graph	· Current traffic volume by vehicle type · Current average speed · Hourly traffic volume variation in the the list and graph · Hourly average speed variation in the the list and graph
Server status		· Server status (Normal / Error) in the list
Operation log	· Roadside Equipment	· List of **Roadside Equipment** in

		operation/out of operationt ・ Operation record ・ Data error record
Date and Time	・ Current date and time	・ Current date and time

6-6-8 Reporting Function

194. The **ATCC Server** shall generate the reports listed below, but not limited to.

- The reports shall be generated according to the schedule and upon request
- The reports shall be selectable for either generating a file in Portable Document File (PDF) format or printing directory to a printer.

Table 6-4 Reporting Contents of ATCC System

Item	Contents
Traffic volume by spot and section	・ Daily report containing hourly traffic volume by vehicle class ・ Daily report containing hourly average speed ・ Monthly report containing daily and weekly traffic volume by vehicle class ・ Monthly report containing daily and weekly average speed
Operation and error log	・ List of **Roadside Equipment** with its status (normal / abnormal) ・ Operation record ・ Error record

6-7 Hardware Specification of the ATCC Roadside Equipment

195. The Hardware Specification for **ATCC Roadside Equipment** mentioned hereunder is minimum specification. **The Contractor** shall not deviate materially from the specifications.

6-7-1 Image Recognition Detector (IRD) and Processing Unit

196. **The Contractor** shall provide equipment as shown below.

Table 6-5 Hardware Specification of IRD and Processing Unit

No.	Item	Specifications
1	Recognition type	・ Image recognition type
2	Power Requirements	・ Shall meet "4-2-4 1) Power Supply for **Roadside Equipment**"
3	Power Consumption	・ 1000 VA or less (Stations in which two (2) **ATCC** and two (2) **CCTV** are installed)
4	Minimum illuminance	・ 2.1 lx, 0.19 lx (with night mode)
5	Video S/N ratio	・ 50 dB or more
6	Lens iris	・ Automatic
7	LAN Interface	・ 10BASE-T/100BASE-TX (RJ-45) x 1port or more

6-7-2 Network Equipment

197. The data transmission of **ATCC Roadside Equipment** with the **ATCC Server** in the **ITSC** shall be made through network equipment provided for **CCTV Camera System**.

198. The data between **ATCC Roadside Equipment** and **ATCC Server** shall be transmitted through network equipment provided for **CCTV Camera System**.

6-7-3 Media Converter

199. Media converter shall be used to connect **ATCC** with network equipment at the location where two sets of **ATCC** will be separately installed at Roadside.

Table 6-6 Hardware Specification of Media Converter

No.	Item	Specifications
1.	LAN interface	・ 10 BASE-T/100BASE-TX (RJ-45) x 1port
2.	Network interface	・ 100BASE-FX (SC) x 1port
3.	Transmission speed	・ 100Mbps
4.	Maximum segment length	・ 2km (Single mode fibre) or more
5.	Power consumption	・ 10VA or less

6-7-4 Housing and Cabinet

200. Detector unit shall be covered in the housing to protect it from rain and other. The orientation of the detector unit shall be adjustable in vertical and lateral directions. Processing unit shall be housed in a rugged cabinet together with circuit, devices, terminal unit, power supply and network equipment. The specification of the cabinet is stated in clause "4-2-4 **Roadside Equipment** 4) Cabinet" of **PTS**.

6-7-5 Power Supply

201. The UPS for the **ATCC Roadside Equipment** shall be shared with the **CCTV Roadside Equipment** or separately provided. Power receiving panel to feed the commercial power shall be supplied and installed at each location in **the Contract**.

6-7-6 Communication Network

202. The data transmission of **ATCC System** shall be dedicated optical fibre network and mobile network by the Communication Service Provider. The optical fibre network shall be utilized as main communication line. The mobile network shall be used as backup communication line. In case of any communication failure in optical fibre network, **ATCC System**'s communication line shall automatically change over to mobile network.

6-8 Hardware Specification of Equipment in the ITSC

1) ATCC Server in the ITSC

203. **The Contractor** shall provide the redundant type server as shown below.

Table 6-7 Hardware Specification of ATCC Server

No.	Item	Specifications
1.	Server configuration	・ Shall meet "4-2-4 **ITSC** Equipment 3) Standard Specification of Server" of **PTS**.

7 Probe Car System

7-1 Purpose

204. This section states **Probe Car System** to be installed as one of the **Sub-Systems** of **Hyderabad City ITS**. **Probe Car System** shall be introduced with following objectives.

- To measure the traffic conditions such as travelling speed and travelling time on the road in **HMA**,
- To provide traffic information including congested area and travelling time at particular section to the road users and encourage avoiding the usage of the congested areas.
- To utilize the processed data as statistics for future road planning such as road widening or road expansion plan, and
- To share the traffic information with road planning agencies, road operators and traffic police in the **ITSC** in order to enhance above mentioned system objectives.

205. **APSRTC** currently operating around 3600 buses in the Hyderabad city. The vehicle tracking devices, i.e. GPS On-Board Unit (OBU), will be mounted on 1350 buses owned by the **APSRTC** and provided under the scheme of other project implemented by the **APSRTC**. The **APSRTC** agreed to provide the probe data of the 1350 city buses to the **ITSC**.

206. As described above in the purpose, the probe data is one of the major data requirements of **Hyderabad City ITS**. It is very important to collect probe data from more number of buses to calculate better traffic information in the **ITSC**. Under such circumstances, it is proposed to provide vehicle tracking devices to the **APSRTC** under **the Contract** to mount on the remaining 2400 city buses of Hyderabad.

207. The scope of the work to supply the vehicle tracking devices to mount on approximately 2400 buses under **the Contract** shall include the following:

- The supplier selected by **APSRTC** to mount, operate and maintain vehicle tracking devices on their 1350 buses shall be appointed as the nominated sub-contractor for the **Hyderabad City ITS**.
- **The Contractor** shall procure, conduct factory test and provide the vehicle tracking devices to the nominated sub-contractor of the **APSRTC**.
- It is the responsibility of **the Contractor** to install and test the communication equipment and the necessary hardware in **APSRTC** to transfer the probe data from the **APSRTC** Bus Probe Server to the **Probe Server** in the **ITSC**.
- The specifications and requirements of the vehicle tracking devices shall be same as those mounted by **APSRTC** in their project. **The Contractor** shall confirm these specifications with **APSRTC**. For the reference purpose, the GPS specifications are provided under the clause "7-5-1 GPS Device for **APSRTC**" of **PTS**.
- It is the responsibility of **APSRTC** to install and test the Vehicle mounting device (OBU) including the communication component on the buses, test the communication between the OBU and the **APSRTC** Bus Probe Server, operation and maintenance of the OBU.

208. The **Probe Car System** shall operate on a 24-hour a day 7-day a week basis.

209. The vehicle tracking data is transmitted to the Bus Probe Server in the **APSRTC** and then transferred to **Probe Server** in the **ITSC**. The probe data transmission from the **APSRTC** Data Centre to the **Probe Server** in the **ITSC** is within the scope of **the Contract**.

210. It shall be the responsibility of **the Contractor** to furnish all necessary hardware and software, install Equipment at the specified location, provide necessary cabling, integrate all system components, and deliver a complete operational system for the transmission of the probe data from the **APSRTC** Data Centre to the **Probe Server** in the **ITSC**

7-2 System Requirements

211. System requirements of the **Probe Car System** are as follows.

- To measure the traffic conditions such as travelling speed and travelling time on the road in **HMA**.
- The vehicle tracking data generated at an interval of 10 seconds in each GPS OBU consists of followings:
  - Bus number,
  - Bus type,
  - Location (Longitude and Latitude),
  - Time stamp,
  - Bus route number,
  - Travel speed
- All of vehicle tracking data collected by **APSRTC** Bus Probe Server shall be received by the **Probe Server** in the **ITSC** at an interval of less than one (1) minute.
- The traffic data can be monitored in the **ITSC** on real-time basis and the data can be stored for a certain period in order to utilize for road planning, road operation and maintenance.
- The communication between **Probe Server** in the **ITSC** and the **APSRTC** Bus Probe Server shall use HTTPS or equivalent data transfer protocol.
- The traffic data collected and analysed by **ITSC System** shall be provided to road users through **VMS System** and other information provision systems such as E-mail, Internet and SMS.

7-3 System Configuration

212. The **Probe Car System** shall consist of the following components;

- **Probe Server** in the **ITSC**,
- Network Equipment for data transfer from the **APSRTC** Bus Probe Server to the **ITSC Server**
- Communication network between the **ITSC** and the **APSRTC**,

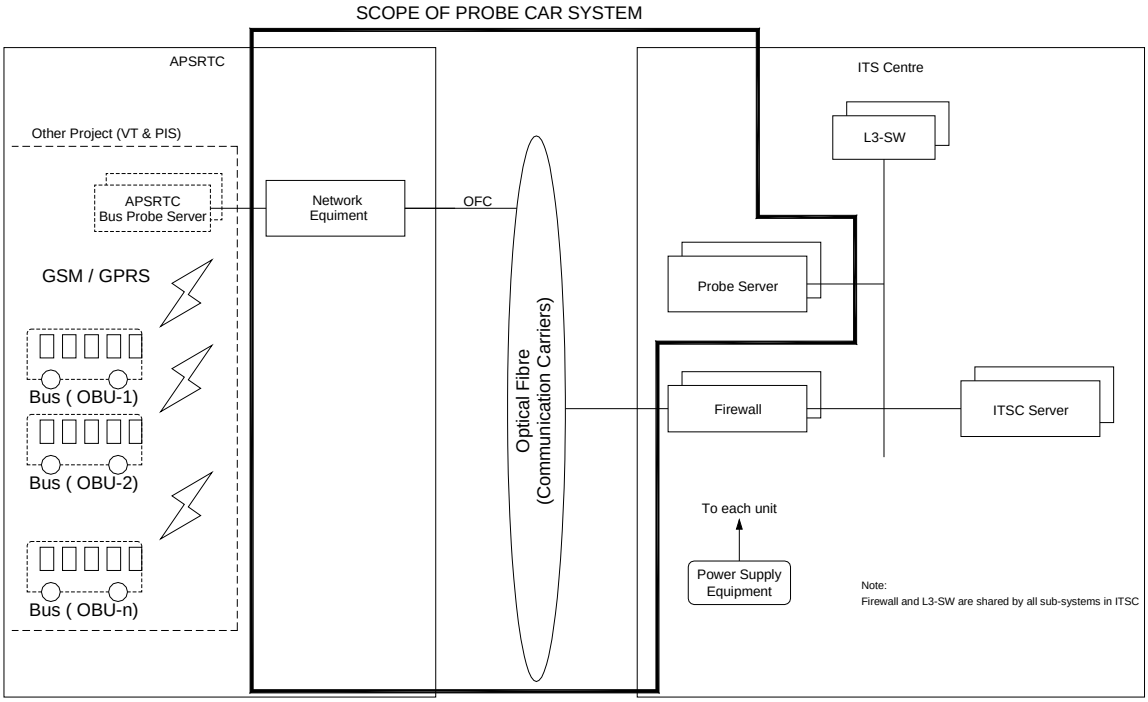


Figure 7-1 Scope of Probe Car System Configuration

213. Components like the **APSRTC** Bus Probe Server in the **APSRTC** Data Centre and GPS on-Board units will be provided under the other project scheme implemented by the **APSRTC**.

214. IP based network equipment shall be provided to connect the **Probe Server** with the **APSRTC** Bus Probe Server through high secured optical fibre network provided by Communication Service Provider.

7-4 System Functions (Software)

215. The **Probe Car System** shall be provided with the functions described below.

7-4-1 Tracking Data Receiving Function

216. The **Probe Server** in the **ITSC** shall receive the vehicle tracking data transferred from the **APSRTC** Bus Probe Server as outlined in below figure:

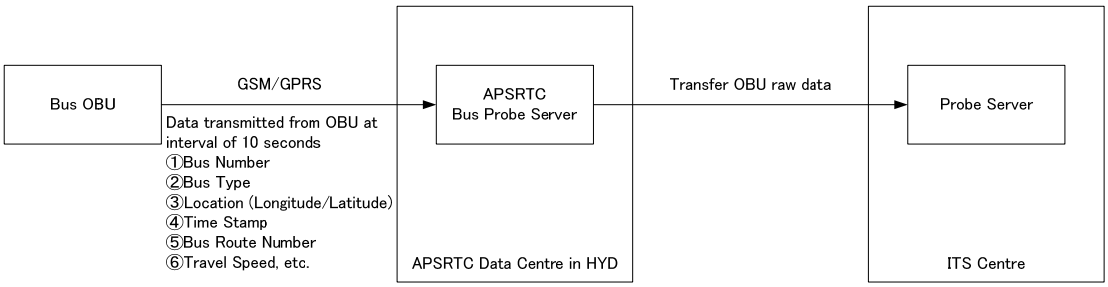


Figure 7-2 Outline of Transferring of Vehicle Tracking Data

217. The vehicle tracking data generated at an interval of 10 seconds in each GPS OBU consists of followings:

- Bus number,

- Bus type,
- Location (Longitude and Latitude),
- Time stamp,
- Bus route number,
- Travel speed

218. All of vehicle tracking data shall be received by the **Probe Server** in the **ITSC** at an interval of less than one (1) minute.

219. The **Probe Server** in the **ITSC** shall communicate with the **APSRTC** Bus Probe Server using HTTPS or equivalent data transfer protocol. The data transfer protocol to be provided by **the Contractor** shall be approved by both Employer and the **APSRTC**.

220. The data structure and format shall be configured with xml (Extensible Markup Language) or equivalent. Details must be coordinated with the **APSRTC** and approved by both Employer and the **APSRTC**.

7-4-2 APSRTC Bus Shelter Data

221. **The Contractor** shall confirm all the existing **APSRTC** bus shelter location and verify in the form of coordinates. The data shall be regularly maintained by adding/deleting/modifying the **APSRTC** bus shelter location data. **The Contractor** shall obtain the data from **APSRTC**.

222. This data shall be used for data elimination functions as described in the clause "7-4-4 Data Elimination Functions" of **PTS**.

7-4-3 Map Matching Function

223. The **Probe Car System** in the **ITSC** shall have vehicle tracking data corrective function named map matching to meet the tracking data with the coordinates of road. To realize the map matching function, the system shall be equipped with digital data map specifying the coordinates of each road called Digital Road Map (DRM).

224. The DRM shall have various digital road data specified in the clause "5-6 Digital Road Map (DRM)" of **PTS**.

7-4-4 Data Elimination Functions

225. The **Probe Car System** in the **ITSC** shall have function to omit abnormal data from data processing in case the tracking data is highly deviated from coordinates of bus routes.

226. The **Probe Car System** in the **ITSC** shall have function to eliminate the bus tracking data in the vicinity of bust stop to minimize the differences with general vehicle traffic flows. In this system, bus tracking data within 50m front and back from bus stop shall be excluded from the processing except the case that bus goes through the bus stop.

227. The system shall be capable of eliminating the tracking data of 100 km/h or faster speed.

228. The **APSRTC** buses that are passing in different routes in the Hyderabad city are identified by bus numbers and bus shelter location in the route of each bus. This information is available with the **APSRTC**. **The Contractor** shall obtain the bus number, bus shelter location data to perform the data elimination function as explained above

7-4-5 Data Processing and Management Function

229. After the processing of map matching and data elimination, the system shall generate average speed data in each section (link) and identify the traffic congested section from the average speed data as described in the below processing flow and algorithm.

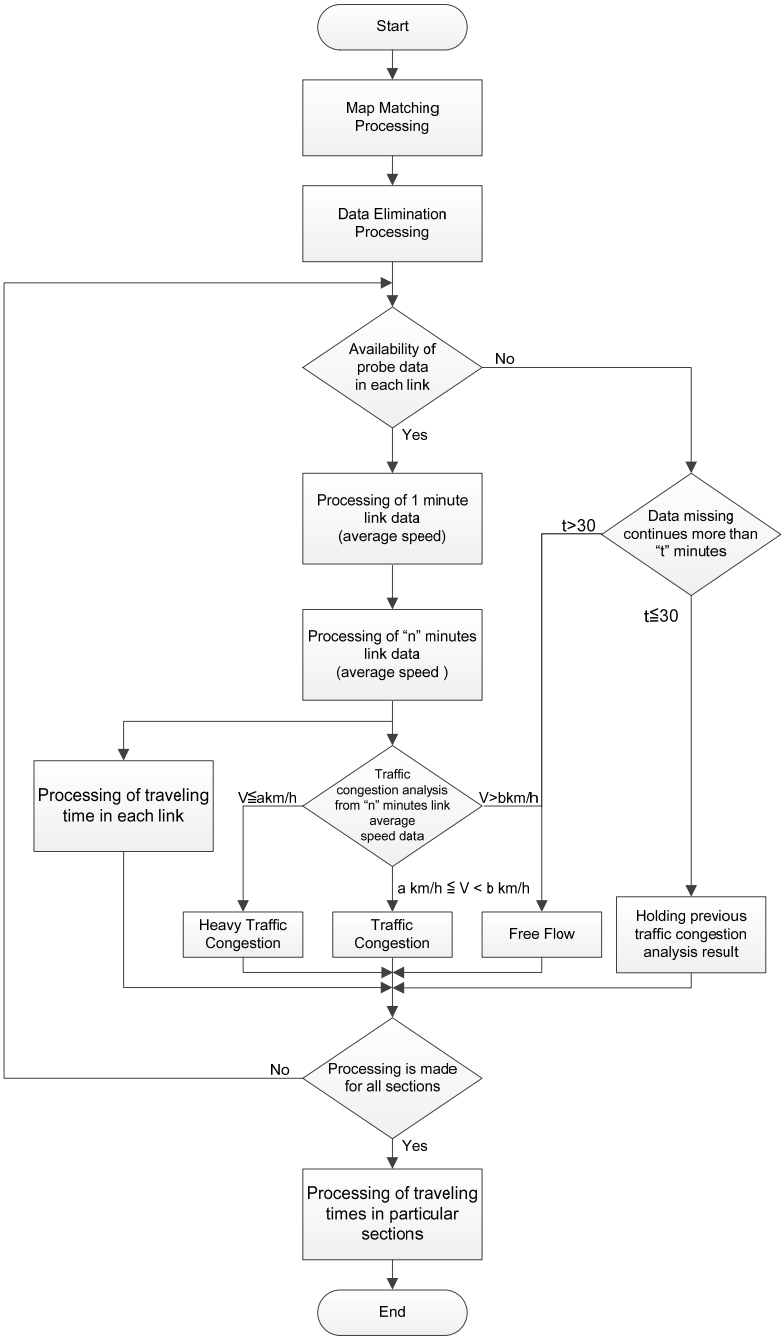


Figure 7-3 Probe Data Processing and Congestion Analysis Flow and Algorithm

230. The algorithm for traffic congestion analysis must be configured to handle the following factors and parameters.

- To avoid the fluctuation of analysis results, average speed data of specific time duration (n) must be utilized in the processing. The default of the time period duration is initially set for five (5) minutes and this value must be changeable.

- The analysis result is classified into three (3) traffic congestion levels, that is, "Heavy Traffic Congestion", "Traffic Congestion" and "Free Flow". The thresholds of traffic congestion level, "a" and "b" are tentatively set as 10km/h and 15km/h respectively in initial stage. Also, these thresholds must be variable and determinable for each location.
- In case of non-availability of data at any time, previous analysis result shall be considered till an extent of 30 minutes. If the data is continuously not available for more than 30 minutes, previous data is reset and the traffic is processed as "Free Flow".
- After the completion of congestion analysis processing in each link, travelling times of particular sections shall be calculated to provide information to road users through **VMS System** and other information provision systems such as E-mail, website and SMS.
- If the average speed processed at a section is lower or higher than the pre-determined threshold, the server shall issue an alarm "abnormal traffic condition" to the **Operator Console** display.
- It shall be possible to monitor real-time traffic flow data on console operator display and also as printed report. Both numerical and graphical presentation of the data shall be provided. The data on the display shall be automatically updated at the pre-defined time interval.
- The congestion analysis shall be prepared for each link (defined as one road section)

7-4-6 Data Storage Function

231. All data transmitted from the **APSRTC** Bus Probe Server and processed data in the **ITSC** shall be recorded and stored in the **Probe Server** for analysis and future usage. Data retrieval and presentation software shall be provided that can show the traffic flow data. Graphical presentation of historical traffic flow data such as hourly variation and daily variation shall also be available.

232. Status of each server and network equipment (normal or malfunctioned) together with error code and time stamp shall be recorded in the **Probe Server** as operation log and for future reliability analysis.

Table 7-1 Minimum Storage Period of Stored Data of Probe Car System

Sub-System	Storage Data		Type
Probe Car System	Bus Location data	Bus number	Raw data
		Bus type	
		Location (Longitude and Latitude)	
		Time stamp	
		Bus route number	
		Travel speed	
		Other available raw data	
	Equipment operational status		Raw data
	1 minute sectional (multiple lanes) data	Vehicle average speed	Processed data
	"n" minutes sectional average speed		Processed data

	Traffic congestion analysis results with parameters	Processed data
	Travelling time in each link	Processed data
	Travelling time in particular section with location parameters	Processed data

7-4-7 Screen Display Functions

233. The information display shall be schematic map based interface and as well in the form of a list.

234. The schematic map based display shall cover the entire HMA and be able to enlarge individual locations on the map when selected. The enlarged view shall be able to display the details for each selected location. The details displayed shall cover the contents as described in the below table but not limited to.

235. The **ITSC Probe Server** shall be capable of creating the following screen contents, but not limited to these:

Table 7-2 Required Screen Contents of Probe Car System

Item	Contents on Schematic Map	Contents on list
Equipment status	・	・ Server and network equipment status (normal / error)
Traffic conditions	・ Current average speed Current traffic congested section ・ Current travelling time Hourly average speed variation	・ Current average speed ・ Currently congested section ・ Current travelling time ・ Hourly average speed variation
Observation (raw) data		・ Observation record in the form of list ・ Screen to edit or remove abnormal observation record
Processed data		・ Processed data in the form of list
Parameter setting		・ Parameters in the form of list ・ Screen form to edit all the parameters
Server status		・ Server status (normal / error) in the form of list
Operation log		・ List of **Roadside Equipment** those operational or non operational ・ Error record
Date and Time	・ Current date and time	・ Current date and time

7-4-8 Reporting Functions

236. The **ITSC Probe Server** shall publish/print the reports listed below, but not limited to these. The reports shall be produced as pre-scheduled or on-demand by system operator. It shall be possible to produce the reports in a portable file format.

Table 7-3 Reporting Contents of Probe Car System

Item	Contents
Traffic conditions	・ Daily report containing hourly sectional average speed ・ Monthly report containing daily sectional average speed and that of the day of the week
Operation and error log	・ List of **Roadside Equipment** those are operational or non operational ・ Error record

7-4-9 Data Transmitting Functions

237. Following data processed in the **ITSC Probe Server** shall be stored at an interval of 5 minutes in the database of **ITSC System** for total system management.

- 1 minutes sectional average speed
- "n" minutes sectional average speed (default "n" = 5 minutes)
- Traffic congestion analysis results with parameters
- Travelling time in each link
- Travelling speed in predetermined particular section with parameters
- Equipment operational status

7-4-10 Communication Network

238. The data transmission of bus tracking data from the **APSRTC** Bus Probe Server shall be made through IP based network provided by the communication provider. The network equipment of the system shall have high reliable and secure connectivity supporting IP-VPN or equivalent.

7-5 Hardware Specification in APSRTC

7-5-1 GPS Device for APSRTC

239. **The Contractor** shall supply the vehicle mounting device i.e. GPS On-Board Unit (OBU) as per the requirement specified by the **APSRTC**. The vehicle mounting device i.e. GPS OBU shall be provided by the Nominated Sub-Contractor.

240. The below table states the specifications of the vehicle mounting device for reference.

Table 7-4 Hardware Specification of Vehicle Mounted GPS unit

No.	Item	Description
1	Processor	・ 32 bit processor
2	Memory	・ 256/512 K byte Flash ・ 64/128 K byte RAM ・ Up to 4 GB storage memory (SD Card)
3	LCD	・ 128X64 pixel Graphical LCD with white LED. Display should be both in English and Telugu
4	Keypad	・ Alphanumeric keypad with ・ Navigational keys ・ Five Functional keys

5	Display Board Interface	· RS-485 Interface · Full Duplex mode · Baud rate: 115200 bps
6	GSM/GPRS	· Dual Band 800 / 1800 MHz · Class B GPRS
7	GPS	· Sensitivity: · - Acquisition: 147 dBm · -Navigation: 160 dBm · -Tracking: 163 dBm · 48 Channel Architecture
8	USB	· USB 2.0 Host Interface
9	RS – 232 Interface	· Configurable Baud rate : 9600 to 115200 bps
10	Audio Interface	· Built-in 40W Audio Amplifier
11	Mic Interface	· Built-in Mic interface for audio announcements
12	Voice Interface	· 3-pin. 3.5 mm jack for hands free
13	Power supply	· 18V to 36V DC (with Audio) · 9V to 36V DC (without Audio)
14	Current with Audio @ 24	· DC : 2.5A (Max) · DC : 1.5A (Typical)
15	Protection	· Cranking (Over voltage and Under voltage) · Reverse voltage protection (No polarity)
16	Input short circuit protection	· Built-in battery backup
17	Mechanicals	· Aluminium powder coated · 180 mm(W) X 90 mm(H) X 75mm(D) · Confirming to IP65
18	Operating temperature	· -10^0 C to + 70^0 C
19	Humidity	· 95% RH @ 40^0 C

7-5-2 Network Equipment

241. Network Equipment required to make the communication of probe data between **APSRTC** and **ITSC** is as in below table

Table 7-5 Hardware Specification of Network Equipment

No.	Descriptions	Remarks
1.	Networking type	· VPN Router
2.	Data link protocol	· Ethernet, Fast Ethernet
3.	Remote management protocol	· RMON, Telnet, SNMP
4.	Encryption algorithm	· Triple DES, IKE
5.	LAN interface	· 10 BASE-T/100BASE-TX (RJ-45) x 1port
6.	Transport protocol	· TCP/IP, IPSec, L2F, L2TP, RSVP
7.	Routing protocol	· NHRP, HSRP, OSPF
8.	Compliant standard	· IEEE 802.1Q, IEEE 802.3, IEEE 802.3u
9.	RAM	· 64 MB or more

10.	Flash memory	・ 32 MB or more

7-6 Hardware Specification of Equipment in the ITSC

7-6-1 Probe Server in the ITSC

242. **The Contractor** shall provide the redundant type server as shown below.

Table 7-6 Hardware Specification of Probe Server

No.	Item	Specifications
1.	Server configuration	・ Same specification stated in clause "4-2-3 **ITSC** Equipment 3) Standard Specification of Server" of **PTS**.

8 CCTV Camera System

8-1 Purpose

243. This section states **CCTV Camera System** to be installed as one of the **Sub-System**s of **Hyderabad City ITS**. **CCTV Camera System** shall have the following objectives.

- To visually monitor road, traffic and weather conditions on major roads in **HMA** from the **ITSC**,
- To detect abnormal conditions on the roads within the coverage of **CCTV** camera in order to take necessary actions
- To view traffic flows on the major roads in the city using live camera footage to confirm the traffic condition at site.

244. The **CCTV** camera shall be installed at the same locations with the **ATCC Roadside Equipment** or the flood monitoring **Roadside Equipment** to monitor traffic conditions and water logging situations on the road. The images taken by camera shall be transmitted to the **ITSC** in real time and the images are selectively shown on the monitor display of **CCTV** console and large display panel. The footage/images from all camera shall be recorded on the storage device in the **CCTV Server** and the system shall operate on a 24-hour a day 7-day a week basis. The **CCTV Camera System** shall be IP based.

245. **CCTV Camera System** shall be capable of taking clear images of road, traffic and weather conditions under any brightness conditions during the daytime and night time.

246. It shall be the responsibility of **the Contractor** to furnish and install all necessary hardware, software, and database, integrate all system components and deliver a complete operational **CCTV Camera System**.

8-2 System Requirements

247. System requirements of **CCTV Camera System** are as follows.

- **CCTV Camera System** shall collect real-time images from each of **CCTV** camera located at roadside and monitor and control the camera images from the **ITSC**.
- The **CCTV** camera shall be equipped with zoom and pan-tilt functions (PTZ functions) to secure wider area and longer distance coverage.
- The **CCTV** camera shall have functionality to take images during night time and have connectivity using high-capacity communication network.
- The **CCTV** camera devices shall be easily available in India.
- The live camera images collected by the system can be shared among road operators and traffic police etc. in the **ITSC** and provide to the public through internet.
- The camera device with soft encoder shall be put on the top of supporting pole of **ATCC** or flood monitoring Equipment. The supporting structure with enough length must be provided to keep good visibility.
- The **CCTV** camera must be placed at the locations where visibility to both bounds on the road is kept as much as possible.

8-3 System Configuration

248. **CCTV Camera System** shall consist of the following components;

- **CCTV Server** at the **ITSC**;
- **CCTV** Console with camera control keyboard and display monitor at the **ITSC**
- **CCTV Roadside Equipment** consisting of camera, controller, network equipment, media converter , power supply equipment and peripheral,
- Communication Network between the **ITSC** and **Roadside Equipment**, and
- Supporting structure and foundation at roadside.

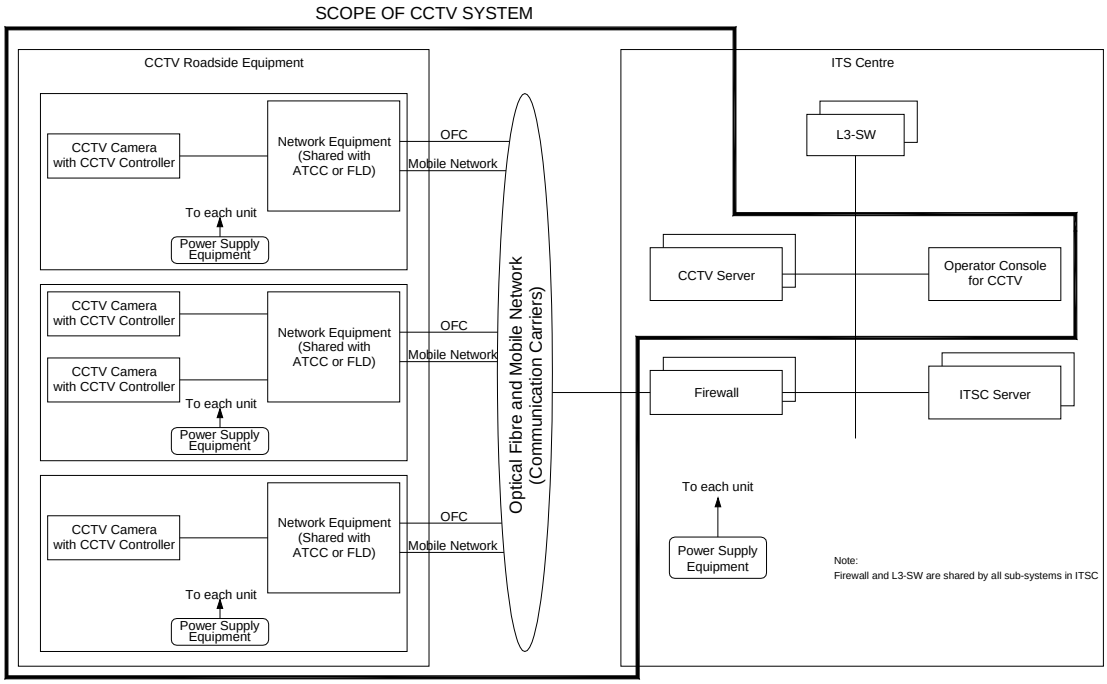


Figure 8-1 Scope of CCTV Camera System Configuration

8-4 Installation Location

249. The **CCTV** camera shall be installed at the locations listed below.

Table 8-1 Installation Location

CCTV No.	Coordinates		Road	Address	Position of Installation	Remarks
	Latitude	Longitude				
CCTV-01	17° 18 '55.55" N	78° 27' 25.42" E	IRR	Near Chandrayan Gutta, IRR	Median	
CCTV-02	17° 20' 8.01" N	78° 29' 41.32" E	IRR	Near Kendriya Vidyalaya, Kanchan Bagh, IRR	Median	
CCTV-03	17° 20' 35.91" N	78° 32' 51.83" E	IRR	Near LB Nagar Junction, LB Nagar to Karmanghat, IRR	Median	
CCTV-04	17° 22' 45.97" N	78° 33' 28.98" E	IRR	Near Nagole Junction, Uppal to LB Nagar, IRR	Median	
CCTV-05	17° 24' 49.25" N	78° 32' 52.36" E	IRR	Near Habsiguda Junction, Torsion Products, IRR	Roadside	Metro section Both side installation (2 equipments)
	17° 24' 48.82" N	78° 32' 51.38" E				
CCTV-06	17° 25' 51.06" N	78° 31' 28.77" E	IRR	Near Mettuguda Junction, Railway Golf Cource, IRR	Roadside	Metro section Both side installation (2 equipments)
	17° 25' 52.00" N	78° 31' 29.55" E				
CCTV-07	17° 26' 37.09" N	78° 28' 29.96" E	IRR	Footover Bridge Begumpet, ACP Office, IRR	Roadside	Metro section Both side installation (2 equipments)
	17° 26' 37.82" N	78° 28' 30.30" E				
CCTV-08	17° 25' 54.61" N	78° 27' 22.36" E	IRR	Green Lands Flyover, Near CM Office, IRR	Median	
CCTV-09	17° 24' 37.24" N	78° 26' 59.36" E	IRR	Taj Banjara, Karachi Bakery, Road No. 1, Banjara Hills	Median	
CCTV-10	17° 22' 10.84" N	78° 25' 44.79" E	IRR	Spencers Stores, Attapur, IRR	Roadside	Make island (both direction) Both side installation (2 equipments)
	17° 22' 10.86" N	78° 25' 45.60" E				
CCTV-11	17° 29' 43.49" N	78° 21' 22.61" E	NH9	NH 9 Near Miyapur, Prajay City	Median	
CCTV-12	17° 27' 31.15" N	78° 25' 58.80" E	NH9	Moosapet Road, Hyderabad Industries ltd, R&D Center, Sanathnagar	Roadside	Metro section Make island (both direction) Both side installation
	17° 27' 30.87" N	78° 25' 58.00" E				
CCTV-13	17° 27' 42.32" N	78° 27' 55.02" E	NH9	Near Bowenpally Junction, Air Force Hostel	Median	
CCTV-14	17° 23' 14.17" N	78° 28' 19.61" E	NH9	Near Gandhi Bhavan, Nampally, NH9	Roadside	Metro section Both side installation (2 equipments)
	17° 23' 14.92" N	78° 28' 20.37" E				
CCTV-15	17° 19' 58.55" N	78° 26' 22.85" E	NH7	Near National Police Academy, Shivarampally, NH7	Median	
CCTV-16	17° 16' 28.19" N	78° 24' 3.06" E	NH7	NH 7 Near Shamshabad	Median	
CCTV-17	17° 22' 6.63" N	78° 31' 16.34" E	NH9	Dilsukhnagar, Near Chandnabrothers Show Room, NH9	Roadside	Metro section Make island (One direction) Both side installation
	17° 22' 7.86" N	78° 31' 15.85" E				
CCTV-18	17° 19' 23.84" N	78° 36' 38.53" E	NH9	All India Radio station, Hayathnagar, NH9	Median	
CCTV-19	17° 24' 1.29" N	78° 32' 24.36" E	NH202	Near Hyderabad Public School, Ramanthapur, NH 202	Median	
CCTV-20	17° 24' 47.43" N	78° 36' 55.13" E	NH202	CPRI, Boduppal (Narapally), NH 202	Median	
CCTV-21	17° 22' 50.27" N	78° 29' 17.17" E	NH9	Esama Bazar Road, Near MGBS, NH9	Median	
CCTV-22	17° 29' 3.74" N	78° 28' 22.95" E	NH7	Nandamurinagar Towards Suchitra,	Median	
CCTV-23	17° 32' 31.38" N	78° 13' 42.00" E	NH9	Muthangi village, NH9	Median	
CCTV-24	17° 36' 21.73" N	78° 29' 23.93" E	NH7	CMR Engineering College, Medchal, NH 7	Median	
CCTV-25	17° 27' 25.61" N	78° 42' 59.29" E	NH202	HP Petroleum, Ghatkesar, NH 202	Median	
CCTV-26	17° 18' 25.24" N	78° 42' 12.63" E	NH9	Inamguda (Ramoji Film City), NH 9	Median	
CCTV-27	17° 14' 1.62" N	78° 21' 22.94" E	NH7	Thondapally village, NH 7/NH 44	Median	
CCTV-28	17° 27' 16.12" N	78° 29' 8.02" E	NH7	Tarbond (JBS), NH 9	Median	
CCTV-29	17° 25' 12.57" N	78° 29' 0.70" E	NH7	Near Makhdoom Mohiuddin Statue, Tankbund, NH 9	Roadside	

CCTV No.	Coordinates		Road	Address	Position of Installation	Remarks
	Latitude	Longitude				
CCTV-30	17° 26' 8.21" N	78° 27' 7.68" E	Ameerpet Rd. (City Road)	Lal Bunglow, Greenland to Ameerpet Road	Roadside	Metro section
CCTV-31	17° 26' 12.49" N	78° 26' 37.21" E	NH9	Ameerpet Junction, Maitrivanam	Roadside	Metro section
CCTV-32	17° 25' 3.07" N	78° 27' 24.85" E	NH9	T Junction from Punkagutta Road to Hotel Taj Krishna	Roadside	Metro section
CCTV-33	17 °25' 23.51" N	78° 27' 38.78" E	Raj Bhavan Road (City	TSR Towers, Somajiguda	Roadside	
CCTV-34	17° 25' 26.75" N	78° 27' 13.83" E	NH9	Model House, Panjagutta	Roadside	Metro section
CCTV-35	17° 24' 15.47" N	78° 27' 8.04" E	IRR	Road No 1, Banjara Hills, Near Masab Tank Flyover Road	Roadside	
CCTV-36	17° 24' 51.03" N	78° 25' 36.54 "E	Road No. 12 (City Road)	Road No 12, Banjara Hills, Banjara Hills Traffic Police	Roadside	
CCTV-37	17° 26' 10.50" N	78° 25' 40.73" E	Krishna Nagar Main Rd. (City	Near Kotla Vijay Bhaskar Reddy Indoor Stadium, Yousufguda	Roadside	
CCTV-38	17° 25' 58.11" N	78° 29' 18.90" E	NH7 (NH9)	Ministers Road Junction, Near James Street Railway Station, Ranigunj	Roadside	
CCTV-39	17° 26' 10.13" N	78° 30' 42.70" E	IRR	Road Under Rail Bridge Near SCR Railnilayam, Secunderabad	Median	
CCTV-40	17° 26' 19.67" N	78° 29' 19.19" E	NH7 (NH9)	NH9, Ranigunj to Paradise, Near Park Lane Y Road	Roadside	
CCTV-41	17° 23' 41.73" N	78° 30' 16.28" E	Tilak Nagar Rd (City	Road Under Rail Bridge Near Fever Hospital, Nallakunta	Median	
CCTV-42	17° 23' 33.53" N	78° 29' 50.08" E	Barkatpura Rd (City Road)	Near EPF Office, Barkatpura Circle Road	Roadside	
CCTV-43	17° 22' 37.78" N	78° 29' 42.60" E	NH9	Road Under Rail Bridge, Malakpet,	Roadside	Metro section
CCTV-44	17° 29' 16.13" N	78° 30' 43.49" E	Siddipet Rd (SH1)	Military College, Siddipet Road, Alwal	Median	
CCTV-45	17° 16' 30.00" N	78° 35' 18.31" E	Nagarjuna Sagar Rd (SH2)	Nagarjuna Sagar Road, Turkayamjal	Median	
CCTV-46	17° 15' 55.46" N	78° 28' 33.46" E	Srisailam Highway (SH5)	Srisailam Highway, Pahadisharif, Near RCI	Median	
CCTV-47	17° 21' 22.83" N	78° 22' 54.85" E	Chevella Rd (SH20)	Chevella Road, Near Shadan College	Median	
CCTV-48	17° 30' 5.59" N	78° 27' 3.07" E	HMT Rd (SH6)	Medak Road, Near HMT	Median	
CCTV-49	17°25'38.15"N	78°27'9.77"E	IRR	Under Punjagutta Flyover	Under Flyover	

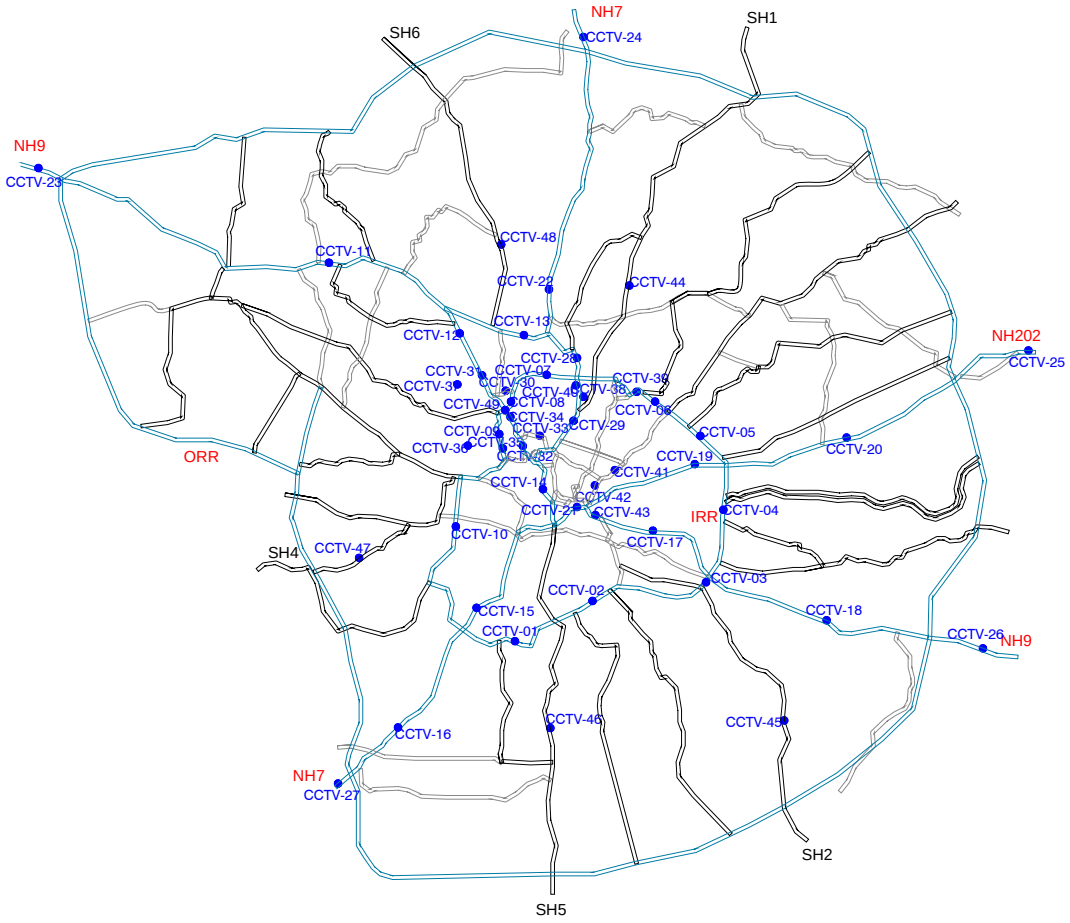


Figure 8-2 Location Map of CCTV Roadside Equipment

250. The locations shown above are tentative. T**he Contractor** shall examine each location and confirm the exact proper location at site for installation of each **Roadside Equipment**. **The Contractor** shall coordinate with the relevant authorities and obtain approval of t**he Employer's Representative**.

8-5 Installation policy

251. **CCTV** shall be placed at the same locations with the traffic counter, which is between junctions, to visually monitor the actual traffic flows, and at the same locations with the flood monitoring sensor to confirm the water logging condition using video footage. It is being considered that one **CCTV** unit shall be placed at one location because the **CCTV** will have pan, tilt and zoom functions.

252. The camera shall be installed either on the top of supporting pole of **ATCC Roadside Equipment** or on the pole to be installed for flood monitoring **Roadside Equipment**. The **CCTV** camera with **ATCC Roadside Equipment** shall be placed at the median of road to monitor both the bounds of traffic flow. However, because of **MET**RO and flyovers, at some locations single **CCTV** camera cannot cover both the bounds of traffic on the roads. In such locations, two sets of **CCTV** camera shall be arranged to cover the required visibility.

In case of any obstacles such as tree branches at surrounding areas of **CCTV** location, such obstacles must be removed before the installation of equipment. The supporting pole must be equipped with steel ladder to ease the maintenance work of **CCTV** camera. In all **CCTV** installations, minimum clearance shall be secured from the road surface.

8-6 System Functions (Software)

253. **CCTV Camera System** shall provide the below described functionalities.

8-6-1 Monitoring Function

254. The road and traffic images taken by **CCTV** cameras on the road shall be transmitted as video signal to the **CCTV Server** at the **ITSC** through the communication network. The **CCTV Server** shall be capable of selecting video signal from any **CCTV** camera to be displayed on the display monitor of the **CCTV** console and **Video Wall**.

255. Sequential display function shall be provided for **CCTV Camera System** to display video images from the multiple cameras sequentially at a pre-set interval. It shall be possible to select the cameras for sequential display and to set the display time of the image from each camera.

256. The **CCTV** display monitor on the console and **Video Wall** shall have multiple screen capability and shall display either one image or multiple images at a time. The image on the **Video Wall** shall be controlled by the **CCTV** console.

8-6-2 PTZ control Function

257. **CCTV Camera System** shall have a manual remote control function of pan, tilt and zoom of the camera. Each camera shall have a normal position of pre-set pan and tilt angles and a pre-set focal length to return and stay when the manual control of PTZ is released.

8-6-3 Image recording and Retrieval

258. All images shall be automatically recorded in the storage device of the **CCTV Server** with camera ID and time stamp. Frame rate of the video signal can be reduced to one frame per minute to reduce the requirements for the storage capacity. Images shall be stored for minimum three (3) days. The **CCTV** still image together with Equipment operational status shall also be stored in the storage server of **ITSC System**.

8-6-4 Data storage Function

259. All data transmitted from the **CCTV Roadside Equipment** and processed data in the **ITSC** shall be recorded and stored in the **CCTV Server** for analysis and future usage. Data retrieval and presentation software shall be provided that can easily retrieve and show the video image and still image taken by the specified Roadside **CCTV** for a given hour or day.

260. Status of **Roadside Equipment** (normal or malfunction) shall be recorded in the **CCTV Server** together with error code and time stamp as operation log that can be utilized for future reliability analysis.

Table 8-2 Minimum Storage Period of Stored Data of CCTV Camera System

Sub-System	Storage Data	Type
Sub-System	· Storage Data	Type
CCTV Camera System	· **CCTV** video image	Raw Data
	· **CCTV** still image	Raw data
	· Equipment operational status	Raw data

8-6-5 Screen Display Functions

261. The information display shall be schematic map based interface and as well in the form of a list.

262. The schematic map based display shall cover the entire HMA and be able to enlarge individual locations on the map when selected. The enlarged view shall be able to display the details for each selected location. The details displayed shall cover the contents as described in the below table but not limited to.

263. The **CCTV Server** shall be capable of creating the following screen contents, but not limited to these:

Table 8-3 Required Screen Contents of CCTV Camera System

Item	Contents on schematic Map	Contents as list
Equipment location and status	· Location of **CCTV** cameras and location of selected camera · Status of **CCTV** cameras	· Location of **CCTV** cameras and location of selected camera · Status of **CCTV** cameras
CCTV video image	· Video image from the **CCTV** camera along with camera ID · **CCTV** video splitting shall support multiple images /videos on one single display screen · **CCTV** video automatically selected and sequentially played · Video image from the **CCTV** camera along with camera ID and event data such as traffic congestion and water logging that was received from the **ITSC Server** · Video image from the video recorder with camera ID, date and time	·
CCTV operation	· Monitoring **CCTV** video · **CCTV** operation to select **CCTV** camera and operation such as pan,	·

	tilt, zoom and return to preset position	
Video operation	· Monitoring recording status · Operations as for recorded videos such as play back rewind and forward. · Management of recorded videos such as delete video and copy video to other media	·
Parameter setting		· Parameters in the form of list · Screen form to edit all the parameters
Server status		· Server status (normal / error) in the form of list
Operation log		· List of **Roadside Equipment** that are operational and non-operational · Error record
Date and Time	· Current date and time	· Current date and time

8-6-6 Reporting Functions

264. The **CCTV Server** shall print the reports listed below, but not limited to these. The reports shall be produced as pre-scheduled or on-demand by the system operator. It shall be possible to publish the report as a portable file format:

Table 8-4 Reporting Contents of CCTV Camera System

Item	Contents
Operation and error log	· List of **CCTV** camera that are operational and non operational · Error record

8-7 Hardware Specification of the CCTV Roadside Equipment

8-7-1 CCTV Camera and Controller

265. The specification of the **CCTV** Camera and Controller to be installed is as shown table below.

Table 8-5 Hardware Specification of CCTV Camera and Controller

No.	Item	Specifications
1.	Imaging Device	· CCD or CMOS
2.	Effective Pixels	· 768 (H) x 494 (V) or more
3.	Scanning area	· 3.59 mm (H) x 2.70 mm (V) or larger
4.	Resolution	· VGA: 640 x 480, QVGA: 320 x 240
5.	Minimum luminance	· 0.5 lx (colour), 0.04 lx (white/black mode) or lower
6.	Video S/N ratio	· 50 dB or more

7.	Pan driving range	· 360 degree endless turning, · maximum speed 120 deg./sec or more
8.	Tilt driving range	· +5 (upward) to -90 (downward) degree or more, · maximum speed 120 deg./sec or more
9.	Lens Type	· Autofocus lens
10.	Zoom Factor	· Optical 30x/ digital 10x or more
11.	Focal length	· 3.8 to 114 mm or longer
12.	Iris	· Auto
13.	Compression system	· JPEG, MPEG-4, H.264
14.	Line bit rate	· 64 kbps / 128 kbps / 256 kbps / 512 kbps / 1024 kbps / 2048 kbps / 4096 kbps
15.	Protocol	· TCP/IP, UDP/IP, HTTP, RTP, FTP, SMTP, DHCP, DNS, DDNS, NTP, SNMP
16.	FTP client	· Alarm image transmission, FTP periodical transmission
17.	Image distribution	· MPEG-4: Unicast / multi-cast · JPEG: Pull/push
18.	Frame rate	· 0.1 fps – 30 fps
19.	LAN interface	· 10 BASE-T/100BASE-TX (RJ-45) x 1port
20.	Power Consumption	· 100 VA or less
21.	Protection class	· IP 65 or higher
22.	Reliability and maintainability	· Expected MTBF > 5 years x 365 days x 24 hours = 43,800 hours as a redundant server · Expected MTTR < 6 hours

8-7-2 Network Equipment

266. The specification of the network equipment to be installed is as shown table below.

Table 8-6 Hardware Specification of Network Equipment

No.	Item	Specifications
1.	Networking type	· 3G wireless integrated router
2.	Wired WAN interface	· 10/100 Mbps Fast Ethernet x 1port · Wire WAN interface · Interface shall meet dedicated optical fibre network supplied by communication provider
3.	Wireless WAN interface	· Mobile network interface x 1port · Interface shall meet wireless mobile network (3G or LTE)
4.	LAN interface	· 10/100 BASE-T x 4 ports
5.	Power consumption	· 100VA or less

8-7-3 Media Converter

267. Media converter shall be used to connect **CCTV** camera with network equipment at the location where two sets of **CCTV** cameras are separately installed at Roadside.

Table 8-7 Hardware Specification of Media Converter

No.	Item	Specifications
1.	LAN interface	・ 10 BASE-T/100BASE-TX (RJ-45) x 1port
2.	Network interface	・ 100BASE-FX (SC) x 1port
3.	Transmission speed	・ 100Mbps
4.	Maximum segment length	・ 2km (Single mode fibre) or more
5.	Power consumption	・ 10VA or less

8-7-4 Housing and Cabinet

268. **CCTV** camera shall be covered with an housing to protect it from rain and other. **CCTV** controller together with circuit, devices, terminal unit, power supply and network equipment shall be accommodated in the cabinet of **ATCC** or **FLD Roadside Equipment**.

269. The cabinet is of the same specification as stated in clause "4-2-4 **Roadside Equipment** 4) Cabinet" of **PTS**.

8-7-5 Power Supply

270. The UPS for the **CCTV Roadside Equipment** shall be shared with the **ATCC** or flood monitoring **Roadside Equipment** or separately provided. Power receiving panel to feed the commercial power shall be supplied and installed at each location.

8-7-6 Communication Network

271. The moving/static picture of the **CCTV** camera to the **ITSC** shall be made through optical fibre network and mobile network of the communication carrier. The optical fibre network shall be utilized as main communication line while the mobile network shall be used as backup. The live images taken by **CCTV** camera must be compressed into digital image format such as H.264/MPEG-4 and M-JPEG to transmit images over IP network. In case of communication failure of optical fibre network, **CCTV Camera System** shall automatically change over the communication line to mobile network. In case of the optical fibre network, the live image compressed into H.264/MPEG-4 format shall be transmitted to the **ITSC** and when the mobile network is utilized, the still images of JPEG format shall be generated at an interval of 1 frame per second or less and transmitted to the **ITSC**.

8-8 Hardware Specification of Equipment in the ITSC

8-8-1 CCTV Server in the ITSC

272. **The Contractor** shall provide the redundant type server as shown below.

Table 8-8 Hardware Specification of CCTV Server

No.	Item	Specifications
1.	Server configuration	・ Same specification stated in clause "4-2-3 **ITSC** Equipment 3) Standard Specification of Server" of **PTS**.

8-8-2 Operator Console for CCTV

273. **The Contractor** shall provide the **Operator Consoles** as shown below. All the **Operator**

Consoles shall be the same model and shall be of the same configuration.

274. **The Contractor** shall provide the required number of camera controller keyboards to be used to select and control cameras and control digital video recorder.

Table 8-9 Hardware Specification of Operator Console for CCTV

No.	Item	Specifications
1.	PC configuration	· Same specification stated in clause "4-2-3 **ITSC** Equipment 4) Standard Specification of **Operator Console**" of **PTS**.
2	Camera controller keyboard	· The camera controller keyboards to be used to select and control the cameras and control digital video recorder. · The camera controller keyboard shall have the following features: · Pan, Tilt and Zoom (PTZ) control of camera, · 3-D Joystick to control PTZ functions, · Digital video recorder control function, · Video switches control function and · RS-232, RS-422, RS-485 or LAN (10/100 Base-T) interface

9 MET System

9-1 Purpose

275. This section states **MET System** to be installed as one of the components of **Hyderabad City ITS**. The **MET System** will be introduced in **the Project** with following objectives.

- To collect the data on weather conditions including rainfall, temperature, wind velocity/direction and etc on the roads in **HMA** from **APSDPS**
- To provide the weather information to the road users.
- To provide measured meteorological data and related alerting signals to road administrators and traffic police etc. in the **ITSC**.
- To store the data for a certain period in order to utilize for future weather statistics.
- To provide alert information to road users through **VMS System** and other information provision systems such as e-mail, website and SMS.

276. The meteorological measurement is carried out by **APSDPS**. It is measured by the **MET** measurement Equipment at approximately 63 locations in the **HMA**. The measured data is transmitted from the meteorological measurement equipment to the Meteorological Server in **APSDPS**. It has been agreed between **HGCL** and **APSDPS** that the meteorological data collected by the Meteorological Server in **APSDPS** will be provided to the **MET Server** of **ITSC** at 5 minute interval.

277. The scope of **MET System** the **Hyderabad City ITS** project is;

- To read the meteorological data from the Meteorological Server in **APSDPS**,
- To transmit the meteorological data from **APSDPS** to the **MET Server** in **ITSC**,
- To process the meteorological data in **ITSC**, and
- To provide the meteorological data to the road users from the **ITSC.**

278. The meteorological data is measured by **APSDPS** currently at 63 locations in **HMA**. The number of locations is tentative. **The Contractor** shall obtain the location list from **APSDPS** where the **APSDPS** is measuring the meteorological data in the **HMA** and confirm with **the Employer**.

9-2 System Requirements

279. System Requirements of the **MET System** are as follows.

- The system shall collect the following weather information. The collection shall be performed at every 5 minute interval.
- Rainfall (detection and level)
- Atmospheric Temperature
- Relative Humidity
- Wind Speed
- Atmospheric Pressure
- Wind Direction
- The collected meteorological data shall be processed to eliminate abnormal data by the **MET Server** in the **ITSC**.

9-3 System Configuration

280. The **MET System** shall consist of the following components:

- **MET Server** at the **ITSC**,
- **MET Workstation** and Network Equipment in the **APSDPS**, and
- Communication network between the **ITSC** and Roadside **MET Workstation** in **APSDPS**
- The above components shall be prepared by **the Contractor**, as shown in the figure below.

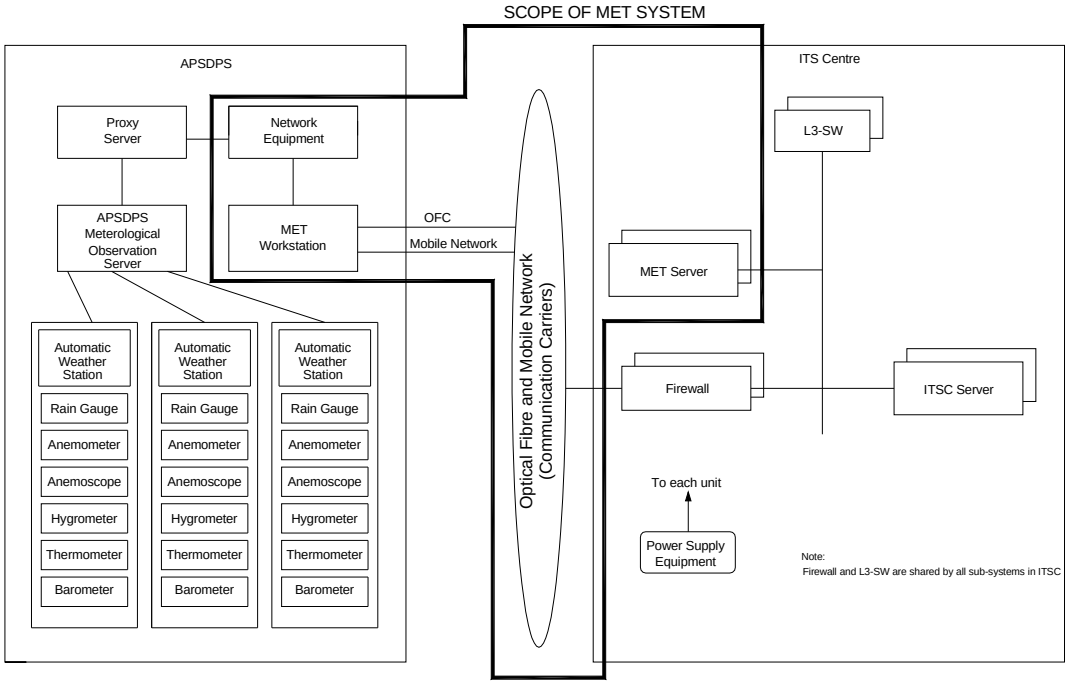


Figure 9-1 Scope of MET System configuration

281. The **MET Server** in the **ITSC** shall receive all meteorological data from the Meteorological Server in the **APSDPS**. IP based network equipment shall be provided to connect the **MET Workstation** in the **APSDPS** with the **MET Server** in the **ITSC**.

282. It shall be the responsibility of **the Contractor** to furnish all necessary hardware and software, install Equipment at the specified location, provide necessary wiring, integrate all system components, and deliver a complete operational **MET System**.

9-4 System Functions (Software)

9-4-1 Data Reading Function of MET Workstation in the APSDPS

283. The **MET Workstation** in the **APSDPS** shall read and obtain the meteorological data from Meteorological Server in the **APSDPS** at specified interval (default is 5 minutes). The meteorological data is stored in the CSV format at the Meteorological Server in the **APSDPS**.

284. The data reading interval and the specified location of the CSV file on the **MET Server** shall be modifiable parameters. **The Contractor** shall confirm the data reading interval with **APSDPS** and get approval of **the Employer**.

285. **The Contractor** shall obtain the CSV file structure from the **APSDPS** and confirm it.

9-4-2 Data Transmission Function of MET Workstation at the APSDPS

286. The meteorological data read from the Meteorological Server in the **APSDPS** shall be transmitted by the **MET Workstation** at **APSDPS** to the **MET Server** in the **ITSC**.

287. The data transmission shall be in real time by instantaneous checking of data availability on the Meteorological Server in the **APSDPS**.

288. The data transmission loss between the **MET Workstation** at the **APSDPS** and the **MET Server** in the **ITSC** shall be identified. The data shall be re-transmitted in case that the data transmission loss is identified.

9-4-3 Data Processing Function in the ITSC

289. The **MET Server** of **ITSC** shall perform the following process:

1) Data validity check

290. Error checking shall be performed for the received data by comparing the data with the pre-defined threshold. Threshold may include upper limit, lower limit, and variation from the previous data. The data that was identified as faulty shall not be used as observed data.

2) Calculation of Hourly and Cumulative Precipitation

291. Precipitation data shall be processed into hourly precipitation and cumulative precipitation.

9-4-4 Data Processing Function by MET Server

292. The **MET Server** shall perform the data processing as listed in the table below for display and logging. Display shall be updated every 5 minute.

Table 9-1 Data Processing Function by MET Server

Data		Display	Logging
Precipitation			
	Moving total for previous 1 hour	X	X
	Total continuous precipitation	X	X
Rainfall detection			
	Instantaneous (every 5 minute)	X	X
Temperature			
	Instantaneous (every 5 minute)	X	X
Wind velocity			
	Maximum during previous 15 minute	X	X
Wind direction			
	Direction at maximum wind during previous 15 minute	X	X

293. A warning system shall be introduced where an alarm is issued to the system operator when the wind data or precipitation data exceeds the pre-defined threshold. Several types and values of threshold shall be provided and the threshold shall be alterable.

294. All meteorological observation data shall be recorded in the database in the form of 5-minute, daily and monthly data and data retrieval software shall be provided for easy

access to the recorded data. It shall be possible to show graphically the retrieved data from the database.

9-4-5 Data Storage Function

295. All data transmitted from the **APSDPS** and processed data in the **ITSC** shall be recorded and stored in the **MET Server** for analysis and future usage. Data retrieval and presentation software shall be provided that shall show the meteorological data received from **APSDPS** at the specified time, hour or day. Graphical presentation of historical meteorological data such as hourly variation and daily variation shall also be possible.

Table 9-2 Stored Data of MET System

Sub-System	Storage Data	Type
MET System	· Instantaneous value of ambient temperature at 5 minute interval	Raw Data
	· Hourly cumulative value of rainfall	Raw Data
	· Cumulative value of rainfall from the start of rainfall	Raw Data
	· Instantaneous rainfall detection at 5 minute interval	Raw Data
	· Maximum and minimum value of wind speed during previous 15 minutes	Raw Data
	· Wind direction at the maximum and minimum velocity during previous 15 minutes	Raw Data
	· Instantaneous temperature (5minutes)	Processed data
	· Moving total precipitation for previous 1hour	Processed data
	· Total continuous precipitation	Processed data
	· Instantaneous rainfall detection (5 minute)	Processed data
	· Maximum value of wind velocity for previous 15 minute	Processed data
	· Direction at maximum wind during previous 15 minute	Processed data
	· Heavy rain analysis results with parameters	Processed data
	· Strong wind analysis results with parameters	Processed data

9-4-6 Screen Display Functions

296. The information display shall be schematic map based interface and as well in the form of a list.

297. The schematic map based display shall cover the entire HMA and be able to enlarge individual locations on the map when selected. The enlarged view shall be able to display the details for each selected location. The details displayed shall cover the contents as described in the below table but not limited to.

298. The **MET Server** shall be capable of creating the following screen contents, but not limited to these:

Table 9-3 Required Screen Contents of MET System

Item	Contents displayed on schematic map	Contents displayed as list
Weather conditions	· Current weather condition (rainfall detection, precipitation, air temperature, wind velocity, wind direction) as graphical display similar to the one displayed on **APSDPS** website.	· Current weather condition (rainfall detection, precipitation, air temperature, wind velocity, wind direction) · Historical variation of weather conditions in the form of list
Observation (raw) data	· Screen to edit or remove abnormal observation record	· Observation record in the form of list · Screen to edit or remove abnormal observation record
Processed data		· Processed data in the form of list
Parameter setting		· Screen form to edit all the parameters
Server status		· Server status (normal / error)
Date and Time	· Current date and time	· Current date and time

9-4-7 Reporting Function

299. The **MET Server** shall print the reports listed below, but not limited to these. The reports shall be published as pre-scheduled or on-demand by system operator. It shall be possible to publish the report in a portable file format.

Table 9-4 Reporting Contents of MET System

Item	Contents
Meteorological data	· Daily report containing hourly precipitation and rainfall detection · Daily report containing hourly maximum and minimum wind velocity, its direction and time · Monthly report containing daily precipitation and rainfall time · Monthly report containing daily maximum and minimum wind velocity, wind direction, and time

9-5 Hardware and Software Specification of the MET Workstation in APSDPS

9-5-1 Hardware of MET Workstation at APSDPS

300. The **MET Workstation** shall be supplied and installed by **the Contractor** in the premises of **APSDPS** to transmit the meteorological data from **APSDPS** Meteorological Server to **ITSC**.

301. **The Contractor** shall provide the server as **MET Workstation** as shown below.

Table 9-5 Hardware Specification of MET Workstation

No.	Item	Specifications
1.	Workstation	・ Other specification shall be followed specification stated in clause "4-2-3 **ITSC** Equipment 3) Standard Specification of Server" of **PTS**. ・ Redundant server is not required. Standard high reliability server is required.

9-5-2 Software for MET Workstation in APSDPS

302. The required software to continuously read the **APSDPS** Meteorological Server and transmit the meteorological data from **APSDPS** Meteorological Server to **ITSC** shall be prepared by **the Contractor** in the **MET Workstation** installed in the **APSDPS**.

9-5-3 UPS Power supply for MET Workstation at APSDPS

303. The UPS for the **MET Workstation** at **APSDPS** shall be provided under **the Contract**. The specification of the UPS for the **MET Workstation** at **APSDPS** shall be same as stated in the clause "4-2-4 2) Power supply for **Roadside Equipment** of **PTS**".

9-5-4 Communication Network

304. The meteorological data transmission from the **MET Workstation** at **APSDPS** to the **ITSC** shall be made through optical fibre network of the communication carrier. The optical fibre network shall be utilized as main communication line while the mobile network shall be used as backup.

9-6 Hardware Specification of Equipment in the ITSC

9-6-1 MET Server in the ITSC

305. **The Contractor** shall provide the redundant type server as shown below.

Table 9-6 Hardware Specification of MET Server

No.	Item	Specifications
1.	Server configuration	・ Same specification stated in clause "4-2-3 **ITSC** Equipment 3) Standard Specification of Server" of **PTS**.

10 FLD System

10-1 Purpose

306. This section states **FLD System** to be installed as one of the components of **Hyderabad City ITS**. **FLD System** shall be installed with following objectives:

- To detect and measure flood situation on the roads in **HMA**.
- To provide the waterlogged information and alerting signals to the road users so that drivers can avoid the flooding area.
- To utilize measured data for road facility improvement planning such as road drainage rehabilitation etc.
- To provide the water logging information to road planning agencies (**HGCL**, HMDA), road administrators and traffic polices.

307. **FLD System** shall collect at the flood observation stations the waterlogged level data continuously. The data collected shall be transmitted to the **FLD Server** at the **ITSC** for data processing and logging. In case water logging is detected, the system shall automatically issue an alarm to the system operator. They shall operate on a 24-hour a day 7-day a week base.

308. It shall be the responsibility of **the Contractor** to furnish all necessary hardware and software, install Equipment at the specified location, provide necessary cabling, integrate all system components, and deliver a complete operational **FLD System**.

10-2 System Requirements

309. System Requirements of **FLD System** are as follows.

- **FLD System** shall detect and measure the following flooding information at Roadside. The flooding information shall be monitored in the **ITSC** on real-time basis. The detection and measurement shall be performed at one (1) minute time interval.
  - Flooding point
  - Flooding depth
- The measured flooding data shall be stored for a certain period in order to utilize for road facility improvement planning.
- The flooding and alerting information detected and measured by the system shall be provided to road users through **VMS System** and other information provision systems such as e-mail, website and SMS.
- Flood monitoring detectors shall be easily installable at Roadside with simple operation and maintenance. The electrode contact type detectors shall be installed.
- The flood monitoring detectors shall be placed on the road shoulder in order to avoid traffic interruption.

10-3 System Configuration

310. **FLD System** shall consist of the following components:

- **FLD Server** at the **ITSC**,

- **FLD Roadside Equipment** consisting of flood monitoring detectors with processing unit, network equipment, power supply equipment and peripheral,
- Communication network between the **ITSC** and **Roadside Equipment** and
- Supporting structure or station house and foundation at Roadside.

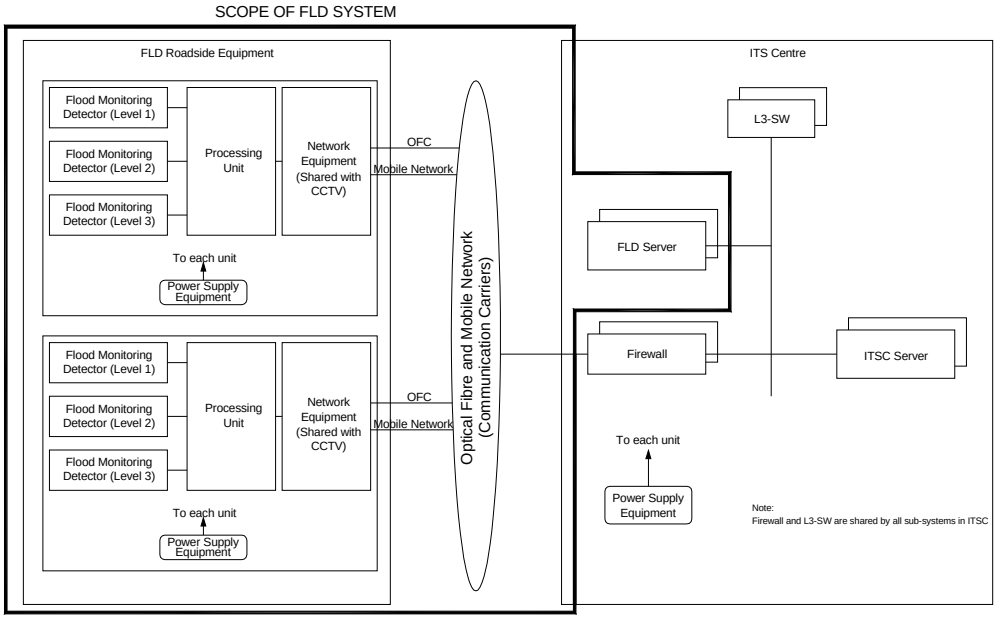


Figure 10-1 Scope of FLD System Configuration

311. The **ITSC** shall have the **FLD Server** for receiving all **FLD Roadside Equipment** data. IP based network equipment shall be provided to connect the **FLD Roadside Equipment** with the **FLD Server** at the **ITSC**.

10-4 Installation Location

312. The **FLD Roadside Equipment** shall be installed at the following 14 locations:

Table 10-1 Installation Location

FM No.	Coordinates		Road	Address	Position of Installation	Remarks
	Latitude	Longitude				
FM-01	17° 26' 8.21" N	78° 27' 7.68" E	Ameerpet Rd. (City Road)	Lal Bunglow, Greenland to Ameerpet Road	Roadside	Metro section
FM-02	17° 26' 12.49" N	78° 26' 37.21" E	NH9	Ameerpet Junction, Maitrivanam	Roadside	Metro section
FM-03	17° 25' 3.07" N	78° 27' 24.85" E	NH9	T Junction from Punkagutta Road to Hotel Taj Krishna	Roadside	Metro section
FM-04	17 °25' 23.51" N	78° 27' 38.78" E	Raj Bhavan Road (City Road)	TSR Towers, Somajiguda	Roadside	
FM-05	17° 25' 26.75" N	78° 27' 13.83" E	NH9	Model House, Panjagutta	Roadside	Metro section
FM-06	17° 24' 15.47" N	78° 27' 8.04" E	IRR	Road No 1, Banjara Hills, Near Masab Tank Flyover Road	Roadside	
FM-07	17° 24' 51.03" N	78° 25' 36.54 "E	Road No. 12 (City Road)	Road No 12, Banjara Hills, Banjara Hills Traffic Police	Roadside	
FM-08	17° 26' 10.50" N	78° 25' 40.73" E	Krishna Nagar Main Rd. (City	Near Kotla Vijay Bhaskar Reddy Indoor Stadium, Yousufguda	Roadside	
FM-09	17° 25' 58.11" N	78° 29' 18.90" E	NH7 (NH9)	Ministers Road Junction, Near James Street Railway Station, Raniguni	Roadside	
FM-10	17° 26' 9.32" N	78° 30' 43.48" E	IRR	Road Under Rail Bridge Near SCR Railnilayam, Secunderabad	Roadside	
FM-11	17° 26' 19.67" N	78° 29' 19.19" E	NH7 (NH9)	NH9, Ranigunj to Paradise, Near Park Lane Y Road	Roadside	
FM-12	17° 23' 41.73" N	78° 30' 16.28" E	Tilak Nagar Rd (City	Road Under Rail Bridge Near Fever Hospital, Nallakunta	Median	
FM-13	17° 23' 33.53" N	78° 29' 50.08" E	Barkatpura Rd (City	Near EPF Office, Barkatpura Circle Road	Roadside	
FM-14	17° 22' 37.78" N	78° 29' 42.60" E	NH9	Road Under Rail Bridge, Malakpet, NH9	Roadside	Metro section

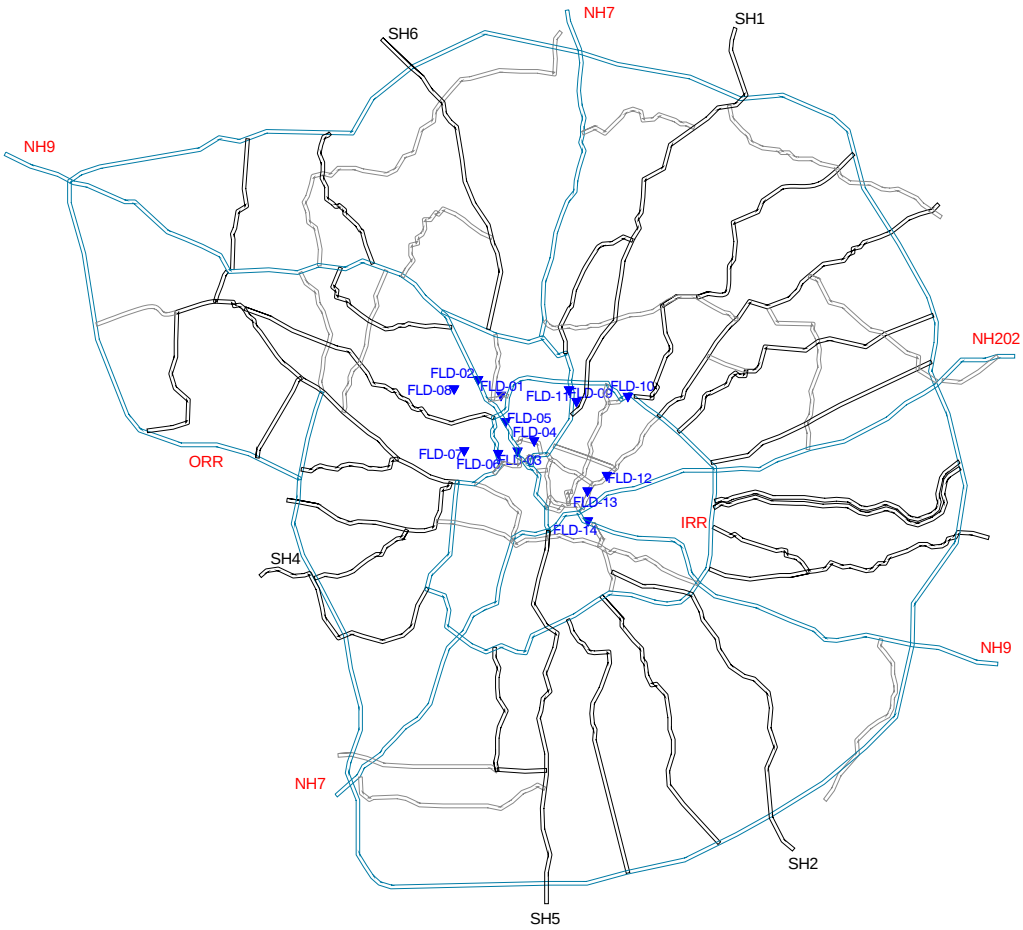


Figure 10-2 Location Map of FLD Roadside Equipment

313. The locations shown above are tentative. T**he Contractor** shall examine each location and confirm the exact proper location at site for installation of each **Roadside Equipment**. **The Contractor** shall coordinate with the relevant authorities and obtain approval of t**he Employer's Representative**.

10-5 Installation policy

314. **Roadside Equipment** of **FLD System** shall be installed at road shoulder. The flood monitoring detectors shall be fixed on steel protective pipe and the bottom of protective pipe must meet the same level of road surface to detect accurate flood conditions. The protective pipe shall be sustained by a supporting steel pole. The **CCTV** camera shall be fixed on the top of supporting pole to monitor the actual flooding situation visually.

315. The 14 locations shown in the table above are tentatively identified based on the information of the critical flooding area in the **HMA**. If the flood conditions at any of the 14 locations are improved and it is judged that the flood monitoring is not required anymore, such locations shall be excluded from the 14 locations.

316. If other locations which are not included in the 14 locations are identified as flood-prone area where it is judged that the flood monitoring is required, such locations shall be included

as the additional location for flood monitoring.

317. **The Contractor** shall confirm the above by contacting and coordination with the relevant authorities including traffic police, GHMC and etc, and take **The Employer's** approval for the finalised locations of the flood monitoring.

318. **The Contractor** shall construct **Roadside Equipment of FLD System** at the designated locations and undertake the necessary works including wiring for data communication and power supply.

10-6 System Functions (Software)

10-6-1 Flood Measuring and Processing Functions

319. The **FLD Roadside Equipment** shall detect following three (3) levels of water logging condition at each location.

- Warning Level I: 100 mm
- Warning Level II: 200 mm
- Warning Level III: 500 mm

320. Detection and measurement shall be on real-time basis.

321. Error checking shall be performed on the measured data by comparing with the previous data. The data identified as faulty shall not be used as observation data.

322. **FLD System** must have an overall detection accuracy of 99% or better in each water logging level detection.

10-6-2 Data Transmitting Function

323. Following measurement data shall be periodically transmitted to the **FLD Server** installed in the **ITSC** through the communication networks.

- Water logging level
- Equipment failure
- Other necessary data

324. The data transmission shall be at one (1) minute time interval.

10-6-3 Data processing and management functions

325. The **FLD Server** shall collect the observed flood logging data and monitor signals from the **FLD Roadside Equipment** at a regular interval.

326. A warning system shall be introduced in the system. An alarm must be issued to the system operator and automatically flashed on the **Video Wall** and/or **Operator Consoles** when a warning level of water logging is detected at Roadside.

327. All observed flood logging data shall be recorded in the **FLD Server** and data retrieval software shall be provided for easy access to the recorded data.

10-6-4 Data Storage Function

328. All data transmitted from the **FLD Roadside Equipment** and processed data in the **ITSC** shall be recorded and stored in the **FLD Server** for analysis and future usage. Data retrieval and presentation software shall be provided that can easily retrieve and show the flooding

information of the specified **Roadside Equipment** at any hour or day.

329. Status of **Roadside Equipment** (normal or malfunctioned) together with error code and time stamp shall be recorded in the **FLD Server** as operation log.

Table 10-2 Minimum Storage Period of Stored Data of FLD System

Sub-System	Storage Data	Type
FLD System	Flood warning level I: 100 mm	Raw data
	Flood warning level II: 200 mm	Raw data
	Flood warning level III: 500 mm	Raw data
	Equipment operational status	Raw data

10-6-5 Screen Display Functions

330. The information display shall be schematic map based interface and as well in the form of a The schematic map based display shall cover the entire HMA and be able to enlarge individual locations on the map when selected. The enlarged view shall be able to display the details for each selected location. The details displayed shall cover the contents as described in the below table but not limited to.

331. The **FLD Server** shall be capable of creating the following screen contents, but not limited to these:

Table 10-3 Required Screen Contents of FLD System

Item	Contents to be displayed on Map	Contents as List
Equipment location and status	・ Location of **FLD Roadside Equipment** and its status (normal / error)	・ Location of **FLD Roadside Equipment** and its status (normal / error)
Flood condition	・ Current flood conditions (warning level I, II and III)	・ Current flood conditions (warning level I, II and III)
Observation (raw) data		・ Observation record in the form of list ・ Screen to edit or remove abnormal observation record
Processed data		・ Processed data in the form of list
Parameter setting		・ Screen form to edit all the parameters
Server status		・ Server status (normal / error) in the form of list
Operation log		・ List of **Roadside Equipment** that are operational and non operational ・ Error record
Date and Time	・ Current date and time	・ Current date and time

10-6-6 Reporting Functions

332. The **FLD Server** shall publish/print the reports listed below, but not limited to these. The

reports shall be published as pre-scheduled or on-demand by system operator. It shall be possible to publish the report in a portable file format.

Table 10-4 Reporting Contents of FLD System

Item	Contents
Flood data	・ Daily report containing water logging level and its time ・ Monthly report containing water logging level and its time
Operation and error log	・ List of **Roadside Equipment** that are operational and non operational ・ Error record

10-6-7 Data Transmitting Functions

333. The following data received and/or processed in the **FLD Server** shall be stored in the database of **ITSC System** on the real time basis.

・ Water logging levels (level 1, 2 and 3) at each **FLD Roadside Equipment**
・ Equipment operational status

334. The alerting signals of waterlogged conditions stored in the database shall be utilized to identify which **VMS** must indicate the warning information to the drivers.

10-7 Hardware Specification of FLD Roadside Equipment

335. The Hardware Specification for **FLD Roadside Equipment** mentioned hereunder is minimum guidelines. **The Contractor** shall not deviate materially from the specifications.

10-7-1 Flood Monitoring Detector

336. **The Contractor** shall provide equipment as shown below.

Table 10-5 Hardware Specification of Flood Monitoring Detector

No.	Item	Specifications
1.	Detection method	・ Electrode contact type
2.	Detecting levels of water logging	・ 100mm, 200 mm and 500mm
3.	Output signals	・ No potential mark contact signal
4.	Material	・ Stainless
5.	Power supply	・ Supplied from processing unit

10-7-2 Processing Unit

337. **The Contractor** shall provide equipment as shown below.

Table 10-6 Hardware Specification of Processing Unit

No.	Item	Specifications
1.	Cabinet size	・ Width: 600mm or less ・ Height: 1,000mm or less
2.	Power consumption	・ 500 VA or less (sensor included)
3.	LAN interface	・ 10BASE-T/100 BASE-TX (RJ-45) x 1port
4.	Reliability and maintainability	・ Expected MTBF > 5 years x 365 days x 24 hours = 43,800 hours as a redundant server ・ Expected MTTR < 6 hours

10-7-3 Network Equipment

338. The data transmission of **FLD Roadside Equipment** with the **FLD Server** in the **ITSC** shall be made through network equipment provided for **CCTV Camera System**.

10-7-4 Cabinet

339. The **FLD** processing unit shall be housed in a rugged cabinet together with circuit, devices, terminal unit, power supply and network equipment.

340. The cabinet is same the specification as stated in clause "4-2-4 **Roadside Equipment** 4) Cabinet" of **PTS**.

10-7-5 Power Supply

341. The UPS for the **FLD Roadside Equipment** shall be shared with the **CCTV Roadside Equipment** or separately provided. Power receiving panel to feed the commercial power shall be supplied and installed at each location in **the Contract**.

10-7-6 Communication Network

342. The data transmission of **FLD System** shall be made through the optical fibre network and through mobile network of the Communication Service Provider. The optical fibre network shall be utilized as main communication line while the mobile network shall be used as backup. In case of any communication failure in optical fibre network, **FLD System** shall automatically change over the communication line to mobile network.

10-8 Hardware Specification of Equipment in the ITSC

10-8-1 FLD Server in the ITSC

343. **The Contractor** shall provide the redundant type server as shown below.

Table 10-7 Hardware Specification of FLD Server

No.	Item	Specifications
1.	Server configuration	・ Same specification stated in clause "4-2-3 **ITSC** Equipment 3) Standard Specification of Server" of **PTS**.

11 VMS System

11-1 Purpose

344. This section states **VMS System** to be installed as one of the **Sub-Systems** of **Hyderabad City ITS**. **VMS System** shall be installed with following objectives;

- To provide road users with real time information of traffic status, incident, and weather conditions on the major roads in **HMA**;
- To provide option of route selection to driver in the case of congestion, incidents and adverse weather,
- The messages displayed on **VMS** are controlled and processed from the **ITSC** Centre (the **ITSC**) where all the information is collected.

345. The **VMS** shall be located at major junctions and intersections on the Inner Ring Road (IRR). The **VMS** shall be placed upstream of major junctions and intersections on national highways and state highways to provide the information to drivers travelling towards the city. **VMS System** shall be capable of creating, managing and displaying messages in three languages (English, Hindi and Telugu) separately and alternately, or simultaneously in case of simple message. The system shall operate on a 24-hour a day 7-day a week basis.

346. It shall be the responsibility of **the Contractor** to furnish all necessary hardware and software, provide gantry or cantilever support depending on the width of road, install the Equipment at the specified location, provide necessary cabling, setup database and parameters, integrate all system components, and deliver a complete operational **VMS System**.

347. The following standards shall apply for the requirements not specifically stated in **The Employer's Requirement**s:

- IRC SP 85-2010
- EN 12966-1
- NEMA TS4

11-2 System Requirements

348. System requirements of **VMS System** are as follows.

- **VMS System** shall display on real time basis the following message components on the **VMS** boards located at Roadside;
  - Location
  - Incident (accident, traffic congestion, bad weather condition, etc.)
  - Action to be taken by road user (Slow-down, be careful, diverting to alternative route, etc.)
- **VMS System** shall provide traffic information such as travelling time on the roads in **HMA** so that the drives select their travelling route.
- Character including symbol mark indicated on the **VMS** board shall be visible under the natural environmental conditions in India, and the character height shall be enough size

for recognition by driver passing through the road.

- **VMS** board(s) shall be properly installed at locations so that the road users can read and understand information on the board and safely change the lane, take turn at junctions and/or intersections.
- The **VMS** board shall be fixed on either gantry type supporting structure or F-shaped cantilever structure. The type of supporting structure shall be determined by considering the message visibility to the drivers.
- **VMS System** shall be capable of creating, managing and displaying messages locally or remotely from the **ITSC**.

11-3 System Configuration

349. The variable message sign system shall consist of the following components:

- **VMS Server** and **Operator Console** for **VMS** at the **ITSC**,
- **VMS Roadside Equipment** consisting of **VMS** board with **VMS** controller, network Equipment, power supply equipment and peripheral,
- Communication network between the **ITSC** and **Roadside Equipment** and
- Supporting structure and foundation at Roadside.

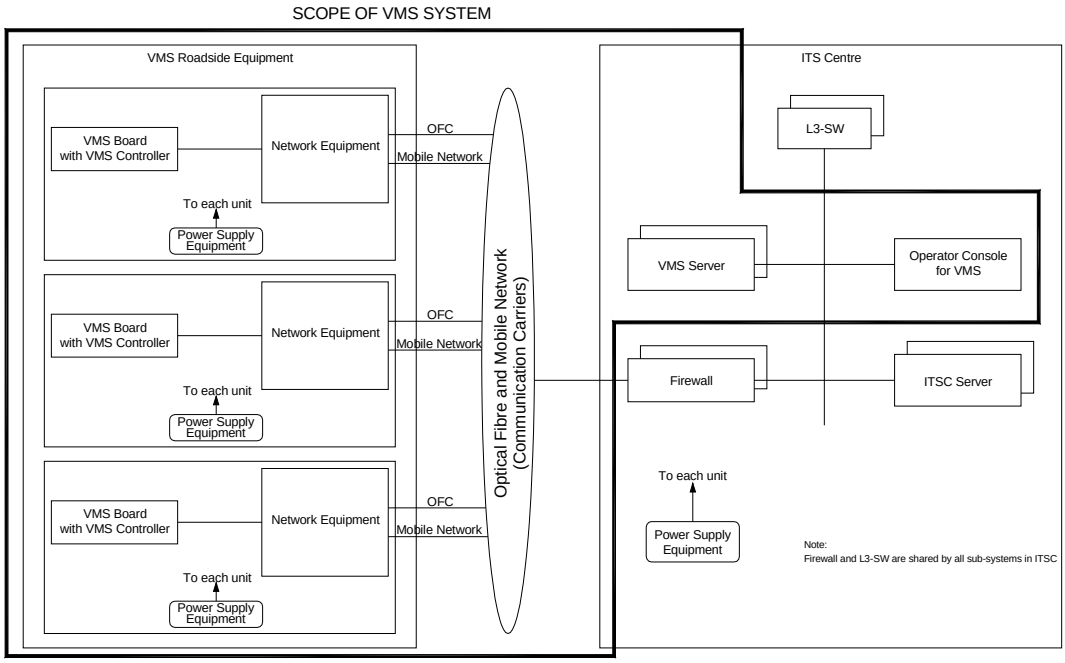


Figure 11-1 Scope of VMS System configuration

350. The **VMS** controller will be accommodated in a separate cabinet or in the **VMS** board housing.

351. A dedicated **Operator Console** for **VMS** shall be provided in the **ITSC** for message preparation, monitoring and control of the variable message signs. IP based network equipment shall be provided to connect the **VMS Roadside Equipment** with the **VMS Server** at the **ITSC**.

11-4 Installation Loation

352. The **VMS** board shall be established at the following locations:

Table 11-1 Installation Location

VMS No.	Coordinates		Road	Address	Type of VMS	Position of Installation	Remarks	
	Latitude	Longitude						
VMS-01	17°20'41.49"N	78°33'12.11"E	NH9	LB Nagar Junction, Towards Dilsukhnagar, Near Maruthi Service Centre, NH9	Cantilever	Median		
VMS-02	17° 20' 53.22" N	78° 33' 7.89" E	IRR	LB Nagar Junction, Towards Karmanghat, Near Hyundai Service Centre, IRR	Cantilever	Median		
VMS-03	17° 20' 42.82" N	78° 32' 58.86" E	IRR	LB Nagar Junction, Towards Uppal,	Cantilever	Median		
VMS-04	17° 24' 5.21" N	78° 33' 46.71" E	NH202	Uppal Junction, Uppal, NH202	Cantilever	Median		
VMS-05	17° 24' 12.08" N	78° 33' 28.89" E	IRR	Uppal Junction, Near Little Flower College, IRR	Cantilever	Roadside	Make island	Metro section
VMS-07	17° 26' 46.69" N	78° 29' 14.54" E	NH7 (NH9)	Towards MG Road, Secunderabad, NH9	Cantilever	Median		
VMS-08	17° 26' 37.00" N	78° 28' 52.82" E	IRR	Near Anand Theatre, MG Road, Secunderabad, IRR	Cantilever	Roadside	Make island	Metro section
VMS-10	17° 25' 42.84" N	78° 27' 4.90" E	NH9	Near Exide Battery Lane, Panjagutta Road, Panjagutta Flyover, Towards Khairatabad, NH9	Cantilever	Roadside	Make island	Metro section
VMS-11	17° 25' 34.33" N	78° 27' 0.83" E	IRR	Nagarjuna Circle Road, Near Brisah, Towards CM Office	Gantry	Roadside to Median		Existing Sign Board
VMS-12	17° 25' 57.52" N	78° 27' 22.34" E	IRR	ITC Kakatiya Sheraton, Greenlands	Gantry	Roadside to Median		
VMS-13	17° 19' 6.64" N	78° 25' 40.09" E	NH7	NH7, Near Entry to PVNR Expressway, Rajendra Nagar	Cantilever	Median		
VMS-14	17° 19' 6.12" N	78° 26' 12.47" E	IRR	IRR, Junction Near Sivarampalli, Towards Mehdipatnam	Cantilever	Median		
VMS-16	17° 23' 55.57" N	78° 26' 45.28" E	IRR	IRR, Mehdipatnam Road, Near Sarojinidevi Eye Hospital & Entry to PVNR Expressway	Cantilever	Median		
VMS-18	17° 28' 38.27" N	78° 25' 16.83" E	NH9	NH9, IDA Kukatpally, Near Metro	Cantilever	Roadside	Make	Metro section
VMS-F-02	17° 25' 38.36" N	78° 26' 33.13" E	Road No.2 (City Road)	Road No 2, Sultan-Ul-Uloom College	Cantilever	Median		
VMS-F-03	17° 23' 55.55" N	78° 26' 45.15" E	IRR	IRR, Mehdipatnam Road, Near Sarojinidevi Eye Hospital & Entry to PVNR Expressway	Cantilever	Median		
VMS-F-04	17° 25' 30.83" N	78° 29' 10.37" E	NH7 (NH9)	NH9, Tank Bund, Secunderabad Sailing Club, Marriott Hotel	Cantilever	Median		
VMS-F-05	17° 26' 16.84" N	78° 30' 37.73" E	IRR	SCR Railnilayam, Secunderabad	Cantilever	Median		
VMS-F-06	17° 26' 9.72" N	78° 30' 56.08" E	IRR	IRR, Secunderabad-Tarnaka Main Road, Alugadda Bavi	Cantilever	Roadside		Metro section
VMS-F-10	17° 22' 5.13" N	78° 28' 33.34" E	NH7	Madhina Circle, Charminar Road	Cantilever	Median		
VMS-F-12	17° 23' 33.89" N	78° 31' 14.00" E	NH202	NH202, Amberpet Main Road, Towards Moosrambagh Junction	Cantilever	Roadside		
VMS-F-13	17° 24' 43.98" N	78° 28' 39.26" E	NH7 (NH9)	NH9, Tank Bund, Near Vemana Statue	Cantilever	Roadside		
VMS-R-1	17° 20' 31.29" N	78° 24' 50.97" E	Himayat Sagar Rd (Radial Road	Himayat Sagar Road, Sri Venkateswara Veterinary College	Cantilever	Median		
VMS-R-3	17° 23' 46.02" N	78° 25' 45.82" E	Mumbai Road (Radial Road 5)	Mumbai Road, Langar House Road Junction, Mehdipatnam	Gantry	Roadside to Median		
VMS-R-4	17° 26' 39.29" N	78° 29' 45.02" E	Club Rd (SH1)	Secunderabad Club Road, Towards SP Road, Gymkhana Grounds,	Cantilever	Median		
VMS-R-5	17° 25' 45.32" N	78° 32' 1.75" E	Tarnaka Main Rd	Tarnaka Main Road, Near Lalapet Flyover, Towards Osmania University Main Road	Cantilever	Median		
VMS-R-6	17° 25' 22.20" N	78° 32' 44.65" E	Nacharam Mallapur Rd	Nacharam Mallapur Road, Near IICT Colony, Towards Habsiguda Main	Cantilever	Median		
VMS-R-8	17° 20' 17.68" N	78° 32' 56.75" E	Nagarjina Sagar Rd	Towards Bairamalguda Bypass Road, Nagarjuna Sagar Road, Near Mallikarjuna Nagar Colony	Cantilever	Median		

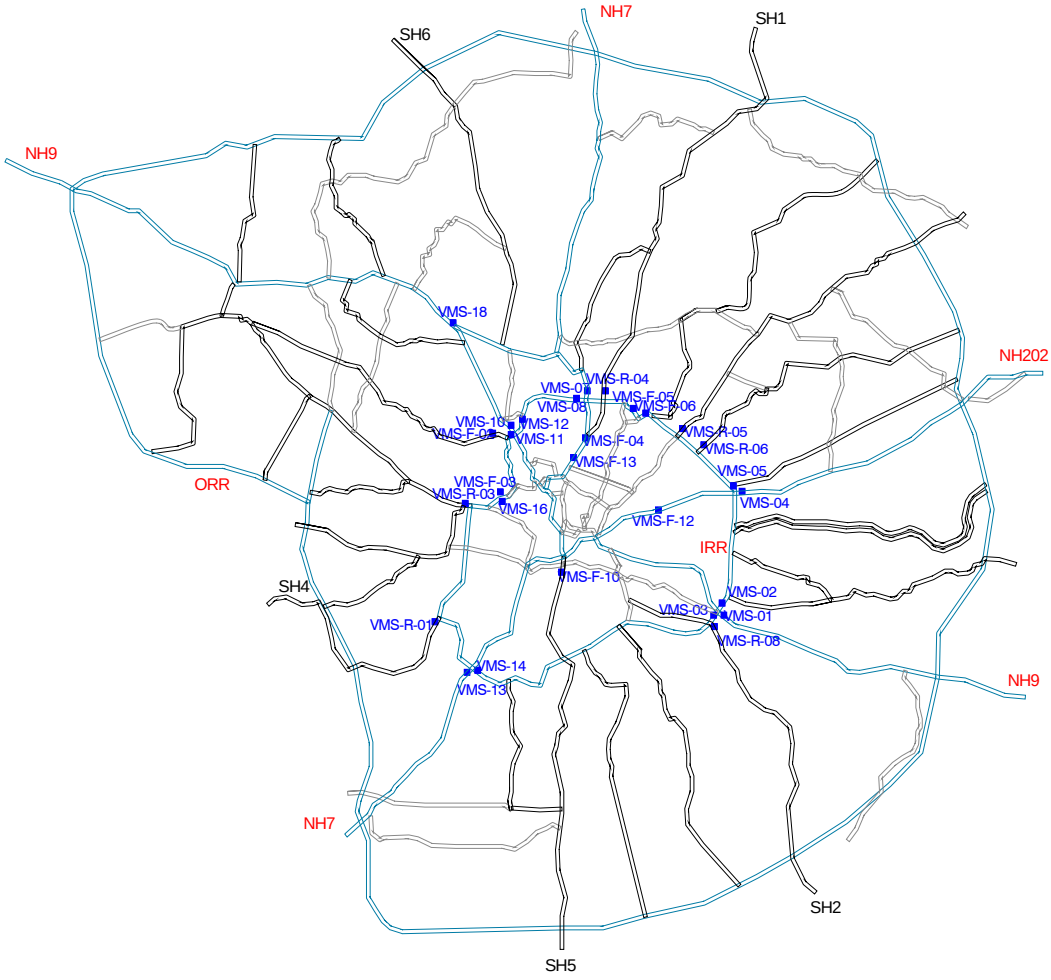


Figure 11-2 Location Map of VMS Roadside Equipment

353. The locations shown above are tentative. T**he Contractor** shall examine each location and confirm the exact proper location at site for installation of each **Roadside Equipment**. **The Contractor** shall coordinate with the relevant authorities and obtain approval of **The Employer's Representative**.

11-5 Installation policy

354. The **VMS** board shall be located at approximately 200m to 300m upstream of targeted junctions and intersections. The **VMS** board must be installed at the location having at least visibility of 200m and showing message to the drivers. Minimum clearance from road surface must be kept under the bottom of **VMS** board.

11-6 System Functions (Software)

11-6-1 Message indication functions

355. Message to be displayed on the **VMS** shall be concise and clear as the road users have to read and understand the message in a short time. Messages shall have uniform structure and simple words shall be used. Messages on the **VMS** board shall be expressed in English, Hindi and Telugu. In principle, a message to be displayed on the **VMS** board shall be

composed of three parts, “location”, “event”, and “action” to be taken by the road users.

1) Location

356. Location indicates the relationship between the **VMS** location and the incident location. They can be expressed as section (between junction A to junction B), distance (ahead, xx km ahead), or specific location (near junction A).

2) Event

357. Event is a thing that has happened or taken place on the road. It includes traffic conditions (accident, congestion), traffic regulation (lane closure, road maintenance work), road condition (wet road surface, damaged pavement), and weather condition (fog, rain, strong wind and flood).

3) Action

358. The action is to be taken by the road users such as “slow down”, “cautious” and “use right/left lane”.

359. All the three components are not necessarily required all the time. Messages consisting of one or two components described above or simple message shall also be displayed.

360. The variable message sign system shall be capable of displaying the graphic symbol marks. The sample symbol marks are listed below for reference. **The Contractor** shall design and propose graphic symbol marks to be used on the variable message sign for approval by **The Employer’s Representative**. The system shall be capable of having a maximum of twenty (20) graphic symbol marks. The graphic symbol marks shall be defined as dot matrix and editing of the symbol mark shall be possible. It shall be possible to combine text and graphic symbol marks in a message.


11-6-2 Message Creation and Editing Functions

361. Three message composition methods shall be provided; (1) manual input, (2) combination of pre-defined phrases, and (3) selection of ready-made message. The functions specified herein shall be possible in three languages i.e. in English, Hindi and Telugu. In addition, a set of graphic symbol marks shall be provided to complement the text message.

1) Manual Composition

362. In the manual input, it shall be possible to display any text message inputted by the system operator using the keyboard of the console in the **ITSC**. There shall be no restriction as to the contents of message but the length of message is limited to the display capacity of the **VMS** board. If manual composition mode is selected, the **Operator Console** shall show the image of the **VMS** board and the message as it is entered by the system operator.

2) Combination of Pre-Defined Phrase

363. In the case of combination of pre-defined phrase, frequently used words or phrases such as “accident”, “congestion”, “construction work”, “slow down” and so on are used to compose a message. It shall be possible to insert a word into the message composed by combination method. There shall be sets of pre-defined words. They shall contain words indicating location, incident and action. Each set shall have a capacity of 100 words in each language. In this mode, the **Operator Console** shall show the categories and the words or phrases in each category for the system operator to select. It shall be possible to alter the pre-defined words by the system operator.

3) Ready-Made Message

364. Ready-made message selection method shall allow the system operator to choose one of the ready-made messages. If the ready-made message mode is selected, the **Operator Console** shall indicate the list of ready-made messages grouped into categories for the system operator to select. Message set shall have the capacity of 100 messages in each language.

4) Graphic Symbol Marks

365. Graphic symbol marks that show typical incidents such as construction work and heavy rain shall be provided to complement the text message. The sample graphic symbol marks are provided in **The Employer’s Requirement**s for reference. The design of graphic symbol marks shall be subject to **the Employer**’s approval.

5) Dot Matrix Pattern

366. **VMS System** shall be provided with a function to create a display pattern by specifying the on/off status and colour of each pixel comprising the display area of the **VMS** board. It shall be possible to mix the dot matrix pattern and character message on the board.

6) Automatic Message Creation from Incident Information

367. If a water logging is detected by the flood monitoring system or an adverse weather condition is detected by the meteorological monitoring system or any incidents are manually inputted at console by system operator, the systems shall send an alarm to **VMS System**. **VMS System** shall then create a warning message indicating the location, type of incident and action to be taken. The message created shall not be displayed automatically on the **VMS** board. Instead, a recommendation shall be displayed on the **Operator Console** indicating the contents of the message and the location of **VMS** for which message is recommended. Upon confirmation of the recommendation, the message shall be displayed.

368. The **Operator Console** shall be provided with updating and editing function of pre-defined word, phrase, message and symbol mark. Editing of symbol mark shall be possible on a pixel basis.

369. Graphic user interface shall be adopted in the interface as much as possible for user friendly operation and fail safe mechanism shall be incorporated to prevent **VMS System** from showing inadequate message. The system shall be equipped with a text input method in Telugu and Hindi languages commonly used in Hyderabad through the standard keyboard.

370. **VMS System** shall be provided with an automatic message selection function based on the priority or severity of the events and coefficient that represents the importance of event. The function shall select and recommend the message to be shown for each **VMS** when there are two or more incidents to be informed to the road users.

371. Each message being displayed on the **VMS** shall be assigned with a time-to-live (TTL) value and upon expiration of TTL, message shall be automatically extinguished. A warning shall be issued to the **Operator Console** before TTL expires for operator to choose extension of TTL or termination of the display as scheduled.

372. **VMS System** shall have an alternative display function, in which a maximum of two sets of message shall be displayed alternatively. The function is intended to display a message in three different languages (English, Hindi and Telugu) but not necessarily limited to the same message.

11-6-3 Data Transmitting Functions

373. Text and symbol mark message to be displayed shall be converted to pixel image data before transmitting to the variable message sign.

374. The **VMS Server** shall communicate with the **VMS** controller at Roadside through the network of the Communication Service Provider. It shall send dot pattern converted message for display. It shall also send out command data to control the **VMS** controller and to confirm normal operation of the **VMS** board. In return, the server shall receive status data from the controller.

11-6-4 Operation monitoring and logging functions

375. Operating status of the variable message sign shall be checked periodically. Status (message on, no message, fault, local control, test and switch off) shall be collected from the Roadside **VMS** controller. If any abnormality is reported, an alarm shall be issued. The collected

operation monitoring data shall be recorded as part of operation log. System operator using his **Operator Console** shall be able to send a command to the controller and collect the dot pattern data being displayed on the **VMS** board.

376. Displayed message along with the starting and ending time shall be recorded as operation log. Status or malfunction of the **VMS** and the controller shall also be recorded. Data retrieval software shall be provided to display the operation log on display monitor and as also to print as report.

11-6-5 Data Storage Function

377. All data transmitted from the **VMS Roadside Equipment** and processed data in the **ITSC** shall be recorded and stored in the **VMS Server** for analysis and future usage. Data retrieval and presentation software shall be provided to show the recommended messages that were displayed along with location of **Roadside Equipment** at a given time or day.

378. Status of **Roadside Equipment** (normal or malfunctioned) shall be recorded in the **VMS Server** as operation log and for future reliability analysis together with error code and time stamp.

Table 11-2 Minimum Storage Period of Stored Data of VMS System

Sub-System	Storage Data	Type
VMS System	・ Recommended message automatically ・ generated against event	・ Raw data
	・ Manual input operation record	・ Raw data
	・ Equipment operational status	・ Raw data
	・ Current message indicating on each **VMS**	・ Processed data

11-6-6 Screen Display Functions

379. The information display shall be schematic map based interface and as well in the form of a list.

380. The schematic map based display shall cover the entire HMA and be able to enlarge individual locations on the map when selected. The enlarged view shall be able to display the details for each selected location. The details displayed shall cover the contents as described in the below table but not limited to.

381. The **VMS Server** shall be capable of creating the following screen contents, but not limited to these:

Table 11-3 Required Screen Contents of VMS System

Item	Contents to be displayed on the Map	Contents as List
Equipment location and status	・ Location of **VMS** and their condition (message / no message and normal / error)	・ Location of **VMS** and their condition (message / no message and normal / error)
Server status		・ Server status (normal / error) in the form of list
VMS Message	・ Message displayed currently on a	・ Message displayed currently in the

	VMS ・ Graphic symbol marks	form ・ Message displayed at past (historical messages displayed) in the form of list ・ Message being displayed at selected **VMS** with starting time and scheduled end time in the form of list ・ Pre-defined words and phrases in the form of list ・ Pre-defined messages in the form of list ・ Graphic symbol marks
Parameter setting		・ Parameters in the form of list ・ Screen form to edit all the parameters
Operation		・ List of **Roadside Equipment** in operation or not ・ Operation log and error record
Date and Time	・ Current date and time	・ Current date and time

11-6-7 Reporting Functions

382. The server shall print the reports listed below, but not limited to these. The reports shall be published as pre-scheduled or on-demand by system operator. It shall be possible to publish the report in a portable file format.

Table 11-4 Reporting Functions of VMS System

Item	Contents
VMS operation	・ Daily report summarizing **VMS** location, message displayed, start time, end time
Operation and error log	・ List of **Roadside Equipment** in operation or not ・ Error record

11-6-8 Communication Network

383. The data transmission of **VMS System** shall be made through optical fibre network and through mobile network of the Communication Service Provider. The optical fibre network shall be utilized as main communication line while the mobile network shall be used as backup. In case of any communication failure in the optical fibre network, **VMS System** shall automatically change over the communication line to mobile network.

11-7 Hardware Specification of VMS Roadside Equipment

11-7-1 VMS Board

1) Display Unit

384. High intensity LED (light emitting diode) shall be used as light source for **VMS**. At least

three colour elements, blue, red and green, shall be provided and a total of five (5) colours of white, yellow, green, red and blue shall be displayed. Brightness and colour shall be uniform throughout the surface.

385. Life of LED unit shall be long enough to withstand the severe environmental conditions in which the signboard operates. **The Contractor** shall submit the results of high temperature high moisture biased test of LED to be used to the satisfaction of **the Employer's Representative**.

386. Display panel of **VMS** shall be of unit construction using LED matrix. The size of the LED matrix unit shall be as per the manufacturer's design. The unit shall be easily replaceable from backside or front without affecting other units. One pixel may be composed of multiple elements or LEDs for colour presentations. The total number of pixels on the display panel shall be determined by the character size, pixel pitch, number of character per line, and number of lines. Display unit shall be capable of detecting open circuit condition of each LED.

387. Malfunction of an LED, a pixel, and a display unit shall not affect the normal operation of other LEDs, pixels and display units.

388. **VMS** designs, components, and enclosures primarily designed for commercial, advertising, billboard or other display purposes shall not be accepted.

2) LED

389. The LED used for the display unit shall be from a reputed LED manufacture. All LEDs used shall be from the same manufacturer and shall have the same part number. The type of LED shall be as indicated below.

Table 11-5 LED Type for VMS

No.	LED colour	Type	
1	Blue	InGaN	Indium-Gallium-Nitride
2	Red	AlInGaP	Aluminium-Indium-Gallium-Phosphide
3	Green	InGaN	Indium-Gallium-Nitride

390. The Tender shall state the source, type and part number of LED used for **VMS** in his Technical Proposal. Data sheet of LED issued by LED manufacturer shall be included in the Technical Proposal as supporting document.

3) Optical Performance

391. The display unit shall be matrix of LED of blue, red and green. The dominant wavelength range of LED shall be as indicated below.

Table 11-6 Optical Performance of VMS

No.	Display colour	Dominant wave length
1	Blue	460～485nm (±5nm)
2	Red	625～630nm (±5nm)
3	Green	510～550nm (±5nm)

392. It shall be possible to display in five colours (white, yellow, green, red and blue) using three

colour LEDs. LED packages shall be fabricated from UV light resistant epoxy.

393. LED shall be selected from the same bin sorted by the LED manufacturer for intensity and colour respectively.

394. The luminance, luminance ratio and beam width shall comply with the type specified by EN 12966-1 2007 Vertical road traffic signs – Part 1: Variable message signs as specified below with the modifications of the requirements and measurement conditions stated below.

- luminance class: L2
- luminance ratio: R3
- beam width: B3

4) Character Size

395. The character size of the **VMS** shall be minimum 300 mm in height excluding blank rows between lines. The **VMS** shall be capable of displaying at least 30 English characters or more including space between words in one line, and capable of displaying at least 3 lines. The standard width of character and number of pixels will be the value defined by the manufacturer. The width shall be adjusted proportionally for each character to display message in proportional font. The display panel shall be capable of displaying all characters used in three languages.

396. A character shall be expressed by a matrix of pixels and on/off status of each pixel shall be independently controlled. The number of pixels comprising a character shall be determined by the character size and pixels spacing to express characters of local languages in smooth and legible font. Spacing between lines shall be at least 10% of the character height.

5) Dimming

397. Dimming function shall be provided to **VMS** to reduce the brightness depending on the ambient light levels and prevent glaring during the dark hours. There shall be at least four (4) levels of brightness. Dimming control may be activated by photo electric cell attached to the **VMS** board, local timer or command from the **ITSC**. A mechanism shall be provided to prevent chattering.

6) Temperature Monitoring

398. The **VMS** shall be equipped with a temperature sensor or sensors to measure the temperature inside the cabinet and ventilation fans to control temperature inside the cabinet. The temperature shall be continuously measured and the data shall be sent to the **ITSC** as one of the monitoring data.

399. The air route of ventilation system shall be designed in such a way that heat generated by LED and other electronic circuits, and heat of sun light absorbed by cabinet shall be efficiently and equally dissipated.

400. The ventilation system shall be designed to keep the temperature inside cabinet lower than 60 degree Celsius at any time of the year when **VMS** is operating normally. Special attention shall be paid to the climate conditions of **the Project** site, where ambient temperature goes as high as 45 degree Celsius or higher and attenuation of sun light is smaller due to the altitude of the location (about 500 meter above sea level).

401. A safety mechanism shall be provided that shuts down the **VMS** if the temperature inside cabinet reaches pre-define threshold temperature that shall be manually adjustable with the default setting of 60 degree Celsius. If shut down at 60 degree Celsius occurs under normal operation during the defect liability period of the **VMS**, it is considered a design defect and **the Contractor** shall take countermeasures to prevent forced shut down due to high temperature including replacement of **VMS** with the new design at no cost to **the Employer**.

7) Display off Mode

402. The **VMS** shall be provided with display off mode, in which it operates normally but the display units shall be turned off for testing purpose.

8) Housing

403. The **VMS** board shall be accommodated in the housing of suitable design made of cold rolled steel sheet or aluminium. Both **VMS** board and controller may be accommodated in one cabinet, or alternatively they will be accommodated in separate cabinets.

404. The housing shall be finished with the anticorrosive treatment if steel is used.

405. **VMS** may or may not have front face panels covering the entire display surface. If front panel is used, it shall consist of perforated aluminium sheeting on the exterior and anti-glare polycarbonate sheeting on the interior. There shall be only one continuous polycarbonate sheet per front face panel. No lenses, individual pixel covers, or multiple polycarbonate sheet, buttons or plugs shall be allowed. Ventilation mechanism shall be provided for the space between LED display unit and front face panel, if front face panel is used.

406. The **VMS** housing shall have minimum two (2) service outlets for maintenance use at convenient location inside the cabinet.

9) Minimum Hardware Specification of VMS Board

407. The Hardware Specification mentioned hereunder is minimum guidelines. **The Contractor** shall not deviate materially from the specifications.

Table 11-7 Specification of VMS Board

No.	Item	Specification
1.	Board size	・ 5,000 mm (W) x 1,500 mm (H) approximately
2.	Character height	・ 300 mm or more
3.	Display pixel pitch	・ 20 mm or less (vertical and horizontal)
4.	Display	・ At least 3 (three) lines ・ Graphic symbol shall be displayed ・ Three (3) languages as English, Hindi and Telugu ・ **The Contractor** shall propose the number of characters to be displayed per line in case of English, Hindi and Telugu languages and get approval from **the Employer**.
8.	Display device	・ Light emitting device LED ・ Luminescent colour (blue , red , green)

408. If the maximum power consumption of the **VMS** proposed exceeds the figure above.

11-7-2 VMS Controller

409. **VMS** controller shall have the following functions:

- Communication control
- Display control
- Monitoring
- Local operation

410. The **VMS** controller shall communicate with the **VMS Server** in the **ITSC** through the communication networks using NTCIP or other equivalent protocols. It shall receive display data from the **VMS Server** and send back the operating status data to the server.

411. Display data received from the **VMS Server** shall be stored in the buffer until all the data have been correctly received without error. After the confirmation of correctness of data, display shall be changed to the new message. Changeover shall be fast and no irregular display shall happen during the transition. Under any circumstances, the changeover of message shall be completed within 3 seconds after the system operator in the **ITSC** has issued a message changeover command.

412. Several test patterns shall be provided to the controller, to test the defect of LED by indicating one of them sequentially.

413. Operating condition of the **VMS** shall be monitored regularly by **VMS** itself and the controller. If any abnormality is detected, error signal shall be issued to the **VMS Server** together with the type of error.

414. It shall be possible to operate the controller and the **VMS** board manually at the site. The manual control panel shall be provided to the controller. Alternatively, manual control shall be made with a notebook computer connected to the controller through serial port or network port.

11-7-3 Network Equipment

415. **The Contractor** shall provide equipment as shown below.

Table 11-8 Hardware Specification of Network Equipment

No.	Item	Specifications
1.	Networking type	・ 3G wireless integrated router
2.	Wired WAN interface	・ 10/100 Mbps Fast Ethernet x 1port
3.	Wireless WAN interface	・ 3G (HSPA, CDMA, etc.) interface x 1port
4.	LAN interface	・ 10/100 Base-Tx x 4ports
7.	Power consumption	・ 100VA or less

11-7-4 Cabinet

416. The **VMS Roadside Equipment** shall be housed in a rugged cabinet together with circuit, devices, terminal unit, power supply and network equipment.

417. The cabinet is same the specification as stated in clause “4-2-4 **Roadside Equipment** 4) Cabinet” of **PTS**.

11-7-5 Supporting Structure

418. The **VMS** board shall be fixed on either gantry type supporting structure or F-shaped cantilever structure. The construction of both gantry and cantilever support shall be part of **the Contract**.

419. Typical designs of the gantry and cantilever support are included in **the Employer's Requirement** Part D: Drawing as reference. **The Contractor** shall design the gantry and cantilever support and their foundation taking into consideration such as weight of **VMS**, bearing capacity of ground, wind load, fixing method of **VMS** board with the gantry and cantilever support, power receiving and network connecting points, and grounding method. The width of the gantry shall be adjusted to the road width at the installation location. **The Contractor** shall obtain the approval for the above calculation sheet from **the Employer's Representative**.

420. A mechanism to adjust the tilting angle of **VMS** shall be provided for the **VMS** housing or fixture that is used to attach the **VMS** to the support. It shall be possible to adjust the tilting between 0 degree (vertical) and 10 degree (tilted forward).

421. If **VMS** is supported by a cantilever support on one side, the design of the support shall consider the tilting of support or arm extended from the cantilever support due to the weight of **VMS**.

422. **The Contractor** shall undertake foundation work for the gantry and cantilever support, communication cable and power cable works, protection against lightning, earthling and other works incidental to the installation of **VMS**.

11-7-6 Power Supply

423. The UPS for the **VMS Roadside Equipment** shall be separately provided. Power receiving panel to feed the commercial power shall be supplied and installed at each location in **the Contract**.

11-7-7 Communication Network

424. The data transmission of **VMS System** shall be made through the optical fibre network and through mobile network of the Communication Service Provider. The optical fibre network shall be utilized as main communication line while the mobile network shall be used as backup. In case of any communication failure in optical fibre network, **VMS System** shall automatically change over the communication line to mobile network.

11-8 Hardware Specification of Equipment in the ITSC

11-8-1 VMS Server in the ITSC

425. **The Contractor** shall provide the redundant type server as shown below.

Table 11-9 Hardware Specification of VMS Server

No.	Item	Specifications
1.	Server configuration	・ Same specification stated in clause "4-2-3 **ITSC** Equipment 3) Standard Specification of Server" of **PTS.**

11-8-2 Operator Console for VMS

426. **The Contractor** shall provide the **Operator Consoles** as shown below. All the **Operator Consoles** shall be the same model and of same configuration.

Table 11-10 Hardware Specification of Operator Console for VMS

No.	Item	Specifications
1.	PC configuration	・ Same specification stated in clause "4-2-3 **ITSC** Equipment 4) Standard Specification of **Operator Console**" of **PTS**.

12 Power and Communication Cables

12-1 General

427. This section states the general, functional and technical requirements for the power cable, earthling cable, optical fibre cable and Ethernet cables to be used for **Hyderabad City ITS**.

428. It is required that **the Contractor** calculates the length of the cables required for **the Works** in accordance with shop drawings to be submitted by **the Contractor** to **the Employer's Representative**.

12-2 Type of Cables

429. The types of cables shall be as follows:

Table 12-1 Type of Cable

No.	Item	Specifications
1.	Indoor power cables	Minimum 1.5 square mm flexible 3 Core
2.	Outdoor power cables	Minimum 1.5 square mm 3 cores
3.	Earthling cable	16 square mm copper PVC insulated cable
4.	Optical fibre cables	OF-SM 4C
5.	Ethernet Cable	UTP CAT 5 or 6 cable for indoor use STP CAT 5 or 6 cable for outdoor use

12-2-1 Indoor Power Cables

430. Indoor power cables shall meet the following specifications:

- Bright annealed, 99.97% electrolytic grade
- Copper conductor (stranded),
- Voltage grade 1100 V,
- Single or multi core cable
- Flame retardant low smoke (FRLS),
- PVC insulated, rodent repellent
- With high oxygen and temperature index
- Un-armoured
- IS 694, IS 8130 or BS 6004/ BS 6500IEC 60502

12-2-2 Outdoor Power Cables

431. Outdoor power cables shall meet the following specifications:

- Bright annealed, 99.97% electrolytic grade
- Copper conductor (solid/stranded),
- Voltage grade 1100 V,
- Single or multi core cable,
- Flame retardant low smoke (FRLS),
- PVC / XLPE insulated,
- With high oxygen and temperature index
- Armoured,

- IS 8130, IS 5831, IS 3975, IS 1554 (Part I) / IS 7098 (Part I) or BS 6346/ IEC 60502

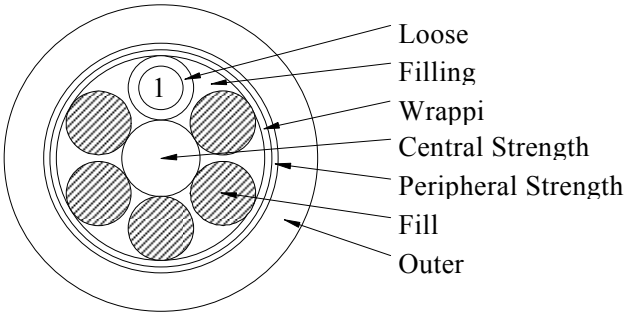
12-2-3 Optical Fibre Cables

432. The optical fibre cable to be supplied and installed under **the Contract** shall be single-mode optical fibre cable having characteristics meeting ITU-T G.652B or better and the specifications below**.**

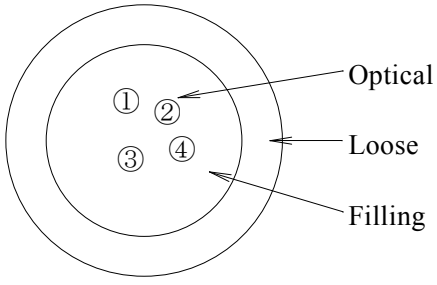
Table 12-2 Specification of Optical Fibre Cables

No.	Item	Specifications
1.	Cable type	· OF-SM 4C
2.	Number of cores	· 4 cores
3.	Mode	· SM (Single Mode)
4.	Cladding diameter	· 125.0 µm ± 1.0
5.	Coated fibre diameter	· 245 µm ±10
6.	Core/cladding concentricity error	· ≤ 0.8µm
7.	Coating/cladding concentricity error	· ≤ 12µm
8.	Cladding non-circularity	· ≤ 1.0 %
9.	Mode field diameter	· 9.3µm ± 0.5 at 1310nm
10.	Attenuation (cable)	· 0.36dB/Km at 1310nm · 0.25dB/Km at 1550nm,
11.	Zero-dispersion wavelength	· 1300 to 1322 nm
12.	Zero-dispersion slope	· ≤0.092 ps/Sq. Nm .km
13.	Cut-off wavelength	· ≤1260 nm
14.	Polarization mode dispersion coefficient	· ≤0.2 at 1310nm
15.	Fibre macro bend loss	· ≤0.05dB at 1550 nm with 75 mm dia, 100 turns
16.	Fibre macro bend loss	· ≤0.5dB at 1550 nm with 32 mm dia, 1 turn
17.	Coating Strip Force	· 1.3 ≤ F ≤ 8.9
18.	Minimum Proof Strength	· 0.70 (100kpsi) Gpa
19.	Strain	· 1 %

433. The optic fibre cable shall be water-blocking type and shall be armoured for underground installation. It shall have virtually same construction as shown in the reference drawing below.



Cable Construction (4cores)



Loose Tube Construction (4 cores / tube)

Figure 12-1 Construction of Fibre Optic Cable (4 cores) – reference only

12-2-4 Network Ethernet Cable

434. The network Ethernet cable shall comply with the IEEE802.3u, IEEE802.3ab, TIA/EIA-854 standards.

435. **The Contractor** shall make his own estimate regarding the required cable lengths and **the Employer** will not take any responsibility as to the correctness of the cable length.

436. **The Contractor** shall do his own assessment for the cable lengths to quote the price for the same. The price quoted shall be fixed price only and no variable price would be considered for the cabling price schedule.

12-3 Cable Installation Work

12-3-1 Cable Installation

437. Sufficient care and measures shall be applied during the loading, transportation and unloading of cable drum so as to avoid shock and damage to the cable.

438. Appropriate surplus of cable shall be arranged inside the junction box.

439. Cable shall be connected only inside the junction box.

440. Plastic plate describing the name of the cable and the origin of cable shall be attached to the cable.

441. During the installation of cable, the following constraints shall be observed.

- The maximum tension allowed.
- The minimum curvature radius allowed: When installing cable at the junction box, curvature radius for power cables shall be more than 10 times of the diameter of the cable and that for optical fibre cable, it shall be more than 20 times of the outside cable diameter being laid. After cable laying work, minimum radius of more than 10 times of the diameter shall be ensured.
- Extension speed of arranging the cables.
- Towing cable shall be made smoothly without any excessive tension intermittently at the time of arranging, and calibration of appropriate apparatus for setting up allowable tension shall be required.

442. The extension of cable shall be carried out at a constant speed and it shall apply the suitable back tension for a drum to avoid hunching.

443. Cable in the point in a junction box shall have at least 3 m margin complied with curvature radius at every junction box and the point of junction box for terminal Equipment shall have the 3 m margin at both sides of branch.

444. Winding up of insulating tape for the connecting point of electric wire shall be required and connected electric wire shall be robust.

445. Connection between electric wire and terminal Equipment shall be connected robustly using terminal lug or a screw.

446. A white vinyl adhesive tape shall be attached around the cable at about 50 mm from the

conduit end as a marker for detection of cable movement.

447. Measures shall be taken to prevent the creeping of the optical fibre cable placed in the conduit having 3% or steeper longitudinal gradient.

12-3-2 Cable Jointing Kit for Power Cable

448. Cable jointing kit for power cable shall be capable of dismantling and reassembling and shall meet the following specifications:

Table 12-3 Specification of Cable Jointing Kit for Power Cable

No.	Item	Specifications
1.	Case material	・ FRP sleeve with resin
2.	Method for cable connection	・ straight joint or branch joint
3.	Protection	・ IP67
4.	Dielectric strength	・ DC 3500V, 5 minute

12-3-3 Optical Fibre Cable Splicing Kit

449. **The Contractor** shall provide water-proof splicing kits in case that underground connection of optical fibre cables in the junction box is required. The splicing kit shall be of heat shrinkable type and capable of jointing a minimum of 4 cores. Cable joints shall be firmly attached to the fixing on the junction box wall and cables shall be placed neatly in the junction box.

12-3-4 Optical Fibre Cable Splicing

450. **The Contractor** shall provide an arc fusion splicer and other tools necessary for jointing optical fibre cables, which shall include, but not be limited to, fibre jacket stripper, cleaver, and heater for shrinkable tube protector. Splicing attenuation shall be measured for all cores at all splicing points. **The Contractor** shall keep the record of splicing loss and submit the record to **the Employer's Representative**. The average splice loss shall not exceed 0.3 dB for single mode fibre.

12-3-5 Optical Fibre Cable Terminal Box

451. **The Contractor** shall provide an optical fibre cable terminal box in the Equipment which employs optical fibre network for the termination of fibre optic cables and connection with the optical codes.

12-4 Test for Optical Fibre Cable

452. After termination, each optical fibre core shall be tested with an OTDR for length, transmission anomalies, and end-to-end attenuation. Results shall be recorded and supplied to **the Employer's Representative** in the form of hard-copy printouts or photographs of screen traces.

453. In case the cable fail to meet the performance requirements specified herein, the cable shall be replaced and test be repeated at **the Contractor**'s cost.

13 Toll Free Number for ITSC Call Centre

454. Toll free number for the call centre shall be arranged by **the Contractor** including the necessary hardware, software and other items.

455. **The Employer** shall arrange for the necessary government approvals.

END

SECTION VII. EMPLOYER'S REQUIREMENTS

PART C: OPERATION & MAINTENANCE SPECIFICATIONS

Table of Contents

1 General

1.1 Definitions

The terms used in the Employer's Requirements Part C: Operation &Maintenance Specifications shall have the meaning described hereunder. The term "Contractor" used herein means "tenderer" or "Tenderer" (as the case may be) when the event is occurring before the Contract becomes effective.

Clean:	Removal of dirt, insects, foreign matters, stains, and touching up of metal surface necessary to prevent rust or corrosion.
Check:	Checking the equipment operation and physical condition and make adjustments or minor repair, clean and oil moving mechanism, secure mounting, and restore water or fuel levels as necessary.
Inspect:	The term "inspect" shall have the same meaning as "check".
Availability:	Availability means electronic equipments and software operating normally for its intended function. Availability can be calculated on a monthly, quarterly, half yearly and yearly moving average of each unit of the sub systems. However, in this specification, availability is calculated on quarterly in order to harmonize with quarterly payment. The term "availability" shall mean the time period for which the specified services/components with specified technical and service standards are available to the Employer and users. Availability, in percentage, of any component (Non IT & IT) can be calculated as: $Availability = (1 - \frac{Downtime - ScheduledDowntime}{Totaltime - ScheduledDowntime}) * 100$
Downtime:	"Downtime" shall mean the time period for which the specified services/components with specified technical and service standards are not available to the Employer and users.
Scheduled downtime:	"Scheduled downtime" is time period required for preventative maintenance, corrective maintenance, new initiatives undertaken by the Contractor or performance enhancement measures with approval of the Employer. It shall not be considered while calculating availability.
Response time:	Response time is time period, for corrective maintenance, from receiving notification of failure at ITS Centre to arriving at the maintenance job site
Resolution time:	Resolution time is time period, for corrective maintenance, from arriving at the maintenance job site of failure to completing the permanent or temporary remedial measure
Operation & Maintenance (O&M) Period	Operation and Maintenance (O&M) Period is the time period from the date stated in the Commissioning Certificate until the date stated in the Contract Completion Certificate. The Operation and Maintenance Period runs in parallel with the Defects Liability Period for the first 2 years and thereafter continues for 3 years until issuance of the Contract Completion Certificate.
Customer Assistance	"Customer Assistance" means the 24X7X365 support to provide information on the road, weather, traffic condition through phone to road users.
Quarterly Billing	Quarterly Billing Value (QBV) is the amount claimed based on price bid by the Contractor for every quarter for delivering the O&M services as specified in the

Value (QBV)	Employer's Requirement.
Service Level Table	Service level table is the table showing the expected service levels of the Employer and service level measurement and payment criteria for O&M services delivered by the Contractor during the O&M period.
Foreign spare parts:	Spare parts which are manufactured in foreign countries and are not regularly available in India.

1.2 General Requirements

The purpose of Operation and Maintenance on the City ITS is to keep the City ITS and related facilities in operation in the manner originally intended, that is to collect road, traffic and weather condition data, process and analyse the data into useful information, disseminate the information to road users and to prolong the life of the system and the equipment. Therefore, time is of essence. Repair must be done in a timely manner. The City ITS shall be in operation for 24 hours a day and 7 days a week without interruption. The Contractor shall not deviate and modify the procedure without written approval by the Employer.

The specifications described herein shall be considered the minimum standards to be followed for the maintenance and repair of all equipment and software covered under the Contract. Unless otherwise specified, the standards for equipment and equipment performance shall be in accordance with the Employer’s Requirements Part A: General Technical Specifications and Part B: Particular Technical Specifications.

1.3 Scope of Work

Apart from installation of the City ITS, the scope of work also includes Operation & Maintenance of the system for a period of 5 years from the date of the Commissioning Certificate. Except otherwise specified in the Employer’s Requirements Part C: Operation & Maintenance Specifications, it is the Contractor's responsibility to provide sufficient manpower to implement flawless Operation & Maintenance of the City ITS and related facilities in operation in the manner originally intended, that is to collect road, traffic and weather condition data, process and analyse the data into useful information, disseminate the information to road users and undertake the Services that are not specifically mentioned in these requirements but essential for the safe and efficient traffic operation on roads of Hyderabad metropolitan area. The Contractor shall maintain qualified staff at the main ITS Centre and other places, wherever required necessary by The Contractor’s proposal, tools, shop facilities, equipment, consumables, transportation and materials and perform all works necessary to maintain in good working manner all City ITS and associated equipment.

Operation & Maintenance services are required to cover ITS Centre system at Nanakramguda Interchange, Closed Circuit Television (CCTV) System, Automatic Traffic Counters-cum-Classifier (ATCC) System, Meteorological data collection and analyse, Variable Message Sign (VMS), Flood Monitoring System (FLD), Probe Bus Data Collection System from Andhra Pradesh State Road Transport Corporation (APSRTC) Digital Transmission System, Network Equipment, and Various Cables to be installed along the entire stretch of Hyderabad Metropolitan Area, and at the equipment comprising the systems above that are supplied and installed under the Contract. Contractor's operation staff will station at Nanakramguda Main Centre and other locations as necessary. Ghatkesar is for maintenance sub-base.

The Contractor shall prepare a list of equipment to be covered by the maintenance based on the actual configuration and quantity of the equipment. If the Contractor provides any additional

equipment not specifically mentioned in the Employer's Requirements to complete the City ITS required under the Contract, they shall be included in the scope of maintenance work and the Contractor shall prepare and submit to the Employer's Representative the revised list for his approval.

The Contractor shall furnish City ITS operation service proposal describing the Operation activities and Maintenance service proposal describing the maintenance activities taking Manufacturer or OEM recommendations for all hardware and software into consideration. This plan shall be approved by the Employer's Representative and shall be updated as necessary during the O&M period so as to reflect the actual conditions of O&M.

The Contractor shall provide all personnel necessary for performing the City ITS operation, Project Manager. Traffic Management Chief, System Operator, Administrative Staff and supporting staff to fulfill the Employer's Requirements under the Contract. The Contractor shall submit curriculum vitae of the candidate person for Project Manager, Traffic Management Chief and System Operator for the Employer's Representative's approval two (2) months in advance of the Commissioning Certificate. These engineers shall be involved in the installation, adjustment, test on completion and training of the Employer's staff of the City ITS to be supplied under the Contract.

The Contractor shall submit curriculum vitae of the candidate person for Chief Maintenance Engineer, Electrical Engineer and Information Technology Engineer for the Employer's Representative's approval two (2) months in advance of the Commissioning Certificate. The Contractor shall provide personnel on site for diagnosis, repair, modification, replacement, or other necessary maintenance services, and shall furnish all maintenance aids and spare parts necessary to meet the performance requirements.

The list of manpower provided herein is a tentative one, and the Contractor shall provide sufficient qualified technical and non-technical hierarchical network of staff for round the clock for O&M service.

The Contractor shall perform the preventive maintenance of all equipment and software supplied under the Contract in accordance with the preventive maintenance schedule to be developed by the Contractor and approved by the Employer's Representative.

The Employer will conduct from time to time the evaluation of the City ITS Operation Services and Maintenance services provided by the Contractor under the Contract based on the performance of service level parameters specified in Service level Table. Non meeting service levels would attract a penalty for every hour of downtime or other parameters beyond the Service Level Table described in **Sub-Clause** 6.1 Service Level Requirement **thereof.**

2 Operation & Maintenance Service Proposal

The Contractors shall describe the methodology to execute proposed Services both Operation & Maintenance in sufficient detail in his Services Proposal to enable the Employer to evaluate the technical capability of the Contractor and to judge whether the proposal is appropriately responsive or not.

The Services Proposal shall be written in the same sequence as the Employer's Requirement. Where the supporting documents such as brochure, article, report, or paper are provided, they shall be attached at the end of the proposal or in a separate volume and a cross reference shall be prepared. The Services Proposal shall be written in English.

2.1 Operation Service Proposal

The contents of the Services Proposal shall include but not limited to the following:

1. Scope of services to be rendered
2. Organization of operation team
3. Manipulation Manual of sub-systems
4. Manipulation Manual of equipment
5. Records and reports to be prepared by the Contractor
6. Contractor's personnel and personnel management
7. Training of Contractor's personnel
8. Safety, security and working environment
9. Employer’s Equipment and Property
10. Required Service Level

No cost information of the services and operation shall be included in the Services Proposal.

2.2 Maintenance Service Proposal

The Contractor shall prepare a list of equipment to be covered by the maintenance based on the actual configuration and quantity of the equipment. If the Contractor provides any additional equipment not specifically mentioned in the Employer’s Requirements to complete the city ITS required under the Contract, they shall be included in the scope of maintenance work and the Contractor shall prepare and submit to the Employer’s Representative the revised list for his approval.

The contents of the Maintenance Services Proposal shall include but not limited to the following:

1. Scope of services to be rendered
2. Organization of maintenance team
3. Checklist for preventive maintenance tasks and the procedure
4. Corrective maintenance procedure
5. Records and reports to be prepared by the Contractor
6. Contractor's personnel and personnel management
7. Training of Contractor's personnel
8. Safety, security and working environment
9. Employer’s Equipment and Property
10. Required Service Level

No cost information of the services and operation shall be included in the Services Proposal.

3 Employer's Requirements for City ITS Operation Services

The various types of operation related services to be performed by the Contractor shall include the following:

3.1 City ITS Operation

The City ITS Operation shall be executed in accordance with the procedures as set forth herein and instructions given by the Employer. The system shall be in operation for 24 hours a day and 7 days a week without interruption. The Contractor shall not divert and modify the procedure without written approval by the Employer.

3.1.1 Number of Staff and Shift

The Contractor shall employ Traffic Management Chief and the suitable number of operators of three (3) shifts for 24 hours, 7days operation. The minimum number of these staff and the tasks assigned to them shall be as shown in the table in **Sub-Clause** 5.2.1 The Role of ITS Centre staff. It shall be noted that the number indicated in the table is the minimum requirements and it is the Contractor's responsibility to provide high quality service seamlessly and additional staff shall be recruited if necessary.

The staff member shown in the table is the persons directly engaged in the ITS Centre Operation Services and the Contractor shall recruit and deploy the necessary number of managers, administrative staff, security guard, cleaning helper, peon and other staff, if necessary.

3.1.2 Briefing at shift change

Shift time of operators shall be arranged in such a way that there will be an overlapping period of at least 15 minutes. During the overlapped period, new operation team shall be briefed by the previous operation team as to the following:

- General traffic condition
- Weather condition
- Existing incidents and accident being disposed of
- On-going and scheduled work and event on Hyderabad Metropolitan Area
- Messages being displayed on VMS
- Equipment malfunctioned and the status of maintenance work
- Other matters that need attention of the operation team

The Contractor shall check and file the above, and submit them to the Employer.

3.1.3 Confirmation of equipment condition

At the start of a shift, operators shall confirm the condition of all equipment through operation or through the workstations. If there is a new failure that was not reported by the previous shift team, the operator shall record it and report it to the maintenance team for proper maintenance action.

During the operation of the system, if the operator detects any abnormality of the equipment, software, or database, he shall report it to the maintenance team for proper maintenance action. The operator shall refrain from manipulating equipment, modifying operating parameters, reloading software or other action without instruction by the maintenance staff when abnormal or defective behaviour of the equipment or software is found.

3.2 Manipulation Manual

Within two (2) month before the Commissioning Certificate, the Contractor shall prepare and submit manipulation manual of equipment/system to the Employer's Representative for approval.

3.3 Operation of CCTV System

3.3.1 System Setup

The CCTV system shall be set to sequential display mode in which video image from all CCTV cameras is sequentially displayed on the multiple video monitors. The number of monitors used and scanning interval of each video camera are user selectable. Image recording function shall be set to ON and image from all CCTV cameras shall be recorded automatically.

3.3.2 Operation

3.3.2.1 Monitoring

The CCTV operator shall from time to time watch the CCTV monitor which sequentially displays video image from all cameras at pre-set interval to monitor and confirm normal traffic flow.

If any abnormality is found in the video image, the operator shall discontinue sequential changeover mode and select and fix the camera that captures the scene of incident, and observe the incident. If the incident is the type that requires assistance, the operator shall inform relevant agencies of the incident and request appropriate action to be taken.

If a report of incident is received and incident location is within the coverage area of a CCTV camera, the operator shall select the CCTV camera of incident location, operate the camera and focus on the incident to monitor to get first-hand information of the incident.

3.3.2.2 Incident detection

If any incident is identified by the CCTV operator, CCTV operator shall contact the relevant agencies such as traffic police, fire brigades, ambulance etc. for their action.

After the contact with the relevant agencies, Traffic Management Chief shall request VMS operator to display appropriate messages on the VMS at appropriate location and direction.

When Traffic Management Chief confirms that the traffic condition has become normal, Manager shall request VMS operator to remove the messages or change the message with second priority. Traffic Management Chief shall inform the relevant agencies of the termination of the incident.

3.3.2.3 Variable message sign

If the serious incident which affects traffic flow or traffic safety, captured by CCTV or reported from other agencies, the VMS operator shall operate VMS console and display the incident information on the VMS of suitable location as per the operating procedure of VMS.

3.3.3 Failure of Equipment

If the CCTV console receives fault signal or no diagnosis signal response from CCTV, CCTV operator shall contact the maintenance team and report the location and status of equipment with failure.

3.4 Operation of Automatic Traffic Counter-cum-Classifier (ATCC) System

3.4.1 System Setup

No specific system setup is required for ATCC once its normal operation is confirmed at the time of system commissioning.

3.4.2 Operation

3.4.2.1 Abnormal traffic condition

If abnormal data are found, the ATCC operator shall confirm whether the actual traffic flow is different from the normal, or the data is erroneous. If the data is found erroneous, the ATCC operator shall inform the maintenance team for further investigation.

3.4.2.2 Monthly review

At the end of every month, the ATCC operator shall go through the data collected by the ATCC for any abnormality that could have been overlooked during daily operation. If an abnormal data is found, the operation shall further examine the data and determine whether the traffic condition became abnormal due to an incident or the ATCC equipment was defective. If any abnormality

that is attributable to erroneous system operation is found, the operator shall inform the maintenance team for further investigation.

3.4.3 Failure of Equipment

If ATCC console receives fault signal or no diagnosis signal response from ATCC, the operator shall contact the maintenance team and report the location and status of equipment with failure for proper maintenance action.

3.5 Operation of Flood (FLD) System

3.5.1 System Setup

Threshold value for water logging shall be determined by and reviewed by the Employer from time to time to ensure the values are appropriate, particularly following heavy precipitations.

3.5.2 Operation

3.5.2.1 Monitoring

When weather is good, no particular operation on the meteorological system is required by the Flood operator. When heavy rain is expected at vicinity of flood monitoring systems at roadside, Flood operator request CCTV operator to capture the image continuously and observe the water logging condition.

3.5.2.2 Abnormal weather condition

The FLD system issues an alarm when level of water exceeds the threshold.

If an alarm is issued, Flood operator shall request VMS operator to display appropriate messages on the VMS at appropriate location and direction with the approval of Traffic Management Chief.

Once an alarm is issued, Flood operator shall check the data and CCTV image and confirm the water logging condition.

When the level of water has returned to the normal level, Flood operator shall request VMS operator to remove messages or change the message and request to Call Center operator to inform related agencies with the approval of Traffic Management Chief.

3.5.2.3 Monthly review

At the end of every month, the Flood operator shall go through the data collected and provide these data to ATCC operator to make a static data of water logging at each monitoring spots and request VMS Operator to record these static data. If any abnormality that is attributable to erroneous system operation is found, the operator shall inform the maintenance team for further investigation.

3.5.3 Failure of Equipment

If ITS workstation receives fault signal or no diagnosis signal response from FLD, Flood operator shall contact the maintenance team and report the location and status of equipment with failure for proper maintenance action.

3.6 Operation of Meteorological (MET) Data

3.6.1 System Setup

No specific system setup is required for MET since all data is sent from APSDPS to ITSC. Threshold value for rainfall and wind velocity shall be determined by and reviewed by **the Employer** from time to time to ensure the values are appropriate, particularly following heavy

precipitations or strong wind.

3.6.2 Operation

3.6.2.1 Monitoring

When weather is good, no particular operation on the meteorological system is required by the Flood operator. When weather is bad or expected to become bad, Flood operator shall review and confirm the weather condition from time to time. The frequency is not fixed but must be adjusted depending on the weather condition.

3.6.2.2 Abnormal weather condition

The MET system issues an alarm when average wind velocity or cumulative rainfall exceeds the pre-defined threshold.

If an alarm is issued, MET operator shall request VMS operator to display appropriate messages on the VMS at appropriate location and direction with the approval of Traffic Management Chief.

Once an alarm is issued, MET operator shall check the data from APSDPS and confirm the weather condition.

When the wind velocity or precipitation has returned to the normal level, MET operator shall request VMS operator to remove messages or change the message and request to Call Center operator to inform related agencies with the approval of Traffic Management Chief.

3.6.2.3 Monthly review

At the end of every month, the Flood operator shall go through the data collected and provide these data to ATCC operator to make a static data of wind velocity and cumulative rainfall.

3.7 Operation of Schematic Map

3.7.1 Update of System

Schematic Map on Video Wall displays following items.

a) Road networks (ORR, IRR, NH, SH and others) except any road which bus is not running on
b) Location of road side equipment (ATCC, CCTV, FLD, VMS)
c) Traffic congestion status
d) Water logging condition
e) Incident (Traffic accident, Disabled vehicle, Obstacle on the road, Vehicle fire, Disaster, etc.)
f) Regulation (Lane closure, Road closure)

System Operator shall maintain any change/adding/removal of location of road side equipment and any information which will display on schematic map.

System Operator confirm that the regular update of Digital Road Map (DRM) , which is provided by the DRM supplier, is surely carried out and properly reflect DRM patch.

3.7.2 Operation

3.7.2.1 Monitoring

3.7.2.2 When any information, which should be shown on the schematic map, received from related agencies through Call Centre Operator, CCTV Operator 1 shall manipulates console and confirm the correct information need to be displayed on schematic map.

3.7.2.3 When future work zone information is received from related agencies through Call Centre Operator, VMS Operator input that information into event console.

3.7.3 Failure of Equipment

If any unclear visible information is confirmed by Traffic Management Chief or any Operators, System Operator shall inform the Maintenance Team for further investigation.

If any discrepancy occurs between provided DRM and schematic map, System Operator shall inform the Maintenance Team for further investigation.

3.8 Operation of Probe System

3.8.1 System Setup

No specific system setup is required for Probe since all bus tracking data is sent from APSRTC to ITSC at an interval of less than one (1) minutes.

3.8.2 Update of System

Call Centre Operator contacts to APSRTC frequently and whenever any changes are founded between current bus schedule and planning schedule, System Operator shall update the system in advance of commencement of new schedule. Examples of schedules are described below.

a) Shifting/Adding/Removal of bus stops on each bus route
b) Changing/Adding/Removal of bus route

3.8.3 Operation

3.8.3.1 Monitoring

When ATCC operator finds abnormal traffic congestion displayed on Digital Road Map of video wall, ATCC operator request to CCTV operator to capture the spot where congestion had started. If the congestion starting spot is out of coverage area of CCTV, ATCC operator request to Call Center operator to contact traffic police to find the cause. Simultaneously, ATCC operator requests to VMS operator to display necessary information on VMS on appropriate location and direction with the approval of Traffic Management Chief.

3.8.3.2 Monthly review

At the end of every month, the ATCC operator shall make the monthly traffic status report, which can describe and organize the traffic data by location, day, week, time and direction wise. ATCC Operator requests VMS Operator to input these static data into event console.

3.9 Operation of Variable Message Sign (VMS) System

3.9.1 Type of information provided

Different types of message will be displayed on the VMS. These types are summarized below. With regard to the message format, the sample messages presented in “IRC:SP: 85-2010, Guidelines for Variable Message Signs.

3.9.2 1) Advance warning message

Advance warning message gives the road users running at upstream section an advance notice of the incident at downstream section. The incident includes traffic congestion, slow traffic, accident, water logging, road closure, fallen object, work zone and weather conditions. The message is effective in reducing possibility of secondary incidents.

3.9.3 2) Advisory message

Advisory message provides the road users with useful information about a specific problem along

their route. This information allows the road users to change their speed or lane in advance of the problem area, or the road users may elect to voluntarily take an alternative route to their destination.

3.9.4 3) Early notice

Early notice informs the road users of a planned event such as work zone. This type of message has lower priority than other types of message and will be displayed only when there is no real-time message to be shown.

3.9.5 Language used

Three languages, English, Hindi, and Telugu will be used for VMS. Thus the VMS operator shall be fluent in these languages. Except short message, messages will be displayed in one of the three languages. Message shall carry the same meaning regardless of the language used. For short message that can be expressed in one line, the same message may be displayed simultaneously in three lines.

3.9.6 Message Composition Method

All messages to be displayed on VMS shall be approved by Traffic Management Chief before actually shown on the VMS. Likewise, removal of the message being displayed requires approval by Traffic Management Chief.

VMS operator can choose message creation from three (3) methods as indicated below.

3.9.7 1) Combination of pre-defined message

The word which are frequently used such as “accident”, “congestion”, ”construction work”, “slow down” and so on are used to compose a message combination by selection at VMS console. They contain words indicating location, event and instruction.

3.9.8 2) Ready-made message

VMS operator may select one of the ready-made messages stored in VMS console.

3.9.9 3) Manual composition

Any message which VMS operator cannot select from VMS console, operator can create any message through keyboard.

3.9.10 4) Graphic symbols

VMS operator may provide a graphic symbol that graphically represent an incident and help road users to understand instantly without reading messages.

3.9.11 Message display

Upon reception of incident information from other operators or directly from other agencies, the VMS operator shall display proper message on the VMSs at appropriate locations and direction without undue delay.

If the VMS on which new message is to be displayed is already showing a message, the VMS operator shall evaluate the priority of the current and new incidents and propose to Traffic Management Chief whether the message being displayed is replaced with the new message or not.

3.9.12 Message removal

Upon reception of the notice that an incident for which a message is displayed has been resolved, the VMS operator shall remove the message or replace with other message immediately. The message of the incident that has been resolved shall not be displayed unnecessarily.

The VMS operator shall check the effectiveness of all the messages being displayed at every 15 minutes and confirm the message needs to be continued or removed. The operator shall remove the message or replace with another message if the message being displayed is no longer applicable.

3.10 Security & Incident Management Service

The City ITS Project shall be designed for an end-to-end multi-layer security blanket to protect applications, services, data and the infrastructure from malicious attacks or theft from external (through internet) and internal (through intranet) hackers. Using Firewalls and Intrusion detection systems such attacks and theft should be controlled and well supported (and implemented) with the security policy. The virus and worms attacks should be well defended with Gateway level Anti-virus system, along with workstation level Anti-virus mechanism. City ITS should be designed to make use of the Secure Socket Layer (SSL)/Virtual Private Network (VPN) technologies to have secured communication between Applications and its end users. Furthermore, all the system logs should be properly stored & archived for future analysis and forensics whenever desired.

These Service Levels would be calculated for each of the following types of incidences:

1. Virus Attack

Any virus infection and passing of malicious code shall be monitored at the gateway level or user complains of virus infection shall be logged and report by monthly report.

2. Denial of Service (DoS) Attack

Non availability of any services shall be analyzed and forensic evidence shall be examined to check whether it was due to external DoS attack.

3. Intrusion

Intrusion is an illegal act of entering, seizing, or taking possession of data hosted by City ITS.

4. SPAM is an unsolicited bulk messages, especially advertising, indiscriminately. SPAM statistics on monthly basis shall be monitored through reports generated by Anti SPAM software.

3.11 Operation Records and Reports

3.11.1 Deployment

The Contractor shall prepare and submit to the Employer as minimum the following reports on deployment:

a) Shift plan of the operation team with the name of traffic management chief and operators on a weekly basis.

b) Daily attendance record within time and Out Time for all Contractor's staff working at City ITS Centre.

c) Daily report of operation agreed with between **the Employer** and the Contractor **according to the manners described below.**

The reports mentioned above are a minimum requirement. **The Employer may instruct the Contractor to submit supplementary reports in addition to the above reports during the Operation and Maintenance Period.**

3.12 Operation Records and Reports

The Contractor shall prepare and submit the various reports as stipulated herein in a form mutually agreed. Each report shall contain as a minimum the information listed.

Traffic Management Chief shall prepare the following reports:

a) Daily report

- List of incident responded by incident category
- Contact summary (numbers by category) with calls, traffic police and other relevant agencies

b) Monthly report

- Number of contact with caller, patrol, police, the Employer and others for each day.
- Number of incident occurred by category for each day
- Number of emergency contact call
- Number of other contacts

Operators who responded to a call (normally Communication Operator) shall prepare the reports listed below. The report shall be compiled immediately after responding to the call and shall not be left unrecorded.

c) Emergency Response Report

- Incident location
- Weather
- Road condition
- Vehicle condition
- Contact record
- Dispatch record
- Traffic regulation implemented

d) Call Record

- Time
- Party contacted
- Incoming or outgoing
- Call content

e) Clearing Record of Object on Road

- Time when information is received or found by CCTV
- Receiver
- Contact source
- Caller
- Type or kind and name of object
- Location and direction
- Lane number

f) Ambulance Information Report

- Date and time
- Reason for dispatch
- Location and direction
- ID of ambulance dispatched
- Service rendered

g) Fire Engine Information Report

- Date and time
- Reason for dispatch
- Location and direction
- ID of fire engine dispatched
- Service rendered

3.13 Contractor's Personnel

3.13.1 Contractor's Key Personnel

For the purpose of discharging its obligations under the Contract, the Contractor shall recruit and deploy the specified number of key personnel of suitable qualification and experience. The Contractor shall ensure that the key personnel deployed are of good health, of highest integrity, punctual, well dressed, well behaved and of qualification and experience prescribed hereunder.

The frequent replacement of key personnel is not desirable unless they are found involved in malpractices or non-compliances. However, a permission of replacement of key personnel shall be obtained from the Employer in advance together with the request for approval for replacement. The Employer, if satisfied with the reasons submitted to him, may allow such replacement after verifying the CVs strictly in accordance with the requirements.

3.13.2 Deployment of Personnel

The Contractor shall recruit and deploy the suitable number of traffic management chief and operator. The minimum number of the staff that the Contractor shall deploy is presented in the preceding section of these Employer's Requirements.

The Contractor shall furnish **with the Employer**, in addition to the list of key personnel provided with the Tender, a list of persons deployed for the purpose of discharging its obligations under the Contract, containing all the details like their educational qualifications, experience, training undergone, health condition, personal residential addresses and recent photograph.

The personnel to be appointed shall not have any previous criminal record. A certificate to this effect from concerned State Police Authorities shall be made obligatory for verification prior to appointment at City ITS Centre.

The Employer may object to the deployment of any personnel for any reason. In such case, the person or persons objected by **the Employer** shall be removed by the Contractor forthwith and replaced within a day from such removal.

The Employer shall not be liable for any misconduct or misdeeds or any act or incident involving the Contractor or any of its personnel in any criminal or civil case. The Contractor shall be **liable** for consequences and if any such incident takes place, the Contractor shall forthwith intimate the incident to **the Employer.**

3.13.3 Relationship between Contractor's staff and the Employer

The Contractor must ensure that it is acting in accordance with the applicable Laws in relation to employment, health, safety and welfare. The Contractor shall be solely responsible for any dispute **in respect of its employment** either during the **Contract Period** or thereafter.

In all circumstances, the Contractor or any person in employment of the Contractor shall have no conflict of interest with the Employer and its employees. All tenderers found to have conflict of interest during tender process/selection of the Contractor shall be disqualified.

3.13.4 Welfare of Contractor's Employee

The Contractor shall be solely responsible and liable for complying with statutory liability for welfare of the employees such as ESI, EPF, workmen's compensation, wages, bonus medical leave, etc.

However, if considered necessary, **the Employer** shall have every right to enquire and seek documentary evidence from the Contractor to confirm, whether all the statutory dues like ESI, EPF, minimum wages, weekly offs, bonus, medical leave, workman compensation and any other entitlements, in accordance with the statutory dues applicable in the area are being paid.

3.13.5 Uniform and Nameplate

The Contractor shall provide uniforms to the persons engaged in City ITS Operation Services at Traffic Control Centre as **approved by the Employer's Representative**. All staff personnel of the Contractor shall wear the uniform and nameplate when on duty without exception. The nameplate shall bear the name and designation.

3.14 Training

The Contractor shall conduct training of the staff as specified herein at the time of new recruitment and also from time to time to ensure high quality City ITS Operation Services. The training shall consist of class room lecture using manual and hands-on training using the City ITS equipment.

The training shall include but not be limited to the following subjects:

a) Basic of traffic engineering
b) Standard incident disposal procedure
c) System log-in, log-out procedure of City ITS
d) CCTV console operation
e) ITS console operation
f) VMS console operation
g) Printer operation
h) Storage device operation
i) Network equipment operation
j) Power supply equipment operation

The Contractor shall describe the contents and the expected duration (number of hours) of the training in the Operation Service Proposal.

The Contractor shall provide **with the Employer**, the details of the training conducted, duration of the training to each appointed staff mentioned above. Only those who have passed the training shall be deployed.

3.15 Safety, Security and Working of Environment

3.15.1 Safety of Staff Deployed

Throughout the period of Contract, the Contractor shall have full regard for safety of all persons entitled to be upon the ITS Centre and for the avoidance of danger to such persons specially from moving traffic.

All staff employed by the Contractor shall receive the training on the work area safety before assigned to the position. The Contractor shall provide all necessary safety equipment such as reflective vests, hardhats to the persons.

3.15.2 Security Access

The Employer will issue an ID to each ITS staff member. ITS Centre staff should be responsible

for the proper use of the ID to access ITS Centre, controlled places and system facilities, and return it immediately if a staff member no longer works for City ITS Operation.

3.16 Employer's Equipment and Property

3.16.1 Provision of Equipment and Property

In order to enable the Contractor to discharge its duties of City ITS Operation Services efficiently and uninterruptedly, the Employer shall provide infrastructural facilities such as staff room, and equipment room at ITS Centre at Nanakramguda.

3.16.2 Care of Equipment

The Contractor may use the Employer's equipment and property that the Contractor is allowed to use with utmost care and attention. If the equipment or property under custody of the Contractor becomes inoperative or defective due to the inappropriate operation or use of them by the Contractor's staff, the Contractor shall repair or replace them at his own cost **as the Employer may instruct before returning the equipment or leaving such facilities.**

If any liability or obligation with regard to the repair or replacement of Employer's equipment and property is remained unfulfilled by the Contractor at the time of return upon termination of the Contract, the amount necessary for the repair or replacement shall be detected to the payment due to the Contractor.

All consumables including but not limited to the printer paper and printer toner shall be arranged and purchased by the Contractor at his own cost.

3.16.3 Power supply

The Employer will provide the electric power to the facilities and equipment that the Contractor allowed to use or to the equipment owned by the Contractor and installed within the Employer's premises for the purpose of the Contract at no cost to the Contractor. The electric power will be uninterruptible power supply backed up by a generator. The Employer shall take no responsibility in case the electric power is interrupted due to the reason whatsoever.

The Contractor shall not misuse the electric power supplied by the Employer and try to save the energy. The Employer reserves the right to inspect the usage of electric power by the Contractor, in case the Employer has any doubt with regard to the usage.

3.17 Inspection and Evaluation

3.17.1 Inspection

The Employer may conduct inspection of the Contractor's work at any time without prior notice, to check, observe, and witness the activities of the Contractor at the City ITS Centre.

The Contractor shall permit the Employer’s Representative at any time or times during the execution of the Contract to enter upon any place where the Contractor is allowed to access within the Employer's premises for the purpose of inspection or for any other legitimate purpose. The Contractor shall give all required information and inspection of records to the Employer's Representative regarding the operation of the City ITS, if asked for.

The purpose of the inspection is to monitor the Contractor's activities and to ensure that all the activities required under the Contract are being carried out properly by the personnel deployed by the Contractor.

The Employer may exercise any check control to ensure discharge of various obligations by the Contractor under the Contract including but not limited to following:

a) Adherence to operation procedure stipulated in the operation manuals;
b) Promptness and appropriateness to communicate with other organizations;
c) Handling of the system and equipment;
d) Appropriateness and promptness of VMS message;
e) Appropriateness of record keeping;
f) Cleanness and tidiness of the ITS Centre and the rooms that are used by the Contractor's staff;
g) Manner and politeness of Contractor's operator toward road users;
h) Traffic safety awareness; and
i) Any other check or control as considered appropriate by the Employer.

3.17.2 Evaluation by the Employer

The Employer may conduct from time to time the evaluation of the City ITS Operation Service provided by the Contractor under the Contract based on the performance of service level parameters specified in Service level Table. Non meeting service levels would attract a penalty for every hour of downtime beyond the downtime permissible.

4 Employer's Requirements for City ITS Maintenance Services

The various type of maintenance and repair works and related services to be performed by the Contractor shall include the following:

4.1 City ITS Maintenance

The City ITS Maintenance shall be executed in accordance with the procedures as set forth herein and instructions given **by the Employer.** The maintenance shall be in operation for 24 hours a day and 7 days a week without interruption. The Contractor shall not divert and modify the procedure without written **approval by the Employer.**

4.1.1 Number of Staff and Shift

The Contractor shall employ chief maintenance engineer and the suitable number of maintenance engineers. The minimum number of these staff and the tasks assigned to them shall be as shown in the table in **Sub-Clause** 5.3.1 **hereof**. 5.3.1. The role of Maintenance Staff. It shall be noted that the number indicated in the table is the minimum requirements and it is the Contractor’s responsibility to provide high quality service seamlessly and additional staff shall be recruited if necessary.

The staff member shown in the table is the persons directly engaged in the Employer Maintenance Services and the Contractor shall recruit and deploy the necessary number of engineers, administrative staff, security guard, cleaning helper, peon and other staff, if necessary.

4.1.2 Briefing at shift change

Shift time of operators shall be arranged in such a way that there will be relevant overlapping period. During the overlapped period, new engineer team shall be briefed by the previous maintenance team as to the following:

- General condition of equipment and software
- Equipment malfunctioned and the status of maintenance work
- On-going and scheduled maintenance work on Hyderabad Metropolitan Area
- Other matters that need attention of the operation team

The Contractor shall check and file the above, and submit them to the Employer.

4.1.3 Confirmation of equipment condition

At the start of a shift, maintenance engineers shall confirm the condition of all equipment. If there is a new failure that was not reported by the previous shift team, the new maintenance engineer shall record it and start proper maintenance action.

4.2 Preventive Maintenance

The Contractor shall perform the preventive maintenance of all equipment and software supplied under the Contract in accordance with the preventive maintenance schedule including scheduled downtime to be proposed by the Contractor and approved by the Employer's Representative.

4.2.1 Inspection Item for Preventive Maintenance

The Contractor shall prepare and submit to the Employer's Representative a list of inspection items for all preventive maintenance work under the Contract two (2) months before the Commissioning Certificate. The inspection item list shall indicate the type of inspection to be performed monthly, bi-annually and annually. The inspection item shall cover all the equipment to be supplied under the Contract.

The list of inspection items and cycle is presented in Attachment 1 for the Operation & Maintenance Specifications. The Contractor shall develop his own inspection item list based on the Attachment 1.

4.2.2 Schedule for Preventive Maintenance

The Contractor shall prepare and submit to **the Employer** a schedule for all preventive maintenance work including scheduled downtime under the Contract two (2) months before the Commissioning Certificate.

The schedule shall be in sufficient detail to indicate which part of the monthly inspections is to be performed in each week and which part of the bi-annual and annual inspections is to be performed in each month and the number of maintenance engineers and technicians to be assigned to the work.

The Contractor will be required to revise the schedule if the work load and the manpower assignment are unbalanced or unrealistic. Failure to submit an acceptable schedule within the specified time shall be a sufficient cause for suspension of the Contract and / or withholding of payments due the Contractor.

4.2.3 Check List

The Contractor shall develop and prepare check lists to be used for preventive maintenance for each type of equipment and software, and submit them for the Employer's Representative for his approval. The checklists shall include the type of equipment, equipment ID, location, date of inspection, name of inspector, check item, and remarks.

The check list shall be used every time a periodical inspection of the equipment is made and results of the inspection shall be recorded together with other details.

The Contractor is required to submit a copy of all recorded check lists every month and as requested by the Employer's Representative at any time. Failure to maintain or submit the check lists shall be a sufficient cause for suspension of the Contract and / or withholding of payments due the Contractor.

4.2.4 Software Preventive Maintenance

The Contractor shall perform preventive maintenance of the software to be provided under the Contract as part of the maintenance work. The Contract shall exert the utmost care not to inadvertently damage the software and database, and cause erroneous or abnormal operation of the

City ITS.

The items for software maintenance shall include but not be limited to the following:

- Monitoring of CPU, memory and disk space utilization
- Monitoring of system availability over TCP/IP
- Monitoring of anti-virus and system security software operation
- Backup of the system and restoration of the system when necessary.
- Monitoring and review of system and event logs.

4.2.5 System modification

The work to be done consists of modifying the system, system parameter and other operating conditions and to improve the operation or to conform to new operational requirements. The work shall be done as directed by the Employer's Representative.

4.3 Corrective Maintenance and Accident Repair

The Contractor shall provide corrective maintenance and accident repair on a 24-hour a day, 7-day a week basis. Upon reception of a failure notice by the contact person, the Contractor shall log the notice and determine the nature and severity of the failure, and dispatch the maintenance crew to the site. Immediate action shall be taken to safeguard the public at any time if the failure is of nature that causes hazardous condition.

If the fault cannot be permanently repaired immediately, a temporary repair or remedial measure sufficient to safeguard the operation of the City ITS shall be effected by the Contractor and **the Employer** shall be so notified. Permanent repairs shall be completed as soon as possible, and in all cases within 96 hours of notification unless extended in unusual circumstances, such as lack of a particular foreign spare part.

Failure to meet the service level requirements by the Contractor shall be a sufficient cause for the Employer to authorize repairs to be completed by others and deduct the costs of such repair from payments due the Contractor. Repetitive failure shall be a sufficient cause for the Employer to terminate the Contract. Failure to effect permanent repairs within the specified time period by the Contractor may also result in being assessed service level penalty as described in Service Level table.

The cost of corrective maintenance of the failure that is not attributable to the Contractor will be determined by mutual negotiation. The Contractor shall assess the extent of the damage, prepare the remedial plan and estimate the cost.

The downtime of corrective maintenance that is not attributable to the Contractor will be determined by mutual negotiation. The Contractor shall report unavoidable downtime including response time and resolution time, and **the Employer** shall assess the downtime and permit The Contractor to consider the downtime for the calculation of the service levels.

4.4 Inspection of Faulty Parts

The Contractor shall inspect the faulty part and submit a report describing the nature of the failure to the Employer's Representative together with his opinion whether the failure is caused by defect, inappropriate operation, act by the third party, normal wear and tear or other reasons.

4.5 Fault Report and Work Order

Each and every corrective maintenance and accident repair work shall be documented on the fault report form and work order form by the Contractor. The Contractor shall prepare and submit the form together with the list of inspection items for the approval of the Employer's Representative. A

copy of completed work order forms shall be submitted with the monthly invoice. No payment shall be made without submitting the completed work order forms. The Fault Reports shall be kept in a log book and shall be made available to the Employer's Representative upon request at any time.

4.6 Maintenance Records and Reports

The Contractor shall prepare and submit a monthly records and reports in the form and contents as specified herein and as agreed with the Employer's Representative.

The Contractor shall maintain a comprehensive record of all maintenance and repair activities and spare parts consumptions and inventory. The records shall include as a minimum maintenance check lists, fault reports, spare parts receiving and consumption records, and work orders. These records shall be kept in a database and various operations including but not limited to search and retrieval of fault record by specified key, statistical processing of records into performance index, and parameters.

4.7 Contractor's Personnel

4.7.1 Contractor's Key Personnel

For the purpose of discharging its obligations under the Contract, the Contractor shall recruit and deploy the specified number of key personnel of suitable qualification and experience. The Contractor shall ensure that the key personnel deployed are of good health, of highest integrity, punctual, well dressed, well behaved and of qualification and experience prescribed hereunder.

The frequent replacement of key personnel is not desirable unless they are found involved in malpractices or non-compliances. However, a permission of replacement of key personnel shall be obtained from **the Employer** in advance together with the request for approval for replacement. **The Employer**, if satisfied with the reasons submitted to him, may allow such replacement after verifying the CVs strictly in accordance with the requirements.

4.7.2 Deployment of Personnel

The Contractor shall recruit and deploy the suitable number of Chief Maintenance Engineer and other engineers. The minimum number of the staff that the Contractor shall deploy is presented in the preceding section of these Employer's Requirements.

The Contractor shall furnish **with the Employer**, in addition to the list of key personnel provided with the Tender, a list of persons deployed for the purpose of discharging its obligations under the Contract, containing all the details like their educational qualifications, experience, training undergone, health condition, personal residential addresses and recent photograph.

The personnel to be appointed shall not have any previous criminal record. A certificate to this effect from concerned State Police Authorities shall be made obligatory for verification prior to appointment at City ITS Centre.

The Employer may object to the deployment of any personnel for any reason. In such case, the person or persons being objected to by **the Employer** shall be removed by the Contractor forthwith and replaced within a day from such removal.

The Employer shall not be liable for any misconduct or misdeeds or any act or incident involving the Contractor or any of its personnel in any criminal or civil case. The Contractor shall be **liable** for consequences and if any such incident takes place, the Contractor shall forthwith intimate the incident to **the Employer.**

4.7.3 Relationship between Contractor's staff and the Employer

The Contractor must ensure that it is acting in accordance with the applicable Laws in

relation to employment, health, safety and welfare. The Contractor shall be solely responsible for any dispute **in respect of its employment** either during the **Contract Period** or thereafter.

In all circumstances, the Contractor or any person in employment of the Contractor shall have no conflict of interest with the Employer and its employees. All tenderers found to have conflict of interest during tender process/selection of the Contractor shall be disqualified.

4.7.4 Welfare of Contractor's Employee

The Contractor shall be solely responsible and liable for complying with statutory liability for welfare of the employees such as ESI, EPF, workmen's compensation, wages, bonus medical leave, etc.

However, if considered necessary, the Employer shall have every right to enquire and seek documentary evidence from the Contractor to confirm, whether all the statutory dues like ESI, EPF, minimum wages, weekly offs, bonus, medical leave, workman compensation and any other entitlements, in accordance with the statutory dues applicable in the area are being paid.

4.7.5 Uniform and Nameplate

The Contractor shall provide uniforms to the persons engaged in City ITS Maintenance Services at Traffic Control Centre as approved by the Employer. All staff personnel of the Contractor shall wear the uniform and nameplate when on duty without exception. The nameplate shall bear the name and designation.

4.8 Training

The Contractor shall conduct training of the staff as specified herein at the time of new recruitment and also from time to time to ensure high quality City ITS Maintenance Services. The training shall consist of class room lecture using manual and hands-on training using the City ITS maintenance.

The training shall include but not be limited to the following subjects:

a) Basic of electric engineering
b) Basic of Information Technology
c) Traffic regulation and safety on work zone
d) Electrical safety

The Contractor shall describe the contents and the expected duration (number of hours) of the training in his Service Proposal.

The Contractor shall provide to the Employer, the details of the training conducted, duration of the training to each appointed staff mentioned above. Only those who have passed the training shall be deployed.

4.9 Safety, Security and Working Environment

4.9.1 Safety of Staff Deployed

Throughout the period of Contract, the Contractor shall have full regard for safety of all persons entitled to be upon the ITS Centre and for the avoidance of danger to such persons specially from moving traffic.

All staff employed by the Contractor shall receive the training on the work area safety before assigned to the position. The Contractor shall provide all necessary safety equipment such as reflective vests, hardhats to the persons.

4.9.2 Security Access

The Employer will issue an ID to each ITS staff member. ITS Maintenance staff should be responsible for the proper use of the ID to access controlled places and system facilities, and return it immediately if a staff member no longer works for City ITS Maintenance.

4.10 Employer's Equipment and Property

4.10.1 Provision of Equipment and Property

In order to enable the Contractor to discharge its duties of City ITS Maintenance Services efficiently and uninterruptedly, the Employer shall provide infrastructural facilities such as staff room, and equipment room at ITS Centre at Nanakramguda and Maintenance sub-base at Ghatkesar.

4.10.2 Care of Equipment

The Contractor may use the Employer's equipment and property that the Contractor is allowed to use with utmost care and attention. If the equipment or property under custody of the Contractor becomes inoperative or defective due to the inappropriate operation or use of them by the Contractor's staff, the Contractor shall repair or replace them at his own cost **as the Employer may instruct before returning the equipment or leaving such facilities.**

If any liability or obligation with regard to the repair or replacement of Employer's equipment and property is remained unfulfilled by the Contractor at the time of return upon termination of the Contract, the amount necessary for the repair or replacement shall be detected to the payment due to the Contractor.

All consumables including but not limited to the printer paper and printer toner shall be arranged and purchased by the Contractor at his own cost.

4.10.3 Power supply

The Employer will provide the electric power to the facilities and equipment that the Contractor allowed to use or to the equipment owned by the Contractor and installed within the Employer's premises for the purpose of the Contract at no cost to the Contractor. The electric power will be uninterruptible power supply backed up by a generator. The Employer shall take no responsibility in case the electric power is interrupted due to the reason whatsoever.

The Contractor shall not misuse the electric power supplied by the Employer and try to save the energy. The Employer reserves the right to inspect the usage of electric power by the Contractor, in case the Employer has any doubt with regard to the usage.

4.11 Inspection and Evaluation

4.11.1 Inspection

The Employer may conduct inspection of the Contractor's work at any time without prior notice, to check, observe, and witness the activities of the Contractor.

The Contractor shall permit the the Employer’s Representative at any time or times during the execution of the Contract to enter upon any place where the Contractor is allowed to access within the Employer's premises for the purpose of inspection or for any other legitimate purpose. The Contractor shall give all required information and inspection of records to the Employer's Representative regarding the Maintenance of the City ITS, if asked for.

The purpose of the inspection is to monitor the Contractor's activities and to ensure that all the activities required under the Contract are being carried out properly by the personnel deployed by the Contractor.

The Employer may exercise any check control to ensure discharge of various obligations by the Contractor under the Contract including but not limited to following:

a) Adherence to maintenance procedure stipulated in the maintenance plan;
b) Adequateness and promptness maintenance;
c) Adequateness of record keeping;
d) Cleanness and tidiness of maintenance room and spare parts yard used by the Contractor's staff;
e) Work Safety awareness; and
f) Any other check or control as considered appropriate by the Employer.

4.11.2 Evaluation by the Employer

The Employer may conduct from time to time the evaluation of the City ITS Maintenance Service provided by the Contractor under the Contract based on the performance of service level parameters specified in Service level Table. Non meeting service levels would attract a penalty for every hour of downtime beyond the downtime permissible.

5 Operation & Maintenance Personnel

5.1 Project Manager

The Project Manager **(the Contractor's representative under Sub-Clause 4.3 of the Conditions of Contract)** shall be responsible for supervising and managing all operation & maintenance activities and operation & maintenance teams in such a way that the City ITS will operate efficiently all the time and all the maintenance works are carried out expeditiously. **He shall receive (on behalf of the Contractor) all notices, instructions, consents, approvals, certificates, determinations and other communications under the Contract.**

The Project Manager shall be at least a graduate in electronics, information technology, systems engineering, computer science, civil engineering, highway engineering or traffic engineering. He shall have the basic knowledge of the equipment and systems comprising the City ITS and possible types of failure that the equipment and system would suffer. He shall be well versed in managing the computer system and network such as ITS Central Centre, or ITS projects of the size and nature comparable to the system to be constructed. He shall have a minimum 15 years of professional experience of projects of similar nature and minimum five (5) years of experience in the maintenance of such system as team leader, project manager, chief engineer or equivalent position.

5.2 Operational Personnel

The Contractor shall provide all personnel necessary for performing the City ITS operation, Project Manager. Traffic Management Chief, Operators, Administrative Staff and supporting staff to fulfill the Employer's requirements under the Contract. The Contractor shall submit curriculum vitae of the candidate person for Project Manager, Traffic Management Chief for the Employer's Representative's approval two (2) months in advance of the Commissioning Certificate. These engineers shall be involved in the installation, adjustment, test on completion and training of the Employer's staff of the City ITS to be supplied under the Contract.

The Contractor shall submit the list of all City ITS Operation staff with name, birth date and address together with copy of ID every month to the Employer's Representative. If there is any change in the composition of the operation staff, **the Contractor shall** immediately **report such changes** to **the Employer.** The Employer will issue an ID to each staff member. The Contractor shall be responsible for the proper use of the ID to gain the access to the access controlled places and system facilities, and return it immediately if a staff member no longer works for the City ITS Operation.

Three (3) shift system shall be adopted for City ITS operation.

5.2.1 The Roles of ITS Centre staff

General Manager of the Employer is responsible for traffic management of the roads in Hyderabad Metropolitan area and for policy related coordination with traffic police, GHMC, R&B, NHAI, APSRTC and related organizations.

Necessary number of operation teams will be formed under the Project Manager of the Contractor. Project Manager supervises all operator teams at ITC Centre. He will be also responsible for the maintenance of City ITS.

An operation team consists of nine (9) persons of one (1) Traffic Management Chief and eight (8) operators with the task assigned as shown below.

No.	Position	Main functions
1	Traffic Management Chief	• Responsible for overall management of ITSC • Monitoring all contents of sub-systems • Instruct operators whenever it require
2	VMS Operator (VMS)	• Leader of each shift • Create and editing of VMS message to be displayed • Select the information as per priority and display selected VMS • Input and record of events
3	Call Center Operator	• Receiving phone call information/data from public and other agencies • Record the call information/data • Providing necessary information/data to related agencies if necessary • Collect and reply any necessary information/data to answer enquiry for caller from public and other agencies • Collect necessary information from related agencies such as VIP movement, work zone
4	CCTV Operator 1 (CCTV / Video Wall)	• Monitor the CCTV images • Utilize PTZ function and understand the situation whenever CCTV sends the serious incident image and inform Manager and VMS operator. • Manipulate Video Wall console if necessary
5	CCTV Operator 2	• Monitor the CCTV images which cannot be covered by operator 1 • Utilize PTZ function and understand the situation whenever CCTV sends the serious incident image and inform Manager and VMS operator.
6	Flood Operator (Flood / MET)	• When alarm issues, inform CCTV operator to check the water logging spot. • When alarm issues since MET data send by APSDPS beyond the threshold, operator inform the Manager and VMS operator
7	ATCC Operator (ATCC / Probe / Static Data	• Collect the information regarding traffic speed and congestion from ATCC • Whenever heavy traffic congestion is found, find the time to

	Analyzer)	destination. • Analyze the traffic data and make a report periodically and whenever manager request.
8	System Operator	• Monitor functionality of FLD, ATCC, MET and Probe equipment/communication • Maintain all network system in ITSC including Security & Incident Management Service • Up-gradation of systems
9	Back-up Operator	• Back-up staff for the above operators except system operator
10	Others	• Necessary number of administrator staff, security guard, cleaning helper, peon and other staff

Traffic Management Chief supervises operators as daytime basis. Regarding operators, one day is divided into three (3) shifts. One party consists of 9 members (No. 2-9) and total 4 parties including back-up. VMS operator is the leader of each shift.

In the night tight shift (i.e. Traffic Management Chief is not in ITSC), VMS operator shall as act for the substitution.

5.2.2 Traffic Management Chief

The Contractor shall appoint Traffic Manager Chief who shall have sufficient knowledge and experience of ITS in all of hardware, software, installation, testing and operation. The Traffic Management Chief shall be responsible for the technical aspect of ITS and involved in technical discussions with **the Employer and the Employer's Representative**.

The Traffic Management Chief shall be at least a graduate in information technology, electronics, electrical engineering, or systems engineering. He shall be well versed in the server network such as those used in the city ITS, factory automation and other industrial automation systems. He shall have a minimum ten (10) years of professional experience and minimum five (5) years of experience in the facility management or maintenance of server, workstation and network.

5.2.3 System Operator

The Contractor shall provide personnel who had experience in system administration, troubleshooting and networking. The personnel shall have at least eight (8) years of IT experience.

5.2.4 Call Centre Operator/VMS Operator/Back-up Operator

The Contractor shall provide personnel who enable to understand three (3) languages (English, Hindi and Telugu) for Call Centre Operator, VMS Operator and Back-up Operator.

5.2.5 Information to be collected

For every incident reported, the operator in the ITS Centre shall gather the information about the details of incident and site condition.

5.2.6 Close coordination with other organizations

City ITS management (operation and maintenance) must be conducted with close coordination and cooperation with other agencies concerned. Liaison and coordination among related agencies such as traffic police, ambulance and fire brigades must be maintained all the time.

5.2.7 Briefing at shift change

Shift time must be arranged in such a way that there will be an overlapping period of at least 15 minutes. During the overlapped period, new team shall be briefed by the previous operation team

as to the following:

- General traffic condition
- Weather condition
- Existing incidents and accident being disposed of
- Messages being displayed on VMS
- Equipment malfunctioned and the status of maintenance work
- Other matters that need attention of the operation team

Leader of each shift shall hand over all reports to the leader of the next shift. When the last shift of the day finishes the duty, Traffic Management Chief checks all reports and files them. He submits them to the Employer's representative.

5.3 Maintenance Personnel

The Contractor shall provide all personnel necessary for the execution of the maintenance, such as Chief Maintenance Engineer, Electrical Engineer, Information Technology Engineer, and technicians to fulfill the Contractor's obligations under the Contract. The Contractor shall submit curriculum vitae of the candidate person for Chief Maintenance Engineer, Electrical Engineer and Information Technology Engineer for the Employer's Representative's approval two (2) months in advance of the start of maintenance work.

5.3.1 The Roles of Maintenance Staff

The Contractor shall set up the necessary number of maintenance teams to undertake the maintenance work in shift on a 24-hour a day and 7-day a week basis. The team shall consist of the number of persons of suitable expertise. Under normal condition, they will engage in the preventive maintenance work. In the event of malfunction or damage to the equipment or operational problem of server system and network, the team shall be dispatched to the site immediately to attend to the incident.

Chief Maintenance Engineer supervises engineers as daytime basis. In the night tight shift (i.e. Chief Maintenance Engineer is off-duty), Electric Engineer shall as act for the substitution. Three (3) shifts shall be adopted for City ITS maintenance. One party consists of 4 members (No. 2-4) and total 4 parties including back-up.

No.	Designation	Task and responsibility
1.	Chief Maintenance Engineer	Responsible for overall maintenance of City ITS
2.	Electric Engineer	-Leader of each maintenance team -Responsible for maintenance of all equipment comprising the City ITS.
3.	Information Technology Engineer	Responsible for maintenance of all Network, Software and database used in the City ITS.
4.	Two (2) numbers of Technicians	Two technicians works with the above engineers.
5.	Others	Necessary number of administrator staff, security guard, cleaning helper, peon and other staff

5.3.2 Chief Maintenance Engineer

The Chief Maintenance Engineer shall be responsible for supervising and managing all

maintenance activities and maintenance team in such a way that the City ITS will operate efficiently all the time and all the maintenance works are carried out expeditiously.

The chief maintenance engineer shall be at least a graduate in electronics, information technology, systems engineering, computer science, civil engineering, highway engineering or traffic engineering. He shall have the basic knowledge of the equipment and systems comprising the City ITS and possible types of failure that the equipment and system would suffer. He shall be well versed in managing the computer system and network such as toll collection system, or ITS projects of the size and nature comparable to the system to be constructed. He shall have a minimum 10 years of professional experience of projects of similar nature and minimum five (5) years of experience in the maintenance of such system as team leader, project manager, chief engineer or equivalent position.

5.3.3 Electrical Engineer

The electrical engineer shall be responsible for the maintenance of all equipment comprising the system under the Contract. He shall be responsible for developing and implementing the preventive work plan of the equipment. He shall also be responsible for locating the fault, identifying the defective part, and preparing and implementing the remedial plan for malfunction and damages to the equipment and cables.

The electrical engineer shall be at least a graduate in electronics, electrical engineering, or systems engineering. He shall be well versed in the electronic and electrical devices such as those used in the ITS, toll collection system, factory automation and other industrial process control systems. He shall have a minimum 10 years of professional experience and minimum five (5) years of experience in the maintenance of electronic and electrical devices.

5.3.4 Information Technology Engineer

The information technology engineer shall be responsible for the maintenance of the servers, workstations, local area network, wide area network and software and database used in the City ITS. He shall be responsible for developing and implementing the preventive work plan for software and network. He shall also be responsible for attending any software and network problems.

The information technology engineer shall be at least a graduate in information technology, electronics, electrical engineering, or systems engineering. He shall be well versed in the server network such as those used in the ITS, toll collection system, factory automation and other industrial automation systems. He shall have a minimum ten (10) years of professional experience and minimum five (5) years of experience in the facility management or maintenance of server, workstation and network.

5.4 Maintenance Facilities

5.4.1 Maintenance Equipment and Tools

The Contractor shall maintain required set of maintenance equipment and tool, and monitoring and testing software normally required for the maintenance of the electrical and server system. The maintenance equipment and tools shall be maintained in good workable condition so that they shall be available all the time. If periodical calibration is required, it shall be calibrated at the regular interval as specified by the supplier of the maintenance equipment. The maintenance staff shall be trained as to the use of the maintenance equipment and tools. The purchase or depreciation cost of the maintenance equipment and tools shall be deemed to be included in the appropriate cost item in the Tender and no separate payment shall be made.

5.4.2 Maintenance Office

The Contractor will be allowed to occupy and use the maintenance room in the ITC Centre building, and other space and room as the Contractor's proposal basis, free of charge for operation & maintenance purpose. The Contractor shall observe the regulations regarding use of the maintenance office. Only persons authorized by the Employer's Representative shall be allowed to use the office and the office shall be used solely for the operation & maintenance of the City ITS. The Contractor shall prepare at his cost desks, chairs, shelves, cabinets, telephone, Internet access and other furniture and facilities necessary for the efficient maintenance operation.

5.4.3 Maintenance Vehicle

The Contractor shall provide at least 2 numbers of vehicles for their operation & maintenance use. The vehicle shall be of the type suitable for maintenance work in terms of the number of passengers and load carrying capacity. The vehicle shall meet the relevant government regulations and registered under the name of the Contractor. The vehicles shall be maintained in good condition to run on the Hyderabad Metropolitan area. The vehicle shall clearly indicate as maintenance vehicle on the side of the vehicle and a yellow flashing light shall be provided on the roof of the vehicle. A set of traffic safety devices consisting of safety cones, stand-alone flashing light, and reflective guide and warning signs shall be provided to the maintenance vehicle. The cost of obtaining and maintaining the maintenance vehicle shall be included in the appropriate items in the Pricing Document and no separate payment shall be made.

6 Service Level Requirements

6.1 Service Level Requirement

Service level means the operation & maintenance service delivery criteria established for the services specified in service table. The purpose of Service Levels specified in the Service Levels Tables is to clearly define the levels of service which shall be achieved by the Contractor during O&M period i.e. Five Years from the date of the Commissioning Certificate. The service level parameters mentioned in the service level table shall be measured on a quarterly basis as per the individual service level parameter requirements, through appropriate service level measurement tool like Enterprise Management Solution (EMS)/Network Management System (NMS). Measurement of service levels for systems shall be automatic using reports from appropriate management tool like EMS. Measurement of service levels for services, which are not delivered using a dedicated tool, will be carried out using appropriate and relevant reports from the Service Desk tool for ticket open and close times. For such services, the Contractor will create a ticket for every service rendered. For services delivered using dedicated tools, measurement of service levels will be carried out using appropriate and relevant reports from the respective tools

Measurement of Service Level parameters will be carried out on cumulative basis in a quarter. Non meeting service levels would attract a penalty for every hour of downtime beyond the downtime permissible.

The Contractor is required to ensure that the service level as per service level table is being compiled. The Contractor is also required to submit service level report along with the quarterly payment invoice in the event the service level is not achieved, service level penalty as applicable on the quarterly payment would be charged as per Service Level Table.

If the **level of required** performance of the system/services is degraded significantly at any time during the **Operation and Maintenance Period, the Contractor shall rectify the situation** to the satisfaction of the **Employer**, **failing which** the Employer **may exercise his right under Sub-Clause 2.4 of the Conditions of Contract.**

The Contractor and the Employer shall regularly review the performance of the services being

provided by the Contractor and the effectiveness of the Service Levels. The Contractor is responsible for development and implementation of appropriate management tools like EMS/NMS. which shall be basis for all project reviews.

The Tender shall report downtime, that is not attributable to the Contractor, such as public communication failure or thunderbolt, to the Employer within three (3) days after the failure. The Employer shall assess the downtime and permit The Tender to consider downtime for the e calculation of service level.

Service Levels Table (Measured quarterly using EMS/NMS)

S..No	Parameter	Formula	Target	Severity	Penalty	Example	How to Measure
1. Traffic Control Centre Equipment							
1	Server Availability (ITSC & Data Back-up Centre and internet servers including the OS, database and any other application running on it)	Availability= {1-{[(A-C)/(B-C)] *100}} Where A= Time for which system is down B = Total Time C= Scheduled downtime Total Time shall measured on 24hoursX30daysX3 months basis	Minimum 99.85% Uptime	Critical	Non meeting of service levels would attract a penalty calculated on cumulative basis in quarter 1% of the QBV or Rs. 50,000/- (whichever is higher) for every 1 hour of down time at a stretch or in parts up to total down time of 2 hours. This down time shall be calculated over and above the total hours of downtime permissible. Beyond 2 hours of down time, 2% of the QBV or 1.0 lakh for every 1 hour of entire down time at a stretch or in parts QBV is the Quarterly Billing Value	If downtime is 2 hours more than the permissible downtime total penalty calculation is as follows: Penalty = 2*1% QBV or 2*50,000/- (whichever is higher) If downtime is 3 hours more than the permissible downtime Penalty = 3*2% QBV or 3*1,00,000/- (whichever is higher)	Log reports of the system System log files shall be conclusive and should provide sufficient proof of the availability of the system. Contractor shall have sole responsibility to make the system available as quickly as possible to meet the service level requirements. Any scheduled down time for maintenance shall be with prior written permission from the Employer. Downtime required for maintenance , new initiatives undertaken by Contractor or performance enhancement measures with prior approval of the Employer shall not be considered while calculating availability
2	Operator Console Availability (Traffic Management Chief, Call Centre,CCTV1,CCTV2, VMS, Flood,ATCC, System)		99.85%	Critical			
3	Storage Availability (Including power availability , network availability , availability of links to applications and databases)		99.85%	Critical			
4	Video Wall		99.85%	Critical			
5	Network Connectivity Between ITSC –Data Back-up Centre – Road side equipment		99.70%	Critical			

S..No.	Parameter	Formula	Availability	Severity	Penalty	Example	Measurement
2. Field Equipments Service Levels							
6	Average Uptime Time period of the .ATCC	Availability= {1-{[(A-C)/(B-C)] *100}} Where A= Time for which system is down B = Total Time C= Scheduled downtime Total Time shall measured on 24hoursX30daysX3 months basis	99.00%	Critical	Non meeting of service levels would attract a penalty calculated on cumulative basis in quarter 0.5% of the QBV or Rs. 25,000/- (whichever is higher) for every 1 hour of down time at a stretch or in parts up to total down time of 2 hours.. This down time shall be calculated over and above the total hours of downtime permissible. Beyond 2 hours of down time, 1% of the QBV or 50,000/- for every 1 hour of entire down time at a stretch or in parts	If downtime is 2 hours more than the permissible downtime total penalty calculation is as follows: Penalty = 2*0.5% QBV or 2*25,000/-(whichever is higher) If downtime is 3 hours more than the permissible downtime Penalty = 3*1% QBV or 3*50,000/- (whichever is higher)	Log reports of the system System log files shall be conclusive and should provide sufficient proof of the availability of the system. Contractor shall have sole responsibility to make the system available as quickly as possible to meet the service level requirements. Any scheduled down time for maintenance shall be with prior written permission from the Employer. Downtime required for maintenance , new initiatives undertaken by Contractor or performance enhancement measures with prior approval of the Employer shall not be considered while calculating availability
7	Average Uptime Time period of the CCTV Camera .						
8	Average Uptime Time period of the FLD.						
9	Average Uptime Time period of the VMS						
10	Average Uptime Time period of UPS						
3. Related Civil & Minor Works Service Levels							
11	Any Physical damage to the Equipment Posts should be restored within 7 days to the normal state			Medium	1% of the QBV or 50,000/- (whichever is higher) for every 2 days of delay		
4. Customer Service Levels							
12	Any complaint /query made by road user/stakeholders to be resolved within 3 days			Medium	0.5% of the QBV or 25,000/- (whichever is higher) for every 2 days of delay		

S..No.	Parameter	Formula	Availability	Severity	Penalty	Example	Measurement
5.Compliances & Reporting procedure Service Levels							
13	Submission of Reports	The Contractor shall submit the monthly reports and reports as requested by the the Employer	Reports for the previous month shall be submitted by the 7th of the next month. Penalty shall be levied only after the 10th of the month of submission.	Medium	1 % of the QBV or 50,000/- (whichever is higher) for every 1 day of delay in submission on an incremental basis to a maximum of 5 %.		
6. Security and Incident management Service Levels							
14	For every Virus attack reported and not resolved within 8 hours			Critical	Rs. 10,000		
15	For every incidence of Denial of service attack.			Critical	Rs. 500,000		
16	For every incidence of Data Theft, Contractor is subject to penalty and / or punishment applicable under the IT act or any other prevailing laws of the State / Country at that point in time, which shall be over and above the said penalty.			Critical	Rs. 500,000		
17	Intrusion (An illegal act of entering, seizing, or taking possession of data hosted by City ITS)			Critical	Rs. 200,000		
18	SPAM (unsolicited bulk messages, especially advertising, indiscriminately)		95.0% (not less than 70%)	Medium	0.5% of Quarterly Billing Value (QBV) for drop in Service level by every 5% on a pro rata basis		

S..No.	Parameter	Formula	Availability	Severity	Penalty	Example	Measurement
7. Training							
19	Participant Pass Rate	(No. of Participants who score at least 80% marks in the first Assessment Test / No. of Participants who took the test)* 100	100%	Critical	For all trainings conducted in a period, 0.01% of TCV (Total Contract Value) for drop in service level by every 10%	If for all trainings conducted in location quarter, Pass percentage is 56%, penalty calculation is as follows : Total drop in service level = (80 - 56) = 24% Total penalty = (24/10)*0.01 = 0.024% of TCV	Retraining to be provided by the successful bidder to all participants scoring less than 80% at no additional cost Score on Assessments done after completion of training. Tests shall be designed by the successful bidder, approved by the Employer and administered and assessed by the Employer
8. Change Request -Software							
20	Delay in Implementation of Change request from signed off timelines in Change Control Note		Signed off timelines as agreed in Change Control Note		10% of cost for implementation of change request for drop in service level by every 25%	If the Change is implemented in 10.5 days and the signed off timeline with the Employer was 7 days, total penalty calculation is as follows: Total drop in service level = (10.5-7) = 3.5 days = (3.5/7)*100 = 50% Total penalty = (50 / 25)*10% = 20% of cost for implementation of change request	Delay will be calculated against signed-off time lines.

The downtime (In hours) of each component shall be totaled to arrive at the actual penalty leviable. For instance if CCTV1 is down for 1 hours and CCTV2 is down for 2 hours, then total camera downtime shall be 3 hours

Total penalty shall not exceed 20% of QBV in each quarter, If three consecutive quarterly deductions exceed more than 20% of respective QBV, will be considered as an event of default or termination. The Contractor has to obtain certification from the employer's representative latest by the end of third quarter.

6.2 Service Level Review Process

- Either the Employer or Contractor may raise an issue by documenting the business or technical problem, which presents a reasonably objective summary of both points of view and identifies specific points of disagreement with possible solutions.
- A meeting or conference call will be conducted to resolve the issue in a timely manner. The documented issues will be distributed to the participants at least 24 hours prior to the discussion if the issue is not an emergency requiring immediate attention.
- The Employer and the Contractor shall develop an interim solution, if required, and subsequently the permanent solution for the problem at hand. The Contractor will then communicate the resolution to all interested parties.
- In case the issue is still unresolved, the arbitration procedures described in the Conditions of Contract Part II Conditions of Particular Applications will be applicable.

6.3 Service Level Penalties

- The total deduction should not exceed 20% of the Quarterly Billing Value (QBV).
- Three consecutive quarterly deductions of more than 20% of the applicable fee on account of any reasons will be deemed to be an event of default and termination.
- The certifications would be obtained by the Contractor latest by end of Third Quarter of the Operations phase failing which the subsequent QBVs will deferred till the certifications is obtained.
- In the event of any of the above happening, it shall be governed by terms & conditions defined in this Tender Document.

7 Spare Parts and Consumables

The Contractor shall maintain required spare parts in order to keep required service levels. An undertaking to be submitted along with technical bid has the sufficient infrastructure and capability to keep/store spares required for maintenances. The Contractor shall at all times during the contract period maintain sufficient inventory of spares, OEM parts and consumables by The Contractor’s own cost for operating and maintaining the City ITS and to meet the Service Level requirements.

8 Note PC and Mobile Phone for Daily Works

The Contractor shall supply required number of general note-PC and mobile phone for the personnel of the Contractor to conduct daily works of operation and maintenance service.

Attachment 1 :

City ITS Inspection item and cycle

ITSC Server

Equipment	Inspection Object	Frequency of Inspection			Inspection Method	Inspection Item
		Monthly	Bi-Annual	Annual		
ITSC Server and each Sub-System Server	Appearance condition		○		Visual check	To check condition of dirt, rusting, damage, deformation, and abrasion of coating. Cleaning.
	Heat generation		○		Visual and handling check	To checking whether heat is generated of not.
	System server and other equipment		○		Check by tool and visual	To checking condition of damage, overheating and disconnection of wire. The screw should be tightened if necessary.
	Measuring voltage		○		Check with instrument	To check whether input voltage is within regulated value or not.
UPS	Appearance condition		○		Visual check	To check condition of rusting and damage.
	Fixed condition of cable connectivity.			○	Visual check	To check the loose of cable connectivity. The screw should be tightened if necessary.
	Checking voltage, specific gravity and temperature of liquid			○	Check with instrument	To checking whether input voltage specific gravity and temperature of liquid is within regulated value or not.

ITSC Video wall

Equipment	Inspection Object	Frequency of Inspection			Inspection Method	Inspection Item
		Monthly	Bi-Annual	Annual		
LCD display	Appearance condition	○			Visual check	To check condition of dirt, rusting, damage, deformation, and abrasion of coating. Cleaning.
	Working condition	○			Visual and handling check	To check display status by handling and update of latest inform
	Measuring voltage	○			Check with instrument	To check whether input voltage is within regulated value or not.
UPS	Appearance condition		○		Visual check	To check condition of rusting and damage.
	Fixed condition of cable connectivity.			○	Visual check	To check the loose of cable connectivity. The screw should be tightened if necessary.
	Checking voltage, specific gravity and temperature of liquid			○	Check with instrument	To check whether input voltage specific gravity and temperature of liquid is within regulated value or not.

ITSC Operator Console

Equipment	Inspection Object	Frequency of Inspection			Inspection Method	Inspection Item
		Monthly	Bi-Annual	Annual		
ITS Centre Console	Appearance condition		○		Visual check	To checking condition of dirt, rusting, damage, deformation, and abrasion of coating Cleaning.
	Heat generation		○		Visual and handling check	To check whether heat is generated of not.
	Measuring voltage		○		Check with instrument	To check whether input voltage is within regulated value or not.
	Image quality of display		○		Visual and operation check	To adjust image quality of display, if necessary.
UPS	Appearance condition		○		Visual check	To checking condition of rusting and damage.
	Fixed condition of cable connectivity.			○	Visual check	To checking the loose of cable connectivity. The screw should be tightened if necessary.
	Checking voltage, specific gravity			○	Check with instrument	To checking whether input voltage specific gravity and temperature of

	and temperature of liquid					liquid is within regulated value or not.

Firewall & Network equipment

Equipment	Inspection Object	Frequency of Inspection			Inspection Method	Inspection Item
		Monthly	Bi-Annual	Annual		
Firewall	Appearance condition		○		Visual check	To check condition of dirt, rusting, damage, deformation, and abrasion of coating. Cleaning.
	Measuring voltage		○		Check with instrument	To check whether input voltage is within regulated value or not.
Network equipment	Appearance condition		○		Visual check	To check condition of dirt, rusting, damage, deformation, and abrasion of coating. Cleaning.
	Measuring voltage		○		Check with instrument	To checking whether input voltage is within regulated value or not.

CCTV System

Equipment	Inspection Object	Frequency of Inspection			Inspection Method	Inspection Item
		Monthly	Bi-Annual	Annual		
CCTV	Appearance condition	○			Visual check	To checking condition of trace of rusting, damage and cleaning lens with using fabric and brush.
	Working condition		○		Visual check	To checking condition of tilt, pan and zooming movement. Calibration.
	Focusing condition		○		Operation check	Adjustment of focus
	Video output condition			○	Visual and operation check	To check condition of image and quality
	Sensitivity condition			○	Visual and operation check	Adjustment of sensitivity condition
	Measuring voltage		○		Check with instrument	To check whether input voltage is within regulated value or not.
	Condition of insulation resistance and ground resistance			○	Check with instrument	To check the condition of insulation resistance and ground resistance weather it is within regulated level or not.
	Rusting and damage of support and foundation			○	Visual check	To check condition of rusting, crack or damage of support and foundation including anchor.
Network equipment	Appearance condition		○		Visual check	To check condition of dirt, rusting, damage, deformation, and abrasion of coating. Cleaning.
	Measuring voltage		○		Check with instrument	To check whether input voltage is within regulated value or not.
UPS	Apparent condition		○		Visual check	To check condition of rusting and damage.
	Fixed condition of cable connectivity.			○	Visual check	To check the loose of cable connectivity. The screw should be tightened if necessary.
	Checking voltage, specific gravity and temperature of liquid			○	Check with instrument	To check whether input voltage specific gravity and temperature of liquid is within regulated value or not.

Variable Message Sign System

Equipment	Inspection Object	Frequency of Inspection			Inspection Method	Inspection Item
		Monthly	Bi-Annual	Annual		
Variable message sign	Appearance condition	○			Visual check	To check condition of trace of dewfall or leaking water, rusting, damage, lock, opening and shutting of door. Cleaning
	Working condition of Lighting Function			○	Visual and operation check	To check the luminance and color tone condition.
	Condition of Breaker, Transformer and Surge Protection Device			○	Visual, odor, handling and abnormal noise check	To check condition of defacement, damage, odor, abnormal noise and overheat. Cleaning
	Fixed condition and abnormality check			○	Visual, odor, handling and	To check the loose of fixed condition. It should be tightened if

	of printed board and relay				abnormal noise check	necessary. To checking condition of defacement, damage, odor, abnormal noise and overheat.
	Loose of each terminal parts			○	Visual and handling check	To check the condition of loose of terminal parts. The screw should be tightened if necessary.
	Display condition of LED			○	Visual and handling check	To check the loose of fixed condition. It should be tightened if necessary.
	Measuring voltage		○		Check with instrument	To check whether input voltage is within regulated value or not.
	Condition of insulation resistance and ground resistance			○	Check with instrument	To check the condition of insulation resistance and ground resistance whether it is within regulated level or not.
	Rusting and damage of support and foundation			○	Visual check	To check condition of rusting, crack or damage of support and foundation including anchor.
Network equipment	Appearance condition		○		Visual check	To check condition of dirt, rusting, damage, deformation, and abrasion of coating. Cleaning.
	Measuring voltage		○		Check with instrument	To check whether input voltage is within regulated value or not.
UPS	Apparent condition		○		Visual check	To check condition of rusting and damage.
	Fixed condition of cable connectivity.			○	Visual check	To check the loose of cable connectivity. The screw should be tightened if necessary.
	Checking voltage, specific gravity and temperature of liquid			○	Check with instrument	To check whether input voltage specific gravity and temperature of liquid is within regulated value or not.

ATCC System

Equipment	Inspection Object	Frequency of Inspection			Inspection Method	Inspection Item
		Monthly	Bi-Annual	Annual		
ATCC	Appearance condition	○			Visual check	To check condition of trace of rusting, damage and deformation. To clean lens with using fabric and brush.
	Focusing condition		○		Operation check	Adjustment of focus
	Video output condition			○	Visual and operation check	To check condition of image and quality
	Sensitivity condition			○	Visual and operation check	Adjustment of sensitivity condition
	Measuring voltage		○		Check with instrument	To check whether input voltage is within regulated value or not.
	Condition of insulation resistance and ground resistance			○	Check with instrument	To check the condition of insulation resistance and ground resistance whether it is within regulated level or not.
	Rusting and damage of support and foundation			○	Visual check	To check condition of rusting, crack or damage of support and foundation including anchor.
Network equipment	Appearance condition		○		Visual check	To check condition of dirt, rusting, damage, deformation, and abrasion of coating. Cleaning.
	Measuring voltage		○		Check with instrument	To check whether input voltage is within regulated value or not.
UPS	Apparent condition		○		Visual check	To check condition of rusting and damage.
	Fixed condition of cable connectivity.			○	Visual check	To check the loose of cable connectivity. The screw should be tightened if necessary.
	Checking voltage, specific gravity and temperature of liquid			○	Check with instrument	To check whether input voltage specific gravity and temperature of liquid is within regulated value or not.

Flood Monitoring System

Equipment	Inspection Object	Frequency of Inspection			Inspection Method	Inspection Item
		Monthly	Bi-Annual	Annual		
FLD: Road side equipment	Appearance condition of observation instruments	○			Visual check	To checking condition of rusting, deformation, damage, and overheat. To clean all observation instruments (Electrode contact type sensor) .
	Working condition of all instruments		○		Visual and operation check	To check measuring condition and calibration of all observation instrument
	Fixed condition of all instruments		○		Visual and handling check	To check the loose of fixed condition. The screw should be tightened if necessary.
	Fixed condition and abnormality check of printed board and relay			○	Visual, odor, handling and abnormal noise check	To check the loose of fixed condition. It should be tightened if necessary. To check condition of deformation, damage, odor, abnormal noise and overheat.
	Loose of each terminal parts			○	Visual and handling check	To check the condition of loose of terminal parts. The screw should be tightened if necessary.
	Condition of insulation resistance and ground resistance			○	Check with instrument	To check the condition of insulation resistance and ground resistance whether it is within recorded level or not.
	Measuring voltage		○		Check with instrument	To check whether input voltage is within regulated value or not.
	Rusting and damage of support and foundation			○	Visual check	To check condition of rusting, crack or damage of support and foundation including anchor.
UPS	Appearance condition		○		Visual check	To check condition of rusting and damage.
	Fixed condition of cable connectivity.			○	Visual check	To check the loose of cable connectivity. The screw should be tightened if necessary.
	Checking voltage, specific gravity and temperature of liquid			○	Check with instrument	To check whether input voltage specific gravity and temperature of liquid is within regulated value or not.

END