AGREEMENT No 5 OF 2013 - 14

GOVERNMENT OF ODISHA
WORKS DEPARTMENT
INDIA
ODISHA STATE ROADS PROJECT
Loan # 7577 - IN

CONTRACT FOR GOODS

Procurement of Commercial Off-the-Shelf (COTS) Software for Odisha Road Asset Management System (O-RAMS)

Between

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

and

Bentley Systems (India) Pvt. Ltd.

Volume - 1

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

Dated: **12th July, 2013**

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PART 1 – The Contract Agreement

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Contract for Goods

Supply of Commercial Off-the-Shelf (COTS) Software for Odisha Road Asset Management Systems (O-RAMS)

THIS CONTRACT AGREEMENT is made the **12th** day of **July, 2013.**

BETWEEN

(1) ***Chief Engineer, World Bank Projects, Odisha on behalf of the Works Department, Government of Odisha*** and having its principal place of business at **Office of the Engineer-in-Chief (Civil), Odisha, Nirman Soudha, Keshari Nagar, Unit – V, Bhubaneswar, Odisha, INDIA – 751001** (hereinafter called "the Purchaser"), and

(2) ***Bentley Systems India Private Limited,*** a corporation incorporated under the laws of **India** and having its principal place of business at **203, Okhla Industrial Estate, Phase – III, New Delhi - 110 020** (hereinafter called "the Supplier").

BENTLEY SYSTEMS INDIA PRIVATE LIMITED New Delhi Office

Pankaj

Chief Engineer,
World Bank Projects, Odisha

WHEREAS the Purchaser invited bids for certain Goods and ancillary services, viz **supply of Commercial Off-the-Shelf (COTS) Software for Odisha Road Asset Management Systems (O-RAMS)** including the full use RDBMS Server license and other related Services e.g. Training Assistance for configuration, acceptance tests and support during one year warranty period and five year AMC and has accepted a Bid by the Supplier for the supply of those Goods and Services in the sum **Indian Rs.2,82,50,771** (Indian Rupees Two crore eighty two lakh fifty thousand seven hundred seventy one) only without applicable sales & service taxes (hereinafter called "the Contract Price").

NOW THIS AGREEMENT WITNESSETH AS FOLLOWS:

1. In this Agreement words and expressions shall have the same meanings as are respectively assigned to them in the Conditions of Contract referred to.

2. The following documents shall constitute the Contract between the Purchaser and the Supplier, and each shall be read and construed as an integral part of the Contract:

Volume-1

(a) PART 1 – The Contract Agreement
(b) PART 2 - Special Conditions of Contract
(c) PART 3 – General Conditions of Contract
(d) PART 4 – The Purchaser's Notification of Award
(e) PART 5 – No Objection Letter
(f) PART 6 – Technical Requirements
(g) PART 7 - Performance Security (Bank Guarantee)

Volume-2

(h) PART 8 – Supplier's Bid

3. This Contract shall prevail over all other Contract documents. In the event of any discrepancy or inconsistency within the Contract documents, then the documents shall prevail in the order listed above.

4. In consideration of the payments to be made by the Purchaser to the Supplier as hereinafter mentioned, the Supplier hereby covenants with the Purchaser to provide the Goods and Services and to remedy defects therein in conformity in all respects with the provisions of the Contract.

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Chief Engineer,
World Bank Projects, Odisha

5. The Purchaser hereby covenants to pay the Supplier in consideration of the provision of the Goods and Services and the remedying of defects therein, the Contract Price or such other sum as may become payable under the provisions of the Contract at the times and in the manner prescribed by the Contract.

IN WITNESS whereof the parties hereto have caused this Agreement to be executed in accordance with the laws of **India** on the day, month and year indicated above.

For and on behalf of the Purchaser, i.e. ***Government of Odisha***

Signed: _____ 14/7/13

Er. Nalini Kanta Pradhan

Chief Engineer
World Bank Project
O/o the E.C.(Civil), Odisha
Bhubaneswar.

in the capacity of : Chief Engineer, World Bank Projects, Odisha

in the presence of :

Witness : _____ 12.7.13
Er. Rashim Ranjan Bohidar
Superintending Engineer, ISAP

Witness : _____ 12/7/2013
Mr. K. B. Panda
Financial Advisor, PMU, OSRP

For and on behalf of the Supplier, i.e. **Bentley Systems India Pvt. Ltd.**

Signed: _____
[Mr. Pankaj Mittal]

in the capacity of : Business Development Manager

in the presence of :

Witness : _____
Mr. Kasturi Srinivas
Technical Manager, Bentley Systems India Pvt. Ltd.

BENTLEY SYSTEMS INDIA PRIVATE LIMITED * New Delhi Office

Chief Engineer,
World Bank Projects, Odisha

PART 2 – Special Conditions of Contract

Chief Engineer,
World Bank Projects, Odisha

Special Conditions of Contract

The following Special Conditions of Contract (SCC) shall supplement and / or amend the General Conditions of Contract (GCC). Whenever there is a conflict, the provisions herein shall prevail over those in the GCC.

GCC 1.1(i)	The Purchaser's country is: ***India***
GCC 1.1(j)	The Purchaser is: **Chief Engineer, World Bank Projects, Odisha** on behalf of Government of Odisha
GCC 1.1 (o)	The Project Site(s)/Final Destination(s) is/are: Office of the Engineer-in-Chief (Civil), Odisha, Nirman Soudha, Keshari Nagar, Unit – V, **Bhubaneswar,** *Odisha, INDIA – 751 001*
GCC 4.2 (a)	The meaning of the trade terms shall be as prescribed by Incoterms.
GCC 4.2 (b)	The version edition of Incoterms shall be *"Incoterms 2000"*
GCC 5.1	The language shall be: **English**
GCC 8.1	For **notices**, the Purchaser's address shall be: Attention: **Chief Engineer, World Bank Projects, Odisha** Address: O/o E.I.C. (Civil), Odisha Nirman Soudha, Keshari Nagar, Unit – V, City: *Bhubaneswar* ZIP Code: 751001 Country: INDIA Telephone: +91 674 239 6783 Facsimile number: +91 674 239 0080 Electronic mail address: pmuosrp@gmail.com the Supplier's address shall be: Attention: **Mr. Pankaj Mittal,** Business Development Manager Address: Bentley Systems India Pvt. Ltd. 203, Okhla Industrial Estate, Phase – III City: New Delhi ZIP Code: 110020 Country: INDIA Telephone: Facsimile number: 011 – 4902 1100, 4902 1199 Electronic mail address: *pankaj.mittal@bentley.com;* *mohd.azad@bentley.com;*
GCC 9.1	The governing law shall be the law of: The State of Odisha in India

BENTLEY SYSTEMS INDIA PVT. LTD. New Delhi Office

Bentley Systems India Pvt. Ltd.

Chief Engineer,
World Bank Projects, Odisha

GCC 10.2	The rules of procedure for arbitration proceedings pursuant to GCC Clause 10.2 shall be as follows: ***(a) Contract with foreign Supplier:*** GCC 10.2 (a)—Any dispute, controversy or claim arising out of or relating to this Contract, or breach, termination or invalidity thereof, shall be settled by arbitration in accordance with the UNCITRAL Arbitration Rules as at present in force. The arbitral tribunal shall consist of three Arbitrators one each to be appointed by the Purchaser and Supplier. The third arbitrator shall be chosen by the two Arbitrators so appointed by the parties, and shall act as presiding arbitrator. In case of failure of the two arbitrators appointed by the parties to reach upon a consensus within a period of 30 days from the appointment of the arbitrator appointed subsequently, the Presiding Arbitrator shall be appointed the Indian Council of Arbitration. Arbitration proceedings shall be held at Bhubaneswar, Odisha, India, and the language of the arbitration proceedings and that of all documents and communications between the parties shall be in English. ***(b) Contracts with Supplier national of the Purchaser's country:*** (a) In case of Dispute or difference arising between the Purchaser and a domestic supplier relating to any matter arising out of or connected with this agreement, such disputes or difference shall be settled in accordance with the Arbitration and Conciliation Act, 1996. The arbitral tribunal shall consist of 3 arbitrators one each to be appointed by the Purchaser and the Supplier. The third Arbitrator shall be chosen by the two Arbitrators so appointed by the Parties and shall act as Presiding arbitrator. In case of failure of the two arbitrators appointed by the parties to reach upon a consensus within a period of 30 days from the appointment of the arbitrator appointed subsequently, the Presiding Arbitrator shall be appointed by the Indian Council of Arbitration. (b) If one of the parties fails to appoint its arbitrator in pursuance of sub-clause (a) and (b) above, within 30 days after receipt of the notice of the appointment of its arbitrator by the other party, then the "The International Centre for Alternative Dispute Resolution (India), both in cases of the Foreign supplier as well as Indian supplier, shall appoint the arbitrator. A certified copy of the order of the "The International Centre for Alternative Disputes Resolution (India), making such an appointment shall be furnished to each of the parties.

	(c) Arbitration proceedings shall be held at Bhubaneswar, Odisha, India, and the language of the arbitration proceedings and that of all documents and communications between the parties shall be English. (d) The decision of the majority of arbitrators shall be final and binding upon both parties. The cost and expenses of Arbitration proceedings will be paid as determined by the arbitral tribunal. However, the expenses incurred by each party in connection with the preparation, presentation etc. of its proceedings as also the fees and expenses paid to the arbitrator appointed by such party or on its behalf shall be borne by each party itself. (e) Where the value of the contract is Rs. 10 million and below, the disputes or differences arising shall be referred to the Sole Arbitrator. The Sole Arbitrator should be appointed by agreement between the parties; failing such agreement, by the appointing authority namely the "The International Centre for Alternative Dispute Resolution (India)".
GCC 13.1	Details of Shipping and other Documents to be furnished by the Supplier are (a) For Goods supplied from abroad: Within 24 Hours of shipment the supplier shall notify the purchaser and mail the following documents to the purchaser: (i) One original and two copies of Supplier's invoice showing contract number, goods description, quantity, unit price and total amount (ii) Copy of Airway /Seaway Bill marked freight prepaid (iii) Three Copies of packing list identifying contents of each package (iv) Insurance certificate along with a copy of "information of shipment" sent to the Insurance agency. (v) Manufacturer's/Supplier's warranty certificate (vi) Manufacturer's Test report (vii) Certificate of origin The above documents shall be received by the Purchaser at least one week before arrival of Goods at the port or place of arrival and, if not received, the Supplier will be responsible for any consequent expenses.

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Chief Engineer,
World Bank Projects, Odisha

	(b) For Goods from within India: Upon delivery of the goods to the consignee, the supplier shall notify the purchaser and mail the following documents to the Purchaser: (i) One original and two copies of the Supplier invoice showing contract number, goods description, quantity, unit price, total amount (ii) Delivery note and acknowledgement of receipt of goods duly sealed and signed by the Consignee (iii) Three copies of packing list identifying contents of each package (iv) Insurance Certificate along with a copy of "information of shipment" sent to the Insurance agency. (v) Manufacturer's/Supplier's warranty certificate (vi) Inspection Certificate issued by the nominated inspection agency (vii) Certificate of Origin. The above documents shall be received by the Purchaser before arrival of the Goods and, if not received, the Supplier will be responsible for any consequent expenses.
GCC 15.1	The prices charged for the Goods supplied and the related Services performed *shall not* be adjustable.
GCC 16.1	GCC 16.1—The method and conditions of payment to be made to the Supplier under this Contract shall be as follows: Payment shall be made in the currency specified in the Contract. **Payment for Goods & Services:**

A. Software Supply, Testing and Installation for COTS, RDBMS etc	INR 16,469,159
B. Training, Assistance for configuration, Acceptance tests and support during warranty period	INR 7,461,612
C. Annual Maintenance Contract	INR 4,320,000
Total: (Excluding Taxes)	**INR 28,250,771**

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Chief Engineer,
World Bank Projects, Odisha

Payment shall be made through SWIFT / NEFT transfer (as quoted in Price schedule) in the following manner:

A. Software Supply, Testing and Installation (INR 16,469,159 Excluding Taxes)

(i) **On Delivery:** Forty (40) percent of the Contract Price for Goods (as mentioned for COTS, RDBMS etc in the price schedule) shall be paid after supply of software licenses, successful installation and pre-commissioning test by the Purchaser within thirty (30) days.

(ii) **On Acceptance:** Remaining Fifty (50) percent of the Contract Price for Goods (as mentioned for COTS, RDBMS etc in the price schedule) shall be paid to the Supplier within thirty (30) days upon submission of claim after successful configuration with operational acceptance test and upon issuance of acceptance certificate by the Purchaser.

(iii) **On Completion of Warranty Period:** Ten (10) percent of the Contract Price for Goods (as mentioned for COTS, RDBMS etc in the price schedule) shall be paid after successful completion of 12 months of warranty period after acceptance by the Purchaser within thirty (30) days.

Note: Refer Part 6. Schedule of Requirements

B. Training, Assistance for configuration, Acceptance tests and support during warranty period (INR 7,461,612 Excluding Taxes)

(i) **On completion of Training:** Twenty-five (25) percent of the Contract Price as mentioned in Price and Completion Schedule – Related Services at item 1 shall be paid after imparting training to the core group for configuration and calibration of its in-built planning tools including providing System / Reference Manuals within thirty (30) days

(ii) **On completion of Acceptance Tests:** Fifty (50) percent of the Contract Price as mentioned in Price and Completion Schedule – Related Services at item 1 shall be paid after providing assistance for configuration and on successful acceptance tests within thirty (30) days.

(iii) **On completion of support period during warranty:** Twenty-five (25) percent of the Contract Price as mentioned in Price and Completion Schedule – Related Services at item 1 shall be paid after expiry of support period during warranty within thirty (30) days.

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	C. Annual Maintenance Contract (AMC) (INR 4,320,000 Excluding Taxes) (i) **On completion of AMC for each Quarter:** Five (5) percent of the Contract Price as mentioned for Price and Completion Schedule – Related Services at Item 2 shall be paid after each quarter of successful completion of the Annual Maintenance, upon Purchaser's approval.
GCC 16.5	The payment-delay period after which the Purchaser shall pay interest to the supplier shall be **45 (Forty Five)** days. The interest rate that shall be applied is: - For foreign currency: LIBOR+2% per annum - For Local Currency: **8 *% per annum***
GCC 18.1	A Performance Security shall be required A Performance Security shall be required within 28 days after the Supplier's receipt of Notification of Award, the supplier shall furnish Performance Security to the Purchaser for an amount of 10% of the contract value. The initial validity of the Bank Guarantee(s) shall cover upto 60 days after the date of completion of performance obligations including warranty and five years of AMC period thereafter. In the event of any correction of defects or replacement of defective material during the warranty period, the warranty for the corrected/ replaced material shall be extended to a further period of 12 months and the Performance Bank guarantee for proportionate value shall be extended 60 days over and above the extended warranty period and 5 years of AMC period.
GCC 18.3	If required, the Performance Security shall be in the form of: a **Bank Guarantee** from any Scheduled bank in INDIA. Foreign suppliers can submit a **Bank Guarantee** issued by a reputable bank or financial institution, such as an insurance, or bonding or surety company located outside INDIA. However, such financial institution shall have a correspondent financial institution located in INDIA to make it enforceable. If required, the Performance security shall be denominated in the currencies of payment of the Contract, in accordance with their portions of the Contract Price.

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Chief Engineer,
World Bank Projects, Odisha

GCC 18.4	Discharge of the Performance Security shall take place " The performance Security will be discharged partially by the purchaser and returned to the Supplier not later than 60 days following the date of completion of the Supplier's performance obligations, including the warranty obligation of 1 year under the contract. During the AMC period (i.e. after warranty period), the Performance Security shall be reduced to 2.5 percent of the Contract price.
GCC 19.1	The copyright of all Intellectual Property (IP), and other materials containing data and information furnished to the Purchaser by the Supplier herein shall remain vested in the Supplier, or, if they are furnished to the Purchaser directly or through the Supplier by any third party license, the copyright in such materials shall remain vested in such third party. The software supplier shall provide an End-user license agreement (EULA) with reference to the Section VI. Schedule of Requirements to define the rights of usage of the software. **Intellectual Property Rights Warranty :** 19.1 The Supplier hereby represents and warrants that: (a) the System as supplied, installed, tested, and accepted; (b) use of the System in accordance with the Contract; and (c) copying of the Software and Materials provided to the Purchaser in accordance with the Contract do not and will not infringe any Intellectual Property Rights held by any third party and that it has all necessary rights or at its sole expense shall have secured in writing all transfers of rights and other consents necessary to make the assignments, licenses, and other transfers of Intellectual Property Rights and the warranties set forth in the Contract, and for the Purchaser to own or exercise all Intellectual Property Rights as provided in the Contract. Without limitation, the Supplier shall secure all necessary written agreements, consents, and transfers of rights from its employees and other persons or entities whose services are used for development of the System.

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Chief Engineer,
World Bank Projects, Odisha

	Intellectual Property Rights Indemnity : 19.2 The Supplier shall indemnify and hold harmless the Purchaser and its employees and officers from and against any and all losses, liabilities, and costs (including losses, liabilities, and costs incurred in defending a claim alleging such a liability), that the Purchaser or its employees or officers may suffer as a result of any infringement or alleged infringement of any Intellectual Property Rights by reason of: (a) installation of the System by the Supplier or the use of the System, including the Materials, in the country where the site is located; (b) copying of the Software and Materials provided the Supplier in accordance with the Agreement; and (c) sale of the products produced by the System in any country, except to the extent that such losses, liabilities, and costs arise as a result of the Purchaser's breach of GCC Clause 19.3. 19.3 Such indemnity shall not cover any use of the System, including the Materials, other than for the purpose indicated by or to be reasonably inferred from the Contract, any infringement resulting from the use of the System, or any products of the System produced thereby in association or combination with any other goods or services not supplied by the Supplier, where the infringement arises because of such association or combination and not because of use of the System in its own right. 19.4 Such indemnities shall also not apply if any claim of infringement: (a) is asserted by a parent, subsidiary, or affiliate of the Purchaser's organization; (b) is a direct result of a design mandated by the Purchaser's Technical Requirements and the possibility of such infringement was duly noted in the Supplier's Bid; or (c) results from the alteration of the System, including the Materials, by the Purchaser or any persons other than the Supplier or a person authorized by the Supplier.

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Chief Engineer,
World Bank Projects, Odisha

19.5 If any proceedings are brought or any claim is made against the Purchaser arising out of the matters referred to in GCC Clause 19.1, the Purchaser shall promptly give the Supplier notice of such proceedings or claims, and the Supplier may at its own expense and in the Purchaser's name conduct such proceedings or claim and any negotiations for the settlement of any such proceedings or claim.

If the Supplier fails to notify the Purchaser within twenty-eight (28) days after receipt of such notice that it intends to conduct any such proceedings or claim, then the Purchaser shall be free to conduct the same on its own behalf. Unless the Supplier has so failed to notify the Purchaser within the twenty-eight (28) days, the Purchaser shall make no admission that may be prejudicial to the defense of any such proceedings or claim. The Purchaser shall, at the Supplier's request, afford all available assistance to the Supplier in conducting such proceedings or claim and shall be reimbursed by the Supplier for all reasonable expenses incurred in so doing.

19.6 The Purchaser shall indemnify and hold harmless the Supplier and its employees, officers, and Subcontractors from and against any and all losses, liabilities, and costs (including losses, liabilities, and costs incurred in defending a claim alleging such a liability) that the Supplier or its employees, officers, or Subcontractors may suffer as a result of any infringement or alleged infringement of any Intellectual Property Rights arising out of or in connection with any design, data, drawing, specification, or other documents or materials provided to the Supplier in connection with this Contract by the Purchaser or any persons (other than the Supplier) contracted by the Purchaser, except to the extent that such losses, liabilities, and costs arise as a result of the Supplier's breach of GCC Clause 19.9.

19.7 Such indemnity shall not cover

(a) any use of the design, data, drawing, specification, or other documents or materials, other than for the purpose indicated by or to be reasonably inferred from the Contract;

(b) any infringement resulting from the use of the design, data, drawing, specification, or other documents or materials, or any products produced thereby, in association or combination with any other Goods or Services not provided by the Purchaser or any other person contracted by the Purchaser, where the infringement arises because of such association or combination and not because of the use of the design, data, drawing, specification, or other documents or materials in its own right.

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Chief Engineer, World Bank Projects, Odisha

	19.8 Such indemnities shall also not apply: (a) if any claim of infringement is asserted by a parent, subsidiary, or affiliate of the Supplier's organization; (b) to the extent that any claim of infringement is caused by the alteration, by the Supplier, or any persons contracted by the Supplier, of the design, data, drawing, specification, or other documents or materials provided to the Supplier by the Purchaser or any persons contracted by the Purchaser. 19.9 If any proceedings are brought or any claim is made against the Supplier arising out of the matters referred to in GCC Clause 19.6, the Supplier shall promptly give the Purchaser notice of such proceedings or claims, and the Purchaser may at its own expense and in the Supplier's name conduct such proceedings or claim and any negotiations for the settlement of any such proceedings or claim. If the Purchaser fails to notify the Supplier within twenty-eight (28) days after receipt of such notice that it intends to conduct any such proceedings or claim, then the Supplier shall be free to conduct the same on its own behalf. Unless the Purchaser has so failed to notify the Supplier within the twenty-eight (28) days, the Supplier shall make no admission that may be prejudicial to the defense of any such proceedings or claim. The Supplier shall, at the Purchaser's request, afford all available assistance to the Purchaser in conducting such proceedings or claim and shall be reimbursed by the Purchaser for all reasonable expenses incurred in so doing.
GCC 23.2	The packing, marking and documentation within and outside the packages shall be: **Commercial Off-the-Shelf (COTS) Software for Odisha Road Asset Management System (O-RAMS)** i) Project ii) Contract No. iii) Country of Origin of Goods iv) Supplier's Name and v) Packing list reference number vi) OSRP SUPPLIES-NOT FOR SALE vii) Purchaser address : Chief Engineer, World Bank Projects, Odisha Nirman Soudha, Keshari Nagar, Unit-V Bhubaneswar – 751 001 India
GCC 24.1	The insurance shall be paid in an amount equal to 110 percent of the CIP (EXW for Goods supplied from within the country) value of the Goods from "Warehouse to warehouse (final destination)" on "All Risks" basis including War Risks and Strikes.

GCC 25.1	Responsibility for transportation of the Goods shall be as specified in the Incoterms. If not in accordance with Incoterms, responsibility for transportations shall be as follows: The Supplier is required under the Contract to transport the Goods to a specified place of final destination within the Purchaser's country, defined as the Project Site, transport to such place of destination in the Purchaser's country, including insurance and storage, as shall be specified in the Contract, shall be arranged by the Supplier, and related costs shall be included in the Contract Price; Custom clearances (as required) shall be responsibility of the Supplier.
GCC 26.1	The inspections and tests shall be: As per the requirements specified in the Schedule of Requirements
GCC 26.2	The Inspections and tests shall be conducted at: Bhubaneswar, India
GCC 27.1	The liquidated damage shall be: 0.5 % of contract price per week or part thereof.
GCC 27.1	The maximum amount of liquidated damages shall be: 10% of the contract price.

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GCC 28.2	During the Warranty Period, the Supplier will provide at no additional cost to the Purchaser all new versions, releases, and updates for all Standard Software that are used in the System, within thirty (30) days of their availability from the Supplier to other clients of the Supplier in the Purchaser's country, and no later than six (6) months after they are released in the country of origin of the Software. As support during the warranty period, the COTS software supplier shall provide the purchaser the following : a) Communicate with the supplier's contact person to assist user to resolve technical problems as identified by the user by appropriate media such as telephone, email, fax etc. The supplier will provide access numbers, e-mail IDs. b) Correct (provide patches / fixes) or replace the COTS software and /or provide service necessary to remedy any programming fault which significantly affects the use of COTS software and is a verifiable problem. The defect is to be rectified by the supplier within 30 days of the problem being reported by the purchaser and accepted by the supplier. c) During the period of the warranty, the purchaser is entitled to return the software for a full refund if the software fails to perform according to specifications, and the supplier is unable to release a maintenance update to rectify it within a maximum of six (6) months. d) The supplier will provide a single copy of any corrections or alterations to or new version of COTS software on the appropriate media and a single copy of the appropriate documentation. e) Minor update and releases by electronic software distribution. f) Major releases and Manual update by courier service.
GCC 28.3	The period of validity of the Warranty shall be: **1 Year** from successful operational test and issuance of Acceptance Certificate from Purchaser. For purposes of the Warranty, the place(s) of final destination(s) shall be: Bhubaneswar, India
GCC 28.5	The period for repair or replacement shall be: **15** days.

GCC 38.0	Add New Clause GCC 38.0 **Product Upgrades** 38.1 At any point during performance of the Contract, should technological advances be introduced by the Supplier for Information Technologies originally offered by the Supplier in its bid and still to be delivered, the Supplier shall be obligated to offer to the Purchaser the latest versions of the available Information Technologies having equal or better performance or functionality at the same or lesser unit prices.
	Add New Clause as: 38.2 At any point during performance of the Contract, for Information Technologies still to be delivered, the Supplier will also pass on to the Purchaser any cost reductions and additional and/or improved support and facilities that it offers to other clients of the Supplier in the Purchaser's Country.
	38.3 During performance of the Contract, the Supplier shall offer to the Purchaser all new versions, releases, and updates of Standard Software, as well as related documentation and technical support services, within thirty (30) days of their availability from the Supplier to other clients of the Supplier in the Purchaser's Country, and no later than six (6) months after they are released in the country of origin. In no case will the prices for these Software exceed those quoted by the Supplier in its bid.
	38.4 During the Warranty Period, the Supplier will provide at no additional cost to the Purchaser all new versions, releases, and updates for all Standard Software that are used in the System, within thirty (30) days of their availability from the Supplier to other clients of the Supplier in the Purchaser's country, and no later than six (6) months after they are released in the country of origin of the Software. As support COTS software shall provide the purchaser the following a) Correct or replace the COTS software and /or provide service necessary to remedy any programming fault which significantly affects the use of COTS software and is a verifiable problem. b) Communicate with the Purchaser contact person to assist user resolve technical problems as identified by the user by appropriate media such as telephone, email, fax etc. c) A single copy of any corrections or alterations to or new version of COTS software on the appropriate media and a single copy of the appropriate documentation. d) Minor update and releases by electronic software distribution. e) Major releases and Manual update by courier service.

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	38.5 The Purchaser shall introduce all new versions, releases or updates of the Software within eighteen (18) months of receipt of a production-ready copy of the new version, release, or update, provided that the new version, release, or update does not adversely affect System operation or performance or require extensive reworking of the System. In cases where the new version, release, or update adversely affects System operation or performance, or requires extensive reworking of the System, the Supplier shall continue to support and maintain the version or release previously in operation for as long as necessary to allow introduction of the new version, release, or update. In no case shall the Supplier stop supporting or maintaining a version or release of the Software less than twenty four (24) months after the Purchaser receives a production-ready copy of a subsequent version, release, or update. The Purchaser shall use all reasonable endeavors to implement any new version, release, or update as soon as practicable, subject to the twenty-four-month-long stop date.

BENTLEY SYSTEMS INDIA PRIVATE LTD. New Delhi

Chief Engineer,
World Bank Projects, Odisha

PART 3 – General Conditions of Contract

Table of Clauses

General Conditions of Contract

1 Definitions

1.1 The following words and expressions shall have the meanings hereby assigned to them:

(a) "Bank" means the World Bank and refers to the International Bank for Reconstruction and Development (IBRD) or the International Development Association (IDA).

(b) "Contract" means the Contract Agreement entered into between the Purchaser and the Supplier, together with the Contract Documents referred to therein, including all attachments, appendices, and all documents incorporated by reference therein.

(c) "Contract Documents" means the documents listed in the Contract Agreement, including any amendments thereto.

(d) "Contract Price" means the price payable to the Supplier as specified in the Contract Agreement, subject to such additions and adjustments thereto or deductions therefrom, as may be made pursuant to the Contract.

(e) "Day" means calendar day.

(f) "Completion" means the fulfillment of the Related Services by the Supplier in accordance with the terms and conditions set forth in the Contract.

(g) "GCC" means the General Conditions of Contract.

(h) "Goods" means all of the commodities, raw material, machinery and equipment, and/or other materials that the Supplier is required to supply to the Purchaser under the Contract.

(i) "Purchaser's Country" is the country specified in the Special Conditions of Contract (SCC).

(j) "Purchaser" means the entity purchasing the Goods and Related Services, as specified in the **SCC.**

(k) "Related Services" means the services incidental to the supply of the goods, such as insurance, installation, training and initial maintenance and other such obligations of the Supplier under the Contract.

(l) "SCC" means the Special Conditions of Contract.

Chief Engineer,
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(m) "Subcontractor" means any natural person, private or government entity, or a combination of the above, to whom any part of the Goods to be supplied or execution of any part of the Related Services is subcontracted by the Supplier.

(n) "Supplier" means the natural person, private or government entity, or a combination of the above, whose bid to perform the Contract has been accepted by the Purchaser and is named as such in the Contract Agreement.

(o) "The Project Site," where applicable, means the place named in the **SCC.**

2 Contract Documents

2.1 Subject to the order of precedence set forth in the Contract Agreement, all documents forming the Contract (and all parts thereof) are intended to be correlative, complementary, and mutually explanatory. The Contract Agreement shall be read as a whole.

3 Fraud and Corruption

3.1 If the Purchaser determines that the Supplier and/or any of its personnel, or its agents, or its Subcontractors, consultants, service providers, suppliers and/or their employees has engaged in corrupt, fraudulent, collusive, coercive or obstructive practices, in competing for or in executing the Contract, then the Purchaser may, after giving 14 days notice to the Supplier, terminate the Supplier's employment under the Contract and cancel the contract, and the provisions of Clause 35 shall apply as if such expulsion had been made under Sub-Clause 35.1.

(a) For the purposes of this Sub-Clause:

(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[1];

(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[2];

[1] "Another party" refers to a public official acting in relation to the procurement process or contract execution. In this context, "public official" includes World Bank staff and employees of other organizations taking or reviewing procurement decisions.

[2] "Party" refers to a public official; the terms "benefit" and "obligation" relate to the procurement process or contract execution; and the "act or omission" is intended to influence the procurement process or contract execution.

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(iii) "collusive practice" is an arrangement between two or more parties[3] 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[4];

(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 11 [Inspections and Audits by the Bank].

3.2 Should any employee of the Supplier be determined to have engaged in corrupt, fraudulent, collusive, coercive, or obstructive practice during the purchase of the Goods, then that employee shall be removed.

4 Interpretation

4.1 If the context so requires it, singular means plural and vice versa.

4.2 Incoterms

(a) Unless inconsistent with any provision of the Contract, the meaning of any trade term and the rights and obligations of parties thereunder shall be as prescribed by Incoterms.

(b) The terms EXW, CIP, FCA, CFR and other similar terms, when used, shall be governed by the rules prescribed in the current edition of Incoterms specified in the **SCC** and published by the International Chamber of Commerce in Paris, France.

[3] "Parties" refers to participants in the procurement process (including public officials) attempting to establish bid prices at artificial, non competitive levels.

[4] "Party" refers to a participant in the procurement process or contract execution.

4.3 Entire Agreement

The Contract constitutes the entire agreement between the Purchaser and the Supplier and supersedes all communications, negotiations and agreements (whether written or oral) of the parties with respect thereto made prior to the date of Contract.

4.4 Amendment

No amendment or other variation of the Contract shall be valid unless it is in writing, is dated, expressly refers to the Contract, and is signed by a duly authorized representative of each party thereto.

4.5 Nonwaiver

(a) Subject to GCC Sub-Clause 4.5(b) below, no relaxation, forbearance, delay, or indulgence by either party in enforcing any of the terms and conditions of the Contract or the granting of time by either party to the other shall prejudice, affect, or restrict the rights of that party under the Contract, neither shall any waiver by either party of any breach of Contract operate as waiver of any subsequent or continuing breach of Contract.

(b) Any waiver of a party's rights, powers, or remedies under the Contract must be in writing, dated, and signed by an authorized representative of the party granting such waiver, and must specify the right and the extent to which it is being waived.

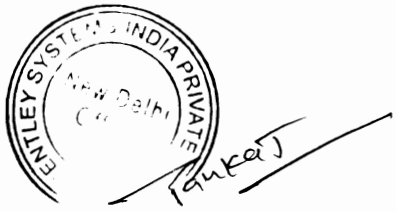
4.6 Severability

If any provision or condition of the Contract is prohibited or rendered invalid or unenforceable, such prohibition, invalidity or unenforceability shall not affect the validity or enforceability of any other provisions and conditions of the Contract.

5 Language

5.1 The Contract as well as all correspondence and documents relating to the Contract exchanged by the Supplier and the Purchaser, shall be written in the language specified in the **SCC.** Supporting documents and printed literature that are part of the Contract may be in another language provided they are accompanied by an accurate translation of the relevant passages in the language specified, in which case, for purposes of interpretation of the Contract, this translation shall govern.

5.2 The Supplier shall bear all costs of translation to the governing language and all risks of the accuracy of such translation, for documents provided by the Supplier.



6 Joint Venture, Consortium or Association

6.2 If the Supplier is a joint venture, consortium, or association, all of the parties shall be jointly and severally liable to the Purchaser for the fulfillment of the provisions of the Contract and shall designate one party to act as a leader with authority to bind the joint venture, consortium, or association. The composition or the constitution of the joint venture, consortium, or association shall not be altered without the prior consent of the Purchaser.

7 Eligibility

7.1 The Supplier and its Subcontractors shall have the nationality of an eligible country. A Supplier or Subcontractor shall be deemed to have the nationality of a country if it is a citizen or constituted, incorporated, or registered, and operates in conformity with the provisions of the laws of that country.

7.2 All Goods and Related Services to be supplied under the Contract and financed by the Bank shall have their origin in Eligible Countries. For the purpose of this Clause, origin means the country where the goods have been grown, mined, cultivated, produced, manufactured, or processed; or through manufacture, processing, or assembly, another commercially recognized article results that differs substantially in its basic characteristics from its components.

8 Notices

8.1 Any notice given by one party to the other pursuant to the Contract shall be in writing to the address specified in the **SCC.** The term "in writing" means communicated in written form with proof of receipt.

8.2 A notice shall be effective when delivered or on the notice's effective date, whichever is later.

9 Governing Law

9.1 The Contract shall be governed by and interpreted in accordance with the laws of the Purchaser's Country, unless otherwise specified in the **SCC.**

10 Settlement of Disputes

10.1 The Purchaser and the Supplier shall make every effort to resolve amicably by direct informal negotiation any disagreement or dispute arising between them under or in connection with the Contract.

10.2 If, after twenty-eight (28) days, the parties have failed to resolve their dispute or difference by such mutual consultation, then either the Purchaser or the Supplier may give notice to the other party of its intention to commence arbitration, as hereinafter provided, as to the matter in dispute, and no arbitration in respect of this matter may be commenced unless such notice is given. Any dispute or difference in respect of which a notice of intention to commence arbitration has been given in accordance with this Clause shall be finally settled by arbitration. Arbitration may be commenced prior to or after delivery of the Goods under the Contract. Arbitration proceedings shall be conducted in accordance with the rules of procedure **specified in the SCC.**

10.3 Notwithstanding any reference to arbitration herein,

(a) the parties shall continue to perform their respective obligations under the Contract unless they otherwise agree; and

(b) the Purchaser shall pay the Supplier any monies due the Supplier.

11 Inspections and Audit by the Bank

11.1 The Supplier shall permit, and shall cause its Subcontractors and consultants to permit, the Bank and/or persons appointed by the Bank to inspect the Supplier's offices and all accounts and records relating to the performance of the Contract and the submission of the bid, and to have such accounts and records audited by auditors appointed by the Bank if requested by the Bank. The Supplier's and its Subcontractors and consultants' attention is drawn to Clause 3 [Fraud and Corruption], which provides, inter alia, that acts intended to materially impede the exercise of the Bank's inspection and audit rights provided for under this Sub-Clause 11.1 constitute a prohibited practice subject to contract termination (as well as to a determination of ineligibility pursuant to the Bank's prevailing sanctions procedures).

12 Scope of Supply

12.1 The Goods and Related Services to be supplied shall be as specified in the Schedule of Requirements.

13 Delivery and Documents

13.1 Subject to GCC Sub-Clause 33.1, the Delivery of the Goods and Completion of the Related Services shall be in accordance with the Delivery and Completion Schedule specified in the Schedule of Requirements. The details of shipping and other documents to be furnished by the Supplier are specified in the **SCC.**

14 Supplier's Responsibilities

14.1 The Supplier shall supply all the Goods and Related Services included in the Scope of Supply in accordance with GCC Clause 12, and the Delivery and Completion Schedule, as per GCC Clause 13.

15 Contract Price

15.1 Prices charged by the Supplier for the Goods supplied and the Related Services performed under the Contract shall not vary from the prices quoted by the Supplier in its bid, with the exception of any price adjustments authorized in the **SCC.**

16 Terms of Payment

16.1 The Contract Price, including any Advance Payments, if applicable, shall be paid as specified in the **SCC.**

16.2 The Supplier's request for payment shall be made to the Purchaser in writing, accompanied by invoices describing, as appropriate, the Goods delivered and Related Services performed, and by the documents submitted pursuant to GCC Clause 13 and upon fulfillment of all other obligations stipulated in the Contract.

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16.3 Payments shall be made promptly by the Purchaser, but in no case later than sixty (60) days after submission of an invoice or request for payment by the Supplier, and after the Purchaser has accepted it.

16.4 The currencies in which payments shall be made to the Supplier under this Contract shall be those in which the bid price is expressed.

16.5 In the event that the Purchaser fails to pay the Supplier any payment by its due date or within the period set forth in the **SCC,** the Purchaser shall pay to the Supplier interest on the amount of such delayed payment at the rate shown in the **SCC,** for the period of delay until payment has been made in full, whether before or after judgment or arbitrage award.

17 Taxes and Duties

17.1 For goods manufactured outside the Purchaser's Country, the Supplier shall be entirely responsible for all taxes, stamp duties, license fees, and other such levies imposed outside the Purchaser's Country.

17.2 For goods Manufactured within the Purchaser's country, the Supplier shall be entirely responsible for all taxes, duties, license fees, etc., incurred until delivery of the contracted Goods to the Purchaser.

17.3 If any tax exemptions, reductions, allowances or privileges may be available to the Supplier in the Purchaser's Country, the Purchaser shall use its best efforts to enable the Supplier to benefit from any such tax savings to the maximum allowable extent.

18 Performance Security

18.1 If required as specified in the SCC, the Supplier shall, within twenty-eight (28) days of the notification of contract award, provide a performance security for the performance of the Contract in the amount specified in the **SCC.**

18.2 The proceeds of the Performance Security shall be payable to the Purchaser as compensation for any loss resulting from the Supplier's failure to complete its obligations under the Contract.

18.3 As specified in the SCC, the Performance Security, if required, shall be denominated in the currency(ies) of the Contract, or in a freely convertible currency acceptable to the Purchaser; and shall be in one of the format stipulated by the Purchaser in the **SCC,** or in another format acceptable to the Purchaser.

18.4 The Performance Security shall be discharged by the Purchaser and returned to the Supplier not later than twenty-eight (28) days following the date of Completion of the Supplier's performance obligations under the Contract, including any warranty obligations, unless specified otherwise in the **SCC.**

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19 Copyright

19.1 The copyright in all drawings, documents, and other materials containing data and information furnished to the Purchaser by the Supplier herein shall remain vested in the Supplier, or, if they are furnished to the Purchaser directly or through the Supplier by any third party, including suppliers of materials, the copyright in such materials shall remain vested in such third party

20 Confidential Information

20.1 The Purchaser and the Supplier shall keep confidential and shall not, without the written consent of the other party hereto, divulge to any third party any documents, data, or other information furnished directly or indirectly by the other party hereto in connection with the Contract, whether such information has been furnished prior to, during or following completion or termination of the Contract. Notwithstanding the above, the Supplier may furnish to its Subcontractor such documents, data, and other information it receives from the Purchaser to the extent required for the Subcontractor to perform its work under the Contract, in which event the Supplier shall obtain from such Subcontractor an undertaking of confidentiality similar to that imposed on the Supplier under GCC Clause 20.

20.2 The Purchaser shall not use such documents, data, and other information received from the Supplier for any purposes unrelated to the contract. Similarly, the Supplier shall not use such documents, data, and other information received from the Purchaser for any purpose other than the performance of the Contract.

20.3 The obligation of a party under GCC Sub-Clauses 20.1 and 20.2 above, however, shall not apply to information that:

(a) the Purchaser or Supplier need to share with the Bank or other institutions participating in the financing of the Contract;

(b) now or hereafter enters the public domain through no fault of that party;

(c) can be proven to have been possessed by that party at the time of disclosure and which was not previously obtained, directly or indirectly, from the other party; or

(d) otherwise lawfully becomes available to that party from a third party that has no obligation of confidentiality.

20.4 The above provisions of GCC Clause 20 shall not in any way modify any undertaking of confidentiality given by either of the parties hereto prior to the date of the Contract in respect of the Supply or any part thereof.

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20.5 The provisions of GCC Clause 20 shall survive completion or termination, for whatever reason, of the Contract.

21 Subcontracting

21.1 The Supplier shall notify the Purchaser in writing of all subcontracts awarded under the Contract if not already specified in the bid. Such notification, in the original bid or later shall not relieve the Supplier from any of its obligations, duties, responsibilities, or liability under the Contract.

21.2 Subcontracts shall comply with the provisions of GCC Clauses 3 and 7.

22 Specifications and Standards

22.1 Technical Specifications and Drawings

(a) The Goods and Related Services supplied under this Contract shall conform to the technical specifications and standards mentioned in Section VI, Schedule of Requirements and, when no applicable standard is mentioned, the standard shall be equivalent or superior to the official standards whose application is appropriate to the Goods' country of origin.

(b) The Supplier shall be entitled to disclaim responsibility for any design, data, drawing, specification or other document, or any modification thereof provided or designed by or on behalf of the Purchaser, by giving a notice of such disclaimer to the Purchaser.

(c) Wherever references are made in the Contract to codes and standards in accordance with which it shall be executed, the edition or the revised version of such codes and standards shall be those specified in the Schedule of Requirements. During Contract execution, any changes in any such codes and standards shall be applied only after approval by the Purchaser and shall be treated in accordance with GCC Clause 33.

23 Packing and Documents

23.1 The Supplier shall provide such packing of the Goods as is required to prevent their damage or deterioration during transit to their final destination, as indicated in the Contract. During transit, the packing shall be sufficient to withstand, without limitation, rough handling and exposure to extreme temperatures, salt and precipitation, and open storage. Packing case size and weights shall take into consideration, where appropriate, the remoteness of the goods' final destination and the absence of heavy handling facilities at all points in transit.

23.2 The packing, marking, and documentation within and outside the packages shall comply strictly with such special requirements as shall be expressly provided for in the Contract, including additional requirements, if any, specified in the **SCC,**

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and in any other instructions ordered by the Purchaser.

24 Insurance

24.1 Unless otherwise specified in the **SCC,** the Goods supplied under the Contract shall be fully insured—in a freely convertible currency from an eligible country—against loss or damage incidental to manufacture or acquisition, transportation, storage, and delivery, in accordance with the applicable Incoterms or in the manner specified in the **SCC.**

25 Transportation

25.1 Unless otherwise specified in the **SCC,** responsibility for arranging transportation of the Goods shall be in accordance with the specified Incoterms.

26 Inspections and Tests

26.1 The Supplier shall at its own expense and at no cost to the Purchaser carry out all such tests and/or inspections of the Goods and Related Services as are specified in the **SCC.**

26.2 The inspections and tests may be conducted on the premises of the Supplier or its Subcontractor, at point of delivery, and/or at the Goods' final destination, or in another place in the Purchaser's Country as specified in the **SCC.** Subject to GCC Sub-Clause 26.3, if conducted on the premises of the Supplier or its Subcontractor, all reasonable facilities and assistance, including access to drawings and production data, shall be furnished to the inspectors at no charge to the Purchaser.

26.3 The Purchaser or its designated representative shall be entitled to attend the tests and/or inspections referred to in GCC Sub-Clause 26.2, provided that the Purchaser bear all of its own costs and expenses incurred in connection with such attendance including, but not limited to, all traveling and board and lodging expenses.

26.4 Whenever the Supplier is ready to carry out any such test and inspection, it shall give a reasonable advance notice, including the place and time, to the Purchaser. The Supplier shall obtain from any relevant third party or manufacturer any necessary permission or consent to enable the Purchaser or its designated representative to attend the test and/or inspection.

26.5 The Purchaser may require the Supplier to carry out any test and/or inspection not required by the Contract but deemed necessary to verify that the characteristics and performance of the Goods comply with the technical specifications codes and standards under the Contract, provided that the Supplier's reasonable costs and expenses incurred in the carrying out of such test and/or inspection shall be added to the Contract Price. Further, if such test and/or inspection impedes the progress of manufacturing and/or the Supplier's performance of its other obligations under the Contract, due allowance will be made in respect of the Delivery Dates and Completion Dates and the other obligations so affected.

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26.6 The Supplier shall provide the Purchaser with a report of the results of any such test and/or inspection.

26.7 The Purchaser may reject any Goods or any part thereof that fail to pass any test and/or inspection or do not conform to the specifications. The Supplier shall either rectify or replace such rejected Goods or parts thereof or make alterations necessary to meet the specifications at no cost to the Purchaser, and shall repeat the test and/or inspection, at no cost to the Purchaser, upon giving a notice pursuant to GCC Sub-Clause 26.4.

26.8 The Supplier agrees that neither the execution of a test and/or inspection of the Goods or any part thereof, nor the attendance by the Purchaser or its representative, nor the issue of any report pursuant to GCC Sub-Clause 26.6, shall release the Supplier from any warranties or other obligations under the Contract.

27 Liquidated Damages

27.1 Except as provided under GCC Clause 32, if the Supplier fails to deliver any or all of the Goods by the Date(s) of delivery or perform the Related Services within the period specified in the Contract, the Purchaser may without prejudice to all its other remedies under the Contract, deduct from the Contract Price, as liquidated damages, a sum equivalent to the percentage specified in the **SCC** of the delivered price of the delayed Goods or unperformed Services for each week or part thereof of delay until actual delivery or performance, up to a maximum deduction of the percentage specified in those **SCC.** Once the maximum is reached, the Purchaser may terminate the Contract pursuant to GCC Clause 35.

28 Warranty

28.1 The Supplier warrants that all the Goods are new, unused, and of the most recent or current models, and that they incorporate all recent improvements in design and materials, unless provided otherwise in the Contract.

28.2 Subject to GCC Sub-Clause 22.1(b), the Supplier further warrants that the Goods shall be free from defects arising from any act or omission of the Supplier or arising from design, materials, and workmanship, under normal use in the conditions prevailing in the country of final destination.

28.3 Unless otherwise specified in the **SCC,** the warranty shall remain valid for twelve (12) months after the Goods, or any portion thereof as the case may be, have been delivered to and accepted at the final destination indicated in the **SCC,** or for eighteen (18) months after the date of shipment from the port or place of loading in the country of origin, whichever period concludes earlier.

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28.4 The Purchaser shall give notice to the Supplier stating the nature of any such defects together with all available evidence thereof, promptly following the discovery thereof. The Purchaser shall afford all reasonable opportunity for the Supplier to inspect such defects.

28.5 Upon receipt of such notice, the Supplier shall, within the period specified in the **SCC,** expeditiously repair or replace the defective Goods or parts thereof, at no cost to the Purchaser.

28.6 If having been notified, the Supplier fails to remedy the defect within the period specified in the **SCC,** the Purchaser may proceed to take within a reasonable period such remedial action as may be necessary, at the Supplier's risk and expense and without prejudice to any other rights which the Purchaser may have against the Supplier under the Contract.

29 Patent Indemnity

29.1 The Supplier shall, subject to the Purchaser's compliance with GCC Sub-Clause 29.2, indemnify and hold harmless the Purchaser and its employees and officers from and against any and all suits, actions or administrative proceedings, claims, demands, losses, damages, costs, and expenses of any nature, including attorney's fees and expenses, which the Purchaser may suffer as a result of any infringement or alleged infringement of any patent, utility model, registered design, trademark, copyright, or other intellectual property right registered or otherwise existing at the date of the Contract by reason of:

(a) the installation of the Goods by the Supplier or the use of the Goods in the country where the Site is located; and

(b) the sale in any country of the products produced by the Goods.

Such indemnity shall not cover any use of the Goods or any part thereof other than for the purpose indicated by or to be reasonably inferred from the Contract, neither any infringement resulting from the use of the Goods or any part thereof, or any products produced thereby in association or combination with any other equipment, plant, or materials not supplied by the Supplier, pursuant to the Contract.

29.2 If any proceedings are brought or any claim is made against the Purchaser arising out of the matters referred to in GCC Sub-Clause 29.1, the Purchaser shall promptly give the Supplier a notice thereof, and the Supplier may at its own expense and in the Purchaser's name conduct such proceedings or claim and any negotiations for the settlement of any such proceedings or claim.

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29.3 If the Supplier fails to notify the Purchaser within twenty-eight (28) days after receipt of such notice that it intends to conduct any such proceedings or claim, then the Purchaser shall be free to conduct the same on its own behalf.

29.4 The Purchaser shall, at the Supplier's request, afford all available assistance to the Supplier in conducting such proceedings or claim, and shall be reimbursed by the Supplier for all reasonable expenses incurred in so doing.

29.5 The Purchaser shall indemnify and hold harmless the Supplier and its employees, officers, and Subcontractors from and against any and all suits, actions or administrative proceedings, claims, demands, losses, damages, costs, and expenses of any nature, including attorney's fees and expenses, which the Supplier may suffer as a result of any infringement or alleged infringement of any patent, utility model, registered design, trademark, copyright, or other intellectual property right registered or otherwise existing at the date of the Contract arising out of or in connection with any design, data, drawing, specification, or other documents or materials provided or designed by or on behalf of the Purchaser.

30 Limitation of Liability

30.1 Except in cases of criminal negligence or willful misconduct,

(a) the Supplier shall not be liable to the Purchaser, whether in contract, tort, or otherwise, for any indirect or consequential loss or damage, loss of use, loss of production, or loss of profits or interest costs, provided that this exclusion shall not apply to any obligation of the Supplier to pay liquidated damages to the Purchaser and

(b) the aggregate liability of the Supplier to the Purchaser, whether under the Contract, in tort or otherwise, shall not exceed the total Contract Price, provided that this limitation shall not apply to the cost of repairing or replacing defective equipment, or to any obligation of the supplier to indemnify the purchaser with respect to patent infringement

31 Change in Laws and Regulations

31.1 Unless otherwise specified in the Contract, if after the date of 28 days prior to date of Bid submission, any law, regulation, ordinance, order or bylaw having the force of law is enacted, promulgated, abrogated, or changed in the place of the Purchaser's country where the Site is located (which shall be deemed to include any change in interpretation or application by the competent authorities) that subsequently affects the Delivery Date and/or the Contract Price, then such Delivery Date and/or Contract Price shall be correspondingly increased or decreased, to the extent that the Supplier has thereby been affected in the performance of any of its obligations under the Contract. Notwithstanding the foregoing, such additional or

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reduced cost shall not be separately paid or credited if the same has already been accounted for in the price adjustment provisions where applicable, in accordance with GCC Clause 15.

32 Force Majeure

32.1 The Supplier shall not be liable for forfeiture of its Performance Security, liquidated damages, or termination for default if and to the extent that its delay in performance or other failure to perform its obligations under the Contract is the result of an event of Force Majeure.

32.2 For purposes of this Clause, "Force Majeure" means an event or situation beyond the control of the Supplier that is not foreseeable, is unavoidable, and its origin is not due to negligence or lack of care on the part of the Supplier. Such events may include, but not be limited to, acts of the Purchaser in its sovereign capacity, wars or revolutions, fires, floods, epidemics, quarantine restrictions, and freight embargoes.

32.3 If a Force Majeure situation arises, the Supplier shall promptly notify the Purchaser in writing of such condition and the cause thereof. Unless otherwise directed by the Purchaser in writing, the Supplier shall continue to perform its obligations under the Contract as far as is reasonably practical, and shall seek all reasonable alternative means for performance not prevented by the Force Majeure event.

33 Change Orders and Contract Amendments

33.1 The Purchaser may at any time order the Supplier through notice in accordance GCC Clause 8, to make changes within the general scope of the Contract in any one or more of the following:

(a) drawings, designs, or specifications, where Goods to be furnished under the Contract are to be specifically manufactured for the Purchaser;

(b) the method of shipment or packing;

(c) the place of delivery; and

(d) the Related Services to be provided by the Supplier.

33.2 If any such change causes an increase or decrease in the cost of, or the time required for, the Supplier's performance of any provisions under the Contract, an equitable adjustment shall be made in the Contract Price or in the Delivery/Completion Schedule, or both, and the Contract shall accordingly be amended. Any claims by the Supplier for adjustment under this Clause must be asserted within twenty-eight (28) days from the date of the Supplier's receipt of the Purchaser's change order.

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33.3 Prices to be charged by the Supplier for any Related Services that might be needed but which were not included in the Contract shall be agreed upon in advance by the parties and shall not exceed the prevailing rates charged to other parties by the Supplier for similar services.

33.4 Subject to the above, no variation in or modification of the terms of the Contract shall be made except by written amendment signed by the parties.

34 Extensions of Time

34.1 If at any time during performance of the Contract, the Supplier or its subcontractors should encounter conditions impeding timely delivery of the Goods or completion of Related Services pursuant to GCC Clause 13, the Supplier shall promptly notify the Purchaser in writing of the delay, its likely duration, and its cause. As soon as practicable after receipt of the Supplier's notice, the Purchaser shall evaluate the situation and may at its discretion extend the Supplier's time for performance, in which case the extension shall be ratified by the parties by amendment of the Contract.

34.2 Except in case of Force Majeure, as provided under GCC Clause 32, a delay by the Supplier in the performance of its Delivery and Completion obligations shall render the Supplier liable to the imposition of liquidated damages pursuant to GCC Clause 26, unless an extension of time is agreed upon, pursuant to GCC Sub-Clause 34.1.

35 Termination

35.1 Termination for Default

(a) The Purchaser, without prejudice to any other remedy for breach of Contract, by written notice of default sent to the Supplier, may terminate the Contract in whole or in part:

(i) if the Supplier fails to deliver any or all of the Goods within the period specified in the Contract, or within any extension thereof granted by the Purchaser pursuant to GCC Clause 34;

(ii) if the Supplier fails to perform any other obligation under the Contract; or

(iii) if the Supplier, in the judgment of the Purchaser has engaged in fraud and corruption, as defined in GCC Clause 3, in competing for or in executing the Contract.

(b) In the event the Purchaser terminates the Contract in whole or in part, pursuant to GCC Clause 35.1(a), the Purchaser may procure, upon such terms and in such manner as it deems appropriate, Goods or Related Services similar to those undelivered or not performed, and the Supplier shall be liable to the Purchaser for any additional costs for such similar Goods or Related Services. However, the Supplier shall continue performance of the Contract to the extent not terminated.

35.2 Termination for Insolvency.

(a) The Purchaser may at any time terminate the Contract by giving notice to the Supplier if the Supplier becomes bankrupt or otherwise insolvent. In such event, termination will be without compensation to the Supplier, provided that such termination will not prejudice or affect any right of action or remedy that has accrued or will accrue thereafter to the Purchaser

35.3 Termination for Convenience.

(a) The Purchaser, by notice sent to the Supplier, may terminate the Contract, in whole or in part, at any time for its convenience. The notice of termination shall specify that termination is for the Purchaser's convenience, the extent to which performance of the Supplier under the Contract is terminated, and the date upon which such termination becomes effective.

(b) The Goods that are complete and ready for shipment within twenty-eight (28) days after the Supplier's receipt of notice of termination shall be accepted by the Purchaser at the Contract terms and prices. For the remaining Goods, the Purchaser may elect:

(i) to have any portion completed and delivered at the Contract terms and prices; and/or

(ii) to cancel the remainder and pay to the Supplier an agreed amount for partially completed Goods and Related Services and for materials and parts previously procured by the Supplier.

36 Assignment

36.1 Neither the Purchaser nor the Supplier shall assign, in whole or in part, their obligations under this Contract, except with prior written consent of the other party.

BENTLEY SYSTEMS INDIA PRIVATE LIMITED ★ New Delhi Office

Chief Engineer,
World Bank Projects, Odisha

37 **Export Restriction**

37.1 Notwithstanding any obligation under the Contract to complete all export formalities, any export restrictions attributable to the Purchaser, to the country of the Purchaser, or to the use of the products/goods, systems or services to be supplied, which arise from trade regulations from a country supplying those products/goods, systems or services, and which substantially impede the Supplier from meeting its obligations under the Contract, shall release the Supplier from the obligation to provide deliveries or services, always provided, however, that the Supplier can demonstrate to the satisfaction of the Purchaser and of the Bank that it has completed all formalities in a timely manner, including applying for permits, authorizations and licenses necessary for the export of the products/goods, systems or services under the terms of the Contract. Termination of the Contract on this basis shall be for the Purchaser's convenience pursuant to Sub-Clause 35.3.

PART 4 – The Purchaser's Notification of Award

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

Letter No. PMU – WB – 35 / 2012 - 18821 Dt. 7.5.13

From

Er. Nalini Kanta Pradhan
Chief Engineer, World Bank Projects, Odisha
Tel.: + 91 – 674 – 239 6783 / Fax: + 91 674 – 239 1476
Email: piuosrp@gmail.com

To

Bentley Systems India Private Limited
203, Okhala Industrial Estate, Phase – III,
New Delhi - 110 020
Fax: 011 – 4902 1100, 4902 1199
Email: pankaj.mittal@bentley.com

Sub: Procurement of Commercial Off-the-Shelf (COTS) Software for Odisha Road Asset Management Systems (O-RAMS)

- **Notification of Award**

Ref: i. IFB Number: PMU-WB-35/2012/AMS-COTS issued vide this office No 34168 Dt. 05 Oct 2012
ii. Your BID Dt. 18th Dec 2012 opened on 21st Dec 2012

Sir,

This is to notify you that, your Bid dated **18th December, 2012** read with subsequent clarifications for supply of the Commercial Off-the-Shelf (COTS) Software for Odisha Road Asset Management Systems (O-RAMS) including the full use RDBMS Server license and other related Services e.g. Training Assistance for configuration, acceptance tests and support during one year warranty period and five year AMC amounting to **Indian Rs. 2,82,50,771** (Indian Rupees Two crore eighty two lakh fifty thousand seven hundred seventy one) only without applicable sales & service taxes, as corrected and modified in accordance with the Instructions to Bidders, has been accepted by the undersigned.

You are requested to furnish the Performance Security in shape of a **Bank Guarantee** in favour of the **Chief Engineer, World Bank Projects, Odisha,** Bhubaneswar from any scheduled bank in India, valid upto 60 days after the date of completion of performance obligations including warranty and five years of AMC period thereafter, amounting not less than **Indian Rs.28,25,078** (Indian Rupees Twenty eight lakhs twenty five thousand seventy eight) only within 28 days of issuance of this letter, in accordance with the Conditions of Contract, using for that purpose one of the Performance Security Forms included in Section IX, Annex to the Bidding Document.

Upon submission of a satisfactory Performance Security as stated above, the formal Contract agreement shall be signed.

Yours sincerely,

Chief Engineer
World Bank Projects, Odisha

BENTLEY SYSTEMS INDIA PRIVATE LIMITED New Delhi Office

Bentley Systems India Pvt. Ltd.

P.T.O.

Chief Engineer,
World Bank Projects, Odisha

Memo No. 18822 Dt. 7.5.13

Copy submitted to the **Engineer-in-Chief-cum-Secretary**, Works Department, Government of Odisha for favour of information. This is with reference to this memo No. 15292 Dt. 15.04.2013 and No Objection of World Bank received vide Email Dt. 01 May 2013.

6/5/13
Chief Engineer
World Bank Projects, Odisha

Memo No. 18823 Dt. 7.5.13

Copy forwarded by Email to **Mr. Rajesh Rohatgi,** Senior Transport Specialist & Task Team Leader OSRP, The World Bank, South Asia Sustainable Development Unit (Transport), 18-20, Kasturba Gandhi Marg, New Delhi-110 001 for favour of information.

6/5/13
Chief Engineer
World Bank Projects, Odisha

(3)

Memo No. 18824 Dt. 7.5.13

Copy to Superintending Engineer, ISAP Cell / Executive Engineer, PMU / Financial Advisor PMU for information and necessary action.

6/5/13
Chief Engineer
World Bank Projects, Odisha

Memo No. 18825 Dt. 7.5.13

Copy to Mr. Pradeep Kumar, Associate Director [Authorised Signatory], LEA Associates South Asia Pvt. Ltd. (LASA), India, Project Office, Plot:N-1/187, IRC Village, Nayapalli, Bhubaneswar, Odisha-751015, Email: lasabbsr@lasaindia.com; pkumar@lasaindia.com for information and necessary action.

6/5/13
Chief Engineer
World Bank Projects, Odisha

BENTLEY SYSTEMS INDIA PRIVATE LTD. New Delhi Office

Chief Engineer,
World Bank Projects, Odisha

PART 5 – No Objection Letter

Chief Engineer, World Bank Projects, Orissa

From: <rrohatgi@worldbank.org>
To: "Chief Engineer, World Bank Projects, Orissa" <pmuosrp@gmail.com>
Cc: <kchoudhary@worldbank.org>; <smohanty1@worldbank.org>; <stadimalla@worldbank.org>; <workssec@ori.nic.in>; <mcpherson_kevin@yahoo.com>
Sent: Wednesday, May 01, 2013 2:40 PM
Subject: Re: BER: Procurement of Commercial Off-the-Shelf (COTS) software for Odisha Road Asset Management System (O-RAMS) - NO Objection

Dear Mr Pradhan

Thank you for sending the Bid Evaluation Report for "Procurement of Commercial Off-the-Shelf (COTS) software for Odisha Road Asset Management System (O-RAMS)" for Bank's review, through your e-mail dated 15th April 2013.

Based on the information provided by you in the subject BER, we have no objection to the PMU's recommendation to award the contract for "Procurement of Commercial Off-the-Shelf (COTS) software for Odisha Road Asset Management System (O-RAMS)" on M/s. Bentley Systems India Private Limited, who as per the PMU's evaluation is the lowest qualified responsive bidder, at a total contract price of INR 28,250,771.00.

However, in view of your technical review of the recommended bidder's bid, which has highlighting certain short-comings in the HDM-4 interface for the AMS, we would like to convey our concerns as follows :

It seems from the Bid Evaluation Report that Bentley's proposed solution is to build an interface to HDM-4 during the course of the project. If this approach is adopted, it is critical that the interface is well specified early on, so that it is clearly understood exactly what it will entail, what it will look like, and how easy it will be to use. For example:

1) Most roads agencies want to be able to run HDM-4 for both strategy analysis and programme analysis, and the interface would ideally allow extract of data for both. It is not even clear from the Bid Evaluation Report whether Bentley are proposing one, or the other, or both. (Project-level analysis can be disregarded at this time).

2) The conversion of data from that collected by PWD, to that required by HDM-4, needs to be very carefully considered, and needs some pavement management expertise. This includes detailed understanding of pretty much everything in the HDM-4 model, including definition of pavement types, definition of defects (cracking, rutting, roughness etc.), definition of traffic classes, vehicle fleets, traffic volumes, axle loads, traffic growth rates etc.

3) How the interface deals with "missing" data - how or whether it allows easy identification of "gaps" in data, how or whether it applies default or otherwise representative values to those data.

4) The supply and ease of use of any homogenization process - i.e. a program that takes the disparate data as collected and stored in the Road Management System against different frequencies and timescales, and collates that for use in HDM-4 to keep the number of segments analyzed to a sensible size.

5) How HDM-4 will be used for Network Development as well as Asset Preservation.

6) The Schemes Manager which is mentioned in the Bid Evaluation Report is, in our understanding, quite far removed from the outputs of HDM-4. HDM-4 is an analytical and planning tool - it is NOT a programming tool. In other words, HDM-4 will give suggestions or recommendations for application of road treatments based on economic analysis. Socio-political and other practical factors (including actual availability of funds versus assumed availability at time of planning; combination (or splitting) of HDM-4 projects into contractable projects; project's readiness for implementation (e.g. acquisition of right of way; completion of environmental certification); agency's capacity to implement; political considerations on distribution of projects among districts etc. etc.) all have to kick in before the HDM-4 recommendation becomes a realizable project. It is only at this stage that a "project" would equate to a "scheme" that could be managed by the Exor Scheme Manager.

Unless Bentley has good experience in implementation of such an interface, they may underestimate the complexity of the task, and there is a risk that they are intending to provide a very simple (or even, simplistic) interface. In order to mitigate this, Bentley would need to provide very early in the project a

Bentley Systems India Pvt. Ltd.

Chief Engineer,
World Bank Projects, Odisha

5/1/2013

detailed analysis of requirements, along with a design of how they will implement those requirements, and get agreement on the interface to be provided.

Please ensure to award the contract within the extended bid validity period and publish results of award on UNDB and Project website, within 15 days from Bank's no objection.

We look forward to receive from you the copy of signed contract agreement and prior review checklist to enable us to issue WBR no. which you can use for claiming disbursement against this contract.

regards

Rajesh Rohatgi
Senior Transport Specialist
The World Bank
South Asia Sustainable Development Unit (Transport)
18-20, Kasturba Gandhi Marg,
New Delhi-110 001
Tel: 91-11-49247773 (Direct), 49247000 (Reception)
Fax: 91-11-49247639
Cell: 91-9818457485
rrohatgi@worldbank.org

"Chief Engineer, World Bank Projects, Orissa" ---04/15/2013 06:56:35 PM---OFFICE OF THE ENGINEER-IN-CHIEF (CIVIL), ODISHA NIRMAN SOUDHA, KESHARI NAGAR, UNIT - V, BHUBANESWAR

From: "Chief Engineer, World Bank Projects, Orissa" <pmuosrp@gmail.com>

To: <rrohatgi@worldbank.org>, <stadimalla@worldbank.org>, <kchoudhary@worldbank.org>, <smohanty1@worldbank.org>

Cc: <workssec@ori.nic.in>

Date: 04/15/2013 06:56 PM

Subject: BER: Procurement of Commercial Off-the-Shelf (COTS) software for Odisha Road Asset Management System (O-RAMS)

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

Letter No. PMU – WB – 35 / 2012 - **15291** Dt. **15th April 2013**

From

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

To

Mr. Rajesh Rohatgi
Senior Transport Specialist and Task Team Leader OSRP
The World Bank
South Asia Sustainable Development Unit (Transport)
18-20, Kasturba Gandhi Marg,
New Delhi-110 001

Sub: Procurement of Commercial Off-the-Shelf (COTS) software for Odisha Road Asset Management System (O-RAMS)

BENTLEY SYSTEMS INDIA PRIVATE LIMITED New Delhi Office

Chief Engineer,
World Bank Projects, Odisha

Ref: IFB Number: PMU-WB-35/2012/AMS-COTS issued in this office No. 34168 Dt. 05 Oct 2012

Sir,

In inviting kind reference to above, please find enclosed herewith the BID Evaluation Report for the aforesaid BID for review of the World Bank and approval thereof.

The Evaluation Committee, for the aforesaid bid, has recommended the offer of Bentley Systems India Private Limited amounting of INR 28,250,771 excluding taxes, who was evaluated as the ***lowest responsive qualified bidder***. A copy of the proceedings of the Evaluation Committee for this BID is also enclosed herewith for reference.

It is requested that No objection of World Bank may please be communicated at the earliest for further necessary action at this end.

Yours sincerely,

Encl. As above

Sd/- N K Pradhan
Chief Engineer
World Bank Projects, Odisha

Memo No. **15292** Dt. **15th April 2013**

Copy submitted to the **Engineer-in-Chief-cum-Secretary**, Works Department, Government of Odisha for favour of information.

Sd/- N K Pradhan
Chief Engineer
World Bank Projects, Odisha[attachment "Bid Evaluation Report - COTS -15Apr13.pdf" deleted by Rajesh Rohatgi/Person/World Bank] [attachment "Minutes of EC - COTS.pdf" deleted by Rajesh Rohatgi/Person/World Bank] [attachment "15291 - COTS BER to WB.pdf" deleted by Rajesh Rohatgi/Person/World Bank]

EMS IN
New Delhi
Office
LIMITED

Bentley Systems India Pvt. Ltd.

Chief Engineer,
World Bank Projects, Odisha

5/1/2013

PART 6 – Technical Requirements

Schedule of Requirements

Contents

1. List of Goods and Delivery Schedule

Effective Date of the Contract: 24th July, 2013

Line Item №	Description of Goods	Quantity	Physical unit	Final (Project Site) Destination as specified in BDS	Delivery (as per Incoterms) Date	
					Earliest Delivery Date	Latest Delivery Date
					[number of days following the date of effectiveness of the Contract]	
1	COTS software **(Exor Version 4.6)** - having unlimited named users with 5 concurrent users at any time out of which 2 users can access analytical functions will be delivered with following **Software Licenses:** 1. Exor Server 2. Network Manager 3. Asset Manager 4. Spatial Manager 5. Schemes Manager 6. Structures Manager 7. Traffic Manager 8. UKPMS 9. Information Manager 10. Maintenance Manager	1	Set	Bhubaneswar, Odisha, India	7 days **31st July, 2013**	7 days **31st July, 2013**
2	Full use **Oracle Database 11g Enterprise Edition** RDBMS-Server license for Quad-Core Processor along with following **Software Licenses:** 1. Spatial and Graph 2. Advanced Security 3. Diagnostics Pack 4. Tuning Pack 5. Database Life-cycle Management Pack 6. Weblogic Suite 7. Weblogic Server Management Pack Enterprise Edition 8. Management Pack Plus for Identity Management	1	Set	Bhubaneswar, Odisha, India	7 days **31st July, 2013**	7 days **31st July, 2013**
3	HDM-4 Software (Latest Edition)	1	No. of license	Bhubaneswar, Odisha, India	7 days **31st July, 2013**	7 days **31st July, 2013**

2. List of Related Services and Completion Schedule

Effective Date of the Contract: ***24th July, 2013***

Service	Description of Service	Quantity	Physical Unit	Place where Services shall be performed	Final Completion Date(s) of Services *weeks from Effective Date*
1	Training	Lumpsum	N.A.	Bhubaneswar	3
2	Assistance for configuration	Lumpsum	N.A.	Bhubaneswar	24
3	Pre-commissioning + Operational Acceptance tests including license an API to support HDM-4 interface	Lumpsum	N.A.	Bhubaneswar	24
4	support during warranty period	Lumpsum	N.A.	Bhubaneswar	52
5	Annual Maintenance Contract (AMC)	Lumpsum	N.A.	Bhubaneswar	5 years after the warranty period

3. Technical Specifications

A. BACKGROUND

0.1 The Purchaser

0.1.1 The State Government of Odisha (GOO) through the Government of India (GOI) has received a loan from the International Bank for Reconstruction and Development (IBRD) for implementation of Odisha State Roads Project. A portion of this loan is being utilized in financing consultancy services for establishing a Road Asset Management System (RAMS) for the state road network with help of a consultant as a requirement under institutional reforms in the road sector. The envisioned system is expected to assist the Odisha Works Department (OWD), Govt. of Odisha (also referred as Client) 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 aim of this effort is to create a RAMS suitable for a sustainable implementation in Odisha taking into account both the manual & automated equipment based data collection, data storage and processing of road data for a network of about twenty thousands of kilometers.

0.1.2 For this purpose, the Client engaged an Implementation Consultant in May 2011 for a period of three years with specific objectives to:

- Configure and establish an electronic Road Asset Management System with a design architecture to reflect international practice, in a way that suits the local needs and conditions
- Prepare a multiyear rolling maintenance program and two annual updates for implementation in subsequent years for the SH and MDR network under control of the Client; and
- Transfer skills and procedures to the Client to sustain the use of the RAMS during and beyond the end of these services

0.1.3 The broad scope of the on-going RAMS implementation consultancy services includes assistance in procurement of a Commercial Off-the-Shelf (COTS) system; and configuration and implementation of that COTS to act as a RAMS for the State of Odisha (named as O-RAMS i.e.Odisha Road Asset Management System).

The configured O-RAMS should include the following components:

a) Road Information System (RIS)
b) Geographic Information System (GIS)
c) Bridge Information System (BIS)
d) Pavement Management System (PMS)
e) Routine Maintenance Management System (RMMS)
f) Traffic Information System (TIS)

0.2 Business Objectives of the Purchaser

0.2.1 The Client is looking to purchase Commercial Off-the-Shelf (COTS) software to use as the basis for O-RAMS. This software should be provided by a supplier with a proven track record of implementing and supporting such systems internationally.

0.2.2 The Client expects its investment in the software to be protected through access to a support and maintenance programme ensuring the delivery of supported and regularly updated COTS software.

0.2.3 The Client is seeking an implementation approach which provides for immediate installation of the software followed by on-site training and facilitation in configuring O-RAMS.

0.2.4 Full implementation of O-RAMS is envisaged to be carried out largely through configuration of this COTS software by the existing Implementation Consultant.

0.3 Overall Goals and Responsibilities

0.3.1 The broad responsibility of the COTS software supplier, Implementation Consultant and the Client is provided in the table below.

Task	Responsibility		
	OWD	Implement-ation Consultant	COTS Software Supplier
Purchase HDM-4 & ArcGIS Server software	X	(X)	
Purchase IT Hardware and Software (servers. OS. database)	X	(X)	(X)
Arrange IT department to house IT system and hosting facility in SDC/ NIC Data Centre	X	(X)	
Arrange Network Connection between Data Centre to OWDHQ and Division/Circle Offices	X	(X)	
Provide counter-part staff in OWDHQ	X	(X)	
Provide Database Administrator. GIS Analyst. IT Support	X	(X)	
Supply licenses for COTS Software			X
Installation of the COTS Software			X
Provide Training to Core Group (OWD & Consultant)		(X)	X
Provide System/Reference Manuals			X
Provide integration Support		(X)	X
COTS Acceptance Testing	(X)	(X)	X
Provide Support (During Warranty Period)		(X)	X
Provide Support (After Warranty Period) - Through AMC		(X)	X
Configure COTS Software		X	(X)
Design Reports/Forms/Tables		X	(X)
Populate with Data (Data collected by OWD & Consultant)		X	
Develop GIS and Additional Components (if required)		X	(X)
Overall System Acceptance Testing	(X)	X	(X)
Provide Implemenation Support		X	(X)
Prepare Documentation (e.g. User Manual)		X	(X)
Train OWD Users		X	

Key:
X – Primary Responsibility
(X) – Secondary Responsibility

Note: Implementation Consultant will be responsible for overall integration to suit O-RAMS requirement with support from Client as regards necessary hardware/ software and COTS software supplier.

0.4 Acronyms Used in These Technical Requirements

0.4.1

	Term	Explanation
	ADT	Average Daily Traffic
	AADT	Average Annual Daily Traffic
	AMC	Annual Maintenance Contract
	AMS	Asset Management System
	BBD	Benkelman Beam Deflection
	BIS	Bridge Information System
	bps	bits per second
	CD	Cross Drainage
	COTS	Commercial-off-the-Shelf
	DBMS	Database Management System
	DGPS	Differential Global Positioning System
	FWD	Falling Weight Deflectometer
	GIS	Geographic Information System
	GoO	Government of Odisha
	GPS	Global Positioning System
	HDM-4	Highway Development and Management Model-Version IV
	HQ	Head Quarter (O-RAMS core group in OWD)
	IT	Information Technology
	LAN	Local Area Network
	LRP	Location Reference Point
	NIC	National Informatics Centre
	ODBC	Open Database Connectivity
	O-RAMS	Odisha Road Asset Management System
	OS	Operating System
	OSWAN	Odisha State Wide Area Network
	OWD	Odisha Works Department
	PMS	Pavement Management System
	RAM	Random Access Memory
	RAMS	Road Asset Management System

	Term	Explanation
	RIS	Road Information System
	RMMS	Routine Maintenance Management System
	R-O-W	Right-of-Way
	ROMDAS	Road Measurement Data Acquisition System
	SQL	Structured Query Language
	TIS	Traffic Information System

B. BUSINESS FUNCTION AND PERFORMANCE REQUIREMENTS

1.1 Business Requirements to Be Met by the System

The following points provide high level functional and performance requirements of the system:

1.1.1 The components of O-RAMS will be implemented at all Divisions, Circles, and Headquarter offices of OWD. There are approximately forty (40) Division offices throughout Odisha which are managed by Circles, the latter expected to number up to about ten (10) in the near future.
The main server running the application and database will be housed in the Data Center at Department of IT or National Informatics Centre (NIC), located offsite from the OWD Headquarters. It will have a dedicated link to the O-RAMS management unit at OWD Headquarters to access the full functional version of the COTS application. All functions related to PMS and administrative operations such as managing rights for user, role etc. will be performed in HQ accessing database through dedicated leased line. The connectivity will likely to be either via OSWAN (Odisha State Wide Area Network) or through a leased-line service, the modality of which will be decided at a later stage.

The web-version of the COTS software and bespoke systems (GIS, TIS and RMMS) will be hosted through a web server separately. It will be accessible to all Division and Circle offices through a user ID and password. The user ID and password will also be used to authenticate the user for accessibility to various functions and levels of O-RAMS (COTS and bespoke applications). It is required that the remote users will access COTS software through a web browser to perform selected functions such as view, edit, query, print data/ reports.

A schematic representation of the proposed configuration/ architecture at various levels/ offices in the OWD is shown in Figure 1.

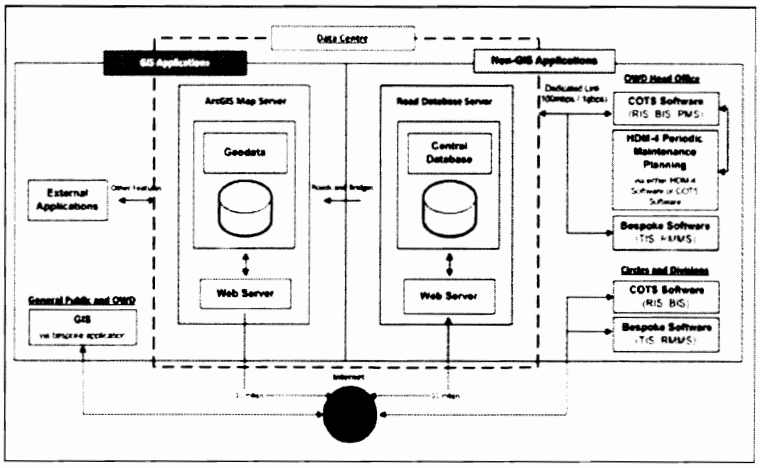

Figure 1: Proposed O-RAMS System Architecture

1.1.2 The geographic location of all road assets will be defined in an external GIS being developed separately (using ESRI technology) by the

Implementation Consultant. This will be linked to the O-RAMS database containing network definition and attribute data. Integration of this external GIS with road database in COTS software is a mandatory requirement and shall be jointly defined by the Implementation Consultant and the COTS software supplier.

Table: Proposed COTS Software Solution

COTS Software	Function	Where Used
Version with Full facility	Core O-RAMS data repository and full-featured road-related data management and analysis tool.	Head Office
Web-Version (View as well as data upload & download facility)	Internet browser-based tool for presenting results of analysis from O-RAMS in graphic reports / charts and running O-RAMS related tasks such as browsing/ uploading/ downloading data, executing queries and data transformation operations, etc.	Head Office, Circles, Divisions

1.1.3 The O-RAMS components will primarily use COTS database software (O-RAMS database) to store and process data.
The applications of O-RAMS such as RIS, BIS, TIS, RMMS and PMS will be made functional by configuring the available facility of the COTS software. However, TIS and RMMS applications will be developed separately by the Implementation Consultant and integrated with the COTS software.

1.1.4 The COTS software supplier shall provide necessary software to comply with the requirements of RIS, BIS and PMS. The COTS software should have facility to import data from other applications such as TIS, RMMS; and to export road network definition data to those applications.

1.2 Functional Performance Requirements of the System

1.2.1 The core of the proposed System will be a web-based **Road Information System (RIS) & Bridge Information System (BIS)** with GIS interface capability. The system will be designed for multi-level user requirements (i.e. Headquarters, Circle, Division, Sub-Division) with appropriate security, interfaces and reporting facilities appropriate to the level of the user. The system must be configurable to meet the various requirements of a road & bridge asset management system.

1.2.2 For managing periodic and capital road work activities, a **Pavement Management System (PMS)** application will be configured by the Implementation Consultant using the inbuilt modules of COTS software. This application will cover preservation of the existing road network as well as expansion which may cover new links, multi-laning, or capacity increase. The engineering and economic analytical tools available within the COTS software therefore should provide deterioration prediction methodology for both bituminous and concrete pavement. The PMS processes must cover / include, but not be limited to:

- network-level planning

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Bentley Systems India Pvt. Ltd.

Chief Engineer,
World Bank Projects, Odisha

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

The structure of the database should support a minimum of such parameters so that the PMS can function with a set of default parameters at the beginning, with the ability to accommodate more refined calibration parameters later.
The PMS application should also be able to link to HDM-4 for undertaking similar analyses.

1.2.3 A **Routine Maintenance Management System (RMMS)** application will be developed by the Implementation Consultant and integrated with the COTS software, 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.

1.2.4 A **Traffic Information System (TIS)** application will be developed by the Implementation Consultant and integrated with the COTS software. The TIS will store survey data, analyse and manage traffic data to be used by other modules of O-RAMS.

1.2.5 The O-RAMS 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.

1.3 Related Information Technology Issues and Initiatives

1.3.1 Services from an external consultant with particular expertise in the MIS and IT / ICT fields are also currently on-going, to help OWD to formulate an effective strategy for development and implementation of an agency-wide Management Information System (MIS), project management and decision support tools in the OWD, supported by an Information Technology / Information and Communications Technology (IT / ICT) architecture and resources.

1.4 Detailed Functional Requirements of the COTS Software

This section describes detailed functional requirements of the system by each sub component.

1.4.1 The COTS software supplier will ensure that the following functional requirements related to system can be satisfactorily achieved by using facilities within the COTS software. The Technical Responsiveness Checklist provided in Section G shall be used by the COTS software supplier to respond to the listed technical requirements.

1.4.2 For the **Road Information System (RIS)**, the COTS software will:

- Support multiple linear referencing methods, allowing all associated data to be located against the network using the users preferred referencing method and then allows these records to be reported back

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Chief Engineer,
World Bank Projects, Odisha

using any defined linear referencing method (e.g. from the start of the section, kilometre point, LRP+ offset).

- Be able to accommodate various network numbering rules, by performing data validation on entry or through some other form of internal validation procedure.
- Provide full network editing functionality. Be able to 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. There should be facility to save the log file containing information on all the changes made to the network.
- Permit splitting, joining and modifying of road sections, and modification of road section lengths, while preserving the integrity of all current and historical data stored against the affected sections.
- Have configurable options to enable the user to define additional types of data to be stored, and to define what attributes are to be stored against each type of data. 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.
- Be able to allow the storage of data over different time periods, to enable comparison of such data. There should be facility to view/select the most current data or for a user defined period.
- Be able to display multi-media objects (e.g. photographs, video clips etc.) as attributes of data items. For video, the COTS software should allow viewing of video data by chainage along the road section, based on frame/chainage lookup tables supplied. The COTS software should have been designed in a way that the processing time for querying the database and extracting information is satisfactory.
- Have a reliable but flexible security system for access and data processing (e.g. security groups, program security, data security).
- Permit security set-up 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.
- Permit security set-up so that different users may have access to different application modules and functions within these modules.
- 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 COTS software database must be permitted, including reporting on user-defined items and attributes, comparisons of current data with historical data, audit records etc. Export to spread sheet and/or comma-delimited text files should also be provided. The supplier should also provide details of any interfaces to third-party reporting tools.

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- Be able to generate strip maps showing on- and off-carriageway features such as carriageway, shoulder, built-up structures, bus shelters, pipes / cables, poles / pylons, road signs, trees, statues, well etc., and support various cross-sectional positional models to allow data to be referenced laterally against road sections.
- Allow the network and associated data to be viewed spatially both over the web and locally.
- Integrate with external systems for any tabular and GIS data
- Permit viewing of external asset information that may be held in other external databases;
- Allow a modular approach so that additional modules may be implemented as the business requirements grow or evolve.
- Allow all other COTS modules to use same core linear referencing modules to avoid the need to duplicate linear referencing systems.
- Be capable of deployment over an intranet and internet architecture.

1.4.3 Table 1 lists the indicative data items being compiled for loading in to ORAMS application.

Table 1 : Data Items

Data Type	Indicative data format
GPS referencing	In GPS eXchange format .gpx and in GIS data formats such as .dxf, .shp, .tab, .dgn. .kml, .kmz, .mdb, .gml
GIS Database (Road centre-line, km stone, road start / end, bridge, culvert, cross road etc., and the items to be captured for strip-map generation within right-of-way)	In ESRI GIS data formats such as ArcSDE, Geodatabase (SDE, FILE, MDB, XML), shape.
Inventory of pavements and CD works	In standard database formats such as .xls / .mdb / .csv / .txt / .dbf; photographs in image formats such as .jpeg, .bmp, .png, .gif, .tiff; Video files in formats such as .mpg, .mp4, .avi, .mov, .swf, .vob, .wmv, .3g2, .3gp, .flv, .rm.
Roughness on paved roads	
Surface distress indicators (4 items such as cracking, ravelling, rutting, depressions or potholes)	
Pavement strength – deflection data	
Bridge (minor & major) visual condition data – 3 or 4 critical attributes	

1.4.4 The COTS software will:

- Allow for menus, interface and reports in English
- 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 / Access / Dbf and other common file formats;

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- Be able to calculate and export all average road attributes for each kilometre, homogeneous road section, or entire road link as necessary.

1.4.5 The RIS data model shall be capable of managing data recorded as both point (e.g. km stones) and linear elements (e.g. roughness data), and as well be able to accommodate overlapping locations for certain types of attributes (e.g. roughness data recorded against lanes, more than one traffic sign at one location, etc.).

1.4.6 The Client is in the process of establishing a Geographic Information System (GIS) using ESRI tools, including ArcMap client software and ArcGIS Server. The COTS software should have capability to provide attribute data of roads in a user-configurable interface to external GIS.

1.4.7 A **Bridge Information System (BIS)** will also be supplied by the COTS software supplier.

a) The BIS will be used to store inventory data on minor and major bridges, information collected from routine and special inspections.

b) The BIS should be compatible with the other modules of O-RAMS

c) BIS functionality will:

- Integrate with the Road Information System (RIS) for network referencing and road data
- Allow form based entry and import from Excel or other common file format, to permit storage of detailed bridge inventory - including data on individual piers, spans, abutments, bearings, expansion joints, approaches, bridge protection works, training works, bridge construction and maintenance history, design capacity, load capacity etc.
- Allow form-based entry and import from Excel or other common file format to store detailed inspection data - including individual defects on each of the above elements, with severity and extent.
- Permit storage of bridge inspection photographs, design drawings etc.
- Store pre-defined estimated unit costs of repair, maintenance, or rehabilitation costs.
- Estimate total cost of bridge repair, maintenance or rehabilitation based on condition rating, inventory parameters and unit costs for relevant bridge work.
- Define and assign matrix based condition index to bridges depending on bridge inspection rating of elements and overall condition rating/index.
- Allow defining priority for maintenance of any bridge based on inspection data.
- Planning and prioritization of bridge works based on condition index
- Enable export of bridge inventory, condition and cost data to standard data formats.

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- Allow for scheduling and tracking bridge inspections.

d) The BIS will be able to produce and report the following thorough analysis of the above data:

- Detailed / summarized bridge inventory of selected bridges in a division / circle or road
- Detailed / summarized bridge inspection data of selected bridges in a division / circle or road
- Link GIS objects (of bridge points) to prepare thematic representation of bridge inventory, inspection ratings and maintenance costs and visualize in built-in map-based interface

Pavement Management System (PMS)

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

1.4.9 For the PMS application, the COTS software shall connect the RIS with an 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 should be able to create an HDM-4 road network file to be imported by HDM-4 and be able to import 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 and / or map-based reports. The reports should allow filtering data by various parameters such as jurisdiction, core / non-core etc.

In addition, it should have facility, to add/ incorporate alternate methodology using well established practices to perform similar function within PMS.

The economic evaluation model shall be capable of the following types of analyses, based on both road condition and any anticipated 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

The PMS will include the following functions:

- An inbuilt alert system to ensure updating of road and pavement condition data periodically and flag the year of data collection while analysing for each parameter.

A generic interface which allows the user to define the rules for automatic homogeneous sectioning. This can include specification of

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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.

- Transformation 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).
- 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.
- Preparation of HDM-4 input files for work standards, traffic classification and growth rates.
- Defining various road works and their unit costs.
- Link GIS objects (of roads) with the road sections to prepare thematic representation of assigned road works and visualize in built-in map interface.

Routine Maintenance Management System (RMMS)

This application will be developed by the Implementation Consultant and integrated with the COTS software. COTS software supplier will provide support related to integration.

1.4.10 The RMMS will :

a) determine on-carriageway routine maintenance requirements for sections not receiving periodic maintenance or improvements in that year and prepares reports and charts for a business plan.

b) be compatible with RIS / PMS and other modules of O-RAMS

RMMS functionality will:

- Define standard on-carriageway routine maintenance works and unit costs.
- Assign routine maintenance activities to sections based on pre-defined maintenance matrix.
- Define maintenance matrix based on pavement condition survey ratings and other inventory, traffic and parameters such as road category / core/ non-core.
- Define and assign rule based priority index based on parameters.
- Define quantity standards for pavement condition rating and maintenance activity.
- Apply quantity standards for calculation of quantity for each maintenance activity.
- Assign off-carriageway routine maintenance cost and routine maintenance of culverts and bridges to the sections selected for routine maintenance.

c) The RMMS shall be able to produce and report the following thorough analysis of the above data:

- Assigned maintenance activity for each section along with quantity and cost
- Group total quantity & cost by maintenance activity by OWD jurisdiction and report through charts / graphs
- Link GIS objects (of roads) with the road sections to prepare thematic representation of assigned routine maintenance works and visualize in built-in map interface

Traffic Information System

This application will be developed by the Implementation Consultant and integrated with the COTS software. COTS software supplier will provide support related to integration.

1.4.11 TIS will provide traffic data to RIS / PMS and other modules of O-RAMS.

a) The TIS will be have capability of storing regular and special classified traffic volume counts and other data as well as outcomes from specific traffic studies. Among the important data to be stored are:

- Processed hourly classified traffic count from permanent traffic count stations.
- 3-day classified traffic counts – hourly and directional
- Short term (<3 days) classified traffic counts – hourly and directional
- Traffic growth rate forecast – estimated externally and stored in the system by location or by class of road or applicable for entire network.
- Vehicle fleet characteristics – as collected from secondary sources for the representative vehicle types (15 vehicle types) and required for economic evaluation.
- Sample hourly flow data – representative for entire network, by core/ non-core, by road class such as SH, MDR, ODR etc.
- Master data such as PCU factors for each vehicle types and seasonal correction factors
- Processed weigh-in-motion or axle load survey data (i.e. aggregated statistics as opposed to measurements of each vehicles), if available
- Processed average pay load by vehicle type (goods vehicles)

b) The TIS will be compatible with RIS.

c) TIS will have ability to estimate traffic levels for any links that are not covered by explicit traffic counts by associating a user defined proportion of traffic from traffic count stations.

d) The TIS should capable of check/flag data accuracy, inconsistencies, and identifying data falling beyond pre-defined acceptable range within current data and comparing previous data.

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

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

- Traffic growth forecasts: predicted traffic patterns of network using supplied traffic growth.
- Vehicle loading characteristics: average axle loadings and equivalent standard axles.
- 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.

f) the TIS shall link GIS objects (of roads) with the road sections to prepare thematic representation of assigned traffic (volume, tonne, VDF, ESAL etc.) and visualize the above data in built-in map interface

C. TECHNICAL SPECIFICATIONS

2.0 General Technical Requirements

2.0.1 **Configurable software:** The software supplied must be configurable. This means that it is possible for the application administrator (initially the Implementation Consultant, but later the Client) to modify parameters or settings, or to otherwise 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 supplier 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 be rejected by the Client.

2.1 Computing Hardware Specifications

2.1.1 The Client intends to implement COTS software on a quad-core processor server configuration. The COTS software supplier shall cost his bid with the above hardware option.

2.2 Network and Communications Specifications

2.2.1 The central database (server) will be accessed through application and web servers; the connectivity will be provided either by NIC or department of IT through a dedicated leased line (through fiber optic cable or other means) to the OWD head-quarter for the full functional version. The web-version will be accessible via leased line internet connectivity or broadband (10 mbps bandwidth preferably dedicated) at both server and user end.

2.3 Software Specifications

2.3.1 **System Software and System-Management Utilities:** The application package (COTS software) should be compatible with Client operating system "Microsoft Windows (XP and onwards)" and server operating system "Microsoft Windows Server (2008 and onwards). It is optional to be compatible to other operating systems like Linux, Unix, Solaris, OS/2 etc.

The COTS web-based application interface must be compatible to internet browsers such as Windows Explorer, Mozilla Firefox, Google Chrome (latest versions) etc.

2.3.2 **Networking and Communications Software:** The COTS software must support latest network services, management and administration features; security and failure management features.

2.3.3 **General-Purpose Software:** The COTS software supplier will also specify any additional software required for implementation of the COTS software like report designer, and any other application that will be required. **The licensing cost for the same is also to be included in the financial offer for COTS software.**

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2.3.4 **Database Software and Development Tools:**
Database Software and Development Tools: The O-RAMS shall operate using a relational database management system (RDBMS) developed using fourth generation language (compatible with either Microsoft SQL Server OR Oracle latest versions or by both).

The Client intends to have a full license of the RDBMS along with the COTS software and to be used as the underlying technology for all O-RAMS applications. It may also be used for developing any other application in future by Client.

The COTS software supplier must specify the RDBMS platform (and version supporting full use database license) of his choice on which the software will operate, and provide cost of licensing the same for financial evaluation. The Client may require the COTS supplier to supply the license for the RDBMS.

2.3.5 **Business Application Software:** The COTS software modules shall be as specified on the basis of technical and functional requirements as stipulated in this document.

2.4 System Management, Administration, and Security Specifications

2.4.0 **General Requirements:** The databases (GIS and O-RAMS) will be accessible to HQ, all Divisions and Circle offices through a user ID and password. The user ID and password will also be used to authenticate the user for accessibility to various functions and functional levels of O-RAMS. The COTS software must have a facility to define role based functional levels and assign such roles to each user. Further, it should also allow assigning OWD-jurisdiction based editing, viewing, printing rights to the users. The COTS software must have a separate interface to perform such administrative and management functions.

2.4.1 **Technical management and troubleshooting:** The COTS software supplier will provide support for configuration. For this purpose the COTS software supplier and the Implementation Consultant will jointly work in the office premises of the Implementation Consultant located at Bhubaneswar. The COTS software supplier shall ensure that adequate support is available to the Client and Implementation Consultant during the duration of this Contract. In addition, the COTS supplier shall provide 3 weeks of training to Client and Implementation Consultant staff in Bhubaneswar. The COTS software supplier will also provide on-line technical expertise to solve / correct / fix any problem promptly arising from the configured application during the service/warranty period.

2.4.2 **User and usage administration:** The Client requires unlimited named users. A maximum five (5) **concurrent** users will access the system, of which two (2) concurrent users will be able to use "analytical functions". **Analytical functions** concerns to all functions related to PMS and administrative operations such as managing rights for user, role etc.

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The data editing/importing will be initially performed at OWD Headquarters. This function may be shifted to the remote offices as implementation and roll-out progress in future. Therefore, additional licenses for the COTS software will likely be required allowing data editing/importing from offices across the State. The COTS software supplier should indicate a unit price for such additional licenses.

2.4.3 **Software certification and accreditation:** The COTS software will be subject to security clearance as per government policies. Therefore, the COTS software supplier must provide information on any certification and accreditation that the software has obtained.

2.5 Service Specifications

2.5.1 **System Integration:** The geographic location of all road assets will be defined in external GIS being developed separately by the Implementation Consultant. This will be linked to the O-RAMS database containing network definition and attribute data. The integration requirements will be jointly undertaken by the Implementation Consultant and the COTS software supplier. It is not mandatory for COTS software to pull GIS data from external GIS and represent using its own built-in GIS functionality. The integration of external GIS with COTS software explicitly means that the road and bridge attributes stored in the COTS database be supplied to external GIS for representation externally.

The integration of the TIS and RMMS with the COTS software will entail, as a minimum, a read-only access of the data contained in the COTS database by the external application for purposes of referencing the locations of external data against the road network entities that are managed by the COTS software. Data that is generated by the external application and subsequently to be populated in the COTS could be done through an import process. Any changes to the network entities that have occurred by time of importing this data should be tracked by the COTS software through a log file and the data in the external systems will be corrected manually.

2.5.2 **Training and Training Materials:**

2.5.2.1 The COTS software supplier will train O-RAMS core group (Implementation Consultant's staff and selected Client staff of Asset Management Cell) during configuration of the software at Bhubaneswar for three (3) weeks. It is expected that about 10 members will take part in the COTS software training. This training will focus on a train-the-trainer type syllabus so that they can carry forward configuration work with support from COTS software supplier. Training on System use to OWD staff is the responsibility of Implementation Consultant.

2.5.2.2 The COTS software supplier shall prepare and provide all operational and training material, for delivery of the program; all such material will be the property of the Client. The COTS software supplier shall bear all expenses for their mobilisation, boarding and lodging in Odisha of their own staff during the duration of the training. Client will provide facilities for training.

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2.5.3 **Technical Support:**

The COTS software, after configuration by the Implementation Consultant, will be delivered to the Client within six (6) months from signing the contract. After Client's acceptance, it will be under warranty period.

2.5.3.1 Warranty Service: The implemented COTS software (O-RAMS) will be under warranty after successful acceptance testing as per General Conditions of Contract. During the period of warranty the COTS software supplier will provide full User support and technical assistance to O-RAMS core-group.

2.5.3.2 User support / hot line: The User support includes resolution of issues that may arise during normal use of the software by the Client officers. This includes provision of dedicated e-mail ID (response time not more than 24 hours) and voice-chat (express resolution) through a dedicated telephone no. (during supplier's normal working time).

2.5.3.3 Technical Assistance: This involves tasks not limited to trouble shooting, bug fixing, providing support for any technical issue or from technology obsolescence etc. The technical support includes on-line chat, dedicated e-mail ID (response time not more than 48 hours) and voice-chat (express resolution) through a dedicated telephone no. (during supplier's normal working time).

2.5.3.4 Post-warranty maintenance services:

There shall be no maintenance charges during the warranty period. Beyond the free maintenance period, the supplier shall indicate in the financial proposal, the rate for the maintenance support or annual maintenance contract (AMC) that will be provided to the Client per year (for 5 years). The services will include but will not be limited to updates, trouble-shooting, resolving any problems faced by the Client, minor modifications and refinements required in the system to improve its effectiveness based on the feedback information collected from its use, and bug-fixing. A technical document mentioning the details of any software updates / patches and the type and extent of changes conducted on the software must be clearly mentioned.

2.5.4 **Data Conversion and Migration:** Data collected during the project are required to be migrated to O-RAMS database using the facilities in the configured COTS software. The Implementation Consultant will migrate any such data that is collected during the project to the O-RAMS database.

2.6 Documentation Requirements

2.6.1 Technical Documents: The COTS software supplier shall provide standard user manuals, technical guides and documentation (editable version) for the use of the system, its input, output, analysis, configuration, administration etc. for the original software. The Implementation Consultant will use them for preparing manuals and necessary

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documentation for the configured O-RAMS. The COTS software supplier shall provide hard and soft copies of all manuals, technical guide etc. to the Implementation Consultant. An administrator's manual explaining how to install, configure, and/or use the software securely will also be provided.

2.7 Consumables and Other Recurrent Cost Items

Nil

2.8 Other Non-IT Goods

Nil

D. TESTING AND QUALITY ASSURANCE REQUIREMENTS

3.1 Inspections

3.1.1 Inspections following delivery: Upon delivery of the licenses, the O-RAMS core group [Implementation Consultant and Asset Management Cell (or its appointed representative)] will verify the media for its installation.

3.2 Pre-commissioning Tests

3.2.0 In addition to the Supplier's standard check-out and set-up tests, the Supplier (with the assistance of the Purchaser) must perform the tests to demonstrate the technical and functional requirements as described in Section B and Section G of Schedule of Requirements on the System and its Subsystems before Installation will be deemed to have occurred and the Purchaser will issue the Installation Certificate(s) (pursuant to GCC Clause 26 and related SCC clauses).

3.3 Operational Acceptance Tests

3.3.0 The COTS software supplier shall work jointly with the Implementation Consultant and the Client to develop a set of step-by-step acceptance tests in order to explicitly test each of the functional and technical requirements. The Implementation Consultant and the Client (or its appointed representative) will perform the various tests and the latter will determine whether or not each test may be signed off as being successful.

3.3.1 The COTS software supplier and Implementation Consultant will jointly work with NIC/SDC to determine the security framework for implementation. Further, security auditing of the software is to be taken up by the third party who is CERT-In certified (http://www.cert-in.org.in/) before hosting. The COTS software supplier and Implementation Consultant must ensure adherence to secure hosting facility at a Data Centre for the server to run on SSH and other secured environment.

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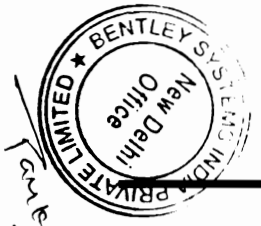

E. IMPLEMENTATION SCHEDULE

Implementation Schedule Table

The below schedule applies to the COTS software module delivery, configuration, acceptance, warranty and AMC.

Line Item No.	Subsystem / Item	Initiation	Installation (weeks from Effective Date)	Acceptance (weeks from Effective Date)
1	Supply licenses for COTS Software, RDBMS etc including Installation of the COTS Software and Pre-commissioning Tests	W1	W1	W3
2	Provide Training to Core Group (OWD & Consultant) for configuration and Calibration of its in-built planning tools including providing System/Reference Manuals	W2		W5
3	Provide support related to software configuration, integration	W11		W26
4	Provide support for COTS software Operational Acceptance Testing	W22	W24	W26
5	Provide Support (During Warranty Period)	W24		W76
6	Annual Maintenance Contract (AMC)	W77		W337

F. REQUIRED FORMAT OF TECHNICAL BIDS

DELETED

G. TECHNICAL RESPONSIVENESS CHECKLIST

Tech. Require. No. 1	**Location Referencing** - Ability to accommodate multiple referencing methods (e.g. from the start of the section, kilometre point, LRP+offset etc.)
Tech. Require. No. 2	**GIS**
	1. Integration of external GIS (being developed separately using ESRI technology) with road database in COTS software
Tech. Require. No. 3	**Network editing and auditing capability and managing old data**
Tech. Require. No. 4	**Road Information System**
	1. General features (import/export/view/sorting/reporting/query of data)
	2. Support different data types (points, section)
	3. Ability to manage old data
	4. Ability to archive data and restore
	5. Support to field data collection devices – Road Information System (RIS) is able to import the data collected in standard database formats by various data collection devices.
	6. Ability to generate strip maps, linear charts of homogeneous sections showing attributes
Tech. Require. No. 5	**Pavement Management System**
	1. General features (import/export/view/sorting/reporting/query of data)
	2. Ability to interface to prioritisation tools like HDM-4 or equivalent
	3. Data aggregation/ transformation (rule based)
	4. Manual refinements of homogeneous sections
	5. Assigning default/ global/ constant values to fields
	6. Ability to interface with HDM-4. (compilation and exporting data to HDM-4 latest version and format for data analysis)
	7. Ability to interface with HDM-4 outputs (import HDM-4 outputs and display results in table/ graphical formats)
	8. Own planning analysis engine (pavement deterioration modelling, prediction, optimization, scenario under different budgets for multi-year programme)
	9. Ability to incorporate alternative methodology to perform similar functions of PMS
	10. Ability to handle committed projects
	11. Ability to select multiple network, sub-network for analysis based on attributes
Tech. Require. No. 6	**Bridge Information System**
	1. General features (import/export/view/sorting/reporting/query of data)
	2. GIS integration
	3. Ability to store multiple photographs and GPS information

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Tech. Require. No. 7	**General Features**
	1. Data input requirements (ability to accommodate strategic to project level data requirement)
	2. Validation mechanism and data entry (bulk data import/ export)
	3. Reporting and query capability and ability for custom building reports
	4. Extent of customization required (indicate the time required for COTS software to conform to the O-RAMS requirements)
Tech. Require. No. 8	**Application, Database and Technology**
	1. Historical data management and storage (including issues for resolving location reference changes)
	2. System architecture (Web-based for each of the versions) [also specify supported modes eg. Desktop, Client- Server etc.]
	3. Database technology used and ability to integrate other internal and external applications/ database (specify supported databases)
	4. User access & security (role and jurisdiction based access)
	5. Experience of installation

Please also refer to the Supplier's response to the above Checklists in its BID attached in Part 8 of the Contract Agreement - Volume –II.

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PART 7 – Performance Security (Bank Guarantee)

Bentley®
Sustaining Infrastructure

IFB Number: PMU-WB-35/2012/AMS-COTS
Date: May 29th, 2013

To
Chief Engineer, World Bank Projects, Odisha
Office of Engineer-In-Chief (Civil),
Nirman Soudha, Keshari Nagar, Unit – V,
Bhubaneswar – 751 001
Tel: +91 674 239 6783 / Fax: +91 674 239 0080
Email: pmuosrp@gmail.com

Reference:

1) ICB No: PMU-WB- 35/2012/AMS-COTS issued vide your office No 34168 dated October 5th 2012.
2) Our BID dated 18th Dec 2012, opened on 21st Dec 2012
3) Your Notification of Award letter no. PMU-WB-35/2012/-18821 dated May 7th 2013.

Subject: Submission of Performance Security.

Sir,
At the outset we would like to thank you for giving us an opportunity to work with your esteemed organization. With reference to above, please find enclosed performance security of **Indian Rupees 28,25,078/- (Indian Rupees Twenty Eight Lakhs Twenty Five Thousand Seventy Eight Only)** in the form of following Bank Guarantees:

1) Bank Guarantee no. PEBNDH304384 of amount Rs. 21, 18,809/- (Indian Rupees Twenty One Lac Eighteen Thousand Eight Hundred Nine Only), dated May 24th 2013, valid till April 30th 2015, issued by The Hongkong and Shanghai Banking Corporation Limited (HSBC).
2) Bank Guarantee no. PEBNDH304398 of amount Rs. 7, 06,269/- (Indian Rupees Seven Lac Six Thousand Two Hundred and Sixty Nine Only), dated May 24th 2013, valid till January 23rd 2020, issued by The Hongkong and Shanghai Banking Corporation Limited (HSBC).

Kindly acknowledge the receipt of above Bank Guarantees.

Thanking You.

Sincerely,
For Bentley Systems India Pvt. Ltd.,

Pankaj 29/5/2013

Pankaj Mittal (Mob: +91-9911102483)
Business Development Manager

Dr. Pal 29/5/13

29/05/13

Encl: As above

Pankaj

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OUR GUARANTEE NO: PEBNDH304384

M/S:
CHIEF ENGG,WORLD BANK PROJ ODISHA
OFF OF THE ENGIG IN CHIEF (CIVIL)
NIRMAN SOUDHA, KESHARI NGR, UNIT V
BHUBANESWAR 751 001

SUB : BANK GURANTEE REF NO: PEBNDH304384
DATED : 24MAY2013
FOR : INR 2,118,809.00
VALID UPTO : 30APR2015
ISSUED ON BEHALF OF : BENTLEY SYSTEMS INDIA PVT LTD

Dear Sir(s)/Madam,

We refer to your letter Ref. NO. dated and confirm issuance of the above mentioned guarantee in your favour and that the guarantee has been signed by signatories who have the requisite power to execute such documents on behalf of the bank.

Yours faithfully,

Authorised Signatory

The Hongkong and Shanghai Banking Corporation Limited
HSBC
New Delhi

BENTLEY SYSTEMS INDIA PRIVATE LIMITED
New Delhi Office

Chief Engineer,
World Bank Projects, Odisha

HSBC

OUR GUARANTEE NO: PEBNDH304384

CH ENGG, WORLD BANK PROJECTS,ODISHA
OFF OF THE ENGG IN CHIEF (CIVIL)
NIRMAN SOUDHA, KESHARI NAGAR, UNIT
BHUBANESWAR 751 001

Date : 28/05/2013

SUB : BANK GURANTEE REF NO: PEBNDH304384

DATED	: 24-MAY-13
FOR	: INR 2,118,809.00
EXPIRY DATE	: 30-APR-15
ISSUED ON BEHALF OF	: BENTLEY SYSTEMS INDIA PVT LTD

Dear Sir(s)/Madam,

We confirm that the above mentioned guarantee issued in your favour and the guarantee has been signed by the signatories Deepa Bhatia (Asst.Manager ,EMP id : 506034) and Shalini Saxena (Vice president credit operation ,SPOA dated 18/Jan/2012) who have the requisite power to execute such documents on behalf of the bank.

Contact Person :

A) Suresh Warrier :
Designation : Associate Vice President
Guarantees Mid Office | GTRF India
Contact Num: 022-67465670

B) S.Selvi
Designation : AM Guarantee MO, GTRF,India
Contact Num: 022-67465645

Mail id :
guaranteeissuanceinm@hsbc.co.in

Mumbai

Yours faithfully,

SURESH WARRIER
AVP - GUARANTEE MO, GTRI
Emp No - 197048

Authorised Signatory

The Hongkong and Shanghai Banking Corporation Limited
India Area Management Office
52/60 Mahatma Gandhi Road, P.O. Box 128, Mumbai 400 001, India. Telephone : 91-22-2268 5555
email : info@hsbc.co.in
www.hsbc.co.in
Incorporated in Hong Kong SAR with limited liability

BENTLEY SYSTEMS INDIA PVT. LTD. New Delhi Office

Chief Engineer,
World Bank Projects, Odisha

INDIA NON JUDICIAL

Government of National Capital Territory of Delhi

e-Stamp

सत्यमेव जयते

Certificate No.	:	**IN-DL14376721948181L**
Certificate Issued Date	:	14-May-2013 12:59 PM
Account Reference	:	IMPACC (IV)/ dl871603/ DELHI/ DL-DLH
Unique Doc. Reference	:	SUBIN-DLDL87160327776064424748L
Purchased by	:	THE HONGKONG AND SHANGHAI BANKING CORPORATION LTD
Description of Document	:	Article 5 General Agreement
Property Description	:	NA
Consideration Price (Rs.)	:	0 (Zero)
First Party	:	THE HONGKONG AND SHANGHAI BANKING CORPORATION LTD
Second Party	:	NA
Stamp Duty Paid By	:	THE HONGKONG AND SHANGHAI BANKING CORPORATION LTD
Stamp Duty Amount(Rs.)	:	100 (One Hundred only)

Please write or type below this line

This Bank Guarantee No– **PEBNDH304384** being executed on 24th May 2013 at New Delhi by

The Hongkong and Shanghai Banking Corporation Ltd.
25 Barakhamba Road, New Delhi - 110001

On behalf of
M/s. Bentley Systems India Private Limited

BENTLEY SYSTEMS INDIA PRIVATE LIMITED * Delhi Office

HSBC New Delhi

Statutory Alert:

1. The authenticity of the Stamp Certificate can be verified at Authorised Collection Centers (ACCs), SHCIL Offices and Sub-registrar Offices (SROs).
2. The Contact Details of ACCs, SHCIL Offices and SROs are available on the Web site "www.shcilestamp.com"

Performance Guarantee

Guarantee No : PEBNDH304384
Date of guarantee: 24 May 2013
Date of the Bid:- 18th Dec. 2012
ICB No. and title: PMU-WB-35/2012/AMS-COTS for procurement of Commercial Off-the-Shelf (COTS) Software for Odisha Road Asset Management Systems (O-RAMS)

Bank's Branch or Office: The Hongkong and Shanghai Banking Corporation Limited, 25, Barakhamba Road New Delhi-110 001

Beneficiary:
Chief Engineer, World Bank Projects, Odisha,
Office Of The Engineer-In-Chief (Civil), Odisha
Nirman Soudha,
Keshari Nagar, Unit – V,
Bhubaneswar – 751 001

AMOUNT NOT OVER INR 21,18,809/-

We have been informed that Bentley Systems India Private Limited, 203, Okhla Industrial Estate, Phase III, New Delhi-110 020 (hereinafter called "the Supplier") been awarded contract by you vide Notification of Award Letter No.PMU-WB-35/2012-18821 dated dt. 07.05.2013 with you, for the supply of Commercial Off-the-Shelf (COTS) software for Odisha Road Asset Management systems (O-RAMS) (hereinafter called "the Contract").

Furthermore, we understand that, according to the conditions of the Contract, a Performance Guarantee is required.

At the request of the Supplier, we The Hongkong and Shanghai Banking Corporation Limited, a company incorporated under the Companies Ordinance of the Hong KongSpecial Administrative Region (HKSAR), having its registered office at 1, Queen's Road Central, Hong Kong and acting through its branch at 25, Barakambha Road, New Delhi 110001, India (hereinafter referred to as "the Bank") hereby irrevocably undertake to pay you any sum(s) not exceeding Rs.21,18,809/- (Rupees Twenty One Lakh Eighteen Thousand Eight Hundred and Nine only) upon receipt by us of your first demand in writing declaring the Supplier to be in default under the Contract, without cavil or argument, or your needing to prove or to show grounds or reasons for your demand or the sum specified therein.

This Guarantee shall expire on 30th day of April 2015, and any demand for payment under it 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.758.

BENTLEY SYSTEMS INDIA PRI... New Delh... Offic...

The Hongkong and Shang... H... New D...

Chief Engineer,
World Bank Projects, Odisha

Guarantee No : PEBNDH304384
Date of guarantee: 24 May 2013

Notwithstanding anything contained herein above :

1. Our maximum liability under this bank guarantee shall not exceed Rs.21,18,809/- (Rupees Twenty One Lakh Eighteen Thousand Eight Hundred and Nine only)
2. This bank guarantee shall be valid only up to 30 April 2015 and
3. We are liable to pay the guaranteed amount or any part thereof under this bank guarantee only and only if we receive a written claim or demand on or before 30 April 2015.

For The Hongkong and Shanghai Banking Corporation Limited

Authorised Signatory

DEEPA BHATIA
ASST. MANAGER
EMPLOYEE ID: 506034

Authorised Signatory

SHALINI SAXENA
VICE PRESIDENT CREDIT OPERATIONS
SPOA DATED 18 JAN 2012

HSBC
New Delhi

Chief Engineer,
World Bank Projects, Odisha

OUR GUARANTEE NO: PEBNDH304398

M/S:
CH ENGG, WORLD BANK PROJECTS,ODISHA
OFF OF THE ENGG IN CHIEF (CIVIL)
NIRMAN SOUDHA, KESHARI NAGAR, UNIT
BHUBANESWAR 751 001

SUB : BANK GURANTEE REF NO: PEBNDH304398
DATED : 24MAY2013
FOR : INR 706,269.00
VALID UPTO : 23JAN2020
ISSUED ON BEHALF OF : BENTLEY SYSTEMS INDIA PVT LTD

Dear Sir(s)/Madam,

We refer to your letter Ref. NO. dated and confirm issuance of the above mentioned guarantee in your favour and that the guarantee has been signed by signatories who have the requisite power to execute such documents on behalf of the bank.

Yours faithfully,

Authorised Signatory

The Hongkong and Shanghai Banking Corporation Limited
HSBC
New Delhi

BENTLEY SYSTEMS INDIA PRIVATE LIMITED
New Delhi Office

Pankaj

Chief Engineer,
World Bank Projects, Odisha

HSBC

OUR GUARANTEE NO: PEBNDH304398

CH ENGG, WORLD BANK PROJECTS,ODISHA
OFF OF THE ENGG IN CHIEF (CIVIL)
NIRMAN SOUDHA, KESHARI NAGAR, UNIT
BHUBANESWAR 751 001

Date : 28/05/2013

SUB : BANK GURANTEE REF NO: PEBNDH304398

DATED	: 24-MAY-13
FOR	: INR 706,269.00
EXPIRY DATE	: 23-JAN-20
ISSUED ON BEHALF OF	: BENTLEY SYSTEMS INDIA PVT LTD

Dear Sir(s)/Madam,

We confirm that the above mentioned guarantee issued in your favour and the guarantee has been signed by the signatories Deepa Bhatia (Asst.Manager ,EMP id : 506034) and Shalini Saxena (Vice president credit operation ,SPOA dated 18/Jan/2012) who have the requisite power to execute such documents on behalf of the bank.

Contact Person :

A) Suresh Warrier :
Designation : Associate Vice President
Guarantees Mid Office | GTRF India
Contact Num:022-67465670

B) S.Selvi
Designation : AM Guarantee MO, GTRF,India
Contact Num: 022-67465645

Mail id :
guaranteeissuanceinm@hsbc.co.in

Mumbai

Yours faithfully,

Authorised Signatory

SURESH WARRIER
AVP - GUARANTEE MO, GTRF
Emp No - 197048

The Hongkong and Shanghai Banking Corporation Limited
India Area Management Office
52/60 Mahatma Gandhi Road, P.O. Box 128, Mumbai 400 001, India. Telephone : 91-22-2268 5555
email : info@hsbc.co.in
www.hsbc.co.in
Incorporated in Hong Kong SAR with limited liability

BENTLEY SYSTEMS INDIA P... New Delhi Office

Chief Engineer,
World Bank Projects, Odisha

INDIA NON JUDICIAL

Government of National Capital Territory of Delhi

e-Stamp

सत्यमेव जयते

Certificate No.	:	**IN-DL14379904853412L**
Certificate Issued Date	:	14-May-2013 01:02 PM
Account Reference	:	IMPACC (IV)/ dl871603/ DELHI/ DL-DLH
Unique Doc. Reference	:	SUBIN-DLDL87160327775648795831L
Purchased by	:	THE HONGKONG AND SHANGHAI BANKING CORPORATION LTD
Description of Document	:	Article 5 General Agreement
Property Description	:	NA
Consideration Price (Rs.)	:	0 (Zero)
First Party	:	THE HONGKONG AND SHANGHAI BANKING CORPORATION LTD
Second Party	:	NA
Stamp Duty Paid By	:	THE HONGKONG AND SHANGHAI BANKING CORPORATION LTD
Stamp Duty Amount(Rs.)	:	100 (One Hundred only)

Please write or type below this line

This Bank Guarantee No– **PEBNDH304398** being executed on 24th May 2013 at New Delhi by

The Hongkong and Shanghai Banking Corporation Ltd.
25 Barakhamba Road, New Delhi - 110001

On behalf of
M/s. Bentley Systems India Private Limited

Authorised Signatory

Statutory Alert:

1. The authenticity of the Stamp Certificate can be verified at Authorised Collection Centers (ACCs), SHCIL Offices and Sub-register Offices (SROs).
2. The Controlling Powers of ACCs, SHCIL Offices and SROs are available on the Web site "www.shcilestamp.com"

Chief Engineer,
World Bank Projects, Odisha

Performance Guarantee

Guarantee No : PEBNDH304398
Date : 24 May 2013
Date of the Bid:- 18th Dec. 2012
ICB No. and title: PMU-WB-35/2012/AMS-COTS for procurement of Commercial Off-the-Shelf (COTS) Software for Odisha Road Asset Management Systems (O-RAMS)

Bank's Branch or Office: The Hongkong and Shanghai Banking Corporation Limited, 25, Barakhamba Road New Delhi-110 001

Beneficiary:
Chief Engineer, World Bank Projects, Odisha,
Office Of The Engineer-In-Chief (Civil), Odisha
Nirman Soudha,
Keshari Nagar, Unit – V,
Bhubaneswar – 751 001

AMOUNT NOT OVER INR 7,06,269/-

We have been informed that Bentley Systems India Private Limited, 203, a private Company, incorporated under the provisions of Companies Act, 1956 having its registered office at Okhla Industrial Estate, Phase III, New Delhi-110 020 (hereinafter called "the Supplier") has been awarded the Contract by you vide Notification of Award Letter No.PMU-WB-35/2012-18821 dated dt. 07.05.2013 with you, for the supply of Commercial off –the-Shelf (COTS) software for Odisha Road Asset Management Systems (O-RAMS) (hereinafter called "the Contract").

Furthermore, we understand that, according to the conditions of the Contract, a Performance Guarantee is required.

At the request of the Supplier, we The Hongkong and Shanghai Banking Corporation Limited, a company incorporated under the Companies Ordinance of the Hong KongSpecial Administrative Region (HKSAR), having its registered office at 1, Queen's Road Central, Hong Kong and acting through its branch at 25, Barakambha Road, New Delhi 110001, India (hereinafter referred to as "the Bank") hereby irrevocably undertake to pay you any sum(s) not exceeding Rs.7,06,269/- (Rupees Seven Lakh Six Thousand Two Hundred and Sixty Nine only) upon receipt by us of your first demand in writing declaring the Supplier to be in default under the Contract, without cavil or argument, or your needing to prove or to show grounds or reasons for your demand or the sum specified therein.

This Guarantee shall expire on 23th day of January 2020, and any demand for payment under it 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. 758.

BENTLEY SYSTEMS INDIA PRIVATE LIMITED New Delhi Office

HSBC New Delhi

Chief Engineer,
World Bank Projects, Odisha

Guarantee No : PEBNDH304398
Date : 24 May 2013

Notwithstanding anything contained herein above :

1. Our maximum liability under this bank guarantee shall not exceed Rs.7,06,269/- (Rupees Seven Lakh Six Thousand Two Hundred and Sixty Nine only)
2. This bank guarantee shall be valid only up to 23 January 2020; and
3. We are liable to pay the guaranteed amount or any part thereof under this bank guarantee only and only if we receive a written claim or demand on or before 23 January 2020.

For The Hongkong and Shanghai Banking Corporation Limited

Authorised Signatory

DEEPA BHATIA
ASST. MANAGER
EMPLOYEE ID: 506034

Authorised Signatory
SHALINI SAXENA
VICE PRESIDENT CREDIT OPERATIONS
SPOA DATED 18 JAN 2012

HSBC

CH ENGG, WORLD BANK PROJECTS,ODISHA
OFF OF THE ENGG IN CHIEF (CIVIL)
NIRMAN SOUDHA, KESHARI NAGAR, UNIT
BHUBANESWAR 751 001

Date : 30/05/2013

OUR GUARANTEE NO: PEBNDH304398 INR 706,269.00
OUR GUARANTEE NO: PEBNDH304384 INR 2,118,809.00

The above mentioned Guarantee has been issued from HSBC on behalf of BENTLEY SYSTEMS INDIA PVT LTD

Yours faithfully,

Authorised Signatory

The Hongkong and Shanghai Banking Corporation Limited
India Area Management Office
52/60 Mahatma Gandhi Road, P.O. Box 128, Mumbai 400 001, India. Telephone : 91-22-2268 5555
email : info@hsbc.co.in
www.hsbc.co.in
Incorporated in Hong Kong SAR with limited liability

Chief Engineer,
World Bank Projects, Odisha

Bentley
Sustaining Infrastructure

BENTLEY SYSTEMS INDIA PVT. LTD.
203, Okhla Industrial Estate
Phase-III, New Delhi - 110 020, India
T +91 11 4902 1100
F +91 11 4902 1199
www.bentley.com/india

CERTIFIED TRUE COPY OF THE RESOLUTION PASSED IN THE MEETING OF BOARD OF DIRECTORS OF BENTLEY SYSTEMS INDIA PRIVATE LIMITED (THE "COMPANY") HELD ON MONDAY, 08 JULY 2013 AT 1 P.M. AT THE CONFERENCE ROOM, HILTON KUALA LUMPUR HOTEL 3 JALAN STESEN SENTRAL, KUALA LUMPUR, 50470, MALAYSIA

AUTHORIZATION TO MR. PANKAJ MITTAL TO EXECUTE CONTRACT ON BEHALF OF THE COMPANY

"RESOLVED THAT, Mr. Pankaj Mittal, Business Development Manager of the Company, Son of Late Shiv Charan Mittal and resident of C-102, Pocket-7,Kendriya Vihar-II, Sector-82, Noida-201304, Uttar Pradesh, India, be and is hereby authorised to sign and execute for and on behalf of the Company the Contract for Goods for the procurement of commercial off-the-shelf (COTS) software for Odisha Road Asset Management System (O-RAMS) ("**Contract**") to be executed between Chief Engineer, World Bank Projects, Orissa on behalf of Works Department, Government of Orissa ("**OWD**") and the Company, pursuant to the award of bid by OWD to the Company vide Letter No. PMU-WB-35/2012-18821 dated May 7, 2013.

RESOLVED FURTHER THAT, the said authorization has been granted to Pankaj Mittal specifically for this Contract only.

FOR AND ON BEHALF OF THE BOARD

BENTLEY SYSTEMS INDIA PRIVATE LTD. NEW DELHI OFFICE

Managing Director

Date: July 9, 2013
Place: Kuala Lumpur, Malaysia

BENTLEY SYSTEMS INDIA PRIVATE LIMITED ★ New Delhi Office

Chief Engineer,
World Bank Projects, Odisha

AGREEMENT No 5 OF 2013 - 14

GOVERNMENT OF ODISHA
WORKS DEPARTMENT
INDIA
ODISHA STATE ROADS PROJECT
Loan # 7577 - IN

CONTRACT FOR GOODS

Procurement of Commercial Off-the-Shelf (COTS) Software for Odisha Road Asset Management System (O-RAMS)

Between

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

and

Bentley Systems (India) Pvt. Ltd.

Volume -2

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

Dated: **12th July, 2013**

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PART 8 – Supplier's Bid

PART 8 – Supplier's Bid

1. Proposal

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BENTLEY SYSTEMS INDIA PRIVATE LIMITED New Delhi Office

Chief Engineer,
World Bank Projects, Odisha

Bid Submission Form

Date: *18th December 2012*
ICB No.: ***PMU-WB- 35/2012/AMS-COTS***
Invitation for Bid No.: ***PMU-WB- 35/2012/AMS-COTS***
Alternative No.: *Not Applicable*

To: Chief Engineer, World Bank Projects,
Odisha Nirman Soudha, Keshari Nagar, Unit – V,
Bhubaneswar – 751 001 INDIA

We, the undersigned, declare that:

(a) We have examined and have no reservations to the Bidding Documents, including

Addenda No.:

Corrigendum No.1 Dated 16th Nov 2012 Issued by Letter No. PMU-WB-35/2012-38960; Corrigendum No.2 to bidding document Received on 4th December 2012 & Response Pre Bid Queries document Received on 4th December 2012

(b) We offer to supply in conformity with the Bidding Documents and in accordance with the Delivery Schedules specified in the Schedule of Requirements the following Goods and Related Services

COTS software (RIS, BIS and PMS), Full Use RDBMS Server License, Training Assistance for configuration and Support during warranty period, Annual Maintenance Contract for 5 Years

(c) The total price of our Bid, excluding any discounts offered in item (d) below, is: ***Indian Rupees 2,82,50,771 Excluding Taxes [Indian Rupees*** Indian Two Crores eighty two lakhs fifty thousand seven hundred and seventy one ***only]***

(d) The discounts offered and the methodology for their application are:

Discounts. If our bid is accepted, the following discounts shall apply.

No Discount Applicable

Methodology of Application of the Discounts. The discounts shall be applied using the following method: _____ *[Specify in detail the method that shall be used to apply the discounts];*

Not Applicable

Pankaj

BENTLEY SYSTEMS INDIA PRIVATE LIMITED New Delhi Office

Chief Engineer,
World Bank Projects, Odisha

(e) Our bid shall be valid for the period of time specified in ITB Sub-Clause 20.1, from the date fixed for the bid submission deadline in accordance with ITB Sub-Clause 24.1, and it shall remain binding upon us and may be accepted at any time before the expiration of that period;

(f) If our bid is accepted, we commit to obtain a performance security in accordance with ITB Clause 44 and GCC Clause 18 for the due performance of the Contract;

(g) We, including any subcontractors or suppliers for any part of the contract, have nationality from eligible countries : **India**

(h) We have no conflict of interest in accordance with ITB Sub-Clause 4.2;

(i) Our firm, its affiliates or subsidiaries—including any subcontractors or suppliers for any part of the contract—has not been declared ineligible by the Bank, under the Purchaser's country laws or official regulations, in accordance with ITB Sub-Clause 4.3;

(j) The following commissions, gratuities, or fees have been paid or are to be paid with respect to the bidding process or execution of the Contract: *[insert complete name of each Recipient, its full address, the reason for which each commission or gratuity was paid and the amount and currency of each such commission or gratuity]*

Name of Recipient	Address	Reason	Amount
	None		

(If none has been paid or is to be paid, indicate "none.")

(k) We understand that this bid, together with your written acceptance thereof included in your notification of award, shall constitute a binding contract between us, until a formal contract is prepared and executed.

(l) We understand that you are not bound to accept the lowest evaluated bid or any other bid that you may receive

Signed: _____

In the capacity of: Business Development Manager

Name : Pankaj Mittal

Duly authorized to sign the bid for and on behalf of **Bentley Systems India Private Limited**

Dated on 18th Day of December 2012

BENTLEY SYSTEMS INDIA PRIVATE LIMITED New Delhi Office

Chief Engineer,
World Bank Projects, Odisha

I. Executive Summary:

The State Government of Odisha (GOO) through the Government of India (GOI) has received a loan from the International Bank for Reconstruction and Development (IBRD) for implementation of Odisha State Roads Project. A portion of this loan is being utilized to establish a Road Asset Management System (RAMS) for the state road network. The system is expected to assist the Odisha Works Department (OWD) to rationalize decision making in planning, programming, funding, procurement, and in the allocation of resources in the road sector in order to make the best use of public funds in preserving the road networks to an acceptable level of serviceability. The aim of this effort is to create a RAMS suitable for a sustainable implementation in Odisha for a network of about twenty thousands of kilometers. The broad scope of the RAMS implementation consultancy services includes configuration and implementation of a Commercial Off-the-Shelf (COTS) system (named as O-RAMS i.e. Odisha Road Asset Management System).

Bentley Systems is pleased to respond to these requirements by proposing the use of software solutions from its Exor product suite. This product suite comprises Commercial off the Shelf (COTS) solutions which are well established and which, since 1995, have been implemented by national, state and local government agencies as well as private sector engineering companies across the world. The Exor software solutions include a core Linear Referencing System (LRS) and a repository for the data being collected in both logical and spatial contexts. The Exor LRS provides a foundation for using additional Exor modules for O-RAMS purposes such as Bridge Information, Pavement Management, Schemes Management and Executive Dashboard reporting.

We expect to see several business issues drive how we and our clients deploy asset management systems and manage business practices going forward. Bentley Systems is cognizant of these needs and strives to ensure our forward Product strategy embraces them:

- The growing need to optimize funding over the long term across both new infrastructure build and maintenance and rehabilitation works;
- An ever increasing need to report on the value received from past infrastructure investments, as well as the need to justify new and increased funding as traditional funding sources are reduced;
- Increasing requirements to integrate information across traditional silos (e.g. pavement, bridge, and maintenance) as we move toward performance based planning and budgeting and the goal of optimizing ride and travel time across the state highway networks and between states. Information integration will also be driven to new levels to support changes in engineering practices and operational engineering decisions that require roadway environment information;
- The need to manage additional asset types like culverts, retaining walls, signs, bike and pedestrian pathways;
- Increasing reporting requirements, from director / chief engineer level through to local managers and engineers, including the need to spatially report significantly more information to a broader audience as many agencies seek to provide summary information and justify decisions to external organizations, politicians and the public – transparency is increasingly important.

BENTLEY SYSTEMS INDIA PRIVATE LIMITED New Delhi Office

Chief Engineer,
World Bank Projects, Odisha

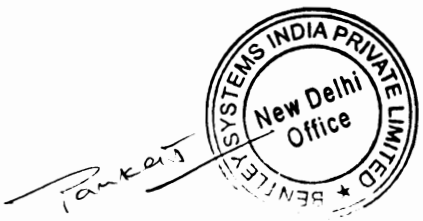
- A focus on integration of data and systems across the lifecycle from Planning & Design through to Construction and Operations and Maintenance.

In this environment there is considerable focus on defining and implementing comprehensive asset management strategies that will fuel critical business decisions with quality, integrated information. A key element of asset management is the use of spatial data or geographic location as an integral part of a solution. OWD recognize this through the desire to integrate the COTS into its corporate GIS - the Exor software was designed to recognize this need many years ago and OWD now has the opportunity to capitalize on the investment made by Bentley Systems in the Exor solutions over these years.
The Exor system will provide a new integrated enterprise asset management database that can support a large number of business systems that are based on the same core linear referencing network. This will enable applications to share and contribute to the completeness and accuracy of the single enterprise network database hub. The system will allow users in a number of business areas to update the one database, with updates shared by all.

Benefits to OWD of implementing Exor:

- Reduction in data management costs by providing a single hub for data which also improves data integrity
- Highly configurable COTS application ensures fit for purpose now and the future as OWD needs evolve or change
- Complementary technology platform to OWD's IT strategy by using Oracle and ESRI underlying technologies
- OWD will become part of an established international user community and will be able to take advantage of product enhancements over the years to come
- Access to established Technical Support Services via Bentley's SELECT program.
- Exor is part of Bentley's Assetwise portfolio of solutions providing OWD with the opportunity to consider other solutions in the longer term. Assetwise brings Asset Lifecycle Information Management to users throughout the entire asset lifecycle – design, build, operate and maintain. A unique proposition in the market as Bentley is the only company able to offer this range of solutions from within its own software portfolio
- Bentley is pleased to offer a free single user license of Maintenance Manager (the Exor RMMS) for OWD to consider as a possible alternative approach to developing a bespoke RMMS.

The Exor solution offers OWD an excellent functional fit to the requirements outlined in the bid document as well as providing additional features that the State of Odisha can build upon to unlock further benefits. Bentley Systems looks forward to discussing the Exor solution further with Odisha Works Department.



Chief Engineer,
World Bank Projects, Odisha

II. Bentley Response to Post Qualification Requirement

1. Post qualification Requirement (ITB38.2)

After determining the lowest-evaluated bid in accordance with ITB Sub-Clause 37.1, the Purchaser shall carry out the post qualification of the Bidder in accordance with ITB Clause 38, using only the requirements specified. Requirements not included in the text below shall not be used in the evaluation of the Bidder's qualifications.

(a) **Financial Capability**

The Bidder shall furnish documentary evidence that it meets the following financial requirement(s):

Average Annual Turnover of COTS supplier should not be less than US$ 1 million (or equivalent) per annum in last three years (i.e. 2008-09, 2009-10 and 2010-11) evidenced by the submission of Audited Annual Accounts and also certificate from Statutory Auditor.

Bentley Response:
Bentley confirms to meet the above financial requirement as bidder. We are enclosing copies of Audited Annual Accounts for last three years (i.e. 2008-09, 2009-10 and 2010-11) as documentary evidence. Kindly refer Appendix for "Documentary Evidence of Financial Capacity".

(b) Experience and Technical Capacity

The Bidder shall furnish documentary evidence from the Purchasers to demonstrate that it meets the following experience requirement(s):

(i) In last 10 years COTS Software (with RIS, PMS and BIS) must have been supplied to and implemented in at least five road agencies.
(ii) Amongst road agencies, at least three must be using the COTS Software satisfactorily at least for last three years; or Amongst road agencies, at least three must have renewed AMC for at least 3 years after implementation and acceptance of the COTS
The documentary evidences shall include the following:
(i) Name of all agencies and address including contact number, and details on number and type of licenses with mention of year in which system were accepted in respective agencies. A certificate from purchaser/ agencies is required confirming implementation year;
(ii) Documentary evidence such as support agreement / Annual Maintenance Contract etc.

Pankaj

BENTLEY SYSTEMS INDIA PRIVATE LIMITED New Delhi Office

Chief Engineer,
World Bank Projects, Odisha

to fulfill requirement of 4.b (i) & (ii) software.

The documentary evidences shall include the following:

(i) Name of all agencies and address including contact number, and details on number and type of licenses with mention of year in which system were accepted in respective agencies. A certificate from purchaser/ agencies is required confirming implementation year;

(ii) Documentary evidence such as support agreement / Annual Maintenance Contract etc. to fulfill requirement of 4.b (i) & (ii)

Bentley Response

The Exor software has been commercially available since 1995 since when it has been implemented worldwide in over 100 local, state and national governments; engineering companies and utility companies.

Many of these organizations are long term users of the software and through their AMC contracts have taken advantage of:-

- Product Functional Upgrades
- Product Technology upgrades
- Maintenance and Bug fixes
- Access to Support services (online, telephone and email based)

We have provided details on the minimum of 5 road agencies requested although we have supplied and implemented our software to more than this number of the past 10 years. Please note that all these users are currently renewing their annual maintenance contracts with Bentley on an on-going basis. We have selected users in different parts of the world to illustrate the international nature of our user base.

Please note that not all users issue acceptance certificates nor we issue AMC contracts annually. These users are on automatically renewable AMC contracts subject to notice of cancellation each year so no separate contracts are issued each year. We have provided copies of relevant paperwork as evidence these are users and by implication they are on-going consumers of Bentley's AMC services. Our users will be more than happy to verify this to OWD if required.

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Pankaj

Chief Engineer,
World Bank Projects, Odisha

1. User: Oregon Department of Transportation (ODOT), USA

Contact:

Heather King, Manager, Road Inventory and Classification Services Unit
555 13th St. NE
Salem, OR 97301, USA
Email: heather.l.king@odot.state.or.us
Tel: + 1-(503) 986-4157

Project Description

Oregon's State Department of Transport TransInfo project called for the delivery and implementation of a roadway network asset management system to replace ITIS, the Features Inventory, and some other existing system functionality with an integrated system including spatial data management. It was important that the new system would support an open technology given the need to interface into a number of existing systems and that the new solution would provide a comprehensive and sophisticated linear referencing capability.

The Exor COTS was selected after a rigorous procurement process because it was in a unique position to meet ODOT needs.

ODOT identified the need for a new integrated enterprise asset management database that can support a large number of business systems that are based on the same core linear referencing network. The intent is to enable each of these applications to share and contribute to the completeness and accuracy of the single enterprise network database hub. The system must allow users in a number of business areas to update the one database, with updates shared by all.

Key Project Date(s)

Project Start Date: 5th May, 2009
Project Go live Date: 18th July, 2011
Official Acceptance 19th July, 2012

Licensed Software

- Exor Database Server 100 users
- Exor Application Server 100 users
- Exor Spatial Manager 20 users
- Exor Schemes Manager 10 users

Supporting Documentation

- Sign off Certificate entitled 'Oregon Transinfo Implementation project'.

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2. *User: Transport for London (TfL), UK*

Contact:
Les Hawker
Transport for London, 197 Blackfriars Road, London, SE1 8NJ, UK
Email: les.hawker@tfl.gov.uk
Tel: +44 20 3054 1208

Project Description

TfL has adopted Bentley's map-based Exor Highway Asset Management solution for more than 500 users responsible for managing the maintenance of the 750,000 assets on the red route road network across the capital - London. The solution is accessible via PC's and hand-held devices and is known NAMS (New Asset Management System).

NAMS provides information to monitor the overall condition of the network and deliver the Key Performance Indicators used to manage the performance of its three contractors via the Exor Maintenance Manager (RMMS) and Information Manager products.

Key Project Date(s)

Project Start Date: April, 2010
Go Live January, 2012

Licensed Software

- Spatial Manager
- Maintenance Manager
- PMS
- Public Enquiry Manager
- Schemes Manager
- Street Works Manager
- Permitting Manager
- Location Services (Network)
- Contractor Interface Manager

500 users across the above applications.

Supporting Documentation

- Document entitled "Agreement for IT Consultancy Services" between Bentley and Capita. This project was delivered with Capita who provide the IT infrastructure for TfL. This project demonstrates how Bentley Systems has worked with a third party to deliver software to a user. An ability to successfully work in this manner will be required in OWD.

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3. User: Australia Capital Territories (ACT), Australia

Contact:
Service Delivery Manager, Operational Support Branch
Territory & Municipal Services (TAMS), ACT Government
Department of Urban Services
Canberra
ACT 2601
Australia
Email: james.downing@act.gov.au
Tel: +61 (02) 6205 2106

Project Description

The Australian Capital Territory (ACT) Department of Urban Services (Urban Services) implemented a new asset management system, based on Exor software modules and consulting services. The Integrated Asset Management System (IAMS) stores information on all of the key assets within the territory, including: roads and footpaths, drainage, parks and public facilities, and waste management. Urban Services is a department of the ACT Government that delivers a wide range of services to the community. Services range from road infrastructure, waste and recycling management, to transport, land, property and information management.

The Exor modules are flexible and cater for the many different asset managed by Urban Services. Having an integrated system allows Urban Services to more easily share and publish asset information internally, and to assist external customers to enquire about assets more efficiently. Access to the IAMS systems is web based and includes mapping and specialist reporting functions. Management reporting is provided for senior managers and occasional users. The Enquiry Manager module is used in connection with the Urban Services call center system to manage all asset and road enquiries. IAMS also initiates dialogue with external contractors.

This project was supported by Downer EDI (Axim) for some of the consultancy services. Downer EDI also provided engineering pavement management services advice to the ACT.

Integration was developed into a 3rd party PMS application – Deighton's dTIMS. This saw the use of Exor as the core linear referencing and asset repository (including condition data) and this data being made available to dTIMS for PMS processing. The results of the PMS analysis in terms of recommended schemes are passed back into Exor for further processing. This ensures all data management can be coordinated and managed via the Exor 'hub'.

A set of Bridge Condition Indices were developed for the ACT based on the BCI's used by VicRoads in Victoria, Australia.

The IAMS project was managed by staff based in Australia, who provided all of the implementation services, such as: installation, data migration, and training and consultancy services. The project is based on a long term business partnership.

The system manages 2,684km of road, all assets, 890 bridges, and enquiries, defects and works orders.

Key Project Date(s)

Project Start Date: Scoping study in 2003 followed by project implementation
Project Go-Live Date: March 2008

Licensed Software

- Network Manager
- Asset Manager
- Schemes Manager
- Maintenance Manager
- Enquiry Manager

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- Asset Valuation Manager
- Accidents Manager
- Structures Manager
- Document Manager
- Information Manager
- MapCapture
- Spatial Manager

There are over 200 users operating from a number of different offices.

Supporting Documentation

- License Order form 'ACT Department of Urban Services'
- The ACT has taken AMC every year since the project completed.

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4. User: Worcestershire County Council, UK

Contact:
Graham Nicholls
Worcestershire Highways, Highways Works Unit
225 London Road, Worcester, WR5 2BE

Tel: +44-(0)1905-761185
Email: G_nicholls@worcestershire.gov.uk

Project Description

Worcestershire County Council (WCC) is a long established user of Exor software having been a customer since 1995. The Exor software is used for routine maintenance purposes and for road works co-ordination purposes in accordance with the UK Traffic Management Act legislation.

WCC has undertaken various additional project activities on the software since the initial implementation including the ability to interface the Exor works order financial and budgetary information into the corporate SAP system. This ensures that as works orders are costed and issued commitments are provided to SAP. Once the work orders have been completed and approved actual expenditure information is provided to SAP.

The SAP solution manages corporate financial budgeting and control and manages invoice reconciliation etc.

WCC are also long established users of the Exor Traffic Management Act solution. This solution provides a control and co-ordination function when organizations wish to occupy road space e.g. to repair the road network, lay new or replace existing infrastructure including utility assets.

Key Project Date(s)

Project Implementation date: Initial applications (RMMS) pre-date 1995. Various supplementary and add on projects since then.

Licensed Software

- Network Manager
- Spatial Manager
- Maintenance Manager (RMMS)
- Information Manager
- PMS
- Enquiry Manager
- Street Works Manager
- Schemes Manager
- Mapcapture
- Contractor Interface Manager
- Financial Interface Manager
- Enquiry Manager API

245 named user population.

Supporting Documentation

- Master Software License Agreement Order / License Number 01096 dated 30th November, 1998 showing the length of time Worcestershire have been using Exor software.

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- Exor License Order Form 01096 dated 1st May, 2012 which documents the last increase in user numbers at Worcestershire and includes agreement for maintenance charges to be paid.

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5. User: Gloucestershire County Council, UK

Contact:
Steve Hawkins
Application Support & PSMA Principal Contact
Environment Directorate
Gloucestershire County Council
Shire Hall, Westgate Street, Gloucester, GL1 2TH
Tel: +44-(0)1452 426158 (direct line)
Email: steve.hawkins@gloucestershire.gov.uk

Project Description

Gloucestershire County Council (GCC) have been using applications from the Exor product suite since prior to 1995. GCC contributed business input into the original RMMS system – Maintenance Manager - designed to manage the principal road network as well as local roads.

Since the original project GCC have extended their use of the Exor product set into other business areas such as network and asset maintenance via Spatial Manager, street works co-ordination and management, street lighting, public rights of way, structures (bridges) and mobile based field data collection (Mapcapture).

GCC have also made extensive use of the Information Manager dashboard and written many of their own management and Key Performance Reports to support the business in their day to day operational engineering decisions.

The Public Enquiry Manager application is used to record and track issues being reported on GCC's network and assets including complaints coming in from the public via the telephone and public. This module helps to supports GCC's e-Government objectives to provide citizens with efficient, electronic service in an easily accessible way.

As a long term use on AMC GCC have benefited from many product enhancements over the years as well as significant technology upgrades.

Key Project Date(s)

Project Implementation date: Initial applications (Maintenance Manager) pre-date 1995. Various supplementary and add on projects since then.

Licensed Software

- Network Manager
- Spatial Manager
- Maintenance Manager (RMMS)
- Information Manager
- Enquiry Manager
- Street Works Manager
- Mapcapture

GCC have a range of licensed users across the in-office applications above which in total number 90 users. In addition there are 35 licenses for the use of Mapcapture in the field.

Supporting Documentation

- Software Licenses and Services Agreement Order / License Number 01013/02 dated 1st April, 1996 showing that GCC have been using this software since 1996 (note the actual usage extends prior to this date though).
- Exor License Order Form 01013-39 entitled 'Summary of Current Licenses Gloucestershire County Council' which documents the current user numbers.

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III. Bentley Response to Bidding Forms

1. Bidder Information Form

[The Bidder shall fill in this Form in accordance with the instructions indicated below. No alterations to its format shall be permitted and no substitutions shall be accepted.]

Date: ***December 18th , 2012***
ICB No.: ***PMU-WB- 35/2012/AMS-COTS***

Page _____of_ _____pages

1. Bidder's Legal Name ***Bentley Systems India Private Limited***
2. In case of JV, legal name of each party: ***NA***
3. Bidder's actual or intended Country of Registration: ***India***
4. Bidder's Year of Registration: ***2000***
5. Bidder's Legal Address in Country of Registration: **203, Okhla Industrial Estate, Phase III, New Delhi 110020, India**
6. Bidder's Authorized Representative Information ***Name: Pankaj Mittal*** ***Address: Bentley Systems India Private Limited*** **203, Okhla Industrial Estate, Phase III, New Delhi -110020, India** ***Telephone/Fax numbers: +91 11 49021100; +91 11 49021199; Mob: +91 9911024843*** ***Email Address: pankaj.mittal@bentley.com***
7. Attached are copies of original documents of: *[check the box(es) of the attached original documents]* ☑Articles of Incorporation or Registration of firm named in 1, above, in accordance with ITB Sub-Clauses 4.1 and 4.2. (See Appendix AOA and Appendix Certificate of Incorporation). ☐ In case of JV, letter of intent to form JV or JV agreement, in accordance with ITB Sub-Clause 4.1. ☐ In case of government owned entity from the Purchaser's country, documents establishing legal and financial autonomy and compliance with commercial law, in accordance with ITB Sub-Clause 4.5.

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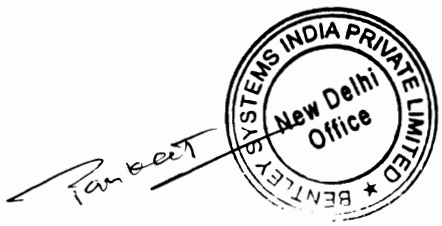
2. Price Schedule Forms

[The Bidder shall fill in these Price Schedule Forms in accordance with the instructions indicated. The list of line items in column 1 of the ***Price Schedules*** *shall coincide with the List of Goods and Related Services specified by the Purchaser in the Schedule of Requirements.]*



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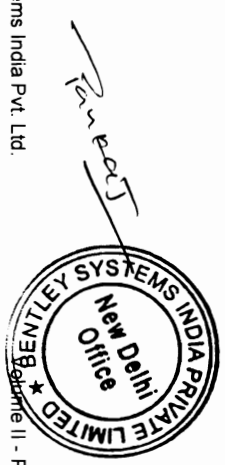

Price Schedule: Goods Manufactured in the Purchaser's Country

Purchaser's Country: India

(Group A and B bids)
Currencies in accordance with ITB Sub-Clause 15

Date: 18-12-2012
ICB No: PMU-WB-35/2012/AMS-COTS
Alternative No: **Not Applicable**
Page No. _____ of _____

1	2	3	4	5	6	7	8	9	10
Line Item N°	Description of Goods	Delivery Date as defined by Incoterms	Quantity in no. of license	Unit price EXW (INR)	Total EXW price per line item (Col. 4×5)	Price per line item for inland transportation and other services required in the Purchaser's Country to convey the Goods to their final destination	Cost of local labor, raw materials and components from with origin in the Purchaser's Country % of Col. 5	Sales and other taxes payable per line item if Contract is awarded (in accordance with ITB 14.6(a)(ii)	Total Price per line item (Col. 6+7) (INR)
[insert number of the item]	*[insert name of Good]*	*[insert quoted Delivery Date]*	*[insert number of units to be supplied and name of the physical unit]*	*[insert EXW unit price]*	*[insert total EXW price per line item]*	*[insert the corresponding price per line item]*	*[Insert cost of local labor, raw material and components from within the Purchase's country as a "% of the EXW price per line item]*	*[insert sales and other taxes payable per line item if Contract is awarded]*	*[insert total price per item]*
1.	COTS software (RIS, BIS & PMS)- having unlimited named users with 5 concurrent users at any time out of which 2 users can access analytical functions.	7 days	1 Set	64,80,000	64,80,000	Nil	Nil	11,16,434.88	64,80,000
2.	Full use RDBMS-Server license	7 days	1 Set	99,89,159	99,89,159	Nil	Nil	5,35,636	99,89,159
Optional Items*									
3.	Additional concurrent license for COTS software with analytical functions*	7 days	1	52,650	52,650	Nil	Nil	8934.51	52,650
4.	Additional concurrent license for COTS software without analytical functions*	7 days	1	52,650	52,650	Nil	Nil	8934.51	52,650
								Total Price	1,52,20,514

Specify the unit price for reference. Shall not be considered in price evaluation, but for future procurement.

Name of Bidder ***Bentley Systems India Private Limited*** Signature of Bidder [ ] Date [ ]

3. Price and Completion Schedule - Related Services

Currencies in accordance with ITB Sub-Clause 15

Date: 18-12-2012
ICB No: PMU-WB-35/2012/AMS-COTS
Alternative No: Not Applicable
Page No. of

	2	3	4	5	6	7
Service N°	Description of Services (excludes inland transportation and other services required in the Purchaser's country to convey the goods to their final destination)	Country of Origin	Delivery Date at place of Final destination	Quantity and physical unit	Unit price*	Total Price per Service* (Col. 5*6 or estimate) (INR)
[insert number of the Service]	*[insert name of Services]*	*[insert country of origin of the Services]*	*[insert delivery date at place of final destination per Service]*	*[insert number of units to be supplied and name of the physical unit]*	*[insert unit price per item]*	*[insert total price per item]*
1.	Training, Assistance for configuration, Acceptance tests and support during warranty period	India	As per Implementation Schedule Table in Part E, Section VI. Schedule of Requirements	Lumpsum	74,61,612	74,61,612
2.	Annual Maintenance Contract (AMC) for 5 years	India	Post warranty	5 years	43,20,000	43,20,000
				Total Bid Price (Including cost of COTS software + Full Use RDBMS Server License + Training Assistance for configuration, Acceptance tests and support during warranty period + 5 Years AMC)		2,82,50,771/- (Indian Rupees Two Crores eighty two lalkhs fifty thousand seven hundred and seventy one only)

* Prices are exclusive of Service Tax or any applicable taxes.

Name of Bidder *[Bentley Systems India Private Limited]* Signature of Bidder *[ ]* Date *[ ]*

4. Bid Security (Bank Guarantee) and Tender Fee

Please find enclosed it in a separate envelope along with Original Bid Documents Envelope

5. Manufacturer's Authorization

Please refer to Appendix for Manufacture's Authorization

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Chief Engineer,
World Bank Projects, Odisha

IV. Technical Solution Proposed for Asset Management System

1. Description of Information Technologies, Materials, Other Goods and Services.

Bentley Response

Bentley Systems will be delivering the current version of the Exor management software applicable at the time the implementation project commences. Exor is currently at version 4.6 and Bentley is proposing to deliver the following COTS modules from the Exor product suite:

- Network Manager
- Asset Manager
- Spatial Manager
- Schemes Manager
- Structures Manager
- License an API to support HDM-4 interface
- Traffic Manager
- PMS
- Information Manager

Standard documentation will be provided in support of the above applications as well as Bentley's standard Training materials.
As requested by OWD Bentley has provided license costs for the Exor solutions and we have provided a separate quotation for the provision of full use database licenses to run the COTS software. Bentley has assumed that OWD are providing the required ESRI licenses (versions specified later in this response).
Bentley will be providing additional services to OWD in order to install configure and provide training in the COTS products.

2. Preliminary Project Plan

The preliminary project schedule reflects our vision of how the project will be structured and executed. The chart shown in the RFP on page 61, Section 0.3.1 Overall Goals and Responsibilities, is reflected in our preliminary project schedule. Once the Authorization to Proceed is received, the Bentley Project Manager will meet with his counterpart to further define the project tasks, responsibilities, and effort estimates for the entire project team. This schedule will be presented, reviewed, and agreed to by all stakeholders during the onsite project kickoff meeting.

Bentley Solutions Methodology (BSM)

Bentley Professional Services works in strict compliance with our project management methodology, the Bentley Solutions Methodology (BSM). BSM supports Bentley's mission to provide world-class value in technology, products, and services.
BSM is a compilation of Bentley's standardized processes for end-to-end Professional Services project activity, thoroughly covering project definition, execution, communication, and completion aspects.

- The methodology is based on over 20 years of implementation and training services expertise within Bentley Professional Services, best industry practices, and established methodologies such

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as the Project Management Institute's (PMI) Project Management Body of Knowledge (PMBOK© Guide) and PRINCE2®.

- BSM is scalable to the size of the project from small consultancy projects to complex system implementations. As project risk and complexity increases, so does the governance. It is part of Bentley's philosophy that no matter how large or small a project, it is implemented to the highest possible standards.
- Because Bentley is a global company, BSM has been designed to be flexible enough to accommodate necessary cultural differences between countries and industries without compromising its purpose of standardization at a high level.

Bentley Professional Services couples BSM with formal project delivery training, a knowledge management approach to centrally harness and share best practices and lessons learned, a Professional Services Automation approach based on standard industry systems and tools, and most important, a pool of highly skilled resources. The level of expertise in Bentley Professional Services serves to strengthen the position of our partners and the users we are privileged to serve.

More specifically, BSM is not just about making you feel good and our consultants motivated – it is a highly developed set of procedures, templates and tools that guide every project from start to finish. Key elements include:

- Roles are defined
- Procedures and guidelines are defined for key steps in each project phase, clearly delineating roles, responsibilities, tools, and deliverables
- Procedures are accompanied by templates, evaluation tools, and checklists
- Workflows and escalation procedures are defined
- Project management processes are defined
- Documentation and communication standards are defined
- BSM training is mandated and BSM compliance is audited
- Knowledge is shared and grown among a globally distributed team, via a powerful, knowledge management based user interface

Several benefits are achieved from the use of standardized methodology such as BSM, including increased efficiency, consistency, and a shortened learning curve for new colleagues. However, the primary benefit resulting from BSM is a consistent high quality in Bentley's project delivery.

BSM: Commitment you can feel, quality you can measure

A flowchart of the methodology follows:

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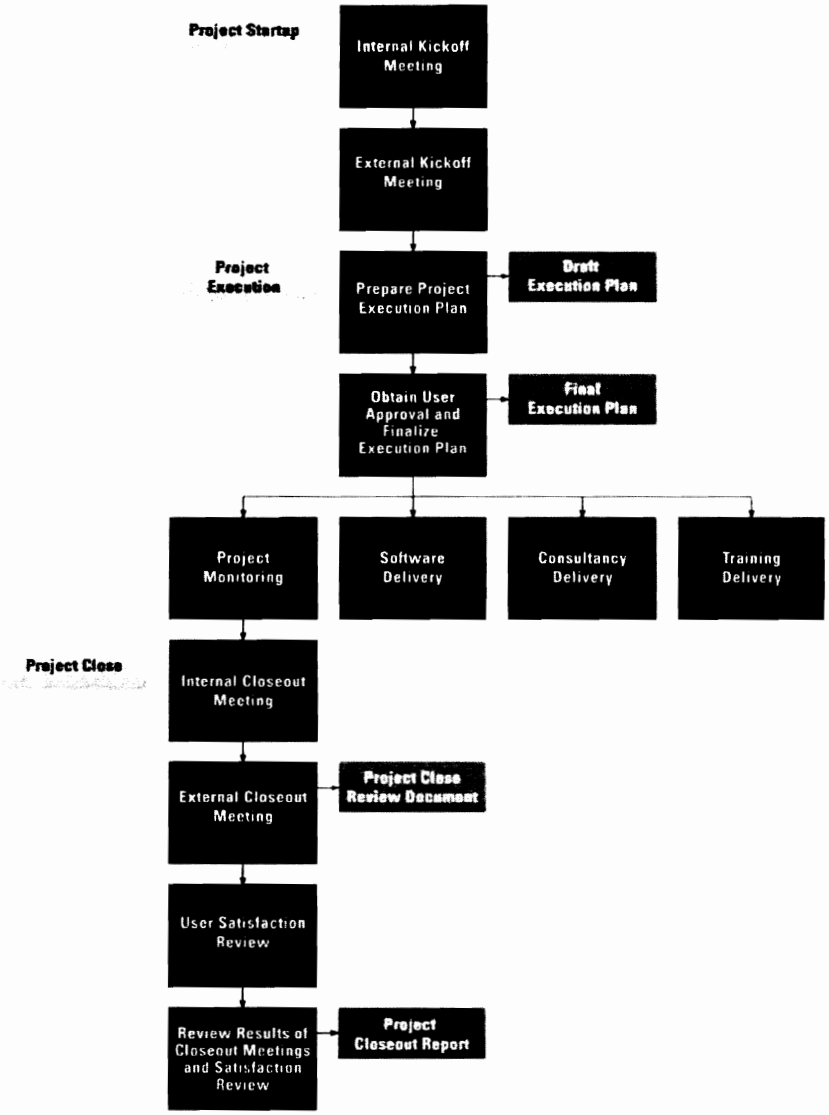
Pankaj

Chief Engineer,
World Bank Projects, Odisha

BSM Project Implementation



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3. Implementation Project Overview

The implementation project will consist of the following tasks to be accomplished either independently by Bentley or in support of the Implementation Consultant. The tasks shown below are high level and are limited in places by the level of effort or by outcome as noted in this overview. We have estimated the level of consultancy support required to assist the Implementation Consultant for each activity based on our experience and the information currently available. Additional consultancy support can be provided as agreed during a change control process.

1. Project Startup and Kick-off

The project startup tasks include the review and agreement of project tasks, effort, schedule, and resource assignments. In addition, a review of the project requirements and approach will be provided to all project team members. The implementation life cycle will also be defined during Startup. The general approach to the project life cycle will be to initially install the system into the Sandpit environment which is then used to build a prototype system and formulate the configuration parameters. This is followed by the installation and review of the configuration in the test environment, verifying the functionality in the training environment and finally moving the system into the production environment. It is assumed that while Bentley will work closely with the Implementation Consultant during the prototyping session in the Sandpit environment, the Implementation Consultant will lead, maintain and manage the implementation for the other environments.

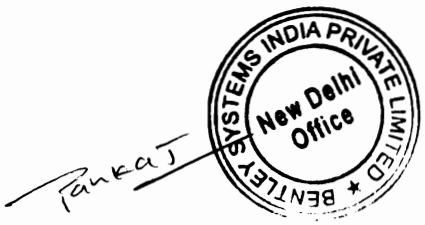
2. Software Installation and Pre-Commissioning Tests

2.1. Infrastructure and Platform

Bentley will lead the installation of the COTS software and provide relevant documentation to the Implementation Consultant to provide them with the information needed to maintain the system. There is an assumption that the hardware and operating system has been setup and tested prior to the installation of the COTS software. This includes network communications, one (1) database server, and one (1) application server. Bentley, with assistance from the Implementation Consultant, will create four (4) database instances, namely Sandpit, Test, Training, and Production. It is also assumed that Recovery backup and ongoing maintenance of the system will be the responsibility of OWD and the Implementation Consultant.

2.2. Provide Training to Core Group

Bentley will provide classroom style training to OWD and the Implementation Consultant. It is assumed that key personnel will be appointed to the training sessions and these candidates will act as champions of the system. The initial training will provide a high level understanding of the product and sufficient information to enable the participants to appreciate the key configuration items that will be covered during subsequent training and re-emphasized during the implementation stages. The training will be provided using standard Bentley Institute materials. The classroom will be provided by OWD and be available a minimum of one (1) day prior to the first class. It is also assumed that training accessories such as whiteboard, flip charts and projector will be present in the training room. There will be no more than 8 students per class and each student must have their own computer.



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3. *Software Configuration and Support*

3.1. Road Information System

Since the network is a key aspect to the Exor system, it is important that the road network is loaded into the system. It is assumed that the road network is currently available as an ESRI Shapefile and available to Bentley to review prior to the commencement of any technical activity. With the knowledge gained during the initial training sessions, an in-depth analysis of the necessary configuration will be provided which will enable the Implementation Consultant to make decisions and review the prototype configuration. The Bentley team will work closely with the Implementation Consultant during the prototyping sessions. Following the prototyping sessions, it is expected that the Implementation Consultant will have a deeper understanding of the system and have the necessary knowledge to independently build a test system. It is also assumed that the Implementation Consultant will manage and maintain the configuration during the life cycle of the project. The Prototyping session will include a template network configuration document, as well as three (3) spatial themes and two (2) road groups. This should enable the Implementation Consultant sufficient insight about the Road Information System to be to create further instances of these items as required. Also included are three (3) days of ad-hoc consulting for Road Information Systems, which the Implementation Consultant can utilize as call-off consulting.

3.2. Pavement Management System

During the prototyping phase, a subset of the network will be used to set the configuration. It is recommended that an appropriate dataset from a Circle will be sufficient to prototype the Pavement Management System. The Implementation Consultant will document the configuration during the prototyping session and apply the configuration settings into other environments. It is assumed that HDM-4 will be used as the integration tool with Exor Asset Manager and Schemes Manager. It is also assumed that historical data will not be loaded into PMS. Bentley acknowledges that although sufficient steps have been taken to empower the administrators to configure PMS, there is a possibility that additional assistance may be required to fine-tune the system. As such, Bentley has included eight days (8) days of ad-hoc consulting, which the Implementation Consultant can utilize as call-off days.

Reporting

Bentley will provide a COTS reporting layer to the Implementation Consultant. In addition, training will be provided on the structure of the reporting layers, as well as reporting tools such as Discoverer and Information Manager. Furthermore, Bentley has allocated 5 days of effort to support the design of ad-hoc reports, which can utilized as call-off days.

GIS Consulting

Bentley will train the Implementation Consultant on the best means of creating GIS themes using Exor/Oracle tools so the Implementation Consultant can create 'custom-build' thematic mapping. It is currently assumed that the integration with an external GIS will be delivered through the following means: a) consume an external WMS layer, b) ability to export/publish Exor GIS layers through Spatial Manager, and c) ability to connect directly to the Oracle Spatial GIS layers in the Exor system. In addition to the standard training, Bentley has allocated 5 days of call-off consultancy to support the design of GIS themes during the life of the project.

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3.3. Data loading

There is a general assumption that the road network will be provided in an ESRI shapefile. In addition, it is also assumed that assets captured for strip-map generation will be in CSV format and Exor CSV loaders will be used for loading. Bentley will provide a format for the CSV files to the Implementation Consultant, and the Implementation consultant will be responsible for providing the data in that format. Bentley will train the Implementation Consultant on configuring the CSV Loaders and ESRI shapefiles as well as configuring the Exor document management facility. In addition to standard COTS training, Bentley has allocated a total of five (5) days as call-off consultancy related to configuring CSV data as well as document management. These ad-hoc consultancy days can be utilized at any time during the life of the project.

3.4. Traffic Manager

As the Traffic Manager Interface is yet to be defined, Bentley has allocated five (5) days of effort to investigate and work with the Implementation Consultant to gather functional and technical specifications.

3.5. Routine Maintenance Manager System

As the interface to the Routine Maintenance Manager System is yet to be defined, Bentley has allocated five (5) days of effort to investigate and work with the Implementation Consultant on gathering these requirements.

Bridge Information System

Bentley recommends Exor Structures Manager to deliver the requirements of the Bridge Information System. Similar to the other Exor systems, Bentley will work closely with the Implementation Consultant to define, capture and enter the appropriate configuration into the Sandpit environment. Bentley will also train the Implementation Consultant to configure and load a small subset of Bridge data. The sample load of the bridge data in the sandpit environment should be limited to a small Geographic area such as a Circle. It is assumed that the Implementation Consultant will configure and load the remaining dataset into the other environments. It is also assumed that historic data, such as Bridges Inventory and Inspection data will not be loaded.

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General Project Assumptions

- The project shall start with the production of a Project Execution Plan (PEP), in accordance with Bentley Solutions Methodology (BSM). This document shall define the methodology used for the implementation
- For loading of data Bentley will provide a file specification format to the Implementation Consultant and the Implementation Consultant will be responsible for providing the data to that format.
- There will be no loading of Historic data, only current data
- Where a level of effort is defined in the plan if additional resource is required this will be subject to change control
- Where training is to be delivered this is standard Bentley Institute Training. Any localization of this training will be subject to change control
- All hardware and networking required will be in place already with Operation Systems installed that comply with the Bentley Exor Certification Matrix
- Management of the system, including day to day maintenance, backup, recovery and disaster recovery us the responsibility of the Implementation Consultant
- If a WMS is to be used this will be provided to Bentley by the Implementation Consultant. The Bentley Exor system can consume a single WMS
- The implementation Consultant will be responsible for the Administration of the application including configuration of user accounts, roles and module access post the administration training.
- All software, documents and training provided by Bentley shall be in English
- Arrangements for on-site activity will be agreed at least 10 working days prior to the consultant or project manager being on-site.
- Where Bentley personnel are working on site they are able to use their own computers to access the internet through their own VPN connection or the equipment provided allows unrestricted access to the internet to allow VPN connection.
- Bentley personnel will not be permanently on site but will complete some aspects of the work remotely, as appropriate.
- Documentation shall be produced to a level of detail typical of this class of project. If detail beyond Bentleys reasonable expectation and experience is requested, this may be managed through change control.
- Bentley does not provide hardware fixes only software releases relating to the Bentley application

4. Confirmation of Responsibility for Integration and Interoperability of Information Technologies

5.4.0 The Bidder must submit a written confirmation that, if awarded the Contract, it shall accept responsibility for successful integration and interoperability of all the proposed Information Technologies included in the System, as further specified in the Bidding Document.

Bentley Response

If awarded the Contract Bentley Systems shall accept primary responsibility for the successful integration and interoperability of the Exor COTS software being delivered by Bentley Systems. As detailed in our response we will also provide integration support services to the Implementation Consultant but for the

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avoidance of doubt, Bentley cannot accept sole responsibility for the successful integration of third party systems not within Bentley's control such as the TIS and RMMS.

Bentley accepts primary responsibility for the following as per bidding document (Clause 0.3, Schedule VI. Schedule of Requirements):

- Supply licenses for COTS Software
- Installation of the COTS Software
- Provide Training to Core Group (OWD & Implementation Consultant)
- Provide System/Reference Manuals
- Provide integration Support
- COTS Acceptance Testing
- Provide Support (During Warranty Period)
- Provide Support (After Warranty Period) - Through AMC

Bentley understands that OWD and Implementation Consultation will provide necessary support to accomplish above responsibility.

5. Statement of Deviations / exceptions to the Technical Specification

Bentley Response

Bentley is pleased to confirm that the only deviations / exceptions to the Technical Specification are the following:-

- **Pavement Management System**

We have proposed a solution which we believe will provide maximum benefit to OWD rather than recommending the use of a PMS not appropriate to OWD's needs. Our solution, which is explained in our responses, is to use Exor as the Linear Referencing, Asset and Condition data hub and to integrate into HDM-4 which will provide the detailed analytics. The results of the HDM-4 analysis will be passed back to Exor to manage via the Scheme Manager application.

The Exor PMS will be available for use if OWD elect to explore it's use as a condition ranking based solution as mentioned might be appropriate at the Bidders' Meeting.

- **GIS Integration**

The Exor solution includes integration into ESRI ArcGIS9.3.

Data is stored within Exor's Oracle Spatial engine in order to provide a non-proprietary way of storing GIS data. Using this approach we're able to serve spatial data to users via Exor's Locator product over the web by providing Maps in Forms. We're also able to serve this data directly into Spatial Manager – the ESRI based platform used for network and asset editing purposes.

We believe this integration offers significant benefits compared to the approach of locating asset data separately from the COTS application and view our approach as a positive deviation from that proposed as it offers tighter integration into ArcGIS.

Pankaj

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6. Bentley Response to Schedule of Requirements

List of Goods and Delivery Schedule

Line Item N°	Description of Goods	Quantity	Physical unit	Final (Project Site) Destination as specified in BDS	Delivery (as per Incoterms) Date		
					Earliest Delivery Date	Latest Delivery Date	Bidder's offered Delivery date [*to be provided by the bidder*]
[insert item No]	*[insert description of Goods]*	*[insert quantity of item to be supplied]*	*[insert physical unit for the*	*[insert place of Delivery]*	*[insert the number of days following the date of effectiveness the*	*[insert the number of days following the date of effectiveness the*	*[insert the number of days following the date of effectiveness the Contract]*
1	COTS software (RIS, BIS & PMS)-having unlimited named users with 5 concurrent users at any time out of which 2 users can access analytical functions.	1	Set	Bhubaneswar, Odisha, India	7	7	7
2	Full use RDBMS-Server license	1	Set	Bhubaneswar, Odisha, India	7	7	7
Optional Items not be considered in price evaluation, but for future procurement							
3	Additional concurrent license for COTS software with analytical functions	1	No. of license	Bhubaneswar, Odisha, India	7	7	7
4	Additional concurrent license for COTS software without analytical functions	1	No. of license	Bhubaneswar, Odisha, India	7	7	7

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List of Related Services and Completion Schedule

Service	Description of Service	Quantity[1]	Physical Unit	Place where Services shall be performed	Final Completion Date(s) of Services
[insert Service No]	*[insert description of Related Services]*	*[insert quantity of items to be supplied]*	*[insert physical unit for the items]*	*[insert name of the Place]*	*weeks from Effective Date*
1	Training	Lumpsum	Weeks	Bhubaneswar	3
2	Assistance for configuration	Lumpsum	Weeks	Bhubaneswar	24
3	Pre-commissioning + Operational Acceptance tests	Lumpsum	Weeks	Bhubaneswar	24
4	support during warranty period	Lumpsum	Weeks	Bhubaneswar	52
5	Annual Maintenance Contract (AMC)	Lumpsum	Years	Bhubaneswar	5 years after the warranty period

7. Bentley Response to Technical Specifications

Business Function and Performance Requirements

1.1 Business Requirements to Be Met by the System

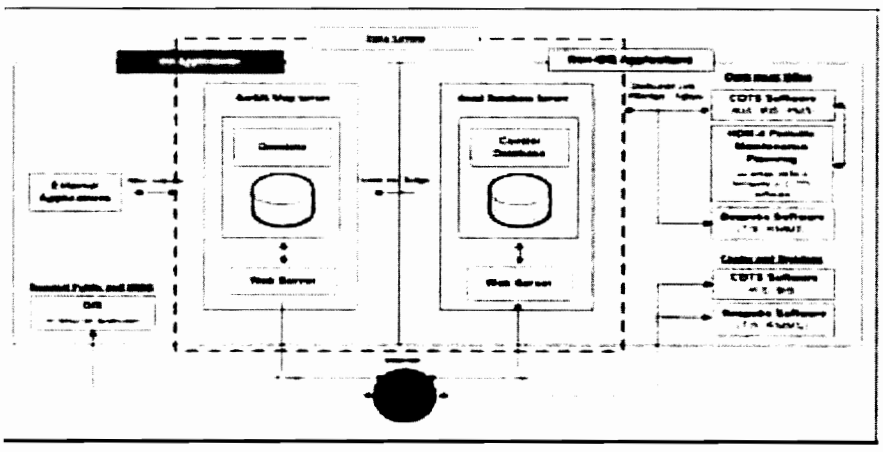
The following points provide high level functional and performance requirements of the system:

1.1.1

The components of O-RAMS will be implemented at all Divisions, Circles, and Headquarter offices of OWD. There are approximately forty (40) Division offices throughout Odisha which are managed by Circles, the latter expected to number up to about ten (10) in the near future. The main server running the application and database will be housed in the Data Center at Department of IT or National Informatics Centre (NIC), located offsite from the OWD Headquarters. It will have a dedicated link to the O-RAMS management unit at OWD Headquarters to access the full functional version of the COTS application. All functions related to PMS and administrative operations such as managing rights for user, role etc. will be performed in HQ accessing database through dedicated leased line. The connectivity will likely to be either via OSWAN (Odisha State Wide Area Network) or through a leased-line service, the modality of which will be decided at a later stage.

The web-version of the COTS software and bespoke systems (GIS, TIS and RMMS) will be hosted through a web server separately. It will be accessible to all Division and Circle offices through a user ID and password. The user ID and password will also be used to authenticate the user for accessibility to various functions and levels of O-RAMS (COTS and bespoke applications). It is required that the remote users will access COTS software through a web browser to perform selected functions such as view, edit, query, print data/ reports.

A schematic representation of the proposed configuration/ architecture at various levels/ offices in the OWD is shown in Figure 1.



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Bentley Response

Bentley is proposing the use of modules from the Exor application suite. These solutions have a track record of being successfully deployed, implemented and used by organizations of all sizes. The organizational and geographical structure of OWD can be fully supported by our applications assuming OWD has the IT infrastructure in place.

Access to the software is via named user accounts and passwords with system administrators able to define access levels and privileges within the system. We have developed a sophisticated and comprehensive user security system which enables control of:-

- User access to the system
- Administrative / organizational level security (e.g. access could be restricted to data in a particular user's district but State level users could have access to all data)
- Network, Asset and Contract (contractor) security to control access to data within an area or administrative office. For example, access could be granted to parts of the road network and certain assets. If Exor's Maintenance Management system were deployed security also extends to maintenance contract information.

A full description of our capabilities in this area is provided in Technical Requirements Number 8 part 4.

1.1.2

The geographic location of all road assets will be defined in an external GIS being developed separately (using ESRI technology) by the Implementation Consultant. This will be linked to the O-RAMS database containing network definition and attribute data. Integration of this external GIS with road database in COTS software is a mandatory requirement and shall be jointly defined by the Implementation Consultant and the COTS software supplier.

Bentley Response

The Bentley applications are fully supportive of this approach and offer added value to this requirement. Bentley's Exor solutions integrate ESRI GIS technology into an engineering environment of operational applications through the use of Oracle Spatial. This approach ensures engineering spatial data can be properly managed from both a spatial perspective as well as a logical one.

Bentley does this by storing the Exor application data (network, assets, condition data etc.) within Oracle and where applicable their spatial context in Oracle Spatial. We can then serve this data quickly and cost effectively to users depending upon their business requirements.

Users who need to undertake network and asset spatial editing will have access to Spatial Manager a fully featured spatial and logical tool using ArcView at the desk top. This is typically a specialist function undertaken by a limited number of users.

The majority of users require access to data for wider purposes such as viewing the network and assets and using various operational applications to manipulate engineering data. For these users data can be served over the web and presented to users in screens which contain embedded mapping functionality – Exor Locator.

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The fact that Exor already has tight integration into ESRI therefore reduces costs and risk to OWD. It also ensures data integrity as the integrated ESRI and Oracle database ensure that as changes take place spatially (e.g. Network editing) all associated data is maintained properly complete with full audit and history trails.

Further integration activities can take place to ensure that map data in the corporate ESRI GIS is available to users within Exor and that data within Exor can be published to the corporate ESRI GIS.

We provide additional information on this requirement in our response to Technical Requirements Number 2.

Table: Proposed COTS Software Solution

COTS Software	Function	Where
Version with Full facility	Core O-RAMS data repository and full-featured road-related data management and analysis tool.	Head Office
Web-Version (View as well as data upload & download facility)	Internet browser-based tool for presenting results of analysis from O-RAMS in graphic reports / charts and running O-RAMS related tasks such as browsing/ uploading/ downloading data, executing queries and data transformation operations, etc.	Head Office, Circles, Divisions

1.1.3

The O-RAMS components will primarily use COTS database software (O- RAMS database) to store and process data. The applications of O-RAMS such as RIS, BIS, TIS, RMMS and PMS will be made functional by configuring the available facility of the COTS software. However, TIS and RMMS applications will be developed separately by the Implementation Consultant and integrated with the COTS software.

Bentley Response

Bentley is proposing the use of its COTS software for O-RAMS and within it the RIS, BIS and PMS. We propose to supplement our PMS by providing integration into HDM-4 to provide the full analytical capability of a PMS.

We are able to provide a product interface called Traffic Interface Manager which sits between Exor and a third party TIS. This will be beneficial in terms of taking data from the TIS which the Implementation Consultant is developing and loading it into Exor.

We note the intention for the Implementation Consultant to also develop the RMMS application. We believe that the Exor RMMS will satisfy many of the requirements specified in this document for this system. It has the advantage of being a COTS product integrated into the rest of Exor in terms of network,

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assets, inspections, contracts, schedules of rates, budgets etc. We have not costed this solution into our proposal but strongly recommend that OWD consider this option as it reduces the risk and cost associated with bespoke development. We have commented on how the Exor RMMS meets the functional requirements stated in this document in Section 1.4.10.

To demonstrate our commitment to OWD though we propose to provide a free license of Maintenance Manager which can be used for evaluation purposes with standard 'out-of-the-box' Meta data i.e. local configuration effort is not included. However, we are proposing the use of the contracts and works ordering functionality within Maintenance Manager alongside Structures Manager (for bridges) so OWD will benefit from some of the functionality of Maintenance Manager through this approach.

1.1.4

The COTS software supplier shall provide necessary software to comply with the requirements of RIS, BIS and PMS. The COTS software should have facility to import data from other applications such as TIS, RMMS; and to export road network definition data to those applications.

Bentley Response

Bentley will provide the required software as described in Section 1.1.3. The Exor product suite includes a configurable interface which enables us to load traffic data from TIS into Exor. We can configure an export routine to provide network data to the TIS (see comment at the end of this section).

We have commented in 1.1.3 that OWD should also consider licensing the Bentley RMMS COTS product. Please note implementation of our RMMS is not costed into our proposal (except for works ordering related functionality for bridges) as it is outside the scope of OWD's requirements. We can import data into Exor but if OWD are using an external RMMS (as currently planned) we would need to agree what RMMS data needs to be imported into Exor and for what purpose.

Whilst network data can be exported from Exor to be used in external systems it is better if these systems have the capability to use the Exor network directly. This way as network changes are undertaken these edits are immediately available to the external system helping to preserve data integrity and mitigate against any risk of silos of network data being created which cannot be reconciled back to the master version of the network. This applies as much to typical RMMS data such as inspections and defects as it does for other data types.

1.2 Functional Performance Requirements of the System

1.2.1

The core of the proposed System will be a web-based **Road Information System (RIS) & Bridge Information System (BIS)** with GIS interface capability. The system will be designed for multi-level user requirements (i.e. Headquarters, Circle, Division, Sub-Division) with appropriate security, interfaces and reporting facilities appropriate to the level of the user. The system must be configurable to meet the various requirements of a road & bridge asset management system.

Pankaj

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Bentley Response

Bentley notes this requirement and is proposing to implement a number of COTS products to meet it.

1.2.2

For managing periodic and capital road work activities, a **Pavement Management System (PMS)** application will be configured by the Implementation Consultant using the inbuilt modules of COTS software. This application will cover preservation of the existing road network as well as expansion which may cover new links, multi-laning, or capacity increase. The engineering and economic analytical tools available within the COTS software therefore should provide deterioration prediction methodology for both bituminous and concrete pavement. The PMS processes must cover /include, but not be 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

The structure of the database should support a minimum of such parameters so that the PMS can function with a set of default parameters at the beginning, with the ability to accommodate more refined calibration parameters later.
The PMS application should also be able to link to HDM-4 for undertaking similar analyses.

Bentley Response

In Technical Requirements Number 5 and Number 7 we describe the capabilities of the Exor PMS and our proposal to ensure OWD is provided with a 'fit for purpose' PMS solution. We understand that OWD is prepared to consider a number of options with regard to how and to what extent deterioration modeling are undertaken. We've proposed the use of HDM-4 to provide this functionality. However, the Exor PMS in 2013 will include the ability to undertake deterioration projections based on standards being defined in the UK. This option could be considered by OWD as an alternative approach and we would be pleased to provide further information on this capability.

The Exor PMS cover the existing road network and subsequent changes and additions to it. It includes analytics to condition rank the network and provides integration into a Scheme Manager system to manage projects once they've been identified. Scheme Manager enables users to manage and track a Scheme from creation through to delivery. Scheme Manage includes the ability to update road construction data once a Scheme has been completed thus ensuring the construction data in Exor reflects that on the road network. This is often a missing component in the data flow but is essential in ensuring PMS analysis is based on the correct construction data.

In the Technical Requirements Numbers 5 and 7 we also detail how we would propose to supplement the Exor PMS via integration into a third party PMS such as HDM-4 and / or other PMS's,

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1.2.3

A Routine Maintenance Management System (RMMS) application will be developed by the Implementation Consultant and integrated with the COTS software, 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.

Bentley Response

We note delivery of the RMMS will be the responsibility of the Implementation Consultant. However, as described in Section 1.1.3 above we believe the Bentley Exor RMMS may offer advantages to OWD and that it should also be considered rather than developing a bespoke solution. We would be pleased to explore this with OWD in more detail but have not currently assumed it is part of this proposal. However, to demonstrate our commitment to OWD we have included one, free license of Maintenance Manager (the Exor RMMS) which will be provided with standard metadata without local configuration and we will provide an overview of it so help OWD assess its fit for possible use.

1.2.4 A **Traffic Information System (TIS)** application will be developed by the Implementation Consultant and integrated with the COTS software. The TIS will store survey data, analyze and manage traffic data to be used by other modules of O-RAMS.

Bentley Response

We note that it will be the responsibility of the Implementation Consultant to develop the TIS. However, Bentley is pleased to propose the use of the Exor Traffic Manager Interface product. Traffic Manager turns traffic count data into an enterprise database of traffic history statistics that can be related to other types of data based on road network location. The Traffic Manager module maintains summary statistics and updates the traffic section information. It is intended to complement the use of a TIS not replace the TIS.

Using Traffic Manager ensures that traffic sites maintain historical integrity through the network maintenance features of Exor's Network Manager, so that traffic data are always associated with the correct spatial or network location.

Processed traffic count data is published as attributes of traffic sections or separate traffic profile records. Each profile can have any number of counts and summary statistics associated with it for any number of years. A pre-publishing tool enables users to preview and evaluate data sets before they are published to ensure data quality.

The published database can be made available in a variety of ways, such as through a browser, GIS map, spreadsheet or data mining tool. Taking advantage of Exor's GIS integration, users can create query sets using polygons directly from the map interface.

Users can use a wide range of querying tools to define simple and complex data queries, and then save the queries and the results. These query sets can be used as the basis for subsequent queries and future re-use.

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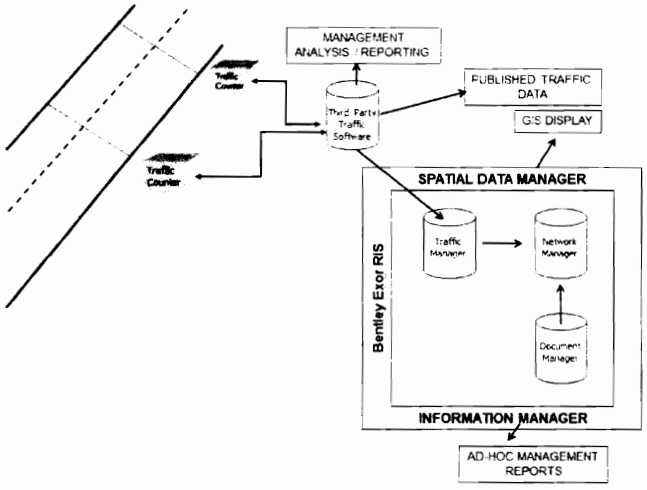
Traffic Manager reporting features enable analysts to define report parameters by time period, region, vehicle class, or other user-defined preferences. Because traffic records are linked to Exor's Network Manager module, analysts can view enhanced highway data by combining attributes such as road details (speed limits, signage, and lane information), road conditions, maintenance records, and street lighting units. Road data item combinations are unlimited.

We would be pleased to work with the Implementation Consultant on specifying how Traffic Manager and the TIS could best work together.

Traffic Manager is also referenced in our response to Technical Requirement Number 8 part 3

The schematic below shows how "Third Party Traffic Software" [OWD's proposed TIS] collects raw traffic data and provides analysis and reporting of this data. Summary data (e.g. AADT data) is then passed via Traffic Manager into Exor where it is loaded against Traffic Sections and the data is then available via reports and the spatial tools such as Spatial Manager and Locator.



1.2.5 The O-RAMS 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.

Bentley Response

The proposed Bentley software is designed to operate at enterprise level and so will support all levels of OWD. It includes the ability to provide access rights to users based on their level in the organizations that, for example, Division users could be restricted to data solely within their division whereas HQ users could be granted access to all data.

1.3 Related Information Technology Issues and Initiatives

1.3.1 Services from an external consultant with particular expertise in the MIS and IT / ICT

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fields are also currently on-going, to help OWD to formulate an effective strategy for development and implementation of an agency-wide Management Information System (MIS), project management and decision support tools in the OWD, supported by an Information Technology / Information and Communications Technology (IT / ICT) architecture and resources.

1.4 Detailed Functional Requirements of the COTS Software

This section describes detailed functional requirements of the system by each sub component.

1.4.1

The COTS software supplier will ensure that the following functional requirements related to system can be satisfactorily achieved by using facilities within the COTS software. The Technical Responsiveness Checklist Provided in Section G shall be used by the COTS software supplier to respond to the listed technical requirements.

Bentley Response

We have reviewed the requirements below and commented where appropriate. We have also provided additional information in detailed responses in Section G as required by OWD. The comments below should be read and taken into account alongside those in Section G.

1.4.2 For the **Road Information System (RIS)**, the COTS software will:

•*Support multiple linear referencing methods, allowing all associated data to be located against the network using the users preferred referencing method and then allows these records to be reported back using any defined linear referencing method (e.g. from the start of the section, kilometer point, LRP+ offset).*

Bentley Response

The Exor Linear Referencing System (LRS) is acknowledged as a World leading solution providing extensive functionality and flexibility. It is the LRS for many of the World's leading National and State level organizations. If OWD decide to adopt the Exor LRS it will join a user community of State Departments of Transport in the U.S., Canada, New Zealand, Italy, Greece and the UK. The Exor LRS is currently being deployed within the Highways Agency in the UK to manage its principal road network.
Technical Requirement Number 1 contains information on the capability of the Exor LRS but suffice to say in this section that we fully meet these requirements.

- *Be able to accommodate various network numbering rules, by performing data validation on entry or through some other form of internal validation procedure.*

Bentley Response

The Exor LRS accommodates a number of numbering rules and performs data validation at the point of entry to preserve data integrity.

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- *Provide full network editing functionality. Be able to 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. There should be facility to save the log file containing information on all the changes made to the network.*

Bentley Response

The Exor LRS meets this requirement. It provides full network editing and also ensures that when network edits are undertaken the data integrity of data associated with the network is maintained. We time stamp changes which is vital to enable them to be rolled back if a mistake has been made and is also essential for audit purposes.

Our response in Technical Requirement Number 1 expands upon this explanation.

- *Permit splitting, joining and modifying of road sections, and modification of road section lengths, while preserving the integrity of all current and historical data stored against the affected sections.*

Bentley Response:

The Exor LRS provides a number of network editing functions:

- Create and end date sections
- Split and Unsplit
- Replace and unreplace
- Merge and Unmerge

As noted above the Exor LRS preserves the integrity of all data against the affected sections. This also provides the important ability to roll the network back in time so that a user could view the network and all associated data as it existed at a user defined point in the past.

This functionality is described in more detail in our response to Technical Requirement Number 3

- *Have configurable options to enable the user to define additional types of data to be stored, and to define what attributes are to be stored against each type of data. 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.*

Bentley Response

The Exor system includes System Administration screens which only users with the appropriate level of security can access. These screens enable a user to define additional types of data to be stored and the attributes for that data item. The system allows the user to define the validation for that item (Number, Character, valid ranges if numerical, pick lists etc.).

This means that Exor users are able to update the Meta data over time without needing to rely on Bentley to do it for them.

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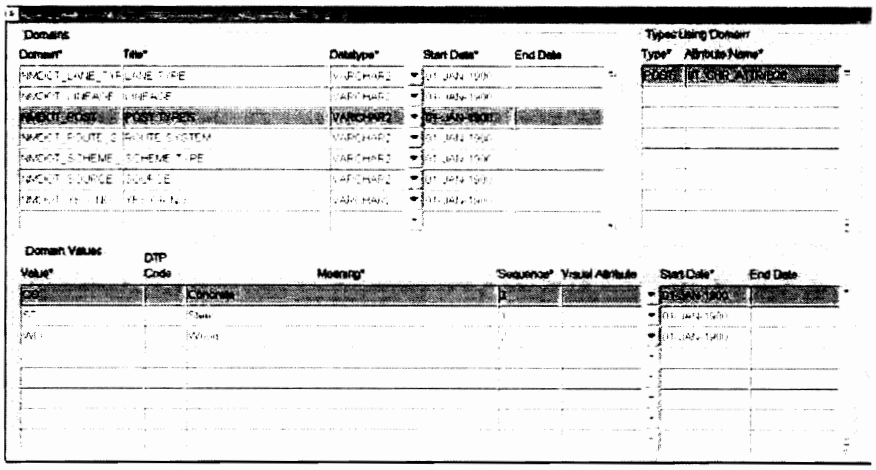
The screen shot below provides an example of how a user has added 'Post Type' as an attribute and then defined three valid values which will appear on a drop down pick list to users in the main Asset screen. Note the use of start and end dates even at the attribute value level which enables a user to prevent an out of date or redundant value appearing on a picklist by end dating it. However, it remains in the system in order to ensure that historical data can still be displayed correctly.



- *Be able to allow the storage of data over different time periods, to enable comparison of such data. There should be facility to view/select the most current data or for a user defined period.*

Bentley Response

The Exor solutions typically store all data without any need to archive it although it will be backed up. This enables users to view data and report it as required.

- *Be able to display multi-media objects (e.g. photographs, video clips etc.) as attributes of data items. For video, the COTS software should allow viewing of video data by chainage along the road section, based on frame/chainage lookup tables supplied. The COTS software should have been designed in a way that the processing time for querying the database and extracting information is satisfactory.*

Bentley Response

The Exor solution includes a Document Management capability to enable multi-media objects to be associated with data in the system e.g. photographs of assets, plans, documents etc. as illustrated below

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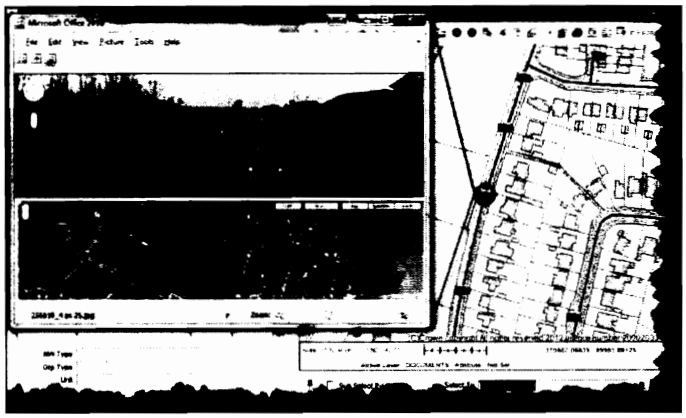

The Exor solution provides the ability to load video data against network sections and to select a section of network and view the video records associated with it.

Please note this functionality enables the video record to be displayed and the user would use the facilities within the video viewer to go to the required chainage position.

We understand that this functionality meets the requirements as explained at the Bidders' Meeting when OWD clarified that a direct link via chainage was not required,

- *Have a reliable but flexible security system for access and data processing (E.g. security groups, program security, data security).*

Bentley Response

The Exor solution has a fully flexible user security regime to ensure appropriate access to the system and to data within it. The capabilities of the security functions are explained in more detail in Technical Requirement 8 part 4.

- *Permit security set-up 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.*

Bentley Response

The Exor solution has a fully flexible user security regime to ensure user privileges can be defined at geographical and administrative levels and to support the requirement that different users have different levels of access to differing data types. The capabilities of the security functions are explained in more detail in Technical Requirement 8 part 4.

- *Permit security set-up so that different users may have access to different application modules and functions within these modules.*

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Bentley Response

The Exor solution allows a System Administrator to define what application modules and functions a user may undertake within the system. The capabilities of the security functions are explained in more detail in Technical Requirement 8 part 4.

•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 COTS software database must be permitted, including reporting on user-defined items and attributes, comparisons of current data with historical data, audit records etc. Export to spread sheet and/or comma-delimited text files should also be provided. The supplier should also provide details of any interfaces to third-party reporting tools.

Bentley Response

The Exor solution provides 3 options in terms of customized reports.

Ad hoc Report Writer

The Exor solution includes Oracle Discoverer which is a tool specifically for end users to access to write their own reports if they have permissions to do so within Discoverer. Some users may just be granted permission to run reports published by other users. Discoverer is embedded within the Exor solution, for use against the Exor database, without additional charge to OWD.

Oracle Discoverer reports on Business Layers which are views of the underlying data tables. This ensures users are presented with appropriate information from the underlying structure as well as providing data security; it's not possible to update data from within Discoverer.

Technical Requirement 4 Part 1 includes more details on Oracle Discoverer.

Information Manager

Information Manager is a web based dashboard providing easy access to reports which are typically presented as bar charts, pie charts or histograms.

Technical Requirement 4 Part 1 includes more details on Information Manager including screen shots.

Other Third Party Tools

Other reporting packages can be used against the Exor database as long as they're capable of accessing the underlying Oracle database (e.g. Crystal Reports). A third party reporting tool is usually sourced directly by an end user rather than provided by Bentley.

•Be able to generate strip maps showing on- and off-carriageway features such as carriageway, shoulder, built-up structures, bus shelters, pipes / cables, poles / pylons, road signs, trees, statues, well etc., and support various cross-sectional positional models to allow data to be referenced laterally against road sections.

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Bentley Response

The Exor solution has the capability to generate strip maps as detailed in our response to Technical Requirement Number 4 Part 6 (strip maps).

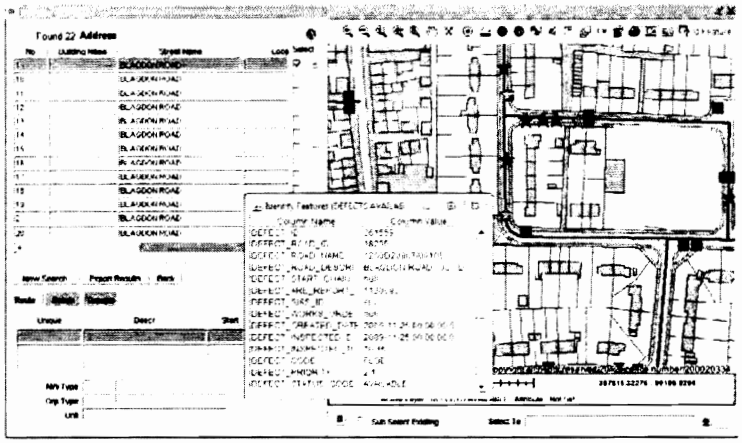
Exor also has the capability to support cross-sectional positions so that data can be referenced laterally against a road section. The cross-sectional positions are user-definable. We also provide functionality to cater for route reversals on sections. Reversing the route on a section will result in the cross-sectional positions being updated. More details on the cross-sectional functionality within Exor are provided in our response to Technical Requirement Number 1 (XSP).

•*Allow the network and associated data to be viewed spatially both over the web and locally.*

Bentley Response

The Exor solution meets this requirement via its integration into Oracle Spatial and ESRI. The solution also enables data to be edited over the web and locally assuming the user has the correct privileges.

Exor's Locator product providing in built maps in screens enables users to cost effectively access spatial data via the web. Users are able to execute queries and to retrieve the results of these queries on a map. For example, in the screen shot below the user has selected a particular location and has then switched on thematic mapping layers which enable the user to view gully assets and also defects which have been collected in this location. The screen shows a smaller window displaying the details of one of the defects.



The Exor mapping capability also enables data updates to be performed via the map as well as displaying data. For example, in our response to Technical Requirement Number 3 we illustrate how networking editing is performed via the map interface.

Operational data can also be maintained from within the mapping interface that Locator provides. For example, in the screen shot below the user has selected a number of defect records via the polygon facility (one yellow and 3 red defects as these are color coded depending on their severity). Having selected these defects the user is presented with a menu allowing them to use these defects in another

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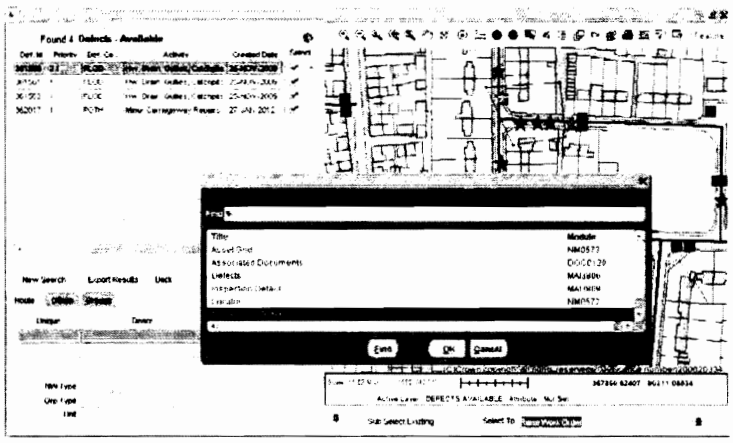
function such as raising a works order to have them repaired (Raise Works Order function is highlighted in blue).

In this example the defects were recorded via the Exor RMMS system and we recommend OWD consider this as an option for its RMMS solution. Alternatively, we would work with the Implementation Consultant to assess how this type of capability could be integrated into a locally developed system.



- *Integrate with external systems for any tabular and GIS data*

Bentley Response

Exor meets this requirement as explained in our response to Technical Requirement Number 4. Our open systems approach enables us to make use of WMS layers and / or Shapefiles. Integration to other formats can also be provided - some via product features and others which may require consultancy from Bentley Systems depending upon the requirements.

- *Permit viewing of external asset information that may be held in other external databases;*

Bentley Response

Bentley is committed to making data more accessible by creating information and knowledge flows across and beyond the enterprise. With this in mind, the functionality of Exor's Foreign Table functionality allows objects and data defined outside of the Exor Database to be included within it, effectively a 'virtual' object. These virtual objects can be treated in the same manner as other assets for mapping, reporting or works management etc. This allows organizations to create a single view of ALL their asset and related data regardless of where these data reside – a unique concept in the Exor solution.

For this link to operate the external data must have a correct network location as the Exor system uses this reference to locate it.

- *Allow a modular approach so that additional modules may be implemented as the business requirements grow or evolve.*

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Bentley Response

The Exor solution set is designed in a modular way so that users need only adopt only those solutions that are required to meet their immediate requirements. However, we believe it is important that users have the opportunity to consider expanding their foot print of solutions as business needs evolve in the future. Bentley is uniquely positioned to assist OWD in this regard through 2 options:-

i) Other Exor Modules

There are other Exor modules which OWD could consider in the future. One is Exor's RMMS rather than developing an RMMS separately. Others might be Enquiry Management, Asset Valuations etc.

ii) Bentley's Assetwise Initiative

Assetwise is a unique proposition aimed at providing complete life cycle asset information management by integrating the design, build and operate and maintain functions. Bentley is the only company able to offer this breadth from its own application set.

One offering within this solution, called eB, offers extended document management, configuration management and work flow processes. This is a powerful addition to Exor as it enables an agency such as OWD to control work flows and documentation which are created in other parts of the life cycle as well as those directly involved in Exor processes. For example, eB could be used to manage design and as built documentation.

•*Allow all other COTS modules to use same core linear referencing modules to avoid the need to duplicate linear referencing systems.*

Bentley Response

The Exor solution uses its LRS as the core locational system and other applications use this rather than having to maintain their own LRS. This provides significant benefits as it ensures OWD would be able to maintain a single LRS rather than having several departments, silo versions as often happens in other agencies.

•*Be capable of deployment over an intranet and internet architecture.*

Bentley Response

The Exor solutions are full capable of being deployed over the intranet or internet as they can run in web browsers.

Please see our response to Technical Requirement Number 8 part 2 for more details.

1.4.3 Table 1 lists the indicative data items being compiled for loading in to ORAMS application.

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Table 1: Data Items

Data Type	Indicative data format
GPS referencing	In GPS eXchange format .gpx and in GIS data formats such as .dxf, .shp, .tab, .dgn. .kml, .kmz, .mdb, .gml
GIS Database (Road centre-line, km stone, road start / end, bridge, culvert, cross road etc., and the items to be captured for strip-map generation within right-of-way)	In ESRI GIS data formats such as ArcSDE, Geodatabase (SDE, FILE, MDB, XML), shape.
Inventory of pavements and CD works	In standard database formats such as .xls / .mdb / .csv / .txt / .dbf; photographs in image formats such as .jpeg, .bmp, .png, .gif, .tiff;
Roughness on paved roads	
Surface distress indicators (4 items such as cracking, ravelling, rutting, depressions or potholes)	
Pavement strength – deflection data	

Data Type	Indicative data format
Bridge (minor & major) visual condition data – 3 or 4 critical attributes	Video files in formats such as .mpg, .mp4, .avi, .mov, .swf, .vob, .wmv, .3g2, .3gp, .flv, .rm.

Bentley Response

This data will need to be loaded into Exor or referenced. Inventory data, for example, will need to be loaded into the Exor Asset Manager product. This is undertaken via loaders which are configured during an implementation or via our product loaders.

Media such as photographs and videos are associated with data in the Exor system and the solution enables Bentley during the implementation and the user thereafter to define the file types and to call the appropriate tool from within Exor e.g. photoviewer software.

1.4.4 The COTS software will:

- Allow for menus, interface and reports in English
- 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 / Access / Dbf and other common file formats;
- Be able to calculate and export all average road attributes for each kilometer, homogeneous road section, or entire road link as necessary.

Bentley Response

The Exor solutions are in English and as detailed above in the requirement to display data locally or over the internet / intranet enable both the display and updating data. The systems provide comprehensive validation and error checking via bulk data loaders as well as via input screens. This validation checks data accuracy, consistency, data types, ranges etc.

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1.4.5 The RIS data model shall be capable of managing data recorded as both point (e.g. km stones) and linear elements (e.g. roughness data), and as well be able to accommodate overlapping locations for certain types of attributes (e.g. roughness data recorded against lanes, more than one traffic sign at one location, etc.).

Bentley Response

The Exor solutions manage point and linear assets as detailed in our responses to Technical Requirement Number 1 and Technical Requirement Number 4 part 2. The system uses its cross sectional position functionality to record lane information and also manages multiple assets in particular locations.

The Exor solution is also able to handle polygon assets such as a park. As can be seen from this response the solution is map enabled so that this data can be viewed via a map based front end.

1.4.6 The Client is in the process of establishing a Geographic Information System (GIS) using ESRI tools, including ArcMap client software and ArcGIS Server. The COTS software should have capability to provide attribute data of roads in a user-configurable interface to external GIS.

Bentley Response

Bentley's approach provides COTS integration into ESRI offering significant advantages to OWD in terms of functionality and data management (no redundancy / improved data integrity resulting in less errors and cost).

Data from within Exor could be made available to the implementation consultant to create the GIS thematic maps.
The Exor system integrates into ESRI and is able to display this data. Note that the Exor database already includes integration into ArcESRI and that in order to maintain data integrity properly network and asset locations (including condition data) are stored and managed within Exor. As explained elsewhere this data can be made available to other geo stores such as the corporate ESRI GIS application by, for example, providing a shapefile of data to it. Data can be displayed in Exor from the ESRI GIS system using a similar process.

The Exor solution uses dynamic segmentation for 'slice and dice' purposes and the user is able to define how this process should be undertaken. Our response to Technical Requirement Number 4 Part 1 provides more details.

Videos can be associated with data within Exor. If the video associated with a road section is loaded against the correct section then when the video is displayed it will show it in the direction of travel. Selecting a particular location along the section will always display the same video starting point and the user would fast forward in the video display tool to the particular chainage required.

1.4.7 A **Bridge Information System (BIS)** will also be supplied by the COTS Software supplier.

a) The BIS will be used to store inventory data on minor and major bridges, information collected from routine and special inspections.

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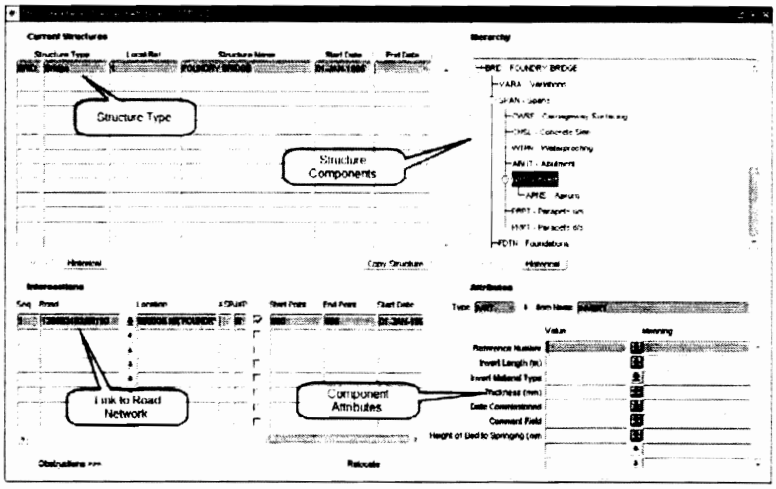
Bentley Response

The Exor Structures management system is configurable for each customer to meet the needs of their individual data modeling requirements. This allows the customer to define any structure type including but not restricted to minor and major bridges.

Each structure type will consist of a set of customer defined components that apply to each structure type and will be stored in a hierarchy that defines each components position within the individual structure hierarchy. These will include but not be restricted to bearings, parapets, foundations, abutments, piers etc.

In addition, each component type can have a number of attributes associated with it that define the component. An example of the structure type, associated components and component attributes is shown in the screen shot below:



The Exor structure management system has a specialized inspections module that allows the customer to define routing inspections with their associated inspection types and inspection intervals and other special inspections as required. All inspections will log the severity and extent of any defects found, these severity and extent values are then used in the calculation of the Bridge Condition Indicators that show the condition of the individual bridges and the structure stock as a whole.

b) The BIS should be compatible with the other modules of O-RAMS

Bentley Response

Exor Structures manager forms part of the integrated solution and is compatible with other modules of the system including:

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- Network Manager (as shown in screen shot above)
- Document manager
- Locator (GIS)
- Maintenance Manager Work Ordering and Contract Management (not within scope of this procurement).

c) *BIS functionality will:*
   - *Integrate with the Road Information System (RIS) for network referencing and road data*

Bentley Response

Exor Structures manager integrates with the Road Information System enabling the structure to be linked to the multiple sections of the road network that interact with the structure. An example of the link to the network is shown in the screen shot above.

•*Allow form based entry and import from Excel or other common file format, to permit storage of detailed bridge inventory - including data on individual piers, spans, abutments, bearings, expansion joints, approaches, bridge protection works, training works, bridge construction and maintenance history, design capacity, load capacity etc.*

Bentley Response
Exor Structures manager allows the user to enter the structures data for the full bridge inventory, the bridge components and any associated using both the form based option (shown in the screen shot above) or using configurable CSV loaders where the data will be presented in a specific format defined by Exor.

•*Allow form-based entry and import from Excel or other common file format to store detailed inspection data - including individual defects on each of the above elements, with severity and extent.*

Bentley Response

Exor Structures manager allows the user to enter the inspections data for all inspectable elements including defect, severity and extent data using a form as shown below or using the inspections loader where the data will be presented in a specific format defined by Exor.

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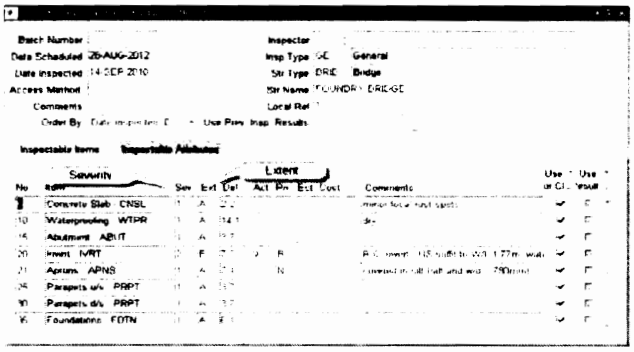


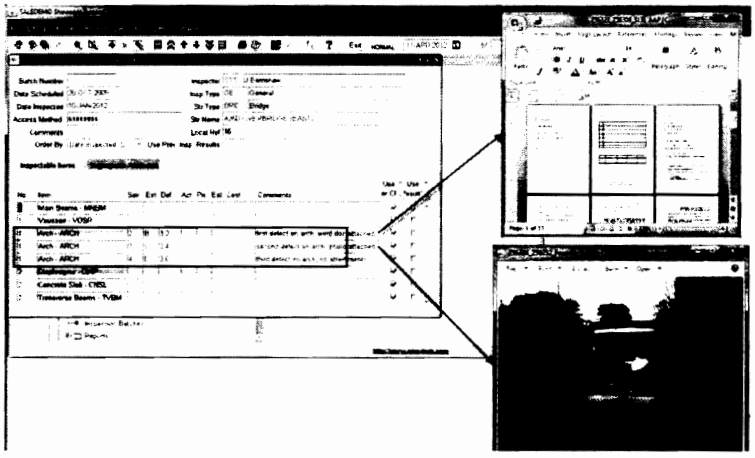
In the screen shot above the severity values are numeric (1-5) and the extent values are alphabetic (a-e) these are pick lists and can be configured to meet the customer requirements as needed.

In addition there are additional columns allowing the storage of defect codes, action, priority, estimated costs and engineer's comments.

- *Permit storage of bridge inspection photographs, design drawings etc.*

Bentley Response

Exor Structures manager allows the storage of multiple documents against individual structures or defects found on those structures, an example of this against defects is shown below:



There is no restriction to the number or type of documents that may be held against a structure.

- *Store pre-defined estimated unit costs of repair, maintenance, or rehabilitation costs.*

Bentley Response

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Exor Structures manager allows the storage of estimated costs against a defect. In addition the Exor Maintenance Manager work ordering system will allow the use of contracts when raising a work order, these contracts contain Bill of Quantity items with pre-defined rates for the repair, maintenance or rehabilitation costs of the structures components. The work ordering system allows multiple contracts with multiple contractors if required.

•*Estimate total cost of bridge repair, maintenance or rehabilitation based on condition rating, inventory parameters and unit costs for relevant bridge work.*

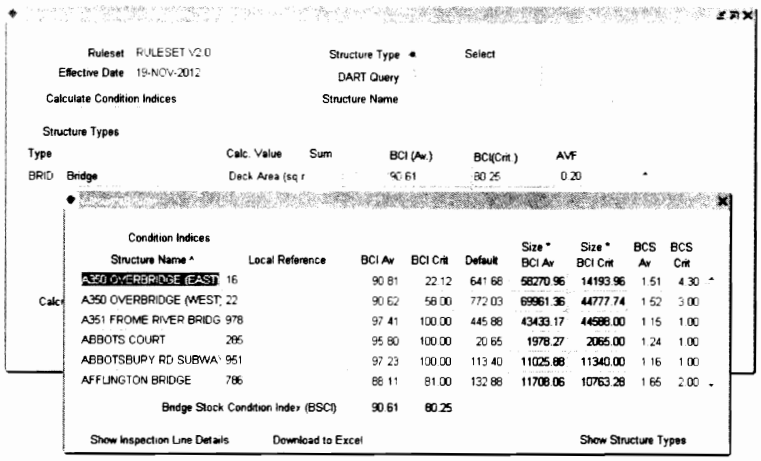
Bentley Response

Exor Structures manager allows the storage of estimated costs against a defect. In addition the Exor Maintenance Manager work ordering system will allow the use of contracts when raising a work order, these contracts contain Bill of Quantity items with pre-defined rates for the repair, maintenance or rehabilitation costs of the structures components. The work ordering system allows multiple contracts with multiple contractors if required.

•*Define and assign matrix based condition index to bridges depending on bridge inspection rating of elements and overall condition rating/index.*

Bentley Response

Exor Structures manager has a Bridge Condition Indicator (BCI) module that utilizes the inspection rating of the bridge elements to give each bridge a condition index and also give the bridge stock an overall condition index. An example of this is shown below:



The above has been run for a complete bridge stock with each individual bridge having its own condition rating. The user may select an individual bridge and view the individual inspection line details that were used to create the BCI for the individual bridge. The BCI criteria are set up for each customer in the form of a ruleset which they can maintain themselves as their requirements change.

•*Allow defining priority for maintenance of any bridge based on inspection data.*

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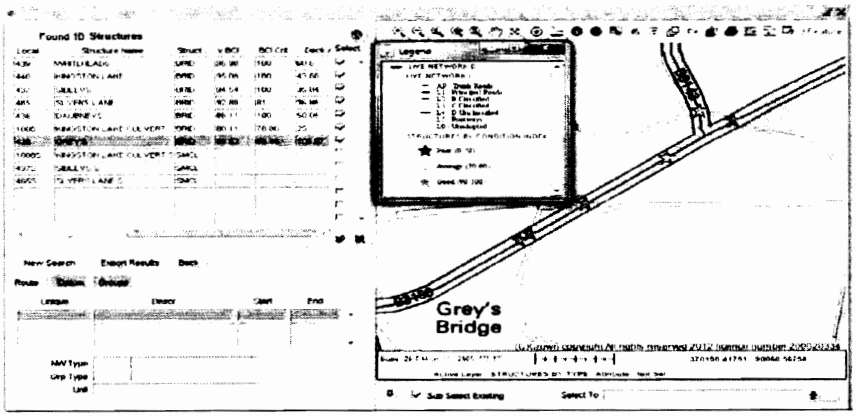
Bentley Response

Exor Structures manager allows the user to enter a priority for maintenance from a picklist as they are entering the severity and extent values for the inspection data, this can be backed up with photographs against each component if required.

- *Planning and prioritization of bridge works based on condition index*

Bentley Response

Exor Structures manager allows the user to plan and prioritize the works using the BCI module as shown in the screen shot above. Once the BCI calculations have been run the individual results are stored against each structure and can be queried in locator and displayed on the map as shown below as well as the ability to use Information Manager and ad hoc reporting tools to define additional reports required to aid in the prioritization of works.



- *Enable export of bridge inventory, condition and cost data to standard data formats.*

Bentley Response

Exor Structures manager allows the export of data via a number of modules by the provision of dedicated export buttons. In addition the ad-hoc reporting tools allow the user to export the data in a number of standard data formats.

- *Allow for scheduling and tracking bridge inspections.*

Bentley Response

Exor Structures manager allows the scheduling and tracking of bridge inspections, the system administrator can define the intervals that certain types of inspections must be carried out, for example Principal inspections every 6 years and general inspections every 2 years. These intervals can be set for the complete bridge stock and overwritten on an individual structure basis if required. The inspections can then be scheduled for a number of years using the auto-schedule inspections module. This will

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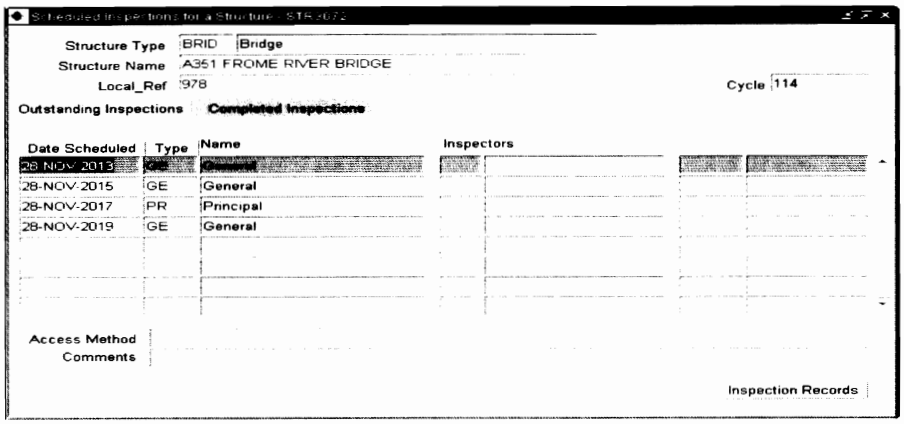
schedule the inspections and display the scheduled and any completed inspections in separate tabs as shown in the screen shot below:



To view completed or manually enter a new inspection the user selects the appropriate inspection and selects the [Inspection records] button on the form.

d) The BIS will be able to produce and report the following thorough analysis of the above data:

- **Detailed / summarized bridge inventory of selected bridges in a division / Circle or road**

Bentley Response

Exor Structures manager allows the production and reporting of bridge data in a number of ways, including:

- Dynamic Attribute Reporting Tool (DART). An ad-hoc structure inventory query tool which allows the user to build queries based on the structure type, components and attributes using Boolean operators to build complex queries.
- Locator GIS query tool
- Standard COTS reports
- Information Manager and the Ad-hoc reporting tools (Discoverer)

- ***Detailed / summarized bridge inspection data of selected bridges in a division / circle or road.***

Bentley Response

Exor Structures manager allows the production and reporting of bridge data in a number of ways, including:

- Locator GIS query tool
- Standard COTS reports
- Information Manager and the Ad-hoc reporting tools (Discoverer)

- ***Link GIS objects (of bridge points) to prepare thematic representation of bridge inventory,***

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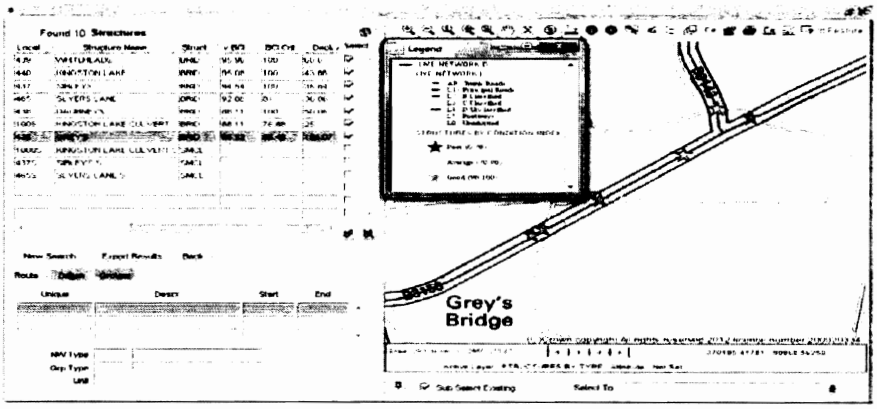
inspection ratings and maintenance costs and visualize in built-in map-based interface

Bentley Response.

Exor structures manager is integrated with locator allowing the user to query bridge details, sort the details and display them on the map as shown below:



Each bridge displayed on the map has been thematically mapped by its bridge condition indicator.

Pavement Management System (PMS)

1.4.8 *The database used by the RIS will allow automatic homogeneous sectioning so that road sections or segment can be created using factors such as condition, inventory and traffic as criteria. The sectioning process shall be interactive with the user being able to adjust the resulting sections for PMS analysis.*

Bentley Response

The Exor LRS includes dynamic segmentation and a function called merge query to create homogeneous sections based on user defined criteria. Once created these homogeneous sections can be used for PMS analysis in, for example, HDM-4. An explanation of the system's dynamic segmentation and merge query capability is provided in our response to Technical Requirement Number 4 part 1.

1.4.9 For the PMS application, the COTS software shall connect the RIS with an 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 should be able to create an HDM-4 road network file to be imported by HDM-4 and be able to import the results of the works program generated by HDM-4 so that they can be related back to the real road network and

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displayed in tabular and / or map-based reports. The reports should allow filtering data by various parameters such as jurisdiction, core / non-core etc.
In addition, it should have facility, to add/ incorporate alternate methodology using well established practices to perform similar function within PMS.
The economic evaluation model shall be capable of the following types of analyses, based on both road condition and any anticipated 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

The PMS will include the following functions:

- An inbuilt alert system to ensure updating of road and pavement condition data periodically and flag the year of data collection while analyzing for each parameter.
- A generic interface which allows the user to define the rules for automatic homogeneous 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.
- Transformation 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).
- Ability to bring in default data where one or more data items are missing, and to highlight in the reporting which data items have been defaulted.
- Preparation of HDM-4 input files for work standards, traffic classification and growth rates.
- Defining various road works and their unit costs.
- Link GIS objects (of roads) with the road sections to prepare thematic representation of assigned road works and visualize in built-in map interface.

Bentley Response

To best meet OWD's PMS needs we are proposing the use of Exor with HDM-4 or should OWD have a preference for another PMS then that could also be considered a candidate for integration.

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A road network file of homogeneous sections would be exported from Exor into HDM-4 for PMS analytical purposes. The results of this analysis in terms of identified schemes or projects are then exported from HDM-4 into Exor. At this point they are managed from within the Exor Schemes Manager solution. The use of Schemes Manager in this capacity is described in our response to Technical Requirement Number 7 part 1.

As noted above in 2013 the Exor PMS will be able to provide deterioration projections as well as condition ranking of the network. We would be pleased to discuss this option with OWD during the implementation to ascertain the best way forward.

Routine Maintenance Management System (RMMS)

This application will be developed by the Implementation Consultant and integrated with the COTS software. COTS software supplier will provide support related to integration.

Bentley Response

We note the comment to provide support to the Implementation Consultant on the integration of the RMMS to be developed by them, at this stage the scope of support required is not known and we have provided a daily consultancy rate to enable the Implementation Consultancy, under OWD's control, to access our services.

The Exor RMMS also includes other functionality that may be of benefit to OWD if it is seeking the level of RMMS functionality that we typically deliver to our customers. For example, the Exor RMMS extends into comprehensive defect management, works orders, budgeting, and interfaces into contractor and / or financial systems.

We recommend OWD consider the Exor RMMS as this will offer 'out of the box' integration and solution focused on maintenance. It might be appropriate to consider a focused Scoping Study to undertake a Functional review of the RMMS requirements which would include a Gap Analysis and also highlight any additional benefits the Exor RMMS could provide to OWD through functionality not defined below but which are part of our standard product. To help in this process Bentley will provide a free, one user license.

Although the RMMS is not part of this procurement but for informational purposes we have commented briefly on OWD's requirements below:-

1.4.10 The RMMS will:
a) Determine on-carriageway routine maintenance requirements for sections not receiving periodic maintenance or improvements in that year and prepares reports and charts for a business plan.

Bentley Response

The Exor solution is able to determine maintenance requirements.

b) Be compatible with RIS / PMS and other modules of O-RAMS RMMS functionality will:

- *Define standard on-carriageway routine maintenance works and unit costs.*

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Bentley Response

The Exor RMMS provides this functionality.

•*Assign routine maintenance activities to sections based on pre-defined maintenance matrix.*

Bentley Response

The Exor RMMS is able to schedule maintenance inspection activities based on pre-defined information. These activities may then lead to follow up maintenance activities.

•*Define maintenance matrix based on pavement condition survey ratings and other inventory, traffic and parameters such as road category / core/ non-core.*

Bentley Response

We would need to understand this requirement in more detail before responding.

•*Define and assign rule based priority index based on parameters.*

Bentley Response

We would need to understand this requirement in more detail before responding.

•*Define quantity standards for pavement condition rating and maintenance activity.*

Bentley Response

We would need to understand this requirement in more detail before responding

•*Apply quantity standards for calculation of quantity for each maintenance activity.*

Bentley Response

The Exor solution enables quantities to be set up for maintenance activities. It also includes contract and schedules or rates functionality to enable works to be costed. A comprehensive works orders management module within the RMMS enables works orders to be estimated and issued to internal or external contractors. Actual repairs and costs are subsequently recorded.

The system contains a budgeting module so that maintenance budgets are accessible from within Exor. This module can also interface into a corporate financial system.

Field based data capture software enables defects on the network to be recorded on site and then passed to the in-office system. If desired rules maybe set up to generate works orders automatically (usually up to pre-defined financial levels). Other works orders can be raised and managed manually.

•*Assign off-carriageway routine maintenance cost and routine maintenance of culverts and bridges to the sections selected for routine maintenance.*

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Bentley Response

The Exor solution enables off-carriageway routine maintenance to take place on assets such as culverts and bridges.

c) The RMMS shall be able to produce and report the following thorough analysis of the above data:

- Assigned maintenance activity for each section along with quantity and cost
- Group total quantity & cost by maintenance activity by OWD jurisdiction and report through charts / graphs
- Link GIS objects (of roads) with the road sections to prepare thematic representation of assigned routine maintenance works and visualize in built-in map interface

Bentley Response

The Exor solution has a wide range of product reports complemented with the ability to use Information Manager and ad hoc reporting tools to define additional reports.

Traffic Information System

This application will be developed by the Implementation Consultant and integrated with the COTS software. COTS software supplier will provide support related to integration.

1.4.11 TIS will provide traffic data to RIS / PMS and other modules of O-RAMS.

a) The TIS will be have capability of storing regular and special classified traffic volume counts and other data as well as outcomes from specific traffic studies. Among the important data to be stored are:

- Processed hourly classified traffic count from permanent traffic count stations.
- 3-day classified traffic counts – hourly and directional
- Short term (<3 days) classified traffic counts – hourly and directional
- Traffic growth rate forecast – estimated externally and stored in the system by location or by class of road or applicable for entire network.
- Vehicle fleet characteristics – as collected from secondary sources for the representative vehicle types (15 vehicle types) and required for economic evaluation.
- Sample hourly flow data – representative for entire network, by core/ non- core, by road class such as SH, MDR, ODR etc.
- Master data such as PCU factors for each vehicle types and seasonal correction factors
- Processed weigh-in-motion or axle load survey data (i.e. Aggregated

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statistics as opposed to measurements of each vehicles), if available

- Processed average pay load by vehicle type (goods vehicles)

b) The TIS will be compatible with RIS.

c) TIS will have ability to estimate traffic levels for any links that are not covered by explicit traffic counts by associating a user defined proportion of traffic from traffic count stations.

d) The TIS should capable of check/flag data accuracy, inconsistencies, and identifying data falling beyond pre-defined acceptable range within current data and comparing previous data.

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

- Traffic volume and flow characteristics; average daily traffic (ADT), average annual daily traffic (AADT), seasonal factors, K-Factors, hourly distribution of annual traffic.
- Traffic growth forecasts: predicted traffic patterns of network using supplied traffic growth.
- Vehicle loading characteristics: average axle loadings and equivalent standard axles.
- 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.

f) The TIS shall link GIS objects (of roads) with the road sections to prepare thematic representation of assigned traffic (volume, ton, VDF, ESAL etc.) and visualize the above data in built-in map interface.

Bentley Response

We note the comment to provide support to the Implementation Consultant on the integration of the TIS to be developed by them,

Bentley has interfaced to Traffic Systems in the past and has developed a product called Traffic Interface Manager (TIM) specifically to enable Exor to load summary traffic data, such as AADT, from TIS into Exor. Traffic Interface Manager complements the TIS. As the TIS has yet to be developed we cannot accurately estimate the configuration effort required and but we have provided a budget to support the implementation consultant. If the required effort exceeds this budgeted figure then ad hoc consultancy will be required.

To support traffic data Exor is able to define traffic sections and traffic count sites within the main application. These are important features in providing a view of traffic data from a maintenance perspective. Exor maintains a history of traffic data including traffic sections.

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Technical Specifications

2.0 General Technical Requirements

2.0.1 **Configurable software:** The software supplied must be configurable. This means that it is possible for the application administrator (initially the Implementation Consultant, but later the Client) to modify parameters or settings, or to otherwise 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 supplier 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 be rejected by the Client.

Bentley Response

The Exor system is highly configurable. The System Administrator functions enable data to be configured easily across a wide range of datasets. We envisage providing assistance with the configuration as well as training to the Implementation Consultant to enable it to undertake its responsibilities. However, we strongly recommend that because the system is highly configurable that these activities are not left to the Implementation Consultant on their own. Bentley has acquired many years of implementing the Exor software and many decisions need to be taken during configuration that impact upon how effectively the system is used. We would like to make our experience available to OWD to ensure the implemented solution is 'fit for purpose' given this will be the Implementation Consultant's first exposure to Exor.

To facilitate this project includes the provision of consultancy services for specific tasks throughout the project.

2.1 Computing Hardware Specifications

2.1.1 The Client intends to implement COTS software on a quad-core processor server configuration. The COTS software supplier shall cost his bid with the above hardware option.

Bentley Response

Bentley has noted this requirement.

2.2 Network and Communications Specifications

2.2.1 The central database (server) will be accessed through application and web servers; the connectivity will be provided either by NIC or department of IT through a dedicated leased line (through fiber optic cable or other means) to the OWD head-quarter for the full functional version. The web-version will be accessible via leased line internet connectivity or broadband (10 mbps bandwidth preferably dedicated) at both server and user end.

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Bentley Response

Bentley has noted this requirement.

2.3 Software Specifications

2.3.1 **System Software and System -Management Utilities:** The application package (COTS software) should be compatible with Client operating system "Microsoft Windows (XP and onwards)" and server operating system "Microsoft Windows Server (2008 and onwards). It is optional to be compatible to other operating systems like Linux, UNIX, Solaris, and OS/2 etc.
The COTS web-based application interface must be compatible to internet browsers such as Windows Explorer, Mozilla Firefox, Google Chrome (latest versions) etc.

Bentley Response

Bentley has noted this requirement.

2.3.2 **Networking and Communications Software:** The COTS software must support latest network services, management and administration features; security and failure management features.

Bentley Response

The Exor solution supports industry standard services, management and administration features.

2.3.3 **General-Purpose Software:** The COTS software supplier will also specify any additional software required for implementation of the COTS software like report designer, and any other application that will be required. The licensing cost for the same is also to be included in the financial offer for COTS software.

Bentley Response

The Bentley solutions proposed to OWD includes the underlying technology costs and includes a report writer.

2.3.4 **Database Software and Development Tools:** The O-RAMS shall operate using a relational database management system (RDBMS) developed using fourth generation language (compatible with either Microsoft SQL Server OR Oracle latest versions or by both).
The Client intends to have a full license of the RDBMS along with the COTS software and to be used as the underlying technology for all O-RAM applications. It may also be used for developing any other application in future by Client.
The COTS software supplier must specify the RDBMS platform (and version supporting full use database license) of his choice on which the software will operate, and provide cost of licensing the same for financial evaluation. The Client may require the COTS supplier to supply the license for the RDBMS.

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Bentley Response

The Bentley solutions proposed in this response utilize the Oracle RDBMS (currently 11g) and associated middleware software. We also use ESRI (ArcSDE 9.3 and ArcView) the licenses for which we understand will be provided by OWD.

2.3.5 **Business Application Software:** The COTS software modules shall be as specified on the basis of technical and functional requirements as stipulated in this document.

Bentley Response

Bentley has noted this requirement.

2.4 System Management, Administration, and Security Specifications

2.4.0 **General Requirements:** The databases (GIS and O-RAMS) will be accessible to HQ, all Divisions and Circle offices through a user ID and password. The user ID and password will also be used to authenticate the user for accessibility to various functions and functional levels of O-RAMS. The COTS software must have a facility to define role based functional levels and assign such roles to each user. Further, it should also allow assigning OWD- jurisdiction based editing, viewing, printing rights to the users. The COTS software must have a separate interface to perform such administrative and management functions.

Bentley Response

The Exor solutions provide comprehensive user security functions. This includes the use of roles etc. The administration of these rights is via users who have been granted System Administration rights. Menu's can be configured to remove from display options that a user cannot use.

The administration of users is described in more detail in our response to Technical Requirement Number 8 part 4.

2.4.1 **Technical management and troubleshooting:** The COTS software supplier will provide support for configuration. For this purpose the COTS software supplier and the Implementation Consultant will jointly work in the office premises of the Implementation Consultant located at Bhubaneswar. The COTS software supplier shall ensure that adequate support is available to the Client and Implementation Consultant during the duration of this Contract. In addition, the COTS supplier shall provide 3 weeks of training to Client and Implementation Consultant staff in Bhubaneswar. The COTS software supplier will also provide on-line technical expertise to solve / correct / fix any problem promptly arising from the configured application during the service/warranty period.

Bentley Response

Bentley has noted the requirement for configuration consultancy and training for OWD and the Implementation Consultant. We have planned for the training to be over 3 weeks as requested in Bhubaneswar. We are assuming that OWD will provide the required hardware to support the onsite training.

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Bentley has a support desk which will provide online technical assistance to assist OWD after the implementation project has finished. The Support desk function is described in more detail in Section 2.5

2.4.2 **User and usage administration:** The Client requires unlimited named users. A maximum five (5) **concurrent** users will access the system, of which two (2) concurrent users will be able to use analytical functions.
The data editing/importing will be initially performed at OWD Headquarters. This function may be shifted to the remote offices as implementation and roll- out progress in future. Therefore, additional licenses for the COTS software will likely be required allowing data editing/importing from offices across the State. The COTS software supplier should indicate a unit price for such additional licenses.

Bentley Response

Bentley software is licensed on a named user basis and there are different types of users. These user licenses are explained in our response to Technical Requirement Number 8 part 4. We have a provided a unit price for the procurement of additional licenses.

2.4.3 **Software certification and accreditation:** The COTS software will be subject to security clearance as per government policies. Therefore, the COTS software supplier must provide information on any certification and accreditation that the software has obtained.

Bentley Response

The Bentley solutions proposed in this response operate on underlying technology platforms – Oracle and ESRI – which may have been subject to various levels of certification and / or accreditation. However, the Bentley solutions proposed have not, in themselves, been subject to such certification or accreditation.

It should be noted though that the Exor solutions are used worldwide by all levels of Government organization and that to date no issues have been raised regarding this aspect.

2.5 Service Specifications

2.5.1 System Integration: The geographic location of all road assets will be defined in external GIS being developed separately by the Implementation Consultant. This will be linked to the O-RAMS database containing network definition and attribute data. The integration requirements will be jointly undertaken by the Implementation Consultant and the COTS software supplier.

The integration of the TIS and RMMS with the COTS software will entail, as a minimum, a read-only access of the data contained in the COTS database by the external application for purposes of referencing the locations of external data against the road network entities that are the external application and subsequently to be populated in the COTS could be done through an import process. Any changes to the network entities that have occurred by time of importing this data should be tracked by the COTS software through a log file and the data in the external systems will be corrected manually." managed by the COTS software. Data that is generated by

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Bentley Response

A detailed description of this requirement is explained in the technical requirement #2. The Exor application is based on the Oracle Spatial database with a database design that maintains the ESRI Geodatabase metadata and acts as a repository of spatial data. This enables the data within Oracle Spatial to be served up using ESRI products. The proposal includes the Exor Spatial Manager module which is an ArcMap/ArcView based network editing environment that allows all complex network editing and asset editing functionalities through spatial interface.

2.5.2 **Training and Training Materials:**

2.5.2.1 The COTS software supplier will train O-RAMS core group (Implementation Consultant's staff and selected Client staff of Asset Management Cell) during configuration of the software at Bhubaneswar for three (3) weeks.

Bentley Response

Bentley will provide COTS standard training during the proposed time period at the specified location. During this period the aim of the training will be to provide appropriate and relevant course as to raise awareness of the proposed solution and products. The users will also receive the standard COTS training materials for each training class. In addition, to the training courses, Bentley also view that product knowledge will also be transferred during the course of the configuration phase through workshops and collaboration activities with the Implementation consultants. Once the configuration is complete, the end users will need to be trained by the Implementation consultants. Bentley trainers will work with the Implementation Consultants to produce the training plan and course content.

2.5.2.2 The COTS software supplier shall prepare and provide all operational And training material, for delivery of the program; all such material will be the property of the Client. The COTS software supplier shall bear all expenses for their mobilization, boarding and lodging in Odisha of their own staff during the duration of the training. Client will provide facilities for training.

Bentley Response

Bentley will provide both administration and user training manuals during the delivery of the standard training courses. As our training cost is priced on this basis, the training materials remain the property of Bentley Systems.

Furthermore, Bentley has vast experience in providing tailored training courses to meet specific needs of our clients. Bentley will be pleased to make similar arrangements with OWD as a separate activity. It would require a Training Needs Analysis Consultancy, followed by preparation and subsequent delivery of the training and production of any associated materials. As it is not possible to evaluate the need for this tailored training nor the effort required to delivery it from the information currently available and therefore only standard training courses have been costed in our response.

2.5.3 Technical Support:

The COTS software, after configuration by the Implementation Consultant, will be delivered to the Client within six (6) months from signing the contract. After Client's acceptance, it will be under warranty period.

2.5.3.1 Warranty Service: The implemented COTS software (O-RAMS) will Be under warranty after successful acceptance testing as per General Conditions

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of Contract. During the period of warranty the COTS software supplier will provide full User support and technical assistance to O-RAMS core-group.

Bentley Response

Agreed. The Bentley Technical Support Group (TSG) will provide support during the warranty period. TSG is a worldwide support organization offering a personal support service to Bentley users worldwide.

2.5.3.2 User support / hot line: The User support includes resolution of issues that may arise during normal use of the software by the Client officers. This includes provision of dedicated e-mail ID (response time not more than 24 hours) and voice-chat (express resolution) through a dedicated telephone no. (During supplier's normal working time).

Bentley Response

TSG provides several methods of issue reporting and communication:-

- Telephone: SELECT support subscribers can avail of a 24 X 7 telephone support hotline that will route within region during regular business hours and to other regional centers outside of local business hours.
- Web site: Service Tickets can be raised, closed and updated using the online Service Ticket Manager tool on the Bentley website
- Chat w/analyst: Live chat with an analyst is available from SELECT services Online Live Chat. This is a 24 X 5 service that routes to the closest open regional service center.
- Email: Once a ticket has been raised further communication between user and analyst can occur by email as desired by the user

The initial response from TSG to a new service ticket is < 4 hours within local working hours

2.5.3.3 Technical Assistance: This involves tasks not limited to trouble shooting, bug fixing, and providing support for any technical issue or from technology obsolescence etc. The technical support includes on-line chat, dedicated e-mail ID (response time not more than 48 hours) and voice-chat (express resolution) through a dedicated telephone no. (During supplier's normal working time).

Bentley Response

All requests for assistance go through TSG as above. Where bug fixes, enhancements or consultancy is required these are provided by specialist resources through TSG. See above for response times.

2.5.3.4 Post-warranty maintenance Services: There shall be no maintenance charges during the warranty period. Beyond the free maintenance period, the supplier shall indicate in the financial proposal, the rate for the maintenance support or annual maintenance contract (AMC) that will be provided to the Client per year (for 5 years). The services will include but will not be limited to updates, trouble-shooting, resolving any problems faced by the Client, minor modifications and refinements required

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in the system to improve its effectiveness based on the feedback information collected from its use, and bug-fixing. A technical document mentioning the details of any software updates / patches and the type and extent of changes conducted on the software must be clearly mentioned.

Bentley Response

Advice on updates and patches will be available from TSG as required and from the Bentley web site.

2.5.4 **Data Conversion and Migration:** Data collected during the project are Required to be migrated to O-RAMS database using the facilities in the configured COTS software. The Implementation Consultant will migrate any such data that is collected during the project to the O-RAMS database.

Bentley Response

COTS functionality will be utilized to load data into the O-RAMS database. These loaders are highly configurable by the administrators. The implementation consultant will be able to define the validation parameters and well as define the format of the data load. Furthermore, erroneous data is quarantined as a 'bad' file and relevant error messages are reported to the users through the User Interface. The user can subsequently correct the 'bad' file and reload through the loaders. In addition, the CSV loaders maintain a history of the data load and also provide a summary of the data load.
The data types listed in section 1.4.3 can be loaded into the O-RAMS system. Typically the network will be loaded as ESRI shapefile and the inventory data will be loaded through CSV loaders. Other media types such as photos can also be loaded through the system either as a one-off bulk transfer or as individual files.

2.6 Documentation Requirements

2.6.1 Technical Documents: The COTS software supplier shall provide standard User manuals, technical guides and documentation (editable version) for the
use of the system, its input, output, analysis, configuration, administration etc. for the original software. The Implementation Consultant will use them for preparing manuals and necessary documentation for the configured O-RAMS.The COTS software supplier shall provide hard and soft copies of all Manuals, technical guide etc. to the Implementation Consultant. An administrator's Manual explaining how to install, configure, and/or use the software securely will also be provided.

Bentley Response

Bentley will happy to provide the relevant documentation associated with the COTS software. Bentley has both administration and user manuals for all COTS modules, which the Implementation consultants can use for preparing manuals and author necessary documentation associated for the configuration of O-RAMS. In an effort to maintain Bentley's environmental charter, digital copies will be the main means of delivering the documentation. Upon the award of the project, Bentley will also provide all soft copies related to the installation and configuration related to the installation and management of the COTS software.

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2.7 Consumables and Other Recurrent Cost Items

Nil

2.8 Other Non-IT Goods

Nil

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Testing and Quality Assurance Requirements

3.1 Inspections

3.1.1 Inspections following delivery: Upon delivery of the licenses, the O-RAMS core group will verify the media for its installation.

Bentley Response:

The EXOR products are COTS based and as such will require the execution of pre-defined test scripts to insure all components have been installed correctly. The test scripts are included within the distribution media along with hardcopy documentation. Any errors found during testing will be remediated prior to accepting this deliverable.

3.2 Pre-commissioning Tests

3.2.0 In addition to the Supplier's standard check-out and set-up tests, the Supplier (with the assistance of the Purchaser) must perform the tests to demonstrate the technical and functional requirements as described in Section B and Section G of Schedule of Requirements on the System and its Subsystems before Installation will be deemed to have occurred and the Purchaser will issue the Installation Certificate(s) (pursuant to GCC Clause 26 and related SCC clauses).

Bentley Response:

Bentley, along with the Implementation Consultant and Client will jointly develop test cases that will demonstrate the technical and functional requirements as described in Section B and G of the Schedule of Requirements before the Installation deliverable is accepted by the Purchaser.

3.3 Operational Acceptance Tests

3.3.0 The COTS software supplier shall work jointly with the Implementation Consultant and the Client to develop a set of step-by-step acceptance tests in order to explicitly test each of the functional and technical requirements. The Implementation Consultant and the Client (or its appointed representative) will perform the various tests and the latter will determine whether or not each test may be signed off as being successful.

Bentley Response:

Bentley, along with the Implementation Consultant and Client will jointly develop test cases that verify all functional and technical requirements have been met. The Implementation Consultant and Client will perform the testing, document any exceptions, and forward the exceptions to Bentley for resolution. Bentley will remediate any program/system issue and forward a new release for re-testing.

3.3.1 The COTS software supplier and Implementation Consultant will jointly work with NIC to determine the security framework for implementation. Further, security auditing of the software is to be taken up by the third party who is CERT-In certified (http://www.cert-in.org.in/) before hosting. The COTS software supplier and Implementation Consultant must ensure adherence to secure hosting facility at a Data Centre for the server to run on SSH and other secured environment.

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Bentley Response:

Bentley will meet with the NIC to verify that its products meet the security requirements for implementation in the hosted environment. Any issues will be remediated and resubmitted for further testing.

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Implementation Schedule

Implementation Schedule Table

The below schedule applies to the COTS software module delivery, configuration, acceptance, warranty and AMC.

Line Item No.	Subsystem / Item	Initiation	Installation (weeks from Effective Date)	Acceptance (weeks from Effective Date)
1	Supply licenses for COTS Software including Installation of the COTS Software and Pre-commissioning Tests	W1	W1	W3
2	Provide Training to Core Group (OWD & Consultant) for configuration and Calibration of its in- built planning tools including providing System/Reference Manuals	W2		W5
5	Provide support related to software configuration, integration	W11		W26
6	Provide support for COTS software Operational Acceptance Testing	W22	W24	W26
7	Provide Support (During Warranty Period)	W24		W76
8	Annual Maintenance Contract (AMC)	W77		W337

Required Format of Technical Bid

5.1 Description of Information Technologies, Materials, Other Goods, and Services

5.1.0 The Bidder must provide detailed descriptions of the essential technical, performance, or other relevant characteristics of all key Information Technologies, Materials, other Goods, and Services offered in the bid (e.g., version, release, and model numbers). Without providing sufficient clear detail, Bidders run the risk of their bids being declared non-responsive.

Bentley Response
Bentley Systems will be delivering the current version of the Exor management software applicable at the time the implementation project commences. Exor is currently at version 4.6 and Bentley is proposing to deliver the following COTS modules from the Exor product suite:

- Network Manager
- Asset Manager
- Spatial Manager
- Schemes Manager
- Structures Manager
- License an API to support HDM-4 interface
- Traffic Manager
- PMS
- Information Manager

Standard documentation will be provided in support of the above applications as well as Bentley's standard Training materials.

Bentley Systems is pleased to provide the costs for the underlying Oracle technology required in order to operate the Exor applications. We are proposing to provide the Oracle technology under an Application Specific Full Use (ASFU) license. This will enable the Exor systems to be enhanced and developed to meet OWD's requirements. For example, the Exor Maintenance Manager product which we have included one free license for in this response could be enhanced to provide the RMMS and a similar principle applies to the Traffic system. This license does however prohibit development activities not related to the immediate requirements and for which we're proposing Exor. If OWD is aware of other applications that intends to develop in the future then we would be pleased to discuss with OWD the costs of a full use, unrestricted license. However we are pleased to quote for full use license software for RDBMS as per the bid requirement

We have assumed that OWD will provide the ESRI ArcSDE v9.3 and ArcView licenses v9.3.1.

Bentley will be providing additional services to OWD in order to install, configure and provide training in the COTS products.

5.1.1 To assist in the bid evaluation, the detailed descriptions should be organized and cross referenced in the same manner as the Bidder's item-by-item commentary on the Technical Requirements described in Section 5.2 below. All information provided by cross reference must, at a minimum, include clear titles and page numbers.

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5.2 Item-by-Item Commentary on the Technical Requirements

5.2.0 The Bidder must provide an item-by-item commentary on the Purchaser's Technical Requirements, demonstrating the substantial responsiveness of the overall design of the System and the individual Information Technologies, Goods, and Services offered to those Requirements

5.2.1 In demonstrating the responsiveness of its bid, the Bidder is strongly urged to use the Technical Responsiveness Checklist provided in Section G of the Technical Requirements. Failure to do so, increases significantly the risk that the Bidder's Technical Bid will be declared technically non-responsive. Among other things, the checklist should contain explicit cross references to the relevant pages in the Bidder's Technical Bid.

5.3 Preliminary Project Plan

5.3.0 The Bidder must prepare a Preliminary Project Plan describing, among other things, the methods and human and material resources that the Bidder proposes to employ in the design, management, coordination, and execution of all its responsibilities, if awarded the Contract, as well as the estimated duration and completion date for each major activity. The Preliminary Project Plan should also state the Bidder's assessment of the major responsibilities of the Purchaser and any other involved third parties in System supply and installation, as well as the Bidder's proposed means for coordinating activities by each of the involved parties to avoid delays or interference.

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5.4 Confirmation of Responsibility for Integration and Interoperability of Information Technologies

5.4.0 The Bidder must submit a written confirmation that, if awarded the Contract, it shall accept responsibility for successful integration and interoperability of all the proposed Information Technologies included in the System, as further specified in the Bidding Document.

Bentley Response:

If awarded the Contract Bentley Systems shall accept primary responsibility for the successful integration and interoperability of the Exor COTS software being delivered by Bentley Systems. As detailed in our response we will also provide integration support services to the Implementation Consultant but for the avoidance of doubt, Bentley cannot accept sole responsibility for the successful integration of third party systems not within Bentley's control such as the TIS and RMMS.

Bentley accepts primary responsibility for the following as per bidding document (Clause 0.3, Schedule VI. Schedule of Requirements):

- Supply licenses for COTS Software
- Installation of the COTS Software
- Provide Training to Core Group (OWD & Implementation Consultant)
- Provide System/Reference Manuals
- Provide integration Support
- COTS Acceptance Testing
- Provide Support (During Warranty Period)
- Provide Support (After Warranty Period) - Through AMC

Bentley understands that OWD and Implementation Consultation will provide necessary support to accomplish above responsibility.

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Technical Responsiveness Checklist

Note to Bidders: The Checklist is provided to help the Bidder organize and consistently present its Technical Bid. For each of the following Technical Requirements, the Bidder must describe how its Technical Bid responds to each Requirement in the format below. In addition, the Bidder must provide cross references to the relevant supporting information, if any, included in the bid. The cross reference should identify the relevant document(s), page number(s), and paragraph(s). The Technical Responsiveness Checklist does not supersede the rest of the Technical Requirements (or any other part of the Bidding Documents). If a requirement is not mentioned in the Checklist that does not relieve the Bidder from the responsibility of including supporting evidence of compliance with that other requirement in its Technical Bid. One- or two-word responses (e.g. "Yes," "No," "Will comply," etc.) are normally not sufficient to confirm technical responsiveness with Technical Requirements.

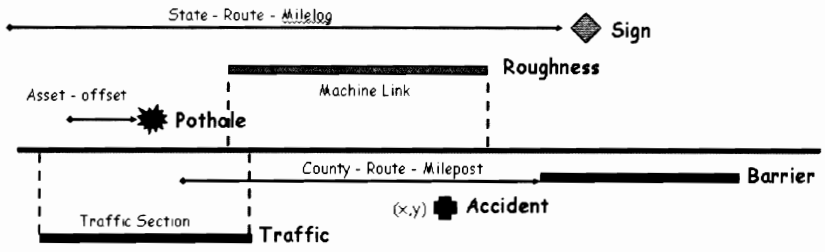
Tech. Require. No. 1	**Location Referencing** - Ability to accommodate multiple referencing methods (e.g. from the start of the section, kilometer point, LRP+offset etc.)	*Mandatory*

Bidder's technical reasons supporting compliance:

The Exor Linear Referencing System (LRS) is specifically designed to accommodate multiple types of referencing and multiple types of network and is fully compliant with this requirement. This is the reason why the Exor LRS has been successfully deployed in National and State agencies around the world.

Multiple linear referencing is possible because of the way the Exor application stores all locations against the underlying datum (this is invisible to the user in their daily operations). When an inventory item is located against a route the system actually converts that location into one or more location records against the datum. Multiple locations records will occur when a feature spans multiple anchor sections. This approach provides the sophisticated ability to perform network editing without the need to relocate all of the associated assets. It also provides the ability for an inventory item to extend along different connecting routes, for example a barrier that extends around two legs of a junction. This approach also allows for non-contiguous assets that may have multiple locations, for example replacing a barrier along its middle section might result in the existing barrier now having a location each side of the new barrier length. All events including inventory items and road characteristics such as speed restrictions are modeled in this way.

The diagram below illustrates how the system is able to use different referencing methods across different types of data ranging from physical, point assets such as a sign through to linear continuous assets such as barriers or non-physical data such as traffic information.



When an inventory item is located the user can use any defined LRS as the referencing method. For

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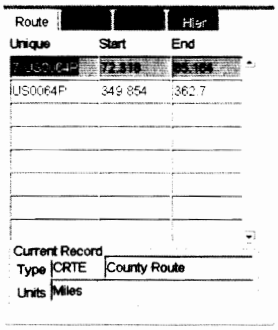
example this could be the route or an offset along a maintenance length. For point items this is identified as a single offset. For linear items this is a start and end offset. Assets maybe located in the system via the spatial, GIS front end or via screens.
Regardless of how a user initially locates the inventory item on the network the system will store the asset location against the underlying network datum. Subsequent users will see the inventory item offsets in whatever LRS method they specify.

The following screen shows how an asset was initially located against county route 7-US0064P but is also referenced against State route US0064P with the converted offsets for each route. These are calculated dynamically for each route from the underlying location records



The strength and versatility of the Exor application lies in the ability of the Network Manager module to manage multiple linear referencing. This is the key to providing a totally integrated solution that can also provide a hub to any suitable external system that uses linear offsets to locate data.

Any number of Routes can be created over the underlying road network and then any road feature such as assets, conditions, characteristics, projects etc. can be identified by their offset along any defined route.

The following screen shows how a route is created. In this case the route has been created for a referencing method called GLKI. The route itself is 1580 which is described as being between Dome Creek and Tete Jaune. The underlying datums are shown as members. Notice how each datum has a start node and an end node. As this is a linear group these start and end nodes provide the connectivity between the datum and the direction of the route. The "C" column allows the cardinality of the datum to be reversed allowing a route to flow in the opposite direction if required.

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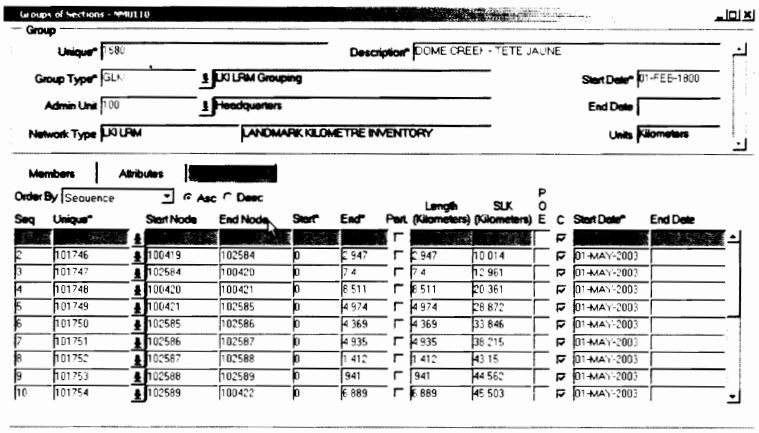
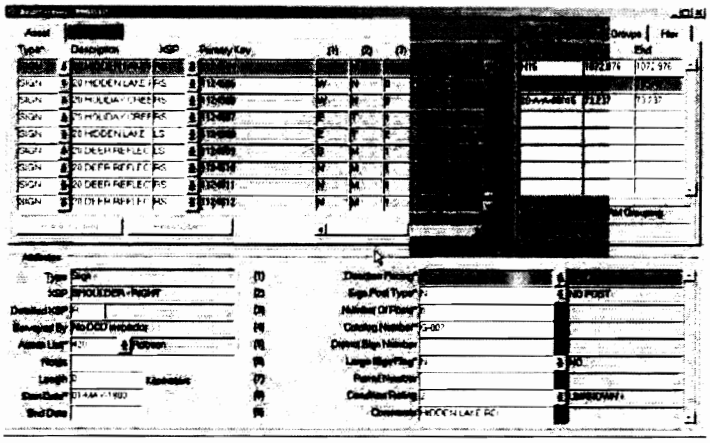


In the above example we saw how route 1580 was defined. The member sections may also belong to other group types or even other groups of the same type (where routes of the same type overlap). It is this approach that provides multiple linear referencing capabilities within the Exor application.

Another distinctive feature of the Exor approach is the fact that all features of the road network are modeled as assets. This might include projects, accidents, physical assets, road characteristics (surface types and numbers of lanes), boundaries, conditions etc. This approach is taken because any of these features may be subjected to locational changes and therefore needs to be easily updateable within the system. A failing of many other linear referencing systems is the inability to cater for changes to boundaries, speed limit zones or condition locations without the need for major network editing exercises. The Exor approach simply requires the relevant asset offsets to be edited once against any single linear referencing method and then the relevant changes including end dates are reflected in subsequent queries and reports against all identified referencing methods.

The following screen shows an asset with the asset location identified against each of the relevant linear referencing methods. In this example the sign is located against Routes H16, 1580 and 20-A-A-00016.



As previously described, Network Manager allows the user to identify any number of routes over the underlying road network. In addition to routes the user may identify any type of network group and then lay these groups over the network as well. These group types may include Inspection Routes and

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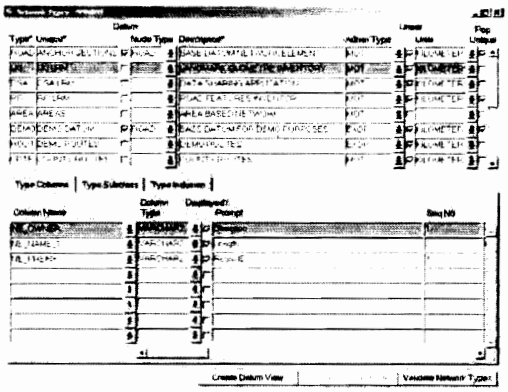
Maintenance Routes. The groups do not necessarily have to be routes but may also be geographical areas of interest such as Safety Zones and Regions. The main point however is that each of these is located over the underlying road network. This enables the user to simply locate any road feature using any referencing method desired and the system is able to identify the location of that feature against any of the other identified linear routes or areas. This enables any road feature to be viewed and reported against any available referencing method regardless of the method it was originally located against.
User driven reference data within the Exor application allows the user to identify any number of network types and linear groupings. This approach will provide OWD with the ability to implement any number of multi-linear referencing methods either at the time of implementation or at a later date.

The following screen shows how these referencing methods are defined using a standard screen within the application.



At the core of the linear referencing are the base datum which can then be overlaid with linear groups that provide the multiple linear referencing capabilities. These groups do not need to have the same segmentation as the base datum or each other. This is achieved using partial memberships that allow the user to identify start and end offsets against the base datum.

Each of these linear routes can be defined to run in any direction along the underlying network. This is achieved by the use of a cardinality flag against the base datum members that identifies the route flows in the opposite direction to direction of the underlying datum.
This is shown in the following screen which contains two datum. The cardinality flag has been unchecked and therefore the datum's flow in the opposite direction from their end node to their start node.

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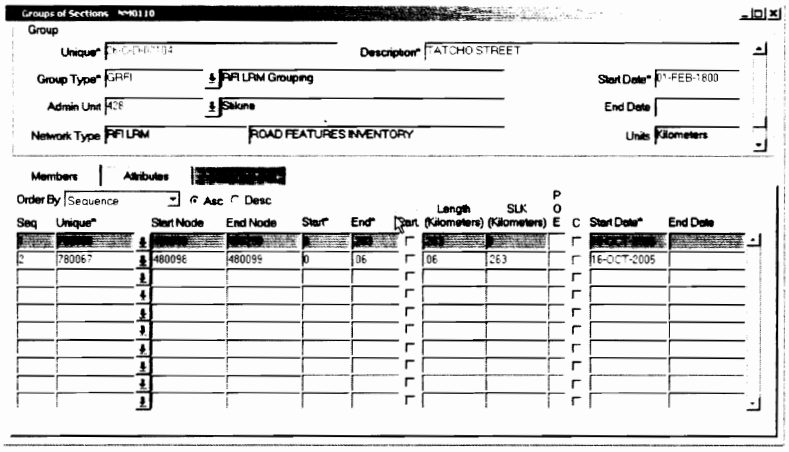
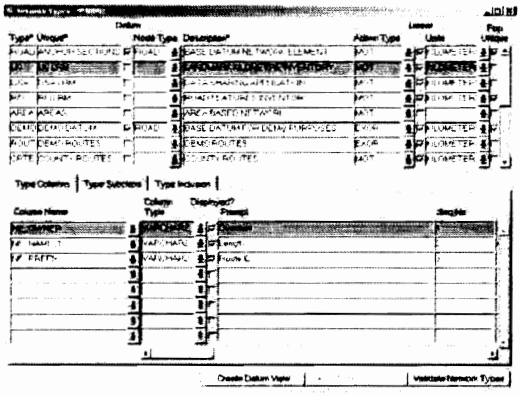


As would be expected from any system that is implemented worldwide, the Exor LRS is fully able to manage different units of measurement. In line with the COTS approach the administrator is able to identify any unit of measure. The system is delivered with standard units configured for miles, meters, feet, kilometres etc.

When a linear referencing method is defined, the administrator identifies the default unit of measurement for that referencing type. This is shown in the following screen shot in the units column.



The following descriptions illustrate the capability of the Exor LRS:-

- **Road ID (highway number) / Milepoint**
  The Exor system supports a roadway Id/ highway number milepost LRM. Each Route will have attributes associated to it that correspond to the components of the key. Each part of the key can be validated as appropriate and then the Key is 'generated' by the Exor software. These "routes" consist of component network segments which could be derived from centerline data, if available, in an existing GIS. Ongoing maintenance and updates of this LRM would be managed within the Exor interface.

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- **Distance from intersection / junction**

  The Exor system supports location referencing from any number of point featured classes; intersections, physical mileposts, signs using measures such as chainage.

- **Accumulative Route Mileage (ARM)**

  Accumulative Route Mileage can be compiled and maintained in the same manner as Roadway ID/Milepost. Using Exor's support for multiple linear referencing, the same base network is used but a different set of 'routes' is maintained over that network.

- **Coordinate System (lat/long)**

  The Exor system has the ability to position any point asset using an x,y location. This data can be input through a bulk load/update process, field data collection device, input using the Exor interface, or digitized with Spatial Manager. If the subject asset has and assigned network roadway id it will be automatically "netcoded". Meaning, the milepost location will be automatically computed and populated.

  It should be noted that the Exor systems is also capable of storing and maintaining "off-network" assets, for example open spaces such as parks.

- **Address**

  The Exor system is capable of storing and reporting data from an address type LRM. Obviously the address LRM would have to exist within the Exor system. Once established, data from other type LRMs could be reported by address, and assets located by address could be reported my milepost or point offset. Bulk uploads – address geocoding - of address located data could be performed with Spatial Manager or via the product loaders.

  Address referencing is more accurately carried out using a geocoding service which will take a fully verified and validated address and return a geographic location (a coordinate pair) this information can then be used to generate a linear location.

- **Signed Route/ Milepoint**

  This would be established as a valid LRM in a similar manner to the Road ID (highway number) or Accumulative Route Mileage route methods. A set of routes would be established that represents the Signed Routes within the state. These routes would need to either be overlapping in some cases (where more than one route traverses the same network). Objects located with this LRM are referenced to all other LRM's.

In addition to locating assets to the linear offsets, users can also optionally identify a cross sectional position. This is used to maintain the features against their relevant road lane or any other position across the public space such as sidewalks or grassed areas.
The following screen shows how users can define their own cross sectional positions (XSP) for each classification of network.

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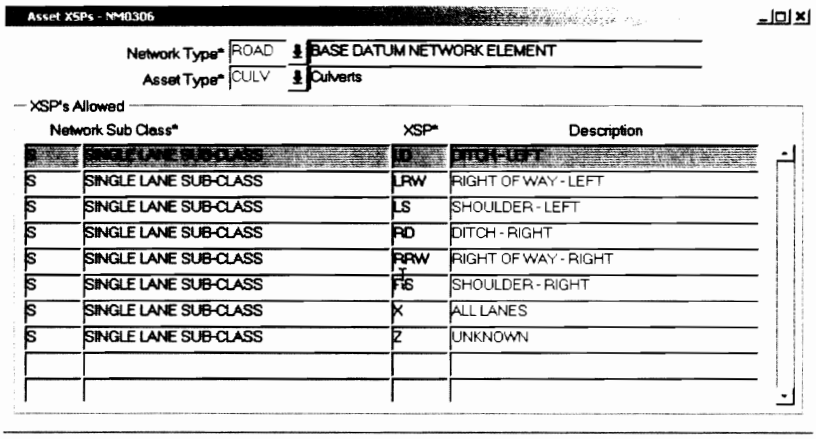
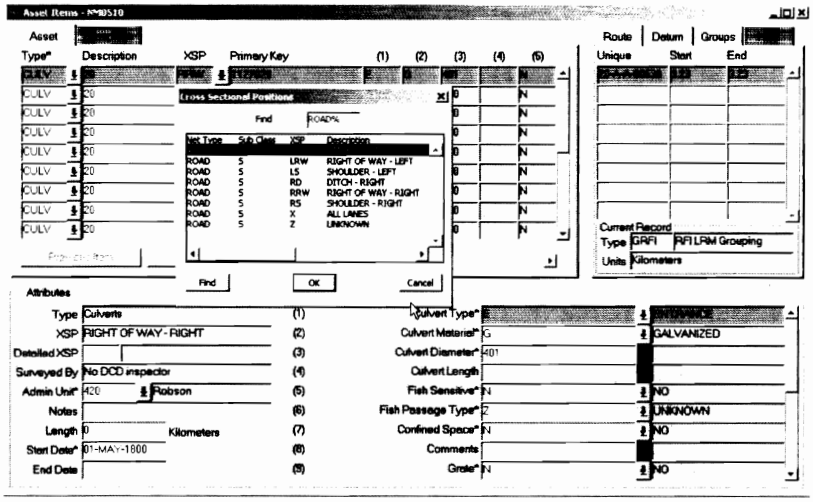
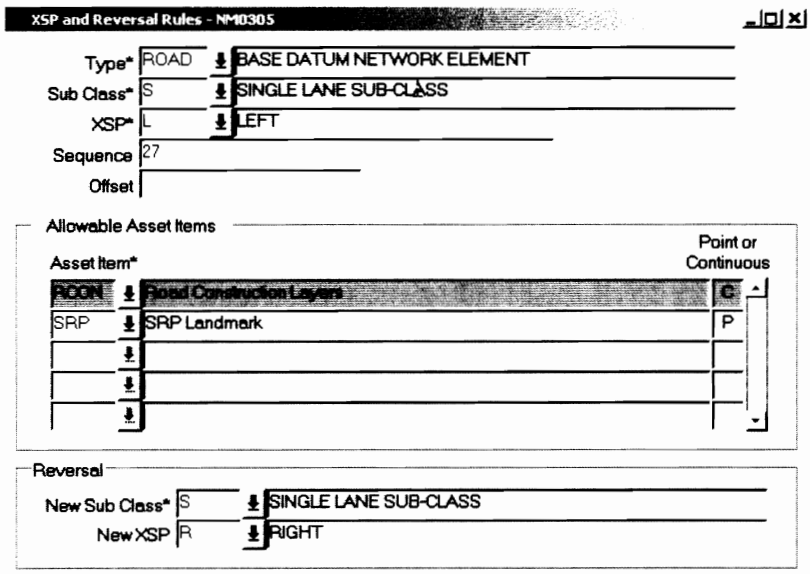


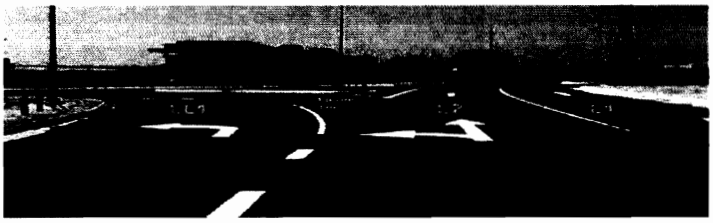
The following screen shows how these cross sectional positions are then used in the system to locate a feature against the correct road lane.



To cater for route reversal functionality the user can also identify rules that determine a feature's new cross sectional position when a route is reversed. This is shown on the following screen.



A typical approach to lane identification is shown in the photo below:



Bidders Cross References to supporting information in technical bid : Section A 1.4.2

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Tech. Require. No. 2	**GIS**	***Mandatory / Optional***
	1. Integration of external GIS (being developed separately using ESRI technology) with road database in COTS software	*Mandatory*

Bidder's technical reasons supporting compliance:

The Exor system is compliant with this requirement. It is based on an open Oracle database platform and uses the spatial capability provided by Oracle as well as integrating into ESRI ensuring it is fully GIS enabled. This provides OWD with the best approach to providing spatial capabilities to not only the key users of the application but also to all casual users and even members of the public should this be needed now or in the future.

This is because the Exor application is based on the Oracle spatial database with a database design that also maintains ESRI Geodatabase metadata. This metadata enables the data within Oracle spatial to be served up using ESRI products. This combination of technology will allow users to view the road network and associated inventory items on the client desktop using tools like Exor's Spatial Manager it also allows users to view this data over the web using the spatial capabilities embedded into the application forms and it also allows casual users or members of the public to view this data spatially over the internet using reporting tools and executive dashboards.

This proposal includes the Exor Spatial Manager module which is an ArcMap / ArcView based network editing environment that allows all required network editing processes to be conducted through a spatial interface. One of the significant benefits of the Exor application is that all editing performed through this Spatial Manager module updates the spatial database directly. These updates are then immediately available to other users of the application regardless of whether they are using the web maps in forms or Spatial Manager. This approach offers OWD significant benefits in terms of maintaining data integrity and reducing operational and administrative costs.

In addition to Spatial Manager all users of the application are able to view spatial data through Exor's Locator product. This approach will enable OWD to cost effectively deploy spatial data to all casual users who do not need to perform network editing as it means these users will not require ESRI licenses.

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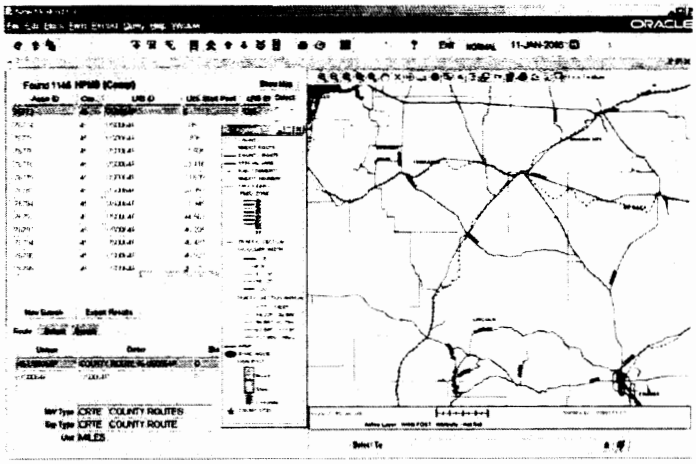
The screen below shows a web map in the Exor Locator tool. From this screen the user can search for asset data based on any criteria and then review the results in the map. Drill down capabilities then allow the user to view specific details of assets as required.



Users are also able to make non spatial edits to the road network through tabular forms. This includes updating tabular data such as names and also performing functions such as splits and merges using offsets.

The GIS technology deployed within the Exor product set also ensures that data can easily be exported or imported. This ensures that we're able to support and enhance the business flows shown in Section B page 63 "Figure 1: Proposed O-RAMS architecture" as we can support the data flows and also offer much tighter integration between the road management system and the GIS technology than is illustrated in this diagram.

Bidders Cross References to supporting information in technical bid : Section A 1.1.2

Tech. Require. No. 3	**Network editing and auditing capability and managing old data**	*Mandatory*

Bidder's technical reasons supporting compliance:

The Exor software provides full network editing capability and importantly maintains full referential integrity of the data associated with the network when edits are performed. Changes are audited and time and date stamped. This ensures it is possible to identify who made changes and when they were undertaken. Importantly by maintaining this information it is also possible to reverse them should an error be made.

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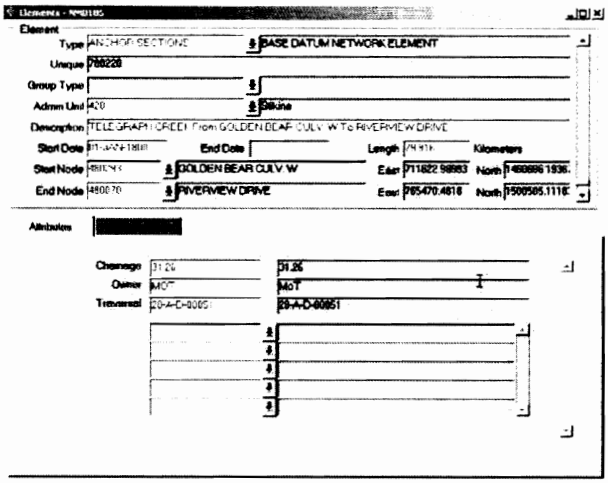
Typical network maintenance functions supported by the LRS are:-

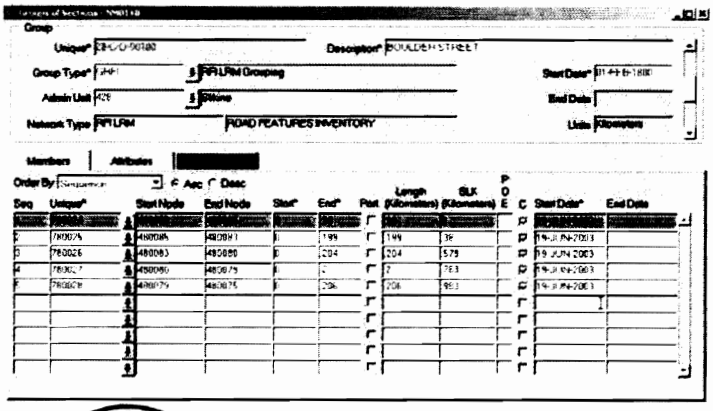
- Create and end date sections
- Split and Unsplit
- Replace and unreplace
- Merge and Unmerge

The Exor Application maintains a network event history through the use of start and end dates. Each time a new piece of network or inventory item is created the system allocates a start date. When these are then subsequently edited or removed the system applies an end date. This provides the ability for the user to specify an effective date and then view the road network and its associated assets at that point in time. This functionality includes the ability to view maps based on these effective dates too.

The following screen shows how the underlying network sections can have start and end dates applied allowing changes to the network to be tracked over time.



The following screen shows how the network groups and the sections within the groups can have start and end dates applied allowing the creation and changes of routes, road names, divisional areas etc. to be tracked over time. This could include changes to boundaries.



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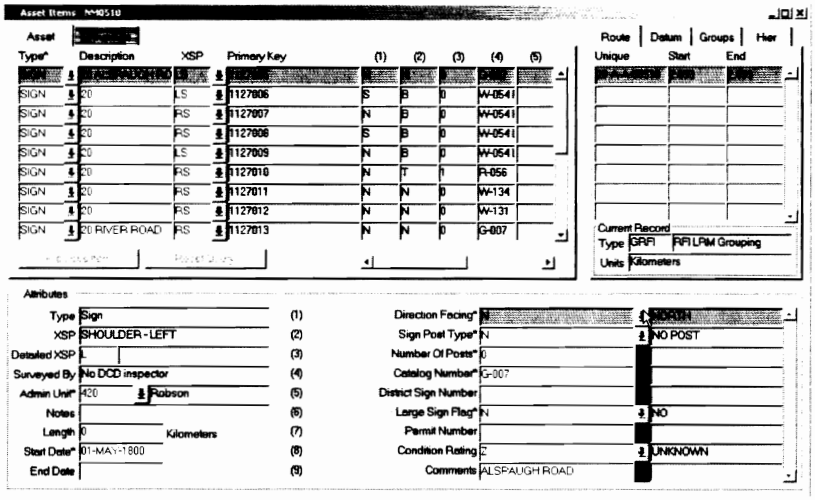
The following screen shows how start and end dates can be applied to the infrastructure assets allowing the creation and removal of these assets to be tracked over time. Note that the system also tracks start and end dates to the asset locations enabling the relocation of assets to also be tracked over time. No data is physically deleted.



Simply applying start and end dates on their own is not sufficient however and Exor has given careful consideration in introducing sophisticated functionality that allows the user to implement business rules to determine how start and end dates can be set automatically for associated network assets when network editing occurs. For example, realigning a length of road network may affect assets that exist along the realigned network. These business rules allow the user to determine how these assets are end dated automatically upon confirming the network edit. This is particularly useful for network attributes such as inspection conditions where performing a new survey and entering these results will result in the previous results becoming end dated.

The following screen shows how the effective date can be set by the end user so that all data retrieved and spatially displayed in that session is shown as it existed at that date. Note how the effective date is set in red to indicate that it is not today's date. Also note how the user is prevented from performing updates to the data when the effective date is set to a date in the past.

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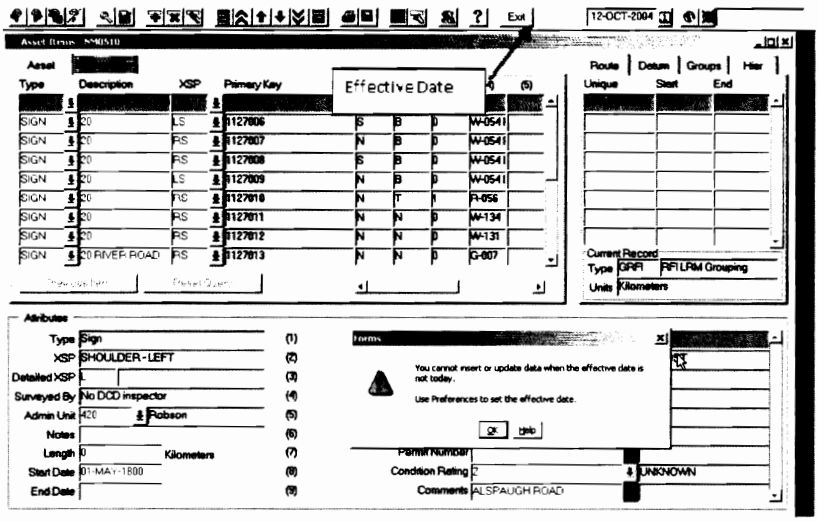
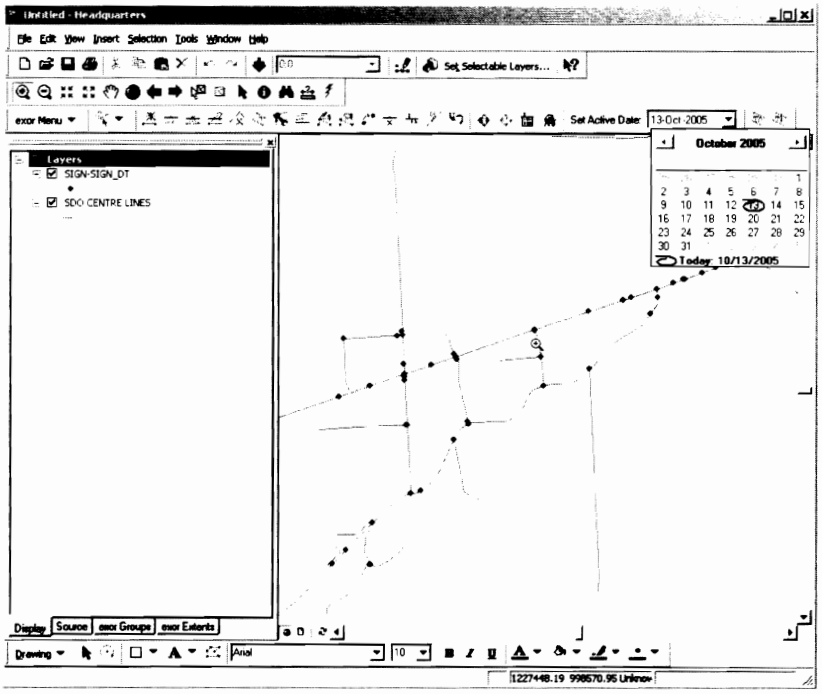


The following screen shows how the effective date can be set within Spatial Manager so that data is displayed spatially as it existed at that date.



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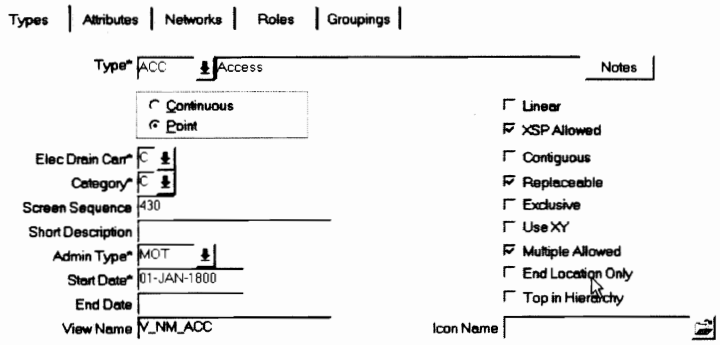
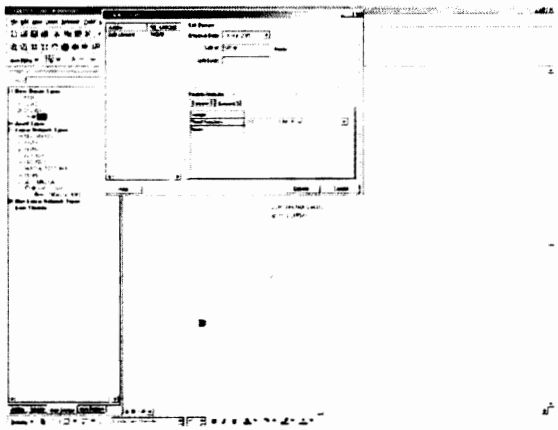
The following screen shows how business rules can be set for the infrastructure assets. In this case the replaceable flag has been set. This will automatically end date an existing asset when a new asset of the same type is located at the same location and the same cross sectional position. This is ideal for features such as condition data where a newly recorded value always replaces the previous value.



Performing network maintenance, such as splitting road sections, via Spatial Manager also ensures all data referenced to the road network is kept properly referenced and a full history is maintained which is vital for reporting purposes and ensures that changes can be reversed if necessary.

The screens below show some examples of the network editing capabilities of Spatial Manager.



This screen shows the splitting function where a user has clicked on the screen where the split is to occur. A tabular form then displays the split information allowing the user to update the offset information as required.

After splitting the network the user can then create the new network elements as shown in the following screen.

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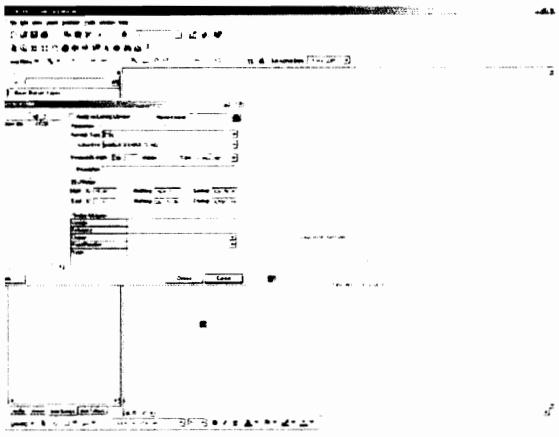


This screen shows how new network elements can be created spatially. The tabular form allows the user to enter textual details about the new element including measured lengths (rather than derived lengths).

The Exor LRS functionality also ensures that modifications that are made within one LRM are simultaneously (and automatically) modified for all other LRMs to maintain data synchronization. There are two important aspects to this functionality and Exor supports both:-

1. The requirement that changes to the location of an inventory item need to be reflected across all other LRMs. This is addressed within Exor because the inventory items and features are located within the database against the underlying datum. Therefore any changes to these items in terms of their locations occur at the datum level regardless of which LRM they were relocated using. As the LRM offsets are calculated dynamically this ensures that the items continue to get reported correctly against all LRMs automatically.

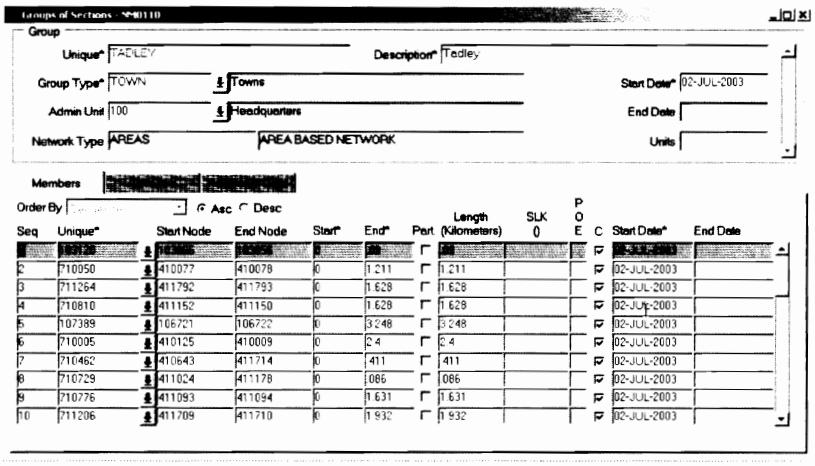
2. Changes to the road network also update locations of inventory items correctly so that they continue to be reported correctly. An example may be the realignment of the network at the beginning of the route would need to ensure that all inventory items occurring after the realignment are reported correctly. Again this is achieved within Exor because all network edits are reflected in the base datum as are the inventory item locations therefore ensuring that inventory items remain correctly located.

The Exor LRS also accommodates changes to geographic areas (e.g. Maintenance Districts) without having to change the base datum or associated inventory items. This is an important feature should administrative or organizational changes take place. If a solution cannot manage this then the user organization could incur considerable data manipulation costs. Exor supports this capability as follows.

The Exor application manages geographic areas through functionality referred to as network groups. This functionality will enable OWD to identify any number of different types of group and then create and populate these groups by identifying the base datum that belong to each of these groups; these may be full or partial datum to cater for where a boundary passes midway through the datum. Different group

types may be created for each geographic area type such as Cities; Counties etc. Individual groups are then created for each City and County etc. A significant benefit of this approach is the ability to adjust boundaries easily without the need to change the base datum or perform major network editing.

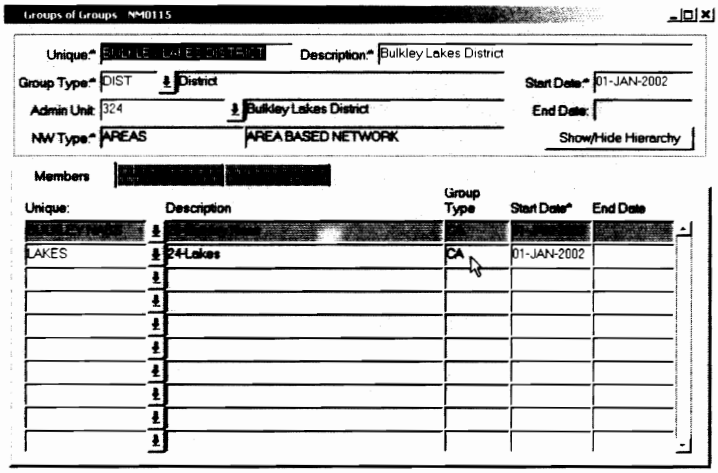
The screen below shows how a group type for towns has been created. The selected town is Tadley, which includes all of the datums shown in the member's panel in the lower section of the screen.



As boundaries change the user can simply add members to the group or end date existing memberships. The start and end offsets can also be updated accordingly. As there are no changes made to the underlying datum during these boundary changes the inventory items will be reported against the new geographical areas correctly without the need to perform updates to the inventory items.

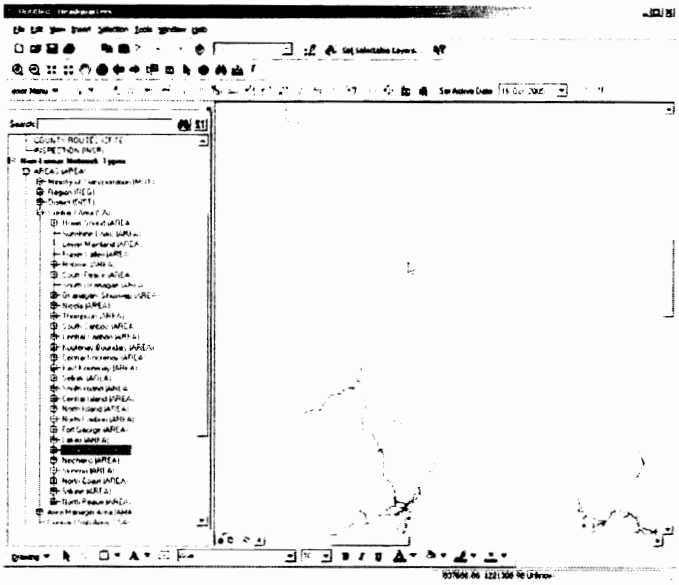
The Exor group functionality also allows groups to be nested. This will allow OWD to identify areas such as sub districts within districts. The benefit of this approach is that once the sub districts are defined the district can be created simply by creating a group containing all of the relevant sub districts.

Updating a sub district boundary then also updates the district boundary. The screen below shows a District with sub districts.



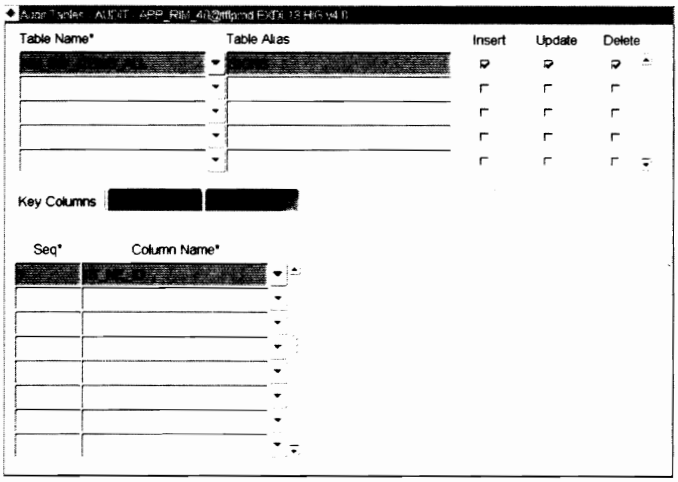
These groups can also be created spatially from within Spatial Manager by selecting a polygon and specifying the type of group to be created.

Once a group is created it can be displayed through the screens shown above or displayed through Spatial Manager. The following screen shows how the Bulkley Nass sub district has been selected and displayed on the map.



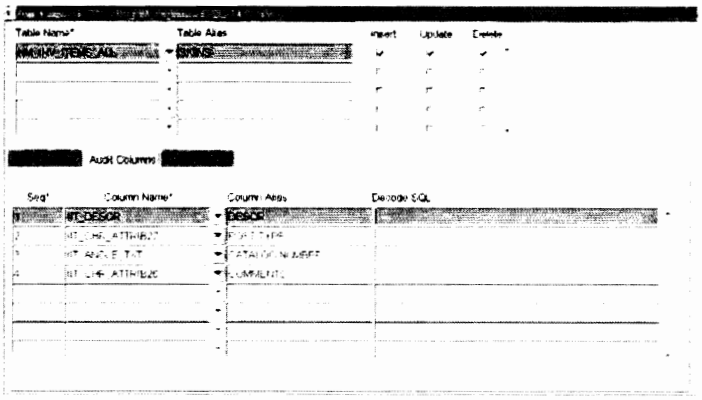
OWD will be able to implement a number of different levels of traceable audit trails. At the simple level the system maintains details of the user creating and the user last modifying the network and inventory data records. This includes the user name, data and time.

Optionally OWD may decide to implement the audit trail functionality available within the application. This functionality will enable the system administrator to identify the database tables and the columns within those tables that need to be audited. The screen below shows how the database tables are identified:



For each table the administrator can identify which types of actions cause an audit record to be created. This includes inserts, updates and deletions.

The screen below shows how the administrator can restrict the audit trail so that records are only created when individual columns within the table are edited.



Bidder's cross references to supporting information in Technical Bid: Section A 1.4.2 (network splitting)

Tech. Require. No. 4	**Road Information System**	***Mandatory /Optional***
	1. General features (import/export/view/sorting/reporting/query of data)	*Mandatory*
	2. Support different data types (points, section)	*Mandatory*
	3. Ability to manage old data	*Mandatory*
	4. Ability to archive data and restore	*Mandatory*
	5. Support to field data collection devices	*Mandatory*
	6. Ability to generate strip maps, linear charts of homogeneous sections showing attributes	*Mandatory*

Bidder's technical reasons supporting compliance:

The Exor software supports the requirements itemized under items 1 – 6.

1. General Features

The Exor solution provides a number of product loaders to import data into the system. These include loaders which might be used on a one-off basis during an implementation to reduce project costs (such as contract schedule of rates items) through to loaders which are used to periodically import asset, inspection and condition data. These loaders include verification and validation routines to maintain data integrity and error correction facilities.

Data within the system can be viewed via screens, maps and reports. These include the ability to sort data.

The system also supports the dynamic segmentation the network based on user specified attributes to identify homogeneous sections. The phrase "dynamic segmentation" applies to three separate capabilities/functions within the Exor system.

The first applies to the creation of the spatial representation of a new asset, or roadway characteristic (point or linear) that has been created within the Exor system:

- by "merging" assets
- through imports (batch uploaded)
- through addition to the Exor system via the forms interface
- through integration using the external asset functionality

Simply put the generation of the GIS theme from an asset table by which individual assets are positioned based on the mile point value on an existing route. In this context the phrase dynamic segmentation also applies to the addition of new asset features to an existing theme based on the mile point value of the new feature. It also applies to the calculation of the mile point of new assets positioned by an x,y coordinate or digitized via Spatial Manager, this process is referred to as net coding.

In the second capability the phrase dynamic segmentation is used in conjunction with Exor's merge query and derived asset capability. As the name implies, merge query "merges" any number of asset classes to create a new derived asset. In the example below Shoulder Type is merged with Rutting data and Traffic Light counts to create a derived asset "Sample Section", which is where these 3 criteria are coincident. These dissimilar asset classes often do not start and stop at a corresponding mile point or node therefore any change in an attribute value or functional class requires a mile post "break" point.

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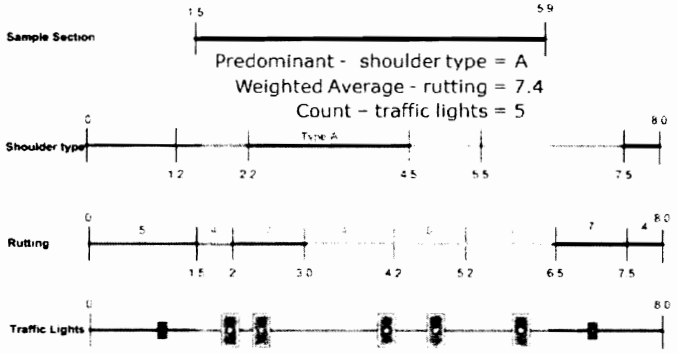
Therefore the merged assets are said to be dynamically segmented.



In the third capability the phrase dynamic segmentation is used in the function called Engineering Dynamic Segmentation. Engineering Dynamic Segmentation analysis is the ability to derive new 'attribute' values using functions such as length, weighted average, maximum, minimum, mean or Median from an existing specified asset attribute for homogenous zones or extents of Network. These homogenous zones may be created as a result of a Merge Query or roadway extents, signed routes etc.

A variety of powerful reporting options are available from within the Exor software:-

- Functionality within the existing product
- Exor standard reports
- Custom developed reports
- Ad-hoc reporting tools such as the Exor locator tool and/or Oracle Discoverer / BI Publisher
- A dashboard module called "Information Manager"

The Exor system supports traditional database query reporting, where users describe reports in the form of parameters which are used to drive a database function, that in turn query the database and then print the results of that query into a tabular, paper report.

However, as technology has advanced users are demanding more and more to be able to query and report directly against the database. Often a query may report the results on the screen so they can be analyzed either in tabular format or spatially and may never require printing.

Alternatively the user may wish to drive queries from the map by drawing a polygon and reporting on all of the assets within that polygon. In other cases, executive users may simply require instant summary information for decision making purposes without the need to understand how to use the core application. For these reasons the Exor solution provides a number of ways to access and report on data.

The Exor application provides powerful query functions that allow data to be queried from the database and then viewed either spatially or through forms. One such module is the Exor Locator module that brings the network, assets and spatial data together into a seamless and easy to use query tool.

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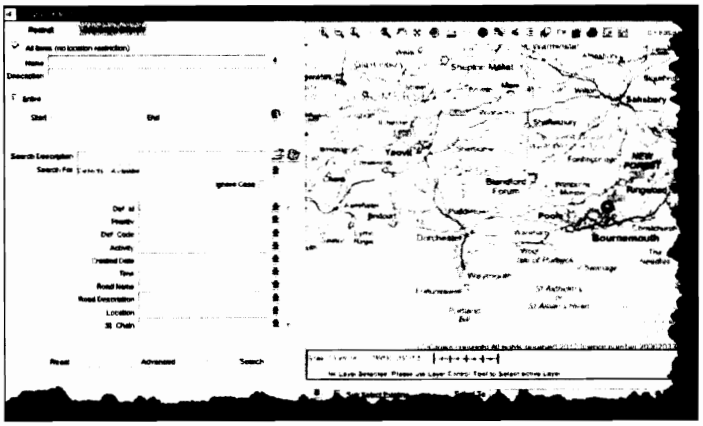
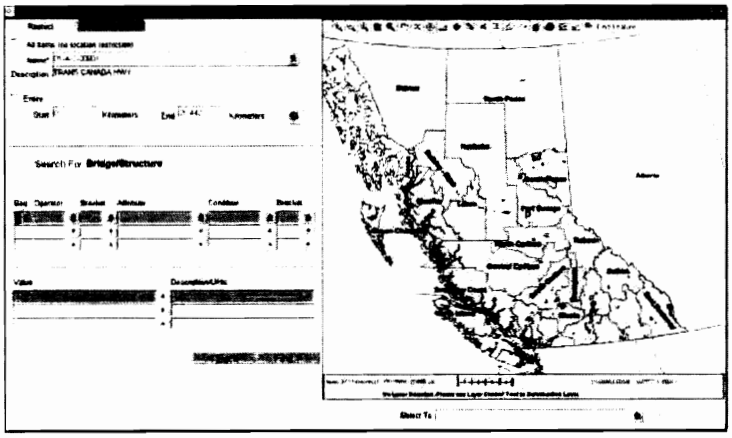
Accessing Data via Exor Locator

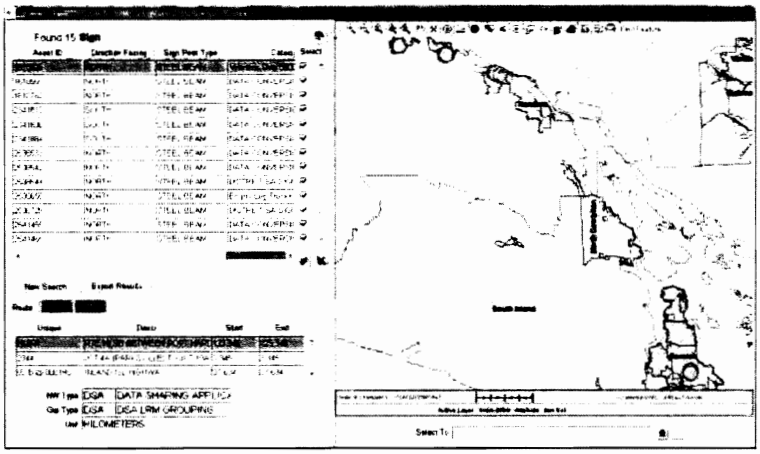
The screen capture below shows the opening screen of the Locator query interface:



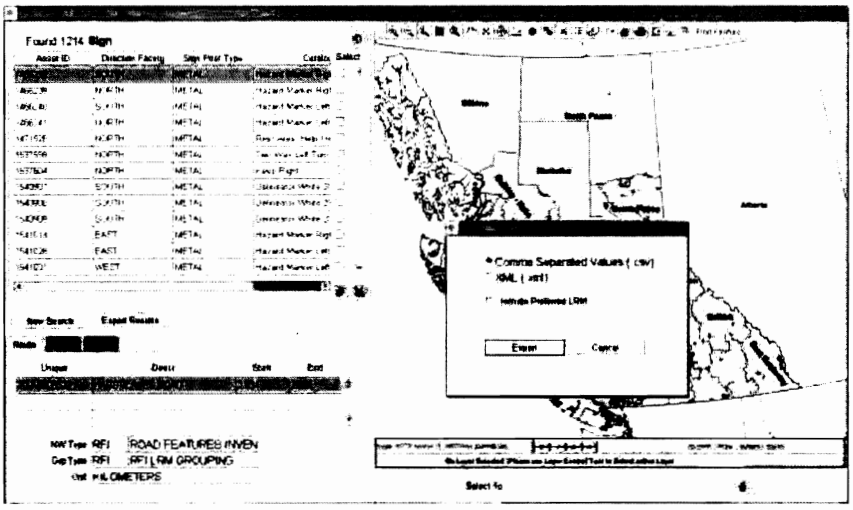
Reports can be restricted to routes or geographical locations using the network gazetteer tool. This enables users to drill down through any linear referencing method (LRM) or group type to selected locations such as routes and regional areas. If a linear route is selected the user can also specify start and end points along the route. Users can then select an inventory type to report against and restrict the selection based on any number of attribute values. An advanced option is also available that allows more complex searches to be performed such as ranges of attribute values. This is shown in the screen below:



After confirming the query parameters the results of the query are displayed in the tabular form. The user can select all of the returned records or manually select any number of individual records. These selected records can then be displayed on the map. The following screen shows a number of signs that have been selected and displayed on the map:



Note how the tabular results can be sorted by clicking on the column header. The columns displayed are configurable by the administrator through the asset reference screens. A number of options are available to users once the required data has been retrieved. This includes an option to export the results to a CSV or XML file. This option is shown below:



Alternatively a "select to" option is available that provides the user with context sensitive options depending on which data is selected in the map. These options may include the display of the data in the Asset matrix form or the Asset maintenance form to provide the ability to perform asset maintenance updates against the report results.

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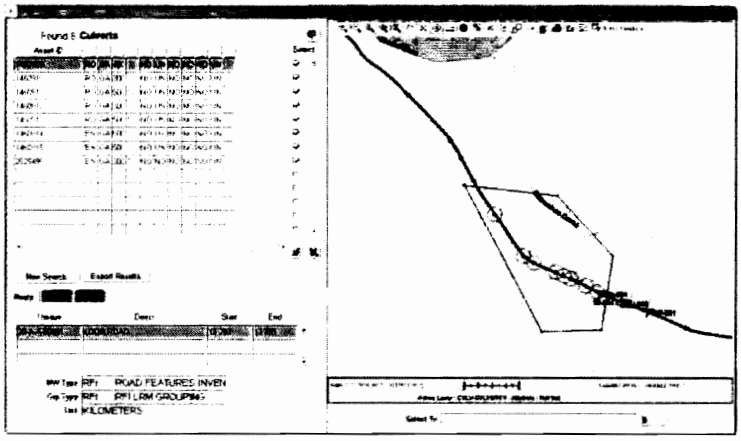
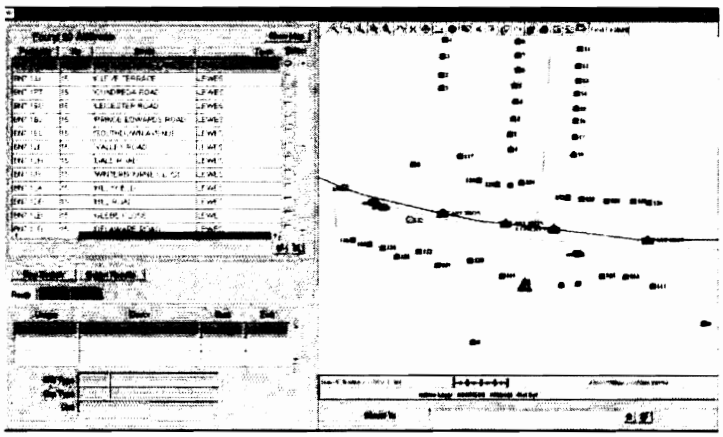
A distinctive benefit of the Exor software is customers can produce their own database functions to perform required functions against the report results and then call these functions from the "Select To" option. For example a function could be created to update the inspected date against all selected assets.

The examples above show how reports can be generated from the tabular data and then displayed spatially. Options are also available that enable these reports to be driven from the map using a polygon, rectangle and nearest item selection tools. This is demonstrated in the following screen where the user has selected a number of signs using the polygon tool:



These selected items can then be included in a report or passed to another form using the "Select To" option to allow further processing.

Another requirement of many users is the ability to include data from external systems including spatial data for display and reporting purposes. The Exor solution provides the ability to display external spatial data through web map services (WMS) or it can import or export ESRI shapefiles. An example of this is shown in the screen below where background data includes properties and road network extents.



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The WMS can be used for Locator and Spatial Manager, The local loading of shapefiles would need to be system wide by an administrator for Locator or on a session by session basis in Spatial Manager.

A major benefit of this approach is the fact that the external asset functionality can be used within Locator. This provides the ability to view data in external systems alongside data within Exor both spatially and in tabular form assuming it has a valid network location. This external data is displayed by generating a spatial location using the network locations.

Standard Reports already existing in the application

A number of the required reports are delivered as standard within the Exor application. These standard reports utilize the Exor generic reporting interface (GRI). This interface enables the administrator to define the parameters for each report and the list of values if applicable. These GRI parameters can use the standard gazetteer functionality that allows routes or geographical areas to be selected and validates the selections accordingly.

For standard reports these GRI parameters are preset but the major benefit of the GRI is that new parameters can be defined for any custom or ad-hoc reports so that other reports can be run from within the Exor application if so desired.

An example of a standard route report is shown below:

Lancashire County Council

06-FEB-2007

Assets On Route Report - By Offset - NM0562

Region of Interest : [illegible]-CASTLE STREET : PARSON LANE TO KING LANE

Min Offset : 0 Max Offset : 137 Route Length : 137 Ambig SC :

Start Measure : 0 End Measure : 137 Extent Length : 137 Unit of Measure : Metres Asset Unit of Measure : Metres

Route Start Offset	Route End Offset	Asset Type		XSP		Description
0	6	CW	Carriageway			5332483, 304, 9, 6.8, 2
4	4	BD	Bollard	2	Left Footway	5332492, 304, 2,
6	8	CW	Carriageway		Left Footway	5332493, 304, 9, 6.2, 2, .
8	14	CW	Carriageway		Left Footway	5332497, 304, 1, 6.2, 2, .
14	24	CW	Carriageway		Left Footway	5332509, 304, 1, 4.1, 2
24	27	CW	Carriageway		Left Footway	5332515, 304, 1, 4.4, 2
27	33	CW	Carriageway		Left Footway	5332520, 304, 1, 5.2, 2
33	49	CW	Carriageway		Left Footway	5332525, 304, 1, 5.4, 2, .
39	39	BD	Bollard	2	Left Footway	5332532, , 2,
43	43	BD	Bollard	2	Left Footway	5332534, , 2,
49	51	CW	Carriageway		Left Footway	5332542, 304, 1, 4.0, 2, .
51	51	BS	Bus Stop	4	Lane 1	7362388, 3, 0 ... 0
51	54	CW	Carriageway		Lane 1	5332548, 304, 9, 4.0, 2,
54	58	CW	Carriageway		Lane 1	5332552, 304, 1, 4.0, 2, .
55	56	BD	Bollard	2	Left Footway	5332553, 304, 2,
56	56	BD	Bollard	9	Right Footway	5332554, 304, 2
58	72	CW	Carriageway		Right Footway	5332560, 304, 1, 5.5, 2, .
72	83	CW	Carriageway		Right Footway	5332576, 304, 1, 4.8, 2, .
75	75	BD	Bollard	9	Right Footway	5332581, 304, 2,
83	89	CW	Carriageway		Right Footway	5332590, 304, 1, 4.5, 2
87	87	BD	Bollard	9	Right Footway	5332593, 304, 2,
89	100	CW	Carriageway		Right Footway	5332594, 304, 1, 4.0, 2
92	92	BD	Bollard	9	Right Footway	5332596, 304, 2,
100	100	BS	Bus Stop	4	Lane 1	7362458, 3 ...
100	112	CW	Carriageway		Lane 1	5332606, 304, 1, 4.0, 2,
112	116	CW	Carriageway		Lane 1	5332613, 304, 13, 4.0, 2
116	121	CW	Carriageway		Lane 1	5332615, 304, 13, 6.0, 2,
121	121	BD	Bollard	9	Right Footway	5332623, 304, 2,
121	126	CW	Carriageway		Right Footway	5332621, 304, 12, 4.4, 2, .
126	130	CW	Carriageway		Right Footway	5332630, 304, 13, 4.6, 2

LANCSTEST Page 1

Exor Leading the way in Infrastructure Asset Management Solutions

Dashboard functionality using Information Manager

The approaches described above will provide OWD with a powerful set of flexible reporting capabilities. Bentley is also proposing a powerful dashboard reporting module - "Information Manager". This will be d... provide executive and customer access to the data within the Exor application.

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Information Manager provides far more than simple reporting, it provides:

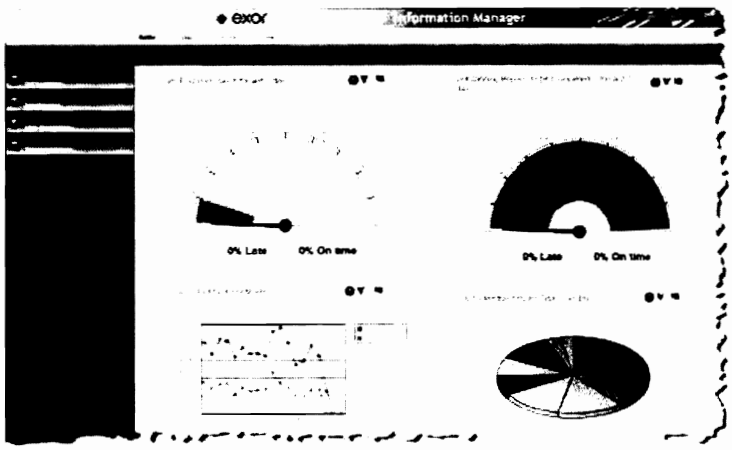
- summary information for effective decision making
- calculated information such as KPI values and conditions
- maps to give the information context
- access to standard reports and
- the ability for users (such as members of the public) to key limited data into the system

Information Manager is delivered with a number of standard reporting outputs (pods). These include:

- Works Orders – Draft Status
- Works Orders Due to be Completed
- Re-Submitted Works Orders
- Held Works Orders
- Rejected Works Orders
- Works Orders to Instruct
- Available Defects
- Length of Road By Admin Unit
- Road Length by Class (Top 5)
- Total Enquiries v Late Enquiries
- Overdue Repair Defect Types

Bentley can provide other Information Manager reports as specified by OWD such as reports based on network mileage by network type and asset information. It will be seen that many of the reports above are focused on the maintenance activities undertaken on the highway. We understand the Maintenance system is to be developed by the Consultant but we would also recommend OWD consider Bentley's Maintenance Management solution as it could save considerable development costs and minimize risk.

Information Manager provides the ability to include spatial maps and charts in reports. Some examples are shown below.



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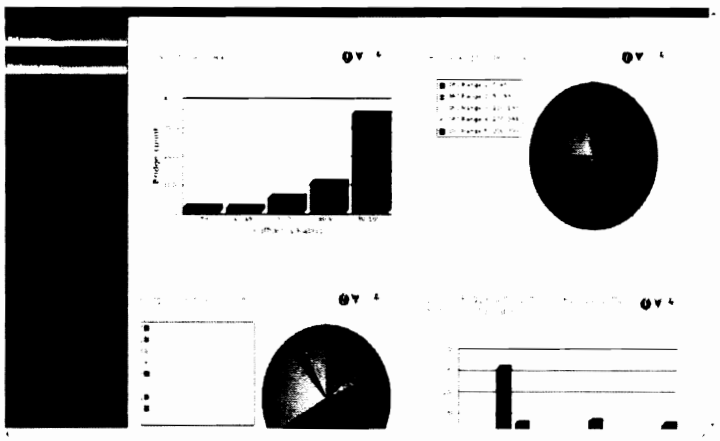

It is important to note that Information Manager is a real time reporting capability and is not based on a separate reporting warehouse. This provides the user with immediate access to current data. The pods shown above have drill down / drill up capability to enable a user to explore the details behind a particular report.

Ad hoc report writing capability will be available to OWD via Oracle Discoverer which will enable authorized users to access the system for reporting purposes. Oracle Discoverer users can fully manage the appearance and content of any reports that they create. These reports can also be exported to industry standard formats such as: CSV, MS Word, MS Excel, XML and PDF.

2. Support different data types (points, section)

The Exor manages a variety of data types including:-

- Point items e.g. signs
- Linear items – Network Sectional data and Asset data (Continuous, Contiguous) e.g. verges, kerbs, condition data etc.
- Polygon (area data) e.g. parks

3. Ability to Manage old Data

The Exor system's underlying Oracle database ensures it is able to cope with huge volumes of data. We manage data via open and end dates and 'deleting' a record end dates it and prevents it being used within the system. However, the record is still present in the database as this is essential for reporting purposes. It also provides the means to roll back the network to a given point in time and see network and associated data as it existed at that time. This process has been described above in Technical Requirement 3.

4. Ability to Archive Data and Restore

Exor users do not need to archive data for operational reasons. The underlying Oracle database ensures it will perform in terms of responsiveness due to the Enterprise level solution it provides.

There are backup and recovery processes in place to maintain data security as users implement a backup re[illegible]ding on their own operational requirements.

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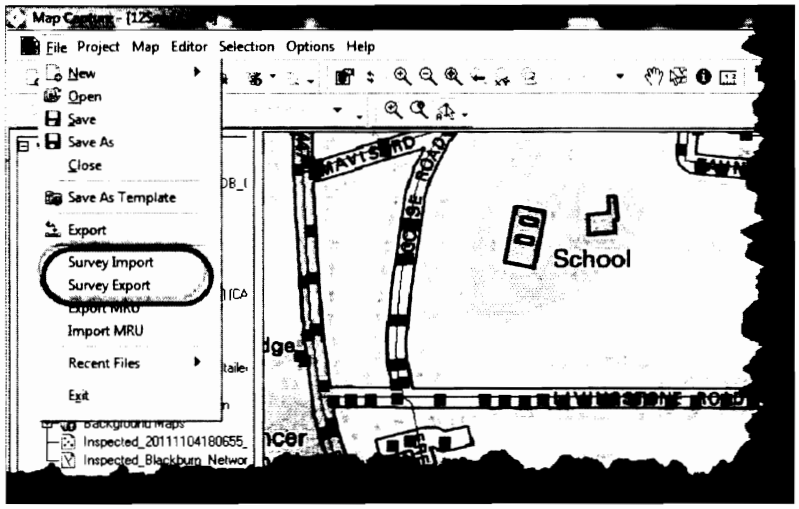
5. Support for Field Data Collection devices

Bentley provides a support for a number of Field Data Collection devices depending on the operational application being used. The software Bentley provides can be run on text based PDA devices or larger tablet devices which enable spatial and logical data to be taken into the field to be used for asset collection and inspection purposes.

The mobile solution provides the ability to import and export 'Surveys'. Surveys are a combination of the background mapping and the assets and defects to be collected. These surveys are created within the office and then exported to each data collection device thus managing all the data held on the machine.

We have provided overview information on Mapcapture below although the current procurement does not include the licensing of field based software. The screen shot below shows the user interface for Mapcapture and its ability to import and export data.



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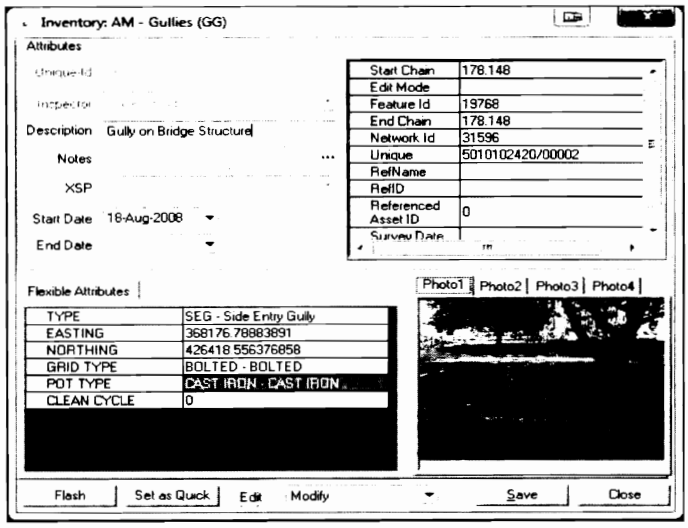
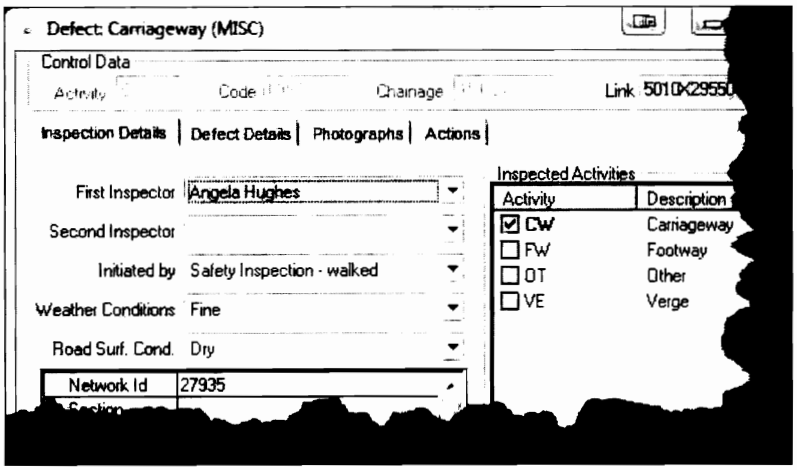
All asset records captured in the field can have photographs associated to them. These photos are automatically associated to the asset record upon upload of the asset in the core system.



To maintain data integrity between the field data software and the back office management system meta data defined in the office is exported onto the field devices. This makes data entry in the field easier, quicker and reduces errors.

The screen below illustrates some of the inspection data that can be entered on site. All drop down lists contain information exported from the main system.



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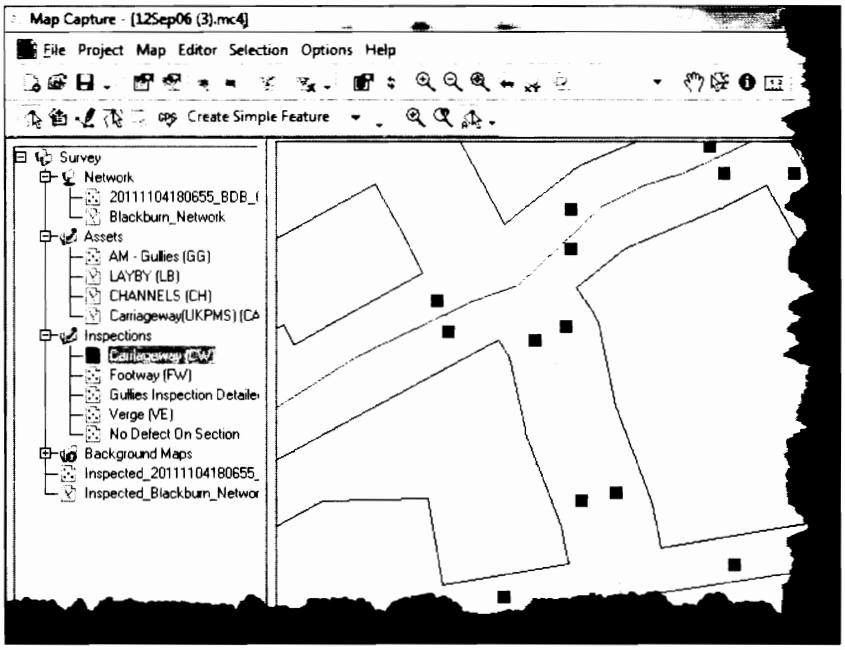
The next screen illustrates a section of road selected for inspection (highlighted in blue) and shows defects previously collected as well as allowing the inspector to record details of new ones. Defects can be located using the manual plotting. The GPS is not used to 'locate' the defect as it is not deemed to be accurate enough for defect and asset locations. Additionally the inspector would not always want to stand at the defect location to enable creation i.e. lane 2 of a dual carriageway.



The following screen shows how a priory can be assigned to the defect to indicate how urgent a treatment is required. It is possible for the inspector in the field to create a repair and once uploaded to the main system this system can automatically or subject to further reviews and approvals trigger off the works orders process. Many users improve administrative efficiencies by setting approval levels for small jobs so that they are passed to a contractor automatically. A review takes place once the work has been done to approve or reject payment.

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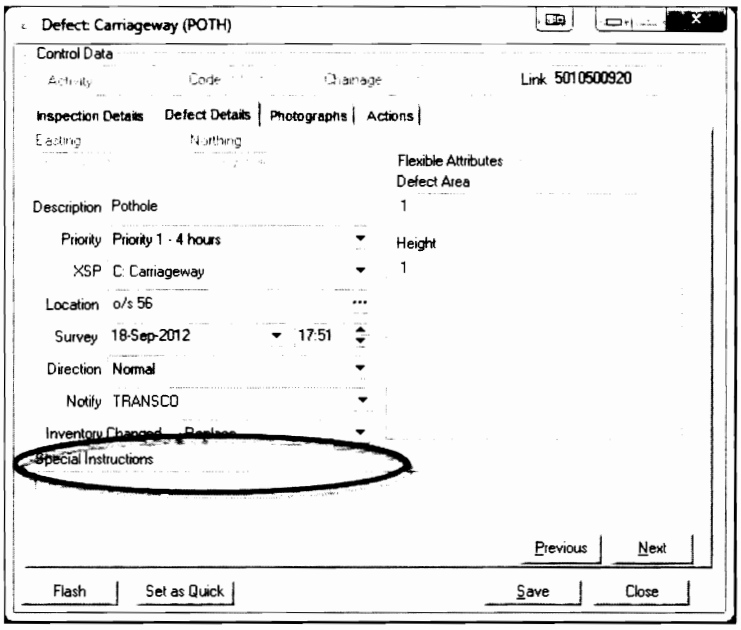
The priorities and expected repair dates can be used to monitor contractor performance to ascertain, for example, whether contracted times for repairs are being met. Some contracts impose penalties for late repairs.



6. Ability to generate strip maps, linear charts of homogeneous sections showing attributes

The Exor solution includes support for strip maps as illustrated below. In the simple example below the user has used a screen to identify a section of network; select one or more types of asset and if necessary specify one or more attributes associated with each asset (e.g. Safety Fences of a particular material). These records are then displayed in the strip map. They are color coded by asset type and also break along the length of the section if their attributes change – e.g. the carriageway asset is continuous from the start of the section to 1,300m but it has different characteristics between measures 850m and 979m.

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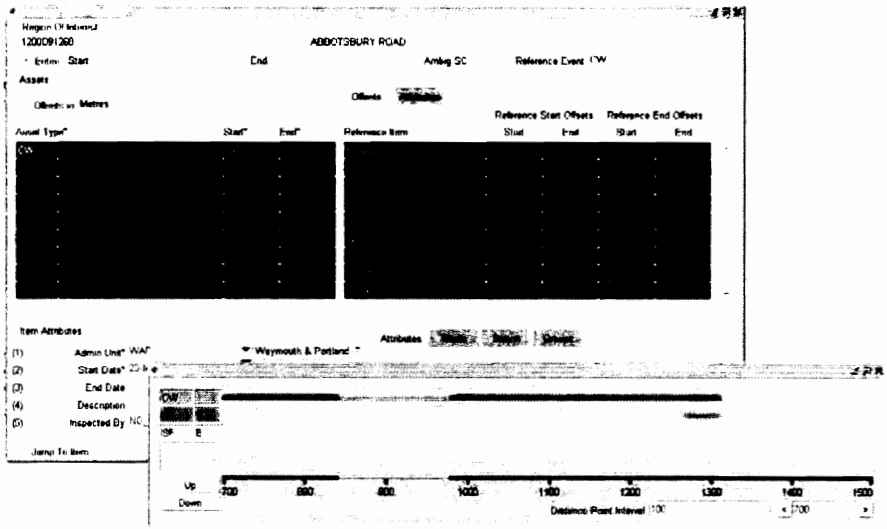

Bidder's cross references to supporting information in Technical Bid: Section A 1.4.2 (custom reporting, external systems integration), Section A 1.4.8

Tech. Require. No. 5	**Pavement Management System**	***Mandatory /Optional***
	1. General features (import/export/view/sorting/reporting/query of data)	*Mandatory*
	2. Ability to interface to prioritization tools like HDM-4 or equivalent	*Mandatory*
	3. Data aggregation/ transformation (rule based)	*Mandatory*
	4. Manual refinements of homogeneous sections	*Mandatory*
	5. Assigning default/ global/ constant values to fields	*Mandatory*
	6. Ability to interface with HDM-4. (compilation and exporting data to HDM-4 latest version and format for data analysis)	*Mandatory*
	7. Ability to interface with HDM-4 outputs (import HDM-4 outputs and display results in table/ graphical formats)	*Mandatory*
	8. Own planning analysis engine (pavement deterioration modeling, prediction, optimization, scenario under different budgets for multi-year program)	*Mandatory*
	9. Ability to incorporate alternative methodology to perform similar functions of PMS	*Mandatory*
	10. Ability to handle committed projects	*Mandatory*
	11. Ability to select multiple network, sub-network for analysis based on attributes	*Mandatory*

Bidder's technical reasons supporting compliance:

1. General features (import/export/view/sorting/reporting/query of data)

The Exor system includes the ability to load condition data based on pre-defined formats. Depending on the source data it may require pre-processing before it is presented to the Exor loaders. This would be determined during the implementation phase.

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The system has the capability to export / view / sort / report and query data as described in the responses to Technical Requirement 4. These are generic features of the Exor system.

2. **Ability to interface to prioritization tools like HDM-4 or equivalent**

Bentley offers users several approaches to PMS analysis in order to ensure our users' requirements are best met. These are described below:-

Exor PMS

The Exor PMS is built around the requirements of Pavement Analysis and provides functionality to load condition data and to undertake an analysis of the network and categorize and rank it through a condition index based approach rather than a deterioration based one.

However, Bentley is assessing new development activities which will see the system being able to provide deterioration projections as a result of market changes and later integration of the Exor product set into another Bentley condition assessment system. We would be pleased to discuss whether the existing functionality and / or enhancements s are sufficient for OWD's needs during the implementation as OWD has expressed an interest in considering alternative approaches to PMS or whether to proceed on the basis as explained in this response which is to use HDM-4.

Bentley offers users the choice of our PMS or taking advantage of the open nature of Exor and to combine the advantages of the Exor core software (linear referencing, assets and other applications) and integrate these into an external PMS as described below.

Integration into Third Party COTS PMS

We have integrated the Exor system into third party PMS applications such as dTIMS from Deighton Associates. This approach has been taken by several users as they wish to utilize the benefits of the Exor LRS and asset management capability combined with a specialist PMS solution.

The Exor solution manages the network and condition data and provides this to dTIMS. The dTIMS PMS undertakes the analysis and then outputs a set of projects / schemes back into the Exor Schemes Manager solution so that the work can be managed in an integrated environment.

Integration into HDM-4

We also provide integration into HDM-4. The integration into HDM-4 works in a similar manner to that described for other third party COTS PMS's as described above. We will need to work with OWD and the Implementation Consultant to develop the integration into HDM-4.

3 Data aggregation/ transformation (rule based)

The Exor allows the aggregation of the road inventory and condition information into defined network segments in order to adequately reflect the characteristics of the road segment. This data aggregation is undertaken using engineering dynamic segmentation and the merge query capability built into Exor. These functions have been described in the response to Technical Requirement 4 part 1.

An important feature of the Exor solution is the ability to model lanes in the highway via our Cross Sectional Position model. This ensures that data aggregation can take into account condition data being collected by road lane – for example, the inside lane of a road may be subject to greater wearing from heavy vehicles than outside lanes reserved for other traffic.

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4 Manual refinements of homogeneous sections

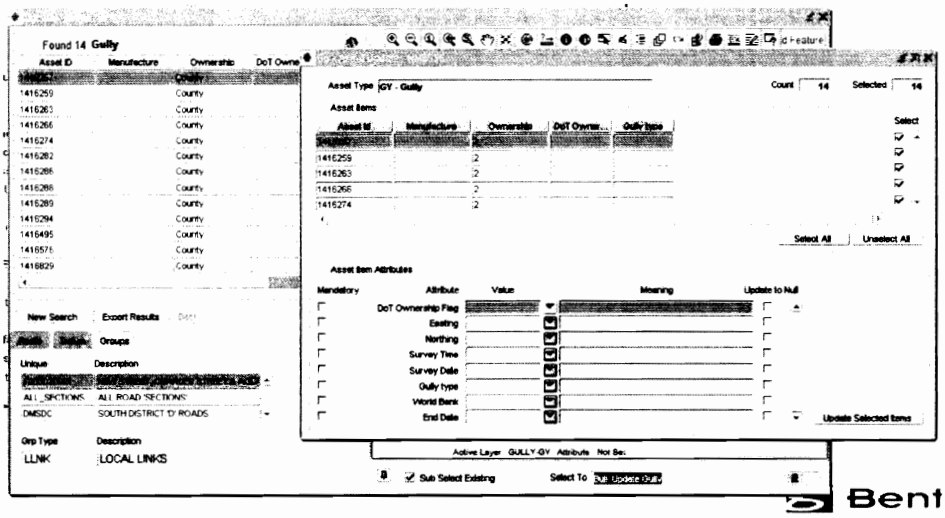
The Exor LRS provides engineering dynamic segmentation to fulfill this requirement. This capability slices and dices the network into user-definable homogeneous sections. This is described more fully in the response to Technical Requirement Number 4 Part 1.

5 Assigning default/ global/ constant values to fields

Exor has the capability to undertake global updates of asset values. This enables the user to easily undertake a bulk update of relevant data. For example, a new value might be defined for a range of data or an existing value needs to be replaced with a new value across a large data set.

These updates can be initiated via a screen or Exor's Map based Locator product. Locator provides the ability to bulk update attributes and bulk end date assets.

The screen shot below illustrates Locator's Bulk Update capabilities. Assets can be selected by route, Boolean queries and wild cards; or spatially with polygons, rectangles or nearest feature. In this case fourteen gully assets have been selected with a polygon. To update these assets the user need only reset the attribution as required and initiate the update.



6 Ability to interface with HDM-4. (compilation and exporting data to HDM-4 latest version and format for data analysis)

As noted in the response to item 2 above Exor is capable of being integrated into HDM-4. We intend to work with OWD and the Implementation Consultant on how exactly the integration should work to ensure OWD secures the maximum benefit from a joint Exor / HDM-4 PMS solution.

7 Ability to interface with HDM-4 outputs (import HDM-4 outputs and display results in table/ graphical formats)

As noted in the previous response above to item 6.

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8 Own planning analysis engine (pavement deterioration modeling, prediction, optimization, scenario under different budgets for multi-year program)

The Exor PMS provides functionality to load condition data and to undertake an analysis of the network and categorize and rank it by condition indices. It is based on a range of condition data being loaded into the Exor solution originating via Coarse Visual Inspections (CVI's) or Detailed Visual Inspections (DVI's).

For those organizations under tight budgetary restraints to manage PMS activities this approach is fit for purpose without needing to implement full deterioration modeling.

However, Bentley is assessing options to provide in a configurable deterioration model as a result of changes in the market and as work progresses to integrate the Exor PMS into an existing Bentley deterioration system. We would be pleased to discuss these options further with OWD during the implementation as initial functionality is expected to be delivered during 2013.

Bentley offers users the choice of our PMS or taking advantage of the open nature of Exor and to combine the advantages of the Exor core software (linear referencing, assets and other applications) and integrate these into an external PMS.

9 Ability to incorporate alternative methodology to perform similar functions of PMS

The Exor PMS provides functionality to load condition data and to undertake an analysis of the network and categorize and rank it by condition indices. It is based on a range of condition data being loaded into the Exor solution originating via Coarse Visual Inspections (CVI's) or Detailed Visual Inspections (DVI's). For those organizations under tight budgetary restraints to manage PMS activities this approach is fit for purpose without needing to implement full deterioration modeling.

Bentley offers users the choice of our PMS or taking advantage of the open nature of Exor and to combine the advantages of the Exor core software (linear referencing, assets and other applications) and integrate these into an external PMS.

Please see our response to section 8 above regarding the new deterioration modeling capability which will be included within the Exor PMS during 2013.

10. Ability to handle committed projects

Once the PMS has identified projects to be undertaken these are passed from the PMS into the Exor Schemes Manager software. The functionality of this solution has been described in the response to Technical Requirement 7 part 1 below.

11. Ability to select multiple network, sub-network for analysis based on attributes

The Exor solution has a sophisticated and comprehensive set of functionality to meet this requirement as described in Technical Requirement Number 4 part 1 above. In this part of our response we describe how Exor's merge query and engineering dynamic segmentation can be used to enable users to analyze the network based on use defined attributes and thereafter to create 'on the fly' dynamic sections of the network with these homogenous attributes.

Bidder's cross references to supporting information in Technical Bid: Technical Requirement 4 Part 1, Technical Requirement 7 Part 1, Section A 1.2.2, Section A 1.4.9

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Tech. Require. No. 6	**Bridge Information System**	***Mandatory / Optional***
	1. General features (import/export/view/sorting/reporting/query of data)	*Mandatory*
	2. GIS integration	*Mandatory*
	3. Ability to store multiple photographs and GPS information	*Mandatory*

Bidder's technical reasons supporting compliance:

1. Exor structures manger is a forms based application allowing users to insert, update, view and query data associated with structures. Data for both the structures asset and inspections can be imported into and exported from the system using standard routines and associated options within the forms and reports.
   The data driven approach of the system allows the customer to set up their data model to match their current data requirements with the flexibility to modify the data model over time as their requirements change.
   Each structure can be individually defined to mimic the actual structures construction and all its associated components with their associated attributes. Defining each structure improves the inspections because the engineer is only inspecting those components that actually exist within the structure.
   A number of facilities are available when defining the structure data including the ability to:
   - Import structure data from other sources
   - Using templates copy similar structures then update the data
   - Bulk update structure attribute data
   - Link structures to the road network to carry out abnormal load routing

   The inspections system allows the definition of any inspection type and associate interval with the ability to set up hierarchical inspections to cater, for example, for Principal inspections taking place every 6 years and General inspections taking place every 2 years with the Principal inspection taking precedence over the General inspection.

   The inspection scheduler will schedule the inspections spanning a number of years if required.
   The inspection regime can be customized for individual bridges if required.
   There is a facility to copy previous inspection results for a structure to speed up the entry of an inspection, once the copy has been carried out the user confirms each record instead of entering them from scratch each time.

   The inspection results (severity and extent) are used in the calculation of the Bridge Condition Indicators for each structure and for the structure stock as a whole.
   Structures links to Maintenance Manager work orders allowing the user to use the full facilities of the work ordering module including:

   - Creating and copying work orders and work order lines
   - Use structures specific contracts for appropriate contractors
   - Associate Schedule of Rates items to the work order lines
   - Maintain the estimated and actual costs for work carried out
   - Automatically link the work orders to the contactors work order system so the Exor system is automatically updated on completion of the work.

2. Exor structures manager stores the location of the structures in two ways
   a) By network location with a start and end chainage, this allows the structure to be displayed as a linear item within the Locator GIS

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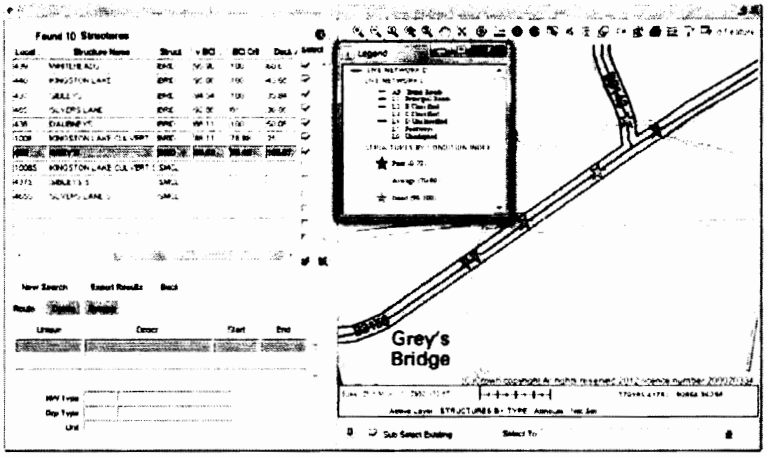
ii) By x and y co-ordinates allowing the structures to be displayed as point items within the Locator GIS.

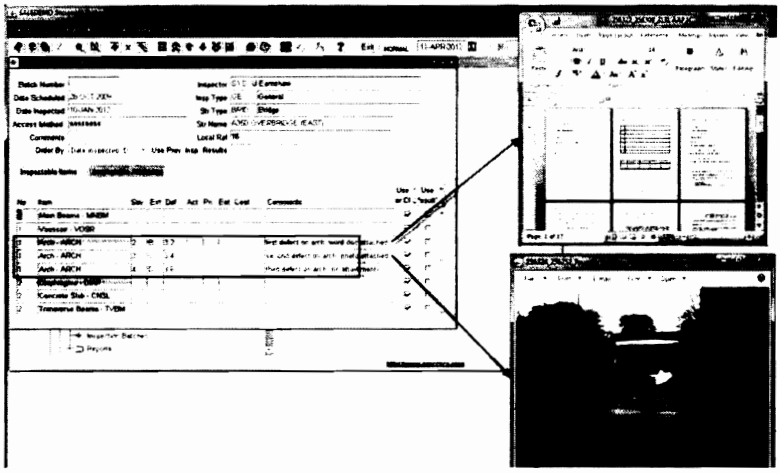
The structure and inspection results etc. can be displayed in a number of ways in locator including thematically by Bridge Condition Indicator as shown below:



3. Exor structure manager allows the storage of multiple documents of any type against:

- The Structure Asset
- The Structure Inspection
- The condition and defect record for each component
- The work order
- The work order line.

An example of documents being held against the condition and defect record is shown below:



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Tech. Require. No. 7	**General Features**	***Mandatory / Optional***
	1. Data input requirements (ability to accommodate strategic to project level data requirement)	*Mandatory*
	2. Validation mechanism and data entry (bulk data import/ export)	*Mandatory*
	3. Reporting and query capability and ability for custom building reports	*Mandatory*
	4. Extent of customization required (indicate the time required for COTS software to conform to the O-RAMS requirements)	*Mandatory*

Bidder's technical reasons supporting compliance:

1. **Data input requirements (ability to accommodate strategic to project level data requirement)**

Exor can accommodate strategic to project level data input. It does this via a number of ways including the Exor PMS system and Schemes Manager application. Schemes Manager enables recommended schemes or projects arising from the PMS analysis to be thereafter managed within Exor.

Schemes Manager can be used to integrate annual work programs across all assets; typically integration of pavement and bridge management forward works programs.

Schemes Manager can also be used to integrate with the annual maintenance work program; which we will be an output from the dTIMS analysis.

Scheme Manager has been developed to manage an agency's asset management plan. It is specifically designed to bring together forward works programs from bridge, pavement, and other planning applications into an integrated, comprehensive, and cohesive list of works from these different systems. The screen shot below shows the Schemes Manager main window opened at the details tab. Schemes Manager allows the user to define the type of scheme, its status, name and comments, admin unit, targeted and actual start and end dates and other data as shown below. As shown in the adjacent map, a scheme can cross more than one asset. In this case, 3 road assets are included in the scheme.

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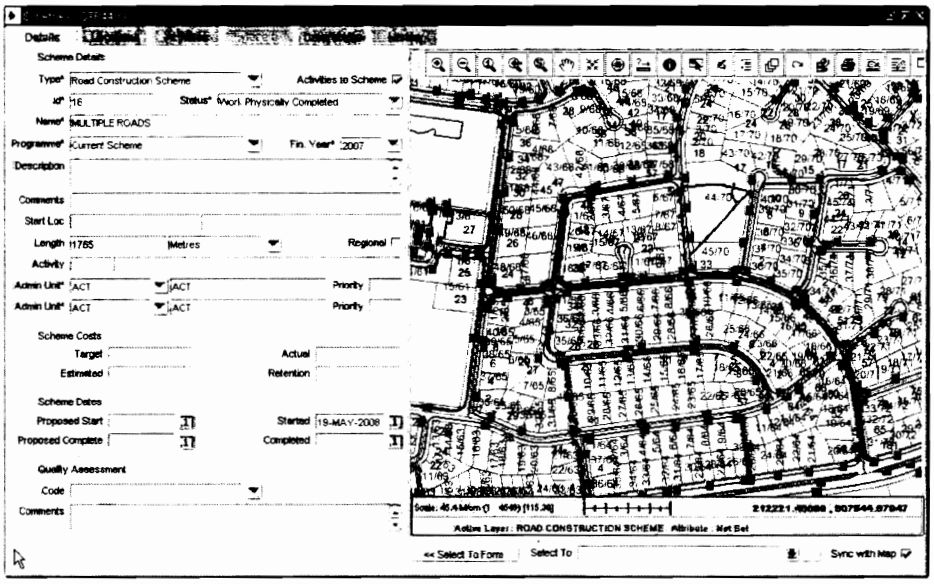

The Locations tab is used to identify what assets are to be included in the scheme.

The Schemes Activities tab is used to describe what changes to data are made as a result of the activities. This can include changes to *construction history* data and resetting condition data. This is an important feature as it ensures that subsequent PMS analysis in the future will be based on accurate construction data. Activities are database procedures built by Bentley to fit client requirements for database updates that result in completion of an activity. Two standard activities include skim and fill. Skim uses information entered into the right bottom part of the form to remove a certain thickness of material from the construction history when the work is completed. Fill uses information, again entered at the bottom right window, to add new layer information to the construction history file.

During implementation Bentley typically identifies those procedures needed to run against and update data as a result of the construction process.

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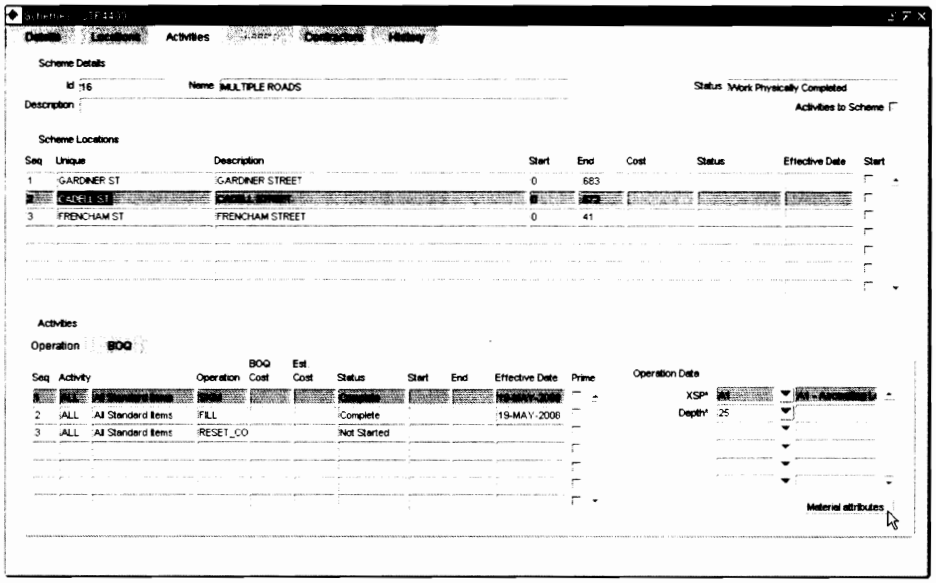

As can be seen from above Schemes Manager is an ideal tool for use in managing strategic level data through to projects.

2. Validation mechanism and data entry (bulk data import/ export)

The Exor solution utilizes a number of approaches for input validation. In general as a forms application the validation is performed at the database level with some validation also provided at the client level for usability purposes. The Exor solution benefits in terms of performance by handling most of the validation at the server especially in a web based environment.

Whenever invalid values are entered by the user a warning panel is displayed to inform the user. The following screenshot shows the type of warning given when a user attempted to enter an invalid sign post type of "DD"

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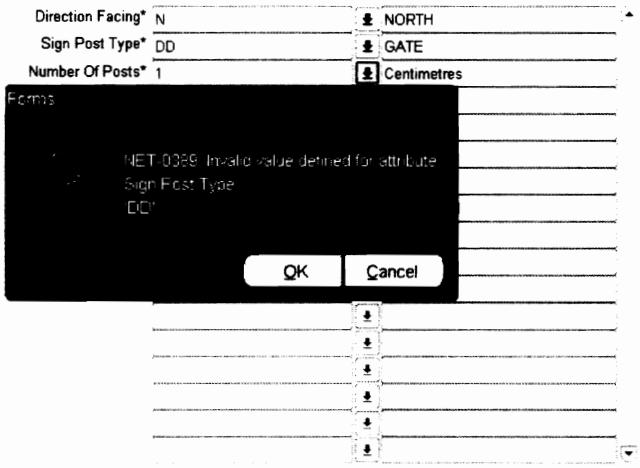
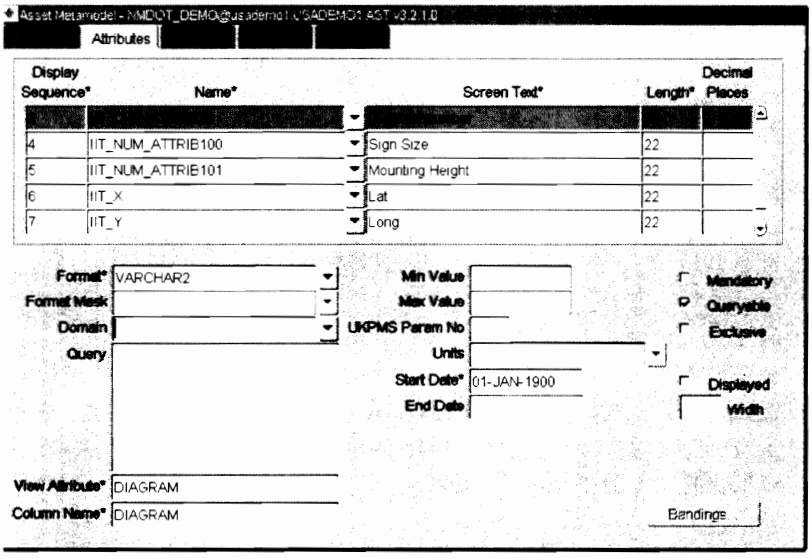


User pick lists are also utilized wherever possible to ensure that users are required to select from valid values therefore ensuring data validation. These user picks are controlled by authorized systems administrator level users.

The same principle applies to the definition of attributes against an asset type. These can be set up and modified by administrators and the system will use the dynamically use this data to validate data.

This is illustrated in the screen shot below where user defined attributes are configured. In this form the administrator can determine whether the field is based on look up values, minimum and maximum values, masks etc.



In addition to these simple types of validation the Exor application also provides business rules that can be defined by the administrator. This includes for example the ability to ensure that certain types of inventory uni[illegible]ous along a route or are unique preventing duplicates at the same offset and cross

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sectional position.

These business rules are validated during direct data input and bulk loading and often highlight during the implementation of Exor inconsistencies and issues in the existing databases that need to be addressed before data can be loaded into Exor.

Bulk Loading Inventory Data

Bulk loading of inventory data is accomplished utilizing Exor's loader, a generic load module which allows data to be loaded into any of the tables within Exor. For example it can be used to load asset item data, network data, and document associations within Document Manager, or asset domains and Lookup values.

Exported records can be loaded in to different ways. One is fully automated as soon as the export files hit the server, the other a manual process. However users can utilize a combination of the two allowing the system to automate as much as the user requires.

Once a record has been imported all attributes including those specified are loaded and available to all authorized users.

If as part of either process a failure occurs these will be flagged to the user and if required emails can be triggered to an individual or group to notify them that an error has occurred.
Standard forms allow the user to easily correct the errors rather than having to search and edit the raw data files. An example of the error correction form is below.

Data is only loaded if it fully complies with the user defined metadata model which includes the option to allow or disallow multiple assets at the same location.

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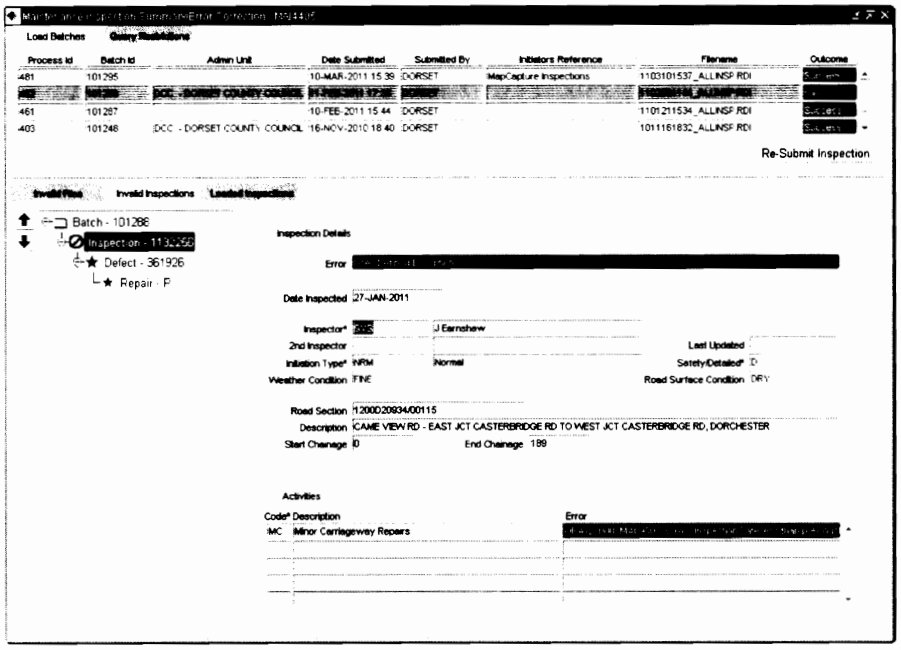

All data is validated upon loading this includes duplication of assets, validation of pick list values, mandatory fields and other data as specified in the user defined metadata model. The screen shot below shows a failure in a load file due to a missing field within a record.

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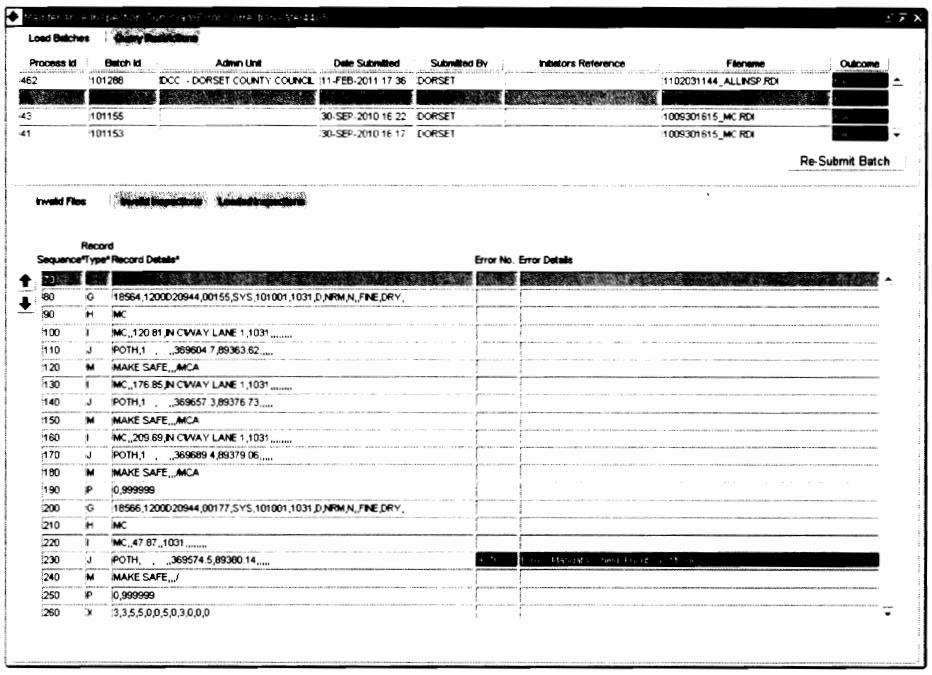
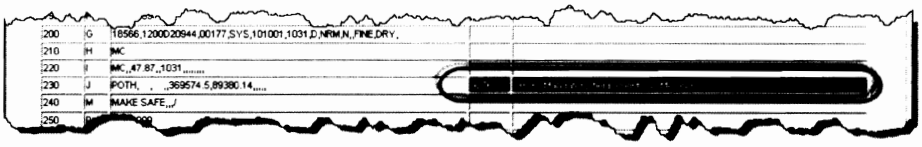
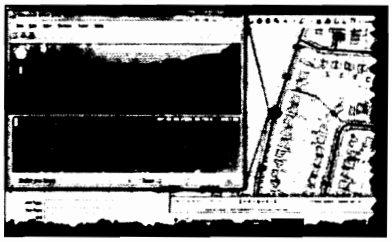


If errors occur during a load process then meaningful error messages are displayed to the user as shown in the screen shot below 'Error: Mandatory field, Priority, is Missing'. These error messages are not only shown to the user within the forms but can also be integrated into emails sent to the user(s).



Any electronic media can be associated to any record within the solution including but not limited to assets, defects, works orders, public enquiries, structures etc. These documents can also be geo-tagged if required.



3. Reporting and query capability and ability for custom building reports

A summary of the reporting capability is provided in Technical Requirement number 4 above. This res[illegible]ws that the Exor software includes a variety of means for querying and reporting on data.

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Access is provided via screens which can include the ability for users to build up a query and then retrieve matching records to the screen and / or to run reports.

The Exor solution includes a variety of standard reports as well as the ability for users to write their own with or without assistance from Bentley once training has been undertaken. The Exor system includes Oracle query tools and Bentley provides a number of productized views of the database which reports drive against.

In addition to the Oracle query tools Bentley provides an Executive dashboard which can be used to display reports in a variety of formats (bar charts, histographs etc.) with full drill up / drill down capability. This dashboard is extremely useful for day to day users as well as others who may need to access information but who do not need to use the main system. Such users could be managers and directors within the user organization. Information Manager can also be used to provide information to external agencies or the public in a controlled manner.

Custom reports can be built using Bentley Professional Services consultants (for a fee) and / or OWD staff can be trained to write their own. These reports are based on supported views of the underlying database which Bentley makes available for reporting purposes.

Access to data via reports is subject to the same user security restrictions that would normally apply to the user.

4. **Extent of customization required (indicate the time required for COTS software to conform to the O- RAMS requirements)**

   Bentley Systems is not proposing any customization to meet the O-RAMS requirements,

Bidder's cross references to supporting information in Technical Bid: Section A 1.4.9

Tech. Require. No. 8	**Application, Database and Technology**	***Mandatory / Optional***
	1. Historical data management and storage (including issues for resolving location reference changes)	*Mandatory*
	2. System architecture (Web-based for each of the versions including ability to switch to offline mode) [also specify supported modes egg. Desktop, Client-Server etc.]	*Mandatory*
	3. Database technology used and ability to integrate other internal and external applications/ database (specify supported databases)	*Mandatory*
	4. User access & security (role and jurisdiction based access)	*Mandatory*
	5. Experience of installation	

Bidder's technical reasons supporting compliance:

1. Historical data management and storage (including issues for resolving location reference changes)

The Exor software manages data on an historical basis and this includes resolving locational reference changes. In our response to Technical Requirement Number 3 we detailed how the Exor solution uses the concept of Effective dates (Start and End dates) on key data elements such as network, assets and meta data.

These dates enable the system to maintain a history of changes over time and also enable a user to roll back the data to any given time to see how the data was at that moment. This is a powerful feature for reporting purposes.

[illegible] user specifically requests to view historical, end dated data, then they only see current

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information which avoids any confusion or information overload. Within Technical Requirement Number 3 there is also an explanation of our network editing functions. These functions preserve data integrity as network changes take effect. For example, if a section of network was split at a particular point to introduce a new node the system end dates the original section and creates two new sections with measures either side of the new node. It then ensures the data is correctly referenced based on the new section measures. This functionality is vital and any data associated with the section will be correctly aligned.

If OWD proceed with the development of the RMMS separately integration Bentley recommends that it is essential the Implementation Consultant integrates into this network functionality.

The Exor system uses the Oracle database for storage purposes and this provides a huge repository for data limited only by the server capacity.

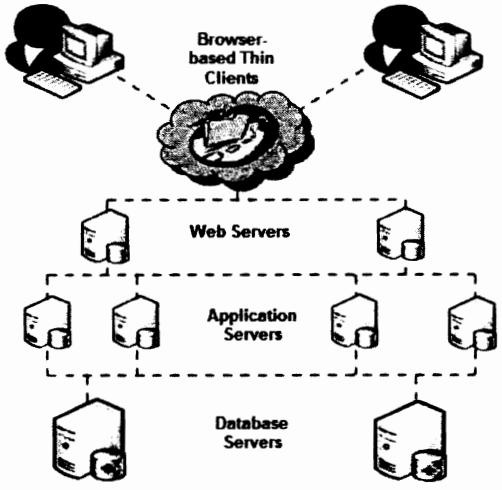
2. System architecture (Web-based for each of the versions including ability to switch to offline mode) [also specify supported modes eg. Desktop, Client- Server etc.]

The Exor software is web enabled to support its use in a modern IT environment. We are able to put mapping on to end users' desktops over the web much cost effectively through the use of Exor Locator which serves spatial data from within Oracle Spatial or via WMS.

Spatial Manager operates in client-server mode due to the underlying ESRI technology (ArcGIS9.3). However, Spatial Manager is a spatial network and asset editing tool and is typically used by a small number of users within an organization due to the specialist nature of this task and the need to ensure data is properly controlled and managed. An emulator could be used to enable it to operate over the web as well.

The software can be run over the internet, intranet and / or on a desk top client server basis.

The mobile software used for ad hoc asset collection on site and inspection purposes (if used with the Exor RMMS) operates typically in offline mode. This is because of potential connectivity issues in many rural areas. Data downloading and uploading is done when the user is able to connect to the system remotely.



The Exor software is implemented on an n-tier architecture which supports its use over the internet as illustrated in the diagram on the left. The exact number of servers required at each level in the architecture is dependent upon the number of users; their activities and the volume of data processing required..

The diagram below illustrates a typical environment. The database server stores both the Exor Hub and application databases including the spatial data. This information can be linked to existing map stores so that spatial data held outside of Exor can be displayed as themes.

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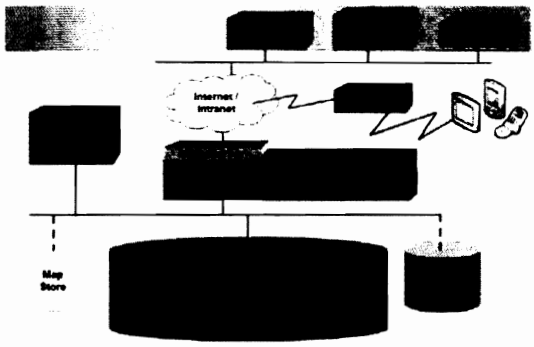
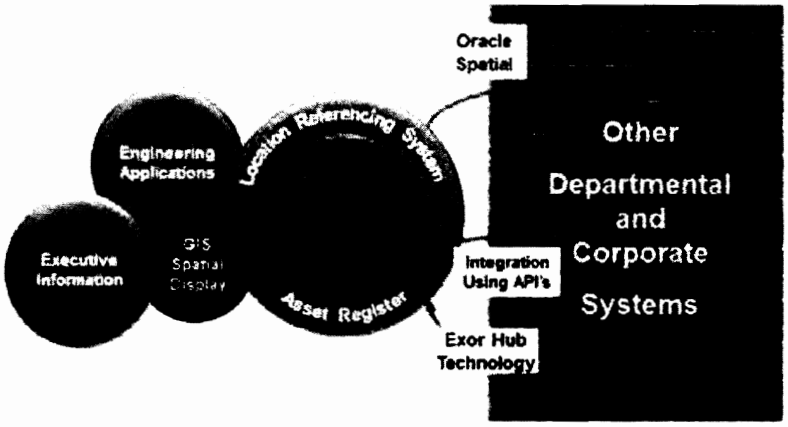


The application / web server stores middle tier technology software required to run Exor over the web and to serve data spatially. The client / server connection is required to support the operation of Spatial Manager a specialist spatial network and asset editing tool.

Users access Exor over this architecture using an internet browser. This also enables other organizations to access the system, for example, third party contractors to access work assigned to them by their client. Finally, third parties such as regulatory bodies or members of the public can be provided with access to the system e.g. to view KPI reports or to report defects on the network.

3. Database technology used and ability to integrate other internal and external applications/ database (specify supported databases)

The Exor product is based on Oracle technology (currently Oracle 11g) and is modular based which enables it to be implemented in phases over a period of time. Central to the Exor product is the Exor Linear Referencing System Hub (Exor LRS Hub). The Exor LRS Hub sets the foundation for not only Exor business applications but for links into other critical business systems. The Exor LRS Hub allows for the creation of a virtual data warehouse linking business data together and providing for a 'single source of truth' for data analysis and reporting allowing meaningful business information to be created and shared.



The Exor LRS Hub provides an immediate COTS solution for the core AMS with the benefit that existing and new additional business systems can operate in a best of breed environment to suite current and future business practice.

It is this hub ability that appeals to current and prospective customers who have had the vision to realize that implementing a core linear network and asset repository avoids the issues of a silo approach that many organizations are striving to move away from. This is achieved through the ability to access ext[illegible] using APIs and virtual tables, and retrospectively access external systems to locate the

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external data against this same network.

An important factor of all Exor applications is the spatial enablement. This is uniquely embedded within the solution. In the past spatial data has often been considered a totally separate application to be handled exclusively by a GIS. Times have changed, technology has changed. Using Oracle Spatial enables the business data to be fully spatially enabled at source with a spatial representation for all data in the hub including the linear network and associated data, including road condition data, assets (culverts, signs, barriers, trees etc.). This spatial functionality is provided through the use of Servlets that allow maps to be viewed inside web served forms simply and efficiently.
The hub and spatial abilities of the Exor application are our key components in the strategy for AMS. However one should not underestimate the importance of the actual business systems themselves that collect and manage the business data on a day-today basis. Bentley can offer a number of high quality business applications that operate in tandem with the Exor LRS Hub.

Foreign Tables: Bentley is committed to making data more accessible by creating information and knowledge flows across and beyond the enterprise. With this in mind, the functionality of Exor's Foreign Table functionality now allows objects and data defined outside of the Exor Database to be included within it, effectively a 'virtual' object. These virtual objects can be treated in the same manner as other assets for mapping, reporting or works management etc. This allows organizations to create a single view of ALL their asset and related data regardless of where these data reside – a unique concept in the Exor solution.

API's and Web Services

Functions and procedures embedded within the Exor LRS Hub are available through and open Application Programming Interface (API) allowing users to develop links from existing systems into the Hub. This is an important feature in allowing for not only consistency between business applications and data, but also to allow other business systems and BI tools to leverage the integration benefits the Exor LRS Hub brings, and to make use of the advanced network analysis tools available from the linear referencing and spatial engine. Increasingly these APIs are being revealed as Standard Web Services allowing for simple interfacing into other applications within SOAP, .NET and J2EE environments.
Product API's include:-

- Financial Interface Manager (FIM) – for integrating financial data in Exor to corporate financial systems (e.g. budgets for works ordering purposes)
- Contractor Interface Manager (CIM) – for integrating works order data in Exor to a contractor's works management system to enable orders to issued and completion information to be received electronically
- Enquiry Manager interface – for integrating a corporate CRM or web site into Exor's Enquiry manager application to enable public complaints / issues to be recorded and tracked within Exor.
- Traffic Manager Interface – for integrating traffic data such as AADT data into the Exor application. An external Traffic System collects the raw traffic data and performs an analysis of this information. Summary traffic data can then be imported into Exor via this interface which will need configuration during the implementation.

It is noted that OWD currently propose not to adapt COTS products in the areas which FIM, CIM and Enquiry Manager Interface operate so these interfaces may not be relevant to your needs. However, they are referenced to demonstrate our commitment and ability to integrate Exor applications into other local syste

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4. User access & security (role and jurisdiction based access)

All Users must possess a Passport to use one or more of the licensed Services. Elevated access rights are provided through additional Visas (either Contributor or Configurator) which are used in conjunction with a Passport.

- A Passport provides the rights for a User to View, Print and Report on provided Services.
- A Contributor Visa provides the rights for a User to Create or Modify business data, including deletions and end dating where permitted by the application. For example, a User needing to create a works order will need a Contributor Visa. A user who needs to edit the underlying network will also require a Contributor Visa.
- A Configurator Visa provides the rights for a User to undertake systems administration tasks such as create new Users, configure User access rights, create and modify Meta data and system configuration parameters. A Configurator Visa is required to allow Users to manage the audit facilities of the provided Service.

Note that ***Passport, Contributor*** and ***Configurator*** provide the licensing rights only; actual rights remain subject to the information rights configured within the security model.

The Exor solution has a comprehensive user access and security regime based on jurisdictional / organizational, network and asset data as detailed below.

The Solution supports multiple Admin Types, which can be used to impose different security regimes on different Asset or Network Types. District Admin Unit security on Network Data is imposed on a user by virtue of the Admin Unit(s) and mode of access the user has been granted. For example a district user could be granted access only to data within that district whereas a user at State level may have access to all data within the State. Privileges associated with this access (READONLY, NORMAL) provide another layer of security. Data security can be more granular e.g. based on asset types as described in the example below.

Users may be allocated access to ALL Network data irrespective of the Admin Units granted, i.e. all Groups and Datum Network Elements may be viewed in READONLY mode, but will only have NORMAL access to those Groups or Datum Network Elements with Admin Units to which the user has been specifically been granted NORMAL access. A user will not be permitted to update a Group or conduct a Network operation, e.g. Split, on any part of a Network with an Admin Unit to which they have not been granted NORMAL access.

Additionally asset information can be used to further restrict a user's access, for example, in a Region or District one contractor may be responsible for Signs whilst a second contractor may have responsibility for Traffic Signals. The Sign Contractor may not need any access to the Traffic Signal Items and similarly the Traffic Signal Contractor may not need access to the Sign items. Assigning these two Asset Types different Admin Types and granting the appropriate Admin Units to a User will ensure that only the required Asset Item Types may be accessed by the different 'sets' of users even though ALL the Asset Items are located within the same Region or District.

A user may be granted access to one or more 'Admin Units' of different Admin Types. This will also determine the mode of access the user will have to an Asset item.

Although [illegible] has excluded the RMMS requirements from this RFP, as the Implementation Consultant

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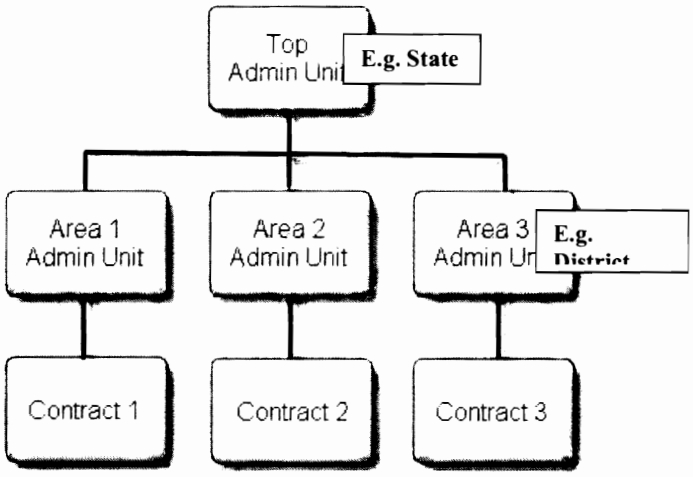
will develop this solution and it will be integrated into the RIS, it is worthwhile highlighting how the security within the Exor solution can be applied to control access to contract information as part of the RMMS' processes assuming a user is using Bentley's Exor RMMS solution or the integration has been designed to have access to this security.

If each Admin Unit only has 1 Contract associated with it (and therefore only 1 contractor) it is sufficient to restrict access to Contracts via the Contract Admin Unit and the Contractor Users Admin Unit i.e. the User created to allow the Contractor to access the system would be given the Admin Unit of the area in which they are contracted, thus allowing them to only see Contracts, Work Orders etc. relating to that area.



The Contractor User security mode is designed for more complex situations. For example, more than one Contractor works in an Admin Unit or a Contractor Works in several but not all Admin Units at the same level. The Contractor can be associated with Roles and/or individual Users. This allows the creation of a set of Users who have access to any Work Orders etc. on any Contracts associated with the Contractor.

Roles and/or Users can be assigned to multiple Contractors allowing, for example, the creation of a Role associated with all Authorities Users and assigned to all Contractors i.e. Users that can view/create Work Order etc. for all Contracts.

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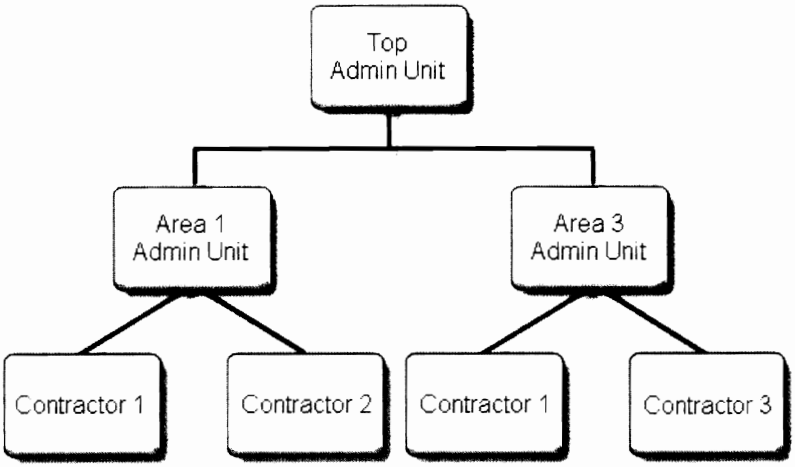
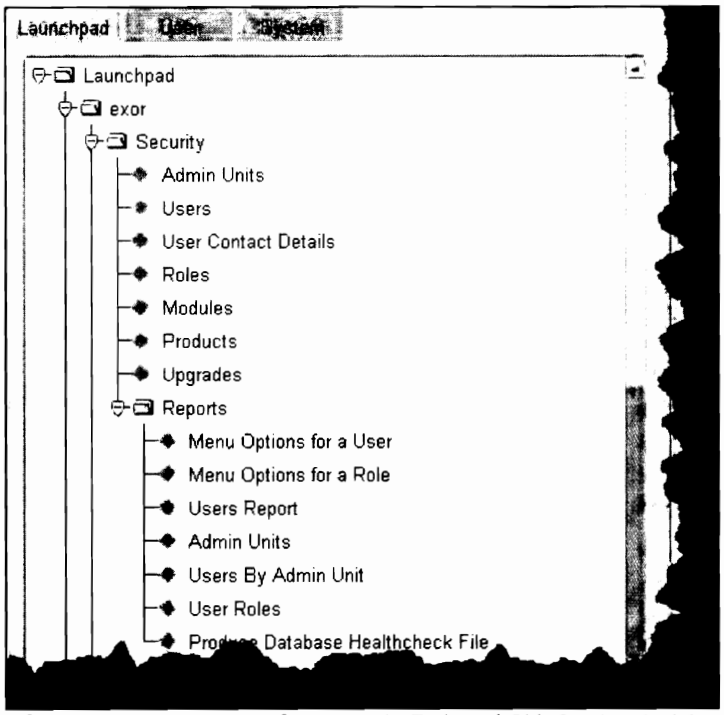


The system can also easily allow system adminstrators to identify who has access to the system and the level of access they've been granted.
The solution has a number of reports for this purpose as can be seen in the screen shot below:-



Bidder's cross references to supporting information in Technical Bid: Section A, 1.1.1, Section A 1.2.4 (Traffic Information System), Section A 1.4.2 (security), Section A 1.4.2 (architecture), Section A, 2.4.2, Section B 2.4.0

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V. Bentley Response to General Conditions of Contract and Special Conditions of Contract

Order Placement: Bentley Systems India Private Limited
203, Okhla Industrial Estate, Phase-III
New Delhi –110020
Ph: 011-4902 1100
Fax: 011-4902 1199

1. **Delivery:** As per terms of bid document.

2. **Validity:** The bid is valid for 120 days from date of bid submission.

3. **Scope of maintenance:** As per Bentley Select Agreement.

4. **Duties and Taxes:**

   i) There is 12.36% Excise Duty and 5% CST on Product/COTS Software and 12.36% Service tax on AMC, Training, Assistance for configuration support,
   ii) There is 5% CST and 12.36% Service tax applicable on supply of Full Use RDBMS license.

   In case of revision, all taxes etc. as applicable at the time of billing will be charged.

5. **Payment terms:** As per terms of bid document in favor of "Bentley Systems India Private Limited' through DD, Cheque or NEFT/RTGS.

6. Consulting days will be eight hours each (from 9.30am to 5.30pm).

7. The parties agree that if there are any additional or different terms or conditions appearing on any PO(s) issued to Bentley by your organization after the date of this proposal, any such additional or different PO terms or conditions shall not apply to the products and services described in this proposal, even if Bentley executes the PO and/or even if Bentley processes the order. For any of your organization's additional or different terms or conditions to be binding on the parties (whether appearing on a PO or otherwise), the parties agree to implement any such additional or different terms or conditions via a separate written agreement only; otherwise no such terms and conditions shall apply to the project described in this proposal.

8. The scope of services in this proposal is based upon information provided by your organization via the aforementioned RFP. Circumstances not contained in the provided RFP, or otherwise unknown to Bentley, may require an addition to the proposed scope of services. Moreover, any additional work that you may engage Bentley to execute will be subject to either a separate proposal or change control, and pricing where any discounts offered herein may not be available irrespective of whether it is completely new work or related to works delivered on the basis of this proposal.

   - Once OWD have accepted this proposal, Bentley will commence work in accordance with this proposal. If after commencement of the work described in this proposal, however, OWD properly [illegible] to terminate the project, OWD will still be invoiced by Bentley for the following:

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- All remaining time that Bentley has worked on the project that has not yet been invoiced.
- All costs already incurred by Bentley that have not yet been invoiced.
- Any and all non-refundable costs for which Bentley may be liable.

9. **Responsibility of OWD:** It is the responsibility of OWD to provide the necessary hardware and Pre Requisite software including operating system version, as recommended by us at the time of Installation

10. **Software License Agreement:** By Ordering the Software itemized in this quotation you agree to be bound by the terms and conditions of the Bentley Software License & SELECT Agreement.

11. All other terms & conditions of bid document are accepted.

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VI. Appendices

1. **Certificate of Incorporation**
2. **Articles of Association**
3. **Documentary Evidence of Financial Capacity**
4. **Documentary Evidence of Experience**
5. **SELECT Agreement**
6. **Product Brochures and Case Studies**
7. **Manufacturer's Authorization**

VII. Tender Fee and Bid Security

Please find it enclosed in a separate envelope along with Original Bid Documents Envelope

BENTLEY SYSTEMS INDIA PRIVATE LIMITED * New Delhi Office

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BENTLEY SYSTEMS INDIA PVT. LTD.
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Phase-III, New Delhi - 110 020 India
T +91 11 4902 1100
F +91 11 4902 1101
[redacted]

Bentley
Sustaining Infrastructure

Manufacturer's Authorization

Date: 18-12-2012
ICB No.: ***PMU-WB- 35/2012/AMS COTS***

To:
Chief Engineer, World Bank Projects, Odisha,
O/o Engineer-in Chief (Civil), Odisha,
Nirman Soudha, Keshari Nagar Unit-V,
Bhubuneswar-751 001, India

WHEREAS

We *Bentley Systems India Private Limited* who are official manufacturers of software, namely EXOR, Microstation, STAAD Pro, MXROAD etc., having its registered office at 203, Okhla Industrial Estate Phase III, New Delhi-110020, India, do hereby authorize *Bentley Systems India Private Limited* to submit a bid the purpose of which is to provide the following Goods, manufactured by us **{"EXOR" - *Commercial Off-the-Shelf (COTS) Software for Odisha Road Asset Management System (O-RAMS)}*** and to subsequently negotiate and sign the Contract.

We hereby extend our full guarantee and warranty in accordance with Clause 28 of the General Conditions of Contract, with respect to the Goods offered by the above firm.

For Bentley Systems India Pvt Ltd,

Name: *Atanu Pattanayak*
Managing Director

Dated on _____ day of _____, _____ *[insert date of signing]*

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ORACLE®

December 20, 2012

TO WHOM IT MAY CONCERN:

Bentley Systems, Inc., 685 Stockton Drive, Exton, PA, 19341, is an OPN Gold member in good standing within the Oracle PartnerNetwork (OPN). The Bentley Systems, Inc. membership includes worldwide membership rights. The firm's annual program membership will expire March 13, 2013. Mark Allain is the Primary Administrator for the firm's OPN relationship.

To learn more about Oracle PartnerNetwork visit: http://partner.oracle.com/.

Sincerely,

Daniel P. Lyndgaard
Sr. Director,
Worldwide Alliances & Channels

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Phone: +1 770.751.7764

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Case Study: Gloucestershire Highways

Gloucestershire Highways Proactive Asset Management Strategy

Scott Tompkins, Asset Manager, Gloucestershire Highways

"Not only is Exor a good planning tool, it's also very good at proving what we've done, and how quick we've been. It helped us build the business case for a £16.5 million claim for infrastructure funding with the DfT (Department for Transport).

"Now, we can both show what we've achieved and also hone in on any areas that may need improvement."

Come rain or snow... Gloucestershire's highways infrastructure has been under the weather in recent years, but thankfully a proactive asset management strategy has kept the roads open!

During the winter of 2008/9 Gloucestershire Highways, a partnership between Gloucestershire County Council and its highways contractor Atkins, was confronted by the most severe winters to hit Britain for more than two decades.

This was preceded by the summer floods of 2007 in which the county saw all its major road and transport routes closed, coupled with the loss of a local water treatment plant and threats to two of the County's power stations, plummeting the region into the UK's largest peace time emergency since World War II. Surface runoff caused significant damage to the highways network and it had to be managed, funded and rebuilt.

UK's Largest Highway Authority

Gloucestershire Highways maintains over 3,300 miles of roads making it one of the UK's largest Highway Authorities. The asset management strategy and the technology that underpins it have proven critical to how Gloucestershire Highways has survived these natural disasters in recent times.

Key to the successful management of its network is a strategic technology partnership with Exor Corporation and its founders, which dates back to the mid 1980's. This enduring relationship has seen Gloucestershire Highways at the forefront of technology advances over the last two decades. And both have been pioneers of asset management strategies, which in the last few years have seen Gloucestershire Highways cope with extreme weather patterns affecting its Highways assets.

Prior to the severe weather events in 2007 Gloucestershire Highways dealt with approximately 20,000 potholes annually. During 2008/9 Gloucestershire Highways identified 30,000 potholes for repair. The number is still increasing and during this financial year 18,000 potholes have already been identified and repaired. If this number is factored for the year of 2009/10 the figure could rise to 43,200 potholes. Approximately 25% of these were reported by the public.

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Case Study: Gloucestershire Highways

Scott Tompkins, Asset Manager, Gloucestershire Highways

"Our vision is that a manager will be able to press a single button to get all of the information he or she needs on a road – when it was last inspected, the number of street lights and gullies on it, whether works are planned, and the budgets involved. We're almost there now."

Exor helps to manage the repair work from the initial report from the Safety Inspector or member of the public, the raising of the works order for the repair to be programmed and the record of the completion time and notes. This provides a clear audit trail from when the problem was reported to the repair which provides evidence in the defence of claims.

Infrastructure Visibility

The strategic relationship between Gloucestershire and Exor began in the mid 1980s, when the council's County Surveyors Department, as it was then known, was looking for clearer management information. This required linking local roads to maps, and the creation of a routine maintenance management system (RMMS) – a database of information about the geographical position of the road network, maintenance requirements, required resources for planning maintenance works, and the performance of the maintenance contractors.

The resulting solution, RoMIS, has Exor highway maintenance management software at its core. The fact that the software has been developed specifically for highways maintenance management, rather than general information management, is crucial to its success.

Customer Focus

In response to National Government's improving accessibility to services initiative, in 2006, a corporate decision was taken to introduce a 08000 number for highways calls. The aim was to provide increased accessibility to the highways service for reporting simple problems such as potholes and street lights. As part of the Corporate Contact Centre the operators would use the council's main customer relationship management (CRM) system which would send information to Exor Public Enquiry Manager (PEM) as the back office system. This enabled the County Council to log and manage all enquiries alongside all other public request logging and develop a database of all customers who contacted the Council.

Rapid Response

But this merger with general Council enquiries came at a price. Councillors, in particular, began to notice it was becoming harder to get a rapid response to their enquiries. Delays were introduced, and first-hand information was proving harder to come by. In addition to this, the complexity of the enquiries following the floods increased, with many of the enquiries relating to flooding and drainage problems, which require more intricate solutions.

The frustration became significant enough for Councillors to fund a 12-month trial, whereby the original area-office systems would be reinstated, using Exor Public Enquiry Manager. The 08000 number would be routed to the most appropriate area office based on the caller's STD (subscriber trunk dialling code).

"The corporate contact centre is a catch-all service, and is not staffed by people with highways expertise," explains Howard Brewer, Environment Directorates Applications and Systems Coordination Manager at Gloucestershire County Council. "Exor Public Enquiry Manager (PEM), on the other hand, is specifically designed for highways maintenance management, so it can capture and process information very quickly."

Since the Council is driven by targets for responsiveness, a degradation in service was not acceptable. Over a three-month period from April 2009, Gloucestershire Highways has logged 22,451 records relating to incident reporting and enquiries from Councillors and the general public.

Case Study: Gloucestershire Highways

Scott Tompkins, Asset Manager, Gloucestershire Highways

"What's not widely publicised is how well the authority handled what was one of the UK's largest peace-time emergency operations."

Service-Level Agreements

Reports of potholes, one of the hottest issues, are inspected within 5 working days. Flooding or other emergencies and serious incidents, such as those caused by road traffic accidents, fallen trees or oil spillages, must receive a response within just two hours. These are among the key performance indicators by which Gloucestershire Highways is measured.

Within these tight timeframes, the reported problem must be logged and converted to a work order, which is fed to the highways contractor, Atkins.

Using the Exor software, the process of raising an emergency works order has been automated from the entry of the initial PEM enquiry. The works order is then posted to the FTP (file transfer site) where Atkins picks up the report and deploys the gang. This process takes approximately 4 minutes. In addition to this the Traffic Management Act compliant notice is sent automatically. Such efficiencies rely not only on the specialist nature of the Exor applications, but on the ability to integrate information from a wealth of different sources to build up a holistic picture of Gloucestershire Highways' road infrastructure and associated assets.

Right of Way Integration

Currently, the Council is working to integrate public-right-of-way data – formerly managed at a departmental level - with the central highways repository, so that maintenance requirements on stiles and small bridges can be planned alongside works on roads.

Integrating Exor's Public Rights of Way (PROW) solution with Gloucestershire Highways' other Exor applications will bring new efficiencies, for example making it easier to allocate calls between departments from a single solution.

Indeed, Gloucestershire County Council is one of Exor's first PROW customers, the solution having been developed on a partnership basis, thereby providing an excellent example of local government and private sector collaboration. Here, Exor has worked very closely with Gloucestershire County Council using the latter's specialist expertise and Exor's industry and IT knowledge to provide the required solution.

"The idea is to reduce duplication and make us even more responsive," Brewer explains.

Although each maintenance and management team has its own KPIs and reporting mechanism, the Council is able to draw all of the information together over the top of these individual systems, for more holistic measurement and reporting.

Flood Damage

When the devastating floods of 2007 hit Gloucestershire, the temporary loss of the local power supply cut access to computer systems across the county. Yet, afterwards, the Exor system proved invaluable for monitoring the high volumes of calls that came in, and for recording potholes and other problems that needed to be deftly addressed.

Says Scott Tompkins, Asset Manager at Gloucestershire Highways: "What's not widely publicised is how well the authority handled what was one of the UK's largest peace-time emergency operations. The events of July 2007 were a one-in-two-hundred-years event, yet the impact on the infrastructure of the locality affected more people than the flood damage itself."

Case Study: Gloucestershire Highways

Howard Brewer, Applications & Systems Manager, Gloucestershire Highways

"Exor Public Enquiry Manager is specifically designed for highways maintenance management, so it can capture and process information very quickly."

A wet spring followed by a wet summer meant water courses were already saturated. Heavy rain meant water courses began to flood and the drainage system struggled to cope. Many of the major roads were no longer passable. The potential flooding of two major power stations (Walham and Castlemeads) along with the flooding of the Mythe Water Treatment Plan led the county to invoke 'emergency' status, and the whole county went into crisis management for four days, with senior managers working night shifts.

Following the floods a survey of the entire network had to be undertaken to determine the level of the flood damage. Over 1,000 work schemes were identified and managed through Exor, each requiring a map, text and photo of the road's condition. All of this evidence had to be collated in order for the service manager to provide map-based evidence and historical data to the Department for Transport to support the case for additional funding for urgent road-works. These had to be prioritised quickly, too.

Showing Success

Following the successful application for additional funding from the Department for Transport, Gloucestershire Highways planned, programmed and delivered the schemes within a short timescale. Almost all of the additional schemes were delivered. Gloucestershire Highways received a lot of praise in how quickly it responded to the emergency, during which millions of pounds of roadway were washed away, all rail services, major routes and many minor roads were closed, over 350,000 people lost clean water supplies and the highways drainage system all but collapsed.

While Tompkins notes that Gloucestershire County Council has always been highly responsive, he concedes that it has fallen down on letting people know about its performance. "There are more political and customer pressures now to be responsive – and to be able to prove this," he says. "Not only is Exor a good planning tool, it's also very good at proving what we've done, and how quick we've been. It helped us build the business case for a £16.5 million claim for infrastructure funding with the DfT (Department for Transport) in 2008 when the flood hit the county. Now, we can both show what we've achieved and also hone in on any areas that may need improvement."

"Our vision is that a manager will be able to press a single button to get all of the information he or she needs on a road – when it was last inspected, the number of street lights and gullies on it, whether works are planned, and the budgets involved. We're almost there now."

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Key Features and Benefits

Manage traffic sections, count sites and traffic statistics using road network locations

Count site, traffic section and traffic profile data displayable on maps with other data

Rapid implementation based on a flexible, data-driven application architecture

Sophisticated, flexible data dissemination that meets AASHTO and FHWA requirements

Interfaces with related Exorapplications such as accidents for enhanced functionality

Road network changes can be applied to historical traffic data to maintain data integrity

Traffic Manager Product Overview

About Traffic Manager

Traffic statistics provide the foundation for safety analysis, pavement management, capacity planning, and a host of other core highway agency functions. Traffic Manager turns traffic count data into an enterprise database of traffic history statistics that can be related to other types of data based on road network location. The integrated TRADAS analysis engine collects and processes traffic data from any type of automated traffic data collection equipment. It process all types of traffic data, most commonly vehicle volume, vehicle classification or type, speed, and weigh in motion (WIM).

Traffic Statistics Database

Exor's Traffic Manager module maintains summary statistics and updates the traffic section information. It is based on open, industry standard Oracle(r) RDBMS technology with integrated GIS and Internet components. Traffic Manager includes all the tools necessary to support a state, county, or municipal traffic data program. It also manages traffic data within an integrated highways management database, together with other agency business data sets such as pavement condition and accident records. Integrating traffic data into your organization's information system enables a proactive approach to the monitoring of roadway performance and provides invaluable infrastructure planning and design information.

Furthermore, traffic sites maintain historical integrity through the network maintenance features of Exor's Network Manager, so that traffic data are always associated with the correct spatial or network location.

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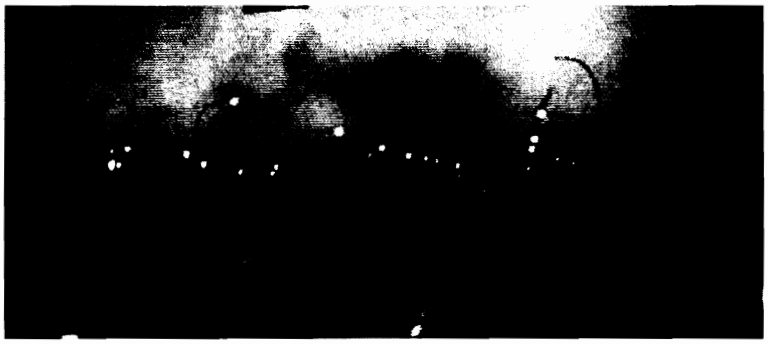
Chief Engineer,
World Bank Projects, Odisha



Flexible, Data-Driven Architecture

Traffic Manager is designed to accommodate a variety of data collection devices, data validation procedures, factor calculation and application rules, and summary and reporting requirements. Traffic Manager accomplishes this flexibility from the 'data driven' approach used in its design. Users can define table attributes and set calculation parameters. This means that an agency can quickly install and configure Traffic Manager software, migrate historic data from legacy systems and use the system to support an ongoing traffic-monitoring program.

Sophisticated and Controlled Data Dissemination

Processed traffic count data is published as attributes of traffic sections or separate traffic profile records. Each profile can have any number of counts and summary statistics associated with it for any number of years. A pre-publishing tool enables users to preview and evaluate data sets before they are published to ensure data quality.

The published database can be made available in a variety of ways, such as through a browser, GIS map, spreadsheet or data mining tool. Taking advantage of Exor's GIS integration, users can create query sets using polygons directly from the map interface. Users can use a wide range of querying tools to define simple and complex data queries, then save the queries and the results. These query sets can be used as the basis for subsequent queries and future re-use.

Traffic Manager reporting features enable analysts to define report parameters by time period, region, vehicle class, or other user-defined preferences. Because traffic records are linked to Exor's Network Manager module, analysts can view enhanced highway data by combining attributes such as road details (speed limits, signage, lane information), road conditions, maintenance records, and street lighting units. Road data item combinations are unlimited.

Reports can be prepared in a variety of formats including Detail and Summary Reports, 3-D Statistical and Cross Tabulations, and map-based plots. Data can also be exported in standard HPMS format.

About Exor:

Exor Corporation was founded in 1995 and is the global leader in infrastructure asset management solutions for network centric industries. Exor established its operating base in highways management and is rapidly expanding into other strategic markets including rail, water, power distribution and oil & gas. Exor provides clients with a modular approach to their individual technology needs. Exor Corporation operates worldwide in Europe, North America and Asia-Pacific and in September 2005 was included in the Software 500 list of the world's foremost software and service providers. Exor systems manage 1,000,000 miles of roads with an asset value in excess of $750 billion (USD).

www.exorcorp.com

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Bentley Systems India Pvt. Ltd.

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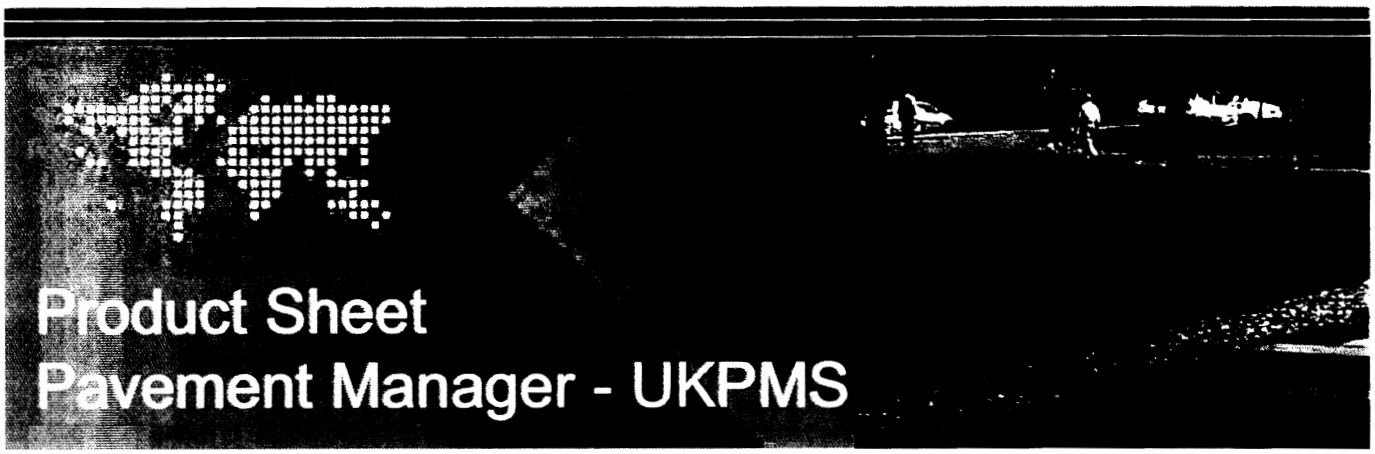

Product Sheet
Pavement Manager - UKPMS

Features

Location and referencing of highways, including footways and cycle-tracks

Ability to operate RMMS and UKPMS XSP models concurrently

Recording of an inventory of maintainable assets within the highway

Survey planning

Recording of condition data collected from various visual and machine surveys
Map Based Display of all UKPMS Data
Scheme Management with automatic updating of Road Construction and Condition

Scheme Costing using standard Unit Rates shipped with Product

'What if' Modelling

Projection of future condition based on historic deterioration, and on engineering models of deterioration for given designs, constructions types and pavement life profiles

Selection of options and requirements for remedial works

Costing of potential works

Management of budgets

Analysis of budgetary and maintenance needs for highway networks

Prioritisation of potential works on a condition basis

Prioritisation of potential schemes of [illegible] econometric

Standard [illegible] Reporting

[illegible] Graphics Reporting

The UK Pavement Management System (UKPMS) is the national standard for management systems for the assessment of local road network conditions and for the planning of investment and maintenance on paved areas of roads, kerbs, footways and cycle-tracks on local roads within the UK. Its use is required by the UK Government for the production of Best Value Performance Indicators on Local Roads. It is also recommended best practice for Local Road maintenance in the '2001 Code of Good Practice for Maintenance Management.'

In response to this national requirement Exor have produced Pavement Manager which adheres to the UKPMS standard and offers our Customers the ability to develop prioritised, costed, indicative maintenance programmes and to analyse different maintenance policies and funding scenarios which support better, more transparent investment decision making.

In addition to this Pavement Manager can provide greater availability of information to assist in establishing budget requirements and future network trends for input to policy making activities. It can be tailored to satisfy specific local requirements, such as the development of local performance indicators to reflect local priorities.

Integration
Pavement Manager is based on the Exor LRS Hub as with all other Exor business modules allowing for data to be analyzed and queried in an integrated, spatially based environment.

To improve upon the basic UKPMS design Exor have added facilities that can be used to design individual Schemes. These planned Schemes are held in Scheme Manager and can be viewed on the Map Display and the effect on BVPIs reported. When a given Scheme is completed the system is designed to automatically update the Road Construction Records and to end-date any Condition Data that exists over the Scheme Length.

Open and Scalable
With the ever increasing volumes of data being produced by SCANNER surveys and the need to perform complex analysis over multiple years Exor are confident that our Oracle based system is scalable and able to handle the large data volumes now required for UKPMS operations. Exor also make use of Oracle Spatial to store the UKPMS spatial information, this ensures that any GIS in operation within the Authority can read and display the UKPMS Survey, Condition Indices, Treatment and Scheme information.

NOW! from Bentley

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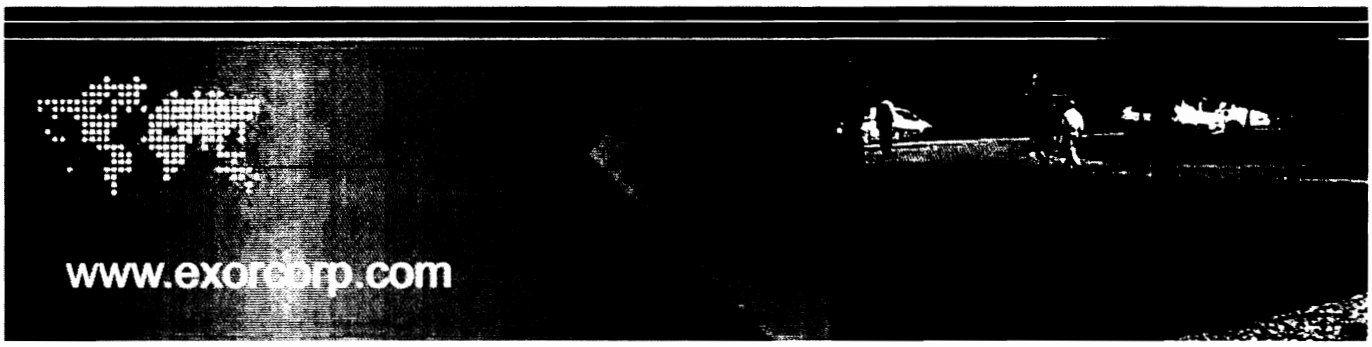

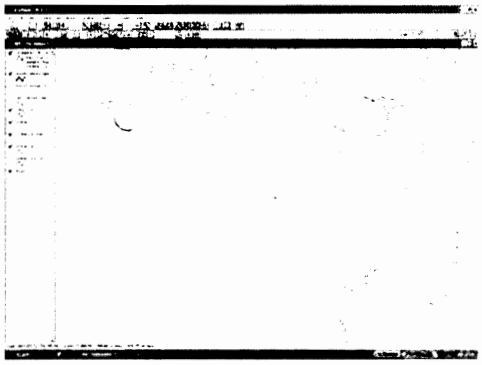

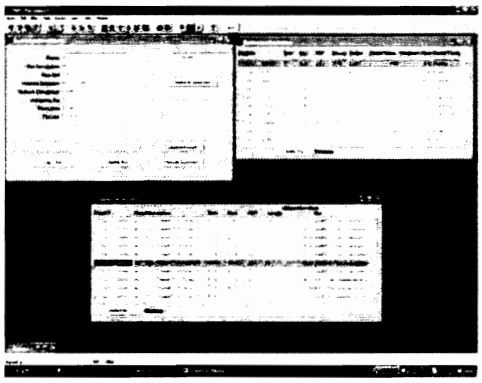

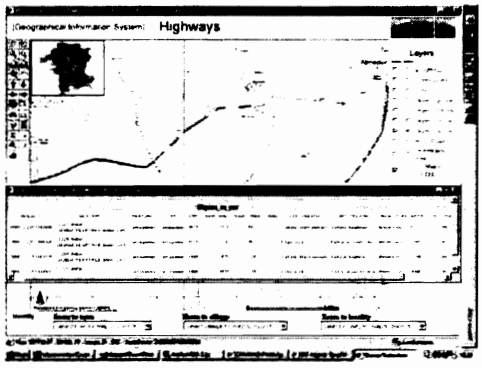

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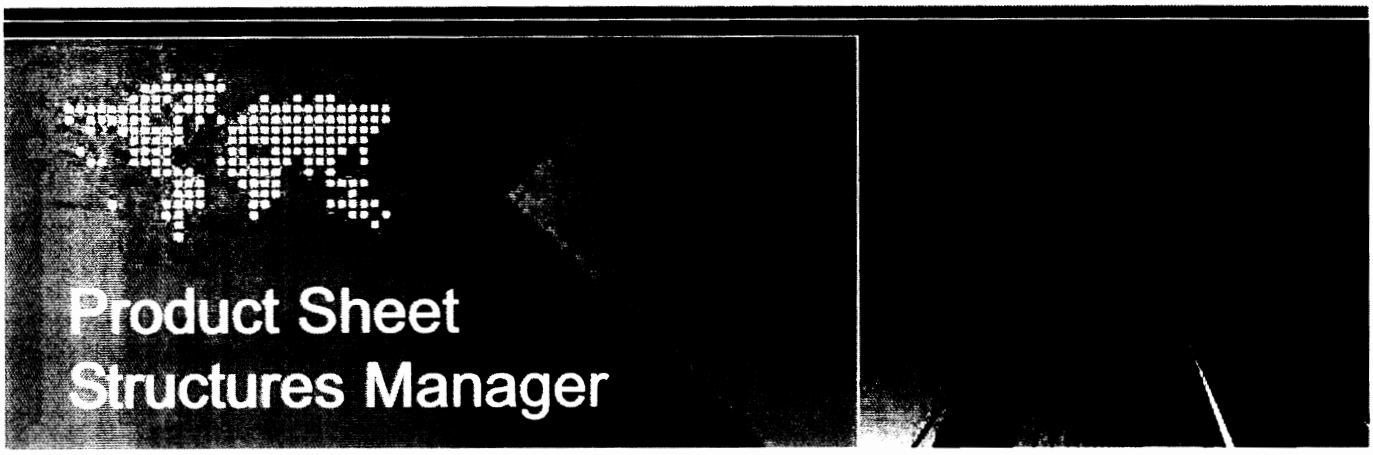

Product Sheet
Structures Manager

Benefits

Models any structure type from simple wooden truss, masonry arches, multiple-span composite steel/concrete, to complex large scale suspension/cable stay bridges

In part of an integrated asset management and asset valuation suite of programs

Detailed component level modeling of any bridge, tunnel, sign, gantry, tall lightening mast and other structures

Supports monitoring of bridge and tunnel degradation over time

Meets national standards for bridge inspections

Inspection scheduler supports bridge condition trend analysis using historical data

Creates a prioritized list of repair schemes and projects

Bridges and tunnels are critical elements in most highway transportation systems. They represent highly valued assets that are costly and time-consuming to build, and essential to keep in working order so that traffic can move smoothly through the entire transportation network. Structures Manager allows highway organizations to protect their investment in bridges, tunnels, and other complex structures through a detailed asset inventory and the tools necessary to monitor and manage the degradation of structure components over time.

Structures Manager provides organizations with a robust information and project management system, thus enabling them to implement long-term maintenance programs and structure improvement strategies. Structures Manager allows for the storage and management of a wide variety of component detail for each structure using a hierarchal model to correlate component relationships and manage substructure inventories.

Manage Deterioration
Structures Manager allows for effective monitoring of structure deterioration, providing a comprehensive set of inspection management tools to efficiently plan condition assessments. The inspection data is used to create prioritized lists of schemes on which maintenance and repairs can be completed using internally generated works orders. Condition indicators can also be stored against both the inspection record and each structure asset. As the inspection data builds over time, along with a history of work performed on each structure, deterioration knowledge will improve.

Meeting Requirements of CSS
In order to ensure adequate funding levels for bridge maintenance, the CSS has stated that it is essential to produce Bridge Condition Indicators (BCIs) for bridges. Exor has worked with the UK Structures Manager User Group to incorporate the new CSS Standard for Bridge Inspections and BCIs into our product. Structures Manager now meets the new CSS requirements, and can produce BCIs for historical inspection data, providing the necessary trends to justify past and future funding requirements. We believe this ability will be mandatory for Bridge Maintainers.

Hierarchical Modeling of Structures and Component Relationships
Structures Manager includes a flexible hierarchical modeling tool designed to maintain and man-age information about any structure and its components. Hierarchical modeling provides maximum flexibility when representing complex structures such as multi-material hybrids, yet is capable of re-cording just one level in the hierarchy thereby simplifying initial implementation. Users can create standard templates to define common attributes of a structure and link them directly to the structure itself. A bridge template may be com-posed of a number of spans, each of which has associated attributes, including height and weight restrictions, joints, bearings, span length and width, materials, defects, or any number of elements common to a particular structure. These templates are the basis for managing a highway structure, its components, and all related activity. Once defined, specific templates are readily available for future use.

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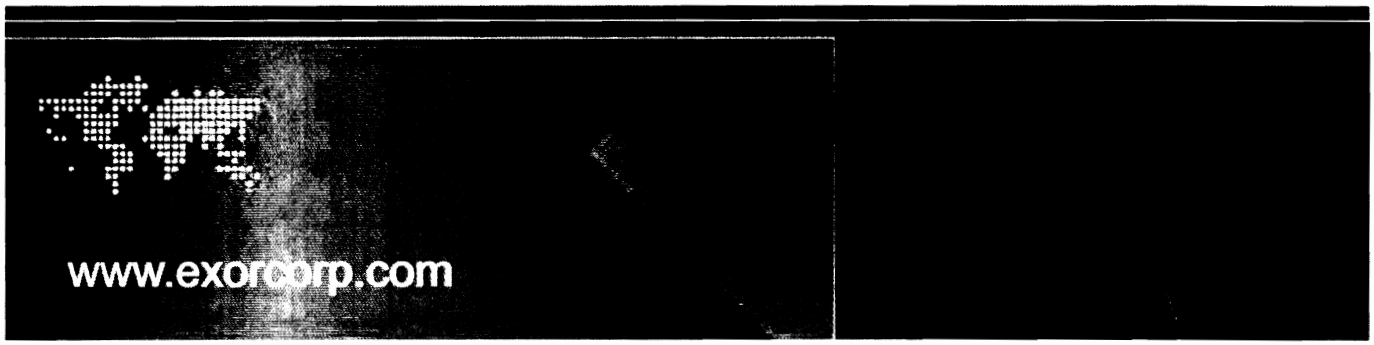
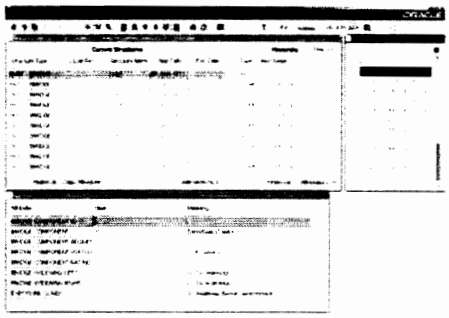
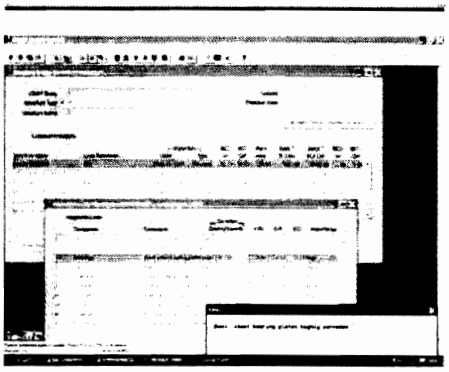


Integration with GIS and other Asset Data
Using Exor s Spatial Manager module, bridges and tunnels can be color-coded based on their condition ratings, and displayed on maps in the GIS to show where the worst and best structures are located. When integrated into the Exor database, bridges and tunnels can be analyzed along with adjoining roadway attributes such as pavement condition. Structures with no condition ratings can be identified as 'not inspected', and inspections can be scheduled.

For Structures Inspections dedicated data input fields have been built into the Exor Mobile software for the purpose of adherence to Governmental legislation and codes of conduct, such as the CSS (County Surveyors Society) guidance on bridge inspection reporting. Field inspectors can carry out and record general and principal inspections for bridges, retaining walls, sign gantries and other structure type s whilst in the field.





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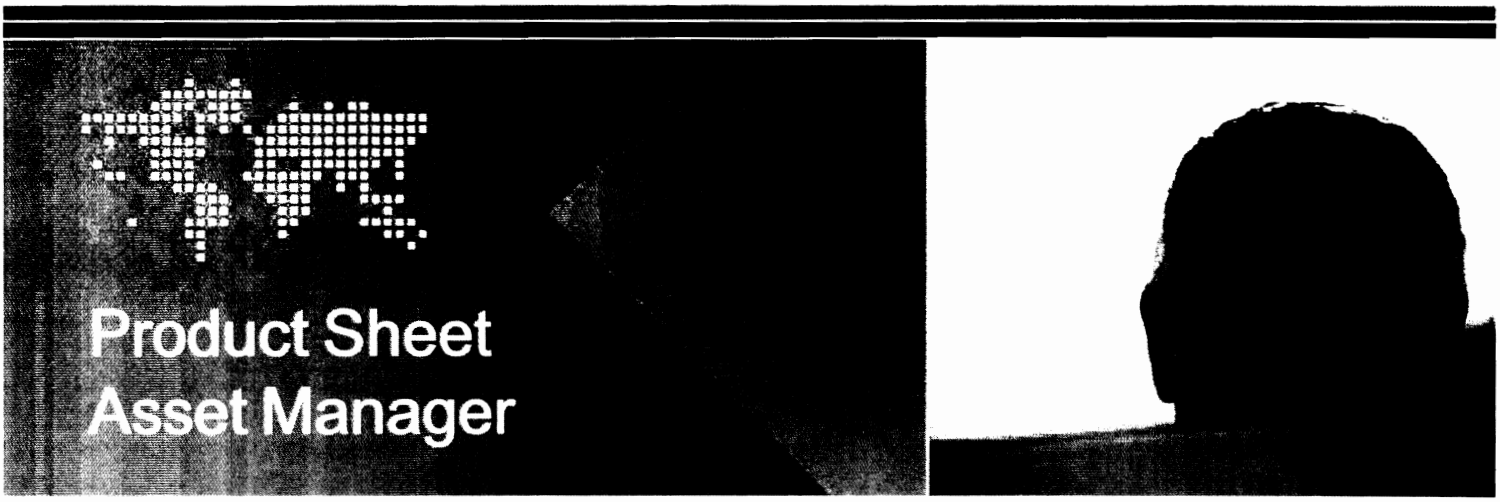

Product Sheet
Asset Manager

Features & Benefits

- Fully Flexible data Model
- Dynamic Data Validation
- Cross Attribute Validation
- Cross Item Validation
- 'External' Assets
- Off Network Assets
- Point, line and Polygon Assets
- Full History of Asset updates
- Fully Integrated with all
- Exor Applications
- Open API

Cost-effective management of public assets is increasingly difficult in these times of deteriorating infrastructure, high user demand, shrinking budgets, and fewer staff resources. Increasingly, the power of the computer is being used to record, analyze and report on valuable information about the location, characteristics, condition, and valuation of assets. Automated databases and decision support tools are allowing public agencies to do more with less. Asset Management Systems are coming into the forefront as the preferred approach for effectively managing assets and the resources used in their upkeep, and for making trade-off decisions among alternative infrastructure investment options.

Asset Definition
Exor's Asset Manager forms part of the Exor LRS Hub solution which allows Highway and Transportation organizations to manage their investment in public infrastructure in a single, integrated database containing asset features, conditions, valuation and location information. Fully flexible and user-definable the full range of assets and associated attributes from signs, guardrails, pavement surface, street markings, and street lighting to culverts, traffic signals, and bridges can be modeled and managed in an integrated fashion. Implementing Asset Manager as part of the LRS Hub with Exor's Network Manager module provides an asset inventory database that is both geographical and referenced to the highway network.

Importantly using Exor's external data functionality, data residing in external databases may be associated with the Asset Hub without the need to duplicate the data or remove from the source system. Asset Manager will create a view onto that data and allow for the data to be used in analysis, query and reporting inside the Exor Hub.

Asset Location
Using the linear referencing capabilities in the Network Manager module, Asset Manager provides support for managing assets based on their physical locations along the road network. Different asset groups can be analyzed by individual street segment or by an entire road class to provide flexible reporting of condition, service level and valuation.

Asset Manager provides support for
hierarchical, polygonal and non-linear assets, such as bridge substructures, parks, properties and buildings. Assets can be located against the linear street network using distance or offset measures. Regardless of how the asset is initially located, it can be viewed and retrieved using either type of measure. GPS coordinates can also be stored against each asset, and the asset's location can be automatically referenced to the street network.

Geography-based Asset Management
Exor takes advantage of map display, spatial query and geography based reporting through a tight integration of the Asset Manager database with the Oracle Spatial database. Adding Exor's Spatial Manager module allows assets edited and managed in a map environment. Exor's Locator module provides simple map tools designed for the engineer.

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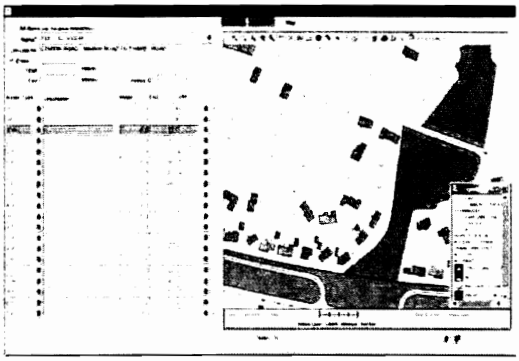
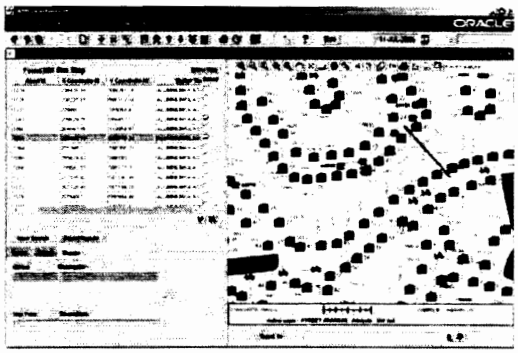
Assets can be queried, and grouped by geography for reporting purposes, and color-coded maps can be produced.

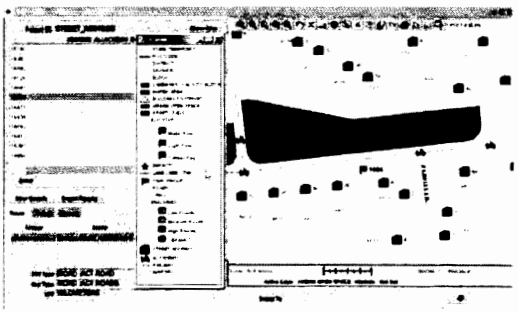
Historical Record of Asset Changes
Exor modules provide a full maintenance history against each asset in the database. By back-dating query requests, a complete historical record of all changes to assets (e.g. condition, relocation), additions to the road network (e.g. new subdivision), and work activities performed on assets (e.g. resurfacing) can be created. This technique can be used to track changes over time, perhaps to justify the need for additional maintenance budgets.

Integration
Exor provides integrated software tools for updating asset condition and valuation changes as the result of on-going maintenance activities and completed refurbishment projects. Asset Manager underpins all Exor Business Modules. It is frequently used with Exor's Maintenance Manager module to provide integration of scheduled, in-progress and completed maintenance activities against assets. This integrated approach records all maintenance activities performed against assets in Asset Manager in a single, integrated database.

To complete the information loop, Exor's integrated MapCapture field data collection software module can be used to conduct asset field inventories, to perform condition assessment inspections and to report maintenance work progress. Asset data can be downloaded into Map-Capture prior to going into the field, and collected data can be uploaded in Asset Manager without special programming or reformatting of data.







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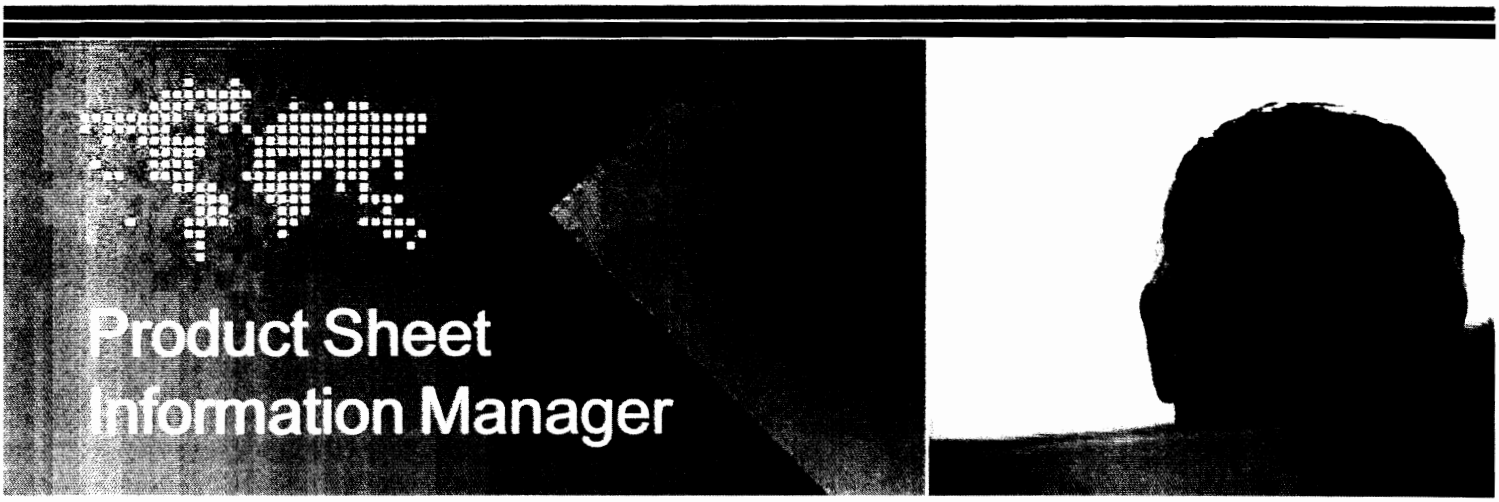

Product Sheet
Information Manager

Features & Benefits

- Simplification of your organizations data into meaningful & accessible information
- Real time dashboard relevant to your role
- Fast & exact information via the web
- Reduce costs by efficiencies in retaining. accessing reporting on data
- Intuitive search & analysis using visual metaphors
- Cost effective enterprise deployment of information
- Easily tailored to match specific client requirements
- Ease of use – little or no past knowledge of Exor applications
- The information you've always wanted in real time... fast

Information manager - Overview

For many users of an integrated infrastructure Asset management System their main requirements centre around performance management and reporting. They wish to see aggregated high level executive information and only where a particular area is under performing do they wish to investigate further. This is sometimes referred to as an Executive dashboard or report scorecard. The same dashboard approach allows Corporate Key Performance and National Indicators to be displayed giving Users and managers alike instant access to upto date information.

Providing pre-packaged and ad-hoc reporting tools is another key requirement to help organisations deliver the right information at the right time considering the wide diversity of information needs within any organisation.

Built to run on the Web. Exor s Information Manager is designed with the end user in mind to provide a complete Reporting and Information Centre for all levels of Exor User from everyday 'power' Users to senior managers who use the system infrequently.

Built and designed to run on the Web. Information Manager allows Users to view aggregated performance management data and then drill to a more detailed level of information both textually and spatially to investigate non-performant areas.

Dashboard

Information Manager allows an unlimited number of dashboard indicators or 'Pods' to be configured and displayed in a manner that best suits the nature of the information in question. Updated in real time or at a predefined time interval, Pods can be configured as Pie Charts, Bar or Line Graphs, tables or a wide number of other display formats. With data security in mind, each Pod is protected by a User Role with only those Users who have been granted the appropriate Role having access to the Pod.

Each Pod can be configured to allow the User to drill to a more detailed level of information both textually and spatially

Location Setting

The information displayed within the Executive Dashboard can be restricted to specific locations by setting the desired location within the IM Toolbar. The location can be set to any Network Section or Group defined within the Exor system to provide specific performance measures or information relating to only features that are located within the selected location.

Mapping

Information Manager includes Web Based mapping allowing multiple data layers to be displayed providing the possibility of increasing workplace productivity through improved information access. Built on proven Oracle Spatial technology, Information Manager allows any data held within the Exor database or other 3rd party data accessed using Exor's 'External Asset' functionality, to be displayed including Open Geospatial Consortium Web Map Service (WMS). Designed with ease of use in mind, Information Manager Map controls, for access and navigation 'follow 'guidelines' and standards now commonplace and in use by Companies such as Google and Mapquest. Map Layers may be toggled on / off allowing a wide variety of spatial information to be displayed.

Intuitive Search capability

When licenced with Enquiry Manager or Street Works Manager IM provides a powerful yet simple search engine to find Enquires or Streetworks. When used in the context of Roadworks, the IM search Engine allows a User to query and display all Works due to take place during a specific date range on a given Street or Town. The search may be further defined using the likely impact of the Works on Traffic flow. The results of the Search may be either displayed in tabular format showing the details of each Roadworks or directly on the Map.

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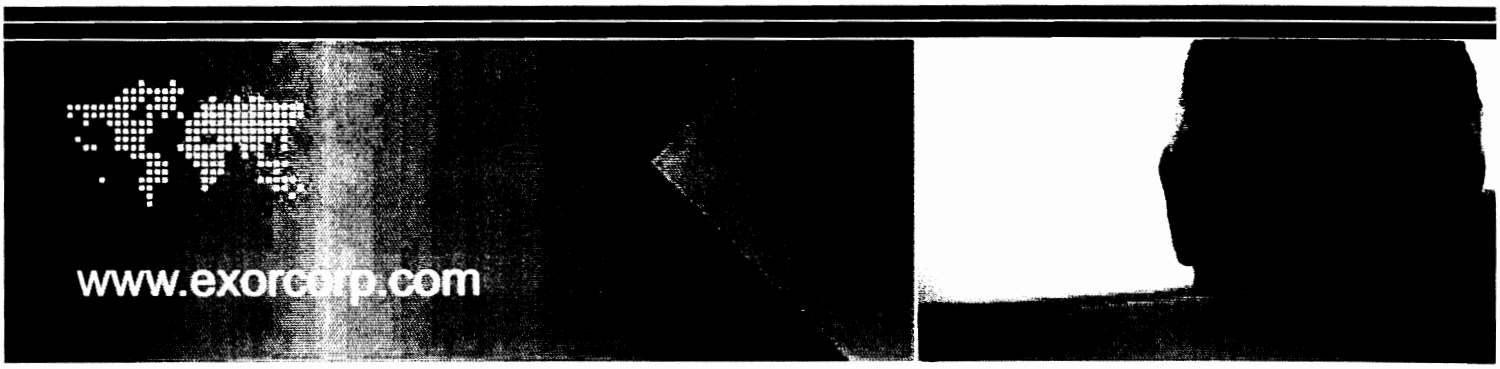

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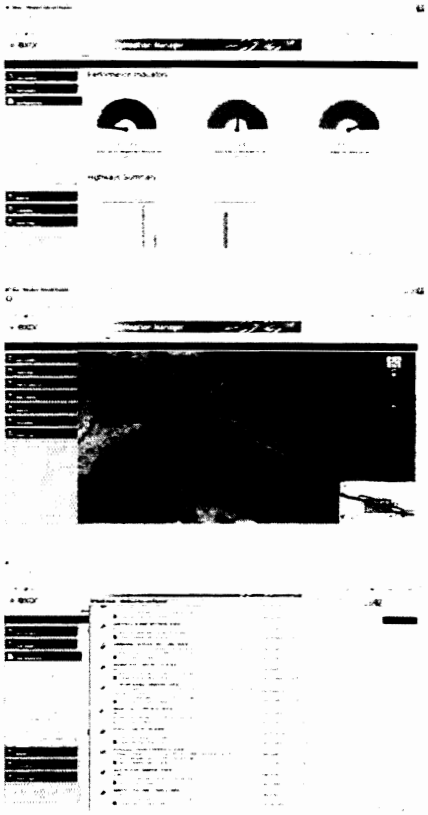
Printing
The information held within any Pod or tabular report displayed within Information manager can be printed, saved in a variety of formats such as html, pdf, csv or exported directly to MS Excel allowing further off line presentation or analysis. The Map display can also be saved as a .pdf file or printed along with a Map Title and Map legend is required.

Reporting
Exor provide many standard reports that are required to meet specific business needs. Each report comes with a standard set of parameters, the values of which can be varied to suit the Users needs. Information Manager allows these standard reports to be grouped in customer defined 'Business Folders' with each folder containing the reports from any Exor Product that relate to that specific business area.

For the production of user specific and ad-hoc reports Information Manager provides an option for using the Oracle Discoverer and / or Oracle BI Publisher products. These products offer high quality business graphics, data mining and offline scheduling capability. Reports written in these tools via Information Manager can be saved and added to a Business report Folder and run by other Users.



Usability
Information Manager has been designed with ease of use and practicality in mind. Instead of lengthy pick lists, IM uses 'predictive type-ahead' functionality that dynamically displays a list of the relevant information. This ensures that little or no expertise or experience of using other Exor products is required.

Worktrays
Information Manager provides an option to add User 'Worktray's' to the application. This allows a user to display a summary level view of their outstanding actions. For example, an Enquiry Manager User can display all Enquiries received today or within the last 7 days that need actioned. Using the drill down functionality within Information Manager, the User can drill to the individual Enquiries or view them on the Map. If required the User can also update the actual Enquiry Manager record from within Information Manager without the need to launch the main Exor application.

Information Manager Server
Information Manager is powered by a set of 'Business Area Views' which simplify the underlying schema allowing easy access for users wanting to write ad-hoc reports. Information Manager Server is designed and built to negate the need to re-write reports or Pods after an Exor Upgrade should the underlying database definition be changed. This offers complete protection in the investment made in writing customer reports.

Enterprise Wide Deployment
Information Manager can be easily deployed across the entire Organisation allowing performance indicators and measures from a wide variety of disparate Departments to be displayed and monitored within a single Web based application. Combined with Exor's 'External Asset' functionality Information Manager can act as the Hub to consolidate and gather the wealth of detailed data that exists within any Organisation, providing a single source of truth.

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Bentley
Sustaining Infrastructure

KDOT Integrates Assets With Bentley Software for Better Informed Decisions

Exor Software Interfaces With Data Repositories to Eliminate Redundancies and Provide Additional Value With No Additional Data Maintenance

Organization

Solution

Location

Project Objective

Products Used

- [illegible]
- [illegible]
- [illegible]

Fast Facts

- Exor software provides a central enterprise repository that maintains federal reporting data and helps manage location information for other KDOT systems
- Exor software also interfaces with other data repositories, such as PONTIS, allowing KDOT to eliminate redundancies and provide additional value to those systems by providing up-to-date information with no additional data maintenance

ROI

- Exor software has improved KDOT's ability to execute highway planning and road maintenance
- Exor software has unlocked the data in KDOT legacy systems and made it both accessible and updatable through one, spatially enabled viewpoint
- KDOT is able to dynamically integrate data together in real-time and provide up-to-the-minute reports as and when they are required, rather than having to access separate silos of information [illegible] them retrospectively

Strategic Approach to Asset Management

The Kansas Department of Transportation (KDOT) has long recognized the need to focus on a strategic approach to asset management and road maintenance to derive long-term benefits from its investment in infrastructure. The DOT has set about implementing a strategy to successfully map its highway assets throughout the state, which will create a framework for KDOT to make effective investment decisions for its transportation future. The ability to share business information across the enterprise is critical to KDOT's success in this approach. To meet its goal KDOT deployed Exor information modeling software, part of Bentley's AssetWise platform, to manage its asset data for roads and highways. Using Exor to integrate its highway, bridge, and rail crossing assets, KDOT now has the ability to produce better data and make better-informed decisions.

Ruby Bradley, geometric and accident data manager at KDOT, explained, "Historically we created silos of asset data for separate business purposes and it became difficult to track and keep these up to date. With Exor software we now have a central enterprise repository that maintains federal reporting data and helps manage location information for other KDOT systems."

She continued, "The Exor software also interfaces with other data repositories, such as PONTIS, allowing us to eliminate redundancies and provide additional value to those systems by providing up to date information with no additional data maintenance. This has improved our ability for highway planning and road maintenance."

Prior to implementing the Exor suite of asset management solutions, KDOT used mainframe technology to coordinate its asset data. One of the difficulties faced by the state in using such a restrictive system was KDOT's inability to expand or add reporting features onto outdated systems. Bradley added, "We initially looked at moving away from the mainframe. However, when we began investigating the market [for a new system] it became apparent that contemporary solutions existed in the market that would deliver significant advantages to us far beyond the benefits of a standard mainframe switch."

Bentley's Exor helps KDOT maintain and manage information about its roads and highways.

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Unlocking and Synchronizing Data in Legacy Systems

One of the first integration projects at KDOT was to synchronize data held in a third-party software platform for bridge management and data held within the planning group to create the National Bridge Inventory submittal for the Federal Highway Administration. This same data also needed to be viewed in the Exor software environment by other managers. Since this was successfully completed the system has continued to develop, evolve, and improve.

Bradley noted that since implementing Bentley Exor software, KDOT has worked in partnership to develop the functionality of the system to match its changing needs – including validation routines, specialized reporting, and calculations for capacity value formulae. The DOT has been able to create a new decision-support system that provides menus and security for a program that helps it prioritize projects and electronically rank its highway segments based on engineering and asset information held in Exor software. Most importantly, Exor software has unlocked the data in its legacy systems and made it both accessible and updatable through one, spatially enabled viewpoint.

"We're now able to dynamically integrate all the data together in real-time and provide up-to-the-minute reports as they are required, rather than having to access separate silos of information and compare them retrospectively," Bradley said. "In turn, by analyzing the data dynamically, we can develop the systems to cater for future needs well before those needs arise. Now, not only are we confident all departments are sharing data, but the data is shared with other business areas through integration with our Exor software. We're confident information retrieved from those sources is accurate and the quality is maintained not only by the groups working seamlessly together, but also due to the visibility of the data across the agency."

Bradley concluded, "Our integration strategy has resulted in the Exor solution becoming the central hub of our asset management strategy, providing accurate asset data to anyone who needs it and maintaining the official state system network."

Bradley said that KDOT now maintains its network and asset data using a spatial view or map. The visual aspect has led to efficiencies in data quality, production of data to support special studies, and a platform to support business decisions, which can now be made and justified easily. KDOT looks forward to continuing to improve the value it delivers to its stakeholders. Exor software has made this possible, delivering all the benefits of a bespoke system through an off-the-shelf product.

For additional information about Exor, part of Bentley's AssetWise platform, visit www.Bentley.com/AssetWise.

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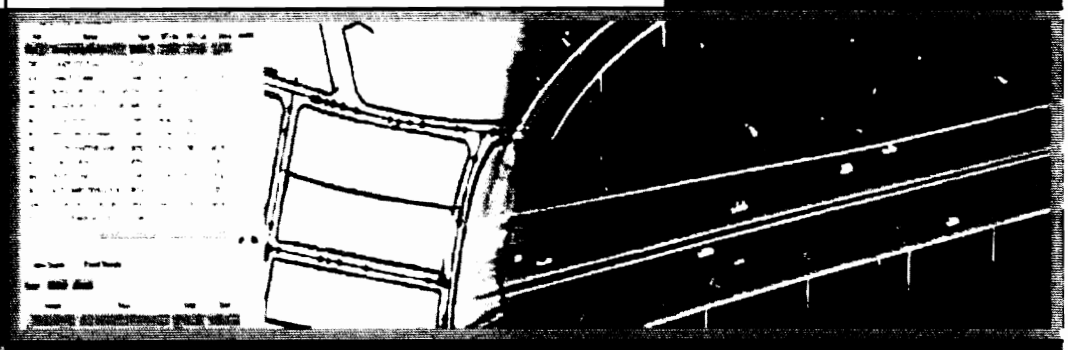
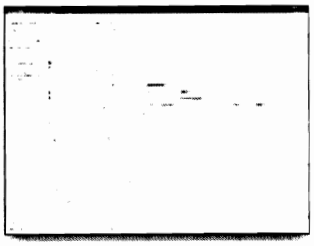
PRODUCT DATA SHEET

Bentley



Geographically Display Networks, Attributes, and Assets

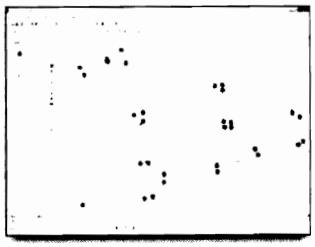
Exor Spatial Manager provides a powerful desktop geographic information system (GIS)-based environment to display, edit, and publish network and asset data. Exor Spatial Manager enables users to display all highway infrastructure data on a map including assets, crash records, traffic statistics, defects, pavement condition, and street works. Users can then input, edit and relocate these records as geographic features using the map.



Users can create and categorize network elements.

Improves Decision Making

Viewing infrastructure data geographically reveals patterns and details not apparent in tables and reports. Exor Spatial Manager enables users to view linear networks, related assets and characteristics together with other GIS data layers. This contextual information, together with the ability to see geographic patterns and carry out spatial analysis of assets, maintenance activities, crash, and project data, significantly improves asset management decision making.

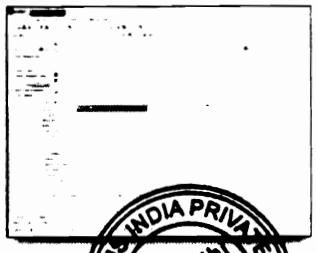


Users can create assets directly on the map.

Ensures Up-to-date Network and Asset Information

Exor Spatial Manager enables users to define changes to the underlying network using the map, while the logical database defining the road network is automatically kept in step. Exor Spatial Manager provides powerful editing tools to maintain networks and assets through its map interface that is built right into the GIS software screens.

...provides a powerful desktop geographic information system (GIS)-based environment to display, edit, and publish network and asset data...



Users can select on for network elements.

Users have a variety of options to update the network including tools to add, delete, shift, merge, and split network elements. The entire network editing functionality is available from a movable tool bar on the GIS screen.

Easy-to-Perform Analysis

Exor Spatial Manager is a user-friendly graphical reporting tool enabling users to query and report on data without any programming knowledge. This ensures all information is available to all types of users. Its GIS technology allows a map-based view of the database for spatial analysis, queries, and reporting.

Exor Spatial Manager provides a variety of tools to organize and search for information based on record attributes and location. It supports multiple linear referencing methods and includes a linear reference method tool to identify all concurrent linear network locations at any point. It also features a tree-like view to display hierarchical information and provide easy, navigable access to network and asset data.

Synchronized Changes

All network asset queries and display functions are integrated with the map-based user interface and standard desktop GIS functionality. Network and asset data, both spatial features and business attributes, are held in a shared database, so all changes to the network geometries are automatically synchronized with changes to asset locations. Exor Spatial Manager enables users to maintain and use multiple linear referencing systems to update assets located using dynamic segmentation or off-network geometries.

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Processor

Operating System

Memory

Processor

Operating System

Memory

Exor Spatial Manager At-A-Glance

Functionality

- Integration with leading desktop GIS to spatially reference all transportation assets, activities, and events in one common database
- Geographic display of highway networks, roadway infrastructure, and their attributes
- Full map-based data entry and editing of road networks and any associated data such as accident locations
- User-friendly geographic query and reporting features in the database
- Interfaces with the database to provide desktop GIS access to data for all Exor modules

Display

- Network elements
- Assets by either linear location or coordinates
- Thematically mapped data using characteristic features
- Grouped GIS themes in a tree view

Create

- New network elements complete with spatial data and textual attributes
- New asset data, complete with spatial data and textual attributes, and locate it
- Network extents for reporting and querying context
- New off-network assets

Edit

- Spatial geometry of network elements
- Spatial geometry of assets
- Textual network and/or asset attributes

Query

- Network and asset data using their spatial location
- Network and asset data using their characteristic attributes
- Combined spatial and textual data (in query parameters)

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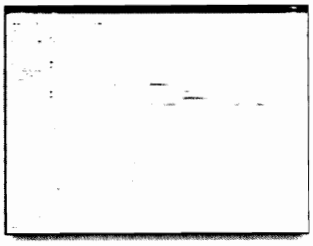
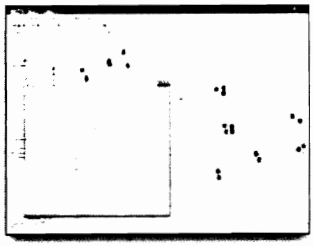
PRODUCT DATA SHEET

Dynamic Network Infrastructure Management

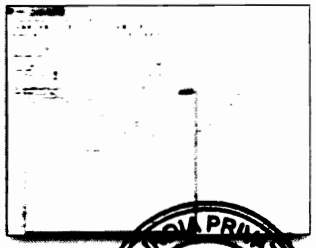
Exor Network Manager is used by transportation organizations to model, manage, and maintain their linear network infrastructure. With a proven track record within the highways industry, Exor Network Manager allows users to view network and asset data using multiple linear referencing methods within a single spatial and temporal enabled database, providing a robust network database model to underpin and integrate network-based applications.



Users Can Create and Categorize Network Elements.



With Exor Network Manager users can edit network elements spatially.



Users can also edit the spatial geometry of a network element.

Provides Connectivity Through Shared Assets

Designed to support multi-modal applications, Exor Network Manager has the ability to maintain multiple networks and network types, such as distinct road classes, rail lines, drainage, pipelines, and utility networks in a single integrated database. Connectivity between network types can be provided either by shared nodes or through the concept of shared assets, such as an asset located on more than one network, where there is no physical connection between networks.

Exor Network Manager supports subclasses and groups to categorize network elements. For example, a user may wish to differentiate between network elements on a road network to denote the highway type, such as whether a highway is single, dual, divided, or multidirectional.

Share Across Entire Organization

Exor Network Manager allows users to create a topologically consistent hierarchical network model. This can support the use of different linear referencing methods (LRMs) on many network types that can be shared by the entire organization running a variety of software applications. Exor Network Manager supports unlimited user-definable network types and associated LRMs that conform to the BS7666 standard and the NSG in the United Kingdom and the NCHRP 20-27 model in the United States.

...view network and asset data using multiple linear referencing methods within a single spatial and temporal enabled database...

Exor Network Manager supports various ways in which LRMs may be constructed. They can be broadly defined as:

- Route and kilometer/mile point (for example, Route 12 km/mile Point 9.29)
- Route kilometer post (for example, Route 12 km/mile Point 9.29 with points of equation)
- Route and reference post (for example, Route 12, Ref Post 15 + 0.29 miles)
- Link – Node (this is a special application of the reference point method)

Users can translate from one reference system to the next using pull-down menus. Inspection crews can use the most efficient referencing method when performing condition assessments, such as offsets from the nearest bridge, then translate the data into a linear referencing method best suited for reporting purposes.

Maintains Complete Historical Record

The date-stamping approach used within Exor Network Manager allows users to view the network and related assets based on any historic date. A complete historical record of the network and assets is maintained in the database, facilitating time-related studies, and the input of field data months after it is collected.

Reduces Software Costs

Exor Network Manager is designed to integrate with popular geospatial information system (GIS) software for the direct spatial query and map display of assets, activities and/or events associated with the network through the LRMs. The Exor Network Manager database supports dynamic segmentation, which determines location on linear features from tables of features containing measurements.

Chief Engineer,
World Bank Projects, Odisha

Processor

Operating System

Memory

Processor

Operating System

Memory

Exor Network Manager At-A-Glance

Network Management

- A fully flexible network data model
- Dynamic data validation
- Multiple networks
- Multiple linear referencing methods (LRMs)
- Full network editing functionality
- A network hierarchy
- A full network history

Network Modeling

- View multiple network node types
- Sub-classify network types
- View flexible network attribution by network type
- Assign elements to network groups automatically
- Convert units dynamically
- Create temporary network extents or regions of interest

Network Grouping Hierarchy

- Categorize multi-level network groupings
- Classify
  - » linear network groupings, such as routes
  - » nonlinear groupings, such as administrative boundary areas
- Categorize partial linear network groupings
- View flexible attribution on network groupings

Multiple Linear Referencing Methods

- Underpin datum
- Manage network cardinality
- Handle points of equation (POEs)
- Manage distance breaks for discontinuous routes
- Reference
  - » routes and offset
  - » route mile posts
  - » route mile

Dynamic Validation

- Validate
  - » attribute value
  - » cross attribute value
  - » linear location

Network Editing

- Create new network elements
- Split network element
- Un-split network element
- Merge network element
- Unmerge network element
- Replace network element
- Undo replace network element
- Close network element
- Unclose network element
- Recalibrate network element
- Reclassify network element

Network History

- Retain full temporal
- Network history
- View network as at any point in the past

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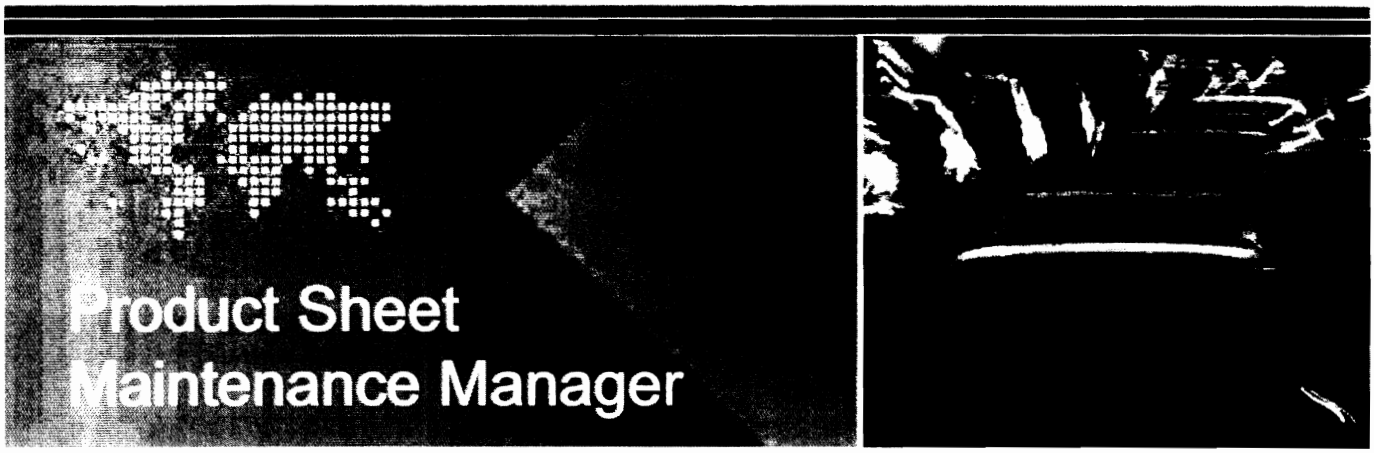
World Bank Projects, Odisha

exor



Product Sheet
Maintenance Manager

Key features & benefits

Flexible inspection regimes to cover all road types

Comprehensive, user definable recording of defects for all assets

Builds Works Orders to meet the required response times

Creates work budgets and keeps track of actual work expenditure

Tracks repairs and maintains a full history of work undertaken

Provides a complete audit trail for defence of legal proceedings

Optional interface to GIS for map display of maintenance activities

To provide transportation infrastructure that the public expects, roads have to be managed. In order to do this effectively, it is necessary to establish a regime that ensures inspections are undertaken at appropriate frequencies, data is collected and stored in a consistent and logical manner and information is readily available for informed decision making. Exor's Maintenance Manager is a specialized tool designed specifically for this purpose.

Inspection Assessment and Recording
The establishment of an effective regime of inspection, assessment and recording is the most crucial component of highway maintenance. Maintenance Manager enables the characteristics of an inspection regime to be easily defined, including the frequency of inspection, items to be recorded and nature of response.

By applying these criteria systematically and consistently, in accordance with the principles of Quality Assurance, it becomes possible to monitor network safety and serviceability, while also maintaining information that may become crucial during legal disputes and proceedings.

All authorities are strongly advised to undertake 'safety inspections' by the Code of Practice for Maintenance Management 'Delivering Best Value in Highway Maintenance', providing the ability to support a defence under Section 58 of The Highways Act 1980 and equivalent legislation within the UK Devolved Administrations.

Conducting more detailed 'service inspections' is also encouraged, and Maintenance Manager provides a single, fully integrated, Management System to effectively store and apply the data recorded.

Effective Work Management
Once defects have been recorded, either from an inspection or from third-party sources such as the general public, an authority has a duty to undertake repairs within the timescales established by their individual Risk Assessments and as deemed appropriate to their particular local circumstances.

Maintenance Manager assists greatly in this process by grouping together similar defects and building the Works Orders needed to instruct their repair. Urgent repairs are issued on a daily basis, whilst less urgent responses can be built into programmes to enable cost-effective use of repair gangs or contractors. Options are available within the system to apply 'standard treatments' to defects and to automatically price Orders from Schedules of Rates.

Defects are cleared from the system with full history -from discovery through repair to being fully maintained. In a similar way, the system automatically updates the database for defects corrected by scheduled Cyclic Maintenance and by major structural works.

Financial Monitoring
Maintenance Manager can hold details of many Contracts and Contractors together with their priced Schedules of Rates. Works Orders can be priced to provide estimates for the work. Budgets for each type of work are entered onto the system and as Orders are raised and issued, the software tracks how much is being 'committed'. When Orders are completed and the final costs entered, the committed amounts become actual spent and budget figures are automatically updated to provide the breakdown needed for accurate financial monitoring.

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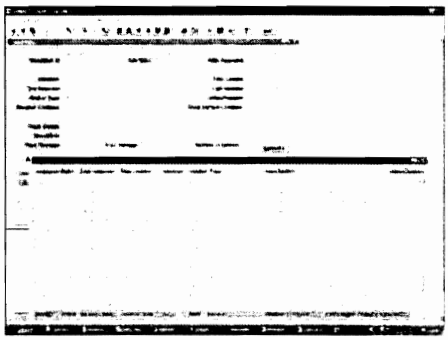
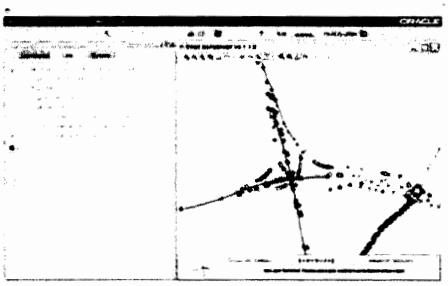
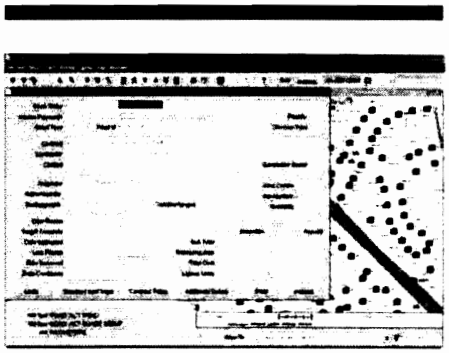
System Integration
Maintenance Manager integrates fully with Exor's Spatial Manager and Asset Manager, enabling map displays of all maintenance activities in a GIS, and linkages to asset records. Work requests can also be raised and tracked through Exor's integrated Enquiry Manager help-desk facility.

Links with MapCapture and Exor Mobile:
Safety Inspections provide for integration with inspectors and engineers in the field and aids in the effective management of the assets. Defects of a severe nature can be downloaded live to exor Maintenance Manager and a Works Order issued immediately to repair it. This helps to ensure the Asset Maintainers meet Service Levels for Defect Repair. Field inspectors can record details of Asset Condition before they reach a severe nature, which can be used to help plan preventative maintenance programmes.

Using Contractor Interface Manager (CIM) and Financial Interface Manager (FIM) links to both Contractor and Financial Systems can be established to improve efficiencies of the whole works management process.







Contact Us

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Tel: +44 (0) 117 900 6200
e-mail: Sales@exorcorp.com

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Bentley Systems India Pvt. Ltd.

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Oracle Spatial and Graph Technology Partners

Oracle Database with Oracle Spatial and Oracle Locator are the preferred location platform of leading geographic information systems (GIS) and location-based services (LBS) vendors.

This list includes **Technology Partners** delivering GIS and LBS technologies using Oracle Spatial, Oracle Locator and Oracle Fusion Middleware Mapviewer.

Go to list of **Solutions Providers and Systems Integrators**

Partners: Technology & Applications

0 | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z

Vendor	*Product*	*Description*
1Spatial (Formerly Laser-Scan)	Radius Topology	Topology Management Solution
	Radius Check	Free, downloadable data integrity checking tool. It comes with spatial data identification and validation functionality, with additional editing functionality that allows the user to fix errors in the data environment.
Abaco	DbMAP Developer Kit	WebGIS Development Tools
	DbMAP Web 3D Extension Kit	2D & 3D Integrated WebGIS Tools
	DbMap Internet Server	Pure Java Internet map server
Acquis (Now Erdas)		
Advanced Visual Systems	OpenViz	Application development tool
AED Sicad		Independent Software Vendor
ANAXIS		Independent Software Vendor
Autodesk	MapGuide	GIS application
	OnSite	Mobile mapping solution
	Envision	Desktop GIS
	AutoCAD Map	Mapping tool
	LocationLogic	LBS platform
	Topobase	GIS/land management solution
AXA		Independent Software Vendor
Bentley Systems	ProjectWise Connector For Oracle	Connector from ProjectWise to Oracle Spatial
	MicroStation iSpatial	Desktop GIS application
	Bentley GeoWeb Publisher	Web Publishing Server
	LRSx	Linear referencing tool
Blue Marble Geographics	GeoObjects	Map Display Tool
Byers Engineering	SpatialAge	Application framework for the telecommunications industry
Cadcorp	Spatial Information System	Desktop and Internet GIS applications
Caliper	Maptitude & TransCAD	Map creation tools
CARIS	LIS/GIS	Desktop GIS application
	Spatial Components	Component development environment
CISS TDI GmbH	CITRA	Services focus on database design and implementation, loading and exporting GIS-data using their own product CITRA, and connecting the database with GIS in a heterogeneous environment
CSoft	CS MapDrive	Desktop GIS
	UtilityGuide, RoadGuide, EcologicCS, UrbaniCS, Web Applications	Industry Solutions
Dawn Corp.	GeoBase 7	Internet map server
Delasoft	SCAT	Spatial Component Administration Tool for Oracle Spatial Enterprise Databases provides an easy way to manage dynamic segmentation and LRS functions. It also provides validation and user reports.
Digital Globe		Geospatial Imagery
Digpro	Utility Systems	
	DP/Com	Fiber Optics & Telecom
	DP/WaW	Water & Wastewater
	Facilplus Spatial/E	Power & Electricity
	Facilplus Spatial/DH	District Heating
	Mapping & GIS	
	DP/Cadaster	Land Management & Cadaster Systems
	DP/Larm	Emergency & Risk Management Systems
Dotted Eyes	Specialists in Digital Mapping and GIS	Ordnance Survey partner enabling organizations to manage large amounts of geographical information
	ResponseMX	Application Development Framework
Erdas (Formerly Acquis)	Erdas ADE (Asset Data Editor)	Web enabled topology editor for Oracle Spatial
eSpatial Solutions Ltd.	iSMART Suite	Oracle Spatial Java development environment
	iSMART Web	Pure-Web spatial application development tools
	iSMART Editor	Spatial editing / digitizing tools
	iSMART Mobile	Off-line spatial viewing & editing sync to Oracle Spatial
	iSMART Live Feeds	Tracking and sensor data to server centric spatial applications
ESRI	ArcGIS	Desktop and enterprise GIS
	ArcView	Desktop GIS
	ArcSDE	Spatial middleware
	ArcIMS	Internet map server
	MapObjects	Geospatial development tool
Exor	Highways	Component-based highway management application
Fichtner Consulting & IT	GeoXtension	Enables creation and configuration of custom geodata applications
	SQL-View Client	Java based spatial data viewing framework
	SQL-View Components	SVG and J2EE based components for web mapping

BENTLEY SYSTEMS INDIA PRIVATE LIMITED New Delhi Office

Bentley Systems India Pvt. Ltd.

Chief Engineer,
World Bank Projects, Odisha

2. Response to Queries on Proposal

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

Letter No. PMU - WB - 35 / 2012 - 2901 Dt. 24.01.13

From

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

To

Mr. Pankaj Mittal
Business Development Manager,
Bentley Systems India Private Limited, 203, Okhla Industrial Estate, Phase III, New Delhi – 110020
+91 11 49021100; +91 11 49021100 / +91 9911024843
Email- pankaj.mittal@bentley.com

Sub: Reference to your bid in response to Procurement of Commercial Off-the-Shelf (COTS) software for Odisha Road Asset Management System (O-RAMS)

Ref: i.) IFB Number: PMU-WB-35/2012/AMS-COTS issued in this office No. 34168 Dt. 05 Oct 2012
ii.) This office No. 43826 Dt. 22.12.2012
iii.) Your bid opened on 21 December 2012

Sir,

Please refer to your bid in response to the IFB notice issued by the undersigned for the above mentioned Project.

1. To complete the evaluation of your bid, the undersigned needs certain clarifications from your firm. Please refer below for detail of clarifications required.

Technical Responsible Checklist

Sl. No.	Tech. Req.	Description	Clarification Required
1	2.	**GIS - Integration of external GIS (being developed separately using ESRI technology) with road database in COTS software**	Ability of the software to perform these functions may be clarified with description and relevant screen shots from the software. Refer to clause 1.4.6, Section IV, page 68 of the bid document and Corrigendum No. 2, Sl. No. 5 for the requirement.
	5.	**Pavement Management System**	
2	2	Ability to interface to prioritisation tools like HDM-4 or equivalent	Ability of the software to perform these functions may be clarified with description, cases of installation (indicate if they are provided to agencies furnished in post-qualification criteria) and relevant screens shots from the software.
3	6	Ability to interface with HDM-4 (compilation and exporting data to HDM-4 latest version and format for data analysis)	
4	7	Ability to interface with HDM-4 outputs (import HDM-4 outputs and display results in table/ graphical formats)	
5	8	Own planning analysis engine (pavement deterioration modelling, prediction, optimization, scenario under different budgets for multi-year programme)	
6	9	Ability to incorporate alternative methodology to perform similar functions of PMS	
	11	Ability to select multiple network, sub-network for analysis based on attributes	

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Pankaj

Chief Engineer,
World Bank Projects, Odisha

	8	**Application, Database and Technology**	
8	3	Database technology used and ability to integrate other internal and external applications database (specify supported databases)	It is understood that the software works on Oracle Spatial RDBMS to support in-built GIS. Please Clarify if the software can provide all the required functionalities as mentioned in Section VI. Schedule of Requirements without **Spatial Extension** version of full use Oracle RDBMS
Technical Requirements			
Sl. No.	**Reference to Bid Document**		**Clarification Required**
9	*Bid Document: Clause 2.5.2.2. page 76. Section IV Schedule of Requirements* *"The COTS software supplier shall prepare and provide all operational and training material, for delivery of the program; all such material will be the property of the client."*		The bidder has mentioned that the training materials remain the property of Bentley Systems. Please Clarify.
10	*Bid Document: Clause 2.6.1. page 77. Section IV. Schedule of Requirements* *"The COTS software supplier shall provide hard and soft copies of all Manuals, technical guides etc."*		The bidder has mentioned that only digital copies will be the main means of delivering the documentation. Please Clarify whether hard copies will be provided
Post Qualification Requirements			
11	*Section III. Sl. No. 4. Post qualification Requirements (ITB 38.2) (b) Experience and Technical Capacity: (i) In last 10 years COTS Software (with RIS, PMS and BIS) must have been supplied to and implemented in at least five road agencies.*		Please clarify with documentary evidence regarding name of licenses (which can be considered equivalent or similar to envisaged RIS PMS BIS), used in 1. Oregon Department of Transportation, USA, 2. Transport for London, UK, and 3. Gloucestershire County Council, UK.
12	*Section III. Sl. No. 4. Post qualification Requirements (ITB 38.2) (b) Experience and Technical Capacity: (ii) Amongst road agencies, at least three must be using the COTS Software satisfactorily at least for last three years;* *or* *Amongst road agencies, at least three must have renewed AMC for at least 3 years after implementation and acceptance of the COTS software.*		Please clarify with documentary evidence regarding renewal of licenses in last three years, in 1. Worcestershire County Council, UK and 2. Gloucestershire County Council, UK.

2. Please provide your clarifications, duly signed by the Authorised Signatory of the bidder, on or before **04 February 2013, 1100 hrs**, failing which; your bid would be evaluated in accordance with the details already submitted to us.

3. It shall also be noted that the clarification sought is part of the evaluation process. Merely by providing the clarification, it shall not be deemed that all the requirements of bidding conditions are met. Your bid would be evaluated based on the documents submitted earlier; along with the clarifications provided by you within the stipulated time.

4. Attention is also drawn to the Clause No. 29.1of the bid document in this regard, which provides that, Any clarification submitted by a Bidder in respect to its Bid and that is not in response to a request by the Purchaser shall not be considered.

Yours sincerely,

Chief Engineer
World Bank Projects, Odisha

Memo No. 2902 Dt. 24.01.13

Copy to Mr. Pradeep Kumar, Associate Director [Authorised Signatory], LEA Associates South Asia Pvt. Ltd. (LASA), India, Project Office, Plot:N-1/187, IRC Village, Nayapalli, Bhubaneswar, Odisha-751015, Email: lasabbsr@lasaindia.com; pkumar@lasaindia.com for information and necessary action.

Chief Engineer
World Bank Projects, Odisha

BENTLEY SYSTEMS INDIA PRIVATE LIMITED New Delhi Office

Chief Engineer,
World Bank Projects, Odisha

Date: *31st January 2013*
ICB No.: ***PMU-WB- 35/2012/AMS-COTS***
Invitation for Bid No.: ***PMU-WB- 35/2012/AMS-COTS***

To:

Chief Engineer, World Bank Projects,
Odisha Nirman Soudha, Keshari Nagar, Unit – V
Bhubaneswar – 751 001 INDIA

Reference: Letter No. PMU – WB – 35 / 2012-2901 Dated 24th January, 2013

Sub: Procurement of Commercial Off-the-Shelf (COTS) software for Odisha Road Asset Management System (O-RAMS)

Dear Sirs,

Thank you for your letter requesting clarifications on our O-RAMS bid. Please find enclosed our detailed response. Should you have any questions please feel free to get back to us

Signed:

In the capacity of: Industry Sales Director

Name: Mohd Azad

Duly authorized to sign the bid for and on behalf of **Bentley Systems India Private Limited**

Dated on 31st January 2013

Encl: Letters from

1. **Gloucestershire County Council, UK.**
2. **Oregon Department of Transportation, USA,**
3. **Worcestershire County Council, UK**
4. **Documentary Evidence of Exor Licenses of "Transport for London, UK"**

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+91 11 49021100, Fax: +91 11 49021199

BENTLEY SYSTEMS INDIA PRIVATE LIMITED New Delhi Office

Chief Engineer,
World Bank Projects, Odisha

Sl No	Tech Req	Description	Clarification Required and Response
1	2	GIS – Integration of external GIS (being developed separately using ESRI technology)with road database in COTS software	Ability of the software to perform these functions may be clarified with description and relevant screen shots from the software. Refer to clause 1.4.6, Section IV, page 68 of the bid document and Corrigendum No. 2, Sl. No. 5 for the requirement. **Bentley Clarification** Bentley notes that the original wording in clause 1.4.6 was amended and simplified by the Corrigendum following comments raised at the Bidders' meeting. Our response is based on the amended wording for section 1.4.6: "The Client is in the process of establishing a Geographic Information System (GIS) using ESRI tools, including ArcMap client software and ArcGIS Server. The COTS software should have capability to provide attribute data of roads in a user-configurable interface to external GIS." Please note that in our original response we provided information in the main body of the response document (page 46) as well as in Technical Requirement No. 3 (page 84). This includes screen shots of ESRI's ArcGIS software well integrated into Exor's Spatial Manager module Here is one screenshot depicting integrated EXOR tools within ArcGIS for ready reference

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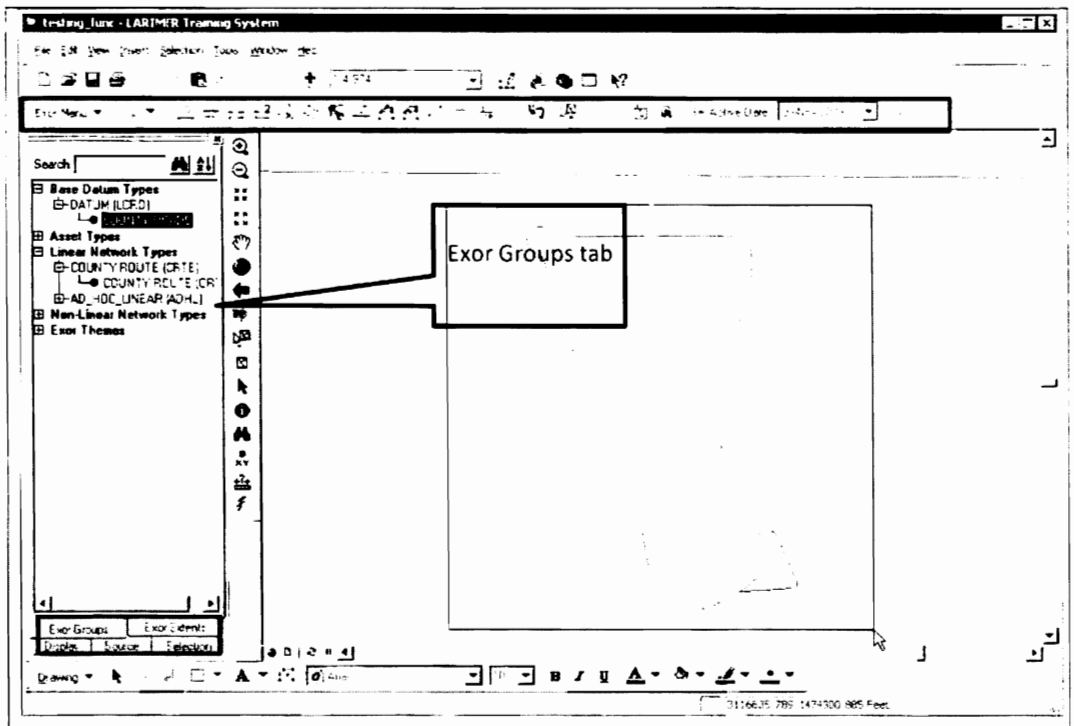
BENTLEY SYSTEMS INDIA PRIVATE LIMITED New Delhi Office

Chief Engineer,
World Bank Projects, Odisha



	5.	**Pavement Management System**	
2	2	Ability to interface to prioritisation tools like HDM-4 or equivalent	Ability of the software to perform these functions may be clarified with description, cases of installation (indicate if they are provided to agencies furnished in post-qualification criteria) and relevant screens shots from the software. **Bentley Clarification** Bentley is proposing the use of its PMS integrated with HDM-4 to provide the functionality, including prediction modelling, indicated in Serial numbers 2 – 7. Our response includes supply of one license of HDM-4 to Odisha Works Department In addition to the above Bentley is planning to deliver enhanced deterioration modelling functionality within our PMS during 2013. This enhancement will be delivered to OWD without additional charge.
3	6	Ability to interface with HDM-4 (compilation and exporting data to HDM-4 latest version and format for data analysis)	
4	7	Ability to interface with HDM-4 outputs (import HDM4 Outputs and display results in graphical formats)	
5	8	Own planning analysis engine (pavement deterioration modelling, prediction, Optimization, scenario under different budgets for multi-year programme)	
6	9	Ability to incorporate alternative methodology to perform similar functions of PMS	
7	11	Ability to select multiple network, sub-network for analysis based on	

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BENTLEY SYSTEMS INDIA PRIVATE LIMITED New Delhi Office

Chief Engineer,
World Bank Projects, Odisha

		attributes	
8	8	**Application, Database and Technology**	
	3	Database technology used and ability to integrate other internal and external applications1 database (specify supported databases)	It is understood the software works on Oracle RDBMS to support in-built GIS. Please clarify if the software can provide all the required functionalities as mentioned in section IV without spatial extension version of full use RDBMS. **Bentley Clarification** Oracle Spatial is an integral part of the way the Exor software functions. It is the repository for all spatial data which can then be served to users via Oracle Locator (which is embedded within the application) as well as via Spatial Manager which uses ESRI at the desktop. Data manipulated via ESRI is also stored in Oracle Spatial. It is not possible to provide the required functionality without Oracle Spatial. Please note that we're offering a substantially discounted full use Oracle license as part of our response.

Technical Requirements		
Sl No	**Reference to Bid Document**	**Clarification Required**
9	Bid Document: Clause 2.5.2.2, page 76. Section IV: Schedule of Requirements Technical Requirements "The COTS supplier shall prepare and provide all operational and training material for delivery of the program; all such material will be the property of the client.	The bidder has mentioned that the training materials remain the property of Bentley Systems. Please clarify. **Bentley Clarification** Bentley Systems retains the Intellectual Property Rights in the information within the training materials. The client however will own the physical copy (copies) of the materials, which can be reused for internal training purpose within OWD.
10	Bid Document: Clause 2.6.1. page 77 Section IV. Schedule of Requirements "The COTS software supplier shall	The bidder has mentioned that only digital copies will be the main means of delivering the documentation. Please clarify whether hard copies will be provided.

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	provide hard and soft copies of all Manuals, technical guides etc...	**Bentley Clarification** Bentley Systems provides one hard copy of the documentation. The user may copy the documentation for use within their own organisation

Post Qualification Requirements		
Sl No	**Reference to Bid Document**	**Clarification Required**
11	Section 111. Sl. No. 4. Post qualification Requirements (ITB 38.2) (b) Experience and Technical Capacity; (i) In last 10 years COTS Software (with RIS, PMS and BIS) must have been supplied to and implemented in at least five road agencies	Please clarify with documentary evidence regarding name of licenses (which can be considered equivalent or similar to envisaged RIS/PMS/BIS), used in 1. Oregon Department of Transportation, USA, 2. Transport for London, UK, and 3. Gloucestershire County Council, UK RIS Equivalent Modules of Exor : Exor Network Manager, Exor Asset Manager, Exor Spatial Manager PMS Equivalent Modules of Exor : PMS/UKPMS, Exor Schemes Manager BIS Equivalent Modules of Exor : Exor Structures Manager **Bentley Clarification** Please see the letters of confirmation we've provided which list the licenses in use for each of these users as well as confirming they have been renewing their maintenance agreements year on year.
12	Section 111. Sl. No. 4. Post qualification Requirements (ITB 38.2) (b) Experience and Technical Capacity; (ii) Amongst road agencies, at least 3 must be using the COTS software satisfactorily at least for last 3 years; Amongst road agencies, at least three must have renewed AMC for at least 3 years after implementation and acceptance of the COTS software.	Please clarify with documentary evidence regarding renewal of licenses in last three years in 1. Worcestershire County Council. UK and 2. Gloucestershire County Council, UK. **Bentley Clarification** Please see the letters of confirmation we've provided from Worcestershire and Gloucestershire CC which state how long they have been using the licenses along with maintenance which has been renewed year on year.

India HQ: Bentley Systems India Pvt. Ltd 203, Okhla Industrial Estate Phase III, New Delhi – 110020
Tel: +91 11 49021100, Fax: +91 11 49021199

BENTLEY SYSTEMS INDIA PRIVATE LIMITED New Delhi Office

Chief Engineer,
World Bank Projects, Odisha

Gloucestershire
COUNTY COUNCIL

Gloucestershire County Council
Shire Hall
Gloucester
GL1 2TH

Fax: (01452) 425674

email: steve.hawkins@gloucestershire.gov.uk

Please ask for: Steve Hawkins — Phone: (01452) 426158

Our Ref. — Your Ref — Date: 22nd January, 2012

Dear Sirs,

This is to certify that we, Gloucestershire County Council, initially established our Road Management System (RMS) by configuring the "EXOR" Asset Management software supplied by Bentley Systems in the year 1990.

Since the initial implementation the system has grown so that to-day the following EXOR sub-systems are included in our solution:-

- Road Information System (EXOR Network, Asset Manager, Spatial Manager)
- Bridge Information System (EXOR Structures Manager)
- EXOR Maintenance Manager
- EXOR Street Works Manager
- EXOR Public Enquiry Manager
- EXOR Public Rights of Way Manager
- EXOR Street Lighting Manager
- EXOR Mapcapture

EXOR was purchased with maintenance support which is currently used at our Head office and district offices for managing nearly 5,300kms of roads and 950 no. of bridges .

Yours faithfully,

Steve Hawkins

Steve Hawkins
Application Support & PSMA Principal Contact

Data Protection and Data Use

www.gloucestershire.gov.uk

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Chief Engineer,
World Bank Projects, Odisha

Oregon

Department of Transportation

22nd January, 2013

This is to confirm that the Oregon Department of Transportation (ODOT) established our state highway Road Management System (RMS), known as TransInfo, by configuring the "EXOR" Asset Management software supplied by Bentley Systems in the year 2011.

The following EXOR sub-systems are included in our solution:

- Road Information System (EXOR Network, Asset Manager, Spatial Manager

- EXOR Schemes Manager

Our purchase of EXOR included maintenance support. The system is currently in use at our ODOT offices and contains data for about 8,030 miles of state highway.

Heather King, Manager
Road Inventory & Classification Services Unit
Transportation Data Services
Transportation Development Division
555 13th Street NE
Salem OR 97301
503 986 4157
Heather.L.KING@odot.state.or.us

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Bentley Systems India Pvt. Ltd.

Chief Engineer,
World Bank Projects, Odisha

worcestershire

Er.Nalini Kanta Pradhan
Chief Engineer
World Bank Projects
Nirman Soudha, Keshari Nagar
Unit V
Bhubaneswar
INDIA

23 January 2013

Our ref: GN/JAO
Ask for: Graham Nicholls

Dear Sirs

This is to certify that, we Worcestershire County Council, initially established our Road Management System (RMS) by configuring the "EXOR" Asset Management software, now supplied by Bentley Systems, in the year 1998.

Since the initial implementation, the system has grown so that today the following EXOR sub-systems are included in our solution;-

- Road Information System (EXOR Network, Asset Manager, Spatial Manager)
- Exor UKPMS
- EXOR Schemes Manager
- EXOR Maintenance Manager
- EXOR Street Works Manager
- EXOR Public Enquiry Manager
- EXOR Information Manager
- EXOR Mapcapture
- EXOR Financial Interface Manager
- EXOR Contractor Interface Manager

EXOR was purchased with maintenance support which is currently used at our Head Office and area offices for managing over 4000 kms of roads and 871 number of bridges

Yours faithfully

GS Nicholls

GS Nicholls

Graham Nicholls BSc
CEng MICE
Highways Systems
and Finance Manager

County Hall
Spetchley Road
Worcester
WR5 2NP

Tel 01905 761185 • Fax 01905 761161 • DX 28941 Worcester 2
gnicholls@worcestershire.gov.uk • www.worcestershire.gov.uk

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EXOR LICENCE ORDER FORM (UK) | **Transport for London - AIMS**

This Licence is subject to the terms of Master Software Licence Agreement number : 02079

Licence Number:	**02079-12**
Commencement Date:	
NSO:	**07-191**
Client purchase order:	**3100133930**
Date raised:	**29-Dec-06**

Technical Contact:
Contact name:
Organisation:
Address:
Telephone:

Invoice To:
Contact name:
Organisation: Surface Transport Corp
Accounts Payable
Address: 24th Floor, Empress State Building
PO Box 50825,, 55 Lillie Road
London SW6 1YS
Telephone: 0845 303 5120

Deliver To:
Contact name:
Organisation: TfL Street Management
42-50 Windsor House
Address: Victoria Street
London
SW1H 0TL
Telephone:

Information Manager All User Licence		2	Annual		£25,000.00
Contractor Interface Manager (CIM)			Annual		£5,000.00
				£0.00	£32,000.00

1 Existing support and maintenance fees continue
2 This licence supplements licence number 02079-08

Third party technology is supplied under the terms of this licence to the extent indicated overleaf
Unless stated otherwise licence and first year annual fees will be invoiced on order
Unless stated otherwise Annual Support & Maintenance fees for pre-existing licences are not affected by this transaction
A summary of the overall licence position following this transaction is provided overleaf

Signature:
Name: STEPHEN RIDDLE SMITH
MANAGING DIRECTOR
Title:
Date: 21/12/07

Signature: N. Atkinson
Name: N. ATKINSON
Title: Chief Asset Manager
Date: 14.2.07

This order is placed subject to the terms and conditions herein and of the Master Software Licence Agreement as detailed above
The terms of Client's Purchase Order (if any) shall be superseded by the terms and conditions of this licence Order Form
All fees are in pounds sterling. All fees are exclusive of Value added tax.

BENTLEY SYSTEMS INDIA PRIVATE LIMITED New Delhi Office

Clifton Heights, Clifton, Bristol BS8 1EJ Tel: 0117 9006200 sales@exor.co.uk

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Chief Engineer,
World Bank Projects, Odisha

SUMMARY OF CURRENT LICENCES Transport for London - AIMS UPE - PROD

System Identifier: [illegible]

Database server:
Application server: Windows

[illegible]	[illegible]	[illegible]	[illegible]
Spatial Manager [illegible]			
- NSG Manager [illegible]			
GIS technology [illegible]			
Spatial Data Manager [illegible]	[illegible]		
- GIS technology licence for SDM			
Accidents / Safety Manager			
Document Manager		Yes	
Information Manager Administrator			
Information Manager (individual user licences)			
Maintenance Manager		Yes	
Pavement Manager / UKPMS		Yes	
Public Enquiry Manager (individual user licences)		Yes	
Street Lighting Manager		Yes	
Street Works Manager		Yes	
Structural Projects Manager		Yes	
Structures Manager		Yes	
Application Bundle	[illegible]		

(Where Information Manager is licensed on All User / [illegible] basis user licences are defined below under 'Infrastructure [illegible]')

(Where Public Enquiry Manager is licenced on departments or corporate basis user licences are defined below under 'Infrastructure Products')

Field Applications	[illegible]	
Data Capture		
Map Capture		
Exor Mobile (single application)		(the number of devices client is licenced to load with a single Exor Mobile application for which client has deployment rights)
Exor Mobile (multi application)		(the number of devices client is licenced to load with multiple Exor Mobile applications for which client has deployment rights)

Interface products and utilities	[illegible]
Contractor Interface Manager	Yes
Financial Interface Manager	
Traffic Interface Manager	
API - PEM	
API - SWM Noticing	
API - other/s (specify which)	
Perl scripts for SWM	
NSG Maint for SWM	
Empress Extract Script	

specify:

[illegible]	[illegible]	[illegible]	[illegible]
Asset Services (includes Database services)			[illegible]
Location Services			
Spatial Services			No
Web Services			No
Map Services			No
Information Manager - All User Licence			
Number of Named Users licenced:			
[illegible]	[illegible]	[illegible]	[illegible]
Database Server			
Asset Services (includes Database services)	Yes	Professional	No
Location Services	Yes	Professional	
Spatial Services	Yes		No
Information Manager - All User Licence	Yes		
PEM Single Directorate			
PEM Enterprise			
Number of CPUs licenced:	2		
Application Server			
Web Services	Yes		No
Map Services	Yes		No
Number of CPUs licenced:	2		

Oracle licences: Where Oracle technology licences are included the following Oracle technology is licenced on a run-time basis for use solely with Exor products: Asset Services Standard Edition - Oracle Database Standard Edition (NOT suitable for Atlas); Asset Services Professional or Enterprise Edition - parts of Oracle Database Enterprise Edition excluding DataGuard; Spatial Services - Oracle Database Enterprise Edition Spatial Option; Web Services - parts of Oracle iAS Enterprise Edition; Map Services - parts of Oracle iAS Enterprise Edition; Information Manager Administrator - Oracle Discoverer Administrator component of Oracle DS

Where client supplies Oracle client accepts that Exor products may in future require different Oracle products

Edition is 'Standard' unless indicated otherwise

A blank entry shall be interpreted as 'No' or 'zero' as appropriate

Notes.

1 [illegible] has right to use Contractor Interface Manager and Information Manager with the following environments: [illegible] at no extra charge

Basis of Licencing

A Named User is defined as an individual person authorised to use any part of the product or access any part of the database whether directly or indirectly and regardless of whether the individual is actively using the product or database at a given time

Non human operated devices count as a Named User if such device can access the database

A CPU licence has no user number restrictions and permits public access to the database

- **All machines with the software installed must be licenced. A multi processor machine must be licenced for all processors. Multi core chips count as one processor per core.**

Where third-party technology (eg GIS, Oracle) is included it is licenced on a restricted use basis for use with Exor products only.

Where client supplies third party technology client accepts that Exor products may in future require different third party products from those currently utilised

S&M and Annual Licences are automatically renewed each year unless cancelled in writing at least 45 days prior to renewal date

Term licences terminate at the end of the specified term

Version: Feb 03 2007

Clifton Heights, Clifton, Bristol BS8 1EJ Tel: 0117 9006280 sales@exor.co.uk

BENTLEY SYSTEMS INDIA PRIVATE LIMITED New Delhi Office

3. List of Oracle Database Modules & Middleware

Pankaj

Chief Engineer,
World Bank Projects, Odisha

Bentley®
Sustaining Infrastructure

IFB Number: PMU-WB-35/2012/AMS-COTS
Date: May 24th 2013

To
Chief Engineer, World Bank Projects, Odisha
Office of Engineer-In-Chief (Civil),
Nirman Soudha, Keshari Nagar, Unit – V,
Bhubaneswar – 751 001
Tel: +91 674 239 6783 / Fax: +91 674 239 0080
Email: pmuosrp@gmail.com

Reference:

1) ICB No: PMU-WB- 35/2012/AMS-COTS and corrigendum no. 2 to bidding document.
2) Your Notification of Award letter no. PMU-WB-35/2012/-18821 dated May 7th 2013.
3) Our letter IFB Number: PMU-WB-35/2012/AMS-COTS dated May 14th 2013.
4) Email communication dated 28th March 2013 with Implementation Consultant and Project Management Unit of OSRP.

Subject: our letter IFB Number: PMU-WB-35/2012/AMS-COTS dated May 14th 2013

Sir,

At the outset we would like to thank you for giving us an opportunity to work with your esteemed organization. We will soon be submitting pre requisite performance security for signing of formal contract agreement with you.

With reference to above and discussion held with your office we would like to clarify the objective of sending letter IFB Number: PMU-WB-35/2012/AMS-COTS dated May 14th 2013.

Background:

As part of the fulfillment of contract we are required to supply COTS software (RIS, BIS & PMS- having unlimited named users with 5 concurrent users at any time out of which 2 users can access analytical functions) and full use RDBMS server license along with underlying technology for a quad core processor server configuration. In our bid response we have considered Oracle full use RDBMS server license and underlying technology needed for running Bentley's EXOR software (COTS). Additionally, Bentley Systems clarified Oracle Full use RDBMS license version and underlying technology modules needed for running EXOR software along with quantity in replying Email communication dated March 28th 2013 to Implementation Consultants and Project Management Unit (PMU) of OSRP. Based on our assessment and our bid we have considered different modules of Bentley's Exor software (COTS) and Oracle technology according to annexure 1. Please note that software modules mentioned in annexure 1 are as per our bid response and there will not be any additional financial implication to Odisha Works Department against supply of the same.

In order to meet strict delivery schedule including supply of Oracle full use RDBMS software, we are working with Original equipment manufacturer (OEM) i.e. Oracle in advance before our formal contract signing. To achieve this, we requested you to confirm the list of Oracle software and modules being procured through Bentley for this procurement which is industry standard practice of OEM's. This will

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New Delhi Office

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india.sales@bentley.com www.bentley.com

Chief Engineer,
World Bank Projects, Odisha

get documented and ensure that the end user (Odisha Works Department) ultimately gets what was ordered and there is no mismatch between requirement and supply and additionally what database modules are licensed with OWD.

Also we wish to confirm that items description mentioned in attachment of our previous letter IFB Number: PMU-WB-35/2012/AMS-COTS dated May 14th 2013 was consolidated to 9 items instead of 27 items which is actually same as per information shared with your office vide email dated March 28th 2013 regarding Oracle modules included in Bentley's bid for full use RDBMS license and underlying technology. Please refer annexure 2 for the same.

Additionally, Email ID confirmation is required by Oracle, to access various Oracle services and interact with Oracle support teams. As part of Oracle process, a link will be sent to the end customer (Odisha Works Department) official email ID from Oracle to accept Oracle Master Agreement (OMA) which is the standard agreement used to license Oracle software and support services. This link will also include end customer address details where the license delivery is required. This email ID will be registered in the Oracle metalink where later on end customer can login and avail Oracle support (including software patches and updates). Since Oracle will be providing online support to end customer directly, Oracle requires the online confirmation of end customer address through the link. Once end customer receives the link they need to click the link, verify OMA with the address by clicking the accept button for confirmation.

We believe that above points clarify about requirements of additional information requested from you. However we'll submit a request for necessary documents required for fulfilling contractual obligations of OEMs as and when required and at this stage you can ignore our letter IFB Number: PMU-WB-35/2012/AMS-COTS dated May 14th 2013.

Thank you for your understanding and we look forward for your kind cooperation during executions of this contract.

Should you require any further information in this regard, please feel free to contact us.

Sincerely,
For Bentley Systems India Pvt. Ltd.,

Pankaj Mittal (Mob: +91-9911102483)
Business Development Manager

BENTLEY SYSTEMS INDIA PRIVATE LIMITED New Delhi Office

Chief Engineer,
World Bank Projects, Odisha

Annexure 1

1. **Bentley's Exor Modules:**

S. No	License type	Description	Quantity
1	Server	Exor Server	1
2		Exor Network Manager	1
3		Exor Asset Manager	1
4		Exor Spatial Manager	1
5		Exor Schemes Manager	1
6		Exor Structures Manager	1
7		Exor Traffic Interface Manager	1
8		Exor UKPMS	1
9		Exor Information Manager	1
10		Exor Maintenance Manager	1
11	User	Contributor Visa	5
12		Asset wise passport	5
13	System Admin	Configurator Visa	1

2. **HDM-4:**

S. No	Description	Quantity
1	HDM-4 software license	1

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3. Oracle's Full use RDBMS Modules:

S/N	Description Of Oracle Programs	Metric	Quantity Purchased
1	Oracle Database Enterprise Edition	Processor	2
2	Spatial and Graph	Processor	2
3	Advanced Security	Processor	2
4	Diagnostics Pack	Processor	2
5	Tuning Pack	Processor	2
6	Database Lifecycle Management Pack	Processor	2
7	Weblogic Suite	Processor	2
8	Weblogic Server Management Pack Enterprise Edition	Processor	2
9	Management Pack Plus for Identity Management	Employee User	160

BENTLEY SYSTEMS INDIA PRIVATE LIMITED New Delhi Office

Pankaj

Pankaj

Chief Engineer,
World Bank Projects, Odisha

Annexure 2

Product Name	Description	Qty	Equivalent Oracle module description as per letter dated May 14th 2013
Oracle DB 11g Ent Edn - CPU	License	2	Oracle Database Enterprise Edition
Oracle DB 11g Ent Edn - CPU	SW Update	2	
Oracle DB 11g Ent Edn - CPU	Pdt Support	2	
Oracle Spatial-CPU	License	2	Spatial and Graph
Oracle Spatial-CPU	SW Update	2	
Oracle Spatial-CPU	Pdt Support	2	
Database Lifecycle Mgmt. Pack-CPU	License	2	Database Lifecycle Management Pack
Database Lifecycle Mgmt. Pack-CPU	SW Update	2	
Database Lifecycle Mgmt. Pack-CPU	Pdt Support	2	
Oracle Advanced Security Option-CPU	License	2	Advanced Security
Oracle Advanced Security Option-CPU	SW Update	2	
Oracle Advanced Security Option-CPU	Pdt Support	2	
Diagnotics Pack - CPU	License	2	Diagnostics Pack
Diagnotics Pack - CPU	SW Update	2	
Diagnotics Pack - CPU	Pdt Support	2	

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Tuning Pack - CPU	License	2	Tuning Pack
Tuning Pack - CPU	SW Update	2	
Tuning Pack - CPU	Pdt Support	2	
Weblogic Suite-CPU	License	2	Weblogic Suite
Weblogic Suite-CPU	SW Update	2	
Weblogic Suite-CPU	Pdt Support	2	
WebLogic Svr. Mgmt. Pack Ent. Edition-CPU	License	2	Weblogic Server Management Pack Enterprise Edition
WebLogic Svr. Mgmt. Pack Ent. Edition-CPU	SW Update	2	
WebLogic Svr. Mgmt. Pack Ent. Edition-CPU	Pdt Support	2	
Identity and Access Management Suite Plus-Employee User-NUP	License	160	Management Pack Plus for Identity Management
Identity and Access Management Suite Plus-Employee User-NUP	SW Update	160	
Identity and Access Management Suite Plus-Employee User-NUP	Pdt Support	160	

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Bentley Systems India Pvt. Ltd.

Chief Engineer,
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