AGREEMENT No 1 of 2011 - 12

GOVERNMENT OF ORISSA
WORKS DEPARTMENT

INDIA
ORISSA STATE ROADS PROJECT
***Loan* # 7577 - IN**

CONTRACT FOR CONSULTANTS' SERVICES

Consultancy Services for providing "Technical Assistance to Establish an Asset Management System on the Core State Road Network of Orissa Works Department"

Between

Chief Engineer, World Bank Projects, Orissa
on behalf of
Works Department, Government of Orissa

and

LEA Associates South Asia Pvt. Ltd. (LASA), India
In Joint Venture with
LEA International Ltd. (LEA), Canada
In association with
Geo Infospace Private Limited (GIPL), India as sub-consultant

Project Management Unit, Orissa State Roads Project
Office of the Engineer-in-Chief (Civil), Orissa,
Nirman Soudha, Keshari Nagar, Unit – V, Bhubaneswar – 751 001

Dated: **5th APRIL, 2011**

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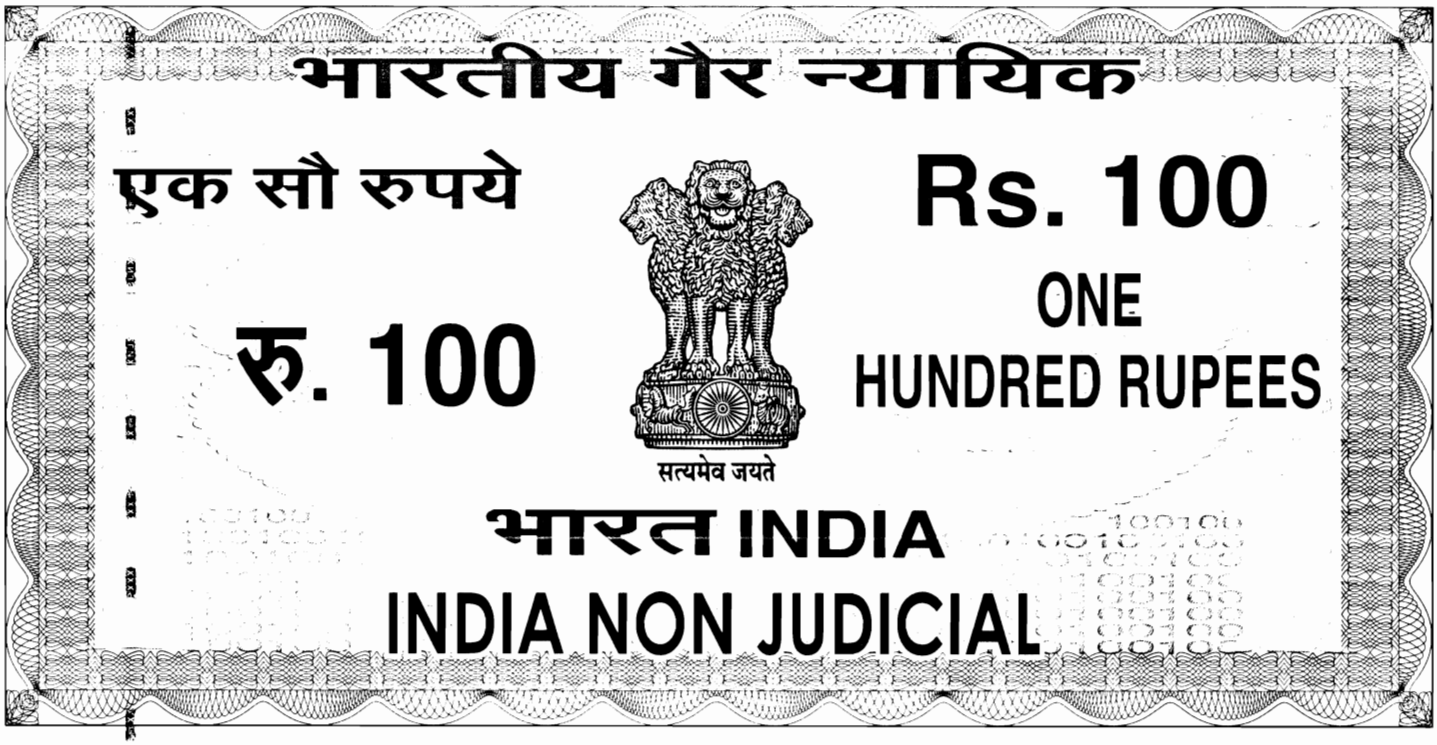

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Contract for Consultants' Services

Consultancy Services for providing "Technical Assistance to Establish an Asset Management System on the Core State Road Network of Orissa Works Department"

This CONTRACT (hereinafter called the "Contract") is made the **5th** day of the month of **April**, **2011**, between, on the one hand, ***Chief Engineer, World Bank Projects, Orissa on behalf of the Works Department, Government of Orissa*** (hereinafter called the "Client") and, on the other hand, a consortium consisting of the following entities, each of which will be jointly and severally liable to the Client for all the Consultant's obligations under this Contract, namely,

LEA Associates South Asia Pvt. Ltd.(LASA), India
B – 1/E-27, Mohan Cooperative Industrial Estate, Mathura Road, New Delhi – 110 044

in joint venture with

LEA International Ltd.(LEA), Canada
Suite 900, 625 Cochrane Drive, Markham, Ontario, Canada, L3R9R9

Consultant

NEW DELHI

Chief Engineer
World Bank Projects, Orissa

and in association with

Geo Infospace Private Limited(GIPL), India as sub-consultant
Flat # 109, Maruthi Complex, Somajiguda, Rajbhaban Road, Hyderabad – 500 082

(hereinafter called the "Consultant").]

WHEREAS

(a) the Client has requested the Consultant to provide certain consulting services as defined in this Contract (hereinafter called the "Services");

(b) the Consultant, having represented to the Client that it has the required professional skills, and personnel and technical resources, has agreed to provide the Services on the terms and conditions set forth in this Contract;

(c) the Client has received a loan from the International Bank for Reconstruction and Development (hereinafter called the "Bank") towards the cost of the Services and intends to apply a portion of the proceeds of this loan to eligible payments under this Contract, it being understood (i) that payments by the Bank will be made only at the request of the Client and upon approval by the Bank , (ii) that such payments will be subject, in all respects, to the terms and conditions of the agreement providing for the loan , and (iii) that no party other than the Client shall derive any rights from the agreement providing for the loan or have any claim to the loan proceeds;

NOW THEREFORE the parties hereto hereby agree as follows:

1. The following documents attached hereto shall be deemed to form an integral part of this Contract:

(a) The General Conditions of Contract;

(b) The Special Conditions of Contract;

(c) The following Appendices:

Appendix A: Description of Services

Appendix B: Reporting Requirements

Appendix C: Key Personnel and Sub-Consultants

Appendix D: Breakdown of Contract Price in Foreign Currency

Appendix E: Breakdown of Contract Price in Local Currency

Appendix F: Services and Facilities Provided by the Client

Appendix G: Form of Advance Payment Guarantee

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O/o the E.I.C. (Civil), Orissa
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2. The mutual rights and obligations of the Client and the Consultant shall be as set forth in the Contract, in particular:

   (a) the Consultants shall carry out the Services in accordance with the provisions of the Contract; and

   (b) the Client shall make payments to the Consultants in accordance with the provisions of the Contract.

IN WITNESS WHEREOF, the Parties hereto have caused this Contract to be signed in their respective names as of the day and year first above written.

For and on behalf of the Client, i.e. ***Government of Orissa***

Er. Nalini Kanta Pradhan
Chief Engineer, World Bank Projects, Orissa

Chief Engineer
World Bank Projects
O/o the E.I.C. (Civil), Orissa
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For and on behalf of each of the Members of the Consultant

LEA Associates South Asia Pvt. Ltd., India

LEA ASSOCIATES SOUTH ASIA PVT. LTD. NEW DELHI

[Pradeep Kumar]

LEA International Ltd., Canada

LEA International Ltd. LEA Toronto, Canada

[Dr. M. P. Raju]

Witness : Gatikrushna Prasad 5/4/2011
Mr.Gatikrushna Prasad
Executive Engineer, PMU, OSRP

Witness : 5/4/11
Mr. Manabhanjan Acharya.
Financial Advisor, PMU,OSRP

Witness : 5.4.11
Mr. G.P. Sahoo
Sr. Consultant,
LEA Associates South Asia Pvt. Ltd.

Witness : 5/4/2011
Mr. Satyakam Sahu
Associates General Manager
LEA Associates South Asia Pvt. Ltd.

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II. General Conditions of Contract

1. General Provisions

1.1 Definitions Unless the context otherwise requires, the following terms whenever used in this Contract have the following meanings:

(a) "Applicable Law" means the laws and any other instruments having the force of law in the Government's country, or in such other country as may be specified in the Special Conditions of Contract (SC), as they may be issued and in force from time to time.

(b) "Bank" means the International Bank for Reconstruction and Development, Washington, D.C., U.S.A., or the International Development Association, Washington, D.C., U.S.A.

(c) "Consultant" means any private or public entity that will provide the Services to the Client under the Contract.

(d) "Contract" means the Contract signed by the Parties and all the attached documents listed in its Clause 1, that is these General Conditions (GC), the Special Conditions (SC), and the Appendices.

(e) "Contract Price" means the price to be paid for the performance of the Services, in accordance with Clause 6;

(f) "Effective Date" means the date on which this Contract comes into force and effect pursuant to Clause GC 2.1.

(g) "Foreign Currency" means any currency other than the currency of the Client's country.

(h) "GC" means these General Conditions of Contract.

(i) "Government" means the Government of the Client's country.

(j) "Local Currency" means the currency of the Client's country.

(k) "Member" means any of the entities that make up the joint venture/consortium/association, and "Members" means all these entities.

(l) "Party" means the Client or the Consultant, as the case may be, and "Parties" means both of them.

(m) "Personnel" means persons hired by the Consultant or by any Sub-Consultants and assigned to the performance of the Services or any part thereof.

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(n) "SC" means the Special Conditions of Contract by which the GC may be amended or supplemented.

(o) "Services" means the work to be performed by the Consultant pursuant to this Contract, as described in Appendix A hereto.

(p) "Sub-Consultants" means any person or entity to whom/which the Consultant subcontracts any part of the Services.

(q) "In writing" means communicated in written form with proof of receipt.

1.2 Law Governing Contract This Contract, its meaning and interpretation, and the relation between the Parties shall be governed by the Applicable Law.

1.3 Language This Contract has been executed in the language specified in the SC, which shall be the binding and controlling language for all matters relating to the meaning or interpretation of this Contract.

1.4 Notices

1.4.1 Any notice, request or consent required or permitted to be given or made pursuant to this Contract shall be in writing. Any such notice, request or consent shall be deemed to have been given or made when delivered in person to an authorized representative of the Party to whom the communication is addressed, or when sent to such Party at the address specified in the SC.

1.4.2 A Party may change its address for notice hereunder by giving the other Party notice in writing of such change to the address specified in the SC.

1.5 Location The Services shall be performed at such locations as are specified in Appendix A hereto and, where the location of a particular task is not so specified, at such locations, whether in the Government's country or elsewhere, as the Client may approve.

1.6 Authority of Member in Charge In case the Consultant consists of a joint venture/ consortium/ association of more than one entity, the Members hereby authorize the entity specified in the SC to act on their behalf in exercising all the Consultant's rights and obligations towards the Client under this Contract, including without limitation the receiving of instructions and payments from the Client.

1.7 Authorized Representatives Any action required or permitted to be taken, and any document required or permitted to be executed under this Contract by the Client or the Consultant may be taken or executed by the officials specified in the SC.

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1.8 Taxes and Duties

The Consultant, Sub-Consultants, and their Personnel shall pay such indirect taxes, duties, fees, and other impositions levied under the Applicable Law as specified in the SC, the amount of which is deemed to have been included in the Contract Price.

1.9 Fraud and Corruption

1.9.1 Definitions

For the purposes of this Sub-Clause, the terms set-forth below are defined as follows:

(i) "corrupt practice" is the offering, giving, receiving or soliciting, directly or indirectly, of anything of value to influence improperly the actions of another party;

(ii) "fraudulent practice" is any act or omission, including a misrepresentation, that knowingly or recklessly misleads, or attempts to mislead, a party to obtain a financial or other benefit or to avoid an obligation;

(iii) "collusive practice" is an arrangement between two or more parties designed to achieve an improper purpose, including to influence improperly the actions of another party;

(iv) "coercive practice" is impairing or harming, or threatening to impair or harm, directly or indirectly, any party or the property of the party to influence improperly the actions of a party;

(v) "obstructive practice" is

(aa) deliberately destroying, falsifying, altering or concealing of evidence material to the investigation or making false statements to investigators in order to materially impede a Bank investigation into allegations of a corrupt, fraudulent, coercive or collusive practice; and/or threatening, harassing or intimidating any party to prevent it from disclosing its knowledge of matters relevant to the investigation or from pursuing the investigation; or

(bb) acts intended to materially impede the exercise of the Bank's inspection and audit rights provided for under Clause 3.6.

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1.9.2 Measures to be Taken

(vi) will cancel the portion of the loan allocated to a contract if it determines at any time that representatives of the Borrower or of a beneficiary of the loan were engaged in corrupt, fraudulent, collusive or coercive practices during the selection process or the execution of that contract, without the Borrower having taken timely and appropriate action satisfactory to the Bank to remedy the situation;

(vii) will sanction a Consultant, including declaring the Consultant ineligible, either indefinitely or for a stated period of time, to be awarded a Bank-financed contract if it at any time determines that the Consultant has, directly or through an agent, engaged in corrupt, fraudulent, collusive or coercive practices in competing for, or in executing, a Bank-financed contract;

1.9.3 Commissions and Fees

The Client will require the successful Consultants to disclose any commissions or fees that may have been paid or are to be paid to agents, representatives, or commission agents with respect to the selection process or execution of the contract. The information disclosed must include at least the name and address of the agent, representative, or commission agent, the amount and currency, and the purpose of the commission or fee.

2. COMMENCEMENT, COMPLETION, MODIFICATION AND TERMINATION OF CONTRACT

2.1 Effectiveness of Contract

This Contract shall come into effect on the date the Contract is signed by both Parties or such other later date as may be stated in the SC. The date the Contract comes into effect is defined as the Effective Date.

2.2 Commencement of Services

The Consultant shall begin carrying out the Services not later than the number of days after the Effective Date specified in the SC.

2.3 Expiration of Contract

Unless terminated earlier pursuant to Clause GC 2.6 hereof, this Contract shall expire at the end of such time period after the Effective Date as specified in the SC.

2.4 Modifications or Variations

Any modification or variation of the terms and conditions of this Contract, including any modification or variation of the scope of the Services, may only be made by written agreement between the Parties. However, each Party shall give due consideration to any proposals for modification or variation made by the other Party.

2.5 Force Majeure

2.5.1 Definition

For the purposes of this Contract, "Force Majeure" means an event which is beyond the reasonable control of a Party and which makes a Party's performance of its obligations under the Contract impossible or so impractical as to be considered impossible under the circumstances.

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2.5.2 No Breach of Contract The failure of a Party to fulfill any of its obligations under the contract shall not be considered to be a breach of, or default under, this Contract insofar as such inability arises from an event of Force Majeure, provided that the Party affected by such an event (a) has taken all reasonable precautions, due care and reasonable alternative measures in order to carry out the terms and conditions of this Contract, and (b) has informed the other Party as soon as possible about the occurrence of such an event.

2.5.3 Extension of Time Any period within which a Party shall, pursuant to this Contract, complete any action or task, shall be extended for a period equal to the time during which such Party was unable to perform such action as a result of Force Majeure.

2.5.4 Payments During the period of their inability to perform the Services as a result of an event of Force Majeure, the Consultant shall be entitled to continue to be paid under the terms of this Contract, as well as to be reimbursed for additional costs reasonably and necessarily incurred by them during such period for the purposes of the Services and in reactivating the Service after the end of such period.

2.6 Termination

2.6.1 By the Client The Client may terminate this Contract in case of the occurrence of any of the events specified in paragraphs (a) through (f) of this Clause GC 2.6.1. In such an occurrence the Client shall give a not less than thirty (30) days' written notice of termination to the Consultant, and sixty (60) days' in the case of the event referred to in (e).

(a) If the Consultant does not remedy a failure in the performance of their obligations under the Contract, within thirty (30) days after being notified or within any further period as the Client may have subsequently approved in writing.

(b) If the Consultant becomes insolvent or bankrupt.

(c) If the Consultant, in the judgment of the Client has engaged in corrupt or fraudulent practices in competing for or in executing the Contract.

(d) If, as the result of Force Majeure, the Consultant are unable to perform a material portion of the Services for a period of not less than sixty (60) days.

(e) If the Client, in its sole discretion and for any reason whatsoever, decides to terminate this Contract.

(f) If the Consultant fails to comply with any final decision reached as a result of arbitration proceedings pursuant to Clause GC 8 hereof.

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2.6.2 By the Consultant

The Consultants may terminate this Contract, by not less than thirty (30) days' written notice to the Client, such notice to be given after the occurrence of any of the events specified in paragraphs (a) through (c) of this Clause GC 2.6.2:

(a) If the Client fails to pay any money due to the Consultant pursuant to this Contract and not subject to dispute pursuant to Clause GC 7 hereof within forty-five (45) days after receiving written notice from the Consultant that such payment is overdue.

(b) If, as the result of Force Majeure, the Consultant is unable to perform a material portion of the Services for a period of not less than sixty (60) days.

(c) If the Client fails to comply with any final decision reached as a result of arbitration pursuant to Clause GC 8 hereof.

2.6.3 Payment upon Termination

Upon termination of this Contract pursuant to Clauses GC 2.6.1 or GC 2.6.2, the Client shall make the following payments to the Consultant:

(a) payment pursuant to Clause GC 6 for Services satisfactorily performed prior to the effective date of termination;

(b) except in the case of termination pursuant to paragraphs (a) through (c), and (f) of Clause GC 2.6.1, reimbursement of any reasonable cost incident to the prompt and orderly termination of the Contract, including the cost of the return travel of the Personnel and their eligible dependents.

3. OBLIGATIONS OF THE CONSULTANT

3.1 General

3.1.1 Standard of Performance

The Consultant shall perform the Services and carry out their obligations hereunder with all due diligence, efficiency and economy, in accordance with generally accepted professional standards and practices, and shall observe sound management practices, and employ appropriate technology and safe and effective equipment, machinery, materials and methods. The Consultant shall always act, in respect of any matter relating to this Contract or to the Services, as faithful advisers to the Client, and shall at all times support and safeguard the Client's legitimate interests in any dealings with Sub-Consultants or third Parties.

3.2 Conflict of Interests

The Consultant shall hold the Client's interests paramount, without any consideration for future work, and strictly avoid conflict with other assignments or their own corporate interests.

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3.2.1 Consultants not to Benefit from Commissions, Discounts, etc.

The payment of the Consultant pursuant to Clause GC 6 shall constitute the Consultant's only payment in connection with this Contract or the Services, and the Consultant shall not accept for their own benefit any trade commission, discount, or similar payment in connection with activities pursuant to this Contract or to the Services or in the discharge of their obligations under the Contract, and the Consultant shall use their best efforts to ensure that the Personnel, any Sub-Consultants, and agents of either of them similarly shall not receive any such additional payment.

3.2.2 Consultant and Affiliates not to be Otherwise Interested in Project

The Consultant agrees that, during the term of this Contract and after its termination, the Consultant and any entity affiliated with the Consultant, as well as any Sub-Consultants and any entity affiliated with such Sub-Consultants, shall be disqualified from providing goods, works or services (other than consulting services) resulting from or directly related to the Consultant's Services for the preparation or implementation of the project.

3.2.3 Prohibition of Conflicting Activities

The Consultant shall not engage, and shall cause their Personnel as well as their Sub-Consultants and their Personnel not to engage, either directly or indirectly, in any business or professional activities which would conflict with the activities assigned to them under this Contract.

3.3 Confidentiality

Except with the prior written consent of the Client, the Consultant and the Personnel shall not at any time communicate to any person or entity any confidential information acquired in the course of the Services, nor shall the Consultant and the Personnel make public the recommendations formulated in the course of, or as a result of, the Services.

3.4 Insurance to be Taken Out by the Consultant

The Consultant (a) shall take out and maintain, and shall cause any Sub-Consultants to take out and maintain, at their (or the Sub-Consultants', as the case may be) own cost but on terms and conditions approved by the Client, insurance against the risks, and for the coverage, as shall be specified in the SC; and (b) at the Client's request, shall provide evidence to the Client showing that such insurance has been taken out and maintained and that the current premiums have been paid.

3.5 Consultant's Actions Requiring Client's Prior Approval

The Consultant shall obtain the Client's prior approval in writing before taking any of the following actions:

(a) entering into a subcontract for the performance of any part of the Services,

(b) appointing such members of the Personnel not listed by name in Appendix C, and

(c) any other action that may be specified in the SC.

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3.6 Reporting Obligations

(a) The Consultant shall submit to the Client the reports and documents specified in Appendix B hereto, in the form, in the numbers and within the time periods set forth in the said Appendix.

(b) Final reports shall be delivered in CD ROM in addition to the hard copies specified in said Appendix.

3.7 Documents Prepared by the Consultant to be the Property of the Client

(a) All plans, drawings, specifications, designs, reports, other documents and software submitted by the Consultant under this Contract shall become and remain the property of the Client, and the Consultant shall, not later than upon termination or expiration of this Contract, deliver all such documents to the Client, together with a detailed inventory thereof.

(b) The Consultant may retain a copy of such documents and software. Restrictions about the future use of these documents, if any, shall be specified in the SC.

3.8 Accounting, Inspection and Auditing

The Consultant shall permit the Bank and/or persons appointed by the Bank to inspect its accounts and records as well as those of its Sub-Consultants relating to the performance of the Contract, and to have such accounts and records audited by auditors appointed by the Bank if required by the Bank. The Consultant's attention is drawn to Clause 1.9.1 which provides, inter alia, that acts intended to materially impede the exercise of the Bank's inspection and audit rights provided for under Clause 3.8 constitute a prohibited practice subject to contract termination (as well as to a determination of ineligibility under the Consultant Guidelines).

4. Consultant's Personnel

4.1 Description of Personnel

The Consultant shall employ and provide such qualified and experienced Personnel and Sub-Consultants as are required to carry out the Services. The titles, agreed job descriptions, minimum qualifications, and estimated periods of engagement in the carrying out of the Services of the Consultant's Key Personnel are described in Appendix C. The Key Personnel and Sub-Consultants listed by title as well as by name in Appendix C are hereby approved by the Client.

4.2 Removal and/or Replacement of Personnel

(a) Except as the Client may otherwise agree, no changes shall be made in the Key Personnel. If, for any reason beyond the reasonable control of the Consultant, such as retirement, death, medical incapacity, among others, it becomes necessary to replace any of the Key Personnel, the Consultant shall provide as a replacement a person of equivalent or better qualifications.

(b) If the Client finds that any of the Personnel have (i) committed serious misconduct or have been charged with having committed a criminal action, or (ii) have reasonable cause to be dissatisfied

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with the performance of any of the Personnel, then the Consultant shall, at the Client's written request specifying the grounds thereof, provide as a replacement a person with qualifications and experience acceptable to the Client.

(c) The Consultant shall have no claim for additional costs arising out of or incidental to any removal and/or replacement of Personnel.

5. Obligations of the Client

5.1 Assistance and Exemptions The Client shall use its best efforts to ensure that the Government shall provide the Consultant such assistance and exemptions as specified in the SC.

5.2 Change in the Applicable Law Related to Taxes and Duties If, after the date of this Contract, there is any change in the Applicable Law with respect to taxes and duties which increases or decreases the cost incurred by the Consultant in performing the Services, then the remuneration and reimbursable expenses otherwise payable to the Consultant under this Contract shall be increased or decreased accordingly by agreement between the Parties, and corresponding adjustments shall be made to the amounts referred to in Clauses GC 6.2 (a) or (b), as the case may be.

5.3 Services and Facilities The Client shall make available free of charge to the Consultant the Services and Facilities listed under Appendix F.

6. Payments to the Consultant

6.1 Lump-Sum Payment The total payment due to the Consultant shall not exceed the Contract Price which is an all inclusive fixed lump-sum covering all costs required to carry out the Services described in Appendix A. Except as provided in Clause 5.2, the Contract Price may only be increased above the amounts stated in Clause 6.2 if the Parties have agreed to additional payments in accordance with Clause 2.4.

6.2 Contract Price (a) The price payable in foreign currency/currencies is set forth in the SC.

(b) The price payable in local currency is set forth in the SC.

6.3 Payment for Additional Services For the purpose of determining the remuneration due for additional services as may be agreed under Clause 2.4, a breakdown of the lump-sum price is provided in Appendices D and E.

6.4 Terms and Conditions of Payment Payments will be made to the account of the Consultant and according to the payment schedule stated in the SC. Unless otherwise stated in the SC, the first payment shall be made against the provision by the Consultant of an advance payment guarantee for the same amount, and shall be valid for the period stated in the SC. Such guarantee shall be in

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the form set forth in Appendix G hereto, or in such other form, as the Client shall have approved in writing. Any other payment shall be made after the conditions listed in the SC for such payment have been met, and the Consultant has submitted an invoice to the Client specifying the amount due.

6.5 Interest on Delayed Payments If the Client has delayed payments beyond fifteen (15) days after the due date stated in the Clause SC 6.4, interest shall be paid to the Consultant for each day of delay at the rate stated in the SC.

7. Good Faith

7.1 Good Faith The Parties undertake to act in good faith with respect to each other's rights under this Contract and to adopt all reasonable measures to ensure the realization of the objectives of this Contract.

8. Settlement Of Disputes

8.1 Amicable Settlement The Parties agree that the avoidance or early resolution of disputes is crucial for a smooth execution of the Contract and the success of the assignment. The Parties shall use their best efforts to settle amicably all disputes arising out of or in connection with this Contract or its interpretation.

8.2 Dispute Resolution Any dispute between the Parties as to matters arising pursuant to this Contract that cannot be settled amicably within thirty (30) days after receipt by one Party of the other Party's request for such amicable settlement may be submitted by either Party for settlement in accordance with the provisions specified in the SC.

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III. Special Conditions of Contract

Number of GC Clause	Amendments of, and Supplements to, Clauses in the General Conditions of Contract
1.1(a)	The words "in the Government's country" are amended to read "in India."
1.3	The language/s is: English.
1.4	The addresses are: Client: Chief Engineer, World Bank Projects, Orissa on behalf of the Government of Orissa in Works Department. Attention: **Er. Nalini Kanta Pradhan,** **Chief Engineer, World Bank Projects, Orissa** Facsimile: + 91 – 674 – 239 0080 E-mail: pmuosrp@gmail.com Consultant: **LEA Associates South Asia Pvt. Ltd., India** B – 1/E-27, Mohan Cooperative Industrial Estate, Mathura Road, New Delhi – 110 044 Attention: **Pradeep Kumar, Chief General Manager,** Facsimile: +91 11 4167 8659, 2697 1062 E-mail: lasa@lasaindia.com;
1.6	The Member in Charge is **LEA Associates South Asia Pvt. Ltd., India** B – 1/E-27, Mohan Cooperative Industrial Estate, Mathura Road, New Delhi – 110 044
1.7	The Authorized Representatives are: For the Client: Chief Engineer, World Bank Projects, Orissa For the Consultant: **Pradeep Kumar, Chief General Manager,** LEA Associates South Asia Pvt. Ltd., India

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1.8	
1.8.1	<u>For domestic consultants/personnel and foreign consultants/personnel who are permanent residents in India</u> The consultants and personnel shall pay the taxes, duties, fees, levies and other impositions levied under the existing, amended or enacted laws during life of this contract and the client shall perform such duties in regard to the deduction of such tax as may be lawfully imposed.
1.8.2	<u>For Foreign Consultancy firms</u> The Client warrants that the Client shall reimburse the Consultants for any indirect taxes, duties, fees, levies and other impositions imposed, under the Applicable Law, on the Consultant, the Sub-Consultants and the Personnel in respect of: (a) any payments whatsoever made by the Client directly to the Consultant, Sub-Consultants and the Personnel (other than nationals or permanent residents of the Government's country), in connection with the carrying out of the Services; (b) any equipment, materials and supplies brought into the Government's country by the Consultant or Sub-Consultants for the purpose of carrying out the Services and which, after having been brought into such territories, will be subsequently withdrawn there from by them; (c) any equipment imported for the purpose of carrying out the Services and paid for out of funds provided by the Client and which is treated as property of the Client; (d) any property brought into the Government's country by the Consultant, any Sub-Consultants or the Personnel (other than nationals or permanent residents of the Government's country), or the eligible dependents of such Personnel for their personal use and which will subsequently be withdrawn there from by them upon their respective departure from the Government's country, provided that:
	(1) the Consultant, Sub-Consultants and Personnel, and their eligible dependents, shall follow the usual customs procedures of the Government's country in importing property into the Government's country; and (2) if the Consultant, Sub-Consultants or Personnel, or their eligible dependents, do not withdraw but dispose of any property in the Government's country upon which customs duties and taxes have been exempted, the Consultant, Sub-Consultants or Personnel, as the case may be, (i) shall bear such customs duties and taxes in conformity with the regulations of the Government's country, or (ii) shall reimburse them to the Client if they were paid by the Client at the time the property in question was brought into the Government's country.

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1.8.3	a) The client shall reimburse Service Tax payable in India as per Applicable Law. The consultant shall register it self for service tax with appropriate authority in India & shall provide the registration Number to the client. b) Tax will be deducted at source as per the prevailing Income Tax Rules.
2.1	The effectiveness conditions are the following: [a] Client's approval of Consultant's proposals for appointment of specified key staff members; [b] effectiveness of Bank Loan; and [c] approval of the Contract by the Bank The Effective Date is 05/05/2011.
2.2	The date for the commencement of Services is 05/05/2011.
2.3	The time period shall be ***36 (Thirty Six) Months***
3.4	The risks and the coverage shall be as follows: (a) Third Party motor vehicle liability insurance in respect of motor vehicles operated in the Government's country by the Consultant or its Personnel or any Sub-Consultants or their Personnel, with a minimum coverage ***as per Motor Vehicles Act 1988***; (b) Third Party liability insurance, with a minimum coverage of ***Rs.20,00,000 (Rupees Twenty Lakhs)*** (After each occurrence the Consultant shall repay premium necessary to make insurance valid for this amount always)*]*; (c) professional liability insurance, with a minimum coverage of ***Three times the Contract Price***; (d) employer's liability and workers' compensation insurance in respect of the Personnel of the Consultant and of any Sub-Consultants, in accordance with the relevant provisions of the Applicable Law, as well as, with respect to such Personnel, any such life, health, accident, travel or other insurance as may be appropriate; and (e) insurance against loss of or damage to (i) equipment purchased in whole or in part with funds provided under this Contract, (ii) the Consultant's property used in the performance of the Services, and (iii) any documents prepared by the Consultant in the performance of the Services.

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3.7 (b)	The Consultant shall not use these documents and software for purposes unrelated to this Contract without the prior written approval of the Client.
5.1	"Not Applicable."
6.2(a)	The amount in foreign currency or currencies is **US$ 712,500** (Excluding Service Taxes) .
6.2(b)	The amount in local currency is **INR 136,917,450** (Excluding Service Taxes)

6.4	The accounts are: for foreign currency or currencies: **LEA International Ltd.** HSBC A/c No. **032-460066-001** Bank Name : **HSBC Bank Canada,** Liberty Square, HSBC Tower, 3601 Highway 7 East, Suite 108, **Markham, ONTARIO, L3R 0M3, Canada** Swift Code : **HKBC CATT** for local currency: **LEA Associates South Asia Pvt. Ltd.** Canara Bank A/c No. 0349261002986 Bank Name: Canara Bank Maharani Bagh Branch, 4, Siddhartha Enclave Commercial Complex, Maharani Bagh, Ashram Chowk, New Delhi – 110014 IFSC Code : **CNRB0000349** Swift Code : **CNRBINBBMHB** The following provisions shall apply to the advance payment and the advance payment guarantee: (1) An advance payment of ***10% of Total Payment payable under the Contract*** shall be made within *30* days after the Effective Date against the submission of an advance payment guarantee for the same. The advance payment guarantee shall be released when the total payments reach fifty (50) percent of the lump-sum amount as it is assumed that at that point, the advance has been entirely set off against the performance of services.

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(2) The advance payment guarantee shall be in the amount and in the currency of the foreign as well as local currency portion of the respective advance payment to be remain valid for the entire period of service.

Payments shall be made according to the following schedule:

The Consultant will be paid fee as a percentage of the contract value as per the schedule given below basing on satisfactory completion and approval of the deliverable items by the client & World Bank.

Item	No. of copies	Due date (months from start)[1]	% age of Contract Amount
Advance Payment			10%
Inception report	10	1	1 %
Quarterly progress report – [Total : 12 Quarters]	10		3 % [@ *0.25%* per quarter]
Needs analysis and overall system architecture Draft report (to be discussed in a workshop)	10	3	1 %
Needs analysis and overall system architecture Final report	10	4	1 %
Draft Report on GPS referencing	10	4	1 %
Final Report GPS referencing	10	5	1 %
Draft Report on Road classification	10	10	1 %
Final Report on Road classification	10	11	1 %
Data acquisition on road condition such as inventory, roughness, surface distress, Pavement strength, traffic volume, axle load etc - Completion of 1st Year data	10	11	7.5 %
Data acquisition on road condition such as inventory, roughness, surface distress, Pavement strength, traffic volume, axle load etc - Completion of 2nd Year data	10	22	3 %
Data acquisition on road condition such as inventory, roughness, surface distress, Pavement strength, traffic volume, axle load etc - Completion of 3rd Year data	10	30	2 %

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Road Information, Bridge Information & Traffic Information System complete with GPS referencing - Compliance testing begin with submission of draft System Design Document alongwith operation manual	1	9	7.5 %
Road Information, Bridge Information & Traffic Information System complete with GPS referencing - Acceptance on demonstration of the system with 1st Year Data	1	10	2 %
Submission of Road data collection manual Draft report	10	2	1 %
Acceptance of Road data collection manual : Final report	10	3	1 %
Economic Evaluation Model, PMS, RMMS and RWFMS Compliance testing begin with submission of draft System Design Document alongwith operation manual	1	12	5 %
Economic Evaluation Model, PMS, RMMS and RWFMS Acceptance on demonstration of the system as Complete	1	14	2 %
Annual road condition and traffic report (for 2011, 2012 and 2013) Draft report	10	14,	1%
		24	1%
		and 36	1%
Annual road condition and traffic report (for 2011, 2012 and 2013) Final report	10	14,	1 %
		24	1 %
		and 36	1%
OWD annual report (for 2011, 2012 and 2013) Draft report	10	14,	1%
		24	1%
		and 36	1%
OWD annual report (for 2011, 2012 and 2013) Final report	10	14,	1%
		24	1%
		and 36	1%
Rolling three year maintenance plan for 12-13, 13-14 and 14-15 - Draft report	10	14,	1%
		24	1%
		and 36	1%
Rolling three year maintenance plan for 12-13, 13-14 and 14-15 - Final report	10	14,	1%
		24	1%
		and 36	1%
Training needs assessment report Draft report	10	6	1%

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	Training needs assessment report Final report	10	7	1%
	AMS, TIS and Economic Evaluation Model user manuals - Draft report	10	10	3%
	AMS, TIS and Economic Evaluation Model user manuals - Final report	10	12	2%
	Various training events	To be Tabulated by consultant with client approval		10%
	AMS "conceptual design" workshop	To be Tabulated by consultant with client approval		1%
	Acceptance of Data, Analysis Tool and accuracy thereof after rectification of errors / variations if any in the final form and Handing over of Assets to Client and Other training manuals to be identified		24	7.5%
	Annual Performance Report of at the end of 3rd Year	10	36	5.5%

6.5	Payment shall be made within 45 days of receipt of the invoice and the relevant documents specified in Clause 6.4, and within 60 days in the case of the final payment. The interest rate is: London Inter-Bank On-Lending Rate LIBOR plus 2% for foreign currency; and **8%** (Commercial Bank's prime lending rate of interest) for local currency.
8.2	Disputes shall be settled by arbitration in accordance with the following provisions: **Dispute Settlement** 8.2 (i) Any dispute, controversy, or claim arising out of or relating to this contract, or the breach, termination or invalidity thereof shall be settled by arbitration in accordance with following provisions: 8.2 (ii) Each dispute submitted by a Party to arbitration shall be heard by a sole arbitrator or an arbitration panel composed of three arbitrators, in accordance with the following provisions: (a) Where the Parties agree that the dispute concerns a technical matter, they may agree to appoint a sole arbitrator or, failing agreement on the identity of such sole arbitrator within thirty (30) days after receipt by the other Party of the proposal of a name for such an appointment by the Party who initiated the proceedings, either Party may apply to the **Secretary General**, Indian Roads Congress India, New Delhi, for a list of not fewer than five

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nominees and, on receipt of such list, the Parties shall alternately strike names therefrom, and the last remaining nominee on the list shall be the sole arbitrator for the matter in dispute. If the last remaining nominee has not been determined in this manner within sixty (60) days of the date of the list, the **Secretary General**, Indian Roads Congress India, New Delhi, shall appoint, upon the request of either Party and from such list or otherwise, a sole arbitrator for the matter in dispute.

(b) Where the Parties do not agree that the dispute concerns a technical matter, the Client and the Consultants shall each appoint one arbitrator, and these two arbitrators shall jointly appoint a third arbitrator, who shall chair the arbitration panel. If the arbitrators named by the Parties do not succeed in appointing a third arbitrator within thirty (30) days after the latter of the two arbitrators named by the Parties has been appointed, the third arbitrator shall, at the request of either Party, be appointed by Secretary, the Indian Council of Arbitration, New Delhi.

(c) If, in a dispute subject to Clause 8.2 (ii) (b), one Party fails to appoint its arbitrator within thirty (30) days after the other Party has appointed its arbitrator, the Party which has named an arbitrator may apply to the Secretary, Indian Council of Arbitration, New Delhi, to appoint a sole arbitrator for the matter in dispute, and the arbitrator appointed pursuant to such application shall be the sole arbitrator for that dispute.

8.3 **Rules of Procedure**

Arbitration proceedings shall be conducted in accordance with procedure of the Arbitration & Conciliation Act 1996, of India unless the Consultant is a foreign national/firm, where arbitration proceedings shall be conducted in accordance with the rules of procedure for arbitration of the United Nations Commission on International Trade Law (UNCITRAL) as in force on the date of this Contract.

8.4 **Substitute Arbitrators**

If for any reason an arbitrator is unable to perform his function, a substitute shall be appointed in the same manner as the original arbitrator.

8.5 **Qualifications of Arbitrators**

The sole arbitrator or the third arbitrator appointed pursuant to paragraphs (a) through (c) of Clause 8.2 (ii) hereof shall be an internationally recognized legal or technical expert with extensive experience in relation to the matter in dispute.

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	8.6 **Miscellaneous** In any arbitration proceeding hereunder: (a) proceedings shall, unless otherwise agreed by the Parties, be held in **BHUBANESWAR**. (b) the English language shall be the official language for all purposes; and (c) the decision of the sole arbitrator or of a majority of the arbitrators (or of the third arbitrator if there is no such majority) shall be final and binding and shall be enforceable in any court of competent jurisdiction, and the Parties hereby waive any objections to or claims of immunity in respect of such enforcement.

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IV. Appendices

APPENDIX A – DESCRIPTION OF SERVICES

Technical Assistance to establish an
ASSET MANAGEMENT SYSTEM

For Orissa State Road Network under Works Department

1. INTRODUCTION

The State Government of Orissa (GOO) through the Government of India (GOI) has received a loan from the International Bank for Reconstruction and Development (IBRD) for implementation of Orissa State Roads Project and intends to apply a portion of this loan to finance consultancy services for establishing an Asset Management System (AMS) for the state road network. The envisioned system will assist the Orissa Works Department(OWD) to rationalize decision making in planning, programming, funding, procurement and in the allocation of resources in road sector in order to make the best use of public funds in preserving the road networks at an acceptable level of serviceability. The AMS will improve the technical capacities, skills and management capabilities of the OWD and other road agency associated with road management and maintenance thus improving the ability of the GOO and its subordinate agencies to manage efficiently and cost-effectively road maintenance and improvement activities. The system will be designed to reflect the state of international practice, in a way that suits the local needs and conditions.

2. STUDY, GOAL AND OBJECTIVES

2.1 The goal of the technical assistance is to ensure that the Works Department is able to effectively prioritize works on its road network as well as report on its condition using a computerized AMS suitable for operating on a GIS platform. This will in turn help to improve the quality and delivery of OWD services in the management of the state road network. The AMS will enhance the capabilities of the OWD by providing a source of readily accessible, relevant and valid information on the road system as well as improved support for decision-making by providing analytical tools. The AMS will store complete network data of the State Roads and will evaluate these roads for planning and programming purposes. The AMS will also store basic network data of National Highways, but in the initial years of its implementation the AMS will not be used to evaluate these networks for planning and programming purposes. The AMS should also have options to include new road systems to the database and analysis tool.

2.2 The aim of this effort is to create an AMS suitable for a sustainable implementation in Orissa taking into account that the collection, storage and processing road condition data for a network of thousands of kilometers is difficult and expensive. The task of data collection, keeping in view the limitations of Road Agencies, should be simplified as much as possible. The structure of the database should contain such parameters that the AMS can function with a set of default parameters at the beginning. Data collection for a specific number of parameters as per Table 2 shall be carried out with realistic approach so that data of a large network can be loaded to the database in few months to make the AMS operational. It should have open options for incorporating further parameters if required alongwith its analysis as a separate add-on module. The operation of the road database and the evaluation tools should be easy and logical, the AMS outputs should be useful to decision makers, and the AMS should start to produce outputs, even if approximate, starting the first year of its development.

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2.3 The specific objectives of the services are to:

a) Develop and establish in use an electronic Asset Management System in HQ;

b) Prepare a multi year rolling maintenance program and two annual updates for implementation in subsequent years on the core state network; and

c) Transfer skills and procedures to an adequate number of staff in the OWD to sustain the use of the AMS during as well as after the end of these services.

2.4 The broad scope of the consultancy services are to:

1) Evaluate and assess current international practice related to Road Asset Management.

2) Study the existing system of maintenance management, current decision-making process, organizational structure, and technical and managerial capabilities of the Roads and Bridges section of the OWD and propose changes aimed at providing adequate support for the AMS and ensuring that any developed system will be sustainable.

3) Based on the need analysis and gaps of the current systems, establish and implement a computerized network level Road Asset Management System and to provide training to selected department staff in the use and maintenance of the system.

The AMS should include the following components:

a) GIS based Road Information System (RIS) & Bridge Information System (BIS)

b) Pavement Management System (PMS)

c) Routine Maintenance Management System (RMMS)

d) Right-of-Way Features Information Management System (RWFIMS)

GIS will be basic platform for all spatial features for road assets. Furthermore the components shall be accessible via an Internet Browser for reporting purposes only. Components should be capable of interfacing with the other Geographic Information System (GIS) applications of GOO like revenue maps and forest maps in future to facilitate easy access to tabular data residing within the AMS.

4) Undertake a Road and Bridge Condition survey and collect the required inventory data for input into the Road Asset Management System. In case of bridges, the condition survey shall be limited to visual observations only.

5) Define the required human resources and organization structure required to manage the system and define plans for training programs required to use the system.

6) Develop a Road Asset management Strategy and a Maintenance Management program for the state of Orissa.

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7) Assist in Procurement of necessary data collection equipment for collection of the road and bridge inventory / condition data, creation of a GIS base map including supply and installation of all latest and updated software and hardware needed to run the AMS from the central office of OWD.

3. BACKGROUND TO THE STUDY AND BROAD NEEDS OF THE OWD

3.1 Orissa has a road network of over **2,62,703 Km** comprising of National Highways, State Highways, Major District Roads, Other District Roads, Rural Roads, Panchayet Samiti Roads and Village roads. The Orissa Works Department (OWD) looks after the construction and maintenance of National Highways, State Highways, Major District Roads and Other District Roads totalling to a length of 18,069 Km which is about **7 %** of the total road length. The remaining roads are under the control of Rural Development Department, Panchayati Raj Department, Water Resources Department, Forest Department, Urban Development Department and so on. Table-1 below gives categorywise road length under the control of OWD.

Table 1 Orissa Road Network under OWD

Road type	Length (km)
National Highways	3,592
State Highways	3,682
Major District Roads	4,481
Other District Roads	6,314
Total	**18,069**

3.2 The responsibility for development and maintenance of National Highways in the state vests with the Ministry of Shipping, Road Transport and Highways (MoSRTH) of the Government of India. The OWD acts on an agency basis to undertake construction and maintenance works on this national network as required by the MoSRTH. However, the construction and maintenance of the State Highways, Major District Roads and Other District Roads are being looked after by the OWD. These 17831 Km of roads which are under the control of OWD carry the bulk of the traffic and are the principal carrier of economic activities.

3.3 The Government of Orissa (GOO) has completed preparation for the proposed World Bank assisted road project to upgrade part of the core road network under Orissa State Roads Project (OSRP). The high priority state roads identified for upgradation and improvement under the above project in Phase-I cover a length of approximately 461 Km of State Highways The OWD, with help of a DPR consultant, has prioritized works for these roads for upgradation and periodic maintenance for implementation during the project using HDM-4. The DPR consultant has also completed a net work analysis for the remaining State Highways (SH only) for prioritization of SH Road Network based on Traffic & Socio-Economic parameters. Besides, the Project Management Unit (PMU) has also identified about 3000 km of roads as "Primary Core Network" which are the important and high traffic density corridors of the state. It is envisaged that the AMS Consultant shall evaluate all the current network, such as all SHs, all MDRs and re-asses the extent of primary core network on which majority of state traffic plies.

3.4 The core of the AMS will be development of a web based **Road Information System (RIS) & Bridge Information System (BIS)**. These will be a series of databases linking different road and bridge data items. It will be accessed either from a centrally linked server or as a distributed database, which is independent of any network. The system will be designed for multi-level user requirements (i.e. headquarters, Circle, Division, Sub-Division as well as the general public through the internet) with appropriate security, interfaces and reporting facilities appropriate to the level of the user. There will be a number of applications developed to address the various

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requirements of road & bridge asset management that will interface with the RIS-BIS. These applications will be designed based on the specific requirements of the different management processes. This GIS based information system for road & bridges shall be developed by the consultant from the base data of latest Survey of India map and/or satellite imageries of road network. These data shall be procured by the OWD from Survey of India offices and/or Remote Sensing Agencies of Govt. of India, such as Orissa Remote Sensing Application Centre (ORSAC) with procurement assistance by the AMS consultant without any service charge. The number of layers and attributed database of the RIS-BIS shall be finalized in consultation with the client. The BIS database shall contain sufficient attributes to maintain the bridge diary besides some 3 to 4 critical attributes to determine investment and rehabilitation needs in bridges.

3.5 For managing periodic and capital road works activities a **Pavement Management System (PMS)** application will be created, which will cover preservation of the existing road network as well as expansion which may cover new links, multi-laning, or capacity increases. The PMS shall in general be user-friendly, for simple and direct application. The engineering and economic analytical tool of PMS should include deterioration prediction model for both bituminous and concrete pavement. The processes to be covered include, but are not limited to:

- network-level planning
- project-level planning
- multi-project programming and budgeting
- optimization of projects under budget constraints
- overall network performance monitoring and evaluation against projected targets

3.6 A **Routine Maintenance Management System (RMMS)** application will be created that: a) determines routine maintenance investments for sections not receiving periodic maintenance or improvements in that year and b) prepares reports and charts for a business plan.

3.7 A **Right of Way Features Information Management System (RWFIMS)** application will be created that: a) maintains all features such as structures, utility services both below and above ground, trees etc, within the Right of Way (ROW) b) generate strip maps showing these features. These database shall be integrated with Road Information System (RIS).

3.8 The AMS is envisaged as a system which will eventually serve all levels in the OWD, i.e. headquarters, Circle and Division offices, in planning and managing the state road network under OWD control.

3.9 To establish the AMS, the OWD has now engaged a team of international and local consultants, hereafter referred to as 'the consultant', to undertake the services. Concurrent with these services, the OWD / GOO is undertaking a comprehensive program of investment in Information Technology and its management information systems more broadly as well as commissioning Institutional Development and Strengthening (IDS) consultants to help implement portions of its institutional strengthening action plan.

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4. DETAILED SCOPE OF WORK

The Consultant has agreed to undertake the following tasks. The consultant has also agreed to propose reasonable modifications or additions to these tasks during implementation.

Task 1 – Assessment of current maintenance management system

4.1 The consultant shall prepare an inception report detailing the methodology for completing the services. The report shall cover following major aspects:

i. Project appreciation;
ii. Detailed methodology to meet the requirements of the Description of Services finalized in consultation with the PMU officers; including scheduling of various sub-activities to be carried out for completion of various stages of the work; stating out clearly their approach & methodology for data collection , data interpretation & data analysis after due inspection of the some of the project stretches and collection / collation of necessary information;
iii. Task assignment and Manning Schedule;
iv. Work programme;
v. Proforma for data collection;

4.2 The consultant shall assess and identify strengths & weaknesses of the current maintenance management practices of the department in the areas of data collection, planning and budgeting, design and specification of maintenance works, procurement and supervision including institutional set-up and the resources available for planning and management. The consultant shall also review the expenditure patterns of the road sector for the last 5 years, method of current resource allocations and the coverage of the maintenance programs at the current level of funding.

4.3 On the basis of this review of current practice, the consultant shall undertake a needs analysis through discussion with OWD officers at different levels and thereby outline an overall AMS "system architecture". This is to be discussed in detail in a *workshop with participation of OWD engineers* and other experts. The final architecture has to be approved by the client. It should be ensured that this system is in line with the overall IT and MIS policy of the State and the department.

4.4 The consultant will review the current classification system that distributes the network into National, State, Major District Roads and Other District Roads and will propose improvements, if needed, redefining the classification of the roads based on administrative and functional parameters, after duly discussing the same with the client and with client's approval. The consultant shall also identify missing links, overtopping zones during condition survey to include required maintenance alternatives in the analysis and cost budgeting. The resulting redefined State and Major District Roads shall represent the core road network to be managed by OWD.

4.5 The consultant shall assess the road referencing system currently in place in Orissa. The consultant shall recommend the method of referencing roads and bridges (road numbers, road sections, bridge numbers etc.) to be adopted in the AMS, to be agreed with the client. This should reflect the practical limitations that would arise with trying to make major changes to the existing system. Currently in Orissa, the location of all roads and bridges are not defined with the use of Global Positioning System (GPS) equipment. The consultant shall perform a network level survey to define the location of all roads and bridges in Orissa using GPS equipment in order to present the network attributes on a GIS System. It is suggested that this be done the same time the first year roughness measurements are collected on the network.

Consultant's Indicative Methodology for Task-1

Task – 1 has been broadly divided 17 Sub-Tasks as detailed below:

Sub-Task 1 Mobilization and Interaction with OWD officers

- Mobilization of the team leader and key professionals of the team during first week of the project initiation.

Sub-Task 2 Project Appreciation

- Introduce the project to the Consultants' team to define the objectives and scope of project and related issues.
- Develop a work programme suiting the project needs during first two weeks of the project initiation.

Sub-Task 3 Review of data available with OWD

- Review of department data as regarding traffic, road/bridge inventory /condition collected under various studies in recent past.
- Department is to provide all the historical data related to resurfacing, strengthening and reconstruction for entire core road network. This will enable to calibrate analytical tools within the proposed system.
- Consistency in format, availability, storage, usefulness and completeness of data will be checked by the Consultants.
- Feedback on the data sufficiency will be provided to OWD immediately before actual data verification at field.
- OWD will provide updated data for field verification (approximately 20% of data) addressing issues within 60 days.
- Data needs of AMS, collection methodology on the basis of available data to be formulated.
- An indicative data collection format is to be finalized by the Consultant within one month of the project initiation in discussion with OWD and circulated to the all responsible offices.

Sub-Task 4 Conduct Site Visit

- The Consultant along with OWD officers or alone to visit select roads and cover possible varieties in terms of categories (NH, SH, MDR/ ODR), bridge type, road conditions, pavement surface types, roads with heavy and low traffic etc. to assess the asset condition ultimately to finalise pilot projects for the development of O-AMS.
- The Consultant will also interact few of the field offices to understand current practices of project delivery.
- This sub-task might also cover verification of some of the data provided by the Client.
- This task is to be initiated during first month of the assignment and would continue until the firmup on pilot project corridors and to acquainte with variety of the roads and its condition in state core road network.

Sub-Task 5 Finalise Approach and Methodology

- The **first** step involves setting a framework for AMS depending upon on the objectives and the department needs utilizing the experience of the Consultants in other places.
- The **second** major step would be careful determination of data needs and the resources needed to collect data on a regular basis. The Consultants will clearly bring out data requirement and first cut format for data collection.
- The **third** step is to setup GIS / GPS mapping framework under which the base mapping requirements such as scale, extent, accuracy and other specifications of the satellite maps shall be deliberated with ORSAC and the same shall procured by the Client. The methodology to

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develop and integrate the GIS component to various modules and the technology that shall be conceptualized and followed.

- This task to start immediately after project initiation and the approach and methodology for all the above three aspects will be deliberated with OWD and finalized within one month of the project initiation. This would also involve deliberation regarding COTS with OWD towards selection and procurement.

Sub-Task 6 Finalise Task Assignment and Scheduling

- The identified tasks and sub-tasks will be deliberated among the respective key professional for finalizing task assignment.
- Task assignment will be scheduled against a time line. If necessary, adjustments may be required in the original schedule (as given in this contract agreement), based on Client interaction and deliberation with key professionals and practical considerations.
- This sub-task to be undertaken in parallel with Sub-task 3/4/5 and be concluded with submission of Inception Report (Sub-Task 8).

Sub-Task 7 Prepare Draft Data Collection Formats

- The Consultant to develop a draft data collection format based on agreed procedure and methodology of the data collection.
- They will form a basis for deliberation with the OWD offices and will be tested in Pilot Project.
- This Sub-Task to be undertaken in parallel with Sub-Task 3 and be concluded with submission of Inception Report (sub-task 8)

Sub-Task 8 Prepare and Submit Inception Report

The Inception Report will include the following:

- Project appreciation report based on site visits
- Revised work plan and methodology, task assignments and manning schedule, if required.
- Proforma for data collection.
- This sub-task to be completed within one month of the project initiation

Sub-Task 9 Review the Related Issues in IDS Report Study and ISAP Documents

- The IDS report will be studied to understand the extent to which the recommendations given in the report have been implemented.
- The Consultant intends to interact with the ISAP Consultants during inception of assignment and closely liaise with them specifically on the subjects dealing with IT, ICT and MIS related issues to have better synergy in carrying out this assignment.
- This sub-task to be completed within one month of the project initiation and review details will be included in the Inception Report.

Sub-Task 10 Review Current Maintenance Management Practices of the OWD and MIS

- A comprehensive review of the various aspects related to current maintenance and management practices of the OWD will be done.
- The review of current practices will encompass various aspects of budgeting and planning, project development, programme delivery and monitoring within OWD. The specific areas which will be reviewed are:
    - Current referencing system
    - Data collection
    - Planning and budgeting
    - Design and specification of maintenance works
    - Procurement and supervision
    - Quality control and/or assurance

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- Current level of computer/software use
- Institutional setup
- Expenditure patterns of the road sector for the last 5 years, method of current resource allocations and the coverage of the maintenance programs at the current level of funding.

- Each of the above aspect will be compared with the industry's best practices. Recommendation for improvement in each area will be provided in line with asset management principles.
- Costs of works for standard design and specification for improvement and maintenance options will be estimated from historical data and or engineering estimates with consultation and collaboration of OWD.
- Strategies for road maintenance will be formulated for planning and budgeting studies. Standard reporting undertaken internally within the Department for asset information, maintenance / improvement will be reviewed and documented for accommodating within AMS.
- The institutional setup and decision-making process will be reviewed. The Consultant will review the involvement of other wings and norms/guidelines adopted in budget both for capital and maintenance.
- This sub-task would involve a series of discussions with various levels of officials within OWD in head office and in field as well.
- This sub-task will be completed within two months of the project initiation.

Sub-Task 11 Needs Analysis and Outline of AMS-System Architecture

- This task would involve a full review of any relevant existing systems and tools related to the AMS at every level of OWD. This will include computerised and non-computerised practice followed within the department.
- The early establishment of the AMS 'system architecture' is, in the Consultant's opinion, critical to the success of the subsequent implementation. It is important that the implementation of the AMS conforms to the overall IT strategy of Govt. of Orissa.
- The Consultant to employ a method developed by the World Bank[1] that allows the assessment of the current level of IT infrastructure in OWD, and recommend the appropriate set of features of the RMS software commensurate with the level of sophistication and complexity that could be supported.
- Similarly, with respect to the AMS-related data, the data collection processes and procedures and the use of associated equipment/tools will be assessed so that they are compatible with the capacity of the OWD.
- The Consultant envisages dTIMS CT playing a pivotal role in providing source of road and bridge related data as well as a link with other modules within (e.g. inventory, condition, road network definition). It also links to the GIS which mean that virtually anything in the AMS that is referenced against the network could be displayed visually.
- Furthermore, employing dTIMS CT Management Dashboard ('md'), the AMS is accessible securely over the Internet, giving users rich map-based reports that help them see impacts of decisions immediately.

[1] Generic Terms of Reference for Supply and Installation of Road Management Systems, Version 1.0 – 31 January, 2007, East Asia Pacific Transport Unit, The World Bank, Washington, D.C."

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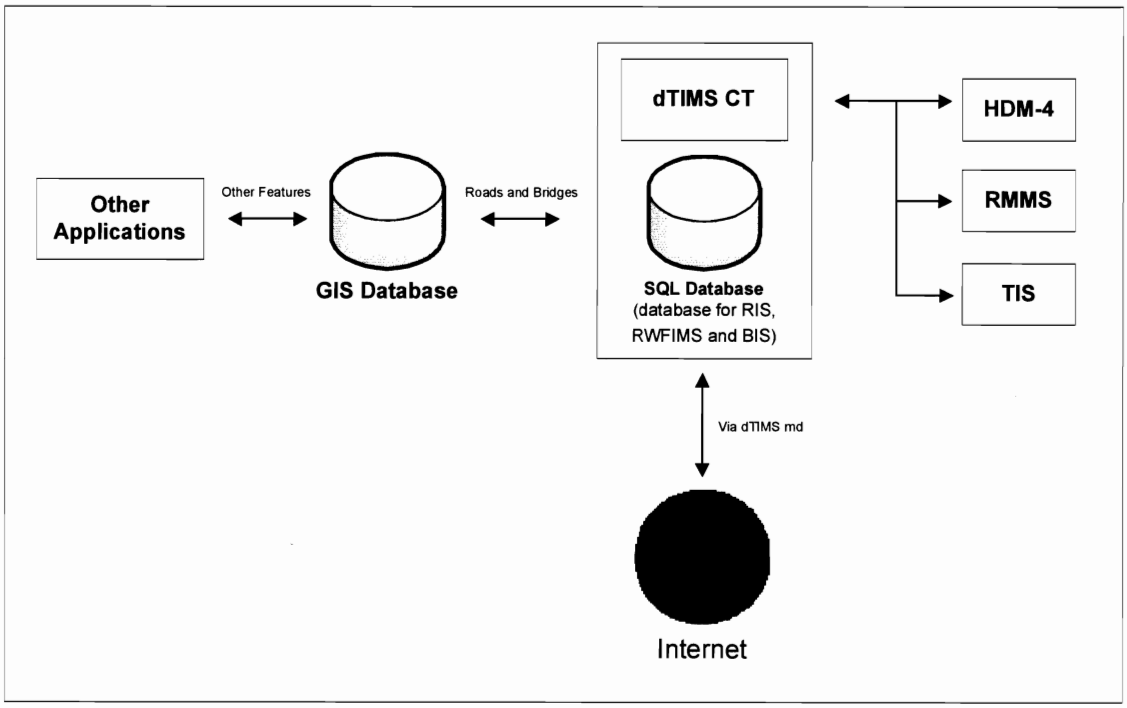

Figure 4: Possible AMS System Architecture

- The proposed system architecture will be discussed in a workshop with participation of OWD engineers and other experts. This sub-task is to be completed within two to three months of the project initiation

Sub-Task 12 Prepare and Submit Needs Analysis and overall System Architecture Report

- Following the in-depth needs analysis for AMS, the Consultant will submit its findings for each component that has a significant contribution to the overall AMS architecture. This will be the guiding principle for the development of AMS.
- This sub- task is to be completed within two months of the project initiation. A draft report on this will be submitted by 3rd month, and based on the comments from OWD a final report will be submitted at the end of 4th month.

Sub-Task 13 Review the Road Classification System

- It is proposed to introduce an addition to the existing classification in the identified core road network of the State. The core network needs to be identified with macro level perspective using Multi-Criteria Analysis (MCA) approach and parameters such as:
  - Physical status
  - Traffic level
  - Connectivity (between major urban centers)
  - Connectivity to ports and other economic centers such as industries, SEZs etc.
  - Missing link between two important corridors.
  - Spatial coverage
- In addition to traffic volume data to be collected at 200 locations by the Consultant, data/information available within OWD or from other sources will be utilized in this exercise. Functional hierarchy established through this process and endorsed by the government may be further fine-tuned after a year once more information and better database is available.
- This sub-task is to be initiated within two months of the project initiation. Since it strongly depends upon the availability of road inventory and traffic survey results; the task may be

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completed by 10th month. A report on same will be submitted at the end of 11th month as a part of Task 5.

Sub-Task 14 Assess Current Road Reference System, Propose refinement and Data Model for AMS

- The Consultant to review the present Location Referencing System in place at the OWD and make recommendations for improvement as per agreed O-AMS referencing system.
- As part of data collection exercises, the GPS co-ordinates of the road centerline of the NH, SH, MDR and ODR road network within Orissa will be recorded.
- Any data related to the road may then be referenced and shown by utilising a linear offset along this shape in the GIS. Geographic locations (i.e. GPS coordinates) of important point assets such as bridges, level crossings, major road junctions will also be recorded separately and will be made available as an added layer.
- This task will be initiated at the project initiation as this task is very important as data collection and system design have dependencies on this. This task will be completed by the end of 2nd month excepting capturing GPS co-ordinates on entire core network. This aspect is further deliberated in subsequent sub-task 22.

Sub-Task 15 Deliberate on GIS/GPS Requirement, Recommend Necessary Data/Maps/Images to be procured and outline methodology for GIS Development

- As per the requirement, all the features of RIS, BIS and RWFMS have to be mapped to the GIS platform. For this purpose a preliminary methodology is proposed:
    - Identify features in each of the systems (RIS, BIS or RWFMS) for mapping (Intersections, Bridges, Road Sections etc)
    - Locate and procure the latest available Geo-referenced and ortho-rectified base / satellite maps showing these features from Survey of India / NRSA.
    - The Consultant strongly recommends satellite map to be used as the base map on which development will begin.
    - OWD will arrange or procure the latest multi-spectral (MS) satellite image with resolution not less than 5.8m (already geo-referenced and ortho-rectified) and validate the features on the satellite image.
    - Digitisation using any industry standard GIS software (ArcGIS) in different layers like Node (Intersections), Link (Section between two intersections), Km Stones, Segment (section between two Km stones), Culvert & Bridge, District Boundary, Sub Division / Taluka Boundary will be also be continued under sub-task 22 by the consultant.

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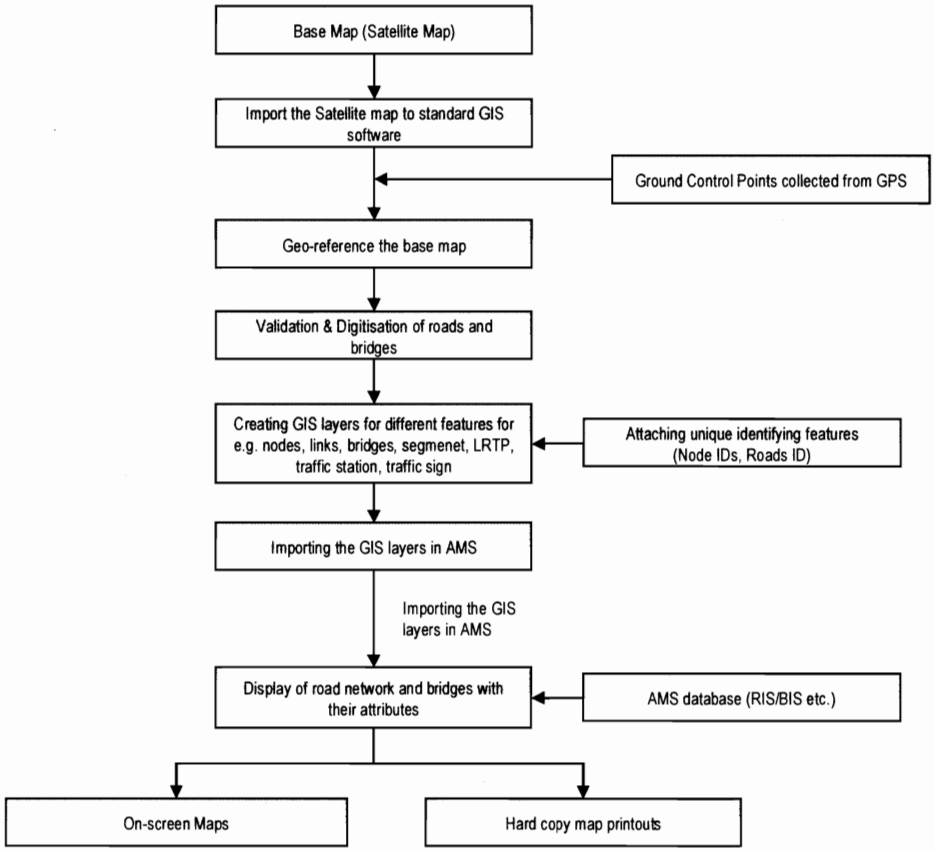
- Typical methodology to be followed towards GIS development is presented below.



Proposed Methodology Flow Chart for GIS Inputs in AMS

Sub-Task 16 Prepare and Submit GPS Referencing Report

- A report limited to the captured GPS points in the field will be prepared along complete road network under OWD.
- Efforts will be made to assign attributes to all captured GPS features for a Pilot Project. This will be tested during development of AMS.
- GPS referencing points to be collected on all roads under OWD and a draft report will be submitted by end of 4th month. It will then be validated on satellite images and a final report will be submitted at the end of 5th month.
- Consultant has assigned 2.5 months for the completion of this sub-task from the time Consultants receive the satellite map. The possibility to deliver a sub-report covering a portion of network will be explored before 4th month to enable to have early comments from OWD on the content and reporting format.

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Task No.	Task / Activities	Year-1			
		Quarter-1	Quarter-2	Quarter-3	Quarter-4
TASK-1:	**ASSESSMENT OF CURRENT MAINTENANCE MANAGEMENT SYSTEM**				
Sub-Task 1	Mobilisation and Interaction with OWD officers				
Sub-Task 2	Project Appreciation				
Sub-Task 3	Review of data available with OWD				
Sub-Task 4	Conduct Site Visit				
Sub-Task 5	Finalise Approach and Methodology (for Data Collection, GIS / GPS Mapping)				
Sub-Task 6	Finalise Task Assignment and Scheduling				
Sub-Task 7	Prepare Draft Data Collection Formats				
Sub-Task 8	Prepare and Submit Inception Report				
Sub-Task 9	IDS Report Study and Review of ISAP				
Sub-Task 10	Review Current Maintenance Management Practices of the OWD and MIS				
Sub-Task 11	Needs Analysis and Outline of AMS-System Architecture				
Sub-Task 12	Prepare and Submit Needs Analysis and overall System Architecture Report				
Sub-Task 13	Review the Road Classification System				
Sub-Task 14	Assess Current Road Reference System, Propose refinement and Data Model for O-AMS				
Sub-Task 15	Deliberate on GIS/GPS Requirement, Recommend Necessary Data/Maps/Images to be procured and outline methodology for GIS Development				
Sub-Task 16	Prepare and Submit GPS Referencing Report				

Legend

- Continuous
- Intermittent
- Workshop / Seminar / Survey
- Report Submission

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Task 2 – Data Collection and Road Information System (RIS) Development

4.6 The consultant shall undertake the data collection outlined on Table 2 on the overall network for 2 years. The consultant may propose improvements to the data collection scope defined on Table 2 to be agreed by the client. The consultant shall use its own data collection equipment during the assignment and shall assist the Client in procurement of similar equipments for Client's use in future on the basis of recommendations to be made in the inception report. The consultant shall be responsible for accuracy of the data collected, by him directly or procured from other agencies/authorities, All the data collection devices shall be calibrated regularly as per the requirements and relevant training should be given to the designated OWD officers.

Table 2 Data to be collected by the Consultant

Data type	National Highways	State Highways and MDRs	ODRs
	3,592 km	8,163 km	6,314 km
GPS referencing	Year 1: 100%	Year 1: 100%	Year 1: 100%
Inventory of pavements	Ω	Ω	Ω
Inventory CD works	Ω	Ω	Ω
Roughness on Paved Roads using ROMDAS	Year 1: NH Year 3: NH	Year 1: 100% Year 3: β	Not Required
Surface Distress Indicators (PCI) (4 items such as cracking, ravelling, rutting, depressions or potholes)	Year 1: NH Year 3: NH	Year 1: 100% Year 3: β	Not Required
Pavement strength – BBD/ FWD data collection or CBR values. To be collected with following frequencies. BBD/FWD – 500m CBR – One in every two km	None	Year 1: 75 % Year 2: δ Year 3: Ψ	Not Required
Bridge (Minor & Major) visual condition data – 3 or 4 critical attributes to be determined	None	Year 1: 100% Year 3: β	Not Required
Traffic AADT using 3 day counts. Up to 200 traffic count stations.	Year 1: NH Year 2: NH Year 3: NH	Year 1: 100% Year 2: 100% Year 3: β	Not Required
Traffic Axle Load at selected 30 locations.	Year 1: NH Year 3: NH	Year 1: 100% Year 3: β	Not Required

NB: Year 3 refers to the one year implementation support period beyond 24 months full time assignment.

Ω For the National Highways (NH), State Highways (SHs) , Major District Roads (MDRs) and Other District Roads (ODRs) covering a length of approximately 18069 KM, OWD shall provide the required inventory of pavements & CD works Consultant shall verify at field about 20% of these data in consultation with the Client. In case of discrepancies , the client / OWD shall provide the updated data within 60 days.

δ : At year 2, remaining 25% of the data shall be collected by Client with assistance of Consultant through its core Asset Management Group using Consultant's equipments as a part of technology transfer.

β : At year 3, 100% of the data shall be collected by Client with assistance of Consultant through its core Asset Management Group using Client's equipments as a part of technology transfer.

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Ψ : At year 3, 25% of the data shall be collected by Client with assistance of Consultant through its core Asset Management Group using Client's equipments as a part of technology transfer.

NH The existing available asset data of not more than 18 months of age for these items on NH network shall be made available by the OWD. In case these data are not of good quality / outdated and if the OWD/Client desires that the data need to be updated on representative sections limiting to 20% of the NH Network , then the Consultant shall carryout the same for which payment shall be made extra on a pro-rated basis as per the financial proposal for the corresponding items of SH/MDR data collection as quoted by the Consultant.

4.7 The consultant shall establish and implement a Road Information System (RIS) through customisation of a COTS software or by developing one and enter appropriate data on the core network as the main repository for the AMS. This RIS shall be linked to data management applications required to meet the needs of the other systems and the management requirements of the OWD.

4.8 The RIS shall:

- operate under computer systems and software compatible with the existing systems being used by OWD and the GoO
- have a uniform and user friendly interface which is designed around the IT capabilities of the OWD
- allow for menus and reports in English
- be designed around accepted international practices (e.g. common user interface, data import/export standards, truth-in-data standards)
- have an inbuilt alert system to ensure updating of road and pavement condition data by every third year and flag the year of data collection while analyzing for each parameter.
- have a reliable but flexible security system for access and data processing;
- be web based to ensure operability and data updating using the Internet/Intranet;
- be capable to check data accuracy, inconsistencies, and the data falling beyond acceptable ranges;
- be able to export to Excel all the road network data stored on the RIS, being able to export to Excel all the average road attributes for each kilometre of the network and being able to export to Excel all the average road attributes for each homogeneous road section
- be designed so that the processing time for querying the database and extracting information is satisfactory;
- include a sub database of inventory of cross drainage structures
- include a sub database of inventory of bridges
- include a sub database of road furniture
- include a sub database for routine maintenance management

4.9 The RIS data model shall be capable of handling data of different spatial attributes ranging from point data (e.g. km stones) to continuous or interval data (e.g. roughness) and should handle overlapping sections. The system shall be designed around a proper location referencing system with sufficient flexibility to cater for changes to the system over time. It should also allow for the graphical representation and presentation of information and shall interface with a Geographic Information System (GIS) for mapping purposes. Currently OWD does not use a GIS. The GIS shall be developed by the consultant using a internationally well-known GIS software to be defined by the client, such as ARCINFO /ARC GIS to be purchased as per 4.35.

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4.10 The AMS shall operate using Standard Query Language (SQL) developed using fourth generation relational database management software, subject to the overriding requirement of compatibility with the OWD computer systems and the technical capacity of OWD staff. The AMS shall not require any proprietary software developed by the consultant or others that would require payment of royalties in future years for AMS modifications or improvements. The development /purchase of database management software shall be decided after the needs analysis is completed by the consultant. The final software modules shall be evaluated on the basis of technical and functional requirements as stipulated in Annexure – 1 of Appendix - A. The Consultant shall provide, i.e. used to create the AMS with full documentation as well as all the source code, compiled code and libraries of the AMS and will provide full training to OWD staff on the process of modifying and compiling the AMSin order that in the future OWD staff will be able to modify and improve the AMS without necessary support from the consultant. Licenses for the standard software will have to become property of the Client and define the ownership of the customized software developed by the Consultant (exclusive or joint). For customized software the Client can have the source code or have an escrow arrangement with the Consultant as agreed during the negotiations.

4.11 The BIS shall contain a cross-drainage and bridge information system databases covering select photographs of CD /bridge structures with sufficient information for any future economic analysis. The database will initially be an inventory of all bridges, the results of bridge inspections, and a history of bridge repairs and expenditures, using data available from OWD and data to be collected by the consultant including all visual condition data as per IRC-SP-35. Number of bridges on SH and MDR are approximately 1650 (less than 30m length 1350 nos. and more than 30m length 300 nos.), which can be used as a broad guidance for preparation of proposal

4.12 The consultant shall provide a **Traffic Information System** linked to the RIS. This is to be capable of storing regular and special traffic counts as well as the outcome from specific studies. Among the data to be stored are:

- continuous counts from permanent traffic count stations
- 3-day classified traffic counts
- short-term (< 3 day) classified traffic counts
- traffic growth forecasts
- vehicle fleet characteristics
- sample hourly flow data
- processed weigh-in-motion or axle load survey data (i.e. aggregated statistics as opposed to measurements of each vehicle), if available
- road accidents

.4.13 The Traffic Information System (TIS) shall be able to produce and report the following thorough analysis of the above data:

i) Traffic volume and flow characteristics; average daily traffic (ADT), average annual daily traffic (AADT), seasonal factors, K-Factors, hourly distribution of annual traffic.

ii) Traffic growth forecasts: predicted traffic patterns of network using supplied traffic growth

iii) Vehicle loading characteristics: average axle loadings and equivalent standard axles.

iv) Historical and forecast data in a graphical format. It shall include, but not be limited to, network utilization, traffic volume and loadings, annual vehicle km of travel, annual tonne km of freight by vehicle class and /or road class.

v) Average accident rates per road or per road class, expresses in number per 100 million vehicle-km (number of total accidents, accidents with fatalities, accidents with injuries and accidents with damage only).

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4.14 The consultant will review the existing data collection procedures and in light of the additional data needs arising from the development of the AMS prepare recommendations on the incremental improvement in data collection procedures, procurement of equipment and scheduling of surveys. The consultant shall prepare a road data collection manual including revised standard forms for data collection.

Consultant's Indicative Methodology for Task-2

Task – 2 has been broadly divided 13 Sub-Tasks as detailed below:

Sub-Task 17 Agreements on Data Requirement, Collection Methodology and Format

- Taking forward from various sub-tasks in Task 1, the Consultant will undertake the data collection as outlined in Table 2 of the Description of Services on the defined network over a period of two (2) years.

- During the Inception period and based on the experience from the Pilot Project, the Consultant may propose any improvements to the data collection scope defined in this Table 2. The first task will be to review the available skills and resources of the OWD for the purpose of sustainability of the data collection.

- The Consultant will use ROMDAS data acquisition system to facilitate roughness data collection.

The table below describes how the various types of data will be acquired:

Table 2: Data Collection Methodology

Data Type	Methodology/Comments
GPS Referencing	This data will be collected via a GPS receiver. The representation of the road sections will be made by 'joining the dots' of the co-ordinates recorded or from the satellite map as discussed. The frequency of the measurements will be discussed / agreed with the Client during Inception stage.
Inventory of Pavements, CD Works	OWD will provide the Consultant with the required inventory and CD works data. The Consultant will verify about 20% of the field data to ensure its suitability for use in the proposed AMS. In case of the discrepancies in the field, the Client shall provide the updated data to the Consultant within 60 days.
Roughness on Paved Roads using ROMDAS	Road roughness, expressed in IRI, will be measured using the ROMDAS, over 8,200 km of State Highways and MDRs during the first year.
Surface Distress Indicators	Four distress types, i.e. cracking, pothole, raveling and rutting will be used to visually describe surface distresses of the pavement. A system of describing severity and or extent (density) will be devised for calculating the surface distress index. A mechanized system to capture surface distresses will be used on the "Pilot Project" to assess feasibility of its use in the future.
Pavement Strength (BBD / FWD / CBR)	Structural strength testing of the pavement will be carried out by means of Benkelman Beam at an interval of 500 m. The in-situ CBR of the sub-grade will be back calculated from a modified BBD testing method. The structure of the existing pavement will be established through a test pit dug at the edge of the pavement at 2 km interval. Routine soil testing will be carried out on the sample recovered from the test pit.
Bridge Condition	Bridge inventory details shall be provided by the Client. Following which a condition survey of selected elements of the bridge will be undertaken by the Consultant through visual inspection in first year.
Traffic - AADT	The Consultant will carry out 3-days classified traffic volume count survey at 200 selected locations on SHs and MDRs.
Traffic - Axle Loads	The Consultant will carry out axle load surveys at 30 selected locations on State Highways and MDRs.

- Under this sub-task, the Consultant will assess the data requirements, propose data collection methodology and proforma for data collection. This along with the following will be discussed in a workshop:
  - Share information on this major initiative of OWD towards establishing an AMS.
  - Discuss goals and objectives of AMS.
  - Consultants' scope and time line.
  - Deliberate on AMS-System Architecture
  - Present assessed data requirement for AMS, collection methodology, and proforma
  - Share expectation of consultants from various levels of officers in HQ or in field.
  - Obtain feedback and incorporate as appropriate.
- This workshop, proposed during 3rd month, will be an important event not only in taking certain critical decisions but also in successful implementation of the proposed AMS.

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Sub-Task 18 Prepare and Submit Road Data Collection Manual

The Consultant will prepare documentations and manuals for the following:

- Data requirement for each component (Road Information System, Bridge Information System, Pavement Management System, Routine Maintenance Management System, Right of Way Feature Management System, Traffic Information System),
- Methodology for data collection including use of equipments in the field, standard formats, procedure of coding in field data sheet, and preparation of AMS import forms etc..

This sub-task will be performed after the completion of the workshop.

Sub-Task 19 Agreement on System Architecture

- Consultant's recommendations regarding system architecture will be discussed at the workshop and a decision will be taken since this is very critical for any further work on system development.

Sub-Task 20 Computerization of Available Data in the required Format

- In case the available data with OWD on inventory of pavement and bridge, condition, roughness etc.are in different formats then OWD will compile the information and provide to the Consultant. Further, Consultant will convert the information into a format suitable for data entry into the proposed system.
- This sub-task will commence after the receipt of data from OWD in the data collection format starting from 3rd month onwards till 4th month.

Sub-Task 21 Gap Analysis and Assessment of Additional Data Requirement

- Consultant will undertake extensive review of existing data collection procedures and the additional data needs arising out of the systems developed and to be implemented.
- OWD will provide the Consultant with pavement and CD inventory, right-of-way features for entire 18,000 km; and roughness and pavement distress indicators for the national highway (3,592 km).
- Initial validation/consistency checks in data will be done on random basis in consultation with OWD. In case of discrepancy found at ground level, this will be informed to the OWD for re-submission of correct/updated data.
- This sub-task will commence after the receipt of data from OWD immediately after inception.

Sub-Task 22 Prepare Data Collection/Verification Programme and Conduct Surveys

- Under this sub-task, the Consultant proposes to carryout the survey on the field as shown in Table 3 below during the first year. Survey programme for subsequent year (Traffic Survey) will be finalized in consultation with OWD at the end of year 1.
- The Consultant will initiate all logistic arrangements, data format, permission letter from the client etc. before commencement of field activities.
- Actual survey locations in case of traffic and axle load will be finalized in consultation with OWD before commencement.

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Table 3: Field Survey

Items	Unit	Survey Quantity (By Consultant)				Survey Quantity (By Client)				Remarks
		Year 1	Year 2	Year 3	Total	Year 1	Year 2	Year 3	Total	
GPS Referencing	km	18069			**18069**					All Roads (NH, SH, MDR / ODR)
Inventory of Pavements	km	3614			**3614**					20% verification
Inventory CD Works	km	3614			**3614**					20% verification
Roughness on Paved Road using ROMDAS	km	8163			**8163**			8163	**8163**	1. Data on NH will be made available by the Client for Year 1 & 3 2. Client may ask Consultant to validate on 20% of NH Length 3. Data on SH/MDR will be collected by Client in Year 3
Surface Distress Indicators (Visual)	km	8163			**8163**			8163	**8163**	1. Data on NH will be made available by the Client for Year 1 & 3 2. Client may ask Consultant to validate on 20% of NH Length 3. Data on SH/MDR will be collected by Client in Year 3
Surface Distress (Mechanical)*	km	800			**800**					For a comparative study with visual method.
Pavement Strength (BBD /FWD / CBR)	km	6122			**6122**		2041	2041	**4082**	75% on SH/MDR in Year 1 by the Consultant 25% on SH/MDR in Year 2 by the Client. 25% on SH/MDR in Year 3 by the Client.
Bridge Condition (Major)	No	300			**300**			300	**300**	
Bridge Condition (Minor)	No	1350			**1350**			1350	**1350**	
Traffic Survey (Classified Volume Count 3-day on SH/MDR)	No	200	200		**400**			200	**200**	1. Data on NH will be made available by the Client for Year 1,2 & 3 2. Cleint may ask Consultant to validate on 20% of locations
Traffic Axle Load (One Day)	No	30			**30**			30	**30**	1. Data on NH will be made available by the Client for Year 1 & 3 2. Cleint may ask Consultant to validate on 20% of locations

* for a comparative study with the visual method and for assessing possibility of its use in future data collection by the Client.

- This sub-task will commence after finalization of data collection procedure manual at the end of 1st month and will continue until 9th month in the First year. In the second year, this task

will be performed during 16-19 months and during 28-30 months in the 3rd year either by Consultants or by OWD as indicated in Table 3.

Sub-Task 23 Survey data Verification and Relationship establishment (from Test Data Collection)

- The Consultant will undertake pavement condition survey mostly through a simplified, visual rating method of road condition and on Pilot Project using mechanized process. Actual extent of the coverage of the road network through mechanized automated equipment will be finalized during inception stage.
- It is proposed to undertake condition survey on 10% of length (800 km approximately) by both visual as well as by mechanical means on Pilot Project to calibrate visual ratings with a reasonable accuracy.
- This sub-task will be undertaken and concluded during 4th month of the assignment such that full scale data collection could be undertaken thereafter.

Sub-Task 24 Prepare and Submit Draft System Design Document of AMS

- After performing various sub-tasks including a review of the existing system, AMS requirements and gap analysis, the Consultant will develop "System Design of AMS" which will take into account user needs and sustainability of the system.
- The conceptual model will include system architecture, user interface design including user interface prototype, in some cases, business logic layer design and more importantly conceptual database design.
- Based on comments received at the Workshop and deliberations and discussions with OWD, the draft system design document will be submitted to the Client. Further modification may be made as and when required and before final submission of overall system design report.
- This sub-task will be undertaken and concluded during 4th month of the assignment and the final version during 11th month of the assignment.

Sub-Task 25 Develop GIS-based RIS, RWFIMS, BIS and TIS

- The development of AMS (RIS, BIS, RWFMS and TIS) at this stage will primarily be done in following three steps:
  - Build low level design – The conceptual system models will be elaborated for programming and integration.
  - Coding - Programs (coding) will then be developed, based on the low level design and 'unit tested'.
  - Testing - Elaborate test cases will be developed along with the necessary test (data) beds to be used for testing the system.

Testing is further proposed to be undertaken at three levels:

- Component testing,
- Integration testing, and
- System testing.

Key requirements....

Compatibility with current system in use within OWD

Uniform and user friendly interface

Menus and reports in English

International practices (eg. Common user interface, data import/export, truth-in-data etc.)

Inbuilt alert system to flag most recent data

Ability to average out data and export to Excel format by kilometer/road homogeneous section.

Sub database for CD structures, bridges, road furniture, routine maintenance management, traffic.

RIS will be capable of handling data of different spatial attributes ranging from point data to continuous or interval data.

RIS will also allow for the graphical representation and presentation of information and shall interface with a Geographic Information System (GIS) for **mapping purposes.**

GIS software to be defined by client. This will be discussed and finalized in the consultation with OWD.

Technology: SQL, RDBMS, Microsoft Excel environment....

Road Information System (RIS) and Right-of-Way Features Information Management System (RWFIMS)

- The dTIMS CT database will form the basis of the RIS/RWFIMS which will contain all the road-related data referenced against the network entities. dTIMS CT will act as the definitive source of Orissa's network-level data.
- The data contained in the AMS/dTIMS CT database will be available to external applications via SQL. For example, the Traffic Information System (TIS) will be a separate application, but it will be linked to the AMS database for purposes of location referencing and the former will also supply the AADT data to be used in planning analysis.
- dTIMS CT, in effect the RIS and RWFIMS, will meet the basic requirements as listed in Section 4.8 of the "Detailed Scope of Work" [of Appendix A "Description of Services] and as well the detailed functional and technical requirements as specified in Annexure 1 of the Appendix A.

Location Referencing

- In dTIMS CT the location can be referred by multiple means such as kilometre stones, linear reference system and Geo coordinates.

Bridge Information System

- The AMS will be configured to accommodate information on bridges and will be populated with the approximately 1,650 bridges on SHs and MDRs.

- It will contain bridge inventory (as given by OWD) and visual condition data as result of inspections (done by the consultant), any available history of bridge repairs and expenditures, using data from the OWD and data to be collected by the Consultant.

- A demonstration project would be undertaken, with the agreement of the Client and the Consultant, where alternative / NDT technologies could be used on a major bridge for programming its maintenance / rehabilitation / reconstruction.

Traffic Information System

- The Consultant in consultation with OWD will determine the specifications for the Traffic Information System (TIS) and the software will be developed as a separate application (module).
- It will, as a minimum, be capable of storing, processing and reporting on the list of types of data given in Sections 4.12 and 4.13 of the Detailed Scope of Work given in Appendix A.

- This task will be undertaken during 4^{th} – 9^{th} month of the assignment.

Sub-Task 26 Prepare and Submit Data Acquisition Report on Road Inventory, Condition, Roughness, Pavement Strength, Traffic Volume, Axle Load etc.

- Above data duly verified and validated and linked to the location referencing of the road network and summarized will be reported at the end of 11^{th} month.
- This sub-task will be carried out in stages as and when data is collected over various portions of the network.

Sub-Task 27 Populate GIS-based RIS, BIS & TIS with Actual Data and Testing with Test Cases

- Mostly, data collected on Pilot Project will be used for testing of GIS-based RIS, BIS and TIS.
- This sub-task will be undertaken during 7^{th} – 9^{th} month of the assignment.

Sub-Task 28 Prepare and Submit System Operation Manual

- A system operation manual (User manual) for RIS, BIS and TIS will be prepared after testing of the system.
- Once prepared, a draft version will be issued in advance to OWD for comments and necessary improvement.
- This sub-task will be undertaken at the end of 9^{th} month of the assignment after completion of sub-task 29.

Sub-Task 29 Install RIS, BIS and TIS Live in OWD

- The integrated and tested RIS / BIS and TIS including traffic and bridge information system will be installed in OWD at the end of 10 month, subject to timely procurement of the necessary software etc.

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Task No.	Task / Activities	Year-1				Year-2				Year-3			
		Quarter-1	Quarter-2	Quarter-3	Quarter-4	Quarter-1	Quarter-2	Quarter-3	Quarter-4	Quarter-1	Quarter-2	Quarter-3	Quarter-4
TASK-2:	DATA COLLECTION AND ROAD INFORMATION SYSTEM (RIS) DEVELOPMENT												
Sub-Task 17	Agreement on Data Requirement, Collection Methodology and Format for Two Years												
Sub-Task 18	Prepare and Submit Road Data Collection Manual												
Sub-Task 19	Agreement on System Architecture												
Sub-Task 20	Computerization of Available Data in the required Format												
Sub-Task 21	Gap Analysis and Assessment of Additional Data Requirement												
Sub-Task 22	Prepare Data Collection/Verification Programme and Conduct Surveys												
Sub-Task 23	Survey data Verification and Relationship establishment (from Test Data Collection)												
Sub-Task 24	Prepare and Submit Draft System Design Document of AMS												
Sub-Task 25	Develop GIS based RIS, RWFIMS, BIS and TIS												
Sub-Task 26	Prepare and Submit Data Acquisition on Road Inventory, Condition, Roughness, Pavement Strength, Traffic Volume, Axle Load etc.												
Sub-Task 27	Populate GIS based RIS, BIS & TIS with Actual Data and Testing with Test Cases												
Sub-Task 28	Prepare and Submit System Operation Manual												
Sub-Task 29	Install RIS, BIS and TIS Live in OWD												

Legend

▬	Continuous
⋯	Intermittent
o	Workshop / Seminar / Survey
●	Report Submission

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Task 3 – Development of planning tools

4.15 For the PMS application, the consultant shall connect the RIS with established and widely accepted economic evaluation model based on sound engineering and economic priority principles, capable of undertaking both strategic and project level analyses at the appropriate organizational levels, such as the Highway Development and Management Model (HDM-4) or equivalent. The PMS could use the current version of HDM-4 software as the primary knowledge engine or HDM-4 may be substituted by an alternative software application utilizing HDM-4 analytical functions and logic provided it is demonstrated that the outputs are equivalent and the operation is substantially superior and appropriate to the Client's users. Even if HDM-4 is not the adopted economic evaluation model of the PMS, the PMS should be able to create an HDM-4 road network file to be imported by HDM-4 containing the average characteristics of selected homogeneous road sections. The economic evaluation model shall be capable of the following types of analyses, which should cover both road condition and capacity improvements:

- strategic budgeting studies;
- project level technical analyses;
- multi-year road works programming and optimization under budget constraints; and
- projection of network condition under various budget scenarios

4.16 *The strategic budgeting studies* shall be undertaken by the Consultant to establish necessary funding levels in general budget categories using data of an appropriate Information Quality Level (IQL). The analysis should be based on a life cycle cost approach. The RMS should be able to establish a medium term budget framework including budget forecasts both for the plan and non-plan budgets; to achieve certain Performance indicators (PIs). These PIs shall be agreed upon between the consultant and OWD.

4.17 The Consultant shall carry *the project level analysis* studies for specific sections of road for different technically feasible options such as periodic maintenance, resurfacing, rehabilitation, reconstruction, widening and geometric improvement etc. The analysis should be done using a life-cycle cost approach and be compatible with that used in the HDM-4 model.

4.18 To allow for preparing optimized multi-year rolling programs, the AMS must include a *multi year programming module* which shall optimize the selection and timing of pavement works under different budget constraints to achieve various performance indicators. The works under these programs would include road widening, reconstruction, rehabilitation, strengthening, resurfacing, bridge rehabilitation/ replacement/construction, road safety interventions etc. The works under these plans should be prioritized using rational criteria for investment decisions to maximize the benefits of investment. The optimization shall be done using a heuristic approach such as that adopted for the HDM-4 model. The consultant will use suitable pavement performance models for predicting the future pavement condition which can be refined over the years. The output for such *Multi-year Rolling Plans and Annual Maintenance Plans* over short and medium term. shall be year-wise optimized work program covering different budget categories and work classes. such as periodic renewals (based on detailed data collected), routine maintenance (based on norms to be developed using age of surface, type of road and overall condition index),

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emergency maintenance (based on norms), and special repairs based on the indicative budget provided by the OWD. The user should be able to refine these programs to obtain the most appropriate program given logistical and other considerations.

4.19 The unconstrained budget requirements for multi-year rolling plans should then be prioritized into three year rolling plans for both road improvement and periodic maintenance considering the budget forecasts from the government and other sources. The above plans would be implemented by OWD using their plan and non-plan budget from various sources. The program shall be produced to a timeframe that meets the government's budgeting cycle and is to be revised in an iterative process as more accurate forecasts or actual budget is known. The consultant will prepare the above plans for the three consecutive years starting latest from FY 11-12 and also train the OWD engineers for the same. The prioritized road sections for the investments in the various plans should be capable of being exported to GIS to be accessible to senior managers to enable decision making.

4.20 The consultant will estimate the average unit cost of road works from historical data and/or engineering estimates. These could come out of recently completed road projects or project being prepared for bidding.

4.21 The consultant **shall calibrate to Orissa conditions the economic evaluation model adopted for the PMS** (for example, deterioration models for both flexible and rigid pavements and road user costs models). The consultant shall characterize the basic characteristics and economic user cost of the vehicle fleet in Orissa, including the average axle loads and ESA factors, as well as typical financial and economic unit costs of road works; and undertake suitable calibration of the key parameters for road user and pavement deterioration modelling equivalent to level-2 calibration of HDM-4 in consultation with the client.

4.22 The database used by the RIS will allow for automatic sectioning so that road sections are created using factors such as condition, inventory and traffic as the criteria. The sectioning process shall be interactive with the user being able to adjust the resulting sections.

4.23 The reporting format for the traffic information system shall allow for the presentation of historical and forecast data in a graphical format. It shall include, but not be limited to, network utilization, traffic volume and loadings, annual vehicle km of travel, annual ton-km of freight by vehicle class and /or road class.

Consultant's Indicative Methodology for Task-3

Task – 3 has been broadly divided 15 Sub-Tasks as detailed below:

Sub-Task 30 Develop Analytical Tools for an HDM-4 based Pavement Management System (PMS)

- The Consultant will develop economic evaluation models, capable of performing the following types of analyses using HDM-4 and / or in-built analytical tools of dTIMS:
  - Strategic budgeting studies;
  - Project-level technical analyses;
  - Multi-year road works programming and optimization under budget constraints; and
  - Projection of network condition under various budget scenarios.
- This task will be undertaken during 7th -12th month of the assignment after end of surveys.

- A simplified flow chart of PMS development within overall framework of AMS development is shown in the following figure.

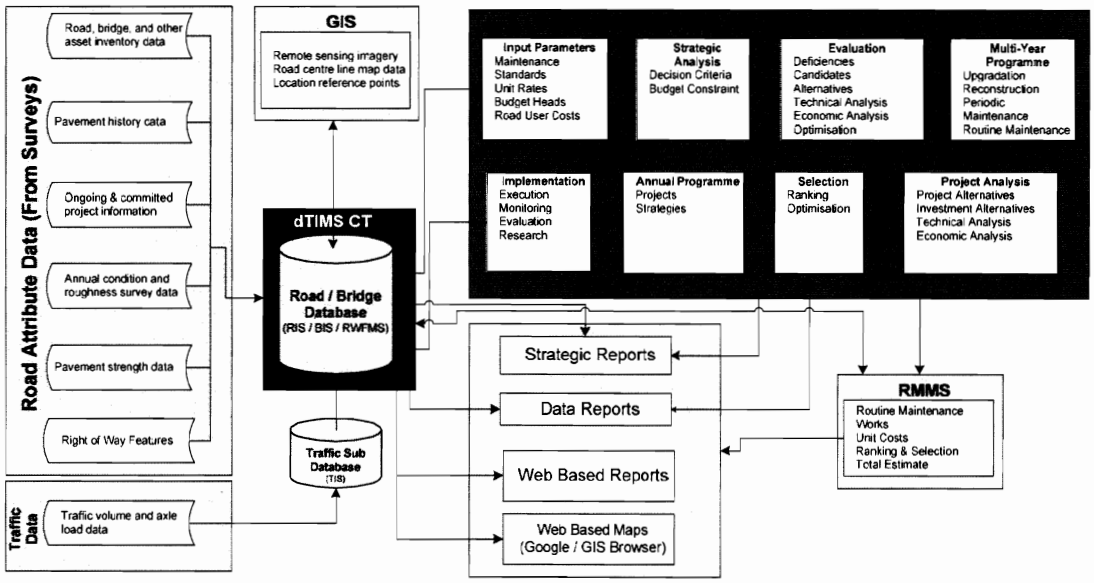

Figure 1: Simplified flow chart of PMS development within overall framework of AMS development.

Sub-Task 31 Develop Analytical Tools for Strategic Budgeting Studies

- The PMS (HDM4/dTIMS) module develops a short, medium and log term plans for various budgetary levels and priorities.
- This sub-task will be undertaken during 11th -12th month of the assignment.

Sub-Task 32 Develop Analytical Tools for Project Level Analysis

- The PMS module will have analytical tools for Project Level Analsis. The same data used in strategic studies will be used here in Project Analysis.
- This task shall be undertaken during 11th -12th month of the assignment after end of surveys

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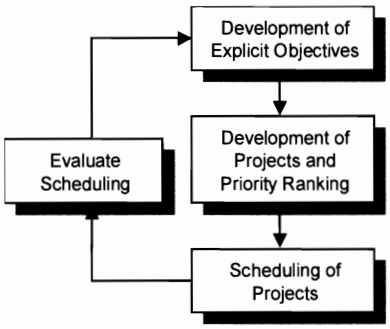
Sub-Task 33 Develop Analytical Tools for Multi-year Programming

- The multi-year programming module which would optimize the selection and timing of pavement works under different budget constraints to achieve various performance indicators.
- As a pilot test run, both HDM-4/dTIMS shall be used as a analytical tool, a series of projects will be identified and placed into three categories, namely:
    - Development – new build projects including the proposed reconstruction of previous roads;
    - Maintenance – ongoing construction and rehabilitation of existing roads;
    - Operations – routine maintenance of roads.



- Once the prioritisation of road upgrading has been complete, the Consultant will prepare a series of budget costs for the prioritised roads. The budget costs will be added together to prepare an annual budget envelope.
- This task shall be undertaken during 12th month of the assignment.

Sub-Task 34 Calibrate HDM-4/dTIMS based PMS

- In order to achieve reliability of the results, it is necessary to adjust the parameters to calibrate the model for the local condition.
- For the AMS, the Consultant will perform a 'Level-2' calibration and adaptation on the following sub-models.

    - **Road Deterioration** – Predicts pavement deterioration for bituminous, concrete and unsealed roads.
    - **Works Effects** – Simulates the effects of road works on pavement condition and determines the corresponding costs.
    - **Road User Effects** – Determines costs of vehicle operation, road accidents and travel time.
    - **Social and Environmental Effects** – Determines the effects of vehicle emissions and energy consumption.

- Where available information is lacking in sufficient detail and/or is difficult to compile, the Consultant may need to resort on some items to the less onerous Level-1 calibration in consultation with client.

- This will be an initial stage of calibration which will, however, need to be carried out subsequently as well as better data/info and more experience is acquired in future.

- This task will be undertaken during 13th month of the assignment on the 1st year data and after the surveys for 2nd and 3rd year data collection.

Sub-Task 35 Estimate Unit Costs for Maintenance Activities (for PMS & RMMS)

- The Consultant will establish the list of treatment to be tested in the analysis and each will be associated with both financial and economic average unit costs.
- The Consultant will estimate these from historical data and/or engineering estimates, and they as well may come from recently completed road projects or those being prepared for bidding based on latest Schedule of Rates published by Govt. of Orissa
- Works for periodic maintenance, strengthening, reconstruction, improvement shall be based on sound accepted practices.
- The steps followed under sub-task are;

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- Review basic treatments for various works such as Periodic Maintenance, Strengthening, Reconstruction, Widening etc.
- Input basic costs of Staff and Equipment
- Input basic costs of materials
- Input speeds, load/unload times/transport leads for haulage of various materials to the site

- This task shall be undertaken during 9th -11th month of the assignment.

Sub-Task 36 Develop Analytical Tools of Routine Maintenance Management System (RMMS)

- The Routine Maintenance Management System (RMMS) application will be developed to determine routine maintenance investments for sections not receiving periodic maintenance or improvements in that year; and to prepare reports and charts for a business plan.
- Further, RMMS application will include other important elements like standards of maintenance activities both in terms of quality and performance, unit costs, schedule of rates, etc.
- It will also have functions to estimate the cost of routine maintenance works and requirements; allocation of budget among activities/scheduling of works etc.
- This sub-task will be undertaken during 11th -12th month of the assignment.

Sub-Task 37 Develop Right-of-Way Features Management System (RWFMS)

- The Right-of-Way Features Management System will be developed in conjunction with RIS initially with available OWD data after 20% field verification. Further details are already explained as a part of sub-task 25.
- This sub-task will be undertaken during 8th -9th month of the assignment

Sub-Task 38 GIS Development and Integration

- The integration of GIS maps (already digitized) with the AMS database server will enable the user to navigate seamlessly from map to the AMS database and vice versa.
- This will enable the user to access any feature either from GIS interface and access its attributes in AMS database or from AMS database and locate the same on the GIS interface automatically. This will be a two-way integration.
- Following are important features:
  - After the completion of mapping the features (digitize using any industry standard GIS software in different layers) with unique identification (Feature IDs), a link to the AMS database will be establishes automatically.
  - Import the layers to the AMS database or integrate the map server containing all the map files to the AMS database server. The later will be a central repository of all maps and client GIS system.
- OWD presently doesn't have a GIS system (software + base map) in place. As a part of the current service, a GIS system will be procured which will be used to develop GIS maps for AMS. The license procured by the client can then be used to modify or add maps when required and then import the layers to AMS by the client in future.
- An utility will be inbuilt in GIS-AMS interface to import the modified map objects into the AMS database seamlessly.
- This sub-task will be undertaken starting from 2nd month of the assignment and will go on till 12th month

Sub-Task 39 Overall System Integration

- AMS is envisaged to be an integration of the following:
  - Off-the-shelf third party product like dTIMS, HDM-4
  - Externally prepared GIS maps
  - In-house applications such as TIS / RMMS

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- The end product would work as an integrated system with following characteristics:
  - Seamless data flow from an application to other
  - Software compatibility
  - Uniform Graphical User Interface (GUI) to enhance user friendliness and acceptability.
  - User Authentication and role based access control.
  - Externalities like web application and security.
  - Master data like location referencing and other fixed features.
- Various sub modules as they are being developed will be integrated and tested before they are installed for use.
- This task shall be undertaken during 11th -12th month of the assignment after development of all the modules.

Sub-Task 40 Prepare and Submit overall System Design Report

- The draft system design document of AMS already prepared during as a part of sub-task 24 will be finalized based on system development undertaken including all the modules and will be submitted as a final copy.
- This task shall be undertaken before the end of 12th month of the assignment after development of all the modules and system integration.

Sub-Task 41 Overall System Testing

- Overall system testing will begin at the end of 9th month from start of the assignment. Training versions of integrated AMS will be deployed at select locations at head quarters, PIU etc. to obtain 'hands on' comments from the end users for its acceptability.
- In parallel, testing of the system by the Consultant's team and further enhancement will continue. During the compliance testing process, suggestions made by the officers of OWD will be noted, reviewed and incorporated appropriately.
- This sub-task will be continued upto12/13th month of the assignment after over-all system integration.

Sub-Task 42 Install AMS Live in OWD

- The integrated and tested version of AMS will be installed in OWD by the end of 14 months. This installation will supersede the earlier installation comprising RIS/BIS/TIS.
- However, some amount of testing, enhancement, bug-fixing will continue in parallel both by consultants' team and end users. Upgrades will be issued to the end users accordingly.

Sub-Task 43 Prepare and Submit Operation Manual(s) for PMS, RMMS

- The operations manual for PMS, RMMS will be prepared and submitted for training and hands on practice for OWD officers.
- The Consultant would incorporate all the comments on value addition of the report and submit a final version after that along with complete AMS operation manual.
- This sub-task will be undertaken after 12th month of the assignment and a draft report will be submitted followed by a final report at the end of 14th month.

Sub-Task 44 Prepare and Submit Operation Manual of AMS (Overall)

- The operations manual for RIS, RWFIMS, BIS and TIS will be prepared as part of Task 28 and PMS, RMMS under sub-task 43 will be integrated and a draft operation manual for AMS will be submitted.
- This task will be initiated during 18th month of the assignment after successful testing of overall AMS and a draft manual shall be submitted followed by a final at 23rd month.

Task No.	Task / Activities	Year-1 Quarter-1	Year-1 Quarter-2	Year-1 Quarter-3	Year-1 Quarter-4	Year-2 Quarter-1	Year-2 Quarter-2	Year-2 Quarter-3	Year-2 Quarter-4	Year-3 Quarter-1	Year-3 Quarter-2	Year-3 Quarter-3	Year-3 Quarter-4
TASK-3:	**DEVELOPMENT OF PLANNING TOOLS**												
Sub-Task 30	Develop Analytical Tools for HDM-4 based Pavement Management System (PMS)			—	—								
Sub-Task 31	Develop Analytical Tools for Strategic Budgeting Studies				—								
Sub-Task 32	Develop Analytical Tools for Project Level Analysis				—								
Sub-Task 33	Develop Analytical Tools for Multi-year Programming				—								
Sub-Task 34	Calibrate HDM-4 based PMS					—							
Sub-Task 35	Estimate Unit Costs for Maintenance Activities (for PMS & RMMS)			—	—								
Sub-Task 36	Develop Analytical Tools of Routine Maintenance Management System (RMMS)				—								
Sub-Task 37	Develop Right of Way Features Management System (RWFMS)			—									
Sub-Task 38	GIS Development and Integration	—	—	—	—								
Sub-Task 39	Overall System Integration				—								
Sub-Task 40	Prepare and Submit overall System Design Report				—●								
Sub-Task 41	Overall System Testing				—	—							
Sub-Task 42	Install O-AMS Live in OWD					—●							
Sub-Task 43	Prepare and Submit Operation Manual(s) for PMS, RMMS and RWFMS				—●	—●							
Sub-Task 44	Prepare and Submit Operation Manual of AMS (Overall)						—	—	—●				

Legend

- — Continuous
- ••• Intermittent
- ○ Workshop / Seminar / Survey
- ● Report Submission

Task 4 – Preparation of annual road condition reports and rolling maintenance plans

4.24 Using the AMS, the consultant shall prepare an annual road condition and traffic report, using annually updated data, for 2011, 2012 and 2013 on all road networks in Orissa, comprising the National Highways (selected data), State Highways, Major District Roads and Other District Roads, to a format to be agreed with the client. The report shall be suitable for public dissemination and shall be posted by the OWD on its website.

4.25 On the basis of an indicative budget to be provided by the OWD, the consultant shall use the AMS to produce a three year program of maintenance and improvement works on the core road network, comprised of State and Major District Roads, with a focus on prioritizing periodic maintenance, rehabilitation and improvement works. The program shall be produced to a timeframe that meets the government's budgeting cycle and is to be revised in an iterative process as more accurate forecasts of the next FY budget become known. The consultant will prepare a 3 year medium term expenditure plan and evaluate the possible funding sources for this expenditure plan.

4.26 The rolling maintenance plan shall be revised twice by the consultant so as to provide input into decision making over three fiscal years in all.

4.27 Using the AMS data, the consultant will prepare an Orissa Works Department (OWD) Annual Report on a format to be agreed with the client. The annual report will present for example: a) current network condition and traffic; b) road works in execution; c) road works completed; d) annual budget for routine maintenance; periodic maintenance; rehabilitation and improvement works; d) road accident and other traffic statistics; e) bridges condition and annual works; and f) projected network condition, traffic and road works for future years.

Consultant's Indicative Methodology for Task-4

Task – 4 has been broadly divided 9 Sub-Tasks as detailed below:

Sub-Task 45 Prepare Annual Road Condition and Traffic Report- Year 1 (i.e. 2011)

- Once data collection in the first year is complete with preliminary analysis, the Consultant proposes to prepare a report on "Annual Road Condition and Traffic".
- The coverage of this report will be limited to the roads under the jurisdiction of OWD. The following information is expected to be available:
    - An inventory of road & bridge asset for complete 18,069 km
    - Roughness level on road asset for 8,163 km of SH&MDR
    - Pavement condition for 11,755 km of NH, SH&MDR
    - Bridge condition for 1,650 bridges on SH&MDR
    - Information on pavement strength for 6,122 km of SH&MDR
    - Traffic characteristics on SH&MDR at 200 locations
    - Vehicle loading characteristics on SH&MDR at 30 locations
- The analysis of data/information would typically result in the following:
    - Road network characteristics – condition (limited to OWD network)
    - Distribution of OWD network by classification (NH, SH…) and roughness class.
    - Overall weighted roughness on OWD network. This could be one of the PCIs
    - Distribution of OWD network by classification (NH, SH…) and surface distress indicators
    - Distribution of OWD network by classification (NH, SH…) and deflection
    - Road network characteristics – traffic (limited to OWD network)
    - Summary results in terms of average daily traffic, traffic composition, hourly variation etc.

- Vehicle loading characteristics – (limited to OWD network)
- Average axle loading, VDF, ESA etc.

- Maximum use of AMS is expected in preparing such reports. The format for reporting results which should be suitable for public dissemination and hosting on the web will be finalized in consultation with OWD.
- This task will be initiated during 9th month of the assignment and a draft report will be submitted followed by a final one at the end of 14th month. The Consultant will, however, explore possibilities of proposing sub-deliverable comprising part of the analysis/area etc. well before the actual submission to obtain early response of the client on the same.

Sub-Task 46 OWD Annual Report- Year 1 (i.e 2011)

- The preparation of "Annual Report" will take state perspective into consideration and would propose key performance indicators for evaluation every year. Key results of "Annual Road Condition and Traffic" report would also be utilized appropriately. An "Annual Report" will be a performance report of the OWD.
- For this purpose, information on the following will be obtained from OWD related to year 1:
  - Mandate of the OWD
  - Human resource at various levels.
  - Physical achievement: maintenance and improvement works as regards roads and bridges i.e. roads/bridge work completed and in progress.
  - Annual outlay by various heads and sub-heads
  - Financial achievement: expenditure incurred on maintenance work, improvement (new road/bridge, widening, rehabilitation etc.)
  - Expenditure on establishment.
  - Expenditure on R&D, ICT, PPP etc.
- The results on the following would be utilized appropriately:
  - Road network and traffic characteristics-physical
  - Road network in the state by various class (NH, SH, MDR, ODR etc.)
  - Distribution of network by ownership and responsibility
  - Road network density by area and population
  - Distribution of road network by surface type (concrete, BT, unsealed)
  - Distribution of Road network by road class and width standard (ML, SDLPS, SDL, IL, SL etc.)
  - Total lane-km in the state
  - Vehicular growth trend in the state
  - Accident trend in the state (based on secondary information)
  - Establish key performance indicators which are measurable and quantifiable every year for comparison.
  - Current road network condition (limited to NH, SH&MDR network)
  - Distribution of OWD network by classification (NH, SH…) and Roughness class.
  - Overall weighted roughness on OWD network. This could be one of the PIs
  - Distribution of OWD network by classification (NH, SH…) and Surface distress indicators
  - Distribution of OWD network by classification (NH, SH…) and deflection class
  - Road network characteristics – traffic (limited to NH,SH&MDR network)
  - Distribution of OWD network by classification (NH, SH…) and Traffic class
  - Road network utilization – vehicle-km and tonne-km (based on assumed pay load).
  - Distribution of OWD network by classification (NH, SH…) and LOS
  - Vehicle loading characteristics – traffic (limited to OWD network)
  - Average axle loading, VDF, ESA etc.
- This report is also proposed to include projected network condition, planned road/bridge works in subsequent year(s) along with outlay.
- The format for reporting results in annual report will be finalized in consultation with OWD.

- This task will be initiated during 12th month of the assignment and a draft report will be submitted followed by a final at 14th month. However, depending on the actual take-off month of this project and in view of covering the complete financial year for reporting through year 1 annual report, timing of such submission from the start of the project may vary somewhat from the above.

Sub-Task 47 Prepare Rolling Three-Year Maintenance Plan

- The Description of Services suggests preparing three-year rolling maintenance program which means preparation of plan considering budgets availability in three years, maintenance need and most importantly prioritization of maintenance work. But, the Consultant will consider preparing the multi-year programme for medium to long term.
- However, each subsequent year the rolling maintenance program is revised considering actual budget availability, works accomplished in previous year and a budget forecast for a further year.
- The plan will focus on prioritizing periodic maintenance, rehabilitation and improvement works. The plan will be produced to a time frame that meets the government's budgeting cycle. However, production of first three year rolling maintenance programme will depend on actual start month of the assignment, availability of data and status of system development.
- The economic evaluation model, PMS and RMMS will be ready by 14th month of an assignment. Therefore generation of multi year programme using the tools will take at least 2 months. Hence, it is expected to submit the report at 17th month.

Sub-Task 48 Prepare Annual Road Condition and Traffic Report - Year 2 (i.e. 2012)

- Under this sub-task, second year Annual Road Condition and Traffic Report is proposed to be prepared and submitted. In addition to the items as discussed in sub-task 45, a comparison is possible at this stage with second round data (traffic) and hence be included.
- This report is expected to utilize full potential of the AMS. Hence most of the reports/charts included in this will be a direct output of the AMS. The Consultant has proposed to incorporate feedback of OWD on report for year 1 and modify this report accordingly.
- This sub-task will be initiated during 19th month of the assignment and a draft report will be submitted followed by a final at the end of 24th month.

Sub-Task 49 OWD Annual Report - Year 2 (i.e. 2012)

- Information obtained from OWD (as mentioned in Sub-Task 46) is proposed to be updated for the year 2. A review of the performance indicators established is proposed to be included based on the new data available during year 2. Feedback from OWD on Annual Report 1 will also be incorporated in this Annual Report 2.
- The Consultant will customize some of the standard reports in consultation with OWD into AMS so that it could straight be included in subsequent Annual Report.
- This sub-task will be initiated during 22nd month of the assignment and a draft report will be submitted followed by a final at 24th month.

Sub-Task 50 Prepare Rolling Three-Year Maintenance Plan - Revision 1

- The plan prepared under sub-task 47 is proposed to be revised in an iterative process as more accurate forecasts of the next financial year budget become known. The revised report will include a further year and indicative budget for that financial year in prioritizing maintenance program.
- This task will be initiated during 22nd month of the assignment and a draft report will be submitted followed by a final at 24th month.

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Sub-Task 51 Prepare Annual Road Condition and Traffic Report - Year 3 (i.e. 2013)

- The sub-task as discussed under heading "Sub-Task 45 & 48" is proposed to be repeated to prepare third year "Annual Road Condition and Traffic Report". This report will utilize results of surveys conducted during third year and be submitted at the end of 36th months from start of the assignment.
- This sub-task will be initiated during 30th month of the assignment and a draft report will be submitted followed by a final one at the end of 36th month.

Sub-Task 52 OWD Annual Report - Year 3 (i.e. 2013)

- The sub-task as discussed under hearing "Sub-Task 49" is proposed to be repeated to prepare and Annual Report-3 for OWD. This will be submitted at the end of 36th months from start of the assignment.
- This sub-task will be initiated during 33rd month of the assignment and a draft report will be submitted followed by a final one at the end of 36th month.

Sub-Task 53 Prepare Rolling Three-Year Maintenance Plan - Revision 2

- The sub-task as discussed under sub-task 50 is proposed to be repeated as second revision in "three year rolling maintenance plan – Revision 2". This plan would hence incorporate work accomplished in previous two years, performance of the maintenance strategy adopted, and actual budget availability for the following Financial Year indicative budget for a further one year.
- The maintenance plan will accordingly be adjusted and proposed.
- It will depend on actual start month of assignment. Hence, the precise month of these deliverables will be indicated in our Inception Report which will consider a time frame that meet government's budgeting cycle.
- This task will be initiated during 33rd month of the assignment and a draft report will be submitted followed by a final at 36th month.

Task No.	Task / Activities	Year-1				Year-2				Year-3			
		Quarter-1	Quarter-2	Quarter-3	Quarter-4	Quarter-1	Quarter-2	Quarter-3	Quarter-4	Quarter-1	Quarter-2	Quarter-3	Quarter-4
TASK-4:	PREPARATION OF ANNUAL ROAD CONDITION REPORTS AND ROLLING MAINTENANCE PLAN												
Sub-Task 45	Prepare Annual Road Condition and Traffic Report- Year 1			▪▪▪	▪▪▪	●							
Sub-Task 46	OWD Annual Report- Year 1				▪▪▪	●							
Sub-Task 47	Prepare Rolling Three Year Maintenance Plan					●	●						
Sub-Task 48	Prepare Annual Road Condition and Traffic Report- Year 2							▪▪▪	▪▪▪ ●				
Sub-Task 49	OWD Annual Report- Year 2								▪▪▪ ●				
Sub-Task 50	Prepare Rolling Three Year Maintenance Plan - Revision 1								●				
Sub-Task 51	Prepare Annual Road Condition and Traffic Report- Year 3											▪▪▪	▪▪▪ ●
Sub-Task 52	OWD Annual Report- Year 3												▪▪▪ ●
Sub-Task 53	Prepare Rolling Three Year Maintenance Plan - Revision 2												●

Legend

— Continuous

▪▪▪ Intermittent

○ Workshop / Seminar / Survey

● Report Submission

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Task 5 - Road Classification.

4.28 The consultant will review the existing road classification system and establish a new classification system based on road functions. The existing classification system will remain but the consultant will superimpose the functional classification system over the existing one to develop a matrix of classification. The functional classification could be based on parameters such as traffic intensity and road function such as arterial, collector or access road. The functional classification will be used to define the improvement/maintenance priority and, recommend optimal standards for design, construction, and maintenance – which could be different for different categories of roads. The consultant will also help the OWD to divide its road network into homogenous road sections to be used as a unit for periodic maintenance and improvement under the proposed system. The database of the AMS should also allow for automatic sectioning so that road sections are created using factors such as condition, inventory and traffic as the criteria. The sectioning process will be interactive with the user being able to adjust the resulting sections.

Consultant's Indicative Methodology for Task-5

Task – 5 has been broadly divided 4 Sub-Tasks as detailed below:

Sub-Task 54 Establish and Deliberate on New Classification System

- Under this sub-task together with sub-task 13, criteria for defining a functional classification system will be proposed based on analysis of the collected road inventory and traffic data. Further to the data collected, socio-economic and demographic parameter will also be considered based on a multi-criteria analysis.
- The consultant will superimpose the new classification of the roads over the existing one to develop a matrix of classification for discussion with OWD.
- This sub-task will be initiated during 3rd but may go on till 10th, as it would be dependent on some of the data to be collected by the Consultant from field.

Sub-Task 55 Prepare and Submit New Classification System

- Based on the comments from OWD, the classification systems will be further revised.
- The final road classification system along with a list of roads for each classification will be submitted to OWD.
- This task will be initiated during 10th month of the assignment and completed at the end of 11th month along with a report submission on same.
- The agreed new classification system of the state road network (limited to the coverage under this project) will be one of the additional attribute of road in RIS.

Sub-Task 56 Prepare Standards for Various Classification

- Roads classified under the new classification system may require different maintenance standards and facilities because of variation in traffic and importance. These will be defined accordingly.
- This sub-task will be initiated during 10th month of the assignment and completed at the end of 12th month.

Sub-Task 57 Prepare Homogeneous Sections

- Homogeneous sections would have been already created as a part of sub-task 30.
- They will be reviewed based on new functional classification again and adjusted, if necessary.
- This sub-task will be performed during 12th month of the assignment.

Task No.	Task / Activities	Year-1			
		Quarter-1	Quarter-2	Quarter-3	Quarter-4
TASK-5:	ROAD CLASSIFICATION				
Sub-Task 54	Establish and Deliberate on New Classification System				
Sub-Task 55	Prepare and Submit New Classification System				
Sub-Task 56	Prepare Standards for various Classification				
Sub-Task 57	Prepare Homogeneous Sections				

Legend
— Continuous
••• Intermittent
O Workshop / Seminar / Survey
● Report Submission

Task 6 – Transfer of skills to OWD staff

4.29 A training needs analysis shall be undertaken by the consultant that identifies skills gaps in all levels of professional staff in all aspects of maintenance planning (including the use of the various software packages and the knowledge to modify or improve the systems developed under the contract) to be provided under these services.

4.30 A set of training program shall be prepared, agreed with the client and delivered on all components of the AMS developed under the project. The training program will utilize a number of techniques and tools to transfer skills, including workshops, field training and practical experience.

4.31 The consultant shall prepare or otherwise provide all operational and training materials, which will be the property of the GOO, for delivery of the program.

4.32 The following is an indicative list of training requirements.

Table 4 Tentative minimum Training Requirements

Indicative Training Programme	Duration of Training	No. of Batches	No. of Trainee in each batch	Type of Trainee
Data acquisition, interpretation, collection including data entry	3 days at site	7	15	JE/AE
Maintenance planning and budgeting including data entry for economic model and use of the software applications to be developed for AMS.	2 days at office	7	15	JE/AE
Data acquisition, interpretation, collection including data entry, Maintenance planning and budgeting including use of software applications, performance monitoring and reporting through use of AMS	2 days at office	7	5	EE
Performance monitoring and decision making using AMS and RIS	1 day at office	2	20	SE/CE
Software maintenance, modifications and improvements	2 days at office	3	10	IT Staff

The Consultant shall bear all cost of organizing the workshop / training for on the job training. For this purpose Consultant shall assume training to be delivered both in the field as well as in office for a 700 person days in total over the period of the services.

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Exposure Visits

The Consultant shall also arrange and bear all the expenses required for Field Exposure Visit outside the country on Asset Management as a part of technology transfer. Three numbers Field Exposure visits to groups of four OWD Engineers in Developed Countries for a minimum period of two weeks in each trip shall be arranged.

Further the Consultant will impart training to 40 OWD Engineers in batches on Road Asset Management Projects outside the State but inside the Country in 10 batches for a minimum duration of one week excluding transit.

The Consultant has to include all expenses for such as air travel, per diem as per standard prevailing rates, lodging, boarding, inland transportation, visa fee, health insurance etc. as applicable alongwith a counterpart person of the Consultant as accompanying guide-cum-facilitator for both overseas training and trainings inside country. The Travelling allowance & Daily allowance permissible during overseas travel for GOO officials are as per the notification issued from time to time by the Department of Expenditure, Ministry of Finance & Ministry of External Affairs, Government of India and the same for inland travels is governed by the notification issued from time to time by the Finance Department, Government of Orissa.

The cost for the entire training and exposure visits as above shall be provided in the financial proposal and this cost shall be considered for evaluation.

Consultant's Indicative Methodology for Task-6

Task – 6 has been broadly divided 8 Sub-Tasks as detailed below:

Sub-Task 58 Finalise Methodology to Assess Training Needs

The training will be conducted at the following three levels:

1. **Training in Orissa: for approximately 700 engineers/IT staff days from various levels using various techniques such as on-the-job, class rooms, field visits, system use, seminars, round table discussion etc.**
2. **Training outside Orissa (in any States having RMS/AMS): for approximately one week to ten batches comprising of four engineers in each batch.**
3. **Overseas Training (At any Developed Country) approximately two weeks tour for each batch comprising four engineers from OWD. Three such batches during first 36 months of the assignment.**

- Out of these three levels, Level-1 is proposed to be carried out after having training needs assessment done. The Consultant will finalise methodology for training needs assessment covering OWD at the inception stage and the actual sample size to be decided in consultation with OWD covering the level of offices of OWD.
- Once the methodology for TNA is agreed, surveys/interactions will be undertaken under following sub-tasks.
- For the purpose, the key professionals in the team would provide required guidelines for assessing training needs as regards implementation of the asset management system.
- The Consultant have kept a separate position as Training Expert/Facilitator. The person proposed as Training Expert/Facilitator has been extensively involved imparting to its clients innovative techniques and methodologies through the technology transfer programs. The entire task related to "Training Needs Assessment" will be undertaken by this position.
- This sub-task will be carried out during 2nd month of the assignment.

Sub-Task 59 Conduct Consultations and/or Survey

- As per agreed methodology under sub-task 58, this sub-task is to implement the same. For doing this, it is proposed to develop structured formats for interactions will senior management; to prepare list of information required from the OWD and; to develop "self assessment form". The form is proposed to be circulated to select staff on pilot basis first.
- In parallel, sampling of staff for many will be undertaken once feedback from field/site staff as many format is received, the same will be updated and final forms will be circulated to the sampled staff.
- Though, our Training experts will be responsible for coordinating the task and getting responses back from OWD staff, cooperation from PIU/OWD is highly solicited at this stage.
- This sub-task will be performed during 2nd to 4th month of the assignment.

Sub-Task 60 Assess Training Needs of OWD Staff

- Generally, self assessment from will reveal "Self Assessment of Competency Level" on various areas such as :
    - Policy and Planning
    - Design
    - Procurement, contract arrangement and project management
    - Safety aspects
    - Systems/Software use
    - Computer literacy
    - Maintenance
    - Working with people etc.
- It will also reveal perceived area of training needs. This will lead to training needs identification at various levels with focus to use AMS once implemented in the state.
- The Consultant will develop/identify levels of training needs in the above subject areas.
- This task will be performed during 3rd to 5th month of the assignment.

Sub-Task 61 Prepare and Submit Training Needs Assessment Report

A draft report on "Training Needs Assessment" will be submitted to the OWD by the end of six months from the start of the assignment. This will be further refined based on comments from OWD and a final revision will be submitted.

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Sub-Task 62 Evolve Training Program

- While OWD will finalise list of the OWD staff from various offices including HQ to be trained on AMS by the Consultant. The Consultant will develop a training program for the same.
- Members of Consultant's team will impart on-the-job-training to the identified OWD staff in addition to the training sessions comprising:
  - Seminars
  - Class rooms instructions
  - Field visits
  - Discussions/R&A

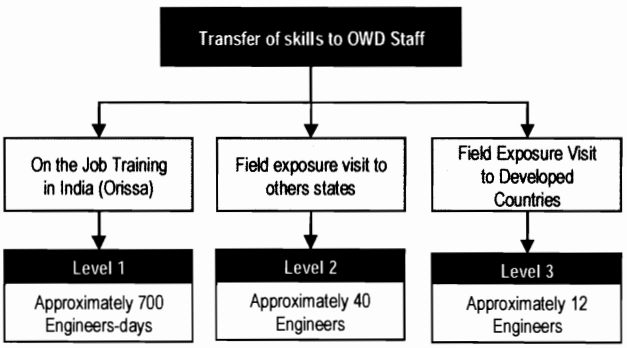

Table 4: Training

Trainee Type	No.	Likely Skill Needs	Forms of training	Skills	(For selected 40 Engineers)	(for selected 12 OWD engineers)
JE/AE	105	Data Acquisition, interpretation, collection including data entry	Field Visit	Data Collection Procedure	Visit to States of India where Asset Management Systems have been in use, benefits, problems found and solutions used etc. Each batch comprising four engineers from OWD One Week each batch Visit to Maharashtra and or Gujrat or Kerala or any other mutually agreed State	Visit to developed country to experience how developed countries uses such system, benefits, problems found and solutions used etc. Each batch comprising four engineers from OWD Two weeks each to Toronto, Canada.
			Seminar	Data Collection Techniques and data collection		
			Class Room	System use including data entry		
JE/AE	105	Maintenance planning and budgeting and procurement including data analysing and evolving the software applications to be developed for AMS.	Field Visits	Data Collection Procedure		
			Seminar	Data verification & Analysis Maintenance planning and budgeting		
			Class Room	System application		
EE	35	Maintenance planning and budgeting including use of software applications, performance	Class Room	Maintenance planning and budgeting using system application		
			Discussion/Q&	Performance monitoring and		

Trainee Type	No.	Likely Skill Needs	Forms of training	Skills	(For selected 40 Engineers)	(for selected 12 OWD engineers)
		monitoring and reporting including through use of software applications,	A	reporting using AMS		
SE/CE	40	Performance monitoring and decision making using AMS and RIS	Class Rooms	Performance monitoring and decision making using AMS and RIS		
			Discussion/Q&A	Queries		
J T Staff	30	Software maintenance, modifications and improvements	On-the-job	Software maintenance, modification and improvement		

- In overall training process, a group of engineers will be identified to be trained as "Trainers" for the other OWD staff. Most probably any training related to system (AMS) would start after a year from the start of the assignment.
- This task will be initiated during 7th month of the assignment and completed by 8th month.

Sub-Task 63 Develop Training Materials

Training material is proposed to be developed under the following focus area:

Table 5: Training Material

Data Collection & Entry in AMS	• Overall requirement of data in AMS • Collection proceedings such as manual and or through equipments • Data Collection Format • Data Coding • Data Entry (AMS: User Manual) • Feed back form
Maintenance Planning & Budgeting	• Explanation of decision tree being used in PMS/RMMS of the proposed OAMS • Work item/specification • Rate estimate and revision • Optimisation using HDM-4 and or dTIMS
System use including Data entry – Level I	• User Manual • Feedback form
System Use Level-II	• Performance monitoring and reporting • Decision making process • Feedback form

System use including Data entry – Level I	• User Manual • Feedback Form
System use Level-II	• Performance monitoring and reporting • Decision making process • Feedback form
HDM-4	• Data flow between AMS and HDM-4 • Strategic budgeting • Project level analyses • Multi year works preparing and optimisation • Projection of network condition and … budget scenario
System Maintenance	• System Administration • Installation, etc.

- The Consultant will develop such materials in consultation with OWD before its use. However, important feedback is expected on the user manual during its use in training which will be incorporated appropriately.
- This sub-task will be initiated during 7th month of the assignment and completed by 14th month.

Sub-Task 64 Conduct Training Courses

- Once training program and material are mutually agreed, conduct of training courses are relatively straight forward.
- In addition to key professionals, the Consultant proposes to utilise our professionals proposed under support professional category to impart training at appropriate level on related aspects.
- This sub-task will be initiated during 10/11th month of the assignment and repeated during 15/16th month.

Sub-Task 65 Conduct Exposure Visit

- A field exposure visit to developed countries will be undertaken to gain experience on how such countries use Asset Management System, their benefits and problems found and solutions used etc.
- Since our key professionals have their working experience in Ministry of Transportation, Ontario, Canada, the Consultants propose the exposure visit be conducted in Canada. This will be finalized after discussion with senior OWD officials. This visit will be conducted for two weeks in three batches each comprising of four OWD officers.
- This sub-task will be initiated in consultation with OWD.

All cost relating to training and exposure visit shall be borne by the Consultant as detailed in Sl. 4.32 and Appendix F.

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Task No.	Task / Activities	Year-1				Year-2				Year-3			
		Quarter-1	Quarter-2	Quarter-3	Quarter-4	Quarter-1	Quarter-2	Quarter-3	Quarter-4	Quarter-1	Quarter-2	Quarter-3	Quarter-4
TASK-6:	SKILL/KNOWLEDGE TRANSFER												
Sub-Task 58	Finalise Methodology to Assess Training Needs												
Sub-Task 59	Conduct Consultations and/or Survey												
Sub-Task 60	Assess Training Needs of OWD Staff												
Sub-Task 61	Prepare and Submit Training Needs Assessment Report												
Sub-Task 62	Evolve Training Program												
Sub-Task 63	Develop Training Materials												
Sub-Task 64	Conduct Training Courses												
Sub-Task 65	Conduct Exposure Visits												

Legend

- Continuous
- Intermittent
- Workshop / Seminar / Survey
- Report Submission

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Task 7 – Ongoing Support

4.33 For a period of one year after the initial assignment of two years the consultant shall arrange for approximately 2 month of one or more technical specialists (may not be key persons) to assist with the ongoing application of the system and data collection. They will assist the Client in applying or modifying the system to develop an investment plan, 5-10 year maintenance program and the budget allocations. They will also update the training of the staff as necessary. The Client shall determine the timing and duration of visit. The Consultant shall submit annual Report comprising of the performance of AMS, Data Collection, Training aspects etc during this support period.

Consultant's Indicative Methodology for Task-7

Task – 7 has been broadly divided 5 Sub-Tasks as detailed below:

As per Detailed Scope of Work given in Appendix A, Consultants are expected to provide support to OWD with ongoing application of the system during third year of assignment. The Consultants will provide approximately 20 man-months of one or more technical and Key staff for the support on assistance in field data acquisition / updation / integration / report. This support would also ensure support to prepare subsequent road condition reports and rolling maintenance plans, to a schedule to be agreed with the client.

Sub-Task 66 Assist in Ongoing Application of the System and Data Collection

- The Consultant will designate a person from the working team to co-ordinate with any such needs with OWD. Based on the support required in data collection by OWD staff in field /queries raised that person will co-ordinate with suitable specialist and get back to OWD. Local technical support staff shall be mobilized for the required period to provide technical support to OWD staff during data collection period.
- Key persons / Specialists (if required) will be mobilised in the field for agreed duration. In addition to 2 month input of key specialists, the Consultant has kept a provision for input from technical support professionals. Depending upon the actual requirement, suitable support staff could be mobilised for the purpose.
- Under this sub-task, intermittent input from professional will be available during 25-36th month of the assignment.

Sub-Task 67 Assist in Modifying or Developing Investment Plans & Budget Allocation

- This sub-task will require support from HDM-4/dTIMS specialist. The Consultant will mobilise this person along with PMS specialist (if required) to support OWD during updating/modifying/developing investment plan/three year rolling maintenance plan and budget allocation.
- This sub-task will be initiated during 35th month of the assignment and completed by 36th month

Sub-Task 68 Assist in Ongoing Training

- It is expected that the "trainers", trained for this purpose, will be able to carry forward training program further for OWD engineers.
- Consultant may mobilise IT professionals for short period(s) for training in this area.
- However, database administrator, system programmer and GIS specialists will be provided to support OWD as per the committed manpower requirements.
- This sub-task will be performed between 27th and 36th month of the assignment.

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Sub-Task 69 Technical Support of the System

- Beyond the initial 24 months and upto 36 months from start of the assignment. The Consultant will continue to provide technical support with "bug" fixes, clarification etc.. This sub-task will primarily be done on a combination of online and offline.
- For any fixes to the custom-developed part, the technical support staff will be available at Bhubaneswar to fix any identified bugs.
- For clarification on COTS, the Consultant will setup one email_ID to receive any queries by email or by phone. Our technology experts will respond to these queries by email or by phone and send paths/updates (if required) for trouble shooting as early as possible.
- The Consultant will develop a format for any `bugs' or error to be recorded by OWD engineers.
- Under this sub-task intermittent input from professional will be available during 25th and 36th month of the assignment as needed.

Sub-Task 70 AMS Performance Report (Year 3)

- With the help of technical specialists/support professionals during the last two years of the assignments, the Consultant will develop Annual Performance Report comprising performance of developed AMS, data collection activities, training aspects etc.
- The reports will be submitted as per the schedule.

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Task No.	Task / Activities	Year-1				Year-2				Year-3			
		Quarter-1	Quarter-2	Quarter-3	Quarter-4	Quarter-1	Quarter-2	Quarter-3	Quarter-4	Quarter-1	Quarter-2	Quarter-3	Quarter-4
TASK-7:	**ONGOING SUPPORT**												
Sub-Task 66	Assist in Ongoing Application of the System and Data Collection												
Sub-Task 67	Assist in modifying or developing Investment Plans & Budget Allocation												
Sub-Task 68	Assist in Ongoing Training												
Sub-Task 69	Technical Support of the System												
Sub-Task 70	AMS Performance Report (Year 3)												

Legend

- Continuous
- Intermittent
- Workshop / Seminar / Survey
- Report Submission

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Task 8 - Manuals, Technical Guidelines, and Completion Report:

4.34 The consultant shall develop comprehensive user manuals and technical guidelines for the developed systems (software), data-collection, preparation of road improvement plans, annual maintenance plans, generation of road condition and other reports, and performing various analyses using the AMS. The consultant shall provide soft copies of all the manuals, technical guidelines and other reports. On completion of the services the consultant will provide a completion report including the lessons learnt further work, and institutional and business procedure changes that may be required to further enhance the use of the AMS and sustain its use.

Consultant's Indicative Methodology for Tasks-8

Task – 8 has been broadly divided 5 Sub-Tasks as detailed below:

To this end, it is vitally important that the users have a "Who, What, Where, When, Why, and How" guide to the AMS. Accordingly, the Consultants will prepare the following documents/ materials to be made readily available to its users:

- AMS user guide
- AMS system administration manual
- AMS data collection and update manual
- Training materials

Soft copies of all above material will be submitted to the Client.

Sub-Task 71 Finalise AMS Technical Manuals (User Manual, System Administration Manual)

- An User Manual will describe the functions in the AMS, how to use the software and data collection equipment, how to collect data and update database etc. Although, training will be provided to select officers, it is not possible to train all the officers at same level at the same time. In this regard, User Manual will be useful to the officers who could not be trained under this project.
- A Draft Manual will be submitted at the end of 12th month.
- System Administration Manual is a guide to administering AMS (e.g. software installation, configuration and upgrade procedures; administration of users and data/program security). This will contain all the technical procedure for installation, configuration and troubleshooting procedure. This will be submitted during ongoing support period.
- This sub-task will be initiated during 10th month of the assignment and completed at the end of 12th month, but additions / modifications will continue till 18th month with submission of manual.

Sub-Task 72 Finalise Data Collection Procedure Manual

- Data Collection Procedure manual will be submitted at the end of 3rd month containing data collection forms and procedures.

Sub-Task 73 Finalise Training Material /Manual

- Any training material (e.g. slide presentations, notes, training exercises) that could be used to assist in training of new users on the various components will be prepared. The Consultant will develop such materials in consultation with OWD.

Sub-Task 74 Finalise Completion Report

- On completion of the services, the Consultants will prepare a completion report including any lessons learnt, and institutional and business procedures changes that may be required to further enhance the use and sustainability of the AMS.

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- This sub-task will be initiated during 35th month of the assignment and completed at the end of 36th month

Sub-Task 75 Quarterly Progress Report

- Progress on each task during the quarter shall be detailed out in the quarterly progress report. Tasks/Sub-tasks which are planned for the next quarter will also be included.
- The repot will flag any issues pending for decision from OWD.
- This sub-task will be performed at the end of every three month during first week.

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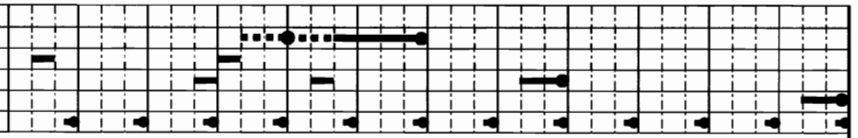
TASK-8:	MANUALS, TECHNICAL GUIDELINES, AND COMPLETION REPORT
Sub-Task 71	Finalise AMS Technical Manuals (User Manual, System Administration Manual)
Sub-Task 72	Finalise Data Collection Procedure Manual
Sub-Task 73	Finalise Training Manual
Sub-Task 74	Finalise Completion Report
Sub-Task 75	Quality Progress Report



Legend

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Workshop / Seminar / Survey
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Task 9 – Procurement of Hardware, Software and data collection Equipment etc.

4.35 The consultant shall assess the need for hardware, software and data collection equipment required by the Client based on the needs analysis as well as the facilities already available during the Inception period. Subsequently the Consultant shall assist the Client in procurement of above items as per World Bank Procurement Guidelines without charging any service fee for the same. The Consultant shall provide similar assistance free of charge beyond the 24 month full time assignment period and up to the end of 12 months service period for any additional procurement requirement for effective implementation of AMS.

Consultant's Indicative Methodology for Task-9

Task – 9 has been broadly divided 5 Sub-Tasks as detailed below:

The Consultants are mandated to develop AMS satisfying the requirements mentioned in Detailed Scope of Work in Appendix A, which encourages procurement and use of the Commercial Off-The-Shelf (COTS) software to optimize the resource in development. Hence, procurement requirements can be classified into three categories as follows:

1. Software
2. Hardware
3. Data Collection Equipment

Sub-Task 76 Recommend Software (COTS /Database / Front End Application, Report Designer, GIS, HDM4 etc)

- The Consultants have proposed to use dTIMS as "Commercial Off-the-Shelf Software" around which AMS will be developed. If necessary, during the development stage, the Consultant will use its own legally acquired licenses to develop new forms, tables etc.. At the completion of the project, any software required for further development and or maintenance will have to be acquired by Client at its own cost. Deighton Associates (COTS provider for dTIMS) will provide necessary license for as many users as required by OWD at the Client's cost.
- Consultants will assist OWD in procurement of software license of front end application, Microsoft SQL Server, GIS Application and HDM-4 and or Report Designer application at OWD cost. In case there is a need for other software licenses, the Consultants will also assist OWD for procurement of the same.
- This sub-task will be performed between 1st and 2nd month for the COTs and for the rest this task will be done during 8th month or as required.

Sub-Task 77 Recommend Hardware for AMS (Servers, Work Stations, Networking, Webhosting)

- Depending on agreed system architecture, the Consultants will propose to OWD on requirement of hardware. Once agreed, OWD will procure the same at their own cost with assistance from the Consultants. The proposal will include but not be limited to the following:
  - Servers: database/application/FTP
  - Client PCs with operating system
  - Printers
  - Plotters
  - Scanners
  - Peripherals (including LAN/WAN requirement)
- This sub-task will be performed by 7th/8th month.

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Sub-Task 78 Recommend Data Collection Equipments

- Depending on agreed procedure for data collection, the Consultants will propose to OWD the requirement for data collection equipment. Once agreed, OWD will procure the same at their own cost with assistance from the Consultant. This will include but not be limited to ROMDAS, Benkelman Deflection Beam, GPS handsets etc.
- This task will be performed in 4th and 5th month.

Sub-Task 79 Report on Procurement of Hardware, Software and Data Collection Equipment

- A report (recommendations) detailing out the specification of the software, hardware and data collection equipments will be arranged from the providers and submitted to the Client. Approximate quantity of requirement of such will also be worked out for entire OWD in association with the Client and submitted along with approximate budget required.
- This task will be performed at 8th month.

Sub-Task 80 Assist Procurement

- The Consultants will provide all necessary assistance in procurement of the hardware, software and data collection equipment.
- Under this sub-task support will be given during month 6 – 12 for procurement

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Task No.	Task / Activities	Year-1				Year-2				Year-3			
		Quarter-1	Quarter-2	Quarter-3	Quarter-4	Quarter-1	Quarter-2	Quarter-3	Quarter-4	Quarter-1	Quarter-2	Quarter-3	Quarter-4
TASK-9:	**PROCUREMENT OF HARDWARE, SOFTWARE AND DATA COLLECTION EQUIPMENT**												
Sub-Task 76	Recommend Software (Database / Front End Application, Report Designer, GIS, HDM-4 etc)												
Sub-Task 77	Recommend Hardware for AMS(Servers, Work Stations, Networking, Webhosting)												
Sub-Task 78	Recommend Data Collection Equipments												
Sub-Task 79	Report on Procurement of Hardware, Software and Data Collection Equipment												
Sub-Task 80	Assist Procurement												

Legend
- Continuous
- Intermittent
- Workshop / Seminar / Survey
- Report Submission

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Task 10 – Implementation and maintenance support:

4.36. After 24 months of the services the consultant shall provide implementation and maintenance support to the OWD in using the proposed system. That will include trouble shooting, resolving any problems faced by the OWD, minor modifications and refinements required in the system to improve its effectiveness based on the feedback information collected from its use, and removing bugs from the Software.

Consultant's Indicative Methodology for Tasks-10

Task – 10 has been broadly divided 3 Sub-Tasks as detailed below:

After implementation on AMS, support on implementation and maintenance as regarding training, data collection and system shall be provided from month 24 to 36. Adequate technical staff to take care of any bugs and troubleshooting will be deployed at Bhubaneswar for such purpose. As already mentioned in Task 7, around 20 man months have been proposed by the Consultant for this purpose during one year of support period.

Sub-Task 81 Assistance / Support in System Use

- It is expected that the "trainers", so trained for the purpose will be able to carry forward training program for other OWD engineers. However, the Consultants will provide assistance on training during 3rd year regarding use of software (AMS).
- Under this sub-task intermittent input from professional will be available during 25-36th month of the assignment.

Sub-Task 82 Assistance / Support in Data Collection

- OWD is expected to undertake data collection on its own using equipments. Although training on data collection would have been imparted to OWD staff, the Consultants will provide further assistance during 3rd year regarding use of data collection equipments, if necessary.
- Under this sub-task intermittent input from professionals will be available during 25-36th month of the assignment.

Sub-Task 83 Maintenance Support of the System

- Beyond the initial 24 months and upto 36 months from start of the assignment. The Consultant will continue to provide technical support with "bug" fixes, clarification etc.. This sub-task will primarily be done on a combination of online and offline.
- For any fixes to the custom-developed part, the technical support staff will be available at Bhubaneswar to fix any identified bugs.
- For clarification on COTS, the Consultant will setup one email_ID to receive any queries by email or by phone. Our technology experts will respond to these queries by email or by phone and send paths/updates (if required) for trouble shooting as early as possible.
- The Consultant will develop a format for any `bugs' or error to be recorded by OWD engineers.
- Under this sub-task intermittent input from professional will be available during 25th and 36th month of the assignment as needed.

Task No.	Task / Activities	Year-1				Year-2				Year-3			
		Quarter-1	Quarter-2	Quarter-3	Quarter-4	Quarter-1	Quarter-2	Quarter-3	Quarter-4	Quarter-1	Quarter-2	Quarter-3	Quarter-4
TASK-10:	**IMPLEMENTATION AND MAINTENANCE SUPPORT**												
Sub-Task 81	Assistance / Support in System Use									▬	▬		▬
Sub-Task 82	Assistance / Support in Data Collection									▪ ▪ ▪ ▬	▪ ▪ ▬		
Sub-Task 83	Maintenance Support of the System									▪ ▪ ▪ ▬	▪ ▪ ▬	▪ ▪ ▪	▪ ▪ ▬

Legend
- ▬ Continuous
- ▪ ▪ Intermittent
- ○ Workshop / Seminar / Survey
- ● Report Submission

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5. REPORTING

The Consultants reporting and output is provided in Appendix B.

6. CONSULTANT INPUTS AND METHODOLOGY

The consultant's indicative approach and methodology is provided at Appendix A. This shall be suitably modified during 1st month of the assignment and provided at Inception Report based on interaction with key professionals and the OWD. The task schedule and staffing schedules are provided at Annexure 2 and 3 of Appendix A.

7. FACILITIES AND SERVICES TO BE PROVIDED BY THE CLIENT

The facilities and services to be provided by the client are provided in Appendix F.

8. OUTPUTS

The Consultants reporting and output is provided in Appendix B.

9. PROJECT TEAM

The Key & Support professionals qualification, experience, input and job description is provided at Annexure-1 of Appendix C. The Broad qualification requirements of key and support professional staff are set down in Annexure-2 of Appendix C.

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ANNEXURE-1

A. FUNCTIONAL AND TECHNICAL REQUIREMENTS OF THE SOFTWARE

After the need analysis is completed, the proposal of the Consultant for the software to be developed or to be purchased will be evaluated against the criteria mentioned below. The following information shall not be used for evaluating the technical proposal of bidders. The option shall be open to the consultant to choose whether he/she wishes to develop his/her own system or buy and customize an off-the-self system provided it satisfies all the basis parameters of need analysis and the system requirement of the country, state and the client. This applies to GIS, the database and the economic modules.

The following clarifications on the functional and technical requirements of the software are to be provided by the AMS Consultant:

1. General Information

The Consultant shall supply the following general information on the proposed system.

- **Commercial Off-the-Shelf Software:** The Consultant may develop the AMS modules through customisation of commercial off-the-shelf (COTS) software or by independently developing one. Proposals based on any proprietary software developed by the consultant or others that would require payment of royalties in future years for AMS modifications or improvements shall not be acceptable.
- **Configurable Software:** The software supplied must be configurable. This means that it is possible for the application administrator (initially the Consultant, but later the Client) to modify parameters or settings, or to otherwise to set up or initialize the system so that it meets the requirements. Applications requiring significant customization (*i.e.* requiring significant additional coding and/or changes to existing source code) will not be considered for the assignment. The Consultant shall clearly indicate the level of customization required for the assignment in their proposal. If this is considered to be excessive, then the proposed system shall rejected by the client.
- **Regional experience with the application:** The Consultant shall indicate in his proposal the regional and country presence of the application, listing within the last five (5) years: (i) all agencies to which the application was supplied; (ii) the year that the system was implemented; (iii) the current status of the implementation; and (iv) the current contract details of the users.
- **Country presence:** The Consultant shall clearly indicate whether or not there are any support offices in the region or country that will provide on-going support after implementation.
- **Support and maintenance services:** The Consultant shall clearly describe future potential support and maintenance services for the application. This should include a sample Service Level Agreement.
- **Reference sites:** The Consultant shall provide a minimum of three (3) reference sites, including contact details, for agencies that have implemented the application within the last five (5) years, and which would be suitable for the Client to contact during any post-process exercise. The Consultant shall confirm with the reference sites prior to submitting the proposal that they are willing to provide comments on the implementation to the Client.

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2. Technical Requirements

Basing on the need analysis findings, the Consultant shall indicate in their report on how the application being proposed conforms to the following Technical Requirements. Note that some of these requirements are Mandatory. If the application being proposed does not conform to a mandatory requirement, then it will be rejected. If the mandatory features are not currently implemented in the system, but will be as part of these services the Consultant shall clearly indicate this in their proposal, and confirm when the features will be available.

The Consultant must clearly indicate whether any customization of source code in his application will be required for the project to meet these technical requirements.

- **Language:** The language of the interface (all menus, screens, reports, and documentation) shall be English.
- **Number of Users:** It is anticipated that up to 50 concurrent users will need access to the application at any one time. The proposal shall clearly indicate the maximum number of users, both potential and in other agencies using the system. The Consultant should give full details of any licensing options, including per user, per seat, or site licenses, in his report . Note that if the AMS is supplied with optional modules that are licensed with separate costs, then the costs of each module should be listed separately in the report.
- **GIS:** Currently, the OWD does not have a Geographic Information System (GIS). The client's preference is for an embedded GIS, although a separate application solution shall be considered. The consultant may propose any internationally recognized GIS software as referred at 4.9.
- **Field Data Collection Devices:** The AMS should support hand-held field data collection devices into which data can be downloaded from the AMS, verified or updated in the field, and synchronized with the AMS later throughthe Client's LAN. Particular attention should be made to accessing data from the equipment to be procured under this assignment in 4.6 of the Task-2 (*eg* ROMDAS, axle load pads, *etc.*)
- **Web Enabling:** The AMS should provide an interface to allow information from the AMS to be made available to other applications, including presentation on Client websites. This is expected to consist of, as a minimum, a map which is linked to summary data as pavement inventory, pavement condition, and traffic volumes.
- **HDM-4 Interface:** The Client wishes the AMS to interface with HDM-4 (the Highway Development and Management Tool) (latest version).

3. Functional Requirements

The Consultant shall indicate in his findings how the application being proposed meets the following Functional Requirements. Note that some of these requirements are Mandatory. If the application being proposed does not conform to a mandatory requirement, then it will be rejected. If the mandatory features are not currently implemented in the system, but will be as part of these services the Consultant shall clearly indicate this in their proposal, and confirm when the features will be available.

The Consultant must clearly indicate whether any customization of source code in his application will be required for the project to meet these technical requirements.

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- **Terminology:** All Screen Labels, Menu Items, and Reports should be configurable to the Client conventions in English.
- **Network Referencing:** The AMS should support different network referencing schemes. These should include linear distance from the start of the road section, linear distance from the start of a road, as well as distance from known location referencing points.
- **Cross-Sectional Positioning:** The AMS should support different cross-sectional positional models, to enable data to be referenced laterally to a location on a road section, in terms of lanes, shoulders, ditches, verges etc.
- **Network Coding Rules:** The AMS should enforce the Client's Network Numbering rules, by performing data validation on entry or through some other form of internal validation procedure.
- **Network Editing:** The AMS should permit splitting and joining of road sections, and modification of road section lengths, while preserving integrity of all current and historical data stored against the affected sections.
- **Network Auditing:** The AMS should audit all changes to the road network definition, and allow review of those changes. The audit should record the date and time of network change, the nature of the change, and the username of the person who made the change.
- **User Defined Data Items, Functionality and Processes:** The AMS should be configurable to enable the user to define additional types of inventory and condition data to be stored, and to define what attributes are to be stored against each type of inventory. There should be no restriction on the number and type of items or their attributes, other than physical limitations of the database management system being used. The RMS must have user-definable data entry forms, including labels in the local language, so that the user does not need to use a table view for entering new types of data.
- **Historical Data:** The AMS should allow the storage of data over different time periods, to enable comparison of data over time. There should be the functionality to view/select the most current data.
- **Multi-Media Data:** The AMS should enable management and display of multi-media objects (eg photographs, video clips etc.) as attributes of inventory items. For video, the RMS should allow viewing of video data by chainage along the road section, based on frame/chainage lookup tables supplied. The GIS should display the multi-media objects in the correct spatial location, and the images should be accessible by selecting them in the GIS.
- **Data Level Security:** The AMS should permit security setup so that user may have different security privileges for sub-networks in different geographical or administrative areas. It should also permit setup so that different users have different levels of access for different types of data.
- **Function Level Security:** The AMS should permit security setup so that different users may have access to different application modules and functions within these modules.
- **Flexible Reporting:** The AMS should provide flexible reporting to enable Client staff to devise their own reports and to make those reports available to other users. Reporting of all items in the RMS database must be permitted, including reporting on user-defined items and attributes, comparisons of current data with historical data, audit records etc. Export to spreadsheet and/or comma-delimited text files should also be provided. The Consultant should also provide details of any interfaces to third-party reporting tools.

- **Dynamic Sub-Sectioning:** The AMS should provide a dynamic sectioning capability that allows sections of homogenous characteristics to be generated and reported upon. This should allow combination of all types of data stored in the RMS. The AMS should allow parameters to be specified for minimum length of section, and also threshold changes in value at which new sections should be created.
- **Schematic Line Diagrams/Strip Maps:** The AMS should enable production of schematic line diagrams and/or strip-maps annotated with any data stored in the AMS.
- **Integration With GIS:** The AMS should integrate with the Client's GIS. The following functions should be included:
    a. The GIS interface should enable editing of the spatial representation of the road network.
    b. The GIS interface should provide a mechanism to compare the depicted length of the graphical representation with the defined length as stored in the AMS, in order to ensure correspondence of data and to highlight anomalies for user investigation.
    c. From the AMS, while reviewing a particular road section, the user should be able to view and highlight that road section in the GIS. The interface should highlight if there is any missing GIS representation for a given road section.
    d. Selected attributes of the road section, as stored in the AMS, should be able to be viewed from the GIS, used as screen labels, and be available for thematic mapping. These attributes should include all section-wide attributes including section identifier, road identifier, defined direction of the section, road classification etc.
    e. The GIS interface should be able to display dynamically segmented data from the AMS. This means that any data stored in the AMS that varies by length along the road section, can be correctly displayed in the GIS.
    f. The GIS interface should be able to view all background GIS data held in the Client's GIS database.
    g. The GIS interface should enable viewing of video data as stored or referenced by the AMS, according to the direction and chainage of the video lookup tables stored in the RMS. The GIS should show a "moving cursor" synchronized with the video to represent location of the individual video frame.
- **HDM-4 Interface:** The AMS should interface with HDM-4 (the Highway Development and Management Tool). The interface should include the following elements:
    h. An automatic sectioning function to create 'homogeneous' sections for analysis based on inventory and condition data;
    i. A generic interface which allows the user to define the rules for the above-mentioned automatic sectioning. This can include specification of which data items to use, what transformations to apply to the individual data items (i.e. average, minimum, maximum, dominant, weighted average), minimum and maximum lengths of sections etc.;
    j. Transformations of inventory and condition data to get it into terms understood by HDM-4 (this may also include manipulation of road construction types to match the set of surface types supported by the tool).
    k. An ability to bring in default data where one or more data items is missing, and to highlight in the reporting which data items have been defaulted;

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l. Preparation of HDM-4 Input files for Work Standards, Traffic Classification and Growth Rates;

m. Averaging and Preparation of data for Strategy Analysis (as opposed to Program Analysis);

n. Import of the results of the works program generated by HDM-4 so that they can be related back to the real road network and displayed in tabular or map-based reports. Depending on how complex the system is and what it is intended for, this may also require the AMS retaining a copy of the road network definition passed to HDM-4, so that if any changes occur to that network between the time of passing the data and getting the results, then they do not prevent the results being imported.

B. DATA AND SOFTWARE to be delivered to the Client

1. The floppy diskettes/ CDs/ storage devices etc. containing all basic as well as the processed data from all field studies and investigations, report, appendices, annexure, documents and drawings shall be submitted to the client from time to time as per output delivery schedules. The data relating to *Engineering Investigation and Traffic Studies, Road inventory condition, Roughness, Test pit (Pavement composition),Falling Weight Deflection, Traffic studies (traffic surveys),axle load surveys, Drainage inventory, Inventory data for bridge and culverts indicating rehabilitation, new construction requirement etc. in MS EXCEL or any other format which could be imported to widely used utility packages and linked to AMS alongwith electronic files of Economic and Financial Analysis.:*

2. **Software:** The Consultant shall also hand over to the Client floppies /CD's containing any general software / integrated / customised AMS system / tool which has been specifically designed / developed for the project including its user Manual.

3. The floppy diskettes/CD's should be properly indexed and a catalogue giving contents of all floppies/CD's and print-outs of the contents (data from field studies topographic data and drawings) should be handed over to the Client at the time of submission of the final Report.

ANNEXURE-2

WORK / ACTIVITY SCHEDULE

Task No.	Task / Activities	Year-1				Year-2				Year-3			
		Quarter-1	Quarter-2	Quarter-3	Quarter-4	Quarter-1	Quarter-2	Quarter-3	Quarter-4	Quarter-1	Quarter-2	Quarter-3	Quarter-4
TASK-1:	**ASSESSMENT OF CURRENT MAINTENANCE MANAGEMENT SYSTEM**												
Sub-Task 1	Mobilisation and Interaction with OWD officers												
Sub-Task 2	Project Appreciation												
Sub-Task 3	Review of data available with OWD												
Sub-Task 4	Conduct Site Visit												
Sub-Task 5	Finalise Approach and Methodology (for Data Collection, GIS / GPS Mapping)												
Sub-Task 6	Finalise Task Assignment and Scheduling												
Sub-Task 7	Prepare Draft Data Collection Formats												
Sub-Task 8	Prepare and Submit Inception Report												
Sub-Task 9	IDS Report Study and Review of ISAP												
Sub-Task 10	Review Current Maintenance Management Practices of the OWD and MIS												
Sub-Task 11	Needs Analysis and Outline of AMS-System Architecture												
Sub-Task 12	Prepare and Submit Needs Analysis and overall System Architecture Report												
Sub-Task 13	Review the Road Classification System												
Sub-Task 14	Assess Current Road Reference System, Propose refinement and Data Model for O-AMS												
Sub-Task 15	Deliberate on GIS/GPS Requirement, Recommend Necessary Data/Maps/Images to be procured and outline methodology for GIS Development												
Sub-Task 16	Prepare and Submit GPS Referencing Report												
TASK-2:	**DATA COLLECTION AND ROAD INFORMATION SYSTEM (RIS) DEVELOPMENT**												
Sub-Task 17	Agreement on Data Requirement, Collection Methodology and Format for Two Years												
Sub-Task 18	Prepare and Submit Road Data Collection Manual												
Sub-Task 19	Agreement on System Architecture												
Sub-Task 20	Computerization of Available Data in the required Format												
Sub-Task 21	Gap Analysis and Assessment of Additional Data Requirement												
Sub-Task 22	Prepare Data Collection/Verification Programme and Conduct Surveys												
Sub-Task 23	Survey data Verification and Relationship establishment (from Test Data Collection)												
Sub-Task 24	Prepare and Submit Draft System Design Document of AMS												
Sub-Task 25	Develop GIS based RIS, RWFIMS, BIS and TIS												
Sub-Task 26	Prepare and Submit Data Acquisition on Road Inventory, Condition, Roughness, Pavement Strength, Traffic Volume, Axle Load etc.												
Sub-Task 27	Populate GIS based RIS, BIS & TIS with Actual Data and Testing with Test Cases												
Sub-Task 28	Prepare and Submit System Operation Manual												
Sub-Task 29	Install RIS, BIS and TIS Live in OWD												
TASK-3:	**DEVELOPMENT OF PLANNING TOOLS**												
Sub-Task 30	Develop Analytical Tools for HDM-4 based Pavement Management System (PMS)												
Sub-Task 31	Develop Analytical Tools for Strategic Budgeting Studies												
Sub-Task 32	Develop Analytical Tools for Project Level Analysis												
Sub-Task 33	Develop Analytical Tools for Multi-year Programming												
Sub-Task 34	Calibrate HDM-4 based PMS												
Sub-Task 35	Estimate Unit Costs for Maintenance Activities (for PMS & RMMS)												
Sub-Task 36	Develop Analytical Tools of Routine Maintenance Management System (RMMS)												
Sub-Task 37	Develop Right of Way Features Management System (RWFMS)												
Sub-Task 38	GIS Development and Integration												
Sub-Task 39	Overall System Integration												
Sub-Task 40	Prepare and Submit overall System Design Report												
Sub-Task 41	Overall System Testing												
Sub-Task 42	Install O-AMS Live in OWD												
Sub-Task 43	Prepare and Submit Operation Manual(s) for PMS, RMMS and RWFMS												
Sub-Task 44	Prepare and Submit Operation Manual of AMS (Overall)												

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Task No.	Task / Activities	Year-1				Year-2				Year-3			
		Quarter-1	Quarter-2	Quarter-3	Quarter-4	Quarter-1	Quarter-2	Quarter-3	Quarter-4	Quarter-1	Quarter-2	Quarter-3	Quarter-4
TASK-4:	**PREPARATION OF ANNUAL ROAD CONDITION REPORTS AND ROLLING MAINTENANCE PLAN**												
Sub-Task 45	Prepare Annual Road Condition and Traffic Report- Year 1												
Sub-Task 46	OWD Annual Report- Year 1												
Sub-Task 47	Prepare Rolling Three Year Maintenance Plan												
Sub-Task 48	Prepare Annual Road Condition and Traffic Report- Year 2												
Sub-Task 49	OWD Annual Report- Year 2												
Sub-Task 50	Prepare Rolling Three Year Maintenance Plan - Revision 1												
Sub-Task 51	Prepare Annual Road Condition and Traffic Report- Year 3												
Sub-Task 52	OWD Annual Report- Year 3												
Sub-Task 53	Prepare Rolling Three Year Maintenance Plan - Revision 2												
TASK-5:	**ROAD CLASSIFICATION**												
Sub-Task 54	Establish and Deliberate on New Classification System												
Sub-Task 55	Prepare and Submit New Classification System												
Sub-Task 56	Prepare Standards for various Classification												
Sub-Task 57	Prepare Homogeneous Sections												
TASK-6:	**SKILL/KNOWLEDGE TRANSFER**												
Sub-Task 58	Finalise Methodology to Assess Training Needs												
Sub-Task 59	Conduct Consultations and/or Survey												
Sub-Task 60	Assess Training Needs of OWD Staff												
Sub-Task 61	Prepare and Submit Training Needs Assessment Report												
Sub-Task 62	Evolve Training Program												
Sub-Task 63	Develop Training Materials												
Sub-Task 64	Conduct Training Courses												
Sub-Task 65	Conduct Exposure Visits												
TASK-7:	**ONGOING SUPPORT**												
Sub-Task 66	Assist in Ongoing Application of the System and Data Collection												
Sub-Task 67	Assist in modifying or developing Investment Plans & Budget Allocation												
Sub-Task 68	Assist in Ongoing Training												
Sub-Task 69	Technical Support of the System												
Sub-Task 70	AMS Performance Report (Year 3)												
TASK-8:	**MANUALS, TECHNICAL GUIDELINES, AND COMPLETION REPORT**												
Sub-Task 71	Finalise AMS Technical Manuals (User Manual, System Administration Manual)												
Sub-Task 72	Finalise Data Collection Procedure Manual												
Sub-Task 73	Finalise Training Manual												
Sub-Task 74	Finalise Completion Report												
Sub-Task 75	Quality Progress Report												
TASK-9:	**PROCUREMENT OF HARDWARE, SOFTWARE AND DATA COLLECTION EQUIPMENT**												
Sub-Task 76	Recommend Software (Database / Front End Application, Report Designer, GIS, HDM-4 etc)												
Sub-Task 77	Recommend Hardware for AMS(Servers, Work Stations, Networking, Webhosting)												
Sub-Task 78	Recommend Data Collection Equipments												
Sub-Task 79	Report on Procurement of Hardware, Software and Data Collection Equipment												
Sub-Task 80	Assist Procurement												
TASK-10:	**IMPLEMENTATION AND MAINTENANCE SUPPORT**												
Sub-Task 81	Assistance / Support in System Use												
Sub-Task 82	Assistance / Support in Data Collection												
Sub-Task 83	Maintenance Support of the System												

Legend
- Continuous
- Intermittent
- Workshop / Seminar / Survey
- Report Submission

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ANNEXURE-3

STAFFING SCHEDULE

	Name of Staff	Position	Home/ Field	Year-1				Year-2				Year-3				Total Staff-month Input		
				Quarter-1	Quarter-2	Quarter-3	Quarter-4	Quarter-1	Quarter-2	Quarter-3	Quarter-4	Quarter-1	Quarter-2	Quarter-3	Quarter-4	Home	Field	Total
KEY PROFESSIONALS																		
Foreign																		
1	Anand Prakash	Team Leader cum Road Asset Management Specialist	Home													0		0
			Field														18	18
2	Andy Kim	Systems (IT) Specialist	Home															0
			Field														16	16
Local																		
1	Dr. Sohan Singh Seehra	Highway Engineer-cum-Pavement Management System Specialist	Home													0		0
			Field														18	18
2	Sagar Prabhakar Deshmukh	Road Data Acquisition & Data Interpretation Specialist	Home													0		0
			Field														12	12
3	Nirmal Kumar Yadamani	GIS Specialist	Home													0		0
			Field														6	6
OTHER EXPERTS																		
1	S.K. Pancholy	Quality Management System Specialist	Home													0		0
			Field														5	5
2	Athavan Andavar	System Engineer	Home													0.5		0.5
			Field														0.5	0.5
3	Dr. M.P. Raju	Network Planning / Road Classification Expert	Home													0		0
			Field														5	5
4	M.K. Saxena	Overseas Training Coordinator	Home													1		1
			Field														4	4
SUPPORT STAFF																		
1	As Per Table 4.3	Group 1: Highway Engineer/ Pavement Engineer/ Bridge Engineer	Home													0		0
			Field														62	62
2	As Per Table 4.3	Group 2: Transport Economist/ Transport Planner/ HDM Specialist	Home													0		0
			Field														38	38
3	As Per Table 4.3	Group 3: GIS/ RIS/ GPS Data Analysis	Home													0		0
			Field														28	28
4	As Per Table 4.3	Group 4: System Architect/ Sr. System Administrator/Software Engineers/ DBMS Specialist	Home													0		0
			Field														80	80
5	As Per Table 4.3	Group 5: Road Surveyor / Data Collection Supervisors / Quantity Surveyors	Home													0		0
			Field														164	164
6	As Per Table 4.3	Group 6: Training Experts / Facilitator	Home													0		0
			Field														22	22
															TOTAL			480

Legend
Full Time input ▬
Part Time input ●●●

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APPENDIX B - REPORTING REQUIREMENTS

1. REPORTING

1.1 The Orissa Works Department (OWD) will be the contractual client for these services. The client has established a Project Management Unit (PMU) to be exclusively in charge of the Orissa State Roads Project. This organization is headed by a Chief Engineer, World Bank Project and is assisted by appropriate professional and support staff.

1.2 A review committee will give effective technical guidance to the consultant and review the outputs of these services. The consultant is required to present (power point presentation) / online demonstration of the developed system before the review committee each of its major deliverable reports before submission. The review committee will recommend any modification/changes considered necessary in the outputs submitted by the consultant. The consultant shall incorporate these changes in the corresponding reports and other outputs. The consultant also has to incorporate the comments of World Bank if any. The Review Committee comprises of senior officials from the OWD with following members:

a.	Engineer-in-Chief-cum-Secretary , Works Dept.	-	Chairperson
b.	Chief Engineer (DPI &Roads)	-	Member
c.	Chief Engineer, National Highways, Orissa	-	Member
d.	Chief Engineer, World Bank Project	-	Member Convenor
e.	Representatives of ORSAC / OCAC / NIC	-	Invitee(s)

1.3 The AMS consultant shall closely liaise with IDS implementation consultant specifically with the consultant dealing with IT, ICT and MIS related issues after the same is mobilized to ascertain compatibility of various systems developed under the project. The consultant will also closely interact with different units of Works Department and policy and decision-making authorities as and when required with advise from the Client.

1.4 As a minimum, the required co-ordination will involve monthly meetings with the Client and quarterly meetings with the Review Committee by the Team Leader and other key personnel of the consultant team. The consultant shall prepare a brief quarterly progress report - showing progress to date/over last quarter, problems and activities proposed for the next quarter - prior to each quarterly meeting with the Review Committee.

2 OUTPUTS

2.1 The consultant is expected to provide the following outputs (reports, databases, software, plans, workshops, training and user manuals and training events) in a format approved by the client. Time schedule in respect of all such activities has been indicated in the table. Consultant shall be required to complete, to the satisfaction of the client, all the different stages of study within the time frame.

2.2 The Consultant shall submit to the client the reports and documents in bound volumes (and not spiral binding from) after completion of each stage of work as per the schedule and in the number of copies as given below. Further, the reports shall also be submitted in pendrives / CD's addition to the hard copies as mentioned in Annexure – 1 of Appendix A.

2.3 The time schedule for various submissions prescribed below shall be strictly adhered to. No time-over-run in respect of these submissions will normally be permitted. Consultant

is, therefore, planned to deploy sufficient number of supporting personnel, both technical and administrative, to undertake various assignments simultaneously. As far as possible, the proposal should include complete information such as number of such persons, name, position, period of engagement, remuneration rate etc. The Consultant has also planned to start necessary survey works from the beginning so as to gain time in respect of various other activities in that stage.

The Client will take all step to approve the reports & documents within two weeks of submission.

The Consultant will be paid fee as a percentage of the contract value as per the schedule given below in Table-5 basing on satisfactory completion and approval of the deliverable items by the client & World Bank.

Table 5 Consultant Outputs Schedule (Pls refer SCC)

Item	No. of copies	Due date (months from effectiveness)	Remarks (as per "Detailed Scope of Work" given in Appendix A unless specified)
Inception report	10	1	Para 4.1
Quarterly progress report	10		Para 5.4 (Appendix B i.e. reporting requirement)
Needs analysis and overall system architecture Draft report (to be discussed in a workshop)	10	3	Para. 4.2 and 4.3
Needs analysis and overall system architecture Final report	10	4	
Draft Report on GPS referencing	10	4	Para 4.5
Final Report on GPS referencing	10	5	Para 4.5
Draft Report on Road classification	10	10	Para 4.4 & 4.28
Final Report on Road classification	10	11	Para 4.4 &4.28
Data acquisition on road condition such as roughness, surface distress, Pavement strength, traffic volume, axle load etc Completion of 1st Year data	10	11	Para. 4.6
Completion of 2nd Year data	10	22	Para. 4.6
Completion of 3rd Year data	10	30	Para. 4.6

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Item	No. of copies	Due date (months from effectiveness)	Remarks (as per "Detailed Scope of Work" given in Appendix A unless specified)
Road Information, Bridge Information & Traffic Information System complete with GPS referencing			
- Compliance testing begin with submission of draft System Design Document alongwith operation manual	10	9	Para. 4.6-4.13
- Acceptance on demonstration of the system with 1st Year Data	10	10	Para. 4.6-4.13
Road data collection manual - Draft report	10	2	Para. 4.14 & 4.34
Road data collection manual - Final report	10	3	Para. 4.14 & 4.34
Economic Evaluation Model, PMS, RMMS and RWFMS Compliance testing begin with submission of draft System Design Document alongwith operation manual	10	12	Para. 4.15– 4.23
Acceptance on demonstration of the system as Complete	10	14	Para. 4.15– 4.23
Annual road condition and traffic report (for 2011, 2012 and 2013) - Draft report	10	14, 24 and 36	Para. 4.24
Annual road condition and traffic report (for 2011, 2012 and 2013) - Final report	10	14, 24 and 36	Para. 4.24
Assistance in procurement of Data collection equipment, including procurement of necessary hardware & softwares		12	Para 4.35, provisional item
OWD annual report (for 2011, 2012 and 2013) – Draft	10	14, 24 and 36	Para 4.18& 4.27
OWD annual report (for 2011, 2012 and 2013) – Final	10	14, 24 and 36	Para 4.18& 4.27
Rolling three year maintenance plan for 11-12, 12-13 and 13-14 - Draft report	10	14, 24 and 36	Para.4.18-4.19 & Para 4.25-4.26
Rolling three year maintenance plan for 11-12, 12-13 and 13-14 - Final report	10	14, 24 and 36	Para.4.18-4.19 & Para 4.25-4.26
Training needs assessment report -Draft report	10	6	Para 4.29

Item	No. of copies	Due date (months from effectiveness)	Remarks (as per "Detailed Scope of Work" given in Appendix A unless specified)
Training needs assessment report -Final report	10	7	Para 4.29
AMS, TIS and Economic Evaluation Model user manuals - Draft report	10	10	Para. 4.34
AMS, TIS and Economic Evaluation Model user manuals - Final report	10	12	Para. 4.34
Various training events	To be Tabulated by consultant with client approval		Para 4.30-4.32
AMS "conceptual design" workshop (Three Numbers)	To be Tabulated by consultant with client approval		Para 6.5
Acceptance of Data, Analysis Tool and accuracy thereof after rectification of errors / variations if any in the final form and Handing over of Assets to Client and Other training manuals to be identified		24	
Annual Performance Report at the end of 3rd Year	10	36	Para 4.27

NB: 36th month deliverable is at the end of support service period which is 12 month after completion of 24 month consultancy period

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APPENDIX C - KEY PERSONNEL AND SUB-CONSULTANTS

ANNEXURE -1

	Name	Position	Qualification	Years of Experience	Proposed Input (months)	Task / Job Assigned
					A. KEY EXPERTS	
1	Anand Prakash (Key Foreign Personnel)	Team Leader – cum - Road Asset Management Specialist	o B.E. (Civil Engineering), University of Roorkee o Post Graduate Diploma (Soil Mechanics and Foundation Engineering), University of Roorkee o M.Sc. (Engineering) Soil Mechanics and Pavement Engineering, Queen's University, Kingston, Canada	48	18	o Mobilisation and Interaction with OWD officers o Project Appreciation o Finalise Task Assignment and Scheduling o Prepare and Submit Inception Report o IDS Report Study and Review of ISAP o Prepare and Submit Needs Analysis and overall System Architecture Report o Prepare and Submit Operation Manual of AMS (Overall) o Prepare Annual Road Condition and Traffic Report- Year 1 o OWD Annual Report- Year 1 o Prepare Annual Road Condition and Traffic Report- Year 2 o OWD Annual Report- Year 2 o Prepare Annual Road Condition and Traffic Report- Year 3 o OWD Annual Report- Year 3 o Conduct Exposure Visits o AMS Performance Report (Year 3) o Finalise AMS Technical Manuals (User Manual, System Administration Manual) o Finalise Completion Report o Quarterly Progress Report
2	Dr. S S Seehra (Key Local Personnel)	Highway Engineer-cum-Pavement Management System Specialist	o B. Sc. Engineering (Civil Engg.), from PEC University of Technology, Chandigarh o Ph.D. Engineering (Transportation Engineering), from Indian Institute of Technology (IIT-	44	18	o Mobilisation and Interaction with OWD officers o Project Appreciation o Review of data available with OWD o Conduct Site Visit o Review Current Maintenance Management Practices of the OWD and MIS o Needs Analysis and Outline of AMS-System Architecture o Agreement on Data Requirement, Collection Methodology and Format for Two Years o Prepare and Submit Road Data Collection Manual o Survey data Verification and Relationship establishment (from Test Data Collection)

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Sl. No.	Name	Position	Qualification	Years of Experience	Proposed Input (months)	Task / Job Assigned
					A. KEY EXPERTS	
			Roorkee) o M.Sc. Engineering (Highways & Transportation)			o Develop Analytical Tools for HDM-4 based Pavement Management System (PMS) o Develop Analytical Tools for Strategic Budgeting Studies o Develop Analytical Tools for Project Level Analysis o Develop Analytical Tools for Multi-year Programming o Calibrate HDM-4 based PMS o Estimate Unit Costs for Maintenance Activities (for PMS & RMMS) o Develop Analytical Tools of Routine Maintenance Management System (RMMS) o Develop Right of Way Features Management System (RWFMS) o Prepare and Submit Operation Manual(s) for PMS, RMMS and RWFMS o Prepare Rolling Three Year Maintenance Plan o Prepare Rolling Three Year Maintenance Plan - Revision 1 o Prepare Rolling Three Year Maintenance Plan - Revision 2 o Prepare Standards for various Classification o Prepare Homogeneous Sections o Develop Training Materials o Conduct Training Courses o Recommend Data Collection Equipments o Report on Procurement of Hardware, Software and Data Collection Equipment

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Sl. No	Name	Position	Qualification	Years of Experience	Proposed Input (months)	Task / Job Assigned
					A. KEY EXPERTS	
3	Sagar Deshmukh (Key Local Personnel)	Road Data Acquisition & Data Interpretation Specialist	o Bachelor of Civil Engineering , from Shivaji University-Maharashtra o Pursuing Ph.D from CEPT University Ahmedabad	15	12	o Mobilisation and Interaction with OWD officers o Project Appreciation o Review of data available with OWD o Conduct Site Visit o Needs Analysis and Outline of AMS-System Architecture o Assess Current Road Reference System, Propose refinement and Data Model for O-AMS o Agreement on Data Requirement, Collection Methodology and Format for Two Years o Prepare and Submit Road Data Collection Manual o Gap Analysis and Assessment of Additional Data Requirement o Prepare Data Collection/Verification Programme and Conduct Surveys o Prepare and Submit Data Acquisition on Road Inventory, Condition, Roughness, Pavement Strength, Traffic Volume, Axle Load etc. o Develop Training Materials o Conduct Training Courses o Assist in Ongoing Application of the System and Data Collection o Finalise Data Collection Procedure Manual o Recommend Data Collection Equipments o Report on Procurement of Hardware, Software and Data Collection Equipment
4	Nirmal Kumar Yadamani (Key Local Personnel)	GIS Specialist	o B.Tech (Electronics and Communications) from Nagarjuna University o M. Tech. Spatial Information Technology , from Jawaharlal Nehru Technological University, Hyderabad	20	6	o Mobilisation and Interaction with OWD officers o Project Appreciation o Finalise Approach and Methodology (for Data Collection, GIS / GPS Mapping) o Assess Current Road Reference System, Propose refinement and Data Model for O-AMS o Deliberate on GIS/GPS Requirement, Recommend Necessary Data/Maps/Images to be procured and outline methodology for GIS Development o Prepare and Submit GPS Referencing Report o GIS Development and Integration o Overall System Integration o Develop Training Materials o Conduct Training Courses

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Sl. No.	Name	Position	Qualification	Years of Experience	Proposed Input (months)	Task / Job Assigned
			A. KEY EXPERTS			
	Andy Kim (Key Foreign Personnel)	Systems (IT) Specialist	o Bachelor of Applied Science (Civil Engineering , from University of Toronto, o Microsoft Certified Systems Engineer, Microsoft Corporation	21	16	o Mobilisation and Interaction with OWD officers o Project Appreciation o Needs Analysis and Outline of AMS-System Architecture o Assess Current Road Reference System, Propose refinement and Data Model for O-AMS o Agreement on System Architecture o Prepare and Submit Draft System Design Document of AMS o Develop GIS based RIS, RWFIMS, BIS and TIS o Populate GIS based RIS, BIS & TIS with Actual Data and Testing with Test Cases o Prepare and Submit System Operation Manual o Install RIS, BIS and TIS Live in OWD o GIS Development and Integration o Overall System Integration o Prepare and Submit overall System Design Report o Overall System Testing o Install O-AMS Live in OWD o Prepare and Submit Operation Manual of AMS (Overall) o Finalise AMS Technical Manuals (User Manual, System Administration Manual) o Recommend Hardware for AMS(Servers, Work Stations, Networking, Webhosting)

S. No.	Position Assigned	Name of Staff	Qualification	Area of Expertise	Total Years of Experience	Task Assigned
OTHER EXPERTS						
1	Quality Management System Specialist	S.K. Pancholy	BE Civil, 1962 PG Diploma (Construction Management)	Quality Control / Quality System	48	Advise on ongoing asset maintenance practices, benchmarking, improvement
2	System Engineer	Athavan Andavar	B.E. (Civil Engineering) M.S. (Geo-technical Engineering), IIT	System Design / Architecture / Database	20	Advise on system architecture, DB design etc.
3	Network Planning & Road Classification Expert	Dr. M.P. Raju	B.E. (Civil), 1984 M.Planning(Transport) Ph.D (Transport Planning)	Traffic & Transport/ Network Planning / Institutional Development / Capacity Building	26	Advise on Network Planning / Road Clarification
4	Overseas Training Coordinator	M.K. Saxena	B.Sc. (Civil Engineering), 1962	Training Coordination and Human Resource Development	47	Co-ordinate overseas training programme in consultation with Client / TL

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S. No.	Position Assigned	Name	Qualification	Areas of Work	Total Years of Experience	Years with LASA	Input (Person-month)
B. THE SUPPORT STAFF							
Group 1: Highway Engineer/ Pavement Engineer/ Bridge Engineer							
1.	Group Leader-cum-Highway / Pavement Engineer 1	**G. P. Sahoo**	B.E. (Civil), Utkal University, 1962	Highway Design and Project Management	47	11	12
2.	Highway/Pavement Engineer 2	**Subir Kumar Roy**	M. Plan (Transport Planning), SPA, N. Delhi, 1997 B.E. (Civil), CBIT, Osmania University, 1995	Transportation Planning & Engineering Management	13	13	8
3.	Highway/Pavement Engineer 3	**Prasanna Thakkar**	B.E. (Civil), Bhilai inst. of Tech., Durg, MP, 1995	Highway Engineering	14	10	12
4.	Bridge Engineer 1	**P. S. Tyagi**	M.E.,University of Roorkee, 1971 B.E. (Civil), University of Roorkee, 1969	Design, Construction and Rehabilitation of Bridges.	38	3	6
5.	Bridge Engineer 2	**Rana Raj Kumar**	BE (Civil), KUVEMPU University, 1994	Bridge - Structural Engineering	15	3	12
6.	Bridge Engineer 3	**Subhendu Kumar Panigrahy**	AMIE, Institute of Engineering (India), Calcutta, 1999	Bridge - Structural Engineering	10	5	12
Group 2: Transport Economist/ Transport Planner/ HDM Specialist							
7.	Group Leader-cum- Transport Planner 1	**Pradeep Kumar**	M. Planning (Transport), SPA, N. Delhi-1998 B. Sc. Engineering (Civil), BIT Sindri, 1995	Transport Planning/Economics/Traffic Engineering/Modeling	15	13	8
8.	Transport Planner 2	**Akshat Jain**	M. Planning (Transport), SPA, N. Delhi, 1998 B Planning, SPA, N. Delhi, 1996	Transport Planning/Economics/Traffic Engineering/Modeling	12	5	6

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S. No.	Position Assigned	Name	Qualification	Areas of Work	Total Years of Experience	Years with LASA	Input (Person-month)
B. THE SUPPORT STAFF							
9.	Transport Planner 3	**Satyakam Sahu**	M. Plan. (Transport Planning), SPA, N. Delhi B. Arch., 1999 Diploma (Transport Economics and Management), Institute of Rail Transport, New Delhi, 2004	Traffic & Transportation Planning /Asset Management/ GIS	10	6	12
10.	Transport Economist	**Sonia Chauhan**	M. Planning (Transport Planning), SPA, N. Delhi, 2004 M. A. (Economics), MSU, Baroda, 2002	Transport Planning & Economics	8	5	6
11.	HDM Specialist	**B. Naganjaneyulu**	M. Tech (Transport), NIT, Warangal, 2004. B.Tech. (Civil), REC, Warangal, 2002 MBA, Finance (Pursuing, IGNOU, Distance Education).	HDM Specialist	8	5	6
Group 3: GIS/ RIS/ GPS Data Analysis							
12.	Group Leader-cum-GIS Specialist	**Bhupesh Gupta**	M. Tech (Remote Sensing & GIS) – IIRS, Dehradun, 2003 M. Sc (Environmental Sciences) – 2000	GIS Application/ Geo Referencing	10	4	12
13.	GPS Data Analysis	**TBN**					16

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S. No.	Position Assigned	Name	Qualification	Areas of Work	Total Years of Experience	Years with LASA	Input (Person-month)
B. THE SUPPORT STAFF							
Group 4: System Architect/ Sr. System Administrator/Software Engineers/ DBMS Specialist							
14.	Group Leader –cum- System Architect	**Selva Balaji Baskara Pandian**	MCA - 2000 BSc (Maths) – 1997, Madurai Kamaraj University	System Architect	10	-	8
15.	Software Engineers / DBMS Specialists 1	**Parag Sawant**	BE (Computer Science), Mumbai, 1991 PGDCA (part time) Mumbai, 1988 to 1989 Diploma in Computer Technology, Mumbai, 1987 to 1990	System Analysis, System Maintenance, Development	19	3	12
16.	Software Engineers / DBMS Specialists 2	**TBN**					12
17.	Software Engineers / DBMS Specialists 3	**Surya Pratap**	DOEACC – O level B. Sc., 2000	Database development/ System development	8	8	12
18.	Software Engineers / DBMS Specialists 4	**Puneet Johari**	MCA, 2006 B. Sc. 2002	System Development/ Programming/ Database	4	2	12
19.	Software Engineers / DBMS Specialists 5	**Chirag Gupta**	MCA – 2004 B.Sc. – 2001	System Development	6	-	12
20.	Software Engineers / DBMS Specialists 6	**Rajaram Lakshmanan**	MCA – 2003, B.Sc. (Comp. Sc.) - 2000	Database Administration / System Development	7	-	12
Group 5: Road Surveyor / Data Collection Supervisors / Quantity Surveyors							
21.	Group Leader- Data Collection Supervisor 1	**Peri Sriram**	M. Tech (Transport), NIT, Warangal, 2006 B. Tech (Civil), KSRM College of Engieering, Kadapa, 2002	Traffic & Transportation Engineering / Planning	7	3	12
22.	Road Surveyor 1	**T Raveendra Babu**	M. Tech (Traffic & Transportation), NIT, Calicut, 2007 B.Tech (Civil), 2005	Traffic & Transportation Engineering / Planning	4	2	16

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S. No.	Position Assigned	Name	Qualification	Areas of Work	Total Years of Experience	Years with LASA	Input (Person-month)
B. THE SUPPORT STAFF							
23.	Road Surveyor 2	**Satyajit Ganguly**	M. Planning (Transport), SPA, N. Delhi, 2009. B. Arch., I.E.P.T. Indore, 2006	Transport Planning	2	2	16
24.	Data Collection Supervisor 2	**Soumitra Singh Roy**	M. Tech. (Transport), 2007	Traffic/Engineering Data Collection/ Interpretation	3	2	16
25.	Data Collection Supervisor 3	**Jayanto Ghosh**	One year D.C.E., 2001 B.Sc, 1994	Engineering Data Collection/ Materials Engineering	11	12	10
26.	Data Collection Supervisor 4	**Satya Sapath Roy**	BE (Civil), CE.T. B.P.U.T., Bhubaneswar, 2008	Highway Engineering	2	2	16
27.	Environmental / Social / Surveyor 1	**Sourav Kumar Sahoo**	Master of Planning (Regional Planning) – 2007, School of Planning and Architecture, New Delhi Master's in Geography - 2004, Utkal University, Bhubaneswar, Orissa, India Bachelor of Arts (geography) – 2002, Ravenshaw (Autonomous) college, Cuttack, Orissa, India	Environment Development, Social Research, Project Management & GIS & Remotesensing	2	2	18
28.	Environmental / Social / Surveyor 2	**Debashish Pal**	Post Graduate Diploma (Environment Management), 2001 M. Sc. (Ecology and Environment), 2006	Environmental Engineering / Social Planning	8	1.5	10
29.	ROW Feature Supervisor 1	**G. Sunil Kumar**	ME (Transportation), JNTU, Hyderabad, 2004 BE (Civil), Baptla Engineering College, 2002	Traffic & Transportation Engineering / Planning	7	3	10

S. No.	Position Assigned	Name	Qualification	Areas of Work	Total Years of Experience	Years with LASA	Input (Person-month)
B. THE SUPPORT STAFF							
3[illegible]	ROW Feature Supervisor 2	**Naresh Gandu**	M. Tech. (Transport), 2008 B.E. (Civil), NIT, Calicut, 2006	Traffic & Transportation Engineering / Planning	3	2	12
31.	ROW Feature Supervisor 3	**Shah Ankit Rajesh Kumar**	M.E. (Highway and Transportation Engineering), 2006 B.E. Civil, 2004	Highway / Traffic Engineering	6	4	8
32.	ROW Feature Supervisor 4	**Rahul Bhatt**	Diploma (Civil), Govt. Polytechnic College, 2007.	Quantity Surveying	3	3	12
33.	Quantity Surveyor	**CH Kasi Viswanadh**	B.E (Civil Engineering) from Arulmigu Meenakshi Amman College of Engineering, Tamilnadu State, in 2004-20007 Diploma (Civil Engineering) from State Board of Technical Education and Training, Andhra Pradesh in Nov.-Dec-2003	Highway Engineering	3	2	8
Group 6: Training Experts / Facilitator							
34.	Training Expert/ Facilitator 1	**Dipakkumar K Sheth**	BE (Civil), Gujarat University, 1977	Highway Engineering/Training	32	2	12
35.	Training Expert/ Facilitator 2	**Cdr. Narayan mishra**	MBA, FMS, New Delhi, 1989 Master in Electronics, Ravenshaw College, 1970 Master in Defense Studies, Madras University, 1984	Human Resources Development and Training	25	5	10

S. No.	Position Assigned	Name	Qualification	Areas of Work	Total Years of Experience	Years with LASA	Input (Person-month)
B. THE SUPPORT STAFF							
ADDITIONAL SUPPORT STAFF							
1	Office Manger -cum-Accountant	TBN					64
2	Survey/ Data entry Assistance	TBN					300
3	DTP Operator	TBN					36
4	Office Boys / Security	TBN					60

TBN: To be named at inception stage

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ANNEXURE -2

BROAD QUALIFICATION REQUIREMENTS OF KEY PROFESSIONAL STAFF

1. Team Leader cum Road Asset Management Specialist

Descriptive Qualifications, Experience and required Tasks

The team leader shall have the required expertise in development & implementation of computerized road asset management and planning system, expertise and through acquaintance with GPS & GIS related data collection methods including automatic data acquisition system, data interpretation, data integration to widely accepted economic tool such as HDM-4 or equivalent tool. The candidate must be well conversant with modern techniques of pavement data acquisition such as computerized video inventory of road features / assets, Ground Penetrating Radar, GPS based georeferencing studies, pavement distress assessment using ROMDAS, laser based profilometer , Falling Weight Deflectometer, image processing tools , video based automatic traffic counts equipments etc. The candidate should be a Graduate in Civil Engineering with desirable Post Graduation Specialisation in the field of either Transport Economics / Transport Engineering / Remote Sensing or Geophysics with minimum 20 years professional experience including ***about 5 years on similar projects in developed country***. He/She should have a through working knowledge in the field of Transport Economics and Traffic Forecasting. He/She must have handled independently the widely accepted economic evaluation tool such as HDM-4 or similar tool with knowledge of region based calibration of the model. He/She will have a proven track record of similar experience at an international level including developing countries. Candidate's training skills in transferring technology shall be preferable.

Qualifications & Experience requirement in Tabular format

I Educational Qualification

a) Minimum : Graduate in Civil Engineering

b) Desirable : Post Graduation Specialisation is desirable either in Transport Economics; or Transport Engineering; or Remote Sensing or Geophysics / GIS or any other relevant field

II General Experience

a) Total Experience : Total Professional Experience *(including 5 Years on AMS Projects in Developed Country)*:

Minimum 15 Years
Desirable 25 Years

b) Relevant Experience : As Team Leader (TL) / Deputy TL or equivalent in Similar projects in **Developed Countries** : 5 Years;

Road Asset Management related Projects : 3 Projects

Knowledge in following fields are essential:

(i) Road sector data management, data acquisition of assets, data interpretation and data integration
(ii) Transport Economics and Traffic Forecasting, Road Maintenance Management
(iii) International accepted economic models such

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as HDM-4/ dTims etc with knowledge on region based calibration of the model.

(iv) Development & implementation of computerized road management and planning system using GIS , GPS and MIS

c) Language : Communication fluently in English is minimum

III Additional Preferences

a) Employment Status : (a) Being a full – time Employee of the Lead Firm or any of the JV Partner for at least 2 Years will carry additional weightage. (*To be prorated for less)*

(b) Proven track record of similar experience at an international level including developing countries with good management capabilities and training skills in transferring technology will carry additional weightage. Documentary evidence to be attached.

2. Highway Engineer-cum- Pavement Management System Specialist:

Descriptive Qualifications, Experience and required Tasks

The person should be a qualified Civil Engineer with desirable post graduation degree in highway / transportation / pavement engineering. He / she must be having about 20 years professional experience with a strong background in pavement distress analysis, rehabilitation and management with about 10 years experience in computerized Pavement Management Systems based on HDM or similar tool. He/She must have first hand experience of road management using computerized systems and be fully capable of operating GIS and HDM type systems and interpreting the results on a Network level. He/She must have experience on road data collection procedures including distress parameters for both flexible and rigid pavements with modern data acquisition equipments such as ROMDAS, FWD, Axle Load Pad etc . Knowledge of international 'best practices' and modern highway maintenance technology with design and specifications of maintenance works based on IRC/AASHTO /TRL is important. He/She must have worked in a similar role in developing / developed countries and must posses experience in training of local professional and engineering staff. He must act as Dy. Team Leader, and shall take care of the co-ordination of activity in absence of team Leader

Qualifications & Experience requirement in Tabular format

I Educational Qualification

a) Minimum : Graduate in Civil Engineering

b) Desirable : Post Graduation is desirable either in
Highway / Pavement Engineering; or
Transportation Engineering;

II General Experience

a) Total Experience : Total Professional Experience :
Minimum 15 Years
Desirable 25 Years

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b) Relevant Experience : Experience as Highway Engineer/ PMS : 10 Years
Road Asset Management related Projects: 3 Projects

Knowledge in following fields are essential:

(i) Pavement distress analysis, rehabilitation and management Systems based on HDM or similar tool.

(ii) Road sector related data management and data acquisition, design and specifications of maintenance works based on IRC/AASHTO /TRL

(iii) International accepted economic models such as HDM-4/ dTims etc with knowledge on region based calibration of the model.

(iv) Network level survey with GPS and GIS, ROMDAS, Axle Load Pad, FWD

c) Language : Communication fluently in English is minimum

III Additional Preferences

a) Employment Status : (a) Being a full – time Employee of the Lead Firm or any of the JV Partner for at least 2 Years will carry additional weightage. (*To be prorated for less)*

(b) Proven track record of similar experience in developing / developed countries with training skills in transferring technology will carry additional weightage. Documentary evidence to be attached.

3. Road Data Acquisition & Data Interpretation Specialist

Descriptive Qualifications, Experience and required Tasks

The candidate should be Masters Degree in Science or Graduate in Engineering with 15 years professional experience including 5 years of relevant experience in handling specialized data collection equipment for pavement evaluation. He/She should have independently handled modern data acquisition system for pavements features / pavement distress (both for flexible and rigid) with equipments such as Ground Penetrating Radar, Falling Weight Deflectometer, Laser based Surface Profiler, GPS & GIS system, ROMDAS, Image Processing tools, Ultrasonic-Pulse Velocity Equipment etc besides Video based automatic traffic counts equipments. He/She should be conversant with equipment calibration used for data acquisition as stated above besides data transfer / data integration for pavement distress analysis, rehabilitation and management systems based on HDM or similar tool. Candidate's training skills in transferring technology shall be preferable.

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Qualifications & Experience requirement in Tabular format

I Educational Qualification

a) Minimum : Masters Degree in Science / Graduate in Engineering

b) Desirable : Specialisation in any relevant field relating to Data Acquisition / Data Interpretation

II General Experience

a) Total Experience : Total Professional Experience :
Minimum 10 Years
Desirable 15 Years

b) Relevant Experience : Experience as Data Acquisition/ Interpretation Specialist: 5 Years

Road Asset Management related Projects: 3 Projects

Knowledge in following fields are essential:

(i) Acquiring and interpreting data with equipments such as Ground Penetrating Radar, Falling Weight Deflectometer, Laser based Surface Profiler, GPS & GIS system, pavement distress acquisition using ROMDAS, image processing tools , video based automatic traffic counts equipmentsetc

(ii) Pavement distress analysis, rehabilitation and management Systems based on HDM or similar tool.

c) Language : Communication fluently in English is minimum

III Additional Preferences

a) Employment Status : (a) Being a full – time Employee of the Lead Firm or any of the JV Partner for at least 2 Years will carry additional weightage. (*To be prorated for less)*

(b) Proven track record of similar experience in with training skills in transferring technology will carry additional weightage. Documentary evidence to be attached.

4. GIS Specialist

Descriptive Qualifications, Experience and required Tasks

The person should be Masters Degree in Science or Graduate in Civil Engineering with specialisation in any relevant field relating to GIS OR Post Graduate in applied science such as applied Geology/ Geophysics / Geography/Remote Sensing having minimum of 15 years professional experience including 5 years in GIS implementation / Web based GIS application. The person should be conversant with well known software such as ArcGIS, Mapinfo, Arc View, ERDAS imagine and other GIS based software. He/ She should have through working knowledge for GIS based system development, GIS integration and analysis including use of GPS Tools and

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GEO Referencing . Proven track record of similar experience in Road Asset Management with training skills in transferring technology shall be preferable.

Qualifications & Experience requirement in Tabular format

I Educational Qualification

a) Minimum : Masters Degree in Science / Graduate in Civil Engineering

b) Desirable : Specialisation in any relevant field relating to GIS

II General Experience

a) Total Experience : Total Professional Experience :
Minimum 10 Years
Desirable 15 Years

b) Relevant Experience : Experience as GIS Specialist: 5 Years

Asset Management related Projects: 3 Projects

Knowledge in following fields are essential:
(i) GIS based system development
(ii) GIS integration and analysis
(iii) GPS Tools and GEO Referencing

c) Language : Communication fluently in English is minimum

III Additional Preferences

a) Employment Status : (a) Being a full – time Employee of the Lead Firm or any of the JV Partner for at least 2 Years will carry additional weightage. (*To be prorated for less)*

(b) Proven track record of similar experience in Road Asset Management with training skills in transferring technology shall carry additional weightage. Documentary evidence to be attached.

5. Systems (IT) Specialist:

Descriptive Qualifications, Experience and required Tasks

The person should be a Graduate Engineer in any discipline / Masters Degree in Computer Science or Computer Application with desirable specialisation / Post Graduation in any relevant field relating to IT System Development/application. He / She should have about 15 years of professional experience including minimum of 5 years in design / development of system architecture for asset management, analysis / programming including data integration to various application software for asset management such as GIS, RIS, PMS etc. Experience in implementation support, user training and project management systems including application of GIS/MIS for management functions shall be preferable. He / She should have minimum of 5 years experience in similar position such as Sr. Software Engineer / Group Leader in development and practical application of IT and other soft computing tools / customization of commercial-off-the-

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shelf software for Asset Management Systems including data analysis, integration of sub-modules/systems, risk management, data base management, trouble shooting, removing bugs from the software and reporting. The person should be well conversant with application of Information Technology and Management Information Systems with integration of AMS tools for Web Based applications including operational compatibility for various e-Governance schemes of Govt of Orissa (GOO) or any other State Governments or Govt of India. Proven track record of similar position with training skills in transferring technology shall be preferable.

Qualifications & Experience requirement in Tabular format

I Educational Qualification

a) Minimum : Graduate in Engineering / Master Degree in Computer Science or Computer Application

b) Desirable : Specialisation / Post Graduation in any relevant field relating to IT System Development /application

II General Experience

a) Total Experience : Total Professional Experience :
Minimum 12 Years
Desirable 15 Years

b) Relevant Experience : Experience as System Analyst: 5 Years

Asset Management related Projects: 3 Projects

Knowledge in following fields are essential:

(i) Design / development of system architecture for asset management, data analysis and integration to various application software such as GIS , HDM-4 etc.

(ii) Practical application of IT and other soft computing tools , customization of commercial-off-the-shelf software for Asset Management Systems and its integration with other sub-systems/tools, risk management, data base management, trouble shooting, removing bugs from the software

(iii) GIS , MIS and IT for Web Based applications including operational compatibility for various e-Governance schemes

c) Language : Communication fluently in English is minimum

III Additional Preferences

a) Employment Status : (a) Being a full – time Employee of the Lead Firm or any of the JV Partner for at least 2 Years will carry additional weightage. (*To be prorated for less)*

(b) Proven track record of similar position with training skills in transferring technology shall carry additional weightage. Documentary evidence to be attached.

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ANNEXURE -3

BROAD QUALIFICATION REQUIREMENTS OF SUPPORT STAFFS

1. Highway Engineer / Pavement Engineer / Bridge Engineer

I Educational Qualification

a) Minimum : Graduate in Civil Engineering

b) Desirable : Post Graduation is desirable either in Highway / Structural Engineering; or any relevant field

II General Experience

a) Total Experience : Total Professional Experience : 10 Years minimum

b) Relevant Experience : Experience as Highway Engineer or equiv. : 5 Years min;
Knowledge in following fields are essential:
(i) Latest CODEs, Circulars, Guidelines of MOST / IRC / AASHTO / TRL / BIS
(ii) Specifications and Standards for Highway Projects relevant to India and International best practice
(iii) Modern Traffic & Pavement Surveying Techniques
(iv) Highway & Bridge Data Collection

c) Language : Communication fluently in English is minimum
Local Language is Advantageous

2. Transport Economist / Transport Planner / HDM Specialist

I Educational Qualification

a) Minimum : Graduate in Civil Engineering

b) Desirable : Post Graduation is desirable either in Transport Economics / Transportation Engineering; or any relevant field

II General Experience

a) Total Experience : Total Professional Experience : 10 Years minimum

b) Relevant Experience : Experience as Transport Economist / Transport Planner or equiv. : 5 Years min;
Knowledge in following fields are essential:
(i) Latest CODEs, Circulars, Guidelines of MOST / IRC / AASHTO / TRL / BIS
(ii) Traffic Forecasting Models & Pavement distress analysis and calibration
(iii) Economic Models like HDM-4 or dTIMs etc.

c) Language : Communication fluently in English is minimum
Local Language is Advantageous

3. GIS / RIS / GPS Data Analysts

I Educational Qualification

a) Minimum : Graduate in Engineering / Science

b) Desirable : Post Graduation is desirable in relevant field

II General Experience

a) Total Experience : Total Professional Experience : 5 Years minimum

b) Relevant Experience : Experience as GIS / RIS / GPS Data Analyst: 2 Years ;
Knowledge in following fields are essential:
(i) GIS Applications,
(ii) GPS Data collections
(iii) Map Geo Referencing

c) Language : Communication fluently in English is minimum
Local Language is Advantageous

4. System Architect / Sr. System Administrator

I Educational Qualification

a) Minimum : Graduate in Engineering / Science

b) Desirable : Post Graduation is desirable in relevant field

II General Experience

a) Total Experience : Total Professional Experience : 10 Years

b) Relevant Experience : Experience as System Analyst: 5 Years ;
Knowledge in following fields are essential:
(i) System Analysis and Development,
(ii) GIS & Economic Model Integration
(iii) Web Development

c) Language : Communication fluently in English is minimum
Local Language is Advantageous

5. Software Engineers / DBMS Specialist

I Educational Qualification

a) Minimum : Graduate in Engineering / Science

b) Desirable : Post Graduation is desirable in relevant field

II General Experience

a) Total Experience : Total Professional Experience : 5 Years

b) Relevant Experience : Experience as Software Engineer: 2 Years ;
Knowledge in following fields are essential:
(i) System Analysis and Development,
(ii) Third Party Model Integration
(iii) Web Development

c) Language : Communication fluently in English is minimum
Local Language is Advantageous

6. Road Surveyor / Data Collection Supervisors / Quantity Surveyors / Environmental / Social / ROW Feature Supervisor

I Educational Qualification

a) Minimum : Diploma in Civil Engineering

II General Experience

a) Total Experience : Total Professional Experience : 2 Years minimum

b) Relevant Experience : **Knowledge in following fields are essential:**
(i) Specifications and Standards for Highway Projects
(ii) Modern Survey Techniques

c) Language : Communication fluently in English is minimum
Local Language is Advantageous

APPENDIX D - BREAKDOWN OF CONTRACT PRICE IN FOREIGN CURRENCY

1. Monthly rates for Personnel

Sr. No.	Name	Position	Staff-month Rate	
I.	**Key Professional Staff-Foreign**			
1	Anand Prakash	Team Leader cum Road Asset Management Specialist	*Home* [USD]	18,000
			Field [USD]	18,000
2	Andy Kim	Systems (IT) Specialist	*Home* [USD]	18,000
			Field [USD]	18,000

2. Reimbursable Expenses

Sr. No.	Description	Unit	Unit Cost
1	**Per diem allowances**	Day	
	Foreign		
i	Expatriate Key Staff	days	75 [USD/day]
2	**International Return flights**		
i	Air Fare (Toronto - Delhi/BBSR-Toronto) round trips	no.	2,000 [USD/round trip]

This appendix will exclusively be used for determining remuneration for additional services.

Consultant's Representative

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World Bank Projects, Orissa

APPENDIX E - BREAKDOWN OF CONTRACT PRICE IN LOCAL CURRENCY

1. Monthly rates for Personnel

Sr. No.	Name	Position	Staff-month Rate		
I.	**Key Professional Staff-Local**				
3	Dr. Sohan Singh Seehra	Highway Engineer cum Pavement Management System Specialist	*Home*	INR	3,00,000
			Field	INR	3,00,000
4	Sagar P Deshmukh	Road Data Acquisition & Data Interpretation Specialist	*Home*	INR	3,00,000
			Field	INR	3,00,000
5	Nirmal Kumar Yadamani	GIS Specialist	*Home*	INR	4,00,000
			Field	INR	4,00,000
I.	**Experts/Specialists**				
1	S K Pancholy	Quality Management System Specialist	*Home*	[INR]	2,50,000
			Field	[INR]	2,50,000
2	Athavan Andavar	System Engineer	*Home*	[INR]	6,00,000
			Field	[INR]	6,00,000
3	Dr. M. P. Raju	Network Planning and Road Classification Expert	*Home*	[INR]	6,00,000
			Field	[INR]	6,00,000
4	M. K. Saxena	Overseas "Training Co-ordinator	*Home*	[INR]	6,00,000
			Field	[INR]	6,00,000
II.	**Technical Sub/ Support Professional Staff**				
1	G. P. Sahoo	Group Leader-cum-Highway / Pavement Engineer 1	*Home/Field*	[INR]	2,00,000
2	Subir Kumar Roy	Highway / Pavement Engineer 2	*Home/Field*	[INR]	1,50,000
3	Prasanna Thakkar	Highway / Pavement Engineer 2	*Home/Field*	[INR]	1,25,000
4	P. S. Tyagi	Bridge Engineer 1	*Home/Field*	[INR]	3,00,000
5	Rana Raj Kumar	Bridge Engineer 2	*Home/Field*	[INR]	1,00,000
6	S.K. Panigrahy	Bridge Engineer 3	*Home/Field*	[INR]	1,00,000
7	Pradeep Kumar	Group Leader-cum- Transport Planner 1	*Home/Field*	[INR]	3,00,000
8	Akshat Jain	Transport Planner 2	*Home/Field*	[INR]	3,00,000
9	Satyakam Sahu	Transport Planner 3	*Home/Field*	[INR]	1,50,000
10	Sonia Chauhan	Transport Economist	*Home/Field*	[INR]	1,00,000
11	B. Naganjaneyulu	HDM Specialist	*Home/Field*	[INR]	1,00,000
12	Bhupesh Gupta	Group Leader-cum-GIS Specialist	*Home/Field*	[INR]	1,00,000
13	TBN	GPS Data Analysis	*Home/Field*	[INR]	60,000
14	Selva Balaji Baskara	Group Leader –cum- System Architect	*Home/Field*	[INR]	2,00,000
15	Parag Sawant	Software Engineers / DBMS Specialists 1	*Home/Field*	[INR]	1,00,000
16	TBN	Software Engineers / DBMS Specialists 2	*Home/Field*	[INR]	75,000
17	Surya Pratap	Software Engineers / DBMS Specialists 3	*Home/Field*	[INR]	75,000
18	Puneet Johari	Software Engineers / DBMS Specialists 4	*Home/Field*	[INR]	75,000
19	Chirag Gupta	Software Engineers / DBMS Specialists 5	*Home/Field*	[INR]	1,60,000
20	Rajaram Lakshmanam	Software Engineers / DBMS Specialists 6	*Home/Field*	[INR]	1,60,000
21	Peri Sriram	Group Leader- Data Collection Supervisor 1	*Home/Field*	[INR]	1,00,000

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World Bank Projects, Orissa

Sr. No.	Name	Position	Staff-month Rate		
22	T Raveendra Babu	Road Surveyor 1	*Home/Field*	[INR]	75,000
23	Satyajit Ganguly	Road Surveyor 2	*Home/Field*	[INR]	60,000
24	Soumitra Singh Roy	Data Collection Supervisor 2	*Home/Field*	[INR]	75,000
25	Jayanto Ghosh	Data Collection Supervisor 3	*Home/Field*	[INR]	75,000
26	Satya Sapath Roy	Data Collection Supervisor 4	*Home/Field*	[INR]	60,000
27	Saurabh Sahu	Environmental / Social / Surveyor 1	*Home/Field*	[INR]	75,000
28	Debashish Pal	Environmental / Social / Surveyor 2	*Home/Field*	[INR]	1,00,000
29	G. Sunil Kumar	ROW Feature Supervisor 1	*Home/Field*	[INR]	1,00,000
30	Naresh Gandu	ROW Feature Supervisor 2	*Home/Field*	[INR]	75,000
31	Ankit R Shah	ROW Feature Supervisor 3	*Home/Field*	[INR]	75,000
32	Rahul Bhatt	ROW Feature Supervisor 4	*Home/Field*	[INR]	60,000
33	CH Kasi Viswanaath	Quantity Surveyor	*Home/Field*	[INR]	75,000
34	Dipak Kumar Sheth	Training Expert/ Facilitator 1	*Home/Field*	[INR]	2,00,000
35	CDR. N. Mishra	Training Expert/ Facilitator 2	*Home/Field*	[INR]	4,00,000
III.	**Administrative Support Staff**				
1	TBN	Office Manager - and - Accountant	*Field*	[INR]	40,000
2	TBN	Survey / Data Entry Assistants	*Field*	[INR]	25,000
3	TBN	DTP Operator	*Field*	[INR]	25,000
4	TBN	Office Boys / Security	*Field*	[INR]	10,000

2. Reimbursable Expenses

Sr. No.	Description	Unit	Unit Cost	
1	**Per diem allowances**	Day		
	Local			
ii	Key Personnel Staff days	days	1,000	[INR/day]
iii	Technical Support Staff Days	days	600	[INR/day]
	Local Air Travel			
ii	Air Fare (Delhi-Bhubaneswar-Delhi) round trips	no.	15,000	[INR/round trip]
3	**Miscellaneous travel expenses (including taxi fare)**	Trip		
i	Train Fare (Delhi-Bhubaneswar - Delhi) in A/C 2nd Class	round trips	4,000	[INR/round trip]
ii	Train Fare (Delhi-Bhubaneswar - Delhi) in A/C 3rd Class	round trips	2,500	[INR/round trip]
4	**Communication costs**			
i	For first 24 months	Months	30,000	[INR/month]
ii	For last 12 months	Months	10,000	[INR/month]
5	**Drafting, Reproduction of Reports**			
	Various Reports (28 Reports, 530 copies in all)	copies	2,500	[INR/copy]
6	**Workshops/Seminars (Training)**			
i	Level 1: Training within Orissa (Site and office) approx. 700 engineer-days	LS	5,00,000	[INR]
ii	Level 2: Training within India (4 OWD Staff in one batch for one week, 10 such batches)	LS	15,00,000	[INR]
iii	Level 3: Overseas Training (3 trips, 4 OWD staff in one trip for two weeks)	LS	30,00,000	[INR]

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Sr. No.	Description		Unit	Unit Cost	
7	**Data Collection /Computerisation (Excluding HR Cost)**				
i	Year 1	GPS referencing	Km	50	[INR/Km]
ii		Pavement Inventory (20% Verification of Entire Network)	Km	100	[INR/Km]
iii		CD Inventory (20% Verification of Entire Network)	Km	100	[INR/Km]
iv		Roughness using ROMDAS	Km	400	[INR/Km]
v		Pavement Condition Survey/Surface distress (Including 10% Addnl for Visual Raing Calibration)	Km	100	[INR/Km]
vi		Pavement strength: BBD or FWD Survey	Km	1,700	[INR/Km]
vii		Bridge Condition (3 or 4 attributes) [1350 minor+300 major]	No.	750	[INR/Bridge]
viii		Traffic Survey (3 days count)	No.	18,000	[INR/Location]
ix		Traffic Axle Load Survey (one day)	No.	70,000	[INR/Location]
x	Year 2	Traffic Survey (3 days count)	No.	20,000	[INR/Location]
8	**Equipment, instruments, materials, supplies, etc.**				
9	**Shipment of personal effects**				
10	**Use of computers, software**				
i	Computers, Printers, UPS etc. (on Hire)		months	1,500	[INR/month]
ii	Towards acquisition of license of Commercial Off-the-Self Software including customization for unlimited use by OWD		to be decided later by client		
iii	HDM-4 (one license)		to be decided later by client		
11	**Laboratory tests**		nill		
12	**Subcontracts**		nill		
13	**Local transportation costs**				
i	Vehicles Hire charges includes cost for rental, drivers, operation, maintenance, repair, insurance etc. for local use use in Bhubaneswar		vehicle months	35,000	[INR/v-m]
14	**Office rent, clerical assistance**				
	If office space (700 sqm) provided by OWD in PIU				
i	Office Establishment		one time LS	10,00,000	[INR]
ii	Office Cost includes maintenance, Electricity, cleaning, repairs etc.				
iia	For the first 24 months		months	30,000	[INR/month]
iib	For the last 12 months		months	20,000	[INR/month]
iii	Accommodation for Key Professionals		months	50,000	[INR/month]
iv	Guest House for Support Staff (including furnishing, maintenance, ACs, electricity, cleaning etc.) (avg for first 24 month and last 12 month)		months	2,00,000	[INR/month]
v	*Office Rent (Additional, if Office space is not provided by OWD) (Not included in FIN-1)*		*months*	*1,00,000*	*[INR/month]*

This appendix will exclusively be used for determining remuneration for additional services.

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APPENDIX F - SERVICES AND FACILITIES PROVIDED BY THE CLIENT

7. FACILITIES AND SERVICES TO BE PROVIDED BY THE CLIENT

7.1 **Office Space.** The OWD will provide office space of **about 700 sq.m** within the PMU premises free of cost for functioning of the Consultancy Services. No other logistical support will be provided by the client. The Consultant shall make its own arrangements to furnish the office space including furniture, equipment, operation and maintenance as per its requirement. The Consultant may purchase /hire furniture and equipment for the office. Upon completion of the assignment the furniture and equipment purchased shall become the property of the OWD and the same shall be handed over to the OWD free of cost. The consultant is also required to furnish additional costing, in case it is not possible by the client to provide office space within the PMU premises which shall not be evaluated but shall be finalized during negotiation.

7.2 **Information.** It is expected that the OWD, both at HQ and at lower levels, will provide all ready and available information as requested by the consultant. These entities may elect to charge reasonable costs for reproduction of data, which the consultant shall bear. The consultant will be responsible for any translation of documents and for processing of all data. The OWD shall provide available annual updates of inventory, condition and traffic data within a timeframe and format to be agreed with the consultant.

7.3 **Expenses.** The Consultant has to pay expenses for surveys, inspections, studies, working sessions and workshop. The consultant has to pay travel expenses, accommodation fee for themselves and for OWD officers accompany with them in the trips to serve the Consultant's assignment. The consultant will fund expenditures for meetings, workshops, seminars and pay per diem, accommodation and transportations for participants. The Consultant shall bear all cost of training and field visits. Apart from this, the amount payable to GOO personnel by the Consultant during training and field visits is listed below.

During Field Visits:

i.) Travel Expense as per actual,
ii.) Accommodation charges as per actual, and

During Training: NIL

7.4 **Accommodation and Vehicles.** The consultant will be responsible for making his own arrangements for accommodation for his key personnel and other staff. The OWD will not provide project vehicles to the Consultant. The Consultant shall purchase /hire vehicles and make his own arrangements for registration, insurance, operation and maintenance. Upon completion of the assignment **the purchased vehicles** shall become the property of the OWD and the same shall be transferred to the OWD free of cost. The Consultant shall be responsible for making his own arrangements for communications.

7.5 **PMU AMS Staff.** The OWD will assign at least three full time staff members to work alongside the consulting team for the duration of the services. In addition, in each division one officer will be notified as the nodal officer for implementation of the AMS. The OWD will seek to maintain continuity of counterpart staff for the duration of the services.

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World Bank Projects, Orissa.
O/o the E.I.C. (Civil), Orissa
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APPENDIX G - FORM OF ADVANCE PAYMENTS GUARANTEE

Note: *See Clause GC 6.4 and Clause SC 6.4.*

Bank Guarantee for Advance Payment

______________________ *[Bank's Name, and Address of Issuing Branch or Office]*

Beneficiary: ________________ *[Name and Address of Client]*

Date: ________________

ADVANCE PAYMENT GUARANTEE No.: ________________

We have been informed that *[name of Consulting Firm]* (hereinafter called "the Consultants") has entered into Contract No. *[reference number of the contract]* dated *[insert date]* with you, for the provision of *[brief description of Services]* (hereinafter called "the Contract").

Furthermore, we understand that, according to the conditions of the Contract, an advance payment in the sum of *[amount in figures]* (*[amount in words]*) is to be made against an advance payment guarantee.

At the request of the Consultants, we *[name of Bank]* hereby irrevocably undertake to pay you any sum or sums not exceeding in total an amount of *[amount in figures]* (*[amount in words]*)[1] upon receipt by us of your first demand in writing accompanied by a written statement stating that the Consultants are in breach of their obligation under the Contract because the Consultants have used the advance payment for purposes other than toward providing the Services under the Contract.

It is a condition for any claim and payment under this guarantee to be made that the advance payment referred to above must have been received by the Consultants on their account number __________ at *[name and address of Bank]*.

---

[1] The Guarantor shall insert an amount representing the amount of the advance payment and denominated either in the currency(ies) of the advance payment as specified in the Contract, or in a freely convertible currency acceptable to the Client.

The maximum amount of this guarantee shall be progressively reduced by the amount of the advance payment repaid by the Consultants as indicated in copies of certified monthly statements which shall be presented to us. This guarantee shall expire, at the latest, upon our receipt of the monthly payment certificate indicating that the Consultants have made full repayment of the amount of the advance payment, or on the __ day of _____, 2___,[2] whichever is earlier. Consequently, any demand for payment under this guarantee must be received by us at this office on or before that date.

This guarantee is subject to the Uniform Rules for Demand Guarantees, ICC Publication No. 458.

_____

[signature(s)]

Note: All italicized text is for indicative purposes only to assist in preparing this form and shall be deleted from the final product.

[2] Insert the expected expiration date. In the event of an extension of the time for completion of the Contract, the Client would need to request an extension of this guarantee from the Guarantor. Such request must be in writing and must be made prior to the expiration date established in the guarantee. In preparing this guarantee, the Client might consider adding the following text to the form, at the end of the penultimate paragraph: "The Guarantor agrees to a one-time extension of this guarantee for a period not to exceed [six months] [one year], in response to the Client's written request for such extension, such request to be presented to the Guarantor before the expiry of the guarantee."

OFFICE OF THE ENGINEER-IN-CHIEF (CIVIL), ORISSA
NIRMAN SOUDHA, KESHARI NAGAR, UNIT – V, BHUBANESWAR – 751 001

Letter No. PMU – WB – 45 / 2008 - 15341 Dt. 28 . 3. 11

From

Er. Nalini Kanta Pradhan
Chief Engineer, World Bank Projects, Orissa
Tel: +91 674 239 6783 / Fax: +91 674 239 0080
Email: pmuosrp@gmail.com

To

M/s LEA Associates South Asia Pvt. Ltd.,
B-1/E-27, Mohan Co-operative Industrial Estate,
Mathura Road, New Delhi- 110 044
Email: lasa@lasaindia.com; info@geoinfospace.com;

Sub: Consultancy Services for providing "Technical Assistance to Establish an Asset Management System on the Core State Road Network of Orissa Works Department"
- **AWARD OF CONTRACT**

Ref: i.) RFP issued vide this office No. 4755 Dt. 05.02.2010
ii) Your Technical Proposal opened on 21.05.2010 and Financial Proposal opened on 16.07.2010
iii) Call for Negotiation issued vide this office No. 34940 Dt. 16.08.2010

Sir,

In inviting a reference to the negotiation held with your authorized representatives on 20th August and from 26th – 31st August 2010 and as per the No Objection issued by World Bank and approval communicated by the Government of Orissa in Works Department, this is to intimate that proposal for the aforesaid consultancy services submitted by **LEA Associates South Asia Pvt. Ltd.**, India in Joint Venture with **LEA International Ltd.**, Canada and in association with **Geo Infospace Pvt. Ltd**, India as Sub-Consultants for an amount of **US$ 712,500** and **INR 136,917,450** (US Dollars Seven hundred twelve thousand five hundred and Indian Rupees one hundred thirty six million nine hundred seventeen thousand four hundred fifty only) excluding applicable Service Tax, is hereby accepted. Accordingly in pursuant to Clause 7.1 of ITC , the contract is hereby awarded in favour of above consortium.

You are requested to send the authorized representatives of the respective joint venture firms alongwith all supporting documents within a fortnight to sign the Contract.

Yours sincerely,

Chief Engineer
World Bank Projects, Orissa

Memo No. 15342 Dt. 28 . 3. 11

Copy submitted to the **Engineer-in-Chief-cum-Secretary**, Works Department, Government of Orissa for favour of information. This is with reference to Works Department No. II- T- 3/2011 – 3438/W Dt. 24.03.2011.

Chief Engineer
World Bank Projects, Orissa

Memo No. 15343 Dt. 28 . 3. 11

Copy forwarded to **Mr. Rajesh Rohatgi,** Senior Transport Specialist & Task Team Leader OSRP, Sustainable Development (South Asia Region), The World Bank, 50-M, Shantipath, Chanakyapuri, New Delhi - 110 021 for information.

Chief Engineer
World Bank Projects, Orissa

Consultant

Chief Engineer
World Bank Projects, Orissa

O/o the Engineer-in-Chief (Civil), Orissa
BHUBANESWAR

Office of the Engineer in-Chief (Civil) Orissa, Bhubaneswar
1021
25 MAR 2011

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26.3.11

GOVERNMENT OF ORISSA
WORKS DEPARTMENT
* * *

No. 3438 /W., Bhubaneswar, Dated, the 24th March, 2010
II-T-3/2011

From
Sri P.K. Rout,
FA-cum-Additional Secretary to Government.

To
The Chief Engineer, World Bank Projects, Orissa,
Nirman Soudha, Bhubaneswar.

Sub:- Selection of Consultant for providing "Technical Assistance" to establish an Asset Management System on Core State Road Network of Orissa, Works Department"..

Sir,

I am directed to invite a reference to your Letter No.49710 dated 16.11.2010 on the subject noted above and to convey the approval of Government for engagement of M/s LEA Associates India in JV with LEA International Ltd., Canada and Geo Info space Pvt. Ltd. India as Consultants for development and establishment of Asset Management System for the Road Network of Works Department with a contract price amounting to Rs.18,72,49,361.00 (i.e. US$ 712,500 + INR 136,917,450 with 10.3% service tax).. The agreement shall be drawn with the Agency as per terms and conditions provided by the World Bank and State Government.

The copy of proceedings of the Tender Committee meeting held on 20.12.2010 at .4.00 P.M. in the Office Chamber of EIC-cum-Secretary to Government is enclosed for reference.

Tender documents received with your letter under reference are returned herewith, the receipt of which may please be acknowledged.

Yours faithfully,
24.3.2011
FA-cum-Additional Secretary to Government

II-T-3/2011/ D. ACHARYA

Consultant

Chief Engineer,
World Bank Projects, Orissa

Gmail by Google

Chief Engineer World Bank Projects Orissa <pmuosrp@gmail.com>

Consultancy Services for providing "Technical Assistance to Establish an Asset Management System on the Core State Road Network of Orissa Works Department"

rrohatgi@worldbank.org <rrohatgi@worldbank.org> **Mon, Nov 8, 2010 at 8:29 AM**
To: "Chief Engineer, World Bank Projects, Orissa" <pmuosrp@gmail.com>
Cc: kchoudhary@worldbank.org, stadimalla@worldbank.org, workssec@ori.nic.in, ygupta@worldbank.org

Dear Mr Pradhan,

This refers to the copy of the combined evaluation report and negotiated draft contract for the above Consultancy received under your email dated September 03, 2010 and clarifications dated September 20, 2010, September 27, 2010 and October 28, 2010. We have reviewed the case and based on the information provided and circumstances explained, have no objection to your recommendations for declaring failure of negotiations with the highest ranked firm Ramboll Denmark AS in association with MMM Gruor Canada and Larsen & Toubro as sub consultant.

We also have no objection to your proposal of signing the contract with the second ranked firm LEA Associates South Asia Pvt. Ltd., India in Joint Venture with LEA International Ltd., Canada and in association with Geo Infospace Pvt. Ltd, India as Sub-Consultants for an amount of US$ 712,500 + INR 136,917,450 exclusive of service tax.

Please note that after signing of the contract, you need to publish the details on award of contract in UNDB/Development Market in accordance with Para 2.28 of Consultancy Guidelines.

Please forward copy of the signed contract to the Bank at your earliest, along with the checklist for prior review duly filled in.

regards

Rajesh Rohatgi
Senior Transport Specialist
Sustainable Development (South Asia Region)
The World Bank
50-M, Shantipath, Chanakyapuri
New Delhi-110 021
☎ Tel: 91-11-41177839
Fax: 91-11-41177849
rrohatgi@worldbank.org
www.worldbank.org/sartransport

Consultant

Chief Engineer,
World Bank Projects, Orissa

दिल्ली DELHI N 618746

POWER OF ATTORNEY

KNOW ALL MEN by these present that I, Dr. M.P. Raju, Managing Director, LEA Associates South Asia Pvt. Ltd. (LASA), B-1/E-27, Mohan Cooperative Industrial Estate, Mathura Road, New Delhi – 110044, residing at 99, Kala Vihar Apartment, Mayur Vihar Phase-I Extension, New Delhi 110091, do hereby nominate, constitute and appoint Mr. Pradeep Kumar, Chief General Manager, LEA Associates South Asia Pvt. Ltd., B-1/E-27, Mohan Cooperative Industrial Estate, Mathura Road, New Delhi- 110044, to be the true and lawful attorney on behalf of LEA Associates South Asia Pvt. Ltd., to sign the Contract Agreement Document for "**Consultancy Services for providing Technical Assistance to Establish an Asset Management System on the Core State Road Network of Orissa Works Department**".

And, I hereby agree that all acts, deeds and things lawfully done by the said Attorney shall be construed as acts, deeds and things done by me on behalf of LEA Associates South Asia Pvt. Ltd., and I undertake to ratify and confirm all and whatsoever that my said Attorney shall lawfully do or cause to be done in connection with the above mentioned purpose for me by virtue of the power hereby given.

The signature of Mr. Pradeep Kumar, Chief General Manager, LEA Associates South Asia Pvt. Ltd. is attested below:

In witness I have signed this Deed on the 30th March 2011.

Dr. M.P. Raju
Managing Director

LEA ASSOCIATES SOUTH ASIA PVT. LTD. NEW DELHI

Signature of Pradeep Kumar

ATTESTED

Witness (KISHORE DAS)

LEA International Ltd. Toronto, Canada

Dr. M.P. Raju
Managing Director

Consultant

Chief Engineer,
World Bank Projects, Orissa
C/o The Engineer-in-Chief (Civil), Orissa
BHUBANESWAR

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INDIA NON JUDICIAL

दिल्ली DELHI

N 715430

Power of Attorney

I, **Dr. M. P. Raju** with the powers vested in me as the Managing Director of LEA Associates South Asia Private Limited (LASA) and as the Director of LEA International Limited (LIL) hereby **nominate Mr. Pradeep Kumar**, Chief General Manager, LASA **as the Authorized Representative of the LASA and LIL Joint Venture** for the Consultancy Services for providing **"Technical Assistance to Establish an Asset Management System on the Core State Road Network of Orissa Works Department"**.

Sincerely,
For **LEA Associates South Asia Private Limited**
and LEA International Limited Joint Venture

LEA ASSOCIATES SOUTH ASIA PVT. LTD. NEW DELHI

LEA INTERNATIONAL LTD. NEW DELHI

Dr. M. P. Raju
Managing Director, LASA
and Director, LIL

Consultant

Page 122 of 126

Chief Engineer,
World Bank Projects, Orissa
BHUBANESWAR

LEA International Ltd.
Transportation and Management Consultant
Consulting Engineers

Suite 900, 625 Cochrane Drive
Markham, ON, L3R 9R9
CANADA
Tel.: 905-470-0015 Fax : 905-470-0030
www.lea.ca

TO WHOMSOEVER IT MAY CONCERN

I, being **Corporate Secretary**, on behalf of the Board of the Directors of **LEA International Limited (LEA), Canada**, do hereby certify the enclosed Power of Attorney as true copy and do further hereby re-affirm the enclosed Power of Attorney issued to **Dr. M. P. Raju,** to sign the Contract Agreement Document for "**Consultancy Services for providing Technical Assistance to Establish an Asset Management System on the Core State Road Network of Orissa Works Department"** on behalf of LEA International Limited, (LEA) Canada**,** Suite 900, 625 Cochrane Drive, Markham, ON, L3R 9R9, CANADA.

The signature of Dr. M. P. Raju, Director, LEA International Ltd. is attested below:

Ksh. Chaoba Singh
Corporate Secretary

LEA International Ltd. Toronto, Canada

Signature of Dr. M. P. Raju

ATTESTED

Date: 30th March 2011

Ksh. Chaoba Singh
Corporate Secretary

af. No. 213 Date 21/1/0

Signature & Seal of Ministry of Government Serv
is hereby attested. The Mission does not take an
responsibility for the contents.

Ontario

MINISTRY OF GOVERNMENT SERVICES

Tirath Singh
Consul (CPV)
Consulate General of India
Toronto

I HEREBY CERTIFY AS FOLLOWS:

BARRY HARPER SMITH

of the Province of Ontario, whose name is subscribed to the attached Instrument, was, at the time of subscribing thereto, a NOTARY PUBLIC in and for the Province of Ontario, Canada, duly commissioned and duly authorized by the laws thereof to administer oaths, to take affidavits and to certify the proof of deeds and other instruments in writing to be recorded within the said Province;

I FURTHER CERTIFY THAT I have compared the signature of the said NOTARY PUBLIC subscribed to the attached Instrument with the specimen signature of the said NOTARY PUBLIC filed in this office and verily believe the said signature to be genuine; and THAT I have compared the impression of the Seal of the said NOTARY PUBLIC appearing on the attached Instrument with the specimen of the Seal filed in this office and verily believe the impression of the Seal to be genuine.

IN TESTIMONY WHEREOF I have hereunto set my Hand and affixed the Seal of the Ministry of Government Services of the Province of Ontario at the City of Toronto in the said Province this fifteenth day of January, A.D. 2009.

Sheila Tracey

for the MINISTER OF GOVERNMENT SERVICES

CERTIFIED TRUE COPY

LEA International Ltd. LEA Canada

LEA International Ltd. LEA Toronto, Canada

Consultant

Chief Engineer
World Bank Projects, Orissa

O/O [illegible], Orissa
BHUBANESWAR

PROVINCE OF ONTARIO)
) *To all whom these presents may*
)
) *come, be seen or known*
TO WIT)

I, ***BARRY H. SMITH****, a Notary Public, in and for the Province of Ontario, by Royal Authority duly appointed, residing at the City of Toronto, in said Province,*

DO Certify and Attest that the paper-writing hereto annexed is a true copy of a document produced and shown to me and purporting to be copy of The Extracts of the Meeting of the Board of Directors of M/S Lea International Ltd. held on Friday the 12th day of September, 2008, the said copy having been compared by me with the said original document, an act whereof being requested I have granted under my Notarial Form and Seal of Office to serve and avail as occasion shall or may require.

In Testimony Whereof *I have hereto subscribed my name and affixed my Notarial Seal of Office at the City of Toronto, Province of Ontario, Canada.*

this 13th day of January, 2009.

A Notary Public in and for the Province of Ontario.

CERTIFIED TRUE COPY

LEA International Ltd. LEA Toronto, Canada

Consultant

Chief Engineer,
World Bank Projects, Orissa

C/o the E.I.C. (Civil), Orissa
BHUBANESWAR

LEA International Ltd.
Consulting Engineers & Planners

Suite 900, 625 Cochrane Drive, Markham, ON, L3R 9R9 CANAD
Tel: 905-470-0015 Fax: 905-470-0030 www.LEA.ca

5331 Jaskow Drive, Richmond, B.C. V7E 5H9 CANADA
Tel: 604-609-2272 Fax: 604-609-7008

CERTIFIED TRUE COPY OF THE EXTRACTS OF THE MINUTES OF THE MEETING OF THE BOARD OF DIRECTORS OF M/S LEA INTERNATIONAL LTD. HELD ON FRIDAY THE 12th SEPTEMBER, 2008 AT SUITE 900, 625 COCHRANE DRIVE, MARKHAM, ON, L3R 9R9 CANADA.

Change in Directors and Secretary

"RESOLVED THAT Mr. John E.L. Farrow, Mr. Pinaki Roychowdhury and Mr. M.P. Raju be and are hereby appointed as the Directors in LEA International Ltd. w.e.f from 12th September, 2008 and Mr. John Da Silva resigned from the directorship of the Company w.e.f 12th September, 2008 due to ill-health and personal reasons.

FURTHER RESOLVED THAT Mr. Paul Gordon Duncan be and is hereby appointed as the Secretary of the Company in place of Mr. Mark Wright w.e.f 12th September, 2008.

RESOLVED FURTHER THAT Mr. Pinaki Roychowdhury or Mr. M.P. Raju, be and are hereby severally authorised to sign, execute the necessary papers, forms or documents on behalf of the Company and to take such other steps as may become necessary for expeditiously execution of the above said decision of the Company."

For and on behalf of
'LEA International Ltd.'

John E.L. Farrow
Director

CERTIFIED TRUE COPY

LEA International Ltd. Toronto, Canada